

### Description

The SXJ290N60MP protects sensitive semiconductor components from damage or upset due to electrostatic discharge (ESD) and other voltage induced transient events. They feature large cross-sectional area junctions for conducting high transient currents, offer desirable electrical characteristics for board level protection, such as fast response time, low operating voltage. It gives designer the flexibility to protect one bi-directional line in applications where arrays are not practical.

### General Features

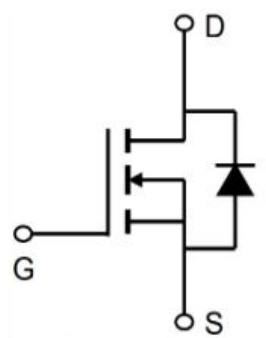
$V_{DS} = 600V$  (Type: 680V)  $IDM = 290A$

$R_{DS(ON)} < 30m\Omega$  @  $V_{GS}=10V$

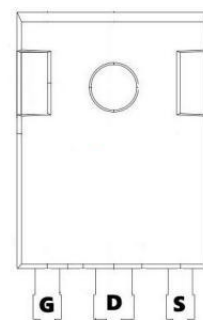
### Application

Uninterruptible Power Supply(UPS)

Power Factor Correction (PFC)



TO-247-3L



### Absolute Maximum Ratings ( $T_c=25^{\circ}C$ unless otherwise noted)

| Symbol         | Parameter                                        | Value           | Unit          |
|----------------|--------------------------------------------------|-----------------|---------------|
| $V_{DSS}$      | Drain-Source Voltage ( $V_{GS} = 0V$ )           | 650             | V             |
| $I_D$          | Continuous Drain Current                         | 100             | A             |
| $IDM$          | Pulsed Drain Current (note1)                     | 290             | A             |
| $V_{GS}$       | Gate-Source Voltage                              | $\pm 30$        | V             |
| $E_{AS}$       | Single Pulse Avalanche Energy (note2)            | 2160            | mJ            |
| $I_{AS}$       | Avalanche current                                | 12              | A             |
| $P_{tot}$      | Power Dissipation ( $T_c = 25^{\circ}C$ )        | 625             | W             |
| $T_J, T_{stg}$ | Operating Junction and Storage Temperature Range | $-55 \sim +150$ | $^{\circ}C$   |
| $R_{thJC}$     | Thermal Resistance, Junction-to-Case             | 0.2             | $^{\circ}C/W$ |
| $R_{thJA}$     | Thermal Resistance, Junction-to-Ambient          | 62              | $^{\circ}C/W$ |

