

# E band MMIC Singly Balanced Mixer

**E-SBM-7681** Previously named CO-E1340317  
**Singly Balanced GaAs Diode MMIC Mixer, 76-81GHz**

## Overview

E-SBM-7681 is a singly balanced MMIC rat race mixer designed for operation in either upconverter or downconverter modes for increased LO and RF isolation. This MMIC is fabricated using GaAs Schottky diode technology and is designed for output frequencies in the range from 76GHz to 81GHz using a fixed LO (76GHz) and varying IF (DC–5GHz). The circuit typically supplies flat conversion losses of 4dB at LO power levels of 7dBm.

The underside of the die is gold plated. The MMIC is compatible with precision die attach methods, as well as thermo-compression and thermosonic wire bonding, making it ideal for MCM and hybrid microcircuit applications. All data shown herein is measured with the chip in a 50 Ohm environment and contacted with RF probes, with results calibrated to the probe tips.

## Features

- 76 - 81 GHz RF.
- DC – 5 GHz IF.
- 4 dB conversion loss.
- 7 dBm LO drive.

## Applications

- Millimeter-wave imaging.
- High resolution radar.
- Sensing.
- P2P communications; short haul / high capacity / low interference links.
- Medical.
- Automotive radar.

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## Specification Overview

Parameter	Min.	Typ.	Max.	Units
Frequency	76		81	GHz
LO Frequency		76		GHz
LO Power	7		12	dBm
IF Frequency	0		5	GHz
Conversion Loss		4	6	dB

### Notes

All tests are carried out at 25°C.

## Absolute Maximum Ratings

Parameter	Rating
LO Power	25 dBm
IF / RF Power	22 dBm
Storage Temperature	-65°C to +175°C
Channel Temperature	+175°C
Operating Temperature	-40°C to +85°C



ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features proprietary protection circuitry, damage may occur on devices subjected to ESD. Proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

