



# STGB10N60L

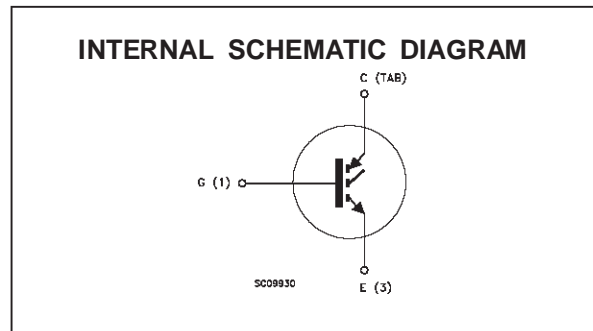
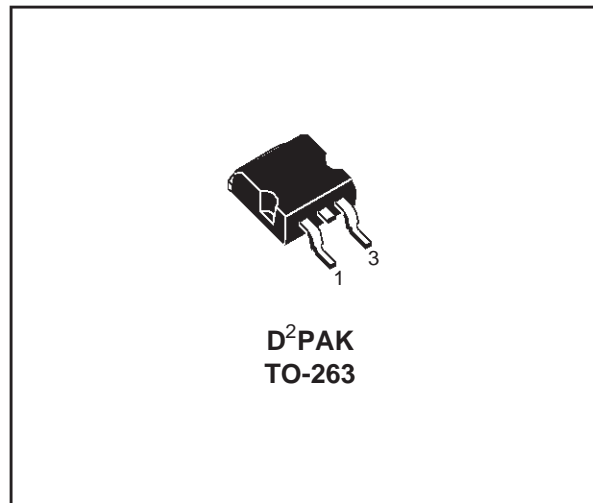
## N-CHANNEL 10A - 600V D<sup>2</sup>PAK LOGIC LEVEL IGBT

TYPE	V <sub>CES</sub>	V <sub>CE(sat)</sub>	I <sub>C</sub>
STGB10N60L	600 V	< 1.95 V	10 A

- HIGH INPUT IMPEDANCE (VOLTAGE DRIVEN)
- VERY LOW ON-VOLTAGE DROP (V<sub>cesat</sub>)
- LOW THRESHOLD VOLTAGE (LOGIC LEVEL INPUT)
- HIGH CURRENT CAPABILITY
- OFF LOSSES INCLUDE TAIL CURRENT
- SURFACE-MOUNTING D2PAK (TO-263) POWER PACKAGE IN TUBE (NO SUFFIX) OR IN TAPE & REEL (SUFFIX "T4")

### APPLICATIONS

- ELECTRONIC IGNITION
- LIGHT DIMMER
- STATIC RELAYS



### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V <sub>CES</sub>	Collector-Emitter Voltage (V <sub>GS</sub> = 0)	600	V
V <sub>ECR</sub>	Reverse Battery Protection	25	V
V <sub>GE</sub>	Gate-Emitter Voltage	± 15	V
I <sub>C</sub>	Collector Current (continuous) at T <sub>c</sub> = 25 °C	25	A
I <sub>C</sub>	Collector Current (continuous) at T <sub>c</sub> = 100 °C	20	A
I <sub>CM</sub> (•)	Collector Current (pulsed)	100	A
P <sub>tot</sub>	Total Dissipation at T <sub>c</sub> = 25 °C	125	W
	Derating Factor	0.83	W/°C
T <sub>stg</sub>	Storage Temperature	-65 to 175	°C
T <sub>j</sub>	Max. Operating Junction Temperature	175	°C

(•) Pulse width limited by safe operating area

## STGB10N60L

### THERMAL DATA

R <sub>thj-case</sub>	Thermal Resistance Junction-case	Max	1.2	°C/W
R <sub>thj-amb</sub>	Thermal Resistance Junction-ambient	Max	62.5	°C/W
R <sub>thc-sink</sub>	Thermal Resistance Case-sink	Typ	0.1	°C/W

