



## STS1HNK60

N-CHANNEL 600V - 8 $\Omega$  - 0.3A SO-8

SuperMESH™ Power MOSFET

TYPE	V <sub>DSS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>	P <sub>w</sub>
STS1HNK60	600 V	< 8.5 $\Omega$	0.3 A	2 W

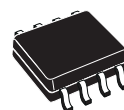
- TYPICAL R<sub>DS(on)</sub> = 8  $\Omega$
- EXTREMELY HIGH dv/dt CAPABILITY
- 100% AVALANCHE TESTED
- GATE CHARGE MINIMIZED
- NEW HIGH VOLTAGE BENCHMARK

### 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.

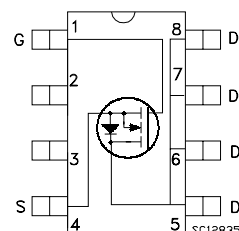
### APPLICATIONS

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



SO-8

### INTERNAL SCHEMATIC DIAGRAM



### ORDERING INFORMATION

SALES TYPE	MARKING	PACKAGE	PACKAGING
STS1HNK60	S1HNK60	SO-8	TAPE & REEL

## STS1HNK60

### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-source Voltage ( $V_{GS} = 0$ )	600	V
$V_{DGR}$	Drain-gate Voltage ( $R_{GS} = 20\text{ k}\Omega$ )	600	V
$V_{GS}$	Gate- source Voltage	$\pm 30$	V
$I_D$	Drain Current (continuous) at $T_C = 25^\circ\text{C}$	0.3	A
$I_D$	Drain Current (continuous) at $T_C = 100^\circ\text{C}$	0.19	A
$I_{DM}(\bullet)$	Drain Current (pulsed)	1.2	A
$P_{TOT}$	Total Dissipation at $T_C = 25^\circ\text{C}$	2	W
	Derating Factor	0.016	W/ $^\circ\text{C}$
dv/dt (1)	Peak Diode Recovery voltage slope	3	V/ns
$T_j$ $T_{stg}$	Operating Junction Temperature Storage Temperature	-65 to 150	$^\circ\text{C}$

(●) Pulse width limited by safe operating area

(1)  $I_{SD} \leq 0.3\text{A}$ ,  $di/dt \leq 100\text{A}/\mu\text{s}$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  $T_j \leq T_{JMAX}$ .

### THERMAL DATA

Rthj-amb	Thermal Resistance Junction-ambient Max	62.5	$^\circ\text{C}/\text{W}$
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### ELECTRICAL CHARACTERISTICS ( $T_{CASE} = 25^\circ\text{C}$ UNLESS OTHERWISE SPECIFIED)

ON/OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source Breakdown Voltage	$I_D = 1\text{ mA}$ , $V_{GS} = 0$	600			V
$I_{DSS}$	Zero Gate Voltage Drain Current ( $V_{GS} = 0$ )	$V_{DS} = \text{Max Rating}$ $V_{DS} = \text{Max Rating}$ , $T_C = 125^\circ\text{C}$			1 50	$\mu\text{A}$ $\mu\text{A}$
$I_{GSS}$	Gate-body Leakage Current ( $V_{DS} = 0$ )	$V_{GS} = \pm 30\text{ V}$			$\pm 100$	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$ , $I_D = 250\text{ }\mu\text{A}$	2.25	3	3.7	V
$R_{DS(on)}$	Static Drain-source On Resistance	$V_{GS} = 10\text{ V}$ , $I_D = 0.5\text{ A}$		8	8.5	$\Omega$

## ELECTRICAL CHARACTERISTICS (CONTINUED)

## DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$g_{fs}$ (1)	Forward Transconductance	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$ , $I_D = 0.5$ A		1		S
$C_{iss}$ $C_{oss}$ $C_{rss}$	Input Capacitance Output Capacitance Reverse Transfer Capacitance	$V_{DS} = 25$ V, $f = 1$ MHz, $V_{GS} = 0$		156 23.5 3.8		pF pF pF

## SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ $t_r$	Turn-on Delay Time Rise Time	$V_{DD} = 300$ V, $I_D = 0.5$ A $R_G = 4.7\Omega$ , $V_{GS} = 10$ V (Resistive Load see, Figure 3)		6.5 5		ns ns
$Q_g$ $Q_{gs}$ $Q_{gd}$	Total Gate Charge Gate-Source Charge Gate-Drain Charge	$V_{DD} = 480$ V, $I_D = 1$ A, $V_{GS} = 10$ V, $R_G = 4.7\Omega$		7 1.1 3.4	10	nC nC nC

## SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$ $t_f$	Turn-off Delay Time Fall Time	$V_{DD} = 300$ V, $I_D = 0.5$ A $R_G = 4.7\Omega$ , $V_{GS} = 10$ V (Resistive Load see, Figure 3)		19 25		ns ns
$t_{r(Voff)}$ $t_f$ $t_c$	Off-voltage Rise Time Fall Time Cross-over Time	$V_{DD} = 480$ V, $I_D = 1.0$ A, $R_G = 4.7\Omega$ , $V_{GS} = 10$ V (Inductive Load see, Figure 5)		24 25 44		ns ns ns

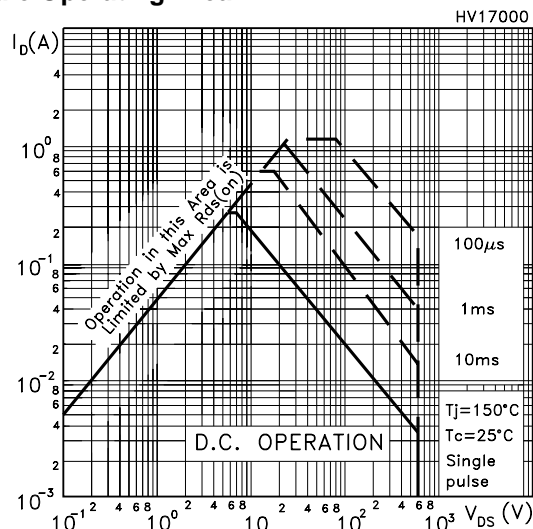
## SOURCE DRAIN DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{SD}$ $I_{SDM}$ (2)	Source-drain Current Source-drain Current (pulsed)				0.3 1.2	A A
$V_{SD}$ (1)	Forward On Voltage	$I_{SD} = 0.3$ A, $V_{GS} = 0$			1.6	V
$t_{rr}$ $Q_{rr}$ $I_{RRM}$	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	$I_{SD} = 0.3$ A, $di/dt = 100$ A/ $\mu$ s $V_{DD} = 25$ V, $T_j = 150^\circ$ C (see test circuit, Figure 5)		229 377 3.3		ns $\mu$ C A

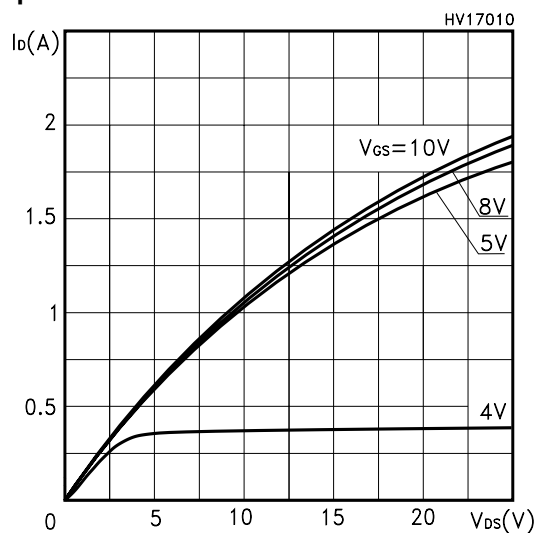
Note: 1. Pulsed: Pulse duration = 300  $\mu$ s, duty cycle 1.5 %.

