

**N-CHANNEL ENHANCEMENT MODE MOSFET**

**OBSOLETE - PART DISCONTINUED**

**Product Summary**

BV <sub>DSS</sub>	R <sub>DS(ON)</sub>	I <sub>D</sub> T <sub>A</sub> = +25°C
12V	23mΩ @ V <sub>GS</sub> = 4.5V	5.1A
	29mΩ @ V <sub>GS</sub> = 2.5V	4.8A

**Description**

This new generation MOSFET has been 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

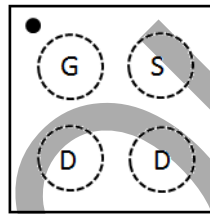
**Features and Benefits**

- Low Q<sub>g</sub> & Q<sub>gd</sub>
- Small Footprint
- Low Profile 0.62mm Height
- **Totally Lead-Free & 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 [contact us](mailto:contact@diodes.com) or your local Diodes representative. <https://www.diodes.com/quality/product-definitions/>**

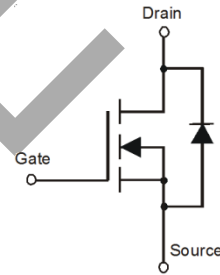
**Mechanical Data**

- Package: U-WLB1010-4
- Terminal Connections: See Diagram Below
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal: Finish - SnAgCu. Solderable per MIL-STD-202 Method 208 @1

U-WLB1010-4 (Type C)



Top View



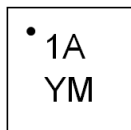
Equivalent Circuit

**Ordering Information (Note 4)**

Part Number	Package	Packing	
		Qty.	Carrier
DMN1023UCB4-7	U-WLB1010-4 (Type C)	3000	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**



1A = Product Type Marking Code  
 YM = Date Code Marking  
 Y or  $\bar{Y}$  = Year (ex: J = 2022)  
 M or  $\bar{M}$  = Month (ex: O = October)

Date Code Key

Year	2017	...	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Code	E	...	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	Unit
Drain-Source Voltage			V <sub>DSS</sub>	12	V
Gate-Source Voltage			V <sub>GS</sub>	±8	V
Continuous Drain Current (Note 5) V <sub>GS</sub> = 4.5V	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	5.1	A
		T <sub>A</sub> = +70°C		4.1	
Continuous Drain Current (Note 5) V <sub>GS</sub> = 2.5V	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	4.8	A
		T <sub>A</sub> = +70°C		3.9	
Pulsed Drain Current (Note 6)			I <sub>DM</sub>	15	A

**Thermal Characteristics**

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 7)	P <sub>D</sub>	0.8	W
Thermal Resistance, Junction to Ambient @T <sub>A</sub> = +25°C (Note 7)	R <sub>θJA</sub>	149	°C/W
Power Dissipation (Note 5)	P <sub>D</sub>	1.2	W
Thermal Resistance, Junction to Ambient @T <sub>A</sub> = +25°C (Note 5)	R <sub>θJA</sub>	102	°C/W
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 (Note 8)</b>						
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>J</sub> = +25°C	I <sub>BSS</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 (Note 8)</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	0.4	0.7	1.2	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	18	23	mΩ	V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 1A
		—	22	29		V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 1A
		—	29	42		V <sub>GS</sub> = 1.8V, I <sub>D</sub> = 1A
Forward Transfer Admittance	Y <sub>fs</sub>	—	8	—	S	V <sub>DS</sub> = 6V, I <sub>D</sub> = 1A
Diode Forward Voltage	V <sub>SD</sub>	—	0.7	1.0	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 1A
Reverse Recovery Charge	Q <sub>RR</sub>	—	1.3	—	nC	V <sub>DD</sub> = 6V, I <sub>F</sub> = 1A,
Reverse Recovery Time	t <sub>RR</sub>	—	11.2	—	ns	di/dt = 100A/μs
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	C <sub>iss</sub>	—	288	440	pF	V <sub>DS</sub> = 6V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	204	310		
Reverse Transfer Capacitance	C <sub>rss</sub>	—	20	30		
Series Gate Resistance	R <sub>G</sub>	—	3.3	6.6	Ω	f = 1MHz, V <sub>GS</sub> = 0V, V <sub>DS</sub> = 0V
Total Gate Charge	Q <sub>g</sub>	—	2.3	3.0	nC	V <sub>GS</sub> = 4.5V, V <sub>DS</sub> = 6V, I <sub>D</sub> = 1A
Gate-Source Charge	Q <sub>gs</sub>	—	0.27	—		
Gate-Drain Charge	Q <sub>gd</sub>	—	0.15	—		
Gate Charge at V <sub>TH</sub>	Q <sub>g(TH)</sub>	—	0.13	—		
Turn-On Delay Time	t <sub>D(ON)</sub>	—	3	5	ns	V <sub>DS</sub> = 6V, V <sub>GS</sub> = 4.5V, R <sub>G</sub> = 20Ω, I <sub>D</sub> = 1A
Turn-On Rise Time	t <sub>r</sub>	—	6	—		
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	18	27		
Turn-Off Fall Time	t <sub>f</sub>	—	9	—		

