

| ID  | $R_{DS(ON)}$ (Typ) | VDSS |
|-----|--------------------|------|
| 53A | 60mΩ               | 600V |

#### Applications:

- Sever
- EV Charging
- Telecom
- Solar

#### Features:

- Ultra fast body diode
- Low gate charge
- Low RDS(on) per chip area(Low FOM)
- Very low switching and conduction loss
- Extremely high commutation ruggedness

#### Ordering Information

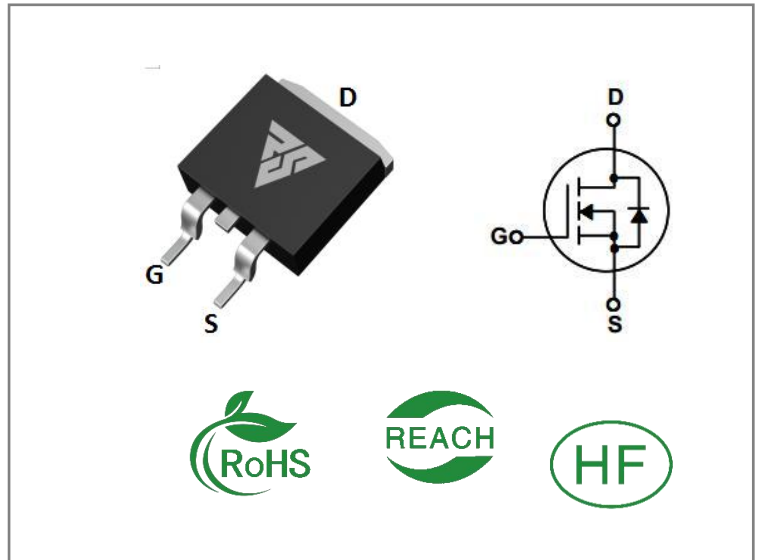
| Part Number | Package | Marking    | Packing   | Qty.    |
|-------------|---------|------------|-----------|---------|
| RSF60R070S  | T0-263  | RSF60R070S | Tape&reel | 800 PCS |

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

| Symbol      | Parameter                                                                                                             | RSF60R070S | Units            |
|-------------|-----------------------------------------------------------------------------------------------------------------------|------------|------------------|
| VDSS        | Drain-to-Source Voltage                                                                                               | 600        | V                |
| ID          | Continuous Drain Current $T_C = 25^\circ\text{C}$                                                                     | 53         | A                |
| ID          | Continuous Drain Current $T_C = 100^\circ\text{C}$                                                                    | 33         |                  |
| IDM         | Pulsed Drain Current (Note*1)                                                                                         | 149        |                  |
| PD          | Power Dissipation                                                                                                     | 328        | W                |
| VGS         | Gate- to- Source Voltage                                                                                              | $\pm 30$   | V                |
| EAS         | Single Pulse Avalanche Energy<br>$L = 10\text{mH}, V_{DS} = 50\text{V}, I_{AS} = 5.1\text{A}, T_J = 25^\circ\text{C}$ | 245        | mJ               |
| dv/dt       | MOSFET dv/ dt ruggedness $V_{DS} = 0 \dots 400\text{V}$ (Max)                                                         | 50         | V/ns             |
| dv/dt       | Reverse diode dv/dt $V_{DS} = 0 \dots 400\text{V}, T_J = 25^\circ\text{C}, I_{SD} \leq I_D$ (Max)                     | 15         | V/ns             |
| TL TPKG     | Maximum Temperature for Soldering                                                                                     | 300        | $^\circ\text{C}$ |
|             | Leads at 0.063in(1.6mm)from Case for 10 seconds                                                                       | 260        |                  |
|             | Package Body for 10 seconds                                                                                           |            |                  |
| 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            | RSF60R070S | Units                         | Test Conditions                                                                                                         |
|---------------|----------------------|------------|-------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| R $\theta$ JC | Junction-to-Case     | 0.38       | $^{\circ}\text{C} / \text{W}$ | Drain lead soldered to water cooled heatsink, PD adjusted for a peak junction temperature of + 1 5 0 $^{\circ}\text{C}$ |
| R $\theta$ JA | Junction-to- Ambient | 39         |                               | 1 cubic foot chamber,free air.                                                                                          |

