



# STD100NH03L

N-CHANNEL 30V - 0.005  $\Omega$  - 60A DPAK  
STripFET™ III POWER MOSFET

TYPE	V <sub>DSS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>
STD100NH03L	30 V	< 0.0055 $\Omega$	60 A(2)

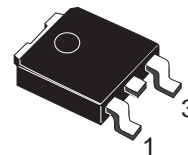
- TYPICAL R<sub>DS(on)</sub> = 0.005  $\Omega$  @ 10 V
- R<sub>DS(on)</sub> \* Q<sub>g</sub> INDUSTRY'S BENCHMARK
- CONDUCTION LOSSES REDUCED
- SWITCHING LOSSES REDUCED
- LOW THRESHOLD DEVICE
- SURFACE-MOUNTING DPAK (TO-252)  
POWER PACKAGE IN TAPE & REEL  
(SUFFIX "T4")

## DESCRIPTION

The **STD100NH03L** utilizes the latest advanced design rules of ST's proprietary STripFET™ technology. This is suitable for the most demanding DC-DC converter application where high efficiency is to be achieved.

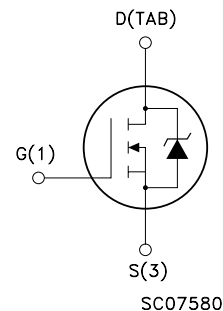
## APPLICATIONS

- SPECIFICALLY DESIGNED AND OPTIMISED FOR HIGH EFFICIENCY DC/DC CONVERTERS



**DPAK  
TO-252**  
(Suffix "T4")

## INTERNAL SCHEMATIC DIAGRAM



## Ordering Information

SALES TYPE	MARKING	PACKAGE	PACKAGING
STD100NH03LT4	D100NH03L	TO-252	TAPE & REEL

## 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> (2)	Drain Current (continuous) at T <sub>C</sub> = 25°C	60	A
I <sub>D</sub> (2)	Drain Current (continuous) at T <sub>C</sub> = 100°C	60	A
I <sub>DM</sub> (3)	Drain Current (pulsed)	240	A
P <sub>tot</sub>	Total Dissipation at T <sub>C</sub> = 25°C	100	W
	Derating Factor	0.66	W/°C
E <sub>AS</sub> (4)	Single Pulse Avalanche Energy	700	mJ
T <sub>stg</sub>	Storage Temperature	-55 to 175	°C
T <sub>j</sub>	Max. Operating Junction Temperature		

## STD100NH03L

### THERMAL DATA

R <sub>thj-case</sub>	Thermal Resistance Junction-case	Max	1.5	°C/W
R <sub>thj-amb</sub>	Thermal Resistance Junction-ambient	Max	100	°C/W
R <sub>thj-pcb</sub>	Thermal Resistance Junction-pcb(#)	Max	43	°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	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> = ± 20V			±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	1.8	2.5	V
R <sub>DS(on)</sub>	Static Drain-source On Resistance	V <sub>GS</sub> = 10 V I <sub>D</sub> = 30 A V <sub>GS</sub> = 5 V I <sub>D</sub> = 30 A		0.005 0.0060	0.0055 0.0105	Ω Ω

### DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g <sub>fs</sub> (5)	Forward Transconductance	V <sub>DS</sub> = 10 V I <sub>D</sub> = 30 A		40		S
C <sub>iss</sub> C <sub>oss</sub> C <sub>rss</sub>	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V <sub>DS</sub> = 15V f = 1 MHz V <sub>GS</sub> = 0		4100 680 70		pF pF pF
R <sub>G</sub>	Gate Input Resistance	f = 1 MHz Gate DC Bias = 0 Test Signal Level = 20 mV Open Drain		1.3		Ω

