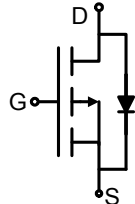
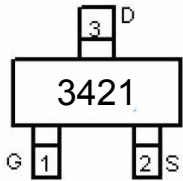



**P-Channel Enhancement Mode Power MOSFET**

|   |   |
|---|---|
| <p><b>DESCRIPTION</b></p> <p>The HM3421 uses advanced trench technology to provide excellent <math>R_{DS(ON)}</math>, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a load switch or in PWM applications.</p> <p><b>GENERAL FEATURES</b></p> <ul style="list-style-type: none"> <li>● <math>V_{DS} = -30V, I_D = -4.2A</math></li> <li>● <math>R_{DS(ON)} &lt; 130m\Omega @ V_{GS} = -2.5V</math></li> <li>● <math>R_{DS(ON)} &lt; 75m\Omega @ V_{GS} = -4.5V</math></li> <li>● <math>R_{DS(ON)} &lt; 65m\Omega @ V_{GS} = -10V</math></li> <li>● High Power and current handling capability</li> <li>● Lead free product is acquired</li> <li>● Surface Mount Package</li> </ul> <p><b>Application</b></p> <ul style="list-style-type: none"> <li>● PWM applications</li> <li>● Load switch</li> <li>● Power management</li> </ul> | <div style="text-align: center;">  <p>Schematic diagram</p>  <p>Marking and pin Assignment</p>  <p>SOT-23-3L top view</p> </div> |
|---|---|

**Package Marking And Ordering Information**

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity   |
|----------------|--------|----------------|-----------|------------|------------|
| 3421           | HM3421 | SOT-23-3L      | Ø180mm    | 8 mm       | 3000 units |

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

| Parameter  | Symbol         | Limit      | Unit |
|--|----------------|------------|------|
| Drain-Source Voltage                             | $V_{DS}$       | -30        | V    |
| Gate-Source Voltage                              | $V_{GS}$       | ±12        | V    |
| Drain Current-Continuous                         | $I_D$          | -4.2       | A    |
| Drain Current-Pulsed (Note 1)                    | $I_{DM}$       | -30        | A    |
| Maximum Power Dissipation                        | $P_D$          | 1.2        | W    |
| Operating Junction and Storage Temperature Range | $T_J, T_{STG}$ | -55 To 150 | °C   |

**Thermal Characteristic**

|  |                 |     |      |
|--|-----------------|-----|------|
| Thermal Resistance, Junction-to-Ambient (Note 2) | $R_{\theta JA}$ | 104 | °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 | $I_{DSS}$  | $V_{DS} = -24V, V_{GS} = 0V$   | -   | -   | -1  | μA   |

