

## 100V N-CHANNEL ENHANCEMENT MODE MOSFET

### Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)}$                    | $I_D$<br>$T_A = 25^\circ C$ |
|---------------|---------------------------------|-----------------------------|
| 100V          | 350m $\Omega$ @ $V_{GS} = 10V$  | 2.4A                        |
|               | 450m $\Omega$ @ $V_{GS} = 6.0V$ | 2.1A                        |

### Description and Applications

This MOSFET has been designed to minimize the on-state resistance and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

- Motor control
- DC-DC Converters
- Power management functions
- Uninterrupted power supply

### Features and Benefits

- Fast switching speed
- Low gate drive
- Low input capacitance
- **Qualified to AEC-Q101 Standards for High Reliability**

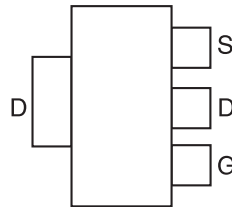
### Mechanical Data

- Case: SOT223
- Case Material: Molded Plastic, UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin annealed over Copper lead frame. Solderable per MIL-STD-202, Method 208
- Weight: 0.112 grams (approximate)

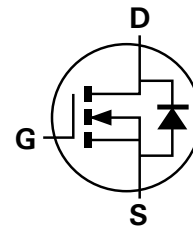
SOT223



Top View



Pin Out - Top View

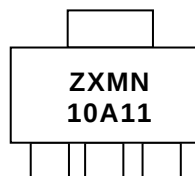


Equivalent Circuit

### Ordering Information

| Product      | Marking   | Reel size (inches) | Tape width (mm) | Quantity per reel |
|--------------|-----------|--------------------|-----------------|-------------------|
| ZXMN10A11GTA | See below | 7                  | 12              | 1,000             |

### Marking Information



ZXMN = Product Type Marking Code, Line 1  
10A11 = Product Type Marking Code, Line 2

**Maximum Ratings** @T<sub>A</sub> = 25°C unless otherwise specified

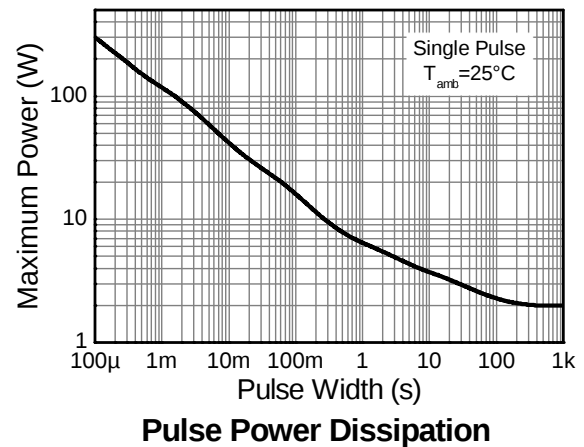
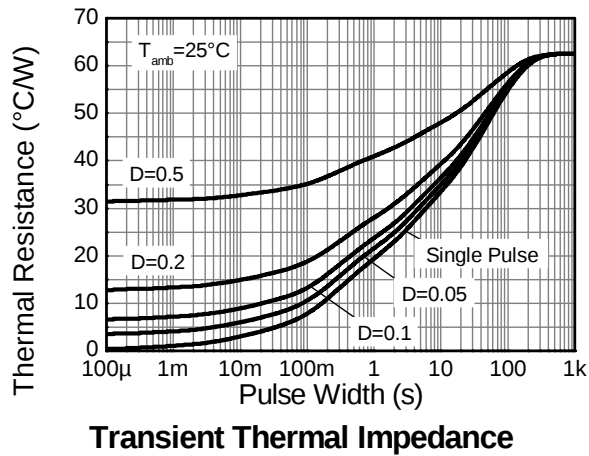
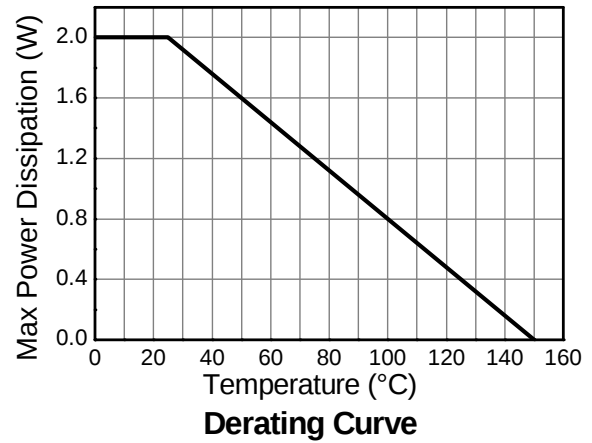
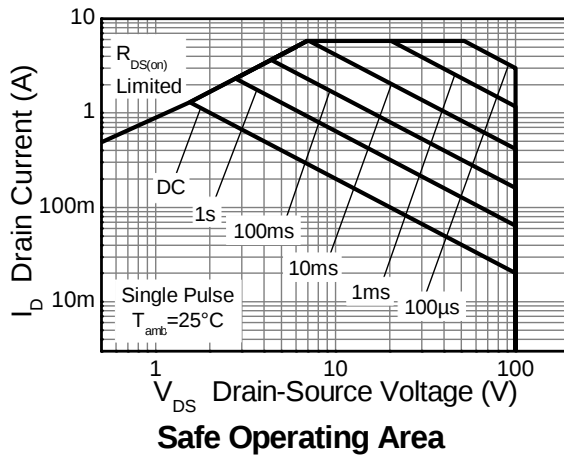
| Characteristic                         |                       |                                | Symbol           | Value | Unit |
|----------------------------------------|-----------------------|--------------------------------|------------------|-------|------|
| Drain-Source voltage                   |                       |                                | V <sub>DSS</sub> | 100   | V    |
| Gate-Source voltage                    |                       |                                | V <sub>GS</sub>  | ±20   | V    |
| Continuous Drain current               | V <sub>GS</sub> = 10V | (Note 2)                       | I <sub>D</sub>   | 2.4   | A    |
|                                        |                       | T <sub>A</sub> = 70°C (Note 2) |                  | 1.9   |      |
|                                        |                       | (Note 1)                       |                  | 1.7   |      |
| Pulsed Drain current                   | V <sub>GS</sub> = 10V | (Note 3)                       | I <sub>DM</sub>  | 7.9   | A    |
| Continuous Source current (Body diode) |                       | (Note 2)                       | I <sub>S</sub>   | 4.6   | A    |
| Pulsed Source current (Body diode)     |                       | (Note 3)                       | I <sub>SM</sub>  | 7.9   | A    |

