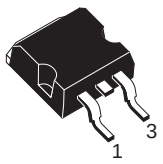
STGB20NB32LZ
STGB20NB32LZ-1

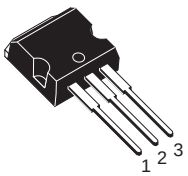
N-CHANNEL CLAMPED 20A - D²PAK/I²PAK
INTERNALLY CLAMPED PowerMESH™ IGBT

TYPE	V_{CES}	$V_{CE(sat)}$	I_C
STGB20NB32LZ	CLAMPED	< 2.0 V	20 A
STGB20NB32LZ-1	CLAMPED	< 2.0 V	20 A

- POLYSILICON GATE VOLTAGE DRIVEN
- LOW THRESHOLD VOLTAGE
- LOW ON-VOLTAGE DROP
- HIGH CURRENT CAPABILITY
- HIGH VOLTAGE CLAMPING FEATURE



D²PAK

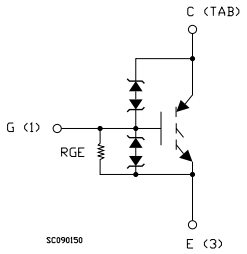


I²PAK

DESCRIPTION

Using the latest high voltage technology based on a patented strip layout, STMicroelectronics has designed an advanced family of IGBTs, the PowerMESH™ 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.

INTERNAL SCHEMATIC DIAGRAM



APPLICATIONS

- ELECTRONIC IGNITION FOR AUTOMOTIVE

ORDERING INFORMATION

SALES TYPE	MARKING	PACKAGE	PACKAGING
STGB20NB32LZT4	GB20NB32LZ	D²PAK	TAPE & REEL
STGB20NB32LZ-1	GB20NB32LZ	I²PAK	TUBE

Downloaded from Elcodis.com electronic components distributor

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
Eas	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

Rthj-case	Thermal Resistance Junction-case Max	1	°C/W
Rthj-amb	Thermal Resistance Junction-ambient Max	62.5	°C/W

ELECTRICAL CHARACTERISTICS (T_{CASE} = 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, Tc= - 40°C	330	355	380	V
		I_C = 2 mA, V_{GE} = 0, Tc= 25°C	325	350	375	V
		I_C = 2 mA, V_{GE} = 0, Tc= 150°C	320	345	370	V
$BV_{(ECR)}$	Emitter Collector Break-down Voltage	I_C = 75 mA, Tc = 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} = ± 10V , V_{CE} = 0	± 400	± 660	± 1000	µA
R_{GE}	Gate Emitter Resistance		10	15	25	KΩ

ON (1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GE(th)}$	Gate Threshold Voltage	V_{CE} = V_{GE}, I_C = 250µA, Tc=-40°C	1.2			V
		V_{CE} = V_{GE}, I_C = 250µA, Tc= 25°C	1	1.4	2	V
		V_{CE} =V_{GE}, I_C = 250µA, Tc=150°C	0.6			V
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage	V_{GE} =4.5V, I_C = 10 A, Tc= 25°C		1.1	1.8	V
		V_{GE} =4.5V, I_C = 10 A, Tc= 150°C		1	1.7	V
		V_{GE} =4.5V, I_C = 20 A, Tc= 25°C		1.35	2	V
		V_{GE} =4.5V, I_C = 20 A, Tc= 150°C		1.25	2	V

Downloaded from Elcodis.com electronic components distributor

ELECTRICAL CHARACTERISTICS (T_{CASE} = 25 °C UNLESS OTHERWISE SPECIFIED)

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	R_{GOFF} =127Ω, V_{Clamp} = 250 V, V_{GE} = 5 V, T_C = 125 °C	34			A
U.I.S.	Functional Test Open Secondary Coil	R_{GOFF} =1KΩ ,Tc=125°C, V_G = 5 V, L = 1.6mH	21.6			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 R_G = 1KΩ , V_{GE} = 4.5 V		2.3 0.6		µs µs
$(di/dt)_{on}$	Turn-on Current Slope	V_{CC}= 250 V, I_C = 20 A R_G=1KΩ, V_{GE} = 4.5 V		550		A/µs
Eon	Turn-on Switching Losses	V_{CC}= 250 V, I_C = 20 A, Tc=25°C R_G=1KΩ, V_{GE} = 4.5 V, Tc=150°C		8.8 9.2		mJ mJ

