



STS1HNK60

N-CHANNEL 600V - 8Ω - 0.3A SO-8

SuperMESH™ Power MOSFET

TYPE	V _{DSS}	R _{DS(on)}	I _D	P _w
STS1HNK60	600 V	< 8.5 Ω	0.3 A	2 W

- TYPICAL R_{DS(on)} = 8 Ω
- EXTREMELY HIGH dv/dt CAPABILITY
- 100% AVALANCHE TESTED
- GATE CHARGE MINIMIZED
- NEW HIGH VOLTAGE BENCHMARK

DESCRIPTION

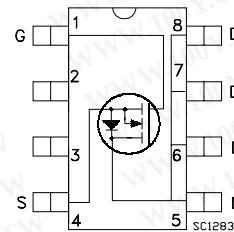
The SuperMESH™ series is obtained through an extreme optimization of ST's well established strip-based PowerMESH™ layout. In addition to pushing on-resistance significantly down, special care is taken to ensure a very good dv/dt capability for the most demanding applications. Such series complements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



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	± 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	μA μA
I_{GSS}	Gate-body Leakage Current ($V_{DS} = 0$)	$V_{GS} = \pm 30\text{ V}$			± 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	Ω

ELECTRICAL CHARACTERISTICS (CONTINUED)

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs} (1)	Forward Transconductance	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$, $I_D = 0.5 \text{ A}$		1		S
C_{iss} C_{oss} C_{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	$V_{DS} = 25 \text{ V}$, $f = 1 \text{ MHz}$, $V_{GS} = 0$		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	$V_{DD} = 300 \text{ V}$, $I_D = 0.5 \text{ A}$ $R_G = 4.7 \Omega$, $V_{GS} = 10 \text{ V}$ (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	$V_{DD} = 480 \text{ V}$, $I_D = 1 \text{ A}$, $V_{GS} = 10 \text{ V}$, $R_G = 4.7 \Omega$		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	$V_{DD} = 300 \text{ V}$, $I_D = 0.5 \text{ A}$ $R_G = 4.7 \Omega$, $V_{GS} = 10 \text{ V}$ (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	$V_{DD} = 480 \text{ V}$, $I_D = 1.0 \text{ A}$, $R_G = 4.7 \Omega$, $V_{GS} = 10 \text{ V}$ (Inductive Load see, Figure 5)		24 25 44		ns ns ns

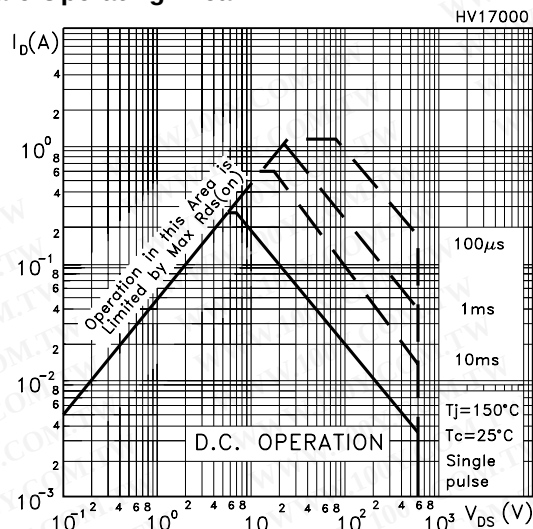
SOURCE DRAIN DIODE

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	$I_{SD} = 0.3 \text{ A}$, $V_{GS} = 0$			1.6	V
t_{rr} Q_{rr} I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	$I_{SD} = 0.3 \text{ A}$, $di/dt = 100 \text{ A}/\mu\text{s}$ $V_{DD} = 25 \text{ V}$, $T_j = 150^\circ\text{C}$ (see test circuit, Figure 5)		229 377 3.3		ns μC A

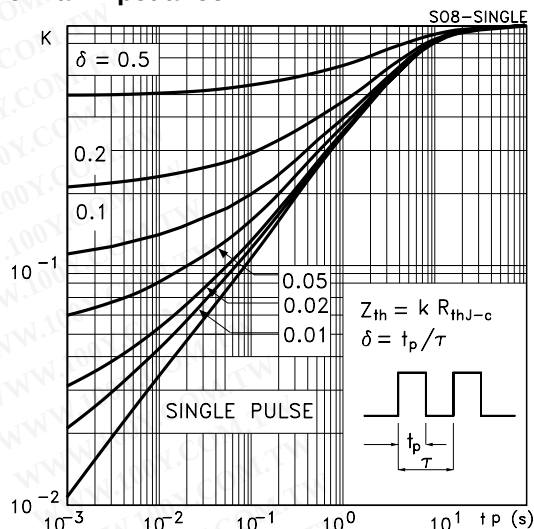
Note: 1. Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %.

