

100V N-CHANNEL ENHANCEMENT MODE MOSFET IN SOT89 PACKAGE
Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$ Max	I_D max $T_A = 25^\circ\text{C}$ (Note 6)
100V	700m Ω @ $V_{GS} = 10\text{V}$	1.4A
	900m Ω @ $V_{GS} = 6\text{V}$	1.2A

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
- Disconnect switches

Features and Benefits

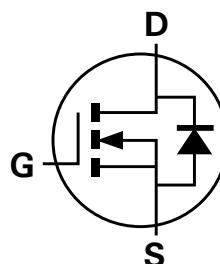
- Low On-Resistance
- Low Threshold
- Fast Switching Speed
- Low Gate Drive
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- Qualified to AEC-Q101 Standards for High Reliability

Mechanical Data

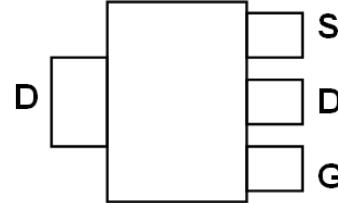
- Case: SOT89
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish
- Weight: 0.052 grams (approximate)



Top View



Device symbol

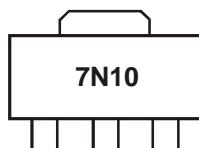

 Top View
Pin-Out

Ordering Information (Note 4)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXMN10A07ZTA	7N10	7	12	1,000

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


7N10 = Product type Marking Code

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

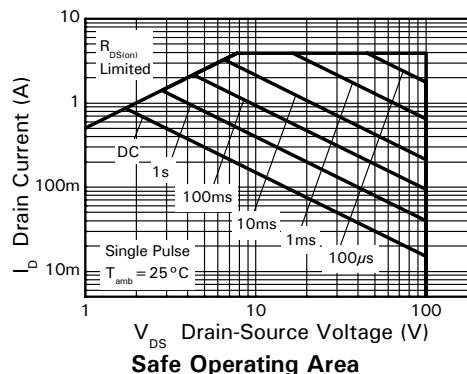
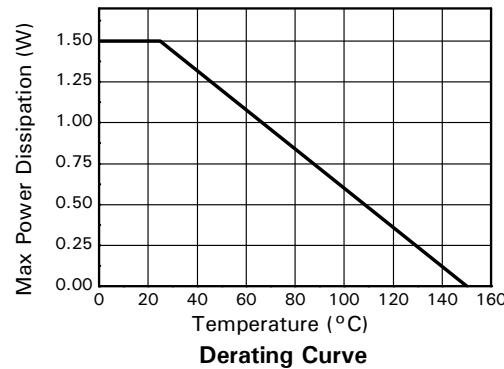
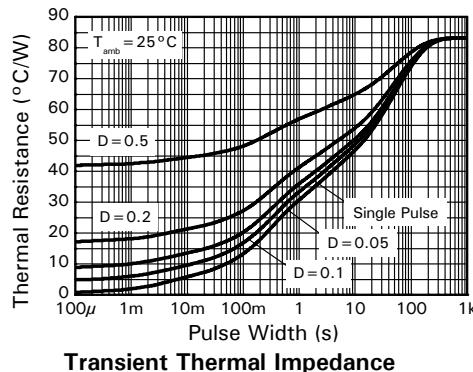
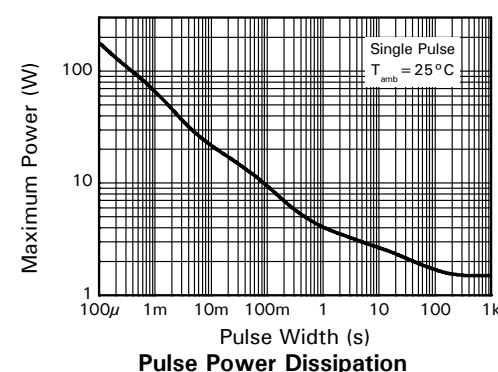
Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	100	V
Gate-Source Voltage			V_{GSS}	± 20	V
Continuous Drain Current	Steady State	@ $V_{GS} = 10\text{V}$; $T_A = 25^\circ\text{C}$ (Note 6) @ $V_{GS} = 10\text{V}$; $T_A = 70^\circ\text{C}$ (Note 6) @ $V_{GS} = 10\text{V}$; $T_A = 25^\circ\text{C}$ (Note 5)	I_D	1.4 1.1 1.0	A
Pulsed Drain Current (Note 7)			I_{DM}	4.2	A
Continuous Source Current (Body Diode) (Note 6)			I_S	2.1	A
Pulsed Source Current (Body Diode) (Note 7)			I_{SM}	4.2	A

