

## CHIPLINK P-Channel Enhancement Mode Power MOSFET

### Description

The LX3401L combines advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltage as low as 2.5V. This device is suitable for use as a load switch or other general applications.

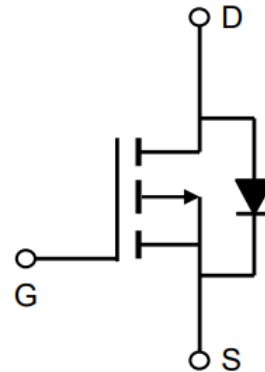
### Features

- $V_{DS} = -30V$ ,  $I_D = -4.2A$   
 $R_{DS(ON)typ.} = 45m\Omega @ V_{DS} = -10V$   
 $R_{DS(ON)typ.} = 51m\Omega @ V_{DS} = -4.5V$   
 $R_{DS(ON)typ.} = 65m\Omega @ V_{DS} = -2.5V$
- Low gate charge
- High power and current handling capability
- Termination is Lead-free and RoHS Compliant

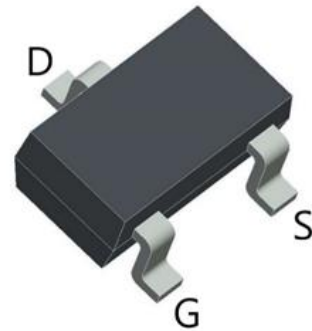


### Applications

- PWM applications
- Load switch
- Power Management



Schematic Diagram



SOT23-3L Package

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

| Parameter                              | Symbol         | Maximum    | Units      |
|----------------------------------------|----------------|------------|------------|
| Drain-Source Voltage                   | $V_{DS}$       | -30        | V          |
| Gate-Source Voltage                    | $V_{GS}$       | $\pm 12$   | V          |
| Continuous Drain Current               | $I_D$          | -4.2       | A          |
| Pulsed Drain Current <sup>B</sup>      | $I_{DM}$       | -20        | A          |
| Maximum Power Dissipation <sup>A</sup> | $P_D$          | 1.2        | W          |
| Junction and Storage Temperature Range | $T_J, T_{STG}$ | -55 To 150 | $^\circ C$ |

## Thermal Characteristic

|                                         |           |     |              |
|-----------------------------------------|-----------|-----|--------------|
| Thermal Resistance, Junction to Ambient | $R_{QJA}$ | 104 | $^\circ C/W$ |
|-----------------------------------------|-----------|-----|--------------|

