2.5V CMOS 1-TO-10 CLOCK DRIVER

Features

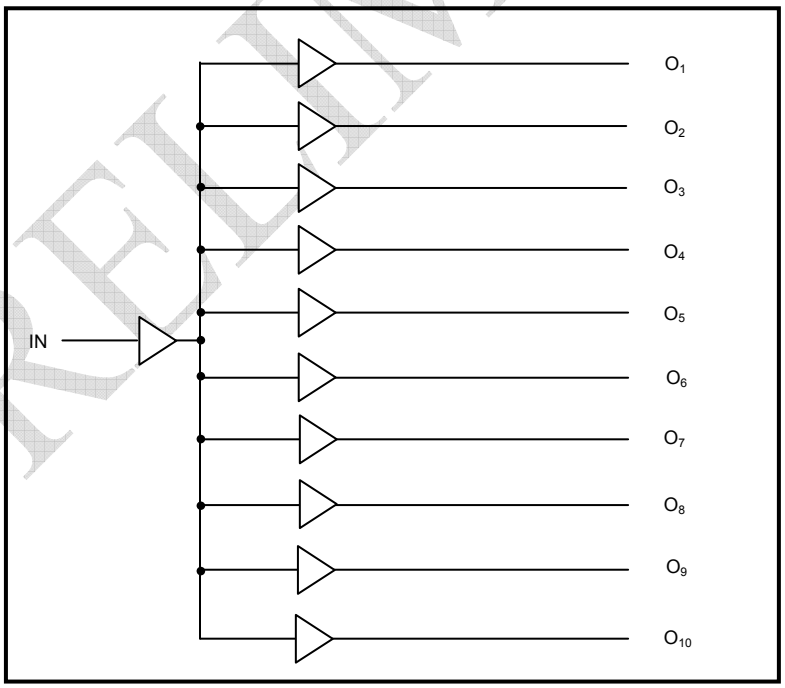
- High frequency > 150MHz
- Guaranteed low skew < 150pS (max.) between any two outputs
- Very low duty cycle distortion < 300pS
- High speed: propagation delay < 3nS
- Very low CMOS power levels
- TTL compatible inputs and outputs
- 1:10 fanout
- Maximum output rise and fall time < 1.25nS (max.)
- Low input capacitance: 3pF (typ)
- 2.5V Supply Voltage
- Available in SSOP and QSOP Packages

Product Description

The PCS2P20807A is a 2.5V compatible, high speed, low noise, 1:10 fanout, non-inverting clock buffer. The large fanout from a single input reduces loading on the preceding driver and provides an efficient clock distribution network.

Providing output to output skew as low as 150pS, the PCS20807A is an ideal clock distribution device for synchronous systems. Multiple power and grounds reduce noise. Typical applications are clock and signal distribution.

Block Diagram



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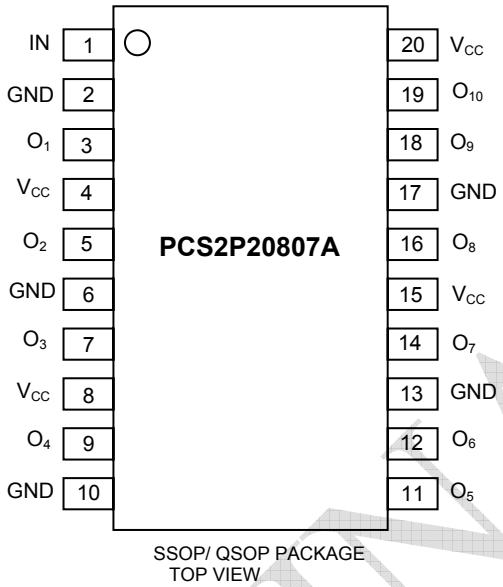
Pin Configuring



SSOP/ QSOP PACKAGE
TOP VIEW

Pin Description

Pin #	Pin Names	Description
1	I N	Clock Input
3,5,7,9,11,12,14,16,18,19	O_1-O_{10}	Clock Outputs
2,6,10,13,17	GND	Ground
4,8,15,20	V_{CC}	Power supply

Capacitance (TA = +25°C, f = 1.0MHz)

Symbol	Parameter[1]	Conditions	Typ	Max	Unit
C_{IN}	Input Capacitance	V_{IN} = 0V	3	4	pF
NOTE:1. This parameter is measured at characterization but not tested.					

