

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$	I_D $T_A = 25^\circ C$
-25V	40m Ω @ $V_{GS} = -4.5V$	-5.2 A

Features and Benefits

- Low Q_g & Q_{gd}
- Small Footprint 1.5-mm x 1.5-mm
- **Gate ESD Protection 6kV**
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

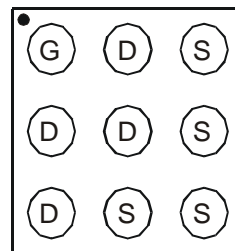
Description and Applications

This new generation MOSFET has been designed to minimize the on-state resistance ($R_{DS(on)}$) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

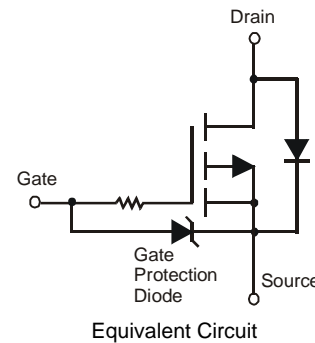
- Battery Management
- Load Switch
- Battery Protection

Mechanical Data

- Case: U-WLB1515-9
- Terminal Connections: See Diagram Below
- Weight: 0.0018 grams (approximate)



Top-View
Pin Configuration



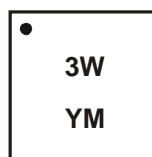
Equivalent Circuit

Ordering Information (Note 4)

Part Number	Case	Packaging
DMP2540UCB9-7	U-WLB1515-9	3000/Tape & Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
 2. See <http://www.diodes.com> 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 <http://www.diodes.com>.

Marking Information



3W = Product Type Marking Code
 YM = Date Code Marking
 Y = Year (ex: Y = 2011)
 M = Month (ex: 9 = September)

Date Code Key

Year	2011	2012	2013	2014	2015	2016	2017
Code	Y	Z	A	B	C	D	E

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 @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic	Symbol	Value	Units
Drain-Source Voltage	V_{DSS}	-25	V
Gate-Source Voltage	V_{GSS}	-6	V
Continuous Drain Current (Note 5) $V_{GS} = -4.5\text{V}$	I_D	$T_A = 25^\circ\text{C}$	-4.0
		$T_A = 70^\circ\text{C}$	-3.0
Continuous Drain Current (Note 6) $V_{GS} = -4.5\text{V}$	I_D	$T_A = 25^\circ\text{C}$	-5.2
		$T_A = 70^\circ\text{C}$	-4.0
Pulsed Drain Current (Pulse duration $10\mu\text{s}$, duty cycle $\leq 1\%$)	I_{DM}	-30	A
Continuous Source Pin Current (Note 6)	I_S	-2.0	A
Pulsed Source Pin Current (Pulse duration $10\mu\text{s}$, duty cycle $\leq 1\%$)	I_{SM}	-15	A
Continuous Gate Clamp Current (Note 5)	I_G	-0.6	A
Pulsed Gate Clamp Current (Pulse duration $10\mu\text{s}$, duty cycle $\leq 1\%$)	I_{GM}	-8	A

Thermal Characteristics @ $T_A = 25^\circ\text{C}$ 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	$^\circ\text{C/W}$
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	69	$^\circ\text{C/W}$
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

Electrical Characteristics @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV_{DSS}	-25	-	-	V	$V_{GS} = 0\text{V}, I_D = -250\mu\text{A}$
Zero Gate Voltage Drain Current @ $T_C = 25^\circ\text{C}$	I_{DSS}	-	-	-1	μA	$V_{DS} = -20\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	-	-	-100	nA	$V_{GS} = -6\text{V}, V_{DS} = 0\text{V}$
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(th)}$	-0.4	-0.6	-1.1	V	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(on)}$	-	33	40	m Ω	$V_{GS} = -4.5\text{V}, I_D = -2\text{A}$
			42	50		$V_{GS} = -2.5\text{V}, I_D = -2\text{A}$
			52	60		$V_{GS} = -1.8\text{V}, I_D = -2\text{A}$
Forward Transfer Admittance	$ Y_{fs} $	-	12	-	S	$V_{DS} = -10\text{V}, I_D = -2\text{A}$
Diode Forward Voltage (Note 5)	V_{SD}	-	-0.7	-1	V	$V_{GS} = 0\text{V}, I_S = -2\text{A}$
Reverse Recovery Charge	Q_{rr}	-	100	-	nC	$V_{dd} = -9.5\text{V}, I_F = -2\text{A}, di/dt = 200\text{A}/\mu\text{s}$
Reverse Recovery Time	t_{rr}	-	130	-	ns	
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	-	342	450	pF	$V_{DS} = -10\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Output Capacitance	C_{oss}	-	174	225	pF	
Reverse Transfer Capacitance	C_{rss}	-	70	90	pF	
Series Gate Resistance	R_G	-	28	35	Ω	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Total Gate Charge (4.5V)	Q_g	-	4.8	6.0	nC	$V_{GS} = -4.5\text{V}, V_{DS} = -10\text{V}, I_D = -2\text{A}$
Gate-Source Charge	Q_{gs}	-	0.5	-	nC	
Gate-Drain Charge	Q_{gd}	-	1.0	-	nC	
Turn-On Delay Time	$t_{D(on)}$	-	11	-	ns	$V_{DD} = -10\text{V}, V_{GS} = -4.5\text{V}, I_{DS} = -2\text{A}, R_G = 2\Omega,$
Turn-On Rise Time	t_r	-	12	-	ns	
Turn-Off Delay Time	$t_{D(off)}$	-	56	-	ns	
Turn-Off Fall Time	t_f	-	42	-	ns	

