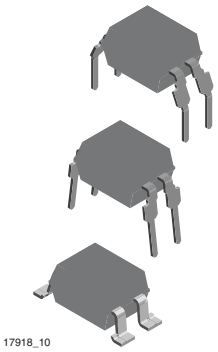
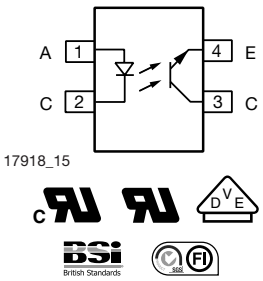
Optocoupler, Phototransistor Output, High Temperature, 110 °C, Rated





DESCRIPTION

The VO610A consists of a phototransistor optically coupled to a gallium arsenide infrared-emitting diode in a 4 pin plastic dual inline package.

AGENCY APPROVALS

- BSI: EN 60065:2002, EN 60950:2000
- DIN EN 60747-5-5 (VDE 0884)
- FIMKO
- UL file no. E52744
- cUL tested to CSA 22.2 bulletin 5A

FEATURES

- CTR offered in 4 groups
- Isolation materials according to UL94-VO
- Pollution degree 2 (DIN/VDE 0110/resp. IEC 60664)
- Climatic classification 55/110/21 (IEC 60068 part 1)
- Temperature range - 55 °C to + 110 °C
- Rated impulse voltage (transient overvoltage) V_{IOTM} = 6 kV_{peak}
- Isolation test voltage (partial discharge test voltage) V_{pd} = 1.6 kV
- Rated isolation voltage (RMS includes DC) V_{IOWM} = 600 V_{RMS}
- Rated recurring peak voltage (repetitive) V_{IORM} = 850 V_{peak}
- Creepage current resistance according to VDE 0303/IEC 60112 comparative tracking index: CTI ≥ 175
- Thickness through insulation ≥ 0.4 mm
- Compliant to RoHS directive 2002/95/EC

APPLICATIONS

Circuits for safe protective separation against electrical shock according to safety class II (reinforced isolation):

- for appl. class I - IV at mains voltage ≤ 300 V
- for appl. class I - IV at mains voltage ≤ 600 V according to table 1 of IEC60664-1, suitable for:
  - Switch-mode power supplies
  - Line receiver
  - Computer peripheral interface
  - Microprocessor system interface

ORDER INFORMATION

PART	REMARKS
VO610A-1	CTR 40 % to 80 %, DIP-4
VO610A-2	CTR 63 % to 125 %, DIP-4
VO610A-3	CTR 100 % to 200 %, DIP-4
VO610A-4	CTR 160 % to 320 %, DIP-4
VO610A-3X006	CTR 100 % to 200 %, DIP-4, 400 mil (option 6)
VO610A-1X007T	CTR 40 % to 80 %, SMD-4 (option 7, tape and reel)
VO610A-2X007T	CTR 63 % to 125 %, SMD-4 (option 7, tape and reel)
VO610A-3X007T	CTR 100 % to 200 %, SMD-4 (option 7, tape and reel)
VO610A-4X007T	CTR 160 % to 320 %, SMD-4 (option 7, tape and reel)

Note

For additional information on the possible lead bend and VDE options refer to option information.

ABSOLUTE MAXIMUM RATINGS (1)				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
INPUT				
Reverse voltage		V_R	6	V
Forward current		I_F	60	mA
Forward surge current	$t_p \leq 10$ µs	I_{FSM}	1.5	A
LED power dissipation	at 25 °C	P_{diss}	100	mW
OUTPUT				
Collector emitter voltage		V_{CEO}	70	V
Emitter collector voltage		V_{ECO}	7	V
Collector current		I_C	50	mA
Collector peak current	$t_p/T = 0.5$, $t_p \leq 10$ ms	I_{CM}	100	mA
Output power dissipation	at 25 °C	P_{diss}	150	mW
COUPLER				
Isolation test voltage (RMS)	t = 1 min	V_{ISO}	5000	V_{RMS}
Operating ambient temperature range		T_{amb}	- 55 to + 110	°C
Storage temperature range		T_{stg}	- 55 to + 125	°C
Soldering temperature (2)	2 mm from case, ≤ 10 s	T_{sld}	260	°C

Notes

(1) T_{amb} = 25 °C, unless otherwise specified.
Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of this document. Exposure to absolute maximum ratings for extended periods of the time can adversely affect reliability.

