



## N-Channel Enhancement Mode Power MOSFET

### Description

The PED2512L uses advanced trench technology to provide excellent  $R_{DS(ON)}$  and low gate charge. It can be used in a wide variety of applications. It is ESD protected.

### General Features

- $V_{DS} = 18V$ ,  $I_D = 10A$

$R_{DS(ON)} < 9.5m\Omega @ V_{GS}=4.5V$

$R_{DS(ON)} < 9.8m\Omega @ V_{GS}=4.2V$

$R_{DS(ON)} < 10.5m\Omega @ V_{GS}=3.8V$

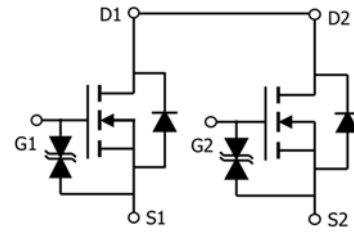
$R_{DS(ON)} < 13m\Omega @ V_{GS}=2.5V$

ESD Rating: 4000V HBM

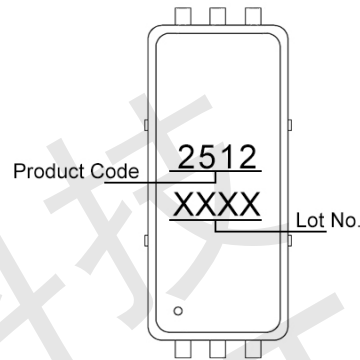
- High Power and current handing capability
- Lead free product is acquired
- Surface Mount Package

### Application

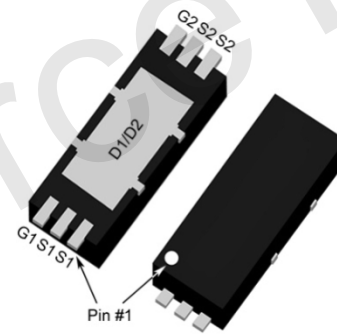
- PWM applications
- Load switch
- Power management
- Battery Protection



Schematic diagram



Marking



PDFN2x5-6L

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

| Parameter  | Symbol         | Rating     | Unit |
|--|----------------|------------|------|
| Drain-Source Voltage                             | $V_{DS}$       | 18         | V    |
| Gate-Source Voltage                              | $V_{GS}$       | $\pm 12$   | V    |
| Drain Current-Continuous                         | $I_D$          | 10         | A    |
| Drain Current-Continuous (TA=70°C)               | $I_D$          | 8          | A    |
| Pulsed Drain Current (Note 1)                    | $I_{DM}$       | 80         | A    |
| Maximum Power Dissipation                        | $P_D$          | 1.7        | W    |
| Operating Junction and Storage Temperature Range | $T_J, T_{STG}$ | -55 To 150 | °C   |

### Thermal Characteristic

|  |                 |    |      |
|--|-----------------|----|------|
| Thermal Resistance, Junction-to-Ambient (Note 2) | $R_{\theta JA}$ | 75 | °C/W |
|--|-----------------|----|------|



