

### Description

The SXG20N06S uses advanced technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

### General Features

$V_{DS} = 60V$   $I_D = 20A$

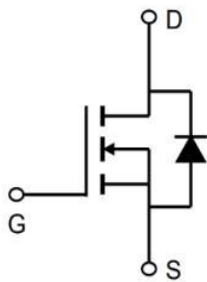
$R_{DS(ON)} < 10m\Omega$  @  $V_{GS}=10V$

### Application

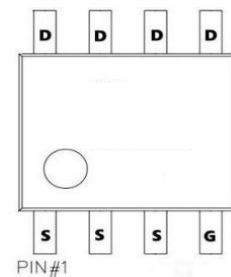
Battery protection

Load switch

Uninterruptible power supply



SOP-8



### Absolute Maximum Ratings@ $T_J=25^\circ C$ (unless otherwise specified)

| Symbol                 | Parameter                              | Value      | Unit         |
|------------------------|----------------------------------------|------------|--------------|
| $V_{DS}$               | Drain source voltage                   | 60         | V            |
| $V_{GS}$               | Gate source voltage                    | $\pm 20$   | V            |
| $I_D @ T_A=25^\circ C$ | Continuous drain current               | 20         | A            |
| $I_D @ T_A=70^\circ C$ | Continuous drain current               | 11         | A            |
| $I_{DM}$               | Pulsed drain current                   | 60         | A            |
| $P_D @ T_A=25^\circ C$ | Power dissipation                      | 60         | W            |
| EAS                    | Single pulsed avalanche energy         | 30         | mJ           |
| TSTG                   | Storage Temperature Range              | -55 to 150 | $^\circ C$   |
| $T_J$                  | Operation and storage temperature      | -55 to 150 | $^\circ C$   |
| $R_{\theta JC}$        | Thermal resistance, junction-case      | 2.1        | $^\circ C/W$ |
| $R_{\theta JA}$        | Thermal resistance, junction-ambient5) | 85         | $^\circ C/W$ |

**Electrical Characteristics (T<sub>J</sub>=25°C, unless otherwise noted)**

| Symbol               | Parameter                        | Test condition                                                                                   | Min. | Typ.   | Max. | Unit |
|----------------------|----------------------------------|--------------------------------------------------------------------------------------------------|------|--------|------|------|
| BVDSS                | Drain-source breakdown voltage   | V <sub>GS</sub> =0 V, I <sub>D</sub> =250 μA                                                     | 60   | 68     |      | V    |
| VGS(th)              | Gate threshold voltage           | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250 μA                                        | 1.2  | 1.5    | 2.5  | V    |
| RDS(ON)              | Drain-source on-state resistance | V <sub>GS</sub> =10 V, I <sub>D</sub> =20 A                                                      |      | 7.5    | 10   | mΩ   |
| RDS(ON)              | Drain-source on-state resistance | V <sub>GS</sub> =4.5 V, I <sub>D</sub> =10 A                                                     |      | 10     | 13   | mΩ   |
| IGSS                 | Gate-source leakage current      | V <sub>GS</sub> =±20 V                                                                           |      |        | ±100 | nA   |
| IDSS                 | Drain-source leakage current     | V <sub>DS</sub> =60 V, V <sub>GS</sub> =0 V                                                      |      |        | 1    | μA   |
| Ciss                 | Input capacitance                | V <sub>GS</sub> =0 V, V <sub>DS</sub> =50 V, f=100 kHz                                           |      | 1182.1 |      | pF   |
| Coss                 | Output capacitance               |                                                                                                  |      | 199.5  |      | pF   |
| Crss                 | Reverse transfer capacitance     |                                                                                                  |      | 4.1    |      | pF   |
| td(on)               | Turn-on delay time               | V <sub>GS</sub> =10 V,<br>V <sub>DS</sub> =50 V,<br>R <sub>G</sub> =2 Ω,<br>I <sub>D</sub> =10 A |      | 17.9   |      | ns   |
| t <sub>r</sub>       | Rise time                        |                                                                                                  |      | 4.0    |      | ns   |
| td(off)              | Turn-off delay time              |                                                                                                  |      | 34.9   |      | ns   |
| t <sub>f</sub>       | Fall time                        |                                                                                                  |      | 5.5    |      | ns   |
| Q <sub>g</sub>       | Total gate charge                | I <sub>D</sub> =10 A,<br>V <sub>DS</sub> =50 V,<br>V <sub>GS</sub> =10 V                         |      | 18.4   |      | nC   |
| Q <sub>gs</sub>      | Gate-source charge               |                                                                                                  |      | 3.3    |      | nC   |
| Q <sub>gd</sub>      | Gate-drain charge                |                                                                                                  |      | 3.1    |      | nC   |
| V <sub>plateau</sub> | Gate plateau voltage             |                                                                                                  |      | 2.8    |      | V    |
| I <sub>S</sub>       | Diode forward current            | V <sub>GS</sub> <V <sub>th</sub>                                                                 |      |        | 60   | A    |
| ISP                  | Pulsed source current            |                                                                                                  |      |        | 180  |      |
| VSD                  | Diode forward voltage            | I <sub>S</sub> =20 A, V <sub>GS</sub> =0 V                                                       |      |        | 1.3  | V    |
| t <sub>rr</sub>      | Reverse recovery time            | I <sub>S</sub> =10 A, di/dt=100 A/μs                                                             |      | 41.8   |      | ns   |
| Q <sub>rr</sub>      | Reverse recovery charge          |                                                                                                  |      | 36.1   |      | nC   |
| I <sub>rrm</sub>     | Peak reverse recovery current    |                                                                                                  |      | 1.4    |      | A    |

