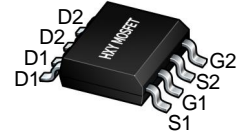




## Description

The SM4953PRL uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. It can be used in a wide variety of applications.



SOP-8

## General Features

$V_{DS} = -30V, I_D = -5.3A$

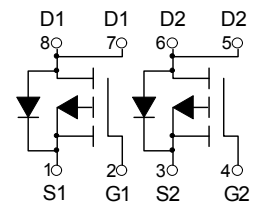
$R_{DS(ON)} < 42m \text{ @ } V_{GS} = -10V$

$R_{DS(ON)} < 85m \text{ @ } V_{GS} = -4.5V$

## Application

PWM application

Load switch



Dual P-Channel MOSFET

## Package Marking and Ordering Information

| Product ID | Pack  | Brand      | Qty(PCS) |
|------------|-------|------------|----------|
| SM4953PRL  | SOP-8 | HXY MOSFET | 3000     |

## Absolute Maximum Ratings ( $T_A = 25^\circ C$ unless otherwise noted)

| Symbol          | Parameter  | Limit      | Unit         |
|-----------------|--|------------|--------------|
| $V_{DS}$        | Drain-Source Voltage                             | -30        | V            |
| $V_{GS}$        | Gate-Source Voltage                              | $\pm 20$   | V            |
| $I_D$           | Drain Current-Continuous                         | -5.3       | A            |
| $I_{DM}$        | Drain Current-Pulsed (Note 1)                    | -20        | A            |
| $P_D$           | Maximum Power Dissipation                        | 2.6        | W            |
| $T_J, T_{STG}$  | Operating Junction and Storage Temperature Range | -55 To 150 | $^\circ C$   |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient (Note 2) | 49         | $^\circ C/W$ |



**Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)**

| Parameter                                 | Symbol              | Condition   | Min | Typ  | Max  | Unit |
|---|---------------------|---|-----|------|------|------|
| <b>Off Characteristics</b>                |                     |   |     |      |      |      |
| Drain-Source Breakdown Voltage            | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V, I <sub>D</sub> =-250μA   | -30 | -33  | -    | V    |
| Zero Gate Voltage Drain Current           | I <sub>DSS</sub>    | V <sub>DS</sub> =-24V, V <sub>GS</sub> =0V  | -   | -    | -1   | μA   |
| Gate-Body Leakage Current                 | I <sub>GSS</sub>    | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V  | -   | -    | ±100 | nA   |
| <b>On Characteristics</b> (Note 3)        |                     |   |     |      |      |      |
| Gate Threshold Voltage                    | V <sub>GS(th)</sub> | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA                                 | -1  | -1.6 | -3   | V    |
| Drain-Source On-State Resistance          | R <sub>DS(ON)</sub> | V <sub>GS</sub> =-10V, I <sub>D</sub> =-5.3A  | -   | 35   | 42   | mR   |
|   |                     | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-4.2A   | -   | 70   | 85   | mR   |
| Forward Transconductance                  | g <sub>FS</sub>     | V <sub>DS</sub> =-15V, I <sub>D</sub> =-4.5A  | 4   | 7    | -    | S    |
| <b>Dynamic Characteristics</b> (Note 4)   |                     |   |     |      |      |      |
| Input Capacitance                         | C <sub>iss</sub>    | V <sub>DS</sub> =-15V, V <sub>GS</sub> =0V,<br>F=1.0MHz                                   | -   | 540  | -    | PF   |
| Output Capacitance                        | C <sub>oss</sub>    |   | -   | 150  | -    | PF   |
| Reverse Transfer Capacitance              | C <sub>rss</sub>    |   | -   | 75   | -    | PF   |
| <b>Switching Characteristics</b> (Note 4) |                     |   |     |      |      |      |
| Turn-on Delay Time                        | t <sub>d(on)</sub>  | V <sub>DD</sub> =-15V, I <sub>D</sub> =-1A,<br>V <sub>GS</sub> =-10V, R <sub>GEN</sub> =6 | -   | 8    | -    | nS   |
| Turn-on Rise Time                         | t <sub>r</sub>      |   | -   | 14   | -    | nS   |
| Turn-Off Delay Time                       | t <sub>d(off)</sub> |   | -   | 18   | -    | nS   |
| Turn-Off Fall Time                        | t <sub>f</sub>      |   | -   | 10   | -    | nS   |
| Total Gate Charge                         | Q <sub>g</sub>      | V <sub>DS</sub> =-15V, I <sub>D</sub> =-5.3A, V <sub>GS</sub> =-10V                       | -   | 12   | -    | nC   |
| Gate-Source Charge                        | Q <sub>gs</sub>     |   | -   | 2.4  | -    | nC   |
| Gate-Drain Charge                         | Q <sub>gd</sub>     |   | -   | 3.2  | -    | nC   |
| <b>Drain-Source Diode Characteristics</b> |                     |   |     |      |      |      |
| Diode Forward Voltage (Note 3)            | V <sub>SD</sub>     | V <sub>GS</sub> =0V, I <sub>S</sub> =-5.3A  | -   | -    | -1.2 | V    |

