



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



PI6C557-03A

PCIe 2.0 Clock Generator with 2 HCSL Outputs

Features

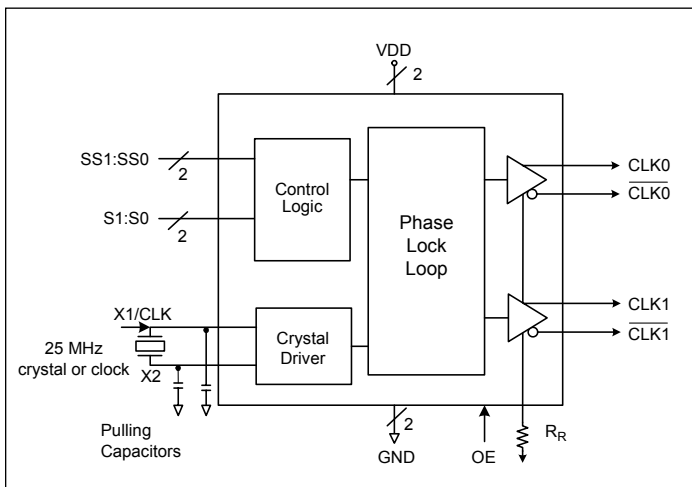
- PCIe® 2.0 compliant
 - Phase jitter - 2.1ps RMS (typ)
- LVDS compatible outputs
- Supply voltage of 3.3V ±10%
- 25MHz crystal or clock input frequency
- HCSL outputs, 0.8V Current mode differential pair
- Jitter 35ps cycle-to-cycle (typ)
- Spread of -0.5%, -0.75%, and no spread
- Industrial temperature range
- Spread Bypass option available
- Spread and frequency selection via external pins
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. “Green” Device (Note 3)
- Packaging: (Pb-free and Green)
 - 16-pin TSSOP (L16)
 - 16-pin QSOP (Q16)

Description

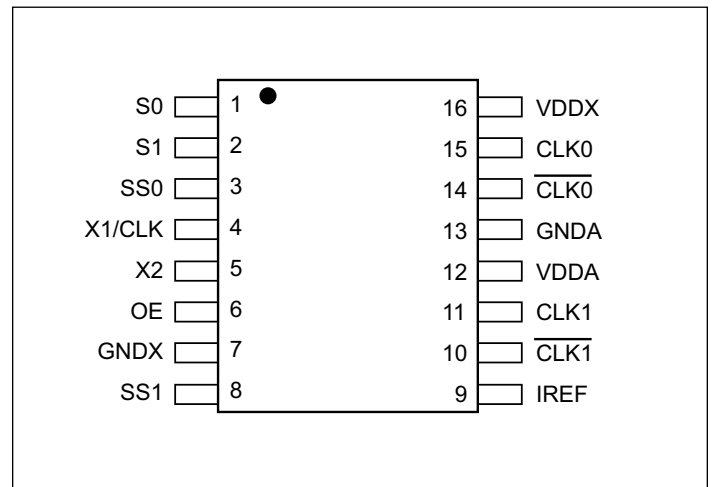
The PI6C557-03A is a spread spectrum clock generator compliant to PCI Express® 2.0 and Ethernet requirements. The device is used for PC or embedded systems to substantially reduce Electro-magnetic Interference (EMI).

The PI6C557-03A provides two differential (HCSL) or LVDS spread spectrum outputs. The PI6C557-03A is configured to select spread and clock selection. Using Pericom's patented Phase-Locked Loop (PLL) techniques, the device takes a 25MHz crystal input and produces two pairs of differential outputs (HCSL) at 25MHz, 100MHz, 125MHz and 200MHz clock frequencies. It also provides spread selection of -0.5%, -0.75%, and no spread.

Block Diagram



Pin Configuration (16-Pin TSSOP)



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.