## STD100NH03L

### ELECTRICAL CHARACTERISTICS (continued)

#### SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ $t_r$	Turn-on Delay Time Rise Time	$V_{DD} = 15\text{ V}$ $I_D = 30\text{ A}$ $R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$ (Resistive Load, Figure 3)		16 95		ns ns
$Q_g$ $Q_{gs}$ $Q_{gd}$	Total Gate Charge Source Gate Charge Gate-Drain Charge	$V_{DD} = 15\text{ V}$ $I_D = 60\text{ A}$ $V_{GS} = 10\text{ V}$		57 11.8 7.3	77	nC nC nC
$Q_{oss}^{(6)}$	Output Charge	$V_{DS} = 16\text{ V}$ $V_{GS} = 0\text{ V}$		27		nC
$Q_{gls}^{(7)}$	Third-quadrant Gate Charge	$V_{DS} < 0\text{ V}$ $V_{GS} = 10\text{ V}$		55		nC

#### SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$ $t_f$	Turn-off Delay Time Fall Time	$V_{DD} = 15\text{ V}$ $I_D = 30\text{ A}$ $R_G = 4.7\ \Omega$ , $V_{GS} = 10\text{ V}$ (Resistive Load, Figure 3)		48 23		ns ns

#### SOURCE DRAIN DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{SD}$ $I_{SDM}$	Source-drain Current Source-drain Current (pulsed)				60 240	A A
$V_{SD}^{(5)}$	Forward On Voltage	$I_{SD} = 30\text{ A}$ $V_{GS} = 0$			1.4	V
$t_{rr}$ $Q_{rr}$ $I_{RRM}$	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	$I_{SD} = 60\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 30\text{ V}$ $T_J = 150^\circ\text{C}$ (see test circuit, Figure 5)		46 64 2.8	62 86	ns nC A

(2) Value limited by wire bonding

(3) Pulse width limited by safe operating area.

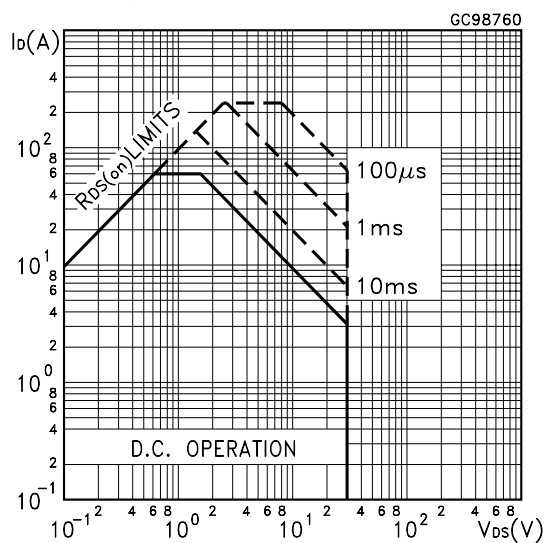
(4) Starting  $T_J = 25^\circ\text{C}$ ,  $I_D = 30\text{ A}$ ,  $V_{DD} = 15\text{ V}$

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

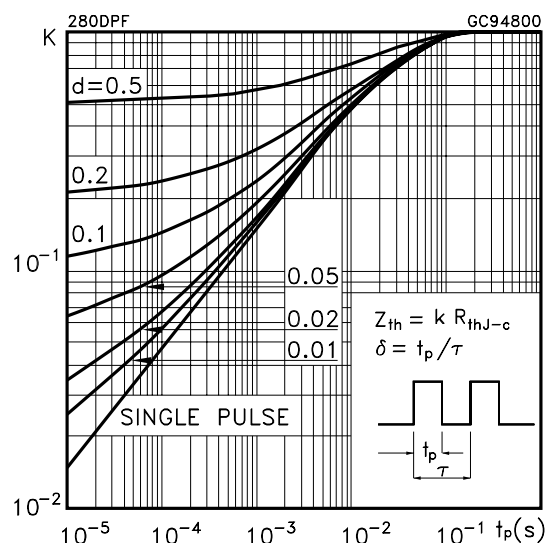
(6)  $Q_{oss} = C_{oss} \cdot \Delta V_{in}$ ,  $C_{oss} = C_{gd} + C_{ds}$ . See Appendix A

