60V N-Channel MOSFET

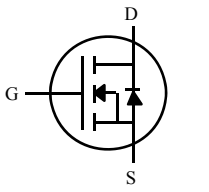
BV_{DSS} = 60 V

$R_{DS(on)}$ = 15 mΩ

I_D = 70 A

TO-220

1.Gate 2. Drain 3. Source



Features

- $R_{DS(on)}$ (Max 0.015 Ω)@V_{GS} =10V
- Gate Charge (Typical 39nC)
- Improved dv/dt Capability, High Ruggedness
- 100% Avalanche Tested
- Maximum Junction Temperature Range (175°C)

Absolute Maximum Ratings

T_C=25℃ unless otherwise specified

Symbol	Parameter	Value	Units
V_{DSS}	Drain-Source Voltage	60	V
I_D	Drain Current – Continuous (T_C = 25℃)	70	A
	Drain Current – Continuous (T_C = 100℃)	45	A
I_{DM}	Drain Current – Pulsed (Note 1)	280	A
V_{GS}	Gate-Source Voltage	±20	V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	750	mJ
I_{AR}	Avalanche Current (Note 1)	70	A
E_{AR}	Repetitive Avalanche Energy (Note 1)	14.7	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	7.0	V/ns
P_D	Power Dissipation (T_C = 25℃)	147	W
	- Derate above 25℃	0.98	W/℃
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +175	℃
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300	℃

Thermal Resistance Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	--	1.02	℃/W
$R_{\theta CS}$	Case-to-Sink	0.5	--	
$R_{\theta JA}$	Junction-to-Ambient	--	62.5	

Electrical Characteristics T_C=25 °C unless otherwise specified

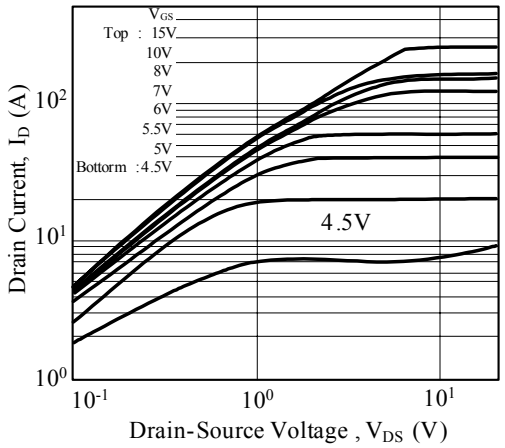
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
On Characteristics						
V_{GS}	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 μA	2.0	--	4.0	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS} = 10 V, I_D = 35 A	--	0.012	0.015	Ω
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 μA	60	--	--	V
ΔBV_{DSS} /ΔT_J	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25℃	--	0.06	--	V/℃
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 60 V, V_{GS} = 0 V	--	--	1	μA
		V_{DS} = 48 V, T_C = 150℃	--	--	10	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS} = 20 V, V_{DS} = 0 V	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS} = -20 V, V_{DS} = 0 V	--	--	-100	nA
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	--	1500	2000	pF
C_{oss}	Output Capacitance		--	800	1050	pF
C_{rss}	Reverse Transfer Capacitance		--	130	170	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Time	V_{DS} = 30 V, I_D = 35 A, R_G = 25 Ω (Note 4,5)	--	20	50	ns
t_r	Turn-On Rise Time		--	200	400	ns
$t_{d(off)}$	Turn-Off Delay Time		--	50	120	ns
t_f	Turn-Off Fall Time		--	70	170	ns
Q_g	Total Gate Charge	V_{DS} = 48 V, I_D = 70 A, V_{GS} = 10 V (Note 4,5)	--	40	60	nC
Q_{gs}	Gate-Source Charge		--	10	--	nC
Q_{gd}	Gate-Drain Charge		--	18	--	nC
Source-Drain Diode Maximum Ratings and Characteristics						
I_S	Continuous Source-Drain Diode Forward Current		--	--	70	A
I_{SM}	Pulsed Source-Drain Diode Forward Current		--	--	280	
V_{SD}	Source-Drain Diode Forward Voltage	I_S = 70 A, V_{GS} = 0 V	--	--	1.5	V
trr	Reverse Recovery Time	I_S = 70 A, V_{GS} = 0 V di_F/dt = 100 A/μs (Note 4)	--	60	--	ns
Qrr	Reverse Recovery Charge		--	100	--	μC

Notes ;

