

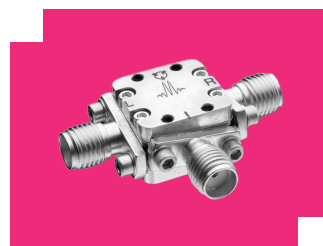
## T3-07LQP

### Two-Tone-Terminator Mixer

## DEVICE OVERVIEW

### General Description

The T3-07 is a high performance mixer featuring LO/RF from 1 MHz to 7 GHz and IF from 1 MHz to 4 GHz. As with all T3 mixers, this mixer offers unparalleled nonlinear performance in terms of IIP3, P1dB, and spurious performance with a flexible LO drive requirement from +15 dBm to +27 dBm. The T3-07 is offered in connectorized, surface mount, and drop-in style packaging, suitable for any type of system level integration. RoHS compliant versions are also available.



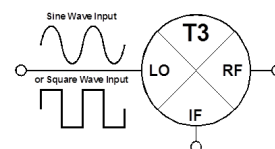
### Features

- Ultra-Broadband RF, LO, and IF
- Compatible with Sine or Square-Wave LO
- Square-Wave LO delivers Industry-Leading Spurious, IP3, and P<sub>1dB</sub> Performance

### Applications

N/A

### Functional Block Diagram



### Part Ordering Options

| Part Number              | Description               | Package | Connectors               | Green Status                    | Product Lifecycle | Export Classification |
|--------------------------|---------------------------|---------|--------------------------|---------------------------------|-------------------|-----------------------|
| <a href="#">T3-07MQP</a> | Two-Tone-Terminator Mixer | QP      | <a href="#">Standard</a> | <a href="#">Consult Factory</a> | Released          | EAR99                 |
| T3-07LQP                 | Two-Tone-Terminator Mixer | QP      | <a href="#">Standard</a> | Non-RoHS                        | Released          | EAR99                 |

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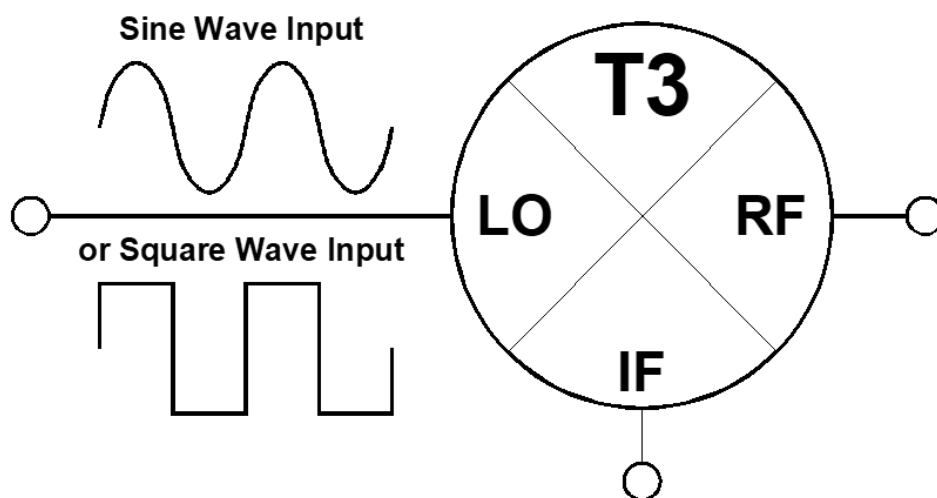
|                                           |                                  |
|-------------------------------------------|----------------------------------|
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## Revision History

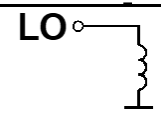
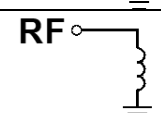
| Revision Code | Revision Date | Comment                                 |
|---------------|---------------|-----------------------------------------|
| -             | 2008-01-01    | Initial Release                         |
| A             | 2018-12-01    | Removed Leaded Surface Mount CQ package |
| B             | 2021-10-01    | Updated SMT Package Outlines            |

