



## 60V 10.5mΩ Dual N-Ch Power MOSFET

### Features

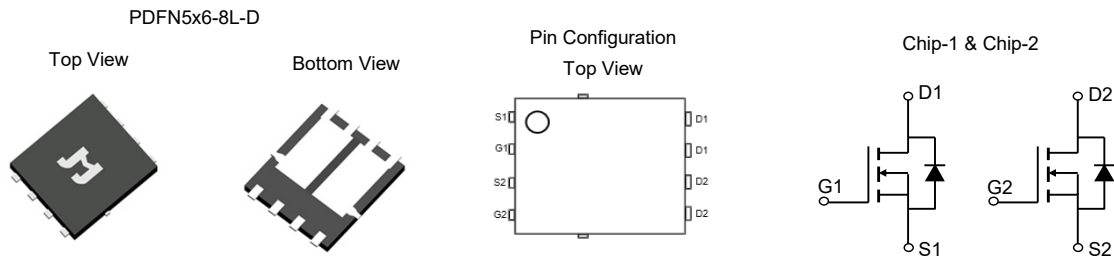
- Low  $R_{DS(ON)}$
- Low Gate Charge
- 100% UIS Tested, 100%  $R_g$  Tested
- Pb-free Lead Plating
- Halogen-free and RoHS-compliant

### Product Summary

| Parameter                                | Value | Unit |
|--|-------|------|
| $V_{DS}$                                 | 60    | V    |
| $V_{GS(th)_Typ}$                         | 1.6   | V    |
| $I_D$ (@ $V_{GS} = 10V$ ) <sup>(1)</sup> | 31    | A    |
| $R_{DS(ON)_Typ}$ (@ $V_{GS} = 10V$ )     | 10.5  | mΩ   |
| $R_{DS(ON)_Typ}$ (@ $V_{GS} = 4.5V$ )    | 13.5  | mΩ   |

### Applications

- Power Management in Computing, CE, IE 4.0, Communications
- Current Switching in DC/DC & AC/DC (SR) Sub-systems
- Load Switching, Quick/Wireless Charging, Motor Driving

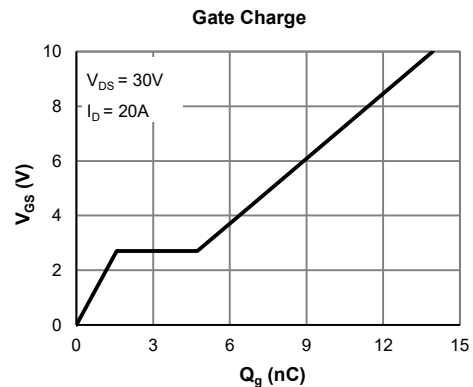
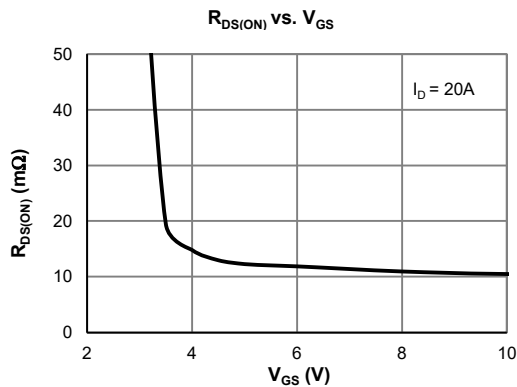


### Ordering Information

| Device         | Package      | # of Pins | Marking | MSL | $T_J$ (°C) | Media        | Quantity (pcs) |
|----------------|--------------|-----------|---------|-----|------------|--------------|----------------|
| JMSL0615AGD-13 | PDFN5x6-8L-D | 8         | L0615AD | 1   | -55 to 150 | 13-inch Reel | 5000           |

