



# STS17NF3LL

## N-CHANNEL 30V - 0.0045 Ω - 17A SO-8 STripFET™ II MOSFET FOR DC-DC CONVERSION

TYPE	V <sub>DSS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>
STS17NF3LL	30 V	<0.0055 Ω	17 A

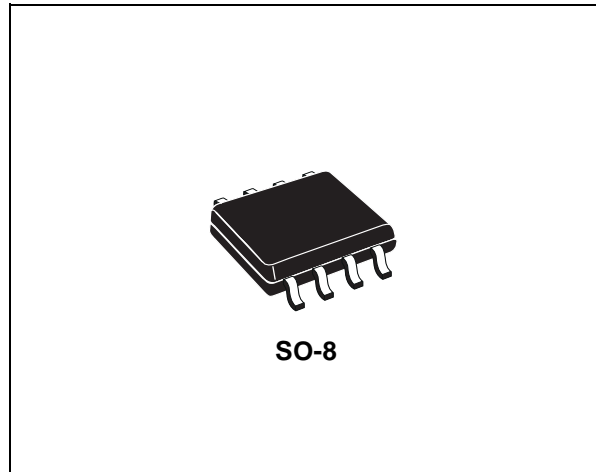
- TYPICAL R<sub>DS(on)</sub> = 0.0045 Ω @ 10V
- OPTIMAL R<sub>DS(on)</sub> x Q<sub>g</sub> TRADE-OFF @ 4.5V
- CONDUCTION LOSSES REDUCED
- SWITCHING LOSSES REDUCED

### DESCRIPTION

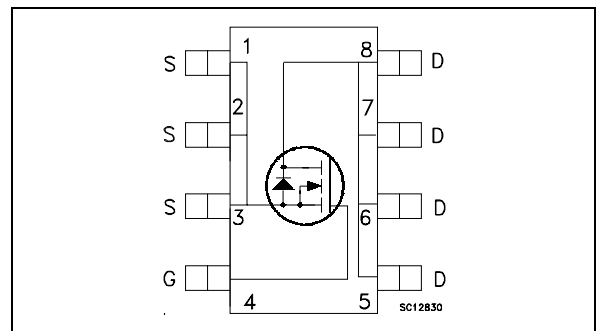
This application specific Power MOSFET is the second generation of STMicroelectronics unique "Single Feature Size™" strip-based process. The resulting transistor shows the best trade-off between on-resistance and gate charge. Such features make it the best choice in high efficiency DC-DC converters for Telecom and computer industries.

### APPLICATIONS

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



### INTERNAL SCHEMATIC DIAGRAM



### 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 kΩ)	30	V
V <sub>GS</sub>	Gate- source Voltage	± 18	V
I <sub>D</sub>	Drain Current (continuous) at T <sub>C</sub> = 25°C	17	A
I <sub>D</sub>	Drain Current (continuous) at T <sub>C</sub> = 100°C	12	A
I <sub>DM</sub> (●)	Drain Current (pulsed)	68	A
P <sub>tot</sub>	Total Dissipation at T <sub>C</sub> = 25°C	3.2	W

(●) Pulse width limited by safe operating area.

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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 <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> = 8.5 A V <sub>GS</sub> = 4.5 V I <sub>D</sub> = 8.5 A		0.0045 0.0055	0.0055 0.007	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> = 8.5 A		37		S
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = 25V, f = 1 MHz, V <sub>GS</sub> = 0		2160		pF
C <sub>oss</sub>	Output Capacitance			614		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			98		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	$V_{DD} = 15\text{ V}$ $I_D = 8.5\text{ A}$ $R_G = 4.7\ \Omega$ $V_{GS} = 4.5\text{ V}$ (Resistive Load, Figure 1)		23.5 39		ns ns
$Q_g$ $Q_{gs}$ $Q_{gd}$	Total Gate Charge Gate-Source Charge Gate-Drain Charge	$V_{DD}=24\text{V}$ $I_D=12.5\text{A}$ $V_{GS}=4.5\text{ V}$ (see test circuit, Figure 2)		26 7 12	35	nC nC nC

