

**DESCRIPTION**

The AM12N80TF is available in the TO-220F Package.

| BVDSS | RDSON | ID  |
|-------|-------|-----|
| 800V  | 0.8Ω  | 12A |

**APPLICATIONS**

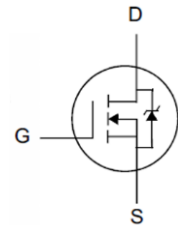
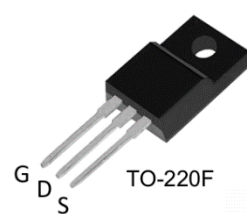
- ATX Power
- LCD Panel Power

**ORDERING INFORMATION**

| Package Type                                | Part Number     |             |
|---|-----------------|-------------|
| TO-220F<br>SPQ: 50pcs /Tube<br>1,000pcs/Box | T3F             | AM12N80T3FU |
| Note  | U: Tube Package |             |
| AiT provides all RoHS products              |                 |             |

**FEATURES**

- 800V, 12A
- $R_{DS(ON)}$  Typ. = 0.8Ω @  $V_{GS} = 10V$
- Proprietary New Planar Technology
- Low Gate Charge Minimize Switching Loss
- Fast Recovery Body Diode

**PIN DESCRIPTION**

| Pin# | Symbol | Function |
|------|--------|----------|
| 1    | G      | Gate     |
| 2    | D      | Drain    |
| 3    | S      | Source   |

**ABSOLUTE MAXIMUM RATINGS**

$T_C = 25^\circ\text{C}$ , unless otherwise Noted

|  |                |
|--|----------------|
| $V_{DSS}$ , Drain-to-Source Voltage <sup>(1)</sup>   | 800V           |
| $V_{GSS}$ , Gate-to-Source Voltage   | ±30V           |
| $I_D$ , Continuous Drain Current   | 12A            |
| $T_C = 100^\circ\text{C}$  | See Fig. 3     |
| $I_{DM}$ , Pulsed Drain Current at $V_{GS} = 10V$ <sup>(2)</sup>                           | See Fig. 6     |
| $E_{AS}$ , Single Pulse Avalanche Energy   | 1200mJ         |
| $dv/dt$ , Peak Diode Recovery $dv/dt$ <sup>(3)</sup>                                       | 5V/ns          |
| $P_D$ , Power Dissipation  | 55W            |
| $P_D$ , Derating Factor above 25°C   | 0.44W/°C       |
| $R_{\theta JC}$ , Thermal Resistance, Junction to Case                                     | 2.27°C/W       |
| $R_{\theta JA}$ , Thermal Resistance, Junction-to-Ambient                                  | 100°C/W        |
| $T_{STG}$ , Storage Temperature Range  | -55°C ~ +150°C |
| $T_J$ , Operating Junction Temperature Range   | -55°C ~ +150°C |
| $T_L$ , Maximum Temperature for Soldering  | 300°C          |
| $T_{PAK}$ , Leads at 0.063in (1.6mm) from Case for 10 seconds, Package Body for 10 seconds | 260°C          |

Stresses above may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated in the Electrical Characteristics are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

(1)  $T_J = +25^\circ\text{C}$  to  $+150^\circ\text{C}$

(2) Repetitive rating; pulse width limited by maximum junction temperature.

(3)  $I_{SD} = 12A$  di/dt < 100 A/μs,  $V_{DD} < BV_{DSS}$ ,  $T_J = +150^\circ\text{C}$

