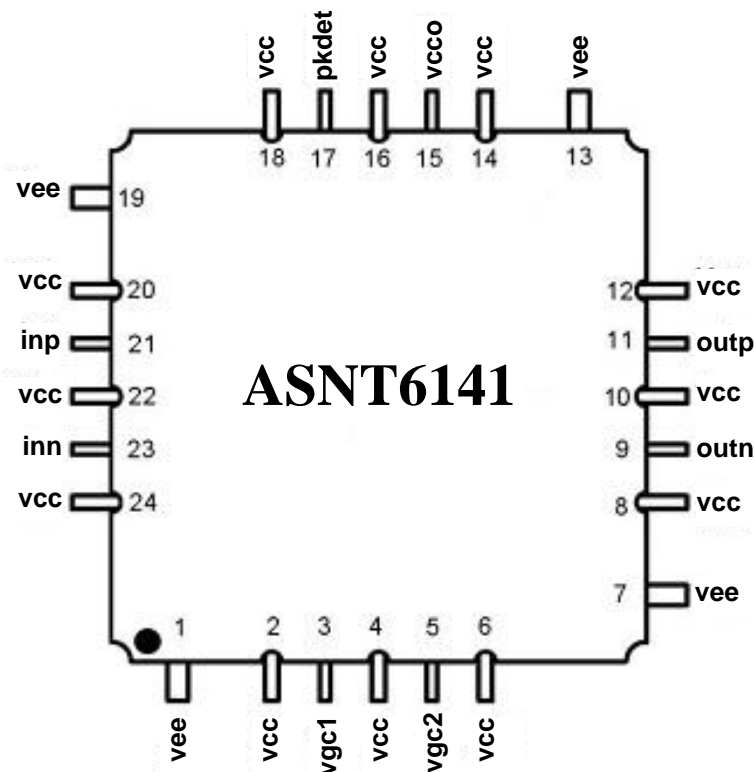




ASNT6141-KMC DC-12GHz Linear amplifier

- Broadband (DC-12GHz) linear amplifier for receiver-side applications
- Features controlled gain from 0dB to 31.5dB
- Features input offset adjustment and input peak detector
- Fully differential input interface with on-chip 50Ohm termination
- Fully differential output interface with on-chip 50Ohm termination
- Output 1dB compression point of 1.5dBm
- 3rd Harmonic better than -47dBc within the full bandwidth
- 15dB Noise Figure
- Single +3.3V or -3.3V power supply
- Power consumption: 530mW typical
- Fabricated in SiGe for high performance, yield, and reliability
- Custom CQFP 24-pin package



DESCRIPTION

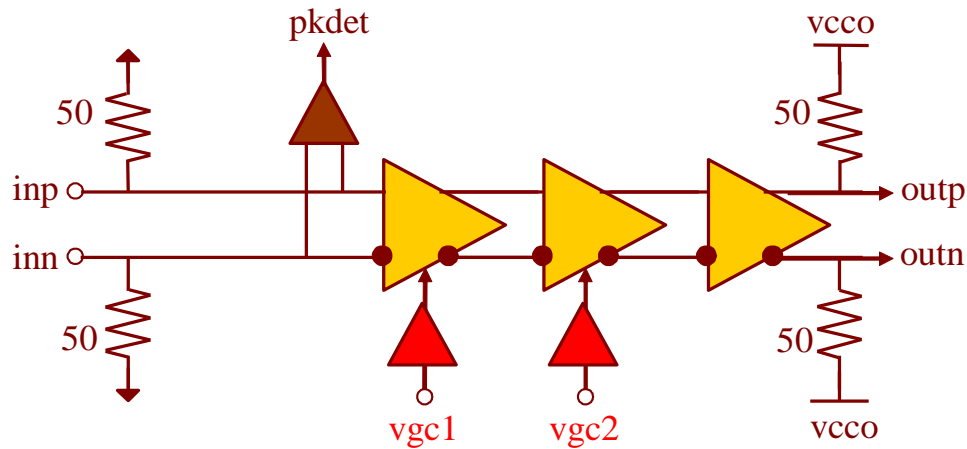


Fig. 1. Functional Block Diagram

The temperature-stable linear amplifier ASNT6141-KMC IC shown in Fig. 1 has been fabricated in SiGe technology and provides low-jitter broadband variable signal amplification between its input **inp/inn** and output **outp/outn** signal ports. This IC is intended for use in high-speed communication systems. The gain adjustment is performed through two independent external control ports **vgc1** and **vgc2**. The typical gain control characteristic is shown in Fig. 2.

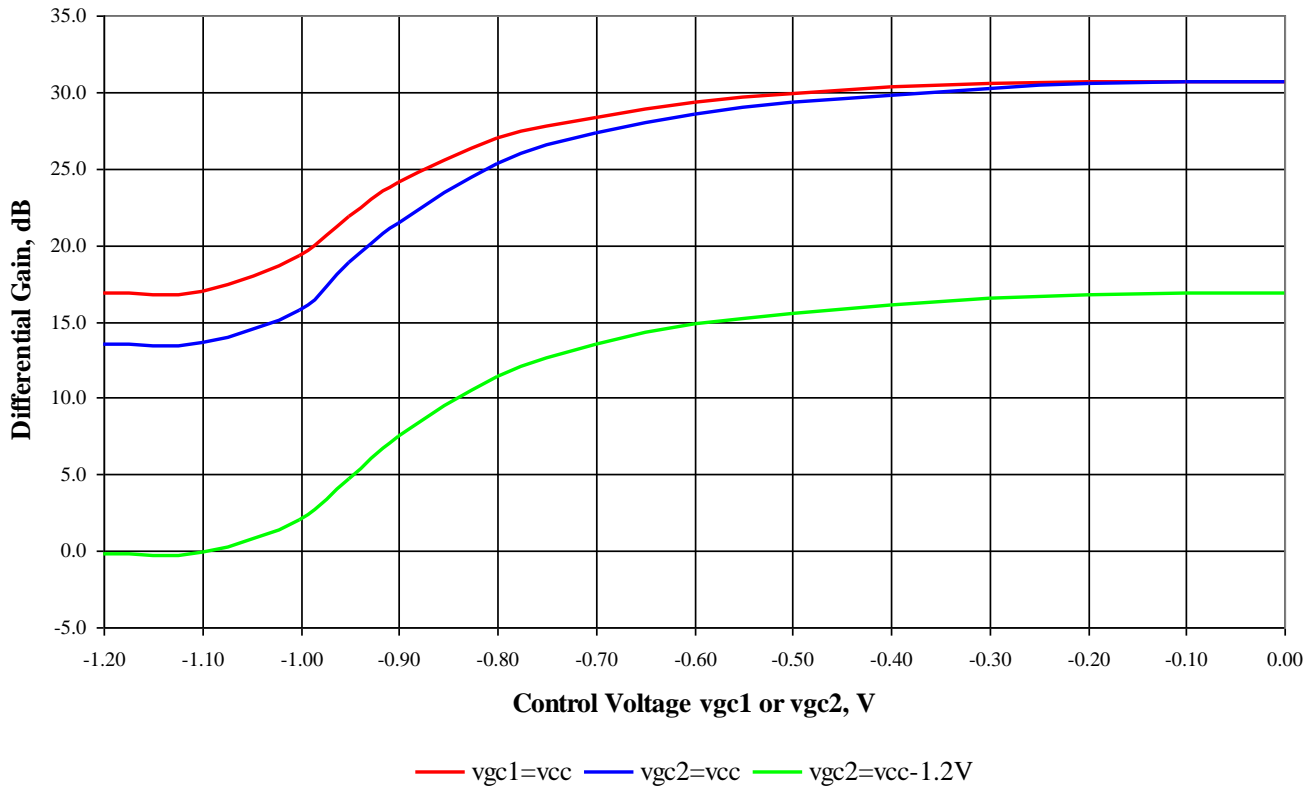


Fig. 2. Typical Gain Control Characteristic



The part's I/Os support the CML logic interface with on chip 50Ω termination to V_{CC} 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.

The on-chip peak detector delivers a single-ended output voltage V_{pkdet} reverse-proportional to the input signal's amplitude. A typical dependence of the V_{pkdet} output voltage versus single-ended input peak-to-peak swing is shown in Fig. 3.

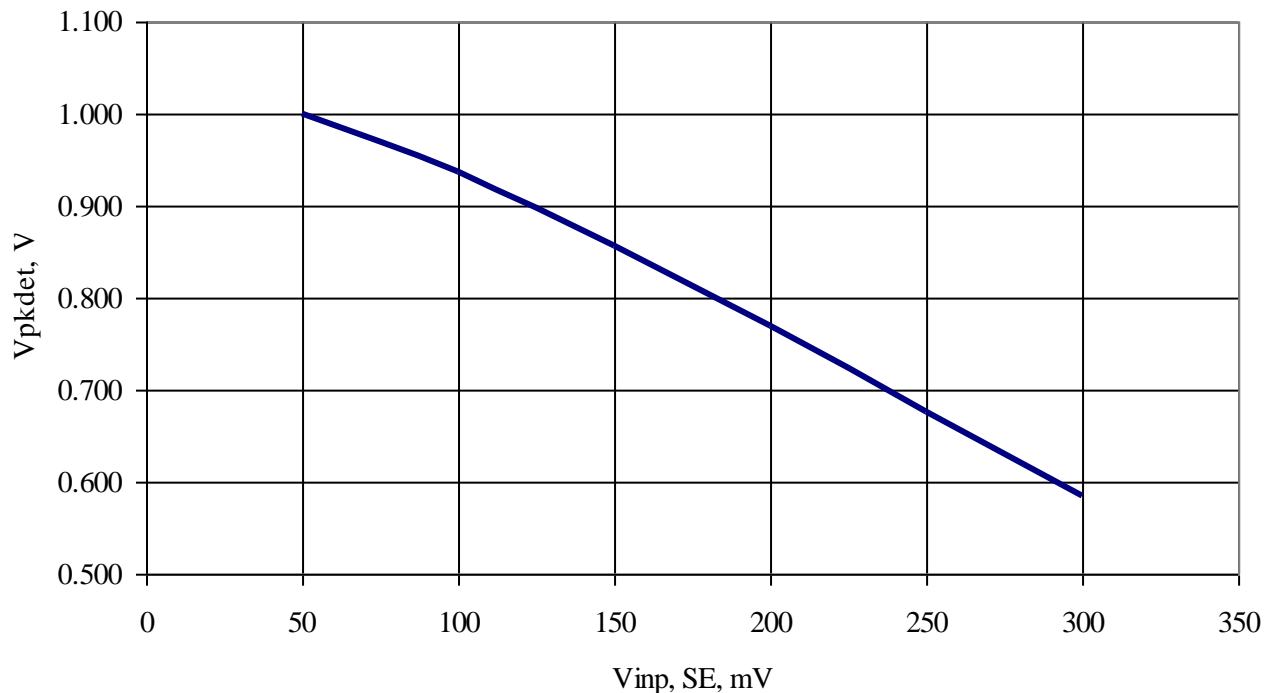


Fig. 3. Typical Peak Detector Output Characteristic

For the optional output common-mode voltage adjustment, the output termination resistors are connected to a separate positive supply voltage V_{CC0} that may be different from V_{CC} .

POWER SUPPLY CONFIGURATION

The part can operate with either a negative supply ($V_{CC} = 0.0V$ =ground and $V_{EE} = -3.3V$), or a positive supply ($V_{CC} = +3.3V$ and $V_{EE} = 0.0V$ =ground). In case of the 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.

Table 1. Absolute Maximum Ratings

Parameter	Min	Max	Units
Main Supply Voltage (vcc-vee)		3.6	V
Output Supply Voltage (vcco-vcc)	-0.8	+0.8	V
Power Consumption		0.60	W
RF Input Voltage Swing (SE)		1.0	V
Control Voltages (vgc1-vcc, vgc2-vcc)	-2.0	+0.4	V
Case 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	21	CML input	Differential high-speed signal inputs with internal SE 50Ω termination to vcc
inn	23		
outp	11	CML output	Differential high-speed signal outputs with internal SE 50Ω termination to vcc. Require external SE 50Ω termination to vcc
outn	9		
Low-Speed I/Os			
vgc1	3	Input	Low-speed amplitude adjustment tuning input
vgc2	5	Input	Low-speed amplitude adjustment tuning input
pkdet	17	Output	Peak detector output with on-chip 2.8KΩ termination to vcc
Supply and Termination Voltages			
Name	Description		Pin Number
vcc	Positive power supply (+3.3V or 0V)		2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24
vee	Negative power supply (0V or -3.3V)		1, 7, 13, 19
vcco	Output buffer power supply		15



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}		160	176	mA	
Power consumption		530		mW	
Junction temperature	-25	50	85	°C	
HS Input Data (inp/inn)					
Bandwidth		12		GHz	At -3dB level from 24dB gain
CM level	-0.8		0	V	
Input referred noise density		2.5		nV/sqrt(Hz)	At maximum gain
S11		-15		dB	DC to 10GHz
HS Output Data (outp/outn)					
CM level		-0.6		V	
S22		-15		dB	DC to 10GHz
Small-signal differential gain	30	31.5	33	dB	At 2GHz, vgc1=vgc2=0V
	-0.2	0	0.2	dB	At 2GHz, vgc1=vgc2=-1.2V
Output referred 1dB compression point		1.5		dBm	Single-Ended, at 10GHz
2 nd harmonic		-45		dBc	<9GHz
		-40		dBc	>9GHz
3 rd harmonic		-50		dBc	<9GHz
		-47		dBc	>9GHz
Low-Speed Control Input (vgc1, vgc2)					
Voltage range	vcc-1.2		vcc	V	
Input impedance		2		KOhm	Terminated to vcc

PACKAGE INFORMATION

The chip die is housed in a custom 24-pin CQFP package shown in Fig. 4. 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 ASNT6141-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.

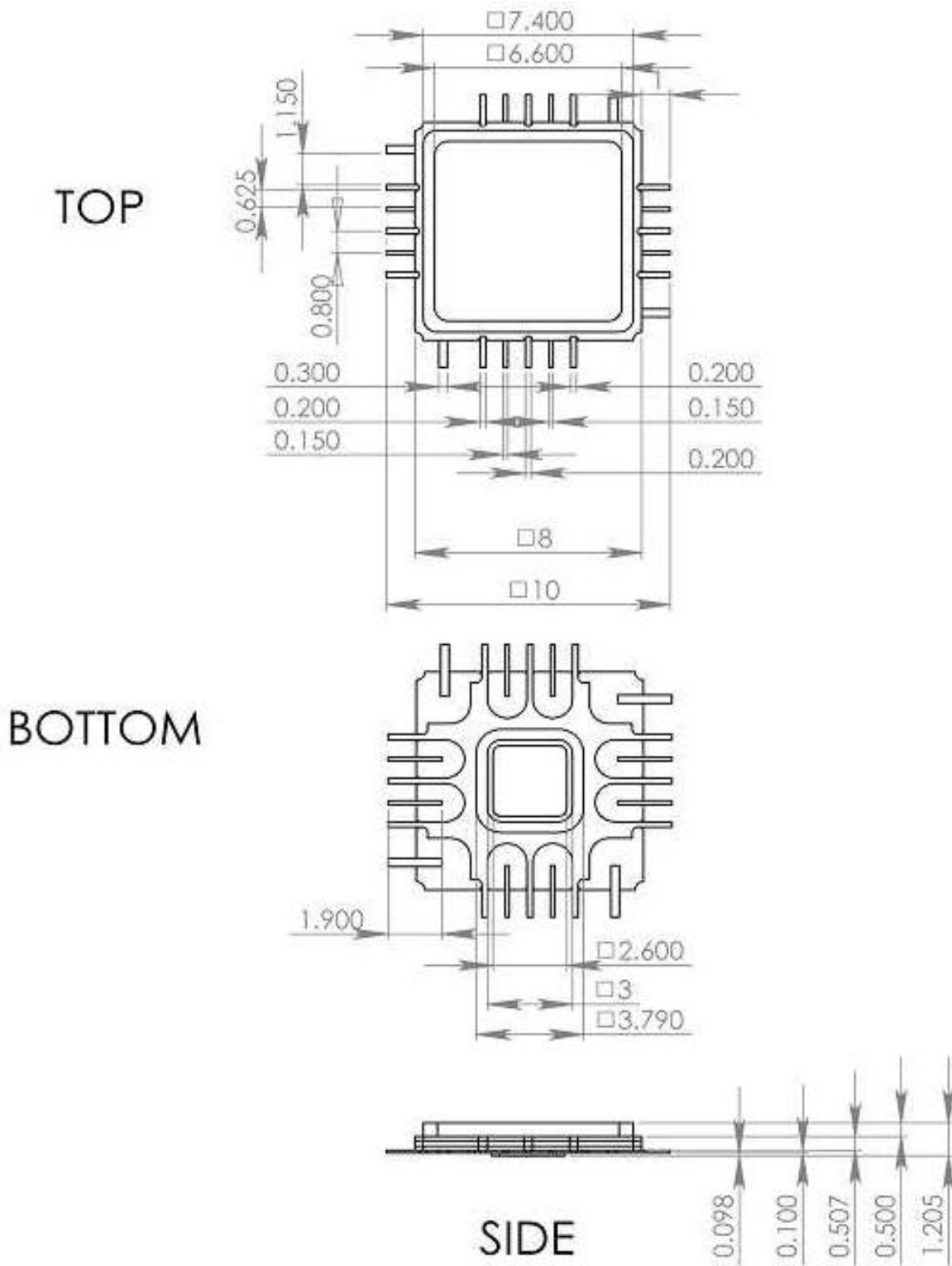


Fig. 4. CQFP 24-Pin Package Drawing (All Dimensions in mm)



REVISION HISTORY

Revision	Date	Changes
2.6.2	05-2020	Updated Package Information
2.5.2	07-2019	Updated Letterhead
2.5.1	05-2018	Corrected Absolute Maximum Ratings
2.4.1	05-2015	Revised Package Information section
2.3.1	01-2015	Added Peak Detector output characteristic Added Peak Detector's output termination value Corrected values of power/current consumption
2.2.1	04-2014	Corrected list of main characteristics on page 1 Added Gain Control characteristic Corrected Electrical Characteristics
2.1.1	07-2013	Corrected Electrical characteristics (gain control settings and bandwidth)
2.0.1	03-2013	Corrected title Corrected description Updated pin out drawing Revised Functional Block Diagram section Revised Description section Revised Terminal Functions section Revised Electrical Characteristics section Added package mechanical drawing Modified format
1.1	03-2012	Added Power Supply Configuration text Replaced the "package view" diagram Added Absolute Maximum Ratings table Added Package Information section Added Revision History table
1.0	09-2010	First release