



# IRF630M IRF630MFP

## N-CHANNEL 200V - 0.35Ω - 9A TO-220/TO-220FP MESH OVERLAY™ MOSFET

TYPE	V <sub>DSS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>
IRF630M	200 V	< 0.40 Ω	9 A
IRF630FPM	200 V	< 0.40 Ω	9 A

- TYPICAL R<sub>DS(on)</sub> = 0.35 Ω
- EXTREMELY HIGH dv/dt CAPABILITY
- VERY LOW INTRINSIC CAPACITANCES
- GATE CHARGE MINIMIZED

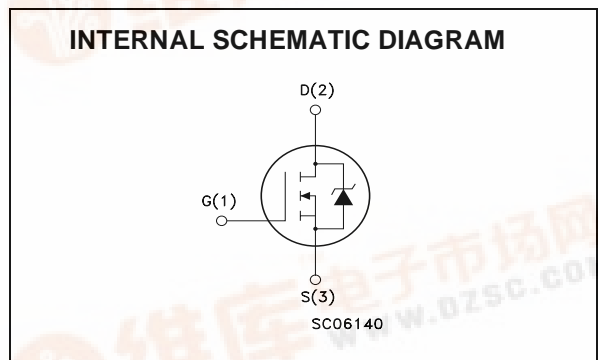
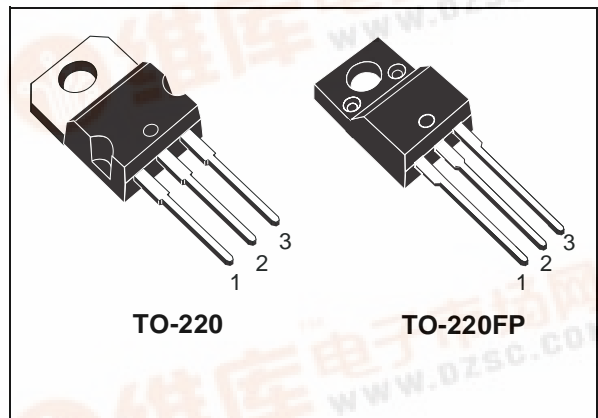
### DESCRIPTION

This power MOSFET is designed using the company's consolidated strip layout-based MESH OVERLAY™ process. This technology matches and improves the performances compared with standard parts from various sources.

Isolated TO-220 option simplifies assembly and cuts risk of accidental short circuit in crowded monitor PCB's.

### APPLICATIONS

- MONITOR DISPLAYS
- GENERAL PURPOSE SWITCH



### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		IRF630M	IRF630MFP	
V <sub>DS</sub>	Drain-source Voltage (V <sub>GS</sub> = 0)	200		V
V <sub>DGR</sub>	Drain-gate Voltage (R <sub>GS</sub> = 20 kΩ)	200		V
V <sub>GS</sub>	Gate- source Voltage	± 20		V
I <sub>D</sub>	Drain Current (continuous) at T <sub>C</sub> = 25°C	9	9 (**)	A
I <sub>D</sub>	Drain Current (continuous) at T <sub>C</sub> = 100°C	5.7	5.7 (**)	A
I <sub>DM</sub> (•)	Drain Current (pulsed)	36	36	A
P <sub>TOT</sub>	Total Dissipation at T <sub>C</sub> = 25°C	75	30	W
	Derating Factor	0.6	0.24	W/°C
dv/dt (1)	Peak Diode Recovery voltage slope	5	5	V/ns
V <sub>ISO</sub>	Insulation Withstand Voltage (DC)	--	2500	V
T <sub>stg</sub>	Storage Temperature	-65 to 150		°C
T <sub>j</sub>	Max. Operating Junction Temperature	150		°C

(•) Pulse width limited by safe operating area

(1) I<sub>SD</sub> ≤ 9A, di/dt ≤ 300A/μs, V<sub>DD</sub> ≤ V<sub>(BR)DSS</sub>, T<sub>j</sub> ≤ T<sub>JMAX</sub>.  
(\*\*) Limited only by Maximum Temperature Allowed

## IRF630M / FP

### THERMAL DATA

		TO-220	TO-220FP	
Rthj-case	Thermal Resistance Junction-case Max	1.67	4.17	°C/W
Rthj-amb	Thermal Resistance Junction-ambient Max	62.5		°C/W
T <sub>I</sub>	Maximum Lead Temperature For Soldering Purpose	300		°C