- Notes:
- Device mounted on FR-4 material with 1-inch<sup>2</sup> (6.45-cm<sup>2</sup>), 2-oz. (0.071-mm thick) Cu.
  - Repetitive rating, pulse width limited by junction temperature.
  - Device mounted on FR-4 PCB with minimum recommended pad layout, single sided.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to production testing.

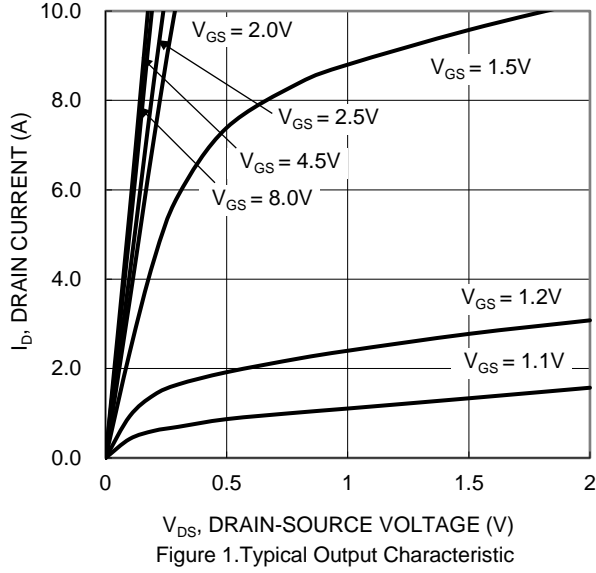


