Standard Circuit

# GMX-0206

## GaAs MMIC Mixer Chip, 2GHz-6GHz

### Performance characteristics

- RF/LO frequency range: 2 - 6 GHz
- IF frequency range : DC-2.5GHz
- Conversion loss : 7.5 dB
- LO-RF isolation: 47dB
- LO-IF isolation : 40dB
- RF-IF isolation : 19 dB
- Local oscillator power: +13dBm~+15dBm
- Chip size: 1.32 x 1.52 x 0.1mm

### Product Introduction

GMX-0206 is a GaAs MMIC double balanced mixer with a frequency range of 2 GHz to 6 GHz and an IF frequency range of DC ~ 2.5 GHz , conversion loss 7.5 dB , LO/RF isolation 47 dB , LO/IF isolation 40 dB , RF/IF isolation 19 dB , typical LO input power +13dBm.
The chip uses on-chip through-hole metallization technology to ensure good grounding, and no additional grounding measures are required. Easy to use. The back of the chip is metallized, suitable for eutectic sintering or conductive adhesive bonding. There is no DC blocking capacitor at the RF , LO, and IF ports .

| Use restriction parameter [1] | |
|---|---|
| Maximum RF input power | +20dBm |
| Maximum LO input power | +20dBm |
| Operating temperature | -55 ~ +85°C |
| storage temperature | -65 ~ +150°C |

【1】 Exceeding any of these maximum limits may cause permanent damage.

Electrical performance parameters ( $T_A$ = +25°C , IF = 100MHz , LO = +13dBm)

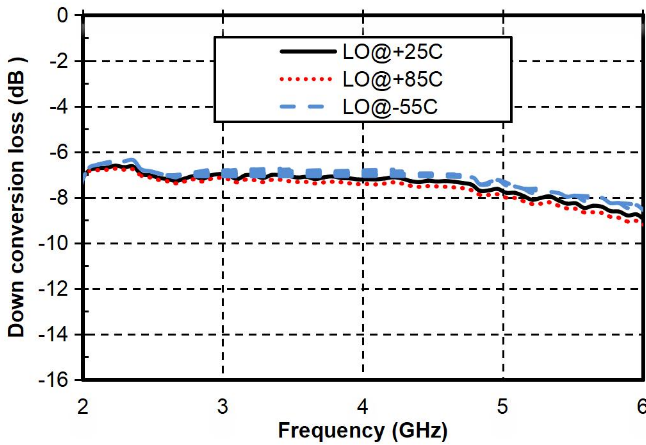
| index | Minimum | Typical Value | Maximum | unit |
|---|---|---|---|---|
| RF frequency range | | 2-6 | | GHz |
| LO frequency range | | 2-6 | | GHz |
| IF frequency | | DC-2.5 | | GHz |
| Frequency conversion loss | - | 7.5 | - | dB |
| LO-RF Isolation | - | 47 | - | dB |
| LO-IF isolation | - | 40 | - | dB |
| RF-IF isolation | - | 19 | - | dB |
| RF input P-1dB | | 11 | | dB m |
| IIP3 | | 18 | | dBm |

The above parameters are all tested in down-conversion mode, with an intermediate frequency of 0.1GHz and a local oscillator power of + 13dBm.

