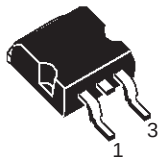
STGB10NB37LZ

N-CHANNEL CLAMPED 10A - D²PAK
INTERNALLY CLAMPED PowerMESH™ IGBT

TYPE	V_{CES}	$V_{CE(sat)}$	I_C
STGB10NB37LZ	CLAMPED	< 1.8 V	10 A

- POLYSILICON GATE VOLTAGE DRIVEN
- LOW THRESHOLD VOLTAGE
- LOW ON-VOLTAGE DROP
- HIGH CURRENT CAPABILITY
- HIGH VOLTAGE CLAMPING FEATURE
- SURFACE-MOUNTING D²PAK (TO-263) POWER PACKAGE IN TUBE (NO SUFFIX) OR IN TAPE & REEL (SUFFIX "T4")



D²PAK
TO-263

DESCRIPTION

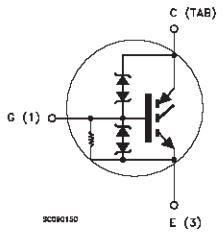
Using the latest high voltage technology based on patented strip layout, SGS-Thomson has designed an advanced family of IGBTs with outstanding performances.

The built in collector-gate zener exhibits a very precise active clamping while the gate-emitter zener supplies an ESD protection.

APPLICATIONS

- AUTOMOTIVE IGNITION

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CES}	Collector-Emitter Voltage (V_{GS} = 0)	CLAMPED	V
V_{ECR}	Reverse Battery Protection	18	V
V_{GE}	Gate-Emitter Voltage	CLAMPED	V
I_C	Collector Current (continuous) at T_c = 25 °C	20	A
I_C	Collector Current (continuous) at T_c = 100 °C	20	A
I_{CM}(•)	Collector Current (pulsed)	60	A
P_{tot}	Total Dissipation at T_c = 25 °C	125	W
	Derating Factor	0.83	W/°C
E_{SD}	ESD (Human Body Model)	4	KV
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	0.2	°C/W

ELECTRICAL CHARACTERISTICS (T_j = 25 °C unless otherwise specified)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$BV_{(CES)}$	Clamped Voltage	I_C = 2 mA V_{GE} = 0 T_j = - 40 to 150 °C	375	400	425	V
$BV_{(ECR)}$	Emitter Collector Break-down Voltage	I_C = 75 mA V_{GE} = 0 T_j = - 40 to 150 °C	18			V
BV_{GE}	Gate Emitter Break-down Voltage	I_C = ± 2 mA T_j = - 40 to 150 °C	12		16	V
I_{CES}	Collector cut-off Current (VGE = 0)	V_{CE} = 15 V V_{GE} = 0 T_j = 150 °C V_{CE} = 200 V V_{GE} = 0 T_j = 150 °C			10 100	µA µA
I_{GES}	Gate-Emitter Leakage Current (VCE = 0)	V_{GE} = ± 10 V V_{CE} = 0			± 0.7	mA
R_{GE}	Gate Emitter Resistance			20		KΩ

ON (*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GE(th)}$	Gate Threshold Voltage	V_{CE} = V_{GE} I_C = 250 µA T_j = - 40 to 150 °C	0.6		2.4	V
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage	V_{GE} = 4.5 V I_C = 10 A T_j = 25 °C V_{GE} = 4.5 V I_C = 10 A T_j = - 40 °C		1.2 1.3	1.8	V V
I_C	Collector Current	V_{GE} = 4.5 V V_{CE} = 9 V	20			A

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs}	Forward Transconductance	V_{CE} = 25 V I_C = 10 A	10	18		S
C_{ies} C_{oes} C_{res}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V_{CE} = 25 V f = 1 MHz V_{GE} = 0		1250 103 18	1700 140 25	pF pF pF
Q_G	Gate Charge	V_{CE} = 320 V I_C = 10 A V_{GE} = 5 V		28		nC