### ELECTRICAL CHARACTERISTICS (T<sub>j</sub> = - 40 to 150 °C unless otherwise specified)

#### OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V <sub>BR(ces)</sub>	Collector-Emitter Breakdown Voltage	I <sub>C</sub> = 250 μA V <sub>GE</sub> = 0	600			V
I <sub>CES</sub>	Collector cut-off (V <sub>GE</sub> = 0)	V <sub>CE</sub> = Max Rating T <sub>j</sub> = 25 °C V <sub>CE</sub> = Max Rating T <sub>j</sub> = 125 °C			25 100	μA μA
I <sub>GES</sub>	Gate-Emitter Leakage Current (V <sub>CE</sub> = 0)	V <sub>GE</sub> = ± 15 V V <sub>CE</sub> = 0			± 100	nA

#### ON (\*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V <sub>GE(th)</sub>	Gate Threshold Voltage	V <sub>CE</sub> = V <sub>GE</sub> I <sub>C</sub> = 250 μA V <sub>CE</sub> = V <sub>GE</sub> I <sub>C</sub> = 250 μA T <sub>j</sub> = 25 °C	0.6 1.0		2.4 2.0	V V
V <sub>CE(SAT)</sub>	Collector-Emitter Saturation Voltage	V <sub>GE</sub> = 4.5 V I <sub>C</sub> = 8 A T <sub>j</sub> = - 40 °C V <sub>GE</sub> = 4.5 V I <sub>C</sub> = 9.5 A T <sub>j</sub> = 25 °C V <sub>GE</sub> = 4.5 V I <sub>C</sub> = 8 A T <sub>j</sub> = 150 °C		1.5 1.4 1.25	2.0	V V V
I <sub>C</sub>	Collector Current	V <sub>GE</sub> = 4.5 V V <sub>CE</sub> = 7 V	15	45		A

#### DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g <sub>fs</sub>	Forward Transconductance	V <sub>CE</sub> = 25 V I <sub>C</sub> = 8 A T <sub>j</sub> = 25 °C	7	12		S
C <sub>ies</sub> C <sub>oes</sub> C <sub>res</sub>	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V <sub>CE</sub> = 25 V f = 1 MHz V <sub>GE</sub> = 0		1800 120 19	2600 165 26	pF pF pF
Q <sub>G</sub>	Gate Charge	V <sub>CE</sub> = 400 V I <sub>C</sub> = 8 A V <sub>GE</sub> = 5 V		30		nC

#### FUNCTIONAL CHARACTERISTICS

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I <sub>CL</sub>	Latching Current	V <sub>clamp</sub> = 480 V dV/dt = 200 V/μs T <sub>j</sub> = 125 °C	20			A
E <sub>CF</sub>	Forward Clamping Energy	T <sub>start</sub> = 55 °C V <sub>clamp</sub> = 480 V I <sub>C</sub> = 10 A L = 4.2 mH - Single Pulse	210			mJ
E <sub>AR</sub>	Reverse Avalanche Energy		10			mJ

**ELECTRICAL CHARACTERISTICS** (continued)

**SWITCHING ON**

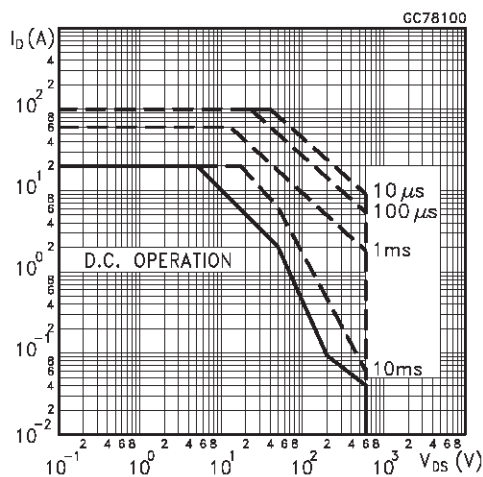
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ $t_r$	Delay Time Rise Time	$V_{CC} = 480\text{ V}$ $V_{GE} = 5\text{ V}$		0.7 1.9		$\mu\text{s}$ $\mu\text{s}$
$(di/dt)_{on}$	Turn-on Current Slope	$V_{CC} = 480\text{ V}$ $R_G = 1\text{ K}\Omega$		5		A/ $\mu\text{s}$
$E_{on}$	Turn-on Switching Losses	$I_C = 8\text{ A}$ $V_{GE} = 5\text{ V}$ $T_j = 125\text{ }^\circ\text{C}$		2.5		mJ

