

| ID | $R_{DS(ON)}(MAX)$ | VDSS |
|----|-------------------|------|
| 9A | 500mΩ             | 800V |

**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
- Built-in ESD Diode

**Ordering Information**

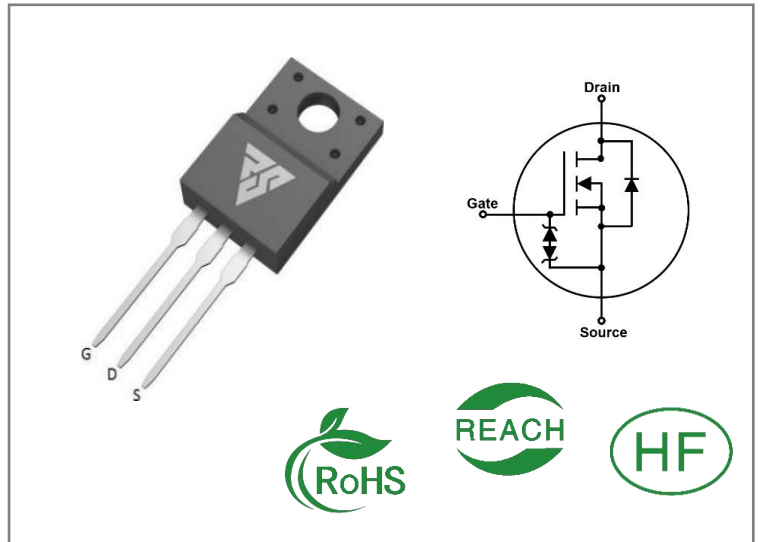
| Part Number | Package | Marking    | Packing | Qty.   |
|-------------|---------|------------|---------|--------|
| RSE80R500F  | T0-220F | RSE80R500F | Tube    | 50 PCS |

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

| Symbol      | Parameter                                                                                              | RSE80R500F | Units            |
|-------------|--------------------------------------------------------------------------------------------------------|------------|------------------|
| VDSS        | Drain-to-Source Voltage                                                                                | 800        | V                |
| ID          | Continuous Drain Current $T_C = 25^\circ\text{C}$                                                      | 9          | A                |
| ID          | Continuous Drain Current $T_C = 100^\circ\text{C}$                                                     | 5.5        |                  |
| IDM         | Pulsed Drain Current (Note*1)                                                                          | 27         |                  |
| PD          | Power Dissipation                                                                                      | 52         | W                |
| VGS         | Gate- to- Source Voltage                                                                               | $\pm 30$   | V                |
| EAS         | Single Pulse Avalanche Energy<br>$V_{DD} = 50\text{V}$ , $R_G = 25\ \Omega$ , $T_C = 25^\circ\text{C}$ | 45         | mJ               |
| dv/dt       | MOSFET dv/ dt ruggedness $V_{DS} = 0 \dots 400\text{V}$                                                | 50         | V/ns             |
| dv/dt       | Reverse diode dv/dt $V_{DS} = 0 \dots 400\text{V}$ , $T_j = 25^\circ\text{C}$ , $I_{SD} \leq I_D$      | 15         | V/ns             |
| VESD(G-S)   | Gate source ESD(HBM-C=100pF, R=1.5KΩ)                                                                  | 2000       | V                |
| 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            | RSE80R500F | Units  | Test Conditions                                                                                       |
|---------------|----------------------|------------|--------|-------------------------------------------------------------------------------------------------------|
| R $\theta$ JC | Junction-to-Case     | 2.4        | °C / W | Drain lead soldered to water cooled heatsink, PD adjusted for a peak junction temperature of + 150 °C |
| R $\theta$ JA | Junction-to- Ambient | 67         |        | 1 cubic foot chamber, free air.                                                                       |

**OFF Characteristics** T<sub>J</sub>= 25°C unless otherwise specified

| Symbol | Parameter                           | Min. | Typ. | Max. | Units | Test Conditions                              |
|--------|-------------------------------------|------|------|------|-------|----------------------------------------------|
| BVDSS  | Drain- to- source Breakdown Voltage | 800  | --   | --   | V     | V <sub>GS</sub> =0V<br>I <sub>D</sub> =250μA |
| IDSS   | Drain- to- Source Leakage Current   | --   | --   | 1    | μA    | V <sub>D</sub> S=800V<br>V <sub>GS</sub> =0V |
| IGSS   | Gate- to- Source Forward Leakage    | --   | --   | 100  | nA    | V <sub>GS</sub> =30V<br>V <sub>D</sub> S=0V  |
|        | Gate- to- Source Reverse Leakage    | --   | --   | -100 |       | V <sub>GS</sub> =-30V<br>V <sub>D</sub> S=0V |

