

## P-Channel Enhancement Mode Power MOSFET

### Description

The PE01P15KA uses advanced trench technology to provide excellent  $R_{DS(ON)}$  and low gate charge. It can be used in a wide variety of applications.

### General Features

- $V_{DS} = -100V$ ,  $I_D = -15A$

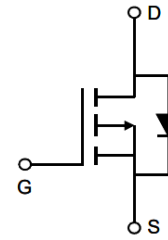
$R_{DS(ON)} < 90m\Omega$  @  $V_{GS} = -10V$

$R_{DS(ON)} < 100m\Omega$  @  $V_{GS} = -4.5V$

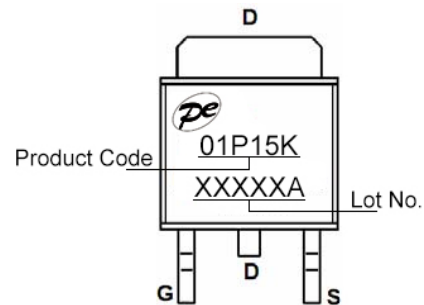
- High Power and current handling capability
- Lead free product is acquired
- Surface Mount Package

### Application

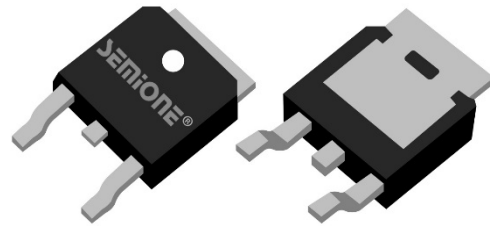
- PWM applications
- Load switch
- Power management



Schematic diagram



Marking and pin assignment



TO-252-2L

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

| Parameter                                        | Symbol         | Rating     | Unit |
|--------------------------------------------------|----------------|------------|------|
| Drain-Source Voltage                             | $V_{DS}$       | -100       | V    |
| Gate-Source Voltage                              | $V_{GS}$       | $\pm 20$   | V    |
| Drain Current-Continuous                         | $I_D$          | -15        | A    |
| Drain Current-Continuous (TC=100°C)              | $I_D$          | -10.5      | A    |
| Pulsed Drain Current (Note 1)                    | $I_{DM}$       | -45        | A    |
| Maximum Power Dissipation                        | $P_D$          | 91         | W    |
| Avalanche Energy (L=0.5mH)                       | $E_{AS}$       | 169        | mJ   |
| Operating Junction and Storage Temperature Range | $T_J, T_{STG}$ | -55 To 175 | °C   |

