A Product Line of
Diodes Incorporated

PI6CL1001

Low Voltage LVCMOS Clock Buffer with Level Shift

Description

The PI6CL1001 is a low voltage, low- noise non-inverting LVCMOS single output clock buffer with level translation.

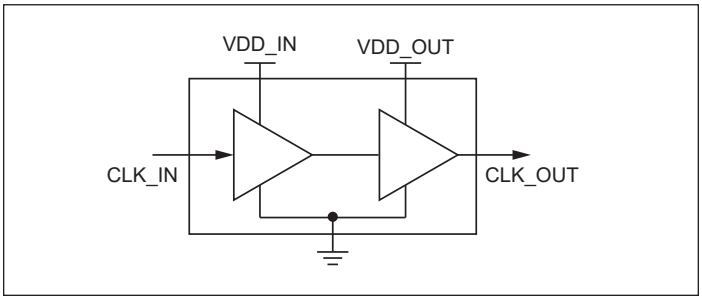
It supports 1.0V to 1.8V power supply. The key goal in designing the PI6CL1001 is to target networking applications that require low voltage power supply, low-jitter, and the capability to bridge the power supply mismatch between clock source and clock sink devices. VDD_IN supply voltage defines input clock level, and VDD_OUT supply voltage defines output clock level. The device is capable of translating clock levels from low to high or from high to low.

The device has a fail-safe input that prevents oscillation at the output in the absence of an input signal and allows for input signals before VDD is supplied.

Application(s)

- Cellphones
- Tablets
- IOTs

Block Diagram



Features

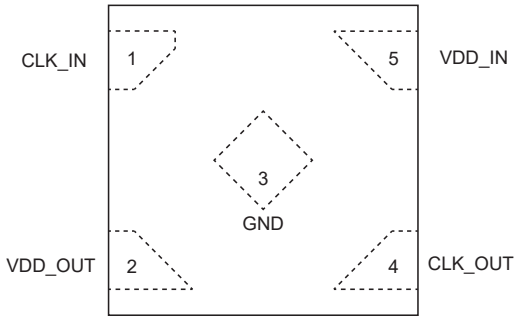
- Low-Noise, Non-Inverting Buffer with 1 Output
- Frequency Range: DC to 60MHz with 1PPS
- 1.0V to 1.8V VDD_IN and VDD_OUT Power Supply
- Supports 32.768KHz Clock Level Shift
- Low to High or High to Low LVCMOS Clock Level Translation
  - Low to High: Minimum Input Clock Level 0.9V to Maximus Output Clock Level 1.8V
  - High to Low: Maximus Input Clock Level 1.8V to Minimum Output Clock Level 1.2V
- Input Power Down Tolerant
- Low Propagation Delay: 3ns (Typical)
- Low Rise/Fall Time: < 2ns (Maximus)
- Low Additive Jitter: < 0.2ps RMS (Maximus)
- After Input Clock Stops, Automatic Standby with Zero uA Power Consumption
- Operating Temperature: –40˚C to 105˚C
- Packaging (Pb-free & Green):
  - 5-Pin, DFN0808 (XDC)
- 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 or your local Diodes representative. https://www.diodes.com/quality/product-definitions/

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.

© 2026 Copyright Diodes Incorporated. All Rights Reserved.

Pin Configuration



Pin Description

Pin Number	Pin Name	Description
1	CLK_IN	Clock Input
2	VDD_OUT	Output power supply
3	GND	Ground
4	CLK_OUT	Clock Output
5	VDD_IN	Input power supply

© 2026 Copyright Diodes Incorporated. All Rights Reserved.

Absolute Maximum Ratings

(Above which the useful life may be impaired. For user guidelines only, not tested.)

