



STS1DNC45

DUAL N-CHANNEL 450V - 4.1Ω - 0.4A SO-8 SuperMESH™ POWER MOSFET

TYPE	V _{DSS}	R _{DS(on)}	I _D
STS1DNC45	450 V	< 4.5 Ω	0.4 A

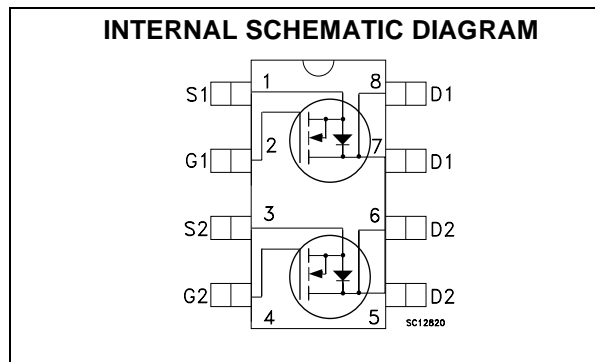
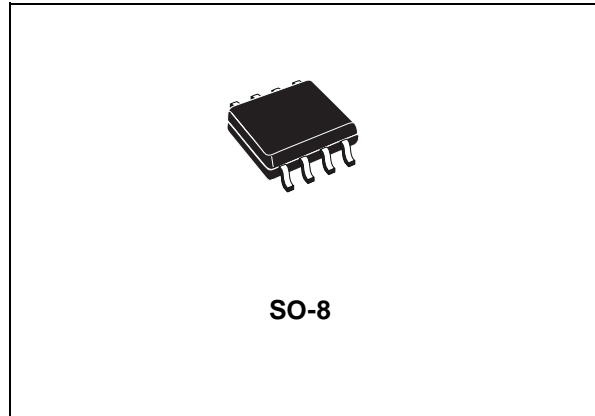
- TYPICAL R_{DS(on)} = 4.1Ω
- STANDARD OUTLINE FOR EASY AUTOMATED SURFACE MOUNT ASSEMBLY
- GATE CHARGE MINIMIZED

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



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{DS}	Drain-source Voltage (V _{GS} = 0)	450	V
V _{DGR}	Drain-gate Voltage (R _{GS} = 20 kΩ)	450	V
V _{GS}	Gate- source Voltage	± 30	V
I _D	Drain Current (continuous) at T _C = 25°C Drain Current (continuous) at T _C = 100°C	0.40 0.25	A A
I _{DM} (●)	Drain Current (pulsed)	1.6	A
P _{TOT}	Total Dissipation at T _C = 25°C Dual Operation Total Dissipation at T _C = 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_{SD} ≤ 0.4 A, di/dt ≤ 100A/μs, V_{DD} ≤ V_{(BR)DSS}, T_J ≤ T_{JMAX}.

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 _j	Max. Operating Junction Temperature	150	°C
T _{stg}	Storage Temperature	-65 to 150	°C

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

AVALANCHE CHARACTERISTICS

Symbol	Parameter	Max Value	Unit
I _{AR}	Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T _j max)	0.4	A
E _{AS}	Single Pulse Avalanche Energy (starting T _j = 25 °C, I _D = I _{AR} , V _{DD} = 50 V)	30	mJ

ELECTRICAL CHARACTERISTICS (T_{CASE} = 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	450			V
I _{DSS}	Zero Gate Voltage Drain Current (V _{GS} = 0)	V _{DS} = Max Rating V _{DS} = Max Rating, T _C = 125 °C			1 50	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	3	3.7	V
R _{DS(on)}	Static Drain-source On Resistance	V _{GS} = 10 V, I _D = 0.5 A		4.1	4.5	Ω

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g _{fs} (1)	Forward Transconductance	V _{DS} = 25 V, I _D = 0.5 A		1.1		S
C _{iss}	Input Capacitance	V _{DS} = 25 V, f = 1 MHz, V _{GS} = 0		160		pF
C _{oss}	Output Capacitance			27.5		pF
C _{rss}	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

