



STP80NF55-06 - STP80NF55-06FP STB80NF55-06-1

N-CHANNEL 55V - 0.005Ω - 80A TO-220/TO-220FP/I²PAK
STripFET™ POWER MOSFET

TYPE	V _{DSS}	R _{DS(on)}	I _D
STP80NF55-06/-1	55 V	<0.0065Ω	80 A
STP80NF55-06FP	55 V	<0.0065Ω	60 A

- TYPICAL R_{DS(on)} = 0.005Ω
- EXCEPTIONAL dv/dt CAPABILITY
- 100% AVALANCHE TESTED
- APPLICATION ORIENTED CHARACTERIZATION
- ADD SUFFIX "T4" FOR ORDERING IN TAPE & REEL

DESCRIPTION

This Power Mosfet is the latest development of STMicroelectronics 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

- SOLENOID AND RELAY DRIVERS
- MOTOR CONTROL, AUDIO AMPLIFIERS
- DC-DC CONVERTERS
- AUTOMOTIVE ENVIRONMENT

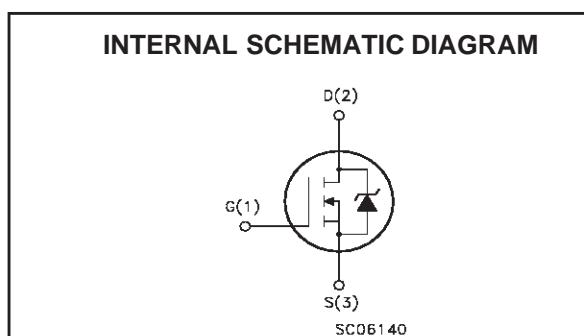
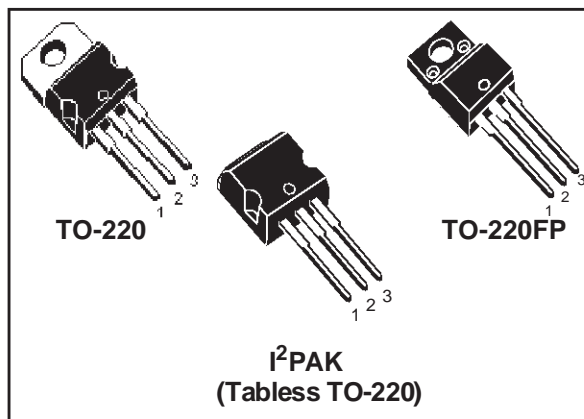
ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		STP(B)80NF-06-1	STP80NF55-06FP	
V _{DS}	Drain-source Voltage (V _{GS} = 0)	55		V
V _{DGR}	Drain-gate Voltage (R _{GS} = 20 kΩ)	55		V
V _{GS}	Gate- source Voltage	±20		V
I _D (1)	Drain Current (continuous) at T _C = 25°C	80	60	A
I _D	Drain Current (continuous) at T _C = 100°C	80	42	A
I _{DM} (1)	Drain Current (pulsed)	320	240	A
P _{TOT}	Total Dissipation at T _C = 25°C	300	45	W
	Derating Factor	2	0.30	W/°C
V _{ISO}	Insulation Withstand Voltage (DC)	--	2500	V
dv/dt (2)	Peak Diode Recovery voltage slope	10		V/ns
T _{stg}	Storage Temperature	- 55 to 175		°C
T _j	Operating Junction Temperature			

(●) Pulse width limited by safe operating area

(1) Current Limited by Package

(2) I_{SD} ≤ 80A, di/dt ≤ 400 μA, V_{DD} ≤ V_{(BR)DSS}, T_j ≤ T_{JMAX}.



