

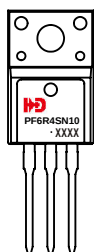
TO-220F Plastic-Encapsulate MOSFETS

100V N-Channel Power SGT MOSFET

Features:

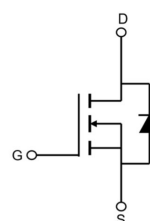
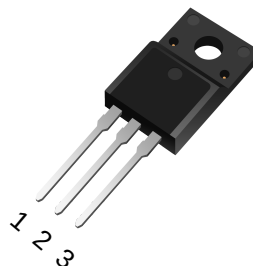
- ☐ Uses advanced SGT MOSFET technology
- ☐ Excellent Switching Characteristics
- ☐ Extended Safe Operating Area
- ☐ Ultra Low Gate Charge: $Q_g=33\text{nC}$ (Typ.)
- ☐ $V_{DS}=100\text{V}$, $I_D=80\text{A}$
- ☐ $R_{ds(on)}:6.4\text{m}\Omega$ (Typ.) @ $V_G=10\text{V}$
- ☐ 100% Avalanche Tested

MARKING



PF6R4SN10 Device code.
Solid dot = Green molding compound device,
if none, the normal device.
XXXX = Code.

TO-220F



1. Gate (G)
2. Drain (D)
3. Source (S)

Absolute Maximum Ratings (@ $T_C = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Value	Unit
V_{DS}	Drain-to-Source Voltage	100	V
V_{GS}	Gate-to-Source Voltage	± 20	V
I_D	Continuous Drain Current	$T_C = 25^\circ\text{C}$	A
		$T_C = 100^\circ\text{C}$	
I_{DM}	Pulsed Drain Current ⁽¹⁾	Refer to Fig.4	A
E_{AS}	Single Pulsed Avalanche Energy ⁽²⁾	133	mJ
P_D	Power Dissipation	$T_C = 25^\circ\text{C}$	W
		$T_C = 100^\circ\text{C}$	
T_J, T_{STG}	Junction & Storage Temperature Range	-55 to 150	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Max	Unit
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient ⁽³⁾	62.5	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.2	

Electrical Characteristics (T_A=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	I _D = 250μA, V _{GS} = 0V	100	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 100V, V _{GS} = 0V	-	-	1.0	μA
I _{GSS}	Gate-Body Leakage Current	V _{DS} = 0V, V _{GS} = ±20V	-	-	±100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	1.1	1.6	2.1	V
R _{DS(ON)}	Static Drain-Source ON-Resistance ⁽⁴⁾	V _{GS} = 10V, I _D = 20A	-	6.4	8.4	mΩ
		V _{GS} = 4.5V, I _D = 15A	-	8.1	10.5	mΩ
Dynamic Characteristics						
R _g	Gate Resistance	f = 1MHz	-	2.0	-	Ω
C _{iss}	Input Capacitance	V _{GS} = 0V, V _{DS} = 50V, f = 1MHz	-	1872	-	pF
C _{oss}	Output Capacitance		-	731	-	pF
C _{rss}	Reverse Transfer Capacitance		-	22	-	pF
Q _g	Total Gate Charge	V _{GS} = 0 to 10V V _{DS} = 50V, I _D = 20A	-	33	-	nC
Q _{gs}	Gate Source Charge		-	6	-	nC
Q _{gd}	Gate Drain("Miller") Charge		-	7	-	nC
Switching Characteristics						
t _{d(on)}	Turn-On DelayTime	V _{GS} = 10V, V _{DD} = 51V I _D = 20A, R _{GEN} = 6.2Ω	-	10	-	ns
t _r	Turn-On Rise Time		-	20	-	ns
t _{d(off)}	Turn-Off DelayTime		-	40	-	ns
t _f	Turn-Off Fall Time		-	54	-	ns
Body Diode Characteristics						
I _S	Maximum Continuous Body Diode Forward Current		-	-	80	A
I _{SM}	Maximum Pulsed Body Diode Forward Current		-	-	319	A
V _{SD}	Body Diode Forward Voltage	V _{GS} = 0V, I _S = 15A	-		1.2	V
trr	Body Diode Reverse Recovery Time	I _F = 15A, di/dt = 100A/us	-	40	-	ns
Qrr	Body Diode Reverse Recovery Charge		-	34.9	-	nC

- Notes:
1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
 2. E_{AS} condition: Starting T_J=25°C, V_{DD}=50V, V_G=10V, R_G=25ohm, L=0.5mH, I_{AS}=13.7A, V_{DD}=0V during time in avalanche.
 3. R_{θJA} is measured with the device mounted on a 1inch² pad of 2oz copper FR4 PCB.
 4. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 0.5%.