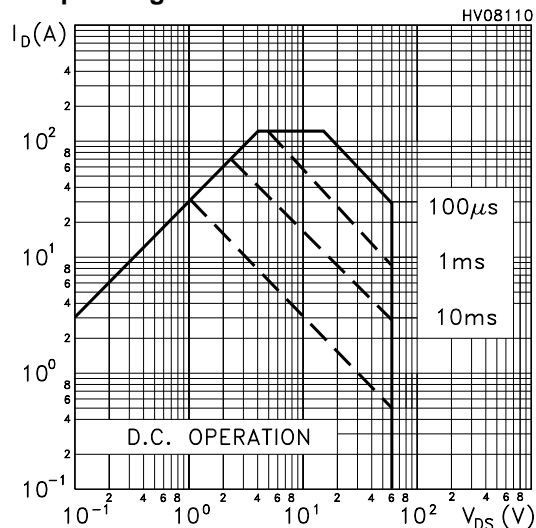
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{r(off)}$	Off-voltage Rise Time	$V_{DD} = 360\text{ V}$, $I_D = 1.5\text{ A}$		8.5		ns
t_f	Fall Time	$R_G = 4.7\Omega$, $V_{GS} = 10\text{ V}$		12		ns
t_c	Cross-over Time	(see test circuit, Figure 5)		18		ns

SOURCE DRAIN DIODE

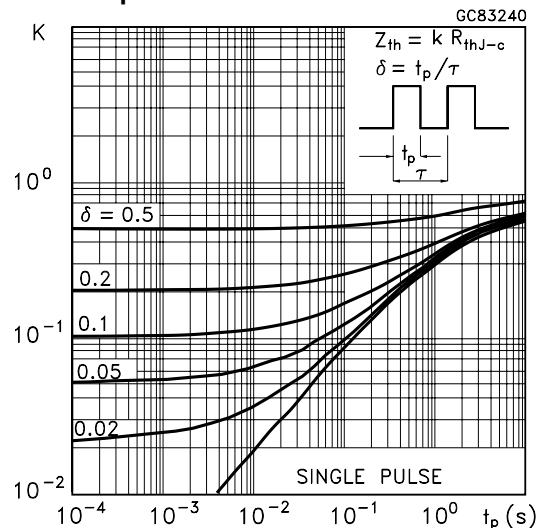
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				0.4	A
$I_{SDM(2)}$	Source-drain Current (pulsed)				1.6	A
$V_{SD(1)}$	Forward On Voltage	$I_{SD} = 0.4\text{ A}$, $V_{GS} = 0$			1.6	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 0.4\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$,		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 μs , duty cycle 1.5 %.
 2. Pulse width limited by safe operating area.

