

**-100V 22mΩ P-Ch Power MOSFET****Features**

- Low On-Resistance
- Excellent Gate Charge x  $R_{DS(ON)}$  Product (FOM)
- Pb-Free Lead Plating
- RoHS and Halogen-Free Compliant
- 100% UIS Tested, 100%  $R_g$  Tested

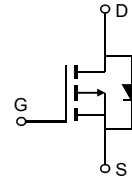
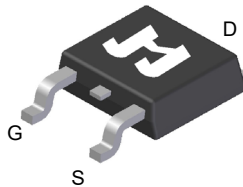
**Product Summary**

| Parameter                                 | Value | Unit |
|-------------------------------------------|-------|------|
| $V_{DS}$                                  | -100  | V    |
| $V_{GS(th\_Typ)}$                         | -2.0  | V    |
| $I_D$ (@ $V_{GS} = -10V$ ) <sup>(1)</sup> | -46   | A    |
| $R_{DS(ON\_Typ)}$ (@ $V_{GS} = -10V$ )    | 22    | mΩ   |
| $R_{DS(ON\_Typ)}$ (@ $V_{GS} = -4.5V$ )   | 31    | mΩ   |

**Applications**

- Battery Management
- DC/DC in Telecoms and Industrial
- Hard Switching and High Speed Circuit

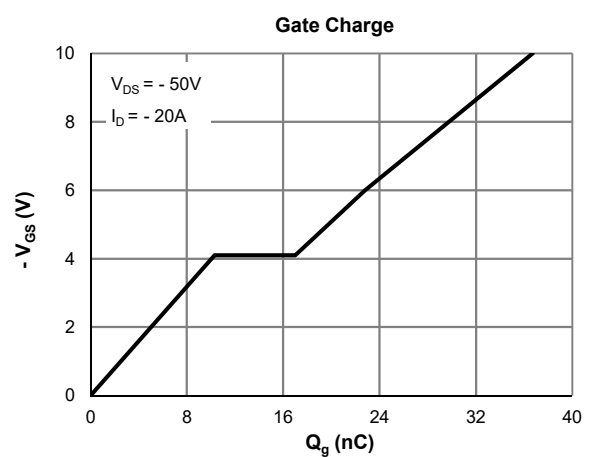
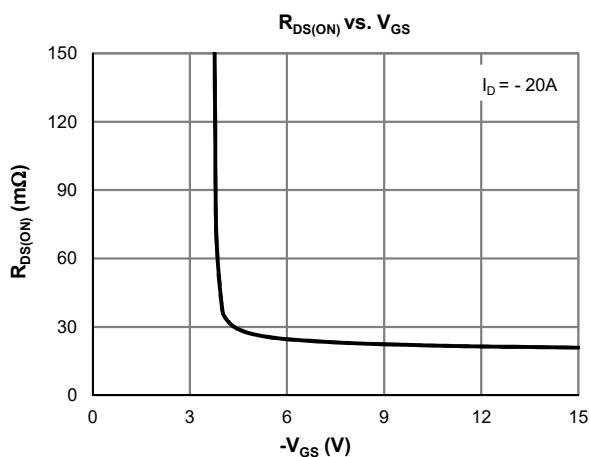
TO-252-3L Top View

**Ordering Information**

| Device        | Package   | # of Pins | Marking | MSL | $T_J$ (°C) | Media        | Quantity (pcs) |
|---------------|-----------|-----------|---------|-----|------------|--------------|----------------|
| JMPL1025AK-13 | TO-252-3L | 3         | PL1025A | 1   | -55 to 150 | 13-inch Reel | 2500           |

