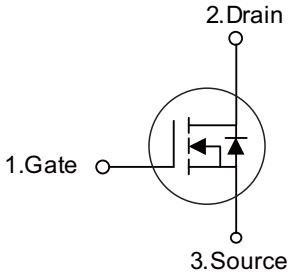
■ PRODUCT CHARACTERISTICS

VDSS	500
R_{DS}(on)typ(@V_{GS} =10 V)	0.48Ω
Qg@type	43nC
ID	13A

Symbol



■ APPLICATIONS

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

■ FEATURES

* High Switching Speed
* 100% Avalanche Tested

TO-220

TO-220F

■ ORDER INFORMATION

Order codes		Package	Packing
Halogen-Free	Halogen		
N/A	MOT13N50SF	TO-220F	50 pieces/Tube
N/A	MOT13N50SA	TO-220	50 pieces/Tube

■ ABSOLUTE MAXIMUM RATINGS (T_C = 25°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°C)	TO-220	P_D	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= 25Ω ,Starting T_J = 25°C
4. I_{SD}≤13.A, di/dt ≤200A/μs, V_{DD}≤ BV_{DSS}, Starting T_J= 25°C

■ ELECTRICAL CHARACTERISTICS (T_C=25°C, unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Off characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} = 0V, I_D = 250μA	500	-	-	V
Drain-Source Leakage Current	I_{DSS}	V_{DS} = 500V, V_{GS} = 0V	-	-	1	μA
Gate-Source Leakage Current	I_{GSS}	V_{GS} = 30V, V_{DS} = 0V	-	-	100	nA
		V_{GS} = -30V, V_{DS} = 0V	-	-	-100	nA
Breakdown Voltage Temperature Coefficient	$\triangle BV_{DSS}/\triangle T_J$	I_D = 250μA Referenced to 25°C	-	0.5	-	V/°C
On characteristics						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS} = V_{GS}, I_D = 250μA	2.0	-	4.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS} = 10V, I_D = 6.5A	-	0.48	0.52	Ω
Dynamic characteristics						
Input Capacitance	C_{ISS}	V_{DS}=25V, V_{GS}=0V, f=1.0MHz	-	1580	-	pF
Output Capacitance	C_{OSS}		-	180	-	pF
Reverse Transfer Capacitance	C_{RSS}		-	20	-	pF
Switching characteristics						
Turn-On Delay Time	$t_{D(ON)}$	V_{DD} =250V, I_D =13A R_G =25Ω (Note 1,2)	-	25	-	nS
Turn-On Rise Time	t_R		-	100	-	nS
Turn-Off Delay Time	$t_{D(OFF)}$		-	130	-	nS
Turn-Off Fall Time	t_F		-	100	-	nS
Total Gate Charge	Q_G	V_{DS}=400V, I_D=13A, V_{GS}=10 V (Note 1, 2)	-	43	-	nC
Gate-Source Charge	Q_{GS}		-	7.5	-	nC
Gate-Drain Charge	Q_{GD}		-	18.5	-	nC
Drain-source diode characteristics						
Drain-Source Diode Forward Voltage	V_{SD}	V_{GS} = 0V, I_S = 13 A	-	-	1.4	V
Maximum Continuous Drain-Source Diode Forward Current	I_S		-	-	13	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}		-	-	52	A
Reverse Recovery Time	t_{RR}	V_{GS} = 0V, I_S = 13A, dI_F / dt = 100A/μs (Note 1)	-	410	-	nS
Reverse Recovery Charge	Q_{RR}		-	4.5	-	μC

Notes: 1. Pulse Test : Pulse width≤300μs, Duty cycle≤2%
2. Essentially independent of operating ambient temperature

