

# 1/3 RACK-MOUNTED BLOCK CONVERTERS



## AMPLITUDE SLOPE CONTROL



Unit shown with option 17



Unit shown without option 17

### FEATURES

- Automatic 5/10 MHz internal/external reference selection with a 0.1 Hz nominal bandwidth clean-up loop
- Gain control
- Amplitude slope control
- RF and L-Band signal monitor ports (RF monitor not available with Ka-Band units)
- Low phase noise
- Low intermodulation distortion
- High-frequency stability
- Summary alarm
- Mute function on alarm or external mute input command
- LO frequency and power monitor
- CE certification

### OPTIONS

- High-performance package
- Higher frequency stability
- RS-422/RS-485 and 10/100 Base-T Ethernet
- LO level monitor
- Lower gain

These Narda-MITEQ one-third rack-mounted block converters are designed for applications where frequency translation is needed between L-Band and the transponder frequency.

U.S. Patent #7,510,090



# 1/3 RACK-MOUNTED BLOCK CONVERTERS

## BLOCK UPCONVERTERS

INPUT FREQUENCY (GHz)	OUTPUT FREQUENCY (GHz)	LO FREQUENCY (GHz)	MODEL NUMBER
0.95 to 1.525	5.85 to 6.425	7.375	UPB1-6.1TRS-INV
0.95 to 1.75	5.85 to 6.65	4.9	UPB1-6.25TRS
0.95 to 1.35	6.7 to 7.1	5.75	UPB1-6.9TRS
0.95 to 1.45	7.9 to 8.4	6.95	UPB1-8.15TRS
0.95 to 1.45	12.75 to 13.25	11.8	UPB1-13TRS
0.95 to 1.7	13.75 to 14.5	12.8	UPB1-14.125TRS
0.95 to 1.45	14 to 14.5	13.05	UPB1-14.25TRS
0.95 to 2.05	17.3 to 18.4	16.35	UPB1-17.85TRS*
0.95 to 1.25	18.1 to 18.4	17.15	UPB1-18.25TRS

\*1 GHz IF bandwidth.

## Ka-BAND

INPUT FREQUENCY (GHz)	OUTPUT FREQUENCY (GHz)	LO FREQUENCY (GHz)	MODEL NUMBER
0.95 to 1.2	28.35 to 28.85	27.4	UPB1-28.6TR
0.95 to 1.45	29 to 29.5	28.05	UPB1-29.25TRS
0.95 to 1.2	29.25 to 29.5	28.3	UPB1-29.375TRS
0.95 to 1.7	29.25 to 30	28.3	UPB1-29.625TRS
0.95 to 1.95	30 to 31	29.05	UPB1-30.5TRS*
1 to 2	30 to 31	29	UPB1-30.5-1TRS*

\*1 GHz IF bandwidth.

## BLOCK DOWNCONVERTERS

INPUT FREQUENCY (GHz)	OUTPUT FREQUENCY (GHz)	LO FREQUENCY (GHz)	MODEL NUMBER
3.4 to 4.2	0.95 to 1.75	5.15	DNB1-3.8TRS-INV
3.4 to 4.2	0.95 to 1.75	8.55/11	DNB1-3.8TRS
3.7 to 4.2	0.95 to 1.45	8.55/11.3	DNB1-3.95TRS
7.25 to 7.75	0.95 to 1.45	6.3	DNB1-7.5TRS
10.7 to 11.7	0.95 to 1.95	9.75	DNB1-11.2TRS*
10.95 to 11.7	0.95 to 1.7	10	DNB1-11.35TRS
11.2 to 12	0.95 to 1.75	10.25	DNB1-11.6TRS
11.45 to 12.25	0.95 to 1.75	10.5	DNB1-11.85TRS
11.7 to 12.5	0.95 to 1.75	10.75	DNB1-12.1TRS
11.7 to 12.75	0.95 to 2	10.75	DNB1-12.225TRS*
12.2 to 12.75	0.95 to 1.5	11.25	DNB1-12.475TRS
12.25 to 12.75	0.95 to 1.45	11.3	DNB1-12.5TRS

\*1 GHz IF bandwidth.

## Ka-BAND

INPUT FREQUENCY (GHz)	OUTPUT FREQUENCY (GHz)	LO FREQUENCY (GHz)	MODEL NUMBER
18.3 to 18.8	0.95 to 1.45	17.35	DNB1-18.55TRS
19.7 to 20.2	0.95 to 1.45	18.75	DNB1-19.95TRS
20.2 to 21.2	0.95 to 1.95	19.25	DNB1-20.7TRS*
20.2 to 21.2	1 to 2	19.2	DNB1-20.7-1TRS*
28.3 to 28.8	0.95 to 1.45	27.35	DNB1-28.55TRS
29.25 to 29.5	0.95 to 1.2	28.3	DNB1-29.375TRS
29.25 to 30	0.95 to 1.7	28.3	DNB1-29.625TRS