**ON Characteristics** T<sub>J</sub>=25°C unless otherwise specified

| Symbol              | Parameter                                      | Min. | Typ. | Max. | Units | Test Conditions                                            |
|---------------------|------------------------------------------------|------|------|------|-------|------------------------------------------------------------|
| R <sub>DS(on)</sub> | Static Drain- to- Source On-Resistance(Note*2) | --   | 460  | 500  | mΩ    | V <sub>GS</sub> =10V<br>I <sub>D</sub> =5A                 |
| V <sub>GS(TH)</sub> | Gate Threshold Voltage                         | 2.5  | --   | 4.5  | V     | V <sub>GS</sub> =V <sub>D</sub> S<br>I <sub>D</sub> =250μA |

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

| Symbol              | Parameter            | Min. | Typ. | Max. | Units | Test Conditions                                                    |
|---------------------|----------------------|------|------|------|-------|--------------------------------------------------------------------|
| t <sub>d(ON)</sub>  | Turn- on Delay Time  | --   | 28   | --   | nS    | V <sub>D</sub> S=400V<br>I <sub>D</sub> =9A<br>R <sub>G</sub> =25Ω |
| t <sub>rise</sub>   | Rise Time            | --   | 34   | --   |       |                                                                    |
| t <sub>d(OFF)</sub> | Turn- OFF Delay Time | --   | 100  | --   |       |                                                                    |
| t <sub>fall</sub>   | Fall Time            | --   | 28   | --   |       |                                                                    |

**Dynamic Characteristics** Essentially independent of operating temperature

| Symbol | Parameter                       | Min. | Typ. | Max. | Units | Test Conditions               |
|--------|---------------------------------|------|------|------|-------|-------------------------------|
| Ciss   | Input Capacitance               | --   | 1028 | --   | pF    | VGS=0V<br>VDS=50V<br>f=1.0MHz |
| Coss   | Output Capacitance              | --   | 58   | --   |       |                               |
| Crss   | Reverse Transfer Capacitance    | --   | 10   | --   |       |                               |
| RG     | Gate Resistance                 | --   | 5.2  | --   | Ω     | VDS=0V<br>VGS=0V<br>f=1.0MHz  |
| Qg     | Total Gate Charge               | --   | 24.6 | --   | nC    | VDS=400V<br>ID=9A<br>VGS=10V  |
| Qgs    | Gate- to- Source Charge         | --   | 5.6  | --   |       |                               |
| Qgd    | Gate-to-Drain(" Miller") Charge | --   | 9    | --   |       |                               |

