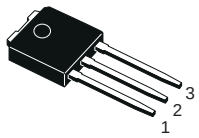
STGD5NB120SZ-1

N-CHANNEL 5A - 1200V IPAK
INTERNALLY CLAMPED PowerMESH™ IGBT

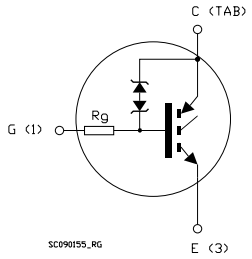
TYPE	V_{CES}	$V_{CE(sat)}$	I_C
STGD5NB120SZ-1	1200 V	< 2.0 V	5 A

- HIGH INPUT IMPEDANCE (VOLTAGE DRIVEN)
- LOW ON-VOLTAGE DROP (V_{cesat})
- HIGHT CURRENT CAPABILITY
- OFF LOSSES INCLUDE TAIL CURRENT
- HIGH VOLTAGE CLAMPING FEATURES



IPAK

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). The built in collector-gate zener exibits a very precise active clamping.

APPLICATIONS

- LIGHT DIMMER
- INRUSH CURRENT LIMITATION

ORDERING INFORMATION

SALES TYPE	MARKING	PACKAGE	PACKAGING
STGD5NB120SZ-1	GD5NB120SZ	IPAK	TUBE

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CES}	Collector-Emitter Voltage (V_{GS} = 0)	1200	V
V_{ECR}	Emitter-Collector Voltage	20	V
V_{GE}	Gate-Emitter Voltage	±20	V
I_C	Collector Current (continuous) at T_C = 25°C	10	A
I_C	Collector Current (continuous) at T_C = 100°C	5	A
I_{CM} (▪)	Collector Current (pulsed)	20	A
P_{TOT}	Total Dissipation at T_C = 25°C	55	W
	Derating Factor	0.4	W/°C
Eas (1)	Single Pulse Avalanche Energy at T_j = 25°C Single Pulse Avalanche Energy at T_j = 100°C	10 7	mJ mJ
T_{stg}	Storage Temperature	–65 to 150	°C
T_j	Operating Junction Temperature range	150	°C

(▪) Pulse width limited by safe operating area

(1) V_{CE} = 50 V , I_{AV} = 3.3 A

THERMAL DATA

Rthj-case	Thermal Resistance Junction-case Max	2.27	°C/W
Rthj-amb	Thermal Resistance Junction-ambient Max	100	°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 = 10 mA, V_{GE} = 0 V	1200			V
I_{CES}	Collector cut-off Current (V_{GE} = 0)	V_{CE} = 900 V V_{CE} = 900 V, T_j = 125 °C			50 250	µA µA
I_{GES}	Gate-Emitter Leakage Current (V_{CE} = 0)	V_{GE} = ±20V , V_{CE} = 0 V			±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	2		5	V
V_{GE}	Gate Emitter Voltage	V_{CE} =2.5 V, I_C = 2 A, Tj = 25÷125°C			6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	V_{GE} = 15V, I_C = 5 A V_{GE} = 15V, I_C = 5 A, Tj =125°C		1.3	2.0	V V

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs}	Forward Transconductance	V_{CE} = 25 V , I_C = 5 A		5		S
C_{ies}(*)	Input Capacitance	V_{CE} = 25V, f = 1 MHz, V_{GE} = 0V		430		pF
C_{oes}(*)	Output Capacitance			40		pF
C_{res}(*)	Reverse Transfer Capacitance			7		pF
R_g	Gate Resistance			4		KΩ

Note: (*) Without Rg Gate Resistance

FUNCTIONAL TEST

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Ias	Unclamped inductive switching current	V_{CC} = 50 V, L= 1.8 mH T_{start} = 25°C, R_{drive} = 1KΩ	3.3			A
I_{CL}	Latching Current	V_{CLAMP} = 960 V, Tj =125°C R_{drive} = 1KΩ		10		A

