



# STB75NF75 STP75NF75 STP75NF75FP

N-CHANNEL 75V - 0.0095  $\Omega$  - 80A TO-220/TO-220FP/D<sup>2</sup>PAK  
STripFET™ II POWER MOSFET

TYPE	V <sub>DSS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>
STB75NF75	75 V	<0.011 $\Omega$	80 A
STP75NF75	75 V	<0.011 $\Omega$	80 A
STP75NF75FP	75 V	<0.011 $\Omega$	80 A(*)

- TYPICAL R<sub>DS(on)</sub> = 0.0095  $\Omega$
- EXCEPTIONAL dv/dt CAPABILITY
- 100% AVALANCHE TESTED
- SURFACE-MOUNTING D<sup>2</sup>PAK (TO-263)  
POWER PACKAGE IN TAPE & REEL  
(SUFFIX "T4")

## DESCRIPTION

This MOSFET series realized with STMicroelectronics unique STripFET™ process has specifically been designed to minimize input capacitance and gate charge. It is therefore suitable as primary switch in advanced high-efficiency, high-frequency isolated DC-DC converters for Telecom and Computer applications. It is also intended for any applications with low gate drive requirements.

## APPLICATIONS

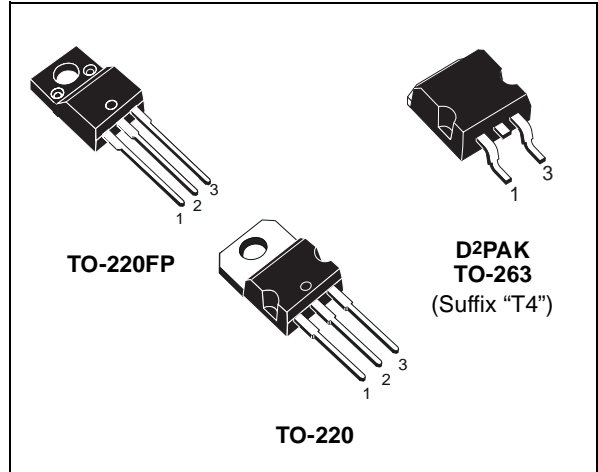
- SOLENOID AND RELAY DRIVERS
- DC MOTOR CONTROL
- DC-DC CONVERTERS
- AUTOMOTIVE ENVIRONMENT

## ABSOLUTE MAXIMUM RATINGS

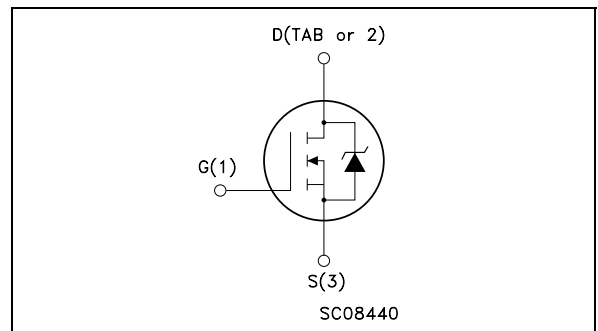
Symbol	Parameter	Value		Unit
		STB75NF75 STP75NF75	STP75NF75FP	
V <sub>DS</sub>	Drain-source Voltage (V <sub>GS</sub> = 0)	75		V
V <sub>DGR</sub>	Drain-gate Voltage (R <sub>GS</sub> = 20 k $\Omega$ )	75		V
V <sub>GS</sub>	Gate- source Voltage	$\pm 20$		V
I <sub>D</sub>	Drain Current (continuous) at T <sub>C</sub> = 25°C	80	80(*)	A
I <sub>D</sub>	Drain Current (continuous) at T <sub>C</sub> = 100°C	70	70(*)	A
I <sub>DM</sub> (●)	Drain Current (pulsed)	320	320(*)	A
P <sub>tot</sub>	Total Dissipation at T <sub>C</sub> = 25°C	300	45	W
	Derating Factor	2.0	0.3	W/°C
dv/dt (1)	Peak Diode Recovery voltage slope	12		V/ns
E <sub>AS</sub> (2)	Single Pulse Avalanche Energy	700		mJ
V <sub>ISO</sub>	Insulation Withstand Voltage (DC)	-----	2000	V
T <sub>stg</sub>	Storage Temperature	-55 to 175		°C
T <sub>j</sub>	Operating Junction Temperature			

(●) Pulse width limited by safe operating area.

(\*) Refer to SOA for the max allowable current values on FP-type due to R<sub>th</sub> value



## INTERNAL SCHEMATIC DIAGRAM



## STB75NF75 STP75NF75 STP75NF75FP

### THERMAL DATA

			D <sup>2</sup> PAK TO-220	TO-220FP	
R <sub>thj-case</sub>	Thermal Resistance Junction-case	Max	0.5	3.33	°C/W
R <sub>thj-amb</sub> T <sub>I</sub>	Thermal Resistance Junction-ambient Maximum Lead Temperature For Soldering Purpose ( 1.6 mm from case, for 10 sec.)	Max	62.5 300		°C/W °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	75			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> = ± 20 V			±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 μA	2	3	4	V
R <sub>DS(on)</sub>	Static Drain-source On Resistance	V <sub>GS</sub> = 10 V I <sub>D</sub> = 40 A		0.0095	0.011	Ω