**OFF Characteristics**  $T_J = 25^{\circ}\text{C}$  unless otherwise specified

| Symbol | Parameter                           | Min. | Typ. | Max. | Units         | Test Conditions                |
|--------|-------------------------------------|------|------|------|---------------|--------------------------------|
| BVDSS  | Drain- to- source Breakdown Voltage | 600  | --   | --   | V             | VGS=0V<br>ID=250 $\mu\text{A}$ |
| IDSS   | Drain- to- Source Leakage Current   | --   | --   | 5    | $\mu\text{A}$ | VDS=600V<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**  $T_J = 25^{\circ}\text{C}$  unless otherwise specified

| Symbol  | Parameter                              | Min. | Typ. | Max. | Units      | Test Conditions                 |
|---------|----------------------------------------|------|------|------|------------|---------------------------------|
| RDS(on) | Static Drain- to- Source On-Resistance | --   | 60   | 70   | m $\Omega$ | VGS=10V<br>ID=18A               |
| VGS(TH) | Gate Threshold Voltage                 | 3    | 4    | 5    | V          | VGS=VDS<br>ID=250 $\mu\text{A}$ |

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

| Symbol  | Parameter            | Min. | Typ. | Max. | Units | Test Conditions                                |
|---------|----------------------|------|------|------|-------|------------------------------------------------|
| td(ON)  | Turn- on Delay Time  | --   | 33   | --   | nS    | VDS=400V<br>ID=21A<br>RG=3 $\Omega$<br>VGS=10V |
| trise   | Rise Time            | --   | 70   | --   |       |                                                |
| td(OFF) | Turn- OFF Delay Time | --   | 80   | --   |       |                                                |
| tfall   | Fall Time            | --   | 59   | --   |       |                                                |

**Dynamic Characteristics** Essentially independent of operating temperature

| Symbol | Parameter                       | Min. | Typ. | Max. | Units | Test Conditions                |
|--------|---------------------------------|------|------|------|-------|--------------------------------|
| Ciss   | Input Capacitance               | --   | 3238 | --   | pF    | VGS=0V<br>VDS=100V<br>f=1.0MHz |
| Coss   | Output Capacitance              | --   | 54   | --   |       |                                |
| Crss   | Reverse Transfer Capacitance    | --   | 4    | --   |       |                                |
| RG     | Gate Resistance                 | --   | 5    | --   | Ω     | VDS=0V<br>VGS=0V<br>f=1.0MHz   |
| Qg     | Total Gate Charge               | --   | 77   | --   | nC    | VDS=480V<br>ID=21A<br>VGS=10V  |
| Qgs    | Gate- to- Source Charge         | --   | 20   | --   |       |                                |
| Qgd    | Gate-to-Drain(" Miller") Charge | --   | 35   | --   |       |                                |

**Source- Drain Diode Characteristics**

| Symbol | Parameter                 | Min. | Typ. | Max. | Units | Test Conditions                    |
|--------|---------------------------|------|------|------|-------|------------------------------------|
| IS     | Continuous Source Current | --   | --   | 53   | A     | Integral pn- diode<br>in MOSFET    |
| ISM    | Maximum Pulsed Current    | --   | --   | 287  | A     |                                    |
| VSD    | Diode Forward Voltage     | --   | --   | 1.0  | V     | IS=42A<br>VGS=0V                   |
| trr    | Reverse Recovery Time     | --   | 165  | --   | nS    | VR=400V<br>IS=21A<br>di/dt=100A/μs |
| Qrr    | Reverse Recovery Charge   | --   | 1    | --   | nC    |                                    |
| Irr    | Reverse recovery curren   | --   | 12   | --   | A     |                                    |

**Notes:**

\* 1. Repetitive rating, pulse width limited by maximum junction temperature.

