

10000 SERIES FREQUENCY CONVERTERS

L, C, X and Ku Bands

| SPECIFICATION | | |
|---|---|---|
| | 10000 UPCONVERTER | 10000 DOWNCONVERTER |
| Type | Dual conversion | Dual conversion |
| Frequency step size | 1 kHz | 1 kHz |
| Frequency sense | No inversion | No inversion |
| Input characteristics | | |
| Input frequency | 70 ± 20 MHz (140 ± 40 MHz Option 4) | Refer to model number table |
| Input impedance | 75 ohms (50 ohms Option 15) | 50 ohms |
| Input return Loss | 20 dB minimum | 18 dB minimum (16 dB minimum L-Band) |
| Signal monitor | -20 dBc nominal | -20 dBc nominal |
| Lo leakage at input | N/A | -70 dBm |
| Input level (non-damage) | +15 dBm maximum | +15 dBm maximum |
| Output characteristics | | |
| Output frequency | Refer to model number table | 70 ± 20 MHz (140 ± 40 MHz Option 4) |
| Output impedance | 50 ohms | 75 ohms (50 ohms Option 15) |
| Output return loss | 18 dB minimum (16 dB minimum L-Band) | 20 dB minimum |
| Signal monitor | -20 dBc nominal | -20 dBc nominal |
| Lo leakage at output | -75 dBm maximum | N/A |
| Power output (P1 dB) | 15 dBm minimum | 16 dBm minimum |
| Transfer characteristics | | |
| Gain at 23°C | +30-35 dB at 23°C | +43-50 dB at 23°C |
| Noise figure at min. gain | 16 dB maximum | 14 dB |
| Noise power density | -123 dBm/Hz maximum | N/A |
| Image rejection | 70 dB minimum (L-Band only) | 80 dB |
| Level stability | ±0.25 dB/day maximum/day at constant temperature ±0.5 dB typical from 0°C to 50°C | |
| Amplitude response | | |
| 70 MHz ± 0 MHz | ±0.35 dB maximum/40 MHz | ±0.35 dB maximum/40 MHz |
| 140 MHz ± 40 MHz (Option 4) | ±0.45 dB maximum/80 MHz | ±0.45 dB maximum/80 MHz |
| RF band | N/A | ±1 dB maximum/RF band (L-Band only) |
| Amplitude slope adjust | ±1 dB typical in 0.2 dB steps | ±1 dB typical in 0.2 dB steps |
| Group delay (70 ± 18 MHz) at 23 °C | | |
| Linear | 0.03 ns/MHz maximum | 0.03 ns/MHz maximum |
| Parabolic | 0.01 ns/MHz maximum | 0.01 ns/MHz maximum |
| Ripple | 1 ns peak-to-peak maximum | 1 ns peak-to-peak maximum |
| Group delay (140 ± 36 MHz) at 23°C | | |
| Linear | 0.025 ns/MHz maximum | 0.025 ns/MHz maximum |
| Parabolic | 0.0035 ns/MHz maximum | 0.0035 ns/MHz maximum |
| Ripple | 1 ns peak-to-peak maximum | 1 ns peak-to-peak maximum |
| Intermodulation distortion (third order) | 52 dBc min. (26 dBm OIP3 pt) 44 dBc min. Ku-Band (22 dBm OIP3 pt) | 60 dBc minimum (30 dBm OIP3 pt) |
| AM/PM conversion | 0.1°/dB maximum to 0 dBm output | 0.1°/dB maximum to 0 dBm output |
| Frequency stability | ±2 x 10 ⁻⁸ , 0°C to 50°C (higher stability options available), ±5 x 10 ⁻⁹ /day typical (fixed temperature after 24 hour on time) | |
| Frequency accuracy | ±25 Hz max. using external reference | ±25 Hz max. using external reference |
| Spurious output (in band) | | |
| Signal related | -60 dBc maximum up to 0 dBm output | -60 dBc maximum up to 0 dBm output |
| Signal independent | -70 dBm maximum | -70 dBm maximum |
| Gain adjustment | 30 dB in 0.2 dB steps (55 dB in 0.2 dB steps at L-Band) | 30 dB in 0.2 dB steps |
| Upconverter mute | 60 dB minimum | N/A |
| External reference | 5 or 10 MHz, +4 ± 3 dBm unit will automatically switch to internal reference if external reference level falls below +1 dBm nominal | |
| Phase noise | See chart | See chart |



