



STW8NB100

N-CHANNEL 1000V - 1.3Ω - 7.3A TO-247

PowerMesh™ MOSFET

TYPE	V _{DSS}	R _{DS(on)}	I _D
STW8NB100	1000V	< 1.45 Ω	7.3 A

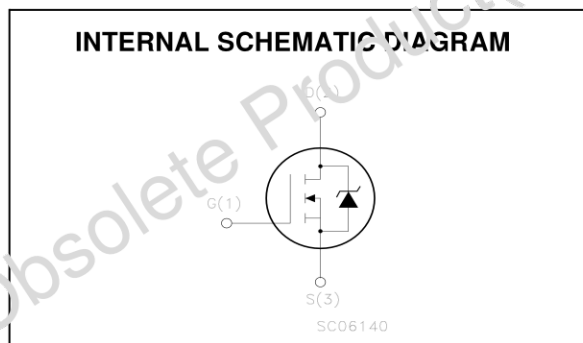
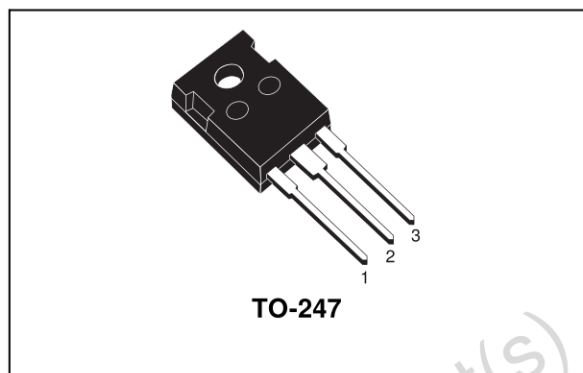
- TYPICAL R_{DS(on)} = 1.3Ω
- EXTREMELY HIGH dv/dt CAPABILITY
- 100% AVALANCHE TESTED
- VERY LOW INTRINSIC CAPACITANCES
- GATE CHARGE MINIMIZED
- ±30V GATE TO SOURCE VOLTAGE RATING

DESCRIPTION

Using the latest high voltage MESH OVERLAY™ process, STMicroelectronics has designed an advanced family of power MOSFETs with outstanding performances. The new patent pending strip layout coupled with the Company's proprietary edge termination structure, gives the lowest RDS(on) per area, exceptional avalanche and dv/dt capabilities and unrivalled gate charge and switching characteristics.

APPLICATIONS

- SWITCH MODE POWER SUPPLIES (SMPS)
- DC-AC CONVERTERS FOR WELDING EQUIPMENT AND UNINTERRUPTIBLE POWER SUPPLIES AND MOTOR DRIVE



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{DS}	Drain-source Voltage (V _{GS} = 0)	1000	V
V _{DGR}	Drain-gate Voltage (R _{GS} = 20 kΩ)	1000	V
V _{GS}	Gate-source Voltage	±30	V
I _D	Drain Current (continuous) at T _C = 25°C	7.3	A
I _D	Drain Current (continuous) at T _C = 100°C	4.18	A
I _{DM} (•)	Drain Current (pulsed)	29.2	A
P _{TOT}	Total Dissipation at T _C = 25°C	190	W
	Derating Factor	1.52	W/°C
dv/dt(1)	Peak Diode Recovery voltage slope	3.5	V/ns
T _{stg}	Storage Temperature	-65 to 150	°C
T _j	Max. Operating Junction Temperature	150	°C

(•) Pulse width limited by safe operating area

(1) I_{SD} ≤ 7.3A, di/dt ≤ 200A/μs, V_{DD} ≤ V_{(BR)DSS}, T_j ≤ T_{JMAX}.

