W band MMIC SPDT Switch

W-SPDT-90100 Previously named TU-W1401502

GaAs Diode MMIC SPDT Switch, 90 – 100 GHz

Overview

W-SPDT-90100 is a SPDT diode based switch that covers from 90 GHz to 100 GHz with very low loss when closed and high isolation when open.

All bond pads and the die backside are gold plated. This MMIC is 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.

A packaged version of the device is also available with WR10 waveguide input and outputs on request.

Features

- 90 – 100GHz.
- <4dB insertion loss.
- >10dB return loss.
- ~30dB isolation.

Applications

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

Specification Overview

Parameter	Min.	Typ.	Max.	Units	Notes
Frequency	90		100	GHz	
Insertion Loss		3.5	4	dB	Biased at 1.5V, 0mA closed Biased at -1.5V, 25mA open
Return Loss (Closed)	10			dB	Biased at 1.5V, 0mA
Isolation (RFIN to RF1) **(RFIN to RF2)**	27.5		33	dB	Biased at -1.5V, 25mA
Return Loss (Open)	6			dB	Biased at -1.5V, 25mA
Maximum OP Power		15		dBm	at P1dB
Closed Voltage		+1.5V		V	
Open Voltage		-1.5V		V	
Closed Current		0		mA	
Open Current		25		mA	

Absolute Maximum Ratings

Parameter	Rating
Control Voltage	-2V to +10V dc
RF Power	25dBm
Storage Temperature	−65°C to +150°C
Channel Temperature	+150°C
Operating Temperature	−40°C to +85°C

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

(Vc1=1.5V, Ic1=0mA, Vc2=-1.5V, Ic2=25mA)

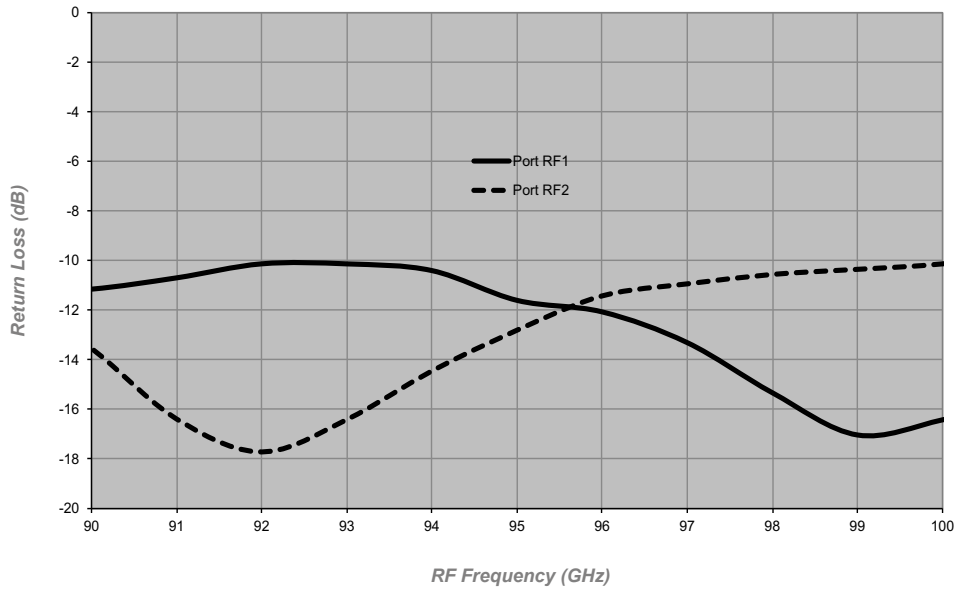


Figure 1
RF1 Closed Return Loss

(Vc1=1.5V, Ic1=0mA, Vc2=-1.5V, Ic2=25mA)

