



# STT3PF20V

## P-CHANNEL 20V - 0.14 $\Omega$ - 2.2A SOT23-6L 2.7-DRIVE STripFET™ II POWER MOSFET

TYPE	V <sub>DSS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>
STT3PF20V	20 V	< 0.20 $\Omega$ (@4.5V) < 0.25 $\Omega$ (@2.7V)	2.2 A

- TYPICAL R<sub>DS(on)</sub> = 0.14  $\Omega$  (@4.5V)
- TYPICAL R<sub>DS(on)</sub> = 0.20  $\Omega$  (@2.7V)
- ULTRA LOW THRESHOLD GATE DRIVE (2.7V)
- STANDARD OUTLINE FOR EASY AUTOMATED SURFACE MOUNT ASSEMBLY

### DESCRIPTION

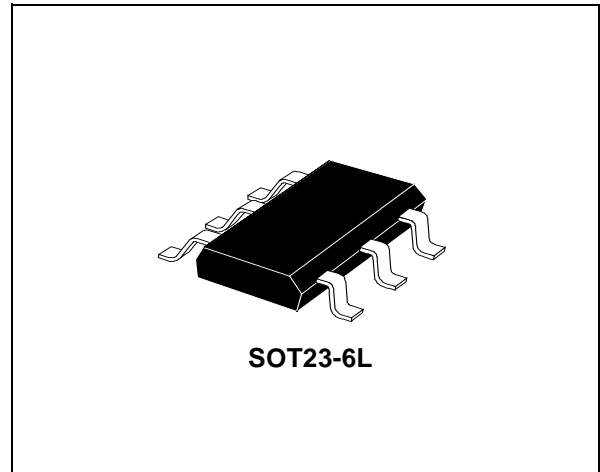
This Power MOSFET is the latest development of STMicroelectronics unique "Single Feature Size™" strip-based process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing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

### APPLICATIONS

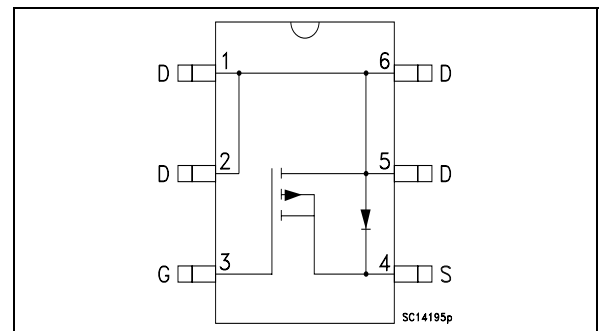
- DC-DC CONVERTERS
- BATTERY MANAGEMENT IN NOMADIC EQUIPMENT
- CELLULAR

### MARKING

- STP2



### INTERNAL SCHEMATIC DIAGRAM



### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V <sub>DS</sub>	Drain-source Voltage (V <sub>GS</sub> = 0)	20	V
V <sub>DGR</sub>	Drain-gate Voltage (R <sub>GS</sub> = 20 k $\Omega$ )	20	V
V <sub>GS</sub>	Gate- source Voltage	$\pm$ 12	V
I <sub>D</sub>	Drain Current (continuous) at T <sub>C</sub> = 25°C	2.2	A
I <sub>D</sub>	Drain Current (continuous) at T <sub>C</sub> = 100°C	1.39	A
I <sub>DM</sub> (●)	Drain Current (pulsed)	8.8	A
P <sub>tot</sub>	Total Dissipation at T <sub>C</sub> = 25°C	1.6	W

(●) Pulse width limited by safe operating area.