THERMAL DATA

Rthj-case	Thermal Resistance Junction-case Max	0.66	°C/W
Rthj-amb	Thermal Resistance Junction-ambient Max	30	°C/W
T _l	Maximum Lead Temperature For Soldering Purpose	300	°C

AVALANCHE CHARACTERISTICS

Symbol	Parameter	Max Value	Unit
I _{AR}	Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T _j max)	7.3	A
E _{AS}	Single Pulse Avalanche Energy (starting T _j = 25 °C, I _D = I _{AR} , V _{DD} = 100 V)	700	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	1000			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 = 250 µA	3	4	5	V
R _{DS(on)}	Static Drain-source On Resistance	V _{GS} = 10V, I _D = 3.6 A		1.3	1.45	Ω

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g _{fs}	Forward Transconductance	V _{DS} > I _{D(on)} × R _{DS(on)max} , I _D = 3.6 A		1.6		S
C _{iss}	Input Capacitance	V _{DS} = 25V, f = 1 MHz, V _{GS} = 0		2900		pF
C _{oss}	Output Capacitance			275		pF
C _{rss}	Reverse Transfer Capacitance			27		pF

ELECTRICAL CHARACTERISTICS (CONTINUED)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = 500V, I_D = 3.5 A$ $R_G = 4.7\Omega, V_{GS} = 10V$ (see test circuit, Figure 3)		32		ns
t_r	Rise Time			13		ns
Q_g	Total Gate Charge	$V_{DD} = 800V, I_D = 7 A,$ $V_{GS} = 10V, R_G = 4.7\Omega$		68	95	nC
Q_{gs}	Gate-Source Charge			16		nC
Q_{gd}	Gate-Drain Charge			31.5		nC

SWITCHING OFF

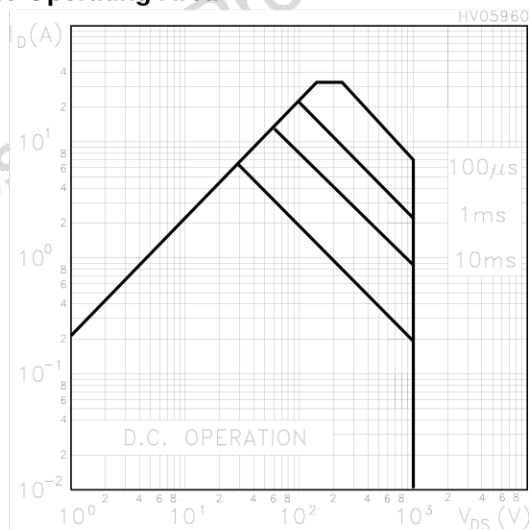
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{r(Voff)}$	Off-voltage Rise Time	$V_{DD} = 800V, I_D = 7 A,$ $R_G = 4.7\Omega, V_{GS} = 10V$ (see test circuit, Figure 5)		32		ns
t_f	Fall Time			32		ns
t_c	Cross-over Time			40		ns

SOURCE DRAIN DIODE

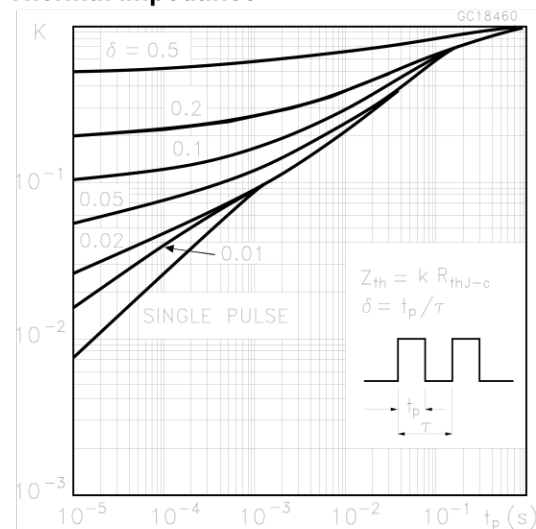
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				7.3	A
$I_{SDM(2)}$	Source-drain Current (pulsed)				29	A
$V_{SD(1)}$	Forward On Voltage	$I_{SD} = 7.3 A, V_{GS} = 0$			1.6	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 7 A, di/dt = 100 A/\mu s,$ $V_{DD} = 100V, T_j = 150^\circ C$ (see test circuit, Figure 5)		1000		ns
Q_{rr}	Reverse Recovery Charge			10.8		μC
I_{RRM}	Reverse Recovery Current			21.5		A

