

### Description

The SX12N10Y uses advanced trench 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

$V_{DS} = 100V$   $I_D = 12A$

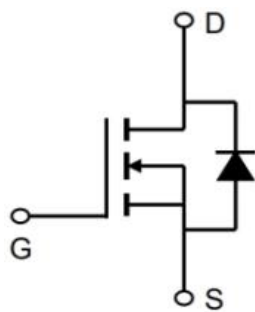
$R_{DS(ON)} < 140m\Omega$  @  $V_{GS}=10V$

### Application

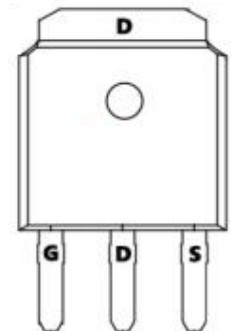
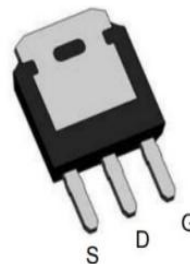
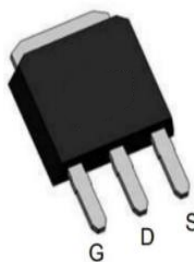
LED lighting

Load switch

Atomizer



TO-251-3L



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

| Symbol            | Parameter                                                  | Value      | Unit          |
|-------------------|------------------------------------------------------------|------------|---------------|
| $V_{DS}$          | Drain source voltage                                       | 100        | V             |
| $V_{GS}$          | Gate source voltage                                        | $\pm 20$   | V             |
| $I_D$             | Continuous drain current <sup>1)</sup> , $T_c=25^{\circ}C$ | 12         | A             |
| $I_{DM}$          | Pulsed drain current <sup>2)</sup> , $T_c=25^{\circ}C$     | 24         | A             |
| $P_D$             | Power dissipation <sup>3)</sup> , $T_c=25^{\circ}C$        | 17         | W             |
| EAS               | Single pulsed avalanche energy <sup>5)</sup>               | 1.2        | mJ            |
| $T_{stg}$ , $T_j$ | Operation and storage temperature                          | -55 to 150 | $^{\circ}C$   |
| $R_{\theta JC}$   | Thermal resistance, junction-case                          | 7.4        | $^{\circ}C/W$ |
| $R_{\theta JA}$   | Thermal resistance, junction-ambient <sup>4)</sup>         | 62         | $^{\circ}C/W$ |

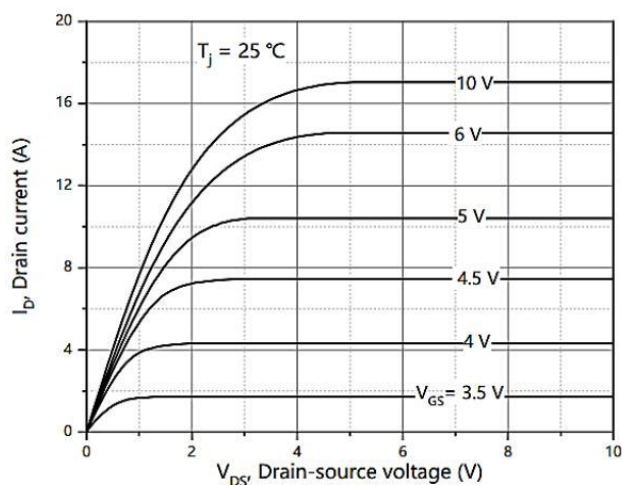
**Electrical Characteristics (T<sub>J</sub>=25°C, unless otherwise noted)**

