



# STB95NF03 STB95NF03-1 STP95NF03

N-CHANNEL 30V - 0.0065  $\Omega$  - 95A D<sup>2</sup>PAK/TO-220/I<sup>2</sup>PAK  
STripFET™ II POWER MOSFET

TYPE	V <sub>DSS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>
STB95NF03/-1	30 V	<0.007 $\Omega$	80 A
STP95NF03	30 V	<0.007 $\Omega$	80 A

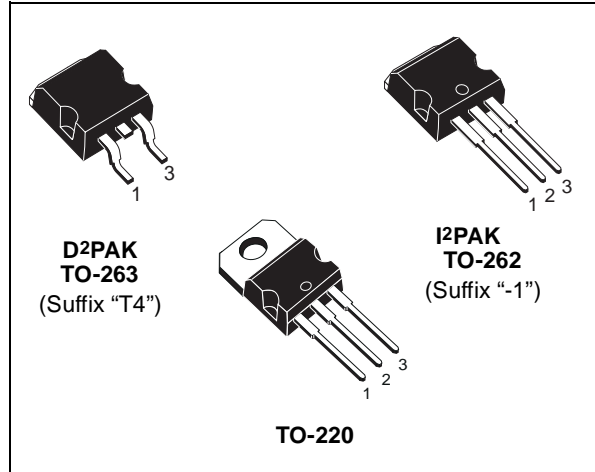
- TYPICAL R<sub>DS(on)</sub> = 0.0065  $\Omega$
- STANDARD THRESHOLD DRIVE
- 100% AVALANCHE TESTED

## DESCRIPTION

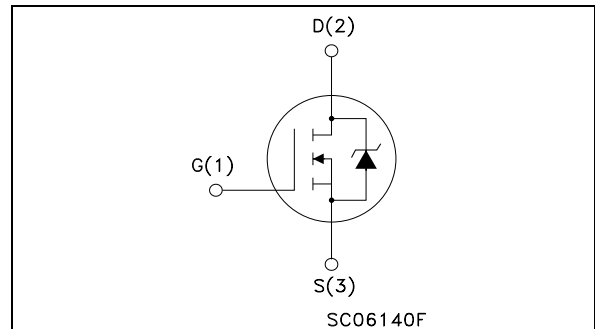
This Power MOSFET is the latest development of STMicroelectronics unique "Single Feature Size™" strip-based process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing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

## APPLICATIONS

- HIGH CURRENT, HIGH SPEED SWITCHING
- 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 k $\Omega$ )	30	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	A
I <sub>D</sub>	Drain Current (continuous) at T <sub>C</sub> = 100°C	80	A
I <sub>DM</sub> (•)	Drain Current (pulsed)	320	A
P <sub>tot</sub>	Total Dissipation at T <sub>C</sub> = 25°C	150	W
	Derating Factor	1	W/°C
dv/dt (1)	Peak Diode Recovery voltage slope	3.0	V/ns
E <sub>AS</sub> (2)	Single Pulse Avalanche Energy	720	mJ
T <sub>stg</sub>	Storage Temperature	-55 to 175	°C
T <sub>j</sub>	Operating Junction Temperature		

(•) Pulse width limited by safe operating area.  
(\*) Current Limited by Package

(1) I<sub>SD</sub>  $\leq$  95A, di/dt  $\leq$  150A/ $\mu$ s, V<sub>DD</sub>  $\leq$  V(BR)DSS, T<sub>j</sub>  $\leq$  T<sub>JMAX</sub>.  
(2) Starting T<sub>j</sub> = 25 °C, I<sub>D</sub> = 47.5A, V<sub>DD</sub> = 25V

**THERMAL DATA**

Rthj-case	Thermal Resistance Junction-case	Max	1	°C/W
Rthj-amb	Thermal Resistance Junction-ambient	Max	62.5	°C/W
T <sub>l</sub>	Maximum Lead Temperature For Soldering Purpose		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	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	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		4	V
R <sub>DS(on)</sub>	Static Drain-source On Resistance	V <sub>GS</sub> = 10 V I <sub>D</sub> = 45 A		0.0065	0.0070	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> = 45 A		50		S
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = 25V f = 1 MHz V <sub>GS</sub> = 0		2450		pF
C <sub>oss</sub>	Output Capacitance			880		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			170		pF