■ TEST CIRCUITS AND WAVEFORMS

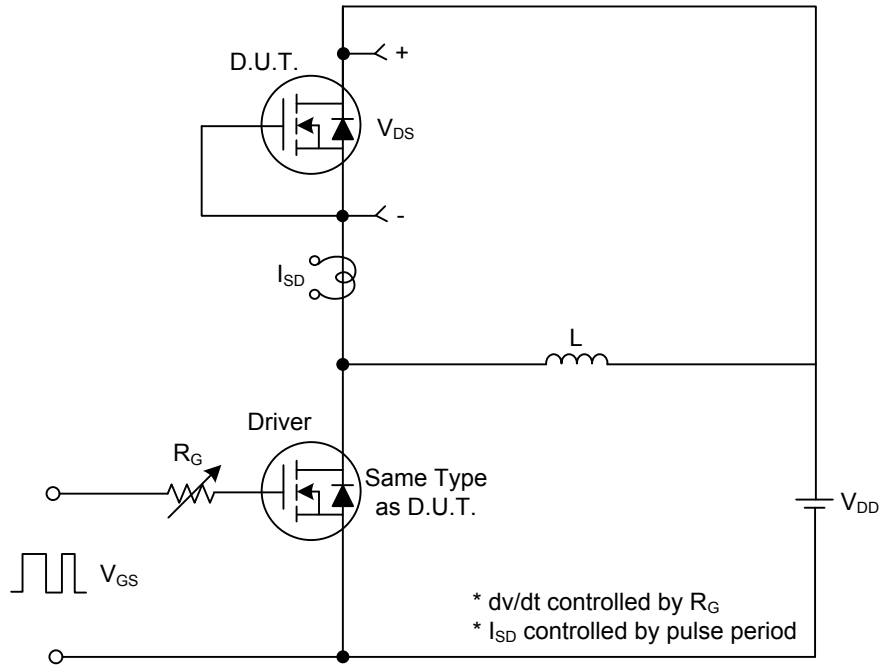


Fig. 1A Peak Diode Recovery dv/dt Test Circuit

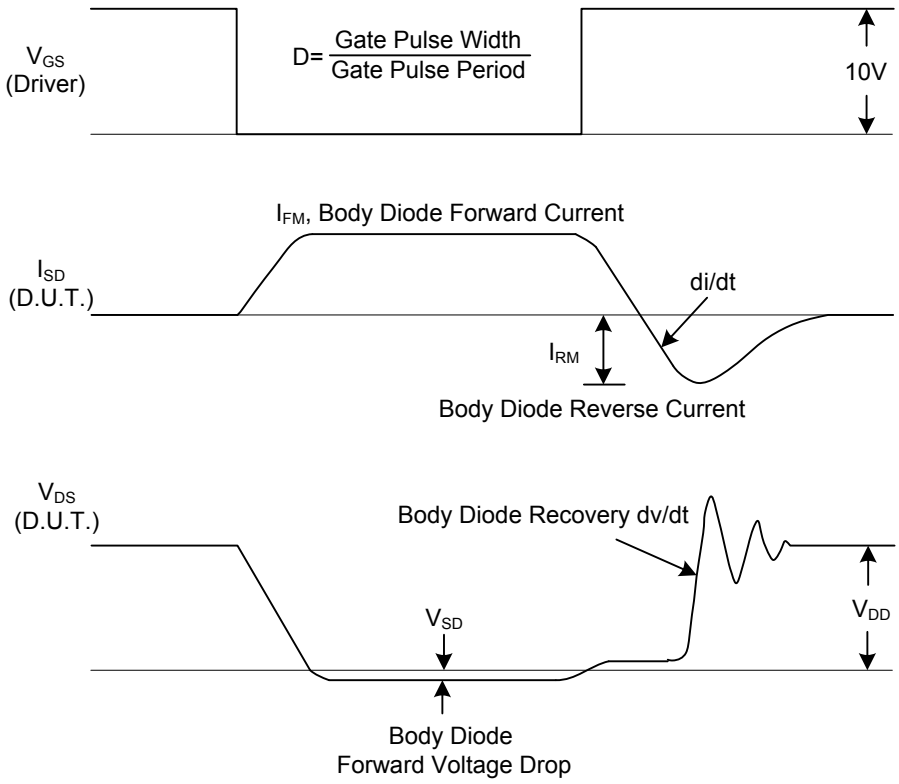


Fig. 1B Peak Diode Recovery dv/dt Waveforms

■ TEST CIRCUITS AND WAVEFORMS(Cont.)

