



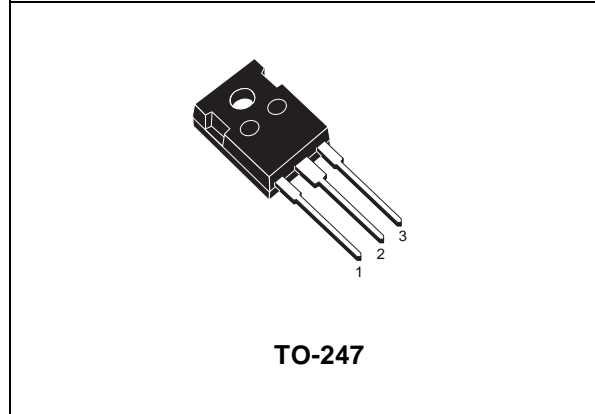
STGW20NB60HD

N-CHANNEL 20A - 600V - TO-247

PowerMESH™ IGBT

TYPE	V _{CES}	V _{CE(sat)} (Max)	I _C
STGW20NB60HD	600 V	< 2.8 V	20 A

- HIGH INPUT IMPEDANCE (VOLTAGE DRIVEN)
- LOW ON-VOLTAGE DROP (V_{CESAT})
- LOW GATE CHARGE
- HIGH CURRENT CAPABILITY
- VERY HIGH FREQUENCY OPERATION
- OFF LOSSES INCLUDE TAIL CURRENT
- CO-PACKAGED WITH TORBOSWITCH™ ANTIPARALLEL DIODE

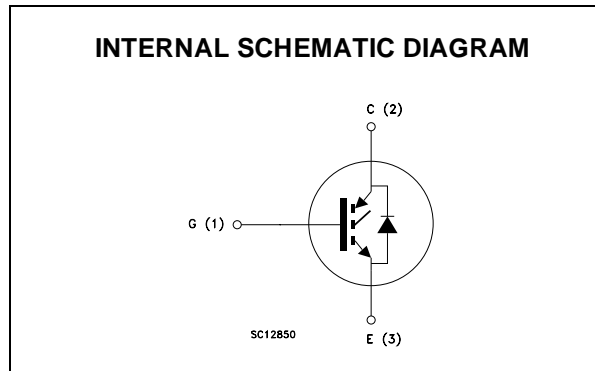


DESCRIPTION

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 "H" identifies a family optimized to achieve very low switching times for high frequency applications (<120KHz).

APPLICATIONS

- HIGH FREQUENCY MOTOR CONTROLS
- WELDING EQUIPMENTS
- SMPS AND PFC IN BOTH HARD SWITCH AND RESONANT TOPOLOGIES



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{CES}	Collector-Emitter Voltage (V _{GS} = 0)	600	V
V _{GE}	Gate-Emitter Voltage	±20	V
I _C	Collector Current (continuous) at T _C = 25°C	40	A
I _C	Collector Current (continuous) at T _C = 100°C	20	A
I _{CM} (●)	Collector Current (pulsed)	160	A
P _{TOT}	Total Dissipation at T _C = 25°C	150	W
	Derating Factor	1.2	W/°C
T _{stg}	Storage Temperature	-65 to 150	°C
T _j	Max. Operating Junction Temperature	150	°C

Note: NEW DATASHEET ACCORDING TO PCN DSG/CT/XXXX

(●) Pulse width limited by safe operating area

STGW20NB60HD

THERMAL DATA

Rthj-case	Thermal Resistance Junction-case Max	0.83	°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)}	Collectro-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			250 2000	μA μA
I _{GES}	Gate-Emitter Leakage Current (V _{CE} = 0)	V _{GE} = ± 20 V, V _{CE} = 0			± 100	nA

ON (*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{GE(th)}	Gate Threshold Voltage	V _{CE} = V _{GE} , I _C = 250 μA	3		5	V
V _{CE(sat)}	Collector-Emitter Saturation Voltage	V _{GE} =15 V, I _C =20 A V _{GE} =15 V, I _C =20 A, T _C =125°C		2.3 1.9	2.8	V V