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

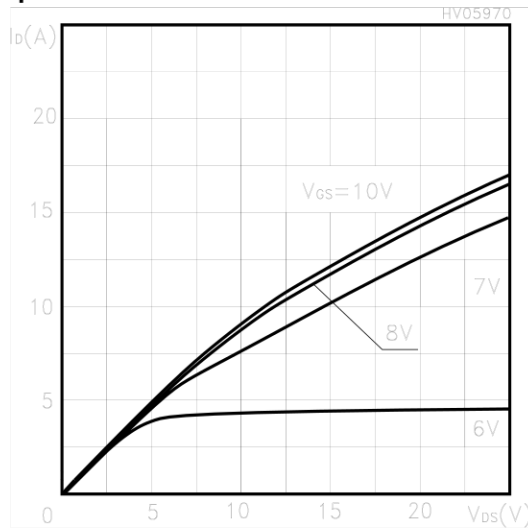
Safe Operating Area



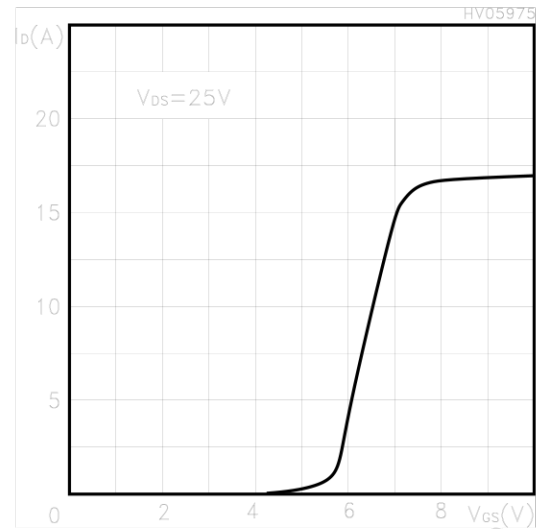
Thermal Impedance



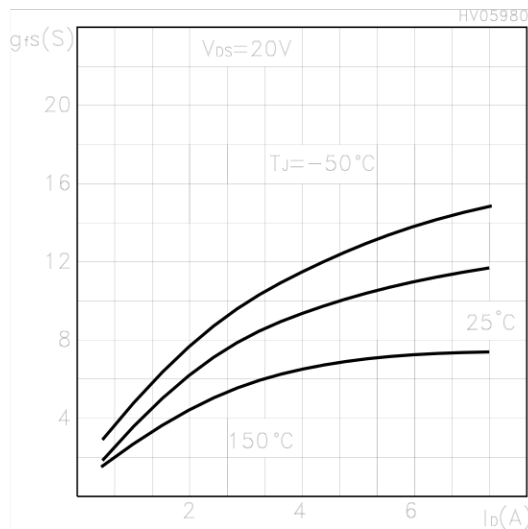
Output Characteristics



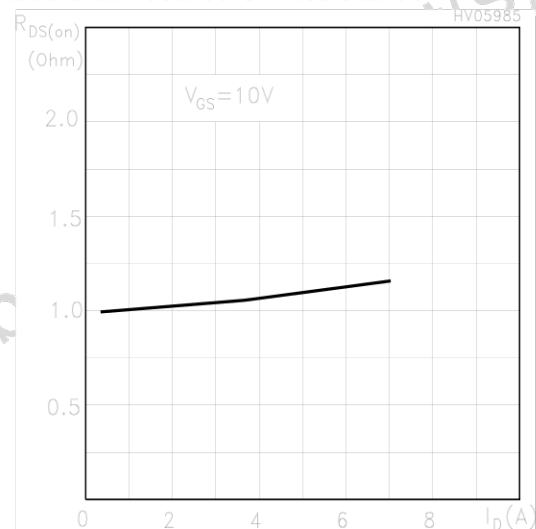
Transfer Characteristics



