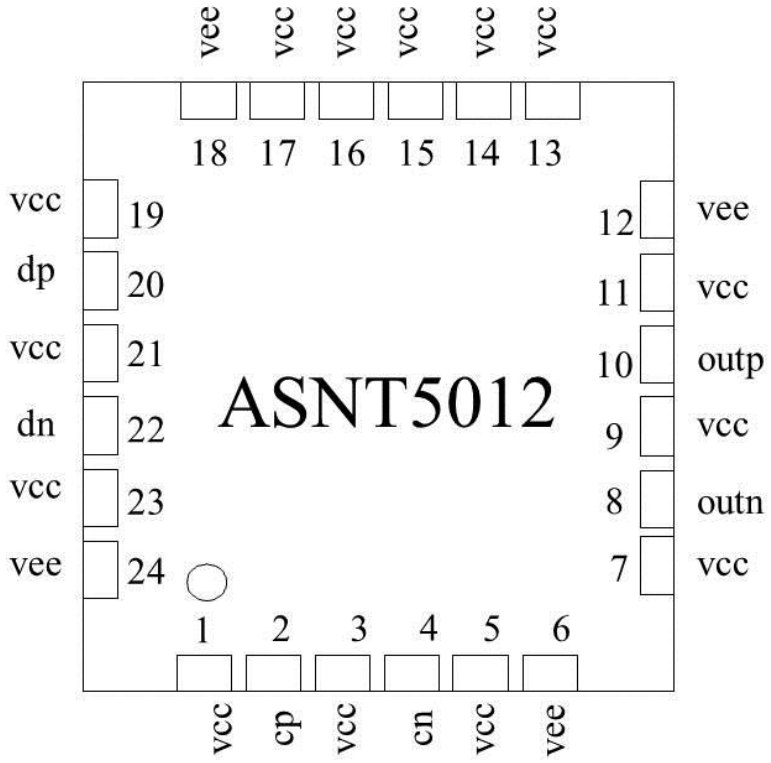
ADSANTEC
Ultra High-Speed Mixed Signal ASICs

Advanced Science And Novel Technology Company, Inc.
2790 Skypark Drive Suite 112, Torrance, CA 90505

Offices: 310-530-9400 / Fax: 310-530-9402
www.adsantec.com

ASNT5012-PQC
DC-17*Gbps* High Sensitivity D-Type Flip-Flop

- High-speed broadband D-Type Flip-Flop for data retiming with full rate clock
- Sensitive input data buffer with increased common-mode voltage range to support sampling applications
- Exhibits low jitter and limited temperature variation over industrial temperature range
- 8*ps* set-up/hold time capability
- 89% clock phase margin for retiming of data input eye
- Fully differential CML input interfaces
- Fully differential CML output interface with 400*mV* single-ended swing
- Single +3.3*V* or -3.3*V* power supply
- Power consumption: 465*mW*
- Fabricated in SiGe for high performance, yield, and reliability
- Standard MLF/QFN 24-pin package



Advanced Science And Novel Technology Company, Inc.
2790 Skypark Drive Suite 112, Torrance, CA 90505

