

## N-Channel Enhancement Mode Power MOSFET

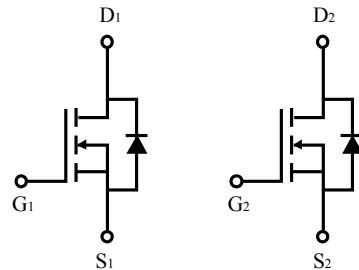
### Description

The 4812 uses advanced trench technology to provide excellent  $R_{DS(ON)}$  and low gate charge . The complementary MOSFETs may be used to form a level shifted high side switch, and for a host of other applications.

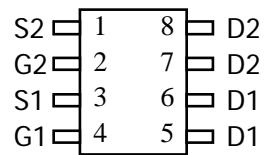
### General Features

| PRODUCT SUMMARY  |                |                              |
|------------------|----------------|------------------------------|
| V <sub>DSS</sub> | I <sub>D</sub> | R <sub>DS(on)</sub> (mΩ) Max |
| 30V              | 6.9A           | 21 @ V <sub>GS</sub> = 10V   |
|                  | 5.0A           | 25 @ V <sub>GS</sub> = 4.5V  |

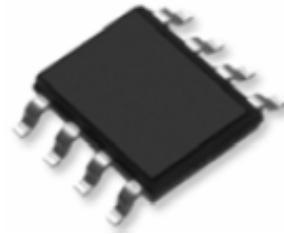
- High power and current handing capability
- Lead free product is acquired
- Surface mount package



**Schematic diagram**



**Marking and pin assignment**



**SOP-8 top view**

### Absolute Maximum Ratings T<sub>A</sub>=25°C unless otherwise noted

| Parameter                              | Symbol                            | Maximum    | Units |
|--|-----------------------------------|------------|-------|
| Drain-Source Voltage                   | V <sub>DS</sub>                   | 30         | V     |
| Gate-Source Voltage                    | V <sub>GS</sub>                   | ±20        | V     |
| Continuous Drain Current <sup>A</sup>  | I <sub>D</sub>                    | 6.9        | A     |
| Pulsed Drain Current <sup>B</sup>      | I <sub>DM</sub>                   | 25         |       |
| Power Dissipation <sup>A</sup>         | P <sub>D</sub>                    | 2          | W     |
|  |                                   | 1.2        |       |
| Junction and Storage Temperature Range | T <sub>J</sub> , T <sub>STG</sub> | -55 to 150 | °C    |

### Thermal Characteristics

| Parameter                                | Symbol           | Typ | Max  | Units |
|--|------------------|-----|------|-------|
| Maximum Junction-to-Ambient <sup>A</sup> | R <sub>0JA</sub> | 48  | 62.5 | °C/W  |
| Maximum Junction-to-Ambient <sup>A</sup> |                  | 74  | 110  | °C/W  |
| Maximum Junction-to-Lead <sup>C</sup>    | R <sub>0JL</sub> | 35  | 40   | °C/W  |



SHENZHEN TUOFENG SEMICONDUCTOR TECHNOLOGY CO.,LTD

# SOP-8 Plastic-Encapsulate MOSFETs

4812

Electrical Characteristics ( $T_J=25^\circ\text{C}$  unless otherwise noted)

