



# STD25NF10L

## N-CHANNEL 100V - 0.030 Ω - 25A DPAK LOW GATE CHARGE STripFET™ II POWER MOSFET

TYPE	V <sub>DSS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>
STD25NF10L	100 V	< 0.035 Ω	25 A

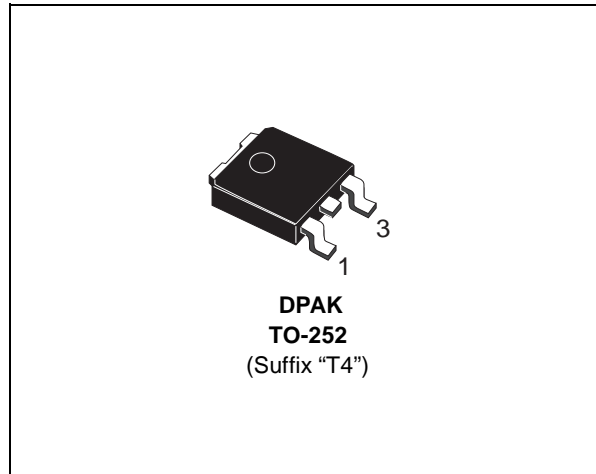
- TYPICAL R<sub>DS(on)</sub> = 0.030 Ω
- EXCEPTIONAL dv/dt CAPABILITY
- 100% AVALANCHE TESTED
- LOW THRESHOLD DEVICE
- LOGIC LEVEL DEVICE
- SURFACE-MOUNTING DPAK (TO-252)  
POWER PACKAGE IN TAPE & REEL  
(SUFFIX "T4")

### DESCRIPTION

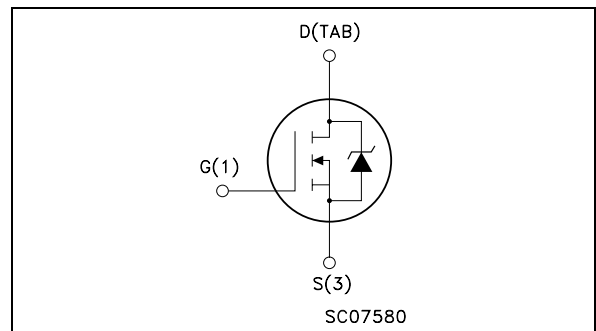
This MOSFET series realized with STMicroelectronics unique STripFET process has specifically been designed to minimize input capacitance and gate charge. It is therefore suitable as primary switch in advanced high-efficiency, high-frequency isolated DC-DC converters for Telecom and Computer applications.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

### APPLICATIONS

- HIGH-EFFICIENCY DC-DC CONVERTERS
- UPS AND MOTOR CONTROL



### INTERNAL SCHEMATIC DIAGRAM



### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V <sub>DS</sub>	Drain-source Voltage (V <sub>GS</sub> = 0)	100	V
V <sub>DGR</sub>	Drain-gate Voltage (R <sub>GS</sub> = 20 kΩ)	100	V
V <sub>GS</sub>	Gate- source Voltage	± 16	V
I <sub>D</sub> (*)	Drain Current (continuous) at T <sub>C</sub> = 25°C	25	A
I <sub>D</sub>	Drain Current (continuous) at T <sub>C</sub> = 100°C	25	A
I <sub>DM</sub> (•)	Drain Current (pulsed)	100	A
P <sub>tot</sub>	Total Dissipation at T <sub>C</sub> = 25°C	100	W
	Derating Factor	0.67	W/°C
dv/dt (1)	Peak Diode Recovery voltage slope	20	V/ns
E <sub>AS</sub> (2)	Single Pulse Avalanche Energy	450	mJ
T <sub>stg</sub>	Storage Temperature	-55 to 175	°C
T <sub>j</sub>	Max. Operating Junction Temperature		