## Typical Feature Curve

Figure 1. Output Characteristics

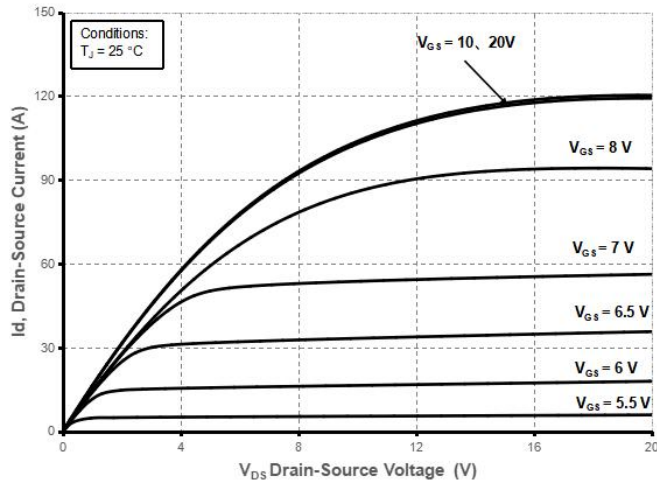


Figure 2. Capacitance

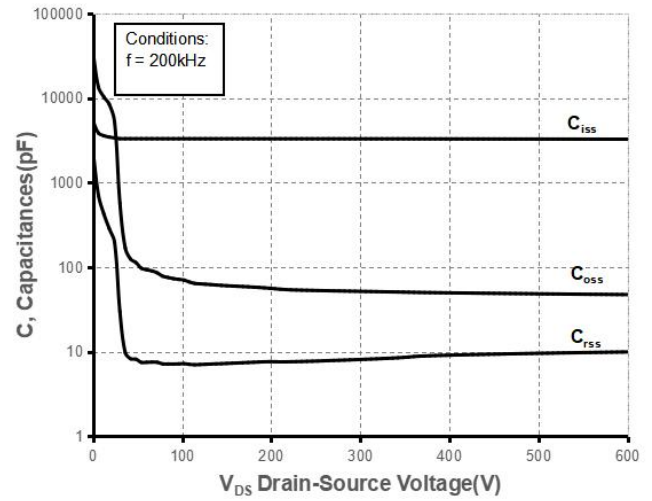


Figure 3. On-state Resistance

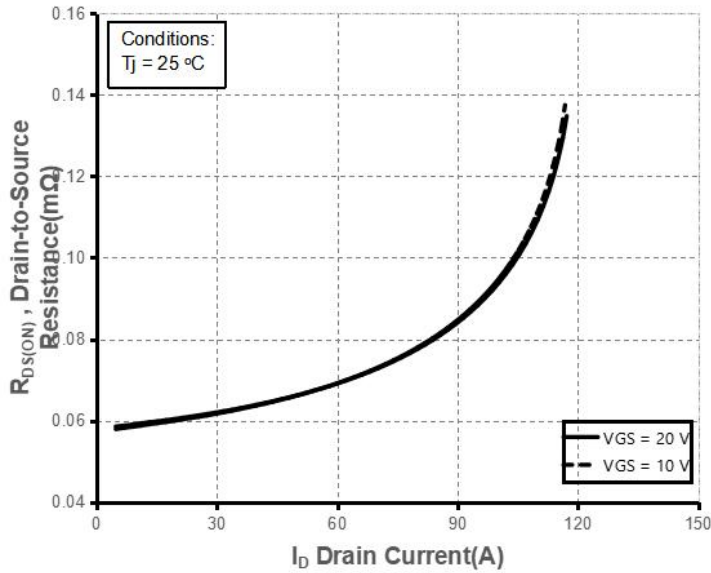


Figure 4. On-state Resistance with Temperature