| 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                                                 | 100  |       |      | V    |
| V <sub>GS(th)</sub>  | Gate threshold voltage           | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250 μA                                    | 1.2  | 1.5   | 2.5  | V    |
| R <sub>DS(ON)</sub>  | Drain-source on-state resistance | V <sub>GS</sub> =10 V, I <sub>D</sub> =5 A                                                   |      | 110   | 140  | mΩ   |
| R <sub>DS(ON)</sub>  | Drain-source on-state resistance | V <sub>GS</sub> =4.5 V, I <sub>D</sub> =3 A                                                  |      | 160   | 180  | mΩ   |
| I <sub>GSS</sub>     | Gate-source leakage current      | V <sub>GS</sub> =20 V                                                                        |      |       | 100  | nA   |
|                      |                                  | V <sub>GS</sub> =-20 V                                                                       |      |       | -100 |      |
| I <sub>DSS</sub>     | Drain-source leakage current     | V <sub>DS</sub> =100 V, V <sub>GS</sub> =0 V                                                 |      |       | 1    | uA   |
| C <sub>iss</sub>     | Input capacitance                | V <sub>GS</sub> =0 V, V <sub>DS</sub> =50 V,<br>f=100 kHz                                    |      | 206.1 |      | pF   |
| C <sub>oss</sub>     | Output capacitance               |                                                                                              |      | 28.9  |      | pF   |
| C <sub>rss</sub>     | Reverse transfer capacitance     |                                                                                              |      | 1.4   |      | pF   |
| t <sub>d(on)</sub>   | Turn-on delay time               | V <sub>GS</sub> =10 V, V <sub>DS</sub> =50 V,<br>R <sub>G</sub> =2 Ω,<br>I <sub>D</sub> =5 A |      | 14.7  |      | ns   |
| t <sub>r</sub>       | Rise time                        |                                                                                              |      | 3.5   |      | ns   |
| t <sub>d(off)</sub>  | Turn-off delay time              |                                                                                              |      | 20.9  |      | ns   |
| t <sub>f</sub>       | Fall time                        |                                                                                              |      | 2.7   |      | ns   |
| Q <sub>g</sub>       | Total gate charge                | I <sub>D</sub> =5 A,<br>V <sub>DS</sub> =50 V,<br>V <sub>GS</sub> =10 V                      |      | 4.3   |      | nC   |
| Q <sub>gs</sub>      | Gate-source charge               |                                                                                              |      | 1.5   |      | nC   |
| Q <sub>gd</sub>      | Gate-drain charge                |                                                                                              |      | 1.1   |      | nC   |
| V <sub>plateau</sub> | Gate plateau voltage             |                                                                                              |      | 5.0   |      | V    |
| I <sub>S</sub>       | Diode forward current            | V <sub>GS</sub> <V <sub>th</sub>                                                             |      |       | 7    | A    |
| I <sub>SP</sub>      | Pulsed source current            |                                                                                              |      |       | 21   |      |
| V <sub>SD</sub>      | Diode forward voltage            | I <sub>S</sub> =7 A, V <sub>GS</sub> =0 V                                                    |      |       | 1.0  | V    |
| t <sub>rr</sub>      | Reverse recovery time            | I <sub>S</sub> =5 A, di/dt=100 A/μs                                                          |      | 32.1  |      | ns   |
| Q <sub>rr</sub>      | Reverse recovery charge          |                                                                                              |      | 39.4  |      | nC   |
| I <sub>rrm</sub>     | Peak reverse recovery current    |                                                                                              |      | 2.1   |      | A    |

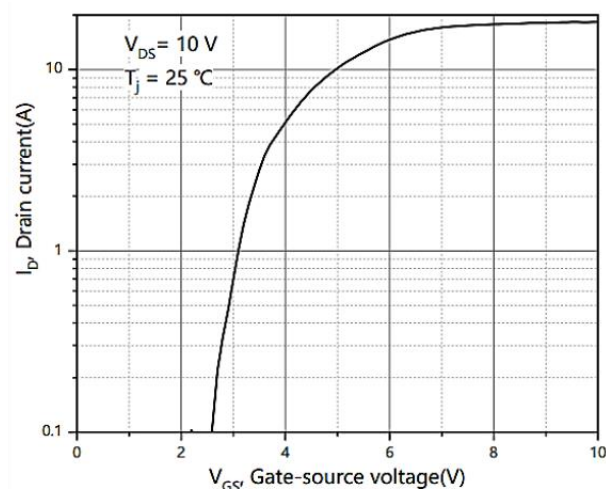
**Note :**

- 1、The data tested by surface mounted on a 1 inch2 FR-4 board with 2OZ copper.
- 2、The data tested by pulsed , pulse width .The EAS data shows Max. rating .
- 3、The test condition is V<sub>GS</sub>≦300us , duty cycle VDD=50 V, R<sub>G</sub>=25Ω, L=0.1 mH, starting 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.