**Thermal Characteristics** @T<sub>A</sub> = 25°C unless otherwise specified

| Characteristic                              |          |                  | Symbol                            | Value      | Unit       |
|---------------------------------------------|----------|------------------|-----------------------------------|------------|------------|
| Power dissipation<br>Linear derating factor | (Note 1) | P <sub>D</sub>   |                                   | 2.0        | W<br>mW/°C |
|                                             |          |                  |                                   | 16         |            |
|                                             | (Note 2) |                  |                                   | 3.9<br>31  |            |
| Thermal Resistance, Junction to Ambient     | (Note 1) | R <sub>θJA</sub> |                                   | 62.5       | °C/W       |
|                                             | (Note 2) |                  |                                   | 32.0       |            |
| Thermal Resistance, Junction to Lead        | (Note 4) | R <sub>θJL</sub> |                                   | 9.8        | °C/W       |
| Operating and storage temperature range     |          |                  | T <sub>J</sub> , T <sub>STG</sub> | -55 to 150 | °C         |

- Notes:
1. For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
  2. Same as note (1), except the device is measured at t ≤ 10 sec.
  3. Same as note (1), except the device is pulsed with D = 0.02 and pulse width 300μs. The pulse current is limited by the maximum junction temperature.
  4. Thermal resistance from junction to solder-point (at the end of the drain lead)