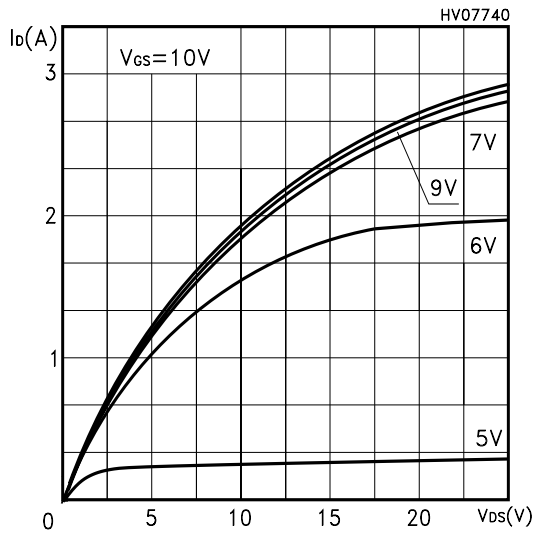
Safe Operating Area



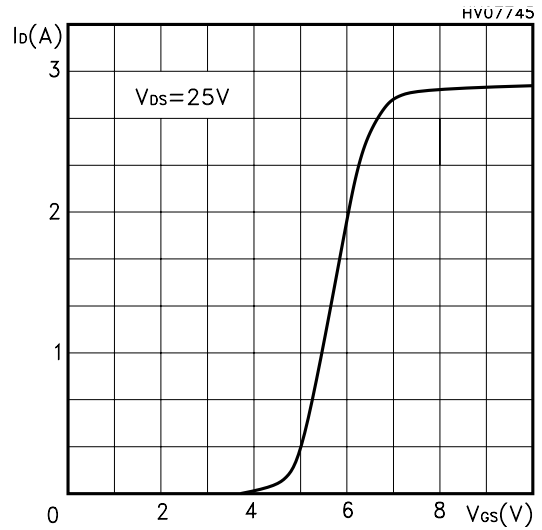
Thermal Impedance



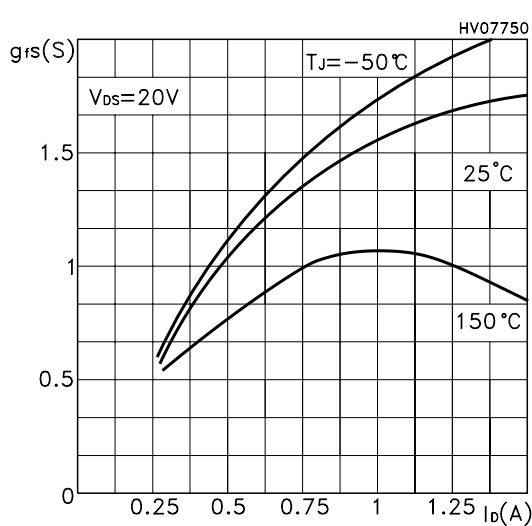
Output Characteristics



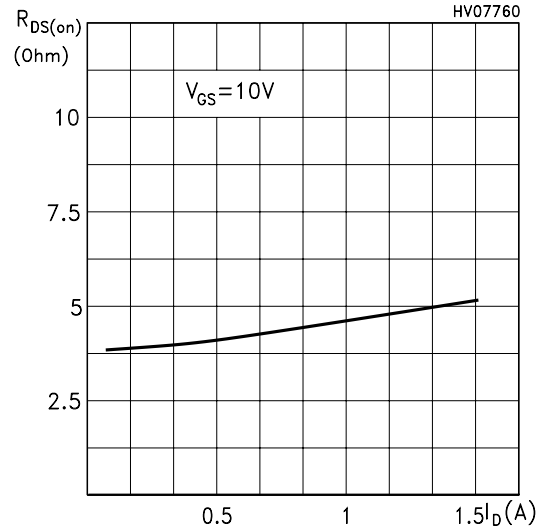
Transfer Characteristics



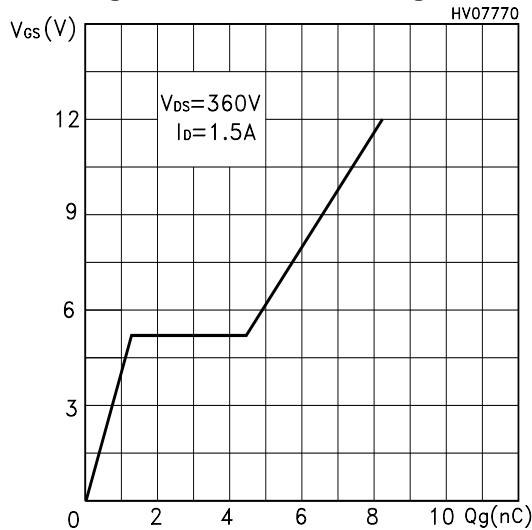
Transconductance



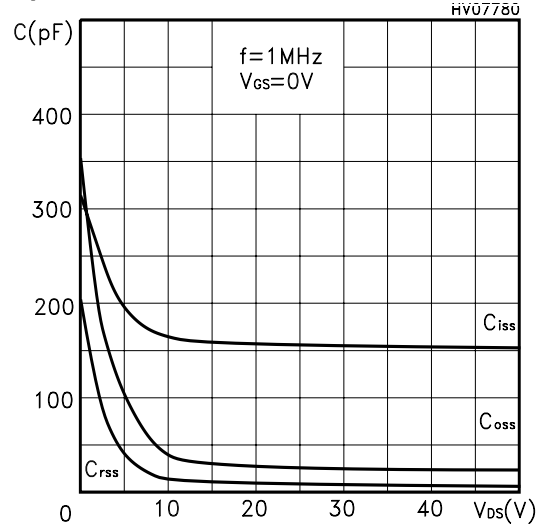
Static Drain-source On Resistance



