

30V N-CHANNEL ENHANCEMENT MODE MOSFET IN SOT89 PACKAGE

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$ Max	I_D max $T_A = 25^\circ C$ (Note 5)
30V	120m Ω @ $V_{GS} = 10V$	3.3A
	180m Ω @ $V_{GS} = 4.5V$	2.7A

Features and Benefits

- Low On-Resistance
- Low Threshold
- Fast Switching Speed
- Low Gate Drive
- **Lead Free/RoHS Compliant (Note 1)**
- **"Green" Device (Note 2)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Description and Applications

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.

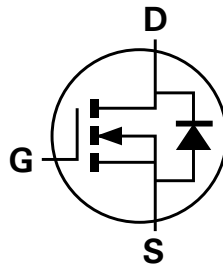
- DC-DC Converters
- Power Management functions
- Motor control

Mechanical Data

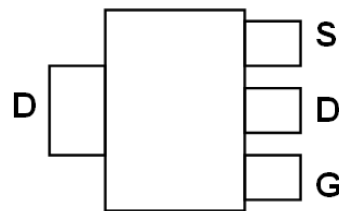
- Case: SOT89
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish
- Weight: 0.052 grams (approximate)



Top View



Device symbol



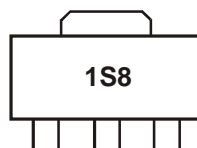
Pin-out Top

Ordering Information (Note 3)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXMN3A01ZTA	1S8	7	12	1,000

- Notes:
1. No purposefully added lead.
 2. Diodes Inc's "Green" Policy can be found on our website at <http://www.diodes.com>
 3. For packaging details, go to our website at <http://www.diodes.com>

Marking Information



1S8 = Product type Marking Code

Maximum Ratings @T_A = 25°C unless otherwise specified

Characteristic		Symbol	Value	Unit
Drain-Source Voltage		V _{DSS}	30	V
Gate-Source Voltage		V _{GSS}	±20	V
Continuous Drain Current	Steady State	@ V _{GS} = 10V ; T _A = 25°C (Note 5)	3.3	A
		@ V _{GS} = 10V ; T _A = 75°C (Note 5)	2.7	
		@ V _{GS} = 10V ; T _A = 75°C (Note 4)	2.2	
Pulsed Drain Current (Note 6)		I _{DM}	20	A
Continuous Source Current (Body Diode) (Note 5)		I _S	3.3	A
Pulsed Source Current (Body Diode) (Note 6)		I _{SM}	20	A

Thermal Characteristics @T_A = 25°C unless otherwise specified

Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 4)	P _D	0.97	W
	(Note 5)		2.12	W
	(Note 4)		129	°C/W
Thermal Resistance, Junction to Ambient	(Note 4)	R _{θJA}	59	°C/W
	(Note 5)			
Operating and Storage Temperature Range		T _J , T _{STG}	-55 to +150	°C

- Notes: 4. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout
 5. Device mounted on 25mm X 25mm FR-4 substrate PC board with 2oz copper
 6. Single pulse rating - 25mm x 25mm FR4 PCB, D=0.02, pulse width 300us – pulse width limited by maximum junction temperature.