2. Pulse width limited by safe operating area.

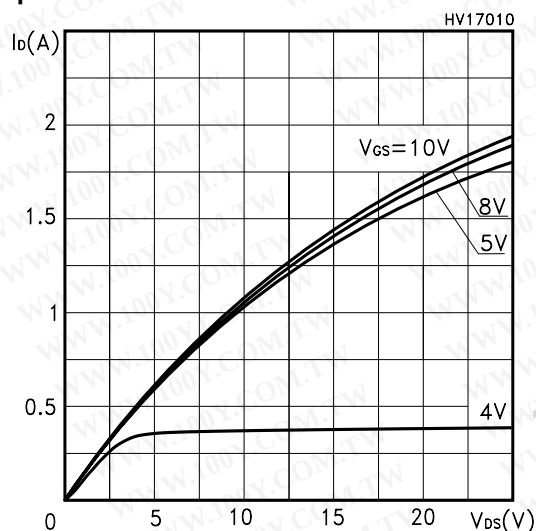
Safe Operating Area



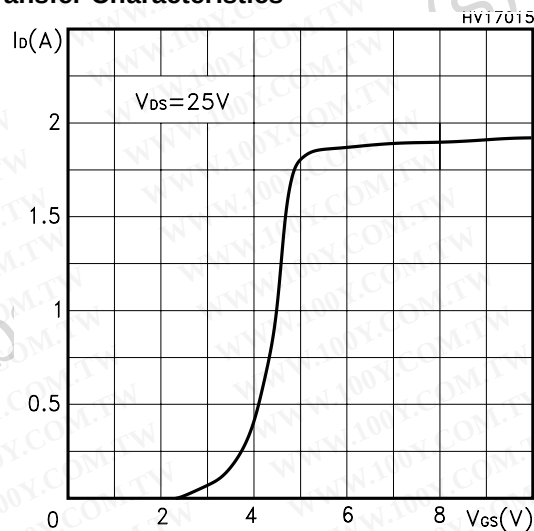
Thermal Impedance



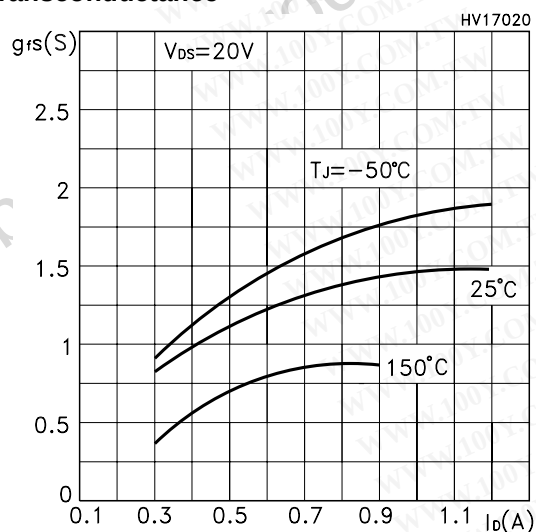
Output Characteristics



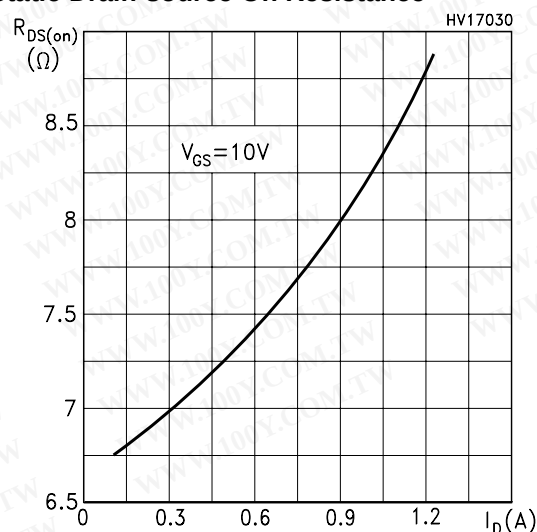
Transfer Characteristics



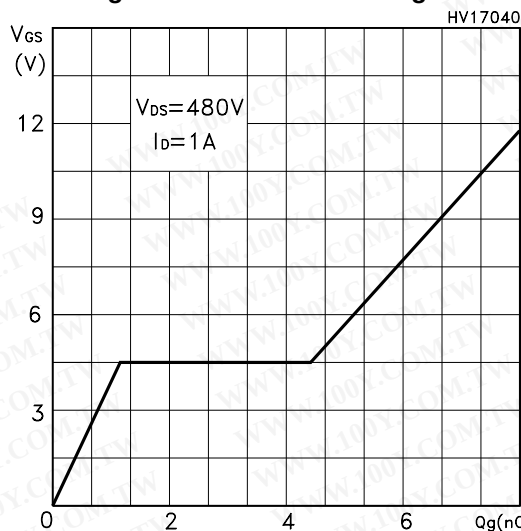
