

**JVE102T****100V 2.3mΩ N-Ch Power MOSFET****Features**

- Ultra-low  $R_{DS(ON)}$
- Low Gate Charge
- 100% UIS Tested, 100%  $R_g$  Tested
- Pb-free Lead Plating
- Halogen-free and RoHS-compliant

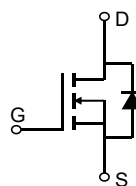
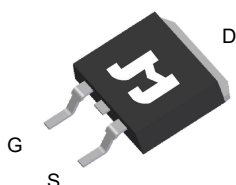
**Product Summary**

| Parameter                                | Value | Unit |
|------------------------------------------|-------|------|
| $V_{DS}$                                 | 100   | V    |
| $V_{GS(th)}_{Typ}$                       | 2.9   | V    |
| $I_D$ (@ $V_{GS} = 10V$ ) <sup>(1)</sup> | 247   | A    |
| $R_{DS(ON)}_{Typ}$ (@ $V_{GS} = 10V$ )   | 2.3   | mΩ   |

**Applications**

- Motor Driving in Power Tool, E-vehicle, Robotics
- Current Switching in DC/DC & AC/DC (SR) Sub-systems
- Power Management in Telecom., Industrial Automation, CE

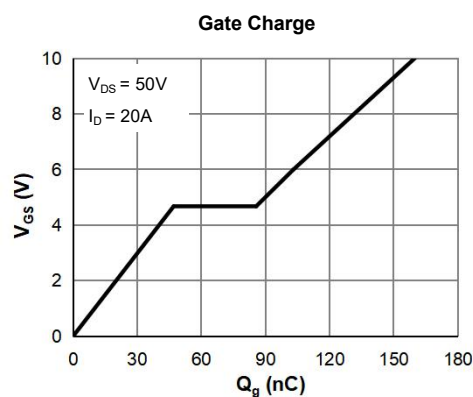
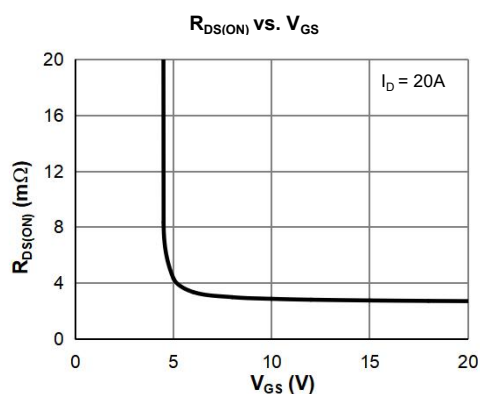
TO-263-3L Top View

**Ordering Information**

| Device  | Package   | # of Pins | Marking | MSL | $T_J$ (°C) | Media        | Quantity (pcs) |
|---------|-----------|-----------|---------|-----|------------|--------------|----------------|
| JVE102T | TO-263-3L | 3         | VE102T  | 3   | -55 to 150 | 13-inch Reel | 800            |

**Absolute Maximum Ratings** (@  $T_A = 25^\circ\text{C}$  unless otherwise specified)

| Parameter                               | Symbol         | Value      | Unit |
|-----------------------------------------|----------------|------------|------|
| Drain-to-Source Voltage                 | $V_{DS}$       | 100        | V    |
| Gate-to-Source Voltage                  | $V_{GS}$       | $\pm 20$   | V    |
| Continuous Drain Current <sup>(1)</sup> | $I_D$          | 247        | A    |
|                                         |                | 156        |      |
| Pulsed Drain Current <sup>(2)</sup>     | $I_{DM}$       | 988        | A    |
| Avalanche Energy <sup>(3)</sup>         | $E_{AS}$       | 1536       | mJ   |
| Power Dissipation <sup>(4)</sup>        | $P_D$          | 347        | W    |
|                                         |                | 138        |      |
| Junction & Storage Temperature Range    | $T_J, T_{STG}$ | -55 to 150 | °C   |



