



Optical Semiconductor Devices

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- 

Visible Laser Diodes

| | Maximum Ratings (Tc = 25°C) | | Electrical/Optical Characteristics (Tc = 25°C) | | | | | | | Remarks |
|----------------------|-----------------------------|------------------|--|-------------------|------------------------|-----------------|---------------|-----------------|----------------|-------------------------------|
| | Optical output power | Case temperature | Threshold current | Operation current | Peak lasing wavelength | Beam divergence | | Monitor current | Test condition | |
| | | | | | | Pararell | Perpendicular | | | |
| Symbol Unit | Po (mW) | Tc (°C) | Ith (mA) | Iop (mA) | λp (nm) | θ // (°) | θ ⊥ (°) | Im (mA) | Po (mW) | |
| Part Number (Note 1) | — | — | Typ. | Typ. | Typ. | Typ. | Typ. | Typ. | — | |
| TOLD9462MD | 7 | -10 to 70 | 23 | 30 | 650 | 8 | 28 | 0.18 | 5 | for DVD |
| TOLD2000MDA/SDA | 7 | -10 to 70 | 25 | 35 | 650 | 9 | 28 | 0.15 | 5 | Dual-wavelength laser for DVD |
| | 7 | | 20 | 35 | 790 | 10 | 32 | 0.35 | 5 | |
| TOLD2000FDA | 7 | -10 to 70 | 25 | 35 | 650 | 9 | 28 | 0.05 | 5 | Dual-wavelength laser for DVD |
| | 7 | | 20 | 35 | 790 | 10 | 32 | 0.10 | 5 | |
| TOLD2003SDA | 7 | -30 to 85 | 40 | 50 | 655 | 9 | 28 | 0.15 | 5 | for DVD-Navigation |
| | 7 | | 35 | 55 | 790 | 10 | 32 | 0.35 | 5 | |
| TOLD9456ME/TE | 100 (pulse: 200) | -10 to 75 | 50 | 130 | 658 | 9.5 | 17.5 | — (Note 2) | 80 | for Rewritable-DVD |
| ** TOLD9457ME | 100 (pulse: 250) | -10 to 75 | 50 | 130 | 658 | 9.5 | 17.5 | — (Note 2) | 80 | for Rewritable-DVD |

Note 1: MD, MDA and ME: φ5.6-mm metal can package, SDA: D-cut metal can package, TE: I-cut metal can package, FDA: Lead frame package

** : Under development

Note 2: The TOLD9456ME/TE, TOLD9457ME do not incorporate monitor photodiodes.

For applications other than optical disk systems, please contact your nearest Toshiba sales office.

Visible LEDs

Dual-Color LED Lamps

| Color of Emitted Light | Intensity Iv (mcd) @IF = 20 mA | | Viewing Angle 2θ1/2 | Part Number | Typical Emitting Wavelength | | Lens Type | Maximum DC Forward Current Rating IF (mA) @Ta = 25°C | Typical Applications |
|------------------------|-----------------------------------|----------|------------------------|---------------|-----------------------------|----------|------------------------|---|----------------------|
| | Min | Typ. | | | λ,d (nm) | λ,p (nm) | | | |
| Red/Green | 476/272 | 1100/500 | 30°/30° | TLRMHGH48T(F) | 626/571 | 636/574 | Transparent | 50 (total) | Message boards |
| | 272/153 | 450/220 | 40°/40° | TLRMHGH48M(F) | 626/571 | 636/574 | Milky white, diffusing | 50 (total) | |

High-Brightness LED Lamps (φ5)

| Color of Emitted Light | Intensity Iv (mcd) @IF = 20 mA | | Viewing Angle 2θ1/2 | Part Number | | Typical Emitting Wavelength | | Lens Type | Maximum DC Forward Current Rating IF (mA) @Ta = 25°C | Typical Applications |
|---------------------------|-----------------------------------|--------------|---------------------------|-------------------|---------------------|--------------------------------|------------------------|---------------------|--|-------------------------------|
| | Min | Typ. | | No rank specified | Two ranks specified | λ.d (nm) | λ.p (nm) | | | |
| | Red | 1530 | | 4500 | 6° | TLSU180P(F) | TLSU180P(TU,F) | | | |
| 4760 | | 11000 | 7° | TLSH20TP(F) | | 613 | 623 | Transparent | 50 | |
| 2720 | | 9000 | | TLRMH20TP(F) | | 626 | 636 | Transparent | 50 | |
| 2720 | | 9000 | | TLSE20TP(F) | | 613 | 623 | Transparent | 50 | |
| 4760 | | 12000 | | TLRME20CP(F) | | 626 | 636 | Red, transparent | 50 | |
| 2720 | | 8000 | | TLRME20TP(F) | | 626 | 636 | Transparent | 50 | |
| 2720 | | 7000 | | TLRE20TP(F) | | 630 | 644 | Transparent | 50 | |
| 2720 | | 10000 | 8° | TLSH180P(F) | TLSH180P(VW,F) | 613 | 623 | Transparent | 50 | |
| 1530 | | 8000 | | TLSE180P(F) | | 613 | 623 | Transparent | 50 | |
| 1530 | | 5000 | | TLRH180P(F) | TLRH180P(UV,F) | 630 | 644 | Transparent | 50 | |
| 850 | | 3000 | | TLRE180AP(F) | TLRE180AP(TU,F) | 630 | 644 | Transparent | 50 | |
| 2720 | | 6500 | 12° | TLSH38TP(F) | | 613 | 623 | Transparent | 50 | |
| 1530 | | 4800 | | TLRMH38TP(F) | | 626 | 636 | Transparent | 50 | |
| 1530 | | 4200 | 15° | TLRMH151P(F) | | 626 | 636 | Transparent | 50 | |
| 1530 | | 4500 | | TLSH17TP(F) | | 613 | 623 | Transparent | 50 | |
| 850 | | 3200 | 20° | TLRMH17TP(F) | | 626 | 636 | Transparent | 50 | |
| 850 | | 3000 | | TLSE17TP(F) | | 613 | 623 | Transparent | 50 | |
| 850 | | 2400 | | TLRME17TP(F) | | 626 | 636 | Transparent | 50 | |
| 476 | | 1500 | | TLRE17TP(F) | | 630 | 644 | Transparent | 50 | |
| 272 | | 900 | | TLSU156P(F) | TLSU156P(QR,F) | 623 | 636 | Transparent | 30 | |
| 85 | | 270 | | TLRE138P(F) | | 630 | 644 | Red, diffusing | 50 | |
| 850 | | 2700 | 22° | TLSH157P(F) | TLSH157P(ST,F) | 613 | 623 | Transparent | 50 | |
| 850 | | 2240 | | TLRMH157P(F) | | 626 | 636 | Transparent | 50 | |
| 476 | | 1900 | | TLSE157P(F) | TLSE157P(ST,F) | 613 | 623 | Transparent | 50 | |
| 476 | | 1700 | | TLRH157P(F) | TLRH157P(ST,F) | 630 | 644 | Transparent | 50 | |
| 272 | | 1000 | 25° | TLRE157AP(F) | TLRE157AP(RS,F) | 630 | 644 | Transparent | 50 | |
| 850 | | 1900 | | TLSH16TP(F) | | 613 | 623 | Transparent | 50 | |
| 476 | | 1500 | | TLRMH16TP(F) | | 626 | 636 | Transparent | 50 | |
| 476 | | 1500 | | TLSE16TP(F) | | 613 | 623 | Transparent | 50 | |
| 476 | | 1000 | | TLSE16CP(F) | | 613 | 623 | Red, transparent | 50 | |
| 476 | | 900 | | TLRMH156P(F) | | 626 | 636 | Transparent | 50 | |
| 272 | | 1200 | | TLRME16TP(F) | | 626 | 636 | Transparent | 50 | |
| 272 | | 800 | | TLRE16TP(F) | | 630 | 644 | Transparent | 50 | |
| 272 | | 800 | | TLRME16CP(F) | | 626 | 636 | Red, transparent | 50 | |
| 153 | | 600 | | TLRE16CP(F) | | 630 | 644 | Red, transparent | 50 | |
| 153 | | 500 | TLRME17DP(F) | | 626 | 636 | Red, diffusing | 50 | | |
| 476 | | 1400 | 30° | TLSH156P(F) | TLSH156P(RS,F) | 613 | 623 | Transparent | 50 | |
| 272 | | 900 | | TLSE156P(F) | TLSE156P(RS,F) | 613 | 623 | Transparent | 50 | |
| 272 | | 800 | | TLRH156P(F) | TLRH156P(QR,F) | 630 | 644 | Transparent | 50 | |
| 153 | | 550 | | TLSU113P(F) | | 623 | 636 | Red, transparent | 30 | |
| 153 | 450 | TLRE156AP(F) | | TLRE156AP(PQ,F) | 630 | 644 | Transparent | 50 | | |
| 272 | 650 | TLRMH265P(F) | | | 626 | 636 | Milky-white, diffusing | 50 | | |
| 47.6 | 250 | 40° | TLSU114P(F) | TLSU114P(NP,F) | 623 | 636 | Red, diffusing | 30 | | |
| 47.6 | 150 | 75° | TLRE25TP(F) | | 630 | 644 | Transparent | 50 | | |
| 27.2 | 80 | 90° | TLRE263AP(F) | TLRE263AP(MN,F) | 630 | 644 | Transparent | 50 | | |
| 8.5 | 20 | 130° | TLRE11TP(F) | | 630 | 644 | Transparent | 50 | | |
| 8.5 | 15 | 150° | TLRE261AP(F) | | 630 | 644 | Transparent | 50 | | |
| Orange | 2720 | 7000 | 6° | TLOU180P(F) | TLOU180P(UV,F) | 605 | 612 | Transparent | 30 | Pilot lamps (narrow range) |
| | 4760 | 15000 | 7° | TLOH20TP(F) | | 605 | 612 | Transparent | 50 | |
| | 4760 | 10000 | | TLOE20TP(F) | | 605 | 612 | Transparent | 50 | |
| | 2720 | 10000 | 8° | TLOH180P(F) | TLOH180P(VW,F) | 605 | 612 | Transparent | 50 | |
| | 1530 | 7000 | | TLOE180AP(F) | TLOE180AP(UV,F) | 605 | 612 | Transparent | 50 | |
| | 2720 | 7500 | 12° | TLOH38TP(F) | | 605 | 612 | Transparent | 50 | |
| | 1530 | 3500 | | TLOE17CP(F) | | 605 | 612 | Orange, transparent | 50 | |
| | 1530 | 5000 | 20° | TLOH17TP(F) | | 605 | 612 | Transparent | 50 | |
| | 1530 | 4500 | | TLOE17TP(F) | | 605 | 612 | Transparent | 50 | |
| | 476 | 900 | | TLOU156P(F) | TLOU156P(RS,F) | 605 | 612 | Transparent | 30 | |
| | 476 | 800 | | TLOU172P(F) | | 605 | 612 | Orange, transparent | 30 | |
| | 850 | 2800 | 22° | TLOH157P(F) | TLOH157P(TU,F) | 605 | 612 | Transparent | 50 | |
| | 476 | 2800 | | TLOE157AP(F) | TLOE157AP(ST,F) | 605 | 612 | Transparent | 50 | |
| | 850 | 2300 | 25° | TLOH16TP(F) | | 605 | 612 | Transparent | 50 | |
| 850 | 2000 | TLOE16TP(F) | | | 605 | 612 | Transparent | 50 | | |
| 476 | 1600 | | TLOE16CP(F) | | 605 | 612 | Orange, transparent | 50 | | |

| Color of Emitted Light | Intensity Iv (mcd) @IF = 20 mA | | Viewing Angle 201/2 | Part Number | | Typical Emitting Wavelength | | Lens Type | Maximum DC Forward Current Rating IF (mA) @Ta = 25°C | Typical Applications | |
|------------------------|-----------------------------------|-------------|------------------------|-------------------|---------------------|-----------------------------|---------------------|---------------------|---|---------------------------------|-------------------------------|
| | Min | Typ. | | No rank specified | Two ranks specified | λ.d (nm) | λ.p (nm) | | | | |
| | Orange | 476 | | 1600 | 27° | TLOV16D(F) | | | | | 605 |
| | 476 | 1500 | 30° | TLOH156P(F) | TLOH156P(ST,F) | 605 | 612 | Transparent | 50 | | |
| | 272 | 1000 | | TLOE156AP(F) | TLOE156AP(RS,F) | 605 | 612 | Transparent | 50 | | |
| | 272 | 900 | | TLOU113P(F) | TLOU113P(RS,F) | 605 | 612 | Orange, transparent | 30 | | |
| | 272 | 900 | | TLOE266(F) | TLOE266(RS,F) | 605 | 612 | Orange, transparent | 50 | | |
| | 47.6 | 250 | | TLOU114P(F) | TLOU114P(NP,F) | 605 | 612 | Orange, diffusing | 30 | | |
| | 153 | 350 | 75° | TLOE25TP (F) | | 605 | 612 | Transparent | 50 | Back lighting (wide range) | |
| | 47.6 | 260 | 90° | TLOE263AP(F) | TLOE263AP(PQ,F) | 605 | 612 | Transparent | 50 | | |
| | 27.2 | 65 | 130° | TLOE11TP (F) | | 605 | 612 | Transparent | 50 | | |
| | 15.3 | 50 | 150° | TLOE261AP(F) | TLOE261AP(LM,F) | 605 | 612 | Transparent | 50 | | |
| | 850 | 4300 | 6° | TLYU180P(F) | TLYU180P(TU,F) | 587 | 590 | Transparent | 30 | | Pilot lamps (narrow range) |
| Yellow | 4760 | 13000 | 7° | TLYH20TP(F) | | 587 | 590 | Transparent | 50 | | |
| | 2720 | 9500 | | TLYE20TP(F) | | 587 | 590 | Transparent | 50 | | |
| | 2720 | 8000 | 8° | TLYH180P(F) | TLYH180P(VW,F) | 587 | 590 | Transparent | 50 | | |
| | 1530 | 4700 | | TLYE180AP(F) | TLYE180AP(UV,F) | 587 | 590 | Transparent | 50 | | |
| | 2720 | 7000 | 12° | TLYH38TP(F) | | 587 | 590 | Transparent | 50 | | |
| | 2200 | 4500 | 15° | TLYH151P(F) | | 587 | 590 | Transparent | 50 | | |
| | 850 | 3000 | 20° | TLYE17CP(F) | | 587 | 590 | Yellow, transparent | 50 | | |
| | 1530 | 4800 | | TLYH17TP(F) | | 587 | 590 | Transparent | 50 | | |
| | 850 | 3000 | | TLYE17TP(F) | | 587 | 590 | Transparent | 50 | | |
| | 153 | 500 | | TLYU156P(F) | TLYU156P(QR,F) | 587 | 590 | Transparent | 30 | | |
| 153 | 400 | TLYU172P(F) | | | 587 | 590 | Yellow, transparent | 30 | | | |
| 850 | 2500 | 22° | TLYH157P(F) | TLYH157P(TU,F) | 587 | 590 | Transparent | 50 | | | |
| 476 | 2200 | | TLYE157AP(F) | TLYE157AP(ST,F) | 587 | 590 | Transparent | 50 | | | |
| 850 | 2200 | 25° | TLYH16TP(F) | | 587 | 590 | Transparent | 50 | | | |
| 476 | 1500 | | TLYE16TP(F) | | 587 | 590 | Transparent | 50 | | | |
| 476 | 1200 | | TLYE16CP(F) | | 587 | 590 | Yellow, transparent | 50 | | | |
| 476 | 1400 | 30° | TLYH156P(F) | TLYH156P(RS,F) | 587 | 590 | Transparent | 50 | | | |
| 272 | 700 | | TLYE156AP(F) | TLYE156AP(QR,F) | 587 | 590 | Transparent | 50 | | | |
| 153 | 500 | | TLYU113P(F) | | 587 | 590 | Yellow, transparent | 30 | | | |
| 47.6 | 130 | 40° | TLYU114P(F) | TLYU114P(MN,F) | 587 | 590 | Yellow, diffusing | 30 | Back lighting (wide range) | | |
| 85 | 300 | 75° | TLYE25TP(F) | | 587 | 590 | Transparent | 50 | | | |
| 47.6 | 170 | 90° | TLYE263AP(F) | TLYE263AP(NP,F) | 587 | 590 | Transparent | 50 | | | |
| 15.3 | 45 | 130° | TLYE11TP(F) | | 587 | 590 | Transparent | 50 | | | |
| 8.5 | 27 | 150° | TLYE261AP(F) | TLYE261AP(JK,F) | 587 | 590 | Transparent | 50 | | | |
| Pure yellow | 2720 | 8000 | 5° | TLPYE23TP(F) | | 580 | 583 | Transparent | 50 | Pilot lamps (narrow range) | |
| | 476 | 2000 | 18° | TLPYE19TP(F) | | 580 | 583 | Transparent | 50 | | |
| | 272 | 750 | 30° | TLPYE18TP(F) | | 580 | 583 | Transparent | 50 | Message boards | |
| Green | 2720 | 7000 | 5° | TLGE23TP(F) | | 571 | 574 | Transparent | 50 | Pilot lamps (narrow range) | |
| | 1530 | 4000 | | TLGU23TP(F) | | 571 | 574 | Transparent | 30 | | |
| | 1530 | 5000 | | 7° | TLGE183P(F) | | 571 | 574 | Transparent | | 50 |
| | 476 | 1300 | 18° | TLGE19TP(F) | | 571 | 574 | Transparent | 50 | | |
| | 476 | 1700 | 20° | TLGE159P(F) | TLGE159P(ST,F) | 571 | 574 | Transparent | 50 | | |
| | 476 | 1400 | | TLGE174P(F) | | 571 | 574 | Green, transparent | 50 | | |
| | 272 | 800 | 28° | TLGE158P(F) | TLGE158P(QR,F) | 571 | 574 | Transparent | 50 | Message boards Back lighting | |
| | 272 | 700 | | TLGE18TP(F) | | 571 | 574 | Transparent | 50 | | |
| | 153 | 500 | 30° | TLGE18CP(F) | | 571 | 574 | Green, transparent | 50 | | |
| | 85 | 200 | | TLGU18TP(F) | | 571 | 574 | Transparent | 30 | | |
| | 47.6 | 180 | | TLGU18CP(F) | | 571 | 574 | Green, transparent | 30 | | |
| | 47.6 | 120 | 45° | TLGU13CP(F) | | 571 | 574 | Green, transparent | 30 | | |
| | 27.2 | 70 | 55° | TLGU13DP(F) | | 571 | 574 | Green, diffusing | 30 | | |
| 27.2 | 90 | 75° | TLGE25TP(F) | | 571 | 574 | Transparent | 50 | Back lighting (wide range) | | |
| 8.5 | 20 | 130° | TLGE11TP(F) | | 571 | 574 | Transparent | 50 | | | |

High-Brightness LED Lamps ($\phi 5$) (continued)

| Color of Emitted Light | Intensity Iv (mcd) @IF = 20 mA | | Viewing Angle 201/2 | Part Number | | Typical Emitting Wavelength | | Lens Type | Maximum DC Forward Current Rating IF (mA) @Ta = 25°C | Typical Applications |
|------------------------|-----------------------------------|------|------------------------|-------------------|---------------------|-----------------------------|------------------|--------------------|---|---------------------------------|
| | Min | Typ. | | No rank specified | Two ranks specified | λ_d (nm) | λ_p (nm) | | | |
| Fresh green | 1530 | 5000 | 5° | TLFGE23TP(F) | | 565 | 568 | Transparent | 50 | Pilot lamps (narrow range) |
| | 272 | 800 | 18° | TLFGE19CP(F) | | 565 | 568 | Green, transparent | 50 | |
| | 272 | 800 | | TLFGE19TP(F) | | 565 | 568 | Transparent | 50 | |
| | 85 | 300 | 30° | TLFGE18TP(F) | | 565 | 568 | Transparent | 50 | Message boards Back lighting |
| Pure green | 850 | 3000 | 5° | TLPGE23TP(F) | | 558 | 562 | Transparent | 50 | Pilot lamps (narrow range) |
| | 476 | 1600 | | TLPGE23TP(F) | | 558 | 562 | Transparent | 30 | |
| | 476 | 2000 | 7° | TLPGE183P(F) | TLPGE183P(ST,F) | 558 | 562 | Transparent | 50 | |
| | 153 | 500 | 18° | TLPGE19TP(F) | | 558 | 562 | Transparent | 50 | |
| | 153 | 430 | 20° | TLPGE159P(F) | | 558 | 562 | Transparent | 50 | |
| | 85 | 150 | 28° | TLPGE158P(F) | | 558 | 562 | Transparent | 50 | |
| | 85 | 200 | 30° | TLPGE18TP(F) | | 558 | 562 | Transparent | 50 | Message boards Back lighting |
| | 27.2 | 90 | | TLPGE18TP(F) | | 558 | 562 | Transparent | 30 | |
| | 27.2 | 80 | | 45° | TLPGE13CP(F) | | 558 | 562 | Green, transparent | |
| | 15.3 | 35 | 55° | TLPGE13DP(F) | | 558 | 562 | Green, diffusing | 30 | |
| 2.72 | 8 | 130° | TLPGE11TP(F) | | 558 | 562 | Transparent | 50 | Back lighting (wide range) | |

High-Brightness LED Lamps (φ3)

