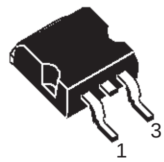
STGB20NB37LZ

N-CHANNEL CLAMPED 20A D^2PAK INTERNALLY CLAMPED PowerMESH™ IGBT

PRELIMINARY DATA

TYPE	V_{CES}	$V_{CE(sat)}$	I_C
STGB20NB37LZ	CLAMPED	< 2.0 V	20 A

- POLYSILICON GATE VOLTAGE DRIVEN
- LOW THRESHOLD VOLTAGE
- LOW ON-VOLTAGE DROP
- HIGH CURRENT CAPABILITY
- HIGH VOLTAGE CLAMPING FEATURE
- SURFACE-MOUNTING D^2PAK (TO-263) POWER PACKAGE IN TUBE (NO SUFFIX) OR IN TAPE & REEL (SUFFIX ”T4”)



D^2PAK
TO-263

DESCRIPTION

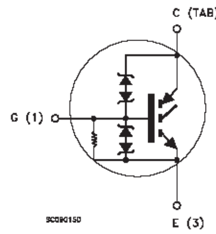
Using the latest high voltage technology based on patented strip layout, STMicroelectronics has designed an advanced family of IGBTs with outstanding performances.

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	20	V
V_{GE}	Gate-Emitter Voltage	CLAMPED	V
I_C	Collector Current (continuous) at T_c = 25 ^oC	40	A
I_C	Collector Current (continuous) at T_c = 100 ^oC	30	A
I_{CM}(•)	Collector Current (pulsed)	80	A
E_{AS}	Single Pulse Energy Tc = 25 ^oC	700	mJ
P_{tot}	Total Dissipation at T_c = 25 ^oC	150	W
	Derating Factor	1	W/^oC
E_{SD}	ESD (Human Body Model)	4	KV
T_{stg}	Storage Temperature	-65 to 175	^oC
T_j	Max. Operating Junction Temperature	175	^oC

(•) Pulse width limited by safe operating area

THERMAL DATA

$R_{thj-case}$	Thermal Resistance Junction-case	Max	1	$^oC/W$
$R_{thj-amb}$	Thermal Resistance Junction-ambient	Max	62.5	$^oC/W$
$R_{thc-sink}$	Thermal Resistance Case-sink	Typ	0.2	$^oC/W$

ELECTRICAL CHARACTERISTICS (T_j = 25 ^oC unless otherwise specified)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$BV_{(CES)}$	Clamped Voltage	I_C =2mA V_{GE} = 0 T_C = - 40^oC I_C =2mA V_{GE} = 0 T_C = 25^oC I_C =2mA V_{GE} = 0 T_C = 150^oC	380 375 370	405 400 395	430 425 420	V V V
$BV_{(ECR)}$	Emitter Collector Break-down Voltage	I_C = 75 mA T_C = 25^oC	20	28		V
BV_{GE}	Gate Emitter Break-down Voltage	I_G =± 2 mA	12	14	16	V
I_{CES}	Collector cut-off Current (VGE = 0)	V_{CE} = 15 V V_{GE} = 0 T_C = 150 ^oC V_{CE} = 200 V V_{GE} = 0 T_C = 150 ^oC			10 100	μA μA
I_{GES}	Gate-Emitter Leakage Current (VCE = 0)	V_{GE} = ± 10 V V_{CE} = 0	± 300	± 660	± 1000	μA
R_{GE}	Gate Emitter Resistance		10	15	30	KΩ

ON (*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GE(th)}$	Gate Threshold Voltage	V_{CE} = V_{GE} I_C = 250μA T_C = - 40^oC V_{CE} = V_{GE} I_C = 250μA T_C = 25^oC V_{CE} = V_{GE} I_C = 250μA T_C = 150^oC	1.2 1.0 0.6	1.4	2	V V V
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage	V_{GE} = 4.5 V I_C = 10 A T_C = 25^oC V_{GE} = 4.5 V I_C = 10 A T_C= 150 ^oC V_{GE} = 4.5 V I_C = 20 A T_C = 25^oC V_{GE} = 4.5 V I_C = 20 A T_C= 150 ^oC		1.1 1.0 1.35 1.25	1.8 1.7 2.0 2.0	V V V V

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs}	Forward Transconductance	V_{CE} = 25 V I_C = 20 A		35		S
C_{ies} C_{oes} C_{res}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V_{CE} = 25 V f = 1 MHz V_{GE} = 0		2300 165 28		pF pF pF
Q_G	Gate Charge	V_{CE} = 280 V I_C = 20 A V_{GE} = 5 V		51		nC