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

(1) I<sub>SD</sub> ≤ 25A, di/dt ≤ 300A/μs, V<sub>DD</sub> ≤ V<sub>(BR)DSS</sub>, T<sub>j</sub> ≤ T<sub>JMAX</sub>  
(2) Starting T<sub>j</sub> = 25 °C, I<sub>D</sub> = 12.5A, V<sub>DD</sub> = 50V

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## THERMAL DATA

Rthj-case	Thermal Resistance Junction-case	Max	1.5	°C/W
Rthj-pcb	Thermal Resistance Junction-pcb(#)	Max	50	°C/W
T <sub>I</sub>	Maximum Lead Temperature For Soldering Purpose		275	°C

(#) When Mounted on 1 inch<sup>2</sup> FR-4 board, 2 oz of Cu.

## 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	100			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> = ± 16 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	1		2.5	V
R <sub>DS(on)</sub>	Static Drain-source On Resistance	V <sub>GS</sub> = 10 V I <sub>D</sub> = 12.5 A V <sub>GS</sub> = 4.5 V I <sub>D</sub> = 12.5 A		0.030 0.035	0.035 0.040	Ω 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> = 12.5 A		24		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		1710 250 110		pF pF 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 Delay Time Rise Time	$V_{DD} = 50\text{ V}$ $I_D = 12.5\text{ A}$ $R_G = 4.7\ \Omega$ $V_{GS} = 5\text{ V}$ (Resistive Load, Figure 3)		20 40		ns ns
$Q_g$ $Q_{gs}$ $Q_{gd}$	Total Gate Charge Gate-Source Charge Gate-Drain Charge	$V_{DD} = 80\text{ V}$ $I_D = 25\text{ A}$ $V_{GS} = 5\text{ V}$		38 8.5 21	52	nC nC nC

### SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$ $t_f$	Turn-off Delay Time Fall Time	$V_{DD} = 50\text{ V}$ $I_D = 12.5\text{ A}$ $R_G = 4.7\ \Omega$ , $V_{GS} = 5\text{ V}$ (Resistive Load, Figure 3)		58 20		ns ns

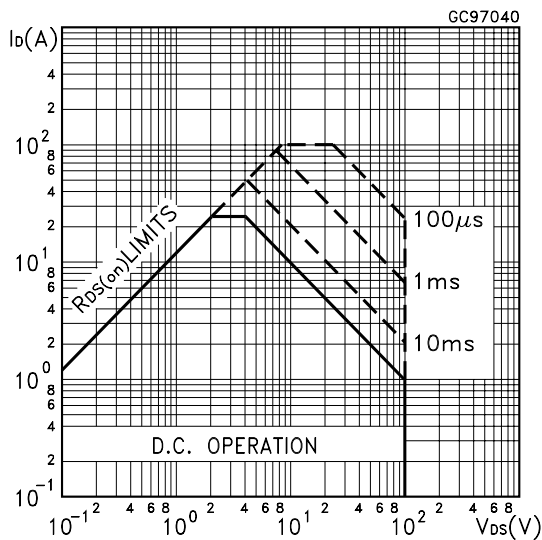
### SOURCE DRAIN DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{SD}$ $I_{SDM} (\bullet)$	Source-drain Current Source-drain Current (pulsed)				25 100	A A
$V_{SD} (*)$	Forward On Voltage	$I_{SD} = 25\text{ A}$ $V_{GS} = 0$			1.5	V
$t_{rr}$ $Q_{rr}$ $I_{RRM}$	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	$I_{SD} = 25\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 50\text{ V}$ $T_j = 150^\circ\text{C}$ (see test circuit, Figure 5)		88 317 7.2		ns nC A

