



STGP7NB120SD

N-CHANNEL 7A - 1200V - TO-220

PowerMESH™ IGBT

TYPE	V _{CES}	V _{CE(sat)}	I _C
STGP7NB120SD	1200 V	< 2.1 V	7 A

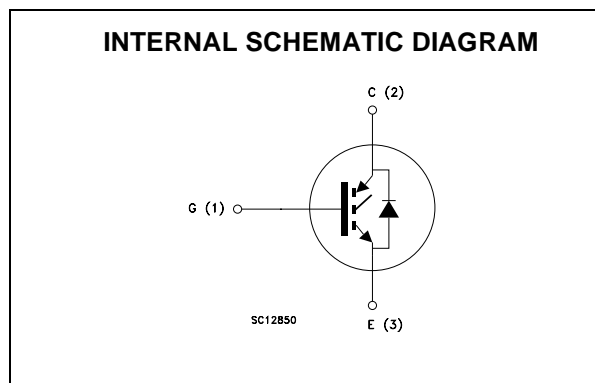
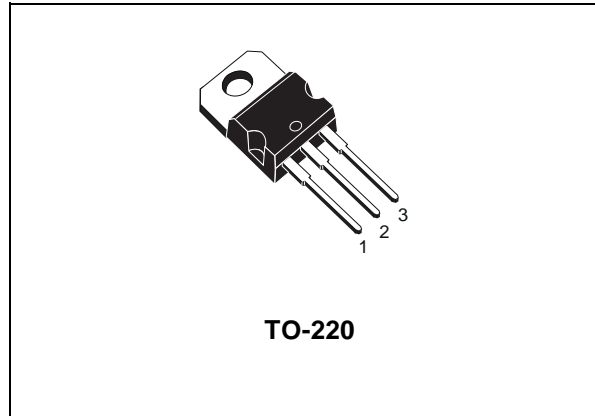
- HIGH INPUT IMPEDANCE (VOLTAGE DRIVEN)
- VERY LOW ON-VOLTAGE DROP (V_{cesat})
- OFF LOSSES INCLUDE TAIL CURRENT
- HIGH CURRENT CAPABILITY

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

APPLICATIONS

- MOTOR CONTROL
- LIGHT DIMMER
- INTRUSH CURRENT LIMITATION



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{CES}	Collector-Emitter Voltage (V _{GS} = 0)	1200	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	10	A
I _C	Collector Current (continuous) at T _C = 100°C	7	A
I _{CM} (●)	Collector Current (pulsed)	20	A
P _{TOT}	Total Dissipation at T _C = 25°C	90	W
	Derating Factor	0.7	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

STGP7NB120SD

THERMAL DATA

Rthj-case	Thermal Resistance Junction-case Max	1.38	°C/W
Rthj-amb	Thermal Resistance Junction-ambient Max	62.5	°C/W
Rthc-h	Thermal Resistance Case-heatsink Typ	0.5	°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 Breakdown Voltage	I _C = 250 μA, V _{GE} = 0	1200			V
V _{BR(ECR)}	Emitter-Collector Breakdown Voltage	I _C = 10mA, V _{GE} = 0	20			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			50 250	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	3		5	V
V _{CE(sat)}	Collector-Emitter Saturation Voltage	V _{GE} = 15V, I _C = 3.5 A V _{GE} = 15V, I _C = 7 A V _{GE} = 15V, I _C = 10 A		1.7	1.6 2.1	V V V

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g _{fs}	Forward Transconductance	V _{CE} = 25 V, I _C = 7 A	2.5	4.5		S
C _{ies} C _{oes} C _{res}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V _{CE} = 25V, f = 1 MHz, V _{GE} = 0		430 40 7		pF pF pF
Q _g	Gate Charge	V _{CE} = 960V, I _C = 7 A, V _{GE} = 15V		29		nC
I _{CL}	Latching Current	V _{clamp} = 960V, T _j = 150°C R _G = 1KΩ	10			A