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## ELECTRICAL CHARACTERISTICS (continued)

### SWITCHING ON (\*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ $t_r$	Turn-on Time Rise Time	$V_{DD} = 15\text{ V}$ $I_D = 47.5\text{ A}$ $R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$		20 195		ns ns
$Q_g$ $Q_{gs}$ $Q_{gd}$	Total Gate Charge Gate-Source Charge Gate-Drain Charge	$V_{DD}=15\text{ V}$ $I_D=95\text{ A}$ $V_{GS}=10\text{ V}$		59 18 21	70	nC nC nC

### SWITCHING OFF(\*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$ $t_f$	Turn-off Delay Time Fall Time	$V_{DD} = 20\text{ V}$ $I_D = 47.5\text{ A}$ $R_G = 4.7\ \Omega$ , $V_{GS} = 10\text{ V}$		35 35		ns ns

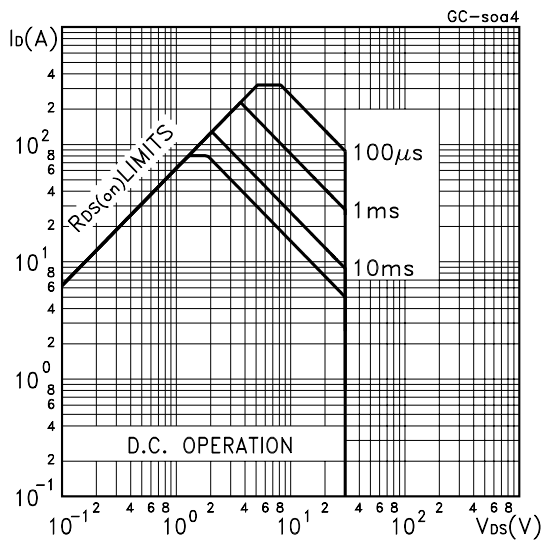
### SOURCE DRAIN DIODE(\*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{SD}$ $I_{SDM} (*)$	Source-drain Current Source-drain Current (pulsed)				95 320	A A
$V_{SD} (*)$	Forward On Voltage	$I_{SD} = 95\text{ A}$ $V_{GS} = 0$			1.3	V
$t_{rr}$ $Q_{rr}$ $I_{RRM}$	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	$I_{SD} = 95\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 20\text{ V}$ $T_j = 150^\circ\text{C}$ (see test circuit, Figure 5)		60 120 4		ns nC A

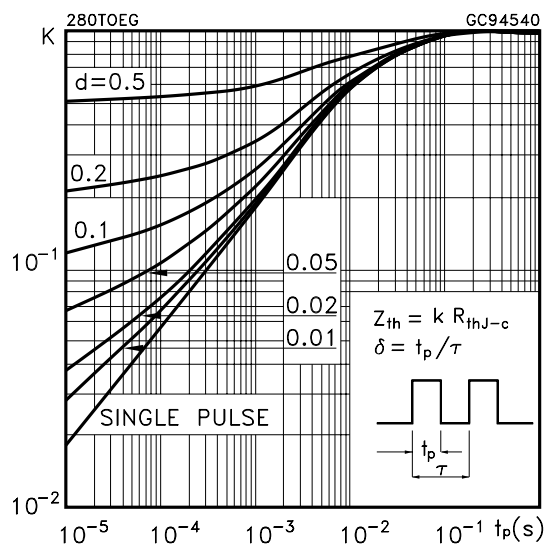
(\*) Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5 %.

