

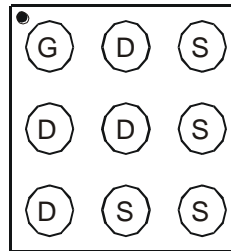
## Product Summary

<b>BV<sub>DSS</sub></b>	<b>R<sub>DS(ON)</sub> Max</b>	<b>I<sub>D</sub></b> <b>T<sub>A</sub> = +25°C</b>
-25V	40mΩ @ V <sub>GS</sub> = -4.5V	-5.4A

## Description and Applications

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

- Battery Management
- Load Switch
- Battery Protection



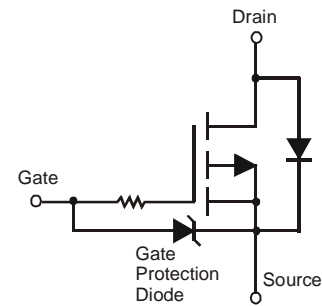
Top View  
Pin Configuration

## Features and Benefits

- Low Q<sub>g</sub> & Q<sub>gd</sub>
- Small Footprint 1.5mm x 1.5mm
- Gate ESD Protection <HBM Class 3A>
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

## Mechanical Data

- Case: U-WLB1515-9 (Type E)
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal: Finish - SnAgCu. Solderable per MIL-STD-202 Method 208 (e1)
- Terminal Connections: See Diagram Below
- Weight: 0.0018 grams (Approximate)



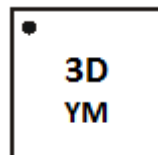
Equivalent Circuit

## Ordering Information (Note 4)

Part Number	Case	Packaging
DMP2541UCB9-7	U-WLB1515-9 (Type E)	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



3D = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: F = 2018)  
 M = Month (ex: 9 = September)

### Date Code Key

Year	2015	2016	2017	2018	2019	2020	2021
Code	C	D	E	F	G	H	I

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>	-25	V	
Gate-Source Voltage	V <sub>GSS</sub>	-6	V	
Continuous Drain Current (Note 5) V <sub>GS</sub> = -4.5V	I <sub>D</sub>	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	-3.9 -3.1	A
Continuous Drain Current (Note 6) V <sub>GS</sub> = -4.5V		T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	-5.4 -4.3	A
Pulsed Drain Current (Pulse Duration 10μs, Duty Cycle ≤1%)	I <sub>DM</sub>	-35	A	
Continuous Source Pin Current (Note 6)	I <sub>S</sub>	-1.9	A	
Pulsed Source Pin Current (Pulse Duration 10μs, Duty Cycle ≤1%)	I <sub>SM</sub>	-35	A	

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

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	P <sub>D</sub>	0.94	W
Total Power Dissipation (Note 6)	P <sub>D</sub>	1.78	W
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	135	°C/W
Thermal Resistance, Junction to Ambient (Note 6)	R <sub>θJA</sub>	71	°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 7)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-25	—	—	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	μA	V <sub>DS</sub> = -20V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	-100	nA	V <sub>GS</sub> = -6V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 7)</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	-0.4	-0.78	-1.1	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	28	40	mΩ	V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -2A
			36	50		V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -2A
			51	60		V <sub>GS</sub> = -1.8V, I <sub>D</sub> = -2A
Diode Forward Voltage (Note 5)	V <sub>SD</sub>	—	-0.74	-1	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -2A
Reverse Recovery Charge	Q <sub>RR</sub>	—	6.8	—	nC	V <sub>DD</sub> = -9.5V, I <sub>F</sub> = -2A, di/dt = 200A/μs
Reverse Recovery Time	t <sub>RR</sub>	—	13.6	—	ns	
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>						
Input Capacitance	C <sub>iss</sub>	—	566	850	pF	V <sub>DS</sub> = -10V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	343	515	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	20	30	pF	
Series Gate Resistance	R <sub>g</sub>	—	12.1	18	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz
Total Gate Charge	Q <sub>g</sub>	—	4.7	7	nC	V <sub>GS</sub> = -4.5V, V <sub>DS</sub> = -10V, I <sub>D</sub> = -2A
Gate-Source Charge	Q <sub>gs</sub>	—	0.6	—	nC	
Gate-Drain Charge	Q <sub>gd</sub>	—	1.0	—	nC	
Turn-On Delay Time	t <sub>D(ON)</sub>	—	3.4	6.8	ns	V <sub>DD</sub> = -10V, V <sub>GS</sub> = -4.5V, I <sub>DS</sub> = -2A, R <sub>g</sub> = 2Ω
Turn-On Rise Time	t <sub>R</sub>	—	6.5	—	ns	
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	55	110	ns	
Turn-Off Fall Time	t <sub>F</sub>	—	43	—	ns	

