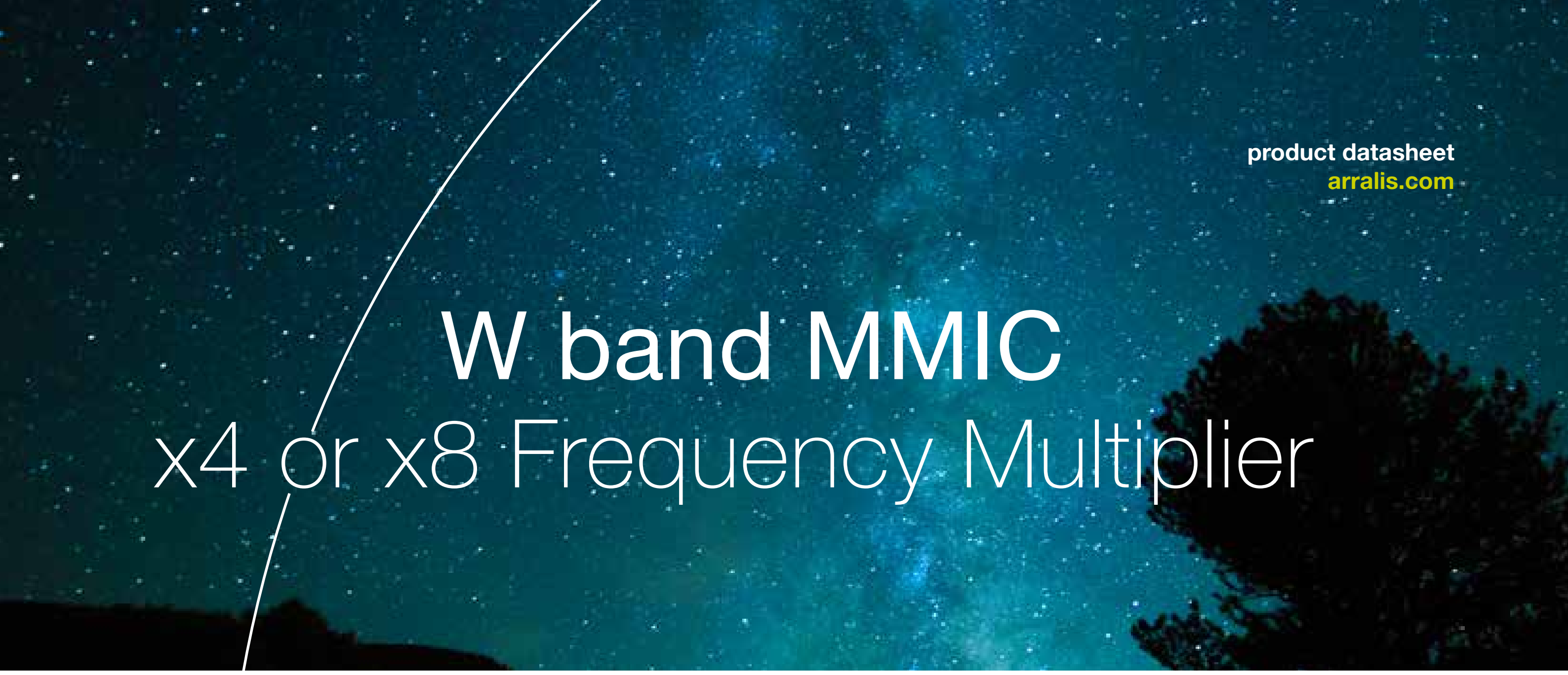


W band MMIC
x4 or x8 Frequency Multiplier

W-x4x8M-8692 Previously named TU-W1340309

GaAs PHEMT MMIC x4 or x8 Multiplier, 86 - 92GHz

Overview

W-x4x8M-8692 is a frequency multiplier with integrated amplifier and filter, designed to drive the W-SBM-9296 and W-DC-9296 mixers so that frequencies in the 92-96 GHz range can be easily realized using a 5.4 GHz baseband signal. This MMIC has a wideband input impedance match which means that it can operate in both x4 or x8 modes, with inputs of ~22 or ~11 GHz respectively. The circuit is designed on a 50um GaAs PHEMT substrate.

