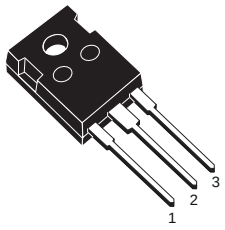
STGW20NB60HD

N-CHANNEL 20A - 600V - TO-247
PowerMESH™ IGBT

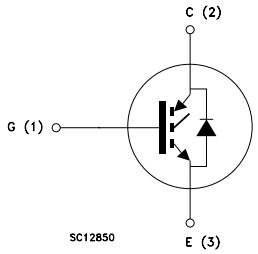
TYPE	V_{CES}	$V_{CE(sat)\ (Max)}$	I_C
STGW20NB60HD	600 V	< 2.8 V	20 A

- 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



TO-247

INTERNAL SCHEMATIC DIAGRAM



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

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			250	µA
		V_{CE} = Max Rating, T_C = 125 °C			2000	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		2.3	2.8	V
		V_{GE}=15 V, I_C=20 A , T_C=125°C		1.9		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	Total Gate Charge	V_{CE} = 480 V, I_C = 20 A,		110	145	nC
Q_{ge}	Gate-Emitter Charge	V_{GE} = 15 V		13		nC
Q_{gc}	Gate-Collector Charge			51		nC
I_{CL}	Latching Current	V_{clamp} = 480 V , R_G =10 Ω	80			A
		V_{GE} =15 V , Tj = 150°C				

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Delay Time	V_{CC} = 480 V, I_C = 50 A		20		ns
t_r	Rise Time	V_{GE} = 15 V , R_G = 10Ω		70		ns
$(di/dt)_{on}$	Turn-on Current Slope	V_{CC}= 480 V, I_C = 20 A,		350		A/µs
Eon	Turn-on Switching Losses	R_G=10 Ω V_{GE} = 15 V, Tj = 125°C		350		µJ

ELECTRICAL CHARACTERISTICS (CONTINUED)

SWITCHING OFF

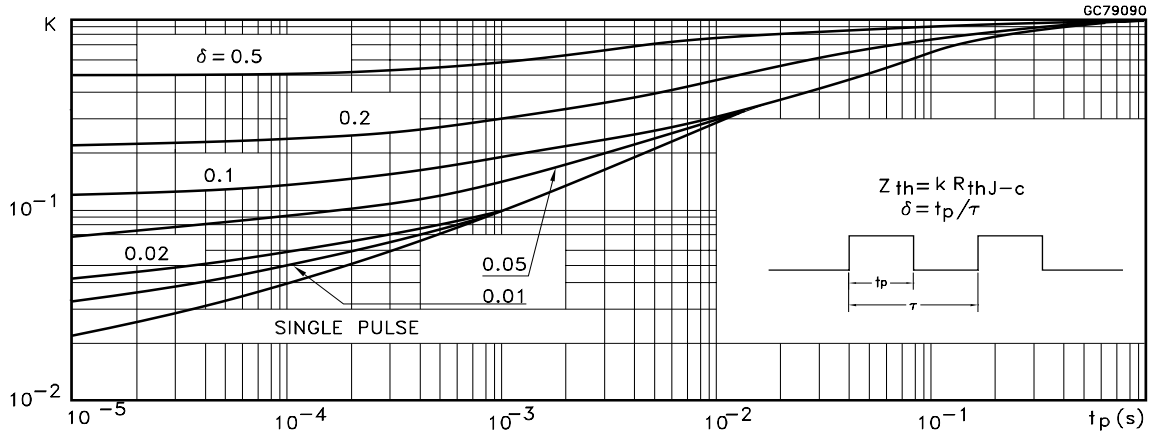
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_c	Cross-over Time	V_{cc} = 480 V, I_C = 20 A, R_{GE} = 10 Ω , V_{GE} = 15 V		115		ns
$t_r(V_{off})$	Off Voltage Rise Time			32		ns
$t_{d(off)}$	Delay Time			170		ns
t_f	Fall Time			75		ns
E_{off}(**)	Turn-off Switching Loss			0.4		mJ
E_{ts}	Total Switching Loss			0.9		mJ
t_c	Cross-over Time	V_{cc} = 480 V, I_C = 20 A, R_{GE} = 10 Ω , V_{GE} = 15 V Tj = 125 °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)

