| Industrial model | Poplular name | Package identificattion | Packing method | Quantity per tube | Quantity per box | Quantity per carton |
|---|---|---|---|---|---|---|
| SPT10N80<br>SPF10N80 | 10N80<br>10N80 | T: TO-220AB<br>F: TO-220F-3L | TUBE | 50/tube | 1Kpcs/box | 5Kpcs |

■Features

Originative New Design
Superior Avalanche Rugged Technology
Robust Gate Oxide Technology
Very Low Intrinsic Capacitances
Excellent Switching Characteristics
Unrivalled Gate Charge: 13.5nC(Typ.)
Extended Safe Operating Area
Lower $R_{DS(ON)}$1Ω(Typ.) @ $V_{GS}$=10V
100% Avalanche Tested
Package: TO-220AB & TO-220F-3L

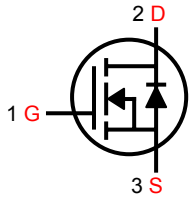
$I_D$=10A
$BV_{DSS}$=800V
$R_{DS(on)}$=0.8Ω

SPF/T10N80 Series Pin Assignment


3-Lead Plastic TO-220AB
Package Code:T
Pin 1: Gate
Pin 2 & Tab: Drain
Pin 3: Source

3-Lead Plastic TO-220F-3L
Package Code: F
Pin 1: Gate
Pin 2: Drain
Pin 3: Source

Series Symbol:




## ■ ABSOLUTE MAXIMUM RATINGS ($T_C$ =25°C, unless otherwise specified)

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DSS}$ | 800 | V |
| Gate-Source Voltage | | $V_{GSS}$ | ±30 | V |
| Continuous Drain Current ($T_C$ = 25°C) | | $I_D$ | 10 | A |
| Pulsed Drain Current (Note 2) | | $I_{DM}$ | 40 | A |
| Avalanche Current (Note 2) | | $I_{AR}$ | 10 | A |
| Avalanche Energy | Single Pulsed (Note 3) | $E_{AS}$ | 920 | mJ |
| | Repetitive (Note 2) | $E_{AR}$ | 24 | mJ |
| Peak Diode Recovery dv/dt (Note 4) | | dv/dt | 4.0 | V/ns |
| Power Dissipation | TO-220AB | $P_D$ | 240 | W |
| | TO-220F-3L | | 36 | |
| Linear Derating Factor above $T_C$ = 25°C | TO-220AB | | 1.92 | °C/W |
| | TO-220F-3L | | 0.288 | |
| Junction Temperature | | $T_J$ | 150 | °C |
| Storage Temperature | | $T_{STG}$ | -55 ~ +150 | °C |

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.
2. Repetitive Rating: Pulse width limited by maximum junction temperature.
3. L=17.3mH, $I_{AS}$=10A, $V_{DD}$=50V, $R_G$=25Ω, Satarting $T_J$=25°C
4. $I_{SD}$ ≤ 10 A, di/dt ≤ 200A/μs, $V_{DD}$ ≤$BV_{DSS}$, Satarting $T_J$=25°C.

## ■ THERMAL DATA

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|---|---|---|---|---|
| Junction to Ambient | TO-220AB | $\theta_{JA}$ | 40 | °C/W |
| | TO-220F-3L | | 62.5 | |
| Junction to Case | TO-220AB | $\theta_{JC}$ | 0.52 | °C/W |
| | TO-220F-3L | | 3.47 | |