**Electrical Characteristics** ( $T_A=25^{\circ}\text{C}$  unless otherwise specified)

| Parameter                          | Symbol              | Test conditions                                                                               | MIN  | TYP  | MAX  | UNIT |
|------------------------------------|---------------------|-----------------------------------------------------------------------------------------------|------|------|------|------|
| Drain-Source Breakdown Voltage     | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V, I <sub>D</sub> =-250uA                                                   | -30  |      |      | V    |
| Gate-Threshold Voltage             | V <sub>th(GS)</sub> | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =-250 uA                                   | -0.7 | -0.9 | -1.3 | V    |
| Gate-body Leakage                  | IGSS                | V <sub>DS</sub> =0V, V <sub>GS</sub> =±10V                                                    |      |      | ±100 | nA   |
| Zero Gate Voltage Drain Current    | IDSS                | V <sub>DS</sub> =-24V, V <sub>GS</sub> =0V                                                    |      |      | -1   | uA   |
| Drain-Source On-Resistance         | R <sub>DS(ON)</sub> | V <sub>GS</sub> =-10V, I <sub>D</sub> =-4.2A                                                  |      | 45   | 55   | mΩ   |
|                                    |                     | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-4A                                                   |      | 51   | 68   | mΩ   |
|                                    |                     | V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-1A                                                   |      | 65   | 88   | mΩ   |
| Forward Transconductance           | g <sub>FS</sub>     | V <sub>DS</sub> =-5V, I <sub>D</sub> =-4.2A                                                   |      | 10   |      | s    |
| Dynamic Characteristics            |                     |                                                                                               |      |      |      |      |
| Input Capacitance                  | C <sub>iSS</sub>    | V <sub>DS</sub> = -15V, V <sub>GS</sub> =0V, F=1MHz                                           |      | 880  |      | pF   |
| Output Capacitance                 | C <sub>oss</sub>    |                                                                                               |      | 105  |      |      |
| Reverse Transfer Capacitance       | C <sub>rSS</sub>    |                                                                                               |      | 65   |      |      |
| Switching Capacitance              |                     |                                                                                               |      |      |      |      |
| Turn-on Delay Time                 | t <sub>d(on)</sub>  | V <sub>DD</sub> = -15V, I <sub>D</sub> =-4.2A<br>V <sub>GS</sub> = -10V, R <sub>GEN</sub> =6Ω |      | 7    |      | nS   |
| Turn-on Rise Time                  | t <sub>r</sub>      |                                                                                               |      | 3    |      | nS   |
| Turn-off Delay Time                | t <sub>d(off)</sub> |                                                                                               |      | 30   |      | nS   |
| Turn-off Fall Time                 | t <sub>f</sub>      |                                                                                               |      | 12   |      | nS   |
| Total Gate Charge                  | Q <sub>g</sub>      | V <sub>DS</sub> = -15V, I <sub>D</sub> =-4.2A, V <sub>GS</sub> =-4.5V                         |      | 8.5  |      | nC   |
| Gate-Source Charge                 | Q <sub>gs</sub>     |                                                                                               |      | 1.8  |      | nC   |
| Gate-Drain Charge                  | Q <sub>gd</sub>     |                                                                                               |      | 2.7  |      | nC   |
| Drain-Source Diode Characteristics |                     |                                                                                               |      |      |      |      |
| Diode Forward Voltage              | V <sub>SD</sub>     | V <sub>GS</sub> =0V, I <sub>D</sub> =-4.2A                                                    |      |      | -1.2 | V    |
| Diode Forward Current              | I <sub>s</sub>      |                                                                                               |      |      | -4.2 | A    |

**Notes:**

- The Power dissipation  $P_D$  is based on  $T_{J(MAX)}=150^{\circ}\text{C}$ , using  $\leq 10s$  junction-to ambient thermal resistance.
- Repetitive rating, pulse width limited by junction temperature  $T_{J(MAX)}=150^{\circ}\text{C}$ . Ratings are based on low frequency and duty cycles to keep initial  $T_J=25^{\circ}\text{C}$ .
- The Static characteristics in Figures are obtained using  $<300\mu s$  pulses, duty cycle 2% max.

