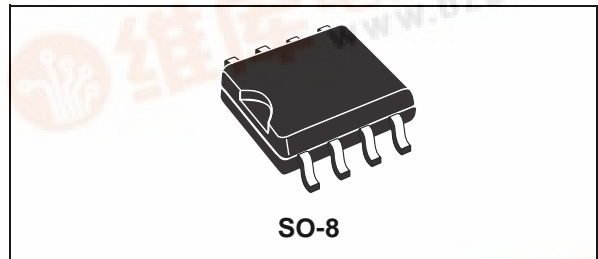




# STS4DPFS2LS

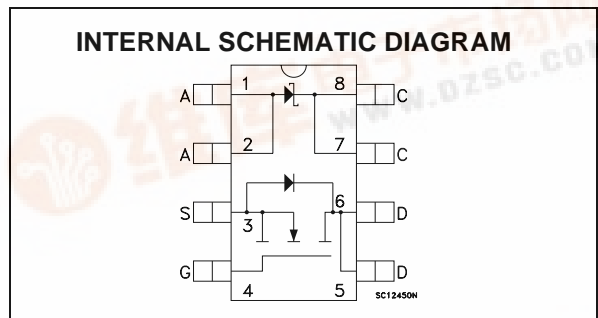
## P-CHANNEL 20V - 0.06Ω - 4A SO-8 STripFET™ MOSFET PLUS SCHOTTKY RECTIFIER

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	< 0.07 Ω	4 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	40 V	0.44 V



### DESCRIPTION

This product associates the latest low voltage STripFET™ 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.



### 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 kΩ)	20	V
V <sub>GS</sub>	Gate- source Voltage	± 20	V
I <sub>D</sub>	Drain Current (continuous) at T <sub>C</sub> = 25°C	4	A
I <sub>D</sub>	Drain Current (continuous) at T <sub>C</sub> = 100°C	3.4	A
I <sub>DM</sub> (●)	Drain Current (pulsed)	16	A
P <sub>TOT</sub>	Total Dissipation at T <sub>C</sub> = 25°C	2	W
E <sub>AS</sub> (1)	Single Pulse Avalanche Energy	20	mJ

### SCHOTTKY ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
V <sub>RRM</sub>	Repetitive Peak Reverse Voltage		40	V
I <sub>F(RMS)</sub>	RMS Forward Current		10	A
I <sub>F(AV)</sub>	Average Forward Current	TL = 120°C δ = 0.5	3	A
I <sub>FSM</sub>	Surge Non Repetitive Forward Current	tp = 10 ms Sinusoidal	75	A
I <sub>RRM</sub>	Repetitive Peak Reverse Current	tp = 2 μs F = 1 kHz	1	A
dv/dt	Critical Rate Of Rise Of Reverse Voltage		10000	V/μs

(●)Pulse width limited by safe operating area  
(1) Starting T<sub>j</sub> = 25°C, I<sub>D</sub> = 2.5 A, V<sub>DD</sub> = 20 V

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

## STS4DPFS2LS

### THERMAL DATA

Rthj-amb	(*)Thermal Resistance Junction-ambient MOSFET	62.5	°C/W
Rthj-amb	(*)Thermal Resistance Junction-ambient SCHOTTKY	100	°C/W
T <sub>stg</sub>	Storage Temperature Range	-55 to 150	°C
T <sub>J</sub>	Junction Temperature	150	°C
(*) Mounted on FR-4 board (Steady State)			

### MOSFET ELECTRICAL CHARACTERISTICS (TCASE = 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> = ± 20 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> = 250μA	1	1.6	2.5	V
R <sub>DS(on)</sub>	Static Drain-source On Resistance	V <sub>GS</sub> = 10V, I <sub>D</sub> = 2.5 A V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 2.5 A		0.06 0.07	0.07 0.085	Ω
I <sub>D(on)</sub>	On State Drain Current	V <sub>DS</sub> > I <sub>D(on)</sub> × R <sub>DS(on)max</sub> , V <sub>GS</sub> = 10V	16			A

### DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g <sub>fs</sub> (1)	Forward Transconductance	V <sub>DS</sub> > I <sub>D(on)</sub> × R <sub>DS(on)max</sub> , I <sub>D</sub> = 2 A		5		S
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = 25V, f = 1 MHz, V <sub>GS</sub> = 0		1350		pF
C <sub>OSS</sub>	Output Capacitance			490		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			130		pF

