



## BLOCK CONVERTER



### FEATURES

- Cover multiple ITU Ku-Band regions and other combinations
- Automatic 5/10 MHz internal/external reference selection with a 0.1 Hz nominal bandwidth clean-up loop
- RS-485/RS-422 and 10/100 Base-T Ethernet remote control
- Gain control
- RF- and L-Band signal monitor ports
- 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
- LO level monitor
- Lower gain
- Amplitude slope control

This equipment is designed for applications where multiple frequency band coverage is required (i.e. Ku-Band: 1, 2, 3 or 4 and other combinations). The up and downconverters cover from L-Band to the transponder bands in a single one-third rack unit.



# MULTIBAND 1/3 RACK-MOUNTED

## BLOCK DOWNCONVERTER

RF INPUT FREQUENCY (GHz)	RF OUTPUT FREQUENCY (GHz)	LO FREQUENCY (GHz)	MODEL NUMBER
10.7 to 11.7	0.95 to 1.95	9.75	DNB2-11.725TR
11.7 to 12.75	0.95 to 2	10.75	
10.95 to 11.7	0.95 to 1.7	10.0	DNB2-11.85TR
12.2 to 12.75	0.95 to 1.45	11.25	
12.75 to 13.75	0.95 to 1.95	11.8	DNB2-13.625TR
13.75 to 14.8	0.95 to 2	12.8	
10.7 to 11.45	0.95 to 1.7	9.75	DNB3-11.725TR
11.45 to 12.2	0.95 to 1.7	10.5	
12.2 to 12.75	0.95 to 1.5	10.25	
10.95 to 11.7	0.95 to 1.7	10	DNB3-11.8TR
11.7 to 12.2	0.95 to 1.45	10.75	
12.2 to 12.75	0.95 to 1.5	11.25	

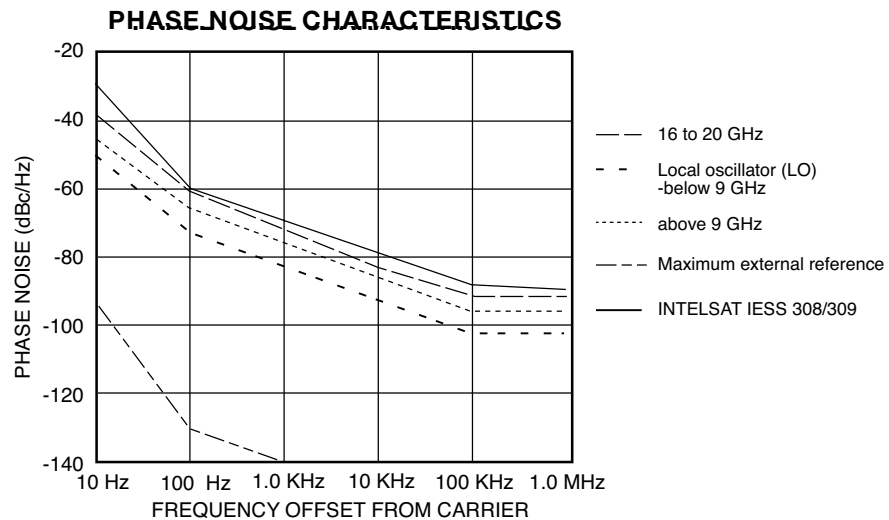
Note: See datasheet D-321 for single band models.

## BLOCK UPCONVERTER

RF INPUT FREQUENCY (GHz)	RF OUTPUT FREQUENCY (GHz)	LO FREQUENCY (GHz)	MODEL NUMBER
0.95 to 1.75	5.85 to 6.65	4.9	UPB2-6/8TR
0.95 to 1.45	7.9 to 8.4	6.95	
0.95 to 1.45	12.75 to 13.25	11.8	UPB2-13.625TR
0.95 to 1.7	13.75 to 14.5	12.8	
0.95 to 1.7	13.75 to 14.5	12.8	UPB2-14/18TR
0.95 to 2.05	17.3 to 18.4	16.35	
0.95 to 1.95	10.7 to 11.7	9.75	UPB2-11.725TR
0.95 to 2.0	11.7 to 12.75	10.75	
0.95 to 1.7	10.95 to 11.7	10.0	UPB3-11.825TR
0.95 to 1.7	11.45 to 12.2	10.5	
0.95 to 1.7	12.0 to 12.7	11.0	

Note: See datasheet D-321 for single-band models.

