



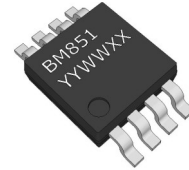
# BM851

## Mixer

1.7~2.7GHz High IIP3 GaAs MMIC Mixer with Integrated LO AMP

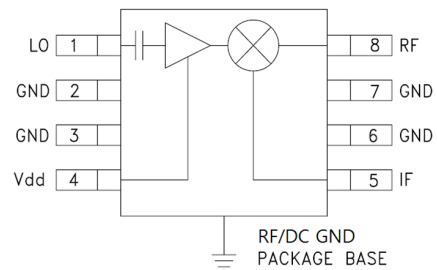
### Device Features

- +33.9 dBm Input IP3
- 8.3dB Conversion Loss
- Integrated LO Driver
- -2 to +4dBm LO drive level
- Available 3.3V to 5V single voltage
- MSL 1, MSOP 8, Lead-free / Green / RoHS compliant
- ESD HBM Class 1B



MSOP 8 Package

### Functional Block Diagram



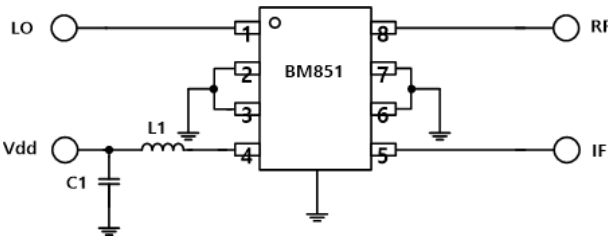
### Product Description

The BM851 is a high linearity and dynamic covering range from 1.7GHz to 2.7GHz on 3.3V to 5V with a passive GaAs FET converter and two stage LO driver. This is packaged in a plastic surface mountable MSOP8 with Lead-free / Green / RoHS compliant. Typical Input IP3 and Conversion loss are 33.9dBm and 8.3dB, respectively. All devices are 100% RF/DC screened.

### Applications

- Base station /Repeaters Infrastructure/Small Cell
- Commercial/Industrial/Military wireless system
- LTE / WCDMA /CDMA Wireless Infrastructure

### Application Circuit



| Bom | Value | Remark |
|-----|-------|--------|
| C1  | 1nF   |        |
| L1  | 56nH  |        |

### \* Notices

- Pls use 0.15T metal thickness for SMT
- See page 11 for more detail

### Absolute Maximum Ratings

| Parameter                  | Rating      | Unit |
|----------------------------|-------------|------|
| Operating Case Temperature | -40 to +85  | °C   |
| Storage Temperature        | -55 to +155 | °C   |
| Junction Temperature       | +126        | °C   |
| Operating Voltage          | +7          | V    |
| LO Power                   | +10         | dBm  |
| Input RF/IF Power          | +25         | dBm  |

Operation of this device above any of these parameters may result in permanent damage.

# BM851

14 Odem ST. P.O.B. 7042 Petach Tikva 4917001, ISRAEL | Office: +972-3-924-3352  
 Fax: +972-3-9243385 | sales@hypertech.co.il | www.hypertech.co.il



## Mixer

1.7~2.7GHz High IIP3 GaAs MMIC Mixer with Integrated LO AMP

### Typical Performance<sup>1</sup>

Test condition \_ Measured on BeRex E/B at 25°C, 50ohm system, Vdd=5V Ids=57.5mA

| Parameter              | Min         | Typ   | Max | Min         | Typ   | Max | Min         | Typ   | Max | Min         | Typ   | Max | Min         | Typ   | Max | Units |
|------------------------|-------------|-------|-----|-------------|-------|-----|-------------|-------|-----|-------------|-------|-----|-------------|-------|-----|-------|
| RF Frequency Range     | 1700 ~ 1800 |       |     | 1800 ~ 2000 |       |     | 2000 ~ 2200 |       |     | 2200 ~ 2400 |       |     | 2500 ~ 2700 |       |     | MHz   |
| LO Frequency Range     | 1400 ~ 1750 |       |     | 1500 ~ 1950 |       |     | 1700 ~ 2150 |       |     | 1900 ~ 2350 |       |     | 2200 ~ 2650 |       |     | MHz   |
| IF Frequency Range     | 50 ~ 300    |       |     | 50 ~ 300    |       |     | 50 ~ 300    |       |     | 50 ~ 300    |       |     | 50 ~ 300    |       |     | MHz   |
| SSB Conversion Loss    |             | 8.3   |     |             | 8.1   |     |             | 8.3   |     |             | 8.8   |     |             | 10.0  |     | dB    |
| Input IP3 <sup>2</sup> |             | 32.0  |     |             | 32.8  |     |             | 33.9  |     |             | 32.3  |     |             | 30.3  |     | dBm   |
| LO Leakage RF Port     |             | -12.7 |     |             | -9.1  |     |             | -6.0  |     |             | -4.6  |     |             | -5.1  |     | dBm   |
| LO Leakage IF Port     |             | -8.7  |     |             | -14.0 |     |             | -15.9 |     |             | -13.0 |     |             | -10.6 |     | dBm   |
| RF-IF Isolation        |             | -16.6 |     |             | -20.2 |     |             | -17.8 |     |             | -14.0 |     |             | -10.6 |     | dB    |
| RF Return Loss         |             | -11.5 |     |             | -13.2 |     |             | -15.5 |     |             | -16.6 |     |             | -15.7 |     | dB    |
| IF Return Loss         |             | -9.2  |     |             | -9.6  |     |             | -11.8 |     |             | -15.1 |     |             | -24.3 |     | dB    |
| Input P1dB             |             | 23.8  |     |             | 23.0  |     |             | 23.0  |     |             | 22.0  |     |             | 20.8  |     | dBm   |
| LO Drive Level         | -2          | 0     | +4  | -2          | 0     | +4  | -2          | 0     | +4  | -2          | 0     | +4  | -2          | 0     | +4  | dBm   |

