



STS25NH3LL

N-CHANNEL 30V - 0.0032 Ω - 25A SO-8 STripFET™ III MOSFET FOR DC-DC CONVERSION

TYPE	V _{DSS}	R _{DS(on)}	I _D
STS25NH3LL	30 V	<0.0035 Ω	25 A

- TYPICAL R_{DS(on)} = 0.0032 Ω @ 10V
- OPTIMAL R_{DS(on)} x Qg TRADE-OFF @ 4.5V
- CONDUCTION LOSSES REDUCED
- SWITCHING LOSSES REDUCED

DESCRIPTION

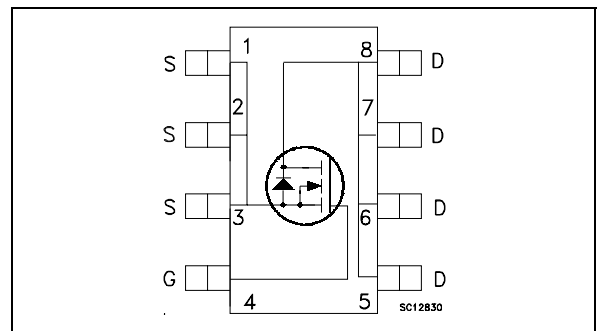
The STS25NH3LL utilizes the latest advanced design rules of ST's proprietary STripFET™ technology. This novel 0.6μ process coupled to unique metalization techniques realizes the most advanced low voltage MOSFET in SO-8 ever produced. It is therefore suitable for the most demanding DC-DC converter applications 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



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{DS}	Drain-source Voltage (V _{GS} = 0)	30	V
V _{DGR}	Drain-gate Voltage (R _{GS} = 20 kΩ)	30	V
V _{GS}	Gate- source Voltage	± 18	V
I _D	Drain Current (continuous) at T _C = 25°C	25	A
I _D	Drain Current (continuous) at T _C = 100°C	18	A
I _{DM} (*)	Drain Current (pulsed)	100	A
E _{AS} (1)	Single Pulse Avalanche Energy	200	mJ
P _{tot}	Total Dissipation at T _C = 25°C	3.2	W

(*) Pulse width limited by safe operating area.

(1) Starting T_j = 25 °C I_D = 12.5A V_{DD} = 30V

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THERMAL DATA

Rthj-amb	(*)Thermal Resistance Junction-ambient	Max	47	°C/W
Rthj-lead	Thermal Resistance Junction-leads	Max	16	°C/W
T _j	Maximum Operating Junction Temperature		-55 to 175	°C
T _{stg}	Storage Temperature		-55 to 175	°C

(*) When Mounted on 1 inch² FR-4 board, 2 oz of Cu and t ≤ 10 sec.

ELECTRICAL CHARACTERISTICS (T_{case} = 25 °C unless otherwise specified)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{(BR)DSS}	Drain-source Breakdown Voltage	I _D = 250 μA, V _{GS} = 0	30			V
I _{DSS}	Zero Gate Voltage Drain Current (V _{GS} = 0)	V _{DS} = Max Rating V _{DS} = Max Rating T _C = 125°C			1 10	μA μA
I _{GSS}	Gate-body Leakage Current (V _{DS} = 0)	V _{GS} = ± 18 V			±100	nA

ON (*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} I _D = 250 μA	1			V
R _{DS(on)}	Static Drain-source On Resistance	V _{GS} = 10 V I _D = 12.5 A V _{GS} = 4.5 V I _D = 12.5 A		0.0032 0.004	0.0035 0.005	Ω Ω

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g _{fs} (*)	Forward Transconductance	V _{DS} = 10 V I _D = 12.5 A		30		S
C _{iss}	Input Capacitance	V _{DS} = 25V, f = 1 MHz, V _{GS} = 0		4450		pF
C _{oss}	Output Capacitance			655		pF
C _{rss}	Reverse Transfer Capacitance			50		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