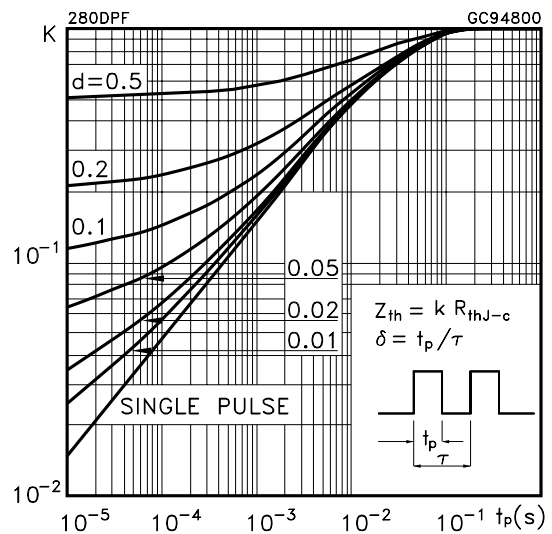
(\*)Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5 %.

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

Safe Operating Area

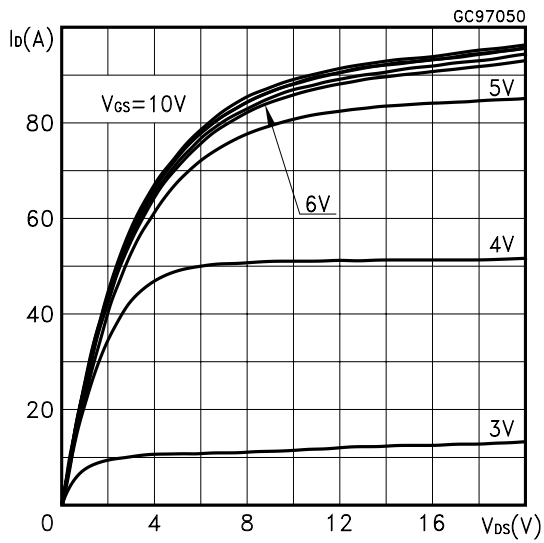


Thermal Impedance

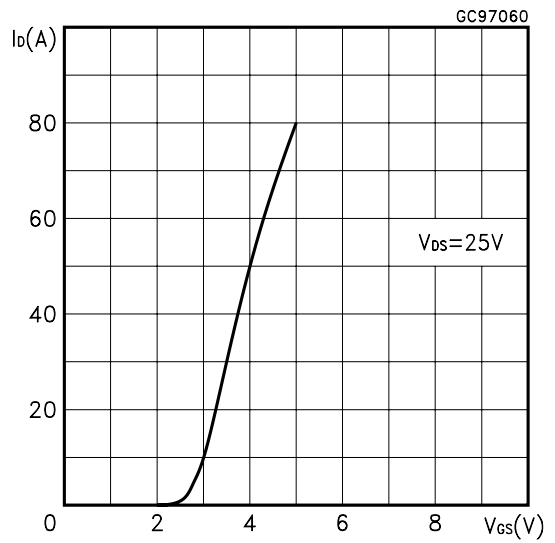


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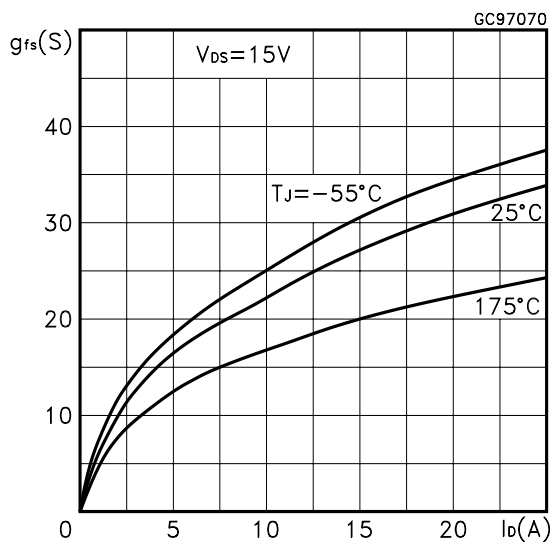
Output Characteristics