**Electrical Characteristics (TA=25°C unless otherwise noted)**

| Parameter                                 | Symbol       | Condition   | Min  | Typ | Max      | Unit      |
|---|--------------|---|------|-----|----------|-----------|
| <b>Off Characteristics</b>                |              |   |      |     |          |           |
| Drain-Source Breakdown Voltage            | $BV_{DSS}$   | $V_{GS}=0V, I_D=250\mu A$                                 | -    | 18  | -        | V         |
| Zero Gate Voltage Drain Current           | $I_{DSS}$    | $V_{DS}=16V, V_{GS}=0V$                                   | -    | -   | 1        | $\mu A$   |
| Gate-Body Leakage Current                 | $I_{GSS}$    | $V_{GS}=\pm 10V, V_{DS}=0V$                               | -    | -   | $\pm 10$ | $\mu A$   |
| <b>On Characteristics (Note 3)</b>        |              |   |      |     |          |           |
| Gate Threshold Voltage                    | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$                             | 0.45 | 0.7 | 1.0      | V         |
| Drain-Source On-State Resistance          | $R_{DS(on)}$ | $V_{GS}=4.5V, I_D=5.5A$                                   | -    | 7.8 | 9.5      | $m\Omega$ |
|   |              | $V_{GS}=4.2V, I_D=5.5A$                                   | -    | 8.2 | 9.8      | $m\Omega$ |
|   |              | $V_{GS}=3.8V, I_D=5A$                                     | -    | 8.6 | 10       | $m\Omega$ |
|   |              | $V_{GS}=2.5V, I_D=5A$                                     | -    | 10  | 13       | $m\Omega$ |
| Forward Transconductance                  | $g_{FS}$     | $V_{DS}=5V, I_D=7.5A$                                     | -    | 30  | -        | S         |
| <b>Dynamic Characteristics (Note 4)</b>   |              |   |      |     |          |           |
| Input Capacitance                         | $C_{iss}$    | $V_{DS}=10V, V_{GS}=0V,$<br>$F=1.0MHz$                    | -    | 850 | -        | pF        |
| Output Capacitance                        | $C_{oss}$    |   | -    | 225 | -        | pF        |
| Reverse Transfer Capacitance (Note 4)     | $C_{rss}$    |   | -    | 205 | -        | pF        |
| <b>Switching Characteristics</b>          |              |   |      |     |          |           |
| Turn-on Delay Time                        | $t_{d(on)}$  | $V_{DD}=10V, R_L=1.35\Omega,$<br>$V_{GS}=5V, R_G=3\Omega$ | -    | 8   | -        | nS        |
| Turn-on Rise Time                         | $t_r$        |   | -    | 17  | -        | nS        |
| Turn-Off Delay Time                       | $t_{d(off)}$ |   | -    | 60  | -        | nS        |
| Turn-Off Fall Time                        | $t_f$        |   | -    | 22  | -        | nS        |
| Total Gate Charge                         | $Q_g$        | $V_{DS}=10V, I_D=5A,$<br>$V_{GS}=4.5V$                    | -    | 16  | -        | nC        |
| Gate-Source Charge                        | $Q_{gs}$     |   | -    | 1.4 | -        | nC        |
| Gate-Drain Charge                         | $Q_{gd}$     |   | -    | 4.2 | -        | nC        |
| <b>Drain-Source Diode Characteristics</b> |              |   |      |     |          |           |
| Diode Forward Voltage (Note 3)            | $V_{SD}$     | $V_{GS}=0V, I_S=1A$                                       | -    | -   | 1.2      | V         |