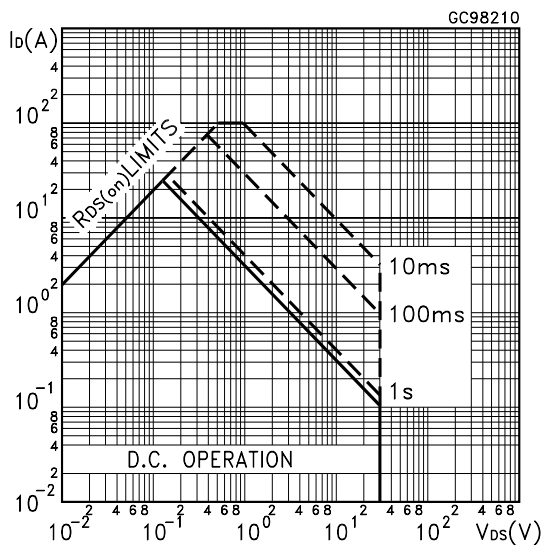
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$ t_f	Turn-off Delay Time Fall Time	$V_{DD} = 15\text{ V}$ $I_D = 12.5\text{ A}$ $R_G = 4.7\ \Omega$, $V_{GS} = 10\text{ V}$ (Resistive Load, Figure 3)		75 8		ns ns

SOURCE DRAIN DIODE

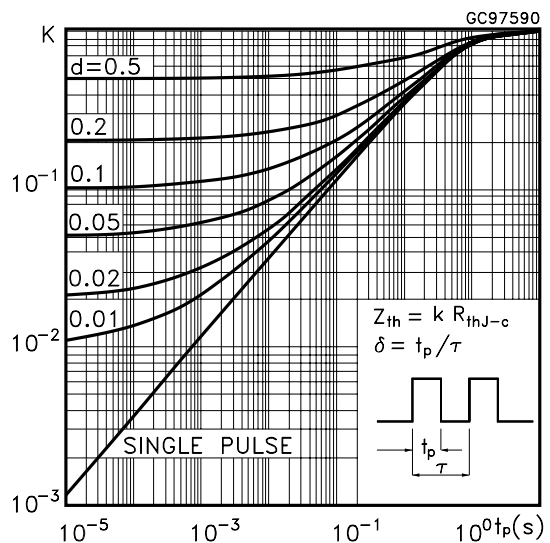
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD} $I_{SDM} (\bullet)$	Source-drain Current Source-drain Current (pulsed)				25 100	A A
$V_{SD} (*)$	Forward On Voltage	$I_{SD} = 25\text{ A}$ $V_{GS} = 0$			1.2	V
t_{rr} Q_{rr} I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery 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 μs , duty cycle 1.5 %.
 (•) Pulse width limited by safe operating area.