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

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P_D	1.5	W
Linear Derating Factor		12	$\text{mW}/^\circ\text{C}$
Power Dissipation (Note 6)	P_D	2.6	W
Linear Derating Factor		21	$\text{mW}/^\circ\text{C}$
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	83.3	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	47.4	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Leads (Note 8)	$R_{\theta JL}$	6.36	$^\circ\text{C}/\text{W}$
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

Notes:

5. For a device surface mounted on 25mm x 25mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.
6. For a device surface mounted on FR4 PCB measured at $t \leq 10$ sec.
7. Repetitive rating - 25mm x 25mm FR4 PCB, $D = 0.02$, pulse width 300 μs – pulse width limited by maximum junction temperature.
8. 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

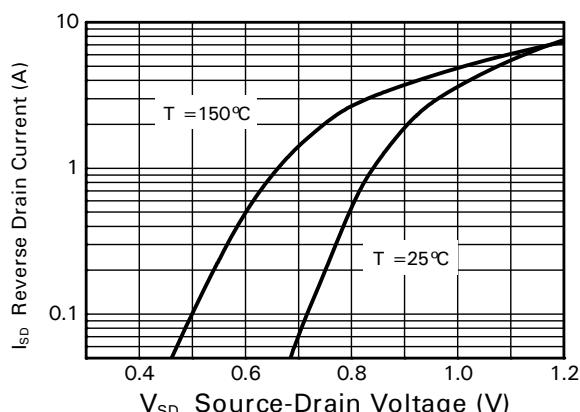
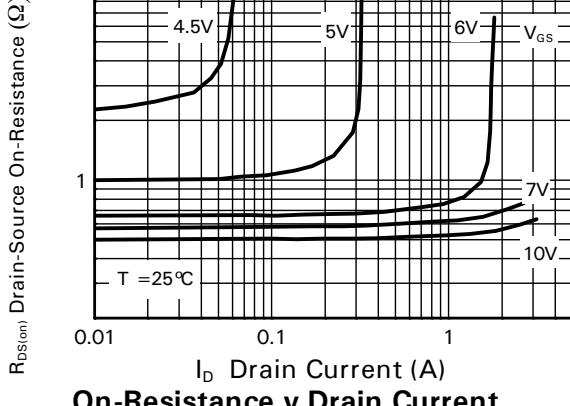
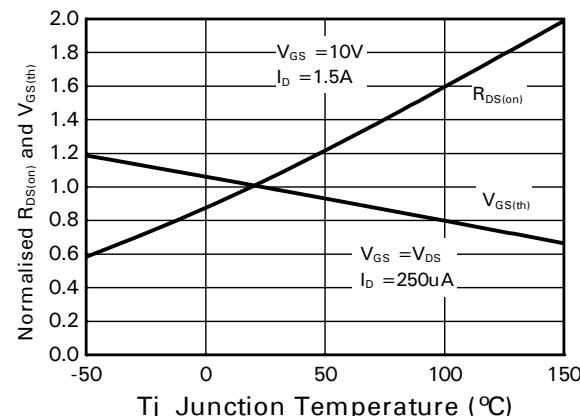
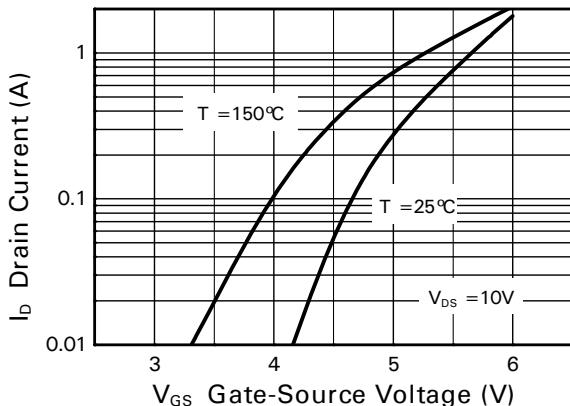
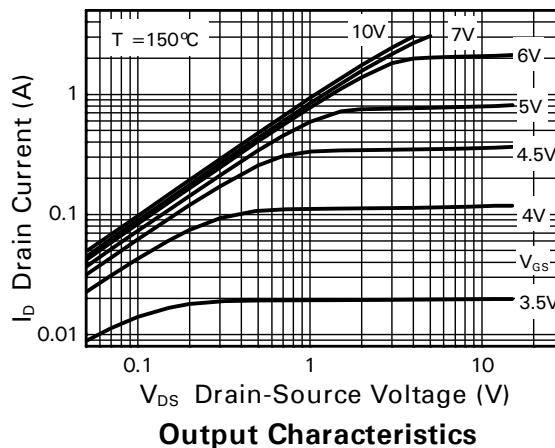
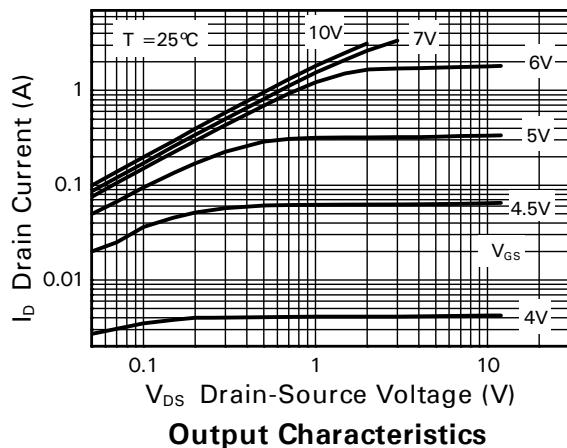
Electrical Characteristics @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	100	-	-	V	$V_{\text{GS}} = 0\text{V}$, $I_D = 250\mu\text{A}$
Zero Gate Voltage Drain Current $T_J = 25^\circ\text{C}$	I_{DSS}	-	-	1.0	μA	$V_{\text{DS}} = 100\text{V}$, $V_{\text{GS}} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	-	-	100	nA	$V_{\text{GS}} = \pm 20\text{V}$, $V_{\text{DS}} = 0\text{V}$