### ELECTRICAL CHARACTERISTICS (TCASE = 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	200			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 50	μA μA
I <sub>GSS</sub>	Gate-body Leakage Current (V <sub>DS</sub> = 0)	V <sub>GS</sub> = ± 20V			±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> = 250μA	2	3	4	V
R <sub>DS(on)</sub>	Static Drain-source On Resistance	V <sub>GS</sub> = 10V, I <sub>D</sub> = 4.5 A		0.35	0.40	Ω

### DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g <sub>fs</sub> (1)	Forward Transconductance	V <sub>DS</sub> > I <sub>D(on)</sub> × R <sub>DS(on)max</sub> , I <sub>D</sub> = 4.5 A	3	4		S
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = 25V, f = 1 MHz, V <sub>GS</sub> = 0		540	700	pF
C <sub>oss</sub>	Output Capacitance			90	120	pF
C <sub>rss</sub>	Reverse Transfer Capacitance			35	50	pF

**ELECTRICAL CHARACTERISTICS (CONTINUED)**

**SWITCHING ON**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = 100\text{ V}, I_D = 4.5\text{ A}$ $R_G = 4.7\Omega, V_{GS} = 10\text{ V}$ (see test circuit, Figure 3)		10	14	ns
$t_r$	Rise Time			15	20	ns
$Q_g$	Total Gate Charge	$V_{DD} = 160\text{ V}, I_D = 9\text{ A},$ $V_{GS} = 10\text{ V}$		31	45	nC
$Q_{gs}$	Gate-Source Charge			7.5		nC
$Q_{gd}$	Gate-Drain Charge			9		nC

**SWITCHING OFF**

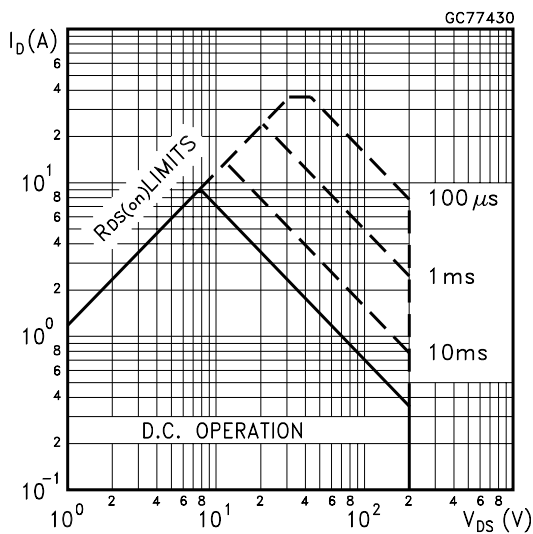
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{r(Voff)}$	Off-voltage Rise Time	$V_{DD} = 160\text{ V}, I_D = 9\text{ A},$ $R_G = 4.7\Omega, V_{GS} = 10\text{ V}$ (see test circuit, Figure 5)		12	17	ns
$t_f$	Fall Time			12	17	ns
$t_c$	Cross-over Time			25	35	ns

**SOURCE DRAIN DIODE**

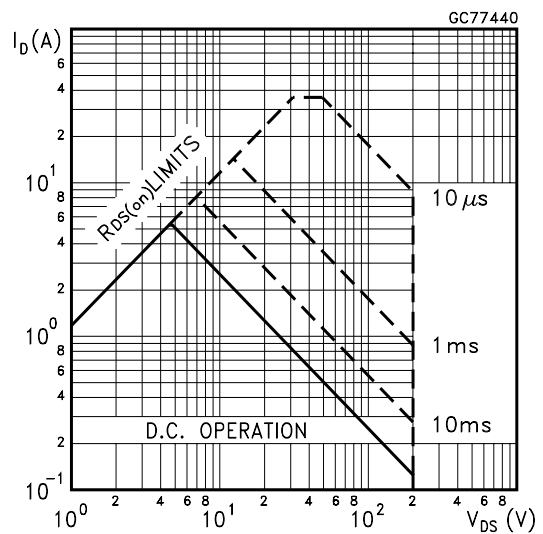
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{SD}$	Source-drain Current				9	A
$I_{SDM(2)}$	Source-drain Current (pulsed)				36	A
$V_{SD(1)}$	Forward On Voltage	$I_{SD} = 9\text{ A}, V_{GS} = 0$			1.5	V
$t_{rr}$	Reverse Recovery Time	$I_{SD} = 9\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 50\text{ V}, T_j = 150^\circ\text{C}$ (see test circuit, Figure 5)		170		ns
$Q_{rr}$	Reverse Recovery Charge			0.95		$\mu\text{C}$
$I_{RRM}$	Reverse Recovery Current			11		A

Note: 1. Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5 %.  
2. Pulse width limited by safe operating area.

