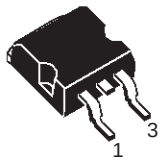
STGB10N60L

N-CHANNEL 10A - 600V D^2PAK LOGIC LEVEL IGBT

TYPE	V_{CES}	$V_{CE(sat)}$	I_C
STGB10N60L	600 V	< 1.95 V	10 A

- HIGH INPUT IMPEDANCE (VOLTAGE DRIVEN)
- VERY LOW ON-VOLTAGE DROP (V_{cesat})
- 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")

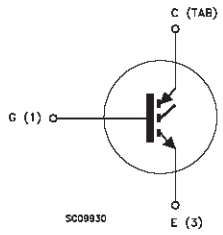


D^2PAK
TO-263

APPLICATIONS

- ELECTRONIC IGNITION
- LIGHT DIMMER
- STATIC RELAYS

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CES}	Collector-Emitter Voltage (V_{GS} = 0)	600	V
V_{ECR}	Reverse Battery Protection	25	V
V_{GE}	Gate-Emitter Voltage	± 15	V
I_C	Collector Current (continuous) at T_c = 25 °C	25	A
I_C	Collector Current (continuous) at T_c = 100 °C	20	A
I_{CM}(•)	Collector Current (pulsed)	100	A
P_{tot}	Total Dissipation at T_c = 25 °C	125	W
	Derating Factor	0.83	W/°C
T_{stg}	Storage Temperature	-65 to 175	°C
T_j	Max. Operating Junction Temperature	175	°C

(•) Pulse width limited by safe operating area

THERMAL DATA

$R_{thj\text{-}case}$	Thermal Resistance Junction-case	Max	1.2	°C/W
$R_{thj\text{-}amb}$	Thermal Resistance Junction-ambient	Max	62.5	°C/W
$R_{thc\text{-}sink}$	Thermal Resistance Case-sink	Typ	0.1	°C/W

ELECTRICAL CHARACTERISTICS (T_j = - 40 to 150 °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	600			V
I_{CES}	Collector cut-off (V_{GE} = 0)	V_{CE} = Max Rating T_j = 25 °C V_{CE} = Max Rating T_j = 125 °C			25 100	µA µA
I_{GES}	Gate-Emitter Leakage Current (V_{CE} = 0)	V_{GE} = ± 15 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 V_{CE} = V_{GE} I_C = 250 µA T_j = 25 °C	0.6 1.0		2.4 2.0	V V
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage	V_{GE} = 4.5 V I_C = 8 A T_j = - 40 °C V_{GE} = 4.5 V I_C = 9.5 A T_j = 25 °C V_{GE} = 4.5 V I_C = 8 A T_j = 150 °C		1.5 1.4 1.25	 2.0 	V V V
I_C	Collector Current	V_{GE} = 4.5 V V_{CE} = 7 V	15	45		A

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs}	Forward Transconductance	V_{CE} =25 V I_C = 8 A T_j = 25 °C	7	12		S
C_{ies} C_{oes} C_{res}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V_{CE} = 25 V f = 1 MHz V_{GE} = 0		1800 120 19	2600 165 26	pF pF pF
Q_G	Gate Charge	V_{CE} = 400 V I_C = 8 A V_{GE} = 5 V		30		nC

FUNCTIONAL CHARACTERISTICS

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CL}	Latching Current	V_{clamp} = 480 V dV/dt = 200 V/µs T_j = 125 °C	20			A
E_{CF}	Forward Clamping Energy	T_{start} = 55 °C V_{clamp} = 480 V I_C = 10 A L = 4.2 mH - Single Pulse	210			mJ
E_{AR}	Reverse Avalanche Energy		10			mJ

ELECTRICAL CHARACTERISTICS (continued)

SWITCHING ON

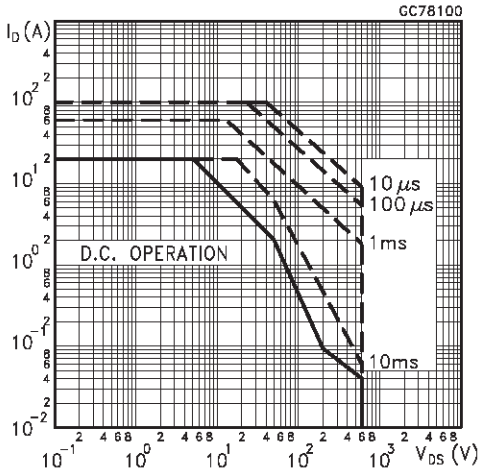
Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
$t_{d(on)}$	Delay Time	V_{CC} = 480 V	I_C = 8 A		0.7		µs
t_r	Rise Time	V_{GE}= 5 V	R_G = 1 KΩ		1.9		µs
$(di/dt)_{on}$	Turn-on Current Slope	V_{CC} = 480 V R_G = 1 KΩ	I_C = 8 A V_{GE} = 5 V		5		A/µs
E_{on}	Turn-on Switching Losses	T_j = 125 °C			2.5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