**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 product.



Typical Electrical and Thermal Characteristics

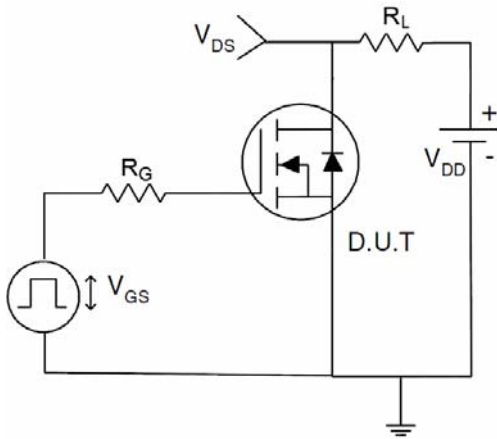


Figure 1 Switching Test Circuit

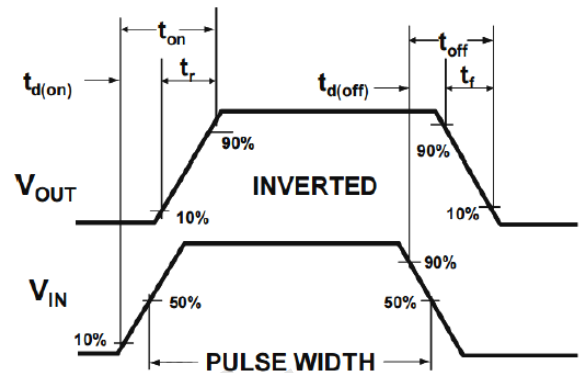


Figure 2 Switching Waveform

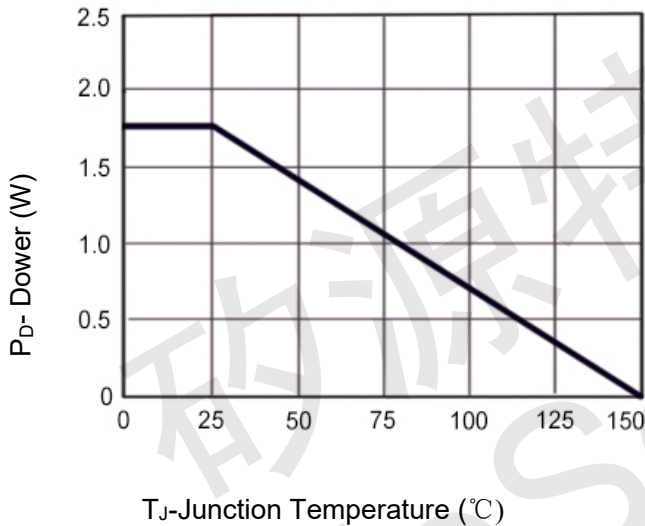


Figure 3 Power Dissipation

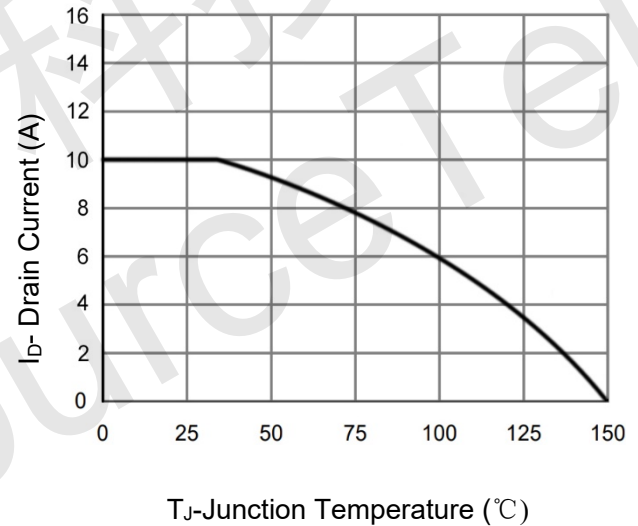


Figure 4 Drain Current

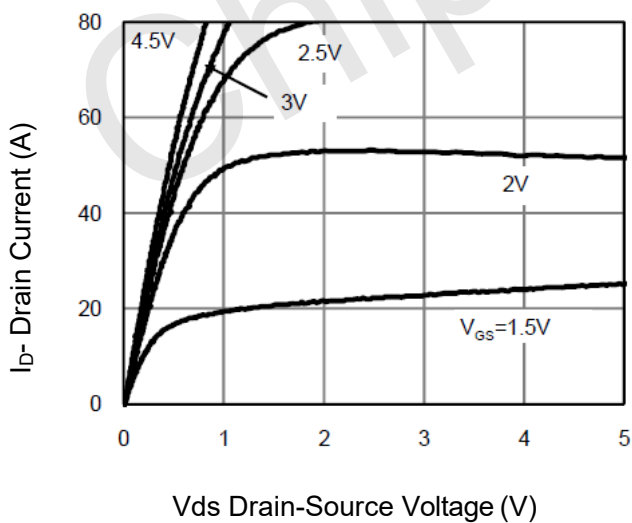