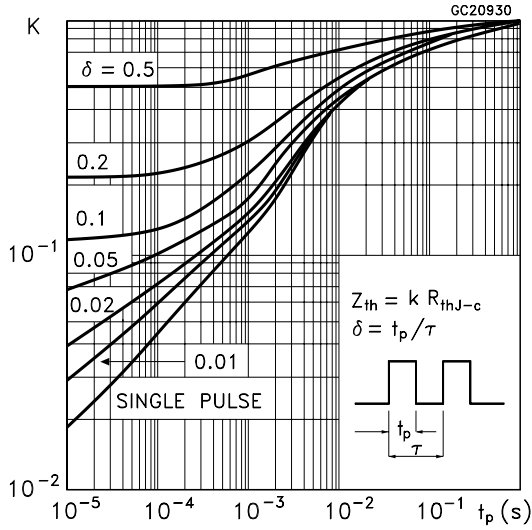
**Safe Operating Area for TO-220**



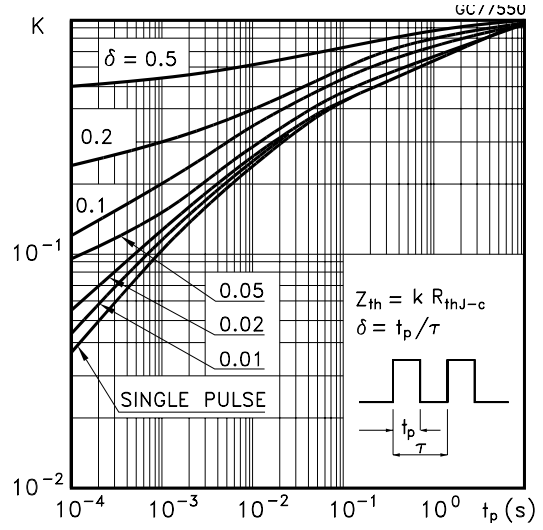
**Safe Operating Area for TO-220FP**



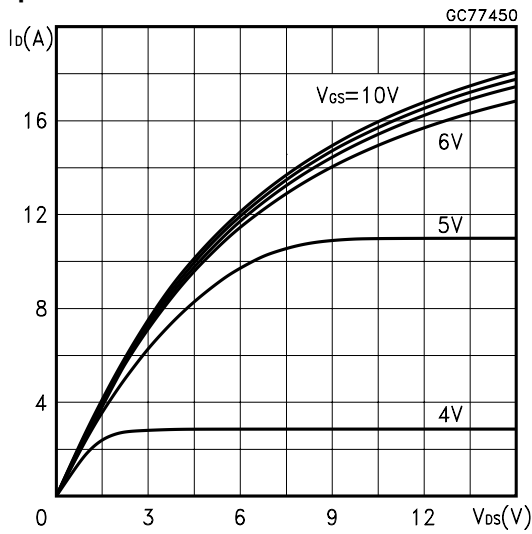
**Thermal Impedance for TO-220**



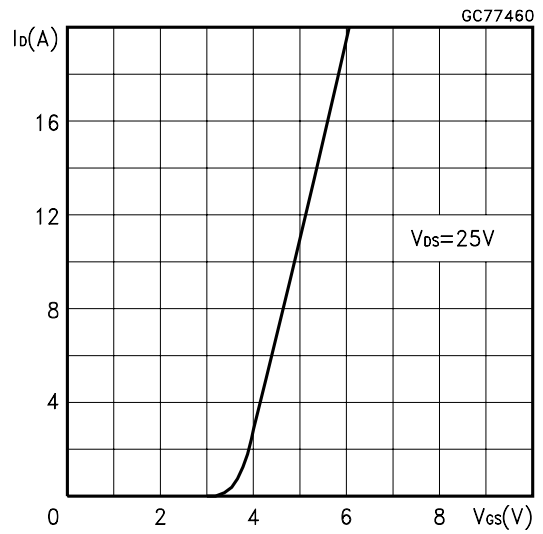
