

Description

The PI6CV304 and PI6CV2304 are low-skew, low-noise, high-speed clock buffers and are ideal for computing, networking, and communication applications. Application examples include PCI(X) clock buffers in servers and workstations, PCI(X) Storage Area Network (SAN), and RAID controllers. They are used for networking and communications applications requiring 80MHz for 10/100Mbps Ethernet and 125MHz for Gigabit networking clocks.

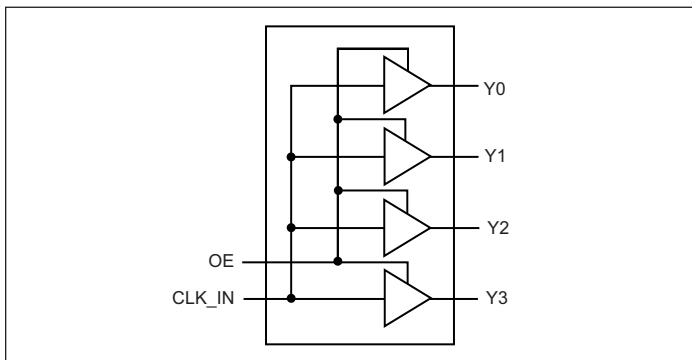
To reduce EMI emission and power consumption, all outputs can be disabled to 3-state by asserting a low signal to the OE (Output Enable) pin.

The PI6CV2304 output impedance is 30Ω. PI6CV304 output impedance is 20Ω.

Application(s)

- 33MHz PCI-to-133 MHz PCIX controllers
- 80MHz for 10/100 Mbps Ethernet
- 125MHz for Gigabit networking
- 155MHz for Optical OC3/SDH/SONET

Block Diagram



Features

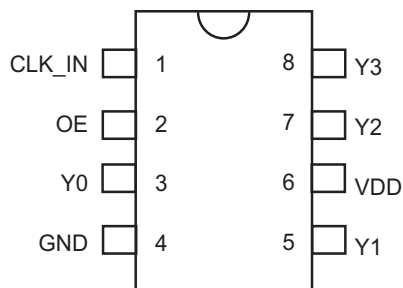
- 140MHz Operation (PI6CV2304)
- 160MHz Operation (PI6CV304)
- Low Noise, Low Skew: 150ps (maximum)
- Fast Rise/Fall Time: 1.0ns (typical)
- Fast Propagation Delay: 2.0ns (typical)
- 5V I/O Tolerant Input
- Industrial Temperature: -40°C to 85°C
- 3.3V Power Supply
- Packaging (Pb-free & Green available)
 - 8-pin TSSOP (L)
 - 8-pin SOIC (W)
- 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](https://www.diodes.com/quality/product-definitions/) 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.

Pin Configuration



Pin Description

Pin Number	Symbol	Type	Qty	Description
1	CLK_IN	Input	1	5V Tolerant clock input
2	OE	Input	1	Active High Output Enable. Y[0-3] outputs will be 3-stated when OE is low
3, 5, 7, 8	Y[0-3]	Output	4	LVC MOS level outputs
4	GND	Ground	1	Ground
6	V _{DD}	Power	1	3.3V power

Function Table

Inputs		Output
X	L	Z
L	H	L
H	H	H

Maximum Ratings

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

Supply Voltage (V_{DD}).....	-0.0V to +5.0V
Input Voltage	-0.5V to $V_{DD}+0.5V$
Industrial Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to +150°C
Junction Temperature.....	150°C
Input ESD MIL-883, Method 3015, Human Body Model.....	2KV

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.