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g <sub>fs</sub> (*)	Forward Transconductance	V <sub>DS</sub> = 15 V I <sub>D</sub> = 40 A		20		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		3700 730 240		pF pF 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	$V_{DD} = 37.5\text{ V}$ $I_D = 45\text{ A}$ $R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$ (Resistive Load, Figure 3)		25 25		ns ns
$Q_g$ $Q_{gs}$ $Q_{gd}$	Total Gate Charge Gate-Source Charge Gate-Drain Charge	$V_{DD} = 60\text{ V}$ $I_D = 80\text{ A}$ $V_{GS} = 10\text{ V}$		117 27 47	160	nC nC nC

**SWITCHING OFF**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$ $t_f$	Turn-off Delay Time Fall Time	$V_{DD} = 37.5\text{ V}$ $I_D = 45\text{ A}$ $R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$ (Resistive Load, Figure 3)		66 30		ns ns

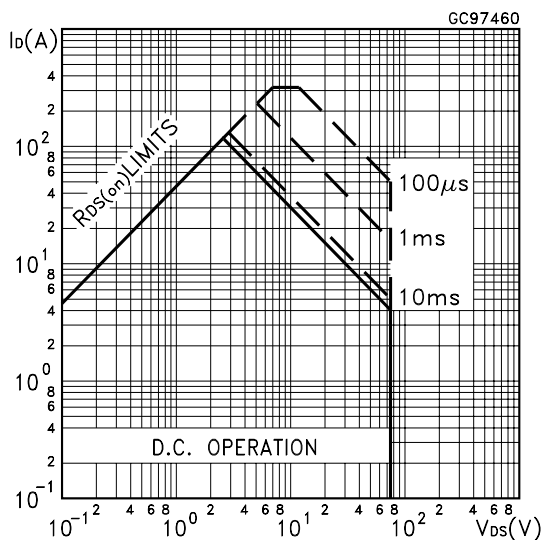
**SOURCE DRAIN DIODE**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{SD}$ $I_{SDM} (\bullet)$	Source-drain Current Source-drain Current (pulsed)				80 320	A A
$V_{SD} (*)$	Forward On Voltage	$I_{SD} = 80\text{ A}$ $V_{GS} = 0$			1.5	V
$t_{rr}$ $Q_{rr}$ $I_{RRM}$	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	$I_{SD} = 80\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 25\text{ V}$ $T_j = 150^\circ\text{C}$ (see test circuit, Figure 5)		132 660 10		ns nC A

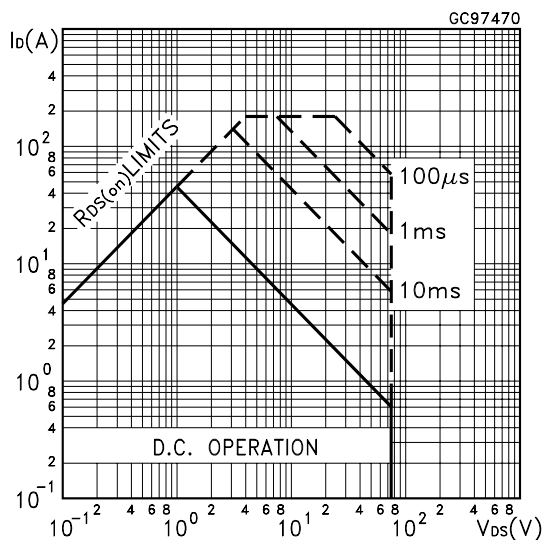
(\*) Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5 %.