FUNCTIONAL CHARACTERISTICS

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
II	Latching Current	V_{CLAMP} = 320 V V_{GE} = 5 V R_{GOFF} = 1 KΩ T_C = 125 °C	20			A
U.I.S.	Unclamped Inductive Switching Current	R_{GOFF}=1 KΩ L =200 µH T_j = 125 °C	15			A
	Functional Test	R_{GOFF}=1 KΩ L =3 mH T_{start} = 55 °C	12			A
E_{AS}	Single Pulse Avalanche Energy	T_{start} = 55 °C T_{start} = 150 °C			215 150	mJ mJ
E_{AR}	Reverse Avalanche Energy	T_c = 125 °C duty cycle < 1% pulse width limited by t_{jmax}			10	mJ

ELECTRICAL CHARACTERISTICS (continued)

SWITCHING ON

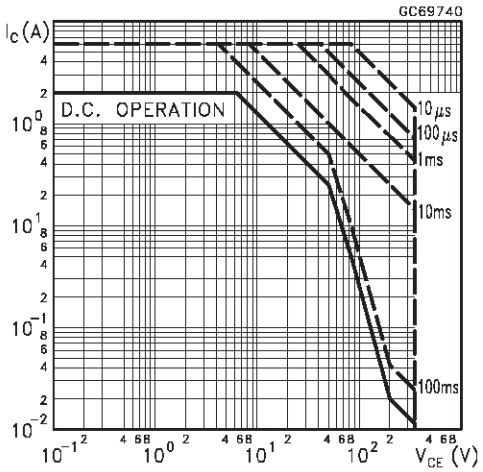
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Delay Time	V_{CC} = 320 V I_C = 10 A		520		ns
t_r	Rise Time	V_{GE}= 5 V R_G = 1 KΩ		340		ns
$(di/dt)_{on}$	Turn-on Current Slope	V_{CC} = 320 V I_C = 10 A		17		A/µs
E_{on}	Turn-on Switching Losses	R_G = 1 KΩ V_{GE} = 5 V		180		µJ

SWITCHING OFF

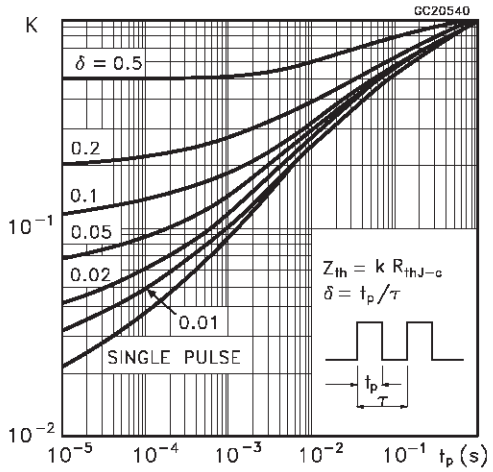
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_c	Cross-Over Time	V_{CLAMP} = 320 V I_C = 10 A		4		µs
$t_r(v_{off})$	Off Voltage Rise Time	R_{GE} = 1 KΩ V_{GE} = 5 V		2.2		µs
t_f	Fall Time			1.5		µs
$t_{d(off)}$	Off Voltage Delay Time			14.8		µs
E_{off}(**)	Turn-off Switching Loss			4.0		mJ
t_c	Cross-Over Time	V_{CLAMP} = 320 V I_C = 10 A		5.2		µs
$t_r(v_{off})$	Off Voltage Rise Time	R_{GE} = 1 KΩ V_{GE} = 5 V		2.8		µs
t_f	Fall Time			2		µs
$t_{d(off)}$	Off Voltage Delay Time	T_j = 125 °C		15.8		µs
E_{off}(**)	Turn-off Switching Loss			6.5		mJ