Offices: 310-530-9400 / Fax: 310-530-9402
www.adsantec.com

DESCRIPTION

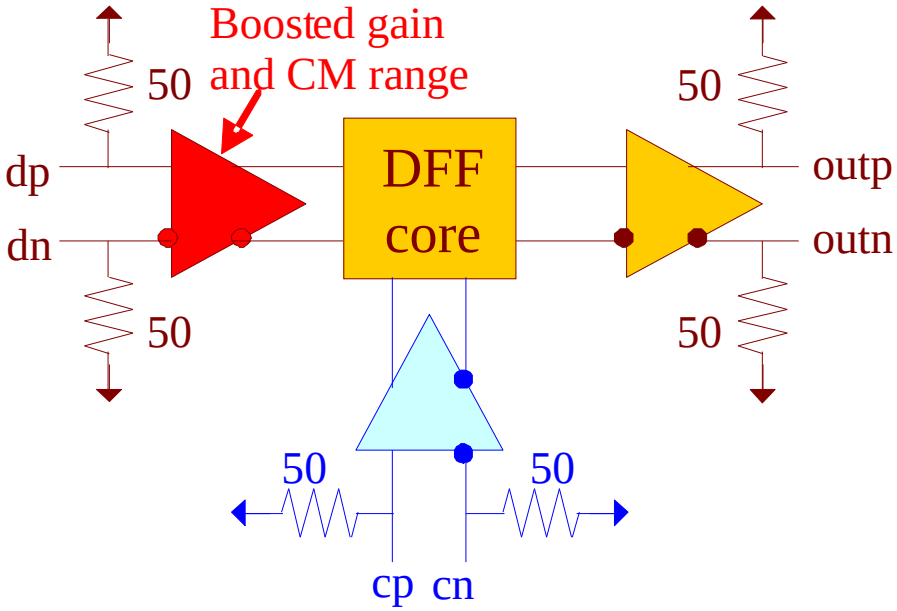


Fig. 1. Functional Block Diagram

The temperature stable ASNT5012-PQC SiGe IC provides broadband data retiming functionality, and is intended for use in high-speed measurement / test equipment. The IC shown in Fig. 1 can sample a high-speed data signal dp/dn with a full-rate external clock cp/cn to create a full-rate retimed NRZ data output outp/outn.

The data input buffer is designed to have increased input signal sensitivity, and is able to operate over a wider range of input common mode (CM) voltages. The part's I/O's support the CML logic interface with on chip 50*Ohm* 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.

POWER SUPPLY CONFIGURATION

The part can operate with either a negative supply (vcc = 0.0*V* = ground and vee = −3.3*V*), or a positive supply (vcc = +3.3*V* and vee = 0.0*V* = ground). In case of a positive supply, all I/Os need AC termination when connected to any devices with 50*Ohm* termination to ground. Different PCB layouts will be needed for each different power supply combination.

Advanced Science And Novel Technology Company, Inc.
2790 Skypark Drive Suite 112, Torrance, CA 90505

Offices: 310-530-9400 / Fax: 310-530-9402
www.adsantec.com

All the characteristics detailed below assume vcc = 0.0*V* and vee = -3.3*V*.

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 vcc).

Table 1. Absolute Maximum Ratings

Parameter	Min	Max	Units
Supply Voltage (vee)		-3.6	*V*
Power Consumption		0.51	*W*
RF Input Voltage Swing (SE)		1.0	*V*
Case Temperature		+90	*ºC*
Storage Temperature	-40	+100	*ºC*
Operational Humidity	10	98	*%*
Storage Humidity	10	98	*%*

TERMINAL FUNCTIONS

TERMINAL			DESCRIPTION
Name	**No.**	**Type**	
High-Speed I/Os			
dp	20	CML input	Differential data inputs with internal SE 50*Ohm* termination to vcc
dn	22		
cp	2	CML input	Differential clock inputs with internal SE 50*Ohm* termination to vcc
cp	4		
outp	10	CML output	Differential data outputs with internal SE 50*Ohm* termination to vcc. Require external SE 50*Ohm* termination to vcc
outn	8		

Supply and Termination Voltages		
Name	**Description**	**Pin Number**
vcc	Positive power supply (+3.3*V* or 0)	1, 3, 5, 7, 9, 11, 13, 14, 15, 16, 17, 19, 21, 23
vee	Negative power supply (0*V* or -3.3*V*)	6, 12, 18, 24

Advanced Science And Novel Technology Company, Inc.
2790 Skypark Drive Suite 112, Torrance, CA 90505
Offices: 310-530-9400 / Fax: 310-530-9402
www.adsantec.com