Test condition \_ Measured on BeRex E/B at 25°C, 50ohm system, Vdd=3.3V Ids= 44.5mA

| Parameter              | Min         | Typ   | Max | Min         | Typ   | Max | Min         | Typ   | Max | Min         | Typ   | Max | Min         | Typ   | Max | Units |
|------------------------|-------------|-------|-----|-------------|-------|-----|-------------|-------|-----|-------------|-------|-----|-------------|-------|-----|-------|
| RF Frequency Range     | 1700 ~ 1800 |       |     | 1800 ~ 2000 |       |     | 2000 ~ 2200 |       |     | 2200 ~ 2400 |       |     | 2500 ~ 2700 |       |     | MHz   |
| LO Frequency Range     | 1400 ~ 1750 |       |     | 1500 ~ 1950 |       |     | 1700 ~ 2150 |       |     | 1900 ~ 2350 |       |     | 2200 ~ 2650 |       |     | MHz   |
| IF Frequency Range     | 50 ~ 300    |       |     | 50 ~ 300    |       |     | 50 ~ 300    |       |     | 50 ~ 300    |       |     | 50 ~ 300    |       |     | MHz   |
| SSB Conversion Loss    |             | 8.3   |     |             | 8.2   |     |             | 8.2   |     |             | 8.7   |     |             | 10.0  |     | dB    |
| Input IP3 <sup>2</sup> |             | 27.6  |     |             | 30.3  |     |             | 31.5  |     |             | 28.1  |     |             | 24.3  |     | dBm   |
| LO Leakage RF Port     |             | -14.0 |     |             | -12.2 |     |             | -11.0 |     |             | -10.9 |     |             | -10.5 |     | dBm   |
| LO Leakage IF Port     |             | -12.6 |     |             | -18.4 |     |             | -20.5 |     |             | -18.2 |     |             | -15.6 |     | dBm   |
| RF-IF Isolation        |             | -16.5 |     |             | -20.5 |     |             | -18.1 |     |             | -14.6 |     |             | -11.0 |     | dB    |
| RF Return Loss         |             | -11.6 |     |             | -12.4 |     |             | -13.3 |     |             | -13.5 |     |             | -14.5 |     | dB    |
| IF Return Loss         |             | -11.1 |     |             | -11.5 |     |             | -14.2 |     |             | -18.0 |     |             | -16.7 |     | dB    |
| Input P1dB             |             | 19.1  |     |             | 18.8  |     |             | 17.8  |     |             | 15.3  |     |             | 13.1  |     | dBm   |
| LO Drive Level         | -2          | 0     | +4  | -2          | 0     | +4  | -2          | 0     | +4  | -2          | 0     | +4  | -2          | 0     | +4  | dBm   |

Preliminary Datasheet

| Parameter                                | Min. | Typical | Max. | Unit |
|--|------|---------|------|------|
| Bandwidth                                | 1700 |         | 2700 | MHz  |
| I <sub>d</sub> @ (V <sub>d</sub> = 5.0V) |      | 57.5    |      | mA   |
| I <sub>d</sub> @ (V <sub>d</sub> = 3.3V) |      | 44.5    |      | mA   |
| R <sub>TH</sub>                          |      | 99.0    |      | °C/W |

<sup>1</sup> Specifications show on 0dBm-LO driven power and 150 MHz-IF frequency in a down converting configuration with a low-side LO.

<sup>2</sup> IIP3 is measured on two tone with RF in power 0dBm/ tone, F<sub>2</sub>-F<sub>1</sub> = 1 MHz..

