

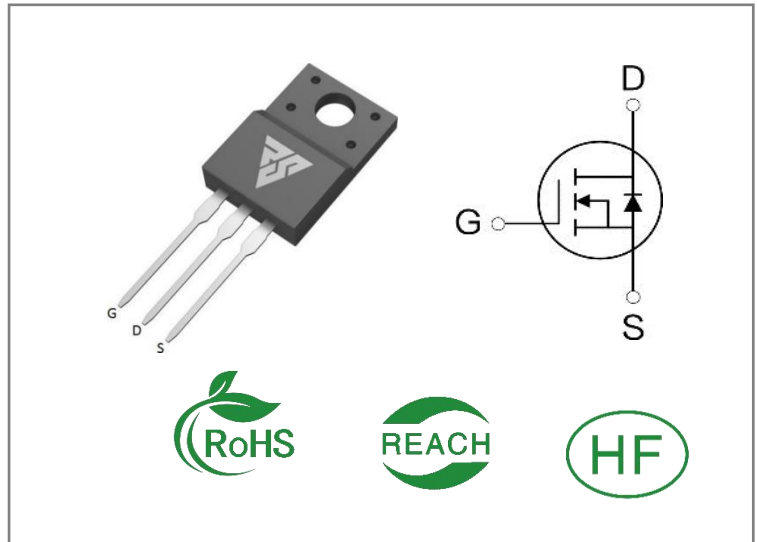
| ID  | $R_{DS(ON)}$ (Typ) | VDSS |
|-----|--------------------|------|
| 23A | 118m $\Omega$      | 550V |

#### Applications:

- Switch Mode Power Supply(SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)
- AC-DC Switching Power Supply

#### Features:

- Fast switching speed
- 100% avalanche tested
- Improved dv/dt capability



#### Ordering Information

| Part Number | Package | Marking   | Packing | Qty.   |
|-------------|---------|-----------|---------|--------|
| RS55R140F   | T0-220F | RS55R140F | Tube    | 50 PCS |

#### Absolute Maximum Ratings $T_c = 25^\circ\text{C}$ unless otherwise specified

| Symbol      | Parameter                                                                                              | RS55R140F  | Units            |
|-------------|--------------------------------------------------------------------------------------------------------|------------|------------------|
| VDSS        | Drain-to-Source Voltage                                                                                | 550        | V                |
| ID          | Continuous Drain Current $T_C = 25^\circ\text{C}$                                                      | 23         | A                |
| ID          | Continuous Drain Current $T_C = 100^\circ\text{C}$                                                     | 13.8       |                  |
| IDM         | Pulsed Drain Current (Note*1)                                                                          | 78         |                  |
| PD          | Power Dissipation                                                                                      | 107        | W                |
| VGS         | Gate- to- Source Voltage                                                                               | $\pm 30$   | V                |
| EAS         | Single Pulse Avalanche Energy<br>$L = 10\text{mH}$ , $V_{DS} = 100\text{V}$ , $T_C = 25^\circ\text{C}$ | 580        | mJ               |
| dv/dt       | MOSFET dv/ dt ruggedness $V_{DS} = 0 \dots 400\text{V}$                                                | 50         | V/ns             |
| dv/dt       | Reverse diode dv/dt $V_{DS} = 0 \dots 400\text{V}$ , $T_j = 25^\circ\text{C}$ ,<br>$I_{SD} \leq I_D$   | 15         | V/ns             |
| TL TPKG     | Maximum Temperature for Soldering                                                                      | 300        | $^\circ\text{C}$ |
|             | Leads at 0.063in(1.6mm)from Case for 10 seconds<br>Package Body for 10 seconds                         | 260        |                  |
| TJ and TSTG | Operating Junction and Storage Temperature Range                                                       | -55 to 150 |                  |

\* Drain Current Limited by Maximum Junction Temperature

Caution: Stresses greater than those listed in the " Absolute Maximum Ratings" Table may cause permanent damage to the device.

**Thermal Resistance**

| Symbol        | Parameter            | RS55R140F | Units  | Test Conditions                                                                                         |
|---------------|----------------------|-----------|--------|---------------------------------------------------------------------------------------------------------|
| R $\theta$ JC | Junction-to-Case     | 1.16      | °C / W | Drain lead soldered to water cooled heatsink, PD adjusted for a peak junction temperature of + 1 5 0 °C |
| R $\theta$ JA | Junction-to- Ambient | 42        |        | 1 cubic foot chamber,free air.                                                                          |

**OFF Characteristics** TJ= 25°C unless otherwise specified

| Symbol | Parameter                           | Min. | Typ. | Max. | Units | Test Conditions    |
|--------|-------------------------------------|------|------|------|-------|--------------------|
| BVDSS  | Drain- to- source Breakdown Voltage | 550  | --   | --   | V     | VGS=0V,ID=250μA    |
| IDSS   | Drain- to- Source Leakage Current   | --   | --   | 1    | μA    | VDS=550V<br>VGS=0V |
| IGSS   | Gate- to- Source Forward Leakage    | --   | --   | 100  | nA    | VGS=30V<br>VDS=0V  |
|        | Gate- to- Source Reverse Leakage    | --   | --   | -100 |       | VGS=-30V<br>VDS=0V |