## Port Configuration and Functions

### Port Diagram



### Port Functions

| Port | Function | Connector Type | Description                                                                                                      | DC Equivalent Circuit                                                                 |
|------|----------|----------------|------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| IF   | IF       | SMAF           | The IF port is DC blocked and AC matched to 50 Ohms from 1 MHz to 4 GHz.                                         |  |
| LO   | LO       | SMAF           | The LO port is DC short to ground and AC matched to 50 Ohms from 1 MHz to 7 GHz. Blocking capacitor is optional. |  |
| RF   | RF       | SMAF           | The RF port is DC short to ground and AC matched to 50 Ohms from 1 MHz to 7 GHz. Blocking capacitor is optional. |  |

## Specifications

### Absolute Maximum Ratings

| Parameter                     | Maximum Rating | Unit |
|-------------------------------|----------------|------|
| LO DC Current                 | 1              | Amp  |
| Maximum Operating Temperature | 100            | °C   |
| Maximum Storage Temperature   | 125            | °C   |
| Minimum Operating Temperature | -55            | °C   |
| Minimum Storage Temperature   | -65            | °C   |
| RF DC Current                 | 1              | Amp  |
| RF Power Handling (RF+LO)     | 25             | dBm  |

### Package Information

| Parameter  | Details            | Rating           |
|------------|--------------------|------------------|
| ESD        | 250 to < 500 Volts | HBM Class 1A     |
| Weight     | Package name: QP   | 15g              |
| Dimensions | -                  | 15.24 x 13.20 mm |