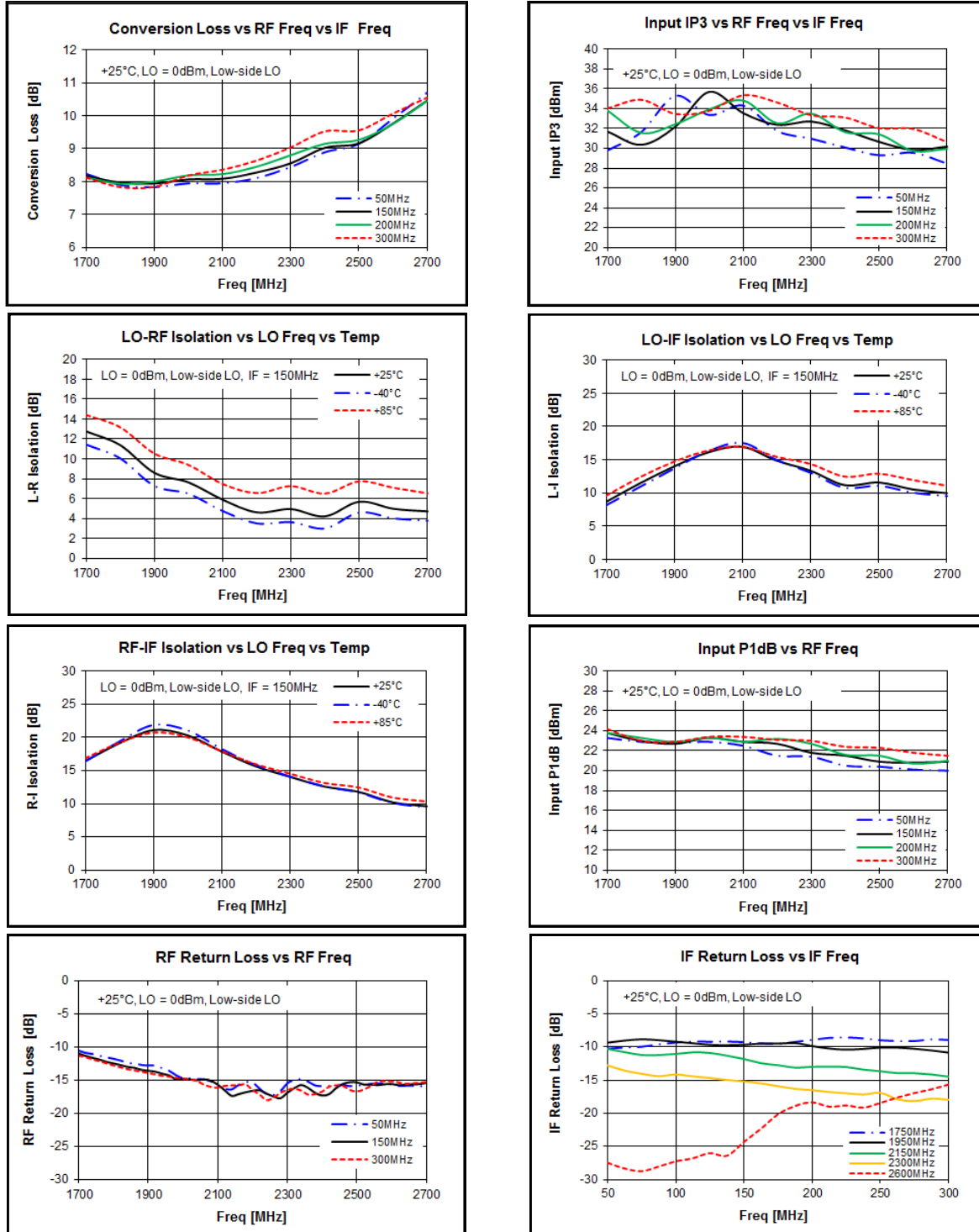


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### 1.7~2.7GHz High IIP3 GaAs MMIC Mixer with Integrated LO AMP

## Typical Test Data

Test condition \_ Measured on BeRex E/B at 25°C, 50ohm system, Vdd=5V, Ids=57.5mA , Down converting



