



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 |

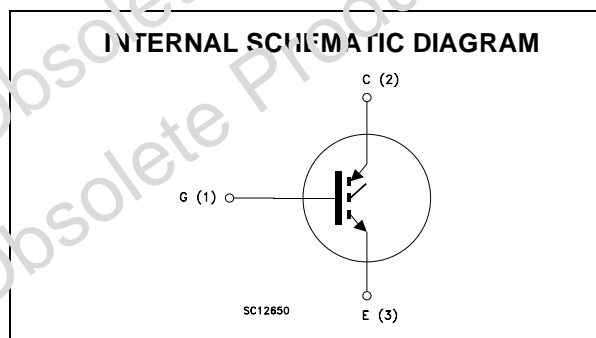
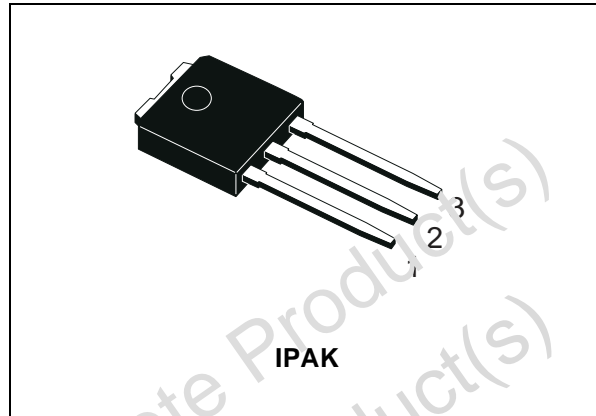
- HIGH INPUT IMPEDANCE (VOLTAGE DRIVEN)
- VERY LOW ON-VOLTAGE DROP (V_{cesat})
- OFF LOSSES INCLUDE TAIL CURRENT
- HIGH CURRENT CAPABILITY

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
- INTRUSH 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 μA, 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} = Max Rating, T _C = 25 °C V _{CE} = Max Rating, T _C = 125 °C | | | 50 250 | 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 _{GE} | Gate Emitter Voltage | V _{CE} = 2.5V, I _C = 2A T _J = 25±125°C | | | 6.5 | V |
| V _{CE(sat)} | Collector-Emitter Saturation Voltage | V _{GE} = 15V, I _C = 3.5 A V _{GE} = 15V, I _C = 7 A V _{GE} = 15V, I _C = 10 A | | 1.7 | 1.6 2.1 | V V |

DYNAMIC

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|------------------|------------------------------|---|------|------|------|------|
| g _{fs} | Forward Transconductance | V _{CE} = 25 V, I _C = 7 A | 2.5 | 4.5 | | S |
| C _{ies} | Input Capacitance | V _{CE} = 25V, f = 1 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 = 7 A, V _{GE} = 15V | | 29 | | nC |
| I _{CL} | Latching Current | V _{clamp} = 960V, T _J = 150°C R _G = 1KΩ | 10 | | | A |

SWITCHING ON

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|-----------------------|--------------------------|---|------|------|------|------|
| t _{d(on)} | Turn-on Delay Time | V _{CC} = 960 V, I _C = 7 A | | 570 | | ns |
| t _r | Rise Time | R _G = 1KΩ, V _{GE} = 15 V | | 270 | | ns |
| (di/dt) _{on} | Turn-on Current Slope | V _{CC} = 960 V, I _C = 7 A, R _G = 1KΩ V _{GE} = 15 V, T _J = 125°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