**Thermal Impedance for TO-220FP**



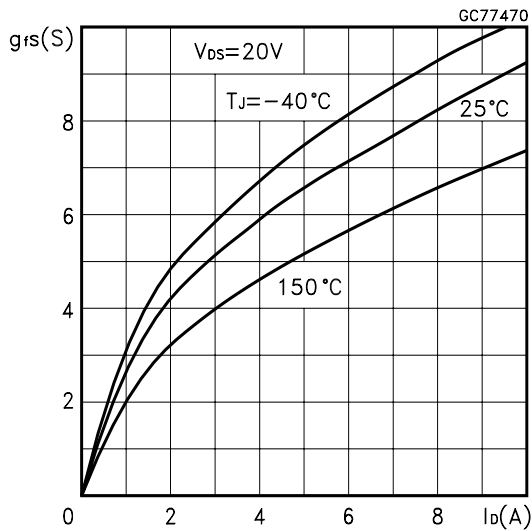
**Output Characteristics**



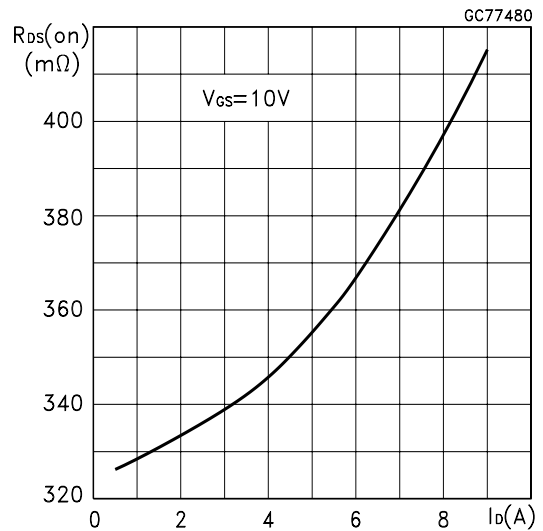
**Transfer Characteristics**



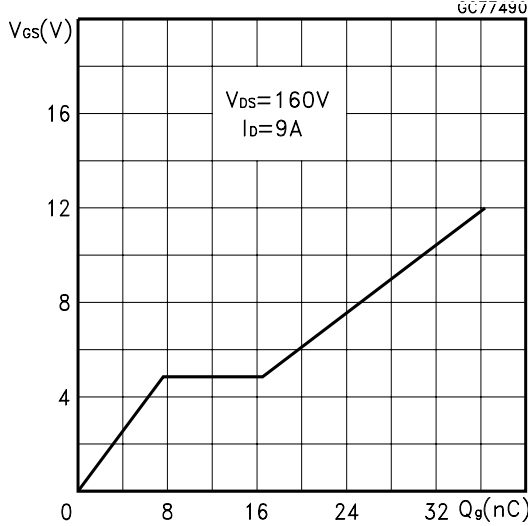
**Transconductance**



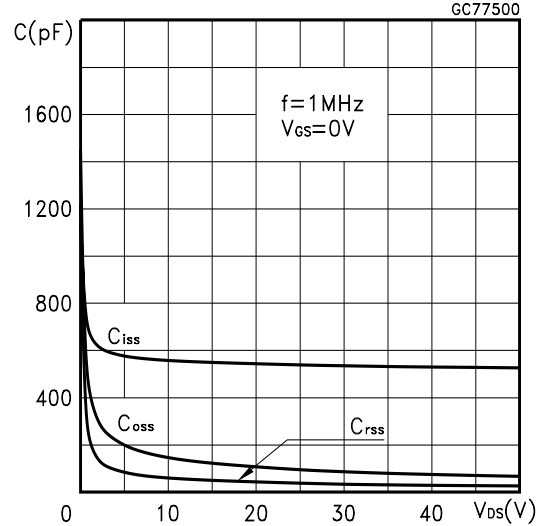