Preliminary Datasheet

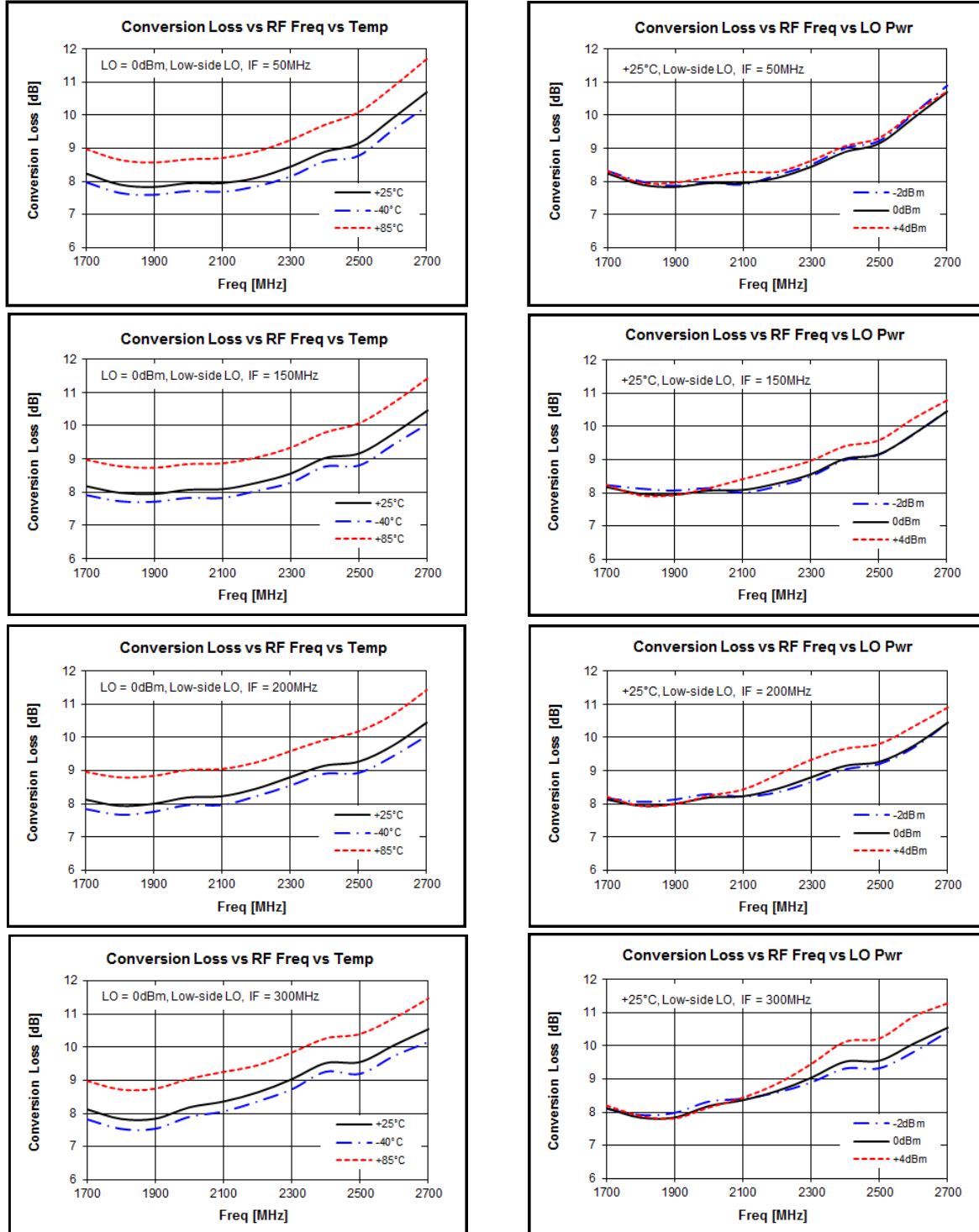


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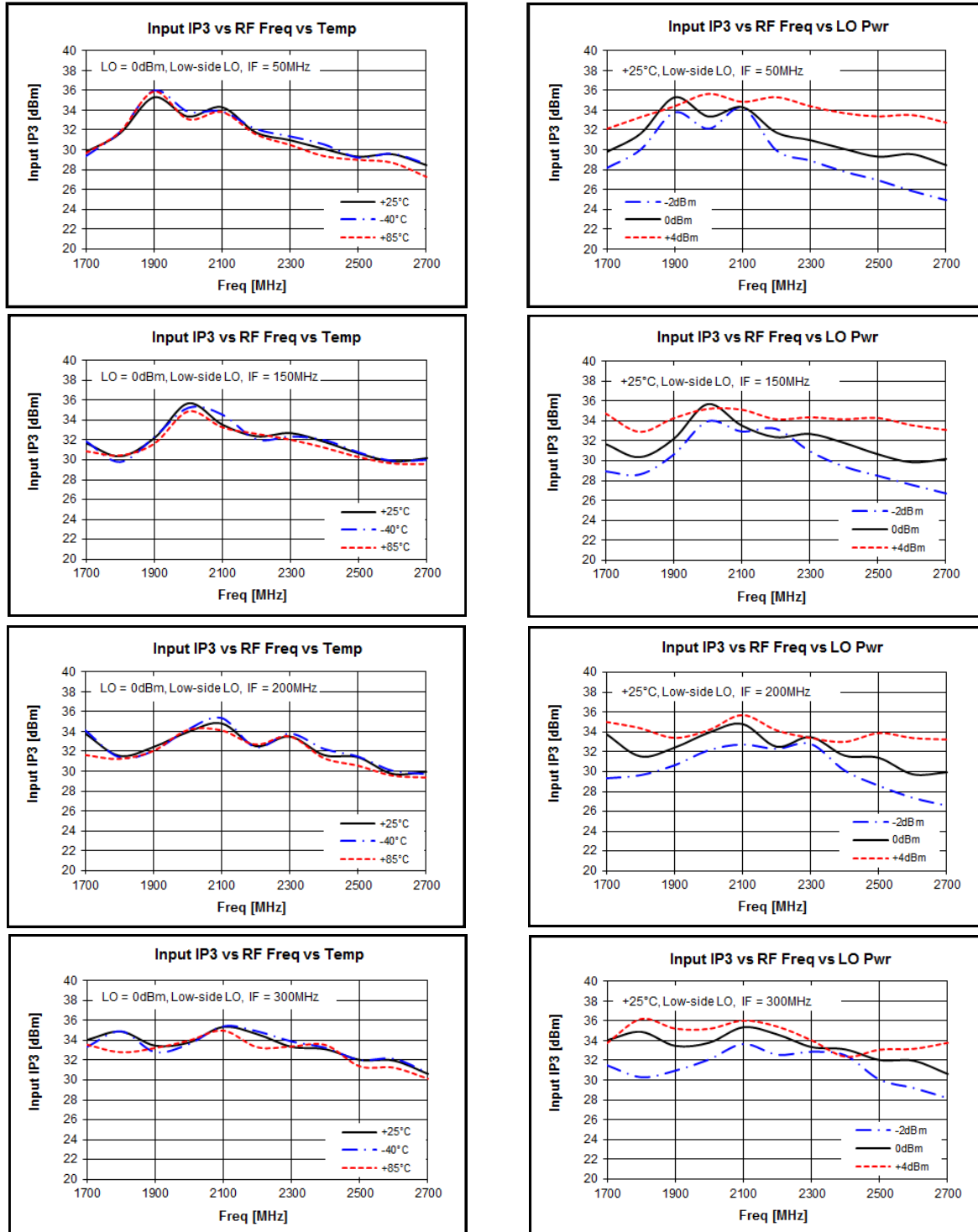