All bond pads and the die backside are gold plated and compatible with conventional 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 provisional and is measured with the chip in a 50 Ohm environment and contacted with RF probes.

Features

- Either x4 or x8 operation
- 86-92 GHz output. (x4 mode)
- 86.6-90.6 GHz output. (x8 mode)
- >8dB return loss.
- Up to 8dBm output power.

Applications

- Narrow bandwidth millimeter-wave imaging.
- High resolution radar.
- Sensing.
- P2P communications; short haul/ high capacity/low interference links.

Specification Overview - x4 Mode

Parameter	Min.	Typ.	Max.	Units
Input Frequency	21.5		23	GHz
Output Frequency	86		92	GHz
Gain			-7	dB
Multiplication Factor		4		
Output Power		0	8	dBm
5th Harmonic Attenuation	27			dB
Current		210		mA

Notes
The tests indicated have all been performed with 100pF de-coupling capacitors on all bias pads.
All tests are carried out at 25°C.

Drain Bias on 1st Stage =0.7V, Gate Bias on 1st Stage =-1.1V; Drain Bias on other stages =2V; Gate Bias on other stages = 0V

Specification Overview - x8 Mode

Parameter			Rating	
Input Frequency	10.825		11.325	GHz
Output Frequency	86.6		90.6	GHz
Gain			-10	dB
Multiplication Factor		8		
Output Power		-2	4	dBm
7th Harmonic Attenuation	18			dB
9th Harmonic Attenuation	28			dB
Current		210		mA

Notes
The tests indicated have all been performed with 100pF de-coupling capacitors on all bias pads.
All tests are carried out at 25°C.

Gate Bias on 1st Stage =-0.6V; Gate Bias on other stages = 0V; Drain Bias on all stages =4V

Absolute Maximum Ratings

Parameter	Rating
Gate Voltage	-5V to 0.2V dc
Drain Voltage	5V
Drain Current	600mA
RF Input Power	25dBm
Storage Temperature	−65°C to +150°C
Channel Temperature	+150°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