- Notes:
- Device mounted on FR-4 PCB with minimum recommended pad layout.
 - Device mounted on FR4 material with 1-inch² (6.45-cm²), 2-oz. (0.071-mm thick) Cu
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to production testing.

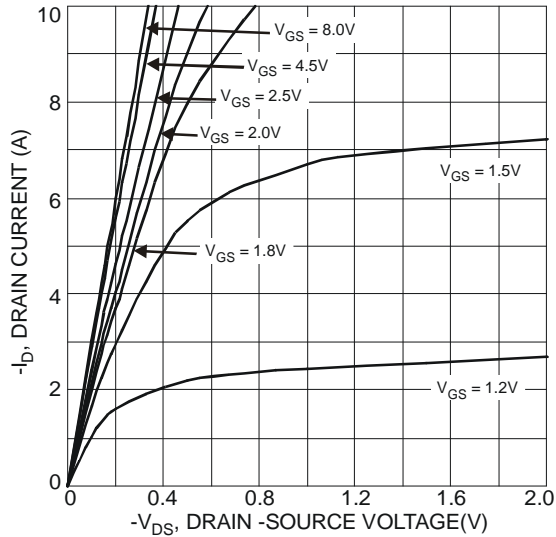


Fig. 1 Typical Output Characteristics

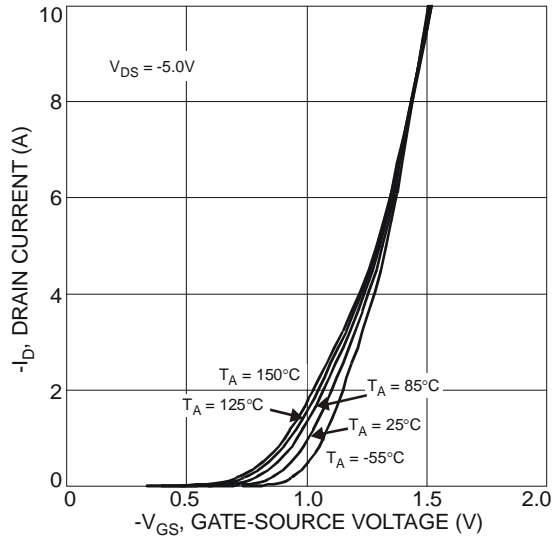


Fig. 2 Typical Transfer Characteristics

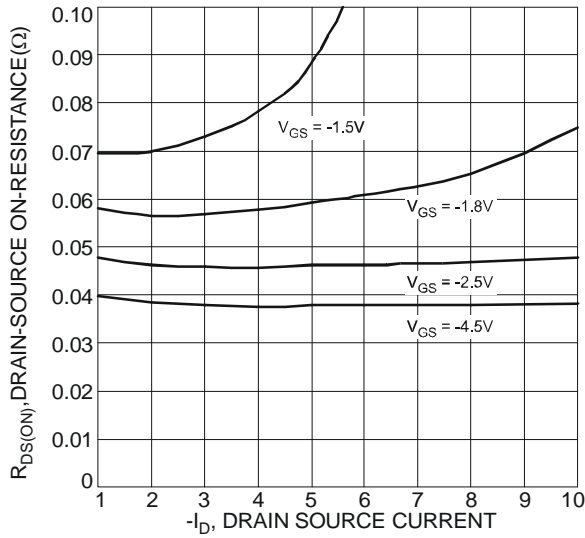