**ELECTRICAL CHARACTERISTICS** $T_J = 25^{\circ}\text{C}$ , unless otherwise Noted

| Parameter                                | Symbol              | Conditions  | Min | Typ. | Max  | Unit |
|--|---------------------|---|-----|------|------|------|
| Off Characteristics                      |                     |   |     |      |      |      |
| Drain-to-Source Breakdown Voltage        | BV <sub>DSS</sub>   | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA  | 800 | -    | -    | V    |
| Drain-to- Source Leakage Current         | I <sub>DSS</sub>    | V <sub>DS</sub> =800V, V <sub>GS</sub> =0V  | -   | -    | 1    | μA   |
|  |                     | V <sub>DS</sub> =640V, V <sub>GS</sub> =0V, T <sub>J</sub> = 125°C                      | -   | -    | 100  |      |
| Gate-to- Source Leakage Current          | I <sub>GSS</sub>    | V <sub>GS</sub> = +30V, V <sub>DS</sub> =0V   | -   | -    | +100 | nA   |
|  |                     | V <sub>GS</sub> = -30V, V <sub>DS</sub> =0V   | -   | -    | -100 |      |
| On Characteristics                       |                     |   |     |      |      |      |
| Gate Threshold Voltage                   | V <sub>GS(TH)</sub> | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                              | 2.0 | -    | 4.0  | V    |
| Static Drain-to-Source On-Resistance *   | R <sub>DS(ON)</sub> | V <sub>GS</sub> =10V, I <sub>D</sub> = 6A   | -   | 0.8  | 1.1  | Ω    |
| Forward Transconductance*                | g <sub>fs</sub>     | V <sub>DS</sub> =20V, I <sub>D</sub> =10A   | -   | 20   | -    | S    |
| Dynamic Characteristics                  |                     |   |     |      |      |      |
| Input Capacitance                        | C <sub>iss</sub>    | V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1.0MHZ                                     | -   | 1950 | -    | pF   |
| Output Capacitance                       | C <sub>oss</sub>    |   | -   | 208  | -    |      |
| Reverse Transfer Capacitance             | C <sub>rss</sub>    |   | -   | 60   | -    |      |
| Total Gate Charge                        | Q <sub>g</sub>      | V <sub>DD</sub> = 640V , I <sub>D</sub> =12V<br>V <sub>GS</sub> =0V ~ 10V               | -   | 70   | -    | nC   |
| Gate-to-Source Charge                    | Q <sub>gs</sub>     |   | -   | 11   | -    |      |
| Gate-to-Drain (Miller) Charge            | Q <sub>gd</sub>     |   | -   | 33   | -    |      |
| Switching Characteristics                |                     |   |     |      |      |      |
| Turn-On Delay Time                       | t <sub>d(on)</sub>  | V <sub>DD</sub> =400V, R <sub>G</sub> =4.7Ω, V <sub>GS</sub> =10V, I <sub>D</sub> = 12A | -   | 20   | -    | ns   |
| Turn-On Rise Time                        | t <sub>r</sub>      |   | -   | 12   | -    |      |
| Turn-Off Delay Time                      | t <sub>d(off)</sub> |   | -   | 70   | -    |      |
| Turn-Off Fall Time                       | t <sub>f</sub>      |   | -   | 25   | -    |      |
| Source- Drain Body Diode Characteristics |                     |   |     |      |      |      |
| Continuous Source Current*               | I <sub>SD</sub>     | Integral PN-Diode in MOSFET   | -   | -    | 12   | A    |
| Pulsed Source Current*                   | I <sub>SM</sub>     |   | -   | -    | 48   | A    |
| Diode Forward Current                    | V <sub>SD</sub>     | I <sub>S</sub> = 12A, V <sub>GS</sub> =0V   | -   | -    | 1.5  | V    |
| Reverse Recovery Time                    | t <sub>rr</sub>     | I <sub>F</sub> = 12A, V <sub>GS</sub> =0V<br>di/dt = 100A/us                            | -   | 600  | -    | ns   |
| Reverse Recovery Charge                  | Q <sub>rr</sub>     |   | -   | 3.4  | -    | uC   |

\* Pulse test: Pulse width  $\leq 380\mu s$ , Duty Cycle  $\leq 2\%$ .