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g _{fs}	Forward Transconductance	V _{CE} = 25 V, I _C = 20 A	7.0	10		S
C _{ies}	Input Capacitance	V _{CE} = 25 V, f = 1 MHz, V _{GE} = 0		1700		pF
C _{oes}	Output Capacitance			200		pF
C _{res}	Reverse Transfer Capacitance			40		pF
Q _g Q _{ge} Q _{gc}	Total Gate Charge Gate-Emitter Charge Gate-Collector Charge	V _{CE} = 480 V, I _C = 20 A, V _{GE} = 15 V		110 13 51	145	nC nC nC
I _{CL}	Latching Current	V _{clamp} = 480 V, R _G = 10 Ω V _{GE} = 15 V, T _J = 150°C	80			A

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t _{d(on)} t _r	Delay Time Rise Time	V _{CC} = 480 V, I _C = 50 A V _{GE} = 15 V, R _G = 10Ω		20 70		ns ns
(di/dt) _{on} E _{on}	Turn-on Current Slope Turn-on Switching Losses	V _{CC} = 480 V, I _C = 20 A, R _G =10 Ω V _{GE} = 15 V, T _J = 125°C		350 350		A/μs μJ

ELECTRICAL CHARACTERISTICS (CONTINUED)

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_c	Cross-over Time	$V_{CC} = 480\text{ V}$, $I_C = 20\text{ A}$, $R_{GE} = 10\ \Omega$, $V_{GE} = 15\text{ V}$		115		ns
$t_r(V_{off})$	Off Voltage Rise Time			32		ns
$t_{d(off)}$	Delay Time			170		ns
t_f	Fall Time			75		ns
$E_{off(**)}$	Turn-off Switching Loss			0.4		mJ
E_{ts}	Total Switching Loss			0.9		mJ
t_c	Cross-over Time	$V_{CC} = 480\text{ V}$, $I_C = 20\text{ A}$, $R_{GE} = 10\ \Omega$, $V_{GE} = 15\text{ V}$, $T_j = 125\text{ }^\circ\text{C}$		190		ns
$t_r(V_{off})$	Off Voltage Rise Time			55		ns
$t_{d(off)}$	Delay Time			210		ns
t_f	Fall Time			140		ns
$E_{off(**)}$	Turn-off Switching Loss			0.7		mJ
E_{ts}	Total Switching Loss			1.25		mJ

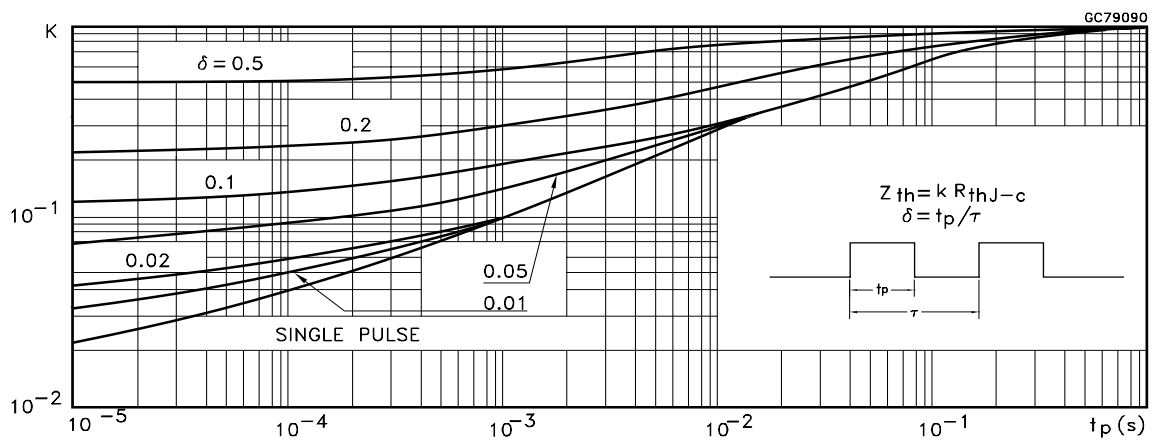
Note: (*)Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %.