x4 Operation

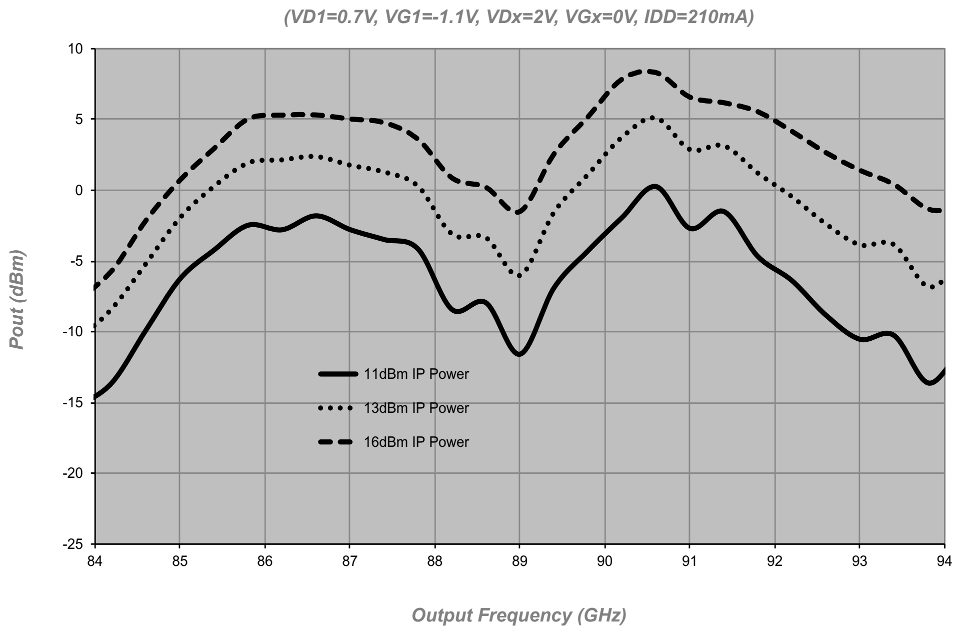


Figure 1
(x4 Mode) *Output Power*

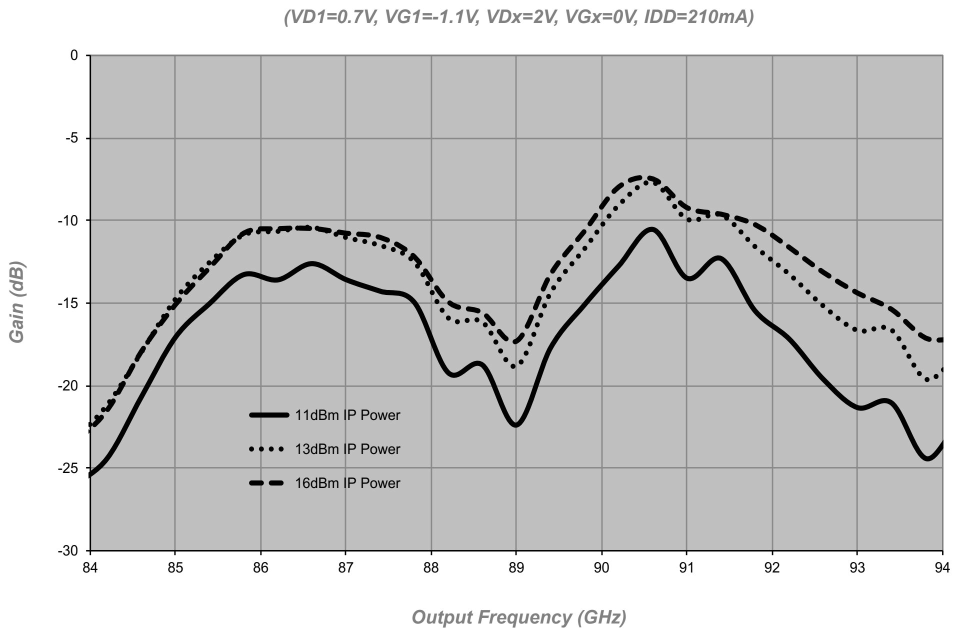


Figure 2
(x4 Mode) *Conversion Gain*