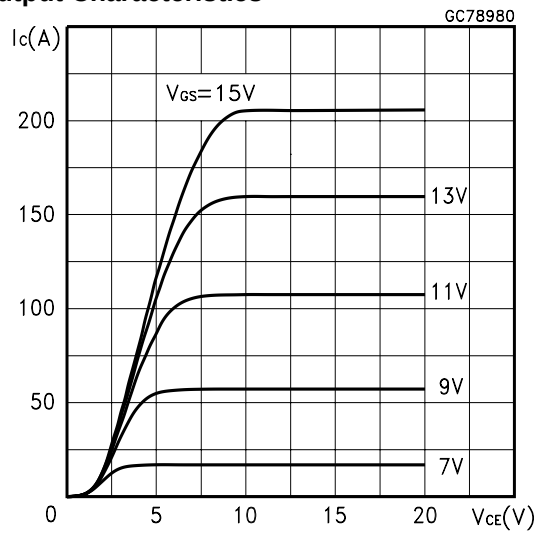
COLLECTOR-EMITTER DIODE

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

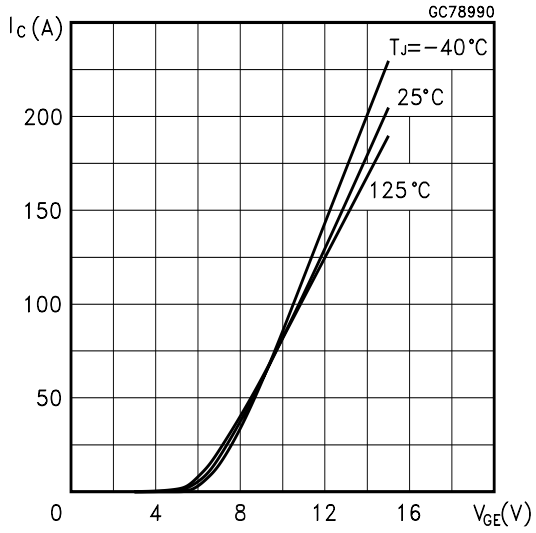
Thermal Impedance



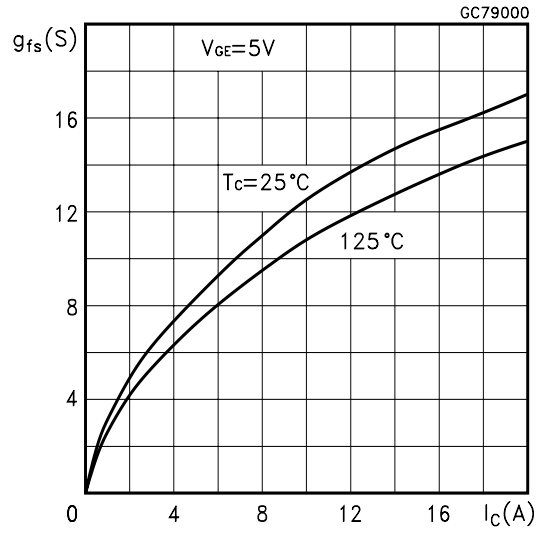
Output Characteristics



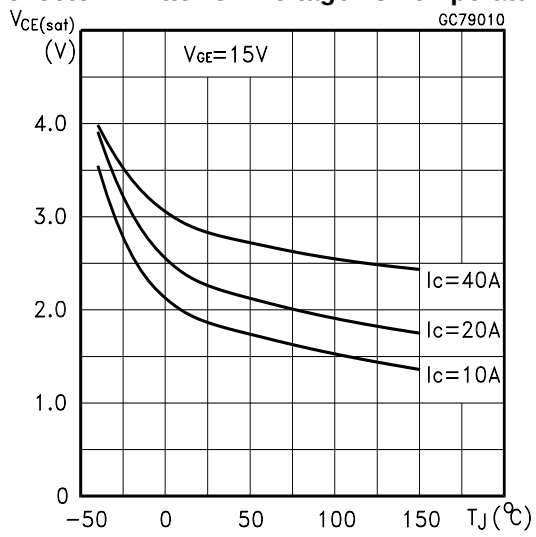
Transfer Characteristics



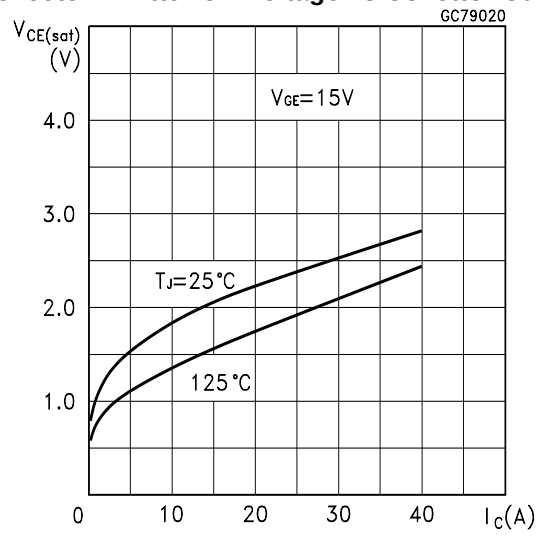