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

| Parameter                                    | Symbol        | Conditions                                                                               | Min. | Typ.  | Max.       | Unit             |
|----------------------------------------------|---------------|------------------------------------------------------------------------------------------|------|-------|------------|------------------|
| <b>STATIC PARAMETERS</b>                     |               |                                                                                          |      |       |            |                  |
| Drain-Source Breakdown Voltage               | $V_{(BR)DSS}$ | $I_D = 250\mu\text{A}$ , $V_{GS} = 0\text{V}$                                            | 100  |       |            | V                |
| Zero Gate Voltage Drain Current              | $I_{DSS}$     | $V_{DS} = 80\text{V}$ , $V_{GS} = 0\text{V}$<br>$T_J = 55^\circ\text{C}$                 |      |       | 1.0<br>5.0 | $\mu\text{A}$    |
| Gate-Body Leakage Current                    | $I_{GSS}$     | $V_{DS} = 0\text{V}$ , $V_{GS} = \pm 20\text{V}$                                         |      |       | $\pm 100$  | nA               |
| Gate Threshold Voltage                       | $V_{GS(th)}$  | $V_{DS} = V_{GS}$ , $I_D = 250\mu\text{A}$                                               | 2.0  | 2.9   | 4.0        | V                |
| Static Drain-Source ON-Resistance            | $R_{DS(ON)}$  | $V_{GS} = 10\text{V}$ , $I_D = 20\text{A}$                                               |      | 2.3   | 2.8        | $\text{m}\Omega$ |
| Forward Transconductance                     | $g_{FS}$      | $V_{DS} = 5\text{V}$ , $I_D = 20\text{A}$                                                |      | 56.7  |            | S                |
| Diode Forward Voltage                        | $V_{SD}$      | $I_S = 1\text{A}$ , $V_{GS} = 0\text{V}$                                                 |      | 0.70  | 1.0        | V                |
| Diode Continuous Current                     | $I_S$         | $T_C = 25^\circ\text{C}$                                                                 |      |       | 247        | A                |
| <b>DYNAMIC PARAMETERS</b> <sup>(5)</sup>     |               |                                                                                          |      |       |            |                  |
| Input Capacitance                            | $C_{iss}$     | $V_{GS} = 0\text{V}$ , $V_{DS} = 50\text{V}$ , $f = 1\text{MHz}$                         |      | 10093 |            | pF               |
| Output Capacitance                           | $C_{oss}$     |                                                                                          |      | 1559  |            | pF               |
| Reverse Transfer Capacitance                 | $C_{rss}$     |                                                                                          |      | 67    |            | pF               |
| Gate Resistance                              | $R_g$         | $V_{GS} = 0\text{V}$ , $V_{DS} = 0\text{V}$ , $f = 1\text{MHz}$                          |      | 3.2   |            | $\Omega$         |
| <b>SWITCHING PARAMETERS</b> <sup>(5)</sup>   |               |                                                                                          |      |       |            |                  |
| Total Gate Charge (@ $V_{GS} = 10\text{V}$ ) | $Q_g$         | $V_{GS} = 0$ to $10\text{V}$<br>$V_{DS} = 50\text{V}$ , $I_D = 20\text{A}$               |      | 160   |            | nC               |
| Total Gate Charge (@ $V_{GS} = 6\text{V}$ )  | $Q_g$         |                                                                                          |      | 103   |            | nC               |
| Gate Source Charge                           | $Q_{gs}$      |                                                                                          |      | 47    |            | nC               |
| Gate Drain Charge                            | $Q_{gd}$      |                                                                                          |      | 39    |            | nC               |
| Turn-On DelayTime                            | $t_{D(on)}$   | $V_{GS} = 10\text{V}$ , $V_{DS} = 50\text{V}$<br>$R_L = 2.5\Omega$ , $R_{GEN} = 3\Omega$ |      | 26    |            | ns               |
| Turn-On Rise Time                            | $t_r$         |                                                                                          |      | 43    |            | ns               |
| Turn-Off Fall Time                           | $t_f$         |                                                                                          |      | 64    |            | ns               |
| Body Diode Reverse Recovery Time             | $t_{rr}$      | $I_F = 15\text{A}$ , $dI_F/dt = 100\text{A}/\mu\text{s}$                                 |      | 100   |            | ns               |
| Body Diode Reverse Recovery Charge           | $Q_{rr}$      | $I_F = 15\text{A}$ , $dI_F/dt = 100\text{A}/\mu\text{s}$                                 |      | 258   |            | nC               |

**Thermal Performance**

| Parameter                               | Symbol          | Typ. | Max. | Unit                      |
|-----------------------------------------|-----------------|------|------|---------------------------|
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 52   | 59   | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction-to-Case    | $R_{\theta JC}$ | 0.36 | 0.47 | $^\circ\text{C}/\text{W}$ |

