

## Product Summary

$BV_{DSS}$	$R_{DS(on)}$	$I_D$ $T_A = +25^\circ C$
-60V	150m $\Omega$ @ $V_{GS} = -10V$	-3A
	185m $\Omega$ @ $V_{GS} = -4.5V$	-2.7A

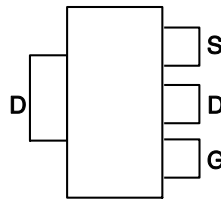
## Description and Applications

This MOSFET is designed to meet the stringent requirements of Automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

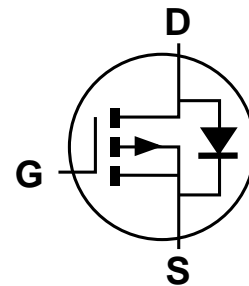
- Motor Control
- Transformer Driving Switch
- DC-DC Converters
- Power Management Functions
- Uninterrupted Power Supply



Top View



Pin Out - Top



Equivalent Circuit

## Features and Benefits

- 100% Unclamped Inductive Switch (UIS) test in production
- Low on-resistance
- Fast switching speed
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

## Mechanical Data

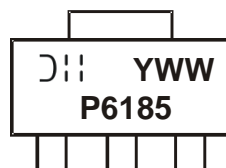
- Case: SOT223
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See diagram below
- Terminals: Finish - Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method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

## Ordering Information (Note 5)

Part Number	Case	Packaging
DMP6185SEQ-13	SOT223	2,500 / 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. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to [http://www.diodes.com/quality/product\\_compliance\\_definitions/](http://www.diodes.com/quality/product_compliance_definitions/).
  5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information



D:P = Manufacturer's Marking  
 P6185 = Marking Code  
 YWW or ȲWW = Date Code Marking  
 Y or Ȳ = Year (ex: 7 = 2017)  
 WW = Week (01 - 53)

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

Characteristic	Symbol	Value	Unit
Drain-Source voltage	V <sub>DSS</sub>	-60	V
Gate-Source voltage	V <sub>GS</sub>	±20	V
Continuous Drain current (Note 7) V <sub>GS</sub> = -10V	I <sub>D</sub>	T <sub>A</sub> = +25°C	-3
		T <sub>A</sub> = +70°C	-2.4
Maximum Body Diode Continuous Current	I <sub>S</sub>	-2	A
Pulsed Drain Current (10µs pulse, duty cycle = 1%)	I <sub>DM</sub>	-15	A
Single Pulsed Avalanche Current (Note 8)	I <sub>AS</sub>	-16	A
Single Pulsed Avalanche Energy (Note 8)	E <sub>AS</sub>	13	mJ