Note: P-CHANNEL MOSFET actual polarity of voltages and current has to be reversed

## STT3PF20V

### THERMAL DATA

Rthj-amb $T_j$ $T_{stg}$	(*)Thermal Resistance Junction-ambient Max. Operating Junction Temperature Storage Temperature	Max	78 -55 to 150 -55 to 150	°C/W °C °C
--------------------------------	--	-----	--------------------------------	------------------

(\*) Mounted on a 1 inch pad of 2 oz. Cu in FR-4 board

(\*\*) Mounted on a minimum pad of 2 oz. Cu in FR-4 board

### ELECTRICAL CHARACTERISTICS ( $T_{case} = 25\text{ °C}$ unless otherwise specified)

#### OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source Breakdown Voltage	$I_D = 250\ \mu A, V_{GS} = 0$	20			V
$I_{DSS}$	Zero Gate Voltage Drain Current ( $V_{GS} = 0$ )	$V_{DS} = \text{Max Rating}$ $V_{DS} = \text{Max Rating } T_C = 125\text{°C}$			1 10	$\mu A$ $\mu A$
$I_{GSS}$	Gate-body Leakage Current ( $V_{DS} = 0$ )	$V_{GS} = \pm 12\text{ V}$			$\pm 100$	nA

#### ON (\*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS} \quad I_D = 250\ \mu A$	0.6			V
$R_{DS(on)}$	Static Drain-source On Resistance	$V_{GS} = 4.5\text{ V} \quad I_D = 1\text{ A}$ $V_{GS} = 2.7\text{ V} \quad I_D = 1\text{ A}$		0.14 0.20	0.20 0.25	$\Omega$ $\Omega$

#### DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$g_{fs} (*)$	Forward Transconductance	$V_{DS} = 15\text{ V} \quad I_D = 1\text{ A}$		4		S
$C_{iss}$ $C_{oss}$ $C_{rss}$	Input Capacitance Output Capacitance Reverse Transfer Capacitance	$V_{DS} = 15\text{ V } f = 1\text{ MHz}, V_{GS} = 0$		315 87 17		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	$V_{DD} = 10\text{ V}$ $I_D = 1\text{ A}$ $R_G = 4.7\ \Omega$ $V_{GS} = 4.5\text{ V}$ (Resistive Load, Figure 3)		38 30		ns ns
$Q_g$ $Q_{gs}$ $Q_{gd}$	Total Gate Charge Gate-Source Charge Gate-Drain Charge	$V_{DD} = 10\text{ V}$ $I_D = 2\text{ A}$ $V_{GS} = 4.5\text{ V}$		3.5 0.34 0.8	4.7	nC nC nC

**SWITCHING OFF**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$ $t_f$	Turn-off Delay Time Fall Time	$V_{DD} = 10\text{ V}$ $I_D = 1\text{ A}$ $R_G = 4.7\ \Omega$ , $V_{GS} = 4.5\text{ V}$ (Resistive Load, Figure 3)		45 11		ns ns

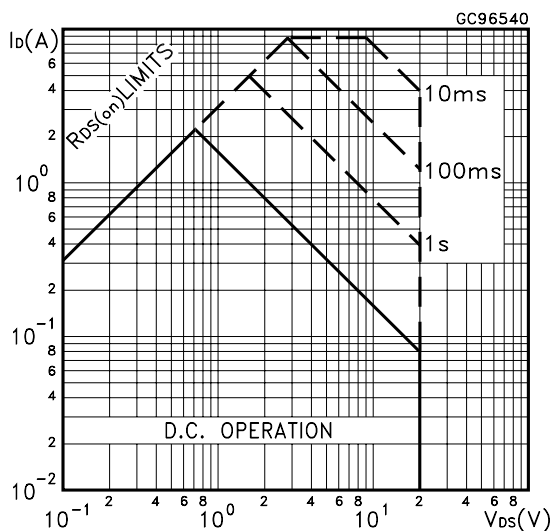
**SOURCE DRAIN DIODE**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{SD}$ $I_{SDM}(\bullet)$	Source-drain Current Source-drain Current (pulsed)				2.2 8.8	A A
$V_{SD}(\ast)$	Forward On Voltage	$I_{SD} = 2\text{ A}$ $V_{GS} = 0$			1.2	V
$t_{rr}$ $Q_{rr}$ $I_{RRM}$	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	$I_{SD} = 2\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 10\text{ V}$ $T_j = 150^\circ\text{C}$ (see test circuit, Figure 5)		15 7.5 1		ns nC A

