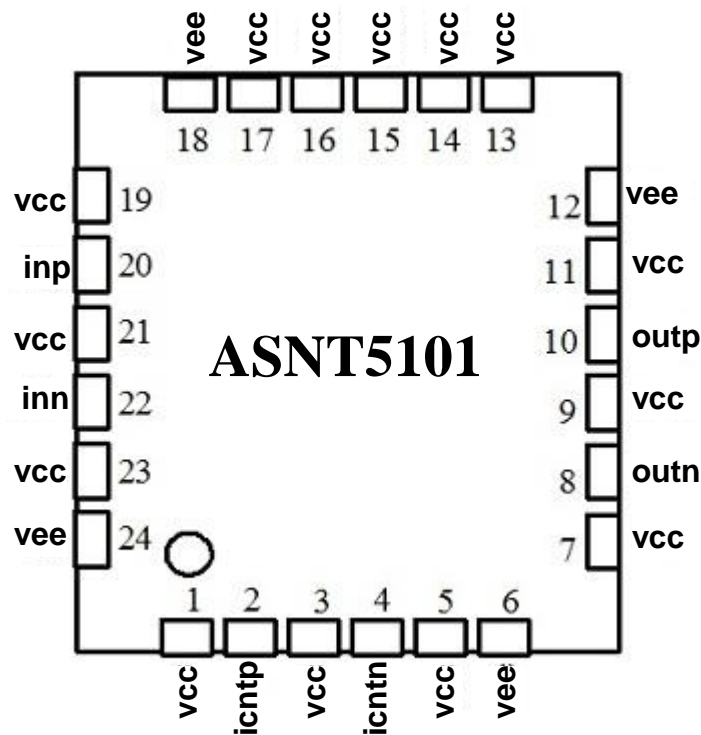




## ASNT5101-PQC DC-22Gbps/20GHz Signal Phase Shifter

- Broadband (DC-22Gbps/ DC-20GHz) tunable data/clock phase shifter
- Delay adjustment range of 105ps
- Exhibits low jitter and limited temperature variation over industrial temperature range
- 2GHz of bandwidth for the phase adjustment tuning port
- Fully differential CML input interface
- Fully differential CML output interface with 850mV single-ended swing
- Single +3.3V or -3.3V power supply
- Power consumption: 745mW
- Fabricated in SiGe for high performance, yield, and reliability
- Custom CQFP 24-pin package