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t _{d(on)} t _r	Turn-on Delay Time Rise Time	V _{CC} = 960 V, I _C = 7 A R _G = 1KΩ, V _{GE} = 15 V		570 270		ns ns
(di/dt) _{on} E _{on}	Turn-on Current Slope Turn-on Switching Losses	V _{CC} = 960 V, I _C = 7 A, R _G = 1KΩ V _{GE} = 15 V, T _j = 125°C		800 3.2		A/μs mJ

ELECTRICAL CHARACTERISTICS (CONTINUED)**SWITCHING OFF**

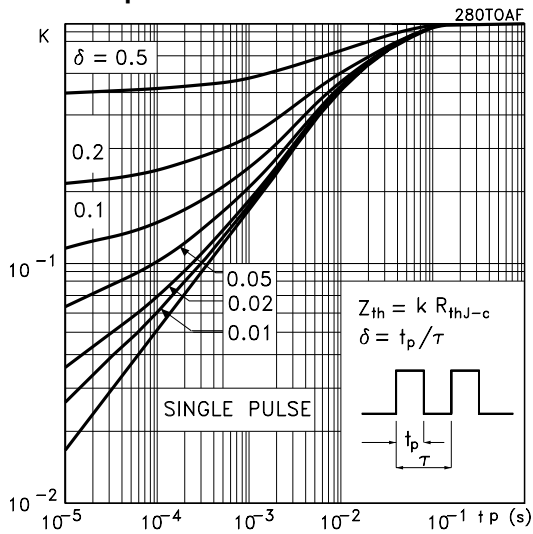
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_c	Cross-over Time	$V_{CC} = 960 \text{ V}$, $I_C = 7 \text{ A}$, $R_{GE} = 1 \text{ K}\Omega$, $V_{GE} = 15 \text{ V}$		4.9		μs
$t_r(V_{off})$	Off Voltage Rise Time			2.9		μs
t_f	Fall Time			3.3		μs
$E_{off(**)}$	Turn-off Switching Loss			15		mJ
t_c	Cross-over Time	$V_{CC} = 960 \text{ V}$, $I_C = 7 \text{ A}$, $R_{GE} = 1 \text{ K}\Omega$, $V_{GE} = 15 \text{ V}$ $T_j = 125 \text{ }^\circ\text{C}$		7.5		μs
$t_r(V_{off})$	Off Voltage Rise Time			5.5		μs
t_f	Fall Time			6.2		μs
$E_{off(**)}$	Turn-off Switching Loss			22		mJ

COLLECTOR-EMITTER DIODE

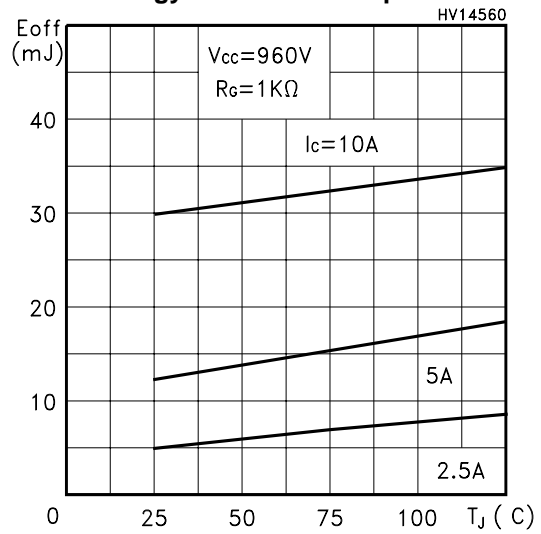
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_f	Forward Current				3.5	A
I_{fm}	Forward Current pulsed				28	A
V_f	Forward On-Voltage	$I_f = 3.5 \text{ A}$ $I_f = 3.5 \text{ A}$, $T_j = 125 \text{ }^\circ\text{C}$		1.7	2.0	V
					1.5	V
t_{rr}	Reverse Recovery Time	$I_f = 3.5 \text{ A}$, $V_R = 600 \text{ V}$, $T_j = 125 \text{ }^\circ\text{C}$, $di/dt = 100 \text{ A}/\mu\text{s}$		190		ns
Q_{rr}	Reverse Recovery Charge			850		nC
I_{rrm}	Reverse Recovery Current			9		A