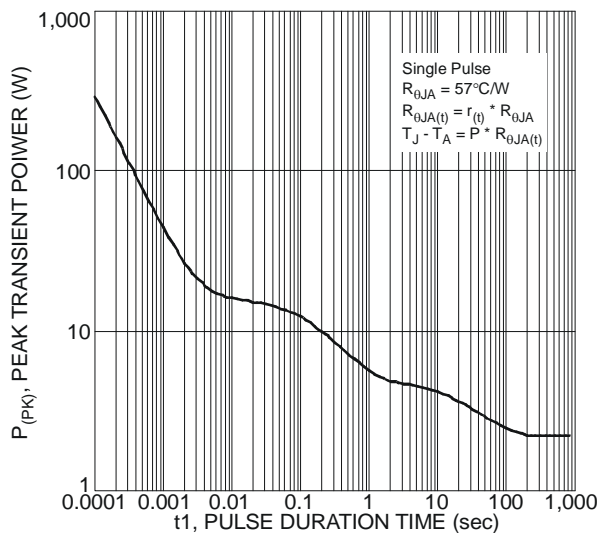


Fig. 1 Single Pulse Maximum Power Dissipation

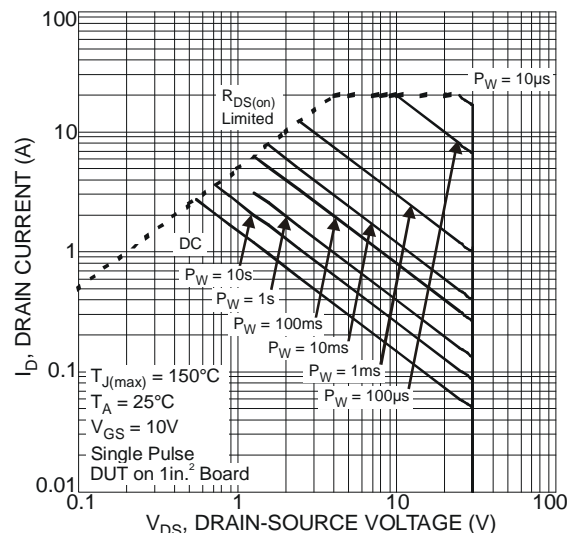


Fig. 2 SOA, Safe Operation Area

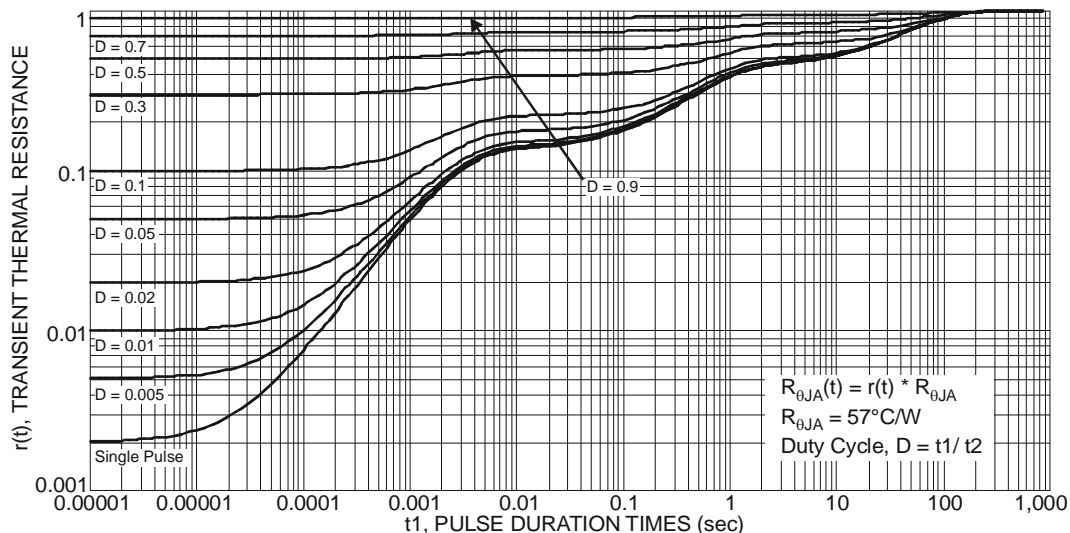


Fig. 3 Transient Thermal Resistance

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}	30	-	-	V	V _{GS} = 0V, I _D = 250μA
Zero Gate Voltage Drain Current T _J = 25°C	I _{DSS}	-	-	0.5	μA	V _{DS} = 30V, 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	-	-	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance (Note 7)	R _{DS(on)}	-	0.106	120	mΩ	V _{GS} = 10V, I _D = 2.5A
			-	180		V _{GS} = 4.5V, I _D = 2A
Forward Transconductance (Note 7 & 9)	g _{FS}	-	3.5	-	S	V _{DS} = 4.5V, I _D = 2.5A
Diodes Forward Voltage (Note 7)	V _{SD}	-	0.85	0.95	V	T _J = 25°C, I _S = 1.7A, V _{GS} = 0V
DYNAMIC CHARACTERISTICS						
Input Capacitance (Note 8 & 9)	C _{iss}	-	186	-	pF	V _{DS} = 25V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance (Note 8 & 9)	C _{oss}	-	48	-	pF	