| Color of Emitted Light | Intensity lv (mcd) @IF = 20 mA | | Viewing Angle 2θ1/2 | Part Number | | Typical Emitting Wavelength | | Lens Type | Maximum DC Forward Current Rating IF (mA) @Ta = 25°C | Typical Applications | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------------------------|---|---------------|------------------------|-------------------|---------------------|-----------------------------|----------------|------------------------|---|----------------------------|--|-----|-----|------|----|------------|--|-----|-----|-----------------------|----|-------------|-----|------|------------|--|-----|-----|-------------|----|------|------|------------|--|-----|-----|-------------|----|-----|------|-----|------------|---------------|-----|-----|-------------|----|-----|------|-------------|----------------|-----|-----|-------------|----|------|------|-------------|--|-----|-----|------------------|----|------|------|-----|------------|--|-----|-----|-------------|----|-----|------|-------------|--|-----|-----|-------------|----|-----|------|------------|--|-----|-----|-------------|----|-----|-----|-----|------------|--|-----|-----|---------------------|----|-----|-----|------------|---------------|-----|-----|-------------|----|----|-----|-----|------------|---------------|-----|-----|------------------|----|-----|-----|------------|--|-----|-----|-------------|----|----|-----|-----|------------|--|-----|-----|------------------------|----|------|-----|------------|---------------|-----|-----|----------------|----|-----|-----|-----|------------|--|-----|-----|-------------|----|-----|-----|-------------|--|-----|-----|-------------|----|-----|-----|------------|--|-----|-----|-------------|----|------|-----|-----|------------|---------------|-----|-----|-------------|----|----|-----|---------------|--|-----|-----|-------------|----|----|-----|-----|---------------|--|-----|-----|------------------|----|----|-----|------------|---------------|-----|-----|-------------|----|----|-----|------------|--|-----|-----|-------------|----|------|-----|-------------|--|-----|-----|-------------|----|------|-----|-------------|----------------|-----|-----|-------------|----|------|-----|--------------|--|-----|-----|-------------|----|------|-----|------------|--|-----|-----|-------------|----|------|-----|---------------|--|-----|-----|----------------|----|------|----|------|------------|--|-----|-----|-------------|----|-----|----|------|-------------|--|-----|-----|-------------|----|------|-----|---------|------------|--|-----|-----|-------------|----|-----------|--------|-----|------|----|------------|--|-----|-----|-------------|----|-------------|-----|------|------------|---------------|-----|-----|-------------|----|-----|------|-----|-------------|----------------|-----|-----|-------------|----|------|------|------------|--|-----|-----|---------------------|----|------|------|-----|------------|--|-----|-----|-------------|----|----|-----|-----|------------|--|-----|-----|---------------------|----|------|-----|------------|--|-----|-----|-------------------|----|-----|------|-----|------------|--|-----|-----|-------------|----|------|-----|------------|---------------|-----|-----|-------------|----|------|-----|-----|------------|--|-----|-----|---------------------|----|-----|-----|------------|---------------|-----|-----|-------------|----|-----|-----|-----|------------|--|-----|-----|-------------|----|----|-----|-------------|----------------|-----|-----|-------------|----|------|-----|------|------------|--|-----|-----|-------------|----|------|----|------|-------------|----------------|-----|-----|-------------|----|--------|-----|------|----|------------|---------------|-----|-----|-------------|----|-------------|-----|------|------------|---------------|-----|-----|-------------|----|-----|------|-----|-------------|----------------|-----|-----|-------------|----|------|------|------------|--|-----|-----|---------------------|----|------|------|-----|------------|--|-----|-----|-------------|----|----|-----|------------|---------------|-----|-----|---------------------|----|------|-----|-----|------------|---------------|-----|-----|-------------------|----|-----|-----|------------|--|-----|-----|-------------|----|------|-----|-----|------------|---------------|-----|-----|-------------|----|------|----|------------|--|-----|-----|---------------------|----|----|-----|-----|--------------|--|-----|-----|-------------|----|----|-----|--------------|--|-----|-----|---------------------|----|----|-----|------------|---------------|-----|-----|-------------|----|----|-----|------------|--|-----|-----|-------------|----|----|-----|-------------|----------------|-----|-----|-------------|----|------|-----|------|--------------|--|-----|-----|-------------------|----|------|----|------|------------|--|-----|-----|-------------|----|------|----|------|-------------|----------------|-----|-----|-------------|----|
| | Min | Typ. | | No rank specified | Two ranks specified | λ,d (nm) | λ,p (nm) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <tr> <td rowspan="27">Red</td> <td>476</td><td>4000</td><td rowspan="3">9°</td><td>TLSU163(F)</td><td></td><td>623</td><td>636</td><td>Pale red, transparent</td><td>30</td><td rowspan="27">Pilot lamps</td> </tr> <tr> <td>476</td><td>1600</td><td>TLSU160(F)</td><td></td><td>623</td><td>636</td><td>Transparent</td><td>30</td> </tr> <tr> <td>2720</td><td>4500</td><td>TLSH160(F)</td><td></td><td>613</td><td>623</td><td>Transparent</td><td>50</td> </tr> <tr> <td>850</td><td>1800</td><td rowspan="3">10°</td><td>TLRH160(F)</td><td>TLRH160(ST,F)</td><td>630</td><td>644</td><td>Transparent</td><td>50</td> </tr> <tr> <td>476</td><td>1200</td><td>TLRE160A(F)</td><td>TLRE160A(RS,F)</td><td>630</td><td>644</td><td>Transparent</td><td>50</td> </tr> <tr> <td>1530</td><td>3500</td><td>TLRME50C(F)</td><td></td><td>626</td><td>636</td><td>Red, transparent</td><td>50</td> </tr> <tr> <td>1530</td><td>3500</td><td rowspan="3">16°</td><td>TLSE50T(F)</td><td></td><td>613</td><td>623</td><td>Transparent</td><td>50</td> </tr> <tr> <td>850</td><td>2200</td><td>TLRME50T(F)</td><td></td><td>626</td><td>636</td><td>Transparent</td><td>50</td> </tr> <tr> <td>850</td><td>1800</td><td>TLRE50T(F)</td><td></td><td>630</td><td>644</td><td>Transparent</td><td>50</td> </tr> <tr> <td>153</td><td>450</td><td rowspan="2">18°</td><td>TLSU164(F)</td><td></td><td>623</td><td>636</td><td>Pale red, diffusing</td><td>30</td> </tr> <tr> <td>153</td><td>300</td><td>TLSU125(F)</td><td>TLSU125(PQ,F)</td><td>623</td><td>636</td><td>Transparent</td><td>30</td> </tr> <tr> <td>85</td><td>270</td><td rowspan="2">35°</td><td>TLSU123(F)</td><td>TLSU123(PQ,F)</td><td>623</td><td>636</td><td>Red, transparent</td><td>30</td> </tr> <tr> <td>272</td><td>800</td><td>TLSH125(F)</td><td></td><td>613</td><td>623</td><td>Transparent</td><td>50</td> </tr> <tr> <td>85</td><td>180</td><td rowspan="2">40°</td><td>TLSU126(F)</td><td></td><td>623</td><td>636</td><td>Milky-white, diffusing</td><td>30</td> </tr> <tr> <td>47.6</td><td>100</td><td>TLSU124(F)</td><td>TLSU124(MN,F)</td><td>623</td><td>636</td><td>Red, diffusing</td><td>30</td> </tr> <tr> <td>272</td><td>800</td><td rowspan="3">45°</td><td>TLSE53T(F)</td><td></td><td>613</td><td>623</td><td>Transparent</td><td>50</td> </tr> <tr> <td>272</td><td>600</td><td>TLRME53T(F)</td><td></td><td>626</td><td>636</td><td>Transparent</td><td>50</td> </tr> <tr> <td>153</td><td>400</td><td>TLRE53T(F)</td><td></td><td>630</td><td>644</td><td>Transparent</td><td>50</td> </tr> <tr> <td>47.6</td><td>170</td><td rowspan="2">60°</td><td>TLSU262(F)</td><td>TLSU262(NP,F)</td><td>623</td><td>636</td><td>Transparent</td><td>30</td> </tr> <tr> <td>85</td><td>330</td><td>TLRME68TG(F)◆</td><td></td><td>626</td><td>636</td><td>Transparent</td><td>50</td> </tr> <tr> <td>85</td><td>260</td><td rowspan="8">80°</td><td>TLRME68CG(F)◆</td><td></td><td>626</td><td>636</td><td>Red, transparent</td><td>50</td> </tr> <tr> <td>85</td><td>220</td><td>TLRH262(F)</td><td>TLRH262(NP,F)</td><td>630</td><td>644</td><td>Transparent</td><td>50</td> </tr> <tr> <td>85</td><td>200</td><td>TLSE62T(F)</td><td></td><td>613</td><td>623</td><td>Transparent</td><td>50</td> </tr> <tr> <td>47.6</td><td>180</td><td>TLRME62T(F)</td><td></td><td>626</td><td>636</td><td>Transparent</td><td>50</td> </tr> <tr> <td>47.6</td><td>150</td><td>TLRE262A(F)</td><td>TLRE262A(MN,F)</td><td>630</td><td>644</td><td>Transparent</td><td>50</td> </tr> <tr> <td>47.6</td><td>130</td><td>TLSU268G(F)◆</td><td></td><td>623</td><td>636</td><td>Transparent</td><td>30</td> </tr> <tr> <td>47.6</td><td>120</td><td>TLRE62T(F)</td><td></td><td>630</td><td>644</td><td>Transparent</td><td>50</td> </tr> <tr> <td>47.6</td><td>140</td><td>TLRME68DG(F)◆</td><td></td><td>626</td><td>636</td><td>Red, diffusing</td><td>50</td> </tr> <tr> <td>15.3</td><td>45</td><td>120°</td><td>TLRE60T(F)</td><td></td><td>630</td><td>644</td><td>Transparent</td><td>50</td> </tr> <tr> <td>8.5</td><td>25</td><td>140°</td><td>TLRE260A(F)</td><td></td><td>630</td><td>644</td><td>Transparent</td><td>50</td> </tr> <tr> <td>27.2</td><td>100</td><td>40°/20°</td><td>TLSU225(F)</td><td></td><td>623</td><td>636</td><td>Transparent</td><td>50</td><td>Side view</td> </tr> <tr> <td rowspan="15">Orange</td> <td>476</td><td>2500</td><td rowspan="2">9°</td><td>TLOU160(F)</td><td></td><td>605</td><td>612</td><td>Transparent</td><td>30</td><td rowspan="5">Pilot lamps</td> </tr> <tr> <td>850</td><td>2300</td><td>TLOH160(F)</td><td>TLOH160(TU,F)</td><td>605</td><td>612</td><td>Transparent</td><td>50</td> </tr> <tr> <td>476</td><td>1500</td><td rowspan="2">10°</td><td>TLOE160A(F)</td><td>TLOE160A(ST,F)</td><td>605</td><td>612</td><td>Transparent</td><td>50</td> </tr> <tr> <td>2720</td><td>7000</td><td>TLOE50C(F)</td><td></td><td>605</td><td>612</td><td>Orange, transparent</td><td>50</td> </tr> <tr> <td>1530</td><td>4500</td><td>16°</td><td>TLOE50T(F)</td><td></td><td>605</td><td>612</td><td>Transparent</td><td>50</td> </tr> <tr> <td>85</td><td>400</td><td rowspan="2">35°</td><td>TLOU123(F)</td><td></td><td>605</td><td>612</td><td>Orange, transparent</td><td>30</td> </tr> <tr> <td>47.6</td><td>180</td><td>TLOU124(F)</td><td></td><td>605</td><td>612</td><td>Orange, diffusing</td><td>30</td> </tr> <tr> <td>272</td><td>1000</td><td rowspan="2">45°</td><td>TLOE53T(F)</td><td></td><td>605</td><td>612</td><td>Transparent</td><td>50</td> </tr> <tr> <td>47.6</td><td>300</td><td>TLOU262(F)</td><td>TLOU262(PQ,F)</td><td>605</td><td>612</td><td>Transparent</td><td>30</td> </tr> <tr> <td>47.6</td><td>200</td><td rowspan="2">60°</td><td>TLOU267(F)</td><td></td><td>605</td><td>612</td><td>Orange, transparent</td><td>30</td> </tr> <tr> <td>153</td><td>450</td><td>TLOH262(F)</td><td>TLOH262(PQ,F)</td><td>605</td><td>612</td><td>Transparent</td><td>50</td> </tr> <tr> <td>153</td><td>350</td><td rowspan="2">80°</td><td>TLOE62T(F)</td><td></td><td>605</td><td>612</td><td>Transparent</td><td>50</td> </tr> <tr> <td>85</td><td>300</td><td>TLOE262A(F)</td><td>TLOE262A(PQ,F)</td><td>605</td><td>612</td><td>Transparent</td><td>50</td> </tr> <tr> <td>27.2</td><td>100</td><td>120°</td><td>TLOE60T(F)</td><td></td><td>605</td><td>612</td><td>Transparent</td><td>50</td> </tr> <tr> <td>15.3</td><td>70</td><td>140°</td><td>TLOE260A(F)</td><td>TLOE260A(LM,F)</td><td>605</td><td>612</td><td>Transparent</td><td>50</td> </tr> <tr> <td rowspan="18">Yellow</td> <td>476</td><td>1500</td><td rowspan="2">9°</td><td>TLYU160(F)</td><td>TLYU160(ST,F)</td><td>587</td><td>590</td><td>Transparent</td><td>30</td><td rowspan="9">Pilot lamps</td> </tr> <tr> <td>850</td><td>4300</td><td>TLYH160(F)</td><td>TLYH160(TU,F)</td><td>587</td><td>590</td><td>Transparent</td><td>50</td> </tr> <tr> <td>476</td><td>2300</td><td rowspan="2">10°</td><td>TLYE160A(F)</td><td>TLYE160A(ST,F)</td><td>587</td><td>590</td><td>Transparent</td><td>50</td> </tr> <tr> <td>1530</td><td>3500</td><td>TLYE50C(F)</td><td></td><td>587</td><td>590</td><td>Yellow, transparent</td><td>50</td> </tr> <tr> <td>1530</td><td>3500</td><td rowspan="2">16°</td><td>TLYE50T(F)</td><td></td><td>587</td><td>590</td><td>Transparent</td><td>50</td> </tr> <tr> <td>85</td><td>220</td><td>TLYU123(F)</td><td>TLYU123(NP,F)</td><td>587</td><td>590</td><td>Yellow, transparent</td><td>30</td> </tr> <tr> <td>47.6</td><td>110</td><td rowspan="2">40°</td><td>TLYU124(F)</td><td>TLYU124(MN,F)</td><td>587</td><td>590</td><td>Yellow, diffusing</td><td>30</td> </tr> <tr> <td>272</td><td>800</td><td>TLYE53T(F)</td><td></td><td>587</td><td>590</td><td>Transparent</td><td>50</td> </tr> <tr> <td>47.6</td><td>150</td><td rowspan="2">45°</td><td>TLYU262(F)</td><td>TLYU262(MN,F)</td><td>587</td><td>590</td><td>Transparent</td><td>30</td> </tr> <tr> <td>47.6</td><td>90</td><td>TLYU267(F)</td><td></td><td>587</td><td>590</td><td>Yellow, transparent</td><td>30</td> </tr> <tr> <td>85</td><td>340</td><td rowspan="6">80°</td><td>TLYE68TG(F)◆</td><td></td><td>587</td><td>590</td><td>Transparent</td><td>50</td> </tr> <tr> <td>85</td><td>300</td><td>TLYE68CG(F)◆</td><td></td><td>587</td><td>590</td><td>Yellow, transparent</td><td>50</td> </tr> <tr> <td>85</td><td>280</td><td>TLYH262(F)</td><td>TLYH262(PQ,F)</td><td>587</td><td>590</td><td>Transparent</td><td>50</td> </tr> <tr> <td>85</td><td>250</td><td>TLYE62T(F)</td><td></td><td>587</td><td>590</td><td>Transparent</td><td>50</td> </tr> <tr> <td>85</td><td>240</td><td>TLYE262A(F)</td><td>TLYE262A(NP,F)</td><td>587</td><td>590</td><td>Transparent</td><td>50</td> </tr> <tr> <td>47.6</td><td>150</td><td>100°</td><td>TLYE68DG(F)◆</td><td></td><td>587</td><td>590</td><td>Yellow, diffusing</td><td>50</td> </tr> <tr> <td>27.2</td><td>85</td><td>120°</td><td>TLYE60T(F)</td><td></td><td>587</td><td>590</td><td>Transparent</td><td>50</td> </tr> <tr> <td>15.3</td><td>40</td><td>140°</td><td>TLYE260A(F)</td><td>TLYE260A(KL,F)</td><td>587</td><td>590</td><td>Transparent</td><td>50</td><td>Back lighting (wide range)</td> </tr> </table> | | | | | | | | | | | Red | 476 | 4000 | 9° | TLSU163(F) | | 623 | 636 | Pale red, transparent | 30 | Pilot lamps | 476 | 1600 | TLSU160(F) | | 623 | 636 | Transparent | 30 | 2720 | 4500 | TLSH160(F) | | 613 | 623 | Transparent | 50 | 850 | 1800 | 10° | TLRH160(F) | TLRH160(ST,F) | 630 | 644 | Transparent | 50 | 476 | 1200 | TLRE160A(F) | TLRE160A(RS,F) | 630 | 644 | Transparent | 50 | 1530 | 3500 | TLRME50C(F) | | 626 | 636 | Red, transparent | 50 | 1530 | 3500 | 16° | TLSE50T(F) | | 613 | 623 | Transparent | 50 | 850 | 2200 | TLRME50T(F) | | 626 | 636 | Transparent | 50 | 850 | 1800 | TLRE50T(F) | | 630 | 644 | Transparent | 50 | 153 | 450 | 18° | TLSU164(F) | | 623 | 636 | Pale red, diffusing | 30 | 153 | 300 | TLSU125(F) | TLSU125(PQ,F) | 623 | 636 | Transparent | 30 | 85 | 270 | 35° | TLSU123(F) | TLSU123(PQ,F) | 623 | 636 | Red, transparent | 30 | 272 | 800 | TLSH125(F) | | 613 | 623 | Transparent | 50 | 85 | 180 | 40° | TLSU126(F) | | 623 | 636 | Milky-white, diffusing | 30 | 47.6 | 100 | TLSU124(F) | TLSU124(MN,F) | 623 | 636 | Red, diffusing | 30 | 272 | 800 | 45° | TLSE53T(F) | | 613 | 623 | Transparent | 50 | 272 | 600 | TLRME53T(F) | | 626 | 636 | Transparent | 50 | 153 | 400 | TLRE53T(F) | | 630 | 644 | Transparent | 50 | 47.6 | 170 | 60° | TLSU262(F) | TLSU262(NP,F) | 623 | 636 | Transparent | 30 | 85 | 330 | TLRME68TG(F)◆ | | 626 | 636 | Transparent | 50 | 85 | 260 | 80° | TLRME68CG(F)◆ | | 626 | 636 | Red, transparent | 50 | 85 | 220 | TLRH262(F) | TLRH262(NP,F) | 630 | 644 | Transparent | 50 | 85 | 200 | TLSE62T(F) | | 613 | 623 | Transparent | 50 | 47.6 | 180 | TLRME62T(F) | | 626 | 636 | Transparent | 50 | 47.6 | 150 | TLRE262A(F) | TLRE262A(MN,F) | 630 | 644 | Transparent | 50 | 47.6 | 130 | TLSU268G(F)◆ | | 623 | 636 | Transparent | 30 | 47.6 | 120 | TLRE62T(F) | | 630 | 644 | Transparent | 50 | 47.6 | 140 | TLRME68DG(F)◆ | | 626 | 636 | Red, diffusing | 50 | 15.3 | 45 | 120° | TLRE60T(F) | | 630 | 644 | Transparent | 50 | 8.5 | 25 | 140° | TLRE260A(F) | | 630 | 644 | Transparent | 50 | 27.2 | 100 | 40°/20° | TLSU225(F) | | 623 | 636 | Transparent | 50 | Side view | Orange | 476 | 2500 | 9° | TLOU160(F) | | 605 | 612 | Transparent | 30 | Pilot lamps | 850 | 2300 | TLOH160(F) | TLOH160(TU,F) | 605 | 612 | Transparent | 50 | 476 | 1500 | 10° | TLOE160A(F) | TLOE160A(ST,F) | 605 | 612 | Transparent | 50 | 2720 | 7000 | TLOE50C(F) | | 605 | 612 | Orange, transparent | 50 | 1530 | 4500 | 16° | TLOE50T(F) | | 605 | 612 | Transparent | 50 | 85 | 400 | 35° | TLOU123(F) | | 605 | 612 | Orange, transparent | 30 | 47.6 | 180 | TLOU124(F) | | 605 | 612 | Orange, diffusing | 30 | 272 | 1000 | 45° | TLOE53T(F) | | 605 | 612 | Transparent | 50 | 47.6 | 300 | TLOU262(F) | TLOU262(PQ,F) | 605 | 612 | Transparent | 30 | 47.6 | 200 | 60° | TLOU267(F) | | 605 | 612 | Orange, transparent | 30 | 153 | 450 | TLOH262(F) | TLOH262(PQ,F) | 605 | 612 | Transparent | 50 | 153 | 350 | 80° | TLOE62T(F) | | 605 | 612 | Transparent | 50 | 85 | 300 | TLOE262A(F) | TLOE262A(PQ,F) | 605 | 612 | Transparent | 50 | 27.2 | 100 | 120° | TLOE60T(F) | | 605 | 612 | Transparent | 50 | 15.3 | 70 | 140° | TLOE260A(F) | TLOE260A(LM,F) | 605 | 612 | Transparent | 50 | Yellow | 476 | 1500 | 9° | TLYU160(F) | TLYU160(ST,F) | 587 | 590 | Transparent | 30 | Pilot lamps | 850 | 4300 | TLYH160(F) | TLYH160(TU,F) | 587 | 590 | Transparent | 50 | 476 | 2300 | 10° | TLYE160A(F) | TLYE160A(ST,F) | 587 | 590 | Transparent | 50 | 1530 | 3500 | TLYE50C(F) | | 587 | 590 | Yellow, transparent | 50 | 1530 | 3500 | 16° | TLYE50T(F) | | 587 | 590 | Transparent | 50 | 85 | 220 | TLYU123(F) | TLYU123(NP,F) | 587 | 590 | Yellow, transparent | 30 | 47.6 | 110 | 40° | TLYU124(F) | TLYU124(MN,F) | 587 | 590 | Yellow, diffusing | 30 | 272 | 800 | TLYE53T(F) | | 587 | 590 | Transparent | 50 | 47.6 | 150 | 45° | TLYU262(F) | TLYU262(MN,F) | 587 | 590 | Transparent | 30 | 47.6 | 90 | TLYU267(F) | | 587 | 590 | Yellow, transparent | 30 | 85 | 340 | 80° | TLYE68TG(F)◆ | | 587 | 590 | Transparent | 50 | 85 | 300 | TLYE68CG(F)◆ | | 587 | 590 | Yellow, transparent | 50 | 85 | 280 | TLYH262(F) | TLYH262(PQ,F) | 587 | 590 | Transparent | 50 | 85 | 250 | TLYE62T(F) | | 587 | 590 | Transparent | 50 | 85 | 240 | TLYE262A(F) | TLYE262A(NP,F) | 587 | 590 | Transparent | 50 | 47.6 | 150 | 100° | TLYE68DG(F)◆ | | 587 | 590 | Yellow, diffusing | 50 | 27.2 | 85 | 120° | TLYE60T(F) | | 587 | 590 | Transparent | 50 | 15.3 | 40 | 140° | TLYE260A(F) | TLYE260A(KL,F) | 587 | 590 | Transparent | 50 |
| Red | 476 | 4000 | 9° | TLSU163(F) | | 623 | 636 | Pale red, transparent | 30 | Pilot lamps | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 476 | 1600 | | TLSU160(F) | | 623 | 636 | Transparent | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2720 | 4500 | | TLSH160(F) | | 613 | 623 | Transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 850 | 1800 | 10° | TLRH160(F) | TLRH160(ST,F) | 630 | 644 | Transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 476 | 1200 | | TLRE160A(F) | TLRE160A(RS,F) | 630 | 644 | Transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1530 | 3500 | | TLRME50C(F) | | 626 | 636 | Red, transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1530 | 3500 | 16° | TLSE50T(F) | | 613 | 623 | Transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 850 | 2200 | | TLRME50T(F) | | 626 | 636 | Transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 850 | 1800 | | TLRE50T(F) | | 630 | 644 | Transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 153 | 450 | 18° | TLSU164(F) | | 623 | 636 | Pale red, diffusing | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 153 | 300 | | TLSU125(F) | TLSU125(PQ,F) | 623 | 636 | Transparent | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 85 | 270 | 35° | TLSU123(F) | TLSU123(PQ,F) | 623 | 636 | Red, transparent | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 272 | 800 | | TLSH125(F) | | 613 | 623 | Transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 85 | 180 | 40° | TLSU126(F) | | 623 | 636 | Milky-white, diffusing | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 47.6 | 100 | | TLSU124(F) | TLSU124(MN,F) | 623 | 636 | Red, diffusing | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 272 | 800 | 45° | TLSE53T(F) | | 613 | 623 | Transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 272 | 600 | | TLRME53T(F) | | 626 | 636 | Transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 153 | 400 | | TLRE53T(F) | | 630 | 644 | Transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 47.6 | 170 | 60° | TLSU262(F) | TLSU262(NP,F) | 623 | 636 | Transparent | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 85 | 330 | | TLRME68TG(F)◆ | | 626 | 636 | Transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 85 | 260 | 80° | TLRME68CG(F)◆ | | 626 | 636 | Red, transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 85 | 220 | | TLRH262(F) | TLRH262(NP,F) | 630 | 644 | Transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 85 | 200 | | TLSE62T(F) | | 613 | 623 | Transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 47.6 | 180 | | TLRME62T(F) | | 626 | 636 | Transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 47.6 | 150 | | TLRE262A(F) | TLRE262A(MN,F) | 630 | 644 | Transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 47.6 | 130 | | TLSU268G(F)◆ | | 623 | 636 | Transparent | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 47.6 | 120 | | TLRE62T(F) | | 630 | 644 | Transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 47.6 | 140 | TLRME68DG(F)◆ | | | 626 | 636 | Red, diffusing | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15.3 | 45 | 120° | TLRE60T(F) | | 630 | 644 | Transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8.5 | 25 | 140° | TLRE260A(F) | | 630 | 644 | Transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 27.2 | 100 | 40°/20° | TLSU225(F) | | 623 | 636 | Transparent | 50 | Side view | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Orange | 476 | 2500 | 9° | TLOU160(F) | | 605 | 612 | Transparent | 30 | Pilot lamps | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | 476 | 1500 | 10° | TLOE160A(F) | TLOE160A(ST,F) | 605 | 612 | Transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2720 | 7000 | | TLOE50C(F) | | 605 | 612 | Orange, transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1530 | 4500 | 16° | TLOE50T(F) | | 605 | 612 | Transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 85 | 400 | 35° | TLOU123(F) | | 605 | 612 | Orange, transparent | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 47.6 | 180 | | TLOU124(F) | | 605 | 612 | Orange, diffusing | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 272 | 1000 | 45° | TLOE53T(F) | | 605 | 612 | Transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 47.6 | 300 | | TLOU262(F) | TLOU262(PQ,F) | 605 | 612 | Transparent | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 47.6 | 200 | 60° | TLOU267(F) | | 605 | 612 | Orange, transparent | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 153 | 450 | | TLOH262(F) | TLOH262(PQ,F) | 605 | 612 | Transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 153 | 350 | 80° | TLOE62T(F) | | 605 | 612 | Transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 85 | 300 | | TLOE262A(F) | TLOE262A(PQ,F) | 605 | 612 | Transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 27.2 | 100 | 120° | TLOE60T(F) | | 605 | 612 | Transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 15.3 | 70 | 140° | TLOE260A(F) | TLOE260A(LM,F) | 605 | 612 | Transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Yellow | 476 | 1500 | 9° | TLYU160(F) | TLYU160(ST,F) | 587 | 590 | Transparent | 30 | Pilot lamps | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 850 | 4300 | | TLYH160(F) | TLYH160(TU,F) | 587 | 590 | Transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 476 | 2300 | 10° | TLYE160A(F) | TLYE160A(ST,F) | 587 | 590 | Transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1530 | 3500 | | TLYE50C(F) | | 587 | 590 | Yellow, transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1530 | 3500 | 16° | TLYE50T(F) | | 587 | 590 | Transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 85 | 220 | | TLYU123(F) | TLYU123(NP,F) | 587 | 590 | Yellow, transparent | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 47.6 | 110 | 40° | TLYU124(F) | TLYU124(MN,F) | 587 | 590 | Yellow, diffusing | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 272 | 800 | | TLYE53T(F) | | 587 | 590 | Transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 47.6 | 150 | 45° | TLYU262(F) | TLYU262(MN,F) | 587 | 590 | Transparent | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 47.6 | 90 | | TLYU267(F) | | 587 | 590 | Yellow, transparent | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 85 | 340 | 80° | TLYE68TG(F)◆ | | 587 | 590 | Transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 85 | 300 | | TLYE68CG(F)◆ | | 587 | 590 | Yellow, transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 85 | 280 | | TLYH262(F) | TLYH262(PQ,F) | 587 | 590 | Transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 85 | 250 | | TLYE62T(F) | | 587 | 590 | Transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 85 | 240 | | TLYE262A(F) | TLYE262A(NP,F) | 587 | 590 | Transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 47.6 | 150 | | 100° | TLYE68DG(F)◆ | | 587 | 590 | Yellow, diffusing | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 27.2 | 85 | 120° | TLYE60T(F) | | 587 | 590 | Transparent | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 15.3 | 40 | 140° | TLYE260A(F) | TLYE260A(KL,F) | 587 | 590 | Transparent | 50 | Back lighting (wide range) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

