



STB10NK60Z, STP10NK60Z STW10NK60Z

N-channel 650 V, 0.65 Ω , 10 A, SuperMESH™ Power MOSFET
Zener-protected I²PAK, D²PAK, TO-220, TO-220FP, TO-247

Features

| Type | V _{DSS} | R _{DS(on) max} | I _D | P _w |
|--------------|------------------|-------------------------|----------------|----------------|
| STB10NK60Z-1 | 600 V | < 0.75 Ω | 10 A | 115 W |
| STB10NK60Z | 600 V | < 0.75 Ω | 10 A | 115 W |
| STP10NK60Z | 600 V | < 0.75 Ω | 10 A | 115 W |
| STP10NK60ZFP | 600 V | < 0.75 Ω | 10 A | 35 W |
| STW10NK60Z | 600 V | < 0.75 Ω | 10 A | 156 W |

- Extremely high dv/dt capability
- 100% avalanche tested
- Gate charge minimized
- Very good manufacturing reliability

Application

- Switching applications

Description

The SuperMESH™ series is obtained through an extreme optimization of ST's well established strip-based PowerMESH™ layout. In addition to pushing on-resistance significantly down, special care is taken to ensure a very good dv/dt capability for the most demanding applications.

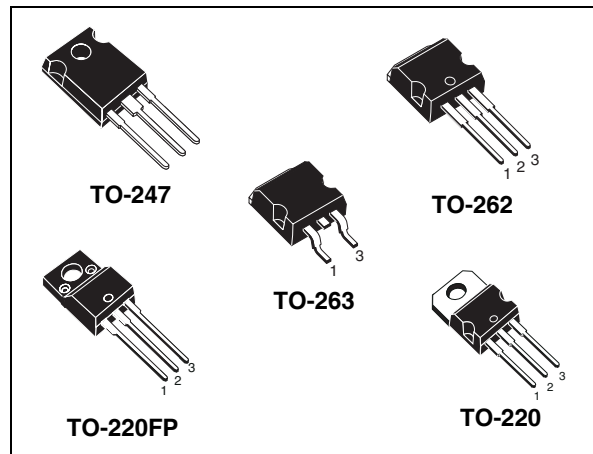


Figure 1. Internal schematic diagram

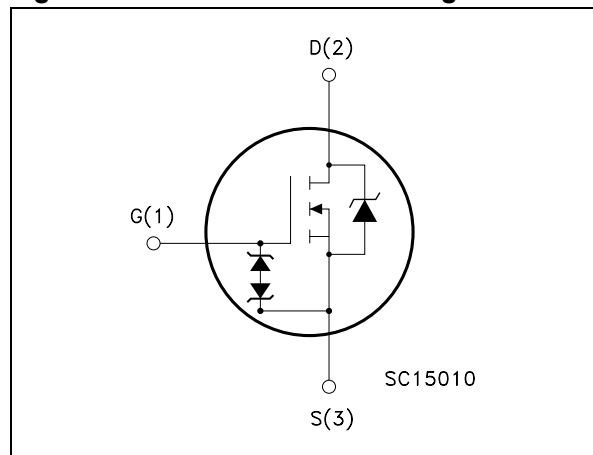


Table 1. Device summary

| Order codes | Marking | Package | Packaging |
|--------------|------------|--------------------|-------------|
| STB10NK60Z-1 | B10NK60Z | I ² PAK | Tube |
| STB10NK60ZT4 | B10NK60Z | D ² PAK | Tape & reel |
| STP10NK60ZFP | P10NK60ZFP | TO-220FP | Tube |
| STP10NK60Z | P10NK60Z | TO-220 | Tube |
| STW10NK60Z | W10NK60Z | TO-247 | Tube |

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1 Electrical ratings

Table 2. Absolute maximum ratings

| Symbol | Parameter | Value | Unit |
|--------------------|---|------------|---------------------|
| V_{DS} | Drain-source voltage ($V_{GS} = 0$) | 30 | V |
| V_{GS} | Gate-source voltage | ± 20 | V |
| $I_D^{(1)}$ | Drain current (continuous) at $T_C = 25\text{ }^\circ\text{C}$ | 80 | A |
| $I_D^{(1)}$ | Drain current (continuous) at $T_C = 100\text{ }^\circ\text{C}$ | 80 | A |
| $I_{DM}^{(2)}$ | Drain current (pulsed) | 320 | A |
| P_{TOT} | Total dissipation at $T_C = 25\text{ }^\circ\text{C}$ | 300 | W |
| | Derating factor | 2 | W/ $^\circ\text{C}$ |
| $dv/dt^{(3)}$ | Peak diode recovery voltage slope | 2 | V/ns |
| $E_{AS}^{(4)}$ | Single pulse avalanche energy | 2.3 | J |
| T_{stg} T_j | Storage temperature Operating junction temperature | -60 to 175 | $^\circ\text{C}$ |

