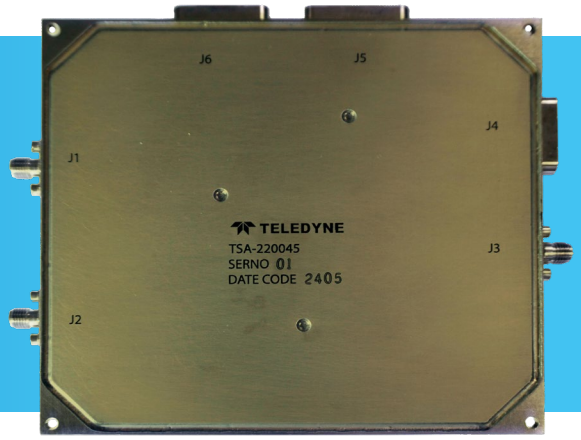
TSA-220045

Ka-Band BUC

Airborne Applications

27.5 – 31 GHz
Ka-Band
Block Upconverter



Description

This Ka-Band Block Upconverter (BUC) is designed to operate over four switch select 1 GHz BW output frequency ranges. The unit can be factory configured for a single output frequency range, or be switched via a RS-422 control to any one of the four bands. The standard switched unit is configured with the following operating bands: 27.5-29.1, 28-29, 29-30, and 30-31 GHz. This product may be configured for alternate 1 GHz BW bands down to 25 GHz.

Other Products

- Low Noise Block Converters (Ku & X-Band)
- Block Up Converters (Ku & X-Band)
- Low Noise Amplifiers (Ku & K-Band)
- Solid State Power Amplifiers (X, Ku & Ka-Band)
- Synthesizers (L, C or X-Band)

Specifications

Parameter	Value
Output Frequency Range	Switchable, 27.5 to 31 GHz
Input Power with No Damage[1]	5 dBm
Input Frequency Range, Switched LO, Non-Inversion	1.0 to 2.0 GHz
Output Power, Linear	+5 dBm min
Modulation Spectrum at Linear Power[3]	-50 dBc
Group Delay Variation over Full Band[1]	3 nsec max
Gain	26 dB min
VSWR Input	2:1
VSWR Output	1.7:1
Gain Variation vs Frequency at Fixed Temperature Over any 40 MHz IF BW Over full IF BW	 ± 0.75 dB ± 3.0 dB
Gain Variation vs Temperature at Fixed Frequency	± 3.0 dB
Output Spurious @ Linear Power 2nd Harmonic (2xIF)+LO , Fc> ±20 MHz	-55 dBc
LO Frequency Range, Switched LO, Low Side, 50 MHz Tuning Step Size	26.55 GHz 27.05 GHJz 28.05 GHz 29.05 GHz
Phase Noise (with 10 MHz External Reference) 100 Hz Offset 1 KHz Offset 10 KHz Offset 100 KHz Offset 1 MHz Offset 10 MHz Offset	 -62 dBc/Hz -72 dBc/Hz -78 dBc/Hz -92 dBc/Hz -112 dBc/Hz -115 dBc/Hz
Input Voltage[1] - Max spurious with max input ripple	+28 ± 0.5 VDC 60 Hz to 1 MHz, 100 mVpp
External Reference Clock Input Frequency Multiplexed with IF input	10 MHz
External Reference Clock Input Level[1], 25°C	0 ± 3 dBm
External Reference Clock Waveform[1], 50 Ohm load	Sinusoidal
External Reference Clock Phase Noise Requirement 10 Hz Offset 100 Hz Offset 1 KHz Offset	 -120 dBc/Hz -145 dbc/Hz -165 dbc/Hz
Output Connector (J3)	2.9 mm-F
IF Input Connector (J2)	SMA(F)
DC Power Connector (J6)	21 Pin Micro-D
Monitor & Control Connector (J4)	15 Pin Micro-D
SSPA, Interface Connector (J5)	25 Pin Micro-D
Ref Output Connector (J1)	SMA(F)
Size	5.0” x 4.5” x 1.15”
Weight	1 lbs max
Finish Body Mounting Surface	 Electroless Nickel Chem Film
Altitude[1,2], Operational	≤60,000 ft
Relative Humidity[1]	Fully Hermetic
Shock[1,2] RTCA DO-160G	6g, 11 ms Half Sine
Operating Temperature Range	-55°C to +85°C
Input DC Current	400 mA at 28V max

[1]GBNT = Guaranteed but not tested
[2]Designed to comply with RTCA DO 160G, Section 7, Category B. Compliance by analysis of similarity to FATR-211042
[3]OQPSK FSymbol = 10 Msps Spectral Re-growth @ 1.0 x FSymbol

Micro D Connector Pinout Descriptions

Micro D Connector J5 on the BUC consists of 15 pins with the pinouts as described in Table 1. The RS-422 GND is internally connected to the GND pins but is provided as a separate output to connect with the source RS-422 connection. Please see Table 3 on how to interface the BUC RS-422 with the system or source RS-422. Micro D Connector J6 on the BUC provides for input DC power connections to power the BUC and pass thru DC power to SSPA.