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

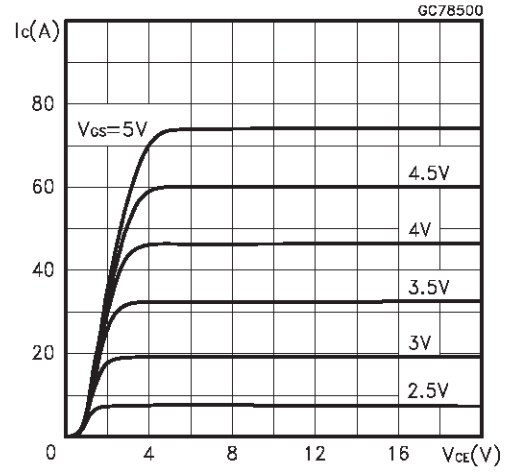
Safe Operating Area



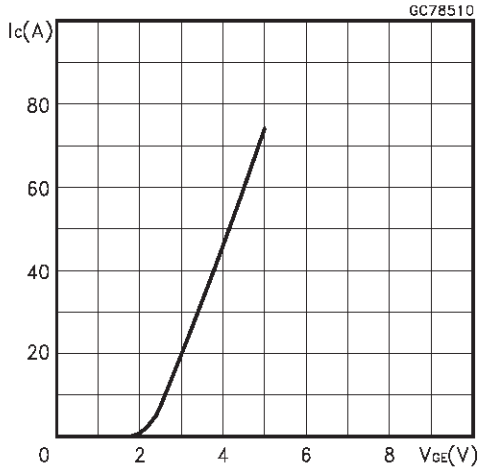
Thermal Impedance



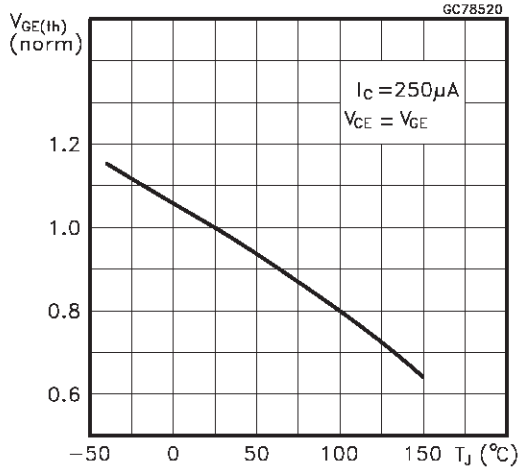
Output Characteristics



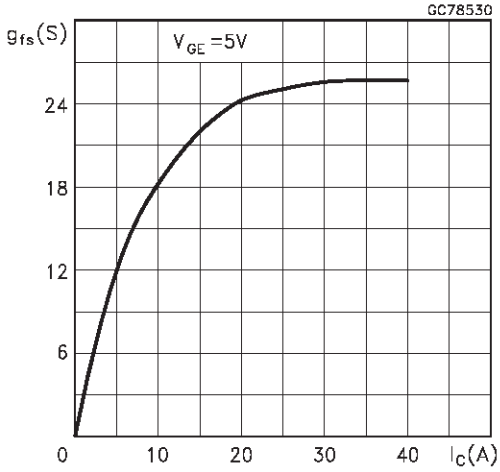
Transfer Characteristics



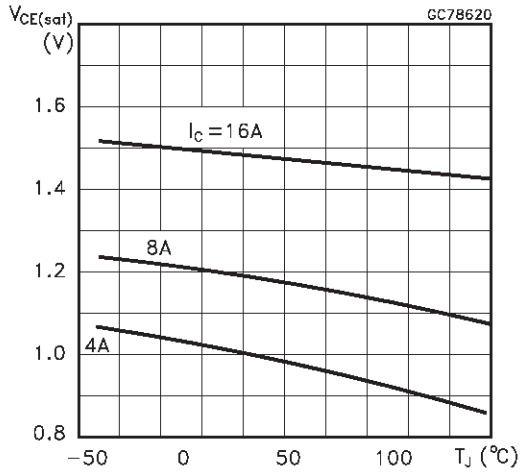
Normalized Gate Threshold Voltage vs Temperature



