

**100V N-CHANNEL ENHANCEMENT MODE MOSFET IN SOT89 PACKAGE**

**Product Summary**

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

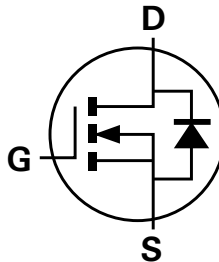
- Low On-Resistance
- Low Threshold
- Fast Switching Speed
- Low Gate Drive
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

**Mechanical Data**

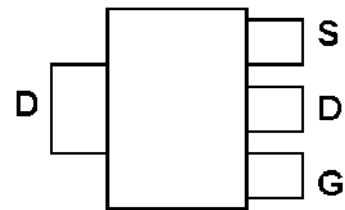
- Case: SOT89
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish
- Weight: 0.052 grams (approximate)



Top View



Device symbol



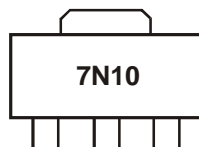
Top View  
Pin-Out

**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<sub>A</sub> = 25°C unless otherwise specified

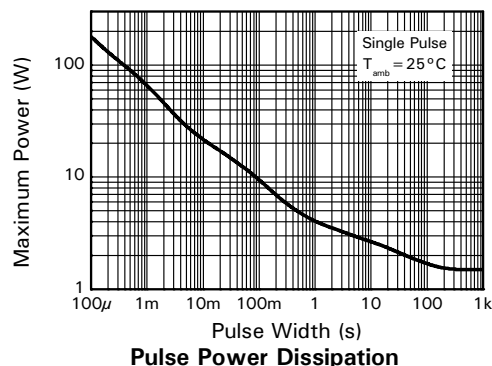
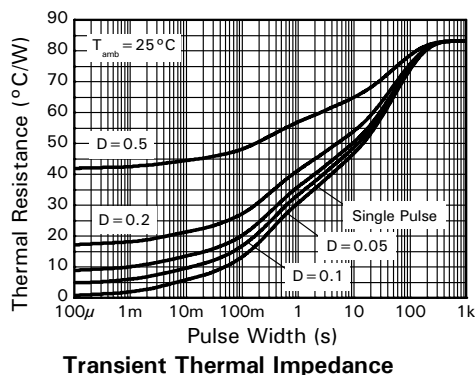
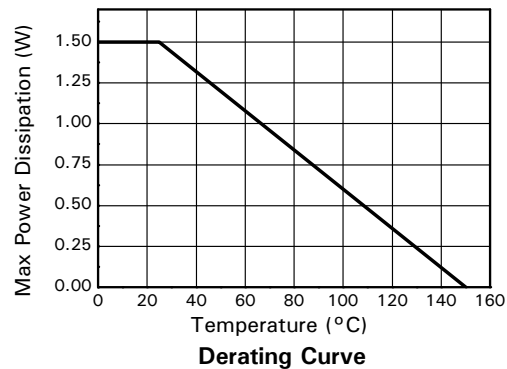
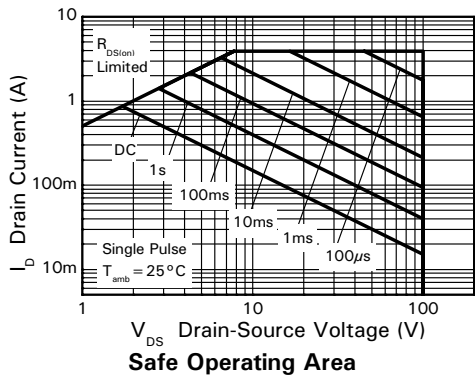
Characteristic		Symbol	Value	Unit
Drain-Source Voltage		V <sub>DSS</sub>	100	V
Gate-Source Voltage		V <sub>GSS</sub>	±20	V
Continuous Drain Current	Steady State	@ V <sub>GS</sub> = 10V; T <sub>A</sub> = 25°C (Note 6)	1.4	A
		@ V <sub>GS</sub> = 10V; T <sub>A</sub> = 70°C (Note 6)	1.1	
		@ V <sub>GS</sub> = 10V; T <sub>A</sub> = 25°C (Note 5)	1.0	
Pulsed Drain Current (Note 7)		I <sub>DM</sub>	4.2	A
Continuous Source Current (Body Diode) (Note 6)		I <sub>S</sub>	2.1	A
Pulsed Source Current (Body Diode) (Note 7)		I <sub>SM</sub>	4.2	A

