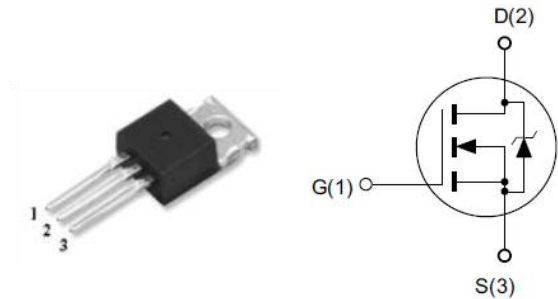


### Features

- ◆ 110V, 294A,  $R_{DS(on)}$ (Typ.) =  $2.0m\Omega @ V_{GS} = 10V$
- ◆ Excellent  $R_{DS(on)}$  and Low Gate Charge
- ◆ 100%  $E_{AS}$  Guaranteed
- ◆ Halogen-free; RoHS-compliant

### Application

- ◆ Load Switch
- ◆ PWM Application
- ◆ Power Management



### Absolute Maximum Ratings $T_c = 25^\circ C$ unless otherwise noted

| Symbol         | Parameter                                     | Rating              | Unit       |
|----------------|-----------------------------------------------|---------------------|------------|
| $V_{DS}$       | Drain-Source Voltage <sup>a</sup>             | 110                 | V          |
| $V_{GS}$       | Gate-Source Voltage                           | $\pm 20$            |            |
| $I_D$          | Drain Current-Continuous                      | $T_C = 25^\circ C$  | A          |
|                |                                               | $T_C = 100^\circ C$ |            |
| $I_{DM}$       | Drain Current-Pulsed <sup>b</sup>             | 1175                |            |
| $P_D$          | Maximum Power Dissipation, $T_C = 25^\circ C$ | 417                 | W          |
| $E_{AS}$       | Single Pulsed Avalanche Energy <sup>c</sup>   | 1296                | mJ         |
| $T_J, T_{STG}$ | Operating and Store Temperature Range         | 150, -55 to 150     | $^\circ C$ |

### Thermal Characteristics

| Symbol          | Parameter                               | Value | Unit         |
|-----------------|-----------------------------------------|-------|--------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case    | 0.3   | $^\circ C/W$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient | 34    |              |

### Electrical Characteristics $T_J = 25^\circ C$ unless otherwise noted

#### ■ Off Characteristics

| Symbol     | Parameter                         | Test Condition                  | Min. | Typ. | Max.      | Unit    |
|------------|-----------------------------------|---------------------------------|------|------|-----------|---------|
| $BV_{DSS}$ | Drain-Source Breakdown Voltage    | $V_{GS} = 0V, I_D = 250\mu A$   | 110  | -    | -         | V       |
| $I_{DSS}$  | Zero Gate Voltage Drain Current   | $V_{DS} = 110V, V_{GS} = 0V$    | -    | -    | 1.0       | $\mu A$ |
| $I_{GSS}$  | Forward Gate Body Leakage Current | $V_{DS} = 0V, V_{GS} = \pm 20V$ | -    | -    | $\pm 100$ | nA      |

### ■ On Characteristics

| Symbol       | Parameter                                      | Test Condition                    | Min. | Typ. | Max. | Unit |
|--------------|------------------------------------------------|-----------------------------------|------|------|------|------|
| $V_{GS(th)}$ | Gate Threshold Voltage                         | $V_{DS} = V_{GS}, I_D = 250\mu A$ | 2.0  | -    | 4.0  | V    |
| $R_{DS(on)}$ | Static Drain-Source On-Resistance <sup>d</sup> | $V_{GS} = 10V, I_D = 20A$         | -    | 2.0  | 2.6  | mΩ   |

### ■ Dynamic Characteristics

| Symbol    | Parameter                    | Test Condition                          | Min. | Typ.  | Max. | Unit |
|-----------|------------------------------|-----------------------------------------|------|-------|------|------|
| $R_G$     | Gate Resistance              | $V_{DS} = V_{GS} = 0V, f = 1.0MHz$      | -    | 2.8   | -    | Ω    |
| $C_{iss}$ | Input Capacitance            | $V_{DS} = 55V, V_{GS} = 0V, f = 1.0MHz$ | -    | 11.55 | -    | nF   |
| $C_{oss}$ | Output Capacitance           |                                         | -    | 1590  | -    | pF   |
| $C_{rss}$ | Reverse Transfer Capacitance |                                         | -    | 37    | -    |      |

