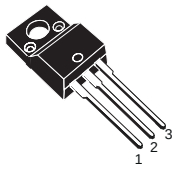
STGF10NB60SD

N-CHANNEL 10A - 600V TO-220FP
PowerMESH™ IGBT

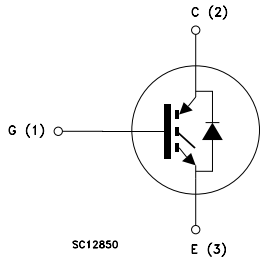
TYPE	V_{CES}	$V_{CE(sat)}$ (Max) @25°C	I_C @100°C
STGF10NB60SD	600	< 1.8 V	10 A

- HIGHT INPUT IMPEDANCE (VOLTAGE DRIVEN)
- LOW ON-VOLTAGE DROP
- HIGH CURRENT CAPABILITY
- OFF LOSSES INCLUDE TAIL CURRENT
- CO-PACKAGED WITH TURBOSWITCH™ ANTIPARALLEL DIODE



TO-220FP

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 “S” identifies a family optimized achieve minimum on-voltage drop for low frequency applications (<1kHz).

APPLICATIONS

- LIGHT DIMMER
- STATIC RELAYS
- MOTOR CONTROL

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	20	A
I_C	Collector Current (continuous) at T_C = 100°C	10	A
I_{CM} (●)	Collector Current (pulsed)	80	A
P_{TOT}	Total Dissipation at T_C = 25°C	25	W
	Derating Factor	0.2	W/°C
V_{ISO}	Insulation Withstand Voltage A.C.(t = 1 sec; Tc = 25°C)	2500	V
T_{stg}	Storage Temperature	–65 to 150	°C
T_j	Max. Operating Junction Temperature	150	°C

(●) Pulse width limited by safe operating area

THERMAL DATA

Rthj-case	Thermal Resistance Junction-case Max	5	°C/W
Rthj-amb	Thermal Resistance Junction-ambient Max	62.5	°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 Break-down Voltage	I_C = 250 µA, V_{GE} = 0,	600			V
$V_{BR(CES)}$	Emitter Collector Break-down Voltage	I_C = 1 mA, V_{GE} = 0,	20			V
I_{CES}	Collector cut-off Current (V_{GE} = 0)	V_{CE} = Max Rating ,T_j =25 °C V_{CE} = Max Rating ,T_j =125 °C			10 100	µA µA
I_{GES}	Gate-Emitter Leakage Current (V_{CE} = 0)	V_{GE} = ± 20V , 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 = 250µA	2.5		5	V
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage	V_{GE} =15V, I_C = 5 A, Tj= 25°C V_{GE} =15V, I_C = 10 A, Tj= 25°C V_{GE} =15V, I_C = 10 A, Tj= 125°C		1.15 1.35 1.25	1.8	V V V

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs}	Forward Transconductance	V_{CE} = 25 V , I_C =10 A	5			S
C_{ies} C_{oes} C_{res}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V_{CE} = 25V, f = 1 MHz, V_{GE} = 0		610 65 12		pF pF pF
Q_g	Gate Charge	V_{CE} = 400V, I_C = 10 A, V_{GE} = 15V		33		nC
I_{CL}	Latching Current	V_{clamp}= 480V, RG= 1kΩ, Tj= 125°C	20			A

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	V_{CC} = 480 V, I_C = 10 A		0.7		µs
t_r	Rise Time	R_G = 1KΩ , V_{GE} = 15 V		0.46		µs
$(di/dt)_{on}$	Turn-on Current Slope	V_{CC}= 480 V, I_C = 10 A		8		A/µs
Eon	Turn-on Switching Losses	R_G=1KΩ, V_{GE} = 15 V		0.6		mJ

