

## Product Summary

$BV_{DSS}$	$R_{DS(ON)}$	$I_D$ $T_A = +25^\circ\text{C}$
40V	0.05 $\Omega$ @ $V_{GS} = 10\text{V}$	7A

## Description

This new generation MOSFET is 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.

## Applications

- DC-DC Converters
- Audio Output Stages
- Relay and Solenoid Driving
- Motor Control

## Features

- Low On-Resistance
- Fast Switching Speed
- Low Threshold
- Low Gate Drive
- Lead-Free Finish; RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)
- Qualified to AEC-Q101 Standards for High Reliability
- An Automotive-Compliant Part is Available Under Separate Datasheet ([ZXMN4A06GQ](#))

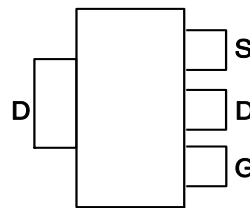
## Mechanical Data

- Case: SOT223
- Case Material: Molded Plastic, UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Annealed over Copper Leadframe; Solderable per MIL-STD-202, Method 208  $\text{e3}$
- Weight: 0.112 grams (Approximate)

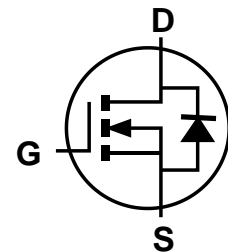
SOT223



Top View



Pin Out - Top View



Equivalent Circuit

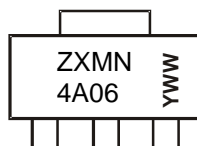
## Ordering Information (Note 4)

Part Number	Compliance	Case	Packaging
ZXMN4A06GTA	Standard	SOT223	1,000/Tape & Reel
ZXMN4A06GTC	Standard	SOT223	4,000/Tape & Reel

- Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
  2. See [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) 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/products/packages.html>.

## Marking Information

SOT223



ZXMN4A06 = Product Type Marking Code  
 YWW = Date Code Marking  
 Y or  $\bar{Y}$  = Last Digit of Year (ex: 6 = 2016)  
 WW or  $\bar{W}W$  = Week Code (01 to 53)

**Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

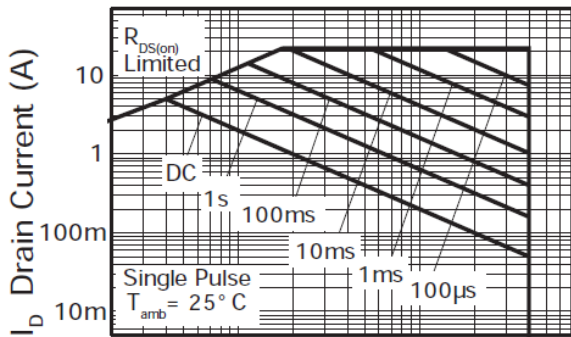
Characteristic			Symbol	Value	Unit	
Drain-Source Voltage			V <sub>DSS</sub>	40	V	
Gate-Source Voltage			V <sub>GS</sub>	±20	V	
Continuous Drain Current	V <sub>GS</sub> = 10V	(Note 6)	I <sub>D</sub>	7	A	
		T <sub>A</sub> = +70°C (Note 6)		5.6		
		(Note 5)		5		
Pulsed Drain Current	V <sub>GS</sub> = 10V	(Note 7)	I <sub>DM</sub>	22	A	
Continuous Source Current (Body Diode)			(Note 6)	I <sub>S</sub>	5.4	A
Pulsed Source Current (Body Diode)			(Note 7)	I <sub>SM</sub>	22	A

