

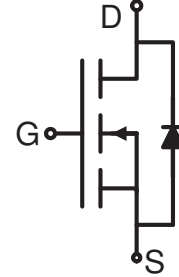
N-Channel Enhancement Mode Power MOSFET

Description

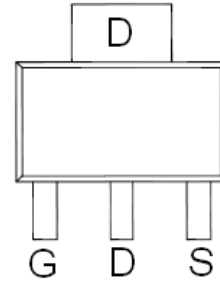
The RM5N60S4 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

General Features

- $V_{DS} = 60V, I_D = 5A$
- $R_{DS(ON)} < 55m\Omega @ V_{GS} = 10V$ (Typ: 46m Ω)
- $R_{DS(ON)} < 80m\Omega @ V_{GS} = 4.5V$ (Typ: 60m Ω)



Schematic diagram



SOT-223-3L view

Application

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply
- Halogen-free
- P/N suffix V means AEC-Q101 qualified, e.g:RM5N60S4V

Package Marking and Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity |
|----------------|----------|----------------|-----------|------------|------------|
| 6005 | RM5N60S4 | SOT-223-3L | Ø330mm | 12mm | 2500 units |

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

| Parameter | Symbol | Limit | Unit |
|--|--------------------|------------|------------|
| Drain-Source Voltage | V_{DS} | 60 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | V |
| Drain Current-Continuous | I_D | 5 | A |
| Drain Current-Continuous($T_C = 100^\circ C$) | $I_D(100^\circ C)$ | 3.5 | A |
| Pulsed Drain Current | I_{DM} | 20 | A |
| Maximum Power Dissipation | P_D | 2 | W |
| Operating Junction and Storage Temperature Range | T_J, T_{STG} | -55 To 150 | $^\circ C$ |

Thermal Characteristic

| | | | |
|---|-----------------|------|--------------|
| Thermal Resistance, Junction-to-Ambient ^(Note 2) | $R_{\theta JA}$ | 62.5 | $^\circ C/W$ |
|---|-----------------|------|--------------|

Electrical Characteristics ($T_A = 25^\circ C$ unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---------------------------------|------------|-------------------------------|-----|-----|-----|---------|
| Off Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS} = 0V, I_D = 250\mu A$ | 60 | 69 | - | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = 60V, V_{GS} = 0V$ | - | - | 1 | μA |

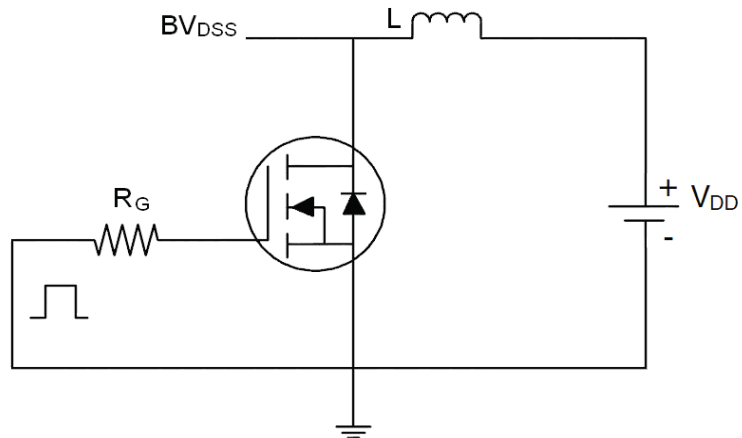
| | | | | | | |
|--|--------------|---|-----|------|-----------|------------|
| Gate-Body Leakage Current | I_{GSS} | $V_{GS}=\pm 20V, V_{DS}=0V$ | - | - | ± 100 | nA |
| On Characteristics ^(Note 3) | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$ | 1.2 | 2 | 2.5 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=4.5A$ | | 46 | 55 | m Ω |
| | | $V_{GS}=4.5V, I_D=4A$ | | 60 | 80 | m Ω |
| Forward Transconductance | g_{FS} | $V_{DS}=5V, I_D=4.5A$ | 11 | - | - | S |
| Dynamic Characteristics ^(Note4) | | | | | | |
| Input Capacitance | C_{ISS} | $V_{DS}=25V, V_{GS}=0V,$ $F=1.0MHz$ | | 450 | | PF |
| Output Capacitance | C_{OSS} | | | 60 | | PF |
| Reverse Transfer Capacitance | C_{RSS} | | | 25 | | PF |
| Switching Characteristics ^(Note 4) | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DS}=30V, I_D=4.5A$ $V_{GS}=10V, R_{GEN}=3\Omega$ | - | 4.7 | - | nS |
| Turn-on Rise Time | t_r | | - | 2.3 | - | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 15.7 | - | nS |
| Turn-Off Fall Time | t_f | | - | 1.9 | - | nS |
| Total Gate Charge | Q_g | $V_{DS}=30V, I_D=4.5A,$ $V_{GS}=10V$ | - | 8.5 | - | nC |
| Gate-Source Charge | Q_{gs} | | - | 1.6 | - | nC |
| Gate-Drain Charge | Q_{gd} | | - | 2.2 | - | nC |
| Drain-Source Diode Characteristics | | | | | | |
| Diode Forward Voltage ^(Note 3) | V_{SD} | $V_{GS}=0V, I_S=5A$ | - | - | 1.2 | V |
| Diode Forward Current ^(Note 2) | I_S | | - | - | 5 | A |