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

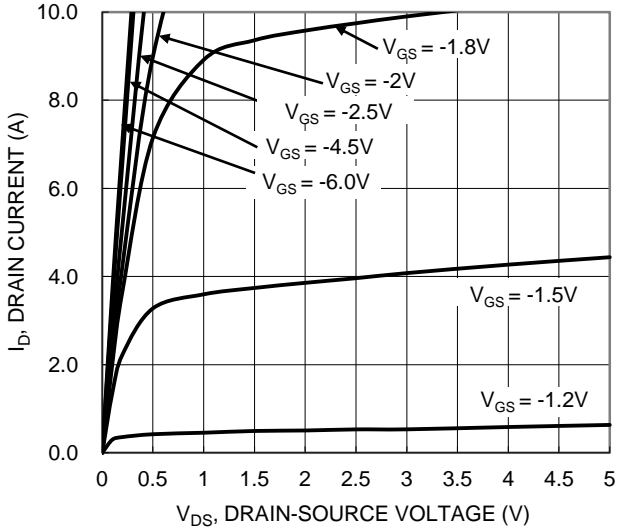


Figure 1. Typical Output Characteristic

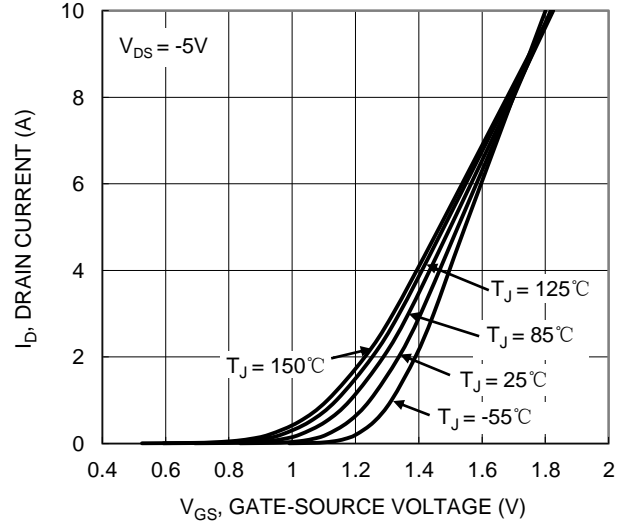


Figure 2. Typical Transfer Characteristic

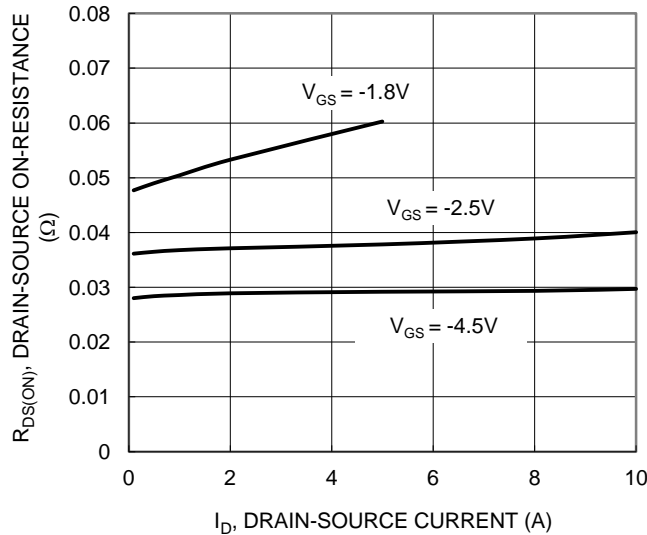


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

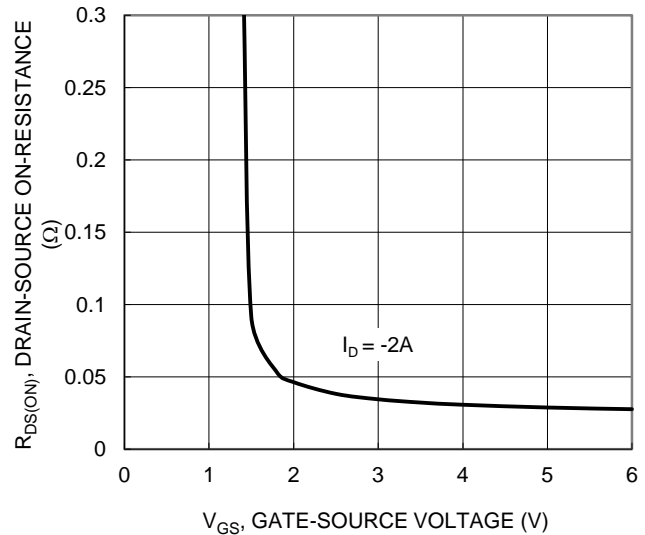