### ■ On Characteristics

| Symbol       | Parameter           | Test Condition                                               | Min. | Typ. | Max. | Unit |
|--------------|---------------------|--------------------------------------------------------------|------|------|------|------|
| $t_{d(on)}$  | Turn-On Delay Time  | $V_{DD} = 55V, V_{GS} = 10V, I_D = 20A, R_{GEN} = 6.2\Omega$ | -    | 50   | -    | ns   |
| $t_r$        | Turn-On Rise Time   |                                                              | -    | 76   | -    |      |
| $t_{d(off)}$ | Turn-Off Delay Time |                                                              | -    | 143  | -    |      |
| $t_f$        | Turn-Off Fall Time  |                                                              | -    | 84   | -    |      |
| $Q_g$        | Total Gate Charge   | $V_{DS} = 55V, V_{GS} = 0 \text{ to } 10V, I_D = 20A$        | -    | 172  | -    | nC   |
| $Q_{gs}$     | Gate-Source Charge  |                                                              | -    | 57   | -    |      |
| $Q_{gd}$     | Gate-Drain Charge   |                                                              | -    | 40   | -    |      |

### ■ Drain-Source Diode Characteristics

| Symbol   | Parameter                                     | Test Condition                         | Min. | Typ. | Max. | Unit |
|----------|-----------------------------------------------|----------------------------------------|------|------|------|------|
| $I_S$    | Drain-Source Diode Forward Continuous Current | $V_G = V_D = 0V, \text{Force Current}$ | -    | -    | 294  | A    |
| $I_{SM}$ | Maximum Pulsed Current                        |                                        | -    | -    | 1175 |      |
| $V_{SD}$ | Drain-Source Diode Forward Voltage            | $V_{GS} = 0V, I_S = 20A$               | -    | -    | 1.2  | V    |
| $T_{rr}$ | Body Diode Reverse Recovery Time              | $I_F = 20A, di_F/dt = 100A/\mu s$      | -    | 104  | -    | ns   |
| $Q_{rr}$ | Body Diode Reverse Recovery Charge            | $I_F = 20A, di_F/dt = 100A/\mu s$      | -    | 351  | -    | nC   |

Notes:

- $T_J = +25^\circ C$  to  $+150^\circ C$ .
- Repetitive rating: pulse width limited by maximum junction temperature.
- $L = 0.5mH, V_{DD} = 25V, I_{AS} = 72A, R_G = 25\Omega$  Starting  $T_J = 25^\circ C$ .
- Pulse width  $\leq 300\mu s$ ; duty cycle  $\leq 0.5\%$ .