Transconductance



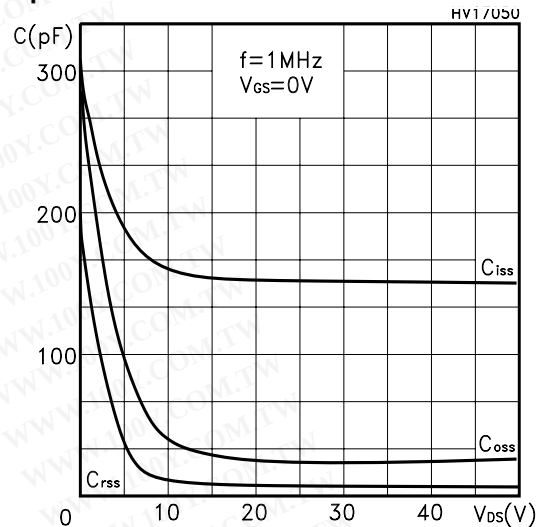
Static Drain-source On Resistance



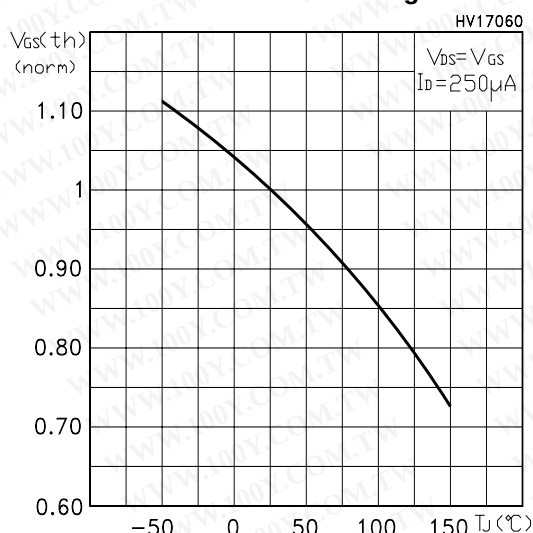
Gate Charge vs Gate-source Voltage



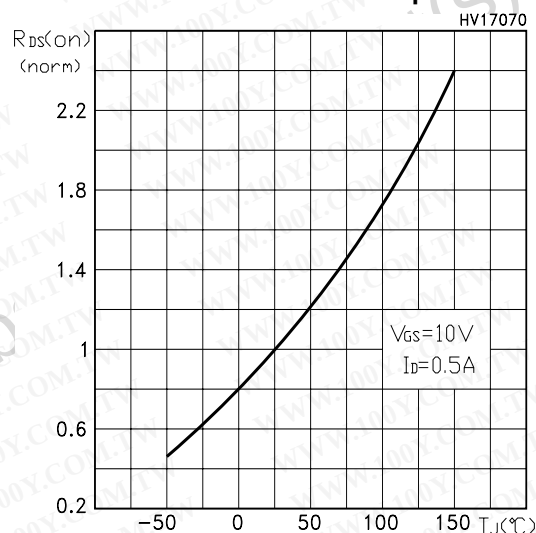
Capacitance Variations



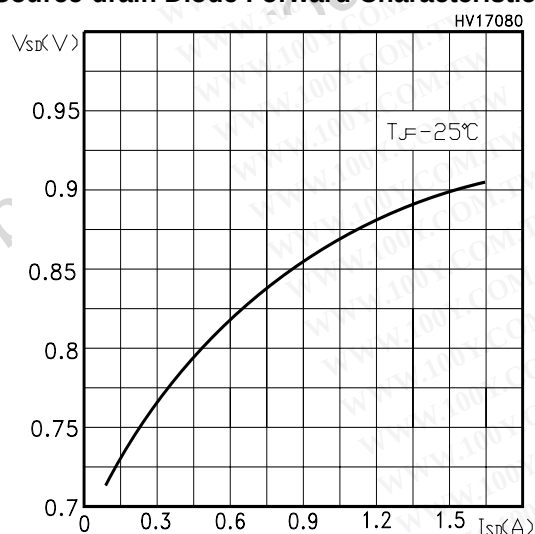
Normalized Gate Threshold Voltage vs Temp.