**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> | $I_D$          | -46        | A    |
| $T_C = 25^\circ\text{C}$                |                | -29        |      |
| $T_C = 100^\circ\text{C}$               |                | -29        |      |
| Pulsed Drain Current <sup>(2)</sup>     | $I_{DM}$       | -174       | A    |
| Avalanche Current <sup>(3)</sup>        | $I_{AS}$       | -45        | A    |
| Avalanche Energy <sup>(3)</sup>         | $E_{AS}$       | 304        | mJ   |
| Power Dissipation <sup>(4)</sup>        | $P_D$          | 114        | W    |
| $T_C = 25^\circ\text{C}$                |                | 45         |      |
| $T_C = 100^\circ\text{C}$               |                | 45         |      |
| 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                         | $V_{GS(th)}$  | $V_{DS} = V_{GS}$ , $I_D = -250\mu\text{A}$                                                | -1.0 | -2.0 | -3.0         | V                |
| Static Drain-Source ON-Resistance              | $R_{DS(ON)}$  | $V_{GS} = -10\text{V}$ , $I_D = -20\text{A}$                                               |      | 22   | 28           | $\text{m}\Omega$ |
|                                                |               | $V_{GS} = -4.5\text{V}$ , $I_D = -15\text{A}$                                              |      | 31   | 40           | $\text{m}\Omega$ |
| Forward Transconductance                       | $g_{FS}$      | $V_{DS} = -5\text{V}$ , $I_D = -15\text{A}$                                                |      | 30   |              | S                |
| Diode Forward Voltage                          | $V_{SD}$      | $I_S = -1\text{A}$ , $V_{GS} = 0\text{V}$                                                  |      | -0.7 | -1.0         | V                |
| Diode Continuous Current                       | $I_S$         | $T_C = 25^\circ\text{C}$                                                                   |      |      | -114         | A                |
| <b>DYNAMIC PARAMETERS <sup>(5)</sup></b>       |               |                                                                                            |      |      |              |                  |
| Input Capacitance                              | $C_{iss}$     | $V_{GS} = 0\text{V}$ , $V_{DS} = -50\text{V}$ , $f = 1\text{MHz}$                          |      | 2525 |              | pF               |
| Output Capacitance                             | $C_{oss}$     |                                                                                            |      | 427  |              | pF               |
| Reverse Transfer Capacitance                   | $C_{rss}$     |                                                                                            |      | 32   |              | pF               |
| Gate Resistance                                | $R_g$         | $V_{GS} = 0\text{V}$ , $V_{DS} = 0\text{V}$ , $f = 1\text{MHz}$                            |      | 4.9  |              | $\Omega$         |
| <b>SWITCHING PARAMETERS <sup>(5)</sup></b>     |               |                                                                                            |      |      |              |                  |
| Total Gate Charge (@ $V_{GS} = -10\text{V}$ )  | $Q_g$         | $V_{GS} = 0$ to $-10\text{V}$<br>$V_{DS} = -50\text{V}$ , $I_D = -20\text{A}$              |      | 37   |              | nC               |
| Total Gate Charge (@ $V_{GS} = -4.5\text{V}$ ) | $Q_g$         |                                                                                            |      | 23   |              | nC               |
| Gate Source Charge                             | $Q_{gs}$      |                                                                                            |      | 10.3 |              | nC               |
| Gate Drain Charge                              | $Q_{gd}$      |                                                                                            |      | 6.7  |              | nC               |
| Turn-On DelayTime                              | $t_{D(on)}$   | $V_{GS} = -10\text{V}$ , $V_{DS} = -50\text{V}$<br>$R_L = 3.3\Omega$ , $R_{GEN} = 6\Omega$ |      | 13.7 |              | ns               |
| Turn-On Rise Time                              | $t_r$         |                                                                                            |      | 53   |              | ns               |
| Turn-Off DelayTime                             | $t_{D(off)}$  |                                                                                            |      | 61   |              | ns               |
| Turn-Off Fall Time                             | $t_f$         |                                                                                            |      | 86   |              | ns               |
| Body Diode Reverse Recovery Time               | $t_{rr}$      | $I_F = -15\text{A}$ , $dI_F/dt = -100\text{A}/\mu\text{s}$                                 |      | 70   |              | ns               |
| Body Diode Reverse Recovery Charge             | $Q_{rr}$      | $I_F = -15\text{A}$ , $dI_F/dt = -100\text{A}/\mu\text{s}$                                 |      | 140  |              | nC               |