**Notes:**

1. Computed continuous current assumes the condition of  $T_{J\_Max}$  while the actual continuous current depends on the thermal & electro-mechanical application board design.
2. This single-pulse measurement was taken under  $T_{J\_Max} = 150^\circ\text{C}$ .
3.  $E_{AS}$  of 1536 mJ is based on starting  $T_J = 25^\circ\text{C}$ ,  $L = 3.0\text{mH}$ ,  $I_{AS} = 32\text{A}$ ,  $V_{GS} = 10\text{V}$ ,  $V_{DD} = 50\text{V}$ ; 100% test at  $L = 0.5\text{mH}$ ,  $I_{AS} = 60\text{A}$ .
4. The power dissipation  $P_D$  is based on  $T_{J\_Max} = 150^\circ\text{C}$ .
5. This value is guaranteed by design hence it is not included in the production test.

## Typical Electrical & Thermal Characteristics

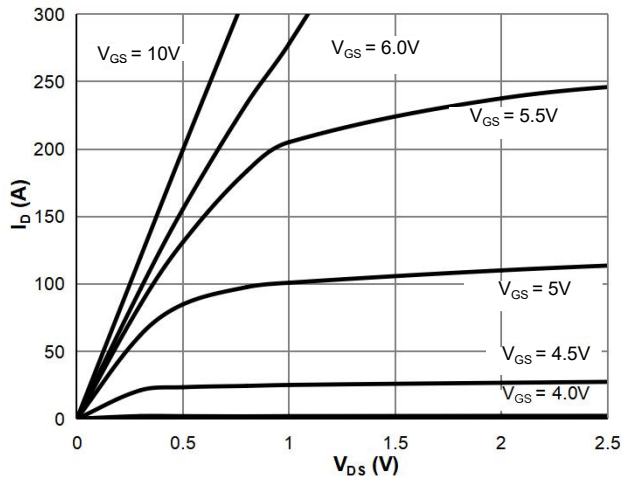


Figure 1: Saturation Characteristics

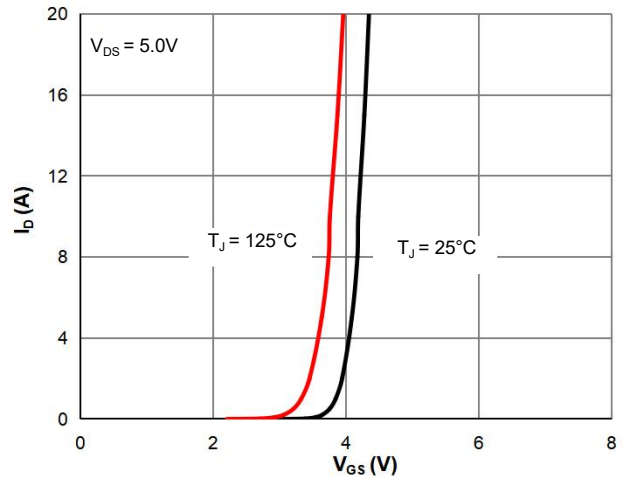


Figure 2: Transfer Characteristics

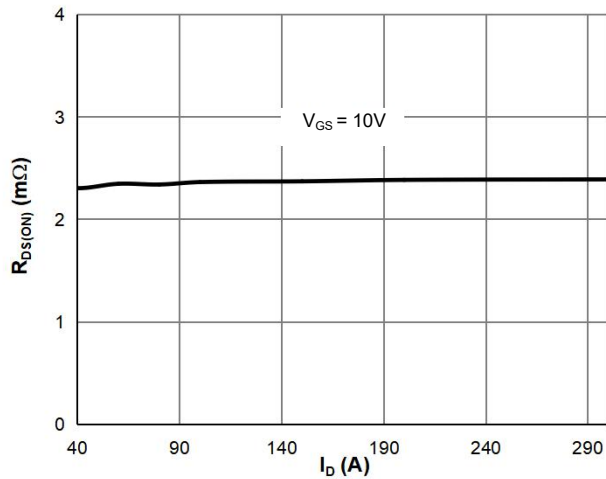


Figure 3:  $R_{DS(ON)}$  vs. Drain Current

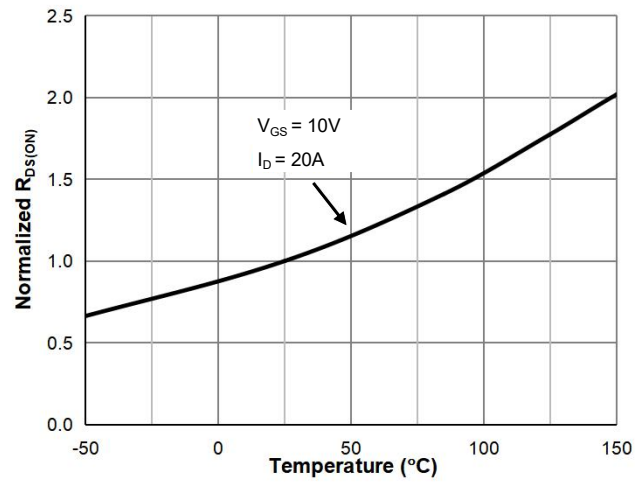


Figure 4:  $R_{DS(ON)}$  vs. Junction Temperature

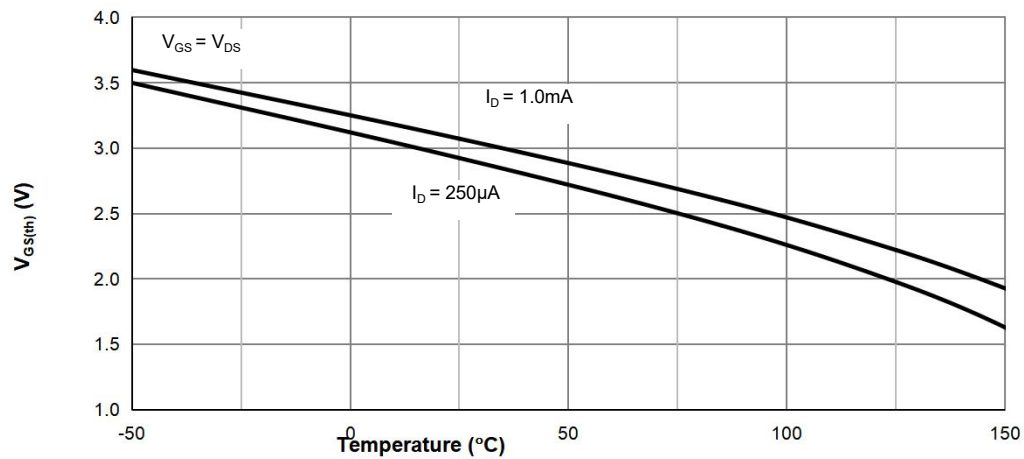
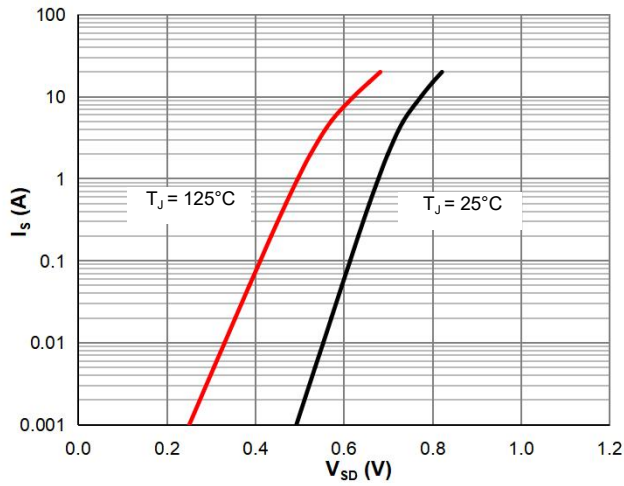
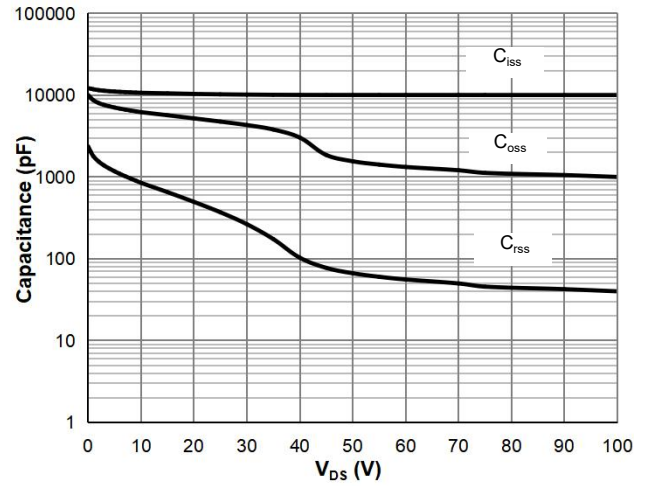


