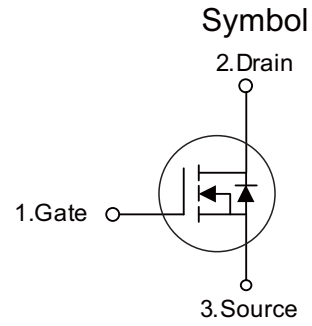


■ PRODUCT CHARACTERISTICS

VDSS	500
$R_{DS(on)Typ}(@V_{GS} = 10 V)$	0.39Ω
Qg@type	43nC
ID	13A



■ APPLICATIONS

- High efficiency switch mode power supplies
- Electronic ballasts
- LED power supply

■ FEATURES

- \* High Switching Speed
- \* 100% Avalanche Tested



■ ORDER INFORMATION

Order codes		Package	Packing
Halogen-Free	Halogen		
N/A	MOT13N50F	TO-220F	50 pieces/Tube
N/A	MOT13N50A	TO-220	50 pieces/Tube

■ ABSOLUTE MAXIMUM RATINGS ( $T_C = 25^\circ C$ , unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT	
Drain-Source Voltage	$V_{DSS}$	500	V	
Gate-Source Voltage	$V_{GSS}$	±30	V	
Continuous Drain Current	$I_D$	13	A	
Pulsed Drain Current (Note 2)	$I_{DM}$	52	A	
Avalanche Current (Note 2)	$I_{AR}$	13	A	
Single Pulsed Avalanche Energy (Note 3)	$E_{AS}$	860	mJ	
Repetitive Avalanche Energy (Note 2)	$E_{AR}$	19.5	mJ	
Peak Diode Recovery dv/dt (Note 4)	dv/dt	4.5	V/ns	
Power Dissipation ( $T_C=25^\circ C$ )	$P_D$	TO-220	195	W
		TO-220F	48	W
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.  $L = 6.0, I_{AS} = 13A, V_{DD} = 50V, R_G = 25\Omega$ , Starting  $T_J = 25^\circ C$
4.  $I_{SD} \leq 13.A, di/dt \leq 200A/\mu s, V_{DD} \leq BV_{DSS}$ , Starting  $T_J = 25^\circ C$

**■ ELECTRICAL CHARACTERISTICS (T<sub>C</sub>=25°C, unless otherwise noted)**

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Off characteristics						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA	500	-	-	V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> = 500V, V <sub>GS</sub> = 0V	-	-	1	μA
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = 30V, V <sub>DS</sub> = 0V	-	-	100	nA
		V <sub>GS</sub> = -30V, V <sub>DS</sub> = 0V	-	-	-100	nA
Breakdown Voltage Temperature Coefficient	ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	I <sub>D</sub> = 250μA Referenced to 25°C	-	0.5	-	V/°C
On characteristics						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA	2.0	-	4.0	V
Static Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> = 10V, I <sub>D</sub> = 6.5A	-	0.39	0.45	Ω
Dynamic characteristics						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1.0MHz	-	1580	-	pF
Output Capacitance	C <sub>OSS</sub>		-	180	-	pF
Reverse Transfer Capacitance	C <sub>RSS</sub>		-	20	-	pF
Switching characteristics						
Turn-On Delay Time	t <sub>D(ON)</sub>	V <sub>DD</sub> =250V, I <sub>D</sub> =13A R <sub>G</sub> =25Ω (Note 1,2)	-	25	-	nS
Turn-On Rise Time	t <sub>R</sub>		-	100	-	
Turn-Off Delay Time	t <sub>D(OFF)</sub>		-	130	-	
Turn-Off Fall Time	t <sub>F</sub>		-	100	-	
Total Gate Charge	Q <sub>G</sub>	V <sub>DS</sub> =400V, I <sub>D</sub> =13A, V <sub>GS</sub> =10 V (Note 1, 2)	-	43	-	nC
Gate-Source Charge	Q <sub>GS</sub>		-	7.5	-	nC
Gate-Drain Charge	Q <sub>GD</sub>		-	18.5	-	nC
Drain-Source Diode Forward Voltage	V <sub>SD</sub>	V <sub>GS</sub> = 0V, I <sub>S</sub> = 13 A	-	-	1.4	V
Maximum Continuous Drain-Source Diode Forward Current	I <sub>S</sub>		-	-	13	A
Maximum Pulsed Drain-Source Diode Forward Current	I <sub>SM</sub>		-	-	52	A
Reverse Recovery Time	t <sub>RR</sub>	V <sub>GS</sub> = 0V, I <sub>S</sub> = 13A,	-	410	-	nS
Reverse Recovery Charge	Q <sub>RR</sub>	di <sub>F</sub> / dt = 100A/μs (Note 1)	-	4.5	-	μC