Safe Operating Area

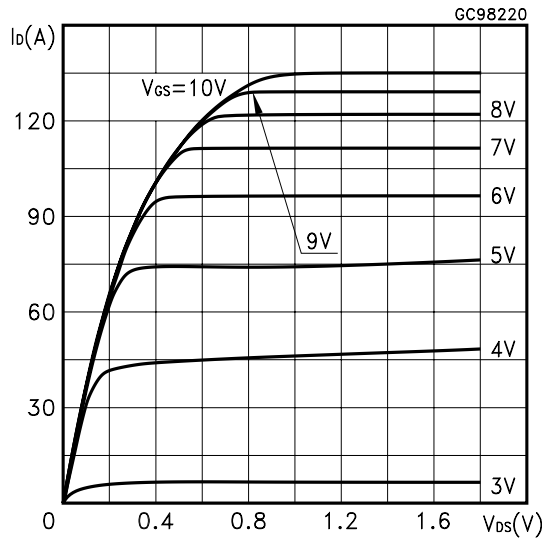


Thermal Impedance

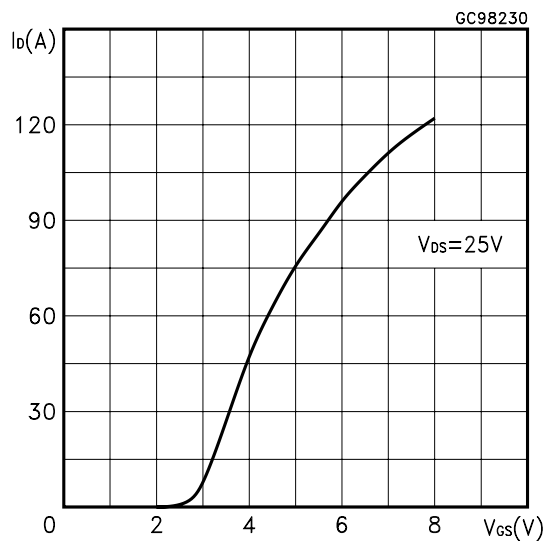


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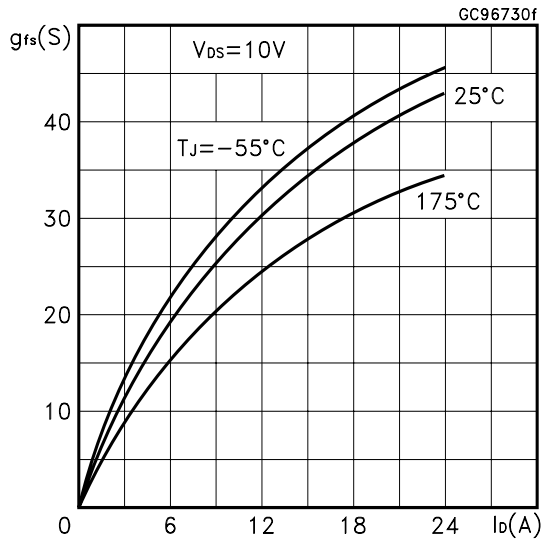
Output Characteristics