(7) Gate charge for synchronous operation

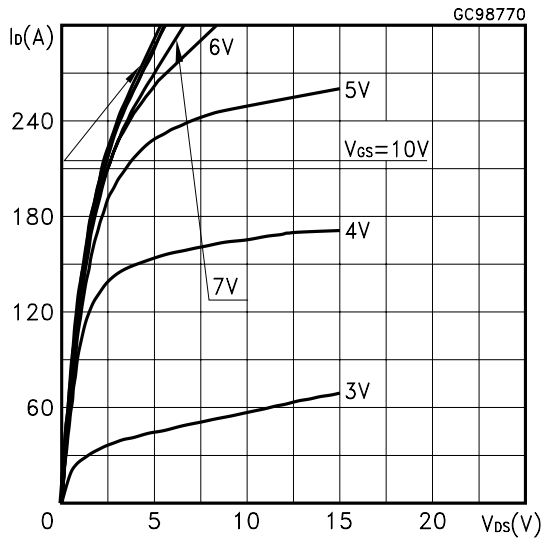
#### Safe Operating Area



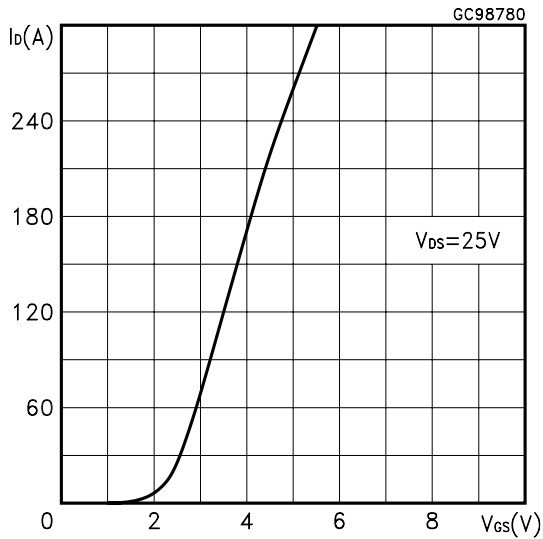
#### Thermal Impedance



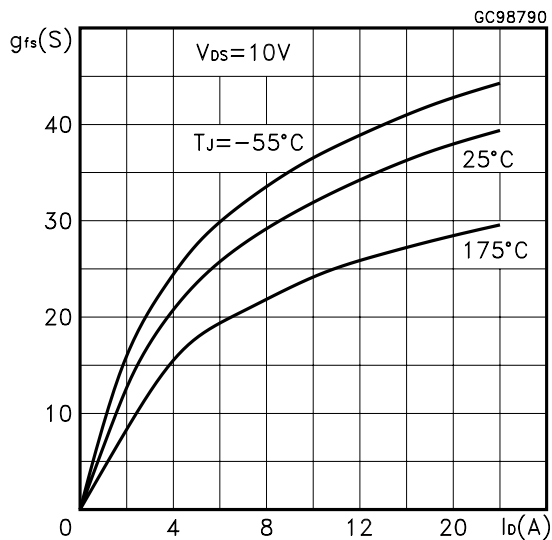
Output Characteristics



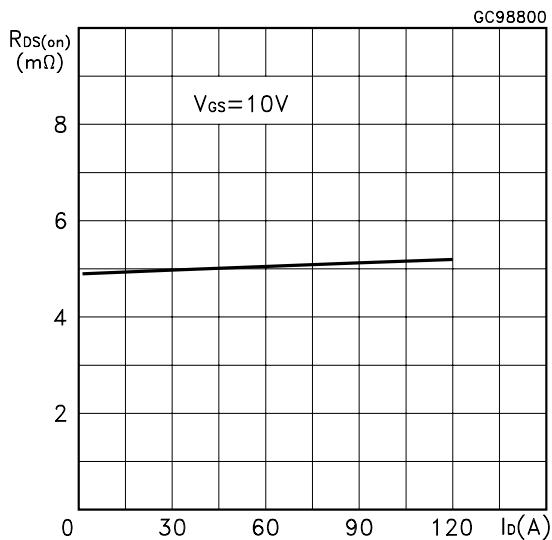
Transfer Characteristics



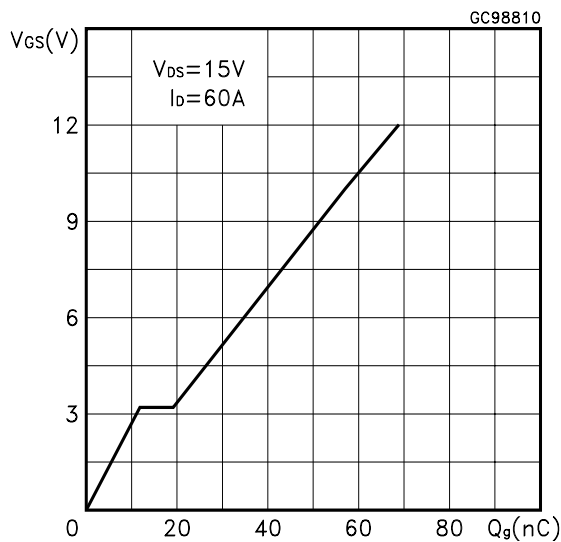
