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°C)	20W
$R_{DS,ON,typ}$	7.0Ω

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
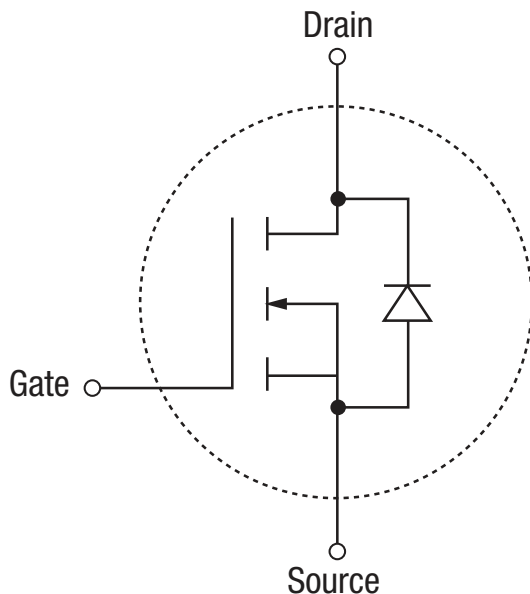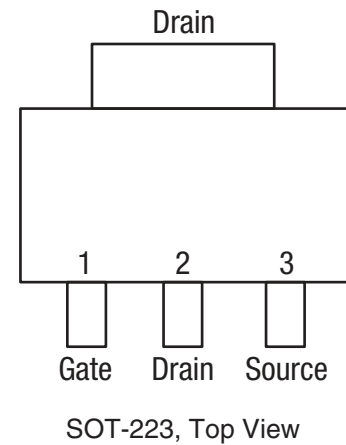 - Specialty
  - Architectural

Equivalent Circuit

Figure 1. Equivalent Cirucit

Pin Configuration

SOT-223, Top View

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°C unless otherwise noted.

V_{DSS} drain-to-source voltage 600V

I_D continuous drain current (T_C = 25°C) 1.5A

I_D continuous drain current (T_C = 100°C) 0.85A

I_{DM} pulsed drain current 6A

V_{GS} gate-to-source voltage .... ±30V

P_D power dissipation (T_C = 25°C) 20W

P_D derating factor above 25°C .... 0.16W/°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

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Electrical Characteristics

$T_C = 25°C$ 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/°C
I_{DSS}	Drain to source leakage current	$V_{DS} = 600V$, $V_{GS} = 0V$, $T_A = 25°C$			25	μA
		$V_{DS} = 600V$, $V_{GS} = 0V$, $T_A = 125°C$			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 tp ≤ 380µs, δ ≤ 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 = 1MHz		170		pF
C_{oss}	Output capacitance			27		
C_{rss}	Reverse transfer capacitance			5		
Resistive Switching Characteristic						
$t_{d(ON)}$	Turn-on delay time	$I_D = 1.5A$, $V_{DD} = 300V$, $V_{GS} = 10V$, $R_G = 4.7Ω$		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 tp ≤ 380us, δ ≤ 2%)						
I_S	Continuous source current (body diode)				1.5	A
I_{SM}	Maximun 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	$I_D = 1.5A$, $T_J = 25°C$, $dI_F/dt = 100A/\mu s$, $V_{GS} = 0V$		530		ns
Q_{rr}	Reverse recovery charge			1100		nC
I_{RRM}	Reverse recovery current			4.4		A

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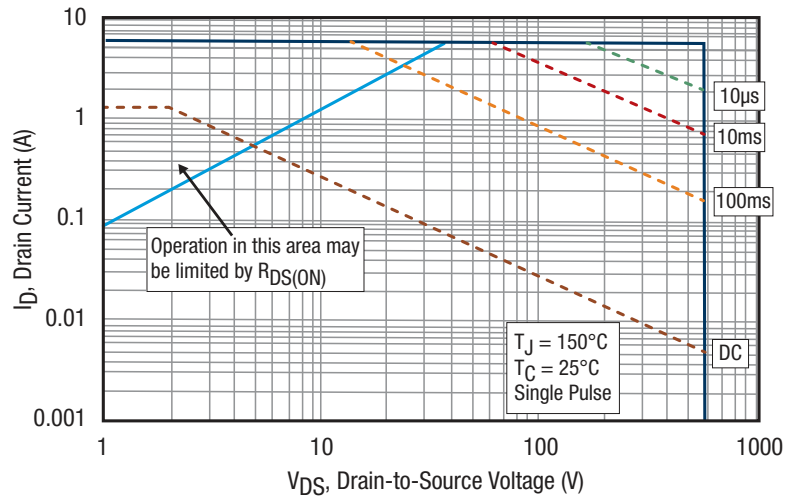# Typical Performance Characteristics