**ON Characteristics** TJ=25°C unless otherwise specified

| Symbol  | Parameter                                      | Min. | Typ. | Max. | Units | Test Conditions     |
|---------|------------------------------------------------|------|------|------|-------|---------------------|
| RDS(on) | Static Drain- to- Source On-Resistance(Note*2) | --   | 118  | 140  | mΩ    | VGS=10V,ID=13A      |
| VGS(TH) | Gate Threshold Voltage                         | 2    | 3.1  | 4    | V     | VGS=VDS<br>ID=250μA |

**Resistive Switching Characteristics** Essentially independent of operating temperature

| Symbol  | Parameter            | Min. | Typ. | Max. | Units | Test Conditions                         |
|---------|----------------------|------|------|------|-------|-----------------------------------------|
| td(ON)  | Turn- on Delay Time  | --   | 17.7 | --   | nS    | VDS=400V<br>ID=13A<br>RG=15Ω<br>VGS=10V |
| trise   | Rise Time            | --   | 24   | --   |       |                                         |
| td(OFF) | Turn- OFF Delay Time | --   | 52   | --   |       |                                         |
| tfall   | Fall Time            | --   | 19   | --   |       |                                         |

**Dynamic Characteristics** Essentially independent of operating temperature

| Symbol | Parameter                       | Min. | Typ. | Max. | Units | Test Conditions                            |
|--------|---------------------------------|------|------|------|-------|--------------------------------------------|
| Ciss   | Input Capacitance               | --   | 1398 | --   | pF    | VGS=0V<br>VDS=50V<br>f=1.0MHz              |
| Coss   | Output Capacitance              | --   | 196  | --   |       |                                            |
| Crss   | Reverse Transfer Capacitance    | --   | 5.5  | --   |       |                                            |
| RG     | Gate Resistance                 | --   | 3.5  | --   | Ω     | VGS DC Bias: 0V<br>Speed: MED<br>DS: Short |
| Qg     | Total Gate Charge               | --   | 33   | --   | nC    | VDS=400V<br>ID=13A<br>VGS=10V              |
| Qgs    | Gate- to- Source Charge         | --   | 7    | --   |       |                                            |
| Qgd    | Gate-to-Drain(" Miller") Charge | --   | 14   | --   |       |                                            |

**Source- Drain Diode Characteristics**

| Symbol | Parameter                     | Min. | Typ. | Max. | Units | Test Conditions                    |
|--------|-------------------------------|------|------|------|-------|------------------------------------|
| IS     | Continuous Source Current     | --   | --   | 23   | A     | Integral pn- diode<br>in MOSFET    |
| ISM    | Maximum Pulsed Current        | --   | --   | 78   | A     |                                    |
| VSD    | Diode Forward Voltage         | --   | --   | 1.2  | V     | IS=23A, VGS=0V                     |
| trr    | Reverse Recovery Time         | --   | 229  | --   | ns    | VR=400V<br>IS=13A<br>di/dt=100A/μs |
| Qrr    | Reverse Recovery Charge       | --   | 2.8  | --   | μC    |                                    |
| Irr    | Peak Reverse Recovery Current | --   | 23   | --   | A     |                                    |

**Notes:**

- \* 1. Repetitive rating, pulse width limited by maximum junction temperature.
- \* 2. Pulse Test: Pulse width ≤ 300μs, Duty Cycle ≤ 2%