## ■ ELECTRICAL CHARACTERISTICS ($T_J$=25°C, unless otherwise specified)

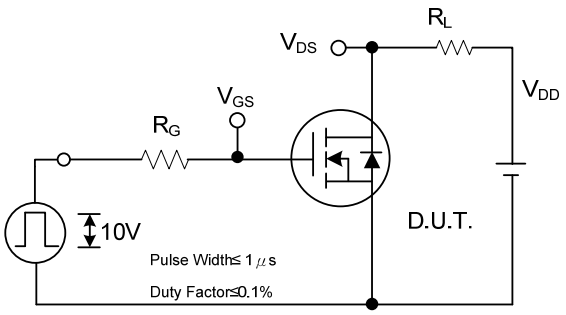
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$ =0 V, $I_D$ =250 μA | 800 | | | V |
| Drain-Source Leakage Current | $I_{DSS}$ | $V_{DS}$ =800V, $V_{GS}$ =0 V | | | 10 | μA |
| | | $V_{DS}$ =640V, $T_C$ =125°C | | | 100 | |
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{DS}$ =0 V, $V_{GS}$ = ±30 V | | | ±100 | nA |
| Breakdown Voltage Temperature Coefficient | $\Delta BV_{DSS}/\Delta T_J$ | $I_D$ =250 μA, Referenced to 25°C | | 0.98 | | mV/°C |
| **ON CHARACTERISTICS** | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{DS}$ =$V_{GS}$, $I_D$ =250 μA | 3.0 | | 5.0 | V |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | $V_{GS}$ = 10 V, $I_D$ = 5.0 A | | 0.8 | 1 | Ω |
| **DYNAMIC PARAMETERS** | | | | | | |
| Input Capacitance | $C_{ISS}$ | $V_{DS}$ =25V, $V_{GS}$ =0V, f=1MHz | | 2150 | 2800 | pF |
| Output Capacitance | $C_{OSS}$ | | | 180 | 230 | pF |
| Reverse Transfer Capacitance | $C_{RSS}$ | | | 15 | 20 | pF |
| **SWITCHING PARAMETERS** | | | | | | |
| Turn-ON Delay Time | $t_{D(ON)}$ | $V_{DD}$=400V, $I_D$=10.0A, $R_G$=25Ω(Note 1,2) | | 50 | 110 | ns |
| Turn-ON Rise Time | $t_R$ | | | 130 | 270 | |
| Turn-OFF Delay Time | $t_{D(OFF)}$ | | | 90 | 190 | |
| Turn-OFF Fall-Time | $t_F$ | | | 80 | 170 | |
| Total Gate Charge | $Q_G$ | $V_{DS}$ =640V, $V_{GS}$ =10V, $I_D$ =10.0A (Note 1,2) | | 45 | 58 | nC |
| Gate Source Charge | $Q_{GS}$ | | | 13.5 | | |
| Gate Drain Charge | $Q_{GD}$ | | | 17 | | |

| **SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS** | | | | | | |
|---|---|---|---|---|---|---|
| Drain-Source Diode Forward Voltage | $V_{SD}$ | $I_S$=10.0 A,$V_{GS}$=0V | | | 1.4 | V |
| Maximum Continuous Drain-Source Diode Forward Current | $I_S$ | | | | 10.0 | A |
| Maximum Pulsed Drain-Source Diode Forward Current | $I_{SM}$ | | | | 40.0 | |
| Reverse Recovery Time | $t_{RR}$ | $V_{GS}$ = 0 V, $dI_F/dt$ = 100 A/μs, $I_S$ = 10.0 A (Note 1) | | 730 | | ns |
| Reverse Recovery Charge | $Q_{RR}$ | | | 10.9 | | nC |

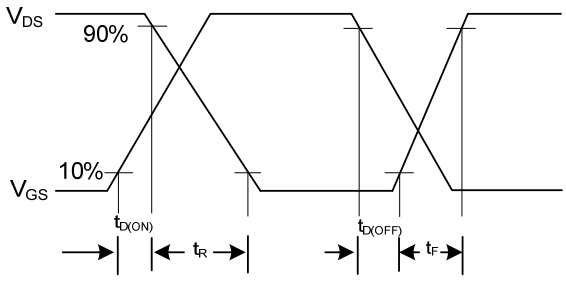
Notes: 1. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.