## Measured Performance Data

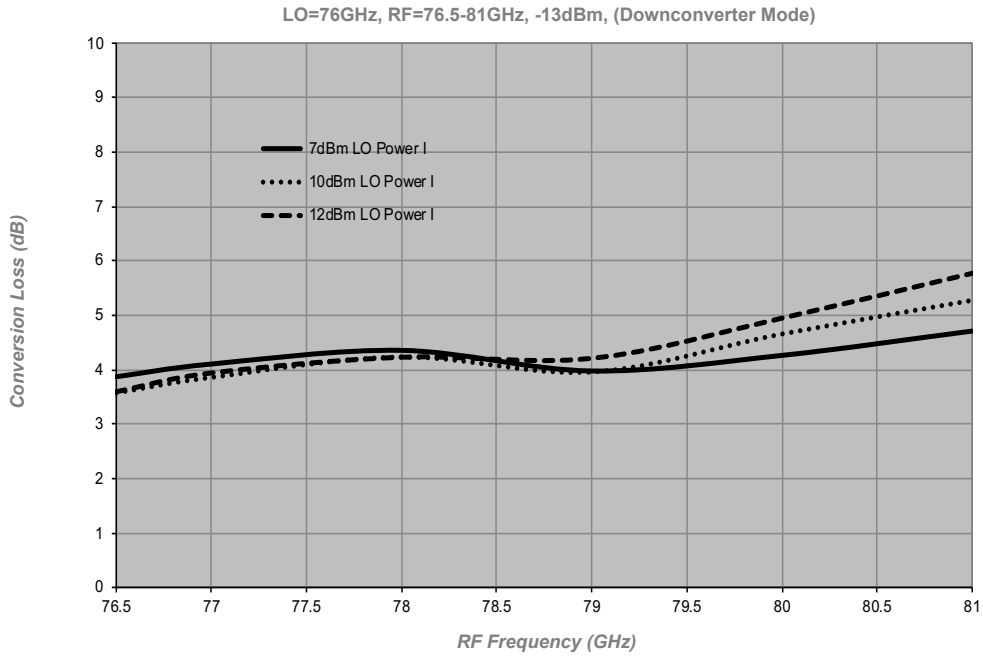


Figure 1  
Conversion Loss v RF Frequency

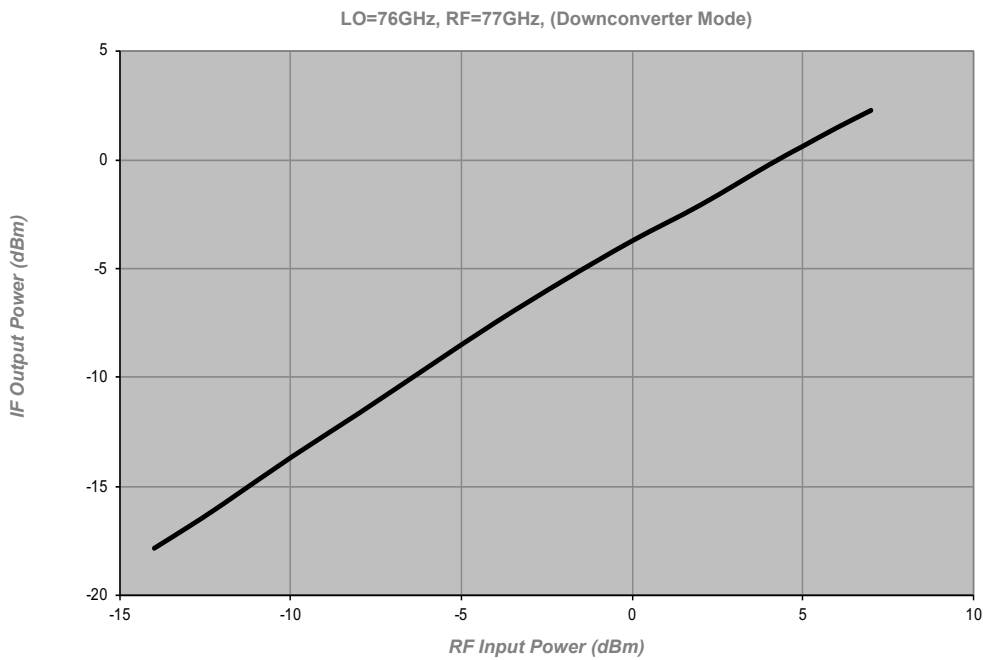
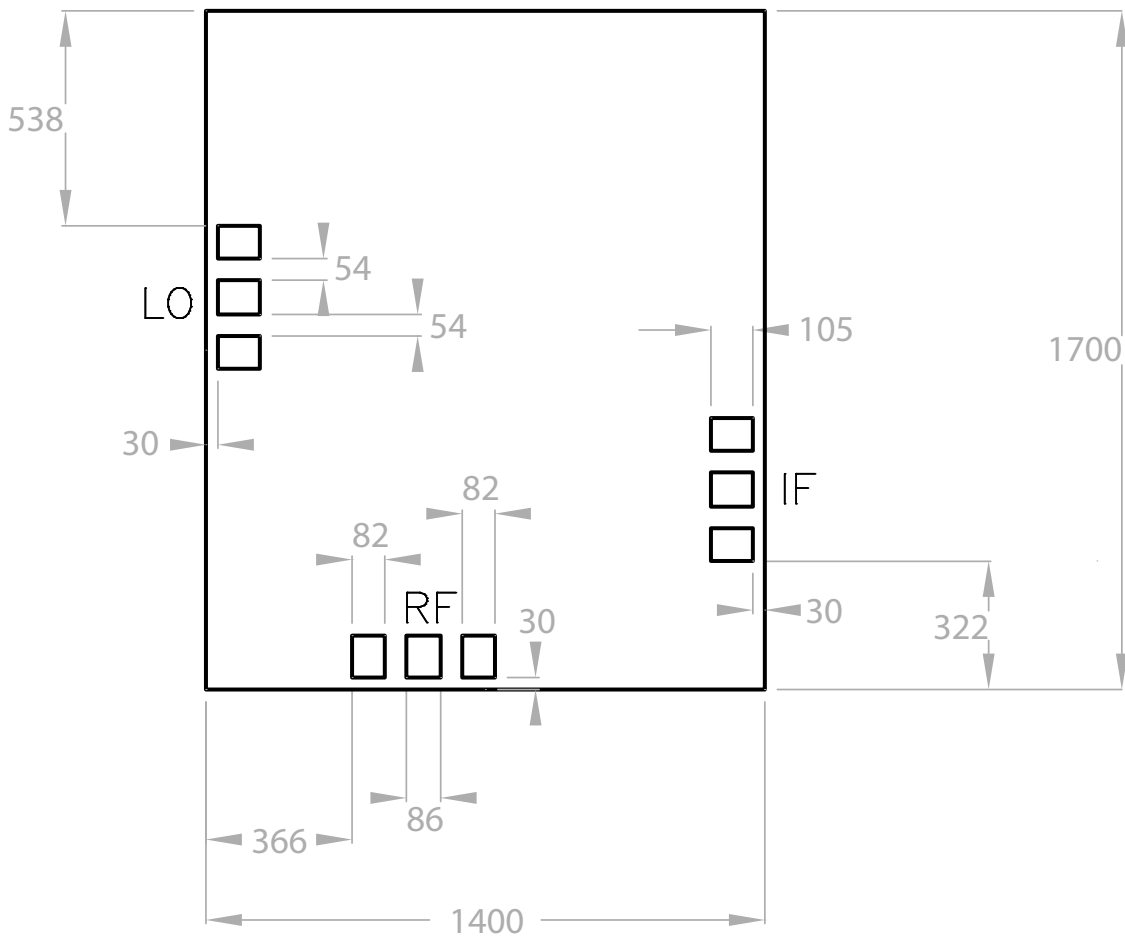


