



STGW50NB60M

N-CHANNEL 50A - 600V - TO-247

PowerMESH™ IGBT

TYPE	V _{CES}	V _{CE(sat)} (25°C)	I _C
STGW50NB60M	600 V	< 1.9 V	50 A

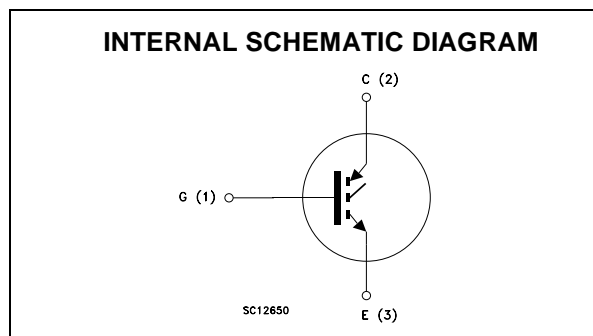
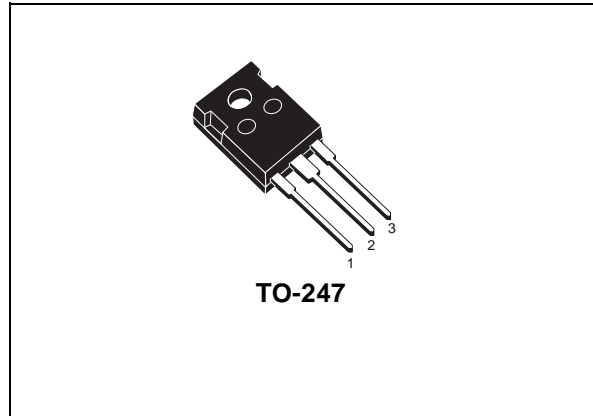
- HIGH INPUT IMPEDANCE (VOLTAGE DRIVEN)
- LOW ON-VOLTAGE DROP (V_{CESAT})
- LOW GATE CHARGE
- HIGH CURRENT CAPABILITY

DESCRIPTION

Using the latest high voltage technology based on a patented strip layout, STMicroelectronics has designed an advanced family of IGBTs, the PowerMESH™ IGBTs, with outstanding performances. The suffix "M" identifies a family optimized to achieve very low saturation on voltage for frequency applications <10 KHz.

APPLICATIONS

- MOTOR CONTROL
- WELDING EQUIPMENTS



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{CES}	Collector-Emitter Voltage (V _{GS} = 0)	600	V
V _{ECR}	Reverse Battery Protection	20	V
V _{GE}	Gate-Emitter Voltage	±20	V
I _C	Collector Current (continuous) at T _C = 25°C	100	A
I _C	Collector Current (continuous) at T _C = 100°C	50	A
I _{CM} (■)	Collector Current (pulsed)	400	A
P _{TOT}	Total Dissipation at T _C = 25°C	250	W
	Derating Factor	2	W/°C
T _{stg}	Storage Temperature	-65 to 150	°C
T _j	Max. Operating Junction Temperature	150	°C

(●) Pulse width limited by safe operating area

STGW50NB60M

THERMAL DATA

Rthj-case	Thermal Resistance Junction-case Max	0.5	°C/W
Rthj-amb	Thermal Resistance Junction-ambient Max	30	°C/W
Rthc-h	Thermal Resistance Case-heatsink Typ	0.1	°C/W

ELECTRICAL CHARACTERISTICS (T_{CASE} = 25 °C UNLESS OTHERWISE SPECIFIED)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{BR(CES)}	Collector-Emitter Breakdown Voltage	I _C = 250 μA, V _{GE} = 0	600			V
I _{CES}	Collector cut-off (V _{GE} = 0)	V _{CE} = Max Rating, T _C = 25 °C V _{CE} = Max Rating, T _C = 125 °C			10 100	μA μA
I _{GES}	Gate-Emitter Leakage Current (V _{CE} = 0)	V _{GE} = ± 20 V, V _{CE} = 0			± 100	nA