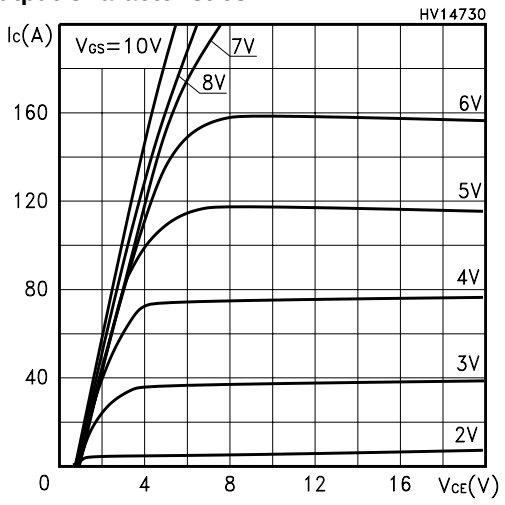
SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_c	Cross-Over Time	V_{cc} = 250 V, I_C = 20 A, R_{GE} = 1 KΩ , V_{GE} = 4.5 V		4.8		µs
$t_r(V_{off})$	Off Voltage Rise Time			2.6		µs
t_f	Fall Time			2		µs
$t_{d(off)}$	Off Voltage Delay Time			11.5		µs
E_{off}(**)	Turn-off Switching Loss			11.8		mJ
t_c	Cross-Over Time	V_{cc} = 250 V, I_C = 20 A, R_{GE} = 1 KΩ , V_{GE} = 4.5 V Tc = 150 °C		7.8		µs
$t_r(V_{off})$	Off Voltage Rise Time			3.5		µs
t_f	Fall Time			3.9		µs
$t_{d(off)}$	Off Voltage Delay Time			12		µs
E_{off}(**)	Turn-off Switching Loss			17.8		mJ

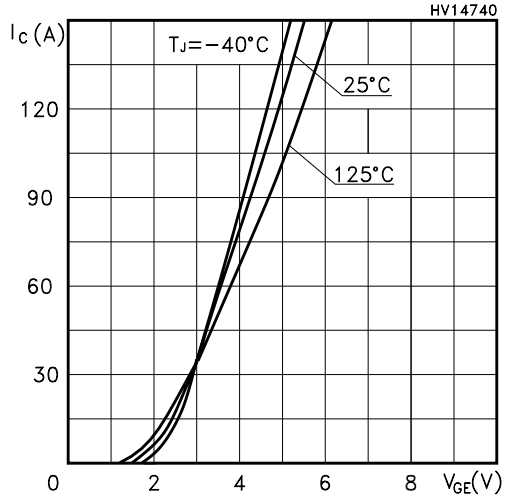
(**)Losses Include Also the Tail (jedec Standardization)