**ELECTRICAL CHARACTERISTICS (CONTINUED)**

**SWITCHING ON**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = 15V, I_D = 3A, R_G = 4.7\Omega$ $V_{GS} = 10V$ (see test circuit, Figure 3)		25		ns
$t_r$	Rise Time			35		ns
$Q_g$	Total Gate Charge	$V_{DD} = 24V, I_D = 6A,$ $V_{GS} = 4.5V$		12.5	16	nC
$Q_{gs}$	Gate-Source Charge			5		nC
$Q_{gd}$	Gate-Drain Charge			3		nC

**SWITCHING OFF**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$	Turn-off Delay Time	$V_{DD} = 15V, I_D = 2A,$ $R_G = 4.7\Omega, V_{GS} = 4.5V$ (see test circuit, Figure 3)		125		ns
$t_f$	Fall Time			30		ns
$t_{r(Voff)}$	Off-voltage Rise Time	$V_{clamp} = 24V, I_D = 6A,$ $R_G = 4.7\Omega, V_{GS} = 4.5V$ (see test circuit, Figure 5)		83		ns
$t_f$	Fall Time			40		ns
$t_c$	Cross-over Time			75		ns

**SOURCE DRAIN DIODE**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{SD}$	Source-drain Current				4	A
$I_{SDM(2)}$	Source-drain Current (pulsed)				16	A
$V_{SD(1)}$	Forward On Voltage	$I_{SD} = 4A, V_{GS} = 0$			1.2	V
$t_{rr}$	Reverse Recovery Time	$I_{SD} = 4A, di/dt = 100A/\mu s,$ $V_{DD} = 15V, T_J = 150^\circ C$ (see test circuit, Figure 5)		45		ns
$Q_{rr}$	Reverse Recovery Charge			36		nC
$I_{RRM}$	Reverse Recovery Current			1.6		A

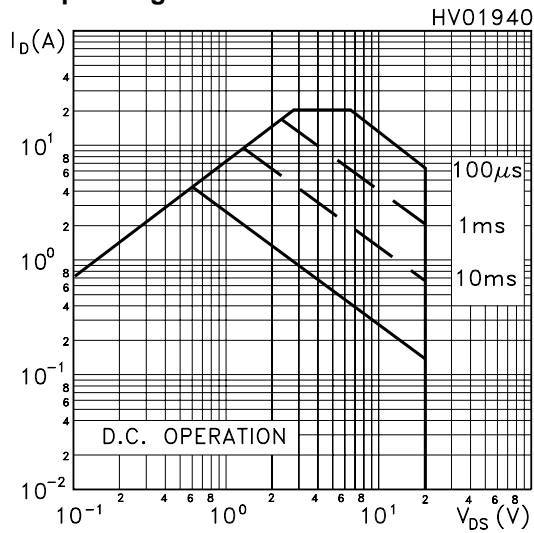
Note: 1. Pulsed: Pulse duration = 300  $\mu s$ , duty cycle 1.5 %.  
2. Pulse width limited by safe operating area.

**SCHOTTKY STATIC ELECTRICAL CHARACTERISTICS**

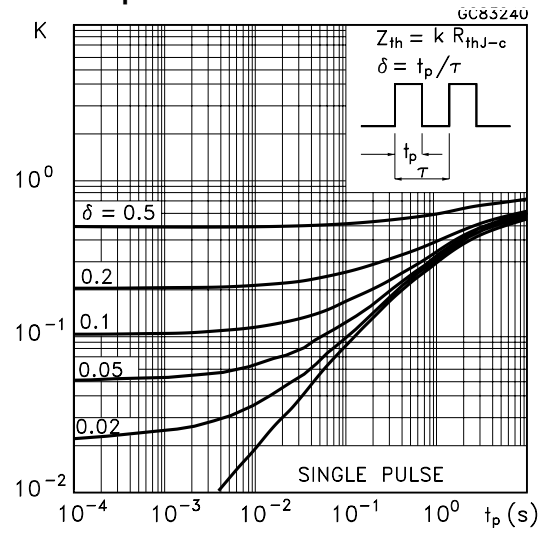
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_R(^*)$	Reversed Leakage Current	$T_J = 25^\circ C, V_R = 30V$ $T_J = 125^\circ C, V_R = 30V$		14 8	50 18	$\mu A$ mA
$V_F(^*)$	Forward Voltage Drop	$T_J = 25^\circ C, I_F = 1A$ $T_J = 125^\circ C, I_F = 1A$ $T_J = 25^\circ C, I_F = 2A$ $T_J = 125^\circ C, I_F = 2A$ $T_J = 25^\circ C, I_F = 3A$ $T_J = 125^\circ C, I_F = 3A$		0.37 0.28 0.41 0.34 0.4	0.42 0.32 0.46 0.39 0.5 0.44	V V V V V V