PI6C557-03A

Pin Description

| Pin # | Pin Name | I/O Type | Description |
|-------|--------------------------|----------|---|
| 1 | S0 | Input | Select pin 0 (Internal pull-up resistor). See Table 1. |
| 2 | S1 | Input | Select pin 1 (Internal pull-up resistor). See Table 1. |
| 3 | SS0 | Input | Spread Select pin 0 (Internal pull-up resistor). See Table 2. |
| 4 | X1/CLK | Input | Crystal or clock input. Connect to a 25MHz crystal or single ended clock. |
| 5 | X2 | Output | Crystal connection. Leave unconnected for clock input. |
| 6 | OE | Input | Output enable. Internal pull-up resistor. |
| 7 | GNDX | Power | Crystal ground pin. |
| 8 | SS1 | Input | Spread Select pin 1 (Internal pull-up resistor). See Table 2. |
| 9 | IREF | Output | Precision resistor attached to this pin is connected to the internal current reference. |
| 10 | $\overline{\text{CLK1}}$ | Output | HCSL compliment clock output |
| 11 | CLK1 | Output | HCSL clock output |
| 12 | VDDA | Power | Connect to a +3.3V source. |
| 13 | GND A | Power | Output and analog circuit ground. |
| 14 | $\overline{\text{CLK0}}$ | Output | HCSL compliment clock output |
| 15 | CLK0 | Output | HCSL clock output |
| 16 | VDDX | Power | Connect to a +3.3V source. |

Table 1: Output Frequency Select Table

| S1 | S0 | CLK(MHz) |
|----|----|----------|
| 0 | 0 | 25 |
| 0 | 1 | 100 |
| 1 | 0 | 125 |
| 1 | 1 | 200 |

Table 2: Spread Selection Table

| SS1 | SS0 | Spread |
|-----|-----|------------|
| 0 | 0 | No Spread |
| 0 | 1 | Down -0.5 |
| 1 | 0 | Down -0.75 |
| 1 | 1 | No Spread |

Application Information

Decoupling Capacitors

Decoupling capacitors of 0.01 μ F should be connected between each V_{DD} pin and the ground plane and placed as close to the V_{DD} pin as possible.

Crystal

Use a 25MHz fundamental mode parallel resonant crystal with less than 300PPM of error across temperature.

Crystal Capacitors

C_L = Crystals's load capacitance in pF

Crystal Capacitors (pF) = $(C_L - 8) * 2$

For example, for a crystal with 16pF load caps, the external effective crystal cap would be 16 pF. $(16-8)*2=16$.

Current Source (IREF) Reference Resistor - R_R

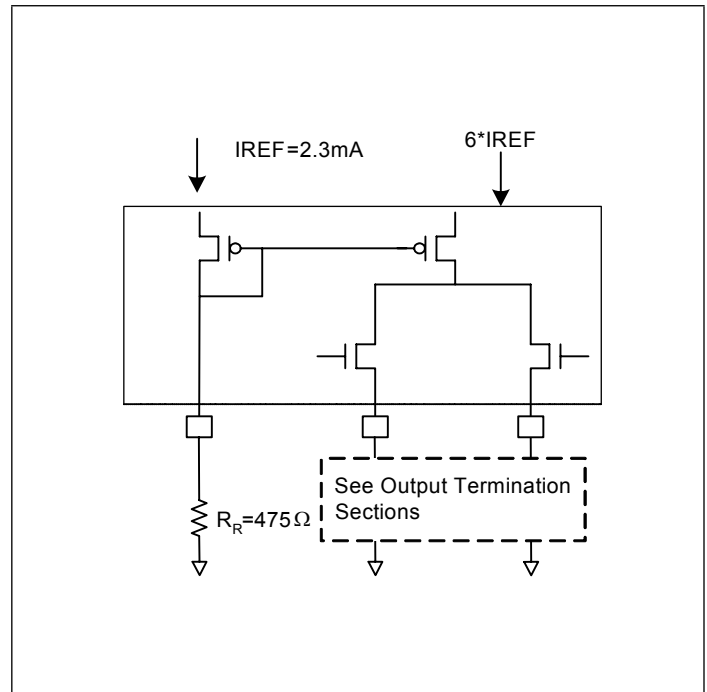
If board target trace impedance is 50 Ω , then $R_R = 475\Omega$ providing an IREF of 2.32 mA. The output current (I_{OH}) is 6*IREF.

Output Termination

The PCI Express differential clock outputs of the PI6C557-03A are open source drivers and require an external series resistor and a resistor to ground. These resistor values and their allowable locations are shown in detail in the PCI Express Layout Guidelines section.

The PI6C557-03A can be configured for LVDS compatible voltage levels. See the LVDS Compatible Layout Guidelines section.

