60V N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$	I_D T_A = 25°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

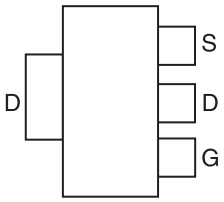
- Fast switching speed
- Low gate drive
- Low input capacitance
- **"Green" component and RoHS compliant (Note 1)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Mechanical Data

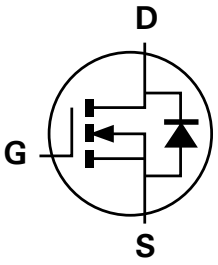
- Case: SOT223
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0 (Note 1)
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See diagram below
- Terminals: Finish - Matte Tin annealed over Copper lead frame. Solderable per MIL-STD-202,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

SOT223

Top View



Pin Out - Top



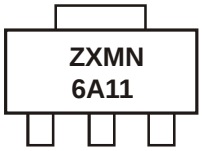
Equivalent Circuit

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°C unless otherwise specified

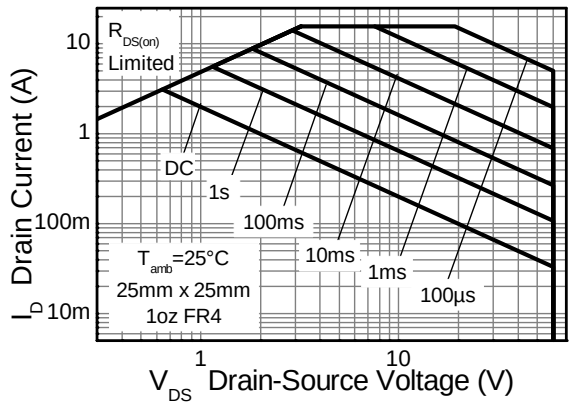
Characteristic			Symbol	Value	Units
Drain-Source Voltage			V_{DSS}	60	V
Gate-Source Voltage			V_{GS}	±20	
Continuous Drain Current	V_{GS} = 10V	(Note 3) T_A = 70°C (Note 3) (Note 2)	I_D	4.4 3.5 3.1	A
Pulsed Drain Current	V_{GS} = 10V	(Note 4)	I_{DM}	15.6	
Continuous Source Current (Body Diode)		(Note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

Thermal Characteristics @T_A = 25°C unless otherwise specified

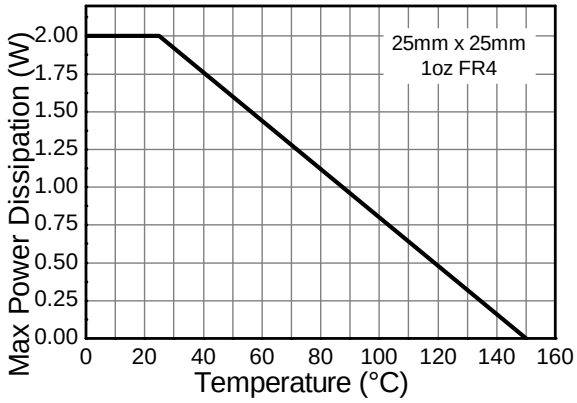
Characteristic		Symbol	Value	Unit
Power Dissipation Linear Derating Factor	(Note 2)	P_D	2.0 16	W mW/°C
	(Note 3)		3.9 31	
Thermal Resistance, Junction to Ambient	(Note 2)	$R_{\theta JA}$	62.5	°C/W
	(Note 3)		32.0	
Thermal Resistance, Junction to Lead	(Note 5)	$R_{\theta JL}$	9.8	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°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 ≤ 10 sec.
4. Same as note (2), except the device is pulsed with D = 0.02 and pulse width 300µs.
5. Thermal resistance from junction to solder-point (at the end of the drain lead).

