



STP36NE06 STP36NE06FP

N - CHANNEL 60V - 0.032Ω - 36A - TO-220/TO-220FP STripFET™ POWER MOSFET

TYPE	V _{DSS}	R _{D(on)}	I _D
STP36NE06	60 V	< 0.040 Ω	36 A
STP36NE06FP	60 V	< 0.040 Ω	20 A

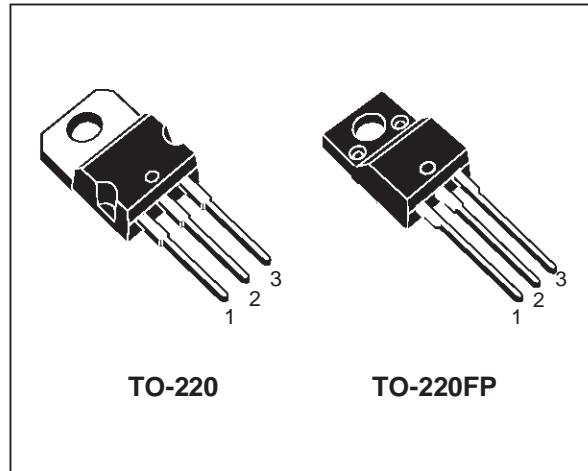
- TYPICAL R_{D(on)} = 0.032 Ω
- EXCEPTIONAL dv/dt CAPABILITY
- 100% AVALANCHE TESTED
- LOW GATE CHARGE 100 °C
- APPLICATION ORIENTED CHARACTERIZATION

DESCRIPTION

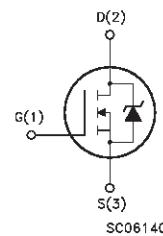
This Power Mosfet is the latest development of SGS-THOMSON unique "Single Feature Size™" strip-based process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing reproducibility.

APPLICATIONS

- HIGH CURRENT, HIGH SPEED SWITCHING
- SOLENOID AND RELAY DRIVERS
- MOTOR CONTROL, AUDIO AMPLIFIERS
- DC-DC & DC-AC CONVERTERS



INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		STP36NE06	STP36NE06FP	
V _{DS}	Drain-source Voltage (V _{GS} = 0)	60		V
V _{DGR}	Drain-gate Voltage (R _{GS} = 20 kΩ)	60		V
V _{GS}	Gate-source Voltage	± 20		V
I _D	Drain Current (continuous) at T _c = 25 °C	36	20	A
I _D	Drain Current (continuous) at T _c = 100 °C	24	14	A
I _{DM(•)}	Drain Current (pulsed)	144	144	A
P _{tot}	Total Dissipation at T _c = 25 °C	100	35	W
	Derating Factor	0.66	0.27	W/°C
V _{ISO}	Insulation Withstand Voltage (DC)	—	2000	V
dv/dt	Peak Diode Recovery voltage slope	7		V/ns
T _{stg}	Storage Temperature	-65 to 175		°C
T _j	Max. Operating Junction Temperature	175		°C

(•) Pulse width limited by safe operating area

(1) I_{SD} ≤ 36 A, di/dt ≤ 300 A/μs, V_{DD} ≤ V_{(BR)DSS}, T_j ≤ T_{JMAX}

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THERMAL DATA

			TO-220	TO-220FP	
R _{thj-case}	Thermal Resistance Junction-case	Max	1.51	4.28	°C/W
R _{thj-amb} R _{thc-sink}	Thermal Resistance Junction-ambient Thermal Resistance Case-sink	Max Typ	62.5 0.5	300	°C/W °C/W °C
T _I	Maximum Lead Temperature For Soldering Purpose				

AVALANCHE CHARACTERISTICS

Symbol	Parameter	Max Value	Unit
I _{AR}	Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T _j max)	36	A
E _{AS}	Single Pulse Avalanche Energy (starting T _j = 25 °C, I _D = I _{AR} , V _{DD} = 25V)	180	mJ

