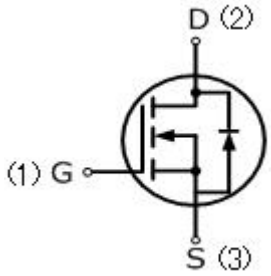
16N65MF

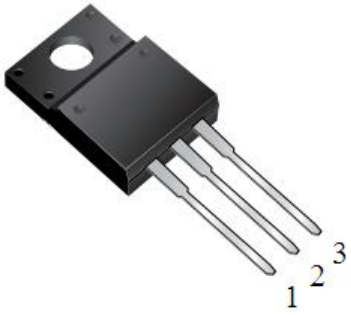
16 Amps,650 Volts N-CHANNEL MOSFET

FEATURE

- 16A,650V,$R_{DS(ON)MAX}$=0.45 Ω @V_{GS}=10V/8A
- Low gate charge
- Low C_{iss}
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability



TO-220MF



Absolute Maximum Ratings(T_C=25℃,unless otherwise noted)

Parameter	Symbol	16N65MF	UNIT
Drain-Source Voltage	V_{DSS}	650	V
Gate-Source Voltage	V_{GSS}	±30	
Continuous Drain Current	I_D	16	A
Pulsed Drain Current(Note1)	I_{DM}	64	
Single Pulse Avalanche Energy (Note 2)	E_{AS}	900	mJ
Avalanche Current(Note1)	I_{AR}	16	A
Repetitive Avalanche Energy (Note1)	E_{AR}	30	mJ
Reverse Diode dV/dt (Note 3)	dv/dt	4.5	V/ns
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 to +150	℃
Maximum lead temperature for soldering purposes, 1/8″from case for 5 seconds	T_L	260	℃

Thermal Characteristics

Parameter		Symbol	TO-220MF	Units
Maximum Junction-to-Case		R_{thJC}	3.0	℃/W
Maximum Power Dissipation	T_C=25℃	P_D	55	W

