

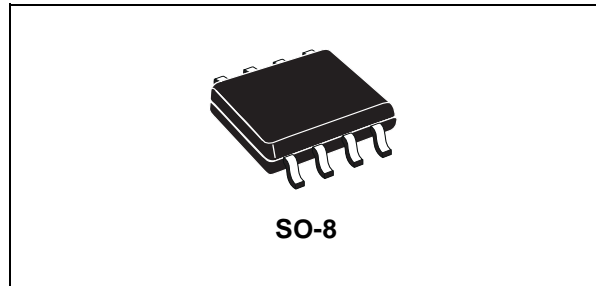


# STS2DPFS20V

P-CHANNEL 20V - 0.14  $\Omega$  - 2.5A SO-8

2.7V-DRIVE STripFET™ II MOSFET PLUS SCHOTTKY DIODE

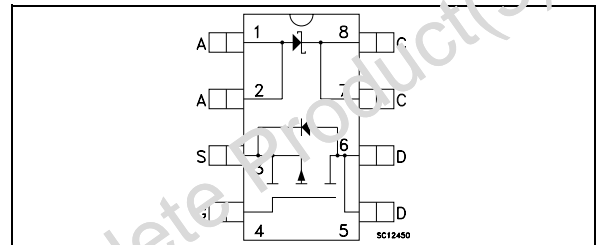
MAIN PRODUCT CHARACTERISTICS			
<b>MOSFET</b>	<b>V<sub>DSS</sub></b>	<b>R<sub>DS(on)</sub></b>	<b>I<sub>D</sub></b>
	20 V	< 0.20 $\Omega$ (@4.5V) < 0.25 $\Omega$ (@2.7V)	2.5 A
<b>SCHOTTKY</b>	<b>I<sub>F(AV)</sub></b>	<b>V<sub>RRM</sub></b>	<b>V<sub>F(MAX)</sub></b>
	3 A	30 V	0.51 V



## DESCRIPTION

This product associates the latest low voltage StripFETœ in p-channel version to a low drop Schottky diode. Such configuration is extremely versatile in implementing, a large variety of DC-DC converters for printers, portable equipment, and cellular phones.

## INTERNAL SCHEMATIC DIAGRAM



## MOSFET 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 kW)	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	2.5	A
I <sub>D</sub>	Drain Current (continuous) at T <sub>C</sub> = 100°C	1.58	A
I <sub>DM</sub> (•)	Drain Current (pulsed)	10	A
P <sub>tot</sub>	Drain Dissipation at T <sub>C</sub> = 25°C	2	W

## SCHOTTKY ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V <sub>RRM</sub>	Repetitive Peak Reverse Voltage	30	V
I <sub>F(RMS)</sub>	RMS Forward Current	20	A
I <sub>F(AV)</sub>	Average Forward Current	3	A
I <sub>FSM</sub>	Surge Non Repetitive Forward Current	75	A
I <sub>RSM</sub>	Non Repetitive Peak Reverse Current	1	A
dv/dt	Critical Rate Of Rise Of Reverse Voltage	10000	V/ $\mu$ s

(•) Pulse width limited by safe operating area

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

## STS2DPFS20V

### TERMAL DATA

Rthj-amb	(*)Thermal Resistance Junction-ambient MOSFET	62.5	°C/W
Rthj-amb	(*)Thermal Resistance Junction-ambient SCHOTTKY MAX	100	°C/W
T <sub>stg</sub>	Storage Temperature Range	-55 to 150	°C
T <sub>j</sub>	Maximum Lead Temperature For Soldering Purpose	150	°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	20			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> = ± 12 V			±100	nA

#### ON (1)

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	0.6			V
R <sub>DS(on)</sub>	Static Drain-source On Resistance	V <sub>GS</sub> = 4.5 V I <sub>D</sub> = 1 A V <sub>GS</sub> = 2.7 V I <sub>D</sub> = 1 A		0.14 0.20	0.20 0.25	Ω Ω

### SCHOTTKY STATIC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I <sub>R</sub> (*)	Reversed Leakage Current	T <sub>J</sub> = 25 °C V <sub>R</sub> = 30 V T <sub>J</sub> = 125 °C V <sub>R</sub> = 30 V		30	0.2 100	mA mA
V <sub>F</sub> (*)	Forward Voltage drop	T <sub>J</sub> = 25 °C I <sub>F</sub> = 3 A T <sub>J</sub> = 125 °C I <sub>F</sub> = 3 A		0.40	0.51 0.46	mA mA

### DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g <sub>fs</sub> (*)	Forward Transconductance	V <sub>DS</sub> = 15 V I <sub>D</sub> = 1 A		4		S
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = 15V, f = 1 MHz, V <sub>GS</sub> = 0		315		pF
C <sub>oss</sub>	Output Capacitance			87		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			17		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**

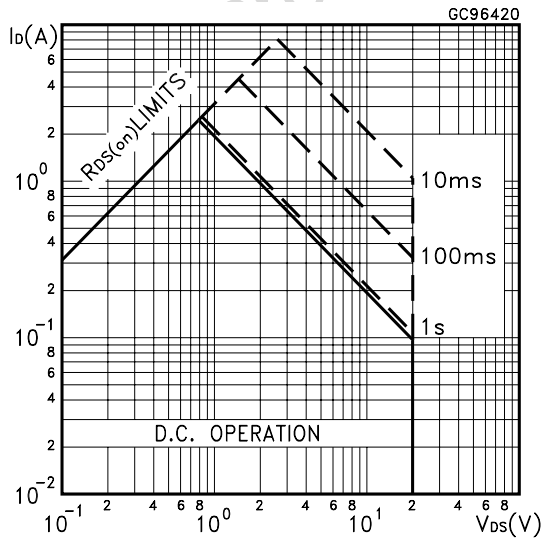
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$ $t_f$	Turn-off Delay Time Fall Time	$V_{DD} = 10\text{ V}$ $I_D = 1\text{ A}$ $R_G = 4.7\ \Omega$ , $V_{GS} = 4.5\text{ V}$ (Resistive Load, Figure 3)		45 11		ns ns

**SOURCE DRAIN DIODE**

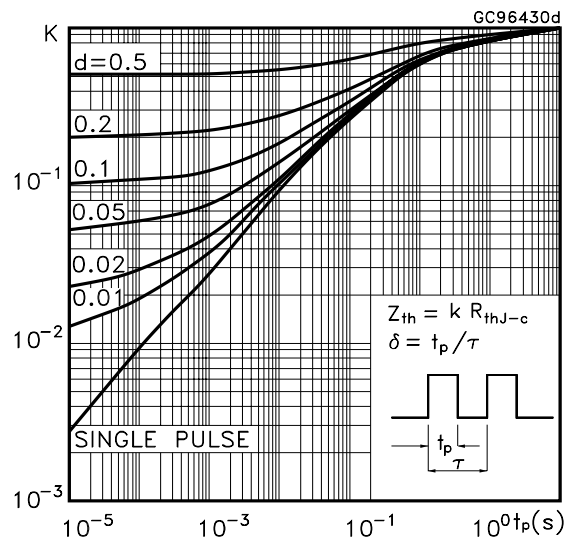
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{SD}$ $I_{SDM} (\bullet)$	Source-drain Current Source-drain Current (pulsed)				2 10	A A
$V_{SD} (*)$	Forward On Voltage	$I_{SD} = 2\text{ A}$ $V_{GS} = 0$			1.2	V
$t_{rr}$ $Q_{rr}$ $I_{RRM}$	Reverse Recovery Time Reverse Recovery Charge Reverse 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

(\*) Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5 %.  
 (•) Pulse width limited by safe operating area.