Operating Conditions

Symbol	Description	Min	Max	Unit
V_{DD}	I/O Supply, Analog Core Supply	3.0	3.6	V
T_A	Industrial Ambient Temperature	-40	+85	°C

PI6CV304 DC Characteristics Over Operating Conditions

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
V_{IL}	Low Input Voltage				0.8	V
V_{IH}	High Input Voltage		2.0			
I_{IL}	Low Input Current	$V_{ININ} = 0$			-5	mA
I_{IH}	High Input Current	$V_{ININ} = V_{DD}$			5	
V_{OL}	Low Output Voltage	$V_{DDDD} = 3.0V$, $I_{OLOL} = 12mA$			0.4	V
V_{OH}	High Output Voltage	$V_{DDDD} = 3.0V$, $I_{OHOH} = -12mA$	2.4			
C_O	Output Capacitance				7	pF
C_I	Input Capacitance				5	
I_{DD}	Supply Current	$C_{LL} = 33pF/33MHz$		20		mA
		$C_{LL} = 33pF/66MHz$		40		
		$C_{LL} = 22pF/80MHz$		35		
		$C_{LL} = 15pF/100MHz$		32		
		$C_{LL} = 10pF/125MHz$		28		
		$C_{LL} = 10pF/155MHz$		41		
Z_O	Output Impedance			20		W
L	Pin Inductance				7	nH

PI6CV304 AC Characteristics

 $T_A = -40 \sim 85^\circ\text{C}$, $V_{DD} = 3.3\text{V} \pm 0.3\text{V}$, 33pF/66MHz and 10pF/160MHz)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
f_{IN}	Input frequency		0		160	MHz
t_{PLH}	Low-to-High propagation delay	CLK_IN to Y[0-3] rising edges @1.5V	1.0		3.0	ns
t_{PHL}	High-to-Low propagation delay	CLK_IN to Y[0-3] falling edges @1.5V	1.0		3.0	
$t_{SK(O)}$	Output skew ⁽²⁾	@1.5V			100	ps
$t_{SK(P)}$	Pulse skew	@1.5V			300	
$t_{SK(T)}$	Package skew	@1.5V			500	
t_R, t_F	Rise, Fall time	0.8V~2.0V			1.2	ns
t_{PZL}, t_{PZH}	Output Enable Time				5	
t_{PLZ}, t_{PHZ}	Output disable Time				10	
t_{DC}	Output Duty Cycle	$t_{DC} = t_H, t_{CY}, t_H = \text{High Pulse Width,}$ $t_{CY} = \text{Output Cycle Time, @ 1.5V}$	45		55	%

Note:

- Identical traces, loads, power supply.
- Maximum Output Skew is 100ps when frequency is below 125MHz with 10pF loading.

PI6CV2304 DC Characteristics Over Operating Conditions

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
V_{IL}	Low Input Voltage				0.8	V
V_{IH}	High Input Voltage		2.0			
I_{IL}	Low Input Current	$V_{ININ} = 0$			-50	mA
I_{IH}	High Input Current	$V_{ININ} = V_{DD}$			200	
V_{OL}	Low Output Voltage	$V_{DDDD} = 3.0\text{V}, I_{OLOL} = 8\text{mA}$			0.4	V
V_{OH}	High Output Voltage	$V_{DDDD} = 3.0\text{V}, I_{OHOH} = -8\text{mA}$	2.4			
I_{DD}	Supply Current	$C_{LL} = 33\text{pF}/33\text{MHz}$		20		mA
		$C_{LL} = 33\text{pF}/66\text{MHz}$		41		
		$C_{LL} = 22\text{pF}/80\text{MHz}$		35		
		$C_{LL} = 15\text{pF}/100\text{MHz}$		34		
		$C_{LL} = 10\text{pF}/125\text{MHz}$		31		
C_O	Output Capacitance				7	pF
C_I	Input Capacitance				5	
Z_O	Output Impedance			30		W
L	Pin Inductance				7	nH