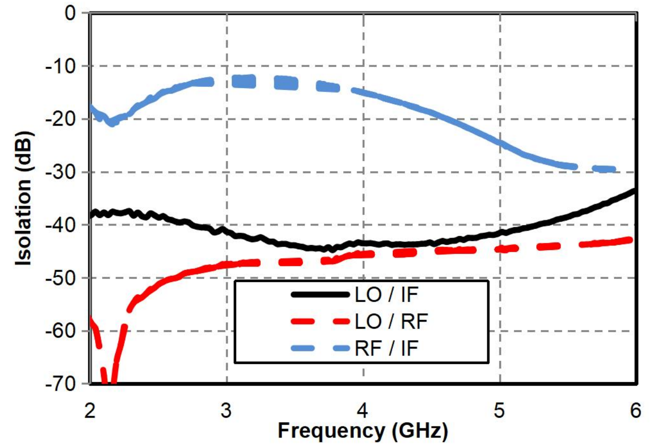
## GaAs MMIC Mixer Chip, 2GHz-6GHz

Main index test curve

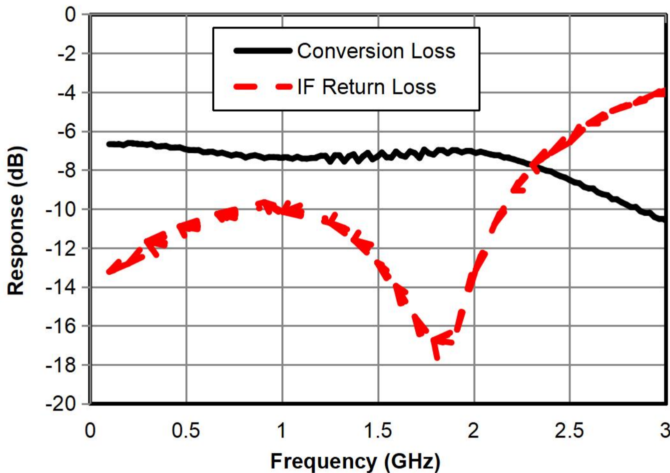
Conversion loss vs. temperature @ LO = +13dBm



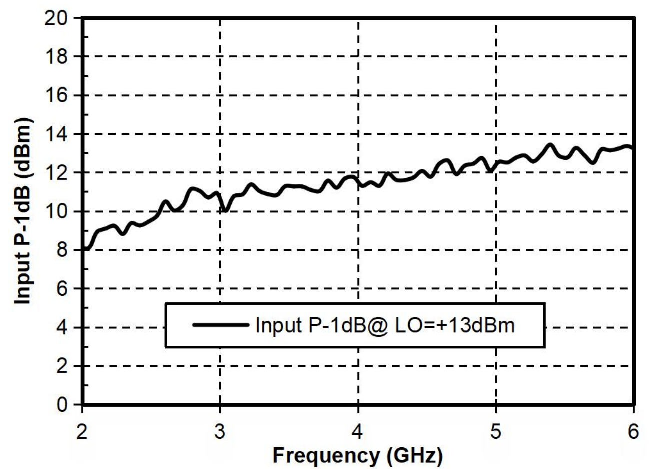

Isolation @ LO = +13dBm




IF bandwidth @ LO = 2G/+13dBm

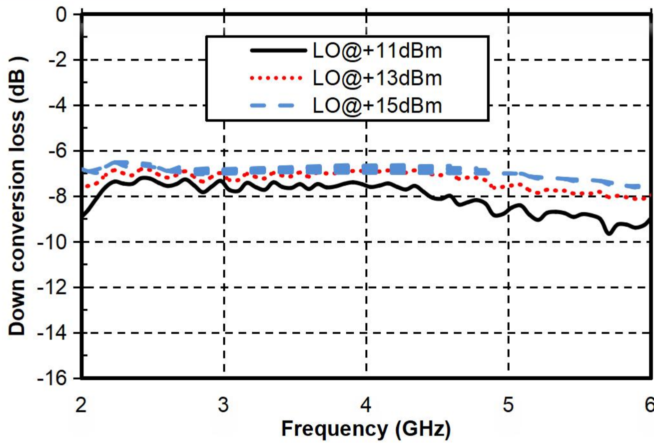


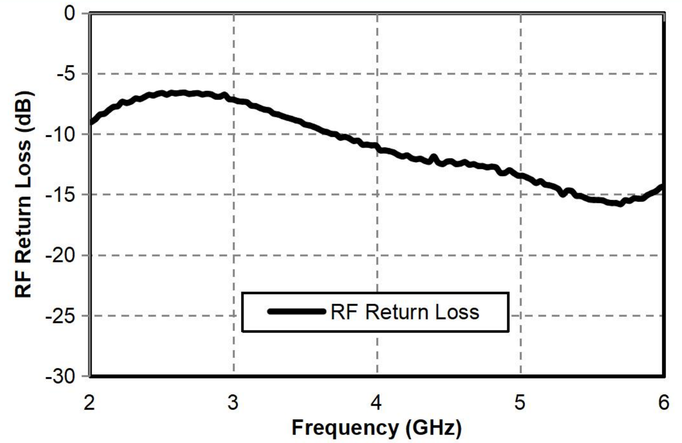

Input P-1dB vs. RF Frequency




Downconversion RF Loss vs. LO Power

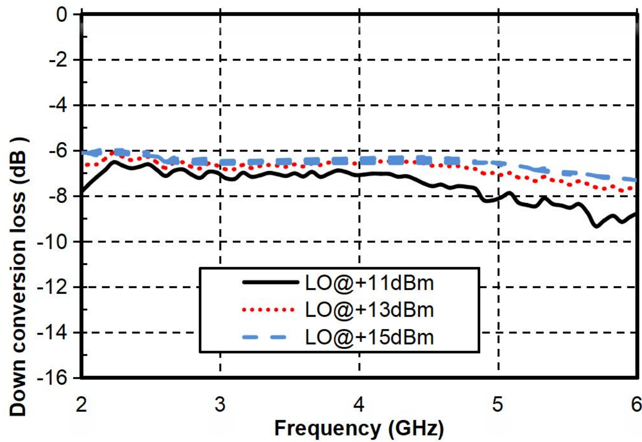
Downconverter RF Return Loss vs. Frequency LO = +13dBm



