



ZXMN6A11G

60V N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$	I_D $T_A = 25^\circ C$
60V	120mΩ @ $V_{GS} = 10V$	4.4A
	180mΩ @ $V_{GS} = 4.5V$	3.5A

Description and Applications

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

- DC-DC converters
- Power management functions
- Disconnect switches
- Motor Control
- Uninterrupted power supply

Features and Benefits

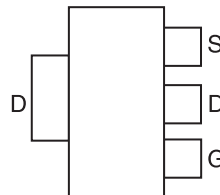
- Fast switching speed
- Low gate drive
- Low input capacitance
- “Green” component and RoHS compliant (Note 1)
- Qualified to AEC-Q101 Standards for High Reliability

Mechanical Data

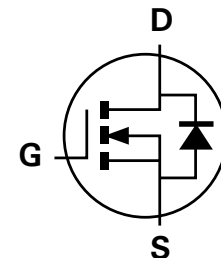
- Case: SOT223
- Case Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0 (Note 1)
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See diagram below
- Terminals: Finish - Matte Tin annealed over Copper lead frame. Solderable per MIL-STD-202, Method 208
- Weight: 0.112 grams (approximate)



Top View



Pin Out - Top



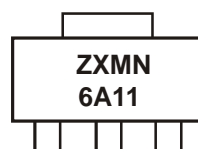
Equivalent Circuit

Ordering Information (Note 1)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXMN6A11GTA	See below	7	12	1,000

Notes: 1. Diodes, Inc. defines “Green” products as those which are RoHS compliant and contain no halogens or antimony compounds; further information about Diodes Inc.’s “Green” Policy can be found on our website. For packaging details, go to our website.

Marking Information



ZXMN = Product Type Marking Code, Line 1
6A11 = Product Type Marking Code, Line 2

Maximum Ratings @ $T_A = 25^\circ\text{C}$ unless otherwise specified

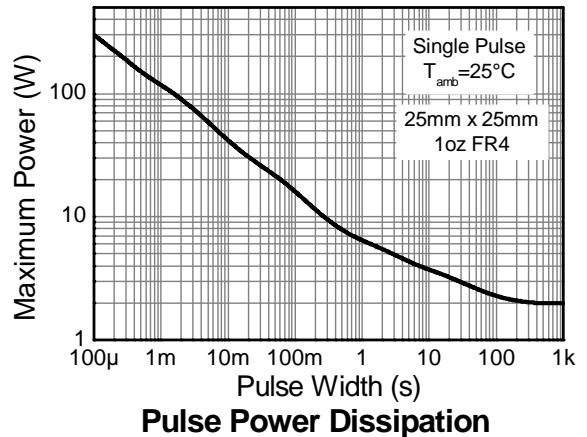
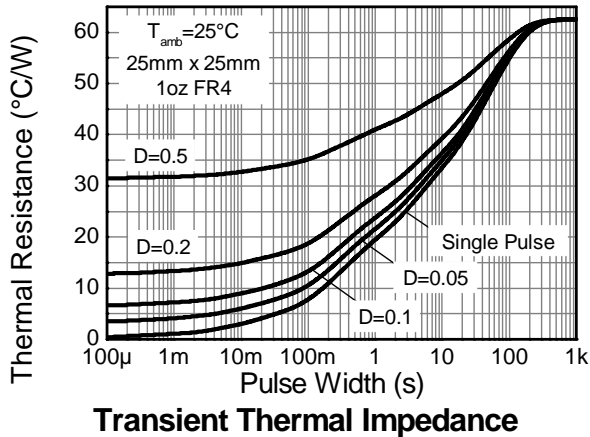
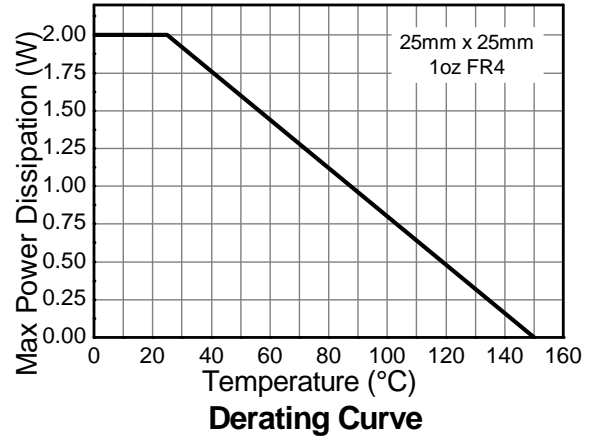
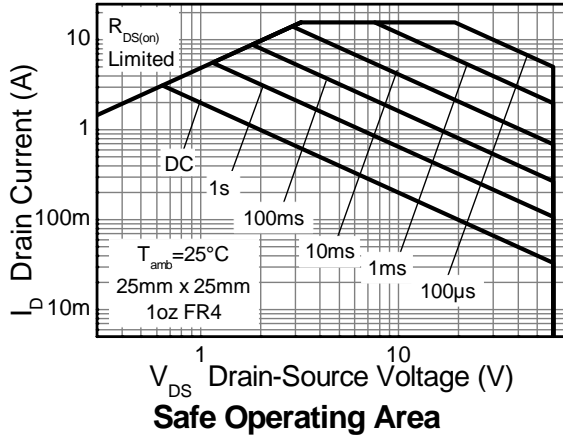
Characteristic			Symbol	Value	Units	
Drain-Source Voltage			V_{DSS}	60	V	
Gate-Source Voltage			V_{GS}	± 20		
Continuous Drain Current	$V_{GS} = 10\text{V}$	(Note 3)	I_D	4.4	A	
		$T_A = 70^\circ\text{C}$ (Note 3)		3.5		
		(Note 2)		3.1		
Pulsed Drain Current	$V_{GS} = 10\text{V}$	(Note 4)	I_{DM}	15.6		
Continuous Source Current (Body Diode)			(Note 3)	I_S		5
Pulsed Source Current (Body Diode)			(Note 4)	I_{SM}		15.6

