Industrial model	Poplular name	Package identificattion	Packing method	Quantity per tube	Quantity per box	Quantity per carton
SPT13N50 SPF13N50	13N50 13N50	T: TO-220AB F: TO-220F-3L	TUBE	50/tube	1Kpcs/box	5Kpcs

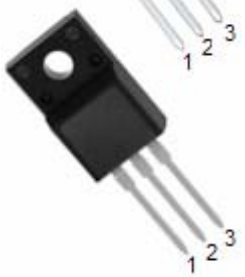
■ APPLICATION
ELECTRONIC BALLAST
ELECTRONIC TRANSFORMER
SWITCH MODE POWER SUPPLY
FEATURES

I_D=13A
BV_{DSS} =500V
$R_{DS(on)}$ =0.45 Ω

■ LOW ON-RESISTANCE
FAST SWITCHING
HIGH INPUT RESISTANCE
RoHS COMPLIANT
Package: TO-220AB & TO-220F-3L

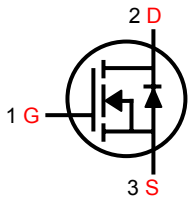
SPF/T13N50 Series Pin Assignment

3-Lead Plastic TO-220AB
Package Code: T
Pin 1: Gate
Pin 2 & Tab: Drain
Pin 3: Source



3-Lead Plastic TO-220F-3L
Package Code: F
Pin 1: Gate
Pin 2: Drain
Pin 3: Source

Series Symbol:



■ ELECTRICAL CHARACTERISTICS(Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
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,		410		nS
Reverse Recovery Charge	Q_{RR}	dI_F / 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

■ 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-220AB	P_D	195	W
	TO-220F-3L		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

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220AB	θ_{JA}	62.5	°C/W
	TO-220F-3L		62.5	°C/W
Junction to Case	TO-220AB	θ_{JC}	0.64	°C/W
	TO-220F-3L		2.58	°C/W

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

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		0.39	0.48	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}	V_{DS}=25V, V_{GS}=0V, f=1.0MHz		1580	2055	pF
Output Capacitance	C_{OSS}			180	235	pF
Reverse Transfer Capacitance	C_{RSS}			20	25	pF
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	$t_{D(ON)}$	V_{DD} =250V, I_D =13A R_G =25Ω (Note 1,2)		25	60	nS
Turn-On Rise Time	t_R			100	210	nS
Turn-Off Delay Time	$t_{D(OFF)}$			130	270	nS
Turn-Off Fall Time	t_F			100	210	nS
Total Gate Charge	Q_G	V_{DS}=400V, I_D=13A, V_{GS}=10 V (Note 1, 2)		43	56	nC
Gate-Source Charge	Q_{GS}			7.5		nC
Gate-Drain Charge	Q_{GD}			18.5		nC