### Absolute Maximum Ratings (@ $T_A = 25^\circ C$ unless otherwise specified)

| Parameter                               | Symbol         | Value               | Unit |
|---|----------------|---------------------|------|
| Drain-to-Source Voltage                 | $V_{DS}$       | 60                  | V    |
| Gate-to-Source Voltage                  | $V_{GS}$       | $\pm 20$            | V    |
| Continuous Drain Current <sup>(1)</sup> | $I_D$          | $T_C = 25^\circ C$  | 31   |
|   |                | $T_C = 100^\circ C$ | 19.9 |
| Pulsed Drain Current <sup>(2)</sup>     | $I_{DM}$       | 118                 | A    |
| Avalanche Current <sup>(3)</sup>        | $I_{AS}$       | 20                  | A    |
| Avalanche Energy <sup>(3)</sup>         | $E_{AS}$       | 20                  | mJ   |
| Power Dissipation <sup>(4)</sup>        | $P_D$          | $T_C = 25^\circ C$  | 24   |
|   |                | $T_C = 100^\circ C$ | 9.4  |
| Junction & Storage Temperature Range    | $T_J, T_{STG}$ | -55 to 150          | °C   |



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

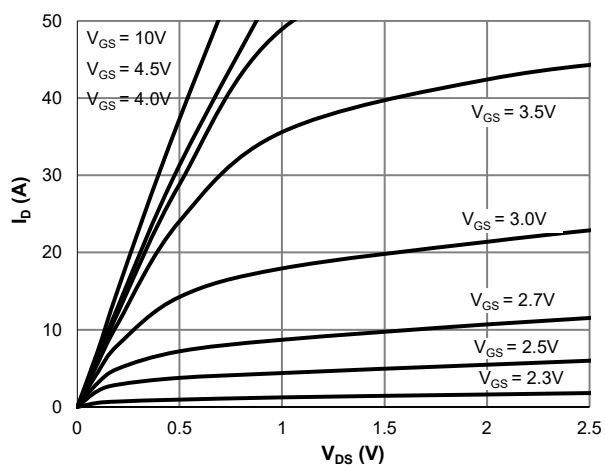
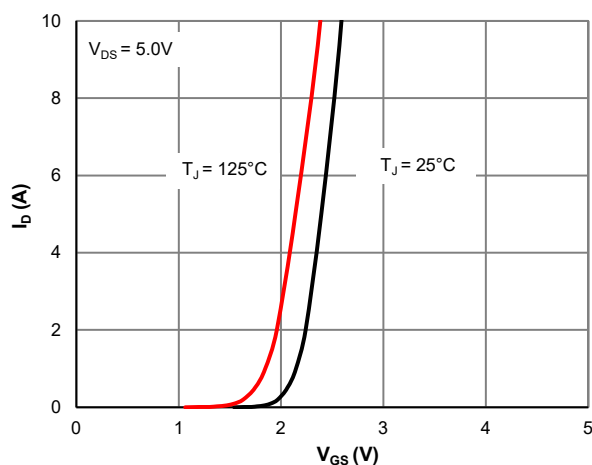
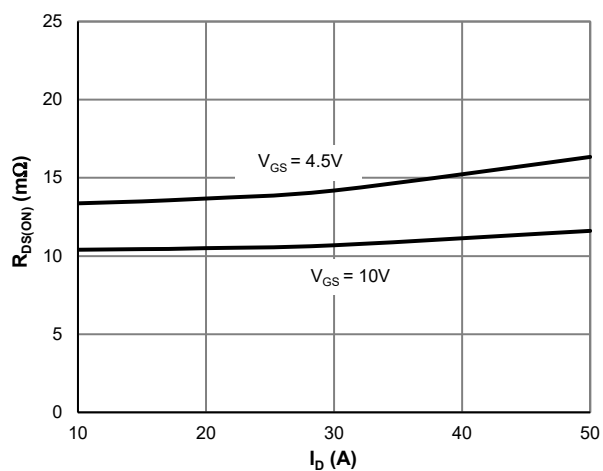
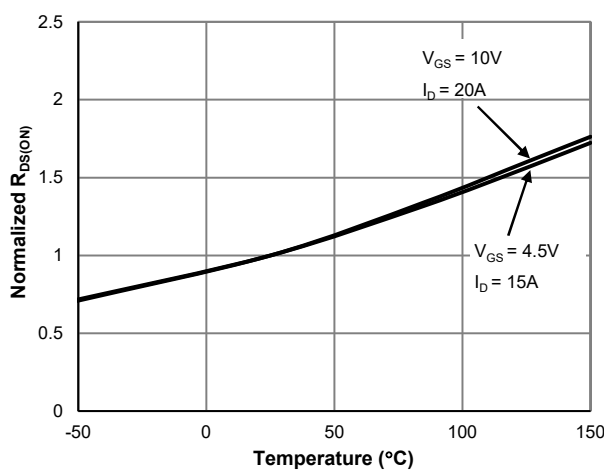
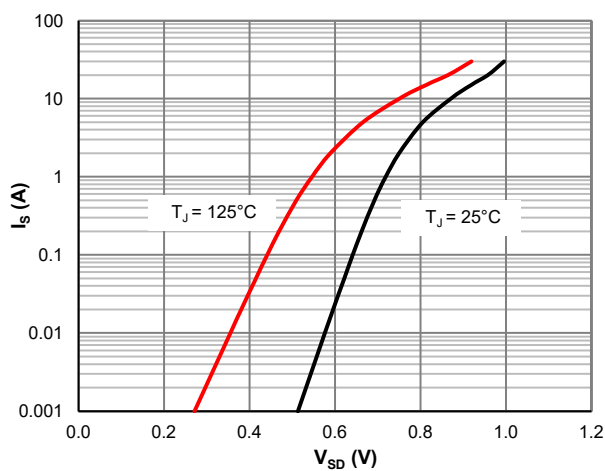
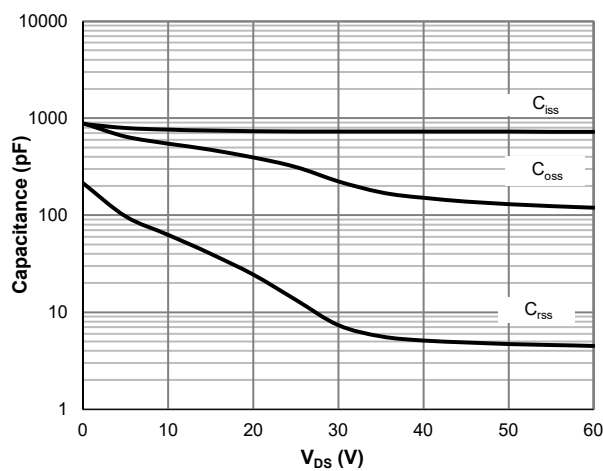
| Parameter                                     | Symbol        | Conditions   | Min.   | Typ. | Max.       | Unit             |
|---|---------------|--|--|------|------------|------------------|
| <b>STATIC PARAMETERS</b>                      |               |  |  |      |            |                  |
| Drain-Source Breakdown Voltage                | $V_{(BR)DSS}$ | $I_D = 250\mu\text{A}$ , $V_{GS} = 0\text{V}$  | 60   |      |            | V                |
| Zero Gate Voltage Drain Current               | $I_{DSS}$     | $V_{DS} = 48\text{V}$ , $V_{GS} = 0\text{V}$<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                        | $V_{GS(th)}$  | $V_{DS} = V_{GS}$ , $I_D = 250\mu\text{A}$   | 1.2  | 1.6  | 2.5        | V                |
| Static Drain-Source ON-Resistance             | $R_{DS(on)}$  | $V_{GS} = 10\text{V}$ , $I_D = 20\text{A}$   |  | 10.5 | 13.5       | $\text{m}\Omega$ |
|   |               | $V_{GS} = 4.5\text{V}$ , $I_D = 15\text{A}$  |  | 13.5 | 17.5       | $\text{m}\Omega$ |
| Forward Transconductance                      | $g_{FS}$      | $V_{DS} = 5\text{V}$ , $I_D = 20\text{A}$  |  | 81   |            | S                |