Figure 1. Typical Output Characteristic

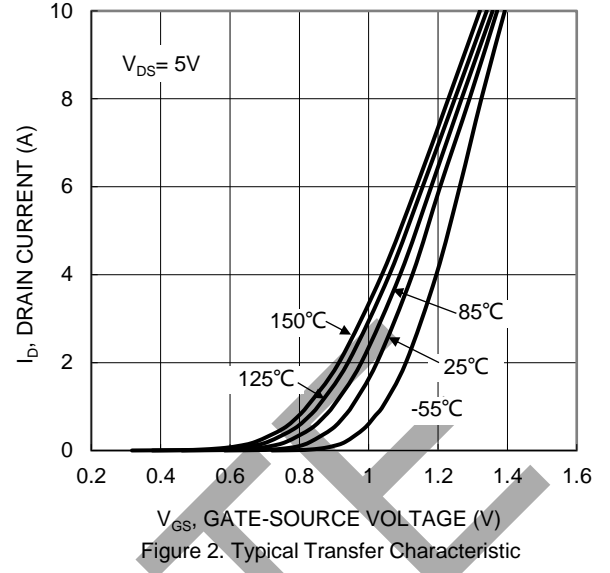


Figure 2. Typical Transfer Characteristic

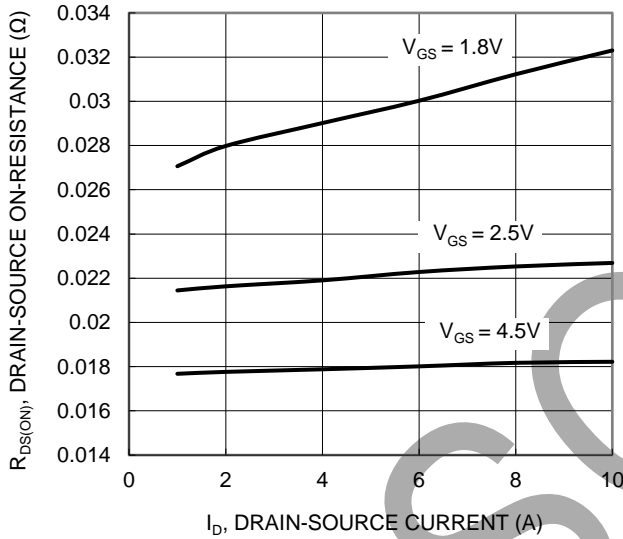


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

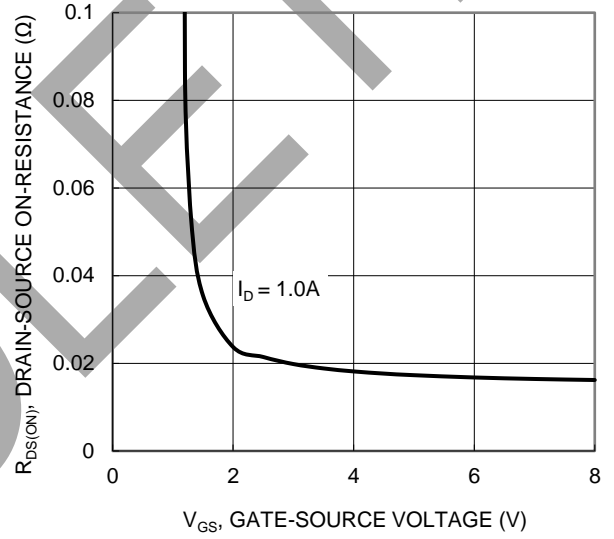


Figure 4. Typical Transfer Characteristic

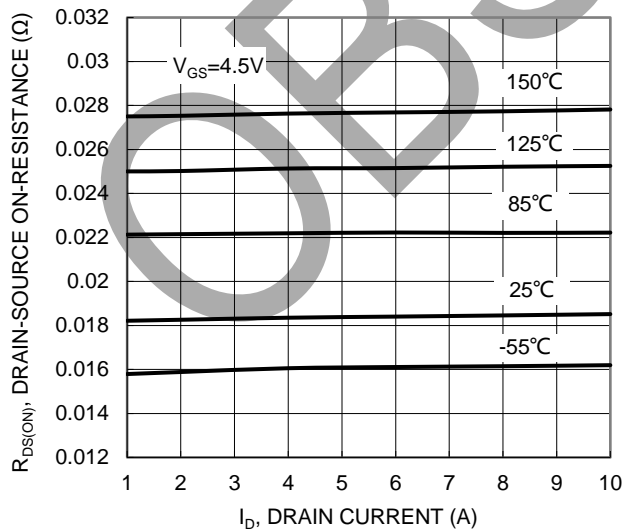


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