STP80NF55-06/FP/STB80NF55-06-1**THERMAL DATA**

		TO-220 / I ² PAK	TO-220FP	
R _{thj-case}	Thermal Resistance Junction-case Max	0.5	3.33	°C/W
R _{thj-amb}	Thermal Resistance Junction-ambient Max	62.5		°C/W
T _l	Maximum Lead Temperature For Soldering Purpose	300		°C

AVALANCHE CHARACTERISTICS

Symbol	Parameter	Max Value	Unit
I _{AR}	Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T _j max)	80	A
E _{AS}	Single Pulse Avalanche Energy (starting T _j = 25 °C, I _D = I _{AR} , V _{DD} = 35 V)	650	mJ

ELECTRICAL CHARACTERISTICS (TCASE = 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	55			V
I _{DSS}	Zero Gate Voltage Drain Current (V _{GS} = 0)	V _{DS} = Max Rating V _{DS} = Max Rating, T _C = 125 °C			1 10	μA μA
I _{GSS}	Gate-body Leakage Current (V _{DS} = 0)	V _{GS} = ±20V			±100	nA

ON (1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	2	3	4	V
R _{DS(on)}	Static Drain-source On Resistance	V _{GS} = 10 V, I _D = 40 A		0.005	0.0065	Ω

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g _{fs} (1)	Forward Transconductance	V _{DS} = 15 V, I _D = 40 A		50		S
C _{iss}	Input Capacitance	V _{DS} = 25V, f = 1 MHz, V _{GS} = 0		7300		pF
C _{OSS}	Output Capacitance			980		pF
C _{rss}	Reverse Transfer Capacitance			250		pF

ELECTRICAL CHARACTERISTICS (CONTINUED)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = 27V, I_D = 40A$		40		ns
t_r	Rise Time	$R_G = 4.7\Omega, V_{GS} = 10V$ (see test circuit, Figure 3)		240		ns
Q_g	Total Gate Charge	$V_{DD} = 44V, I_D = 80A,$		190	256	nC
Q_{gs}	Gate-Source Charge	$V_{GS} = 10V$		38		nC
Q_{gd}	Gate-Drain Charge			66		nC

SWITCHING OFF

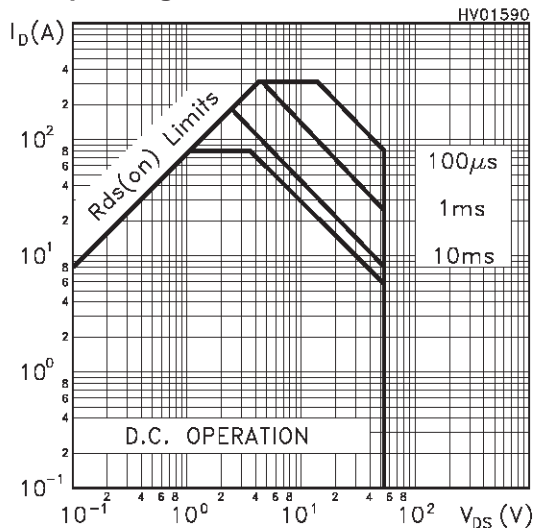
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$	Turn-off-Delay Time	$V_{DD} = 27V, I_D = 40A,$		260		ns
t_f	Fall Time	$R_G = 4.7\Omega, V_{GS} = 4.5V$ (see test circuit, Figure 3)		75		ns

SOURCE DRAIN DIODE

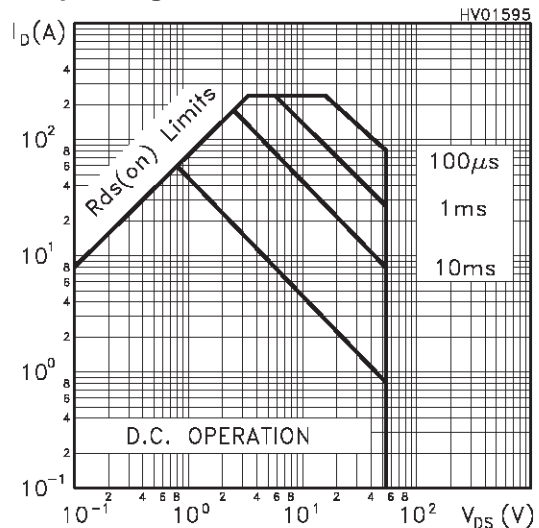
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				80	A
$I_{SDM(1)}$	Source-drain Current (pulsed)				320	A
$V_{SD(2)}$	Forward On Voltage	$I_{SD} = 80A, V_{GS} = 0$			1.5	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 80A, di/dt = 100A/\mu s,$		80		ns
Q_{rr}	Reverse Recovery Charge	$V_{DD} = 20V, T_j = 150^\circ C$		0.24		μC
I_{RRM}	Reverse Recovery Current	(see test circuit, Figure 5)		6		A

Note: 1. Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %.
2. Pulse width limited by safe operating area.