Figure 4. Typical Transfer Characteristic

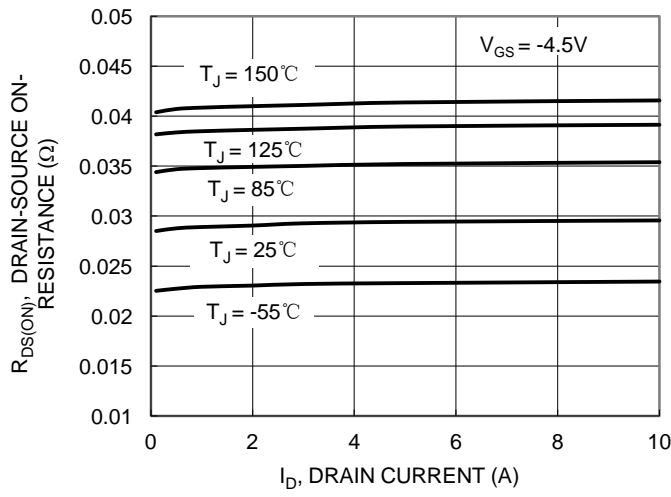


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

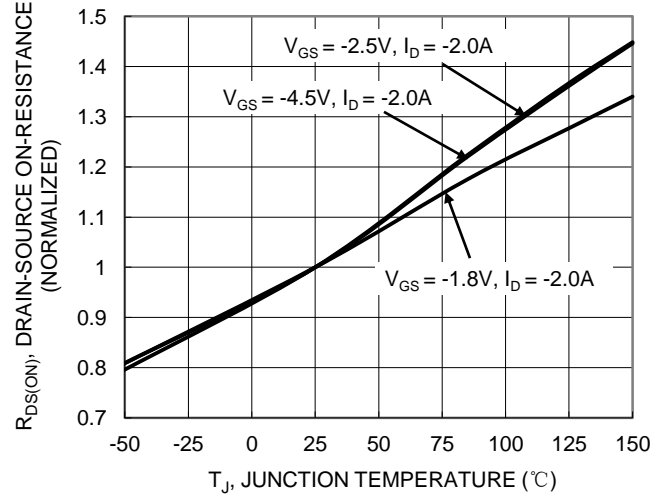


Figure 6. On-Resistance Variation with Junction Temperature

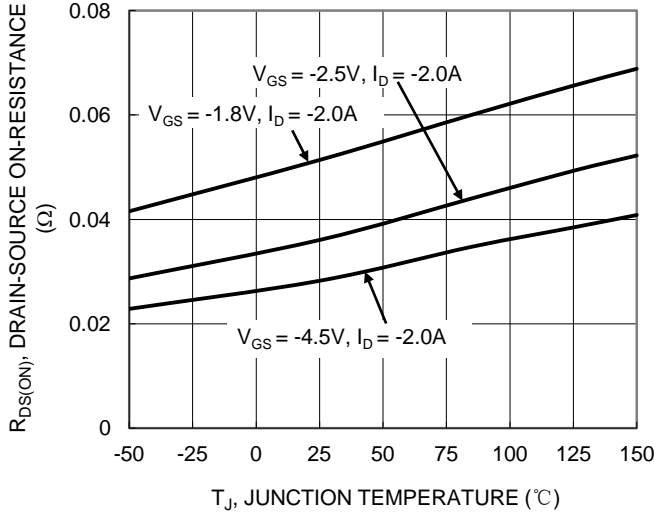


Figure 7. On-Resistance Variation with Junction Temperature