### Recommended Operating Conditions

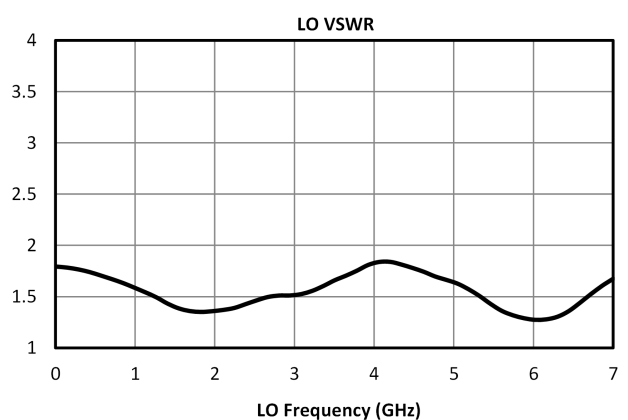
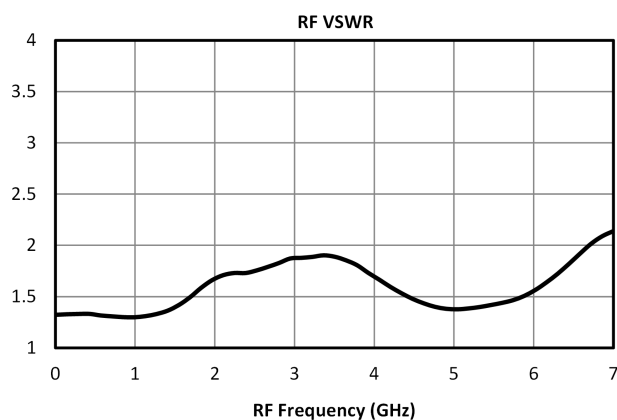
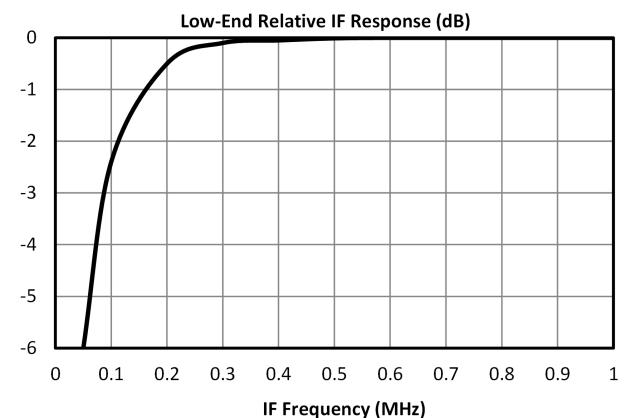
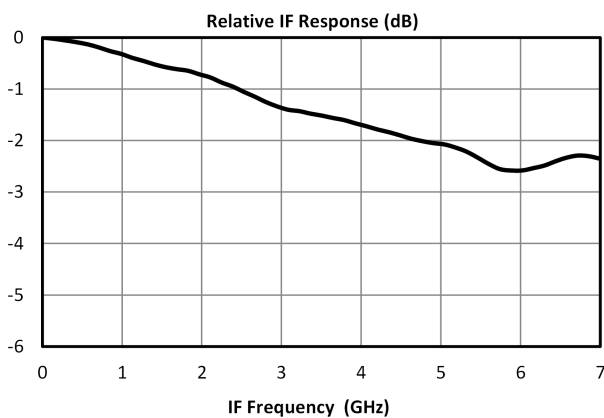
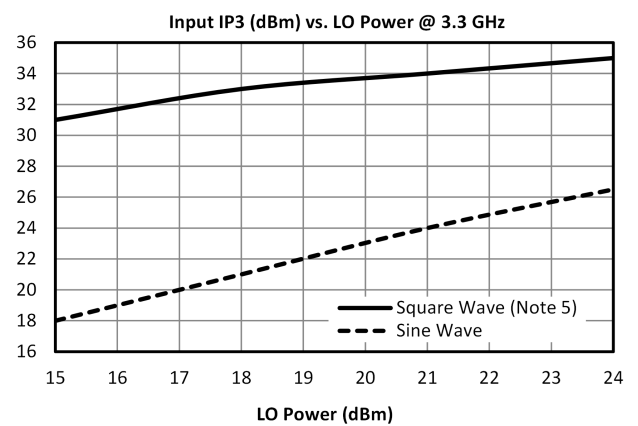
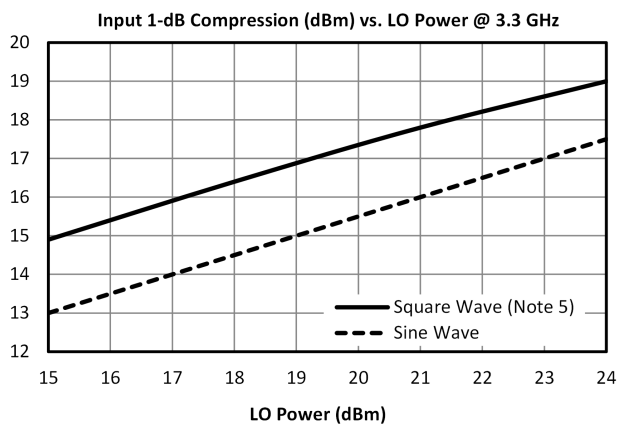
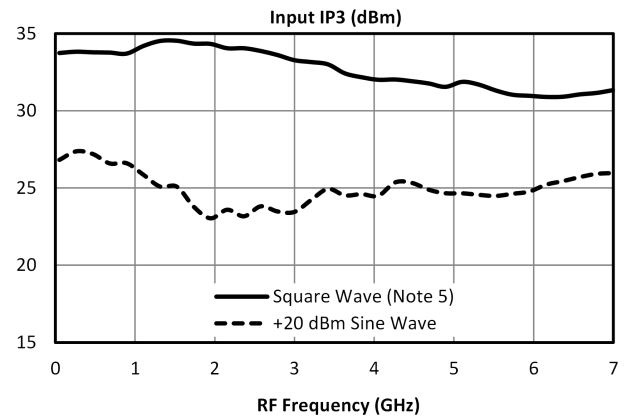
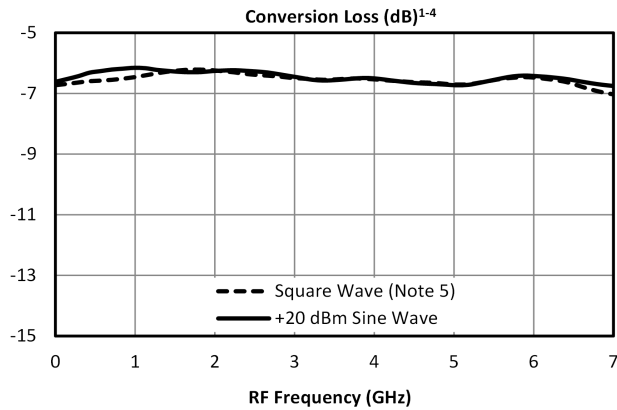
| Parameter      | Min | Nominal | Max | Unit |
|----------------|-----|---------|-----|------|
| LO Input Power | 15  | -       | 25  | -    |

