



STGB20NB37LZ

N-CHANNEL CLAMPED 20A D²PAK 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 D²PAK (TO-263)
POWER PACKAGE IN TUBE (NO SUFFIX)
OR IN TAPE & REEL (SUFFIX "T4")

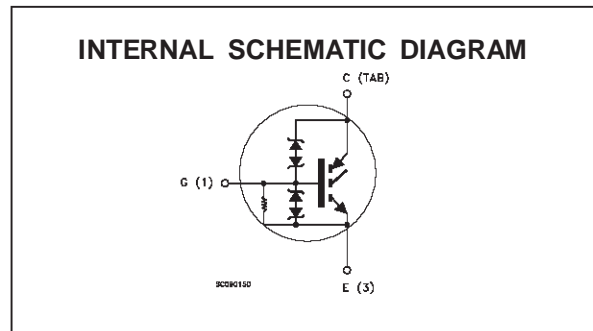
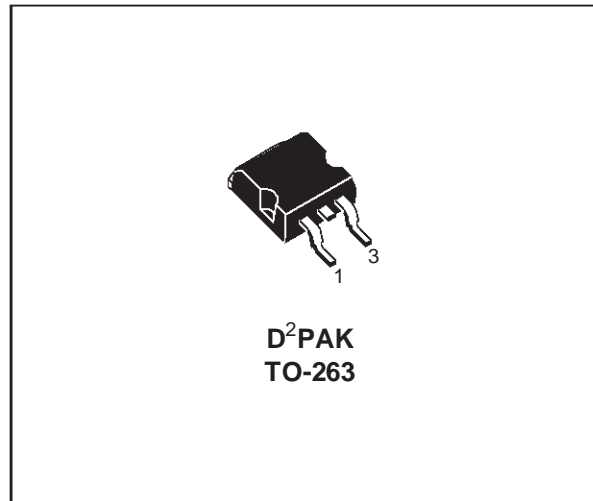
DESCRIPTION

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



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 °C	40	A
I _C	Collector Current (continuous) at T _c = 100 °C	30	A
I _{CM} (•)	Collector Current (pulsed)	80	A
E _{AS}	Single Pulse Energy T _c = 25 °C	700	mJ
P _{tot}	Total Dissipation at T _c = 25 °C	150	W
	Derating Factor	1	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

STGB20NB37LZ

THERMAL DATA

R _{thj-case}	Thermal Resistance Junction-case	Max	1	°C/W
R _{thj-amb}	Thermal Resistance Junction-ambient	Max	62.5	°C/W
R _{thc-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 = 2mA V _{GE} = 0 T _C = - 40°C	380	405	430	V
		I _C = 2mA V _{GE} = 0 T _C = 25°C	375	400	425	V
		I _C = 2mA V _{GE} = 0 T _C = 150°C	370	395	420	V
BV _(ECR)	Emitter Collector Break-down Voltage	I _C = 75 mA T _C = 25°C	20	28		V
BV _{GE}	Gate Emitter Break-down Voltage	I _G = ± 2 mA	12	14	16	V
I _{CES}	Collector cut-off Current (V _{GE} = 0)	V _{CE} = 15 V V _{GE} = 0 T _C = 150 °C			10	μA
		V _{CE} = 200 V V _{GE} = 0 T _C = 150 °C			100	μA
I _{GES}	Gate-Emitter Leakage Current (V _{CE} = 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°C	1.2			V
		V _{CE} = V _{GE} I _C = 250μA T _C = 25°C	1.0	1.4	2	V
		V _{CE} = V _{GE} I _C = 250μA T _C = 150°C	0.6			V
V _{CE(SAT)}	Collector-Emitter Saturation Voltage	V _{GE} = 4.5 V I _C = 10 A T _C = 25°C		1.1	1.8	V
		V _{GE} = 4.5 V I _C = 10 A T _C = 150 °C		1.0	1.7	V
		V _{GE} = 4.5 V I _C = 20 A T _C = 25°C		1.35	2.0	V
		V _{GE} = 4.5 V I _C = 20 A T _C = 150 °C		1.25	2.0	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}	Input Capacitance	V _{CE} = 25 V f = 1 MHz V _{GE} = 0		2300		pF
C _{oes}	Output Capacitance			165		pF
C _{res}	Reverse Transfer Capacitance			28		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
II	Latching Current	$V_{CLAMP} = 250\text{ V}$ $R_{G\text{OFF}} = 1\text{ K}\Omega$	$V_{GE} = 4.5\text{ V}$ $T_C = 150\text{ }^\circ\text{C}$	80		A
U.I.S.	Functional Test Open Secondary Coil	$R_{G\text{OFF}}=1\text{ K}\Omega$ $L=3\text{ mH}$ $R_{G\text{OFF}}=1\text{ K}\Omega$ $L=3\text{ mH}$	$T_C = 25\text{ }^\circ\text{C}$ $T_C = 150\text{ }^\circ\text{C}$	21.6 15	26 18	A A