| Symbol                   | Parameter                             | Conditions                                | Min | Typ | Max       | Units            |
|--------------------------|---------------------------------------|---|-----|-----|-----------|------------------|
| <b>STATIC PARAMETERS</b> |                                       |   |     |     |           |                  |
| $\text{BV}_{\text{DSS}}$ | Drain-Source Breakdown Voltage        | $I_D = 250\mu\text{A}, V_{GS}=0\text{V}$  | 30  |     |           | V                |
| $I_{\text{DSS}}$         | Zero Gate Voltage Drain Current       | $V_{DS}=30\text{V}, V_{GS}=0\text{V}$     |     |     | 500       | nA               |
| $I_{\text{GSS}}$         | Gate-Body leakage current             | $V_{DS}=0\text{V}, V_{GS}=\pm 20\text{V}$ |     |     | $\pm 100$ | nA               |
| $V_{\text{GS(th)}}$      | Gate Threshold Voltage                | $V_{DS}=V_{GS}, I_D = 250\mu\text{A}$     | 1.1 | 1.6 | 2.0       | V                |
| $I_{\text{D(ON)}}$       | On state drain current                | $V_{GS}=4.5\text{V}, V_{DS}=5\text{V}$    | 20  |     |           | A                |
| $R_{\text{DS(ON)}}$      | Static Drain-Source On-Resistance     | $V_{GS}=10\text{V}, I_D = 6.9\text{A}$    |     | 18  | 21        | $\text{m}\Omega$ |
|                          |                                       | $V_{GS}=4.5\text{V}, I_D = 5.0\text{A}$   |     | 22  | 25        | $\text{m}\Omega$ |
| $g_{\text{FS}}$          | Forward Transconductance              | $V_{DS} = 5\text{V}, I_D = 6.9\text{A}$   |     | 15  |           | S                |
| $V_{\text{SD}}$          | Diode Forward Voltage                 | $I_S = 3\text{A}, V_{GS}=0\text{V}$       |     | 0.8 | 1.2       | V                |
| $I_S$                    | Maximum Body-Diode Continuous Current |   |     | 3   |           | A                |

**DYNAMIC PARAMETERS**

|                  |                              |  |  |     |     |          |
|------------------|------------------------------|--|--|-----|-----|----------|
| $C_{\text{iss}}$ | Input Capacitance            | $V_{GS}=0\text{V}, V_{DS}=15\text{V}, f=1\text{MHz}$ |  | 680 |     | pF       |
| $C_{\text{oss}}$ | Output Capacitance           |  |  | 102 |     | pF       |
| $C_{\text{rss}}$ | Reverse Transfer Capacitance |  |  | 77  |     | pF       |
| $R_g$            | Gate resistance              | $V_{GS}=0\text{V}, V_{DS}=0\text{V}, f=1\text{MHz}$  |  | 3.0 | 3.6 | $\Omega$ |

**SWITCHING PARAMETERS**

|                     |                                    |  |  |      |  |    |
|---------------------|------------------------------------|--|--|------|--|----|
| $Q_g(10\text{V})$   | Total Gate Charge (10V)            | $V_{DD}=15\text{V}, V_{GEN} = 10\text{V}, I_D = 6.9\text{A}$                       |  | 13.8 |  | nC |
| $Q_g(4.5\text{V})$  | Total Gate Charge (4.5V)           |  |  | 6.7  |  | nC |
| $Q_{gs}$            | Gate Source Charge                 |  |  | 1.8  |  | nC |
| $Q_{gd}$            | Gate Drain Charge                  |  |  | 3.2  |  | nC |
| $t_{D(\text{on})}$  | Turn-On Delay Time                 | $V_{DD}=15\text{V}, V_{GEN}=10\text{V}, R_L=2.2\Omega$<br>$R_{\text{GEN}}=3\Omega$ |  | 4.6  |  | ns |
| $t_r$               | Turn-On Rise Time                  |  |  | 4.1  |  | ns |
| $t_{D(\text{off})}$ | Turn-Off Delay Time                |  |  | 20.6 |  | ns |
| $t_f$               | Turn-Off Fall Time                 |  |  | 5.2  |  | ns |
| $t_{rr}$            | Body Diode Reverse Recovery Time   |  | $I_F = 6.9\text{A}, dI/dt=100\text{A}/\mu\text{s}$ | 16.5 |  | ns |
| $Q_{rr}$            | Body Diode Reverse Recovery Charge | $I_F = 6.9\text{A}, dI/dt=100\text{A}/\mu\text{s}$                                 |  | 7.8  |  | nC |

A: The value of  $R_{\text{0JA}}$  is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ\text{C}$ . The value in any given application depends on the user's specific board design. The current rating is based on the  $t \leq 10\text{s}$  thermal resistance rating.

B: Repetitive rating, pulse width limited by junction temperature.

C. The  $R_{\text{0JA}}$  is the sum of the thermal impedance from junction to lead  $R_{\text{0JL}}$  and lead to ambient.