Output Structures



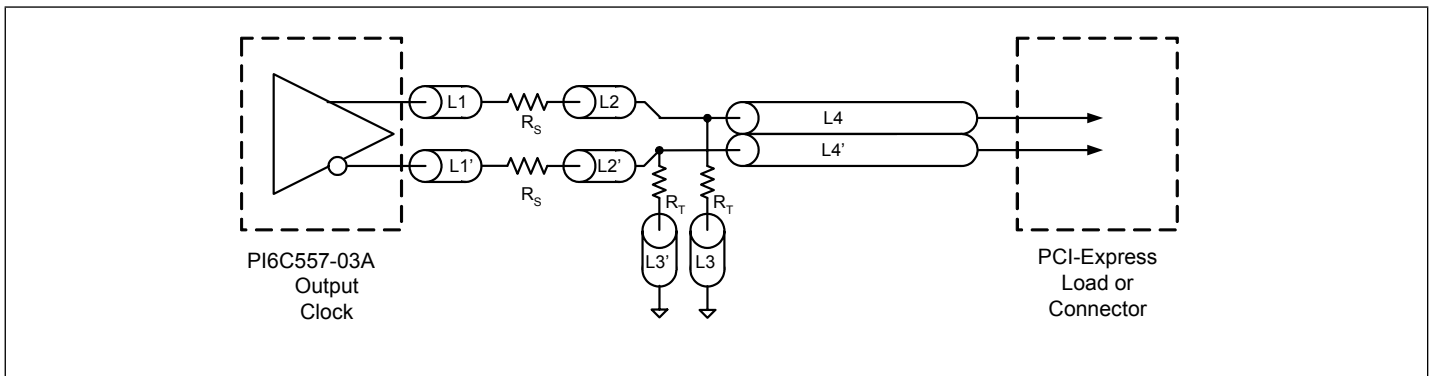
PCI Express Layout Guidelines

| Common Recommendations for Differential Routing | Dimension or Value | Unit |
|---|--------------------|------|
| L1 length, route as non-coupled 50Ω trace. | 0.5 max | inch |
| L2 length, route as non-coupled 50Ω trace. | 0.2 max | inch |
| L3 length, route as non-coupled 50Ω trace. | 0.2 max | inch |
| R _S | 33 | Ω |
| R _T | 49.9 | Ω |

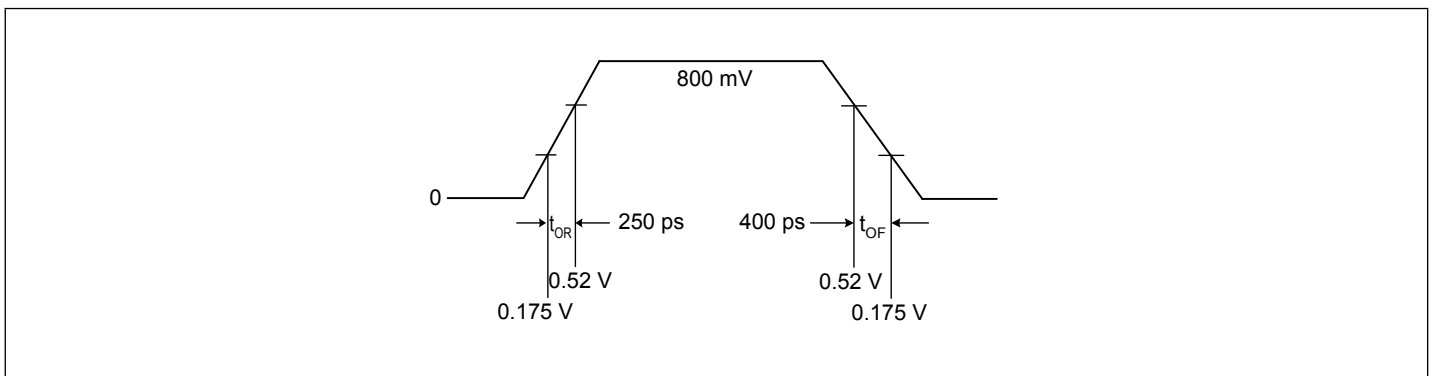
| Differential Routing on a Single PCB | Dimension or Value | Unit |
|---|---------------------|------|
| L4 length, route as coupled microstrip 100Ω differential trace. | 2 min to 16 max | inch |
| L4 length, route as coupled stripline 100Ω differential trace. | 1.8 min to 14.4 max | inch |

| Differential Routing to a PCI Express connector | Dimension or Value | Unit |
|---|-----------------------|------|
| L4 length, route as coupled microstrip 100Ω differential trace. | 0.25 min to 14 max | inch |
| L4 length, route as coupled stripline 100Ω differential trace. | 0.225 min to 12.6 max | inch |