ELECTRICAL CHARACTERISTICS (T_{case} = 25 °C unless otherwise specified)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{(BR)DSS}	Drain-source Breakdown Voltage	I _D = 250 μA V _{GS} = 0	60			V
I _{DSS}	Zero Gate Voltage Drain Current (V _{GS} = 0)	V _{DS} = Max Rating V _{DS} = Max Rating °C			1 10	μA μA
I _{GSS}	Gate-body Leakage Current (V _{DS} = 0)	V _{GS} = ± 20 V			± 100	nA

ON (*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} I _D = 250 μA	2	3	4	V
R _{DSS(on)}	Static Drain-source On Resistance	V _{GS} = 10V I _D = 18 A		0.032	0.04	Ω
I _{D(on)}	On State Drain Current	V _{DS} > I _{D(on)} × R _{DSS(on)max} V _{GS} = 10 V	36			A

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g _{fs} (*)	Forward Transconductance	V _{DS} > I _{D(on)} × R _{DSS(on)max} I _D = 18 A	7	15		S
C _{iiss} C _{oiss} C _{riss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V _{DS} = 25 V f = 1 MHz V _{GS} = 0		2115 260 65	2800 350 90	pF pF pF

ELECTRICAL CHARACTERISTICS (continued)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on Time Rise Time	$V_{DD} = 30 \text{ V}$ $I_D = 18 \text{ A}$ $R_G = 4.7 \Omega$ $V_{GS} = 10 \text{ V}$		28 85	40 115	ns ns
$(di/dt)_{on}$	Turn-on Current Slope	$V_{DD} = 48 \text{ V}$ $I_D = 36 \text{ A}$ $R_G = 4.7 \Omega$ $V_{GS} = 10 \text{ V}$		250		A/ μs
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	$V_{DD} = 48 \text{ V}$ $I_D = 36 \text{ A}$ $V_{GS} = 10 \text{ V}$		50 13 18	70	nC nC nC

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{r(voff)}$ t_f t_c	Off-voltage Rise Time Fall Time Cross-over Time	$V_{DD} = 48 \text{ V}$ $I_D = 36 \text{ A}$ $R_G = 4.7 \Omega$ $V_{GS} = 10 \text{ V}$		12 25 40	16 35 55	ns ns ns

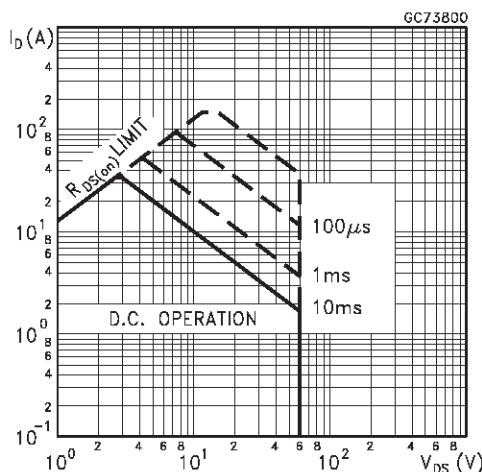
SOURCE DRAIN DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD} $I_{SDM}(\bullet)$	Source-drain Current Source-drain Current (pulsed)				36 144	A A
$V_{SD} (*)$	Forward On Voltage	$I_{SD} = 36 \text{ A}$ $V_{GS} = 0$			1.5	V
t_{rr} Q_{rr} I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	$I_{SD} = 36 \text{ A}$ $di/dt = 100 \text{ A}/\mu\text{s}$ $V_{DD} = 30 \text{ V}$ $T_j = 150^\circ\text{C}$		75 245 6.5		ns μC A

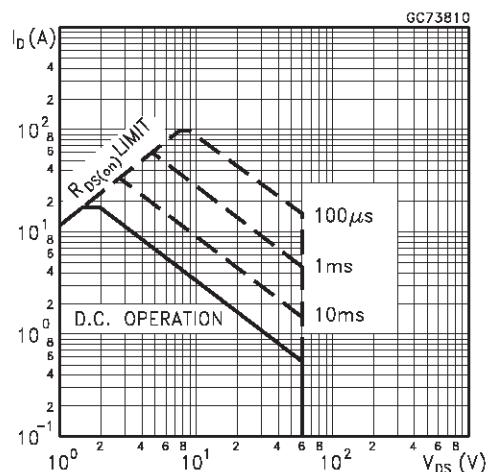
(*) Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %

(*) Pulse width limited by safe operating area

Safe Operating Area for TO-220

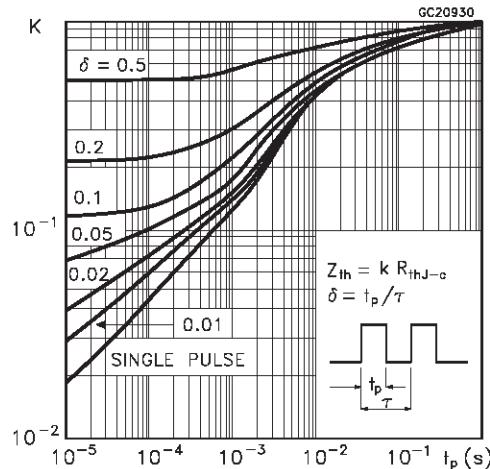


Safe Operating Area for TO-220FP

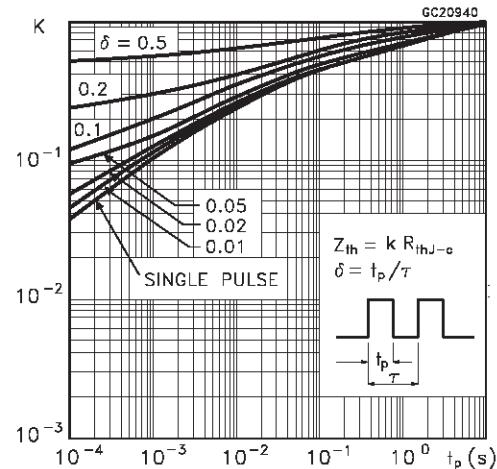


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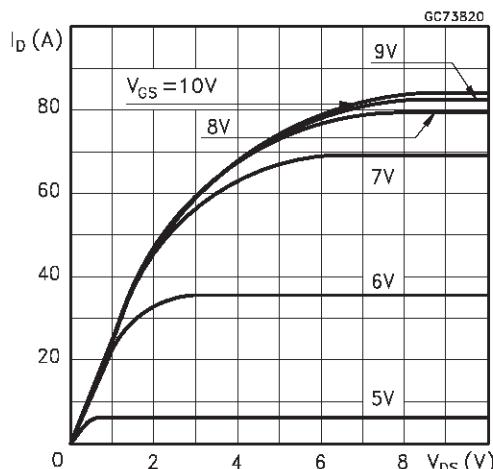
Thermal Impedance for TO-220



