

Analog Devices Welcomes Hittite Microwave Corporation

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KA-BAND BLOCK UPCONVERTER

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Features

- Compact Design
- Dual L Band Inputs
- Dual Upconversion to ensure no phase inversion
- SMA(F) Input Connectors
- K(F) Output Connector
- Digital Gain control
- Thermal Monitoring and Gain Compensation
- Size: 4.88" x 4.42" x 0.48"
- Weight: 0.6 lbs.
- Designed for Military Environments

Typical Applications

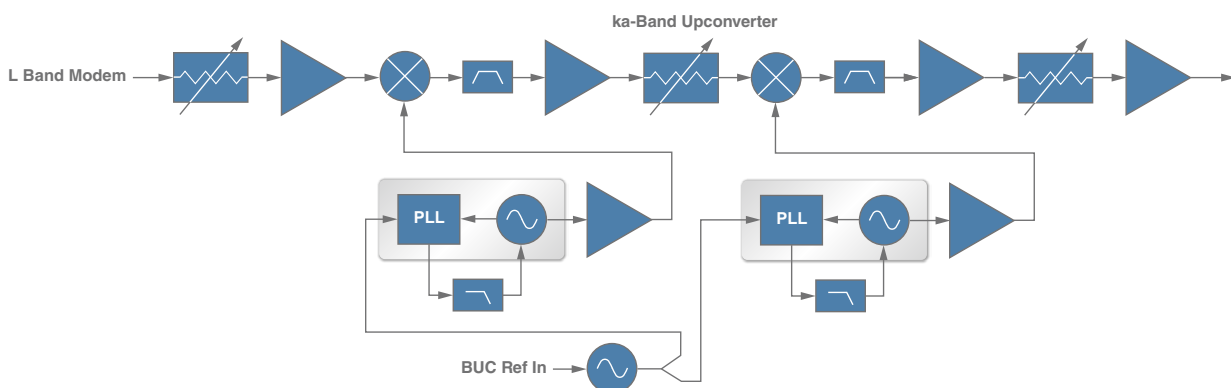
- Satellite communications
 - Commercial
 - Military

General Description

The HMC7053 is a fully integrated Ka-Band Block Upconverter. The unit is designed for single carrier use in satellite communications. It covers both Commercial and Military bands and is designed to meet military environmental conditions.

Parameter	Typical
Input Frequency Range (GHz)	1 - 2
Output Frequency Range (GHz)	29 - 31
Conversion Gain (dB)	+20
Gain Flatness -1 GHz (dB)	3
Gain Flatness -10 MHz (dB)	0.7
Input Power (dBm)	-30 - +5
Output P1dB (dBm)	+2
Phase Noise (dBc/Hz)	
10 Hz	-50
100 Hz	-66
1 kHz	-93
10 kHz	-92
100 kHz	-94
1 MHz	-104
10 MHz	-118
Spurious (dBc)	-60
AM/PM Conversion (Deg/dB)	2
BUC DC Power (VDC @ AMP)	5.75V @ 2.25 A
Size (in)	4.2" x 4.2" x 1.63"

Functional Block Diagram



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Electrical Specifications

Parameter	Specification			Units	Notes
	Min.	Typ.	Max.		
Input IF frequency	1		2	GHz	
Frequency range (MIL)	30		31	GHz	Military band
Frequency range (COMM)	29		30	GHz	Commercial band
Reference frequency		10		MHz	
Reference input power	-5		5	dBm	
Reference output power	-7.5		5	dBm	
Input IF Power			5	dBm	
Conversion gain	+20		+20	dB	
Gain flatness - 1 Ghz			3	dB	
Gain flatness - 40 Mhz			0.7	dB	
Gain variation (over temp)			±1.0	dB	
Gain stability			±0.25	dB/24h	
Gain control	30			dB	
Group delay - 40 MHz			±0.25	nSec	
Group delay - 10 MHz			±0.1	nSec	
Internal TX (VSWR)		2:1			
External TX (VSWR)		2:1			
10MHz reference (VSWR)		2:1			
100MHz reference (VSWR)		2:1			
RF output (VSWR)		2:1			
P1dB		+2		dBm	
TX maximum power (Psat)		+3		dBm	3 dB compression
Output IP3		+16.5		dBm	
LO leakage			-20	dBm	
Image rejection			-60	dBc	
Signal related spurious			-60	dBc	
Non-signal related spurs			-40	dBm	
TX single sideband spurs			-40	dBm	
Phase Noise					
10 Hz		-50		dBc/Hz	
100 Hz		-66		dBc/Hz	
1 KHz		-93		dBc/Hz	
10 KHz		-92		dBc/Hz	
100 KHz		-94		dBc/Hz	
1 MHz		-104		dBc/Hz	