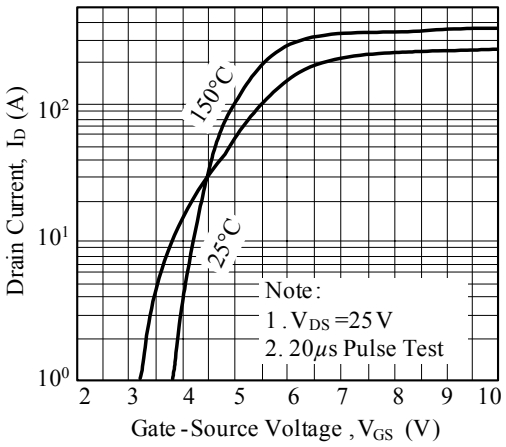
1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. I_{AS}=70A, V_{DD}=25V, R_G=25Ω, Starting T_J=25°C
3. I_{SD}≤70A, di/dt≤300A/μs, V_{DD}≤BV_{DSS} , Starting T_J=25 °C
4. Pulse Test : Pulse Width ≤ 300μs, Duty Cycle ≤ 2%
5. Essentially Independent of Operating Temperature

Typical Characteristics

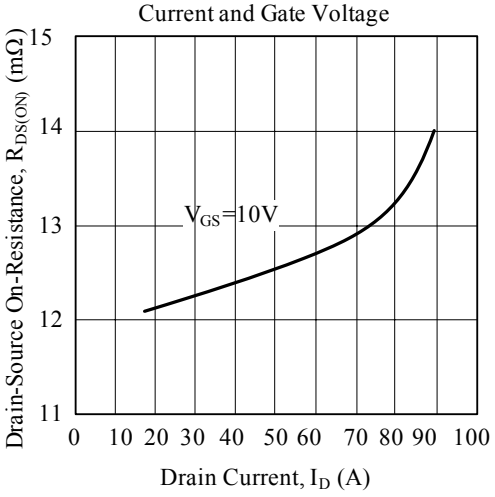
On-State Characteristics



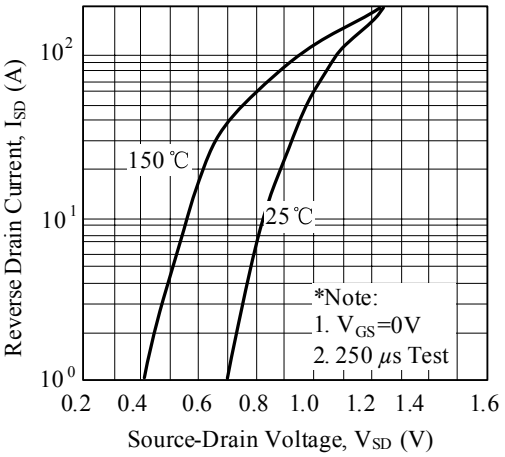
Transfer Characteristics



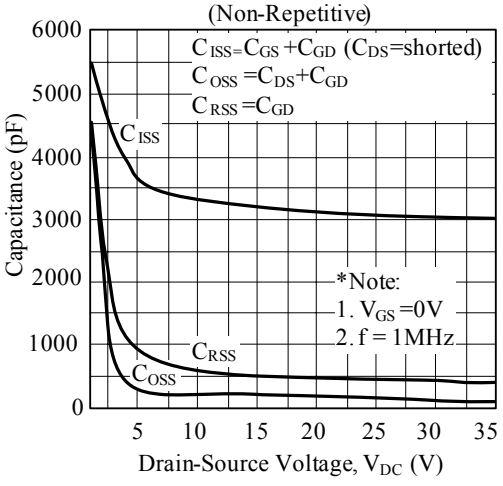
On-Resistance Variation vs . Drain Current and Gate Voltage



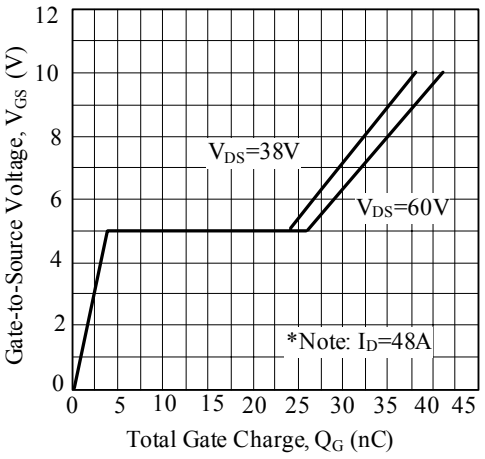
Reverse Drain Current vs. Allowable Case Temperature