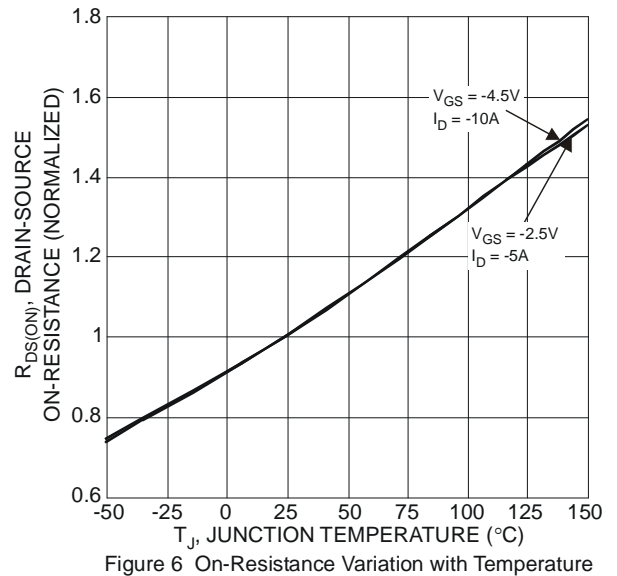
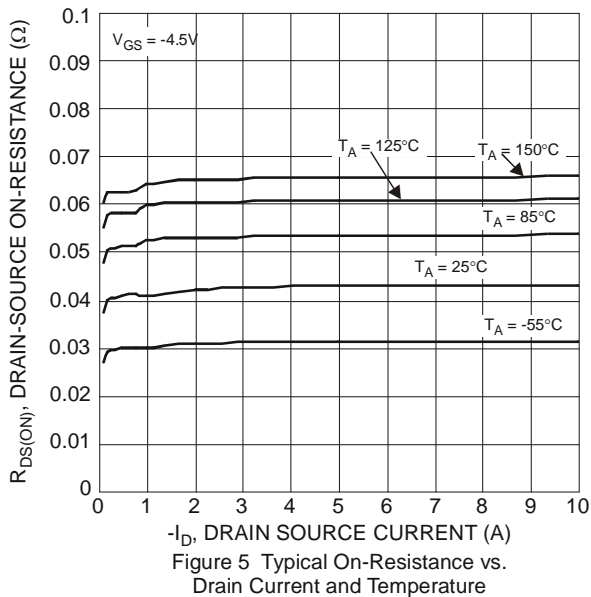
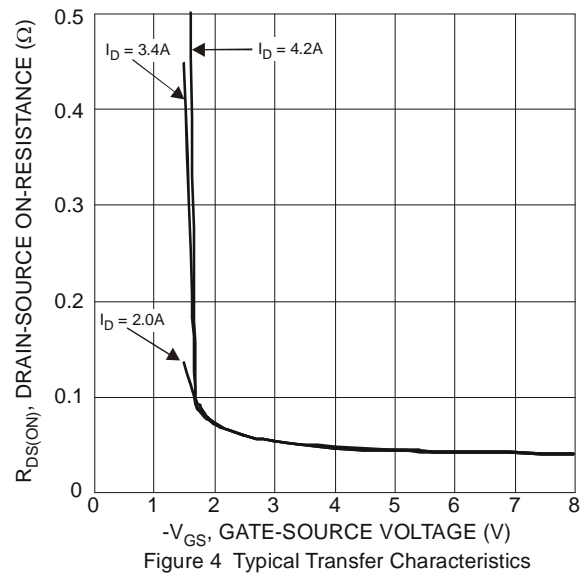
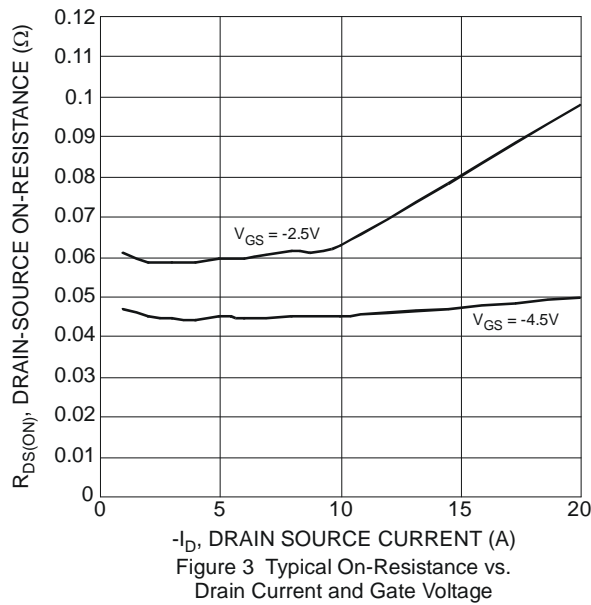
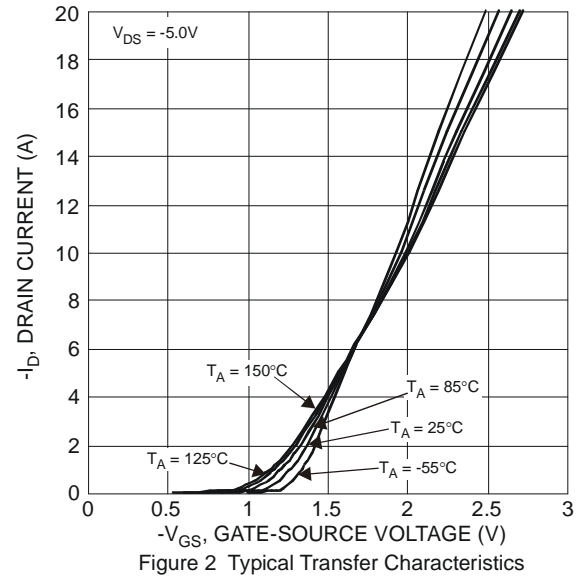
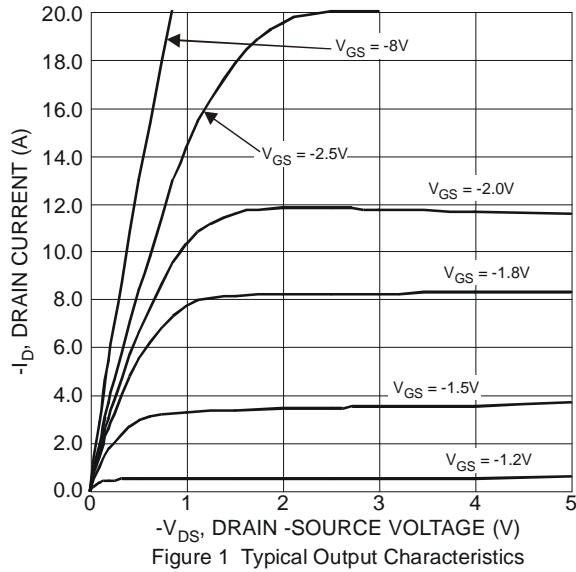
**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 6)	P <sub>D</sub>	T <sub>A</sub> = +25°C	1.2
		T <sub>A</sub> = +70°C	0.8
Thermal Resistance, Junction to Ambient (Note 6)	R <sub>θJA</sub>	Steady state	104
		t < 10s	51
Total Power Dissipation (Note 7)	P <sub>D</sub>	T <sub>A</sub> = +25°C	2.2
		T <sub>A</sub> = +70°C	1.4
Thermal Resistance, Junction to Ambient (Note 7)	R <sub>θJA</sub>	Steady state	60
		t < 10s	30
Thermal Resistance, Junction to Case (Note 7)	R <sub>θJC</sub>	7.6	
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b> (Note 9)						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-60	-	-	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250µA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	-	-	-1	µA	V <sub>DS</sub> = -48V, 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> (Note 9)						
Gate Threshold Voltage	V <sub>GS(th)</sub>	-1	-	-3	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250µA
