



## STP100NF03L-03

N-CHANNEL 30V - 0.0026 Ω - 100A TO-220

STripFET™ II POWER MOSFET

TYPE	V <sub>DSS</sub>	R <sub>D(on)</sub>	I <sub>D</sub>
STP100NF03L-03	30 V	<0.0032 Ω	100 A

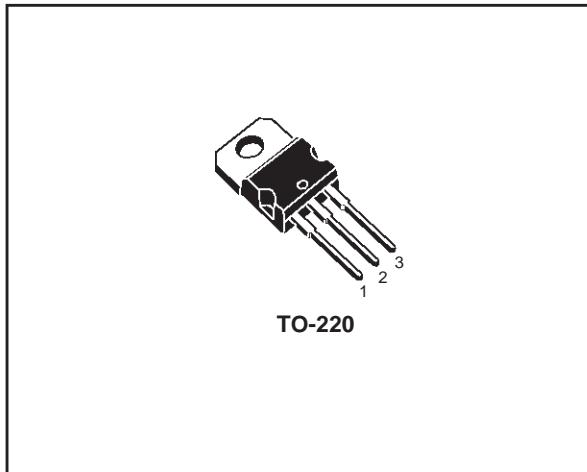
- TYPICAL R<sub>D(on)</sub> = 0.0026 Ω
- LOW THRESHOLD DRIVE
- 100% AVALANCHE TESTED
- LOGIC LEVEL DEVICE

### DESCRIPTION

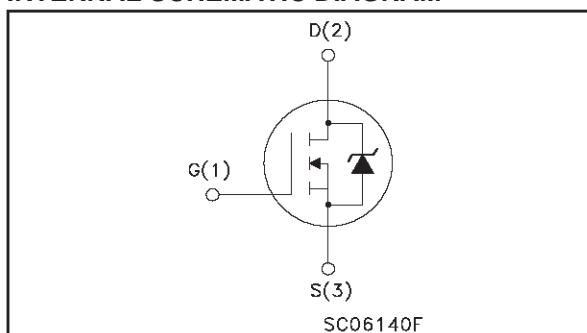
This Power MOSFET is the latest development of STMicroelectronics unique "Single Feature Size™" strip-based process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing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

### APPLICATIONS

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



### INTERNAL SCHEMATIC DIAGRAM



### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V <sub>DS</sub>	Drain-source Voltage (V <sub>GS</sub> = 0)	30	V
V <sub>DGR</sub>	Drain-gate Voltage (R <sub>GS</sub> = 20 kΩ)	30	V
V <sub>GS</sub>	Gate- source Voltage	± 16	V
I <sub>D(1)</sub>	Drain Current (continuos) at T <sub>C</sub> = 25°C	100	A
I <sub>D(1)</sub>	Drain Current (continuos) at T <sub>C</sub> = 100°C	100	A
I <sub>DM(•)</sub>	Drain Current (pulsed)	400	A
P <sub>tot</sub>	Total Dissipation at T <sub>C</sub> = 25°C	300	W
	Derating Factor	2	W/°C
EAS(2)	Single Pulse Avalanche Energy	1.4	J
T <sub>stg</sub>	Storage Temperature	-60 to 175	°C
T <sub>j</sub>	Max. Operating Junction Temperature	175	°C

(•) Pulse width limited by safe operating area

(2) Starting T<sub>j</sub> = 25 °C, I<sub>AR</sub> = 50A, V<sub>DD</sub> = 50V

(1) Current Limited by Package

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### THERMAL DATA

Rthj-case Rthj-amb T <sub>I</sub>	Thermal Resistance Junction-case Thermal Resistance Junction-ambient Maximum Lead Temperature For Soldering Purpose	Max Max	0.5 62.5 300	°C/W °C/W °C
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### ELECTRICAL CHARACTERISTICS ( $T_{case} = 25 \text{ }^{\circ}\text{C}$ unless otherwise specified)

#### OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V(BR)DSS	Drain-source Breakdown Voltage	I <sub>D</sub> = 250 $\mu\text{A}$ , V <sub>GS</sub> = 0	30			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	$\mu\text{A}$ $\mu\text{A}$
I <sub>GSS</sub>	Gate-body Leakage Current (V <sub>DS</sub> = 0)	V <sub>GS</sub> = $\pm$ 16 V			$\pm$ 100	nA

