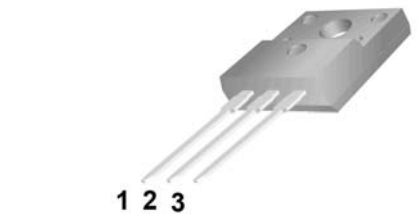
18N50

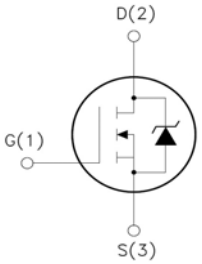
TO-220F

RoHS COMPLIANT

Features:

- ☐ Low Intrinsic Capacitances.
- ☐ Excellent Switching Characteristics.
- ☐ Extended Safe Operating Area.
- ☐ Unrivalled Gate Charge :Qg=50 nC (Typ.).
- ☐ VDSS=500V,I_D=18A
- ☐ R_{DS}(on) :0.23Ω (Max) @V_G=10V
- ☐ 100% Avalanche Tested





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

Absolute Maximum Ratings (Ta=25℃ unless otherwise noted)

Symbol	Parameter		Value	Unit
V_{DSS}	Drain-Source Voltage		500	V
I_D	Drain Current	T_C=25℃	18	A
		T_C=100℃	12.9	
V_{GSS}	Gate- Source Voltage		±30	V
E_{AS}	Single Pulse Avalanche Energy (note1)		980	mJ
I_{AR}	Avalanche Current (note2)		18	A
P_D	Power Dissipation (Tc=25℃)		38.5	W
T_j	Junction Temperature(Max)		150	℃
T_{stg}	Storage Temperature		-55~+150	
TL	Maximum lead temperature for soldering purpose,1/8" from case for 5 seconds		300	

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JC}$	Thermal Resistance,Junction to Case	-	3.3	℃/W
$R_{\theta JA}$	Thermal Resistance,Junction to Ambient	-	62.5	

Electrical Characteristics (Ta=25℃ unless otherwise noted)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	I_D=250μA，V_{GS}=0	500	-	-	V
△BVDSS/△TJ	Breakdown Voltage Temperature Coefficient	I_D=250μA ,Reference to 25℃	-	0.53	-	V/℃
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=500V, V_{GS}=0V	-	-	1	μA
		V_{DS}=400V, Tc=125℃			10	
I_{GSSF}	Gate-body leakage Current, Forward	V_{GS}=+30V, V_{DS}=0V	-	-	100	nA
I_{GSSR}	Gate-body leakage Current, Reverse	V_{GS}=-30V, V_{DS}=0V	-	-	-100	
On Characteristics						
$V_{GS(TH)}$	Date Threshold Voltage	I_D=250μA,V_{DS}=V_{GS}	2.5	-	4.5	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	I_D9A,V_{GS}=10V	-	-	0.23	Ω
Dynamic Characteristics						
Ciss	Input Capacitance	V_{DS}=25V，V_{GS}=0，f=1.0MHz	-	3420	-	pF
Coss	Output Capacitance		-	325	-	
Crss	Reverse Transfer Capacitance		-	25	-	
Switching Characteristics						
Td(on)	Turn-On Delay Time	V_{DD}=250V，I_D=18A R_G=25Ω (Note 3,4)	-	95	200	nS
Tr	Turn-On Rise Time		-	375	760	
Td(off)	Turn-Off Delay Time		-	100	210	
Tf	Turn-Off Rise Time		-	105	220	
Qg	Total Gate Charge	V_{DS}=400V,V_{GS}=10V，I_D=18A (Note 3,4)	-	50	65	nC
Qgs	Gate-Source Charge		-	14.8	-	
Qgd	Gate-Drain Charge		-	21.6	-	
Drain-Source Diode Characteristics and Maximum Ratings						
Is	Max. Diode Forward Current	-	-	-	18	A
I_{SM}	Max. Pulsed Forward Current	-	-	-	80	
V_{SD}	Diode Forward Voltage	I_D=18A	-	-	1.5	V
Trr	Reverse Recovery Time	I_S=18A,V_{GS} =0V diF/dt=100A/μs (Note3)	-	507	-	nS
Qrr	Reverse Recovery Charge		-	7.2	-	μC

