

Description

The XR46000 is a silicon N-channel enhanced power MOSFET. With low conduction loss, good switching performance and high avalanche energy, it is suitable for various power supply system, especially for AC step driving application for LED lighting.

The package type is SOT-223, which comply with the RoHS standard.

Key Parameters

| | |
|--------------------------------|--------------|
| V_{DSS} | 600V |
| I_D | 1.5A |
| $P_D (T_C = 25^\circ\text{C})$ | 20W |
| $R_{DS,ON,typ}$ | 7.0 Ω |

FEATURES

- Fast switching
- ESD improved capability
- Low gate charge (Typ. 7.5nC)
- Low reverse transfer capacitance (Typ. 5.0pF)

APPLICATIONS

- LED lighting applications
 - Downlight
 - High bay
 - Specialty
 - Architectural

Equivalent Circuit

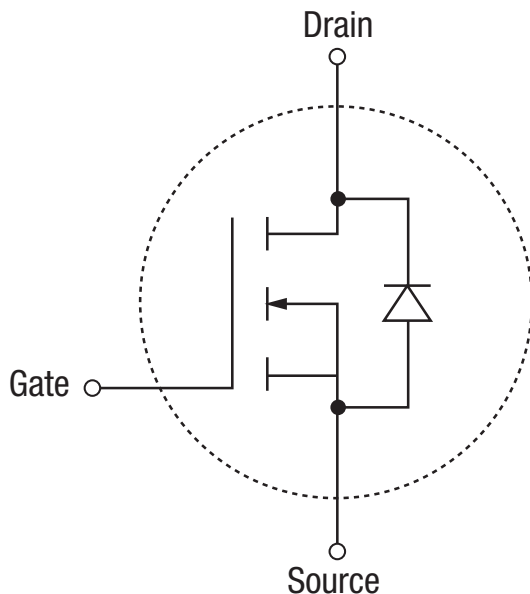
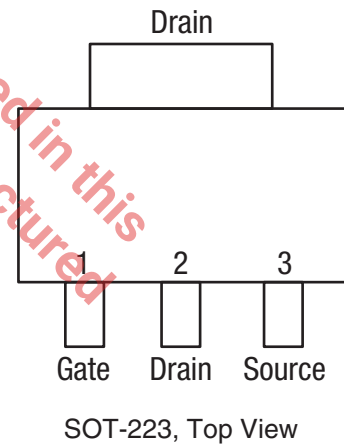


Figure 1. Equivalent Circuit

Pin Configuration



Absolute Maximum Ratings

Stresses beyond the limits listed below may cause permanent damage to the device. Exposure to any Absolute Maximum Rating condition for extended periods may affect device reliability and lifetime.

$T_C = 25^\circ\text{C}$ unless otherwise noted.

| | |
|--|--|
| V_{DSS} drain-to-source voltage | 600V |
| I_D continuous drain current ($T_C = 25^\circ\text{C}$) | 1.5A |
| I_D continuous drain current ($T_C = 100^\circ\text{C}$) | 0.85A |
| I_{DM} pulsed drain current | 6A |
| V_{GS} gate-to-source voltage | $\pm 30\text{V}$ |
| P_D power dissipation ($T_C = 25^\circ\text{C}$) | 20W |
| P_D derating factor above 25°C | $0.16\text{W}/^\circ\text{C}$ |
| $T_{STORAGE}$ storage temperature range | -65°C to 150°C |
| E_{AS} single pulse avalanche energy | 80mJ |

NOTE:

Unless otherwise noted, all tests are pulsed tests at the specified temperature, therefore: $T_J = T_C = T_A$.

Operating Conditions

| | |
|--|---|
| T_J operating junction temperature | 150°C |
| T_A operating ambient temperature | -40°C to 85°C |

The product (or products) mentioned in this data sheet are no longer being manufactured and may not be ordered (OBS)

Electrical Characteristics

$T_C = 25^\circ\text{C}$ unless otherwise noted.