|   |              |  |      |     |           |            |
|---|--------------|--|------|-----|-----------|------------|
| Gate-Body Leakage Current                 | $I_{GSS}$    | $V_{GS}=\pm 12V, V_{DS}=0V$                                | -    | -   | $\pm 100$ | nA         |
| <b>On Characteristics (Note 3)</b>        |              |  |      |     |           |            |
| Gate Threshold Voltage                    | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=-250\mu A$                             | -0.7 | -1  | -1.3      | V          |
| Drain-Source On-State Resistance          | $R_{DS(ON)}$ | $V_{GS}=-10V, I_D=-4.2A$                                   | -    | 50  | 55        | m $\Omega$ |
|   |              | $V_{GS}=-4.5V, I_D=-4A$                                    | -    | 64  | 72        | m $\Omega$ |
|   |              | $V_{GS}=-2.5V, I_D=-1A$                                    |      | 95  | 120       | m $\Omega$ |
| Forward Transconductance                  | $g_{FS}$     | $V_{DS}=-5V, I_D=-4.2A$                                    | -    | 10  | -         | S          |
| <b>Dynamic Characteristics (Note4)</b>    |              |  |      |     |           |            |
| Input Capacitance                         | $C_{iss}$    | $V_{DS}=-15V, V_{GS}=0V,$<br>$F=1.0MHz$                    | -    | 950 | -         | PF         |
| Output Capacitance                        | $C_{oss}$    |  | -    | 115 | -         | PF         |
| Reverse Transfer Capacitance              | $C_{rss}$    |  | -    | 75  | -         | PF         |
| <b>Switching Characteristics (Note 4)</b> |              |  |      |     |           |            |
| Turn-on Delay Time                        | $t_{d(on)}$  | $V_{DD}=-15V, I_D=-3.2A$<br>$V_{GS}=-10V, R_{GEN}=6\Omega$ | -    | 7   | -         | nS         |
| Turn-on Rise Time                         | $t_r$        |  | -    | 3   | -         | nS         |
| Turn-Off Delay Time                       | $t_{d(off)}$ |  | -    | 30  | -         | nS         |
| Turn-Off Fall Time                        | $t_f$        |  | -    | 12  | -         | nS         |
| Total Gate Charge                         | $Q_g$        | $V_{DS}=-15V, I_D=-4A, V_{GS}=-4.5V$                       | -    | 9.5 | -         | nC         |
| Gate-Source Charge                        | $Q_{gs}$     |  | -    | 2   | -         | nC         |
| Gate-Drain Charge                         | $Q_{gd}$     |  | -    | 3   | -         | nC         |
| <b>Drain-Source Diode Characteristics</b> |              |  |      |     |           |            |
| Diode Forward Voltage (Note 3)            | $V_{SD}$     | $V_{GS}=0V, I_S=-1A$                                       | -    | -   | -1.2      | V          |

### 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 production

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



Figure 1: Switching Test Circuit

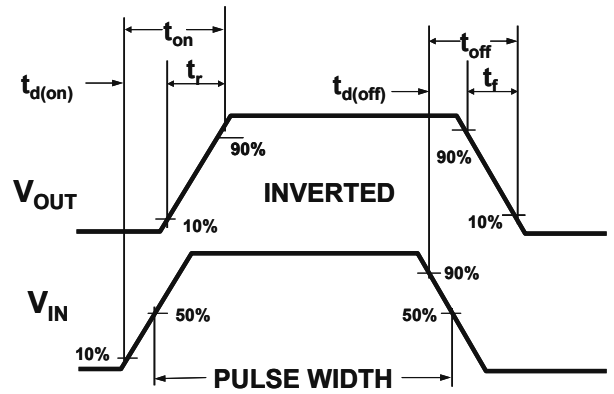
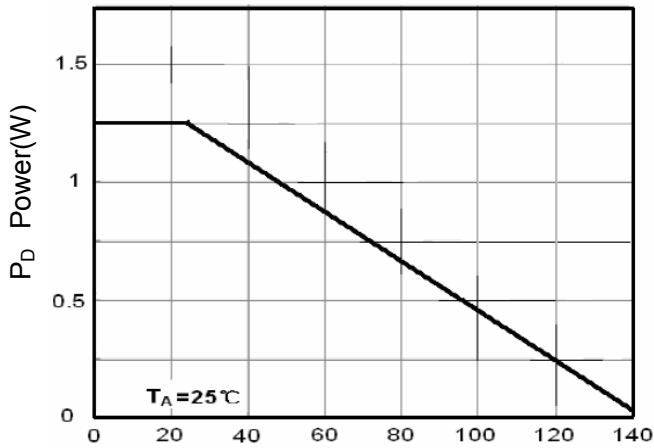
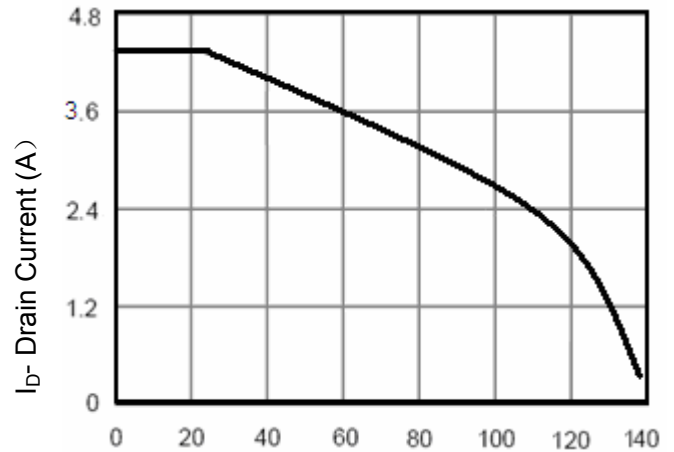


