PI6C557-06

1:4 HCSL PCIe® Buffer

Features

- 1:4 HCSL clock buffer
- PCIe® Gen 1, 2 and 3 compliant
- Selectable reference inputs
- Cycle-to-Cycle Jitter <70ps
- Output-to-Output Skew <35ps
- 3.3V supply voltage
- TSSOP-20 package
- Industrial Temperature

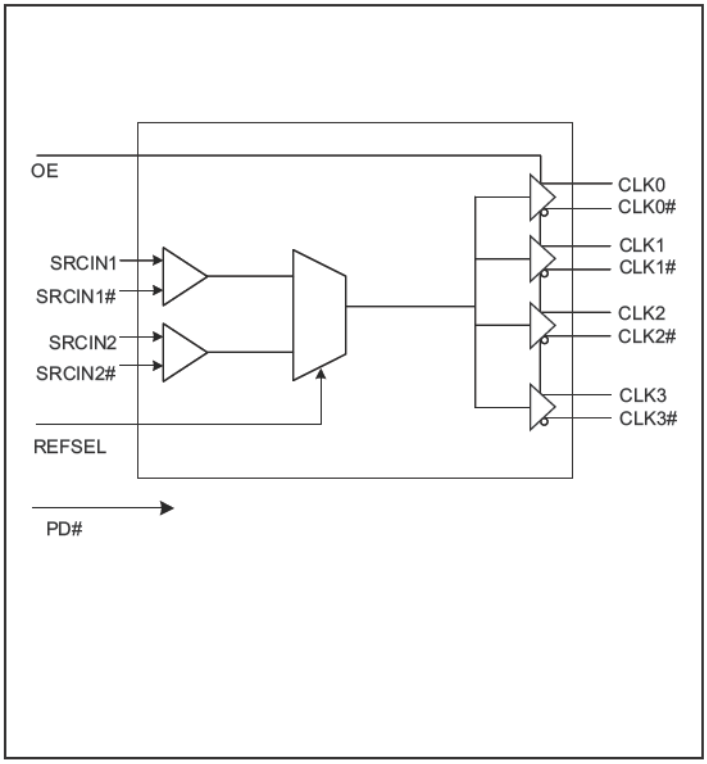
Description

The PI6C557-06 is a high performance PCIe® buffer with four HCSL outputs compliant to PCIe® Gen 1, 2 and 3 standards. The device has selectable reference inputs to provide flexibility in system design.