Measured Performance Data

x4 Operation

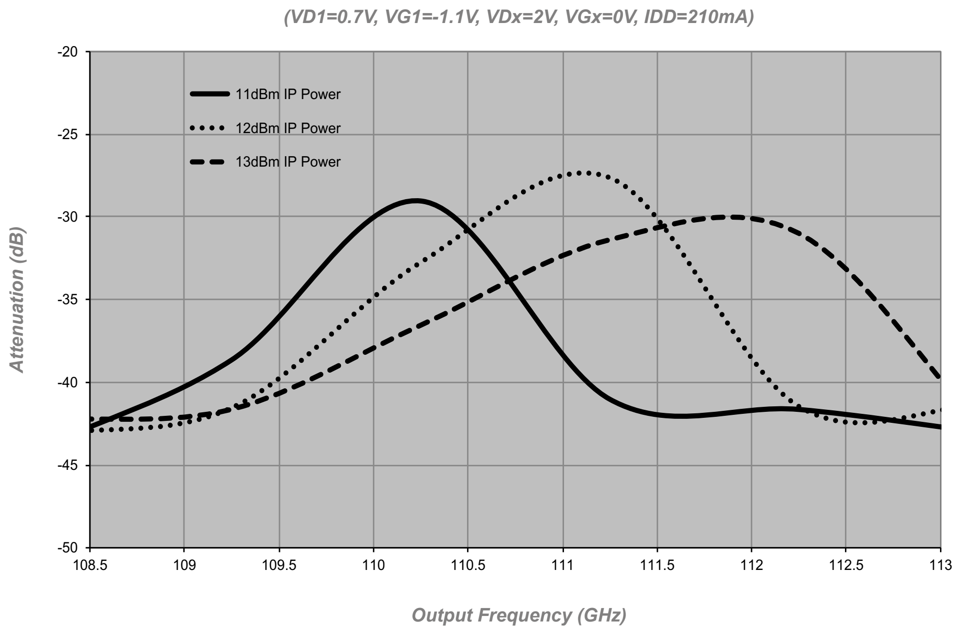


Figure 3
(x4 Mode)
5th Harmonic Attn. from 4th

Measured Performance Data

x8 Operation