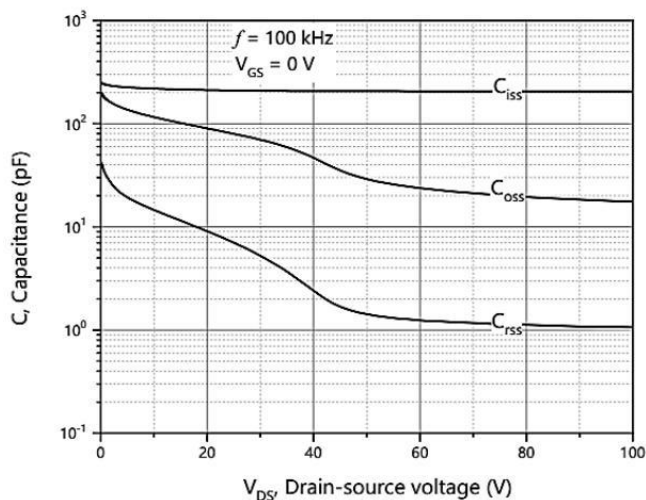
## Typical Characteristics



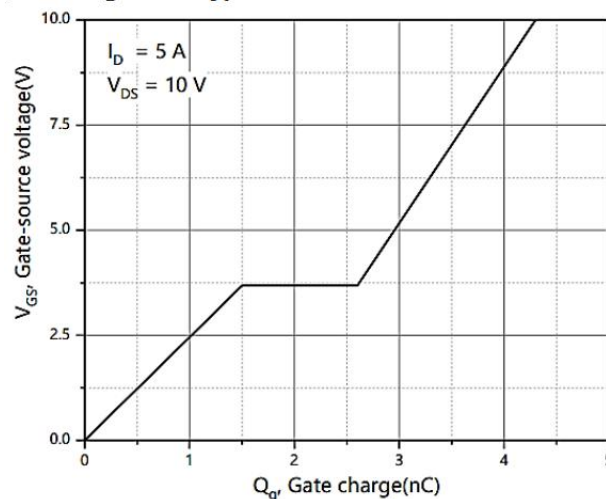
**Figure 1. Typ. output characteristics**



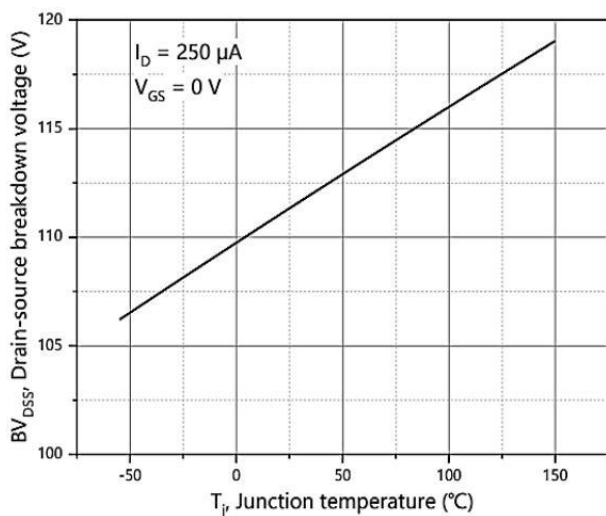
**Figure 2. Typ. transfer characteristics**



