

# High Performance Outdoor Block Upconverters and Downconverters

## For Q-Band Applications



This series of outdoor block upconverters and downconverters are designed for antenna mounting.

A strong set of monitor and control functions support powerful remote control. A contact closure summary alarm is provided for fault monitoring.

A continuously updated log of time-stamped records of activity is also provided.

## Features

- Small weather resistant enclosure
- Automatic 5/10 MHz internal/external reference selection
- RS485/RS422 and 10/100Base-T Ethernet remote control
- RF input signal monitor ports
- 30 dB gain control
- 32 memory locations
- High frequency stability
- Summary alarm
- AC power supply (CE Mark)

## Options

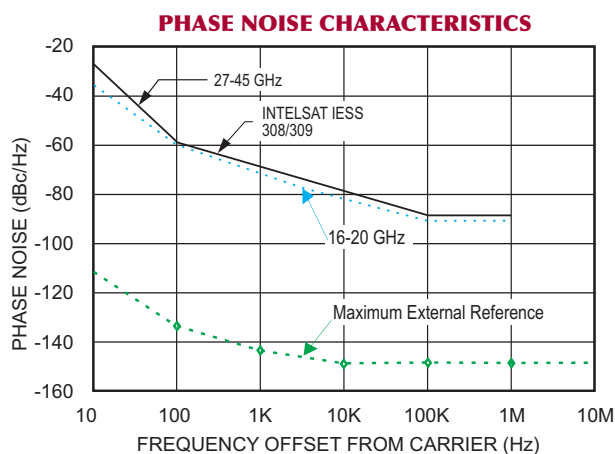
- Higher performance package
- Higher frequency stability
- Lower gain
- DC power
- LO level monitoring
- Low noise amplifier (Downconverters only)
- Custom higher IF frequency bands (ie: X-Band) are available as a special order option

Input Frequency (GHz)	Output Frequency (GHz)	Translation Frequency (GHz)	Model Number
<b>Block Upconverters</b>			
0.95-1.45	43.5-44.0	42.55	UPB-WS-43.75
0.95-1.45	44.0-44.5	43.05	UPB-WS-44.25
0.95-1.45	44.5-45.0	43.55	UPB-WS-44.75
0.95-1.45	45.0-45.5	44.05	UPB-WS-45.25
0.95-1.95	43.5-44.5	42.55	UPB-WS-44
0.95-1.95	44.5-45.5	43.55	UPB-WS-45
0.95-1.95	43.5-45.5	42.55/43.55	UPB2-WS-44.5
1-2	43.5-45.5	42.50/43.50	UPB2-WS-44.5.1
<b>Block Downconverters</b>			
18.3-18.8	0.95-1.45	17.35	DNB-WS-18.55
19.7-20.2	0.95-1.45	18.75	DNB-WS-19.95
20.2-21.2	0.95-1.95	19.25	DNB-WS-20.7
20.2-21.2	1-2	19.2	DNB-WS-20.7-1
<b>Test Downconverters</b>			
43.5-44.0	0.95-1.45	42.55	DNB-WS-43.75
44.0-44.5	0.95-1.45	43.05	DNB-WS-44.25
44.5-45.0	0.95-1.45	43.55	DNB-WS-44.75
45.0-45.5	0.95-1.45	44.05	DNB-WS-45.25
43.5-44.5	0.95-1.95	42.55	DNB-WS-44
44.5-45.5	0.95-1.95	43.55	DNB-WS-45
43.5-45.5	0.95-1.95	42.55/43.55	DNB2-WS-44.5

