



## N-Channel Enhancement Mode Power MOSFET

### Description

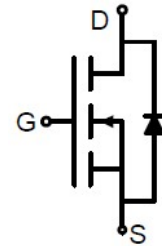
The PE8306H uses advanced trench technology to provide excellent  $R_{DS(ON)}$  and low gate charge. It can be used in a wide variety of applications.

### General Features

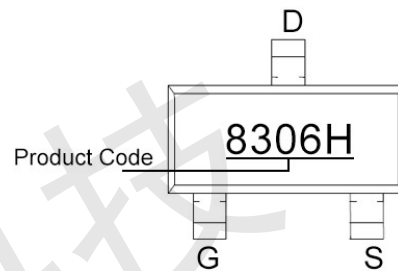
- $V_{DS} = 30V$ ,  $I_D = 6A$
- $R_{DS(ON)} < 26m\Omega$  @  $V_{GS}=10V$
- $R_{DS(ON)} < 40m\Omega$  @  $V_{GS}=4.5V$
- High Power and current handing capability
- Lead free product is acquired
- Surface Mount Package

### Application

- PWM applications
- Load switch
- Power management



Schematic diagram



Marking and pin assignment



SOT-23-3L

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

| Parameter  | Symbol         | Rating     | Unit |
|--|----------------|------------|------|
| Drain-Source Voltage                             | $V_{DS}$       | 30         | V    |
| Gate-Source Voltage                              | $V_{GS}$       | $\pm 20$   | V    |
| Drain Current-Continuous                         | $I_D$          | 6          | A    |
| Pulsed Drain Current (Note 1)                    | $I_{DM}$       | 30         | A    |
| Maximum Power Dissipation                        | $P_D$          | 1.4        | W    |
| Operating Junction and Storage Temperature Range | $T_J, T_{STG}$ | -55 To 150 | °C   |

### Thermal Characteristic

|  |                 |    |      |
|--|-----------------|----|------|
| Thermal Resistance, Junction-to-Ambient (Note 2) | $R_{\theta JA}$ | 89 | °C/W |
|--|-----------------|----|------|



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

| Parameter                                 | Symbol       | Condition   | Min | Typ | Max       | Unit      |
|---|--------------|---|-----|-----|-----------|-----------|
| <b>Off Characteristics</b>                |              |   |     |     |           |           |
| Drain-Source Breakdown Voltage            | $BV_{DSS}$   | $V_{GS}=0V, I_D=250\mu A$                                       | 30  | -   | -         | V         |
| Zero Gate Voltage Drain Current           | $I_{DSS}$    | $V_{DS}=30V, V_{GS}=0V$   | -   | -   | 1         | $\mu A$   |
| Gate-Body Leakage Current                 | $I_{GSS}$    | $V_{GS}=\pm 20V, V_{DS}=0V$                                     | -   | -   | $\pm 100$ | nA        |
| <b>On Characteristics (Note 3)</b>        |              |   |     |     |           |           |
| Gate Threshold Voltage                    | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$                                   | 1.0 | 1.5 | 2.2       | V         |
| Drain-Source On-State Resistance          | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=5A$  | -   | 20  | 26        | $m\Omega$ |
|   |              | $V_{GS}=4.5V, I_D=4A$   | -   | 29  | 40        | $m\Omega$ |
| Forward Transconductance                  | $g_{FS}$     | $V_{DS}=10V, I_D=5.5A$  | 10  | -   | -         | S         |
| <b>Dynamic Characteristics (Note 4)</b>   |              |   |     |     |           |           |
| Input Capacitance                         | $C_{iss}$    | $V_{DS}=15V, V_{GS}=0V,$<br>$F=1.0MHz$                          | -   | 460 | -         | pF        |
| Output Capacitance                        | $C_{oss}$    |   | -   | 60  | -         | pF        |
| Reverse Transfer Capacitance (Note 4)     | $C_{rss}$    |   | -   | 50  | -         | pF        |
| Gate Resistance                           | $R_g$        | $V_{DS}=0V, V_{GS}=0V, F=1.0MHz$                                | -   | 2   | -         | $\Omega$  |
| <b>Switching Characteristics</b>          |              |   |     |     |           |           |
| Turn-on Delay Time                        | $t_{d(on)}$  | $V_{DD}=15V, I_D=2A, R_L=1\Omega,$<br>$V_{GS}=10V, R_G=3\Omega$ | -   | 4.5 | -         | nS        |
| Turn-on Rise Time                         | $t_r$        |   | -   | 2.4 | -         | nS        |
| Turn-Off Delay Time                       | $t_{d(off)}$ |   | -   | 14  | -         | nS        |
| Turn-Off Fall Time                        | $t_f$        |   | -   | 2.5 | -         | nS        |
| Total Gate Charge                         | $Q_g$        | $V_{DS}=15V, I_D=6A, V_{GS}=10V$                                | -   | 7.1 | -         | nC        |
| Gate-Source Charge                        | $Q_{gs}$     |   | -   | 1.4 | -         | nC        |
| Gate-Drain Charge                         | $Q_{gd}$     |   | -   | 2.2 | -         | nC        |
| <b>Drain-Source Diode Characteristics</b> |              |   |     |     |           |           |
| Diode Forward Voltage (Note 3)            | $V_{SD}$     | $V_{GS}=0V, I_S=1A$   | -   | -   | 1.2       | V         |
| Diode Forward Current (Note 2)            | $I_S$        |   | -   | -   | 3         | 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.