Downloaded from Elcodis.com electronic components distributor

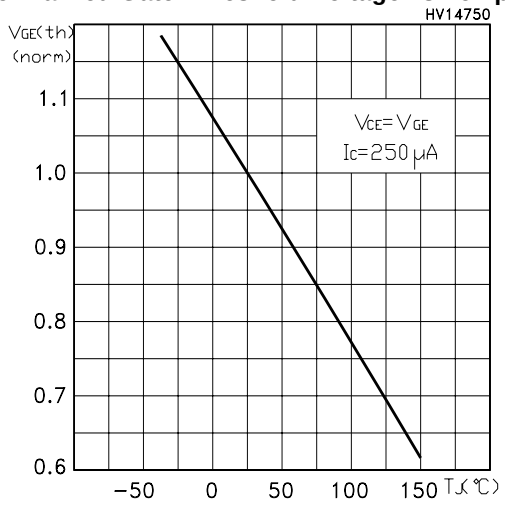
Output Characteristics



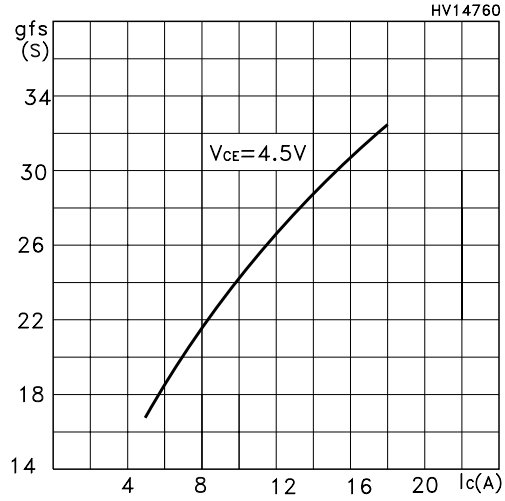
Transfer Characteristics



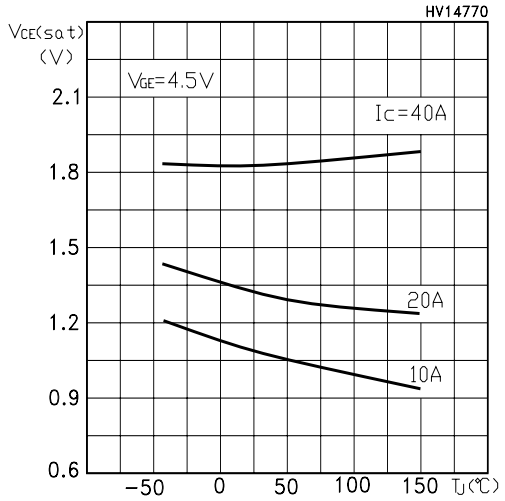
Normalized Gate Threshold Voltage vs Temp.