SWITCHING OFF

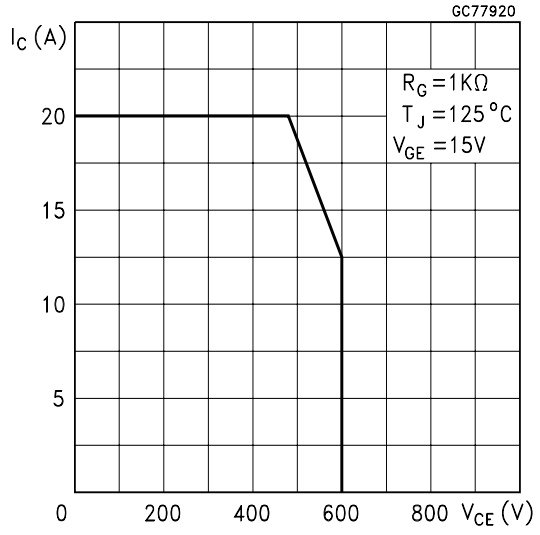
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_c	Cross-over Time	V_{clamp} = 480 V, I_C = 10 A,		2.2		µs
$t_r(V_{off})$	Off Voltage Rise Time	R_{GE} = 1K Ω , V_{GE} = 15 V		1.2		µs
t_f	Fall Time			1.2		µs
E_{off}(**)	Turn-off Switching Loss			5.0		mJ
t_c	Cross-over Time	V_{clamp} = 480 V, I_C = 10 A,		3.8		µs
$t_r(V_{off})$	Off Voltage Rise Time	R_{GE} = 1KΩ , V_{GE} = 15 V		1.2		µs
t_f	Fall Time	Tj = 125 °C		1.9		µs
E_{off}(**)	Turn-off Switching Loss			8.0		mJ

COLLECTOR-EMITTER DIODE

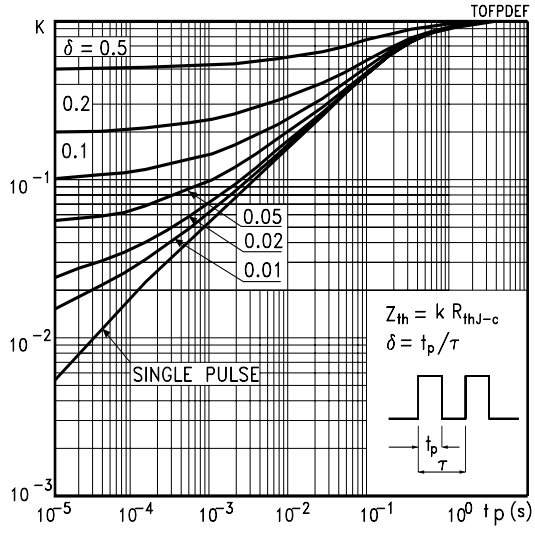
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_f	Forward Current				7	A
I_{fm}	Forward Current pulsed				56	A
V_f	Forward On-Voltage	I_f = 3.5 A		1.4	1.9	V
		I_f = 3.5 A, Tj = 125 °C		1.15		V
t_{rr}	Reverse Recovery Time	I_f = 7 A ,V_R = 20 V,		50		ns
Q_{rr}	Reverse Recovery Charge	Tj =125°C, di/dt = 100A/µs		70		nC
I_{rrm}	Reverse Recovery Current			2.7		A

(●)Pulsed: Pulse duration = 300 µs, duty cycle 1.5 %.
(1)Pulse width limited by max. junction temperature.
(**)Losses Include Also the Tail