ON (1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{GE(th)}	Gate Threshold Voltage	V _{CE} = V _{GE} , I _C = 250 μA	3	4	5	V
V _{CE(sat)}	Collector-Emitter Saturation Voltage	V _{GE} = 15V, I _C = 30 A @25°C V _{GE} = 15V, I _C = 30 A @100°C V _{GE} = 15V, I _C = 50 A @25°C V _{GE} = 15V, I _C = 50 A @100°C		1.3 1.2 1.5 1.35	1.9	V V V V

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g _{fs}	Forward Transconductance	V _{CE} = 15 V, I _C = 18 A		22		S
C _{ies} C _{oes} C _{res}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V _{CE} = 25 V, f = 1 MHz, V _{GE} = 0		4500 400 70		pF pF pF
Q _g Q _{ge} Q _{gc}	Total Gate Charge Gate-Emitter Charge Gate-Collector Charge	V _{CE} = 480 V, I _C = 50 A, V _{GE} = 15 V		231 28 97		nC nC nC
I _{CL}	Latching Current	V _{clamp} = 480 V, T _j = 125°C R _G = 10 Ω	300			A

SWITCHING ON

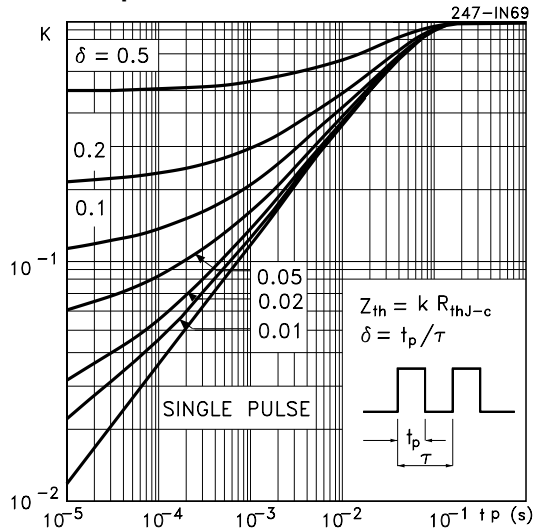
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t _{d(on)} t _r	Turn-on Delay Time Rise Time	V _{CC} = 480 V, I _C = 50 A R _G = 10Ω, V _{GE} = 15 V		45 30		ns ns
(di/dt) _{on} E _{on}	Turn-on Current Slope Turn-on Switching Losses	V _{CC} = 480 V, I _C = 50 A R _G = 10 Ω, V _{GE} = 15 V T _j = 125°C		1600 800		A/μs μJ

ELECTRICAL CHARACTERISTICS (CONTINUED)**SWITCHING OFF**

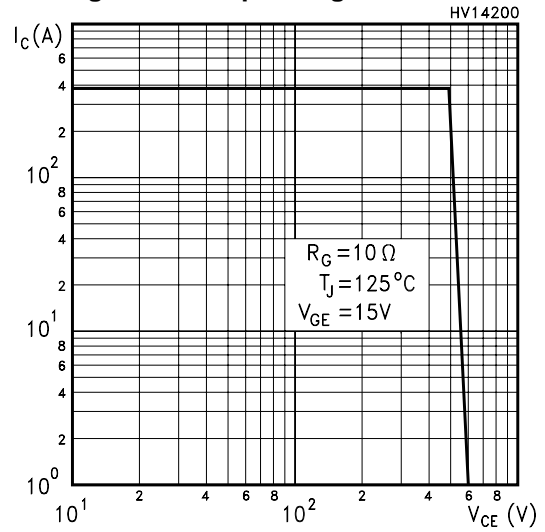
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_c	Cross-over Time	$V_{CC} = 480 \text{ V}$, $I_C = 50 \text{ A}$		450		ns
$t_r(V_{off})$	Off Voltage Rise Time	$R_{GE} = 10 \Omega$, $V_{GE} = 15 \text{ V}$		130		ns
$t_{d(off)}$	Delay Time			410		ns
t_f	Fall Time			300		ns
$E_{off(**)}$	Turn-off Switching Loss			4		mJ
E_{ts}	Total Switching Loss			4.1		mJ
t_c	Cross-over Time	$V_{CC} = 480 \text{ V}$, $I_C = 50 \text{ A}$		730		ns
$t_r(V_{off})$	Off Voltage Rise Time	$R_{GE} = 10 \Omega$, $V_{GE} = 15 \text{ V}$		265		ns
$t_{d(off)}$	Delay Time	$T_j = 125 \text{ }^\circ\text{C}$		565		ns
t_f	Fall Time			440		ns
$E_{off(**)}$	Turn-off Switching Loss			6.6		mJ
E_{ts}	Total Switching Loss			7.1		mJ