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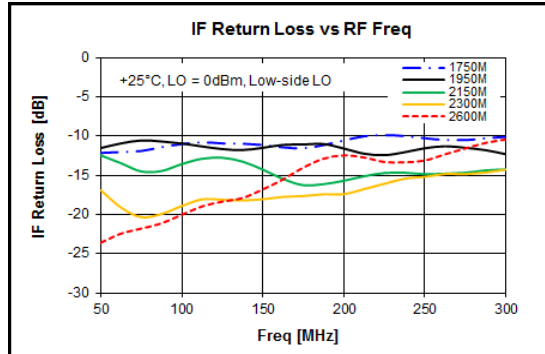
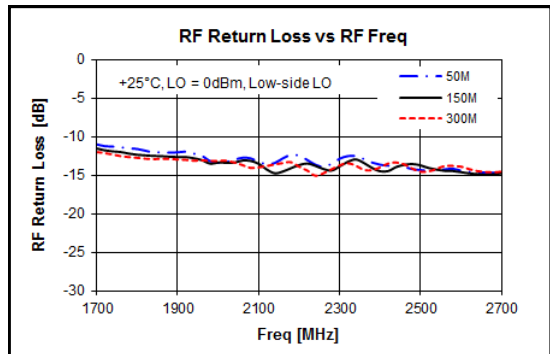
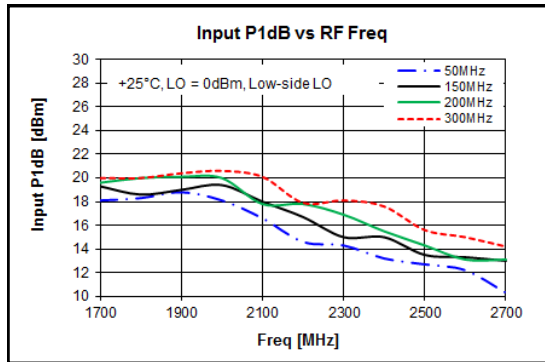
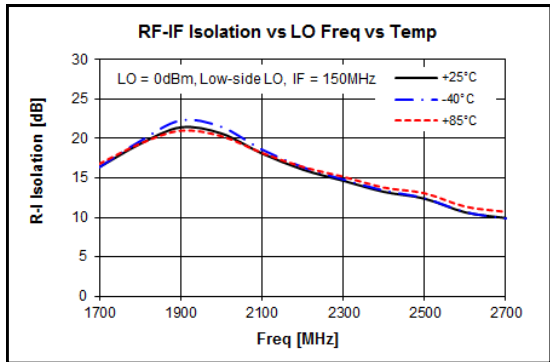
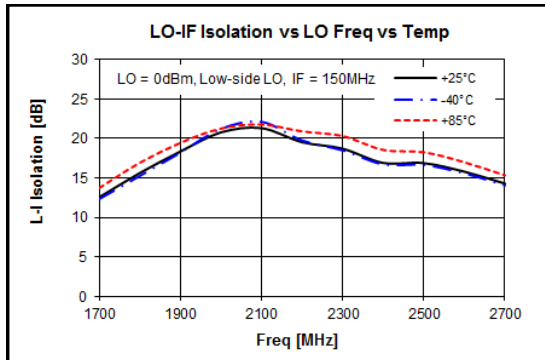
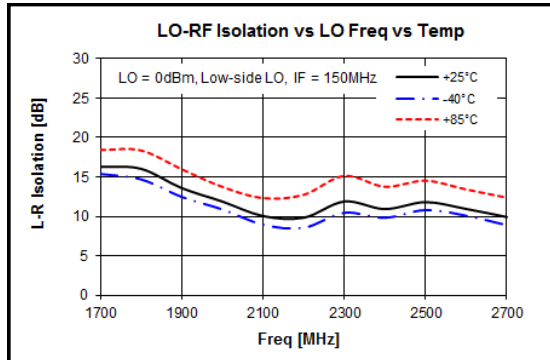
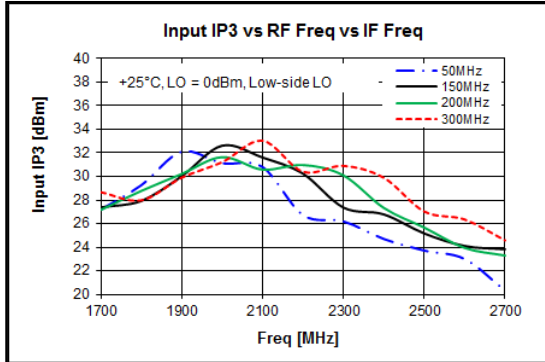
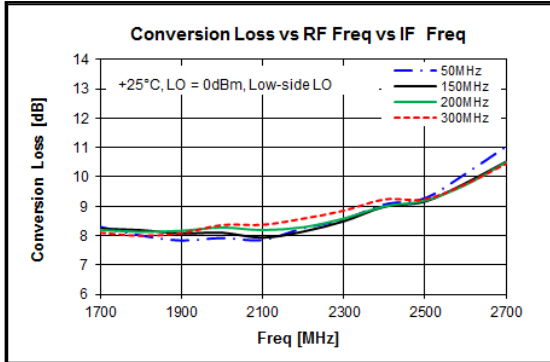


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Test condition \_ Measured on BeRex E/B at 25°C, 50ohm system, Vdd=3.3V, Ids=44.5mA, Down converting