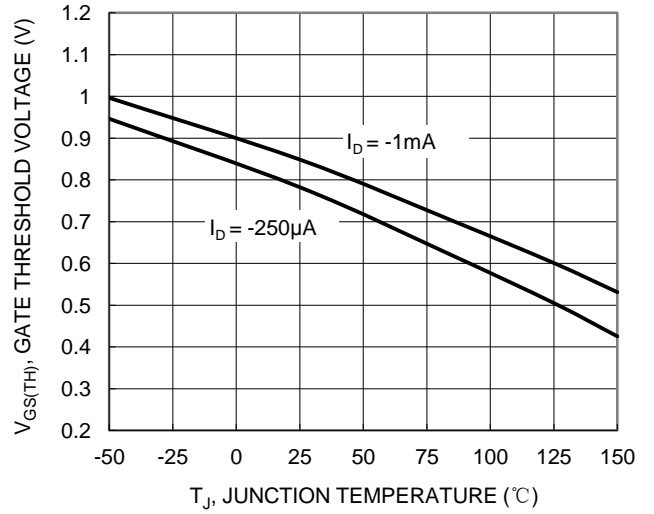


Figure 8. Gate Threshold Variation vs. Junction Temperature

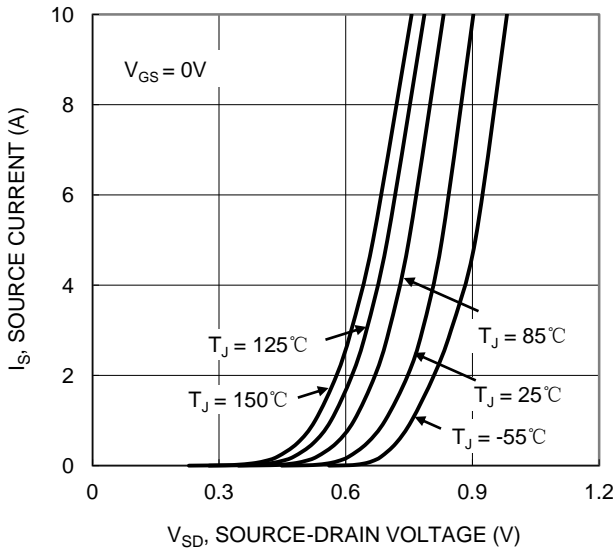


Figure 9. Diode Forward Voltage vs. Current

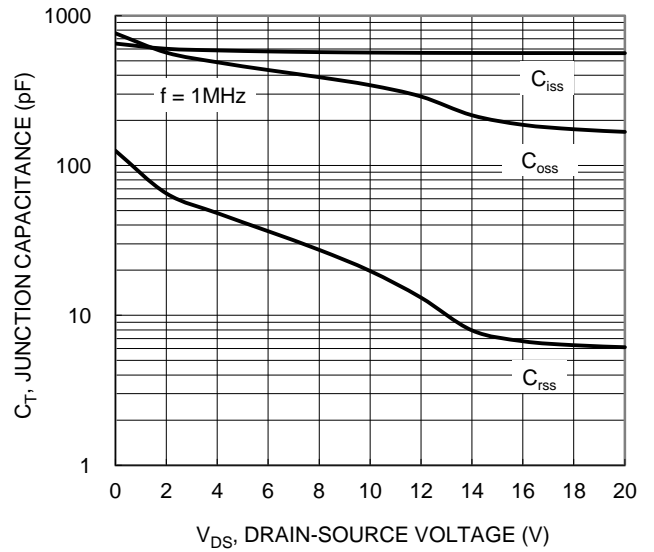


Figure 10. Typical Junction Capacitance

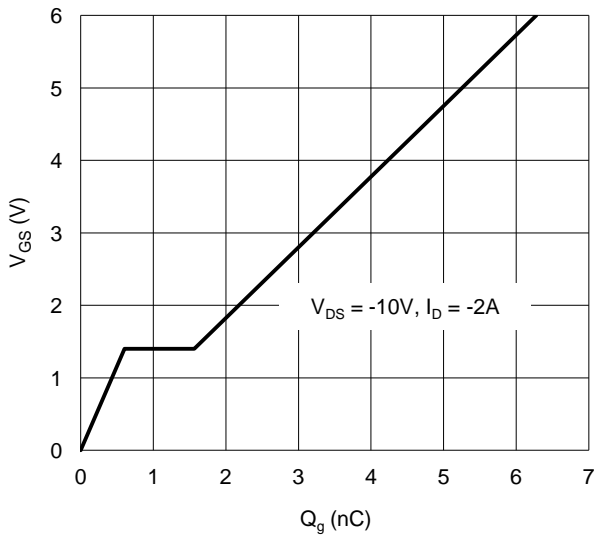


Figure 11. Gate Charge

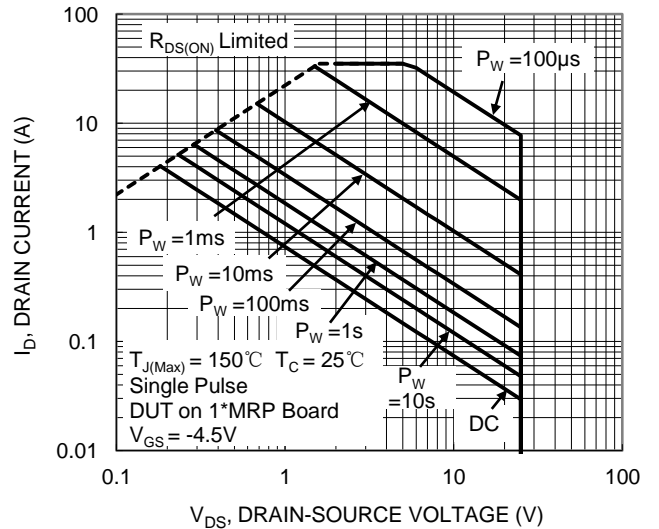


