



PE2305A

P-Channel Enhancement Mode Power MOSFET

Description

The PE2305A uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. It can be used in a wide variety of applications.

General Features

- $V_{DS} = -20V$, $I_D = -4.1A$

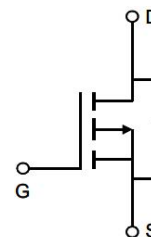
$$R_{DS(ON)} < 45m\Omega @ V_{GS} = -4.5V$$

$$R_{DS(ON)} < 60m\Omega @ V_{GS} = -2.5V$$

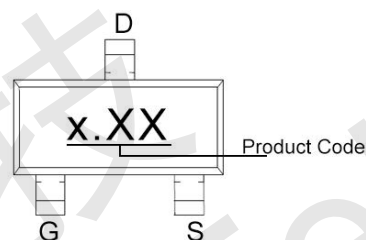
- High Power and current handing capability
- Lead free product is acquired
- Surface Mount Package

Application

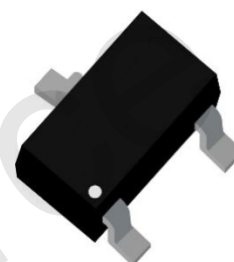
- PWM applications
- Load switch
- Power management



Schematic diagram



Marking and pin assignment



SOT-23

Absolute Maximum Ratings (TA=25°C unless otherwise noted)

| Parameter | Symbol | Rating | Unit |
|--|----------------|------------|------|
| Drain-Source Voltage | V_{DS} | -20 | V |
| Gate-Source Voltage | V_{GS} | ± 12 | V |
| Drain Current-Continuous | I_D | -4.1 | A |
| Pulsed Drain Current (Note 1) | I_{DM} | -15 | A |
| Maximum Power Dissipation | P_D | 1.5 | W |
| Operating Junction and Storage Temperature Range | T_J, T_{STG} | -55 To 150 | °C |

Thermal Characteristic

| | | | |
|--|-----------------|----|------|
| Thermal Resistance, Junction-to-Ambient (Note 2) | $R_{\theta JA}$ | 83 | °C/W |
|--|-----------------|----|------|



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Electrical Characteristics (TA=25°C unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|--------------|---|-------|------|-----------|------------|
| Off Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=-250\mu A$ | -20 | - | - | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS}=-20V, V_{GS}=0V$ | - | - | -1 | μA |
| Gate-Body Leakage Current | I_{GSS} | $V_{GS}=\pm 12V, V_{DS}=0V$ | - | - | ± 100 | nA |
| On Characteristics (Note 3) | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=-250\mu A$ | -0.45 | -0.7 | -1 | V |
| Drain-Source On-State Resistance | $R_{DS(on)}$ | $V_{GS}=-4.5V, I_D=-4.1A$ | - | 30 | 45 | m Ω |
| | | $V_{GS}=-2.5V, I_D=-3A$ | - | 43 | 60 | m Ω |
| Forward Transconductance | g_{FS} | $V_{DS}=-5V, I_D=-3A$ | - | 10 | - | S |
| Dynamic Characteristics (Note 4) | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS}=-10V, V_{GS}=0V,$ $F=1.0MHz$ | - | 1090 | - | pF |
| Output Capacitance | C_{oss} | | - | 170 | - | pF |
| Reverse Transfer Capacitance (Note 4) | C_{rss} | | - | 150 | - | pF |
| Switching Characteristics | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}=-10V, I_D=-1A, R_L=1\Omega,$ $V_{GS}=-4.5V, R_G=3\Omega$ | - | 12 | - | nS |
| Turn-on Rise Time | t_r | | - | 35 | - | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 30 | - | nS |
| Turn-Off Fall Time | t_f | | - | 10 | - | nS |
| Total Gate Charge | Q_g | $V_{DS}=-10V, I_D=-4.1A,$ $V_{GS}=-4.5V$ | - | 10 | - | nC |
| Gate-Source Charge | Q_{gs} | | - | 1.3 | - | nC |
| Gate-Drain Charge | Q_{gd} | | - | 2.1 | - | nC |
| Drain-Source Diode Characteristics | | | | | | |
| Diode Forward Voltage (Note 3) | V_{SD} | $V_{GS}=0V, I_S=-1A$ | - | - | -1.2 | V |
| Diode Forward Current (Note 2) | I_S | | - | - | -1.6 | A |

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to product.