SWITCHING OFF

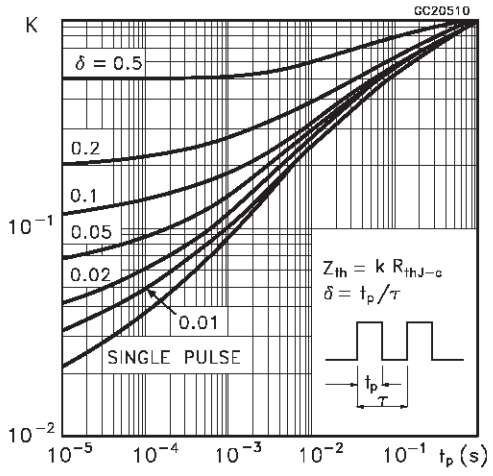
Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
t_c	Cross-Over Time	V_{CC} = 480 V	I_C = 8 A		4		µs
$t_r(v_{off})$	Off Voltage Rise Time	R_{GE} = 1 KΩ	V_{GE} = 5 V		2.5		µs
t_f	Fall Time	T_j = 25 °C			1.5		µs
E_{off}(**)	Turn-off Switching Loss				9.0		mJ
t_c	Cross-Over Time	V_{CC} = 480 V	I_C = 8 A		6		µs
$t_r(v_{off})$	Off Voltage Rise Time	R_{GE} = 1 KΩ	V_{GE} = 5 V		3.3		µs
t_f	Fall Time	T_j = 125 °C			2.5		µs
E_{off}(**)	Turn-off Switching Loss				10.8		mJ

(•) Pulse width limited by safe operating area
(∗) Pulsed: Pulse duration = 300 µs, duty cycle 1.5 %
(**)Losses Include Also The Tail (Jedec Standardization)