## Typical Feature Curve

Figure 1. Output Characteristics

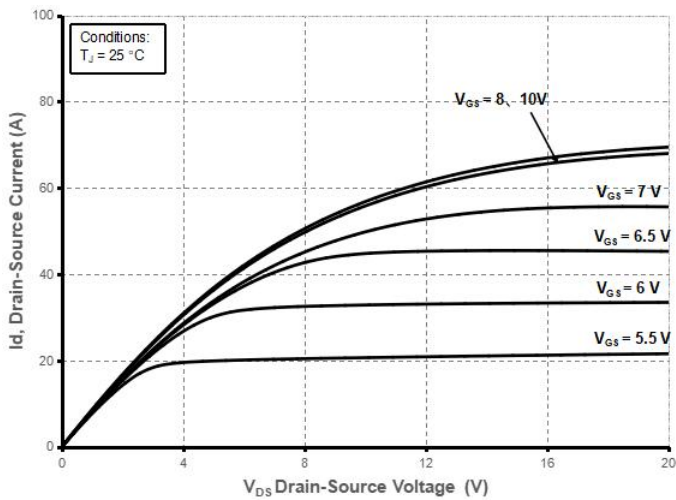


Figure 2. Transfer Characteristics

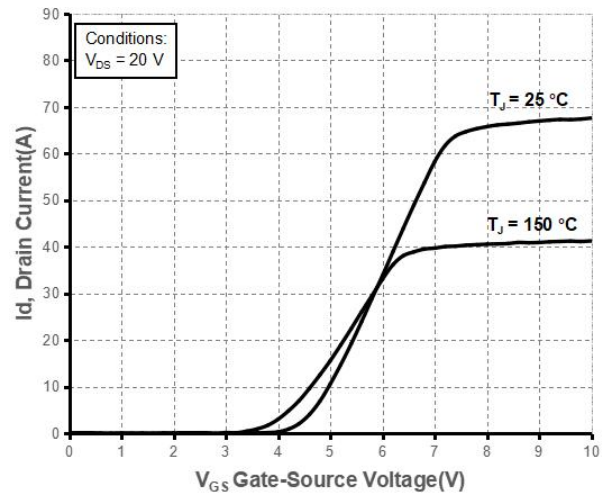


Figure 3. On-state Resistance

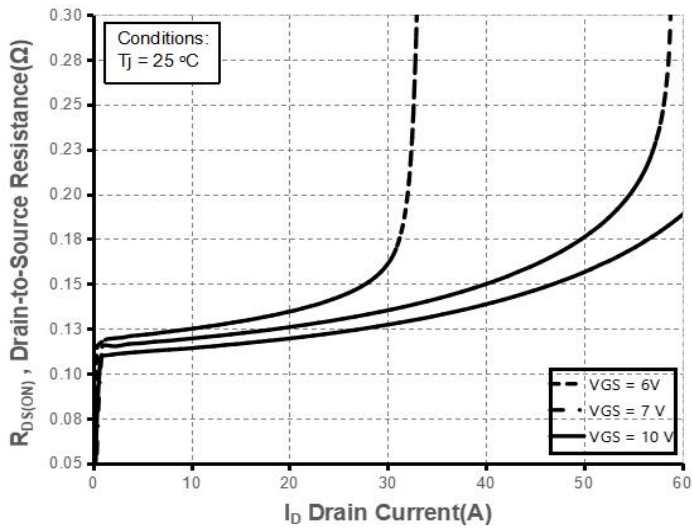


Figure 4. On-state Resistance with Temperature

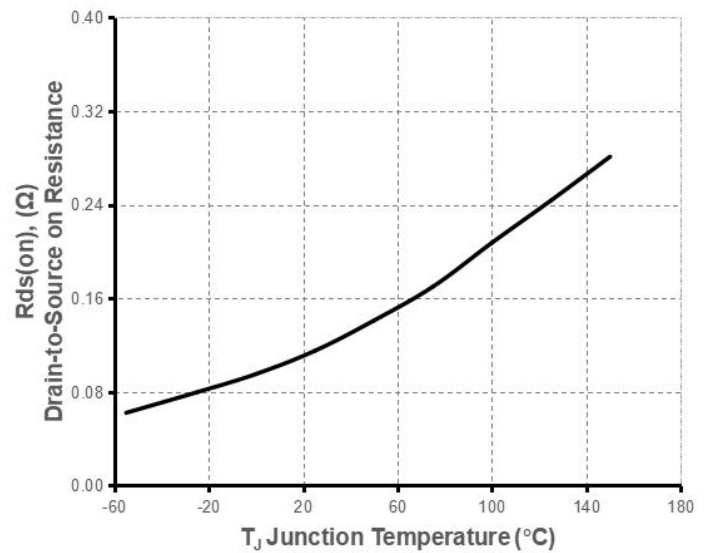