(\*) Pulse width limited by  $T_{jmax}$

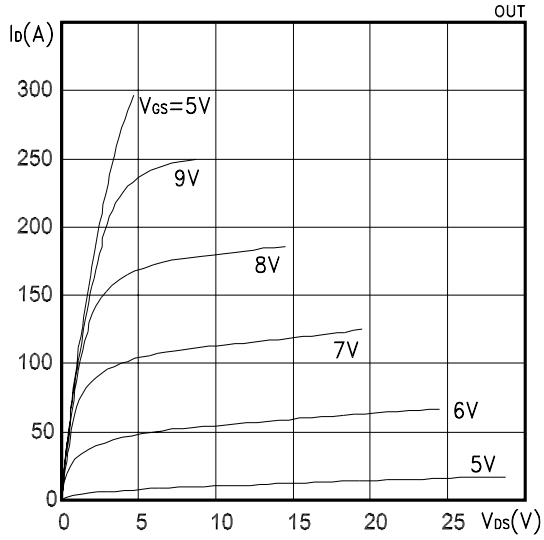
Safe Operating Area



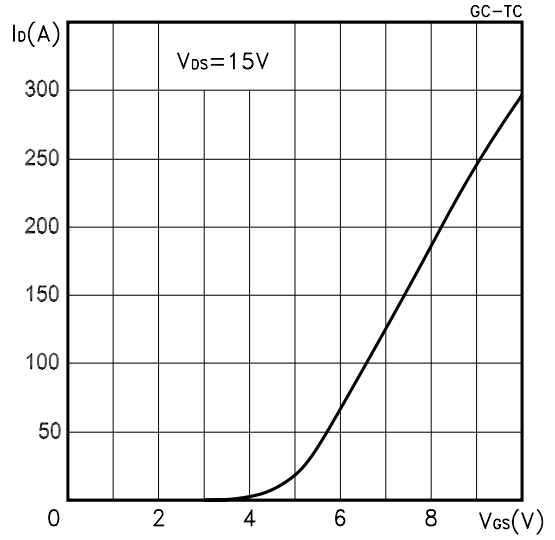
Thermal Impedance



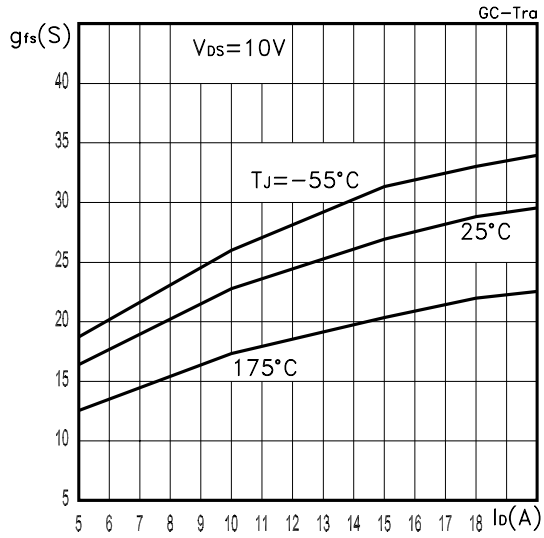
Output Characteristics



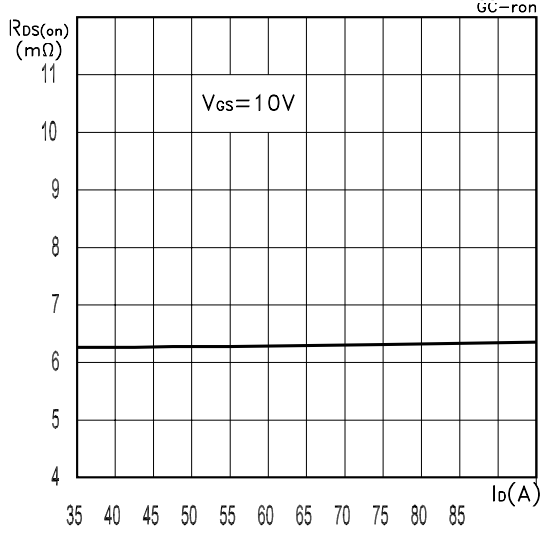
Transfer Characteristics



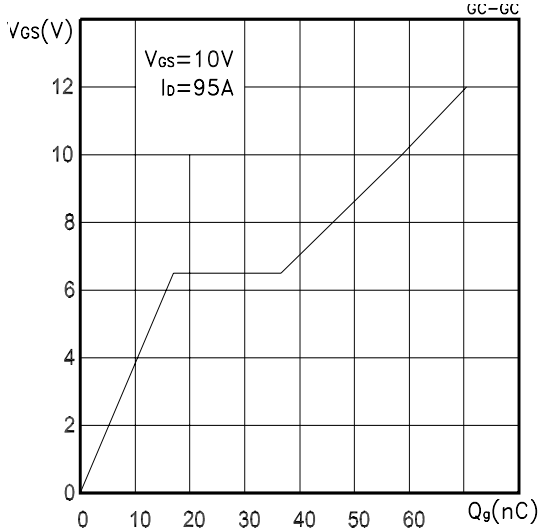
Transconductance



