

## N-Channel 100V MOSFET

### EX5N10

| $V_{DS}$ (V) | $R_{DS(on),max}$ (m $\Omega$ ) | $I_D$ (A) |
|--------------|--------------------------------|-----------|
| 100V         | 152.5 @ $V_{GS} = 10V$         | 2.1       |

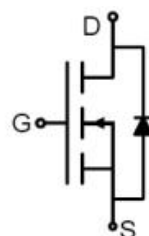
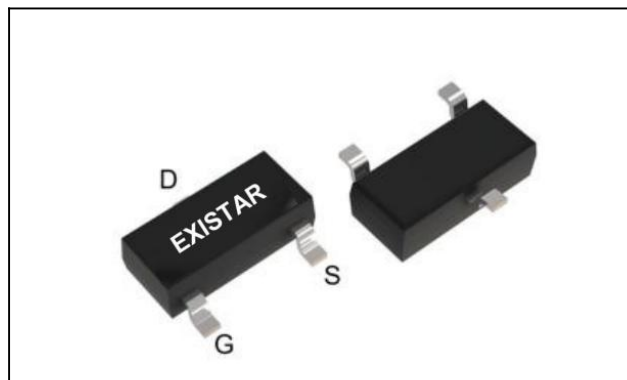
### Features

- Low  $R_{DS(on)}$  trench technology
- Low thermal impedance
- Fast switching speed
- 100% avalanche tested

### Applications

- DC/DC conversion
- Load Switch
- Power Management

### SOT-23



### Package And Ordering Information

| Ordering code | Package | Marking |
|---------------|---------|---------|
| EX5N10        | SOT-23  | 5N10    |

### Ordering Information

| Package | Units/ Reel | Reels/ Inner Box | Units/ Inner Box |
|---------|-------------|------------------|------------------|
| SOT-23  | 3000        | 15               | 45000            |

**Key Performance Parameters**

| Parameter                                        | Value | Unit |
|--------------------------------------------------|-------|------|
| V <sub>DS</sub> , min @ T <sub>j</sub> (max)     | 100   | V    |
| I <sub>D</sub> , pulse                           | 8.4   | A    |
| R <sub>DS(ON)</sub> , max @ V <sub>GS</sub> =10V | 152.5 | mΩ   |
| Q <sub>g</sub>                                   | 4.4   | nC   |

**Absolute Maximum Ratings at T<sub>j</sub>=25°C Unless Otherwise Noted**

| Parameter                                        |                       | Symbol                            | Limit      | Unit |
|--------------------------------------------------|-----------------------|-----------------------------------|------------|------|
| Drain-source voltage                             |                       | V <sub>DS</sub>                   | 100        | V    |
| Gate-source voltage                              |                       | V <sub>GS</sub>                   | ±20        |      |
| Continuous drain current                         | T <sub>A</sub> =25°C  | I <sub>D</sub>                    | 2.1        | A    |
|                                                  | T <sub>A</sub> =100°C |                                   | 1.3        |      |
| Pulsed drain current                             |                       | I <sub>D,pulse</sub>              | 8.4        |      |
| Avalanche energy, single pulse                   |                       | E <sub>AS</sub>                   | 16         | mJ   |
| Power dissipation                                | T <sub>A</sub> =25°C  | P <sub>D</sub>                    | 1.4        | W    |
|                                                  | T <sub>A</sub> =100°C |                                   | 0.5        |      |
| Operating junction and storage temperature range |                       | T <sub>J</sub> , T <sub>stg</sub> | -55 To 150 | °C   |

