



# STS25NH3LL

## N-CHANNEL 30V - 0.0032 $\Omega$ - 25A SO-8 STripFET™ III MOSFET FOR DC-DC CONVERSION

TYPE	V <sub>DSS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>
STS25NH3LL	30 V	<0.0035 $\Omega$	25 A

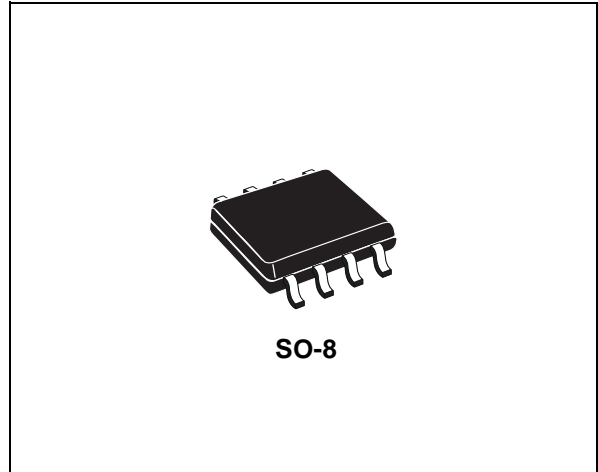
- TYPICAL R<sub>DS(on)</sub> = 0.0032  $\Omega$  @ 10V
- OPTIMAL R<sub>DS(on)</sub> x Q<sub>g</sub> TRADE-OFF @ 4.5V
- CONDUCTION LOSSES REDUCED
- SWITCHING LOSSES REDUCED

### DESCRIPTION

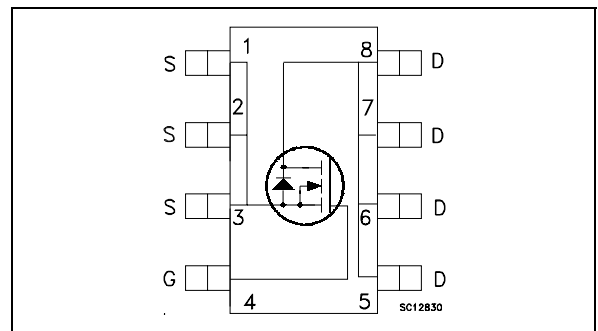
The STS25NH3LL utilizes the latest advanced design rules of ST's proprietary STripFET™ technology. This novel 0.6 $\mu$  process coupled to unique metalization techniques realizes the most advanced low voltage MOSFET in SO-8 ever produced. It is therefore suit able for the most demanding DC-DC converter applications where high efficiency is to be achieved at high output current.

### APPLICATIONS

- DC-DC CONVERTERS FOR TELECOM AND NOTEBOOK CPU CORE
- SYNCHRONOUS RECTIFIER



### INTERNAL SCHEMATIC DIAGRAM



### Ordering Information

SALES TYPE	MARKING	PACKAGE	PACKAGING
STS25NH3LL	S25NH3LL	SO-8	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	$\pm 18$	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	18	A
I <sub>DM</sub> (•)	Drain Current (pulsed)	100	A
E <sub>AS</sub> (1)	Single Pulse Avalanche Energy	200	mJ
P <sub>tot</sub>	Total Dissipation at T <sub>C</sub> = 25°C	3.2	W

(•) Pulse width limited by safe operating area.

(1) Starting T<sub>j</sub> = 25 °C I<sub>D</sub> = 12.5A V<sub>DD</sub> = 30V

## STS25NH3LL

### THERMAL DATA

Rthj-amb	(*)Thermal Resistance Junction-ambient	Max	47	°C/W
Rthj-lead	Thermal Resistance Junction-leads	Max	16	°C/W
T <sub>j</sub>	Maximum Operating Junction Temperature		-55 to 175	°C
T <sub>stg</sub>	Storage Temperature		-55 to 175	°C

(\*) When Mounted on 1 inch<sup>2</sup> FR-4 board, 2 oz of Cu and t ≤ 10 sec.