Capacitance Characteristics (Non-Repetitive)

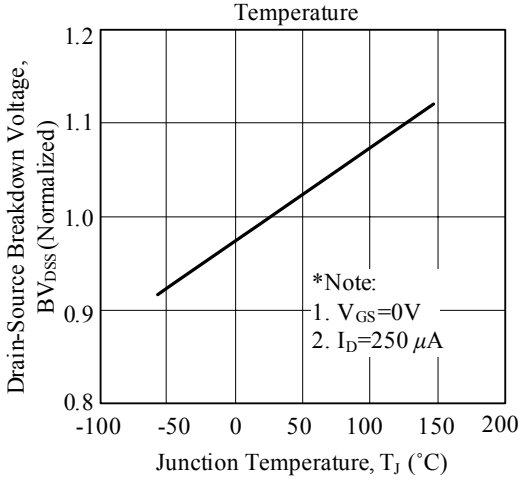


Gate Charge Characteristics

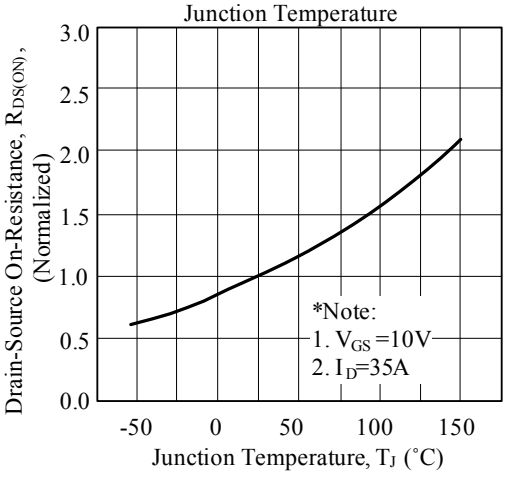


Typical Characteristics (Continued)

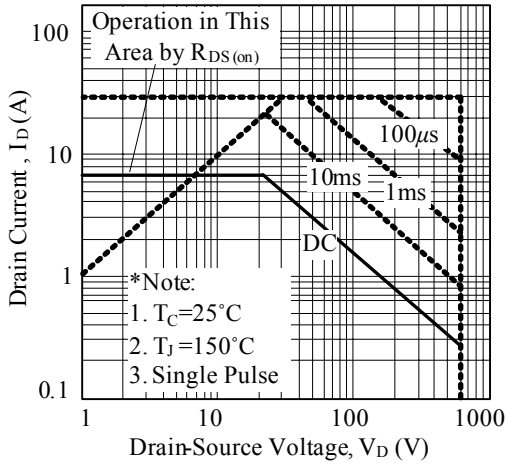
Breakdown Voltage Variation vs. Junction Temperature



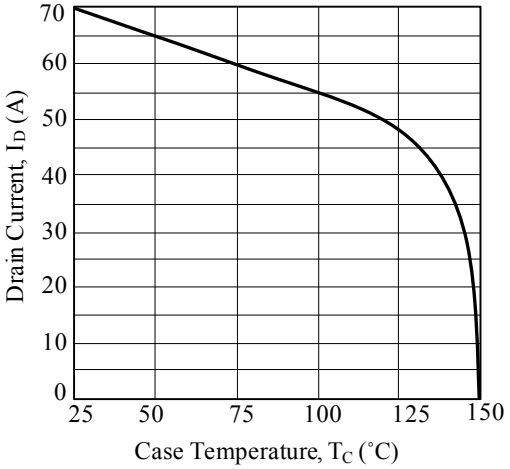
On-Resistance Variation vs Junction Temperature