### Characteristic Curve

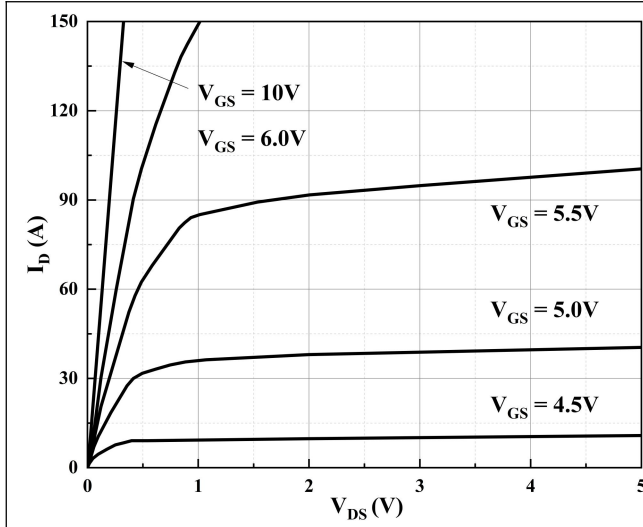


Figure 1. Typical Output Characteristics

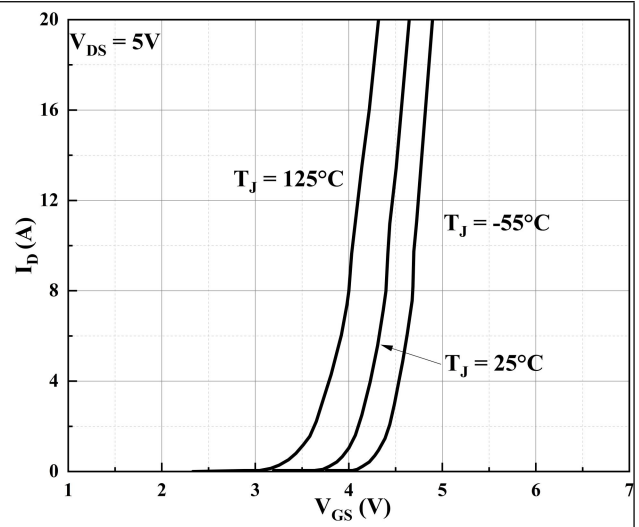


Figure 2. Typical Transfer Characteristics

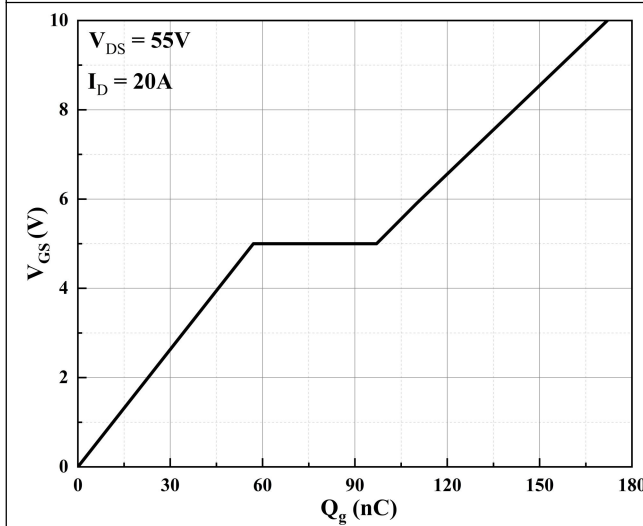


Figure 3. Typical Gate Charge

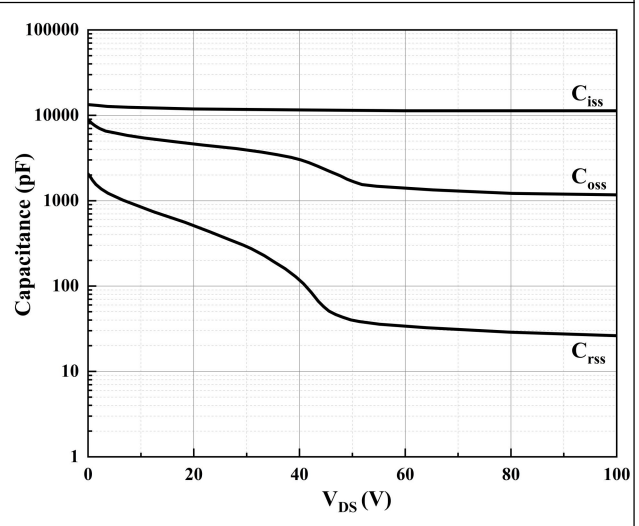


Figure 4. Typical Capacitance

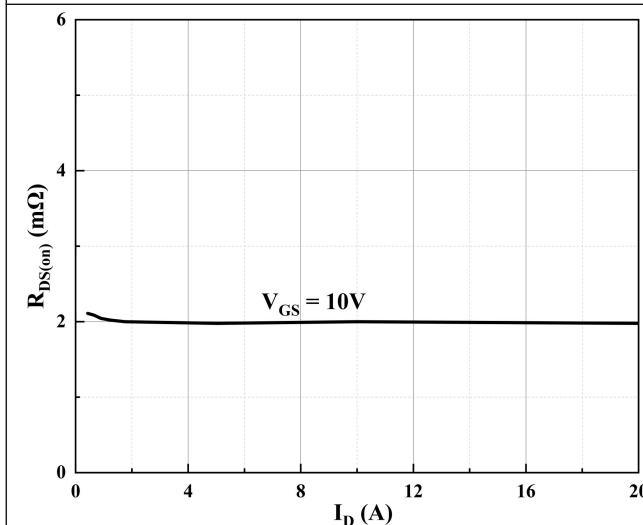


Figure 5. Static Drain-Source On-Resistance vs. Drain Current

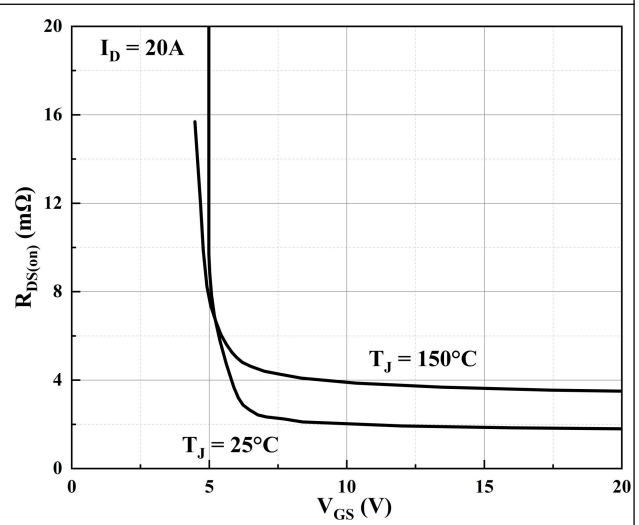


Figure 6. Static Drain-Source On-Resistance vs. Gate-Source Voltage

### ■ Characteristic Curve

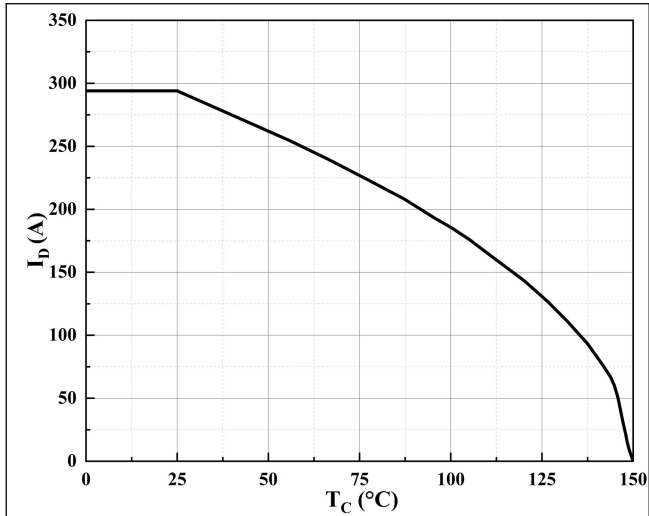