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

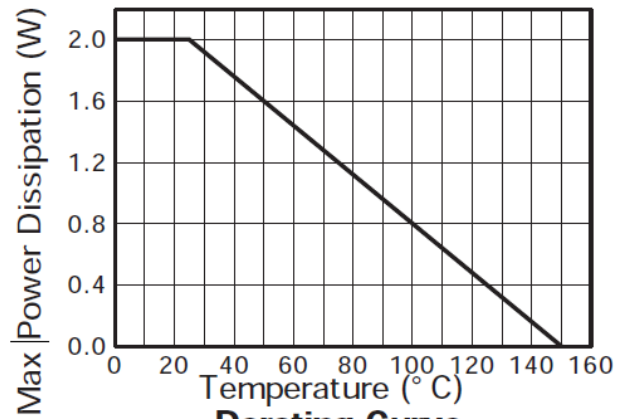
Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 5)	P <sub>D</sub>	2	W
			16	
	Linear Derating Factor		3.9	
Thermal Resistance, Junction to Ambient	(Note 7)	R <sub>θJA</sub>	62.5	°C/W
	(Note 6)		32.2	
Operating and Storage Temperature Range		T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

- Notes:
5. For a device surface mounted on 25mm x 25mm FR-4 PCB with high coverage of single sided 1oz copper, in still air conditions.
  6. For a device surface mounted on FR-4 PCB measured at t ≤ 5 seconds.
  7. Repetitive rating 25mm x 25mm FR-4 PCB, D = 0.05, pulse width 10µs - pulse width limited by maximum junction temperature.

