

## Product Summary

BV <sub>DSS</sub>	R <sub>DS(ON)</sub>	I <sub>D</sub> T <sub>A</sub> = +25°C
12V	20mΩ @ V <sub>GS</sub> = 4.5V	6.6A
	23mΩ @ V <sub>GS</sub> = 2.5V	6.1A

## Description

This new generation MOSFET is designed to minimize the on-state resistance (R<sub>DS(ON)</sub>), yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

## Applications

- Battery managements
- Load switches
- Battery protections

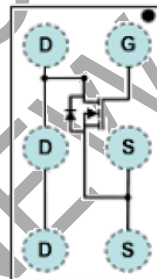
## Features and Benefits

- Low Q<sub>G</sub> & Q<sub>GD</sub>
- Small Footprint
- Low Profile 0.62mm Height
- **Totally Lead-Free & Full 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-WLB1510-6
- Terminal Connections: See Diagram Below
- Terminals: Finished – SnAgCu Ball @1
- Weight: 0.0018 grams (Approximate)

U-WLB1510-6



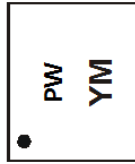
Top View

## Ordering Information (Note 4)

Part Number	Package	Packing	
		Qty.	Carrier
DMN1016UCB6-7	U-WLB1510-6	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

**U-WLB1510-6**


PW = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: J = 2022)  
 M = Month (ex: 3 = March)

**Date Code Key**

Year	2014	...	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Code	B	...	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

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

Characteristic	Symbol	Value	Units
Drain-Source Voltage	V <sub>DSS</sub>	12	V
Gate-Source Voltage	V <sub>GSS</sub>	±8	V
Continuous Drain Current (Note 5) V <sub>GS</sub> = 4.5V	Steady State	T <sub>A</sub> = +25°C	5.5
		T <sub>A</sub> = +70°C	4.2
Continuous Drain Current (Note 6) V <sub>GS</sub> = 4.5V	Steady State	T <sub>A</sub> = +25°C	6.6
		T <sub>A</sub> = +70°C	5.3
Pulsed Drain Current (Note 7)	I <sub>DM</sub>	30	A

## Thermal Characteristics

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 5)	P <sub>D</sub>	0.92	W
Total Power Dissipation (Note 6)	P <sub>D</sub>	1.47	W
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	136	°C/W
Thermal Resistance, Junction to Ambient (Note 6)	R <sub>θJA</sub>	94	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

Notes: 5. Device mounted on FR-4 PCB with minimum recommended pad layout.  
 6. Device mounted on FR4 material with 1-inch<sup>2</sup> (6.45-cm<sup>2</sup>), 2-oz (0.071-mm thick) Cu.  
 7. 300ms pulse, pulse duty cycle ≤ 2%.