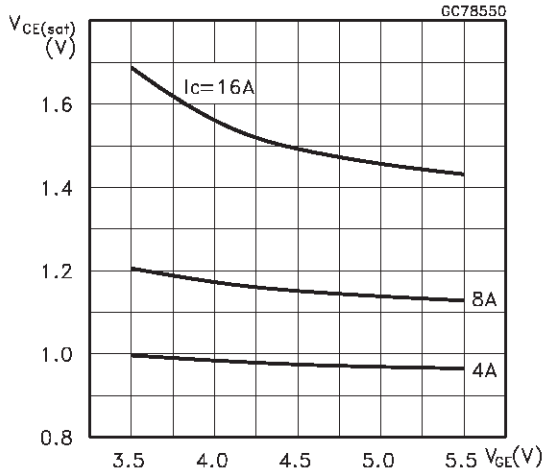
Transconductance



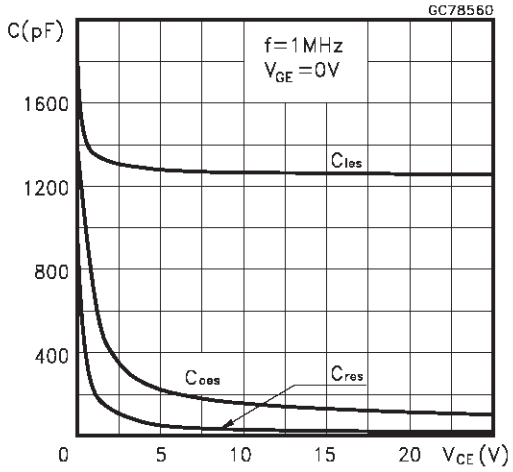
Collector-Emitter On Voltage vs Temperature



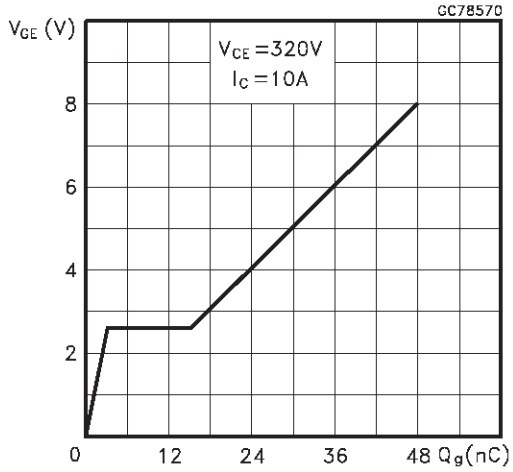
Collector-Emitter On Voltage vs Gate-Emitter Voltage



