1.8V/2.5V, 250MHz, 1:10 Networking Clock Buffer

Features

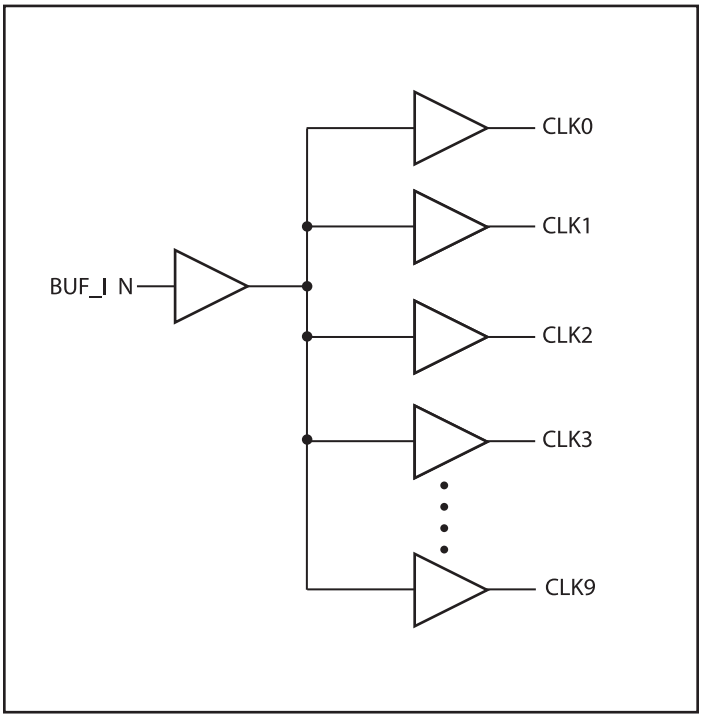
- High-speed, low-noise, non-inverting 1-10 buffer
- Maximum Frequency up to 250 MHz
- Low output skew < 60ps
- Low duty cycle distortion < 200ps
- Low propagation delay < 2.0ns
- Multiple V_{DD}, GND pins for noise reduction
- 1.8V or 2.5V supply voltage
- Packages (Pb-free & Green):
  - 20-pin, TSSOP (L20)
  - 20-pin, SSOP (H20)

Description

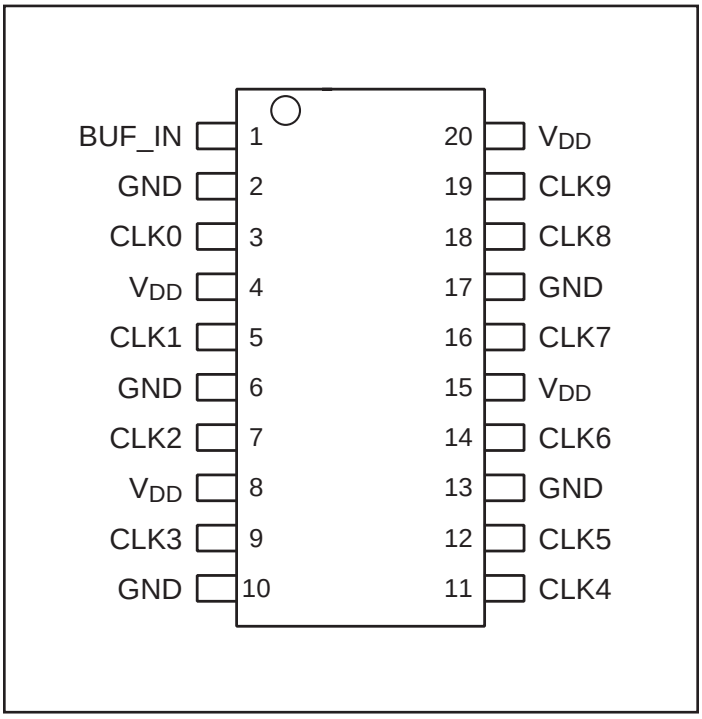
The PI6C10807 is a 1.8V, or 2.5V high-speed, low-noise 1-10 non-inverting clock buffer. The key goal in designing the PI6C10807 is to target networking applications that require low-skew, low-jitter, and high-frequency clock distribution.

Providing output-to-output skew as low as 60ps, the PI6C10807 is an ideal clock distribution device for synchronous systems. Designing synchronous networking systems requires a tight level of skew from a large number of outputs.