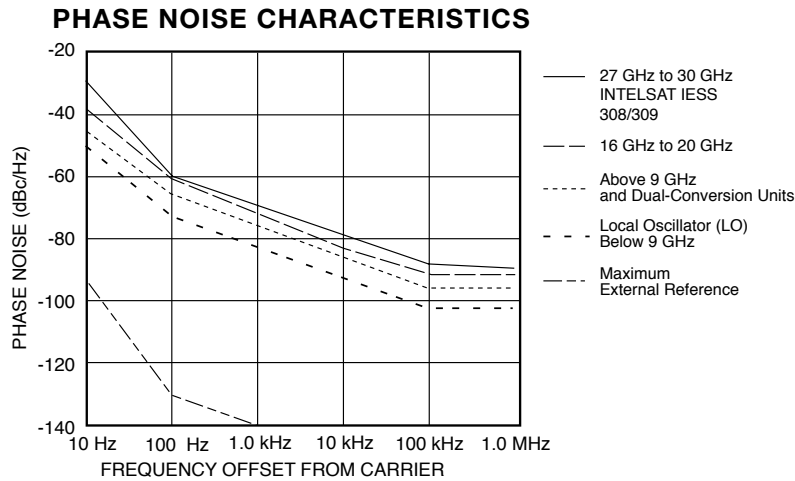
\*1 GHz IF bandwidth.

SPECIFICATIONS	UPCONVERTER	DOWNCONVERTER
Input characteristics		
Return loss	18 dB minimum	20 dB minimum
LO leakage	N/A	-80 dBm maximum
Signal monitor	-20 dBc nominal	-20 dBc nominal
Output characteristics		
Return loss (50 ohms)	20 dB minimum, 18 dB for units above 22 GHz	18 dB minimum
Signal monitor	-20 dBc nominal	-20 dBc nominal
Power output (P1dB)	+18 dBm minimum	+18 dBm minimum
Transfer characteristics		
Gain	30 dB, $\pm 3$ dB at 23 °C	35 dB, $\pm 3$ dB at 23 °C
Gain control	30 dB continuous adjust, rear panel control (0.2 dB steps with Option 17)	30 dB continuous adjust, rear panel control (0.2 dB steps with Option 17)
Gain stability	$\pm 0.25$ dB/day maximum at constant temperature	$\pm 0.25$ dB/day maximum at constant temperature
Amplitude response	$\pm 0.25$ dB/40 MHz maximum, $\pm 1$ dB maximum over RF frequency band	
Amplitude slope control	$\pm 1$ dB/500 MHz BW	$\pm 2$ dB minimum/1000 MHz BW
Image rejection	60 dB minimum	60 dB minimum
Noise figure at minimum attenuation	15 dB maximum (20 dB for units above 22 GHz, 1 GHz IF bandwidth units)	
Intermodulation distortion (third order)	With two inband signals at 0 dBm output, third-order intermodulation products are less than:	
	60 dBc minimum	56 dBc minimum
Spurious outputs (inband)	65 dBc minimum up to 0 dBm output (including 2 x 1 spurious on 1 GHz IF bandwidth units) at maximum gain	
Signal-related		
Signal-independent	-75 dBm maximum	-75 dBm maximum
Harmonic	N/A	65 dBc up to 0 dBm output
Phase noise	See graph on next page	See graph on next page
Frequency stability	$\pm 5 \times 10^{-8}$ , 0°C to 50°C (higher stability options available), $\pm 5 \times 10^{-9}$ /day typical (fixed temperature after 24 hours on time)	
Automatic reference configuration	External 5 MHz or 10 MHz at +4 $\pm 3$ dBm. If external reference is below +1 dBm nominal, the converter will automatically lock to the internal reference.	
Mute	60 dB minimum on summary alarm or mute command. Mute status and control illuminated keys and LCD display with Option 17.	
Indicator and Alarms		
LO out-of-lock	Red LED (front panel)	Red LED (front panel)
Internal reference	Amber LED (front panel)	Amber LED (front panel)
Power ON indicator	Green LED (front panel)	Green LED (front panel)
Summary alarm	Contact closure status for DC voltage and local oscillator	

Note: All specifications at maximum gain unless otherwise noted.

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## PHASE NOISE SPECIFICATIONS



## OPTIONS

Missing option numbers are not applicable for this product.

### 1. High-performance package

- Power output (1 dB compression) .....+20 dBm minimum (+15 dBm minimum, Ka-Band upconverters)
- Gain slope.....0.03 dB/MHz maximum
- Gain stability.....±0.25 dB/day maximum at constant temperature,  
1.0 dB peak-to-peak maximum/0°C to 50°C
- Group delay .....1 ns peak-to-peak maximum
- Spurious outputs (inband)
- Signal-related .....65 dBc minimum at 0 dBm output
- Signal-independent.....-80 dBm maximum
- Image rejection .....80 dB minimum
- Intermodulation distortion (third order) .....With two inband signals at 0 dBm output, third-order intermodulation products are less than 60 dBc minimum and 50 dBc minimum (Ka-Band upconverters).

