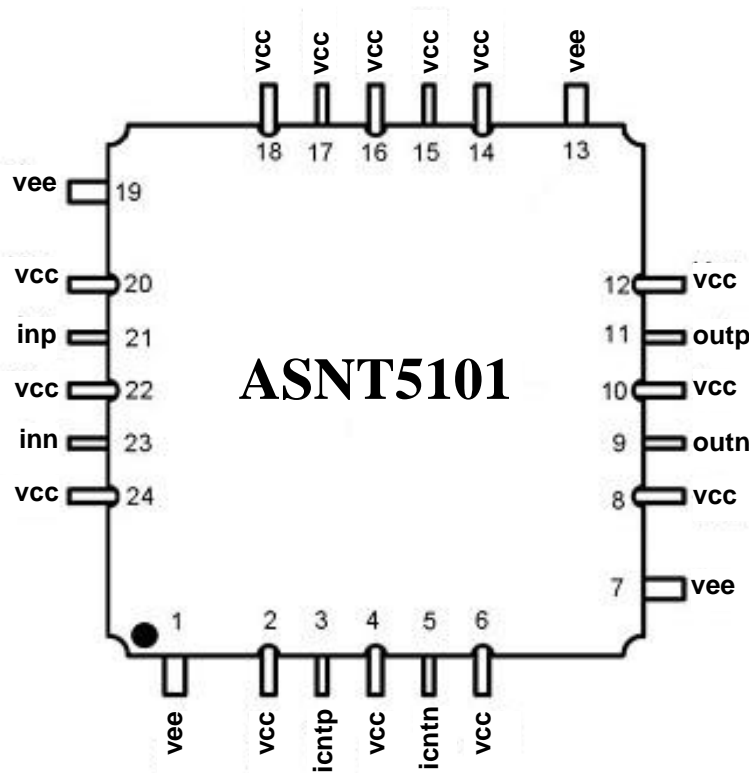




ASNT5101-KMC DC-46Gbps/23GHz Signal Phase Shifter

- Broadband (DC-46Gbps/ DC-23GHz) 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

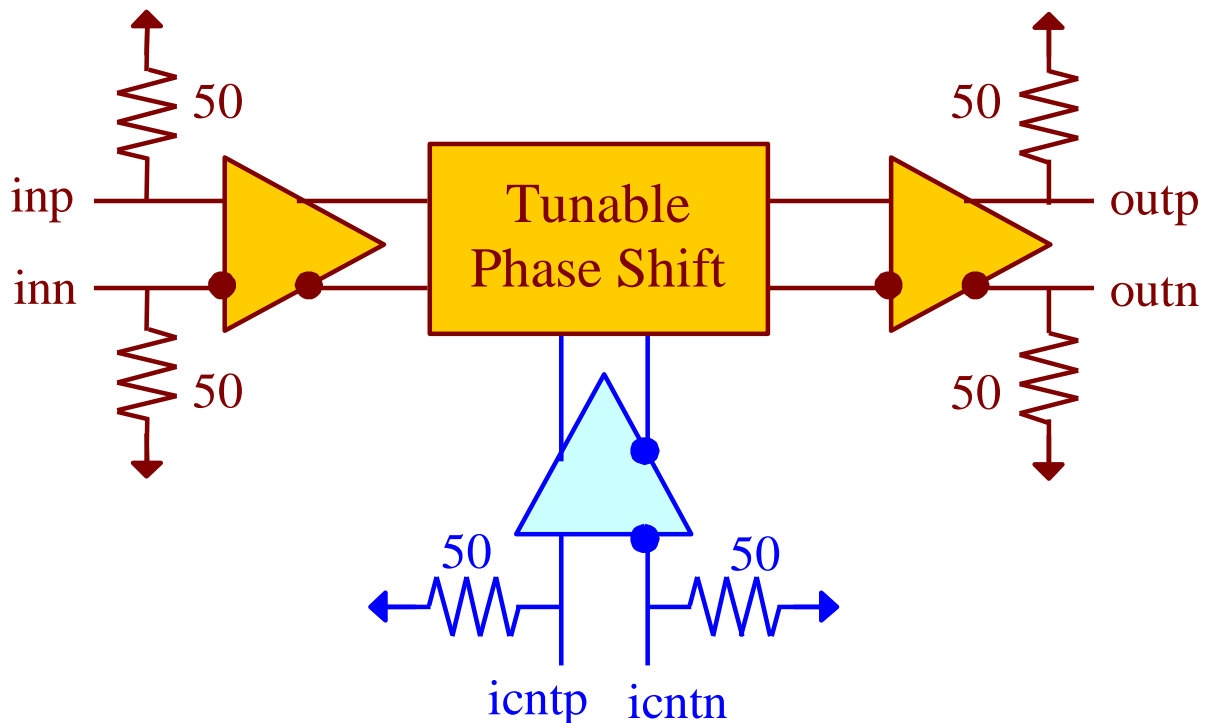


Fig. 1. Functional Block Diagram

ASNT5101-KMC 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 Ω 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.

