

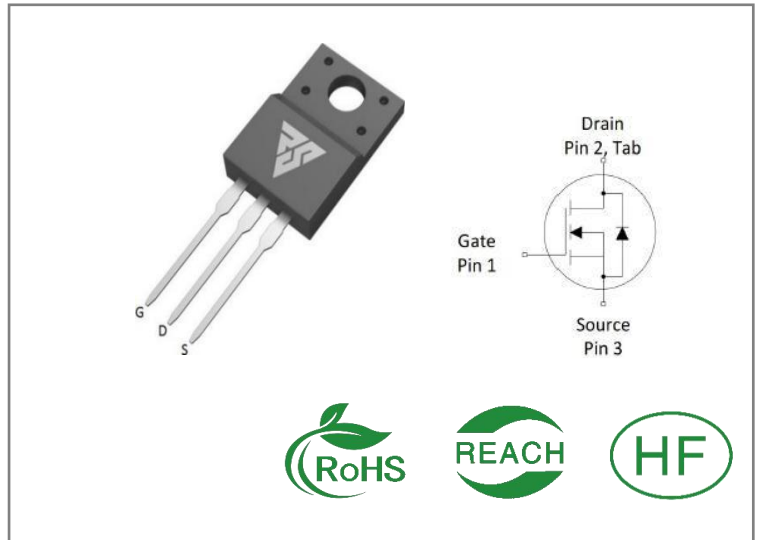
| ID | R <sub>DS(ON)</sub> (Typ) | VDSS |
|----|---------------------------|------|
| 7A | 1.2Ω                      | 650V |

#### Applications:

- LED power supplies
- Cell Phone Charger
- Standby Power

#### Features:

- Low gate charge
- Low Ciss
- Fast switching



#### Ordering Information

| Part Number | Package | Marking  | Packing | Qty.   |
|-------------|---------|----------|---------|--------|
| RS7N65BF    | T0-220F | RS7N65BF | Tube    | 50 PCS |

#### Absolute Maximum Ratings Tc= 25°C unless otherwise specified

| Symbol      | Parameter                                                                      | RS7N65BF   | Units |
|-------------|--------------------------------------------------------------------------------|------------|-------|
| VDSS        | Drain-to-Source Voltage                                                        | 650        | V     |
| ID          | Continuous Drain Current TC=25°C(Note*1)                                       | 7          | A     |
| IDM         | Pulsed Drain Current (Note*2)                                                  | 28         |       |
| PD          | Power Dissipation TC=25°C                                                      | 65         | W     |
| VGS         | Gate- to- Source Voltage                                                       | ±30        | V     |
| EAS         | Single Pulse Avalanche Energy<br>L = 10mH, VD=50V, TC=25°C                     | 451        | mJ    |
| TL TPKG     | Maximum Temperature for Soldering                                              | 300        | °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           | RS7N65BF | Units                         | Test Conditions                                                                                                         |
|---------------|---------------------|----------|-------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| R $\theta$ JC | Junction-to-Case    | 1.9      | $^{\circ}\text{C} / \text{W}$ | 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 | 58       |                               | 1 cubic foot chamber, free air.                                                                                         |

### OFF Characteristics TJ= 25 $^{\circ}\text{C}$ unless otherwise specified

| Symbol | Parameter                           | Min. | Typ. | Max. | Units         | Test Conditions                |
|--------|-------------------------------------|------|------|------|---------------|--------------------------------|
| BVDSS  | Drain- to- source Breakdown Voltage | 650  | --   | --   | V             | VGS=0V<br>ID=250 $\mu\text{A}$ |
| IDSS   | Drain- to- Source Leakage Current   | --   | --   | 1    | $\mu\text{A}$ | VDS=650V<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 $^{\circ}\text{C}$ unless otherwise specified

| Symbol  | Parameter                              | Min. | Typ. | Max. | Units    | Test Conditions                 |
|---------|----------------------------------------|------|------|------|----------|---------------------------------|
| RDS(on) | Static Drain- to- Source On-Resistance | --   | 1.2  | 1.4  | $\Omega$ | VGS=10V<br>ID=3.5A              |
| VGS(TH) | Gate Threshold Voltage                 | 2.0  | 2.8  | 4.0  | V        | VGS=VDS<br>ID=250 $\mu\text{A}$ |
| Rg      | Gate Resistance                        | --   | 2.8  | --   | $\Omega$ | VGS=0V<br>VDS=0V<br>f=1MHz      |
| Gfs     | Forward Transconductance               | --   | 3    | --   | S        | VDS=40V<br>ID=3.5A              |

### Resistive Switching Characteristics Essentially independent of operating temperature

| Symbol  | Parameter            | Min. | Typ. | Max. | Units | Test Conditions                               |
|---------|----------------------|------|------|------|-------|-----------------------------------------------|
| td(ON)  | Turn- on Delay Time  | --   | 10   | --   | nS    | VDS=325V<br>ID=6A<br>RG=10 $\Omega$<br>VGS=0V |
| trise   | Rise Time            | --   | 12   | --   |       |                                               |
| td(OFF) | Turn- OFF Delay Time | --   | 24   | --   |       |                                               |
| tfall   | Fall Time            | --   | 33   | --   |       |                                               |

