# SuperMOS – PDFN3*3-8L -30V $BV_{DSS}$, 8mΩ $R_{DS(on)}$, P-channel MOSFET

## 1. Description

The AP30P30Q-ES is P-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. Device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product AP30P30Q-ES is Pb-free.

## 2. Features

- -30V, $R_{DS(ON)}$=8.0mΩ(TYP.) @$V_{GS}$=-10V
  $R_{DS(ON)}$=11.5mΩ(TYP.) @$V_{GS}$=-4.5V
- Fast Switching
- High density cell design for low $R_{DS(on)}$
- Material: Halogen free
- Reliable and rugged
- Avalanche Rated
- Low leakage current

## 3. Applications

- PWM applications
- Load switch
- Power management in portable/desktop PCs
- DC/DC conversion

100% UIS TESTED!

## 4. Ordering Information

| Part Number | Package | Marking | Material | Packing | Quantity per reel | Flammability Rating | Reel Sizes |
|---|---|---|---|---|---|---|---|
| AP30P30Q-ES | PDFN3*3-8L | ES3347/LOT | Halogen free | Tape & Reel | 5,000 PCS | UL 94V-0 | 13 inches |

Table-1 Ordering information

## 5. Pin Configuration and Functions

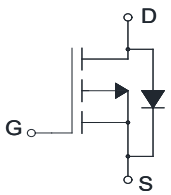
| Pin | Function | Outline | Circuit Diagram |
|---|---|---|---|
| 4 | Gate | Note c   |   |
| 1/2/3 | Source | | |
| 5/6/7/8 | Drain | | |

Table-2 Pin configuration

# 6. Specification

## Absolute Maximum Rating & Thermal Characteristics

Ratings at 25 ℃ ambient temperature unless otherwise specified.

| Parameter | | Symbol | Limit | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $BV_{DSS}$ | -30 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±25 | V |
| Continuous Drain Current | $T_C$=25°C | $I_D$ | -39 | A |
| | $T_C$=75°C | | -30 | |
| Maximum Power Dissipation | $T_C$=25°C | $P_D$ | 30 | W |
| | $T_C$=75°C | | 17.8 | |
| Pulsed Drain Current [a] | | $I_{DM}$ | -156 | A |
| Avalanche Current, Single Pulsed [b] | | $I_{AS}$ | -25 | A |
| Avalanche Energy, Single Pulsed [b] | | $E_{AS}$ | 93.7 | mJ |
| Operating Junction Temperature | | $T_J$ | 150 | °C |
| Storage Temperature Range | | $T_{stg}$ | -55 to +150 | °C |

Thermal resistance ratings

| Parameter | | Symbol | Typical | Unit |
|---|---|---|---|---|
| Junction-to-Ambient Thermal Resistance | t ≤ 10 s | $R_{\theta JA}$ | 40 | °C/W |
| Junction-to-Case Thermal Resistance | Steady State | $R_{\theta JC}$ | 4.2 | |

Note:

a: Repetitive rating, pulse width limited by junction temperature, tp=10μs, Duty Cycle=1%.

b: EAS condition：Tj=25℃,$V_{DD}$=-30V,$V_G$=-10V,L=0.3mH,Rg=25Ω.

c: This diagram is only an electrical schematic, and the actual pin size is based on POD.