Typical Characteristics

Figure 1: Power De-rating

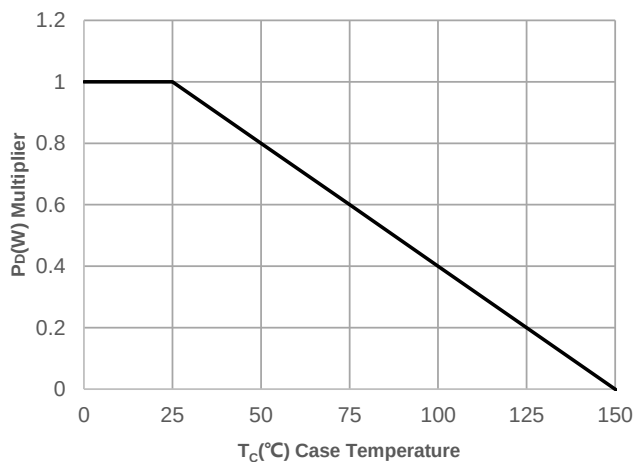


Figure 2: Current De-rating

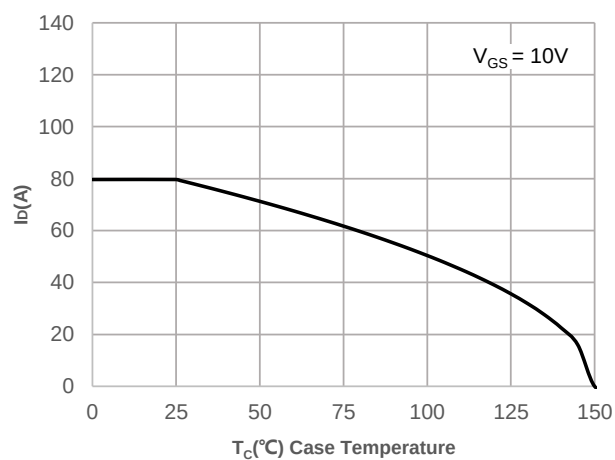


Figure 3: Normalized Maximum Transient Thermal Impedance

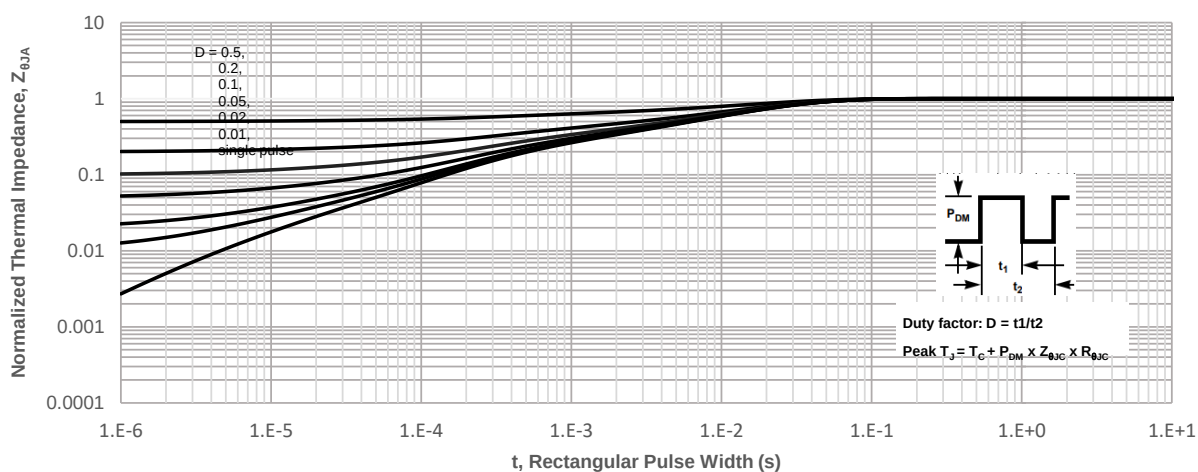


Figure 4: Peak Current Capacity