Block Diagram



Pin Configuration



Pin Description

Pin Name	Description
BUF_IN	Input
CLK [0:9]	Outputs
GND	Ground
V_{DD}	Power

2.5V Absolute Maximum Ratings (Above which the useful life may be impaired. For user guidelines only, not tested.)

Storage Temperature	–65°C to +150°C
V_{DD} Voltage	–0.5V to +3.6V
Output Voltage (max. 3.6V)	–0.5V to V_{DD}+0.5V
Input Voltage (max 3.6V)	–0.5V to V_{DD}+0.5V

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.

2.5V DC Characteristics (Over Operating Range: V_{DD} = 2.5V ± 0.2V, T_A = -40° to 85°C)

Parameters	Description	Test Conditions[1]		Min.	Typ.[2]	Max.	Units
V_{DD}	Supply Voltage			2.3	2.5	2.7	
V_{IH}	Input HIGH Voltage	Logic HIGH level		1.7		3.6	V
V_{IL}	Input LOW Voltage	Logic LOW level		-0.3		0.7	
I_I	Input Current	V_{DD} = Max, Vin = V_{DD} or GND				15	µA
V_{OH}	Output High Voltage	V_{DD} = Min., V_{IN} = V_{IH} or V_{IL}	I_{OH} = -1mA	2.0			V
			I_{OH} = -2mA	1.7			
			I_{OH} = -8mA	1.7			
V_{OL}	Output LOW Voltage	V_{DD} = Min., V_{IN} - V_{IH} or V_{IL}	I_{OL} = 1mA			0.1	
			I_{OL} = 2mA			0.2	
			I_{OL} = 8mA			0.2	

Notes:
1. For Max. or Min. conditions, use appropriate operating range values.
2. Typical values are at V_{DD} = 2.5V, +25°C ambient and maximum loading.

2.5V AC Characteristics (Over Operating Range: V_{DD} = 2.5V ± 0.2V, T_A = -40° to 85°C)

Parameters	Description	Test Conditions[1]	Min.	Typ	Max.	Units
F_{IN}	Input Frequency		0		250	MHz
t_R/t_F	CLKn Rise/Fall Time	20% to 80%			1.0	ns
$t_{SK(P)}$[3, 5]	Pulse Skew between opposite transitions (t_{PHL}-t_{PLH}) of the same output	Vin > V_{DD} C_L = 5pF, 125 MHz		100	200	ps
t_{PLH}, t_{PHL}[2, 5]	Propagation Delay BUF_IN to CLKn	C_L = 5pF, 125 MHz	1.0	1.5	2.0	ns
$t_{SK(O)}$[3, 5]	Output to Output Skew between any two outputs of the same device @ same transition				60	ps
$t_{SK(T)}$[3, 5]	Part to Part Skew between two identical outputs of different parts on the same board[4]				300	
t_{dc_in}[5]	Duty Cycle In @ Ins edge rate		45		55	%
t_{dc_out}[5]	Duty Cycle Out		40		57.5	

Notes:
1. See test circuit and waveforms.
2. Minimum limits are guaranteed but not tested on Propagation Delays.
3. Skew measured at worst case temperature (max. temp).
4. Identical conditions: loading, transitions, supply voltage, temperature, package type and speed grade.
5. Outputs are measured at V_{DD}/2

1.8V Absolute Maximum Ratings (Above which the useful life may be impaired. For user guidelines only, not tested.)

Storage Temperature	–65°C to +150°C
V_{DD} Voltage	–0.5V to +2.5V
Output Voltage (max 2.5V)	–0.5V to V_{DD}+0.5V
Input Voltage (max 2.5V)	–0.5V to V_{DD}+0.5V

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.