## TYPICAL PERFORMANCE CHARACTERISTICS

Fig 1. Maximum Effective Thermal Impedance, Junction-to-Case

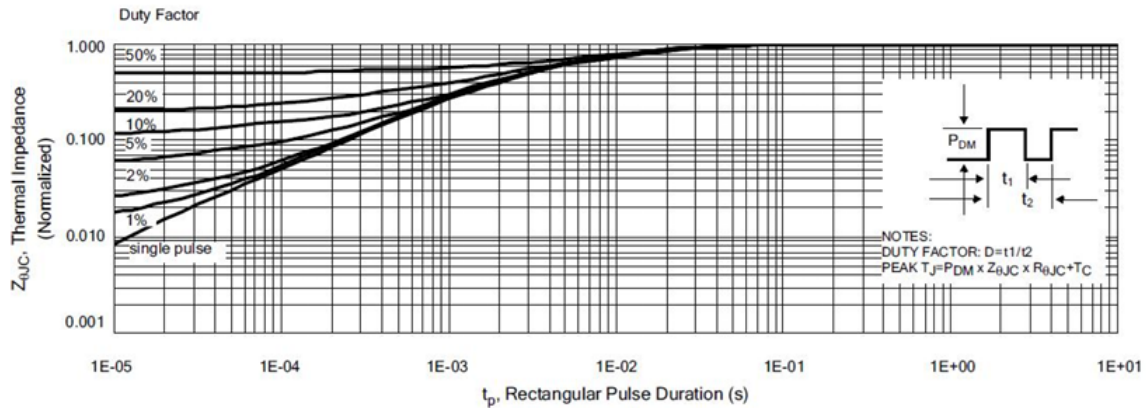


Fig 2. Maximum Power Dissipation vs. Case Temperature

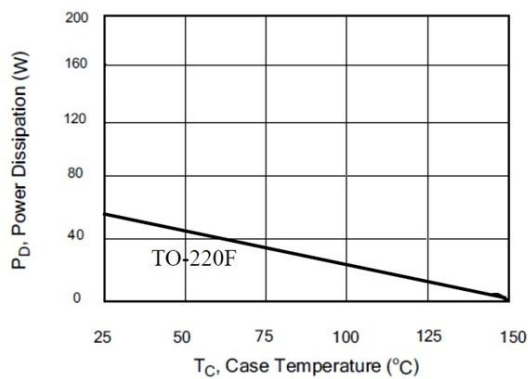


Fig 3. Maximum Continuous Drain Current vs. Case Temperature

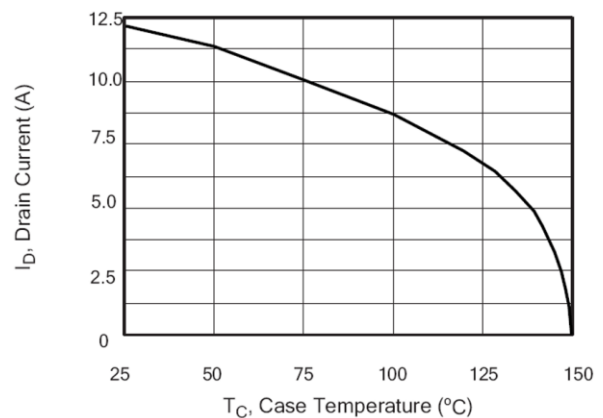


Fig 4. Typical Output Characteristics