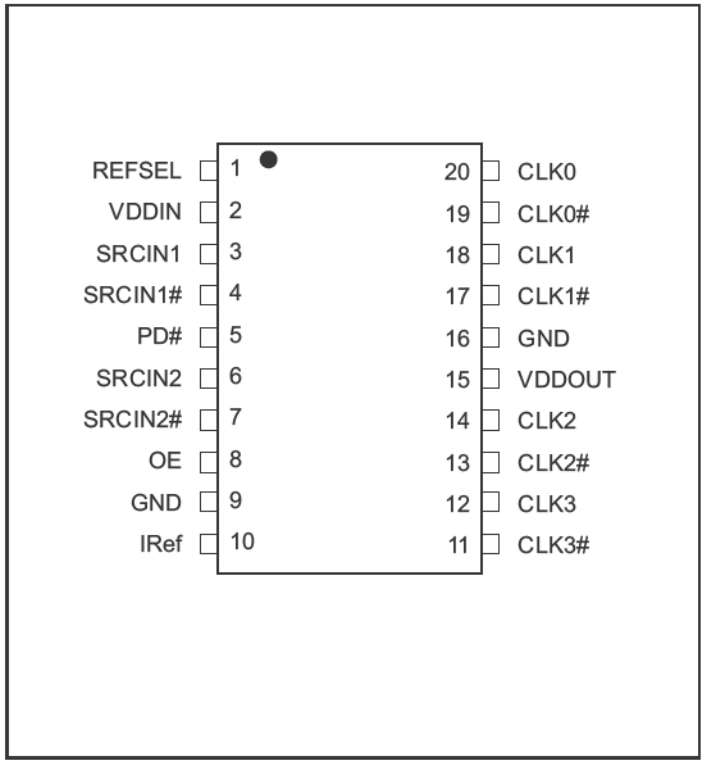
Applications

- Servers
- Embedded computing systems
- Networking systems

Block Diagram



Pin Configuration



Function Table

REFSEL	INPUT Selected
0	SRCIN2 / SRCIN2#
1	SRCIN1 / SRCIN1#

Pin Description

Pin #	Pin	Type	Description
1	REFSEL	Input	Internal pull up. “0” select SRCIN2/2#; “1” selects SRCIN1/1#.
2	VDDIN	Power	3.3V for input buffer
3, 4	SRCIN1, SRCIN1#	Input	HCSL Input 1
5	PD#	Input	Power Down mode. “0” is “power down”, “1” is normal operation. Internal pull up. Outputs are in tri-state when power down.
6, 7	SRCIN2, SRCIN2#	Input	HCSL input 2
8	OE	Input	Output enable for all outputs. “0” is “disabled” as tri-stated, “1” is enable output mode. Internal pull up.
9,16	GND	Power	Ground
10	IRef	Input	External resistor connection for internal current reference
11,12	CKL3#, CLK3	Output	HCSL output
13,14	CKL2#, CLK2	Output	HCSL output
15	VDDOUT	Power	3.3V for outputs
17, 18	CKL1#, CLK1	Output	HCSL output
19, 20	CKL0#, CLK0	Output	HCSL output

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

Storage Temperature ..... - 65°C to +155°C
Ambient Temperature with Power Applied ..... -40°C to +85°C
3.3V Analog Supply Voltage ..... - 0.5 to +4.6V
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.

Recommended Operating Condition

Symbol	Description	Test Conditions	Min	Type	Max	Unit
V_{DD}	Power supply	-	3.135	-	3.465	V
I_{DD}	Total Power Supply Current	50Ω, 2pF	-	41[1]		mA
		HCSL Load (See page 6)	-	-	90	mA
$I_{DD\_Output\ tri\text{-}stated}$	Total power supply current with Outputs are tri-stated	OE is "0"	-	-	15	mA
$I_{dd\ power\ down}$	Total power supply current in power down mode	PD# = "0", no load			0.3	mA
T_A	Operating temperature	Industrial temperature	-40		+85	°C

Note:

1. This is for 2 outputs. Total Current = I_{CORE} + 2x I_{OUTPUT} = 13 + 14 x 2 = 41mA

LVCMOS DC Electrical Characteristics (Over Operating Conditions)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{IH}	Input High Voltage	-	2	-	V_{DD}+0.3	V
V_{IL}	Input Low Voltage	-	-0.3	-	0.8	V
I_{IH}	Input High Current	$V_{IN} = V_{DD}$	-	-	45	µA
I_{IL}	Input Low Current	V_{IN} = 0V	-45	-	-	µA
R_{PU}	Internal pull up resistance	REFSEL, OE, PD#	-	120	-	kOhm

Differential DC Input Characteristics (Over Operating Conditions)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_{IH}	Input High Current, IN-	V_{IN} = VDD=3.465V	-	-	5	µA
	Input High Current, IN+				45	µA
I_{IL}	Input Low Current, IN-	V_{IN} = 0V	-45	-	-	µA
	Input Low Current, IN+		-5	-	-	µA
V_{IH}	Input High Voltage	Single-ended swing HCSL	660	700	850	mV
V_{IL}	Input Low Voltage		-150	0		mV
V_{ID}	Input differential voltage	Single-ended swing LVDS	250	350	450	mV
V_{IO}	Input Differential offset voltage	Cross point	1.125	1.25	1.375	mV

HCSL DC Electrical Characteristics (Over Operating Conditions)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{OH}	Output High Voltage	-	660	-	850	mV
V_{OL}	Output Low Voltage	-	-	-	150	mV
V_{CROSS}	Absolute Crossing Point Voltages	-	250	-	550	mV
ΔV_{CROSS}	Total variation of VCROSS overall edges	-	-	-	140	mV
I_{OH}	Output High Current	With 475-Ohm resistor connected between IREF pin and GND	-	14	-	mA