D. The static characteristics in Figures 1 to 6,12,14 are obtained using 80 $\mu\text{s}$  pulses, duty cycle 0.5% max.

E. These tests are performed with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ\text{C}$ . The SOA curve provides a single pulse rating.

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# SOP-8 Plastic-Encapsulate MOSFETs

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## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

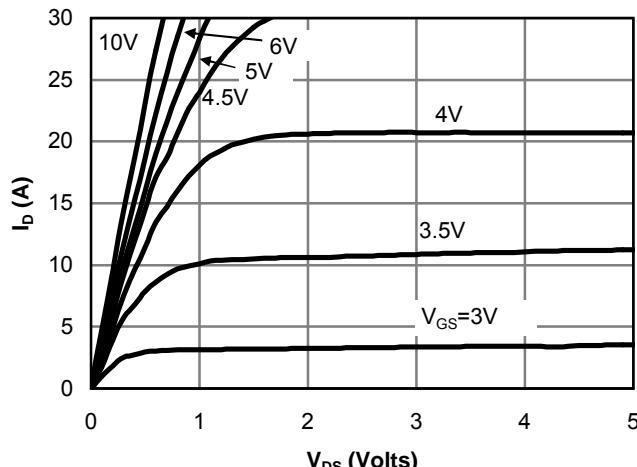


Fig 1: On-Region Characteristics