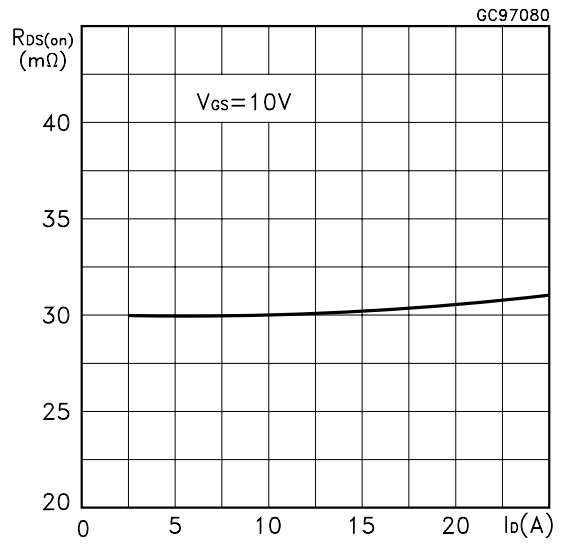
Transfer Characteristics



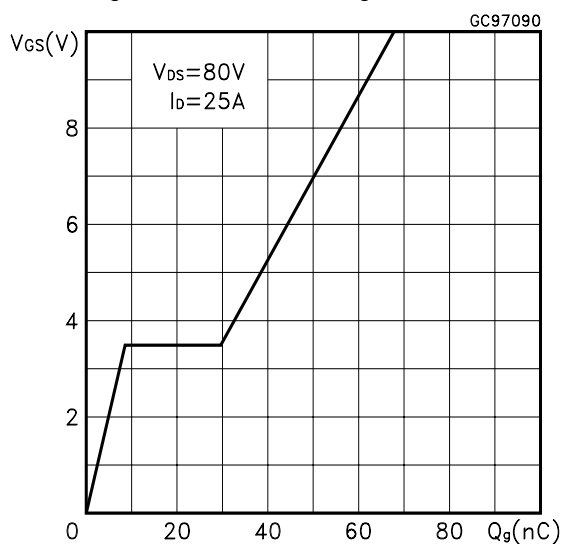
Transconductance



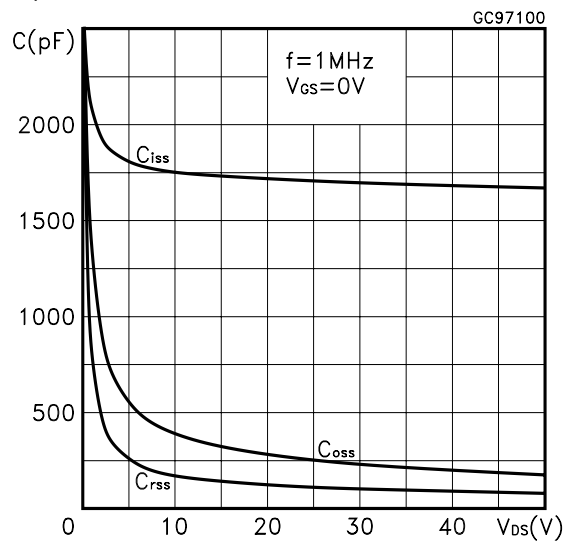
Static Drain-source On Resistance



Gate Charge vs Gate-source Voltage

