



## Description

The HIRLR3717PbF uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

## General Features

$V_{DS} = 20V$   $I_D = 80A$

$R_{DS(ON)} < 5m\Omega$  @  $V_{GS}=4.5V$

## Application

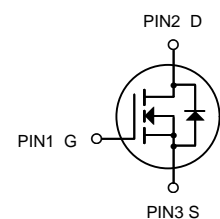
Battery protection

Load switch

Uninterruptible power supply



TO-252-2L  
(DPAK)



N-Channel MOSFET

## Package Marking and Ordering Information

| Product ID   | Pack            | Brand      | Qty(PCS) |
|--------------|-----------------|------------|----------|
| HIRLR3717PbF | TO-252-2L(DPAK) | HXY MOSFET | 2500     |

## Absolute Maximum Ratings (TC=25°C unless otherwise noted)

| Symbol             | Parameter  | Limit      | Unit |
|--------------------|--|------------|------|
| $V_{DS}$           | Drain-Source Voltage                             | 20         | V    |
| $V_{GS}$           | Gate-Source Voltage                              | $\pm 12$   | V    |
| $I_D$              | Drain Current-Continuous                         | 80         | A    |
| $I_D(100^\circ C)$ | Drain Current-Continuous( $T_C=100^\circ C$ )    | 42         | A    |
| $I_{DM}$           | Pulsed Drain Current                             | 210        | A    |
| $P_D$              | Maximum Power Dissipation                        | 70         | W    |
|                    | Derating factor                                  | 0.48       | W/°C |
| $E_{AS}$           | Single pulse avalanche energy (Note 5)           | 200        | mJ   |
| $T_J, T_{STG}$     | Operating Junction and Storage Temperature Range | -55 To 150 | °C   |



### Thermal Characteristic

|  |                 |     |      |
|--|-----------------|-----|------|
| Thermal Resistance, Junction-to-Case <sup>(Note 2)</sup> | $R_{\theta JC}$ | 2.1 | °C/W |
|--|-----------------|-----|------|