Reverse Transfer Capacitance (Note 8 & 9)	C _{rss}	-	29	-	pF	
Gate Charge (Note 8 & 9)	Q _g	-	2.6	-	nC	V _{GS} = 4.5V, V _{DS} = 15V, I _D = 2.5A
Total Gate Charge (Note 8 & 9)	Q _g	-	5.0	-	nC	V _{GS} = 10V, V _{DS} = 15V, I _D = 2.5A
Gate-Source Charge (Note 8 & 9)	Q _{gs}	-	0.8	-	nC	
Gate-Drain Charge (Note 8 & 9)	Q _{gd}	-	1.2	-	nC	
Reverse Recovery Time (Note 9)	t _{rr}		17.7		ns	T _J = 25°C, I _S = 2.5A, di/dt = 100A/μs
Reverse Recovery Charge (Note 9)	Q _{rr}		13.0		nC	
Turn-On Delay Time (Note 8 & 9)	t _{D(on)}	-	2.6	-	ns	V _{GS} = 10V, V _{DD} = 15V, R _G = 6Ω, I _D = 2.5A
Turn-On Rise Time (Note 8 & 9)	t _r	-	4.1	-	ns	
Turn-Off Delay Time (Note 8 & 9)	t _{D(off)}	-	13.5	-	ns	
Turn-Off Fall Time (Note 8 & 9)	t _f	-	3.6	-	ns	

Notes: 7. Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤ 2%.
8. Switching characteristics are independent of operating junction temperature.
9. For design aid only, not subject to production testing.