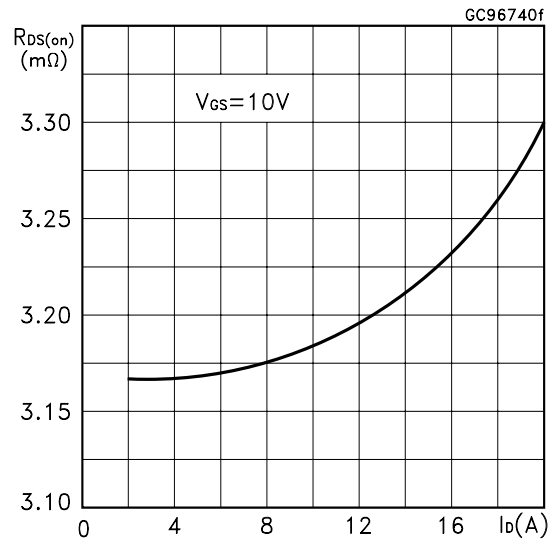
Transfer Characteristics



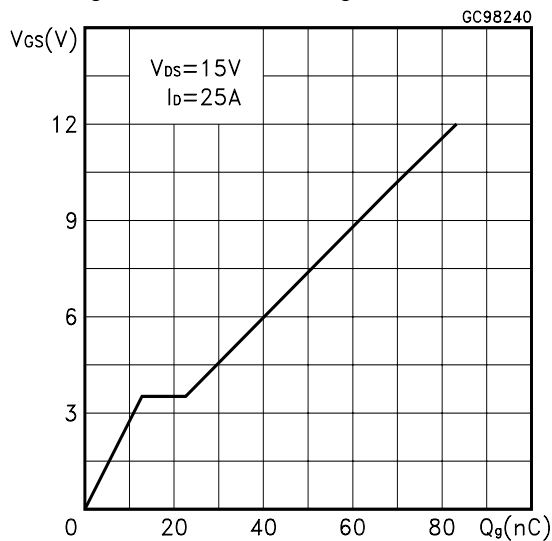
Transconductance



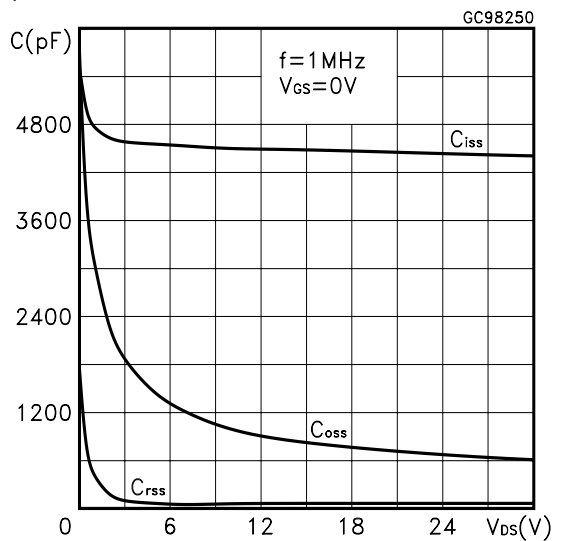
Static Drain-source On Resistance



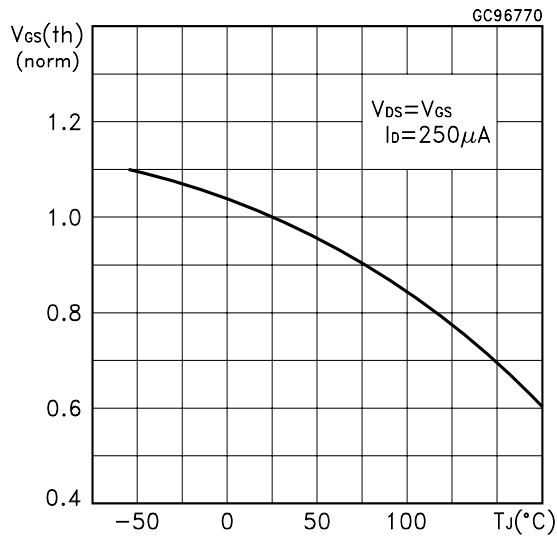
Gate Charge vs Gate-source Voltage



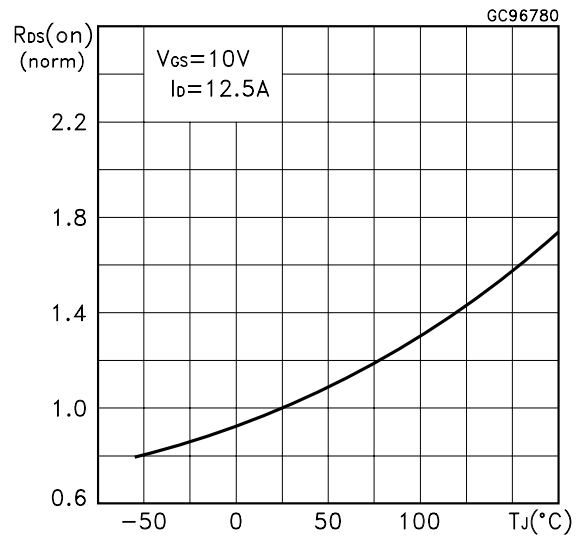
Capacitance Variations



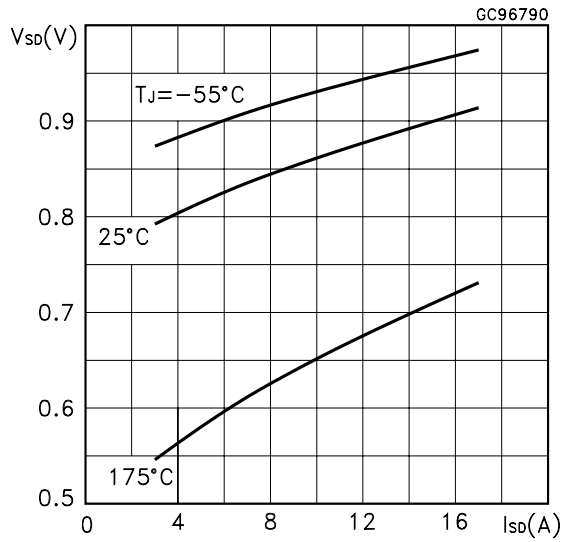
Normalized Gate Threshold Voltage vs Temperature



Normalized on Resistance vs Temperature



Source-drain Diode Forward Characteristics



Normalized Breakdown Voltage vs Temperature.