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)

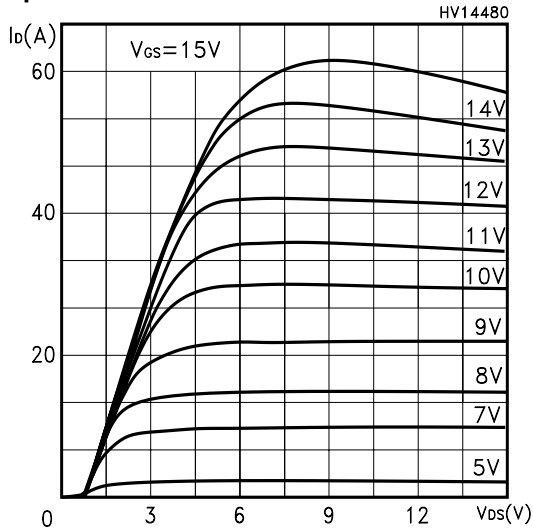
Thermal Impedance



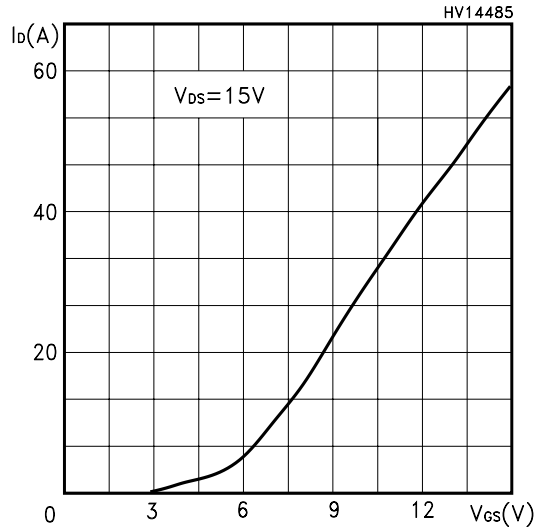
Turn-Off Energy Losses vs Temperature



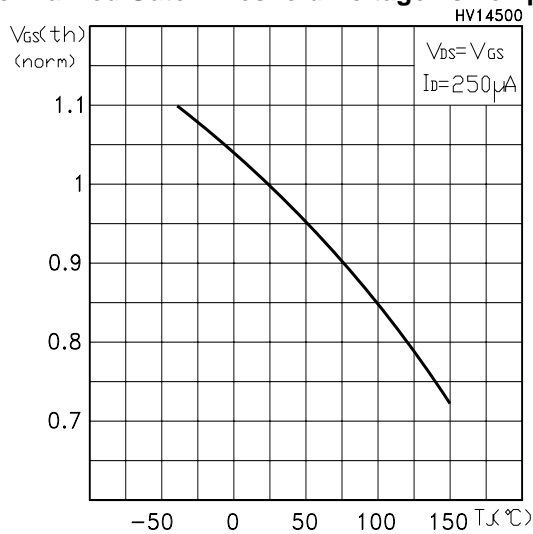
Output Characteristics