2. Pulse width limited by safe operating area.

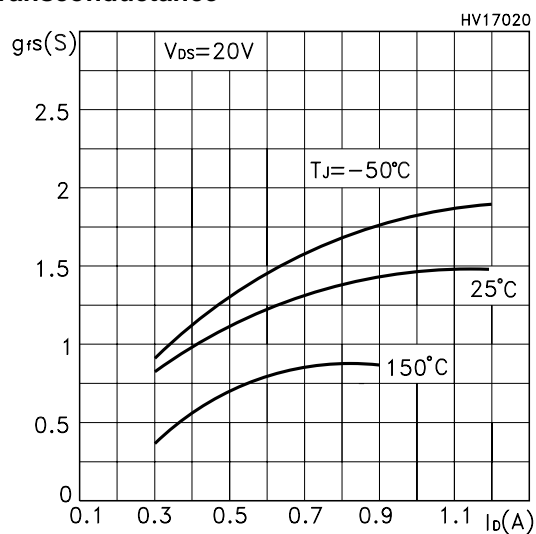
### Safe Operating Area



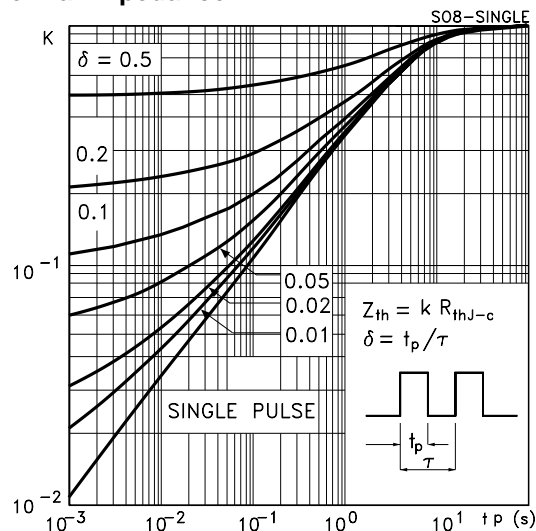
### Output Characteristics



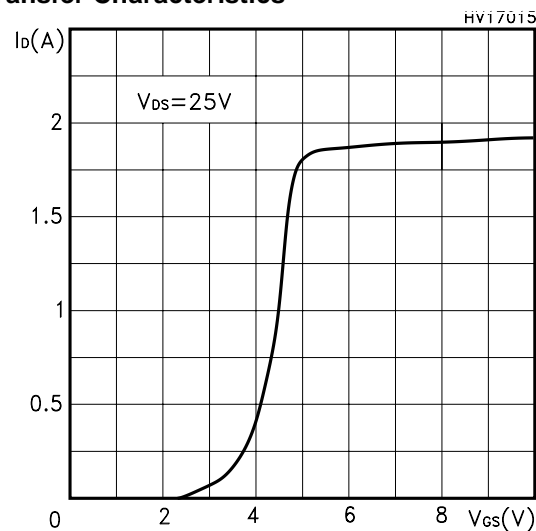
### Transconductance



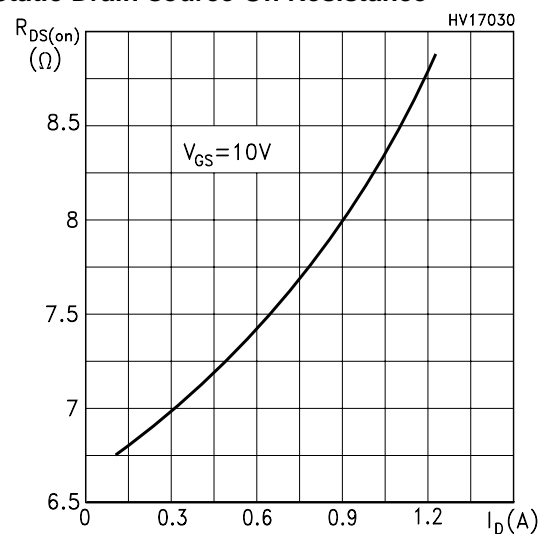