| Diode Forward Voltage                         | $V_{SD}$      | $I_S = 1\text{A}$ , $V_{GS} = 0\text{V}$   |  | 0.71 | 1.0        | V                |
| Diode Continuous Current                      | $I_S$         | $T_C = 25^\circ\text{C}$   |  |      | 24         | A                |
| <b>DYNAMIC PARAMETERS</b> <sup>(5)</sup>      |               |  |  |      |            |                  |
| Input Capacitance                             | $C_{iss}$     | $V_{GS} = 0\text{V}$ , $V_{DS} = 30\text{V}$ , $f = 1\text{MHz}$                         |  | 731  |            | pF               |
| Output Capacitance                            | $C_{oss}$     |  |  | 224  |            | pF               |
| Reverse Transfer Capacitance                  | $C_{rss}$     |  |  | 7.4  |            | pF               |
| Gate Resistance                               | $R_g$         | $V_{GS} = 0\text{V}$ , $V_{DS} = 0\text{V}$ , $f = 1\text{MHz}$                          |  | 1.7  |            | $\Omega$         |
| <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>$V_{DS} = 30\text{V}$ , $I_D = 20\text{A}$               |  | 13.9 |            | nC               |
| Total Gate Charge (@ $V_{GS} = 4.5\text{V}$ ) | $Q_g$         |  |  | 7.0  |            | nC               |
| Gate Source Charge                            | $Q_{gs}$      |  |  | 1.6  |            | nC               |
| Gate Drain Charge                             | $Q_{gd}$      |  |  | 3.1  |            | nC               |
| Turn-On Delay Time                            | $t_{D(on)}$   | $V_{GS} = 10\text{V}$ , $V_{DS} = 30\text{V}$<br>$R_L = 1.5\Omega$ , $R_{GEN} = 6\Omega$ |  | 3.7  |            | ns               |
| Turn-On Rise Time                             | $t_r$         |  |  | 4.3  |            | ns               |
| Turn-Off Delay Time                           | $t_{D(off)}$  |  |  | 16.2 |            | ns               |
| Turn-Off Fall Time                            | $t_f$         |  |  | 6.5  |            | ns               |
| Body Diode Reverse Recovery Time              | $t_{rr}$      |  | $I_F = 15\text{A}$ , $dI_F/dt = 100\text{A}/\mu\text{s}$ |      | 24         |                  |
| Body Diode Reverse Recovery Charge            | $Q_{rr}$      | $I_F = 15\text{A}$ , $dI_F/dt = 100\text{A}/\mu\text{s}$                                 |  | 9.3  |            | nC               |