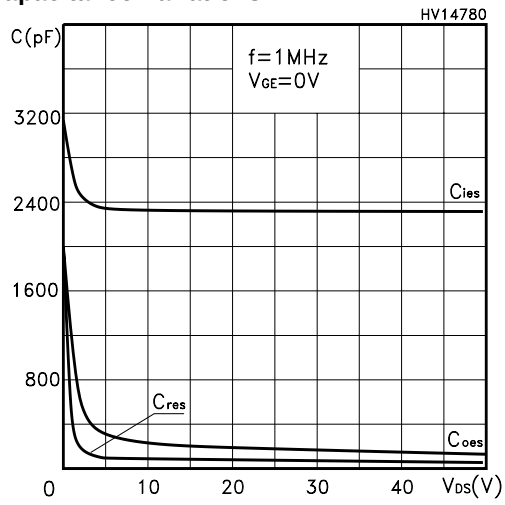
Transconductance



Collector-Emitter On Voltage vs Temperature

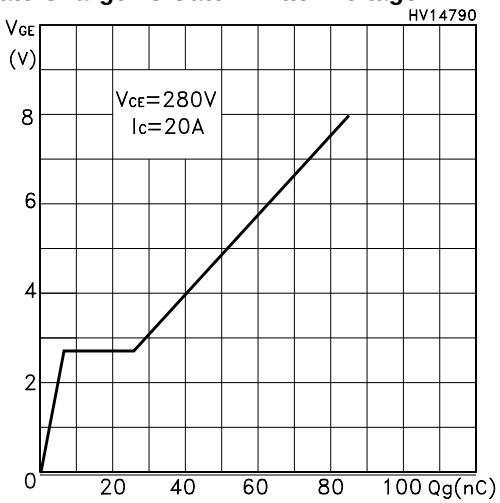


Capacitance Variations

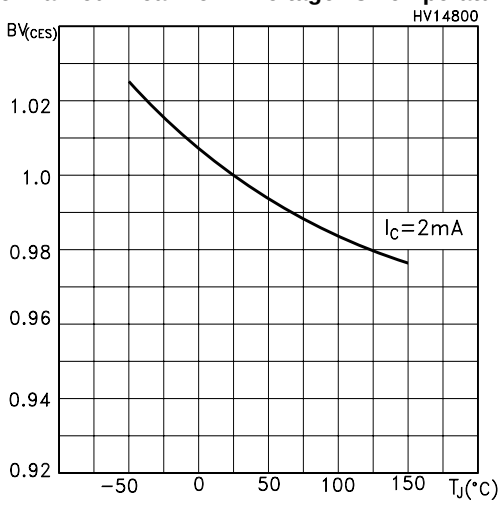


Downloaded from Elcodis.com electronic components distributor

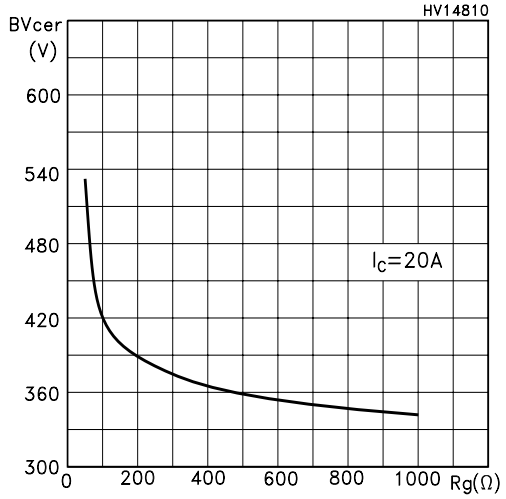
Gate Charge vs Gate-Emitter Voltage



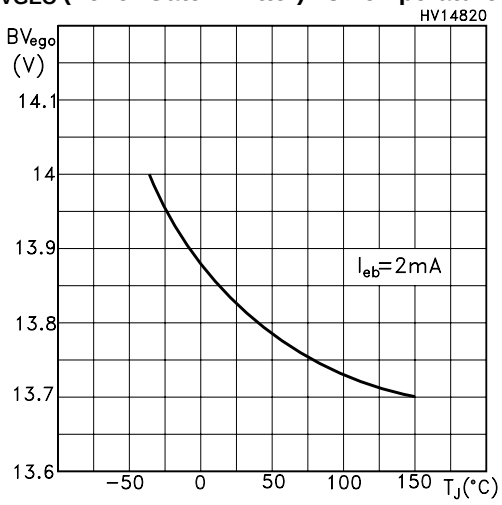
Normalized BreakDown Voltage vs Temperature



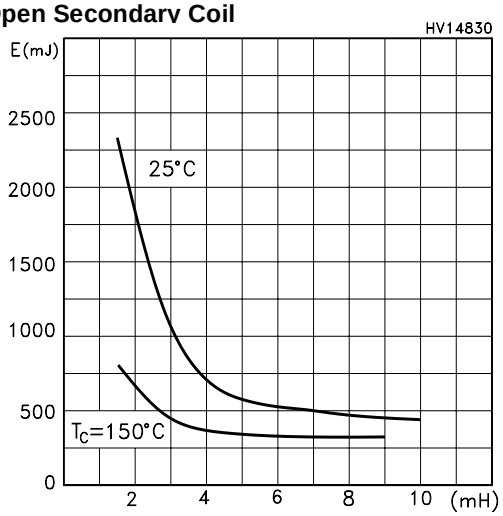
Break-Down Voltage vs Emitter Resistance



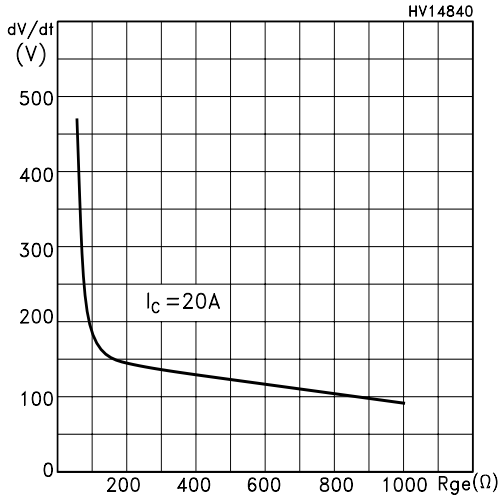
B_{VGEO} (Zener Gate-Emitter) vs Temperature



