

DUAL P-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

BV _{DSS}	R _{DS(ON)} Max	I _D Max T _A = +25°C
-20V	75mΩ @ V _{GS} = -4.5V	-4.6A
	110mΩ @ V _{GS} = -2.5V	-2.9A

Description

This MOSFET has been designed to minimize the on-state resistance yet maintain superior switching performance, making it ideal for high-efficiency power-management applications.

Applications

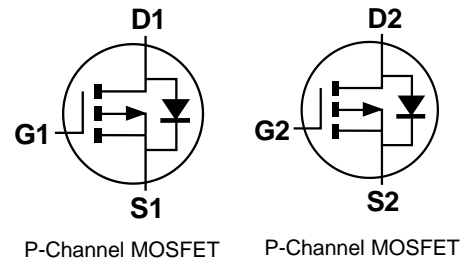
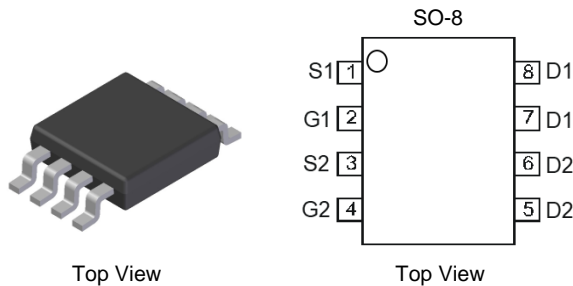
- Backlighting
- Power-management functions
- DC-DC converters

Features

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e.: parts qualified to AEC-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please refer to the related automotive grade (Q-suffix) part. A listing can be found at <https://www.diodes.com/products/automotive/automotive-products/>.**
- **This part is qualified to JEDEC standards (as references in AEC-Q) for High Reliability. <https://www.diodes.com/quality/product-definitions/>**

Mechanical Data

- Package: SO-8
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram Below
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.072 grams (Approximate)

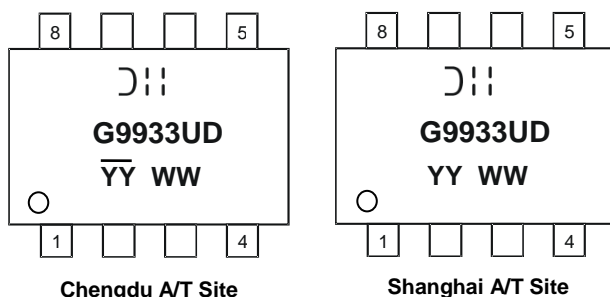


Ordering Information (Note 4)

Part Number	Package	Packing	
		Qty.	Carrier
DMG9933USD-13	SO-8	2,500	Tape & Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
 2. See <https://www.diodes.com/quality/lead-free/> 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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information



- ⌋⌋ = Manufacturer's Marking
- G9933UD = Product Type Marking Code
- YYWW = Date Code Marking
- YY or YY = Year (ex: 23 = 2023)
- WW = Week (01 to 53)
- YY = Date Code Marking for SAT (Shanghai Assembly/ Test site)
- YY = Date Code Marking for CAT (Chengdu Assembly/ Test site)

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V _{DSS}	-20	V
Gate-Source Voltage			V _{GSS}	±12	V
Continuous Drain Current (Note 5) V _{GS} = -4.5V	Steady State	T _A = +25°C	I _D	-4.6	A
		T _A = +85°C		-3	
Pulsed Drain Current (Note 6)			I _{DM}	-20	A

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P _D	1.15	W
Thermal Resistance, Junction to Ambient @T _A = +25°C	R _{θJA}	109	°C/W
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +150	°C