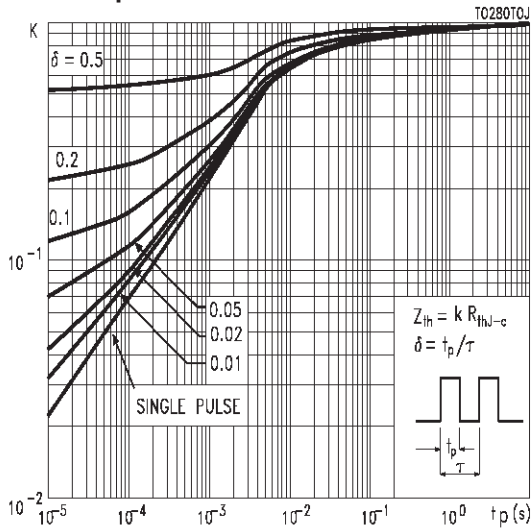
Safe Operating Area for TO-220 / I²PAK



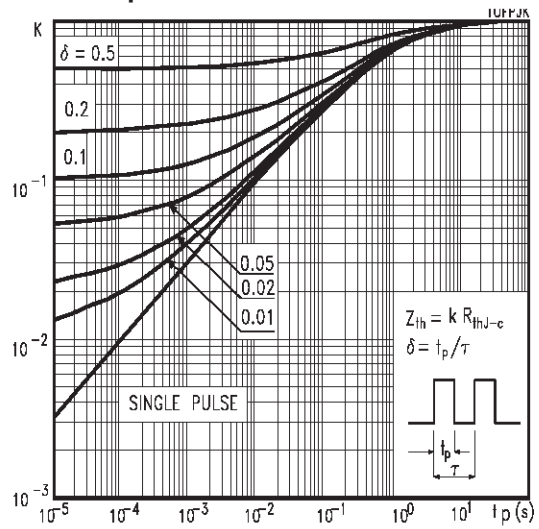
Safe Operating Area for TO-220FP



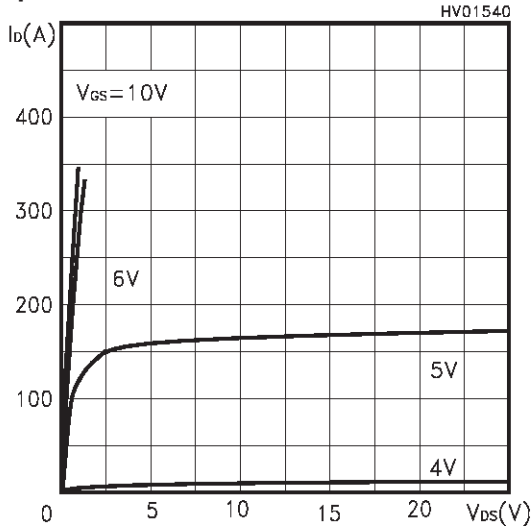
Thermal Impedance For TO-220 / I PAK



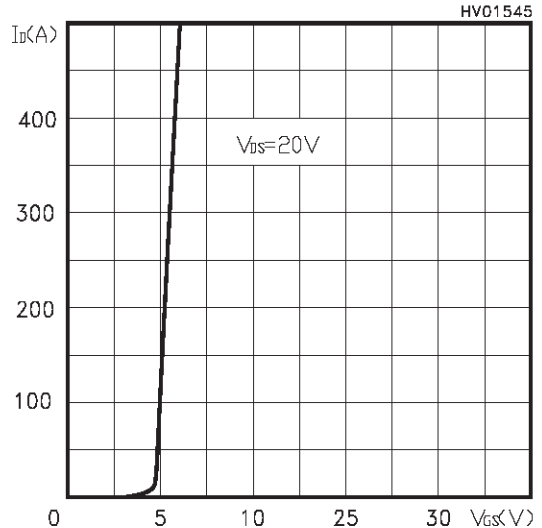