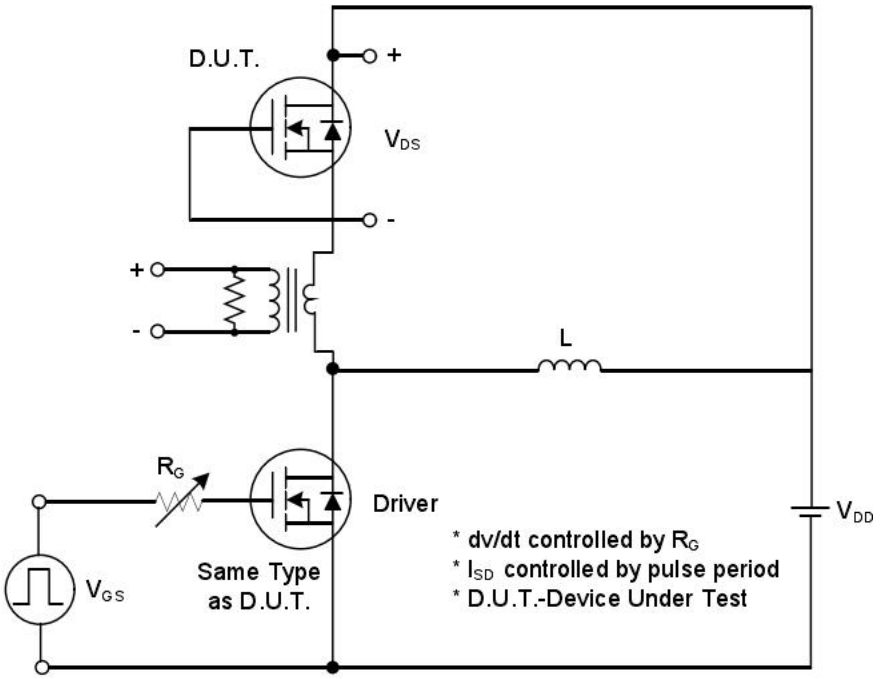
Electrical Characteristics (T_c=25℃,unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V,I_D=250uA	650	—	—	V
Breakdown Temperature Coefficient	ΔBV_{DSS} /ΔT_J	Reference to 25℃, I_D=250uA	—	0.6	—	V/℃
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=650V,V_{GS}=0V	—	—	1	μA
Gate-Body Leakage Current,Forward	I_{GSSF}	V_{GS}=30V,V_{DS}=0V	—	—	100	nA
Gate-Body Leakage Current,Reverse	I_{GSSR}	V_{GS}=-30V,V_{DS}=0V	—	—	-100	nA
On Characteristics						
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS}=10V,I_D=250uA	2	—	4	V
Drain-Source On-State Resistance	$R_{DS(on)}$	V_{GS}=10V,I_D=8A	—	0.33	0.45	Ω
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{DS}=25V,V_{GS}=0V, f=1.0MHZ	—	1968	—	pF
Output Capacitance	C_{oss}		—	1047	—	pF
Reverse Transfer Capacitance	C_{rss}		—	73	—	pF
Switching Characteristics						
Turn-On Delay Time	$t_{d(on)}$	V_{DD}=325V,I_D=16A, R_G=25Ω (Note4,5)	—	58	—	ns
Turn-On Rise Time	t_r		—	126	—	ns
Turn-Off Delay Time	$t_{d(off)}$		—	214	—	ns
Turn-Off Fall Time	t_f		—	49	—	ns
Total Gate Charge	Qg	V_{DS}=480V,I_D=16A, V_{GS}=10V, (Note4,5)	—	63	—	nC
Gate-Source Charge	Qgs		—	11	—	nC
Gate-Drain Charge	Qgd		—	29	—	nC
Drain-Source Body Diode Charcteristics and Maximum Ratings						
Continuous Diode Forward Current	I_S		—	—	16	A
Pulsed Diode Forward Current	I_{SM}		—	—	64	A
Diode Forward Voltage	V_{SD}	I_S=16A,V_{GS}=0V	—	—	1.5	V
Reverse Recovery Time	t_{rr}	V_{GS}=0V,I_S=16A, dI_F/dt=100A/us, (Note4)	—	483	—	ns
Reverse Recovery Charge	Q_{rr}		—	8.9	—	μC