## Typical Electrical and Thermal Characteristics

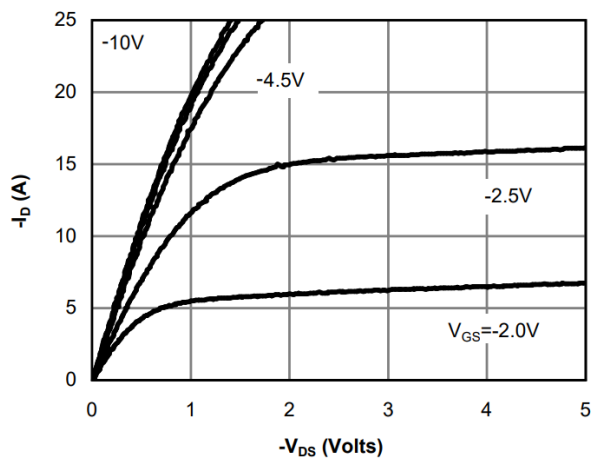


Figure 1: On-region Characteristics

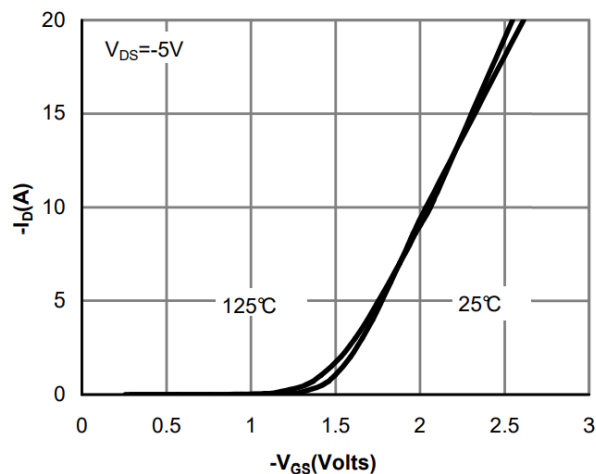


Figure 2: Transfer Characteristics

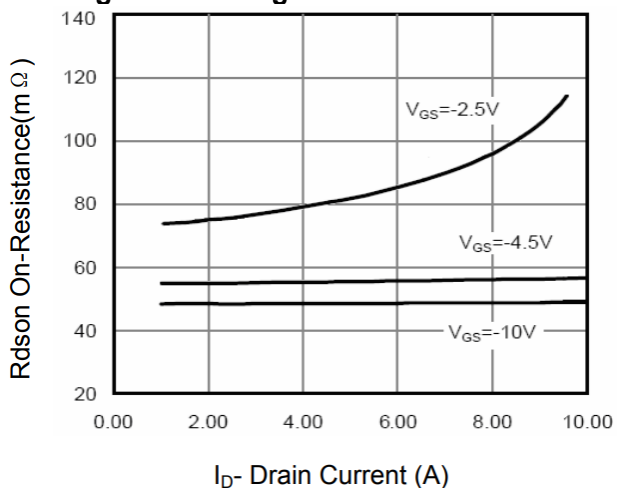


Figure 3: Drain-Source On-Resistance

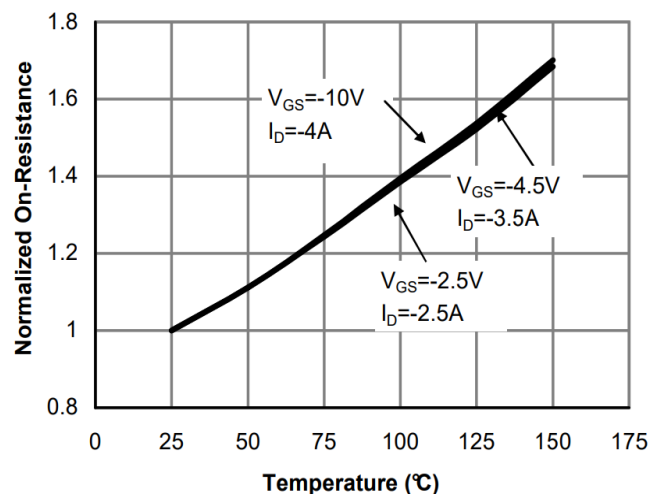


Figure 4: On-Resistance vs. Junction Temperature

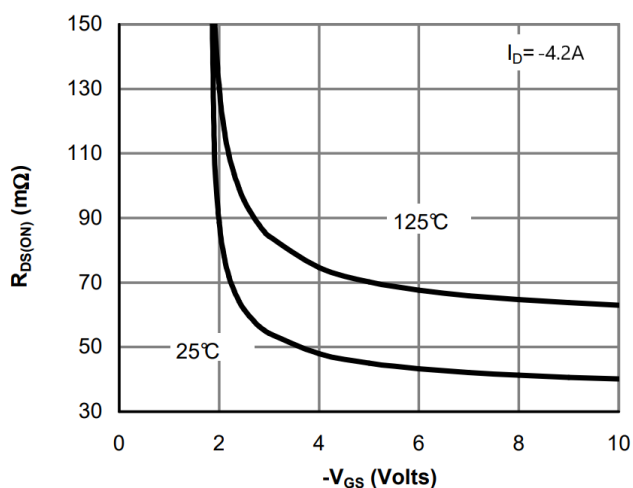


Figure 5: On-Resistance vs. Gate-Source Voltage

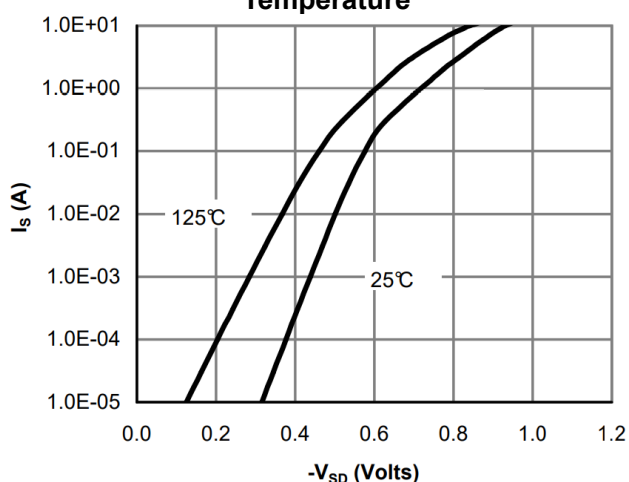


Figure 6: Body-Diode Characteristics

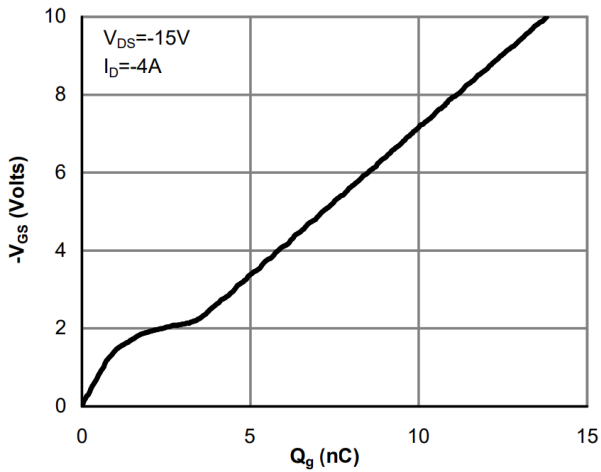


Figure 7: Gate-Charge Characteristics