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Typical Electrical and Thermal Characteristics

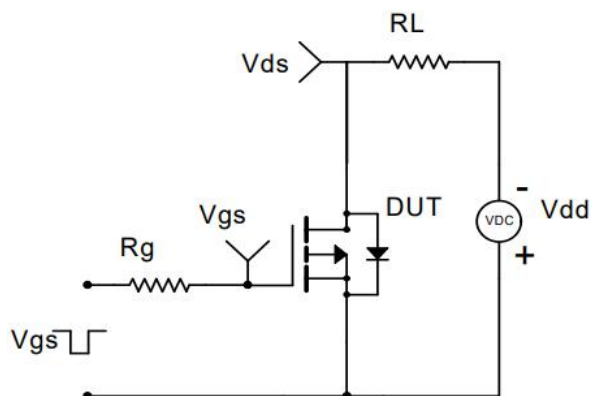


Figure 1 Switching Test Circuit

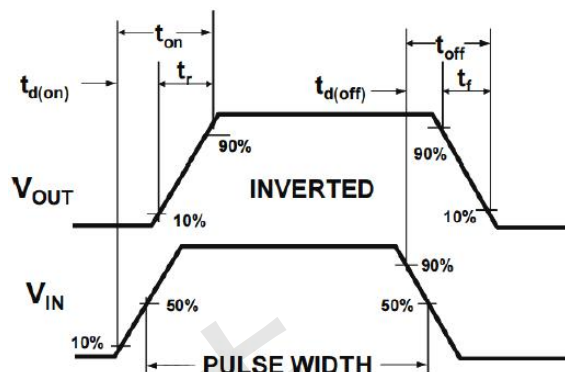


Figure 2 Switching Waveform

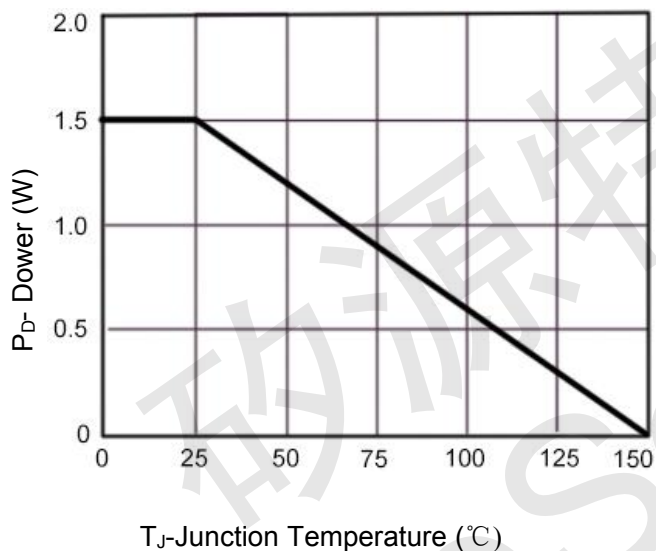


Figure 3 Power De-rating