(**)Losses include Also the Tail (Jedec Standardization)

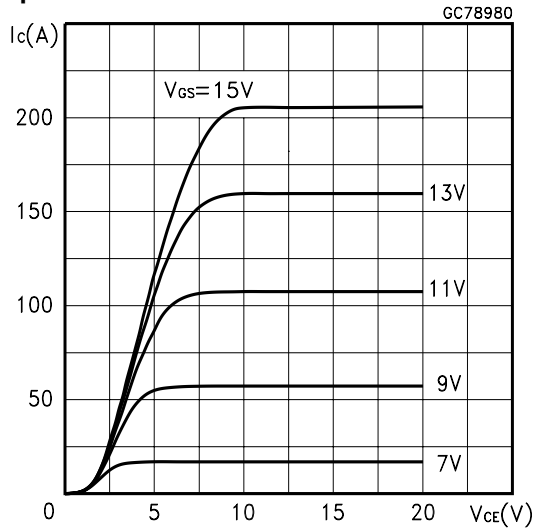
COLLECTOR-EMITTER DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_f	Forward Current				10	A
I_{fm}	Forward Current pulsed				80	A
V_f	Forward On-Voltage	$I_f = 10\text{ A}$ $I_f = 10\text{ A}$, $T_j = 125\text{ }^\circ\text{C}$		1.27 1	2.0	V V
t_{rr}	Reverse Recovery Time	$I_f = 10\text{ A}$, $V_R = 27\text{ V}$, $T_j = 125\text{ }^\circ\text{C}$, $di/dt = 100\text{ A}/\mu\text{s}$		80.5		ns
Q_{rr}	Reverse Recovery Charge			181		nC
I_{rrm}	Reverse Recovery Current			4.5		A