**SWITCHING OFF**

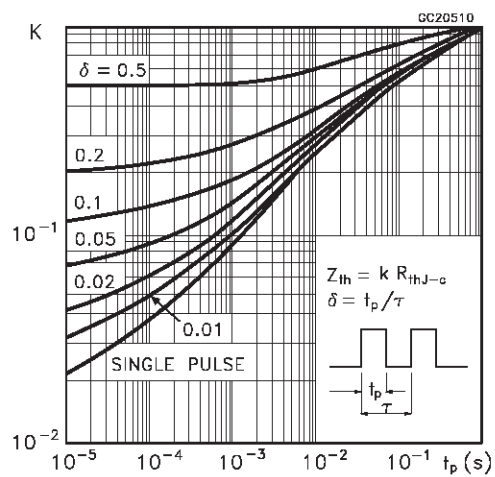
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_c$ $t_r(v_{off})$ $t_f$ $E_{off(**)}$	Cross-Over Time Off Voltage Rise Time Fall Time Turn-off Switching Loss	$V_{CC} = 480\text{ V}$ $R_{GE} = 1\text{ K}\Omega$ $T_j = 25\text{ }^\circ\text{C}$		4 2.5 1.5 9.0		$\mu\text{s}$ $\mu\text{s}$ $\mu\text{s}$ mJ
$t_c$ $t_r(v_{off})$ $t_f$ $E_{off(**)}$	Cross-Over Time Off Voltage Rise Time Fall Time Turn-off Switching Loss	$V_{CC} = 480\text{ V}$ $R_{GE} = 1\text{ K}\Omega$ $T_j = 125\text{ }^\circ\text{C}$		6 3.3 2.5 10.8		$\mu\text{s}$ $\mu\text{s}$ $\mu\text{s}$ mJ

(●) Pulse width limited by safe operating area  
 (\*) Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5 %  
 (\*\*) Losses Include Also The Tail (Jedec Standardization)