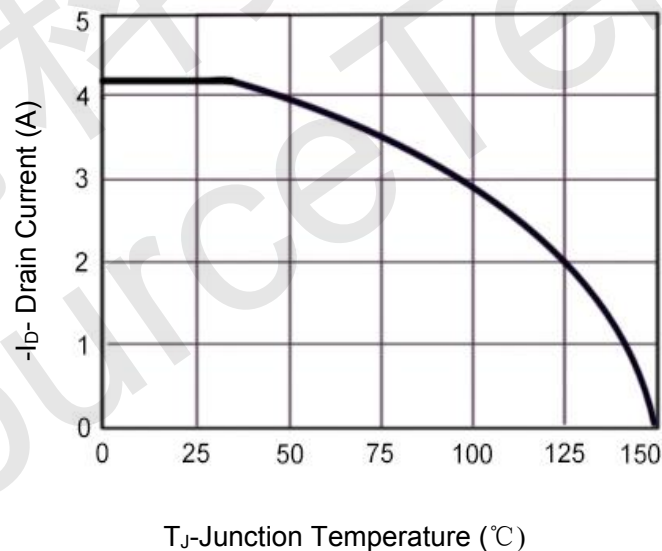


Figure 4 Drain Current

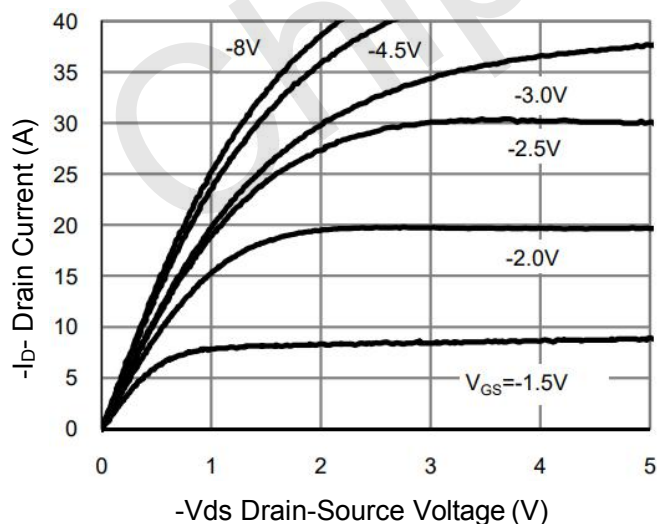


Figure 5 Output Characteristics

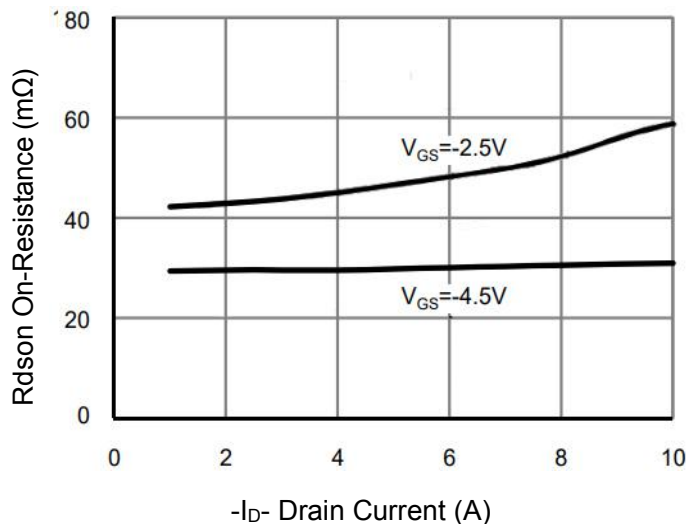


Figure 6 R_dson vs Drain Current



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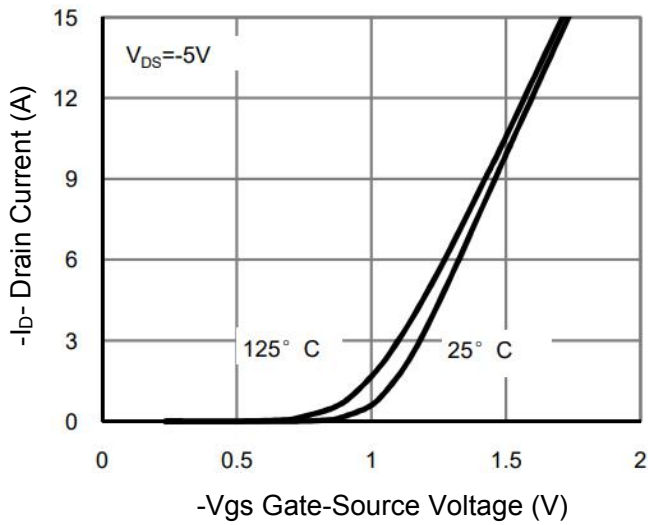


