DUAL 20V N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$	Package	I_D T_A = +25°C (Notes 5 & 6)
20V	130mΩ @ V_{GS} = 4.5V	MSOP-8	2.5A
	150mΩ @ V_{GS} = 2.7V		2.3A

Features

- Low On-Resistance
- Low Threshold
- Fast Switching Speed
- Low Gate Drive
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Description

This MOSFET has been designed to minimize the on-state resistance ($R_{DS(on)}$) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

Mechanical Data

- Case: MSOP-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish e3
- Weight: 0.008 grams (approximate)

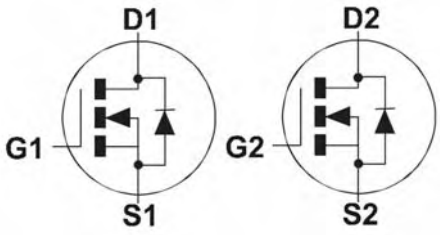
Applications

- DC-DC Converters
- Power Management functions
- Motor Control
- Disconnect Switches

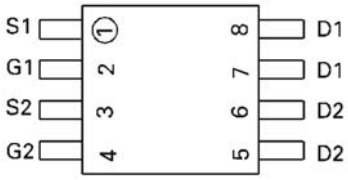
MSOP8



Top View



Device Symbol



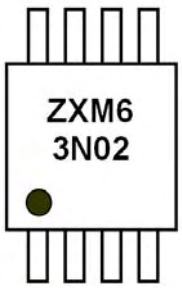
Top View
Pin-Out

Ordering Information (Note 4)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXMD63N02XTA	ZXM63N02	7	12	1,000
ZXMD63N02XTC	ZXM63N02	13	12	4,000

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See http://www.diodes.com for more information about Diodes Incorporated's definitions of Halogen and Antimony free,"Green" and Lead-Free.
3. Halogen and Antimony free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. For packaging details, go to our website at http://www.diodes.com

Marking Information



ZXM63N02 = Product type Marking Code

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Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	20	V
Gate-Source Voltage			V_{GSS}	±12	V
Continuous Drain Current	Steady State	@ V_{GS} = 10V; T_A = +25°C (Note 5 & 6) @ V_{GS} = 10V; T_A = +70°C (Note 5 & 6) @ V_{GS} = 10V; T_A = +100°C (Note 5 & 6)	I_D	2.5 1.9 0.78	A
Pulsed Drain Current		(Notes 6 & 7)	I_{DM}	19	A
Continuous Source Current (Body Diode)		(Notes 5 & 6)	I_S	1.5	A
Pulsed Source Current (Body Diode)		(Notes 6 & 7)	I_{SM}	19	A

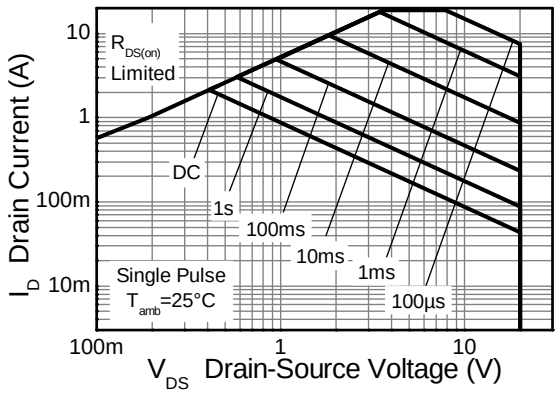
Thermal Characteristics

Characteristic		Symbol	Value	Unit
Power Dissipation	(Notes 6 & 8)	P_D	0.87	W
	(Notes 5 & 6)		1.25	
	(Notes 8 & 9)		1.04	
Thermal Resistance, Junction to Ambient	(Notes 6 & 8)	$R_{\theta JA}$	143	°C/W
	(Notes 5 & 6)		100	
	(Notes 8 & 9)		120	
Thermal Resistance, Junction to Leads	(Note 10)	$R_{\theta JL}$	84.9	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

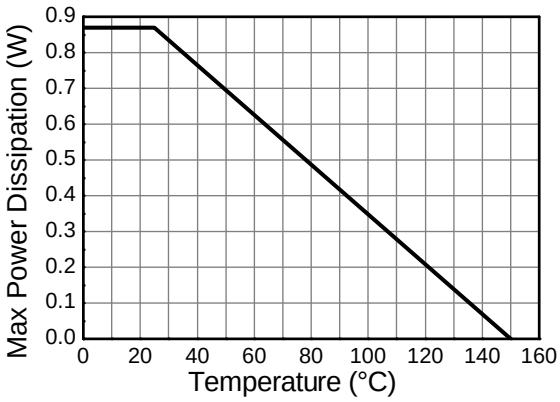
Notes:
5. For a device surface mounted on FR4 PCB measured at t ≤ 10 sec.
6. For device with one active die.
7. Repetitive rating - 25mm x 25mm FR4 PCB, D = 0.02, pulse width 300µs – pulse width limited by maximum junction temperature.
8. For a device surface mounted on 25mm x 25mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.
9. For device with two active die running at equal power.
10. Thermal resistance from junction to solder-point (at the end of the drain lead).