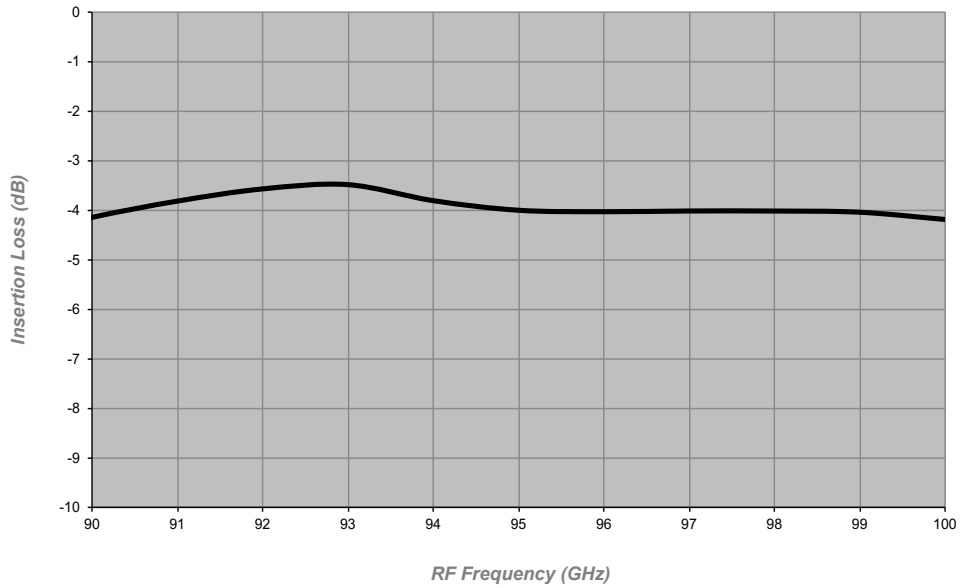


Figure 2
RF1 Insertion Loss

Measured Performance Data

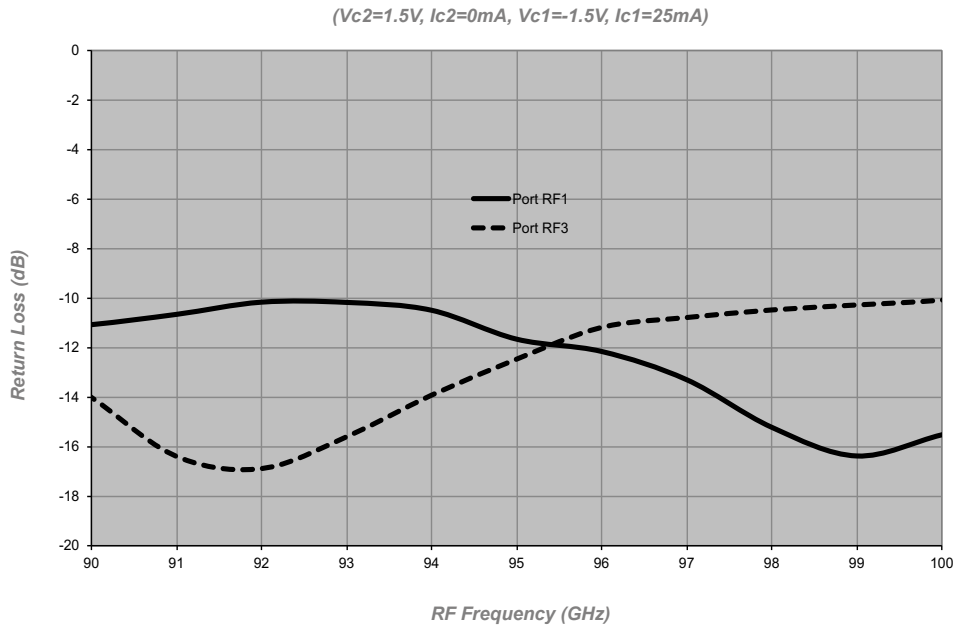


Figure 3
RF2 Closed' Return Loss

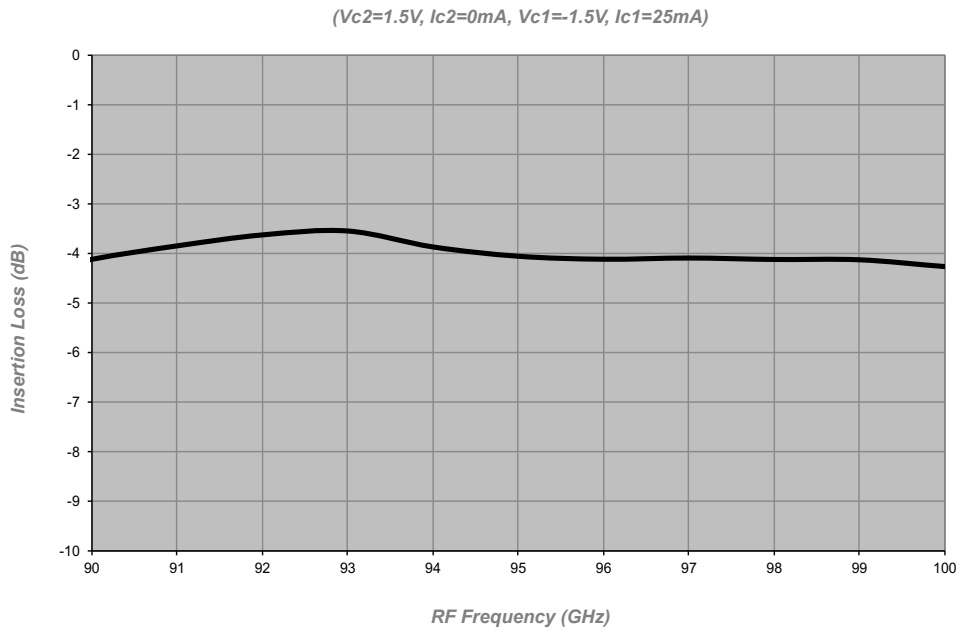


Figure 4
RF2 Insertion Loss

Measured Performance Data

(Vc2=1.5V, Ic2=0mA, Vc1=-1.5V, Ic2=25mA)