2. Independent of operating temperature.

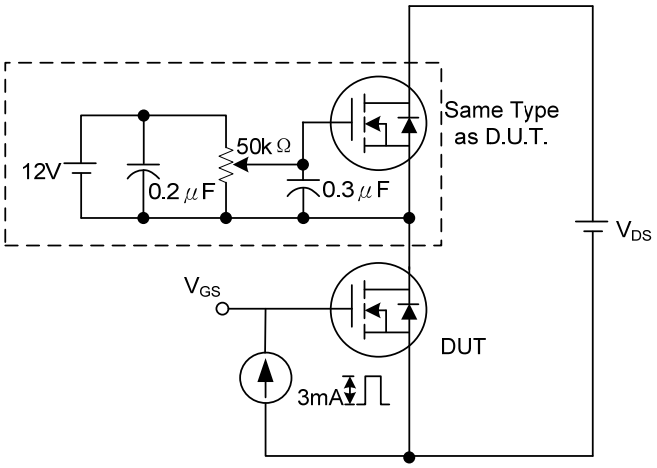
## ■ TEST CIRCUIT



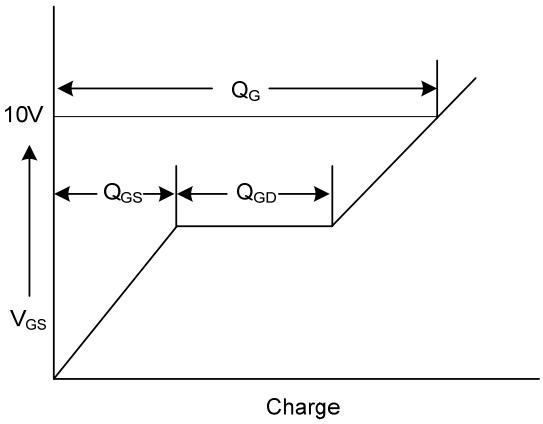

**Switching Test Circuit**



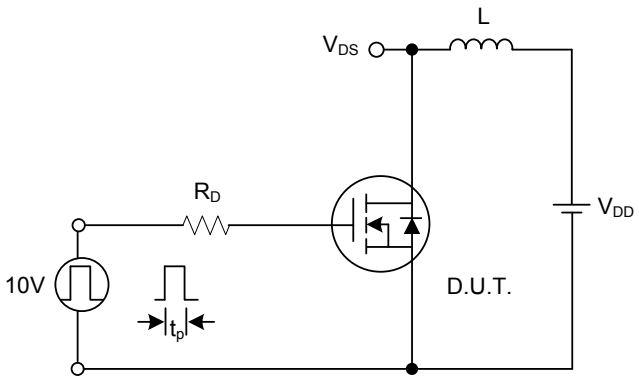

**Switching Waveforms**



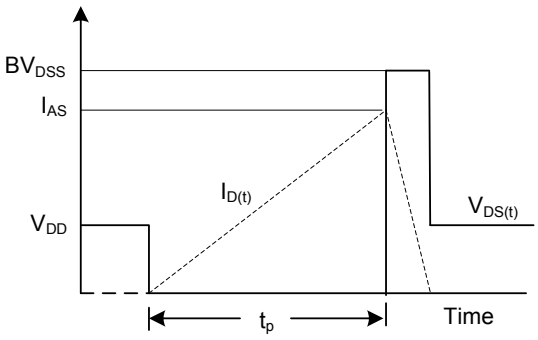