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

Safe Operating Area

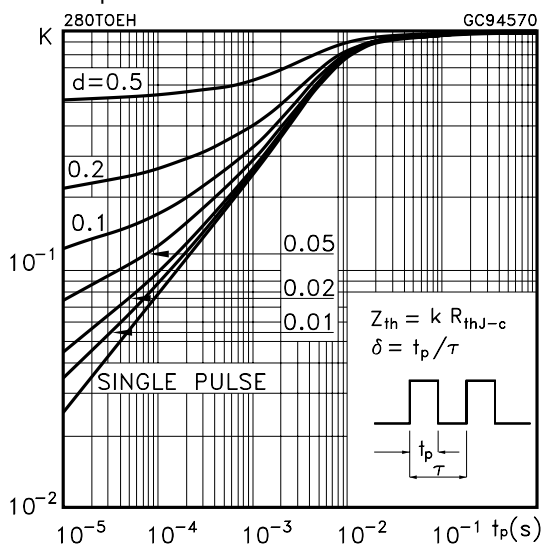


Safe Operating Area for TO-220FP

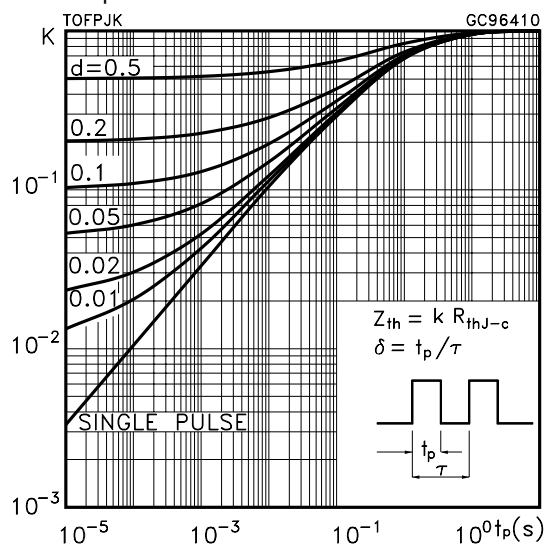


# STB75NF75 STP75NF75 STP75NF75FP

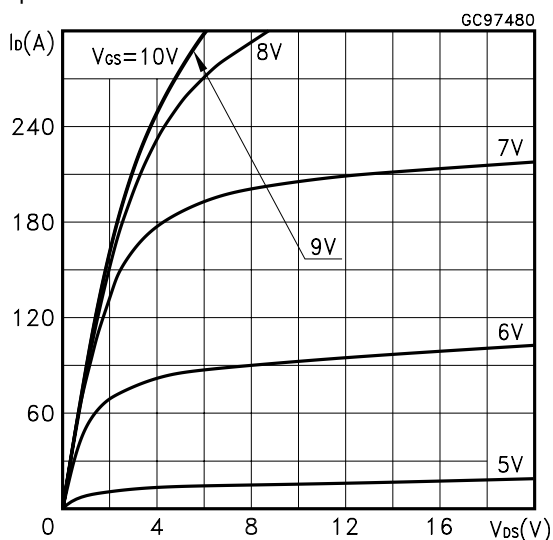
Thermal Impedance



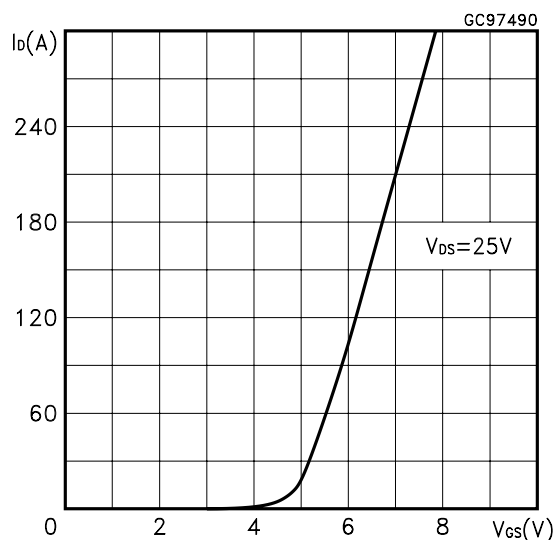
Thermal Impedance for TO-220FP



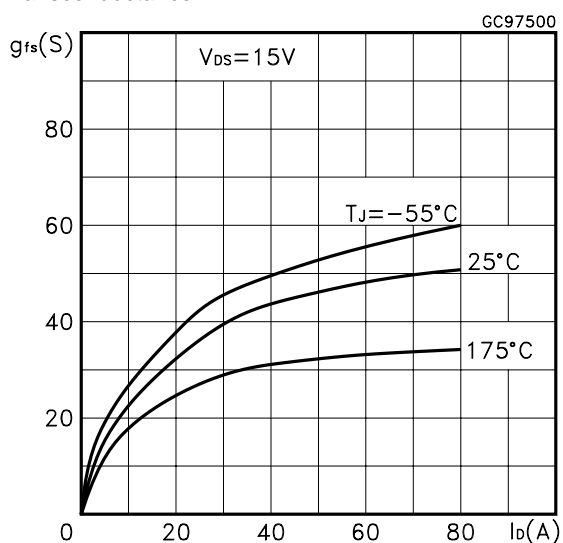
Output Characteristics