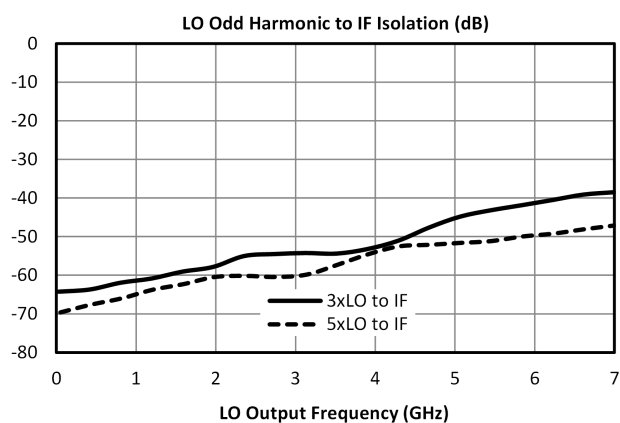
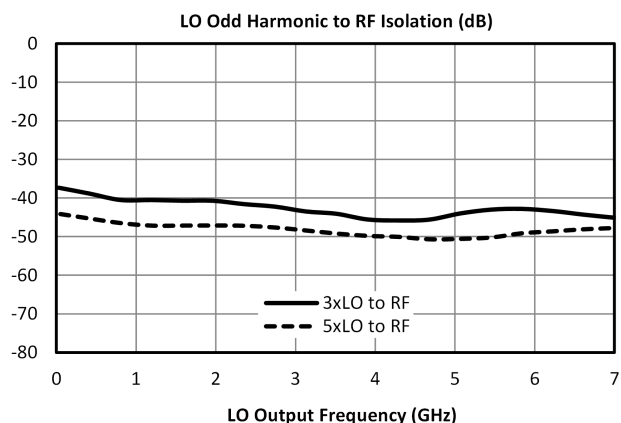
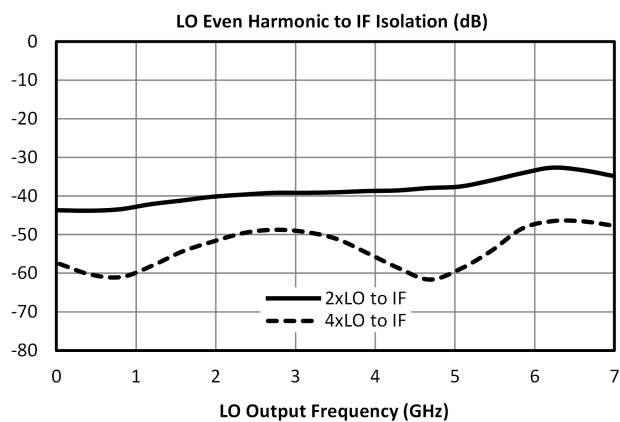
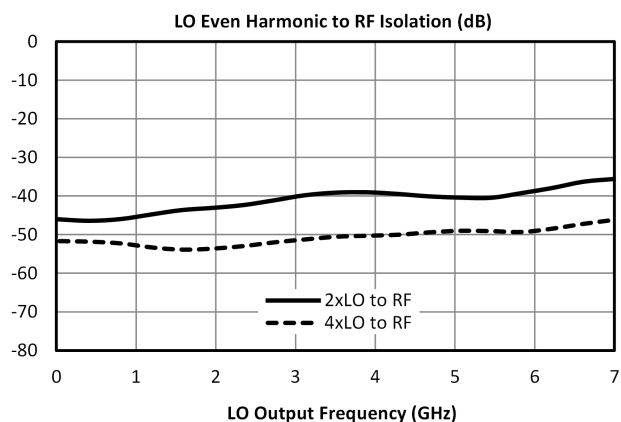