Normalized On Resistance vs Temperature



Source-drain Diode Forward Characteristics



Normalized BVDSS vs Temperature

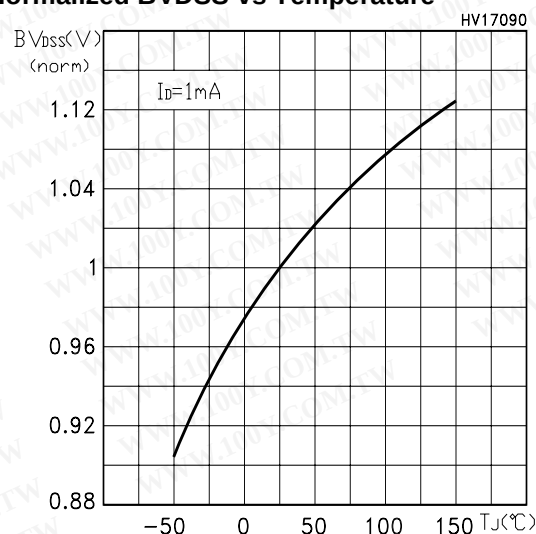


Fig. 1: Unclamped Inductive Load Test Circuit

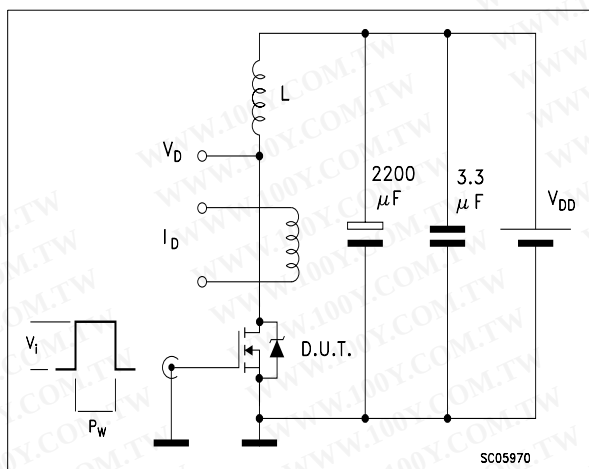


Fig. 2: Unclamped Inductive Waveform

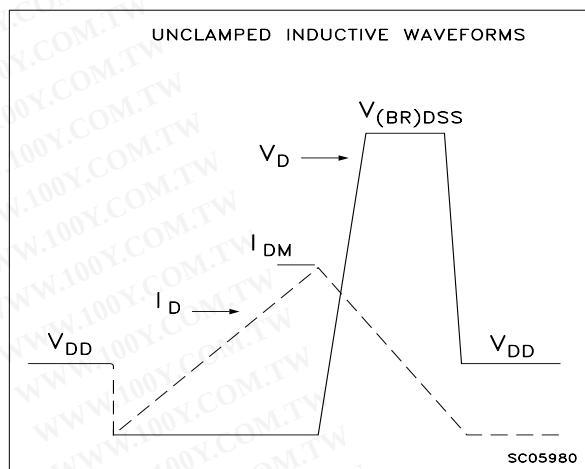


Fig. 3: Switching Times Test Circuit For Resistive Load