- Limited by package
- Pulse width limited by safe operating area
- $I_{SD} = 80\text{ A}$, $di/dt = 240\text{ A}/\mu\text{s}$, $V_{DD} = V_{(BR)DSS}$, $T_J = T_{JMAX}$
- Starting $T_j = 25\text{ }^\circ\text{C}$, $I_D = 80\text{ A}$, $V_{DD} = 50\text{ V}$

Table 3. Thermal resistance

| Symbol | Parameter | Value | Unit |
|----------------|--|-------|---------------------------|
| $R_{thj-case}$ | Thermal resistance junction-case max | 0.5 | $^\circ\text{C}/\text{W}$ |
| $R_{thj-amb}$ | Thermal resistance junction-ambient max | 62.5 | $^\circ\text{C}/\text{W}$ |
| T_l | Maximum lead temperature for soldering purpose | 300 | $^\circ\text{C}$ |

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

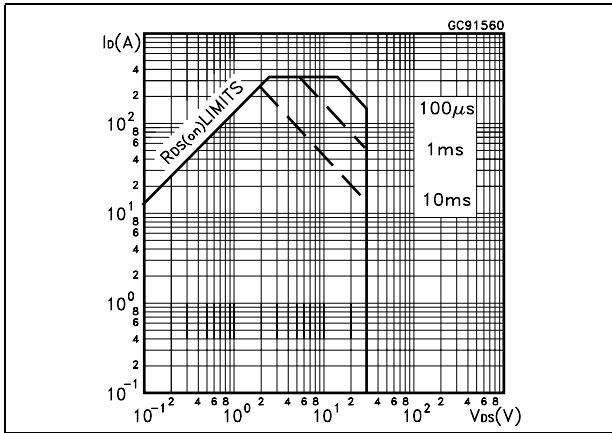


Figure 3. Thermal impedance

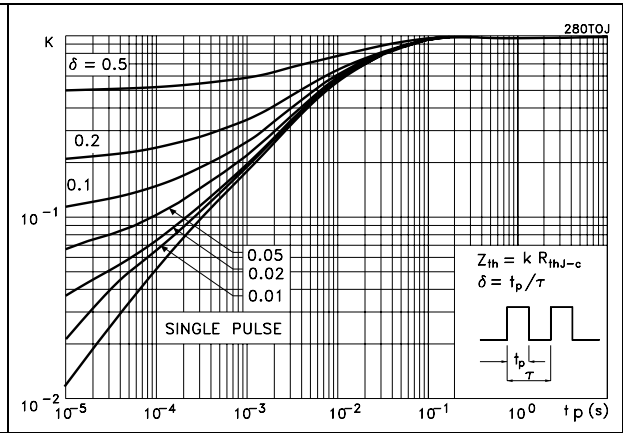


Figure 4. Output characteristics

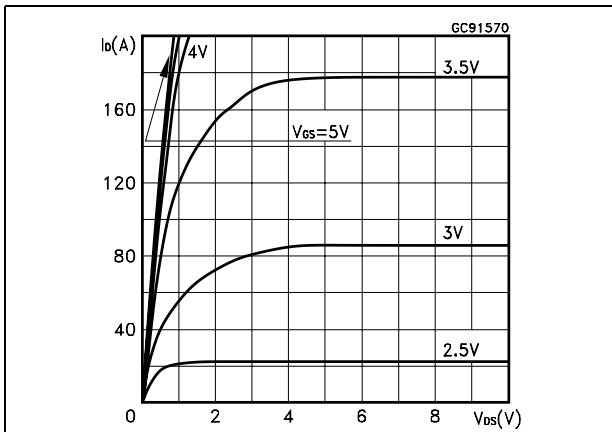


Figure 5. Transfer characteristics

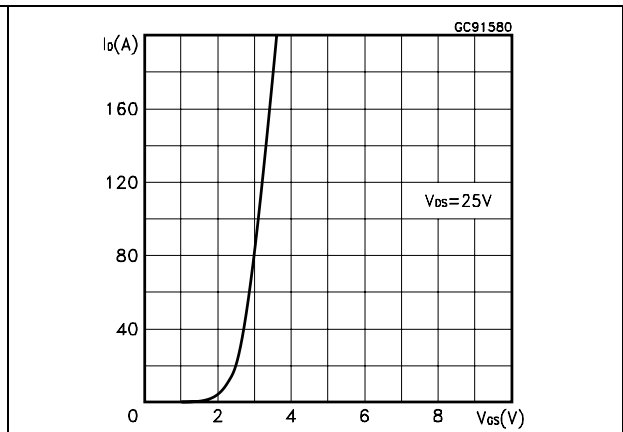


Figure 6. Transconductance

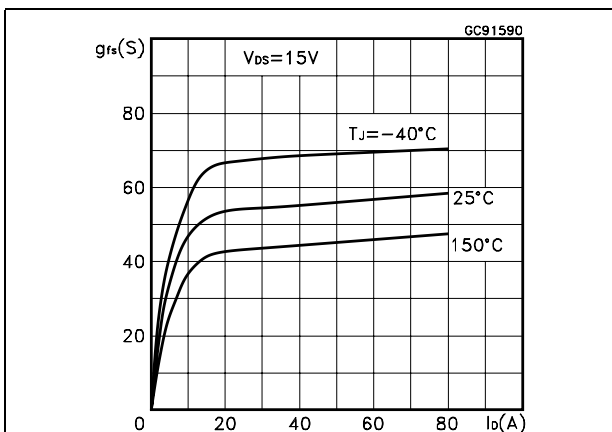
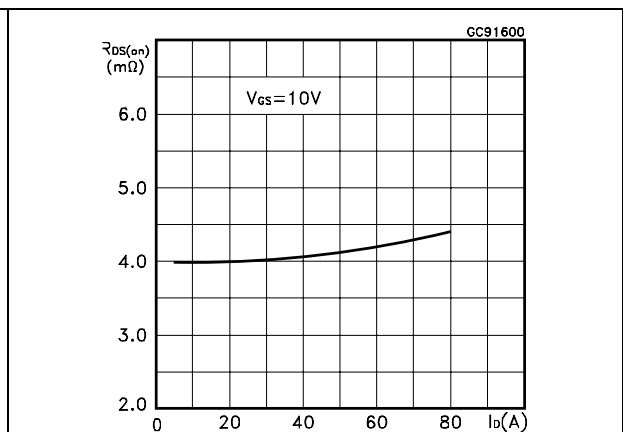


Figure 7. Static drain-source on resistance

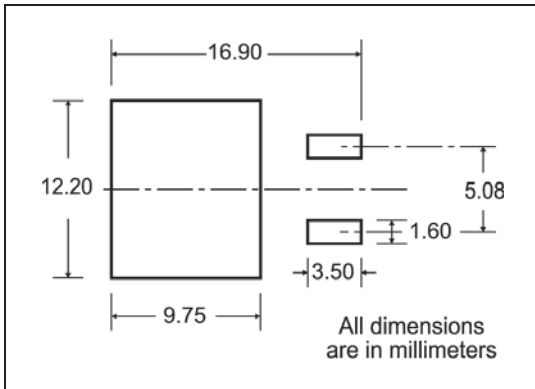


4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

5 Packaging mechanical data