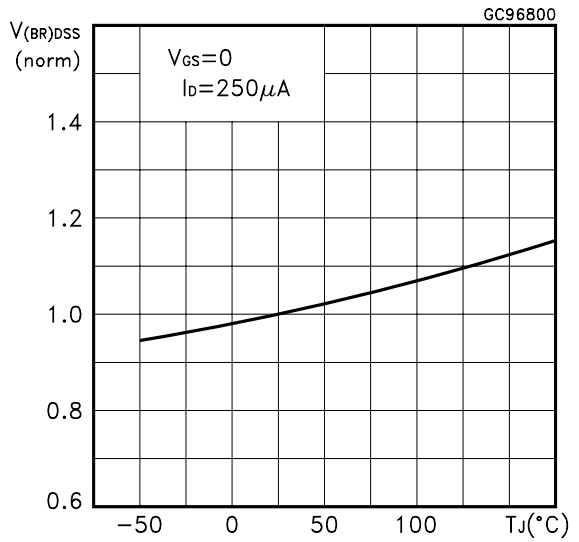


Fig. 1: Switching Times Test Circuits For Resistive Load

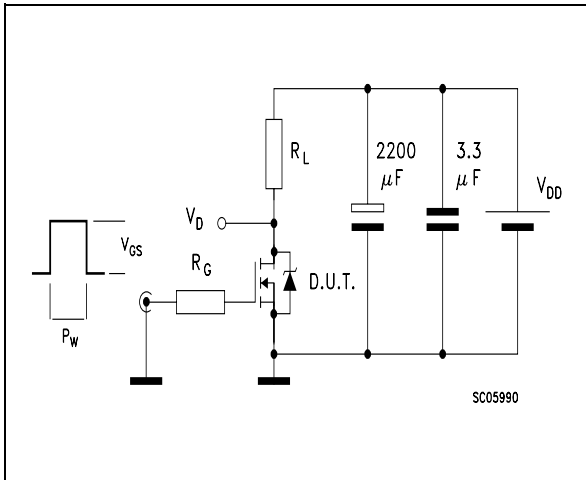


Fig. 2: Gate Charge test Circuit

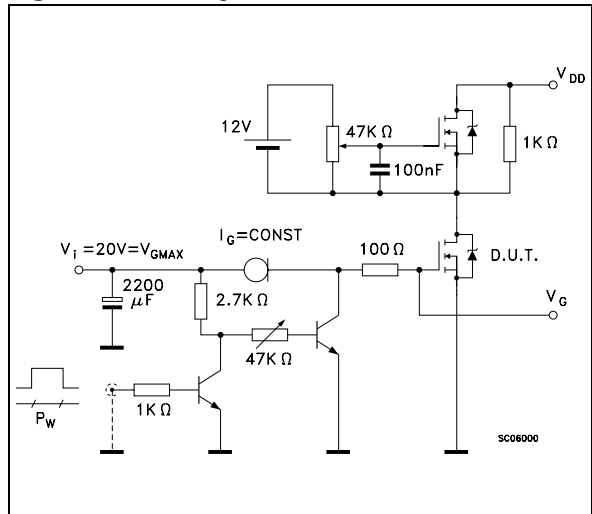