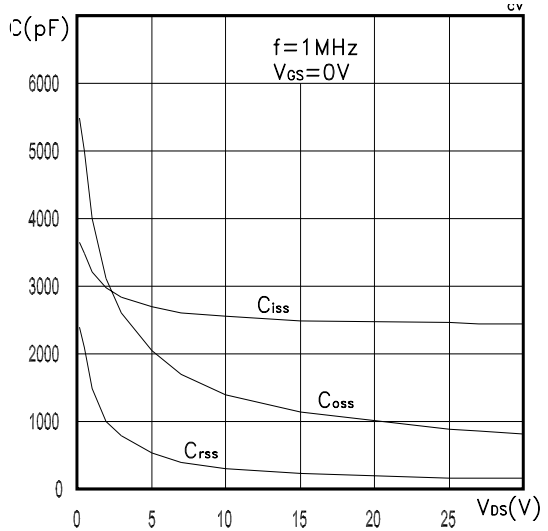
Static Drain-source On Resistance



Gate Charge vs Gate-source Voltage

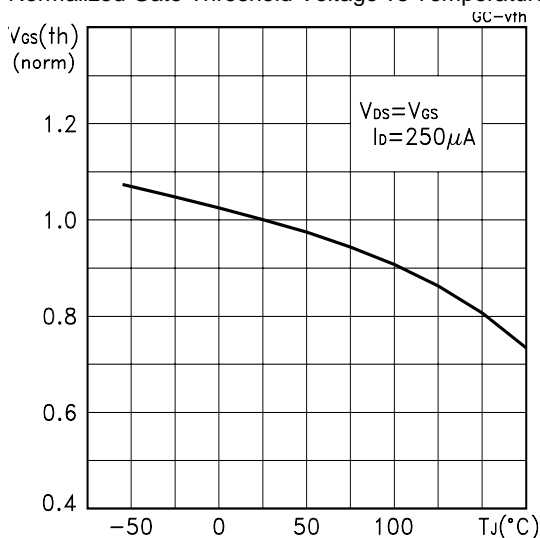


Capacitance Variations

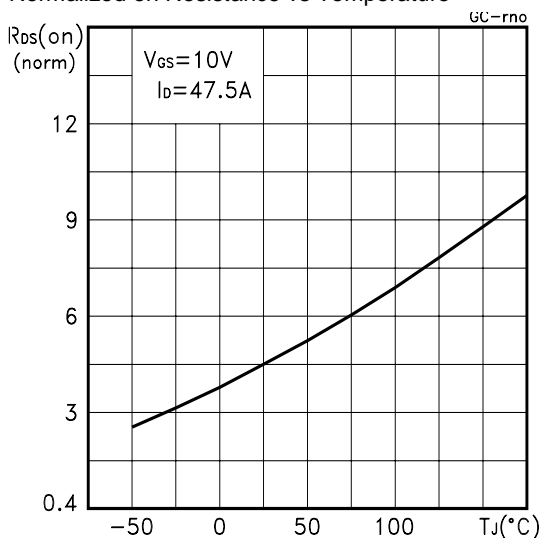


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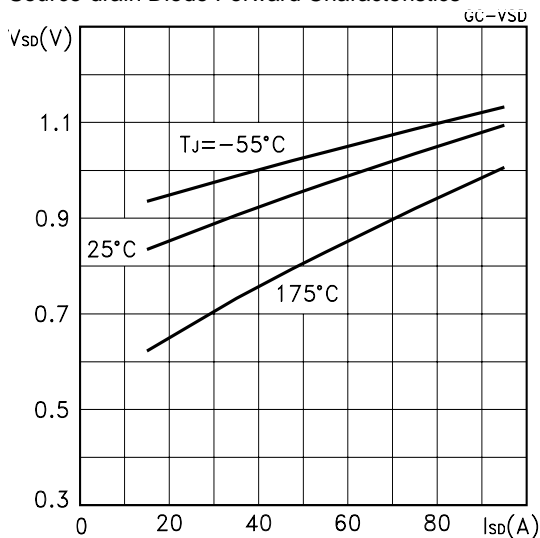
Normalized Gate Threshold Voltage vs Temperature



