# SMT10T20ALPDQ

**100V Dual N-Channel Power MOSFET**

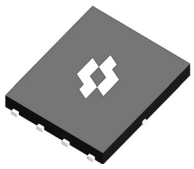
### Product Summary

| $V_{DS}$ | $R_{DS(ON)\_MAX}$ | $I_{D\_MAX}$ |
|---|---|---|
| 100 V | 20 mΩ @$V_{GS}$ = 10V | 32 A |
| | 27 mΩ @$V_{GS}$ = 4.5V | |

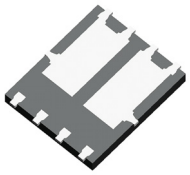
### Sinesemi Automotive MOSFET

AEC Qualified RoHS HALOGEN FREE

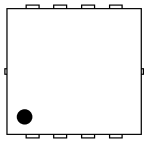
**PDFN5060-8L-D**



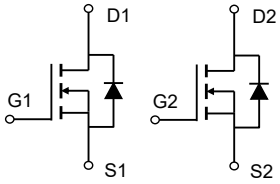
Top View



Bottom View




PIN Configuration
(Top View)




Chip-1 & Chip-2
Schematic Diagram

### Features

- N-Channel Enhancement Mode - Logic Level
- AEC-Q101 Qualified, PPAP Capable
- 175°C Operating Temperature
- 100% UIS and $R_g$ Tested

### Applications

- General Automotive Applications

### Mechanical Data

- Green Molding Compound
- Moisture Sensitivity: Level 1 per J-STD-020
- UL Flammability Classification Rating 94V-0

### Ordering Information

| Orderable Part Number | Package Type | Device Marking | Form | Quantity (pcs) |
|---|---|---|---|---|
| SMT10T20ALPDQ | PDFN5060-8L-D | 10T20ALDQ | 13" Tape&Reel | 5,000 |

### Maximum Ratings (@ $T_C$ = 25°C, unless otherwise specified.)

| Parameter | | Symbol | Value | Unit |
|---|---|---|---|---|
| Drain - Source Voltage | | $V_{DS}$ | 100 | V |
| Gate - Source Voltage | | $V_{GS}$ | ±20 | V |
| Continuous Drain Current ($V_{GS}$ = 10V) (1) | $T_C$ = 25°C | $I_D$ | 32 | A |
| | $T_C$ = 100°C | | 23 | A |
| Pulsed Drain Current (2) | | $I_{DM}$ | 125 | A |
| Single Pulse Avalanche Energy (3) | | $E_{AS}$ | 40 | mJ |
| Single Pulse Avalanche Current (L= 0.1mH) | | $I_{AS}$ | 16 | A |
| Power Dissipation | $T_C$ = 25°C | $P_D$ | 43 | W |
| | $T_C$ = 100°C | | 21 | W |
| Junction & Storage Temperature Range | | $T_J$, $T_{STG}$ | -55 ~ +175 | °C |

### Thermal Characteristics

| Parameter | Symbol | Typ. | Max. | Unit |
|---|---|---|---|---|
| Thermal Resistance, Junction-to-Ambient (4) | $R_{\theta JA}$ | 45 | 56 | °C/W |
| Thermal Resistance, Junction-to-Case (5) | $R_{\theta JC}$ | 2.7 | 3.5 | °C/W |