PI6CV2304 AC Characteristics

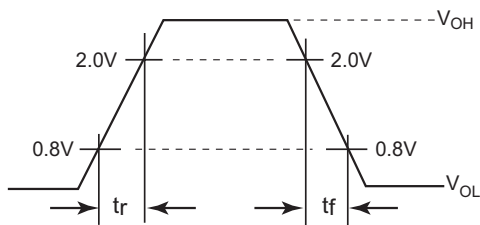
($T_A = -40 \sim 85^\circ\text{C}$, $V_{DD} = 3.3\text{V} \pm 0.3\text{V}$, 33pF/66MHz and 10pF/133MHz)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
f_{IN}	Input frequency		0		140	MHz
t_{PLH}	Low-to-High propagation delay	CLK_IN to Y[0-3] rising edges @1.5V	1.0		3.0	ns
t_{PHL}	High-to-Low propagation delay	CLK_IN to Y[0-3] falling edges @1.5V	1.0		3.0	
$t_{SK(O)}$	Output skew	@1.5V			150	ps
$t_{SK(P)}$	Pulse skew	@1.5V			300	
$t_{SK(T)}$	Package skew ⁽¹⁾	@1.5V			500	
t_R, t_F	Rise, Fall time	0.8V~2.0V			1.35	ns
t_{PZL}, t_{PZH}	Output Enable Time				5	
t_{PLZ}, t_{PHZ}	Output disable Time				10	
t_{DC}	Output Duty Cycle	$t_{DC} = t_H, t_{CY}, t_H = \text{High Pulse Width},$ $t_{CY} = \text{Output Cycle Time, @ 1.5V}$	45		55	%

Note:

1. Identical traces, loads, power supply.

Rise/Fall Time

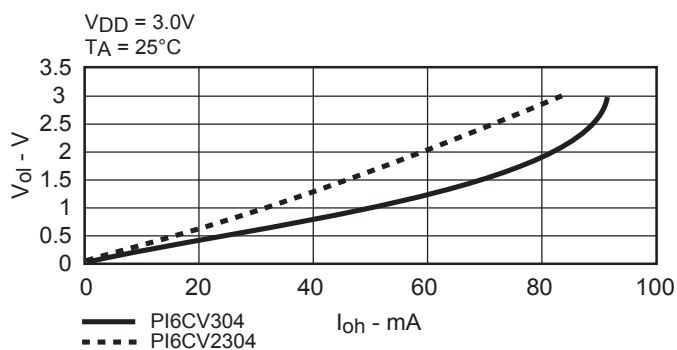


Note:

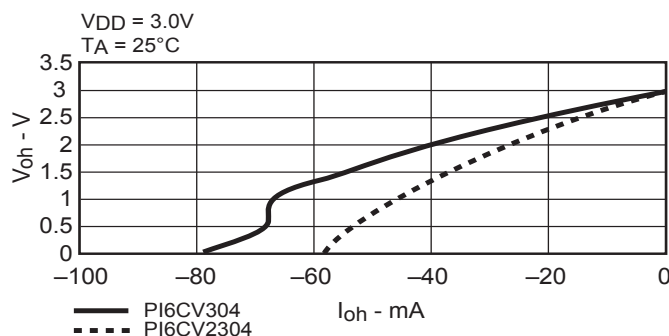
For test circuit: $R_S = 0$ for PI6CV2304, $R_S = 15$ ohms for PI6CV304

$C_L = 10, 15, 22$, or 33 pF, depending on frequency.