Transconductance



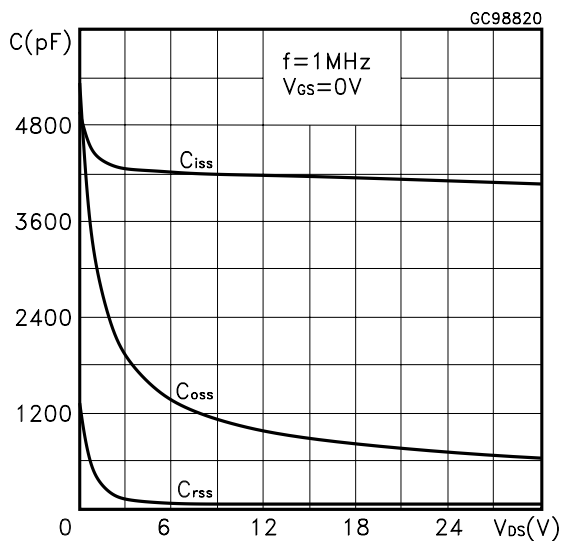
Static Drain-source On Resistance



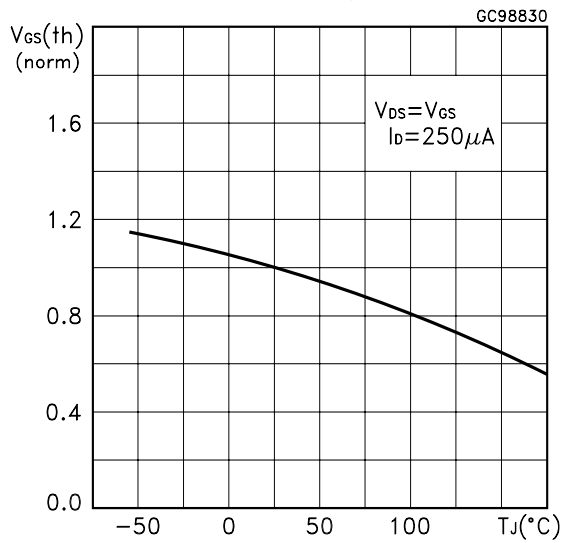
Gate Charge vs Gate-source Voltage



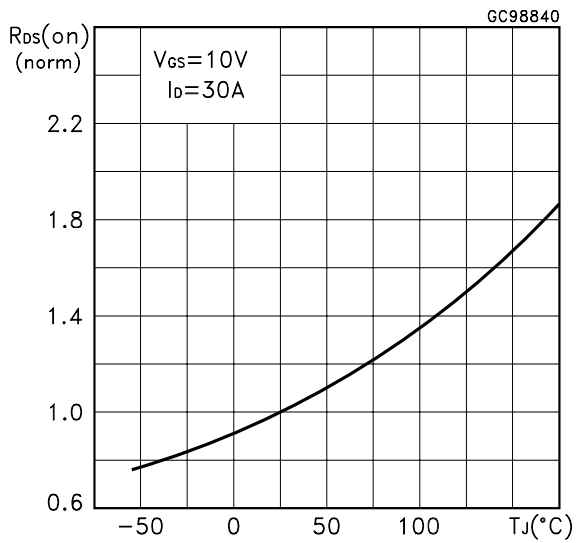
Capacitance Variations



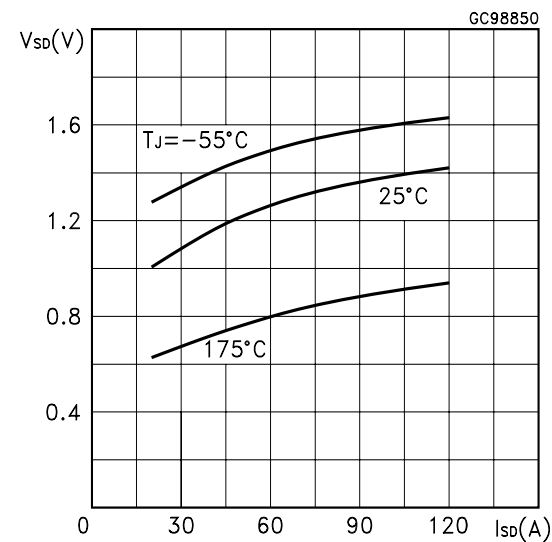
Normalized Gate Threshold Voltage vs Temperature



