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Product Summary

V_{DSS}	$R_{DS(ON)}$	Q_g	Q_{gd}	I_D
-12V	12mΩ	4.9nC	1.1nC	-7.6A

Typ. @ V_{GS} = -4.5V, T_A = +25°C

Description

This 1st generation Lateral MOSFET (LD-MOS) is engineered to minimize on-state losses and switch ultra-fast, making it ideal for high efficiency power transfer. Using Chip-Scale Package (CSP) to increase power density by combining low thermal impedance with minimal $R_{DS(ON)}$ per footprint area.

Applications

- DC-DC converters
- Battery management
- Load switches

Features

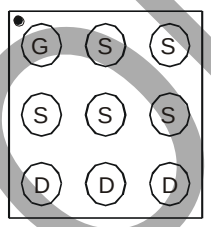
- LD-MOS Technology with the Lowest Figure of Merit:
  $R_{DS(ON)}$ = 12mΩ to Minimize On-State Losses
  Q_g = 4.9nC for Ultra-Fast Switching
- $V_{GS(TH)}$ = -0.8V Typ. for a Low Turn-On Potential
- CSP with Footprint 1.5mm × 1.5mm
- Height = 0.62mm for Low Profile
- ESD = 3kV HBM Protection of Gate
- **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

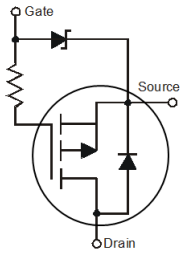
- Package: U-WLB1515-9
- Terminal Connections: See Diagram Below



ESD PROTECTED TO 3kV



Top-View
Pin Configuration



Equivalent Circuit

Ordering Information (Note 4)

Part Number	Package	Packing	
		Qty.	Carrier
DMP1018UCB9-7	U-WLB1515-9	3,000	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



EW = Product Type Marking Code
YM = Date Code Marking
Y or $\underline{Y}$ = Year (ex: J = 2022)
M or $\underline{M}$ = Month (ex: 9 = September)

Date Code Key

Year	2012	…	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Code	Z	…	J	K	L	M	N	O	P	R	S	T

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

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

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V_{DSS}	-12	V
Gate-Source Voltage			V_{GSS}	-6	V
Continuous Drain Current (Note 5) V_{GS} = -4.5V	Steady State	T_A = +25°C T_A = +70°C	I_D	-7.6 -6.0	A
Continuous Drain Current (Note 6) V_{GS} = -4.5V	Steady State	T_A = +25°C T_A = +70°C	I_D	-5.5 -4.3	A
Pulsed Drain Current (Pulse Duration 10µs, Duty Cycle ≤ 1%)			I_{DM}	-60	A

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

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 5)	P_D	1.0	W
Total Power Dissipation (Note 6)	P_D	1.8	W
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	126.8	°C/W
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	69	°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}	-12	—	—	V	V_{GS} = 0V, I_D = -250µA
Zero Gate Voltage Drain Current @T_C = +25°C	I_{DSS}	—	—	-1	µA	V_{DS} = -9.6V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	-100	nA	V_{GS} = -6.0V, V_{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	-0.4	-0.8	-1.3	V	V_{DS} = V_{GS}, I_D = -250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	12	18	mΩ	V_{GS} = -4.5V, I_D = -2A
			15	22		V_{GS} = -2.5V, I_D = -2A
Forward Transfer Admittance	$\|Y_{fs}\|$	—	5.5	—	S	V_{DS} = -6V, I_D = -2A
Diode Forward Voltage (Note 6)	V_{SD}	—	-0.7	-1	V	V_{GS} = 0V, I_S = -2A
Reverse Recovery Charge	Q_{rr}	—	30.2	—	nC	V_{dd} = -5V, I_F = -2A, di/dt = 200A/µs
Reverse Recovery Time	t_{rr}	—	71.4	—	ns	
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	457	—	pF	V_{DS} = -6V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	272	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	120	—	pF	
Series Gate Resistance	R_G	—	21.23	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz
Total Gate Charge (-4.5V)	Q_g	—	4.9	—	nC	V_{GS} = -4.5V, V_{DS} = -6V, I_D = -2A
Gate-Source Charge	Q_{gs}	—	0.6	—	nC	
Gate-Drain Charge	Q_{gd}	—	1.1	—	nC	
Turn-On Delay Time	$t_{D(on)}$	—	4.45	—	ns	V_{DD} = -6V, V_{GS} = -4.5V, I_{DS} = -2A, R_G = 2Ω
Turn-On Rise Time	t_r	—	12	—	ns	
Turn-Off Delay Time	$t_{D(off)}$	—	100	—	ns	
Turn-Off Fall Time	t_f	—	93	—	ns	

Notes:
5. Device mounted on FR-4 PCB with minimum recommended pad layout.
6. Device mounted on FR4 material with 1inch^2 (6.45cm^2), 2oz (0.071mm thick) Cu.
7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to production testing.