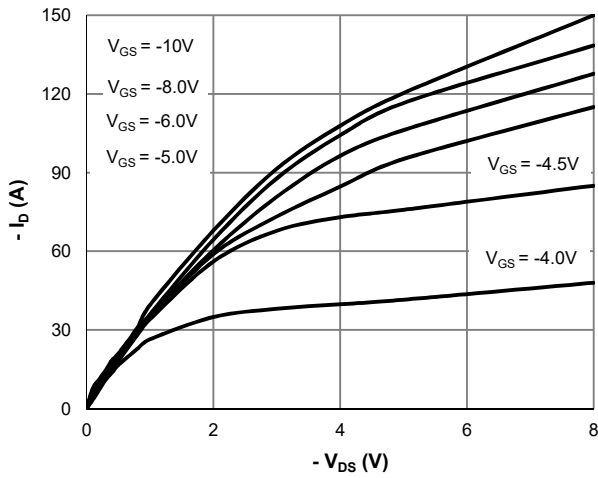
**Thermal Performance**

| Parameter                               | Symbol          | Typ. | Max. | Unit                      |
|-----------------------------------------|-----------------|------|------|---------------------------|
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 47   | 56   | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction-to-Case    | $R_{\theta JC}$ | 0.84 | 1.1  | $^\circ\text{C}/\text{W}$ |

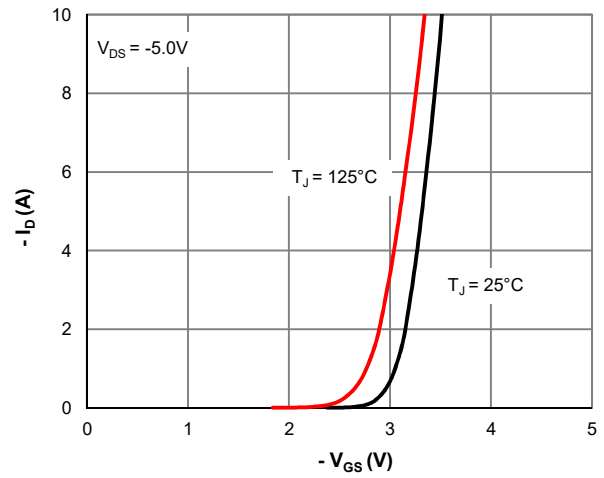
**Notes:**

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. This single-pulse measurement was taken under the following condition [ $L = 300\mu\text{H}$ ,  $V_{GS} = -10\text{V}$ ,  $V_{DD} = -50\text{V}$ ] while its value is limited by  $T_{J\_Max} = 150^\circ\text{C}$ .
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.

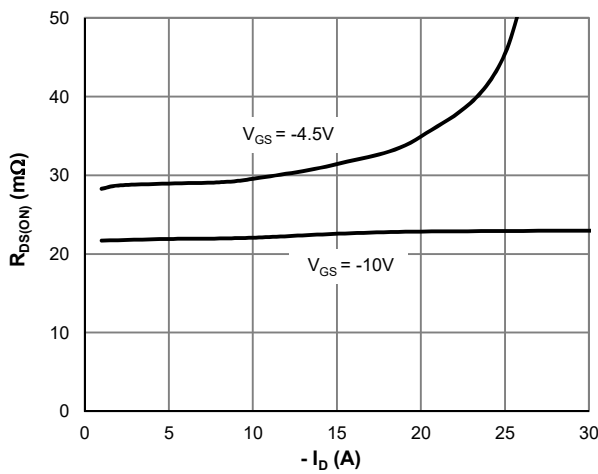
# Typical Electrical & Thermal Characteristics