Absolute Maximum Ratings[1]

Symbol	Description	Max	Unit
V_{TERM}[2]	Terminal Voltage with Respect to GND	-0.5 to +4.6	V
V_{TERM}[3]	Terminal Voltage with Respect to GND	-0.5 to +5.5	V
V_{TERM}[4]	Terminal Voltage with Respect to GND	-0.5 to V_{CC}+0.5	V
TSTG	Storage Temperature	-65 to +150	° C
IOUT	DC Output Current	-60 to +60	mA

NOTES:
1. These are stress ratings only and are not implied for functional use. Exposure to absolute maximum ratings for prolonged periods of time may affect device reliability.
2. V_{CC} terminals.
3. Input terminals.
4. Outputs and I/O terminals.

Power Supply Characteristics

Symbol	Parameter	Test Conditions[1]		Min	Typ[2]	Max	Unit
I_{CCL} I_{CCH}	Quiescent Power Supply Current TTL Inputs HIGH	V_{CC}= Max V_{IN} = GND or V_{CC}			0.1	20	µA
ΔI_{CC}	Power Supply Current per Input HIGH	V_{CC}= Max V_{IN} = V_{CC} -0.6V			45	300	µA
I_{CCD}	Dynamic Power Supply Current per Output[3]	V_{CC}= 2.7V and 15 pF load 150 MHz			40		µA /MHz
I_C	Total Power Supply Current[4]	V_{CC}= Max. C_L= 12pF All outputs toggling fi = 150MHz	V_{IN}= V_{CC} V_{IN}= GND		105	125	mA
			V_{IN}= V_{CC} –0.6V V_{IN}= GND		105	125	

NOTES:
1. For conditions shown as Max. or Min., use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Typical values are at V_{CC} = 2.5V, +25°C ambient.
3. This parameter is not directly testable, but is derived for use in Total Power Supply calculations.
4. I_C = IQUIESCENT + IINPUTS + IDYNAMIC
   I_C = I_{CC} + ΔI_{CC} DHNT + I_{CCD} (fi)
   I_{CC} = Quiescent Current (I_{CCL}, I_{CCH} and I_{CCZ})
   ΔI_{CC} = Power Supply Current for a TTL High Input (V_{IN} = V_{CC} -0.6V)
   D_H = Duty Cycle for TTL Inputs High
   N_T = Number of TTL Inputs at DH
   I_{CCD} = Dynamic Current Caused by an Input Transition Pair (HLH or LHL)
   fi = Input Frequency

DC Electrical Characteristics Over Operating Range

Following Conditions Apply Unless Otherwise Specified
Industrial: T_A = -40°C to +85°C, V_{CC} = 2.5V ± 0.2V

Symbol	Parameter	Test Conditions[1]		Min	Typ[2]	Max	Unit
V_{IH}	Input HIGH Level			1.7			V
V_{IL}	Input LOW Level					0.7	V
I_{IH}	Input HIGH Current (Input pins)	V_{CC}= Max, V_I = V_{CC}				±1	mA
I_{IL}	Input LOW Current (Input pins)	V_{CC}= Max, V_I = GND				±1	mA
V_{IK}	Clamp Diode Voltage	V_{CC}= Min, I_{IN} = -18mA			-0.7	-1	V
I_{ODH}	Output HIGH Current	V_{CC}= 2.5V, V_{IN} = V_{IH} or V_{IL} V_O = 1.25V[3]		-25	-45	-100	mA
I_{ODL}	Output LOW Current	V_{CC}= 2.5V, V_{IN} = V_{IH} or V_{IL} V_O = 1.25V[3]		20	55	120	mA
V_{OH}	Output HIGH Voltage	V_{CC}= Min V_{IN} = V_{IH} or V_{IL}	I_{OH} = -1mA	V_{CC}–0.2			V
			I_{OH} = -8mA	1.8[5]			
V_{OL}	Output LOW Voltage	V_{CC}= Min	I_{OL} = 1mA			0.4	V
		V_{IN} = V_{IH} or V_{IL}	I_{OL} = 8mA			0.6	
I_{OS}	Short Circuit Current[4]	V_{CC}= Max., V_O = GND[3]		-25	-60	-135	mA

NOTES:
1. For conditions shown as Max or Min, use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Typical values are at Vcc = 2.5V, +25°C ambient.
3. Not more than one output should be shorted at one time. Duration of the test should not exceed one second.
4. This parameter is guaranteed but not tested.
5. V_{OH} = Vcc - 0.6V at rated current.