1.8V DC Characteristics (Over Operating Range: V_{DD} = 1.8V ± 0.15V, T_A = -40° to 85°C)

Parameters	Description	Test Conditions(1)		Min.	Typ. (2)	Max.	Units
V_{DD}	Supply Voltage			1.65	1.8	1.95	
V_{IH}	Input HIGH Voltage	Logic HIGH level		1.1		2.7	V
V_{IL}	Input LOW Voltage	Logic LOW level		-0.3		0.35*V_{DD}	
I_I	Input Current(3)	V_{DD} = Max, Vin = V_{DD} or GND				15	µA
V_{OH}	Output High Voltage	V_{DD} = Min., V_{IN} = V_{IH} or V_{IL}	I_{OH} = -2mA	1.35			V
			I_{OH} = -8mA	1.2			
V_{OL}	Output LOW Voltage	V_{DD} = Min., V_{IN} - V_{IH} or V_{IL}	I_{OL} = 2mA			0.1	
			I_{OL} = -8mA			0.2	

Notes:
1. For Max. or Min. conditions, use appropriate operating V_{DD} and Ta values.
2. Typical values are at V_{DD} = 1.8V, +25°C ambient and maximum loading.
3. This parameter is determined by device characterization but is not production tested.

1.8V AC Characteristics (Over Operating Range: V_{DD} = 1.8V ± 0.15V, T_A = -40° to 85°C)

Parameters	Description	Test Conditions(1)	Min.	Typ	Max.	Units
F_{IN}	Input Frequency		0		180	MHz
t_R/t_F	CLKn Rise/Fall Time	20% to 80%			1.0	ns
$t_{SK(P)}$ 3, 5	Pulse Skew between opposite transitions (t_{PHL}-t_{PLH}) of the same output	Vin > V_{DD} C_L = 5pF, 125 MHz		100	200	ps
t_{PLH}, t_{PHL} 2, 5	Propagation Delay BUF_IN to CLKn	C_L = 5pF, 125 MHz	1.0	1.5	2.0	ns
$t_{SK(O)}$ 3, 5	Output to Output Skew between any two outputs of the same device @ same transition				60	ps
$t_{SK(T)}$ 3, 5	Part to Part Skew between two identical outputs of different parts on the same board4				300	
t_{dc_in} 5	Duty Cycle In @ Ins edge rate		45		55	%
t_{dc_out} 5	Duty Cycle Out		40		57.5	

Notes:
1. See test circuit and waveforms
2. Minimum limits are guaranteed but not tested on Propagation Delays.
3. Skew measured at worst case temperature (max. temp).
4. Identical conditions: loading, transitions, supply voltage, temperature, package type and speed grade..
5. Outputs are measured at V_{DD}/2

Power Supply Characteristics

Parameters	Description	Test Conditions[1]		Min.	Typ. [2]	Max.	Units
I_{DDQ}	Quiescent Power Supply Current	V_{DD} = 2.7V	V_{IN} = GND or V_{DD}			10	µA
		V_{DD} = 1.95V				10	
I_{DDn}	Dynamic Power Supply Current per Output	V_{DD} = 2.7V	All Outputs Toggling, C_L = 5pF, F_{IN} = 125MHz		1.8		mA
		V_{DD} = 1.95V			3.5		
I_{DD_TOT}	Total Power Supply Current	V_{DD} = 2.7V	V_{IN} = V_{DD} or GND, All Outputs Toggling, C_L = 5pF, F_{IN} = 125MHz		48		
		V_{DD} = 1.95V			35		
ΔI_{CC}	Static Supply Current per inputs @ High Level	V_{DD} = 2.7V	V_{INx} = V_{DD} - 0.6V [3]			500	µA
		V_{DD} = 1.95V	V_{INx} = V_{DD} - 0.6V [3]			450	

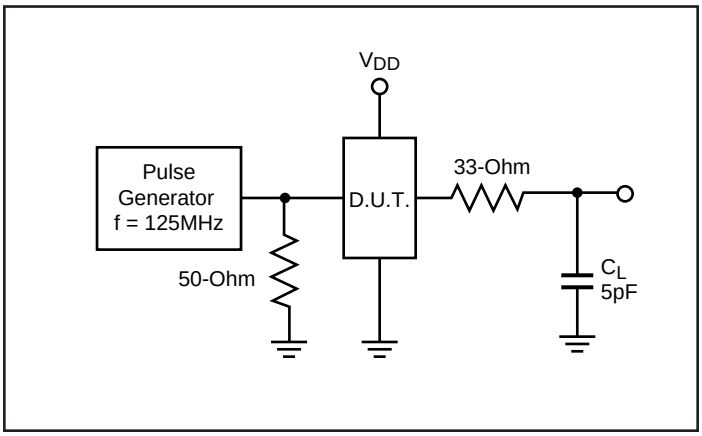
Notes:
1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics.
2. Typical values are at V_{DD} = 1.5V, 1.8V or 2.5V, and +25°C ambient.
3. Per TTL driven input (V_{IN} = V_{DD} - 0.6V); all other inputs at V_{DD} or GND.