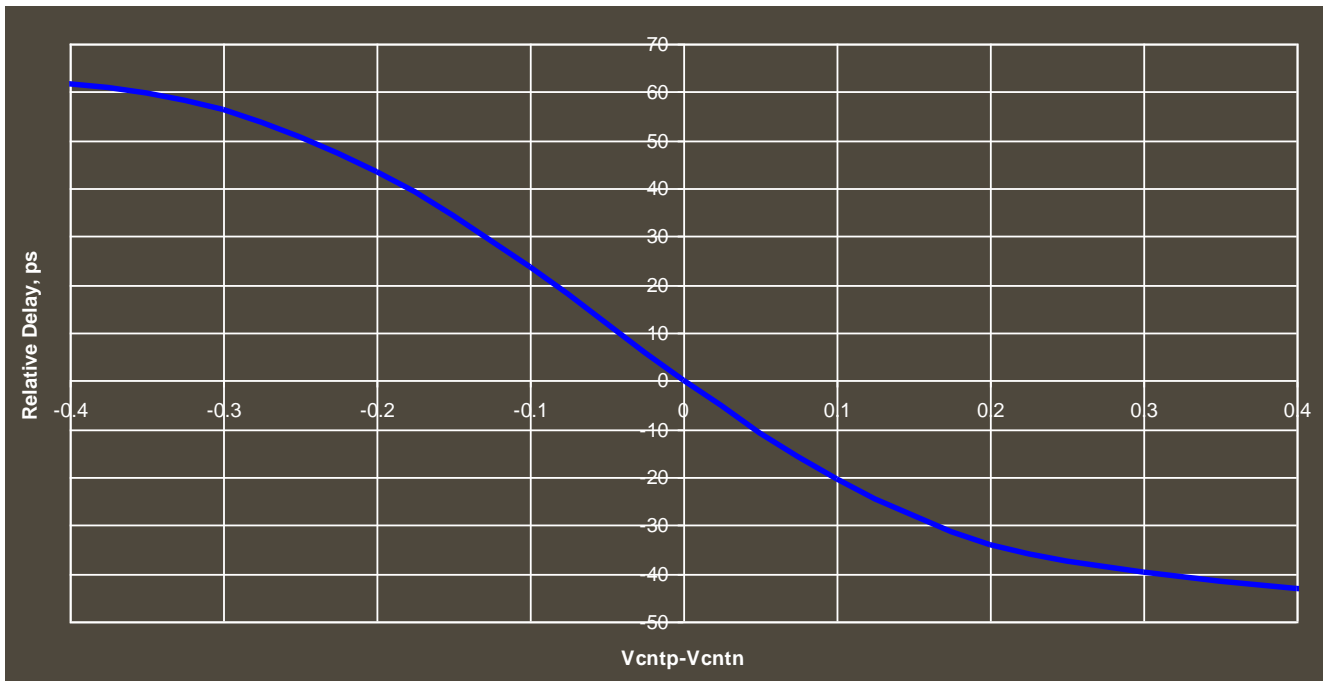


Fig. 2. Delay Control Diagram



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 50Ω 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	
High-Speed I/Os			
inp	21	CML input	Differential high-speed signal inputs with internal SE 50Ω termination to v_{cc}
inn	23		
icntp	3	CML input	Differential low-speed control inputs with internal SE 50Ω termination to v_{cc}
icntn	5		
outp	11	CML output	Differential high-speed signal outputs with internal SE 50Ω termination to v_{cc} . Require external SE 50Ω termination to v_{cc}
outn	9		
Supply And Termination Voltages			
Name	Description		Pin Number
v_{cc}	Positive power supply (+3.3V or 0)		2, 4, 6, 8, 10, 12, 14, 15, 16, 17, 18, 20, 22, 24
v_{ee}	Negative power supply (0V or -3.3V)		1, 7, 13, 19



ELECTRICAL CHARACTERISTICS

PARAMETER	MIN	TYP	MAX	UNIT	COMMENTS
General Parameters					
vee	-3.1	-3.3	-3.5	V	±6%
vcc		0.0		V	External ground
I _{vee}		225		mA	
Power consumption		745		mW	
Junction temperature	-40	25	125	°C	
HS Input Data/Clock (inp/inn)					
Data Rate	DC		46	Gbps	
Frequency	DC		23	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
HS Output Data/Clock (outp/outn)					
Data Rate	DC		46	Gbps	
Frequency	DC		23	GHz	For clock signals
Logic "1" level		vcc		V	
Logic "0" level		vcc-0.85		V	With external 50Ωm DC termination.
Rise/Fall times	13		15	ps	20%-80%
Output Jitter			1	ps	Peak-to-peak
Duty cycle	45	50	55	%	For clock signal
Output-to-Input Delay					
Adjustment range		105		ps	For the full range of icntp/icntn control signals
Absolute delay stability	-12		12	ps	0-125°C
Tuning port (icntp/icntn)					
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 CQFP package shown in Fig. 3. Even though the package provides a center heat slug located on the back side of the package to be used for heat dissipation, ADSANTEC does **NOT** recommend for this section to be soldered to the board. If the customer wishes to solder it, it should be connected to the vcc plain, which is ground for the negative supply or power for the positive supply.



REVISION HISTORY

Revision	Date	Changes
2.5.1	04-2014	Corrected electrical characteristics table
2.4.1	06-2013	Corrected title Corrected block diagram Corrected control diagram Corrected terminal functions Corrected electrical characteristics table
2.3.1	02-2013	Corrected title Corrected description Added tuning diagram Added package mechanical drawing
2.2.1	08-2012	Modified format
2.1	06-2012	Corrected phase adjustment speed data
2.0	02-2012	Revised functional block Diagram section Revised description section Added power supply configuration text Revised terminal functions section Revised electrical characteristics section Added absolute maximum ratings table Added package information section Added revision history table
1.0	03-2009	First release