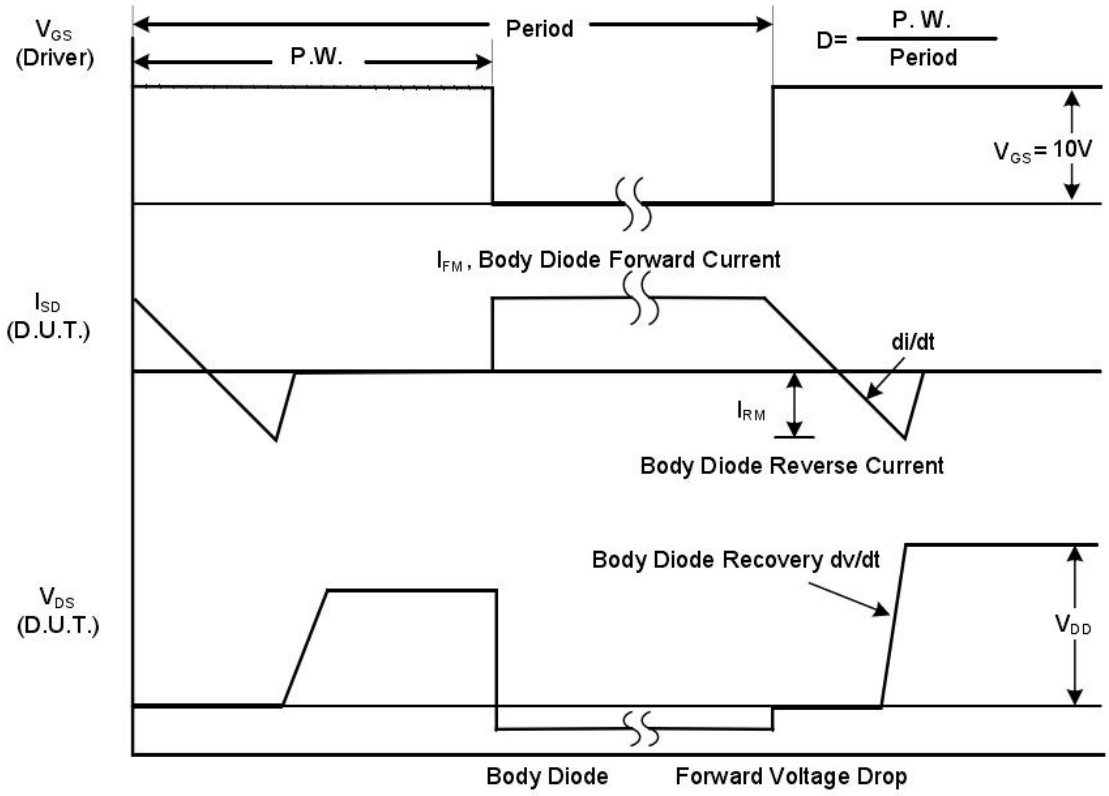
Notes

1. Repetitive Rating:pulse width limited by maximum junction temperature.
2. L=10mH,R_g=25Ω,I_{AS}=16A, starling T_J=25℃.
3. I_{SD}≤I_D,dI/dt=200A/us,V_{DD}≤BV_{DSS},starting T_J=25℃.
4. Pulse width≤300us;duty cycle≤2%.
5. Repetitive rating; pulse width limited by maximum junction temperature.