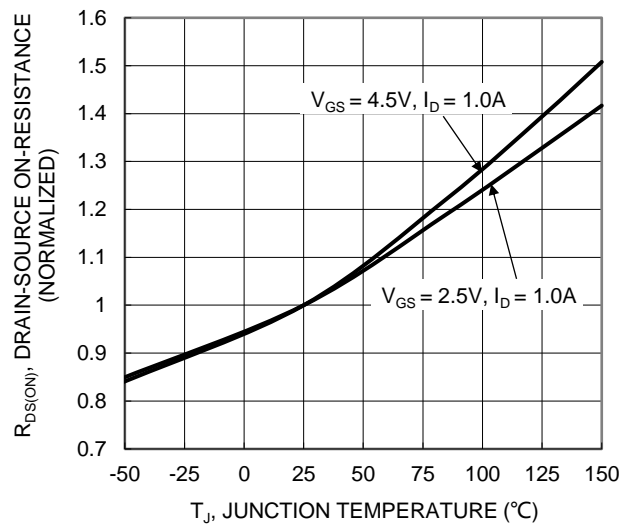


Figure 6. On-Resistance Variation with Junction Temperature

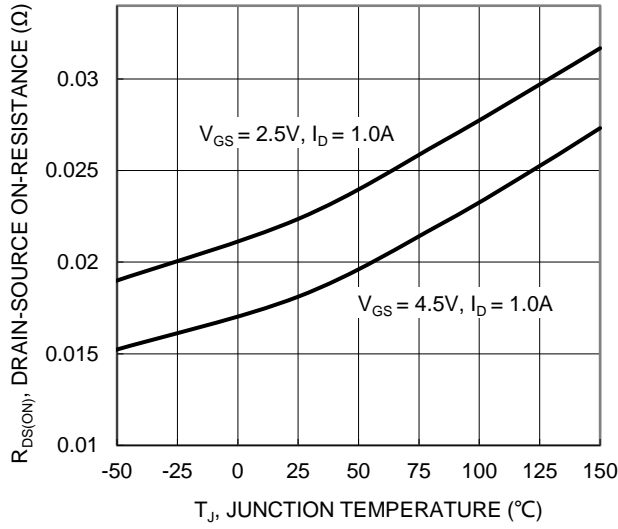


Figure 7. On-Resistance Variation with Junction Temperature

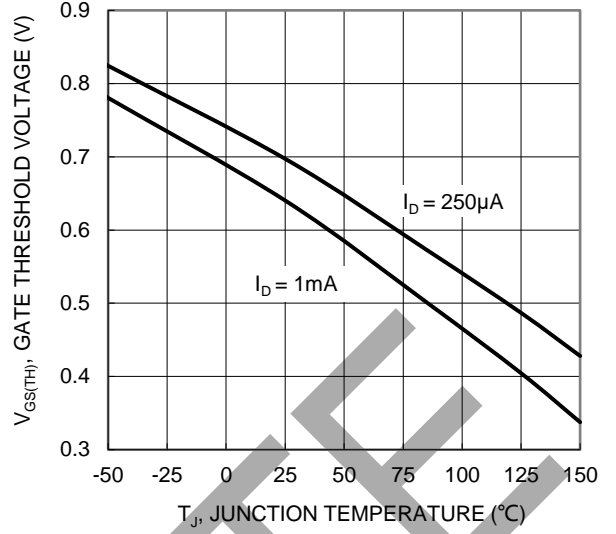


Figure 8. Gate Threshold Variation vs. Junction Temperature

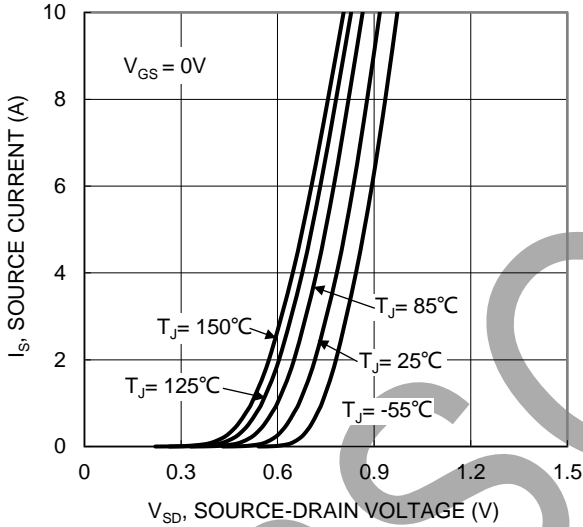