Capacitance (T_A = 25°C, f = 1 MHz)

Parameters[1]	Description	Test Conditions	Typ	Max.	Units
C_{IN}	Input Capacitance	V_{IN} = 0V	3.0	4	pF
C_{OUT}	Output Capacitance	V_{OUT} = 0V	—	6	

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

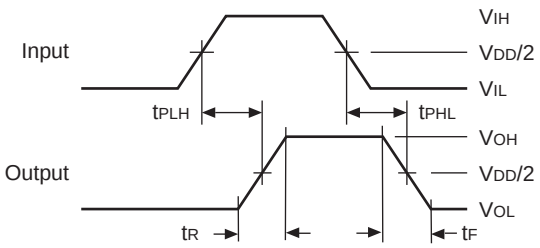
Test Circuits for All Outputs



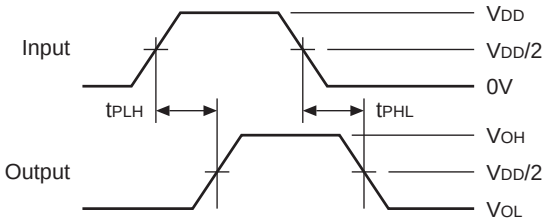
Definitions:
C_L = Load capacitance: includes jig and probe capacitance.

