

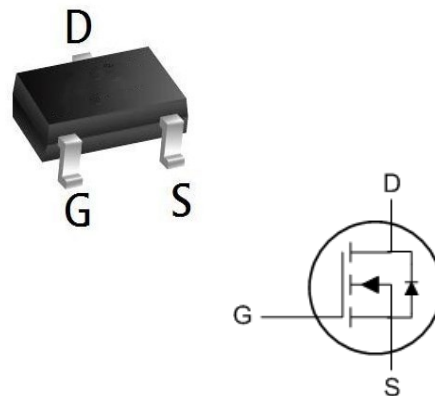
- ★ Green Device Available
- ★ Super Low Gate Charge
- ★ Excellent Cdv/dt effect decline
- ★ Advanced high cell density Trench technology


**Product Summary**

| BVDSS | RDS(on) | ID   |
|-------|---------|------|
| 100V  | 95 mΩ   | 5.0A |

**Description**

The XXWS5N10L is the high cell density trenched N-ch MOSFETs, which provides excellent RDS(on) and efficiency for most of the small power switching and load switch applications. The XXWS5N10L meet the RoHS and Green Product requirement with full function reliability approved.

**SOT23-3L Pin Configuration**

**Absolute Maximum Ratings**

| Symbol                     | Parameter                                  | Rating     | Units            |
|----------------------------|--------------------------------------------|------------|------------------|
| $V_{DS}$                   | Drain-Source Voltage                       | 100        | V                |
| $V_{GS}$                   | Gate-Source Voltage                        | $\pm 20$   | V                |
| $I_D@T_A=25^\circ\text{C}$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 5          | A                |
| $I_D@T_A=70^\circ\text{C}$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 2.2        | A                |
| $I_{DM}$                   | Pulsed Drain Current <sup>2</sup>          | 11         | A                |
| $P_D@T_A=25^\circ\text{C}$ | Total Power Dissipation <sup>3</sup>       | 1          | W                |
| $T_{STG}$                  | Storage Temperature Range                  | -55 to 150 | $^\circ\text{C}$ |
| $T_J$                      | Operating Junction Temperature Range       | -55 to 150 | $^\circ\text{C}$ |

**Thermal Data**

| Symbol          | Parameter                                        | Typ. | Max. | Unit               |
|-----------------|--------------------------------------------------|------|------|--------------------|
| $R_{\theta JA}$ | Thermal Resistance Junction-ambient <sup>1</sup> | ---  | 125  | $^\circ\text{C/W}$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case <sup>1</sup>    | ---  | 80   | $^\circ\text{C/W}$ |