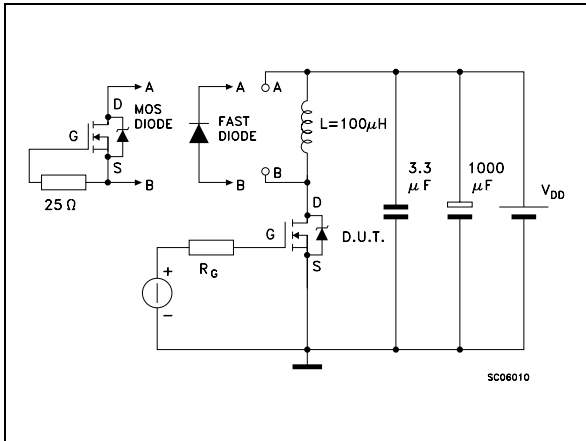
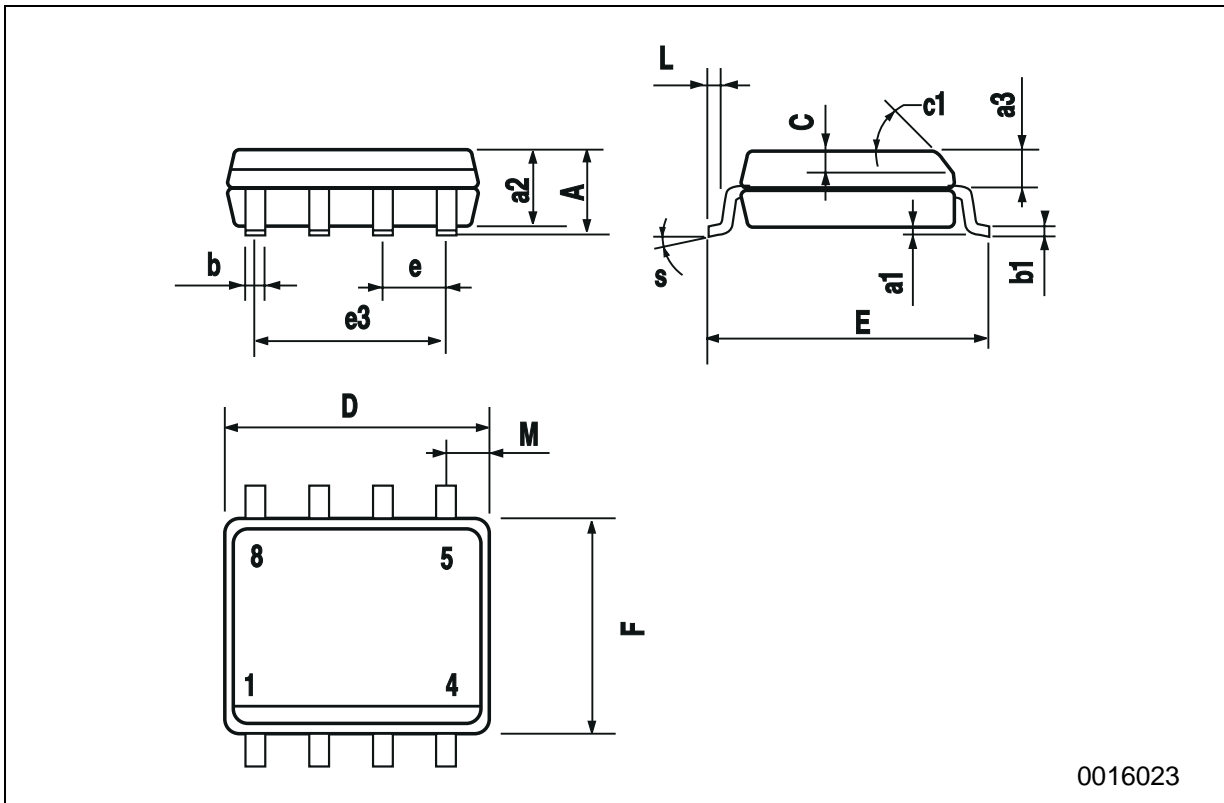


Fig. 3: Test Circuit For Diode Recovery Behaviour



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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