



STS1NC60

N-CHANNEL 600V - 12Ω - 0.3A - SO-8 PowerMESH™II MOSFET

TYPE	V _{DSS}	R _{DS(on)}	I _D
STS1NC60	600 V	< 15 Ω	0.3 A

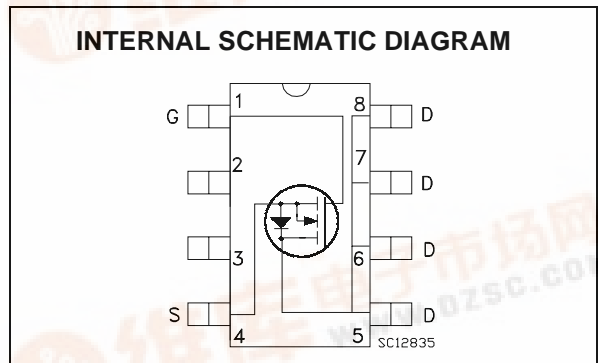
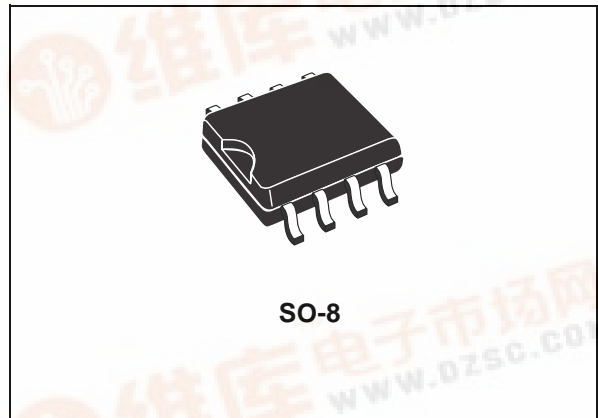
- TYPICAL R_{DS(on)} = 12Ω
- EXTREMELY HIGH dv/dt CAPABILITY
- 100% AVALANCHE TESTED
- NEW HIGH VOLTAGE BENCHMARK
- GATE CHARGE MINIMIZED

DESCRIPTION

The PowerMESH™II is the evolution of the first generation of MESH OVERLAY™. The layout refinements introduced greatly improve the Ron*area figure of merit while keeping the device at the leading edge for what concerns switching speed, gate charge and ruggedness.

APPLICATIONS

- AC ADAPTORS AND BATTERY CHARGERS
- SWITCH MODE POWER SUPPLIES (SMPS)



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 kΩ)	600	V
V _{GS}	Gate- source Voltage	±30	V
I _D	Drain Current (continuous) at T _C = 25°C	0.3	A
I _D	Drain Current (continuous) at T _C = 100°C	0.18	A
I _{DM} (●)	Drain Current (pulsed)	1.2	A
P _{TOT}	Total Dissipation at T _C = 25°C	2.5	W
	Derating Factor	0.02	W/°C
dv/dt (1)	Peak Diode Recovery voltage slope	3	V/ns
T _{stg}	Storage Temperature	-60 to 150	°C
T _j	Max. Operating Junction Temperature	150	°C

(●)Pulse width limited by safe operating area

(1)I_{SD} ≤ 0.3A, di/dt ≤ 100A/μs, V_{DD} ≤ V_{(BR)DSS}, T_j ≤ T_{JMAX}

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THERMAL DATA

Rthj-pcb	Thermal Resistance Junction-PC Board	50	°C/W
Rthj-amb	Thermal Resistance Junction-ambient Max (Surface Mounted)	60	°C/W
T _l	Maximum Lead Temperature For Soldering Purpose	260	°C

AVALANCHE CHARACTERISTICS

Symbol	Parameter	Max Value	Unit
I _{AR}	Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T _j max)	0.3	A
E _{AS}	Single Pulse Avalanche Energy (starting T _j = 25 °C, I _D = I _{AR} , V _{DD} = 50 V)	60	mJ