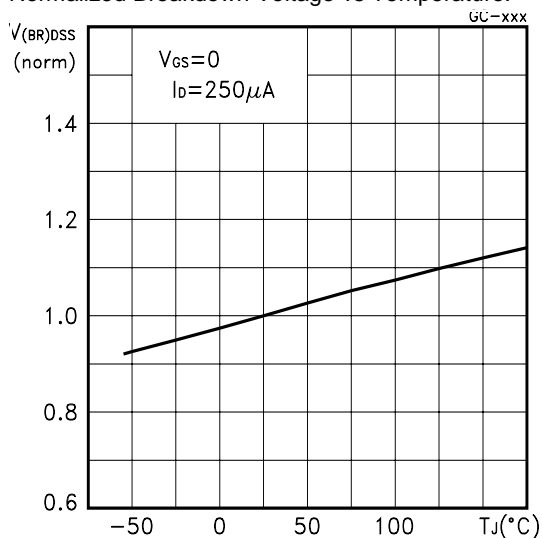
Normalized on Resistance vs Temperature



Source-drain Diode Forward Characteristics



Normalized Breakdown Voltage vs Temperature.



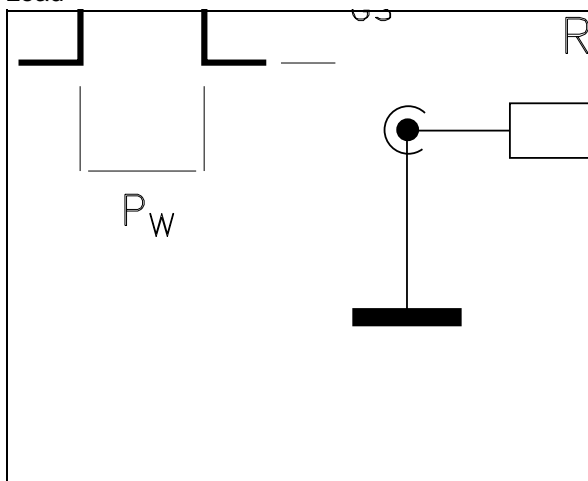
**Fig. 1: Unclamped Inductive Load Test Circuit**



**Fig. 2: Unclamped Inductive Waveform**



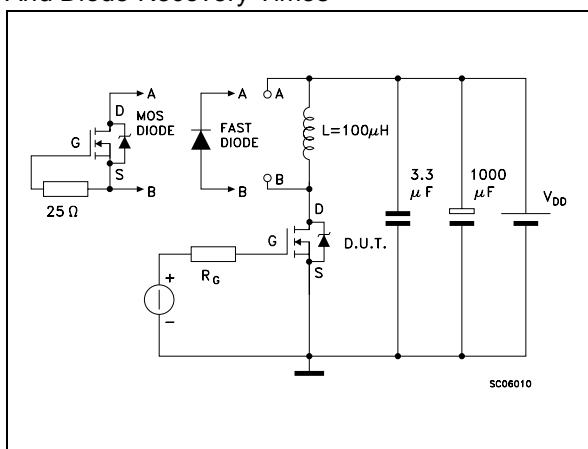
**Fig. 3: Switching Times Test Circuits For Resistive Load**