Self Clamped Inductive Switching Energy vs Open Secondary Coil

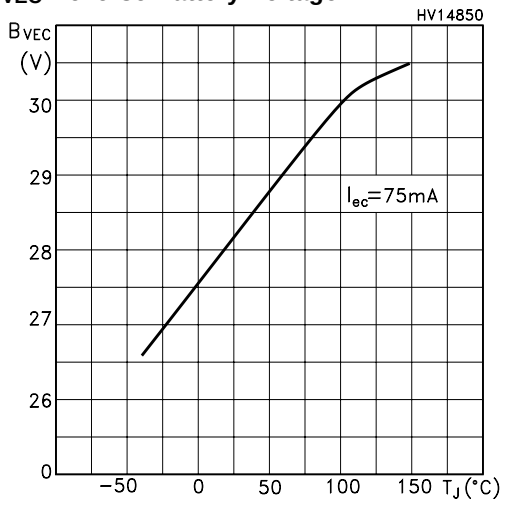


dV/dt Gate-Emitter Resistance

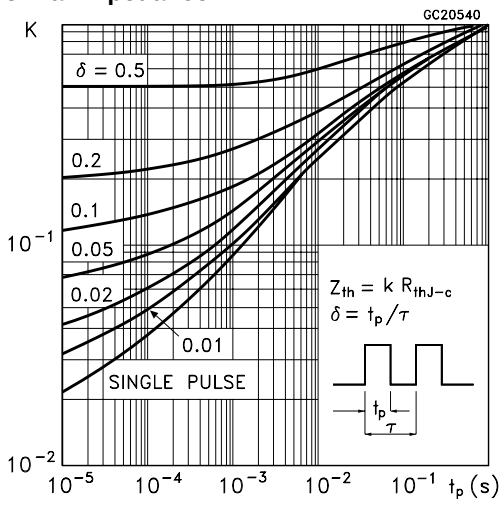


Downloaded from Elcodis.com electronic components distributor

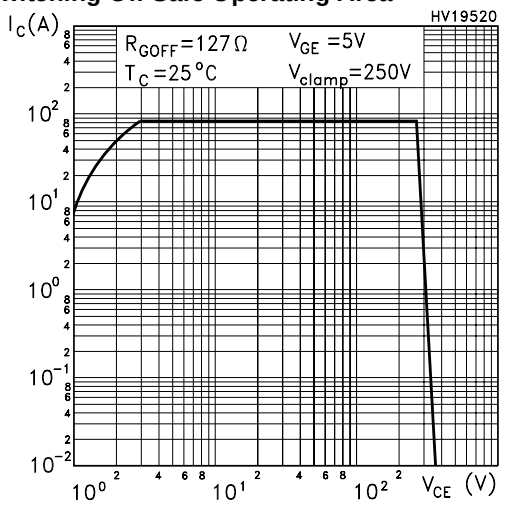
B_{VEC} Reverse Battery Voltage



Thermal Impedance



Switching Off Safe Operating Area