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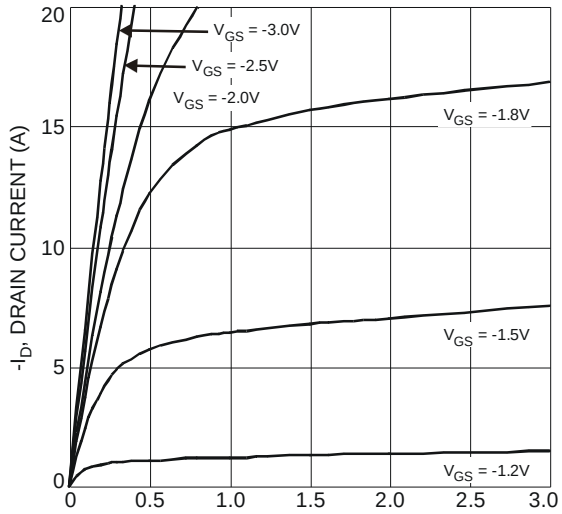


Figure 1 Typical Output Characteristics

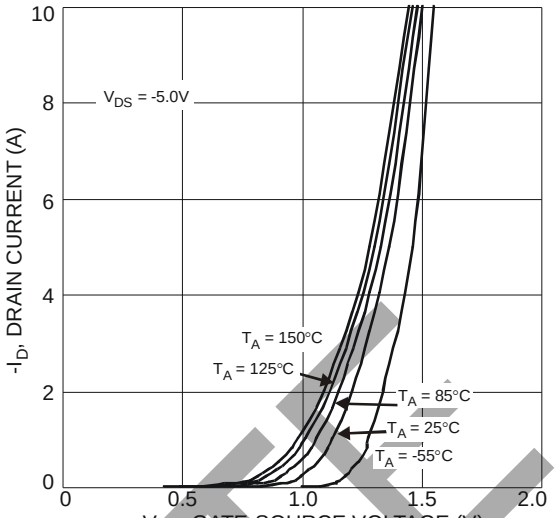


Figure 2 Typical Transfer Characteristics

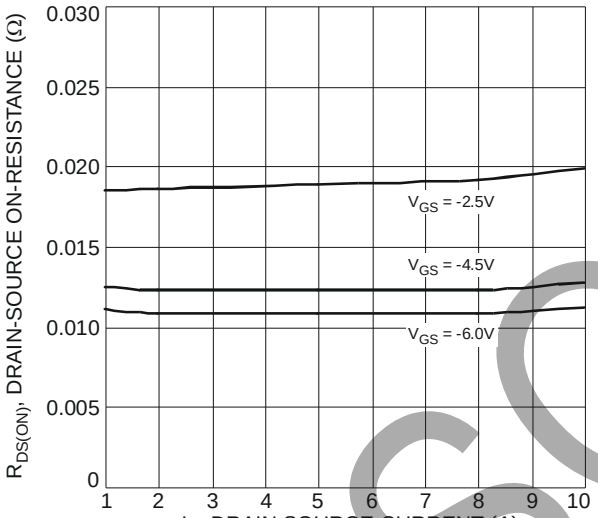


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

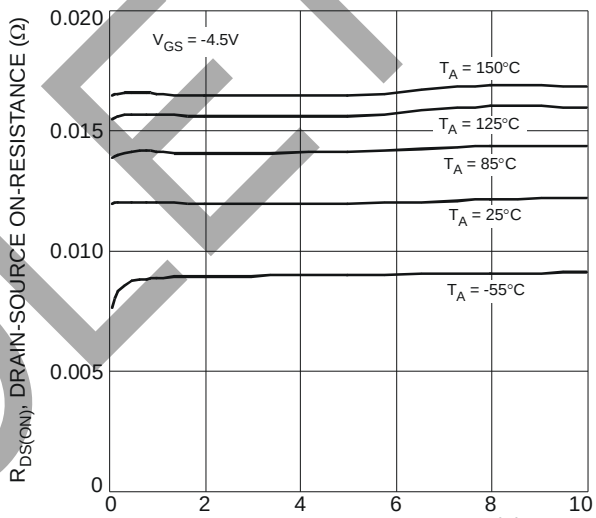