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{\text{GS(th)}}$	2	-	4	V	$V_{\text{DS}} = V_{\text{GS}}$, $I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance (Note 9)	$R_{\text{DS(on)}}$	-	-	700	$\text{m}\Omega$	$V_{\text{GS}} = 10\text{V}$, $I_D = 1.5\text{A}$
			-	900		$V_{\text{GS}} = 6\text{V}$, $I_D = 1\text{A}$
Forward Transconductance (Note 9 & 11)	g_{FS}	-	1.6	-	S	$V_{\text{DS}} = 15\text{V}$, $I_D = 1\text{A}$
Diodes Forward Voltage (Note 9)	V_{SD}	-	0.85	0.95	V	$T_J = 25^\circ\text{C}$, $I_S = 1.5\text{A}$, $V_{\text{GS}} = 0\text{V}$
DYNAMIC CHARACTERISTICS						
Input Capacitance (Note 10 & 11)	C_{iss}	-	138	-	pF	$V_{\text{DS}} = 50\text{V}$, $V_{\text{GS}} = 0\text{V}$, $f = 1.0\text{MHz}$
Output Capacitance (Note 10 & 11)	C_{oss}	-	12	-	pF	
Reverse Transfer Capacitance (Note 10 & 11)	C_{rss}	-	6	-	pF	
Gate Resistance (Note 10 & 11)	R_g	1.8	-	2.6	Ω	$f = 1\text{MHz}$, $V_{\text{GS}} = 0\text{V}$, $V_{\text{DS}} = 0\text{V}$
Total Gate Charge (Note 10 & 11)	Q_g	-	2.9	-	nC	$V_{\text{GS}} = 10\text{V}$, $V_{\text{DS}} = 50\text{V}$, $I_D = 1\text{A}$
Gate-Source Charge (Note 10 & 11)	Q_{gs}	-	0.7	-	nC	
Gate-Drain Charge (Note 10 & 11)	Q_{gd}	-	1	-	nC	
Reverse Recovery Time (Note 11)	t_{rr}		27		ns	$T_J = 25^\circ\text{C}$, $I_F = 1\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$
Reverse Recovery Charge (Note 11)	Q_{rr}		12		nC	
Turn-On Delay Time (Note 10 & 11)	$t_{\text{D(on)}}$	-	1.8	-	ns	$V_{\text{GS}} = 10\text{V}$, $V_{\text{DD}} = 50\text{V}$, $R_g = 6\Omega$, $I_D = 1\text{A}$
Turn-On Rise Time (Note 10 & 11)	t_r	-	1.5	-	ns	
Turn-Off Delay Time (Note 10 & 11)	$t_{\text{D(off)}}$	-	4.1	-	ns	
Turn-Off Fall Time (Note 10 & 11)	t_f	-	2.1	-	ns	