#### ON (\*)

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 $\mu\text{A}$	1	1.7	2.5	V
R <sub>D(on)</sub>	Static Drain-source On Resistance	V <sub>GS</sub> = 10 V I <sub>D</sub> = 50 A V <sub>GS</sub> = 4.5 V I <sub>D</sub> = 50 A		0.0026 0.0032	0.0032 0.0045	$\Omega$ $\Omega$

#### DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g <sub>fs</sub> (*)	Forward Transconductance	V <sub>DS</sub> >I <sub>D(on)</sub> xR <sub>D(on)max</sub> I <sub>D</sub> =10 A	10			S
C <sub>iss</sub> C <sub>oss</sub> C <sub>rss</sub>	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V <sub>DS</sub> = 25V f = 1 MHz V <sub>GS</sub> = 0		6200 1720 300		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	$V_{DD} = 15 \text{ V}$ $I_D = 50 \text{ A}$ $R_G = 4.7 \Omega$ $V_{GS} = 4.5 \text{ V}$ (Resistive Load, Figure 3)		35 315		ns ns
$Q_g$ $Q_{gs}$ $Q_{gd}$	Total Gate Charge Gate-Source Charge Gate-Drain Charge	$V_{DD} = 24 \text{ V}$ $I_D = 100 \text{ A}$ $V_{GS} = 5 \text{ V}$		88 22.5 36		nC nC nC

**SWITCHING OFF**

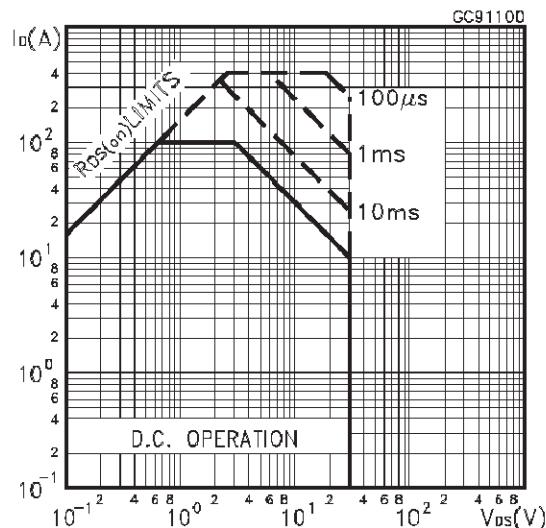
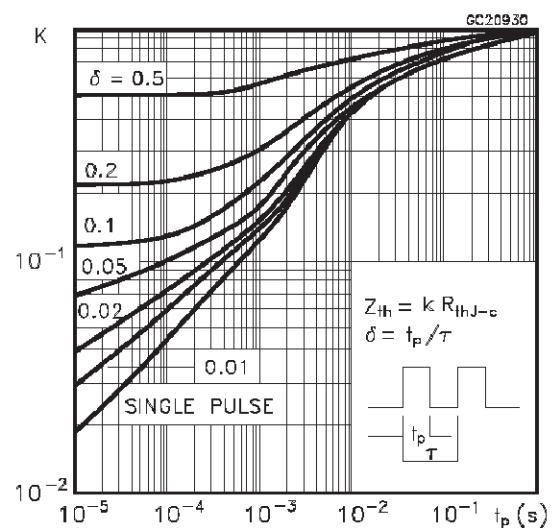
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$ $t_f$	Turn-off Delay Time Fall Time	$V_{DD} = 20 \text{ V}$ $I_D = 50 \text{ A}$ $R_G = 4.7 \Omega$ , $V_{GS} = 4.5 \text{ V}$ (Resistive Load, Figure 3)		115 95		ns ns
$t_{f(Voff)}$ $t_f$ $t_c$	Off-Voltage Rise Time Fall Time Cross-over Time	$V_{clamp} = 24 \text{ V}$ $I_D = 100 \text{ A}$ $R_G = 4.7 \Omega$ $V_{GS} = 4.5 \text{ V}$ (Inductive Load, Figure 5)		110 55 100		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)				100 400	A A
$V_{SD} (*)$	Forward On Voltage	$I_{SD} = 100 \text{ A}$ $V_{GS} = 0$			1.3	V
$t_{rr}$ $Q_{rr}$ $I_{RRM}$	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	$I_{SD} = 100 \text{ A}$ $di/dt = 100 \text{ A}/\mu\text{s}$ $V_{DD} = 20 \text{ V}$ $T_j = 150^\circ\text{C}$ (see test circuit, Figure 5)		75 150 4		ns nC A