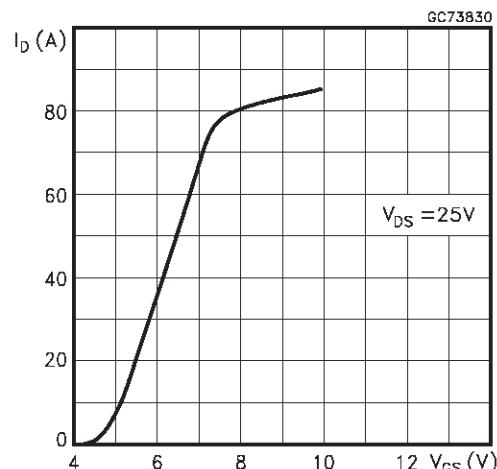
Thermal Impedance for TO-220FP



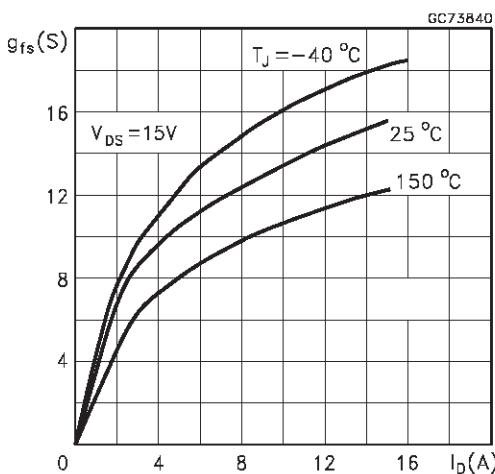
Output Characteristics



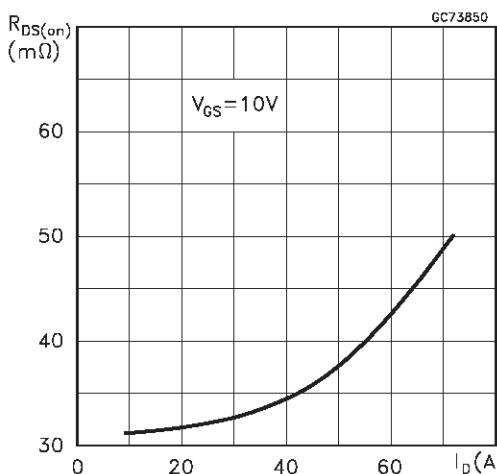
Transfer Characteristics



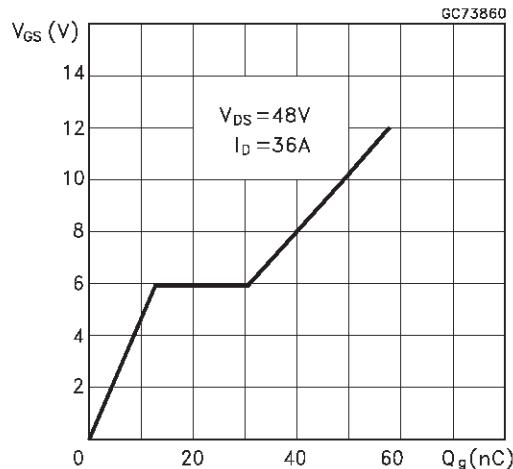
Transconductance



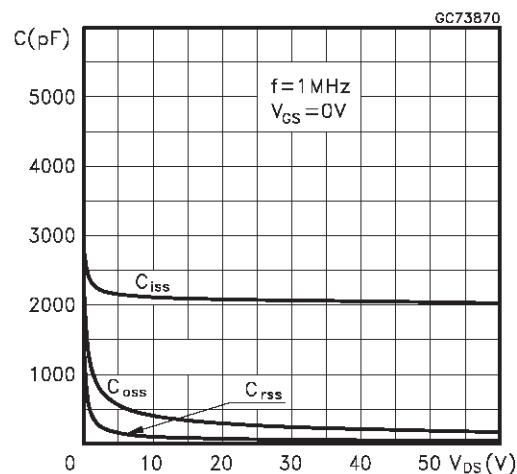
Static Drain-source On Resistance



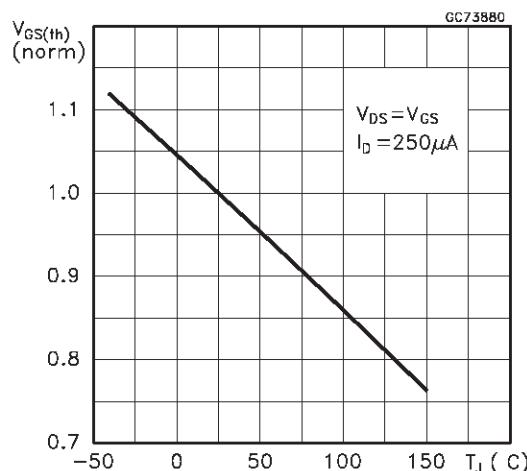
Gate Charge vs Gate-source Voltage



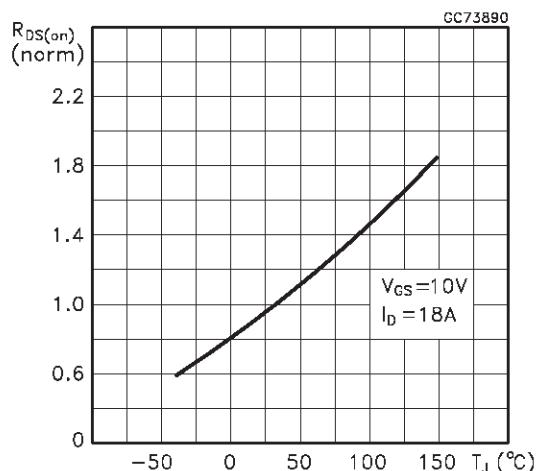
Capacitance Variations



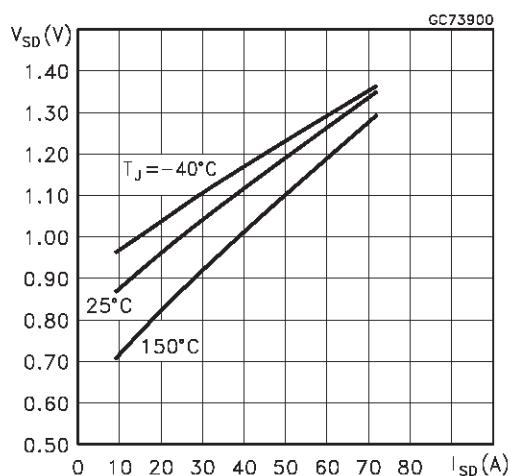
Normalized Gate Threshold Voltage vs Temperature



Normalized On Resistance vs Temperature



Source-drain Diode Forward Characteristics



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Fig. 1: Unclamped Inductive Load Test Circuit