## Thermal Characteristics

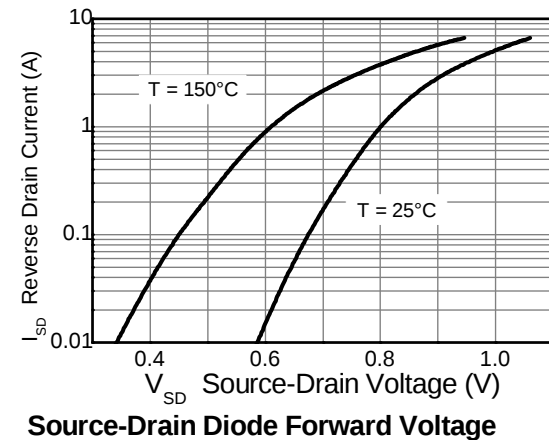
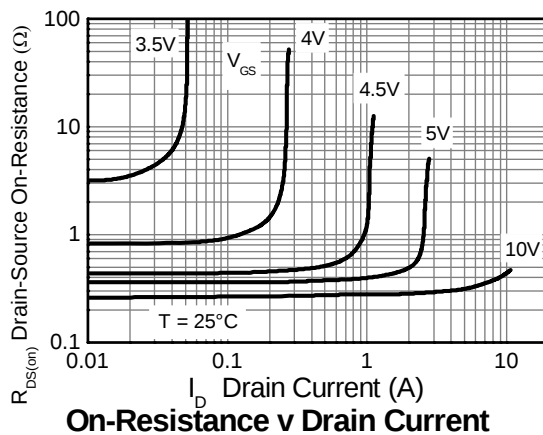
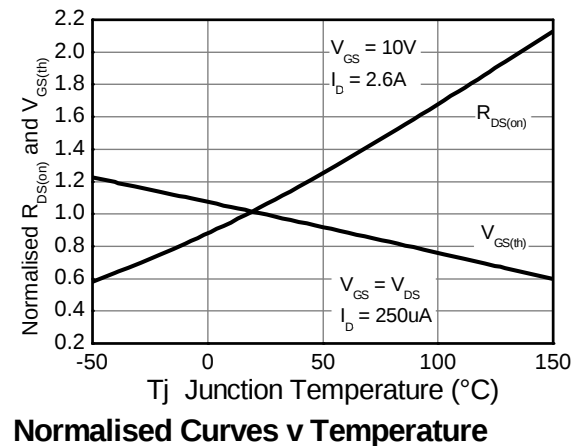
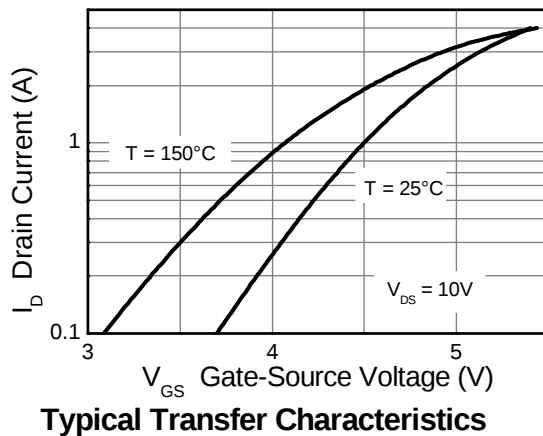
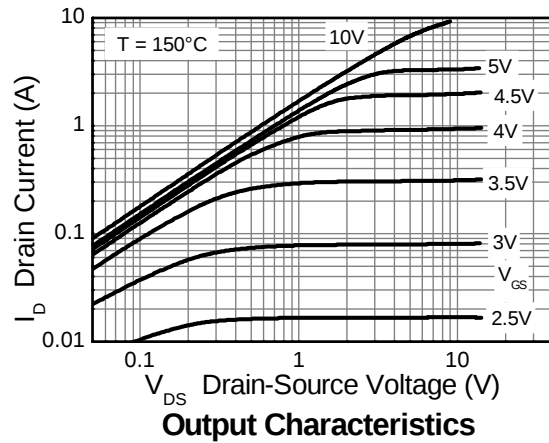
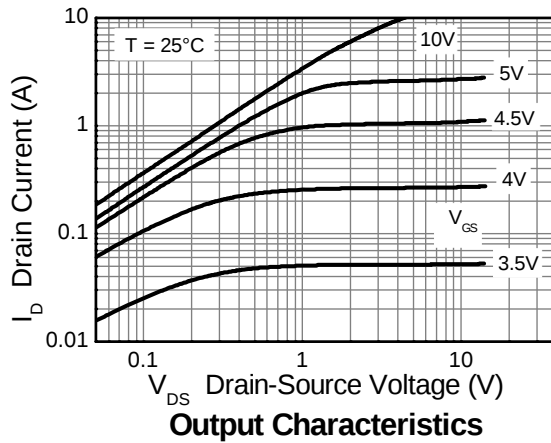