**Notes:**

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production



### Typical Electrical and Thermal Characteristics

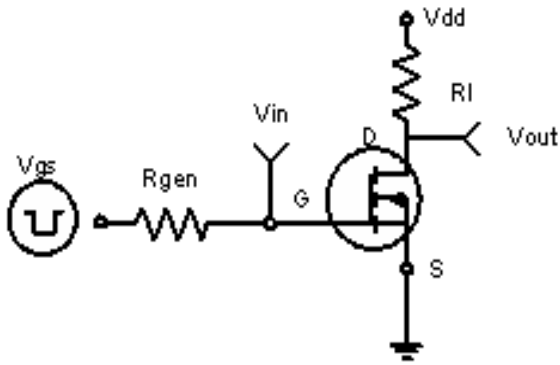


Figure 1: Switching Test Circuit

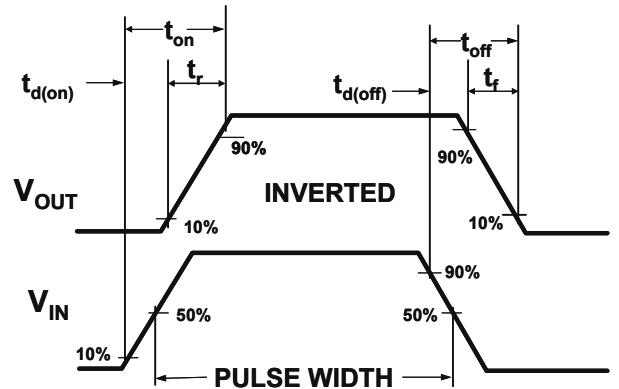


Figure 2: Switching Waveforms

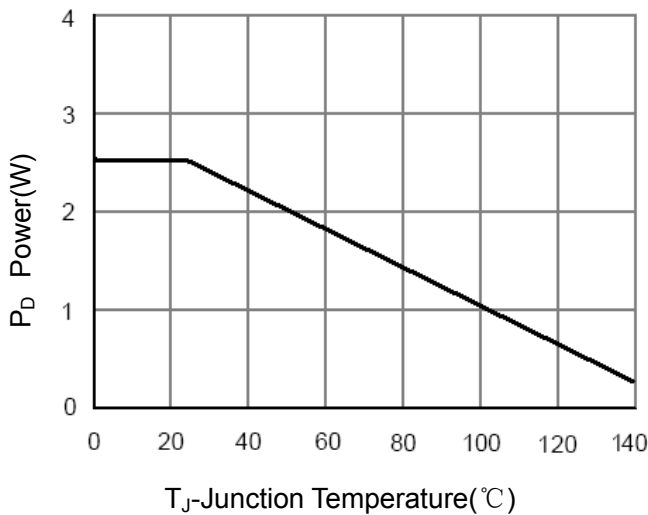


Figure 3 Power Dissipation

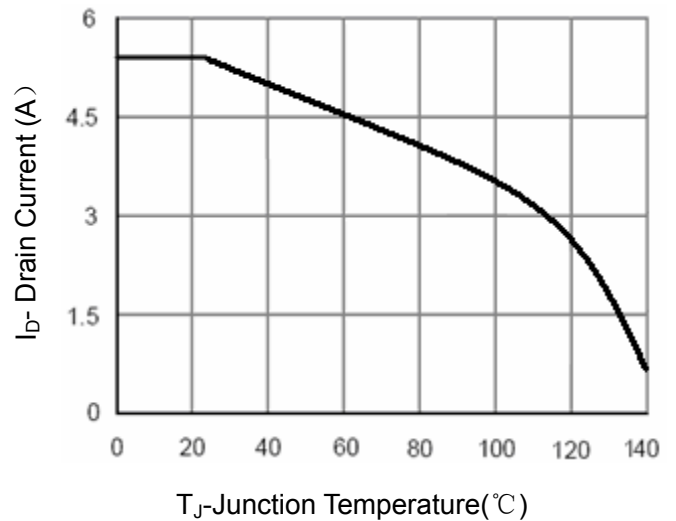


Figure 4 Drain Current

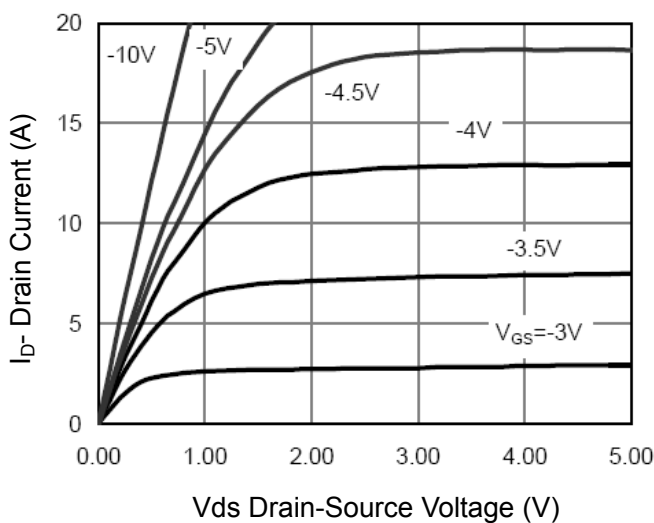


Figure 5 Output Characteristics