Transconductance



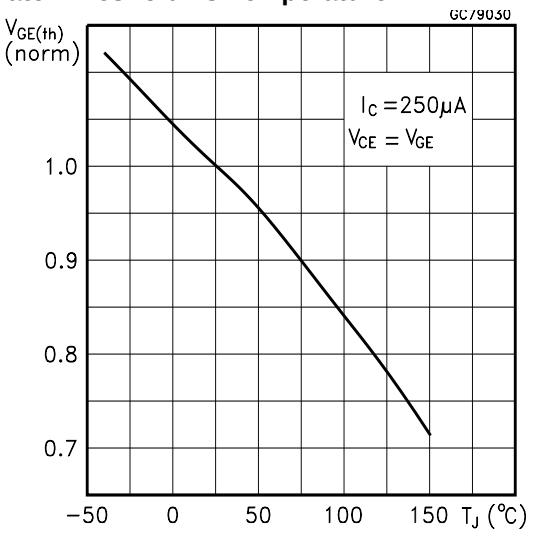
Collector-Emitter On Voltage vs Temperature



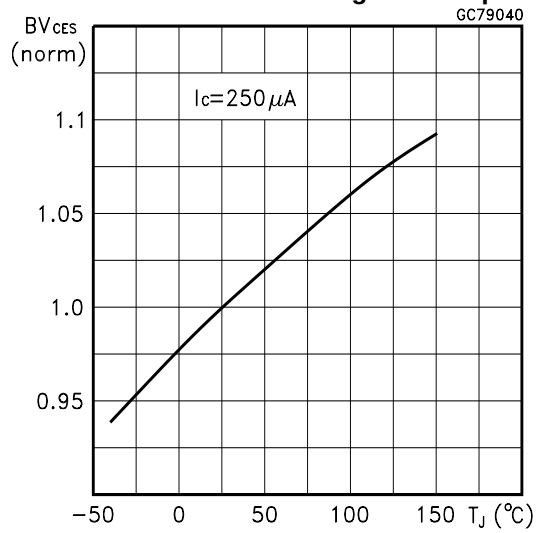
Collector-Emitter On Voltage vs Collettor Current



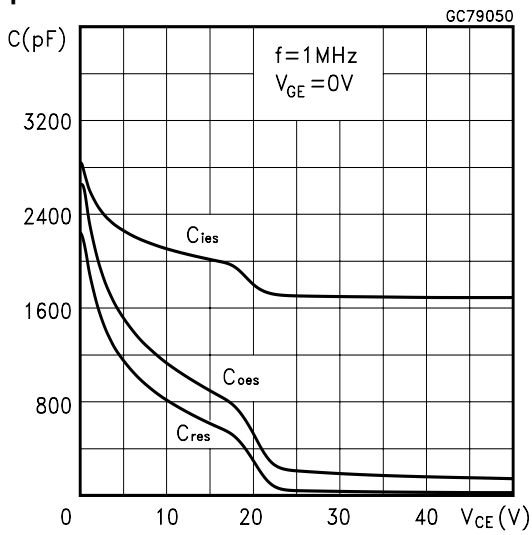
Gate Threshold vs Temperature



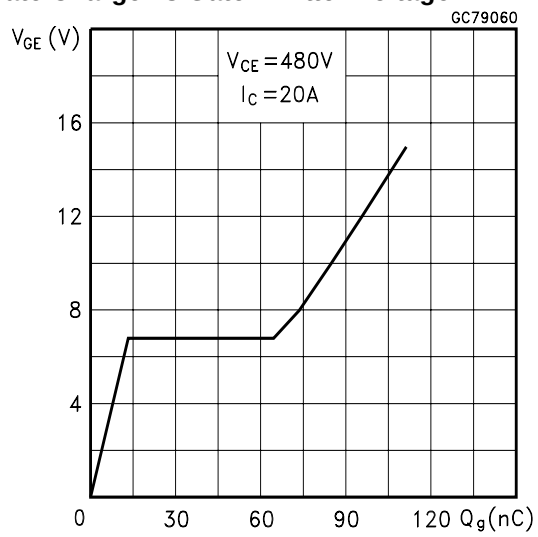
Normalized Breakdown Voltage vs Temperature