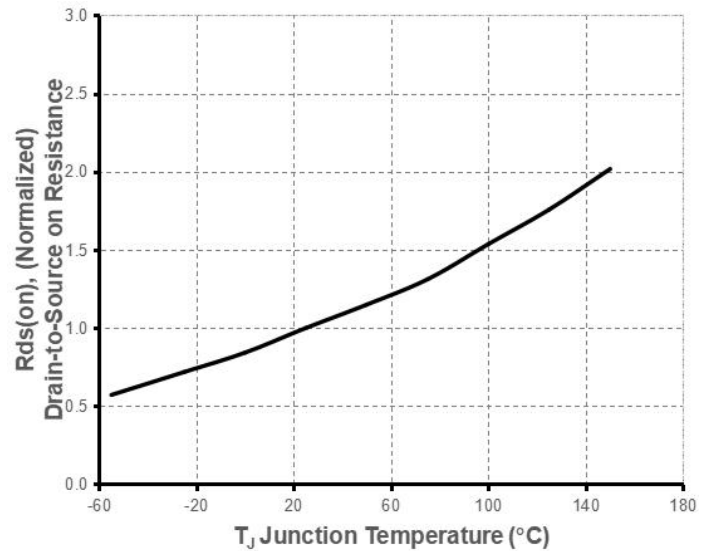


Figure 5. Transfer Characteristics

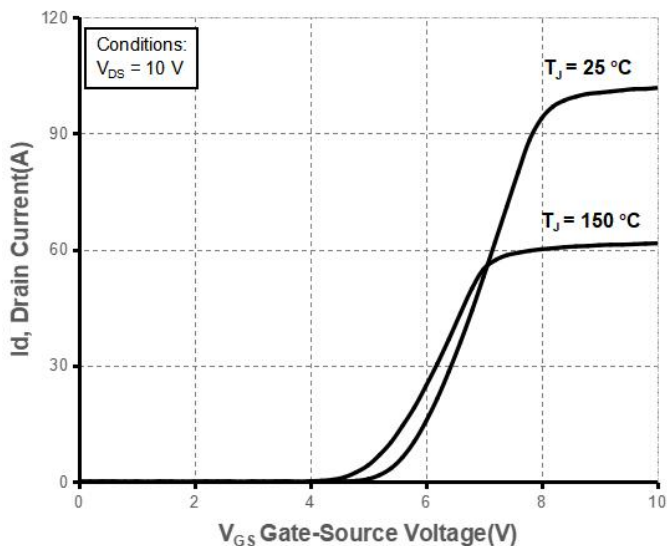


Figure 6. Breakdown Voltage with Temperature

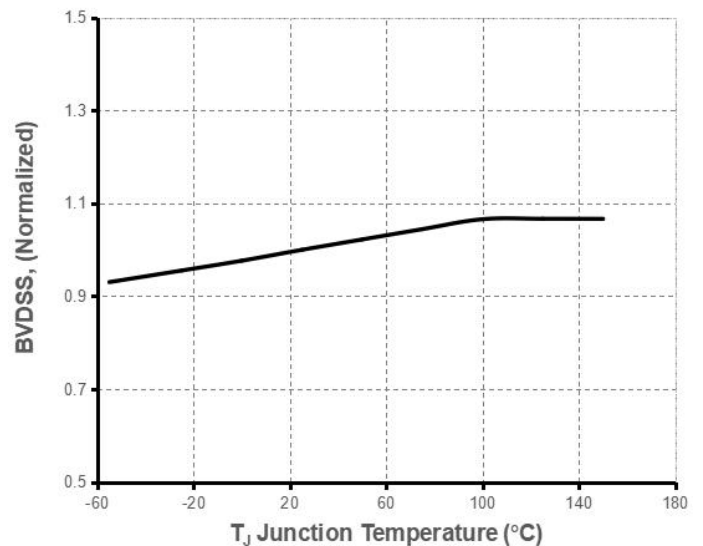


Figure 7. Gate Charge

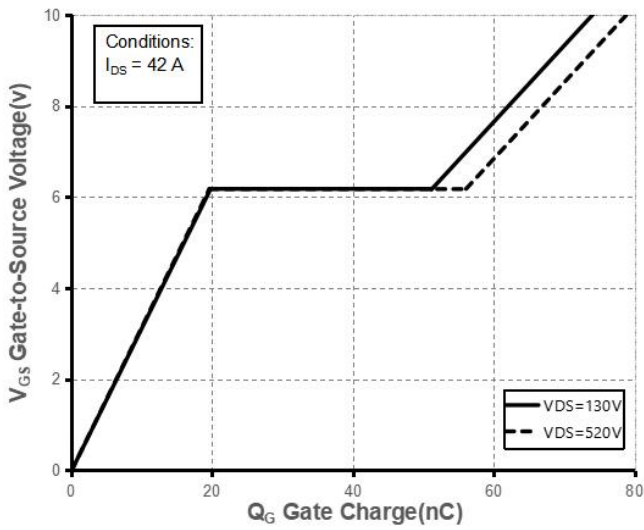


