



## PE8212HN N-Channel Enhancement Mode Power MOSFET

### PE8212HN Description

The PE8212HN 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.

### PE8212HN General Features

- $V_{DS} = 18V$ ,  $I_D = 12A$

$R_{DS(ON)} < 7.5m\Omega$  @  $V_{GS}=4.5V$

$R_{DS(ON)} < 8.6m\Omega$  @  $V_{GS}=3.8V$

$R_{DS(ON)} < 10m\Omega$  @  $V_{GS}=3.1V$

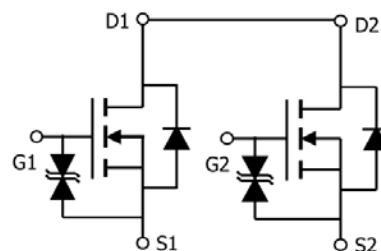
$R_{DS(ON)} < 11m\Omega$  @  $V_{GS}=2.5V$

ESD Rating: 4000V HBM

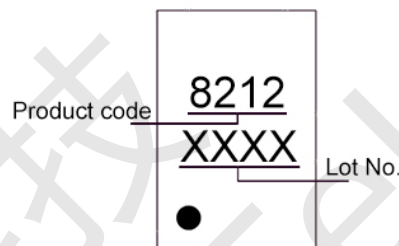
- High Power and current handing capability
- Lead free product is acquired
- Surface Mount Package

### PE8212HN Application

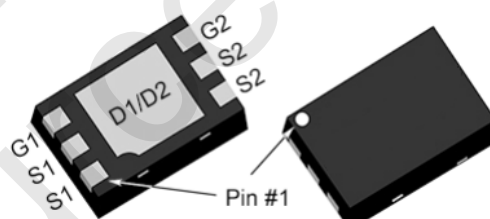
- PWM applications
- Load switch
- Power management



Schematic diagram



Marking



DFN2x3-6L

### PE8212HN 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                         | $I_D$          | 12         | A    |
| Pulsed Drain Current (Note 1)                    | $I_{DM}$       | 70         | A    |
| Maximum Power Dissipation                        | $P_D$          | 1.5        | W    |
| Operating Junction and Storage Temperature Range | $T_J, T_{STG}$ | -55 To 150 | °C   |

### PE8212HN Thermal Characteristic

|                                                  |                 |    |      |
|--------------------------------------------------|-----------------|----|------|
| Thermal Resistance, Junction-to-Ambient (Note 2) | $R_{\theta JA}$ | 83 | °C/W |
|--------------------------------------------------|-----------------|----|------|



## PE8212HN Electrical Characteristics (TA=25°C unless otherwise noted)

| Parameter                             | Symbol       | Condition                                                        | Min  | Typ  | Max      | Unit       |
|---------------------------------------|--------------|------------------------------------------------------------------|------|------|----------|------------|
| Off Characteristics                   |              |                                                                  |      |      |          |            |
| 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             | $I_{GSS}$    | $V_{GS}=\pm 10V, V_{DS}=0V$                                      | -    | -    | $\pm 10$ | $\mu A$    |
| On Characteristics (Note 3)           |              |                                                                  |      |      |          |            |
| 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      | $R_{DS(ON)}$ | $V_{GS}=4.5V, I_D=5.5A$                                          | 5.2  | 6.0  | 7.5      | m $\Omega$ |
|                                       |              | $V_{GS}=3.8V, I_D=5.5A$                                          | 5.6  | 6.8  | 8.6      | m $\Omega$ |
|                                       |              | $V_{GS}=3.1V, I_D=5A$                                            | 6.0  | 7.5  | 10       | m $\Omega$ |
|                                       |              | $V_{GS}=2.5V, I_D=5A$                                            | 7.0  | 9.0  | 11       | m $\Omega$ |
| Forward Transconductance              | $g_{FS}$     | $V_{DS}=5V, I_D=5A$                                              | 15   | -    | -        | S          |
| Dynamic Characteristics (Note 4)      |              |                                                                  |      |      |          |            |
| Input Capacitance                     | $C_{iss}$    | $V_{DS}=10V, V_{GS}=0V,$<br>$F=1.0MHz$                           | -    | 1300 | -        | pF         |
| Output Capacitance                    | $C_{oss}$    |                                                                  | -    | 310  | -        | pF         |
| Reverse Transfer Capacitance (Note 4) | $C_{rss}$    |                                                                  | -    | 295  | -        | pF         |
| Gate Resistance                       | $R_g$        | $V_{DS}=0V, V_{GS}=0V, F=1.0MHz$                                 | -    | 1    | -        | K $\Omega$ |
| Switching Characteristics             |              |                                                                  |      |      |          |            |
| Turn-on Delay Time                    | $t_{d(on)}$  | $V_{DD}=10V, I_D=2A, R_L=1\Omega,$<br>$V_{GS}=4.5V, R_G=3\Omega$ | -    | 10.2 | -        | nS         |
| Turn-on Rise Time                     | $t_r$        |                                                                  | -    | 41   | -        | nS         |
| Turn-Off Delay Time                   | $t_{d(off)}$ |                                                                  | -    | 67   | -        | nS         |
| Turn-Off Fall Time                    | $t_f$        |                                                                  | -    | 31   | -        | nS         |
| Total Gate Charge                     | $Q_g$        | $V_{DS}=10V, I_D=3A,$<br>$V_{GS}=4.5V$                           | -    | 17   | -        | nC         |
| Gate-Source Charge                    | $Q_{gs}$     |                                                                  | -    | 2    | -        | nC         |
| Gate-Drain Charge                     | $Q_{gd}$     |                                                                  | -    | 5.1  | -        | nC         |
| Drain-Source Diode Characteristics    |              |                                                                  |      |      |          |            |
| Diode Forward Voltage (Note 3)        | $V_{SD}$     | $V_{GS}=0V, I_S=1A$                                              | -    | -    | 1.2      | V          |
| Diode Forward Current (Note 2)        | $I_S$        |                                                                  | -    | -    | 12       | A          |