**Gate Charge Test Circuit**




**Gate Charge Waveform**

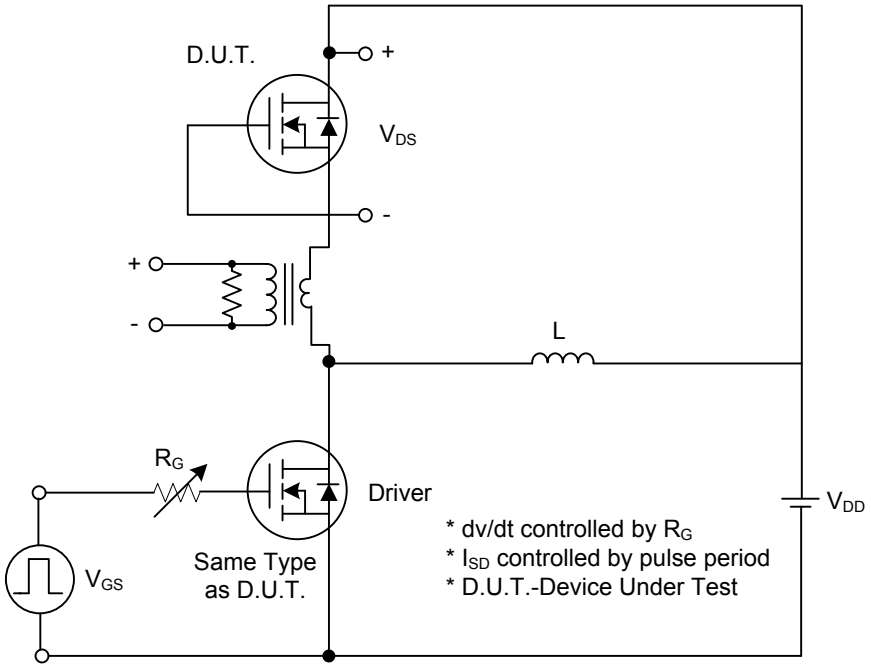



**Unclamped Inductive Switching Test Circuit**

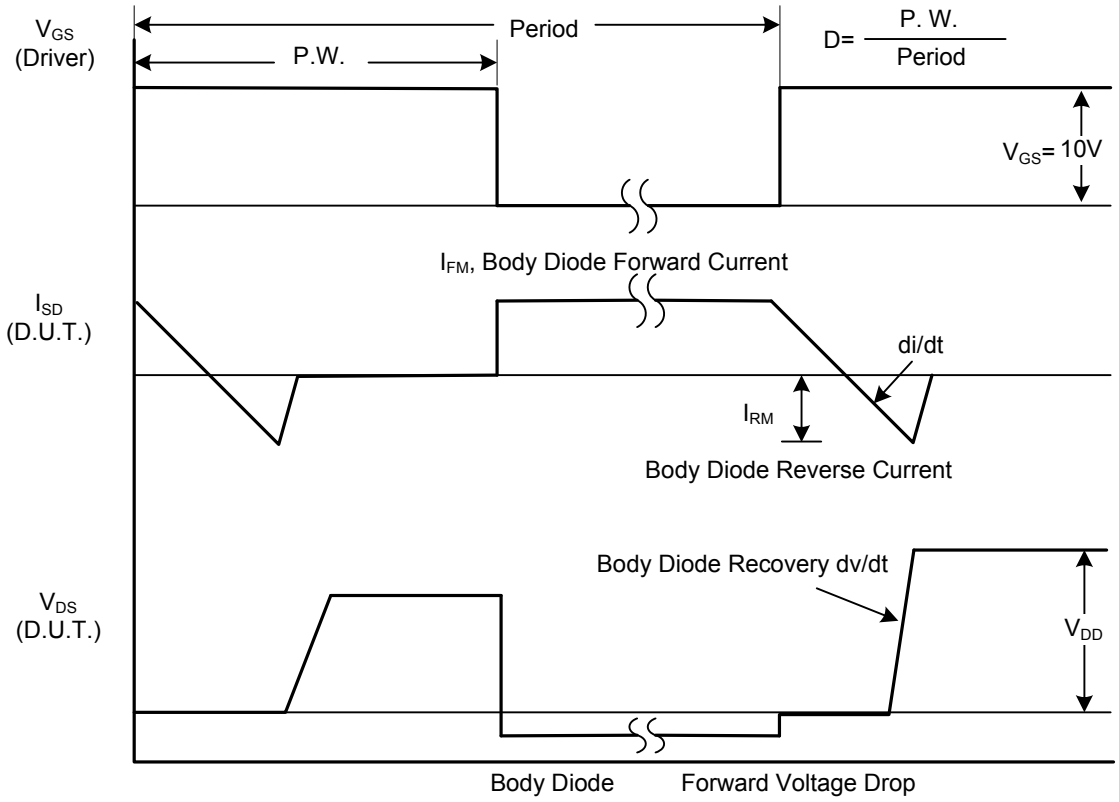



**Unclamped Inductive Switching Waveforms**

■ TEST CIRCUIT(Cont.)