## DESCRIPTION

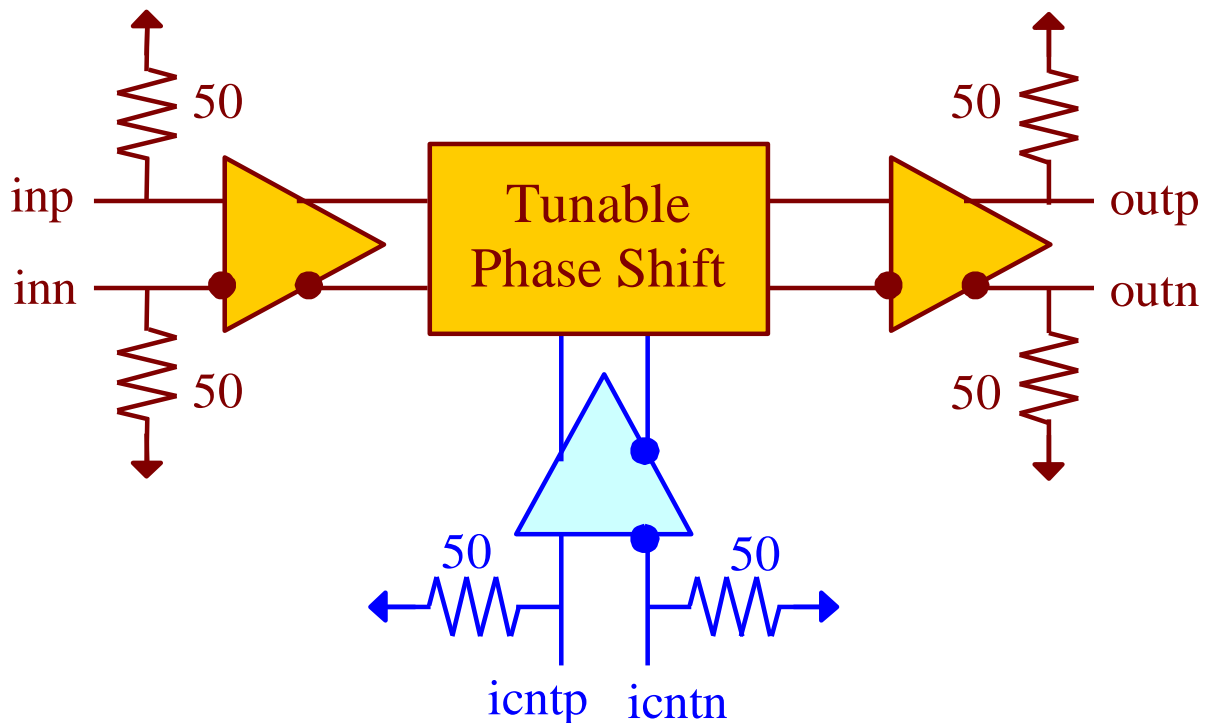


Fig. 1. Functional Block Diagram

ASNT5101-PQC is a variable data / clock delay line fabricated in SiGe technology. The IC shown in Fig. 1 provides an adjustable delay of its differential output signal **outp/outn** in relation to its broadband input signal **inp/inn**. The delay is controlled through a wide-band differential tuning port **icntp/icntn**.

The part's I/Os support the CML logic interface with on chip 50 $\Omega$  termination to **vcc** and may be used differentially, AC/DC coupled, single-ended, or in any combination (see also POWER SUPPLY CONFIGURATION). In the DC-coupling mode, the input signal's common mode voltage should comply with the specifications shown in ELECTRICAL CHARACTERISTICS. In the AC-coupling mode, the input termination provides the required common mode voltage automatically. The differential DC signaling mode is recommended for optimal performance.

Due to an extremely low jitter, the part is suitable for use in high-speed measurement / test equipment.

## Delay Control Port

The delay is controlled through a wide-band differential tuning port **icntp/icntn**. The delay control diagram is shown in Fig. 2.