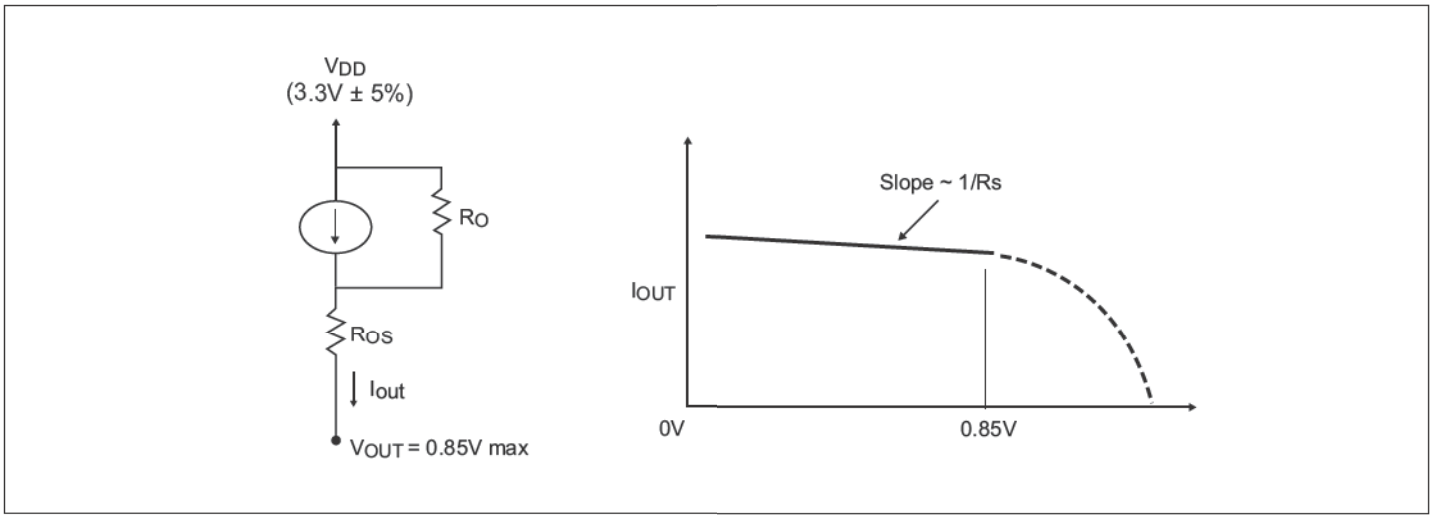
HCSL AC Electrical Characteristics (Over Operating Conditions)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
F_{in}	Input Frequency	-	-	-	200	MHz
F_{OUT}	Output Frequency	HCSL termination	-	-	200(1)	MHz
T_r / T_f	Output Rise/Fall time	Between 0.175V and 0.525V(2)	175	-	700	ps
ΔT_r / ΔT_f	Rise and Fall Time Variation(2)	-	-	-	125	ps
T_{PD}	Propagation delay	Input to output measured at the mid point level	-	3.0	4.5	ns
T_{skew}	Output-to-Output Skew(3)	-	-	-	35	ps
T_{DC}	Output Duty Cycle(3)	-	47	-	53	%
J_C	Cycle to cycle jitter (3)	Differential waveform	-	50	70	ps
J_{Add}	Additive RMS jitter (4)	100MHz HCSL from 12 kHz to 20MHz	-	330	-	fs
	Additive RMS jitter for PCIe 2.0		< 0	-	1	ps
J_{Phase}	RMS phase jitter for PCIe 3.0	High Frequency	-	0.4	1	ps
		Low Frequency	-	0.6	3	ps
PSR	Power Supply Noise Rejection	50mVp-p input sine wave 100kHz to 600kHz(2)	-	-53	-	dBc
T_{OEN}	OE enable time				100	ns
T_{OEF}	OE disable time	———————			100	ns

Notes:

1. For LVDS Termination , the maximum frequency is 100MHz
2. Measurement is taken from Single Ended waveform.
3. Measurement is taken from Differential waveform.
4. Additive jitter is calculated from input and output RMS phase jitter. ($J_A = \sqrt{(\text{output jitter})2 - (\text{input jitter})2}$

