Product Summary (Typ. @ V_{GS} = -4.5V, T_A = +25°C)

V_{DSS}	$R_{DS(ON)}$	Q_g	Q_{gd}	I_D
-20V	55mΩ	2.9nC	0.5nC	-3.5A

Description

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

Applications

- Battery managements
- Load switches
- Battery protections

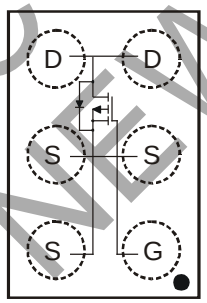
Features and Benefits

- LD-MOS Technology with the Lowest Figure of Merit:
  $R_{DS(ON)}$ = 55mΩ to Minimize On-State Losses
  Q_g = 2.9nC for Ultra-Fast Switching
- $V_{GS(TH)}$ = -0.6V Typ. for a Low Turn-On Potential
- CSP with Footprint 1.5mm × 1.0mm
- Height = 0.62mm for Low Profile
- **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-Q100/101/200, 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
- Weight: 0.0018 grams (Approximate)

U-WLB1510-6



Top View

Ordering Information (Note 4)

Part Number	Package	Packing	
		Qty.	Carrier
DMP2070UCB6-7	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/.

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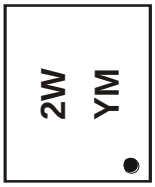
Marking Information

U-WLB1510-6



2W = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: J = 2022)
M = Month (ex: 9 = September)

Date Code Key

Year	2011	….	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Code	Y	….	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_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V_{DSS}	-20	V
Gate-Source Voltage			V_{GSS}	±8	V
Continuous Drain Current (Note 5) V_{GS} = -4.5V	Steady State	T_A = +25°C T_A = +70°C	I_D	-2.5 -2.0	A
Continuous Drain Current (Note 6) V_{GS} = -4.5V	Steady State	T_A = +25°C T_A = +70°C	I_D	-3.5 -2.8	A
Pulsed Drain Current (Note 7)			I_{DM}	-12	A
Maximum Continuous Body Diode Forward Current (Note 6)			I_S	-1.8	A

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

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 5)	P_D	0.92	W
Total Power Dissipation (Note 6)	P_D	1.47	W
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	136	°C/W
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	84	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-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^2 (6.45-cm^2), 2-oz. (0.071-mm thick) Cu.
7. 300ms pulse, pulse duty cycle ≤ 2%.

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV_{DSS}	-20	—	—	V	V_{GS} = 0V, I_D = -250µA
Zero Gate Voltage Drain Current @T_C = +25°C	I_{DSS}	—	—	-1	µA	V_{DS} = -16V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±8V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(TH)}$	-0.4	-0.6	-1.0	V	V_{DS} = V_{GS}, I_D = -250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	55	70	mΩ	V_{GS} = -4.5V, I_D = -1A
			70	90		V_{GS} = -2.5V, I_D = -1A
			90	110		V_{GS} = -1.8V, I_D = -1A
			110	150		V_{GS} = -1.5V, I_D = -1A
Forward Transfer Admittance	$\|Y_{fs}\|$	—	12	—	S	V_{DS} = -10V, I_D = -1A
Diode Forward Voltage (Note 6)	V_{SD}	—	-0.7	-1	V	V_{GS} = 0V, I_S = -1A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	210	—	pF	V_{DS} = -10V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	92	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	38	—	pF	
Series Gate Resistance	R_G	—	5.3	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge	Q_g	—	2.9	—	nC	V_{GS} = -4.5V, V_{DS} = -10V, I_D = -1A
Gate-Source Charge	Q_{gs}	—	0.3	—	nC	
Gate-Drain Charge	Q_{gd}	—	0.5	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	7.3	—	ns	V_{DD} = -10V, V_{GS} = -4.5V, I_{DS} = -1A, R_G = 20Ω
Turn-On Rise Time	t_R	—	14.0	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	42.6	—	ns	
Turn-Off Fall Time	t_F	—	32	—	ns	

Notes: 8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to production testing.