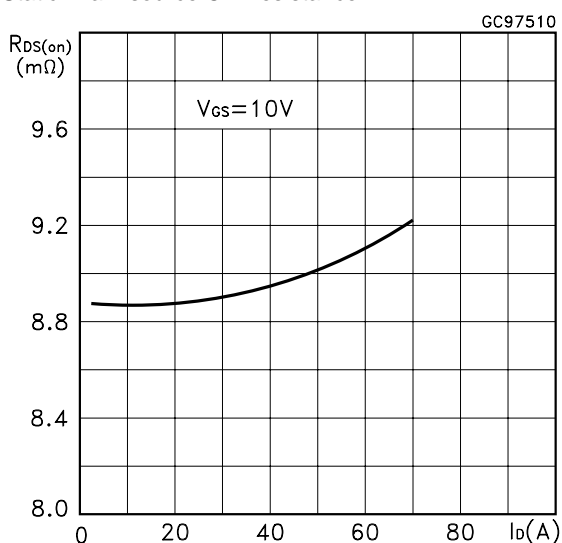
Transfer Characteristics



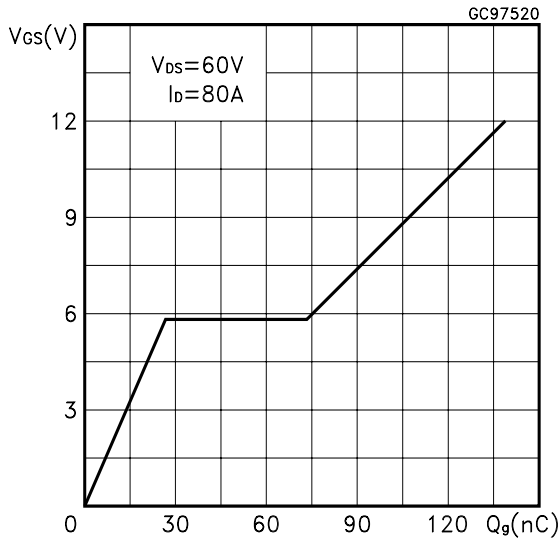
Transconductance



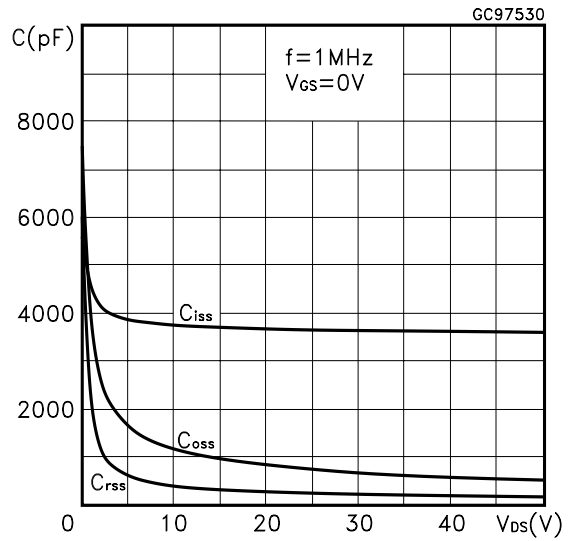
Static Drain-source On Resistance



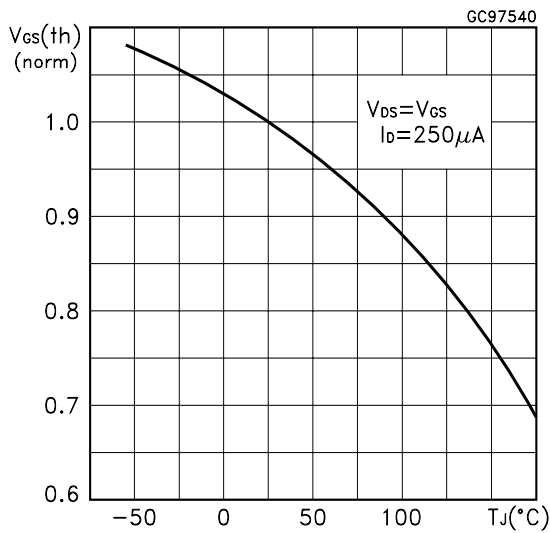
Gate Charge vs Gate-source Voltage



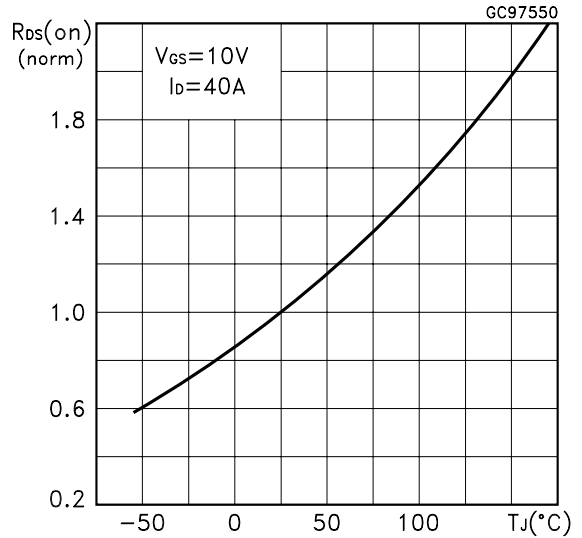
Capacitance Variations



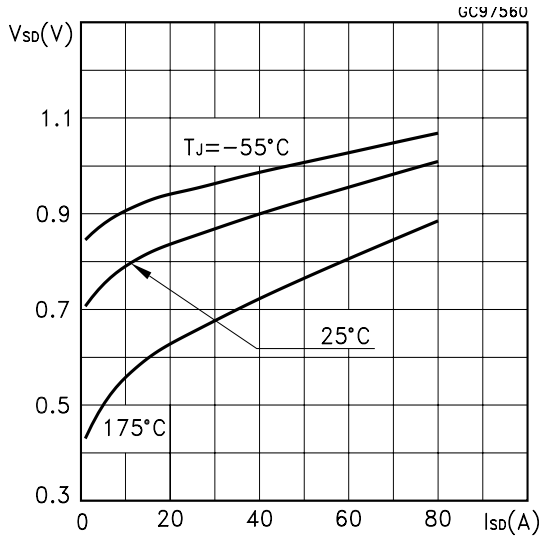
Normalized Gate Threshold Voltage vs Temperature



