XR46000

N-Channel Power MOSFET

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.

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

Key Parameters

V_{DSS}	600V
I_D	1.5A
P_D (T_C = 25°C)	20W
$R_{DS,ON,typ}$	7.0Ω

Equivalent Circuit

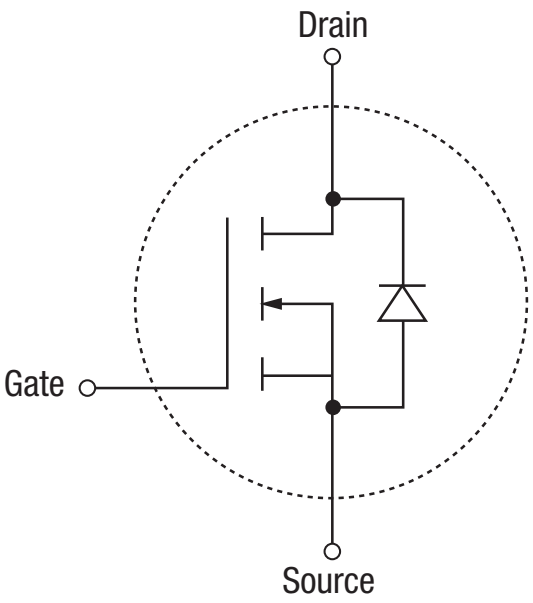
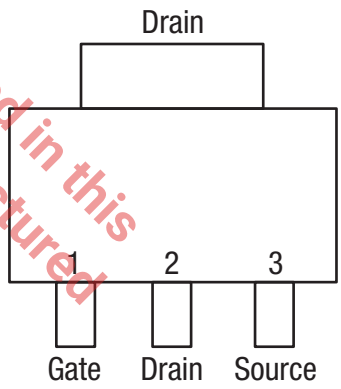


Figure 1. Equivalent Cirucit

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

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 = 250µA	600			V
$\Delta BV_{DSS}/\Delta T_J$	Breakdown voltage temperature coefficient	I_D = 250µA, 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 = 250µA	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/µs, V_{GS} = 0V		530		ns
Q_{rr}	Reverse recovery charge			1100		nC
I_{RRM}	Reverse recovery current			4.4		A

Typical Performance Characteristics

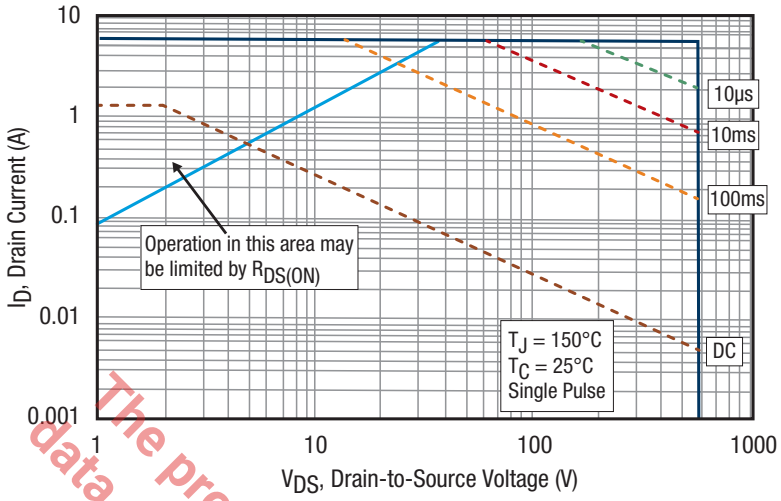


Figure 2. Safe Operating Area

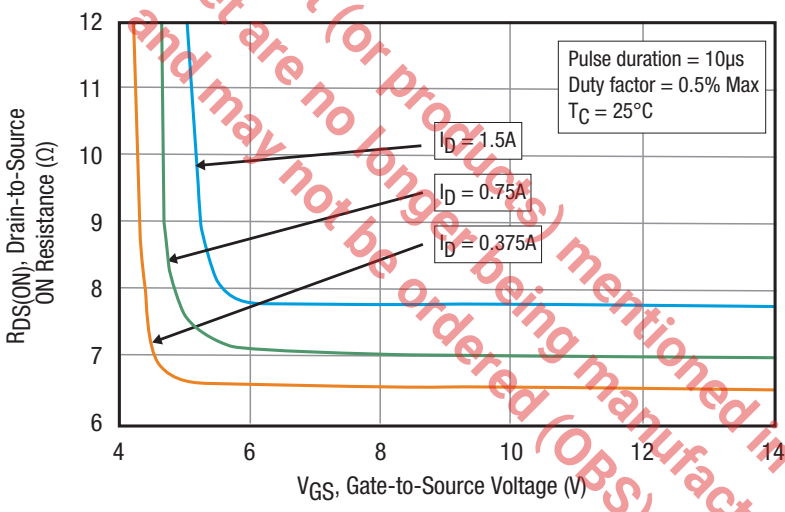


Figure 3. Typical Drain-to-Source ON Resistance vs. Gate Voltage and Drain Current