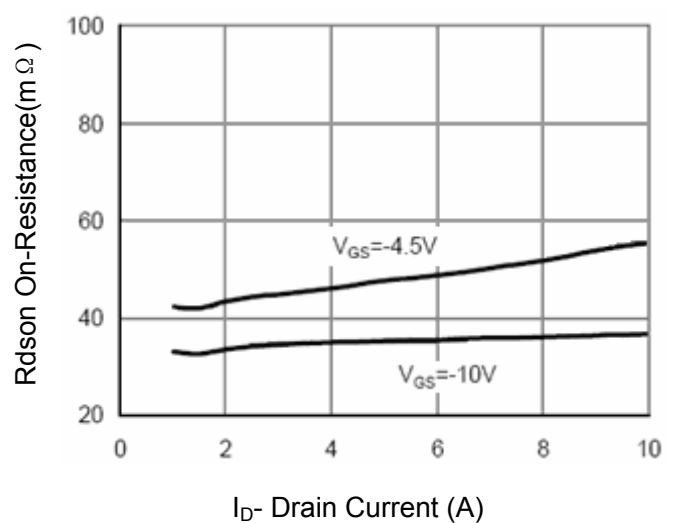


Figure 6 Drain-Source On-Resistance

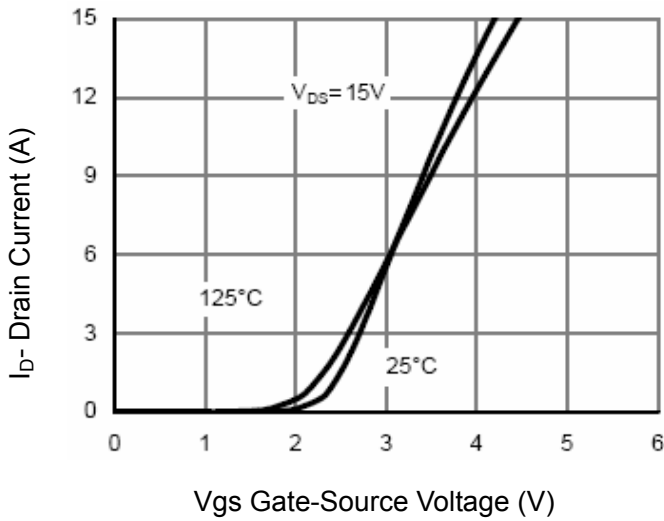


Figure 7 Transfer Characteristics

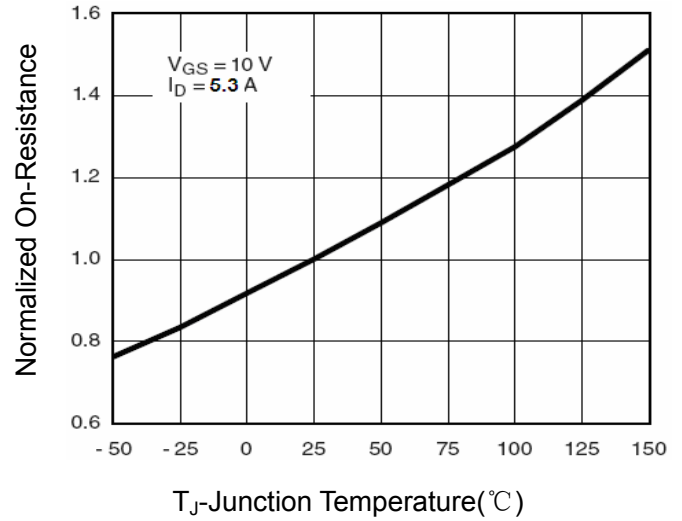


Figure 8 Drain-Source On-Resistance

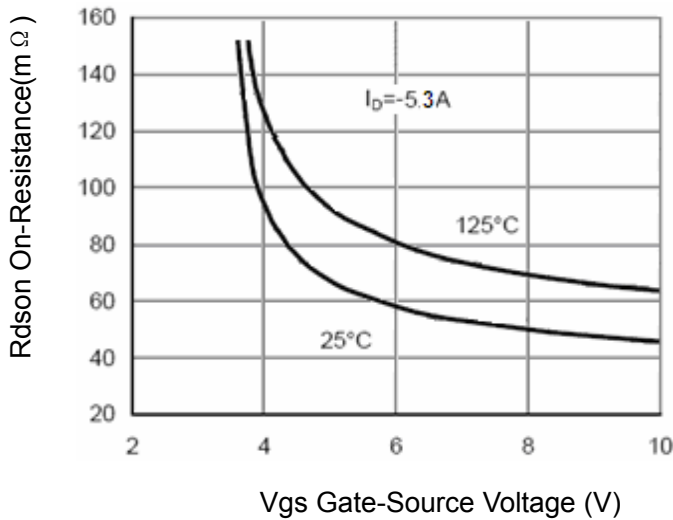


Figure 9 Rdson vs Vgs

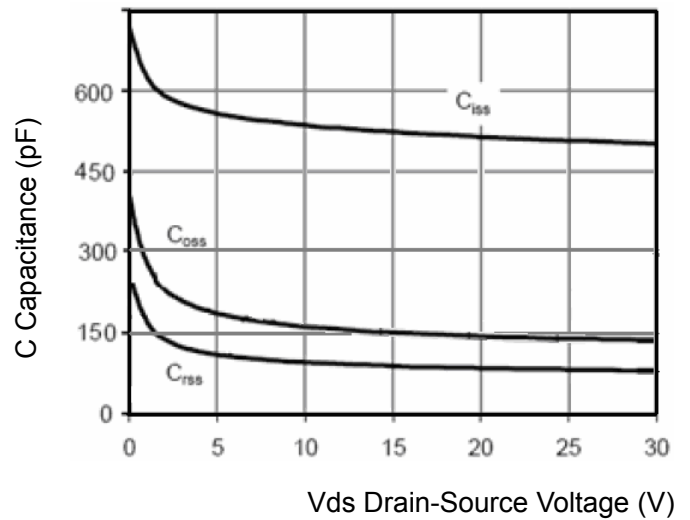


Figure 10 Capacitance vs Vds

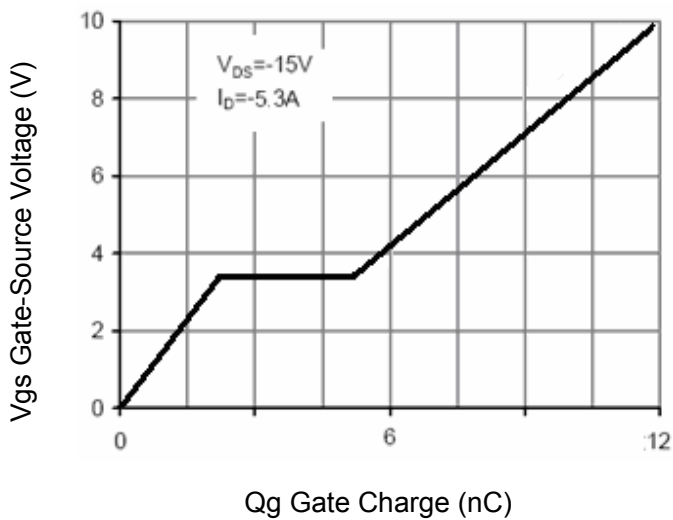


Figure 11 Gate Charge

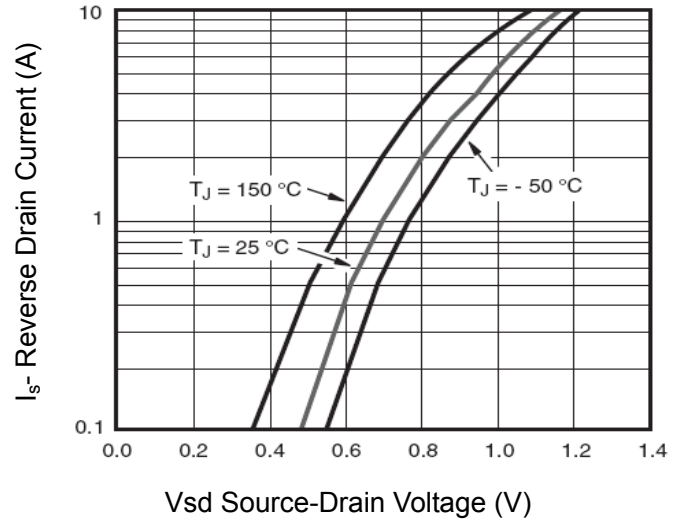


Figure 12 Source- Drain Diode Forward