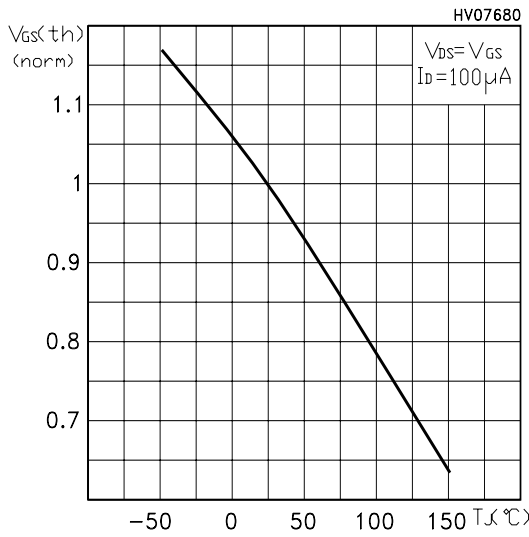
Gate Charge vs Gate-source Voltage



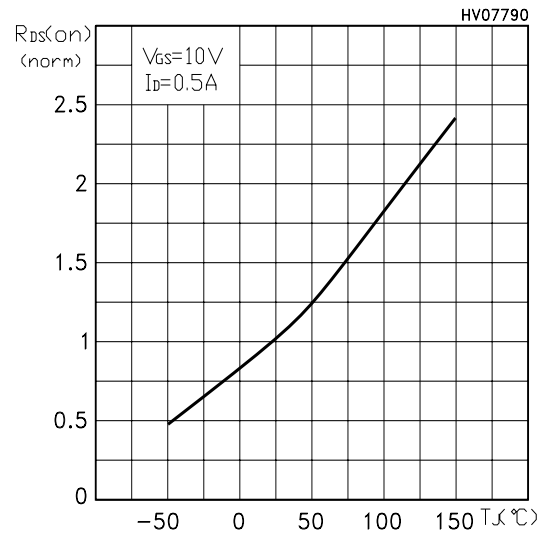
Capacitance Variations



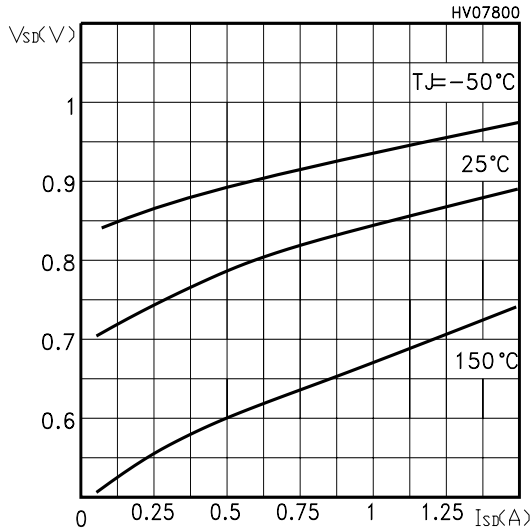
Normalized Gate Threshold Voltage vs Temp.



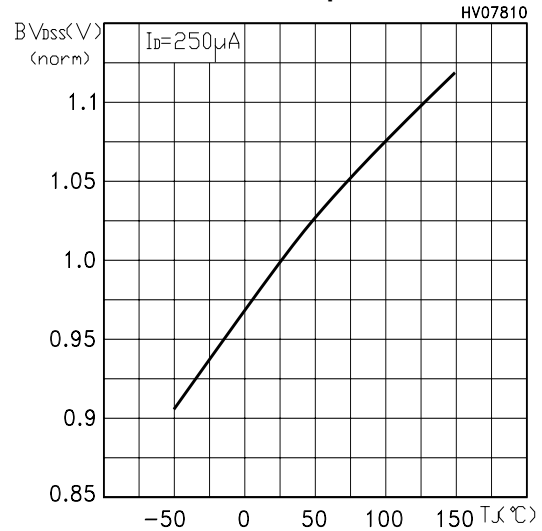
Normalized On Resistance vs Temperature



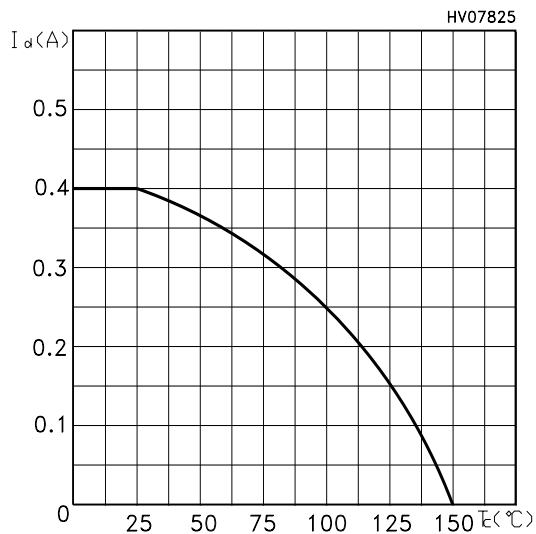
Source-drain Diode Forward Characteristics