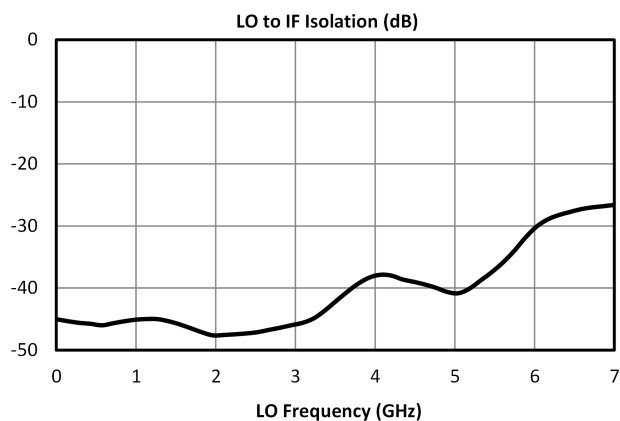
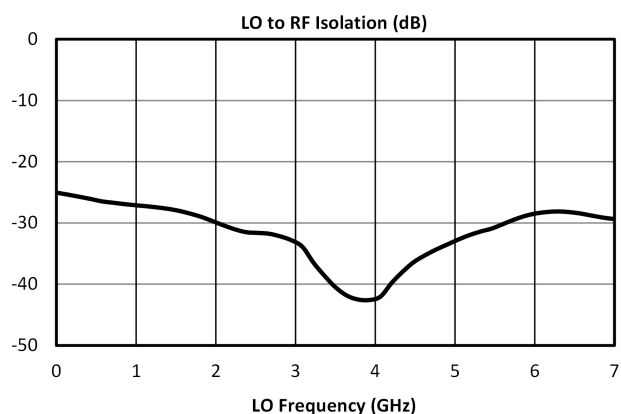
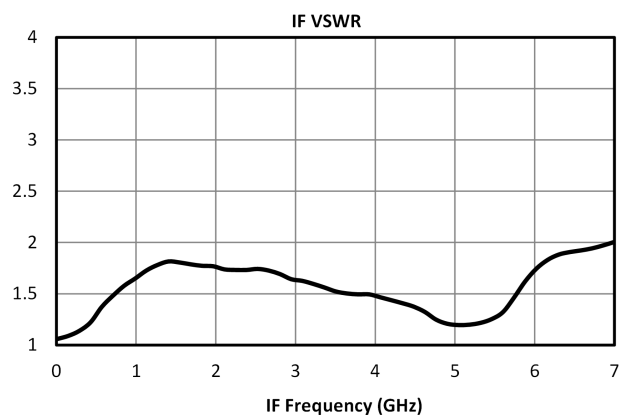
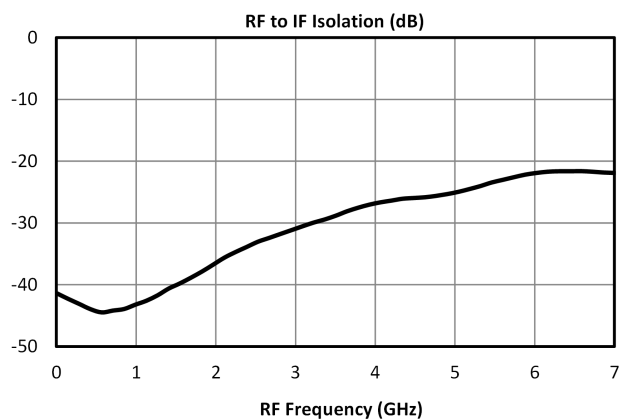
## Electrical Specifications