■ TEST CIRCUITS AND WAVEFORMS

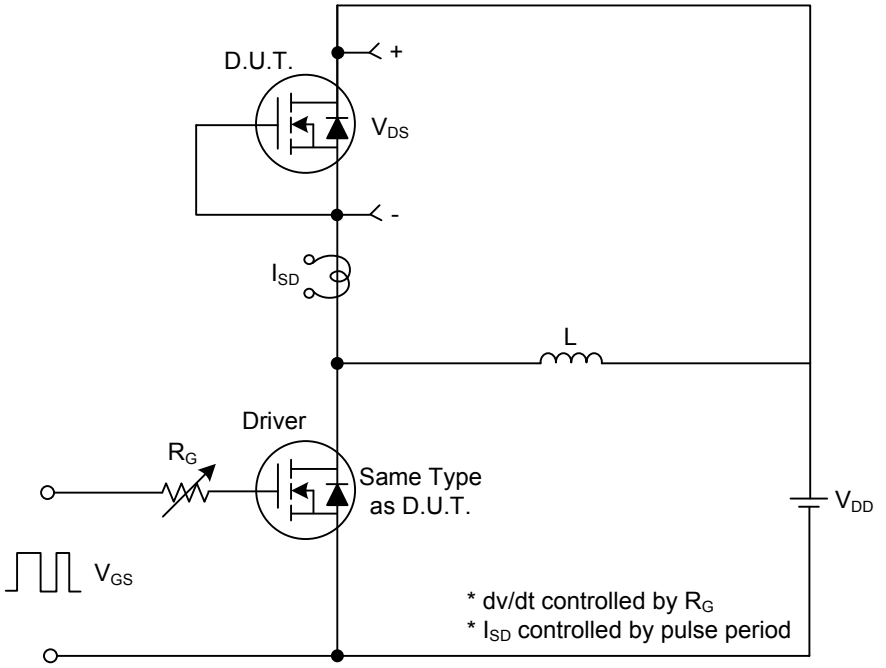


Fig. 1A Peak Diode Recovery dv/dt Test Circuit

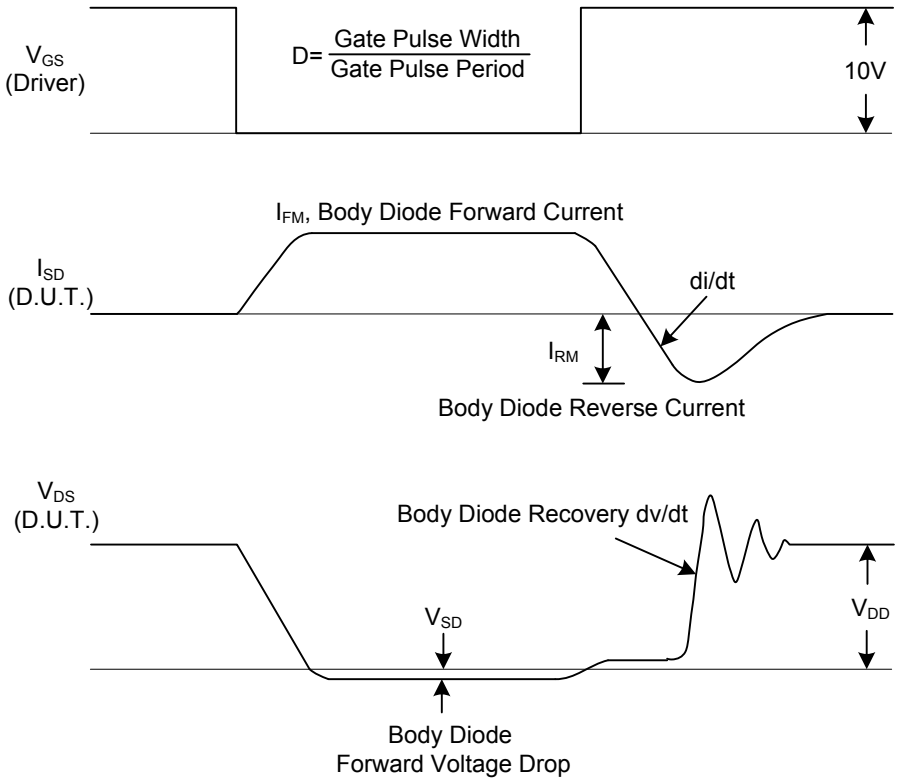


Fig. 1B Peak Diode Recovery dv/dt Waveforms

■ TEST CIRCUITS AND WAVEFORMS (Cont.)