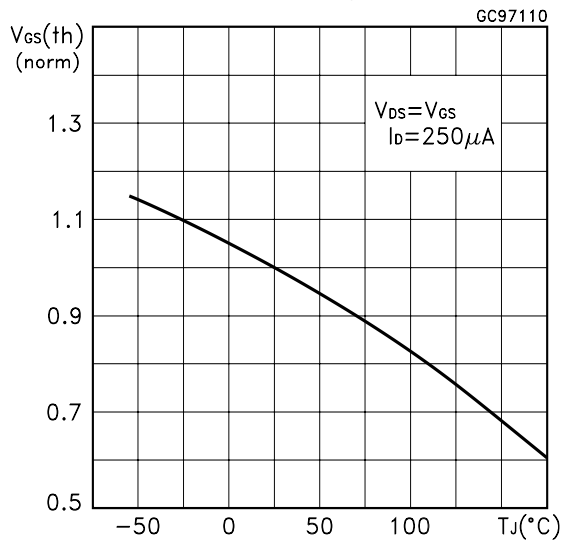


Capacitance Variations

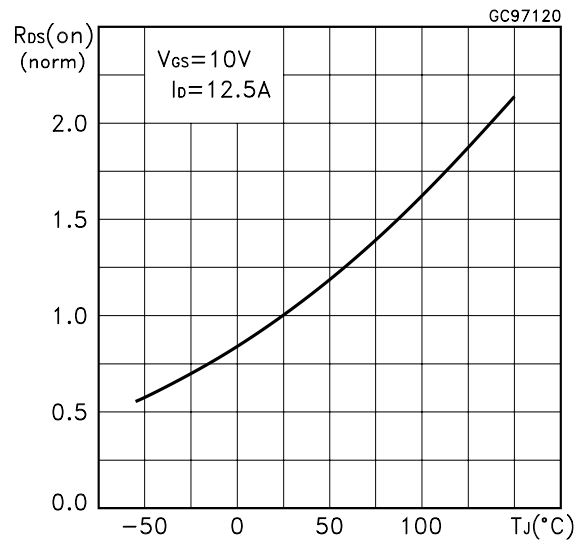


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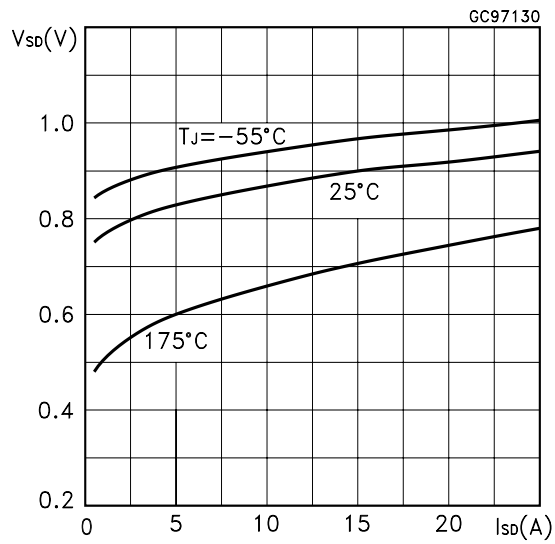
Normalized Gate Threshold Voltage vs Temperature