## Electrical Characteristics

At TA = 25℃ unless otherwise specified

| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| OFF CHARACTERISTICS | | | | | | |
| Drain-to-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V, $I_D$=-250uA | -30 | | | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=-30V, $V_{GS}$=0V | | | -1 | uA |
| Gate-to-source Leakage Current | $I_{GSS}$ | $V_{DS}$=0V, $V_{GS}$=±25V | | | ±100 | nA |
| ON CHARACTERISTICS | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{GS}$=$V_{DS}$, $I_D$=-250uA | -1.0 | -1.4 | -2.0 | V |
| Drain-to-source On-resistance | $R_{DS(on)}$ | $V_{GS}$=-10V, $I_D$=-12A | | 8 | 13 | mΩ |
| | | $V_{GS}$=-4.5V, $I_D$=-7A | | 11.5 | 18 | |
| Forward Trans conductance | $g_{FS}$ | $V_{DS}$=-5.0V, $I_D$=-6A | | 24 | 40 | S |
| CHARGES, CAPACITANCES AND GATE RESISTANCE | | | | | | |
| Input Capacitance | $C_{ISS}$ | $V_{GS}$=0V, f=1MHz, $V_{DS}$ =-15V | | 1780 | | pF |
| Output Capacitance | $C_{OSS}$ | | | 235 | | |
| Reverse Transfer Capacitance | $C_{RSS}$ | | | 200 | | |
| Gate Resistance | $R_g$ | f=1MHZ | | 2.5 | | Ω |
| Total Gate Charge | $Q_{G(TOT)}$ | $V_{GS}$=-10V, $V_{DS}$=-15V, $I_D$ =-20A | | 46 | | nC |
| Gate-to-Source Charge | $Q_{GS}$ | | | 1.0 | | |
| Gate-to-Drain Charge | $Q_{GD}$ | | | 1.4 | | |
| SWITCHING CHARACTERISTICS | | | | | | |
| Turn-On Delay Time | $t_{d(ON)}$ | $V_{GS}$=-10V, $V_{DS}$=-15V, $R_L$=1Ω, $R_G$=3Ω | | 8 | | ns |
| Rise Time | $t_r$ | | | 27 | | |
| Turn-Off Delay Time | $t_{d(OFF)}$ | | | 68 | | |
| Fall Time | $t_f$ | | | 39 | | |
| BODY DIODE CHARACTERISTICS | | | | | | |
| Forward Voltage | $V_{SD}$ | $V_{GS}$=0V, $I_S$=-1.0A | | -0.75 | -1.5 | V |