**Electrical Characteristics** @T<sub>A</sub> = 25°C unless otherwise specified

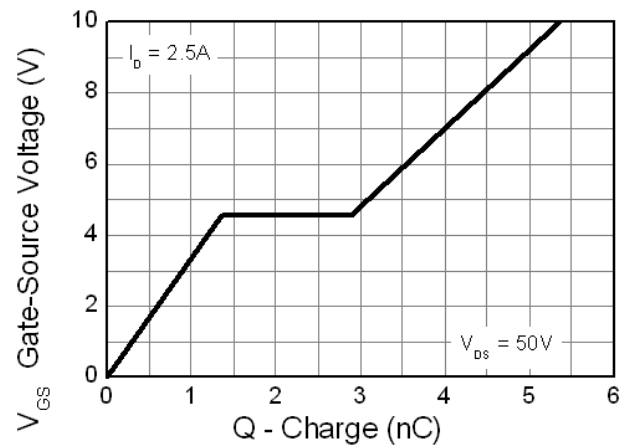
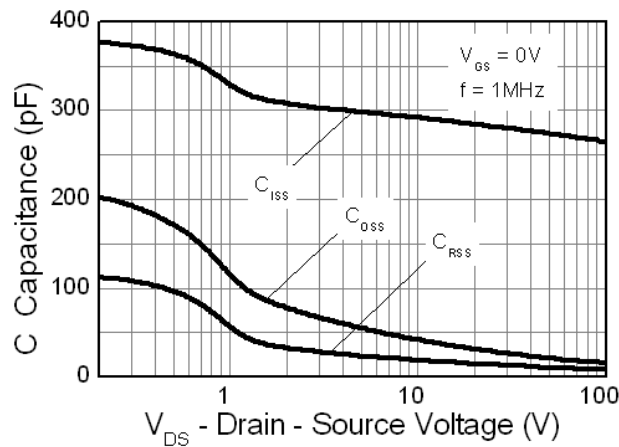
| Characteristic                             | Symbol               | Min | Typ  | Max  | Unit | Test Condition                                                                             |                                                |
|--------------------------------------------|----------------------|-----|------|------|------|--------------------------------------------------------------------------------------------|------------------------------------------------|
| OFF CHARACTERISTICS                        |                      |     |      |      |      |                                                                                            |                                                |
| Drain-Source Breakdown Voltage             | BV <sub>DSS</sub>    | 100 | —    | —    | V    | I <sub>D</sub> = 250μA, V <sub>GS</sub> = 0V                                               |                                                |
| Zero Gate Voltage Drain Current            | I <sub>DSS</sub>     | —   | —    | 1    | μA   | V <sub>DS</sub> = 100V, V <sub>GS</sub> = 0V                                               |                                                |
| Gate-Source Leakage                        | I <sub>GSS</sub>     | —   | —    | ±100 | nA   | V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V                                               |                                                |
| ON CHARACTERISTICS                         |                      |     |      |      |      |                                                                                            |                                                |
| Gate Threshold Voltage                     | V <sub>GS(th)</sub>  | 2.0 | —    | 4.0  | V    | I <sub>D</sub> = 250μA, V <sub>DS</sub> = V <sub>GS</sub>                                  |                                                |
| Static Drain-Source On-Resistance (Note 5) | R <sub>DS (ON)</sub> | —   | —    | 0.35 | Ω    | V <sub>GS</sub> = 10V, I <sub>D</sub> = 2.6A                                               |                                                |
|                                            |                      |     |      | 0.45 |      | V <sub>GS</sub> = 6V, I <sub>D</sub> = 1.3A                                                |                                                |
| Forward Transconductance (Notes 5 & 6)     | g <sub>fs</sub>      | —   | 4    | —    | S    | V <sub>DS</sub> = 15V, I <sub>D</sub> = 2.6A                                               |                                                |
| Diode Forward Voltage (Note 5)             | V <sub>SD</sub>      | —   | 0.85 | 0.95 | V    | I <sub>S</sub> = 1.85A, V <sub>GS</sub> = 0V                                               |                                                |
| Reverse recovery time (Note 6)             | t <sub>rr</sub>      |     | 26   | —    | ns   | I <sub>F</sub> = 1.0A, di/dt = 100A/μs                                                     |                                                |
| Reverse recovery charge (Note 6)           | Q <sub>rr</sub>      | —   | 30   | —    | nC   |                                                                                            |                                                |
| DYNAMIC CHARACTERISTICS (Note 6)           |                      |     |      |      |      |                                                                                            |                                                |
| Input Capacitance                          | C <sub>iss</sub>     | —   | 274  | —    | pF   | V <sub>DS</sub> = 50V, V <sub>GS</sub> = 0V<br>f = 1MHz                                    |                                                |
| Output Capacitance                         | C <sub>oss</sub>     | —   | 21   | —    | pF   |                                                                                            |                                                |
| Reverse Transfer Capacitance               | C <sub>rss</sub>     | —   | 11   | —    | pF   |                                                                                            |                                                |
| Total Gate Charge (Note 7)                 | Q <sub>g</sub>       | —   | 3.5  | —    | nC   | V <sub>GS</sub> = 6.0V                                                                     | V <sub>DS</sub> = 50V<br>I <sub>D</sub> = 2.5A |
| Total Gate Charge (Note 7)                 | Q <sub>g</sub>       | —   | 5.4  | —    | nC   | V <sub>GS</sub> = 10V                                                                      |                                                |
| Gate-Source Charge (Note 7)                | Q <sub>gs</sub>      | —   | 1.4  | —    | nC   |                                                                                            |                                                |
| Gate-Drain Charge (Note 7)                 | Q <sub>gd</sub>      | —   | 1.5  | —    | nC   |                                                                                            |                                                |
| Turn-On Delay Time (Note 7)                | t <sub>D(on)</sub>   | —   | 2.7  | —    | ns   | V <sub>DD</sub> = 50V, V <sub>GS</sub> = 10V<br>I <sub>D</sub> = 1A, R <sub>G</sub> ≅ 6.0Ω |                                                |
| Turn-On Rise Time (Note 7)                 | t <sub>r</sub>       | —   | 1.7  | —    | ns   |                                                                                            |                                                |
| Turn-Off Delay Time (Note 7)               | t <sub>D(off)</sub>  | —   | 7.4  | —    | ns   |                                                                                            |                                                |
| Turn-Off Fall Time (Note 7)                | t <sub>f</sub>       | —   | 3.5  | —    | ns   |                                                                                            |                                                |