**Dynamic Characteristics** Essentially independent of operating temperature

| Symbol | Parameter                       | Min. | Typ. | Max. | Units | Test Conditions               |
|--------|---------------------------------|------|------|------|-------|-------------------------------|
| Ciss   | Input Capacitance               | --   | 1153 | --   | pF    | VGS=0V<br>VDS=25V<br>f=1.0MHz |
| Coss   | Output Capacitance              | --   | 90   | --   |       |                               |
| Crss   | Reverse Transfer Capacitance    | --   | 4    | --   |       |                               |
| Qg     | Total Gate Charge               | --   | 21   | --   | nC    | VDS=520V<br>ID=6A<br>VGS=10V  |
| Qgs    | Gate- to- Source Charge         | --   | 6    | --   |       |                               |
| Qgd    | Gate-to-Drain(" Miller") Charge | --   | 4    | --   |       |                               |

**Source- Drain Diode Characteristics**

| Symbol | Parameter                 | Min. | Typ. | Max. | Units | Test Conditions                             |
|--------|---------------------------|------|------|------|-------|---------------------------------------------|
| IS     | Continuous Source Current | --   | --   | 7    | A     | Integral pn- diode<br>in MOSFET             |
| ISM    | Maximum Pulsed Current    | --   | --   | 28   | A     |                                             |
| VSD    | Diode Forward Voltage     | --   | --   | 1.2  | V     | IS=3A<br>VGS=0V                             |
| trr    | Reverse Recovery Time     | --   | 360  | --   | nS    | VGS=0V<br>VDS=30V<br>IS=1A<br>di/dt=100A/μs |
| Qrr    | Reverse Recovery Charge   | --   | 660  | --   | μC    |                                             |

**Notes:**

\* 1. Limited by TJ MAX<150°C, Maximum Duty Cycle D=0.5, TO-220 equivalent.

\* 2. This single-pulse measurement was taken under Tj\_Max = 150°C.