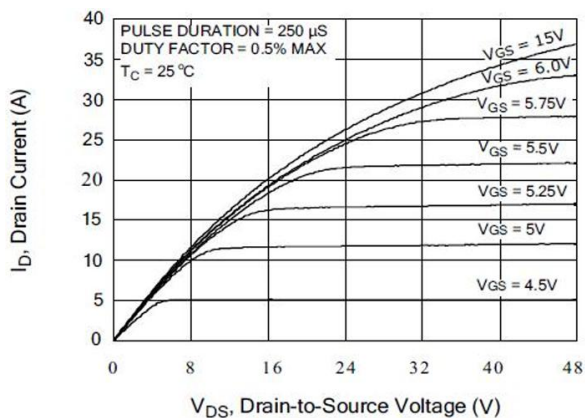


Fig 5. Typical Drain-to-Source ON Resistance vs. Gate Voltage and Drain Current

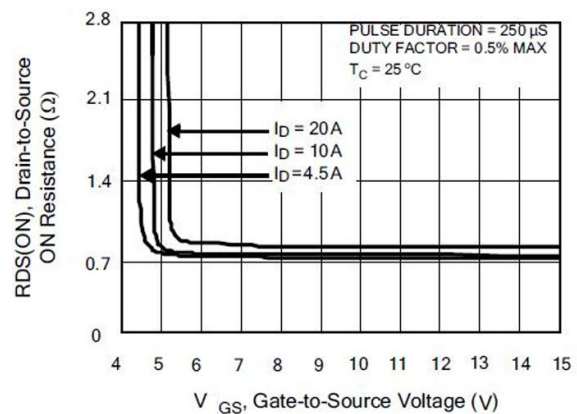




Fig 6. Maximum Peak Current Capability

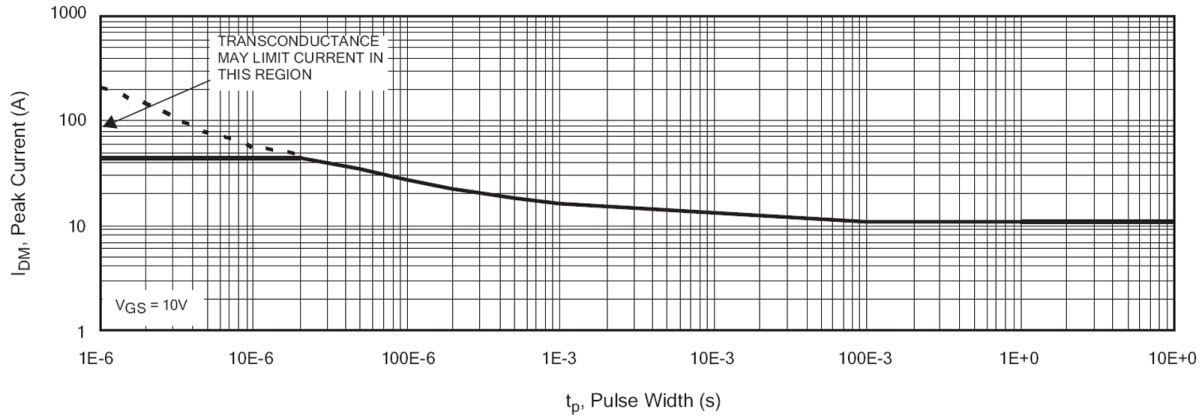


Fig 7. Typical Transfer Characteristics

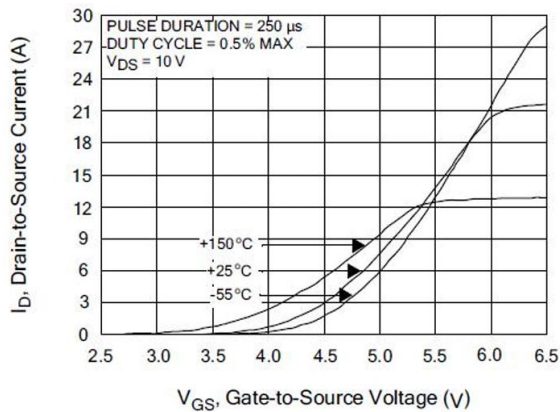


Fig 8. Unclamped Inductive Switching Capability

