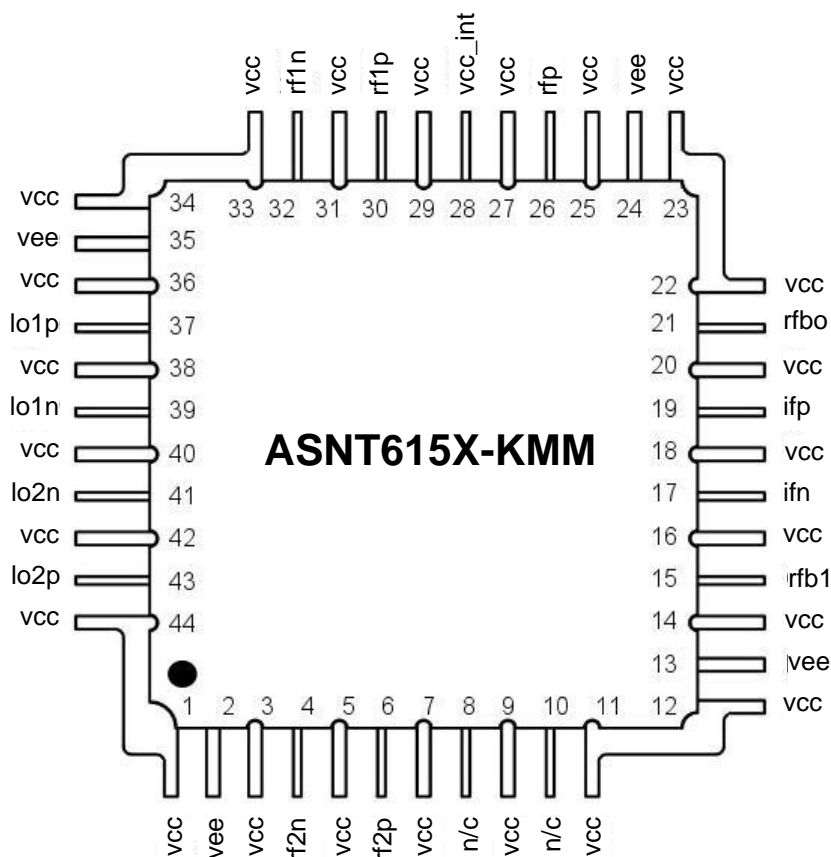




ASNT615X-KMM Balanced I/Q Modulators (Up-Converters)

- DC to 4GHz broadband Radio Frequency (RF) inputs.
- Optional 4GHz LPF for RF inputs (ASNT6150).
- Up to 20GHz Local Oscillator (LO) inputs.
- Broadband DC to 26GHz 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: 410mW with LPF (ASNT6150), 385mW without LPF (ASNT6151).
- Fabricated in SiGe for high performance, yield, and reliability.
- Custom CQFP 44-pin package.





DESCRIPTION

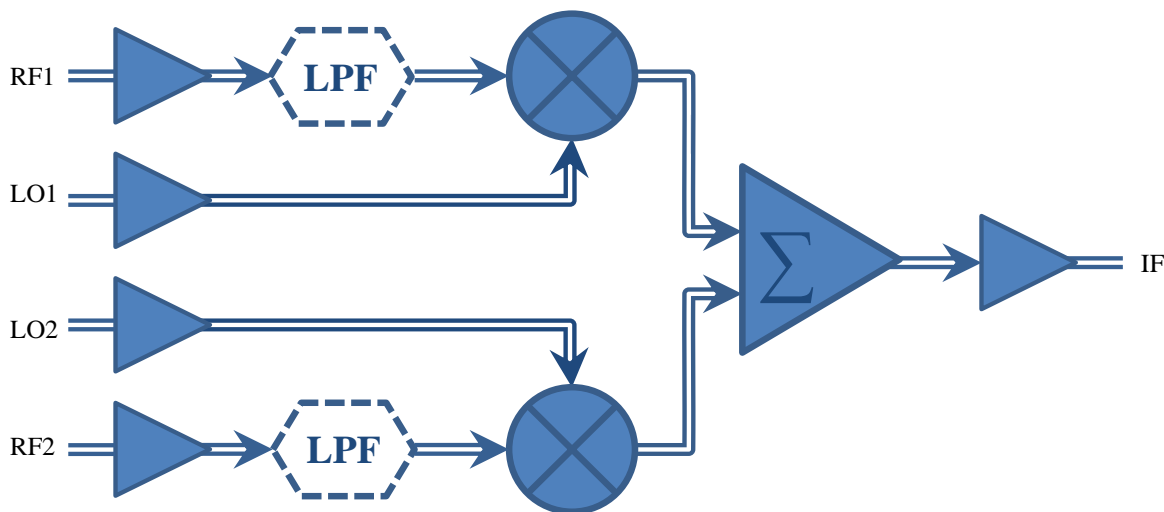


Fig. 1. Functional Block Diagram.

I/Q modulators are critical components in the signal chain of modern digital transmitters. I/Q modulators perform the frequency translation that moves the base-band signal to the desired location in the RF spectrum. An 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 ASNT6150 chip includes two low-pass filters (LPF) for processing of RF signals prior to their mixing with the corresponding LO signals. The ASNT6151 chip does not include the filters.