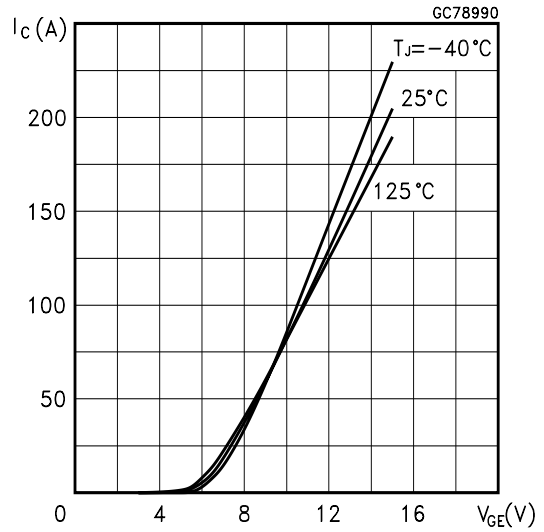
Thermal Impedance



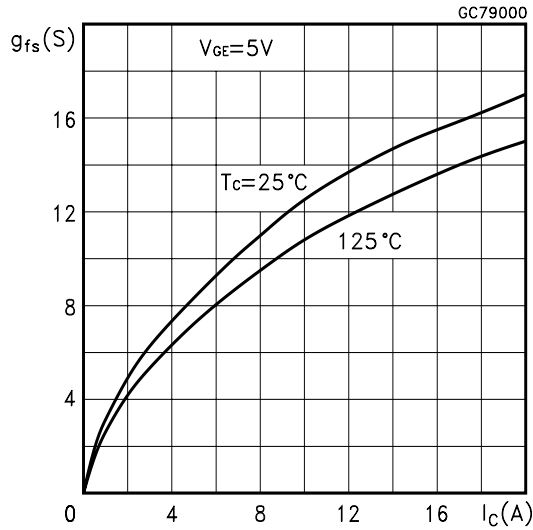
Output Characteristics



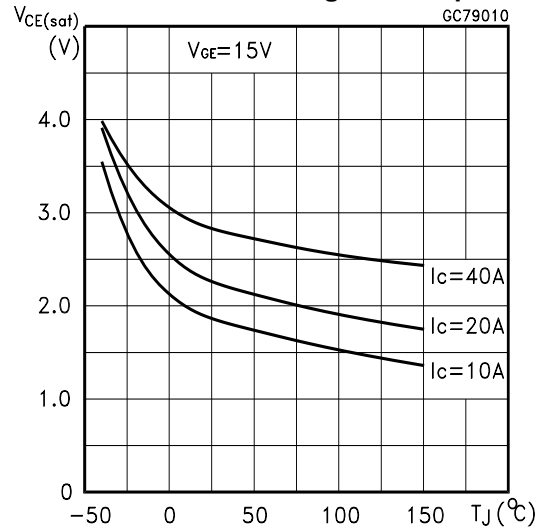
Transfer Characteristics



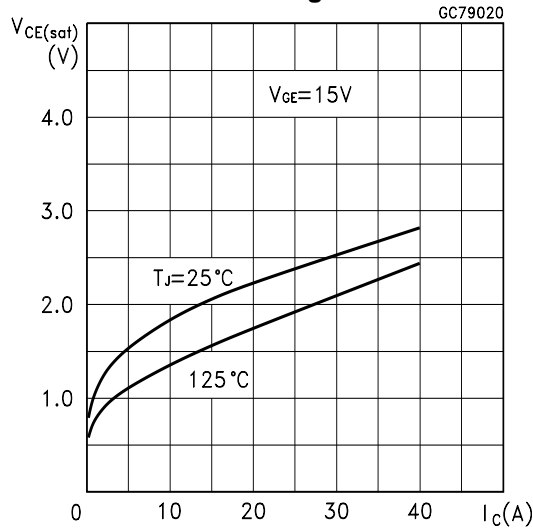
Transconductance



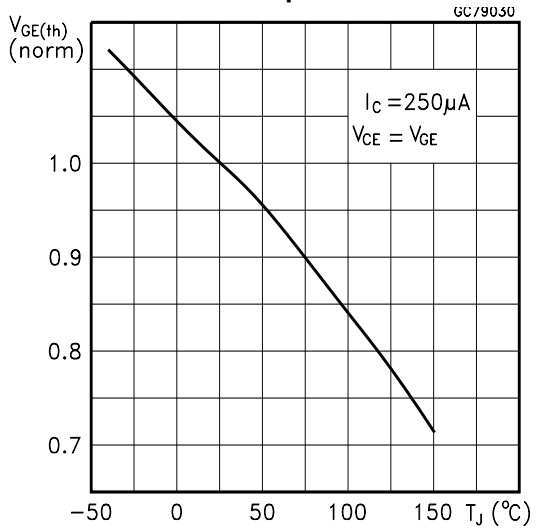
Collector-Emitter On Voltage vs Temperature



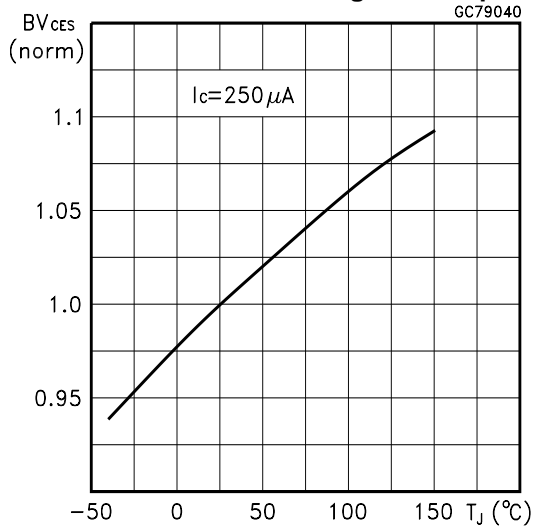
Collector-Emitter On Voltage vs Collector Current



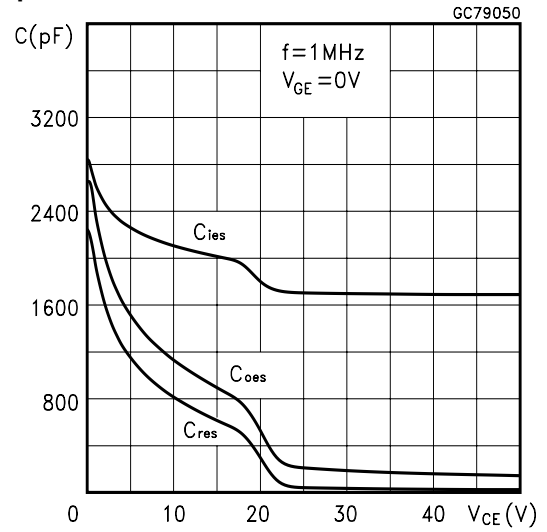
Gate Threshold vs Temperature



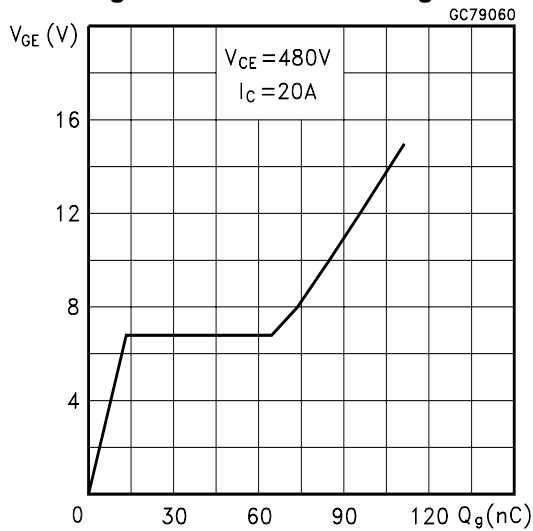
Normalized Breakdown Voltage vs Temperature



