



# STP30NS15LFP

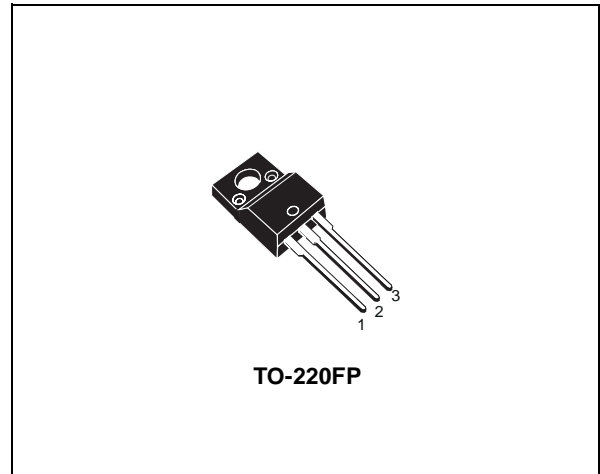
## N-CHANNEL 150V - 0.085 Ω - 10A TO-220FP MESH OVERLAY™ POWER MOSFET

TYPE	V <sub>DSS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>
STP30NS15LFP	150 V	<0.1Ω	10 A

- TYPICAL R<sub>DS(on)</sub> = 0.085Ω
- EXTREMELY HIGH dv/dt CAPABILITY
- 100% AVALANCHE TESTED

### DESCRIPTION

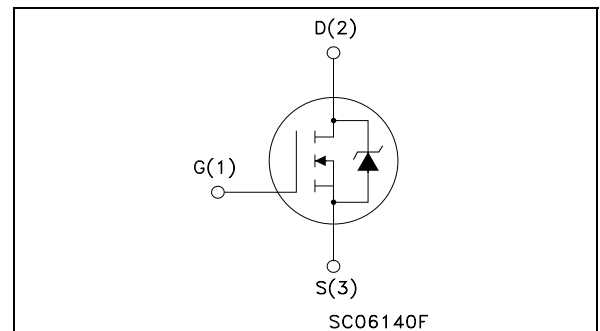
Using the latest high voltage MESH OVERLAY™ process, STMicroelectronics has designed an advanced family of power MOSFETs with outstanding performances. The new patent pending strip layout coupled with the Company's proprietary edge termination structure, gives the lowest R<sub>DS(on)</sub> per area, exceptional avalanche and dv/dt capabilities and unrivalled gate charge and switching characteristics.



### APPLICATIONS

- SWITCHING "S" CAPACITOR

### INTERNAL SCHEMATIC DIAGRAM



### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V <sub>DS</sub>	Drain-source Voltage (V <sub>GS</sub> = 0)	150	V
V <sub>DGR</sub>	Drain-gate Voltage (R <sub>GS</sub> = 20 kΩ)	150	V
V <sub>GS</sub>	Gate- source Voltage	± 15	V
I <sub>D</sub>	Drain Current (continuous) at T <sub>C</sub> = 25°C	10	A
I <sub>D</sub>	Drain Current (continuous) at T <sub>C</sub> = 100°C	7	A
I <sub>DM</sub> (●)	Drain Current (pulsed)	40	A
P <sub>tot</sub>	Total Dissipation at T <sub>C</sub> = 25°C	30	W
	Derating Factor	0.2	W/°C
E <sub>AS</sub> (1)	Single Pulse Avalanche Energy	300	mJ
dv/dt (2)	Peak Diode Recovery voltage slope	2.4	V/ns
T <sub>stg</sub>	Storage Temperature	-55 to 175	°C
T <sub>j</sub>	Operating Junction Temperature		

(●) Pulse width limited by safe operating area.

(1) Starting T<sub>j</sub> = 25 °C, I<sub>D</sub> = 15A, V<sub>DD</sub> = 75V

(2) I<sub>SD</sub> ≤ 35A, di/dt ≤ 300A/μs, V<sub>DD</sub> ≤ V<sub>(BR)DSS</sub>, T<sub>j</sub> ≤ T<sub>JMAX</sub>.