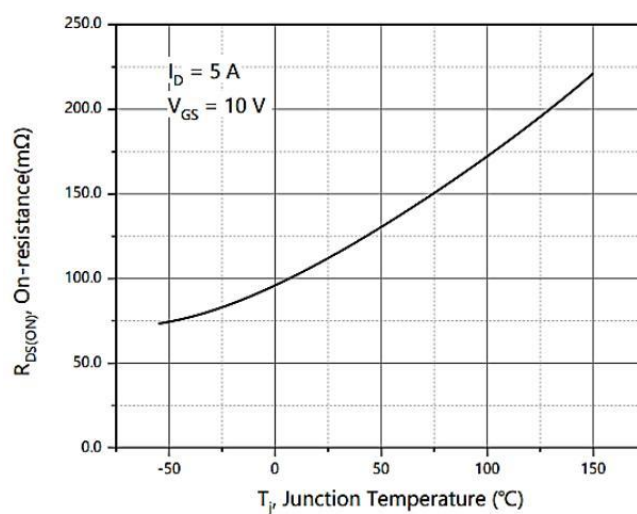
**Figure 3. Typ. capacitances**



**Figure 4. Typ. gate charge**

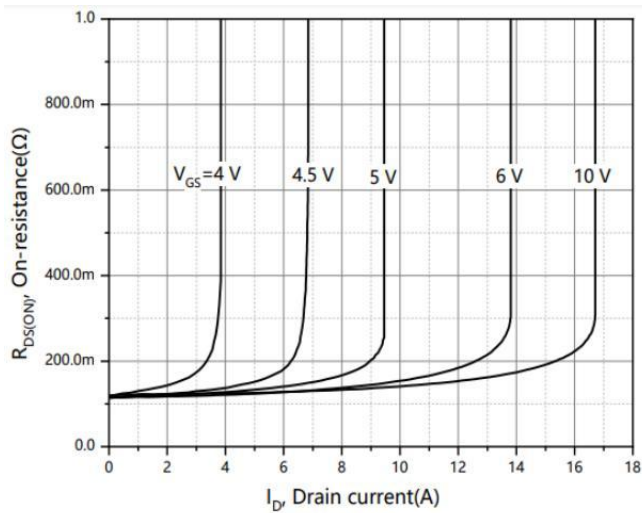


**Figure 5. Drain-source breakdown voltage**

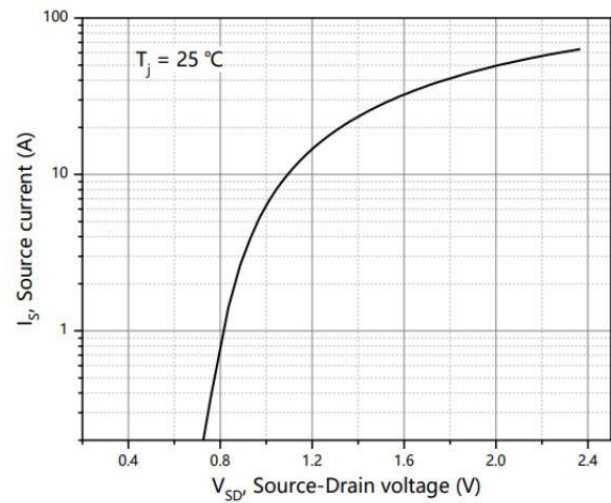


**Figure 6. Drain-source on-state resistance**

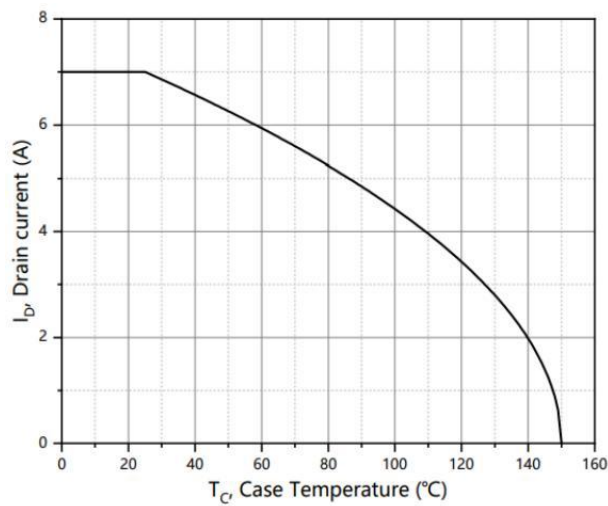
## Typical Characteristics



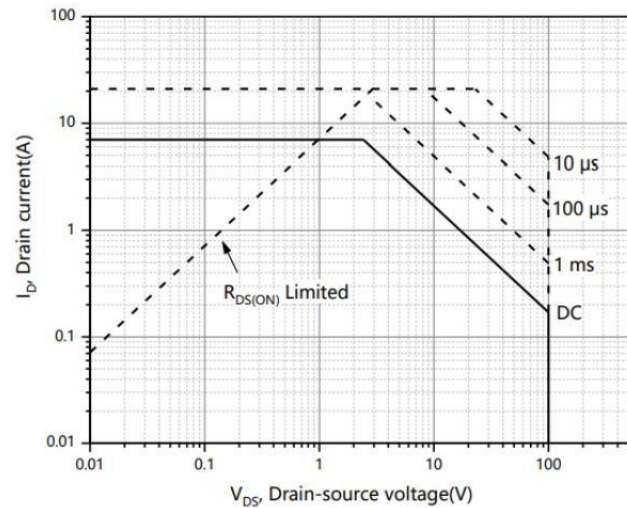
**Figure 7. Drain-source on-state resistance**



**Figure 8. Forward characteristic of body diode**

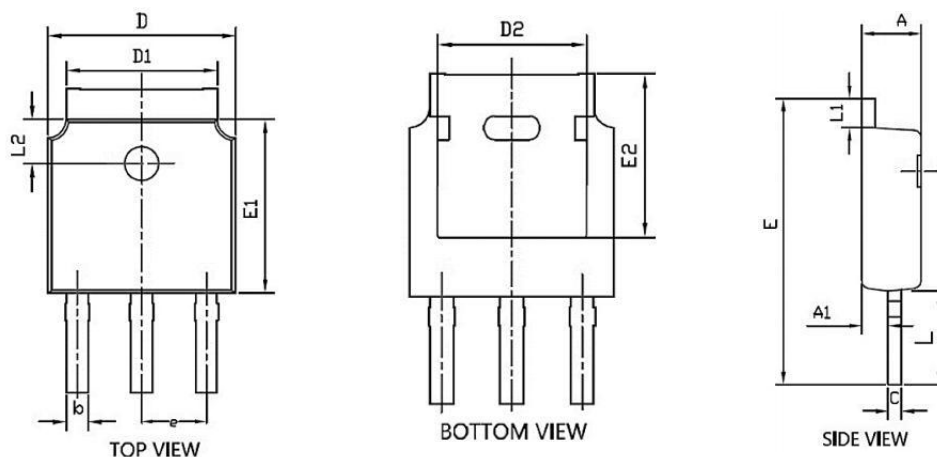


**Figure 9. Drain current**



**Figure 10. Safe operation area  $T_C=25^\circ\text{C}$**

## Package Mechanical Data-TO-251-3L



| Symbol | Common   |      |      |
|--------|----------|------|------|
|        | mm       |      |      |
|        | Mim      | Nom  | Max  |
| A      | 2.2      | 2.3  | 2.4  |
| A1     | 0.9      | 1.0  | 1.1  |
| b      | 0.66     | 0.76 | 0.86 |
| C      | 0.46     | 0.52 | 0.58 |
| D      | 6.50     | 6.6  | 6.7  |
| D1     | 5.15     | 5.3  | 5.45 |
| D2     | 4.6      | 4.8  | 4.95 |
| E      | 10.4     | ---- | 11.5 |
| E1     | 6.0      | 6.1  | 6.2  |
| E2     | 5.400REF |      |      |
| e      | 2.286BSC |      |      |
| L      | 3.5      | 4.0  | 4.3  |
| L1     | 0.9      | ---  | 1.27 |
| L2     | 1.4      | ---  | 1.9  |

## Package Marking and Ordering Information

| Product ID | Pack      | Marking | Qty(PCS) |
|------------|-----------|---------|----------|
| TAPING     | TO-251-3L |         | 4000     |