ELECTRICAL CHARACTERISTICS

SWITCHING ON

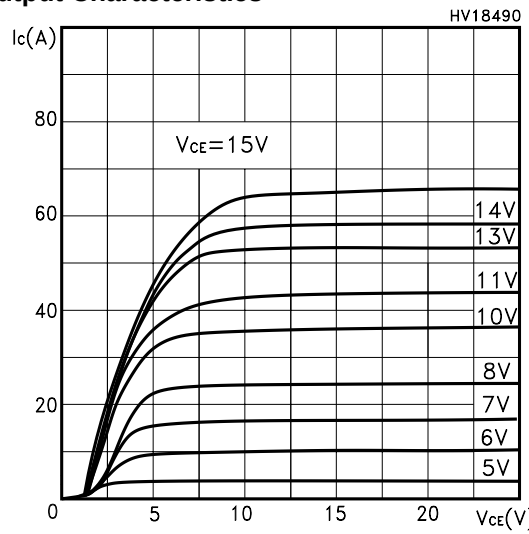
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Delay Time Rise Time	I_C = 5 A , V_{CC} = 960 V V_{GE} = 15 V , R_{drive} = 1KΩ Tj = 25°C		690 160		ns ns
$(di/dt)_{on}$ Eon	Turn-on Current Slope Turn-on Switching Losses	I_{CC} = 5 A , V_{CC} = 960 V V_{GE} = 15 V , R_{drive} = 1KΩ Tj = 125°C		39 2.64		A/µs mJ

SWITCHING OFF

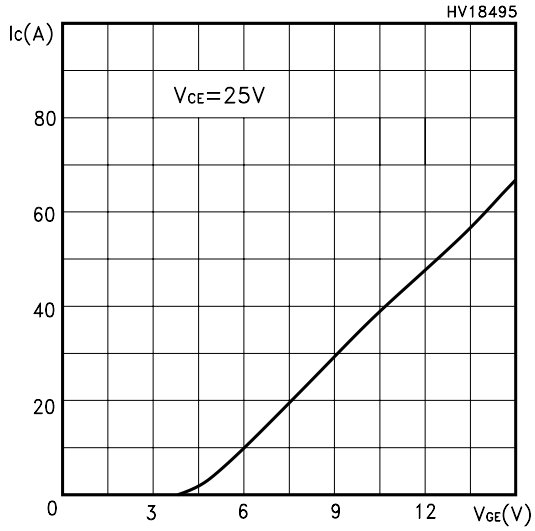
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_c $t_r(V_{off})$ $t_{d(off)}$ t_f E_{off}(**)	Cross-over Time Off Voltage Rise Time Delay Time Fall Time Turn-off Switching Loss	I_C = 5 A , V_{CC} = 960 V V_{GE} = 15 V , R_{drive} = 1KΩ Tj = 25°C		4 2.2 12.1 1.13 9		µs µs µs µs mJ
t_c $t_r(V_{off})$ $t_{d(off)}$ t_f E_{off}(**)	Cross-over Time Off Voltage Rise Time Delay Time Fall Time Turn-off Switching Loss	I_C = 5 A , V_{CC} = 960 V V_{GE} = 15 V , R_{drive} = 1KΩ Tj = 125°C		5 2.2 12.1 2 10.2		µs µs µs µs mJ

