ADSANTEC
Ultra High-Speed Mixed Signal ASICs

Advanced Science And Novel Technology Company, Inc.
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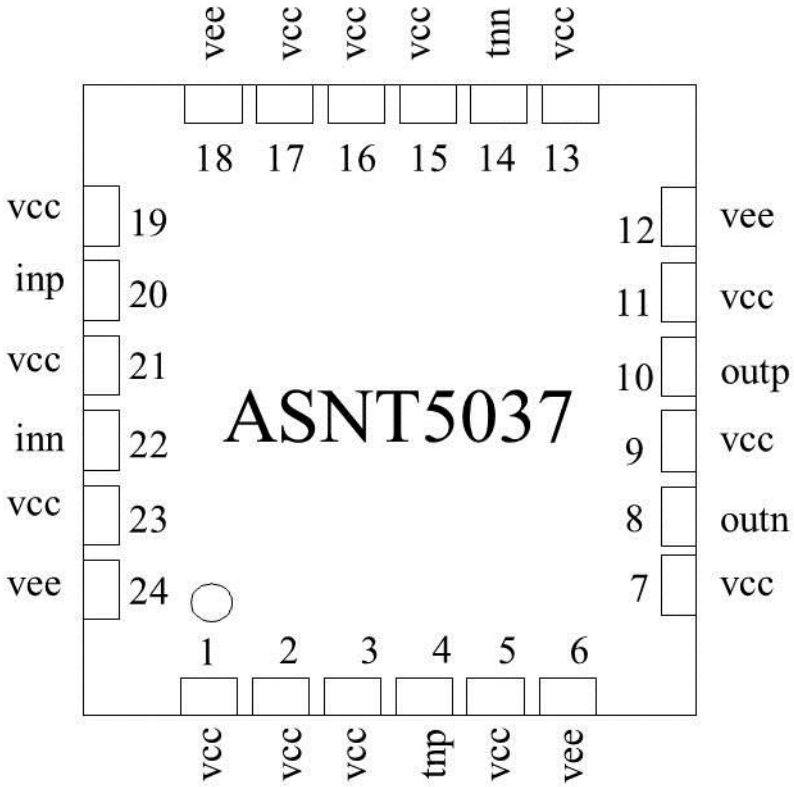
ASNT5037-PQC
DC-17*Gbps* Limiting Amplifier

- Broadband (DC-17*Gbps*) limiting amplifier
- Exhibits low jitter and limited temperature variation over industrial temperature range
- 100*MHz* of bandwidth for the amplitude adjustment tuning port
- Ideal for high speed proof-of-concept prototyping
- Fully differential CML input interfaces
- Fully differential CML output interface with adjustable SE amplitude from 0*V* to 1.16*V*
- Single +3.3*V* or -3.3*V* power supply
- Power consumption: 647*mW*
- Fabricated in SiGe for high performance, yield, and reliability
- Standard MLF/QFN 24-pin package