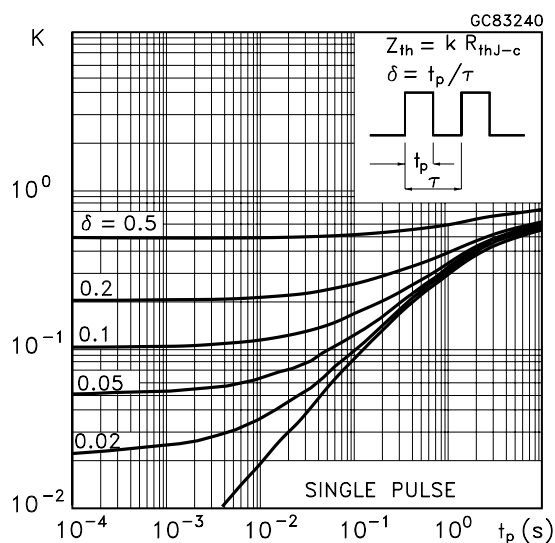
( $\ast$ ) Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5 %.

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

Safe Operating Area

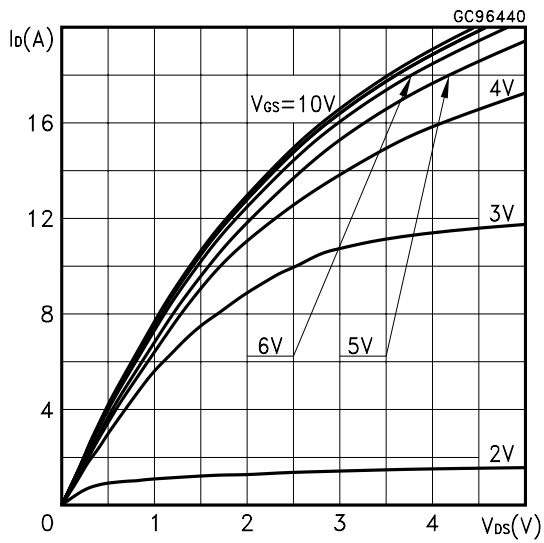


Thermal Impedance

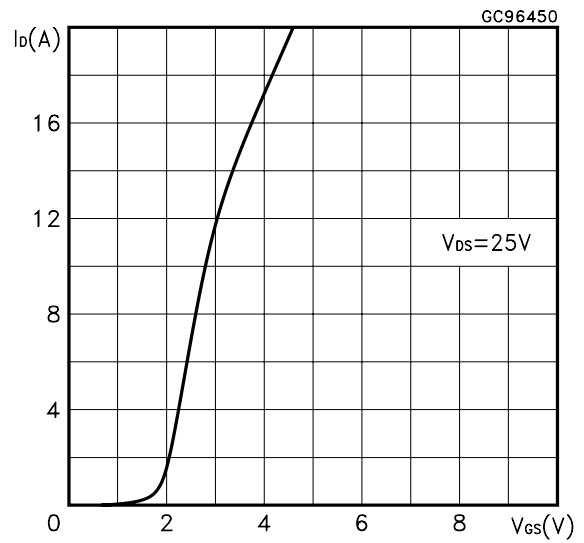


