



## 30V 0.85mΩ N-Ch Power MOSFET

### Features

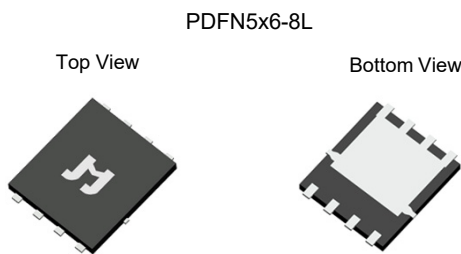
- Ultra-low  $R_{DS(ON)}$
- Low Gate Charge
- 100% UIS Tested, 100%  $R_g$  Tested
- Pb-free Lead Plating
- Halogen-free and RoHS-compliant

### Product Summary

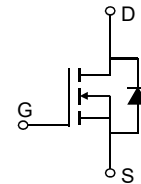
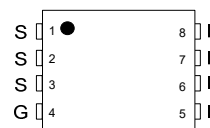
| Parameter                                | Value | Unit |
|--|-------|------|
| $V_{DS}$                                 | 30    | V    |
| $V_{GS(th\_Typ)}$                        | 1.7   | V    |
| $I_D$ (@ $V_{GS} = 10V$ ) <sup>(1)</sup> | 245   | A    |
| $R_{DS(ON)\_Typ}$ (@ $V_{GS} = 10V$ )    | 0.85  | mΩ   |
| $R_{DS(ON)\_Typ}$ (@ $V_{GS} = 4.5V$ )   | 1.3   | mΩ   |

### Applications

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



Pin Configuration  
Top View

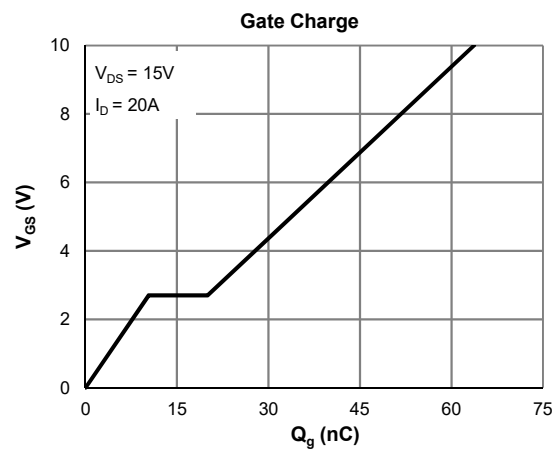
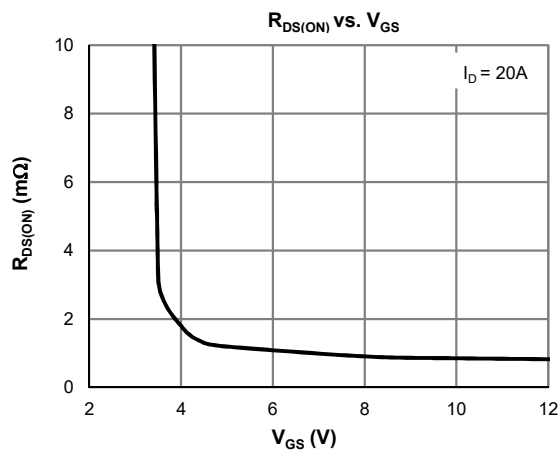


### Ordering Information

| Device        | Package    | # of Pins | Marking | MSL | $T_J$ (°C) | Media        | Quantity (pcs) |
|---------------|------------|-----------|---------|-----|------------|--------------|----------------|
| JMSL0301AG-13 | PDFN5x6-8L | 8         | SL0301A | 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                 | $V_{DS}$       | 30                  | V    |
| Gate-to-Source Voltage                  | $V_{GS}$       | ±20                 | V    |
| Continuous Drain Current <sup>(1)</sup> | $I_D$          | $T_C = 25^\circ C$  | 245  |
|   |                | $T_C = 100^\circ C$ | 155  |
| Pulsed Drain Current <sup>(2)</sup>     | $I_{DM}$       | 540                 | A    |
| Avalanche Current <sup>(3)</sup>        | $I_{AS}$       | 37                  | A    |
| Avalanche Energy <sup>(3)</sup>         | $E_{AS}$       | 205                 | mJ   |
| Power Dissipation <sup>(4)</sup>        | $P_D$          | $T_C = 25^\circ C$  | 96   |
|   |                | $T_C = 100^\circ C$ | 38   |
| Junction & Storage Temperature Range    | $T_J, T_{STG}$ | -55 to 150          | °C   |



