MBT-5000 & MBT-5003 L-Band Up/Down Converter System

Converters

Introduction

The RF marketplace has been transitioning from traditional 70/140 MHz IF-based networks to systems using L-Band (950 to 2000 MHz) for the modem/RF equipment link. The MBT-5000 Up/Down Converter System provides this frequency conversion between L-Band IF and C-/X-/Ku/Ka-Band RF frequencies. Featuring a drop down front panel providing access to two "hot swappable" frequency conversion modules, this unit offers either a mix of conversion functionality or 1:1 redundant system operation.

Designed for rack mounting, the MBT-5000's 1RU 19-inch chassis front panel contains all operator controls, indicators and displays for local and remote with RF, IF, power, and communications interfaces on the rear. When configured with the redundancy option, the main chassis contains two diode "OR-ed" internal power supplies for increased reliability along with the necessary IF/RF switches. Providing the level of RF frequency conversion performance that has historically been associated with 70/140 MHz rack mount converter systems, the MBT-5000 provides a smooth IF infrastructure upgrade path.

Key Features

- Meets or exceeds IESS-308/309
- Facilitates 188-164A system compliance
- Low phase noise
- Powerful M&C support
- Ethernet/Telnet/SNMP
- EIA-232/485
- Flexible configuration
- RF Band switching in minimal time without requiring tools
- Available 1:1 redundancy in a 1RU chassis (MBT-5000) or a 3RU chassis (MBT-5003)

MBT-5003

The MBT-5003 is a 3RU version of the MBT-5000, providing higher output power and a "single chassis" redundant solution. This package is designed for rugged "fly-away" terminal use.

Applications

The flexibility of the MBT-5000 & MBT-5003 make them ideally suited for:

- Earth stations where L-Band IF products are being integrated into a 70/140 MHz IF infrastructure
- Reconfigurable Multi-Band requirements that are typically found in transportable / flyaway type installations

Block Up Converter (BUC-5000)

The BUC-5000 field interchangeable module translates an L-Band input carrier to the desired output frequency (C, X, Ku or Ka-Band) with an output level capable of driving an HPA. Available bands include:

Frequency Bands By Model

	RF Output	IF Input	LO
BUC-5000C	5850 – 6425 MHz	950 – 1525 MHz	4900 MHz
Option	6650 MHz	950 - 1750 MHz	
Option	6725 MHz	950 - 1825 MHz	
BUC-5000CI Inverted	5850 – 6425 MHz	950 – 1525 MHz	7375 MHz
BUC-5000X	7900 – 8400 MHz	950 – 1450 MHz	6950 MHz
Optional	7900 – 8400 MHz	1000 – 1500 MHz	6900 MHz
BUC-5000Ku	13.75 – 14.50 GHz	950 – 1700 MHz	12.80 GHz
BUC-5000KuN	14.00 – 14.50 GHz	950 – 1450 MHz	13.05 GHz
MBT-5003	7900 – 8400 MHz	1000 – 1500 MHz	6900 MHz

Block Down Converter (BDC-5000)

The BDC-5000 field interchangeable module translates a band specific input frequency block (C, X, Ku or Ka), from the LNA, down to L-Band (950 to 2000 MHz). Available bands include:

Frequency Bands By Model

	RF Input	IF Output	LO
BDC-5000C	3400 – 4200 MHz	950 – 1750 MHz	5150 MHz
BDC-5000CNI Non-inverting	3625 – 4200 MHz	1325 – 1900 MHz	2300 MHz
BDC-5000X	7250 – 7750 MHz	950 – 1450 MHz	6300 MHz
Optional	7250 – 7750 MHz	1000 – 1500 MHz	6250 MHz
BDC-5000K	10.95 – 11.70 GHz	950 – 1700 MHz	10.00 GHz
Switched LO	11.70 – 12.20 GHz	950 – 1450 MHz	10.75 GHz
	12.25 – 12.75 GHz	950 – 1450 MHz	11.30 GHz
Option 1	10.95 – 11.70 GHz	950 – 1700 MHz	10.00 GHz
	11.70 – 12.75 GHz	950 – 2000 MHz	10.75 GHz
Option 2	10.70 – 11.70 GHz	950 – 1950 MHz	9.75 GHz
	11.70 – 12.75 GHZ	950 – 2000 MHz	10.75 GHz
MBT-5003	7250 – 7750 MHz	1000 – 1500 MHz	6250 MHz