### 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.



## PE8212HN Typical Electrical and Thermal Characteristics

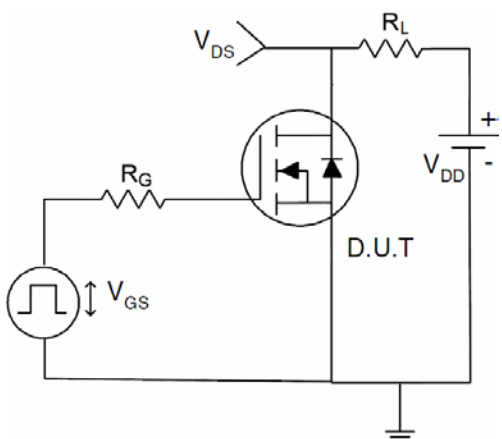


Figure 1 Switching Test Circuit

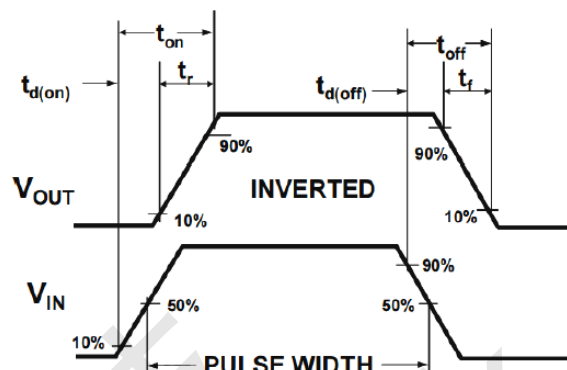


Figure 2 Switching Waveform

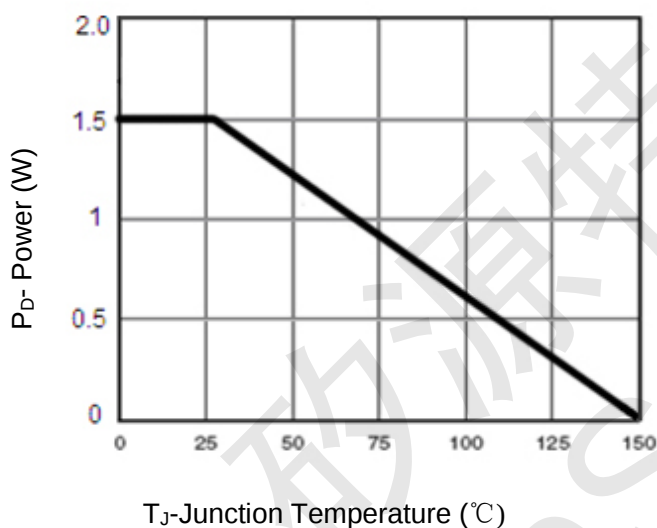


Figure 3 Power Dissipation

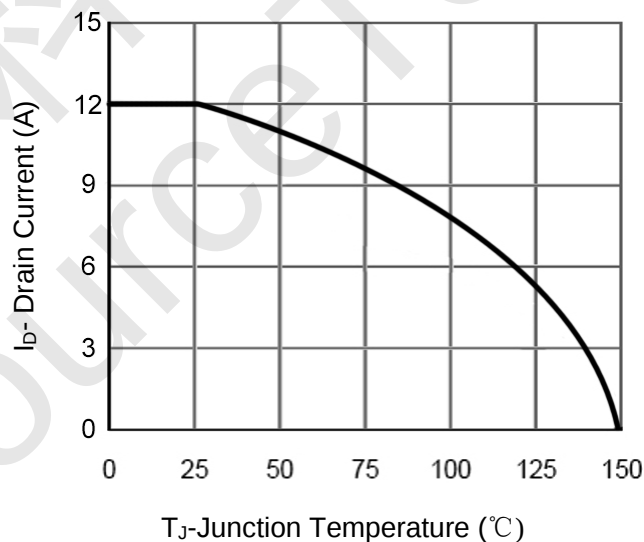


Figure 4 Drain Current