Thermal Impedance For TO-220FP



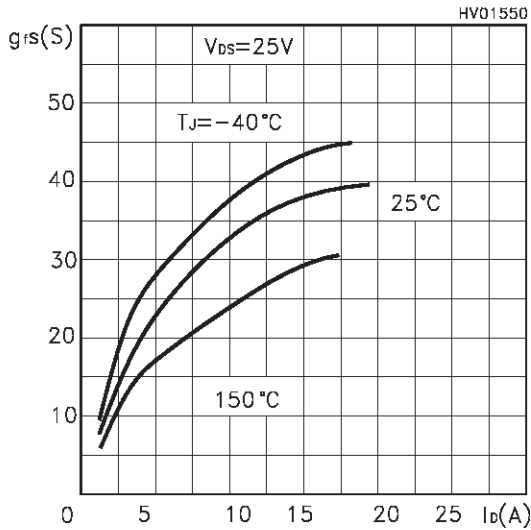
Output Characteristics



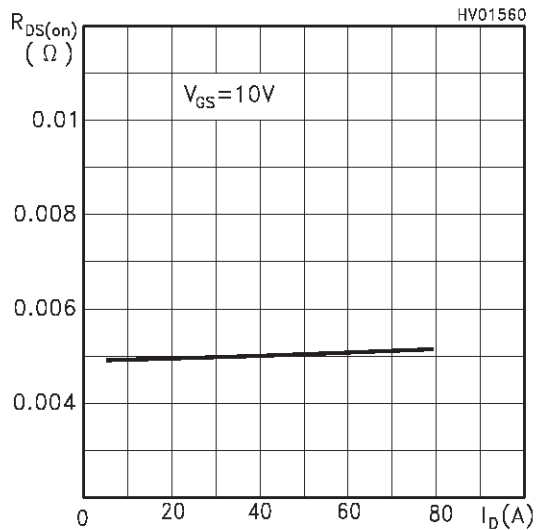
Transfer Characteristics



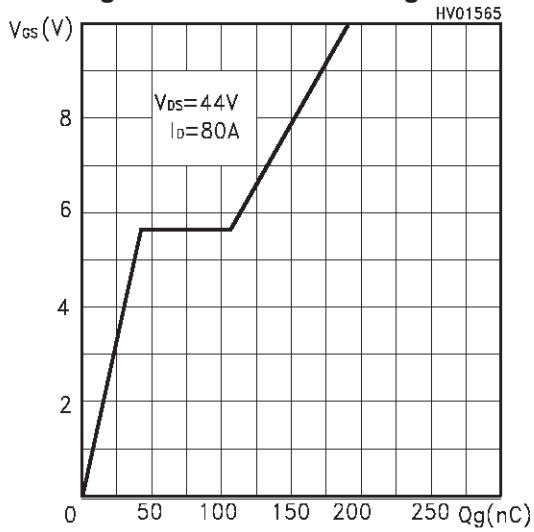
Transconductance



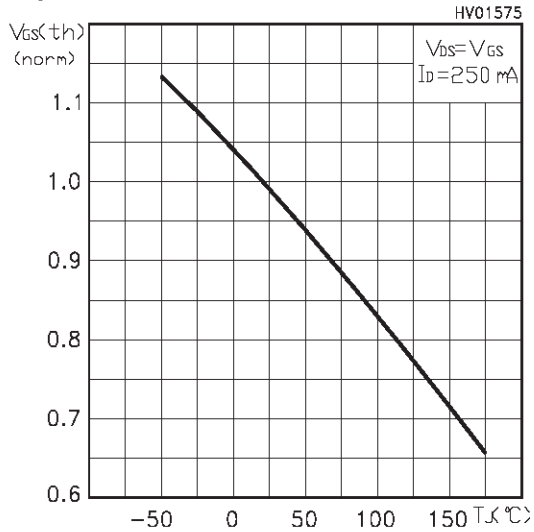