FUNCTIONAL CHARACTERISTICS

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Il	Latching Current	V_{CLAMP} = 250 V V_{GE} = 4.5 V R_{GOFF} = 1 KΩ T_C = 150 °C	80			A
U.I.S.	Functional Test Open Secondary Coil	R_{GOFF}=1 KΩ L =3 mH T_C = 25 °C R_{GOFF}=1 KΩ L =3 mH T_C = 150 °C	21.6 15	26 18		A A

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Delay Time Rise Time	V_{CC} = 250 V I_C = 20 A V_{GE}= 4.5 V R_G = 1 KΩ		2.3 0.6		μs μs
$(di/dt)_{on}$	Turn-on Current Slope	V_{CC} = 250 V I_C = 20 A R_G = 1 KΩ V_{GE} = 4.5 V		550		A/μs
E_{on}	Turn-on Switching Losses	V_{CC}=250V I_C =20A T_C = 25 °C R_G =1 KΩ V_{GE} =4.5V T_C = 150 °C		8.8 9.2		mJ mJ

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_c $t_r(v_{off})$ t_f $t_d(_{off})$ E_{off}(**)	Cross-Over Time Off Voltage Rise Time Fall Time Off Voltage Delay Time Turn-off Switching Loss	V_{CC} = 250 V I_C = 20 A R_{GE} = 1 KΩ V_{GE} = 4.5 V		4.8 2.6 2.0 11.5 11.8		μs μs μs μs mJ
t_c $t_r(v_{off})$ t_f $t_d(_{off})$ E_{off}(**)	Cross-Over Time Off Voltage Rise Time Fall Time Off Voltage Delay Time Turn-off Switching Loss	V_{CC} = 250 V I_C = 20 A R_{GE} = 1 KΩ V_{GE} = 4.5 V T_C = 150 °C		7.8 3.5 3.9 12.0 17.8		μs μs μs μs mJ

