Excelics EMA407A

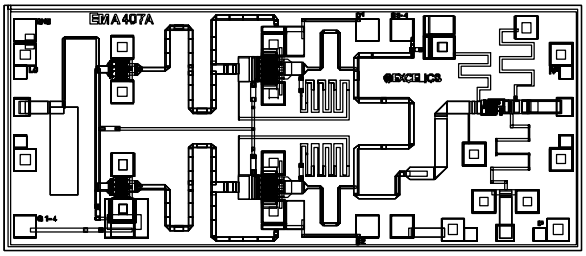
TENTATIVE DATA SHEET

20-32 GHz SUB-HARMONICALLY PUMPED MIXER

FEATURES

- **20-32 GHz BANDWIDTH**
- **INTEGRATED LO AMPLIFIER**
- **11 dB ± 1.5 dB TYPICAL CONVERSION LOSS**
- **0.3 MICRON RECESSED "MUSHROOM" GATE**
- **Si_3N_4 PASSIVATION**
- **ADVANCED EPITAXIAL HETEROJUNCTION**

The EMA407A chip is a sub-harmonically pumped MMIC mixer with an integrated LO amplifier. It can be used as an up-converter or down-converter.



Chip Size 1060 x 2500 microns
Chip Thickness: 75 ± 13 microns
All Dimensions In Microns

ELECTRICAL CHARACTERISTICS[1] (T_a = 25 ^{O}C)

SYMBOL	PARAMETERS/TEST CONDITIONS	MIN	TYP	MAX	UNIT
F_{RF}	RF Frequency Range	20		32	GHz
F_{LO}	LO Frequency Range	9		18	GHz
F_{IF}	IF Frequency Range			5	GHz
P_{1dB}	Input RF Power at 1dB Gain Compression		6		dBm
C_L	Conversion loss		11		dB
ΔC_L	Flatness		± 1.5		dB
NF	Noise Figure		11		dB
LOdr	LO drive level		8		dBm
Idd	Power Supply Current		160		mA
Vdd	Power Supply Voltage		5	8	V

MAXIMUM RATINGS AT 25^{O}C

SYMBOLS	PARAMETERS	ABSOLUTE[1]	CONTINUOUS[2]
Vds	Drain-Source Voltage	12V	8V
Vgs	Gate-Source Voltage	-8V	-3V
Ids	Drain Current	Idss	225mA
Igf	Forward Gate Current	55 mA	9mA
Pin	Input Power	dBm	@3dB Compression
Tch	Channel Temperature	175^{o}C	150^{o}C
Tstg	Storage Temperature	-65/175^{o}C	-65/150^{o}C
Pt	Total Power Dissipation	1.1 W	900 mW

Note: 1. Exceeding any of the above ratings may result in permanent damage.
2. Exceeding any of the above ratings may reduce MTTF below design goals.