**Note**

- 1、 Calculated continuous current based on maximum allowable junction temperature.
- 2、 Repetitive rating; pulse width limited by max. junction temperature.
- 3、 Pd is based on max. junction temperature, using junction-case thermal resistance.
- 4、 V<sub>DD</sub>=50 V, R<sub>G</sub>=50 Ω, L=0.3 mH, starting T<sub>J</sub>=25 °C.
- 5、 The value of R<sub>θJA</sub> is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with T<sub>a</sub>=25 °C.

## Typical Characteristics

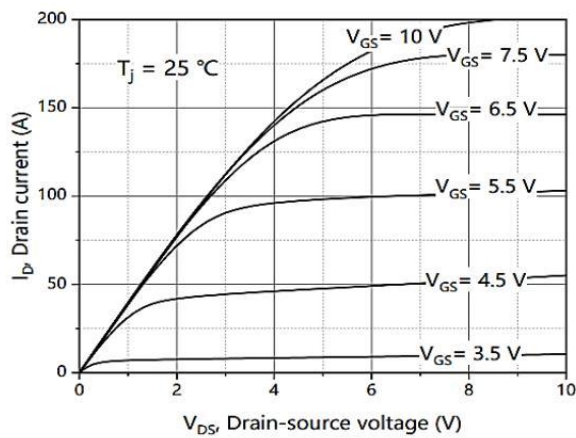


Figure 1. Typ. output characteristics

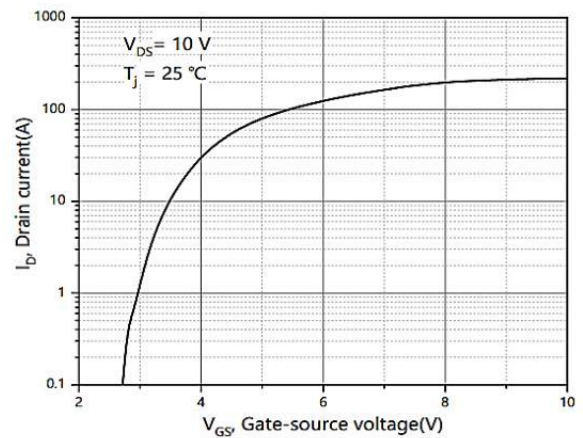


Figure 2. Typ. transfer characteristics

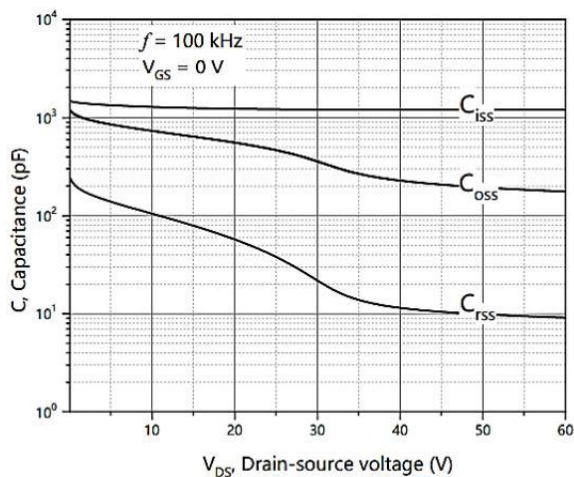