Notes: 1. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%

2. Essentially independent of operating ambient temperature

■ TEST CIRCUITS AND WAVEFORMS

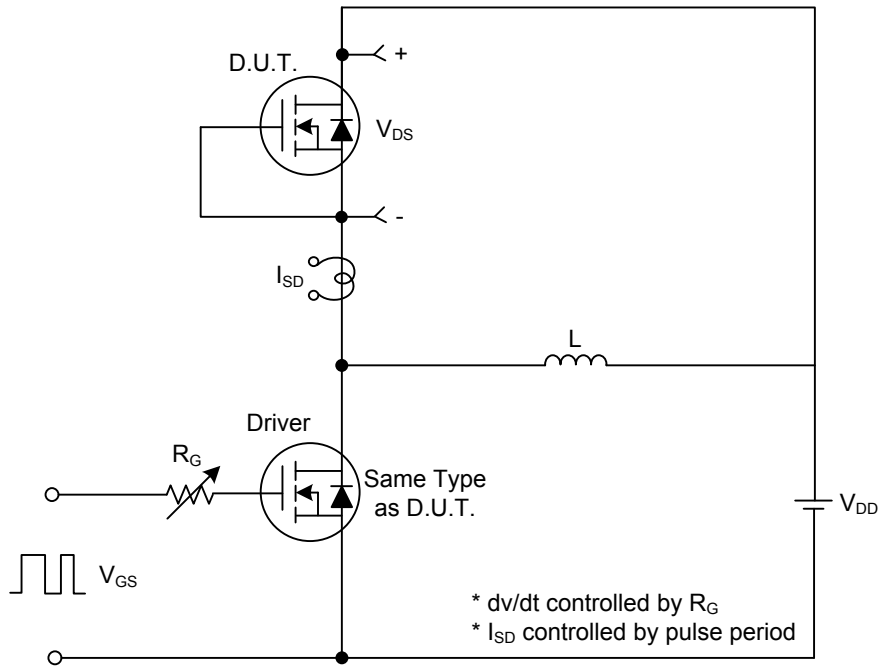


Fig. 1A Peak Diode Recovery dv/dt Test Circuit

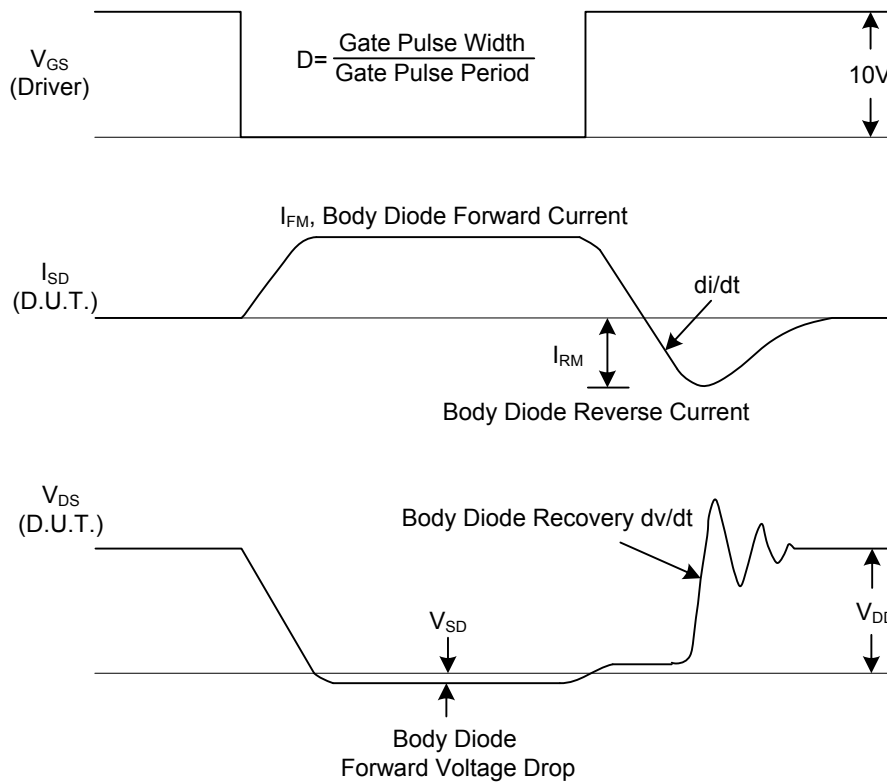


Fig. 1B Peak Diode Recovery dv/dt Waveforms

■ TEST CIRCUITS AND WAVEFORMS(Cont.)