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

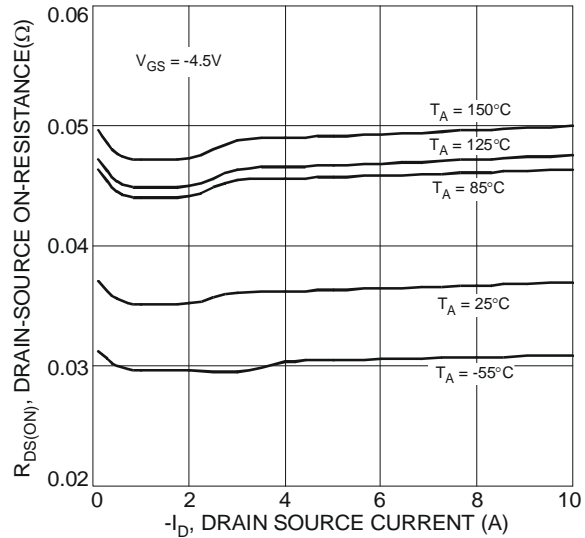


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

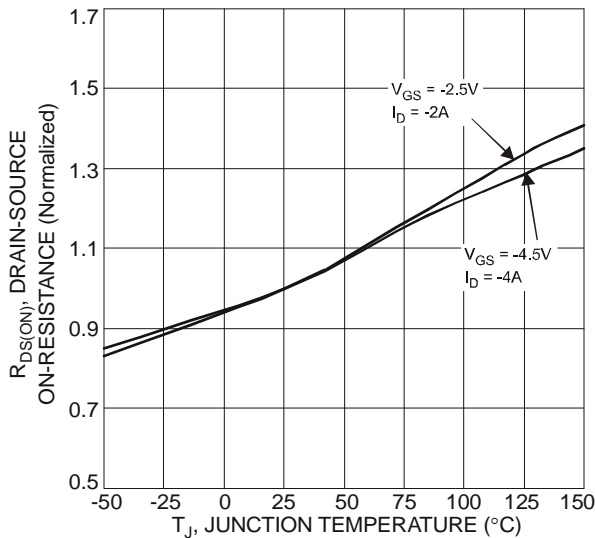


Fig. 5 On-Resistance Variation with Temperature

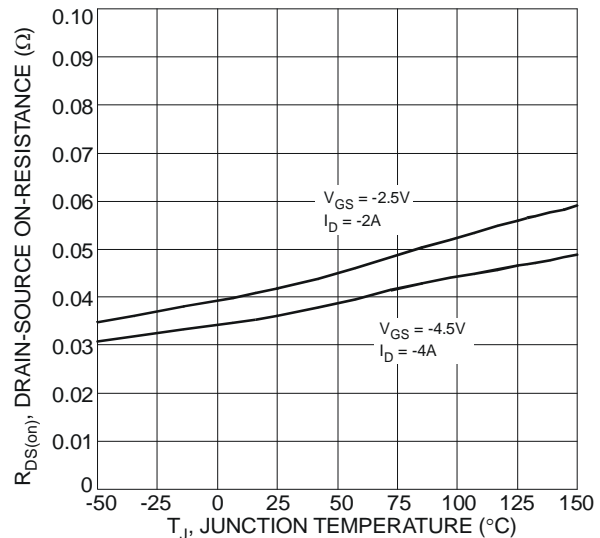


Fig. 6 On-Resistance Variation with Temperature

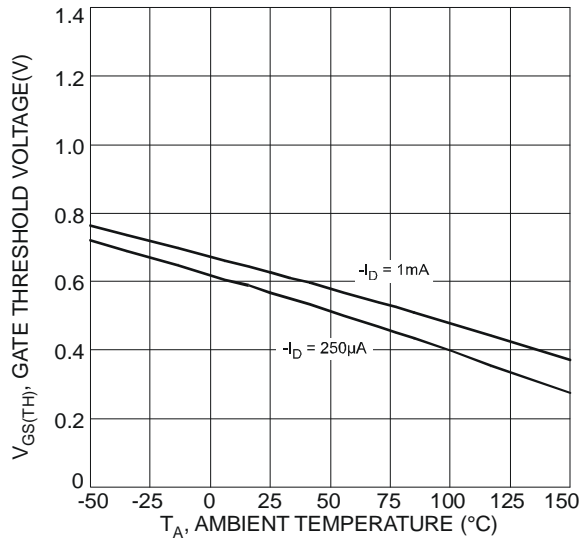