Normalized BVDS vs Temperature



Max Id Current vs Tc



Maximum Avalanche Energy vs Temperature

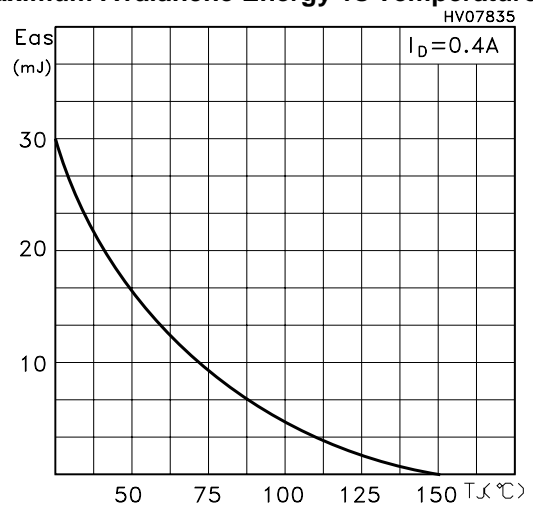


Fig. 1: Unclamped Inductive Load Test Circuit

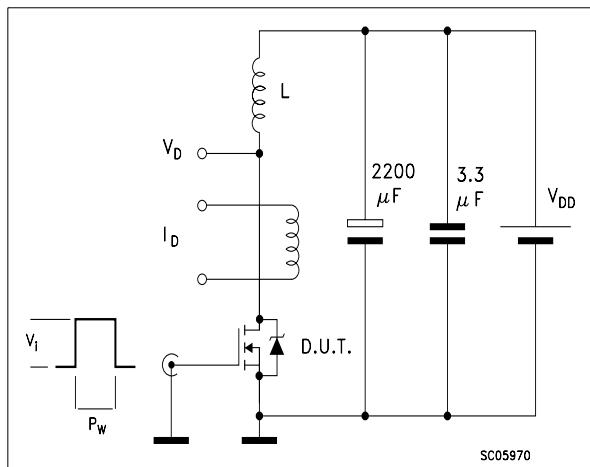


Fig. 2: Unclamped Inductive Waveform

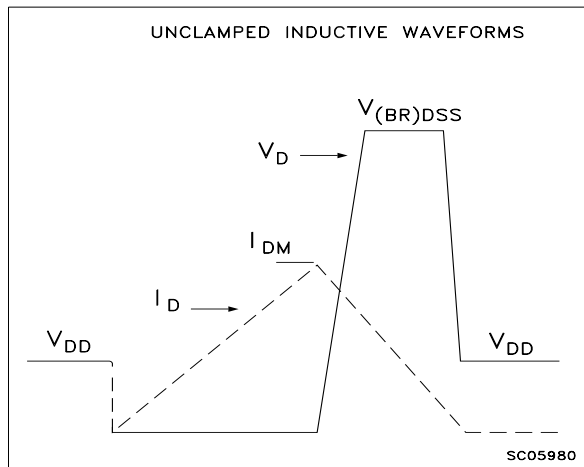


Fig. 3: Switching Times Test Circuit For Resistive Load

