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STGD7NB120S-1

N-CHANNEL 7A - 1200V - IPAK

PowerMESH™ IGBT

PRELIMINARY DATA

TYPE	V _{CES}	V _{CE(sat)}	I _C
STGD7NB120S-1	1200 V	< 2.1 V	7 A

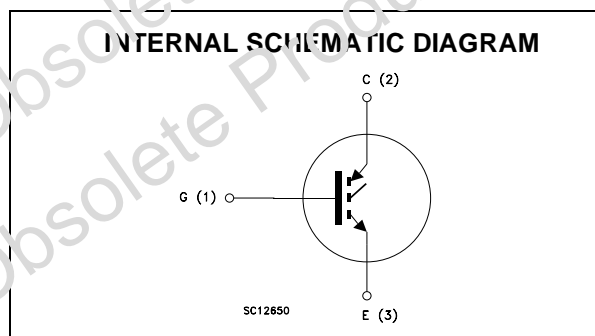
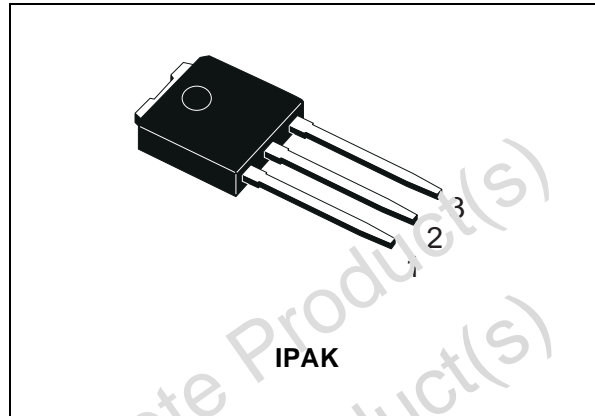
- HIGH INPUT IMPEDANCE (VOLTAGE DRIVEN)
- VERY LOW ON-VOLTAGE DROP (V_{cesat})
- OFF LOSSES INCLUDE TAIL CURRENT
- HIGH CURRENT CAPABILITY

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 suffix "S" identifies a family optimized to achieve minimum on-voltage drop for low frequency applications (<1kHz).

APPLICATIONS

- MOTOR CONTROL
- LIGHT DIMMER
- INRUSH CURRENT LIMITATION



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{CES}	Collector-Emitter Voltage (V _{GS} = 0)	1200	V
V _{ECR}	Reverse Battery Protection	20	V
V _{GE}	Gate-Emitter Voltage	±20	V
I _C	Collector Current (continuous) at T _C = 25°C	10	A
I _C	Collector Current (continuous) at T _C = 100°C	7	A
I _{CM} (■)	Collector Current (pulsed)	20	A
P _{TOT}	Total Dissipation at T _C = 25°C	55	W
	Derating Factor	0.4	W/°C
T _{stg}	Storage Temperature	-65 to 150	°C
T _j	Max. Operating Junction Temperature	150	°C

(■) Pulse width limited by safe operating area

STGD7NB120S-1

THERMAL DATA

Rthj-case	Thermal Resistance Junction-case Max	2.27	°C/W
Rthj-amb	Thermal Resistance Junction-ambient Max	100	°C/W
Rthc-h	Thermal Resistance Case-heatsink Typ	0.5	°C/W

ELECTRICAL CHARACTERISTICS (TCASE = 25 °C UNLESS OTHERWISE SPECIFIED)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{BR(CES)}$	Collectro-Emitter Breakdown Voltage	$I_C = 250 \mu A, V_{GE} = 0$	1200			V
$V_{BR(ECR)}$	Emitter-Collectro Breakdown Voltage	$I_C = 10mA, V_{GE} = 0$	20			V
I_{CES}	Collector cut-off ($V_{GE} = 0$)	$V_{CE} = \text{Max Rating}, T_C = 25 \text{ }^\circ\text{C}$ $V_{CE} = \text{Max Rating}, T_C = 125 \text{ }^\circ\text{C}$			50 250	μA μA
I_{GES}	Gate-Emitter Leakage Current ($V_{CE} = 0$)	$V_{GE} = \pm 20V, V_{CE} = 0$			± 100	nA

ON (1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GE(th)}$	Gate Threshold Voltage	$V_{CE} = V_{GE}, I_C = 250\mu A$	3		5	V
V_{GE}	Gate Emitter Voltage	$V_{CE} = 2.5V, I_C = 2A$ $T_J = 25 \div 125 \text{ }^\circ\text{C}$			6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$V_{GE} = 15V, I_C = 3.5A$			1.6	V
		$V_{CE} = 15V, I_C = 7A$			2.1	V
		$V_{GE} = 15V, I_C = 10A$		1.7		