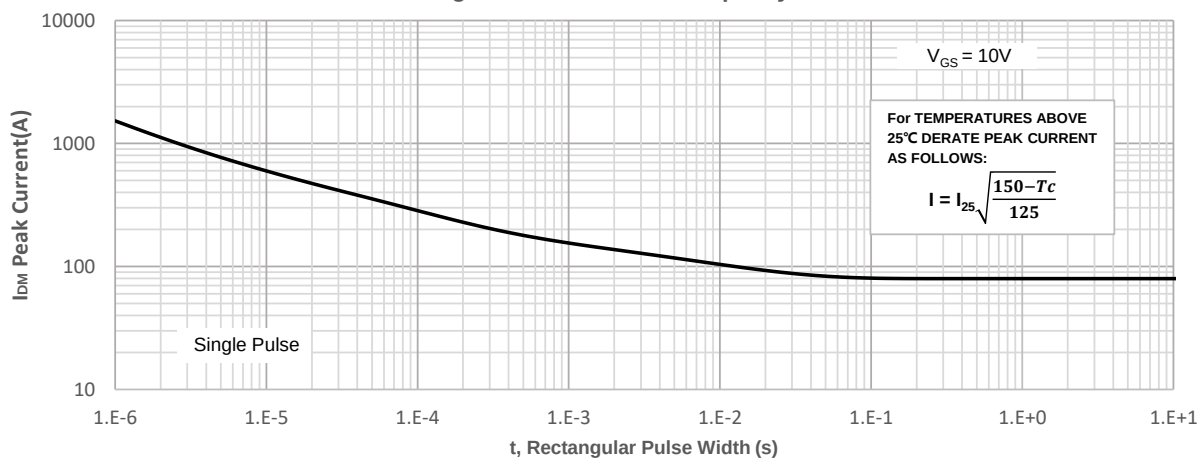


Figure 5: Output Characteristics

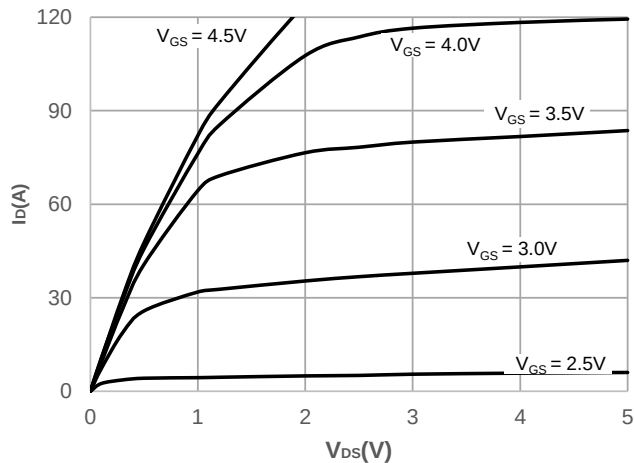


Figure 6: Typical Transfer Characteristics

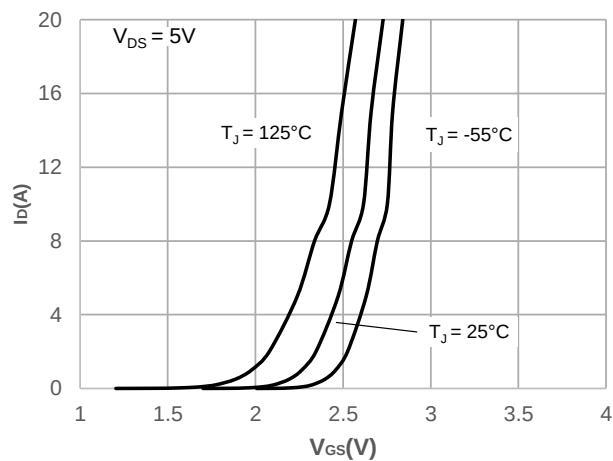


Figure 7: On-resistance vs. Drain Current

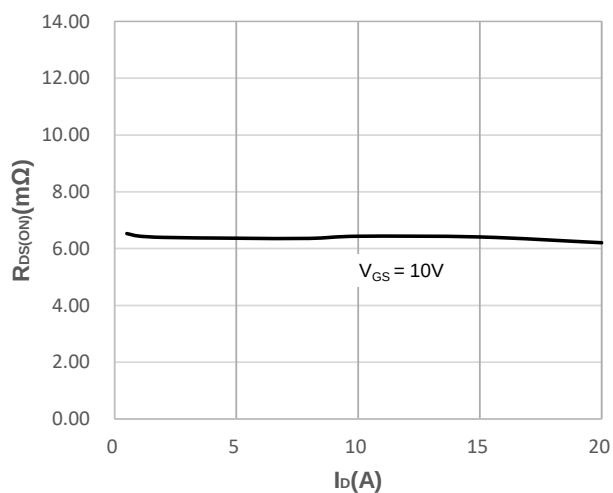


Figure 8: Body Diode Characteristics