### 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> = ± 18 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			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		0.0032 0.004	0.0035 0.005	Ω Ω

#### DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g <sub>fs</sub> (*)	Forward Transconductance	V <sub>DS</sub> = 10 V I <sub>D</sub> = 12.5 A		30		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		4450 655 50		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	$V_{DD} = 15\text{ V}$ $I_D = 12.5\text{ A}$ $R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$ (Resistive Load, Figure 1)		18 50		ns ns
$Q_g$ $Q_{gs}$ $Q_{gd}$	Total Gate Charge Gate-Source Charge Gate-Drain Charge	$V_{DD}=15\text{ V}$ $I_D=25\text{ A}$ $V_{GS}=4.5\text{ V}$ (see test circuit, Figure 2)		30 12.5 10	40	nC nC nC

**SWITCHING OFF**

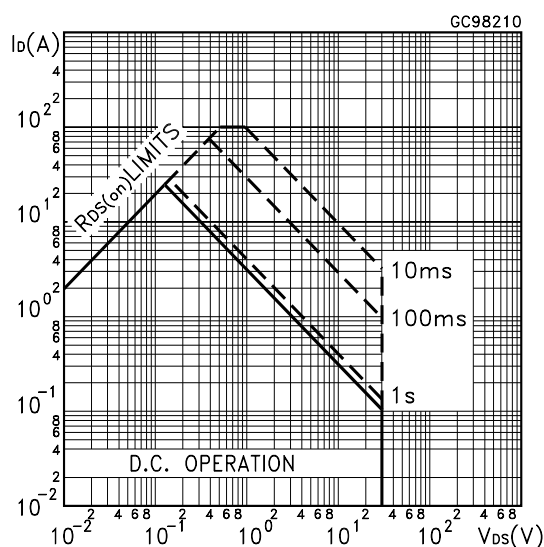
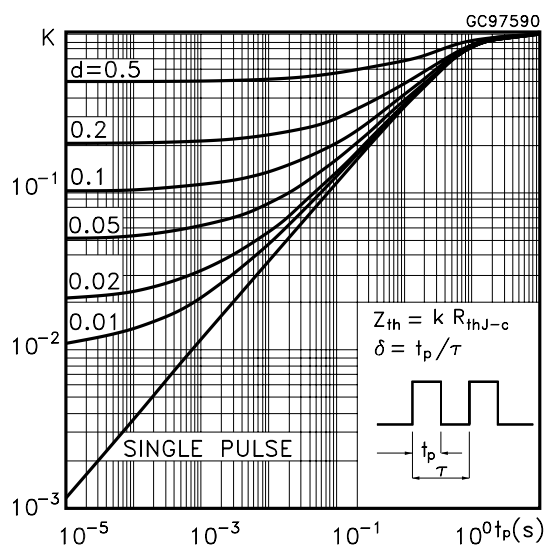
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$ $t_f$	Turn-off Delay Time Fall Time	$V_{DD} = 15\text{ V}$ $I_D = 12.5\text{ A}$ $R_G = 4.7\ \Omega$ , $V_{GS} = 10\text{ V}$ (Resistive Load, Figure 3)		75 8		ns ns

**SOURCE DRAIN DIODE**

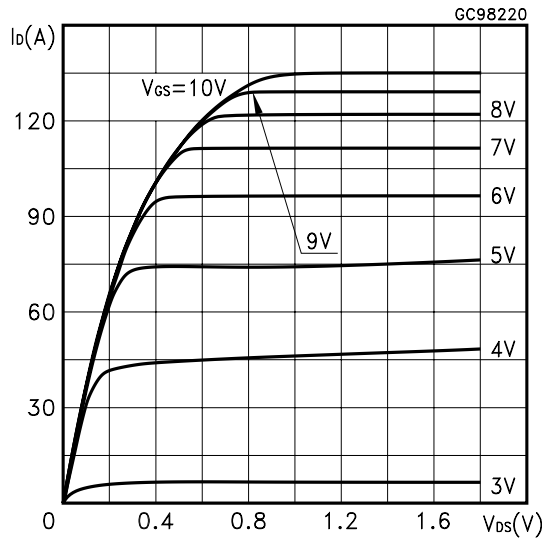
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{SD}$ $I_{SDM}$	Source-drain Current Source-drain Current (pulsed)				25 100	A A
$V_{SD}^{(*)}$	Forward On Voltage	$I_{SD} = 25\text{ A}$ $V_{GS} = 0$			1.2	V
$t_{rr}$ $Q_{rr}$ $I_{RRM}$	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	$I_{SD} = 25\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 25\text{ V}$ $T_J = 150^\circ\text{C}$ (see test circuit, Figure 3)		32 34 2.1		ns nC A