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

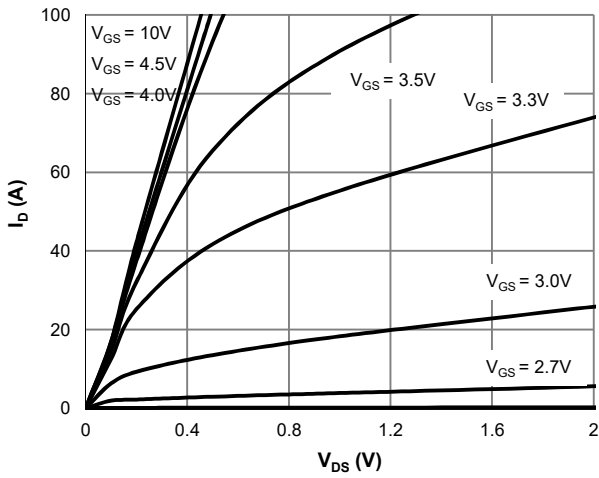
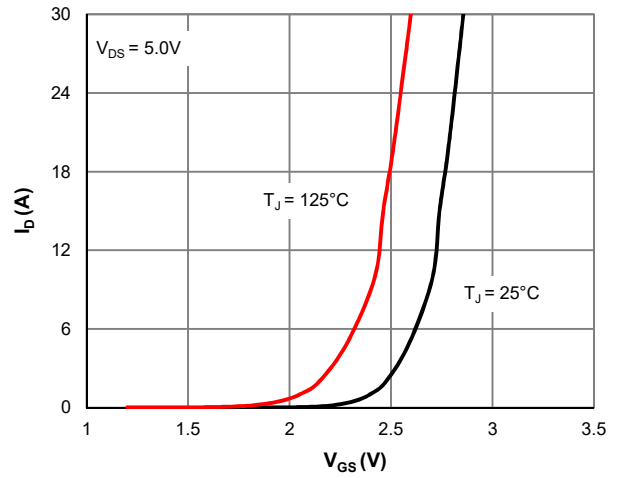
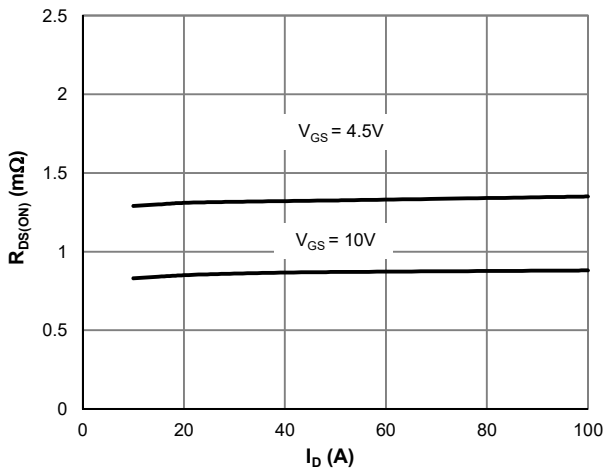
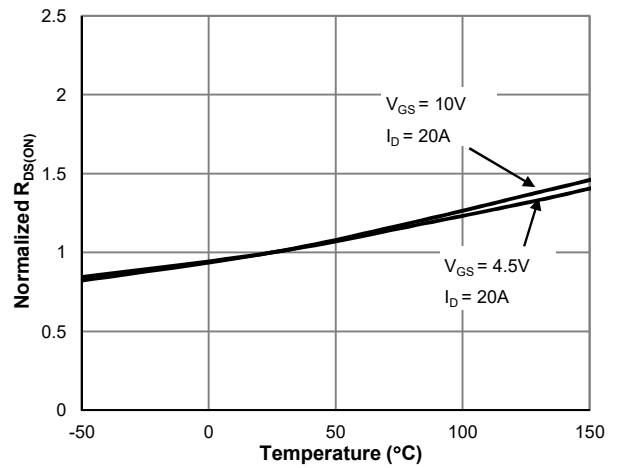
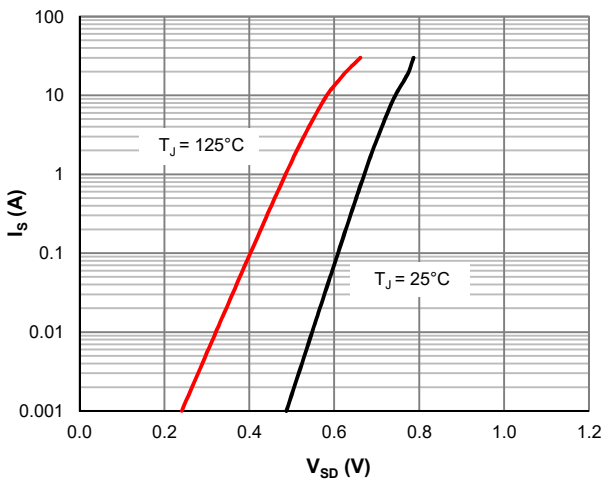
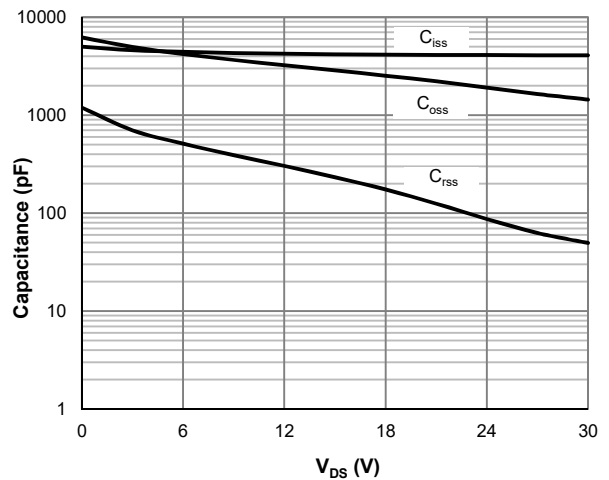
| Parameter                                     | Symbol        | Conditions  | Min.  | Typ. | Max.       | Unit             |
|---|---------------|---|---|------|------------|------------------|
| <b>STATIC PARAMETERS</b>                      |               |   |   |      |            |                  |
| Drain-Source Breakdown Voltage                | $V_{(BR)DSS}$ | $I_D = 1\text{mA}, V_{GS} = 0\text{V}$  | 30  |      |            | V                |
| Zero Gate Voltage Drain Current               | $I_{DSS}$     | $V_{DS} = 24\text{V}, V_{GS} = 0\text{V}$<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   | 1.7  | 2.5        | V                |
| Static Drain-Source ON-Resistance             | $R_{DS(on)}$  | $V_{GS} = 10\text{V}, I_D = 20\text{A}$   |   | 0.85 | 1.1        | $\text{m}\Omega$ |
|   |               | $V_{GS} = 4.5\text{V}, I_D = 20\text{A}$  |   | 1.3  | 1.7        | $\text{m}\Omega$ |
| Forward Transconductance                      | $g_{FS}$      | $V_{DS} = 5\text{V}, I_D = 20\text{A}$  |   | 110  |            | S                |
| Diode Forward Voltage                         | $V_{SD}$      | $I_S = 1\text{A}, V_{GS} = 0\text{V}$   |   | 0.69 | 1.0        | V                |
| Diode Continuous Current                      | $I_S$         | $T_C = 25^\circ\text{C}$  |   |      | 96         | A                |
| <b>DYNAMIC PARAMETERS</b> <sup>(5)</sup>      |               |   |   |      |            |                  |
| Input Capacitance                             | $C_{iss}$     | $V_{GS} = 0\text{V}, V_{DS} = 15\text{V}, f = 1\text{MHz}$                          |   | 4185 |            | pF               |