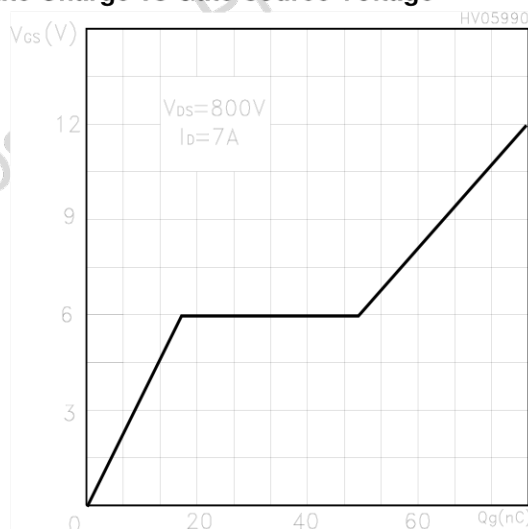
Transconductance



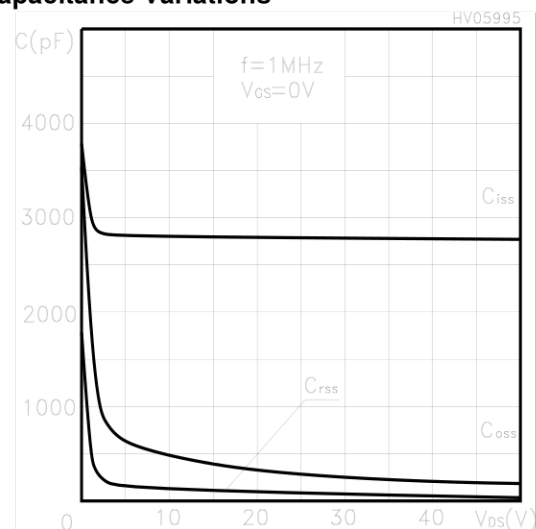
Static Drain-source On Resistance



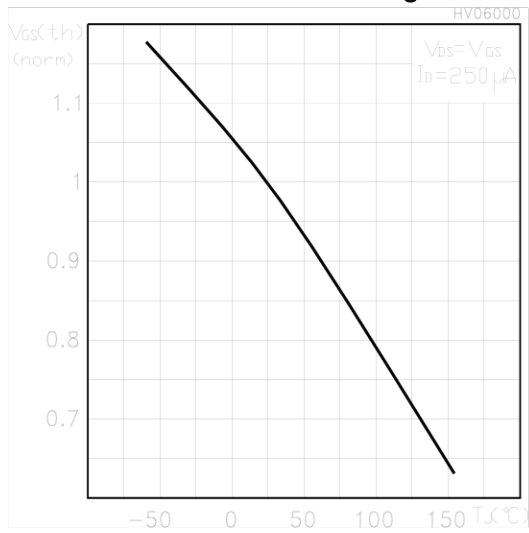
Gate Charge vs Gate-source Voltage



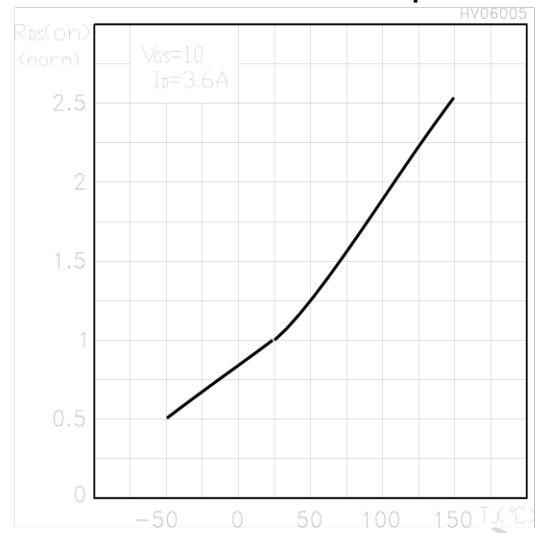
Capacitance Variations



Normalized Gate Threshold Voltage vs Temp.



