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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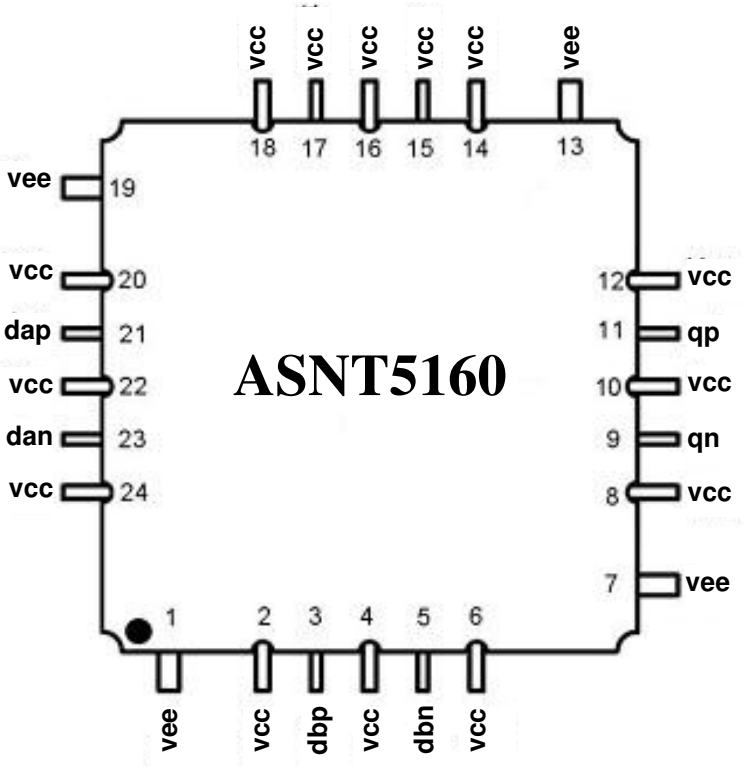
ASNT5160-KMC
DC-50*Gbps* AND/OR Logic Gate

- High speed broadband AND/OR Boolean logic gate
- Exhibits low jitter and limited temperature variation over industrial temperature range
- 25*GHz* analog input bandwidth for both data inputs
- Ideal for high speed proof-of-concept prototyping
- 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: 270*mW*
- Fabricated in SiGe for high performance, yield, and reliability
- Custom CQFP 24-pin package



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DESCRIPTION

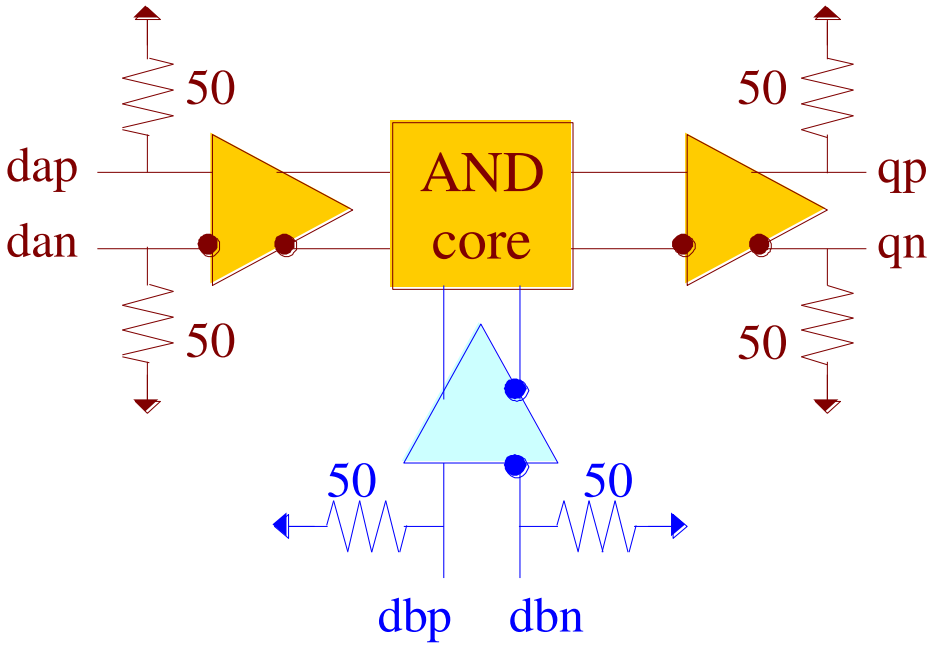

Fig. 1. Functional Block Diagram

The temperature stable ASNT5160-KMC SiGe IC provides broadband AND/OR Boolean logic functionality, and is intended for use in high-speed measurement / test equipment. The IC shown in Fig. 1 can AND/OR a high-speed data input signal dap/dan with another high-speed data input signal dbp/dbn, and deliver a high-speed NRZ data output signal qp/qn. An RZ data output signal can be generated by inserting up to half of the IC's maximum data input frequency into one data input signal dap/dan or dbp/dbn while providing an up to its maximum clock signal analog bandwidth into the other data input dap/dan or dbp/dbn.

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 (also see 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 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*.

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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.