Normalized on Resistance vs Temperature



Source-drain Diode Forward Characteristics



Normalized Breakdown Voltage vs Temperature

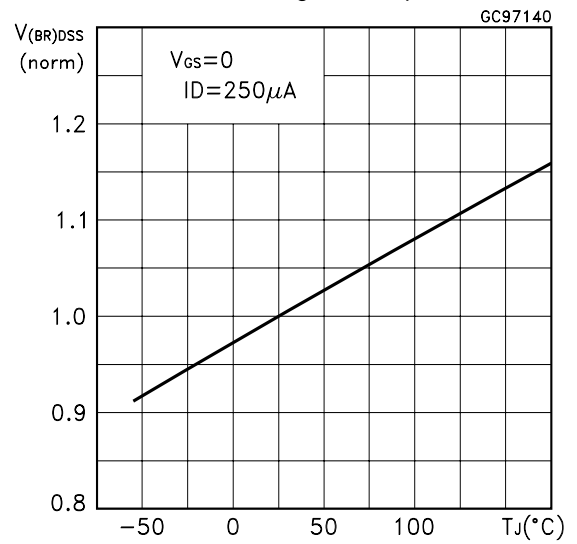


Fig. 1: Unclamped Inductive Load Test Circuit

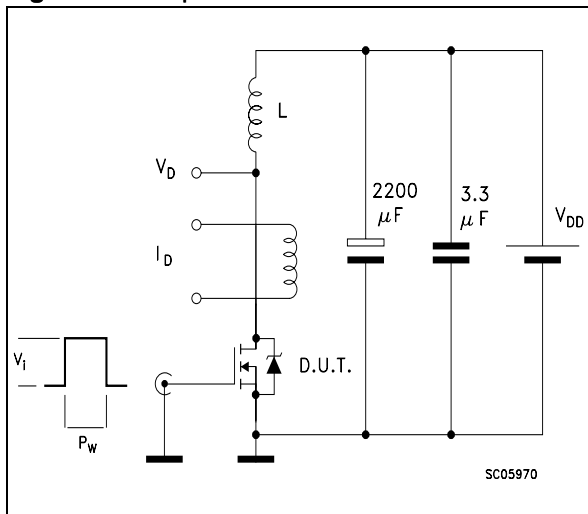


Fig. 2: Unclamped Inductive Waveform