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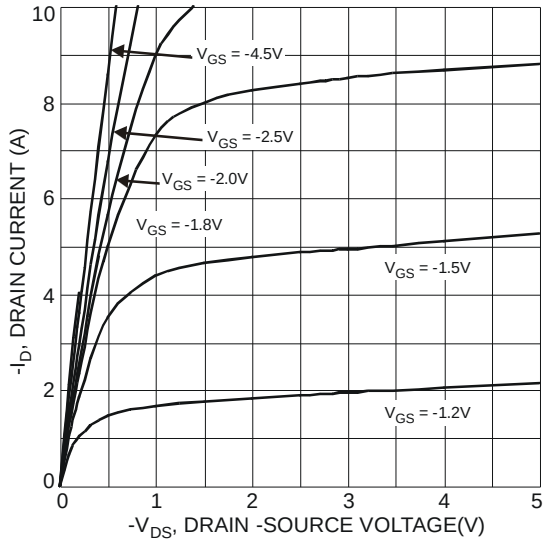

Fig. 1 Typical Output Characteristics

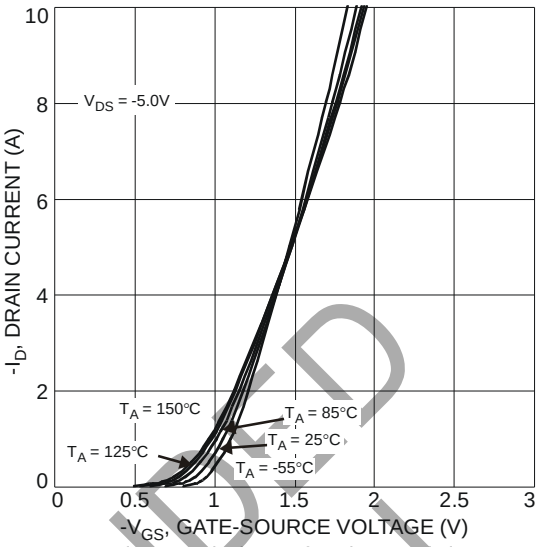

Fig. 2 Typical Transfer Characteristics

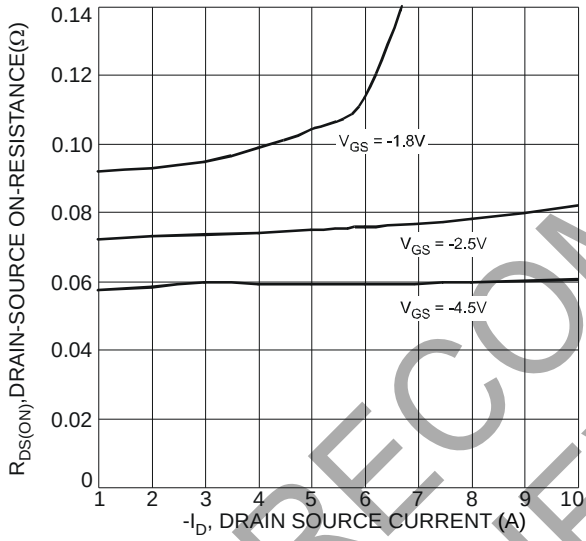

Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

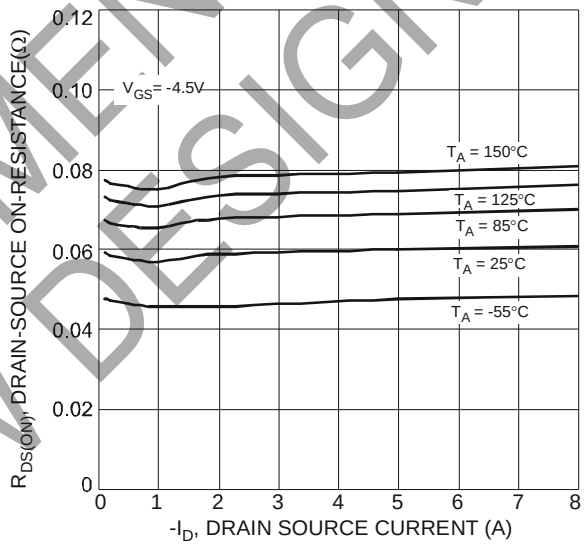

Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

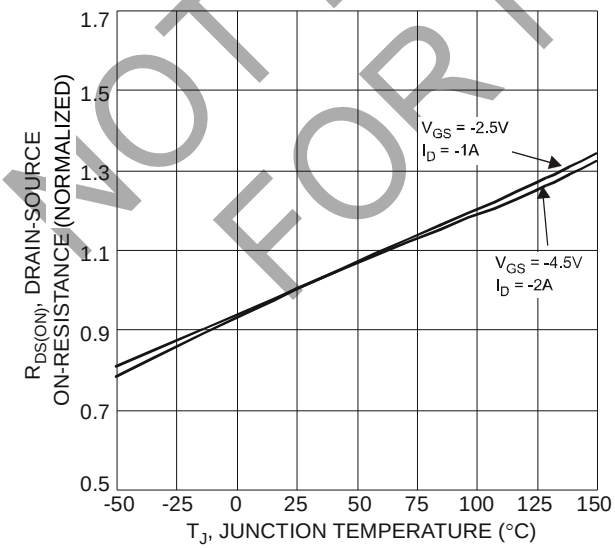

Fig. 5 On-Resistance Variation with Temperature

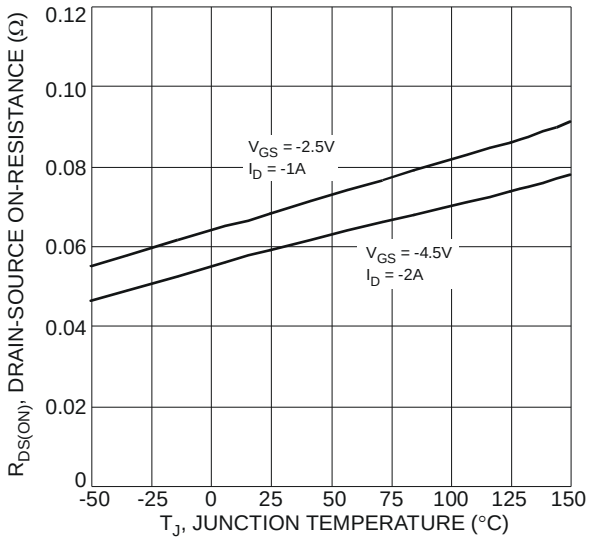

Fig. 6 On-Resistance Variation with Temperature

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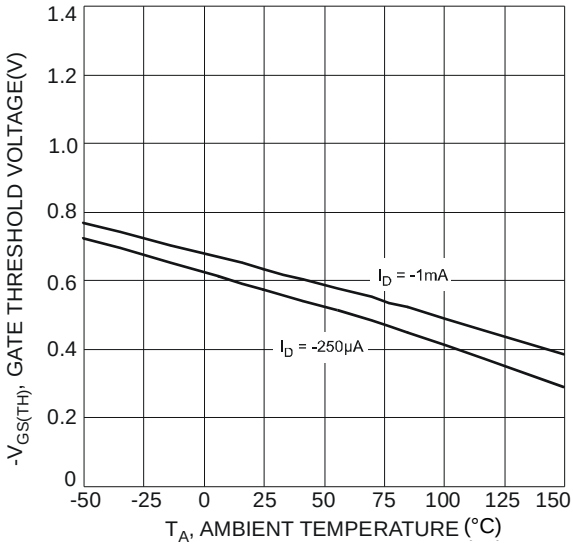