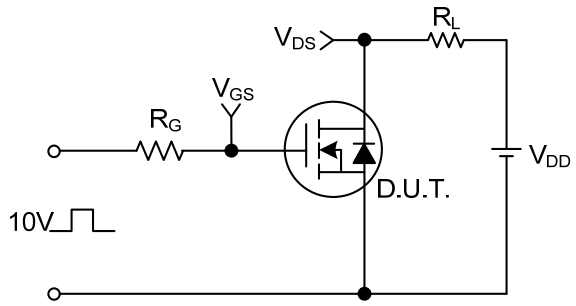


Fig. 2A Switching Test Circuit

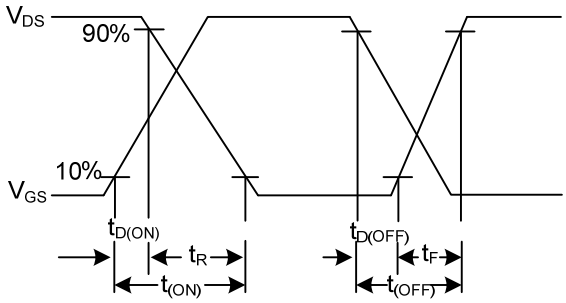


Fig.2B Switching Waveforms

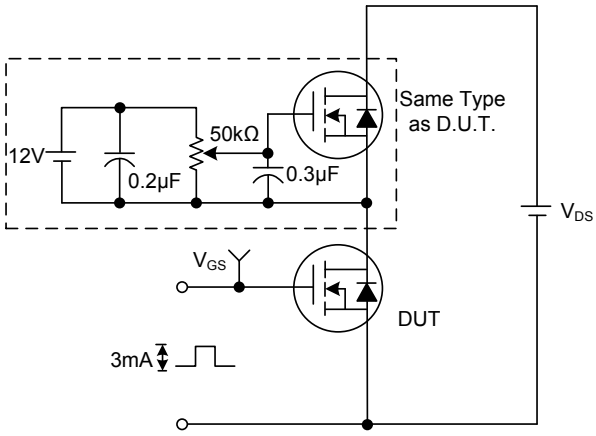


Fig. 3A Gate Charge Test Circuit

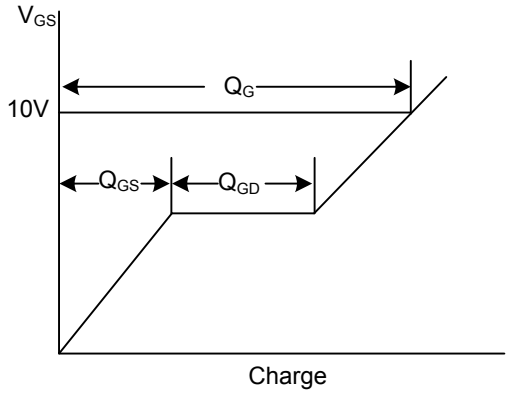


Fig. 3B Gate Charge Waveform

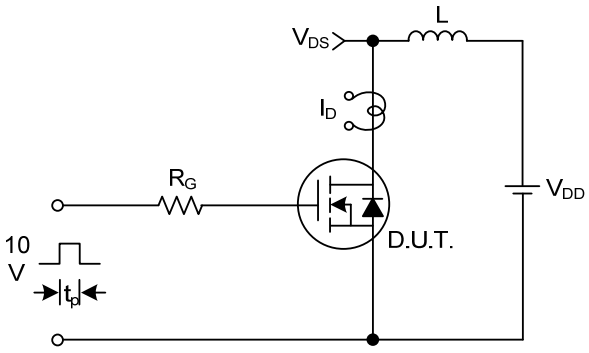


Fig. 4A Unclamped Inductive Switching Test Circuit

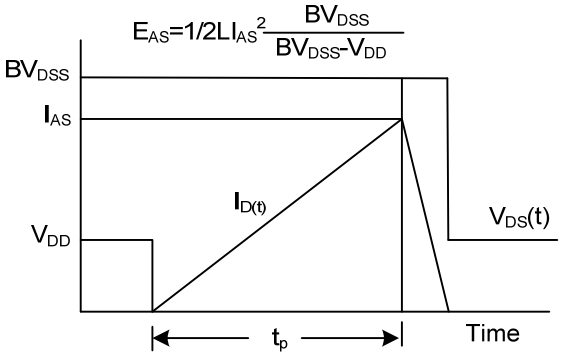
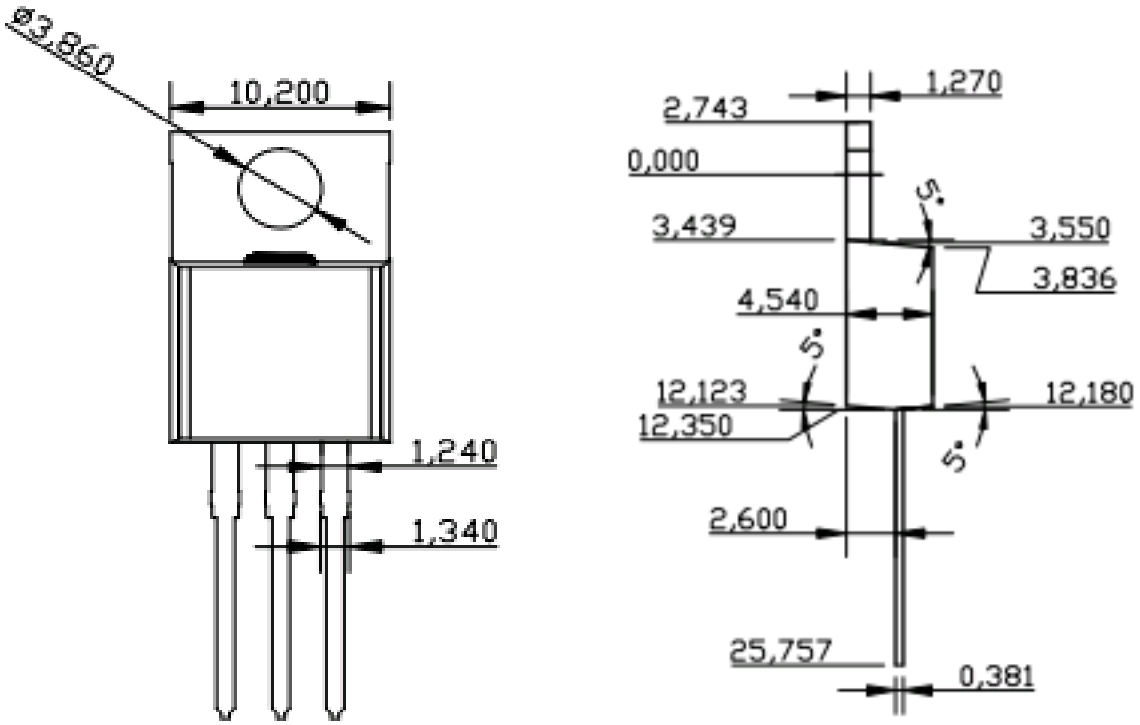


Fig. 4B Unclamped Inductive Switching Waveforms

■ TO-220AB Package outline dimensions



■ TO-220F-3L Package outline dimensions