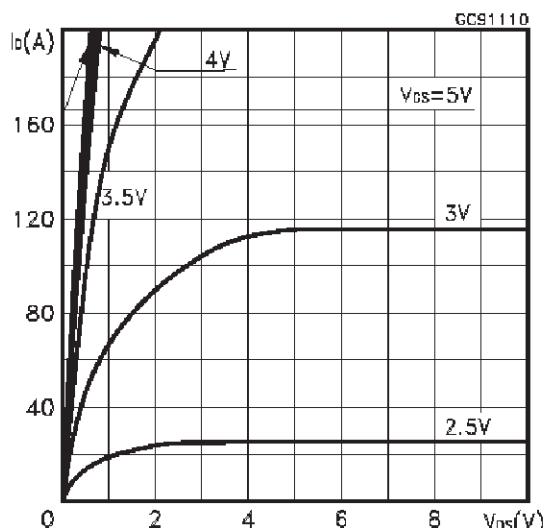
(\*)Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5 %.

(\bullet)Pulse width limited by safe operating area.

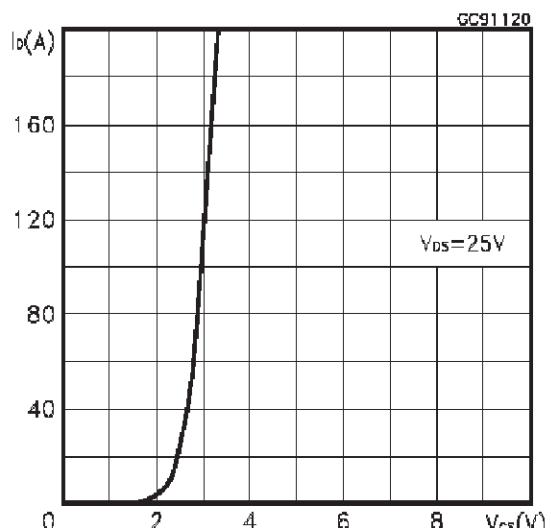
**Safe Operating Area****Thermal Impedance**

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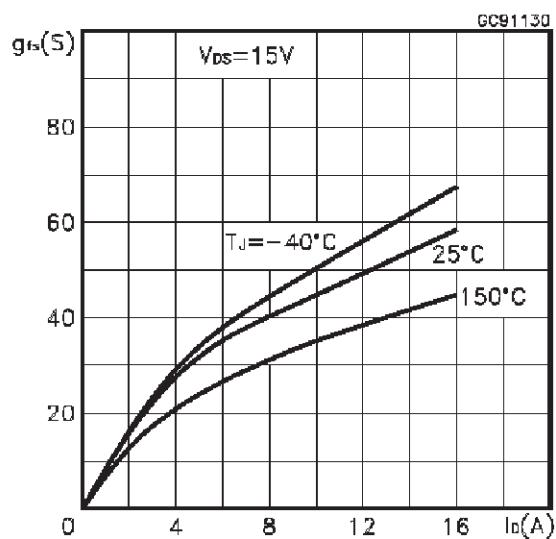
Output Characteristics