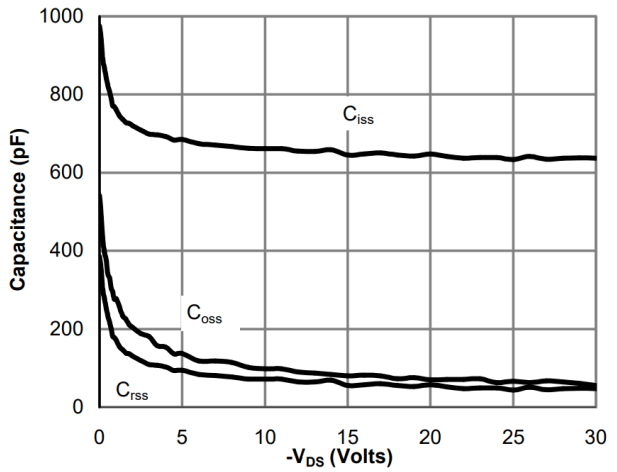


Figure 8: Capacitance Characteristics

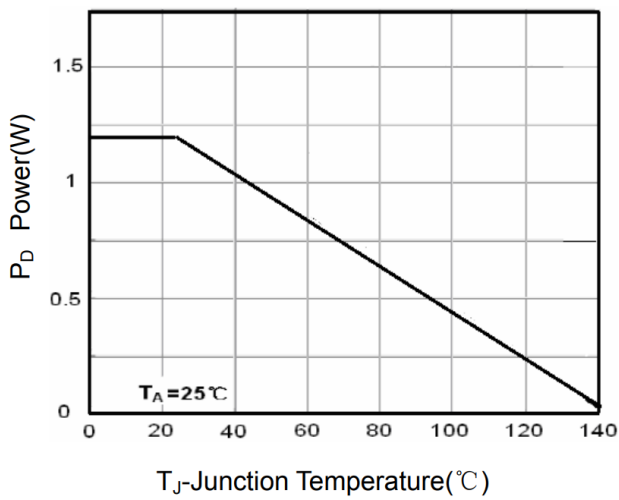


Figure 9: Power Dissipation

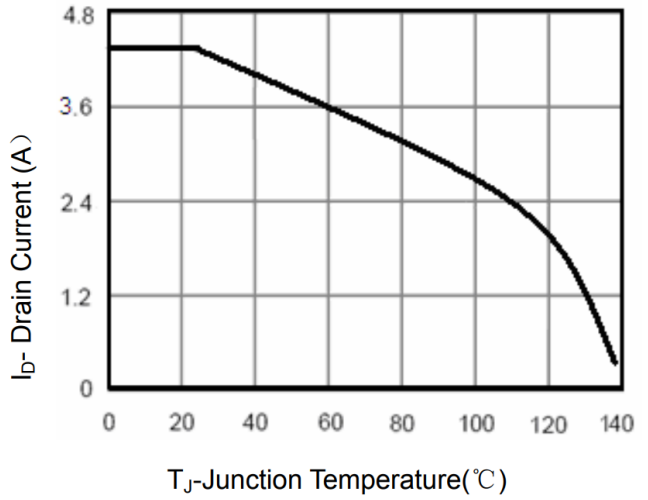


Figure 10: Drain Current

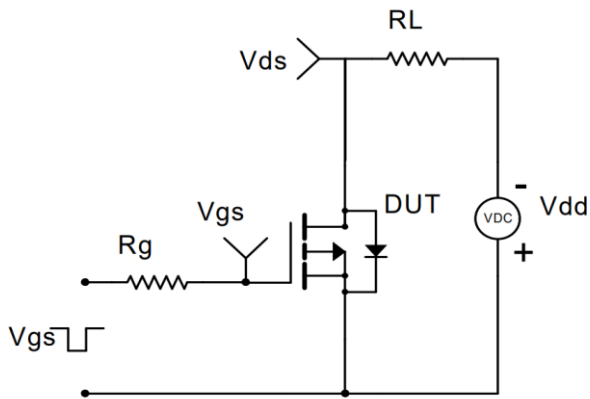


Figure 11: Switching Test Circuit

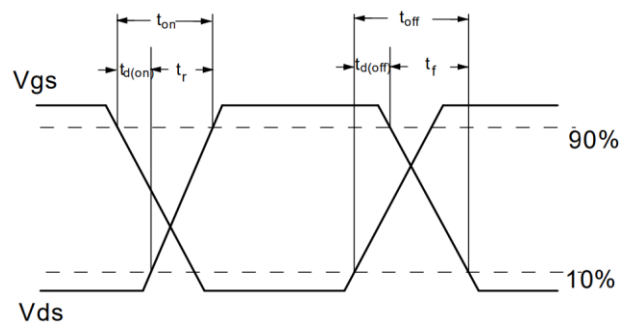


Figure 12: Switching Waveform

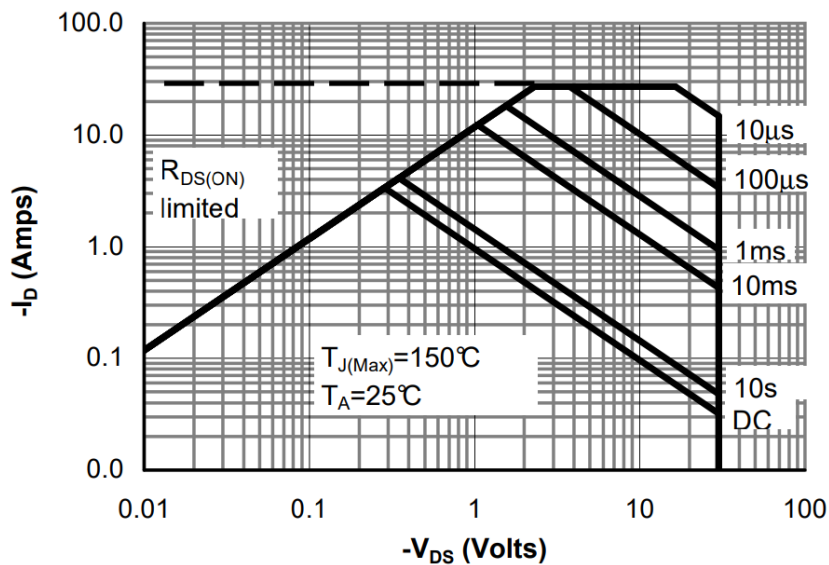


Figure 13: Safe Operation Area

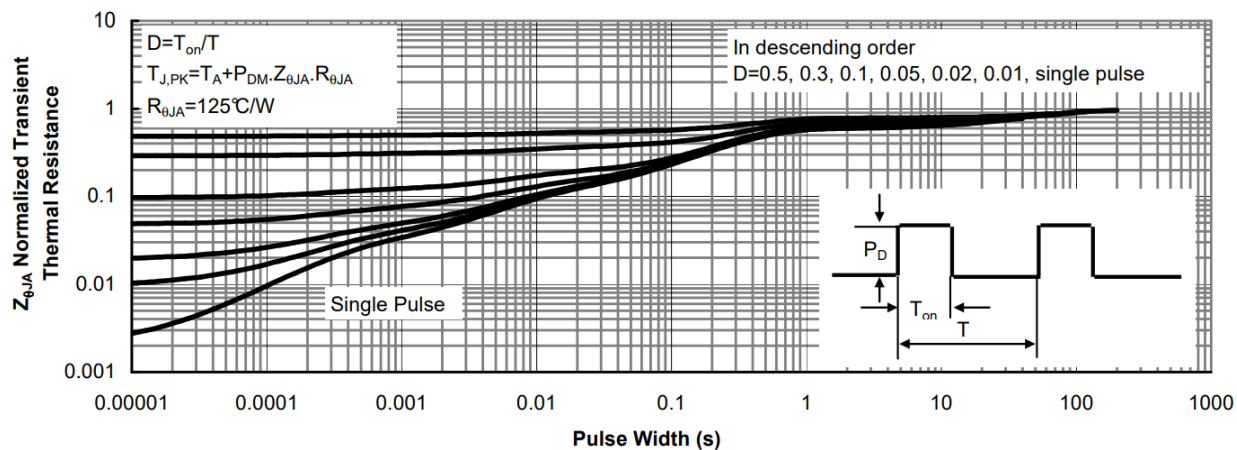
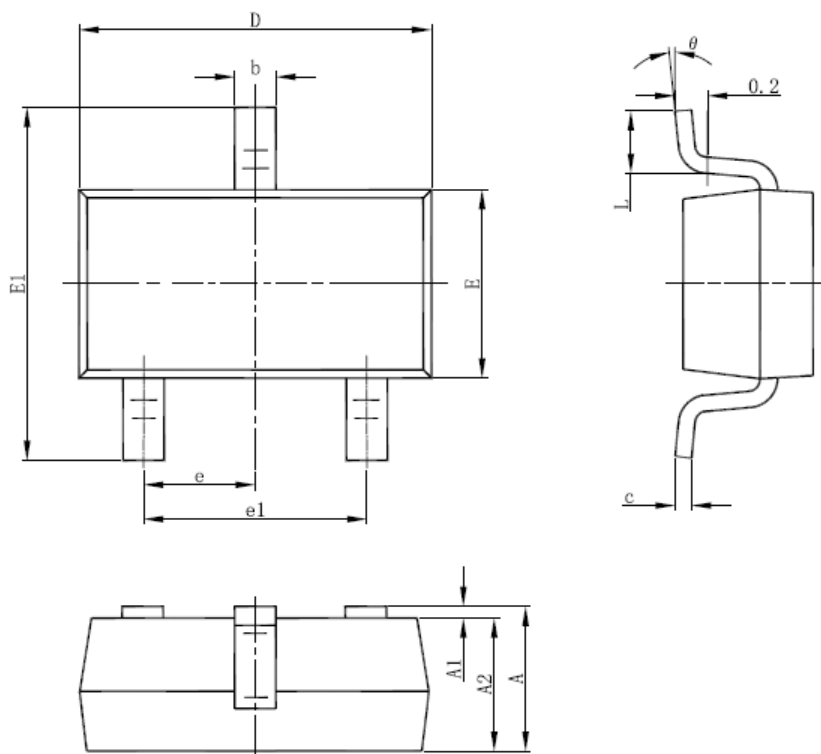


Figure 14: Normalized Maximum transient Thermal Impedance

## SOT23-3L Package Information



| Symbol   | Dimensions In Millimeters |       | Dimensions In Inches |       |
|----------|---------------------------|-------|----------------------|-------|
|          | Min                       | Max   | Min                  | Max   |
| A        | 1.050                     | 1.250 | 0.041                | 0.049 |
| A1       | 0.000                     | 0.100 | 0.000                | 0.004 |
| A2       | 1.050                     | 1.150 | 0.041                | 0.045 |
| b        | 0.300                     | 0.500 | 0.012                | 0.020 |
| c        | 0.100                     | 0.200 | 0.004                | 0.008 |
| D        | 2.820                     | 3.020 | 0.111                | 0.119 |
| E        | 1.500                     | 1.700 | 0.059                | 0.067 |
| E1       | 2.650                     | 2.950 | 0.104                | 0.116 |
| e        | 0.950(BSC)                |       | 0.037(BSC)           |       |
| e1       | 1.800                     | 2.000 | 0.071                | 0.079 |
| L        | 0.300                     | 0.600 | 0.012                | 0.024 |
| $\theta$ | 0°                        | 8°    | 0°                   | 8°    |

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