## Typical Feature Curve

Figure.1 Output Characteristics  $T_J=25^{\circ}\text{C}$

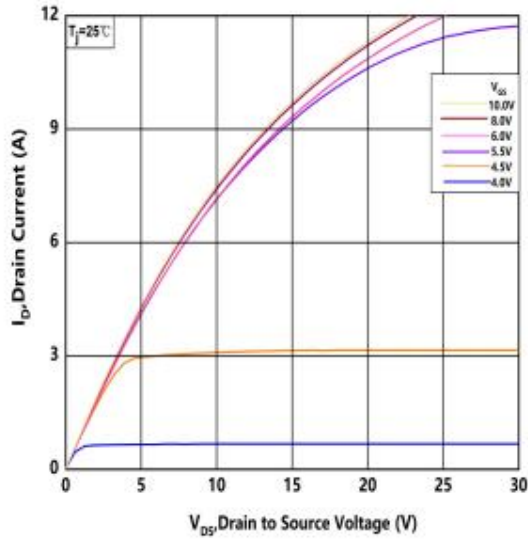


Figure.2 Transfer Characteristic for Various Junction Temperatures

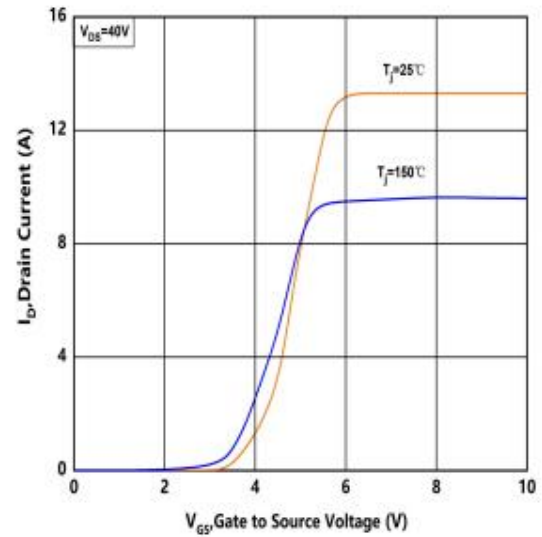


Figure.3 On-Resistance vs Drain Current For Various Gate Voltage

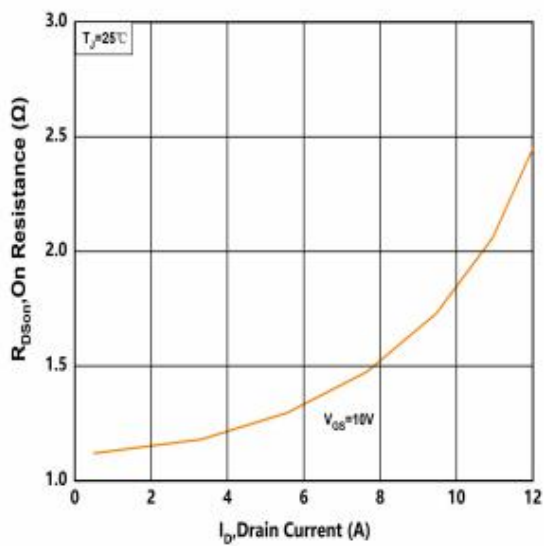
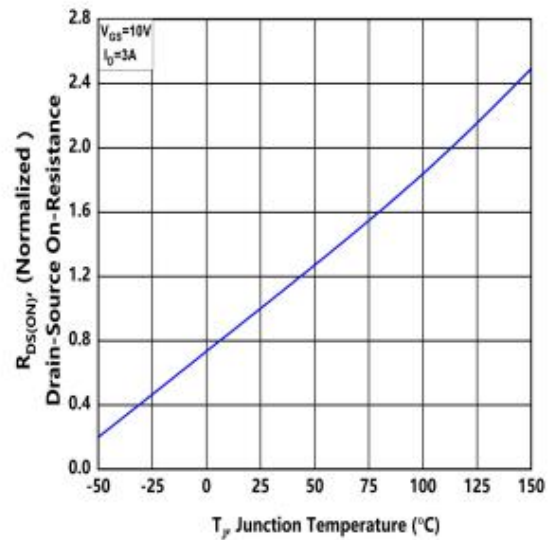