**Thermal Characteristics**

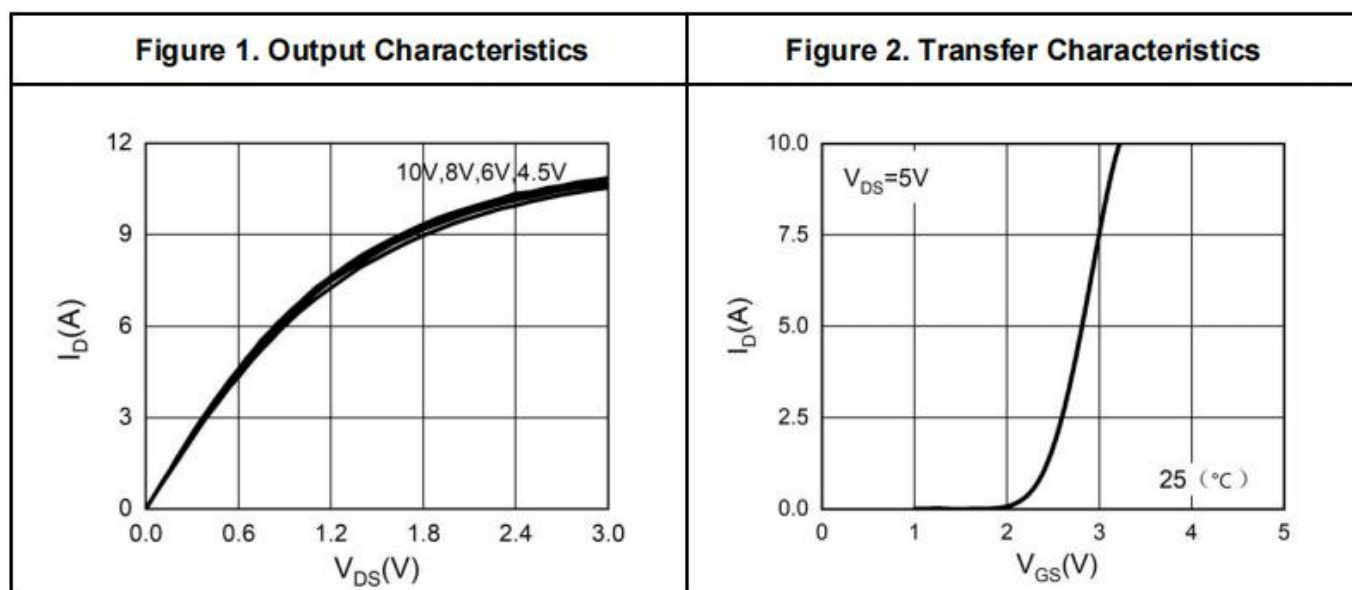
| Parameter                               |              | Symbol           | Max. | Unit |
|-----------------------------------------|--------------|------------------|------|------|
| Thermal resistance, junction-to-case    | Steady state | R <sub>θJC</sub> | -    | °C/W |
| Thermal resistance, junction-to-ambient | Steady state | R <sub>θJA</sub> | 91   |      |

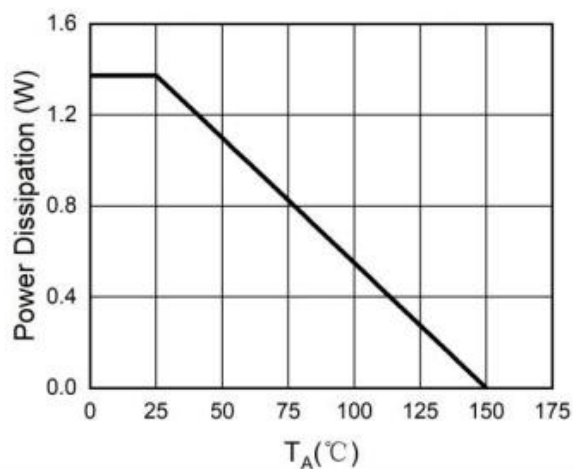
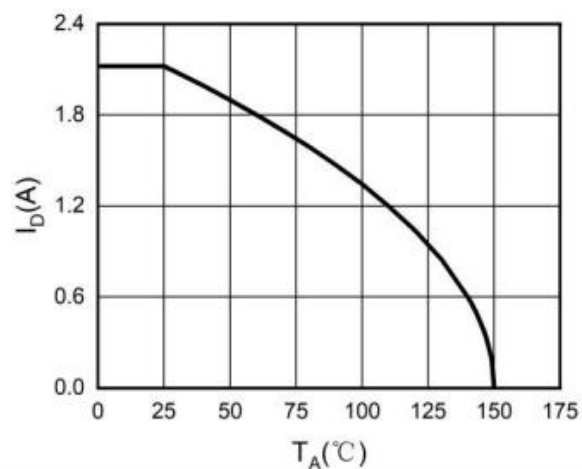
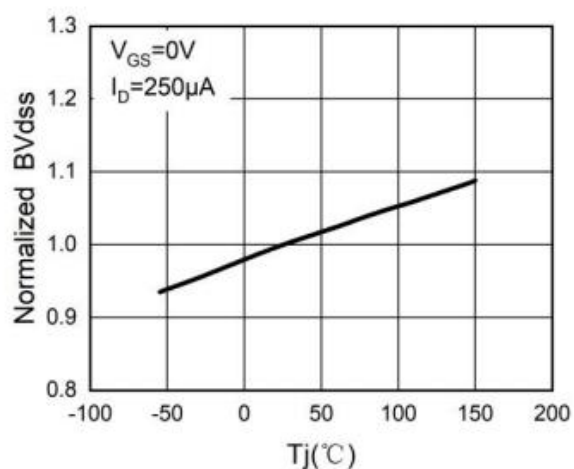
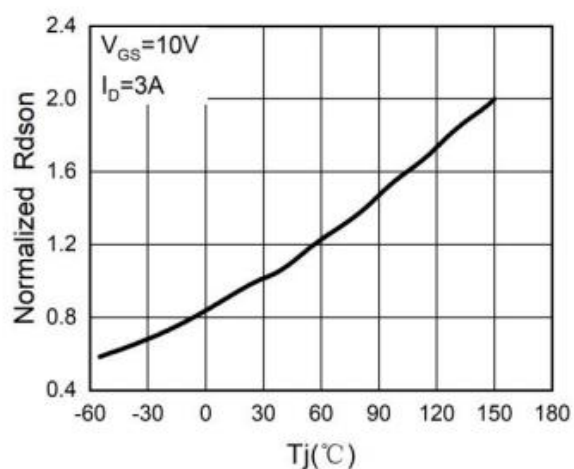
**Electrical Characteristics at T<sub>j</sub>=25°C unless otherwise specified**