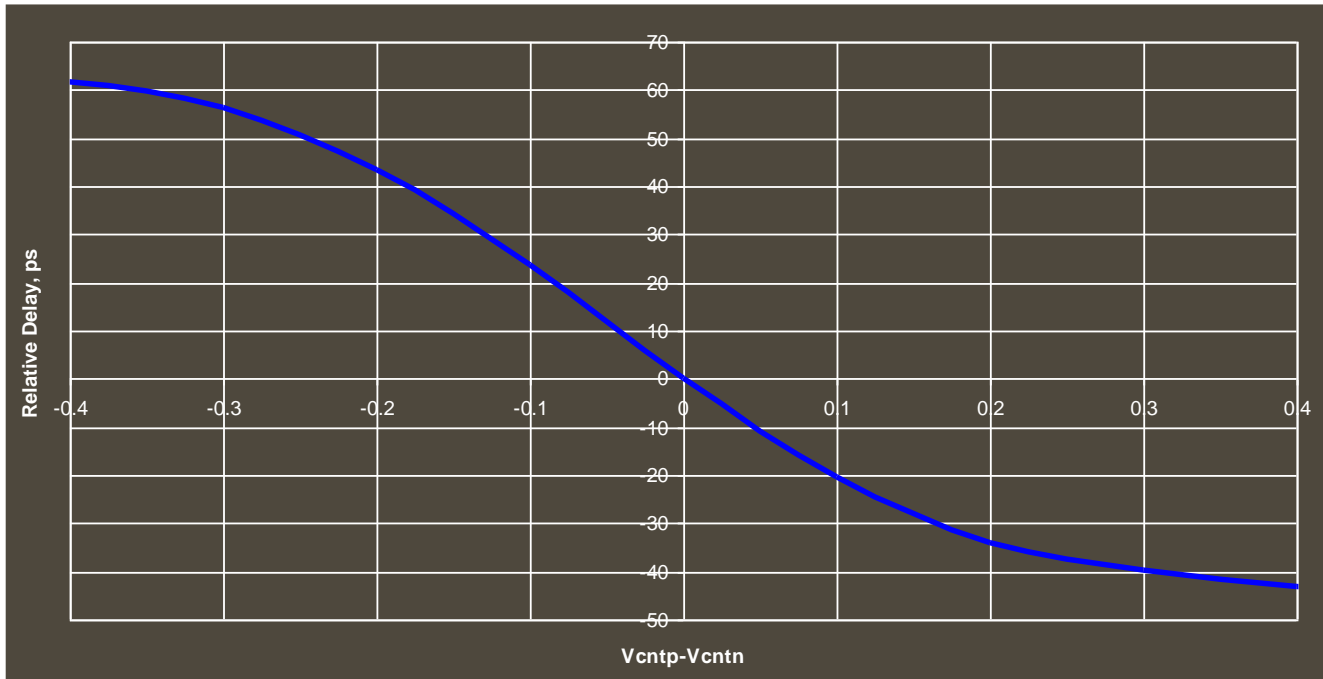


Fig. 2. Delay Control Diagram



## POWER SUPPLY CONFIGURATION

The part can operate with either a negative supply ( $v_{cc} = 0.0V = \text{ground}$  and  $v_{ee} = -3.3V$ ), or a positive supply ( $v_{cc} = +3.3V$  and  $v_{ee} = 0.0V = \text{ground}$ ). In case of a positive supply, all I/Os need AC termination when connected to any devices with  $50\Omega$  termination to ground. Different PCB layouts will be needed for each different power supply combination.

**All the characteristics detailed below assume  $v_{cc} = 0.0V$  and  $v_{ee} = -3.3V$ .**

## ABSOLUTE MAXIMUM RATINGS

Caution: Exceeding the absolute maximum ratings shown in Table 1 may cause damage to this product and/or lead to reduced reliability. Functional performance is specified over the recommended operating conditions for power supply and temperature only. AC and DC device characteristics at or beyond the absolute maximum ratings are not assumed or implied. All min and max voltage limits are referenced to ground (assumed  $v_{cc}$ ).

Table 1. Absolute Maximum Ratings

Parameter	Min	Max	Units
Supply Voltage ( $v_{ee}$ )		-3.6	V
Power Consumption		0.82	W
RF Input Voltage Swing (SE)		1.0	V
Case Temperature		+90	$^{\circ}C$
Storage Temperature	-40	+100	$^{\circ}C$
Operational Humidity	10	98	%
Storage Humidity	10	98	%

## TERMINAL FUNCTIONS

TERMINAL			DESCRIPTION
Name	No.	Type	
<b>High-Speed I/Os</b>			
inp	20	CML input	Differential high-speed signal inputs with internal SE $50\Omega$ termination to $v_{cc}$
inn	22		
icntp	2	CML input	Differential low-speed control inputs with internal SE $50\Omega$ termination to $v_{cc}$
icntn	4		
outp	10	CML output	Differential high-speed signal outputs with internal SE $50\Omega$ termination to $v_{cc}$ . Require external SE $50\Omega$ termination to $v_{cc}$
outn	8		
<b>Supply And Termination Voltages</b>			
Name	Description		Pin Number
vcc	Positive power supply (+3.3V or 0)		1, 3, 5, 7, 9, 11, 13, 14, 15, 16, 17, 19, 21, 23
vee	Negative power supply (0V or -3.3V)		6, 12, 18, 24



## ELECTRICAL CHARACTERISTICS

PARAMETER	MIN	TYP	MAX	UNIT	COMMENTS
<b>General Parameters</b>					
vee	-3.1	-3.3	-3.5	V	±6%
vcc		0.0		V	External ground
I <sub>vee</sub>		225		mA	
Power consumption		745		mW	
Junction temperature	-40	25	125	°C	
<b>HS Input Data/Clock (inp/inn)</b>					
Data Rate	DC		22	Gbps	
Frequency	DC		20	GHz	For clock signals
Swing	0.05		1.0	V	Differential or SE, p-p
CM Voltage Level	vcc-0.8		vcc	V	Must match for both inputs
<b>HS Output Data/Clock (outp/outn)</b>					
Data Rate	DC		22	Gbps	
Frequency	DC		20	GHz	For clock signals
Logic "1" level		vcc		V	
Logic "0" level		vcc-0.85		V	With external 50Ωm DC termination.
Rise/Fall times	16		20	ps	20%-80%
Output Jitter			1	ps	Peak-to-peak
Duty cycle	45	50	55	%	For clock signal
<b>Output-to-Input Delay</b>					
Adjustment range		105		ps	For the full range of icntp/icntn control signals
Absolute delay stability	-12		12	ps	0-125°C
<b>Tuning port (icntp/icntn)</b>					
Bandwidth	DC		2000	MHz	
SE voltage level	vcc-400		vcc	mV	Half control range when the opposite pin is at vcc
SE voltage level	vcc-800		vcc	mV	Full control range when the opposite pin is at vcc-0.4V
Differential swing	0		800	mV	Peak-peak, full control range
CM Level		vcc-(Diff. swing)/4		V	In differential mode

## PACKAGE INFORMATION

The chip die is housed in a custom 24-pin QFN package shown in Fig. 3. The package provides a center heat slug located on its back side to be used for heat dissipation. ADSANTEC recommends for this section to be soldered to the vcc plain, which is ground for a negative supply, or power for a positive supply.

