ADSANTEC
Ultra High-Speed Mixed Signal ASICs

Advanced Science And Novel Technology Company, Inc.
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Offices: 310-530-9400 / Fax: 310-530-9402
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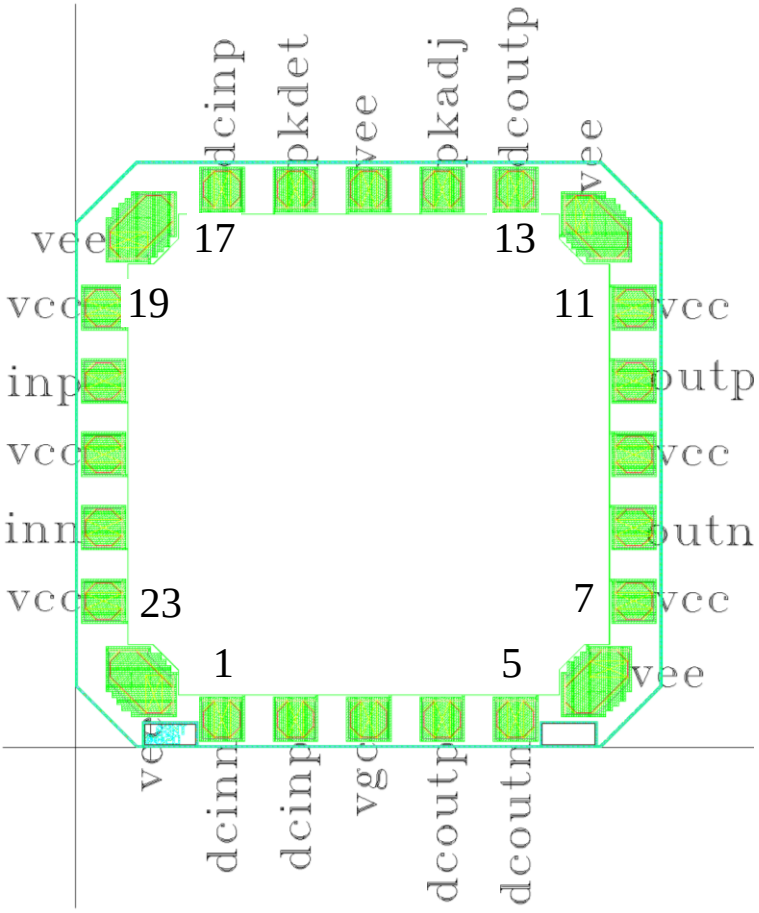
ASNT5136-BD
DC-45*Gbps* Limiting Amplifier

- Broadband limiting amplifier with adjustable gain, output peaking, and offset controls
- Low jitter and limited temperature variation over industrial temperature range
- 30*GHz* of analog bandwidth in limiting mode
- On-chip input peak detector
- Fully differential CML-type input interface
- Fully differential CML output interface with 300*mV* single-ended swing
- Single +3.3*V* or -3.3*V* power supply
- Power consumption: 365*mW*
- Fabricated in SiGe for high performance, yield, and reliability