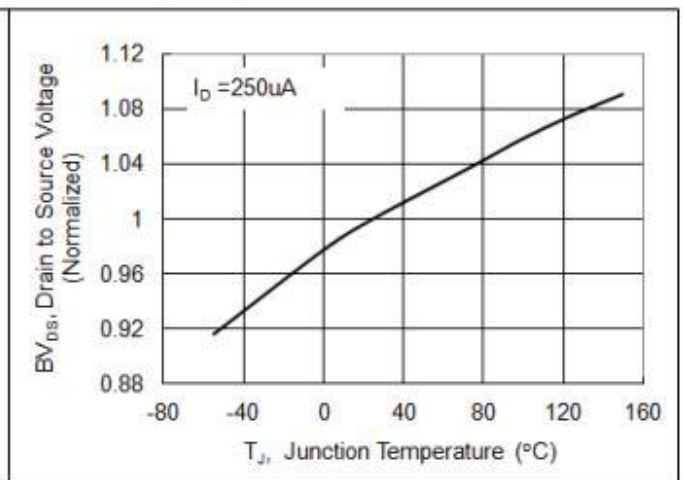
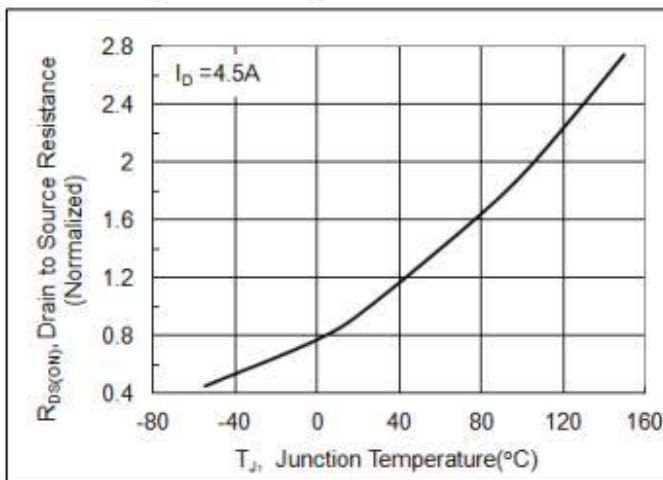
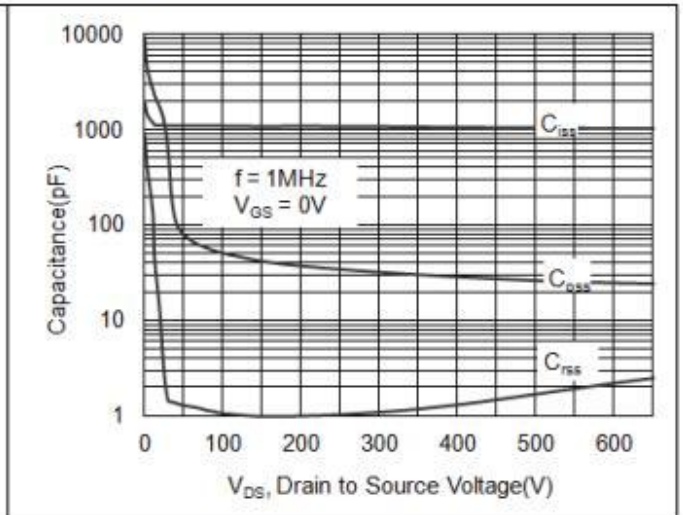
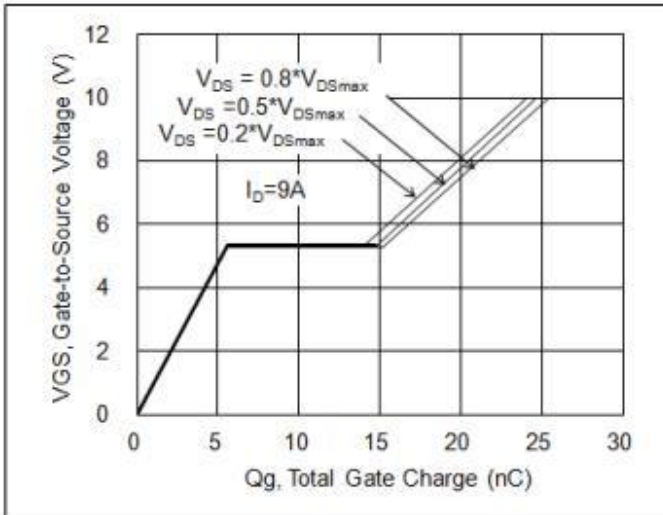
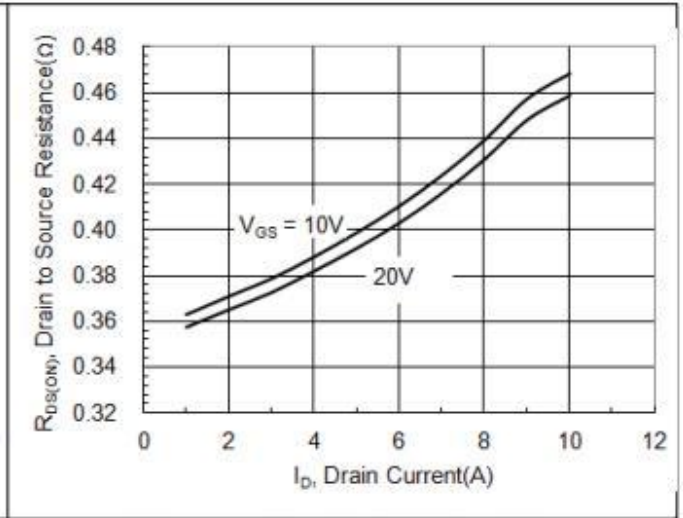
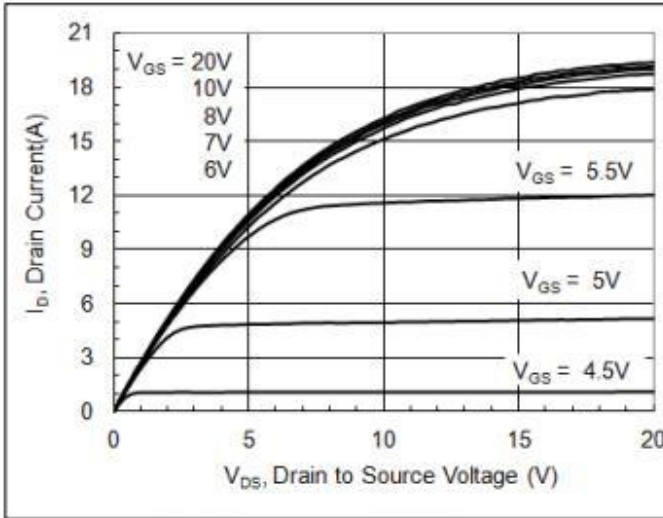
**Source- Drain Diode Characteristics**