## STP30NS15LFP

### THERMAL DATA

Rthj-case	Thermal Resistance Junction-case	Max	5	°C/W
Rthj-amb	Thermal Resistance Junction-ambient	Max	62.5	°C/W
T <sub>I</sub>	Maximum Lead Temperature For Soldering Purpose	Typ	300	°C

### ELECTRICAL CHARACTERISTICS (T<sub>case</sub> = 25 °C unless otherwise specified)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V <sub>(BR)DSS</sub>	Drain-source Breakdown Voltage	I <sub>D</sub> = 250 μA, V <sub>GS</sub> = 0	150			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current (V <sub>GS</sub> = 0)	V <sub>DS</sub> = Max Rating V <sub>DS</sub> = Max Rating T <sub>C</sub> = 125°C			1 10	μA μA
I <sub>GSS</sub>	Gate-body Leakage Current (V <sub>DS</sub> = 0)	V <sub>GS</sub> = ± 15V			±100	nA

ON (1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> I <sub>D</sub> = 250 μA	1	2	3	V
R <sub>DS(on)</sub>	Static Drain-source On Resistance	V <sub>GS</sub> = 10 V I <sub>D</sub> = 5 A V <sub>GS</sub> = 5 V I <sub>D</sub> = 5 A		0.085 0.1	0.1 0.112	Ω Ω

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g <sub>fs</sub> (*)	Forward Transconductance	V <sub>DS</sub> = 20 V I <sub>D</sub> = 7 A		6		S
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = 25V, f = 1 MHz, V <sub>GS</sub> = 0		1080		pF
C <sub>oss</sub>	Output Capacitance			170		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			105		pF

**ELECTRICAL CHARACTERISTICS** (continued)

**SWITCHING ON**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ $t_r$	Turn-on Delay Time Rise Time	$V_{DD} = 75\text{ V}$ $I_D = 5\text{ A}$ $R_G = 4.7\ \Omega$ $V_{GS} = 4.5\text{ V}$ (Resistive Load, Figure 1)		25 95		ns ns
$Q_g$ $Q_{gs}$ $Q_{gd}$	Total Gate Charge Gate-Source Charge Gate-Drain Charge	$V_{DD}=120\text{V}$ $I_D=10\text{A}$ $V_{GS}=5\text{V}$ (see test circuit, Figure 2)		40 7.5 20	54	nC nC nC

**SWITCHING OFF**

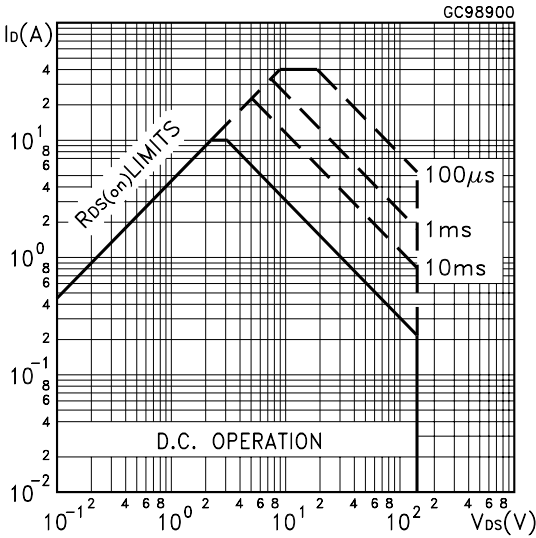
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$ $t_f$	Turn-off Delay Time Fall Time	$V_{DD} = 75\text{ V}$ $I_D = 5\text{ A}$ $R_G = 4.7\ \Omega$ , $V_{GS} = 5\text{ V}$ (Resistive Load, Figure 1)		55 30		ns ns
$t_r(V_{off})$ $t_f$ $t_c$	Off-voltage Rise Time Fall Time Cross-over Time	$V_{clamp} = 120\text{ V}$ $I_D = 10\text{ A}$ $R_G = 4.7\ \Omega$ , $V_{GS} = 4.5\text{ V}$ (Inductive Load, Figure 3)		15 30 50		ns ns ns

