



STGP7NB60F - STGD7NB60F

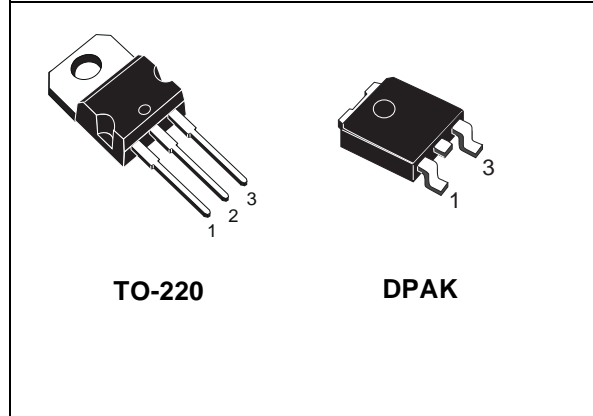
N-CHANNEL 7A - 600V - TO-220 / DPAK

PowerMESH™ IGBT

PRELIMINARY DATA

| TYPE | V _{CES} | V _{CE(sat)} (Max) @25°C | I _C @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_{cesat})
- OFF LOSSES INCLUDE TAIL CURRENT
- LOW GATE CHARGE
- HIGH CURRENT CAPABILITY
- HIGH FREQUENCY OPERATION
- ADD SUFFIX "T4" FOR ORDERING IN TAPE & REEL (DPAK)

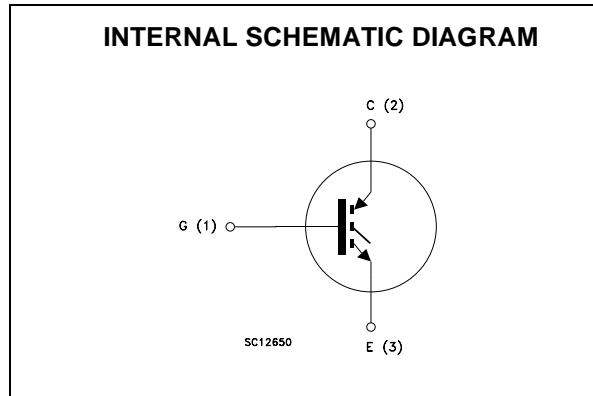


DESCRIPTION

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 _{CES} | Collector-Emitter Voltage (V _{GS} = 0) | 600 | | V |
| V _{GE} | Gate-Emitter Voltage | ±20 | | V |
| I _C | Collector Current (continuous) at T _C = 25°C | 14 | | A |
| I _C | Collector Current (continuous) at T _C = 100°C | 7 | | A |
| I _{CM} (■) | Collector Current (pulsed) | 56 | | A |
| P _{TOT} | Total Dissipation at T _C = 25°C | 80 | 70 | W |
| | Derating Factor | 0.64 | 0.56 | W/°C |
| T _{stg} | Storage Temperature | - 55 to 150 | | °C |
| T _j | 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 _{BR(CES)} | Collectro-Emitter Breakdown Voltage | I _C = 250 μA, V _{GE} = 0 | 600 | | | V |
| I _{CES} | Collector cut-off (V _{GE} = 0) | V _{CE} = Max Rating, T _C = 25 °C V _{CE} = Max Rating, T _C = 125 °C | | | 10 100 | μA μA |
| I _{GES} | Gate-Emitter Leakage Current (V _{CE} = 0) | V _{GE} = ±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 = 250μA | 3 | | 5 | V |
| V _{CE(sat)} | Collector-Emitter Saturation Voltage | V _{GE} = 15V, I _C = 7 A V _{GE} = 15V, I _C = 7 A, T _J = 125°C | | 2 1.5 | 2.4 | V V |