Fig. 7 Gate Threshold Variation vs. Ambient Temperature

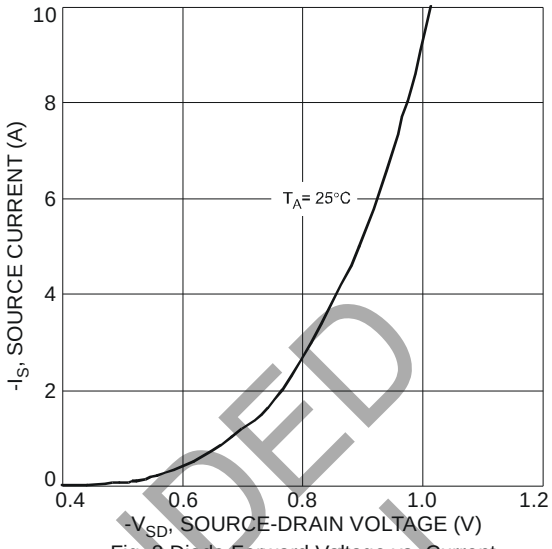

Fig. 8 Diode Forward Voltage vs. Current

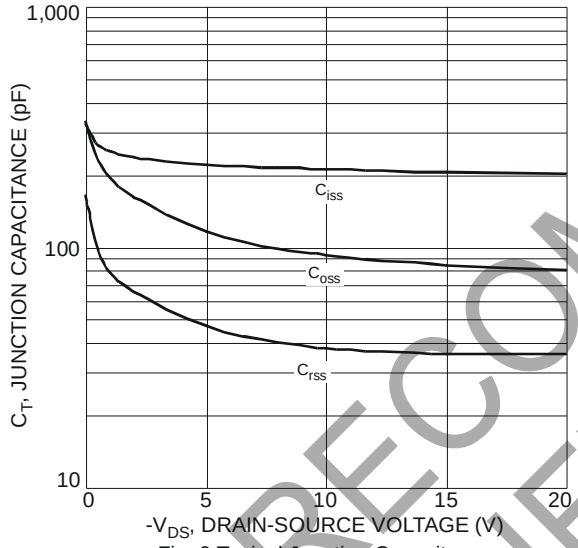

Fig. 9 Typical Junction Capacitance

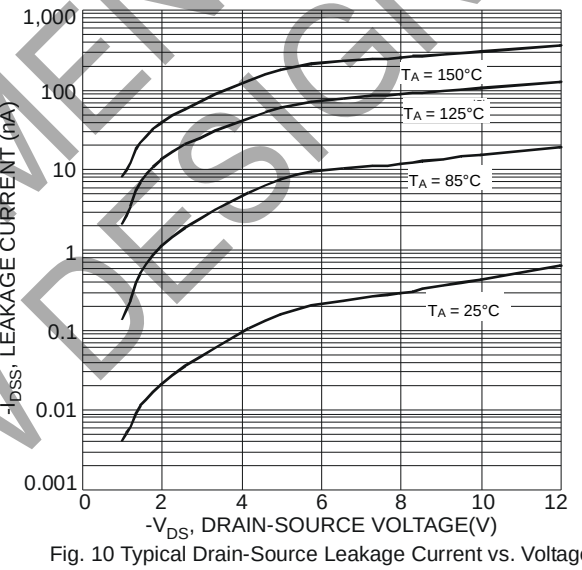

Fig. 10 Typical Drain-Source Leakage Current vs. Voltage

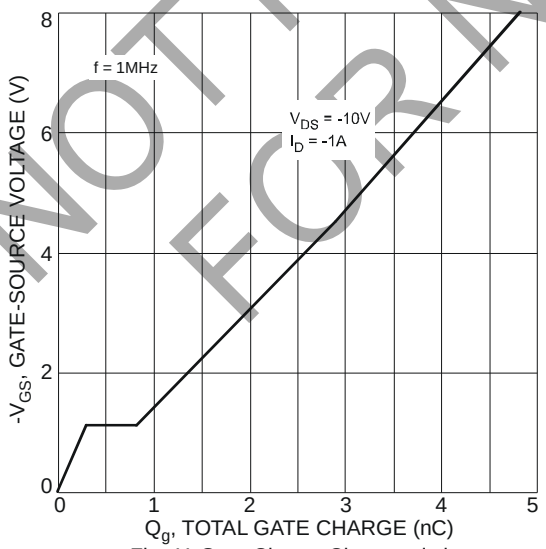

Fig. 11 Gate-Charge Characteristics

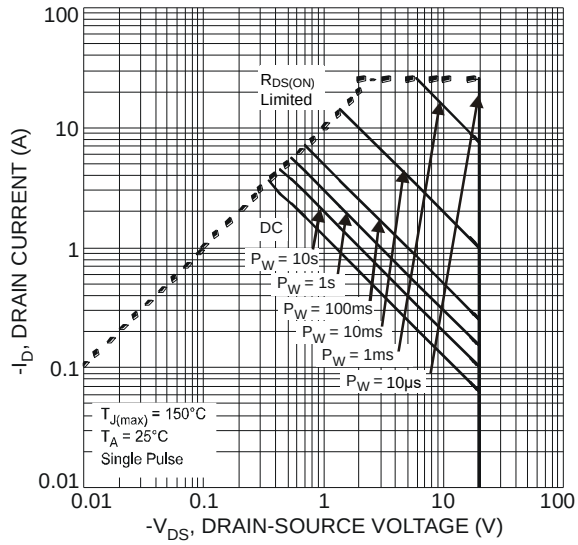

Fig. 12 SOA, Safe Operation Area

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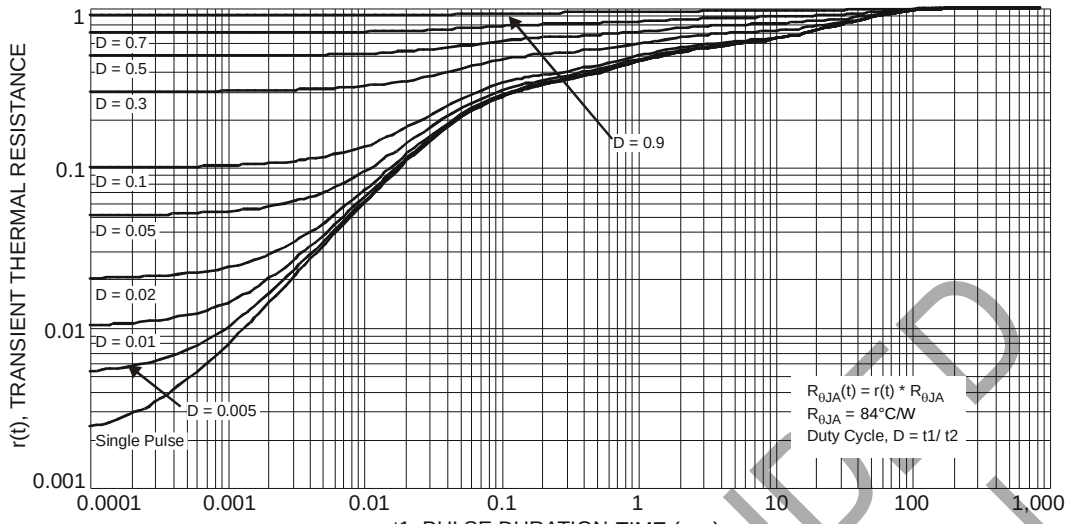