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

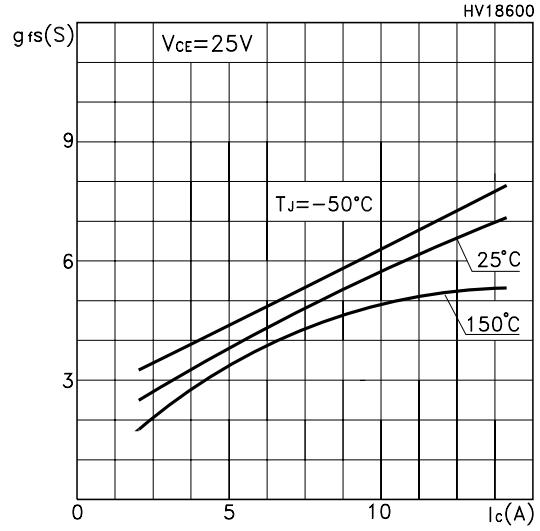
Output Characteristics



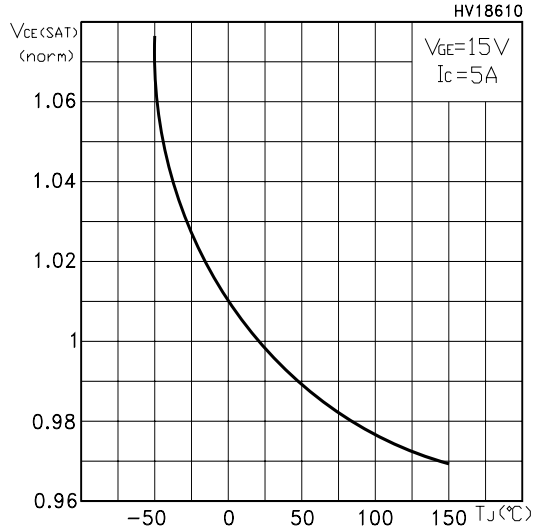
Transfer Characteristics



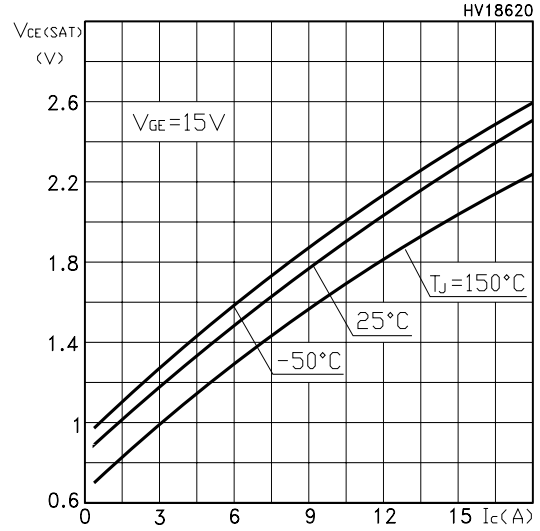
Transconductance



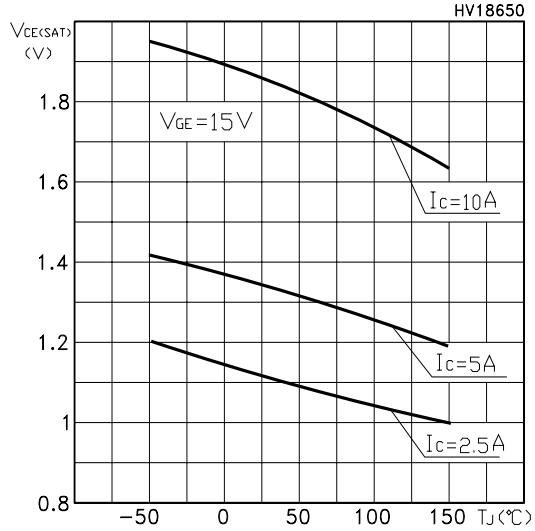
Normalized Collector-Emitter On Voltage vs Temp.



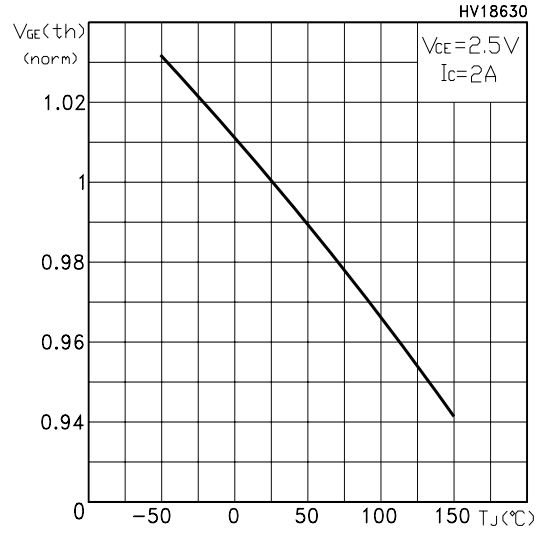
Collector-Emitter On Voltage vs Collector Current



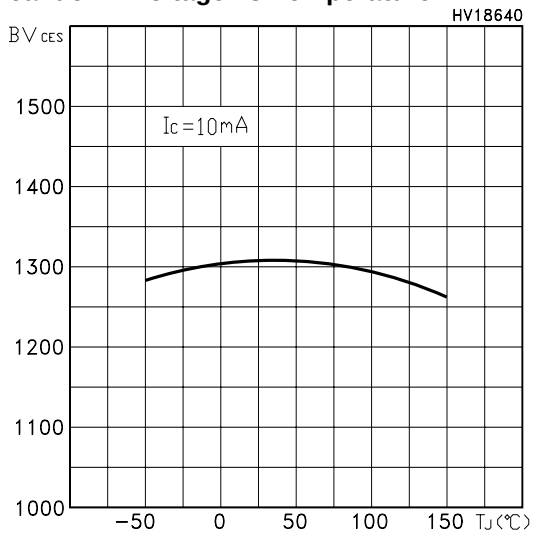
Collector-Emitter On Voltage vs Temperature