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b> (Note 8)						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	12	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
Zero Gate Voltage Drain Current (@T <sub>C</sub> = +25°C)	I <sub>DSS</sub>	—	—	1.0	μA	V <sub>DS</sub> = 9.6V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±8V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS</b> (Note 8)						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	0.4	0.6	1.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	16	20	mΩ	V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 1.5A
		—	20	23		V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 1.5A
Forward Transfer Admittance	Y <sub>FS</sub>	—	14	—	S	V <sub>DS</sub> = 6V, I <sub>D</sub> = 1.5A
Diode Forward Voltage (Note 6)	V <sub>SD</sub>	—	0.7	1.0	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 1.5A
Reverse Recovery Charge	Q <sub>RR</sub>	—	8	—	nC	V <sub>DD</sub> = 6V, I <sub>F</sub> = 1.5A, di/dt = 200A/μs
Reverse Recovery Time	t <sub>RR</sub>	—	43.6	—	ns	
<b>DYNAMIC CHARACTERISTICS</b> (Note 9)						
Input Capacitance	C <sub>ISS</sub>	—	423	550	pF	
Output Capacitance	C <sub>OSS</sub>	—	238	310	pF	V <sub>DS</sub> = 6V, V <sub>GS</sub> = 0V, f = 1.0MHz
Reverse Transfer Capacitance	C <sub>RSS</sub>	—	41	55	pF	
Series Gate Resistance	R <sub>G</sub>	—	3	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz
Total Gate Charge (4.5V)	Q <sub>G</sub>	—	4.2	5.5	nC	
Gate-Source Charge	Q <sub>GS</sub>	—	0.6	—	nC	V <sub>GS</sub> = 4.5V, V <sub>DS</sub> = 6V, I <sub>D</sub> = 1.5A
Gate-Drain Charge	Q <sub>GD</sub>	—	0.4	—	nC	
Turn-On Delay Time	t <sub>D(ON)</sub>	—	5	8	ns	
Turn-On Rise Time	t <sub>r</sub>	—	10	—	ns	V <sub>DS</sub> = 6V, V <sub>GS</sub> = 4.5V, R <sub>G</sub> = 4Ω, I <sub>D</sub> = 1.5A
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	25	40	ns	
Turn-Off Fall Time	t <sub>f</sub>	—	10	—	ns	

- Notes:
6. Device mounted on FR4 material with 1-inch<sup>2</sup> (6.45-cm<sup>2</sup>), 2-oz (0.071-mm thick) Cu.
  8. Short duration pulse test used to minimize self-heating effect.
  9. Guaranteed by design. Not subject to production testing.