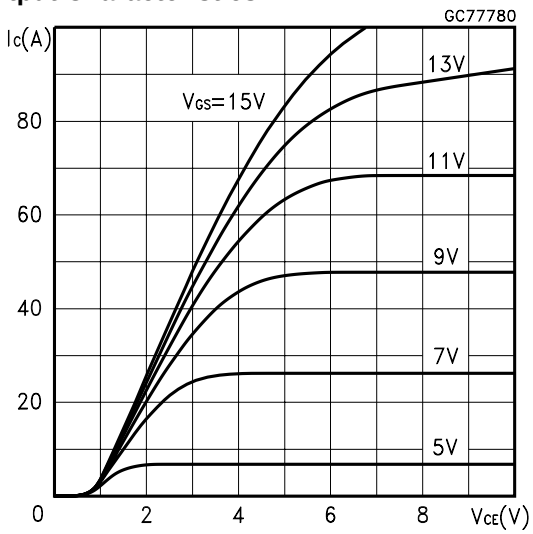
Switching Off Safe Operating Area



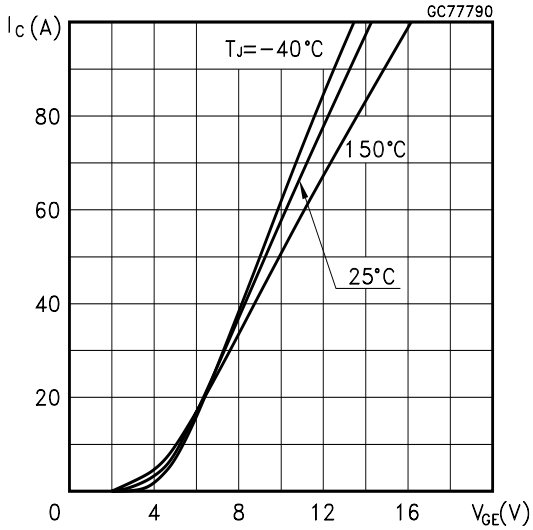
Thermal Impedance



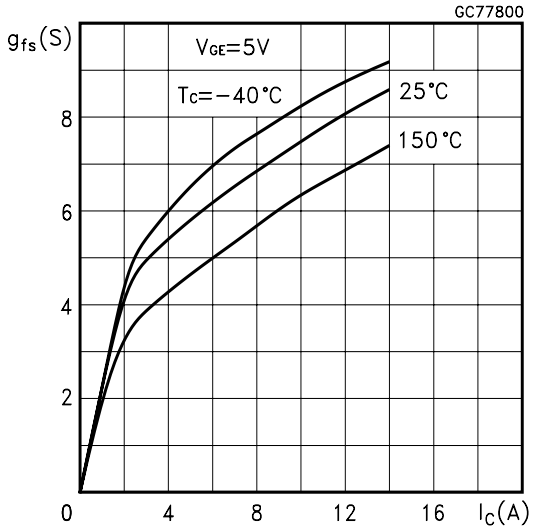
Output Characteristics



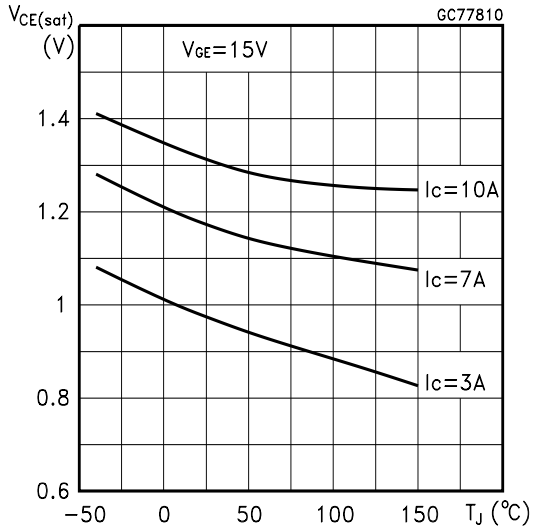