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DESCRIPTION

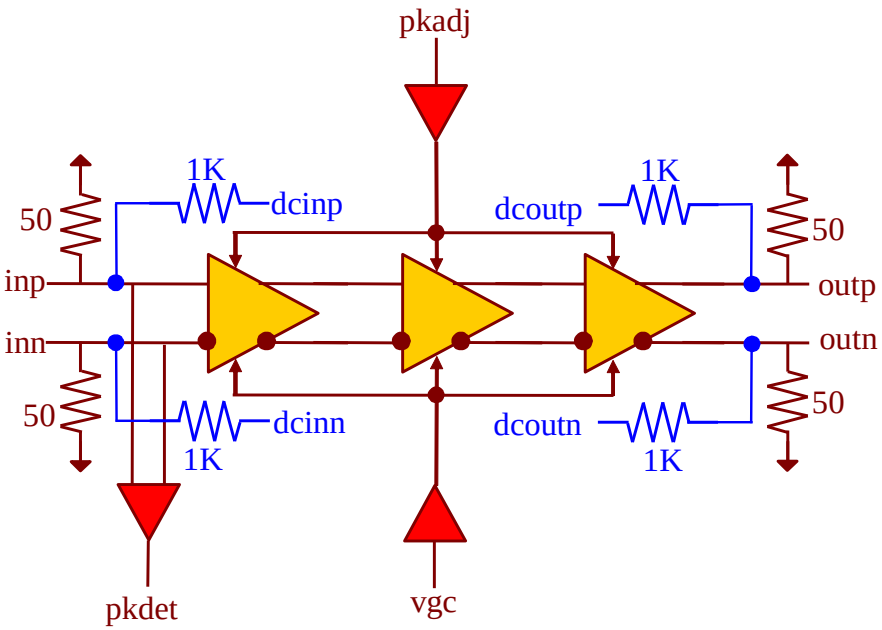

Fig. 1. Functional Block Diagram

The temperature stable ASNT5136-BD SiGe IC provides low jitter broadband variable signal amplification between its input and output signal ports and is intended for use in high-speed communication systems. The circuit shown in Fig. 1 accepts an analog signal at its input differential port inp/inn and delivers a voltage-limited output signal at the output differential port outp/outn. The common-mode voltage levels of input and output signals can be adjusted using analog control inputs dcinp/dcinn and dcoutp/dcoutn respectively. The total gain can be externally adjusted through the gain control port vgc. The output signal's peaking can be controlled through the port pkadj. The input amplitude can be monitored using analog output voltage pkdet.

The part's I/Os 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 ASNT5136-BD 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 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.

The chip substrate should be connected to vee or completely isolated. DO NOT connect substrate to vcc!

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

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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		0.4	*W*
RF Input Voltage Swing (SE)		1.0	*V*
Back-of-the-die Temperature		+90	*°C*
Storage Temperature	-40	+100	*°C*
Operational Humidity	10	98	*%*
Storage Humidity	10	98	*%*

TERMINAL FUNCTIONS

TERMINAL			DESCRIPTION
Name	**No.**	**Type**	
High-Speed I/Os			
inp	20	CML input	Differential data 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		
dcinp	2, 17	Analog inputs	inp common mode control voltage
dcinn	1		inn common mode control voltage
dcoutp	4, 13	Analog inputs	outp common mode control voltage
dcoutn	5		outn common mode control voltage
vgc	3	Analog inputs	Gain control voltage
pkadj	14		Peaking control voltage
pkdet	16	Analog output	Analog voltage representing input signal's amplitude
Supply And Termination Voltages			
Name	**Description**		**Pin Number**
vcc	Positive power supply (+3.3*V* or 0)		7, 9, 11, 19, 21, 23
vee	Negative power supply (0*V* or -3.3*V*)		6, 12, 15, 18, 24

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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		110		*mA*	
Power consumption		365		*mW*	
Junction temperature	-25	50	125	*°C*	
Input (inp/inn)					
Data Rate	0		45	*Gbps*	
Swing	10	200	500	*mV*	Differential or SE, p-p
CM Voltage Level	vcc-0.8	vcc-0.3	vcc+0.3	*V*	Must match for both inputs
Output (outp/outn)					
Data Rate	0		45	*Gbps*	
Logic "1" level		vcc		*V*	
Logic "0" level		vcc-0.3		*V*	With external 50*Ohm* DC termination
Rise/Fall Times	10	12	14	*ps*	20%-80%
Additive Jitter			1	*ps*	Peak-to-peak
Gain Control Port (vgc)					
Bandwidth	0.0		100	*MHz*	
Input Signal Range	-1.0		0.0	*V*	
Gain Variation	32	35	38	*dB*	< ±5%
Peaking Control Port (pkadj)					
Bandwidth	0.0		100	*MHz*	
Input Signal Range	-1.0		0.0	*V*	
Common Mode Control Ports (dcinp/dcinn, dcoutp/dcoutn)					
Input Signal Range	-3.3		0.0	*V*	
Peak Detector Output (pkdet)					
Bandwidth	0.0		1.0	*KHz*	
Output Signal Range	-1.0		0.0	*V*	

DIE INFORMATION

The die has external dimensions of 1.2x1.2mm^2 with an approximate thickness of 280μm, and includes 24 octagonal pads: 5 on each side and 4 corner pads. The pad frame parameters are presented in Table 2.

Table 2. Pad Frame Parameters

Pad Type	Metal dimensions, μm	Opening dimensions, μm	Step, μm
Side pad	80x80	74x74	150
Corner pad	154x106	148x74	n/a

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The part's identification name is ASNT5136-BD. 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 2 characters after the dash mark the part as a bare die.

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

REVISION HISTORY

Revision	Date	Changes
1.7.2	02-2020	Updated Die Information
1.6.2	07-2019	Updated Letterhead
1.6.1	04-2017	Added description of substrate connection Updated absolute maximum ratings section
1.5.1	02-2014	Corrected die dimensions units to mm^2
1.4.1	02-2013	Corrected description Corrected electrical characteristics Added die information Corrected format
1.3.1	08-2012	Added pad frame drawing Corrected description Added power supply configuration Corrected format
1.2.1	08-2012	Initial release