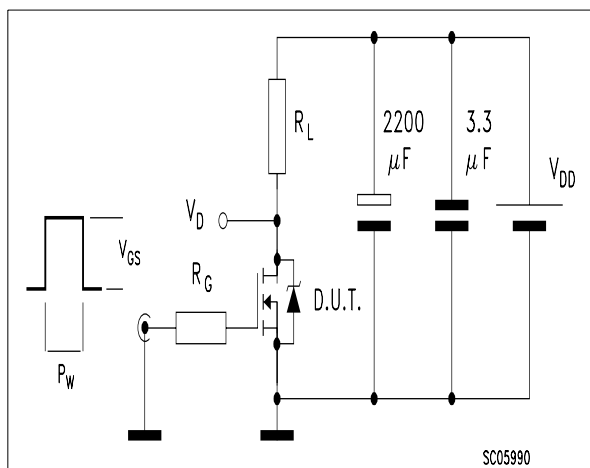


Fig. 4: Gate Charge test Circuit

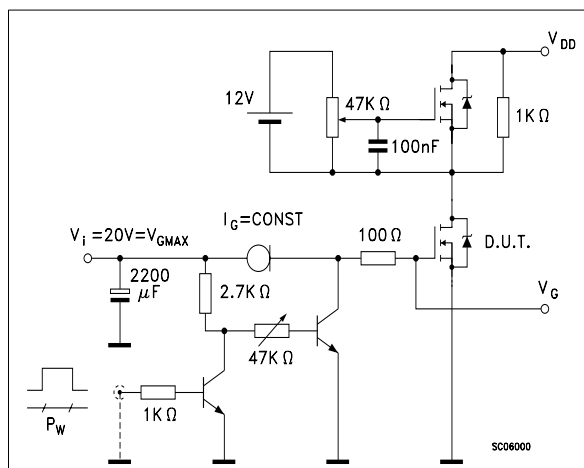
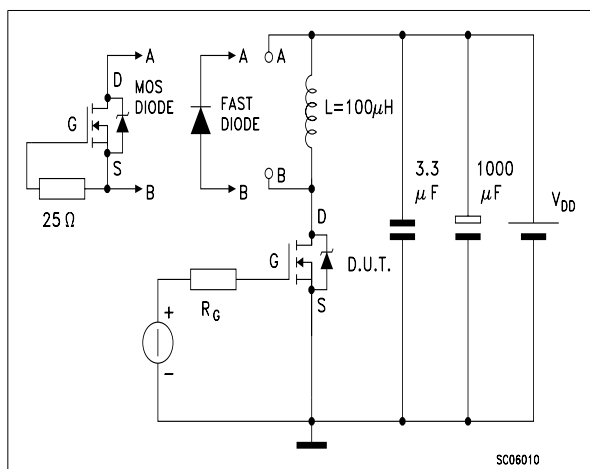
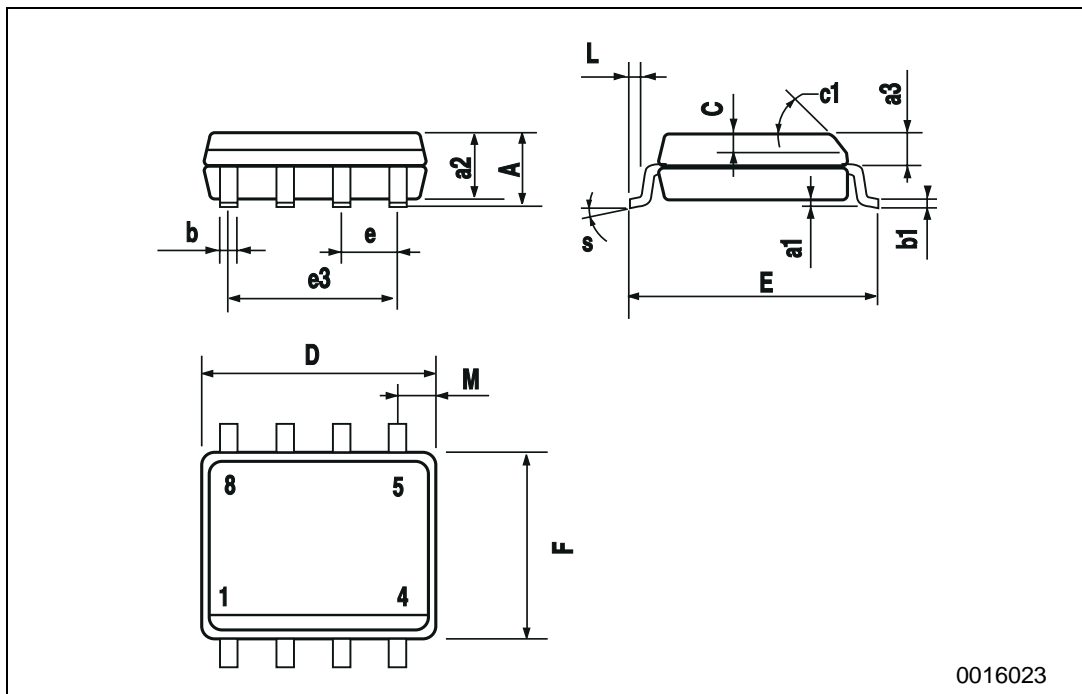


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



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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