### Electrical Characteristics (TC=25°C unless otherwise noted)

| Parameter                                     | Symbol              | Condition   | Min | Typ  | Max  | Unit |
|---|---------------------|---|-----|------|------|------|
| Off Characteristics                           |                     |   |     |      |      |      |
| Drain-Source Breakdown Voltage                | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V I <sub>D</sub> =250μA   | 20  | -    | -    | V    |
| Zero Gate Voltage Drain Current               | I <sub>DSS</sub>    | V <sub>DS</sub> =20V, V <sub>GS</sub> =0V   | -   | -    | 1    | μA   |
| Gate-Body Leakage Current                     | I <sub>GSS</sub>    | V <sub>GS</sub> =±12V, V <sub>DS</sub> =0V  | -   | -    | ±100 | nA   |
| On Characteristics <sup>(Note 3)</sup>        |                     |   |     |      |      |      |
| Gate Threshold Voltage                        | V <sub>GS(th)</sub> | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA  | 0.5 | 0.75 | 1.0  | V    |
| Drain-Source On-State Resistance              | R <sub>DS(ON)</sub> | V <sub>GS</sub> =4.5V, I <sub>D</sub> =20 A   | -   | 3.5  | 5    | mΩ   |
|   |                     | V <sub>GS</sub> =2.5V, I <sub>D</sub> =15A  |     | 5.5  | 7    | mΩ   |
| Forward Transconductance                      | g <sub>FS</sub>     | V <sub>DS</sub> =10V, I <sub>D</sub> =20A   | 15  | -    | -    | S    |
| Dynamic Characteristics <sup>(Note4)</sup>    |                     |   |     |      |      |      |
| Input Capacitance                             | C <sub>iss</sub>    | V <sub>DS</sub> =10V, V <sub>GS</sub> =0V,<br>F=1.0MHz  | -   | 2000 | -    | PF   |
| Output Capacitance                            | C <sub>oss</sub>    |   | -   | 500  | -    | PF   |
| Reverse Transfer Capacitance                  | C <sub>rss</sub>    |   | -   | 200  | -    | PF   |
| Switching Characteristics <sup>(Note 4)</sup> |                     |   |     |      |      |      |
| Turn-on Delay Time                            | t <sub>d(on)</sub>  | V <sub>DD</sub> =10V, I <sub>D</sub> =2A, R <sub>L</sub> =1Ω<br>V <sub>GS</sub> =4.5V, R <sub>G</sub> =3Ω | -   | 6.4  | -    | nS   |
| Turn-on Rise Time                             | t <sub>r</sub>      |   | -   | 17.2 | -    | nS   |
| Turn-Off Delay Time                           | t <sub>d(off)</sub> |   | -   | 29.6 | -    | nS   |
| Turn-Off Fall Time                            | t <sub>f</sub>      |   | -   | 16.8 | -    | nS   |
| Total Gate Charge                             | Q <sub>g</sub>      | V <sub>DS</sub> =10V, I <sub>D</sub> =20A,<br>V <sub>GS</sub> =10V  | -   | 27   |      | nC   |
| Gate-Source Charge                            | Q <sub>gs</sub>     |   | -   | 6.5  |      | nC   |
| Gate-Drain Charge                             | Q <sub>gd</sub>     |   | -   | 6.4  |      | nC   |
| Drain-Source Diode Characteristics            |                     |   |     |      |      |      |
| Diode Forward Voltage <sup>(Note 3)</sup>     | V <sub>SD</sub>     | V <sub>GS</sub> =0V, I <sub>S</sub> =10A  | -   |      | 1.2  | V    |
| Diode Forward Current <sup>(Note 2)</sup>     | I <sub>S</sub>      |   | -   | -    | 80   | A    |
| Reverse Recovery Time                         | t <sub>rr</sub>     | T <sub>J</sub> = 25°C, I <sub>F</sub> = 20A<br>di/dt = 100A/μs <sup>(Note3)</sup>                         | -   | 25   | -    | nS   |
| Reverse Recovery Charge                       | Q <sub>rr</sub>     |   | -   | 24   | -    | nC   |
| Forward Turn-On Time                          | t <sub>on</sub>     | Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)                                      |     |      |      |      |

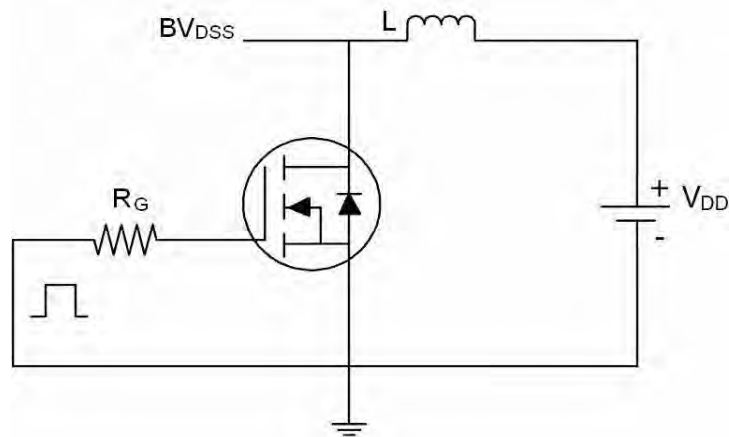
### Notes:

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
5. EAS condition :  $T_J=25^\circ C, V_{DD}=10V, V_G=10V, L=0.5mH, R_g=25\Omega$ ,