Switching Characteristics Over Operating Range[1,2]

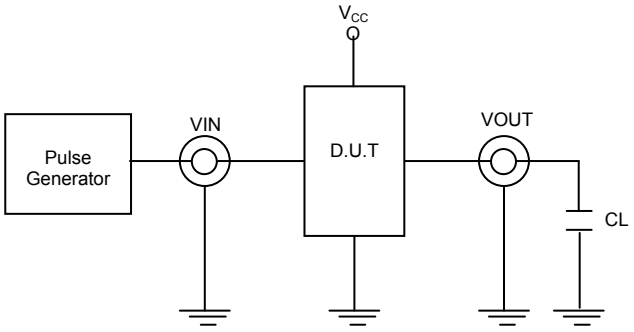
Following Conditions Apply Unless Otherwise Specified
Industrial: T_A = -40°C to +85°C, V_{CC} = 2.5V ± 0.2V

Symbol	Parameter	Conditions[3]	Min	Typ	Max	Unit
t_{PLH} t_{PHL}	Propagation Delay	C_L= 22pF 100 MHz		3	3.5	nS
t_R	Output Rise Time			1	1.25	nS
t_F	Output Fall Time			1	1.25	nS
$t_{SK(O)}$	Same Device Output Pin-to-Pin Skew[4]			100	150	pS
$t_{SK(P)}$	Pulse Skew[5]			250	300	pS
$t_{SK(PP)}$	Part-to-Part Skew[6]			400	600	pS

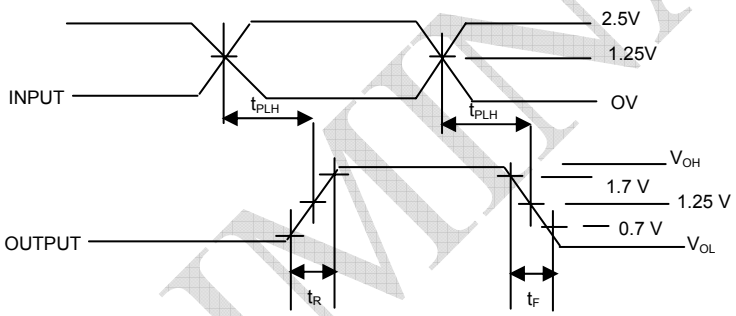
Symbol	Parameter	Conditions[3,7]	Min	Typ	Max	Unit
t_{PLH} t_{PHL}	Propagation Delay	C_L= 12pF 150 MHz		2.4	2.7	nS
t_R	Output Rise Time			1	1.2	nS
t_F	Output Fall Time			1	1.2	nS
$t_{SK(O)}$	Same Device Output Pin-to-Pin Skew[4]			100	150	pS
$t_{SK(P)}$	Pulse Skew[5]			250	300	pS
$t_{SK(PP)}$	Part-to-Part Skew[6]			400	600	pS

NOTES:
1. t_{PLH} and t_{PHL} are production tested. All other parameters guaranteed but not production tested.
2. Propagation delay range indicated by Min. and Max. limit is due to VCC, operating temperature and process parameters. These propagation delay limits do not imply skew.
3. See test circuits and waveforms.
4. Skew measured between all outputs under identical transitions and load conditions.
5. Skew measured is difference between propagation delay times t_{PHL} and t_{PLH} of same output under identical load conditions.
6. Part to part skew for all outputs given identical transitions and load conditions at identical VCC levels and temperature.
7. Airflow of 1m/s is recommended for frequencies above 133MHz.