Static Drain-source On Resistance



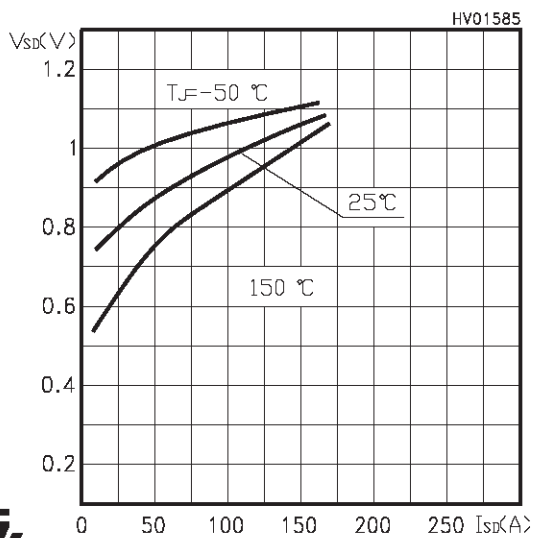
Gate Charge vs Gate-source Voltage



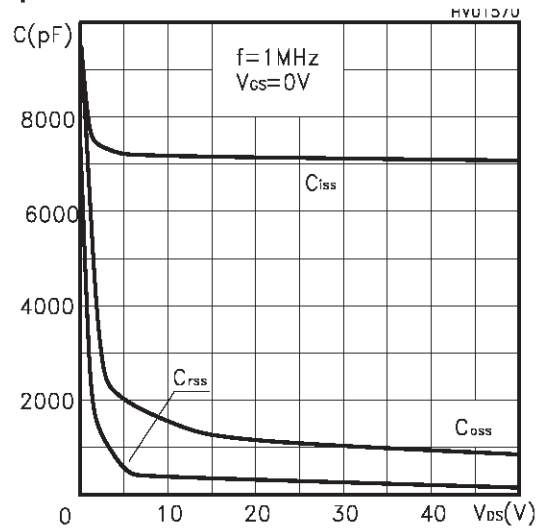
Normalized Gate Threshold Voltage vs Temperature



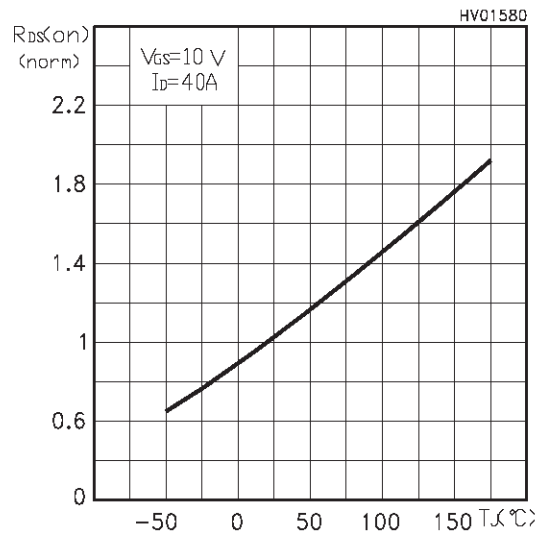
Source-drain Diode Forward Characteristics