**SWITCHING OFF**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$ $t_f$	Turn-off Delay Time Fall Time	$V_{DD} = 15\text{ V}$ $I_D = 8.5\text{ A}$ $R_G = 4.7\ \Omega$ , $V_{GS} = 4.5\text{ V}$ (Resistive Load, Figure 3)		47.5 37		ns ns

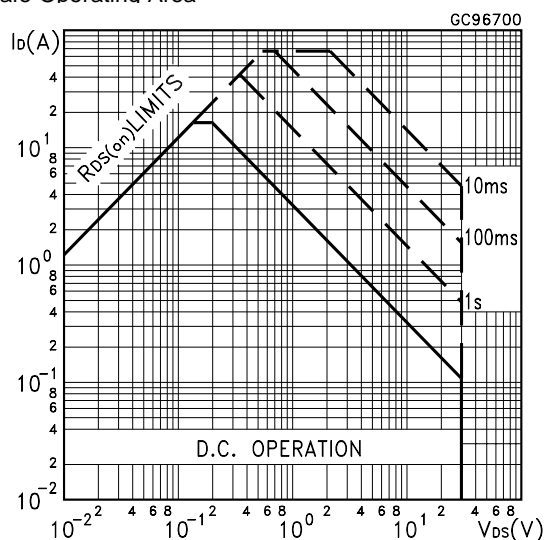
**SOURCE DRAIN DIODE**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{SD}$ $I_{SDM} (\bullet)$	Source-drain Current Source-drain Current (pulsed)				17 68	A A
$V_{SD} (*)$	Forward On Voltage	$I_{SD} = 17\text{ A}$ $V_{GS} = 0$			1.2	V
$t_{rr}$ $Q_{rr}$ $I_{RRM}$	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	$I_{SD} = 17\text{ A}$ $di/dt = 100\text{A}/\mu\text{s}$ $V_{DD} = 15\text{ V}$ $T_j = 150^\circ\text{C}$ (see test circuit, Figure 3)		39 45 2.3		ns nC A

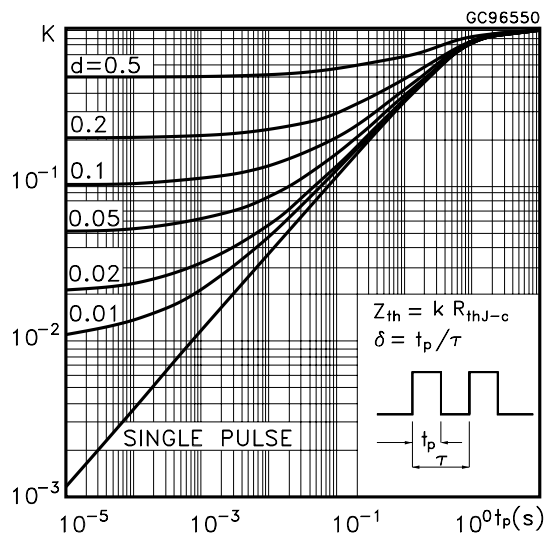
(\*) Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5 %.