Figure 5. Capacitance

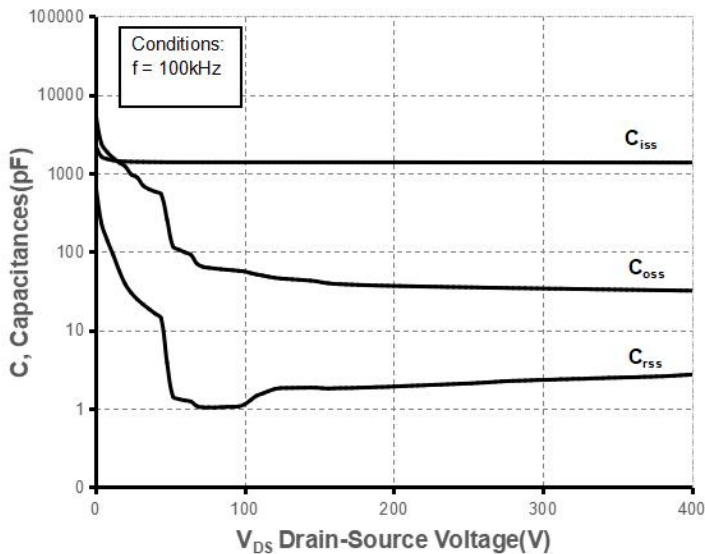


Figure 6. Gate Charge

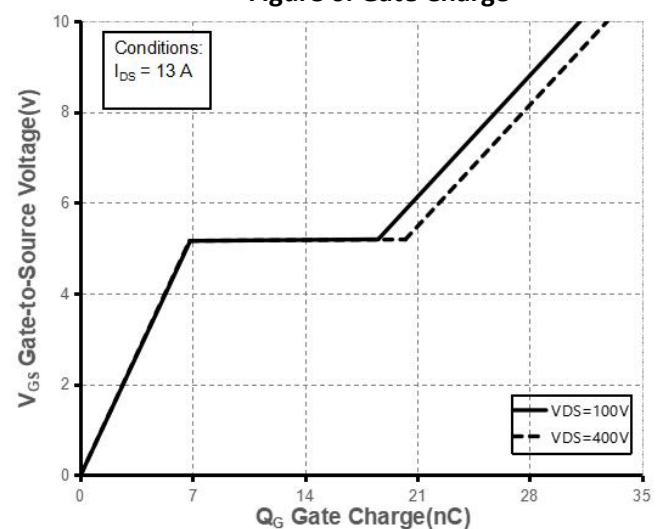


Figure 7. Forward characteristics of reverse diode

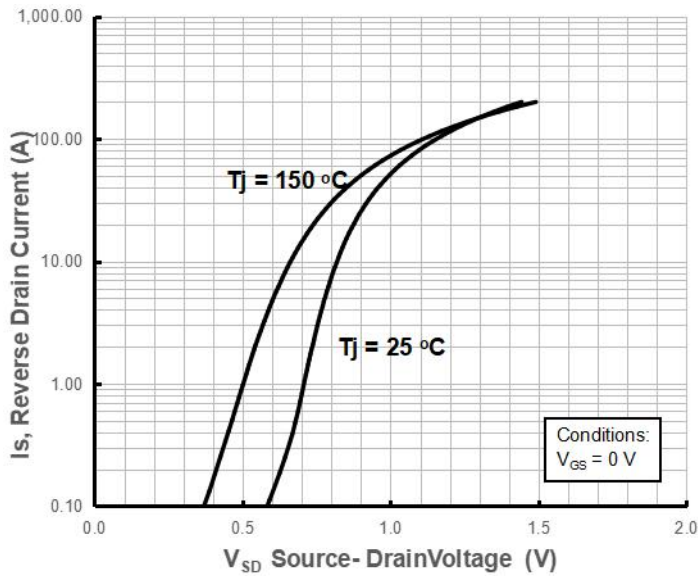


Figure 8. Power Dissipation Derating Curve

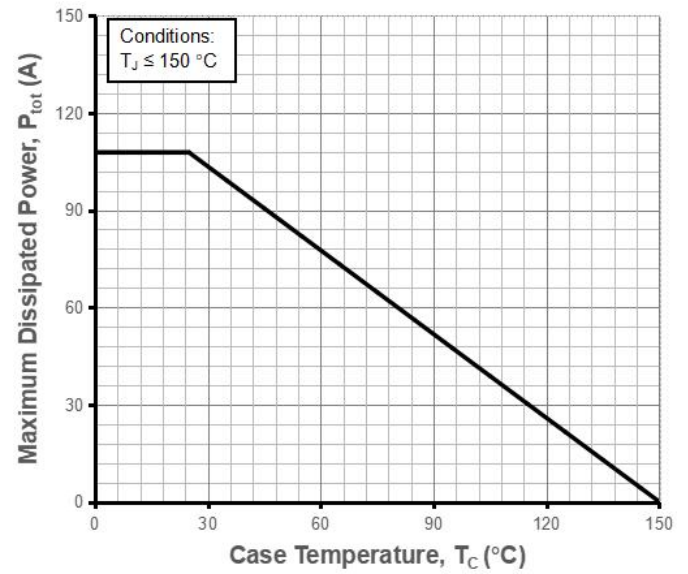


