

### 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 $\Omega$

### 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

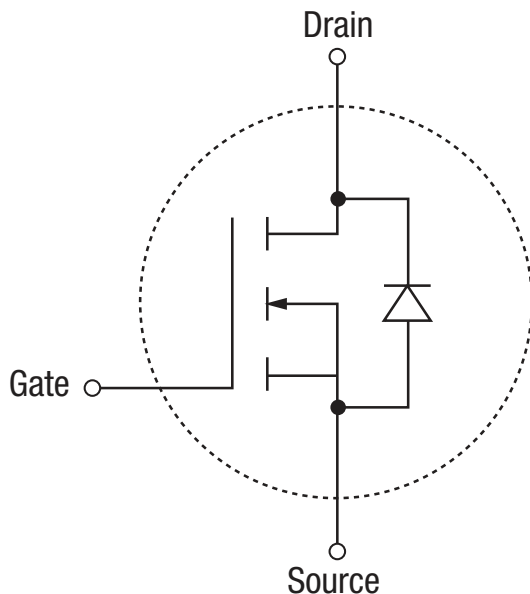
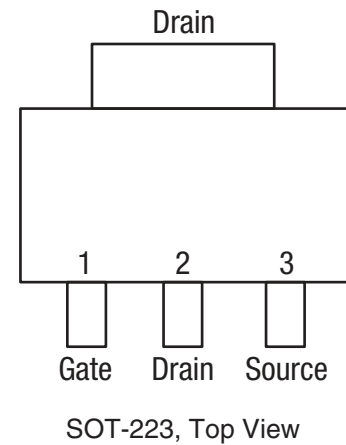


Figure 1. Equivalent Circuit

### 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 $25^\circ\text{C}$ .....	0.16W/ $^\circ\text{C}$
$T_{STORAGE}$ storage temperature range.....	$-65^\circ\text{C}$ to $150^\circ\text{C}$
$E_{AS}$ 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 .....	$150^\circ\text{C}$
$T_A$ operating ambient temperature .....	$-40^\circ\text{C}$ to $85^\circ\text{C}$

## Electrical Characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units	
<b>OFF Characteristic</b>							
$BV_{DSS}$	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 $25^\circ\text{C}$		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	$\mu A$	
		$V_{DS} = 600V, V_{GS} = 0V, T_A = 125^\circ\text{C}$			250		
$I_{GSS(F)}$	Gate to source forward leakage	$V_{GS} = 30V$			12	$\mu A$	
$I_{GSS(R)}$	Gate to source reverse leakage	$V_{GS} = -28V$			-12		
<b>ON Characteristic (pulse width <math>t_p \leq 380\mu s</math>, <math>\delta \leq 2\%</math>)</b>							
$R_{DS(ON)}$	Drain to source on-resistance	$V_{GS} = 10V, I_D = 0.75A$		7.0	8.0	$\Omega$	
$V_{GS(TH)}$	Gate threshold voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0		4.0	V	
<b>Dynamic Characteristic</b>							
$g_{fs}$	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			
<b>Resistive Switching Characteristic</b>							
$t_{d(ON)}$	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			
<b>Source-Drain Diode Characteristics (pulse width <math>t_p \leq 380\mu s</math>, <math>\delta \leq 2\%</math>)</b>							
$I_S$	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

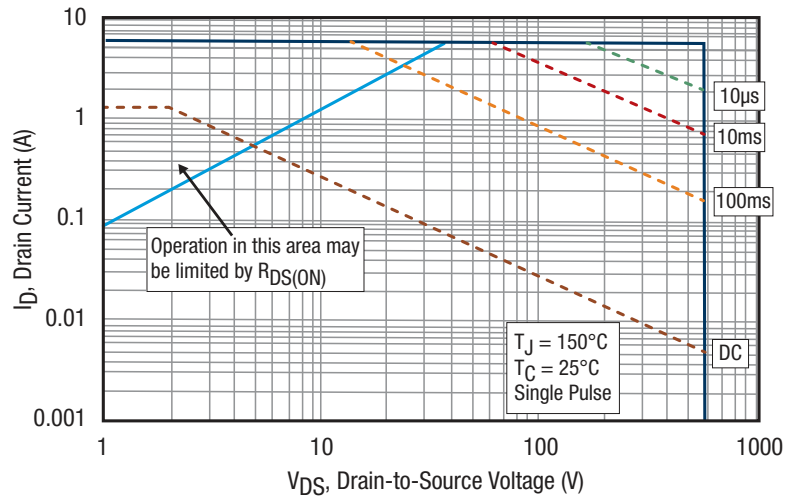


Figure 2. Safe Operating Area

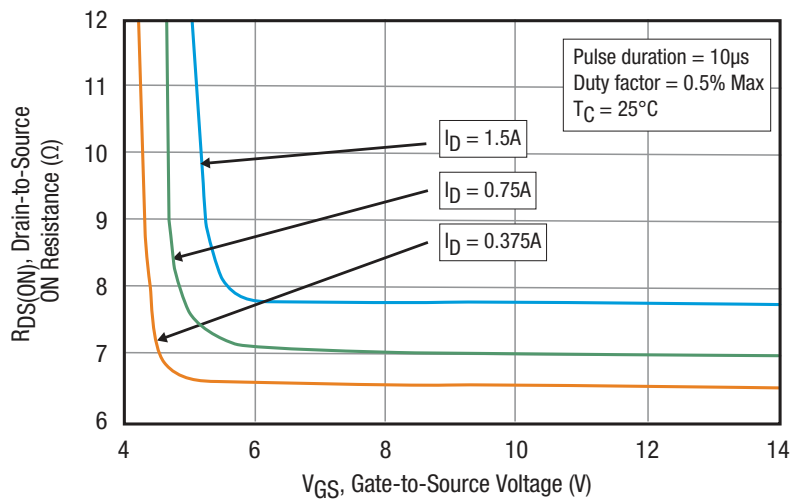


Figure 3. Typical Drain-to-Source ON Resistance vs. Gate Voltage and Drain Current