| Symbol | Parameter | Conditions | Min | Typ | Max | Units | |
|--|---|--|-----|------|------|--------------------|----|
| OFF Characteristic | | | | | | | |
| BV_{DSS} | Drain to source breakdown voltage | $V_{GS} = 0V, I_D = 250\mu A$ | 600 | | | V | |
| $\Delta BV_{DSS}/\Delta T_J$ | Breakdown voltage temperature coefficient | $I_D = 250\mu A$, reference 25°C | | 0.71 | | $V/^\circ\text{C}$ | |
| I_{DSS} | Drain to source leakage current | $V_{DS} = 600V, V_{GS} = 0V, T_A = 25^\circ\text{C}$ | | | 25 | μA | |
| | | $V_{DS} = 600V, V_{GS} = 0V, T_A = 125^\circ\text{C}$ | | | 250 | | |
| $I_{GSS(F)}$ | Gate to source forward leakage | $V_{GS} = 30V$ | | | 12 | μA | |
| $I_{GSS(R)}$ | Gate to source reverse leakage | $V_{GS} = -28V$ | | | -12 | | |
| ON Characteristic (pulse width $t_p \leq 380\mu s$, $\delta \leq 2\%$) | | | | | | | |
| $R_{DS(ON)}$ | Drain to source on-resistance | $V_{GS} = 10V, I_D = 0.75A$ | | 7.0 | 8.0 | Ω | |
| $V_{GS(TH)}$ | Gate threshold voltage | $V_{DS} = V_{GS}, I_D = 250\mu A$ | 2.0 | | 4.0 | V | |
| Dynamic Characteristic | | | | | | | |
| g_{fs} | Forward transconductance | $V_{DS} = 15V, I_D = 0.75A$ | | 1.0 | | S | |
| C_{iss} | Input capacitance | $V_{GS} = 0V, V_{DS} = 25V, f = 1\text{MHz}$ | | 170 | | pF | |
| C_{oss} | Output capacitance | | | 27 | | | |
| C_{rss} | Reverse transfer capacitance | | | 5 | | | |
| Resistive Switching Characteristic | | | | | | | |
| $t_{d(ON)}$ | Turn-on delay time | $I_D = 1.5A, V_{DD} = 300V, V_{GS} = 10V,$ $R_G = 4.7\Omega$ | | 8 | | ns | |
| t_r | Rise time | | | 30 | | | |
| $t_{d(OFF)}$ | Turn-off delay time | | | 22 | | | |
| t_f | Fall time | | | 55 | | | |
| Q_g | Total gate charge | $I_D = 1.5A, V_{DD} = 480V, V_{GS} = 10V$ | | 7.5 | | nC | |
| Q_{gs} | Gate to source charge | | | 1.7 | | | |
| Q_{gd} | Gate to drain "Miller" charge | | | 4.0 | | | |
| Source-Drain Diode Characteristics (pulse width $t_p \leq 380\mu s$, $\delta \leq 2\%$) | | | | | | | |
| I_S | Continuous source current (body diode) | | | | 1.5 | A | |
| I_{SM} | Maximum source current (body diode) | | | | 6.0 | | |
| V_{SD} | Diode forward voltage | $I_S = 1.5A, V_{GS} = 0V$ | | | 1.5 | V | |
| T_{rr} | Reverse recovery time | $I_D = 1.5A, T_J = 25^\circ\text{C}, dI_F/dt = 100A/\mu s,$ $V_{GS} = 0V$ | | 530 | | ns | |
| Q_{rr} | Reverse recovery charge | | | | 1100 | | nC |
| I_{RRM} | Reverse recovery current | | | | 4.4 | | A |