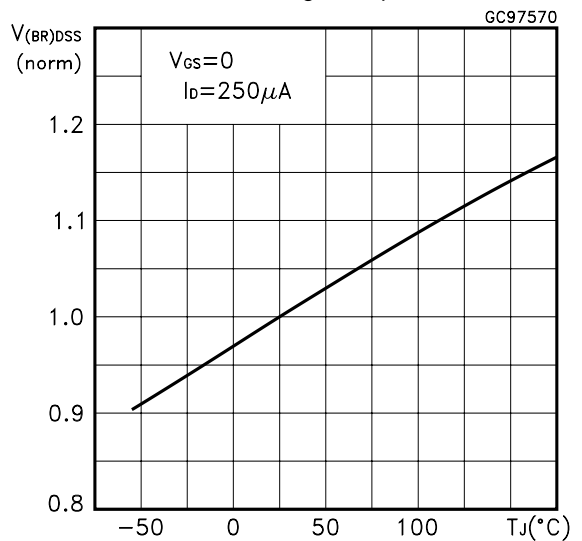
Normalized on Resistance vs Temperature



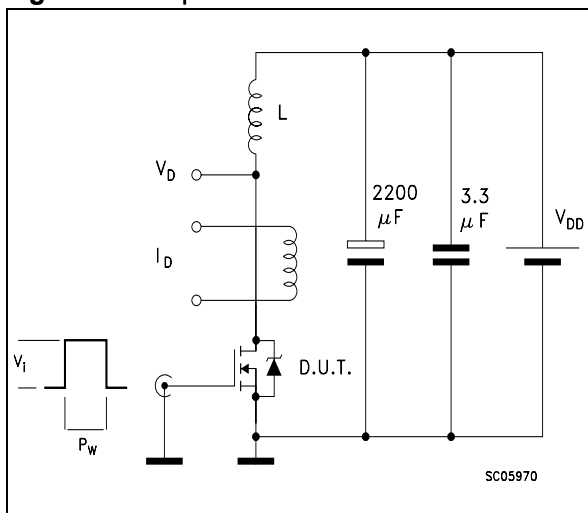
Source-drain Diode Forward Characteristics



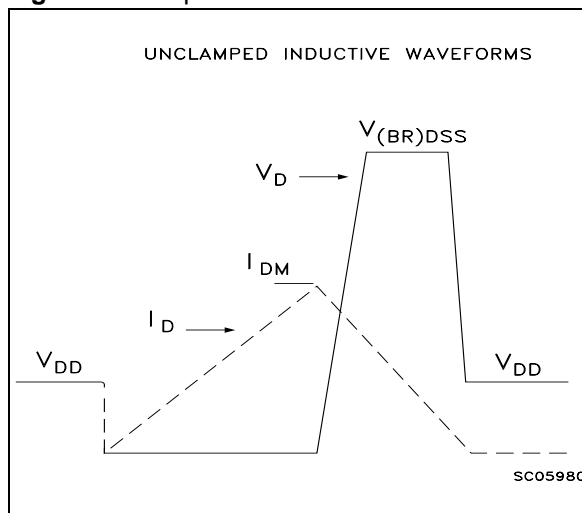
Normalized Breakdown Voltage Temperature



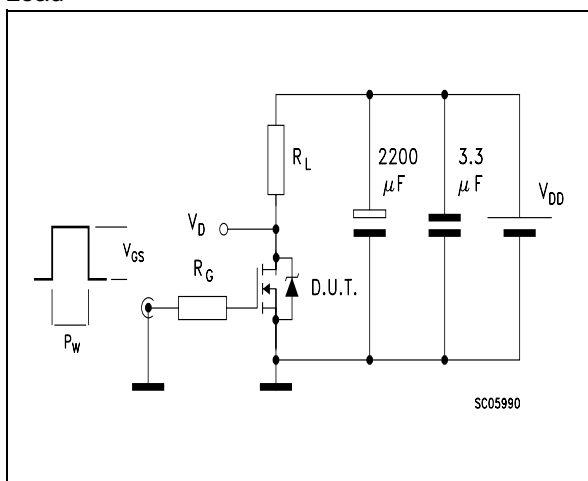
**Fig. 1: Unclamped Inductive Load Test Circuit**



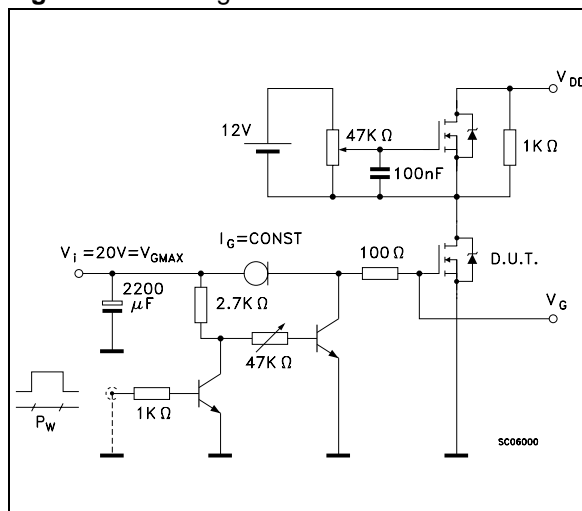
**Fig. 2: Unclamped Inductive Waveform**



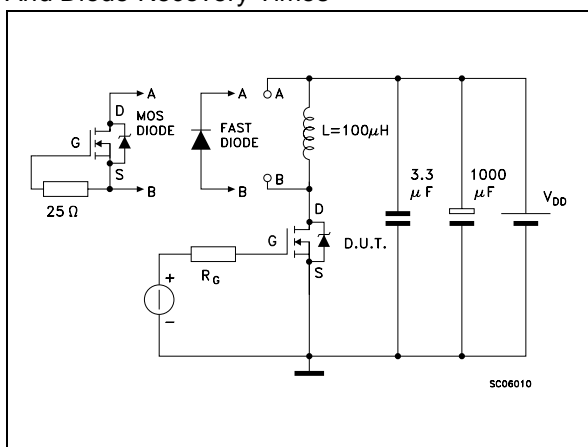
**Fig. 3: Switching Times Test Circuits For Resistive Load**