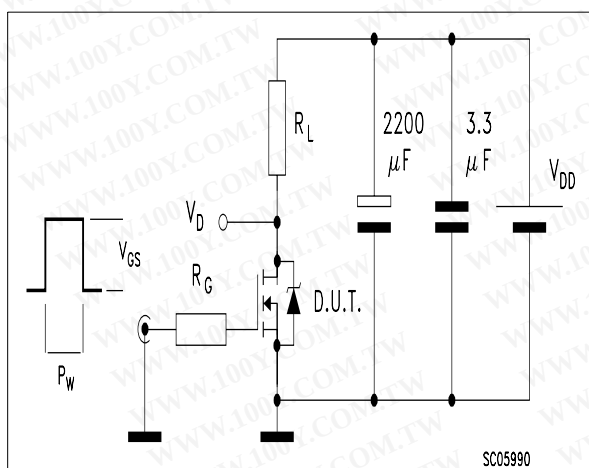


Fig. 4: Gate Charge test Circuit

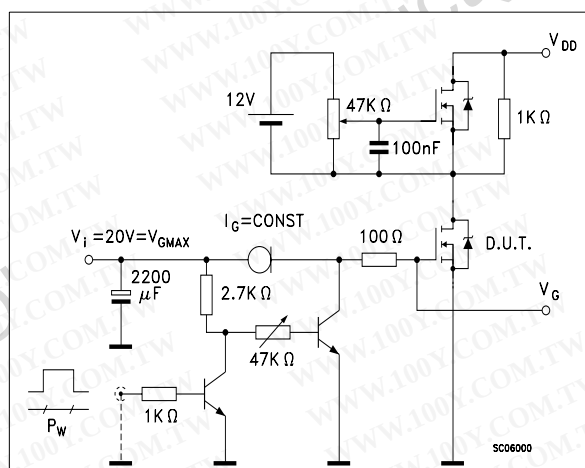
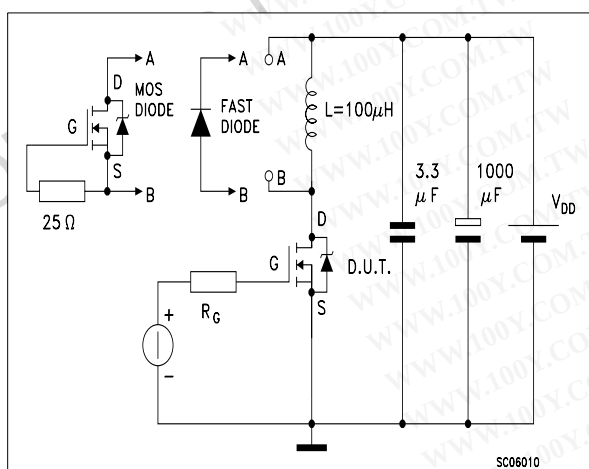
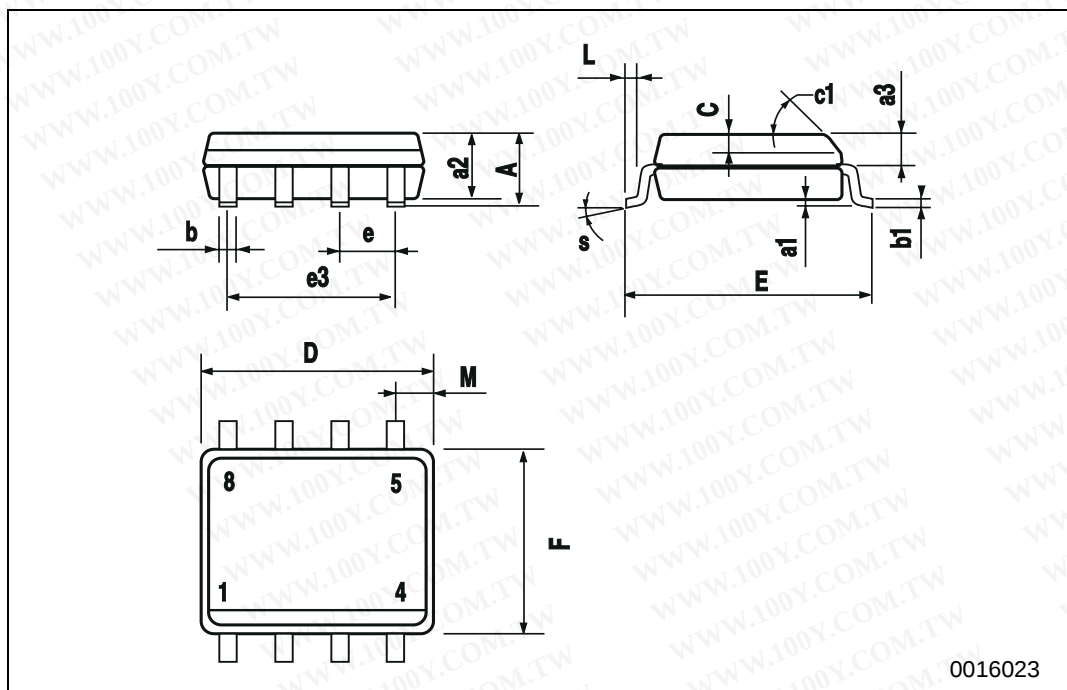


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



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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