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# STGD7NB120S-1

N-CHANNEL 7A - 1200V - IPAK

PowerMESH™ IGBT

PRELIMINARY DATA

TYPE	V <sub>CES</sub>	V <sub>CE(sat)</sub>	I <sub>C</sub>
STGD7NB120S-1	1200 V	< 2.1 V	7 A

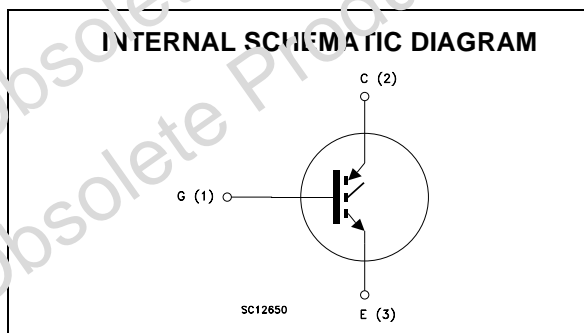
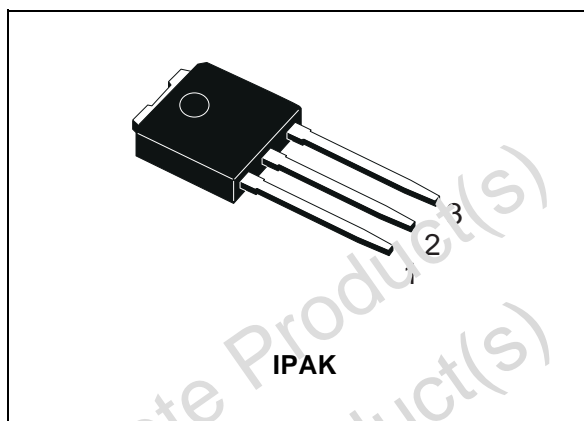
- HIGH INPUT IMPEDANCE (VOLTAGE DRIVEN)
- VERY LOW ON-VOLTAGE DROP (V<sub>cesat</sub>)
- OFF LOSSES INCLUDE TAIL CURRENT
- HIGH CURRENT CAPABILITY

## 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 achieve minimum on-voltage drop for low frequency applications (<1kHz).

## APPLICATIONS

- MOTOR CONTROL
- LIGHT DIMMER
- INTRUSH CURRENT LIMITATION



## ABSOLUTE MAXIMUM RATINGS

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

(●) Pulse width limited by safe operating area

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**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 <sub>BR(CES)</sub>	Collectro-Emitter Breakdown Voltage	I <sub>C</sub> = 250 μA, V <sub>GE</sub> = 0	1200			V
V <sub>BR(ECR)</sub>	Emitter-Collectro Breakdown Voltage	I <sub>C</sub> = 10mA, V <sub>GE</sub> = 0	20			V
I <sub>CES</sub>	Collector cut-off (V <sub>GE</sub> = 0)	V <sub>CE</sub> = Max Rating, T <sub>C</sub> = 25 °C V <sub>CE</sub> = Max Rating, T <sub>C</sub> = 125 °C			50 250	μA μA
I <sub>GES</sub>	Gate-Emitter Leakage Current (V <sub>CE</sub> = 0)	V <sub>GE</sub> = ±20V, V <sub>CE</sub> = 0			±100	nA

**ON (1)**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V <sub>GE(th)</sub>	Gate Threshold Voltage	V <sub>CE</sub> = V <sub>GE</sub> , I <sub>C</sub> = 250μA	3		5	V
V <sub>GE</sub>	Gate Emitter Voltage	V <sub>CE</sub> = 2.5V, I <sub>C</sub> = 2A, T <sub>J</sub> = 25÷125°C			6.5	V
V <sub>CE(sat)</sub>	Collector-Emitter Saturation Voltage	V <sub>GE</sub> = 15V, I <sub>C</sub> = 3.5 A V <sub>GE</sub> = 15V, I <sub>C</sub> = 7 A V <sub>GE</sub> = 15V, I <sub>C</sub> = 10 A		1.7	1.6 2.1	V V