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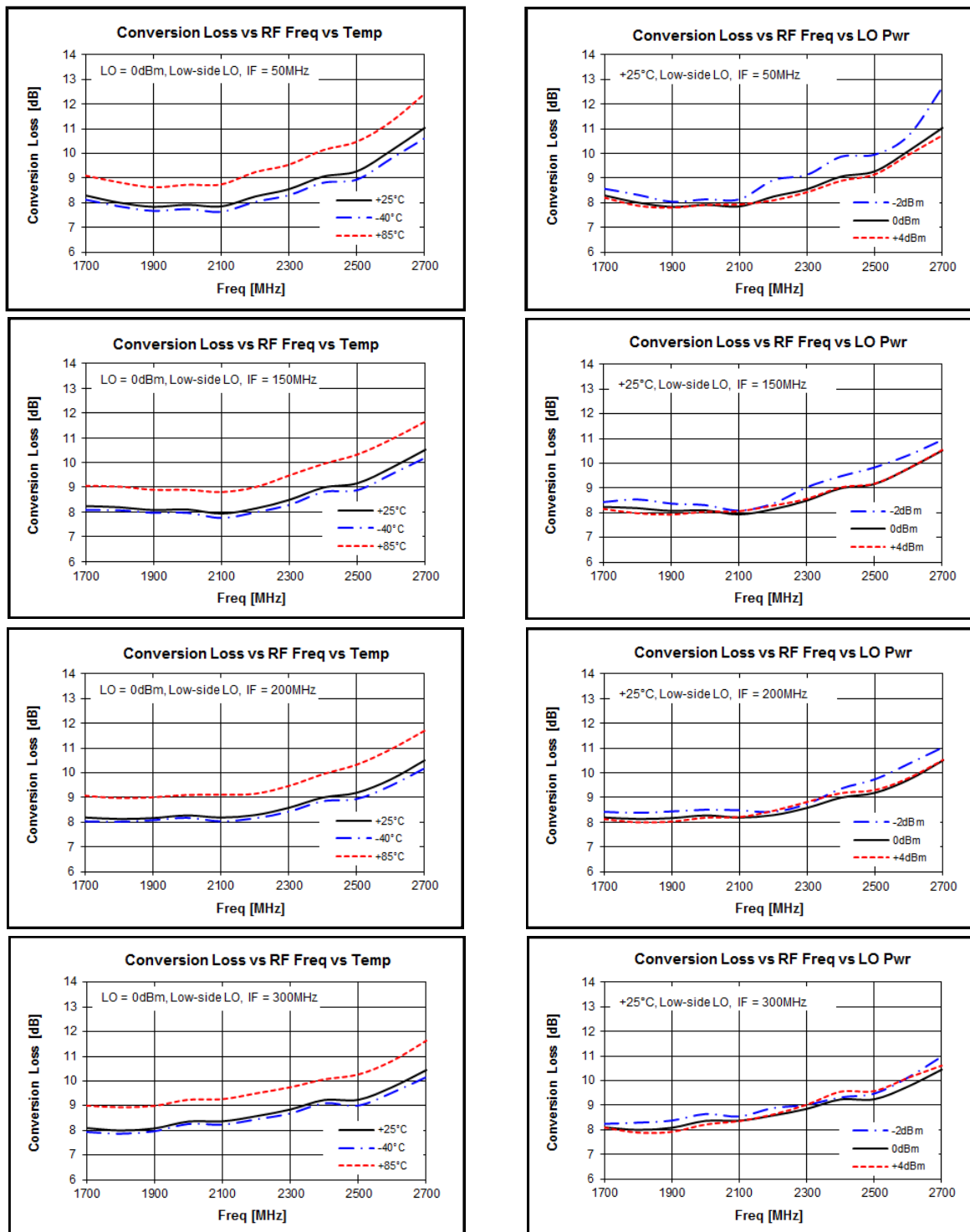


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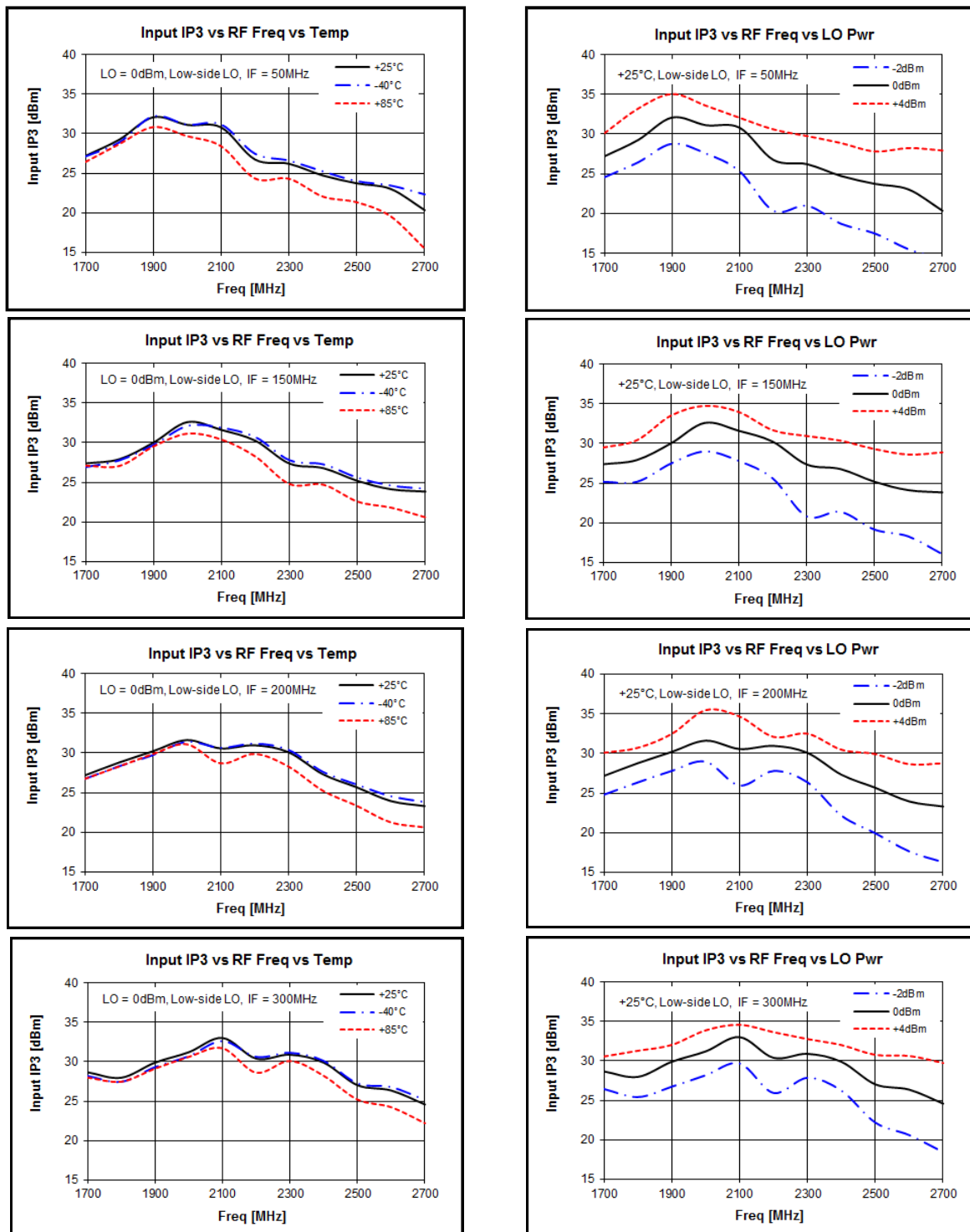