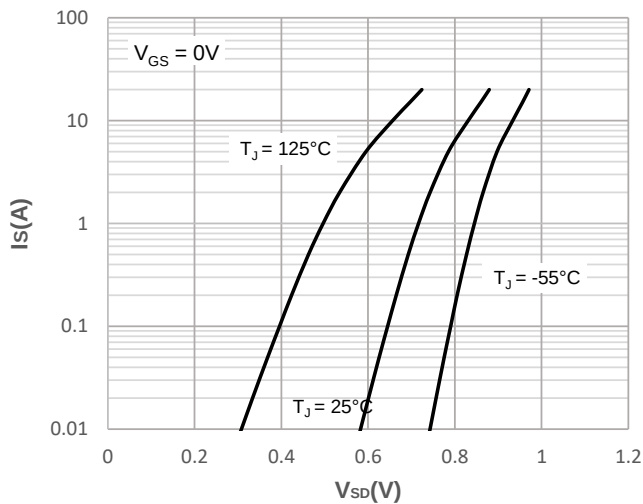


Figure 9: Gate Charge Characteristics

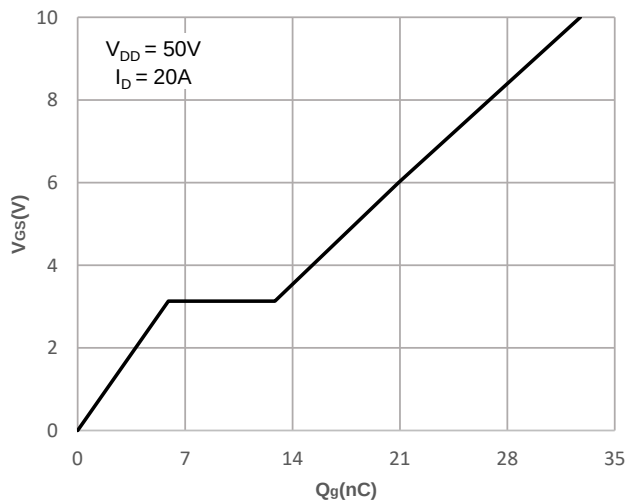


Figure 10: Capacitance Characteristics

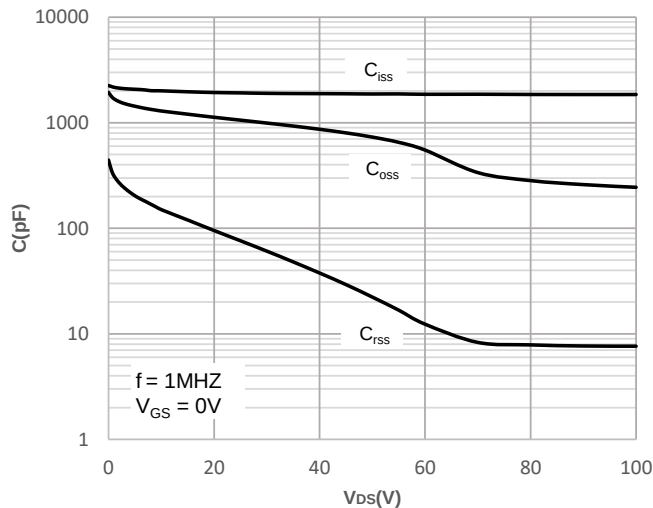


Figure 11: Normalized Breakdown voltage vs. Junction Temperature

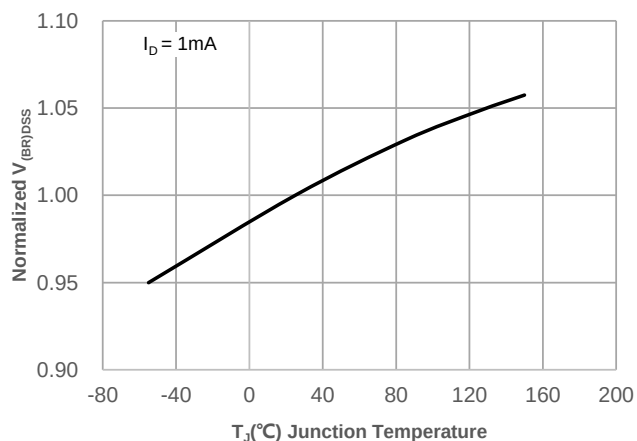