Storage Temperature	–65°C to +150°C
Junction Temperature	150°C Max.
Input Voltage	–0.5V to +2.5V
Output Voltage	VDD_OUT + 0.2V
VDD_IN	–0.5V to +2.25V
VDD_OUT	–0.5V to +2.5V
Output Current	–50mA to +50mA
ESD Protection (HBM)	2000V

Note:
Stresses greater than those listed under MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

DC Characteristics

Case 1. V_{DD_IN} = 1.2V±0.1V, V_{DD_OUT} = 1.8V±0.1V, T_A= –40° to 105°C
Case 2. V_{DD_IN} = 1.8V±0.1V, V_{DD_OUT} = 1.2V±0.1V, T_A= –40° to 105°C

Parameters	Description	Test Conditions		Min.	Typ.	Max.	Units
V_{DD_IN}	Input Supply Voltage			0.9		1.98	V
V_{DD_OUT}	Output Supply Voltage			1.08		1.98	V
V_{IH}	Input HIGH Voltage	Logic HIGH level		0.8 x V_{DD_IN}			V
V_{IL}	Input LOW Voltage	Logic LOW level				0.2 x V_{DD_IN}	V
I_{DD_IN}	Input Current	Both input and output clocks are toggling. 2pF load termination. f_0 = 24MHz.			30	60	µA
I_{DD_OUT}	Output Current	Both input and output clocks are toggling. 2pF load termination.	f_0 = 12MHz		250	500	µA
			f_0 = 24MHz		500	1000	µA
			f_0 = 48MHz		1000	2000	µA
$I_{LEAKAGE_IN}$	Input Leakage Current			–8		8	uA
V_{OH}	Output High Voltage	Low to High					
		$V_I = V_{IH}$, I_{OH} = –100µA, V_{DD_OUT} = 1.62-1.98V		V_{DD_OUT} –0.1			V
		$V_I = V_{IH}$, I_{OH} = –8mA, V_{DD_OUT} = 1.62V		1.2			V
		High to Low					
		$V_I = V_{IH}$, I_{OH} = –100µA, V_{DD_OUT} = 1.08V-1.2V		V_{DD_OUT} –0.1			V
		$V_I = V_{IH}$, I_{OH} = –4mA, V_{DD_OUT} = 1.08V		0.7			V

© 2026 Copyright Diodes Incorporated. All Rights Reserved.

Parameters	Description	Test Conditions	Min.	Typ.	Max.	Units
V_{OL}	Output LOW Voltage	Low to High				
		$V_I = V_{IL}$, I_{OL} = 100µA, V_{DD_OUT} = 1.62-1.98V			0.1	V
		$V_I = V_{IL}$, I_{OL} = 8mA, V_{DD_VOUT} = 1.62V			0.45	V
		High to Low				
		$V_I = VI_L$, I_{OL} = 100µA, V_{DD_OUT} = 1.08V-1.2V			0.1	V
		$V_I = V_{IL}$, I_{OL} = 4mA, V_{DD_VOUT} = 1.08V			0.25	V

AC Characteristics

Case 1. V_{DD_IN} = 1.2V±0.1V, V_{DD_OUT} = 1.8V±0.1V, T_A= –40° to 105°C
Case 2. V_{DD_IN} = 1.8V±0.1V, V_{DD_OUT} = 1.2V±0.1V, T_A= –40° to 105°C

Parameters	Description	Test Conditions(1)	Min.	Typ	Max.	Units
F_{IN}	Input Frequency		DC		60	MHz
$t_{R/tF}$	CLKn Rise/Fall Time	20% to 80%		1	2	ns
t_{PD}	Propagation Delay	C_L = 2pF, 24MHz Outputs are measured @ Vdd/2		3	5	ns
t_{dc_in}	Duty Cycle In @ 1ns edge rate		45		55	%
t_{dc_out}	Duty Cycle Out		43		57	%
$T_{startup}$	Time after power supply exceeds 0.5V before applying input clock, to ensure glitch free output.				225	us
R_{out}	Output Impedance	V_{DD_OUT} = 1.2V		50		Ω
		V_{DD_OUT} = 1.8V		34		
Add_Jitter RMS	12kHz to 5MHz additive RMS random jitter.	f_0 = 24MHz, input slew rate ≥ 0.2V/ns, V_{IH}-V_{IL} ≥ 850mVpp		0.05	0.2	ps
V_{INpp}	Clipped sine wave input voltage swing level	V_{DDin} = 1.8V, connect to CLKIN through AC coupling and bias circuit		0.8		V

Notes:

1. See test circuit and waveforms.
2. Minimum limits are guaranteed but not tested on Propagation Delays.
3. Identical conditions: loading, transitions, supply voltage, temperature, package type and speed grad

© 2026 Copyright Diodes Incorporated. All Rights Reserved.