Capacitance Variations



Normalized On Resistance vs Temperature



Normalized Drain-source Breakdown vs Temperature

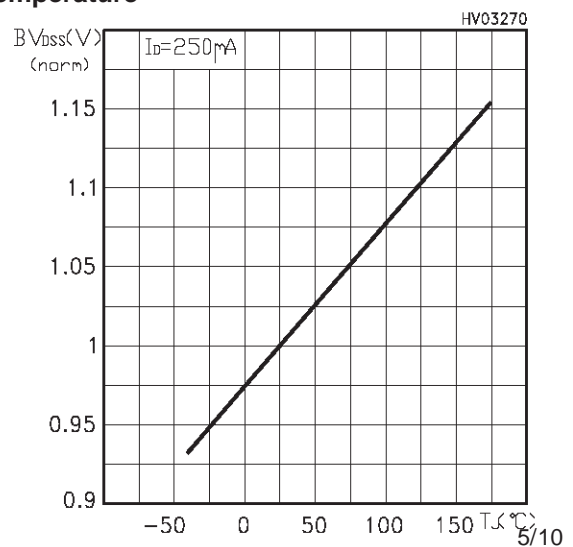


Fig. 1: Unclamped Inductive Load Test Circuit

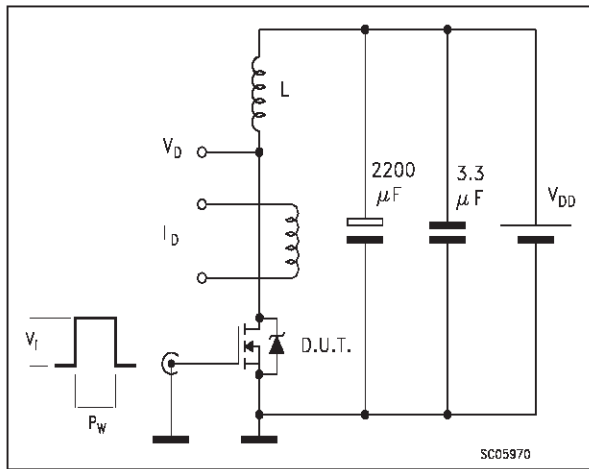


Fig. 2: Unclamped Inductive Waveform