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

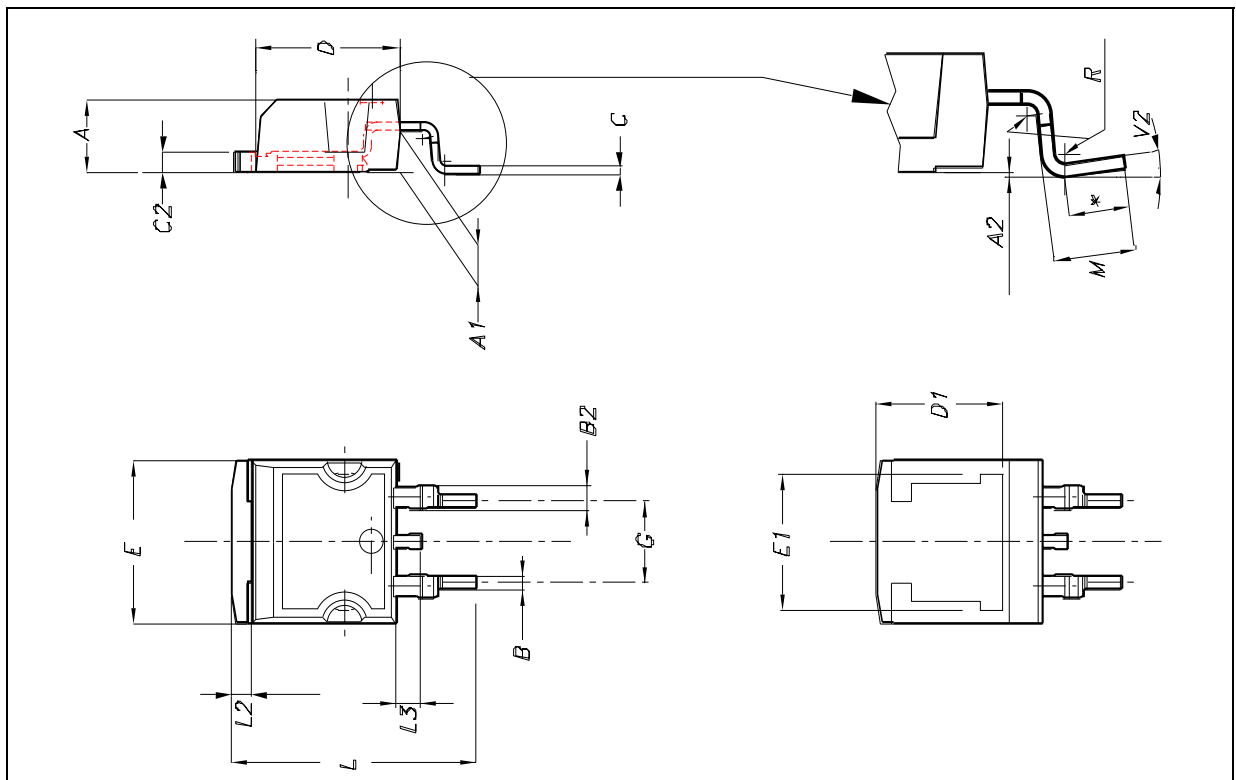


**Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times**



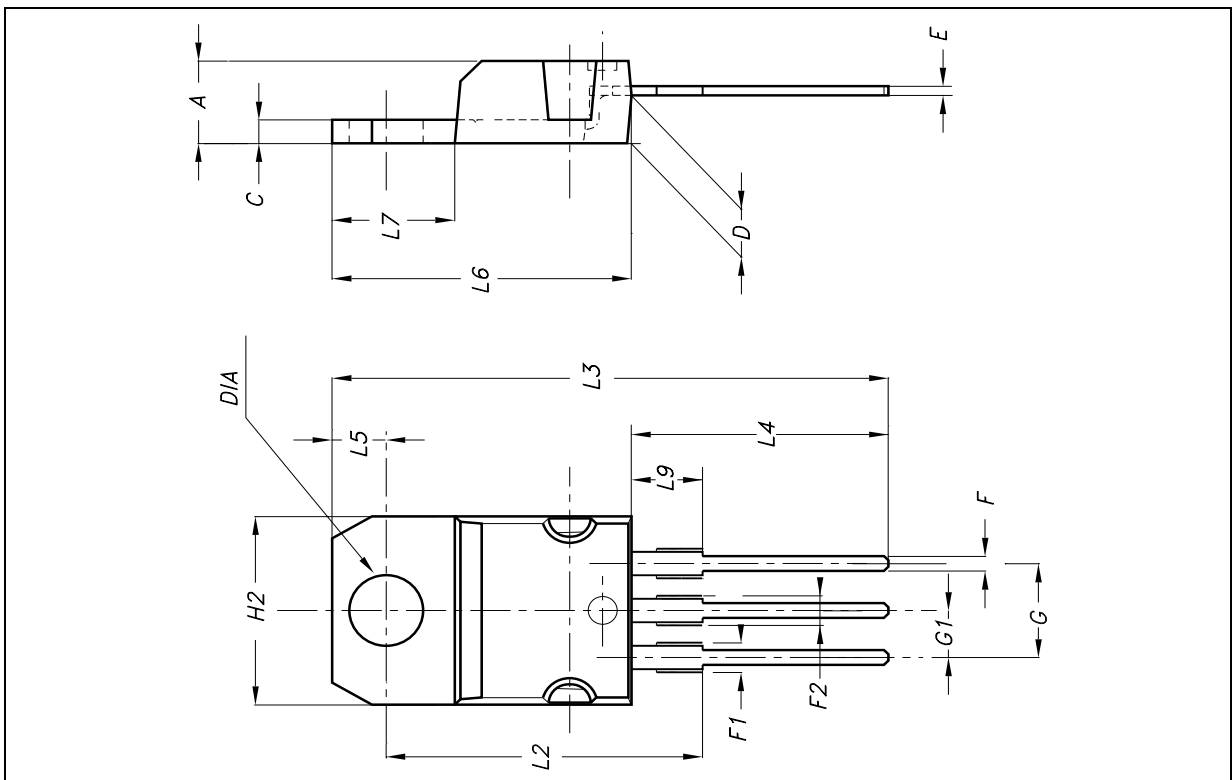
D<sup>2</sup>PAK MECHANICAL DATA

DIM.	mm.			inch.		
	MIN.	TYP.	MAX.	MIN.	TYP.	TYP.
A	4.4		4.6	0.173		0.181
A1	2.49		2.69	0.098		0.106
A2	0.03		0.23	0.001		0.009
B	0.7		0.93	0.028		0.037
B2	1.14		1.7	0.045		0.067
C	0.45		0.6	0.018		0.024
C2	1.21		1.36	0.048		0.054
D	8.95		9.35	0.352		0.368
D1		8			0.315	
E	10		10.4	0.394		0.409
E1	8.5				0.334	
G	4.88		5.28	0.192		0.208
L	15		15.85	0.591		0.624
L2	1.27		1.4	0.050		0.055
L3	1.4		1.75	0.055		0.069