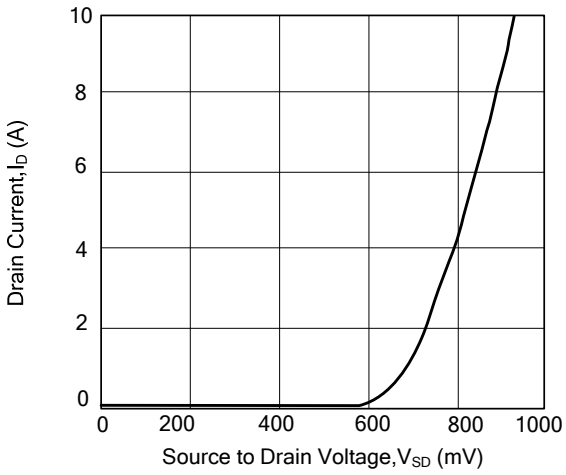



**Peak Diode Recovery dv/dt Test Circuit**

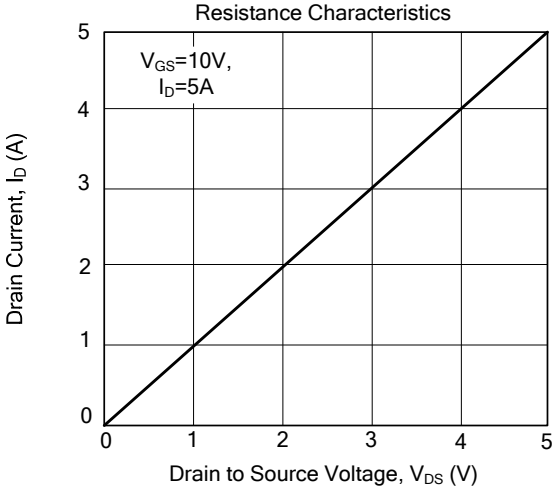


## ■ TYPICAL CHARACTERISTICS

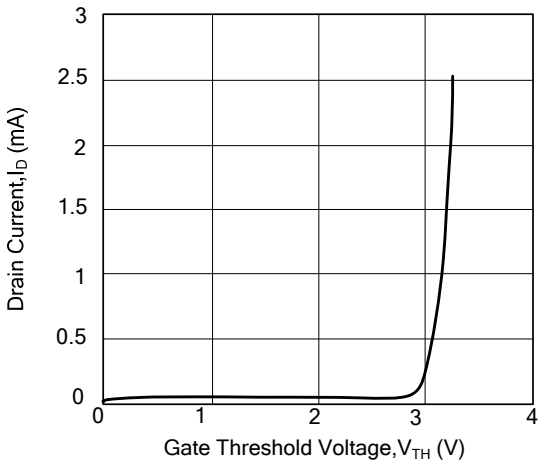
Drain Current vs. Source to Drain Voltage



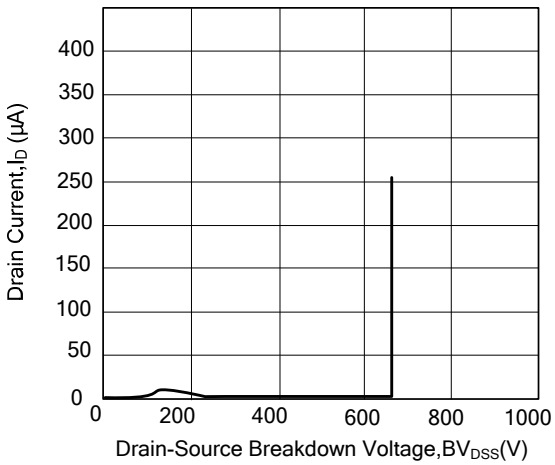

Drain-Source On-State Resistance Characteristics



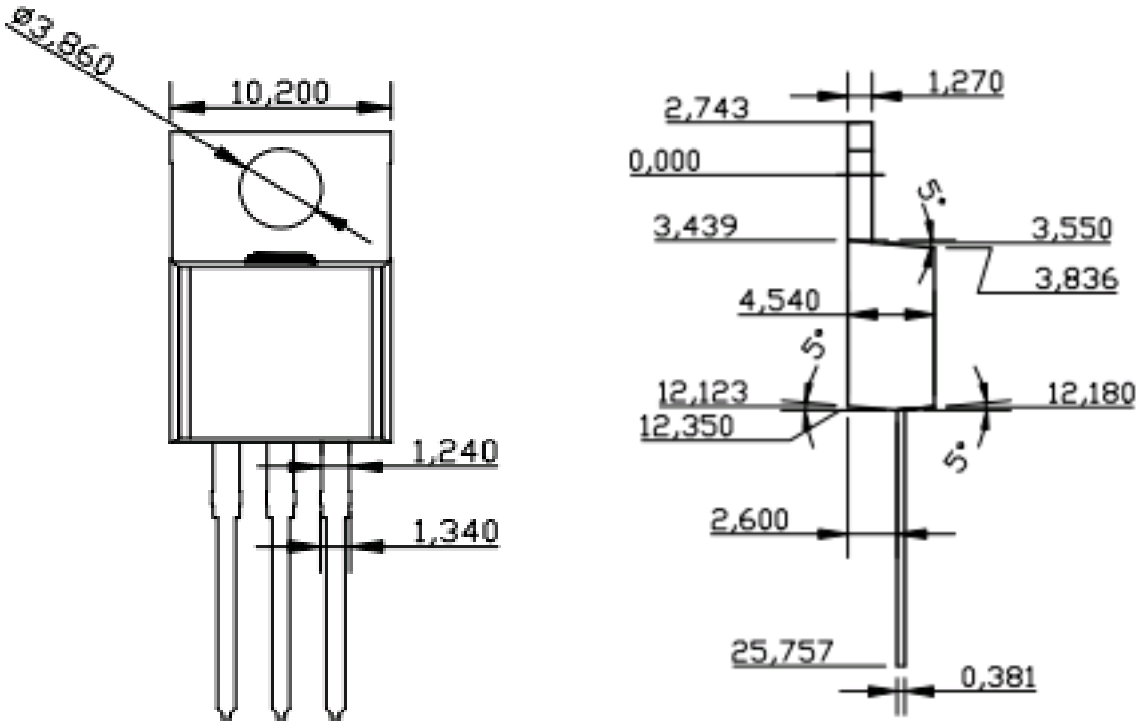

Drain Current vs. Gate Threshold Voltage




Drain Current vs. Drain-Source Breakdown Voltage



**TO-220-3L PACKAGE OUTLINE DIMENSIONS**



**TO- 220F- 3L PACKAGE OUTLINE DIMENSIONS**