The Narda-MITEQ frequency converters are designed for advanced satellite communication systems and are available for a wide variety of frequency plans. Phase noise, amplitude flatness and spurious outputs have been optimized to provide the user with a transparent frequency conversion for all video and data applications.

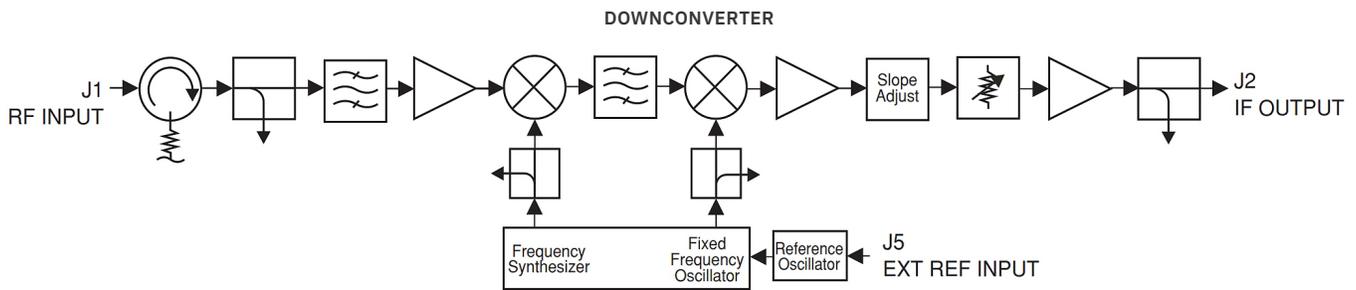
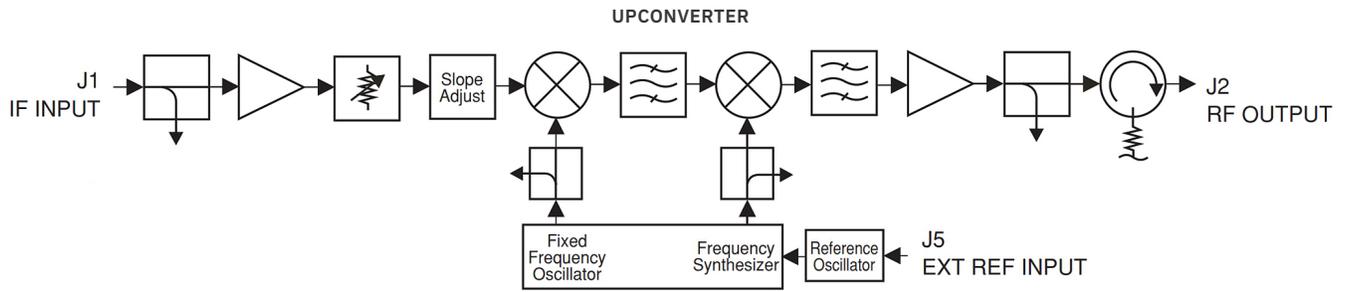
A strong feature set of monitor and control functions supports powerful local and remote control. Among the features are control of frequency, attenuation and 64 memory locations for each converter where various setups can be stored and recalled.