**Thermal Characteristics** @T<sub>A</sub> = 25°C unless otherwise specified

Characteristic		Symbol	Value	Unit
Power Dissipation (Note 5)		P <sub>D</sub>	1.5	W
Linear Derating Factor			12	mW/°C
Power Dissipation (Note 6)		P <sub>D</sub>	2.6	W
Linear Derating Factor			21	mW/°C
Thermal Resistance, Junction to Ambient (Note 5)		R <sub>θJA</sub>	83.3	°C/W
Thermal Resistance, Junction to Ambient (Note 6)		R <sub>θJA</sub>	47.4	°C/W
Thermal Resistance, Junction to Leads (Note 8)		R <sub>θJL</sub>	6.36	°C/W
Operating and Storage Temperature Range		T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

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

**Thermal Characteristics**



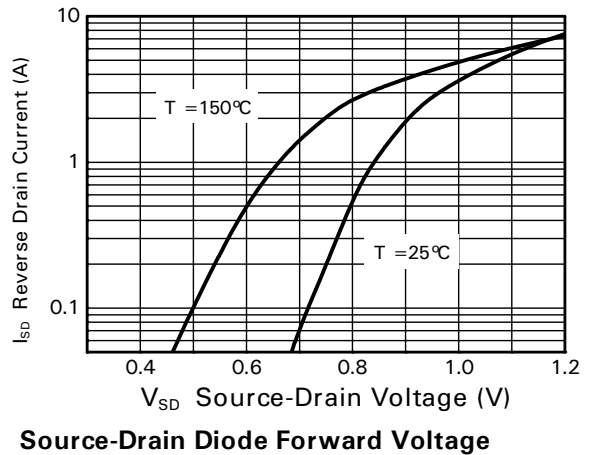
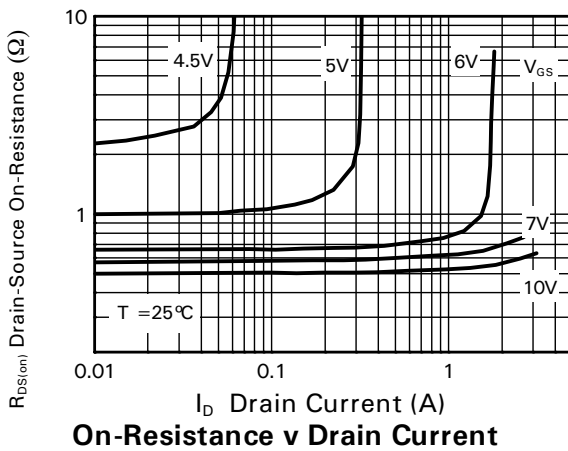
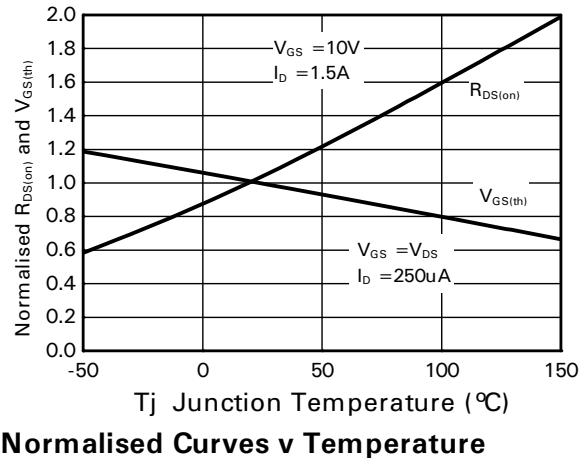
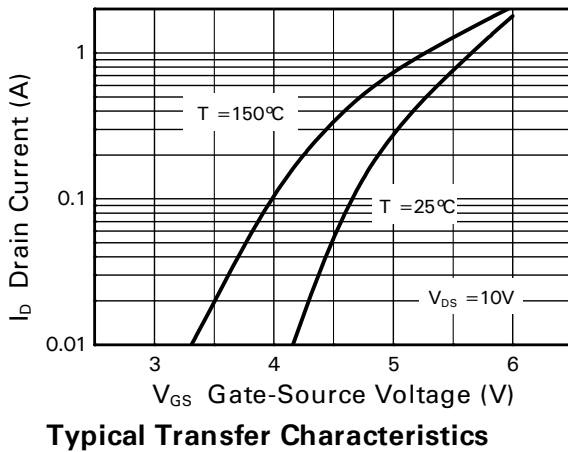
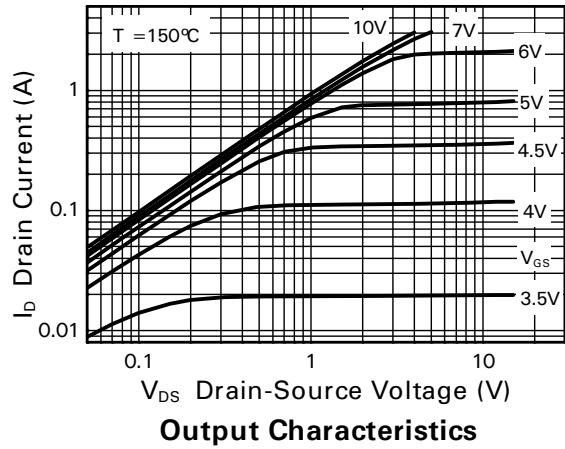
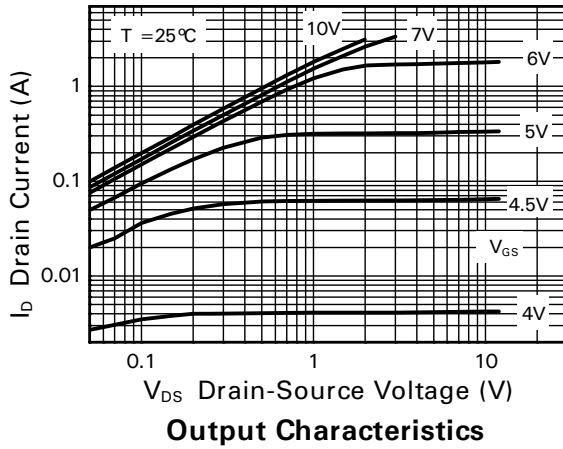
**Electrical Characteristics** @T<sub>A</sub> = 25°C unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	100	-	-	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
Zero Gate Voltage Drain Current T <sub>J</sub> = 25°C	I <sub>DSS</sub>	-	-	1.0	μA	V <sub>DS</sub> = 100V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	-	-	100	nA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	2	-	4	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
Static Drain-Source On-Resistance (Note 9)	R <sub>DS(on)</sub>	-	-	700	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 1.5A
