



## STS1DNC45

DUAL N-CHANNEL 450V - 4.1Ω - 0.4A SO-8

SuperMESH™ POWER MOSFET

TYPE	V <sub>DSS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>
STS1DNC45	450 V	< 4.5 Ω	0.4 A

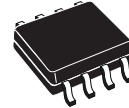
- TYPICAL R<sub>DS(on)</sub> = 4.1Ω
- STANDARD OUTLINE FOR EASY AUTOMATED SURFACE MOUNT ASSEMBLY
- GATE CHARGE MINIMIZED

### DESCRIPTION

The SuperMESH™ series is obtained through an extreme optimization of ST's well established strip-based PowerMESH™ layout. In addition to pushing on-resistance significantly down, special care is taken to ensure a very good dv/dt capability for the most demanding applications. Such series complements ST full range of high voltage MOSFETs including revolutionary MDmesh™ products.

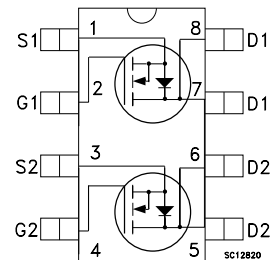
### APPLICATIONS

- SWITCH MODE LOW POWER SUPPLIES (SMPS)
- DC-DC CONVERTERS
- LOW POWER, LOW COST CFL (COMPACT FLUORESCENT LAMPS)
- LOW POWER BATTERY CHARGERS



SO-8

### INTERNAL SCHEMATIC DIAGRAM



### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V <sub>DS</sub>	Drain-source Voltage (V <sub>GS</sub> = 0)	450	V
V <sub>DGR</sub>	Drain-gate Voltage (R <sub>GS</sub> = 20 kΩ)	450	V
V <sub>GS</sub>	Gate- source Voltage	± 30	V
I <sub>D</sub>	Drain Current (continuous) at T <sub>C</sub> = 25°C Drain Current (continuous) at T <sub>C</sub> = 100°C	0.40 0.25	A A
I <sub>DM</sub> (●)	Drain Current (pulsed)	1.6	A
P <sub>TOT</sub>	Total Dissipation at T <sub>C</sub> = 25°C Dual Operation Total Dissipation at T <sub>C</sub> = 25°C Single Operation	1.6 2	W W
dv/dt(1)	Peak Diode Recovery voltage slope	3	V/ns

(●) Pulse width limited by safe operating area

(1) I<sub>SD</sub> ≤ 0.4 A, di/dt ≤ 100A/μs, V<sub>DD</sub> ≤ V<sub>(BR)DSS</sub>, T<sub>J</sub> ≤ T<sub>JMAX</sub>.

## STS1DNC45

### THERMAL DATA

Rthj-amb(#)	Thermal Resistance Junction-ambient Max Single Operation Thermal Resistance Junction-ambient Max Dual Operation	62.5 78	°C/W °C/W
T <sub>j</sub>	Max. Operating Junction Temperature	150	°C
T <sub>stg</sub>	Storage Temperature	-65 to 150	°C

(#) When Mounted on FR4 board (Steady State)

### AVALANCHE CHARACTERISTICS

Symbol	Parameter	Max Value	Unit
I <sub>AR</sub>	Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T <sub>j</sub> max)	0.4	A
E <sub>AS</sub>	Single Pulse Avalanche Energy (starting T <sub>j</sub> = 25 °C, I <sub>D</sub> = I <sub>AR</sub> , V <sub>DD</sub> = 50 V)	30	mJ

### 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	450			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 50	µA µA
I <sub>GSS</sub>	Gate-body Leakage Current (V <sub>DS</sub> = 0)	V <sub>GS</sub> = ± 30V			±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	2.3	3	3.7	V
R <sub>DS(on)</sub>	Static Drain-source On Resistance	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 0.5 A		4.1	4.5	Ω

### DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g <sub>fs</sub> (1)	Forward Transconductance	V <sub>DS</sub> = 25 V, I <sub>D</sub> = 0.5 A		1.1		S
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = 25 V, f = 1 MHz, V <sub>GS</sub> = 0		160		pF
C <sub>oss</sub>	Output Capacitance			27.5		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			4.7		pF

**ELECTRICAL CHARACTERISTICS (CONTINUED)****SWITCHING ON**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = 225\text{ V}$ , $I_D = 0.5\text{ A}$		6.7		ns
$t_r$	Rise Time	$R_G = 4.7\Omega$ , $V_{GS} = 10\text{ V}$ (see test circuit, Figure 3)		4		ns
$Q_g$	Total Gate Charge	$V_{DD} = 360\text{ V}$ , $I_D = 1.5\text{ A}$ ,		7	10	nC
$Q_{gs}$	Gate-Source Charge	$V_{GS} = 10\text{ V}$		1.3		nC
$Q_{gd}$	Gate-Drain Charge			3.2		nC

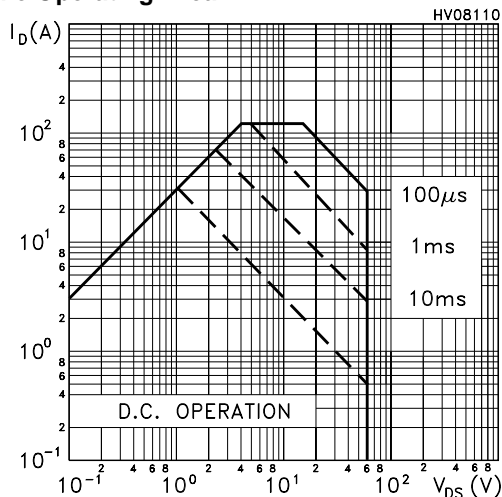
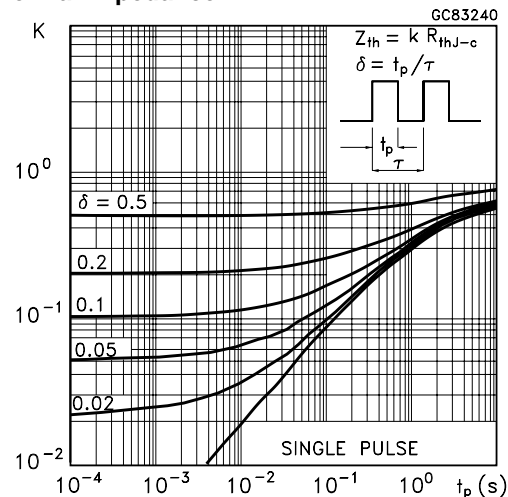
**SWITCHING OFF**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{r(off)}$	Off-voltage Rise Time	$V_{DD} = 360\text{ V}$ , $I_D = 1.5\text{ A}$		8.5		ns
$t_f$	Fall Time	$R_G = 4.7\Omega$ , $V_{GS} = 10\text{ V}$		12		ns
$t_c$	Cross-over Time	(see test circuit, Figure 5)		18		ns

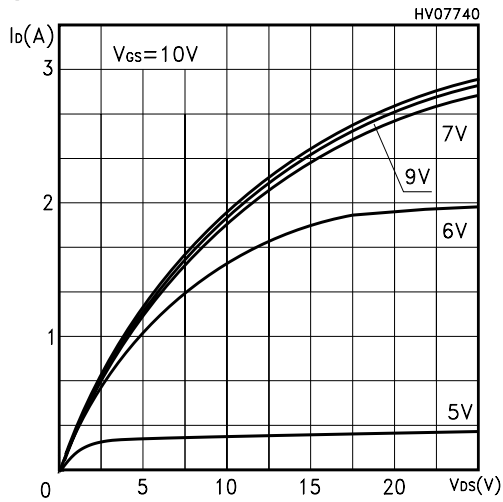
**SOURCE DRAIN DIODE**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{SD}$	Source-drain Current				0.4	A
$I_{SDM(2)}$	Source-drain Current (pulsed)				1.6	A
$V_{SD(1)}$	Forward On Voltage	$I_{SD} = 0.4\text{ A}$ , $V_{GS} = 0$			1.6	V
$t_{rr}$	Reverse Recovery Time	$I_{SD} = 0.4\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ ,		225		ns
$Q_{rr}$	Reverse Recovery Charge	$V_{DD} = 100\text{ V}$ , $T_J = 150^\circ\text{C}$		530		nC
$I_{RRM}$	Reverse Recovery Current	(see test circuit, Figure 5)		4.7		A