## 7. Typical Characteristic

**Figure 1. On-Regin Characteristics**

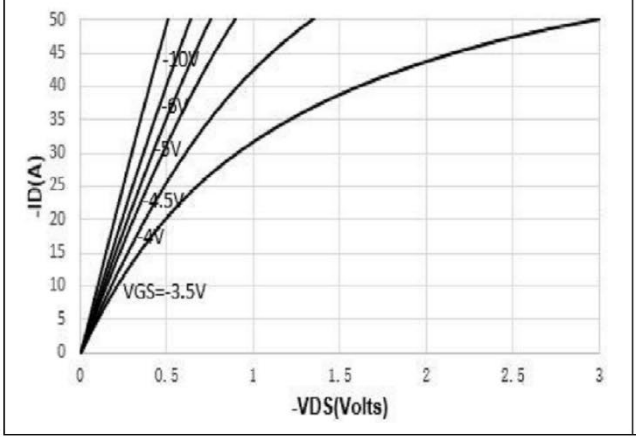



**Figure 2. Transfer Characteristics**

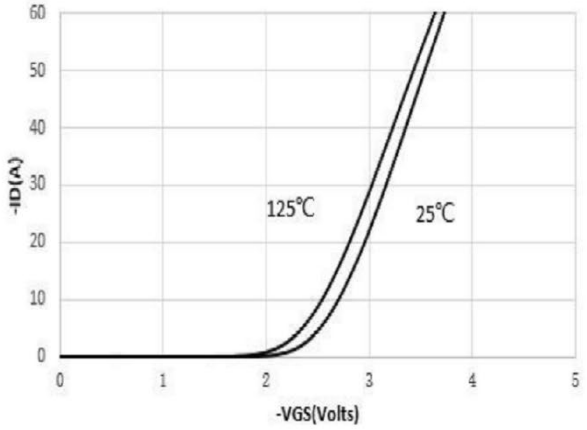



**Figure 3. On-Resistance vs. Drain Current and Gate Voltage**

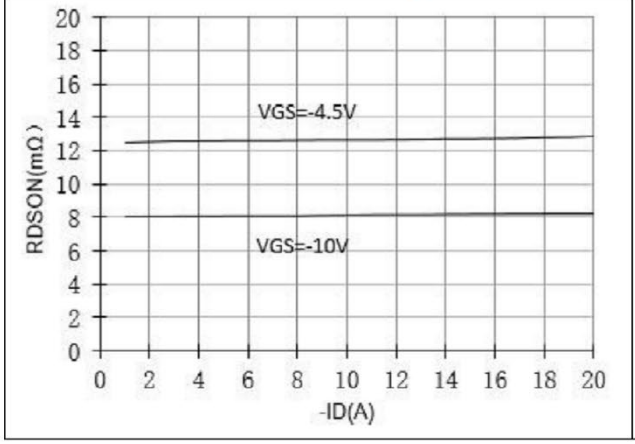



**Figure 4. On-Resistance vs. Junction Temperature**

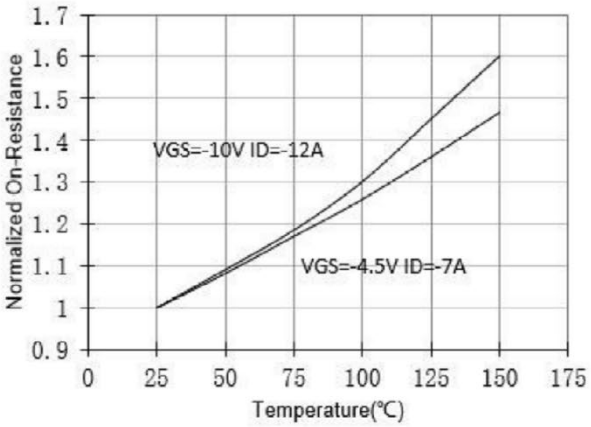



**Figure 5. On-Resistance vs. Gate-Source Voltage**

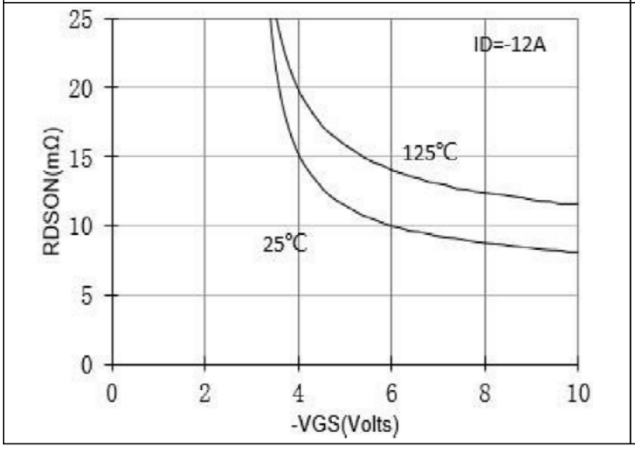
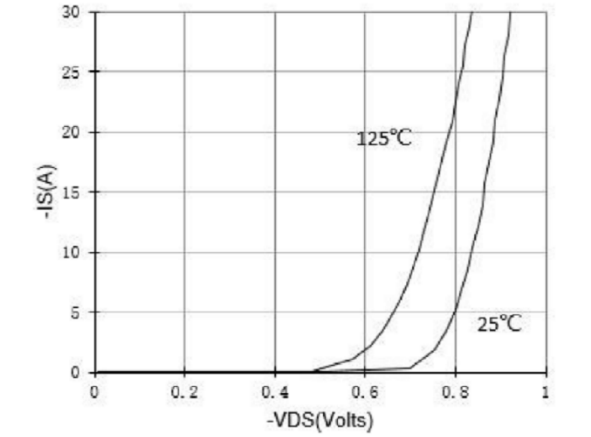
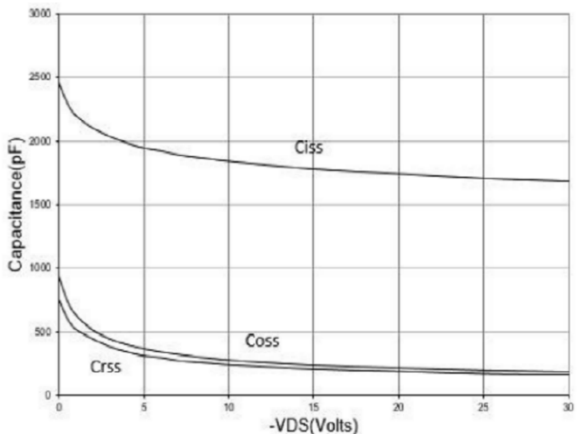