Figure.4 Typical On-Resistance vs Junction Temperature



## Typical Feature Curve

Figure.5 Typical Threshold Voltage vs Junction Temperature

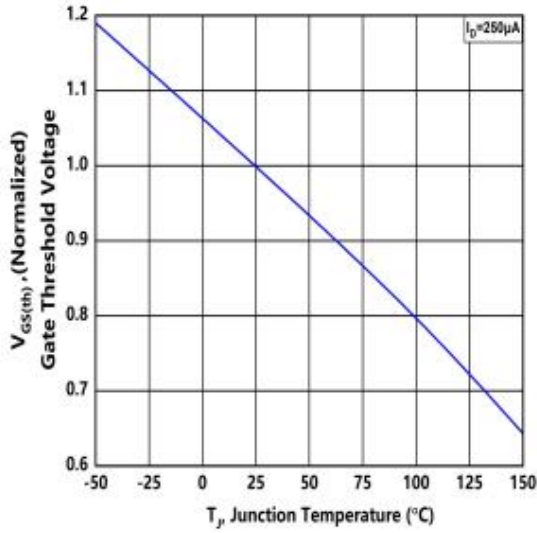


Figure.6 Typical Breakdown Voltage vs Junction Temperature

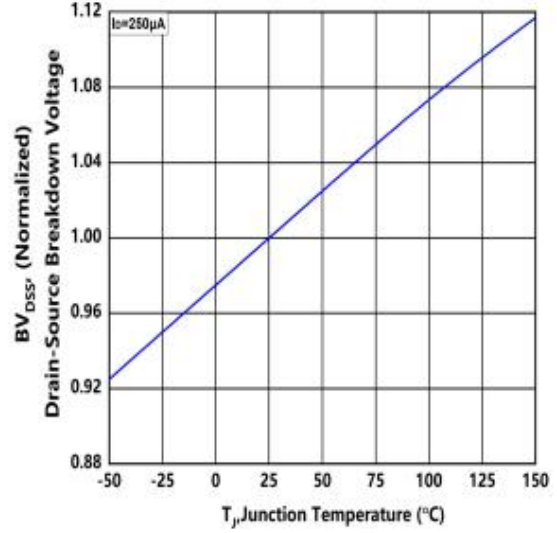


Figure.7 Typical Capacitance vs Drain to Source Voltage

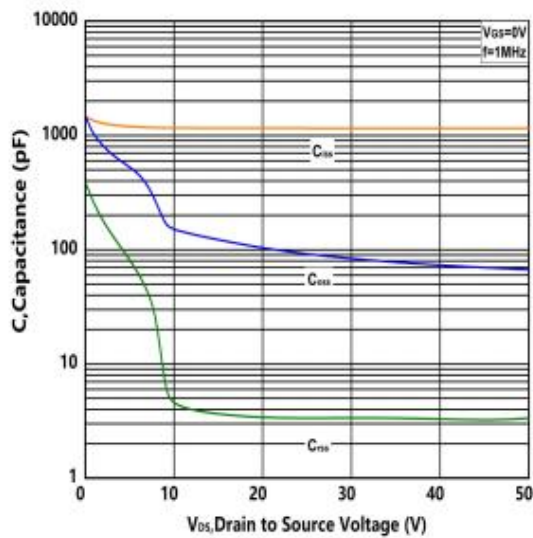


Figure.8 Typical Gate Charge vs Gate to Source Voltage