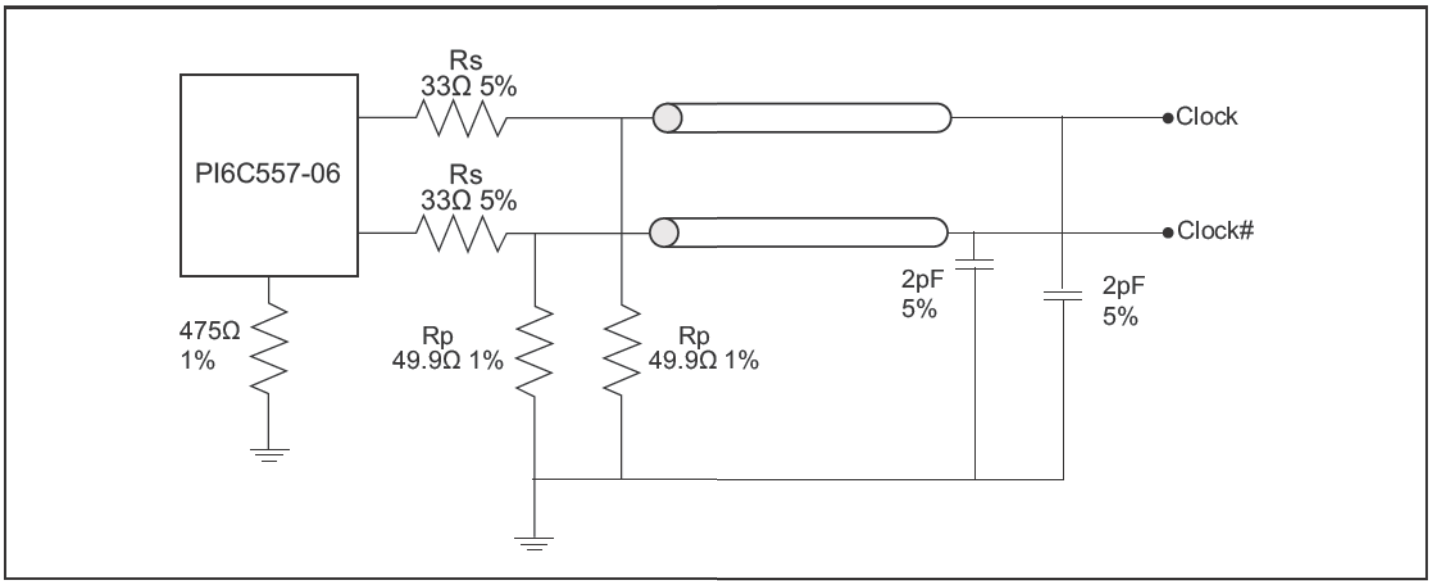
HCSL output buffer characteristics



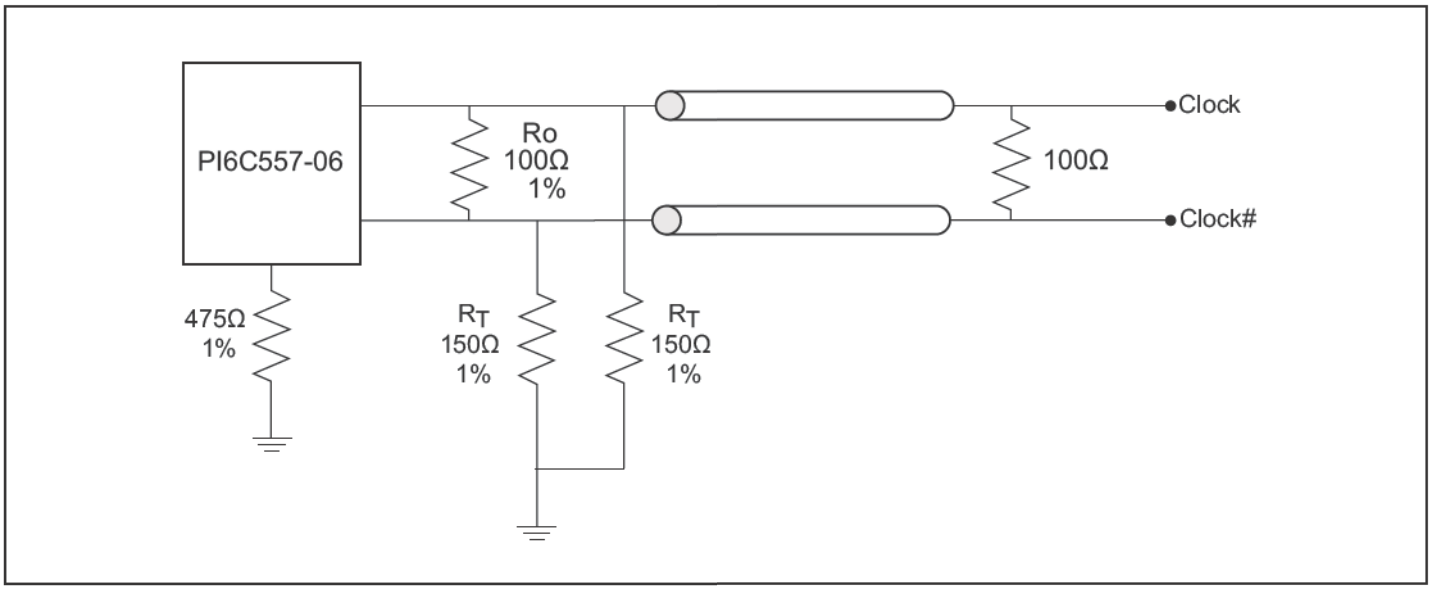
HCSL output buffer characteristics

Symbol	Minimum	Maximum
R_O	3000Ω	N/A
R_{OS}	unspecified	unspecified
V_{OUT}	N/A	850mV