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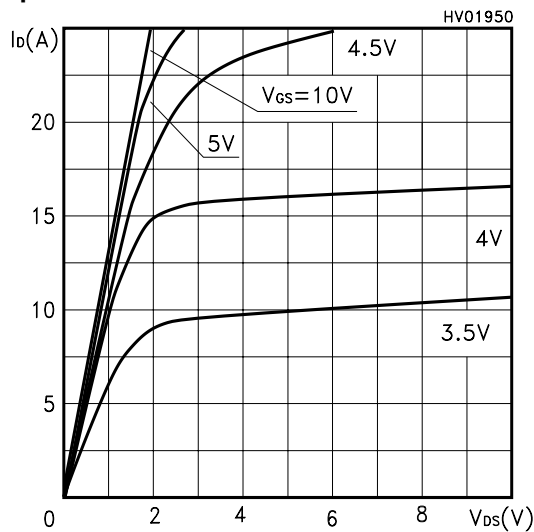
## Safe Operating Area



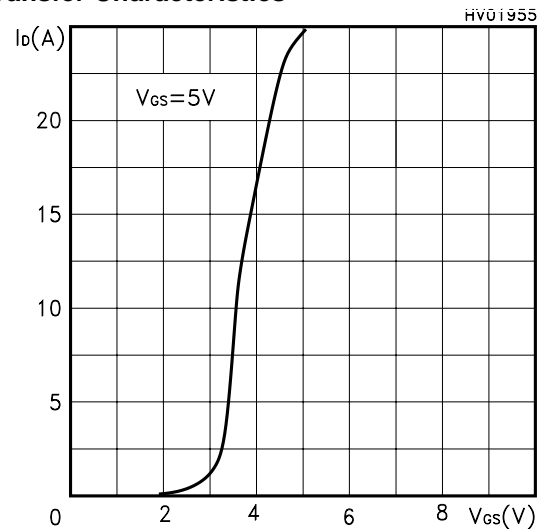
## Thermal Impedance



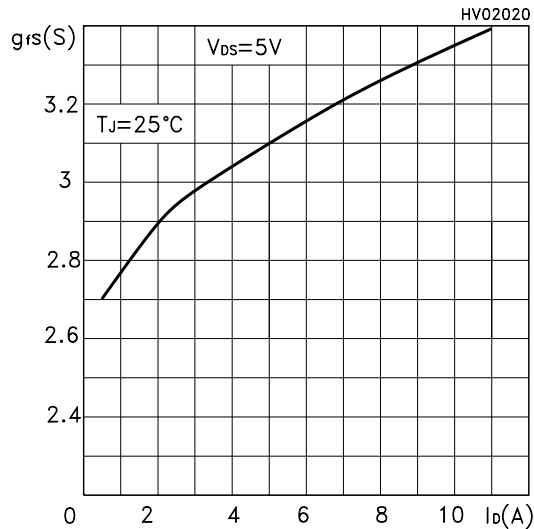
## Output Characteristics



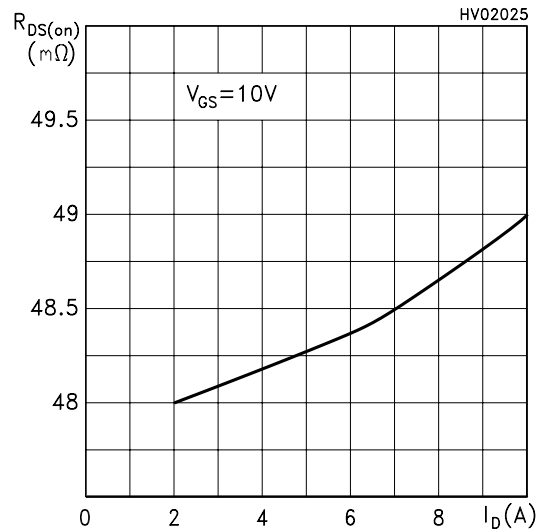
## Transfer Characteristics



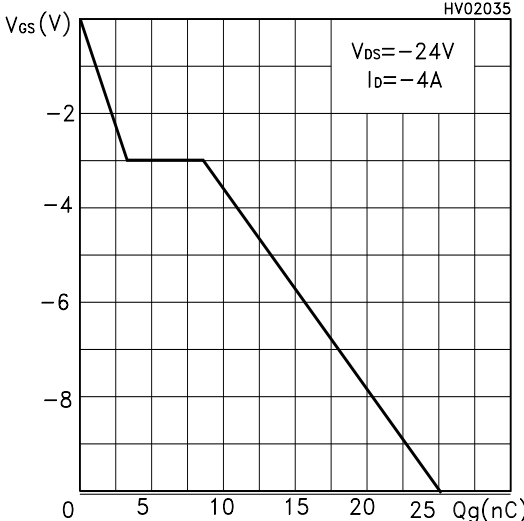