**Static Drain-source On Resistance**



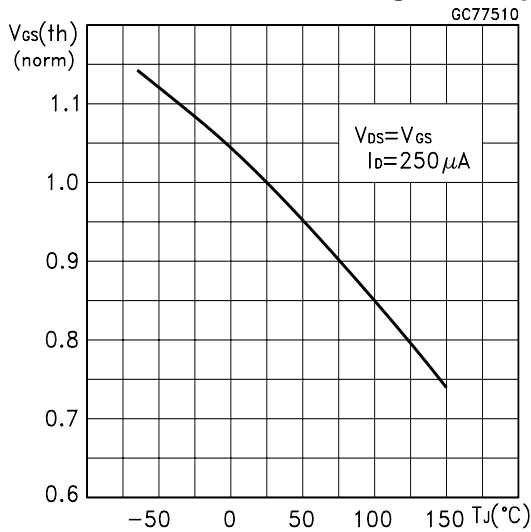
**Gate Charge vs Gate-source Voltage**



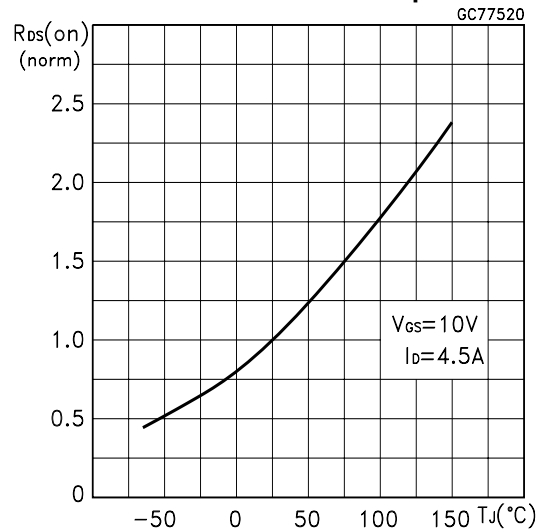
**Capacitance Variations**



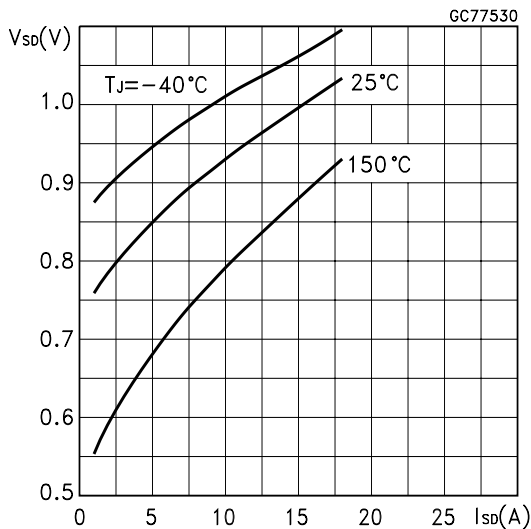
**Normalized Gate Threshold Voltage vs Temp.**