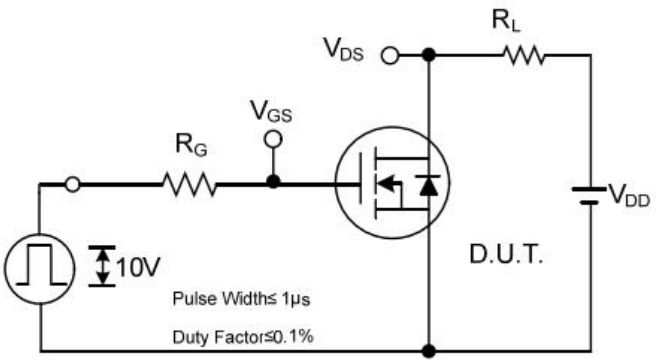
RATINGAND CHARACTERISTIC CURVES



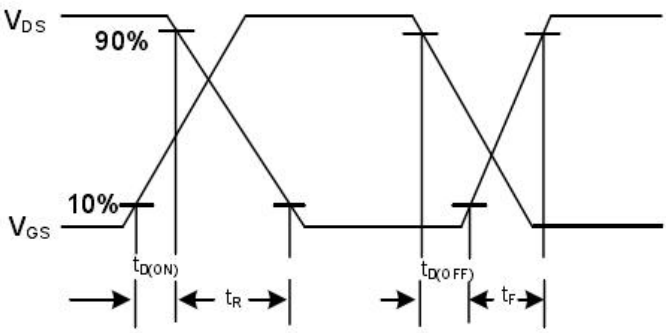
Peak Diode Recovery dv/dt Test Circuit



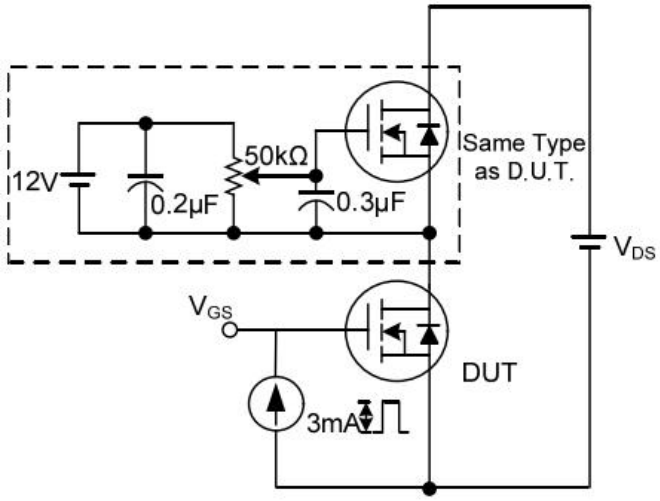
Peak Diode Recovery dv/dt Waveforms



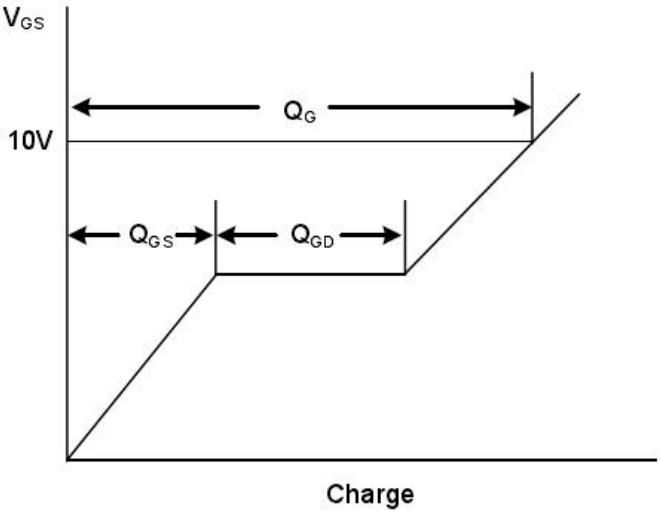
Switching Test Circuit