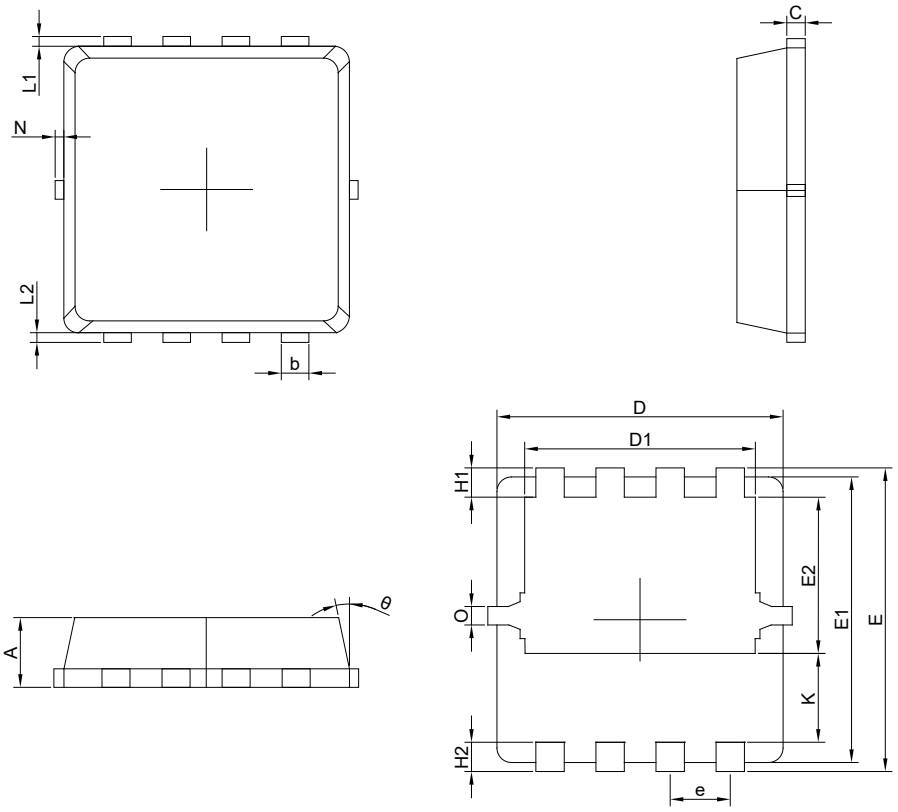

**Figure 6. Body-Diode Characteristics**



| Figure 7. Capacitance Characteristics | |
|---|---|
|  | |

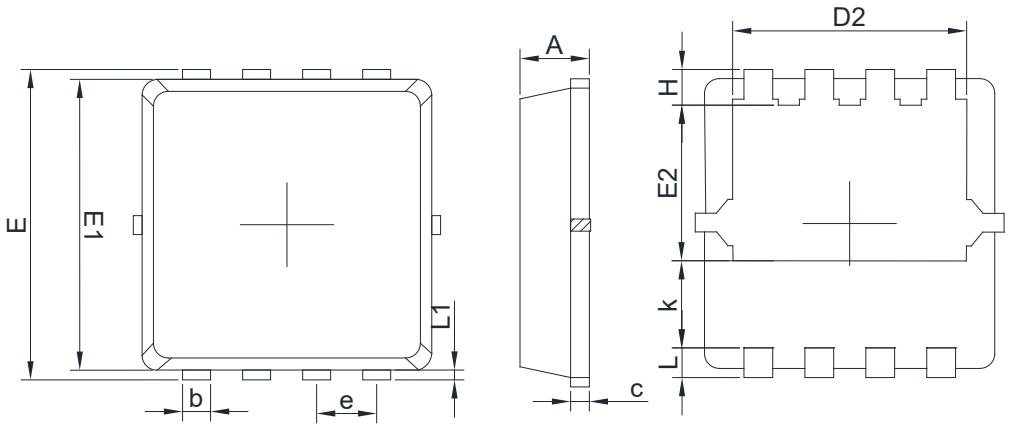
## 8. Dimension (PDFN3*3-8L)