Note: 1. Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %.
2. Pulse width limited by max. junction temperature.
(**) Losses include Also the Tail (Jedec Standardization)

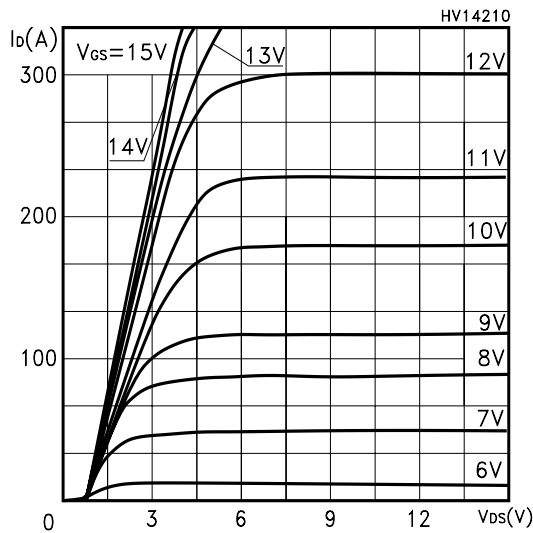
Thermal Impedance



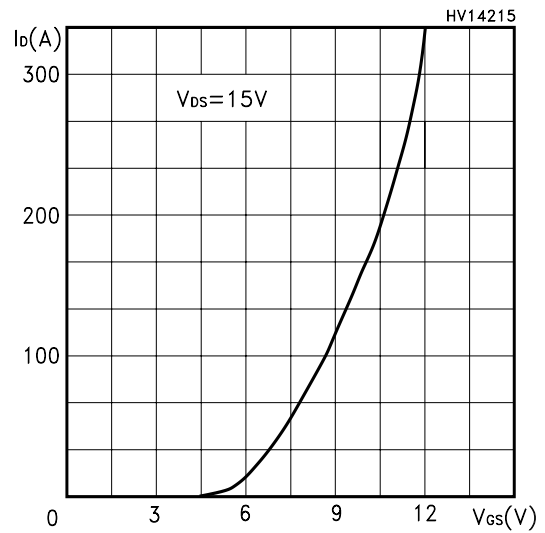
Switching Off Safe Operating Area



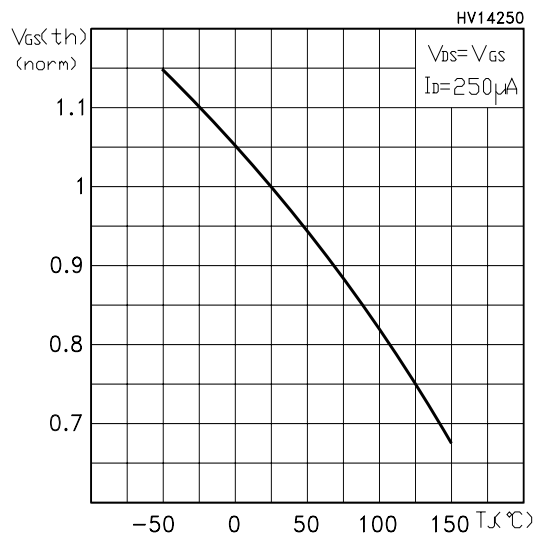