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		140		*mA*	
Power consumption		465		*mW*	
Junction temperature	-25	50	125	*°C*	
Input Data (dp/dn)					
Data rate	DC		17	*Gbps*	
SE swing	25	300	800	*mV*	Peak-to-peak
CM voltage level	vcc-1.2	vcc-0.3	vcc	*V*	
Input Clock (cp/cn)					
Frequency	0.1		17	*GHz*	
Swing	50	300	800	*mV*	Peak-to-peak
CM voltage level	vcc-0.8	vcc-0.3	vcc	*V*	
Duty cycle	40	50	60	*%*	
Clock phase margin	86	88	90	*%*	For reliable data latching
HS Output Data (outp/outn)					
Data rate	DC		17	*Gbps*	
Logic “1” level		vcc		*V*	
Logic “0” level		vcc-0.4		*V*	With external 50*Ohm* DC termination
Rise/Fall times			22	*ps*	20%-80%
Output Jitter			10	*ps*	Peak-to-peak

PACKAGE INFORMATION

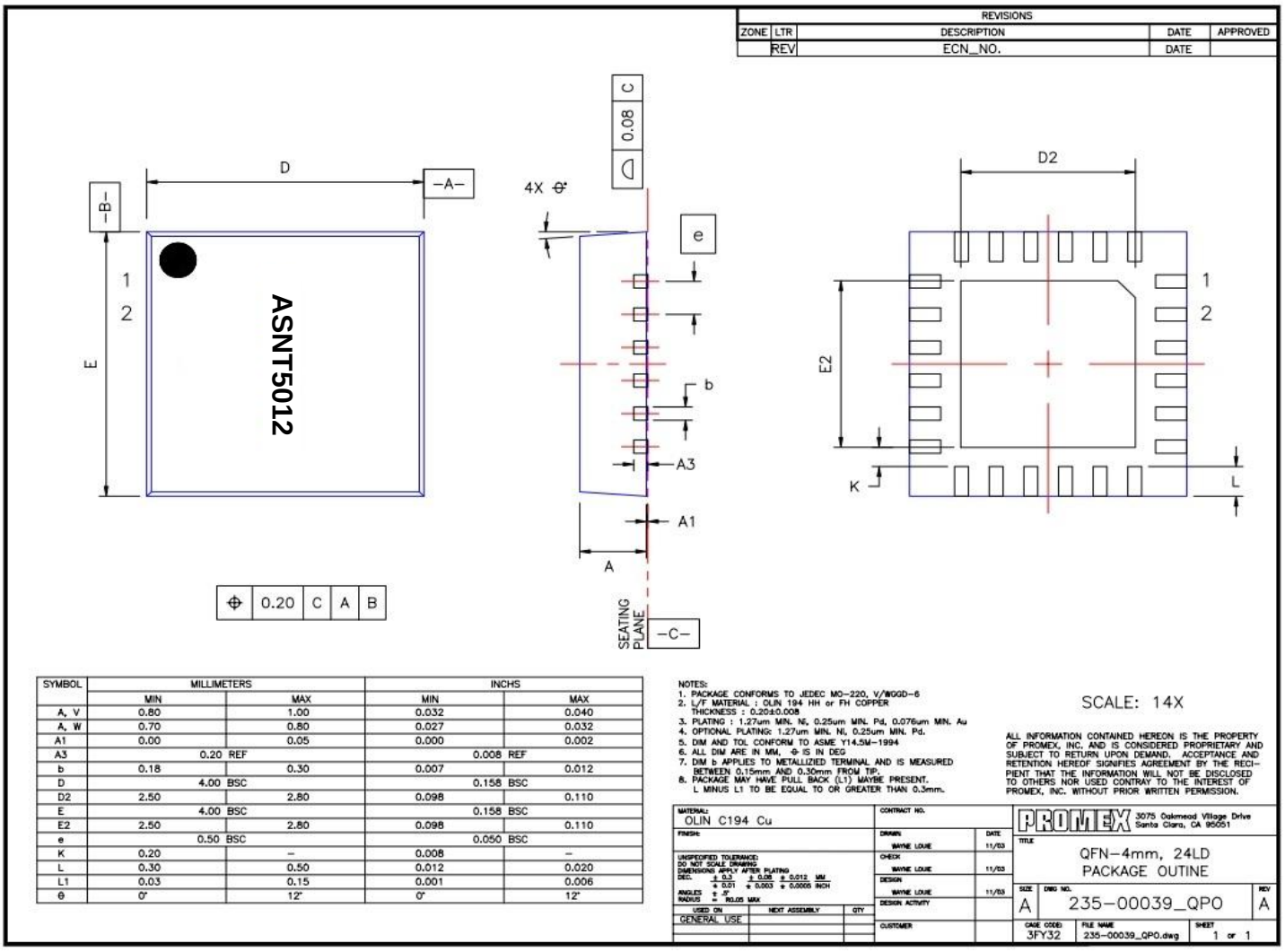
The chip die is housed in a standard 24-pin QFN package shown in Fig. 2. It is recommended that the center heat slug located on the back side of the package is soldered to the vee plain that is ground for the positive supply or power for the negative supply.