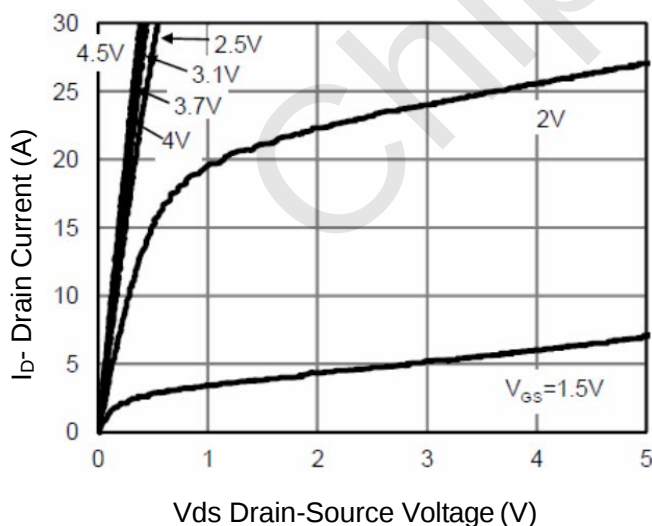


Figure 5 Output Characteristics

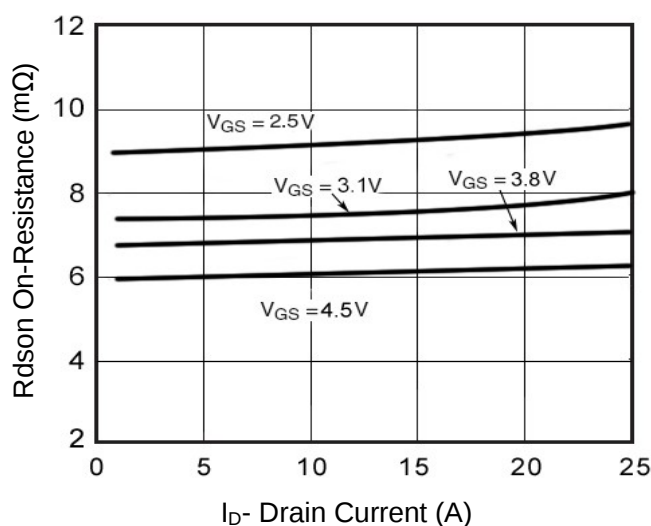


Figure 6 Rdson vs Drain Current

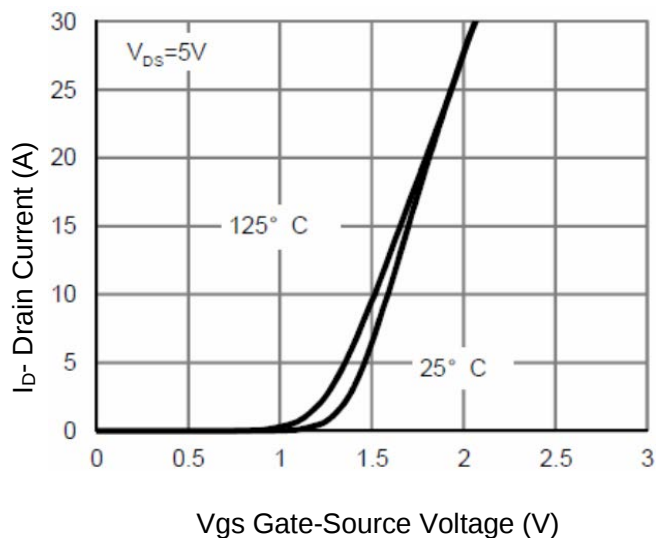


Figure 7 Transfer Characteristics

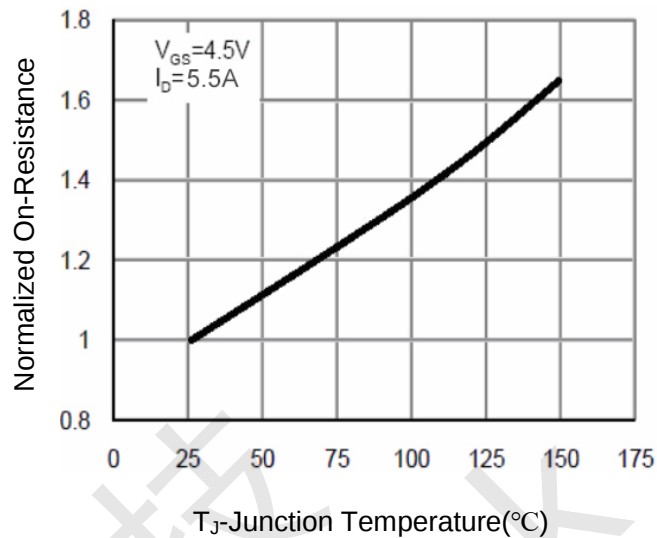


Figure 8 Rdson vs Junction Temperature

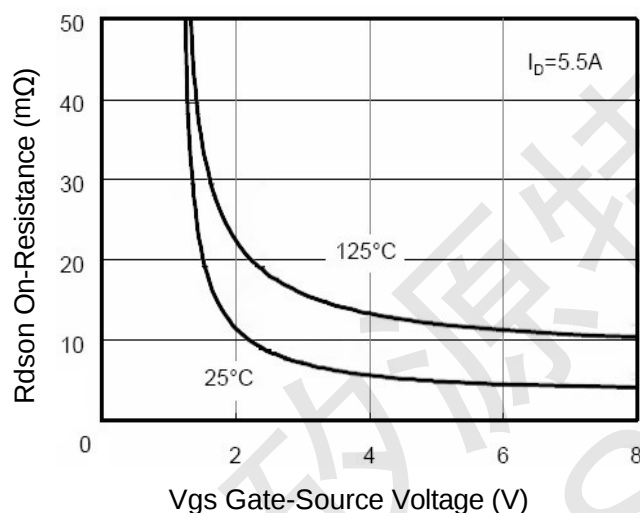


Figure 9 Rdson vs Vgs

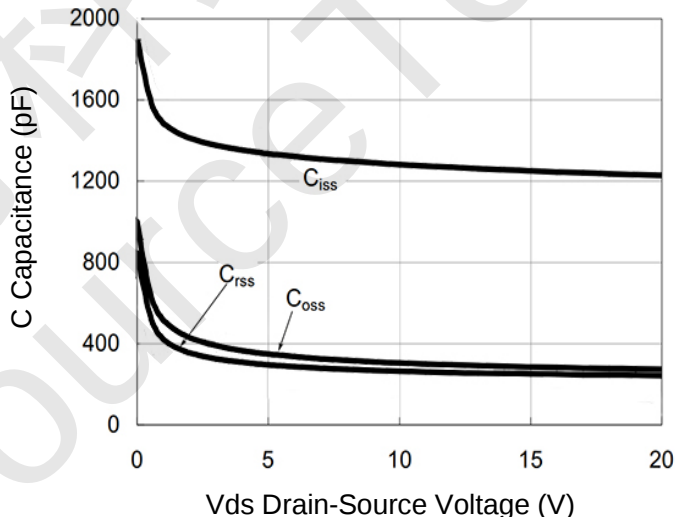