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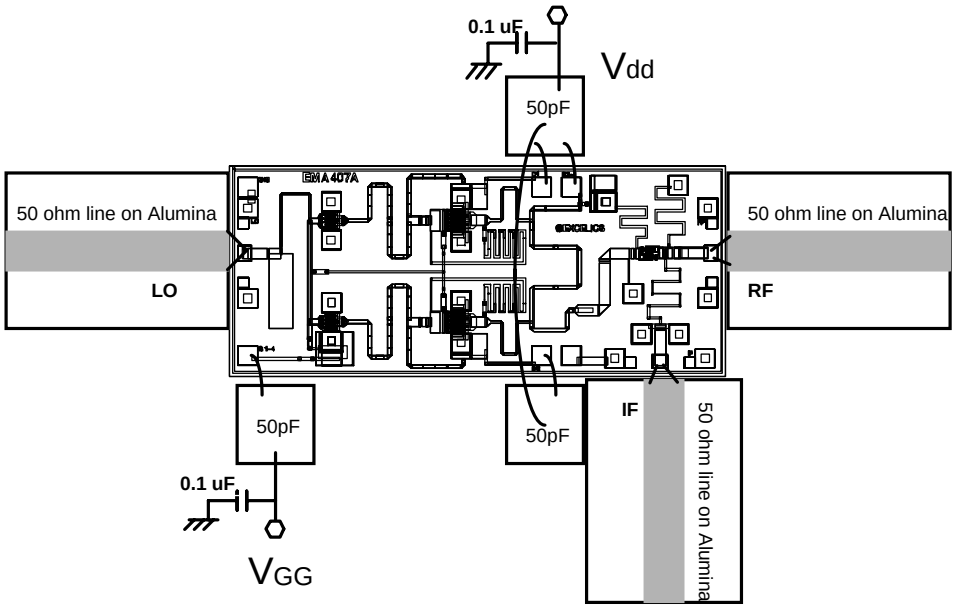
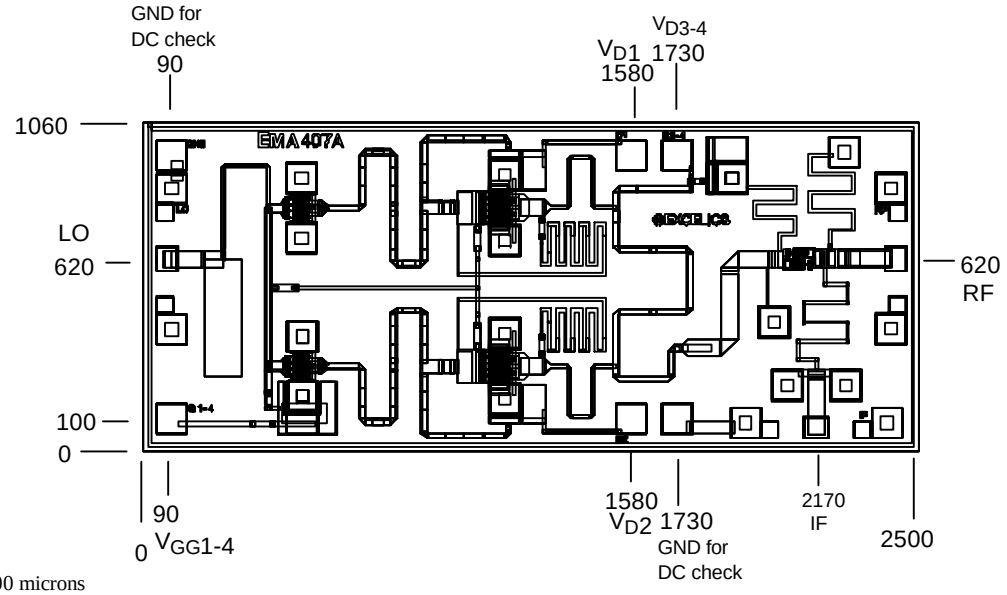
ASSEMBLY DRAWING



The length of wires for RF and LO connections should be as short as possible. Use at least two wires, and separate the wires to minimize the mutual inductance.

CHIP OUTLINE



Chip Size 1060 x 2500 microns
Chip Thickness: 75 ± 13 microns
PAD Dimensions: 1. DC 100 x 100 microns
2. RF 80 x 68 microns
All Dimensions In Microns