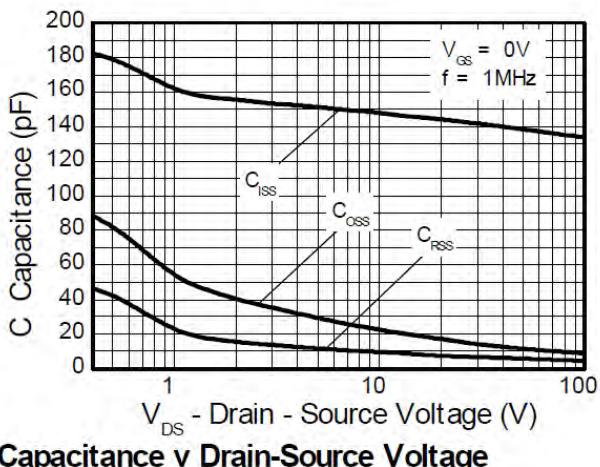
Notes:

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

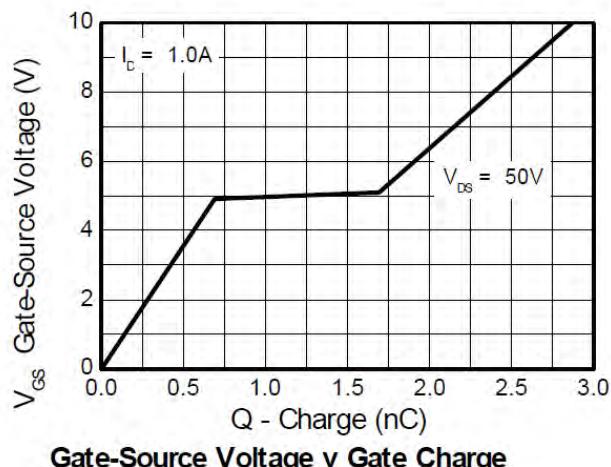
Typical Characteristics



Typical Characteristics - Continued

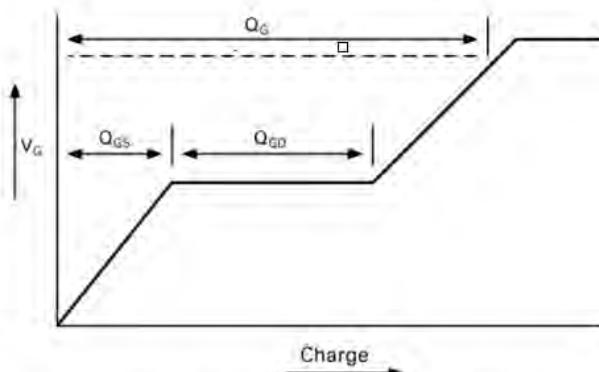


Capacitance v Drain-Source Voltage

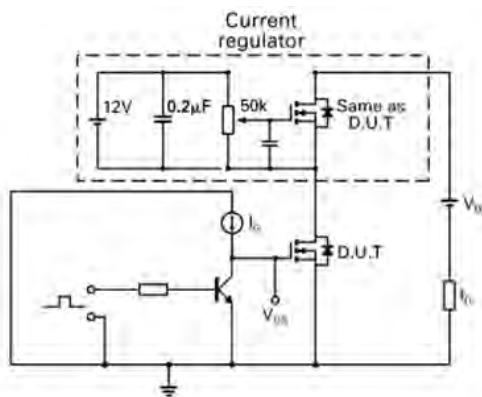


Gate-Source Voltage v Gate Charge

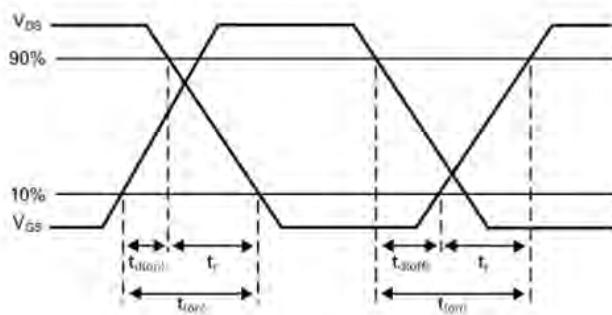
Test Circuits



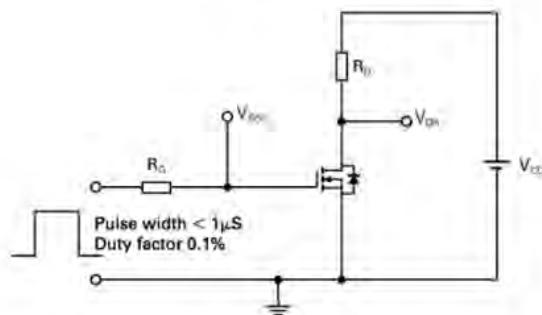
