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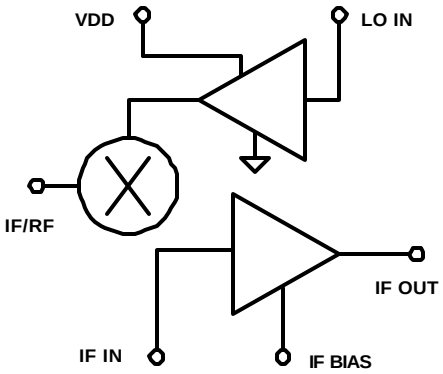
C2306
DATA SHEET

MMDS / ISM / S-Band Mixer
1800 to 4800 MHz Operation



Features

- **10 dB Gain**
- **10 to 900 MHz Integrated IF Amplifier**
- **Single 5V Supply**
- **26 dBm Output IP3**
- **Separate MIXER/LO AMP and IF AMP cells.**
- **75 ohm IF output impedance**



Applications

- **2.4 GHz ISM Band Applications**
- **MMDS Downconverters**
- **MMDS Upconverters**
- **Bluetooth Applications**
- **Wireless Local Loop Systems**
- **Wireless LANS and WANS**
- **Wireless Internet Systems**
- **Wireless T1 Data Link Equipment**

Description

The C2306 is a flexible, high intercept, frequency conversion GaAs MMIC packaged in a 14 pin SOIC package. The MMIC is usable as an upconverter or downconverter mixer. Each subcircuit is brought out on separate pins to allow for custom filtering on the IF/RF mixer interstage or custom matching for specific bands. Broadband parallel feedback networks are used on the gain and LO driver stages and the mixer is a singly balanced two diode mixer. The FET source of the IF amplifier stage (IF BIAS) is accessible for AC bypassing which allows for current reduction with self bias circuitry. The gain and DC current is broken up as follows: LO AMP gain = 11dB; current = 27 mA, IF AMP gain = 17dB, current = 60mA, Mixer conversion loss = -6dB. Simple external matching circuits can be implemented for all ports to achieve VSWR's < 2:1 over moderate bandwidths of less than 400MHz.

Electrical Characteristics

Typical Specifications for V_{DD}=5.0V T_A=+25°C

Minimum and Maximum specifications are guaranteed over RF range 2.50GHz – 2.68GHz

Tested in 50Ω input / 75Ω output system, LO=2.278GHz at 5dBm, using matching circuit shown on page 2.

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Conversion Gain	G	LO=5dBm	9	10	11	dB
Single Sideband Noise Figure	NF	LO=2.278GHz		12		dB
Output IP3	IP3	LO=5dBm		26		dBm
IF Output Return Loss	S_{22}	75Ω output ref.		-11		dB
LO Input Return Loss	S_{11}	50Ω input ref.		-2		dBm
Output Power at 1dB Comp.	P_{1dB}	LO=5dBm		17		dBm
Operating Drain Current	I_{DD}			85		mA
LO IN to IF OUT Isolation	ISO_{L-I}	LO=5dBm		-40		dB
Load VSWR for Input/Output Stability[1]	VSWR	With network on page 2		10:1		
Thermal Resistance	θ_{JC}	Junction to GND lead		75		°C/W

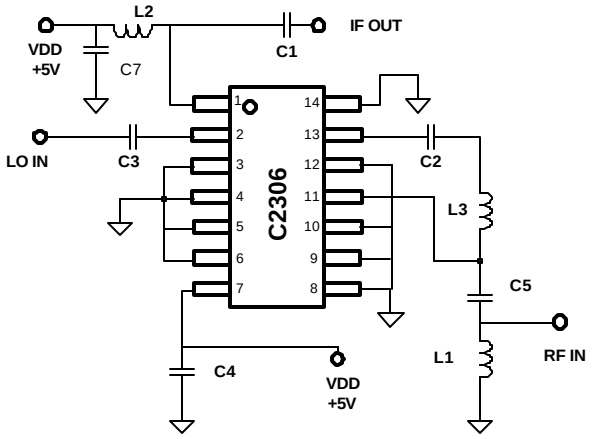
[1] As a separate circuit the IF AMP is conditionally stable for VSWR < 5:1 over 1.5-3.6GHz

Absolute Maximum Ratings

Characteristic	Symbol	Value	Units
Drain Voltage	$V_{DD1,2}$	+7	V
Bias Current	I_{DS}	160	mA
RF Input Power	P_{IN}	+18	dBm
Power Dissipation	P_{DISS}	.6	W
Load VSWR	VSWR	10:1	
Operating Temperature	T_{OP}	-40 to +85	°C
Junction Temperature	T_J	150	°C
Storage Temperature Range	T_{STG}	-65 to +150	°C
Caution: Operating beyond specified rating for any of these parameters may cause permanent damage to the device.			