Notes : 1, L=5.0mH, IAS=18A, VDD=50V, RG=25Ω, Starting TJ =25°C
2, Repetitive Rating : Pulse width limited by maximum junction temperature
3, Pulse Test : Pulse Width ≤ 300μs, Duty Cycle ≤ 2%
4, Essentially Independent of Operating Temperature

Typical Characteristics

Figure 1. On-Region Characteristics

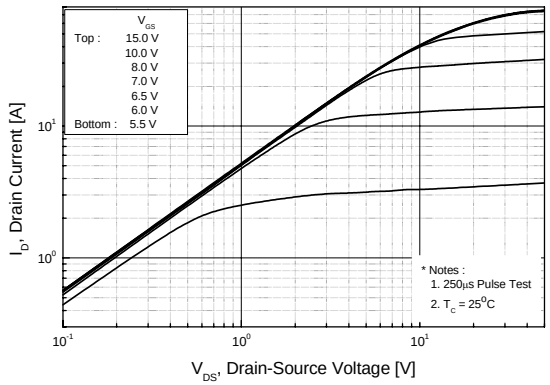


Figure 2. Transfer Characteristics

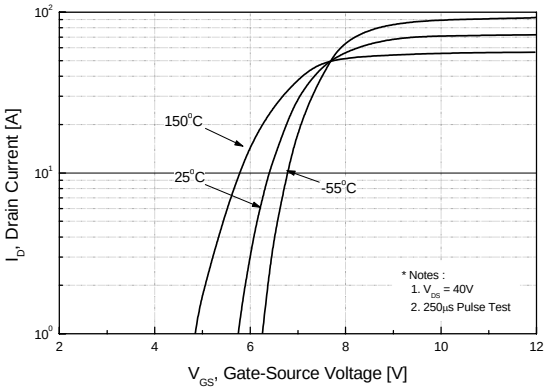


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

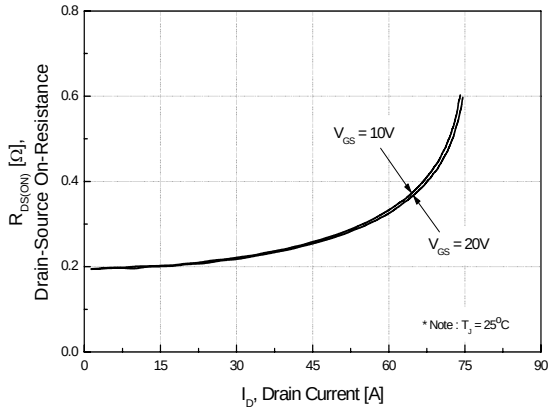


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperatue

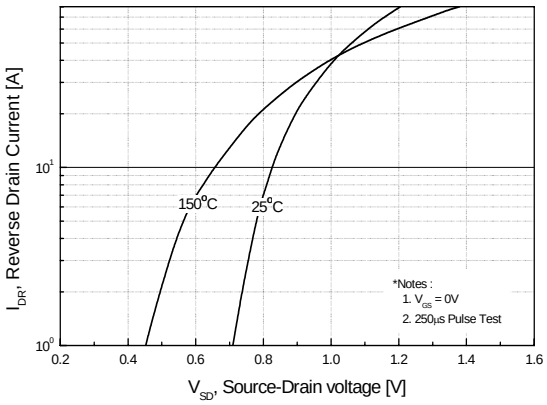


Figure 5. Capacitance Characteristics

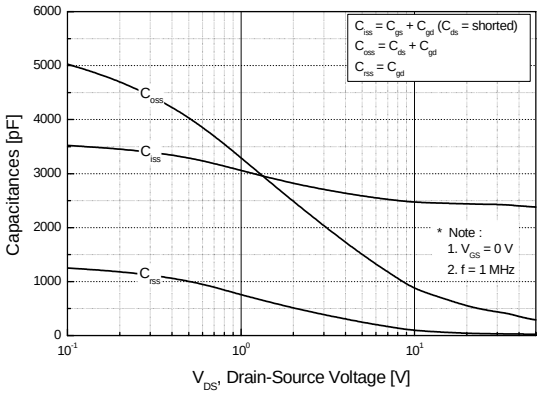
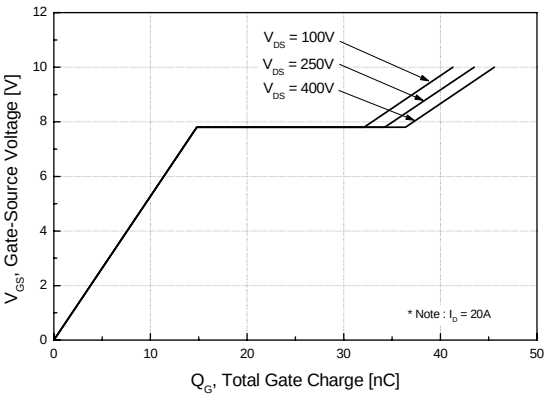


Figure 6. Gate Charge Characteristics



Typical Characteristics (Continued)