PCI Express Device Routing



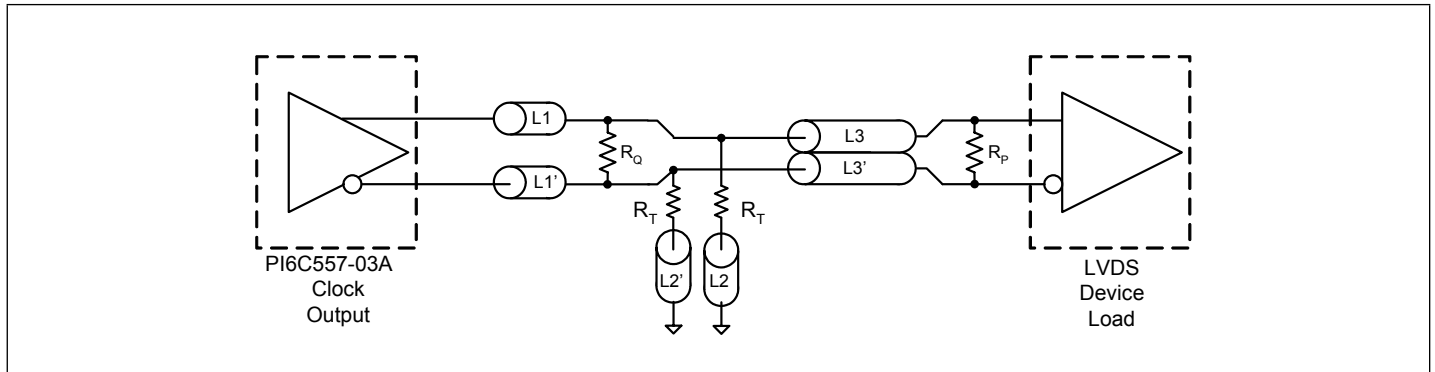
Typical PCI Express (HCSL) Waveform



Application Information

| LVDS Recommendations for Differential Routing | Dimension or Value | Unit |
|---|--------------------|------|
| L1 length, route as non-coupled 50Ω trace. | 0.5 max | inch |
| L2 length, route as non-coupled 50Ω trace. | 0.2 max | inch |
| RP | 100 | Ω |
| RQ | 100 | Ω |
| RT | 150 | Ω |
| L3 length, route as 100Ω differential trace. | | |
| L3 length, route as 100Ω differential trace. | | |

LVDS Device Routing



Maximum Ratings

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

| | |
|------------------------------------|------------------------|
| Supply Voltage to Ground Potential | 5.5V |
| All Inputs and Outputs | -0.5V to $V_{DD}+0.5V$ |
| Ambient Operating Temperature | -40 to +85°C |
| Storage Temperature | -65 to +150°C |
| Junction Temperature | 150°C |
| Soldering Temperature | 260°C |
| ESD Protection (Input) | 2000 V min (HBM) |

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.

Electrical Specifications

Recommended Operation Conditions

| Parameter | Min. | Typ. | Max. | Unit |
|---|------|------|------|------|
| Ambient Operating Temperature | -40 | | +85 | °C |
| Power Supply Voltage (measured in respect to GND) | +3.0 | | +3.6 | V |

DC Characteristics ($V_{DD} = 3.3V \pm 10\%$, $T_A = -40^\circ C$ to $+85^\circ C$)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|------------|-----------------------------------|--------------------------------|--------------------------------------|------|----------------|------------|
| V_{DD} | Supply Voltage | | 3.0 | 3.3 | 3.6 | V |
| V_{IH} | Input High Voltage ⁽¹⁾ | OE | 2.0 | | $V_{DD} + 0.3$ | V |
| V_{IL} | Input Low Voltage ⁽¹⁾ | OE | GND - 0.3 | | 0.8 | V |
| I_{IL} | Input Leakage Current | $0 < V_{in} < V_{DD}$ | With input pull-up and pull-downs | -20 | 20 | μA |
| | | | Without input pull-up and pull-downs | -5 | 5 | |
| I_{DD} | Operating Supply Current | $R_L = 50\Omega$, $C_L = 2pF$ | | | 95 | mA |
| I_{DDOE} | | OE = LOW | | | 50 | mA |
| C_{IN} | Input Capacitance | @ 55MHz | | | 7 | pF |
| C_{OUT} | Output Capacitance | @ 55MHz | | | 6 | pF |
| L_{PIN} | Pin Inductance | | | | 5 | nH |
| R_{OUT} | Output Resistance | CLK Outputs | 3.0 | | | k Ω |

Notes:

- Single edge is monotonic when transitioning through region.