### Thermal Characteristic

|                                               |                 |      |      |
|-----------------------------------------------|-----------------|------|------|
| Thermal Resistance, Junction-to-Case (Note 2) | $R_{\theta JC}$ | 1.65 | °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                                             | -100 | -    | -    | V    |
| Zero Gate Voltage Drain Current       | I <sub>DSS</sub>    | V <sub>DS</sub> =-100V,V <sub>GS</sub> =0V                                             | -    | -    | -1   | μA   |
| Gate-Body Leakage Current             | I <sub>GSS</sub>    | V <sub>GS</sub> =±20V,V <sub>DS</sub> =0V                                              | -    | -    | ±100 | nA   |
| On Characteristics (Note 3)           |                     |                                                                                        |      |      |      |      |
| Gate Threshold Voltage                | V <sub>GS(th)</sub> | V <sub>DS</sub> =V <sub>GS</sub> ,I <sub>D</sub> =-250μA                               | -1.2 | -2   | -2.5 | V    |
| Drain-Source On-State Resistance      | R <sub>DS(ON)</sub> | V <sub>GS</sub> =-10V,I <sub>D</sub> =-8A                                              | -    | 68   | 90   | mΩ   |
|                                       |                     | V <sub>GS</sub> =-4.5V,I <sub>D</sub> =-8A                                             | -    | 78   | 100  | mΩ   |
| Forward Transconductance              | g <sub>FS</sub>     | V <sub>DS</sub> =-10V,I <sub>D</sub> =-8A                                              | -    | 20   | -    | S    |
| Dynamic Characteristics (Note 4)      |                     |                                                                                        |      |      |      |      |
| Input Capacitance                     | C <sub>iss</sub>    | V <sub>DS</sub> =-50V,V <sub>GS</sub> =0V,<br>F=1.0MHz                                 | -    | 2450 | -    | pF   |
| Output Capacitance                    | C <sub>oss</sub>    |                                                                                        | -    | 370  | -    | pF   |
| Reverse Transfer Capacitance (Note 4) | C <sub>rss</sub>    |                                                                                        | -    | 140  | -    | pF   |
| Switching Characteristics             |                     |                                                                                        |      |      |      |      |
| Turn-on Delay Time                    | t <sub>d(on)</sub>  | V <sub>DD</sub> =-50V,I <sub>D</sub> =-8A,<br>V <sub>GS</sub> =-10V,R <sub>G</sub> =3Ω | -    | 16   | -    | nS   |
| Turn-on Rise Time                     | t <sub>r</sub>      |                                                                                        | -    | 73   | -    | nS   |
| Turn-Off Delay Time                   | t <sub>d(off)</sub> |                                                                                        | -    | 34   | -    | nS   |
| Turn-Off Fall Time                    | t <sub>f</sub>      |                                                                                        | -    | 57   | -    | nS   |
| Total Gate Charge                     | Q <sub>g</sub>      | V <sub>DS</sub> =-50V,I <sub>D</sub> =-8A,V <sub>GS</sub> =-10V                        | -    | 61   | -    | nC   |
| Gate-Source Charge                    | Q <sub>gs</sub>     |                                                                                        | -    | 14   | -    | nC   |
| Gate-Drain Charge                     | Q <sub>gd</sub>     |                                                                                        | -    | 15   | -    | nC   |
| Drain-Source Diode Characteristics    |                     |                                                                                        |      |      |      |      |
| Diode Forward Voltage (Note 3)        | V <sub>SD</sub>     | V <sub>GS</sub> =0V,I <sub>S</sub> =-1A                                                | -    | -    | -1.2 | V    |
| Maximum Body-Diode Current            | I <sub>S</sub>      |                                                                                        | -    | -    | -15  | 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.