ELECTRICAL CHARACTERISTICS (TCASE = 25 °C UNLESS OTHERWISE SPECIFIED)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{(BR)DSS}	Drain-source Breakdown Voltage	I _D = 250 μA, V _{GS} = 0	600			V
I _{DSS}	Zero Gate Voltage Drain Current (V _{GS} = 0)	V _{DS} = Max Rating V _{DS} = Max Rating, T _C = 125 °C			1 10	μA μA
I _{GSS}	Gate-body Leakage Current (V _{DS} = 0)	V _{GS} = ± 30V			±100	nA

ON ⁽¹⁾

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	2	3	4	V
R _{DS(on)}	Static Drain-source On Resistance	V _{GS} = 10V, I _D = 0.5 A		12	15	Ω

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g _{fs} (1)	Forward Transconductance	V _{DS} > I _{D(on)} × R _{DS(on)max} , I _D = 0.5 A		0.87		S
C _{iss}	Input Capacitance	V _{DS} = 25V, f = 1 MHz, V _{GS} = 0		108		pF
C _{oss}	Output Capacitance			18		pF
C _{rss}	Reverse Transfer Capacitance			2.5		pF

ELECTRICAL CHARACTERISTICS (CONTINUED)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = 300V, I_D = 0.5A$ $R_G = 4.7\Omega, V_{GS} = 10V$		7.2		ns
t_r	Rise Time	(see test circuit, Figure 3)		8		ns
Q_g	Total Gate Charge	$V_{DD} = 480V, I_D = 1A,$ $V_{GS} = 10V$		7.3	10	nC
Q_{gs}	Gate-Source Charge			3.4		nC
Q_{gd}	Gate-Drain Charge			2.5		nC

SWITCHING OFF

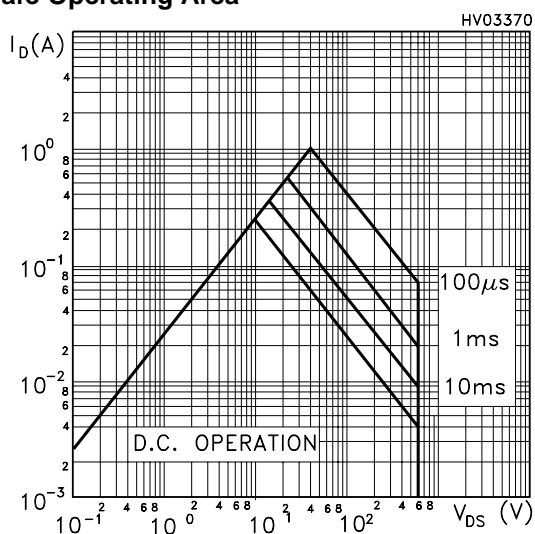
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{r(Voff)}$	Off-voltage Rise Time	$V_{DD} = 480V, I_D = 1A,$ $R_G = 4.7\Omega, V_{GS} = 10V$		33		ns
t_f	Fall Time	(see test circuit, Figure 5)		11		ns
t_c	Cross-over Time			43		ns

SOURCE DRAIN DIODE

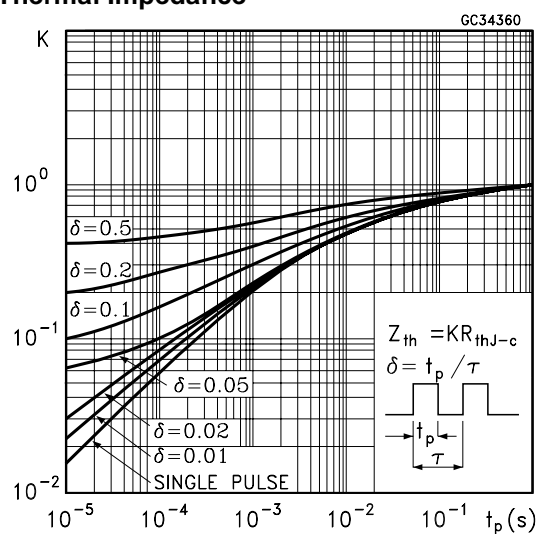
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				0.3	A
$I_{SDM(2)}$	Source-drain Current (pulsed)				1.2	A
$V_{SD(1)}$	Forward On Voltage	$I_{SD} = 0.3A, V_{GS} = 0$			1.6	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 1A, di/dt = 100A/\mu s,$ $V_{DD} = 25V, T_j = 150^\circ C$		450		ns
Q_{rr}	Reverse Recovery Charge	(see test circuit, Figure 5)		720		μC
I_{RRM}	Reverse Recovery Current			3.2		A