- Notes:
5. Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤ 2%
  6. For design aid only, not subject to production testing.
  7. Switching characteristics are independent of operating junction temperatures.

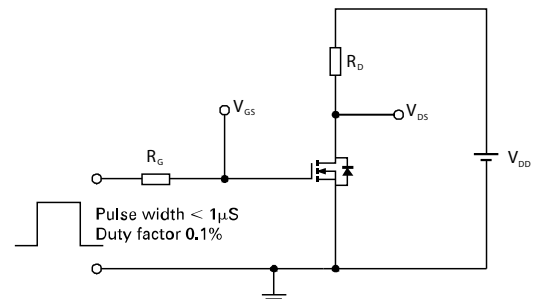
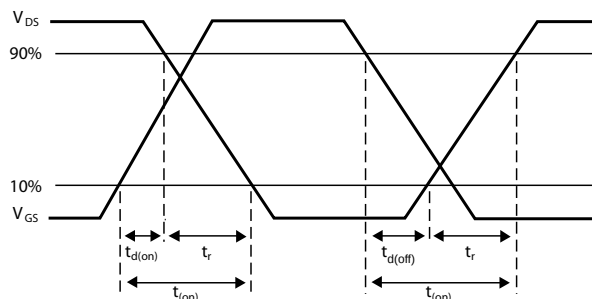
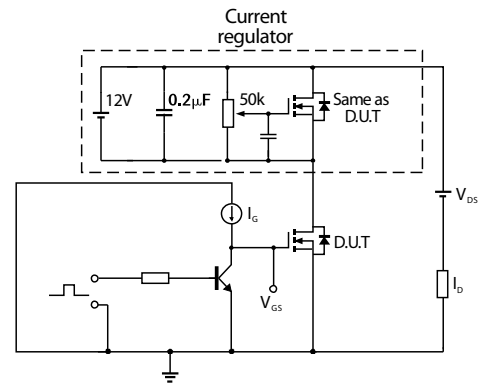
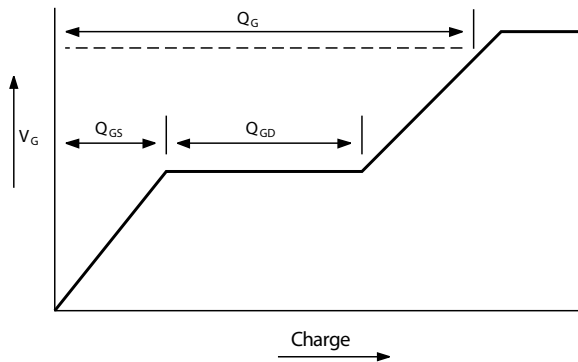
## Typical Characteristics