## Typical Electrical and Thermal Characteristics

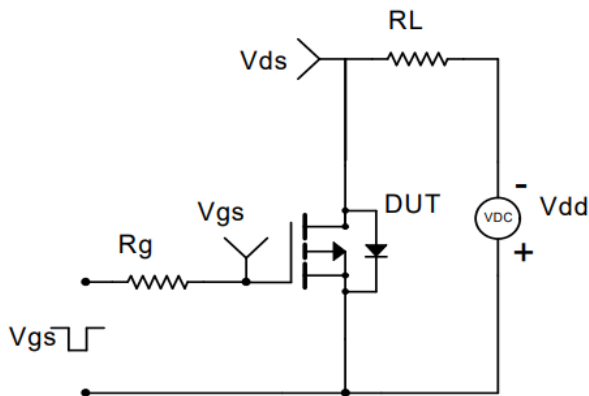


Figure 1 Switching Test Circuit

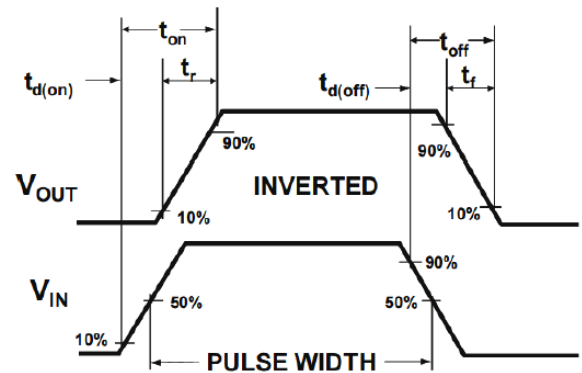


Figure 2 Switching Waveform

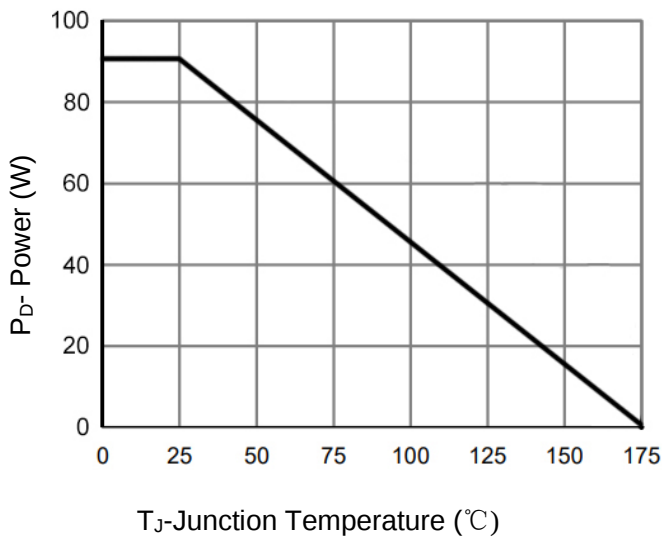


Figure 3 Power De-rating

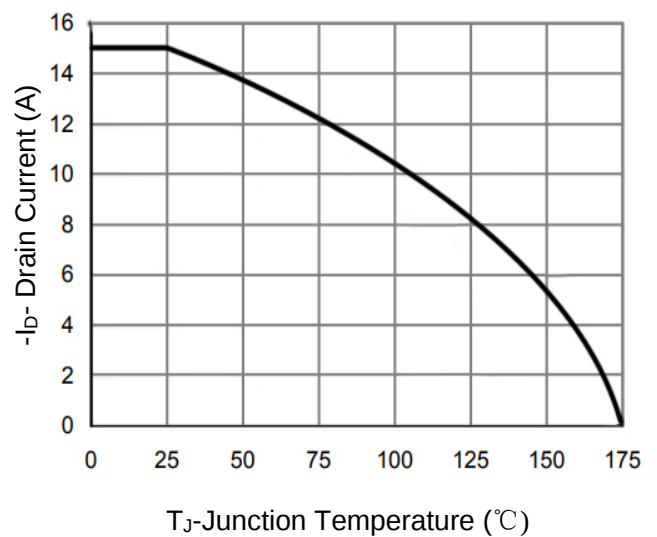


Figure 4 Drain Current

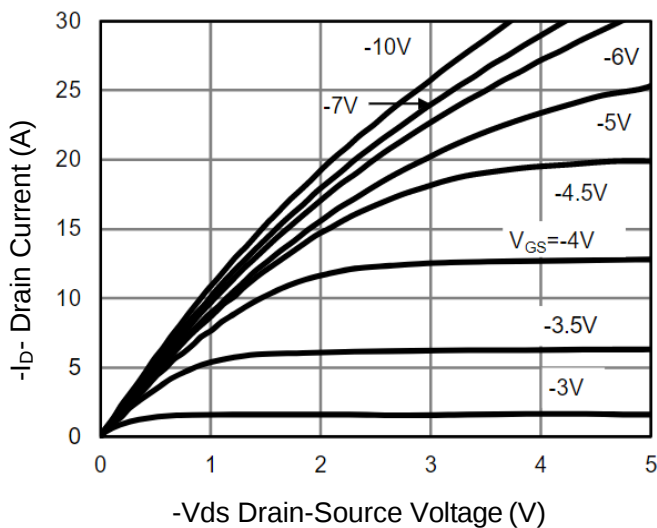


Figure 5 Output Characteristics

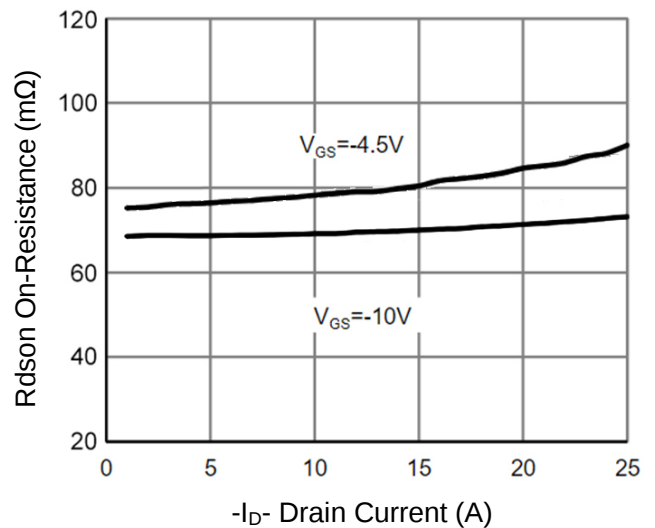


Figure 6 Rdson vs Drain Current