Output Characteristics



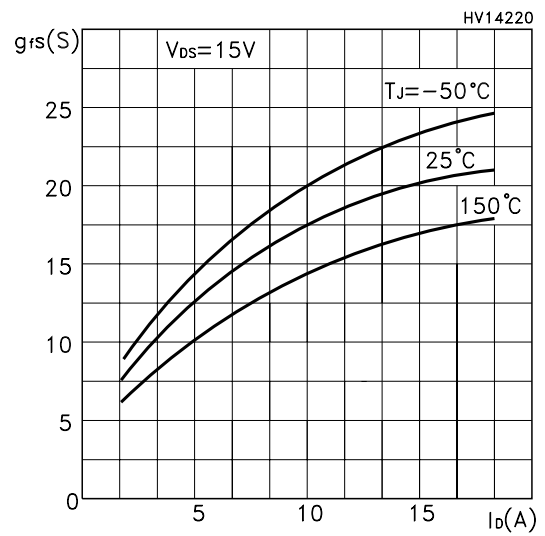
Transfer Characteristics



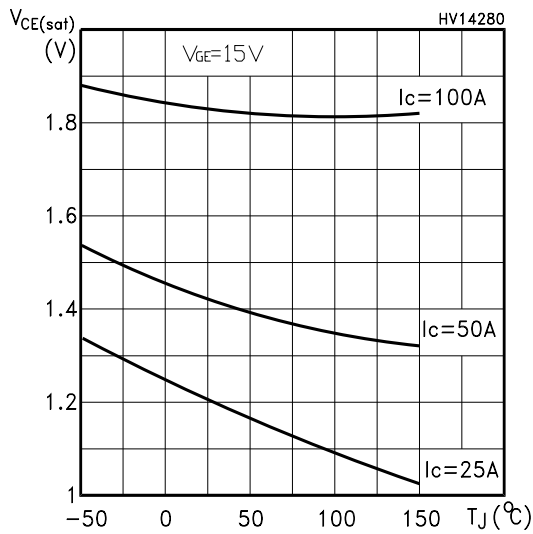
Normalized Gate Threshold Voltage vs Temp.



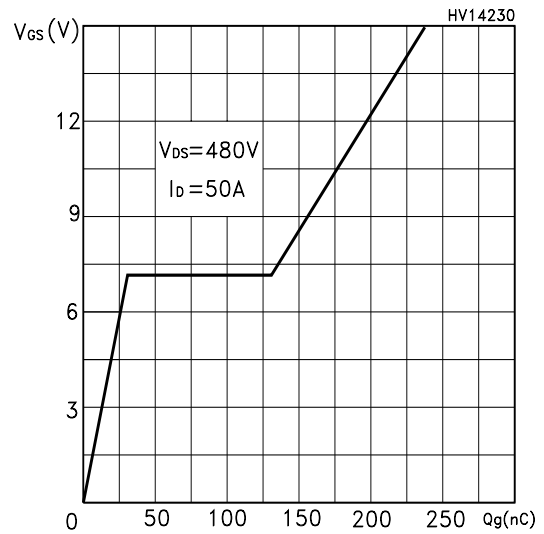
Transconductance



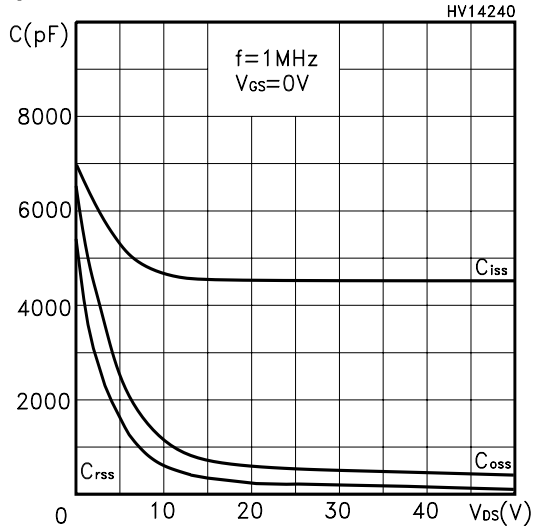
Collector-Emitter On Voltage vs Temperature