D²PAK FOOTPRINT



TAPE AND REEL SHIPMENT

TAPE MECHANICAL DATA

| DIM. | mm | | inch | |
|------|------|------|--------|--------|
| | MIN. | MAX. | MIN. | MAX. |
| A0 | 10.5 | 10.7 | 0.413 | 0.421 |
| B0 | 15.7 | 15.9 | 0.618 | 0.626 |
| D | 1.5 | 1.6 | 0.059 | 0.063 |
| D1 | 1.59 | 1.61 | 0.062 | 0.063 |
| E | 1.65 | 1.85 | 0.065 | 0.073 |
| F | 11.4 | 11.6 | 0.449 | 0.456 |
| K0 | 4.8 | 5.0 | 0.189 | 0.197 |
| P0 | 3.9 | 4.1 | 0.153 | 0.161 |
| P1 | 11.9 | 12.1 | 0.468 | 0.476 |
| P2 | 1.9 | 2.1 | 0.075 | 0.082 |
| R | 50 | | 1.574 | |
| T | 0.25 | 0.35 | 0.0098 | 0.0137 |
| W | 23.7 | 24.3 | 0.933 | 0.956 |

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 | 24.4 | 26.4 | 0.960 | 1.039 |
| N | 100 | | 3.937 | |
| T | | 30.4 | | 1.197 |

| BASE QTY | BULK QTY |
|----------|----------|
| 1000 | 1000 |

10 pitches cumulative tolerance on tape +/- 0.2 mm

6 Revision history

Table 10. Revision history

| Date | Revision | Changes |
|-------------|----------|--|
| 29-Sep-2005 | 6 | Inserted ecopack indication |
| 29-Oct-2005 | 7 | New value inserted in Table 6 |
| 11-Apr-2006 | 8 | New template |
| 19-Sep-2006 | 9 | Unit changed in Table 5 |
| 17-Nov-2008 | 10 | Updated Section 4: Package mechanical data |

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