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

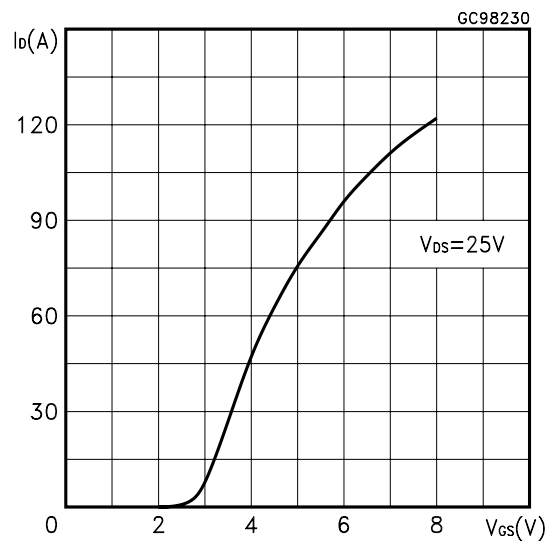
(●) Pulse width limited by safe operating area.

**Safe Operating Area****Thermal Impedance**

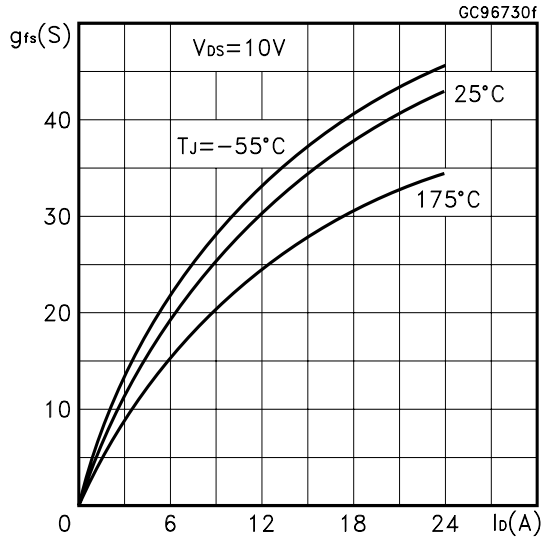
Output Characteristics



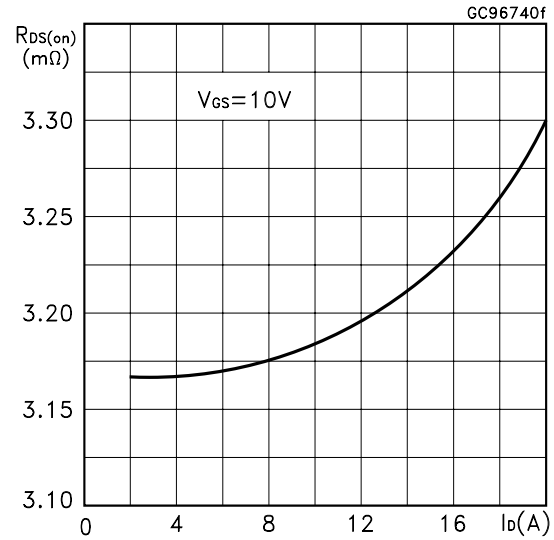
Transfer Characteristics