**Normalized On Resistance vs Temperature**

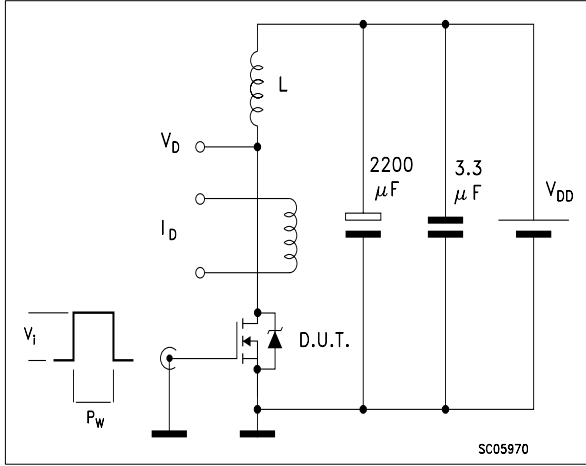


**Source-drain Diode Forward Characteristics**

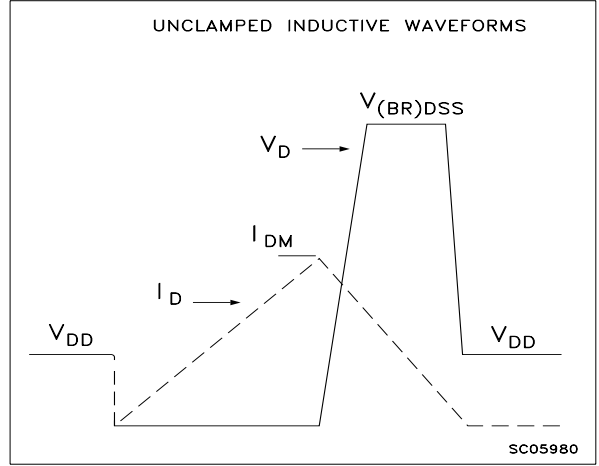


# IRF630M / FP

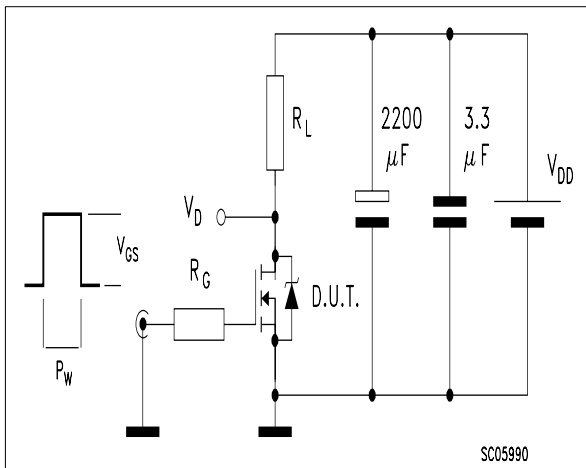
**Fig. 1: Unclamped Inductive Load Test Circuit**



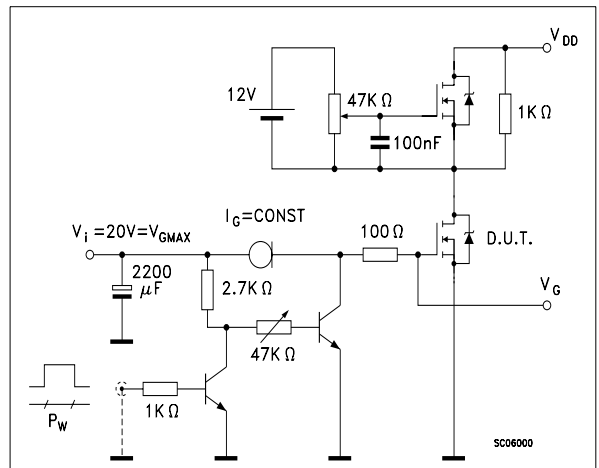
**Fig. 2: Unclamped Inductive Waveform**



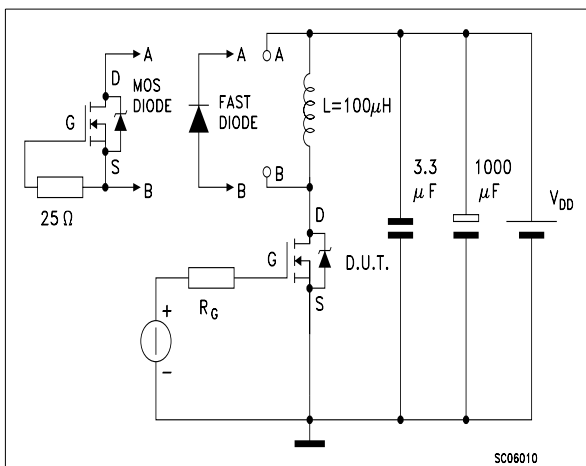
**Fig. 3: Switching Times Test Circuit For Resistive Load**