**DYNAMIC**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g <sub>fs</sub>	Forward Transconductance	V <sub>CE</sub> = 25 V, I <sub>C</sub> = 7 A	2.5	4.5		S
C <sub>ies</sub>	Input Capacitance	V <sub>CE</sub> = 25V, f = 1 MHz, V <sub>GE</sub> = 0		430		pF
C <sub>oes</sub>	Output Capacitance			40		pF
C <sub>res</sub>	Reverse Transfer Capacitance			7		pF
Q <sub>g</sub>	Gate Charge	V <sub>CE</sub> = 960V, I <sub>C</sub> = 7 A, V <sub>GE</sub> = 15V		29		nC
I <sub>CL</sub>	Latching Current	V <sub>clamp</sub> = 960V, T <sub>J</sub> = 150°C R <sub>G</sub> = 1KΩ	10			A

**SWITCHING ON**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>CC</sub> = 960 V, I <sub>C</sub> = 7 A R <sub>G</sub> = 1KΩ, V <sub>GE</sub> = 15 V		570		ns
t <sub>r</sub>	Rise Time			270		ns
(di/dt) <sub>on</sub>	Turn-on Current Slope	V <sub>CC</sub> = 960 V, I <sub>C</sub> = 7 A, R <sub>G</sub> = 1KΩ V <sub>GE</sub> = 15 V, T <sub>J</sub> = 125°C		800		A/μs
E <sub>on</sub>	Turn-on Switching Losses			3.2		μJ

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**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		$\mu\text{s}$
$t_r(V_{off})$	Off Voltage Rise Time		2.9	$\mu\text{s}$		
$t_f$	Fall Time		3.3	$\mu\text{s}$		
$E_{off(**)}$	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		$\mu\text{s}$
$t_r(V_{off})$	Off Voltage Rise Time		5.5	$\mu\text{s}$		
$t_f$	Fall Time		6.2	$\mu\text{s}$		
$E_{off(**)}$	Turn-off Switching Loss		22	mJ		

Note: 1. Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5 %.

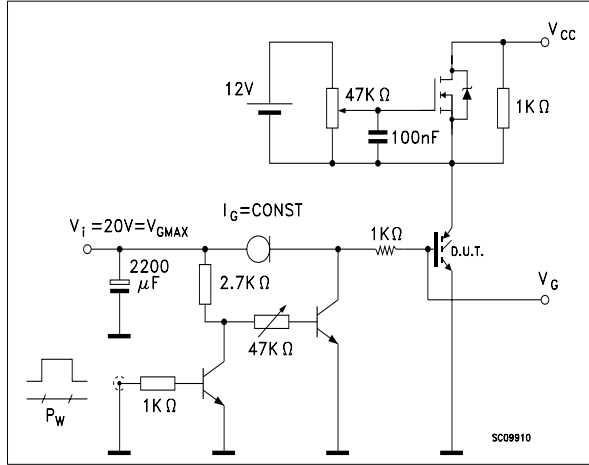
2. Pulse width limited by max. junction temperature.

(\*\*)Losses include Also the Tail (Jedec Standardization)