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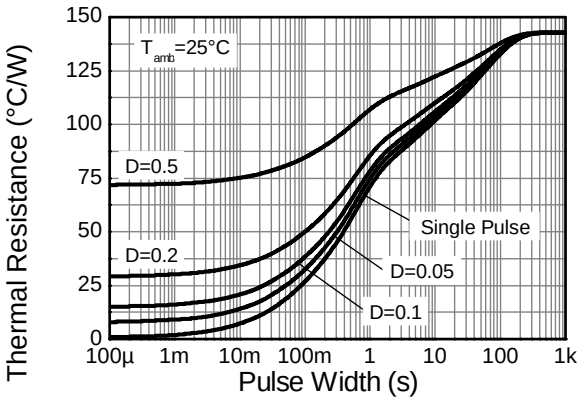
Thermal Characteristics



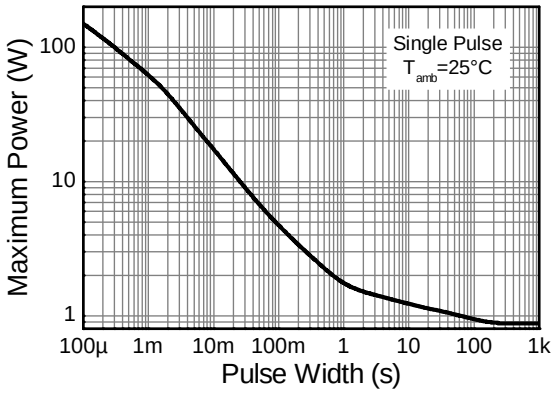
Safe Operating Area



Derating Curve



Transient Thermal Impedance



Pulse Power Dissipation

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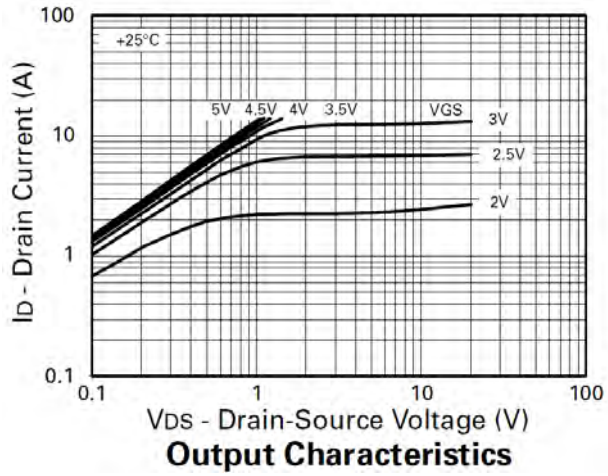
Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	20	-	-	V	V_{GS} = 0V, I_D = 250µA
Zero Gate Voltage Drain Current T_J = +25°C	I_{DSS}	-	-	1.0	µA	V_{DS} = 20V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	-	-	100	nA	V_{GS} = ±12V, V_{DS} = 0V
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(th)}$	0.7	-	3	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance (Note 11)	$R_{DS\ (ON)}$	-	65	130	mΩ	V_{GS} = 4.5V, I_D = 1.7A
			90	150		V_{GS} = 2.7V, I_D = 0.85A
Forward Transconductance (Notes 11 & 13)	g_{fs}	2.6	-	-	S	V_{DS} = 10V, I_D = 0.85A
Diodes Forward Voltage (Note 11)	V_{SD}	-	0.85	0.95	V	T_J = 25°C, I_S = 1.7A, V_{GS} = 0V
DYNAMIC CHARACTERISTICS						
Input Capacitance (Note 12 & 13)	C_{iss}	-	350	700	pF	V_{DS} = 15V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance (Notes 12 & 13)	C_{oss}	-	120	250		
Reverse Transfer Capacitance (Notes 12 & 13)	C_{rss}	-	50	100		
Gate Resistance (Notes 12 & 13)	R_g	-	3.8	7.6	Ω	f = 1MHz, V_{GS} = 0V, V_{DS} = 0V
Total Gate Charge (Notes 12 & 13)	Q_g	-	4.5	6	nC	V_{GS} = 4.5V, V_{DS} = 16V, I_D = 1.7A
Gate-Source Charge (Notes 12 & 13)	Q_{gs}	-	0.5	0.65		
Gate-Drain Charge (Notes 12 & 13)	Q_{gd}	-	2	2.5		
Reverse Recovery Time (Note 13)	t_{rr}	-	15	30	ns	T_J = +25°C, I_F = 1.7A, di/dt = 100A/µs
Reverse Recovery Charge (Note 13)	Q_{rr}	-	5.9	-	nC	
Turn-On Delay Time (Notes 12 & 13)	$t_{D(on)}$	-	3.4	-	ns	V_{DD} = 10V, I_D = 1.7A, R_G = 6Ω, R_D = 5.7Ω,
Turn-On Rise Time (Notes 12 & 13)	t_r	-	8.1	-		
Turn-Off Delay Time (Notes 12 & 13)	$t_{D(off)}$	-	13.5	-		
Turn-Off Fall Time (Notes 12 & 13)	t_f	-	9.1	-		