## Transconductance



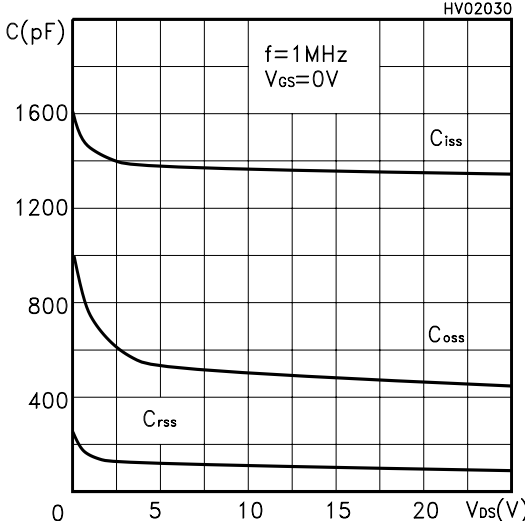
## Static Drain-source On Resistance



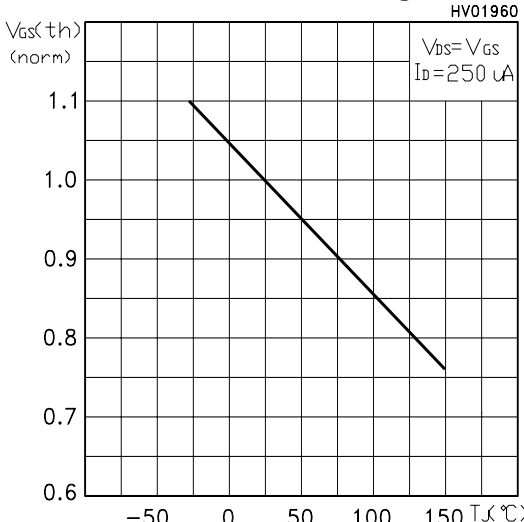
Gate Charge vs Gate-source Voltage



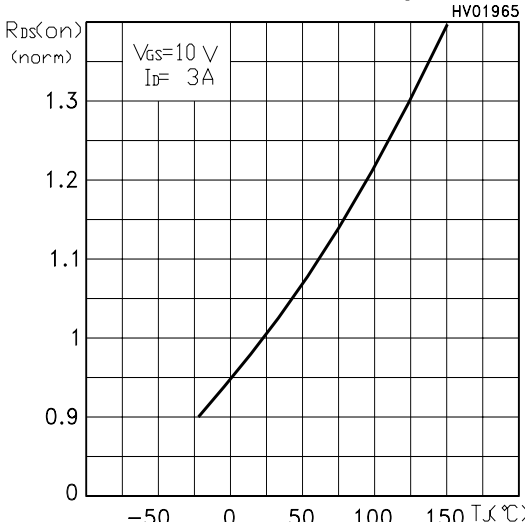
Capacitance Variations



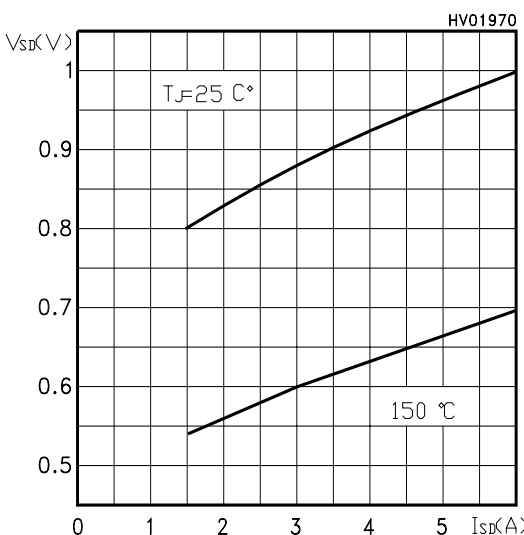