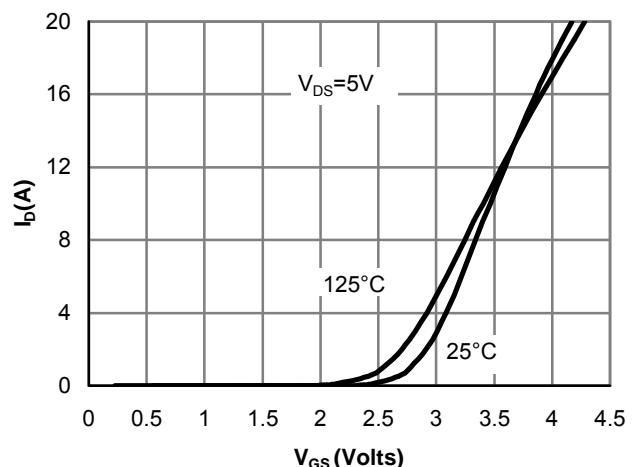


Figure 2: Transfer Characteristics

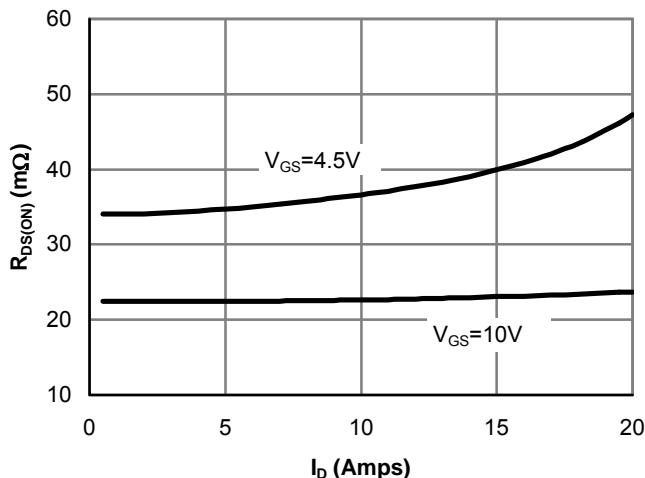


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

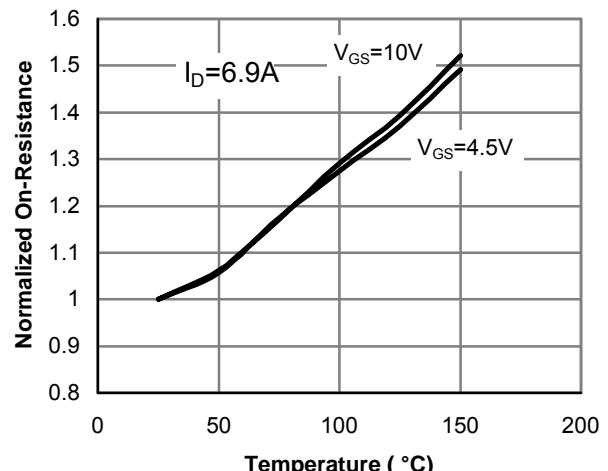


Figure 4: On-Resistance vs. Junction Temperature

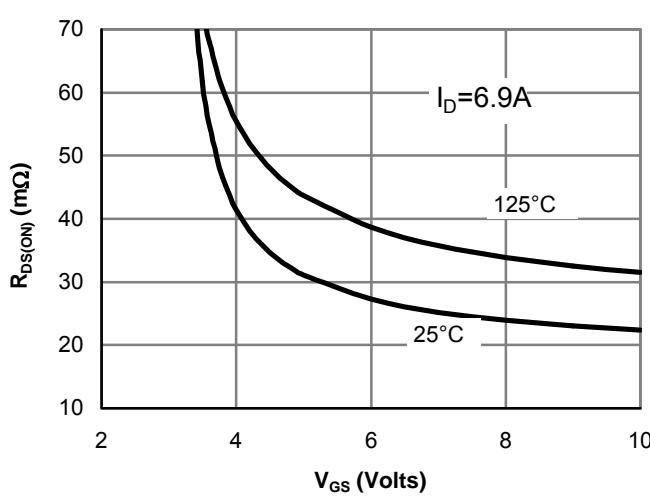


Figure 5: On-Resistance vs. Gate-Source Voltage

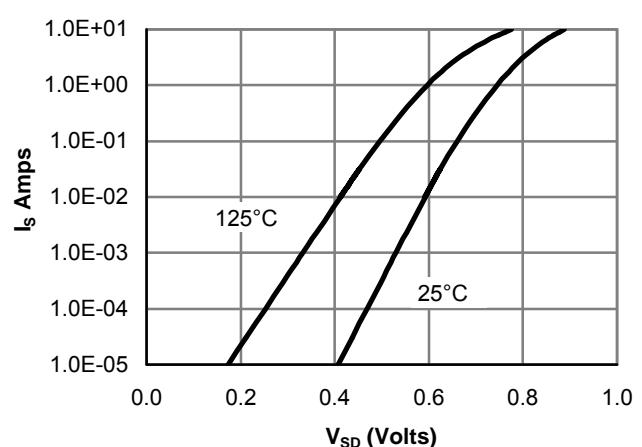


Figure 6: Body diode characteristics

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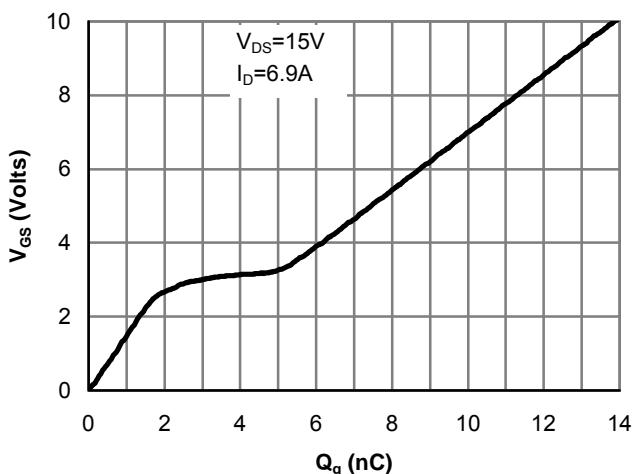