# STT3PF20V

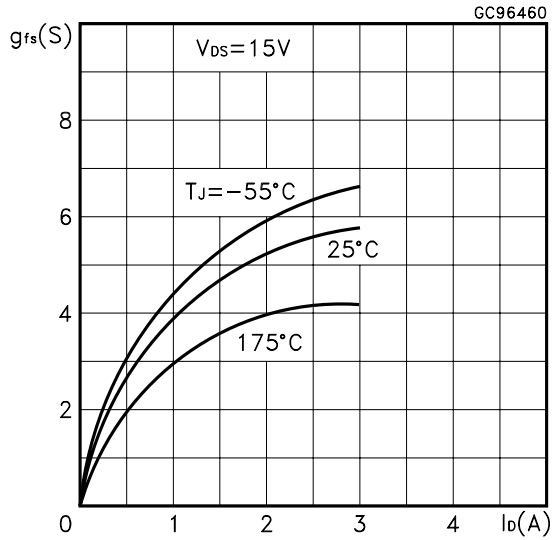
Output Characteristics



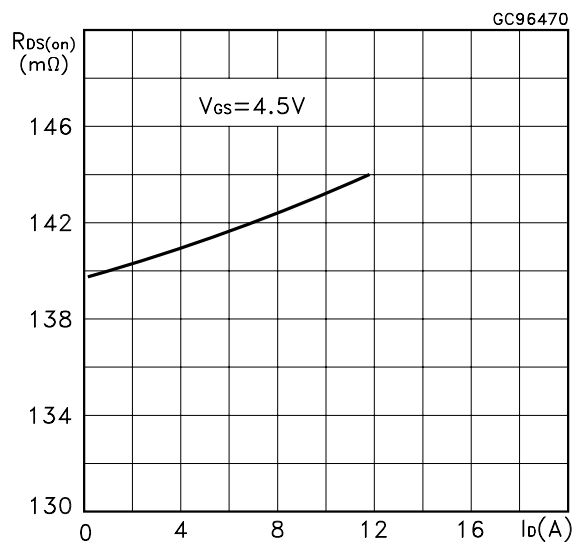
Transfer Characteristics



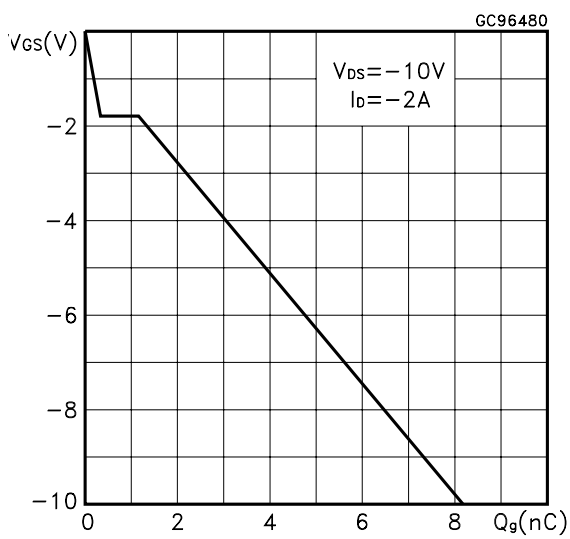
Transconductance



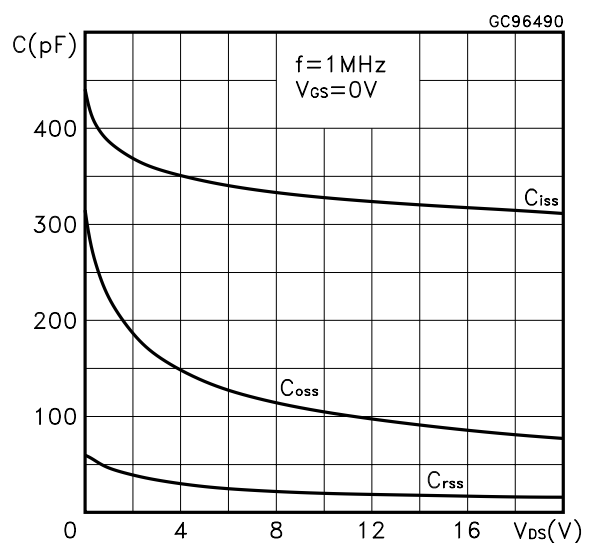
Static Drain-source On Resistance



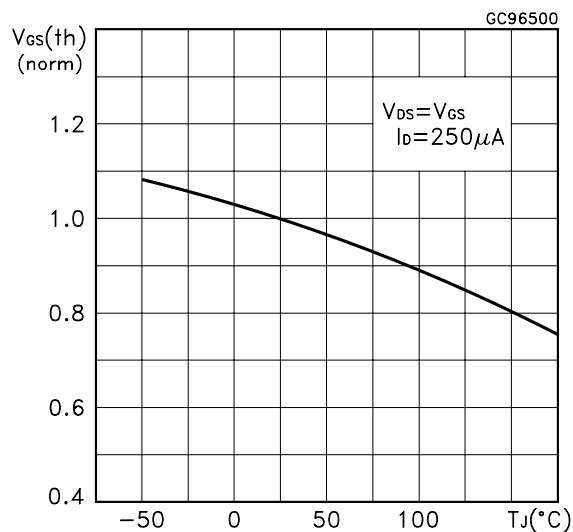