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

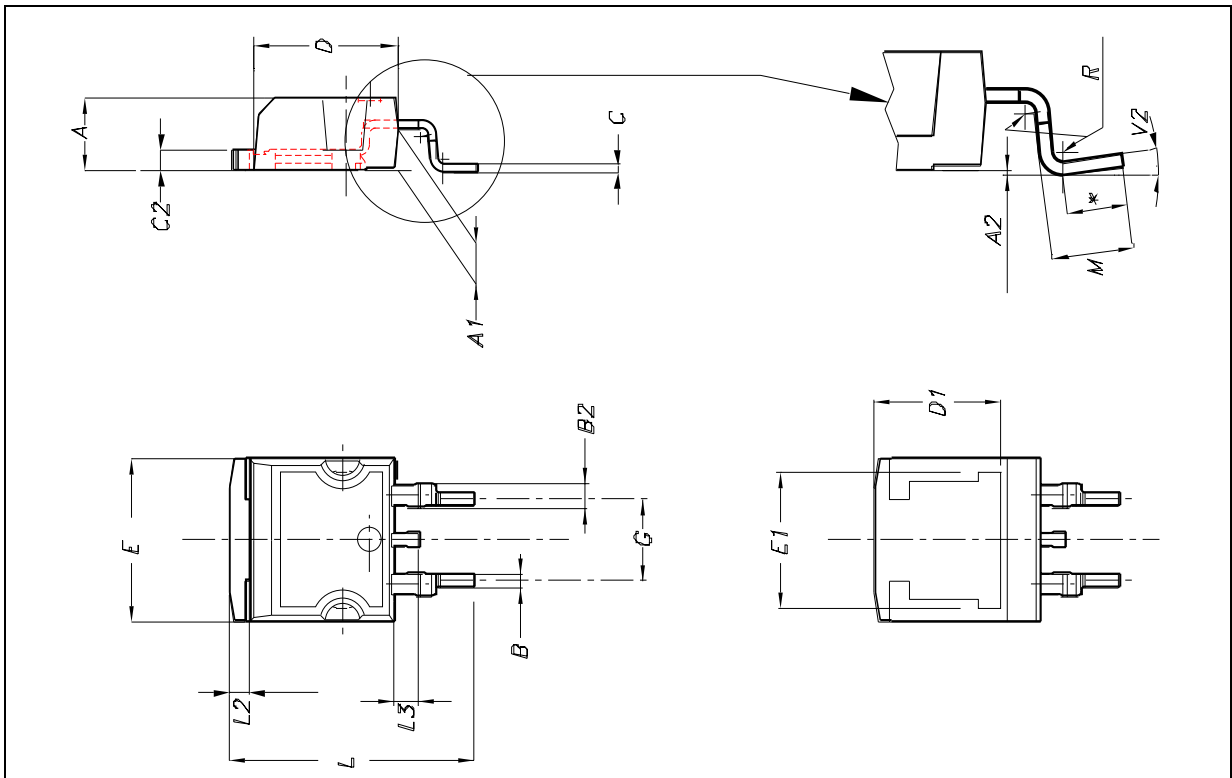


**Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times**



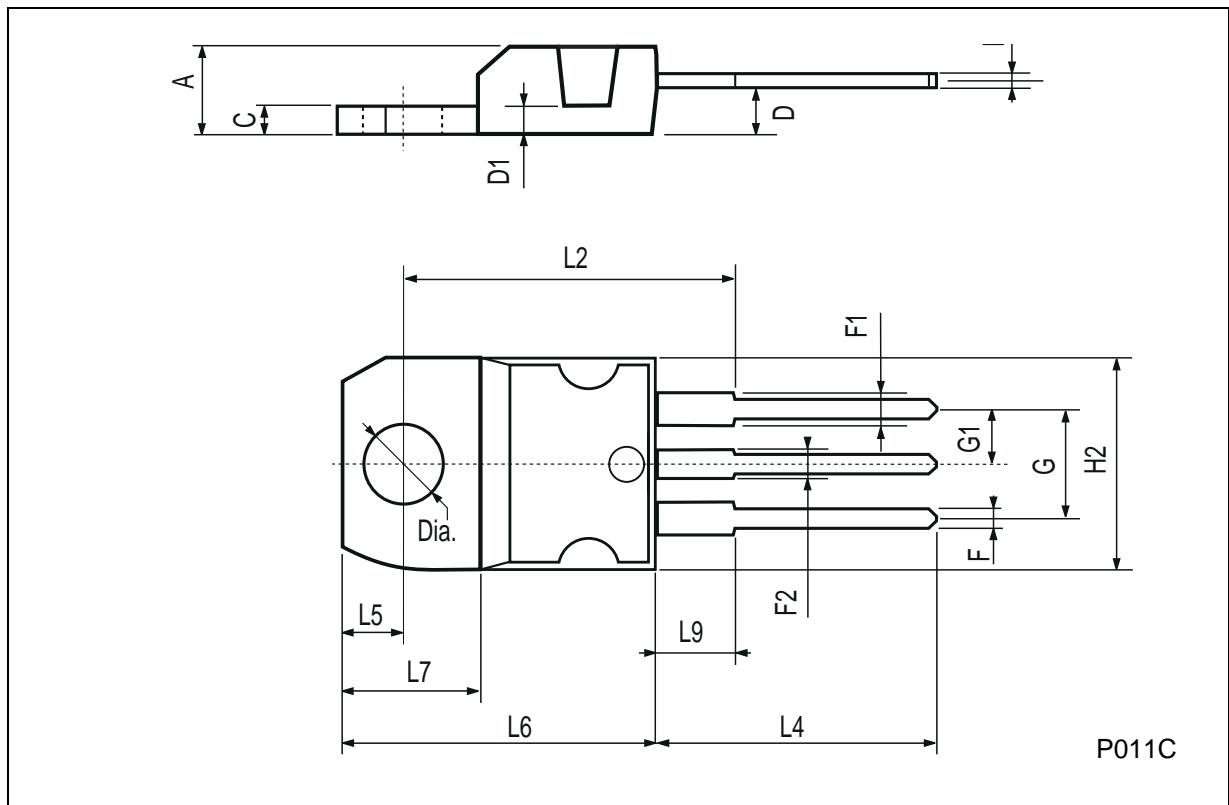
**D<sup>2</sup>PAK MECHANICAL DATA**

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			0.015	
V2	0°		8°	0°		8°



**TO-220 MECHANICAL DATA**

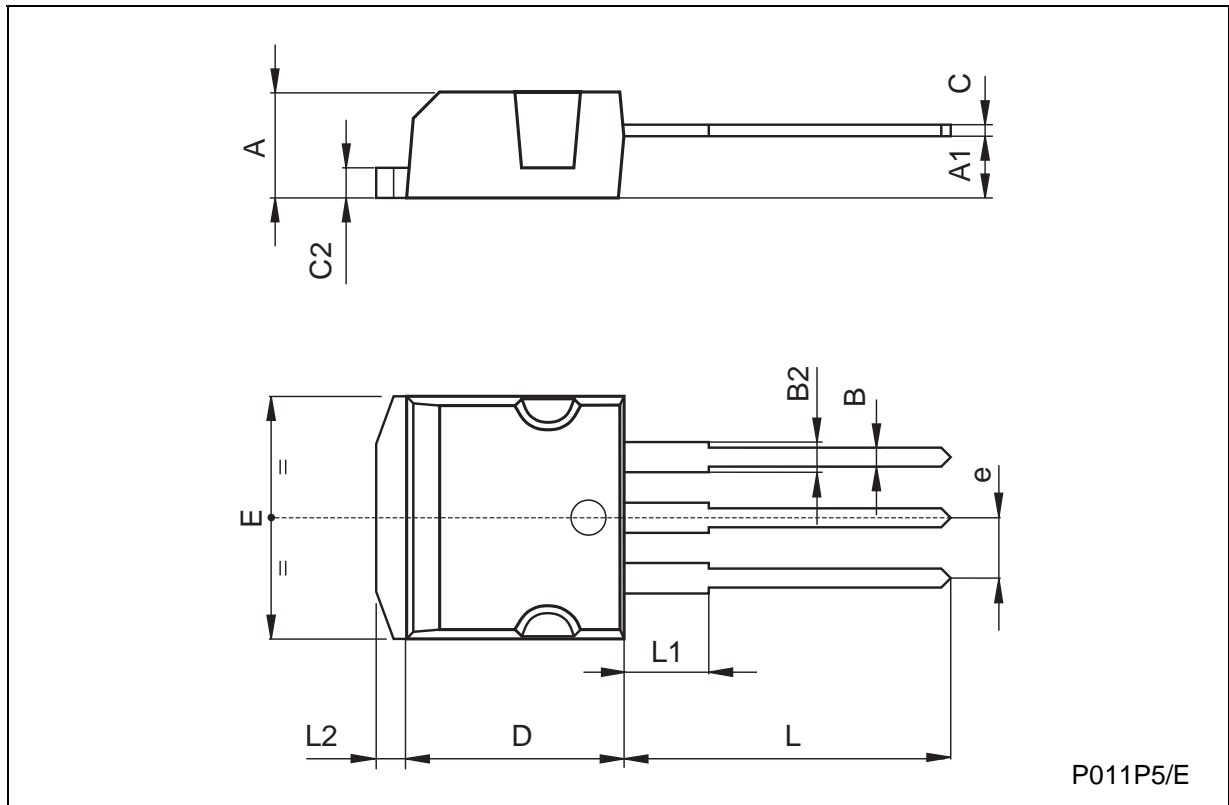
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
C	1.23		1.32	0.048		0.051
D	2.40		2.72	0.094		0.107
D1		1.27			0.050	
E	0.49		0.70	0.019		0.027
F	0.61		0.88	0.024		0.034
F1	1.14		1.70	0.044		0.067
F2	1.14		1.70	0.044		0.067
G	4.95		5.15	0.194		0.203
G1	2.4		2.7	0.094		0.106
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



