



STGB20NB32LZ

N-CHANNEL CLAMPED 20A D²PAK INTERNALLY CLAMPED PowerMESH™ IGBT

PRELIMINARY DATA

TYPE	V _{CES}	V _{CE(sat)}	I _C
STGB20NB32LZ	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")

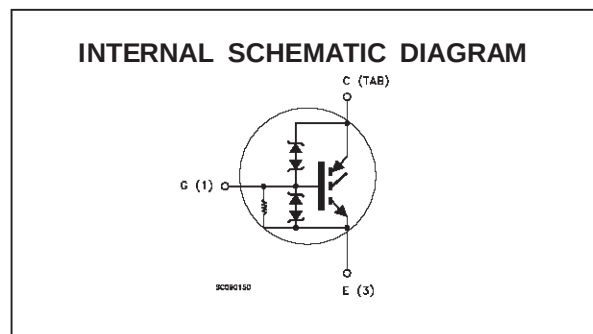
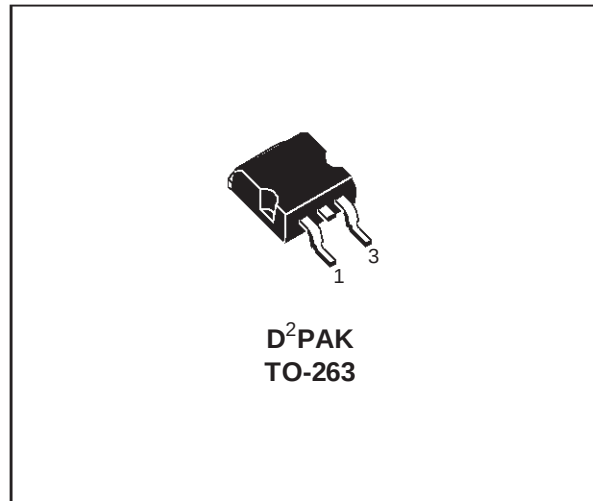
DESCRIPTION

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

THERMAL DATA

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

ELECTRICAL CHARACTERISTICS ($T_j = 25^{\circ}C$ unless otherwise specified)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$BV_{(CES)}$	Clamped Voltage	$I_C = 2mA$ $V_{GE} = 0$ $T_C = -40^{\circ}C$	330	355	380	V
		$I_C = 2mA$ $V_{GE} = 0$ $T_C = 25^{\circ}C$	325	350	375	V
		$I_C = 2mA$ $V_{GE} = 0$ $T_C = 150^{\circ}C$	320	345	370	V
$BV_{(ECR)}$	Emitter Collector Break-down Voltage	$I_C = 75 mA$ $T_C = 25^{\circ}C$	20	28		V
BV_{GE}	Gate Emitter Break-down Voltage	$I_G = \pm 2 mA$	12	14	16	V
I_{CES}	Collector cut-off Current ($V_{GE} = 0$)	$V_{CE} = 15 V$ $V_{GE} = 0$ $T_C = 150^{\circ}C$			10	μA
		$V_{CE} = 200 V$ $V_{GE} = 0$ $T_C = 150^{\circ}C$			100	μA
I_{GES}	Gate-Emitter Leakage Current ($V_{CE} = 0$)	$V_{GE} = \pm 10 V$ $V_{CE} = 0$	± 300	± 660	± 1000	μA
R_{GE}	Gate Emitter Resistance		10	15	30	$K\Omega$