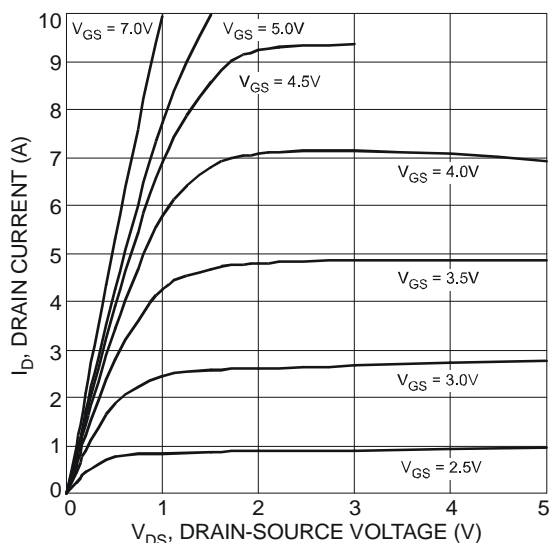


Fig. 4 Typical Output Characteristic, T_A = 25°C

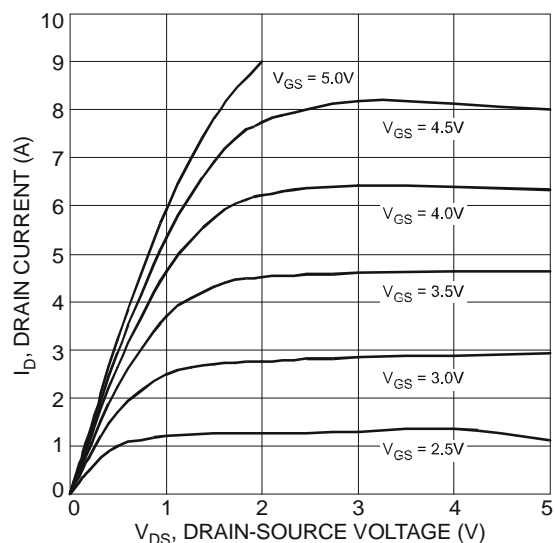


Fig. 5 Typical Output Characteristic, T_A = 150°C

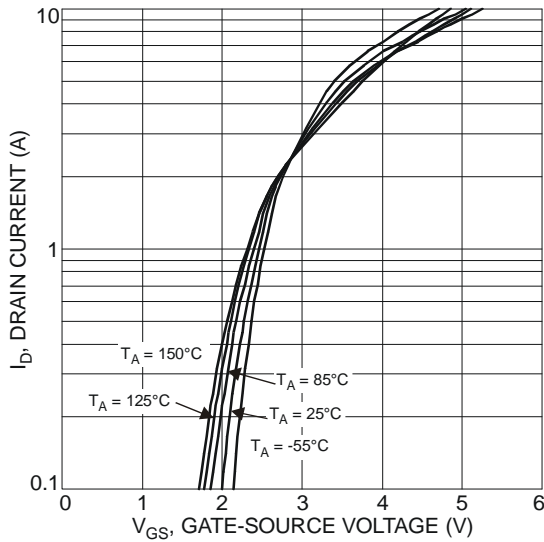


Fig. 6 Typical Transfer Characteristics

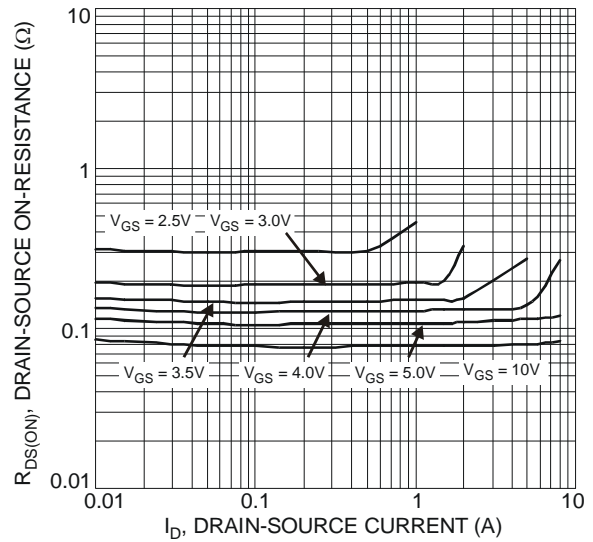


Fig. 7 Typical On-Resistance vs. Drain Current and Gate Voltage

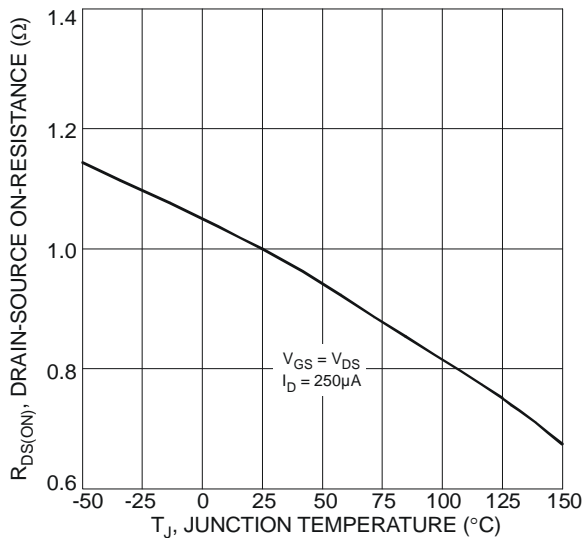


Fig. 8 On-Resistance Variation with Temperature

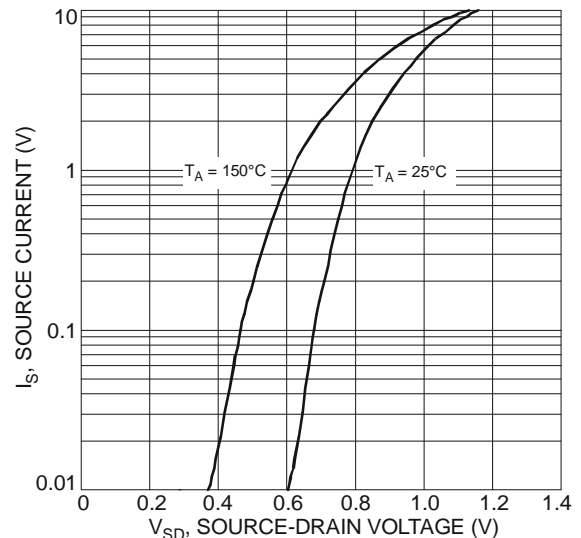


Fig. 9 Diode Forward Voltage vs. Current

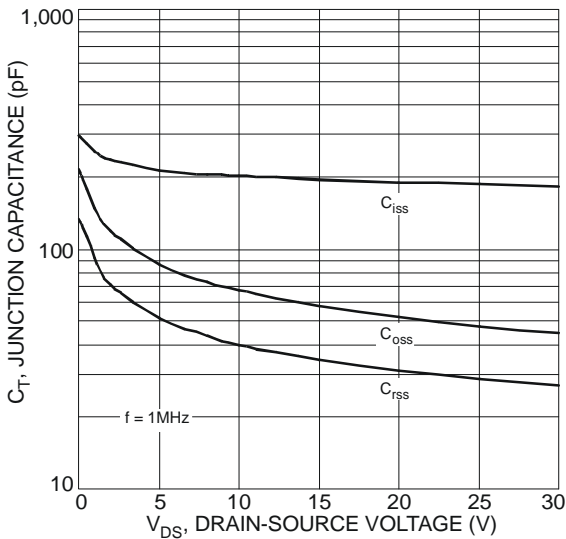