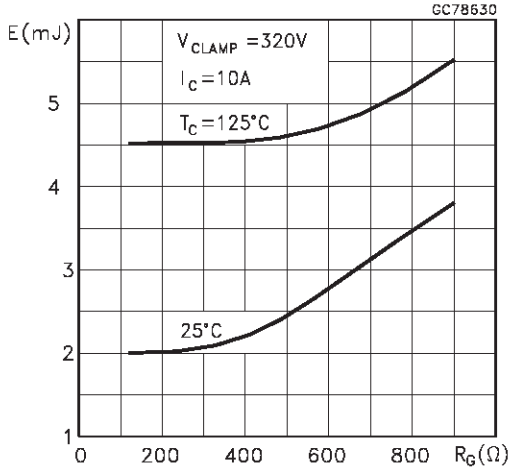
Capacitance Variations



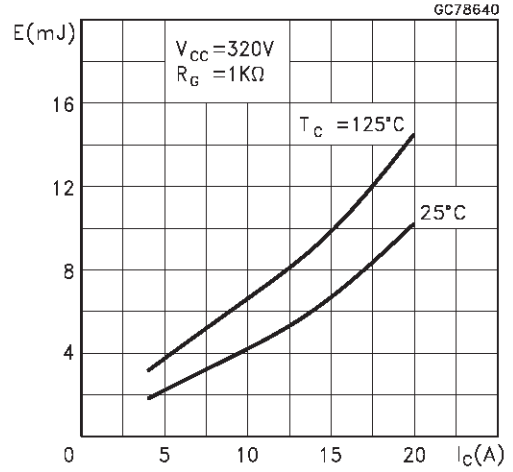
Gate Charge vs Gate-Emitter Voltage



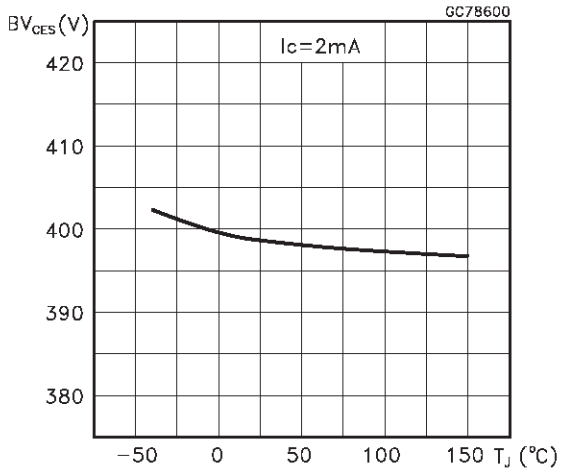
Off Losses vs Gate Resistance



Off Losses vs Collector Current



Break-down Voltage vs Temperature



Clamping Voltage vs Gate Resistance

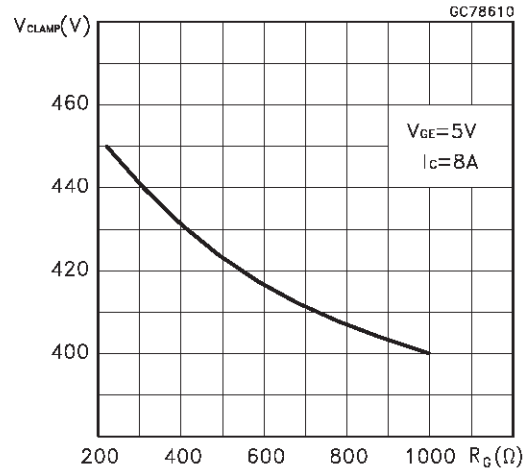


Fig. 1: Unclamped Inductive Load Test Circuit

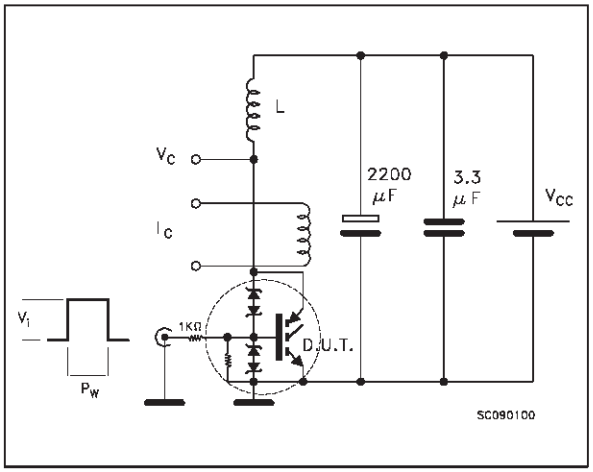


Fig. 2: Unclamped Inductive Waveform

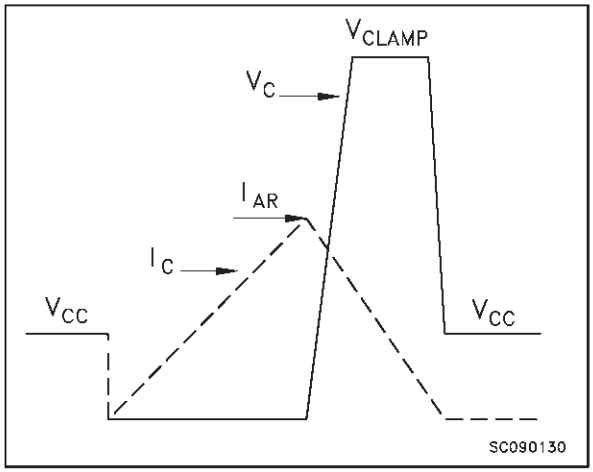