## PHASE NOISE SPECIFICATIONS





SPECIFICATIONS	BLOCK DOWNCONVERTER
Input characteristics	
Return loss (50 ohms)	18 dB minimum
LO leakage	-80 dB maximum
Signal monitor	-20 dBc nominal
Output characteristics	
Return loss	18 dB minimum
Signal monitor	-20 dBc nominal
Power output (1 dB compression)	+13 dBm minimum (upconverters), +18 dBm minimum (downconverters)
Transfer characteristics	
Gain	33 dB $\pm$ 3 dB at 23 °C (upconverters), 35 dB $\pm$ 3 dB at 23 °C (downconverters)
Gain control	30 dB in 0.2 dB steps
Gain stability	$\pm$ 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
Image rejection	60 dB minimum
Noise figure (at minimum attenuation)	15 dB maximum
Intermodulation distortion (third-order)	With two inband signals at 0 dBm output, third-order intermodulation products are less than 50 dBc minimum (upconverters), 60 dBc minimum (downconverters)
Spurious outputs (inband)	
Signal-related (non-harmonic)	65 dBc minimum up to 0 dBm output
Output harmonic (downconverters only)	60 dBc up to -10 dBm output
Signal-independent	-75 dBm maximum
Phase noise	See graph on page two
Frequency stability	$\pm$ 5 x 10 <sup>-8</sup> , 0 °C to 50 °C (higher stability options available), 5 x 10 <sup>-9</sup> /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. Reference oscillator acts as an analog phase lock with a 0.1 Hz nominal loop bandwidth. Typical loop suppression of the external reference is as follows: 28 dB at 1 Hz offset, 65 dB at 10 Hz offset, and 100 dB at 100 Hz offset
RF mute	60 dB minimum on summary alarm or mute command
Remote interface	10/100 Base-T Ethernet interface providing web-browser based configuration, SNMP 1.0 configuration, alarm reporting via SNMP trap, telnet access, password protection and selectable RS-485/RS-422. Refer to L3 Narda-MITEQ Technical Note 25T066 for details.
Alarms	
Summary alarm	Contact closure status for DC voltage and local oscillator

Note: All specifications at minimum attenuation unless otherwise noted.

# MULTIBAND 1/3 RACK-MOUNTED

## OPTIONS

Missing option numbers are not applicable for this product.

### 1. High-performance package

- Power output (1 dB compression) .....+20 dBm minimum
- Gain slope.....0.03 dB/MHz maximum/any 10 MHz
- 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 each band
- Spurious outputs (inband)
- Signal-related.....65 dBc minimum up to 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
- High-performance phase noise (dBc/Hz) (maximum)

LO Frequency	OFFSET (Hz)					
	10	100	1K	10K	100K/300K	1M
Up to 6.7 GHz	-54	-78	-108	-116	-119	-136
6.7 GHz to < 8 GHz	-53	-76	-107	-114	-117	-134
8 GHz to < 12 GHz	-48	-73	-103	-112	-115	-132
12 GHz to < 13.4 GHz	-48	-72	-102	-110	-113	-130
13.4 GHz to < 16 GHz	-47	-70	-100	-108	-111	-128
16 GHz to < 24 GHz	-42	-67	-98	-106	-109	-126

Noise spectral density.....-88 dBm/4 kHz maximum (upconverters)

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

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

### 2. Lower gain .....20 ±3 dB at 23 °C, 18 dB noise figure, 20 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 to 50 °C, 1 x 10<sup>-9</sup>/day typical (fixed temperature after 72 hours on time).

F. Higher frequency stability reference with direct phase lock to external reference input. No phase noise suppression on external reference input. ±5 x 10<sup>-9</sup>, 0 °C to 50 °C, 1 x 10<sup>-9</sup>/day typical (fixed temperature after 72 hours on time).

G. Self-calibrating tracking reference with controlled slew rate. Internal reference tracks external reference and uses external reference to correct for aging of the internal reference. The internal reference changes frequency at a maximum rate of 0.06 ppm/second. When external reference is lost, the reference frequency is held at the previous value. Frequency stability on internal reference: ±5 x 10<sup>-8</sup>, 0 °C to 50 °C, 1 x 10<sup>-9</sup>/day typical (fixed temperature after 72 hours on time).  
5 x 10<sup>-8</sup>/year typical

H. Self-calibrating tracking reference with controlled slew rate. Internal reference tracks external reference and uses external reference to correct for aging of the internal reference. The internal reference changes frequency at a maximum rate of 0.06 ppm/second. When external reference is lost, the reference frequency is held at the previous value. Frequency stability on internal reference: ±2 x 10<sup>-9</sup>, 0 °C to 50 °C, 1 x 10<sup>-9</sup>/day typical (fixed temperature after 72 hours on time).  
5 x 10<sup>-8</sup>/year typical



## OPTIONS (CONTINUED)

Missing option numbers are not applicable for this product.