Normalized on Resistance vs Temperature



Source-drain Diode Forward Characteristics



Normalized Breakdown Voltage vs Temperature

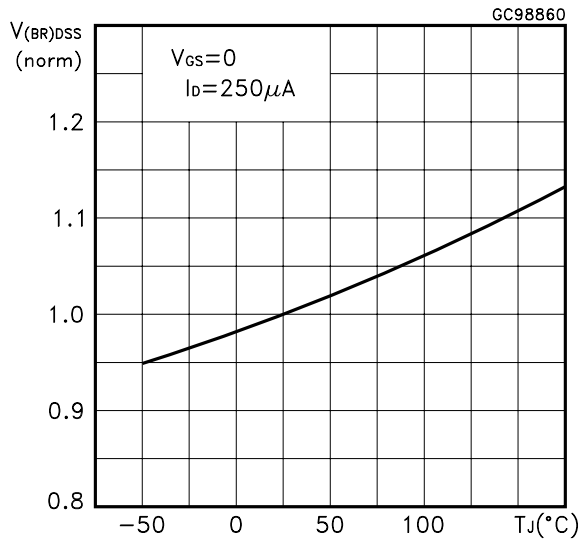


Fig. 1: Unclamped Inductive Load Test Circuit

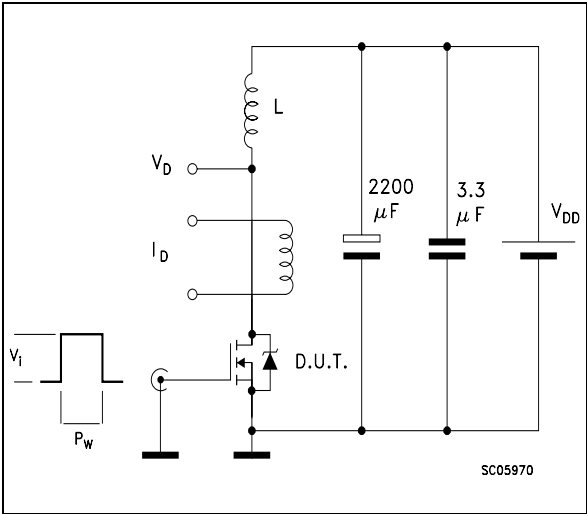


Fig. 2: Unclamped Inductive Waveform

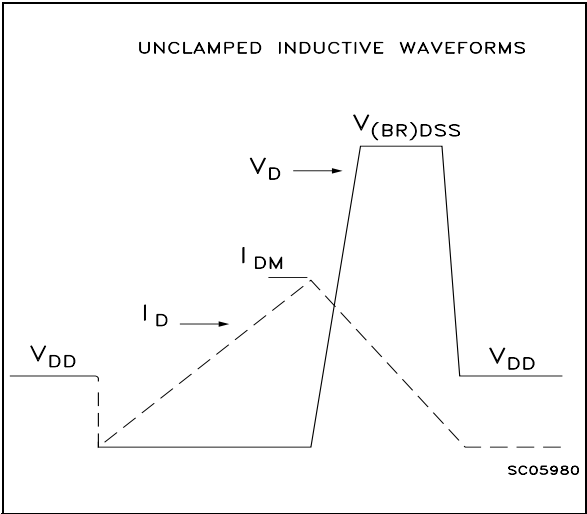