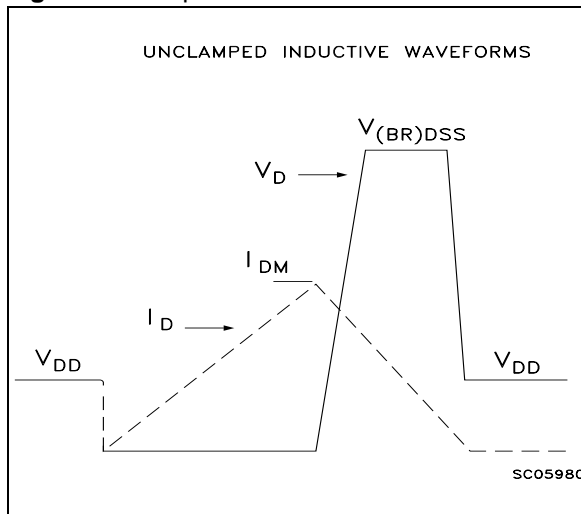


Fig. 3: Switching Times Test Circuits For Resistive Load

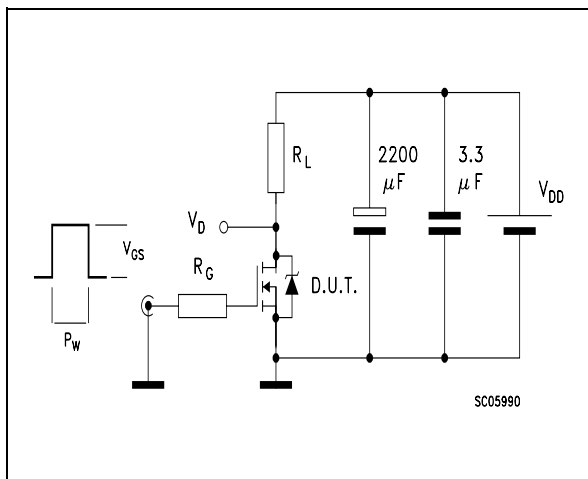


Fig. 4: Gate Charge test Circuit

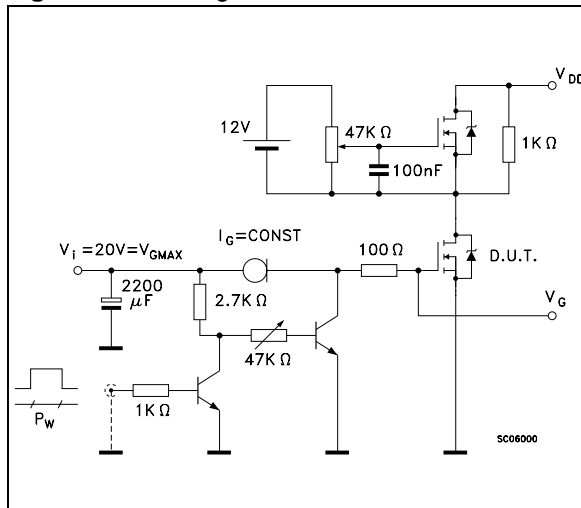
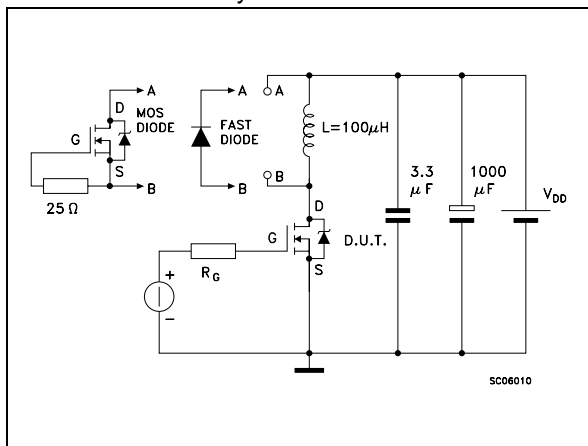
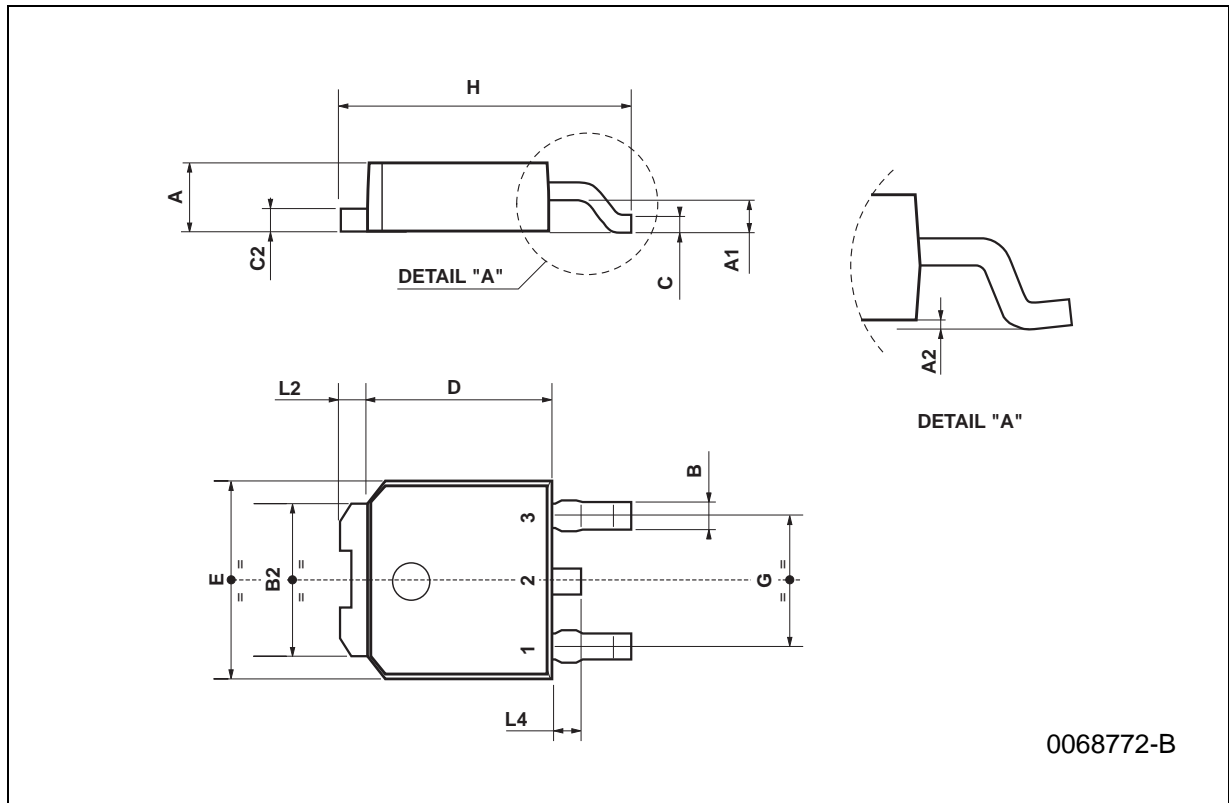