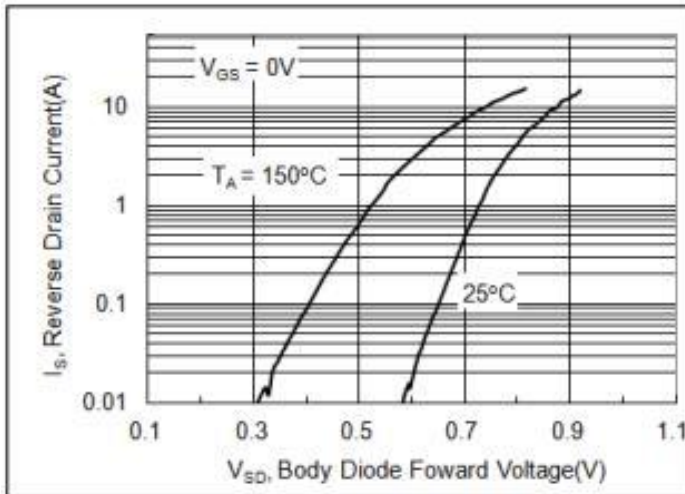
| Symbol | Parameter                 | Min. | Typ. | Max. | Units | Test Conditions                   |
|--------|---------------------------|------|------|------|-------|-----------------------------------|
| IS     | Continuous Source Current | --   | --   | 9    | A     | Integral pn- diode<br>in MOSFET   |
| ISM    | Maximum Pulsed Current    | --   | --   | 27   | A     |                                   |
| VSD    | Diode Forward Voltage     | --   | --   | 1.3  | V     | IS=9A<br>VGS=0V                   |
| trr    | Reverse Recovery Time     | --   | 258  | --   | nS    | VR=100V<br>IS=9A<br>di/dt=100A/μs |
| Qrr    | Reverse Recovery Charge   | --   | 3.15 | --   | μC    |                                   |

**Notes:**

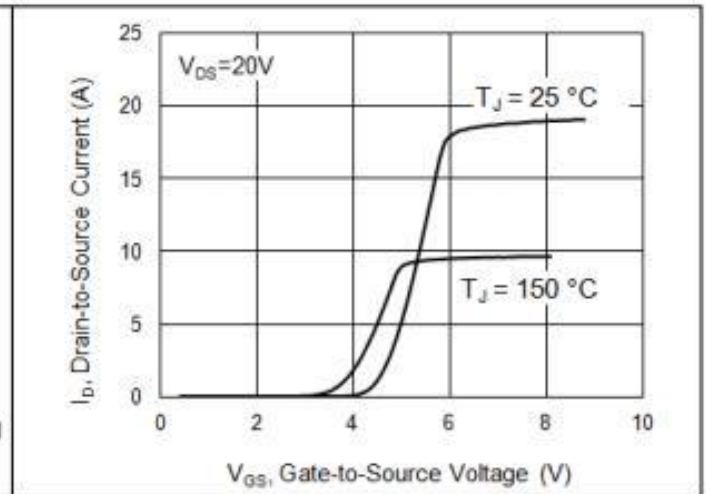
- \* 1. Repetitive rating, pulse width limited by maximum junction temperature.
- \* 2. Pulse Test: Pulse width ≤ 300μs, Duty Cycle ≤ 2%