**Electrical Characteristics(Chip-1 & Chip-2)** (@ $T_J$ = 25°C, unless otherwise specified.)

| Parameter | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **Off Characteristics** [6] | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 0V, $I_D$ = 250μA | 100 | - | - | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 100V, $V_{GS}$ = 0V | - | - | 1.0 | μA |
| | | $T_J$ = 125°C | - | - | 100 | μA |
| Gate-Source Leakage Current | $I_{GSS}$ | $V_{GS}$ = ±20V, $V_{DS}$ = 0V | - | - | ±100 | nA |
| **On Characteristics** [6] | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{GS}$ = $V_{DS}$, $I_D$ = 250μA | 1.2 | 1.8 | 2.5 | V |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | $V_{GS}$ = 10V, $I_D$ = 20A | - | 16.5 | 20 | mΩ |
| | | $V_{GS}$ = 4.5V, $I_D$ = 15A | - | 21 | 27 | mΩ |
| Forward Transconductance | $g_{fs}$ | $V_{DS}$ = 5.0V, $I_D$ = 20A | - | 20 | - | S |
| Diodes Forward Voltage | $V_{SD}$ | $I_S$ = 2.0A, $V_{GS}$ = 0V | - | 0.7 | 1.2 | V |
| **Dynamic Characteristics** [7] | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$ = 50V, $V_{GS}$ = 0V, f = 1MHz | - | 554 | 720 | pF |
| Output Capacitance | $C_{oss}$ | | - | 258 | 335 | pF |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 8.4 | 17 | pF |
| Gate Resistance | $R_g$ | $V_{GS}$ = 0V, $V_{DS}$ = 0V, f = 1MHz | - | 1.0 | - | Ω |
| **Switching Characteristics** [7] | | | | | | |
| Turn-On DelayTime | $t_{d(on)}$ | $V_{GS}$ = 10V, $V_{DS}$ = 50V<br>$I_D$ = 20A, $R_{GEN}$ = 3.0Ω | - | 3.2 | - | ns |
| Rise Time | $t_r$ | | - | 2.7 | - | ns |
| Turn-Off DelayTime | $t_{d(off)}$ | | - | 10.5 | - | ns |
| Fall Time | $t_f$ | | - | 4.0 | - | ns |
| **Gate Charge Characteristics** [7] | | | | | | |
| Total Gate Charge ($V_{GS}$ = 10V) | $Q_g$ | $V_{DS}$ = 50V, $I_D$ = 20A<br>$V_{GS}$ = 10V | - | 10.6 | 13.8 | nC |
| Total Gate Charge ($V_{GS}$ = 4.5V) | $Q_g$ | | - | 5.5 | 7.2 | nC |
| Gate-Source Charge | $Q_{gs}$ | | - | 1.8 | 2.7 | nC |
| Gate-Drain Charge | $Q_{gd}$ | | - | 2.5 | 3.8 | nC |
| Gate Plateau Voltage | $V_{plateau}$ | | - | 3.2 | - | V |
| **Drain-Source Diode Characteristics** [7] | | | | | | |
| Body Diode Reverse Recovery Time | $t_{rr}$ | $I_F$ = 20A, dI/dt = 100A/μs,<br>$T_J$ = 25°C | - | 34 | - | ns |
| Body Diode Reverse Recovery Charge | $Q_{rr}$ | | - | 39 | - | nC |
| Diode Forward Current | $I_S$ | $T_C$ = 25°C | - | - | 32 | A |

**Notes:**

1. This current is chip limited, whiich is calculated based on Rthjc.
2. This current is calculated on single pulse with 10μs Pulse & Duty Cycle = 1%.
3. Defined by design, not subject to production test, $E_{AS}$ condition: $T_J$=25°C, $V_{DD}$=50V, $V_{GS}$=10V, L=1.0mH.
4. Device mounted on FR-4 substrate PC board with 2oz copper in 1inch square cooling area.
5. Thermal resistance from junction to soldering point (on the exposed drain pad).
6. Short duration pulse test used to minimize self-heating effect.
7. Defined by design, not subject to production.