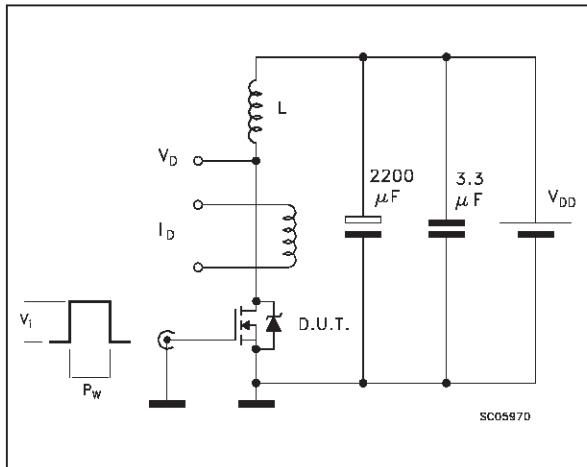


Fig. 2: Unclamped Inductive Waveform

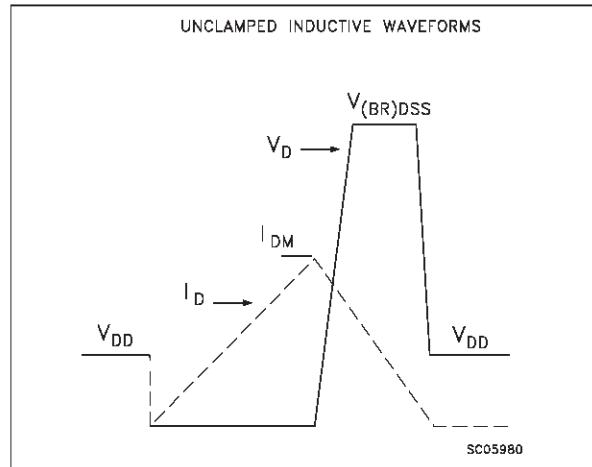


Fig. 3: Switching Times Test Circuits For Resistive Load