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

| Symbol               | Parameter                        | Test Condition                                                         | Min. | Typ. | Max. | Unit |
|----------------------|----------------------------------|------------------------------------------------------------------------|------|------|------|------|
| V(BR)DSS             | Drain-source breakdown voltage   | V <sub>GS</sub> =0V, I <sub>D</sub> =1mA                               | 600  | 680  | -    | V    |
| V(GS)th              | Gate threshold voltage           | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =2mA                 | 2.5  | 3.6  | 4.5  | V    |
| I <sub>DSS</sub>     | Zero gate voltage drain current  | V <sub>DS</sub> =600V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C       | -    | -    | 10   | μA   |
| I <sub>GSS</sub>     | Gate-source leakage current      | V <sub>GS</sub> =±30V, V <sub>DS</sub> =0V                             | -    | -    | ±100 | nA   |
| R <sub>DS(on)</sub>  | Drain-source on-state resistance | V <sub>GS</sub> =10V, I <sub>D</sub> =40A, T <sub>J</sub> =25°C        | -    | 26   | 30   | mΩ   |
| R <sub>DS(on)</sub>  | Drain-source on-state resistance | V <sub>GS</sub> =10V, I <sub>D</sub> =40A, T <sub>J</sub> =125°C       | -    | 61   | 70   | mΩ   |
| R <sub>G</sub>       | Gate resistance                  | V <sub>DD</sub> =0V, V <sub>GS</sub> =0V, F=1MHz                       | -    | 2.4  | -    | Ω    |
| C <sub>iss</sub>     | Input capacitance                | V <sub>GS</sub> =0V, V <sub>DS</sub> =50V, f=250kHz                    | -    | 9420 | -    | pF   |
| C <sub>oss</sub>     | Output capacitance               |                                                                        | -    | 619  | -    | pF   |
| C <sub>rss</sub>     | Reverse transfer capacitance     |                                                                        | -    | 6.42 | -    | pF   |
| t <sub>d(on)</sub>   | Turn-on delay time               | V <sub>DD</sub> =400V, V <sub>GS</sub> =10V, I <sub>D</sub> =50A,      | -    | 21   | -    | ns   |
| t <sub>r</sub>       | Rise time                        |                                                                        | -    | 30   | -    | ns   |
| t <sub>d(off)</sub>  | Turn-off delay time              |                                                                        | -    | 94   | -    | ns   |
| t <sub>f</sub>       | Fall time                        |                                                                        | -    | 12   | -    | ns   |
| Q <sub>gs</sub>      | Gate to source charge            | V <sub>DD</sub> =480V, I <sub>D</sub> =50A, V <sub>GS</sub> =0 to 10V  | -    | 55   | -    | nC   |
| Q <sub>gd</sub>      | Gate to drain charge             |                                                                        | -    | 78   | -    | nC   |
| Q <sub>g</sub>       | Gate charge total                |                                                                        | -    | 230  | -    | nC   |
| V <sub>plateau</sub> | Gate plateau voltage             |                                                                        | -    | 6.0  | -    | V    |
| V <sub>SD</sub>      | Diode forward voltage            | V <sub>GS</sub> =0V, I <sub>F</sub> =40A, T <sub>F</sub> =25°C         | -    | 0.88 | -    | V    |
| t <sub>rr</sub>      | Reverse recovery time            | V <sub>R</sub> =100V, I <sub>F</sub> =50A, di <sub>F</sub> /dt=100A/μs | -    | 176  | -    | ns   |
| Q <sub>rr</sub>      | Reverse recovery charge          |                                                                        | -    | 1.2  | -    | μC   |
| I <sub>rrm</sub>     | Peak reverse recovery current    |                                                                        | -    | 13.5 | -    | A    |

**Note :**

- 1、The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
- 2、The EAS data shows Max. rating . L=30mH, I<sub>AS</sub> =12A, V<sub>DD</sub> =50V, R<sub>G</sub>=25Ω
- 3、The test condition is Pulse Test: I<sub>SD</sub> ≤ I<sub>D</sub>, di/dt = 100A/us, V<sub>DD</sub> ≤ BVDSS, Starting at T<sub>J</sub> =25°C
- 4、The power dissipation is limited by 150°C junction temperature
- 5、The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub> , in real applications , should be limited by total power dissipation.

## Typical Characteristics

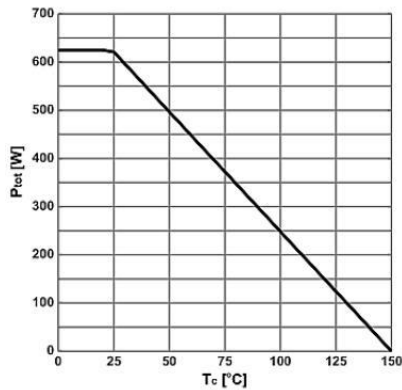


Figure1: Power dissipation (Non FullPAK)