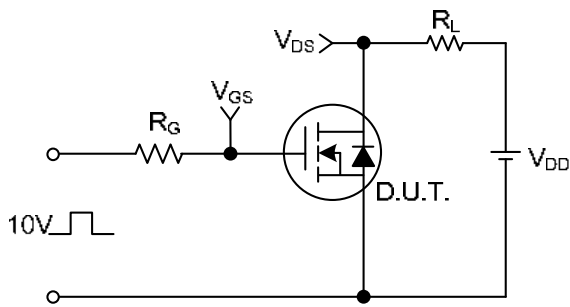


Fig. 2A Switching Test Circuit

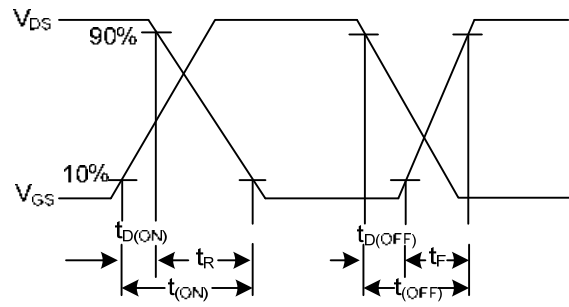


Fig.2B Switching Waveforms

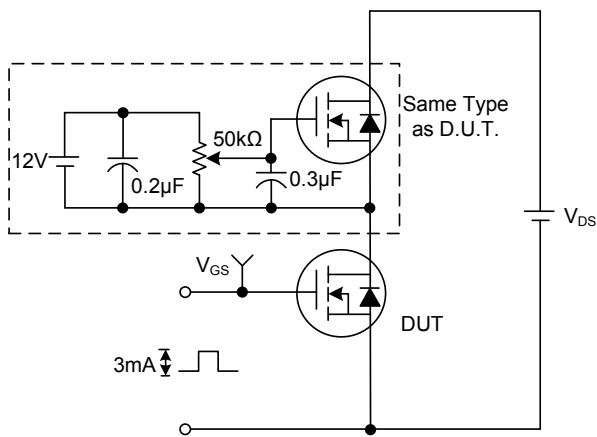


Fig. 3A Gate Charge Test Circuit

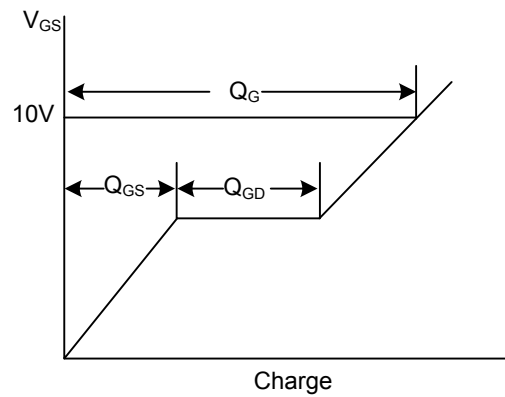


Fig. 3B Gate Charge Waveform

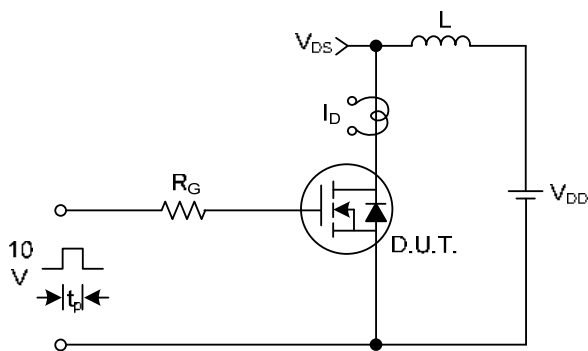


Fig. 4A Unclamped Inductive Switching Test Circuit

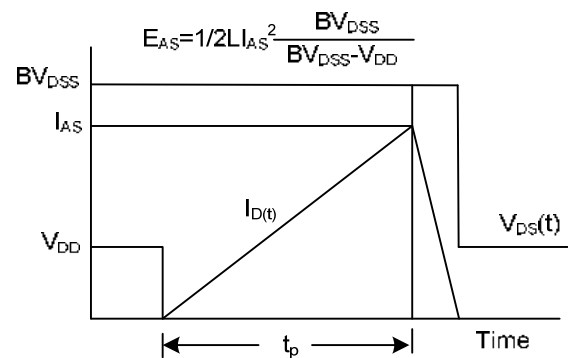


Fig. 4B Unclamped Inductive Switching Waveforms



■ TO-220-3L PACKAGE OUTLINE DIMENSIONS