Figure 9. Diode Forward Voltage vs. Current

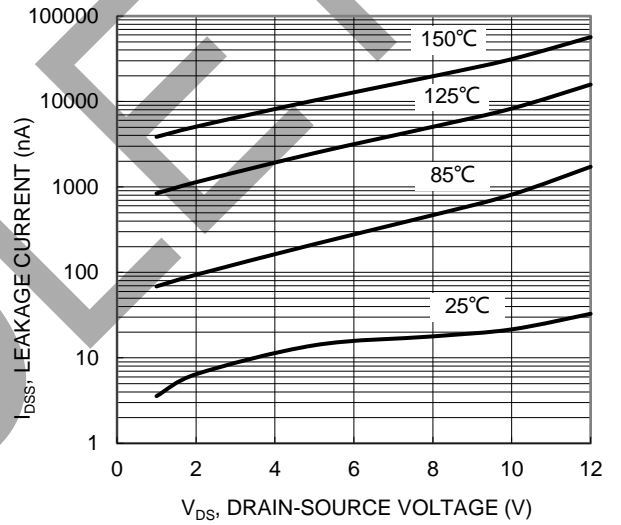


Figure 10. Typical Drain-Source Leakage Current vs. Voltage

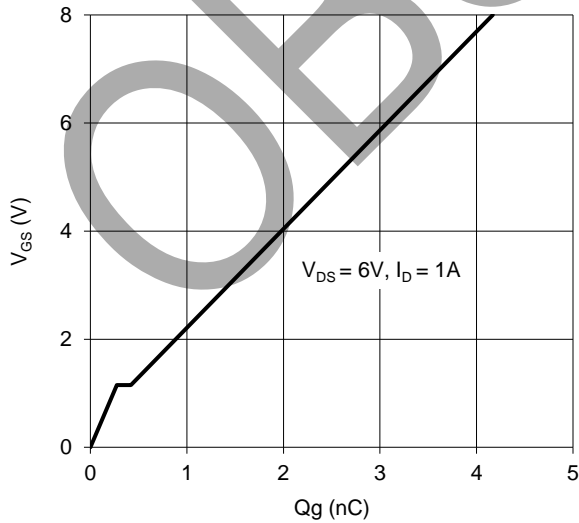


Figure 11. Gate Charge

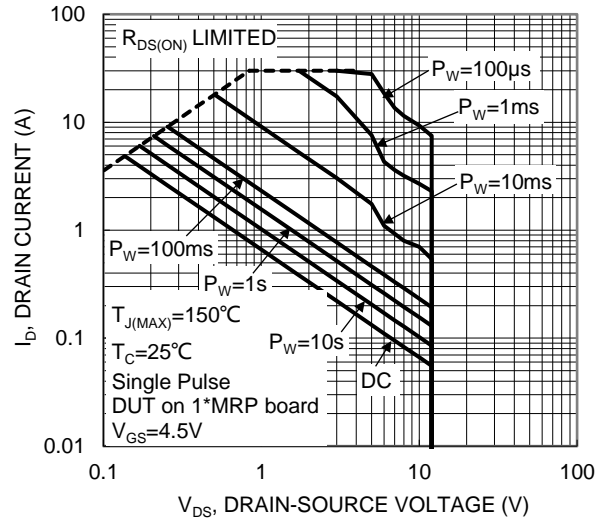


Figure 12. SOA, Safe Operation Area

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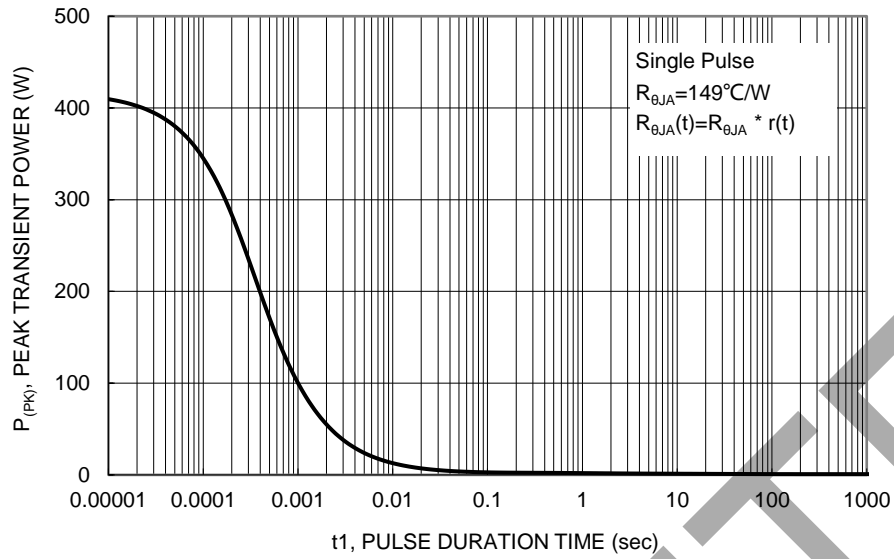