Capacitance

T_A = 25°C, f = 1MHz

Parameters[1]	Description	Test Conditions	Typ	Max.	Units
C_{IN}	Input Capacitance	V_{IN} = 0	2.0		pF
C_{OUT}	Output Capacitance	V_{OUT} = 0	2.5		

Note:

1. This parameter is determined by device characterization but is not production tested.

© 2026 Copyright Diodes Incorporated. All Rights Reserved.

Typical Application

Figure below shows an example of PI6CL1001 being used in a clock level translation application.

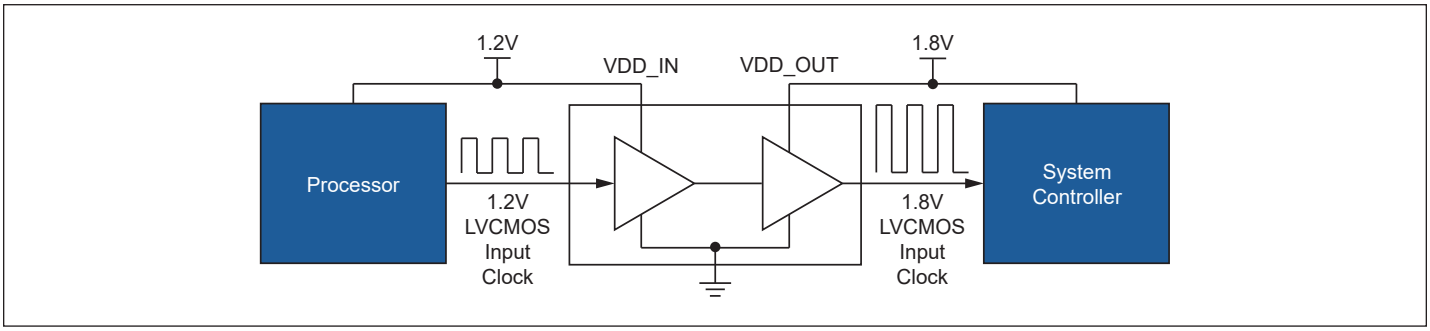
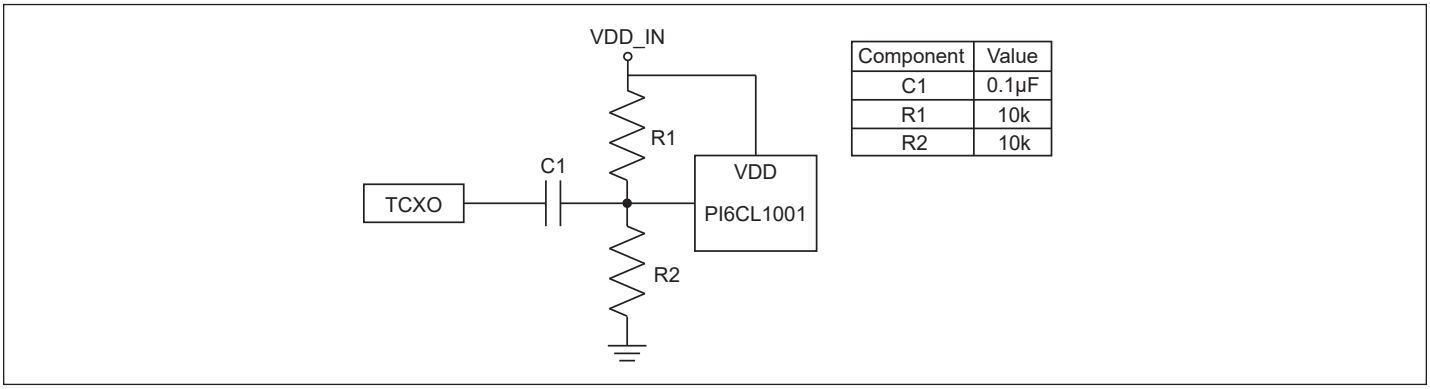