ON (*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GE(th)}$	Gate Threshold Voltage	$V_{CE} = V_{GE}$ $I_C = 250\mu A$ $T_C = -40^{\circ}C$	1.2			V
		$V_{CE} = V_{GE}$ $I_C = 250\mu A$ $T_C = 25^{\circ}C$	1.0	1.4	2	V
		$V_{CE} = V_{GE}$ $I_C = 250\mu A$ $T_C = 150^{\circ}C$	0.6			V
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage	$V_{GE} = 4.5 V$ $I_C = 10 A$ $T_C = 25^{\circ}C$		1.1	1.8	V
		$V_{GE} = 4.5 V$ $I_C = 10 A$ $T_C = 150^{\circ}C$		1.0	1.7	V
		$V_{GE} = 4.5 V$ $I_C = 20 A$ $T_C = 25^{\circ}C$		1.35	2.0	V
		$V_{GE} = 4.5 V$ $I_C = 20 A$ $T_C = 150^{\circ}C$		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	$R_{G\text{OFF}} = 1\text{ K}\Omega$ $L = 3\text{ mH}$ $T_C = 25\text{ }^\circ\text{C}$ $R_{G\text{OFF}} = 1\text{ K}\Omega$ $L = 3\text{ mH}$ $T_C = 150\text{ }^\circ\text{C}$	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	$V_{CC} = 250\text{ V}$ $I_C = 20\text{ A}$ $T_C = 25\text{ }^\circ\text{C}$ $R_G = 1\text{ K}\Omega$ $V_{GE} = 4.5\text{ V}$ $T_C = 150\text{ }^\circ\text{C}$		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