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs}	Forward Transconductance	$V_{CE} = 25V, I_C = 7A$	2.5	4.5		S
C_{ies}	Input Capacitance	$V_{CE} = 25V, f = 1 \text{ MHz}, V_{GE} = 0$		430		pF
C_{oes}	Output Capacitance			40		pF
C_{res}	Reverse Transfer Capacitance			7		pF
Q_g	Gate Charge	$V_{CE} = 960V, I_C = 7A,$ $V_{GE} = 15V$		29		nC
I_{CL}	Latching Current	$V_{clamp} = 960V, T_J = 150 \text{ }^\circ\text{C}$ $R_G = 1K\Omega$	10			A

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$V_{CC} = 960V, I_C = 7A$ $R_G = 1K\Omega, V_{GE} = 15V$		570		ns
t_r	Rise Time			270		ns
$(di/dt)_{on}$	Turn-on Current Slope	$V_{CC} = 960V, I_C = 7A, R_G = 1K\Omega$ $V_{GE} = 15V, T_J = 125 \text{ }^\circ\text{C}$		800		A/ μs
E_{on}	Turn-on Switching Losses			3.2		μJ

ELECTRICAL CHARACTERISTICS (CONTINUED)**SWITCHING OFF**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_c	Cross-over Time	$V_{CC} = 960 \text{ V}$, $I_C = 7 \text{ A}$, $R_{GE} = 1 \text{ K}\Omega$, $V_{GE} = 15 \text{ V}$		4.9		μs
$t_r(V_{off})$	Off Voltage Rise Time			2.9		μs
t_f	Fall Time			3.3		μs
$E_{off(**)}$	Turn-off Switching Loss			15		mJ
t_c	Cross-over Time	$V_{CC} = 960 \text{ V}$, $I_C = 7 \text{ A}$, $R_{GE} = 1 \text{ K}\Omega$, $V_{GE} = 15 \text{ V}$ $T_j = 125 \text{ }^\circ\text{C}$		7.5		μs
$t_r(V_{off})$	Off Voltage Rise Time			5.5		μs
t_f	Fall Time			6.2		μs
$E_{off(**)}$	Turn-off Switching Loss			22		mJ

Note: 1. Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %.
 2. Pulse width limited by max. junction temperature.
 (**) Losses include Also the Tail (Jedec Standardization)