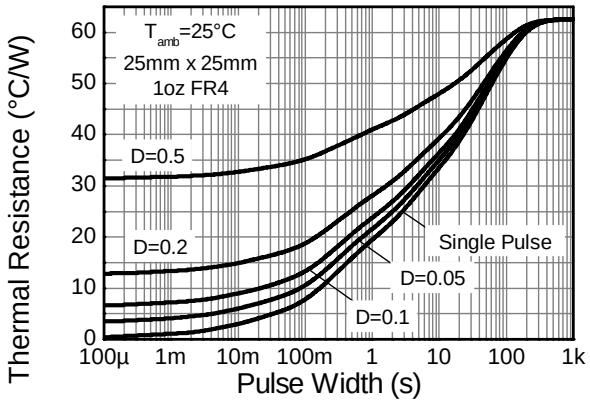
Thermal Characteristics



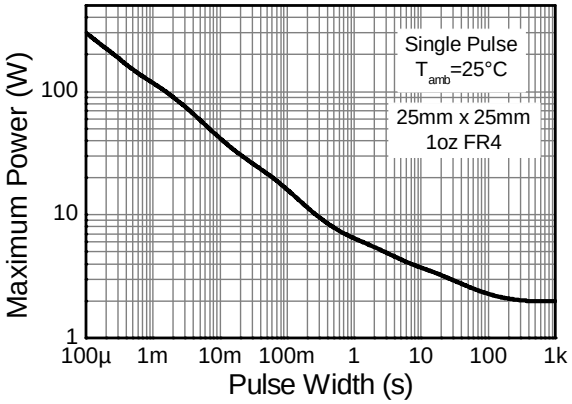
Safe Operating Area



Derating Curve



Transient Thermal Impedance



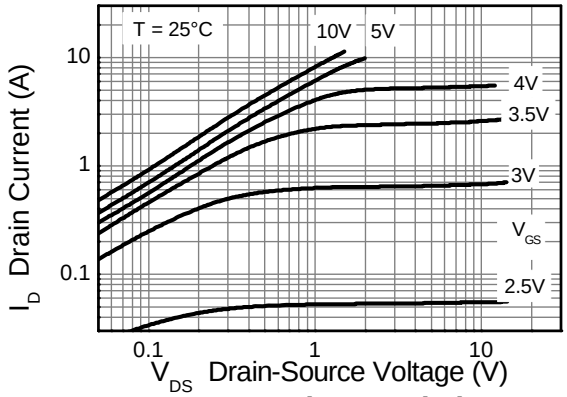
Pulse Power Dissipation

Electrical Characteristics @T_A = 25°C unless otherwise specified

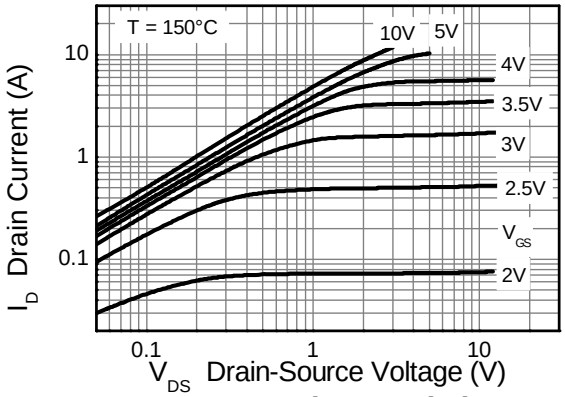
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	60	—	—	V	I_D = 250μA, V_{GS} = 0V
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1.0	μA	V_{DS} = 60V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(th)}$	1.0	—	3.0	V	I_D = 250μA, V_{DS} = V_{GS}
Static Drain-Source On-Resistance (Note 6)	$R_{DS\ (ON)}$	—	0.105	0.120	Ω	V_{GS} = 10V, I_D = 2.5A
		—	0.150	0.180		V_{GS} = 4.5V, I_D = 2A
Forward Transconductance (Notes 6 & 7)	g_{fs}	—	4.9	—	S	V_{DS} = 15V, I_D = 2.5A
Diode Forward Voltage (Note 6)	V_{SD}	—	0.85	0.95	V	I_S = 2.8A, V_{GS} = 0V, T_J = 25°C
Reverse Recovery Time (Note 7)	t_{rr}	—	21.5	—	ns	I_S = 2.8A, di/dt = 100A/μs
Reverse Recovery Charge (Note 7)	Q_{rr}	—	20.5	—	nC	T_J = 25°C
DYNAMIC CHARACTERISTICS (Note 7)						
Input Capacitance	C_{iss}	—	330	—	pF	V_{DS} = 40V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	35.2	—		
Reverse Transfer Capacitance	C_{rss}	—	17.1	—		
Gate Charge (Note 8)	Q_g	—	3.0	—	nC	V_{GS} = 4.5V; V_{DS} = 15V, I_D = 2.5A
Total Gate Charge (Note 8)	Q_g	—	5.7	—		V_{GS} = 10V; V_{DS} = 15V, I_D = 2.5A
Gate-Source Charge (Note 8)	Q_{gs}	—	1.25	—		V_{DS} = 15V, I_D = 2.5A
Gate-Drain Charge (Note 8)	Q_{gd}	—	0.86	—		V_{DS} = 15V, I_D = 2.5A
Turn-On Delay Time (Note 8)	$t_{D(on)}$	—	1.95	—	ns	V_{DD} = 30V, I_D = 2.5A, R_G = 6Ω, V_{GS} = 10V
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 ≤ 300μs; duty cycle ≤ 2%.
7. For design aid only, not subject to production testing.
8. Switching characteristics are independent of operating junction temperature.