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

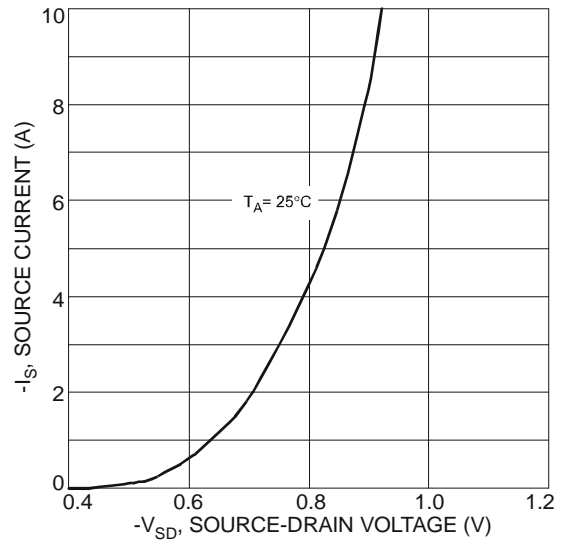


Fig. 8 Diode Forward Voltage vs. Current

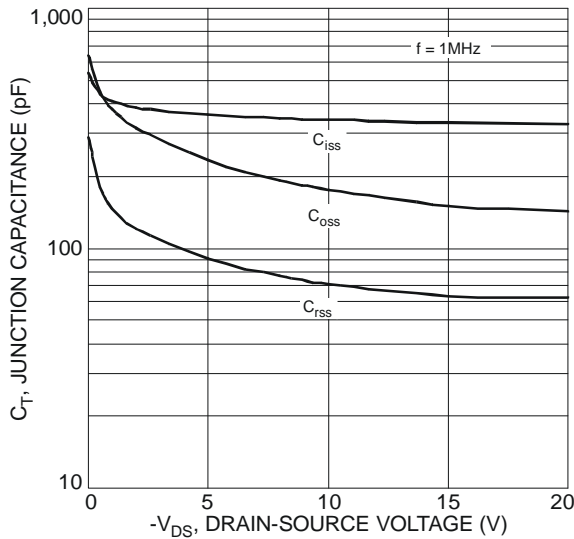


Fig. 9 Typical Junction Capacitance

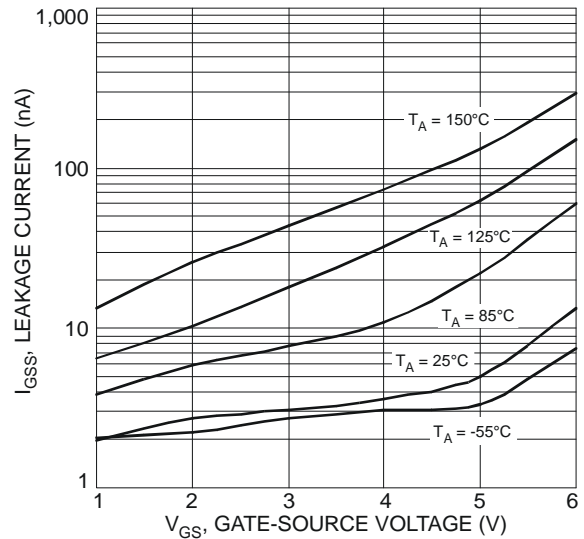


Fig. 10 Gate-Source Leakage Current vs. Voltage

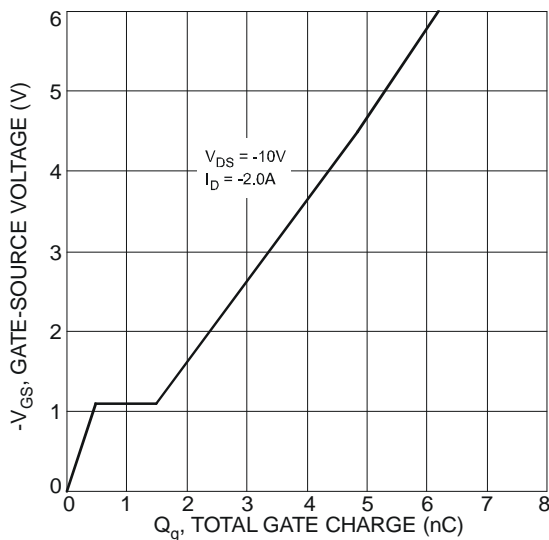


Fig. 11 Gate-Charge Characteristics

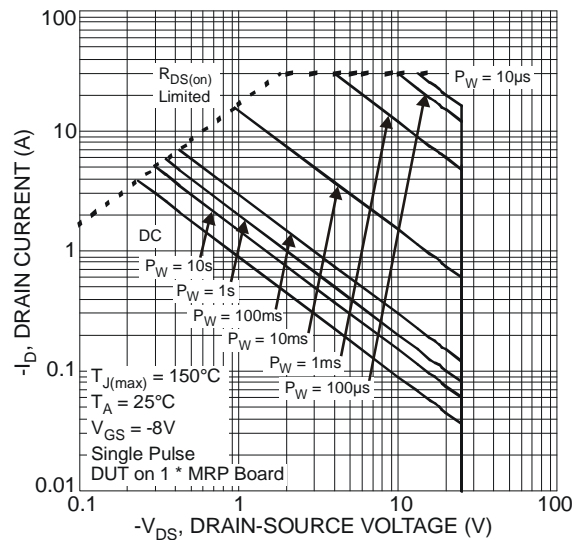