M	2.4		3.2	0.094		0.126
R		0.4			0.016	
V2	0°		8°	0°		8°



**TO-220 MECHANICAL DATA**

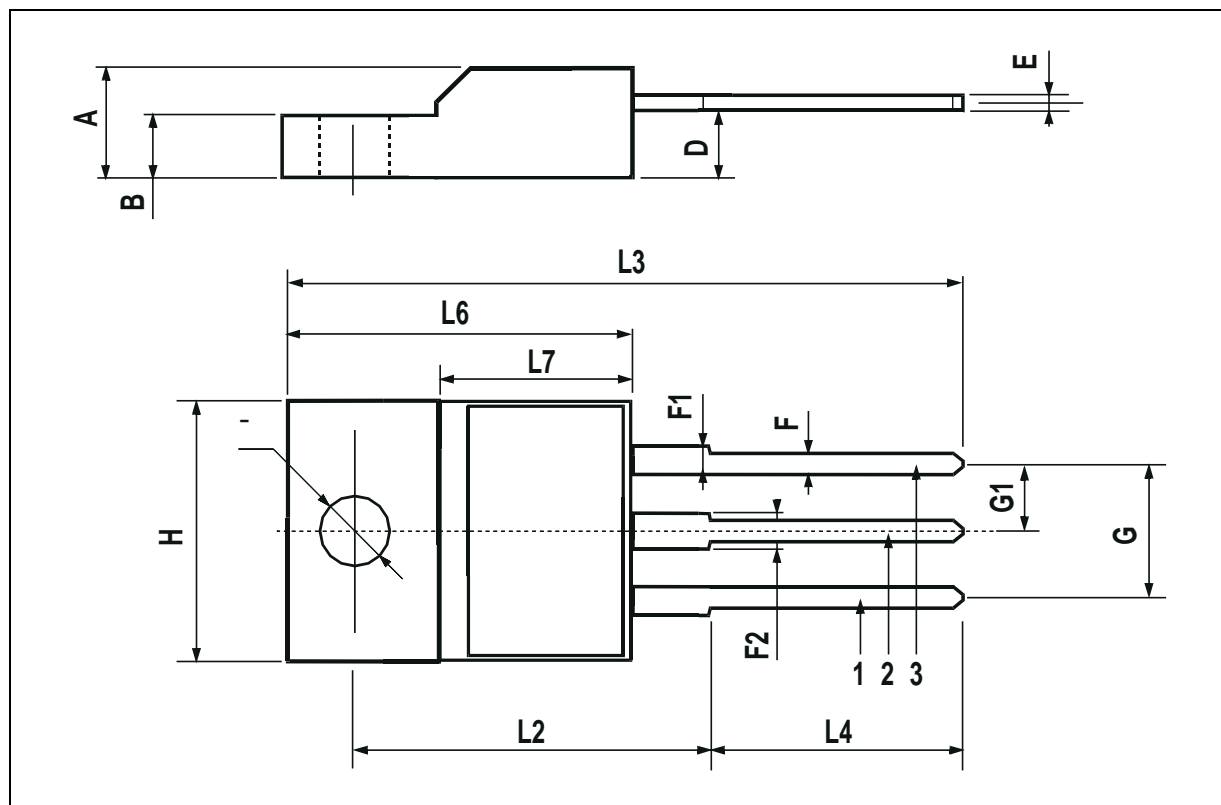
DIM.	mm.			inch.		
	MIN.	TYP.	MAX.	MIN.	TYP.	TYP.
A	4.4		4.6	0.173		0.181
C	1.23		1.32	0.048		0.051
D	2.40		2.72	0.094		0.107
E	0.49		0.70	0.019		0.027
F	0.61		0.88	0.024		0.034
F1	1.14		1.70	0.044		0.067
F2	1.14		1.70	0.044		0.067
G	4.95		5.15	0.194		0.203
G1	2.40		2.70	0.094		0.106
H2	10		10.40	0.393		0.409
L2		16.40			0.645	
L3		28.90			1.137	
L4	13		14	0.511		0.551
L5	2.65		2.95	0.104		0.116
L6	15.25		15.75	0.600		0.620
L7	6.20		6.60	0.244		0.260
L9	3.50		3.93	0.137		0.154
DIA	3.75		3.85	0.147		0.151