### Thermal Impedance



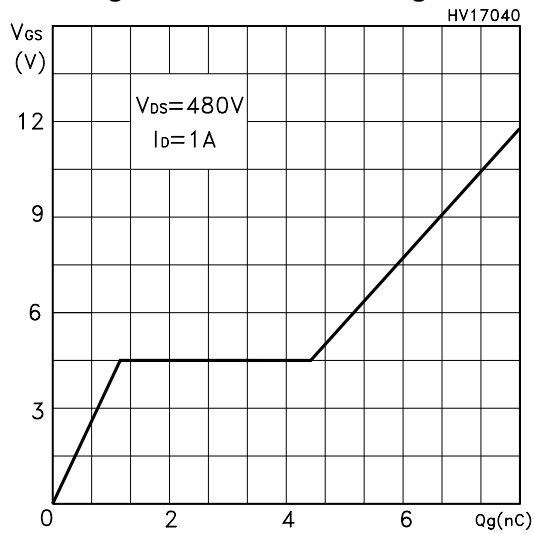
### Transfer Characteristics



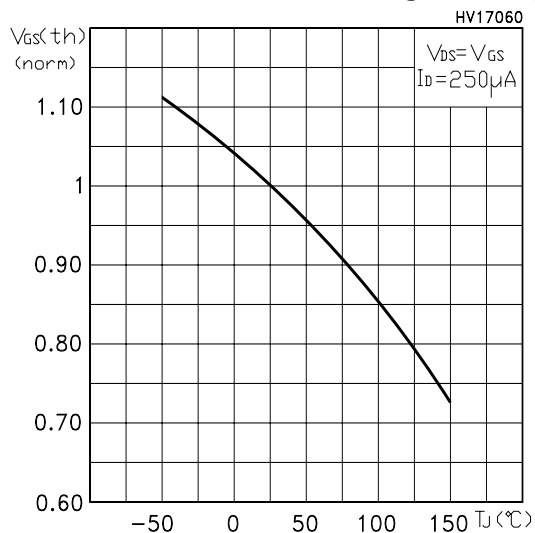
### Static Drain-source On Resistance



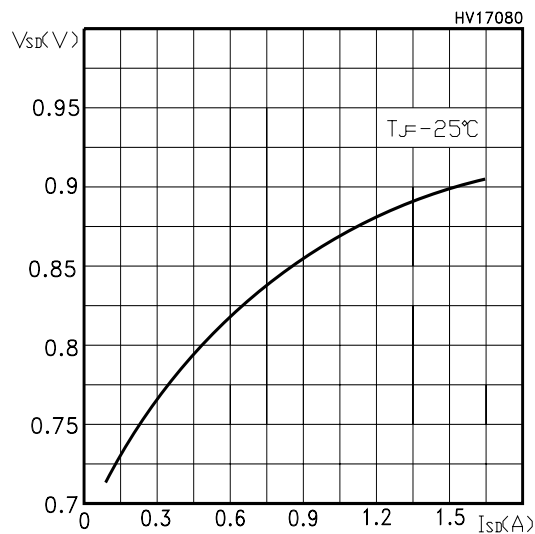
Gate Charge vs Gate-source Voltage



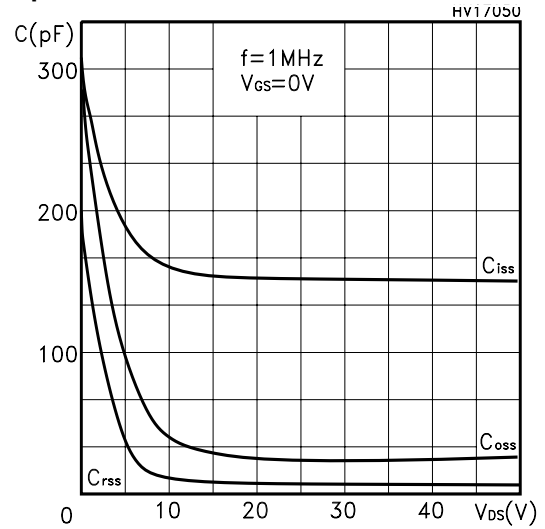
Normalized Gate Threshold Voltage vs Temp.