Specifications guaranteed from -55 to +100°C, measured in a 50Ω system.

| Parameter          | Test Conditions                   | Min   | Typ | Max  | Unit |
|--------------------|-----------------------------------|-------|-----|------|------|
| Conversion Loss    | LO/RF=.001-7GHz<br>IF=.001-0.5GHz | -     | 6.5 | 9    | dB   |
| Conversion Loss    | LO/RF=.001-7GHz<br>IF=.001-4GHz   | -     | 8   | 10.5 | dB   |
| IF Frequency Range | -                                 | 0.001 | -   | 4    | GHz  |
| LO Frequency Range | -                                 | 0.001 | -   | 7    | GHz  |
| RF Frequency Range | -                                 | 0.001 | -   | 7    | GHz  |
| Input IP3          | -                                 | -     | 32  | -    | dBm  |
| LO-RF Isolation    | -                                 | -     | 32  | -    | dB   |

## Typical Performance Plots





## Spur Table

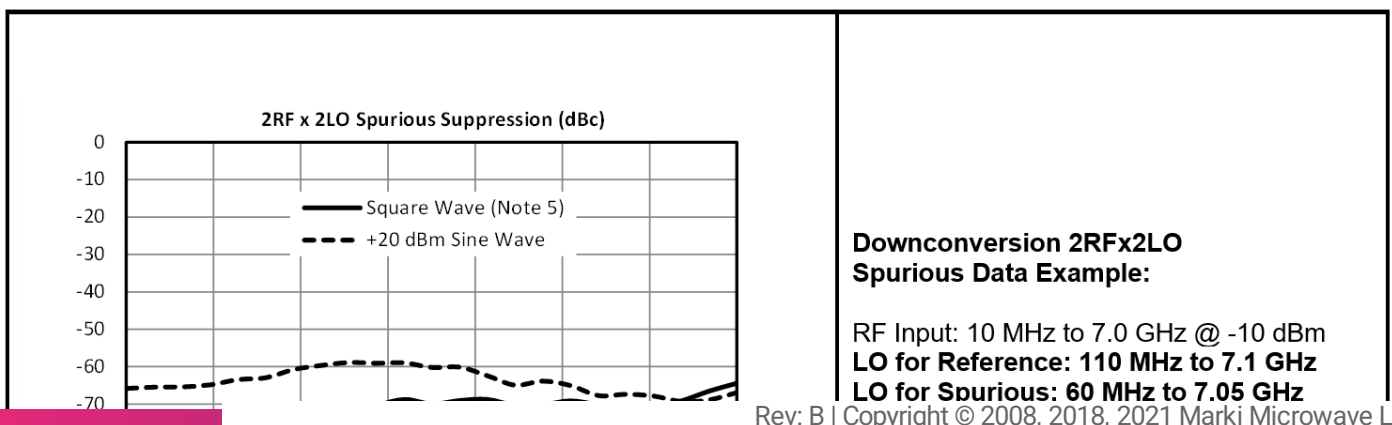
### Downconversion Spurious Suppression

Spurious data is taken by selecting RF and LO frequencies (+mLO+nRF) within the 1 MHz to 7 GHz RF/LO bands, which create a 100 MHz IF spurious output. The mixer is swept across the full spurious band and the mean is calculated. The numbers shown in the table below are for a -10 dBm RF input. Spurious suppression is scaled for different RF power levels by (n-1), where “n” is the RF spur order. For example, the 2RFx2LO spur is 72 dBc for a -10 dBm input, so a -20 dBm RF input creates a spur that is (2-1) x (-10 dB) dB lower, or 82 dBc.

**Typical Downconversion Spurious Suppression (dBc): Square Wave (Sine Wave) LO<sup>5</sup>**

| -10 dBm RF Input | 0xLO     | 1xLO                                                                  | 2xLO     | 3xLO    | 4xLO    | 5xLO    |
|------------------|----------|-----------------------------------------------------------------------|----------|---------|---------|---------|
| 0xRF             | -----    | See LO to IF Isolation and LO Harmonic to IF Isolation Plots (Page 3) |          |         |         |         |
| 1xRF             | 20 (23)  | Reference                                                             | 18 (27)  | 11 (12) | 16 (28) | 19 (20) |
| 2xRF             | 73 (60)  | 74 (66)                                                               | 72 (64)  | 77 (65) | 70 (60) | 77 (63) |
| 3xRF             | 105 (83) | 95 (83)                                                               | 100 (87) | 94 (74) | 97 (75) | 98 (72) |
| 4xRF             | >110     | >110                                                                  | >110     | >110    | >110    | >110    |
| 5xRF             | >120     | >120                                                                  | >120     | >120    | >120    | >120    |

A sample downconversion spurious sweep is shown below. An LO which is 100 MHz higher than the RF is used to create a 100 MHz reference IF. A second LO is used to create a 2x2 spurious IF, also at 100 MHz (50 MHz fundamental IF). The difference between these two output levels is the spurious suppression in dBc. The mean value across the full 1 MHz to 7 GHz RF input band is the number shown in the table above.