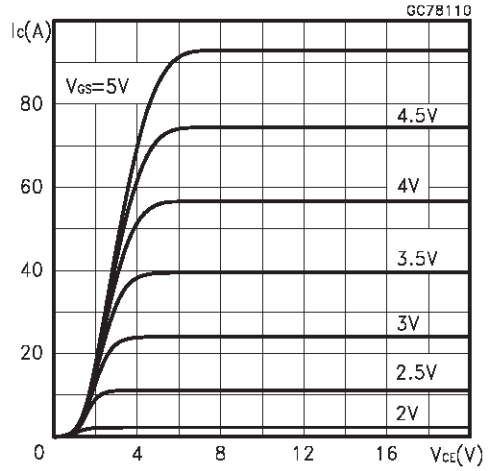
Safe Operating Area



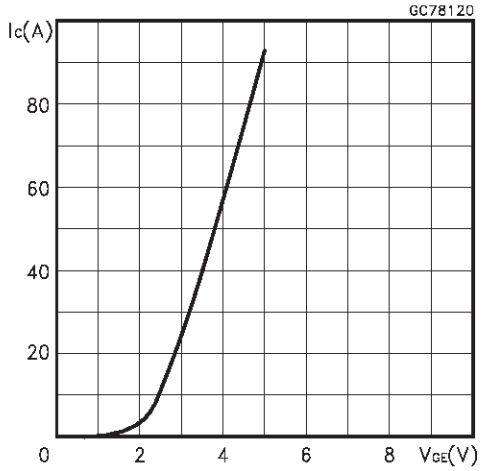
Thermal Impedance



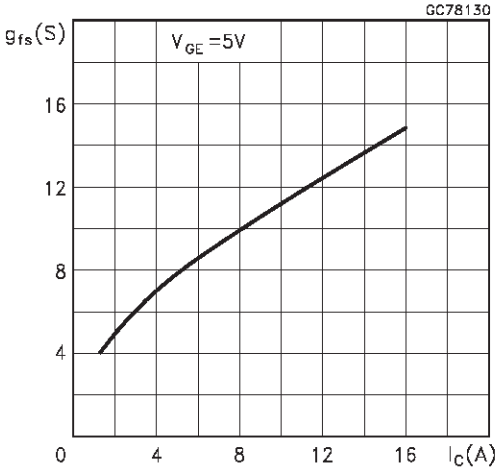
Output Characteristics



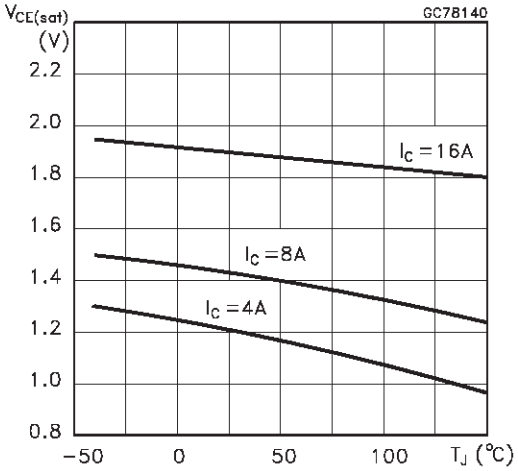
Transfer Characteristics



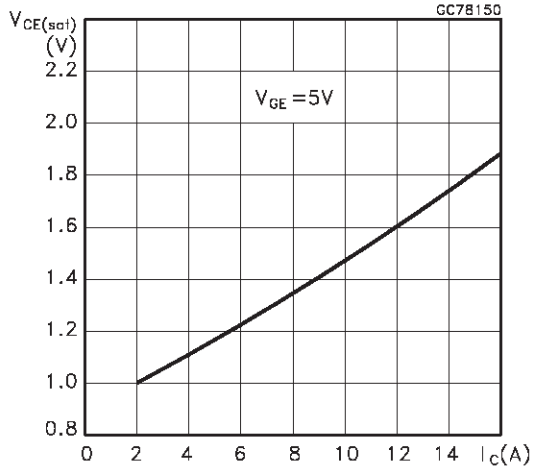
Transconductance



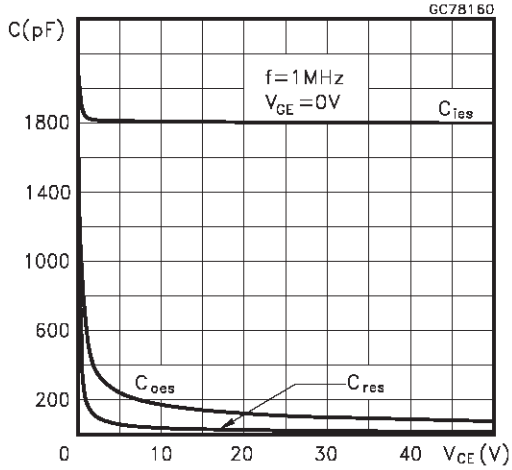
Collector-Emitter On Voltage vs Temperature



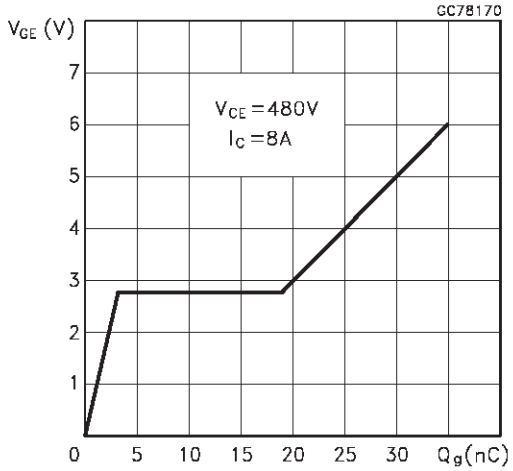
Collector-Emitter On Voltage vs Collector Current