◆: Mount flush with PCB

High-Brightness LED Lamps ($\phi 3$) (continued)

| Color of Emitted Light | Intensity Iv (mcd) @IF = 20 mA | | Viewing Angle 201/2 | Part Number | | Typical Emitting Wavelength | | Lens Type | Maximum DC Forward Current Rating IF (mA) @Ta = 25°C | Typical Applications |
|------------------------|-----------------------------------|-------------|------------------------|-------------------|---------------------|-----------------------------|------------------|--------------------|---|----------------------------|
| | Min | Typ. | | No rank specified | Two ranks specified | λ_d (nm) | λ_p (nm) | | | |
| | Pure yellow | 850 | | 2500 | 16° | TLPYE50T(F) | | | | |
| | 153 | 450 | 45° | TLPYE53T(F) | | 580 | 583 | Transparent | 50 | |
| | 47.6 | 150 | 80° | TLPYE62T(F) | | 580 | 583 | Transparent | 50 | Back lighting (wide range) |
| Green | 850 | 2400 | 9° | TLGE160(F) | TLGE160(TU,F) | 571 | 574 | Transparent | 50 | Pilot lamps |
| | 476 | 1200 | 10° | TLGU50T(F) | | 571 | 574 | Transparent | 30 | |
| | 476 | 1500 | 16° | TLGE50T(F) | | 571 | 574 | Transparent | 50 | |
| | 153 | 500 | 35° | TLGE125(F) | TLGE125(QR,F) | 571 | 574 | Transparent | 50 | |
| | 153 | 450 | | TLGE123(F) | TLGE123(PQ,F) | 571 | 574 | Green, transparent | 50 | |
| | 47.6 | 170 | 40° | TLGU53T(F) | | 571 | 574 | Transparent | 30 | |
| | 47.6 | 150 | | TLGU53C(F) | | 571 | 574 | Green, transparent | 30 | |
| | 153 | 400 | 45° | TLGE53T(F) | | 571 | 574 | Transparent | 50 | |
| | 27.2 | 80 | 50° | TLGU53D(F) | | 571 | 574 | Green, diffusing | 30 | Back lighting (wide range) |
| | 47.6 | 220 | 65° | TLGE262(F) | TLGE262(NP,F) | 571 | 574 | Transparent | 50 | |
| | 27.2 | 70 | 80° | TLGU62T(F) | | 571 | 574 | Transparent | 30 | |
| | 47.6 | 155 | | TLGE68TG(F) ◆ | | 571 | 574 | Transparent | 50 | |
| | 47.6 | 110 | | TLGE68CG(F) ◆ | | 571 | 574 | Green, transparent | 50 | |
| | 47.6 | 110 | | TLGE62T(F) | | 571 | 574 | Transparent | 50 | |
| | 15.3 | 45 | 100° | TLGE68DG(F) ◆ | | 571 | 574 | Green, diffusing | 50 | |
| | 15.3 | 50 | 120° | TLGE60T(F) | | 571 | 574 | Transparent | 50 | |
| 8.5 | 45 | TLGE260(F) | | TLGE260(KL,F) | 571 | 574 | Transparent | 50 | | |
| Fresh green | 272 | 1000 | 16° | TLFGE50C(F) | | 565 | 568 | Green, transparent | 50 | Pilot lamps |
| | 272 | 1000 | | TLFGE50T(F) | | 565 | 568 | Transparent | 50 | |
| | 85 | 200 | 45° | TLFGE53T(F) | | 565 | 568 | Transparent | 50 | |
| | 27.2 | 70 | 80° | TLFGE68CG(F) ◆ | | 565 | 568 | Green, transparent | 50 | |
| | 27.2 | 70 | | TLFGE62T(F) | | 565 | 568 | Transparent | 50 | |
| | 15.3 | 30 | 100° | TLFGE68DG(F) ◆ | | 565 | 568 | Green, diffusing | 50 | |
| Pure green | 272 | 450 | 9° | TLPGE160(F) | | 558 | 562 | Transparent | 50 | Pilot lamps |
| | 153 | 450 | 10° | TLPGU50T(F) | | 558 | 562 | Transparent | 30 | |
| | 153 | 600 | 16° | TLPGE50T(F) | | 558 | 562 | Transparent | 50 | |
| | 47.6 | 150 | 35° | TLPGE125(F) | | 558 | 562 | Transparent | 50 | |
| | 27.2 | 80 | 40° | TLPGU53T(F) | | 558 | 562 | Transparent | 30 | |
| | 27.2 | 70 | | TLPGU53C(F) | | 558 | 562 | Green, transparent | 30 | |
| | 47.6 | 130 | 45° | TLPGE53T(F) | | 558 | 562 | Transparent | 50 | |
| | 15.3 | 40 | 50° | TLPGU53D(F) | | 558 | 562 | Green, diffusing | 30 | Back lighting (wide range) |
| | 15.3 | 45 | 65° | TLPGE262(F) | | 558 | 562 | Transparent | 50 | |
| | 15.3 | 45 | 80° | TLPGE62T(F) | | 558 | 562 | Transparent | 50 | |
| 8.5 | 25 | TLPGU62T(F) | | | 558 | 562 | Transparent | 30 | | |

◆: Mount flush with PCB

High-Brightness LED Lamps (Other)

| Package Size (mm) | Color of Emitted Light | Intensity lv (mcd) @IF = 20 mA | | Viewing Angle 201/2 | Part Number | | Typical Emitting Wavelength | | Lens Type | Maximum DC Forward Current Rating IF (mA) @Ta = 25°C | Typical Applications |
|--------------------|------------------------|--------------------------------|-------|---------------------|-------------------|---------------------|-----------------------------|---------------------|---------------------|--|----------------------|
| | | Min | Typ. | | No rank specified | Two ranks specified | λ_d (nm) | λ_p (nm) | | | |
| φ10 | Red | 4760 | 19000 | 4° | TLRH190P(F) | TLRH190P(WX,F) | 630 | 644 | Transparent | 50 | Traffic light |
| | Orange | 8500 | 33000 | | TLOH190P(F) | TLOH190P(XY,F) | 605 | 612 | Transparent | 50 | |
| | Yellow | 8500 | 30000 | | TLYH190P(F) | TLYH190P(XY,F) | 587 | 590 | Transparent | 50 | |
| Elliptical 5 × 5.8 | Red | 272 | 750 | 30°/50° | TLSE27C(F) | | 613 | 623 | Red, transparent | 50 | Message boards |
| | | 153 | 400 | | TLRME27C(F) | | 626 | 636 | Red, transparent | 50 | |
| | | 85 | 300 | | TLRE27C(F) | | 630 | 644 | Red, transparent | 50 | |
| | 30°/60° | 153 | 450 | TLRH247(F) | TLRH247(PQ,F) | 630 | 644 | Transparent | 50 | | |
| | | 85 | 350 | TLRE248(F) | | 630 | 644 | Red, transparent | 50 | | |
| | | 85 | 450 | TLOU248(F) | | 605 | 612 | Orange, transparent | 30 | | |
| | Orange | 272 | 800 | 30°/50° | TLOE27C(F) | | 605 | 612 | Orange, transparent | 50 | |
| | | 153 | 370 | 30°/60° | TLOE248(F) | | 605 | 612 | Orange, transparent | 50 | |
| | Yellow | 272 | 650 | 30°/50° | TLYE27C(F) | | 587 | 590 | Yellow, transparent | 50 | |
| | | 153 | 700 | 30°/60° | TLYH247(F) | TLYH247(QR,F) | 587 | 590 | Transparent | 50 | |
| | Green | 30°/50° | 85 | 250 | TLGE27C(F) | | 571 | 574 | Green, transparent | 50 | |
| | | | 47.6 | 180 | TLGU27C(F) | | 571 | 574 | Green, transparent | 30 | |
| | | 30°/60° | 153 | 400 | TLGE247(F) | TLGE247(PQ,F) | 571 | 574 | Transparent | 50 | |
| | | | 153 | 360 | TLGE248(F) | | 571 | 574 | Green, transparent | 50 | |
| | Pure green | 27.2 | 90 | | TLPGE247(F) | TLPGE247(LM,F) | 558 | 562 | Transparent | 50 | |
| Elliptical 4.3 × 5 | Red | 85 | 300 | 50°/80° | * TLSE28C(F) | | 613 | 623 | Red, transparent | 50 | |
| | Yellow | 153 | 350 | 50°/80° | * TLYE28C(F) | | 587 | 590 | Yellow, transparent | 50 | |
| | Green | 47.6 | 150 | 50°/80° | * TLGE28C(F) | | 571 | 574 | Green, transparent | 50 | |

*: New product

Surface-Mount LED Lamps (1608)

| Package (mm) | Color of Emitted Light | Part Number | Luminous Intensity typ. (mcd) @20 mA | Viewing Angle typ. (°) | Packing Type |
|---|------------------------|----------------------------|--------------------------------------|------------------------|---|
| 1.6 (L) × 0.8 (W) × 0.6 (H) (PCB type) | Red | ◇ TLRE1008A(T04)/(T05) | 70 | 100 to 140 | Embossed taping Taping No.: T04 4-mm pitch 4000 pcs/reel |
| | Red | ◇ TLSE1008A(T04)/(T05) | 135 | | |
| | Orange | ◇ TLOE1008A(T04)/(T05) | 150 | | |
| | Yellow | ◇ TLYE1008A(T04)/(T05) | 105 | | |
| | Pure yellow | ◇ TLPYE1008A(T04)/(T05) | 70 | | |
| | Green | ◇ TLGE1008A(T04)/(T05) | 70 | | |
| | Fresh green | ◇ TLFGE1008A(T04)/(T05) | 40 | | |
| | Pure green | ◇ TLPGE1008A(T04)/(T05) | 18 | | Taping No.: T05 2-mm pitch 8000 pcs/reel |
| | Red | ◇ TLSU1008A(T04)/(T05) | 60 | | |
| | Orange | ◇ TLOU1008A(T04)/(T05) | 78 | | |
| | Amber | ◇ TLAU1008A(T04)/(T05) | 30 | | |
| | Yellow | ◇ TLYU1008A(T04)/(T05) | 30 | | |
| | Green | ◇ TLGU1008A(T04)/(T05) | 30 | | |
| | Pure green | ◇ TLPGU1008A(T04)/(T05) | 6 | | |
| 1.6 (L) × 0.8 (W) × 0.6 (H) (ESC type) | Red | ◇ TLRV1020(T14,F)/(T15,F) | Δ15 | 140 to 160 | Embossed taping Taping No.: T14 4-mm pitch 4000 pcs/reel |
| | Red | ◇ TLRMV1020(T14,F)/(T15,F) | Δ20 | | |
| | Red | ◇ TLSV1020(T14,F)/(T15,F) | Δ30 | | |
| | Orange | ◇ TLOV1020(T14,F)/(T15,F) | Δ38 | | Taping No.: T15 2-mm pitch 8000 pcs/reel |
| | Yellow | ◇ TLYV1020(T14,F)/(T15,F) | Δ25 | | |
| | Green | ◇ TLGV1020(T14,F)/(T15,F) | Δ14 | | |
| | Pure green | ◇ TLPGV1020(T14,F)/(T15,F) | Δ3.5 | | |
| 1.6 (L) × 0.8 (W) × 0.45 (H) (ESC type) | Red | ◇ TLRV1022(T14,F)/(T15,F) | Δ15 | 140 | Embossed taping Taping No.: T14 4-mm pitch 4000 pcs/reel |
| | Red | ◇ TLRMV1022(T14,F)/(T15,F) | Δ20 | | |
| | Red | ◇ TLSV1022(T14,F)/(T15,F) | Δ30 | | |
| | Orange | ◇ TLOV1022(T14,F)/(T15,F) | Δ38 | | Taping No.: T15 2-mm pitch 8000 pcs/reel |
| | Yellow | ◇ TLYV1022(T14,F)/(T15,F) | Δ25 | | |
| | Green | ◇ TLGV1022(T14,F)/(T15,F) | Δ14 | | |
| | Pure green | ◇ TLPGV1022(T14,F)/(T15,F) | Δ3.5 | | |

◇: Dry-packed product

Δ: @IF = 5 mA

Surface-Mount LED Lamps (2125)

| Package (mm) | Color of Emitted Light | Part Number | Luminous Intensity typ. (mcd) @20 mA | Viewing Angle typ. (°) | Packing Type |
|--|------------------------|-------------------|---|------------------------|---|
| 2.0 (L) × 1.25 (W) × 1.1 (H) (PCB type) | Red | ◇ TLRE1002A(T02) | 70 | 120 to 140 | Embossed taping Taping No.: T02 4-mm pitch 3000 pcs/reel |
| | Red | ◇ TLSE1002A(T02) | 140 | | |
| | Orange | ◇ TLOE1002A(T02) | 180 | | |
| | Yellow | ◇ TLYE1002A(T02) | 105 | | |
| | Pure yellow | ◇ TLPYE1002A(T02) | 70 | | |
| | Green | ◇ TLGE1002A(T02) | 70 | | |
| | Fresh green | ◇ TLFGE1002A(T02) | 40 | | |
| | Pure green | ◇ TLPGE1002A(T02) | 18 | | |
| | Red | ◇ TLRU1002A(T02) | 45 | | |
| | Red | ◇ TLSU1002A(T02) | 60 | | |
| | Orange | ◇ TLOU1002A(T02) | 78 | | |
| | Amber | ◇ TLAU1002A(T02) | 30 | | |
| | Yellow | ◇ TLYU1002A(T02) | 30 | | |
| | Green | ◇ TLGU1002A(T02) | 30 | | |
| | Pure green | ◇ TLPGU1002A(T02) | 6 | | |
| | Green | ◇ TLEGC1002(T02) | Δ120 | | |
| Blue | ◇ TLBC1002(T02) | Δ45 | | | |

◇: Dry-packed product

Δ: @If = 10 mA

Surface-Mount LED Lamps (with φ2 Lens-Top)

| Package (mm) | Color of Emitted Light | Part Number | Luminous Intensity typ. (mcd) @20 mA | Viewing Angle typ. (°) | Packing Type |
|---|------------------------|-------------------|---|------------------------|---|
| 3.2 (L) × 2.4 (W) × 2.4 (H) with φ2 lens | Red | ◇ TLRE1005B(T03) | 450 | 30 | Embossed taping Taping No.: T03 4-mm pitch 1000 pcs/reel |
| | Red | ◇ TLSE1005B(T03) | 1000 | | |
| | Orange | ◇ TLOE1005B(T03) | 1500 | | |
| | Yellow | ◇ TLYE1005B(T03) | 850 | | |
| | Pure yellow | ◇ TLPYE1005B(T03) | 350 | | |
| | Green | ◇ TLGE1005B(T03) | 350 | | |
| | Fresh green | ◇ TLFGE1005B(T03) | 250 | | |
| | Pure green | ◇ TLPGE1005B(T03) | 130 | | |

◇: Dry-packed product

Mini Size SMD LED Lamps

| Package (mm) | Color of Emitted Light | Part Number | Luminous Intensity typ. (mcd) @20 mA | Viewing Angle typ. (°) | Packing Type |
|-----------------------------|------------------------|------------------|---|------------------------|---|
| 2.2 (L) × 1.4 (W) × 1.3 (H) | Red | ◇ TLRV1060(T18) | 90 | 120 | Embossed taping Taping No.: T18 4-mm pitch 3000 pcs/reel |
| | Red | ◇ TLSV1060(T18) | 160 | | |
| | Orange | ◇ TLOV1060(T18) | 160 | | |
| | Yellow | ◇ TLYV1060(T18) | 130 | | |
| | Pure yellow | ◇ TLPYV1060(T18) | 100 | | |
| | Green | ◇ TLEGC1060(T18) | 160 | | |
| | Blue | ◇ TLBC1060(T18) | 40 | | |

◇: Dry-packed product

Large Size SMD LED Lamps (Flat-Top)

| Package (mm) | Color of Emitted Light | Part Number | Luminous Intensity typ. (mcd) @20 mA | Viewing Angle typ. (°) | Packing Type |
|-----------------------------|------------------------|-------------------|---|---------------------------|---|
| 3.2 (L) × 2.8 (W) × 1.9 (H) | Red | ◇ TLRH1106(T11) | ♣ 250 | 120 | Embossed taping Taping No.: T11 4-mm pitch 2000 pcs/reel |
| | Red | ◇ TLRMH1106(T11) | ♣ 300 | | |
| | Red | ◇ TLSH1106(T11) | ♣ 600 | | |
| | Orange | ◇ TLOH1106(T11) | ♣ 620 | | |
| | Yellow | ◇ TLYH1106(T11) | ♣ 500 | | |
| | Green | ◇ TLGH1106(T11) | ♣ 250 | | |
| | Red | ◇ TLRMH1100B(T11) | 150 | | |
| | Red | ◇ TLSH1100B(T11) | 260 | | |
| | Orange | ◇ TLOH1100B(T11) | 270 | | |
| | Yellow | ◇ TLYH1100B(T11) | 220 | | |
| | Red | ◇ TLRE1100B(T11) | 100 | | |
| | Red | ◇ TLSE1100B(T11) | 180 | | |
| | Orange | ◇ TLOE1100B(T11) | 180 | | |
| | Yellow | ◇ TLYE1100B(T11) | 150 | | |
| | Green | ◇ TLGE1100B(T11) | 100 | | |
| | Pure green | ◇ TLPGE1100B(T11) | 25 | | |
| | Blue | ◇ TLBA1100B(T11) | Δ6 | | |
| | Green | ◇ TLEGC1100B(T11) | 200 | | |
| | Blue | ◇ TLBC1100B(T11) | 45 | | |
| | Green | ◇ TLEGE1100B(T11) | 230 | | |
| | Bluish green | ◇ TLGTE1100B(T11) | 300 | | |
| White | ◇ TLWA1100(T11) | 100 | | | |
| White | ◇ TLWH1100(T11) | 420 | | | |
| Bluish green | ◇ TLBGA1100(T11) | 100 | | | |
| Reddish purple | ◇ TLRPA1100(T11) | 70 | | | |

◇: Dry-packed product

Δ: @If = 10 mA

♣: @If = 50 mA

Large Size SMD LED Lamps (Lens-Top)

| Package (mm) | Color of Emitted Light | Part Number | Luminous Intensity typ. (mcd) @20 mA | Viewing Angle typ. (°) | Packing Type |
|---|------------------------|------------------|---|---------------------------|--|
| 3.2 (L) × 2.8 (W) × 3.4 (H) with φ2.8 lens | Red | ◇ TLRE1102(T10) | 320 | 65 | Embossed taping Taping No.: T10 8-mm pitch 500 pcs/reel |
| | Red | ◇ TLSE1102(T10) | 600 | | |
| | Orange | ◇ TLOE1102(T10) | 650 | | |
| | Yellow | ◇ TLYE1102(T10) | 480 | | |
| | Green | ◇ TLGE1102(T10) | 300 | | |
| | Pure green | ◇ TLPGE1102(T10) | 75 | | |

◇: Dry-packed product

Photo Sensors

Infrared LEDs and Visible LEDs for Sensor Application

| Part Number | Features | Electrical/Optical Characteristics (Ta = 25°C) | | | | | | | | | Application |
|---------------------|------------------|--|---------------------------|------|---------|--------------------|-----|--------------|-------------------------------|----------------------|--|
| | | Rank specified | Radiant intensity (mW/sr) | | | Radiant power (mW) | | | Peak emission wavelength (nm) | Half-value angle (°) | |
| | | | Min | Max | If (mA) | Min | Max | If (mA) | | | |
| TLN108(F) | TO-18 (lens can) | — | 10 | — | 50 | — | — | — | 940 | ±8 | Opto-electronic switch |
| TLN201(F) | TO-18 (lens can) | — | 20 | — | 50 | — | — | — | 880 | ±7 | |
| TLN105B(F) | φ5 | — | 12 | — | 50 | — | — | — | 950 | ±23.5 | Remote control |
| TLN110(F) | φ5 | — | 15 | — | 50 | — | — | — | 940 | ±8 | Opto-electronic switch |
| TLN115A(F) | φ5 | — | 15 | — | 50 | — | — | — | 950 | ±21 | Remote control |
| | | TLN115A(B,F) | 19 | — | | | | | | | |
| TLN231(F) | φ5 | — | 35 | — | 50 | — | — | — | 870 | ±16 | Space optical transmission |
| TLN233(F) | φ5 | — | 46 | — | 50 | — | — | — | 870 | ±13 | Opto-electronic switch |
| TLN227(F) | φ5 | — | — | — | — | 14 | — | 50 | 870 | ±5 | Space optical transmission |
| TLN225(F) | φ4.9 | — | — | — | — | 14 | — | 50 | 870 | ±21 | Space optical transmission |
| TLN226(F) | φ4.9 | — | — | — | — | 14 | — | 50 | 870 | ±13 | |
| TLN210(F) | φ3.6 side view | — | — | — | — | 7 | — | 300 (Note 2) | 875 | ±32 | Used only for cameras (for light projection) |
| TLN212(F) | φ3.6 side view | — | — | — | — | 8 | — | 300 (Note 2) | 870 | ±35 | |
| TLN217(F) | φ3.6 side view | — | — | — | — | 12 | — | 300 (Note 2) | 870 | ±32.5 | |
| TLN119(F) | φ3 | — | 2.5 | 10 | 20 | — | — | — | 945 | ±30 | Opto-electronic switch |
| | | TLN119(B,F) | 4.2 | 10 | | | | | | | |
| TLN238(F) | φ3 | — | 40 | — | 50 | — | — | — | 870 | ±18 | Space optical transmission Opto-electronic switch |
| TLOH9202 (Note 1) | φ3.1 SOP | — | lv = 13cd Typ. | — | 20 | — | — | — | 612 | ±4 | Used only for cameras (for auxiliary lighting) |
| * TLOH9203 (Note 1) | φ3.1 SOP | — | lv = 15cd Typ. | — | 20 | — | — | — | 612 | ±4 | Used only for cameras (for auxiliary lighting) |
| TLN117(F) | Small side view | — | 2 | — | 20 | — | — | — | 940 | ±15 | Opto-electronic switch |
| | | TLN117(B,F) | 2 | 7.5 | | | | | | | |
| | | TLN117(C,F) | 5 | 18.7 | | | | | | | |

Note 1: Orange LED

Note 2: t = 10 ms ON

Note: If = forward current; lv: Intensity

*: New product

Photo Transistors and Photo Darlington Transistors

| Part Number | Features | Electrical/Optical Characteristics (Ta = 25°C) | | | | | | | | | Photodarlington Transistor | Application |
|-------------|------------------|--|--------------------|------|-------------------------|-------------------|---------|--------------------------------|----------------------|-----------------|----------------------------|-------------|
| | | Rank specified | Light current (μA) | | | Dark current (μA) | | Peak sensitive wavelength (nm) | Half-value angle (°) | Visible ray cut | | |
| | | | Min | Max | E (mW/cm ²) | Max | VCE (V) | | | | | |
| TPS601A(F) | TO-18 (lens can) | — | 100 | — | 0.1 | 0.2 | 30 | 800 | ±10 | — | — | |
| | | TPS601A(A,F) | 100 | 300 | | | | | | | | |
| | | TPS601A(B,F) | 200 | 600 | | | | | | | | |
| | | TPS601A(C,F) | 400 | 1200 | | | | | | | | |
| TPS610(F) | φ5 | — | 100 | — | 0.1 | 0.1 | 24 | 800 | ±8 | — | Opto-electronic switch | |
| TPS611(F) | φ5 | — | 30 | — | 0.1 | 0.1 | 24 | 900 | ±8 | ○ | | |
| TPS615(F) | φ3 | — | 20 | 150 | 0.1 | 0.1 | 24 | 800 | ±30 | — | | |
| | | TPS615(A,F) | 20 | 50 | | | | | | | | |
| | | TPS615(B,F) | 34 | 85 | | | | | | | | |
| | | TPS615(C,F) | 60 | 150 | | | | | | | | |
| | | TPS615(AB,F) | 20 | 85 | | | | | | | | |
| | | TPS615(BC,F) | 34 | 150 | | | | | | | | |
| TPS616(F) | φ3 | — | 10 | 75 | 0.1 | 0.1 | 24 | 900 | ±30 | ○ | | |
| | | TPS616(A,F) | 10 | 25 | | | | | | | | |
| | | TPS616(B,F) | 17 | 42.5 | | | | | | | | |
| | | TPS616(C,F) | 30 | 75 | | | | | | | | |
| | | TPS616(AB,F) | 10 | 42.5 | | | | | | | | |
| | | TPS616(BC,F) | 17 | 75 | | | | | | | | |
| TPS622(F) | Small side view | — | 27 | — | 0.1 | 0.1 | 24 | 870 | ±15 | ○ | | |
| | | TPS622(A,F) | 27 | 80 | | | | | | | | |
| | | TPS622(B,F) | 55 | 165 | | | | | | | | |

Note: E = radiant incidence; VCE = collector-emitter voltage

Photo Diodes

| Part Number | Features | Electrical/Optical Characteristics (Ta = 25°C) | | | | | | | Application |
|-------------|-----------|--|-------------------------|-------------------|--------------------|--------------------------------|----------------------|-----------------|----------------|
| | | Short-circuit current (µA) | | Dark current (nA) | | Peak sensitive wavelength (nm) | Half-value angle (°) | Visible ray cut | |
| | | Min | E (mW/cm ²) | Max | V _R (V) | | | | |
| TPS703(F) | Side view | 0.9 | 0.1 | 30 | 10 | 960 | ±65 | ○ | Remote control |
| TPS704(F) | | 0.5 | 0.1 | 30 | 10 | 1000 | ±65 | ○ | |
| TPS705(F) | TO-92 | 0.5 | 0.1 | 30 | 10 | 970 | ±65 | ○ | |
| TPS706(F) | | 1.0 | 0.1 | 30 | 10 | 970 | ±65 | ○ | |