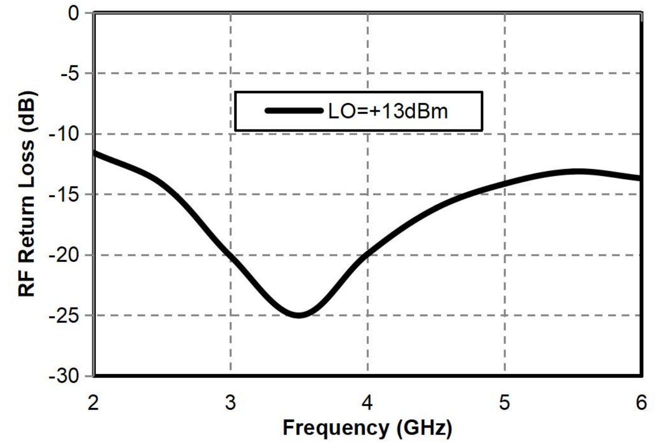




## GaAs MMIC Mixer Chip, 2GHz-6GHz

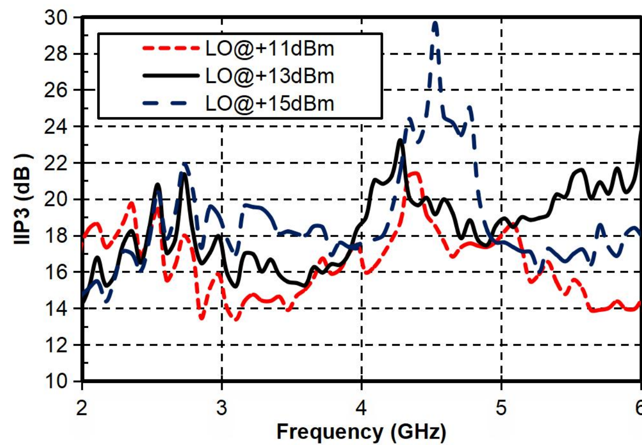
Upconversion RF Loss vs. LO Power



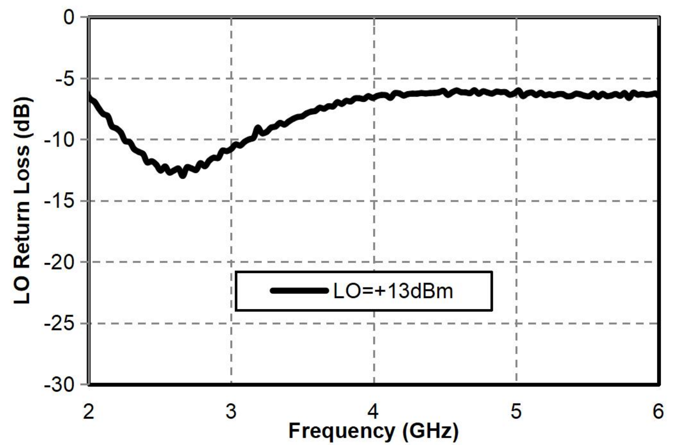

Upconverter RF Return Loss vs. Frequency LO = +13dBm




IIP3




LO Standing Wave vs. Frequency




LO harmonic leakage

| | nLO ( measured at RF port ) |
|---|---|

| LO(GHz) | 1 | 2 | 3 |
|---|---|---|---|
| 2 | 62 | 83 | 101 |
| 3 | 53 | 77 | 91 |
| 4 | 53 | 89 | 105 |
| 5 | 54 | 100 | 104 |
| 6 | 54 | 85 | 99 |