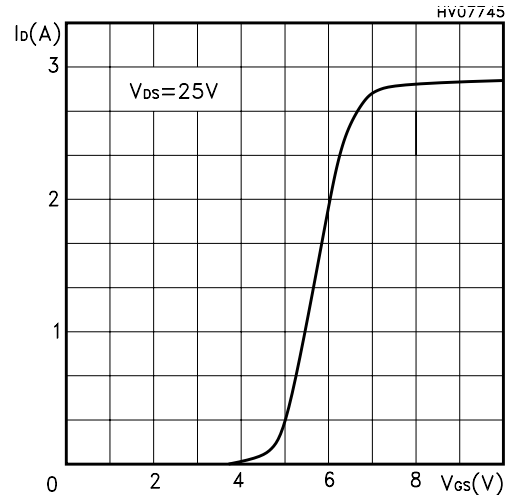
Note: 1. Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5 %.  
2. Pulse width limited by safe operating area.

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

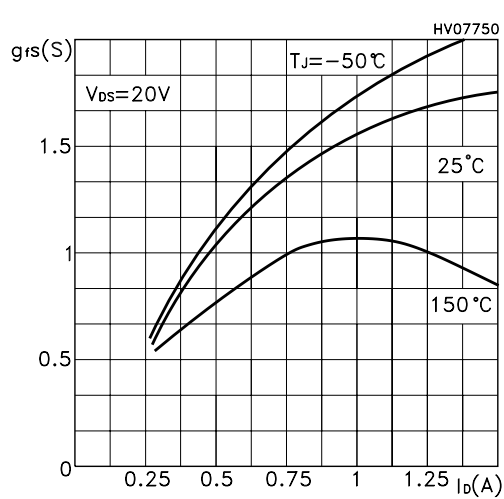
Output Characteristics



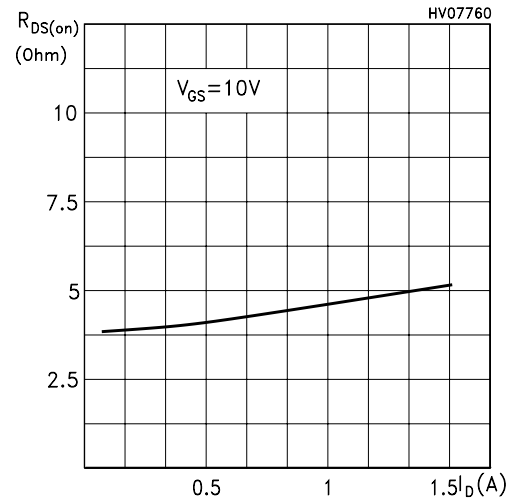
Transfer Characteristics