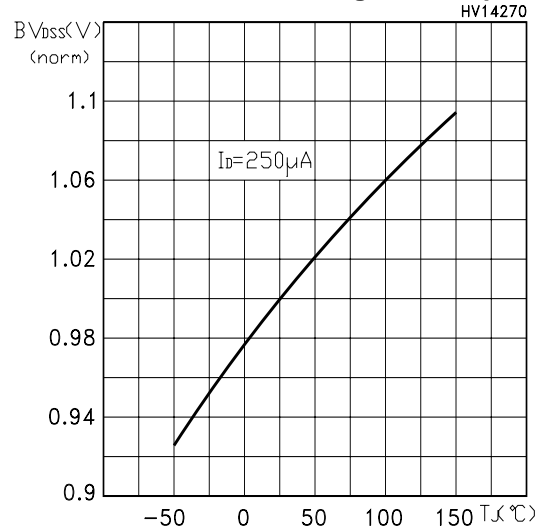
Gate-Charge vs Gate-Emitter Voltage



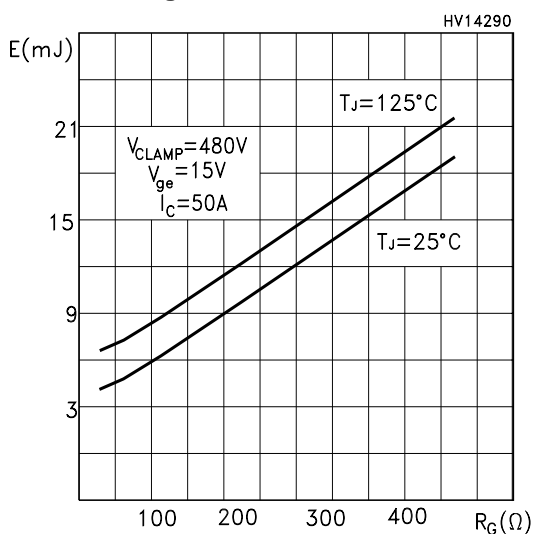
Capacitance Variations



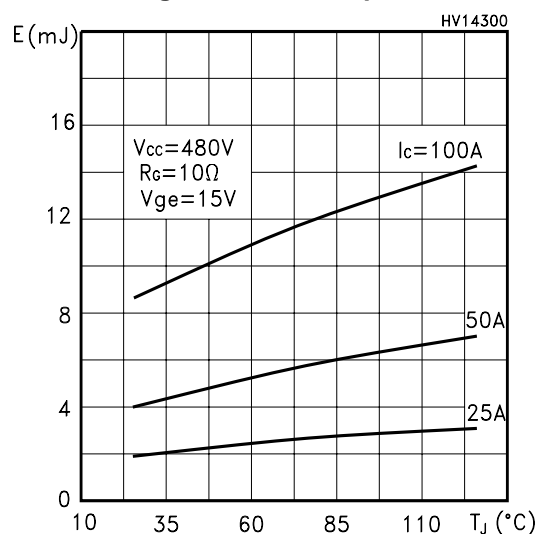
Normalized Break-down Voltage vs Temp.



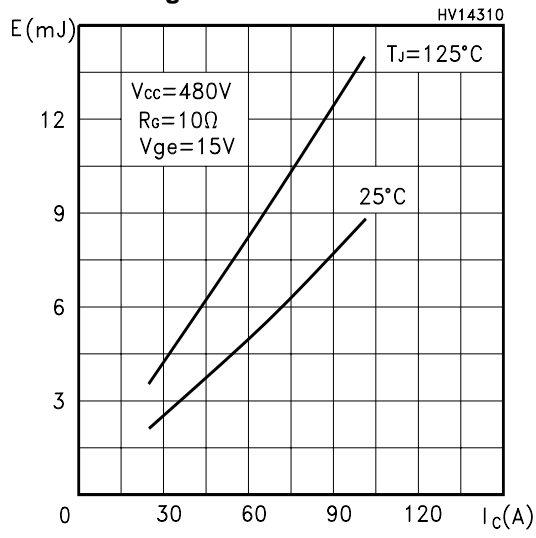
Total Switching losses vs Gate Resistance



