



# STGP7NB60F - STGD7NB60F

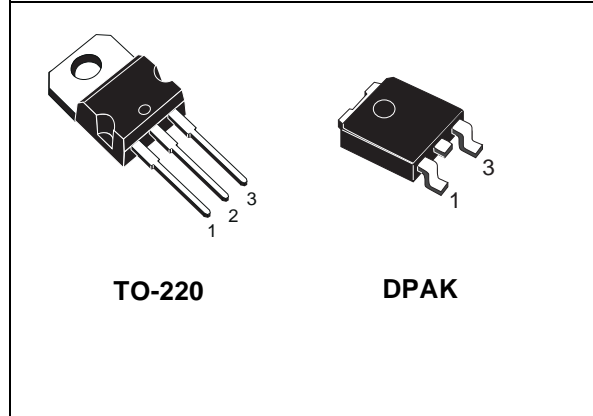
N-CHANNEL 7A - 600V - TO-220 / DPAK

PowerMESH™ IGBT

PRELIMINARY DATA

TYPE	V <sub>CES</sub>	V <sub>CE(sat)</sub> (Max) @25°C	I <sub>C</sub> @100°C
STGP7NB60F	600 V	< 2.4 V	7 A
STGD7NB60F	600 V	< 2.4 V	7 A

- HIGH INPUT IMPEDANCE
- LOW ON-VOLTAGE DROP (V<sub>cesat</sub>)
- OFF LOSSES INCLUDE TAIL CURRENT
- LOW GATE CHARGE
- HIGH CURRENT CAPABILITY
- HIGH FREQUENCY OPERATION
- ADD SUFFIX "T4" FOR ORDERING IN TAPE & REEL (DPAK)

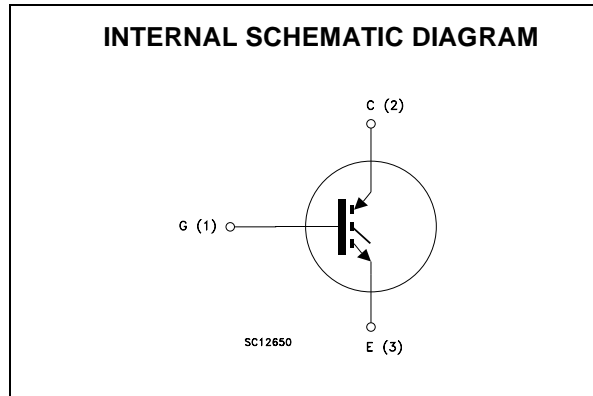


## DESCRIPTION

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 "F" identifies a family optimized to achieve very low switching times for frequency applications (<40KHZ)

## APPLICATIONS

- MOTOR CONTROLS
- SMPS AND PFC AND BOTH HARD SWITCH AND RESONANT TOPOLOGIES



## ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		TO-220	DPAK	
V <sub>CES</sub>	Collector-Emitter Voltage (V <sub>GS</sub> = 0)	600		V
V <sub>GE</sub>	Gate-Emitter Voltage	±20		V
I <sub>C</sub>	Collector Current (continuous) at T <sub>C</sub> = 25°C	14		A
I <sub>C</sub>	Collector Current (continuous) at T <sub>C</sub> = 100°C	7		A
I <sub>CM</sub> (■)	Collector Current (pulsed)	56		A
P <sub>TOT</sub>	Total Dissipation at T <sub>C</sub> = 25°C	80	70	W
	Derating Factor	0.64	0.56	W/°C
T <sub>stg</sub>	Storage Temperature	- 55 to 150		°C
T <sub>j</sub>	Max. Operating Junction Temperature	150		°C

(■) PULSE WIDTH LIMITED BY SAFE OPERATING AREA

## STGP7NB60F - STGD7NB60F

### THERMAL DATA

		TO-220	DPAK	
Rthj-case	Thermal Resistance Junction-case Max	1.56	1.78	°C/W
Rthj-amb	Thermal Resistance Junction-ambient Max	62.5	100	°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	600			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			10 100	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>CE(sat)</sub>	Collector-Emitter Saturation Voltage	V <sub>GE</sub> = 15V, I <sub>C</sub> = 7 A V <sub>GE</sub> = 15V, I <sub>C</sub> = 7 A, T <sub>J</sub> = 125°C		2 1.5	2.4	V V

### DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
C <sub>ies</sub>	Input Capacitance	V <sub>CE</sub> = 25V, f = 1 MHz, V <sub>GE</sub> = 0			540	pF
C <sub>oes</sub>	Output Capacitance				80	pF
C <sub>res</sub>	Reverse Transfer Capacitance				13	pF
Q <sub>g</sub>	Total Gate Charge	V <sub>CE</sub> = 480V, I <sub>C</sub> = 7 A, V <sub>GE</sub> = 15V		37	50	nC
Q <sub>ge</sub>	Gate-Emitter Charge			4		nC
Q <sub>gc</sub>	Gate-Collector Charge			18		nC
I <sub>CL</sub>	Latching Current	V <sub>clamp</sub> = 480 V T <sub>J</sub> = 125°C, R <sub>G</sub> = 10 Ω		28		A

### SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>CC</sub> = 480 V, I <sub>C</sub> = 7 A		17		ns
t <sub>r</sub>	Rise Time	R <sub>G</sub> = 10Ω, V <sub>GE</sub> = 15 V		6		ns
(di/dt) <sub>on</sub>	Turn-on Current Slope	V <sub>CC</sub> = 480 V, I <sub>C</sub> = 7 A R <sub>G</sub> = 10Ω		900		A/μs
E <sub>on</sub>	Turn-on Switching Losses	V <sub>GE</sub> = 15 V, T <sub>J</sub> = 125°C		60		μJ

**ELECTRICAL CHARACTERISTICS (CONTINUED)**

**SWITCHING OFF**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_c$	Cross-over Time	$V_{CC} = 480\text{ V}, I_C = 7\text{ A},$ $R_G = 10\ \Omega, V_{GE} = 15\text{ V}$		190		ns
$t_r(V_{off})$	Off Voltage Rise Time			45		ns
$t_{d(off)}$	Delay Time			110		ns
$t_f$	Fall Time			140		ns
$E_{off(**)}$	Turn-off Switching Loss			240		$\mu\text{J}$
$E_{ts}$	Total Switching Loss			290		$\mu\text{J}$
$t_c$	Cross-over Time	$V_{CC} = 480\text{ V}, I_C = 7\text{ A},$ $R_G = 10\ \Omega, V_{GE} = 15\text{ V}$ $T_j = 125\text{ }^\circ\text{C}$		410		ns
$t_r(V_{off})$	Off Voltage Rise Time			135		ns
$t_{d(off)}$	Delay Time			205		ns
$t_f$	Fall Time			300		ns
$E_{off(**)}$	Turn-off Switching Loss			650		$\mu\text{J}$
$E_{ts}$	Total Switching Loss			625		$\mu\text{J}$

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)