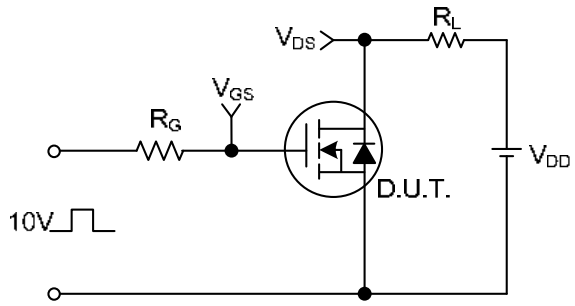


Fig. 2A Switching Test Circuit

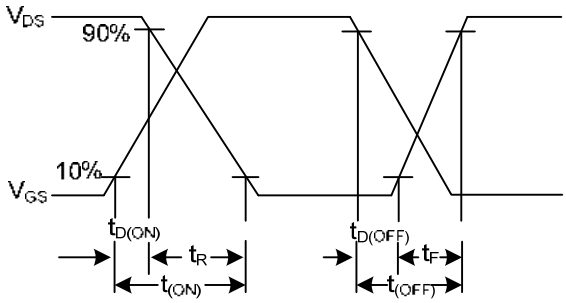


Fig.2B Switching Waveforms

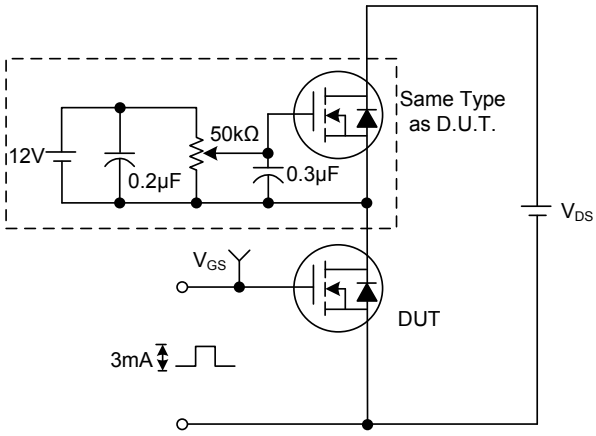


Fig. 3A Gate Charge Test Circuit

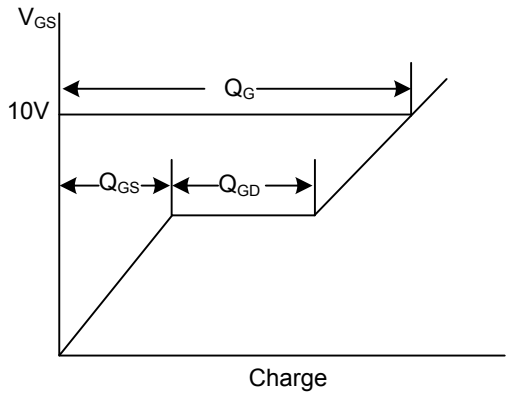


Fig. 3B Gate Charge Waveform