Figure 7 Transfer Characteristics

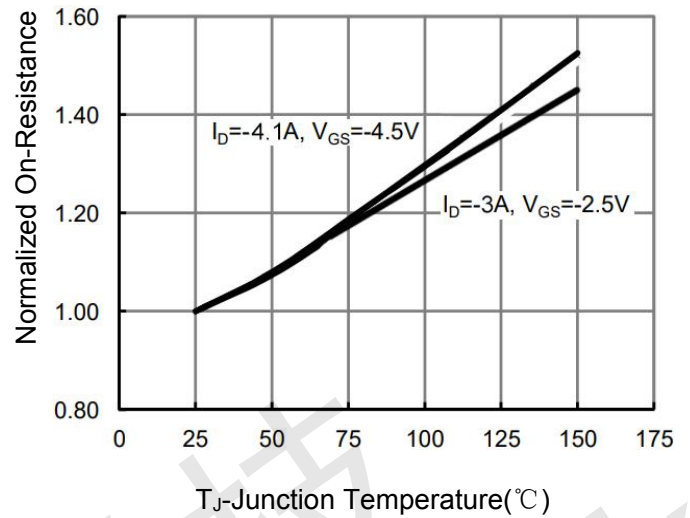


Figure 8 R_DS(on) vs Junction Temperature

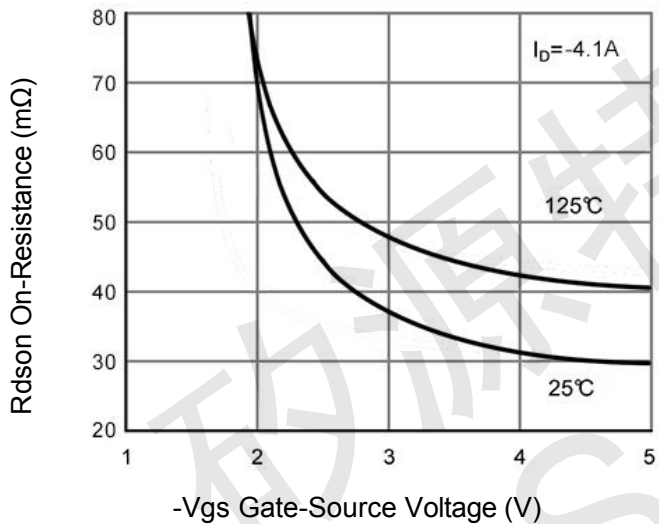


Figure 9 R_DS(on) vs V_GS

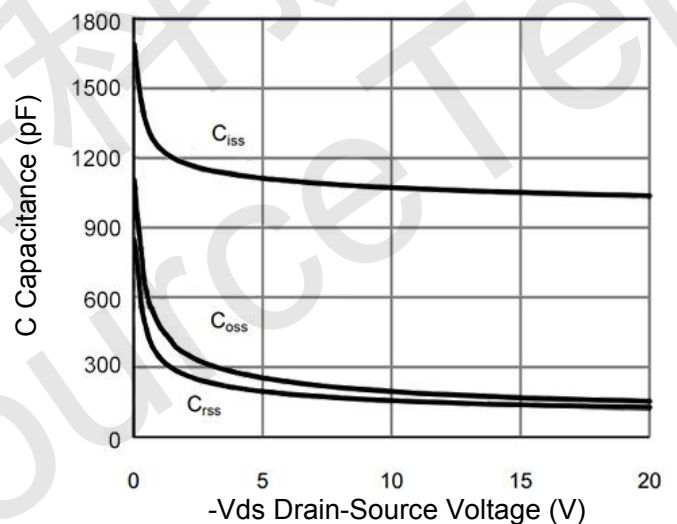


Figure 10 Capacitance vs V_DS