Figure 5 Output Characteristics

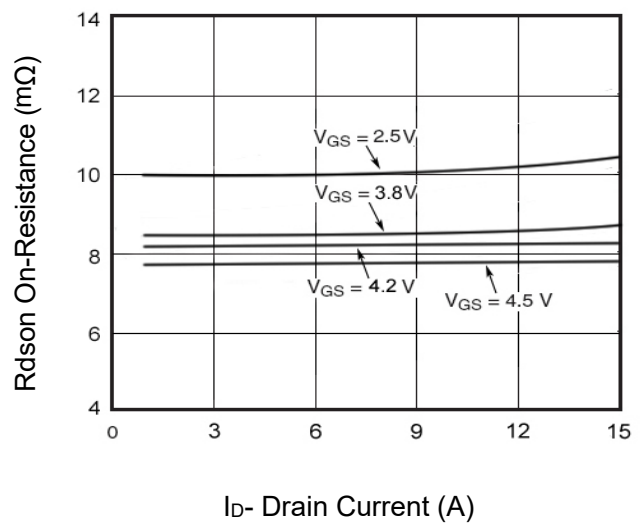


Figure 6 Rdson vs Drain Current

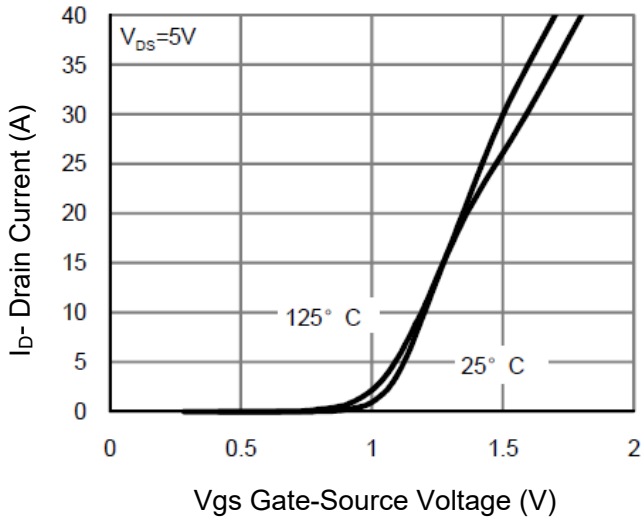


Figure 7 Transfer Characteristics

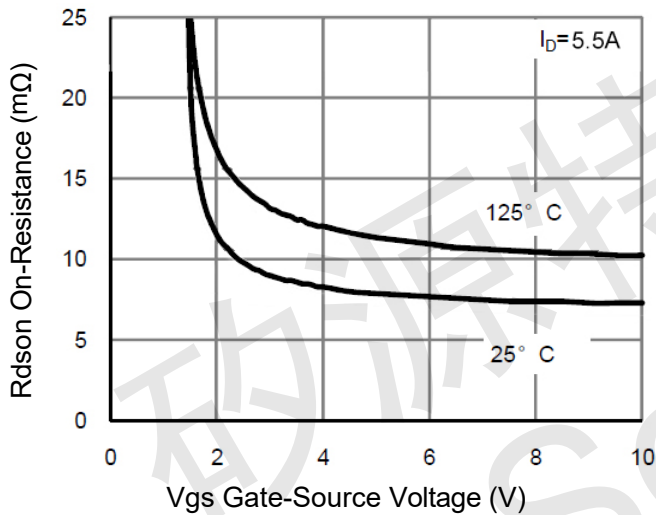


Figure 9 Rdson vs Vgs

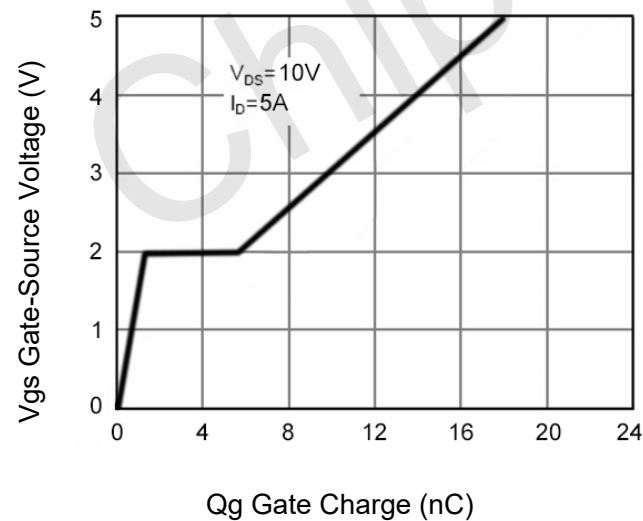


Figure 11 Gate Charge

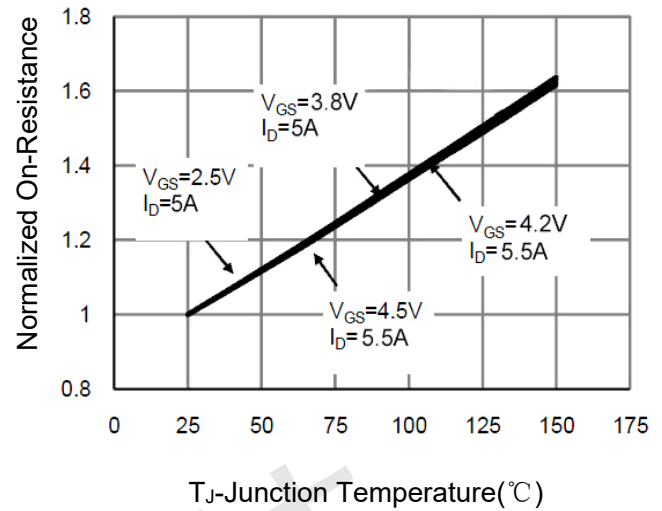


Figure 8 Rdson vs Junction Temperature