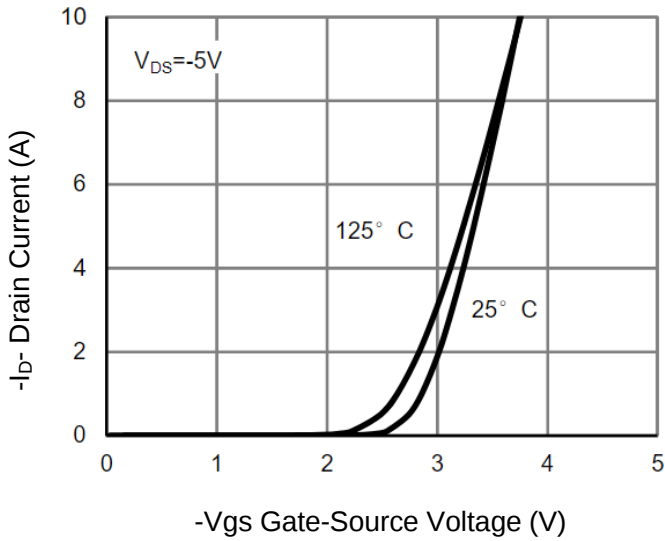


Figure 7 Transfer Characteristics

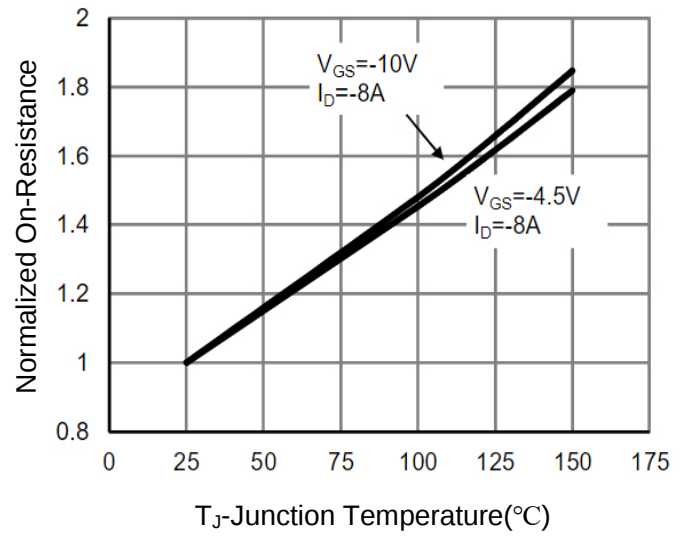


Figure 8 Rdson vs Junction Temperature

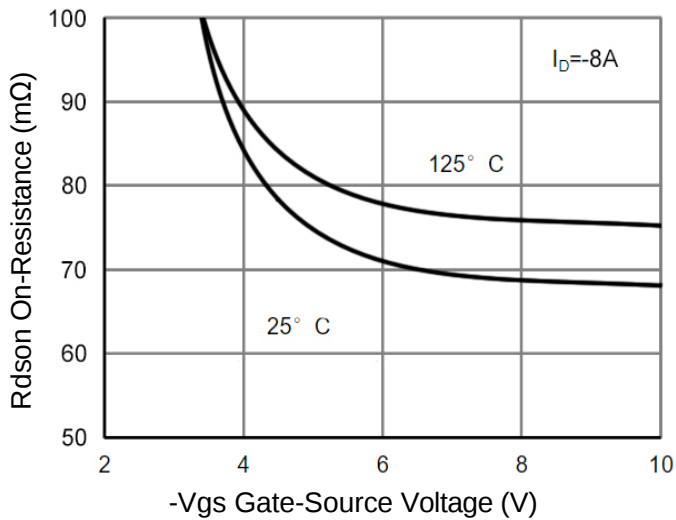


Figure 9 Rdson vs Vgs

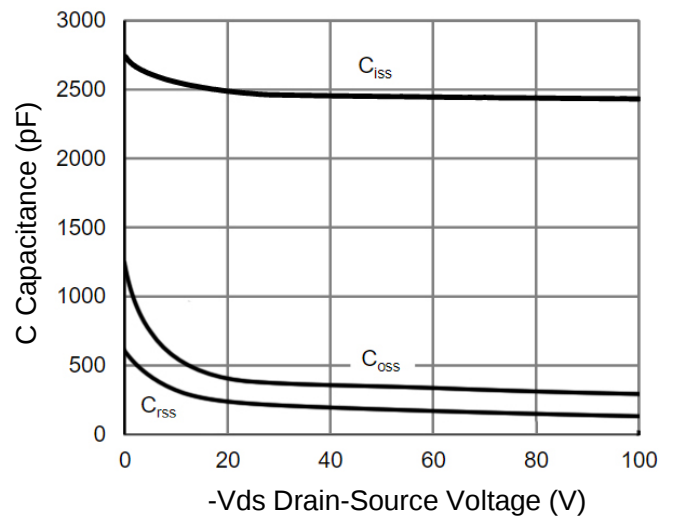


Figure 10 Capacitance vs Vds

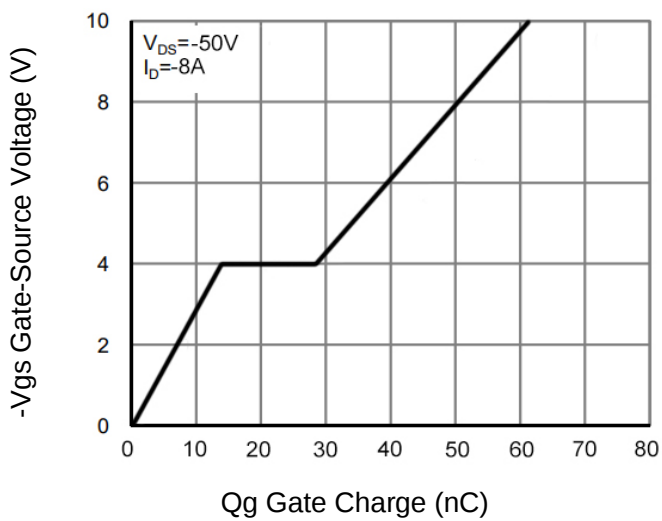


Figure 11 Gate Charge

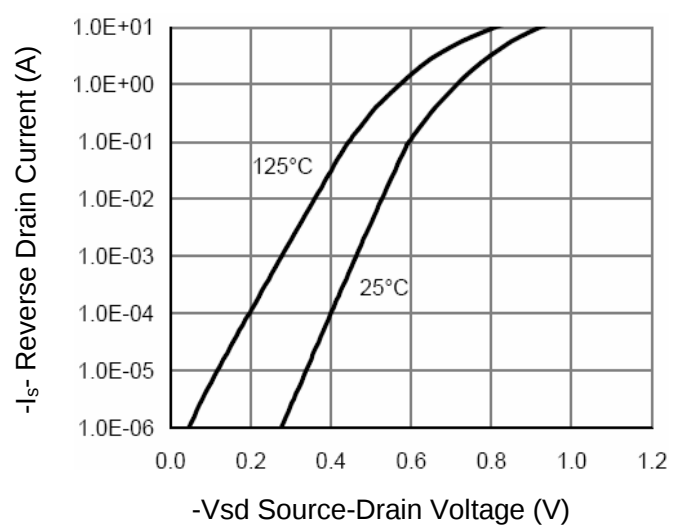


Figure 12 Source- Drain Diode Forward