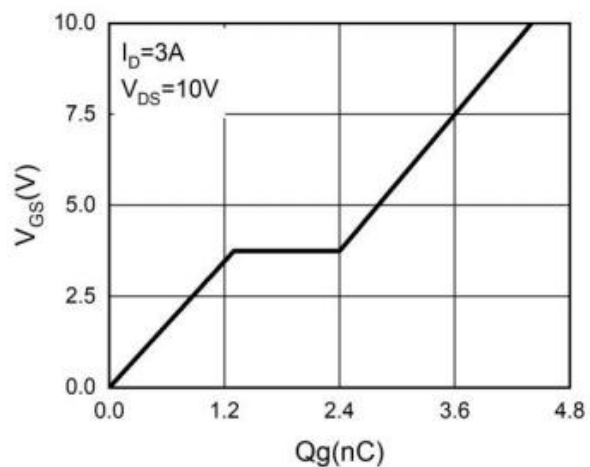
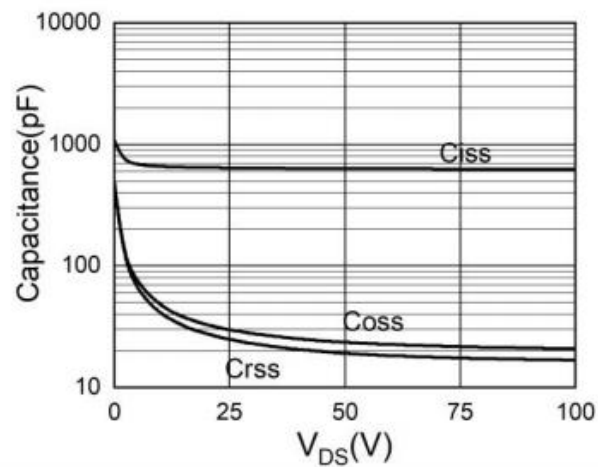
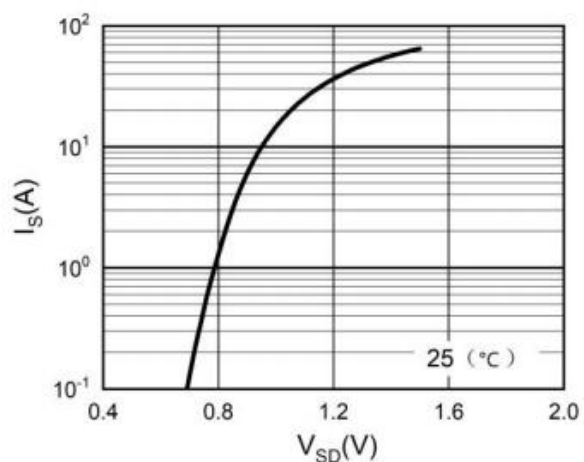
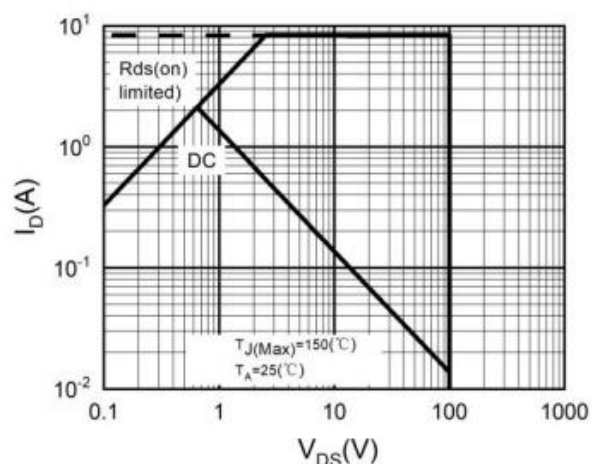
| Parameter                         | Symbol               | Min. | Typ. | Max.  | Unit | Test conditions                                             |
|-----------------------------------|----------------------|------|------|-------|------|-------------------------------------------------------------|
| <b>Static</b>                     |                      |      |      |       |      |                                                             |
| Drain to source breakdown voltage | V <sub>(BR)DSS</sub> | 100  |      |       | V    | V <sub>GS</sub> = 0, I <sub>D</sub> = 250 μA                |
| Gate-source threshold voltage     | V <sub>GS(th)</sub>  | 1    |      | 2.5   | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA |
| Gate-body leakage                 | I <sub>GSS</sub>     |      |      | ±100  | nA   | V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±20 V              |
| Zero gate voltage drain current   | I <sub>DSS</sub>     |      |      | 1     | μA   | V <sub>DS</sub> = 100 V, V <sub>GS</sub> = 0 V              |
| Drain-source on-resistance        | R <sub>DS(on)</sub>  |      | 122  | 152.5 | mΩ   | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 3 A                |
| Drain-source on-resistance        | R <sub>DS(on)</sub>  |      | 128  | 170.2 | mΩ   | V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 2 A               |
| Forward transconductance          | g <sub>fs</sub>      |      | 6.2  |       | S    | V <sub>DS</sub> = 5 V, I <sub>D</sub> = 3 A                 |