Table 1: J4 Pin Connections (Customer Interface)

J4 PIN CONNECTIONS		
PIN NO.	**FUNCTION**	**DESCRIPTION**
J4 -1	+RX (RS-422)	
J4-2	-RX (RS-422)	
J4-3	GND	
J4-4	RESERVED	
J4-5	RFTXEN (MUTE)	
J4-6	FACTORY RESERVED	
J4-7	FACTORY RESERVED	
J4-8	CUSTOMER RESERVED	
J4-9	+TX (RS-422)	
J4-10	-TX (RS-422)	
J4-11	FACTORY RESERVED	
J4-12	FACTORY RESERVED	
J4-13	FACTORY RESERVED	
J4-14	CUSTOMER RESERVED	
J4-15	CUSTOMER RESERVED	

Table 2: J5 Connector Functions (for Pairing with SSPA)

J5 PIN CONNECTIONS		
PIN NO.	**FUNCTION**	**DESCRIPTION**
J5 -1	+28V_SSPA	
J5-2	+28V_SSPA	
J5-3	+28V_SSPA	
J5-4	+28V_SSPA	
J5-5	GND	
J5-6	GND	
J5-7	GND	
J5-8	-TX (RS-422)	
J5-9	+RX (RS-422)	
J5-10	RFTXEN (OPTIONAL, +3.3V=ON, OV=OFF)	
J5-11	GND (RS-422)	
J5-12	GND	
J5-13	RESERVED (DO NOT CONNECT)	
J5-14	+28V_SSPA	
J5-15	+28V_SSPA	
J5-16	+28V_SSPA	
J5-17	GND	
J5-18	GND	
J5-19	GND	
J5-20	GND	
J5-21	+TX (RS-422)	
J5-22	-RX (RS-422)	
J5-23	SUMFLT (OPTIONAL,+3.3V=FAULT)	
J5-24	GND	
J5-25	RESERVED (DO NOT CONNECT)	

Table 3: J6 Connector Functions (Customer Interface)

J6 PIN CONNECTIONS		
PIN NO.	**FUNCTION**	**DESCRIPTION**
J6 -1	+28V_BUC	
J6-2	+28V_BUC	
J6-3	+28V_SSPA	
J6-4	NC	
J6-5	NC	
J6-6	GND	
J6-7	GND	
J6-8	GND	
J6-9	NC	
J6-10	NC	
J6-11	GND	
J6-12	+28V_SSPA	
J6-13	+28V_SSPA	
J6-14	+28V_SSPA	
J6-15	NC	
J6-16	NC	
J6-17	GND	
J6-18	GND	
J6-19	GND	
J6-20	NC	
J6-21	NC	

Table 4: RS-422 BUC Command List

"VER"	Read Firmware Version
"SN"	Read Unit Serial Number
"ECHO 0"	Turns RS-422 Echo OFF (command sent is not repeated back)
"ECHO 1"	Turns RS-422 Echo ON (command send is repeated back)
"RF0"	Turns RF Power OFF (**Mute** Command)
"RF1"	Turns RF Power ON (**Enable** command)
"STA"	Read PLL Lock Status (0=Normal, 1=Fault)
"TEMP"	Reports BUC Temperature (˚C)
"B1"	Set Band Frequency to 28-29GHz
"B2"	Set Band Frequency to 29-30GHz
"B3"	Set Band Frequency to 27.5-29.1GHz
"B4"	Set Band Frequency to 30-31GHz