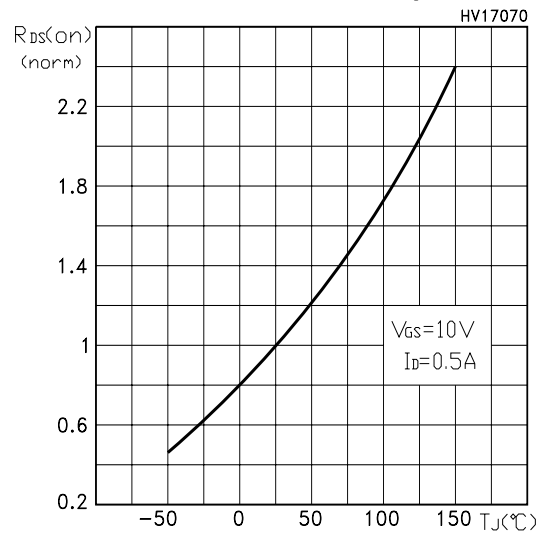
Source-drain Diode Forward Characteristics



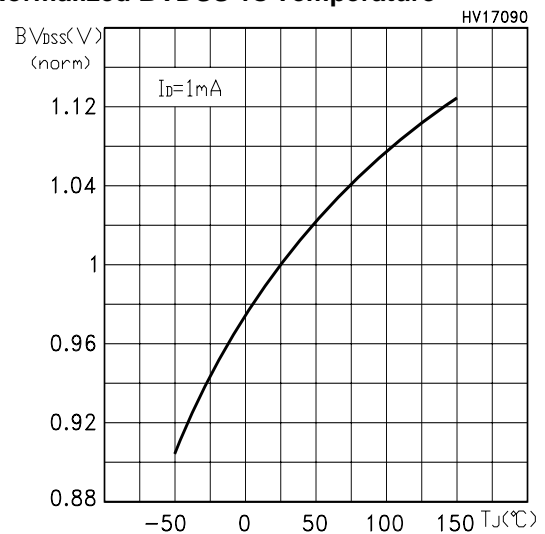
Capacitance Variations



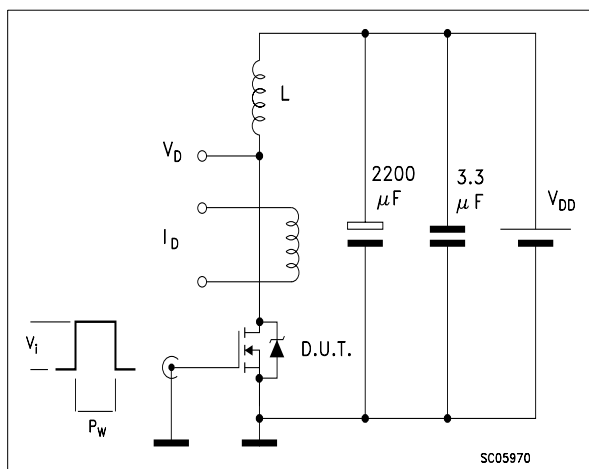
Normalized On Resistance vs Temperature



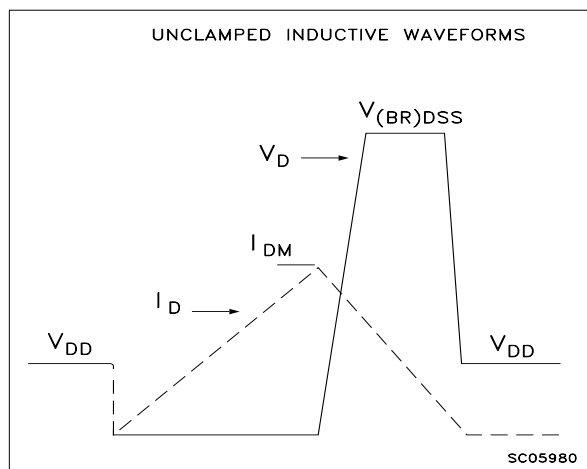
Normalized BVDSS vs Temperature



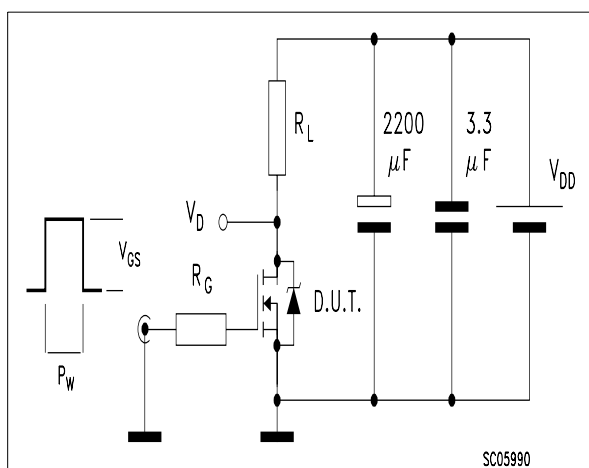
**Fig. 1: Unclamped Inductive Load Test Circuit**