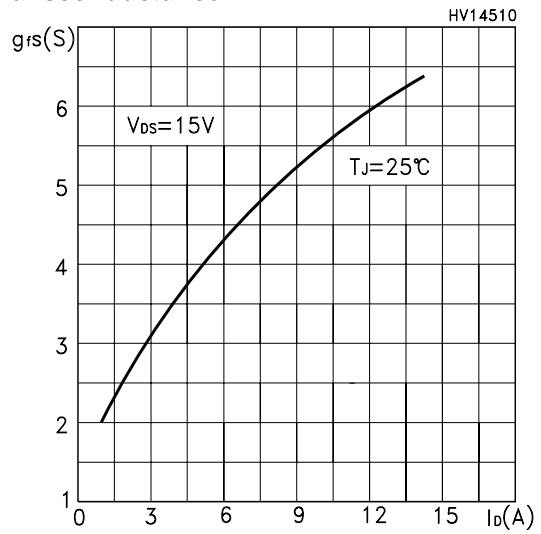
Transfer Characteristics



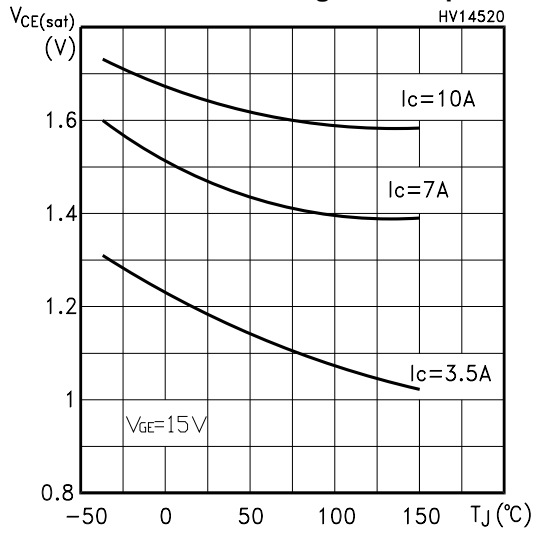
Normalized Gate Threshold Voltage vs Temp.



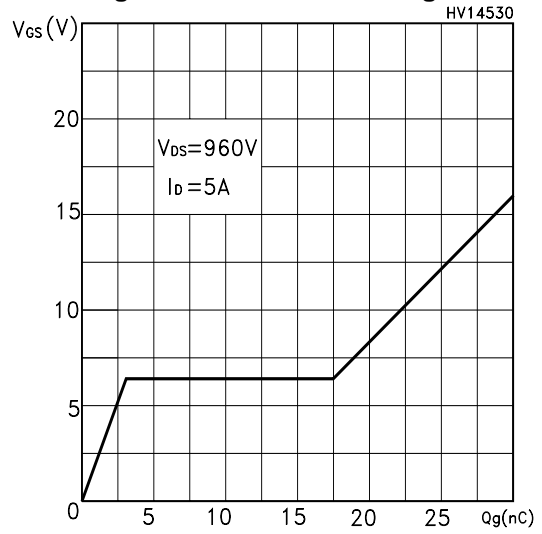
Transconductance



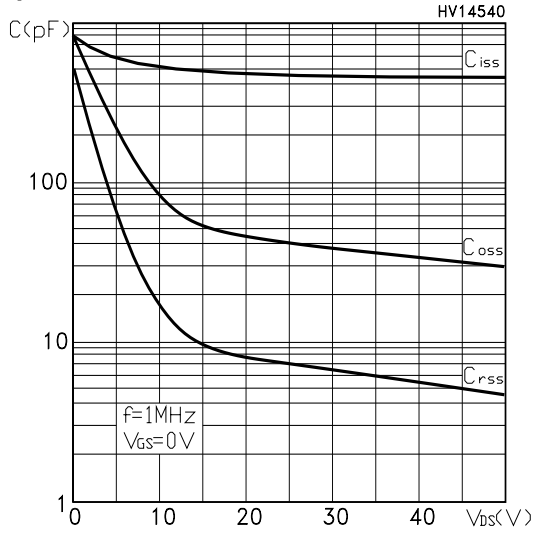
Collector-Emitter On Voltage vs Temperature