Figure 9. Breakdown Voltage with Temperature

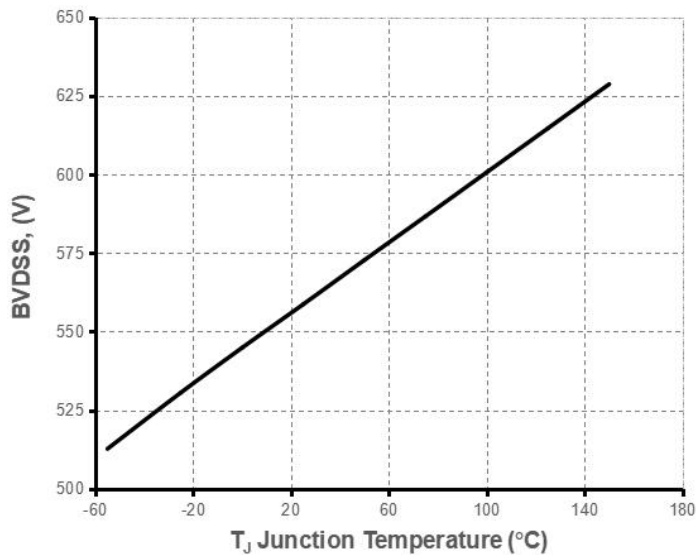


Figure 10. Normalized Threshold Voltage vs. Temperature

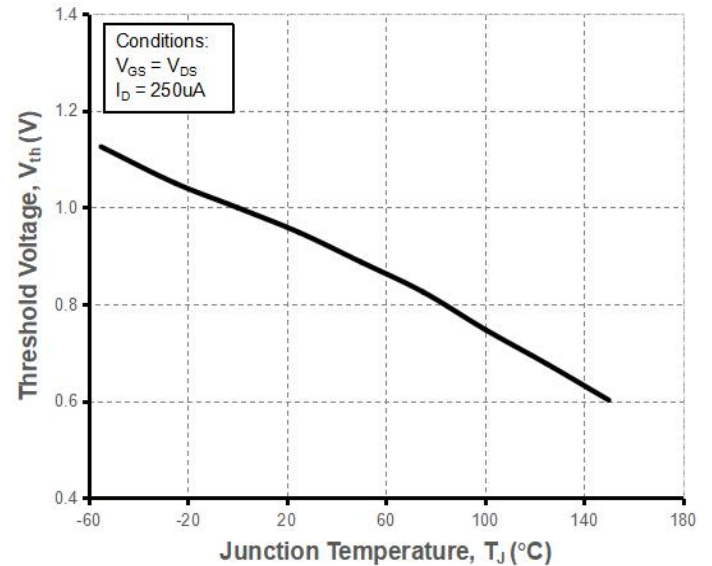


Figure 11. Coss Capacitor Stored Energy

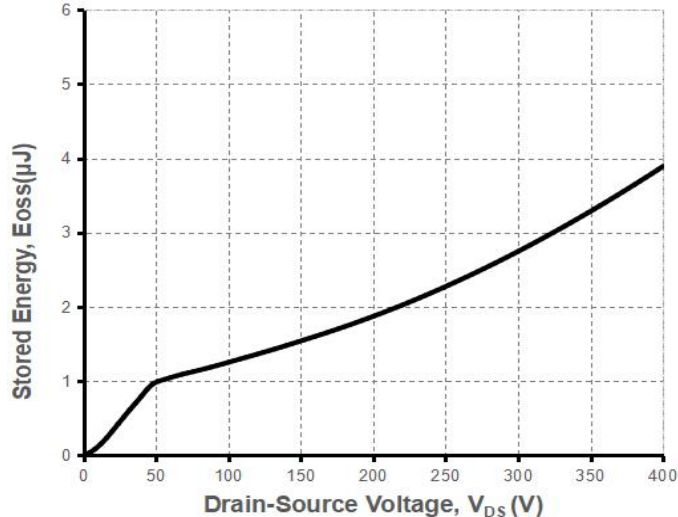
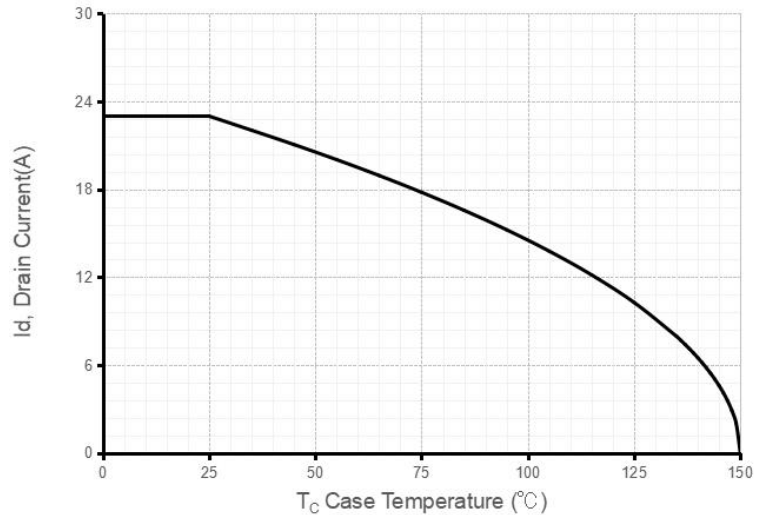
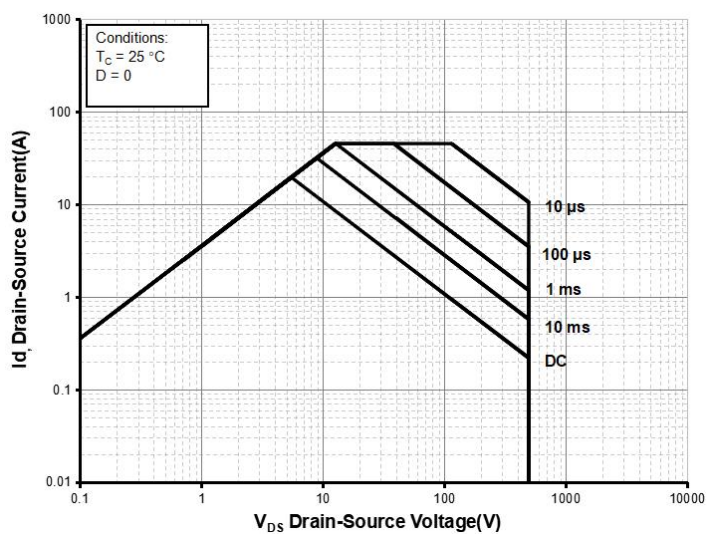