Typical Performance Characteristics

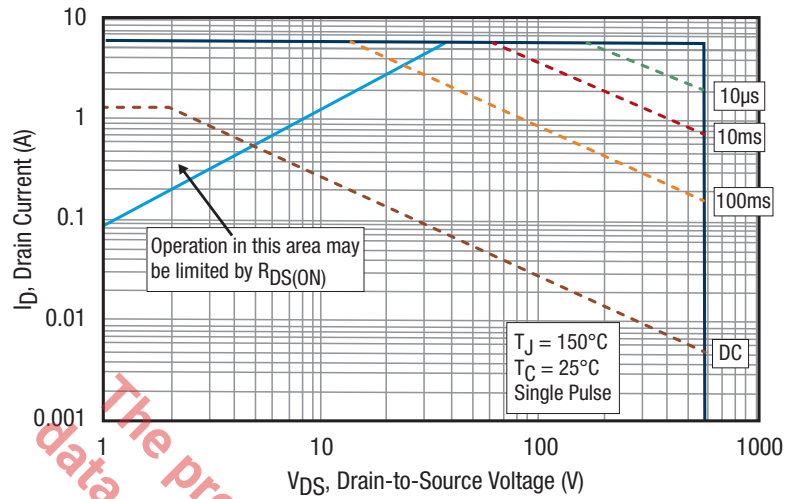


Figure 2. Safe Operating Area

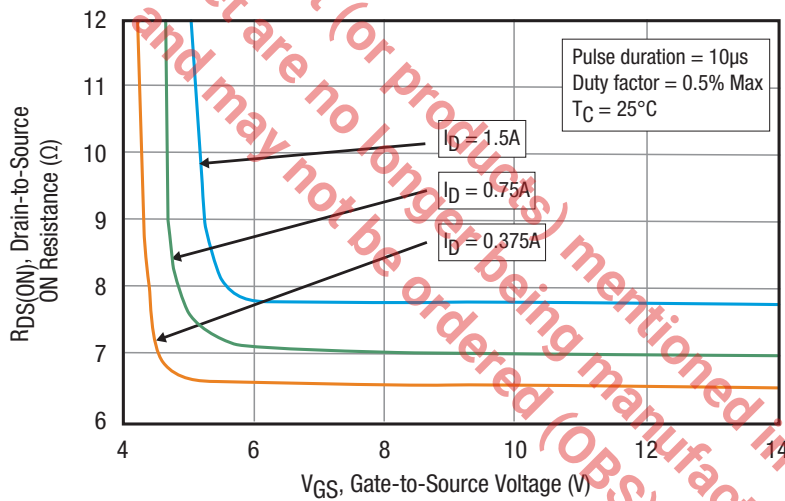


Figure 3. Typical Drain-to-Source ON Resistance vs. Gate Voltage and Drain Current

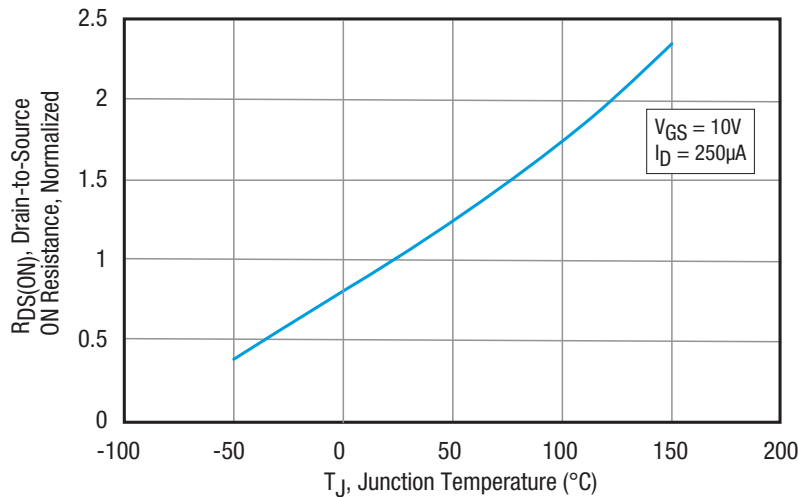
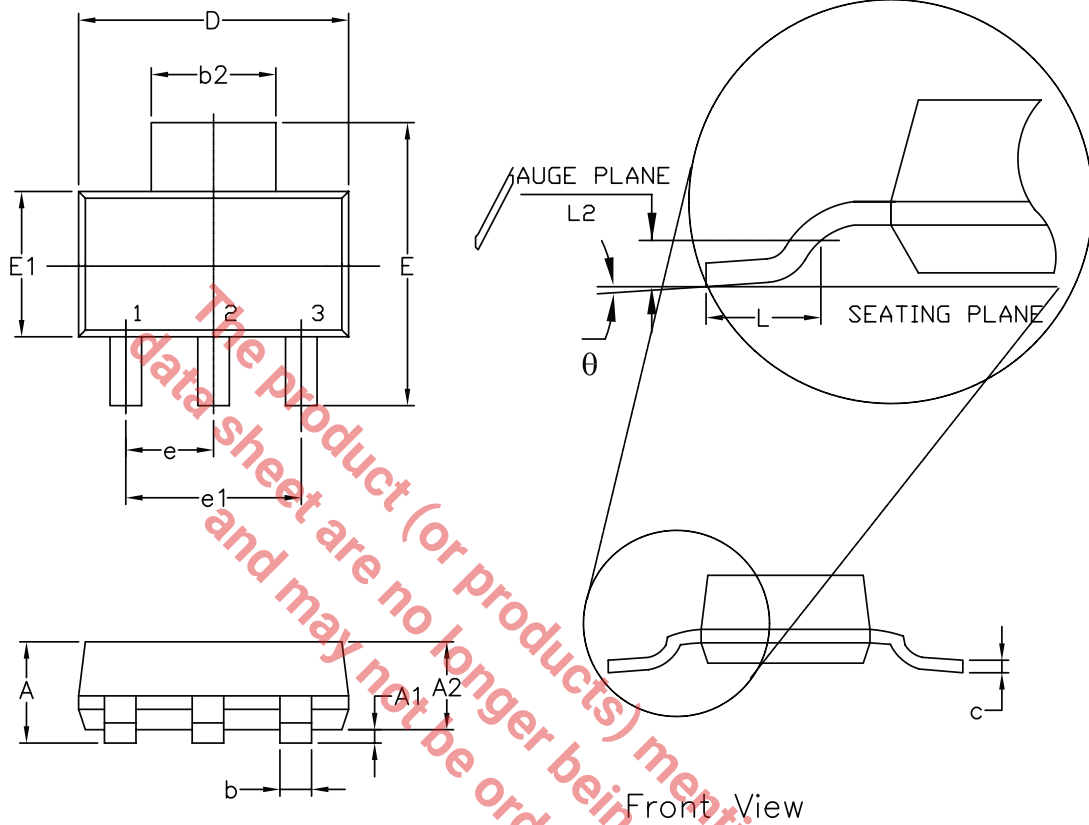