(2) Refer to reflow profile for soldering conditions for surface mounted parts (SMD). Refer to wave profile for soldering conditions for through hole parts (DIP).

ELECTRICAL CHARACTERISTICS (1)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
INPUT						
Forward voltage	$I_F = \pm 50$ mA	V_F		1.25	1.6	V
Junction capacitance	$V_R = 0$, f = 1 MHz	C_j		50		pF
OUTPUT						
Collector emitter voltage	$I_C = 1$ mA	V_{CEO}	70			V
Emitter collector voltage	$I_E = 100$ µA	V_{ECO}	7			V
Collector emitter cut-off current	$V_{CE} = 20$ V, $I_F = 0$, E = 0	I_{CEO}		10	100	nA
COUPLER						
Collector emitter saturation voltage	$I_F = 10$ mA, $I_C = 1$ mA	V_{CEsat}			0.3	V
Cut-off frequency	$V_{CE} = 5$ V, $I_F = 10$ mA, $R_L = 100$ Ω	f_c		110		kHz
Coupling capacitance	f = 1 MHz	C_k		0.6		pF

Note

(1) T_{amb} = 25 °C, unless otherwise specified.
Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluation. Typical values are for information only and are not part of the testing requirements.

CURRENT TRANSFER RATIO							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
I_C/I_F	V_{CE} = 5 V, I_F = 1 mA	VO610A-1	CTR	13	30		%
		VO610A-2	CTR	22	45		%
		VO610A-3	CTR	34	70		%
		VO610A-4	CTR	56	90		%
	V_{CE} = 5 V, I_F = 10 mA	VO610A-1	CTR	40		80	%
		VO610A-2	CTR	63		125	%
		VO610A-3	CTR	100		200	%
		VO610A-4	CTR	160		320	%

MAXIMUM SAFETY RATINGS (1)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT						
Forward current		I_F			130	mA
OUTPUT						
Power dissipation		P_{diss}			265	mW
COUPLER						
Safety temperature		T_{si}			150	°C

Note

(1) According to DIN EN 60747-5-5 (VDE 0884) (see figure 2). This optocoupler is suitable for safe electrical isolation only within the safety ratings. Compliance with the safety ratings shall be ensured by means of suitable protective circuits.

INSULATION RATED PARAMETERS						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Partial discharge test voltage - routine test	100 %, t_{test} = 1 s	V_{pd}	1.6			kV
Partial discharge test voltage - lot test (sample test)	t_{Tr} = 60 s, t_{test} = 10 s, (see figure 2)	V_{pd}	1.3			kV
Insulation resistance	V_{IO} = 500 V	R_{IO}	10^{12}			Ω
	V_{IO} = 500 V, T_{amb} = 100 °C	R_{IO}	10^{11}			Ω
	V_{IO} = 500 V, T_{amb} = 150 °C (construction test only)	R_{IO}	10^{9}			Ω
Rated impulse voltage		V_{IOTM}			6	kV
Max. working voltages	Recurring peak voltage	V_{IORM}	850			V_{peak}

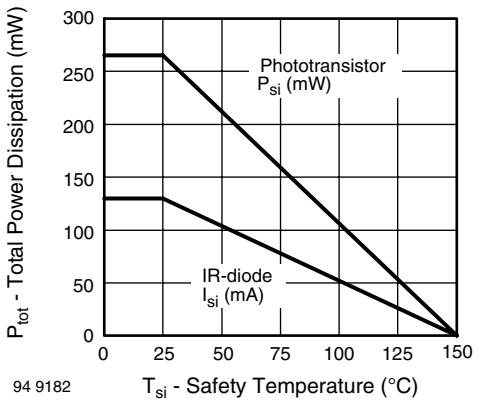


Fig. 1 - Derating Diagram

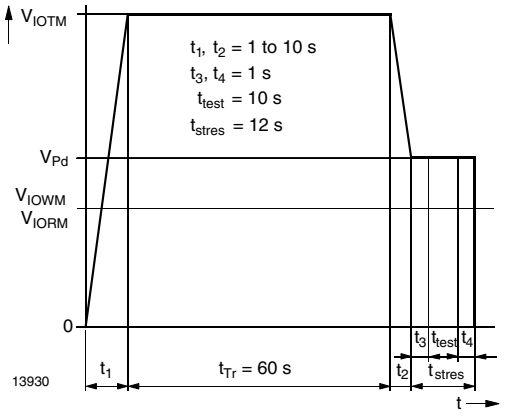


Fig. 2 - Test Pulse Diagram for Sample Test according to DIN EN 60747-5-5 (VDE0884)/DIN EN 60747-; IEC60747