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

| UPCONVERTERS | |
|--------------------|---------------|
| RF FREQUENCY (GHz) | MODEL NUMBERS |
| 0.95 – 2.15 | U-10048-1-1K |
| 2 – 2.4 | U-10048-4-1K |
| 5.725 – 6.725 | U-10053-6-1K |
| 7.9 – 8.4 | U-10054-1K |
| 12.75 – 14.5 | U-10056-7-1K |
| 13.75 – 14.8 | U-10056-6-1K |
| 10.7 – 12.75 | U-10008R-6-1K |
| 17.3 – 18.4 | U-10057-2-1K |

| DOWNCONVERTERS | |
|--------------------|---------------|
| RF FREQUENCY (GHz) | MODEL NUMBERS |
| 0.95 – 2.15 | D-10000-3-1K |
| 2 – 2.4 | D-10000-6-1K |
| 3.4 – 4.2 | D-10001-1-1K |
| 7.25 – 7.75 | D-10005-1K |
| 10.7 – 12.75 | D-10008-6-1K |
| 12.75 – 14.5 | D-10056R-7-1K |
| 13.75 – 14.8 | D-10056R-6-1K |

REPRESENTATIVE BLOCK DIAGRAM



| PHASE NOISE SPECIFICATIONS | | | | | | | |
|--|------|-------|------|-------|--------|--------|------|
| 1. Phase noise (-dBc/Hz) (maximum with internal reference). | | | | | | | |
| UPCONVERTERS | | | | | | | |
| Model | 10Hz | 100Hz | 1KHz | 10KHz | 100KHz | 300KHz | 1MHz |
| U-10048-1-1K | 67 | 79 | 100 | 104 | 105 | 113 | 126 |
| U-10048-4-1K | 63 | 76 | 97 | 102 | 103 | 112 | 124 |
| U-10053-6-1K | 62 | 72 | 94 | 98 | 99 | 106 | 119 |
| U-10054-1K | 59 | 72 | 91 | 97 | 98 | 106 | 118 |
| U-10056-7-1K | 56 | 67 | 87 | 93 | 94 | 101 | 113 |
| U-10056-6-1K | 56 | 67 | 87 | 93 | 94 | 101 | 113 |
| U-10008R-6-1K | 52 | 66 | 86 | 91 | 92 | 98 | 111 |
| U-10057-2-1K | 51 | 65 | 85 | 90 | 91 | 97 | 110 |
| DOWNCONVERTERS | | | | | | | |
| Model | 10Hz | 100Hz | 1KHz | 10KHz | 100KHz | 300KHz | 1MHz |
| D-10000-3-1K | 67 | 79 | 100 | 104 | 105 | 113 | 126 |
| D-10000-6-1K | 63 | 76 | 97 | 102 | 103 | 112 | 124 |
| D-10001-1-1K | 62 | 72 | 94 | 98 | 99 | 106 | 119 |
| D-10005-1K | 58 | 70 | 91 | 96 | 97 | 105 | 118 |
| D-10008-6-1K | 52 | 66 | 86 | 91 | 92 | 98 | 111 |
| D-10056R-7-1K | 56 | 67 | 87 | 93 | 94 | 101 | 113 |
| D-10056R-6-1K | 56 | 67 | 87 | 93 | 94 | 101 | 113 |
| Maximum External Reference to Achieve Above Phase Noise with 10 MHz Reference (dBc/Hz) | | | | | | | |
| | 10Hz | 100Hz | 1KHz | 10KHz | 100KHz | 300KHz | 1MHz |
| Systems without Option 10E, 10F, 10G or 10H | 120 | 150 | 160 | 160 | 160 | 160 | 160 |
| Systems with Option 10E, 10F, 10G or 10H | 95 | 130 | 140 | 140 | 140 | 140 | 140 |