Figure 7. Maximum Continuous Drain Current vs. Case Temperature

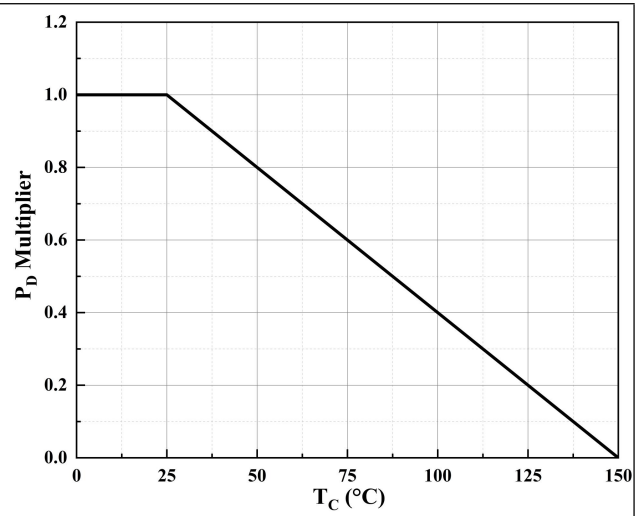


Figure 8. Maximum Power Dissipation Multiplier vs. Case Temperature

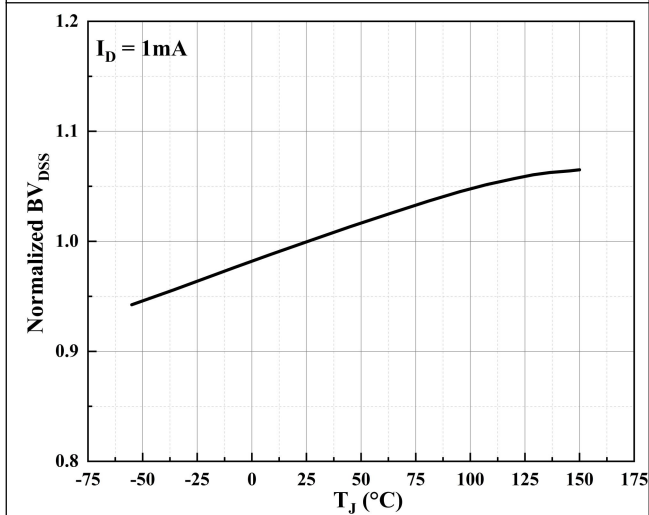


Figure 9. Normalized Breakdown Voltage vs. Junction Temperature

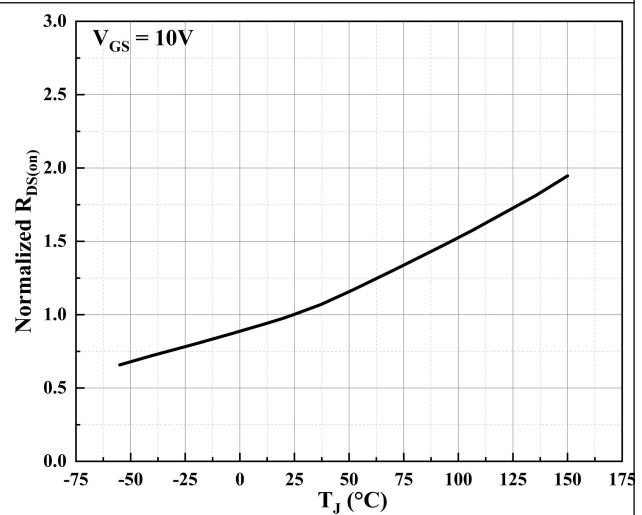


Figure 10. Normalized Static Drain-Source On-Resistance vs. Junction Temperature

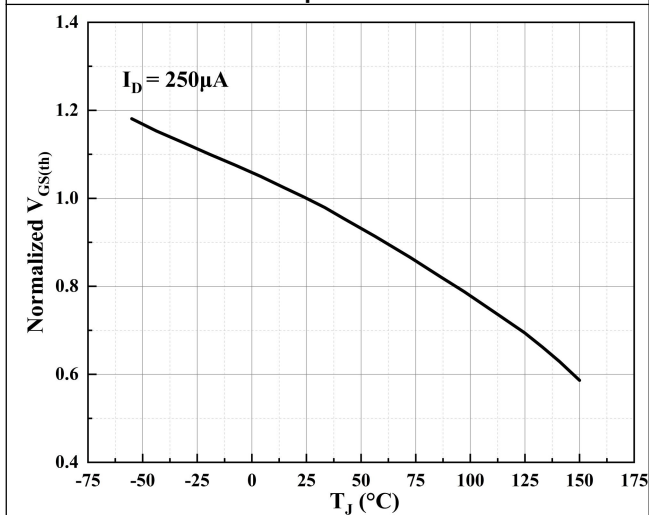


Figure 11. Normalized Threshold Voltage vs. Junction Temperature

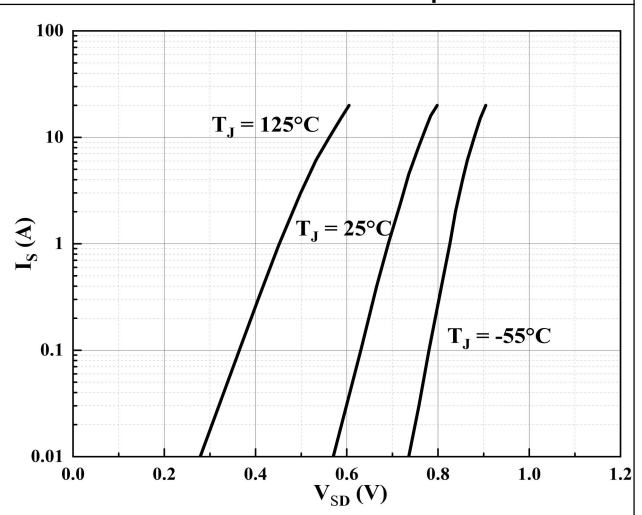


Figure 12. Body Diode Characteristics

### ■ Characteristic Curve

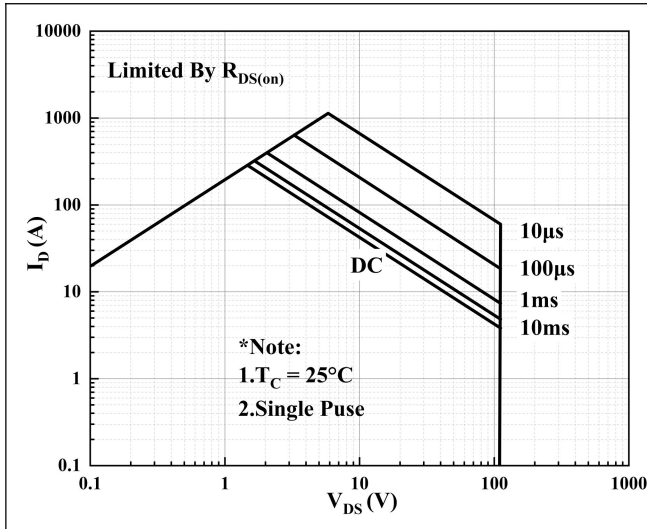