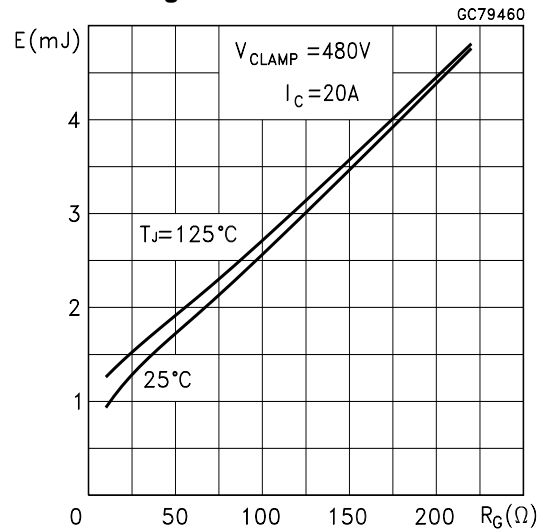
Capacitance Variations



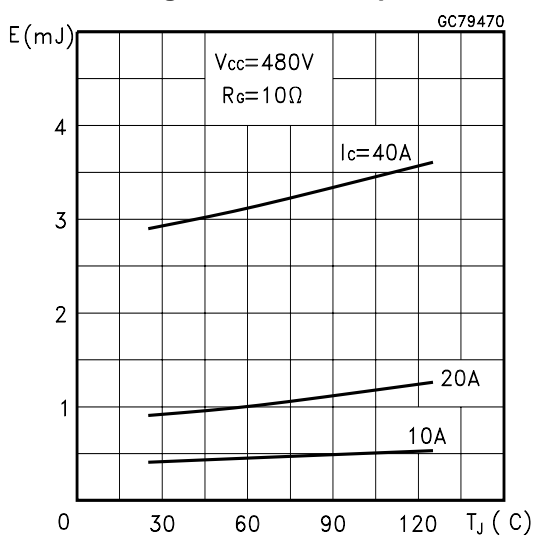
Gate Charge vs Gate-Emitter Voltage



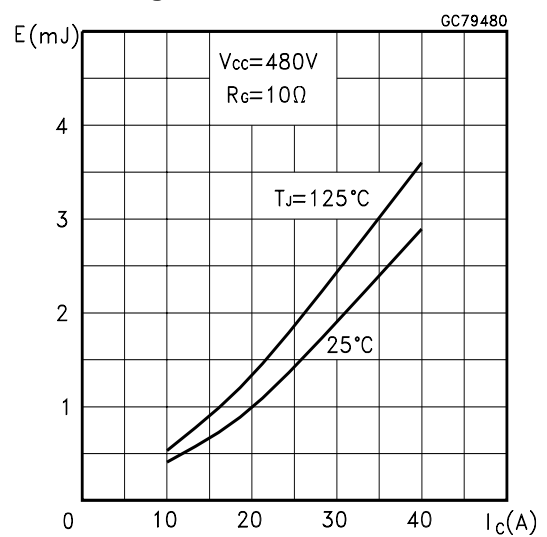
Total Switching Losses vs Gate Resistance