NOT RECOMMENDED FOR NEW DESIGNS

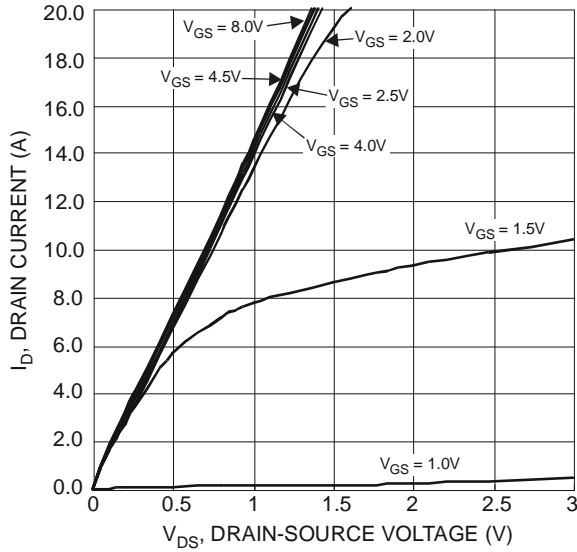


Figure 1 Typical Output Characteristics

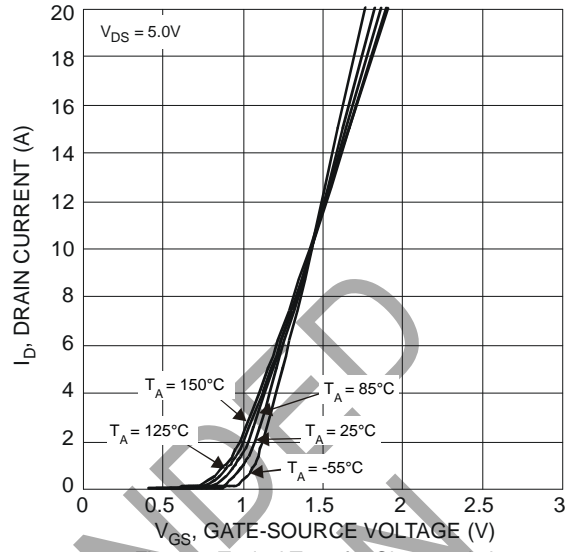


Figure 2 Typical Transfer Characteristics

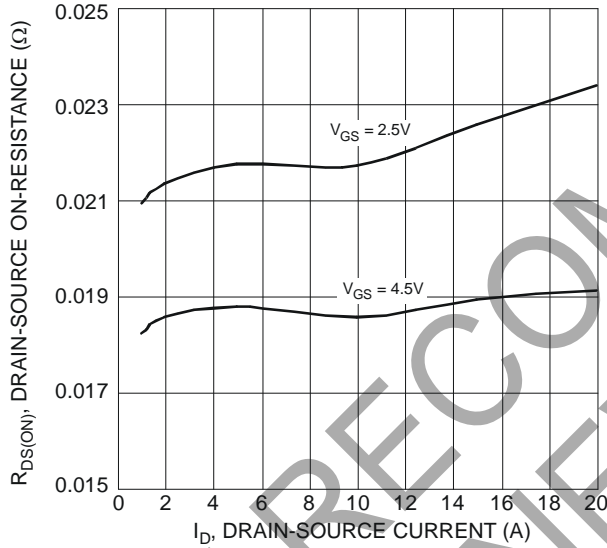


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

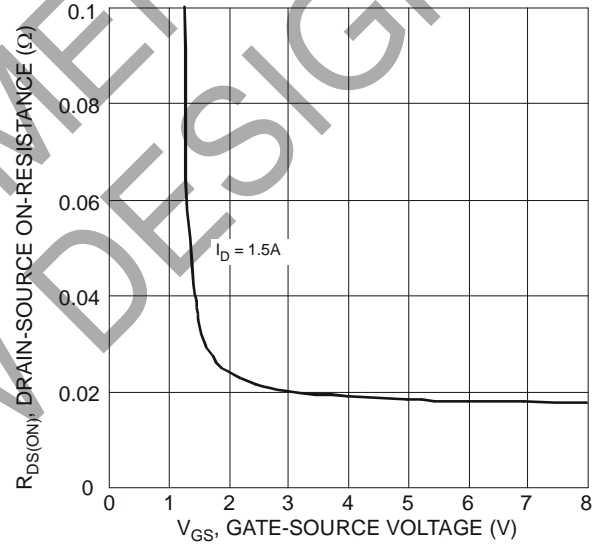


Figure 4 Typical Transfer Characteristics

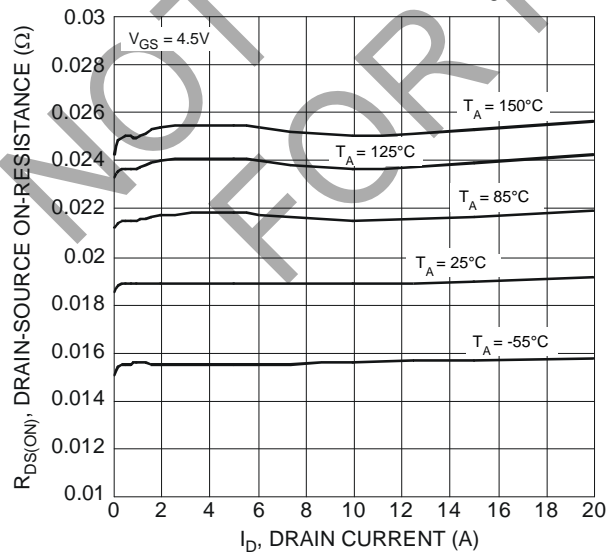