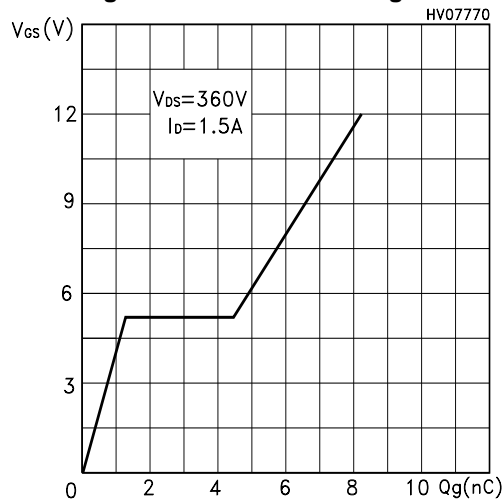
Transconductance



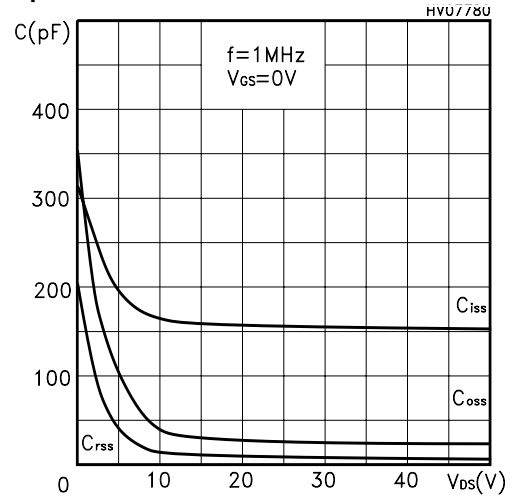
Static Drain-source On Resistance



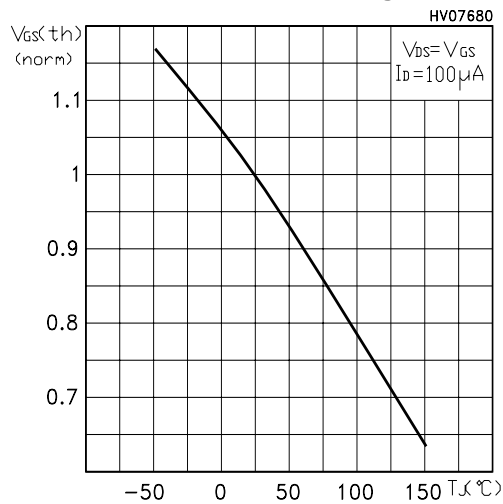
Gate Charge vs Gate-source Voltage



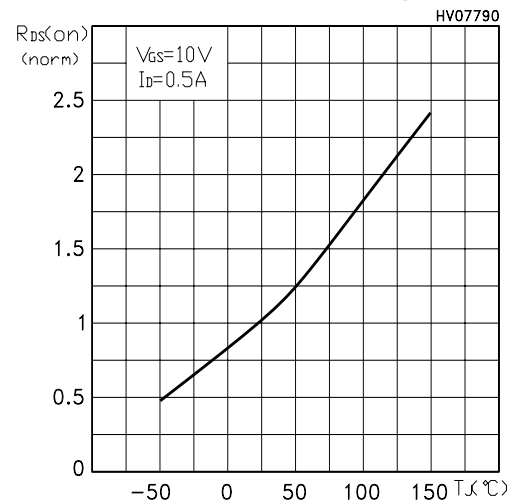
Capacitance Variations



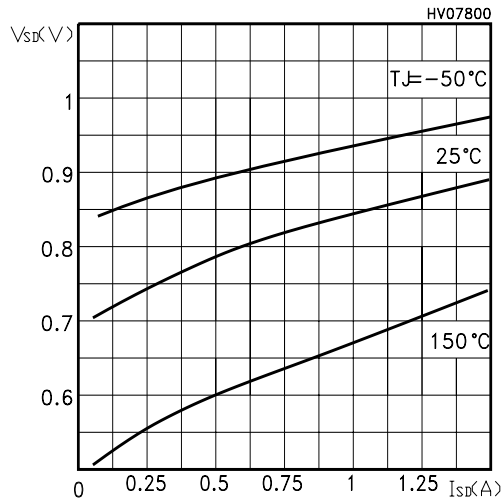
Normalized Gate Threshold Voltage vs Temp.