Figure 8. On-Resistance Variation vs. Temperature

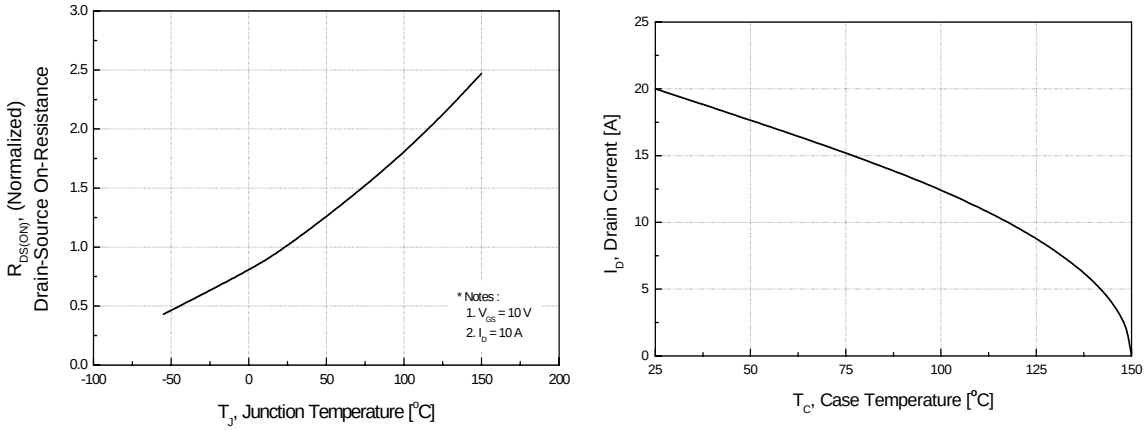


Figure 9-2. Maximum Safe Operating Area

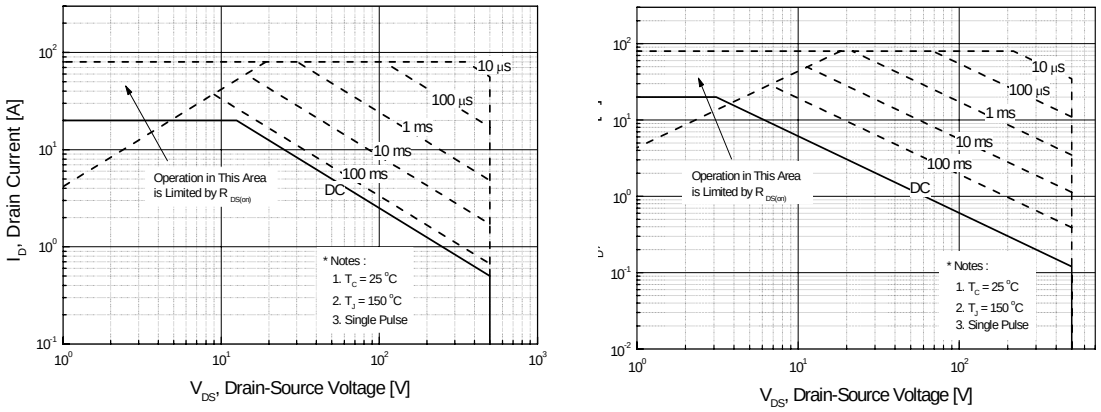
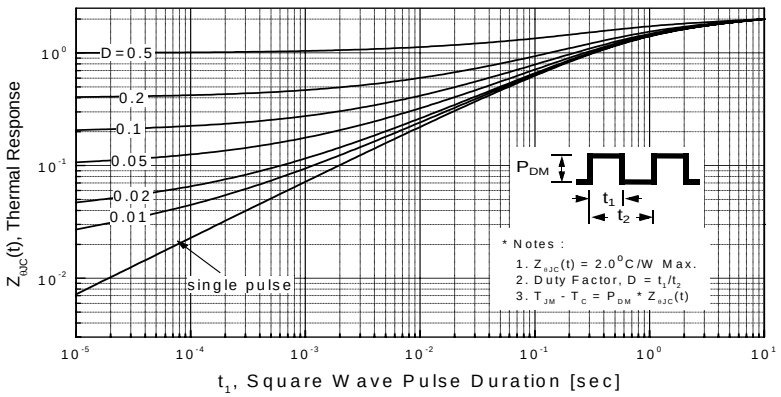
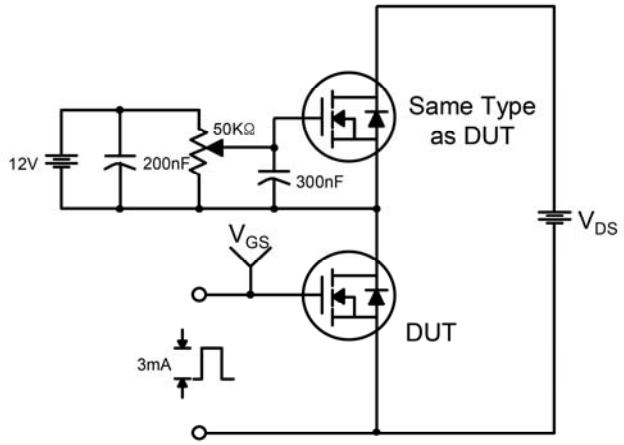


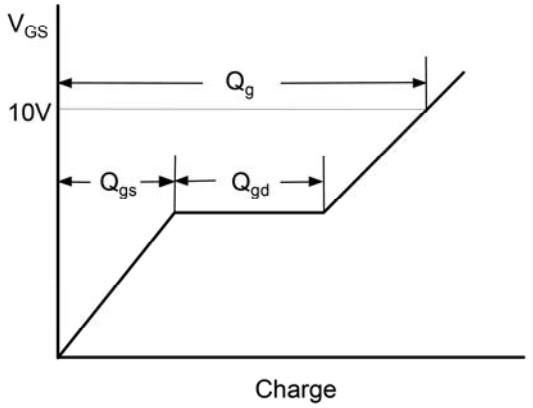
Figure 10. Maximum Drain Currentvs. Case Temperature