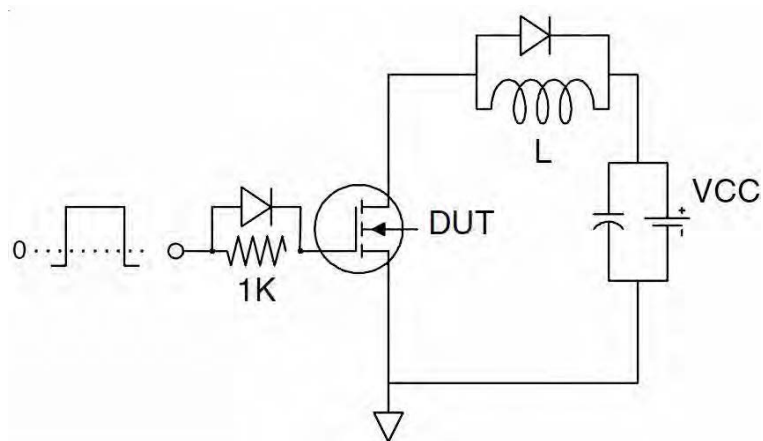


## Test circuit

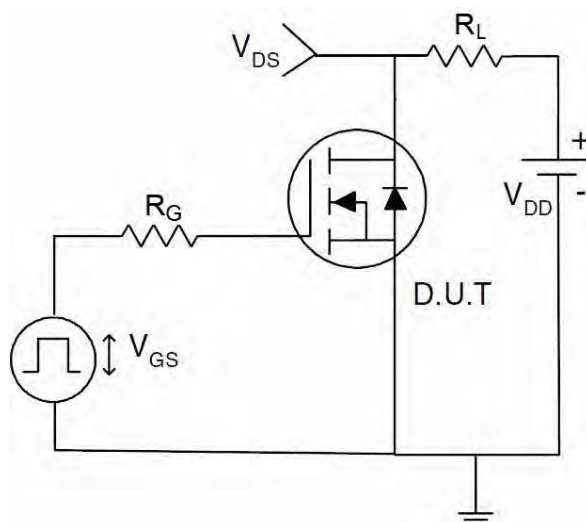
### 1) $E_{AS}$ Test Circuit



### 2) Gate Charge Test Circuit



### 3) Switch Time Test Circuit





## Typical Electrical and Thermal Characteristics (Curves)

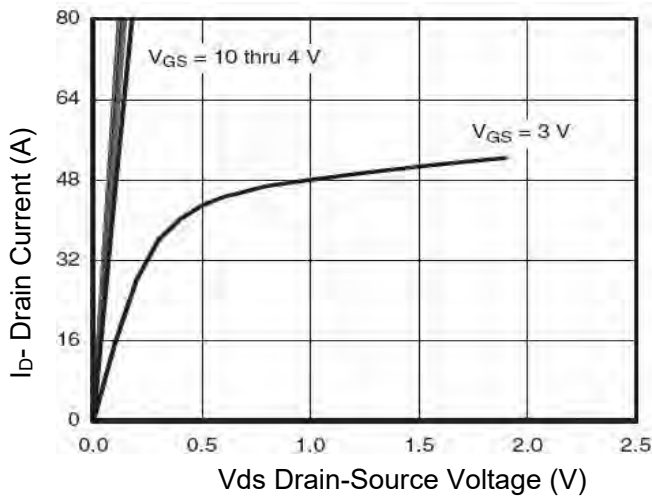