Switching Waveforms

Propagation Delay

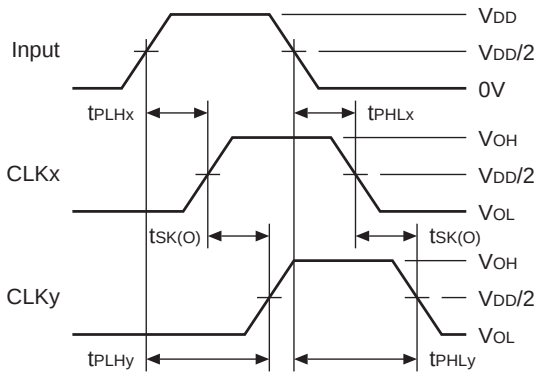


Pulse Skew – $t_{SK(P)}$



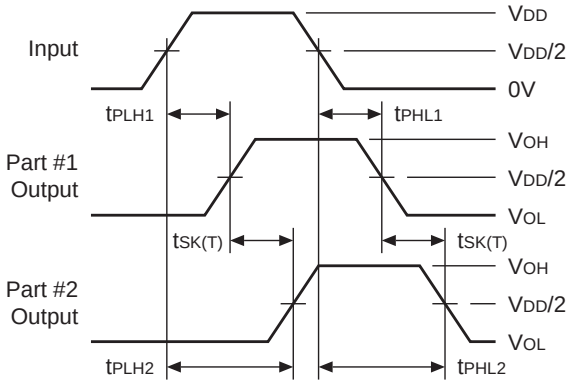
$t_{SK(P)} = | t_{PLH} - t_{PLH} |$

Output Skew – $t_{SK(O)}$



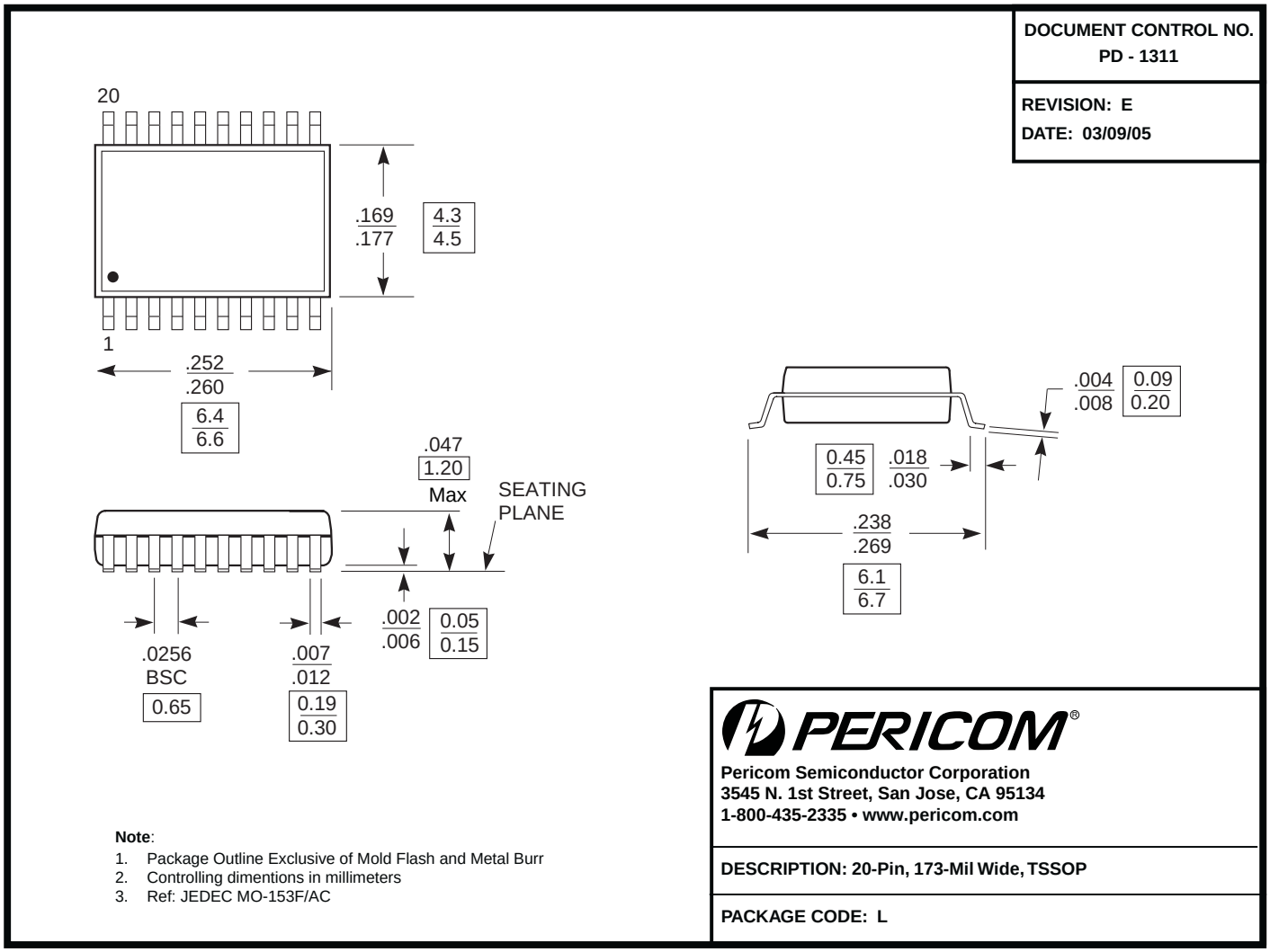
$t_{SK(O)} = | t_{PLHy} - t_{PLHx} |$ or $| t_{PHLy} - t_{PHLx} |$