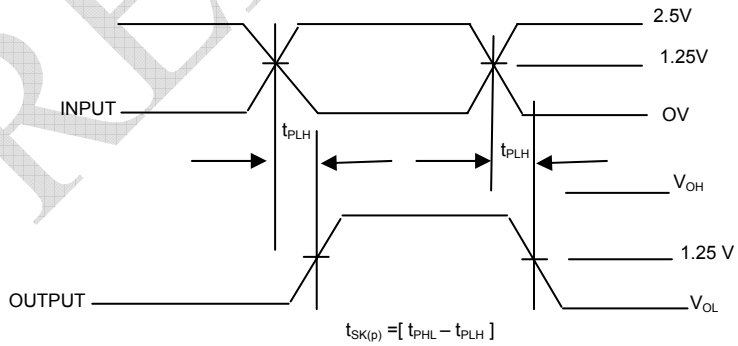
Test Circuits and Waveforms



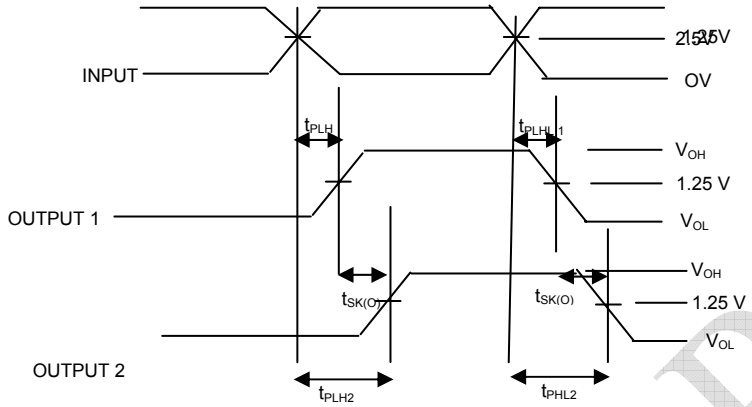
CL = Load Capacitance: Includes Jig and Capacitance probe



Propagation Delay

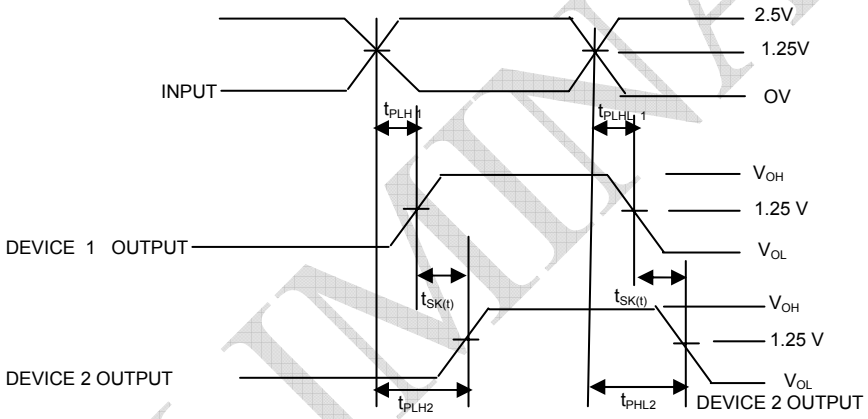


Pulse Skew - $t_{SK(P)}$



$t_{SK(O)} = [\ t_{PLH2} - t_{PLH\,1}\ ]$ or $[t_{PHL2} - t_{PHL1}]$

Output Skew - $t_{SK(O)}$



$t_{SK(t)} = [\ t_{PLH2} - t_{PLH\,1}\ ]$ or $[t_{PHL2} - t_{PHL1}]$

Part-to-Part Skew - $t_{SK(PP)}$

NOTE: Device 1 and device 2 are same package type and speed grade.