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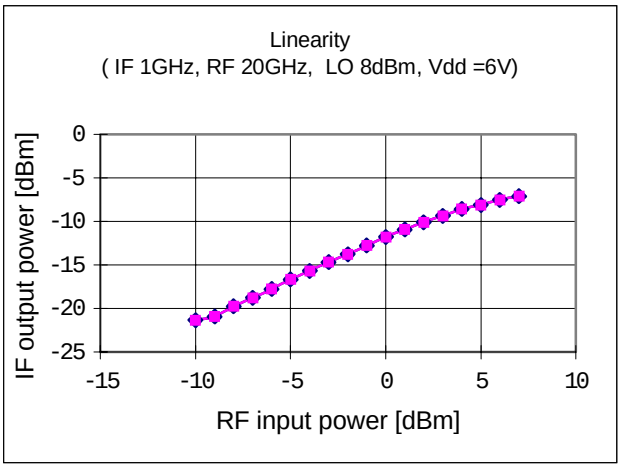
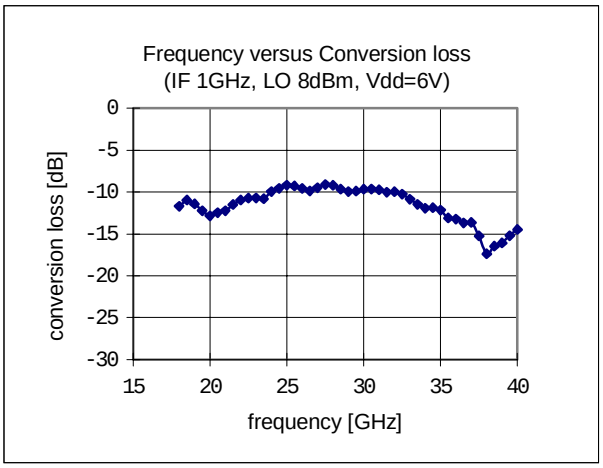
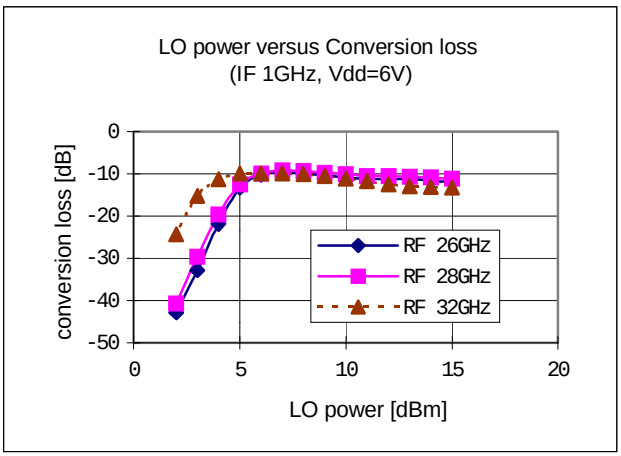
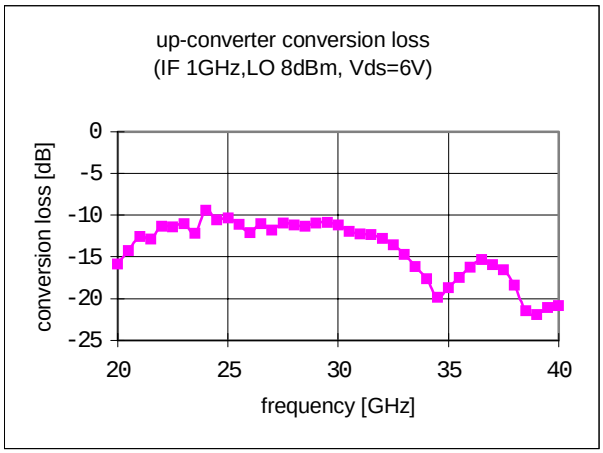
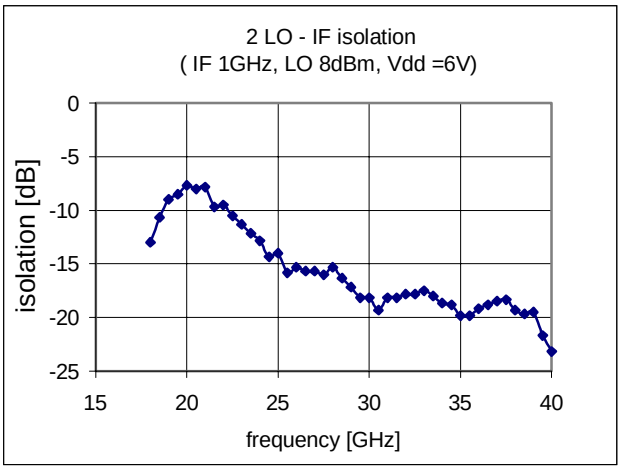
TYPICAL APPLICATION PERFORMANCE











APPLICATION HINTS

The device should be die attached with Gold-Tin eutectic. Epoxy die attach is not recommended. Thermocompression bonding of .7 mil to 1 mil diameter gold wire is recommended.

The sources of the transistors are directly via-hole grounded. A negative voltage is required to bias the gates of the transistors. The gate voltage for the input stage must be provided at the RF input bonding pad, and the drain current for the output stage must be provided through the output bonding pad. The drain bias circuits should be well bypassed down to MHz frequencies to prevent oscillations. Some isolation should be provided between the two drain circuits at GHz frequencies to prevent oscillations. Although there is some bypassing on chip of the VD1 and VG2 terminals, additional bypass capacitors, placed close to the chip, are recommended.

The gate and drain power supplies should be sequenced to turn on the negative gate voltage before the positive drain voltage is applied. Turning on the full drain voltage before the gate voltage can cause excessive power dissipation or destructive oscillations.