SWITCHING CHARACTERISTICS						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN**	**TYP.**	**MAX**	**UNIT**
Delay time	V_S = 5 V, I_C = 2 mA, R_L = 100 Ω, (see figure 3)	t_d		3		µs
Rise time	V_S = 5 V, I_C = 2 mA, R_L = 100 Ω, (see figure 3)	t_r		3		µs
Fall time	V_S = 5 V, I_C = 2 mA, R_L = 100 Ω, (see figure 3)	t_f		4.7		µs
Storage time	V_S = 5 V, I_C = 2 mA, R_L = 100 Ω, (see figure 3)	t_s		0.3		µs
Turn-on time	V_S = 5 V, I_C = 2 mA, R_L = 100 Ω, (see figure 3)	t_{on}		6		µs
Turn-off time	V_S = 5 V, I_C = 2 mA, R_L = 100 Ω, (see figure 3)	t_{off}		5		µs
Turn-on time	V_S = 5 V, I_F = 10 mA, R_L = 1 kΩ, (see figure 4)	t_{on}		9		µs
Turn-off time	V_S = 5 V, I_F = 10 mA, R_L = 1 kΩ, (see figure 4)	t_{off}		10		µs

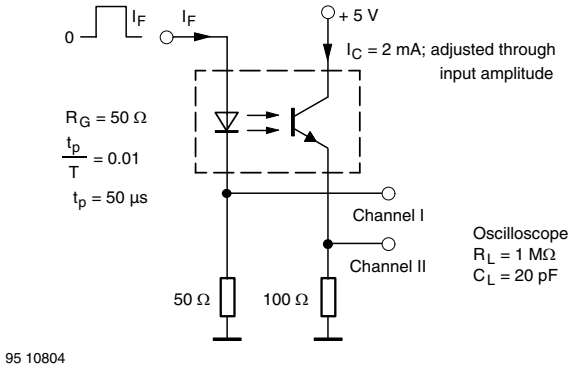


Fig. 3 - Test Circuit, Non-Saturated Operation

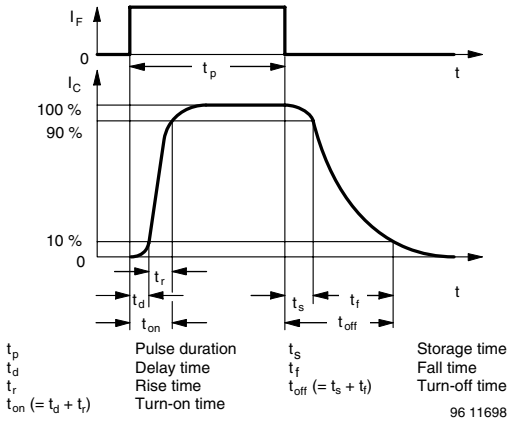


Fig. 5 - Switching Times

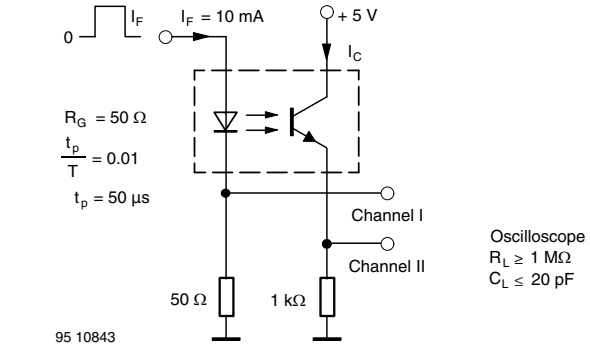
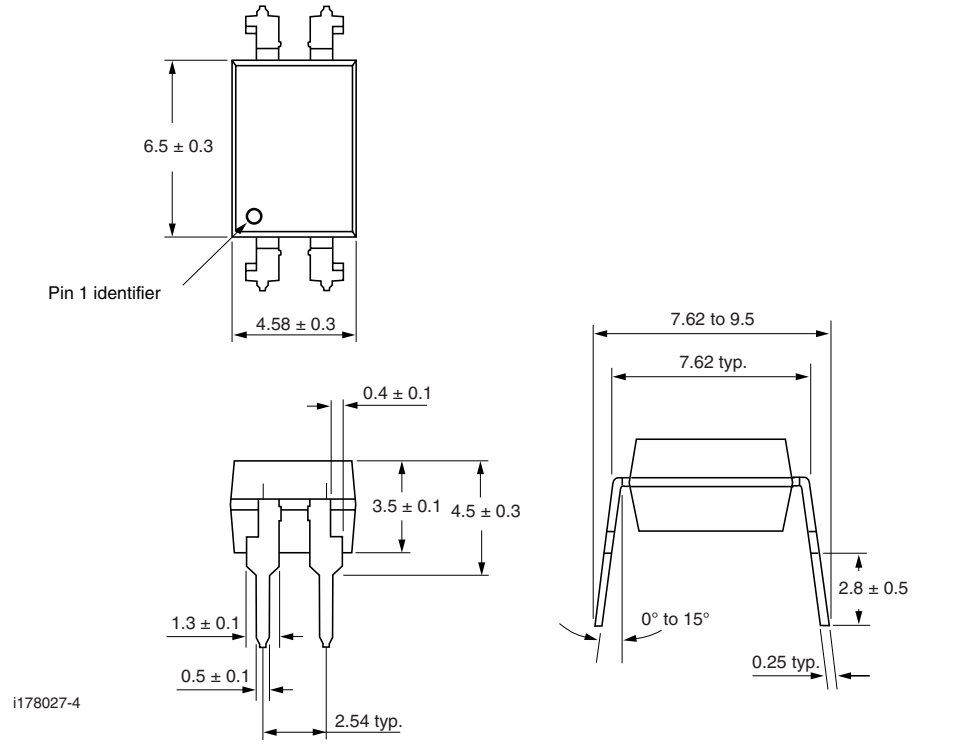
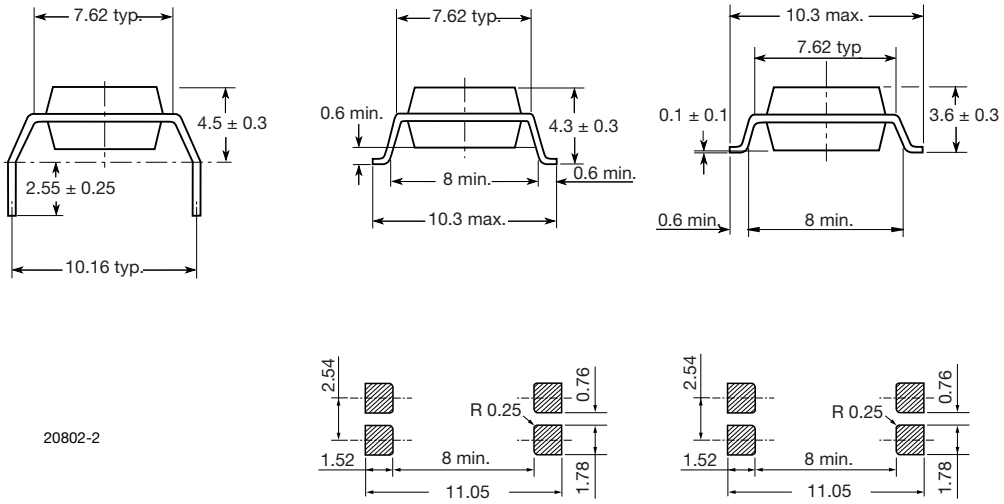


Fig. 4 - Test Circuit, Saturated Operation

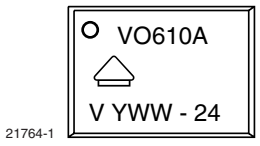
PACKAGE DIMENSIONS in millimeters



Option 6 **Option 7** **Option 9**



PACKAGE MARKING



Note

VDE logo is only printed on option 1 parts. Optioninformation is not marked on the part.

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