Fig. 1: Gate Charge test Circuit

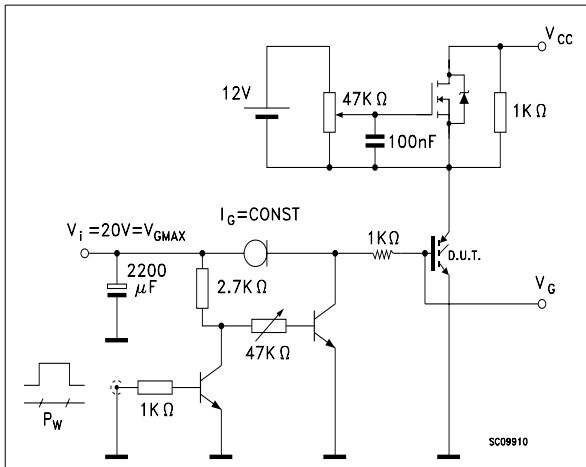
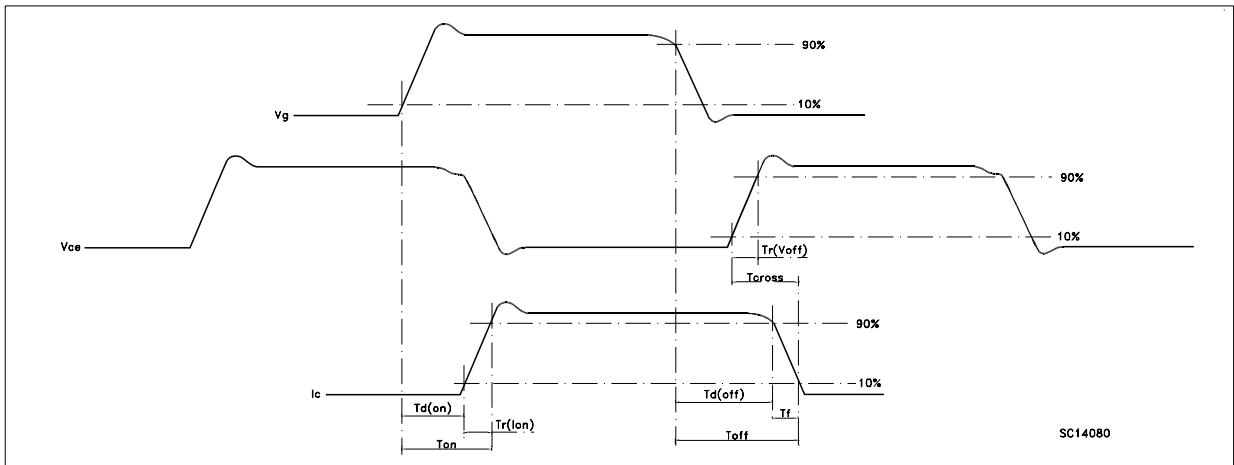
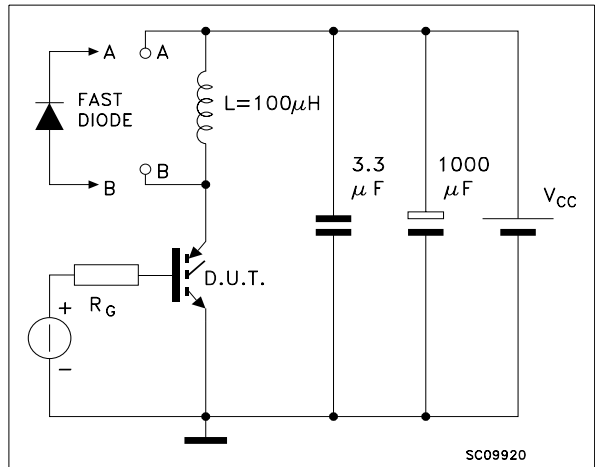
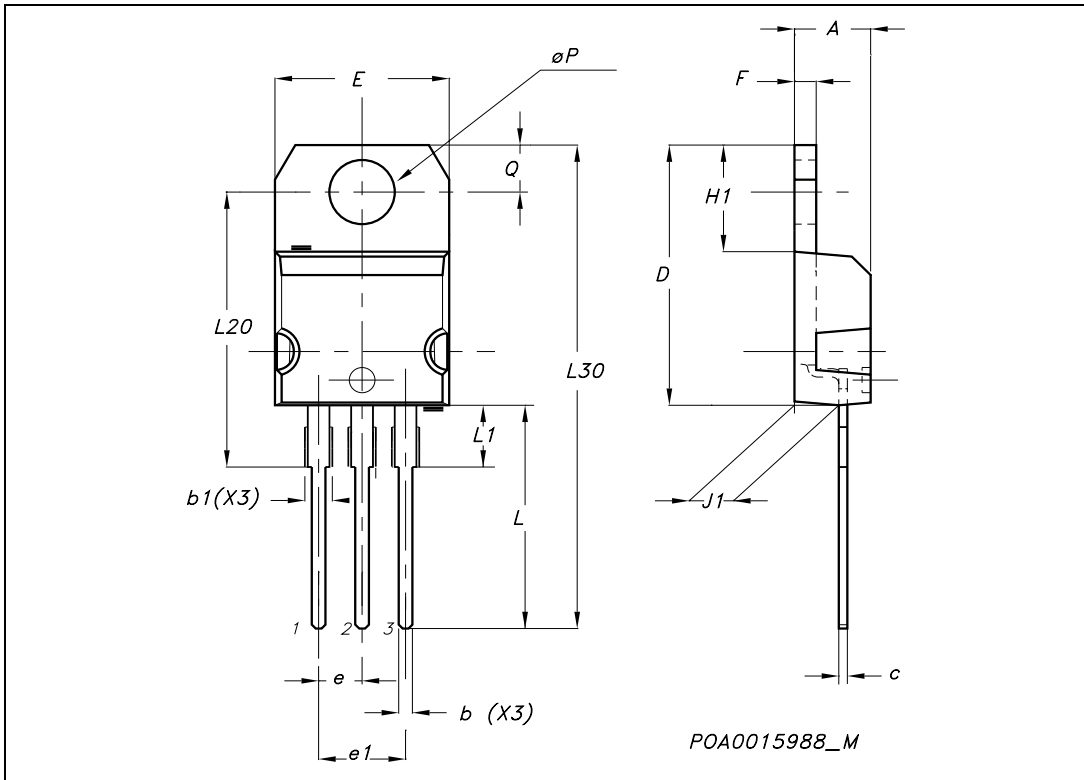