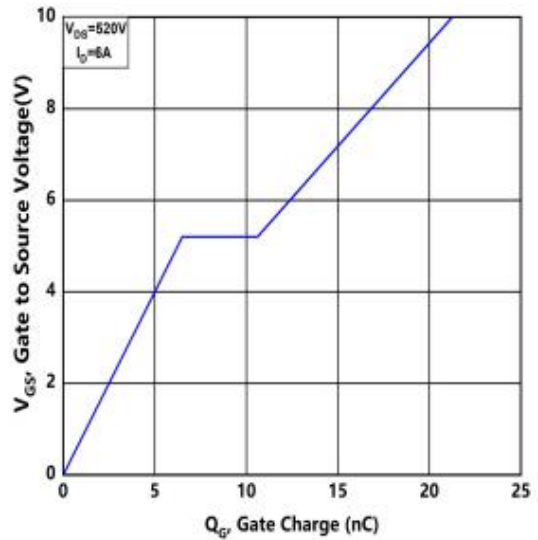


Figure.9 Typical Body Diode Characteristics

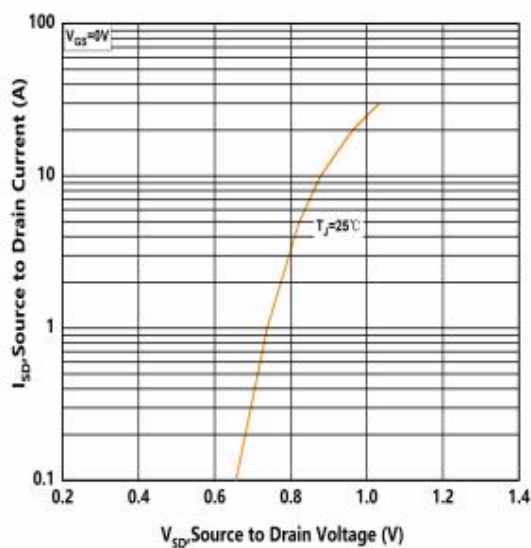


Figure.10 Maximum power Dissipation Derating vs Case Temperature

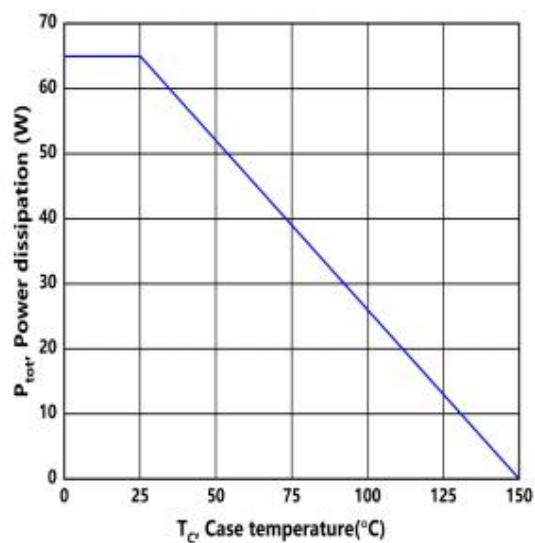


Figure.11 Safe Operating Area

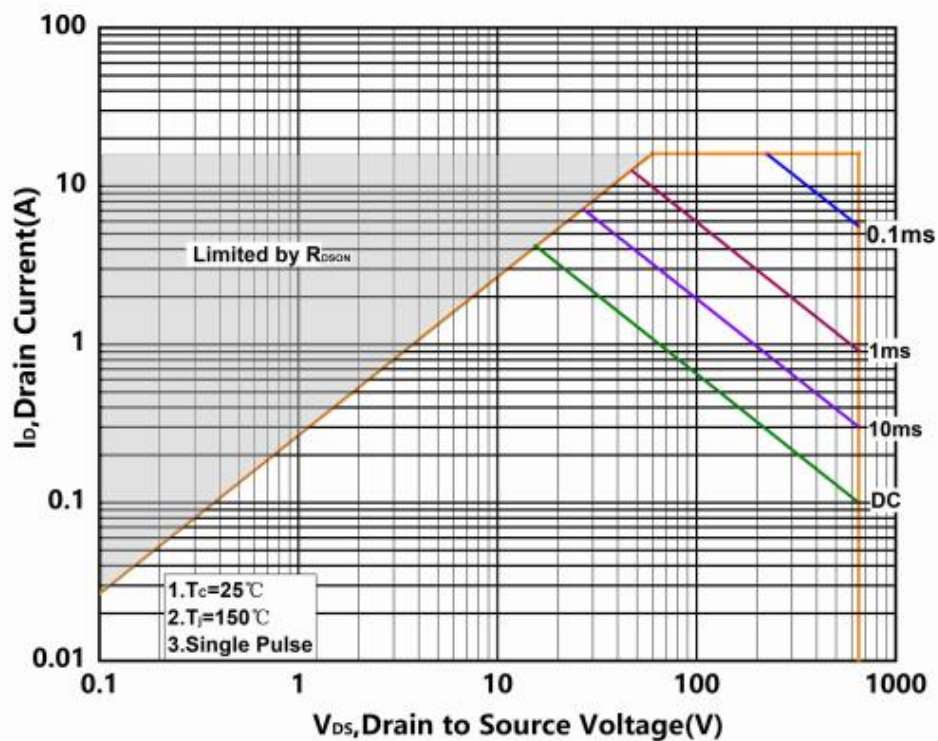
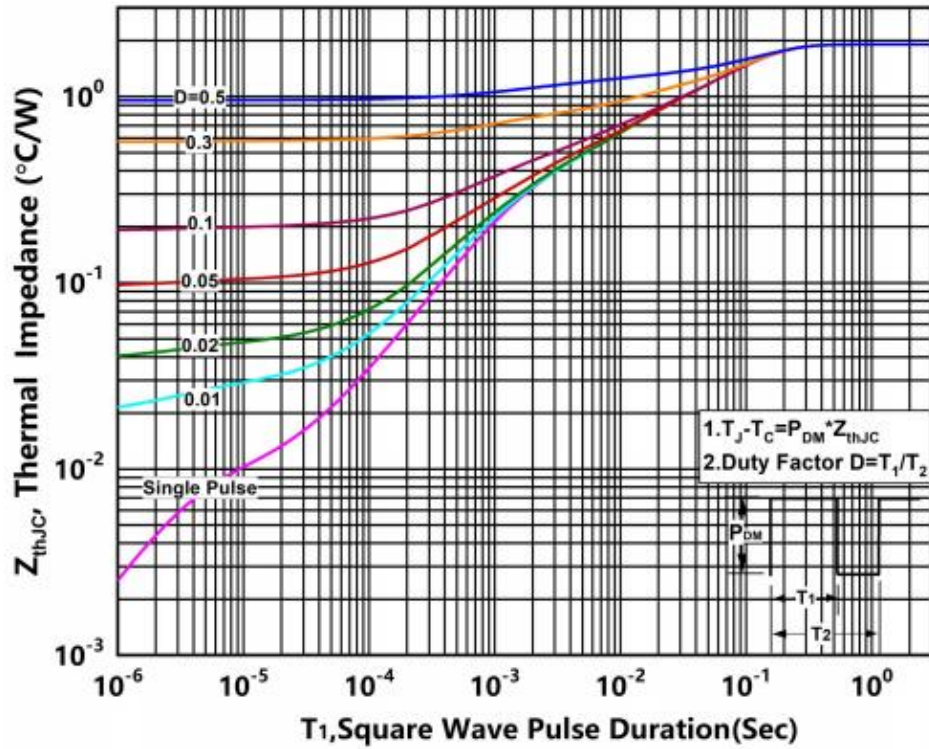
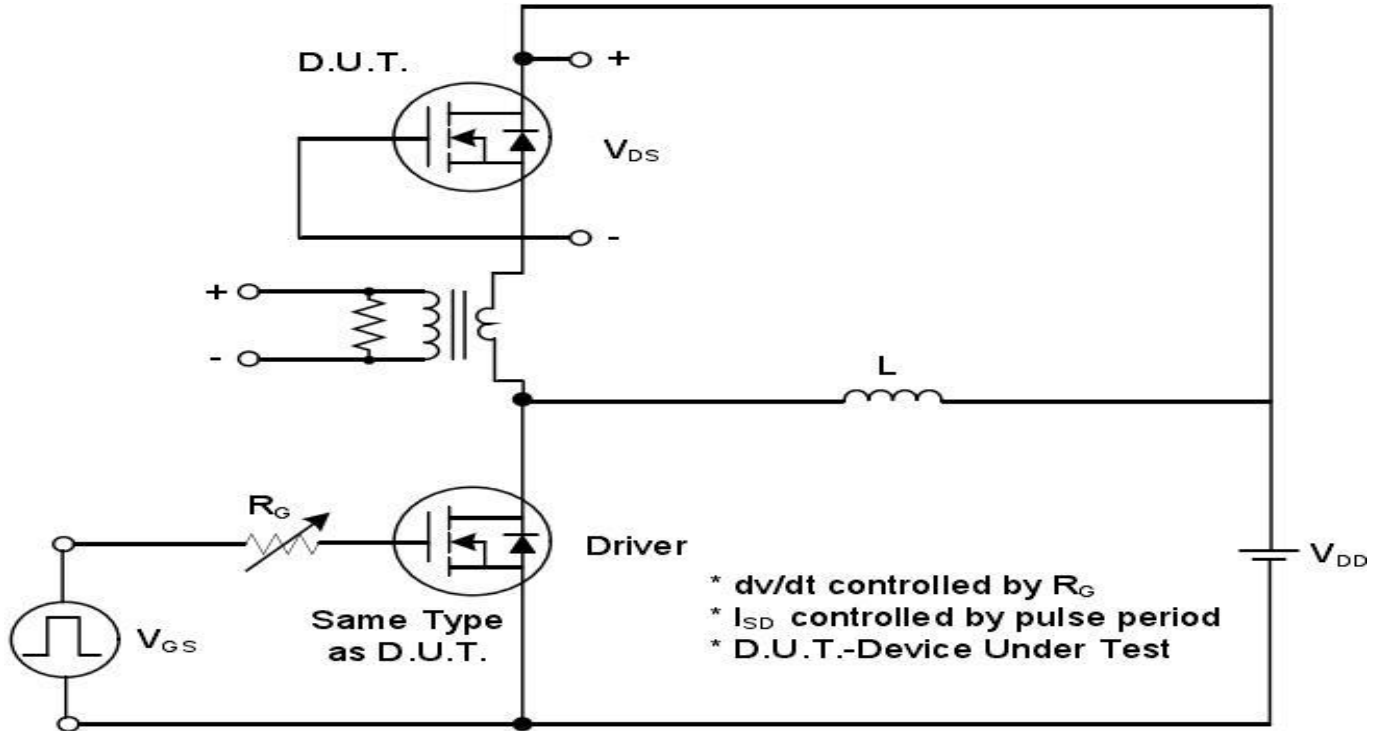