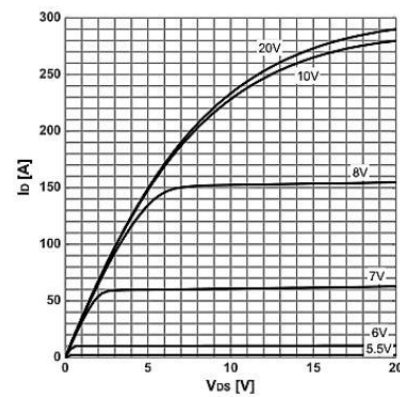


Figure2: output characteristics

$I_D=f(V_{DS})$ ;  $T_j=25^\circ\text{C}$ ; parameter:  $V_{GS}$

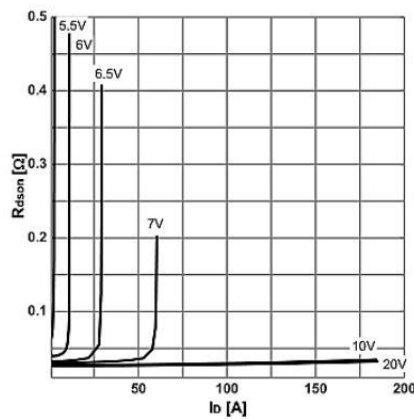


Figure3: Typ. drain-source on-state resistance

$R_{DS(on)}=f(I_D)$ ;  $T_j=25^\circ\text{C}$ ; parameter:  $V_{GS}$

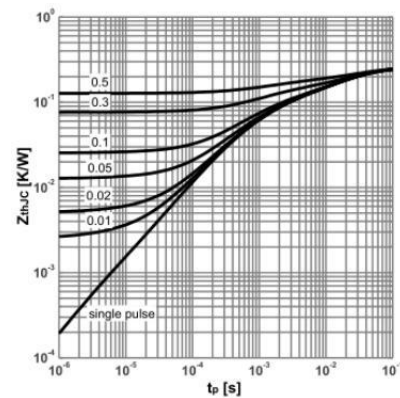


Figure4:Max. transient thermal impedance

$P_{tot}=f(T_c)$

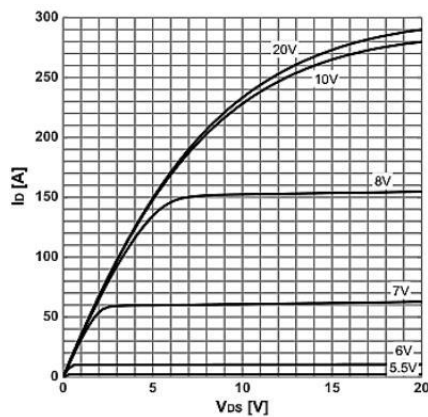


Figure5: Type. output characteristics  $I_D=f(V_{DS})$ ;  $T_j=125^\circ\text{C}$ ; parameter:  $V_{GS}$

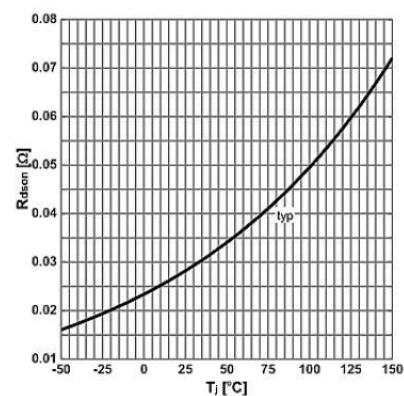
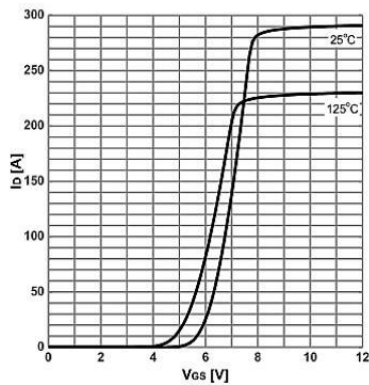


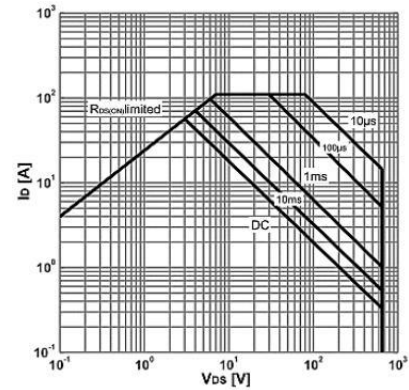
Figure6: Max. transient thermal impedance  $R_{DS(on)}=f(T_j)$ ;  $I_D=23.5\text{A}$ ;  $V_{GS}=10\text{V}$

## Typical Characteristics



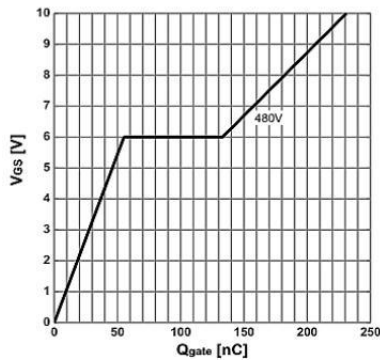
**Figure 7: Typ. transfer characteristics**