**SOURCE DRAIN DIODE**

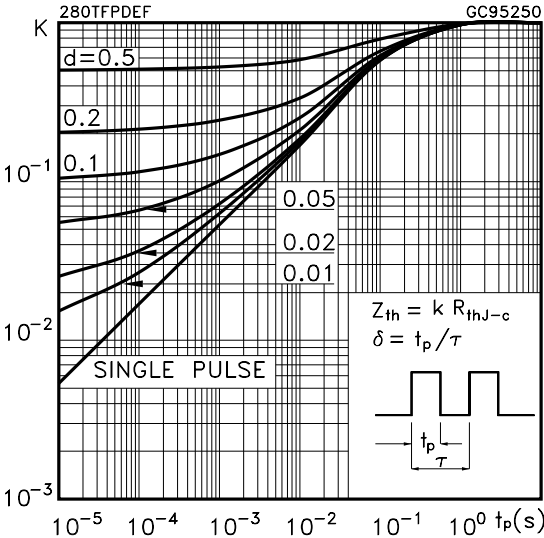
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{SD}$ $I_{SDM}(\bullet)$	Source-drain Current Source-drain Current (pulsed)				10 40	A A
$V_{SD}(\ast)$	Forward On Voltage	$I_{SD} = 10\text{ A}$ $V_{GS} = 0$			1.3	V
$t_{rr}$ $Q_{rr}$ $I_{RRM}$	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	$I_{SD} = 10\text{ A}$ $di/dt = 100\text{A}/\mu\text{s}$ $V_r = 30\text{ V}$ $T_j = 150^\circ\text{C}$ (Inductive Load, Figure 3)		160 950 12		ns nC A

(\*)Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5 %.  
 (•)Pulse width limited by safe operating area.

**Safe Operating Area**

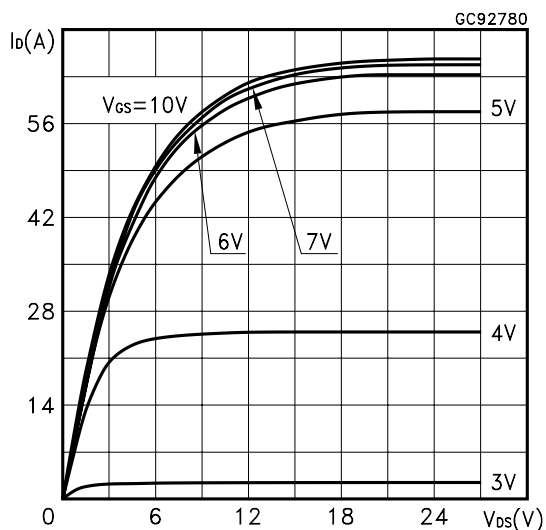


**Thermal Impedance**

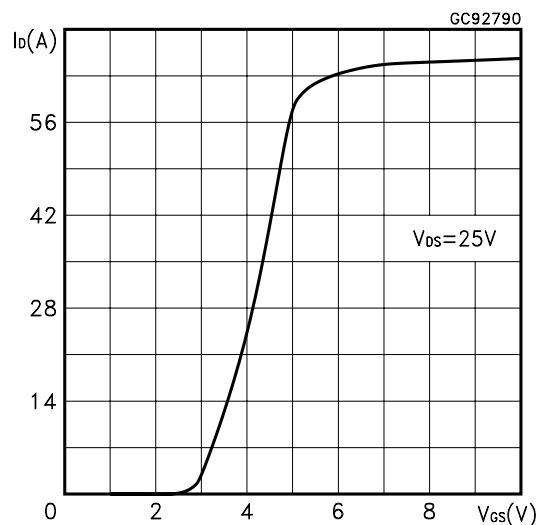


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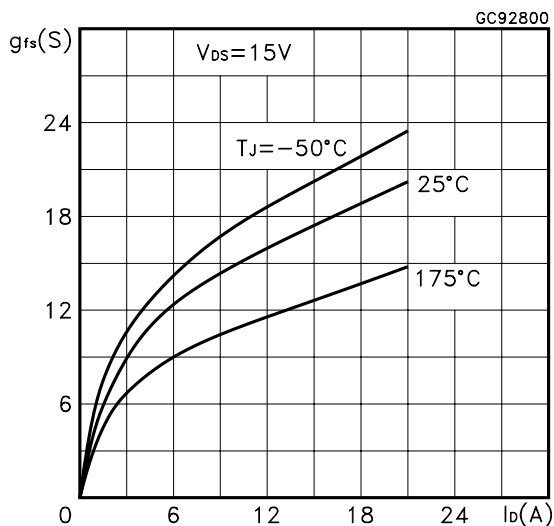
Output Characteristics