Table 1. Absolute Maximum Ratings

Parameter	Min	Max	Units
Supply Voltage (vee)		-3.6	*V*
Power Consumption		0.30	*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			
dap	21	CML input	Differential data/clock inputs with internal SE 50*Ohm* termination to vcc.
dan	23		
dbp	3	CML input	Differential data/clock inputs with internal SE 50*Ohm* termination to vcc.
dbn	5		
qp	11	CML output	Differential data outputs with internal SE 50*Ohm* termination to vcc. Require external SE 50*Ohm* termination to vcc.
qn	9		

Supply and Termination Voltages		
Name	**Description**	**Pin Number**
vcc	Positive power supply. (+3.3*V* or 0)	2, 4, 6, 8, 10, 12, 14, 15, 16, 17, 18, 20, 22, 24
vee	Negative power supply. (0*V* or -3.3*V*)	1, 7, 13, 19

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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		85		*mA*	
Power consumption		270		*mW*	
Junction temperature	-40	25	125	*°C*	
HS Input Data/Clock (dap/dan, dbp/dbn)					
Data Rate	DC		50	*Gbps*	When used to generate NRZ data
Clock Frequency	DC		25	*GHz*	When used to generate RZ data
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 (qp/qn)					
Data Rate	DC		50	*Gbps*	
Logic "1" level		vcc		*V*	
Logic "0" level		vcc-0.4		*V*	With external 50*Ohm* DC termination
Rise/Fall times	6	8	10	*ps*	20%-80%
Output Jitter			1	*ps*	Peak-to-peak

PACKAGE INFORMATION

The chip die is housed in a custom 24-pin CQFP package shown in Fig. 2. 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.

The part's identification label is ASNT5160-KMC. 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.

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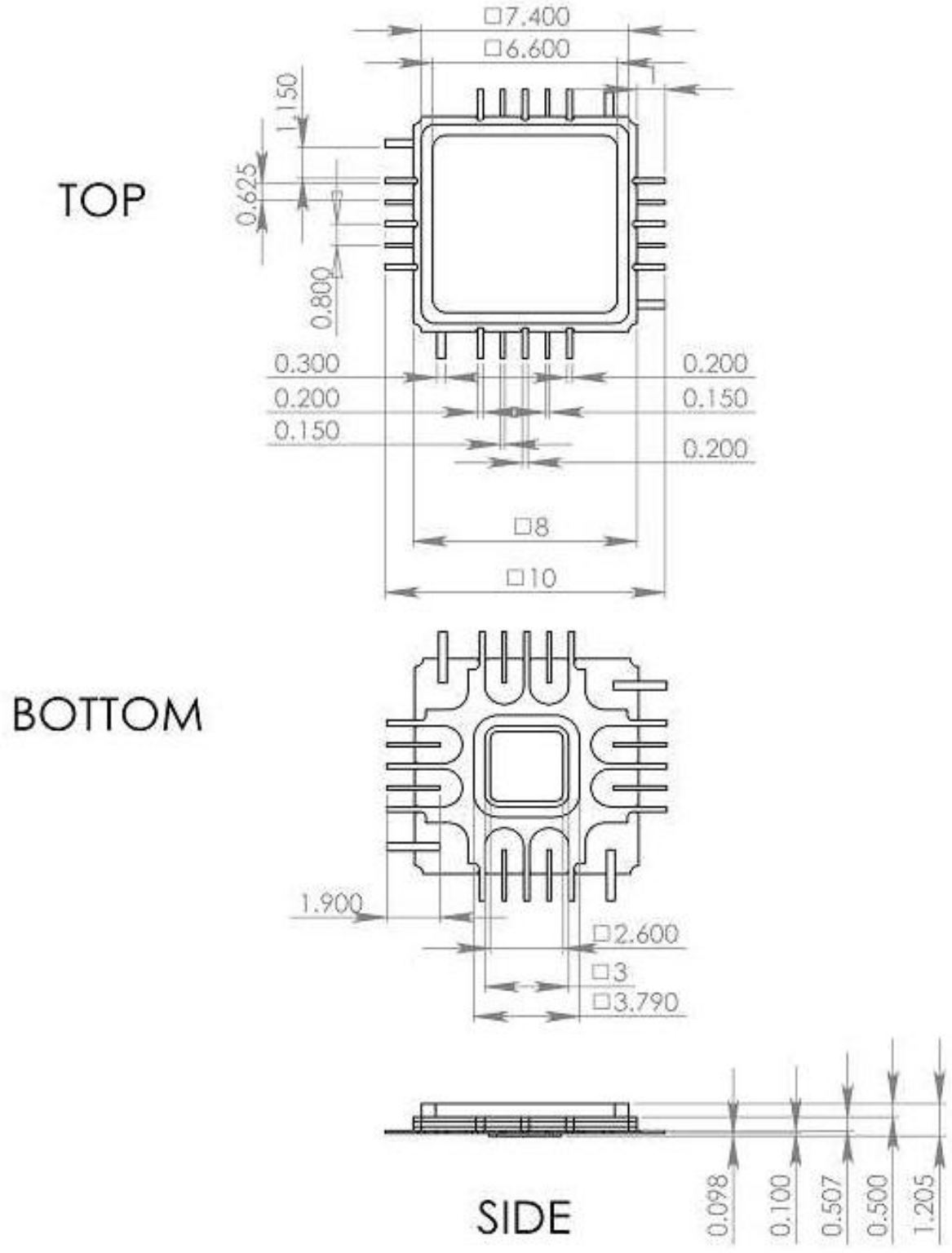

Fig. 2. CQFP 24-Pin Package Drawing (All Dimensions in mm)

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REVISION HISTORY

Revision	Date	Changes
5.1.2	04-2020	Updated Package Information
5.0.2	07-2019	Updated Letterhead
5.0.1	03-2013	Corrected title Added package pin out drawing Revised functional block diagram Revised description Added power supply configuration Added absolute maximum ratings Revised terminal functions Revised electrical characteristics Added package information and mechanical drawing Format correction
4.0	02-2008	Revised electrical characteristics section Revised packaging information section
3.0	06-2007	Revised electrical characteristics section
2.0	04-2007	Revised terminal functions section
1.0	01-2007	First release