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV _{DSS}	-20	—	—	V	V _{GS} = 0V, I _D = -250μA
Zero Gate Voltage Drain Current T _J = +25°C	I _{DSS}	—	—	-1	μA	V _{DS} = -16V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±12V, V _{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	V _{GS(th)}	-0.45	—	-1.1	V	V _{DS} = V _{GS} , I _D = -250μA
Static Drain-Source On-Resistance	R _{DS(on)}	—	55	75	mΩ	V _{GS} = -4.5V, I _D = -4.8A
		—	76	110		V _{GS} = -2.5V, I _D = -1A
Forward Transfer Admittance	Y _{fs}	—	10	—	S	V _{DS} = -9V, I _D = -3.4A
Diode Forward Voltage	V _{SD}	—	-0.8	-1.2	V	V _{GS} = 0V, I _S = -2A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C _{iss}	—	608.4	—	pF	V _{DS} = -6V, V _{GS} = 0V f = 1MHz
Output Capacitance	C _{oss}	—	81.5	—	pF	
Reverse Transfer Capacitance	C _{rss}	—	72.4	—	pF	
Gate Resistance	R _g	—	44.91	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge	Q _g	—	6.5	—	nC	V _{DS} = -10V, V _{GS} = -4.5V, I _D = -3.2A
Gate-Source Charge	Q _{gs}	—	0.9	—	nC	
Gate-Drain Charge	Q _{gd}	—	1.5	—	nC	
Turn-On Delay Time	t _{D(on)}	—	12.45	—	ns	V _{DS} = -10V, V _{GS} = -4.5V, R _L = 10Ω, R _G = 1Ω, I _D = -1A
Turn-On Rise Time	t _r	—	10.29	—	ns	
Turn-Off Delay Time	t _{D(off)}	—	46.52	—	ns	
Turn-Off Fall Time	t _f	—	22.19	—	ns	

- Notes:
- Device mounted on FR-4 PCB, with minimum recommended pad layout.
 - Repetitive rating, pulse width limited by junction temperature.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to production testing.