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

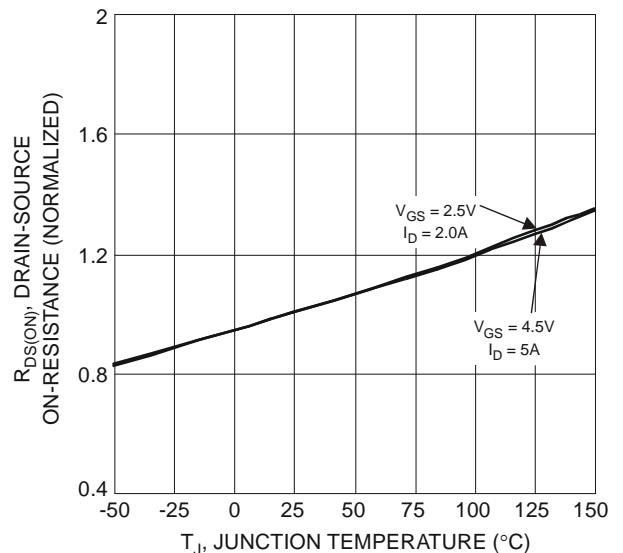


Figure 6 On-Resistance Variation with Temperature

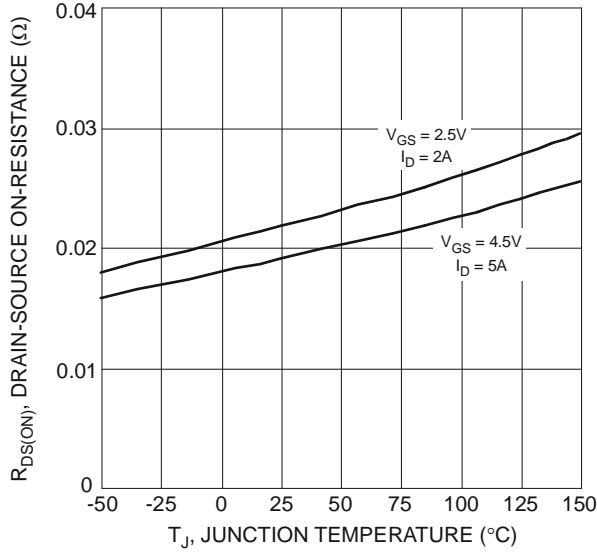


Figure 7 On-Resistance Variation with Temperature

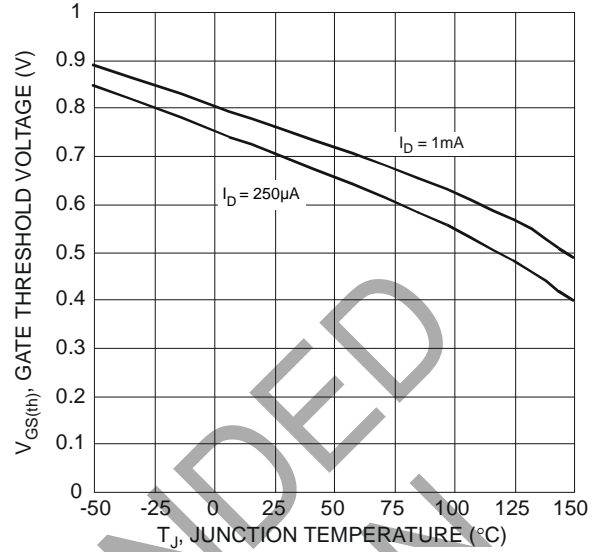


Figure 8 Gate Threshold Variation vs. Junction Temperature

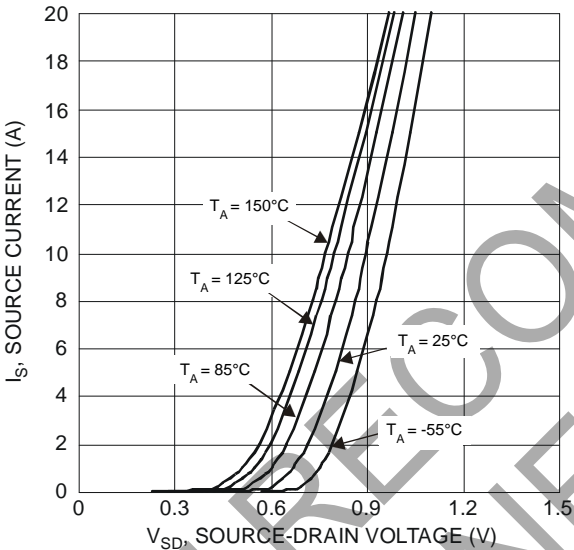


Figure 9 Diode Forward Voltage vs. Current