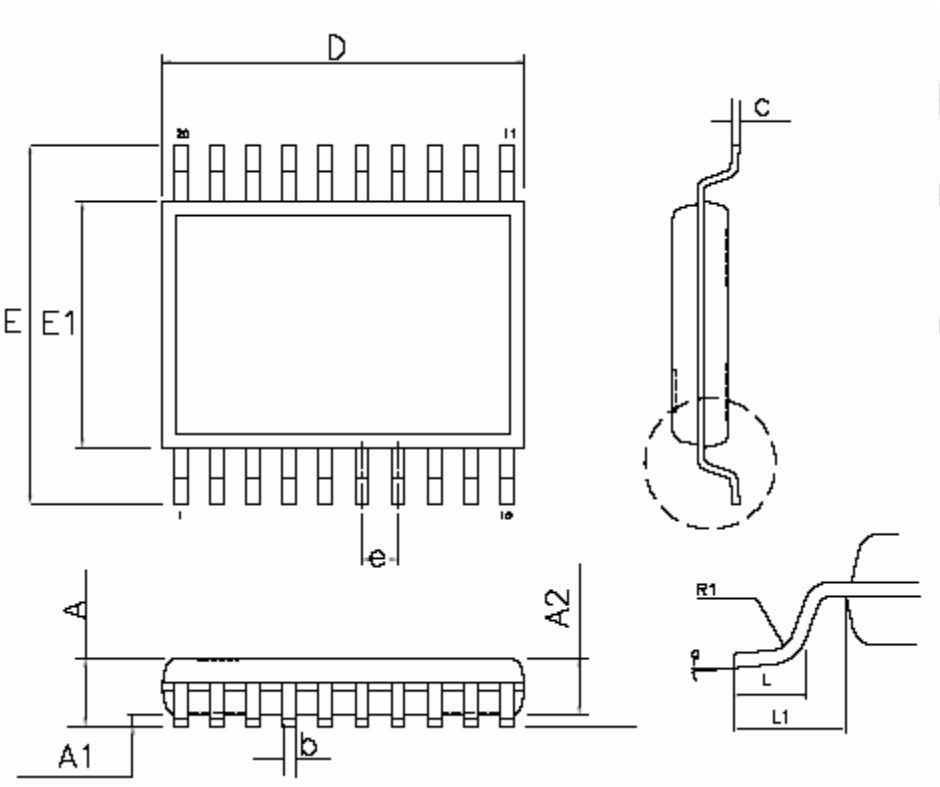
Test Conditions

Symbol	VCC = 2.5V ±0.2V	Unit
C_L	22[1] / 12[2]	pF
R_T	Z $_{OUT}$ of pulse generator	Ω
t_R / t_F	1.25[1] / 1.2[2]	nS

DEFINITIONS:
C_L = Load capacitance: includes jig and probe capacitance.
R_T = Termination resistance: should be equal to ZOUT of the Pulse Generator.
t_R / t_F = Rise/Fall time of the input stimulus from the Pulse Generator.
NOTES:
1. Test conditions at 100MHz.
2. Test conditions at 150MHz.

Package Information

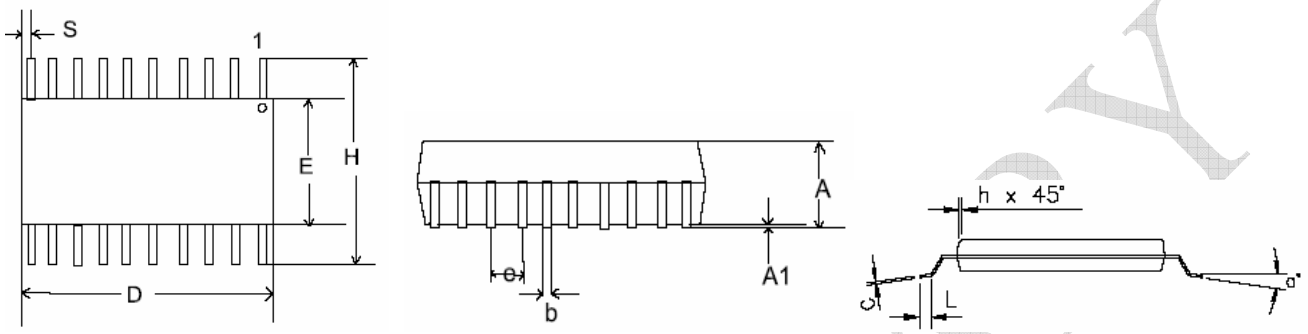
20-lead SSOP (209 mil)



Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	0.053	0.069	1.346	1.753
A1	0.004	0.010	0.102	0.254
A2	….	0.059	….	1.499
D	0.337	0.344	8.560	8.738
c	0.007	0.011	0.178	0.274
E	0.228	0.244	5.791	6.198
E1	0.150	0.157	3.810	3.988
L	0.016	0.035	0.406	0.890
L1	0.010 BASIC		0.254 BASIC	
b	0.008	0.014	0.203	0.356
R1	0.003	….	0.08	…..
a	0°	8°	0°	8°
e	0.025 BASIC		0.635 BASIC	