Fig. 2: Test Circuit For Inductive Load Switching



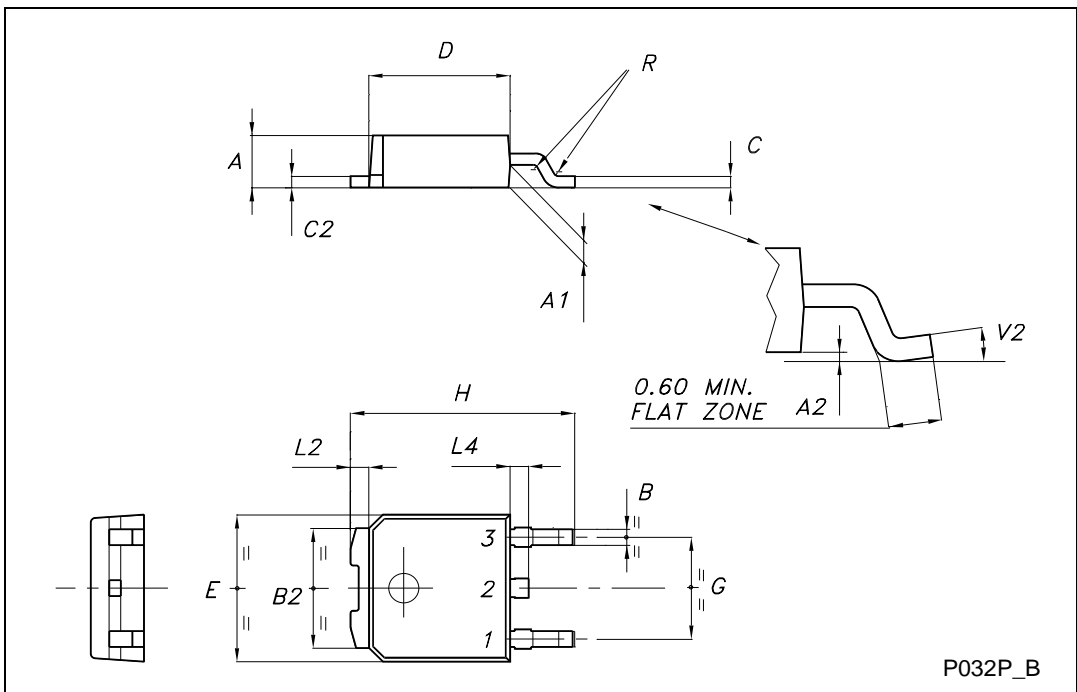
**TO-220 MECHANICAL DATA**

DIM.	mm.			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
b	0.61		0.88	0.024		0.034
b1	1.15		1.70	0.045		0.066
c	0.49		0.70	0.019		0.027
D	15.25		15.75	0.60		0.620
E	10		10.40	0.393		0.409
e	2.40		2.70	0.094		0.106
e1	4.95		5.15	0.194		0.202
F	1.23		1.32	0.048		0.052
H1	6.20		6.60	0.244		0.256
J1	2.40		2.72	0.094		0.107
L	13		14	0.511		0.551
L1	3.50		3.93	0.137		0.154
L20		16.40			0.645	
L30		28.90			1.137	
øP	3.75		3.85	0.147		0.151
Q	2.65		2.95	0.104		0.116