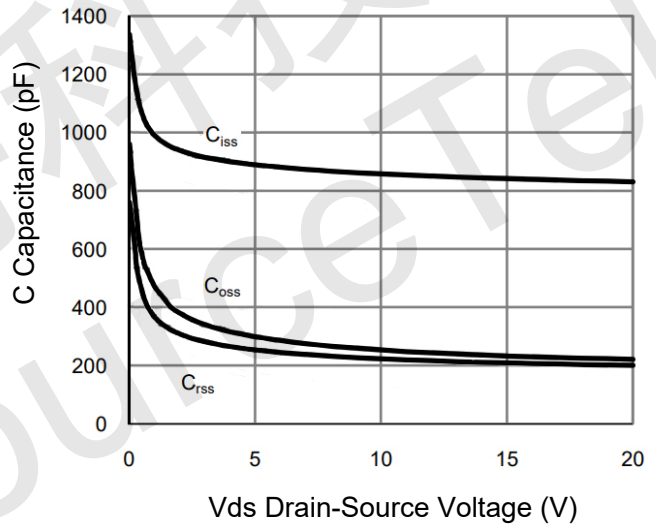


Figure 10 Capacitance vs Vds

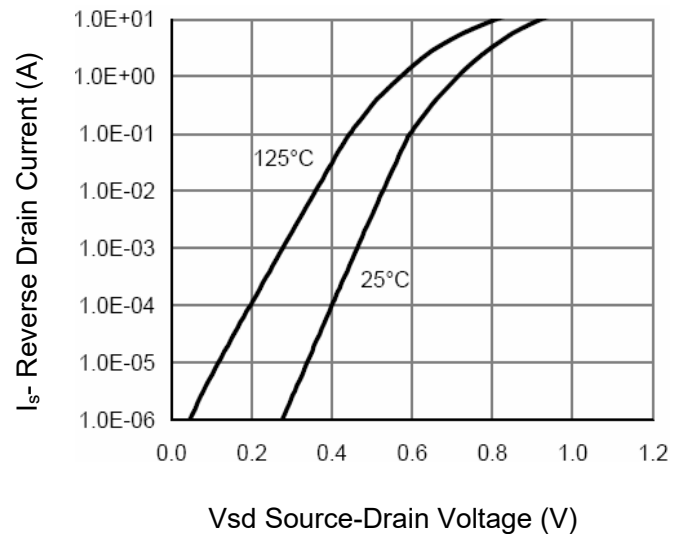


Figure 12 Source- Drain Diode Forward

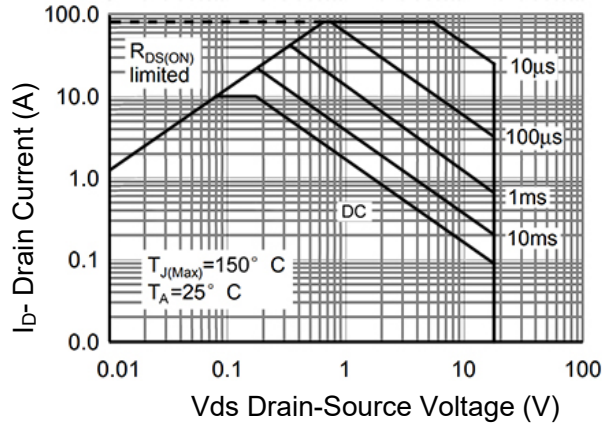


Figure 13 Safe Operation Area

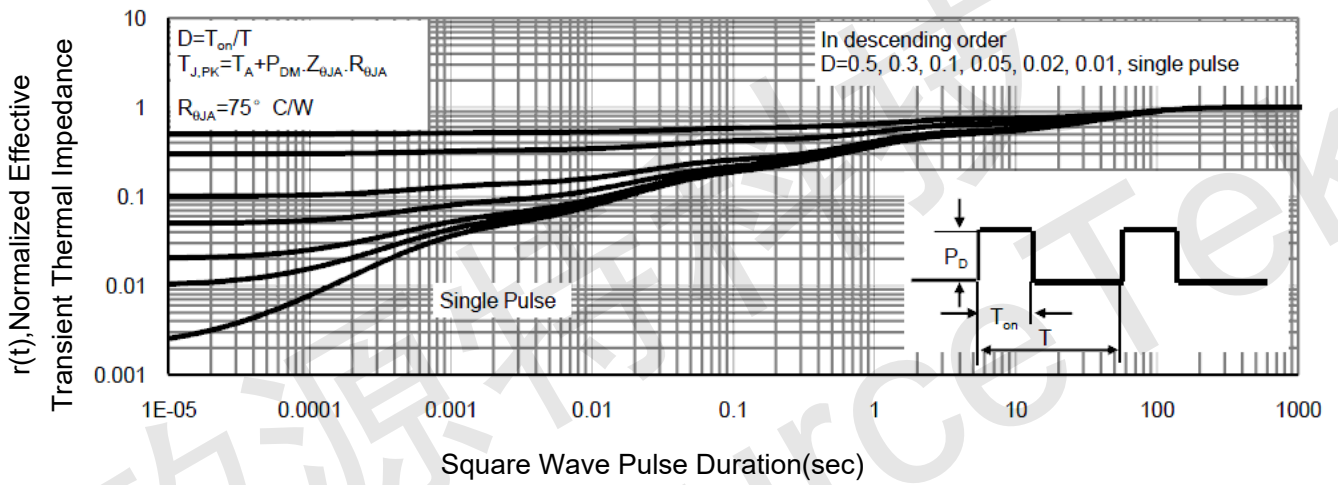
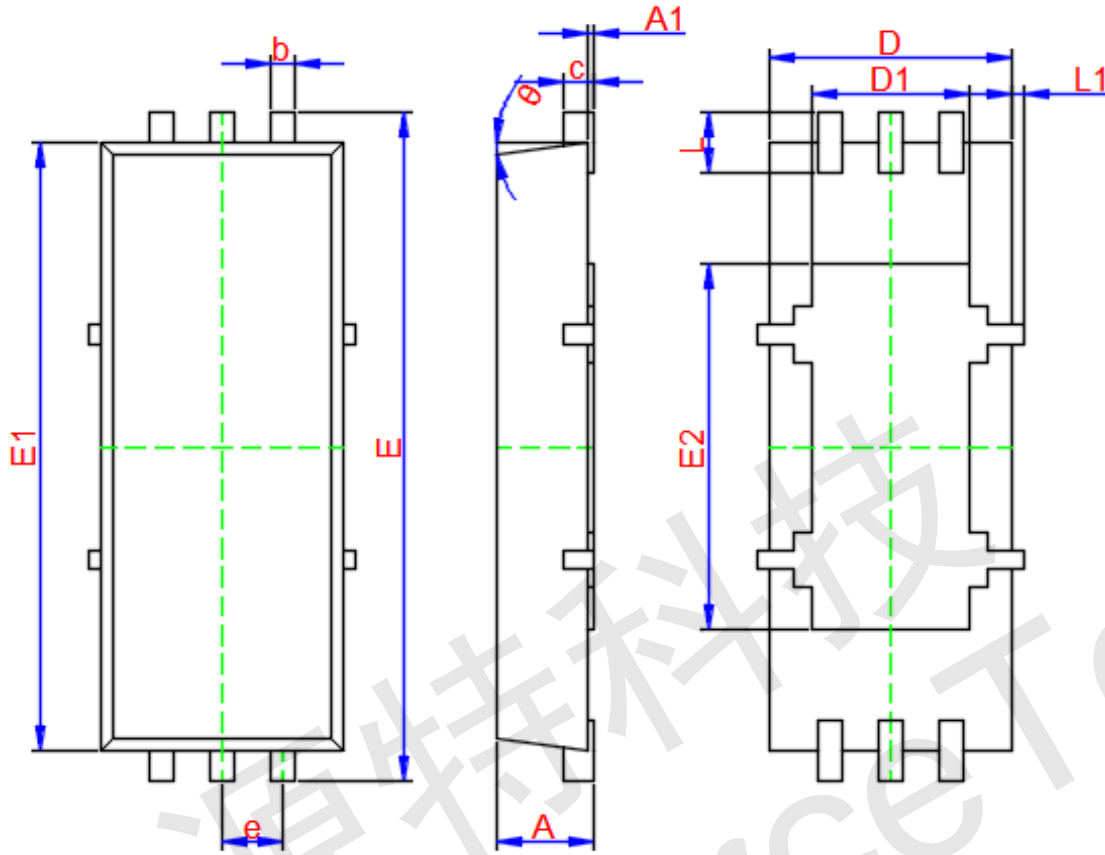


Figure 14 Normalized Maximum Transient Thermal Impedance



PDFN2x5-6L Package Information



| Symbol   | Dimensions In Millimeters |       |       |
|----------|---------------------------|-------|-------|
|          | Min.                      | Typ.  | Max.  |
| A        | 0.700                     | 0.750 | 0.800 |
| A1       | 0.000                     | 0.020 | 0.050 |
| b        | 0.200                     | 0.225 | 0.300 |
| c        | 0.100                     | 0.152 | 0.200 |
| D        | 2.000TYP.                 |       |       |
| D1       | 1.300                     | 1.350 | 1.550 |
| E        | 5.000TYP                  |       |       |
| E1       | 4.500TYP.                 |       |       |
| E2       | 2.600                     | 2.670 | 2.950 |
| e        | 0.500TYP.                 |       |       |
| L        | 0.400                     | 0.500 | 0.600 |
| L1       | 0                         | -     | 0.100 |
| $\theta$ | 0°                        | 10°   | 12°   |