Note: E = radiant incidence; V_R = reverse voltage

Photo-ICs (Digital output)

| Part Number | Features | Electrical/Optical Characteristics (Ta = 25°C) | | | | | | | Application | |
|-------------|------------------------------------|--|----------------|---|-----------|---------------------|--------------------------------|----------------------|-------------|---|
| | | Output format | | Threshold radiant incidence (mW/cm ²) | | | Peak sensitive wavelength (nm) | Half-value angle (°) | | Visible ray cut |
| | | With resistor | Open collector | L → H Max | H → L Max | V _{CC} (V) | | | | |
| TPS841(F) | Small side view | — | ○ | 0.3 | — | 2.7 to 15 | 900 | ±15 | ○ | Opto-electronic switch |
| TPS842A(F) | | — | ○ | — | 0.3 | 2.7 to 15 | 900 | ±15 | ○ | |
| TPS843(F) | | ○ | — | 0.3 | — | 2.7 to 15 | 900 | ±15 | ○ | |
| TPS844(F) | | ○ | — | — | 0.3 | 2.7 to 15 | 900 | ±15 | ○ | |
| TPS816(F) | Side view, sync optical modulation | ○ | — | 0.08 | 0.1 | 5 | 900 | ±65 | ○ | High-speed remote controller (fo = 455 kHz) |
| TPS830(F) | Side view, | ○ | — | Min L = 3 m | | 5 | 900 | ±63/±30 | ○ | |
| TPS831(F) | Oval lens | ○ | — | | | 5 | 940 | ±63/±30 | ○ | |

Note: V_{CC} = power supply voltage; L: Transmission distance; fo: Operating frequency

Photo-ICs (Analog output)

| Part Number | Features | Electrical/Optical Characteristics (Ta = 25°C) | | | | | | | | | Application | |
|-------------|--|--|--------|--------|----------------------------|---------------------|-------------------|---------------------|--------------------------------|----------------------|-------------|------------------------|
| | | Light current (µA) | | | | | Dark current (µA) | | Peak sensitive wavelength (nm) | Half-value angle (°) | | Visible ray cut |
| | | Rank specified | Min | Max | E _v (lx) | V _{CC} (V) | Max | V _{CC} (V) | | | | |
| TPS820(F) | Small side view | — | (1500) | (6000) | E = 0.1 mW/cm ² | 5 | 0.5 | 5 | 870 | ±15 | ○ | Opto-electronic switch |
| TPS850 | Chip type SMD: 3.2 (L) × 2.4 (W) × 1.1 (H) | — | 180 | 300 | 100 | 3 | 0.5 | 3.3 | 640 | ±40 | — | Illuminance sensor |
| TPS851 | Chip type SMD: 2.1 (L) × 2.0 (W) × 0.7 (H) | — | 37 | 74 | 100 | 3 | 0.17 | 3.3 | 600 | ±55 | — | |
| | | TPS851(A) | 37 | 62 | | | | | | | | |
| | | TPS851(B) | 44 | 74 | | | | | | | | |
| * TPS852 | Chip type SMD: 1.6 (L) × 1.6 (W) × 0.55 (H) | — | 27 | 54 | 100 | 3 | 0.1 | 3.3 | 600 | ±55 | — | |
| TPS855(F) | Side view | — | 210 | 350 | 100 | 5 | 0.5 | 5.5 | 640 | ±65 | — | |

Note: V_{CC} = power supply voltage; E_v: Illuminance; E = radiant incidence

*: New product

Photo Interrupters (Photo transistor output)

| Part Number | Features | Gap (mm) | Slit Width (mm) | Electrical Characteristics (Ta = 25°C) | | | | Maximum Ratings (Ta = 25°C) Collector-emitter voltage (V) | Applications |
|--------------|--|----------|-----------------|--|-----|---------|---------|--|---|
| | | | | Current transfer ratio (%) | | | | | |
| | | | | Min | Max | If (mA) | VCE (V) | | |
| TLP832(F) | PWB direct-mount type | 5 | 0.5 | 5 | 100 | 10 | 2 | 35 | Printers Fax machines Copiers Image scanners VCRs Vending machines Tape readers |
| TLP833(F) | | 5 | 0.5 | 5 | 100 | 10 | 2 | 35 | |
| TLP841 | | 5 | 0.5 | 2.5 | 50 | 10 | 2 | 35 | |
| TLP831(F) | | 4.2 | 0.5 (Note 1) | 5 | 100 | 10 | 2 | 35 | |
| TLP830(F) | | 2 | 0.15 | 3 | 20 | 10 | 2 | 35 | |
| TLP828(F) | PWB direct-mount type, dust-proof type | 5 | — | 7.5 | 150 | 10 | 2 | 35 | |
| * TLP844 | Ultra-compact type | 2 | 0.3 | 3.5 | 35 | 5 | 2 | 35 | Cameras |
| * TLP846 | | 1.2 | 0.15 | 3 | 24 | 5 | 2 | 35 | |
| * TLP846 (R) | | 1.2 | 0.15 | 4 | 20 | 5 | 2 | 35 | |

Note 1: Horizontal slit

*: New product

Note: PWB = printed wiring board; If = forward current; VCE = collector-emitter voltage

Photo Interrupters (Photo-IC output)

| Part Number | Features | Gap (mm) | Slit Width (mm) | Electrical Characteristics (Ta = 25°C) | | | | | Applications |
|--------------|-----------------------|----------|-----------------|--|----------------|------------------------------|-----------|-----------|---|
| | | | | Output format | | Threshold input current (mA) | | | |
| | | | | With resistor | Open-collector | L → H Max | H → L Max | Vcc (V) | |
| TLP1033A(F) | PWB direct-mount type | 5 | 0.5 | | ○ | — | 3 | 2.7 to 15 | Printers Fax machines Copiers Image scanners VCRs Vending machines Tape readers |
| * TLP1032(F) | | 5 | 0.5 | | ○ | 3 | — | 2.7 to 15 | |

Note: PWB = printed wiring board; Vcc = power supply voltage

*: New product

Photo Interrupters (with connector)

| Part Number | Features | Gap (mm) | Slit Width (mm) | Electrical Characteristics (Ta = 25°C) | | | | Applications |
|---------------|--------------------|----------|-----------------|--|---------------|------------------------|------------------------|---|
| | | | | Operating supply voltage (V) | Output format | | Connector manufacturer | |
| | | | | | With resistor | Open collector | | |
| TLP1241(C5,F) | Snap-in mount type | 5 | 0.5 | VCE ≤ 35 V | | Phototransistor output | Tyco Electronics AMP | Printers Copiers Fax machines Vending machines Machine tools FA equipment Amusement equipment |
| TLP1242(C6,F) | | 5 | 0.5 | VCE ≤ 35 V | | Phototransistor output | Tyco Electronics AMP | |
| TLP1243(C8) | | 5 | 0.7 | VCE ≤ 35 V | | Phototransistor output | Tyco Electronics AMP | |
| TLP1251(C5,F) | | 5 | 0.5 | 4.5 to 5.5 | | ○ | Tyco Electronics AMP | |
| TLP1252(C6,F) | | 5 | 0.5 | 4.5 to 5.5 | | ○ | Tyco Electronics AMP | |
| TLP1253(C6,F) | | 5 | 0.5 | 4.5 to 5.5 | | ○ | Tyco Electronics AMP | |
| TLP1254(C6,F) | | 5 | 0.5 | 2.97 to 3.63 | | ○ | Tyco Electronics AMP | |
| TLP1255(C8) | | 5 | 0.7 | 2.97 to 5.5 | | ○ | Tyco Electronics AMP | |

Note: VCE: Collector-emitter voltage

Photo Couplers & Photo Relays

Transistor Output Devices (For Switching Supply, DC-DC Converter)

| Part Number | Pin Configuration | Features | CTR (%) | | | | V _{CEO} | BV _s | Safety Standards ⁽²⁾ | | | | |
|-------------------|-------------------|--|---------|-----|-----|-----------------------------------|------------------|-----------------|---------------------------------|------------------|------------------|---------------------------------|--------------------------------------|
| | | | Rank | Min | Max | @I _F , V _{CE} | | | UL | TÜV | VDE | BSI | IEC |
| TLP421 TLP421F | | DIP 4 pin High isolation voltage UL-recognized (double protection) EN60747 approved with option (D4) SEMKO-approved | — | 50 | 600 | 5 mA, 5 V | 80 V | 5000 Vrms | ○ | ◎ EN 60747 | △ EN 60747 | ◎ EN 60065 EN 60950 | △ 65 950 435 ⁽⁴⁾ |
| | | | Y | 50 | 150 | | | | | | | | |
| | | | GR | 100 | 300 | | | | | | | | |
| | | | BL | 200 | 600 | | | | | | | | |
| | | | GB | 100 | | | | | | | | | |
| | | | YH | 75 | 150 | | | | | | | | |
| | | | GRL | 100 | 200 | | | | | | | | |
| | | | GRH | 150 | 300 | | | | | | | | |
| | | | BLL | 200 | 400 | | | | | | | | |
| TLP181 | | Mini-flat MFSOP6 General-purpose High current transfer ratio SEMKO-approved | — | 50 | 600 | 5 mA, 5 V | 80 V | 3750 Vrms | ○ | △ | ○ ⁽¹⁾ | ◎ EN 60950 | |
| | | | Y | 50 | 150 | | | | | | | | |
| | | | GR | 100 | 300 | | | | | | | | |
| | | | BL | 200 | 600 | | | | | | | | |
| | | | GB | 100 | | | | | | | | | |
| | | | YH | 75 | 150 | | | | | | | | |
| | | | GRL | 100 | 200 | | | | | | | | |
| | | | GRH | 150 | 300 | | | | | | | | |
| | | | BLL | 200 | 400 | | | | | | | | |
| TLP281 | | SOP4 Half-pitch mini-flat Lead pitch = 1.27 mm General-purpose SEMKO-approved | — | 50 | 600 | 5 mA, 5 V | 80 V | 2500 Vrms | ○ | △ | ○ ⁽¹⁾ | ◎ EN 60950 | |
| | | | Y | 50 | 150 | | | | | | | | |
| | | | GR | 100 | 300 | | | | | | | | |
| | | | BL | 200 | 600 | | | | | | | | |
| | | | GB | 100 | | | | | | | | | |
| | | | YH | 75 | 150 | | | | | | | | |
| | | | GRL | 100 | 200 | | | | | | | | |
| | | | GRH | 150 | 300 | | | | | | | | |
| | | | BLL | 200 | 400 | | | | | | | | |
| TLP283 | | SOP4 Half-pitch mini-flat Lead pitch = 1.27 mm Low input current High speed | — | 100 | 400 | 1 mA, 5 V | 100 V | 2500 Vrms | ○ | | | | |
| | | | Y | 50 | 150 | | | | | | | | |
| | | | GR | 100 | 300 | | | | | | | | |
| | | | BL | 200 | 600 | | | | | | | | |
| | | | GB | 100 | | | | | | | | | |
| | | | YH | 75 | 150 | | | | | | | | |
| | | | GRL | 100 | 200 | | | | | | | | |
| | | | GRH | 150 | 300 | | | | | | | | |
| | | | BLL | 200 | 400 | | | | | | | | |

Note (1): The EN60747-5-2 safety standard for compact packages is different from that for standard DIP packages. Since the mini flat package is a compact package, please contact your nearest Toshiba sales office for more details.

Note (2): In the safety standard column:

○: Approved ◎: SELV-approved △: Design which meets safety standard (as of 04/6) TÜV and VDE: EN60747-5-2-approved with option D4.

Note (4): TLP421F only

(For HA)

| Part Number | Pin Configuration | Features | CTR (%) | | | | V _{CEO} | BV _s | Safety Standards ⁽²⁾ | | | | |
|----------------------------------|-------------------|--|---------|-----|-----|-----------------------------------|------------------|-----------------|---------------------------------|------------------|------------------|---------------------------------|----------------|
| | | | Rank | Min | Max | @I _F , V _{CE} | | | UL | TÜV | VDE | BSI | IEC |
| TLP620 ⁽³⁾ TLP620F | | DIP 4 pin AC input EN60747 approved with option (D4) SEMKO-approved | — | 50 | 600 | ±5 mA, 5 V | 55 V | 5000 Vrms | ○ | △ EN 60747 | ◎ EN 60747 | ◎ EN 60065 EN 60950 | △ 65 950 |
| | | | Y | 50 | 150 | | | | | | | | |
| | | | GR | 100 | 300 | | | | | | | | |
| | | | BL | 200 | 600 | | | | | | | | |
| | | | GB | 100 | | | | | | | | | |
| TLP180 ⁽³⁾ | | Mini-flat MFSOP6 AC input SEMKO-approved | — | 50 | 600 | ±5 mA, 5 V | 80 V | 3750 Vrms | ○ | ○ ⁽¹⁾ | △ | ◎ EN 60950 | |
| | | | Y | 50 | 150 | | | | | | | | |
| | | | GR | 100 | 300 | | | | | | | | |
| | | | BL | 200 | 600 | | | | | | | | |
| | | | GB | 100 | | | | | | | | | |
| TLP280 ⁽³⁾ | | SOP4 Half-pitch mini-flat Lead pitch = 1.27 mm AC input SEMKO-approved | — | 50 | 600 | ±5 mA, 5 V | 80 V | 2500 Vrms | ○ | △ | ○ ⁽¹⁾ | ◎ EN 60950 | |
| | | | Y | 50 | 150 | | | | | | | | |
| | | | GR | 100 | 300 | | | | | | | | |
| | | | BL | 200 | 600 | | | | | | | | |
| | | | GB | 100 | | | | | | | | | |

Note (1): The EN60747-5-2 safety standard for compact packages is different from that for standard DIP packages. Since the mini flat package is a compact package, please contact your nearest Toshiba sales office for more details.

Note (2): In the safety standard column:

○: Approved ◎: SELV-approved △: Design which meets safety standard (as of 04/6) TÜV and VDE: EN60747-5-2-approved with option D4.

Note (3): The products with the ranks Y and BL are limited in production. For details, please contact your nearest Toshiba sales office.

(For PLC)

| Part Number | Pin Configuration | Features | CTR (%) | | | | V _{CEO} | BV _s | Safety Standards ⁽²⁾ | | | | |
|-------------|-------------------|--|---------|-----|-----|-----------------------------------|------------------|-----------------|---------------------------------|-----|------------------|-----|-------------|
| | | | Rank | Min | Max | @I _F , V _{CE} | | | UL | TÜV | VDE | BSI | IEC |
| TLP280-4 | | SOP16 4 channels of the TLP280 Lead pitch = 1.27 mm AC input SEMKO-approved | — | 50 | 600 | ±5 mA, 5 V | 80 V | 2500 Vrms | ○ | △ | ○ ⁽¹⁾ | ◎ | EN 60950 |
| | | | GB | 100 | | | | | | | | | |
| TLP281-4 | | SOP16 4 channels of the TLP281 Lead pitch = 1.27 mm SEMKO-approved | — | 50 | 600 | 5 mA, 5 V | 80 V | 2500 Vrms | ○ | △ | ○ ⁽¹⁾ | ◎ | EN 60950 |
| | | | GB | 100 | | | | | | | | | |
| TLP283-4 | | SOP16 4 channels of the TLP283 Lead pitch = 1.27 mm Low input current High speed | — | 100 | 400 | 1 mA, 5 V | 100 V | 2500 Vrms | ○ | | | | |

Note (1): The EN60747-5-2 safety standard for compact packages is different from that for standard DIP packages. Since the mini flat package is a compact package, please contact your nearest Toshiba sales office for more details.

Note (2): In the safety standard column:

○: Approved ◎: SELV-approved △: Design which meets safety standard (as of 04/6) TÜV and VDE: EN60747-5-2-approved with option D4.

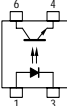
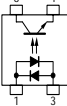
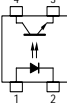
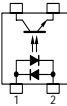
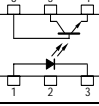
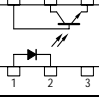
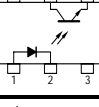
(For Telecommunication)

| Part Number | Pin Configuration | Features | CTR (%) | | | | V _{CEO} | BV _s | Safety Standards ⁽²⁾ | | | | |
|-------------|-------------------|---|---------|-----|-----|-----------------------------------|------------------|-----------------|---------------------------------|------------------|------------------|---------------------------------|-----|
| | | | Rank | Min | Max | @I _F , V _{CE} | | | UL | TÜV | VDE | BSI | IEC |
| TLP629 | | DIP 4 pin High input current 150 mA I _F rating DC input | — | 20 | 80 | 100 mA, 1 V | 55 V | 5000 Vrms | ○ | △ EN 60747 | △ EN 60747 | △ EN 60065 EN 60950 | |
| TLP320 | | DIP 4 pin High input current AC input 150 mA I _F rating | — | 20 | 80 | ±100 mA, 1 V | 55 V | 5000 Vrms | ○ | | | ◎ EN 60950 | |
| TLP330 | | DIP 6 pin High input current AC input 150 mA I _F rating | — | 20 | 80 | ±100 mA, 1 V | 55 V | 5000 Vrms | ○ | | | | |
| TLP628 | | DIP 4 pin High V _{CEO} V _{CEO} = 350 V | — | 50 | 600 | 5 mA, 5 V | 350 V | 5000 Vrms | ○ | △ EN 60747 | △ EN 60747 | △ EN 60065 EN 60950 | |
| | | | GB | 100 | | | | | | | | | |

Note (2): In the safety standard column:

○: Approved ◎: SELV-approved △: Design which meets safety standard (as of 04/6) TÜV and VDE: EN60747-5-2-approved with option D4.

(Low Input Type)

| Part Number | Pin Configuration | Features | CTR (%) | | | | V _{CEO} | BV _s | Safety Standards ⁽²⁾ | | | | |
|-------------|--|--|---------|-----|------|-----------------------------------|------------------|-----------------|---------------------------------|------------------|------------------|---------------------------------|----------------|
| | | | Rank | Min | Max | @I _F , V _{CE} | | | UL | TÜV | VDE | BSI | IEC |
| TLP124 |  | Mini-flat MFSOP6 Low input current | — | 100 | 1200 | 1 mA, 0.5 V | 80 V | 3750 Vrms | ○ | | | | |
| | | | BV | 200 | | | | | | | | | |
| TLP126 |  | Mini-flat MFSOP6 AC input Low input current | — | 100 | 1200 | ±1 mA, 0.5 V | 80 V | 3750 Vrms | ○ | | | | |
| | | | BV | 200 | | | | | | | | | |
| TLP624 |  | DIP 4 pin Low input current BSI-approved | — | 100 | 1200 | 1 mA, 0.5 V | 55 V | 5000 Vrms | ○ | △ EN 60747 | △ EN 60747 | ◎ EN 60065 EN 60950 | △ 65 950 |
| | | | BV | 200 | | | | | | | | | |
| TLP626 |  | DIP 4 pin Low input current AC input BSI-approved | — | 100 | 1200 | ±1 mA, 0.5 V | 55 V | 5000 Vrms | ○ | △ EN 60747 | △ EN 60747 | ◎ EN 60065 EN 60950 | △ 65 950 |
| | | | BV | 200 | | | | | | | | | |
| TLP137 |  | Mini-flat MFSOP6 Low input current Internal base connection | — | 100 | 1200 | 1 mA, 0.5 V | 80 V | 3750 Vrms | ○ | | | | |
| | | | BV | 200 | | | | | | | | | |
| TLP331 |  | DIP 6 pin Low input current Internal base connection | — | 100 | 1200 | 1 mA, 0.5 V | 55 V | 5000 Vrms | ○ | | | | |
| | | | BV | 200 | | | | | | | | | |
| TLP332 |  | DIP 6 pin Low input current No internal base connection | — | 100 | 1200 | 1 mA, 0.5 V | 55 V | 5000 Vrms | ○ | | | | |
| | | | BV | 200 | | | | | | | | | |

Note (2): In the safety standard column:

○: Approved ◎: SELV-approved △: Design which meets safety standard (as of 04/6) TÜV and VDE: EN60747-5-2-approved with option D4.

(1-Channel Type (other than those above))

| Part Number | Pin Configuration | Features | CTR (%) | | | | V _{CEO} | BV _s | Safety Standards ⁽²⁾ | | | | |
|-----------------------|-------------------|---|---------|-----|-----|-----------------------------------|------------------|-----------------|---------------------------------|------------------|------------------|---------------------------------|--------------------------------------|
| | | | Rank | Min | Max | @I _F , V _{CE} | | | UL | TÜV | VDE | BSI | IEC |
| TLP321 | | 4-pin small package High V _{CEO} | — | 50 | 600 | 5 mA, 5 V | 80 V | 5000 Vrms | ○ | | | | |
| | | | Y | 50 | 150 | | | | | | | | |
| | | | GR | 100 | 300 | | | | | | | | |
| | | | BL | 200 | 600 | | | | | | | | |
| | | | GB | 100 | | | | | | | | | |
| TLP521-1 | | DIP 4 pin General-purpose | A | 50 | 600 | 5 mA, 5 V | 55 V | 2500 Vrms | ○ | | | | |
| | | | Y | 50 | 150 | | | | | | | | |
| | | | GR | 100 | 300 | | | | | | | | |
| | | | BL | 200 | 600 | | | | | | | | |
| | | | GB | 100 | | | | | | | | | |
| | | | YH | 75 | 150 | | | | | | | | |
| | | | GRL | 100 | 200 | | | | | | | | |
| | | | GRH | 150 | 300 | | | | | | | | |
| | | | BLL | 200 | 400 | | | | | | | | |
| TLP621 TLP621F | | DIP 4 pin High isolation voltage UL-recognized (double protection) EN60747 approved with option (D4) SEMKO-approved | — | 50 | 600 | 5 mA, 5 V | 55 V | 5000 Vrms | ○ | △ EN 60747 | ◎ EN 60747 | ◎ EN 60065 EN 60950 | △ 65 950 435 ⁽⁴⁾ |
| | | | Y | 50 | 150 | | | | | | | | |
| | | | GR | 100 | 300 | | | | | | | | |
| | | | BL | 200 | 600 | | | | | | | | |
| | | | GB | 100 | | | | | | | | | |
| | | | YH | 75 | 150 | | | | | | | | |
| | | | GRL | 100 | 200 | | | | | | | | |
| | | | GRH | 150 | 300 | | | | | | | | |
| | | | BLL | 200 | 400 | | | | | | | | |
| TLP120 ⁽³⁾ | | Mini-flat MFSOP6 AC input | — | 50 | 600 | ±5 mA, 5 V | 80 V | 3750 Vrms | ○ | | | | |
| | | | Y | 50 | 150 | | | | | | | | |
| | | | GR | 100 | 300 | | | | | | | | |
| | | | BL | 200 | 600 | | | | | | | | |
| | | | GB | 100 | | | | | | | | | |
| TLP130 ⁽³⁾ | | Mini-flat MFSOP6 AC input Internal base connection | — | 50 | 600 | ±5 mA, 5 V | 80 V | 3750 Vrms | ○ | | | | |
| | | | Y | 50 | 150 | | | | | | | | |
| | | | GR | 100 | 300 | | | | | | | | |
| | | | BL | 200 | 600 | | | | | | | | |
| | | | GB | 100 | | | | | | | | | |
| TLP131 ⁽³⁾ | | Mini-flat MFSOP6 General-purpose Internal base connection | — | 50 | 600 | 5 mA, 5 V | 80 V | 3750 Vrms | ○ | | | | |
| | | | Y | 50 | 150 | | | | | | | | |
| | | | GR | 100 | 300 | | | | | | | | |
| | | | BL | 200 | 600 | | | | | | | | |
| | | | GB | 100 | | | | | | | | | |
| TLP630 ⁽³⁾ | | DIP 6 pin AC input High isolation voltage | — | 50 | 600 | ±5 mA, 5 V | 55 V | 5000 Vrms | ○ | | | | |
| | | | Y | 50 | 150 | | | | | | | | |
| | | | GR | 100 | 300 | | | | | | | | |
| | | | BL | 200 | 600 | | | | | | | | |
| | | | GB | 100 | | | | | | | | | |
| TLP631 ⁽³⁾ | | DIP 6 pin General-purpose Internal base connection | — | 50 | 600 | 5 mA, 5 V | 55 V | 5000 Vrms | ○ | | | | |
| | | | Y | 50 | 150 | | | | | | | | |
| | | | GR | 100 | 300 | | | | | | | | |
| | | | BL | 200 | 600 | | | | | | | | |
| | | | GB | 100 | | | | | | | | | |
| TLP632 ⁽³⁾ | | DIP 6 pin General-purpose No internal base connection | — | 50 | 600 | 5 mA, 5 V | 55 V | 5000 Vrms | ○ | | | | |
| | | | Y | 50 | 150 | | | | | | | | |
| | | | GR | 100 | 300 | | | | | | | | |
| | | | BL | 200 | 600 | | | | | | | | |
| | | | GB | 100 | | | | | | | | | |
| TLP731 ⁽³⁾ | | DIP 6 pin EN60747-approved with option (D4) | — | 50 | 600 | 5 mA, 5 V | 55 V | 4000 Vrms | ○ | △ EN 60747 | ◎ EN 60747 | ◎ EN 60065 EN 60950 | △ 435 ⁽⁴⁾ |
| | | | Y | 50 | 150 | | | | | | | | |
| | | | GR | 100 | 300 | | | | | | | | |
| | | | BL | 200 | 600 | | | | | | | | |
| | | | GB | 100 | | | | | | | | | |
| TLP732 ⁽³⁾ | | DIP 6 pin EN60747-approved with option (D4) No internal base connection | — | 50 | 600 | 5 mA, 5 V | 55 V | 4000 Vrms | ○ | △ EN 60747 | ◎ EN 60747 | ◎ EN 60065 EN 60950 | △ 435 ⁽⁴⁾ |
| | | | Y | 50 | 150 | | | | | | | | |
| | | | GR | 100 | 300 | | | | | | | | |
| | | | BL | 200 | 600 | | | | | | | | |
| | | | GB | 100 | | | | | | | | | |

Note (2): In the safety standard column:

○: Approved ◎: SELV-approved △: Design which meets safety standard (as of 04/6) TÜV and VDE: EN60747-5-2-approved with option D4.