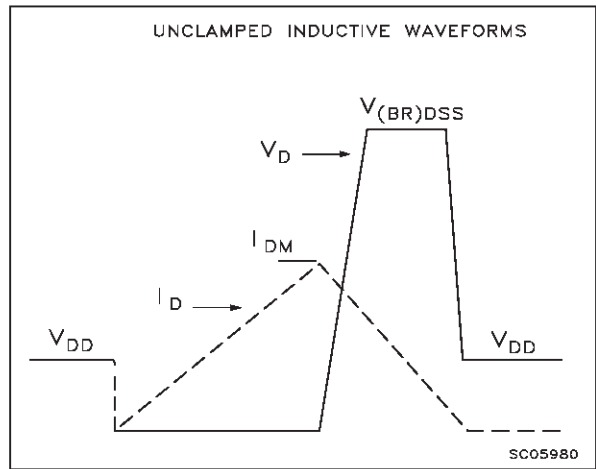


Fig. 3: Switching Times Test Circuit For Resistive Load

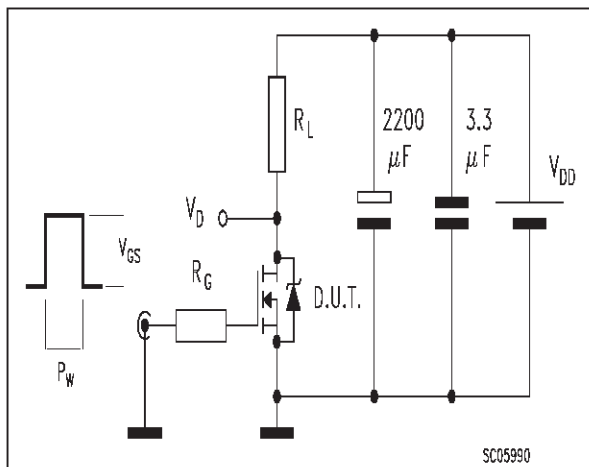


Fig. 4: Gate Charge test Circuit

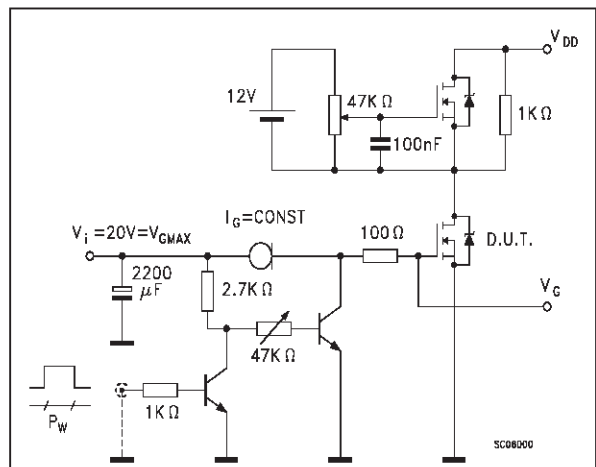
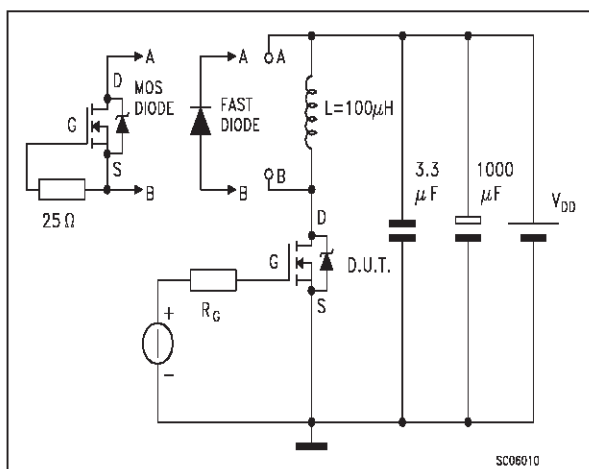
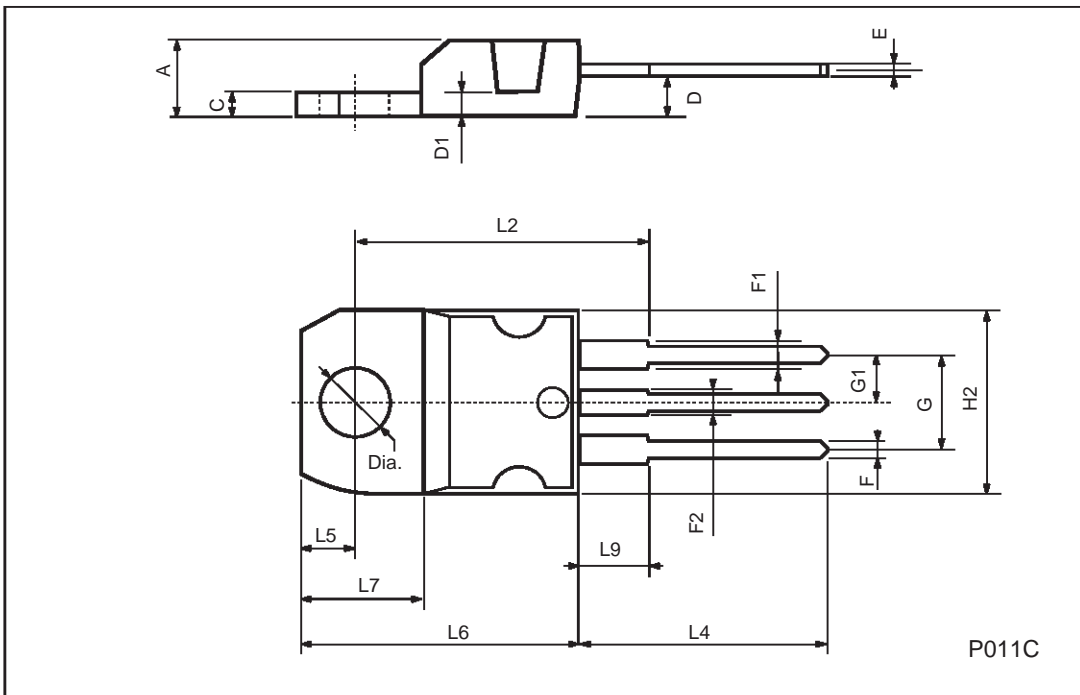