Package Skew – $t_{SK(T)}$

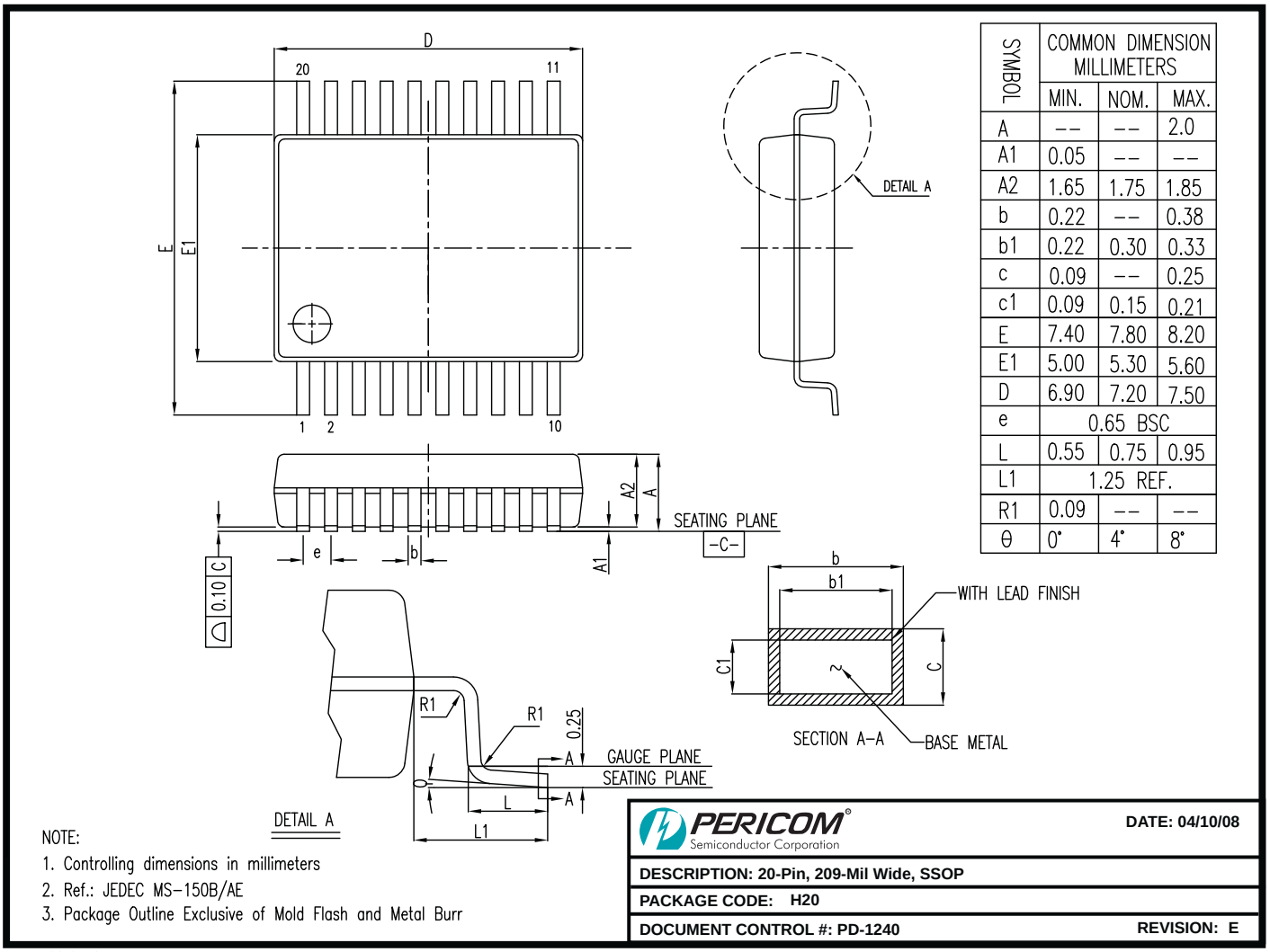


$t_{SK(T)} = | t_{PLH2} - t_{PLH1} |$ or $| t_{PHL2} - t_{PHL1} |$

Packaging Mechanical: 20-pin, TSSOP (L)



Packaging Mechanical: 20-pin, SSOP (H)



SYMBOL	COMMON DIMENSION MILLIMETERS		
	MIN.	NOM.	MAX.
A	--	--	2.0
A1	0.05	--	--
A2	1.65	1.75	1.85
b	0.22	--	0.38
b1	0.22	0.30	0.33
c	0.09	--	0.25
c1	0.09	0.15	0.21
E	7.40	7.80	8.20
E1	5.00	5.30	5.60
D	6.90	7.20	7.50
e	0.65 BSC		
L	0.55	0.75	0.95
L1	1.25 REF.		
R1	0.09	--	--
θ	0°	4°	8°

NOTE:
1. Controlling dimensions in millimeters
2. Ref.: JEDEC MS-150B/AE
3. Package Outline Exclusive of Mold Flash and Metal Burr

PERICOM Semiconductor Corporation

DATE: 04/10/08

DESCRIPTION: 20-Pin, 209-Mil Wide, SSOP

PACKAGE CODE: H20

DOCUMENT CONTROL #: PD-1240 REVISION: E

08-0140

Ordering Information[1-3]

Ordering Code	Package Code	Package Type
PI6C10807LE	L	Pb-free & Green, 20-pin 173-mil wide TSSOP
PI6C10807HE	H	Pb-free & Green, 20-pin 209-mil wide SSOP

Notes:
1. Thermal Characteristics can be found on the web at www.pericom.com/packaging/
2. E = Lead-free and Green
3. Adding an X suffix = Tape/Reel