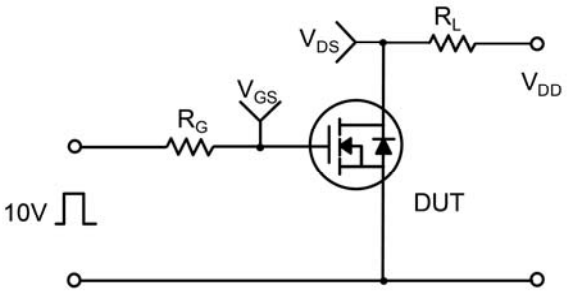
Transient Thermal Response Curve

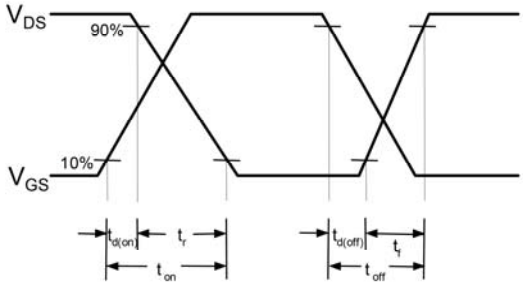
Gate Charge Test Circuit & Waveform



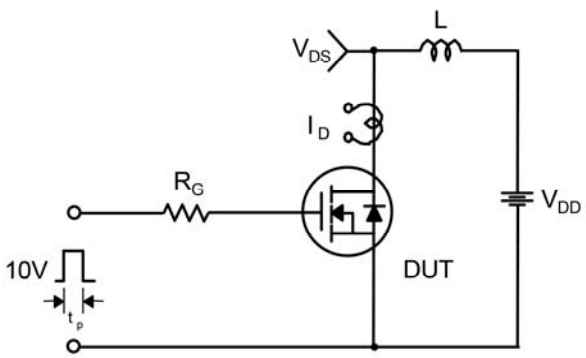