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

Safe Operating Area

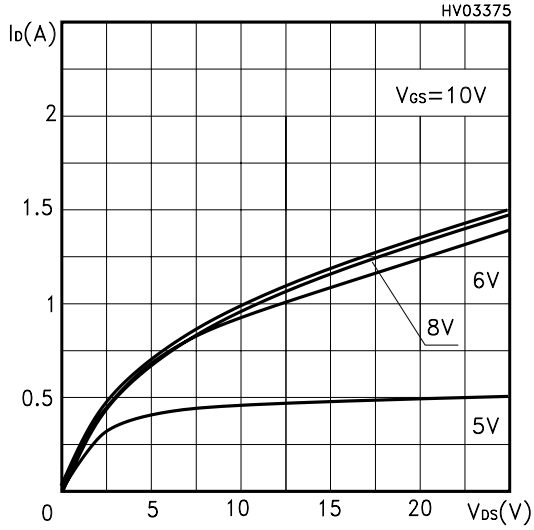


Thermal Impedance

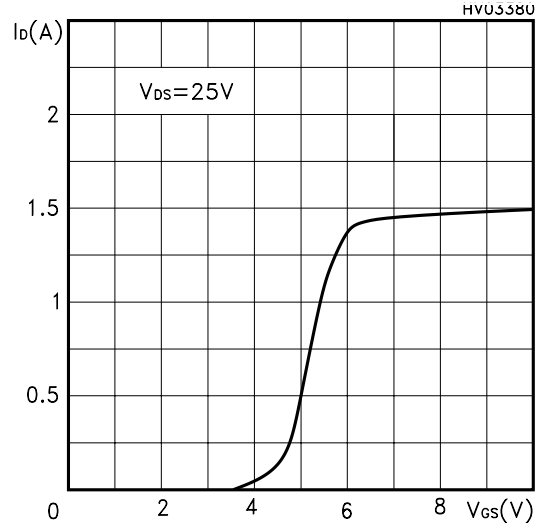


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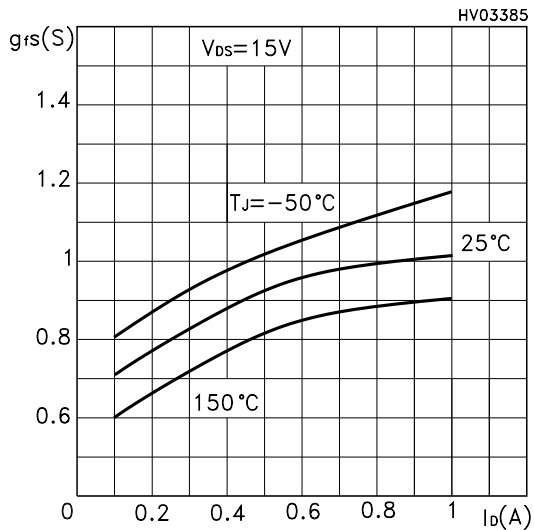
Output Characteristics