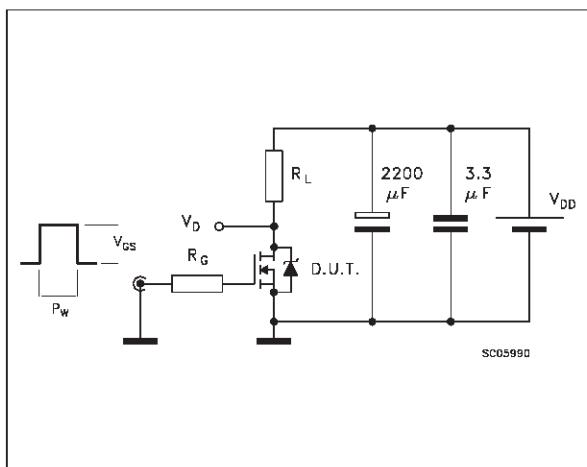


Fig. 4: Gate Charge test Circuit

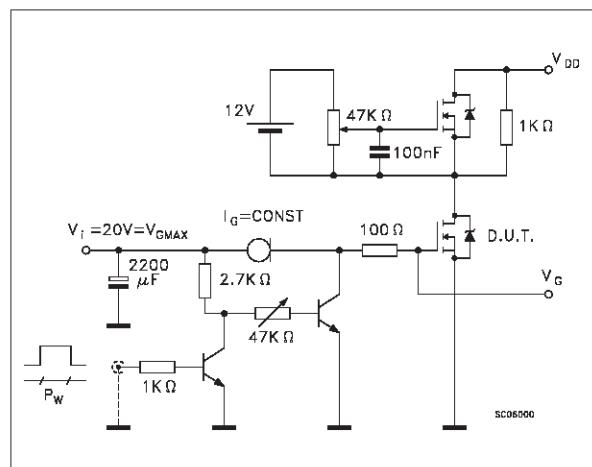
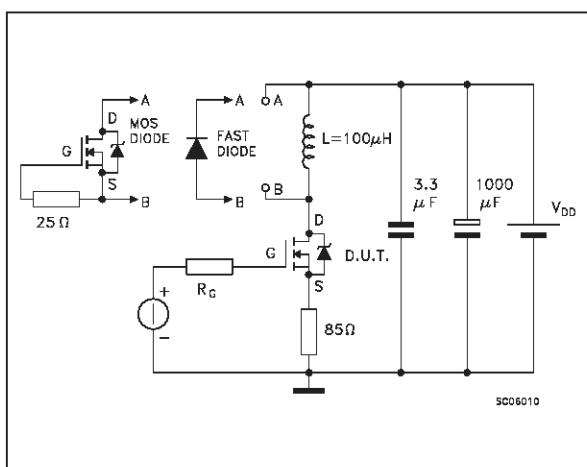
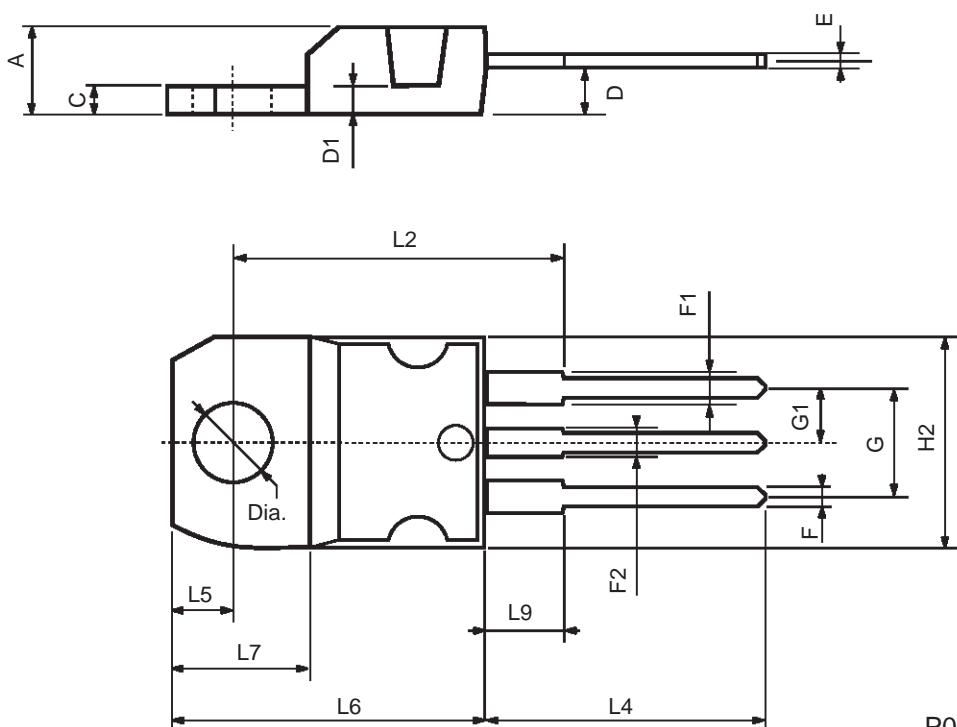