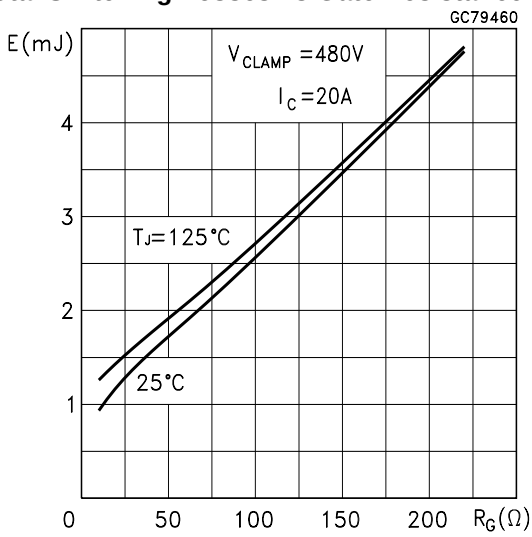
Capacitance Variations



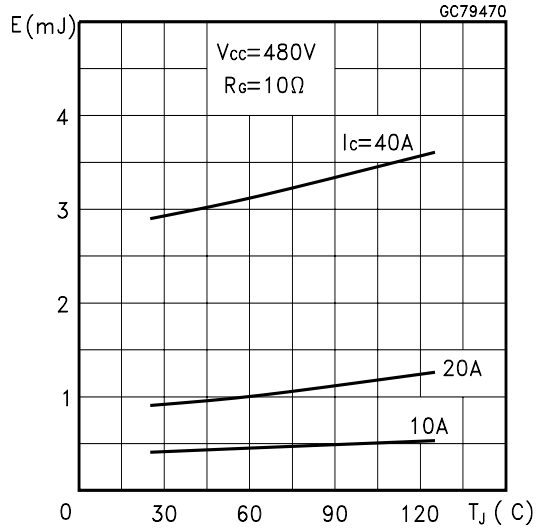
Gate Charge vs Gate-Emitter Voltage



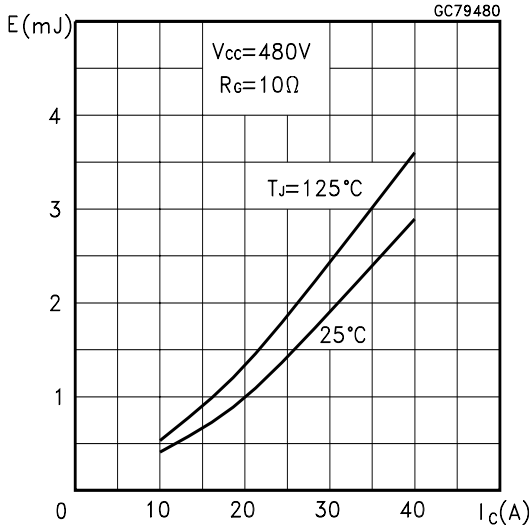
Total Switching Losses vs Gate Resistance