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

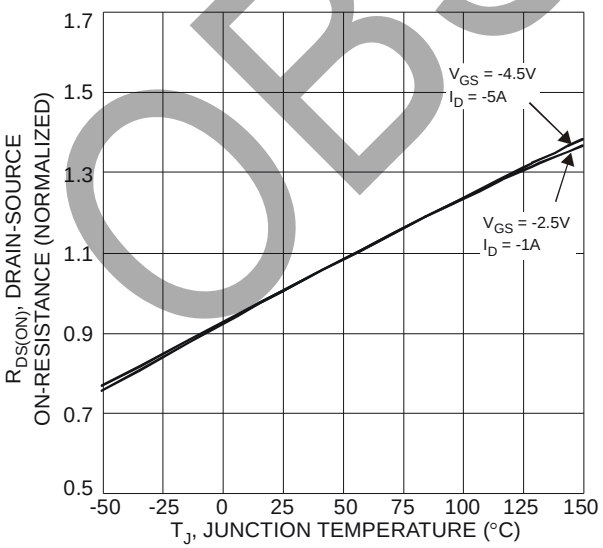


Figure 5 On-Resistance Variation with Temperature

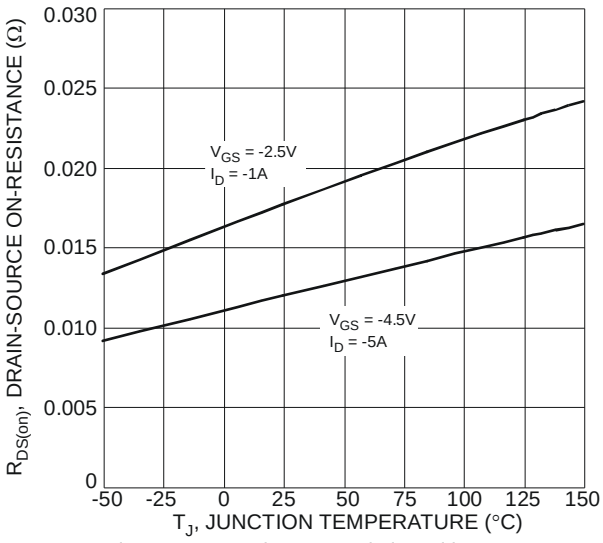


Figure 6 On-Resistance Variation with Temperature

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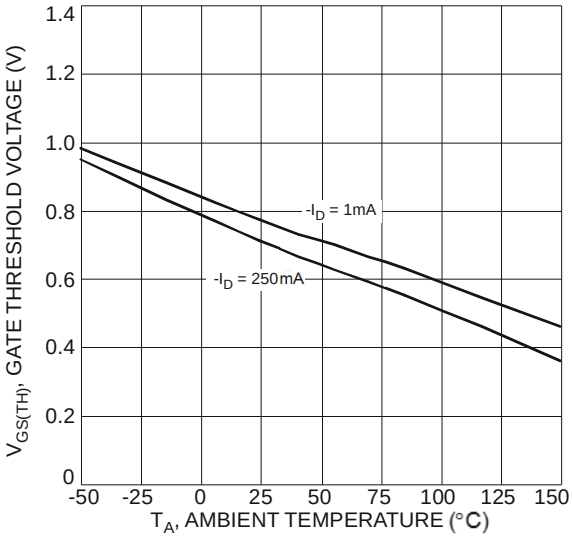