Thermal Characteristics @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic		Symbol	Value	Unit	
Power Dissipation	(Note 2)	P_D	2.0	W	
			16		
Linear Derating Factor	(Note 3)		3.9		mW/ $^\circ\text{C}$
			31		
Thermal Resistance, Junction to Ambient	(Note 2)	$R_{\theta JA}$	62.5	$^\circ\text{C}/\text{W}$	
	(Note 3)		32.0		
Thermal Resistance, Junction to Lead	(Note 5)	$R_{\theta JL}$	9.8		
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	$^\circ\text{C}$	

- Notes:
2. For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
 3. Same as note (2), except the device is measured at $t \leq 10$ sec.
 4. Same as note (2), except the device is pulsed with $D = 0.02$ and pulse width 300 μs .
 5. Thermal resistance from junction to solder-point (at the end of the drain lead).

Thermal Characteristics

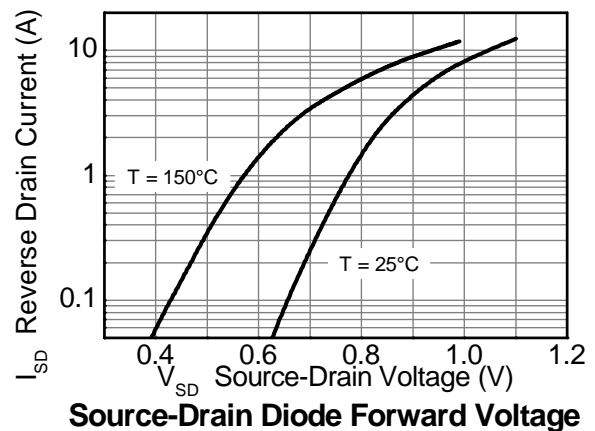
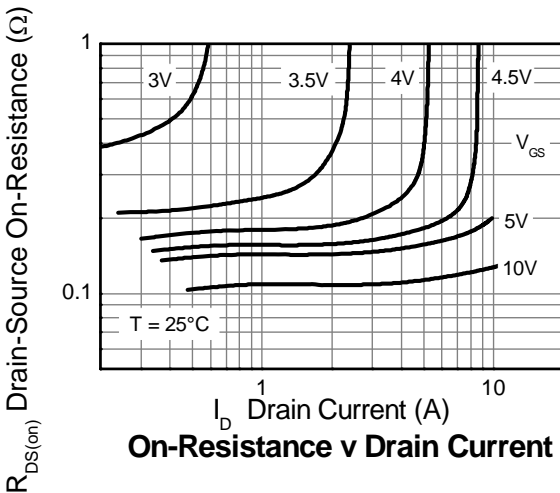
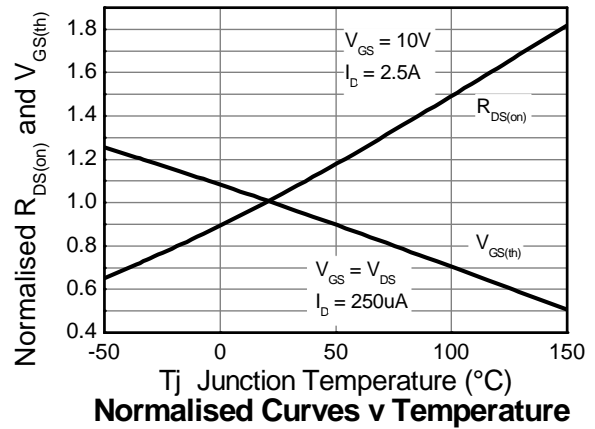
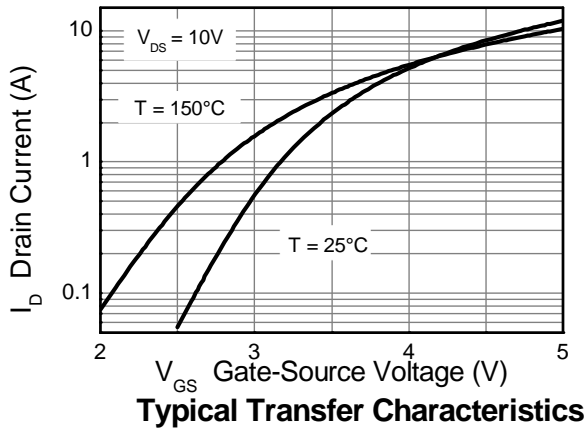
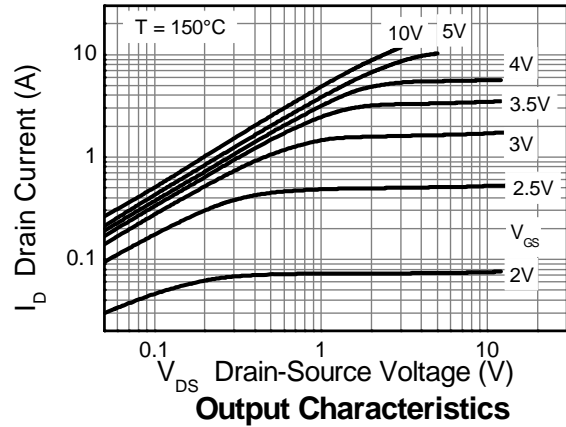
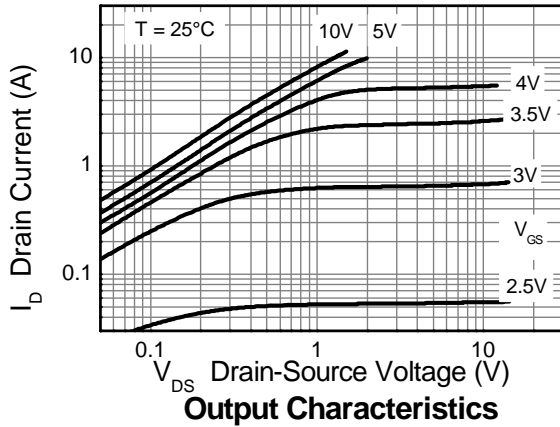