Fig.1 Typical Output Characteristics

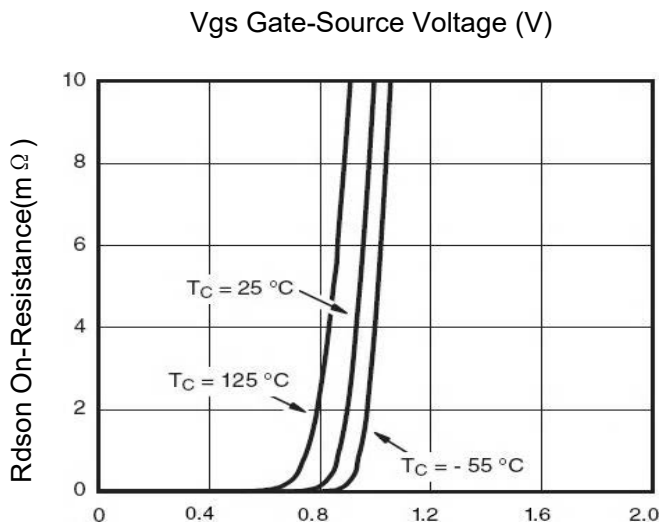


Figure 2 Transfer Characteristics

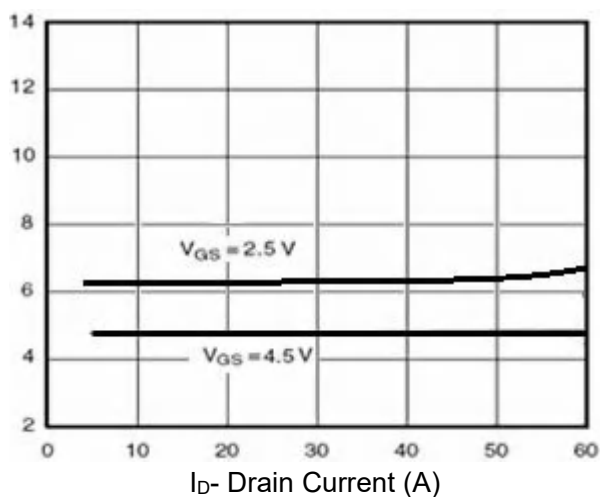


Figure 3 Rdson- Drain Current

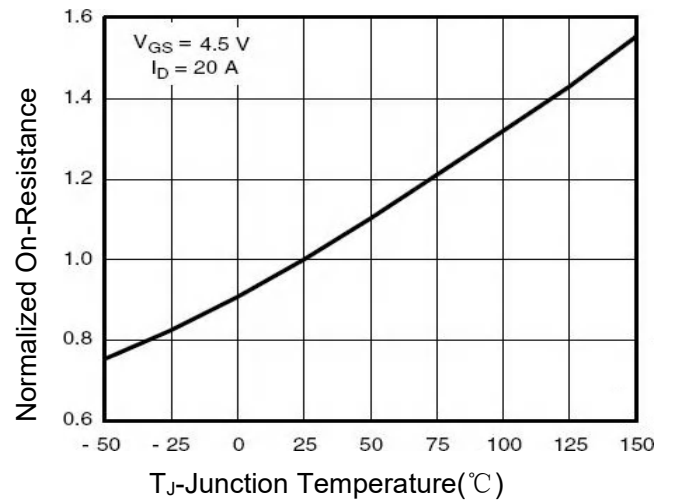