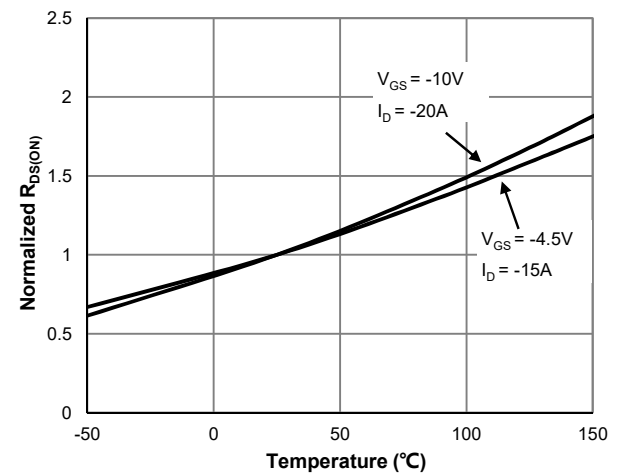
**Figure 1: Saturation Characteristics**



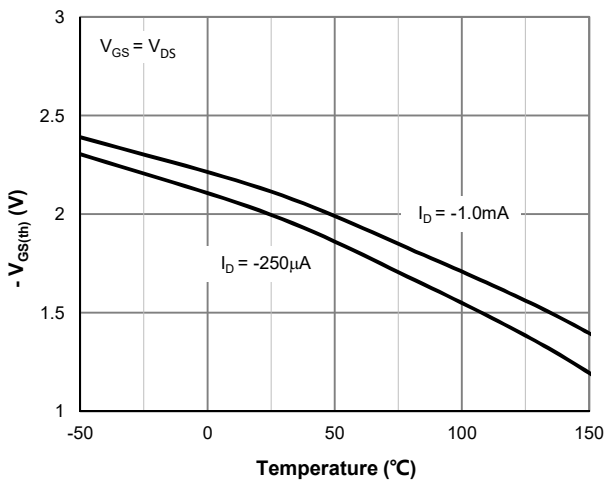
**Figure 2: Transfer Characteristics**



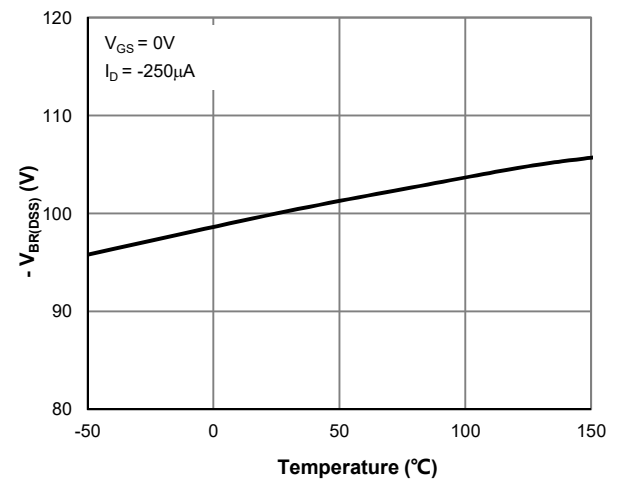
**Figure 3:  $R_{DS(ON)}$  vs. Drain Current**