Specifications	Upconverter	Downconverter
Input characteristics	18 dB minimum	
Return loss (50 ohms)	N/A	
LO leakage	N/A	-80 dB maximum
Signal monitor	-20 dBc nominal	N/A
Output characteristics	18 dB minimum	
Return loss	N/A	
Signal monitor	N/A	-20 dBc nominal
Power output (1 dB compression)	+10 dBm minimum	+18 dBm minimum
Transfer characteristics	33 dB $\pm$ 3 dB at 23°C	
Gain	30 dB $\pm$ 3 dB at 23°C	
Gain control	30 dB in 0.2 dB steps	
Gain stability	$\pm$ 0.25 dB/day maximum at constant temperature $\pm$ 2 dB, -40 to +60°C	
Amplitude response	$\pm$ 0.25 dB/40 MHz maximum, $\pm$ 1 dB maximum over RF frequency band	
Image rejection	80 dB minimum	
Noise figure (at minimum attenuation)	20 dB maximum	
Intermodulation distortion (third order)	With two inband signals at 0 dBm output, third order intermodulation products are less than	
	40 dBc minimum	60 dBc minimum
Spurious outputs (inband)	65 dBc minimum up to 10 dBm output (including 2x1 spurious on 1 GHz IF bandwidth units) at maximum gain	
Signal related	65 dBc minimum up to 10 dBm output (including 2x1 spurious on 1 GHz IF bandwidth units) at maximum gain	
Signal independent	-65 dBm maximum	
Phase noise	See graph	
Frequency stability	$\pm$ 5 x 10 <sup>-8</sup> , -40 to +60°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 or 10 MHz at +4 $\pm$ 3 dBm. Unit will automatically switch to internal reference if external reference level falls below +1 dBm nominal.	
Upconverter mute	60 dB minimum on summary alarm or mute command	
Remote interface	10/100Base-T Ethernet interface providing Web-browser based configuration, SNMP 1.0 configuration, alarm reporting via SNMP trap, telnet access, password protection and selectable RS485/RS422. Refer to MITEQ's Technical Note 25T066 for details.	
Indicator and Alarms		
LO out-of-lock	Red LED (front panel)	
Power ON indicator	Green LED (front panel)	
Summary alarm	Contact closure status for DC voltage and local oscillator (Programmable LNA current alarm for downconverters +12 VDC up to 500 MA maximum)	

Note: All specifications guaranteed at maximum gain unless otherwise noted.

## Phase Noise Specifications



## Options

- 1.** High performance package.
  - Power output (1 dB compression)..... 15 dBm minimum (upconverters),  
20 dBm minimum (downconverters)
  - Gain slope ..... 0.03 dB/MHz maximum
  - Gain stability.....  $\pm 0.25$  dB/day maximum at constant temperature,  
 $\pm 1.0$  dB peak-to-peak maximum/-40 to +60°C
  - Group delay ..... 1 ns peak-to-peak maximum
  - Spurious outputs (inband)
    - Signal related ..... 65 dBc minimum up to 0 dBm output
    - Signal independent ..... -80 dBm 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)
  - Noise spectral density ..... -78 dBm/4 kHz maximum (downconverters),  
-83 dBm/4 kHz maximum (upconverters)
  - AM/PM conversion (at 0 dBm output) ..... 0.1°/dB maximum
  - Upconverter mute..... 80 dB minimum on summary alarm, external mute  
input command or remote control.
- 2.** Lower gain.
  - Gain..... 20  $\pm 3$  dB at 23°C, 22 dB noise figure,  
signal related spurious -65 dBc at -10 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.
  - B.**  $\pm 1 \times 10^{-8}$ , -40 to +60°C,  
1  $\times 10^{-9}$ /day typical (fixed temperature after 24 hour on time).
  - C.**  $\pm 5 \times 10^{-9}$ , -40 to +60°C,  
1  $\times 10^{-9}$ /day typical (fixed temperature after 24 hour on time).
  - F.** 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; 100 dB at 100 Hz offset.
- 14.** Low Noise Option (Downconverters only).

Frequency (GHz)	Available Noise Temperature	
	At +25°C (Maximum)	Interface Input
18.30 - 18.80	120°	WR-42 Grooved Flange
19.70 - 20.20	120°	WR-42 Grooved Flange
20.20 - 21.20	120°	WR-42 Grooved Flange

Note: Gain increase to 62  $\pm 3$  dBm.

- 19.** DC power input.
  - A.** +24 to +32 VDC input
  - B.** +42 to +60 VDC input
  - C.** -42 to -60 VDC input
- 27.** RF connector option..... RF connector on rear panel as per Outline Drawing Waveguide location.  
Please consult factory.
- VM.** Vertical mounting option for integration on RB plates.