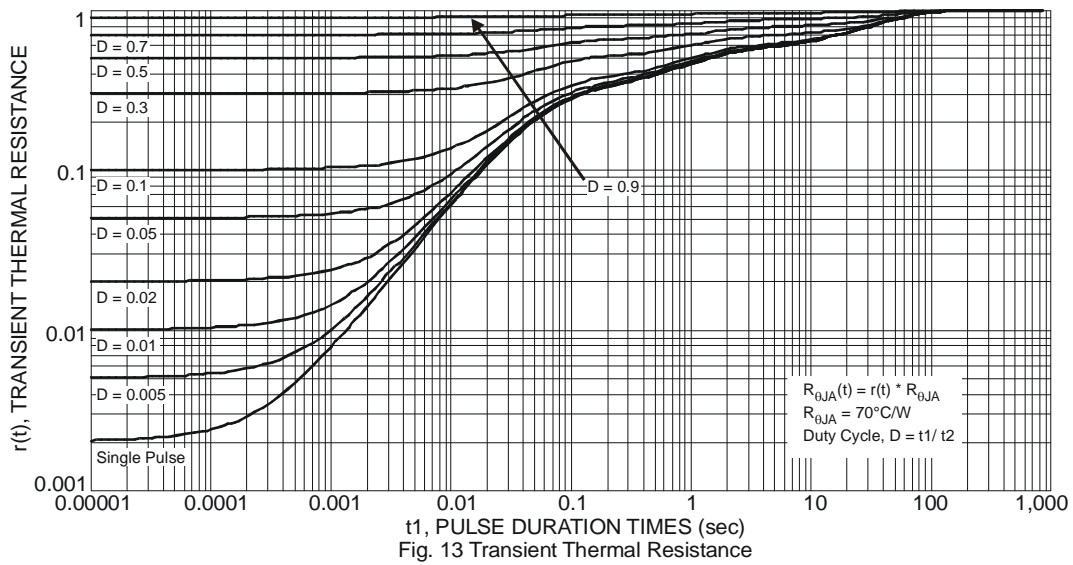
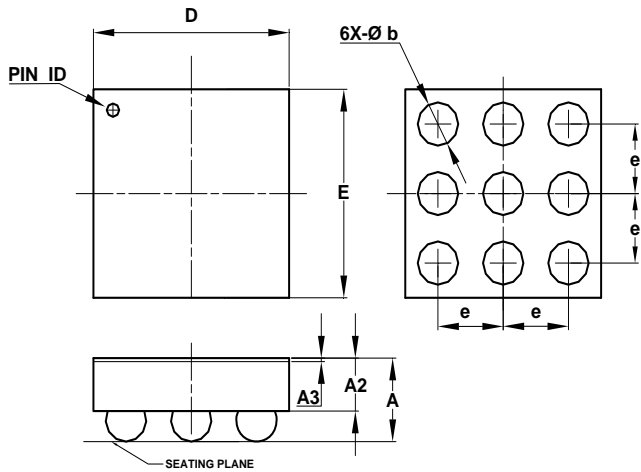


Fig. 12 SOA, Safe Operation Area

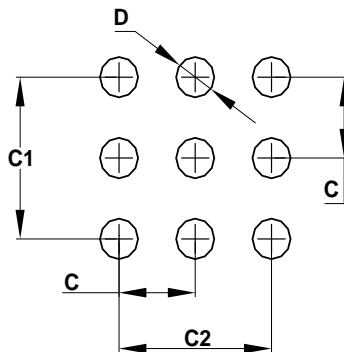


Package Outline Dimensions



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	1.51	1.49
E	1.47	1.51	1.49
e	-	-	0.50
All Dimensions in mm			

Suggested Pad Layout



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

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