Figure 5:  $V_{GS(th)}$  vs. Junction Temperature

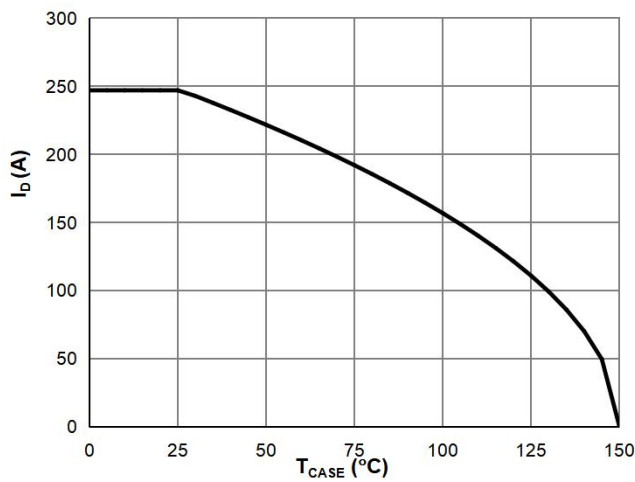
## Typical Electrical & Thermal Characteristics



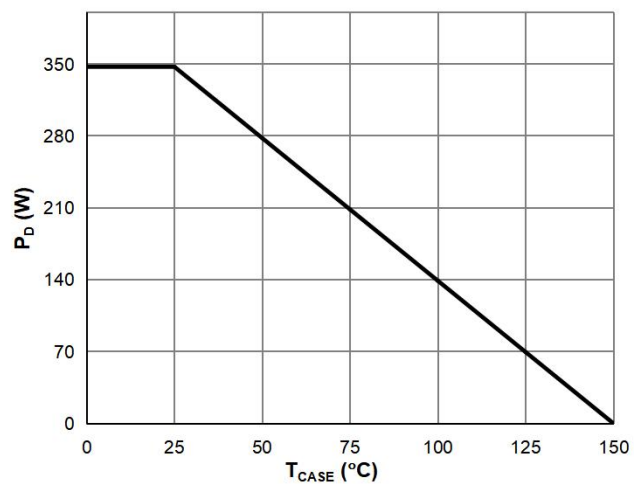
**Figure 7: Body-Diode Characteristics**



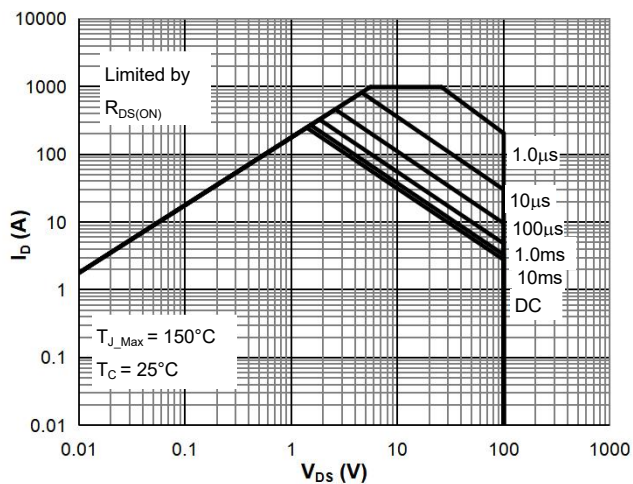
**Figure 8: Capacitance Characteristics**