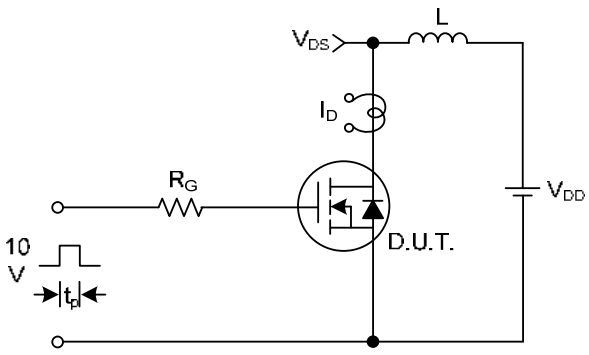


Fig. 4A Unclamped Inductive Switching Test Circuit

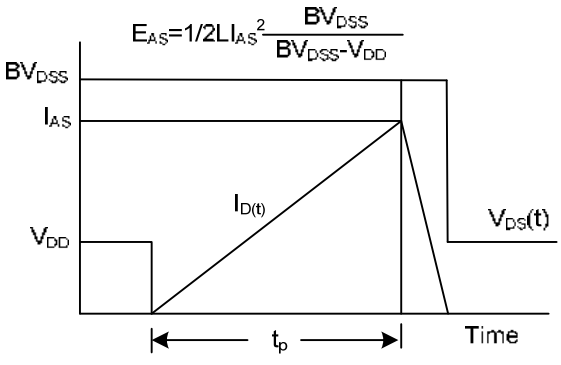
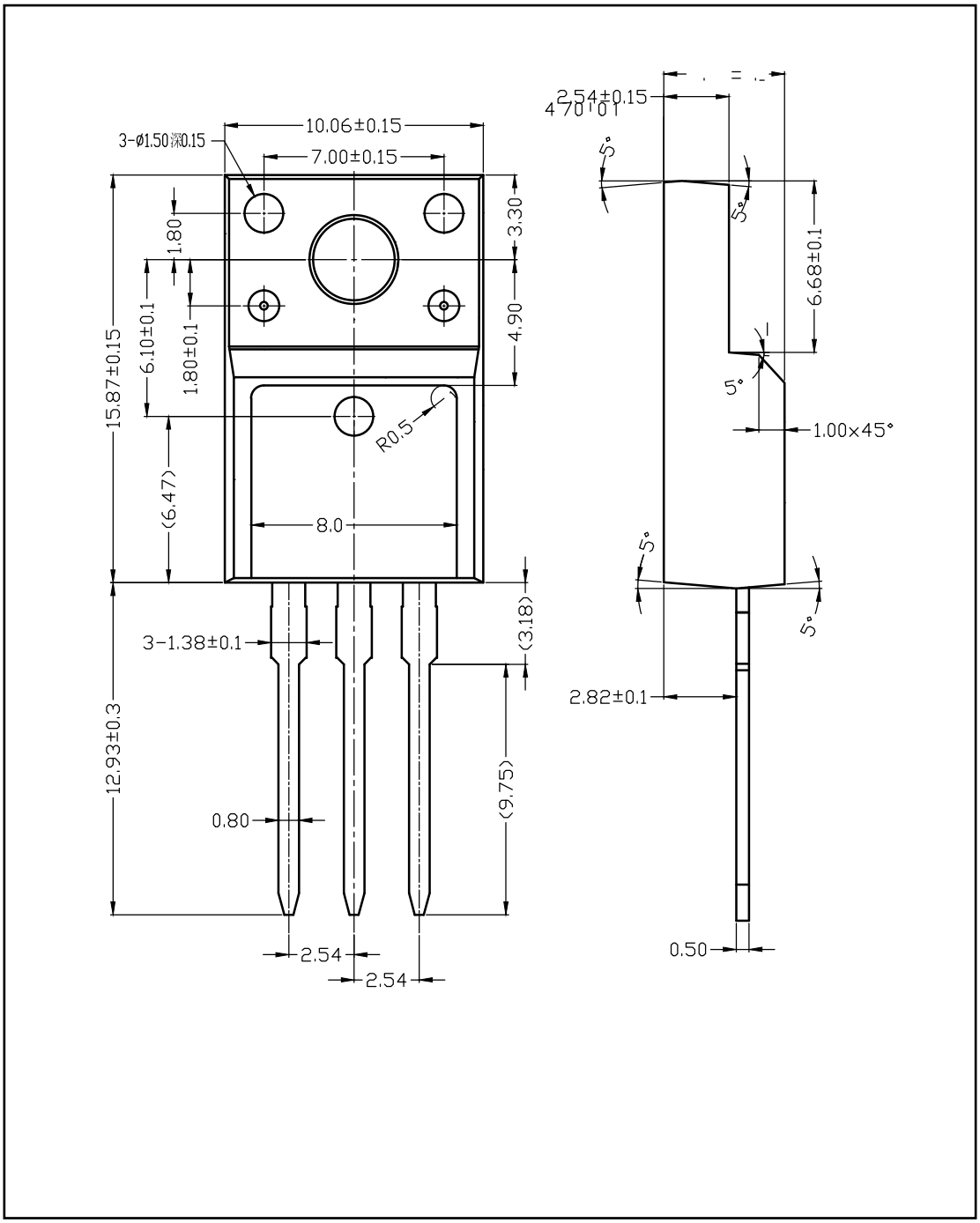


Fig. 4B Unclamped Inductive Switching Waveforms

■ TO-220F-3L PACKAGE OUTLINE DIMENSIONS



■ TO-220-3L PACKAGE OUTLINE DIMENSIONS