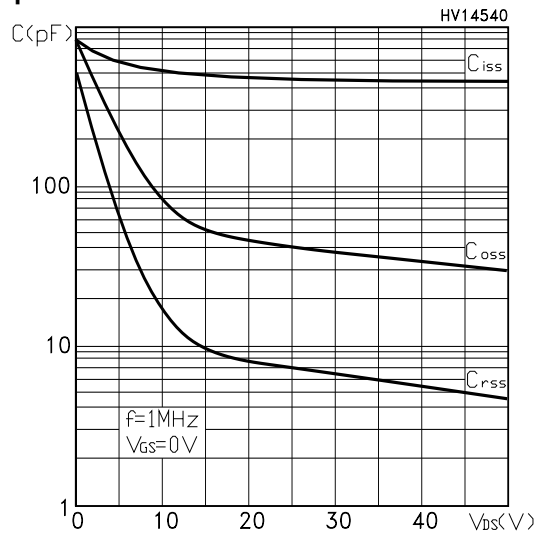
Gate Threshold vs Temperature



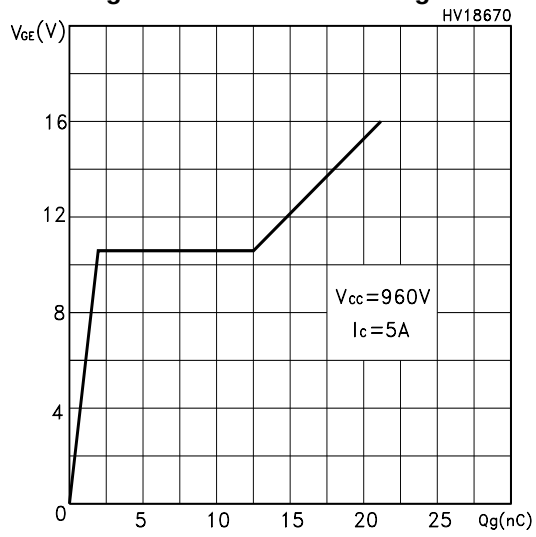
Breakdown Voltage vs Temperature



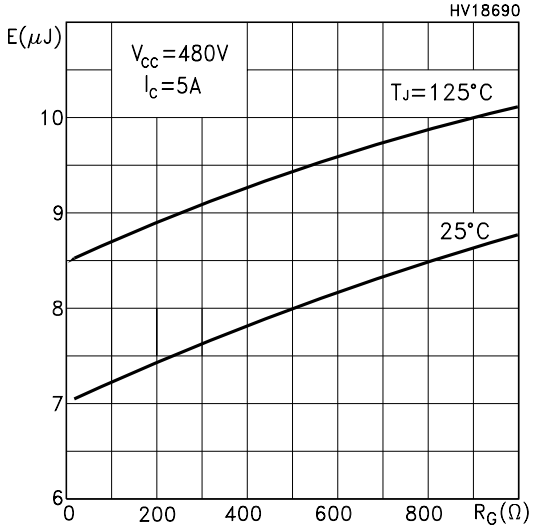
Capacitance Variations



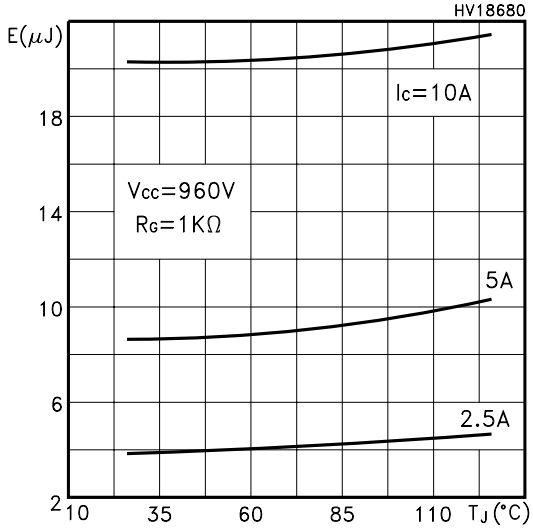
Gate Charge vs Gate-Emitter Voltage



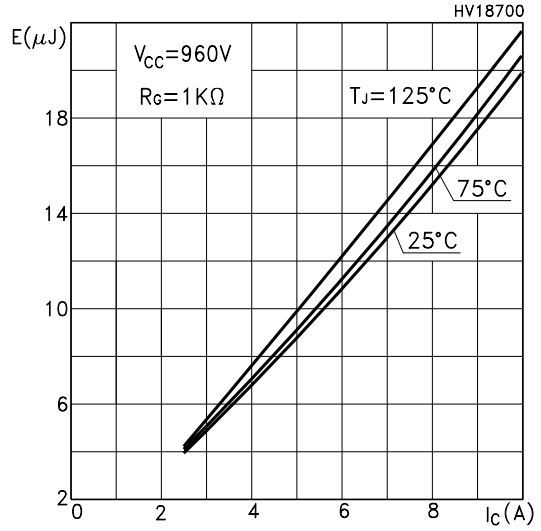
Total Switching Losses vs Gate Resistance