Application Information

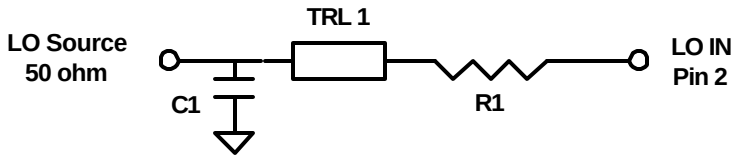
Matching/Diplexing Circuit for 2.5 to 2.68 GHz Operation



Part	Value/Type	Size
C1	270pF NPO	0603
C2	200pF NPO	0603
C3	33pF NPO	0603
C4,C7	0.1uF X7R	0603
C5	1.8pF NPO	0603
L1	5 nH	0805
L2	560 nH	1008
L3	15 nH	0805

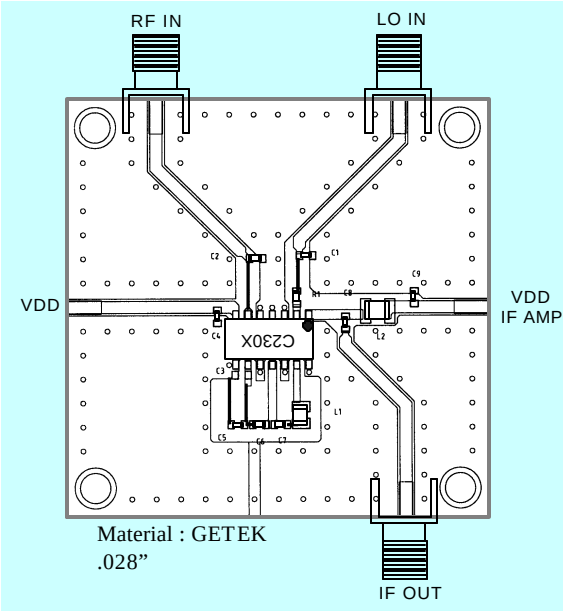
Recommended LO IN Port Matching

The LO IN port of the C2306 can be matched into 50 ohms with a lossy network. At 3dBm drive, the unmatched port is at Z = 5 –15j ohms at 2.278 GHz. Also of note is that this impedance varies somewhat with the LO drive level. Therefore a narrow band high Q network is not recommended due to inherent manufacturing variation in LO drive available. The simple network below matches this port over an ~ 10% bandwidth.



Part	Value/Type	Size
C1	1.8pF NPO	0603
R1	4.3 Ω	0603
TRL1	θ = 21°, Z_0=110Ω	@2.5GHz

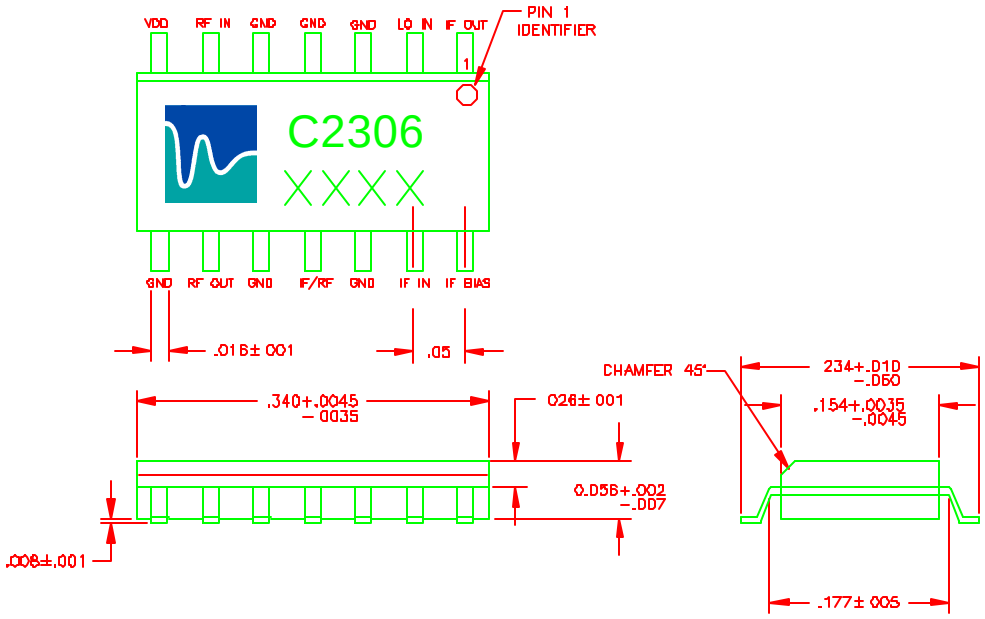
Test Board Layout



Biasing and Electrical Ground/ Thermal Considerations

Pins 3,4,5,10 and 12 should have ground vias straddling both sides of the pin solder contact. This insures good electrical and thermal grounding. If the IF AMP is run at I_{dss} (DC Grounded IF BIAS pin 14), this pin should be grounded as described above. It is recommended that a continuous ground plane be present under the package to lower pin impedance and maintain similarity with the matching environment used in the schematic in the Application Information section. Bias for the IF amplifier is supplied thru IF OUT pin 14. All ports are DC coupled to the IC. Pins 2,6 and 13 should be kept at 0V DC to maintain proper gate voltages. Pin 9 is internally biased at 5V under normal operation and requires an external DC block.

Package Specifications



Pin Number	Function
1	IF OUT
2	LO IN
3	GND
4	GND
5	GND
6	GND
7	VDD
8	GND
9	GND
10	GND
11	IF/RF
12	GND
13	IF IN
14	IF BIAS

Notes:

- Standard packaging is 14L SOIC tube. Tape and Reel available upon request.
- All shipments F.O.B. Pacific Wireless Aptos, CA 95003

Advantages of GaAs MMIC

RF Integration – Less Components/Board Space
Good Device Matching – No Tweaks – Less Tuning
Great power efficiency at low voltage
Better Linearity and Distortion Performance
Superb Radiation Immunity
No Latent or Cummulative ESD effects
No Infant Mortality; No "Walking Wounded"
No Burn-in Necessary

Part Numbers:

Part Number	Description
C2306	1800 to 4800 Mixer – Tube
C2306TR	1800 to 4800 Mixer – Tape and Reel

For further information contact:

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