Resistive Switching Test Circuit & Waveforms

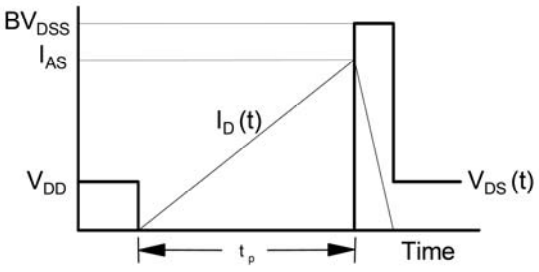




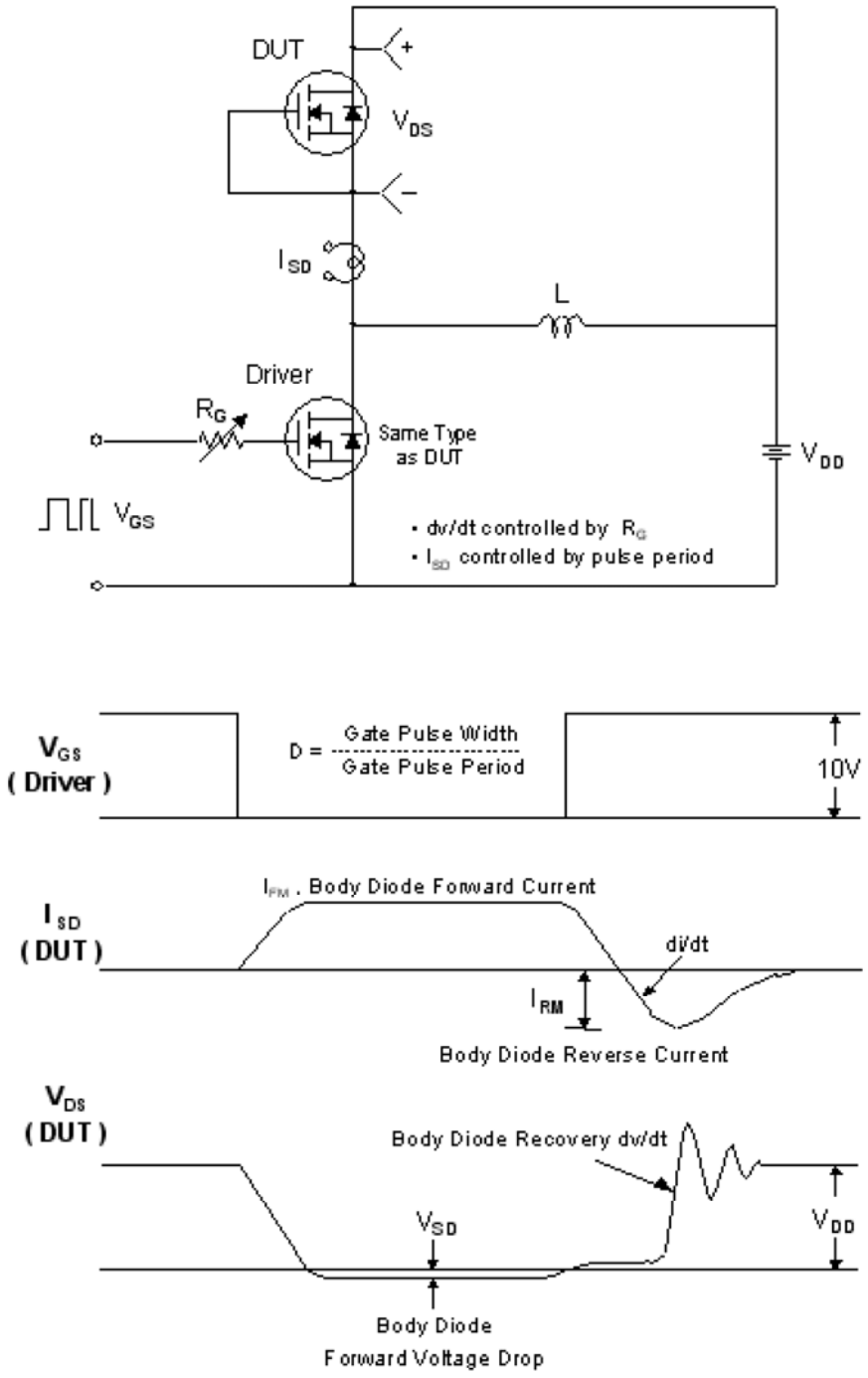
Unclamped Inductive Switching Test Circuit & Waveforms