Figure 3. Typ. capacitances

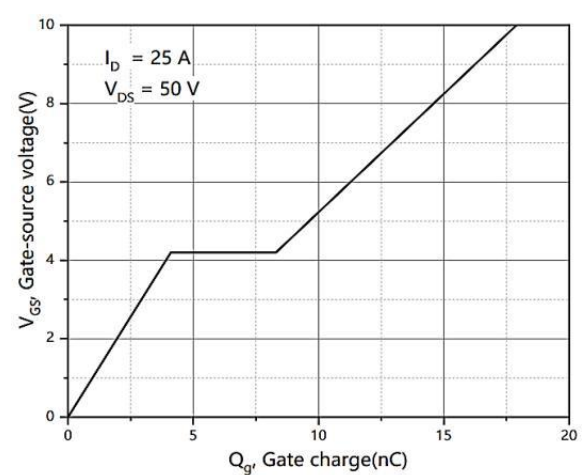


Figure 4. Typ. gate charge

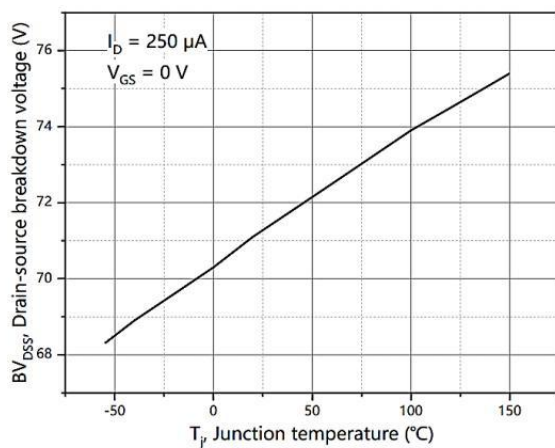


Figure 5. Drain-source breakdown voltage

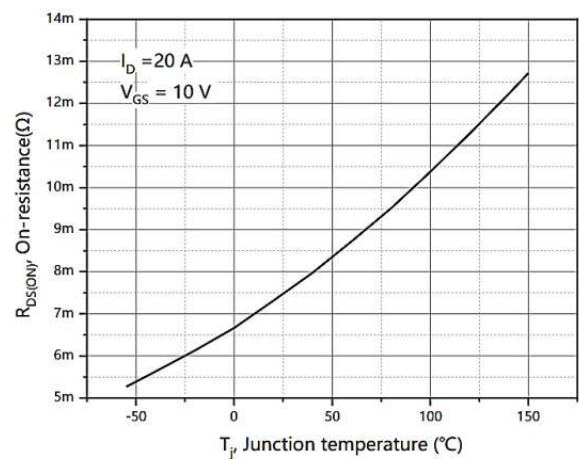


Figure 6. Drain-source on-state resistance

## Typical Characteristics

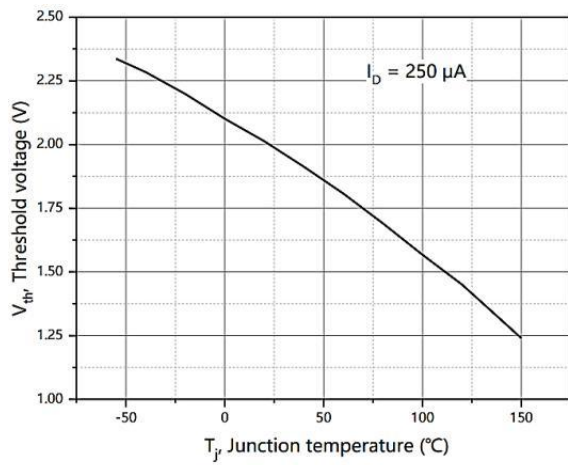


Figure 7. Threshold voltage

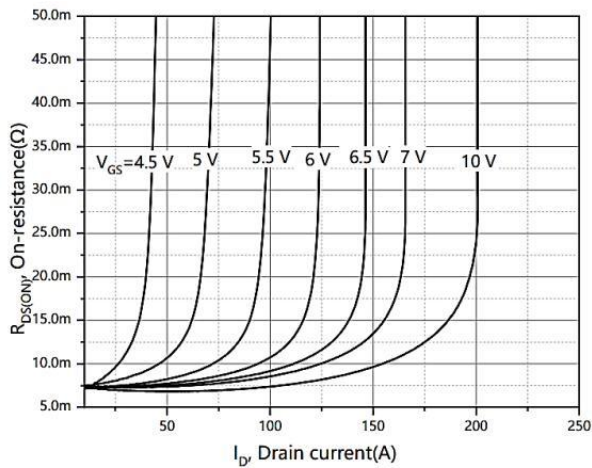


Figure 9. Drain-source on-state resistance

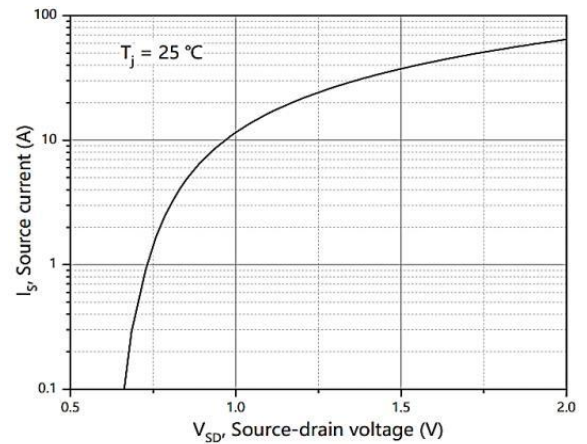


Figure 8. Forward characteristic of body diode

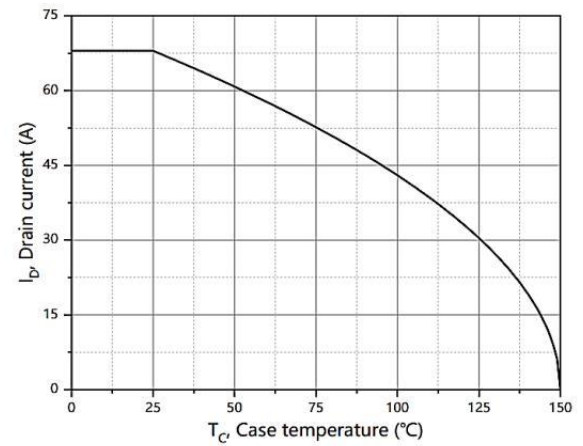


Figure 10. Drain current

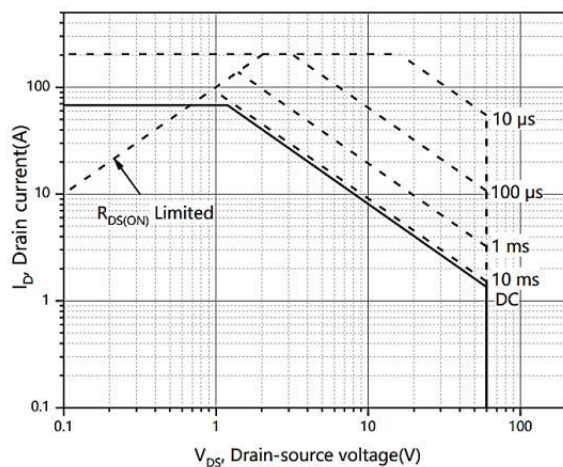


Figure 11. Safe operation area  $T_c=25\text{ }^{\circ}\text{C}$