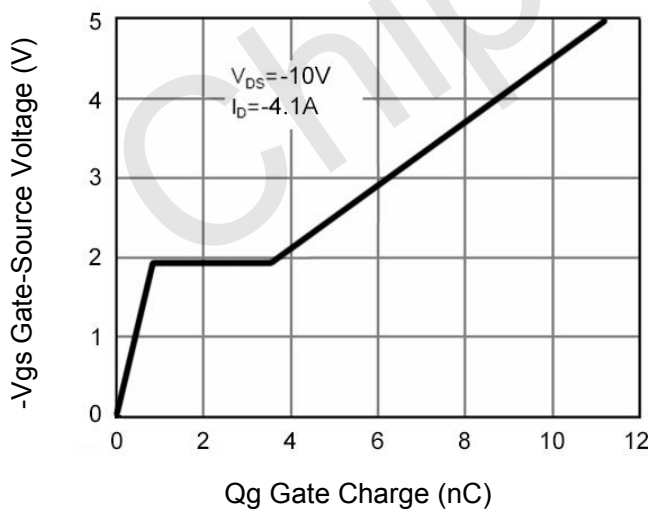


Figure 11 Gate Charge

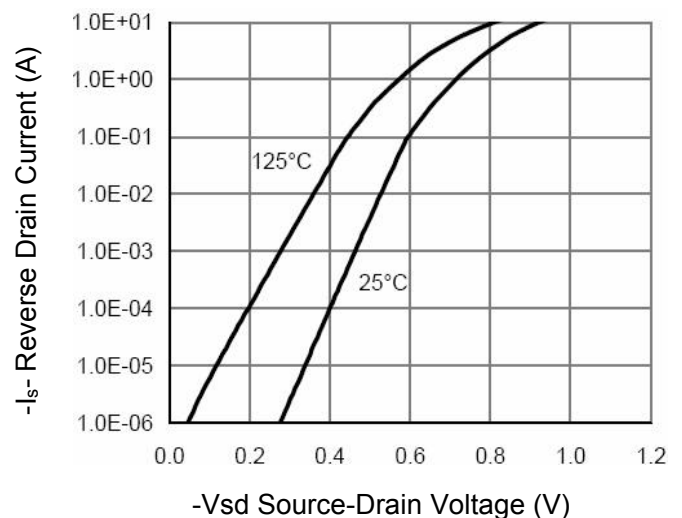


Figure 12 Source- Drain Diode Forward



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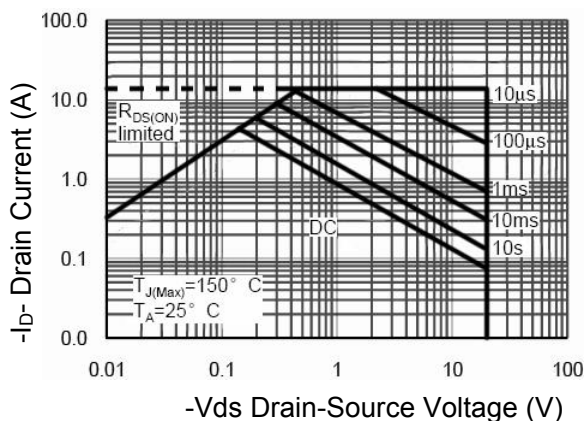