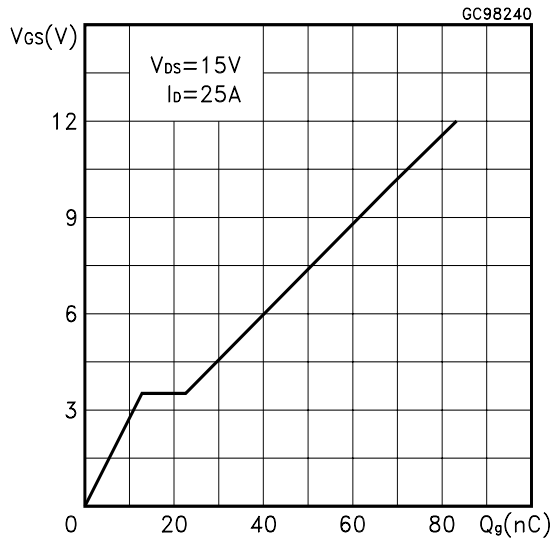
Transconductance



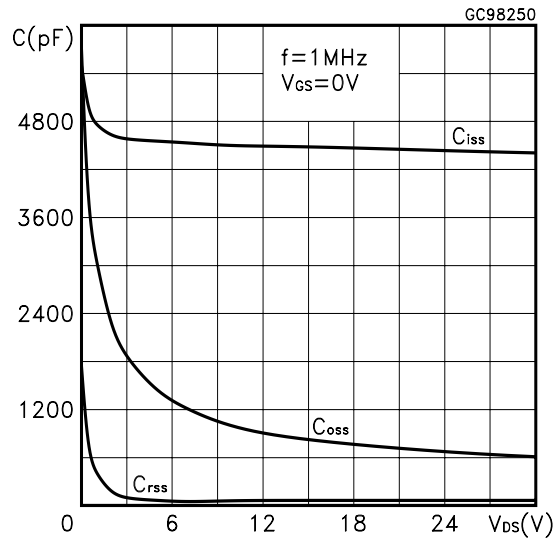
Static Drain-source On Resistance



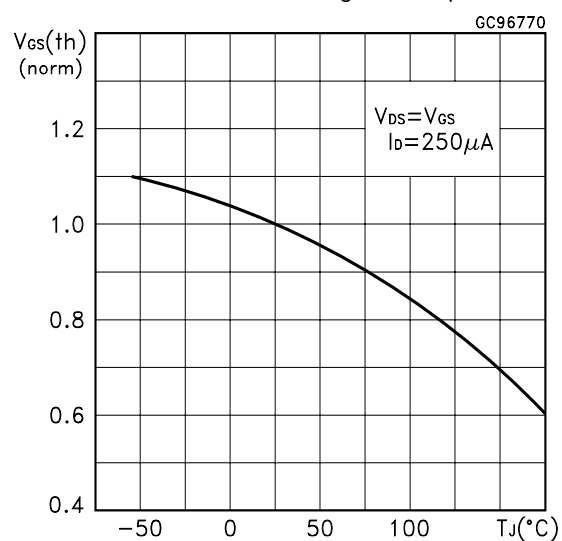
Gate Charge vs Gate-source Voltage



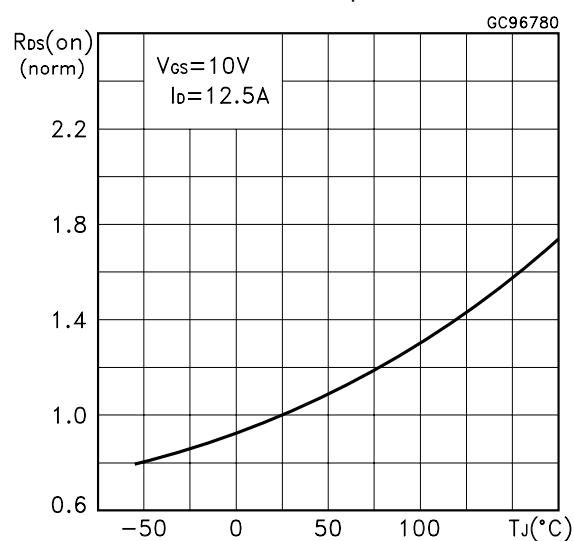
Capacitance Variations



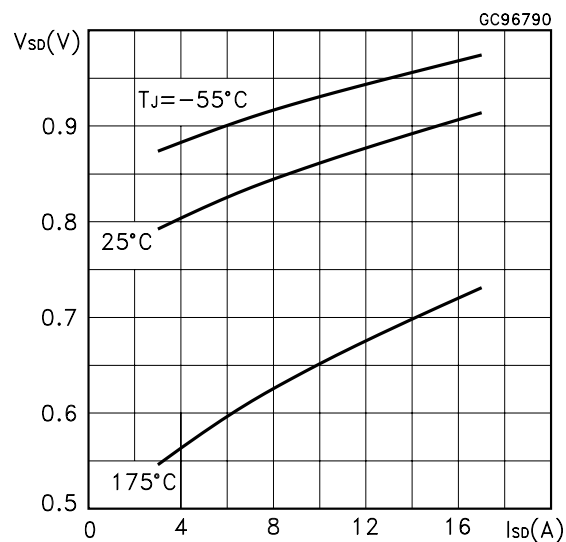