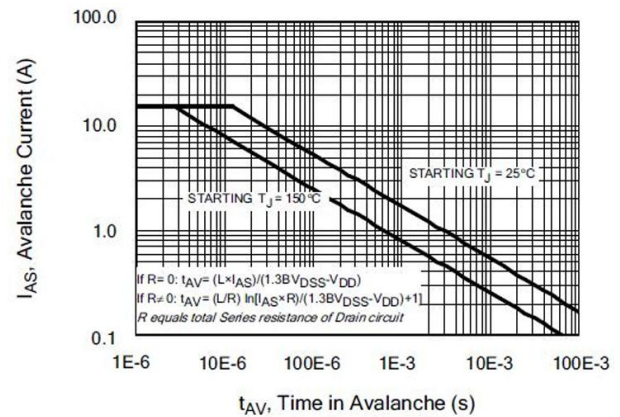


Fig 9. Typical Drain-to-Source ON Resistance vs. Drain Current

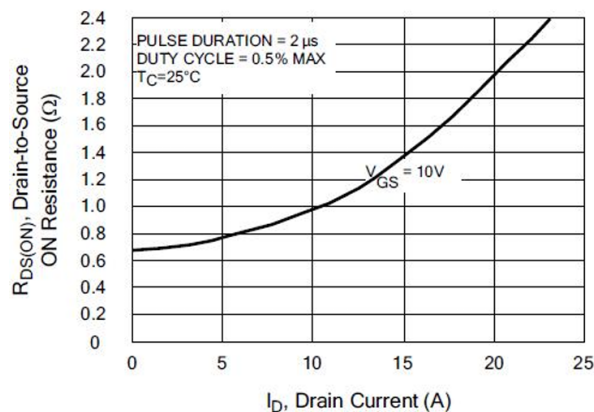


Fig 10. Typical Drain-to-Source ON Resistance vs. Junction Temperature

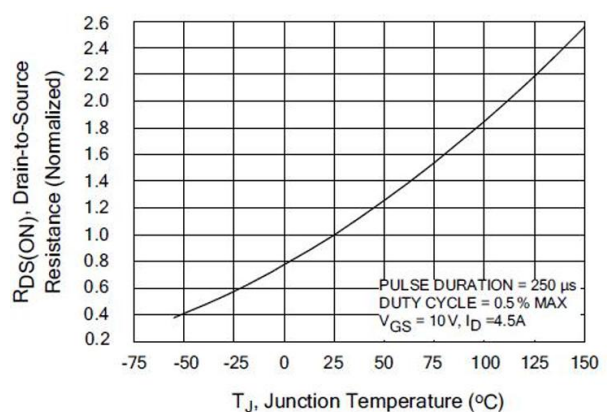




Fig 11. Typical Breakdown Voltage  
vs. Junction Temperature

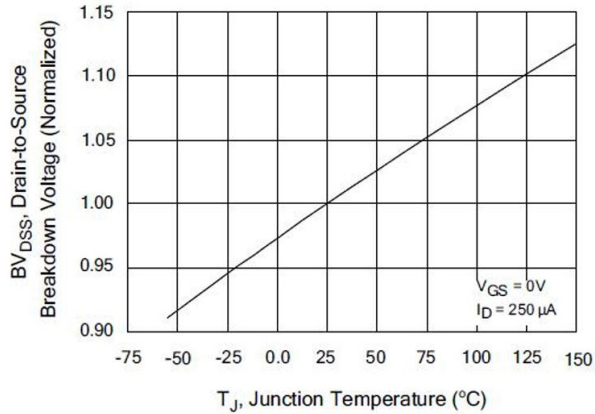


Fig 12. Typical Threshold Voltage  