Gate Charge vs Gate-source Voltage



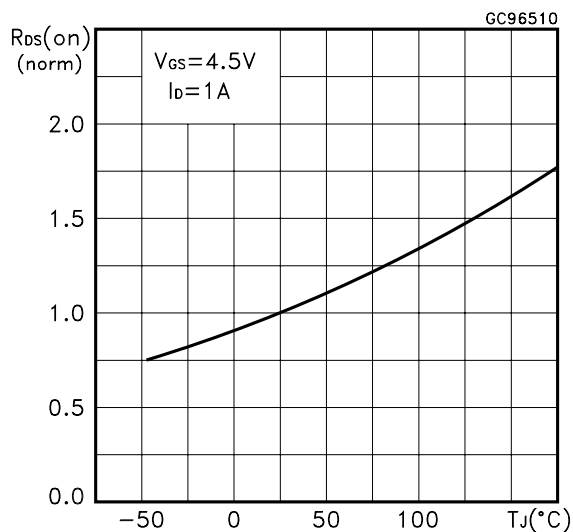
Capacitance Variations



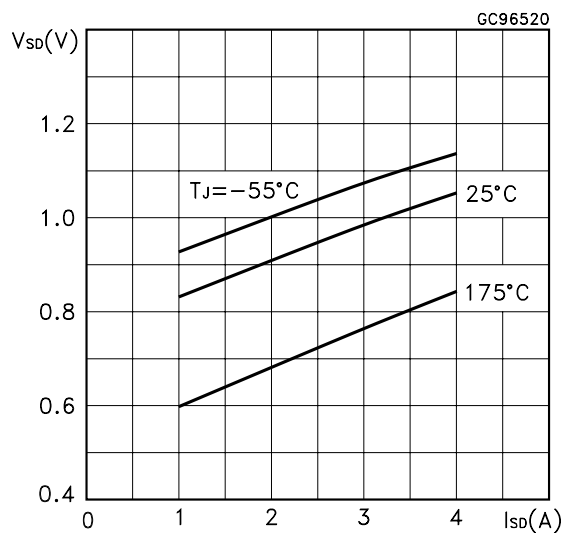
Normalized Gate Threshold Voltage vs Temperature



Normalized on Resistance vs Temperature



Source-drain Diode Forward Characteristics



Normalized Breakdown Voltage vs Temperature.