Electrical Characteristics @ $T_A = 25^\circ\text{C}$ unless otherwise specified

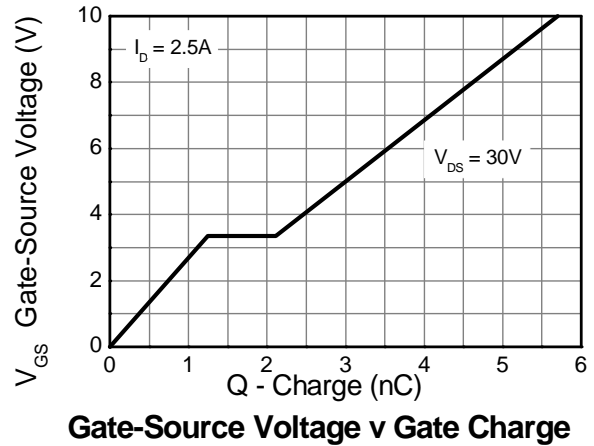
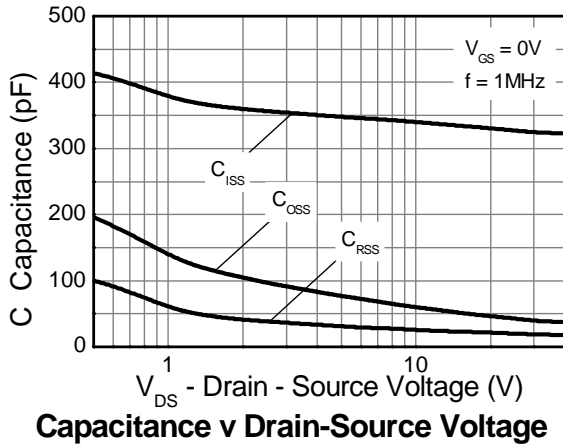
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	60	—	—	V	$I_D = 250\mu\text{A}$, $V_{GS} = 0\text{V}$
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1.0	μA	$V_{DS} = 60\text{V}$, $V_{GS} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	—	—	± 100	nA	$V_{GS} = \pm 20\text{V}$, $V_{DS} = 0\text{V}$
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(th)}$	1.0	—	3.0	V	$I_D = 250\mu\text{A}$, $V_{DS} = V_{GS}$
Static Drain-Source On-Resistance (Note 6)	$R_{DS(on)}$	—	0.105	0.120	Ω	$V_{GS} = 10\text{V}$, $I_D = 2.5\text{A}$
		—	0.150	0.180		$V_{GS} = 4.5\text{V}$, $I_D = 2\text{A}$
Forward Transconductance (Notes 6 & 7)	g_{fs}	—	4.9	—	S	$V_{DS} = 15\text{V}$, $I_D = 2.5\text{A}$
Diode Forward Voltage (Note 6)	V_{SD}	—	0.85	0.95	V	$I_S = 2.8\text{A}$, $V_{GS} = 0\text{V}$, $T_J = 25^\circ\text{C}$
Reverse Recovery Time (Note 7)	t_{rr}	—	21.5	—	ns	$I_S = 2.8\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$
Reverse Recovery Charge (Note 7)	Q_{rr}	—	20.5	—	nC	$T_J = 25^\circ\text{C}$
DYNAMIC CHARACTERISTICS (Note 7)						
Input Capacitance	C_{iss}	—	330	—	pF	$V_{DS} = 40\text{V}$, $V_{GS} = 0\text{V}$, $f = 1.0\text{MHz}$
Output Capacitance	C_{oss}	—	35.2	—		
Reverse Transfer Capacitance	C_{rss}	—	17.1	—		
Gate Charge (Note 8)	Q_g	—	3.0	—	nC	$V_{GS} = 4.5\text{V}$ $V_{GS} = 10\text{V}$ $V_{DS} = 15\text{V}$ $I_D = 2.5\text{A}$
Total Gate Charge (Note 8)	Q_{g}	—	5.7	—		
Gate-Source Charge (Note 8)	Q_{gs}	—	1.25	—		
Gate-Drain Charge (Note 8)	Q_{gd}	—	0.86	—	ns	$V_{DD} = 30\text{V}$, $I_D = 2.5\text{A}$, $R_G = 6\Omega$, $V_{GS} = 10\text{V}$
Turn-On Delay Time (Note 8)	$t_{D(on)}$	—	1.95	—		
Turn-On Rise Time (Note 8)	t_r	—	3.5	—		
Turn-Off Delay Time (Note 8)	$t_{D(off)}$	—	8.2	—		
Turn-Off Fall Time (Note 8)	t_f	—	4.6	—		

- Notes:
6. Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$.
 7. For design aid only, not subject to production testing.
 8. Switching characteristics are independent of operating junction temperature.