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times

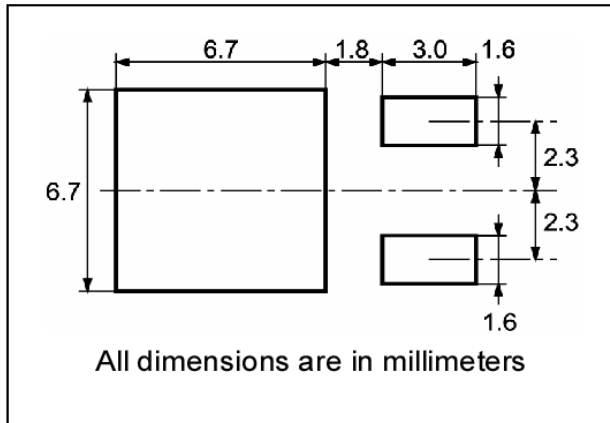


**TO-252 (DPAK) MECHANICAL DATA**

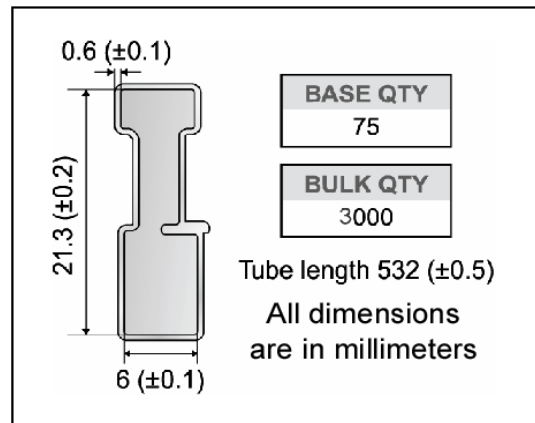
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	2.2		2.4	0.086		0.094
A1	0.9		1.1	0.035		0.043
A2	0.03		0.23	0.001		0.009
B	0.64		0.9	0.025		0.035
B2	5.2		5.4	0.204		0.212
C	0.45		0.6	0.017		0.023
C2	0.48		0.6	0.019		0.023
D	6		6.2	0.236		0.244
E	6.4		6.6	0.252		0.260
G	4.4		4.6	0.173		0.181
H	9.35		10.1	0.368		0.397
L2		0.8			0.031	
L4	0.6		1	0.023		0.039



**DPAK FOOTPRINT**



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



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

40 mm min. Access hole at slot location

Full radius

Tape slot in core for tape start 2.5mm min. width

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	16.4	18.4	0.645	0.724
N	50		1.968	
T		22.4		0.881

<b>BASE QTY</b>	<b>BULK QTY</b>
1000	1000

**TAPE MECHANICAL DATA**

DIM.	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A0	6.8	7	0.267	0.275
B0	10.4	10.6	0.409	0.417
B1		12.1		0.476
D	1.5	1.6	0.059	0.063
D1	1.5		0.059	
E	1.65	1.85	0.065	0.073
F	7.4	7.6	0.291	0.299
K0	2.55	2.75	0.100	0.108
P0	3.9	4.1	0.153	0.161
P1	7.9	8.1	0.311	0.319
P2	1.9	2.1	0.075	0.082
R	40		1.574	
W	15.7	16.3	0.618	0.641

For machine ref. only including draft and radii concentric around B0

10 pitches cumulative tolerance on tape +/- 0.2 mm

Center line of cavity

TRL

FEED DIRECTION

Bending radius R min.



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