Normalized On Resistance vs Temperature



Source-drain Diode Forward Characteristics

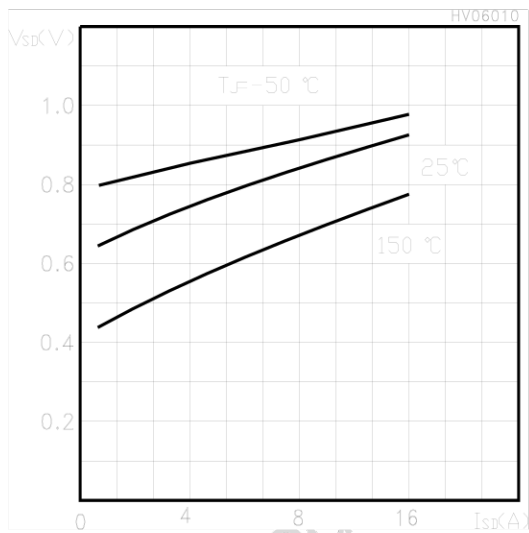


Fig. 1: Unclamped Inductive Load Test Circuit

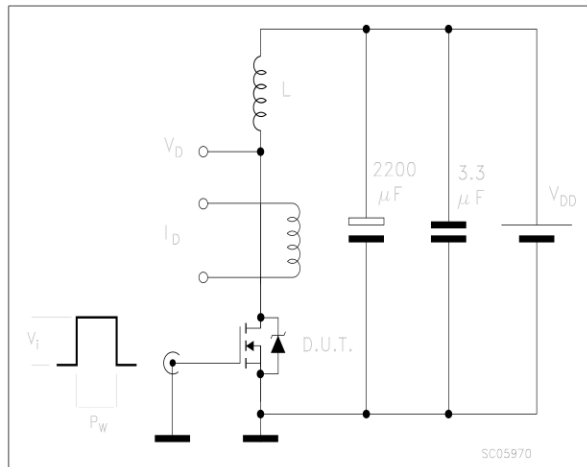


Fig. 2: Unclamped Inductive Waveform

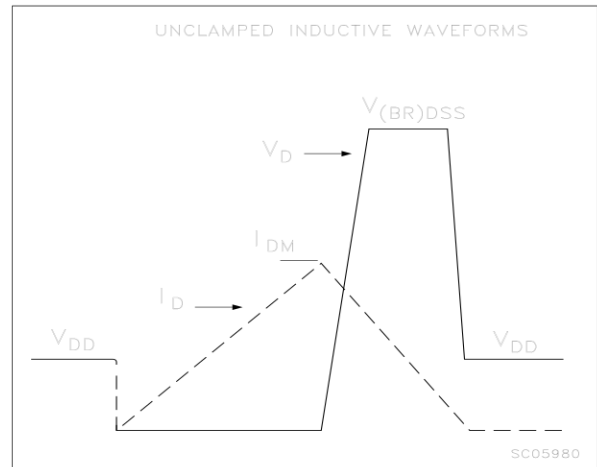


Fig. 3: Switching Times Test Circuit For Resistive Load

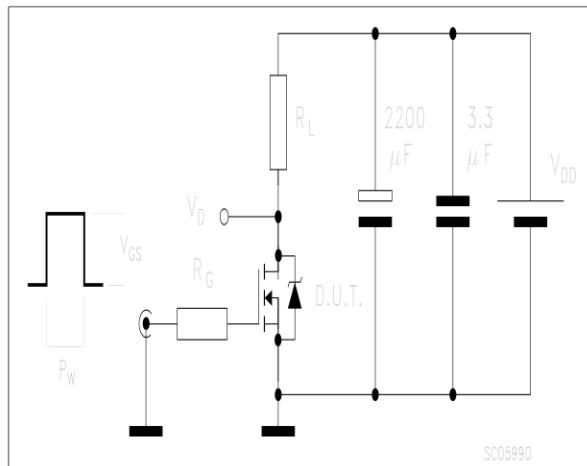


Fig. 4: Gate Charge test Circuit

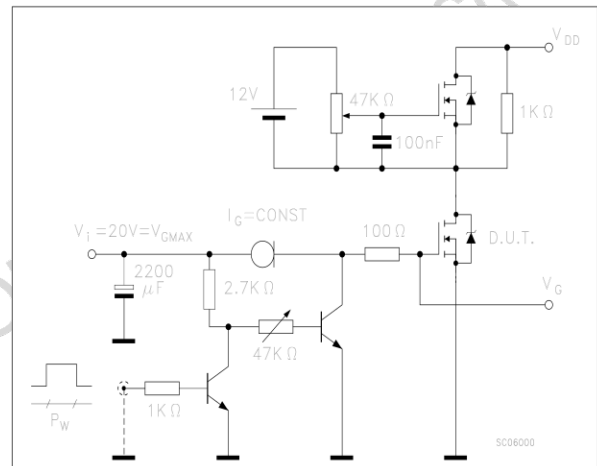
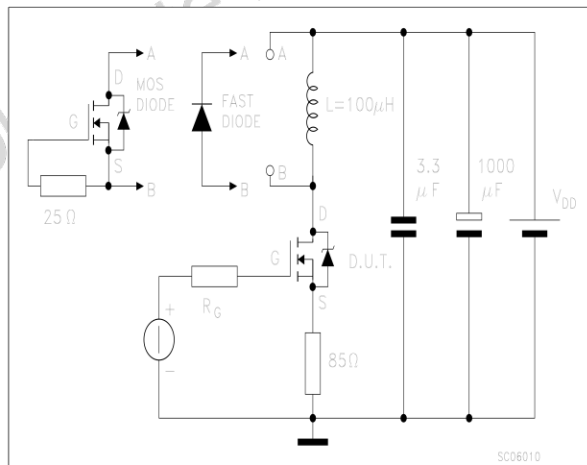
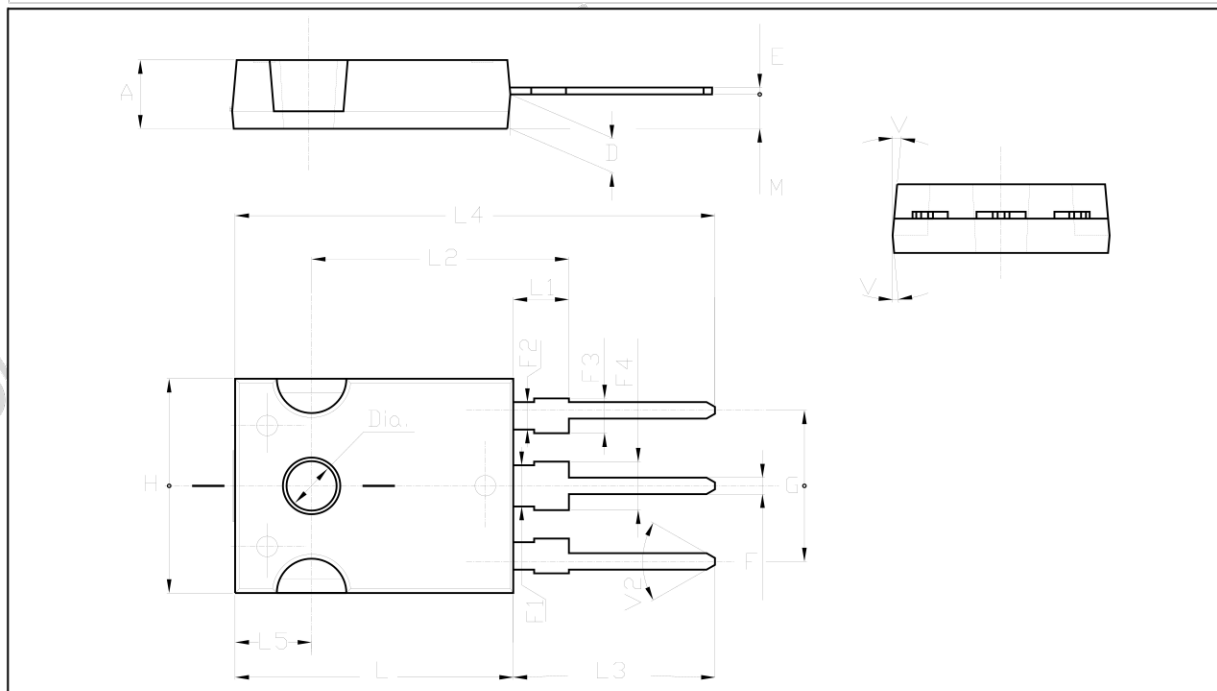


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



TO-247 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.85		5.15	0.19		0.20
D	2.20		2.60	0.08		0.10
E	0.40		0.80	0.015		0.03
F	1		1.40	0.04		0.05
F1		3			0.11	
F2		2			0.07	
F3	2		2.40	0.07		0.09
F4	3		3.40	0.11		0.13
G		10.90			0.43	
H	15.45		15.75	0.60		0.62
L	19.85		20.15	0.78		0.79
L1	3.70		4.30	0.14		0.17
L2		18.50			0.72	
L3	14.20		14.80	0.56		0.58
L4		34.60			1.36	
L5		5.50			0.21	
M	2		3	0.07		0.11
V		5°			5°	
V2		60°			60°	
Dia	3.55		3.65	0.14		0.143





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