## QM1016 | 1.8 GHz Frequency Up-Converter

### Typical Applications

- Frequency Conversion
- Laboratory Test Equipment
- Digital Receiver Exciter (DREX) Systems
- Digital RF Memory (DRFM) Kernel
- Communication systems, SATCOM
- EW, ELINT, SIGINT, DF
- Wideband systems
- Phased array antenna systems
- Radar systems

### RF Frequency Range
1822.5 MHz +/- 100 MHz

### IF Frequency
322.5 MHz +/- 200 MHz

### Options
| 100 | Dual-channel, internal LO |



### Features

- Upconversion from IF to RF
- High-quality low-phase noise LO tuners

### Form-Factor

- 1U 19" Rack module

**QM1016, 1U 19" Rack-Mount. Connector locations may vary from locations shown here**

### General Description

The QM1016 is an RF upconverter based off of our successful QM1004 line of wideband frequency converters. This new product is designed to accept an analog IF input centered on 322.5 MHz and upconvert to 1822.5 MHz center frequency with 200 MHz of bandwidth. The unit uses a fixed 1500 MHz internal LO.

The QM1016 is controlled via USB or TCP/IP and uses VISA control drivers with the USBTMC protocol, enabling seamless integration into Windows®, Linux®, and Macintosh® environments. A Windows® GUI is provided.

All QM1016 Series specifications are customizable upon request. Please contact sales@quonsetmicrowave.com for more information. Detailed performance specifications are also available upon request.

For price, delivery, and to place orders, please contact Quonset Microwave:
315 Commerce Park Road, Unit 3, North Kingstown, RI 02852 Phone: 401-295-0062

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## Electrical Specifications

*Upconverter/Transmitter Channel*

| Parameter | Min. | Typ. | Max. | Units |
|---|---|---|---|---|
| IF Input Center Frequency | | 322.5 | | MHz |
| RF Output Frequency Range | | 1822.5 | | MHz |
| Instantaneous Usable Bandwidth | | 200 | | MHz |
| Gain (preliminary) | | 23 | | dB |
| Noise Figure (preliminary) | | 3 | | dB |
| Flatness | | 0.5 | | dB |
| Attenuation Range | | 90 | | dB |
| Attenuation Step Size | | 0.5 | | dB |
| Calibrated Amplitude Uncertainty | | 0.1 | | dB |
| Calibrated Phase Uncertainty | | 0.1 | | deg |

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## Internal Synthesizers (Option 101)

| Parameter | Min. | Typ. | Max. | Units |
|---|---|---|---|---|
| LO Phase Noise @ 10 kHz | | -115 | -110 | dBc/Hz |

## Internal 100 MHz Reference (Option 101)

| Parameter | Min. | Typ. | Max. | Units |
|---|---|---|---|---|
| Frequency Stability vs Temp (0 to 50 degC) | | +/- 5 | | ppb |
| Frequency Stability vs Internal Regulated Supply Voltage | | +/- 20 | | ppb |
| Warm-Up @ 25 degC (< 3 minutes) | | +/- 100 | | ppb |
| Daily Aging (after 30 days) | | +/- 1 | | ppb |
| Yearly Aging | | +/- 100 | | ppb |
| 10-year Aging | | +/- 500 | | ppb |
| Ref Phase Noise @ 1 Hz | | -90 | | dBc/Hz |
| Ref Phase Noise @ 10 Hz | | -120 | | dBc/Hz |
| Ref Phase Noise @ 100 Hz | | -135 | | dBc/Hz |
| Ref Phase Noise @ 1 kHz | | -145 | | dBc/Hz |
| Ref Phase Noise @ 10 kHz | | -150 | | dBc/Hz |
| Ref Phase Noise @ 100 kHz | | -150 | | dBc/Hz |
| Ref Phase Noise @ 1 MHz | | -150 | | dBc/Hz |

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### Additional External Electrical Specifications

| Parameter | Min. | Typ. | Max. | Units |
|---|---|---|---|---|
| Operating Voltage | | +15 | | VDC |
| Current Draw | | | 5 | Amps |
| External Reference Input | 10 | | 100 | MHz |
| External Reference 1 Output | | 100 | | MHz |
| External Reference 2 Output | | 10 | | MHz |

### Environmental Specifications

| Parameter | Min. | Typ. | Max. | Units |
|---|---|---|---|---|
| Operating Temperature | 0 | | 50 | degC |
| Storage Temperature | -20 | | 70 | degC |
| Operating Humidity, Non-Condensing | 10 | | 90 | % |