Figure 10 Capacitance vs Vds

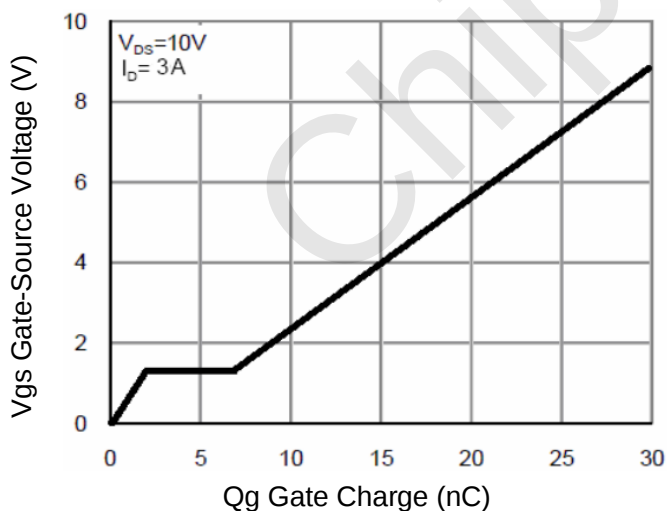


Figure 11 Gate Charge

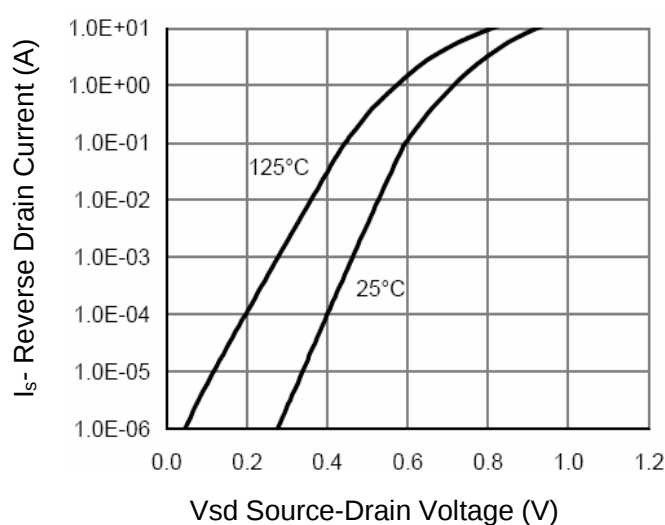


Figure 12 Source- Drain Diode Forward

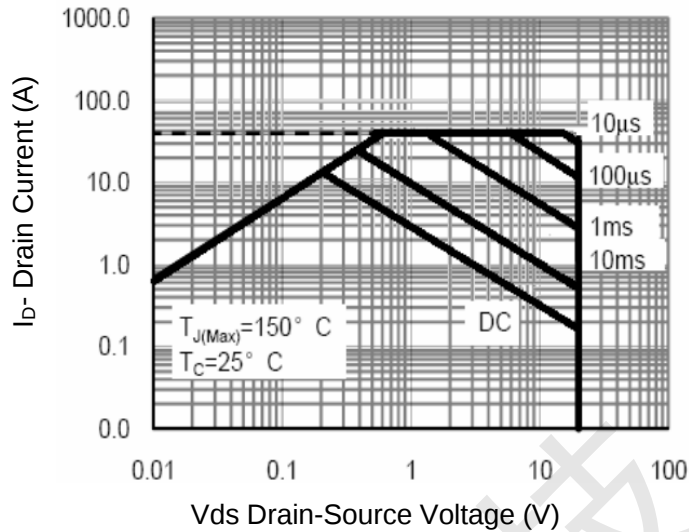


Figure 13 Safe Operation Area

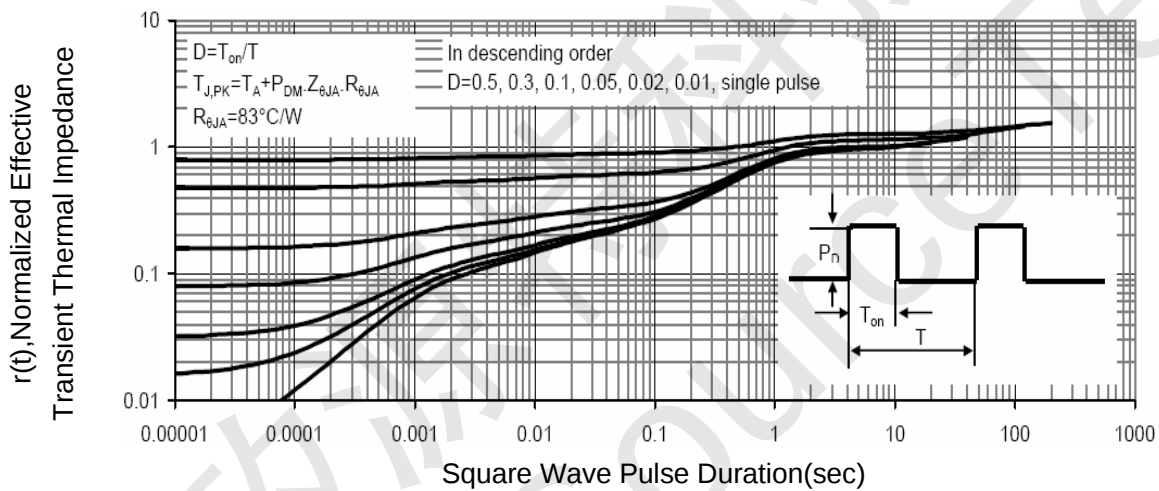
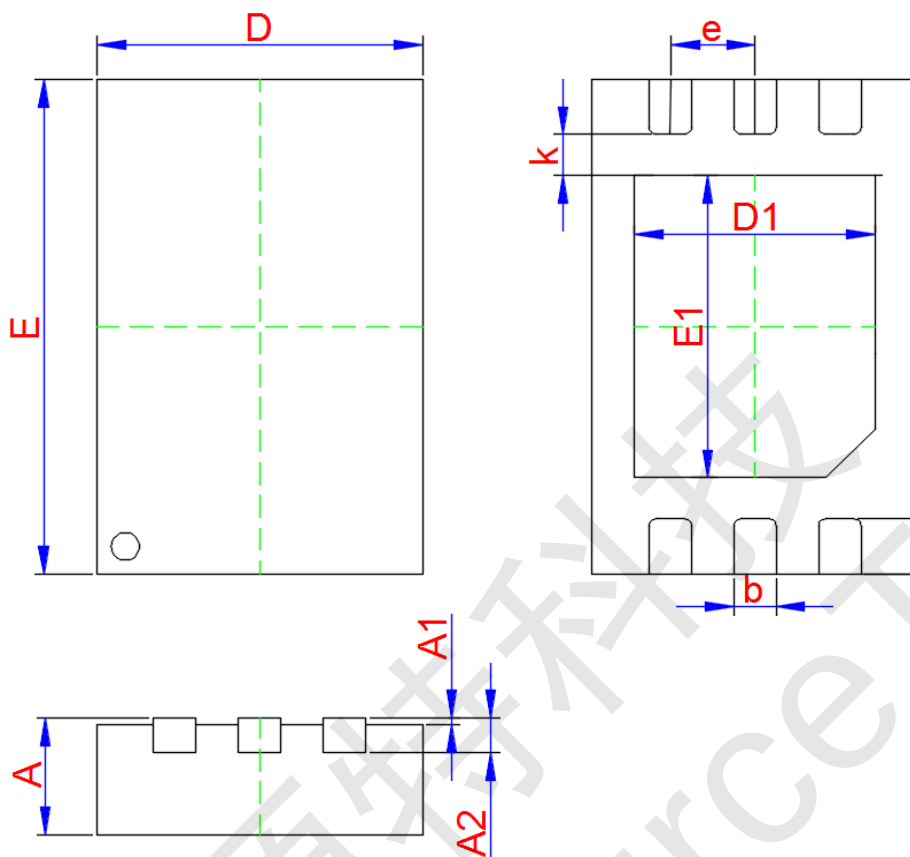


Figure 14 Normalized Maximum Transient Thermal Impedance



PE8212HN DFN2x3-6L Package Information



| Symbol | Dimensions In Millimeters |       |       |
|--------|---------------------------|-------|-------|
|        | Min.                      | Typ.  | Max.  |
| A      | 0.700                     | 0.750 | 0.800 |
| A1     | 0.000                     | 0.020 | 0.050 |
| A2     | 0.203 TYP.                |       |       |
| D      | 1.950                     | 2.000 | 2.050 |
| E      | 2.950                     | 3.000 | 3.050 |
| D1     | 1.450                     | 1.500 | 1.550 |
| E1     | 1.650                     | 1.700 | 1.750 |
| k      | 0.200 MIN.                |       |       |
| b      | 0.200                     | 0.250 | 0.300 |
| e      | 0.500 TYP.                |       |       |
| L      | 0.300                     | 0.350 | 0.400 |