$$E_{AS} = \frac{1}{2} L I_{AS}^2 \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$



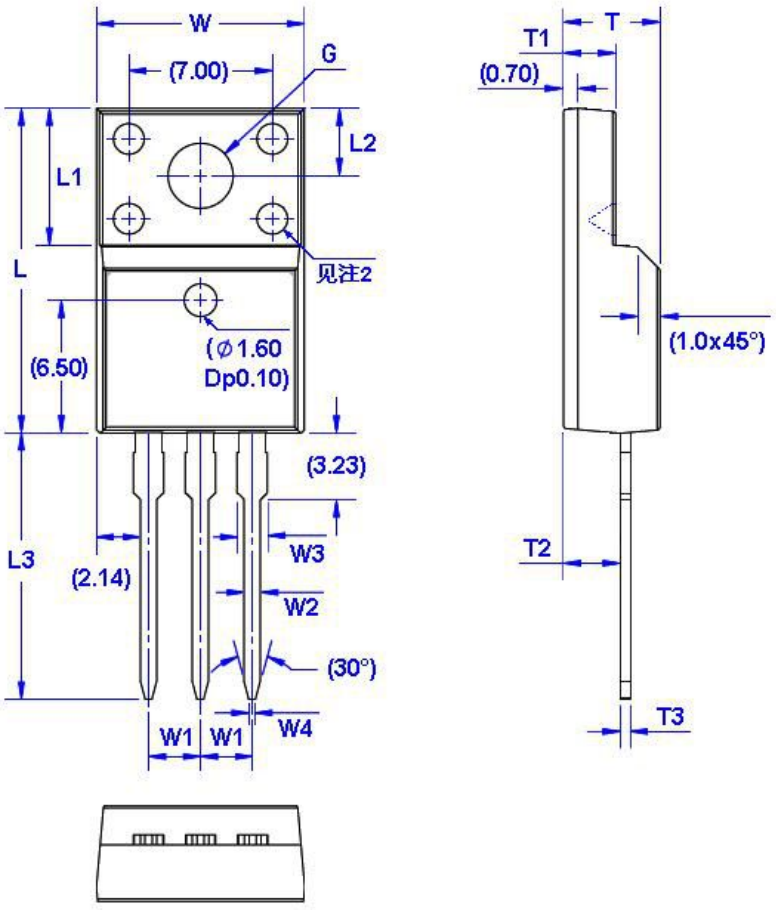
Peak Diode Recovery dv/dt Test Circuit & Waveform



Package Dimension

TO-220F

Unit: mm



Symbol	Size		Symbol	Size		Symbol	Size		Symbol	Size	
	Min	Max		Min	Max		Min	Max		Min	Max
W	9.96	10.36	W4	0.25	0.45	L3	12.78	13.18	T3	0.45	0.60
W1	2.54 (TYP)		L	15.67	16.07	T	4.50	4.90	G(Φ)	3.08	3.28
W2	0.70	0.90	L1	6.48	6.88	T1	2.34	2.74			
W3	1.24	1.47	L2	3.20	3.40	T2	2.56	2.96			