Note (3): The products with the ranks Y and BL are limited in production. For details, please contact your nearest Toshiba sales office.

Note (4): TLP621F only

Note (6): The IEC435 is approved after the leads of the devices are formed (LF2).

| Part Number | Pin Configuration | Features | CTR (%) | | | | V _{CEO} | BV _s | Safety Standards ⁽²⁾ | | | | |
|---|-------------------|--|---------|-----|-----|-----------------------------------|------------------|-----------------|---------------------------------|------------------|------------------|---------------------------------|--------------------------------|
| | | | Rank | Min | Max | @I _F , V _{CE} | | | UL | TUV | VDE | BSI | IEC |
| TLP733 ⁽³⁾ TLP733F ⁽³⁾ | | DIP 6 pin EN60747-approved with option (D4) SEMKO-approved | — | 50 | 600 | 5 mA, 5 V | 55 V | 4000 Vrms | ○ | △ EN 60747 | ◎ EN 60747 | ◎ EN 60065 EN 60950 | △ 435 ⁽⁴⁾ 950 |
| | | | Y | 50 | 150 | | | | | | | | |
| | | | GR | 100 | 300 | | | | | | | | |
| | | | BL | 200 | 600 | | | | | | | | |
| | | | GB | 100 | | | | | | | | | |
| TLP734 ⁽³⁾ TLP734F ⁽³⁾ | | DIP 6 pin EN60747-approved with option (D4) SEMKO-approved No internal base connection | — | 50 | 600 | 5 mA, 5 V | 55 V | 4000 Vrms | ○ | △ EN 60747 | ◎ EN 60747 | ◎ EN 60065 EN 60950 | △ 435 ⁽⁴⁾ 950 |
| | | | Y | 50 | 150 | | | | | | | | |
| | | | GR | 100 | 300 | | | | | | | | |
| | | | BL | 200 | 600 | | | | | | | | |
| | | | GB | 100 | | | | | | | | | |
| CNY17-2 | | Direct replacement for CNY17 Series | — | 63 | 125 | 10 mA, 5 V | 70 V | 2500 Vrms | △ | | | | |
| CNY17-3 | | | — | 100 | 200 | | | | | | | | |
| CNY17-4 | | | — | 160 | 320 | | | | | | | | |

Note (2): In the safety standard column:

○: Approved ◎: SELV-approved △: Design which meets safety standard (as of 04/6) TUV and VDE: EN60747-5-2-approved with option D4.

Note (3): The products with the ranks Y and BL are limited in production. For details, please contact your nearest Toshiba sales office.

Note (4): TLP734F only

Note (6): TLP733F only

(2-Channel Type)

| Part Number | Pin Configuration | Features | CTR (%) | | | | V _{CEO} | BV _s | Safety Standards ⁽²⁾ | | | | |
|-------------------------|-------------------|---|---------|-----|------|-----------------------------------|------------------|-----------------|---------------------------------|------------------|------------------|---------------------------------|-----------------------|
| | | | Rank | Min | Max | @I _F , V _{CE} | | | UL | TUV | VDE | BSI | IEC |
| TLP504A | | DIP 8 pin General-purpose | — | 50 | 600 | 5 mA, 5 V | 55 V | 2500 Vrms | ○ | | | | |
| | | | GB | 100 | | | | | | | | | |
| TLP321-2 ⁽⁵⁾ | | 2 channels of the TLP321 | — | 50 | 600 | 5 mA, 5 V | 80 V | 5000 Vrms | ○ | | | | |
| | | | GR | 100 | 300 | | | | | | | | |
| | | | BL | 200 | 600 | | | | | | | | |
| | | | GB | 100 | | | | | | | | | |
| TLP521-2 ⁽⁵⁾ | | DIP 8 pin 2 channels of the TLP521-1 | A | 50 | 600 | 5 mA, 5 V | 55 V | 2500 Vrms | ○ | | | | |
| | | | Y | 50 | 150 | | | | | | | | |
| | | | GR | 100 | 300 | | | | | | | | |
| | | | BL | 200 | 600 | | | | | | | | |
| | | | GB | 100 | | | | | | | | | |
| TLP621-2 ⁽⁵⁾ | | DIP 8 pin 2 channels of the TLP621 EN60747 approved with option (D4) SEMKO-approved | — | 50 | 600 | 5 mA, 5 V | 55 V | 5000 Vrms | ○ | △ EN 60747 | ◎ EN 60747 | ◎ EN 60065 EN 60950 | △ 65 950 435 |
| | | | Y | 50 | 150 | | | | | | | | |
| | | | GR | 100 | 300 | | | | | | | | |
| | | | BL | 200 | 600 | | | | | | | | |
| | | | GB | 100 | | | | | | | | | |
| TLP624-2 | | DIP 8 pin 2 channels of the TLP624 BSI-approved | — | 100 | 1200 | 1 mA, 0.5 V | 55 V | 5000 Vrms | ○ | △ EN 60747 | △ EN 60747 | ◎ EN 60065 EN 60950 | △ 65 950 |
| | | | BV | 200 | | | | | | | | | |
| TLP628-2 | | DIP 8 pin 2 channels of the TLP628 | — | 50 | 600 | 5 mA, 5 V | 350 V | 5000 Vrms | ○ | △ EN 60747 | △ EN 60747 | △ EN 60065 EN 60950 | |
| | | | GB | 100 | | | | | | | | | |
| TLP629-2 | | DIP 8 pin 2 channels of the TLP629 | — | 20 | 80 | 100 mA, 1 V | 55 V | 5000 Vrms | ○ | △ EN 60747 | △ EN 60747 | △ EN 60065 EN 60950 | |

Note (2): In the safety standard column:

○: Approved ◎: SELV-approved △: Design which meets safety standard (as of 04/6) TUV and VDE: EN60747-5-2-approved with option D4.

Note (3): The products with the ranks Y and BL are limited in production. For details, please contact your nearest Toshiba sales office.

Note (5): The products with the ranks BL are limited in production. For details, please contact your nearest Toshiba sales office.

(2-Channel Type with AC Input)

| Part Number | Pin Configuration | Features | CTR (%) | | | | V _{CEO} | BV _s | Safety Standards ⁽²⁾ | | | | |
|-------------|-------------------|---|---------|-----|------|-----------------------------------|------------------|-----------------|---------------------------------|------------------|------------------|---------------------------------|----------|
| | | | Rank | Min | Max | @I _F , V _{CE} | | | UL | TUV | VDE | BSI | IEC |
| TLP620-2 | | DIP 8 pin 2 channels of the TLP620 EN60747 approved with option (D4) SEMKO-approved | — | 50 | 600 | ±5 mA, 5 V | 55 V | 5000 Vrms | ○ | △ EN 60747 | ⊙ EN 60747 | ⊙ EN 60065 EN 60950 | △ 950 |
| | | | GB | 100 | | | | | | | | | |
| TLP626-2 | | DIP 8 pin 2 channels of the TLP626 BSI-approved | — | 100 | 1200 | ±1 mA, 0.5 V | 55 V | 5000 Vrms | ○ | △ EN 60747 | △ EN 60747 | ⊙ EN 60065 EN 60950 | △ 950 |
| | | | BV | 200 | | | | | | | | | |
| TLP320-2 | | DIP 8 pin 2 channels of the TLP320 | — | 20 | 80 | ±100 mA, 1 V | 55 V | 5000 Vrms | ○ | | | ⊙ EN 60950 | |

Note (2): In the safety standard column:

○: Approved ⊙: SELV-approved △: Design which meets safety standard (as of 04/6) TUV and VDE: EN60747-5-2-approved with option D4.

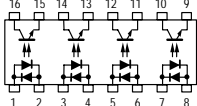
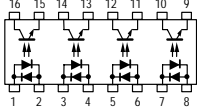
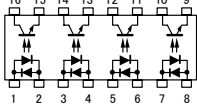
(4-Channel Type)

| Part Number | Pin Configuration | Features | CTR (%) | | | | V _{CEO} | BV _s | Safety Standards ⁽²⁾ | | | | |
|-------------|-------------------|--|---------|-----|------|-----------------------------------|------------------|-----------------|---------------------------------|------------------|------------------|---------------------------------|-----------------|
| | | | Rank | Min | Max | @I _F , V _{CE} | | | UL | TUV | VDE | BSI | IEC |
| TLP321-4 | | 4 channels of the TLP321 | — | 50 | 600 | 5 mA, 5 V | 80 V | 5000 Vrms | ○ | | | | |
| | | | GB | 100 | | | | | | | | | |
| TLP521-4 | | DIP 16 pin 4 channels of the TLP521-1 | A | 50 | 600 | 5 mA, 5 V | 55 V | 2500 Vrms | ○ | | | | |
| | | | GB | 100 | | | | | | | | | |
| TLP621-4 | | DIP 16 pin 4 channels of the TLP621 EN60747 approved with option (D4) | — | 50 | 600 | 5 mA, 5 V | 55 V | 5000 Vrms | ○ | △ EN 60747 | ⊙ EN 60747 | ⊙ EN 60065 EN 60950 | △ 950 435 |
| | | | GB | 100 | | | | | | | | | |
| TLP624-4 | | DIP 16 pin 4 channels of the TLP624 BSI-approved | — | 100 | 1200 | 1 mA, 0.5 V | 55 V | 5000 Vrms | ○ | △ EN 60747 | △ EN 60747 | ⊙ EN 60065 EN 60950 | △ 950 |
| | | | BV | 200 | | | | | | | | | |
| TLP628-4 | | DIP 16 pin 4 channels of the TLP628 | — | 50 | 600 | 5 mA, 5 V | 350 V | 5000 Vrms | ○ | △ EN 60747 | △ EN 60747 | △ EN 60065 EN 60950 | |
| | | | GB | 100 | | | | | | | | | |
| TLP629-4 | | DIP 16 pin 4 channels of the TLP629 | — | 20 | 80 | 100 mA, 1 V | 55 V | 5000 Vrms | ○ | △ EN 60747 | △ EN 60747 | △ EN 60065 EN 60950 | |

Note (2): In the safety standard column:

○: Approved ⊙: SELV-approved △: Design which meets safety standard (as of 04/6) TUV and VDE: EN60747-5-2-approved with option D4.

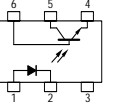
(4-Channel Type with AC Input)

| Part Number | Pin Configuration | Features | CTR (%) | | | | V _{CEO} | BV _s | Safety Standards ⁽²⁾ | | | | |
|-------------|---|--|---------|-----|------|-----------------------------------|------------------|-----------------|---------------------------------|------------------|------------------|---------------------------------|----------------|
| | | | Rank | Min | Max | @I _F , V _{CE} | | | UL | TÜV | VDE | BSI | IEC |
| TLP620-4 |  | DIP 16 pin 4 channels of the TLP620 EN60747 approved with option (D4) | — | 50 | 600 | ±5 mA, 5 V | 55 V | 5000 Vrms | ○ | △ EN 60747 | ◎ EN 60747 | ◎ EN 60065 EN 60950 | △ 65 950 |
| | | | GB | 100 | | | | | | | | | |
| TLP626-4 |  | DIP 16 pin 4 channels of the TLP626 BSI-approved | — | 100 | 1200 | ±1 mA, 0.5 V | 55 V | 5000 Vrms | ○ | △ EN 60747 | △ EN 60747 | ◎ EN 60065 EN 60950 | △ 65 950 |
| | | | BV | 200 | | | | | | | | | |
| TLP320-4 |  | DIP 16 pin 4 channels of the TLP320 | — | 20 | 80 | ±100 mA, 1 V | 55 V | 5000 Vrms | ○ | | | ◎ EN 60950 | |

Note (2): In the safety standard column:

○: Approved ◎: SELV-approved △: Design which meets safety standard (as of 04/6) TÜV and VDE: EN60747-5-2-approved with option D4.

(JEDEC Type)

| Part Number | Pin Configuration | Features | CTR (%) | | | | V _{CEO} | BV _s | Safety Standards ⁽²⁾ | | | | | |
|---------------|--|---|---|-----|-----|-----------------------------------|------------------|-----------------|---------------------------------|-----|-----|-----|-----|--|
| | | | Rank | Min | Max | @I _F , V _{CE} | | | UL | TÜV | VDE | BSI | IEC | |
| 4N25 (SHORT) |  | JEDEC type 4N25 (short) can be used in place of products 25A to 28. | — | 20 | — | 10 mA, 10 V | 30 V | 2500 Vrms | ○ | | | | | |
| 4N25A (SHORT) | | | | | | | | | | | | | | |
| 4N26 (SHORT) | | | | | | | | | | | | | | |
| 4N27 (SHORT) | | | | | | | | | | | | | | |
| 4N28 (SHORT) | | | | | | | | | | | | | | |
| 4N35 (SHORT) | | | JEDEC type 4N35 (short) can be used in place of products 36 and 37. | — | 100 | — | | | ○ | | | | | |
| 4N36 (SHORT) | | | | | | | | | | | | | | |
| 4N37 (SHORT) | | | | | | | | | | | | | | |
| 4N38 (SHORT) | | | | | | | | | | | | | | |
| 4N38A (SHORT) | | JEDEC type 4N38 (short) can be used in place of 4N38A (short). | — | 10 | — | | 80 V | ○ | | | | | | |

Note (2): In the safety standard column:

○: Approved ◎: SELV-approved △: Design which meets safety standard (as of 04/6) TÜV and VDE: EN60747-5-2-approved with option D4.

Darlington Transistor Output Devices (4-Pin Outline Type)

| Part Number | Pin Configuration | Features | CTR (%) | | V _{CE(sat)} (V) | | V _{CEO} | BV _s | Safety Standards ⁽²⁾ | | | | |
|-------------|-------------------|--|---------|-----------------------------------|--------------------------|----------------------------------|------------------|-----------------|---------------------------------|------------------|------------------|---------------------------------|----------------|
| | | | Min | @I _F , V _{CE} | Max | @I _C , I _F | | | UL | TUV | VDE | BSI | IEC |
| TLP127 | | Mini-flat MFSOP6 High V _{CEO} | 1000 | 1 mA, 1 V | 1.2 | 100 mA, 10 mA | 300 V | 2500 Vrms | ○ | △ ⁽¹⁾ | △ | ◎ EN 60950 | |
| TLP627 | | DIP 4 pin High V _{CEO} BSI-approved SEMKO-approved | 1000 | 1 mA, 1 V | 1.2 | 100 mA, 10 mA | 300 V | 5000 Vrms | ○ | △ EN 60747 | ◎ EN 60747 | ◎ EN 60065 EN 60950 | △ 65 950 |
| TLP523 | | DIP 4 pin General-purpose | 500 | 1 mA, 1 V | 1.0 | 50 mA, 10 mA | 55 V | 2500 Vrms | ○ | | | | |

Note (1): The EN60747-5-2 safety standard for compact packages is different from that for standard DIP packages. Since the mini flat package is a compact package, please contact your nearest Toshiba sales office for more details.

Note (2): In the safety standard column:

○: Approved ◎: SELV-approved △: Design which meets safety standard (as of 04/6) TUV and VDE: EN60747-5-2-approved with option D4.

(6-Pin Outline Type)

| Part Number | Pin Configuration | Features | CTR (%) | | V _{CE(sat)} (V) | | V _{CEO} | BV _s | Safety Standards ⁽²⁾ | | | | |
|-------------|-------------------|---|---------|-----------------------------------|--------------------------|----------------------------------|------------------|-----------------|---------------------------------|-----|-----|-----|-----|
| | | | Min | @I _F , V _{CE} | Max | @I _C , I _F | | | UL | TUV | VDE | BSI | IEC |
| TLP371 | | DIP 6 pin High V _{CEO} | 1000 | 1 mA, 1 V | 1.2 | 100 mA, 10 mA | 300 V | 5000 Vrms | ○ | | | | |
| TLP372 | | DIP 6 pin High V _{CEO} No internal base connection | | | | | | | | | | | |

Note (2): In the safety standard column:

○: Approved ◎: SELV-approved △: Design which meets safety standard (as of 04/6) TUV and VDE: EN60747-5-2-approved with option D4.

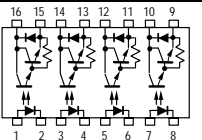
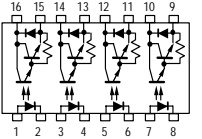
(2-Channel Type)

| Part Number | Pin Configuration | Features | CTR (%) | | V _{CE(sat)} (V) | | V _{CEO} | BV _s | Safety Standards ⁽²⁾ | | | | |
|-------------|-------------------|---|---------|-----------------------------------|--------------------------|----------------------------------|------------------|-----------------|---------------------------------|------------------|------------------|---------------------------------|----------------|
| | | | Min | @I _F , V _{CE} | Max | @I _C , I _F | | | UL | TUV | VDE | BSI | IEC |
| TLP523-2 | | DIP 8 pin 2 channels of the TLP523 | 500 | 1 mA, 1 V | 1.0 | 50 mA, 10 mA | 55 V | 2500 Vrms | ○ | | | | |
| TLP627-2 | | DIP 8 pin 2 channels of the TLP627 BSI-approved SEMKO-approved | 1000 | 1 mA, 1 V | 1.2 | 100 mA, 10 mA | 300 V | 5000 Vrms | ○ | △ EN 60747 | ◎ EN 60747 | ◎ EN 60065 EN 60950 | △ 65 950 |

Note (2): In the safety standard column:

○: Approved ◎: SELV-approved △: Design which meets safety standard (as of 04/6) TUV and VDE: EN60747-5-2-approved with option D4.

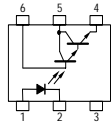
(4-Channel Type)

| Part Number | Pin Configuration | Features | CTR (%) | | VCE(sat) (V) | | VCEO | BV _s | Safety Standards ⁽²⁾ | | | | | |
|-------------|---|--|---------|-----------------------|--------------|----------------------------------|-------|-----------------|---------------------------------|------------------|------------------|---------------------------------|----------------|--|
| | | | Min | @I _F , VCE | Max | @I _C , I _F | | | UL | TÜV | VDE | BSI | IEC | |
| TLP523-4 |  | DIP 16 pin 4 channels of the TLP523 | 500 | 1 mA, 1 V | 1.0 | 50 mA, 10 mA | 55 V | 2500 Vrms | ○ | | | | | |
| TLP627-4 |  | DIP 16 pin 4 channels of the TLP627 BSI-approved | 1000 | 1 mA, 1 V | 1.2 | 100 mA, 10 mA | 300 V | 5000 Vrms | ○ | △ EN 60747 | ◎ EN 60747 | ◎ EN 60065 EN 60950 | △ 65 950 | |

Note (2): In the safety standard column:

○: Approved ◎: SELV-approved △: Design which meets safety standard (as of 04/6) TÜV and VDE: EN60747-5-2-approved with option D4.

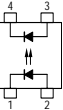
(JEDEC Type)

| Part Number | Pin Configuration | Features | CTR (%) | | VCE(sat) (V) | | VCEO | BV _s | Safety Standards ⁽²⁾ | | | | | |
|---------------|---|---|---------|-----------------------|--------------|----------------------------------|------|-----------------|---------------------------------|-----|-----|-----|-----|--|
| | | | Min | @I _F , VCE | Max | @I _C , I _F | | | UL | TÜV | VDE | BSI | IEC | |
| 4N29 (SHORT) |  | JEDEC type 4N29 (short) can be used in place of products 29A to 31. | 100 | 10 mA, 10 V | 1.0 | 2 mA, 8 mA | 30 V | 2500 Vrms | ○ | | | | | |
| 4N29A (SHORT) | | | 50 | | 1.2 | | | | | | | | | |
| 4N30 (SHORT) | | JEDEC type 4N32 (short) can be used in place of products 32A and 33. | 500 | 1.0 | | | | | | | | | | |
| 4N31 (SHORT) | | | | | | | | | | | | | | |
| 4N32 (SHORT) | | | | | | | | | | | | | | |
| 4N33 (SHORT) | | | | | | | | | | | | | | |

Note (2): In the safety standard column:

○: Approved ◎: SELV-approved △: Design which meets safety standard (as of 04/6) TÜV and VDE: EN60747-5-2-approved with option D4.

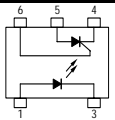
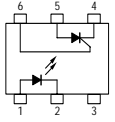
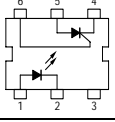
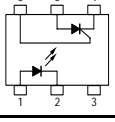
Diode Output Devices

| Part Number | Pin Configuration | Features | CTR (%) | | I _{LEAK} (nA) | | V _{KAO} | BV _s | Safety Standards ⁽²⁾ | | | | | |
|-------------|---|---|---------|-----------------|------------------------|-------------------|------------------|-----------------|---------------------------------|------------------|------------------|---------------------------------|-----|--|
| | | | Min | @I _F | Max | @V _{KAO} | | | UL | TÜV | VDE | BSI | IEC | |
| TLP722 |  | DIP 4 pin High-speed SEMKO-approved | 0.1 | 10 mA | 50 nA | 10 V | 30 V | 4000 Vrms | ○ | △ EN 60747 | △ EN 60747 | △ EN 60065 EN 60950 | | |

Note (2): In the safety standard column:

○: Approved ◎: SELV-approved △: Design which meets safety standard (as of 04/6) TÜV and VDE: EN60747-5-2-approved with option D4.

Thyristor Output Devices (AC 100 to 120 V Line Type)

| Part Number | Pin Configuration | Features | I _{FT} | V _{TM} | | V _{DRM} | BV _S | Safety Standards ⁽²⁾ | | | | | |
|---------------------|---|--|-----------------|-----------------|--------|------------------|--------------------------|---------------------------------|------------------|------------------|---------------------------------|--------------------------------|--|
| | | | Max (mA) | Max (V) | @ITM | | | UL | TÜV | VDE | BSI | IEC | |
| TLP141G |  | Mini-flat MFSOP6 General-purpose | 10 | 1.3 | 100 mA | 400 V | 2500 V _{rms} | ○ | | | | | |
| TLP541G |  | DIP 6 pin General-purpose Low I _{FT} | 7 | 1.3 | 100 mA | 400 V | 2500 V _{rms} | ○ | | | | | |
| TLP741G |  | DIP 6 pin EN60747-approved with option (D4) | 10 | 1.3 | 100 mA | 400 V | 4000 V _{rms} | ○ | △ EN 60747 | ⊙ EN 60747 | ⊙ EN 60065 EN 60950 | △ 435 ⁽⁵⁾ 950 | |
| TLP747G TLP747GF |  | DIP 6 pin EN60747-approved with option (D4) Internal creepage: 4 mm (min) SEMKO-approved | 15 | 1.3 | 100 mA | 400 V | 4000 V _{rms} | ○ | △ EN 60747 | ⊙ EN 60747 | ⊙ EN 60065 EN 60950 | △ 435 ⁽⁵⁾ 950 | |

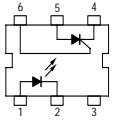
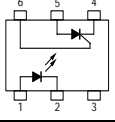
Note (2): In the safety standard column:

○: Approved ⊙: SELV-approved △: Design which meets safety standard (as of 04/6) TÜV and VDE: EN60747-5-2-approved with option D4.

Note (4): TLP747GF/JF only

Note (5): TLP741G(LF2)/J(LF2) only

(AC 200 to 240 V Line Type)

| Part Number | Pin Configuration | Features | I _{FT} | V _{TM} | | V _{DRM} | BV _S | Safety Standards ⁽²⁾ | | | | |
|---------------------|---|--|-----------------|-----------------|--------|------------------|--------------------------|---------------------------------|------------------|------------------|---------------------------------|--------------------------------|
| | | | Max (mA) | Max (V) | @ITM | | | UL | TÜV | VDE | BSI | IEC |
| TLP741J |  | DIP 6 pin EN60747-approved with option (D4) | 10 | 1.3 | 100 mA | 600 V | 4000 V _{rms} | ○ | △ EN 60747 | ⊙ EN 60747 | ⊙ EN 60065 EN 60950 | △ 435 ⁽⁵⁾ 950 |
| TLP747J TLP747JF |  | DIP 6 pin EN60747-approved with option (D4) Internal creepage: 4 mm (min) SEMKO-approved | 15 | 1.3 | 100 mA | 600 V | 4000 V _{rms} | ○ | △ EN 60747 | ⊙ EN 60747 | ⊙ EN 60065 EN 60950 | △ 435 ⁽⁵⁾ 950 |

Note (2): In the safety standard column:

○: Approved ⊙: SELV-approved △: Design which meets safety standard (as of 04/6) TÜV and VDE: EN60747-5-2-approved with option D4.