Package Information

20-lead QSOP

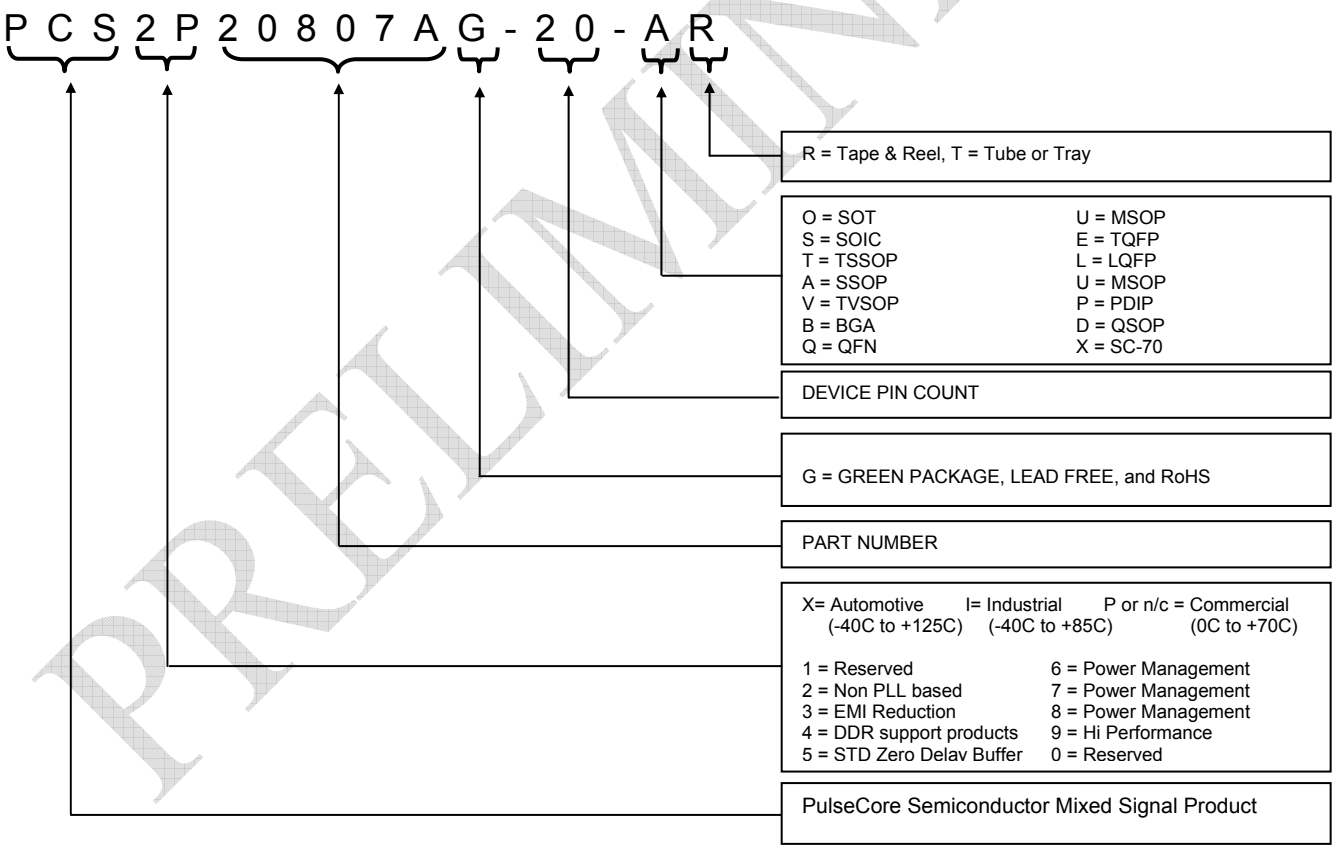


Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	0.060	0.068	1.52	1.73
A1	0.004	0.008	0.10	0.20
b	0.009	0.012	0.23	0.30
c	0.007	0.010	0.18	0.25
D	0.337	0.344	8.56	8.74
E	0.150	0.157	3.81	3.99
e	0.025 BSC		0.64 BSC	
H	0.230	0.244	5.84	6.20
h	0.010	0.016	0.25	0.41
L	0.016	0.035	0.41	0.89
S	0.056	0.060	1.42	1.52
a	0°	8°	0°	8°

Ordering Information

Part Number	Marking	Package Type	Temperature
PCS2P20807AG-20-AR	2P20807AG	20-Pin SSOP, TAPE & REEL , Green	Commercial
PCS2P20807AG-20-AT	2P20807AG	20-Pin SSOP, TUBE, Green	Commercial
PCS2P20807AG-20-DR	2P20807AG	20-Pin QSOP, TAPE & REEL, Green	Commercial
PCS2P20807AG-20-DT	2P20807AG	20-Pin QSOP, TUBE, Green	Commercial
PCS2I20807AG-20-AR	2I20807AG	20-Pin SSOP, TAPE & REEL, Green	Industrial
PCS2I20807AG-20-AT	2I20807AG	20-Pin SSOP, TUBE, Green	Industrial
PCS2I20807AG-20-DR	2I20807AG	20-Pin QSOP, TAPE & REEL, Green	Industrial
PCS2I20807AG-20-DT	2I20807AG	20-Pin QSOP, TUBE, Green	Industrial

Device Ordering Information



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Note: This product utilizes US Patent # 6,646,463 Impedance Emulator Patent issued to PulseCore Semiconductor, dated 11-11-2003