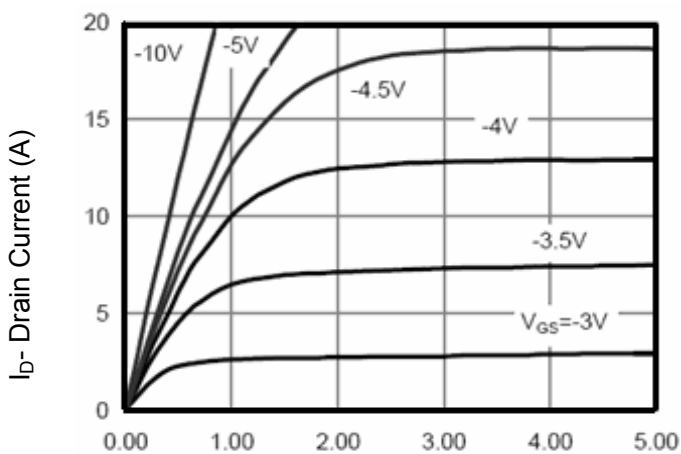
Figure 2: Switching Waveforms



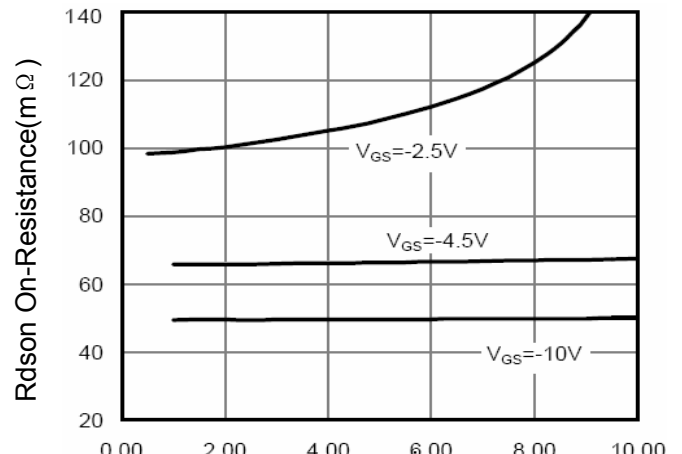
T<sub>J</sub>-Junction Temperature(°C)  
Figure 3 Power Dissipation