Note (4): TLP747GF/JF only

Note (5): TLP741G(LF2)/J(LF2) only

Triac Output Devices (For SSR)

| Part Number | Pin Configuration | Features | IFT | | V _{TM} | | ZC ⁽⁵⁾ | V _{DRM} | BVs | Safety Standards ⁽²⁾ | | | | |
|-----------------------------------|-------------------|--|------|----------|-----------------|-------|-------------------|------------------|--------------|---------------------------------|------------------|-----|-----|-----|
| | | | Rank | Max (mA) | Max (V) | @ITM | | | | UL | TÜV | VDE | BSI | IEC |
| TLP260J | | Mini-flat MFSOP6 Non-zero-voltage turn-on | — | 10 | 2.8 | 70 mA | | 600 V | 3000 Vrms | ○ | △ ⁽¹⁾ | ○ | | |
| TLP160G | | Mini-flat MFSOP6 Non-zero-voltage turn-on | — | 10 | | | | | | | | | | |
| | | | IFT7 | 7 | | | | | | | | | | |
| | | | IFT5 | 5 | | | | | | | | | | |
| TLP161G | | Mini-flat MFSOP6 Zero-voltage turn-on | — | 10 | | | | | | | | | | |
| | | | IFT7 | 7 | | | | | | | | | | |
| | | | IFT5 | 5 | | | | | | | | | | |
| TLP160J TLP165J ⁽¹⁾ | | Mini-flat MFSOP6 Non-zero-voltage turn-on | — | 10 | | | | | | | | | | |
| | | | IFT7 | 7 | | | | | | | | | | |
| TLP161J TLP166J ⁽¹⁾ | | Mini-flat MFSOP6 Zero-voltage turn-on | — | 10 | | | | | | | | | | |
| | | | IFT7 | 7 | | | | | | | | | | |
| TLP168J | | Mini-flat MFSOP6 Zero-voltage turn-on Low IFT | — | 3 | | | | | | | | | | |

Note (1): The EN60747-5-2 safety standard for compact packages is different from that for standard DIP packages. Since the mini flat package is a compact package, please contact your nearest Toshiba sales office for more details.

Note (2): In the safety standard column:

○: Approved ◎: SELV-approved △: Design which meets safety standard (as of 04/6) TÜV and VDE: EN60747-5-2-approved with option D4.

Note (4): TLP165J/166J only

Note (5): Zero Cross circuit

(For OA)

| Part Number | Pin Configuration | Features | IFT | | V _{TM} | | ZC ⁽⁵⁾ | V _{DRM} | BVs | Safety Standards ⁽²⁾ | | | | |
|---------------------------|-------------------|---|------|----------|-----------------|-------|-------------------|------------------|--------------|---------------------------------|--------------|-----|-----|-----|
| | | | Rank | Max (mA) | Max (V) | @ITM | | | | UL | TÜV | VDE | BSI | IEC |
| * TLP360J * TLP360JF | | DIP 4 pin Non-zero-voltage turn-on EN60747-approved with option (D4) | — | 10 | 2.8 | 70 mA | | 600 V | 5000 Vrms | ○ | ◎ EN60747 | △ | | |
| | | | IFT7 | 7 | | | | | | | | | | |
| ** TLP361J ** TLP361JF | | DIP 4 pin Zero-voltage turn-on EN60747-approved with option (D4) | — | 10 | 2.8 | 70 mA | ○ | 600 V | 5000 Vrms | ○ | ◎ EN60747 | △ | | |
| | | | IFT7 | 7 | | | | | | | | | | |

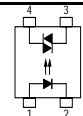
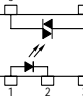
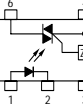
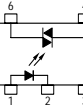
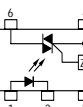
*: New product

** : Under development

Note (2): In the safety standard column:

○: Approved ◎: SELV-approved △: Design which meets safety standard (as of 04/6) TÜV and VDE: EN60747-5-2-approved with option D4.

(AC 100 to 120 V Line Type)

| Part Number | Pin Configuration | Features | IFT | | V _{TM} | | ZC ⁽⁵⁾ | V _{DRM} | BV _s | Safety Standards ⁽²⁾ | | | | |
|---------------------------|---|--|------|----------|-----------------|------------------|-------------------|------------------|-----------------|---------------------------------|------------------|------------------|---------------------------------|----------|
| | | | Rank | Max (mA) | Max (V) | @I _{TM} | | | | UL | TÜV | VDE | BSI | IEC |
| TLP525G |  | DIP 4 pin | — | 10 | 3.0 | 100 mA | | 400 V | 2500 Vrms | ○ | | | | |
| TLP560G |  | DIP 6 pin General-purpose Non-zero-voltage turn-on | — | 10 | 3.0 | 100 mA | | 400 V | 2500 Vrms | ○ | | | | |
| | | | IFT7 | 7 | | | | | | | | | | |
| | | | IFT5 | 5 | | | | | | | | | | |
| TLP561G |  | DIP 6 pin General-purpose Zero-voltage turn-on | — | 10 | 3.0 | 100 mA | ○ | 400 V | 2500 Vrms | ○ | | | | |
| | | | IFT7 | 7 | | | | | | | | | | |
| | | | IFT5 | 5 | | | | | | | | | | |
| TLP3022(S) TLP3022F(S) |  | DIP 6 pin Direct replacement for XXX3020/3021/3022 EN60747-approved SEMKO-approved | — | 10 | 3.0 | 100 mA | | 400 V | 5000 Vrms | ○ | △ EN 60747 | ◎ EN 60747 | ◎ EN 60065 EN 60950 | △ 950 |
| TLP3023(S) TLP3023F(S) | | DIP 6 pin Direct replacement for XXX3023 EN60747-approved SEMKO-approved | — | 5 | | | | | | | | | | |
| TLP3042(S) TLP3042F(S) |  | DIP 6 pin Direct replacement for XXX3040/3041/3042 EN60747-approved SEMKO-approved | — | 10 | 3.0 | 100 mA | ○ | 400 V | 5000 Vrms | ○ | △ EN 60747 | ◎ EN 60747 | ◎ EN 60065 EN 60950 | △ 950 |
| TLP3043(S) TLP3043F(S) | | DIP 6 pin Direct replacement for XXX3043 EN60747-approved SEMKO-approved | — | 5 | | | | | | | | | | |

Note (2): In the safety standard column:

○: Approved ◎: SELV-approved △: Design which meets safety standard (as of 04/6) TÜV and VDE: EN60747-5-2-approved with option D4.

Note (5): Zero Cross circuit

(AC 200 to 240 V Line Type)

| Part Number | Pin Configuration | Features | IFT | | V _{TM} | | ZC ⁽⁵⁾ | V _{DRM} | BVs | Safety Standards ⁽²⁾ | | | | |
|---------------------------|-------------------|--|------|----------|-----------------|--------|-------------------|------------------|-----------|---------------------------------|------------------|------------------|---------------------------------|--------------------------------|
| | | | Rank | Max (mA) | Max (V) | @ITM | | | | UL | TUV | VDE | BSI | IEC |
| TLP560J | | DIP 6 pin General-purpose Non-zero-voltage turn-on | — | 10 | 3.0 | 100 mA | | 600 V | 2500 Vrms | ○ | | | | |
| TLP561J | | DIP 6 pin General-purpose Zero-voltage turn-on Includes a Z.C. circuit. | — | 10 | 3.0 | 100 mA | ○ | 600 V | 2500 Vrms | ○ | | | | |
| TLP762J TLP762JF | | DIP 6 pin Internal creepage: 4 mm (min) EN60747-approved with option (D4) SEMKO-approved Non-zero-voltage turn-on | — | 10 | 3.0 | 100 mA | | 600 V | 4000 Vrms | ○ | △ EN 60747 | ◎ EN 60747 | ◎ EN 60065 EN 60950 | △ 435 ⁽⁴⁾ 950 |
| TLP763J TLP763JF | | DIP 6 pin Internal creepage: 4 mm (min) EN60747-approved with option (D4) SEMKO-approved Zero-voltage turn-on Includes a Z.C. circuit. | — | 10 | 3.0 | 100 mA | ○ | 600 V | 4000 Vrms | ○ | △ EN 60747 | ◎ EN 60747 | ◎ EN 60065 EN 60950 | △ 435 ⁽⁴⁾ 950 |
| TLP3052(S) TLP3052F(S) | | DIP 6 pin Direct replacement for XXX3052 EN60747-approved SEMKO-approved | — | 10 | 3.0 | 100 mA | | 600 V | 5000 Vrms | ○ | △ EN 60747 | ◎ EN 60747 | ◎ EN 60065 EN 60950 | △ 950 |
| TLP3062(S) TLP3062F(S) | | DIP 6 pin Direct replacement for XXX3060/3061/3062 EN60747-approved SEMKO-approved | — | 10 | 3.0 | 100 mA | ○ | 600 V | 5000 Vrms | ○ | △ EN 60747 | ◎ EN 60747 | ◎ EN 60065 EN 60950 | △ 950 |
| TLP3063(S) TLP3063F(S) | | DIP 6 pin Direct replacement for XXX3063 EN60747-approved SEMKO-approved | — | 5 | | | | | | | | | | |
| TLP3064(S) TLP3064F(S) | | DIP 6 pin Extra-low IFT EN60747-approved SEMKO-approved | — | 3 | | | | | | | | | | |

Note (2): In the safety standard column:

○: Approved ◎: SELV-approved △: Design which meets safety standard (as of 04/6) TUV and VDE: EN60747-5-2-approved with option D4.

Note (4): TLP762JF/763JF only

Note (5): Zero Cross circuit

(Multi-channel Type)

| Part Number | Pin Configuration | Features | IFT | | V _{TM} | | ZC ⁽⁵⁾ | V _{DRM} | BVs | Safety Standards ⁽²⁾ | | | | |
|-------------|-------------------|---|------|----------|-----------------|--------|-------------------|------------------|-----------|---------------------------------|-----|-----|-----|-----|
| | | | Rank | Max (mA) | Max (V) | @ITM | | | | UL | TUV | VDE | BSI | IEC |
| TLP525G-2 | | DIP 8 pin 2 channels of the TLP525G | — | 10 | 3.0 | 100 mA | | 400 V | 2500 Vrms | ○ | | | | |
| TLP525G-4 | | DIP 16 pin 4 channels of the TLP525G | — | 10 | | | | | | | | | | |

Note (2): In the safety standard column:

○: Approved ◎: SELV-approved △: Design which meets safety standard (as of 04/6) TUV and VDE: EN60747-5-2-approved with option D4.

Note (5): Zero Cross circuit

AC Power Output Devices (AC 100 to 120 V Line Type)

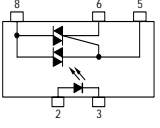
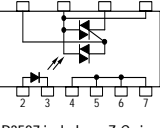
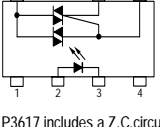
| Part Number | Pin Configuration | Features | IFT | | ITM | | VDRM | BVs | Safety Standards ⁽²⁾ | | | | | | | | | | |
|-------------|-------------------|--|------|----------|------------------------------|-------------------|-------|-----------|---------------------------------|-----|-----|-----|-----|-----------|---|--|--|--|--|
| | | | Rank | Max (mA) | @ Ta = 40°C | ZC ⁽⁵⁾ | | | UL | TUV | VDE | BSI | IEC | | | | | | |
| TLP3502 | | DIP 8 pin Direct control up to 0.5 Arms load Non-zero-voltage turn-on | — | 10 | 0.5 Arms | | 400 V | 2500 Vrms | ○ | | | | | | | | | | |
| | | | IFT7 | 7 | | | | | | | | | | | | | | | |
| | | | IFT5 | 5 | | | | | | | | | | | | | | | |
| TLP3502A | | DIP 8 pin Direct control up to 0.6 Arms load Non-zero-voltage turn-on | — | 10 | 0.6 Arms | | 400 V | | | | | | | 2500 Vrms | ○ | | | | |
| | | | IFT7 | 7 | | | | | | | | | | | | | | | |
| | | | IFT5 | 5 | | | | | | | | | | | | | | | |
| TLP3503 | | DIP 8 pin Direct control up to 0.5 Arms load Zero-voltage turn-on Includes a Z.C.circuit. | — | 10 | 0.5 Arms | ○ | 400 V | | | | | | | | | | | | |
| | | | IFT7 | 7 | | | | | | | | | | | | | | | |
| | | | IFT5 | 5 | | | | | | | | | | | | | | | |
| TLP3520 | | DIP 16 pin Direct control up to 1.0 Arms load Non-zero-voltage turn-on | — | 10 | 1 Arms | | 400 V | 2500 Vrms | ○ | | | | | | | | | | |
| | | | IFT7 | 7 | | | | | | | | | | | | | | | |
| | | | IFT5 | 5 | | | | | | | | | | | | | | | |
| TLP3520A | | DIP 16 pin Direct control up to 1.2 Arms load Non-zero-voltage turn-on | — | 10 | 1.2 Arms | | 400 V | | | | | | | 2500 Vrms | ○ | | | | |
| | | | IFT7 | 7 | | | | | | | | | | | | | | | |
| | | | IFT5 | 5 | | | | | | | | | | | | | | | |
| TLP3521 | | DIP 16 pin Direct control up to 1.0 Arms load Zero-voltage turn-on Includes a Z.C.circuit. | — | 10 | 1 Arms | ○ | 400 V | | | | | | | | | | | | |
| | | | IFT7 | 7 | | | | | | | | | | | | | | | |
| | | | IFT5 | 5 | | | | | | | | | | | | | | | |
| TLP3530 | | DIP 16 pin Two-channel type Direct control up to 1.0 Arms load (for 1 ch) / 1.4 Arms load (for 2 ch) Non-zero-voltage turn-on | — | 10 | 1 Arms [for 1 channel] | | 400 V | 2500 Vrms | ○ | | | | | | | | | | |
| | | | IFT7 | 7 | 1.4 Arms [for 2 channels] | | | | | | | | | | | | | | |

Note (2): In the safety standard column:

○: Approved ◎: SELV-approved △: Design which meets safety standard (as of 04/6) TUV and VDE: EN60747-5-2-approved with option D4.

Note (5): Zero Cross circuit

(AC 200 to 240 V Line Type)

| Part Number | Pin Configuration | Features | IFT | | ITM | | VDRM | BVs | Safety Standards ⁽²⁾ | | | | |
|-------------------------|--|---|------|----------|-------------|-------------------|-------|--------------|---------------------------------|------------------|-----|-----|-----|
| | | | Rank | Max (mA) | @ Ta = 40°C | ZC ⁽⁵⁾ | | | UL | TÜV | VDE | BSI | IEC |
| TLP3506 TLP3507 |  TLP3507 includes a Z.C.circuit. | DIP 8 pin Direct control up to 0.5 Arms load High V _{DRM} Zero-voltage turn-on (TLP3507) | — | 10 | 0.5 Arms | | 600 V | 2500 Vrms | ○ | | | | |
| TLP3526 TLP3527 |  TLP3527 includes a Z.C.circuit. | DIP 16 pin Direct control up to 1.0 Arms load High V _{DRM} Zero-voltage turn-on (TLP3527) | — | 10 | 1 Arms | | 600 V | | ○ | ◎ EN 60747 | △ | | |
| * TLP3616 ** TLP3617 |  TLP3617 includes a Z.C.circuit. | DIP 8 pin Direct control up to 1.0 Arms load High V _{DRM} Zero-voltage turn-on (TLP3617) | — | 10 | 1 Arms | | 600 V | | △ | | | | |

*: New product

** : Under development

Note (2): In the safety standard column:

○: Approved ◎: SELV-approved △: Design which meets safety standard (as of 04/6) TÜV and VDE: EN60747-5-2-approved with option D4.

Note (5): Zero Cross circuit

IC Output Devices (For Plasma Display Panel, FA)

| Part Number | Pin Configuration | Features | Data Rate (NRZ) (Typ.) | CTR | @If | BV _s | Safety Standards ⁽²⁾ | | | | |
|-------------|-------------------|--|---------------------------|--------------------------------------|------|-----------------|---------------------------------|-----|-----|-----|-----|
| | | | | | | | UL | TUV | VDE | BSI | IEC |
| ** TLP116 | | Mini-flat MFSOP6 High speed High CMR Low power dissipation | 35 ns | Totempole output (Inverter logic) | 5 mA | 3750 Vrms | ○ | | | | |

** : Under development

Note (2): In the safety standard column:

○: Approved ◎: SELV-approved △: Design which meets safety standard (as of 04/6) TUV and VDE: EN60747-5-2-approved with option D4.

(For IPM Driver)

| Part Number | Pin Configuration | Features | Data Rate (NRZ) (Typ.) | CTR | @If | BV _s | Safety Standards ⁽²⁾ | | | | |
|-----------------------------|-------------------|--|---------------------------|---|-------|-----------------|---------------------------------|------------------|------------------|---------------------------------|----------------|
| | | | | | | | UL | TUV | VDE | BSI | IEC |
| ** TLP106 | | Mini-flat MFSOP6 IPM direct drive High CMR | 250 ns | Totempole output (Buffer logic type) | 3 mA | 3750 Vrms | △ | | | | |
| TLP114A(IGM) | | Mini-flat MFSOP6 High CMR | 0.45 μs | 25% Min | 10 mA | 3750 Vrms | ○ | ○ ⁽¹⁾ | △ | | |
| TLP559(IGM) | | DIP 8 pin High CMR Internal shield | 0.45 μs | 25% Min | 10 mA | 2500 Vrms | ○ | | | | |
| TLP759(IGM) TLP759F(IGM) | | DIP 8 pin Internal shield EN60747-approved with option (D4) SEMKO-approved | 0.45 μs | 25% Min | 10 mA | 5000 Vrms | ○ | △ EN 60747 | ◎ EN 60747 | ◎ EN 60065 EN 60950 | △ 65 950 |

** : Under development

Note (1): The EN60747-5-2 safety standard for compact packages is different from that for standard DIP packages. Since the mini flat package is a compact package, please contact your nearest Toshiba sales office for more details.

Note (2): In the safety standard column:

○: Approved ◎: SELV-approved △: Design which meets safety standard (as of 04/6) TUV and VDE: EN60747-5-2-approved with option D4.

(For IGBT/MOSFET/Giant Transistor Drivers)

| Part Number | Pin Configuration | Features | Data Rate (NRZ) (Typ.) | CTR | @If | BV _s | Safety Standards ⁽²⁾ | | | | |
|-----------------------------|-------------------|---|------------------------|----------------------------------|------|-----------------|---------------------------------|---------------|---------------|-----|-----|
| | | | | | | | UL | TUV | VDE | BSI | IEC |
| TLP557 | | DIP 8 pin Giant transistor direct drive | 1 μs | 0.25 A constant current output | 5 mA | 2500 Vrms | ○ | | | | |
| TLP251 TLP251F | | DIP 8 pin Low-power IGBT/MOSFET direct drive EN60747-approved with option (D4) | 0.25 μs | ±0.4 A peak output current (max) | 5 mA | 2500 Vrms | ○ | △ EN 60747 | ◎ EN 60747 | | |
| TLP351 TLP351F | | DIP 8 pin Medium-power IGBT/MOSFET direct drive High speed Low power dissipation | 0.2 μs | ±0.6 A peak output current (max) | 5 mA | 3750 Vrms | ○ | ◎ EN 60747 | △ EN 60747 | | |
| * TLP701 * TLP701F | | SDIP 6 pin IGBT/MOSFET direct drive High speed Low power dissipation | 0.25 μs | ±0.6 A peak output current (max) | 5 mA | 5000 Vrms | ○ | ◎ EN 60747 | △ | | |
| TLP250 TLP250F | | DIP 8 pin Medium-power IGBT/MOSFET direct drive High speed EN60747-approved with option (D4) | 0.15 μs | ±1.5 A peak output current (max) | 5 mA | 2500 Vrms | ○ | △ EN 60747 | ◎ EN 60747 | | |
| TLP250(INV) TLP250F(INV) | | DIP 8 pin Medium-power IGBT/MOSFET direct drive High speed For inverters | 0.15 μs | ±2.0 A peak output current (max) | 5 mA | | ○ | △ EN 60747 | ◎ EN 60747 | | |
| ** TLP350 ** TLP350F | | DIP 8 pin Medium-power IGBT/MOSFET direct drive High CMR High speed Low power dissipation | 0.25 μs | ±2.5 A peak output current (max) | 5 mA | 3750 Vrms | ○ | △ | △ | | |

*: New product

** : Under development

Note (2): In the safety standard column:

○: Approved ◎: SELV-approved △: Design which meets safety standard (as of 04/6) TUV and VDE: EN60747-5-2-approved with option D4.

(1-Channel Type (other than those above))

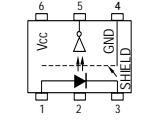
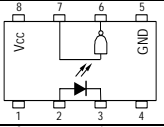
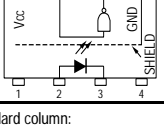
| Part Number | Pin Configuration | Features | Data Rate (NRZ) (Typ.) | CTR | @If | BV _s | Safety Standards ⁽²⁾ | | | | |
|-----------------------|-------------------|---|------------------------|---------------------------------|--------|-----------------|---------------------------------|------------------|---------------|---------------------------|----------------|
| | | | | | | | UL | TUV | VDE | BSI | IEC |
| TLP112 | | Mini-flat MFSOP6 High speed | 1 Mbit/s | 10% Min | 16 mA | 2500 Vrms | ○ | | | | |
| TLP112A | | Mini-flat MFSOP6 High CTR | | 20% Min | | | | | | | |
| TLP114A | | Mini-flat MFSOP6 High CMR | 1 Mbit/s | 20% Min | 16 mA | 3750 Vrms | ○ | ○ ⁽¹⁾ | △ | | |
| TLP550 | | DIP 8 pin No internal base connection Standard | 1 Mbit/s | 10% Min (19% min for rank O) | 16 mA | 2500 Vrms | ○ | | | | |
| TLP559 | | DIP 8 pin High CMR Internal shield | 1 Mbit/s | 20% Min | 16 mA | 2500 Vrms | ○ | | | | |
| TLP651 | | DIP 8 pin High isolation voltage Internal base connection | 1 Mbit/s | 10% Min (19% min for rank O) | 16 mA | 5000 Vrms | ○ | | | | |
| TLP750 | | DIP 8 pin High isolation voltage EN60747-approved with option (D4) SEMKO-approved | 1 Mbit/s | 10% Min (19% min for rank O) | 16 mA | | ○ | △ EN 60747 | ◎ EN 60747 | ◎ EN 60065 EN 60950 | △ 65 950 |
| TLP751 | | DIP 8 pin High isolation voltage Internal base connection EN60747-approved with option (D4) SEMKO-approved | 1 Mbit/s | 10% Min | 16 mA | | | | | | |
| TLP759 TLP759F | | DIP 8 pin Internal shield EN60747-approved with option (D4) SEMKO-approved | 1 Mbit/s | 20% Min | 16 mA | | ○ | △ EN 60747 | ◎ EN 60747 | ◎ EN 60065 EN 60950 | △ 65 950 |
| * TLP719 * TLP719F | | SDIP 6 pin High CMR Internal shield | 1 Mbit/s | 20% Min | 16 mA | 5000 Vrms | ○ | ◎ EN 60747 | △ | | |
| TLP558 | | DIP 8 pin 3 state output Low input Inverter logic | 5 Mbit/s | 3-state output | 1.6 mA | 2500 Vrms | ○ | | | | |
| TLP2200 | | DIP 8 pin 3 state output Low input current Buffer logic | 5 Mbit/s | 3-state output | 1.6 mA | 2500 Vrms | ○ | | | | |
| TLP113 | | Mini-flat MFSOP6 High speed | 10 Mbit/s | Open-collector | 10 mA | 2500 Vrms | ○ | | | | |

*: New product

Note (1): The EN60747-5-2 safety standard for compact packages is different from that for standard DIP packages. Since the mini flat package is a compact package, please contact your nearest Toshiba sales office for more details.

Note (2): In the safety standard column:

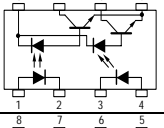
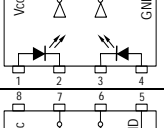
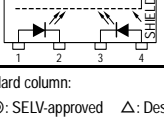
○: Approved ◎: SELV-approved △: Design which meets safety standard (as of 04/6) TUV and VDE: EN60747-5-2-approved with option D4.

| Part Number | Pin Configuration | Features | Data Rate (NRZ) (Typ.) | CTR | @If | BVs | Safety Standards ⁽²⁾ | | | | |
|-------------|---|---|------------------------|----------------|-------|-----------|---------------------------------|-----|-----|-----|-----|
| | | | | | | | UL | TUV | VDE | BSI | IEC |
| TLP115 |  | Mini-flat MFSOP6 High CMR | 10 Mbit/s | Open-collector | 10 mA | 2500 Vrms | ○ | | | | |
| TLP115A | | Mini-flat MFSOP6 High CMR Low input current | | | 5 mA | | | | | | |
| TLP552 |  | DIP 8 pin High speed Logic output | 10 Mbit/s | Open-collector | 5 mA | 2500 Vrms | ○ | | | | |
| TLP2601 |  | DIP 8 pin High CMR High speed | 10 Mbit/s | Open-collector | 5 mA | 2500 Vrms | ○ | | | | |

Note (2): In the safety standard column:

○: Approved ⊙: SELV-approved △: Design which meets safety standard (as of 04/6) TUV and VDE: EN60747-5-2-approved with option D4.

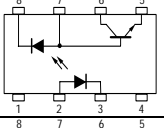
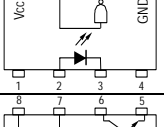
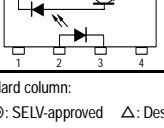
(2-Channel Type)

| Part Number | Pin Configuration | Features | Data Rate (NRZ) (Typ.) | CTR | @If | BVs | Safety Standards ⁽²⁾ | | | | |
|-------------|---|---|------------------------|----------------|-------|-----------|---------------------------------|-----|-----|-----|-----|
| | | | | | | | UL | TUV | VDE | BSI | IEC |
| TLP2530 |  | Dual-channel version of the 6N135 | 1 Mbit/s | 7% Min | 16 mA | 2500 Vrms | ○ | | | | |
| TLP2531 | | Dual-channel version of the 6N136 | 1 Mbit/s | 19% Min | 16 mA | | ○ | | | | |
| TLP2630 |  | Dual-channel version of the 6N137 | 10 Mbit/s | Open-collector | 5 mA | 2500 Vrms | ○ | | | | |
| TLP2631 |  | High CMR Dual-channel version of the TLP2601 | 10 Mbit/s | Open-collector | 5 mA | | ○ | | | | |

Note (2): In the safety standard column:

○: Approved ⊙: SELV-approved △: Design which meets safety standard (as of 04/6) TUV and VDE: EN60747-5-2-approved with option D4.