Figure 7 Gate Threshold Variation vs. Ambient Temperature

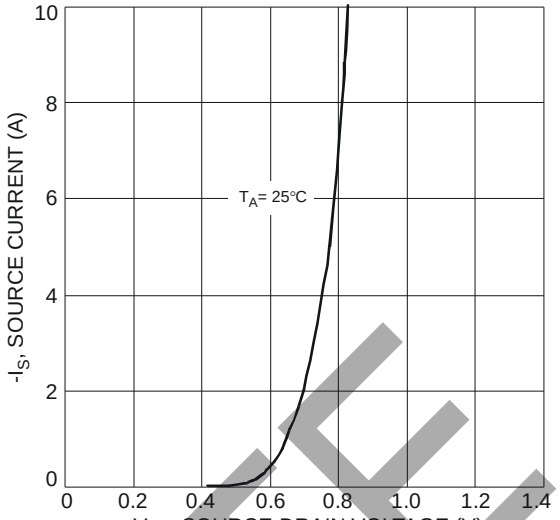


Figure 8 Diode Forward Voltage vs. Current

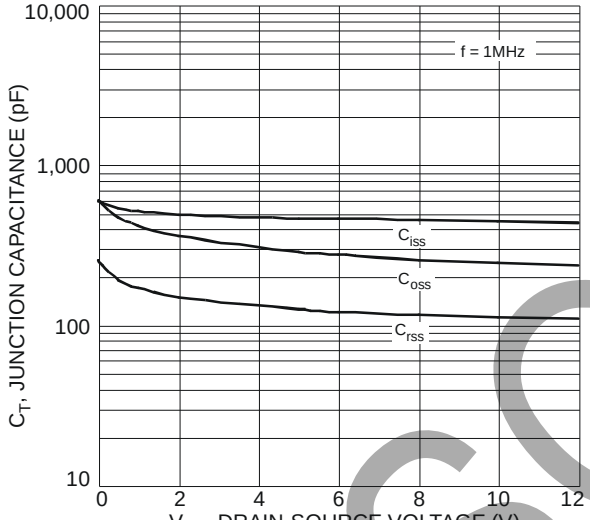


Figure 9 Typical Junction Capacitance

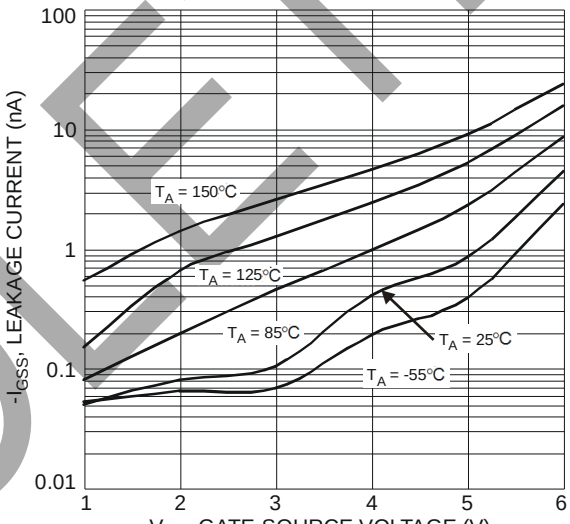


Figure 10 Typical Gate-Source Leakage Current vs. Voltage

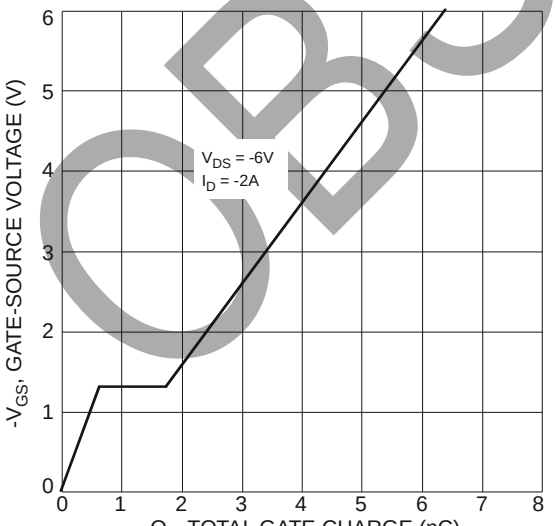


Figure 11 Gate-Charge Characteristics

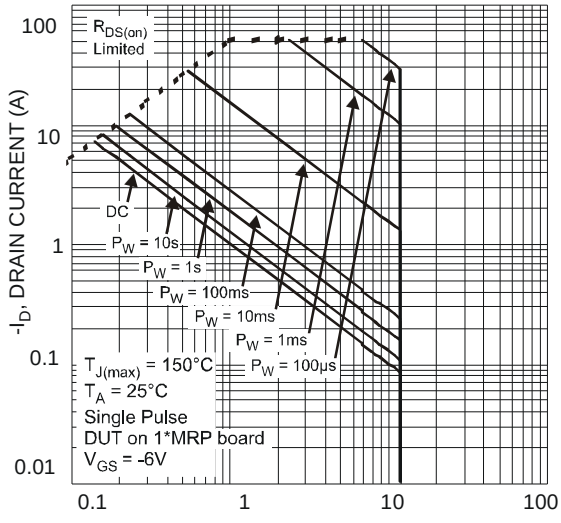


Figure 12 SOA, Safe Operation Area

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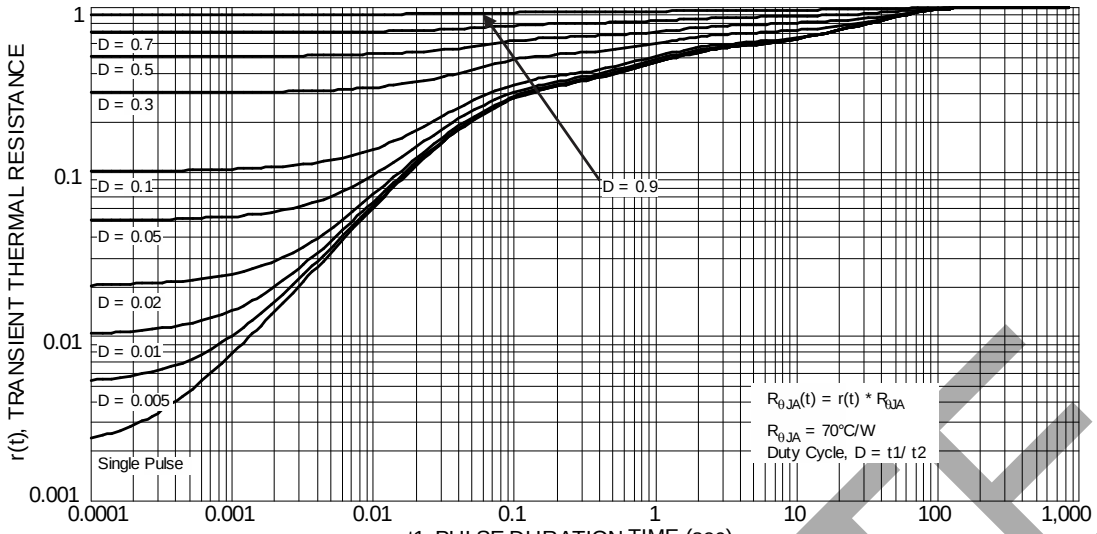


Figure 13 Transient Thermal Resistance