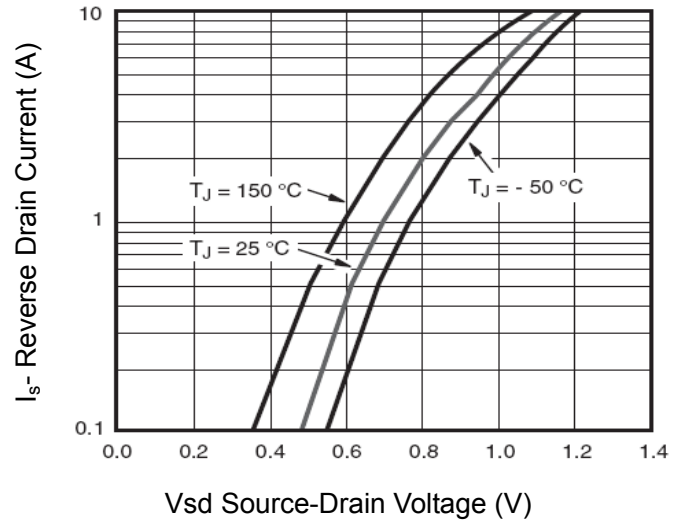
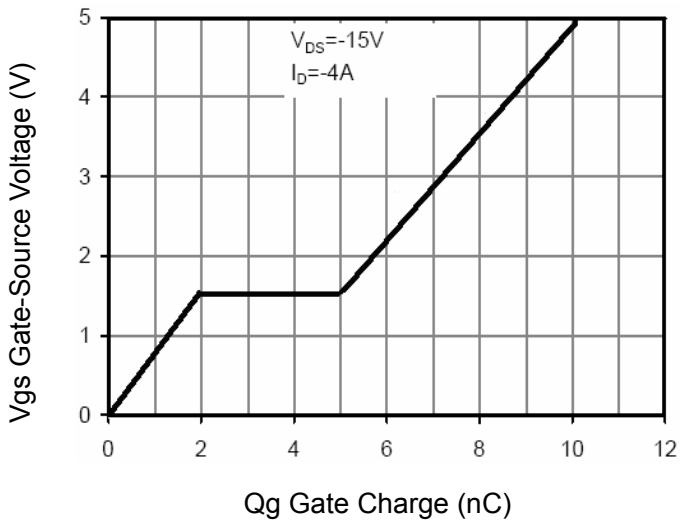
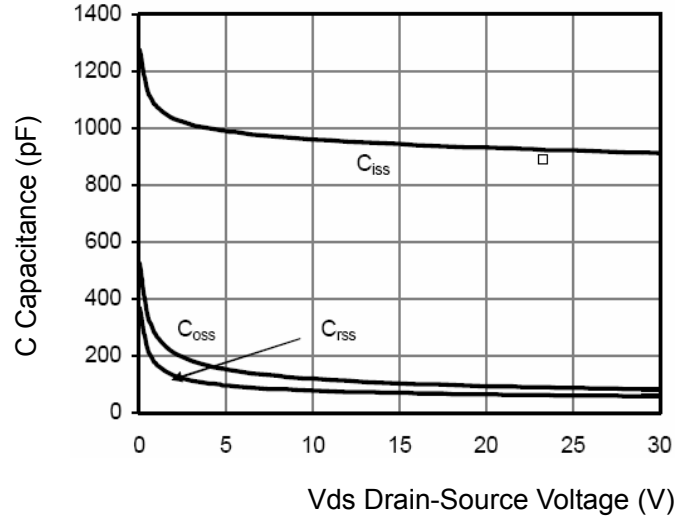
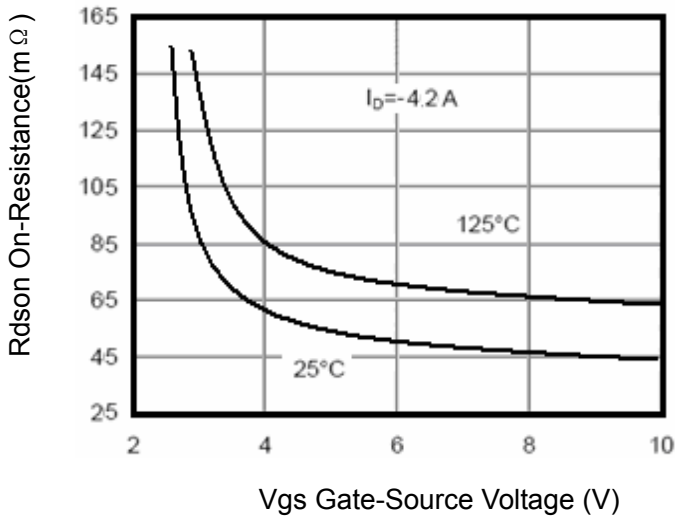