The part’s identification label is ASNT5012-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.

Advanced Science And Novel Technology Company, Inc.
2790 Skypark Drive Suite 112, Torrance, CA 90505

Offices: 310-530-9400 / Fax: 310-530-9402
www.adsantec.com



SYMBOL	MILLIMETERS		INCHS	
	MIN	MAX	MIN	MAX
A, V	0.80	1.00	0.032	0.040
A, W	0.70	0.80	0.027	0.032
A1	0.00	0.05	0.000	0.002
A3	0.20 REF		0.008 REF	
b	0.18	0.30	0.007	0.012
D	4.00 BSC		0.158 BSC	
D2	2.50	2.80	0.098	0.110
E	4.00 BSC		0.158 BSC	
E2	2.50	2.80	0.098	0.110
e	0.50 BSC		0.050 BSC	
K	0.20	–	0.008	–
L	0.30	0.50	0.012	0.020
L1	0.03	0.15	0.001	0.006
θ	0°	12°	0°	12°

NOTES:
1. PACKAGE CONFORMS TO JEDEC MO-220, V/WGGD-6
2. L/F MATERIAL : OLIN 194 HH or FH COPPER THICKNESS : 0.20±0.008
3. PLATING : 1.27um MIN. Ni, 0.25um MIN. Pd, 0.076um MIN. Au
4. OPTIONAL PLATING: 1.27um MIN. Ni, 0.25um MIN. Pd.
5. DIM AND TOL CONFORM TO ASME Y14.5M-1994
6. ALL DIM ARE IN MM, θ IS IN DEG
7. DIM b APPLIES TO METALLIZIED TERMINAL AND IS MEASURED BETWEEN 0.15mm AND 0.30mm FROM TIP.
8. PACKAGE MAY HAVE PULL BACK (L1) MAYBE PRESENT. L MINUS L1 TO BE EQUAL TO OR GREATER THAN 0.3mm.

Fig. 2. QFN 24-Pin Package Drawing (All Dimensions in mm)

Advanced Science And Novel Technology Company, Inc.
2790 Skypark Drive Suite 112, Torrance, CA 90505

Offices: 310-530-9400 / Fax: 310-530-9402
www.adsantec.com

REVISION HISTORY

Revision	Date	Changes
3.4.2	02-2020	Updated Package Information
3.3.2	07-2019	Updated Letterhead
3.3.1	03-2017	Updated Description section Updated Power Supply Configuration section Updated Terminal functions section Revised Electrical Characteristics section
3.2.1	02-2013	Revised title Revised package information
3.1.1	01-2013	Revised maximum speed
3.0.1	01-2013	Revised package pin out drawing Revised functional block diagram Added power supply configuration Added absolute maximum ratings Revised terminal functions Revised electrical characteristics Added package information and mechanical drawing Format correction
2.0	07-2009	Revised electrical characteristics
1.0	02-2008	First release