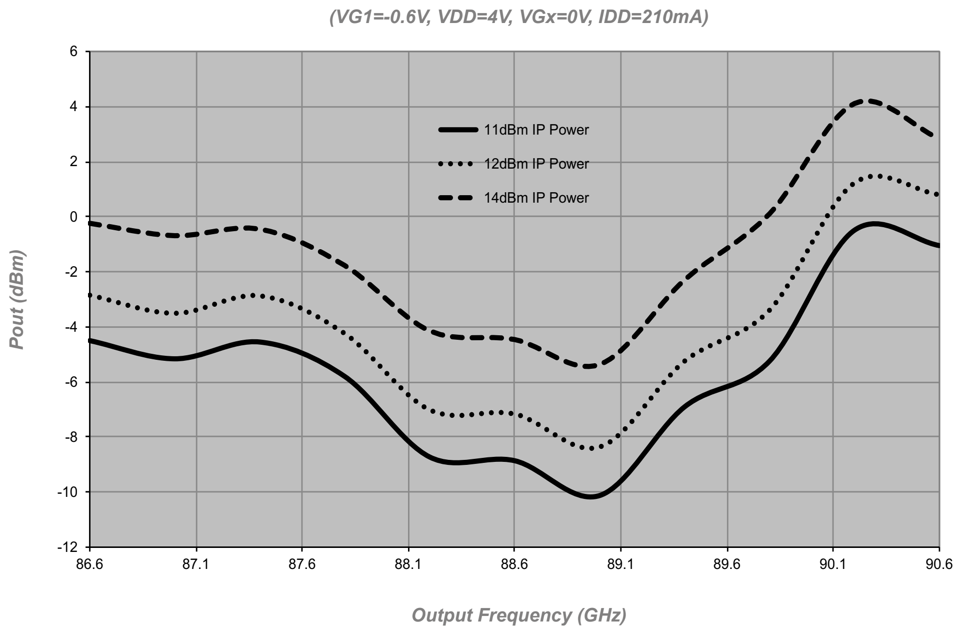


Figure 4
(x8 Mode) *Output Power*

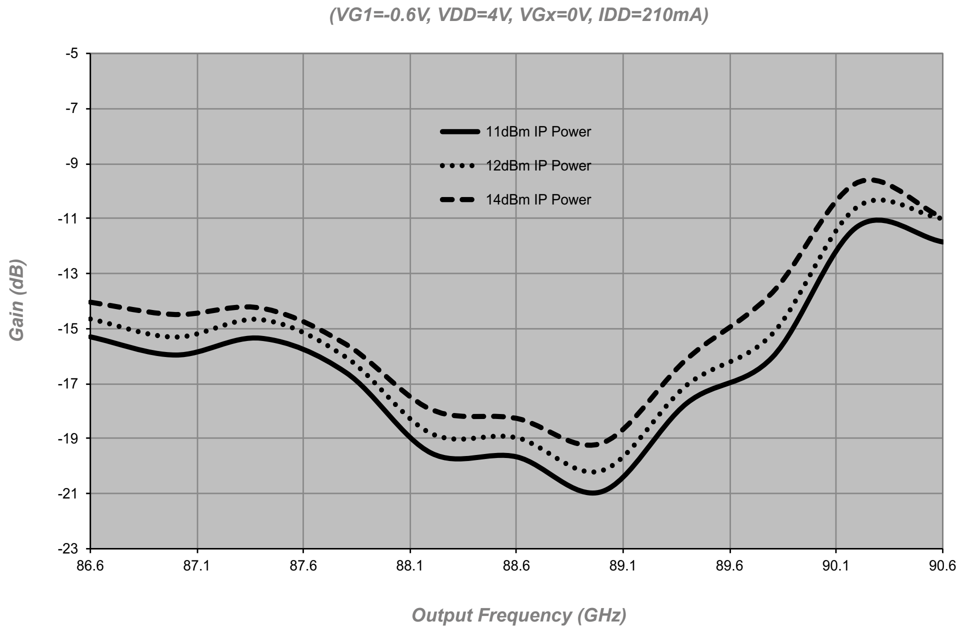


Figure 5
(x8 Mode) *Conversion Gain*

Measured Performance Data

x8 Operation