| Output Capacitance                            | $C_{oss}$     |   |   | 2861 |            | pF               |
| Reverse Transfer Capacitance                  | $C_{rss}$     |   |   | 233  |            | pF               |
| Gate Resistance                               | $R_g$         | $V_{GS} = 0\text{V}, V_{DS} = 0\text{V}, f = 1\text{MHz}$                           |   | 1.8  |            | $\Omega$         |
| <b>SWITCHING PARAMETERS</b> <sup>(5)</sup>    |               |   |   |      |            |                  |
| Total Gate Charge (@ $V_{GS} = 10\text{V}$ )  | $Q_g$         | $V_{GS} = 0 \text{ to } 10\text{V}$<br>$V_{DS} = 15\text{V}, I_D = 20\text{A}$      |   | 64   |            | nC               |
| Total Gate Charge (@ $V_{GS} = 4.5\text{V}$ ) | $Q_g$         |   |   | 31   |            | nC               |
| Gate Source Charge                            | $Q_{gs}$      |   |   | 10.4 |            | nC               |
| Gate Drain Charge                             | $Q_{gd}$      |   |   | 9.7  |            | nC               |
| Turn-On Delay Time                            | $t_{D(on)}$   | $V_{GS} = 10\text{V}, V_{DS} = 15\text{V}$<br>$R_L = 0.75\Omega, R_{GEN} = 6\Omega$ |   | 6.2  |            | ns               |
| Turn-On Rise Time                             | $t_r$         |   |   | 7.8  |            | ns               |
| Turn-Off Delay Time                           | $t_{D(off)}$  |   |   | 35   |            | ns               |
| Turn-Off Fall Time                            | $t_f$         |   |   | 20   |            | ns               |
| Body Diode Reverse Recovery Time              | $t_{rr}$      |   | $I_F = 15\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$ |      | 54         |                  |
| Body Diode Reverse Recovery Charge            | $Q_{rr}$      | $I_F = 15\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$                               |   | 60   |            | nC               |