**Electrical Characteristics**  $T_C=25^{\circ}\text{C}$  unless otherwise specified

| Symbol                                                 | Parameter                                                                 | Test Condition                                                                                | Min. | Typ. | Max. | Units |
|--------------------------------------------------------|---------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|------|------|------|-------|
| Off Characteristic                                     |                                                                           |                                                                                               |      |      |      |       |
| V <sub>(BR)DSS</sub>                                   | Drain-Source Breakdown Voltage                                            | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA                                                  | 100  | 110  | -    | V     |
| I <sub>DSS</sub>                                       | Zero Gate Voltage Drain Current                                           | V <sub>DS</sub> = 100V, V <sub>GS</sub> = 0V                                                  | -    | -    | 1    | μA    |
| I <sub>GSS</sub>                                       | Gate to Body Leakage Current                                              | V <sub>DS</sub> = 0V, V <sub>GS</sub> = ±20V                                                  | -    | -    | ±100 | nA    |
| On Characteristics <sup>note3</sup>                    |                                                                           |                                                                                               |      |      |      |       |
| V <sub>GS(th)</sub>                                    | Gate Threshold Voltage                                                    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                                    | 1.0  | 1.95 | 3.0  | V     |
| R <sub>DS(on)</sub>                                    | Static Drain-Source On-Resistance <sup>note2</sup>                        | V <sub>GS</sub> = 10V, I <sub>D</sub> = 3A                                                    | -    | 95   | 140  | mΩ    |
| Dynamic Characteristics <sup>note4</sup>               |                                                                           |                                                                                               |      |      |      |       |
| C <sub>iss</sub>                                       | Input Capacitance                                                         | V <sub>DS</sub> = 50V, V <sub>GS</sub> = 0V,<br>f = 1.0MHz                                    | -    | 196  | -    | pF    |
| C <sub>oss</sub>                                       | Output Capacitance                                                        |                                                                                               | -    | 25.9 | -    | pF    |
| C <sub>rss</sub>                                       | Reverse Transfer Capacitance                                              |                                                                                               | -    | 21.4 | -    | pF    |
| Q <sub>g</sub>                                         | Total Gate Charge                                                         | V <sub>DS</sub> = 50V, I <sub>D</sub> = 3A,<br>V <sub>GS</sub> = 10V                          | -    | 4.3  | -    | nC    |
| Q <sub>gs</sub>                                        | Gate-Source Charge                                                        |                                                                                               | -    | 3.5  | -    | nC    |
| Q <sub>gd</sub>                                        | Gate-Drain(“Miller”) Charge                                               |                                                                                               | -    | 3.1  | -    | nC    |
| Switching Characteristics <sup>note4</sup>             |                                                                           |                                                                                               |      |      |      |       |
| t <sub>d(on)</sub>                                     | Turn-On Delay Time                                                        | V <sub>DD</sub> = 50V, I <sub>DS</sub> =3A<br><br>R <sub>G</sub> = 2Ω, V <sub>GEN</sub> = 10V | -    | 14.7 | -    | ns    |
| t <sub>r</sub>                                         | Turn-On Rise Time                                                         |                                                                                               | -    | 3.5  | -    | ns    |
| t <sub>d(off)</sub>                                    | Turn-Off Delay Time                                                       |                                                                                               | -    | 20.9 | -    | ns    |
| t <sub>f</sub>                                         | Turn-Off Fall Time                                                        |                                                                                               | -    | 2.7  | -    | ns    |
| Drain-Source Diode Characteristics and Maximum Ratings |                                                                           |                                                                                               |      |      |      |       |
| I <sub>S</sub>                                         | Maximum Continuous Drain to Source Diode Forward Current <sup>note2</sup> |                                                                                               | -    | -    | 5    | A     |
| I <sub>SM</sub>                                        | Maximum Pulsed Drain to Source Diode Forward Current                      |                                                                                               | -    | -    | 12   | A     |
| V <sub>SD</sub>                                        | Drain to Source Diode Forward Voltage <sup>note3</sup>                    | V <sub>GS</sub> = 0V, I <sub>S</sub> =3A                                                      | -    | -    | 1.3  | V     |
| t <sub>rr</sub>                                        | Body Diode Reverse Recovery Time                                          | V <sub>GS</sub> = 0V, I <sub>F</sub> = 3A,<br>di/dt =100A/μs                                  | -    | 32.1 | -    | ns    |
| Q <sub>rr</sub>                                        | Body Diode Reverse Recovery Time Charge                                   |                                                                                               | -    | 39.4 | -    | nC    |
| I <sub>rrm</sub>                                       | Peak Reverse Recovery Current                                             |                                                                                               | -    | 2.1  | -    | A     |

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production
5.  $V_{DD}=50$  V,  $R_G=50$   $\Omega$ ,  $L=0.3$  mH, starting  $T_J=25$   $^{\circ}\text{C}$