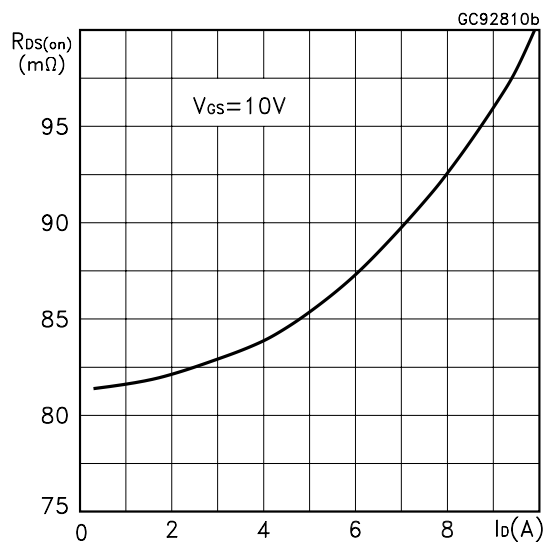
Transfer Characteristics



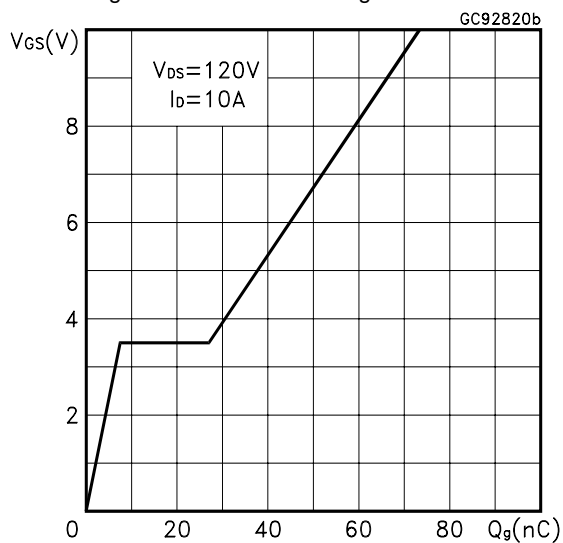
Transconductance



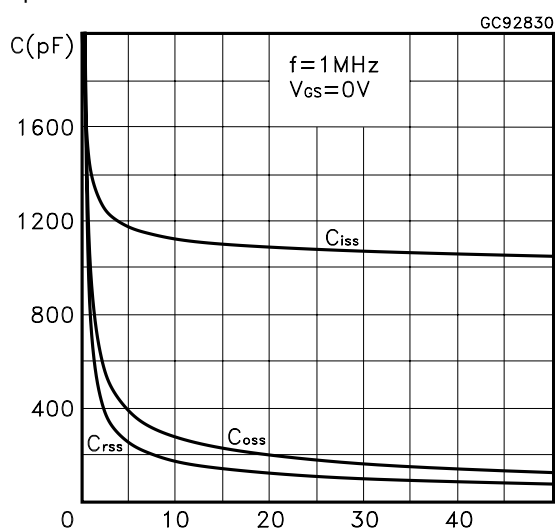
Static Drain-source On Resistance



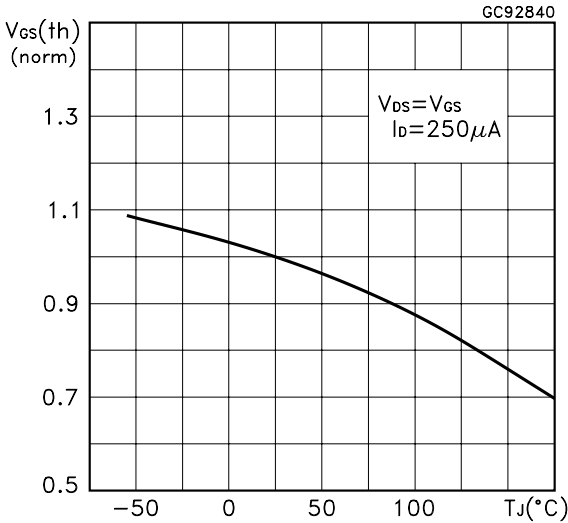
Gate Charge vs Gate-source Voltage



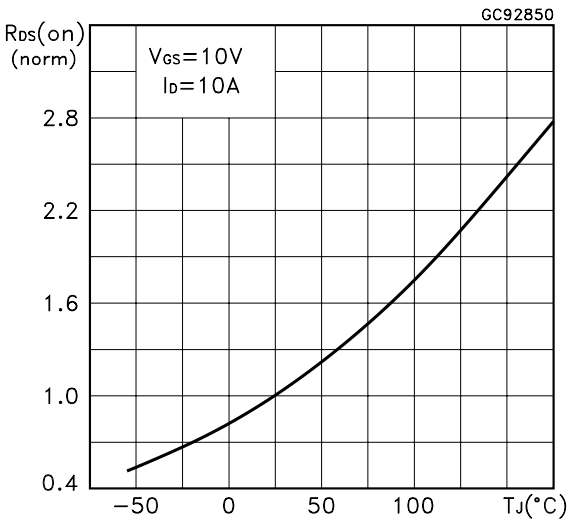