vs. Junction Temperature

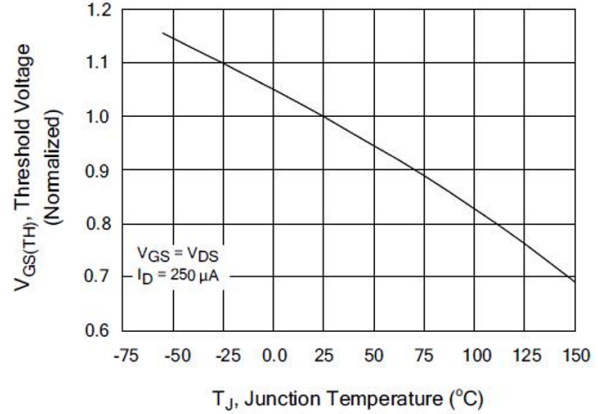


Fig 13. Maximum Forward Bias Safe Operating Area

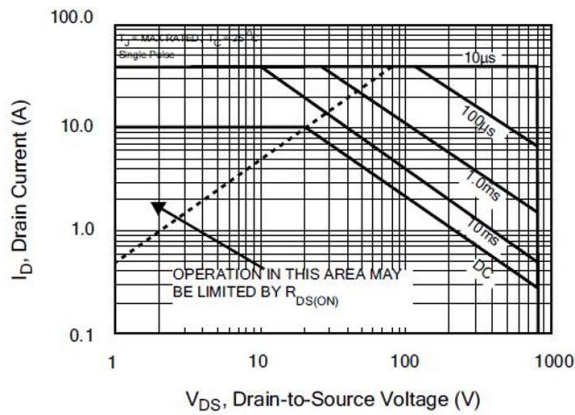


Fig 14. Typical Capacitance  
vs. Drain-to-Source Voltage

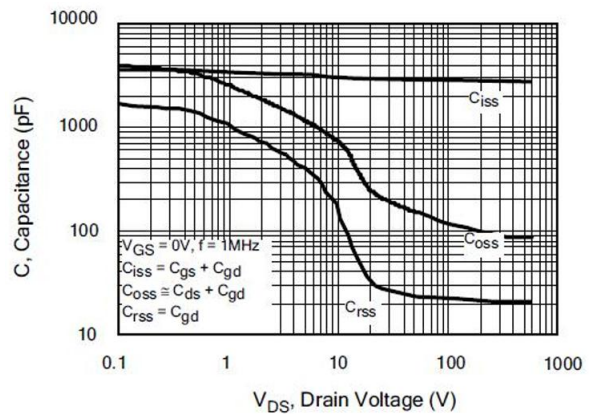


Fig 15. Typical Gate Charge  
vs. Gate-to-Source Voltage

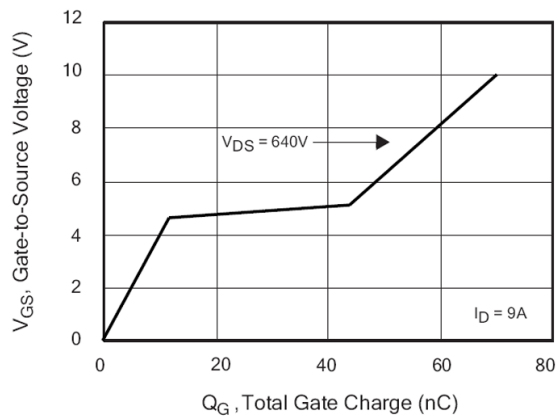
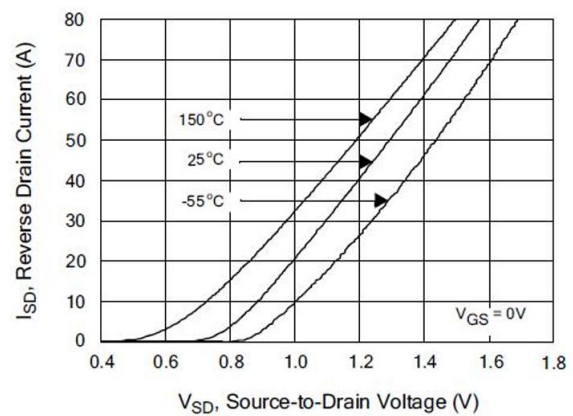