Notes:

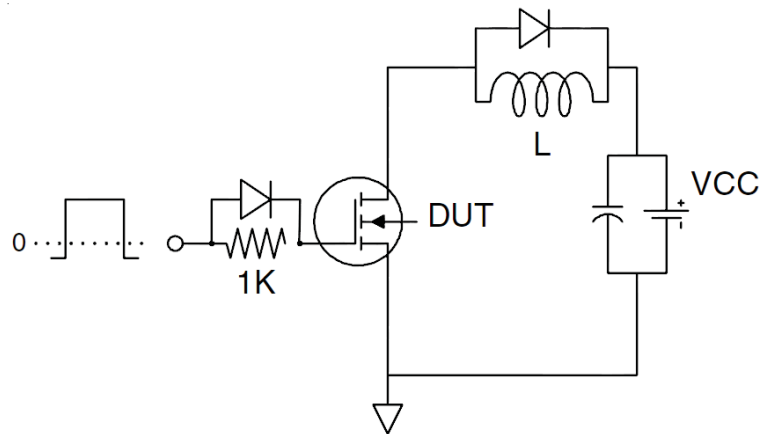
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production

Test Circuit

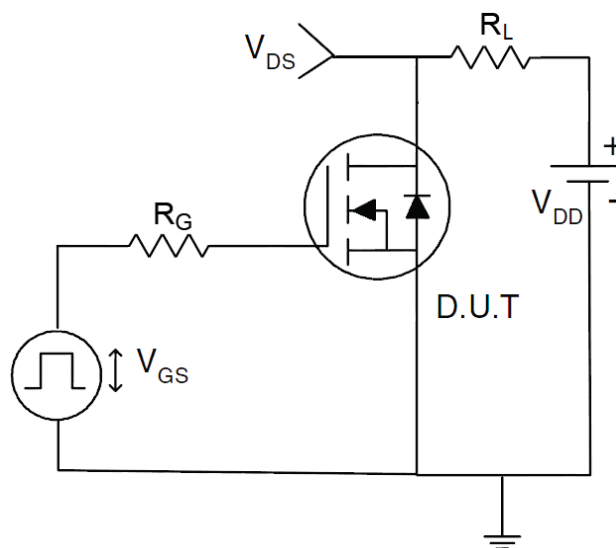
1) E_{AS} Test Circuit



2) Gate Charge Test Circuit



3) Switch Time Test Circuit



RATING AND CHARACTERISTICS CURVES (RM5N60S4)