**Thermal Performance**

| Parameter                               | Symbol          | Typ. | Max. | Unit                      |
|---|-----------------|------|------|---------------------------|
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 68   | 82   | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction-to-Case    | $R_{\theta JC}$ | 5.3  | 6.0  | $^\circ\text{C}/\text{W}$ |

**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 [ $L = 100\mu\text{H}$ ,  $V_{GS} = 10\text{V}$ ,  $V_{DD} = 30\text{V}$ ] 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: Body-Diode Characteristics**

**Figure 6: Capacitance Characteristics**

Typical Electrical & Thermal Characteristics

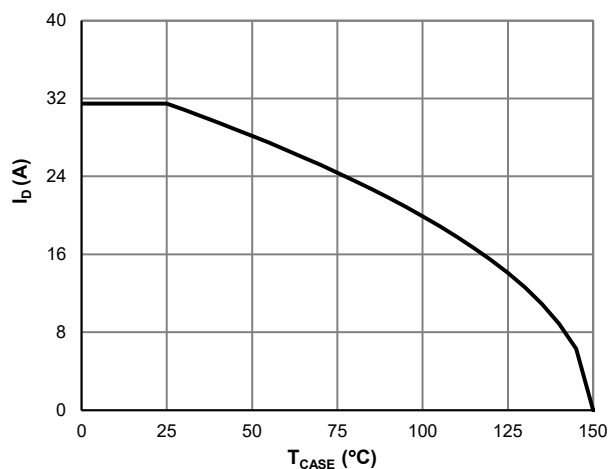