Figure 2  
Pin v Pout

## Outline Drawing

**Die Packing Information**  
 All die are delivered using gel-paks  
 unless otherwise requested.



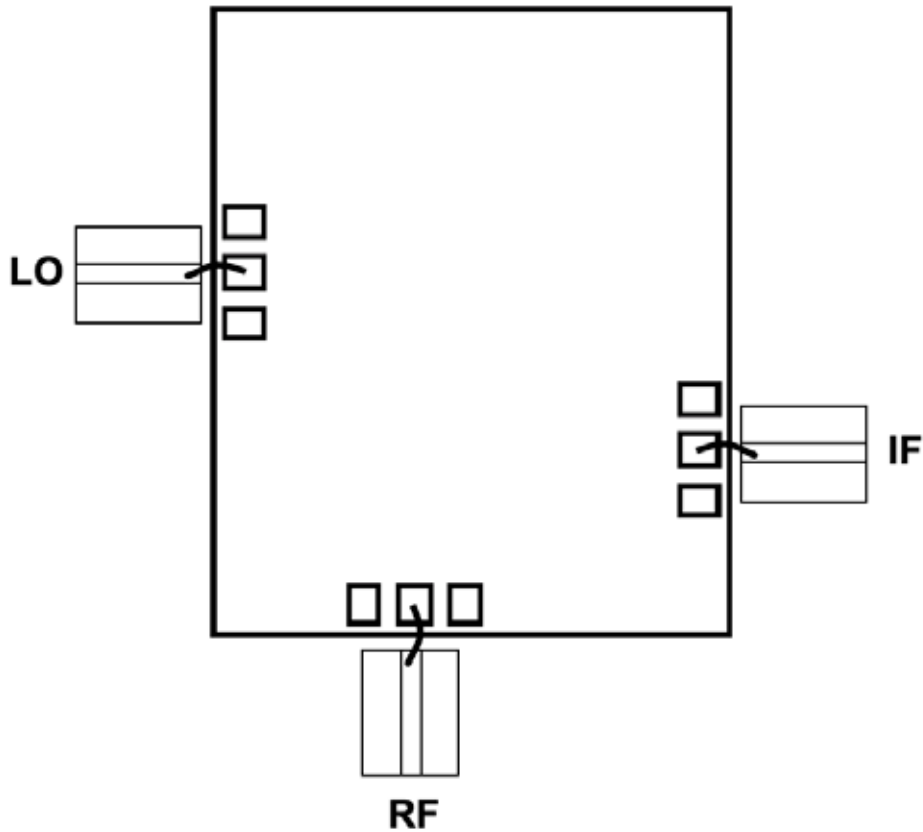
### Notes

1. All dimensions are in um.
2. RF bond pads are 105 x 86um.
3. Gold backside metalisation.
4. Backside metal is ground.
5. Die thickness is 70um

## Pad Descriptions

Name	Description
LO	LO pad. This pad is dc coupled.
RF	RF pad. This pad is dc coupled.
IF	IF pad. This pad is dc coupled.
BOTTOM	The die backside must be connected to RF/dc ground.

## Connection Configurations



## General Notes on Assembly

Die should be mounted on conductive material such as gold-plated metal to provide a good ground and suitable heat sink, if necessary.

1. Attaching the die using Au/Sn preforms is preferable. The Eutectic melt for Au/Sn occurs at approximately 280°C so the die (plus mount and preform) is initially heated up to 180°C and then it is heated for approximately 10 seconds to 280°C using a nitrogen heat gun. The device will survive 10 seconds at this temperature. The static breakdown for GaAs devices is approximately 330°C.
2. Pure, dry nitrogen should be used as the heat source.
3. If the devices cannot be lifted/ placed by a vacuum device, then ESD die-lifting tweezers are preferable.
4. Supply lines should be decoupled with 100pF capacitors. Larger planar capacitors could be used if available.
5. Aluminium wire must not be used.

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