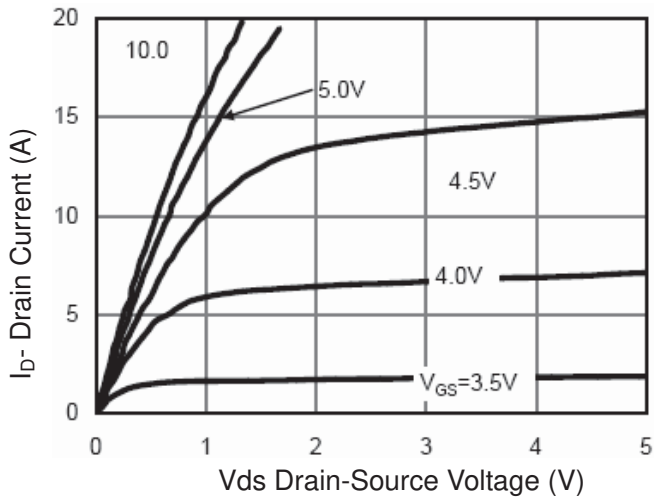


Figure 1 Output Characteristics

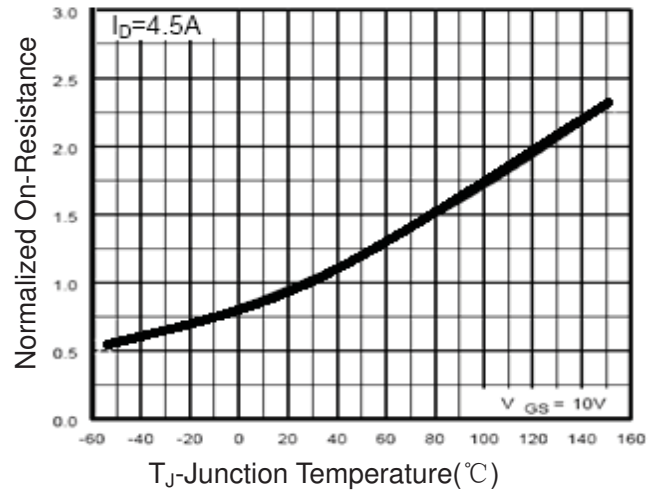


Figure 4 Rdson-Junction Temperature

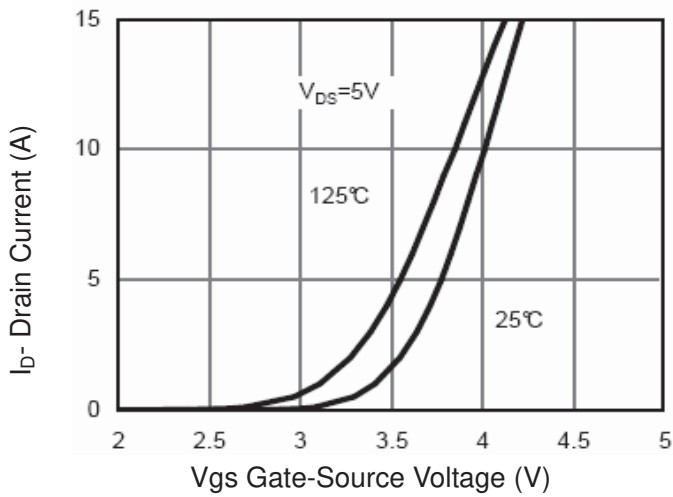


Figure 2 Transfer Characteristics