| OPTIONS |
|--|
| 4. 140 MHz IF frequency. |
| 10. Higher frequency stability reference. |
| C. $\pm 2 \times 10^{-9}$, 0°C to 50°C, 1×10^{-9} /day typical (fixed temperature after 24 hour on time). |
| E. $\pm 5 \times 10^{-9}$, 0°C to 50°C, 1×10^{-9} /day typical (fixed temperature after 24 hour on time). See Note 1 below. |
| F. $\pm 2 \times 10^{-9}$, 0°C to 50°C, 1×10^{-9} /day typical (fixed temperature after 24 hour on time). See Note 1 below. |
| NOTE 1: Analog reference Phase Lock: External 5 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. |
| 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: $\pm 5 \times 10^{-8}$, 0°C to 50°C, 1×10^{-9} /day typical (fixed temperature after 72 hour on time). 5×10^{-8} /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: $\pm 2 \times 10^{-9}$, 0°C to 50°C, 1×10^{-9} /day typical (fixed temperature after 72 hour on time). 5×10^{-8} /year typical. |
| 15. 50 ohm IF impedance. |
| 17. Remote control. |
| C. RS232 remote interface. |
| NRF. Type N-female RF connector (Note: Monitor remains SMA female). RF return loss: 16 dB. |
| Notes: Missing option numbers are not applicable for this product. For literature describing Local control (front panel) and remote control (bus protocols), refer to Narda-MITEQ's Technical Note 25T063. Protocols are backwards compatible with Technical Notes 25T010 and 25T009. |

KEY FEATURES

- > Supports expandable NSU 1:N Switchover Series (D-323)
- > Amplitude slope adjust
- > Three monitor and control ports:
 1. RS485/RS422 remote interface (J6A) changes to RS232 with Option 17C
 2. RS485/RS422 control interface (J7) is provided for use with NSU redundancy system (D-323) or as an alternative interface
 3. 10/100Base-T Ethernet interface (J6B)
- > RF, IF and LO monitor ports
- > Automatic switching to external 5/10 MHz reference and electronic adjust of internal reference frequency
- > Low intermodulation distortion
- > Better than IESS-308/309 compliant phase noise
- > 64 programmable memory locations
- > 30 dB level control
- > External alarm input via contact closure
- > Date and time-stamped event log

OPTIONS

- > Higher Stability Reference
- > Remote RS232
- > 140 MHz IF Frequency
- > 50 ohm IF Impedance
- > Type "N" RF Connector

| GENERAL SPECIFICATIONS | |
|-----------------------------------|--|
| PRIMARY POWER REQUIREMENTS | |
| Voltage | 100-240 VAC (-10%, +6%) |
| Frequency | 47 – 63 Hz |
| Consumption | 55 W typical, 65 W maximum |
| PHYSICAL | |
| Weight | 12 pounds (5.4 kg) nominal |
| Chassis Dimensions | 19" [482.6mm] x 175" [44.45mm] panel height x 22" [560mm] maximum (including connectors) |
| Connectors | |
| RF | SMA female (N female, Option NRF) |
| RF Monitor | SMA female |
| IF | BNC female |
| IF Monitor | BNC female |
| LO Monitors | SMA female |
| Alarm | DE-9P |
| External Reference | BNC female |
| Remote Interface | DE-9S for RS485, RS422 and RS232, RJ-45 female for Ethernet |
| Primary Power Input | IEC-320 |
| Auxiliary Control Interface | DE-9S |
| ENVIRONMENTAL | |
| Operating | |
| Ambient Temperature | 0°C to +50°C |
| Relative Humidity | Up to 95% at 30°C |
| Atmospheric Pressure | Up to 10,000 feet |
| Non-Operating | |
| Ambient Temperature | -50°C to +70°C |
| Relative Humidity | Up to 95% at 40°C |
| Atmospheric Pressure | Up to 40,000 feet |
| Shock and Vibration | Normal handling by commercial carriers |

TYPICAL REAR PANEL VIEW



RSM Switch Module Location
(see D323 for more information)

10000 Series Frequency Converters

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Narda-MITEQ is an agile global aerospace and defense technology innovator, delivering end-to-end solutions that meet customers' mission-critical needs. The company provides advanced defense and commercial technologies across air, land, sea, space and cyber domains.



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