High-performance phase noise (dBc/Hz)(maximum)

LO FREQUENCY	OFFSET [Hz]					
	10	100	1 K	10 K	100 K	1 M
Up to 6.7 GHz	-54	-78	-108	-116	-119	-136
6.7 LO to < 8 GHz	-53	-76	-107	-114	-117	-134
8 LO to < 12 GHz	-48	-73	-103	-112	-115	-132
12 LO to < 13.4 GHz	-48	-72	-102	-110	-113	-130
13.4 LO to < 16 GHz	-47	-70	-100	-108	-111	-128
16 LO to < 24 GHz	-42	-67	-98	-106	-109	-126
24 LO to < 29.5 GHz	-41	-64	-94	-102	-107	-124

Noise spectral density.....-90 dBm/4 kHz maximum (upconverters below 18 GHz),  
-85 dBm/4 kHz maximum (downconverters and upconverters above 18 GHz)

AM/PM conversion (at 0 dBm output) .....0.1°/dB maximum

Upconverter mute.....80 dB minimum on summary alarm, external mute input control or remote command.

## OPTIONS (CONTINUED)

Missing option numbers are not applicable for this product.

2. Lower gain

Gain .....20 ±3 dB at 23°C,  
 18 dB noise figure, 22 dB for 1 GHz IF bandwidth units,  
 signal-related spurious -65 dBc at -5 dBm output

8. LO level alarm

Summary alarm is generated for loss of power in any of the required local oscillators

10. Higher frequency stability reference

C. ±5 x 10<sup>-9</sup>, 0°C to 50°C,  
 1 x 10<sup>-9</sup>/day typical (fixed temperature after 24 hours on time)  
 E. ±5 x 10<sup>-9</sup>, 0°C to 50°C,  
 1 x 10<sup>-9</sup>/day typical (fixed temperature after 24 hours on time)  
 High frequency stability reference with direct phase lock to external reference input.  
 No phase noise suppression on external reference input.

Note: Converter may require 7 to 10 days to reach stability after long storage periods.

17. Remote control .....10/100 Base-T Ethernet interface providing:

- HTTP-based web server
- SNMP 1.0 configuration
- Alarm reporting via SNMP Trap
- Telnet access
- Password protection and selectable RS-485/RS-422
- Gain control is 30 dB in 0.2 dB steps
- Alarm, reference and mute status on front panel

Note: For literature describing local control (front panel) and remote control (bus control), refer to Narda-MITEQ Technical Note 25T066.

## GENERAL SPECIFICATIONS

### PRIMARY POWER REQUIREMENTS

Voltage.....90 VAC to 250 VAC  
 Frequency .....47 Hz to 63 Hz  
 Consumption.....12 W typical

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## GENERAL SPECIFICATIONS (CONTINUED)

### PHYSICAL

Weight.....	4.5 lb. [2.04 kg] nominal
Dimensions.....	5.70" [144.8 mm] x 1.48" [37.6 mm] x 18" [457.2 mm] (excluding connectors)
Rear-panel connectors	
RF-Band.....	SMA female-compatible
L-Band .....	SMA female
RF-Band monitor.....	SMA female (not available with Ka-Band units)
L-Band monitor .....	SMA female
External reference input .....	SMA female
Status interface.....	DE-9S
Redundancy interface .....	DE-9P
Remote interface (Option 17).....	RJ-45 female for Ethernet, RS-422/RS-485 available on status connector
Primary power input .....	IEC-320
Front panel connectors	
LO monitor .....	SMA female

### ENVIRONMENTAL

#### Operating

Ambient temperature.....	0°C to 50°C
Relative humidity.....	Up to 95% at 30°C
Atmospheric pressure .....	Up to 10,000 feet

#### Nonoperating

Ambient temperature.....	-50°C to +70°C
Relative humidity.....	Up to 95% at 45°C
Atmospheric pressure .....	Up to 40,000 feet
Shock and vibration .....	Normal handling by commercial carriers

### ACCESSORIES

#### One-third rack-mount frame

Model number .....	OL-TR3-20
Weight.....	1.5 lb. [0.68 kg] nominal
Dimensions .....	19" [482.6 mm] x 1.75" [44.5 mm] x 20" [508.0 mm]

#### Single unit frame (includes rack slides)

Model number .....	OL-TR1-20
Weight.....	2 lb. [0.9 kg] nominal
Dimensions .....	19" [482.6 mm] x 1.75" [44.5 mm] x 18" [457.2 mm]

#### Dual-unit frame (includes rack slides)

Model number .....	OL-TR2-20
Weight.....	3 lb. [1.35 kg] nominal
Dimensions .....	19" [482.6 mm] x 1.75" [44.5 mm] x 18" [457.2 mm]

The material presented in this datasheet was current at the time of publication. Narda-MITEQ's continuing product improvement program makes it necessary to reserve the right to change our mechanical and electrical specifications without notice. If either of these parameters is critical, please contact the factory to verify that the information is current.

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D-384B/03.13.17



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