Fig. 3: Switching Times Test Circuits For Resistive Load

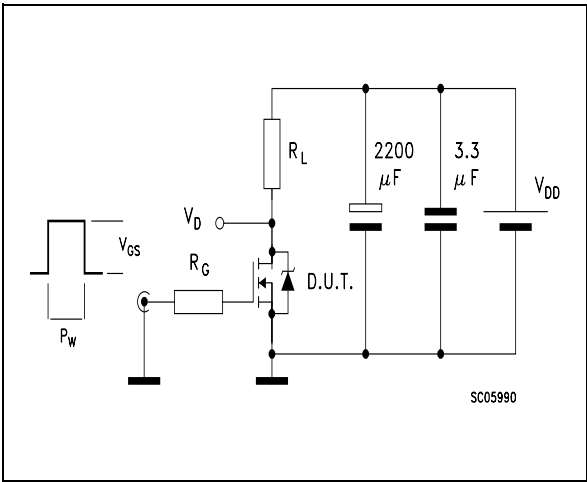


Fig. 4: Gate Charge test Circuit

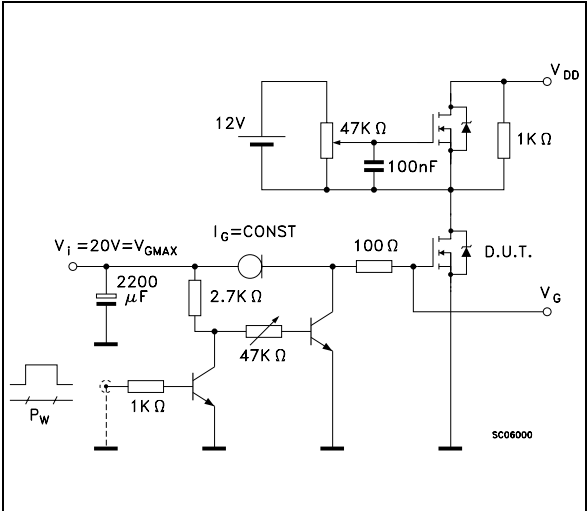
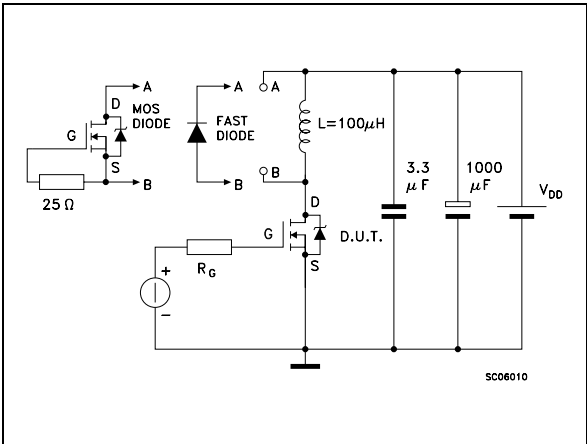
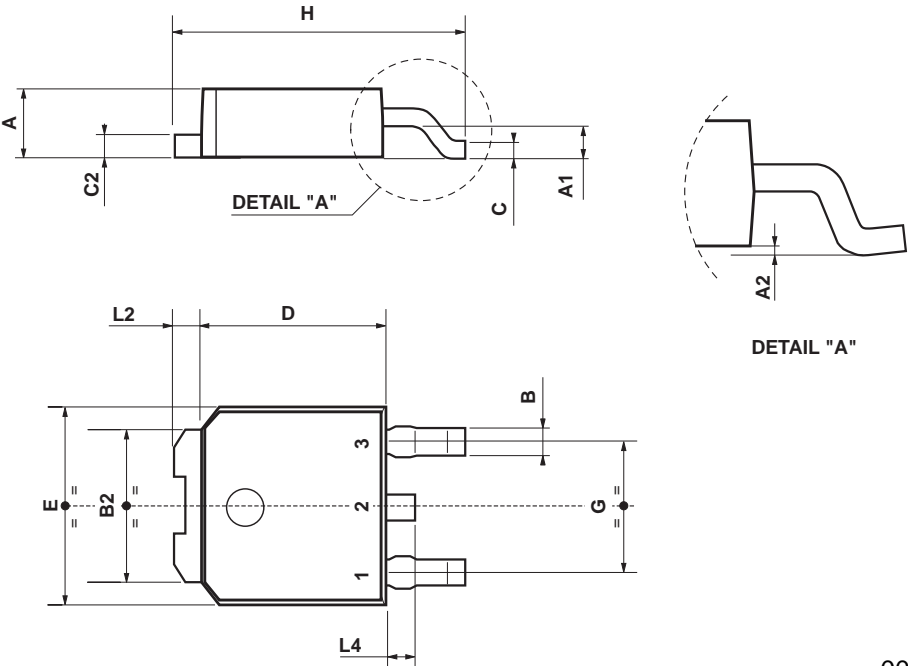


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