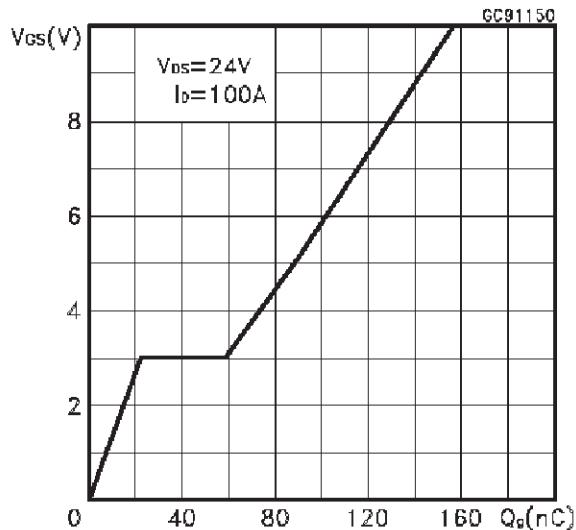
Transfer Characteristics



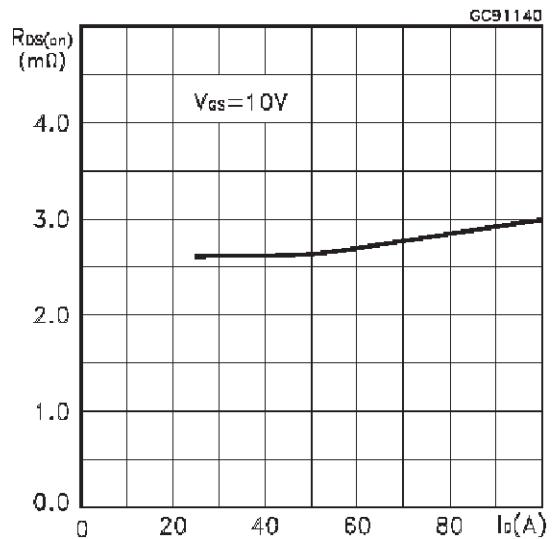
Transconductance



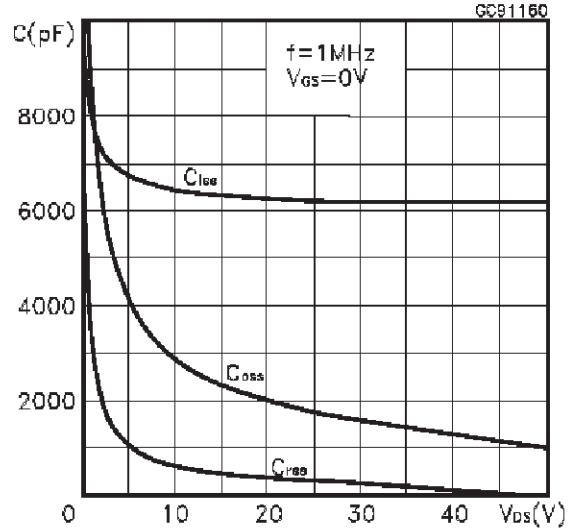
Gate Charge vs Gate-source Voltage



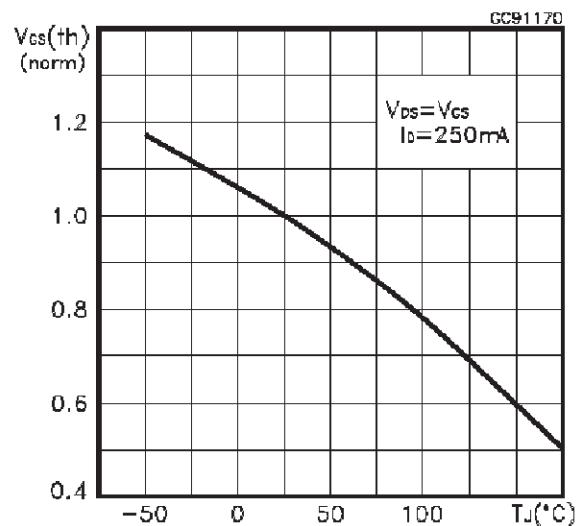
Static Drain-source On Resistance



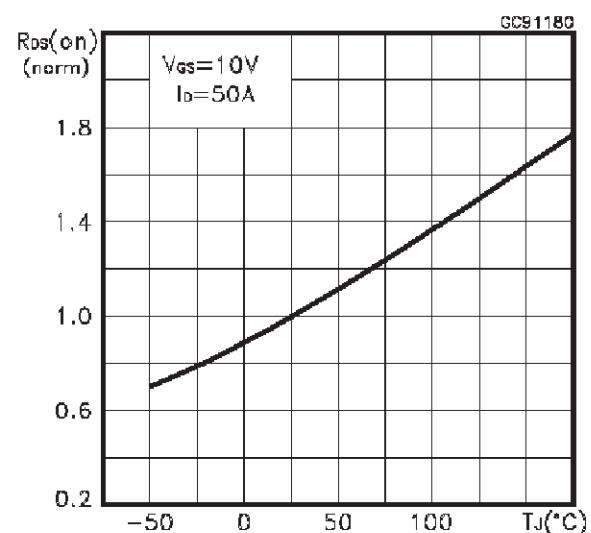
Capacitance Variations



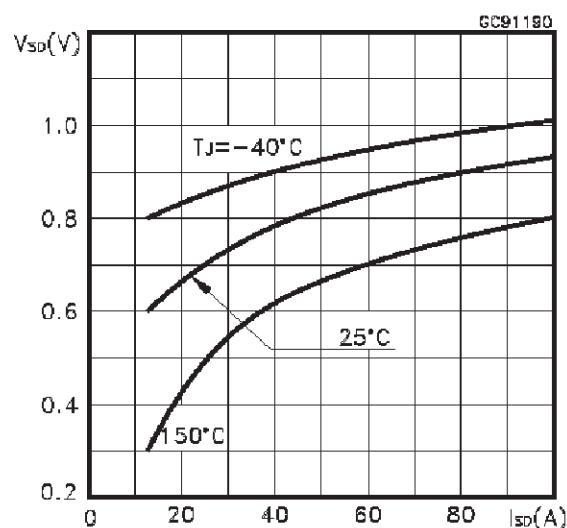
Normalized Gate Threshold Voltage vs Temperature