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



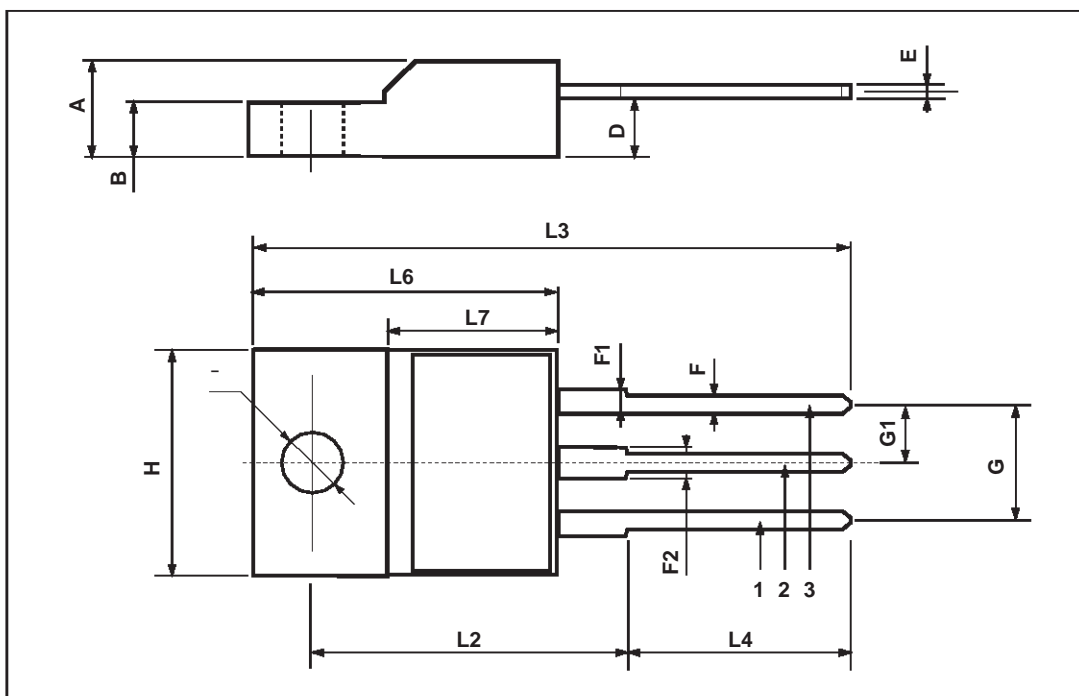
TO-220 MECHANICAL DATA

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



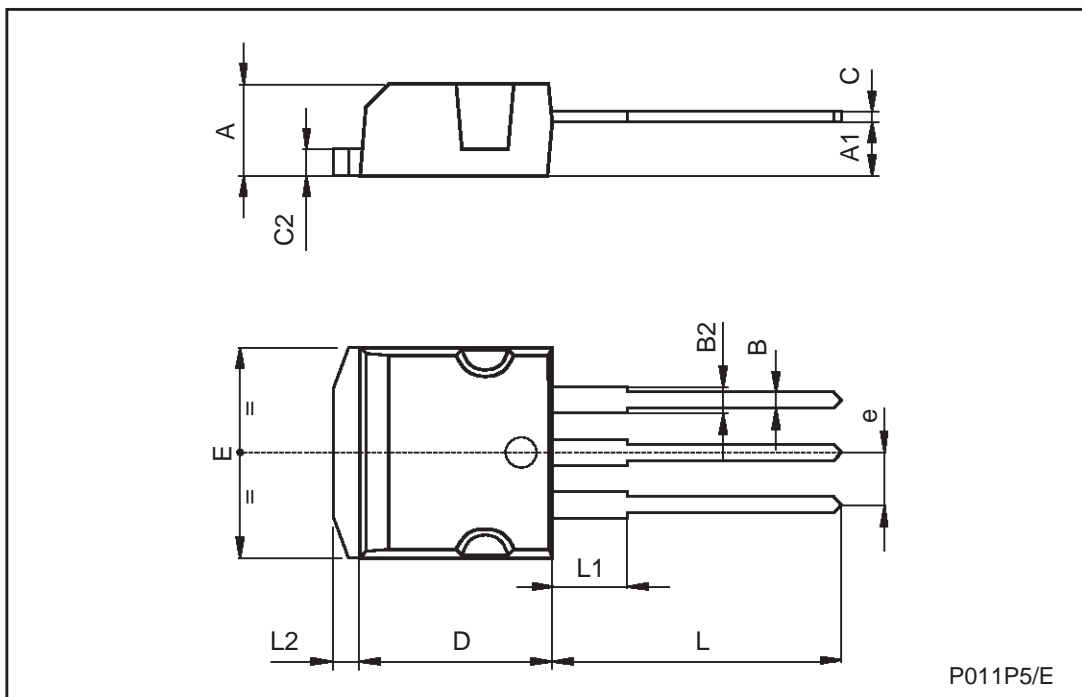
TO-220FP MECHANICAL DATA

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



TO-262 (I²PAK) MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.4		4.6	0.173		0.181
A1	2.49		2.69	0.098		0.106
B	0.7		0.93	0.027		0.036
B2	1.14		1.7	0.044		0.067
C	0.45		0.6	0.017		0.023
C2	1.23		1.36	0.048		0.053
D	8.95		9.35	0.352		0.368
e	2.4		2.7	0.094		0.106
E	10		10.4	0.393		0.409
L	13.1		13.6	0.515		0.531
L1	3.48		3.78	0.137		0.149
L2	1.27		1.4	0.050		0.055



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