Figure 7: Gate-Charge characteristics

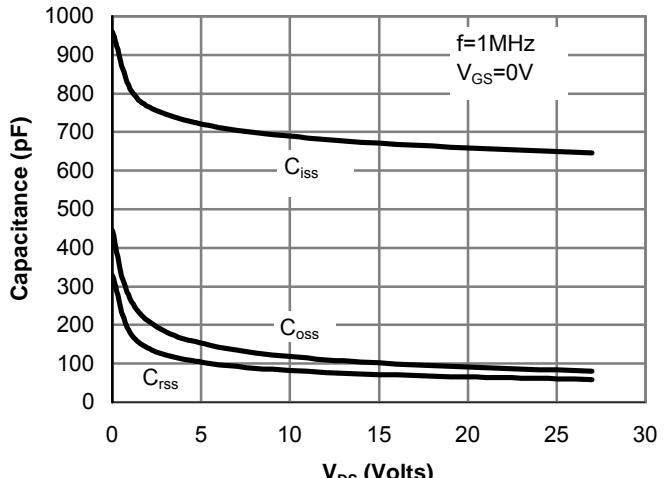


Figure 8: Capacitance Characteristics

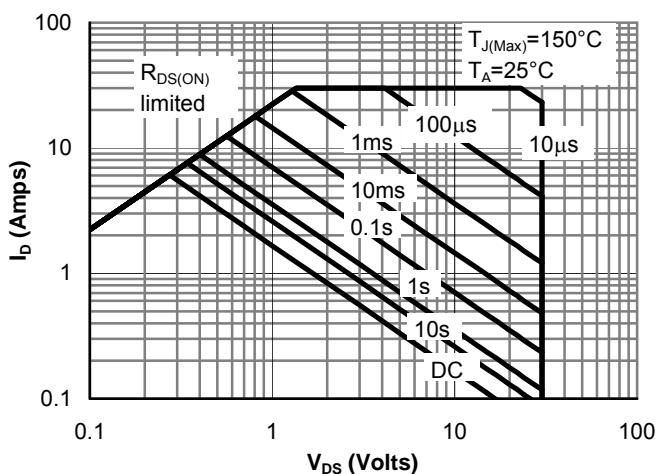


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

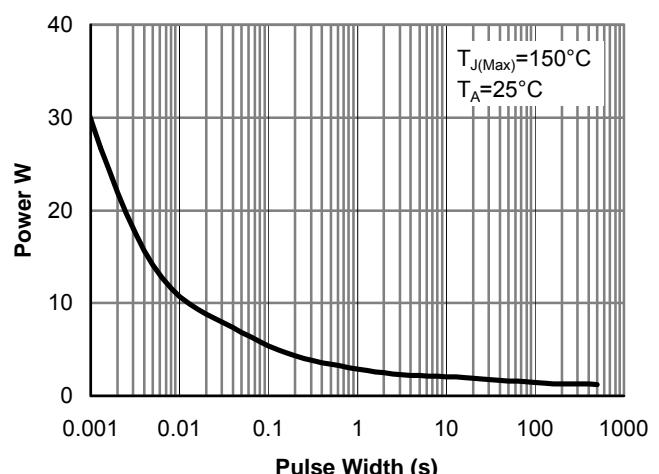


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

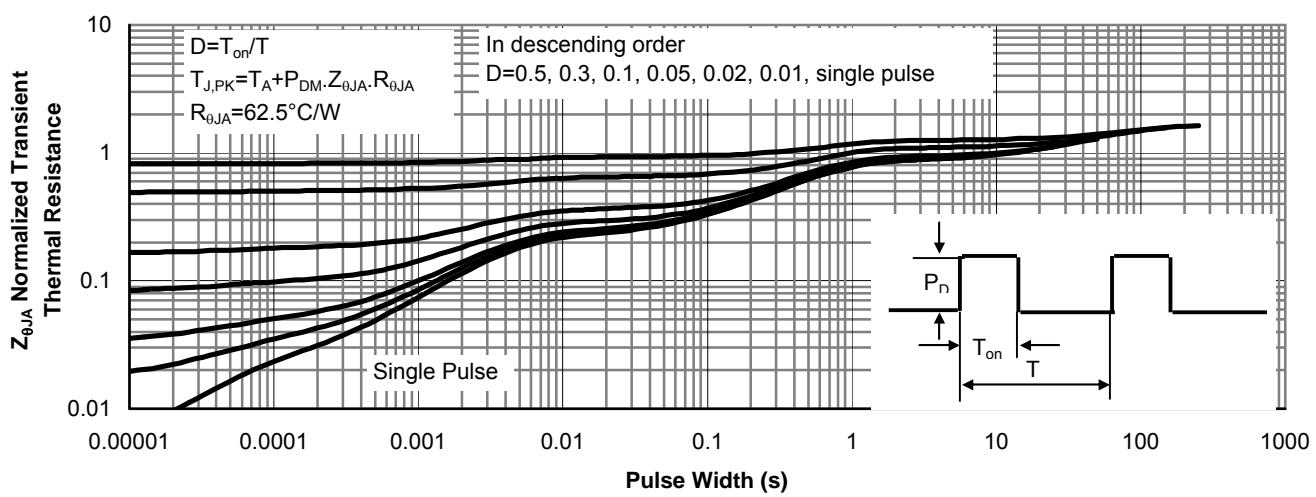
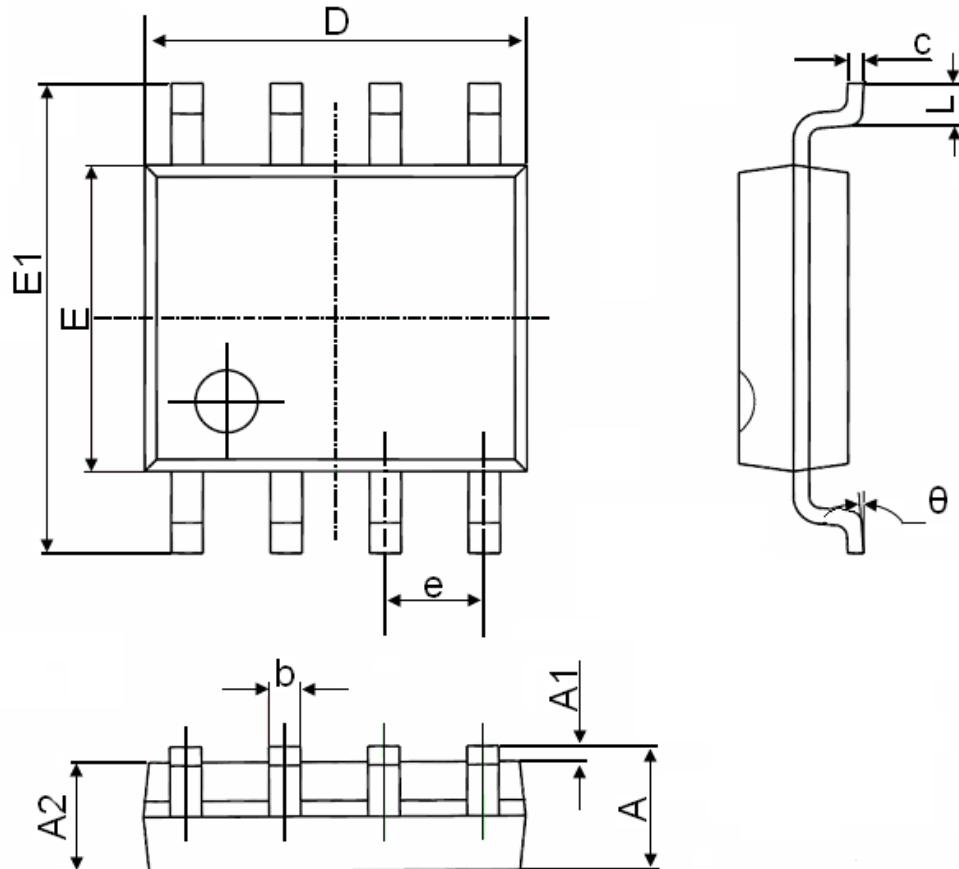


Figure 11: Normalized Maximum Transient Thermal Impedance

**SOP-8 Package Information**


| 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 | 0.006                | 0.010 |
| D      | 4.700                     | 5.100 | 0.185                | 0.200 |
| E      | 3.800                     | 4.000 | 0.150                | 0.157 |
| E1     | 5.800                     | 6.200 | 0.228                | 0.244 |
| e      | 1.270(BSC)                |       | 0.050(BSC)           |       |
| L      | 0.400                     | 1.270 | 0.016                | 0.050 |
| θ      | 0°                        | 8°    | 0°                   | 8°    |