|                              |                     |  |     |     |    |                                                                                                    |
|------------------------------|---------------------|--|-----|-----|----|----------------------------------------------------------------------------------------------------|
| Gate resistance              | Rg                  |  | 1.0 |     | Ω  | f=1MHz                                                                                             |
| Gate Charge                  |                     |  |     |     |    |                                                                                                    |
| Total gate charge            | Qg                  |  | 4.4 |     | nC | V <sub>DS</sub> = 50 V, I <sub>D</sub> = 3 A, V <sub>GS</sub> = 10 V                               |
| Gate-source charge           | Qgs                 |  | 1.3 |     |    |                                                                                                    |
| Gate-drain charge            | Qgd                 |  | 1.1 |     |    |                                                                                                    |
| Dynamic                      |                     |  |     |     |    |                                                                                                    |
| Turn-on delay time           | t <sub>d(on)</sub>  |  | 16  |     | ns | V <sub>DS</sub> = 50 V, V <sub>GS</sub> = 10 V,<br>R <sub>L</sub> = 16.7 Ω, R <sub>GEN</sub> = 3 Ω |
| Rise time                    | t <sub>r</sub>      |  | 4   |     |    |                                                                                                    |
| Turn-off delay time          | t <sub>d(off)</sub> |  | 20  |     |    |                                                                                                    |
| Fall time                    | t <sub>f</sub>      |  | 3.6 |     |    |                                                                                                    |
| Input capacitance            | C <sub>iss</sub>    |  | 635 |     | pF | V <sub>DS</sub> =50 V, V <sub>GS</sub> = 0 V, f = 1.0MHz                                           |
| Output capacitance           | C <sub>oss</sub>    |  | 24  |     |    |                                                                                                    |
| Reverse transfer capacitance | C <sub>rss</sub>    |  | 19  |     |    |                                                                                                    |
| Body Diode                   |                     |  |     |     |    |                                                                                                    |
| Diode forward voltage        | V <sub>SD</sub>     |  |     | 1.2 | V  | V <sub>GS</sub> = 0 V, I <sub>s</sub> = 3 A                                                        |
| Reverse recovery time        | t <sub>rr</sub>     |  | 20  |     | ns | I <sub>F</sub> = 3 A, di/dt = 100 A/μs                                                             |
| Reverse recovery charge      | Q <sub>rr</sub>     |  | 13  |     | nC |                                                                                                    |