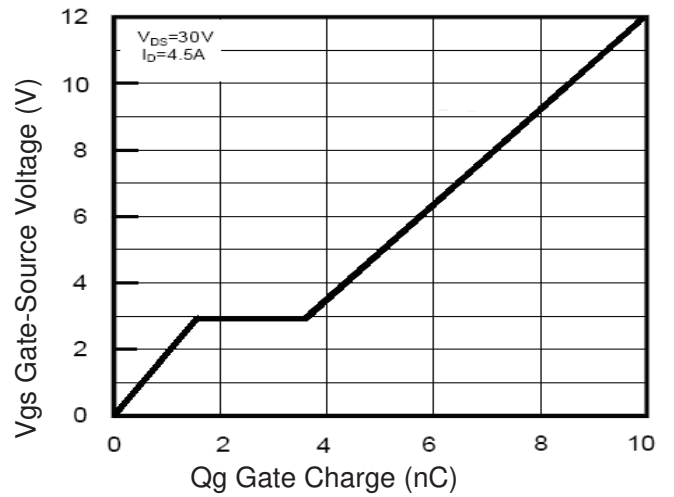


Figure 5 Gate Charge

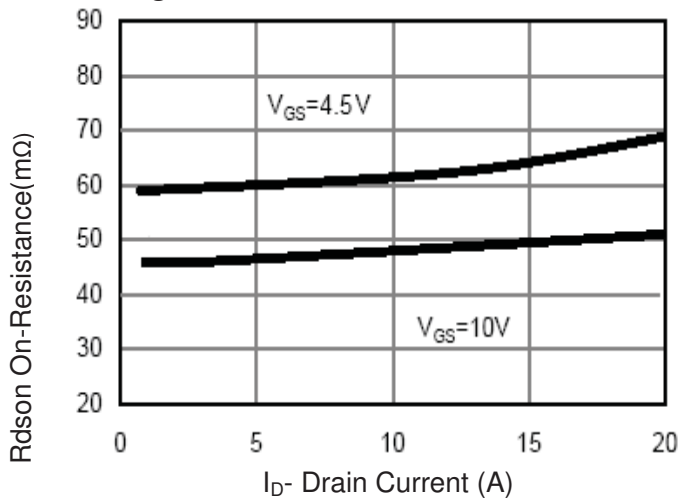


Figure 3 Rdson- Drain Current

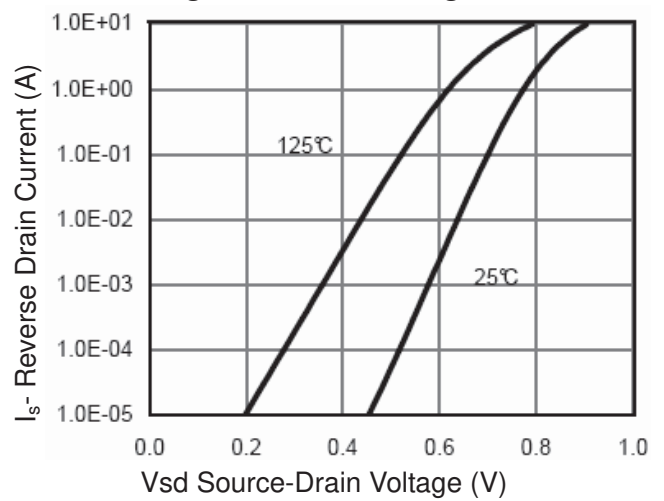


Figure 6 Source- Drain Diode Forward

RATING AND CHARACTERISTICS CURVES (RM5N60S4)