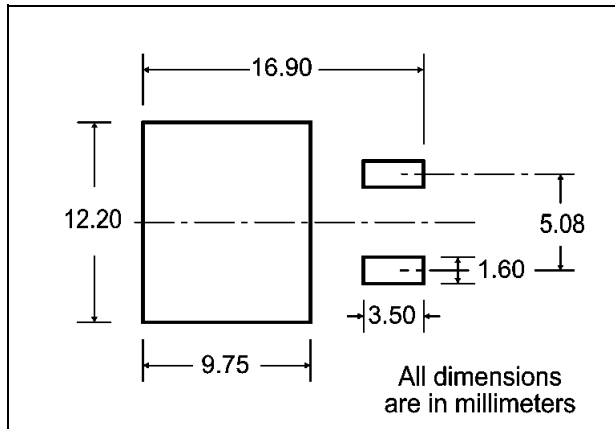


**TO-262 (I<sup>2</sup>PAK) MECHANICAL DATA**

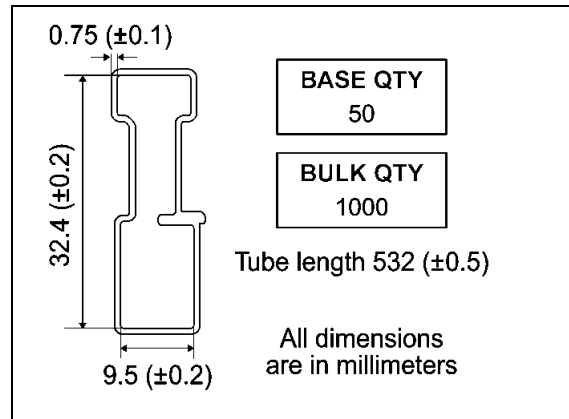
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.4		4.6	0.173		0.181
A1	2.49		2.69	0.098		0.106
B	0.7		0.93	0.027		0.036
B2	1.14		1.7	0.044		0.067
C	0.45		0.6	0.017		0.023
C2	1.23		1.36	0.048		0.053
D	8.95		9.35	0.352		0.368
e	2.4		2.7	0.094		0.106
E	10		10.4	0.393		0.409
L	13.1		13.6	0.515		0.531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



**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 diameter A, a central hub with diameter D, and a tape slot in the core for tape start with a width of 2.5 mm min. The distance from the center of the reel to the center of the tape slot is B. The distance from the center of the reel to the center of the hub is C. The distance from the center of the hub to the center of the tape slot is N. The distance from the center of the hub to the center of the tape slot is G, measured at the hub. The distance from the center of the hub to the center of the tape slot is T. The distance from the center of the hub to the center of the tape slot is 40 mm min. Access hole at slot location. The distance from the center of the hub to the center of the tape slot is Full radius. The distance from the center of the hub to the center of the tape slot is 2.5 mm min. width.

**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 is 10 pitches cumulative tolerance on tape +/- 0.2 mm. The distance from the center of the cavity to the center of the tape is User Direction of Feed. The distance from the center of the cavity to the center of the tape is TRL. The distance from the center of the cavity to the center of the tape is FEED DIRECTION. The distance from the center of the cavity to the center of the tape is Bending radius. The distance from the center of the cavity to the center of the tape is R min.

\* on sales type

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