

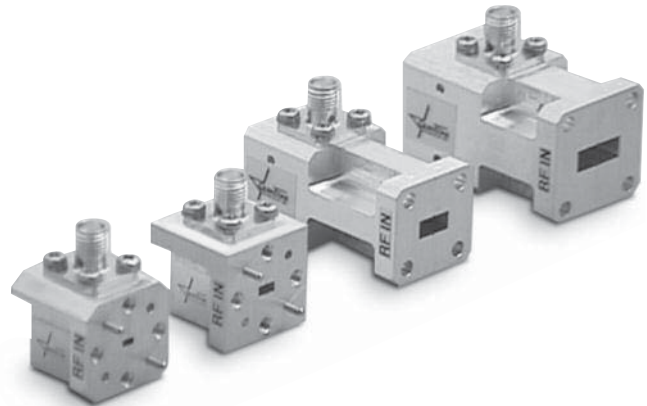


# Harmonic Mixers and Diplexers

QMH

## Characteristics

- ◆ Optimized for Any Harmonic Number
- ◆ External Diplexer Option
- ◆ High Sensitivity
- ◆ Broad Bandwidth



## Product Description

QuinStar Technology's **QMH series harmonic mixers** enable downconversion of millimeter-wave signals using lower frequency (microwave) local oscillator in the 2 to 20 GHz frequency range. The downconverted intermediate frequency (IF) is in the 5 MHz to 3 GHz range. Harmonic mixing is achieved by mixing appropriate harmonic N of the local oscillator, generated by the mixer itself, with the RF signal to produce an IF typically in the 5 MHz to 3 GHz range, such that  $f_{IF} = |N \cdot f_{LO} - f_{RF}|$ . The separation of the LO and IF signals is done by an external diplexer. They cover the frequency range of 18 to 170 GHz in nine full waveguide bands. These harmonic mixers are useful for subsystem applications involving frequency sampling such as phase-locked oscillators and frequency linearizers.

They are also ideally suited for test and measurement equipment, such as spectrum analyzers, frequency counters and power meters.

Harmonic mixers can be optimized for either odd or even harmonics of the local oscillator (LO). They can also be produced to operate on all harmonics, even or odd. Series QMH harmonic mixers have a common SMA port for LO and IF signals, and hence require an external diplexer. Those mixers can be supplied with external diplexers to combine/separate LO and IF signals. Several choices of LO & IF ranges are offered as standard products. Typical LO ranges from 1.5 GHz to 20 GHz and IF from DC to 2.5 GHz.

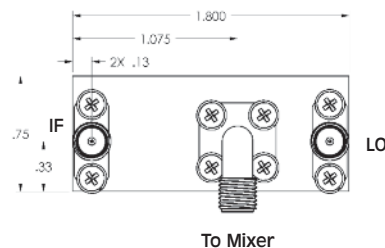
## Specifications

| FREQUENCY BAND  | K       | Ka      | Q     | U     | V     | E     | W      | F      | D       |
|---|---------|---------|-------|-------|-------|-------|--------|--------|---------|
| Frequency Range (GHz)   | 18-26.5 | 26.5-40 | 33-50 | 40-60 | 50-75 | 60-90 | 75-110 | 90-140 | 110-170 |
| Waveguide Size  | WR-42   | WR-28   | WR-22 | WR-19 | WR-15 | WR-12 | WR-10  | WR-8   | WR-6    |
| Conversion Loss (dB typ) <sup>1</sup>                                 | 20      | 22      | 24    | 26    | 28    | 30    | 32     | 35     | 37      |
| Minimum Detectable Signal in 1 kHz bandwidth (dBm, typ.) <sup>2</sup> | -110    | -110    | -105  | -100  | -95   | -90   | -85    | -80    | -75     |

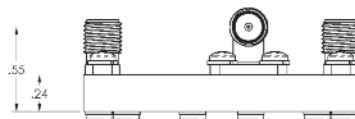
Other waveguide sizes are available.

<sup>1</sup> For 9th harmonic of LO, IF < 1 GHz. Typical LO power range is 7 to 14 dBm.

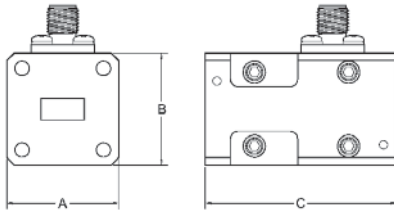
<sup>2</sup> For other harmonics, the minimum detectable signal may vary.



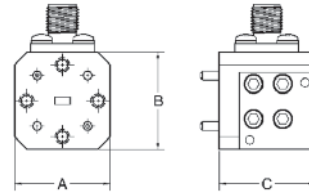
Diplexer Outline



### Outline Drawings/Mechanical Specifications



WR-42 and WR-28



WR-22 through WR-10

| FREQUENCY BAND | WAVEGUIDE SIZE | FLANGE PATTERN <sup>1</sup> | LO and IF | OUTLINE DIMENSIONS, inches/mm |           |            |
|----------------|----------------|-----------------------------|-----------|-------------------------------|-----------|------------|
|                |                |                             |           | A                             | B         | C          |
| K              | WR-42          | UG-595/U                    | SMA JACK  | 0.88/22.4                     | 0.88/22.4 | 1.5/38.1   |
| Ka             | WR-28          | UG-599/U                    | SMA JACK  | 0.75/19.1                     | 0.75/19.1 | 1.5/38.1   |
| Q              | WR-22          | UG-383/U <sup>1</sup>       | SMA JACK  | 1.13/28.7                     | 1.13/28.7 | 1.25/31.75 |
| U              | WR-19          | UG-383/U <sup>1</sup>       | SMA JACK  | 1.13/28.7                     | 1.13/28.7 | 1.25/31.75 |
| V              | WR-15          | UG-385/U                    | SMA JACK  | 0.75/19.1                     | 0.75/19.1 | 0.75/19.1  |
| E              | WR-12          | UG-387/U                    | SMA JACK  | 0.75/19.1                     | 0.75/19.1 | 0.75/19.1  |
| W              | WR-10          | UG-387/U                    | SMA JACK  | 0.75/19.1                     | 0.75/19.1 | 0.75/19.1  |

<sup>1</sup> Square flanges available for Q and U band.

### Ordering Information

Model Number **QMH -**

**AB CD E F GH**



Please specify exact RF and LO/IF frequency range when ordering.

RF center frequency rounded to nearest GHz

(A0 = 100 GHz, A1 = 101 GHz, B0 = 110 GHz, B1 = 111 GHz, etc., FB = fullband)

LO frequency rounded to nearest GHz

(If not fixed or defined, use XX)

harmonic number

O = odd  
E = even  
B = both

diplexer option

00 = no diplexer provided (customer to provide)  
D1 = diplexer provided IF = DC-1 GHz, LO = 1.8 to 7.5 GHz  
D2 = diplexer provided IF = DC-1 GHz, LO = 5 to 20 GHz  
D3 = diplexer provided IF = DC-2.5 GHz, LO = 5 to 20 GHz

waveguide band designator

K = K-band      E = E-band  
A = Ka-band    W = W-band  
Q = Q-band      F = F-band  
U = U-band      D = D-band  
V = V-band