Figure 13 Safe Operation Area

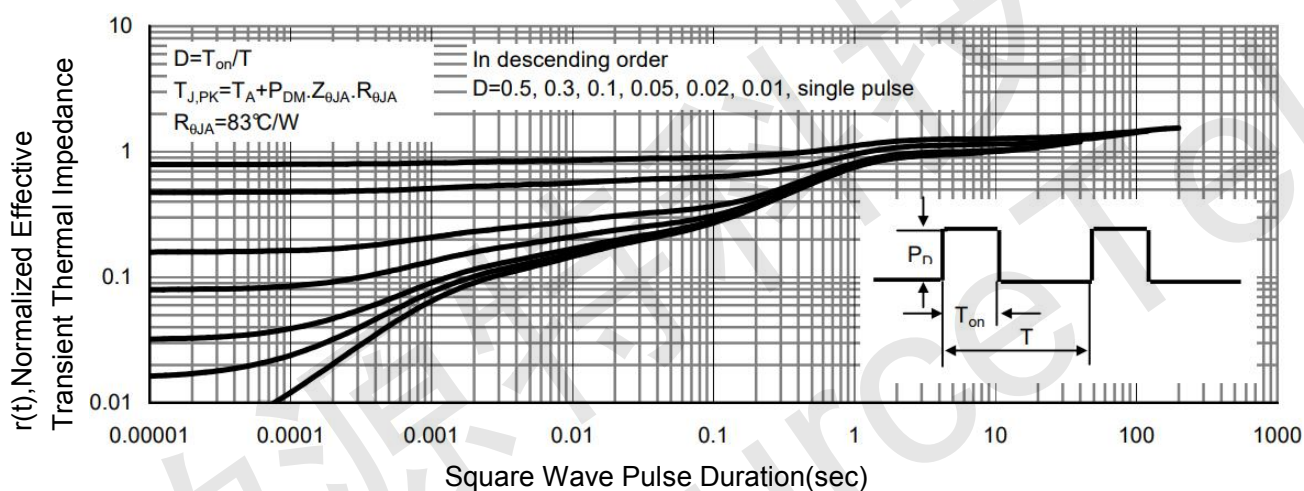
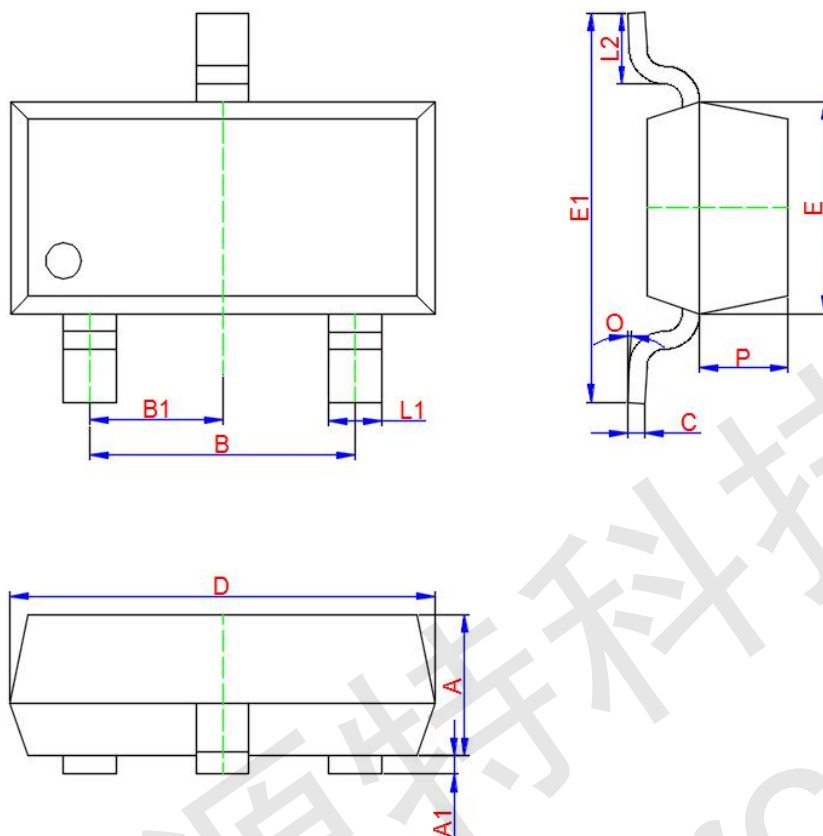


Figure 14 Normalized Maximum Transient Thermal Impedance



SOT-23 Package Information



| Symbol | Dimensions In Millimeters | | |
|--------|---------------------------|-------|-------|
| | Min. | Typ. | Max. |
| A | 0.900 | 1.000 | 1.100 |
| A1 | 0.000 | 0.050 | 0.100 |
| L1 | 0.300 | 0.400 | 0.500 |
| C | 0.100 | 0.110 | 0.120 |
| D | 2.800 | 2.900 | 3.000 |
| E | 1.250 | 1.300 | 1.350 |
| E1 | 2.250 | 2.400 | 2.550 |
| B | 1.800 | 1.900 | 2.000 |
| B1 | 0.950 TYP. | | |
| L2 | 0.200 | 0.350 | 0.450 |
| P | 0.550 | 0.575 | 0.600 |
| O | 0° | 4° | 8° |