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



TO-220 MECHANICAL DATA

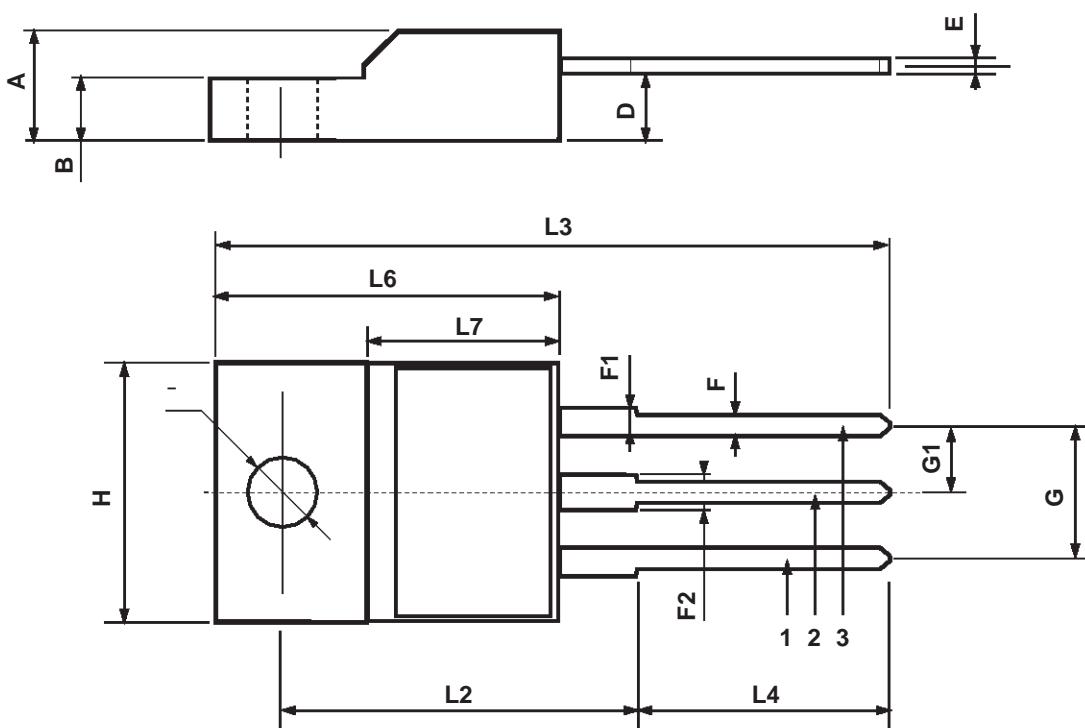
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
C	1.23		1.32	0.048		0.051
D	2.40		2.72	0.094		0.107
D1		1.27			0.050	
E	0.49		0.70	0.019		0.027
F	0.61		0.88	0.024		0.034
F1	1.14		1.70	0.044		0.067
F2	1.14		1.70	0.044		0.067
G	4.95		5.15	0.194		0.203
G1	2.4		2.7	0.094		0.106
H2	10.0		10.40	0.393		0.409
L2		16.4			0.645	
L4	13.0		14.0	0.511		0.551
L5	2.65		2.95	0.104		0.116
L6	15.25		15.75	0.600		0.620
L7	6.2		6.6	0.244		0.260
L9	3.5		3.93	0.137		0.154
DIA.	3.75		3.85	0.147		0.151



P011C

TO-220FP MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.4		4.6	0.173		0.181
B	2.5		2.7	0.098		0.106
D	2.5		2.75	0.098		0.108
E	0.45		0.7	0.017		0.027
F	0.75		1	0.030		0.039
F1	1.15		1.7	0.045		0.067
F2	1.15		1.7	0.045		0.067
G	4.95		5.2	0.195		0.204
G1	2.4		2.7	0.094		0.106
H	10		10.4	0.393		0.409
L2		16			0.630	
L3	28.6		30.6	1.126		1.204
L4	9.8		10.6	0.385		0.417
L6	15.9		16.4	0.626		0.645
L7	9		9.3	0.354		0.366
Ø	3		3.2	0.118		0.126



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