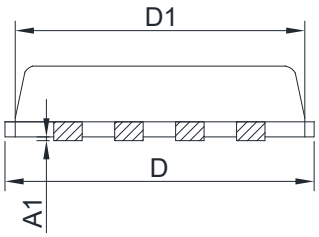
### POD A(J)




| Symbol | Dimensions in Millimeters | | | Symbol | Dimensions in Millimeters | | |
|---|---|---|---|---|---|---|---|
| | MIN | NOM | MAX | | MIN | NOM | MAX |
| A | 0. 65 | 0.75 | 0.85 | e | 0. 65 BSC. | | |
| b | 0. 25 | 0. 30 | 0. 35 | H1 | 0. 21 | 0.31 | 0. 41 |
| C | 0. 15 | 0. 20 | 0. 25 | H2 | 0. 30 | 0. 40 | 0.50 |
| D | 3. 00 | 3.10 | 3. 20 | K | 0.78 | 0. 88 | 0. 98 |
| D1 | 2. 40 | 2. 50 | 2. 60 | L1/L2 | 0. 10 REF. | | |
| E | 3. 20 | 3. 30 | 3. 40 | θ | 11° | 12° | 13° |
| E1 | 3. 00 | 3.10 | 3. 20 | N | 0 | - | 0.15 |
| E2 | 1. 60 | 1.70 | 1.80 | O | 0. 2 REF. | | |

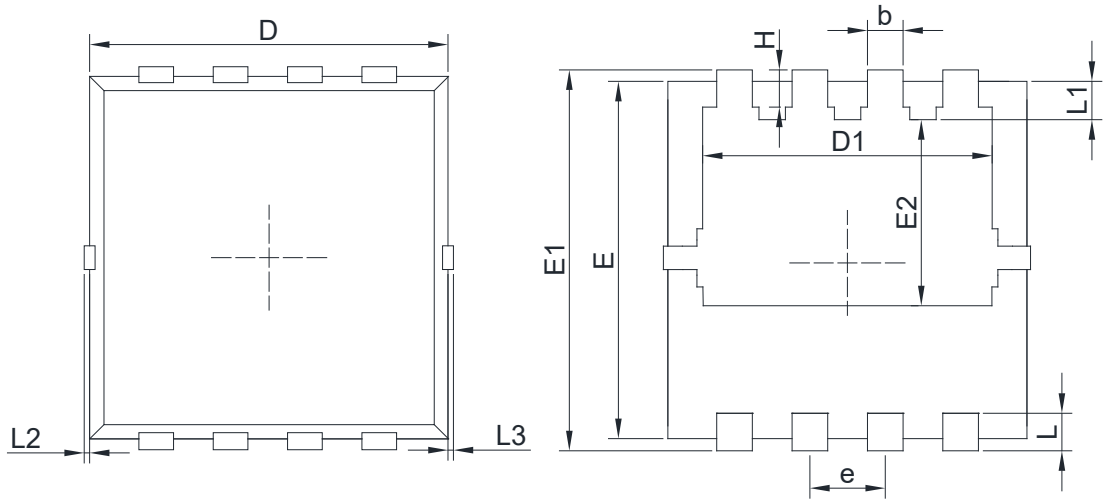
## POD B(Q)

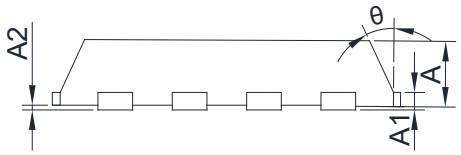



| Symbol | Dimensions in Millimeters | | | Symbol | Dimensions in Millimeters | | |
|---|---|---|---|---|---|---|---|
| | Min. | NOM. | Max. | | Min. | NOM. | Max. |
| A | 0.65 | 0.75 | 0.85 | H | 0.385 | 0.485 | 0.585 |
| A1 | | | 0.05 | k | 0.80 | | |
| b | 0.20 | 0.30 | 0.40 | L | 0.30 | 0.40 | 0.50 |
| c | 0.10 | 0.15 | 0.25 | e | 0.65BCS | | |
| D | 3.05 | 3.20 | 3.35 | L1 | 0.025 | 0.125 | 0.225 |
| D1 | 3.05 | 3.15 | 3.25 | D2 | 2.30 | 2.45 | 2.60 |
| E | 3.25 | 3.35 | 3.45 | E2 | 1.36 | 1.51 | 1.66 |
| E1 | 3.00 | 3.10 | 3.20 | | | | |