## Typical Electrical and Thermal Characteristics(Chip-1 & Chip-2)

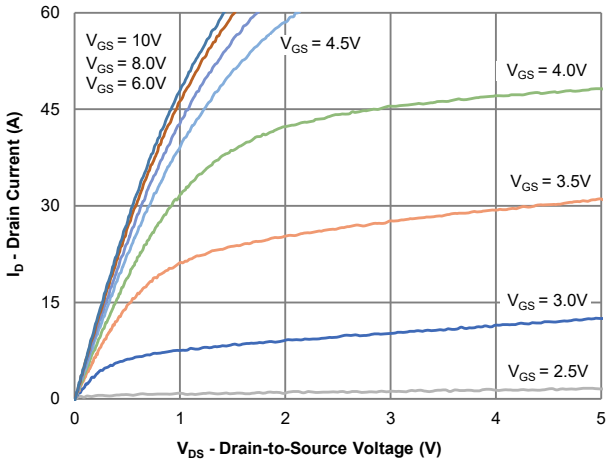



Figure 1: Output Characteristics

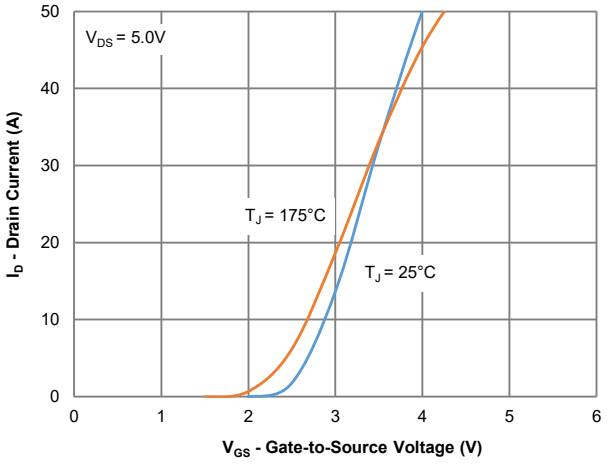



Figure 2: Transfer Characteristics

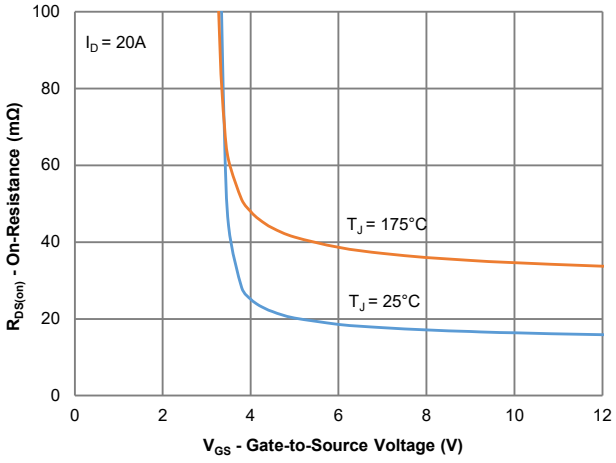



Figure 3: On-Resistance vs. Gate-Source Voltage

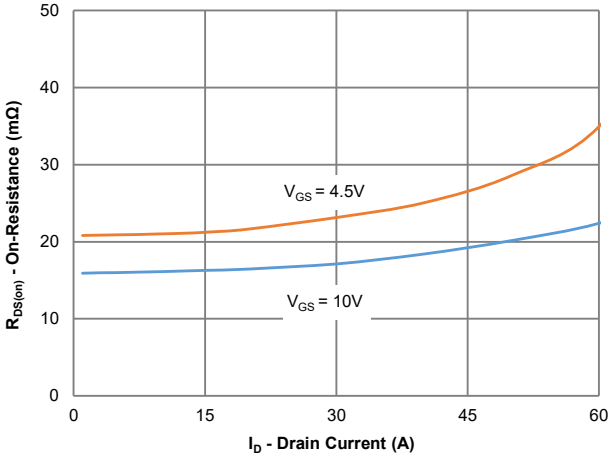



Figure 4: On-Resistance vs. Gate-Source Voltage

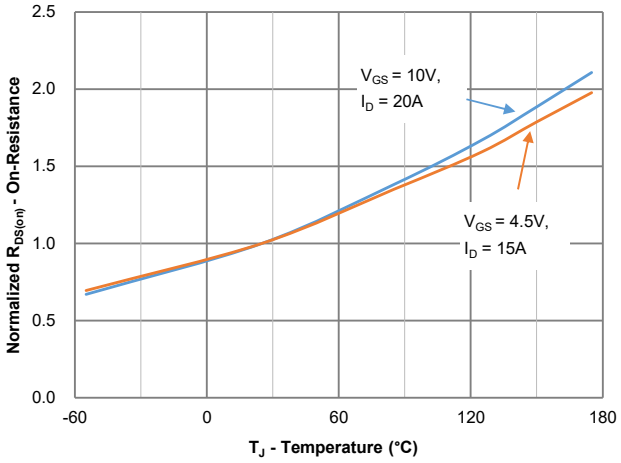



Figure 5: On-Resistance vs. Junction Temperature

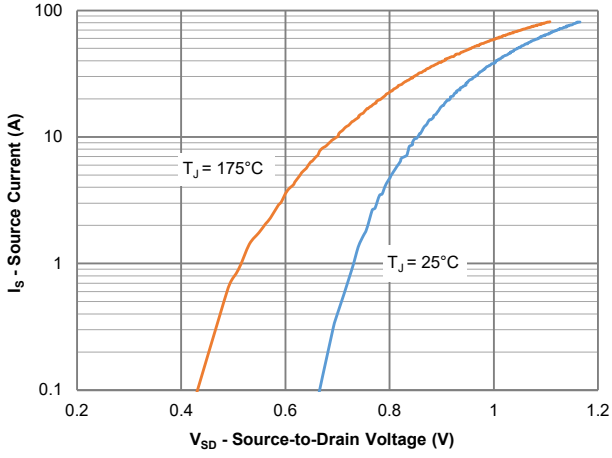