Typical Electrical and Thermal Characteristics

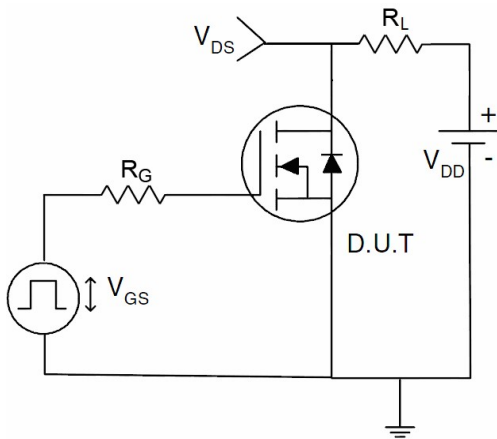


Figure 1 Switching Test Circuit

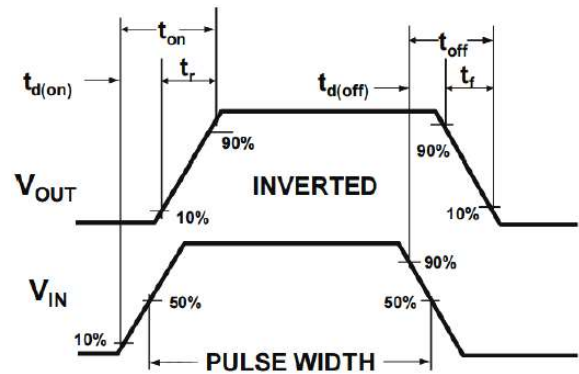


Figure 2 Switching Waveform

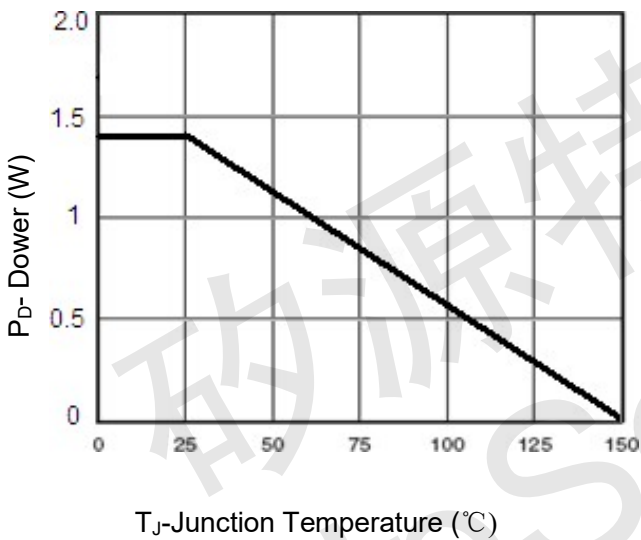


Figure 3 Power De-rating

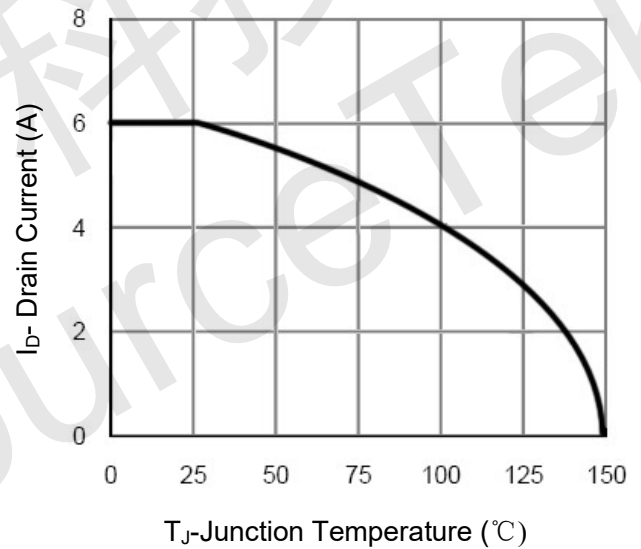


Figure 4 Drain Current

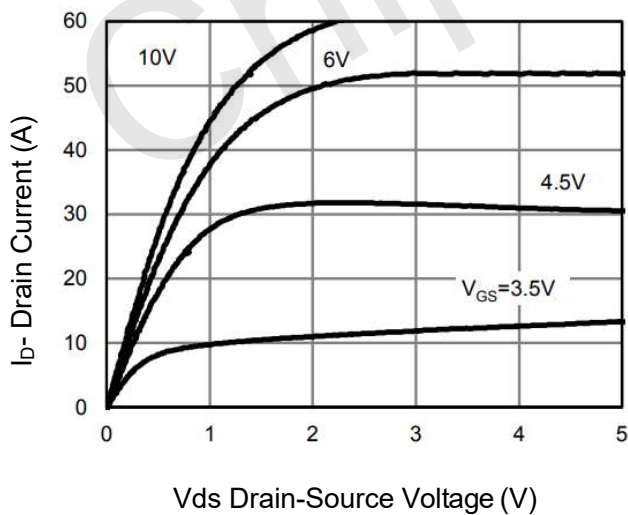