Fig 16. Typical Body Diode Transfer Characteristics





## TEST CIRCUIT

Fig 17. Peak Diode Recovery dv/dt Test Circuit

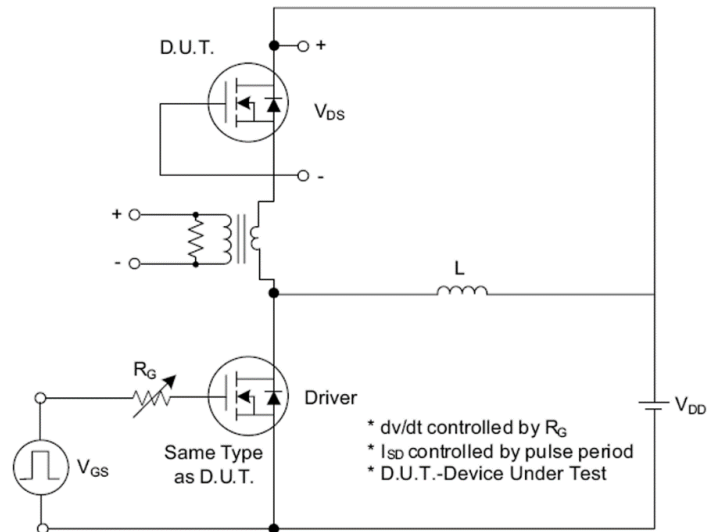


Fig 18. Peak Diode Recovery dv/dt Waveforms

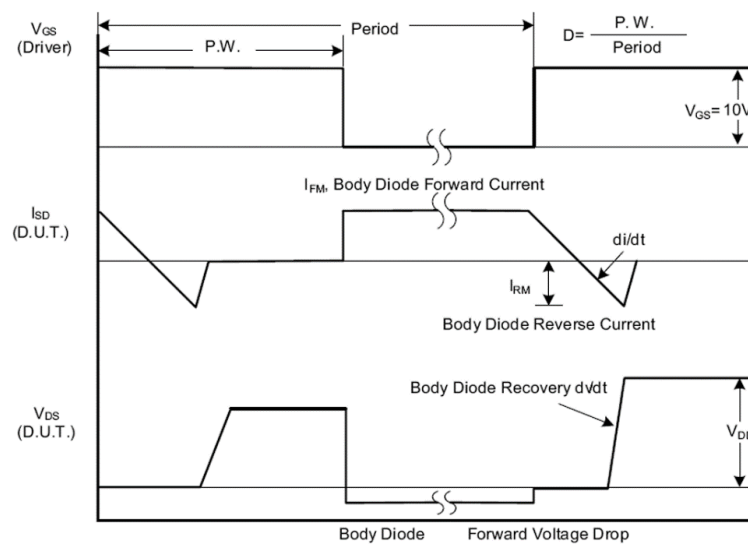






Fig 19. Switching Teat Circuit

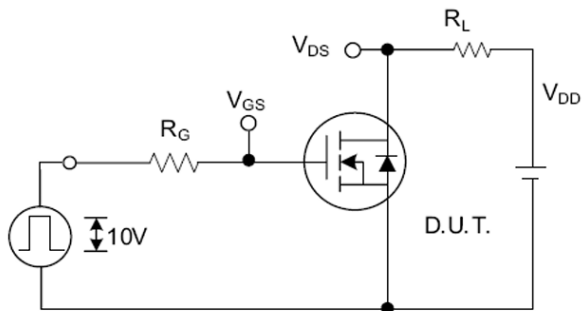


Fig 20. Switching Waveforms

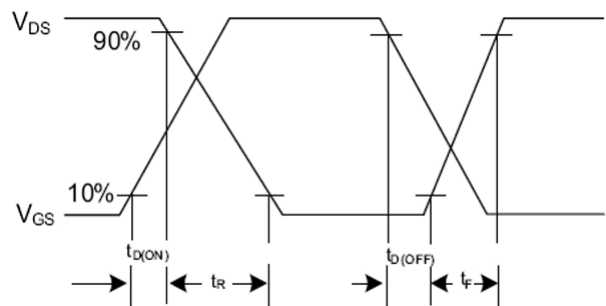


Fig 21. Gate Charge Test Circuit

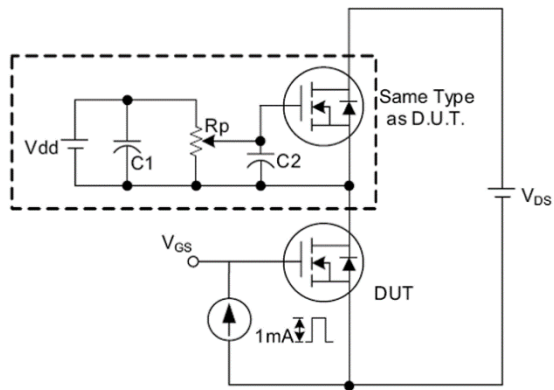


Fig 22. Gate Charge Waveform

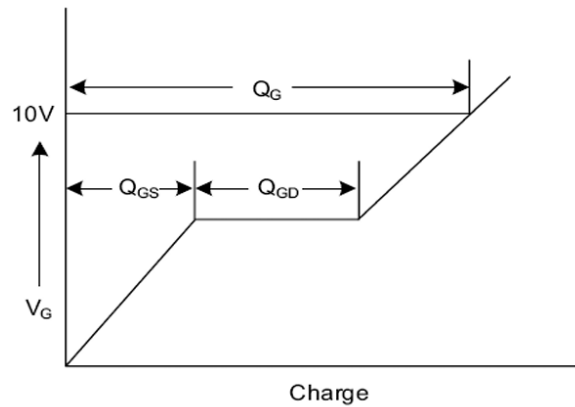


Fig 23. Unclamped Inductive Switching Teat Circuit

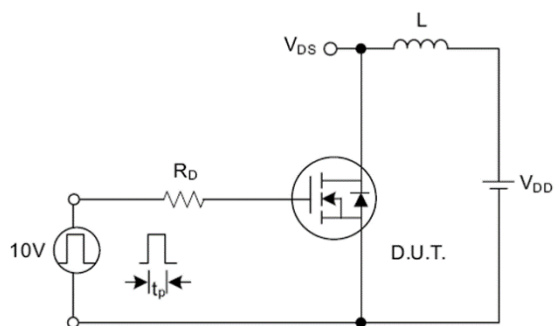
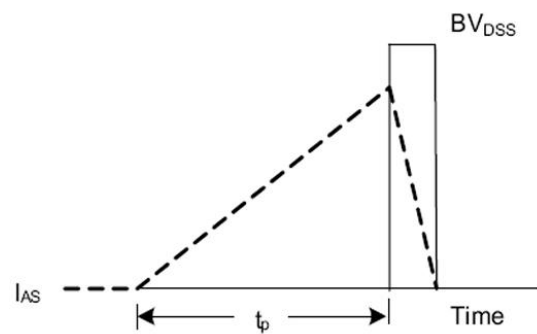