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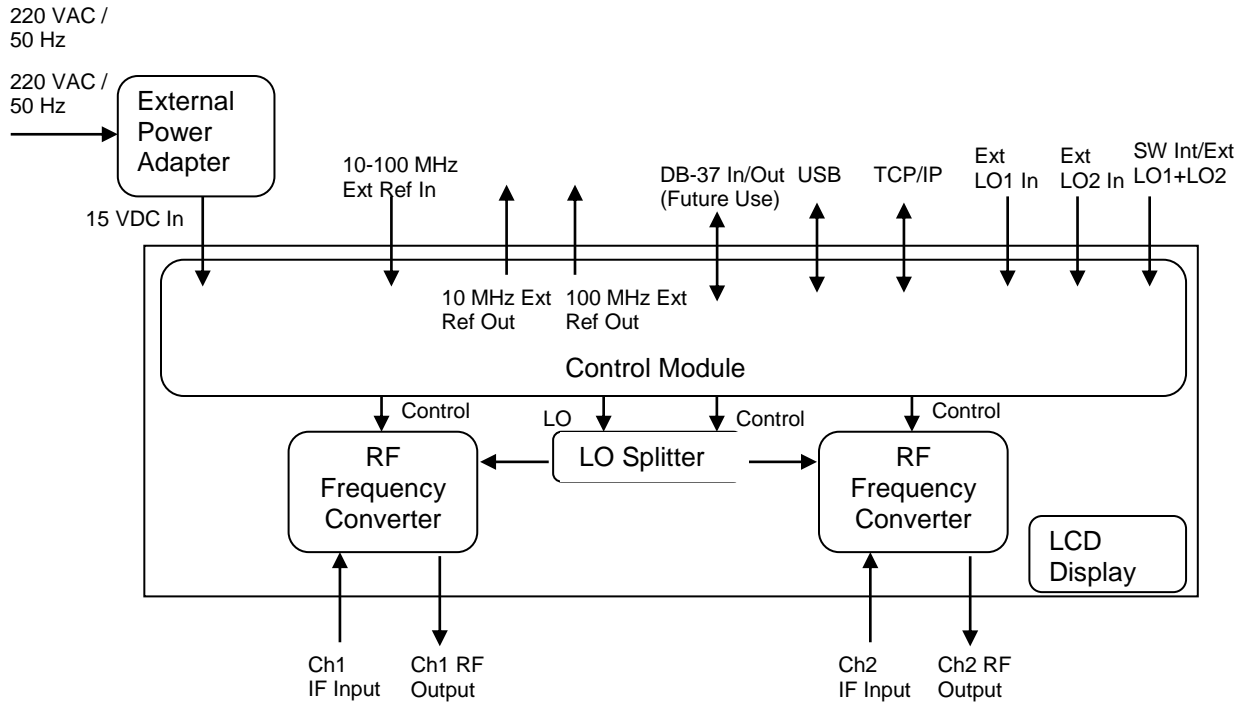
## QM1016 Series System Block Diagram



Figure 1. QM1016 block diagram – Option 102 without Internal LO

### RF Signal Chain
QM1016 Wideband Up Converter uses a single stage conversion architecture to convert frequencies up 322.5 MHz center-frequency IF to an 1822.5 MHz RF frequency. The block diagram is shown in Figure 1 (dual-channel without internal LOs).

### Controlling QM1016 Upconverters
QM1016 Rack Mount Upconverters with internal LOs have been designed to be VISA and USBTMC compliant. VISA drivers are provided by many Test and Measurement companies, including Agilent Technologies, National Instruments, and Tektronix. USB and TCP/IP communication and command structure is discussed in detail in the frequency conversion programming manual. A lightweight GUI, supported in Windows®, will be provided for units with internal LOs, providing control of all commonly used commands.

### Interface Connections
The necessary front and back panel input/output connections on a QM1016 frequency converter is summarized in Table 1. The front-panel connections are shown in Figure 2 while the rear-panel connections are shown in Figure 3.

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Figure 2. Front panel connections to QM1016 (figure is only representative, there will be slight changes).
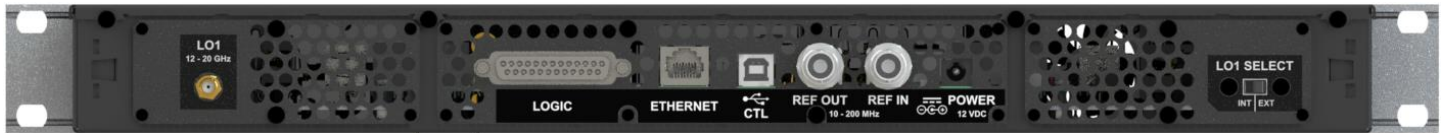


Figure 3. Rear-panel connections to QM1016 (figure is only representative, there will be slight changes).

Table 1. Input and output connections for QM1016 (19" Rack-Mount Form-Factor)

| Parameter | Connector Style | Type | Location |
|---|---|---|---|
| Upconverter IF Input – Ch1 | SMA | Female | Front Panel |
| Upconverter RF Output – Ch1 | SMA | Female | Front Panel |
| Upconverter IF Input – Ch2 | SMA | Female | Front Panel |
| Upconverter RF Output – Ch2 | SMA | Female | Front Panel |
| Reference Input (10-100 MHz) | BNC | Female | Rear Panel |
| Reference 1 Output (100 MHz) | BNC | Female | Rear Panel |
| Reference 2 Output (10 MHz) | BNC | Female | Rear Panel |
| LO Input (1500 MHz) | SMA | Female | Rear Panel |
| LO Int/Ext Switch | Toggle | SPDT Switch | Rear Panel |
| LO Output (1500 MHz) | SMA | Female | Rear Panel |
| USB | Micro-USB | Female | Rear Panel |
| TCP/IP | RJ-45 | Female | Rear Panel |
| Power Jack | 2.5 mm ID, 5.5mm OD Barrel | Male | Rear Panel |
| TTL Input (Frequency Tuning, Attenuation Control, Lock Status) | DB-37 | Female | Rear Panel |

**Power Interface**

The QM1016 Combined Up/Downconverter requires a DC input voltage of 15V applied at the power jack (2.5mm ID, 5.5mm OD barrel) on the back panel of the instrument. An AC-DC power adapter is supplied with the unit.

**Absolute Maximums**

| Operating Temperature | +50 °C |
|---|---|
| RF Input Power | +20 dBm |

**ELECTROSTATIC SENSITIVE DEVICE**
**OBSERVE HANDLING PRECAUTIONS**

**Ordering Information**

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## QM1016-[Options]

where
Options= 100 (dual-channel, internal LOs)