## Typical Feature Curve

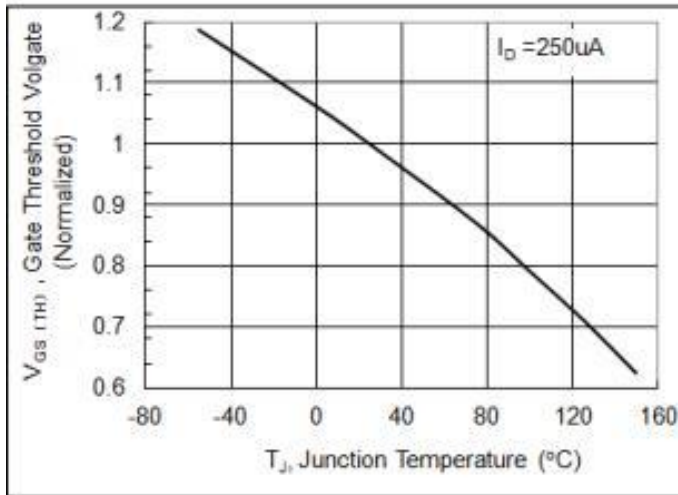




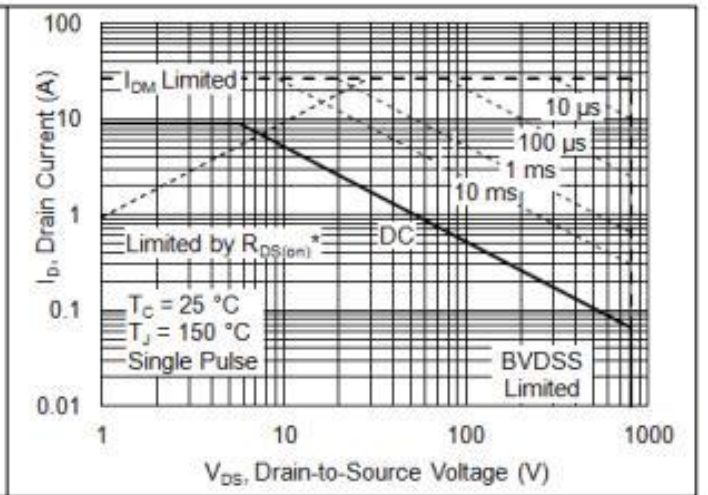
**Fig 7 . Forward characteristics of reverse diode**