## Typical Characteristics

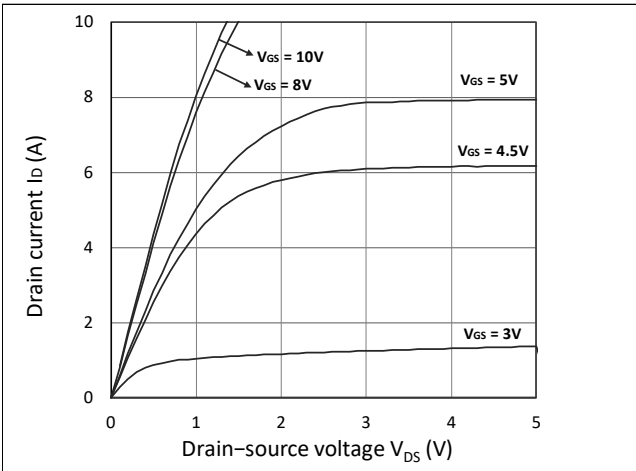


Figure 1. Output Characteristics

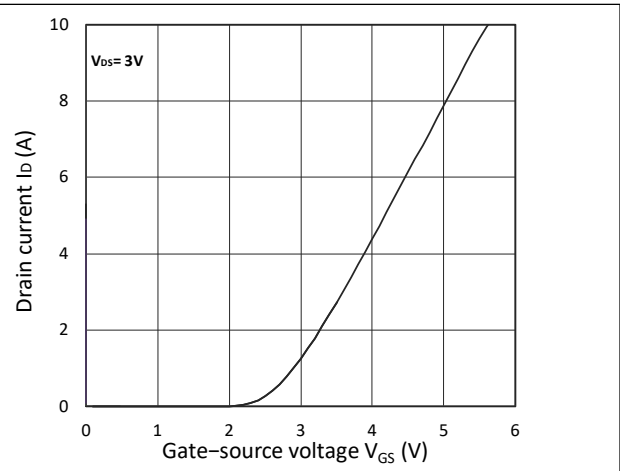


Figure 2. Transfer Characteristics

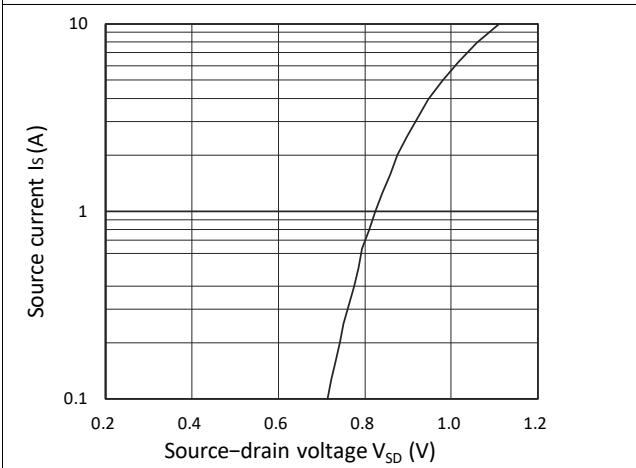


Figure 3. Forward Characteristics of Reverse

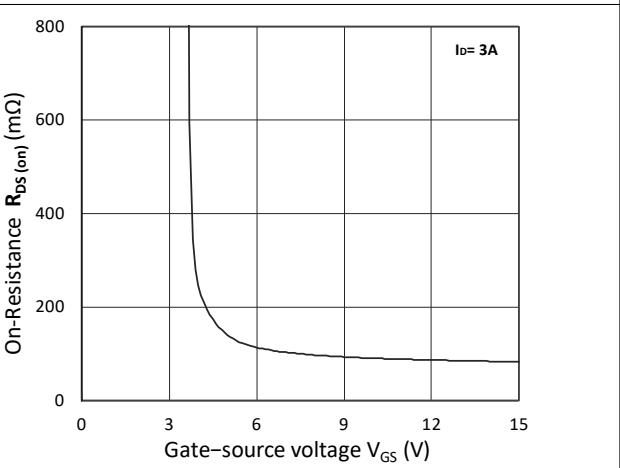


Figure 4.  $R_{DS(on)}$  vs.  $V_{GS}$

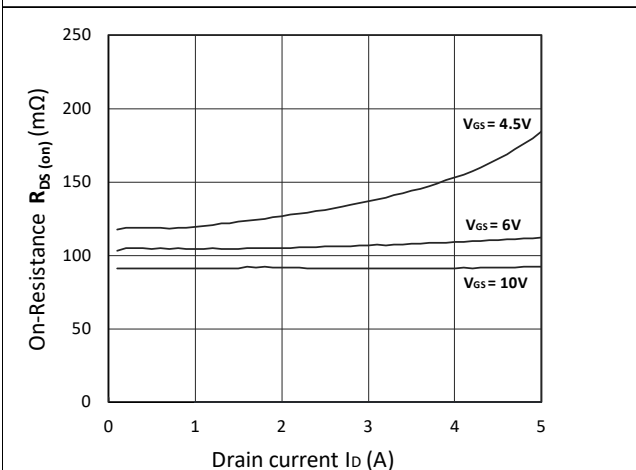


Figure 5.  $R_{DS(on)}$  vs.  $I_D$

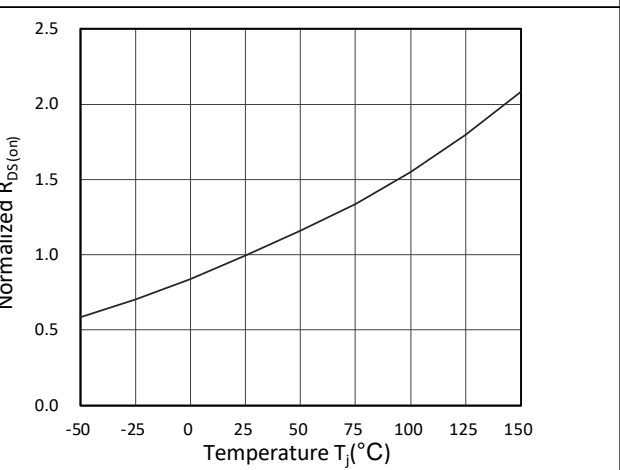


Figure 6. Normalized  $R_{DS(on)}$  vs. Temperature

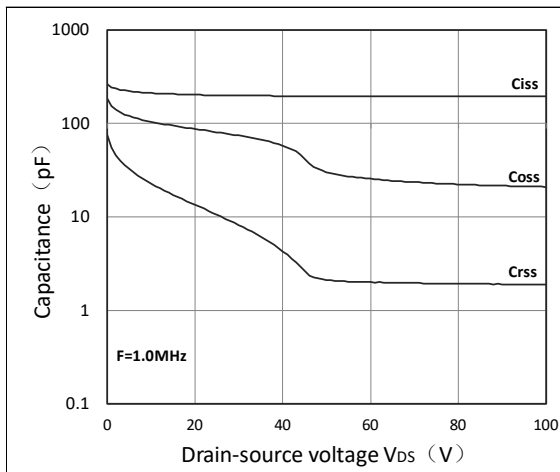


Figure 7. Capacitance Characteristics

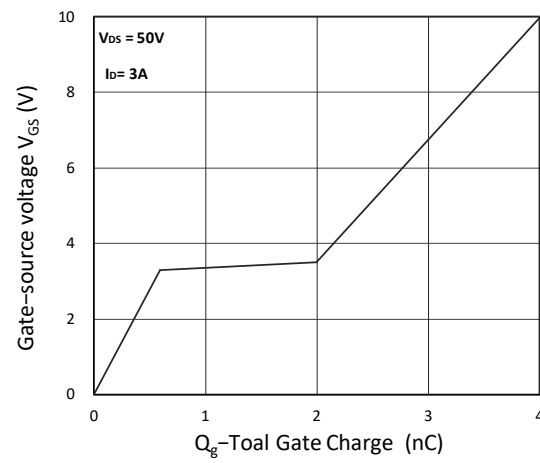
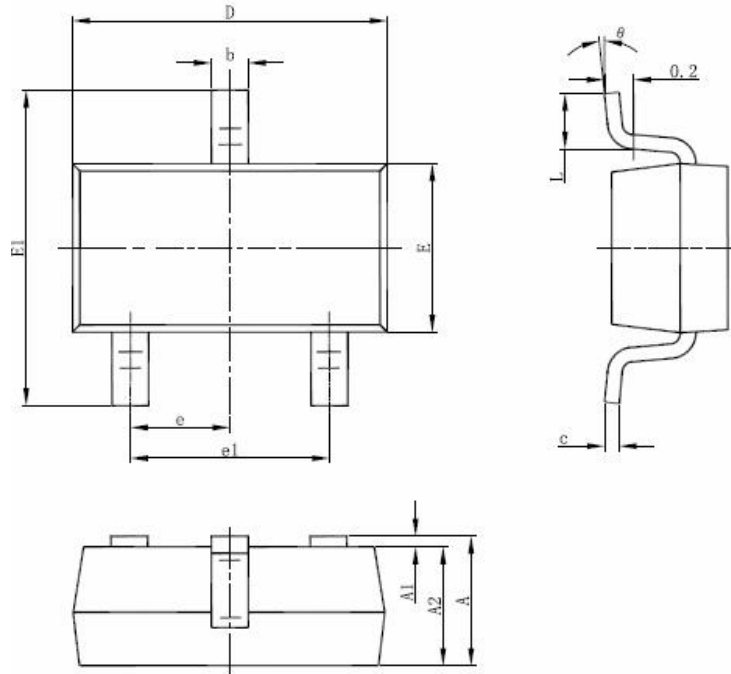


Figure 8. Gate Charge Characteristics

**SOT-23-3L Package Information**



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min                       | Max   | Min                  | Max   |
| A      | 1.050                     | 1.250 | 0.041                | 0.049 |
| A1     | 0.000                     | 0.100 | 0.000                | 0.004 |
| A2     | 1.050                     | 1.150 | 0.041                | 0.045 |
| b      | 0.300                     | 0.500 | 0.012                | 0.020 |
| c      | 0.100                     | 0.200 | 0.004                | 0.008 |
| D      | 2.820                     | 3.020 | 0.111                | 0.119 |
| E      | 1.500                     | 1.700 | 0.059                | 0.067 |
| E1     | 2.650                     | 2.950 | 0.104                | 0.116 |
| e      | 0.950(BSC)                |       | 0.037(BSC)           |       |
| e1     | 1.800                     | 2.000 | 0.071                | 0.079 |
| L      | 0.300                     | 0.600 | 0.012                | 0.024 |
| θ      | 0°                        | 8°    | 0°                   | 8°    |