Basic gate charge waveform



Gate charge test circuit

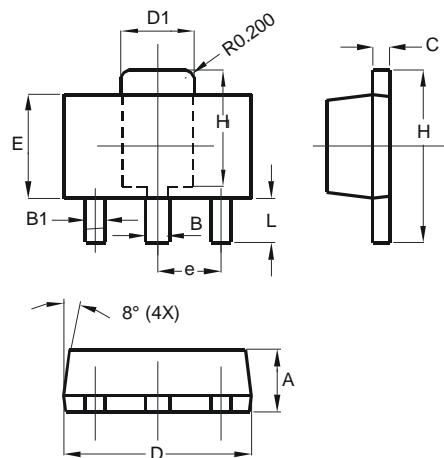


Switching time waveforms



Switching time test circuit

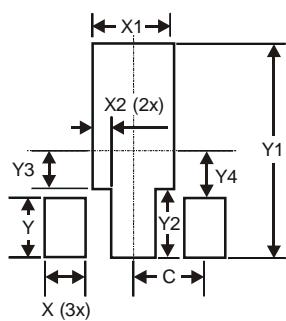
Package Outline Dimensions



SOT89		
Dim	Min	Max
A	1.40	1.60
B	0.44	0.62
B1	0.35	0.54
C	0.35	0.44
D	4.40	4.60
D1	1.62	1.83
E	2.29	2.60
e	1.50 Typ	
H	3.94	4.25
H1	2.63	2.93
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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