Normalized Gate Threshold Voltage vs Temperature



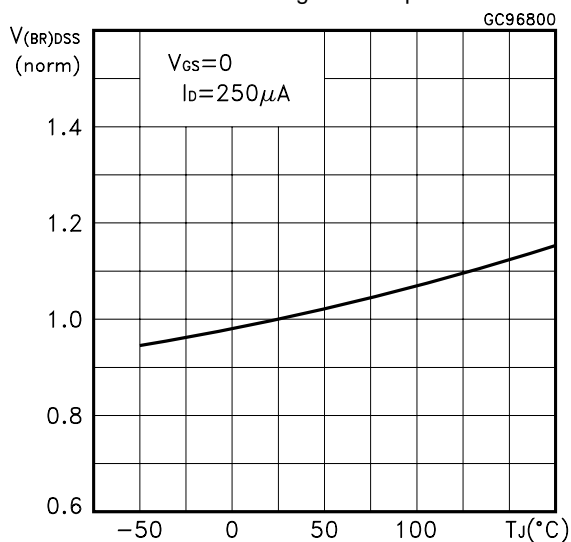
Normalized on Resistance vs Temperature



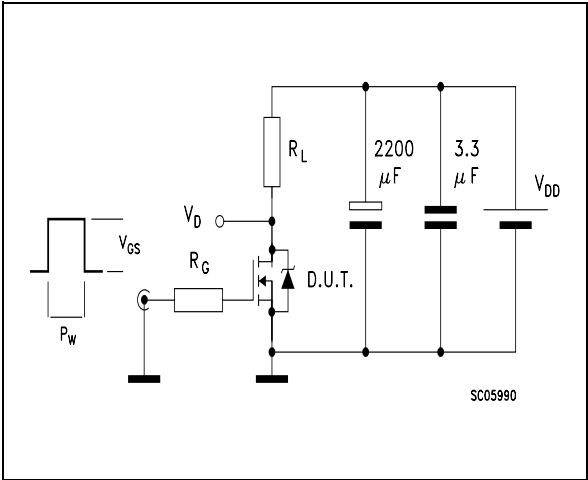
Source-drain Diode Forward Characteristics



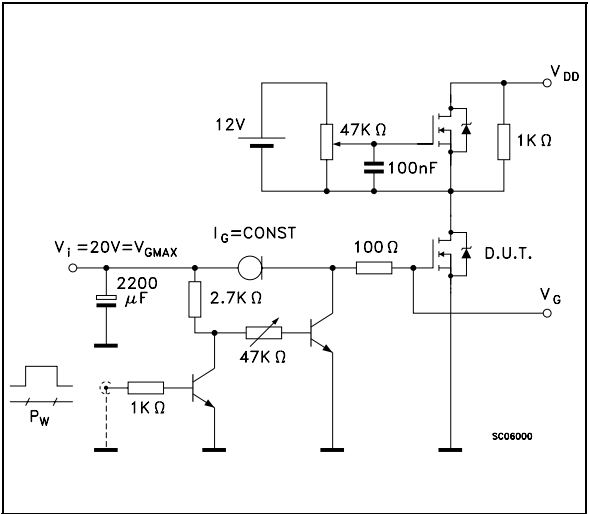
Normalized Breakdown Voltage vs Temperature.