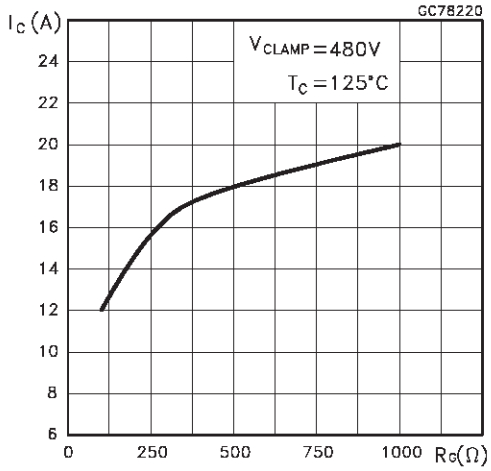
Capacitance Variations



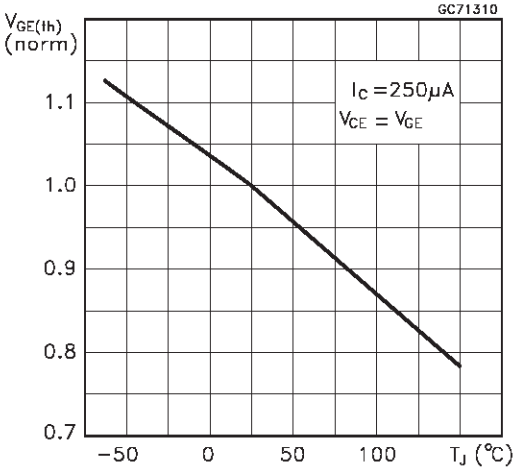
Gate Charge vs Gate-Emitter Voltage



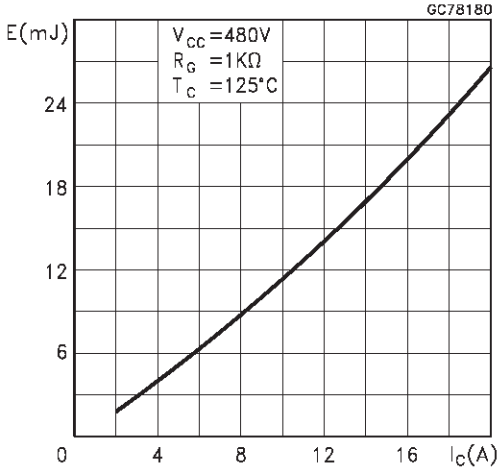
Latching Current vs Rg



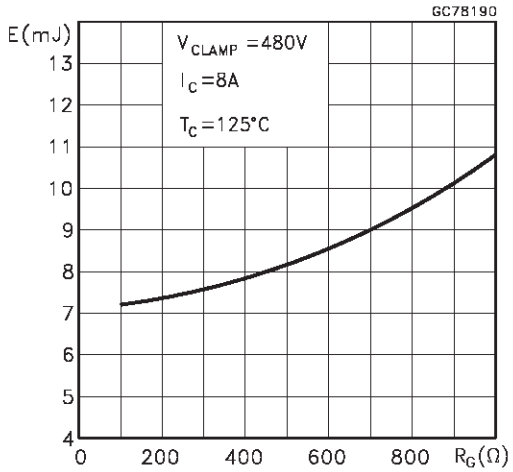
Gate Threshold vs Temperature



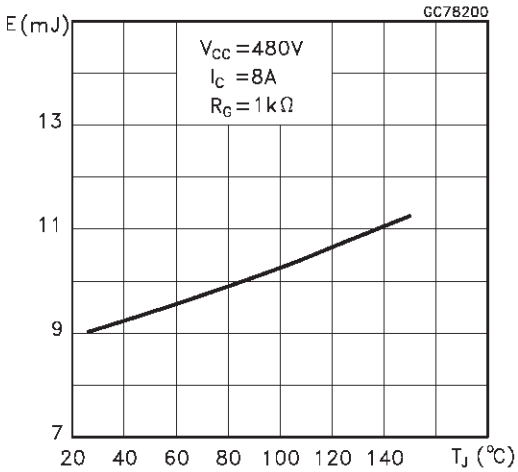
Off Losses vs Collector Current



Off Losses vs Gate Resistance



Off Losses vs Temperature



Switching Off Safe Operatin Area