Figure 13. Maximum Safe Operating Area

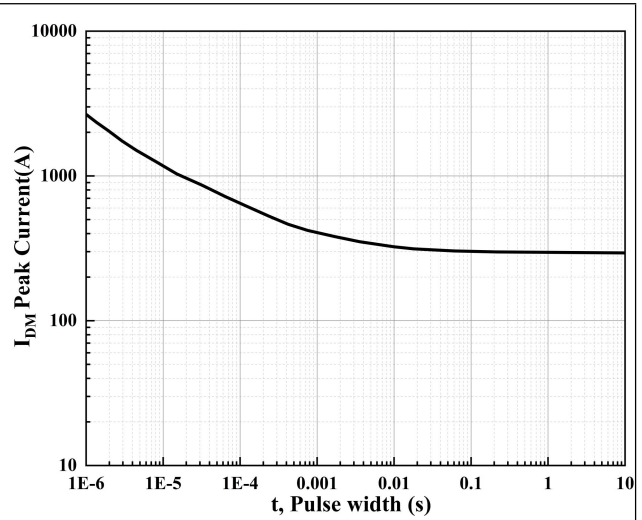


Figure 14. Peak Current Capacity

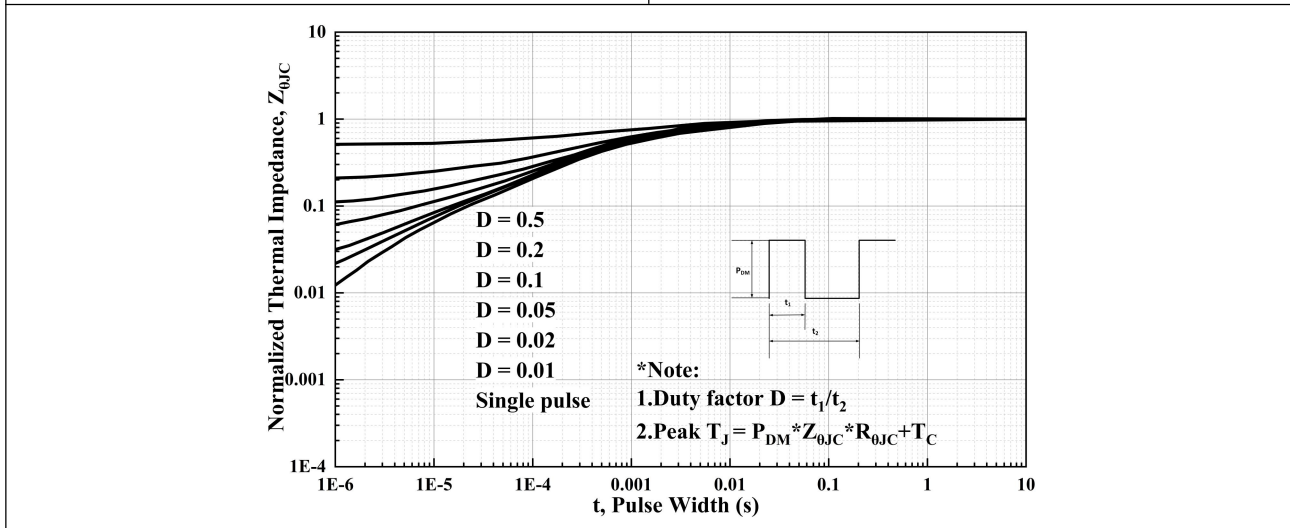
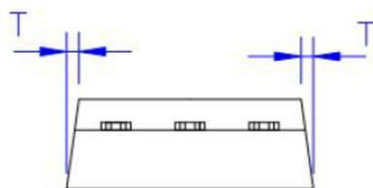
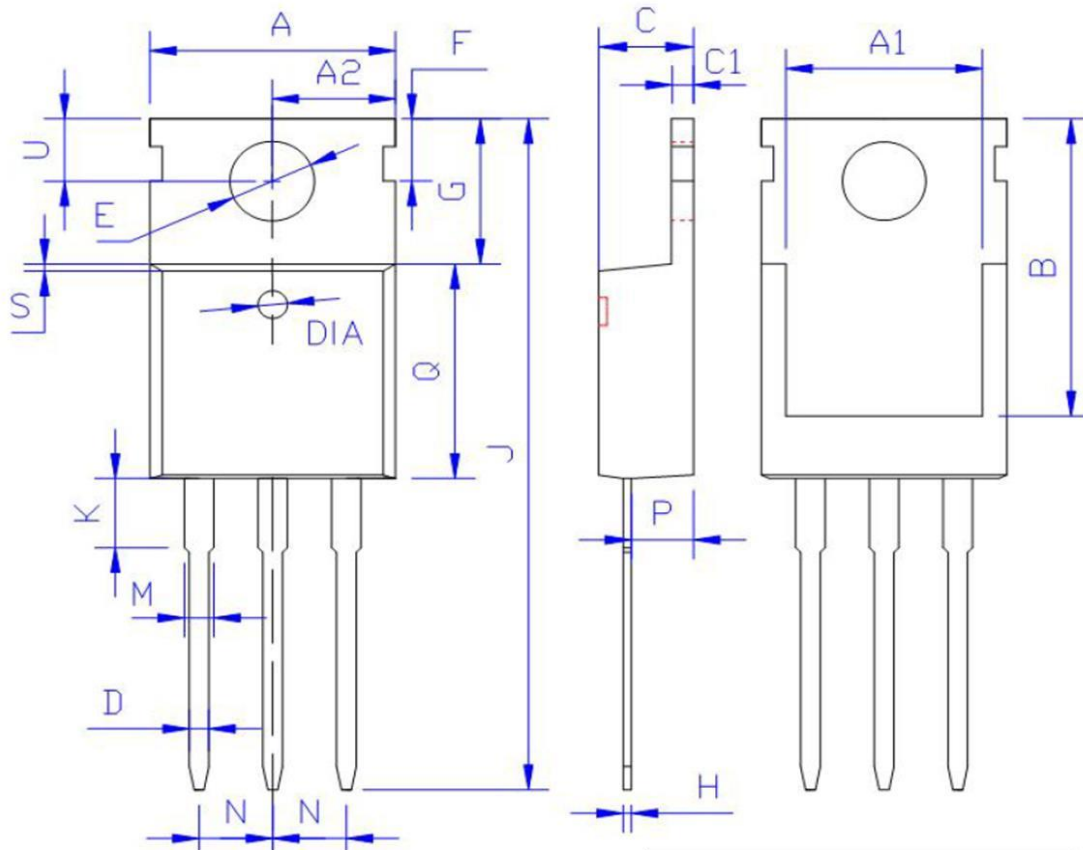


Figure 15. Normalized Maximum Transient Thermal Impedance

### Package Information

#### TO-220



| Dim.                         | Min.                    | Max.  |
|------------------------------|-------------------------|-------|
| A                            | 9.80                    | 10.20 |
| A1                           | 7.80                    | 8.20  |
| A2                           | 4.80                    | 5.20  |
| B                            | 13.00                   | 13.40 |
| C                            | 4.35                    | 4.65  |
| C1                           | 1.15                    | 1.45  |
| D                            | 0.65                    | 0.95  |
| E                            | 3.45                    | 3.75  |
| F                            | 2.85                    | 3.15  |
| G                            | 6.40                    | 6.80  |
| H                            | 0.35                    | 0.65  |
| J                            | 28.68                   | 29.08 |
| K                            | 2.80                    | 3.20  |
| M                            | 1.15                    | 1.45  |
| N                            | Typical 2.54            |       |
| P                            | 2.20                    | 2.60  |
| Q                            | 9.00                    | 9.40  |
| S                            | 0.15                    | 0.35  |
| T                            | 0.15                    | 0.35  |
| U                            | 2.65                    | 2.95  |
| DIA                          | 直径 1.5±0.1<br>深 MAX 0.5 |       |
| All Dimensions in millimeter |                         |       |