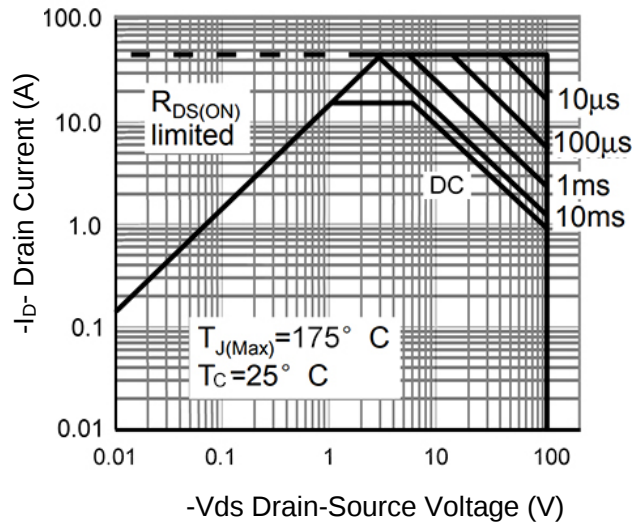


Figure 13 Safe Operation Area

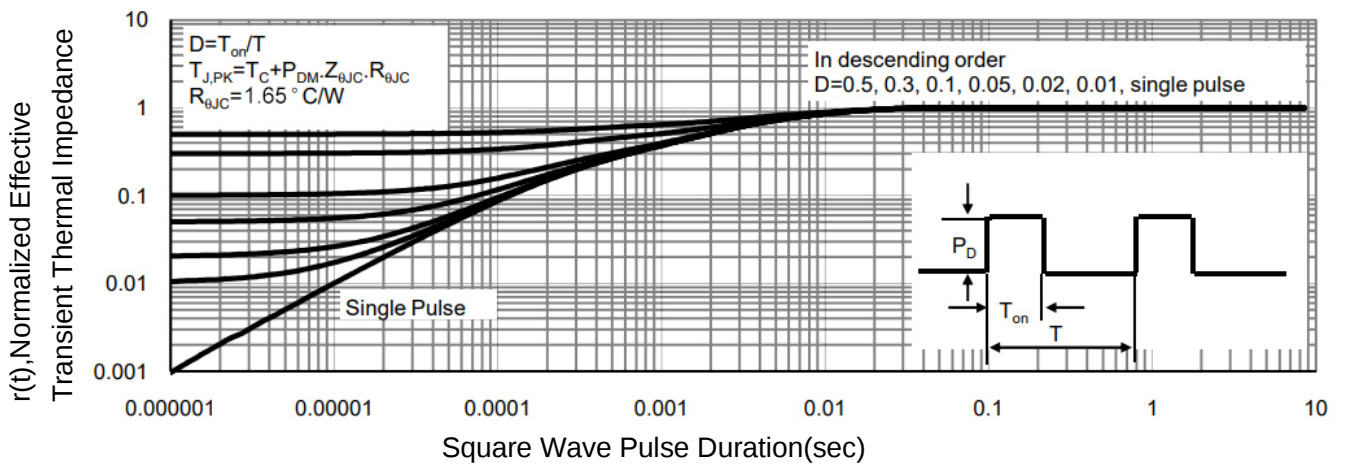
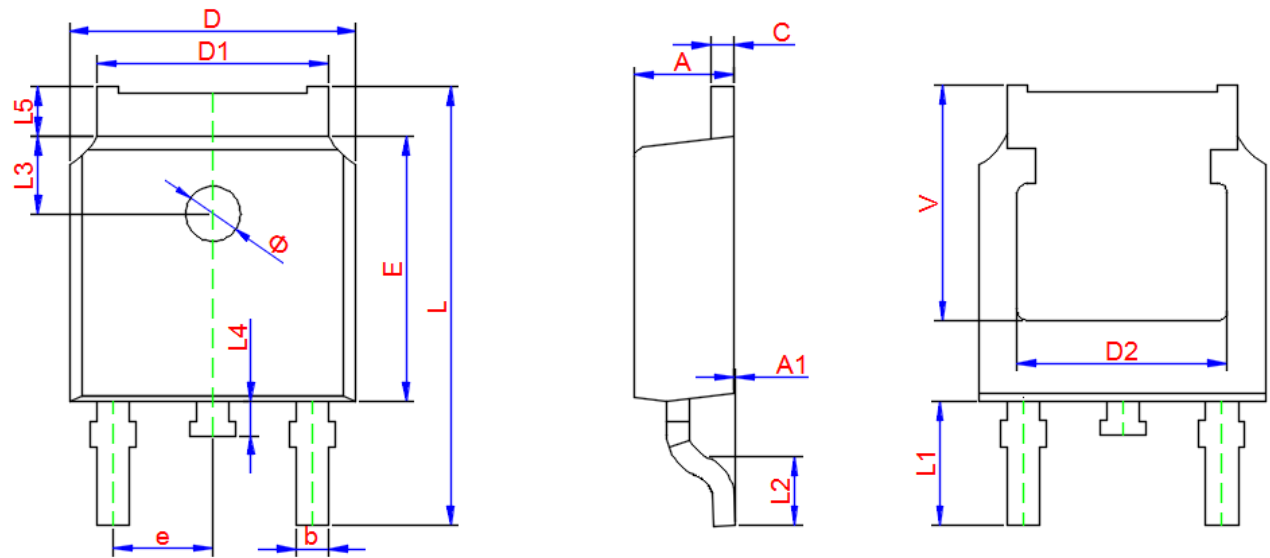


Figure 14 Normalized Maximum Transient Thermal Impedance

TO-252-2L Package Information



| Symbol | Dimensions In Millimeters |        |        |
|--------|---------------------------|--------|--------|
|        | Min.                      | Typ.   | Max.   |
| A      | 2.200                     | 2.300  | 2.400  |
| A1     | 0.000                     | --     | 0.127  |
| b      | 0.660                     | 0.760  | 0.860  |
| D      | 6.500                     | 6.600  | 6.700  |
| D1     | 5.100                     | 5.330  | 5.460  |
| C      | 0.450                     | 0.500  | 0.600  |
| D2     | 4.830 TYP.                |        |        |
| E      | 6.000                     | 6.100  | 6.200  |
| e      | 2.186                     | 2.286  | 2.386  |
| L      | 9.800                     | 10.100 | 10.400 |
| L1     | 2.900 TYP.                |        |        |
| L2     | 1.400                     | 1.500  | 1.600  |
| L3     | 1.800 TYP.                |        |        |
| L4     | 0.600                     | 0.800  | 1.000  |
| L5     | 0.900                     | --     | 1.250  |
| Φ      | 1.100.                    | --     | 1.300  |
| θ      | 0°                        | --     | 8°     |
| V      | 5.350                     |        |        |