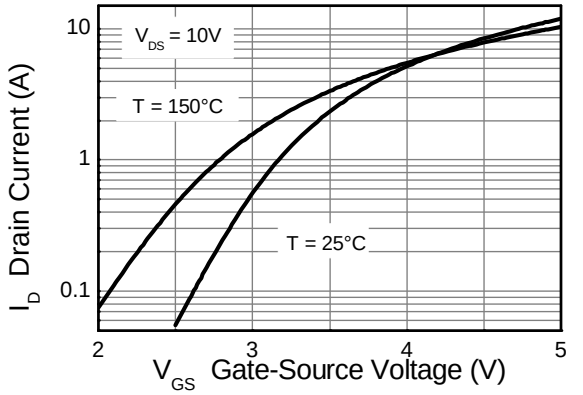
Typical Characteristics



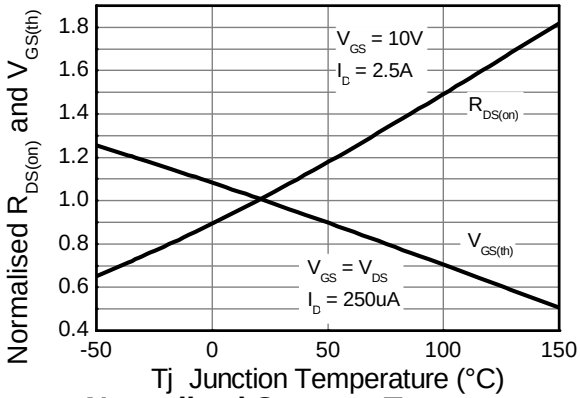
Output Characteristics



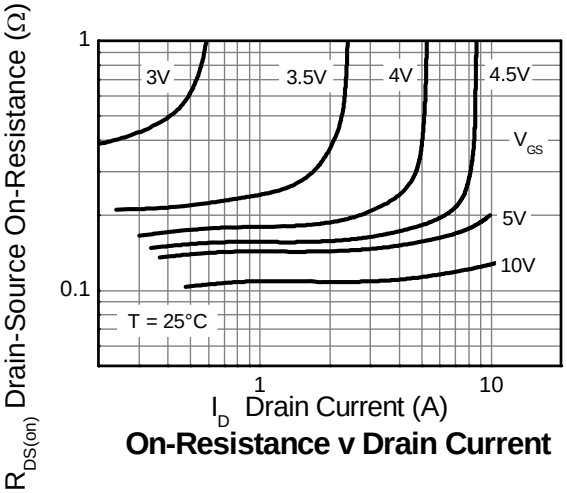
Output Characteristics



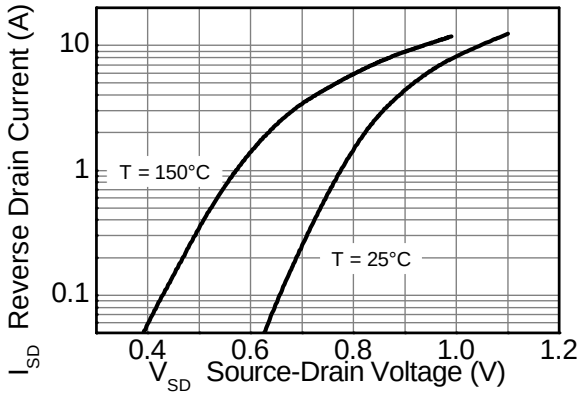
Typical Transfer Characteristics



Normalised Curves v Temperature

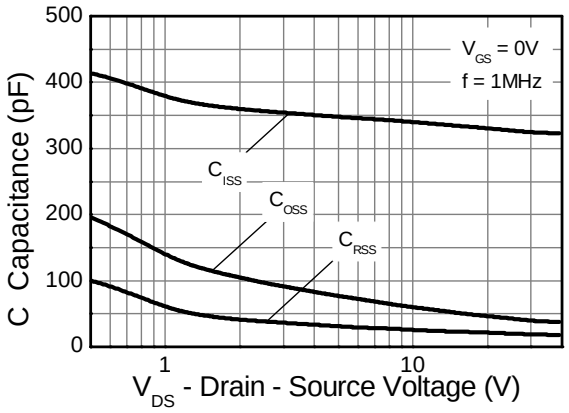


On-Resistance v Drain Current