Configuration

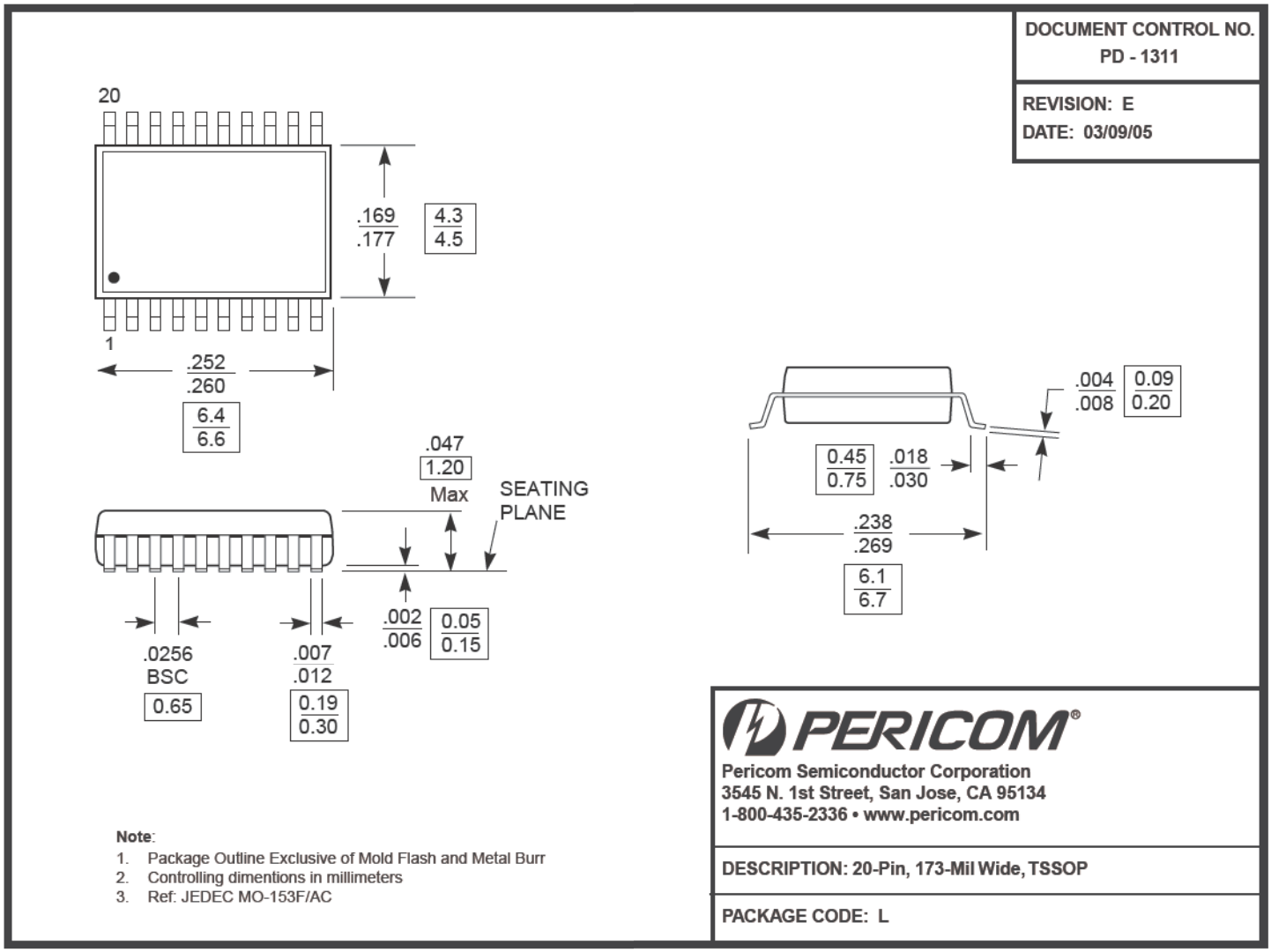


Test Load Board Termination for HCSL output



Test Load Board Termination for LVDS output

Packaging Mechanical: 20-pin TSSOP (L)



Ordering Information[1-3]

Ordering Code	Package Code	Package Type	Operating Temperature
PI6C557-06LIE	L	Pb-free & Green, 20-pin 173-mil TSSOP	-40°C to 85°C
PI6C557-06LE	L	Pb-free & Green, 20-pin 173-mil TSSOP	0°C to 70°C

Notes:

1. Thermal characteristics and package top marking information can be found at http://www.pericom.com/packaging/
2. E = lead-free and green packaging
3. Adding an X suffix = tape/reel