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Electrical Specifications

Parameter	Specification			Units	Notes
	Min.	Typ.	Max.		
10 MHz		-118		dBc/Hz	
AM/PM conversion	0		2	Deg/dB	
Int IF to Ext IF isolation	70			dB	
VDD (BUC)	5.5		5.9	VDC	
+21V	19.5		23	VDC	
-5V	-5.1		-4.9	VDC	
IDD (BUC)			2.5	A	
I (+21V)			50	mA	
I (-5V)			75	mA	
DC Power Max			16.3	W	

[1] Footnote if needed

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Figure 1. Small Signal Gain

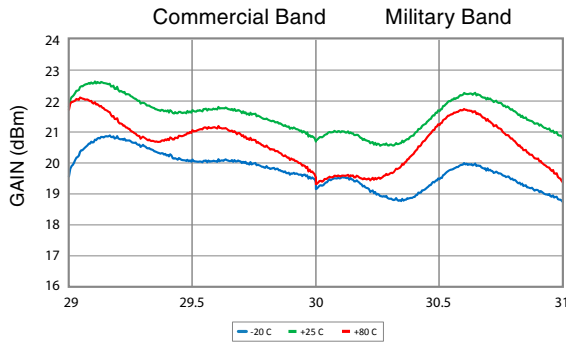


Figure 2. Output P1dB

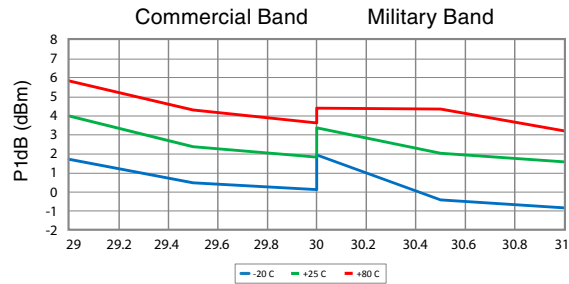


Figure 3. Saturated Output Power

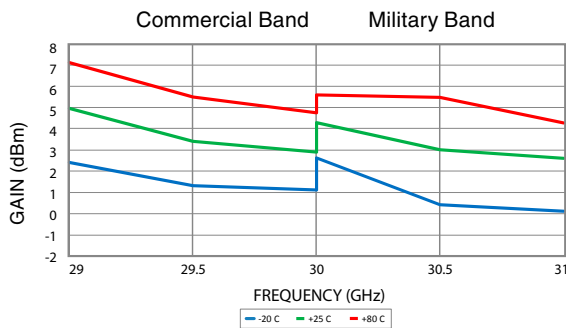


Figure 4. IP3

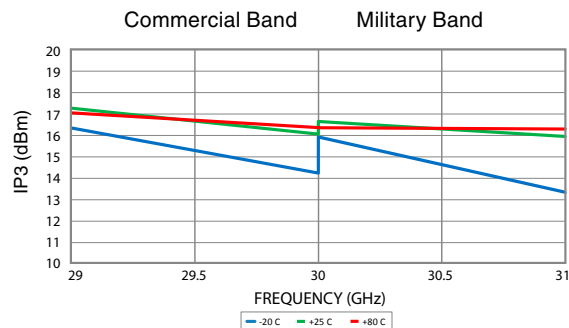


Figure 5. Phase Noise (carrier @ 30 GHz)