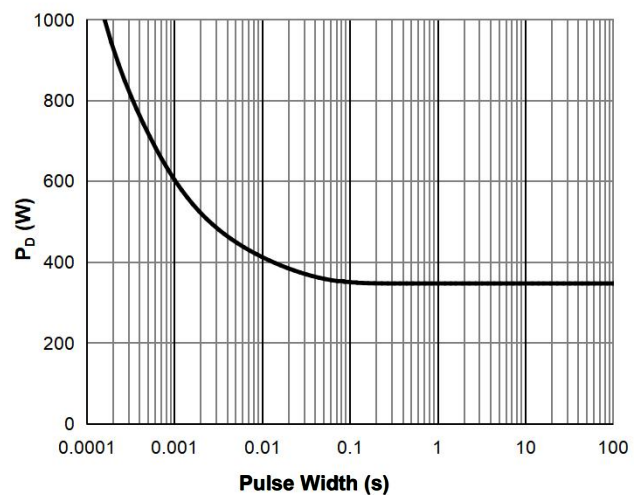
**Figure 9: Current De-rating**



**Figure 10: Power De-rating**

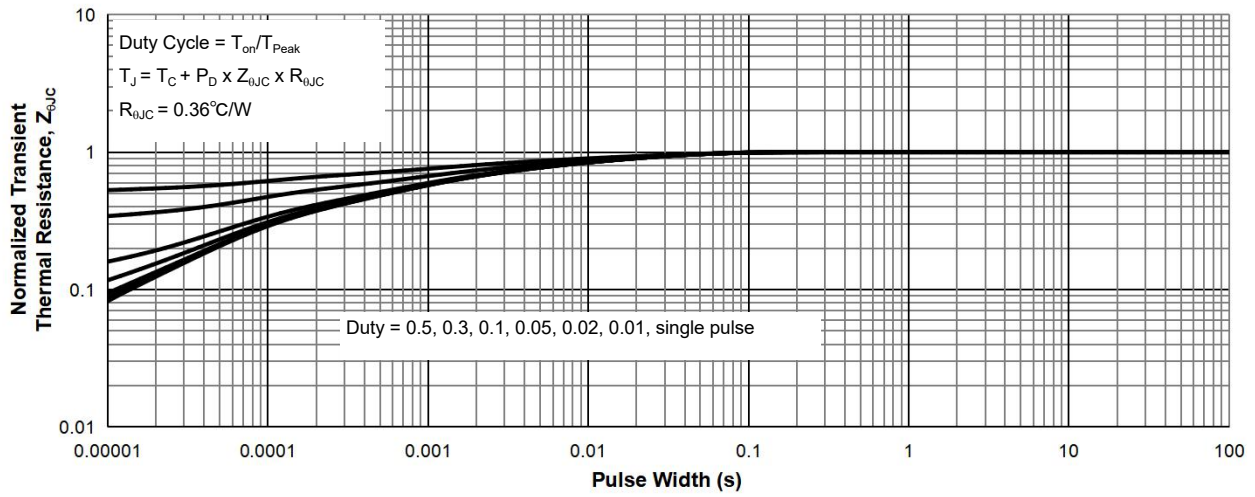


**Figure 11: Maximum Safe Operating Area**

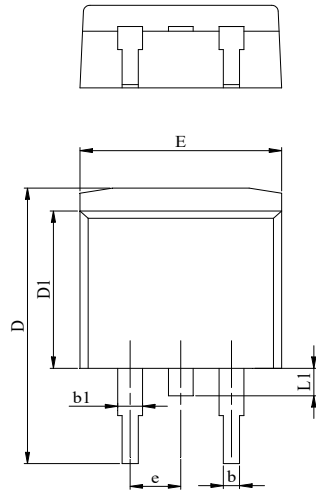


**Figure 12: Single Pulse Power Rating, Junction-to-Case**

## Typical Electrical & Thermal Characteristics



**Figure 13: Normalized Maximum Transient Thermal Impedance**

**TO-263-3L Package Information**
**Package Outline**


| DIM. | MILLIMETER |      |       |
|------|------------|------|-------|
|      | MIN.       | NOM. | MAX.  |
| A    | 4.24       |      | 4.77  |
| A1   | 2.30       |      | 2.89  |
| A2   | 0.00       | 0.10 | 0.25  |
| b    | 0.70       |      | 0.96  |
| b1   | 1.17       |      | 1.70  |
| C    | 0.30       |      | 0.60  |
| C1   | 1.15       |      | 1.42  |
| D    | 14.10      |      | 15.88 |
| D1   | 8.50       |      | 9.60  |
| E    | 9.78       |      | 10.36 |
| L    | 1.78       |      | 2.79  |
| L1   |            |      | 1.75  |
| e    |            | 2.54 |       |

**Recommend Soldering Footprint**