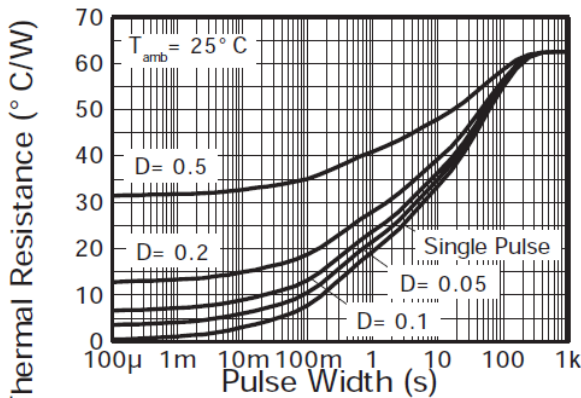
**Thermal Characteristics**



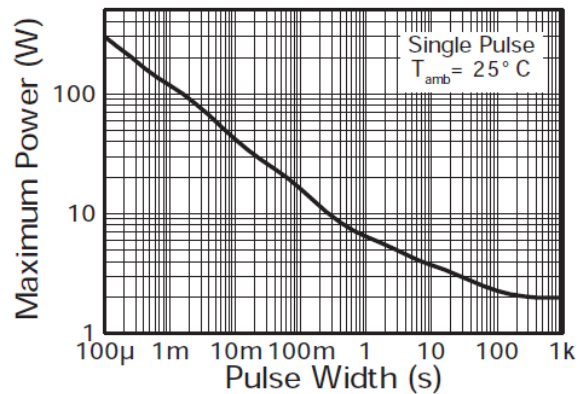
**Safe Operating Area**



**Derating Curve**



**Transient Thermal Impedance**



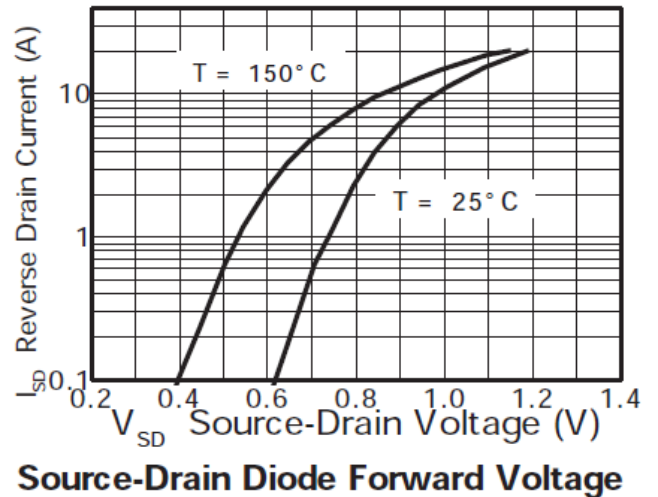