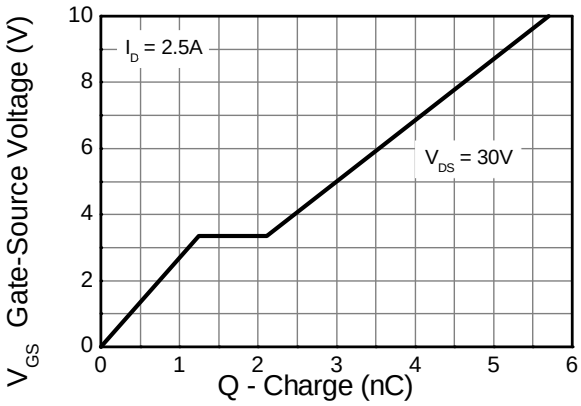


Source-Drain Diode Forward Voltage

Typical Characteristics - continued

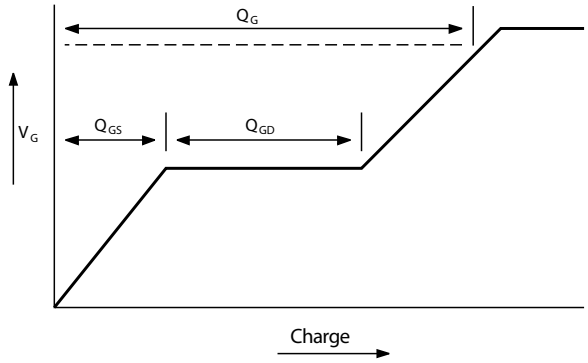


Capacitance v Drain-Source Voltage

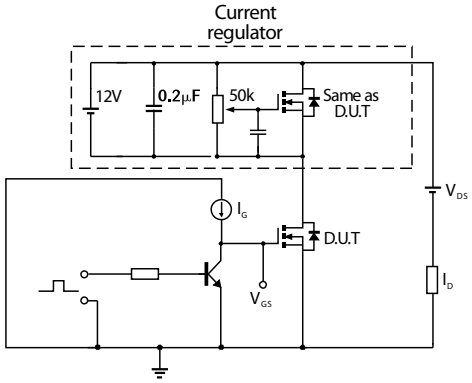


Gate-Source Voltage v Gate Charge

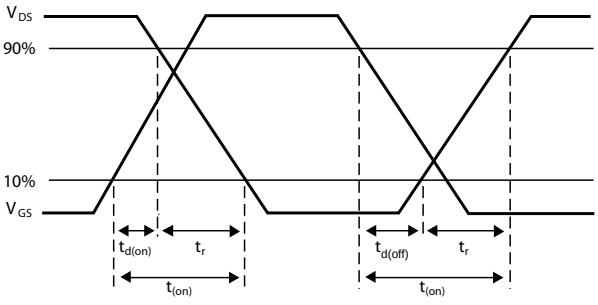
Test Circuit



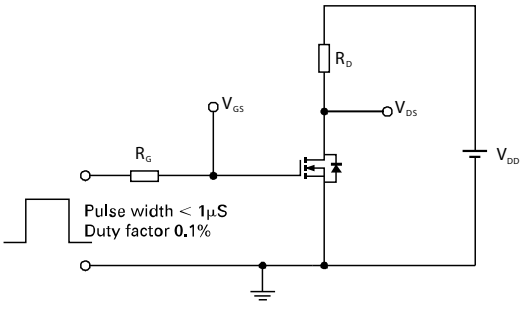