Figure 8. Maximum Drain Current

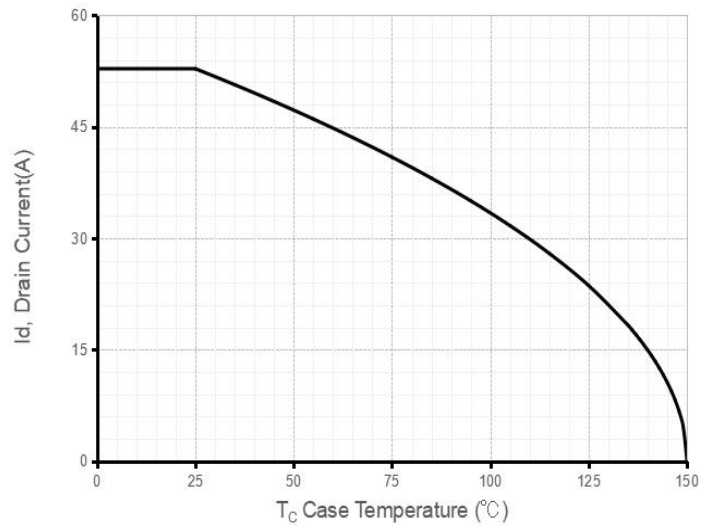


Fig 9. Safe Operating Area

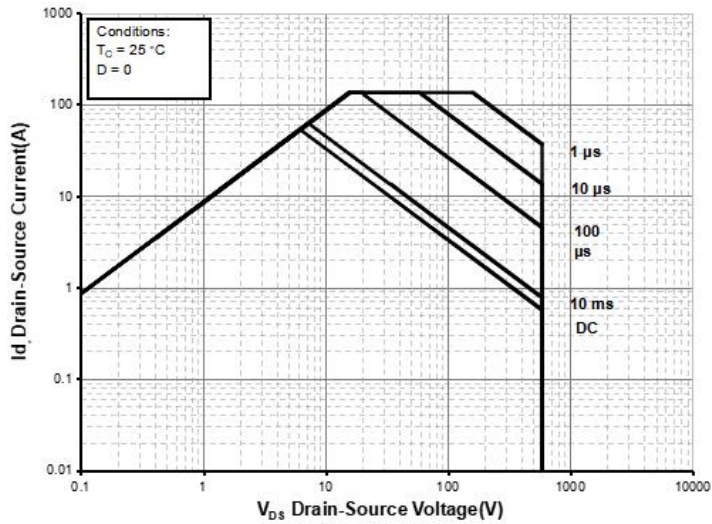


Fig 10. Body Diode Characteristics

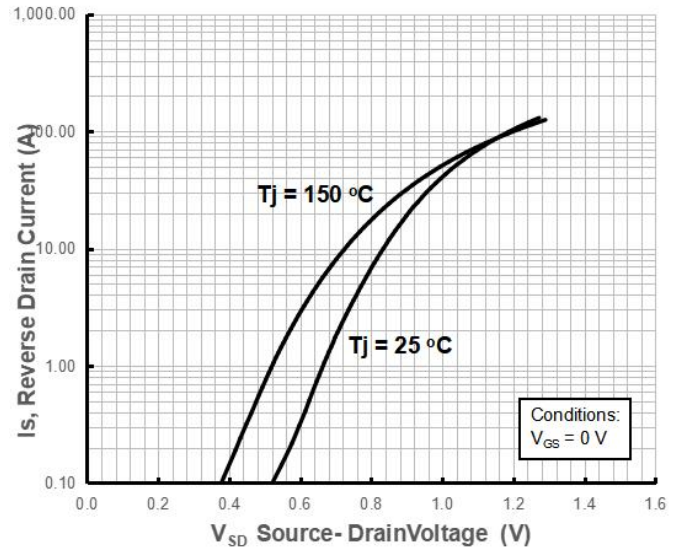
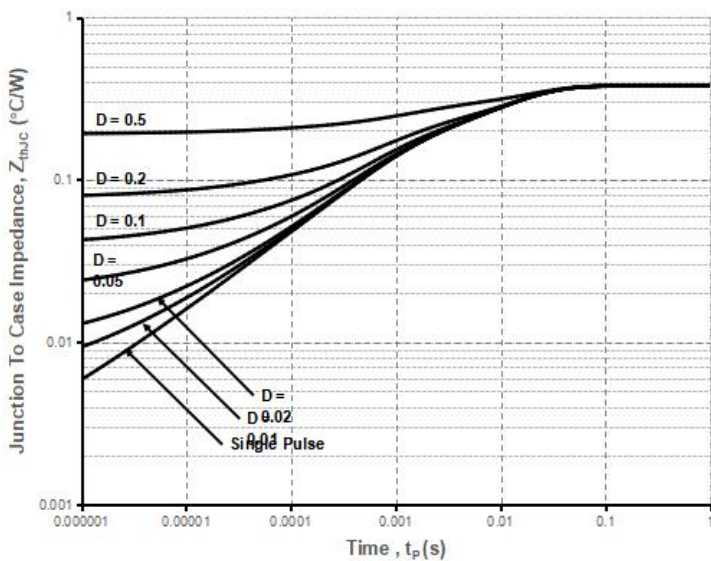