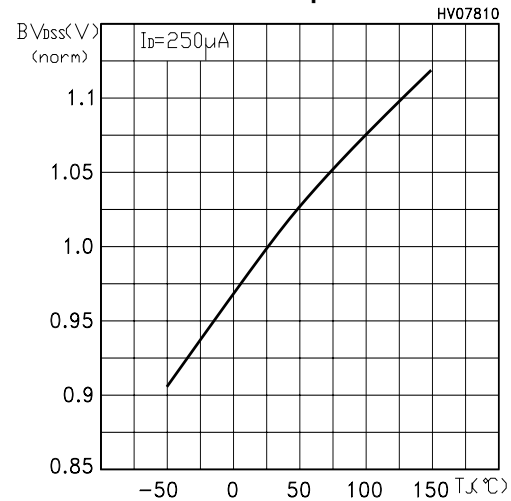
Normalized On Resistance vs Temperature



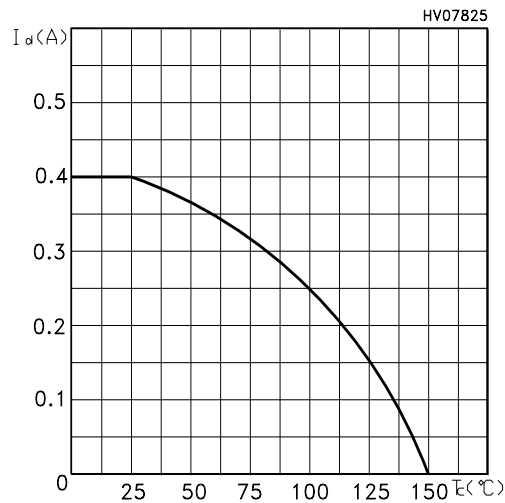
Source-drain Diode Forward Characteristics