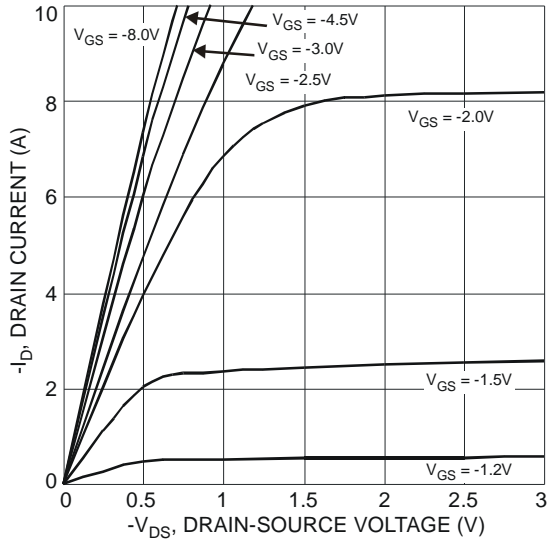


Fig. 1 Typical Output Characteristics

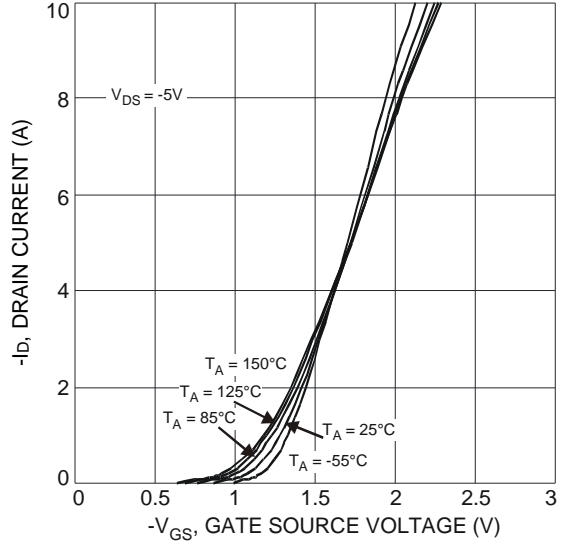


Fig. 2 Typical Transfer Characteristics

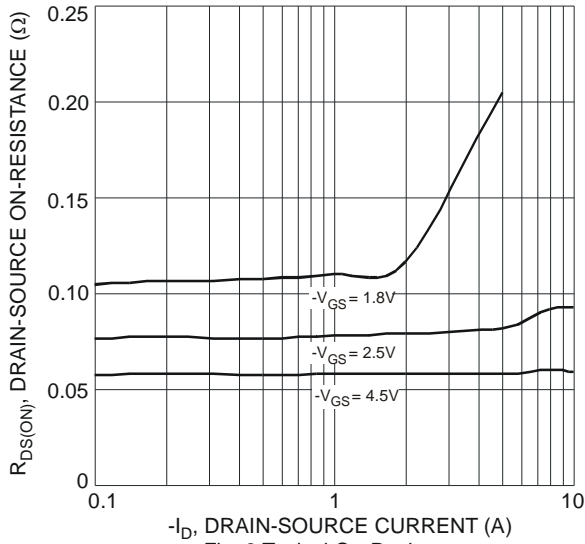


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

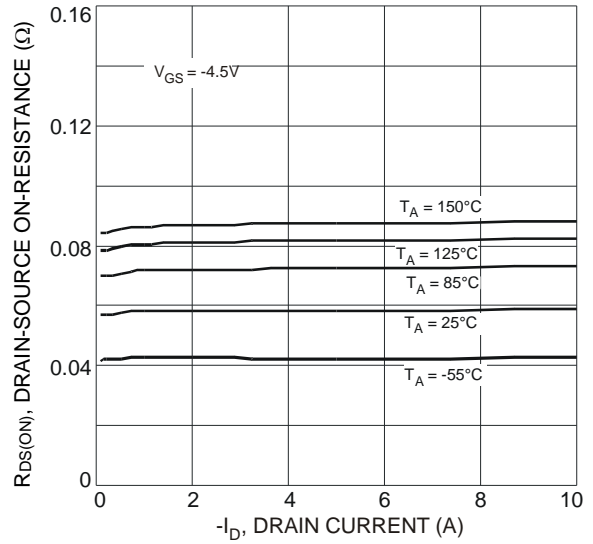


Fig. 4 Typical Drain-Source On-Resistance vs. Drain Current and Temperature

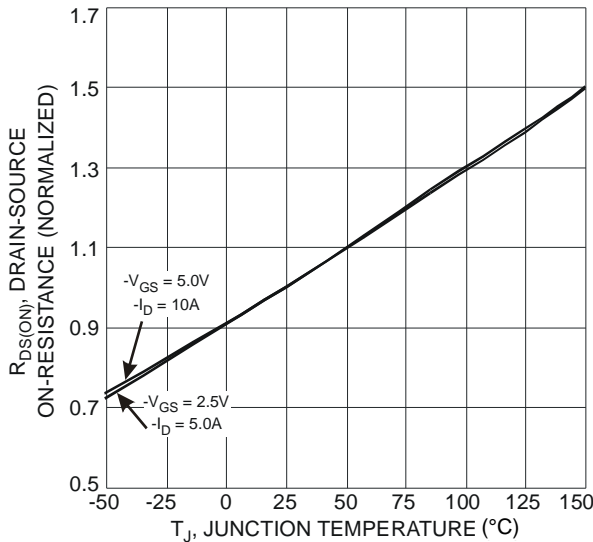


Fig. 5 On-Resistance Variation with Temperature