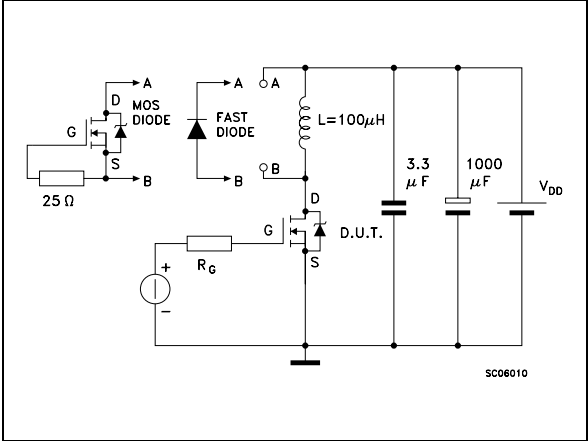
**Fig. 1: Switching Times Test Circuits For Resistive Load**



**Fig. 2: Gate Charge test Circuit**

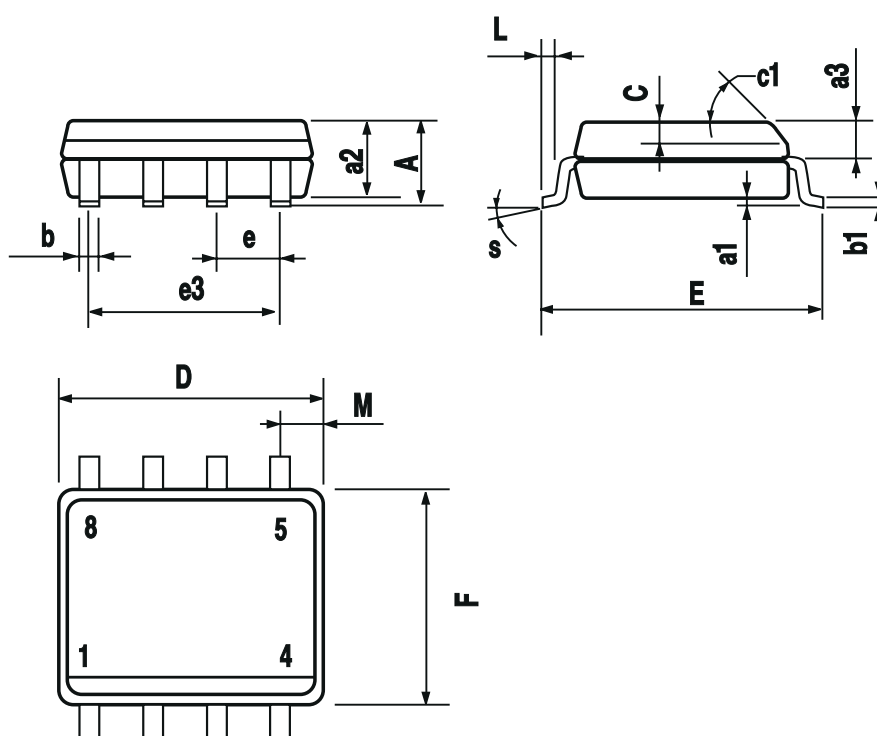


**Fig. 3: Test Circuit For Diode Recovery Behaviour**



## SO-8 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			1.75			0.068
a1	0.1		0.25	0.003		0.009
a2			1.65			0.064
a3	0.65		0.85	0.025		0.033
b	0.35		0.48	0.013		0.018
b1	0.19		0.25	0.007		0.010
C	0.25		0.5	0.010		0.019
c1	45 (typ.)					
D	4.8		5.0	0.188		0.196
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		3.81			0.150	
F	3.8		4.0	0.14		0.157
L	0.4		1.27	0.015		0.050
M			0.6			0.023
S	8 (max.)					



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