Transfer Characteristics



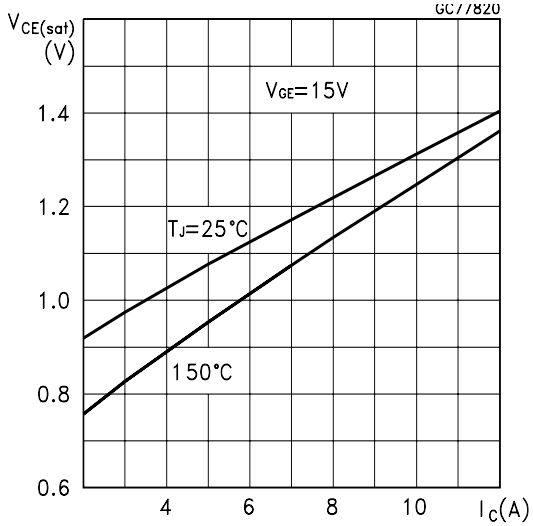
Transconductance



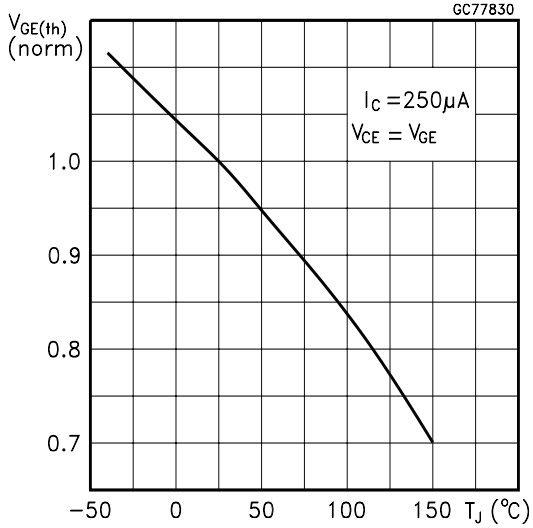
Collector-Emitter On Voltage vs Temperature



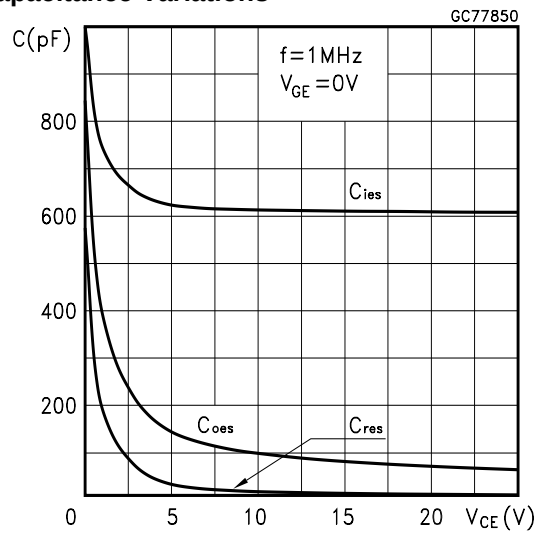
Collector-Emitter On Voltage vs Collector Current