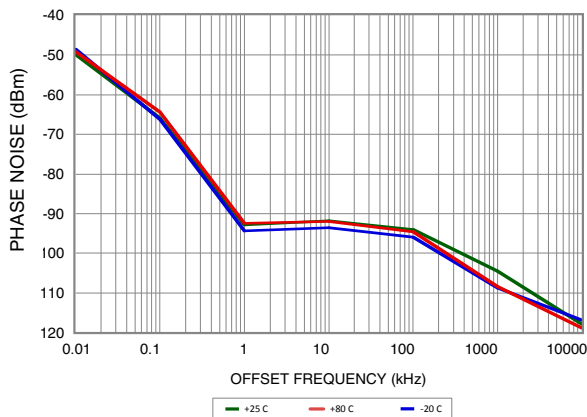
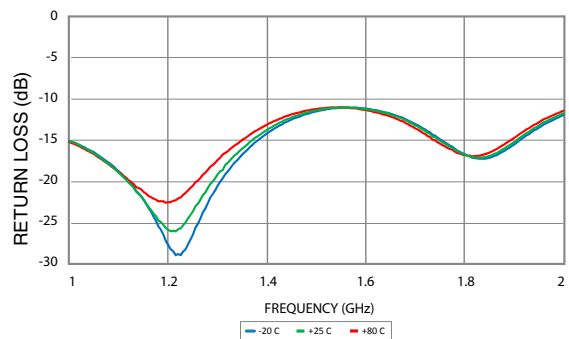


Figure 6. Input Return Losses



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Figure 7. Output Return Losses (Military Band)

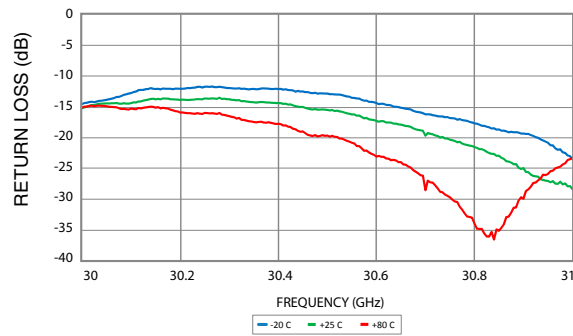
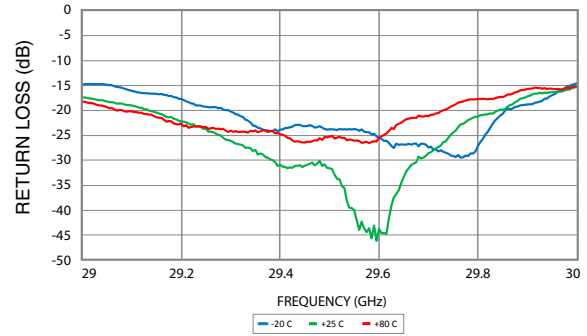


Figure 8. Output Return Losses (Commercial Band)



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Table 1. Absolute Maximum Ratings

Parameter	Max Rating
VDD_BUC	+20V
21 VDC_BUC	+30V
-5 VDC_BUC	-20V
Operating temp	-20 to +80 °C
Storage temp	-55 to +125 °C
Continuous Pdiss	16.3W
ESD sensitivity	Class 1A

Table 2. RF I/O Ports

Port #	I/O	Function	Description
J3	I	L_LP_INT_TX MDM_INT_10MHz_REF	Internal modem input with 10 Hz reference signal
J4	I	L_LP_EXT_TX MDM_EXT_10MHz_REF	External modem input with 10 Hz reference signal
J6	O	BUC_10MHz_REF_OUT	10 MHz reference signal output
J7	I	BUC_100MHz_REF_IN	100 MHz reference signal input
J8	O	BUC_RF_OUT	Upconverter module (BUC) RF output port K(F)