Figure 12: Normalized on Resistance vs. Junction Temperature

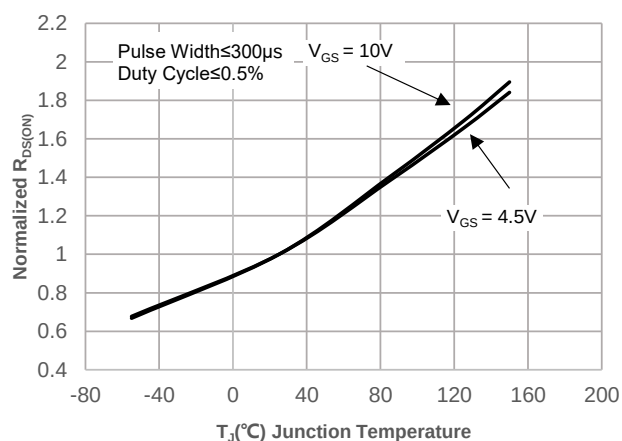


Figure 13: Normalized Threshold Voltage vs. Junction Temperature

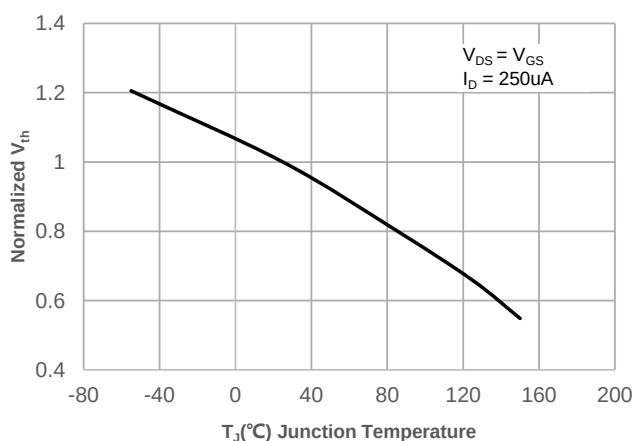


Figure 14: $R_{DS(ON)}$ vs. V_{GS}

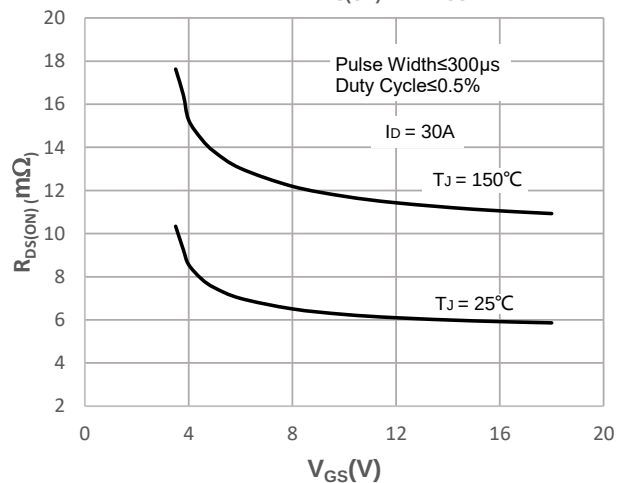
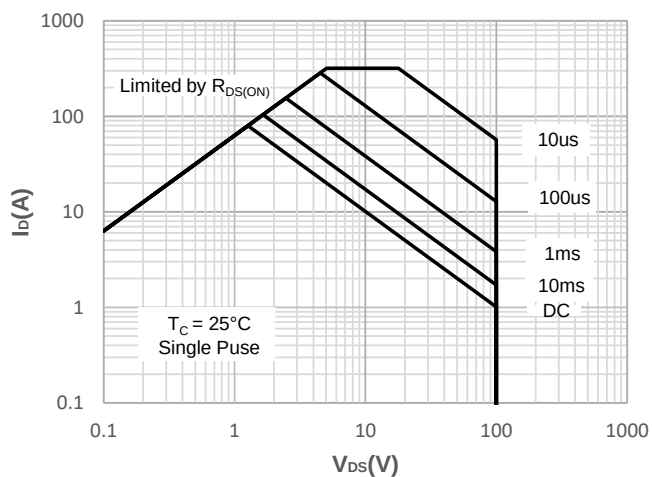