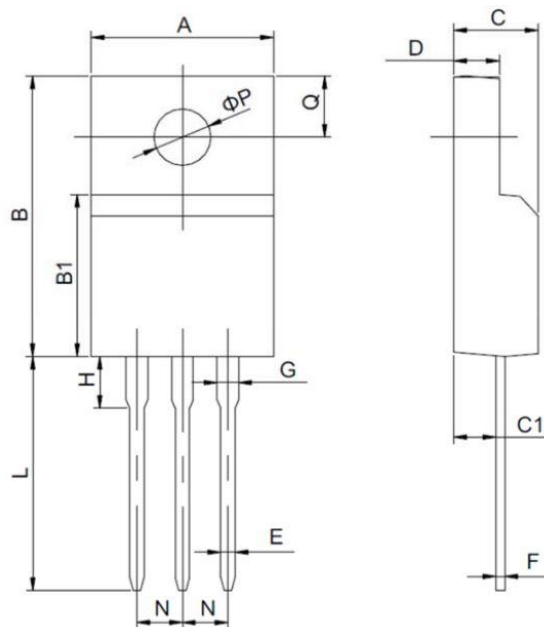


Fig 24. Unclamped Inductive Switching Waveform



**PACKAGE INFORMATION**

Dimension in TO-220F (Unit: mm)



| Symbol | Min.   | Max.   |
|--------|--------|--------|
| A      | 9.600  | 10.400 |
| B      | 15.400 | 16.200 |
| B1     | 8.900  | 9.500  |
| C      | 4.300  | 4.900  |
| C1     | 2.100  | 3.000  |
| D      | 2.400  | 3.000  |
| E      | 0.600  | 1.000  |
| F      | 0.300  | 0.600  |
| G      | 1.120  | 1.420  |
| H      | 1.600  | 3.800  |
| L      | 12.000 | 14.000 |
| N      | 2.340  | 2.740  |
| Q      | 3.150  | 3.550  |
| ΦP     | 2.900  | 3.300  |





## IMPORTANT NOTICE

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