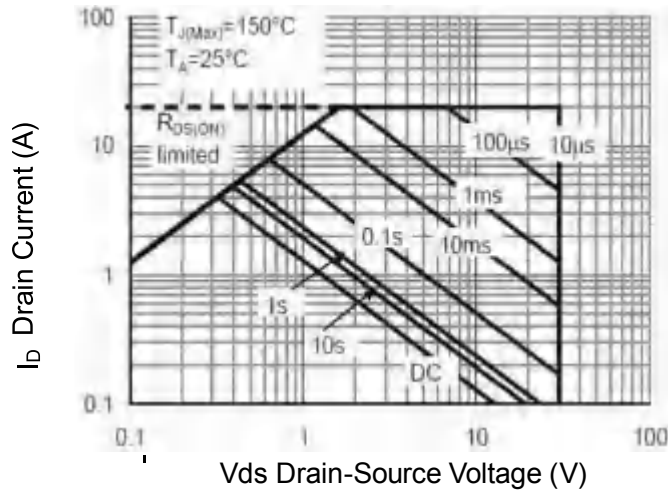


Figure 13 Safe Operation Area

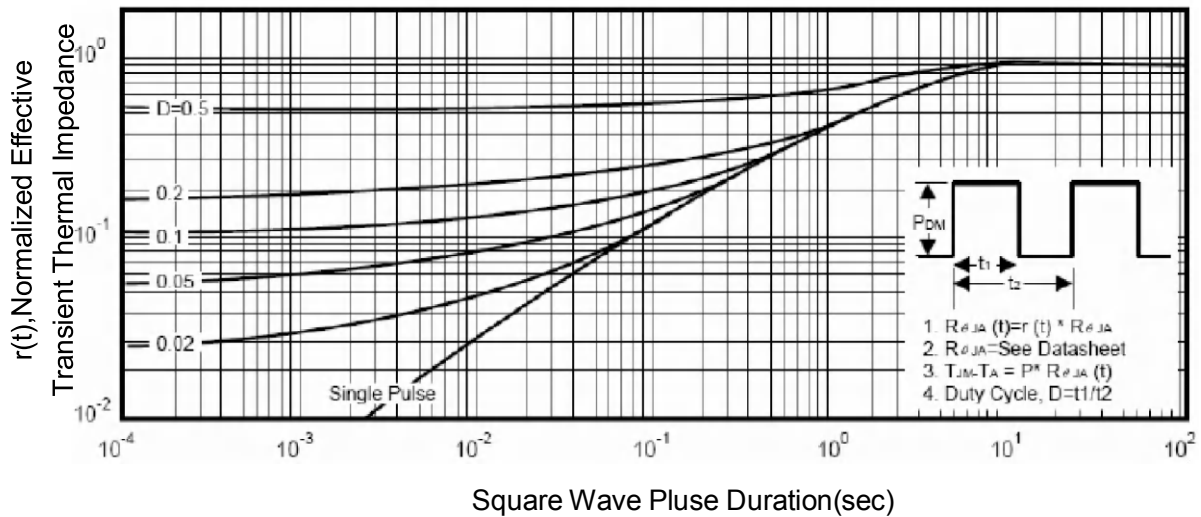
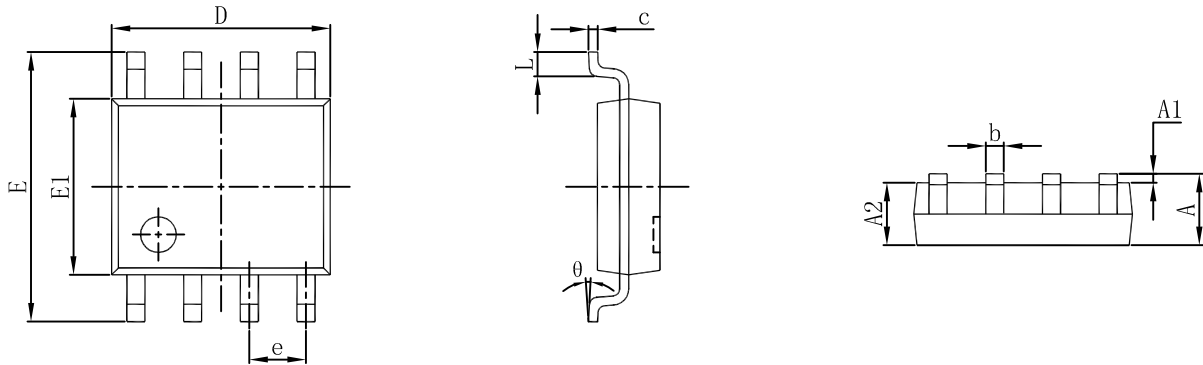


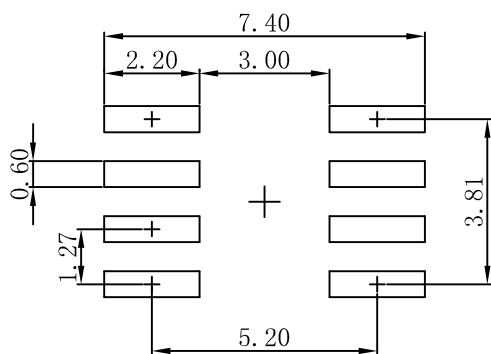
Figure 14 Normalized Maximum Transient Thermal Impedance



### SOP-8 Package Outline Dimensions



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min                       | Max   | Min                  | Max   |
| A      | 1.350                     | 1.750 | 0.053                | 0.069 |
| A1     | 0.100                     | 0.250 | 0.004                | 0.010 |
| A2     | 1.350                     | 1.550 | 0.053                | 0.061 |
| b      | 0.330                     | 0.510 | 0.013                | 0.020 |
| c      | 0.170                     | 0.250 | 0.007                | 0.010 |
| D      | 4.800                     | 5.000 | 0.189                | 0.197 |
| e      | 1.270 (BSC)               |       | 0.050 (BSC)          |       |
| E      | 5.800                     | 6.200 | 0.228                | 0.244 |
| E1     | 3.800                     | 4.000 | 0.150                | 0.157 |
| L      | 0.400                     | 1.270 | 0.016                | 0.050 |
| θ      | 0°                        | 8°    | 0°                   | 8°    |



Note:  
 1. Controlling dimension: in millimeters.  
 2. General tolerance:  $\pm 0.05\text{mm}$ .  
 3. The pad layout is for reference purposes only.



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