Total Switching losses vs Temperature



Total Switching losses vs Ic



Collector-Emitter on Voltage vs Current

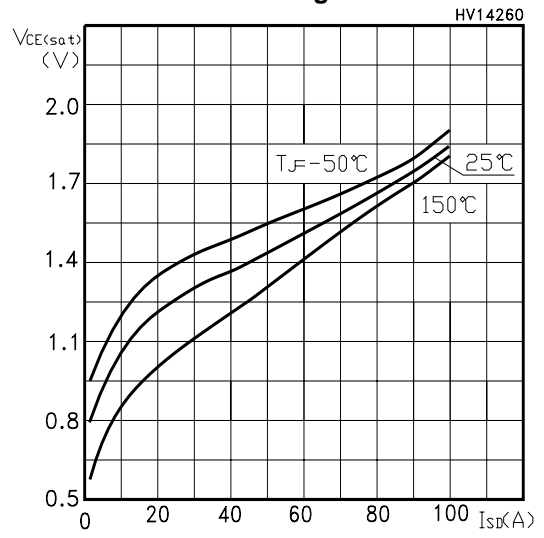


Fig. 1: Gate Charge test Circuit

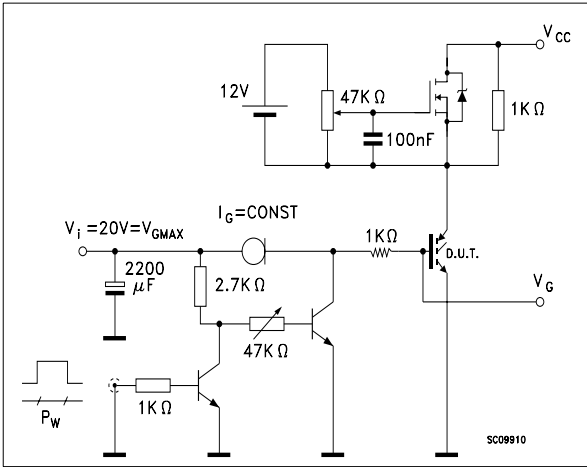
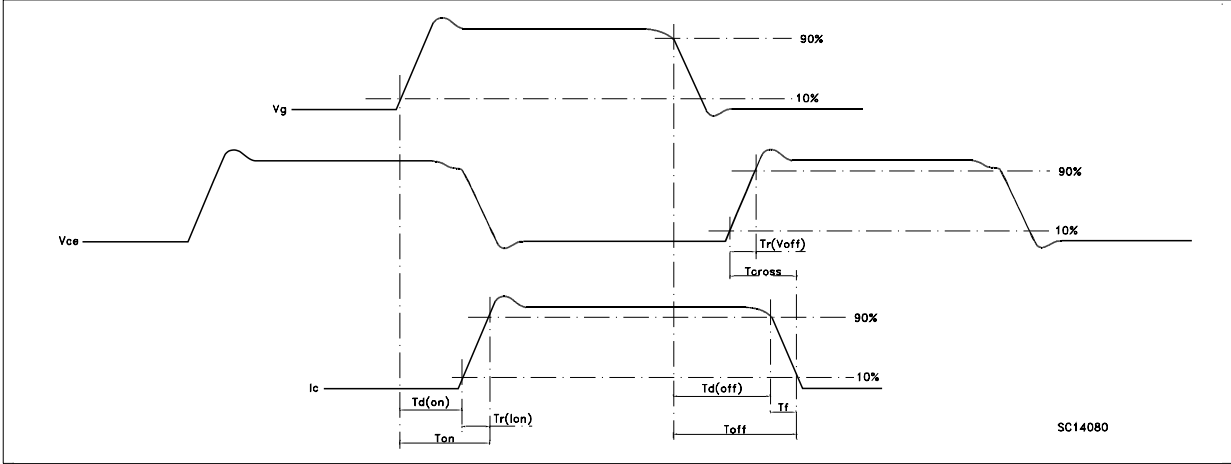