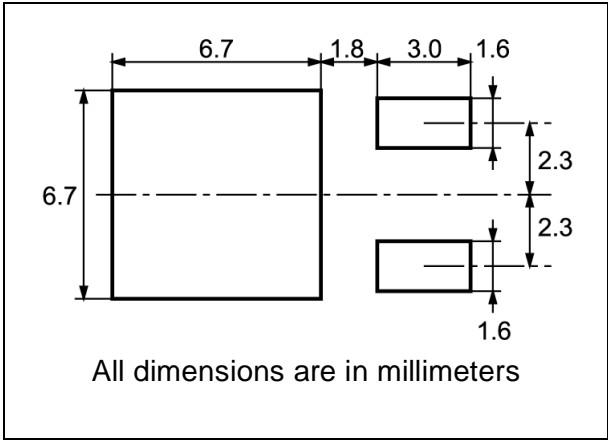


**TO-252 (DPAK) MECHANICAL DATA**

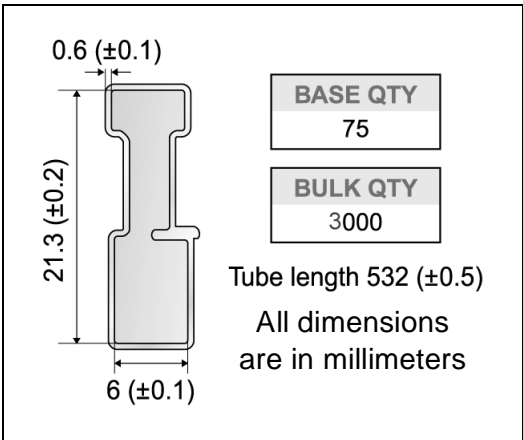
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	2.20		2.40	0.087		0.094
A1	0.90		1.10	0.035		0.043
A2	0.03		0.23	0.001		0.009
B	0.64		0.90	0.025		0.035
B2	5.20		5.40	0.204		0.213
C	0.45		0.60	0.018		0.024
C2	0.48		0.60	0.019		0.024
D	6.00		6.20	0.236		0.244
E	6.40		6.60	0.252		0.260
G	4.40		4.60	0.173		0.181
H	9.35		10.10	0.368		0.398
L2		0.8			0.031	
L4	0.60		1.00	0.024		0.039
V2	0°		8°	0°		0°



**DPAK FOOTPRINT**



**TUBE SHIPMENT (no suffix)\***



**TAPE AND REEL SHIPMENT (suffix "T4")\***

40 mm min. Access hole at slot location

Tape slot in core for tape start 2.5mm min. width

Full radius

G measured at hub

**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		0.795	
G	16.4	18.4	0.645	0.724
N	50		1.968	
T		22.4		0.881

BASE QTY	BULK QTY
2500	2500

**TAPE MECHANICAL DATA**

DIM.	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A0	6.8	7	0.267	0.275
B0	10.4	10.6	0.409	0.417
B1		12.1		0.476
D	1.5	1.6	0.059	0.063
D1	1.5		0.059	
E	1.65	1.85	0.065	0.073
F	7.4	7.6	0.291	0.299
K0	2.55	2.75	0.100	0.108
P0	3.9	4.1	0.153	0.161
P1	7.9	8.1	0.311	0.319
P2	1.9	2.1	0.075	0.082
R	40		1.574	
W	15.7	16.3	0.618	0.641

TOP COVER TAPE

10 pitches cumulative tolerance on tape +/- 0.2 mm

User Direction of Feed

FEED DIRECTION

Bending radius R min.

For machine ref. only including draft and radii concentric around B0

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