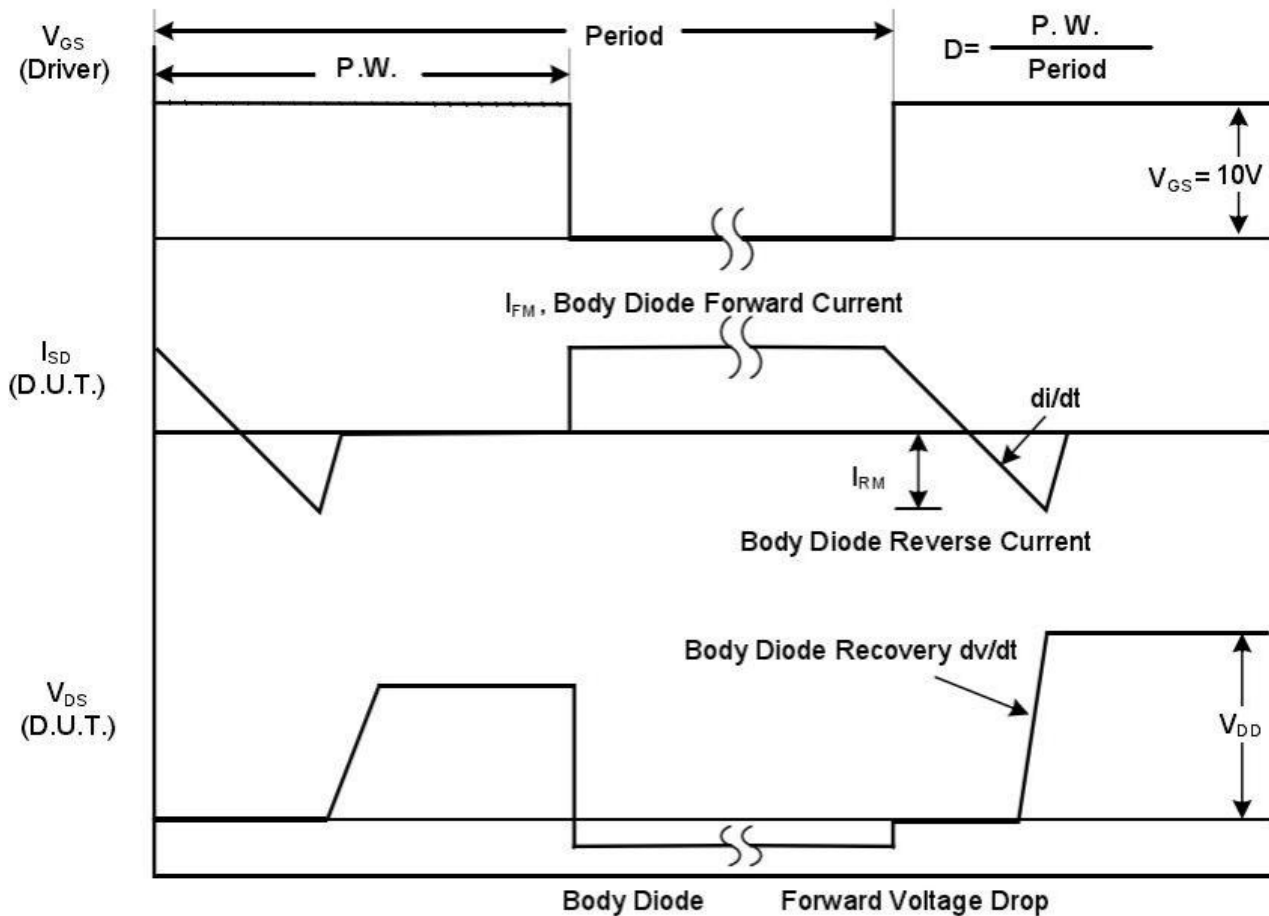
Figure.12 Transient Thermal Impedance (Junction - Case)



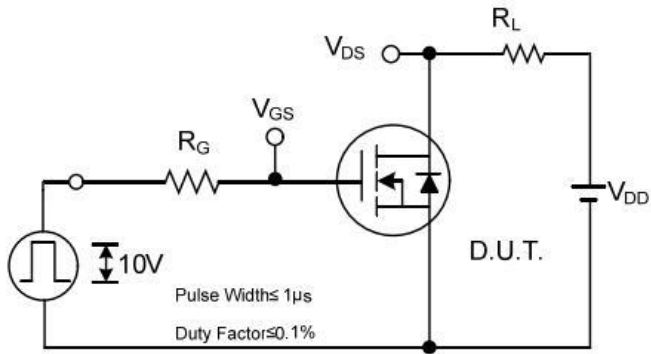
## Test Circuits and Waveforms



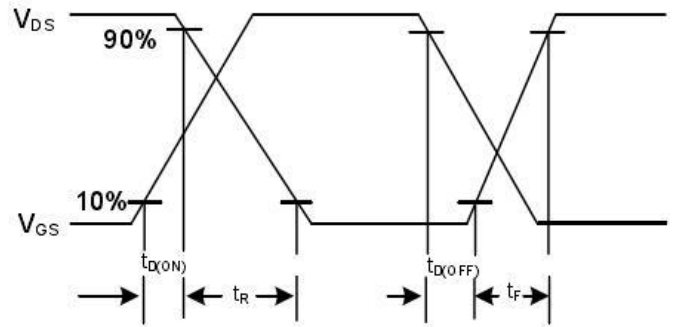
**Peak Diode Recovery  $dv/dt$  Test Circuit**