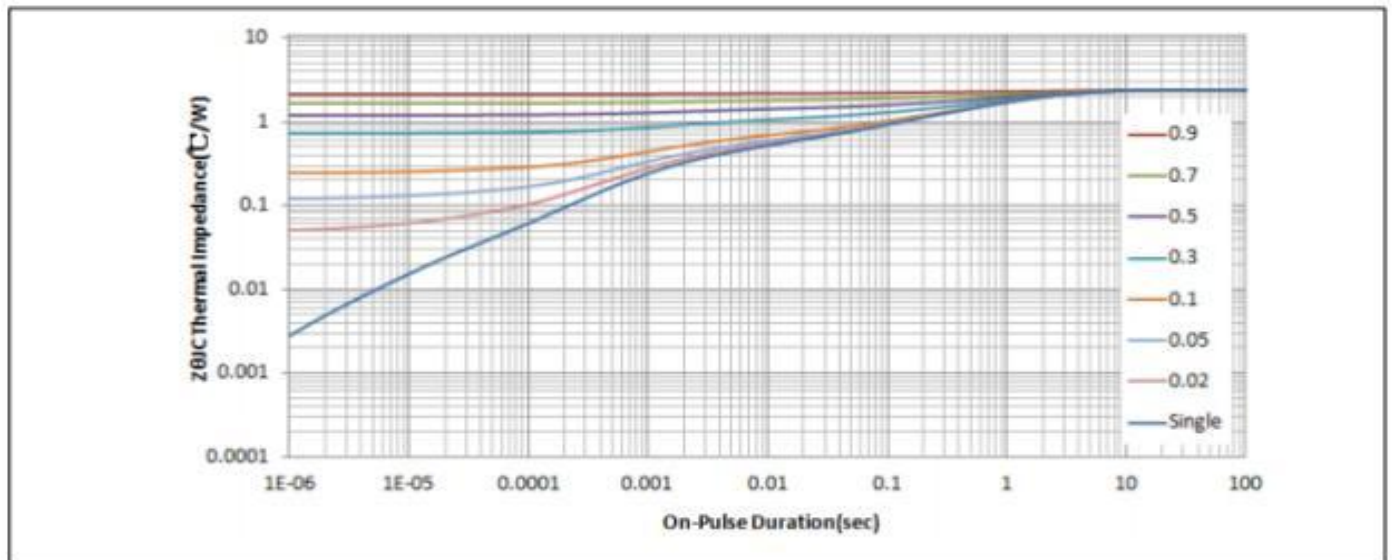
**Fig 8 . Transfer characteristics**



**Fig 9 .  $V_{GS(TH)}$  vs junction temperature**

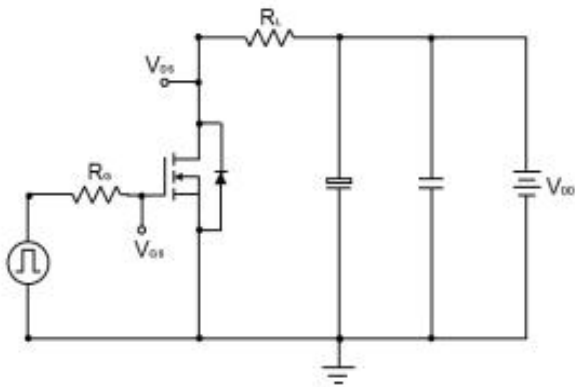


**Fig 10. Safe operating area(TO-220F)**

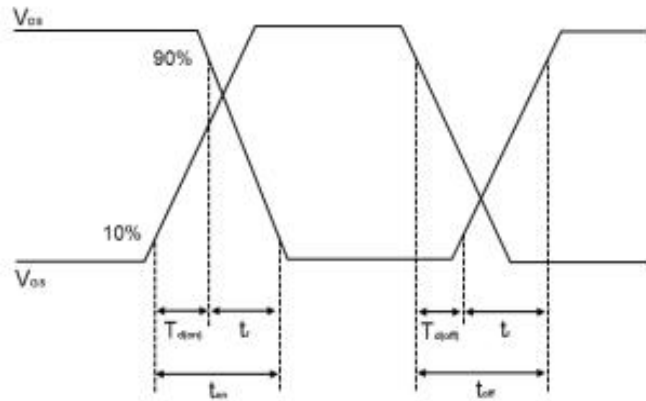


**Fig 11. Transient thermal impedance**

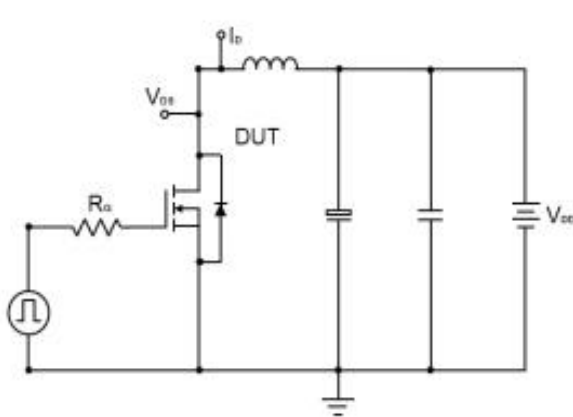
## Test Circuits and Waveforms



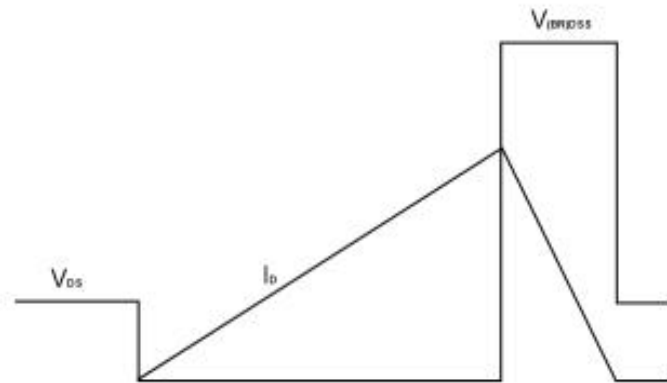
Test circuit for resistive load switching times