			-	900		V <sub>GS</sub> = 6V, I <sub>D</sub> = 1A
Forward Transconductance (Note 9 & 11)	g <sub>FS</sub>	-	1.6	-	S	V <sub>DS</sub> = 15V, I <sub>D</sub> = 1A
Diodes Forward Voltage (Note 9)	V <sub>SD</sub>	-	0.85	0.95	V	T <sub>J</sub> = 25°C, I <sub>S</sub> = 1.5A, V <sub>GS</sub> = 0V
<b>DYNAMIC CHARACTERISTICS</b>						
Input Capacitance (Note 10 & 11)	C <sub>iss</sub>	-	138	-	pF	V <sub>DS</sub> = 50V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance (Note 10 & 11)	C <sub>oss</sub>	-	12	-	pF	
Reverse Transfer Capacitance (Note 10 & 11)	C <sub>rss</sub>	-	6	-	pF	
Gate Resistance (Note 10 & 11)	R <sub>g</sub>	1.8	-	2.6	Ω	f = 1MHz, V <sub>GS</sub> = 0V, V <sub>DS</sub> = 0V
Total Gate Charge (Note 10 & 11)	Q <sub>g</sub>	-	2.9	-	nC	V <sub>GS</sub> = 10V, V <sub>DS</sub> = 50V, I <sub>D</sub> = 1A
Gate-Source Charge (Note 10 & 11)	Q <sub>gs</sub>	-	0.7	-	nC	
Gate-Drain Charge (Note 10 & 11)	Q <sub>gd</sub>	-	1	-	nC	
Reverse Recovery Time (Note 11)	t <sub>rr</sub>	-	27	-	ns	T <sub>J</sub> = 25°C, I <sub>F</sub> = 1A, di/dt = 100A/μs
Reverse Recovery Charge (Note 11)	Q <sub>rr</sub>	-	12	-	nC	
Turn-On Delay Time (Note 10 & 11)	t <sub>D(on)</sub>	-	1.8	-	ns	V <sub>GS</sub> = 10V, V <sub>DD</sub> = 50V, R <sub>G</sub> = 6Ω, I <sub>D</sub> = 1A
Turn-On Rise Time (Note 10 & 11)	t <sub>r</sub>	-	1.5	-	ns	
Turn-Off Delay Time (Note 10 & 11)	t <sub>D(off)</sub>	-	4.1	-	ns	
Turn-Off Fall Time (Note 10 & 11)	t <sub>f</sub>	-	2.1	-	ns	