Normalized Gate Threshold Voltage vs Temp.



Normalized On Resistance vs Temperature

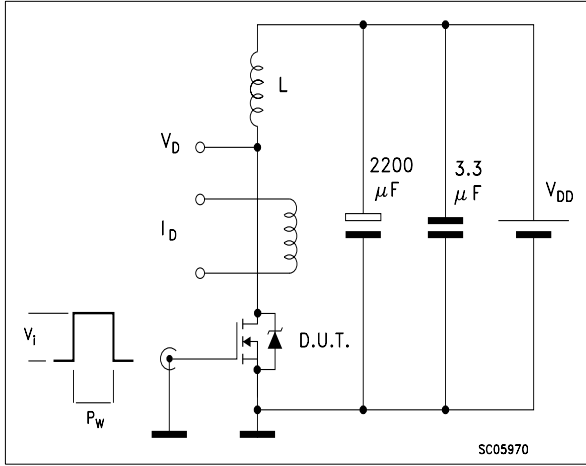


Source-drain Diode Forward Characteristics

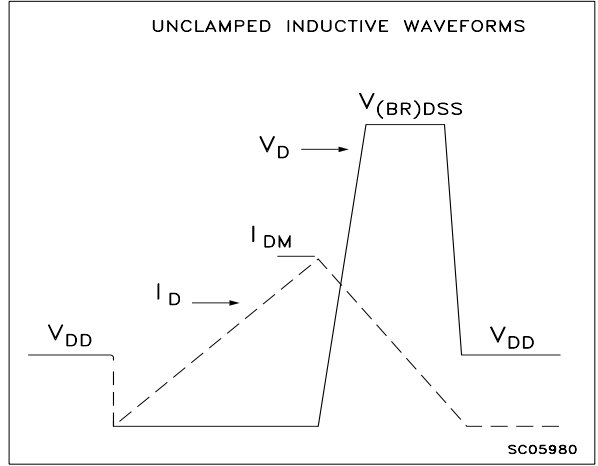


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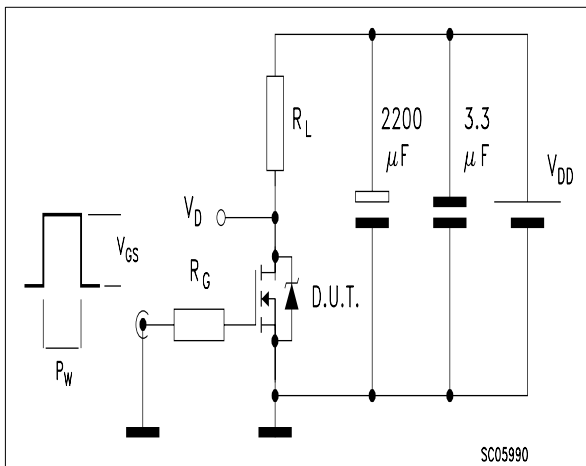
**Fig. 1: Unclamped Inductive Load Test Circuit**