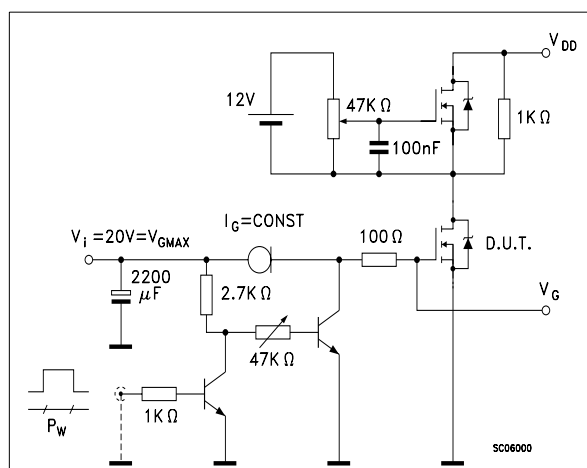
**Fig. 2: Unclamped Inductive Waveform**



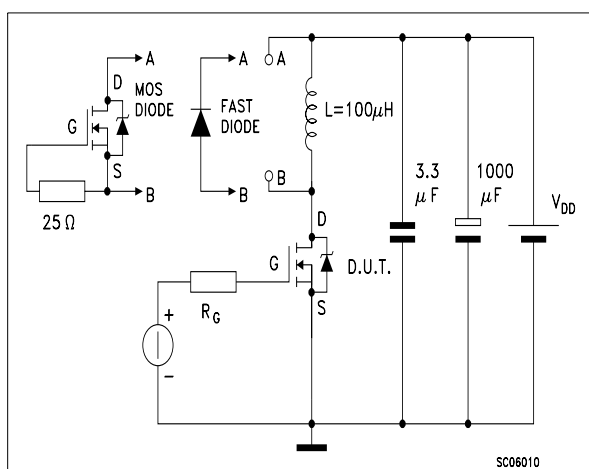
**Fig. 3: Switching Times Test Circuit For Resistive Load**



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

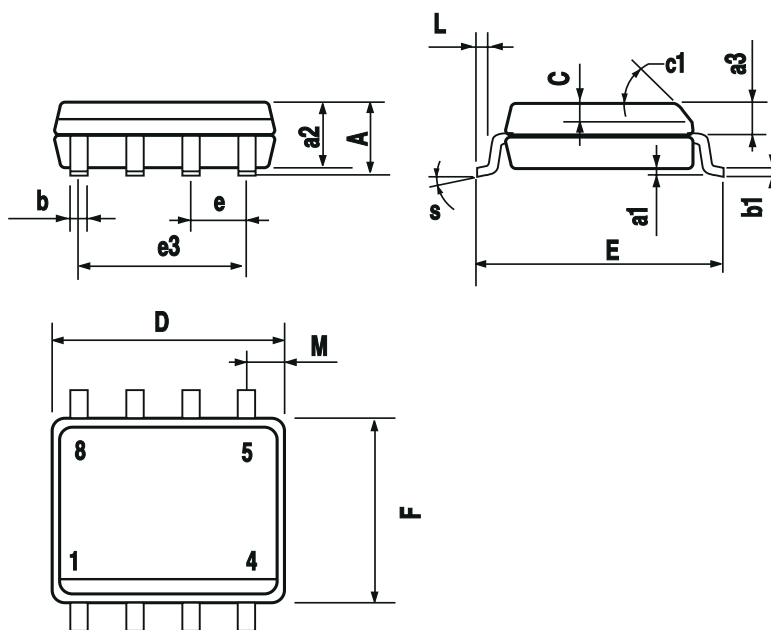


**Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times**



## 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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