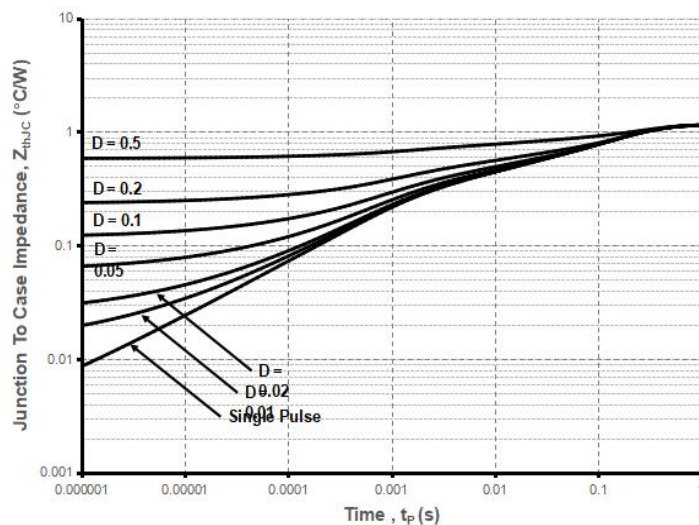
Figure 12. Maximum Drain Current



**Figure 13. Safe Operating Area**

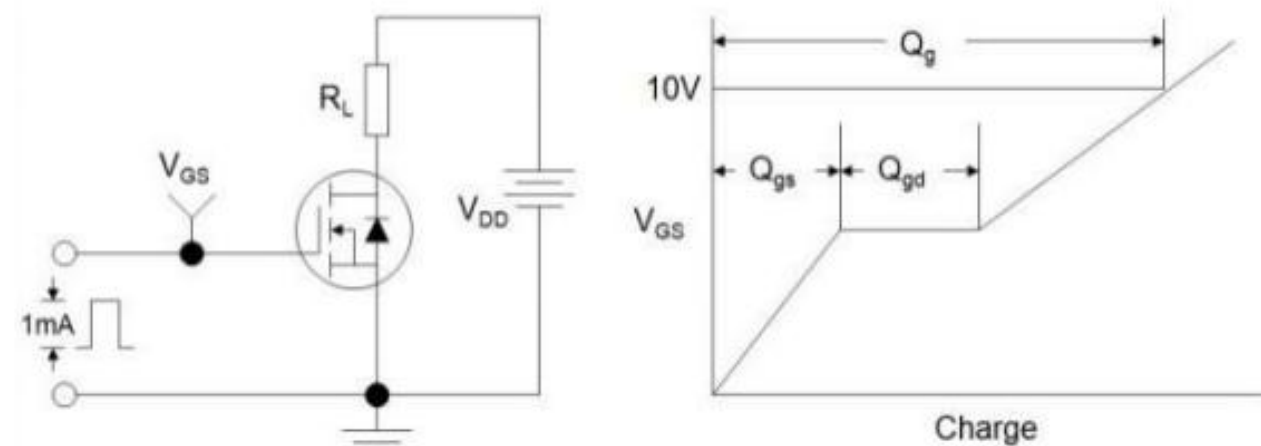


**Figure 14. Maximum Transient Thermal Characteristics**

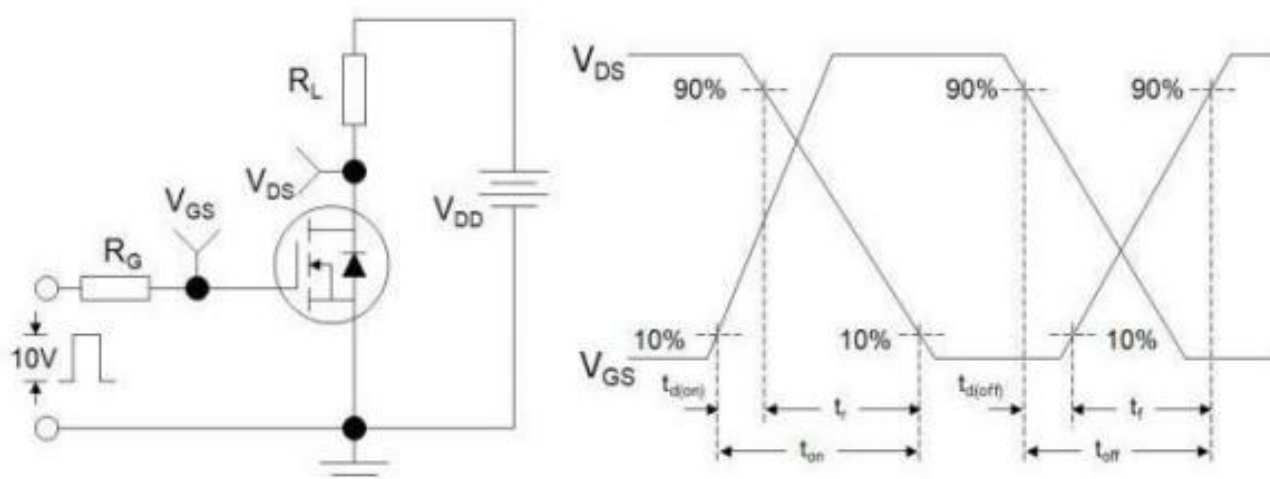


## Test Circuits and Waveforms

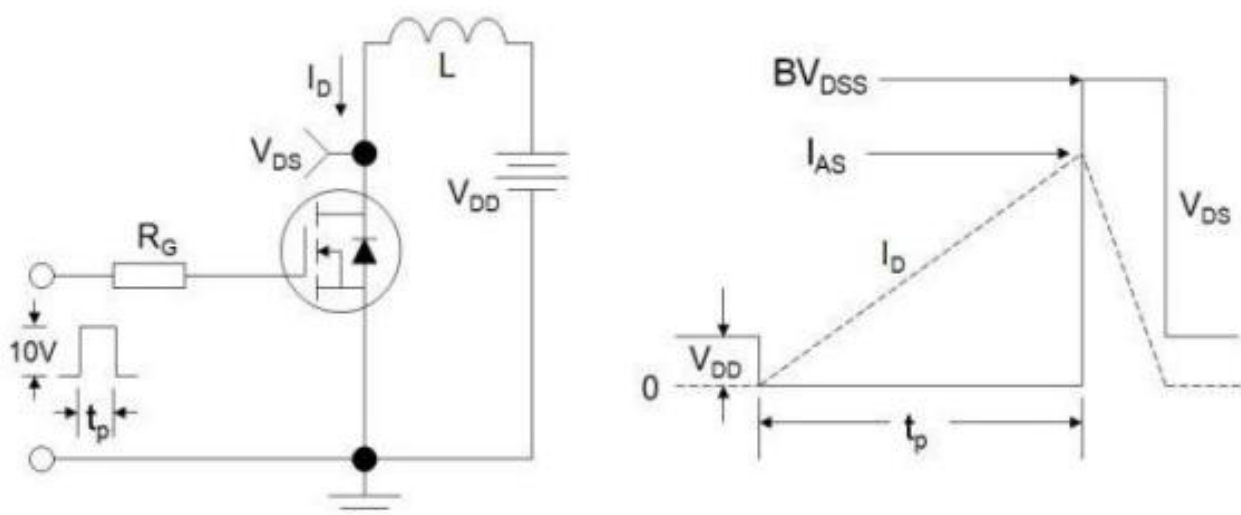
**Figure A: Gate Charge Test Circuit and Waveform**