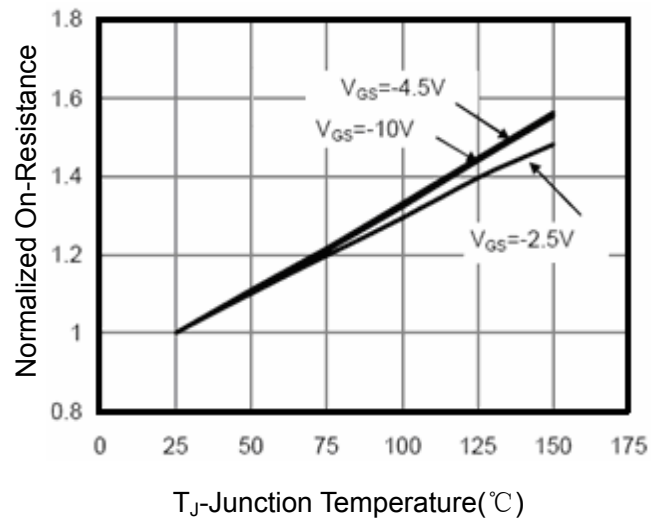
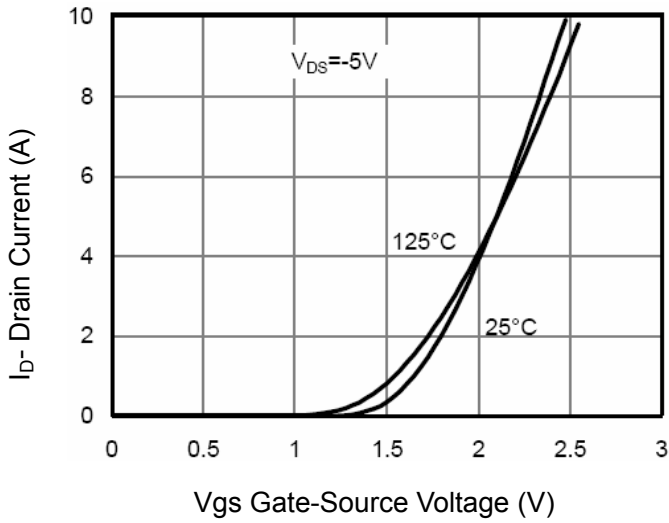
T<sub>J</sub>-Junction Temperature(°C)  
Figure 4 Drain Current