**Safe Operating Area**

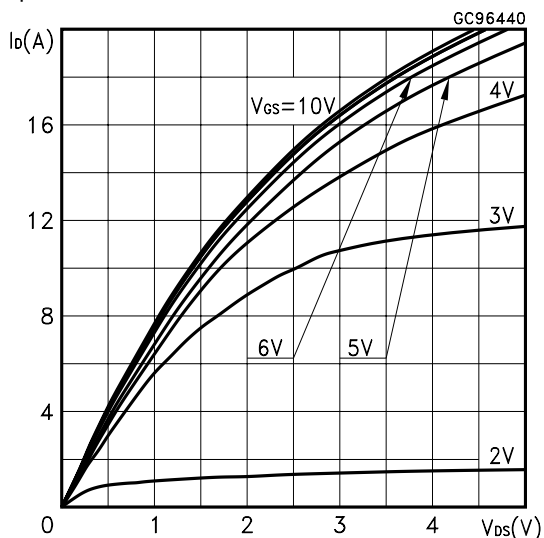


**Thermal Impedance**

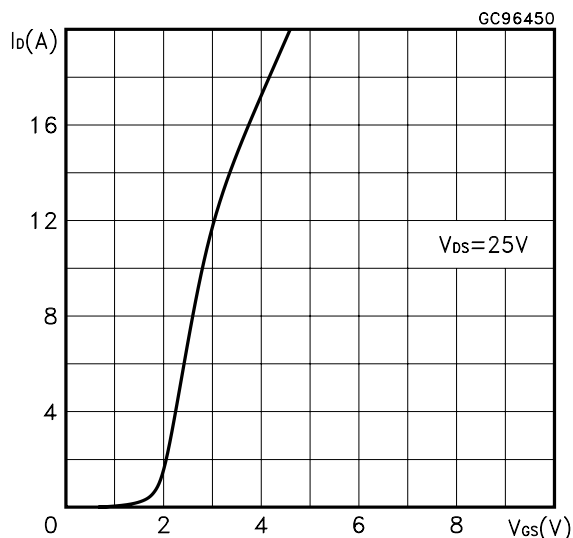


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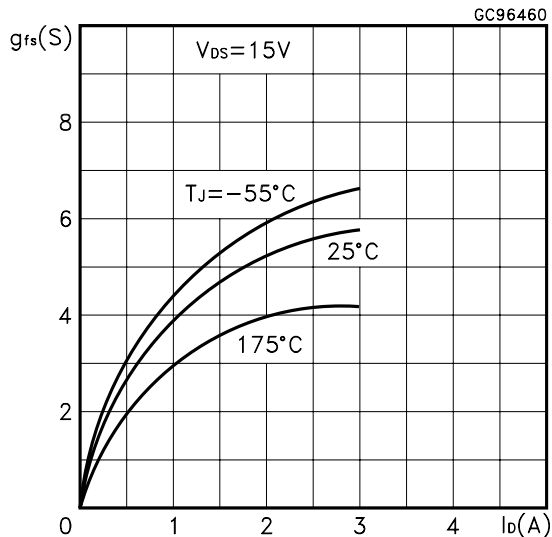
Output Characteristics