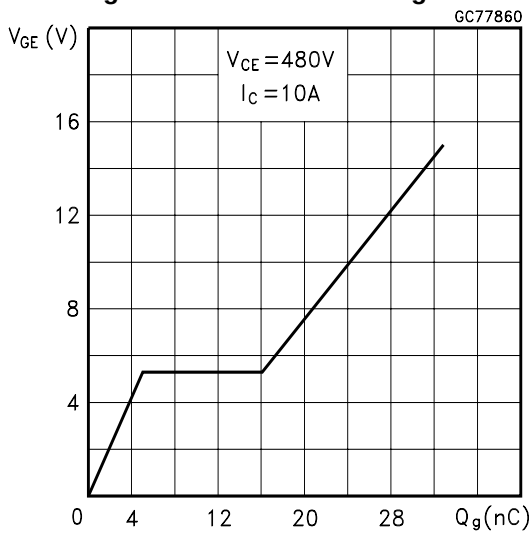
Gate Threshold Voltage vs Temperature



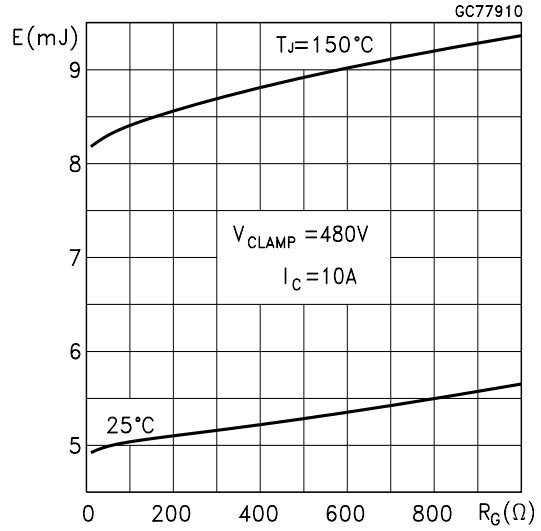
Capacitance Variations



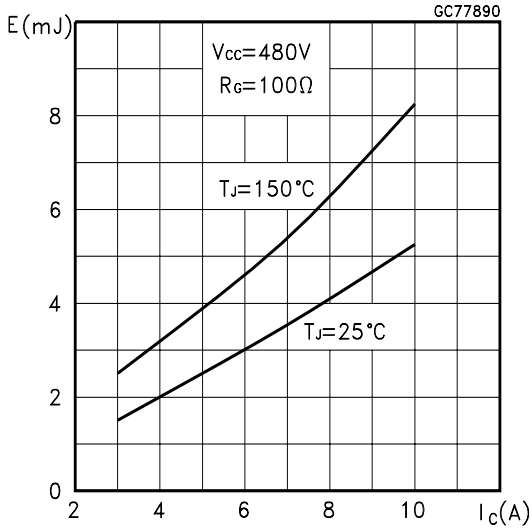
Gate Charge vs Gate-Emitter Voltage



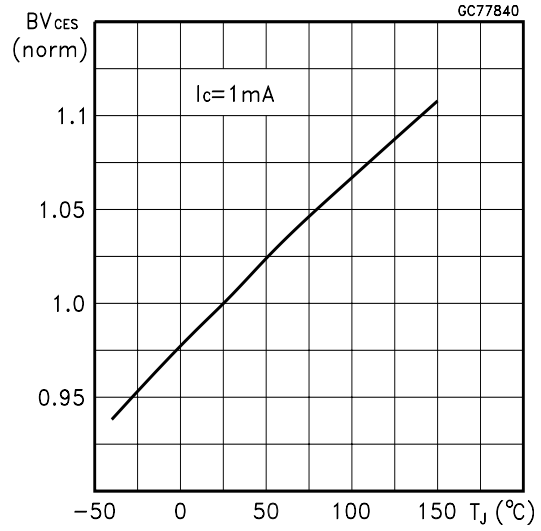
Off Losses vs Gate Resistance



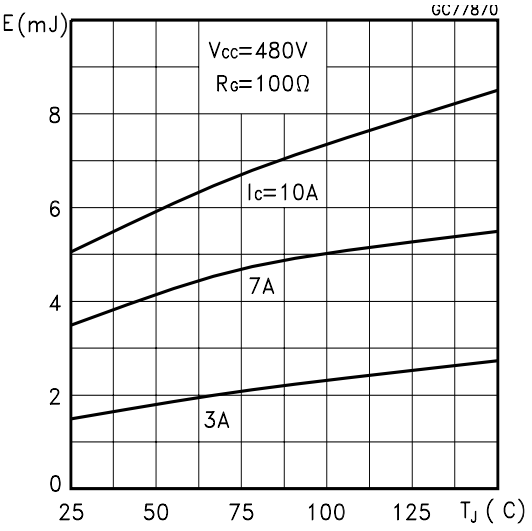
Off Losses vs Collector Current



Normalized Break-down Voltage vs Temp.