The part's output buffers support the CML-type interface with on chip 500 Ω termination to vcc and may be used in either DC or AC coupling modes (see also POWER SUPPLY CONFIGURATION). The differential DC signaling is recommended for the optimal performance. In particular, the output common-mode voltage level of vcc-0.4V is guaranteed only in case of external single-ended 500 Ω DC termination to vcc.

The part's input buffer supports the CML-type interface with equivalent on-chip 500 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 is recommended for the optimal performance.

POWER SUPPLY CONFIGURATION

IC can operate with either negative supply (vcc = 0.0V=ground and vee = -3.3V), or positive supply (vcc = +3.3V and vee = 0.0V=ground). In case of the positive supply, all I/Os need AC termination when connected to any devices with 500 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 (vee)		3.8	V
Power Consumption		470	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	41	CML input	Differential LO2 inputs with internal SE 50Ohm termination to vcc.
lo2n	28		
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		
rfb1	15	Analog	Control for core currents
rfbo	19	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, 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}		124		mA	
Power consumption		410		mW	
Junction temperature	-40	27	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		20		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		26		GHz	At -3dB level
Small Signal Gain		0		dB	
CM Level		vcc -0.4		V	With external 50Ohm DC termination

PACKAGE INFORMATION

The chip die is housed in a custom, 44-pin CQFP package shown in Fig. 2. The package's mechanical information is available on the company's [website](#). Even though the package provides a center heat slug located on the back side of the package to be used for heat dissipation, ADSANTEC does **NOT** recommend for this section to be soldered to the board. If the customer wishes to solder it, it should be connected to vcc plain that is ground for the negative supply or power for the positive supply.

The package's leads will be trimmed to a length of 1.0mm. After trimming, the package's leads will be further processed as follows:

1. The lead's gold plating will be removed per the following sections of J-STD-001D:
 - 3.9.1 Solderability
 - 3.2.2 Solder Purity Maintenance
 - 3.9.2 Solderability Maintenance
 - 3.9.3 Gold Removal
2. The leads will be tinned with Sn63Pb37 solder.

The part's identification label is ASNT615X-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. Here X represents either 0 or 1.

This device complies with the Restriction of Hazardous Substances (RoHS) per EU 2002/95/EC for all six substances.



44-PIN KMM Package

All Dimensions are in millimeters

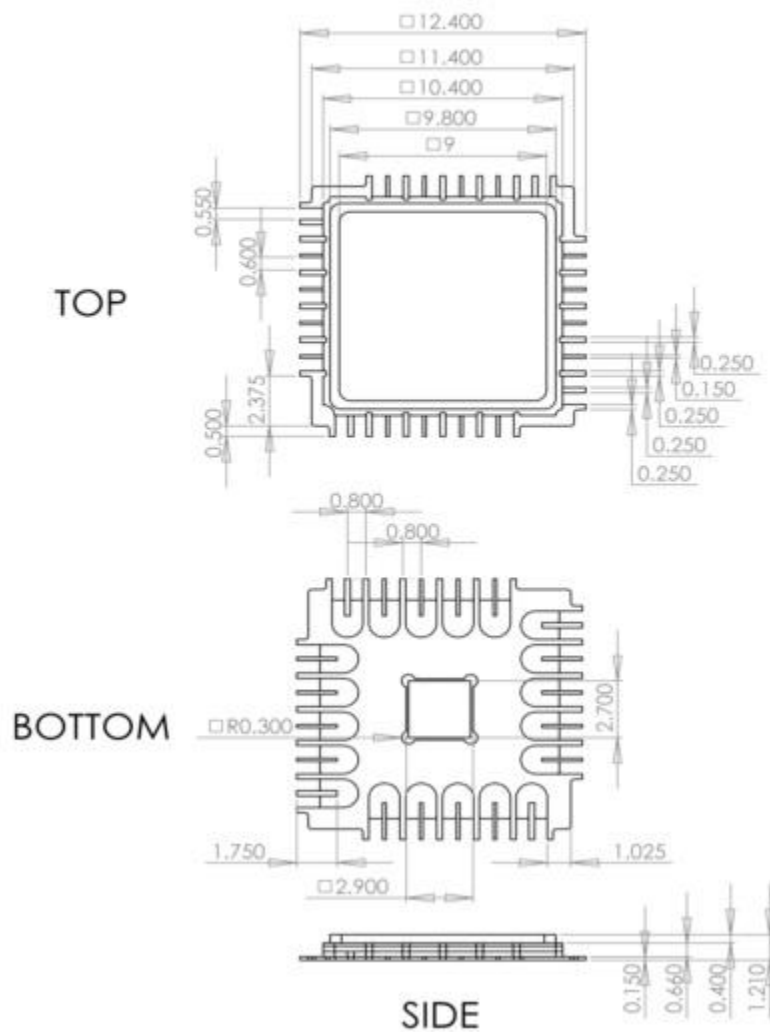


Fig. 2. Package Drawing.

REVISION HISTORY

Revision	Date	Changes
1.0.1	4-2012	Initial Release