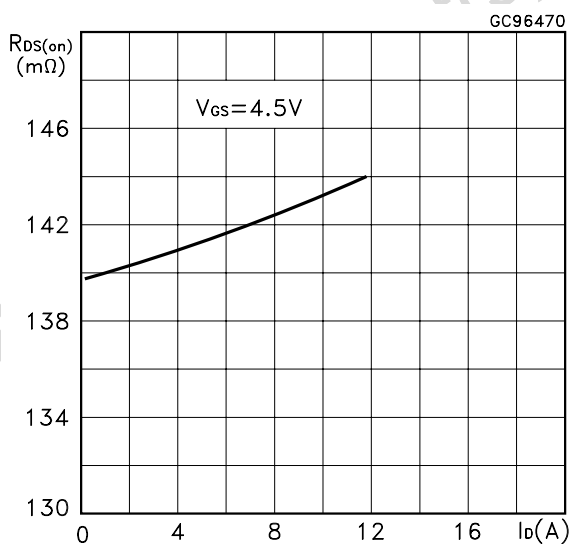
Transfer Characteristics



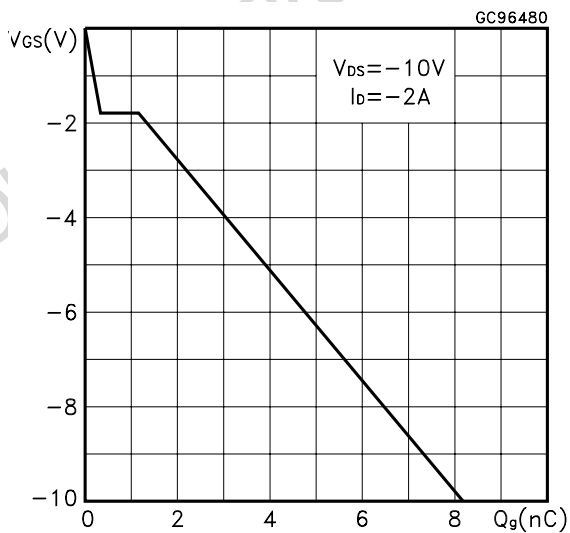
Transconductance



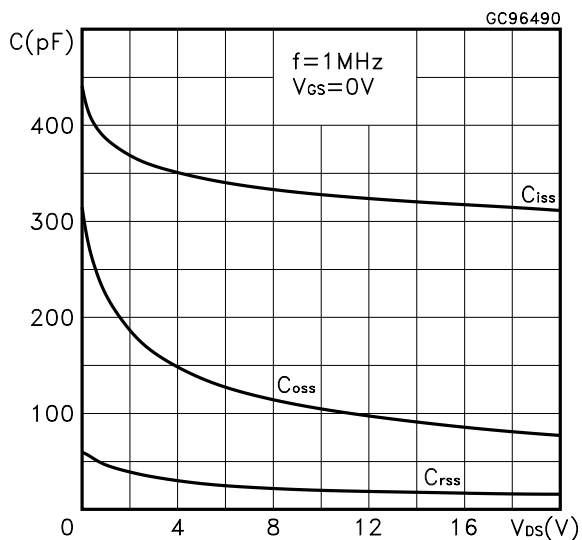
Static Drain-source On Resistance



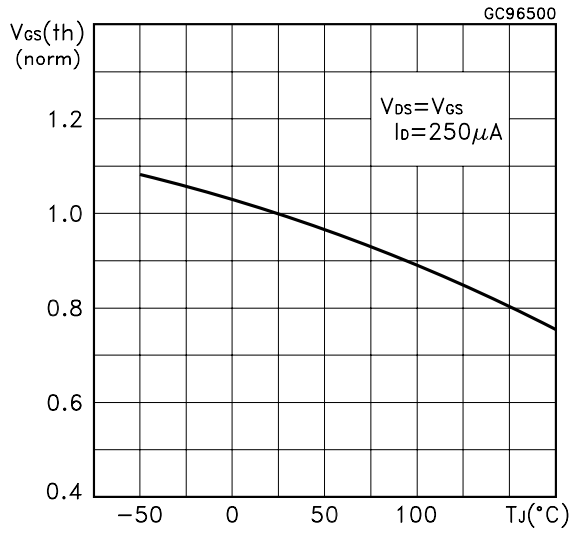
Gate Charge vs Gate-source Voltage



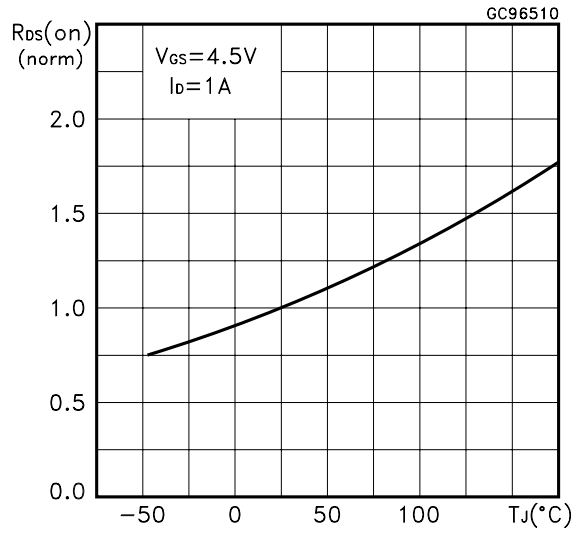
Capacitance Variations



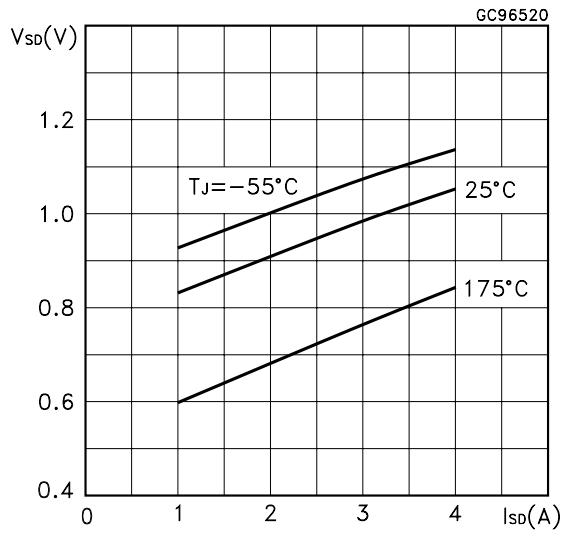
Normalized Gate Threshold Voltage vs Temperature



Normalized on Resistance vs Temperature



Source-drain Diode Forward Characteristics



Normalized Breakdown Voltage vs Temperature.