Figure 6: Source-Drain Diode Forward Voltage

## Typical Electrical and Thermal Characteristics(Chip-1 & Chip-2)

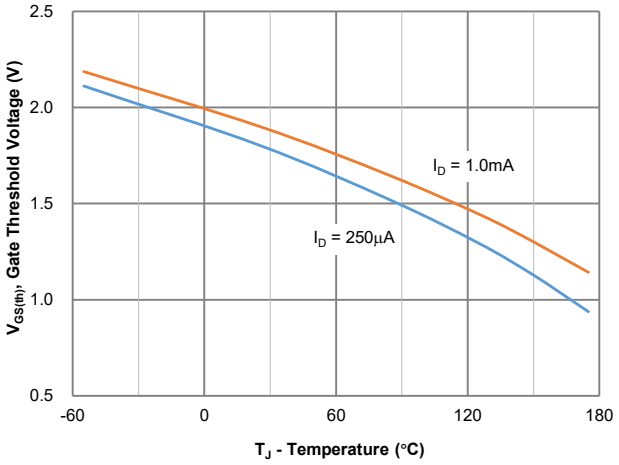



Figure 7: Gate Threshold Variation vs. Junction Temperature

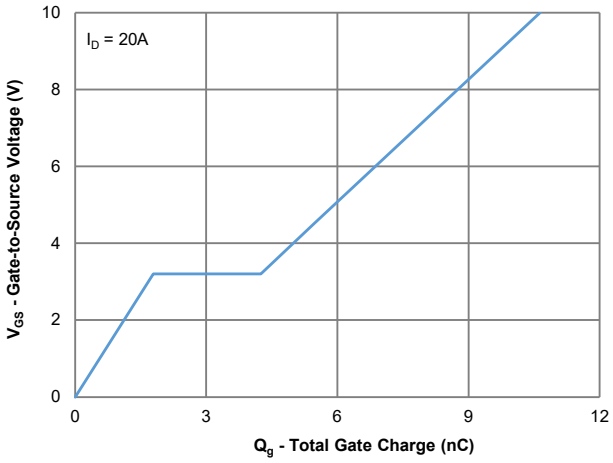



Figure 8: Gate Charge Characteristics

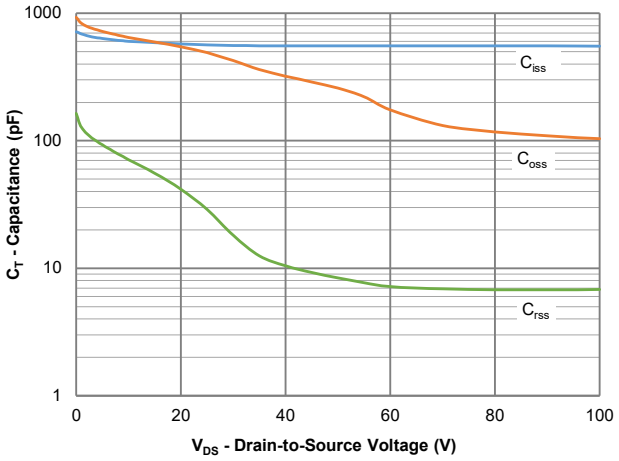



Figure 9: Capacitance Characteristics

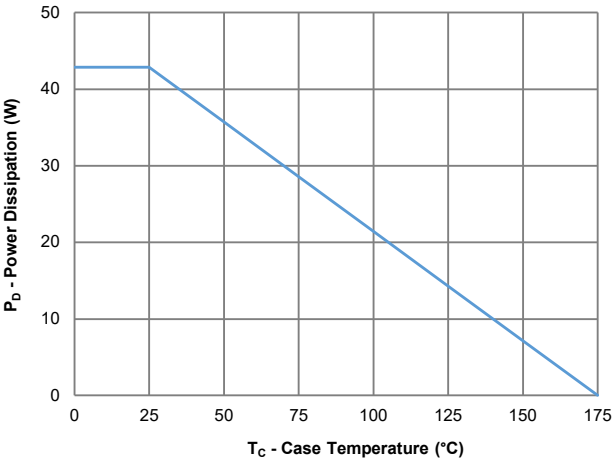



Figure 10: Power Derating

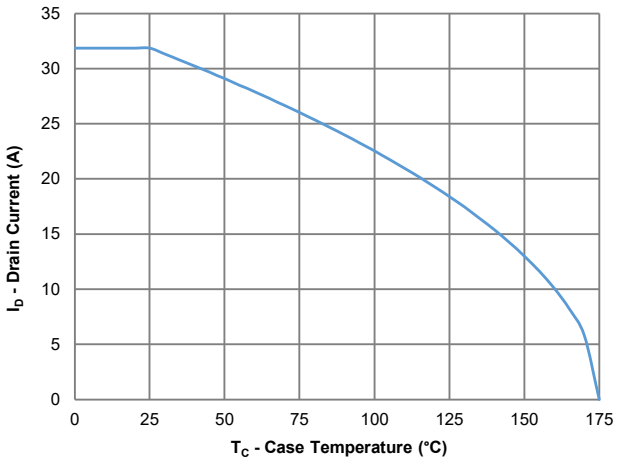



Figure 11: Current Derating

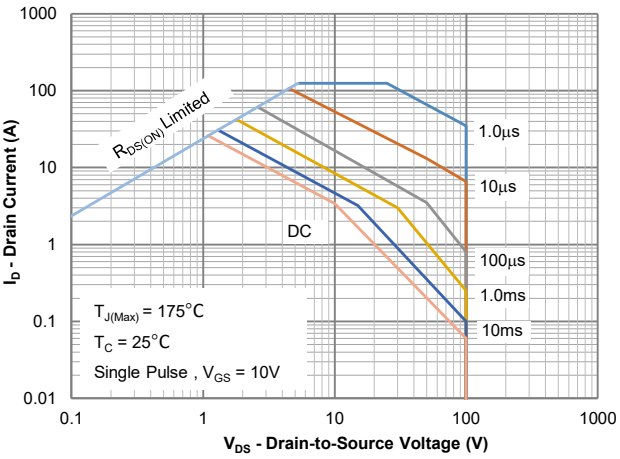