HCSL Output AC Characteristics ($V_{DD} = 3.3V \pm 10\%$, $T_A = -40^{\circ}C$ to $+85^{\circ}C$)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|------------------|---|---------------------------------------|------|------|------|---------|
| F_{IN} | Input Frequency | | | 25 | | MHz |
| V_{OUT} | Output Frequency | | 25 | | 200 | MHz |
| V_{OH} | Output High Voltage ^(1,2) | 100 MHz HCSL output @ $V_{DD} = 3.3V$ | 660 | 800 | 900 | mV |
| V_{OL} | Output Low Voltage ^(1,2) | | -150 | 0 | | mV |
| V_{CPA} | Crossing Point Voltage ^(1,2) | Absolute | 250 | 350 | 550 | mV |
| V_{CN} | Crossing Point Voltage ^(1,2,4) | Variation over all edges | | | 140 | mV |
| J_{CC} | Jitter, Cycle-to-Cycle ^(1,3) | | | 35 | 60 | ps |
| J_{RMS} | PCIe RMS Jitter | PCIe 2.0 Test Method @ 100MHz Output | | | 3.1 | ps |
| MF | Modulation Frequency | Spread Spectrum | 30 | 31.5 | 33 | kHz |
| t_{OR} | Rise Time ^(1,2) | From 0.175V to 0.525V | 175 | | 500 | ps |
| t_{OF} | Fall Time ^(1,2) | From 0.525V to 0.175V | 175 | | 500 | ps |
| T_{SKEW} | Skew between outputs | At Crossing Point Voltage | | | 50 | ps |
| $T_{DUTY-CYCLE}$ | Duty Cycle ^(1,3) | | 45 | | 55 | % |
| T_{OE} | Output Enable Time ⁽⁵⁾ | All outputs | | | 10 | μs |
| T_{OT} | Output Disable Time ⁽⁵⁾ | All outputs | | | 10 | μs |
| t_{STABLE} | From power-up to $V_{DD}=3.3V$ | From Power-up $V_{DD}=3.3V$ | | 3.0 | | ms |
| t_{SPREAD} | Setting period after spread change | Setting period after spread change | | 3.0 | | ms |

Notes:

- $R_L = 50\text{-}\Omega$ with $C_L = 2\text{ pF}$
- Single-ended waveform
- Differential waveform
- Measured at the crossing point
- CLK pins are tri-stated when OE is LOW

Thermal Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---------------|--|------------|------|------|------|---------------|
| θ_{JA} | Thermal Resistance Junction to Ambient | Still air | | | 90 | $^{\circ}C/W$ |
| θ_{JC} | Thermal Resistance Junction to Case | | | | 24 | $^{\circ}C/W$ |

Recommended Crystal Specification

Pericom recommends:

- GC2500003 XTAL 49S/SMD(4.0 mm), 25M, $CL=18\text{pF}$, $\pm 30\text{ppm}$
http://www.pericom.com/pdf/datasheets/se/GC_GF.pdf
- FY2500081, SMD 5x3.2(4P), 25M, $CL=18\text{pF}$, $\pm 30\text{ppm}$
http://www.pericom.com/pdf/datasheets/se/FY_F9.pdf
- FL2500047, SMD 3.2x2.5(4P), 25M, $CL=18\text{pF}$, $\pm 20\text{ppm}$
<http://www.pericom.com/pdf/datasheets/se/FL.pdf>

PI6C557-03A

Part Marking

L Package

PI6C557
-03ALE
ZYYWWXX
○

Z: Die Rev
YY: Year
WW: Workweek
1st X: Assembly Code
2nd X: Fab Code

L Package—2017 (Au Version)