Fig 11. Maximum Transient Thermal Characteristics



## Test Circuits and Waveforms

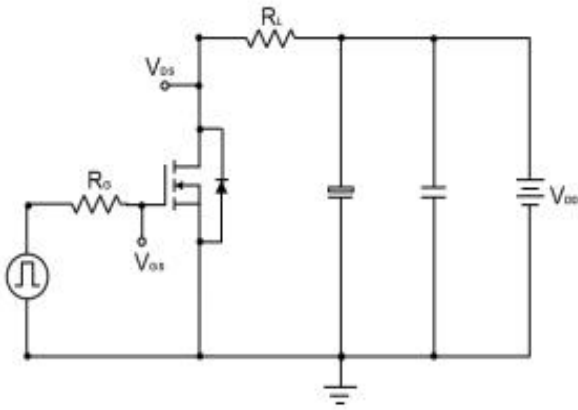


Fig 13. Test circuit for resistive load switching times

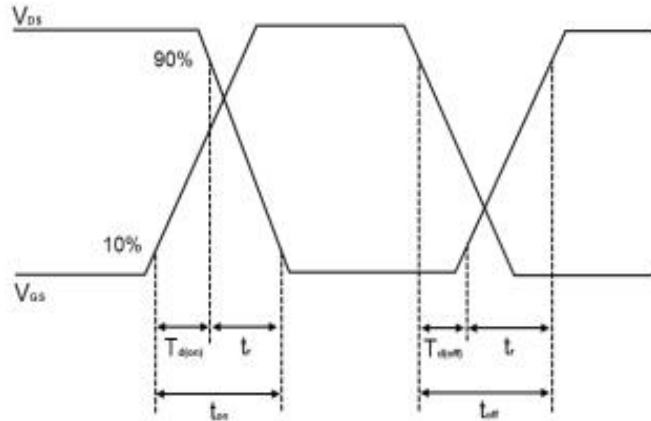


Fig 14. Switching times waveform

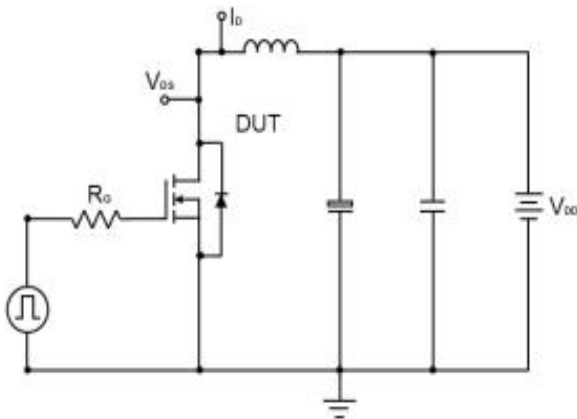


Fig 15. Test circuit for unclamped inductive load

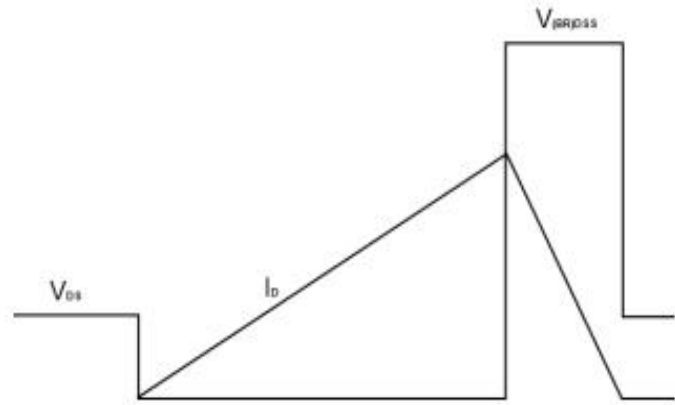


Fig 16. Unclamped inductive waveform