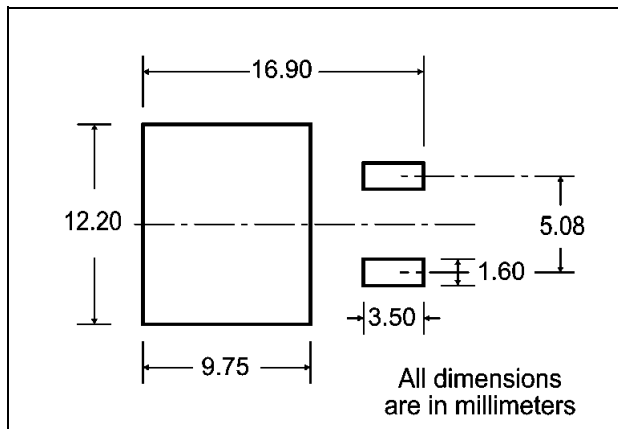


## TO-220FP MECHANICAL DATA

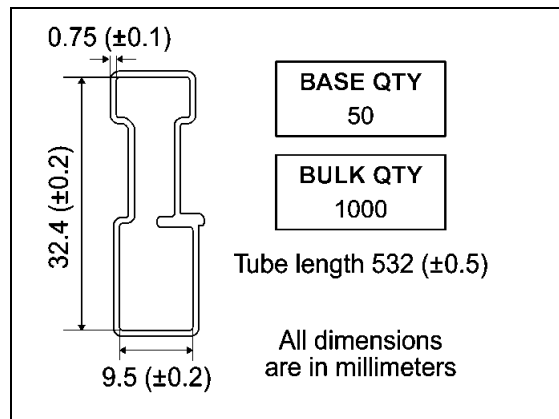
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.4		4.6	0.173		0.181
B	2.5		2.7	0.098		0.106
D	2.5		2.75	0.098		0.108
E	0.45		0.7	0.017		0.027
F	0.75		1	0.030		0.039
F1	1.15		1.7	0.045		0.067
F2	1.15		1.7	0.045		0.067
G	4.95		5.2	0.195		0.204
G1	2.4		2.7	0.094		0.106
H	10		10.4	0.393		0.409
L2		16			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



**D2PAK FOOTPRINT**



**TUBE SHIPMENT (no suffix)\***



**TAPE AND REEL SHIPMENT (suffix "T4")\***

Diagram showing the tape and reel shipment details. The top view shows a circular reel with a diameter of A. The tape slot in the core has a width of 2.5 mm min. and a full radius. The distance from the center of the reel to the start of the tape slot is B. The distance from the center of the reel to the center of the tape slot is D. The distance from the center of the reel to the center of the tape slot is also labeled as 40 mm min. Access hole at slot location. The side view shows the tape thickness T, the distance from the center of the reel to the center of the tape slot C, and the distance from the center of the reel to the center of the tape slot N. The distance from the center of the reel to the center of the tape slot is also labeled as G measured at hub.

**REEL MECHANICAL DATA**

DIM.	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A		330		12.992
B	1.5		0.059	
C	12.8	13.2	0.504	0.520
D	20.2		0.795	
G	24.4	26.4	0.960	1.039
N	100		3.937	
T		30.4		1.197

BASE QTY	BULK QTY
1000	1000

**TAPE MECHANICAL DATA**

DIM.	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A0	10.5	10.7	0.413	0.421
B0	15.7	15.9	0.618	0.626
D	1.5	1.6	0.059	0.063
D1	1.59	1.61	0.062	0.063
E	1.65	1.85	0.065	0.073
F	11.4	11.6	0.449	0.456
K0	4.8	5.0	0.189	0.197
P0	3.9	4.1	0.153	0.161
P1	11.9	12.1	0.468	0.476
P2	1.9	2.1	0.075	0.082
R	50		1.574	
T	0.25	0.35	0.0098	0.0137
W	23.7	24.3	0.933	0.956

Diagram showing the tape mechanical data. The top view shows the tape with dimensions K0, D, P2, P0, E, F, W, B0, D1, A0, P1, and Center line of cavity. The distance from the center of the cavity to the center of the tape slot is labeled as 10 pitches cumulative tolerance on tape +/- 0.2 mm. The side view shows the tape thickness T, the distance from the center of the cavity to the center of the tape slot C, and the distance from the center of the cavity to the center of the tape slot N. The distance from the center of the cavity to the center of the tape slot is also labeled as G measured at hub. The bottom view shows the tape with dimensions TRL, FEED DIRECTION, and Bending radius R min.

\* on sales type

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