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

Safe Operating Area

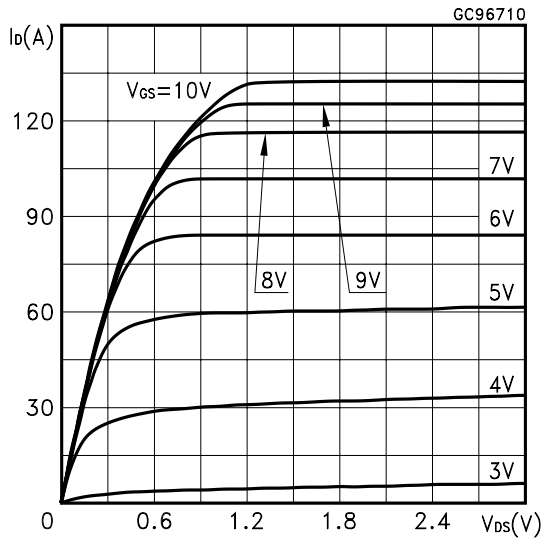


Thermal Impedance

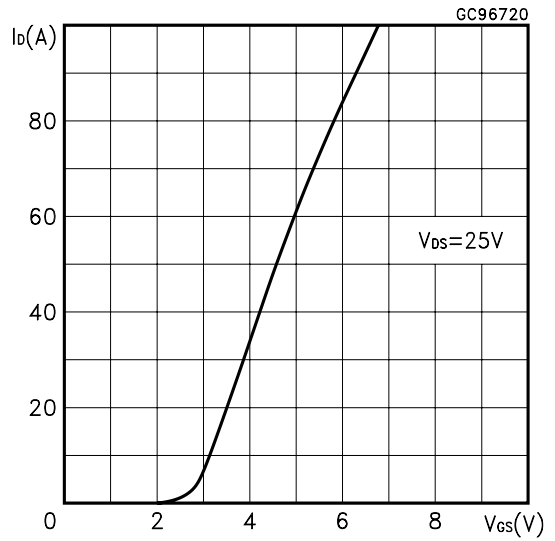


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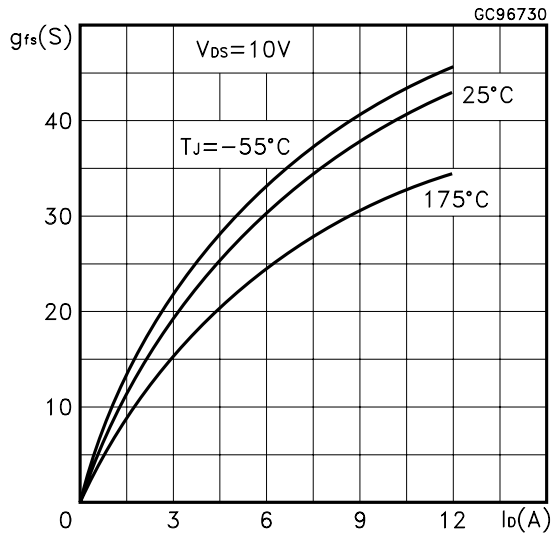
Output Characteristics