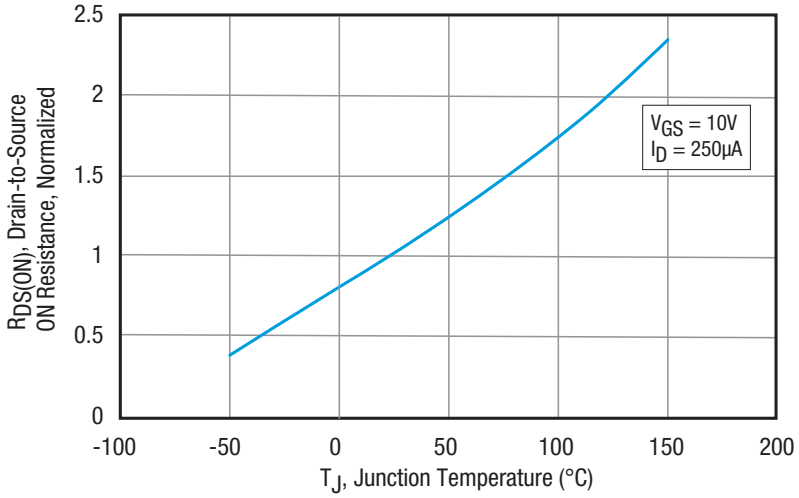
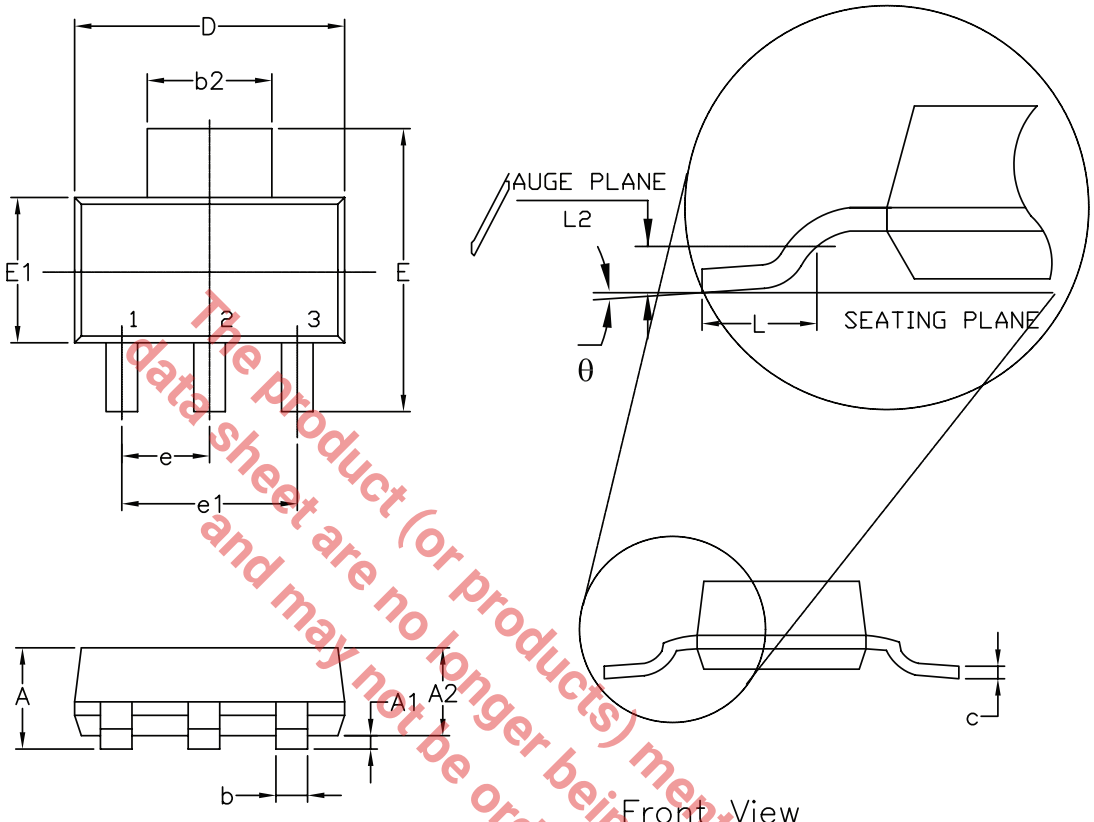


Figure 4. Typical Drain-to-Source ON Resistance vs. Junction Temperature

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[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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