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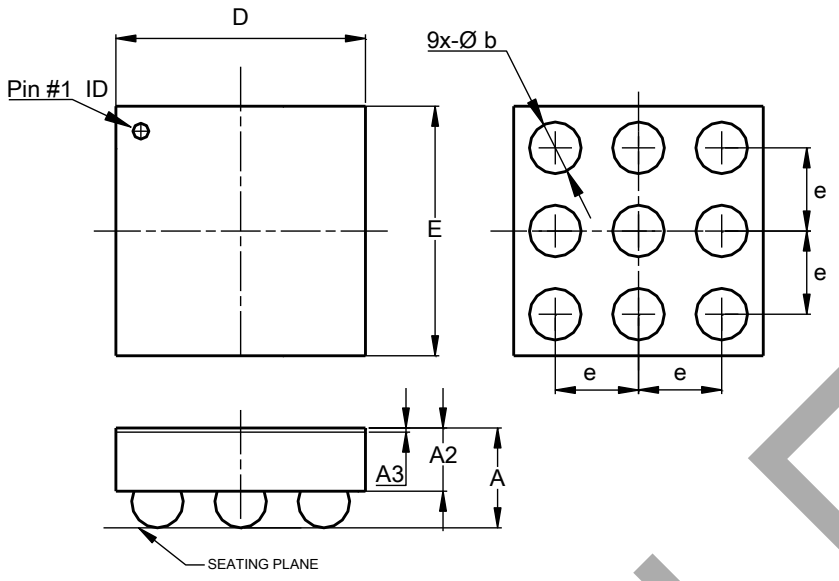
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Package Outline Dimensions

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

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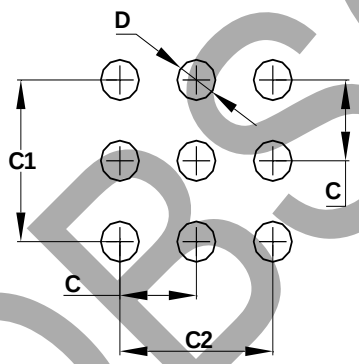


U-WLB1515-9			
Dim	**Min**	**Max**	**Typ**
A	--	0.62	--
A2	--	0.36	0.36
A3	0.020	0.030	0.025
b	0.27	0.37	0.32
D	1.47	1.50	1.49
E	1.47	1.50	1.49
e	--	--	0.50
All Dimensions in mm			

Suggested Pad Layout

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

U-WLB1515-9



Dimensions	Value (in mm)
C	0.50
C1	1.00
C2	1.00
D	0.25

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