Basic gate charge waveform



Gate charge test circuit

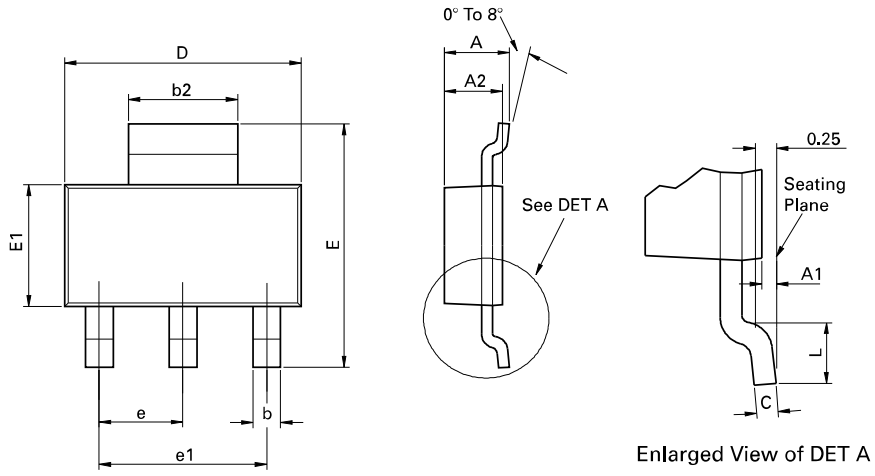


Switching time waveforms



Switching time test circuit

Package Outline Dimensions

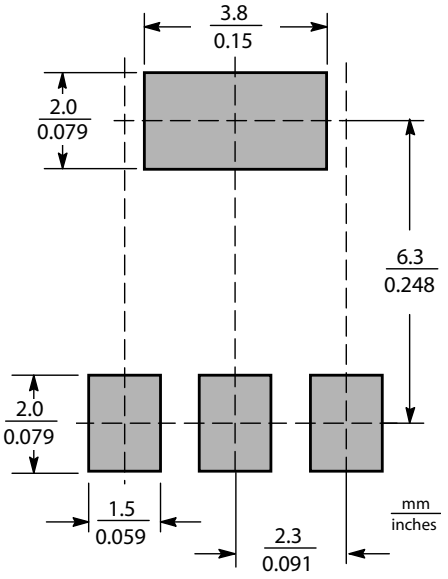


Enlarged View of DET A

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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