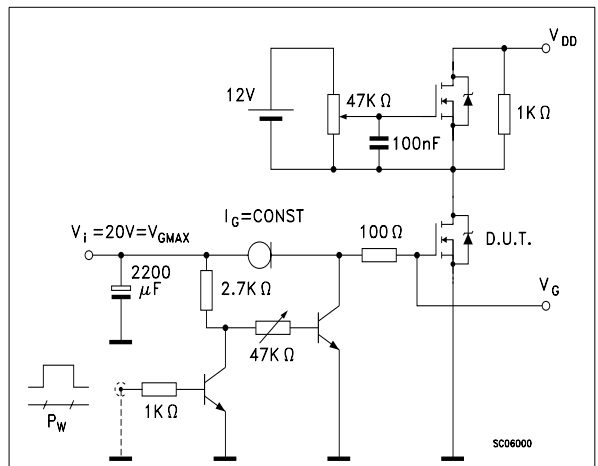
**Fig. 2: Unclamped Inductive Waveform**



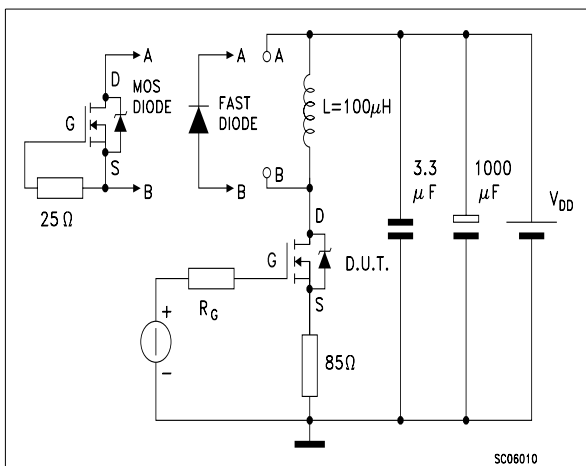
**Fig. 3: Switching Times Test Circuits For Resistive Load**



**Fig. 4: Gate Charge test Circuit**

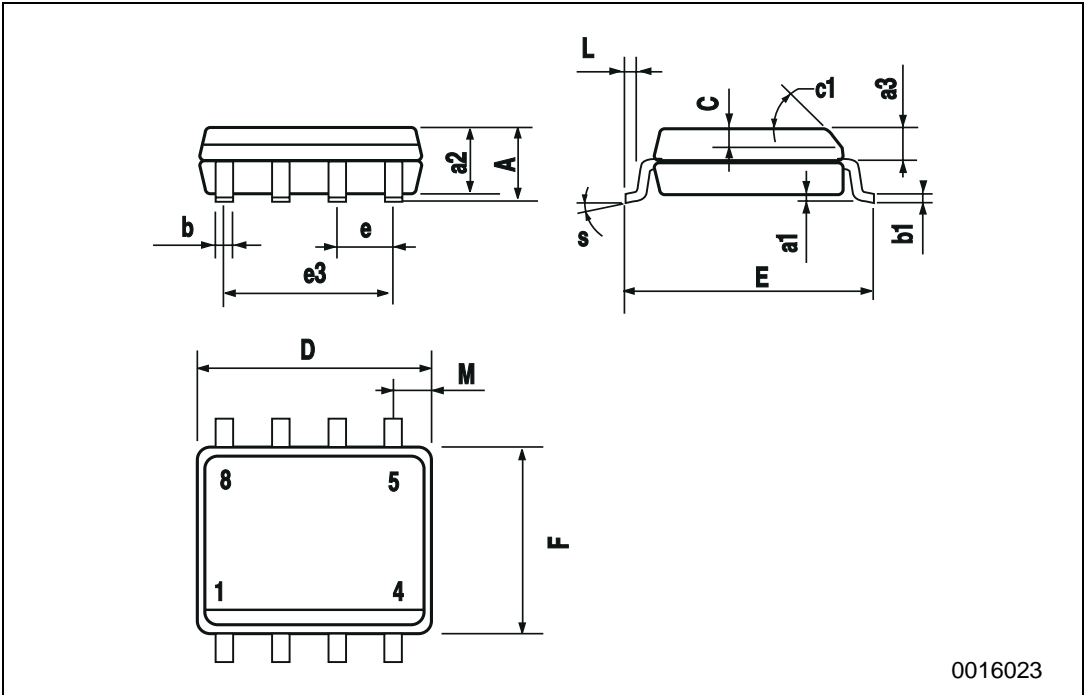


**Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times**



**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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