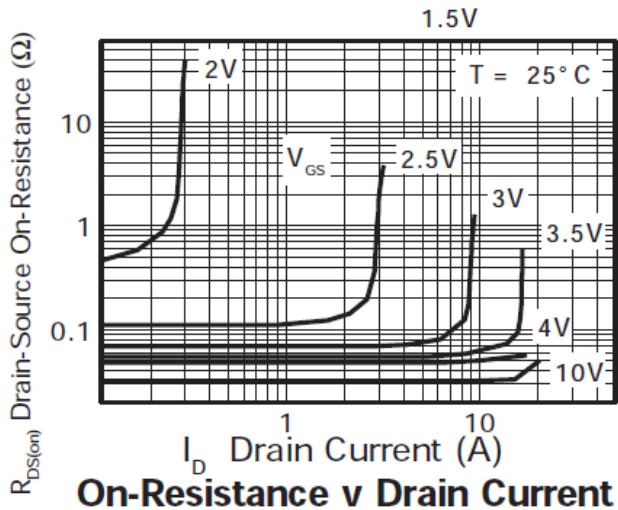
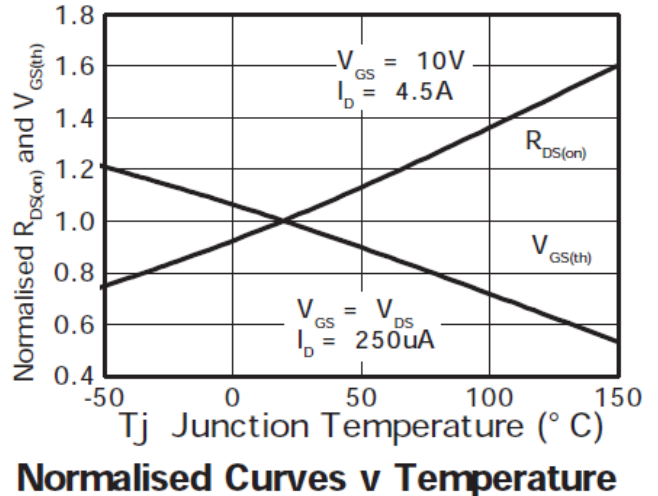
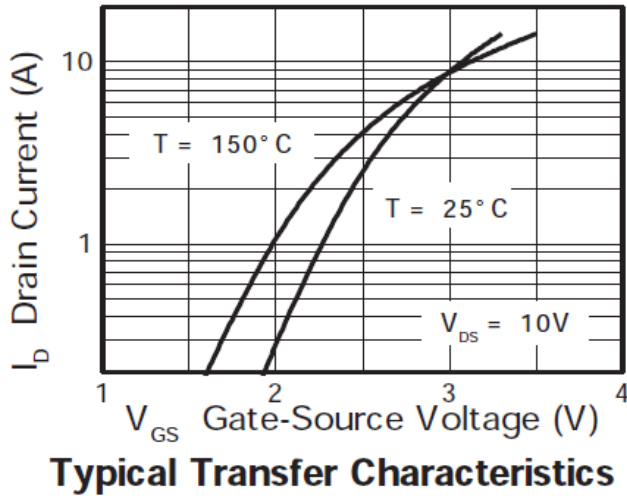
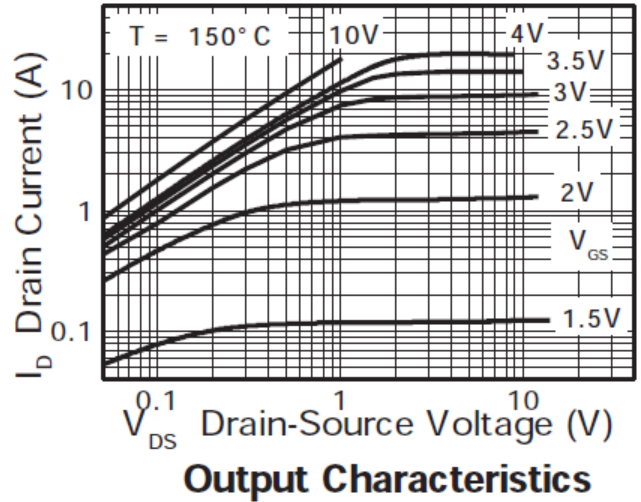
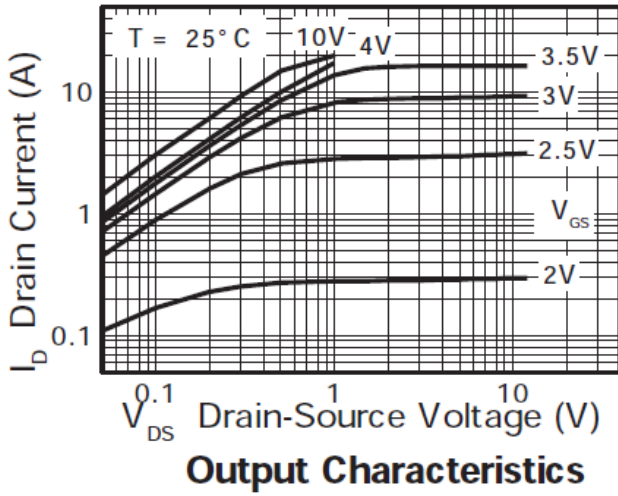
**Pulse Power Dissipation**