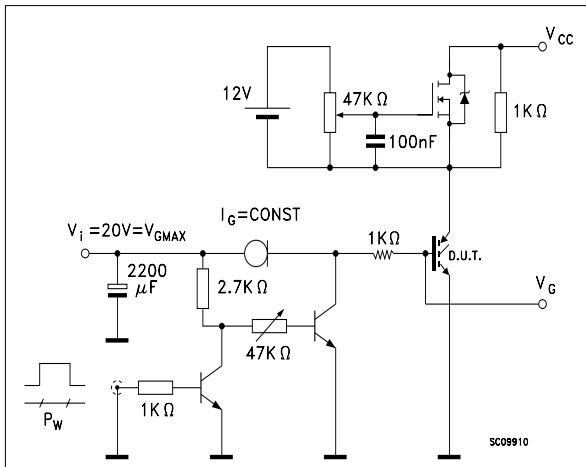
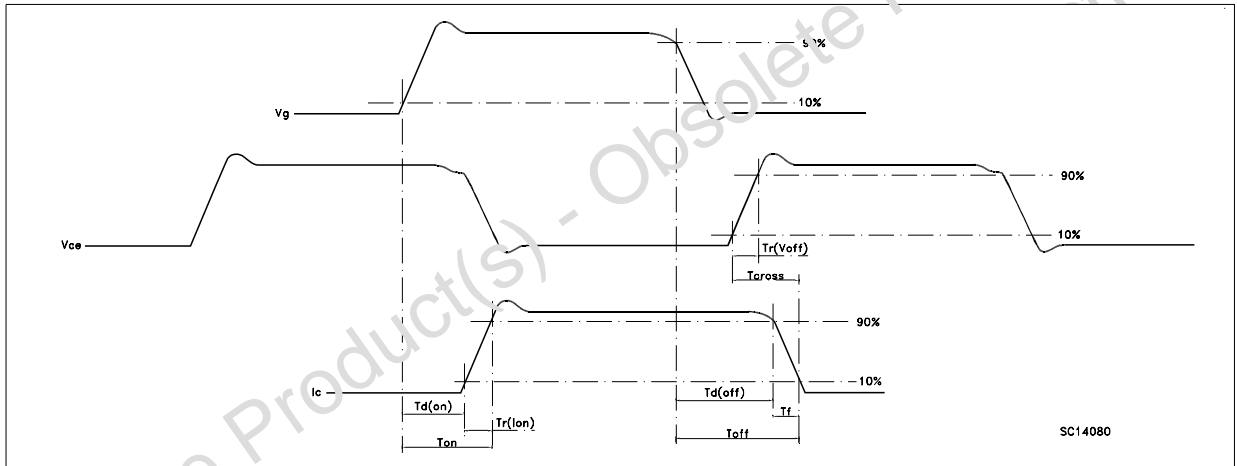
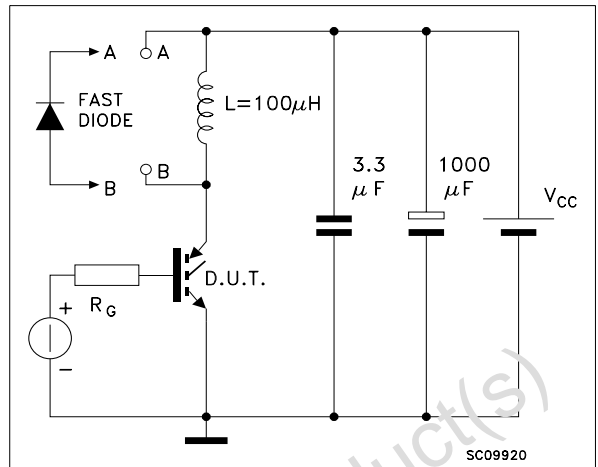
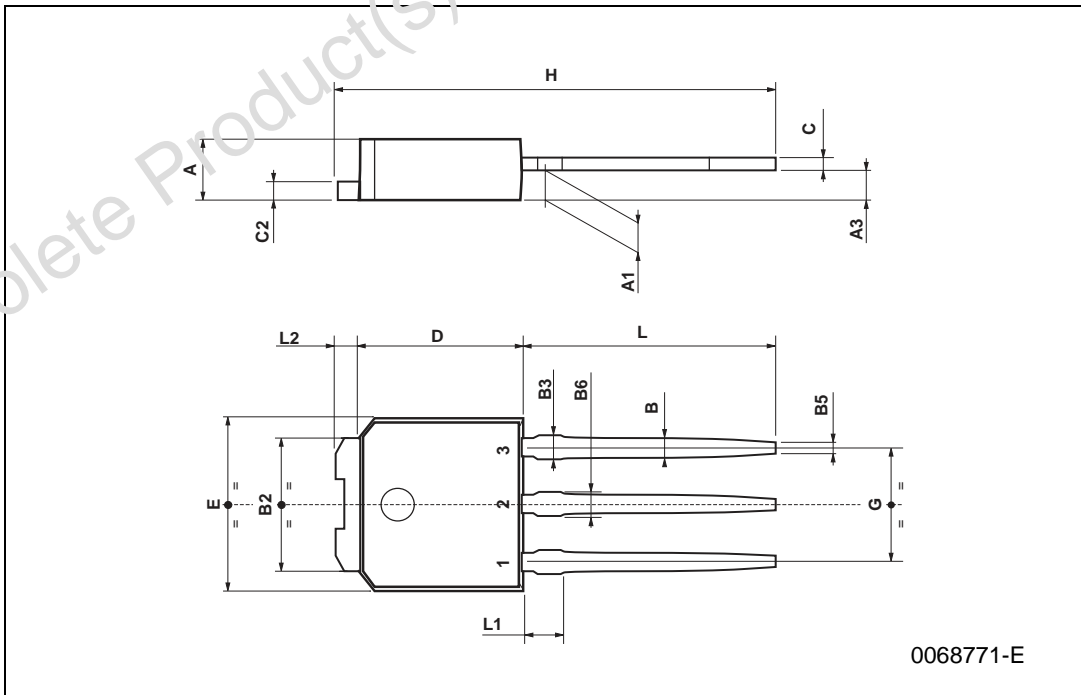


Fig. 2: Test Circuit For Inductive Load Switching



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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