## Combined spurious suppression

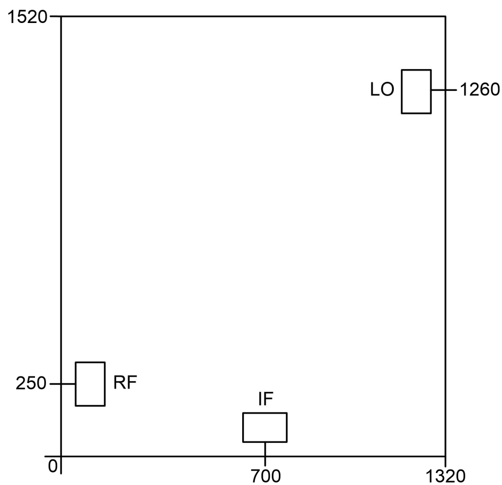
| | nLO | | | | |
|---|---|---|---|---|---|
| mRF | 0 | 1 | 2 | 3 | 4 |
| 0 | ××× | 13 | 25 | 25 | 35 |
| 1 | 9 | 0 | 30 | 38 | 31 |
| 2 | 77 | 70 | 69 | 58 | 74 |
| 3 | 72 | 77 | 71 | 66 | 89 |
| 4 | 88 | / | / | / | 96 |

Test conditions: RF=4.1GHz@-10dBm, LO=4GHz@13dBm , all values are relative values of 1*RF-1*LO( P_IF,dBm ) , unit: dBc .

| | nLO | | | | |
|---|---|---|---|---|---|
| mRF | 0 | 1 | 2 | 3 | 4 |
| 0 | ××× | 3 | 15 | 15 | 25 |
| 1 | 8 | 0 | 30 | 38 | 32 |
| 2 | 73 | 78 | 79 | 68 | 83 |
| 3 | 81 | / | / | 85 | 90 |
| 4 | 82 | / | / | 91 | / |

Test conditions: RF=4.1GHz@-20dBm, LO=4GHz@13dBm , all values are relative values of 1*RF-1*LO( P_IF,dBm ), unit: dBc .

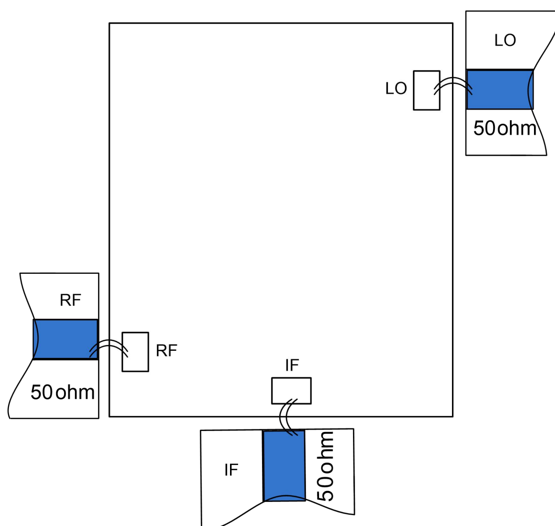
## Appearance structure [2]




【 2 】The units in the figure are all micrometers ( dimensional tolerance: ±100um.)

## GaAs MMIC Mixer Chip, 2GHz-6GHz

## Recommended assembly drawing




## Precautions for use

- The chip needs to be stored in an anti-static container and kept in a nitrogen environment.
- bare die surface using wet chemical methods .
- Please strictly follow the ESD protection requirements to avoid static damage to the bare chip.
- General operation: Please use precision pointed tweezers to pick up bare chips. Avoid touching the chip surface with tools or fingers during operation.
- Rack mounting operation suggestions: Bare chip mounting can be done by AuSn solder eutectic sintering

or conductive adhesive bonding. The mounting surface must be clean and flat.

- Sintering process: It is recommended to use AuSn solder sheets with a gold -tin ratio of 80/20 . The working surface temperature reaches 255 °C and the tool ( vacuum chuck ) temperature reaches 265 °C. When the high-temperature mixed gas (nitrogen-hydrogen ratio of 90/10 ) is blown to the chip, the temperature at the top of the tool should be raised to 290 °C. Do not keep the chip at a temperature above 320 °C for more than 20 seconds. The friction time should not exceed 3 seconds.
- Bonding process: The amount of conductive glue dispensed should be as small as possible. After the chip is placed in the installation position , the conductive glue should be vaguely visible around it . For curing conditions, please follow the information provided by the conductive glue manufacturer.
- Bonding operation suggestions: Use Φ0.025mm (1mil) gold wire for both ball and wedge bonding . Thermo-ultrasonic bonding temperature is 150 °C. The pressure of the wedge for ball bonding is 40~50gf , and the pressure of the wedge bonding is 18~22gf . Use the smallest possible ultrasonic energy. The bonding starts at the pressure point on the chip and ends at the package (or substrate) .