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	-	110	150	mΩ	V <sub>GS</sub> = -10V, I <sub>D</sub> = -2.2A
			130	185		
Diode Forward Voltage	V <sub>SD</sub>	-	-0.75	-0.95	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -1A
<b>DYNAMIC CHARACTERISTICS</b> (Note 10)						
Input Capacitance	C <sub>iss</sub>	-	708	-	pF	V <sub>DS</sub> = -30V, V <sub>GS</sub> = 0V, f = 1MHz
Output Capacitance	C <sub>oss</sub>	-	39	-	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	-	32	-	pF	
Gate Resistance	R <sub>g</sub>	-	17	28	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz
Total Gate Charge (V <sub>GS</sub> = -4.5V)	Q <sub>g</sub>	-	6.2	-	nC	V <sub>DS</sub> = -30V, I <sub>D</sub> = -12A
Total Gate Charge (V <sub>GS</sub> = -10V)	Q <sub>g</sub>	-	14	-	nC	
Gate-Source Charge	Q <sub>gs</sub>	-	2.8	-	nC	
Gate-Drain Charge	Q <sub>gd</sub>	-	3.1	-	nC	
Turn-On Delay Time	t <sub>D(on)</sub>	-	5.2	-	ns	V <sub>DS</sub> = -30V, R <sub>L</sub> = 2.5Ω V <sub>GS</sub> = -10V, R <sub>G</sub> = 3Ω
Turn-On Rise Time	t <sub>r</sub>	-	23	-	ns	
Turn-Off Delay Time	t <sub>D(off)</sub>	-	33	-	ns	
Turn-Off Fall Time	t <sub>f</sub>	-	39	-	ns	
Body Diode Reverse Recovery Time	t <sub>rr</sub>	-	22	-	ns	I <sub>F</sub> = -12A, di/dt = 100A/µs
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>	-	17	-	nC	