Off Losses vs Temperature



Emitter-Collector Diode Characteristics

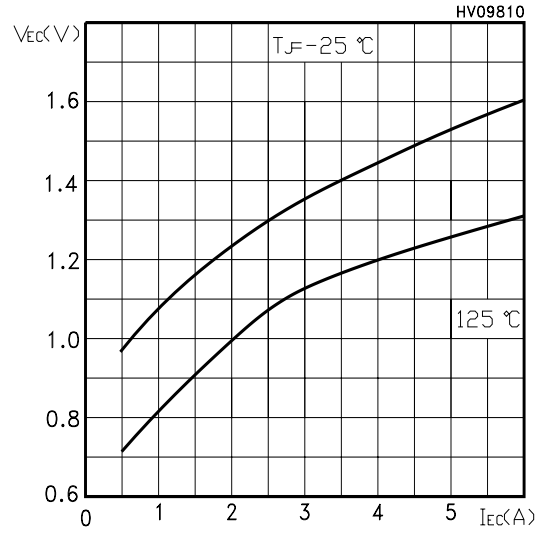


Fig. 1: Gate Charge test Circuit

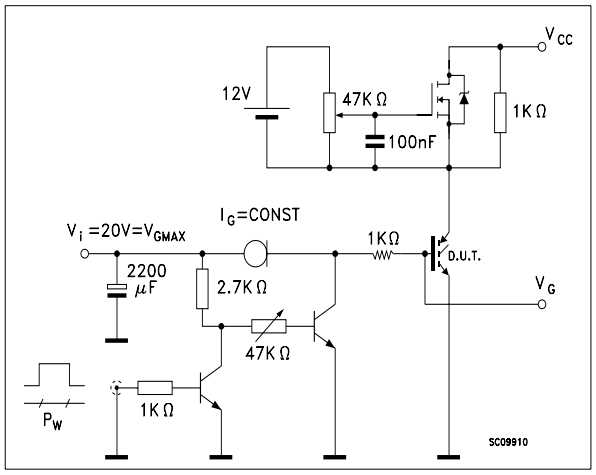
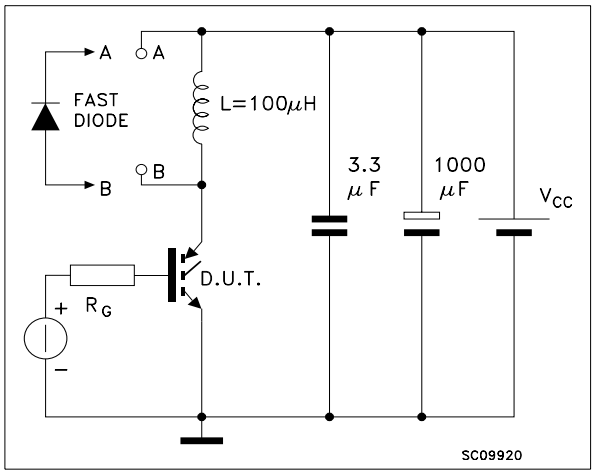
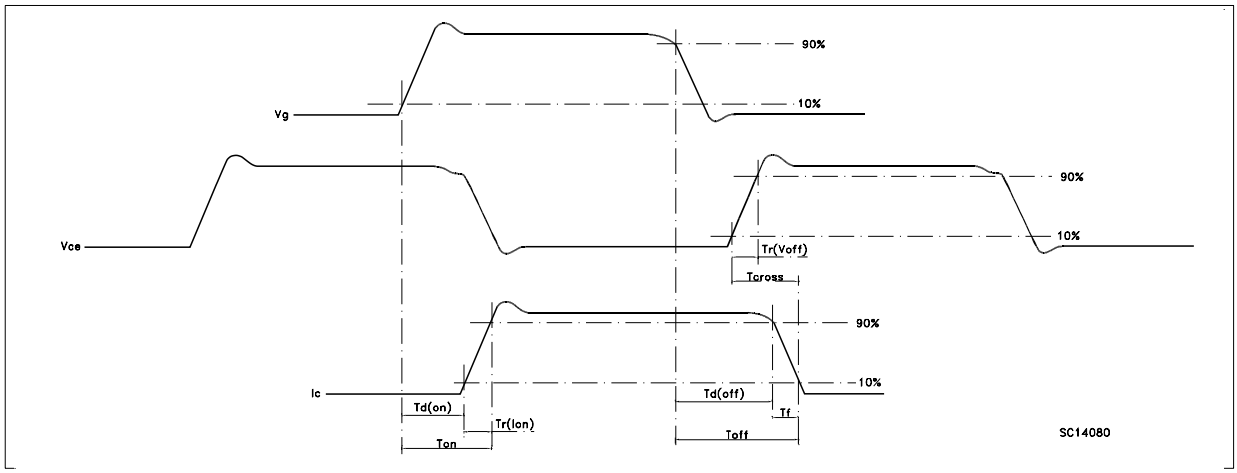


Fig. 2: Test Circuit For Inductive Load Switching





TO-220FP MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.4		4.6	0.173		0.181
B	2.5		2.7	0.098		0.106
D	2.5		2.75	0.098		0.108
E	0.45		0.7	0.017		0.027
F	0.75		1	0.030		0.039
F1	1.15		1.5	0.045		0.067
F2	1.15		1.5	0.045		0.067
G	4.95		5.2	0.195		0.204
G1	2.4		2.7	0.094		0.106
H	10		10.4	0.393		0.409
L2		16			0.630	
L3	28.6		30.6	1.126		1.204
L4	9.8		10.6	.0385		0.417
L5	2.9		3.6	0.114		0.141
L6	15.9		16.4	0.626		0.645
L7	9		9.3	0.354		0.366
Ø	3		3.2	0.118		0.126