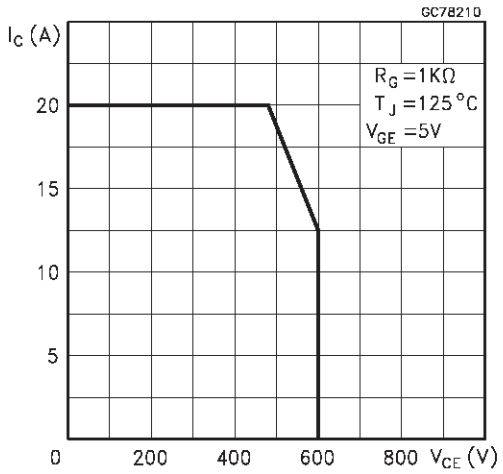


Fig. 1: Gate Charge test Circuit

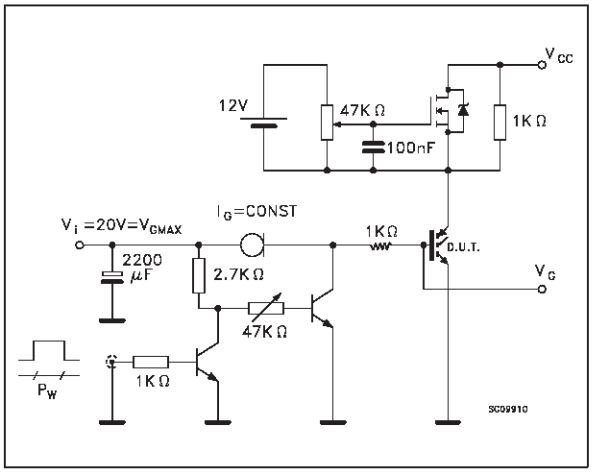


Fig. 2: Switching Times Test Circuit For Resistive Load

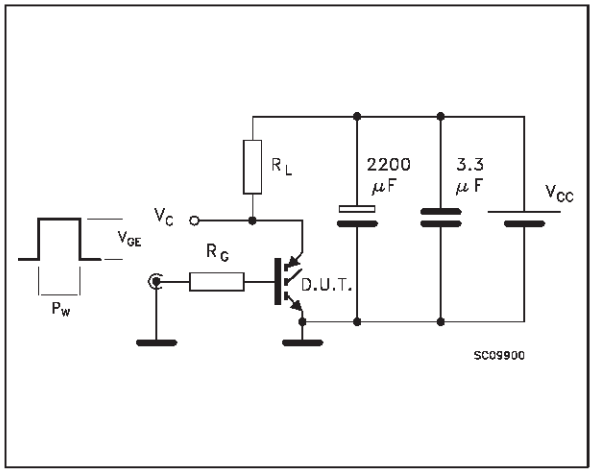
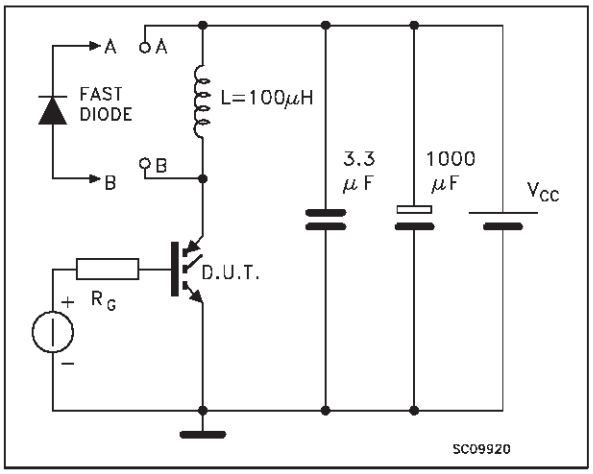
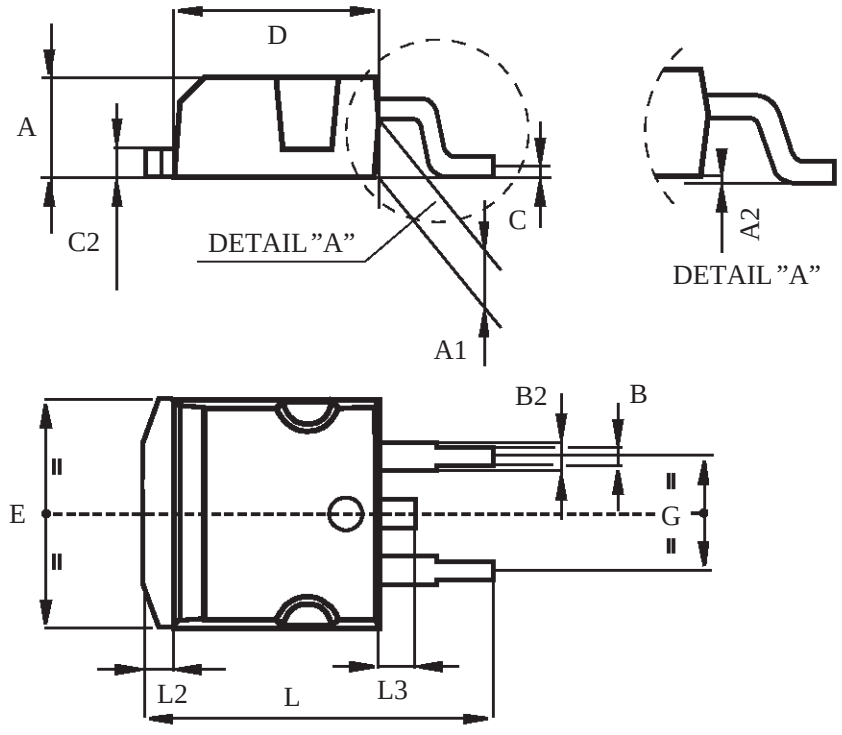


Fig. 3: Test Circuit For Inductive Load Switching



TO-263 (D^2PAK) 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



P011P6/E