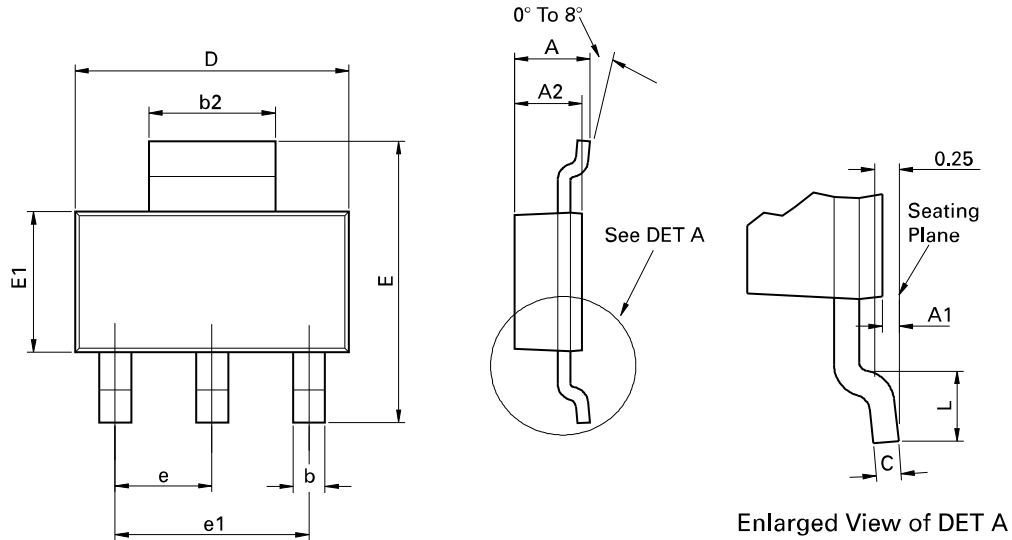
## Typical Characteristics - continued



## Test Circuits



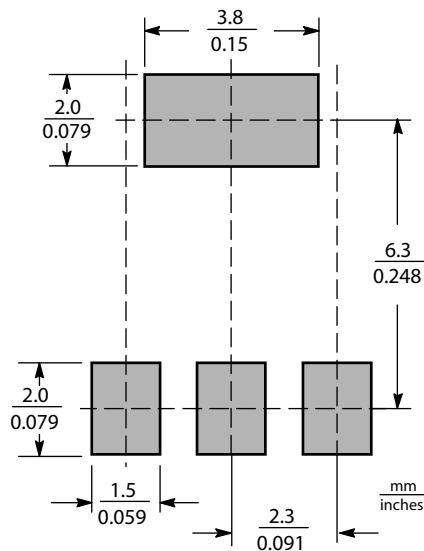
## Package Outline Dimensions



Conforms to JEDEC TO-261 AA Issue B

| DIM | Millimeters |      | Inches |        | DIM | Millimeters |      | Inches     |       |
|-----|-------------|------|--------|--------|-----|-------------|------|------------|-------|
|     | Min         | Max  | Min    | Max    |     | Min         | Max  | Min        | Max   |
| A   | -           | 1.80 | -      | 0.071  | D   | 6.30        | 6.70 | 0.248      | 0.264 |
| A1  | 0.02        | 0.10 | 0.0008 | 0.004  | e   | 2.30 BSC    |      | 0.0905 BSC |       |
| A2  | 1.55        | 1.65 | 0.0610 | 0.0649 | e1  | 4.60 BSC    |      | 0.181 BSC  |       |
| b   | 0.66        | 0.84 | 0.026  | 0.033  | E   | 6.70        | 7.30 | 0.264      | 0.287 |
| b2  | 2.90        | 3.10 | 0.114  | 0.122  | E1  | 3.30        | 3.70 | 0.130      | 0.146 |
| C   | 0.23        | 0.33 | 0.009  | 0.013  | L   | 0.90        | -    | 0.355      | -     |

## Suggested Pad Layout



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