Figure 4. Typical Drain-to-Source ON Resistance vs. Junction Temperature

Package Description

Top View



Side View

| 3 Pin SOT-223 JEDEC TO-261 Variation AA | | | | | | |
|---|------------------------------------|------|------|--|-------|-------|
| SYMBOLS | DIMENSIONS IN MM (Control Unit) | | | DIMENSIONS IN INCH (Reference Unit) | | |
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | — | — | 1.80 | — | — | 0.071 |
| A1 | 0.02 | — | 0.10 | 0.001 | — | 0.004 |
| A2 | 1.50 | 1.60 | 1.70 | 0.060 | 0.063 | 0.067 |
| b | 0.66 | 0.76 | 0.84 | 0.026 | 0.030 | 0.033 |
| b2 | 2.90 | 3.00 | 3.10 | 0.114 | 0.118 | 0.122 |
| c | 0.23 | 0.30 | 0.35 | 0.010 | 0.012 | 0.014 |
| D | 6.30 | 6.50 | 6.70 | 0.248 | 0.256 | 0.264 |
| E | 6.70 | 7.00 | 7.30 | 0.264 | 0.276 | 0.287 |
| E1 | 3.30 | 3.50 | 3.70 | 0.130 | 0.138 | 0.146 |
| e | 2.30 BSC | | | 0.091 BSC | | |
| e1 | 4.60 BSC | | | 0.182 BSC | | |
| L | 0.75 | — | — | 0.030 | — | — |
| L2 | 0.25 BSC | | | 0.010 BSC | | |
| θ | 0° | — | 10° | 0° | — | 10° |
| N | 3 | | | 3 | | |

Ordering Information⁽¹⁾

| Part Number | Operating Temperature Range | Package | Packaging Method | Lead Free ⁽²⁾ |
|--------------|--------------------------------|---------|------------------|--------------------------|
| XR46000ESETR | -40°C ≤ T _J ≤ 150°C | SOT-223 | Tape and reel | Yes |

NOTES:

1. Refer to www.maxlinear.com/XR46000 for most up-to-date Ordering Information.
2. Visit www.maxlinear.com for additional information on Environmental Rating.

Revision History

| Revision | Date | Description |
|----------|----------|--|
| 1A | Aug 2016 | Initial release |
| 1B | Nov 2019 | Updated to MaxLinear logo. Updated Ordering Information. |

If the product (or products) mentioned in this data sheet are no longer being manufactured and may not be ordered (OBS)



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