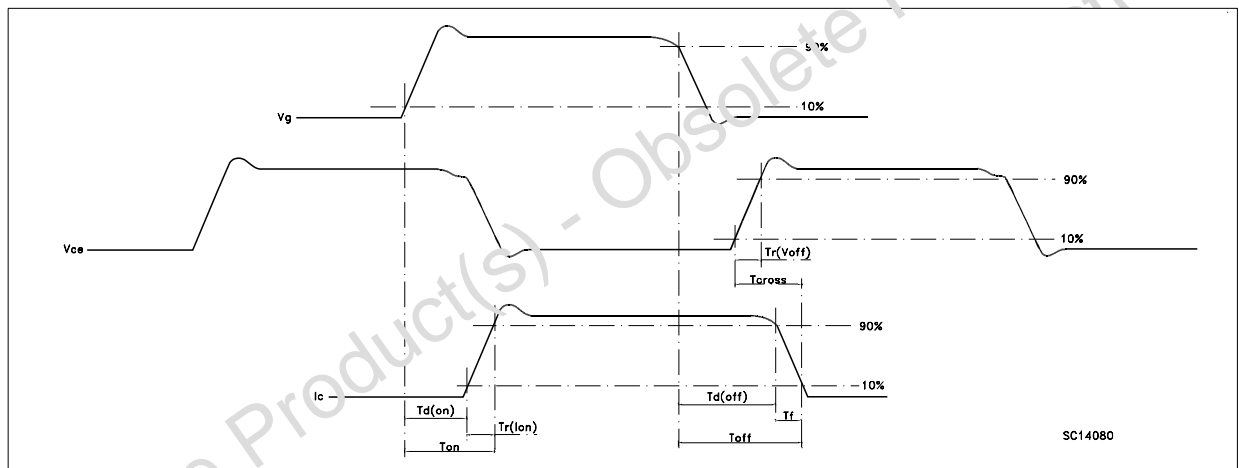
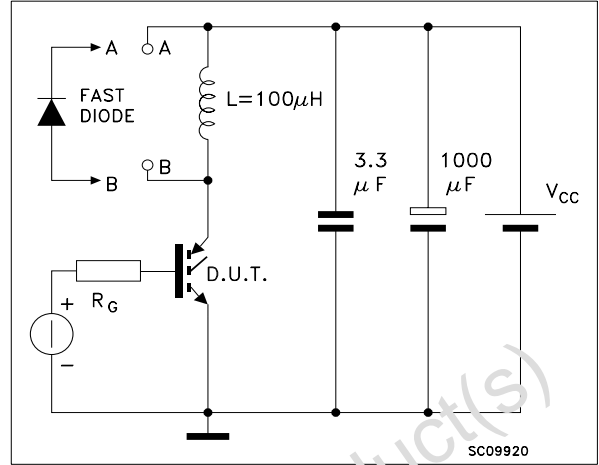
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**Fig. 1: Gate Charge test Circuit**



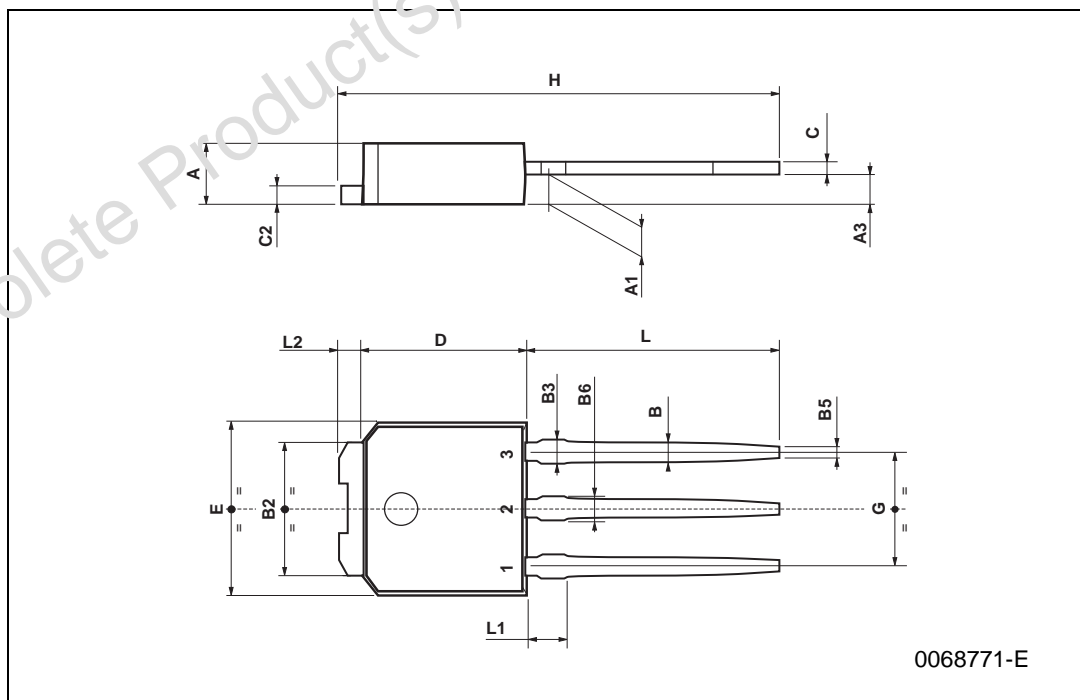
**Fig. 2: Test Circuit For Inductive Load Switching**



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**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		9.1	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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