Capacitance Variations



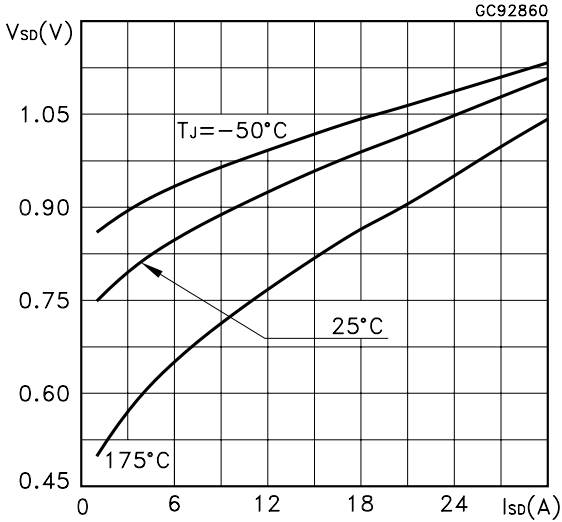
Normalized Gate Threshold Voltage vs Temperature



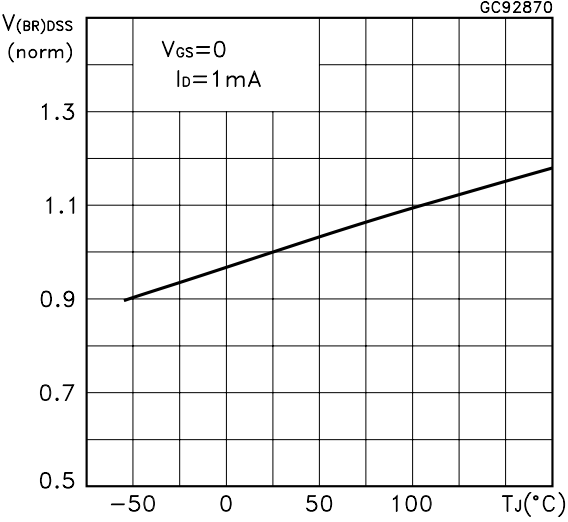
Normalized on Resistance vs Temperature



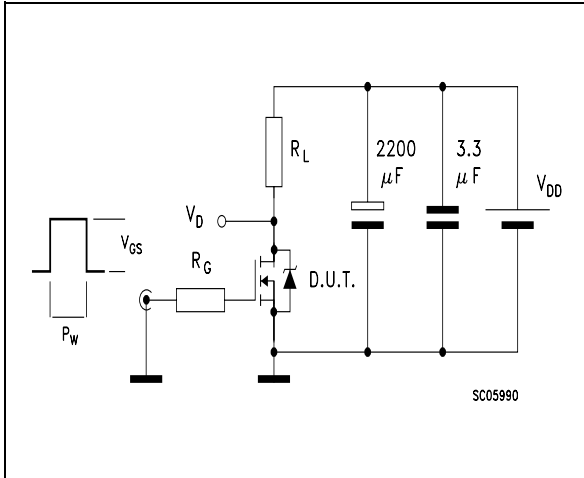
Source-drain Diode Forward Characteristics