**Fig. 4: Gate Charge test Circuit**

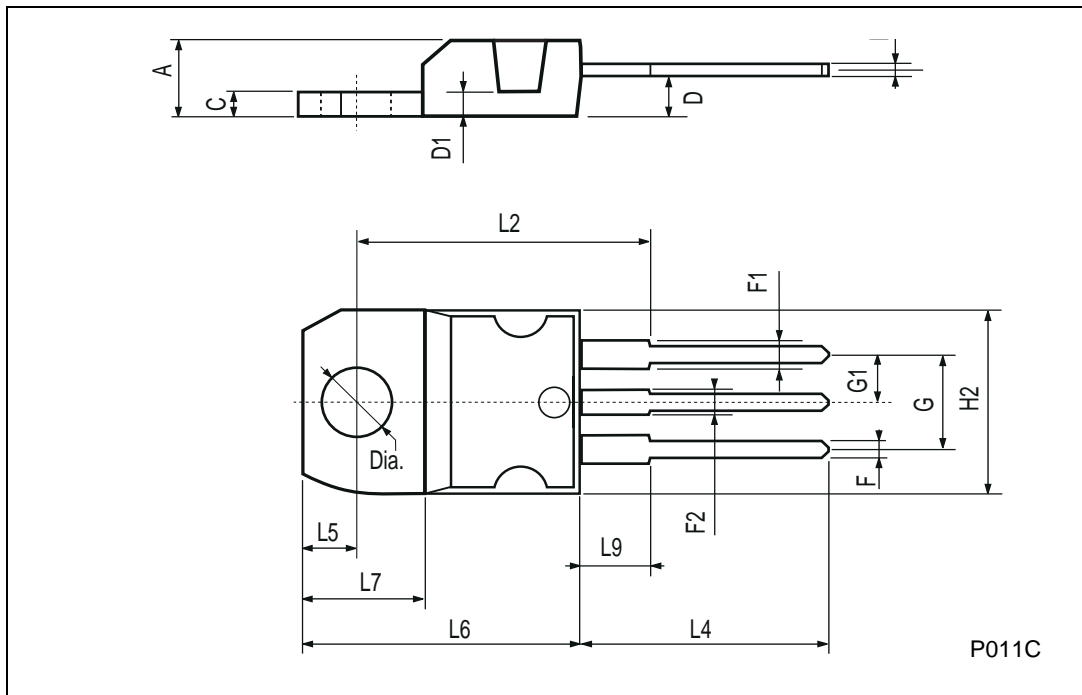


**Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times**



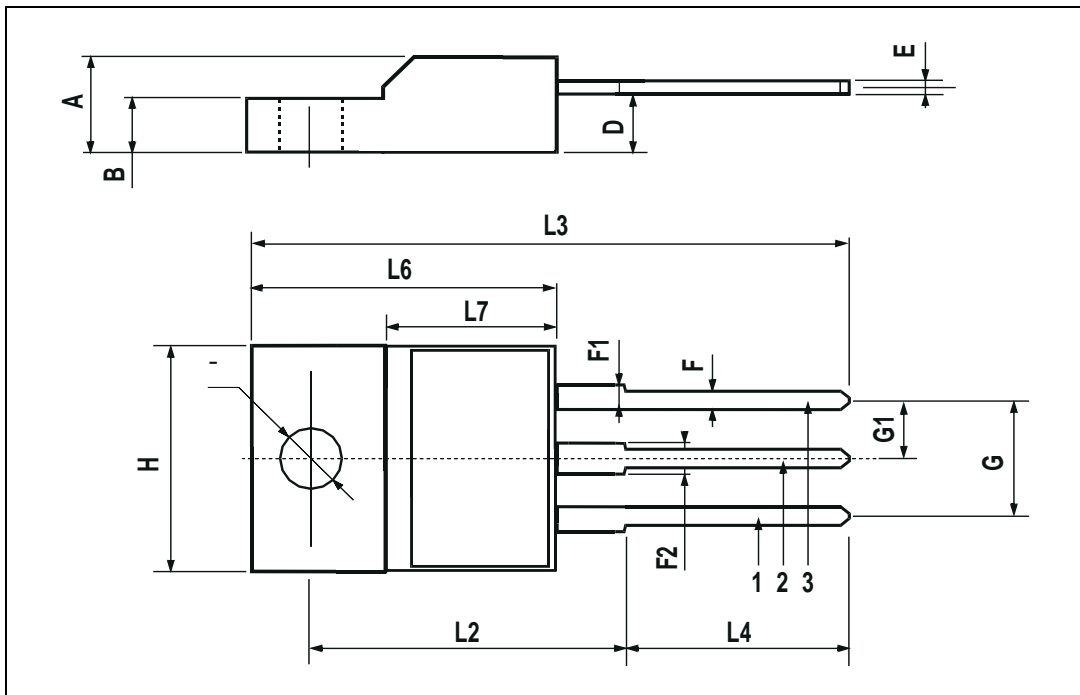
**TO-220 MECHANICAL DATA**

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
∅	3		3.2	0.118		0.126





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