Total Switching Losses vs Temperature



Total Switching Losses vs Collector Current



Switching Off Safe Operating Area

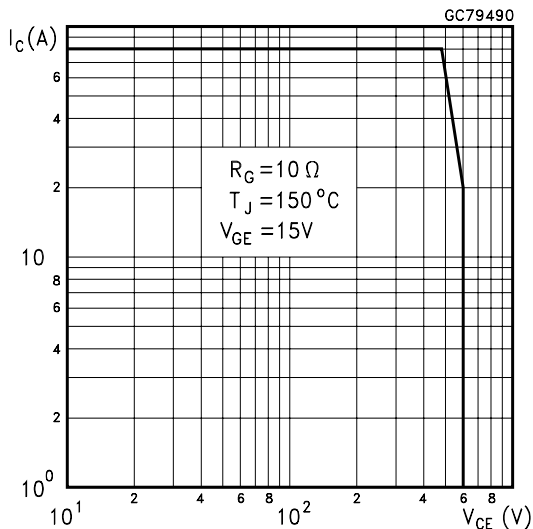
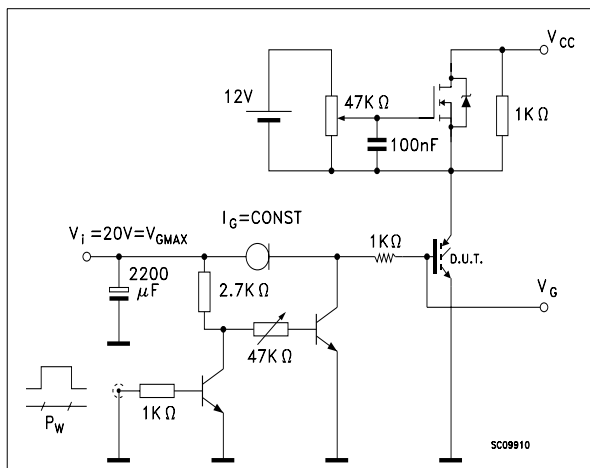