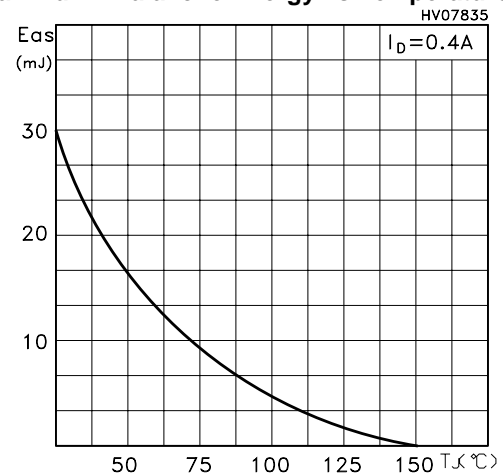
Normalized BVDSS vs Temperature



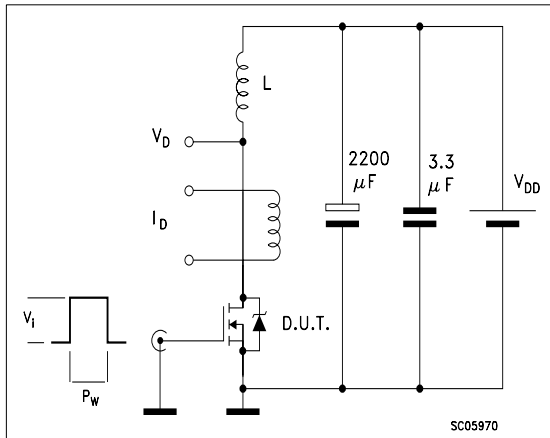
Max Id Current vs Tc



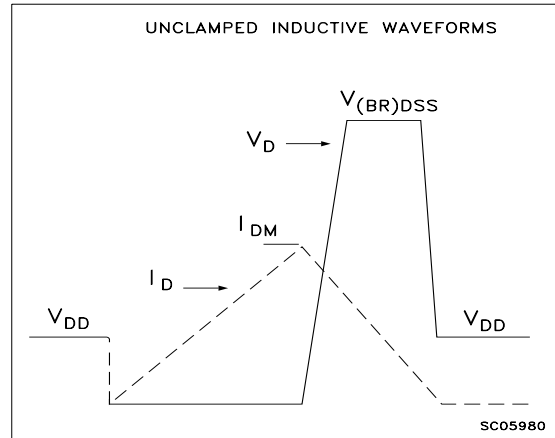
Maximum Avalanche Energy vs Temperature



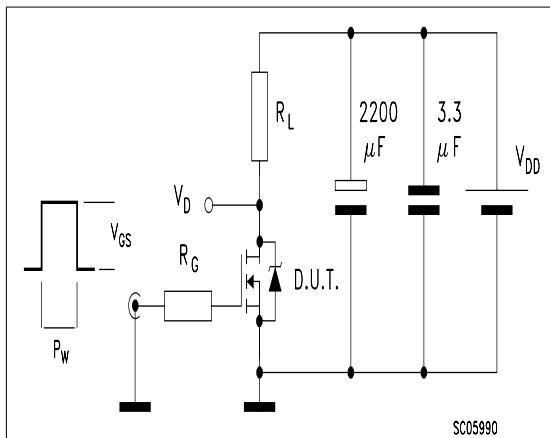
**Fig. 1: Unclamped Inductive Load Test Circuit**



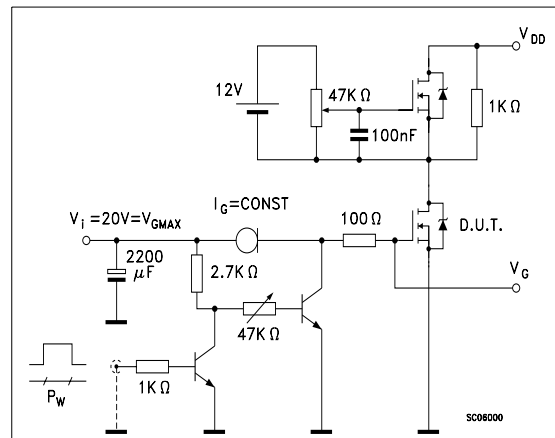
**Fig. 2: Unclamped Inductive Waveform**



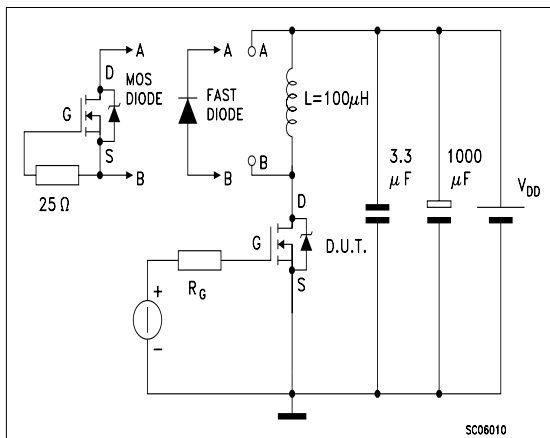
**Fig. 3: Switching Times Test Circuit For Resistive Load**



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

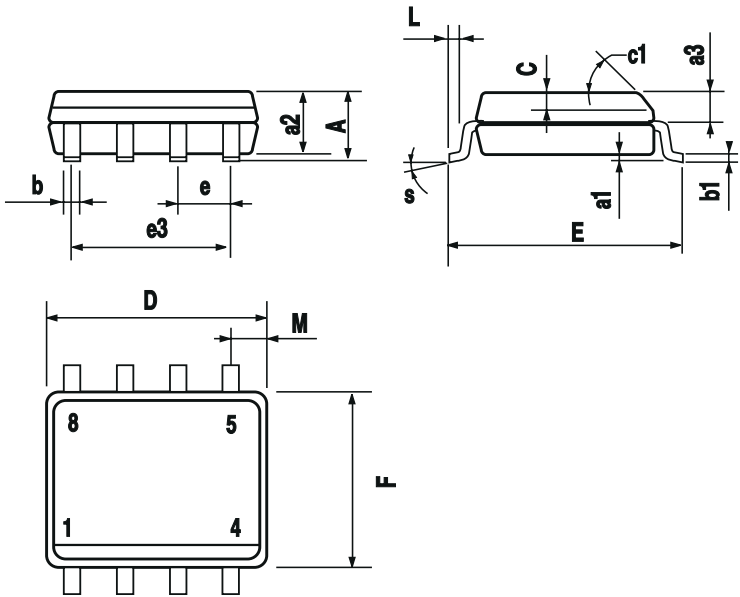


**Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times**



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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