Figure 15: Maximum Safe Operating Area



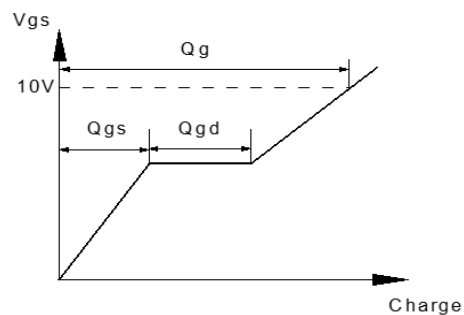
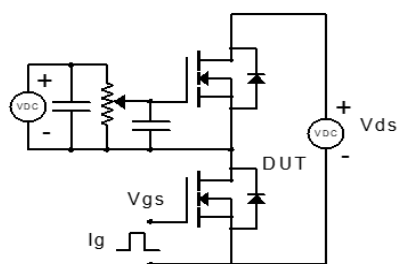


Figure 1: Gate Charge Test Circuit & Waveform

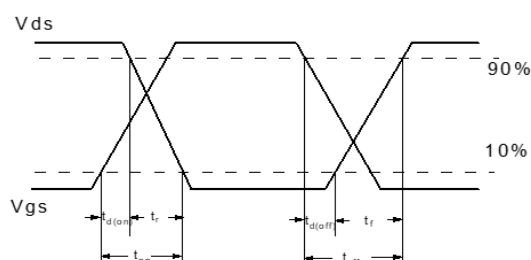
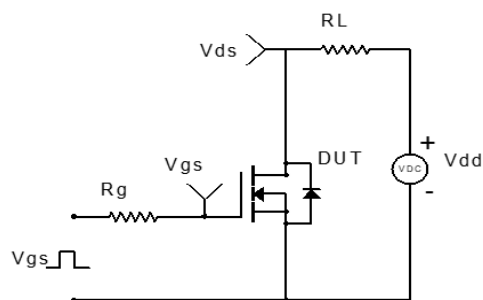


Figure 2: Resistive Switching Test Circuit & Waveform

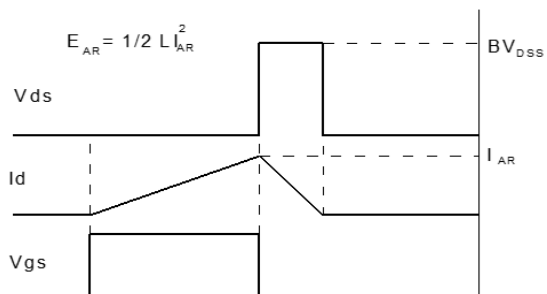
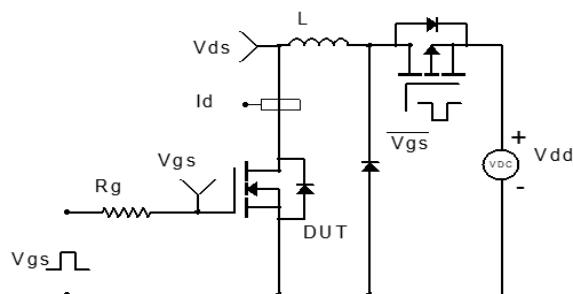


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

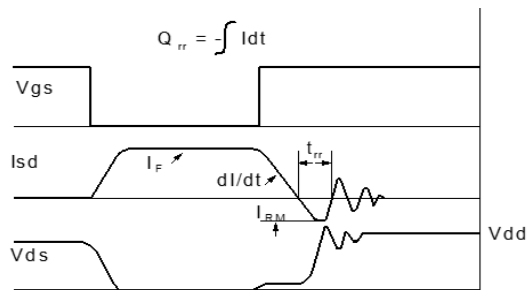
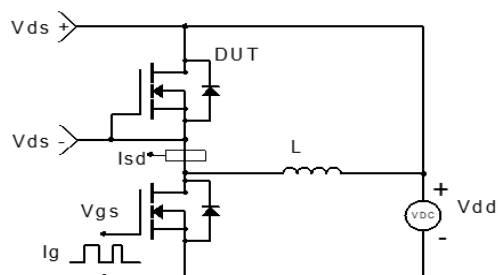


Figure 4: Diode Recovery Test Circuit & Waveform

TO-220F Package Outline Dimensions