DYNAMIC

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

SWITCHING ON

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|-----------------------|--------------------------|--|------|------|------|------|
| t _{d(on)} | Turn-on Delay Time | V _{CC} = 480 V, I _C = 7 A | | 17 | | ns |
| t _r | Rise Time | R _G = 10Ω, V _{GE} = 15 V | | 6 | | ns |
| (di/dt) _{on} | Turn-on Current Slope | V _{CC} = 480 V, I _C = 7 A R _G = 10Ω | | 900 | | A/μs |
| E _{on} | Turn-on Switching Losses | V _{GE} = 15 V, T _J = 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 | | μJ |
| E_{ts} | Total Switching Loss | | | 290 | | μJ |
| 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 | | μJ |
| E_{ts} | Total Switching Loss | | | 625 | | μJ |

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

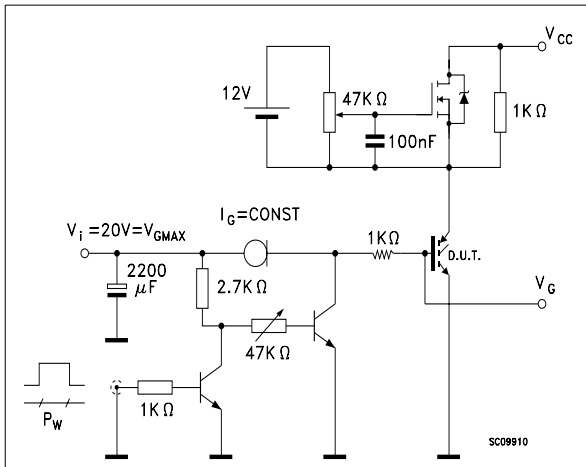
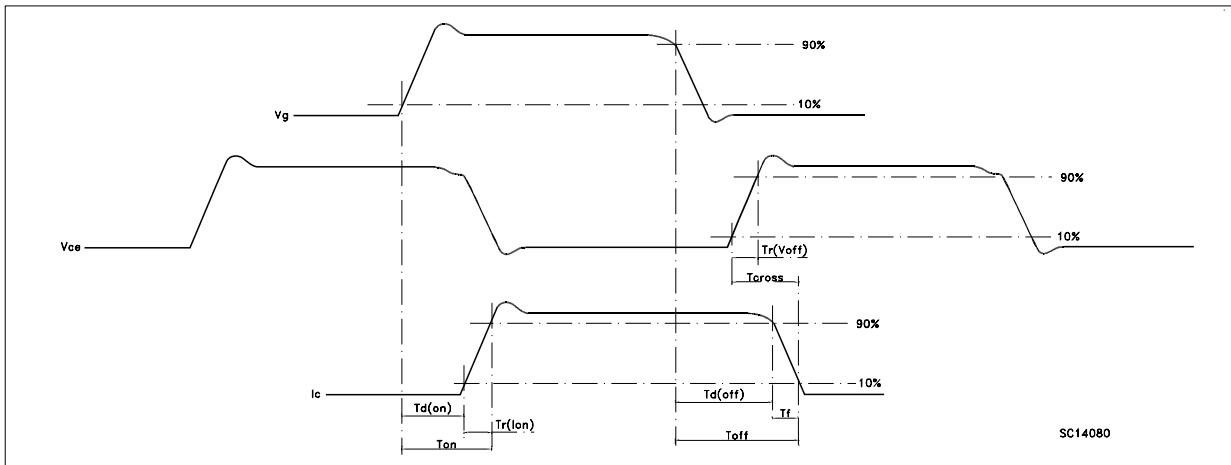
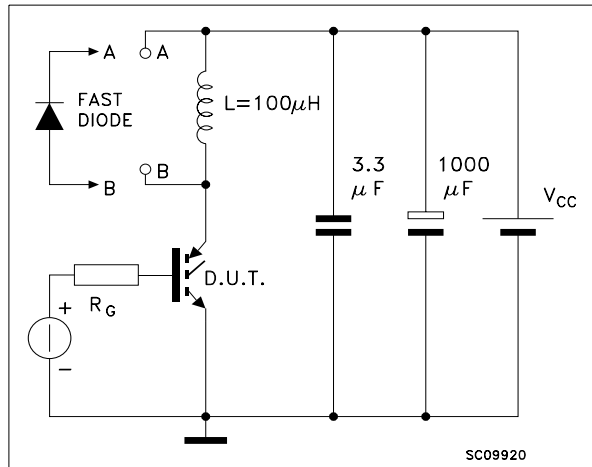
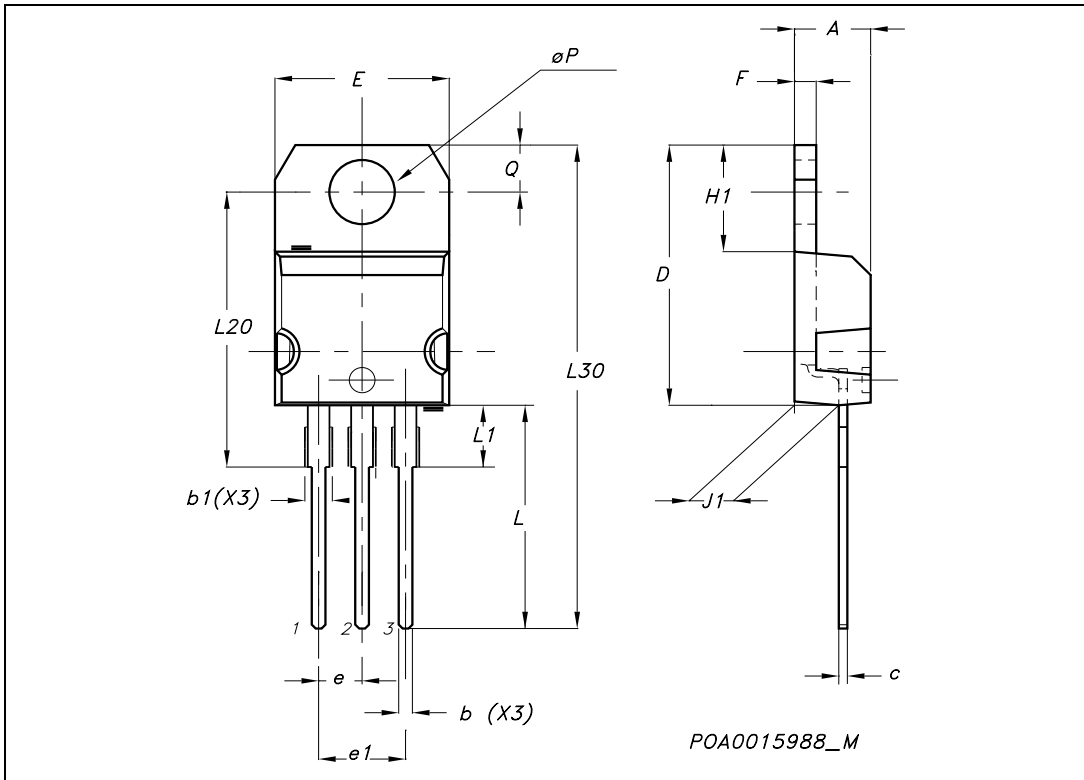