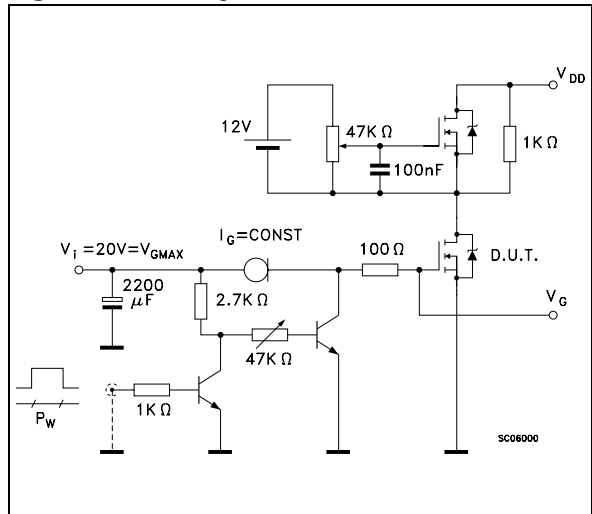
Normalized Breakdown Voltage vs Temperature



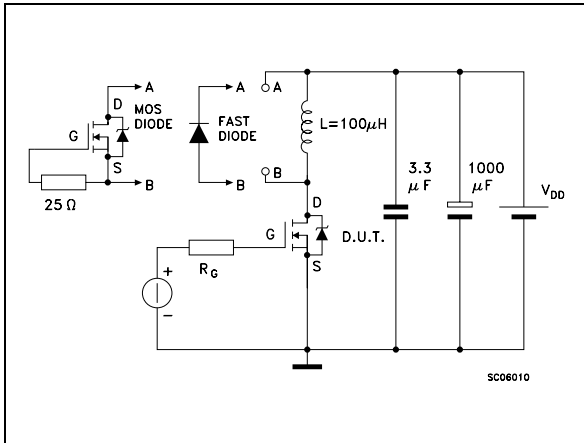
**Fig. 1: Switching Times Test Circuits For Resistive Load**