Downloaded from Elcodis.com electronic components distributor

Fig. 1: Unclamped Inductive Load Test Circuit

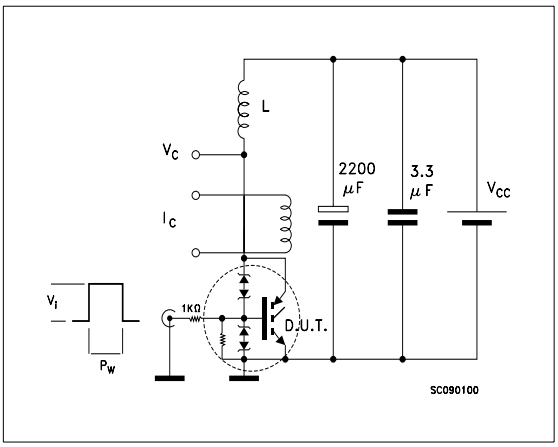


Fig. 2: Unclamped Inductive Waveform

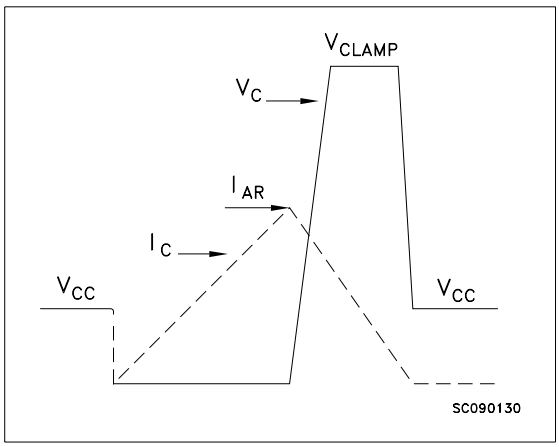


Fig. 3: Test Circuit For Inductive Load Switching And Diode Recovery Times

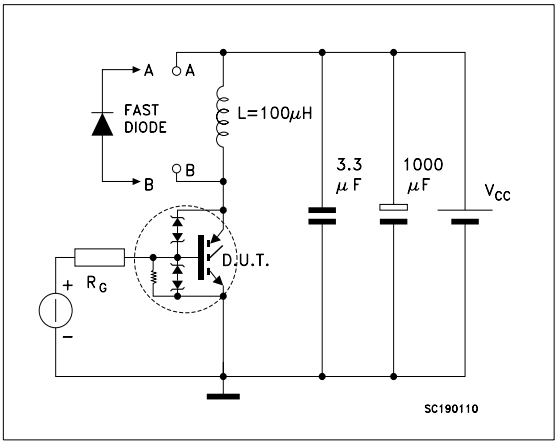
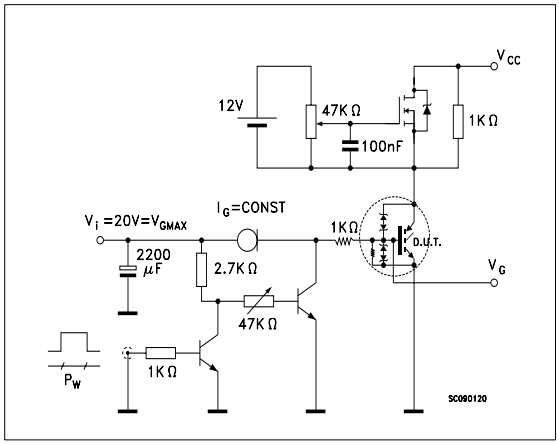