Figure 5 Output Characteristics

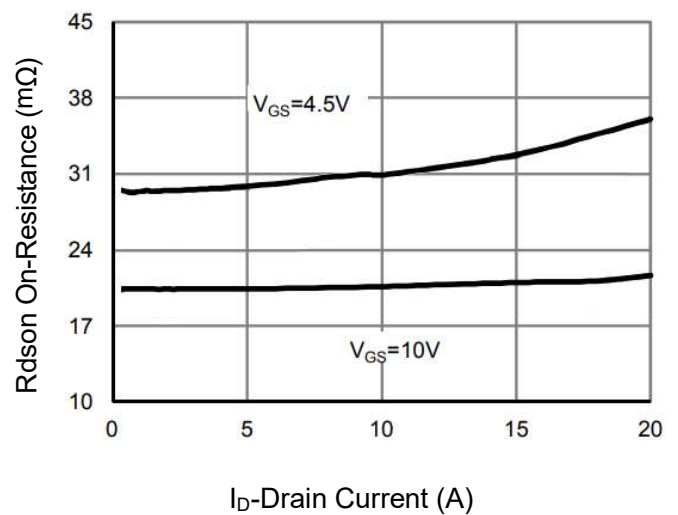


Figure 6 Rdson vs Drain Current

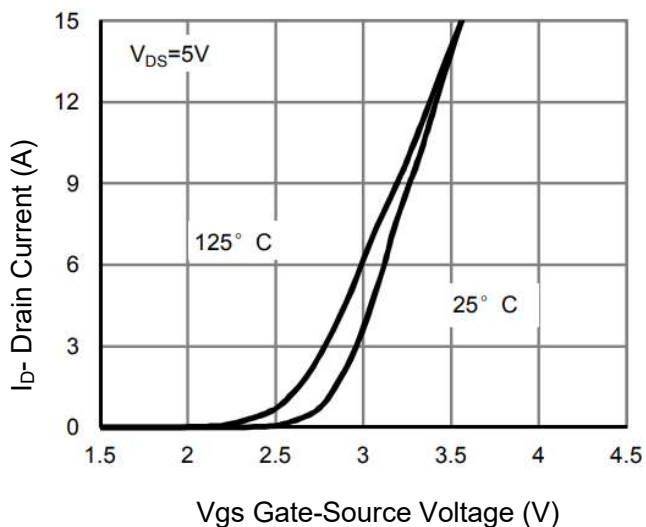


Figure 7 Transfer Characteristics

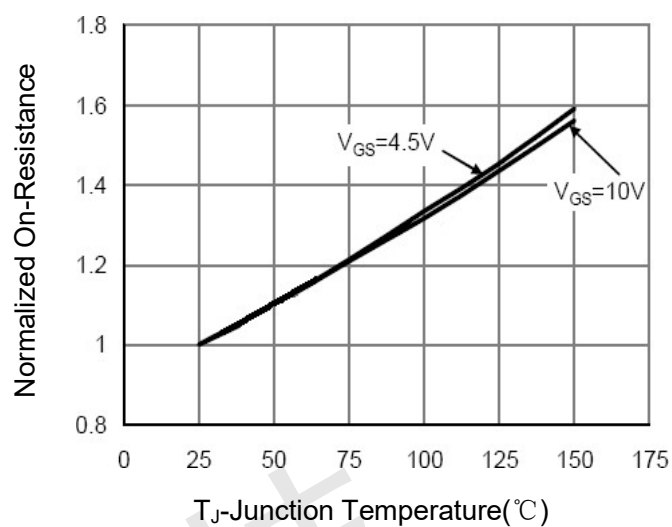


Figure 8 Rdson vs Junction Temperature

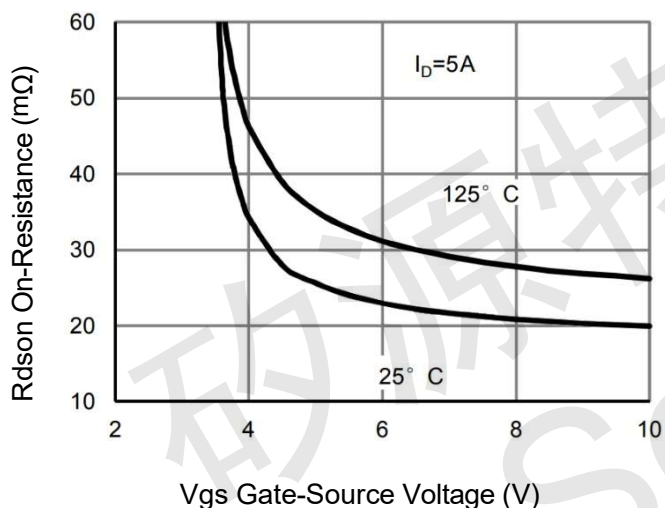


Figure 9 Rdson vs Vgs

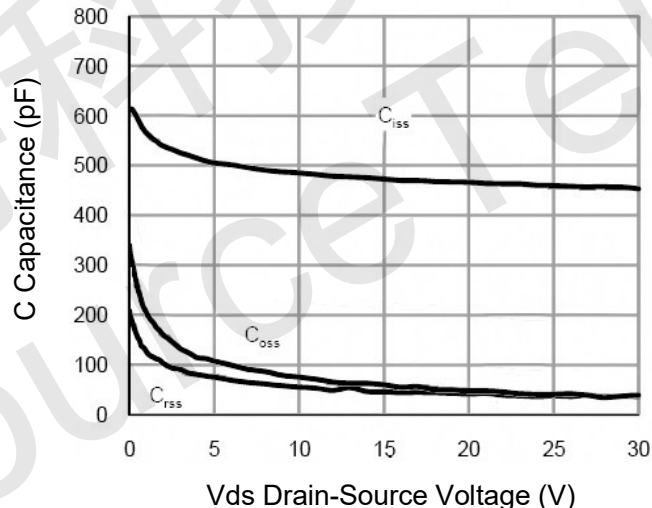


Figure 10 Capacitance vs Vds