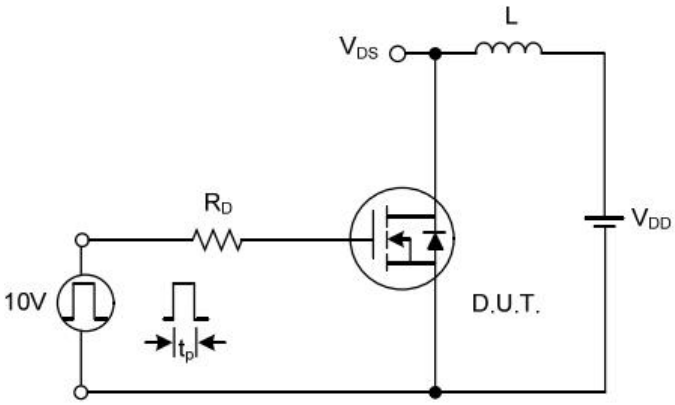
Switching Waveforms



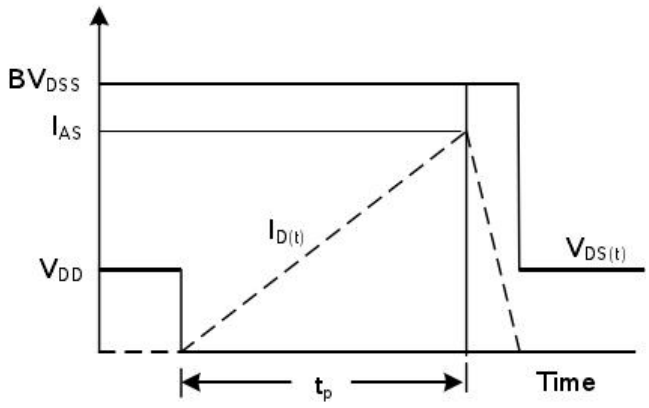
Gate Charge Test Circuit



Gate Charge Waveform

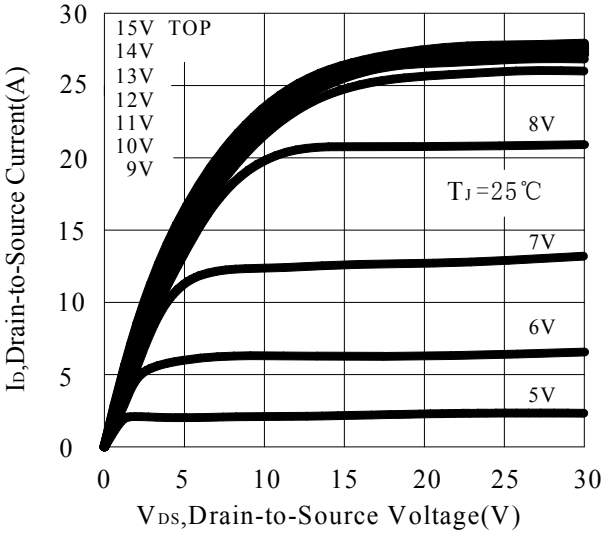


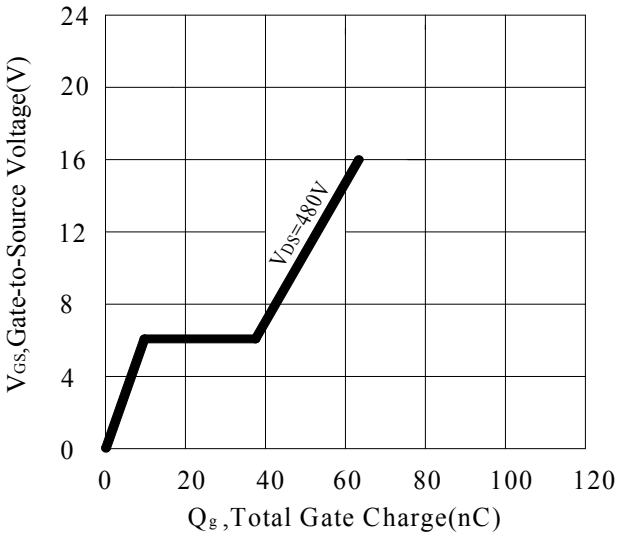
Unclamped Inductive Switching Test Circuit