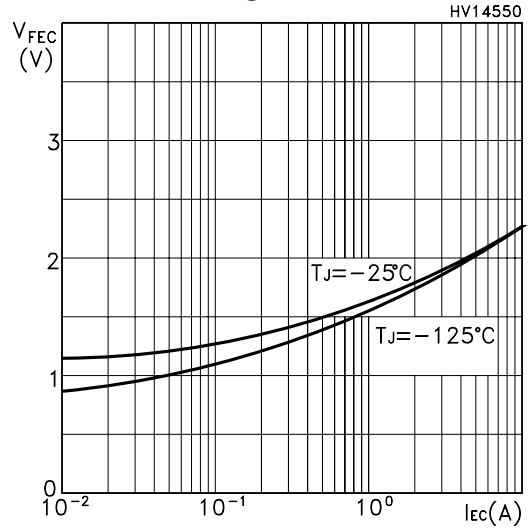
Gate-Charge vs Gate-Emmitter Voltage



Capacitance Variations



Diode Forward Voltage



Collector-Emitter On Voltage vs Collector Current

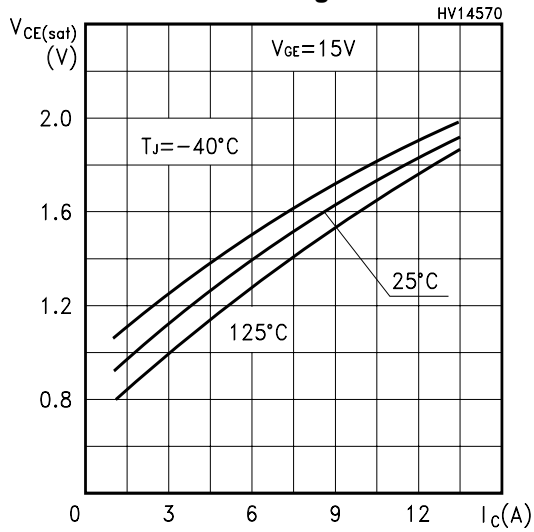


Fig. 1: Gate Charge test Circuit

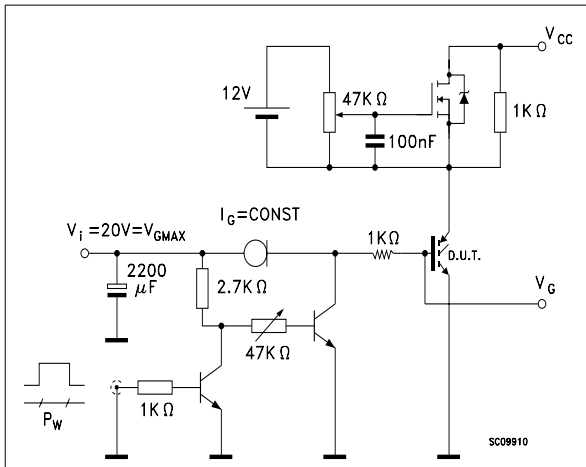
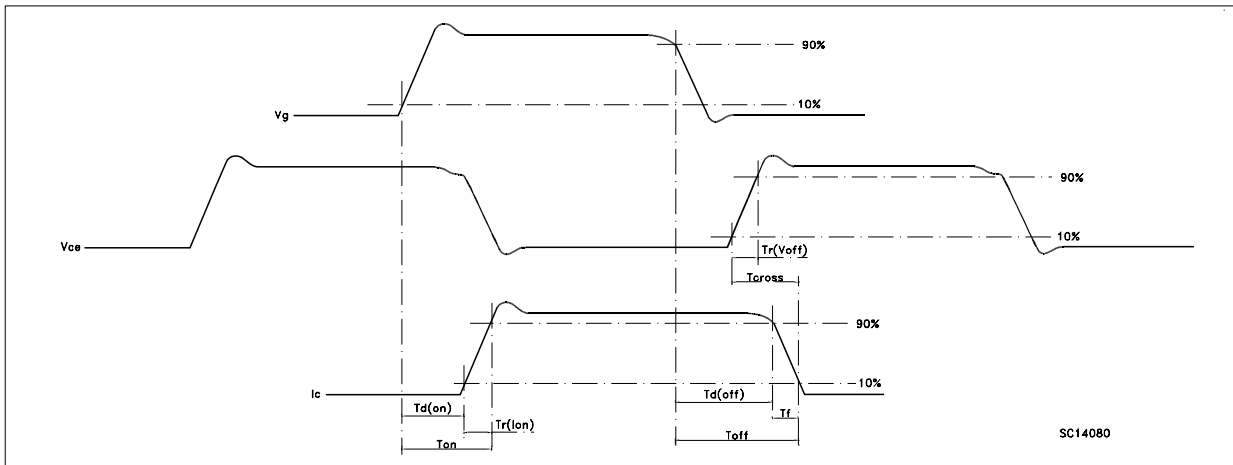
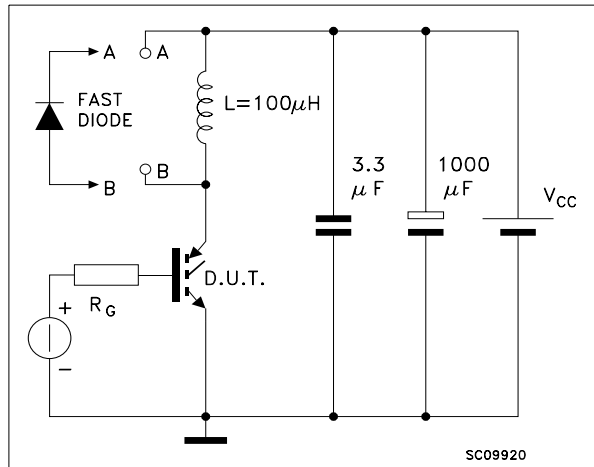
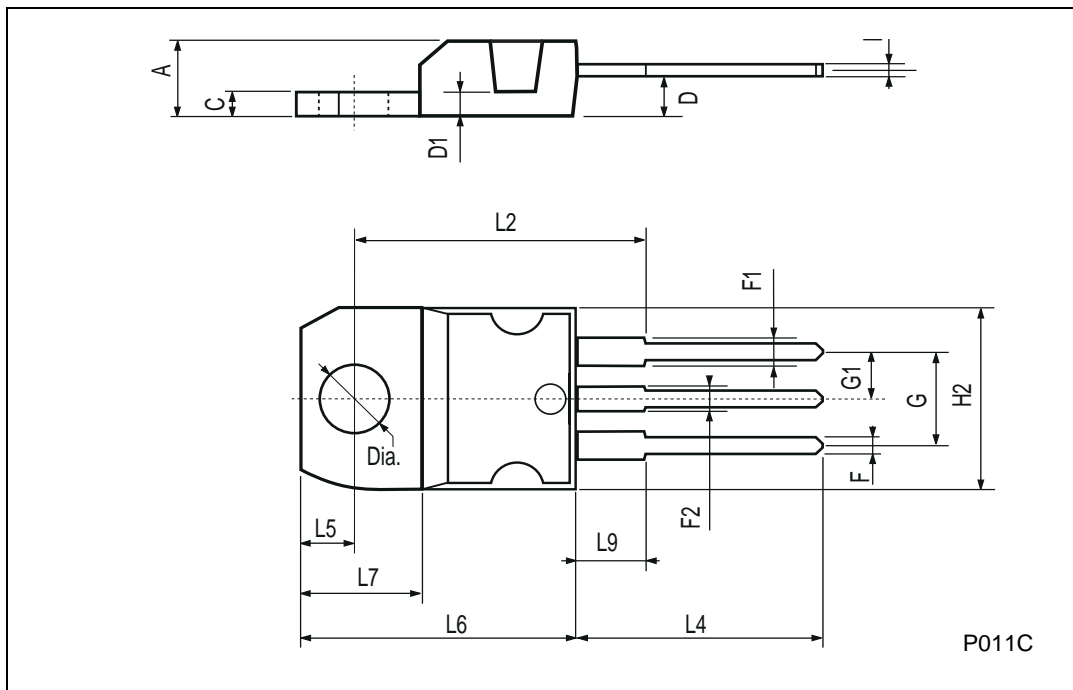


Fig. 2: Test Circuit For Inductive Load Switching (SC09920)



TO-220 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
C	1.23		1.32	0.048		0.051
D	2.40		2.72	0.094		0.107
D1		1.27			0.050	
E	0.49		0.70	0.019		0.027
F	0.61		0.88	0.024		0.034
F1	1.14		1.70	0.044		0.067
F2	1.14		1.70	0.044		0.067
G	4.95		5.15	0.194		0.203
G1	2.4		2.7	0.094		0.106
H2	10.0		10.40	0.393		0.409
L2		16.4			0.645	
L4	13.0		14.0	0.511		0.551
L5	2.65		2.95	0.104		0.116
L6	15.25		15.75	0.600		0.620
L7	6.2		6.6	0.244		0.260
L9	3.5		3.93	0.137		0.154
DIA.	3.75		3.85	0.147		0.151



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