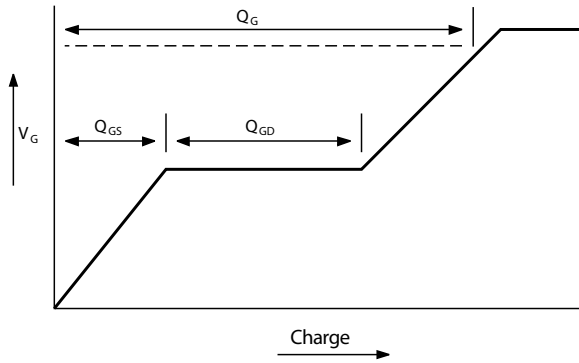
Typical Characteristics



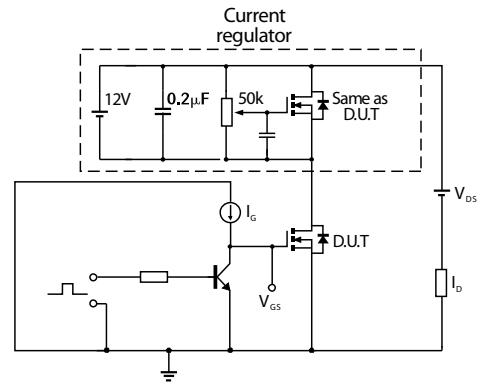
Typical Characteristics - continued



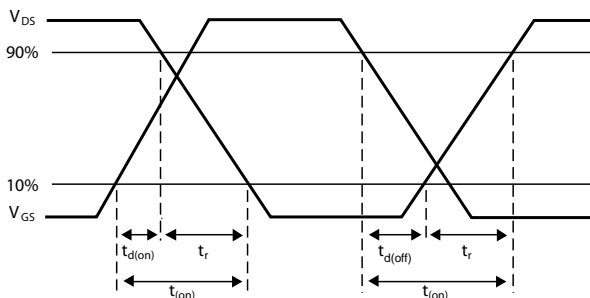
Test Circuit



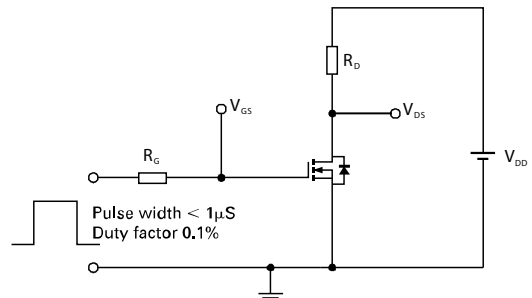
Basic gate charge waveform



Gate charge test circuit

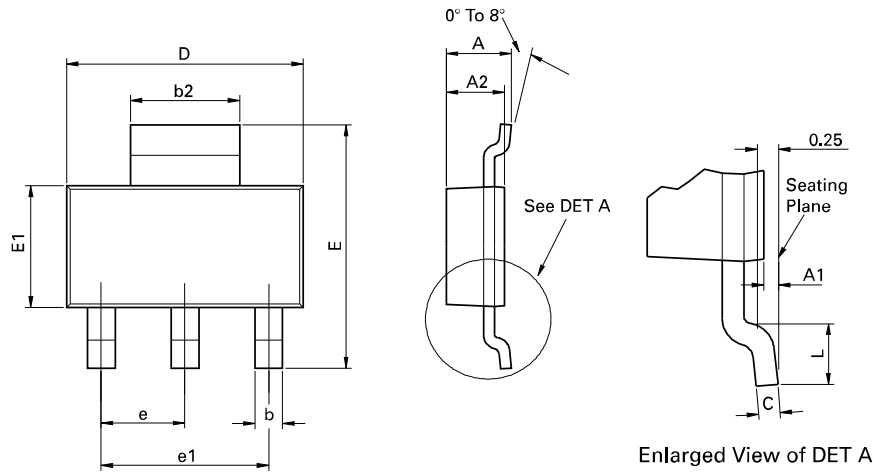


Switching time waveforms



Switching time test circuit

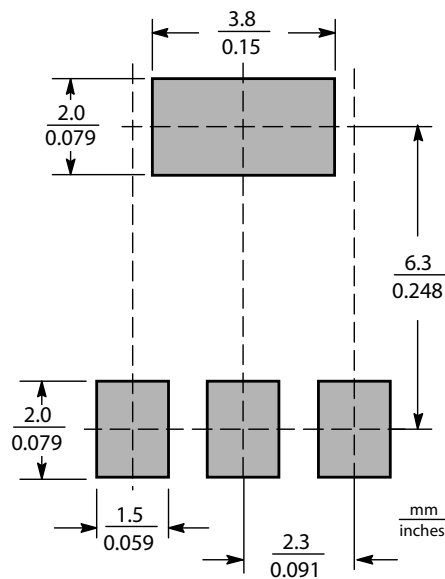
Package Outline Dimensions



Conforms to JEDEC TO-261 AA Issue B

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min	Max	Min	Max		Min	Max	Min	Max
A	-	1.80	-	0.071	D	6.30	6.70	0.248	0.264
A1	0.02	0.10	0.0008	0.004	e	2.30 BSC		0.0905 BSC	
A2	1.55	1.65	0.0610	0.0649	e1	4.60 BSC		0.181 BSC	
b	0.66	0.84	0.026	0.033	E	6.70	7.30	0.264	0.287
b2	2.90	3.10	0.114	0.122	E1	3.30	3.70	0.130	0.146
C	0.23	0.33	0.009	0.013	L	0.90	-	0.355	-

Suggested Pad Layout



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