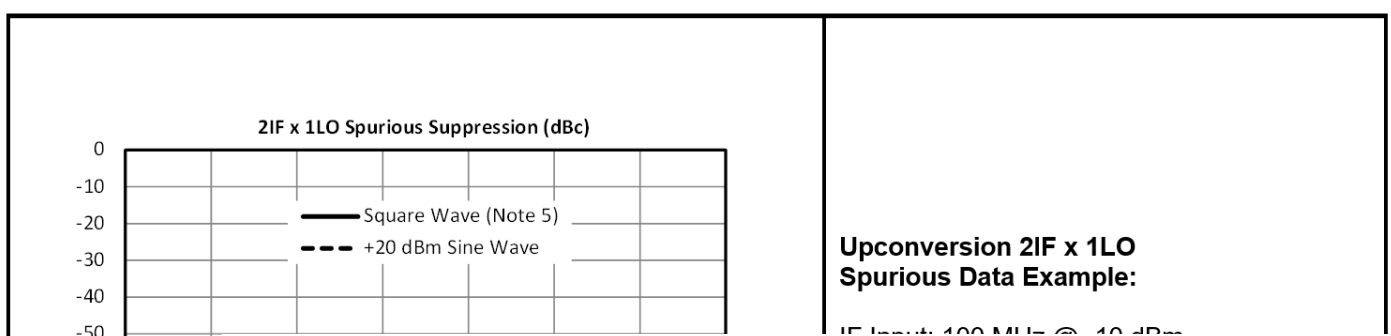
## Upconversion Spurious Suppression

Spurious data is taken by mixing a 100 MHz IF with LO frequencies (+mLO+nIF), which creates an RF within the 1 MHz to 7 GHz RF band. The mixer is swept across the full spurious output band and the mean is calculated. The numbers shown in the table below are for a -10 dBm IF input. Spurious suppression is scaled for different IF input power levels by (n-1), where “n” is the IF spur order. For example, the 2IFx1LO spur is typically 70 dBc for a -10 dBm input, so a -20 dBm IF input creates a spur that is (2-1) x (-10 dB) dB lower, or 80 dBc.

**Typical Upconversion Spurious Suppression (dBc): Square Wave (Sine Wave) LO<sup>5</sup>**

| -10 dBm IF Input | 0xLO     | 1xLO                                                                  | 2xLO     | 3xLO     | 4xLO     | 5xLO    |
|------------------|----------|-----------------------------------------------------------------------|----------|----------|----------|---------|
| 0xIF             | -----    | See LO to RF Isolation and LO Harmonic to RF Isolation Plots (Page 3) |          |          |          |         |
| 1xIF             | 19 (21)  | Reference                                                             | 17 (23)  | 11 (12)  | 17 (24)  | 19 (19) |
| 2xIF             | 74 (66)  | 70 (63)                                                               | 78 (65)  | 79 (63)  | 77 (67)  | 79 (65) |
| 3xIF             | 104 (83) | 98 (80)                                                               | 103 (85) | 102 (75) | 100 (79) | 98 (75) |
| 4xIF             | >110     | >110                                                                  | >110     | >110     | >110     | >110    |
| 5xIF             | >120     | >120                                                                  | >120     | >120     | >120     | >120    |