$I_D = f(V_{GS})$ ;  $V_{DS} = 20V$ ; parameter:  $T_j$



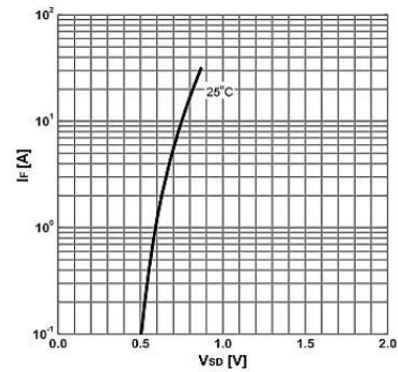
**Figure8 : Safe operating area (Non FullPAK)**

$I_D = f(V_{DS})$ ;  $T_j = 25^\circ C$ ;  $D = 0$ ; parameter:  $t_p$



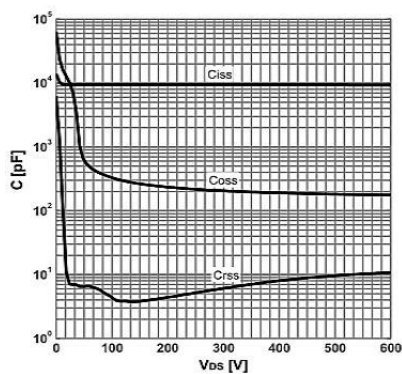
**Figure9: Typ. gate charge**

$V_{GS} = f(Q_{gate})$ ;  $I_D = 25A$  pulsed;  $V_{DS} = 400V$



**Figure 10: Forward characteristics of reverse diode**

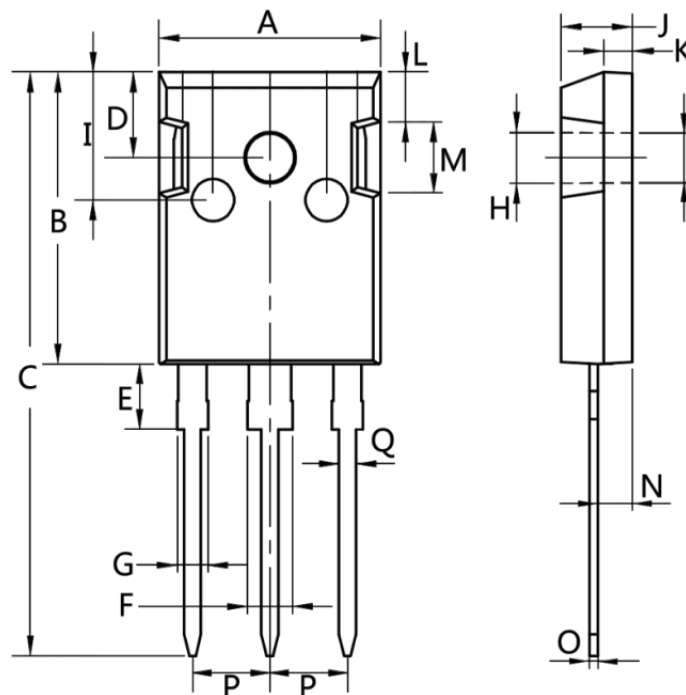
$I_R = f(V_{SD})$ ; parameter:  $T_j$



**Figure 11: Typ. capacitances**

$C = f(V_{DS})$ ;  $V_{GS} = 0V$ ;  $f = 250kHz$

**Package Mechanical Data-TO-247-3L**



| Dim. | Min.     | Max. |
|------|----------|------|
| A    | 15.0     | 16.0 |
| B    | 20.0     | 21.0 |
| C    | 41.0     | 42.0 |
| D    | 5.0      | 6.0  |
| E    | 4.0      | 5.0  |
| F    | 2.5      | 3.5  |
| G    | 1.75     | 2.5  |
| H    | 3.0      | 3.5  |
| I    | 8.0      | 10.0 |
| J    | 4.9      | 5.1  |
| K    | 1.9      | 2.1  |
| L    | 3.5      | 4.0  |
| M    | 4.75     | 5.25 |
| N    | 2.0      | 3.0  |
| O    | 0.55     | 0.75 |
| P    | Typ 5.08 |      |
| Q    | 1.2      | 1.3  |

**Package Marking and Ordering Information**

| Product ID | Pack      | Marking | Qty(PCS) |
|------------|-----------|---------|----------|
| TAPING     | TO-247-3L |         | 330      |