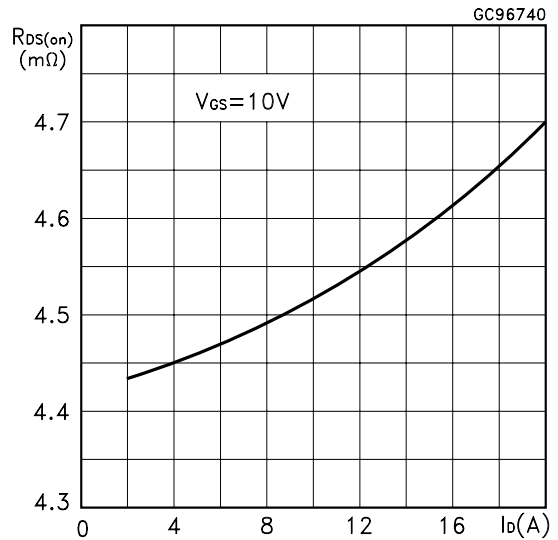
Transfer Characteristics



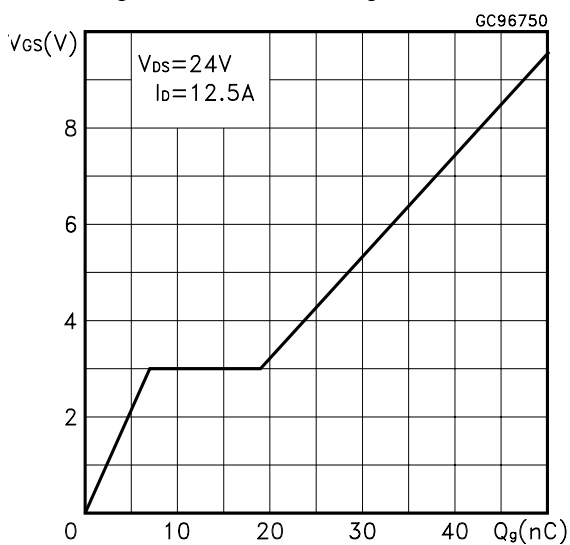
Transconductance



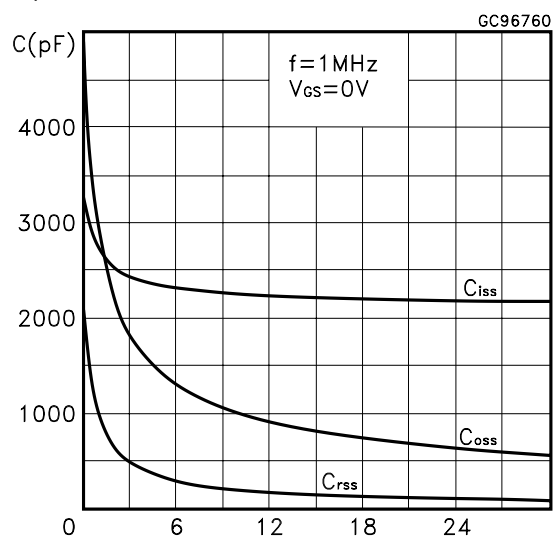
Static Drain-source On Resistance



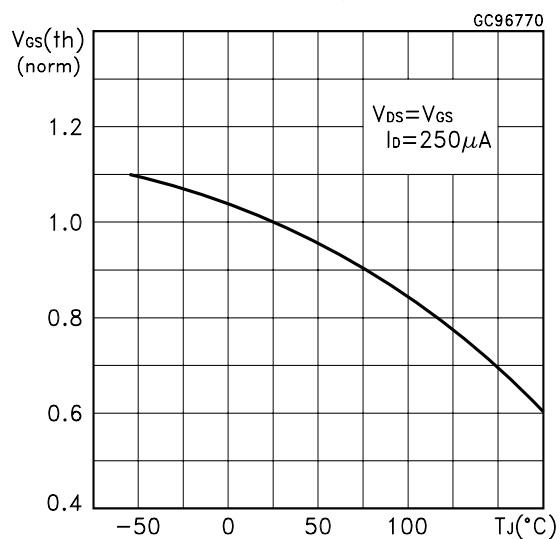
Gate Charge vs Gate-source Voltage



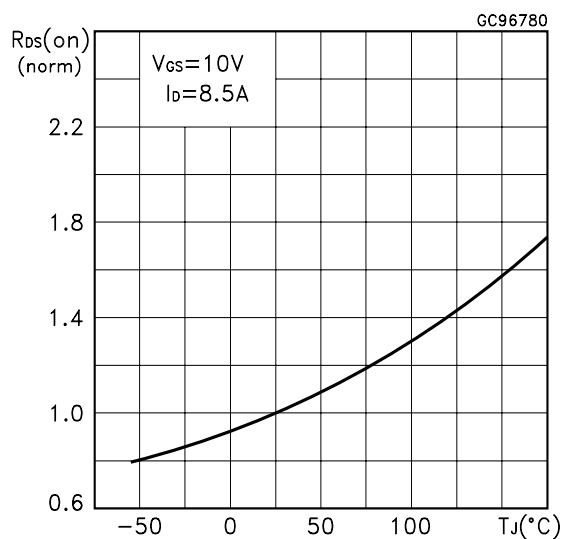
Capacitance Variations



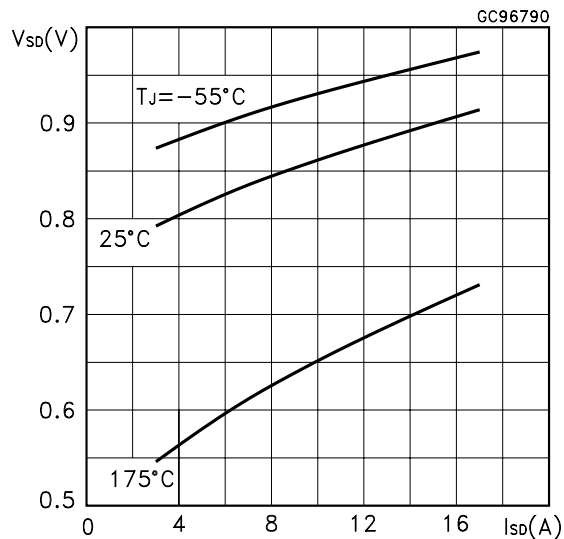
Normalized Gate Threshold Voltage vs Temperature