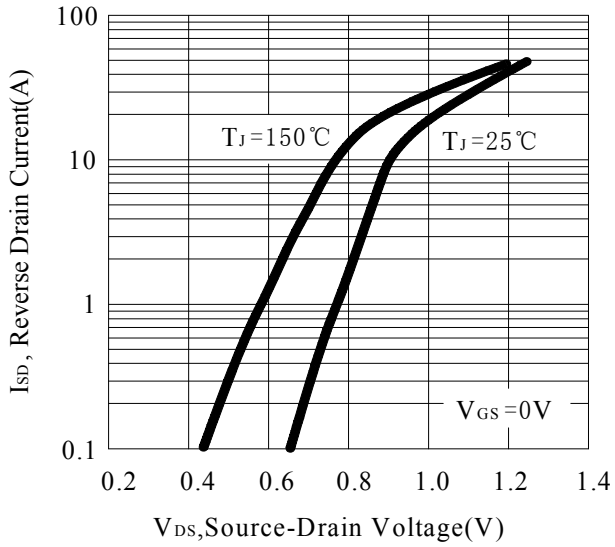


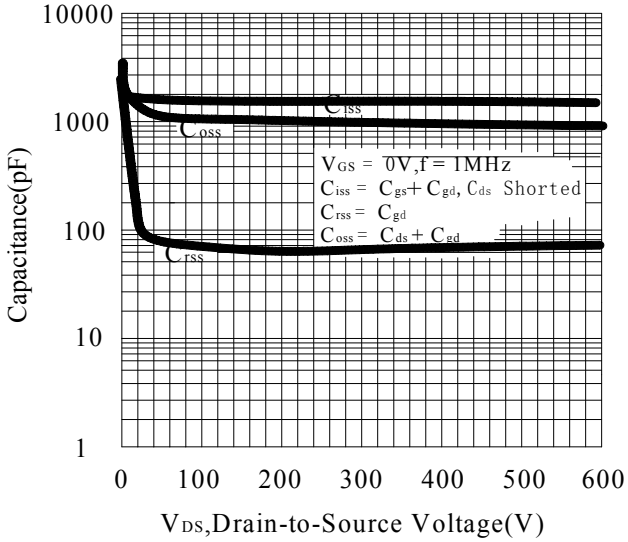
Unclamped Inductive Switching Waveforms

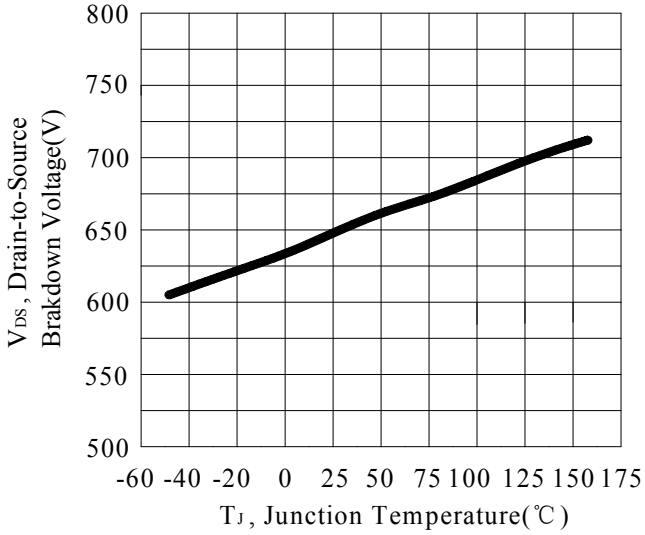
RATINGAND CHARACTERISTIC CURVES

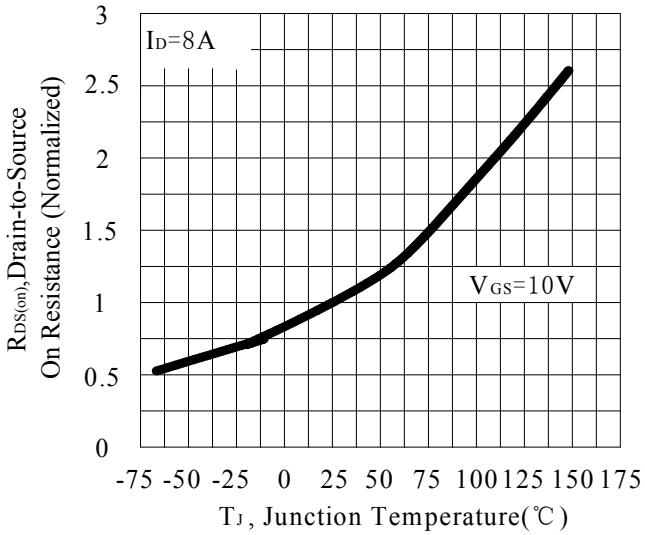


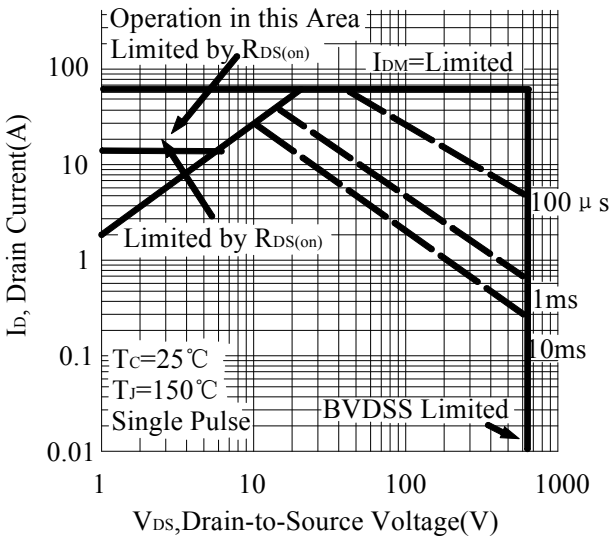


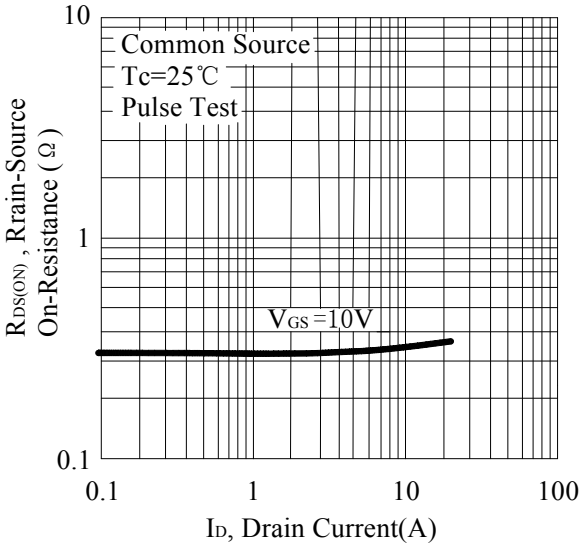


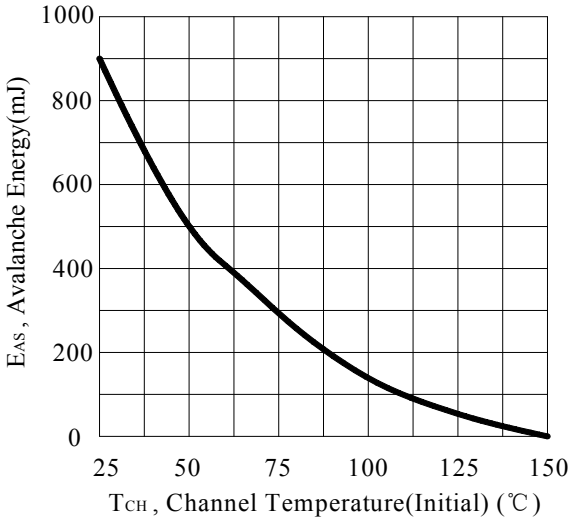


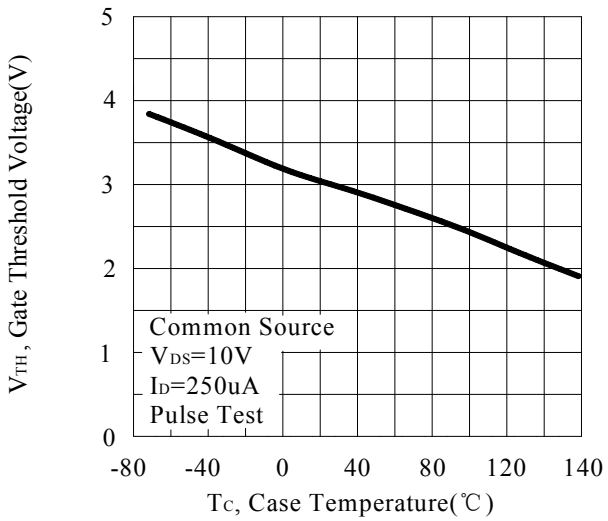


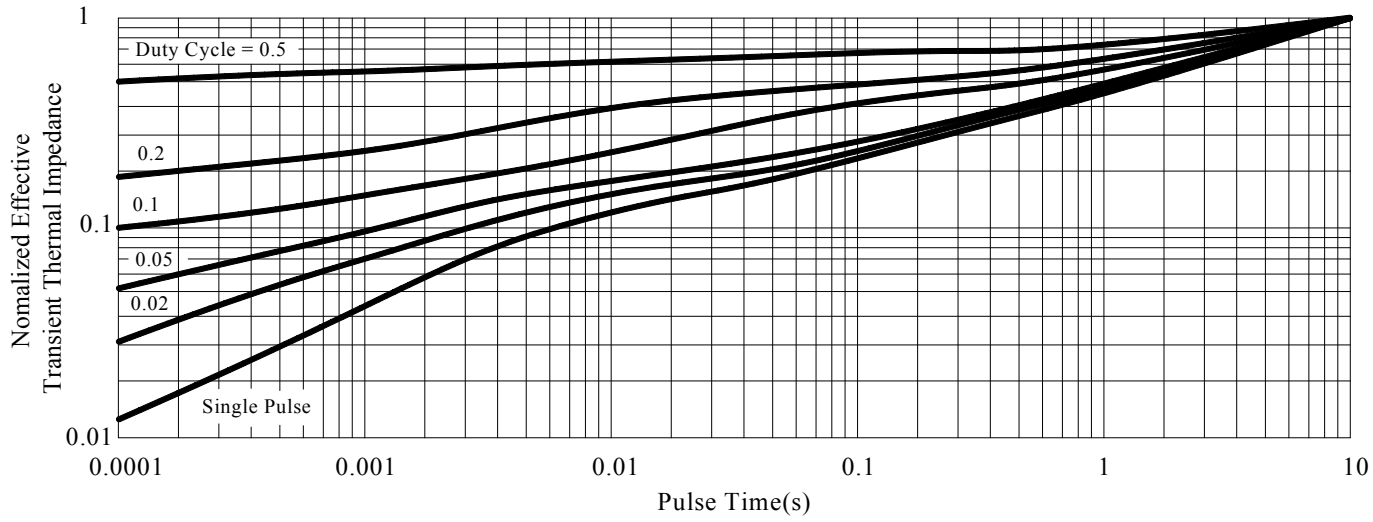



Operation in this Area
Limited by RDS(on)
IDM=Limited
100 μ s
1ms
10ms
Limited by RDS(on)
TC=25℃