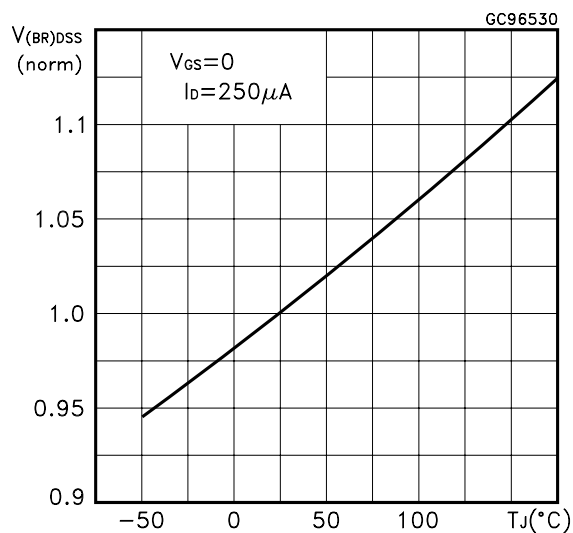


Fig. 1: Unclamped Inductive Load Test Circuit

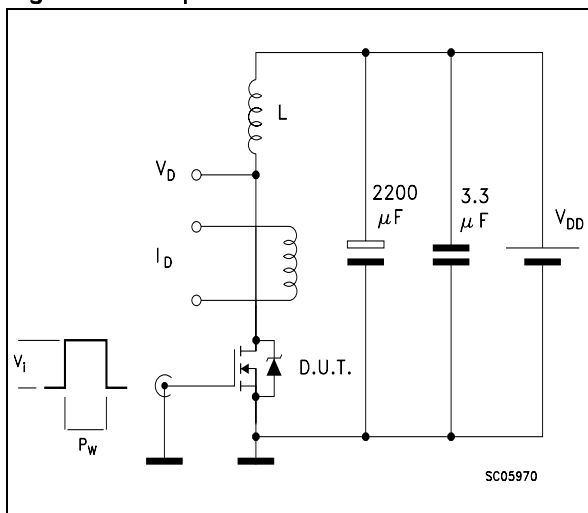


Fig. 2: Unclamped Inductive Waveform

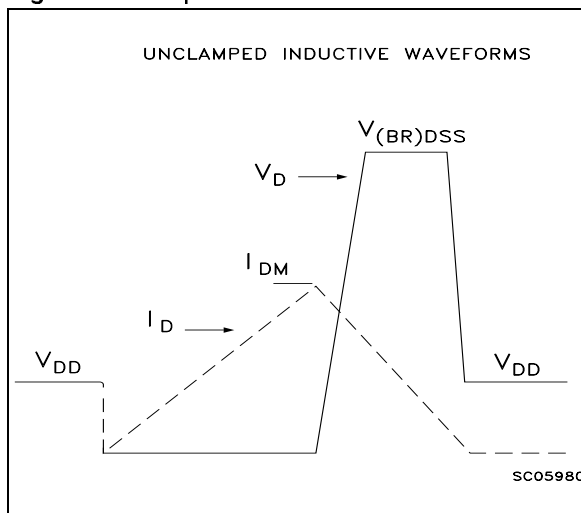


Fig. 3: Switching Times Test Circuits For Resistive Load

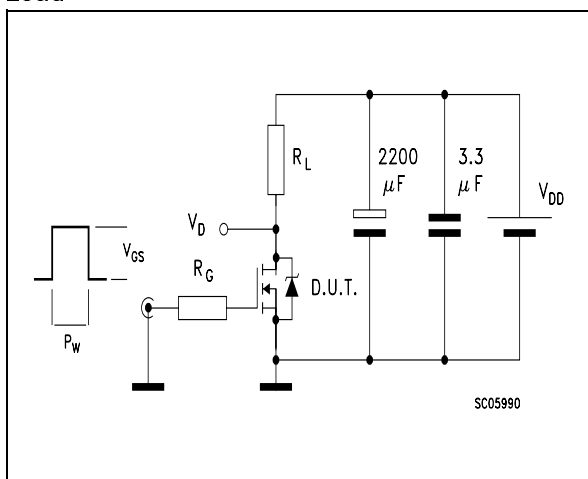


Fig. 4: Gate Charge test Circuit

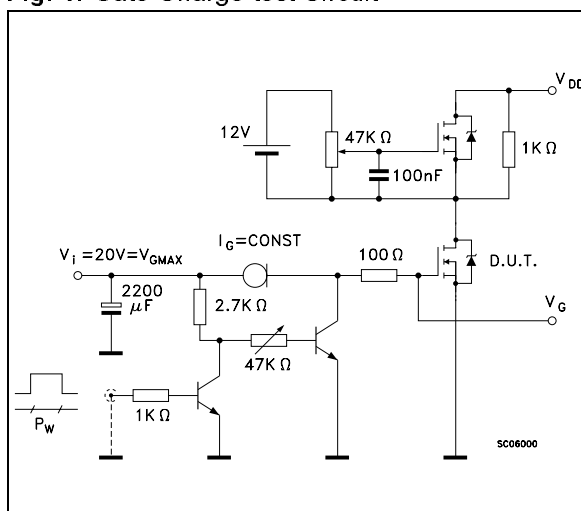
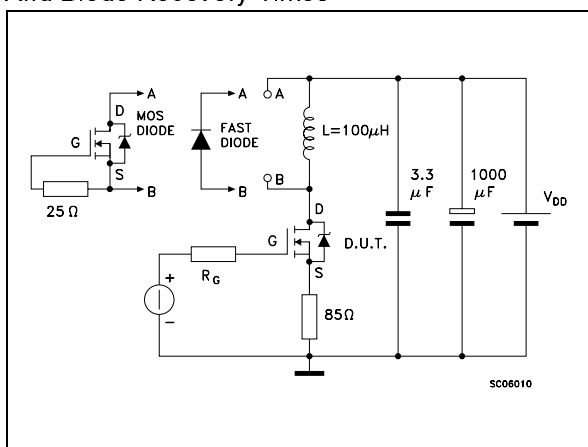
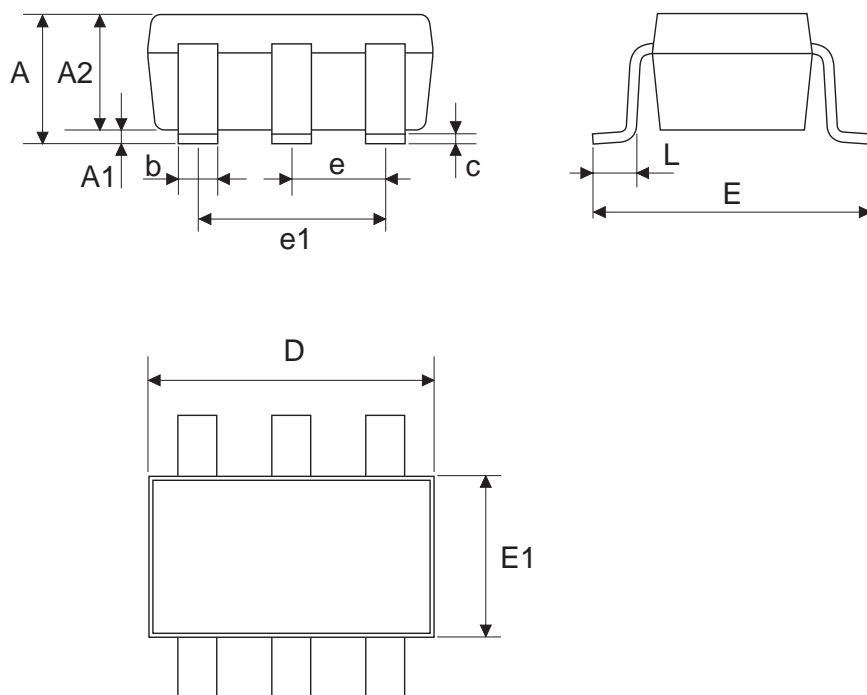


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



## SOT23-6L MECHANICAL DATA

DIM.	mm			mils		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	0.90		1.45	0.035		0.057
A1	0.00		0.15	0.000		0.006
A2	0.90		1.30	0.035		0.051
b	0.25		0.50	0.010		0.020
C	0.09		0.20	0.004		0.008
D	2.80		3.10	0.110		0.122
E	2.60		3.00	0.102		0.118
E1	1.50		1.75	0.059		0.069
L	0.35		0.55	0.014		0.022
e		0.95			0.037	
e1		1.90			0.075	



Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

The ST logo is registered trademark of STMicroelectronics  
© 2002 STMicroelectronics - All Rights Reserved

All other names are the property of their respective owners.

STMicroelectronics GROUP OF COMPANIES  
Australia - Brazil - Canada - China - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco -  
Singapore - Spain - Sweden - Switzerland - United Kingdom - United States.

<http://www.st.com>