Fig. 10 Typical Junction Capacitance

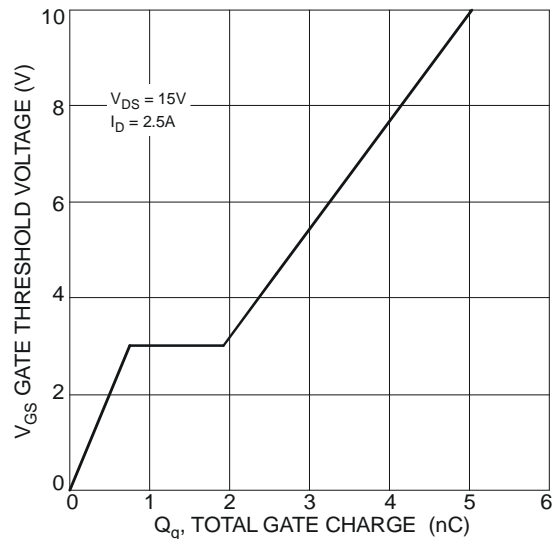
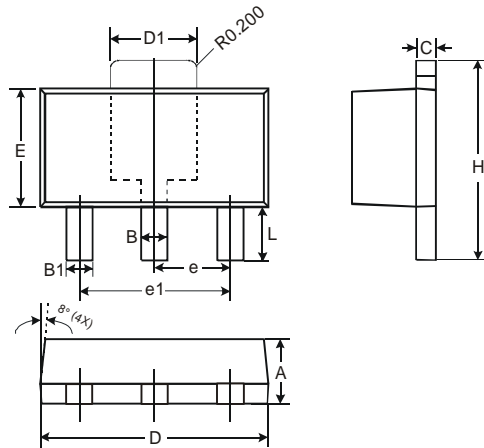


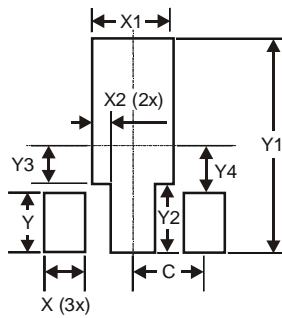
Fig. 11 Gate Charge

Package Outline Dimensions



SOT89		
Dim	Min	Max
A	1.40	1.60
B	0.44	0.62
B1	0.35	0.54
C	0.35	0.43
D	4.40	4.60
D1	1.52	1.83
E	2.29	2.60
e	1.50 Typ	
e1	3.00 Typ	
H	3.94	4.25
L	0.89	1.20
All Dimensions in mm		

Suggested Pad Layout



Dimensions	Value (in mm)
X	0.900
X1	1.733
X2	0.416
Y	1.300
Y1	4.600
Y2	1.475
Y3	0.950
Y4	1.125
C	1.500

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