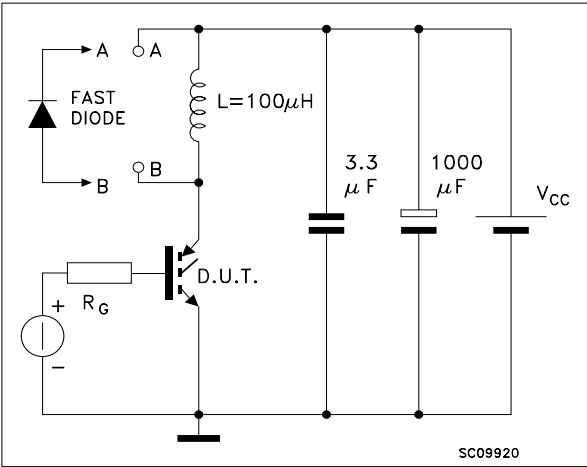
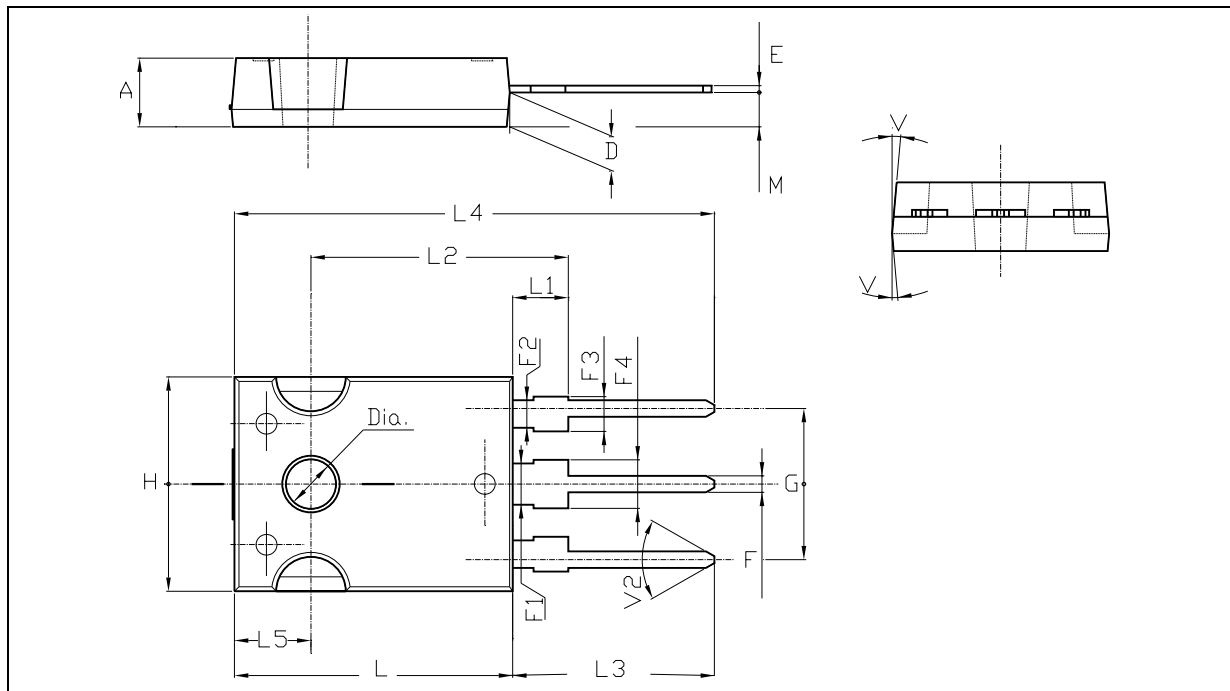


Fig. 2: Test Circuit For Inductive Load Switching



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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