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DESCRIPTION

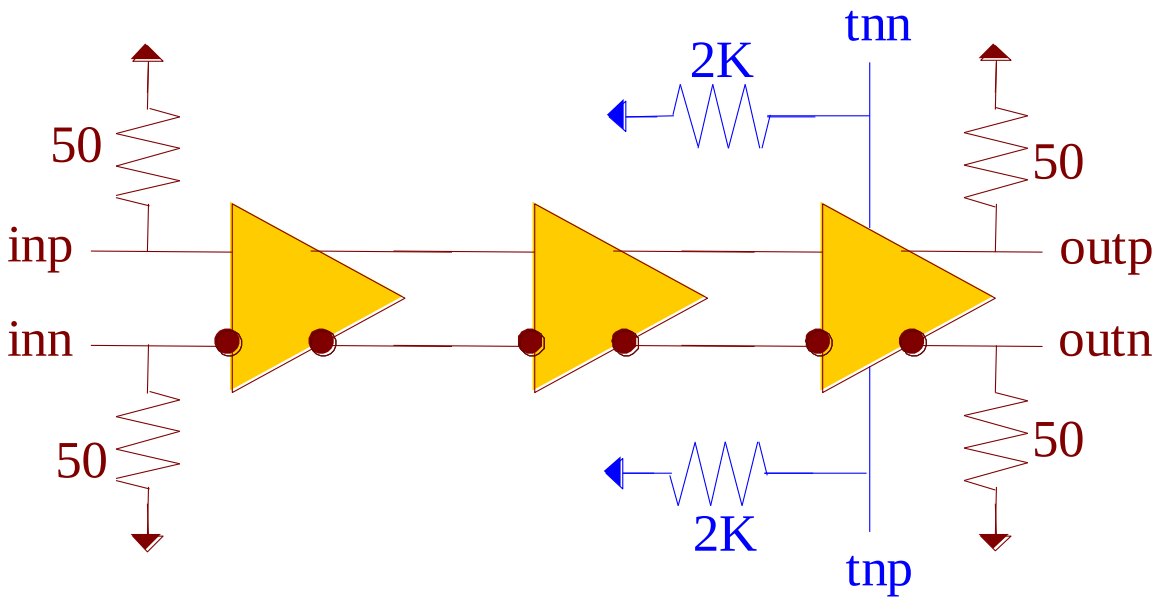

Fig. 1. Functional Block Diagram

The temperature stable ASNT5037-PQC SiGe IC provides extremely low jitter broadband signal amplitude control capability, and is intended for use in high-speed measurement / test equipment. The IC shown in Fig. 1 can process a high-speed data signal inp/inn and deliver a high-speed data output signal outp/outn with its output signal amplitude controlled by tuning ports tnp/tnn. Higher values of tnp and lower values of tnn (or higher values of the differential signal) result in higher output amplitudes.

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.

Amplitude Control Port

The output amplitude is controlled through a wide-band differential tuning port tnp/tnn. The amplitude control diagram is shown in Fig. 2.

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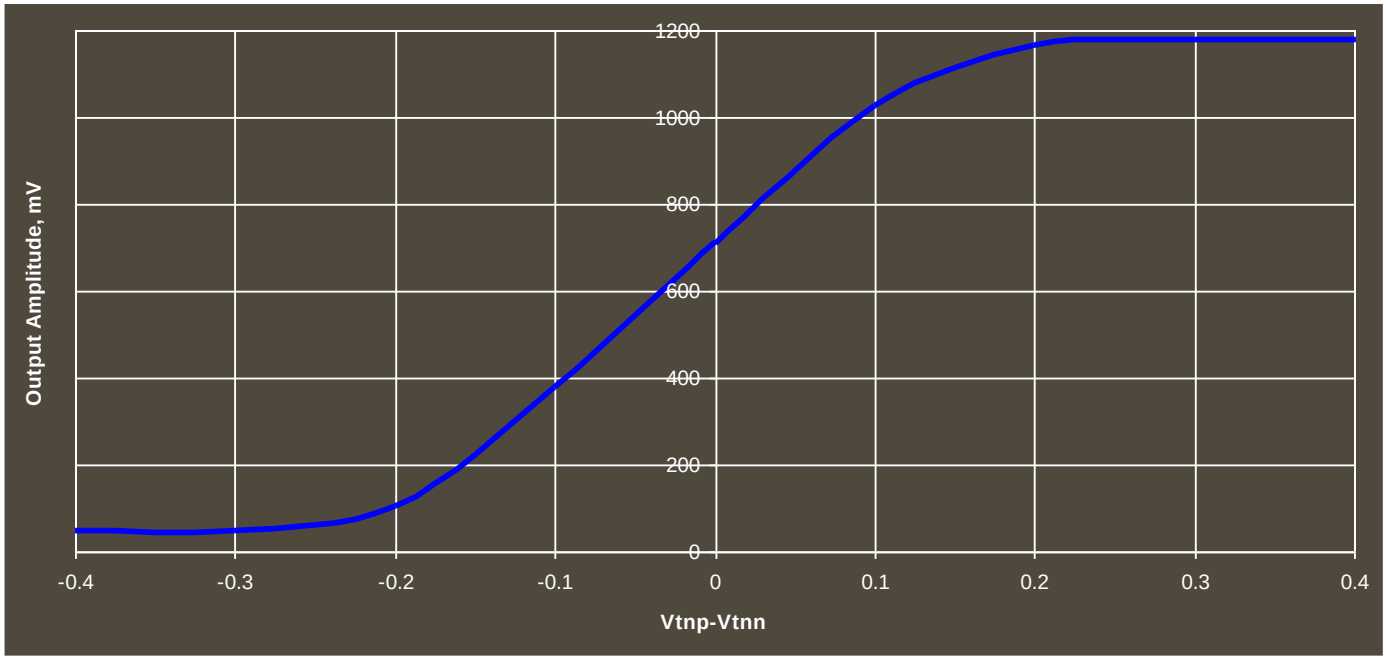