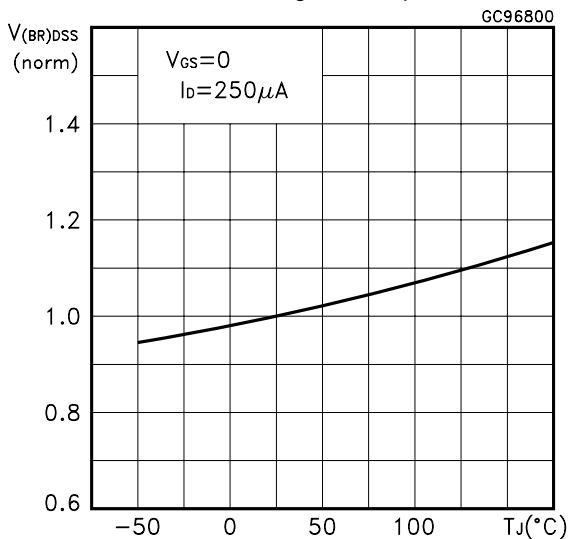
Normalized on Resistance vs Temperature



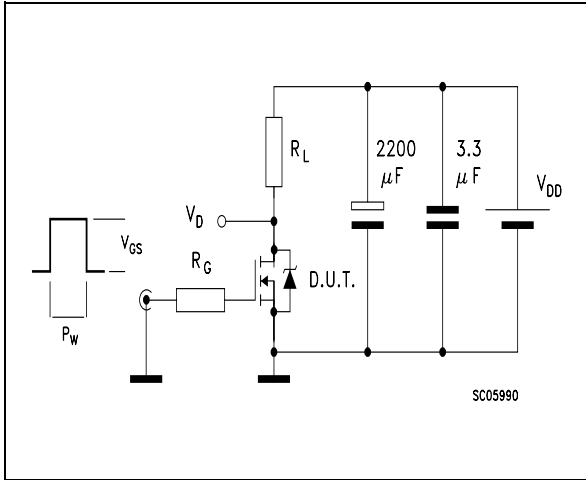
Source-drain Diode Forward Characteristics



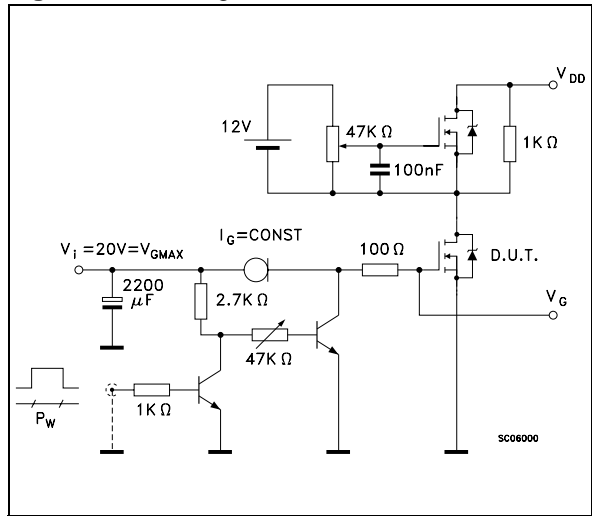
Normalized Breakdown Voltage vs Temperature.