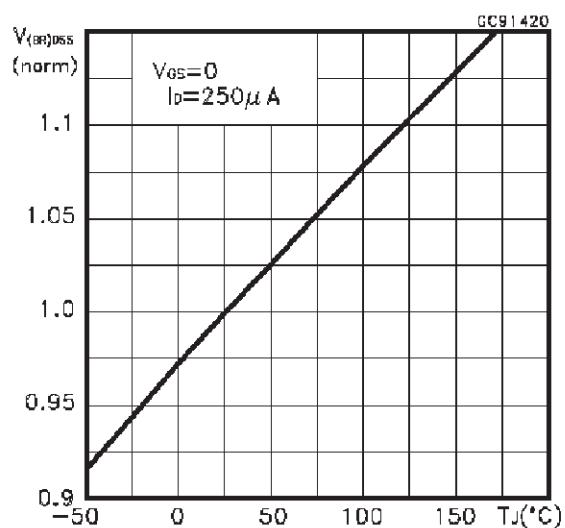
Normalized on Resistance vs Temperature



Source-drain Diode Forward Characteristics

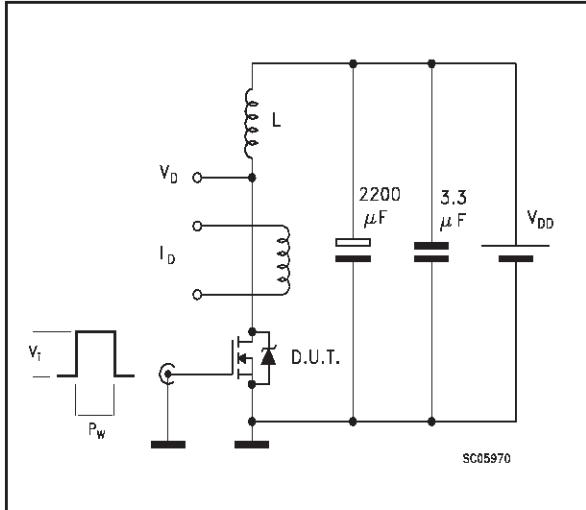


Normalized Breakdown Voltage Temperature

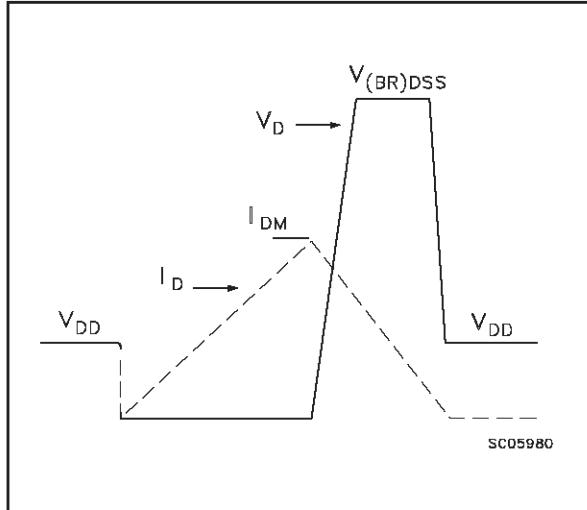


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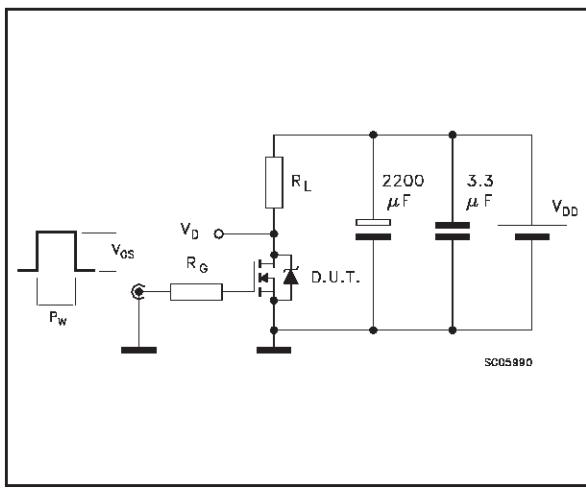
**Fig. 1: Unclamped Inductive Load Test Circuit**