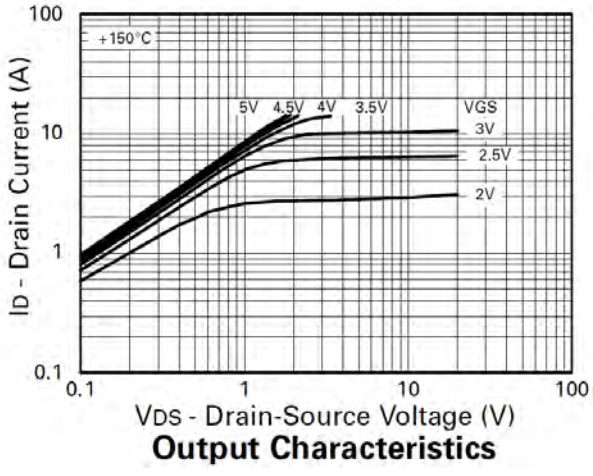
Notes: 11. Measured under pulsed conditions. Pulse width ≤ 300µs; duty cycle ≤2%.
12. Switching characteristics are independent of operating junction temperature.
13. For design aid only, not subject to production testing.

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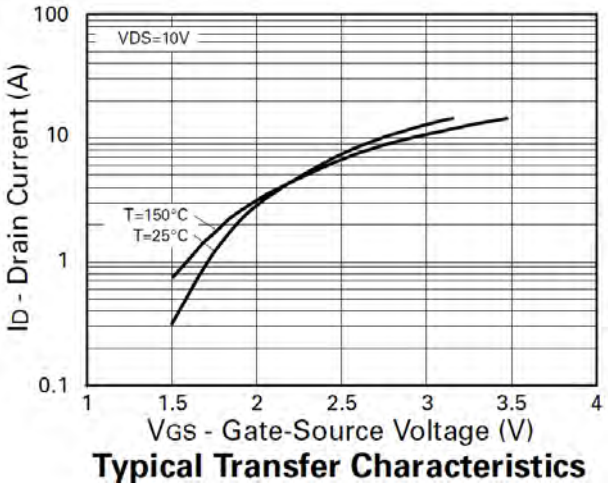
Typical Characteristics