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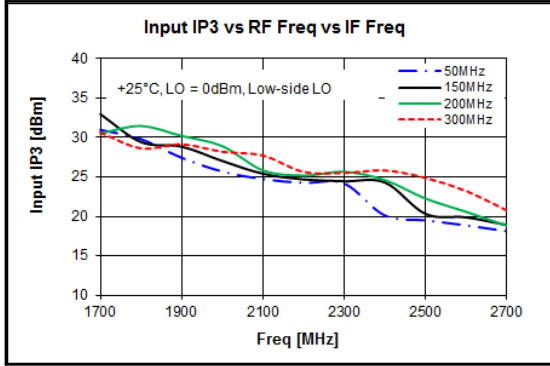


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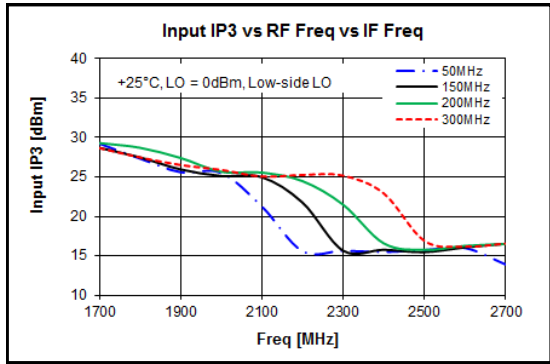
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### Spur Table

|   |   | M   |    |     |     |     |    |
|---|---|-----|----|-----|-----|-----|----|
|   |   | 0   | 1  | 2   | 3   | 4   | 5  |
| N | 0 |     | 4  | 13  | 9   | 3   | 8  |
|   | 1 | 13  | 0  | 24  | 25  | 24  | 20 |
|   | 2 | 73  | 65 | 44  | 67  | 55  | 55 |
|   | 3 | 73  | 90 | 76  | 84  | 67  | 75 |
|   | 4 | 108 | 88 | 105 | 93  | 90  | 88 |
|   | 5 | 102 | 94 | 91  | 102 | 100 | 94 |

Spur table is  $N \times f_{RF} - M \times f_{LO}$  mixer spurious products for 0 dBm input power, unless otherwise noted.

RF Frequency = 1842 MHz

LO Frequency = 1642 MHz

All values in dBc relative to the IF Power Level.

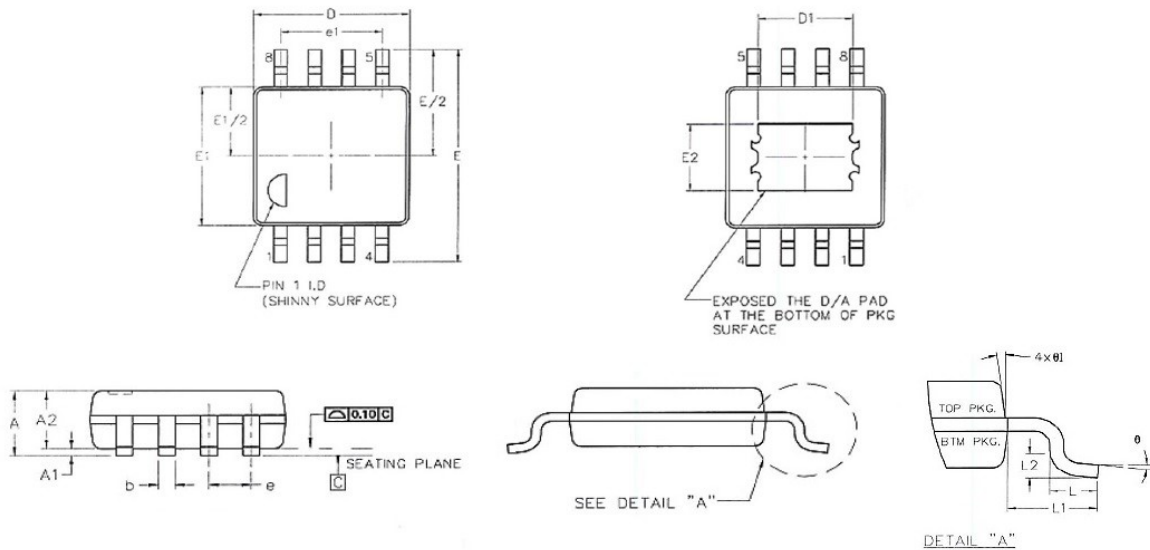


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## Package Outline Drawing

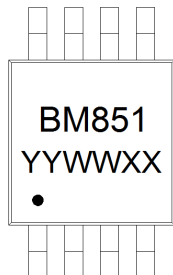


|     | A  | A1 | A2 | b  | D   | D1 | E   | E1  | E2 | e        | e1       | L  | L1     | L2     |
|-----|----|----|----|----|-----|----|-----|-----|----|----------|----------|----|--------|--------|
| Min |    | 2  | 32 | 11 | 114 | 66 | 188 | 114 | 54 | 25.5 Typ | 76.7 Typ | 16 | 37 Ref | 10 Typ |
| Nom |    | 4  | 34 |    | 118 |    | 192 | 118 |    |          |          | 22 |        |        |
| Max | 42 | 6  | 36 | 15 | 122 | 70 | 196 | 122 | 58 |          |          | 27 |        |        |