**Fig. 2: Gate Charge test Circuit**

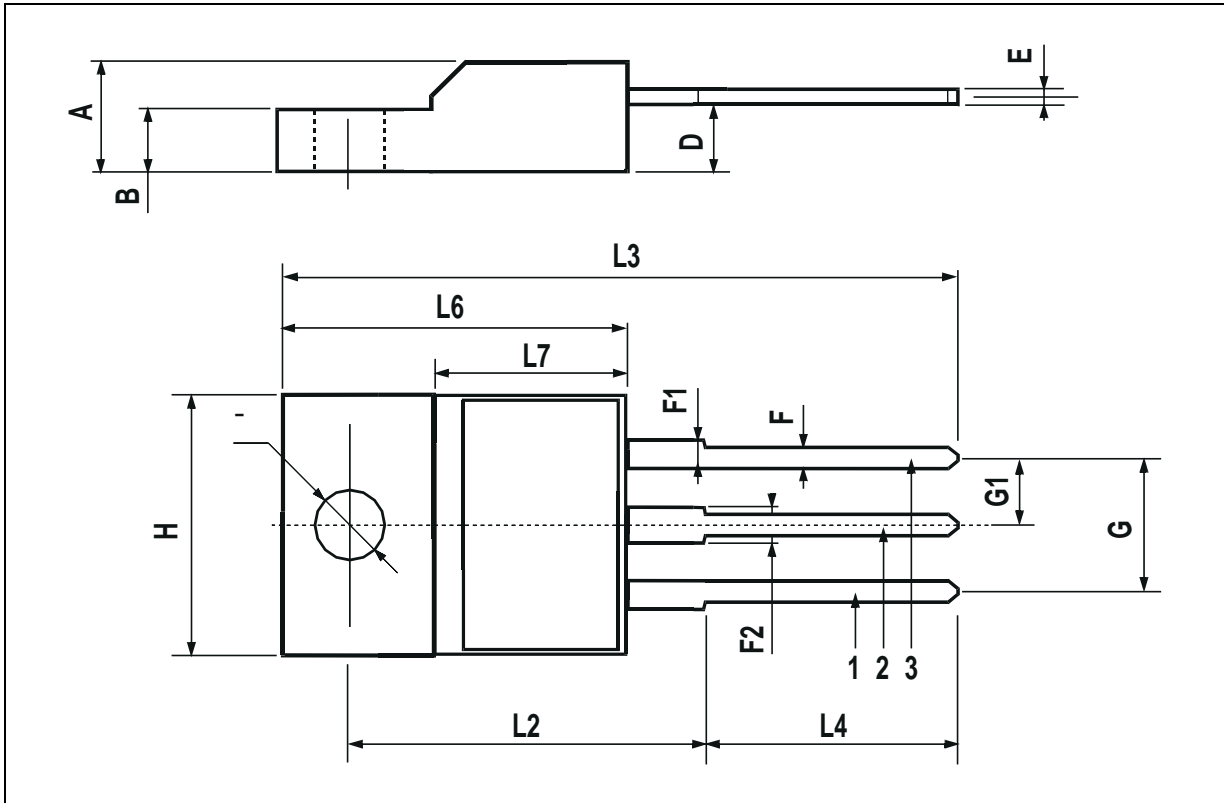


**Fig. 3: Test Circuit For Diode Recovery Behaviour**



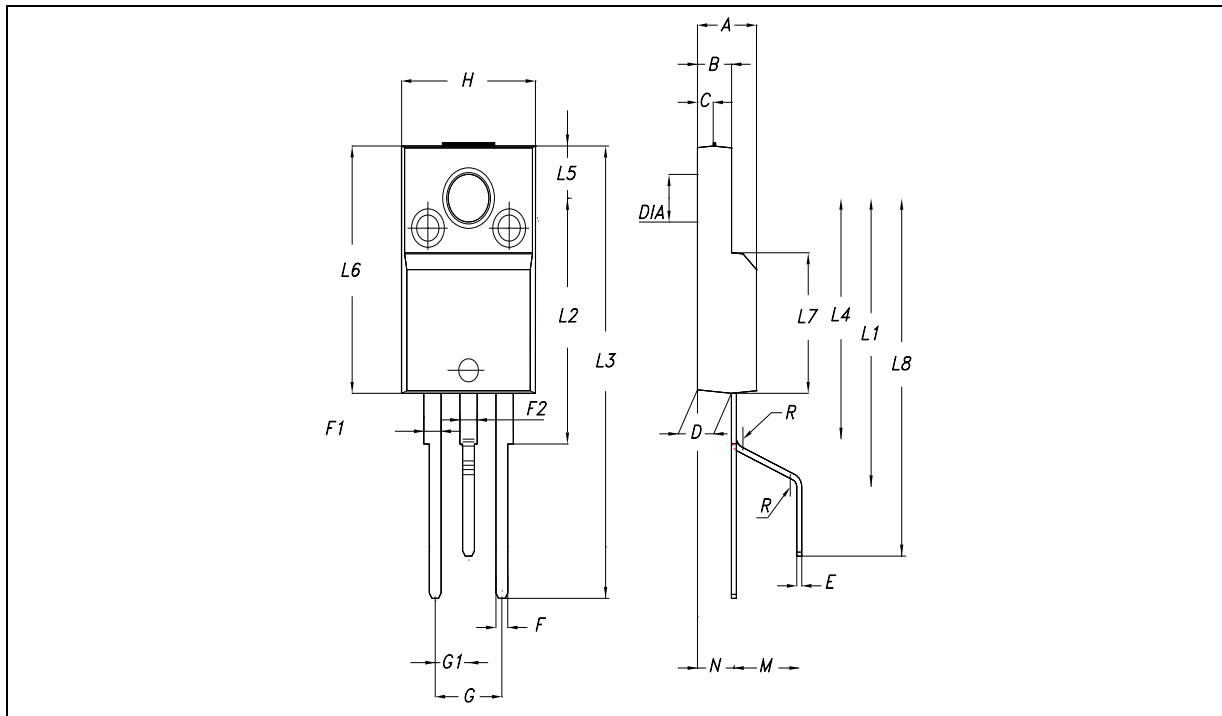
**TO-220FP MECHANICAL DATA**

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-220FP(023Y) 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	0.009		0.106
C	1		1.4	0.039		0.055
D	2.4		2.75	0.094		0.108
E	0.4		0.7	0.015		0.027
F	0.75		1	0.029		0.039
F1	1.15		1.7	0.045		0.066
F2	1.15		1.7	0.045		0.066
G	4.68		5.48	0.184		0.215
G1	2.24		2.84	0.088		0.111
H	10		10.4	0.393		0.409
L1	18.4		19.2	0.724		0.755
L2		16			0.629	
L3	29		30	1.14		1.18
L4	15.3		16.1	0.60		0.63
L5		3.4			0.133	
L6	15.9		16.4	0.625		0.665
L7	9		9.3	0.354		0.366
L8	22.5		23.6	0.885		0.929
M	4.6		5.4	0.181		0.212
N	2.29		3.29	0.090		0.129
Dia	3		3.2			





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