Figure 13. Single Pulse Maximum Power Dissipation

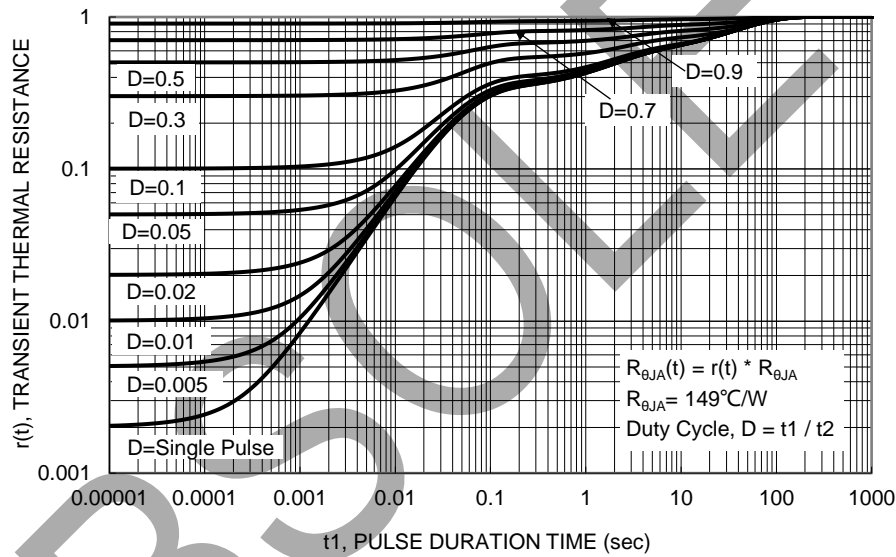
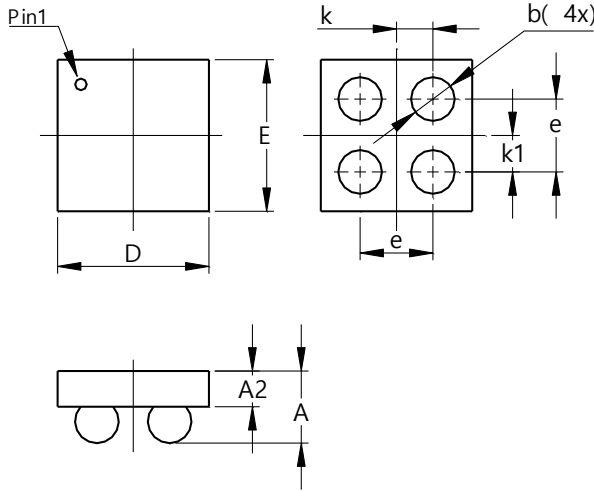


Figure 14. Transient Thermal Resistance

**Package Outline Dimensions**

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

U-WLB1010-4 (Type C)

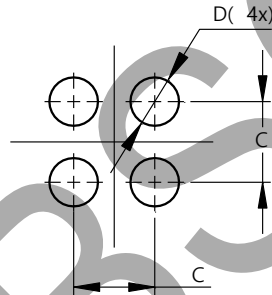


U-WLB1010-4 (Type C)			
Dim	Min	Max	Typ
A	--	0.62	--
A2	--	--	0.38
b	0.25	0.35	0.30
D	0.92	1.00	0.96
E	0.92	1.00	0.96
e	--	--	0.50
k	--	--	0.25
k1	--	--	0.25
All Dimensions in mm			

**Suggested Pad Layout**

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

U-WLB1010-4 (Type C)



Dimensions	Value (in mm)
C	0.500
D	0.300

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