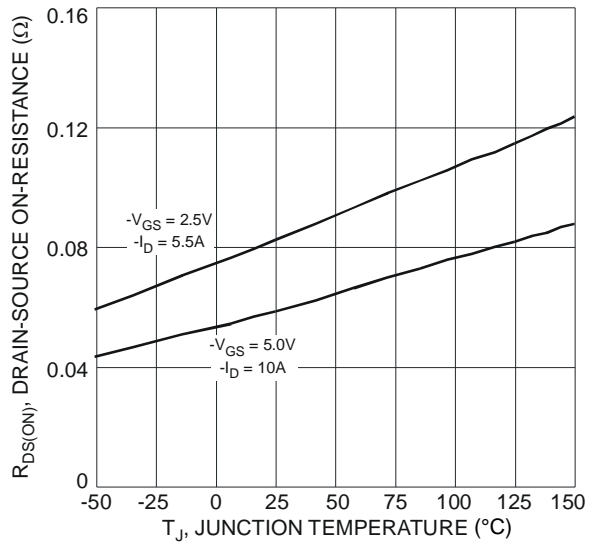


Fig. 6 On-Resistance Variation with Temperature

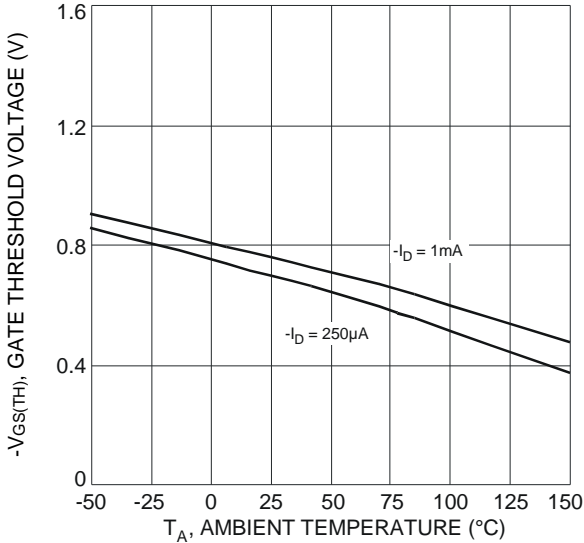


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

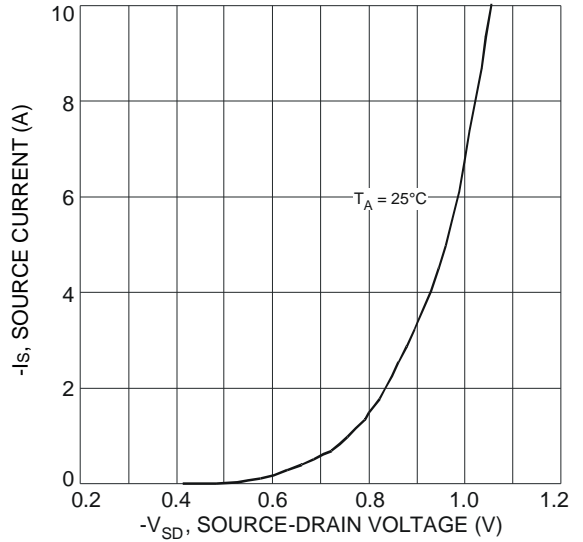


Fig. 8 Diode Forward Voltage vs. Current

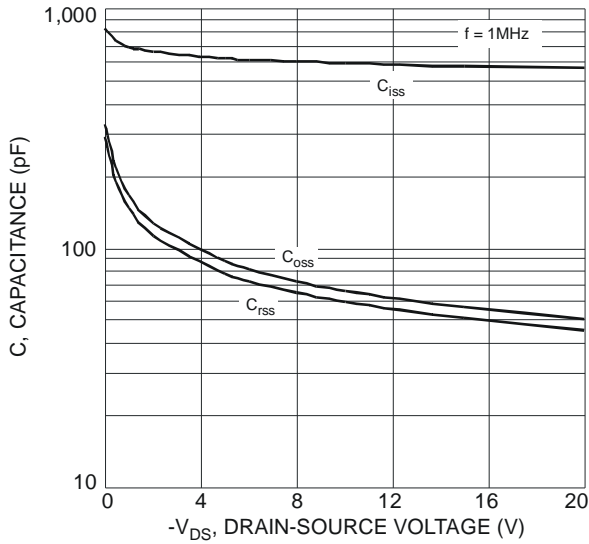


Fig. 9 Typical Total Capacitance

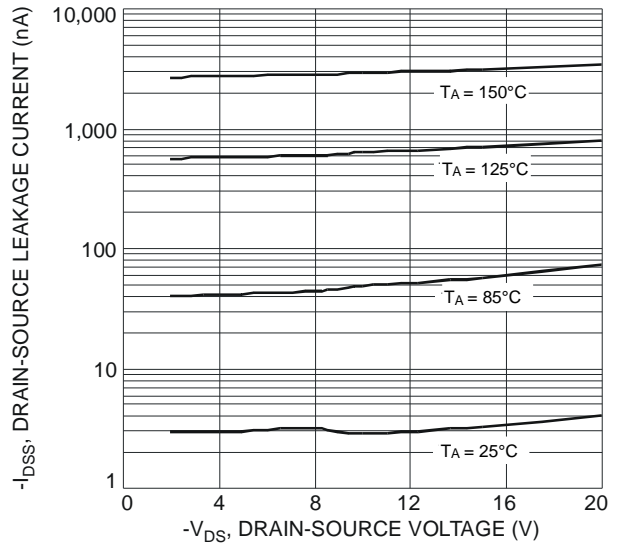