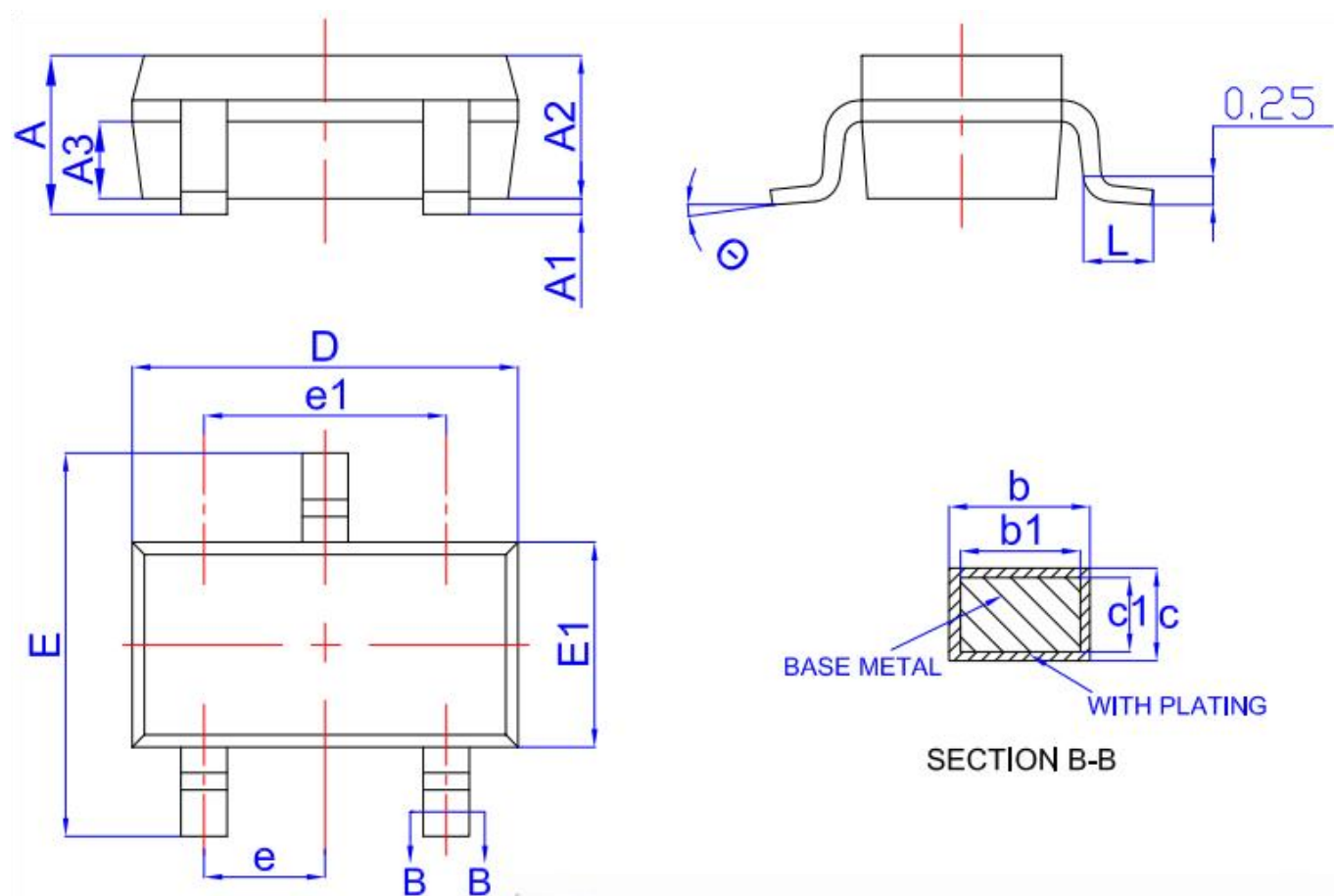
## Electrical Characteristics Diagrams



**Figure 3. Power Dissipation**

**Figure 4. Drain Current**

**Figure 5.  $BV_{DSS}$  vs Junction Temperature**

**Figure 6.  $R_{DS(ON)}$  vs Junction Temperature**


**Figure 7. Gate Charge Waveforms**

**Figure 8. Capacitance**

**Figure 9. Body-Diode Characteristics**

**Figure 10. Maximum Safe Operating Area**


## Package Outline Dimensions



| SYMBOL | MILLIMETER |      |      |
|--------|------------|------|------|
|        | MIN        | NOM  | MAX  |
| A      | —          | —    | 1.25 |
| A1     | 0.04       | —    | 0.10 |
| A2     | 1.00       | 1.10 | 1.20 |
| A3     | 0.55       | 0.65 | 0.75 |
| b      | 0.3        | —    | 0.4  |
| b1     | 0.37       | 0.40 | 0.43 |
| c      | 0.11       | —    | 0.21 |
| c1     | 0.10       | 0.13 | 0.16 |
| D      | 2.72       | 2.92 | 3.12 |
| E      | 2.60       | 2.80 | 3.00 |
| E1     | 1.40       | 1.60 | 1.80 |
| e      | 0.95BSC    |      |      |
| e1     | 1.90BSC    |      |      |
| L      | 0.30       | —    | 0.60 |
| Θ      | 0          | —    | 8°   |

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