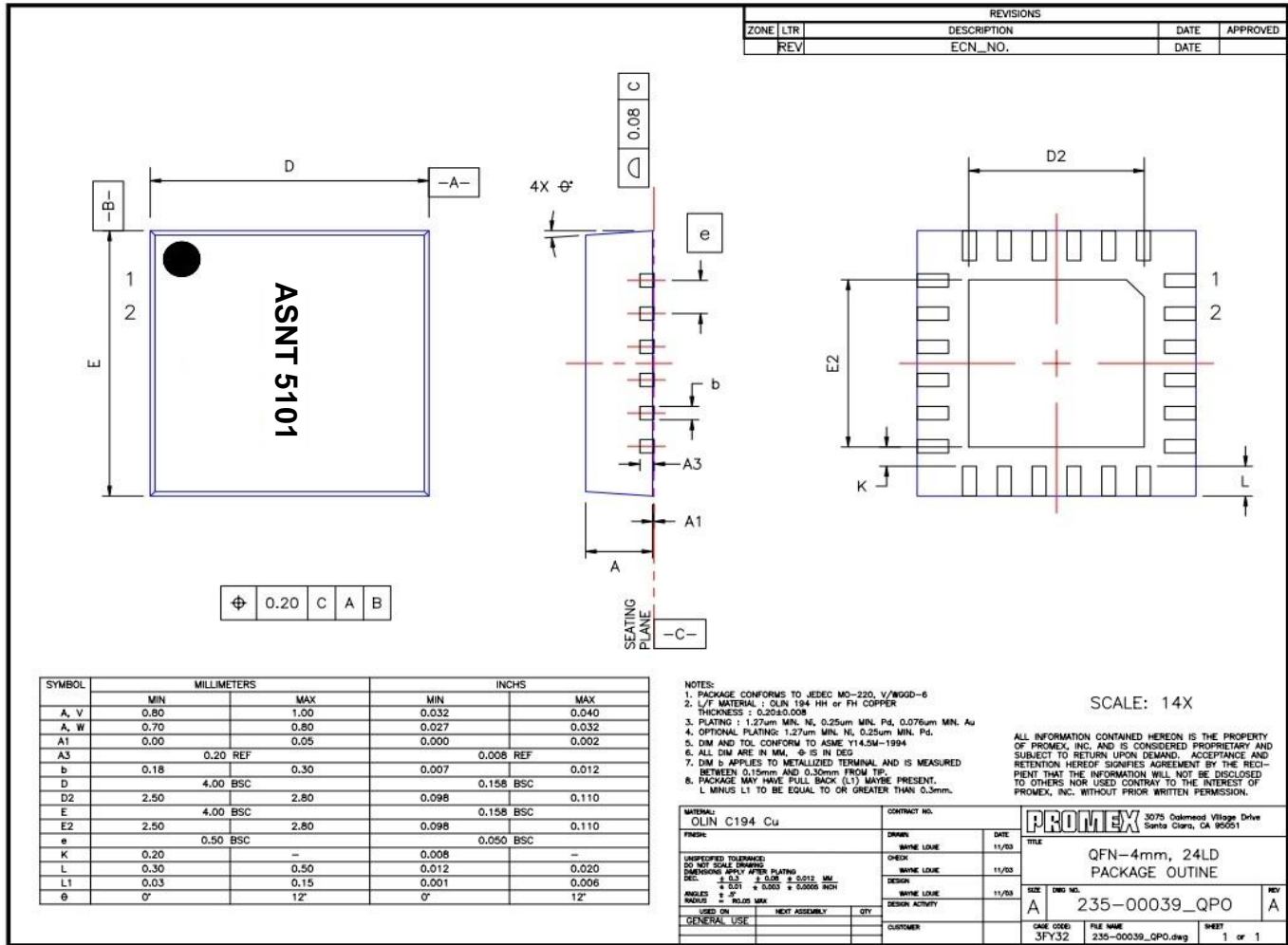


Fig. 3. QFN 24-Pin Package Drawing (all dimensions in mm)

The part's identification label is ASNT5101-PQC. The first 8 characters of the name before the dash identify the bare die including general circuit family, fabrication technology, specific circuit type, and part version while the 3 characters after the dash represent the package's manufacturer, type, and pin out count.

This device complies with the Restriction of Hazardous Substances (RoHS) per 2011/65/EU for all ten substances.

## REVISION HISTORY

Revision	Date	Changes
1.1.2	01-2020	Updated Package Information
1.0.2	07-2019	Updated Letterhead
1.0.1	05-2015	First release