Fig. 13 Transient Thermal Resistance

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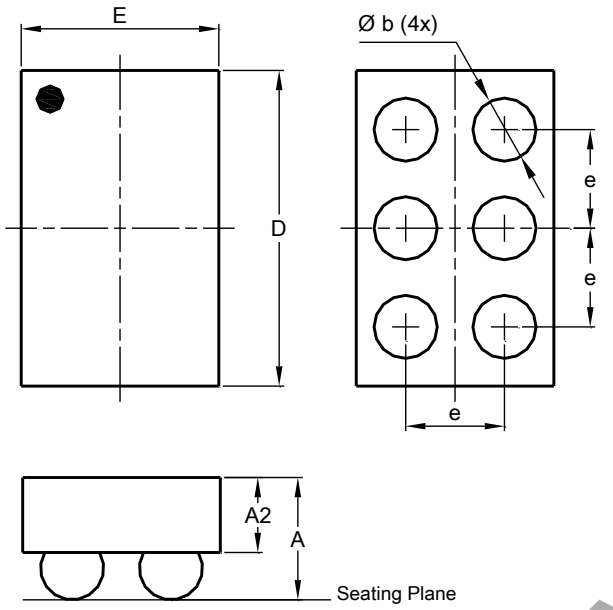
Package Outline Dimensions

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			

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Suggested Pad Layout

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

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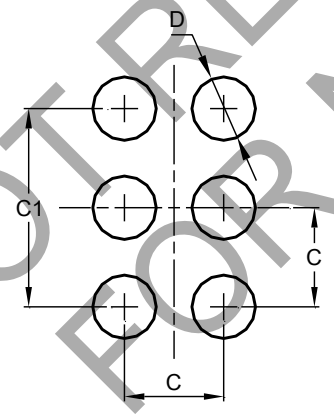

Dimensions	Value (in mm)
C	0.50
C1	1.00
D	0.25

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