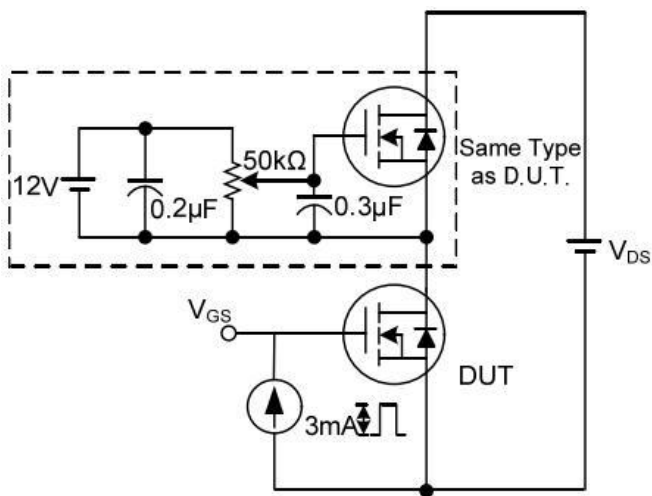
**Peak Diode Recovery  $dv/dt$  Waveforms**



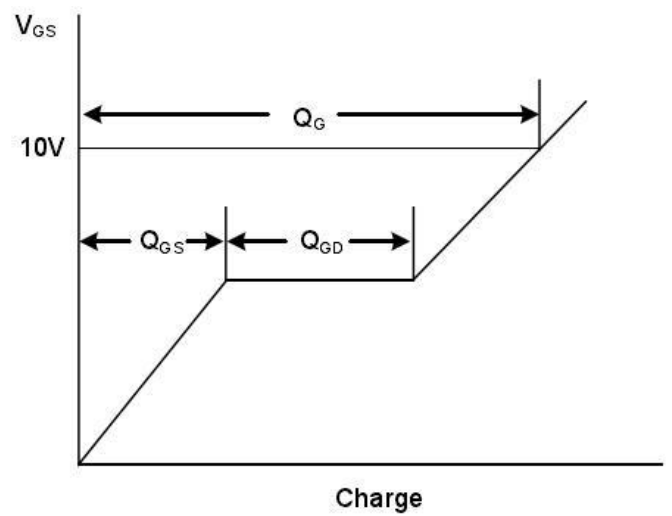
**Switching Test Circuit**



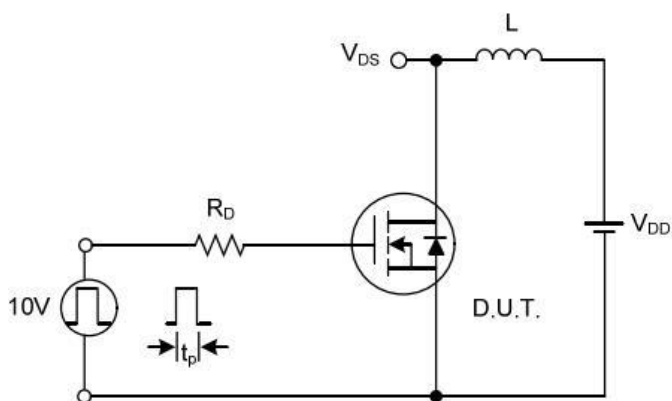
**Switching Waveforms**



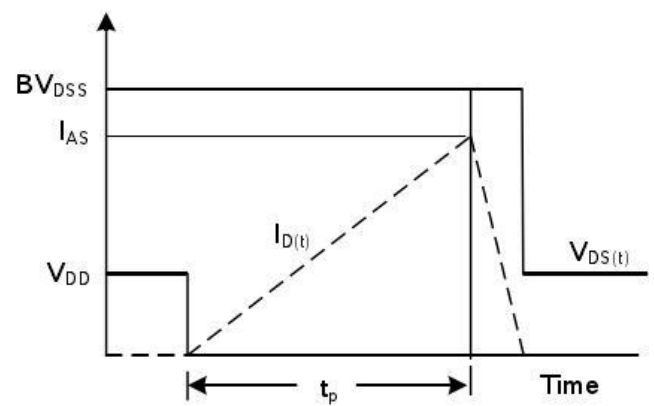
**Gate Charge Test Circuit**



**Gate Charge Waveform**

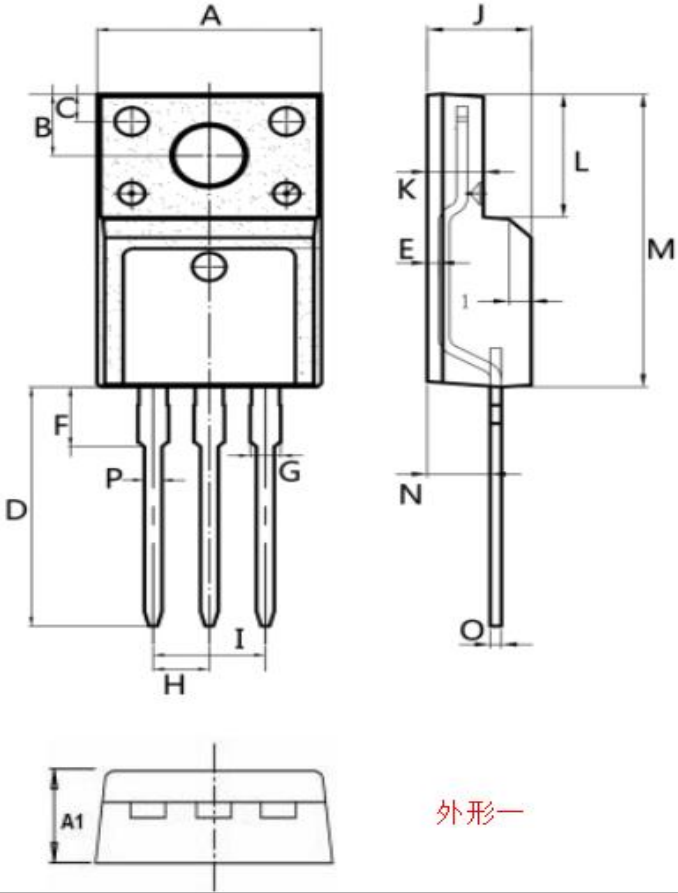
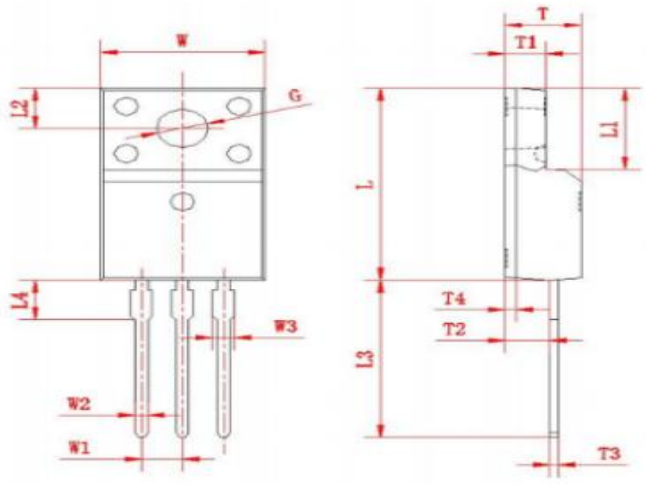


**Unclamped Inductive Switching Test Circuit**



**Unclamped Inductive Switching Waveforms**

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

|                                                                                                |      |        |       |
|------------------------------------------------------------------------------------------------|------|--------|-------|
|  <p>外形一</p>  | Dim. | Min.   | Max.  |
|                                                                                                | A    | 9.95   | 10.36 |
|                                                                                                | A1   | 4.5    | 5.0   |
|                                                                                                | B    | 2.95   | 3.25  |
|                                                                                                | C    | 1.25   | 1.45  |
|                                                                                                | D    | 12.60  | 13.60 |
|                                                                                                | E    | 0.40   | 0.60  |
|                                                                                                | F    | 2.8    | 3.5   |
|                                                                                                | G    | 1.30   | 1.45  |
|                                                                                                | H    | (2.54) |       |
|                                                                                                | I    | (5.08) |       |
|                                                                                                | J    | 4.60   | 4.75  |
|                                                                                                | K    | 2.45   | 2.65  |
|                                                                                                | L    | 6.5    | 6.8   |
|                                                                                                | M    | 15.4   | 16.0  |
|                                                                                                | N    | 2.25   | 3.05  |
|                                                                                                | O    | 0.45   | 0.55  |
|                                                                                                | P    | 0.70   | 0.90  |
| All Dimensions in millimeter                                                                   |      |        |       |
|  <p>外形二</p> | Dim. | Min.   | Max.  |
|                                                                                                | W    | 9.95   | 10.36 |
|                                                                                                | W1   | (2.54) |       |
|                                                                                                | W2   | 0.70   | 0.90  |
|                                                                                                | W3   | 1.25   | 1.47  |
|                                                                                                | L    | 15.67  | 16.07 |
|                                                                                                | L1   | 6.48   | 6.88  |
|                                                                                                | L2   | 3.2    | 3.4   |
|                                                                                                | L3   | 12.6   | 13.6  |
|                                                                                                | L4   | (3.23) |       |
|                                                                                                | T    | 4.50   | 4.90  |
|                                                                                                | T1   | 2.34   | 2.74  |
|                                                                                                | T2   | 2.25   | 2.95  |
|                                                                                                | T3   | 0.45   | 0.60  |
|                                                                                                | T4   | (0.70) |       |
|                                                                                                | G    | 3.08   | 3.28  |
| All Dimensions in millimeter                                                                   |      |        |       |

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