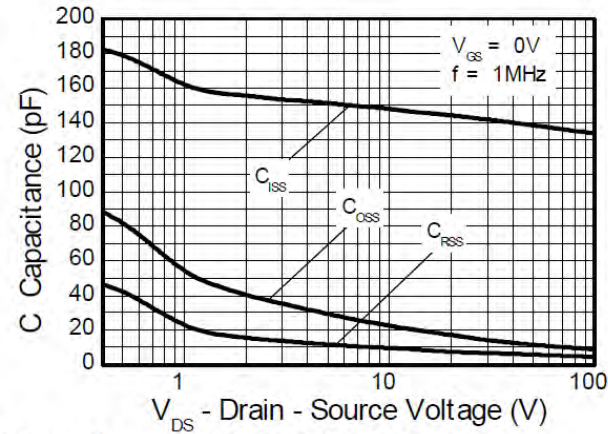
- Notes:
- 9. Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤ 2%.
  - 10. Switching characteristics are independent of operating junction temperature.
  - 11. For design aid only, not subject to production testing.

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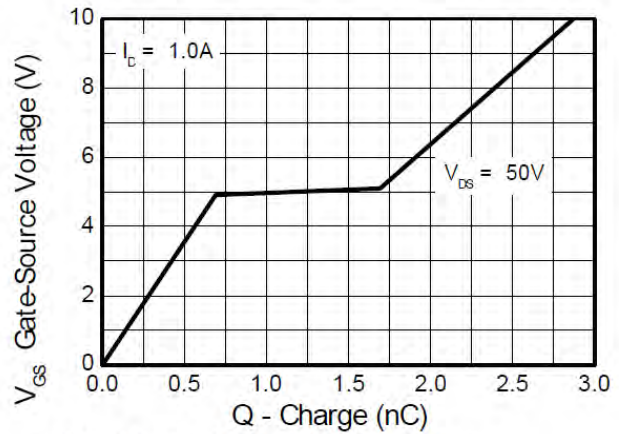
**Typical Characteristics**