(JEDEC Type)

| Part Number | Pin Configuration | Features | Data Rate (NRZ) (Typ.) | CTR | @If | BVs | Safety Standards ⁽²⁾ | | | | |
|-------------|---|-----------------------|------------------------|-----------|--------|-----------|---------------------------------|-----|-----|-----|-----|
| | | | | | | | UL | TUV | VDE | BSI | IEC |
| 6N135 |  | JEDEC type Standard | 1 Mbit/s | 7% Min | 16 mA | 2500 Vrms | ○ | | | | |
| 6N136 | | | | 19% Min | | | | | | | |
| 6N137 |  | JEDEC type High speed | 10 Mbit/s | 700% Typ. | 5 mA | 2500 Vrms | ○ | | | | |
| 6N138 |  | JEDEC type High CTR | 300 kbit/s | 300% Min | 1.6 mA | | ○ | | | | |
| 6N139 | | | | 400% Min | 0.5 mA | | | | | | |

Note (2): In the safety standard column:

○: Approved ⊙: SELV-approved △: Design which meets safety standard (as of 04/6) TUV and VDE: EN60747-5-2-approved with option D4.

Photovoltaic Output Devices

| Part Number | Pin Configuration | Features | Short-Circuit Current (μA) | | | Open Voltage Voc (V) | | BVs | Safety Standards ⁽²⁾ | | | | | | | | |
|-------------|-------------------|--|---|-----|-------|----------------------|-------|--------------|---------------------------------|-----|-----|-----|-----|--|--|--|--|
| | | | Rank | Min | @If | Min | @If | | UL | TÜV | VDE | BSI | IEC | | | | |
| TLP190B | | Mini-flat MFSOP6 | — | 12 | 10 mA | 7 | 10 mA | 2500 Vrms | ○ | | | | | | | | |
| TLP191B | | Mini-flat MFSOP6 Internal shunt resistor | — | 24 | 20 mA | 7 | 20 mA | | ○ | | | | | | | | |
| TLP590B | | DIP 6 pin General-purpose | — | 12 | 10 mA | 7 | 10 mA | | ○ | | | | | | | | |
| | | | C20 | 20 | | | | | | | | | | | | | |
| TLP591B | | DIP 6 pin Internal shunt resistor | — | 24 | 20 mA | 7 | 20 mA | ○ | | | | | | | | | |
| | | | C40 | 40 | | | | | | | | | | | | | |

Note (2): In the safety standard column:

○: Approved ©: SELV-approved △: Design which meets safety standard (as of 04/6) TÜV and VDE: EN60747-5-2-approved with option D4.

Photo Relays (MOSFET Output Devices, 1-Form-A)

| Part Number | Pin Configuration | Features | V _{off} min (V) | I _{on} max (A) | R _{on} max (Ω) | R _{on} typ. (Ω) | Coff typ. (pF) | I _{FT} max (mA) | BV _s (min) (V _{rms}) | Safety Standards ⁽²⁾ | | | | | | | |
|-------------|-------------------|--|--------------------------|--|-------------------------|--------------------------|----------------|--------------------------|---|---------------------------------|-----|------|-----|-----|--|--|--|
| | | | | | | | | | | UL | TUV | VDE | BSI | IEC | | | |
| TLP3130 | | 2.54SOP4 Lower CR For testers | 20 | 0.16 | 8 | 5 | 1 | 4 | 1500 | ○ | | | | | | | |
| TLP3230 | | SSOP4 Lower CR For testers | | 0.16 | 8 | 5 | 1 | 4 | | △ | | | | | | | |
| TLP3131 | | 2.54SOP4 Lower CR For testers | | 0.3 | 1.5 | 1 | 5 | 4 | | ○ | | | | | | | |
| TLP3231 | | SSOP4 Lower CR For testers | | 0.45 | 1.2 | 0.8 | 5 | 4 | | △ | | | | | | | |
| TLP3113 | | 2.54SOP4 Lower CR For testers | 40 | 0.08 | 35 | 25 | 0.6 | 4 | 1500 | ○ | | | | | | | |
| TLP3213 | | SSOP4 Lower CR For testers | | 0.08 | 35 | 25 | 0.6 | 4 | | △ | | | | | | | |
| TLP3116 | | 2.54SOP4 Lower CR For testers | | 0.12 | 15 | 10 | 1 | 4 | | ○ | | | | | | | |
| TLP3216 | | SSOP4 Lower CR For testers | | 0.12 | 15 | 10 | 1 | 4 | | △ | | | | | | | |
| TLP3114 | | 2.54SOP4 Lower CR For testers | | 0.25 | 3 | 2 | 5 | 4 | | ○ | | | | | | | |
| TLP3214 | | SSOP4 Lower CR For testers | | 0.25 | 3 | 2 | 5 | 4 | | △ | | | | | | | |
| TLP3115 | | 2.54SOP4 Lower CR For testers | | 0.3 | 1.5 | 1 | 10 | 4 | | ○ | | | | | | | |
| TLP3215 | | SSOP4 Lower CR For testers | | 0.3 | 1.5 | 1 | 10 | 4 | | △ | | | | | | | |
| TLP3110 | | | | MFSOP6 (4-pin) Lower CR For testers | 60 | 0.35 | 1.2 | 0.9 | | 100 | 4 | 1500 | ○ | | | | |
| TLP172A | | | | 2.54 SOP4 Economical High output current | | 0.4 | 2 | 1 | | 130 | 3 | | ○ | | | | |
| TLP176A | | 2.54 SOP4 High output current | 0.4 | 2 | | 1 | 130 | 3 | ○ | △ | ○ | | | | | | |
| TLP192A | | 2.54 SOP6 Economical High output current | 0.4 | 2 | | 1 | 130 | 3 | ○ | | | | | | | | |
| TLP197A | | 2.54 SOP6 High output current | 0.4 | 2 | | 1 | 130 | 3 | ○ | | | | | | | | |
| TLP225A | | DIP4 For DC use only | 2500 | 0.5 | | 1.1 | 0.8 | — | 5 | ○ | | | | | | | |
| TLP222A | | DIP4 Economical High output current | | 0.5 | 2 | 1 | 130 | 3 | ○ | | | | | | | | |
| TLP227A | | DIP4 High output current | | 0.5 | 2 | 1 | 130 | 3 | ○ | | | | ○ | | | | |

Note (2): In the safety standard column:

○: Approved ©: SELV-approved △: Design which meets safety standard (as of 04/6) TUV and VDE: EN60747-5-2-approved with option D4.

Photo Relays (MOSFET Output Devices, 1-Form-A) (continued)

| Part Number | Pin Configuration | Features | V _{off} min (V) | I _{on} max (A) | R _{on} max (Ω) | R _{on} typ. (Ω) | Coff typ. (pF) | I _{FT} max (mA) | BV _s (min) (V _{rms}) | Safety Standards ⁽²⁾ | | | | |
|-------------|-------------------|--|--------------------------------|-------------------------------|--|---|----------------------|--------------------------------|---|---------------------------------|------|-----|-----|-----|
| | | | | | | | | | | UL | TUV | VDE | BSI | IEC |
| TLP592A | | DIP6 Economical High output current | 60 | 0.5 | 2 | 1 | 130 | 3 | 2500 | ○ | | | | |
| TLP597A | | DIP6 High output current | | 0.5 | 2 | 1 | 130 | 3 | | ○ | | | | |
| TLP3540 | | DIP8 High output current | 60 | 2.0 | 0.12 | — | 600 | 5 | 1500 | ○ | | | | |
| TLP3542 | | DIP6 High output current | | 2.5 | 0.1 | 0.065 | 400 | 3 | | 2500 | △ | | | |
| TLP3111 | | MFSOP6 (4-pin) Lower CR For testers | 80 | 0.1 | 20 | 16 | 11 | 4 | 1500 | ○ | | | | |
| TLP3217 | | SSOP4 For testers | | 0.12 | 12 | 8 | 5 | 5 | | △ | | | | |
| TLP3121 | | 2.54SOP4 Lower CR For testers | | 0.35 | 1.2 | 1 | 30 | 4 | | ○ | | | | |
| TLP3120 | | 2.54SOP6 High output current | | 1.25 | 0.15 | 0.11 | 460 | 5 | | ○ | | | | |
| TLP179D | | 2.54SOP4 Lower CR For testers | 200 | 0.05 | 50 | 40 | 15 | 3 | 1500 | ○ | | | | |
| TLP199D | | 2.54SOP6 Lower CR For testers | | 0.05 | 50 | 40 | 15 | 3 | | ○ | | | | |
| TLP176D | | 2.54 SOP4 For PBXes, telecom | | 0.2 | 8 | 5 | 100 | 3 | | ○ | △ | ○ | | |
| TLP197D | | 2.54 SOP6 General-purpose | | 0.2 | 8 | 5 | 100 | 3 | | ○ | | | | |
| TLP172G | | 2.54 SOP4 Economical General-purpose | | 350 | 0.11 | 35 | 25 | 30 | | 3 | 1500 | ○ | | |
| TLP192G | | 2.54 SOP6 Economical General-purpose | 0.11 | | 35 | 25 | 30 | 3 | ○ | | | | | |
| TLP176G | | 2.54 SOP4 General-purpose | 0.12 | | 35 | 15 | 40 | 3 | ○ | △ | | ○ | ○ | ○ |

Note (2): In the safety standard column:

○: Approved ◎: SELV-approved △: Design which meets safety standard (as of 04/6) TUV and VDE: EN60747-5-2-approved with option D4.

| Part Number | Pin Configuration | Features | V _{off} min (V) | I _{on} max (A) | R _{on} max (Ω) | R _{on} typ. (Ω) | Coff typ. (pF) | I _{FT} max (mA) | BV _s (min) (V _{rms}) | Safety Standards ⁽²⁾ | | | | | |
|-------------|-------------------|--|--------------------------------|-------------------------------|--|---|----------------------|--------------------------------|---|---------------------------------|-----|-----|-----|-----|---|
| | | | | | | | | | | UL | TUV | VDE | BSI | IEC | |
| TLP197G | | 2.54 SOP6 General-purpose | 350 | 0.12 | 35 | 15 | 40 | 3 | 1500 | ○ | △ | ○ | ○ | ○ | |
| TLP174G | | 2.54 SOP4 Current-limiting function General-purpose, For modems | | 0.12 | 35 | 15 | 40 | 3 | | ○ | | | | ○ | |
| TLP222G | | DIP4 Economical General-purpose, For modems | | 0.12 | 35 | 25 | 30 | 3 | ○ | | | | ○ | ○ | |
| TLP227G | | DIP4 General-purpose, For modems | | 0.12 | 35 | 15 | 40 | 3 | ○ | △ | ○ | ○ | ○ | | |
| TLP592G | | DIP6 Economical General-purpose | | 0.12 | 35 | 25 | 30 | 3 | 2500 | ○ | | | | | |
| TLP597G | | DIP6 General-purpose | | 0.12 | 35 | 15 | 40 | 3 | | ○ | △ | ○ | ○ | ○ | |
| TLP224G | | DIP4 Current-limiting function For modems | | 0.12 | 35 | 15 | 40 | 3 | | ○ | | | | △ | ○ |
| TLP594G | | DIP6 Current-limiting function General-purpose | | 0.12 | 35 | 15 | 40 | 3 | | ○ | | | | | |
| TLP176GA | | 2.54 SOP4 General-purpose, For modems | | 400 | 0.12 | 35 | 17 | 70 | 3 | 1500 | ○ | | | ○ | |
| TLP174GA | | 2.54 SOP4 Current-limiting function General-purpose, For modems | | | 0.12 | 35 | 17 | 70 | 3 | | ○ | | | | |
| TLP197GA | | 2.54 SOP6 Current-limiting function General-purpose | 0.12 | | 35 | 17 | 70 | 3 | ○ | | | | | ○ | |
| TLP3125 | | 2.54 SOP8 | 0.2 | | 4 | 3.5 | 410 | 3 | ○ | | | | | | |
| TLP227GA | | DIP4 General-purpose, For modems | 0.12 | | 35 | 17 | 70 | 3 | 2500 | ○ | | | | ○ | |
| TLP224GA | | DIP4 Current-limiting function For modems | 0.12 | | 35 | 17 | 70 | 3 | | ○ | | | | | ○ |
| TLP597GA | | DIP6, General-purpose | 400 | 0.12 | 35 | 17 | 70 | 3 | 2500 | ○ | | | | ○ | |
| TLP797GA | | DIP6 High isolation voltage | | 0.12 | 35 | 17 | 70 | 3 | 5000 | ○ | △ | △ | △ | △ | |
| TLP797J | | DIP6 High isolation voltage | | 600 | 0.1 | 35 | 25 | 120 | | 3 | ○ | △ | △ | △ | △ |

Note (2): In the safety standard column:

○: Approved ◎: SELV-approved △: Design which meets safety standard (as of 04/6) TUV and VDE: EN60747-5-2-approved with option D4.

Photo Relays (MOSFET Output Devices, 2-Form-A)

| Part Number | Pin Configuration | Features | V _{OFF} min (V) | I _{ON} max (A) | R _{ON} max (Ω) | R _{ON} typ. (Ω) | Coff typ. (pF) | I _{FT} max (mA) | BV _s (min) (V _{rms}) | Safety Standards ⁽²⁾ | | | | | |
|-------------|----------------------------|-------------------------------------|--------------------------------|-------------------------------|--|---|----------------------|--------------------------------|---|---------------------------------|-----|-----|-----|-----|---|
| | | | | | | | | | | UL | TUV | VDE | BSI | IEC | |
| TLP202A | | 2.54 SOP8, Two TLP172A channels | 60 | 0.4 | 2 | 1 | 130 | 3 | 1500 | ○ | | | | | |
| TLP206A | | 2.54 SOP8, Two TLP176A channels | | 0.4 | 2 | 1 | 130 | 3 | | ○ | | | | | |
| TLP222A-2 | | DIP8 Two TLP222A channels | 60 | 0.5 | 2 | 1 | 130 | 3 | 2500 | ○ | | | | | |
| TLP227A-2 | | DIP8 Two TLP227A channels | | 0.5 | 2 | 1 | 130 | 3 | | ○ | | | | | ○ |
| TLP209D | | 2.54 SOP8, Two TLP179D channels | 200 | 0.05 | 50 | 40 | 15 | 3 | 1500 | ○ | | | | | |
| TLP200D | | 2.54 SOP8, Two TLP176D channels | | 0.2 | 8 | 5 | 100 | 3 | | ○ | | | | | |
| TLP202G | | 2.54 SOP8, Two TLP172G channels | 350 | 0.11 | 35 | 25 | 30 | 3 | | ○ | | | | | |
| TLP206G | | 2.54 SOP8, Two TLP176G channels | | 0.12 | 35 | 17 | 40 | 3 | | ○ | △ | ○ | ○ | ○ | |
| TLP204G | | 2.54 SOP8, Two TLP174G channels | | 0.12 | 35 | 17 | 40 | 3 | | ○ | | | | ○ | |
| TLP222G-2 | | DIP8, Two TLP222G channels | | 2500 | 0.12 | 50 | 25 | 30 | | 3 | ○ | | | ○ | ○ |
| TLP227G-2 | DIP8, Two TLP227G channels | 0.12 | 35 | | 15 | 40 | 3 | ○ | △ | ○ | ○ | ○ | | | |
| TLP224G-2 | DIP8, Two TLP224G channels | 0.12 | 35 | | 15 | 40 | 3 | ○ | | | ○ | ○ | | | |
| TLP206GA | | 2.54 SOP8, Two TLP176GA channels | 400 | 0.12 | 35 | 17 | 70 | 3 | 1500 | ○ | | | ○ | | |
| TLP204GA | | 2.54 SOP8, Two TLP174GA channels | | 0.12 | 35 | 17 | 70 | 3 | | ○ | | | | | |
| TLP227GA-2 | | DIP8, Two TLP227GA channels | | 2500 | 0.12 | 35 | 17 | 70 | 3 | ○ | | | | ○ | |
| TLP224GA-2 | | DIP8, Two TLP224GA channels | | | 0.12 | 35 | 17 | 70 | 3 | ○ | | | | ○ | |

Note (2): In the safety standard column:

○: Approved ◎: SELV-approved △: Design which meets safety standard (as of 04/6) TUV and VDE: EN60747-5-2-approved with option D4.

Photo Relays (MOSFET Output Devices, 1-Form-B)

| Part Number | Pin Configuration | Features | V _{OFF} min (V) | I _{on} max (A) | R _{on} max (Ω) | R _{on} typ. (Ω) | Coff typ. (pF) | I _{FT} max (mA) | BV _s (min) (V _{rms}) | Safety Standards ⁽²⁾ | | | | |
|-------------|-------------------|-----------------------------|--------------------------------|-------------------------------|--|---|----------------------|--------------------------------|---|---------------------------------|-----|-----|-----|-----|
| | | | | | | | | | | UL | TÜV | VDE | BSI | IEC |
| TLP4172G | | 2.54SOP4 General-purpose | 350 | 0.09 | 50 | 25 | 30 | 3 | 1500 | ○ | | | | |
| TLP4192G | | 2.54SOP6 General-purpose | | 0.09 | 50 | 25 | 30 | 3 | 1500 | ○ | | | | |
| TLP4222G | | DIP4 General-purpose | | 0.1 | 50 | 25 | 30 | 3 | 2500 | ○ | | | | |
| TLP4592G | | DIP6 General-purpose | | 0.1 | 50 | 25 | 30 | 3 | 2500 | ○ | | | | |
| TLP4176G | | 2.54SOP4 General-purpose | | 0.12 | 25 | 15 | 100 | 3 | 1500 | ○ | | | | |
| TLP4197G | | 2.54SOP6 General-purpose | | 0.12 | 25 | 15 | 100 | 3 | 1500 | ○ | | | | |
| TLP4227G | | DIP4 General-purpose | | 0.15 | 25 | 15 | 100 | 3 | 2500 | ○ | | | | ○ |
| TLP4597G | | DIP6 General-purpose | | 0.15 | 25 | 15 | 100 | 3 | 2500 | ○ | | | | ○ |

Note (2): In the safety standard column:

○: Approved ⊙: SELV-approved △: Design which meets safety standard (as of 04/6) TÜV and VDE: EN60747-5-2-approved with option D4.

Photo Relays (MOSFET Output Devices, 2-Form-B)

| Part Number | Pin Configuration | Features | V _{OFF} min (V) | I _{on} max (A) | R _{on} max (Ω) | R _{on} typ. (Ω) | Coff typ. (pF) | I _{FT} max (mA) | BV _s (min) (V _{rms}) | Safety Standards ⁽²⁾ | | | | |
|-------------|-------------------|------------------------------------|--------------------------------|-------------------------------|--|---|----------------------|--------------------------------|---|---------------------------------|-----|-----|-----|-----|
| | | | | | | | | | | UL | TÜV | VDE | BSI | IEC |
| TLP4202G | | 2.54SOP8, Two TLP4172G channels | 350 | 0.09 | 50 | 25 | 30 | 3 | 1500 | ○ | | | | |
| TLP4222G-2 | | DIP8, Two TLP4222G channels | | 0.1 | 50 | 25 | 30 | 3 | 2500 | ○ | | | | |
| TLP4206G | | 2.54SOP8, Two TLP4176G channels | | 0.12 | 25 | 15 | 100 | 3 | 1500 | ○ | | | | |
| TLP4227G-2 | | DIP8, Two TLP4227G channels | | 0.15 | 25 | 15 | 100 | 3 | 2500 | ○ | | | | ○ |

Note (2): In the safety standard column:

○: Approved ⊙: SELV-approved △: Design which meets safety standard (as of 04/6) TÜV and VDE: EN60747-5-2-approved with option D4.

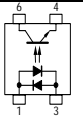
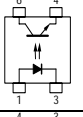
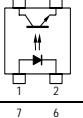
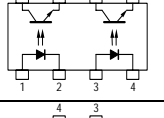
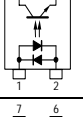
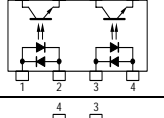
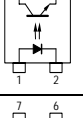
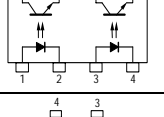
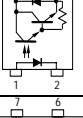
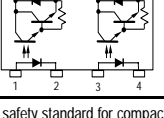
Photo Relays (MOSFET Output Devices, 1-Form-B + 1-Form-A)

| Part Number | Pin Configuration | Features | V _{off} min (V) | I _{on} max (A) | R _{on} max (Ω) | R _{on} typ. (Ω) | Coff typ. (pF) | I _{FT} max (mA) | BV _s (min) (V _{rms}) | Safety Standards ⁽²⁾ | | | | |
|-------------|-------------------|---|--------------------------------|-------------------------------|--|---|----------------------|--------------------------------|---|---------------------------------|-----|-----|-----|-----|
| | | | | | | | | | | UL | TÜV | VDE | BSI | IEC |
| TLP4027G | | 2.54SOP8 1a1b (N.C. + N.O.) General-purpose | 350 | 0.09 | 50 | 25 | 30 | 3 | 1500 | ○ | | | | |
| TLP4007G | | DIP8 1a1b (N.C. + N.O.) General-purpose | | 0.1 | 50 | 25 | 30 | 3 | 2500 | ○ | | | | |
| TLP4026G | | 2.54SOP8 1a1b (N.C. + N.O.) General-purpose | | 0.12 | 25 | 15 | 65 | 3 | 1500 | ○ | | | | |
| TLP4006G | | DIP8 1a1b (N.C. + N.O.) General-purpose | | 0.12 | 25 | 15 | 65 | 3 | 2500 | ○ | | | | |

Note (2): In the safety standard column:

○: Approved ◎: SELV-approved △: Design which meets safety standard (as of 04/6) TÜV and VDE: EN60747-5-2-approved with option D4.

Products Manufactured by Toshiba Semiconductor (Thailand) Co., Ltd.

| Part Number | Pin Configuration | Features | VCE0 | BVs | Safety Standards ⁽²⁾ | | | | |
|-------------|---|--|-------|--------------|---------------------------------|------------------|------------------|---------------------------------|----------------|
| | | | | | UL | TUV | VDE | BSI | IEC |
| TLP180(T) |  | Mini-flat MFSOP6 AC input SEMKO-approved | 80 V | 3750 Vrms | ○ | ○ ⁽¹⁾ | △ | ◎ EN 60950 | △ 950 |
| TLP181(T) |  | Mini-flat MFSOP6 SEMKO-approved General-purpose | 80 V | 3750 Vrms | ○ | △ | ○ ⁽¹⁾ | ◎ EN 60950 | △ 950 |
| TLP521-1(T) |  | DIP 4 pin General-purpose | 55 V | 2500 Vrms | ○ | | | | |
| TLP521-2(T) |  | 2 channels of the TLP521-1(T) | | | ○ | | | | |
| TLP620(T) |  | DIP 4 pin AC input SEMKO-approved | 55 V | 5000 Vrms | ○ | △ EN 60747 | ◎ EN 60747 | ◎ EN 60065 EN 60950 | △ 65 950 |
| TLP620-2(T) |  | 2 channels of the TLP620(T) SEMKO-approved | | | ○ | △ EN 60747 | ◎ EN 60747 | ◎ EN 60065 EN 60950 | |
| TLP621(T) |  | DIP 4 pin High isolation voltage SEMKO-approved | 55 V | 5000 Vrms | ○ | △ EN 60747 | ◎ EN 60747 | ◎ EN 60065 EN 60950 | △ 65 950 |
| TLP621-2(T) |  | 2 channels of the TLP621(T) SEMKO-approved | | | ○ | △ EN 60747 | ◎ EN 60747 | ◎ EN 60065 EN 60950 | |
| TLP627(T) |  | DIP 4 pin Darlington transistor output High VCE0 SEMKO-approved | 300 V | 5000 Vrms | ○ | △ EN 60747 | ◎ EN 60747 | ◎ EN 60065 EN 60950 | △ 65 950 |
| TLP627-2(T) |  | 2 channels of the TLP627(T) SEMKO-approved | | | ○ | △ EN 60747 | ◎ EN 60747 | ◎ EN 60065 EN 60950 | |

Note (1): The EN60747-5-2 safety standard for compact packages is different from that for standard DIP packages. Since the mini flat package is a compact package, please contact your nearest Toshiba sales office for more details.

Note (2): In the safety standard column:

○: Approved ◎: SELV-approved △: Design which meets safety standard (as of 04/6) TUV and VDE: EN60747-5-2-approved with option D4.
Note that the products manufactured by Toshiba Semiconductor (Thailand) Co., Ltd. are not available in Japan.