Fig. 3: Switching Times Test Circuits For Resistive Load

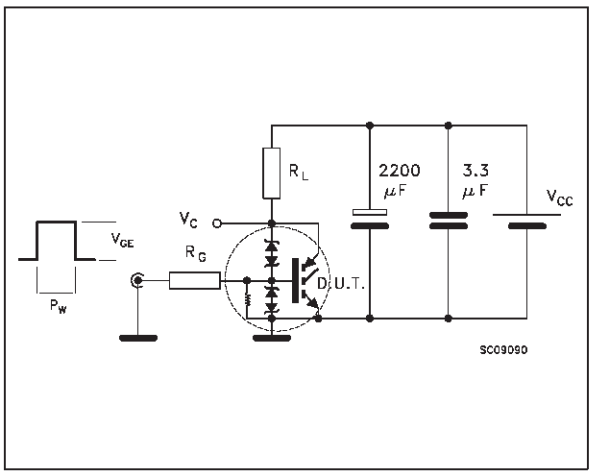


Fig. 4: Gate Charge test Circuit

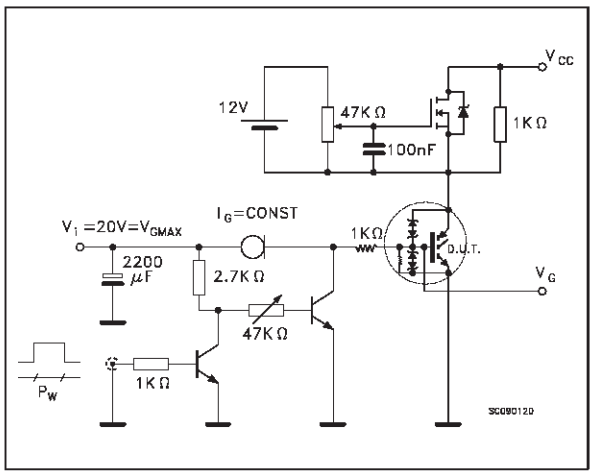
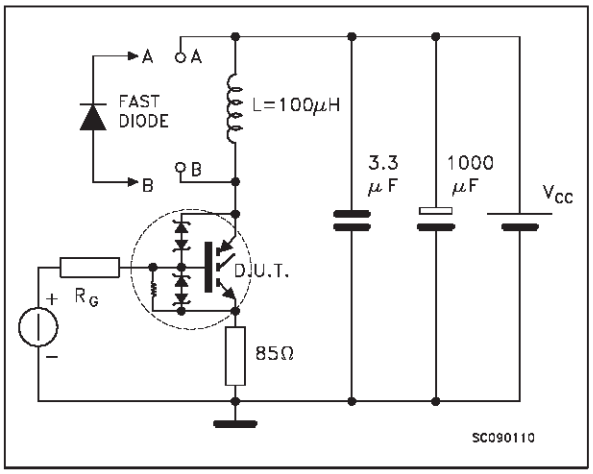


Fig. 5: Test Circuit For Inductive Load Switching And DIode Recovery Times



TO-263 (D^2PAK) MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.3		4.6	0.169		0.181
A1	2.49		2.69	0.098		0.106
B	0.7		0.93	0.027		0.036
B2	1.25		1.4	0.049		0.055
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		10.28	0.393		0.404
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