Figure 4 Rdson-Junction Temperature

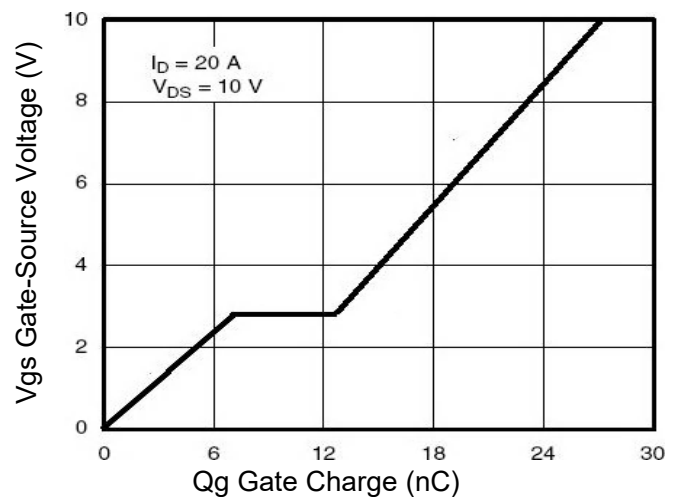


Figure 5 Gate Charge

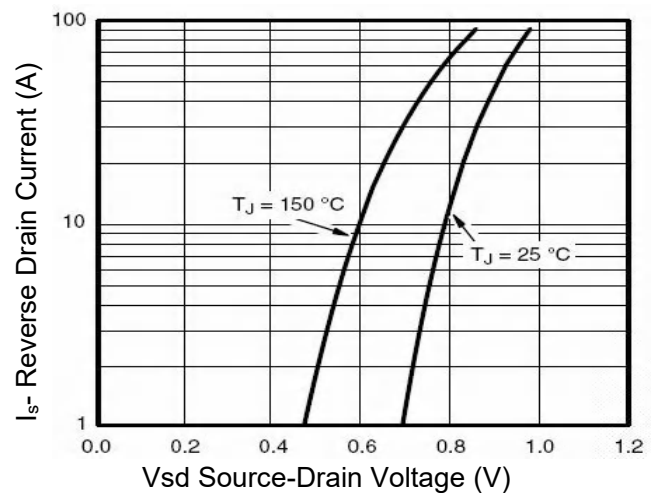


Figure 6 Source- Drain Diode Forward

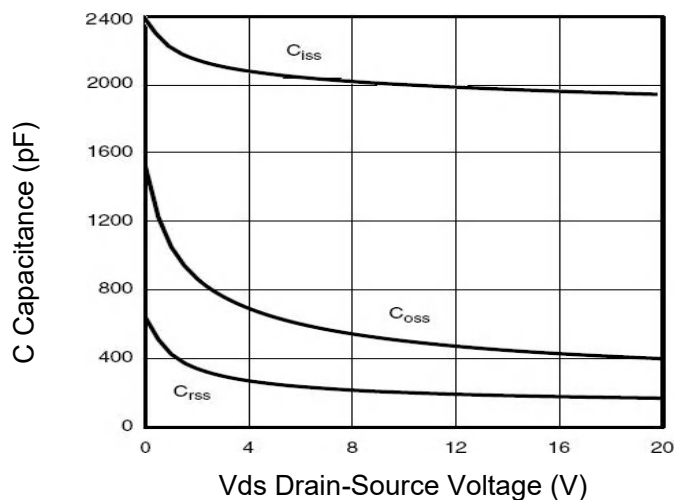


Figure 7 Capacitance vs Vds

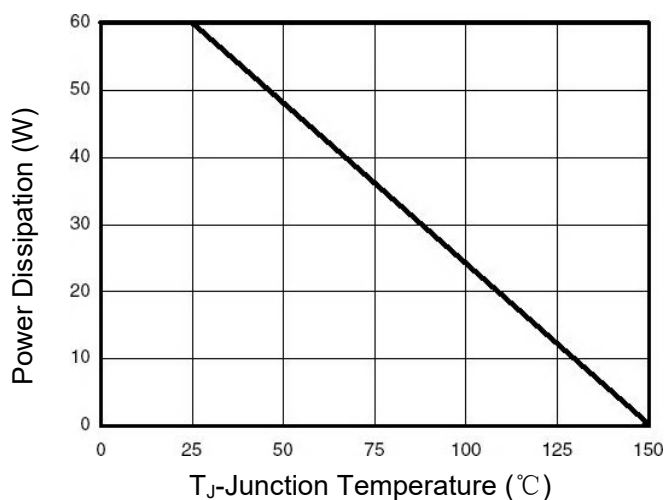