Low-Level Output Voltage vs. Low-Level Output Current

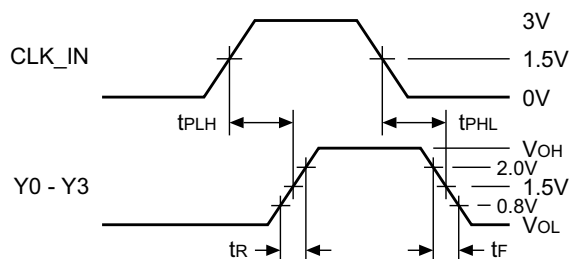


High-Level Output Voltage vs. High-Level Output Current

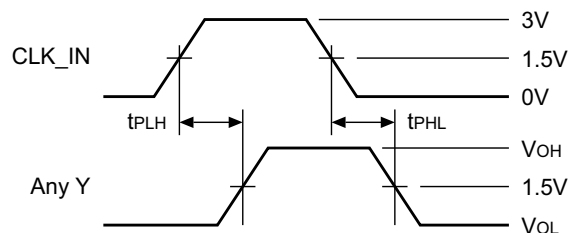


Switching Waveforms

Propagation Delay

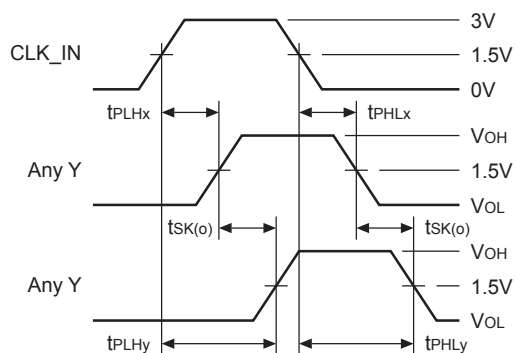


Pulse Skew – tsk(p)



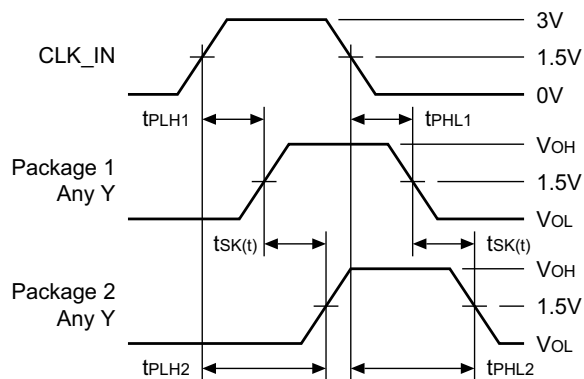
$$tsk(p) = |t_{PHL} - t_{PLH}|$$

Output Skew – tsk(o)



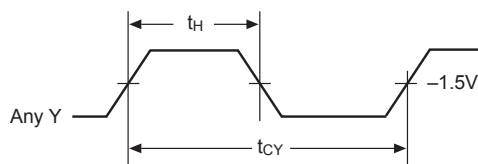
$$tsk(o) = |t_{PLHy} - t_{PLHx}| \text{ or } |t_{PHLy} - t_{PHLx}|$$

Package Skew – tsk(t)



$$tsk(t) = |t_{PLH2} - t_{PLH1}| \text{ or } |t_{PHL2} - t_{PHL1}|$$

Output Duty Cycle – t_{DC}



Part Marking

PI6CV304

L Package

Pericom Product Family
Device/Package Type

PI6CV
304LE
YYWWXX

Y: Year
W: Workweek
1st X: Assembly Code
2nd X: Fab Code
Note: Date Code per MA-1251

W Package

Pericom Product Family
Device/Package Type

PI6CV
304WE
YYWWXX

Y: Year
W: Workweek
1st X: Assembly Code
2nd X: Fab Code
Note: Date Code per MA-1251

PI6CV2304

L Package

Pericom Product Family
Device/Package Type

PI6CV
2304LE
YYWWXX

Y: Year
W: Workweek
1st X: Assembly Code
2nd X: Fab Code
Note: Date Code per MA-1251