PI6C557
-03ALE
ZYYWWXX
○

Z: Die Rev
YY: Year
WW: Workweek
1st X: Assembly Code
2nd X: Fab Code

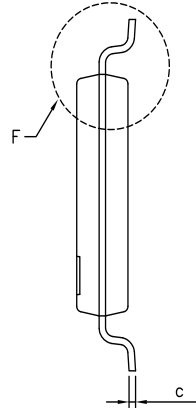
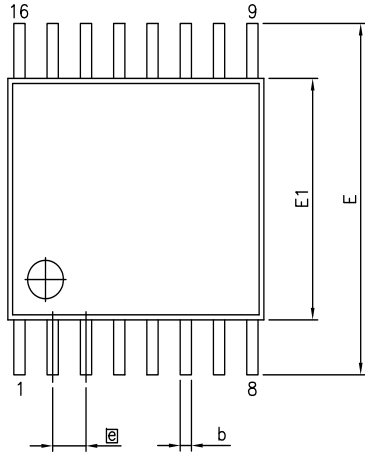
Q Package

PI6C557
-03AQE
YYWWXX
○

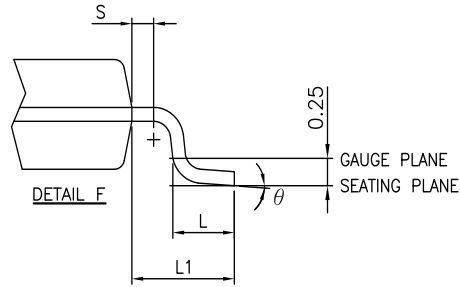
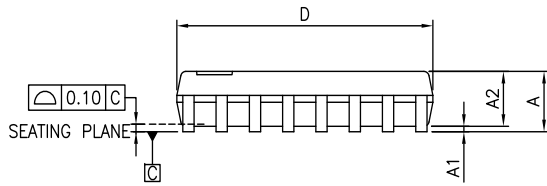
YY: Year
WW: Workweek
1st X: Assembly Code
2nd X: Fab Code

PI6C557-03A

Packaging Mechanical: 16-TSSOP (L)



| SYMBOLS | MIN. | NOM. | MAX. |
|----------|----------|------|------|
| A | – | – | 1.20 |
| A1 | 0.05 | – | 0.15 |
| A2 | 0.80 | 1.00 | 1.05 |
| b | 0.19 | – | 0.30 |
| c | 0.09 | – | 0.20 |
| D | 4.90 | 5.00 | 5.10 |
| E1 | 4.30 | 4.40 | 4.50 |
| E | 6.20 | 6.40 | 6.60 |
| e | 0.65 BSC | | |
| L1 | 1.00 REF | | |
| L | 0.45 | 0.60 | 0.75 |
| S | 0.20 | – | – |
| θ | 0° | – | 8° |



NOTES:

1. ALL DIMENSIONS IN MILLIMETERS. ANGLES IN DEGREES.
2. JEDEC MO-153F
3. DIMENSIONS DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.