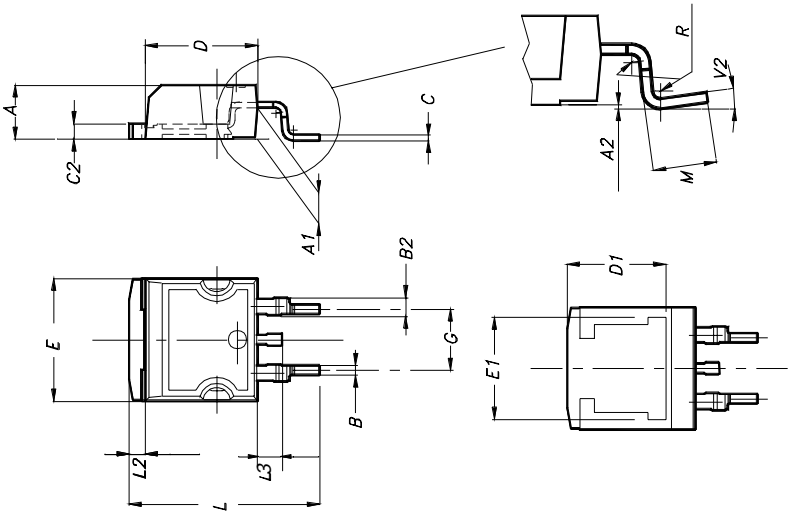
Fig. 4: Gate Charge test Circuit



Downloaded from Elcodis.com electronic components distributor

D^2PAK MECHANICAL DATA

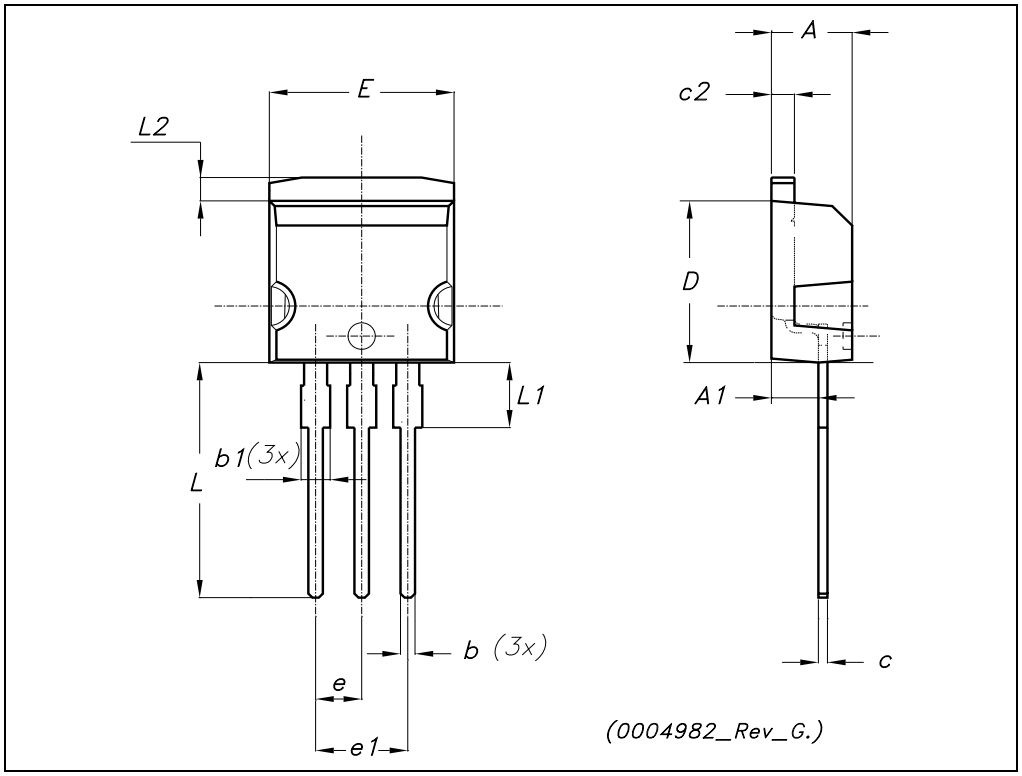
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.4		4.6	0.173		0.181
A1	2.49		2.69	0.098		0.106
A2	0.03		0.23	0.001		0.009
B	0.7		0.93	0.027		0.036
B2	1.14		1.7	0.044		0.067
C	0.45		0.6	0.017		0.023
C2	1.23		1.36	0.048		0.053
D	8.95		9.35	0.352		0.368
D1		8			0.315	
E	10		10.4	0.393		
E1		8.5			0.334	
G	4.88		5.28	0.192		0.208
L	15		15.85	0.590		0.625
L2	1.27		1.4	0.050		0.055
L3	1.4		1.75	0.055		0.068
M	2.4		3.2	0.094		0.126
R		0.4			0.015	
V2	0º		8º			



Downloaded from Elcodis.com electronic components distributor

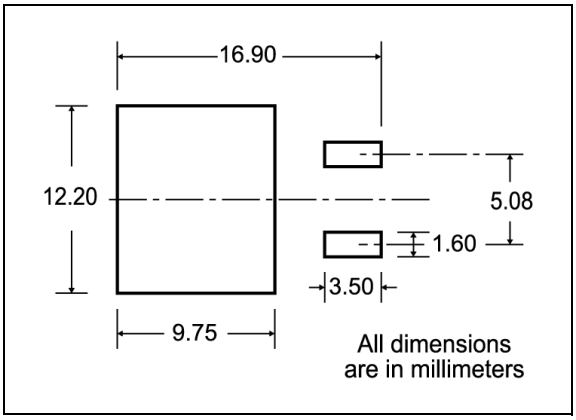
TO-262 (I^2PAK) MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
A1	2.40		2.72	0.094		0.107
b	0.61		0.88	0.024		0.034
b1	1.14		1.70	0.044		0.066
c	0.49		0.70	0.019		0.027
c2	1.23		1.32	0.048		0.052
D	8.95		9.35	0.352		0.368
e	2.40		2.70	0.094		0.106
e1	4.95		5.15	0.194		0.202
E	10		10.40	0.393		0.410
L	13		14	0.511		0.551
L1	3.50		3.93	0.137		0.154
L2	1.27		1.40	0.050		0.055