Figure 7: Current De-rating

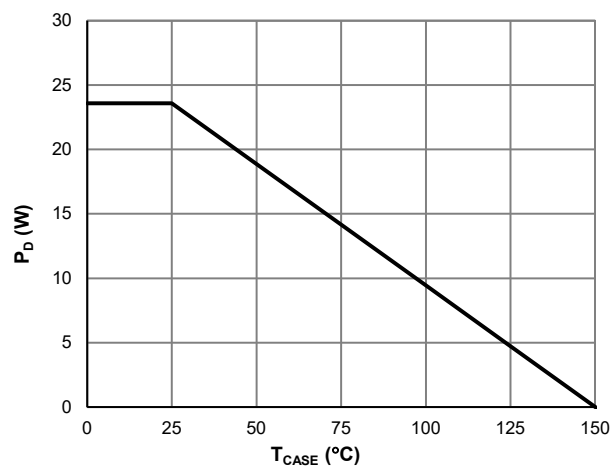


Figure 8: Power De-rating

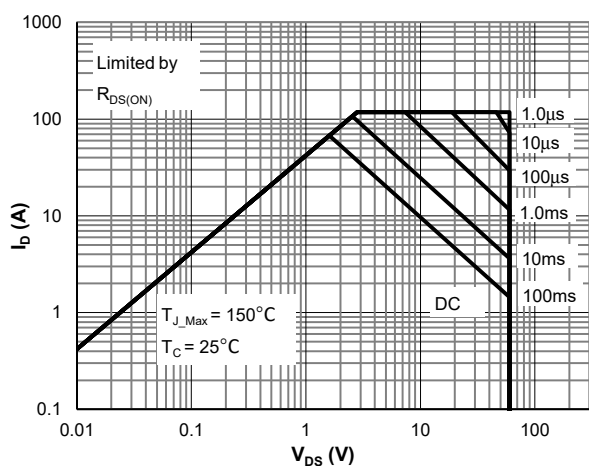


Figure 9: Maximum Safe Operating Area

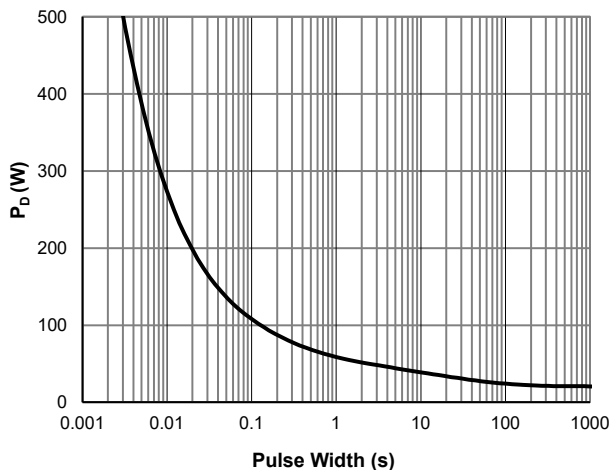


Figure 10: Single Pulse Power Rating, Junction-to-Case

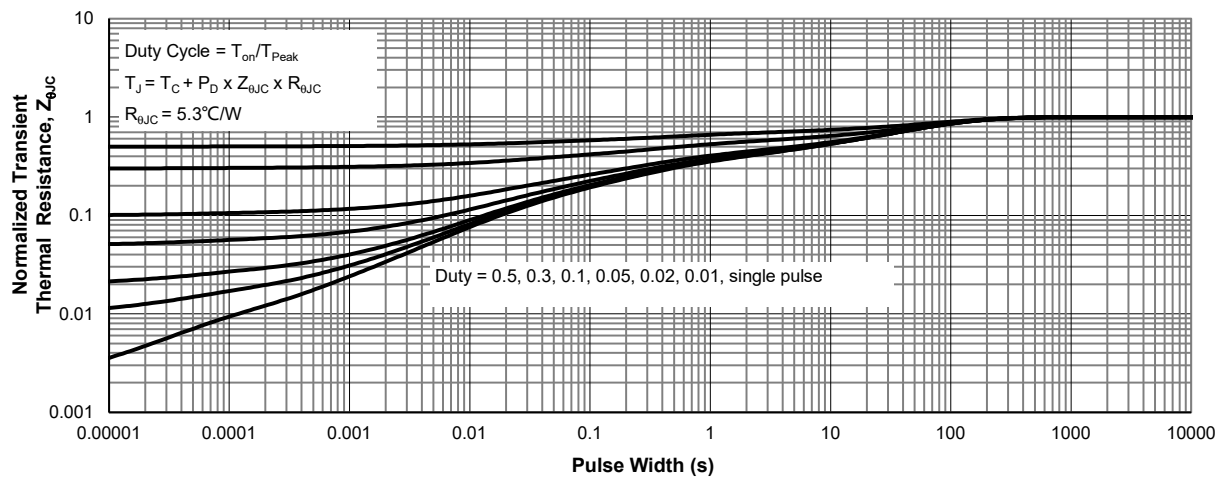
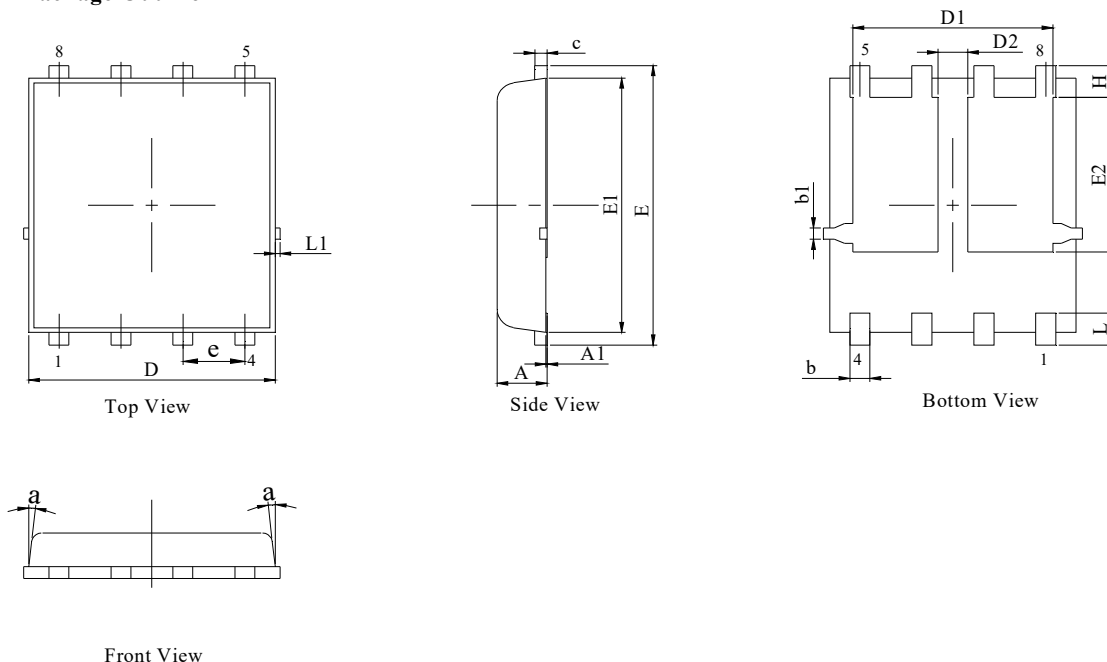
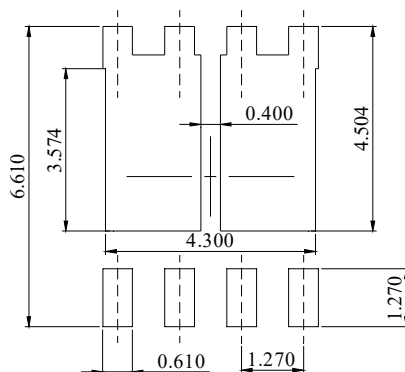


Figure 11: Normalized Maximum Transient Thermal Impedance

**PDFN5x6-8L-D Package Information**
**Package Outline**

**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M,1994.
2. ALL DIMENSIONS IN MILLIMETER (ANGLE IN DEGREE).
3. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD FLASH PROTRUSIONS OR GATE BURRS.

| DIM. | MILLIMETER |      |       |
|------|------------|------|-------|
|      | MIN.       | NOM. | MAX.  |
| A    | 0.90       | 1.00 | 1.10  |
| A1   | 0.00       | -    | 0.10  |
| b    | 0.31       | 0.41 | 0.51  |
| b1   | 0.15       | 0.25 | 0.35  |
| c    | 0.23       | -    | 0.33  |
| D    | 4.95       | 5.05 | 5.15  |
| D1   | 4.00       | 4.10 | 4.20  |
| D2   | 0.50       | 0.60 | 0.70  |
| E    | 6.05       | 6.15 | 6.25  |
| E1   | 5.50       | 5.60 | 5.70  |
| E2   | 3.31       | 3.41 | 3.51  |
| e    | 1.27BSC    |      |       |
| H    | 0.60       | 0.70 | 0.80  |
| L    | 0.50       | 0.70 | 0.80  |
| L1   | -          | -    | 0.125 |
| a    | -          | -    | 12°   |

**Recommended Soldering Footprint**


DIMENSIONS: MILLIMETERS