- \*21-1. Amplitude slope control ..... Front panel and remote control of amplitude slope.  
Control range: 0 dB to 1 dB minimum 500 MHz IF BW, 0 dB to 1.5 dB minimum 800 MHz IF BW, 0 dB to 2 dB minimum 1000 MHz IF BW, 0 dB to 3 dB minimum 1500 MHz IF BW. Control step size: 0.2 dB
- \*21-2. Amplitude slope control ..... Front panel and remote control of amplitude slope.  
Control range: 0 dB to 2 dB minimum 500 MHz IF BW, 0 dB to 3 dB minimum 800 MHz IF BW, 0 dB to 4 dB minimum 1000 MHz IF BW, 0 dB to 6 dB minimum 1500 MHz IF BW. Control step size: 0.2 dB

Notes: Amplitude response specifications are measured with linear components of slope equalization removed. Units are calibrated outside minimum range, however, minimum slope range provided as listed above. For Options 21-1 and 21-2, amplitude slope may be flat for 0 dB slope value.

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

For literature describing local control (front panel) and remote control (bus control), refer to L3 Narda-MITEQ Technical Note 25T066.

## GENERAL SPECIFICATIONS

### PRIMARY POWER REQUIREMENTS

- Voltage..... 100 VAC to 240 VAC (-10%, +6%)
- Frequency ..... 47 Hz to 63 Hz
- Consumption..... 12 W typical, 20 W maximum

### PHYSICAL

- Weight..... 4.5 lb. [2.04 kg] nominal
- Dimensions ..... 5.70" [144.8 mm] x 1.48" [37.6 mm] x 20" [508.0 mm] (excluding connectors)
- Rear-panel connectors
  - RF-Band..... SMA female
  - RF-Band monitor ..... SMA female
  - L-Band ..... SMA female
  - L-Band monitor ..... SMA female
  - External reference input..... SMA female
  - Status interface ..... DE-9S
  - Redundancy interface ..... DE-9P
  - Remote interface ..... 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

- Temperature ..... 0 °C to 50 °C
- Atmospheric pressure..... Up to 10,000 feet

#### Nonoperating

- Temperature ..... -50 °C to +70 °C
- Atmospheric pressure..... Up to 40,000 feet
- Shock and vibration ..... Normal handling by commercial carriers

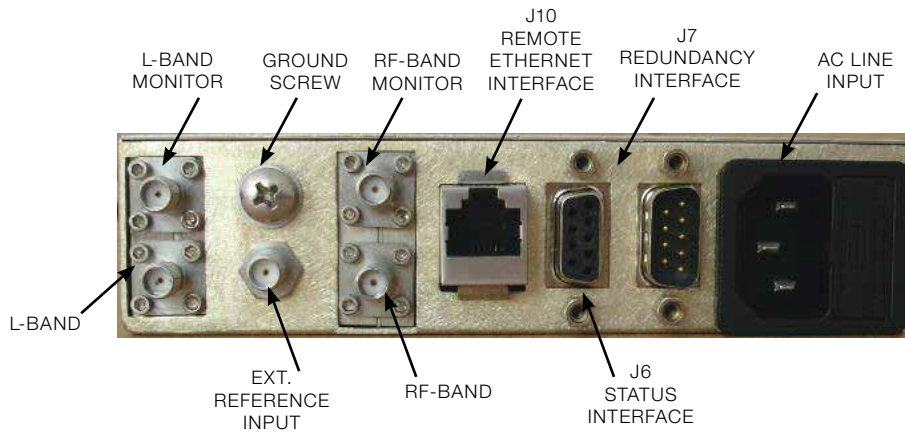
### ACCESSORIES

#### 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]

# MULTIBAND 1/3 RACK-MOUNTED

## TYPICAL REAR-PANEL VIEW



**narda**  **MITEQ**

435 Moreland Road

Hauppauge, NY 11788

Tel: 631-231-1700

Fax: 631-231-1711

Email: [nardaMITEQ@L3T.com](mailto:nardaMITEQ@L3T.com)

[www.nardamiteq.com](http://www.nardamiteq.com)

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