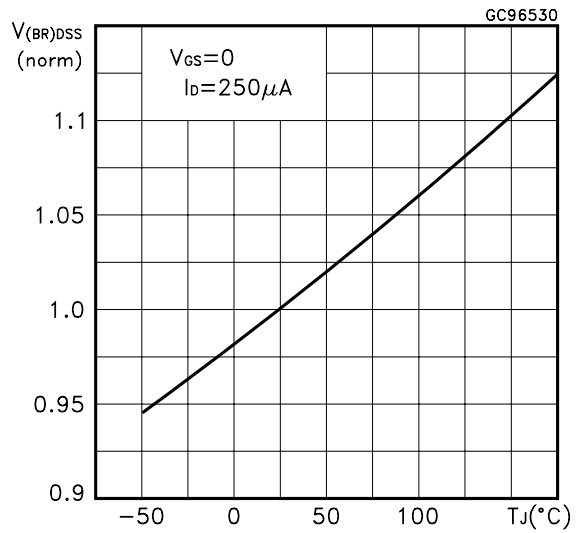


Fig. 1: Unclamped Inductive Load Test Circuit

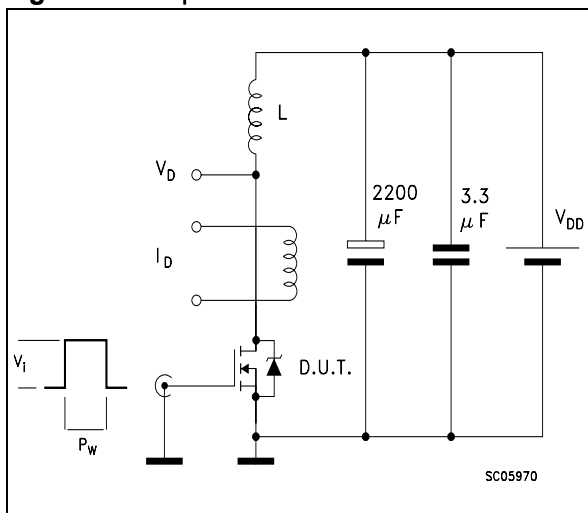


Fig. 2: Unclamped Inductive Waveform

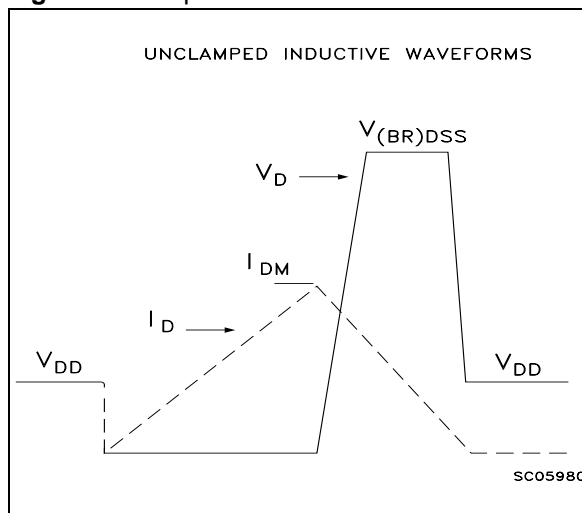


Fig. 3: Switching Times Test Circuits For Resistive Load

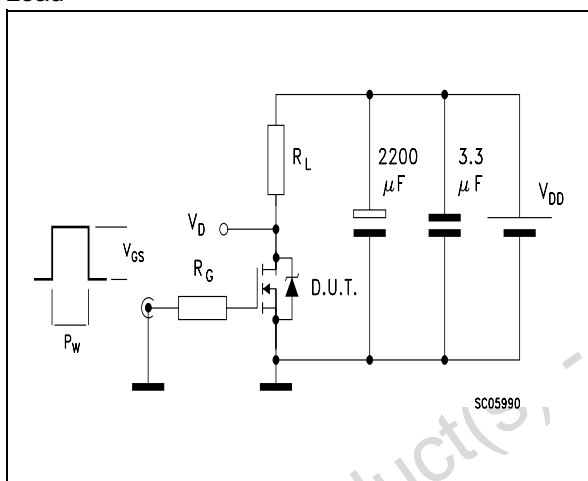