\*Remark all unit in mils

Preliminary Datasheet

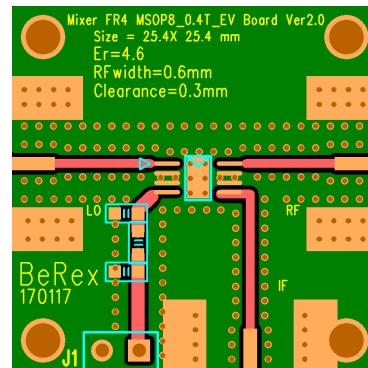
## Package Marking



Pin 1

YY = Year, WW = Working Week,  
 XX = Wafer No.

## Evaluation Board Drawing





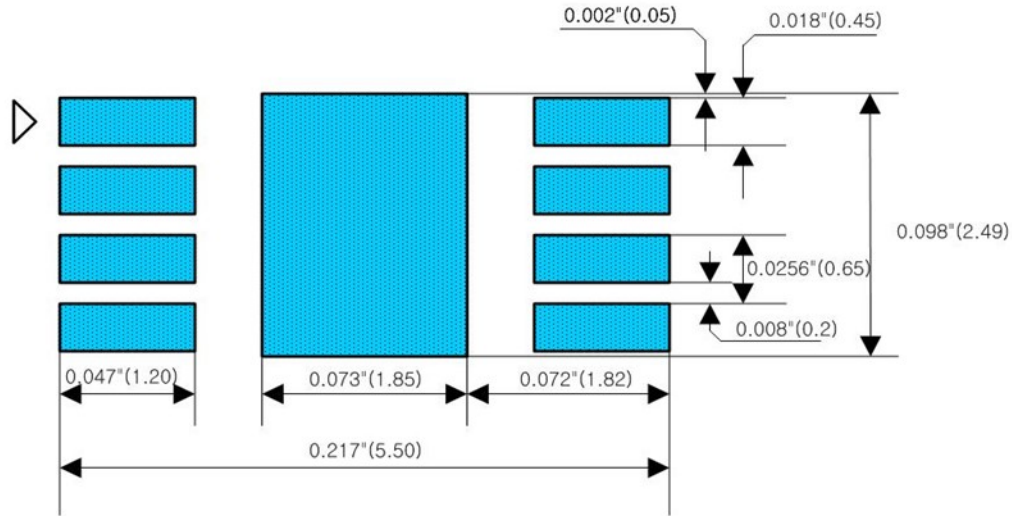
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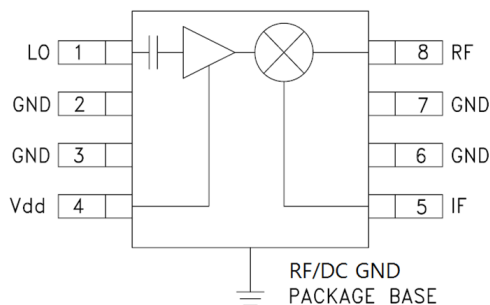
### Suggested PCB Land Pattern and PAD Layout

#### PCB Land Pattern



- Note :**
1. Connection to Bottom Ground with multiple via holes.
  2. Via holes \_ as many as possible.
  3. All Dimensions \_ millimeters.
  4. PCB lay out \_ on BeRex website.
  5. Use 0.15T metal mask to avoid incomplete soldering on exposed ground pad.

#### Pin Configuration



| Pin No.         | Label | Description   |
|-----------------|-------|---|
| 1               | LO    | Local Oscillator Injection. Internally DC Blocked   |
| 2,3,6,7         | GND   | RF/DC Ground.   |
| 4               | Vdd   | Power supply for LO amplifier   |
| 5               | IF    | Intermediate Frequency  |
| 8               | RF    | Radio Frequency   |
| Backside Paddle | GND   | RF/DC Ground. Follow recommended via pattern and ensure good solder attach for best thermal and electrical performance. |

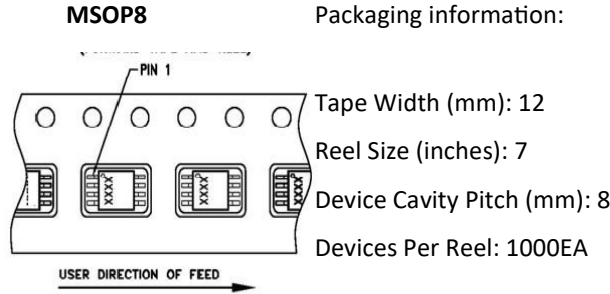


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## Tape & Reel



## Lead plating finish

### 100% Tin Matte finish

(All BeRex products undergoes a 1 hour, 150 degree C, Anneal bake to eliminate thin whisker growth concerns.)

## MSL / ESD Rating

|                    |                                     |
|--------------------|-------------------------------------|
| <b>ESD Rating:</b> | Class 1B                            |
| <b>Value:</b>      | Passes <1000V                       |
| <b>Test:</b>       | Human Body Model (HBM)              |
| <b>Standard:</b>   | JEDEC Standard JESD22-A114B         |
| <br>               |                                     |
| <b>MSL Rating:</b> | Level 1 at +265°C convection reflow |
| <b>Standard:</b>   | JEDEC Standard J-STD-020            |



Proper ESD procedures should be followed when handling this device.

## NATO CAGE code:

|   |   |   |   |   |
|---|---|---|---|---|
| 2 | N | 9 | 6 | F |
|---|---|---|---|---|