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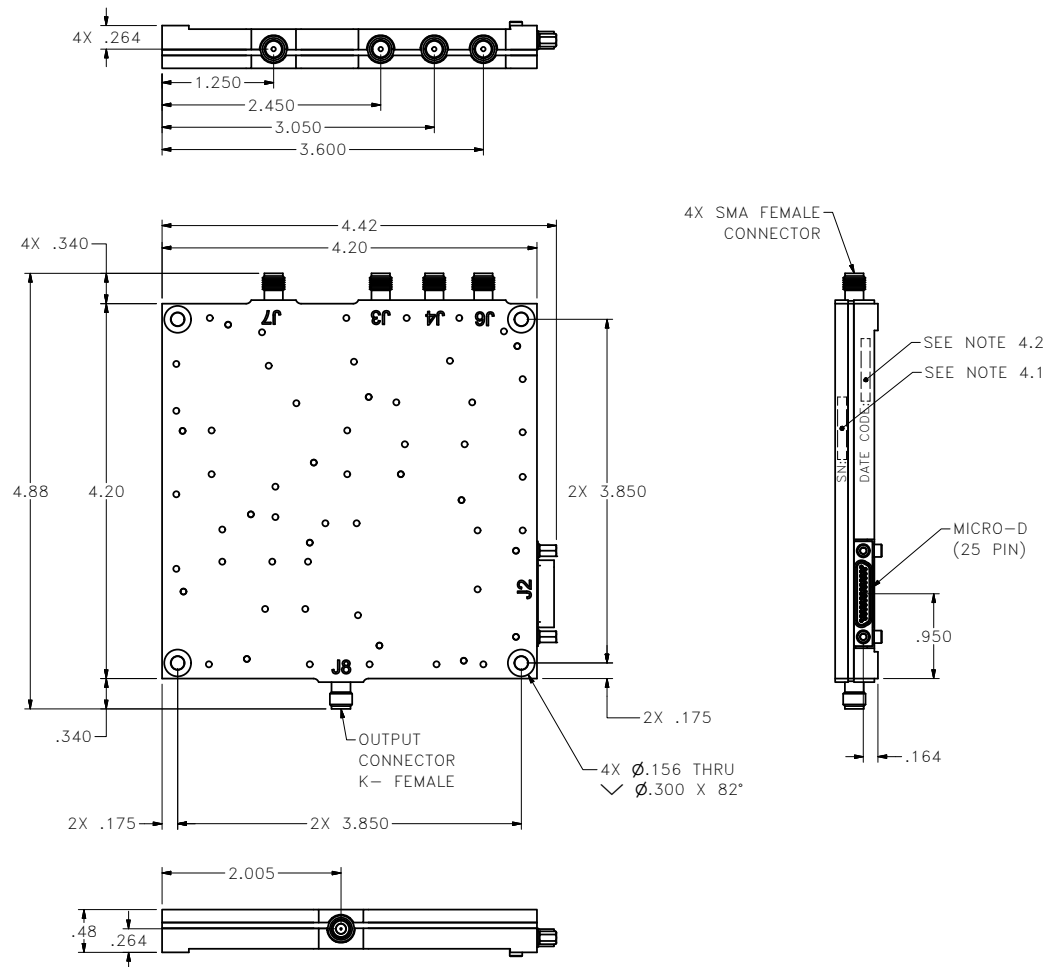
Table 4. J2 BUC Connector Pin Out

Pin #	Signal/Voltage	Description
1	VDD_BUC	BUC positive voltage supply
2	VDD_BUC	
3	VDD_BUC	
4	21VDC	BUC positive voltage supply to PLLs
5	GND	
6	SPARE	
7	MDM_SELECT	Modem input selection. High (3.3V): internal modem, Low (0V): external modem
8	BUC_LO_LOCK	PLL lock indication. High (3.3V): unlocked, Low (0V): locked
9	TX_GAIN_CNTL_LE	Gain control signal latch enable
10	GND	
11	RESERVED FOR VENDOR USE: (RS232_RXD0)	
12	BUC_HPA_12C_SDA	I ² C bus data
13	GND	
14	GND	
15	GND	
16	GND	
17	-5VDC	BUC negative voltage supply
18	HPA_MUTE	
19	GND	
20	TX_BAND_SELECT	Transmitter band selection. High (3.3V): commercial band 29-30 GHz, Low (0V): military band 30 -31 GHz
21	TX_GAIN_CNTL_SERIN	Gain control signal serial input
22	TX_GAIN_CNTL_CLK	Gain control signal clock
23	RESERVED FOR VENDOR USE: (RS232_RXD0)	
24	GND	
25	BUC_HPA_12C_SCL	I ² C bus clock

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Outline Drawing



NOTES:

- 1.0 MATERIAL: ALUMINUM
- 2.0 FINISH: BASEPLATE AND COVER CHEMICAL CONVERSION COAT PER MIL-DTL-5541, TYPE II, CLASS 3
- 3.0 TOLERANCES:
 - 3.1 XX = \pm .02
 - 3.2 XXX = \pm .010
- 4.0 MARKINGS TO BE LABEL OR ENGRAVED AND LOCATED APPROXIMATELY AS SHOWN
 - 4.1 UNIT TO BE SERIALLY MARKED IN ACCORDANCE WITH PURCHASE CONTRACT WHERE "X" = SEQUENTIAL NUMBERS
 - 4.2 DATE CODE MARKINGS TO SHOW DATE IN "MMYY:" FORMAT

Package Information

Size	Weight
4.88" x 4.42" x 0.48"	0.6 lbs