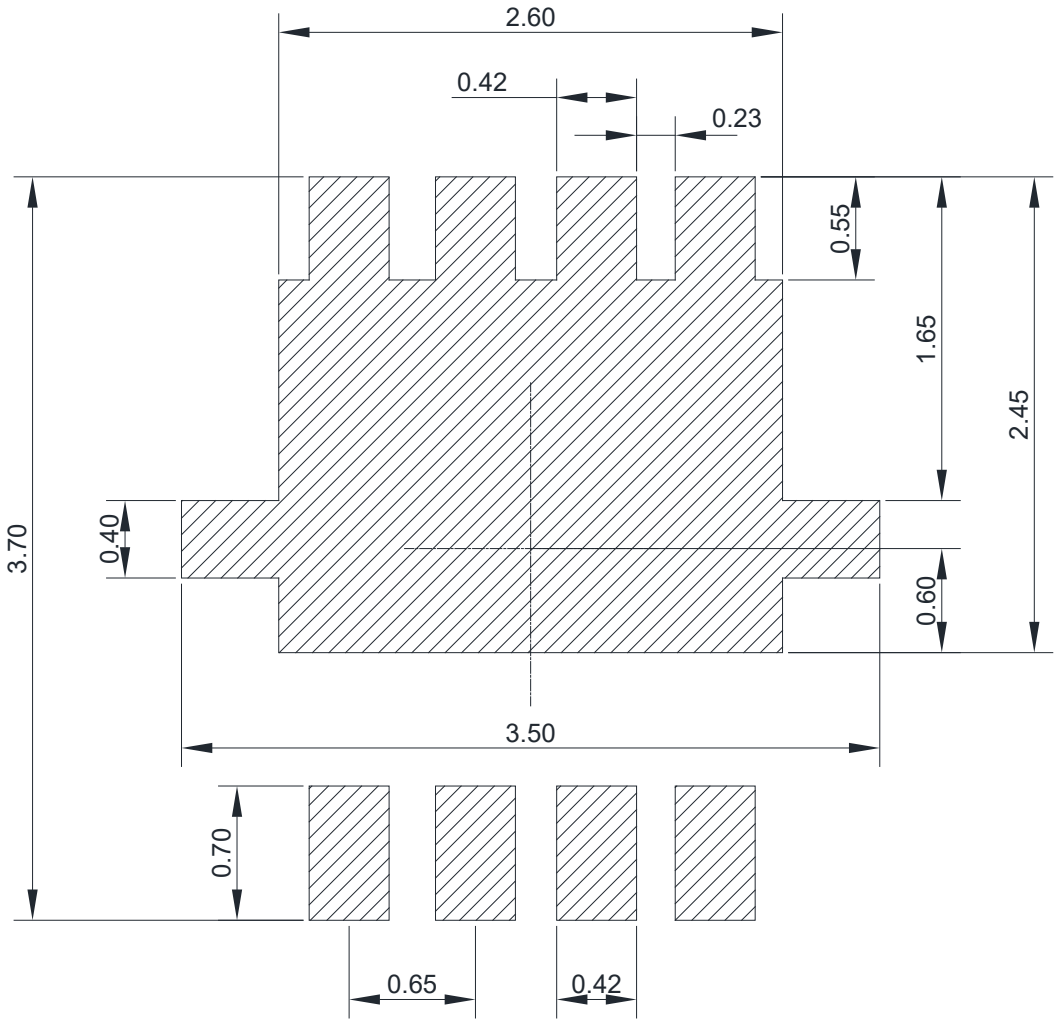
# POD C(X)




| COMMON DIMENSIONS CUNITS MEASURE=MILLIMETER | | | | | | | |
|---|---|---|---|---|---|---|---|
| SYMBOL | MIN | TYP | MAX | SYMBOL | MIN | TYP | MAX |
| A | 0.700 | 0.800 | 0.900 | L | 0.300 | 0.400 | 0.500 |
| A1 | 0.152 REF | | | L1 | 0.180 | 0.330 | 0.480 |
| A2 | 0~0.05 | | | L2 | 0~0.100 | | |
| D | 3.000 | 3.100 | 3.200 | L3 | 0~0.100 | | |
| D1 | 2.300 | 2.450 | 2.600 | H | 0.315 | 0.415 | 0.515 |
| E | 2.900 | 3.000 | 3.100 | b | 0.200 | 0.300 | 0.400 |
| E1 | 3.150 | 3.300 | 3.450 | e | 0.550 | 0.650 | 0.750 |
| E2 | 1.320 | 1.520 | 1.720 | θ | 8° | 10° | 12° |

## 9. Recommended Soldering Footprint




DIMENSIONS: MILLIMETERS

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