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
  - Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
  - UIS in production with L = 0.1mH, starting T<sub>A</sub> = +25°C.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.



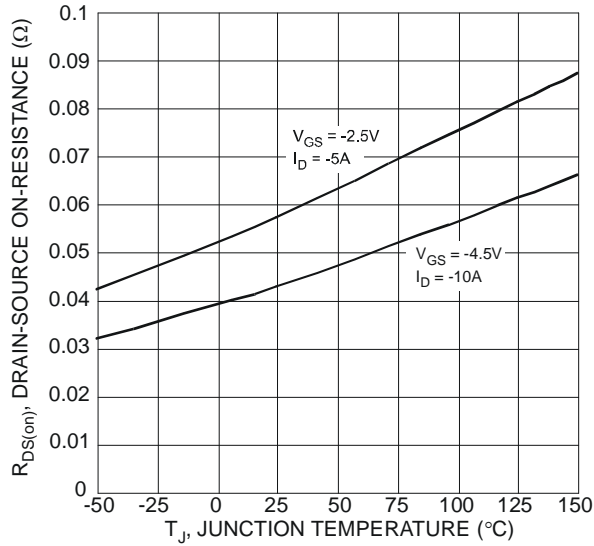


Figure 7 On-Resistance Variation with Temperature

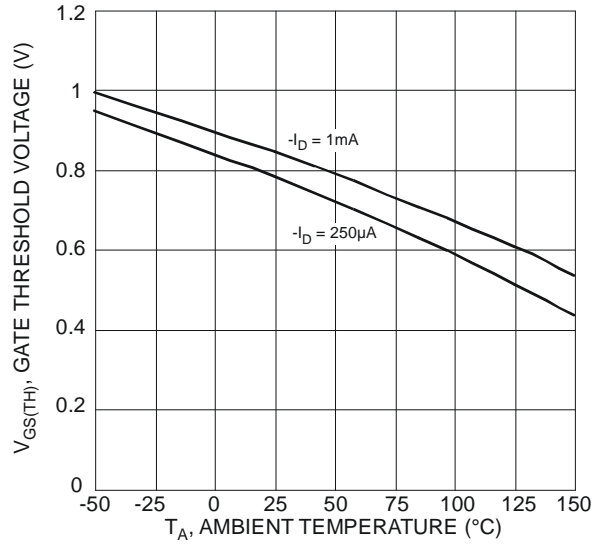


Figure 8 Gate Threshold Variation vs. Ambient Temperature

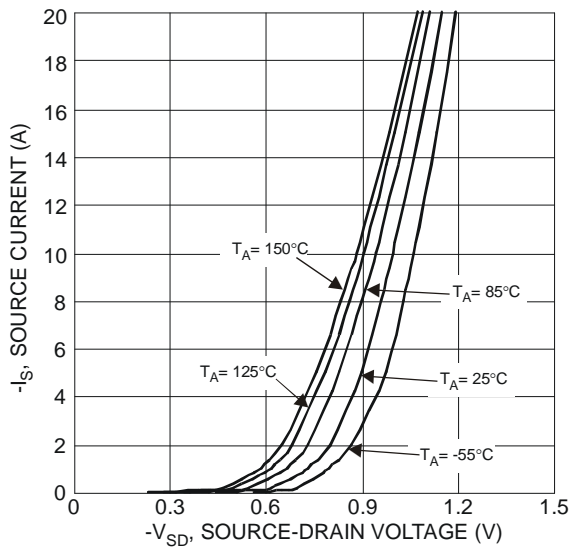


Figure 9 Diode Forward Voltage vs. Current

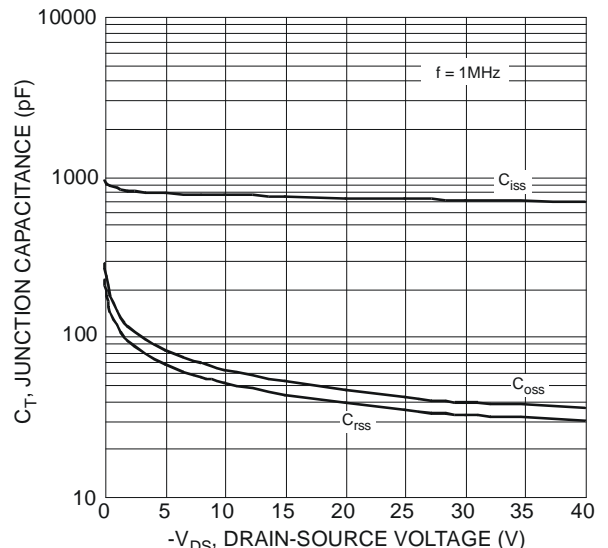