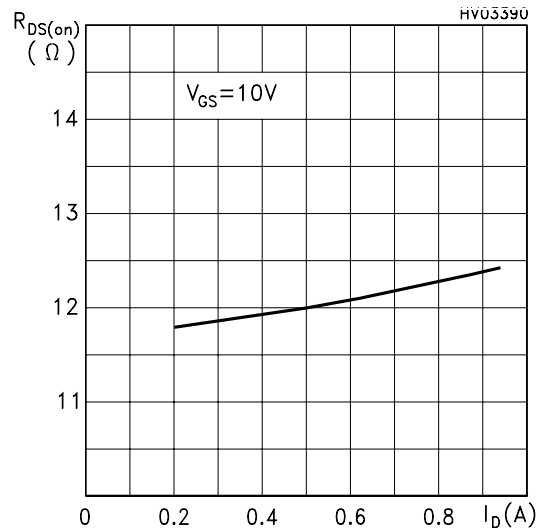
Transfer Characteristics



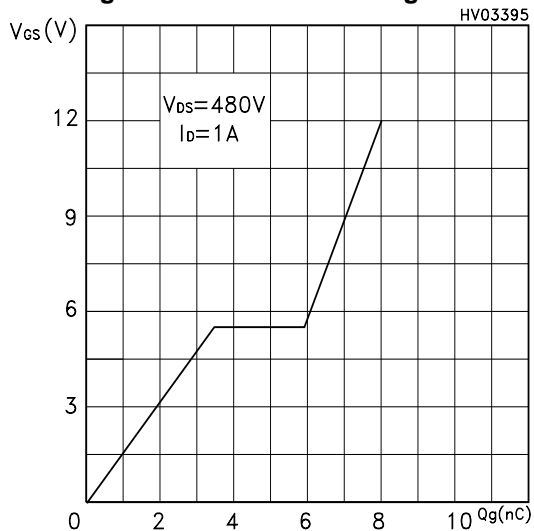
Transconductance



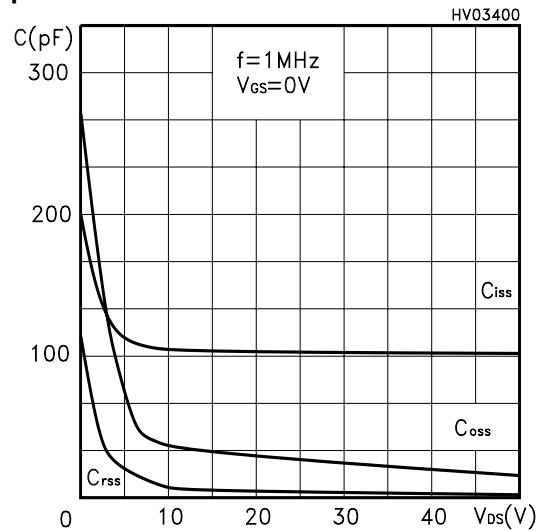
Static Drain-Source On Resistance



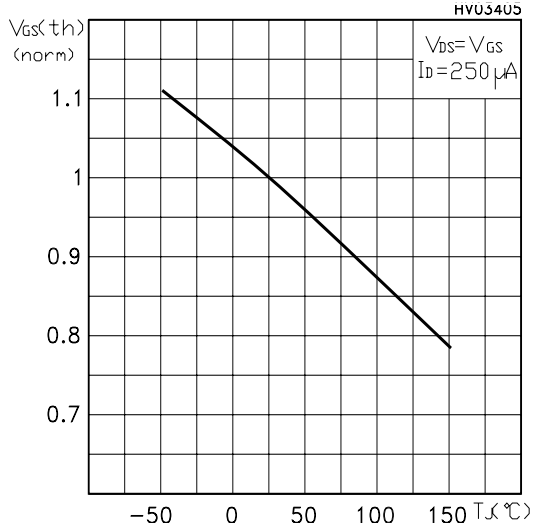
Gate Charge vs Gate-source Voltage



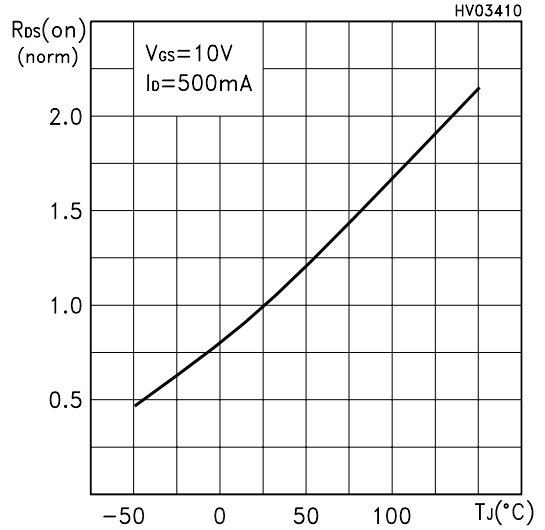
Capacitance Variations



Normalized Gate Threshold Voltage vs Temp.