Figure 12. SOA, Safe Operation Area

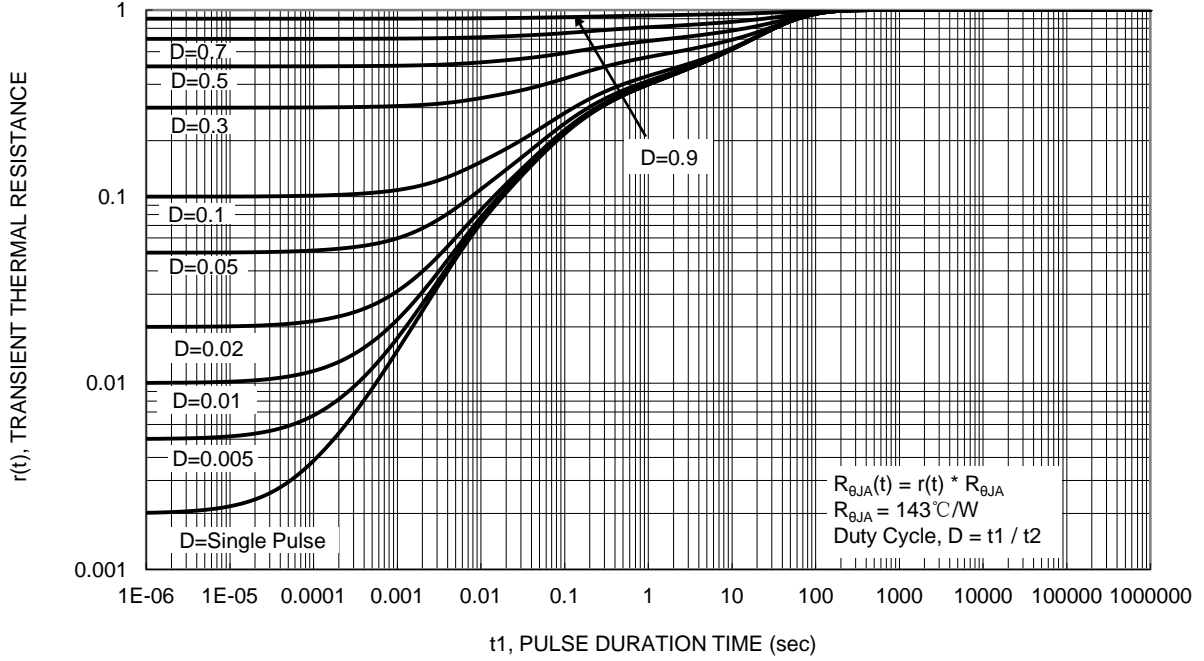
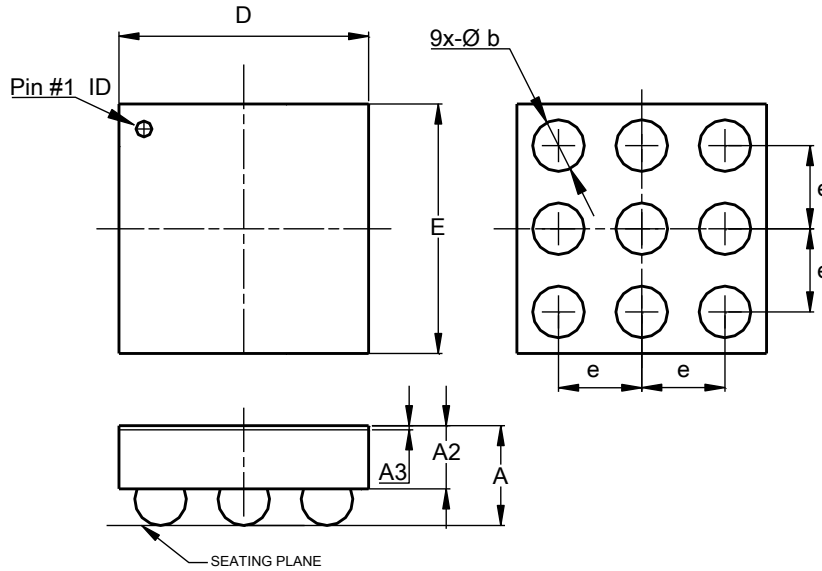


Figure 13. Transient Thermal Resistance

**Package Outline Dimensions**

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

**U-WLB1515-9 (Type E)**

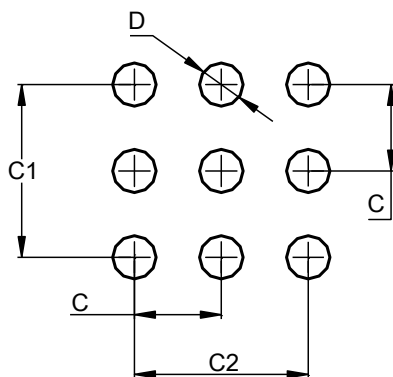


U-WLB1515-9 (Type E)			
Dim	Min	Max	Typ
A	--	0.62	--
A2	--	0.36	0.36
A3	0.020	0.030	0.025
b	0.27	0.37	0.32
D	1.47	1.51	1.49
E	1.47	1.51	1.49
e	--	--	0.50
All Dimensions in mm			

**Suggested Pad Layout**

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

**U-WLB1515-9 (Type E)**



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

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