# High Performance Outdoor Block Upconverters and Downconverters for Q-Band Applications

## General Specifications

### Primary Power Requirements

Voltage.....	90–250 VAC
Frequency.....	47–63 Hz
Consumption.....	40 W typical

### Physical

Weight.....	15 pounds (6.80 kg) nominal
Front panel connectors	
RF band	
Below 22 GHz.....	SMA female compatible
Above 40 GHz.....	WR-22 grooved, UG-383/U flange
L-band.....	N female
L-band monitor.....	SMA female
External reference input.....	SMA female
Status monitor.....	MS3116E14-18S for summary alarm and RS422/485*
Remote interface.....	RJ-45 female for Ethernet, RS422/485 available on status connector
Primary power input.....	FCI Clipper Series

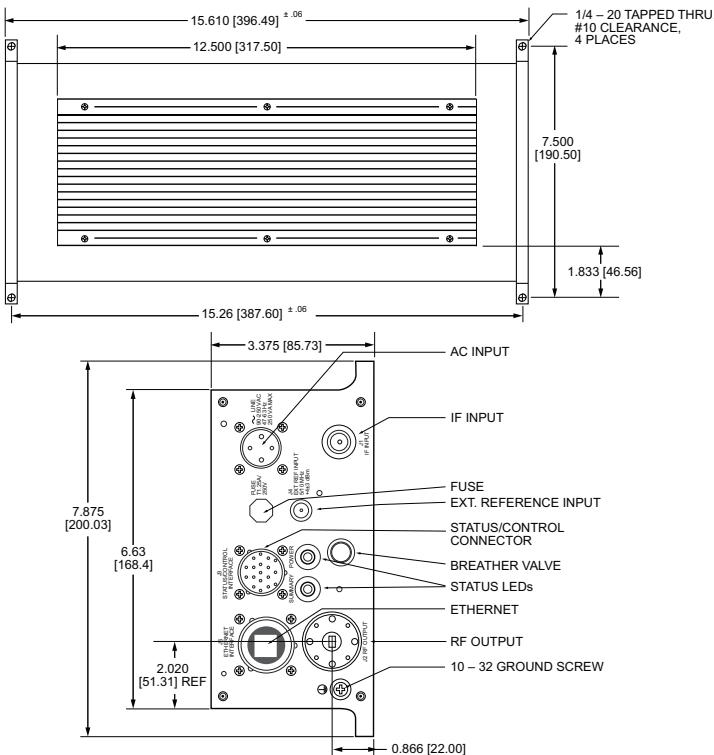
\*Note: Unit supplied with mating connector.

### Environmental

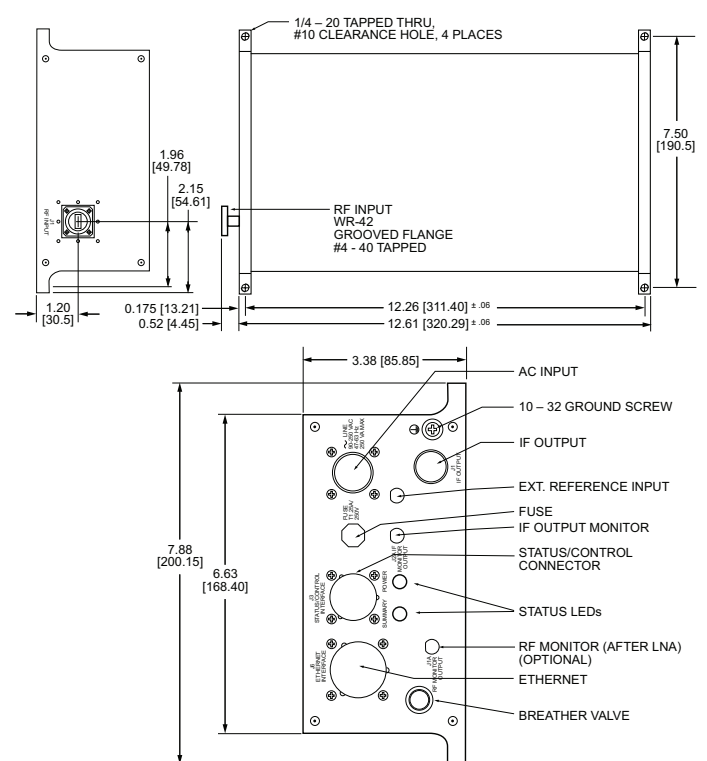
Operating	
Temperature.....	-40 to +60°C
Atmospheric pressure.....	Up to 10,000 feet
Nonoperating	
Temperature.....	-50 to +70°C
Atmospheric pressure.....	Up to 40,000 feet
Shock and vibration.....	Normal handling by commercial carriers

## Outline Drawings

### Q-Band Upconverter Package



### Q-Band Downconverter With Low Noise Option



NOTE: Dimensions shown in brackets [ ] are in millimeters.



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