Fig. 1: Gate Charge test Circuit



Diode Forward Voltage

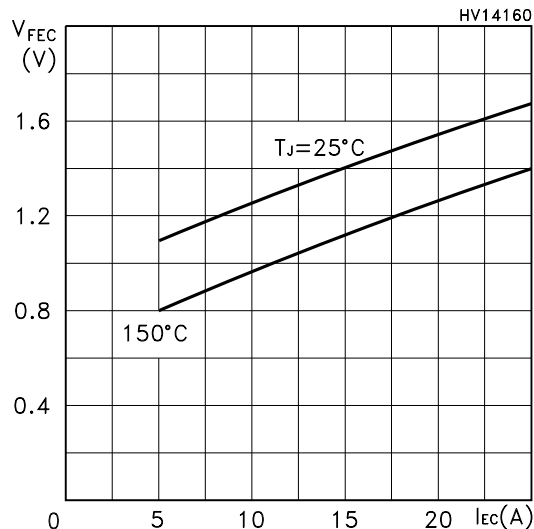
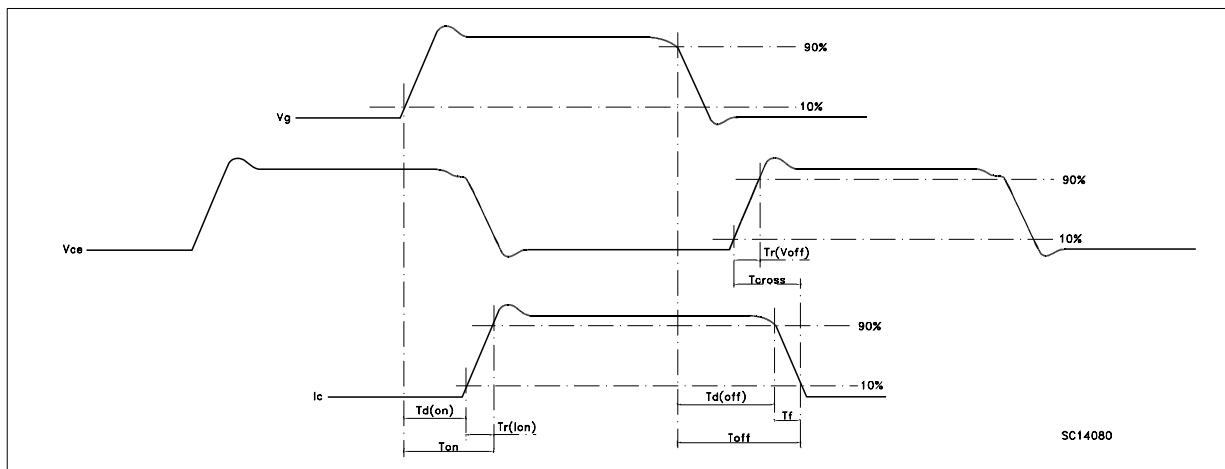
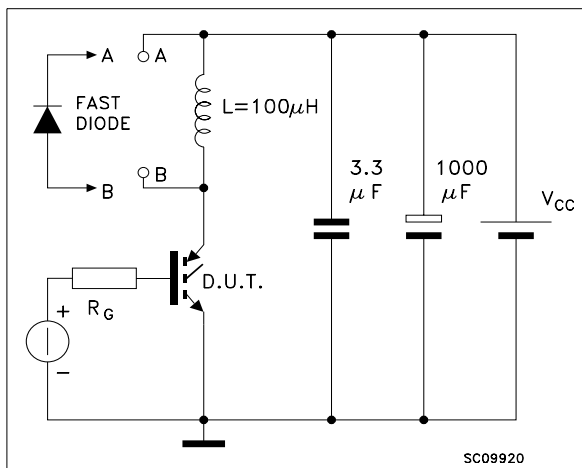
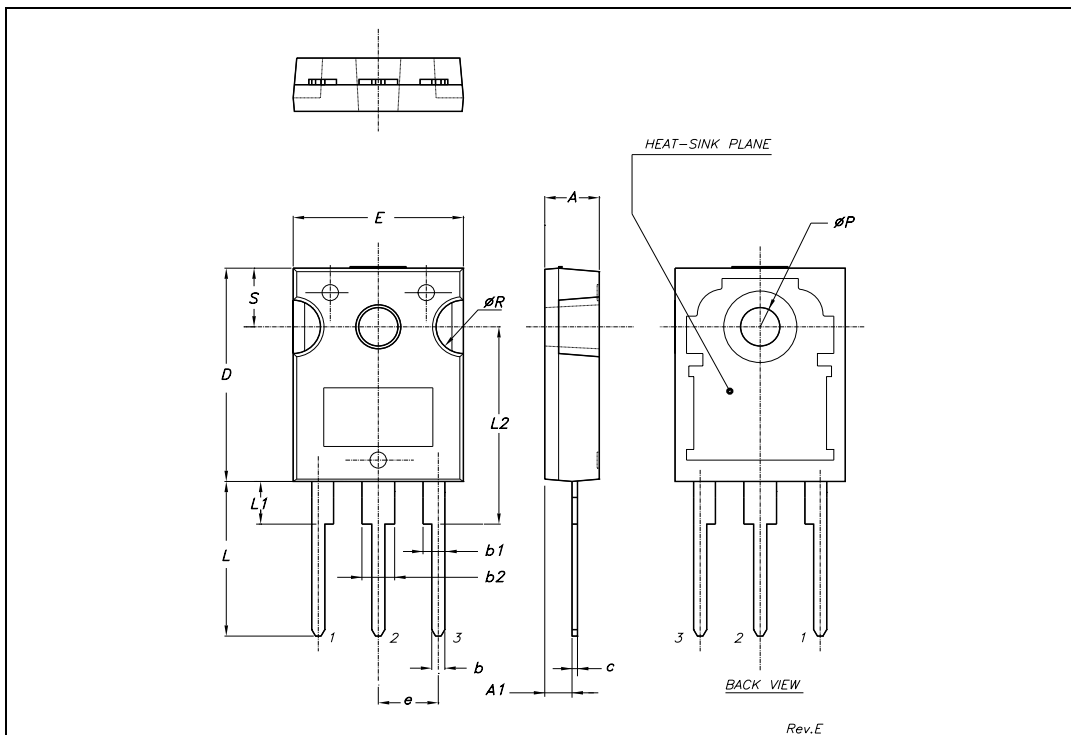


Fig. 2: Test Circuit For Inductive Load Switching



TO-247 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.85		5.15	0.19		0.20
A1	2.20		2.60	0.086		0.102
b	1.0		1.40	0.039		0.055
b1	2.0		2.40	0.086		0.094
b2	3.0		3.40	0.118		0.134
c	0.40		0.80	0.015		0.03
D	19.85		20.15	0.781		0.793
E	15.45		15.75	0.608		0.620
e		5.45			0.214	
L	14.20		14.80	0.560		0.582
L1	3.70		4.30	0.14		0.17
L2		18.50			0.728	
øP	3.55		3.65	0.140		0.143
øR	4.50		5.50	0.177		0.216
S		5.50			0.216	



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