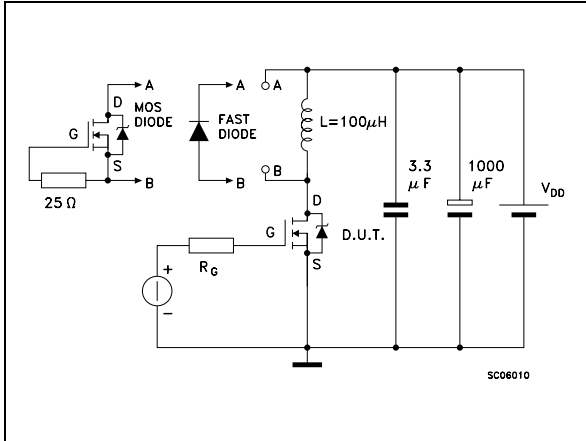
**Fig. 1: Switching Times Test Circuits For Resistive Load**



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

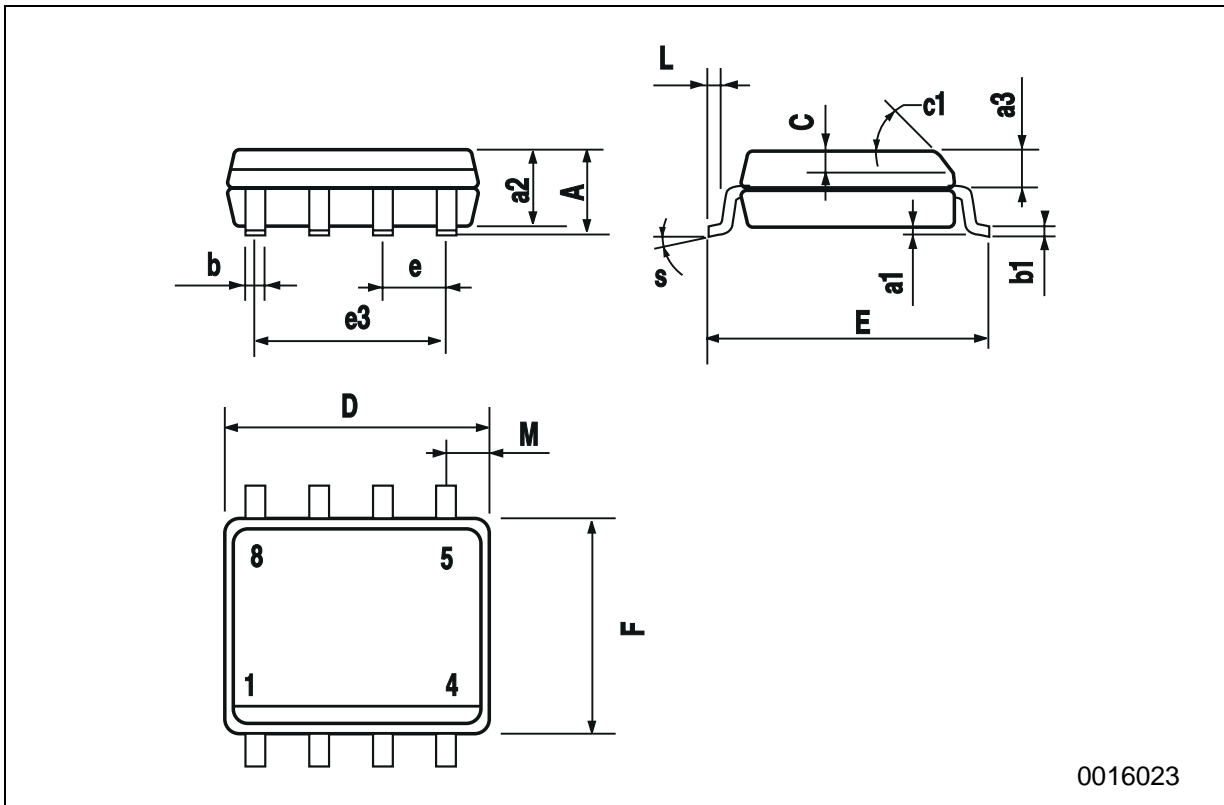


**Fig. 3: Test Circuit For Diode Recovery Behaviour**



**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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