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

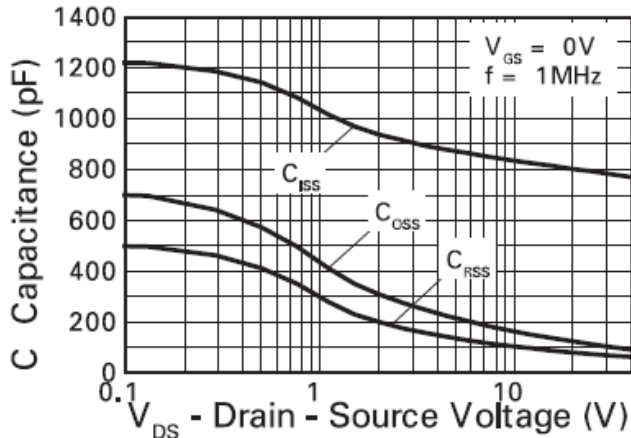
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 8)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	40	—	—	V	I <sub>D</sub> = 250μA, V <sub>GS</sub> = 0V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	1	μA	V <sub>DS</sub> = 40V, V <sub>GS</sub> = 0V
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>	1	—	2	V	I <sub>D</sub> = 250μA, V <sub>DS</sub> = V <sub>GS</sub>
Static Drain-Source On-Resistance (Note 8)	R <sub>DS(ON)</sub>	—	—	0.05	Ω	V <sub>GS</sub> = 10V, I <sub>D</sub> = 4.5A
				0.075		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 3.2A
Forward Transconductance	g <sub>fs</sub>	—	8.7	—	S	V <sub>DS</sub> = 15V, I <sub>D</sub> = 2.5A
Diode Forward Voltage (Note 8)	V <sub>SD</sub>	—	0.8	0.95	V	I <sub>F</sub> = 2.5A, V <sub>GS</sub> = 0V, T <sub>J</sub> = +25°C
Reverse Recovery Time (Note 9)	t <sub>RR</sub>	—	19.86	—	ns	I <sub>F</sub> = 2.5A, di/dt = 100A/μs,
Reverse Recovery Charge (Note 9)	Q <sub>RR</sub>	—	16.36	—	nC	T <sub>J</sub> = +25°C
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	C <sub>iss</sub>	—	770	—	pF	V <sub>DS</sub> = 40V, V <sub>GS</sub> = 0V f = 1MHz
Output Capacitance	C <sub>oss</sub>	—	92	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	61	—	pF	
Total Gate Charge	Q <sub>g</sub>	—	18.2	—	nC	V <sub>DS</sub> = 30V, V <sub>GS</sub> = 10V, I <sub>D</sub> = 2.5A (Refer to test circuit)
Gate-Source Charge	Q <sub>gs</sub>	—	2.1	—	nC	
Gate-Drain Charge	Q <sub>gd</sub>	—	4.5	—	nC	
Turn-On Delay Time	t <sub>D(ON)</sub>	—	2.55	—	ns	V <sub>DD</sub> = 30V, V <sub>GS</sub> = 10V I <sub>D</sub> = 2.5A, R <sub>G</sub> ≅ 6Ω (Refer to test circuit)
Turn-On Rise Time	t <sub>r</sub>	—	4.45	—	ns	
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	28.61	—	ns	
Turn-Off Fall Time	t <sub>f</sub>	—	7.35	—	ns	