Fig. 2: Test Circuit For Inductive Load Switching



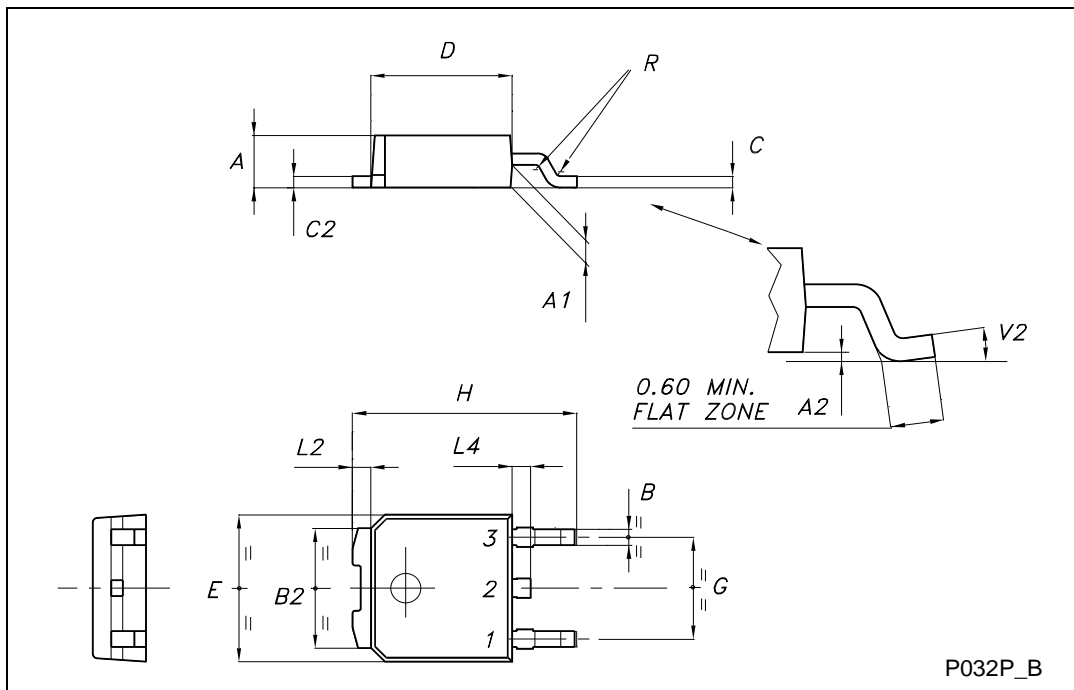
TO-220 MECHANICAL DATA

| 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 |

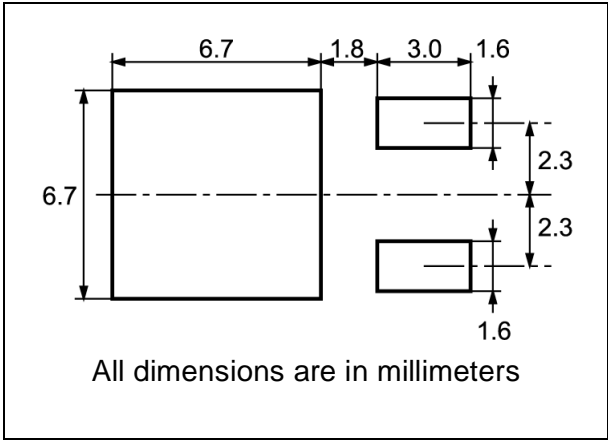


TO-252 (DPAK) MECHANICAL DATA

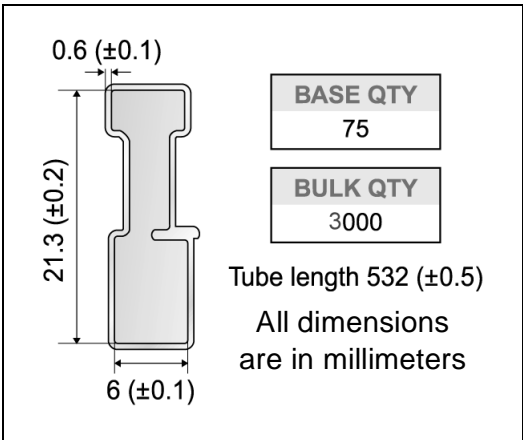
| DIM. | mm | | | inch | | |
|------|------|------|-------|-------|-------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | 2.20 | | 2.40 | 0.087 | | 0.094 |
| A1 | 0.90 | | 1.10 | 0.035 | | 0.043 |
| A2 | 0.03 | | 0.23 | 0.001 | | 0.009 |
| B | 0.64 | | 0.90 | 0.025 | | 0.035 |
| B2 | 5.20 | | 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

Full radius

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

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 | 2500 |
| BULK QTY | 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 |

10 pitches cumulative tolerance on tape + / - 0.2 mm

Center line of cavity

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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