TJ=150℃
Single Pulse
BVDSS Limited
ID, Drain Current(A)
VDS,Drain-to-Source Voltage(V)
100
10
1
0.1
0.01
1
10
100
1000


Common Source
Tc=25℃
Pulse Test
VGS =10V
RDS(ON) , Rrain-Source On-Resistance (Ω)
ID, Drain Current(A)
10
1
0.1
0.1
1
10
100

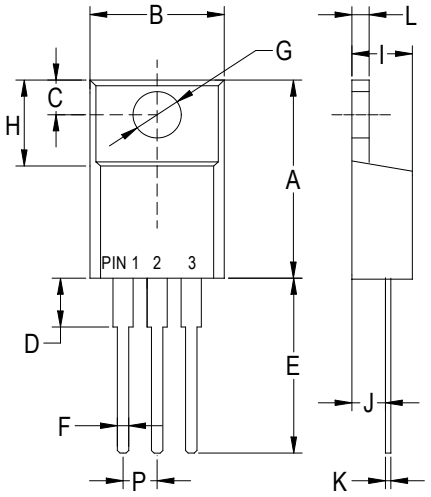

EAS , Avalanche Energy(mJ)
TCH , Channel Temperature(Initial) (℃)
1000
800
600
400
200
0
25
50
75
100
125
150


VTH, Gate Threshold Voltage(V)
Common Source
VDS=10V
ID=250uA
Pulse Test
TC, Case Temperature(℃)
5
4
3
2
1
0
-80
-40
0
40
80
120
140


Duty Cycle = 0.5
0.2
0.1
0.05
0.02
Single Pulse
Nomalized Effective Transient Thermal Impedance
Pulse Time(s)
1
0.1
0.01
0.0001
0.001
0.01
0.1
1
10

PACKAGE OUTLINE DIMENSIONS

TO-220MF



TO-220MF		
Dim	Min	Max
A	.590(15.0)	.650(16.5)
B	.393(10.0)	.414(10.5)
C	.118(3.00)	.138(3.50)
D	.118(3.00)	.146(3.70)
E	.512(13.0)	.551(14.0)
F	.028(0.70)	.035(0.90)
G	.114(2.90)	.138(3.50)
H	.255(6.50)	.280(7.10)
I	.173(4.40)	.197(5.00)
J	.102(2.60)	.110(2.80)
K	.018(0.45)	.026(0.65)
L	.092(2.35)	.109(2.75)
P	.890(2.25)	.113(2.85)

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