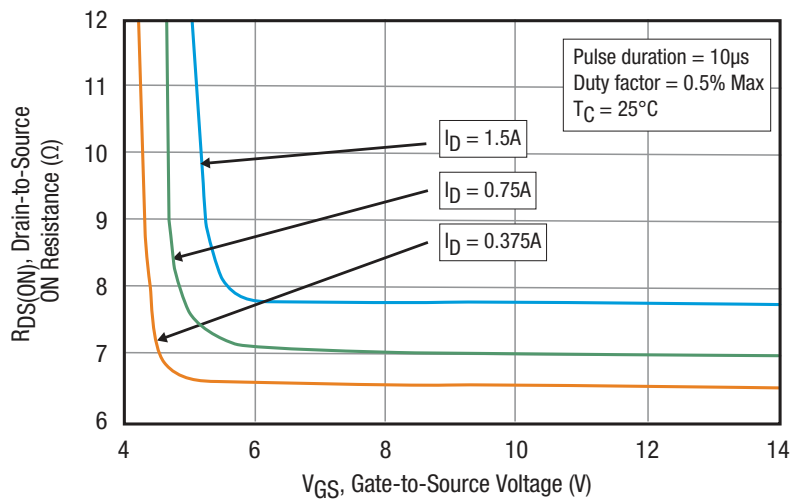
Figure 2. Safe Operating Area

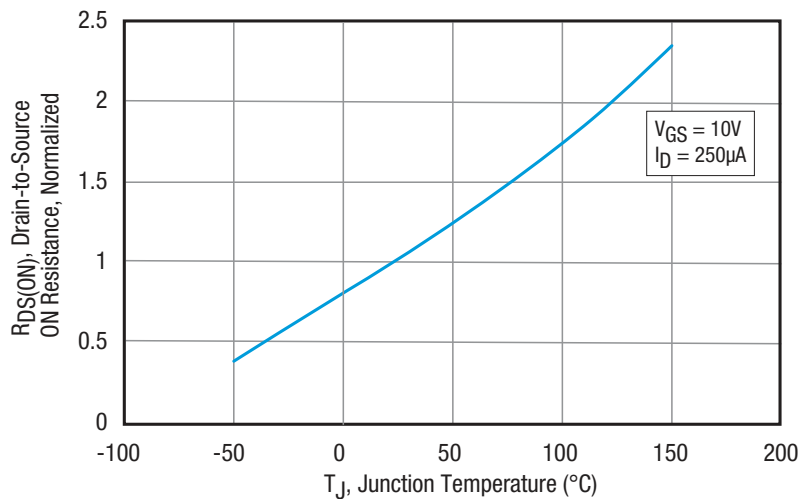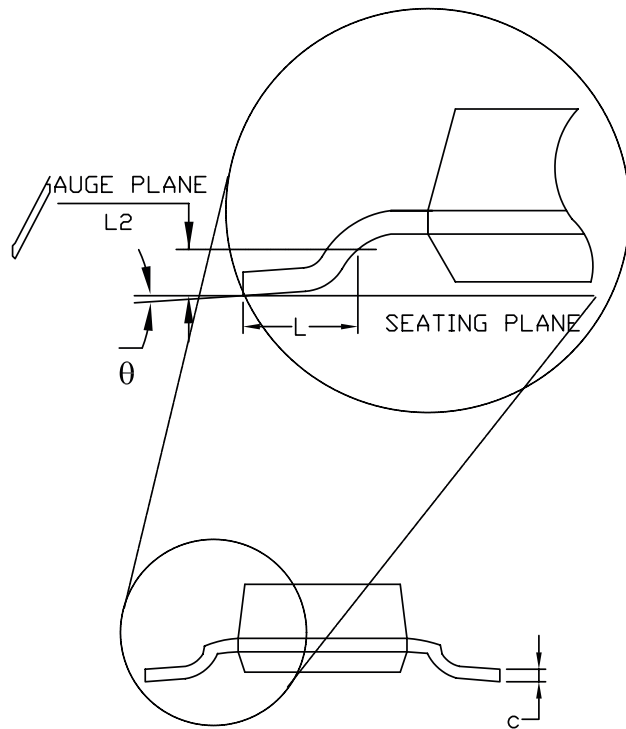Figure 3. Typical Drain-to-Source ON Resistance vs. Gate Voltage and Drain Current

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

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Package Description

Top View
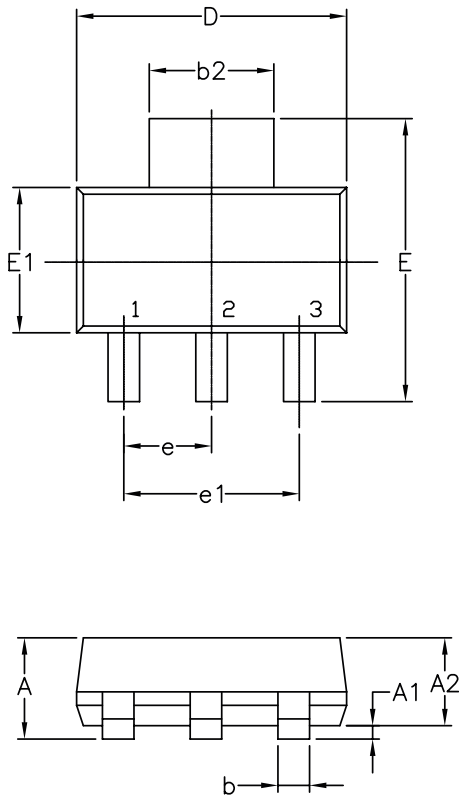
Side View

Front 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		

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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.

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