Fig. 4: Gate Charge test Circuit

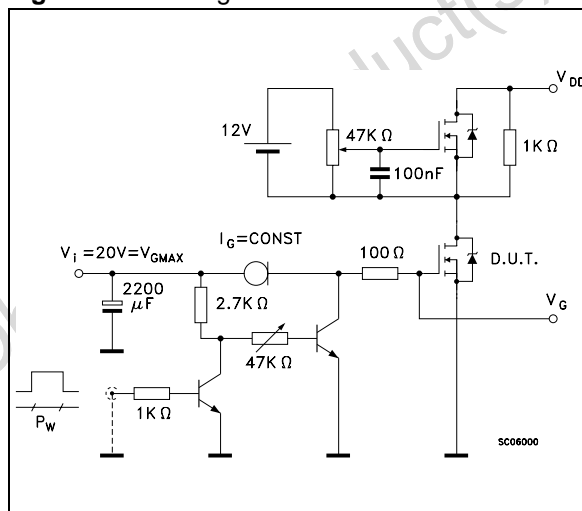
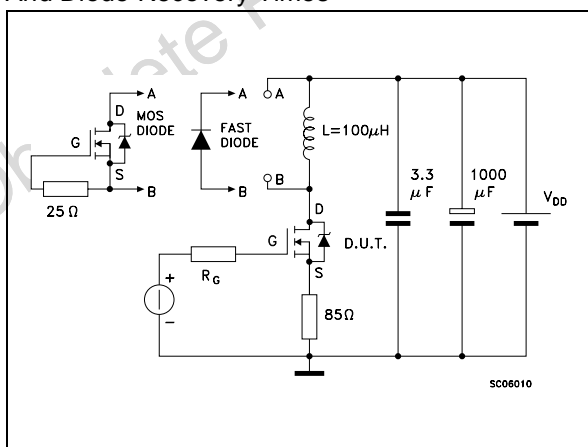
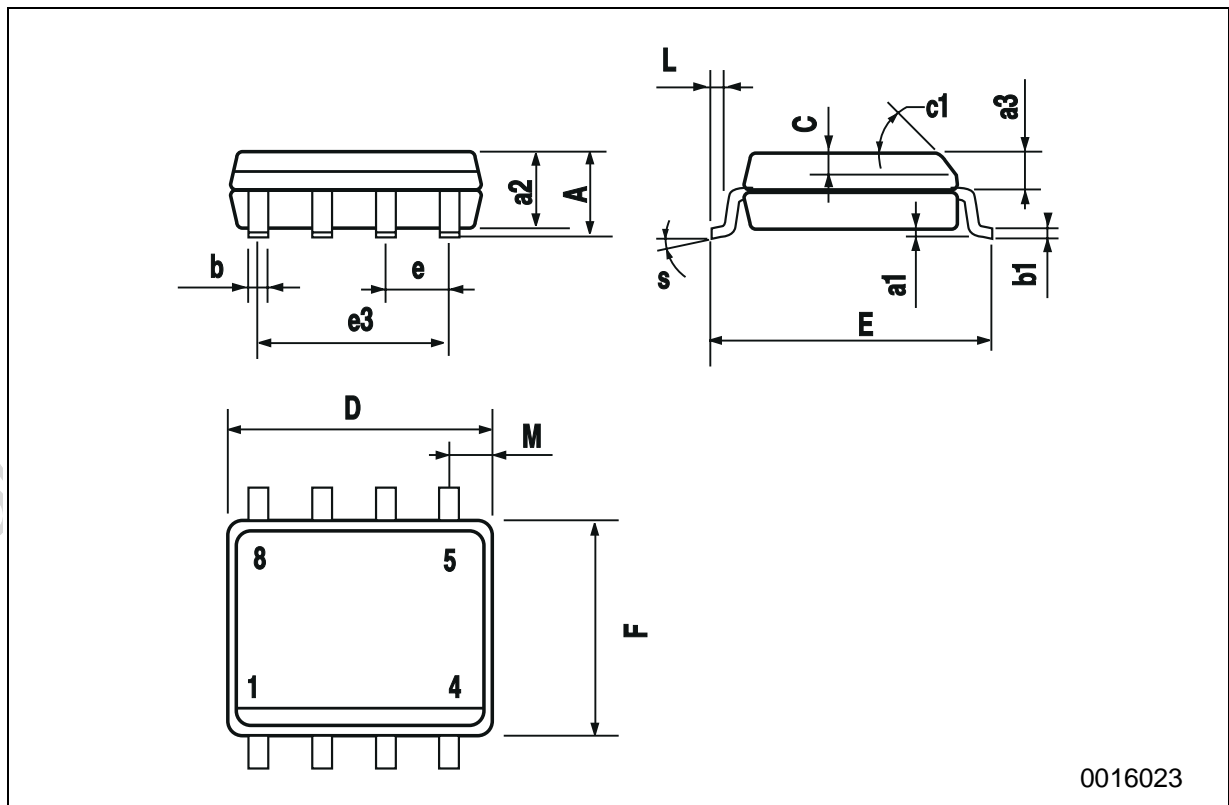


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



**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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