Fig. 10 Typical Drain-Source Leakage Current vs. Drain-Source Voltage

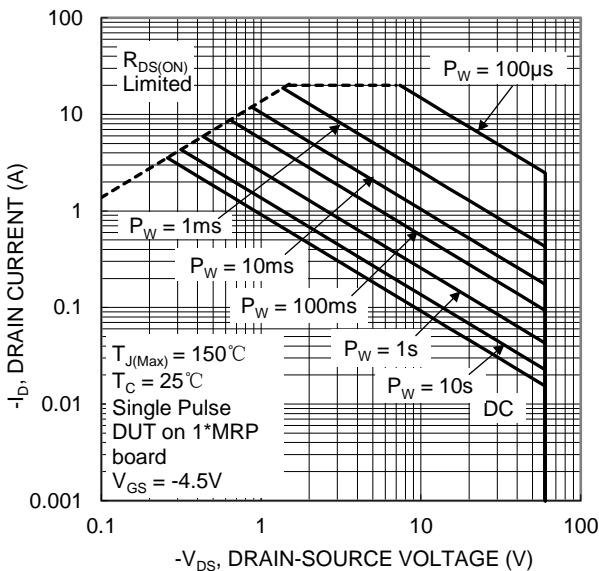


Fig. 11 SOA, Safe Operation Area

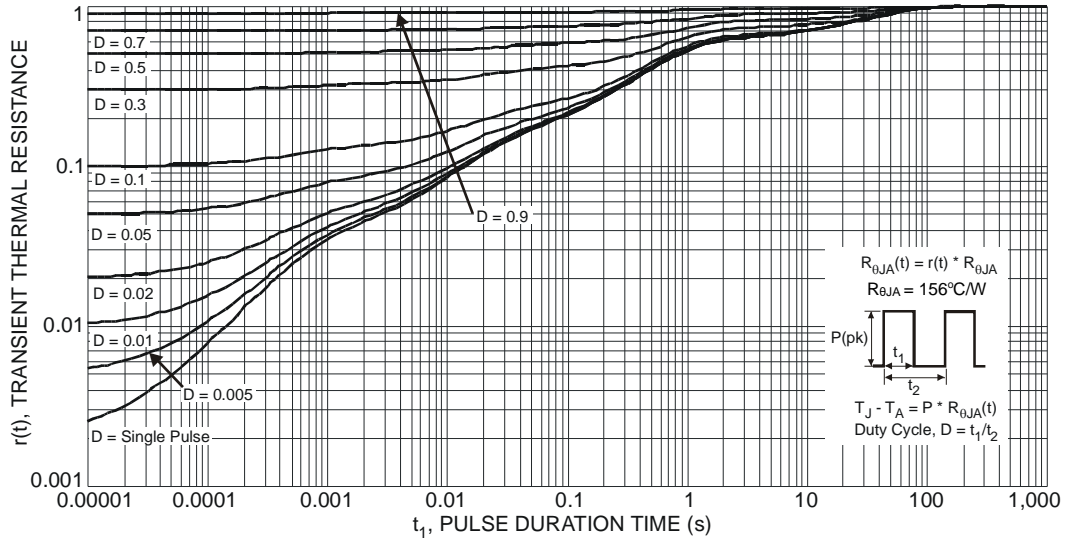
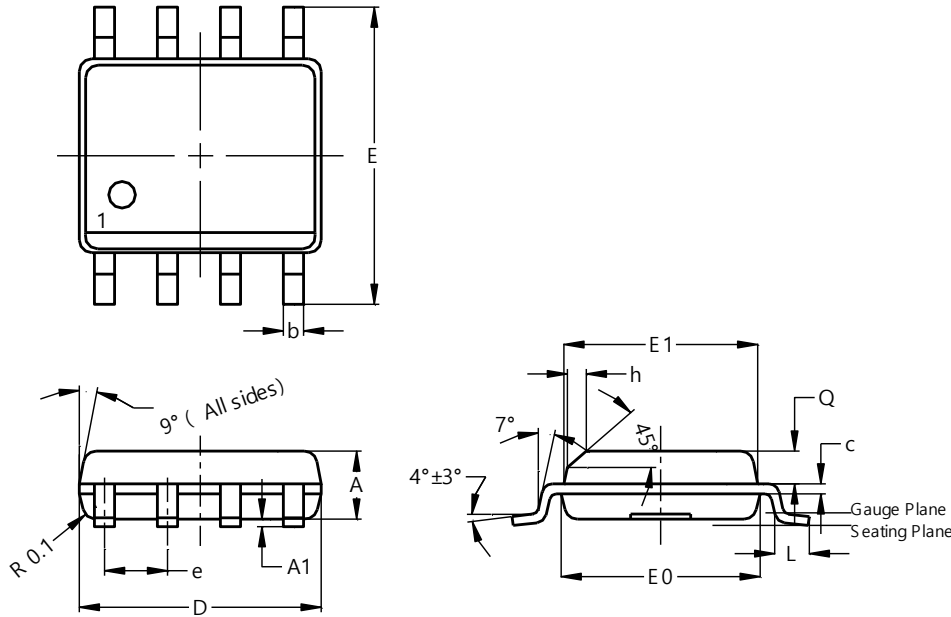


Fig. 12 Transient Thermal Resistance

Package Outline Dimensions

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

SO-8



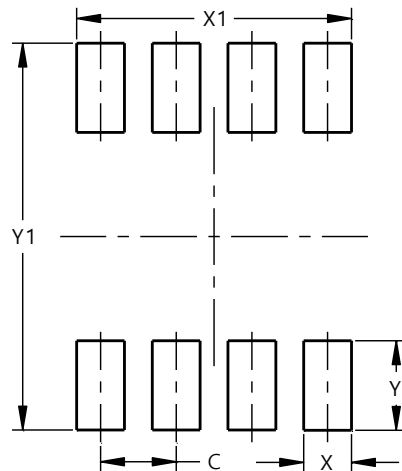
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Dim	Min	Max	Typ
A	1.40	1.50	1.45
A1	0.10	0.20	0.15
b	0.30	0.50	0.40
c	0.15	0.25	0.20
D	4.85	4.95	4.90
E	5.90	6.10	6.00
E1	3.80	3.90	3.85
E0	3.85	3.95	3.90
e	--	--	1.27
h	--	--	0.35
L	0.62	0.82	0.72
Q	0.60	0.70	0.65

All Dimensions in mm

Suggested Pad Layout

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

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Dimensions	Value (in mm)
C	1.27
X	0.802
X1	4.612
Y	1.505
Y1	6.50

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