Fig. 2. Amplitude Control Diagram

POWER SUPPLY CONFIGURATION

The part can operate with either negative supply (vcc = 0.0*V* = ground and vee = −3.3*V*), or positive supply (vcc = +3.3*V* and vee = 0.0*V* = ground). In case of the 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.

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.

Table 1. Absolute Maximum Ratings

Parameter	Min	Max	Units
Supply Voltage (vee)		-3.6	*V*
Power Consumption		0.7	*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	*%*

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TERMINAL FUNCTIONS

TERMINAL			DESCRIPTION
Name	**No.**	**Type**	
High-Speed I/Os			
inp	20	CML input	Differential high-speed signal inputs with internal SE 50*Ohm* termination to vcc.
inn	22		
outp	10	CML output	Differential high-speed signal outputs with internal SE 50*Ohm* termination to vcc. Require external SE 50*Ohm* termination to vcc.
outn	8		
tnp	4	CML input	Differential output amplitude control signal with internal 2*KOhm* termination to vcc.
tnn	14		

Supply and Termination Voltages		
Name	**Description**	**Pin Number**
vcc	Positive power supply. (+3.3*V* or 0)	1, 2, 3, 5, 7, 9, 11, 13, 15, 16, 17, 19, 21, 23
vee	Negative power supply. (0*V* or -3.3*V*)	6, 12, 18, 24

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		196		*mA*	
Power consumption		647		*mW*	
Junction temperature	-40	25	125	*°C*	
HS Input Data (inp/inn)					
Data Rate	DC		17	*Gbps*	
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 (outp/outn)					
Data Rate	DC		17	*Gbps*	
Logic "1" level		vcc		*V*	
Logic "0" level	vcc-1.16	vcc-0.58	vcc	*V*	With external 50*Ohm* DC termination, and full range of tnp/tnn control signal.
Maximum swing		1.16		*V*	
Rise/Fall times	15	17	19	*ps*	20%-80%
Output Jitter			1	*ps*	Peak-to-peak
Duty cycle	45	50	55	*%*	
Tuning port (tnp/tnn)					
Bandwidth	DC		100	*MHz*	
SE voltage level	vcc-500		vcc	*mV*	½ control range, the opposite pin at vcc.
SE voltage level	vcc-1000		vcc	*mV*	Full control range, the opposite pin at vcc-0.5*V*.
Differential swing	0		1000	*mV*	Peak-peak. Full control range.
CM Voltage Level	vcc-0.5		vcc	*V*	Must match for both inputs

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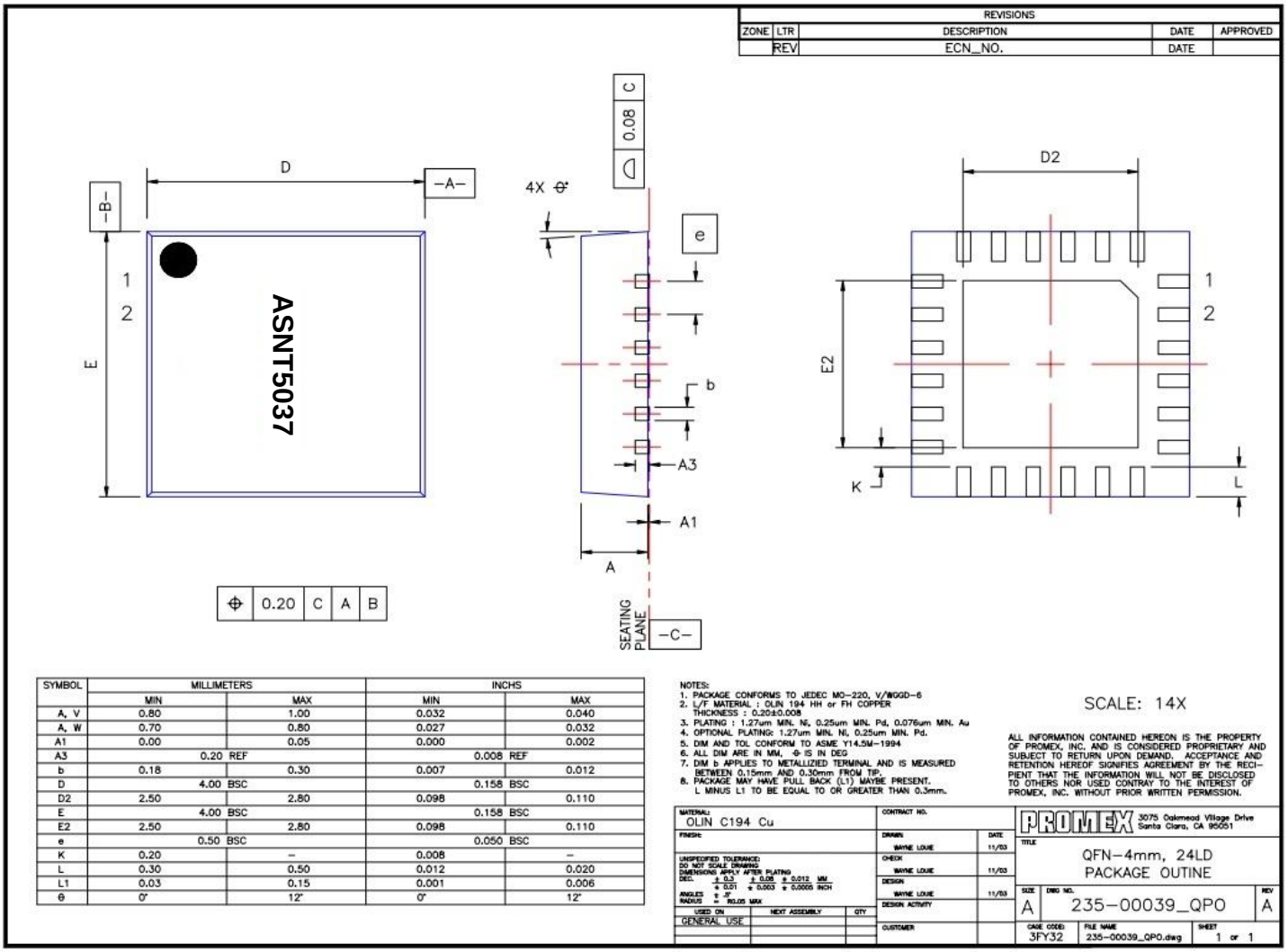
PACKAGE INFORMATION

The chip die is housed in a standard 24-pin QFN package shown in Fig. 3. 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 ASNT5037-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.



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 : 0.203±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, ⊕ 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. 3. QFN 24-Pin Package Drawing (All Dimensions in mm)

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REVISION HISTORY

Revision	Date	Changes
5.4.2	04-2020	Updated Package Information
5.3.2	07-2019	Updated Letterhead
5.3.1	09-2014	Added maximum output swing value
5.2.1	09-2014	Corrected output amplitude Corrected power consumption Added Amplitude Control Port description
5.1.1	07-2014	Added description of tnp/tnn ports
5.0.1	03-2013	Corrected title Revised package pin out drawing Revised functional block diagram Revised description Added power supply configuration Added absolute maximum ratings Revised terminal functions Revised electrical characteristics Revised package information Added mechanical drawing Format correction
4.1	03-2010	Revised electrical characteristics Added package information section
4.0	02-2010	Revised electrical characteristics
3.0	01-2010	Revised electrical characteristics
2.0	12-2009	Revised electrical characteristics
1.0	08-2009	First release