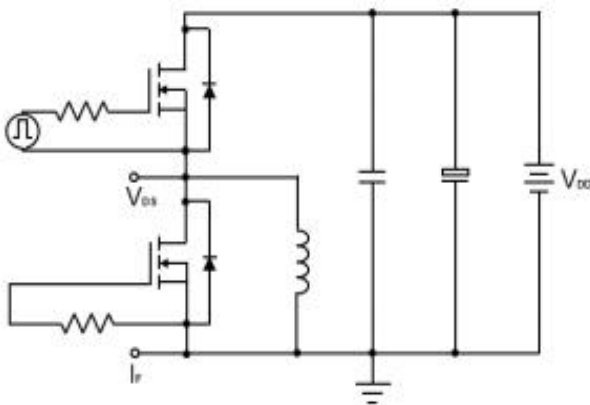


Fig 17. Test circuit for diode

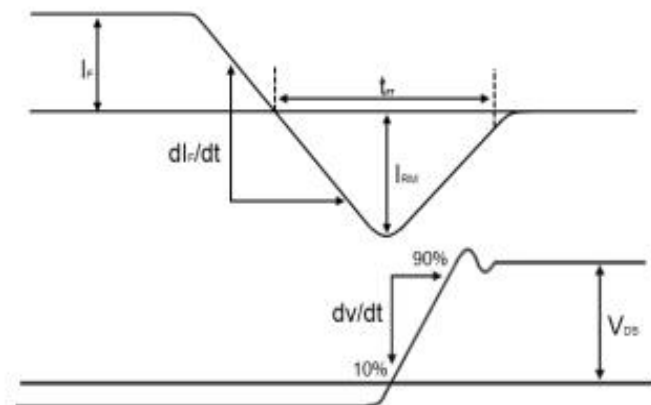
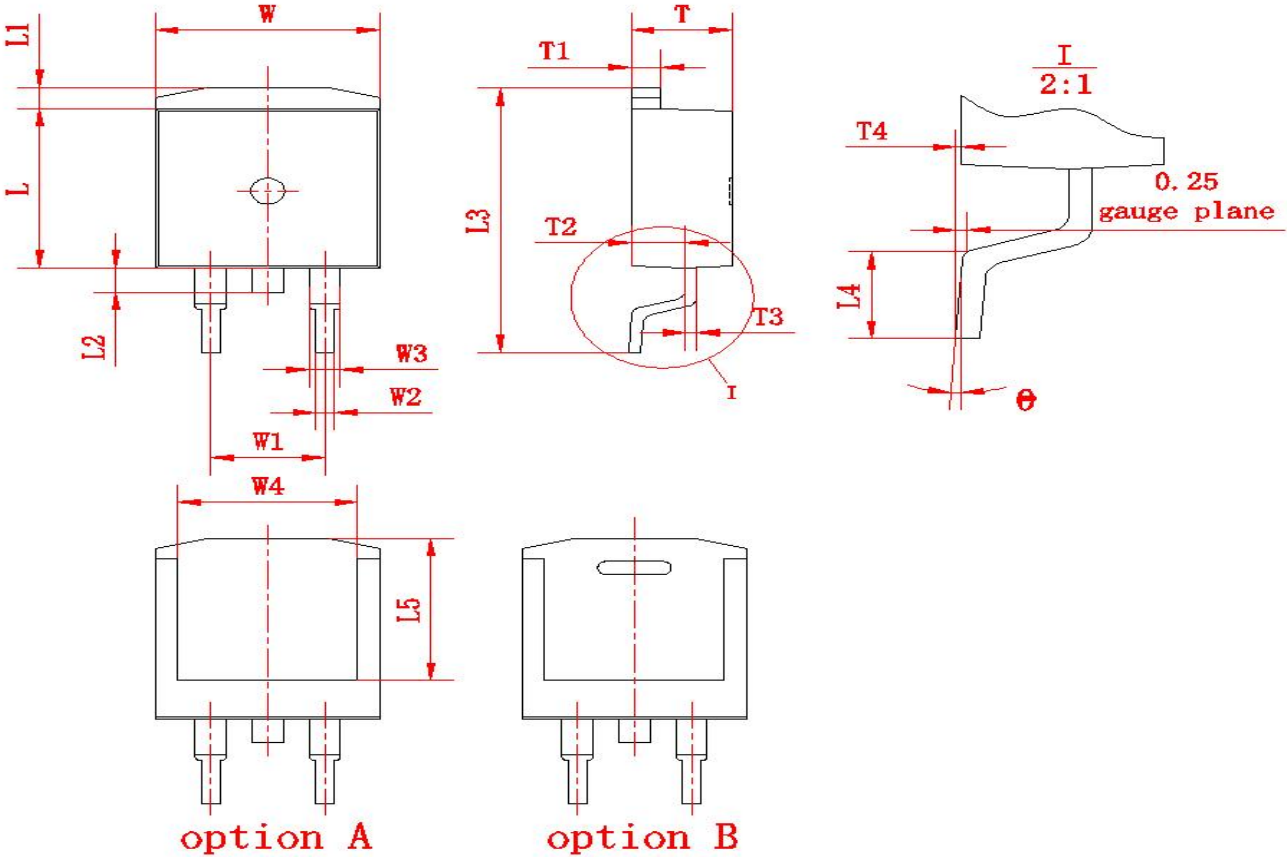


Fig 18. Diode recovery



Package outline drawing(TO-263 Unit: mm)



(单位: mm)

| 符号 | 尺寸     |       | 符号 | 尺寸    |       | 符号    | 尺寸   |      |
|----|--------|-------|----|-------|-------|-------|------|------|
|    | Min    | Max   |    | Min   | Max   |       | Min  | Max  |
| W  | 9.80   | 10.20 | L1 | 1.00  | 1.40  | T1    | 1.20 | 1.40 |
| W1 | (5.08) |       | L2 | 1.20  | 1.60  | T2    | 2.20 | 2.60 |
| W2 | 0.70   | 0.95  | L3 | 15.00 | 15.60 | T3    | 0.45 | 0.65 |
| W3 | 1.17   | 1.62  | L4 | 2.20  | 2.80  | T4    | 0    | 0.25 |
| W4 | (8.0)  |       | L5 | (8.2) |       | theta | 0°   | 8°   |
| L  | 9.00   | 9.40  | T  | 4.30  | 4.70  |       |      |      |

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