Notes: 8. Short duration pulse test used to minimize self-heating effect.  
9. Guaranteed by design. Not subject to product testing.

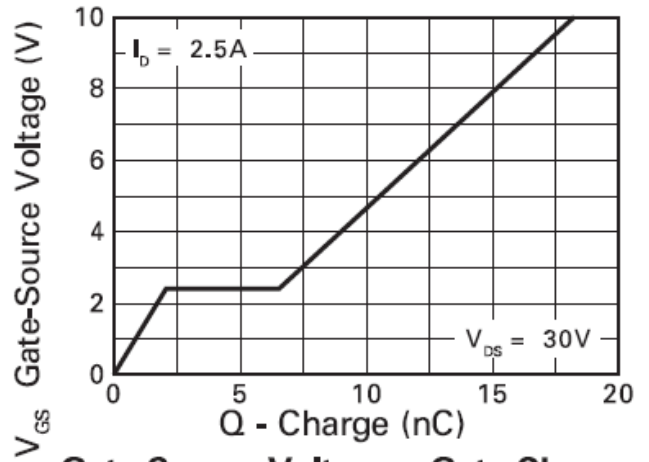
**Typical Characteristics**



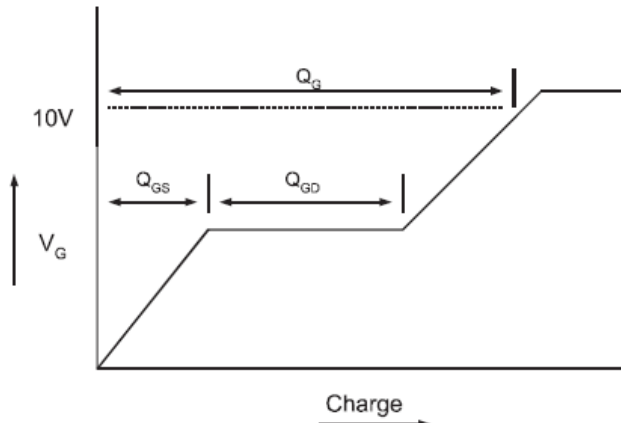
**Typical Characteristics (Cont.)**



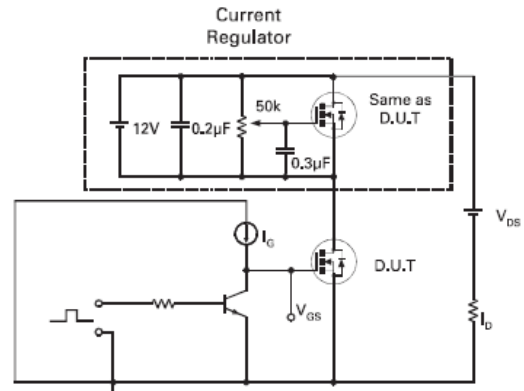
**Capacitance v Drain-Source Voltage**



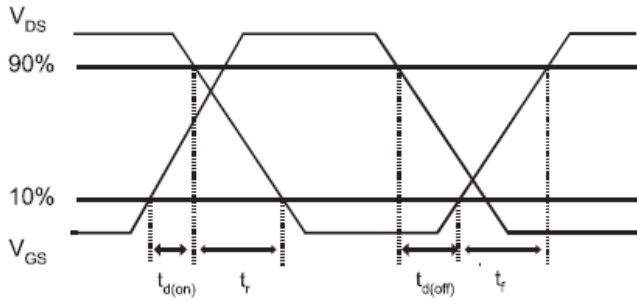
**Gate-Source Voltage v Gate Charge**



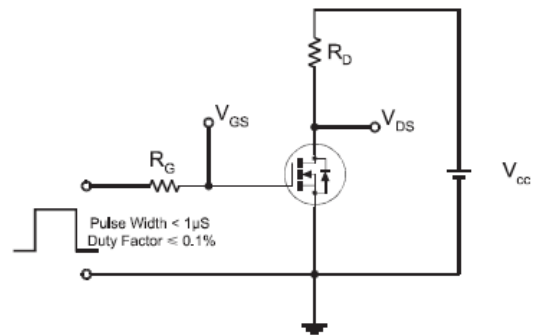
**Basic Gate Charge Waveform**



**Gate Charge Test Circuit**



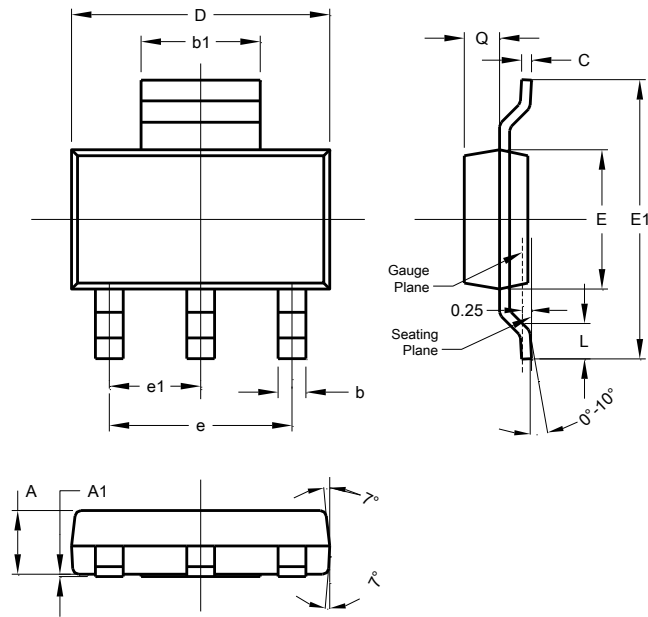
**Switching Time Waveforms**



**Switching Time Test Circuit**

**Package Outline Dimensions**

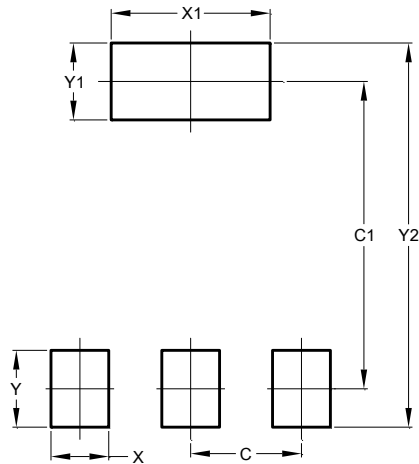
Please see <http://www.diodes.com/package-outlines.html> for the latest version.



SOT223			
Dim	Min	Max	Typ
A	1.55	1.65	1.60
A1	0.010	0.15	0.05
b	0.60	0.80	0.70
b1	2.90	3.10	3.00
C	0.20	0.30	0.25
D	6.45	6.55	6.50
E	3.45	3.55	3.50
E1	6.90	7.10	7.00
e	-	-	4.60
e1	-	-	2.30
L	0.85	1.05	0.95
Q	0.84	0.94	0.89
All Dimensions in mm			

**Suggested Pad Layout**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.



Dimensions	Value (in mm)
C	2.30
C1	6.40
X	1.20
X1	3.30
Y	1.60
Y1	1.60
Y2	8.00

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