Figure 12: Safe Operating Area

**Typical Electrical and Thermal Characteristics(Chip-1 & Chip-2)**

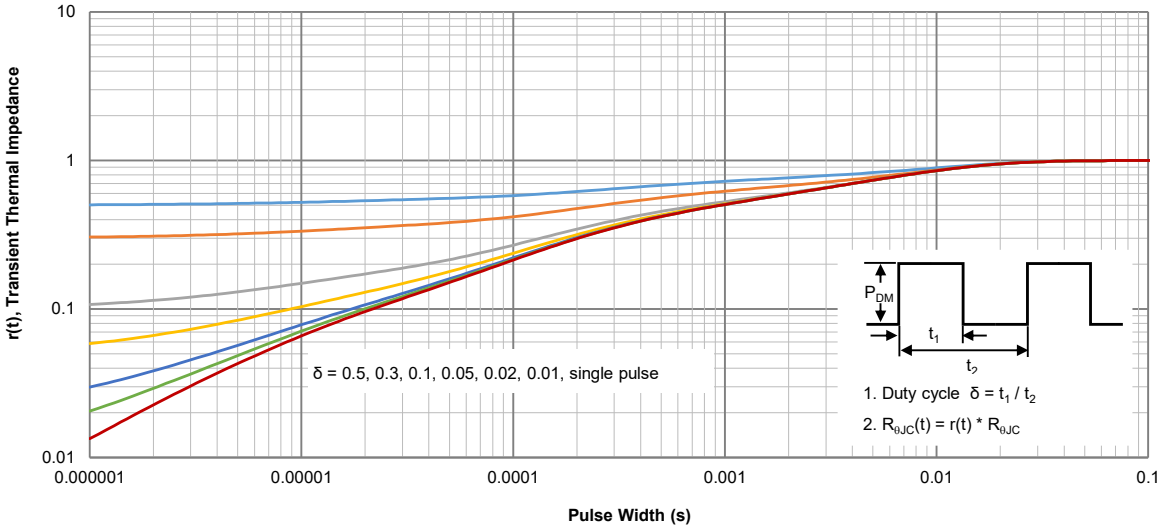
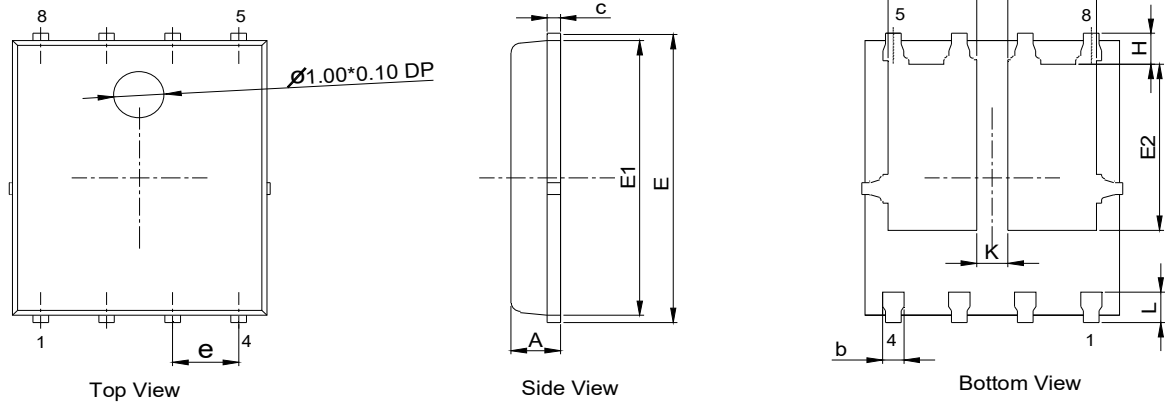
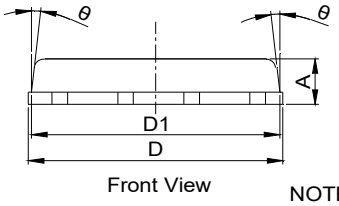



**Figure 13: Normalized Maximum Transient Thermal Impedance**

**PDFN5060-8L-D Package Outline**

## Package Outline

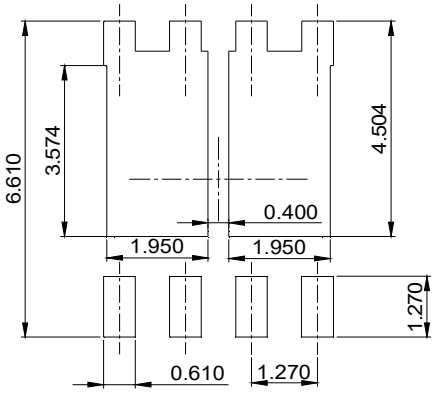



NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M,1994.
2. ALL DIMNESIONS IN MILLIMETER (ANNGLE IN DEGREE).
3. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD FLASH PROTRUSIONS OR GATE BURRS.

| DIM. | MILLIMETER | | |
|---|---|---|---|
| | MIN. | NOM. | MAX. |
| A | 0.90 | 1.00 | 1.10 |
| b | 0.20 | -- | 0.51 |
| c | 0.21 | 0.25 | 0.34 |
| D | 4.85 | 5.00 | 5.15 |
| D1 | 4.80 | 4.90 | 5.00 |
| D2 | 1.50 | -- | 1.80 |
| E | 5.90 | 6.00 | 6.10 |
| E1 | 5.65 | 5.75 | 5.85 |
| E2 | 3.38 | 3.48 | 3.78 |
| e | 1.27BSC | | |
| H | 0.41 | -- | 0.75 |
| L | 0.45 | 0.60 | 0.75 |
| K | 0.60 REF | | |
| θ | 0° | -- | 12° |

## Recommended Soldering Footprint




DIMENSIONS:MILLIMETERS