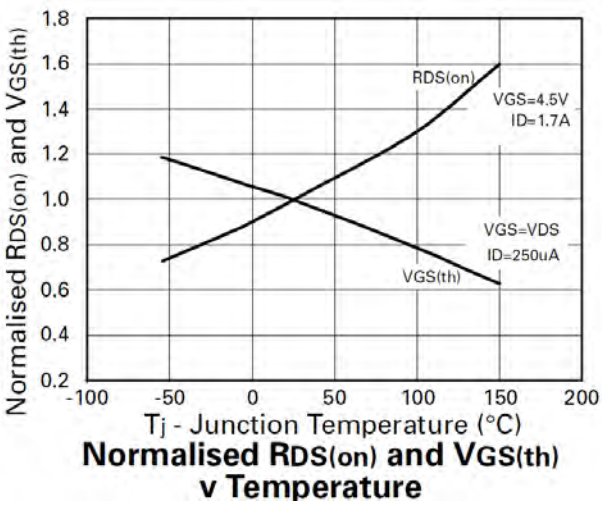
Output Characteristics



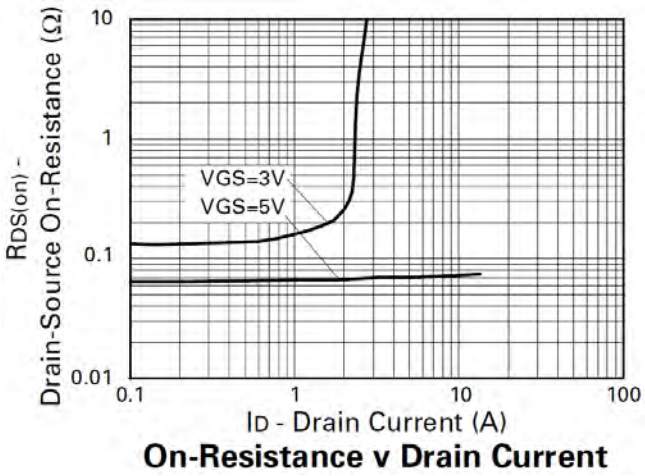
Output Characteristics



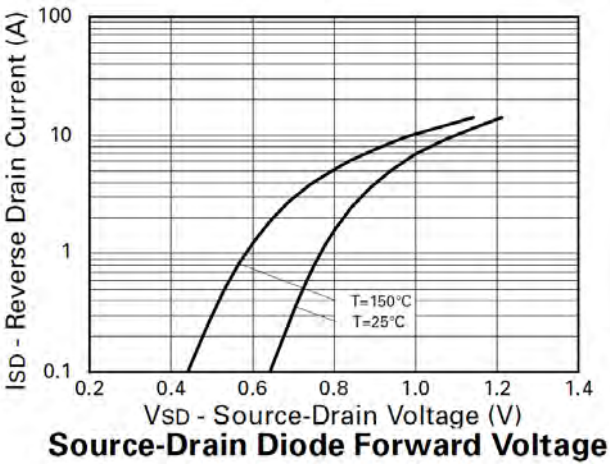
Typical Transfer Characteristics



Normalised RDS(on) and VGS(th) v Temperature



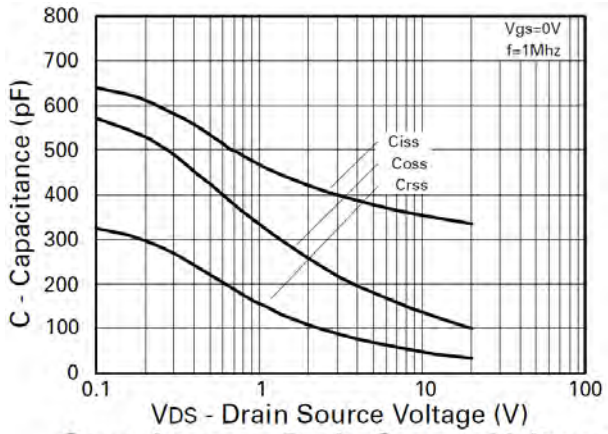
On-Resistance v Drain Current



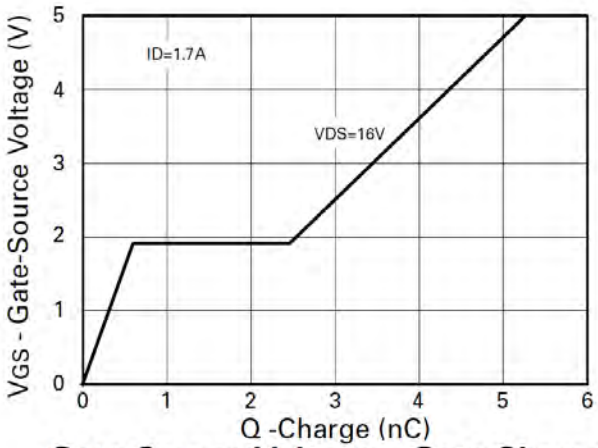
Source-Drain Diode Forward Voltage

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Typical Characteristics (cont.)