**Thermal Performance**

| Parameter                               | Symbol          | Typ. | Max. | Unit                      |
|---|-----------------|------|------|---------------------------|
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 45   | 55   | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction-to-Case    | $R_{\theta JC}$ | 1.0  | 1.3  | $^\circ\text{C}/\text{W}$ |

**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 $\mu\text{H}$ ,  $V_{GS} = 10\text{V}$ ,  $V_{DS} = 30\text{V}$ ] 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

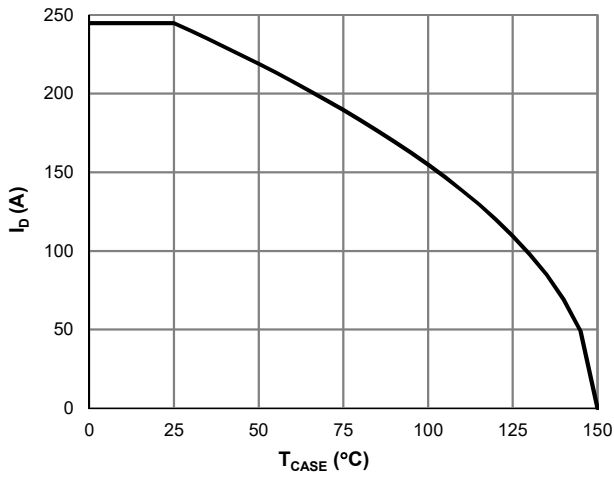