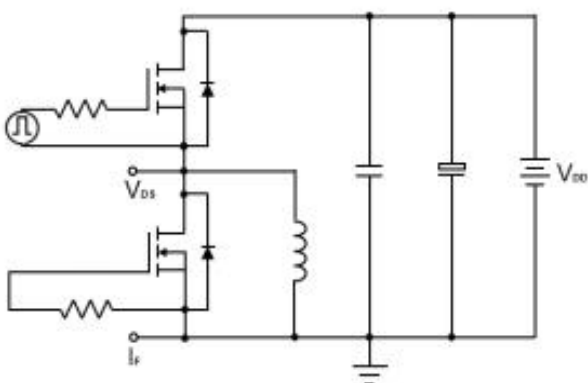
Switching times waveform



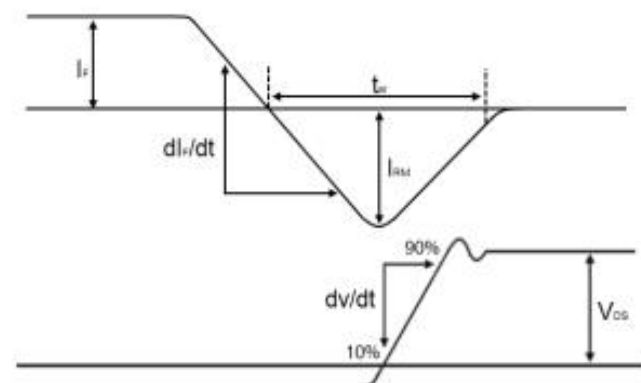
Test circuit for unclamped inductive load