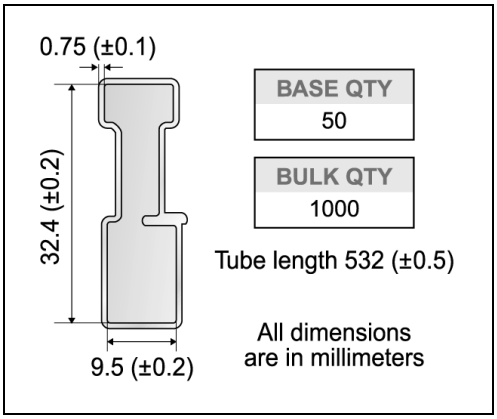


Downloaded from Elcodis.com electronic components distributor

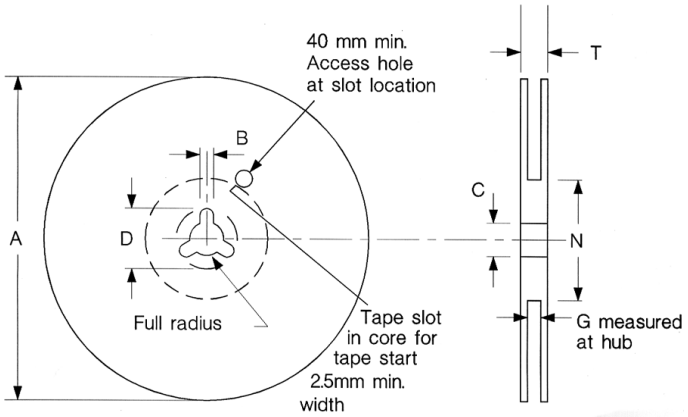
D²PAK FOOTPRINT



TUBE SHIPMENT (no suffix)*



TAPE AND REEL SHIPMENT (suffix "T4")*



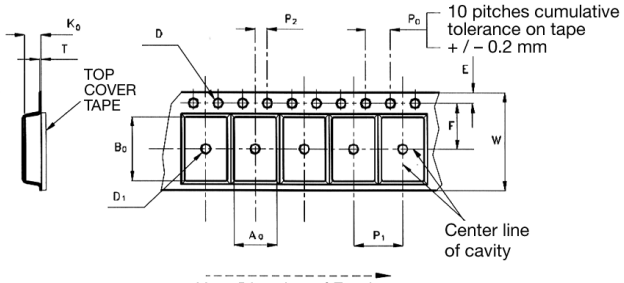
REEL MECHANICAL DATA

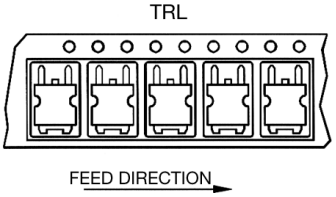
DIM.	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A		330		12.992
B	1.5		0.059	
C	12.8	13.2	0.504	0.520
D	20.2		0795	
G	24.4	26.4	0.960	1.039
N	100		3.937	
T		30.4		1.197

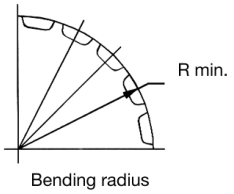
BASE QTY	BULK QTY
1000	1000

TAPE MECHANICAL DATA

DIM.	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A0	10.5	10.7	0.413	0.421
B0	15.7	15.9	0.618	0.626
D	1.5	1.6	0.059	0.063
D1	1.59	1.61	0.062	0.063
E	1.65	1.85	0.065	0.073
F	11.4	11.6	0.449	0.456
K0	4.8	5.0	0.189	0.197
P0	3.9	4.1	0.153	0.161
P1	11.9	12.1	0.468	0.476
P2	1.9	2.1	0.075	0.082
R	50		1.574	
T	0.25	0.35	0.0098	0.0137
W	23.7	24.3	0.933	0.956







* on sales type

Downloaded from Elcodis.com electronic components distributor

Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

© The ST logo is a registered trademark of STMicroelectronics

© 2003 STMicroelectronics - Printed in Italy - All Rights Reserved
STMicroelectronics GROUP OF COMPANIES
Australia - Brazil - Canada - China - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco
Singapore - Spain - Sweden - Switzerland - United Kingdom - United States.
© http://www.st.com

Downloaded from Elcodis.com electronic components distributor