SWITCHING ON

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

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_c $t_r(V_{\text{off}})$ t_f $t_{d(\text{off})}$ $E_{\text{off}}^{(**)}$	Cross-Over Time Off Voltage Rise Time Fall Time Off Voltage Delay Time Turn-off Switching Loss	$V_{CC} = 250\text{ V}$ $R_{GE} = 1\text{ K}\Omega$	$I_C = 20\text{ A}$ $V_{GE} = 4.5\text{ V}$	4.8 2.6 2.0 11.5 11.8		μs μs μs μs mJ
t_c $t_r(V_{\text{off}})$ t_f $t_{d(\text{off})}$ $E_{\text{off}}^{(**)}$	Cross-Over Time Off Voltage Rise Time Fall Time Off Voltage Delay Time Turn-off Switching Loss	$V_{CC} = 250\text{ V}$ $R_{GE} = 1\text{ K}\Omega$ $T_C = 150\text{ }^\circ\text{C}$	$I_C = 20\text{ A}$ $V_{GE} = 4.5\text{ V}$	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

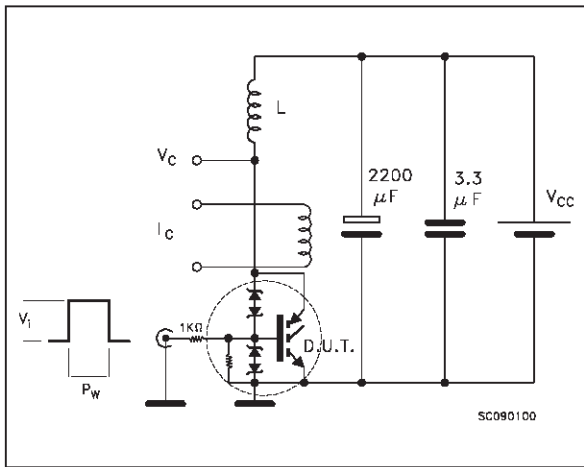


Fig. 2: Unclamped Inductive Waveform

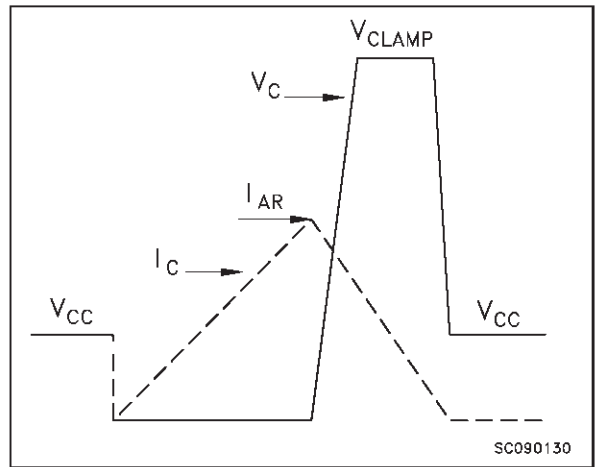


Fig. 3: Switching Times Test Circuits For Resistive Load

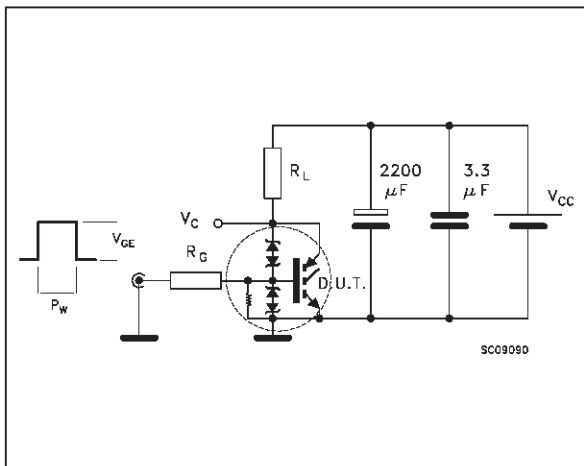


Fig. 4: Gate Charge test Circuit

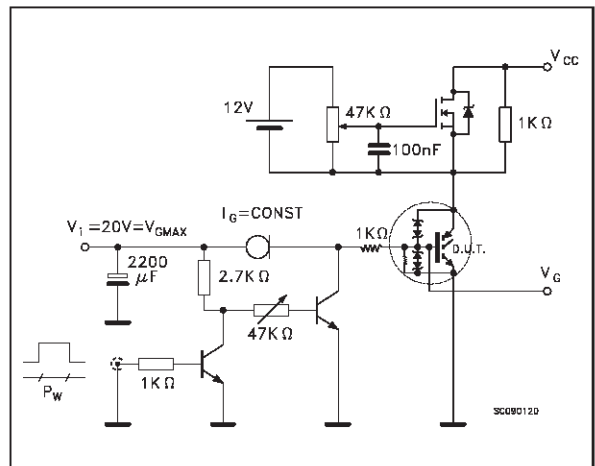
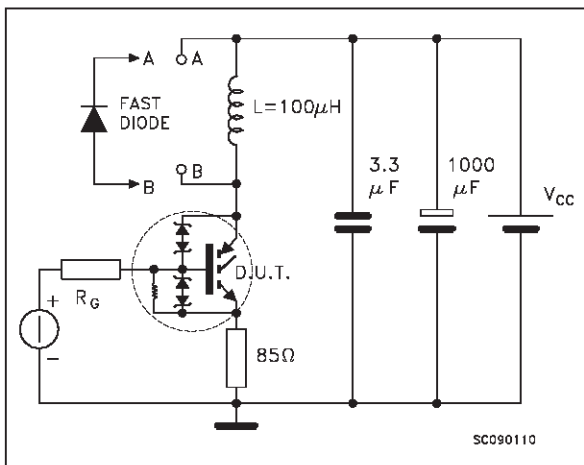
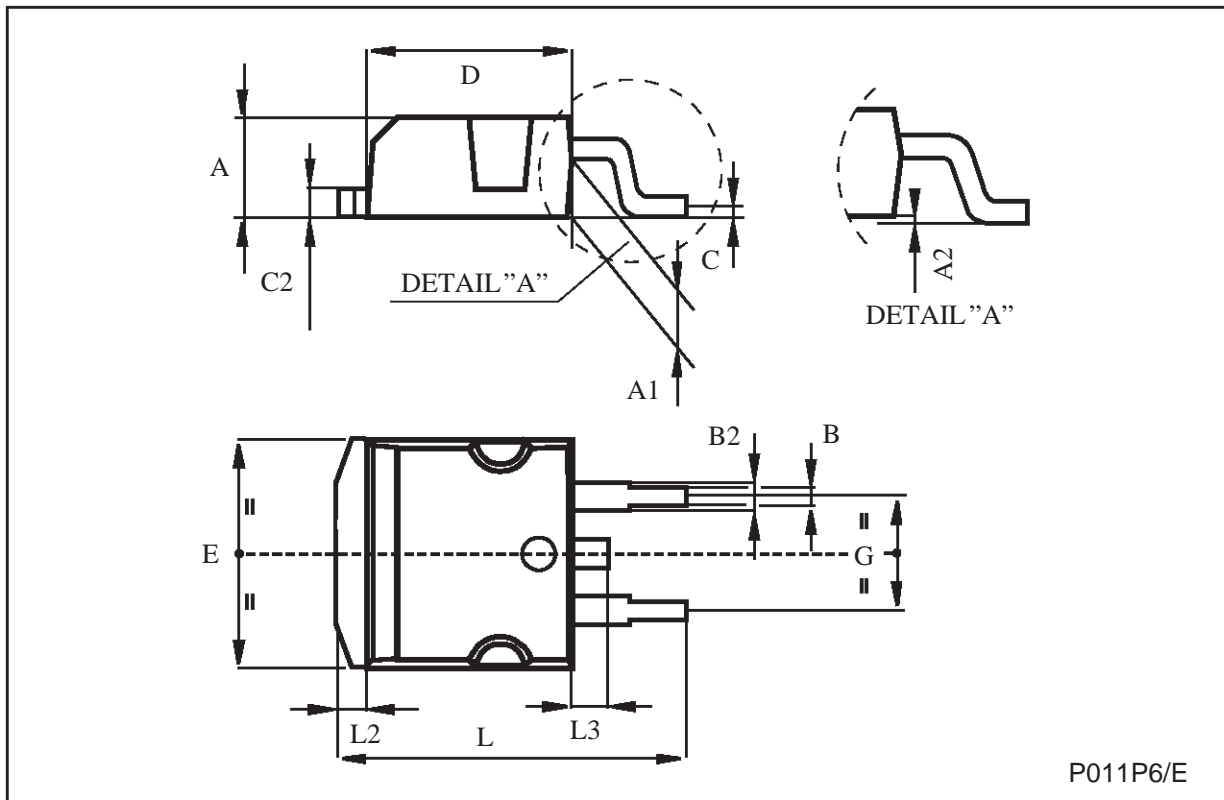


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



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



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