Figure 1. Processor Clock Level Translation Application



Component	Value
C1	0.1µF
R1	10k
R2	10k

Figure 2. Clipped Sine Wave Input Application Diagram

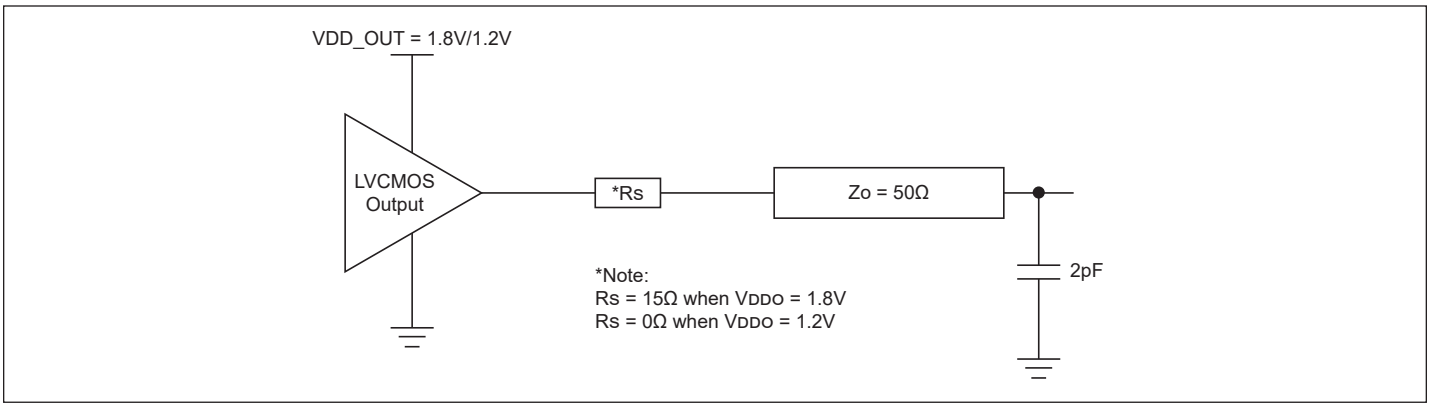


Figure 3. VDD_OUT Test Diagram

© 2026 Copyright Diodes Incorporated. All Rights Reserved.

Switching Waveforms

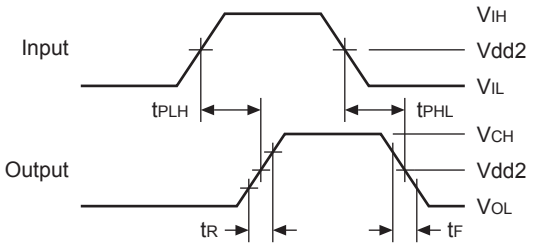
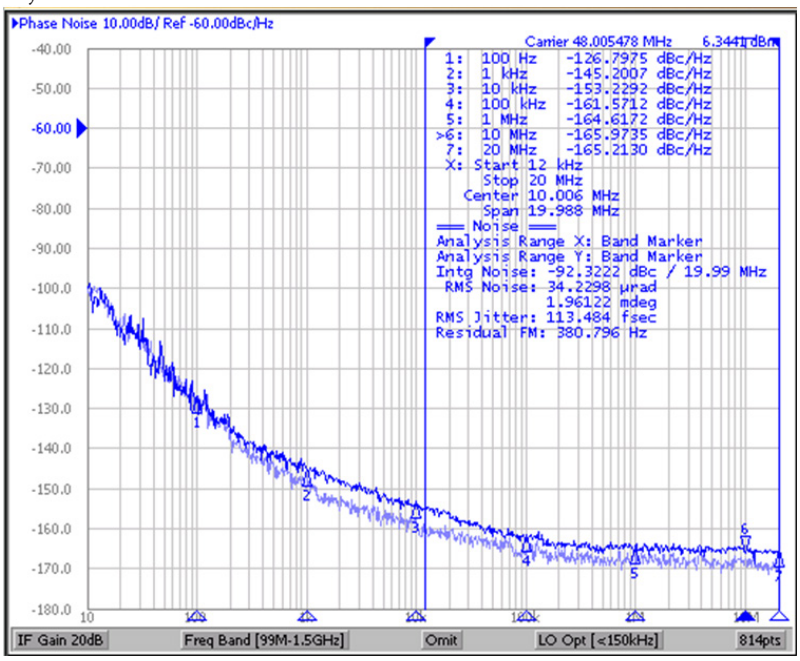