Figure 9 Power De-rating

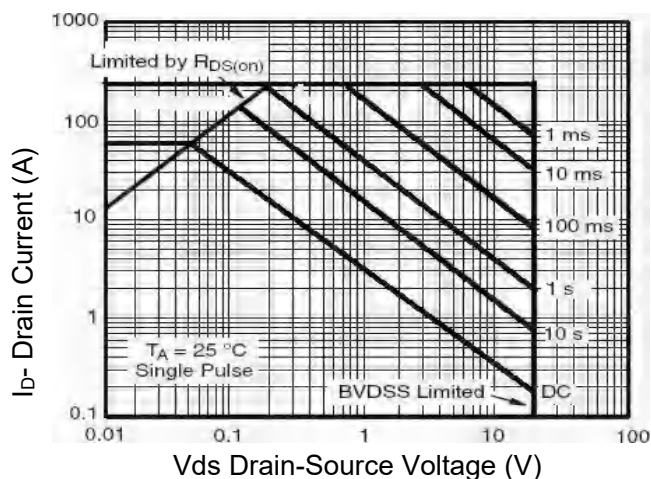


Figure 8 Safe Operation Area

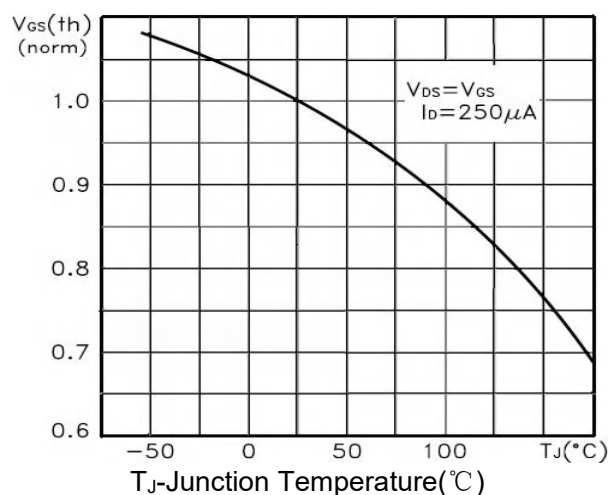


Figure 10  $V_{GS(th)}$  vs Junction Temperature

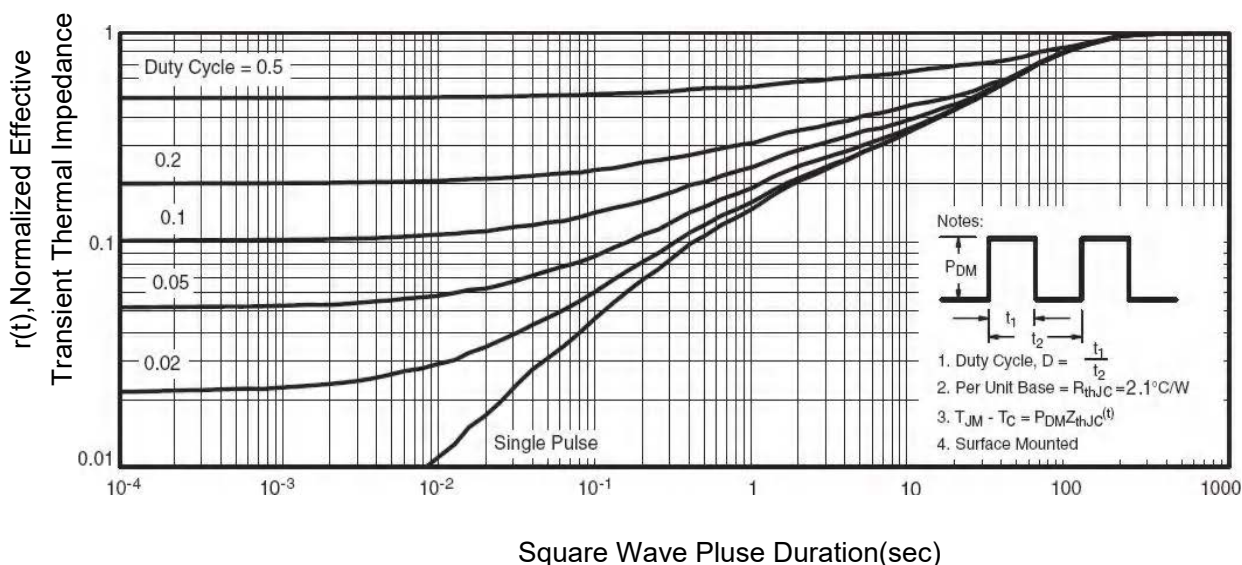
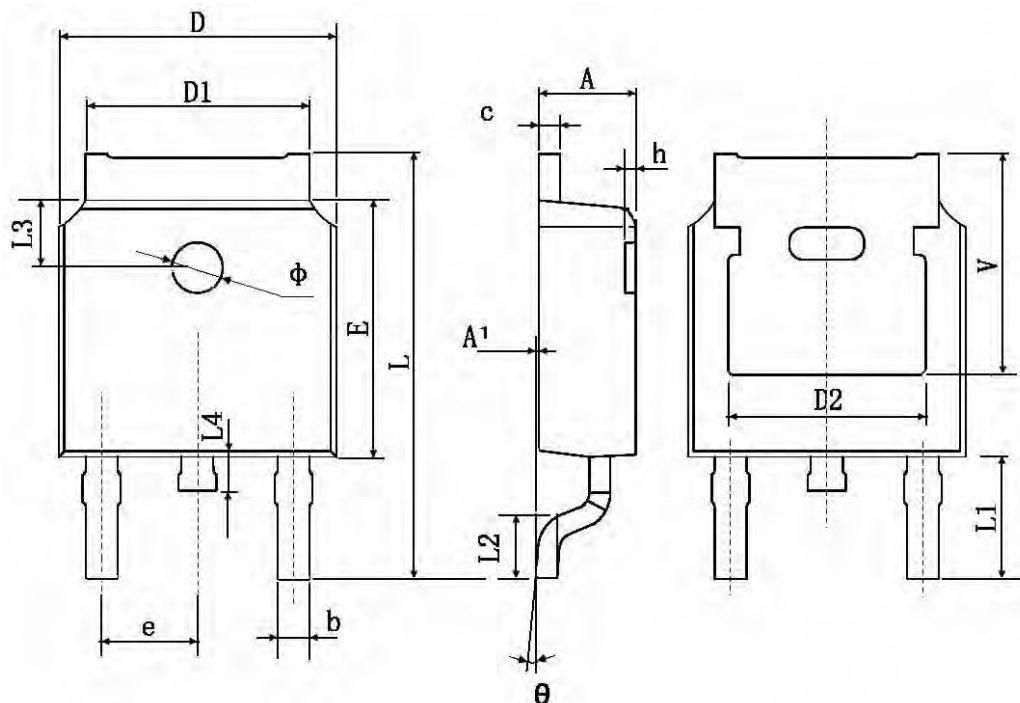