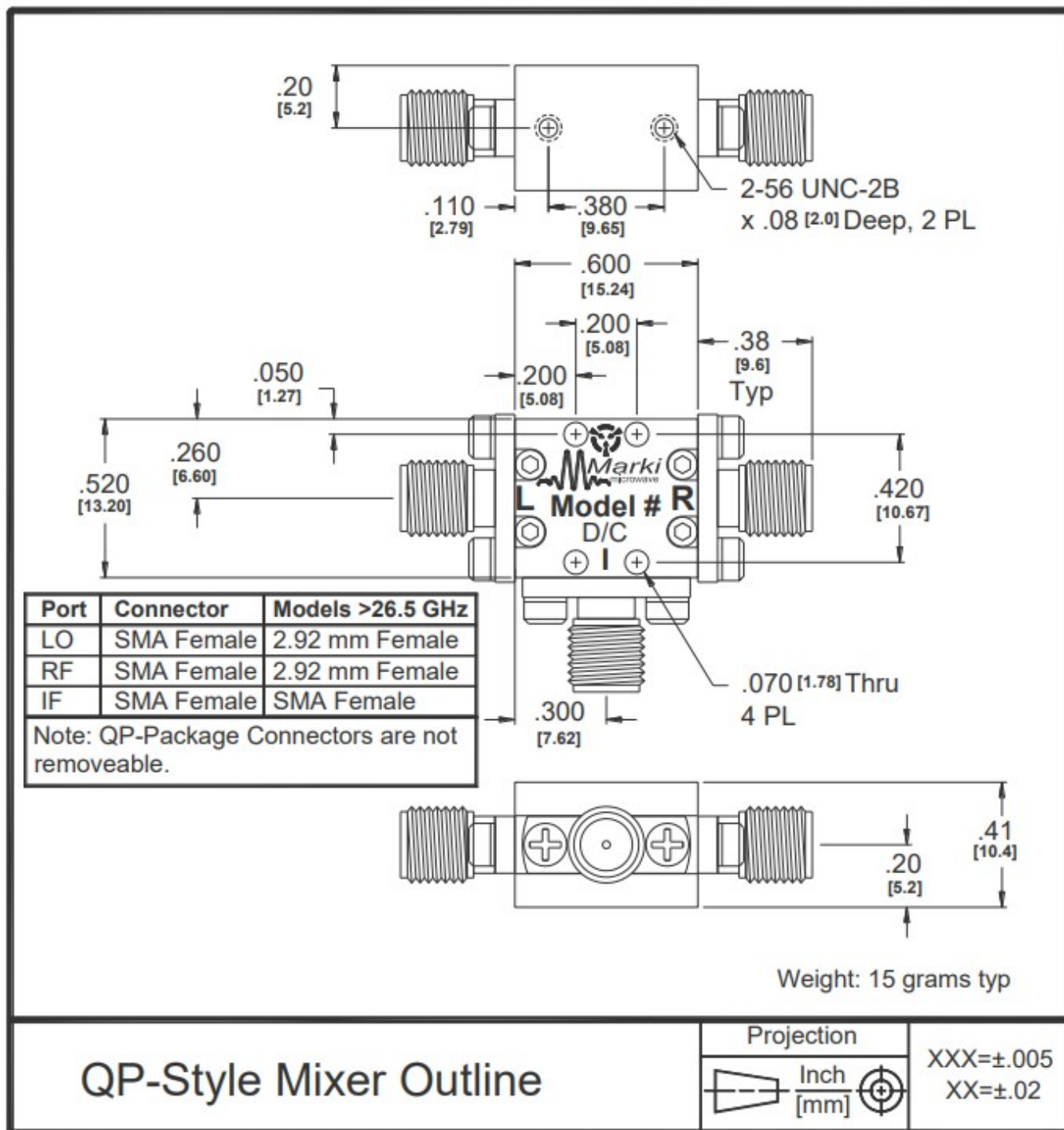
A sample upconversion spurious sweep is shown below. A 100 MHz reference IF input is used to create an RF output that is 100 MHz below the LO input (LO-IF=RF). A second LO (100 MHz higher) is combined with the same 100 MHz IF input (LO-2xIF=RF) to create the same 1 MHz to 7 GHz RF output band. The difference between these two output levels is the spurious suppression in dBc. The mean value across the full RF output band is the number shown in the table above.



## Mechanical Data

### Outline Drawing

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