Figure 10 Typical Junction Capacitance

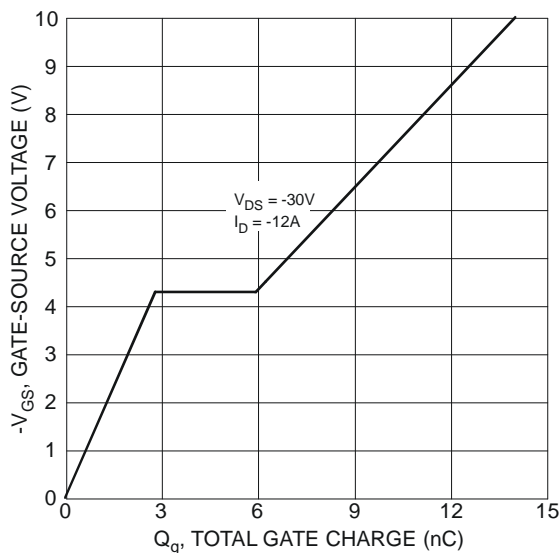
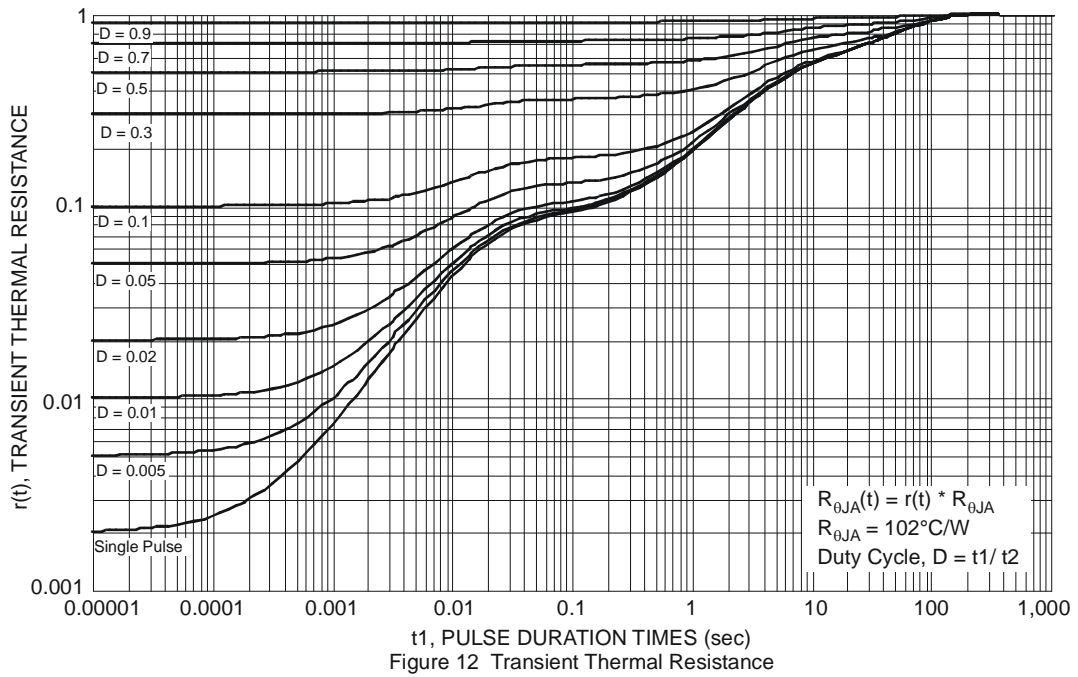
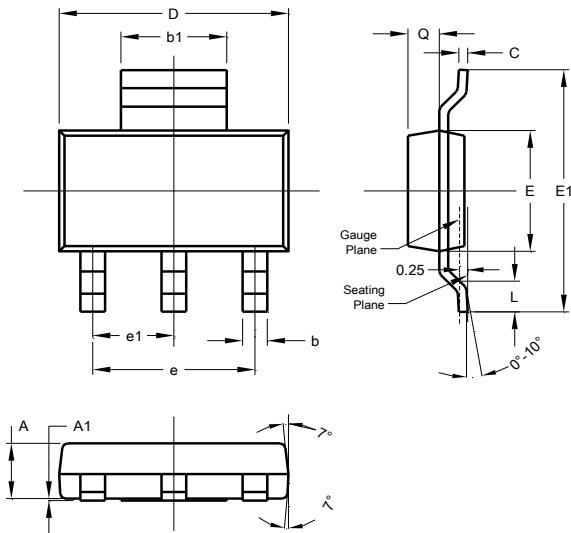


Figure 11 Gate-Charge Characteristics



**Package Outline Dimensions**

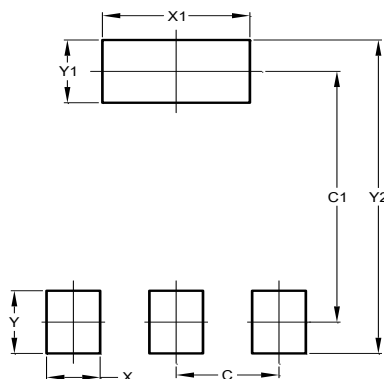
Please see <http://www.diodes.com/package-outlines.html> for the latest version.



SOT223			
Dim	Min	Max	Typ
A	1.55	1.65	1.60
A1	0.010	0.15	0.05
b1	2.90	3.10	3.00
b2	0.60	0.80	0.70
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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