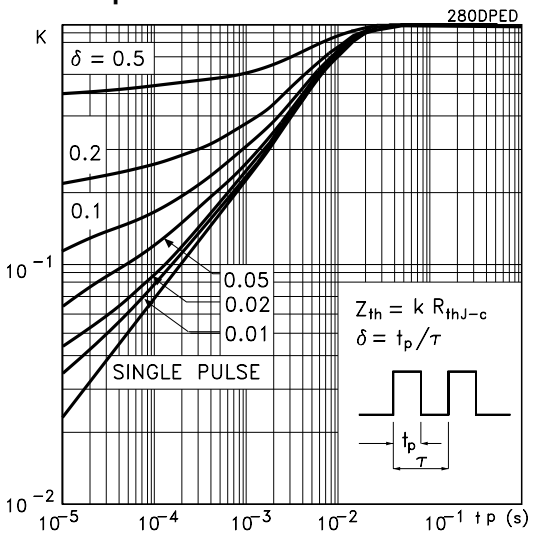
Total Switching Losses vs Temperature



Total Switching Losses vs Collector Current



Thermal Impedance



Turn-Off SOA

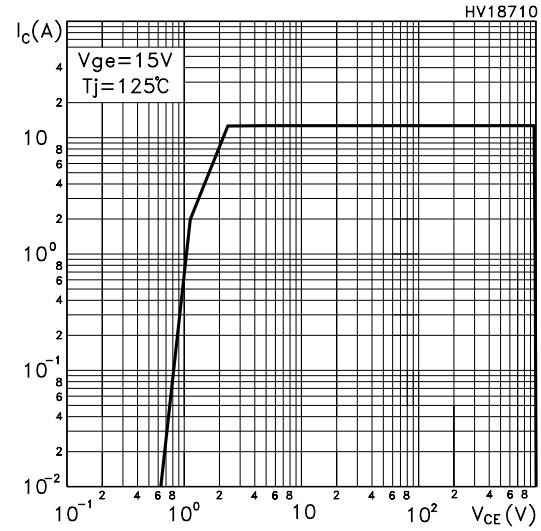


Fig. 1: Gate Charge test Circuit

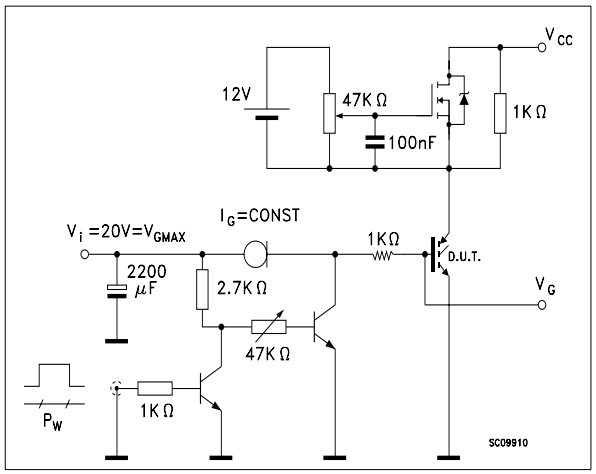
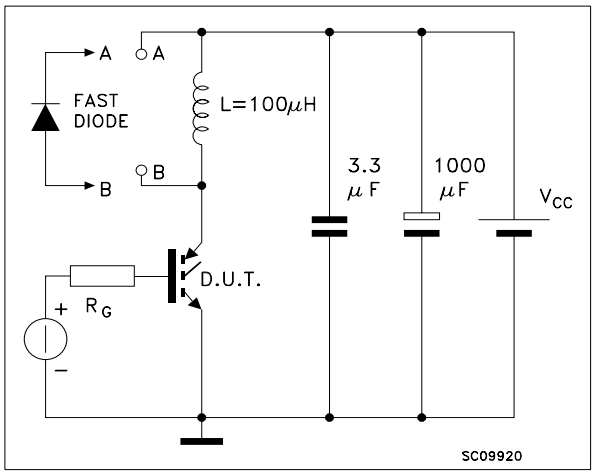
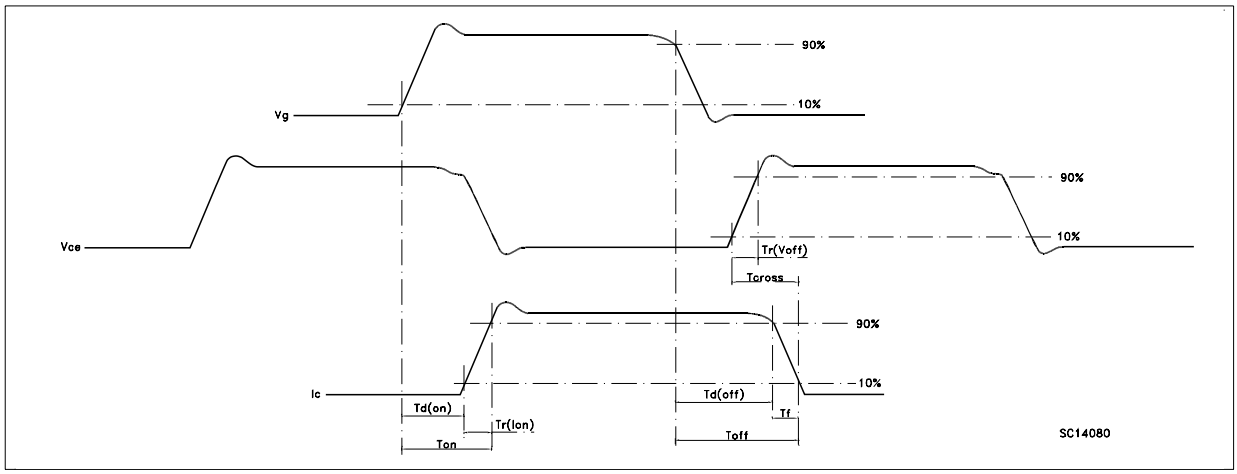


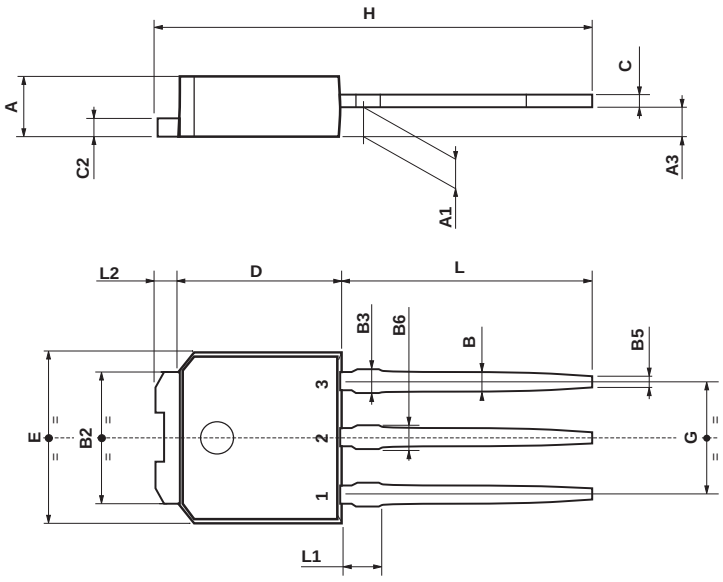
Fig. 2: Test Circuit For Inductive Load Switching





TO-251 (IPAK) MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	2.2		2.4	0.086		0.094
A1	0.9		1.1	0.035		0.043
A3	0.7		1.3	0.027		0.051
B	0.64		0.9	0.025		0.031
B2	5.2		5.4	0.204		0.212
B3			0.85			0.033
B5		0.3			0.012	
B6			0.95			0.037
C	0.45		0.6	0.017		0.023
C2	0.48		0.6	0.019		0.023
D	6		6.2	0.236		0.244
E	6.4		6.6	0.252		0.260
G	4.4		4.6	0.173		0.181
H	15.9		16.3	0.626		0.641
L	9		9.4	0.354		0.370
L1	0.8		1.2	0.031		0.047
L2		0.8	1		0.031	0.039



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