**Typical Characteristics - Continued**

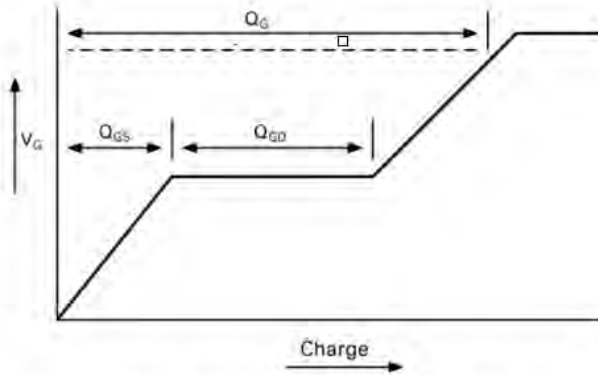


**Capacitance v Drain-Source Voltage**

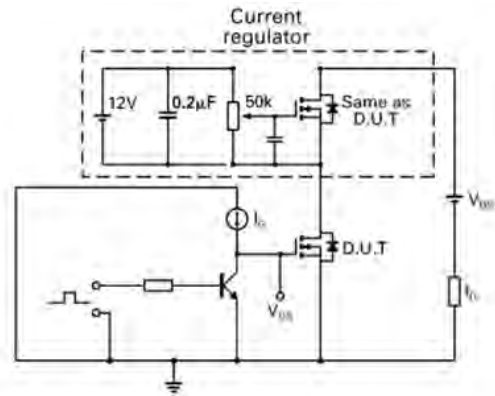


**Gate-Source Voltage v Gate Charge**

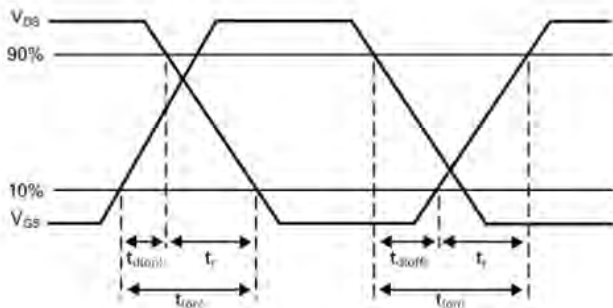
**Test Circuits**



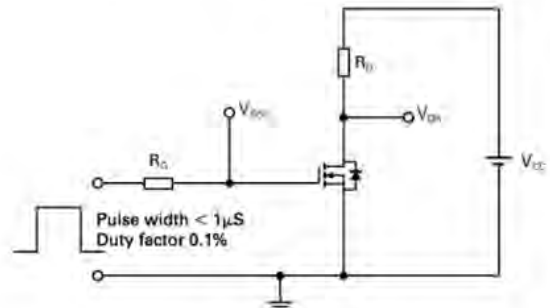
**Basic gate charge waveform**



**Gate charge test circuit**

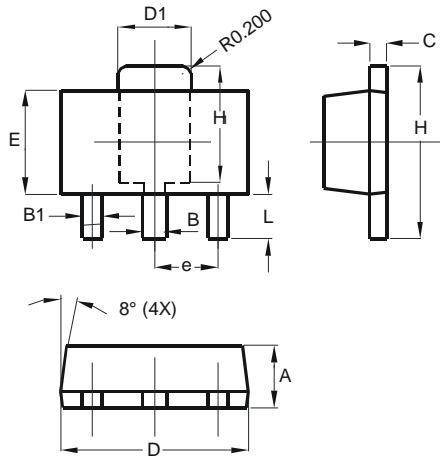


**Switching time waveforms**



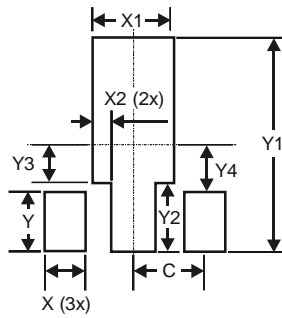
**Switching time test circuit**

**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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