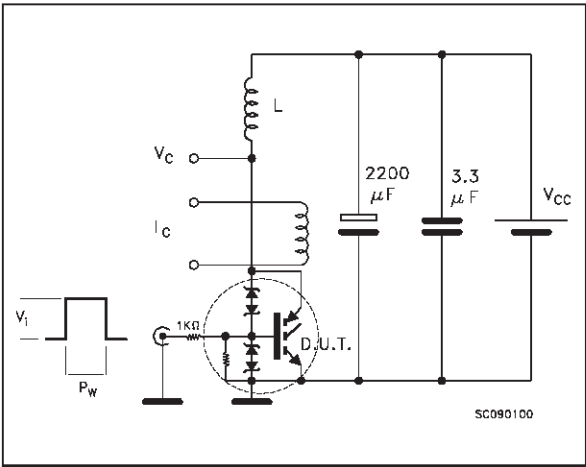


Fig. 2: Unclamped Inductive Waveform

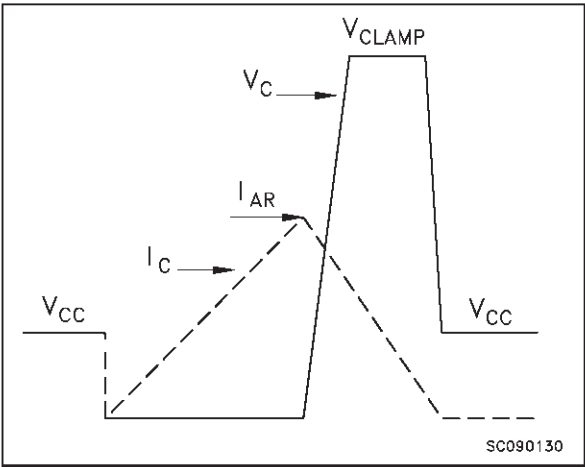


Fig. 3: Switching Times Test Circuits For Resistive Load

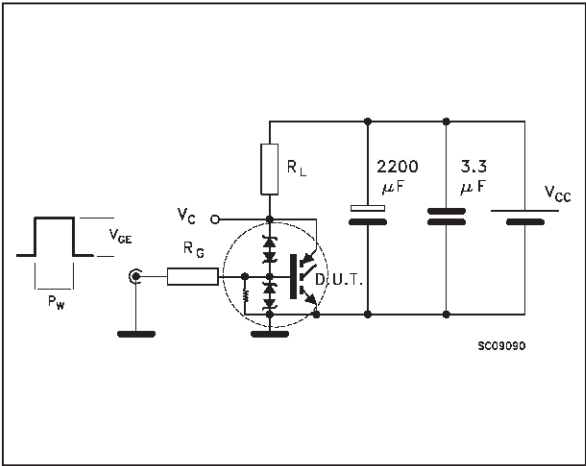


Fig. 4: Gate Charge test Circuit

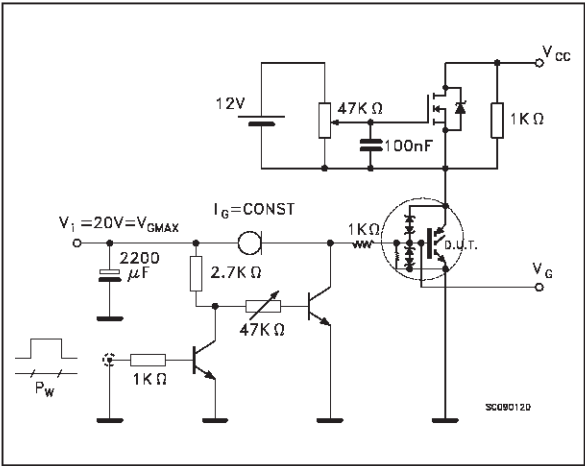
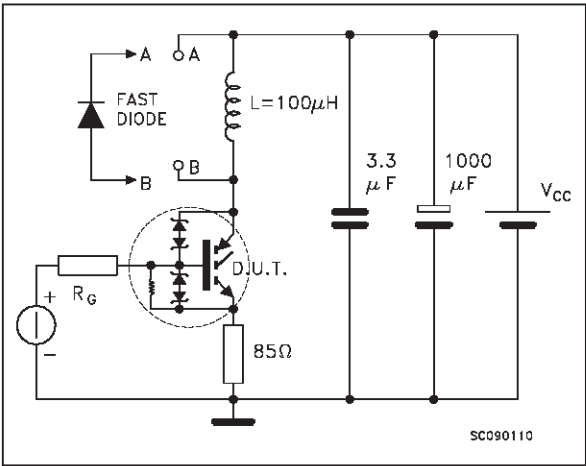
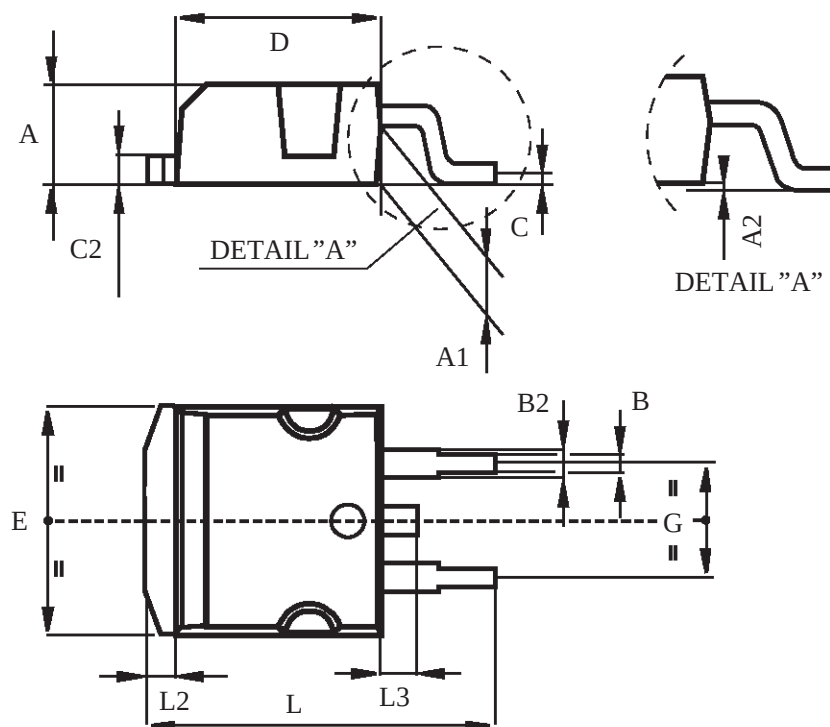


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



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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