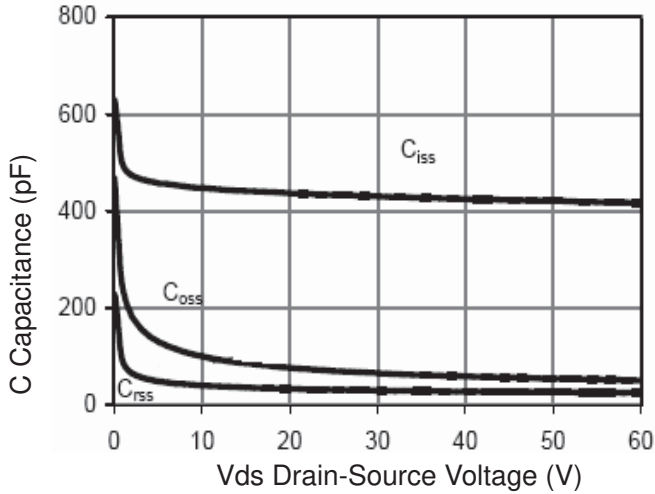


Figure 7 Capacitance vs Vds

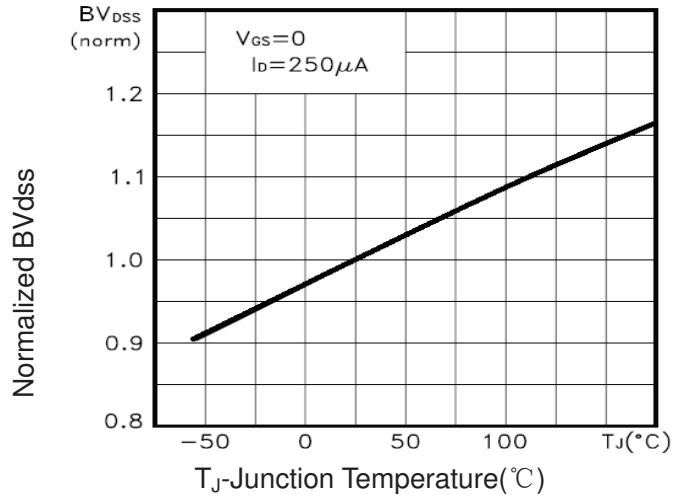


Figure 9 BV_{DSS} vs Junction Temperature

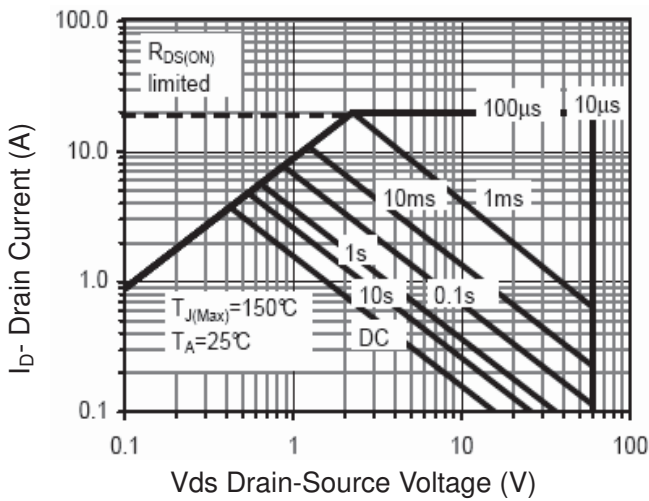


Figure 8 Safe Operation Area

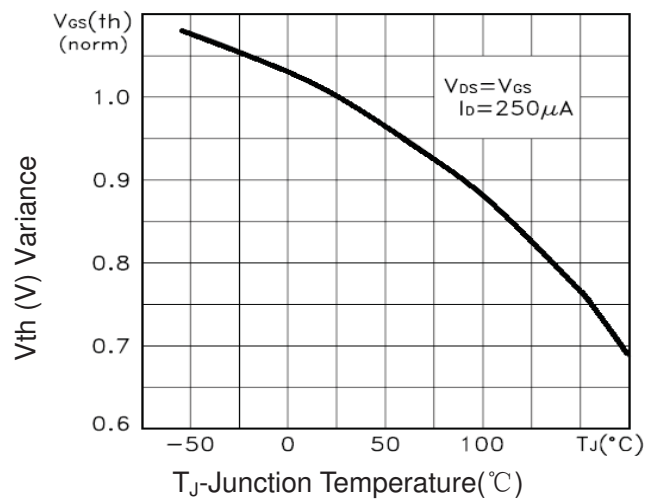


Figure 10 $V_{GS(th)}$ vs Junction Temperature

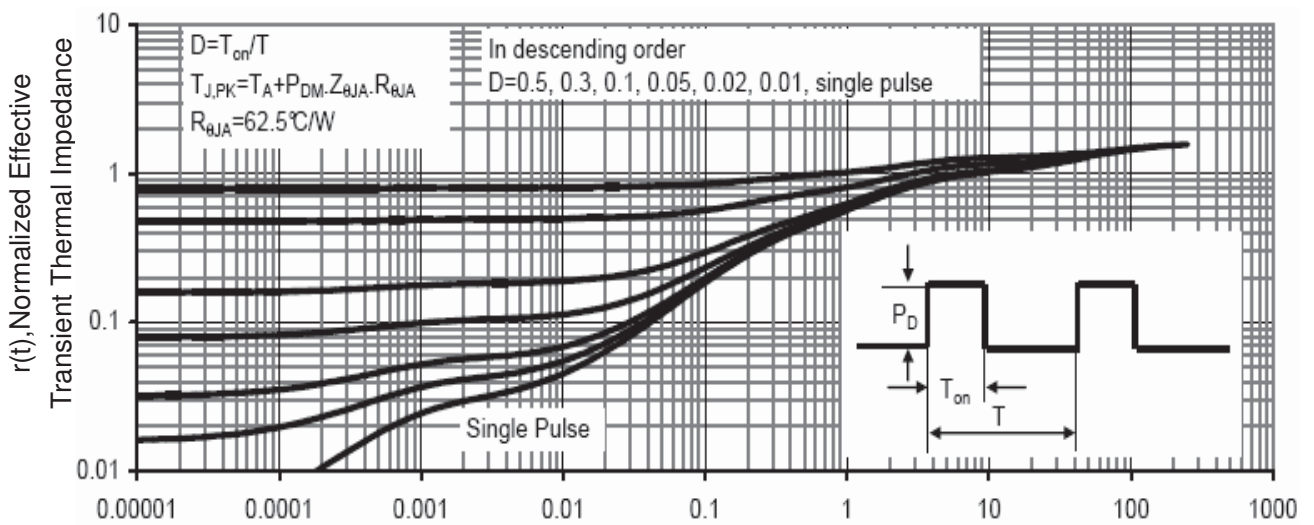
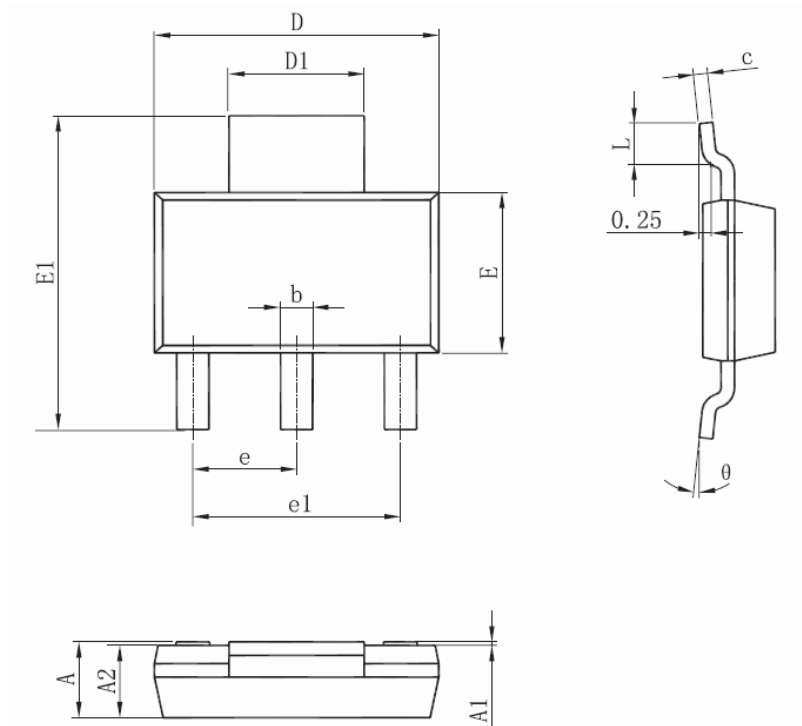


Figure 11 Normalized Maximum Transient Thermal Impedance

SOT-223-3L Package Information



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 1.520 | 1.800 | 0.060 | 0.071 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 1.500 | 1.700 | 0.059 | 0.067 |
| b | 0.660 | 0.820 | 0.026 | 0.032 |
| c | 0.250 | 0.350 | 0.010 | 0.014 |
| D | 6.200 | 6.400 | 0.244 | 0.252 |
| D1 | 2.900 | 3.100 | 0.114 | 0.122 |
| E | 3.300 | 3.700 | 0.130 | 0.146 |
| E1 | 6.830 | 7.070 | 0.269 | 0.278 |
| e | 2.300(BSC) | | 0.091(BSC) | |
| e1 | 4.500 | 4.700 | 0.177 | 0.185 |
| L | 0.900 | 1.150 | 0.035 | 0.045 |
| θ | 0° | 10° | 0° | 10° |

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.

DISCLAIMER NOTICE

Rectron Inc reserves the right to make changes without notice to any product specification herein, to make corrections, modifications, enhancements or other changes. Rectron Inc or anyone on its behalf assumes no responsibility or liability for any errors or inaccuracies. Data sheet specifications and its information contained are intended to provide a product description only. "Typical" parameters which may be included on RECTRON data sheets and/ or specifications can and do vary in different applications and actual performance may vary over time. Rectron Inc does not assume any liability arising out of the application or use of any product or circuit.

Rectron products are not designed, intended or authorized for use in medical, life-saving implant or other applications intended for life-sustaining or other related applications where a failure or malfunction of component or circuitry may directly or indirectly cause injury or threaten a life without expressed written approval of Rectron Inc. Customers using or selling Rectron components for use in such applications do so at their own risk and shall agree to fully indemnify Rectron Inc and its subsidiaries harmless against all claims, damages and expenditures.