Maximum Safe Operating



Maximum Drain Current vs. Case Temperature



Transient Thermal Response Curve

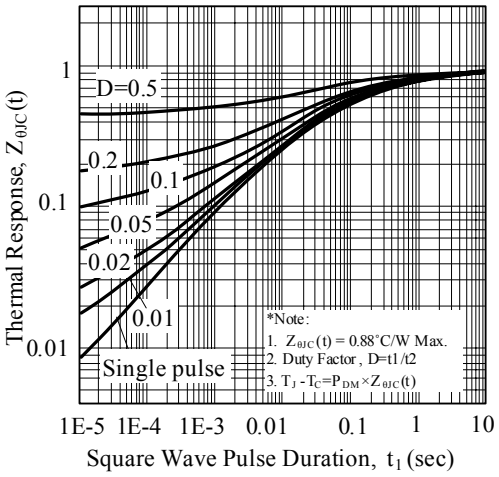


Fig 12. Gate Charge Test Circuit & Waveform

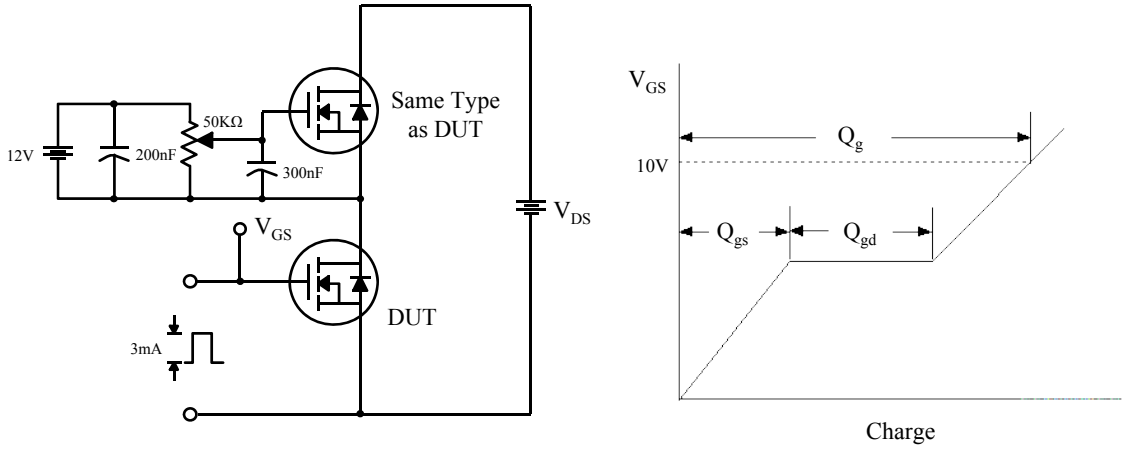


Fig 13. Resistive Switching Test Circuit & Waveforms

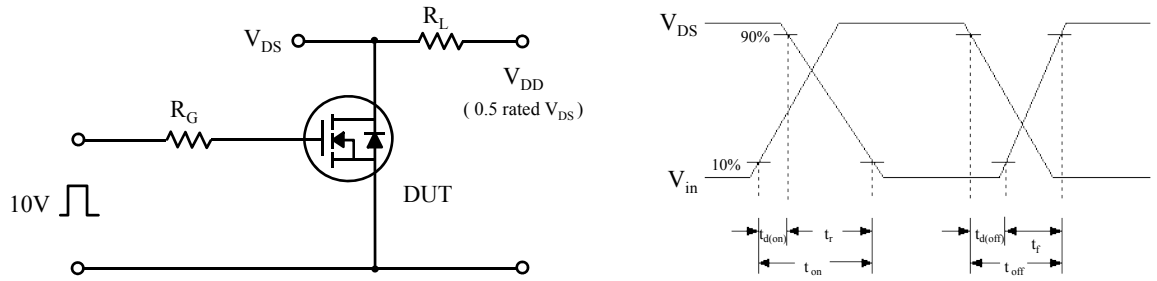


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

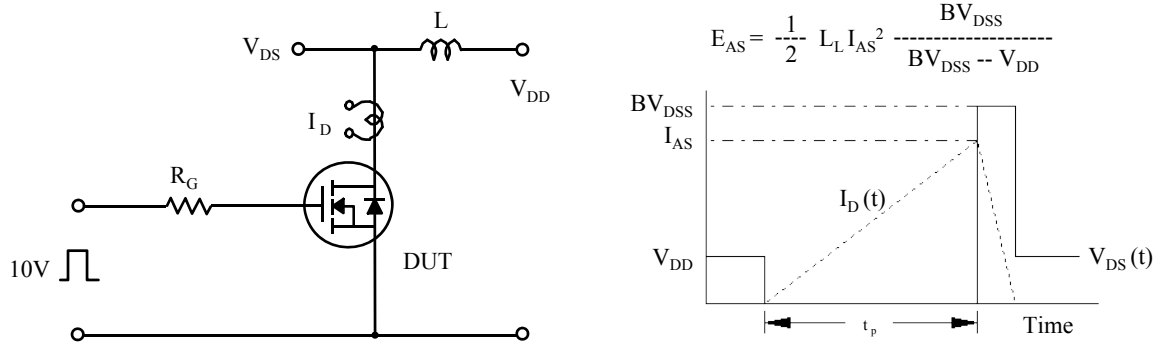


Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms