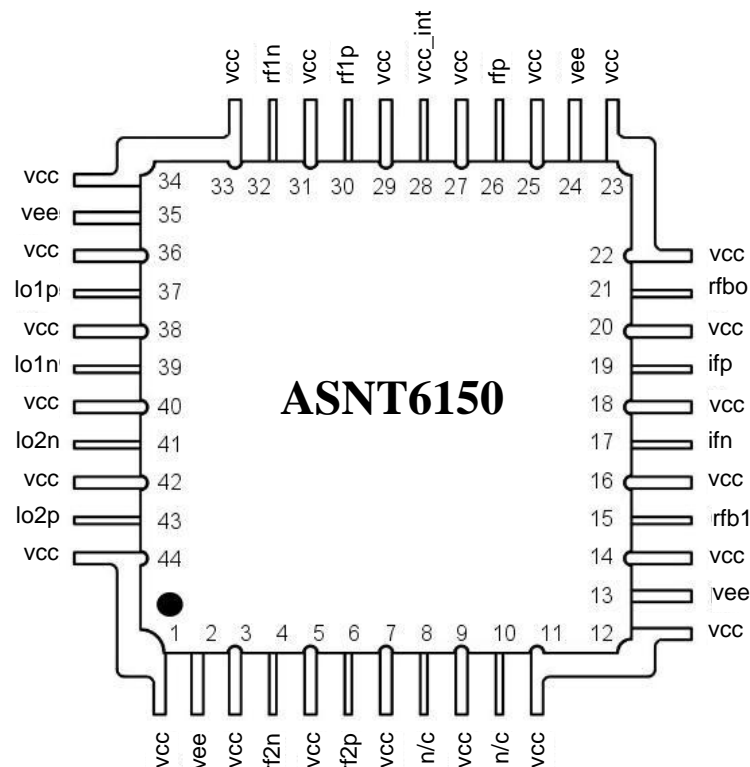




ASNT6150-KMM Balanced I/Q Modulator (Up-Converter) with LPF

- DC to 4GHz broadband Radio Frequency (RF) inputs
- 4GHz LPF for RF inputs
- Up to 18GHz Local Oscillator (LO) inputs
- Broadband DC to 18GHz Intermediate Frequency (IF) output
- Differential input linearity range up to 600mV p-p
- 30dB RF-to-IF isolation
- All inputs are differential CML-type with 50Ohm on-chip termination
- Limited temperature variation over industrial temperature range
- Single +3.3V or -3.3V power supply
- Power consumption: 446mW
- Fabricated in SiGe for high performance, yield, and reliability
- Custom CQFP 44-pin package



DESCRIPTION

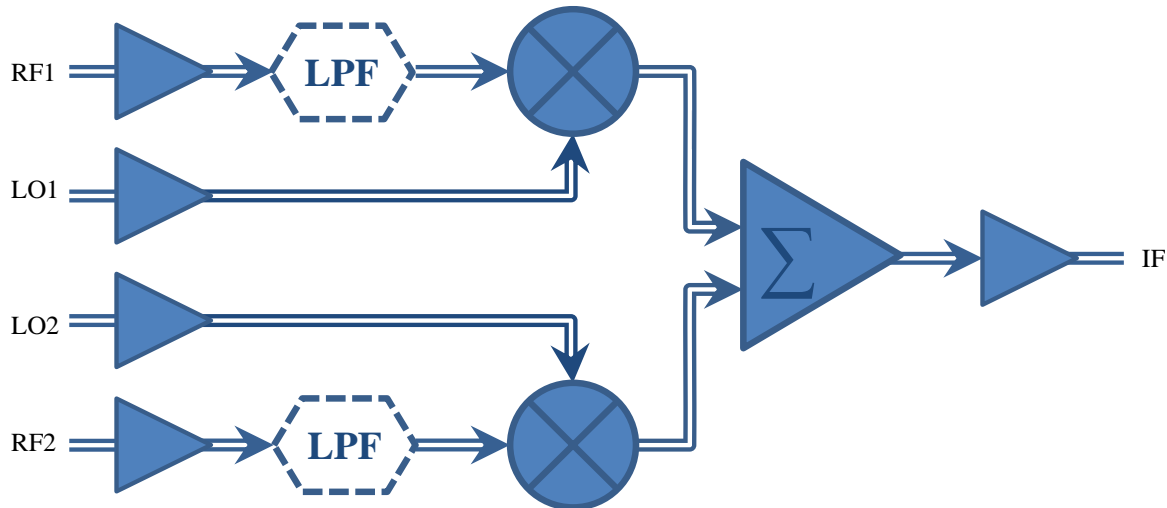


Fig. 1. Functional Block Diagram

I/Q modulators are critical components in the signal chain of modern digital transmitters. I/Q modulators perform the frequency translation that moves a base-band signal to a desired location in the RF spectrum. The I/Q modulator shown in Fig. 1 accepts 2 local oscillator inputs LO1, LO2 representing in-phase (I) and quadrature (Q) components separated by 90°. These two signals are combined with I and Q baseband signals RF1, RF2 in two separate mixers. The outputs from both mixers are then summed to provide a modulated carrier IF. The chip includes two low-pass filters (LPF) for processing RF signals prior to their mixing with the corresponding LO signals.

The part's output buffers support the CML-type interface with on chip 50 Ω termination to **vcc** and may be used in either DC or AC coupling modes (see also POWER SUPPLY CONFIGURATION). The differential DC signaling mode is recommended for optimal performance. In particular, the output common-mode voltage level of **vcc**-0.4V is guaranteed only in case of external single-ended 50 Ω DC termination to **vcc**.

The part's input buffer supports the CML-type interface with equivalent on-chip 50 Ω termination and can be used in either DC or AC coupling modes. In the first mode, the input signal's common mode voltage should comply with the specifications shown in ELECTRICAL CHARACTERISTICS. In the second mode, the input termination provides the required common mode voltage automatically. The differential signaling mode is recommended for optimal performance.

POWER SUPPLY CONFIGURATION

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

All the characteristics detailed below assume **vcc = 3.3V and **vee** = 0V.**



ABSOLUTE MAXIMUM RATINGS

Caution: Exceeding the absolute maximum ratings 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 (VCC)		3.6	V
Power Consumption		490	mW
Case Temperature		+90	°C
Storage Temperature	-40	+100	°C
Operational Humidity	10	98	%
Storage Humidity	10	98	%

TERMINAL FUNCTIONS

TERMINAL			DESCRIPTION
Name	No.	Type	
lo1p	37	CML input	Differential LO1 inputs with internal SE 50Ohm termination to VCC
lo1n	39		
lo2p	43	CML input	Differential LO2 inputs with internal SE 50Ohm termination to VCC
lo2n	41		
rf1p	30	CML input	Differential RF1 inputs with internal SE 50Ohm termination to VCC
rf1n	32		
rf2p	6	CML input	Differential RF2 inputs with internal SE 50Ohm termination to VCC
rf2n	4		
ifp	19	CML output	Differential IF outputs. Require external SE 50Ohm termination to VCC
ifn	17		
rfp	26	Analog	Control for core currents
rfb1	15	Analog	Control for core currents
rfbo	21	Analog	Control for output buffer current
Supply and Termination Voltages			
Name	Description		Pin Number
vcc	Positive power supply (+3.3V or 0)		1, 3, 5, 7, 9, 11, 12, 14, 16, 18, 20, 22, 23, 25, 27, 28, 29, 31, 33, 34, 36, 38, 40, 42, 44
vee	Negative power supply (0V or -3.3V)		2, 13, 24, 35
n/c	Not connected pins		8, 10



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}		135		mA	
Power consumption		446		mW	
Junction temperature	-40	25	85	°C	
RF Input					
Bandwidth		4		GHz	At -3dB level
Linearity range		600		mV	Differential p-p
CM Voltage Level	vcc -0.6	vcc -0.4	vcc +0.4	V	
LO Input					
Bandwidth		18		GHz	At -3dB level
Linearity range		600		mV	Differential p-p
CM Voltage Level	vcc -0.6	vcc -0.4	vcc +0.4	V	
IF Output					
Bandwidth		18		GHz	At -3dB level
Small Signal Gain		0		dB	From LO input, diff-to-diff
		-6		dB	From RF input, diff-to-diff
CM Level		vcc -0.4		V	With external 50Ω DC termination

PACKAGE INFORMATION

The chip die is housed in a custom, 44-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 ASNT6150-KMM. 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 digits after the underscore 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.

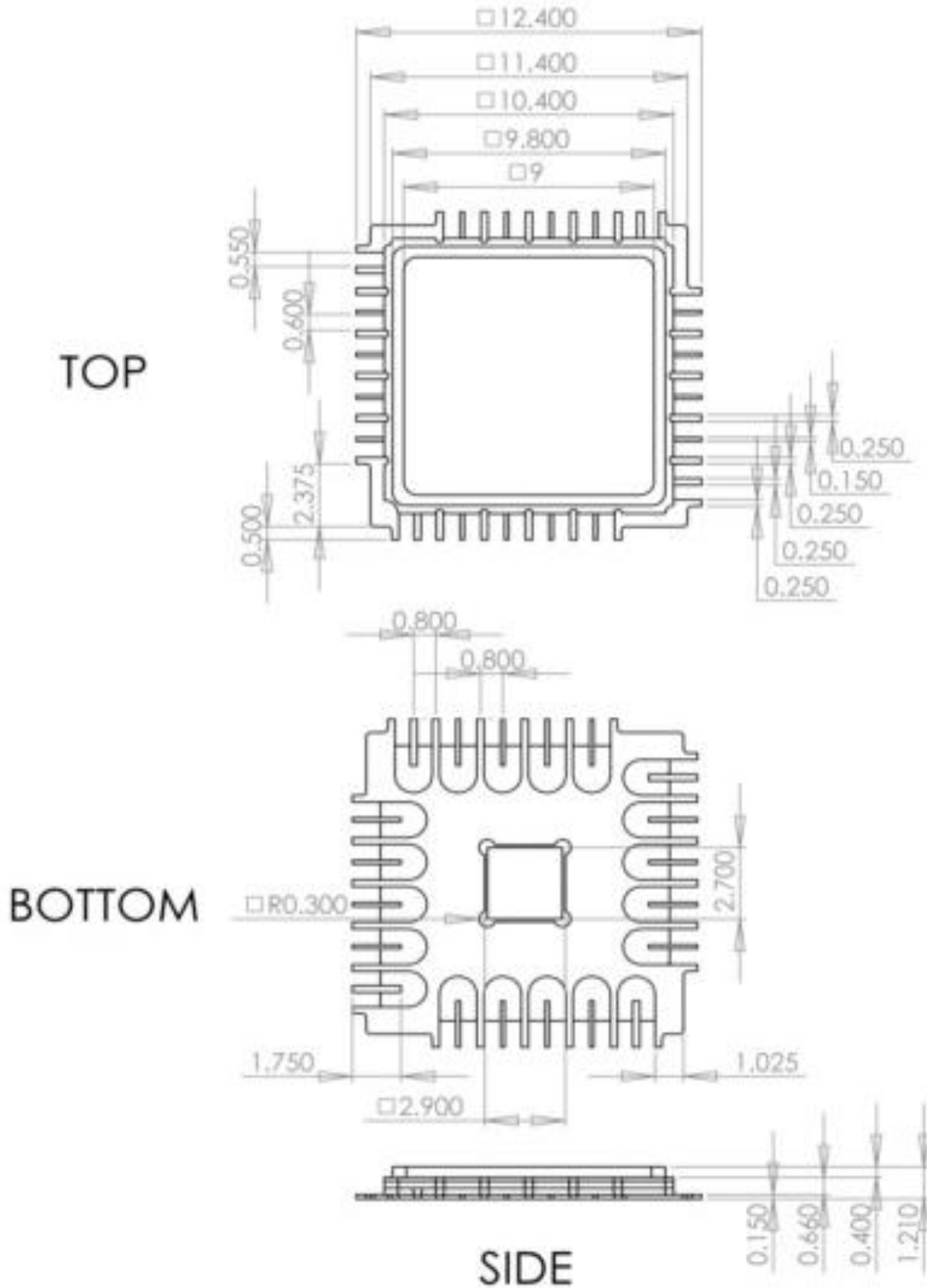


Fig. 2. CQFP 44-Pin Package Drawing (All Dimensions in mm)



REVISION HISTORY

Revision	Date	Changes
1.3.2	05-2020	Updated Package Information
1.2.2	07-2019	Updated Letterhead
1.2.1	05-2013	Corrected title Removed specifications for ASNT6151 Corrected absolute maximum ratings Corrected terminal functions Corrected electrical characteristics
1.1.1	03-2013	Corrected speed characteristics Added gain specification Corrected power consumption values Corrected package information Corrected format
1.0.1	04-2012	Initial release