Fiber-Optic Devices (TOSLINK™)

Fiber-Optic Modules (Simplex type)

| Fiber-Optic Transmitting Module | Fiber-Optic Receiving Module | Data Rate (b/s, NRZ) | Transmission Distance (m) ⁽¹⁾ max | Emission Wavelength (nm) ⁽¹⁾ | Pulse Width Distortion (ns) ⁽¹⁾ | Operating Temperature (°C) | Compatible Optical Fiber (μm) | Compatible Optical Fiber with Fiber-Optic Connectors |
|---------------------------------|--------------------------------|----------------------|--|---|--|----------------------------|--------------------------------|--|
| TOTX170 ⁽³⁾ | TORX170 | DC to 6M | 1000 800 | 800 | ±55 | -40 to 70 | H-PCF(200/230) | CF-1001 Series ⁽⁵⁾ |
| TOTX170A ⁽³⁾ | TORX170 | DC to 6M | 40 | 650 | ±55 | -40 to 70 | APF(980/1000) | LUCT1-TC1000-xxM ⁽¹⁵⁾ TOCP100-xxBT ⁽¹⁶⁾ |
| TOTX178A ⁽⁹⁾ | TORX178B ⁽⁹⁾ | 0.1 to 6M | 5 | 650 | ±30 | -20 to 70 | APF(970/1000) APF(980/1000) | LUCT1-TC1000-xxM ⁽¹⁵⁾ TOCP100-xxBT ⁽¹⁶⁾ |
| TOTX178S | TORX178S | 0.1 to 6M | 5 | 650 | ±30 | -20 to 70 | APF(970/1000) | |
| TOTX179 ⁽⁹⁾ | TORX179 ⁽⁹⁾ | 0.1 to 12.8M | 5 | 650 | ±25 | -20 to 70 | APF(980/1000) | |
| TOTX179P | TORX179P | 0.1 to 12.8M | 5 | 650 | ±25 | -20 to 70 | APF(970/1000) APF(980/1000) | |
| TOTX179L ⁽⁹⁾⁽¹³⁾ | TORX179L ⁽⁹⁾⁽¹³⁾ | 0.1 to 12.8M | 5 | 650 | ±25 | -20 to 70 | | |
| TOTX179PL ⁽¹³⁾ | TORX179PL ⁽¹³⁾ | 0.1 to 12.8M | 5 | 650 | ±25 | -20 to 70 | | |
| TOTX179S | TORX179S | 0.1 to 12.8M | 5 | 650 | ±25 | -20 to 70 | | |
| TOTX140 ⁽⁴⁾⁽⁹⁾ | TORX178B | 0.1 to 6M | 5 | 660 | ±30 | -20 to 70 | | |
| TOTX141 ⁽⁴⁾⁽⁹⁾ | TORX141 ⁽⁴⁾ | 0.1 to 15M | 10 | 650 | ±20 | -20 to 70 | | |
| TOTX141P ⁽⁴⁾ | TORX141P ⁽⁴⁾ | 0.1 to 15M | 10 | 650 | ±20 | -20 to 70 | | |
| TOTX141L ⁽⁴⁾⁽⁹⁾⁽¹³⁾ | TORX141L ⁽⁴⁾⁽⁹⁾⁽¹³⁾ | 0.1 to 15M | 10 | 650 | ±20 | -20 to 70 | | |
| TOTX141PL ⁽⁴⁾⁽¹³⁾ | TORX141PL ⁽⁴⁾⁽¹³⁾ | 0.1 to 15M | 10 | 650 | ±20 | -20 to 70 | | |
| TOTX180 ⁽⁹⁾⁽¹¹⁾ | TORX180 ⁽¹¹⁾ | DC to 6M | 1000 800 | 800 | ±55 | -40 to 85 | H-PCF(200/230) | CF-1001 Series ⁽⁵⁾ |
| TOTX180 ⁽¹¹⁾ | TORX186 ⁽¹¹⁾ | DC to 8M | 1000 800 | 800 | ±42 | -40 to 85 | H-PCF(200/230) | CF-1001 Series ⁽⁵⁾ |
| TOTX180A ⁽³⁾⁽¹¹⁾ | TORX180 ⁽¹¹⁾ | DC to 6M | 40 | 650 | ±55 | -40 to 85 | APF(980/1000) | LUCT1-TC1000-xxM ⁽¹⁵⁾ TOCP100-xxBT ⁽¹⁶⁾ |
| TOTX193 | TORX193 | DC to 6M | 10 | 660 | ±25 | -40 to 85 | APF(980/1000) | — |
| TOTX193K ⁽⁹⁾ | TORX193K ⁽⁹⁾ | DC to 6M | 10 | 660 | ±25 | -40 to 85 | | |
| TOTX194 ⁽³⁾ | TORX194 | DC to 10M | 1000 700 | 800 | ±30 | -40 to 85 | H-PCF(200/230) | CF-1001 Series ⁽⁵⁾ |
| TOTX195 ⁽³⁾ | TORX194 | DC to 10M | 50 | 670 | ±30 | -40 to 85 | APF(980/1000) | LUCT1-TC1000-xxM ⁽¹⁵⁾ TOCP100-xxBT ⁽¹⁶⁾ |
| TOTX196 | TORX196 | DC to 6M | 1000 800 | 800 | ±55 | -40 to 85 | H-PCF(200/230) | CF-1001 Series ⁽⁵⁾ |
| TOTX196 | TORX198 ⁽²⁾ | DC to 6M | 1000 800 | 800 | ±55 | -40 to 85 | H-PCF(200/230) | CF-1001 Series ⁽⁵⁾ |
| TOTX197 | TORX196 | DC to 6M | 40 | 670 | ±55 | -40 to 85 | APF(980/1000) | LUCT1-TC1000-xxM ⁽¹⁵⁾ TOCP100-xxBT ⁽¹⁶⁾ |
| TOTX197 | TORX198 ⁽²⁾ | DC to 6M | 40 | 670 | ±55 | -40 to 85 | APF(980/1000) | LUCT1-TC1000-xxM ⁽¹⁵⁾ TOCP100-xxBT ⁽¹⁶⁾ |

TOSLINK is a trademark of Toshiba Corporation.

The part number of the lead-free package is suffixed with (F). For details, please consult Toshiba sales office.

Note (1): Indicates values when Ta = 25°C

Note (2): These fiber-optic receiving modules have analog output pins for monitoring the amount of received light.

Note (3): External resistances must be changed according to the transmission distance.

Note (4): Vcc = 2.7 V to 3.6 V

Note (5): Manufactured by Sumitomo Electric Industries, Ltd.

Note (9): These are panel mount type fiber-optic modules.

Note (11): These are fiber-optic modules in a ceramic package.

Note (12): Under development

Note (13): Shutter system.

Note (14): Manufactured by TST (Toshiba Semiconductor (Thailand) Co., Ltd.).

Note (15): Manufactured by Asahi Kasei EMD Corporation.

Note (16): Manufactured by Toray Industries, inc.

Note (17): Manufactured by Mitsubishi Rayon Co., Ltd.

| Fiber-Optic Transmitting Module | Data Rate (NRZ, b/s) | Emission Wavelength (nm) | Fiber Output Power (dBm) ⁽¹⁾ | PulseWidth Distortion (nm) ⁽⁹⁾ | Supply Voltage (V) | Operating Temperature (°C) | Compatible Optical Fiber (μm) | Compatible Optical Fiber with Connectors |
|--------------------------------------|----------------------|--------------------------|---|---|--------------------|----------------------------|-------------------------------|--|
| TOTX141(F,T) ⁽⁹⁾⁽¹⁴⁾ | DC to 15 M | 650 | -21 to -15 | ±20 | 2.7 to 3.6 | -20 to 70 | APF(980/1000) | RFA4011-*** ⁽¹⁷⁾ |
| TOTX141P(F,T) | DC to 15 M | 650 | -21 to -15 | ±20 | 2.7 to 3.6 | -20 to 70 | | |
| TOTX147(F,T) ⁽⁹⁾⁽¹⁴⁾ | DC to 15M | 650 | -21 to -15 | ±15 | 2.7 to 3.6 | -20 to 70 | | |
| TOTX147L(F,T) ⁽⁹⁾⁽¹³⁾⁽¹⁴⁾ | DC to 15M | 650 | -21 to -15 | ±15 | 2.7 to 3.6 | -20 to 70 | | |
| TOTX147PL(F,T) | DC to 15M | 650 | -21 to -15 | ±15 | 2.7 to 3.6 | -20 to 70 | | |
| TOTX177(F,T) ⁽⁹⁾⁽¹⁴⁾ | DC to 15M | 650 | -21 to -15 | ±15 | 5 ± 0.25 | -20 to 70 | | |
| TOTX177L(F,T) ⁽⁹⁾⁽¹³⁾⁽¹⁴⁾ | DC to 15M | 650 | -21 to -15 | ±15 | 5 ± 0.25 | -20 to 70 | | |
| TOTX177PL(F,T) | DC to 15M | 650 | -21 to -15 | ±15 | 5 ± 0.25 | -20 to 70 | | |
| TOTX178A(F,T) ⁽⁹⁾⁽¹⁴⁾ | DC to 6M | 650 | -21 to -15 | ±30 | 5 ± 0.25 | -20 to 70 | | |
| TOTX178S(F,T) | DC to 6M | 650 | -21 to -15 | ±30 | 5 ± 0.25 | -20 to 70 | | |
| TOTX179(F,T) ⁽⁹⁾⁽¹⁴⁾ | DC to 12.8M | 650 | -21 to -15 | ±25 | 5 ± 0.25 | -20 to 70 | | |
| TOTX179P(F,T) | DC to 12.8M | 650 | -21 to -15 | ±25 | 5 ± 0.25 | -20 to 70 | | |
| TOTX179S(F,T) | DC to 12.8M | 650 | -21 to -15 | ±25 | 5 ± 0.25 | -20 to 70 | | |

| Fiber-Optic Receiving Module | Data Rate (NRZ, b/s) | Maxmum Receivable Power (dBm) ⁽¹⁾ | Minimum Receivable Power (dBm) ⁽¹⁾ | PulseWidth Distortion (nm) ⁽⁹⁾ | Supply Voltage (V) | Operating Temperature (°C) | Compatible Optical Fiber (μm) | Compatible Optical Fiber with Connectors |
|--------------------------------------|----------------------|--|---|---|--------------------|----------------------------|-------------------------------|--|
| TORX147(F,T) ⁽⁹⁾⁽¹⁴⁾ | 0.1 to 15M | -14.5 | -24 | ±15 | 2.7 to 3.6 | -20 to 70 | APF(980/1000) | RFA4011-*** ⁽¹⁷⁾ |
| TORX147L(F,T) ⁽⁹⁾⁽¹³⁾⁽¹⁴⁾ | 0.1 to 15M | -14.5 | -24 | ±15 | 2.7 to 3.6 | -20 to 70 | | |
| TORX147PL(F,T) | 0.1 to 15M | -14.5 | -24 | ±15 | 2.7 to 3.6 | -20 to 70 | | |
| TORX177(F,T) ⁽⁹⁾⁽¹⁴⁾ | 0.1 to 15M | -14.5 | -24 | ±15 | 5 ± 0.25 | -20 to 70 | | |
| TORX177L(F,T) ⁽⁹⁾⁽¹³⁾⁽¹⁴⁾ | 0.1 to 15M | -14.5 | -24 | ±15 | 5 ± 0.25 | -20 to 70 | | |
| TORX177PL(F,T) | 0.1 to 15M | -14.5 | -24 | ±15 | 5 ± 0.25 | -20 to 70 | | |

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The part number of the lead-free package is suffixed with (F). For details, please consult Toshiba sales office.

Note (1): Indicates values when Ta = 25°C

Note (2): These fiber-optic receiving modules have analog output pins for monitoring the amount of received light.

Note (3): External resistances must be changed according to the transmission distance.

Note (4): Vcc = 2.7 V to 3.6 V

Note (5): Manufactured by Sumitomo Electric Industries, Ltd.

Note (9): These are panel mount type fiber-optic modules.

Note (11): These are fiber-optic modules in a ceramic package.

Note (12): Under development

Note (13): Shutter system.

Note (14): Manufactured by TST (Toshiba Semiconductor (Thailand) Co., Ltd.).

Note (15): Manufactured by Asahi Kasei EMD Corporation.

Note (16): Manufactured by Toray Industries, inc.

Note (17): Manufactured by Mitsubishi Rayon Co., Ltd.

Fiber-Optic Modules (Duplex type)

| Fiber-Optic Transceiving Module | Data Transmission Rate (b/s, NRZ) | Transmission Distance (m) ⁽¹⁾ max | Emission Wavelength (nm) ⁽¹⁾ | Pulse Width Distortion (ns) ⁽¹⁾ | Operating Temperature (°C) | Compatible Optical Fiber (μm) | Compatible Optical Fiber with Fiber-Optic Connectors |
|---------------------------------|-----------------------------------|--|---|--|----------------------------|-------------------------------|---|
| TODX270 ⁽³⁾ | DC to 6M | 1000 800 | 800 | ±55 | -40 to 70 | H-PCF(200/230) | CF-2001/2071 Series ⁽⁵⁾ |
| TODX270A ⁽³⁾ | DC to 6M | 40 | 650 | ±55 | -40 to 70 | APF(980/1000) | LUCT2-1000W-xxM ⁽¹⁵⁾ TOCP200-xxBT ⁽¹⁶⁾ |
| TODX280 ⁽³⁾⁽¹¹⁾ | DC to 6M | 1000 800 | 800 | ±55 | -40 to 85 | H-PCF(200/230) | CF-2001/2071 Series ⁽⁵⁾ |
| TODX280A ⁽³⁾⁽¹¹⁾ | DC to 6M | 40 | 650 | ±55 | -40 to 85 | APF(980/1000) | LUCT2-1000W-xxM ⁽¹⁵⁾ TOCP200-xxBT ⁽¹⁶⁾ |
| TODX286 ⁽¹¹⁾ | DC to 8M | 1000 800 | 800 | ±42 | -40 to 85 | H-PCF(200/230) | CF-2001/2071 Series ⁽⁵⁾ |
| TODX283 ⁽¹¹⁾ | DC to 50M | 10(APF) 100(PCF) | 650 | ±7 | -10 to 70 | APF(980/1000) | LUCT2-1000W-xxM ⁽¹⁵⁾ TOCP200-xxBT ⁽¹⁶⁾ |
| | | | | | | H-PCF(200/230) | CF-2001/2071 Series ⁽⁵⁾ |
| TODX294 ⁽³⁾ | DC to 10M | 1000 700 | 800 | ±30 | -40 to 85 | H-PCF(200/230) | CF-2001/2071 Series ⁽⁵⁾ |
| TODX295 ⁽³⁾ | DC to 10M | 50 | 670 | ±30 | -40 to 85 | APF(980/1000) | LUCT2-1000W-xxM ⁽¹⁵⁾ TOCP200-xxBT ⁽¹⁶⁾ |
| TODX296 | DC to 6M | 1000 | 800 | ±55 | -40 to 85 | H-PCF(200/230) | CF-2001/2071 Series ⁽⁵⁾ |
| | | 800 | | | | | |
| TODX297 | DC to 6M | 40 | 670 | ±55 | -40 to 85 | APF(980/1000) | LUCT2-1000W-xxM ⁽¹⁵⁾ TOCP200-xxBT ⁽¹⁶⁾ |
| TODX298 ⁽²⁾ | DC to 8M | 1000 | 800 | ±42 | -40 to 85 | H-PCF(200/230) | CF-2001/2071 Series ⁽⁵⁾ |
| | | 700 | | | | | |
| TODX2402 ⁽¹²⁾ | 20 to 250M | 20 m (250M) | 650 | — | 0 to 60 (250M) | APF(980/1000) | RFA4412M-xxx ⁽¹⁷⁾ |
| | 20 to 125M | 50 m (125M) | | | -10 to 70 (125M) | | |

Note (1): Indicates values when Ta = 25°C

Note (2): These fiber-optic receiving modules have analog output pins for monitoring the amount of received light.

Note (3): External resistances must be changed according to the transmission distance.

Note (5): Manufactured by Sumitomo Electric Industries, Ltd.

Note (11): These are fiber-optic modules in a ceramic package.

Note (12): New product

Note (15): Manufactured by Asahi Kasei EMD Corporation.

Note (16): Manufactured by Toray Industries, inc.

Note (17): Manufactured by Mitsubishi Rayon Co., Ltd.

SFF/SFP Optical Transceiver (SFF Optical Transceiver)

| Type Name | Data Rate (Gb/s) | Transmission Distance ⁽¹⁾ | Operating Temperature ⁽²⁾ (°C) | Supply Voltage (V) | Wavelength (nm) | Detector |
|----------------------------|------------------|---|---|--------------------|-----------------|----------|
| TOTR210 | Up to 2.5 | 300 m (2.125 Gb/s, 50/125 μm MMF) 550 m (1.25 Gb/s, 50/125 μm MMF) | 0 to 70 | 3.3 | 850(VCSEL) | PD |
| TOTR210-T ⁽³⁾ | Up to 2.5 | 300 m (2.125 Gb/s, 50/125 μm MMF) 550 m (1.25 Gb/s, 50/125 μm MMF) | 0 to 70 | 3.3 | 850(VCSEL) | PD |
| TOTR310-F | Up to 2.5 | 2 km / 15 km (SMF) | 0 to 70 | 3.3 | 1310(FP-LD) | PD |
| TOTR310-FT ⁽³⁾ | Up to 2.5 | 2 km / 15 km (SMF) | 0 to 70 | 3.3 | 1310(FP-LD) | PD |
| TOTR310-D | Up to 2.5 | 15 km (SMF) | 0 to 70 | 3.3 | 1300(DFB × 4) | PD |
| TOTR310-DAC ⁽⁴⁾ | Up to 2.5 | 40 km (SMF) | 0 to 70 | 3.3 | 1300(DFB × 4) | APD |
| TOTR360-D | Up to 2.5 | 15 km / 40 km (SMF) | 0 to 70 | 3.3 | 1550(DFB × 8) | PD |
| TOTR360-DAC ⁽⁴⁾ | Up to 2.5 | 80 km (SMF) | 0 to 70 | 3.3 | 1550(DFB × 8) | APD |

Note (1): Target distance.

Note (2): Case Temperature

Note (3): 2 × 5 pins package

Note (4): Integrated DC/DC Converter.

(SFP Optical Transceiver)

| Type Name | Data Rate (Gb/s) | Transmission Distance ⁽¹⁾ | Operating Temperature ⁽²⁾ (°C) | Supply Voltage (V) | Wavelength (nm) | Detector |
|----------------------------|------------------|---|---|--------------------|-----------------|----------|
| TOTR210P | Up to 2.5 | 300 m (2.125 Gb/s, 50/125 μm MMF) 550 m (1.25 Gb/s, 50/125 μm MMF) | 0 to 70 | 3.3 | 850(VCSEL) | PD |
| TOTR310P-F | Up to 2.5 | 2 km / 15 km (SMF) | 0 to 70 | 3.3 | 1310(FP-LD) | PD |
| TOTR310P-D | Up to 2.5 | 15 km (SMF) | 0 to 70 | 3.3 | 1300(DFB × 4) | PD |
| TOTR310P-DA ⁽⁴⁾ | Up to 2.5 | 40 km (SMF) | 0 to 70 | 3.3 | 1300(DFB × 4) | APD |
| TOTR360P-D | Up to 2.5 | 15 km / 40 km (SMF) | 0 to 70 | 3.3 | 1550(DFB × 8) | PD |
| TOTR360P-DA ⁽⁴⁾ | Up to 2.5 | 80 km (SMF) | 0 to 70 | 3.3 | 1550(DFB × 8) | APD |

Note (1): Target distance.

Note (2): Case Temperature

Note (3): 2 × 5 pins package

Note (4): Integrated DC/DC Converter.

(SFP Optical Transceiver with Digital Diagnostic Capability and Pull de-latch Lever)

| Type Name | Data Rate (Gb/s) | Transmission Distance ⁽¹⁾ | Operating Temperature ⁽²⁾ (°C) | Supply Voltage (V) | Wavelength (nm) | Detector |
|----------------------------|------------------|---|---|--------------------|-----------------|----------|
| TOTR211P | Up to 2.5 | 300 m (2.125 Gb/s, 50/125 μm MMF) 550 m (1.25 Gb/s, 50/125 μm MMF) | 0 to 70 | 3.3 | 850(VCSEL) | PD |
| TOTR311P-F | Up to 2.5 | 2 km / 15 km (SMF) | 0 to 70 | 3.3 | 1310(FP-LD) | PD |
| TOTR311P-D | Up to 2.5 | 15 km (SMF) | -10 to 70 | 3.3 | 1300(DFB × 4) | PD |
| TOTR311P-DA ⁽⁴⁾ | Up to 2.5 | 40 km (SMF) | -10 to 70 | 3.3 | 1300(DFB × 4) | APD |
| TOTR361P-D | Up to 2.5 | 15 km / 40 km (SMF) | -10 to 70 | 3.3 | 1550(DFB × 8) | PD |
| TOTR361P-DA ⁽⁴⁾ | Up to 2.5 | 80 km (SMF) | -10 to 70 | 3.3 | 1550(DFB × 8) | APD |

Note (1): Target distance.

Note (2): Case Temperature

Note (3): 2 × 5 pins package

Note (4): Integrated DC/DC Converter.

Image Sensors

CCD Linear Image Sensors

| Classification | Part Number | Photo Sensitive Pixels (Picture Element) | | | Sensitivity (Typ.) (V/lx · s) | Data Rate (MHz) | Other Features |
|------------------------|---------------------|--|---------------------|---------------------|----------------------------------|--------------------|--------------------------------|
| | | Type/Lamp | Number | Size (μm) | | | |
| Lens reduction type | TCD1706DG | B/W | 7400 | 4.7×4.7 | 15 | 25×4 | Single 5-V power supply |
| | TCD1708DG | | 7450 | | | | |
| | TCD1709DG | | 7500 | 7×7 | | 25×4 | |
| | TCD1711DG | | 7450 | 4.7×4.7 | | 30×2 | |
| | TCD2558DG-1 | Color | 5340×3 Line | 7×7 | R:8.5, G:12.7, B:9.5 | 10 | |
| | TCD2561DG-1 | | 5340×4 Line | 7×7 | R:10.4, G:14.4, B:8.7, B/W:21.0 | Color:10, B/W:10×2 | |
| | TCD2702ADG | | 7350×3 Line | 9.325×9.325 | R:7.8, G:11.5, B:3.7 | 25×2 | 2-line interlace |
| | TCD2703ADG | | 7500×3 Line | | R:9.3, G:14.5, B:4.8 | | |
| | TCD2704DG-1 | | 7500×4 Line | 5×5 | R:4.9, G:6.3, B:4.2, B/W:10.8 | Color:12, B/W:12×2 | |
| | TCD2705DG | | 7300×3 Line | 10×10 | R:3.6, G:4.7, B:2.7 | 30×2 | |
| | TCD2707DG | | 7450×4 Line | 4.7×4.7 | R:5.5, G:8.5, B:4.2, B/W:12.8 | Color:20, B/W:25×2 | |
| | TCD2905CFG | | 5400×6 Line | 5.25×5.25 | R:4.7, G:6.4, B:3.7 | 10 | |
| | TCD2908CFG | | 5400×8 Line | 5.25×5.25 | R:4.9, G:6.7, B:3.6, B/W:22.4 | Color:10, B/W:10×2 | |
| | TCD2953CFG | | 10680×6 Line | 4 pitch | R:1.5, G:2.0, B:1.4 | 10 | Overflow drain, 4-μm pitch |
| | TCD2955CFG | 14240×6 Line | 3×4 | R:1.5, G:2.0, B:1.4 | 10 | Overflow drain | |
| TCD2957CFG | 10680×6 Line | 2.625×3.9 | R:1.7, G:2.1, B:1.1 | 10 | Electronic Shutter | | |
| CIS module | CIPS54CS301 | R, G, B | 644 | 50×40 | --- | 2.5 | |
| | CIPS317CF603 | Color | 7488×3 Color | 23×34 | --- | 80/3 Color | |
| | CIPS308BS620A | Y/G | 7296 | 24×40 | --- | 90 | Shading adjustment, 10-bit ADC |
| | CIPS308BS621B | | | | --- | 21 | Shading adjustment, 8-bit ADC |
| | CIPS218CF601 | R,G,B | 5152 | 24×40 | --- | 5×2 | |

Toshiba manufactures the products shown in bold in offshore factories.

| Package | Resolution (DPI) | Uses | Remark |
|------------------------------------|------------------|------------------------------|--------------------------|
| 22PIN Cerdip | A3 600 | Photocopiers, Scanners | |
| 68PIN Cerdip | | | |
| 22PIN Cerdip | | | |
| 22PIN Cerdip | A4 600 | Color scanners | |
| | | Photocopiers, Color scanners | |
| 68PIN Cerdip | A3 600 | Photocopiers, Color scanners | MP: '05/2Q |
| 22PIN Cerdip | | | |
| 68PIN Cerdip | | | |
| 22PIN Cerdip | | | |
| 22PIN CLCC | A4 1200 | Color scanners | |
| 32PIN CLCC | A4 2400 | | |
| | A4 3200 | | |
| 22PIN CLCC | A4 2400 | | |
| 12PIN connector | 54mm 300 | Mobile | ES: '03/3Q |
| 40PIN connector | A3 600 | Color scanners, MFP | |
| 24PIN connector, 8PIN connector | | Photocopiers, MFP | ES: 3 months after order |
| 35PIN connector | | | |
| 15PIN connector | | A4 600 | MFP |

Area Image Sensors and Signal Processors ICs

| Dynastron | | | | | | |
|----------------|-------------|--------------------|-----------------|----------------------------------|-------------------|--------------------------|
| Optical format | Part number | Total pixel number | Color / Mono | Package | Power consumption | Digital signal processor |
| 1/4 inch | TCM8210MD | 698 × 502 (350K) | Color (R, G, B) | 24-pin package with optical lens | 100 mW (15 fps) | Incorporated |
| 1/6 inch | TCM8230MD | 698 × 502 (350K) | Color (R, G, B) | 20-pin package with optical lens | 30 mW (15 fps) | Incorporated |