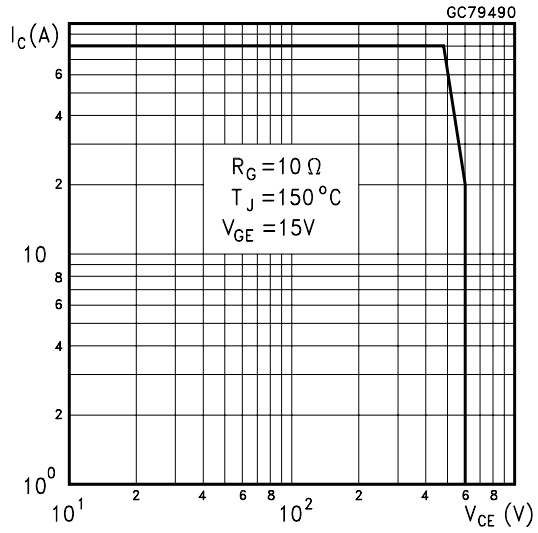
Total Switching Losses vs Temperature



Total Switching Losses vs Collector Current



Switching Off Safe Operating Area



Diode Forward Voltage

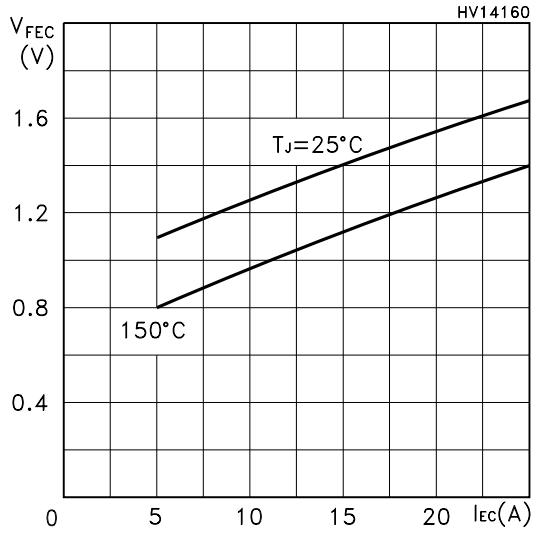


Fig. 1: Gate Charge test Circuit

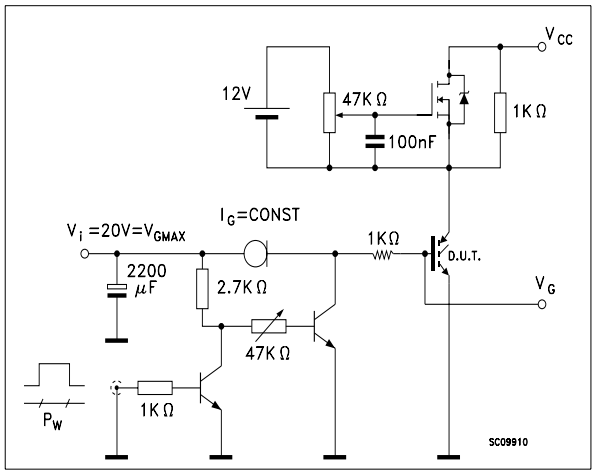
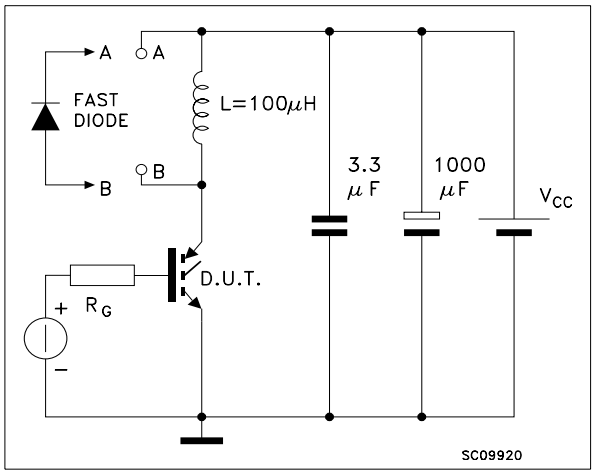
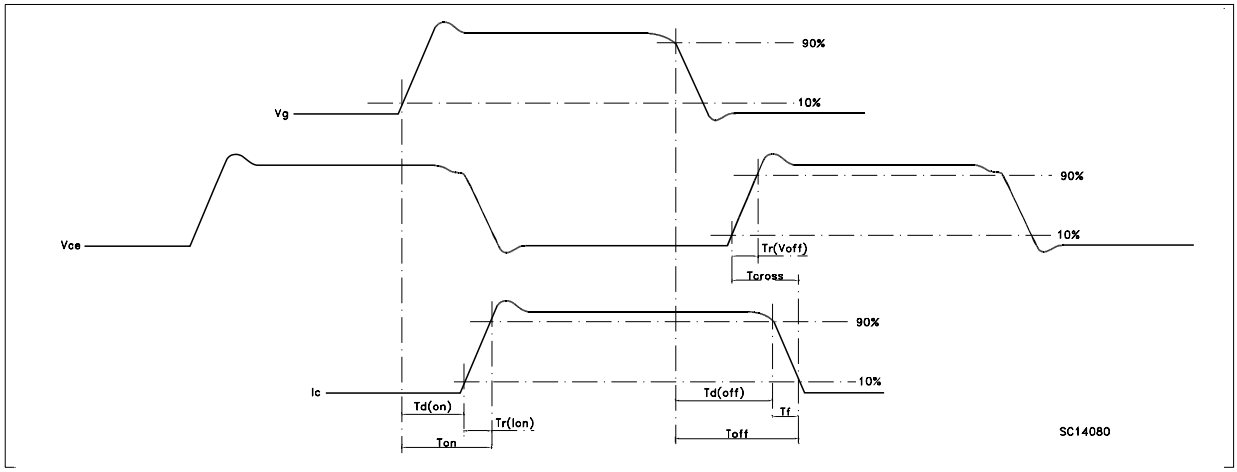


Fig. 2: Test Circuit For Inductive Load Switching





TO-247 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.85		5.15	0.19		0.20
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