Figure 7: Current De-rating

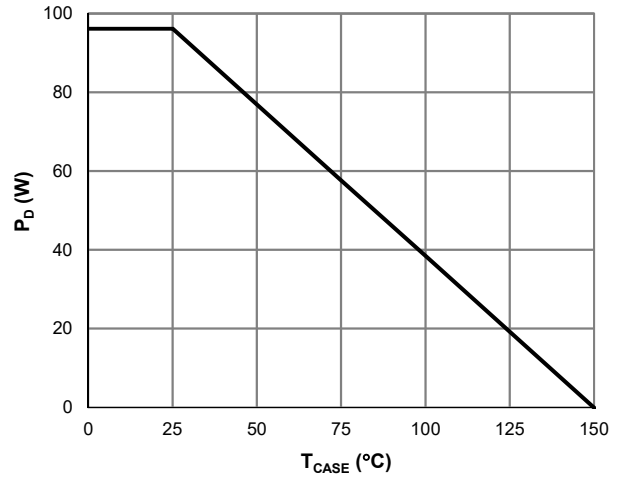


Figure 8: Power De-rating

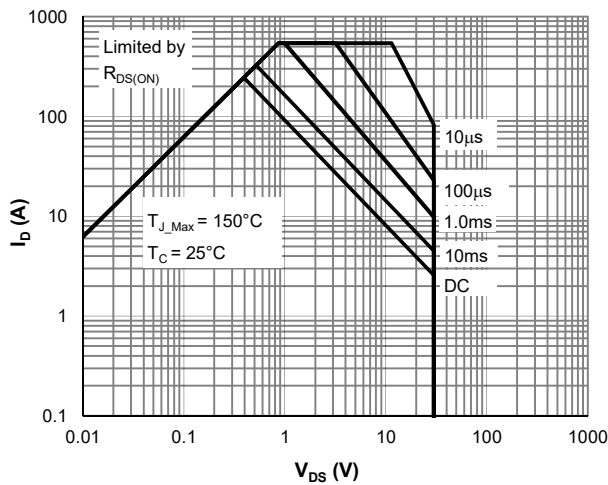


Figure 9: Maximum Safe Operating Area

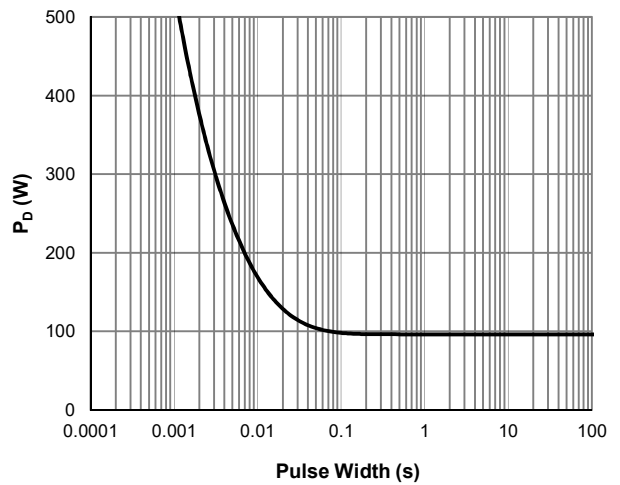


Figure 10: Single Pulse Power Rating, Junction-to-Case

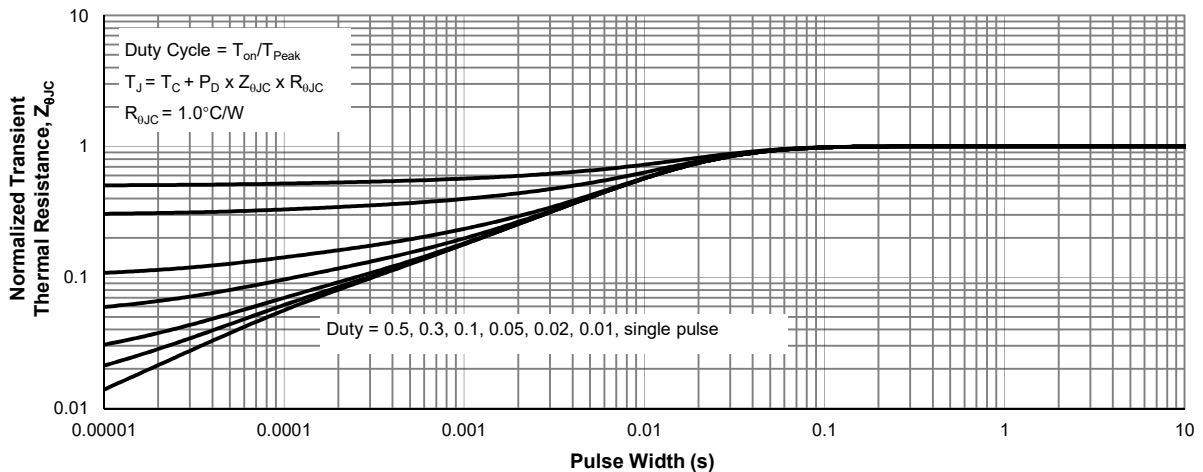
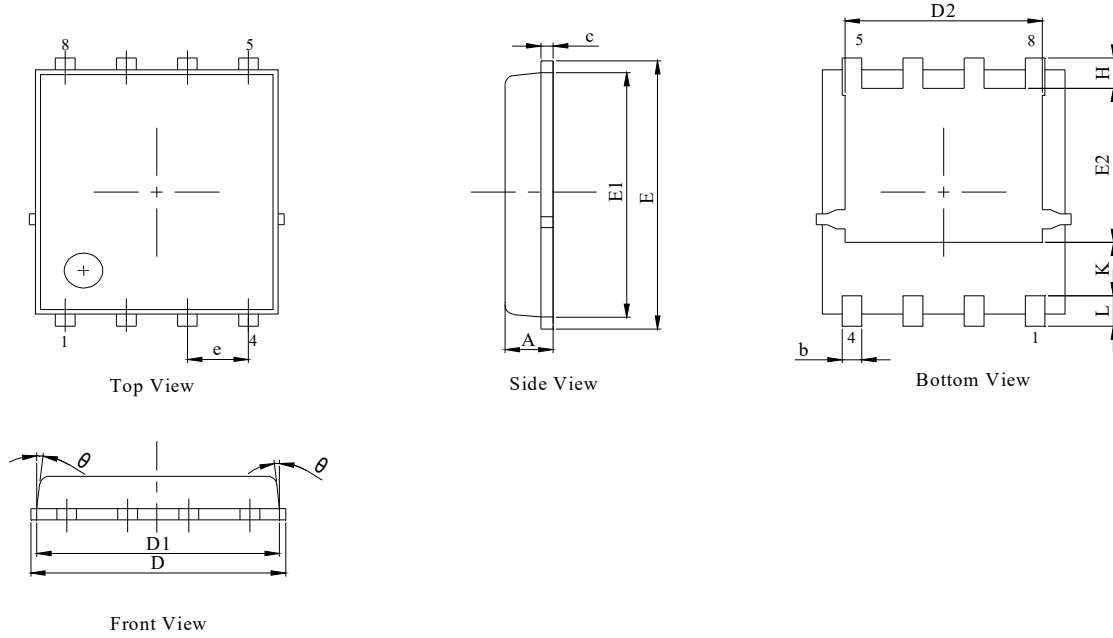
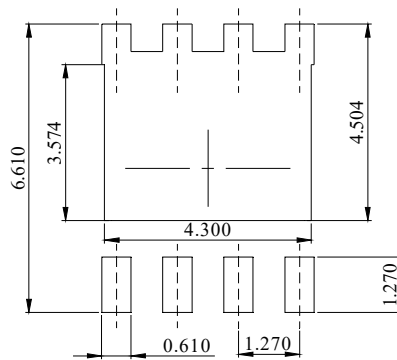


Figure 11: Normalized Maximum Transient Thermal Impedance

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

**NOTES:**

1. Dimension and tolerance 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 |
| b        | 0.31       | 0.41 | 0.51 |
| c        | 0.20       | 0.25 | 0.30 |
| D        | 5.00       | 5.20 | 5.40 |
| D1       | 4.95       | 5.05 | 5.15 |
| D2       | 4.00       | 4.10 | 4.20 |
| E        | 6.05       | 6.15 | 6.25 |
| E1       | 5.50       | 5.60 | 5.70 |
| E2       | 3.42       | 3.53 | 3.63 |
| e        | 1.27BSC    |      |      |
| H        | 0.60       | 0.70 | 0.80 |
| L        | 0.50       | 0.70 | 0.80 |
| K        | 1.23 REF   |      |      |
| $\theta$ | -          | -    | 10°  |

**Recommended Soldering Footprint**


DIMENSIONS: MILLIMETERS