DATE: 03/24/16

DESCRIPTION: 16-Pin, 173mil Wide TSSOP

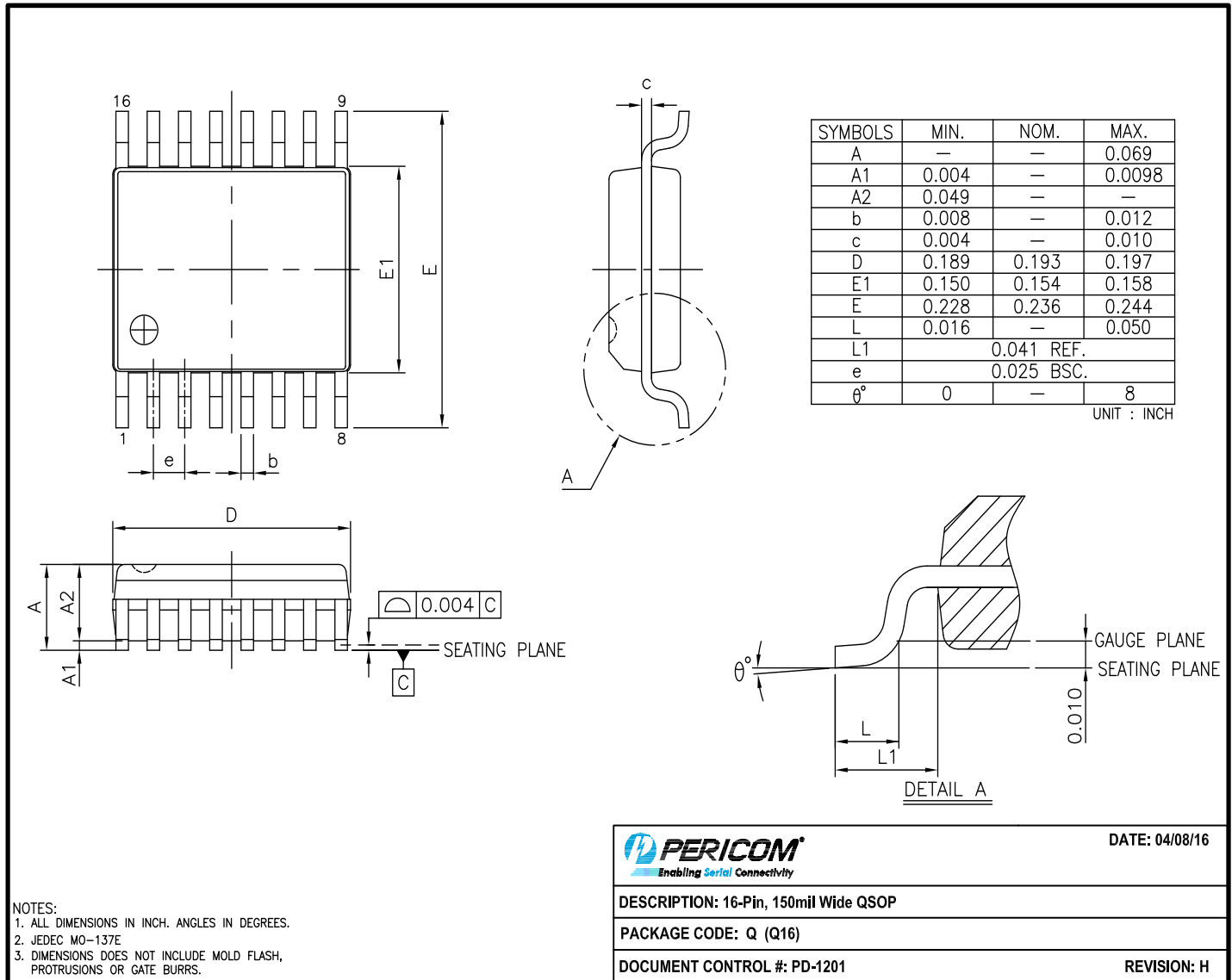
PACKAGE CODE: L (L16)

DOCUMENT CONTROL #: PD-1310

REVISION: G

16-0061

Packaging Mechanical: 16-QSOP (Q)



16-0056

For latest package info.

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

Ordering Information

| Ordering Code | Package Code | Package Type |
|----------------|--------------|-----------------------------|
| PI6C557-03ALEX | L | 16-pin, 173mil Wide (TSSOP) |
| PI6C557-03AQEX | Q | 16-pin, 150mil Wide (QSOP) |

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

IMPORTANT NOTICE

DIODES INCORPORATED MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION).

Diodes Incorporated and its subsidiaries reserve the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein. Diodes Incorporated does not assume any liability arising out of the application or use of this document or any product described herein; neither does Diodes Incorporated convey any license under its patent or trademark rights, nor the rights of others. Any Customer or user of this document or products described herein in such applications shall assume all risks of such use and will agree to hold Diodes Incorporated and all the companies whose products are represented on Diodes Incorporated website, harmless against all damages.

Diodes Incorporated does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel.

Should Customers purchase or use Diodes Incorporated products for any unintended or unauthorized application, Customers shall indemnify and hold Diodes Incorporated and its representatives harmless against all claims, damages, expenses, and attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized application.

Products described herein may be covered by one or more United States, international or foreign patents pending. Product names and markings noted herein may also be covered by one or more United States, international or foreign trademarks.

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 definitive format released by Diodes Incorporated.

LIFE SUPPORT

Diodes Incorporated products are specifically not authorized for use as critical components in life support devices or systems without the express written approval of the Chief Executive Officer of Diodes Incorporated. As used herein:

A. Life support devices or systems are devices or systems which:

1. are intended to implant into the body, or

2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

Customers represent that they have all necessary expertise in the safety and regulatory ramifications of their life support devices or systems, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of Diodes Incorporated products in such safety-critical, life support devices or systems, notwithstanding any devices- or systems-related information or support that may be provided by Diodes Incorporated. Further, Customers must fully indemnify Diodes Incorporated and its representatives against any damages arising out of the use of Diodes Incorporated products in such safety-critical, life support devices or systems.

Copyright © 2016, Diodes Incorporated

www.diodes.com