W Package

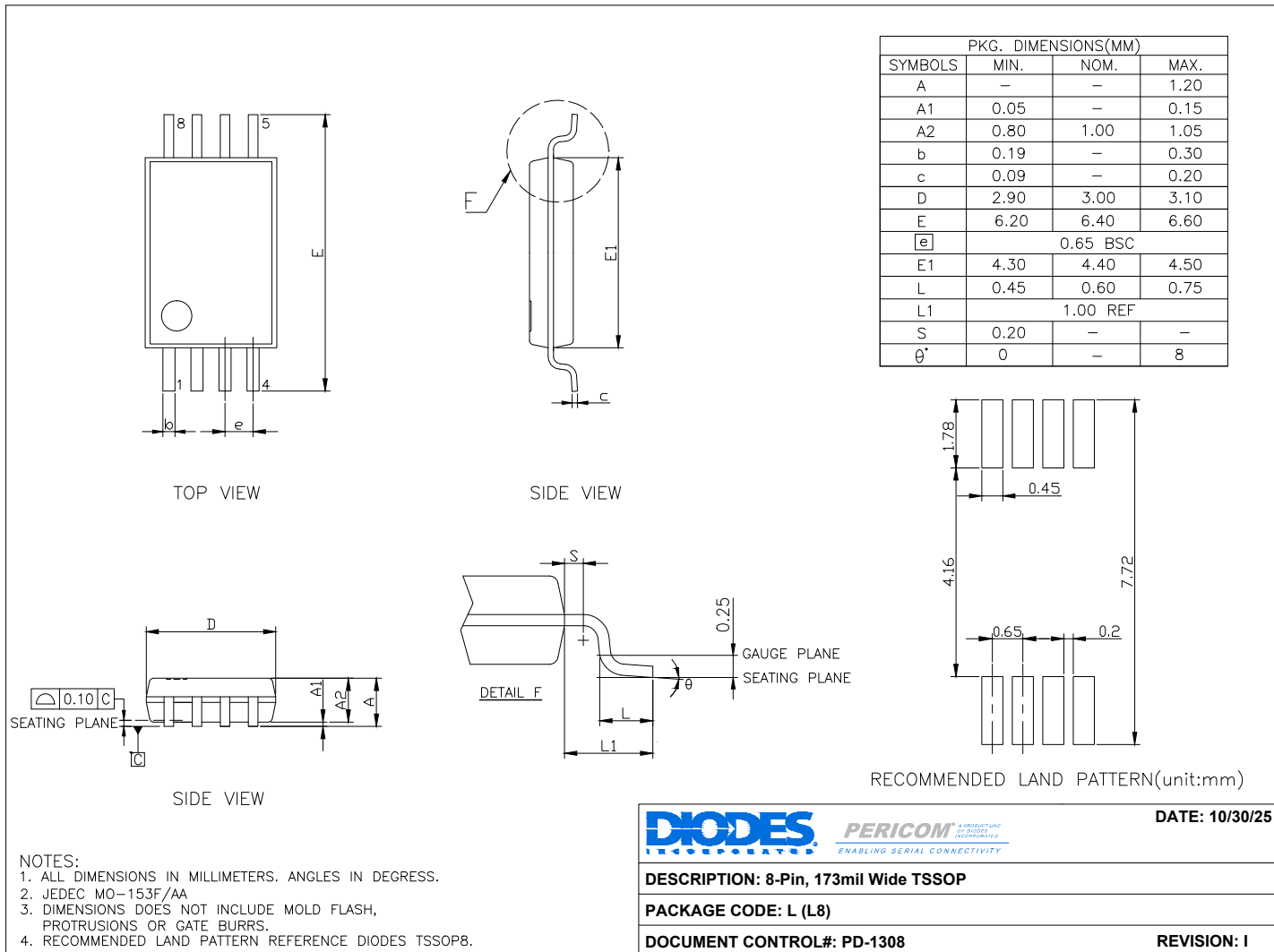
Pericom Product Family
Device/Package Type