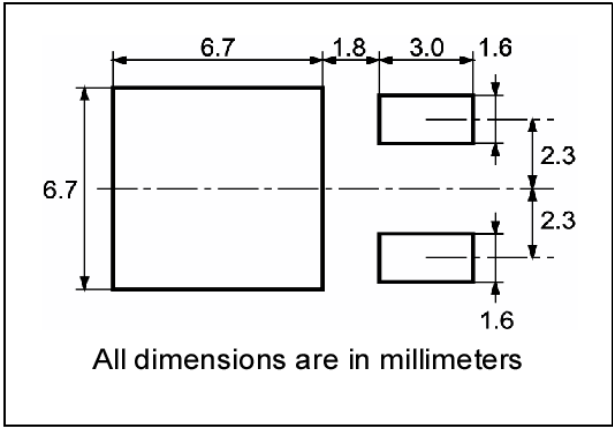
TO-252 (DPAK) MECHANICAL DATA

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

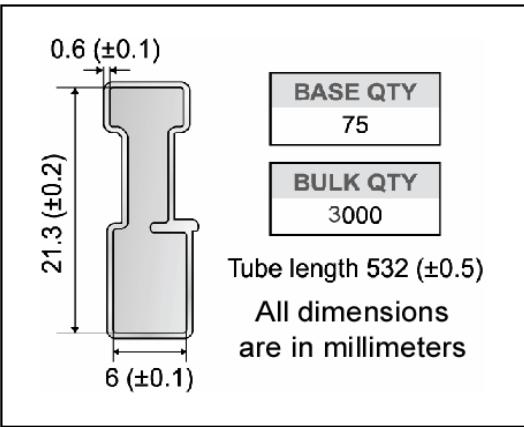


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### DPAK FOOTPRINT



### TUBE SHIPMENT (no suffix)\*



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