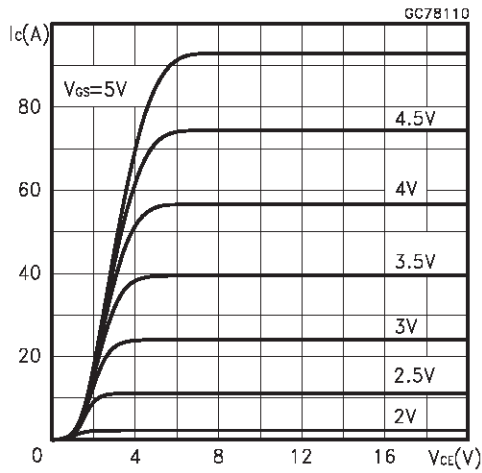
**Safe Operating Area**



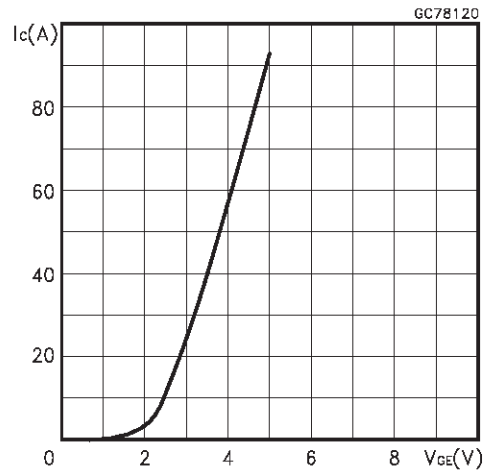
**Thermal Impedance**



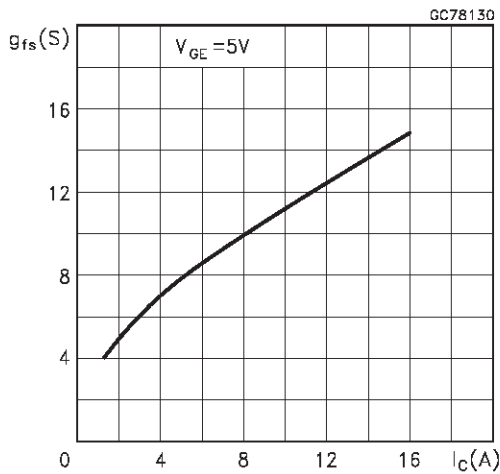
Output Characteristics



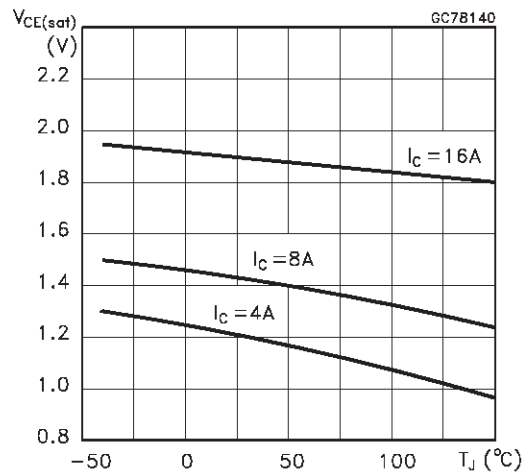
Transfer Characteristics



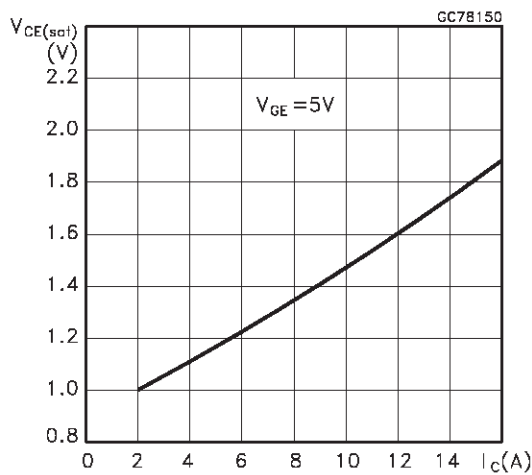
Transconductance



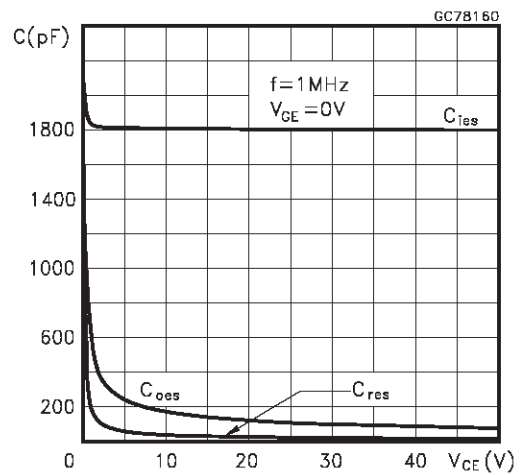
Collector-Emitter On Voltage vs Temperature



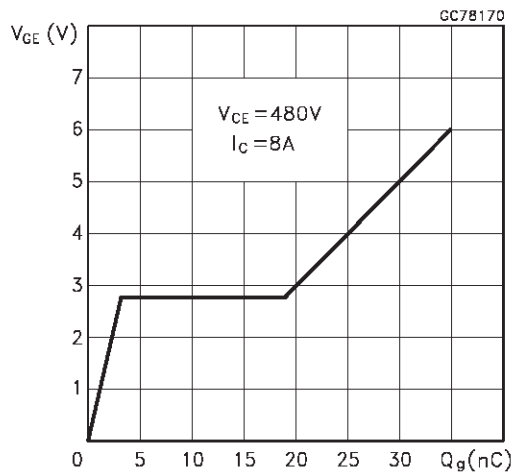
Collector-Emitter On Voltage vs Collector Current