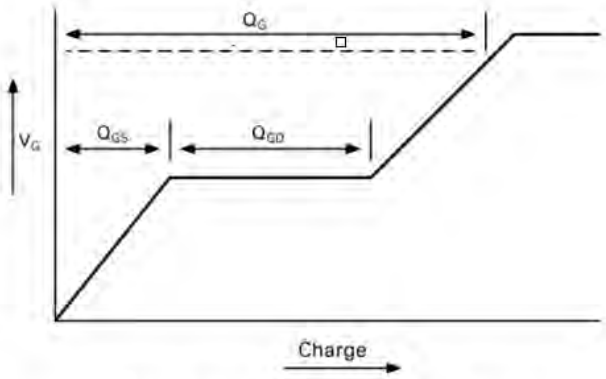


Capacitance v Drain-Source Voltage

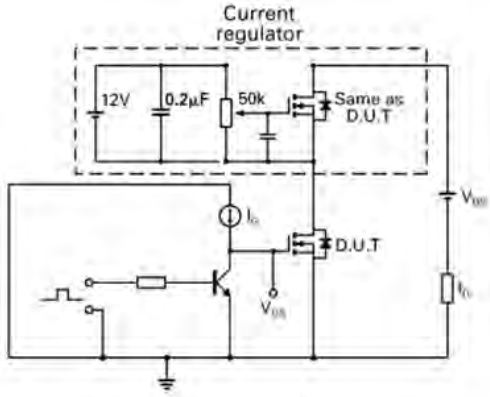


Gate-Source Voltage v Gate Charge

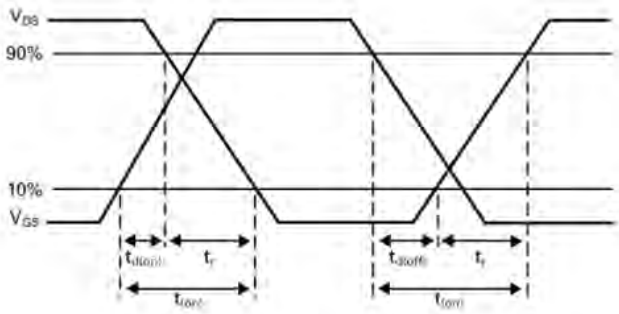
Test Circuits



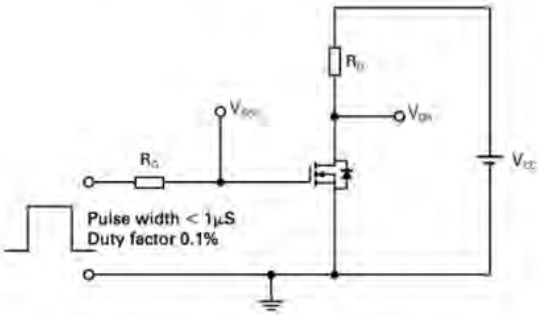
Basic gate charge waveform



Gate charge test circuit



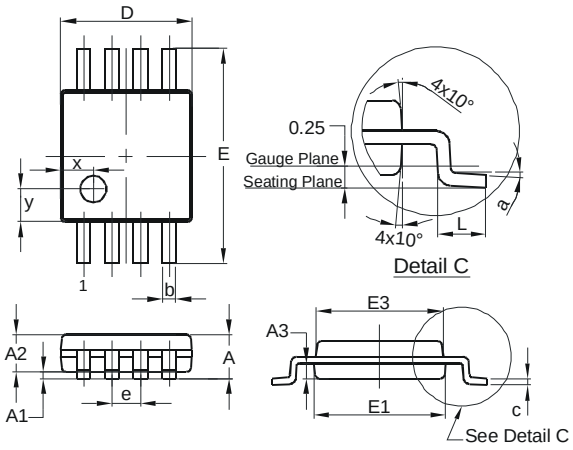
Switching time waveforms



Switching time test circuit

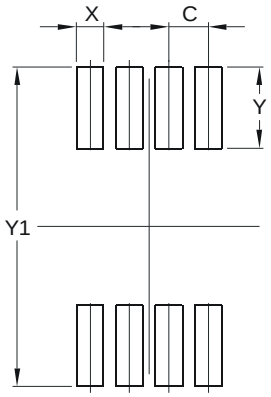
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Package Outline Dimensions



MSOP-8			
Dim	**Min**	**Max**	**Typ**
A	-	1.10	-
A1	0.05	0.15	0.10
A2	0.75	0.95	0.86
A3	0.29	0.49	0.39
b	0.22	0.38	0.30
c	0.08	0.23	0.15
D	2.90	3.10	3.00
E	4.70	5.10	4.90
E1	2.90	3.10	3.00
E3	2.85	3.05	2.95
e	-	-	0.65
L	0.40	0.80	0.60
a	0°	8°	4°
x	-	-	0.750
y	-	-	0.750
All Dimensions in mm			

Suggested Pad Layout



Dimensions	Value (in mm)
C	0.650
X	0.450
Y	1.350
Y1	5.300

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