Figure 4. Propagation Delay

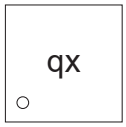
Output vs. Input Phase Noise Plot

Test conditions same as Typical Application block diagram in Figure 1.
Output Phase Jitter = 202fs, Addjitter = 21.2fs



© 2026 Copyright Diodes Incorporated. All Rights Reserved.

Part Marking

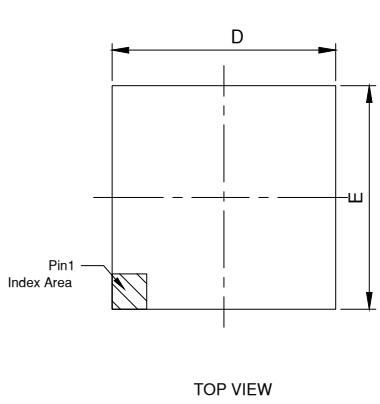


q: PI6CL1001XDCE
x: One Character Shortened Datecode

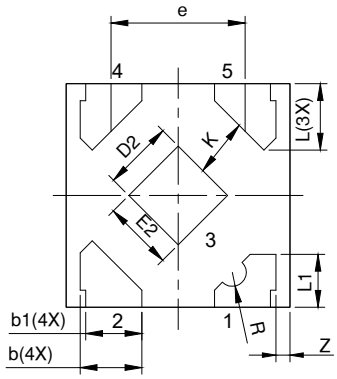
© 2026 Copyright Diodes Incorporated. All Rights Reserved.

Packaging Mechanical

5-X2-DFN0808 (XDC)

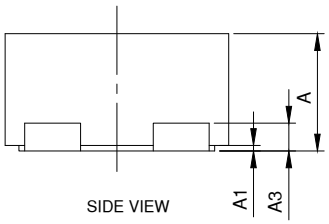


TOP VIEW

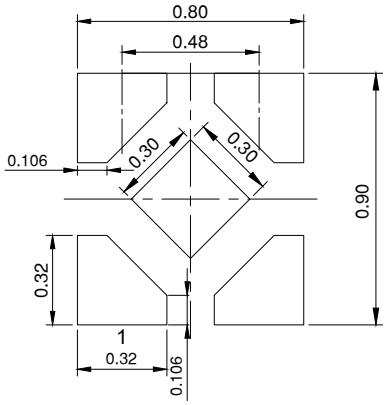


BOTTOM VIEW

	ONS(MM)		
SYMBOL	Min	NOM	Max
A	0.25	0.30	0.35
A1	0.00	0.02	0.04
A3	0.10REF		
D	0.75	0.80	0.85
E	0.75	0.80	0.85
D2	0.20	0.25	0.30
E2	0.20	0.25	0.30
L	0.188	0.238	0.288
L1	0.139	0.189	0.239
b	0.17	0.22	0.27
b1	0.15	0.20	0.25
Z		0.05	
k	0.20	--	--
e	0.48BSC		
R	0.05TYP		



SIDE VIEW



RECOMMENDED LAND PATTERN

Notes:
1. ALL DIMENSIONS ARE IN mm. ANGLES IN DEGREES.
2. RECOMMENDED LAND PATTERN REFERENCE DIODES PKG X2-DFN0808-4.