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

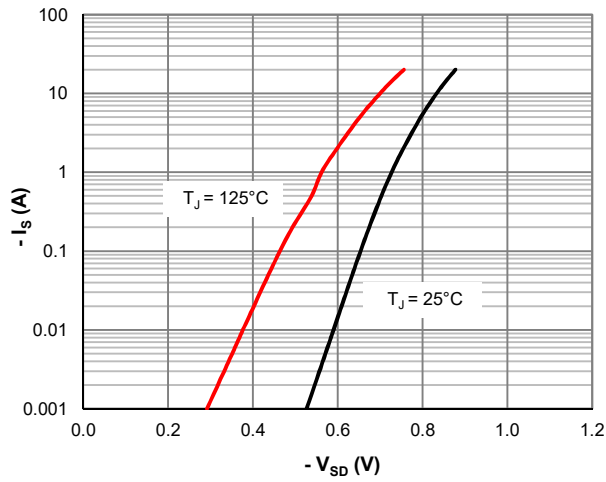


**Figure 5:  $V_{GS(th)}$  vs. Junction Temperature**

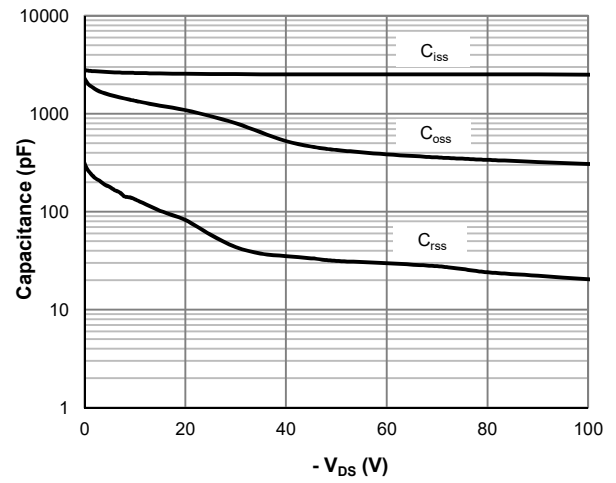


**Figure 6:  $V_{BR(DSS)}$  vs. Junction Temperature**

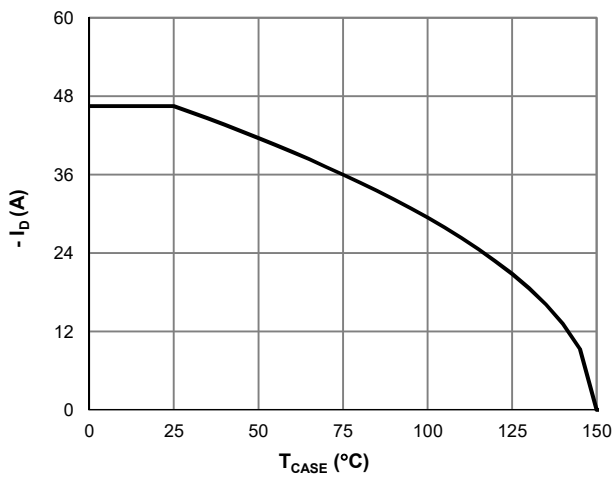
## Typical Electrical & Thermal Characteristics



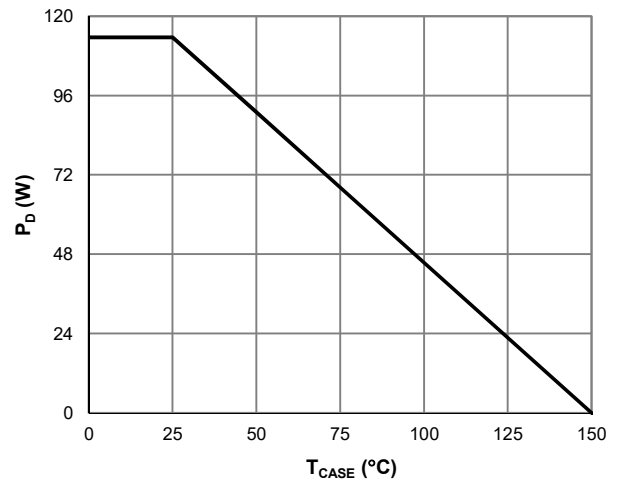
**Figure 7: Body-Diode Characteristics**