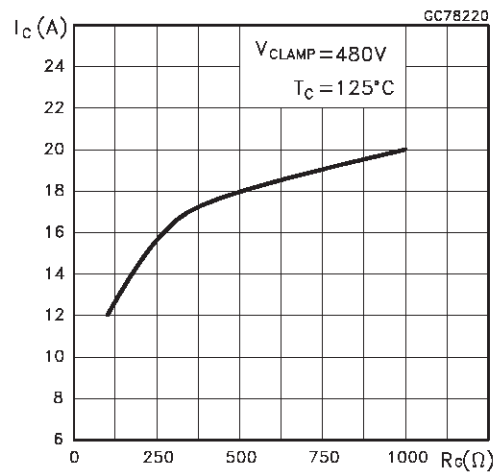
Capacitance Variations



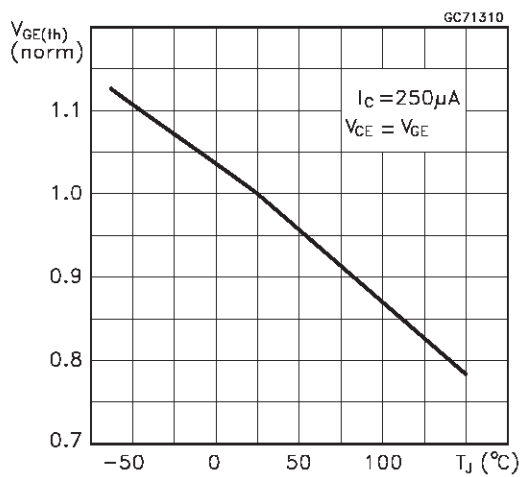
Gate Charge vs Gate-Emitter Voltage



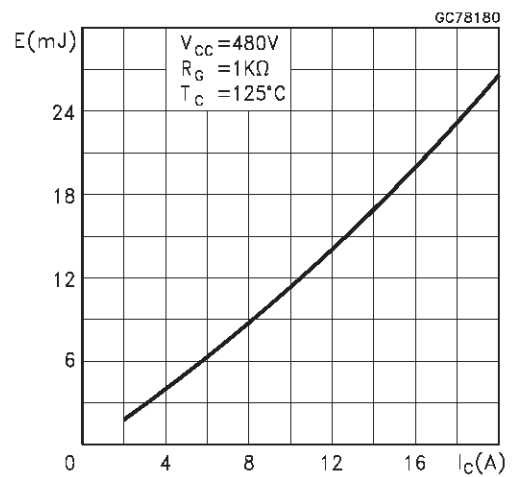
Latching Current vs Rg



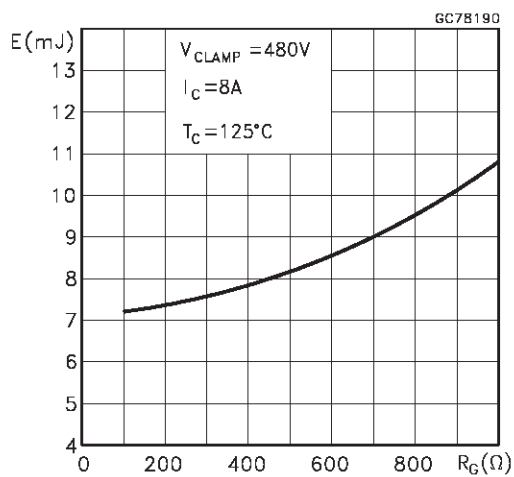
Gate Threshold vs Temperature



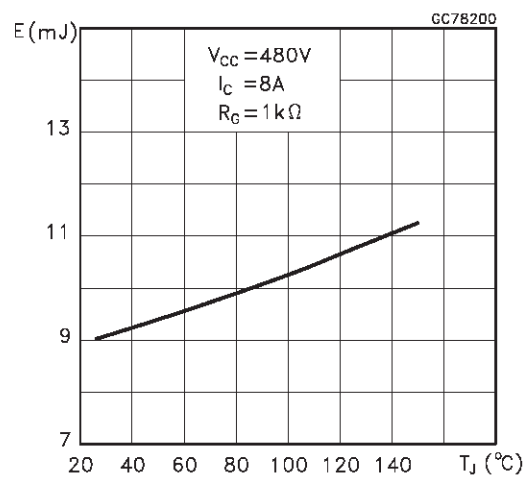
Off Losses vs Collector Current



Off Losses vs Gate Resistance



Off Losses vs Temperature