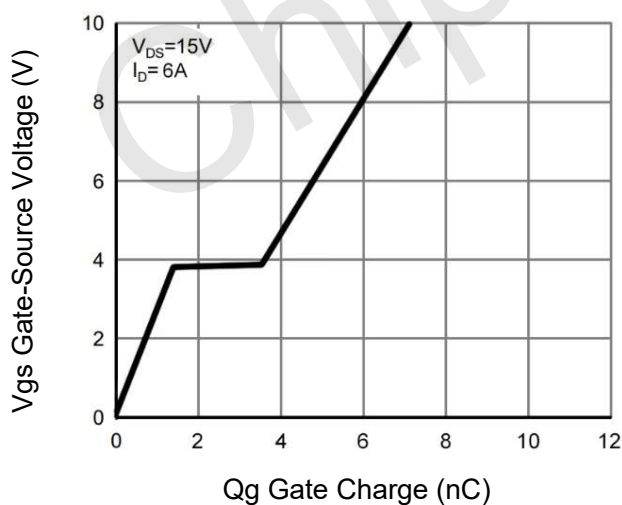


Figure 11 Gate Charge

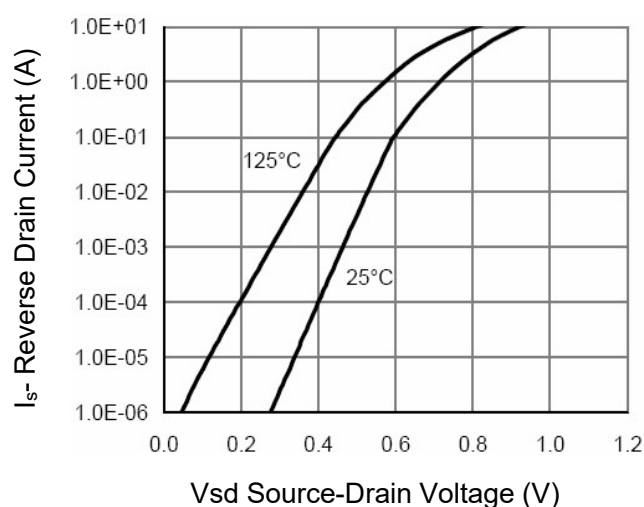


Figure 12 Source- Drain Diode Forward

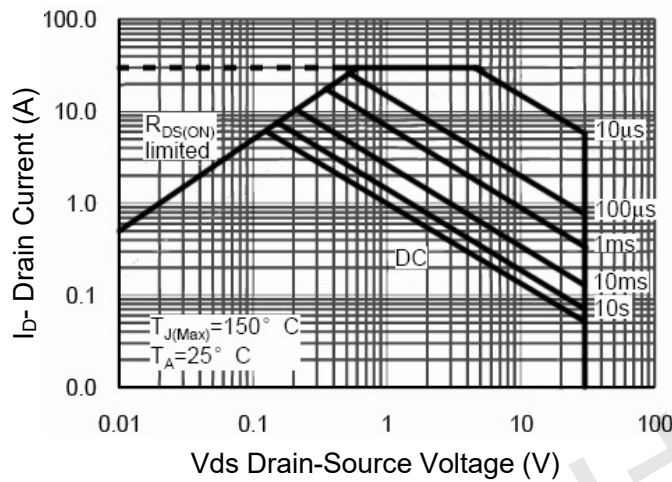


Figure 13 Safe Operation Area

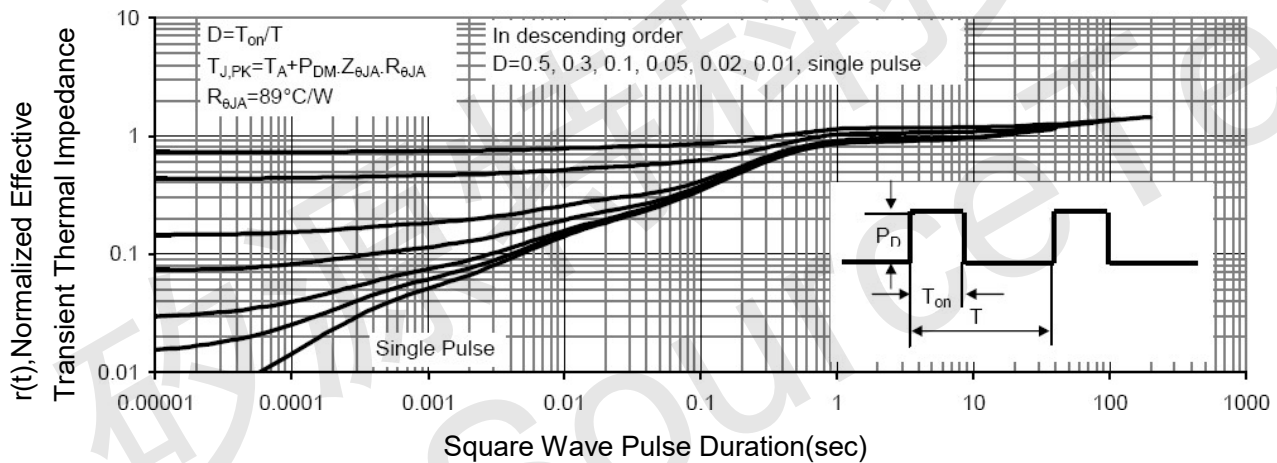
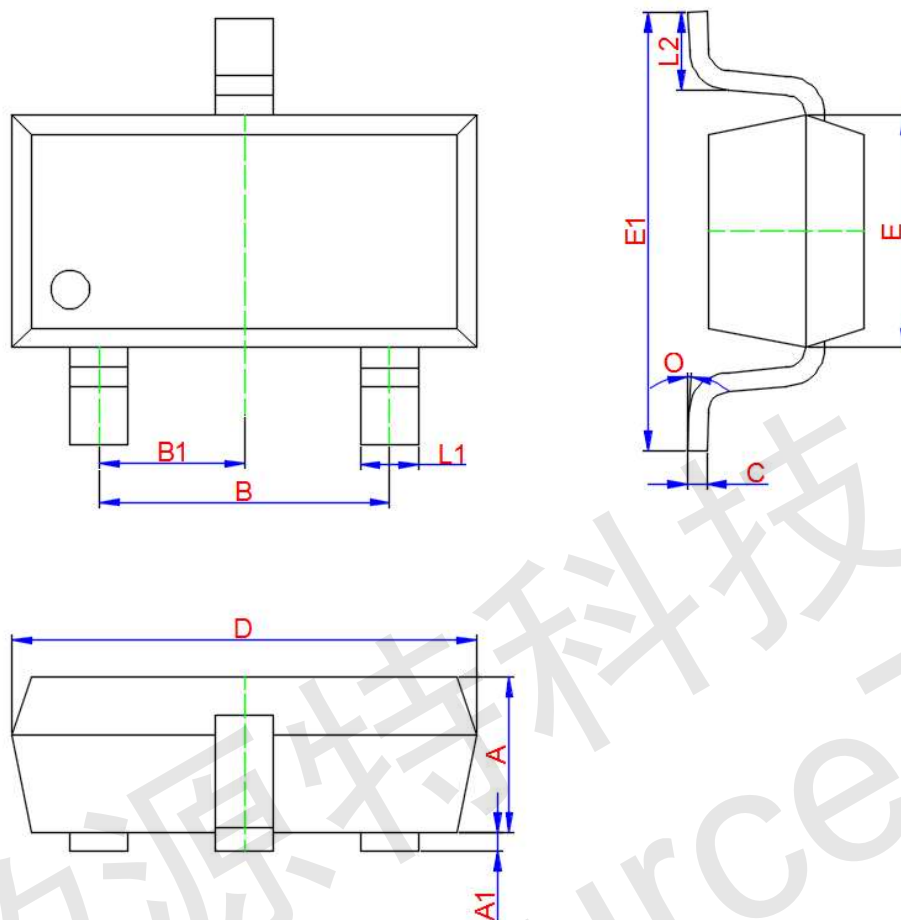


Figure 14 Normalized Maximum Transient Thermal Impedance



SOT-23-3L Package Information



| Symbol | Dimensions In Millimeters |       |       |
|--------|---------------------------|-------|-------|
|        | Min.                      | Typ.  | Max.  |
| A      | 1.050                     | 1.100 | 1.150 |
| A1     | 0.000                     | 0.050 | 0.100 |
| L1     | 0.300                     | 0.400 | 0.500 |
| C      | 0.100                     | 0.150 | 0.200 |
| D      | 2.820                     | 2.920 | 3.020 |
| E      | 1.500                     | 1.600 | 1.700 |
| E1     | 2.650                     | 2.800 | 2.950 |
| B      | 1.800                     | 1.900 | 2.000 |
| B1     | 0.950 TYP.                |       |       |
| L2     | 0.300                     | 0.450 | 0.600 |
| O      | 0°                        | 4°    | 8°    |