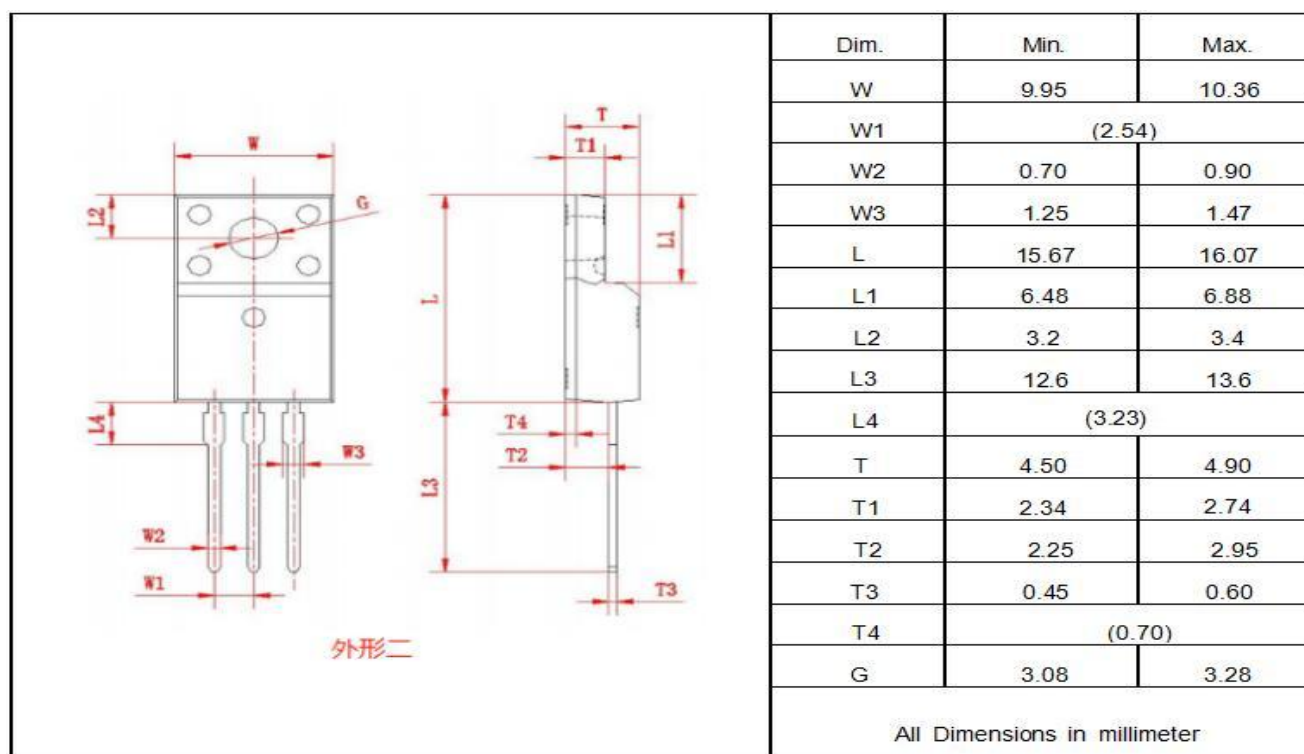
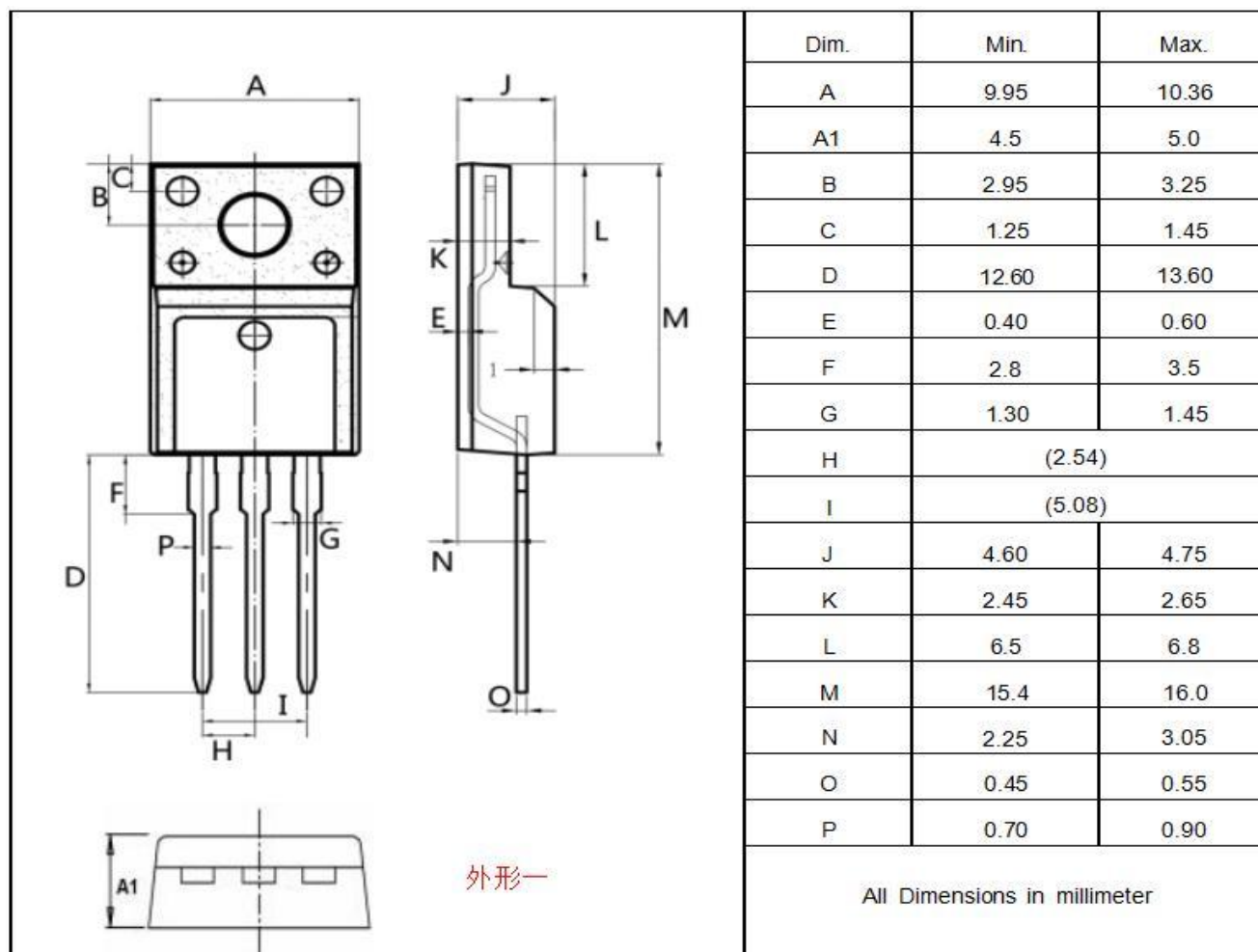
Unclamped inductive waveform



Test circuit for diode characteristics



Diode recovery waveform

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


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