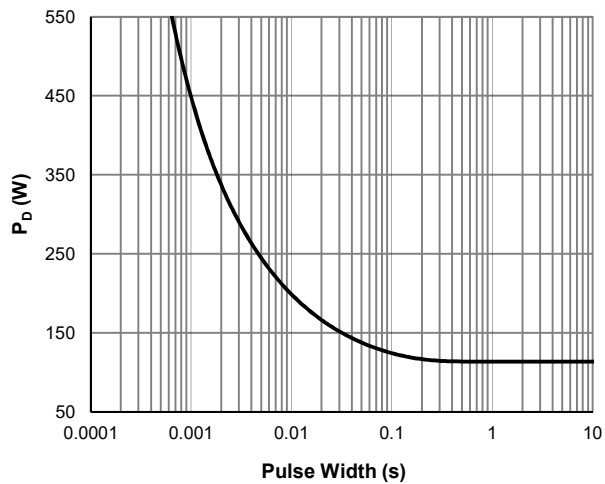
**Figure 8: Capacitance Characteristics**



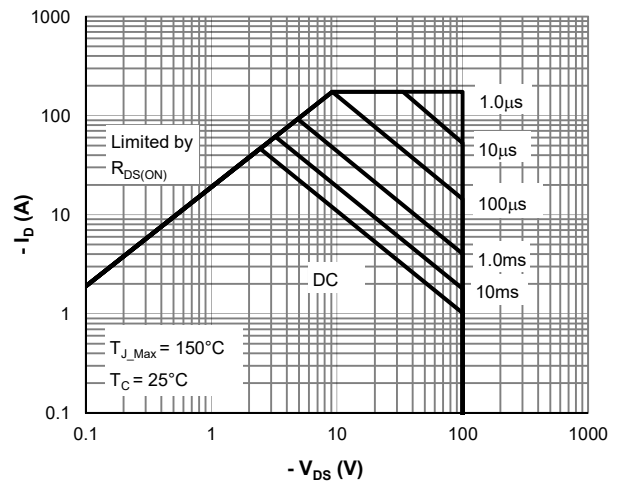
**Figure 9: Current De-rating**



**Figure 10: Power De-rating**

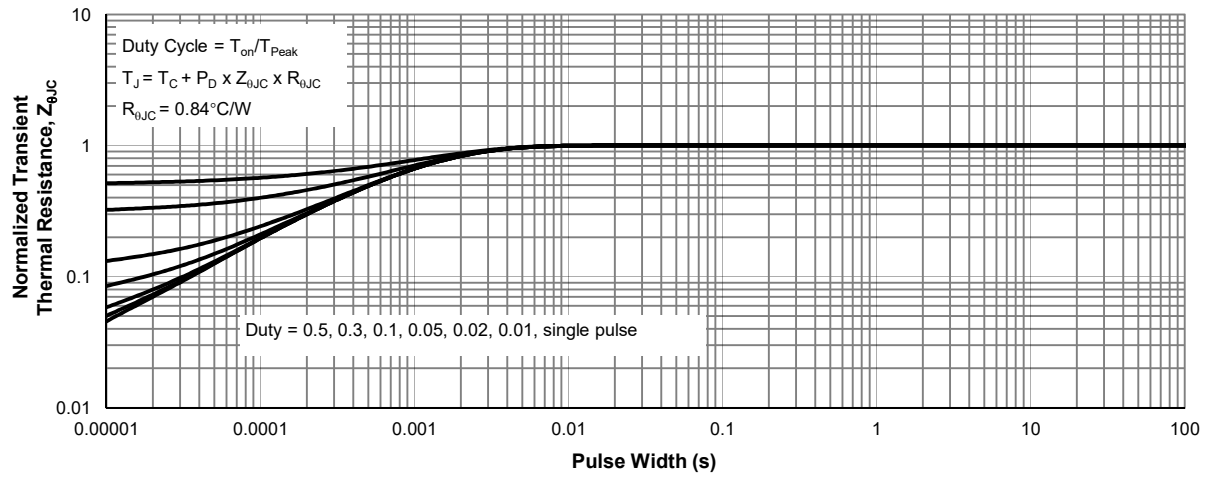


**Figure 11: Single Pulse Power Rating, Junction-to-Case**

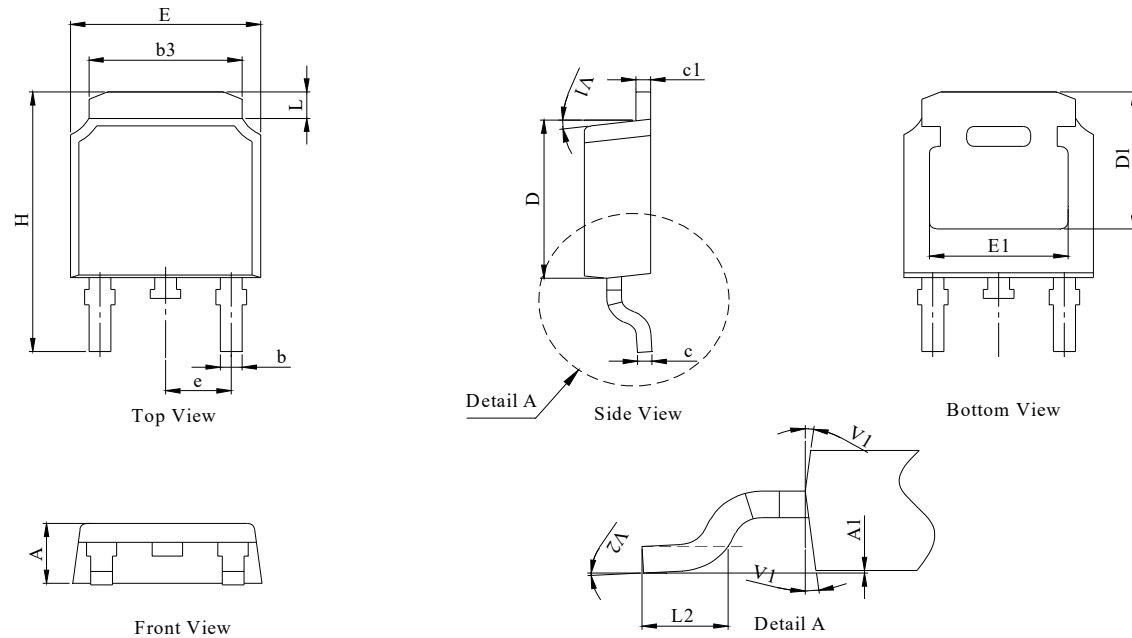


**Figure 12: Maximum Safe Operating Area**

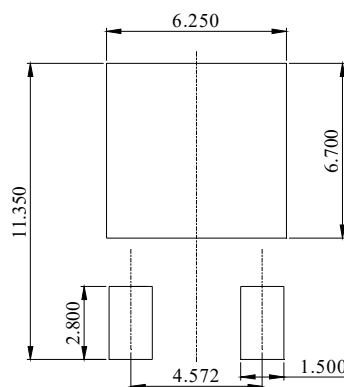
# Typical Electrical & Thermal Characteristics



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

**TO-252-3L Package Information**
**Package Outline**


| DIM. | MILLIMETER |       |       |
|------|------------|-------|-------|
|      | MIN.       | NOM.  | MAX.  |
| A    | 2.18       | 2.30  | 2.39  |
| A1   | 0          | -     | 0.13  |
| b    | 0.64       | 0.76  | 0.89  |
| c    | 0.40       | 0.50  | 0.61  |
| c1   | 0.46       | 0.50  | 0.58  |
| D    | 5.97       | 6.10  | 6.23  |
| D1   | 5.05       | --    | --    |
| E    | 6.35       | 6.60  | 6.73  |
| E1   | 4.32       | --    | --    |
| b3   | 5.21       | 5.38  | 5.55  |
| e    | 2.29 BSC   |       |       |
| H    | 9.40       | 10.00 | 10.40 |
| L    | 0.89       | --    | 1.27  |
| L2   | 1.40       |       | 1.78  |
| V1   | 7° REF     |       |       |
| V2   | 0°         | -     | 6°    |

**Recommend Soldering Footprint**


DIMENSIONS: MILLIMETERS