Fig. 1: Gate Charge test Circuit

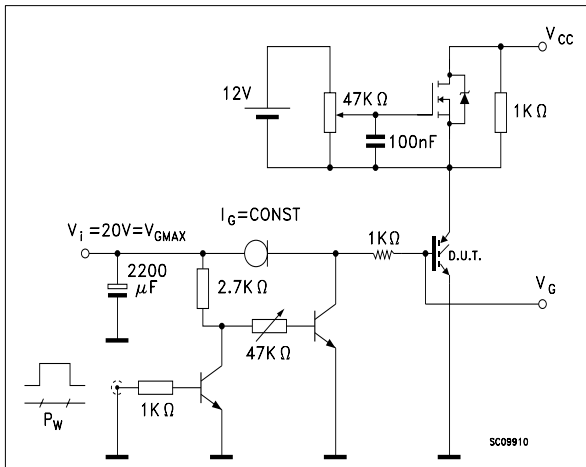
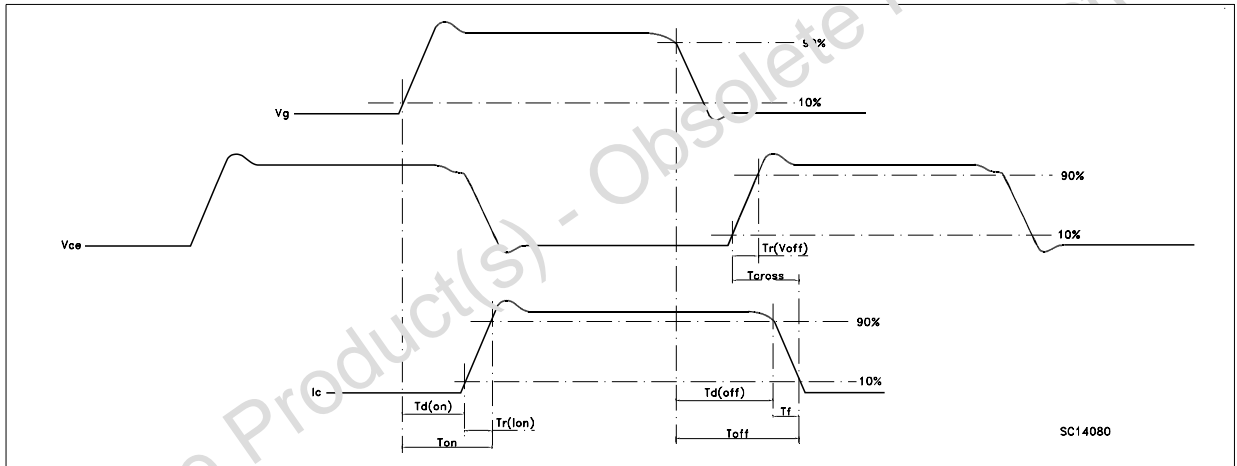
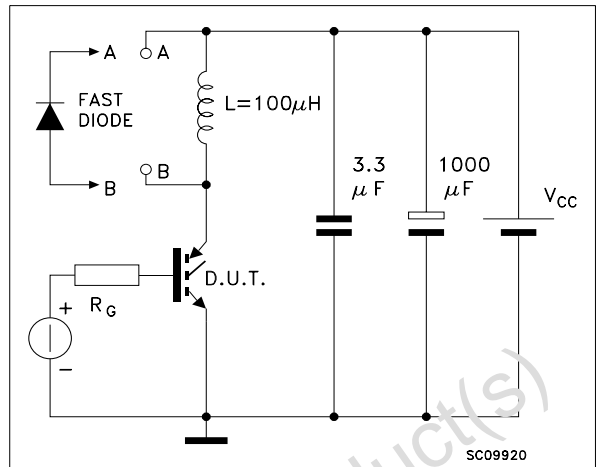
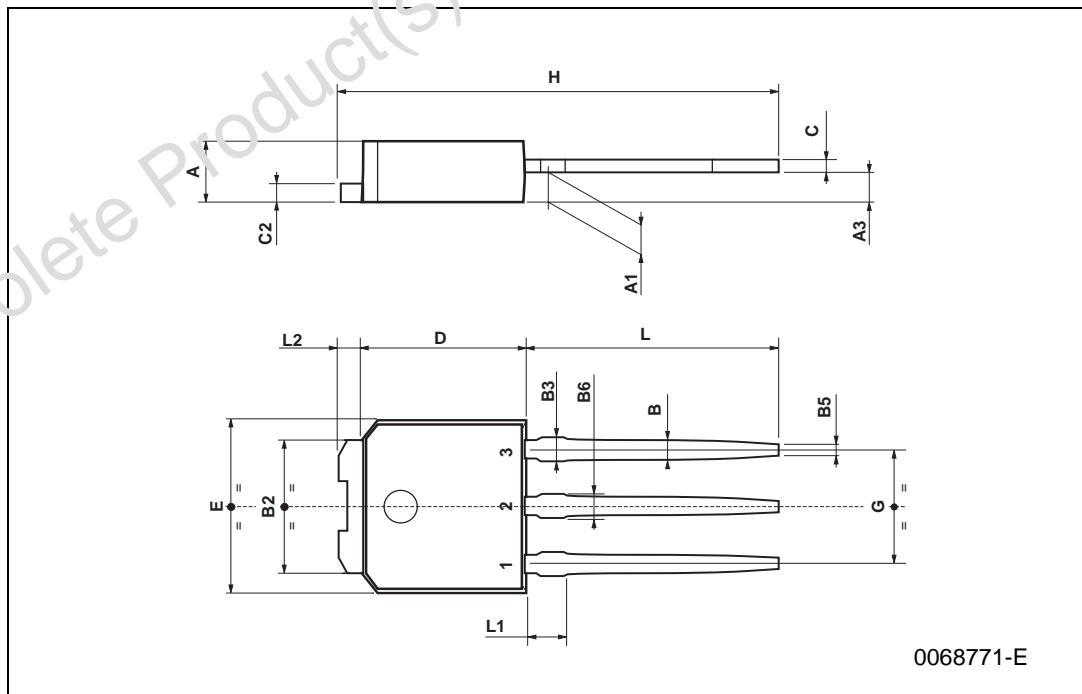


Fig. 2: Test Circuit For Inductive Load Switching



TO-251 (IPAK) MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	2.2		2.4	0.086		0.094
A1	0.9		1.1	0.035		0.043
A3	0.7		1.3	0.027		0.051
B	0.64		0.9	0.025		0.031
B2	5.2		5.4	0.204		0.212
B3			0.85			0.033
B5		0.3			0.012	
B6			0.95			0.037
C	0.45		0.6	0.017		0.023
C2	0.48		0.6	0.019		0.023
D	6		6.2	0.236		0.244
E	6.4		6.6	0.252		0.260
G	4.4		4.6	0.173		0.181
H	15.9		16.3	0.626		0.641
L	9		9.4	0.354		0.370
L1	0.8		1.2	0.031		0.047
L2		0.8	1		0.031	0.039



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