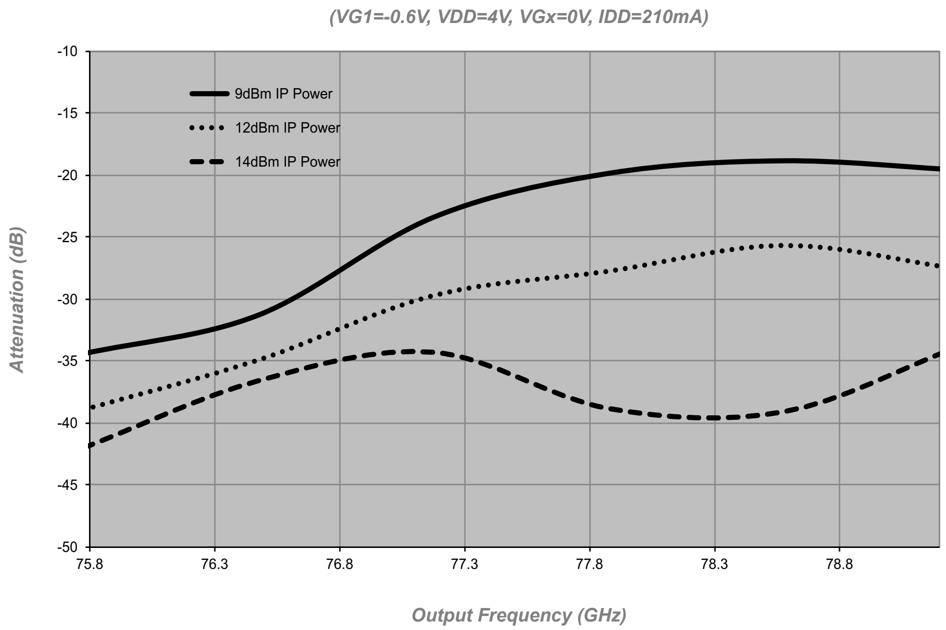


Figure 6
(x8 Mode)
7th Harmonic Attn. from 8th

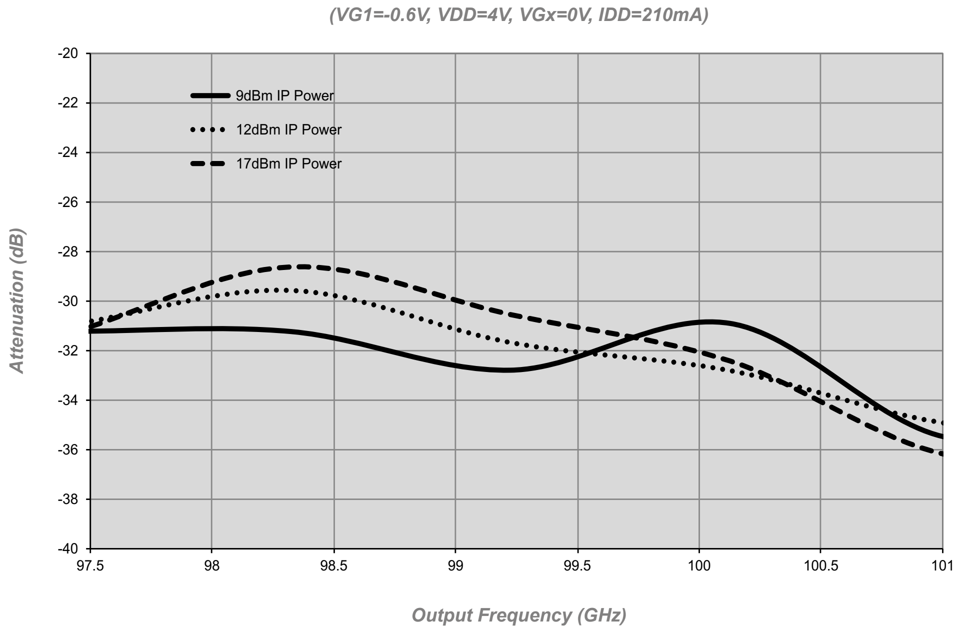
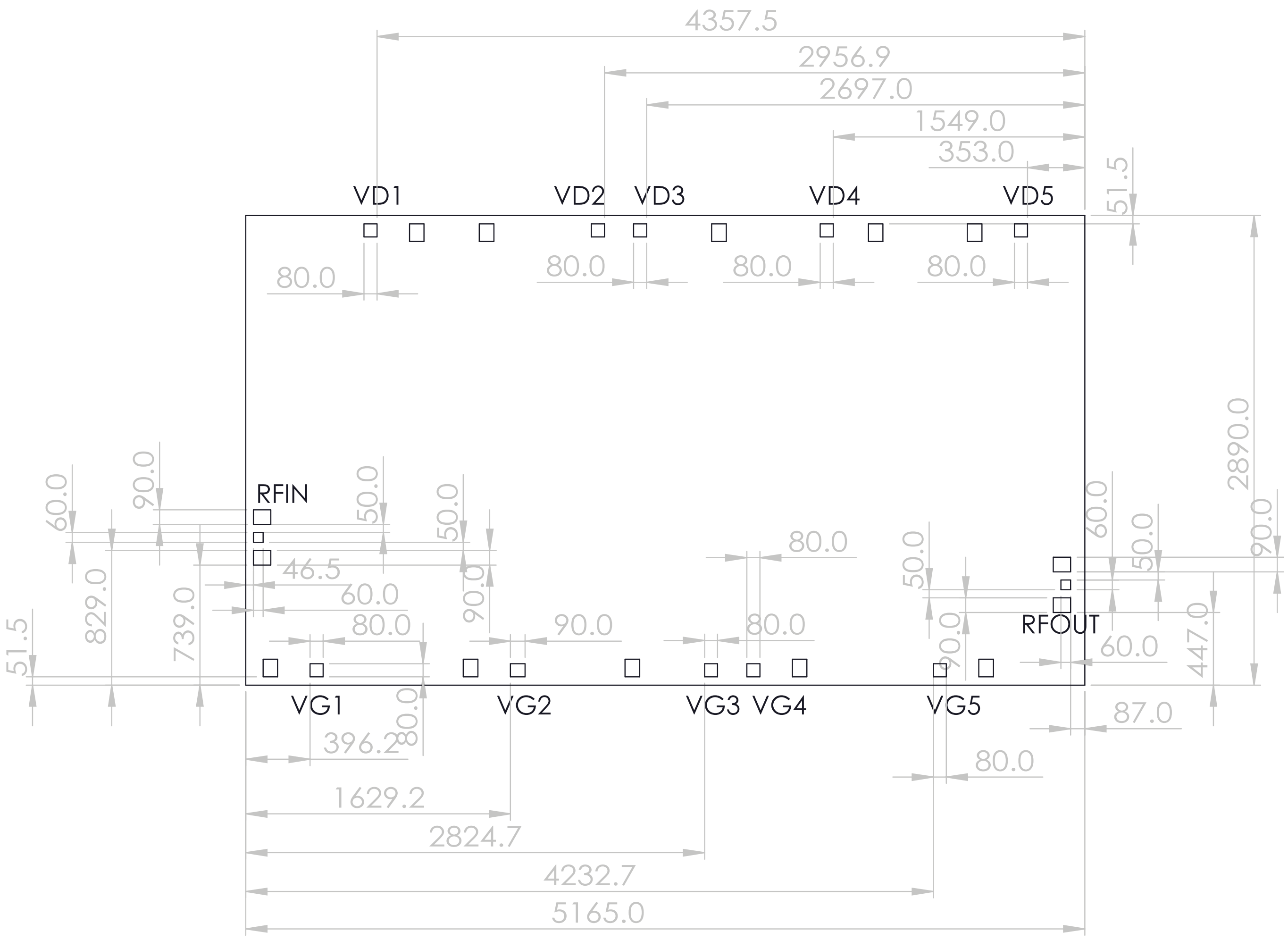