Normalized On Resistance vs Temperature



Source-drain Diode Forward Characteristics

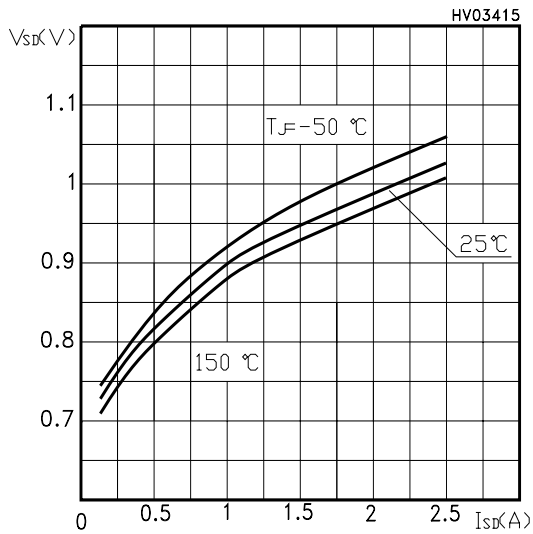


Fig. 1: Unclamped Inductive Load Test Circuit

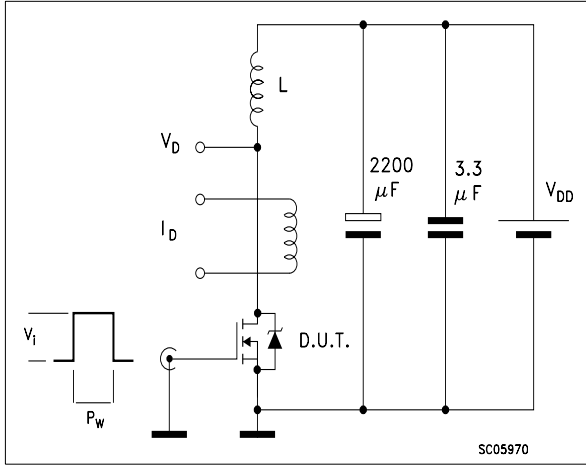


Fig. 2: Unclamped Inductive Waveform

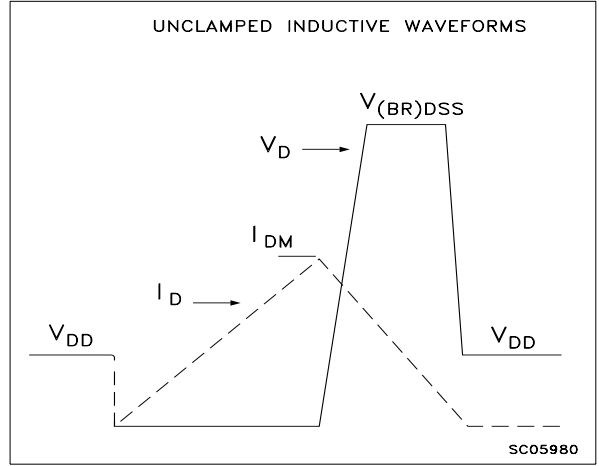


Fig. 3: Switching Times Test Circuit For Resistive Load