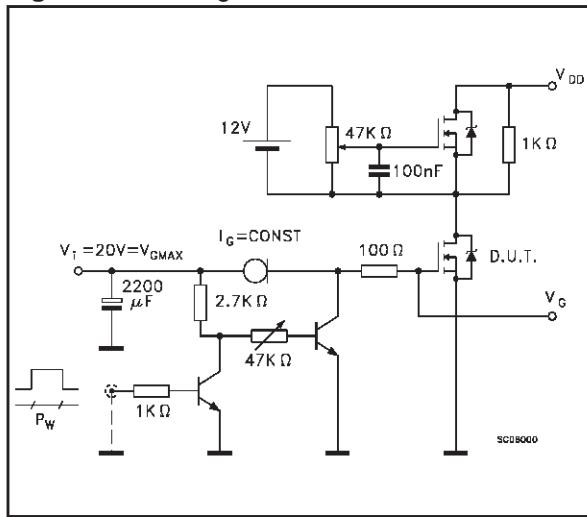
**Fig. 2: Unclamped Inductive Waveform**



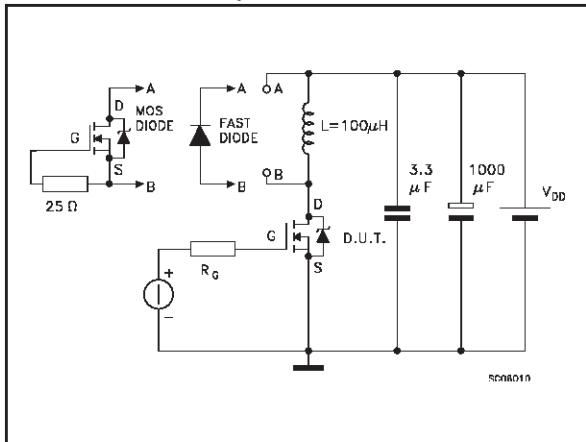
**Fig. 3: Switching Times Test Circuits For Resistive Load**



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

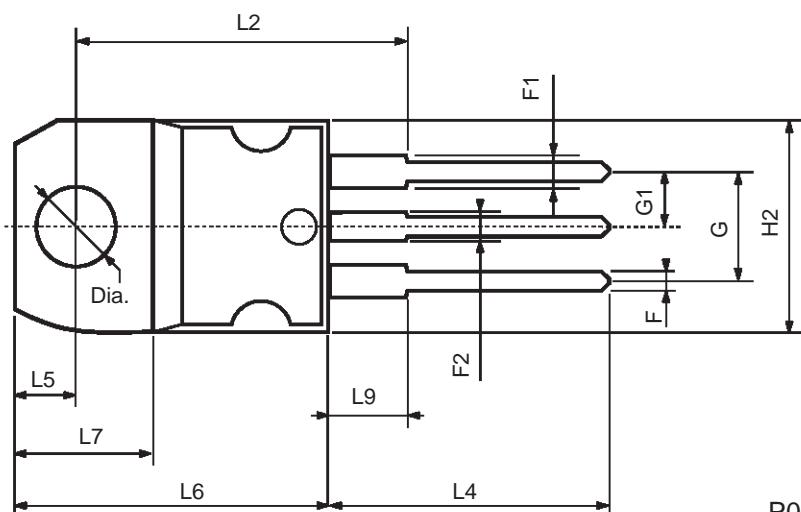
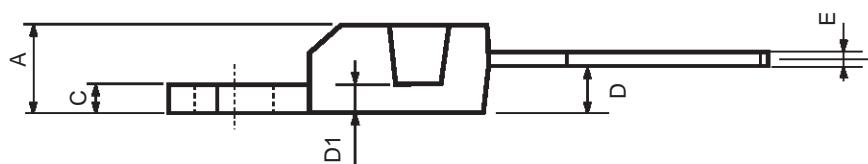


**Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times**



## 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



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