PI6CV
2304WE
YYWWXX

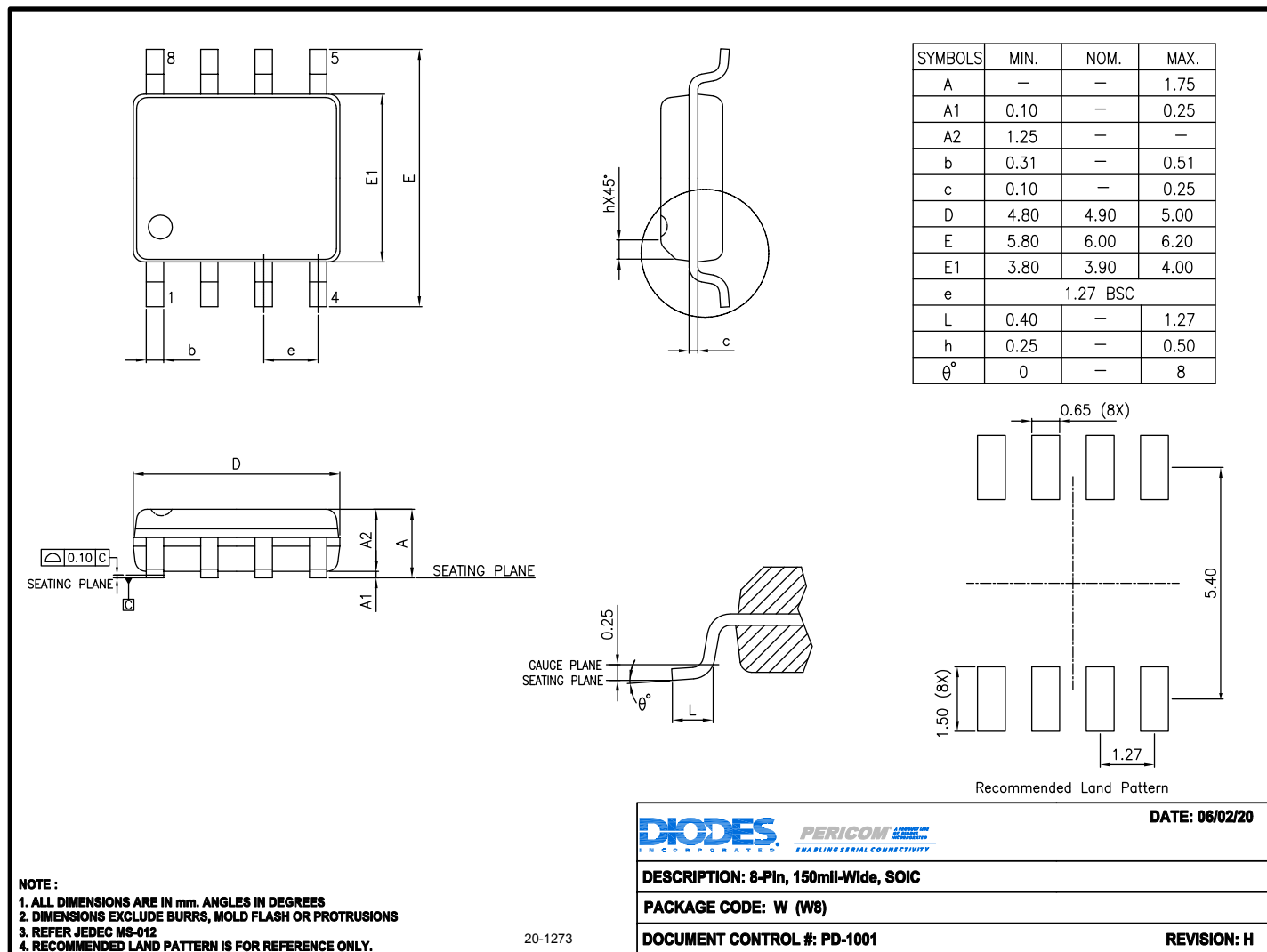
Y: Year
W: Workweek
1st X: Assembly Code
2nd X: Fab Code
Note: Date Code per MA-1251

Packaging Mechanical

8-TSSOP (L)



8-SOIC (W)



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	Description
PI6CV304LEX	L	8-pin, 173-mil wide (TSSOP)
PI6CV304WEX	W	8-pin, 150-mil wide (SOIC)
PI6CV2304LEX	L	8-pin, 173-mil wide (TSSOP)
PI6CV2304WEX	W	8-pin, 150-mil wide (SOIC)

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 <http://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

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