Specifications

BUC-5000 Block Up Converter IDU

Input/Output Impedance	50 Ω
Input Return Loss	15 dB minimum
Output Return Loss	18 dB minimum
Input Connector	N, Female (SMA for Redundancy option, TNC MBT-5003)
Output Connector	N, Female (SMA for Redundancy option)
Gain	30 dB nominal (38 dB for MBT-5003) at minimum attenuation
Full Band (Constant Temp./ 0° to 50°C)	+/- .25 dB/+/- 1.0 dB (to +56°C for MBT-5003)
Per 40 MHz Slope	+/- 0.25 dB .03 dB/MHz Max.
Mute	-60 dBc (-80dBm for MBT-5003)
User Attenuation Range	0 to 20 dB (50 dB for MBT-5003), in 0.25 dB steps
Output Power, P1dB	+15 dBm (+22 dBm for MBT-5003) minimum
Noise Figure	15 dB at minimum attenuation
Intermodulation Distortion	-50 dBc at 0 dBm Total Output -30 dBc at 3 dB OPBO Total Output (MBT-5003)
Lo Leakage	-60 dBm (-75 dBm MBT-5003)
60 Hz & Harmonics	<-36 dBc (typically <-50 dBc)
Phase Non-Linearity	
per 20 MHz BW	8 degrees p-p
per 36 MHz BW	12 degress p-p
Spurious (In-band)	
Carrier Related	-60 dBc (-75 dBc for MBT-5003)
Non-Carrier Related	-60 dBm (-70 dBm for MBT-5003)
Phase Noise	Exceeds MIL-STD-188-164A
100 Hz	-68 dBc/Hz
1 kHz	-78 dBc/Hz
10 kHz	-88 dBc/Hz
100 kHz	-98 dBc/Hz
1 MHz	

Monitor & Control

Serial M&C Interface	TIA/EIA-232, TIA/EIA-485, 4-wire 9-pin D, Female
Alarm	Form C 9-pin D, Female
Redundant Switch Connections	SMA Female
Remote Interface	Ethernet, RJ-45

Physical & Environmental

Operating Temp.	0° to 50°C (56°C, MBT-5003)
Non-Operating Temp.	-50° to 70°C
Humidity	5 to 95% non-condensing
Operational Altitude	10,000 ft. above sea level
Weight	15 lbs nominal
Dimensions (height x width x depth)	1.75" x 19" x 15" (MBT-5000) 5.22" x 19" x 14" (MBT-5003)

Reference

External Input	5 or 10 MHz 0 ± 5 dBm BNC Female
Optional output	10 MHz Rear Panel BNC Female
Stability over Time	± 1 x 10^{-9}/Day
Stability over Temp	± 1 x 10^{-8}/Day

BDC-5000 Block Down Converter IDU

Input/Output Impedance	50 Ω
Input Return Loss	18 dB minimum
Output Return Loss	15 dB minimum
Input Connector	N, Female (SMA for Redundancy option)
Output Connector	N, Female (SMA for Redundancy option, TNC for MBT-5003)
Gain	35 dB nominal (38 dB for MBT-5003) at minimum attenuation
Full Band (Constant Temp./ 0° to 50°C)	+/- .25 dB/+/- 1.0 dB (to +56°C for MBT-5003)
Per 40 MHz Slope	+/- 0.25 dB .03 dB/MHz Max.
Mute	-60 dBc (-80 dBm for MBT-5003)
User Attenuation Range	0 to 20 dB, in 0.25 dB steps
Output Power, P1dB	+ 15 dBm (+ 20 dBm for MBT-5003) minimum
Noise Figure	15 dB at minimum attenuation
Intermodulation Distortion	-50 dBc at 0 dBm Total Output -56 dBc at 3 dBm Total Output (MBT-5003)
Spurious (In-band)	
Carrier Related	-60 dBc (-75 dBc, MBT-5003)
Non-Carrier Related	-60 dBm (-70 dBm, MBT-5003)
2nd Harmonic	20 dBc max. (-40 dBc typical)
Lo Leakage	-60 dBm (-75 dBm, MBT-5003)
60 Hz & Harmonics	<-36 dBc (typically <-50 dBc)
Phase Non-Linearity	
per 20 MHz BW	3 degrees p-p
per 36 MHz BW	4 degrees p-p
Phase Noise	Exceeds MIL-STD-188-164A
100 Hz	-68 dBc/Hz
1 kHz	-78 dBc/Hz
10 kHz	-88 dBc/Hz
100 kHz	-98 dBc/Hz
1 MHz	-108 dBc/Hz

Prime Power

Voltage	90 – 260 VAC -48 VDC Optional
Frequency	47 to 63 Hz
Dissipation	60 W (100 W, MBT-5003) typical

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