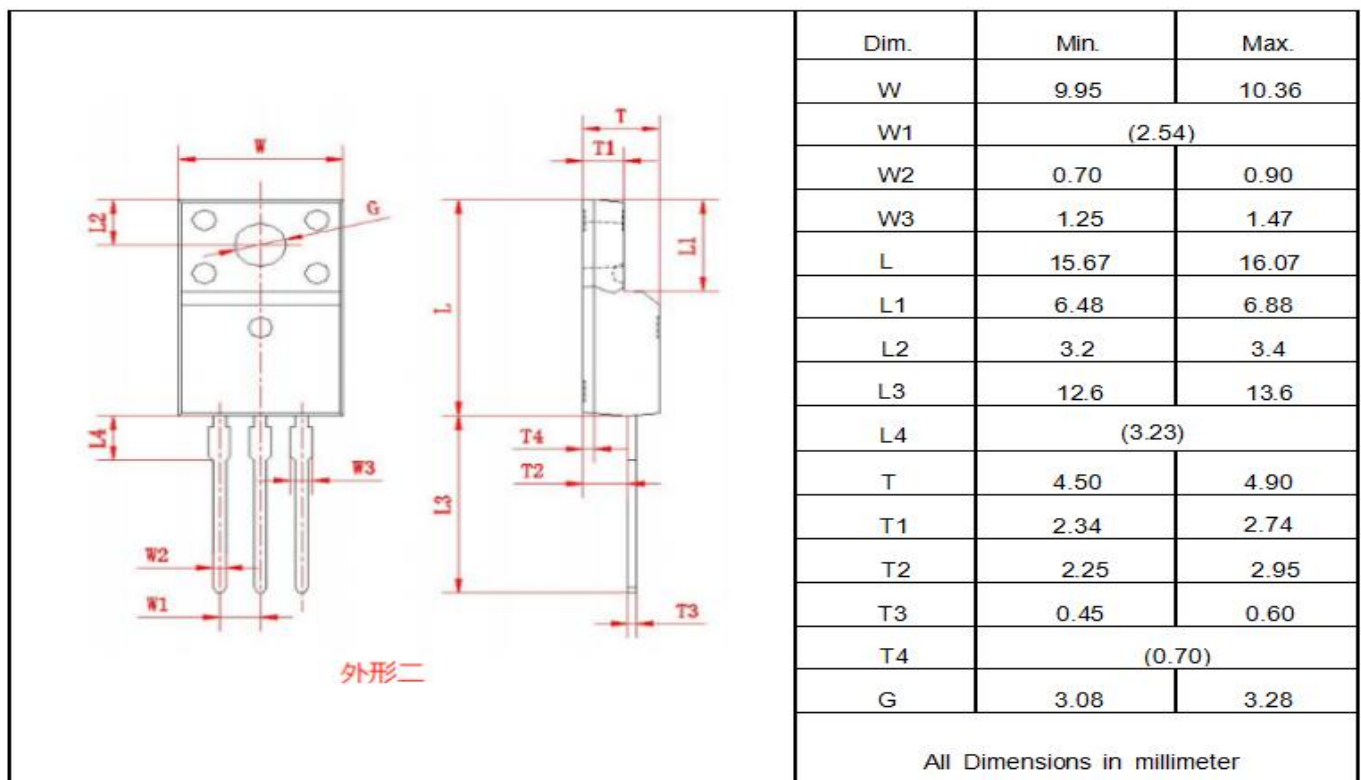
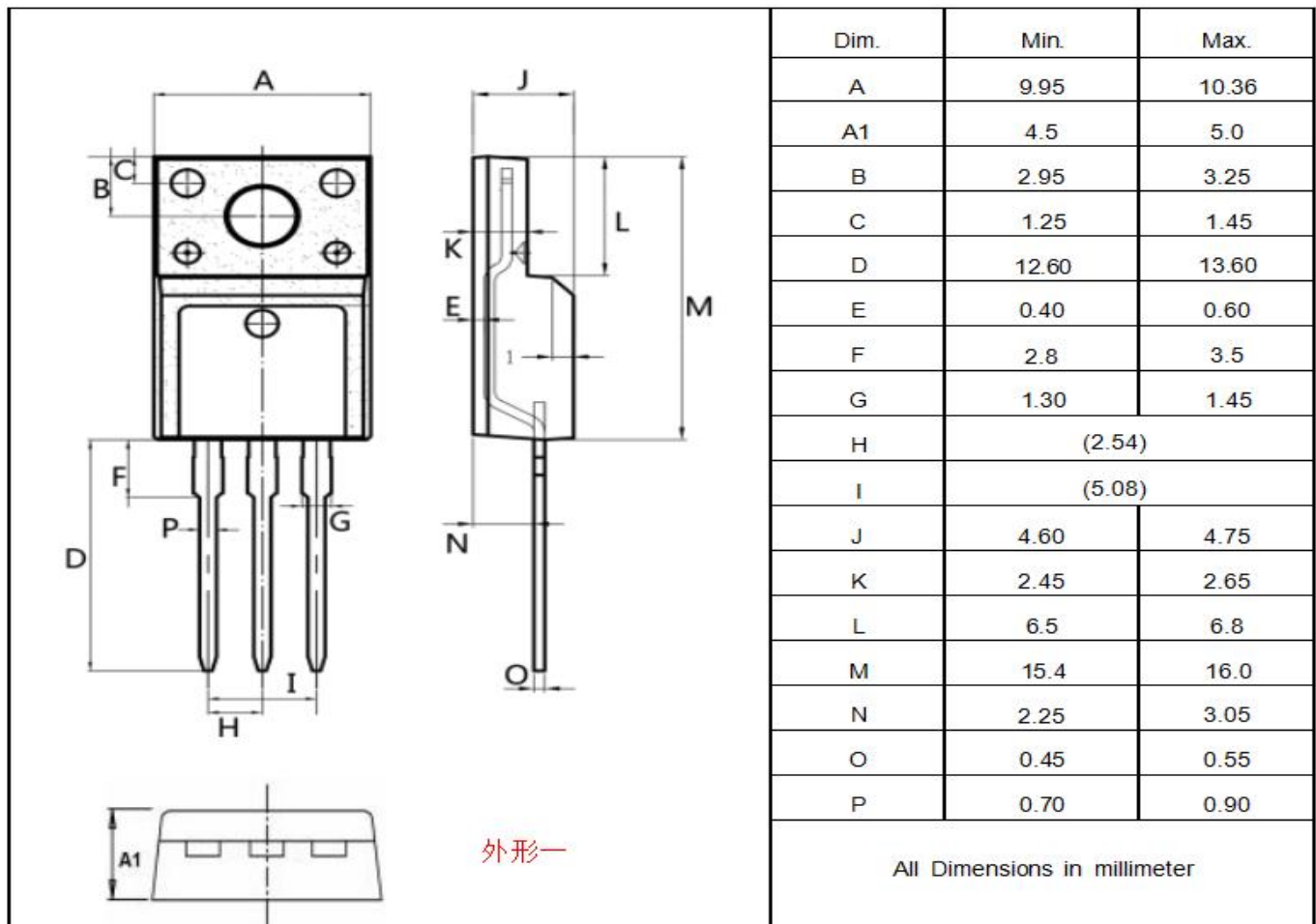


**Figure B: Resistive Switching Test Circuit and Waveform**



**Figure C: Unclamped Inductive Switching Test Circuit and Waveform**



**Package outline drawing(TO-220F Unit: mm)**


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