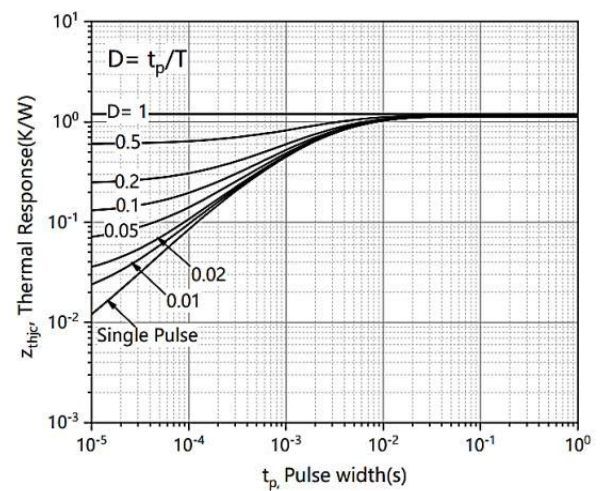
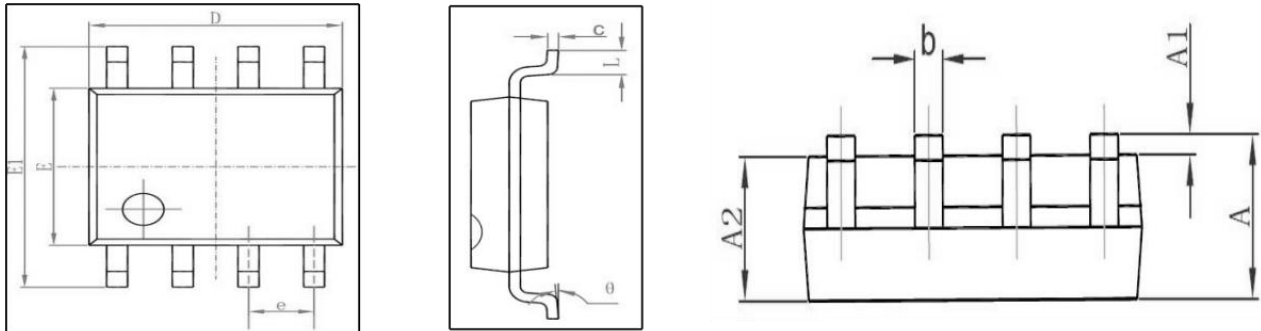
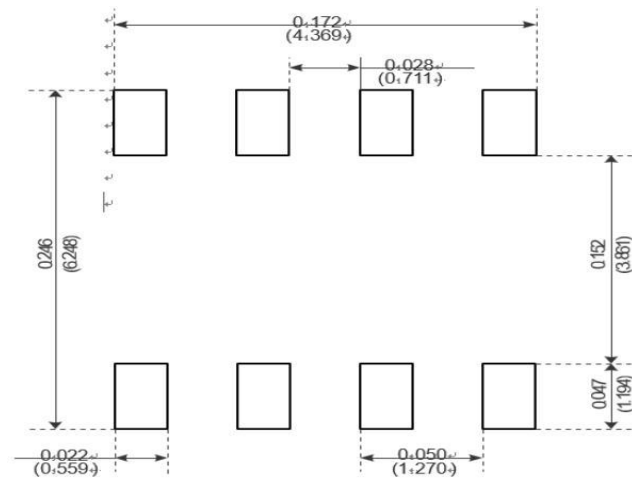


Figure 12. Max. transient thermal impedance

## Package Mechanical Data-SOP-8



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min                       | Max   | Min                  | Max   |
| A      | 1.350                     | 1.750 | 0.053                | 0.069 |
| A1     | 0.100                     | 0.250 | 0.004                | 0.010 |
| A2     | 1.350                     | 1.550 | 0.053                | 0.061 |
| b      | 0.330                     | 0.510 | 0.013                | 0.020 |
| c      | 0.170                     | 0.250 | 0.006                | 0.010 |
| D      | 4.700                     | 5.100 | 0.185                | 0.200 |
| E      | 3.800                     | 4.000 | 0.150                | 0.157 |
| E1     | 5.800                     | 6.200 | 0.228                | 0.244 |
| e      | 1.270 (BSC)               |       | 0.050 (BSC)          |       |
| L      | 0.400                     | 1.270 | 0.016                | 0.050 |
| θ      | 0°                        | 8°    | 0°                   | 8°    |



Recommended Minimum Pads

## Package Marking and Ordering Information

| Product ID | Pack  | Marking | Qty(PCS) |
|------------|-------|---------|----------|
| TAPING     | SOP-8 |         | 3000     |