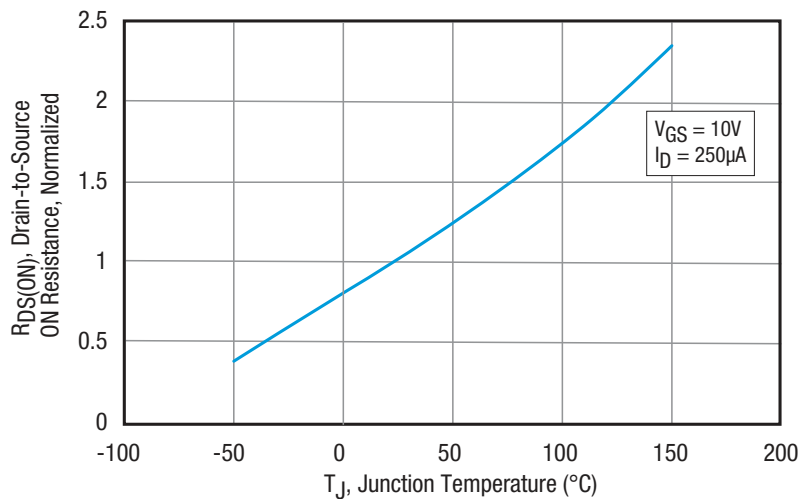
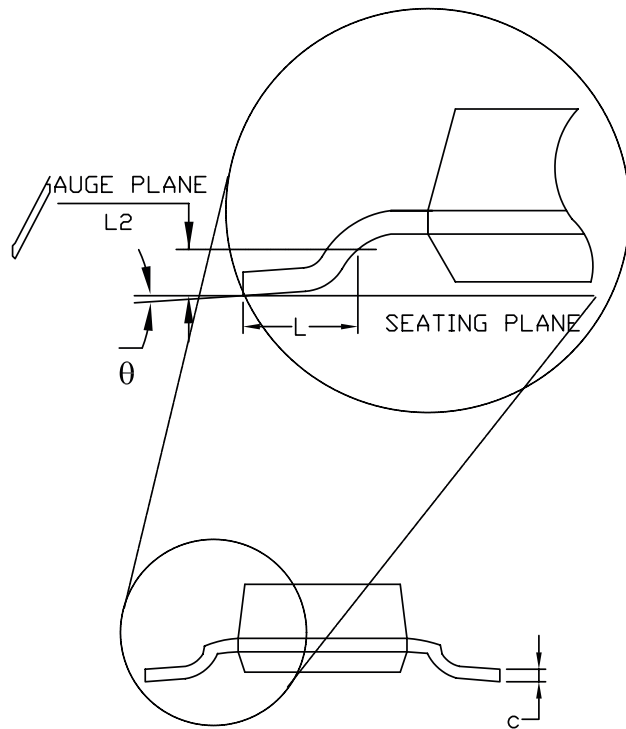
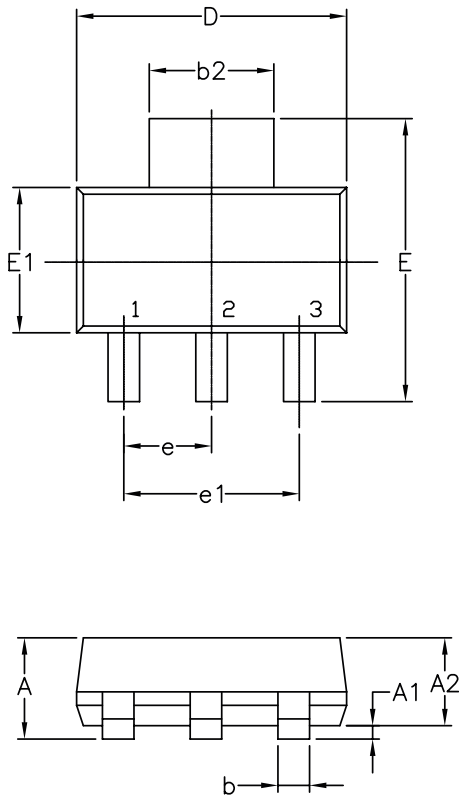


Figure 4. Typical Drain-to-Source ON Resistance vs. Junction Temperature

Package Description

Top View



Front 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<sup>(1)</sup>

Part Number	Operating Temperature Range	Package	Packaging Method	Lead Free <sup>(2)</sup>
XR46000ESETR	-40°C ≤ T <sub>J</sub> ≤ 150°C	SOT-223	Tape and reel	Yes

### NOTES:

1. Refer to [www.maxlinear.com/XR46000](http://www.maxlinear.com/XR46000) for most up-to-date Ordering Information.
2. Visit [www.maxlinear.com](http://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.



5966 La Place Court  
 Suite 100  
 Carlsbad, CA 92008  
 Tel.: +1 (760) 692-0711  
 Fax: +1 (760) 444-8598  
[www.maxlinear.com](http://www.maxlinear.com)

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