DIODES INCORPORATED / PERICOM ENABLING SERIAL CONNECTIVITY	DATE: 12/05/24
DESCRIPTION: X2-DFN0808-5	
PACKAGE CODE: XDC(XDC5)	
DOCUMENT CONTROL#: PD-2291	REVISION:A

For latest package info.

please check: http://www.diodes.com/design/support/packaging/pericom-packaging/packaging-mechanicals-and-thermal-characteristics/

Ordering Information

Orderable Part Number	Package Code	Package Description	Temperature	Pin 1 Orientation
PI6CL1001XDCEX	XDC	5-Contact, X2-DFN0808-5	–40˚C to 105˚C	Bottom Left Corner

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. E = Pb-free and Green
5. X suffix = Tape/Reel

© 2026 Copyright Diodes Incorporated. All Rights Reserved.

IMPORTANT NOTICE

1. DIODES INCORPORATED (Diodes) AND ITS SUBSIDIARIES MAKE NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO ANY INFORMATION CONTAINED IN THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION).

2. The Information contained herein is for informational purpose only and is provided only to illustrate the operation of Diodes' products described herein and application examples. Diodes does not assume any liability arising out of the application or use of this document or any product described herein. This document is intended for skilled and technically trained engineering customers and users who design with Diodes' products. Diodes' products may be used to facilitate safety-related applications; however, in all instances customers and users are responsible for (a) selecting the appropriate Diodes products for their applications, (b) evaluating the suitability of Diodes' products for their intended applications, (c) ensuring their applications, which incorporate Diodes' products, comply the applicable legal and regulatory requirements as well as safety and functional-safety related standards, and (d) ensuring they design with appropriate safeguards (including testing, validation, quality control techniques, redundancy, malfunction prevention, and appropriate treatment for aging degradation) to minimize the risks associated with their applications.

3. Diodes assumes no liability for any application-related information, support, assistance or feedback that may be provided by Diodes from time to time. Any customer or user of this document or products described herein will assume all risks and liabilities associated with such use, and will hold Diodes and all companies whose products are represented herein or on Diodes' websites, harmless against all damages and liabilities.

4. Products described herein may be covered by one or more United States, international or foreign patents and pending patent applications. Product names and markings noted herein may also be covered by one or more United States, international or foreign trademarks and trademark applications. Diodes does not convey any license under any of its intellectual property rights or the rights of any third parties (including third parties whose products and services may be described in this document or on Diodes' website) under this document.

5. Diodes' products are provided subject to Diodes' Standard Terms and Conditions of Sale (https://www.diodes.com/about/company/terms-and-conditions/terms-and-conditions-of-sales/) or other applicable terms. This document does not alter or expand the applicable warranties provided by Diodes. Diodes does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel.

6. Diodes' products and technology may not be used for or incorporated into any products or systems whose manufacture, use or sale is prohibited under any applicable laws and regulations. Should customers or users use Diodes' products in contravention of any applicable laws or regulations, or for any unintended or unauthorized application, customers and users will (a) be solely responsible for any damages, losses or penalties arising in connection therewith or as a result thereof, and (b) indemnify and hold Diodes and its representatives and agents harmless against any and all claims, damages, expenses, and attorney fees arising out of, directly or indirectly, any claim relating to any noncompliance with the applicable laws and regulations, as well as any unintended or unauthorized application.

7. While efforts have been made to ensure the information contained in this document is accurate, complete and current, it may contain technical inaccuracies, omissions and typographical errors. Diodes does not warrant that information contained in this document is error-free and Diodes is under no obligation to update or otherwise correct this information. Notwithstanding the foregoing, Diodes reserves the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein. This document is written in English but may be translated into multiple languages for reference. Only the English version of this document is the final and determinative format released by Diodes.

8. Any unauthorized copying, modification, distribution, transmission, display or other use of this document (or any portion hereof) is prohibited. Diodes assumes no responsibility for any losses incurred by the customers or users or any third parties arising from any such unauthorized use.

9. This Notice may be periodically updated with the most recent version available at https://www.diodes.com/about/company/terms-and-conditions/important-notice

The Diodes logo is a registered trademark of Diodes Incorporated in the United States and other countries.
All other trademarks are the property of their respective owners.
© 2026 Diodes Incorporated. All Rights Reserved.

www.diodes.com

© 2026 Copyright Diodes Incorporated. All Rights Reserved.