V<sub>DS</sub> Drain-Source Voltage (V)  
Figure 5 Output CHARACTERISTICS



I<sub>D</sub>- Drain Current (A)  
Figure 6 Drain-Source On-Resistance



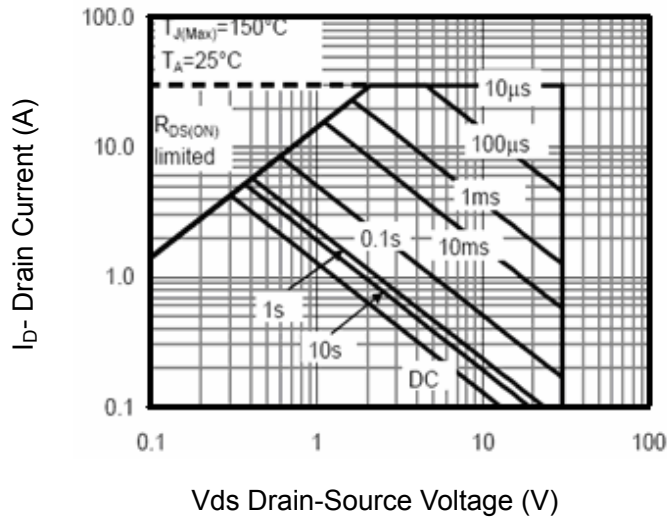


Figure 13 Safe Operation Area

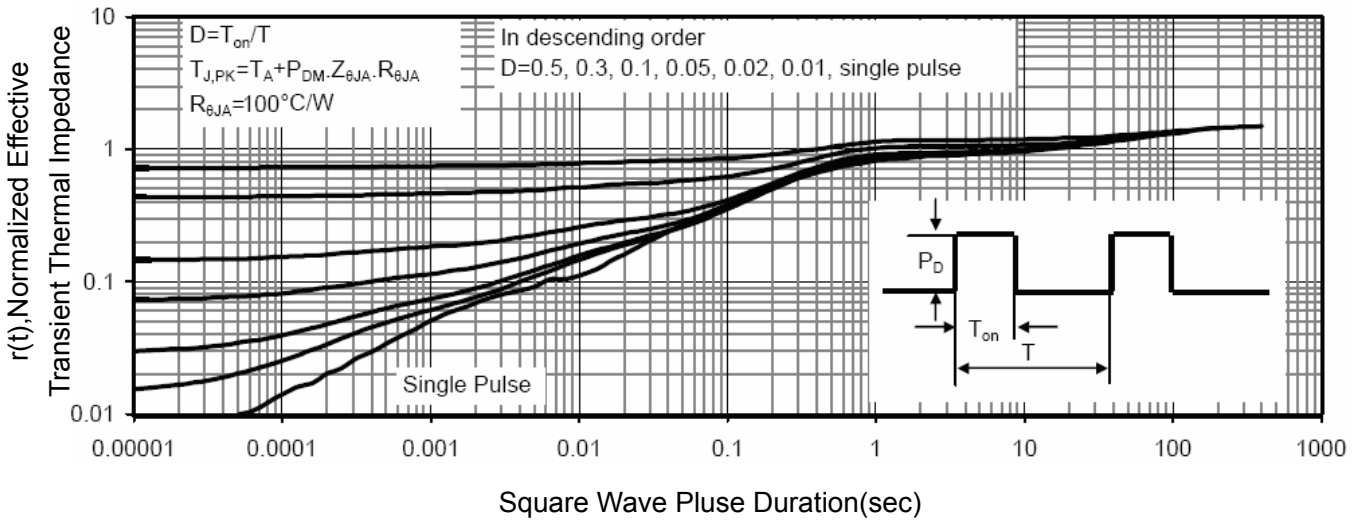
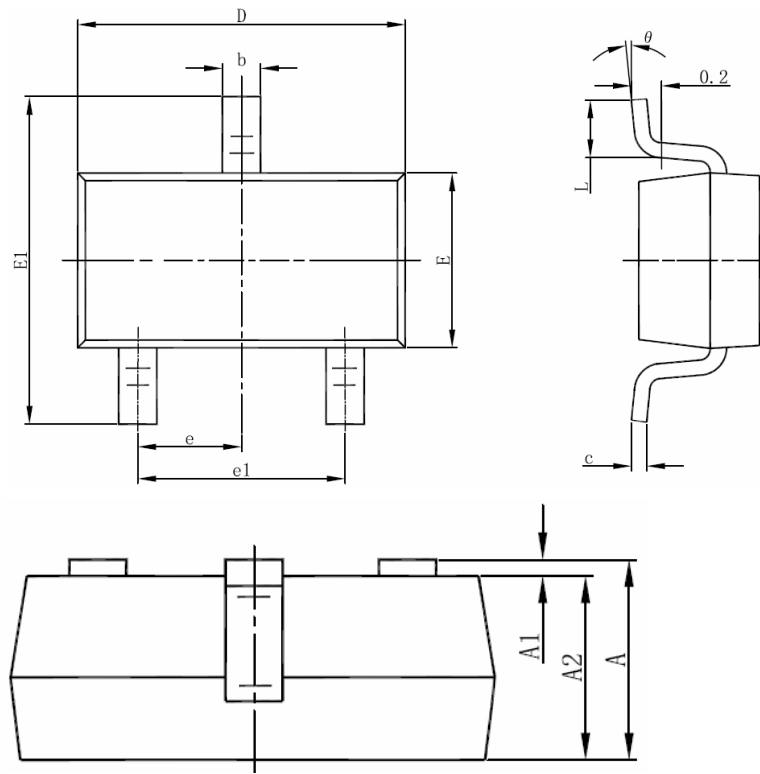


Figure 14 Normalized Maximum Transient Thermal Impedance

## SOT-23-3L 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 |
| θ      | 0°                        | 8°    | 0°                   | 8°    |

### NOTES

1. All dimensions are in millimeters.
2. Tolerance  $\pm 0.10\text{mm}$  (4 mil) unless otherwise specified
3. Package body sizes exclude mold flash and gate burrs. Mold flash at the non-lead sides should be less than 5 mils.
4. Dimension L is measured in gauge plane.
5. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.

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