Figure 7
(x8 Mode)
9th Harmonic Attn. from 8th

Outline Drawing



Pad Descriptions

Name	Description
RFIN	Input RF pad. This pad is AC coupled.
RFOUT	Output RF pad. This pad is AC coupled.
VDx	Drain bias pad for stage x
VGx	Gate bias pad for stage x.
BOTTOM	The die backside must be connected to RF/DC ground.

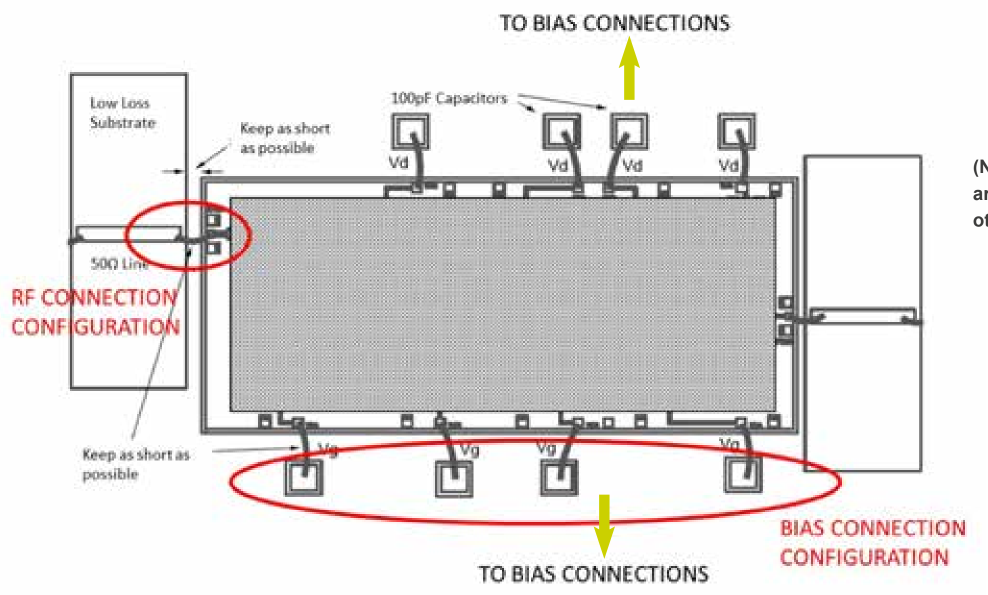
Notes

1. All dimensions are in um.
2. Typical DC bond pads are 80um square.
3. RF bond pads are 60um square.
4. All pads have gold metalisation.
5. Gold backside metalisation.
6. Backside metal is ground.
7. Connections are not required for unlabelled bond pads.
8. Die thickness is 50um

Die Packing Information

All die are delivered using gel-paks unless otherwise requested.

General Notes on Assembly



(Not actual die – these rules are applied to all MMICs unless otherwise stated)

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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