Switching Off Safe Operatin Area

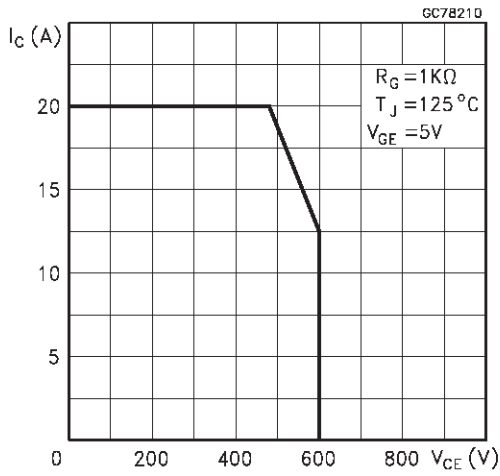


Fig. 1: Gate Charge test Circuit

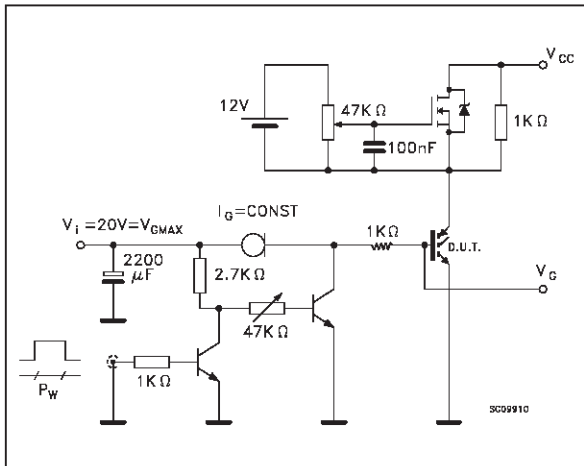


Fig. 2: Switching Times Test Circuit For Resistive Load

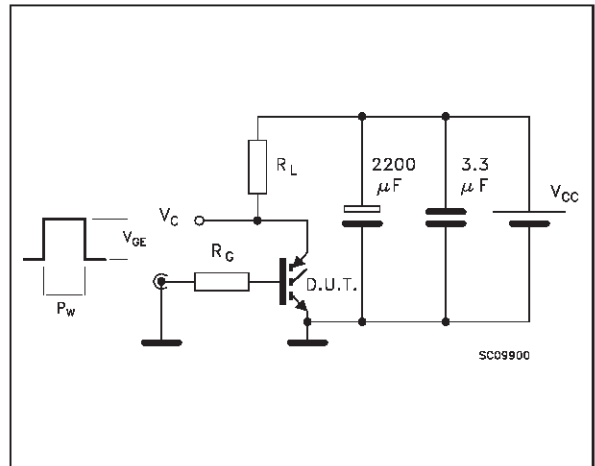
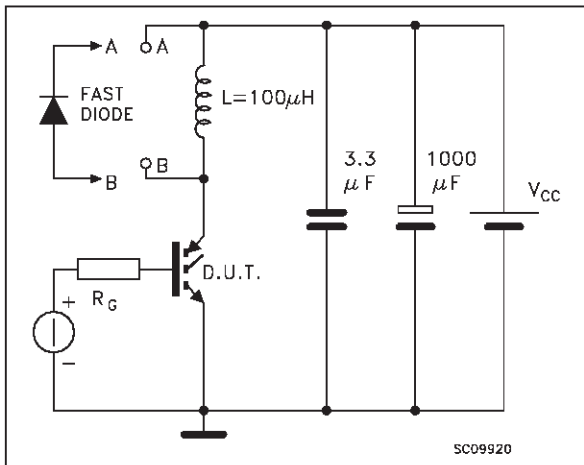
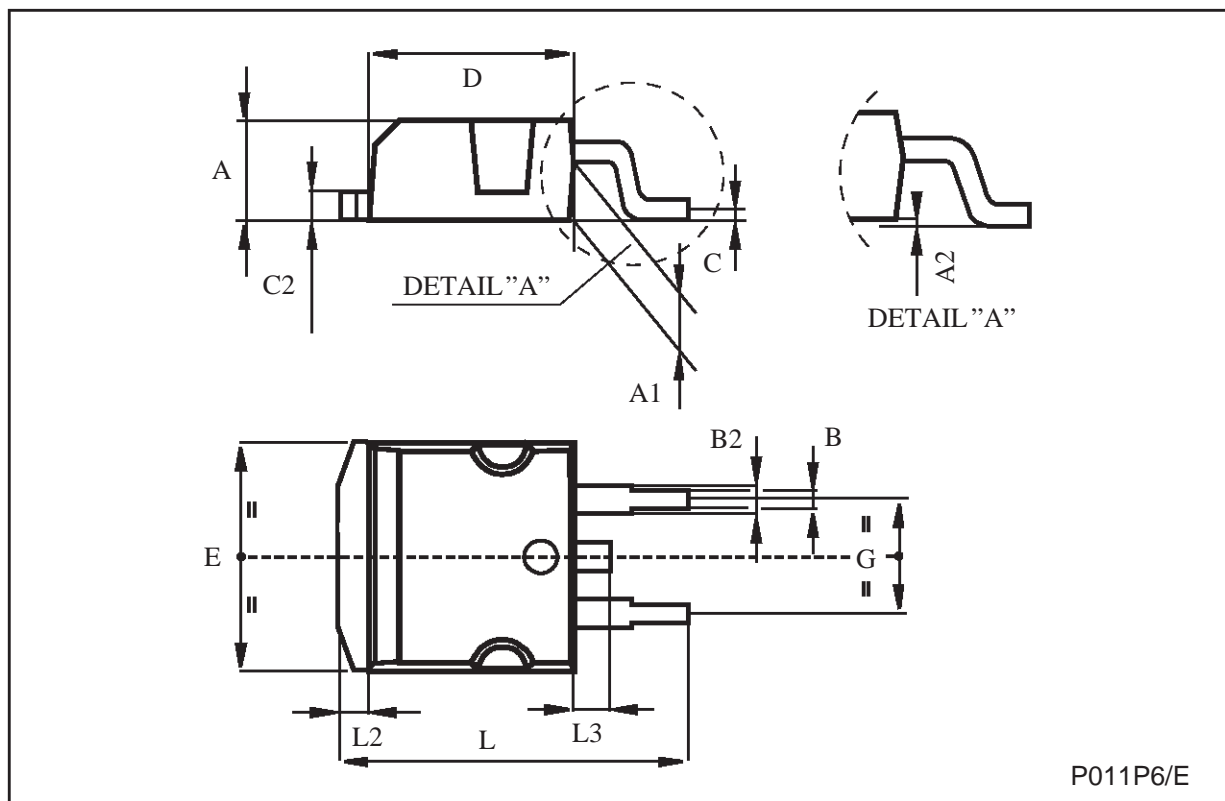


Fig. 3: Test Circuit For Inductive Load Switching



TO-263 (D<sup>2</sup>PAK) MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.4		4.6	0.173		0.181
A1	2.49		2.69	0.098		0.106
B	0.7		0.93	0.027		0.036
B2	1.14		1.7	0.044		0.067
C	0.45		0.6	0.017		0.023
C2	1.21		1.36	0.047		0.053
D	8.95		9.35	0.352		0.368
E	10		10.4	0.393		0.409
G	4.88		5.28	0.192		0.208
L	15		15.85	0.590		0.624
L2	1.27		1.4	0.050		0.055
L3	1.4		1.75	0.055		0.068



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