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

Fig. 1: Unclamped Inductive Load Test Circuit

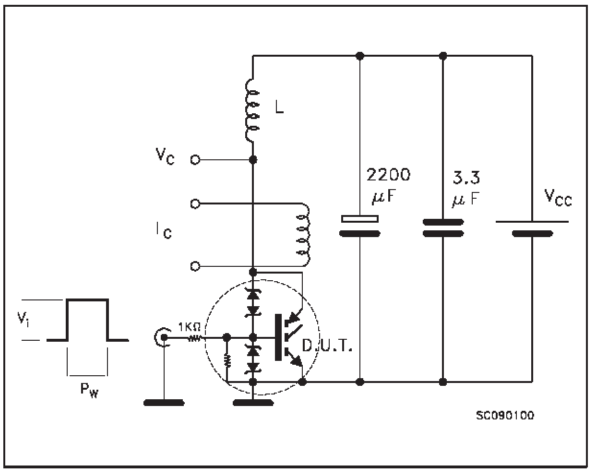


Fig. 2: Unclamped Inductive Waveform

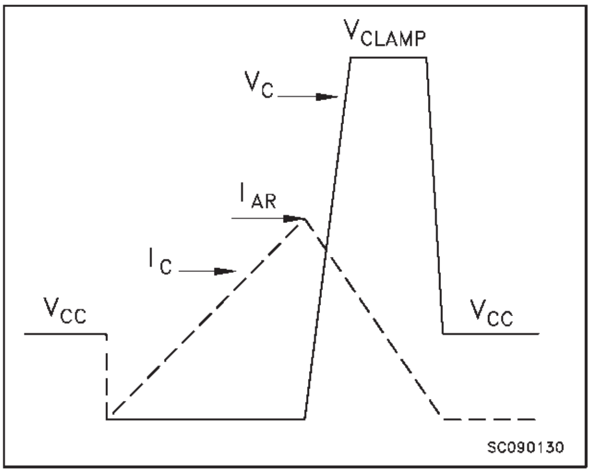


Fig. 3: Switching Times Test Circuits For Resistive Load

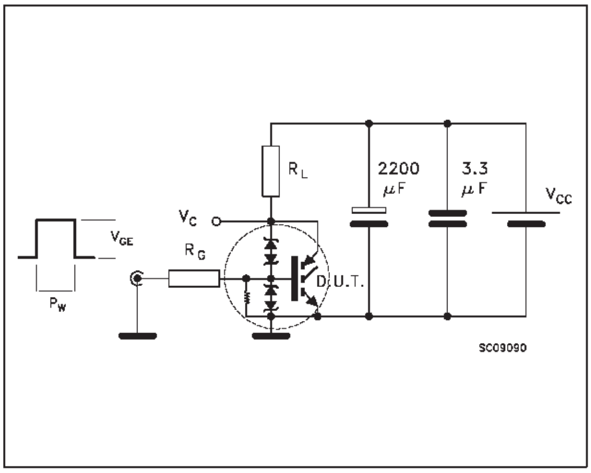


Fig. 4: Gate Charge test Circuit

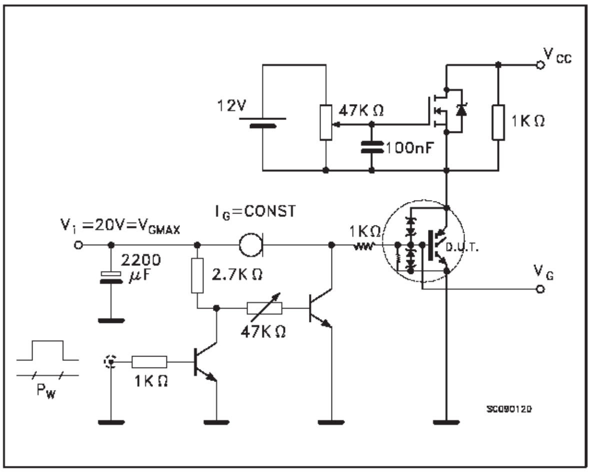
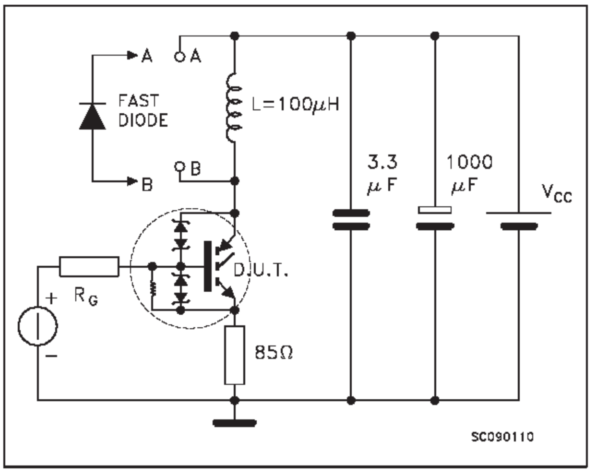
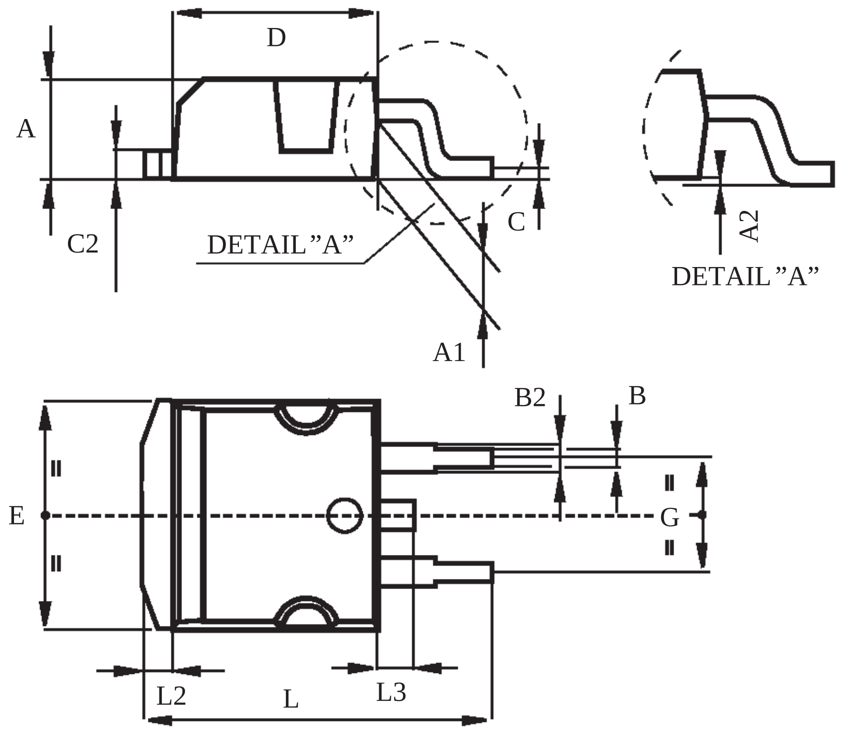


Fig. 5: Test Circuit For Inductive Load Switching And DIode Recovery Times



TO-263 (D²PAK) 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

STMicroelectronics GROUP OF COMPANIES

Australia - Brazil - China - Finland - France - Germany - Hong Kong - India - Italy - Japan - Malaysia - Malta - Morocco - Singapore - Spain - Sweden - Switzerland - United Kingdom - U.S.A.

http://www.st.com