Figure 11 Normalized Maximum Transient Thermal Impedance



## TO252-2L(DPAK) Package Information



| Symbol | Dimensions In Millimeters |        | Dimensions In Inches |       |
|--------|---------------------------|--------|----------------------|-------|
|        | Min.                      | Max.   | Min.                 | Max.  |
| A      | 2.200                     | 2.400  | 0.087                | 0.094 |
| A1     | 0.000                     | 0.127  | 0.000                | 0.005 |
| b      | 0.660                     | 0.860  | 0.026                | 0.034 |
| c      | 0.460                     | 0.580  | 0.018                | 0.023 |
| D      | 6.500                     | 6.700  | 0.256                | 0.264 |
| D1     | 5.100                     | 5.460  | 0.201                | 0.215 |
| D2     | 0.483 TYP.                |        | 0.190 TYP.           |       |
| E      | 6.000                     | 6.200  | 0.236                | 0.244 |
| e      | 2.186                     | 2.386  | 0.086                | 0.094 |
| L      | 9.800                     | 10.400 | 0.386                | 0.409 |
| L1     | 2.900 TYP.                |        | 0.114 TYP.           |       |
| L2     | 1.400                     | 1.700  | 0.055                | 0.067 |
| L3     | 1.600 TYP.                |        | 0.063 TYP.           |       |
| L4     | 0.600                     | 1.000  | 0.024                | 0.039 |
| Φ      | 1.100                     | 1.300  | 0.043                | 0.051 |
| θ      | 0°                        | 8°     | 0°                   | 8°    |
| h      | 0.000                     | 0.300  | 0.000                | 0.012 |
| V      | 5.350 TYP.                |        | 0.211 TYP.           |       |



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