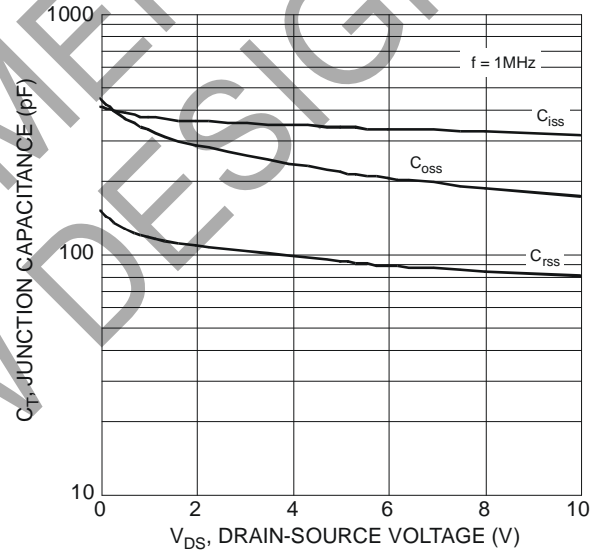


Figure 10 Typical Junction Capacitance

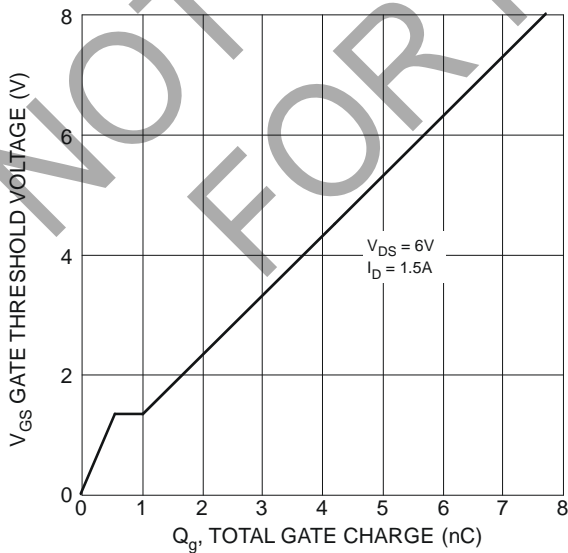


Figure 11 Gate Charge

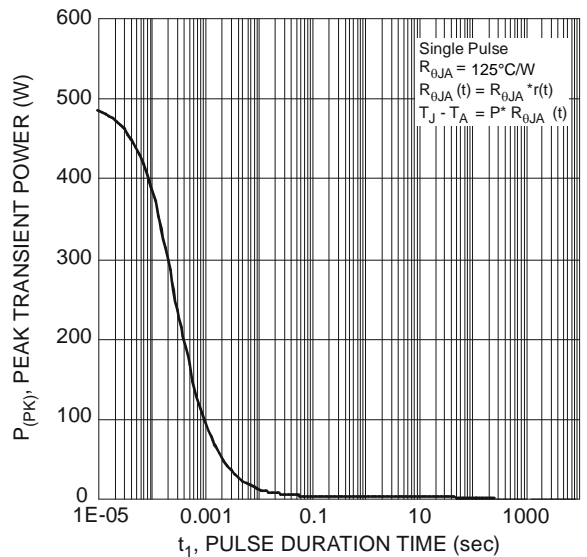


Figure 12 Single Pulse Maximum Power Dissipation

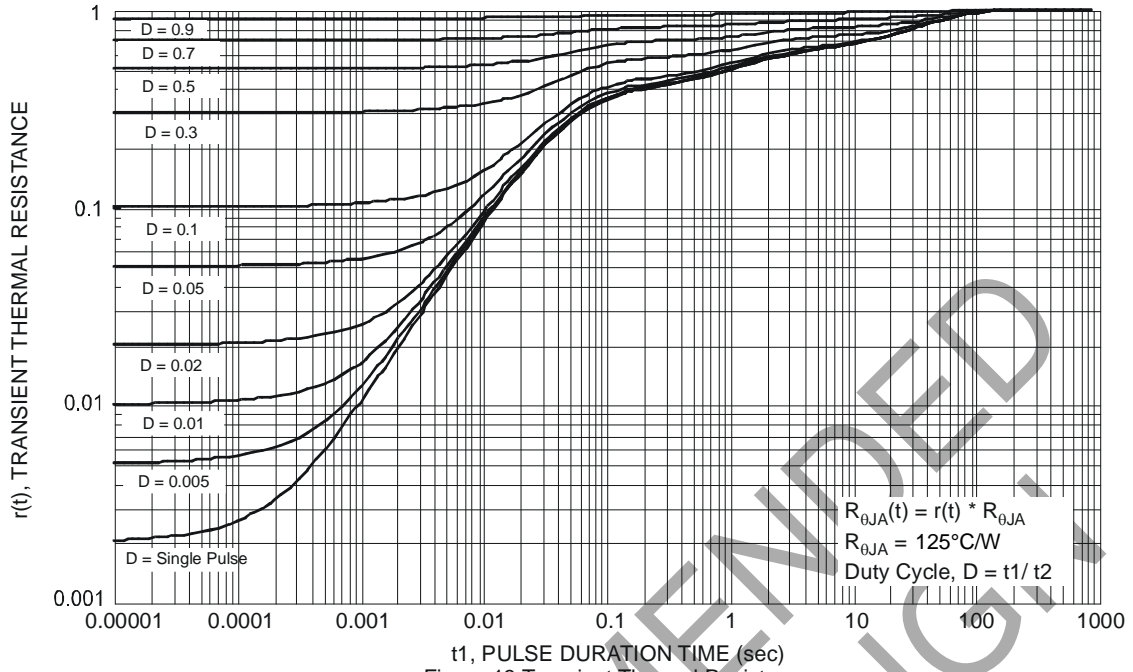


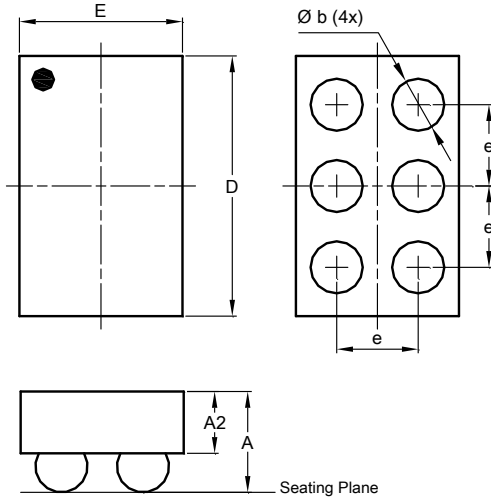
Figure 13 Transient Thermal Resistance

NOT RECOMMENDED FOR NEW DESIGN

**Package Outline Dimensions**

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

**U-WLB1510-6**

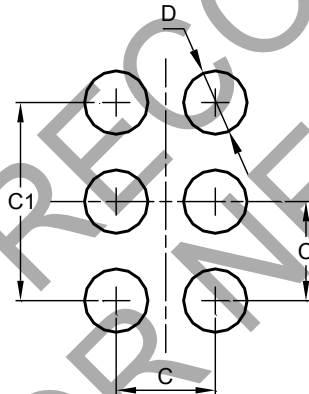


U-WLB1510-6			
Dim	Min	Max	Typ
A	—	0.62	—
A2	—	—	0.038
b	0.27	0.37	0.32
D	1.40	1.50	1.50
E	0.90	1.00	1.00
e	—	—	0.50
All Dimensions in mm			

**Suggested Pad Layout**

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

**U-WLB1510-6**



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

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