Digital Protocols

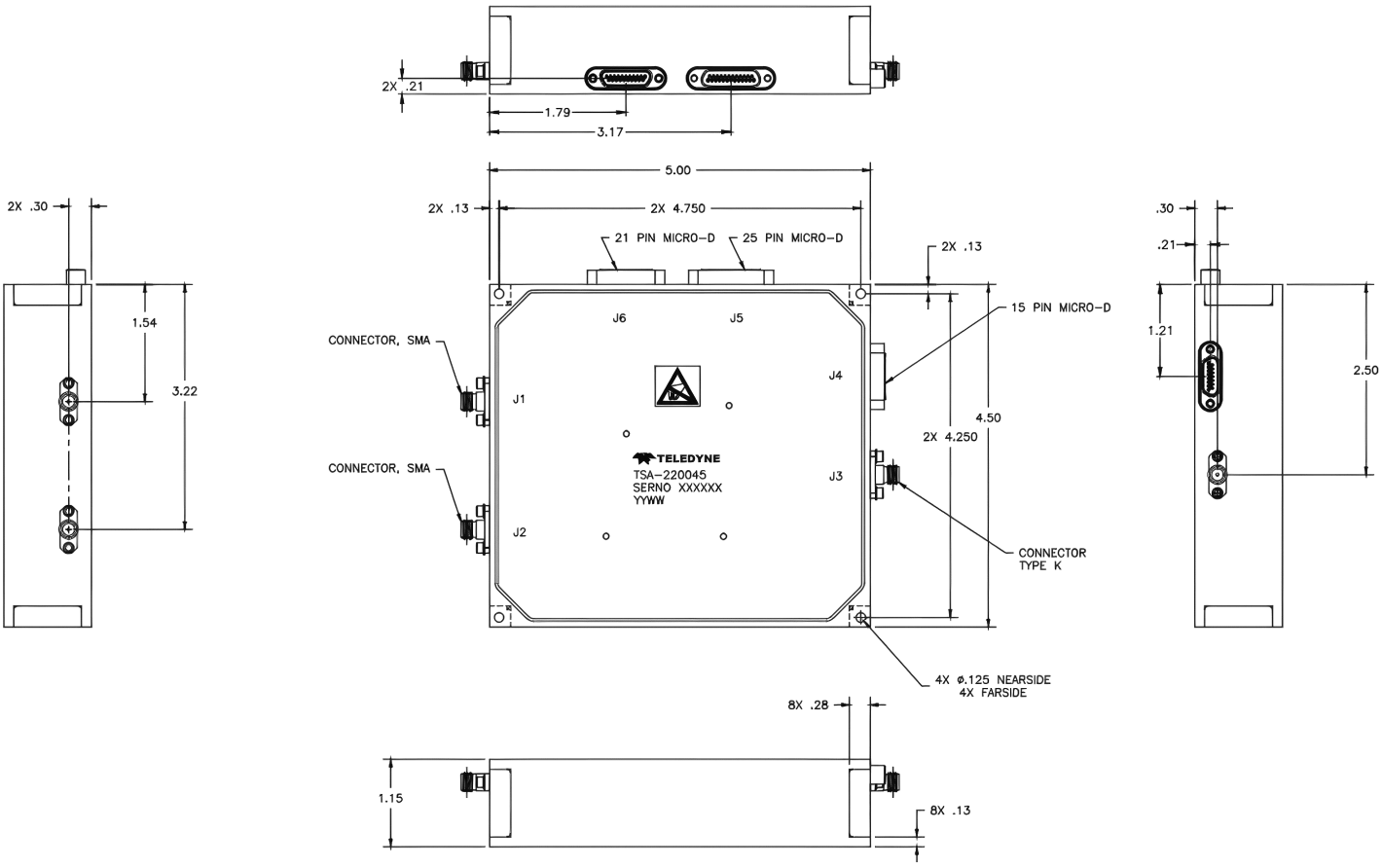
The RS-422 link uses ASCII commands to control the BUC. All BUC Commands are shown in Table 4. A high-to-low transition indicates the start of the data. An ASCII command is terminated by a newline (“\n”) character.

For example: Read Firmware Version
Command: VER\n
Result: Firmware ver: V220045.3.4

The Phase Lock Loop Fault status is read through the RS-422 with command “STA”. 0 is normal and 1 is fault.

However, there is one discrete pins: MUTE. MUTE (J4-5 RFTXEN) is a hardwired TTL controlled pin for disabling RF power in case of emergency. This pin is high through an internal pull-up. To disable the unit, simply ground this pin.

Outline Drawing – description



NOTES: (Unless otherwise specified

1. Dimensions are in inches
2. Tolerances: XXXX ± 0.010
   X.XX ± 0.02
3. Marking as shown shall be permanent and legible per MIL-STD-130 using black epoxy base ink
4. Case material: Aluminum
5. Finish: All surfaces except top and bottom cover are electroless nickel-plate per MIL-C-26074. Top and bottom covers are Chem Film per MIL-DTL-5541, Class 3, Yellow.