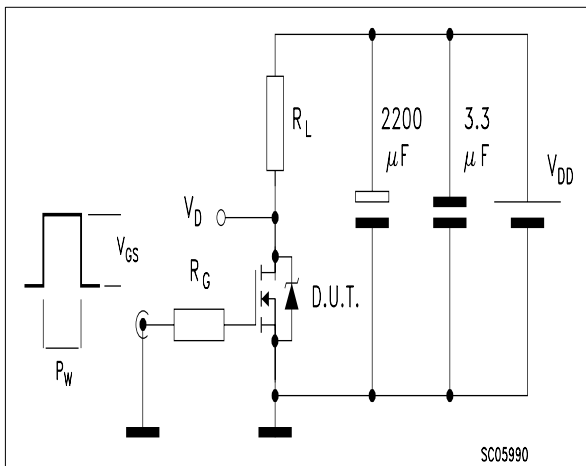


Fig. 4: Gate Charge test Circuit

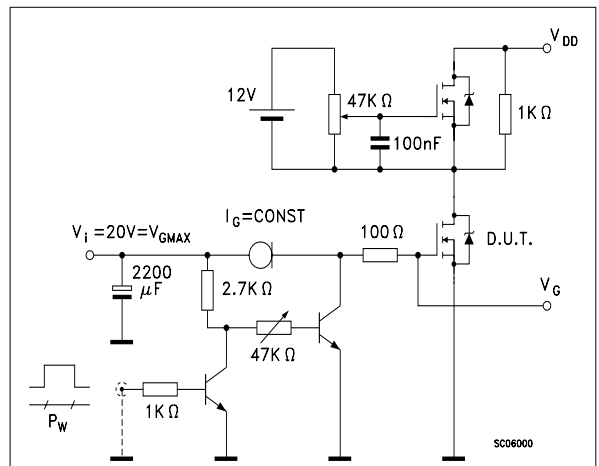
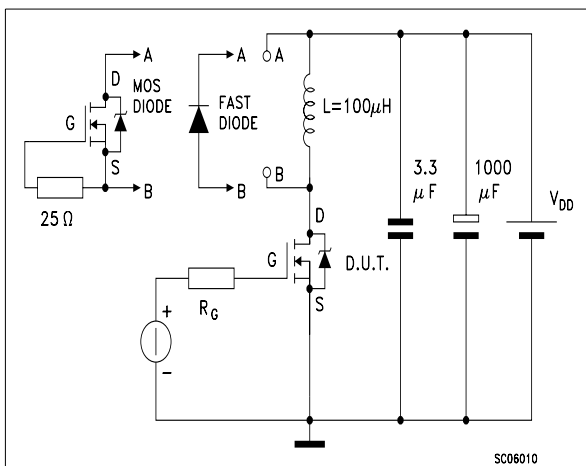
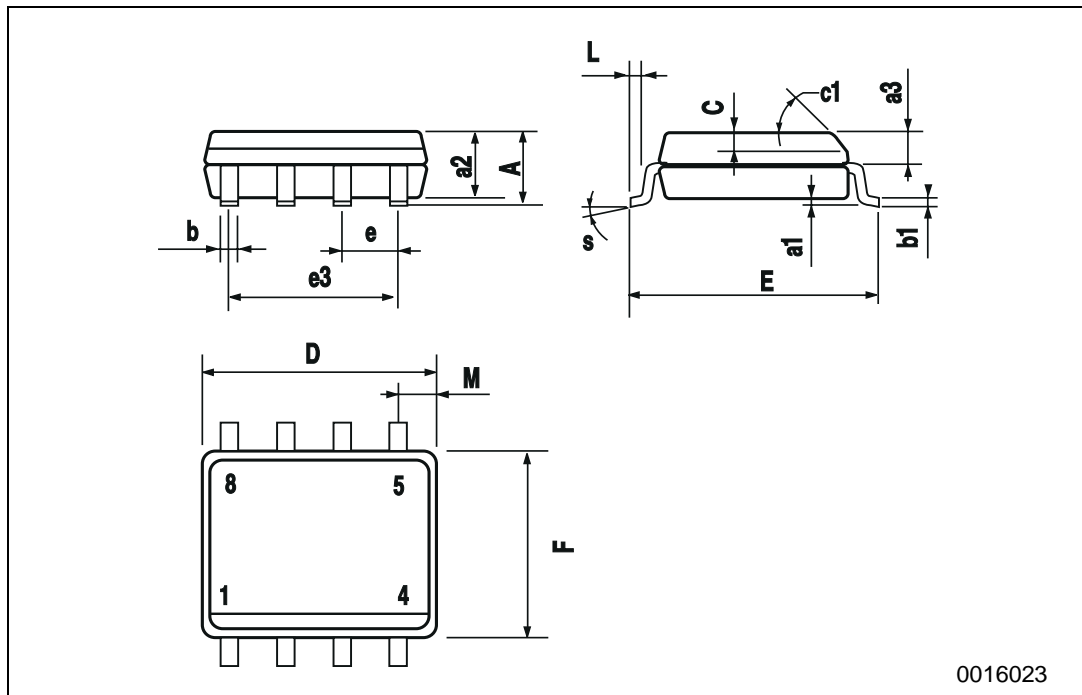


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



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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