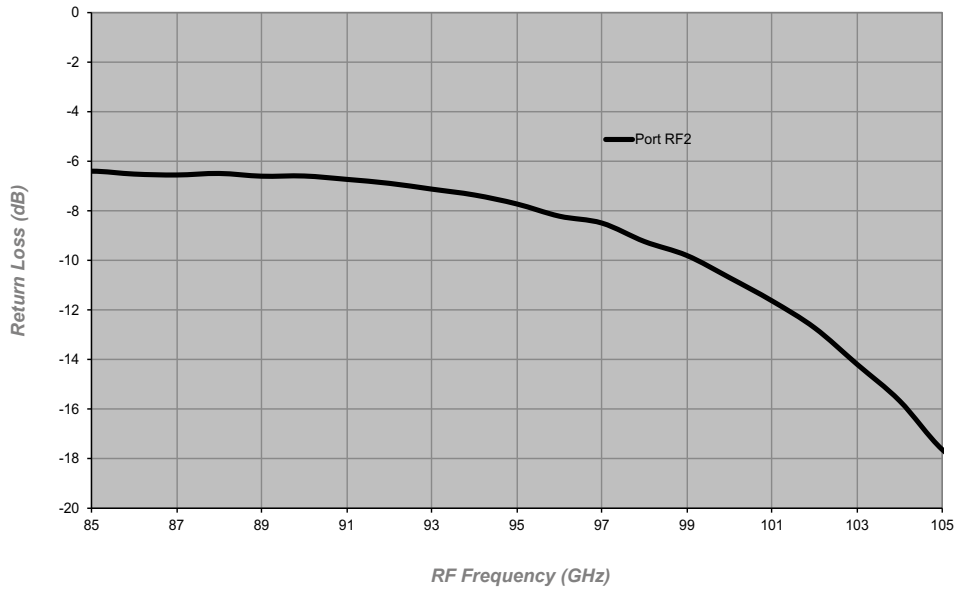


Figure 5
RF1 Open Return Loss

(Vc2=1.5V, Ic2=0mA, Vc1=-1.5V, Ic2=25mA)

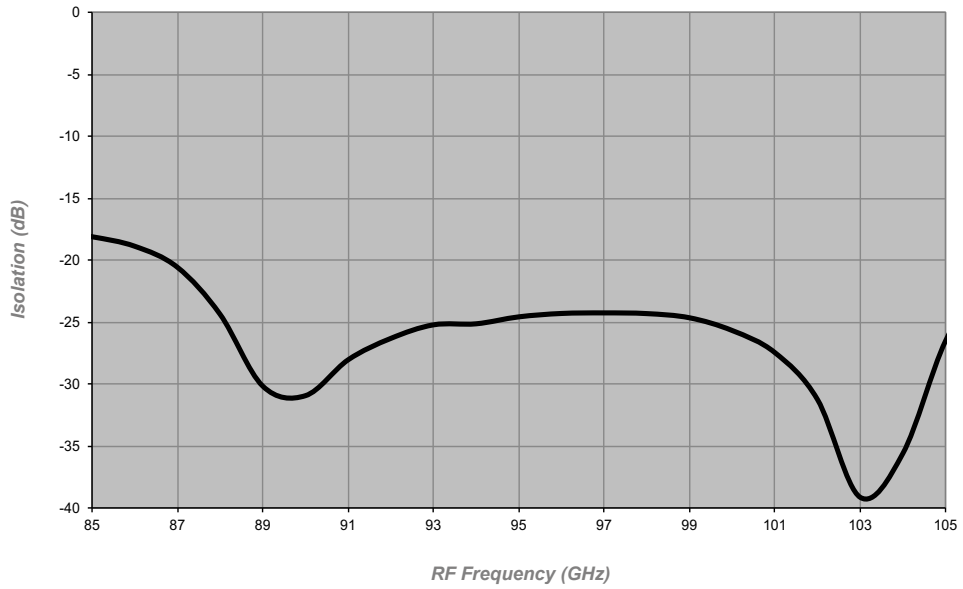


Figure 6
RF1 Isolation

Measured Performance Data

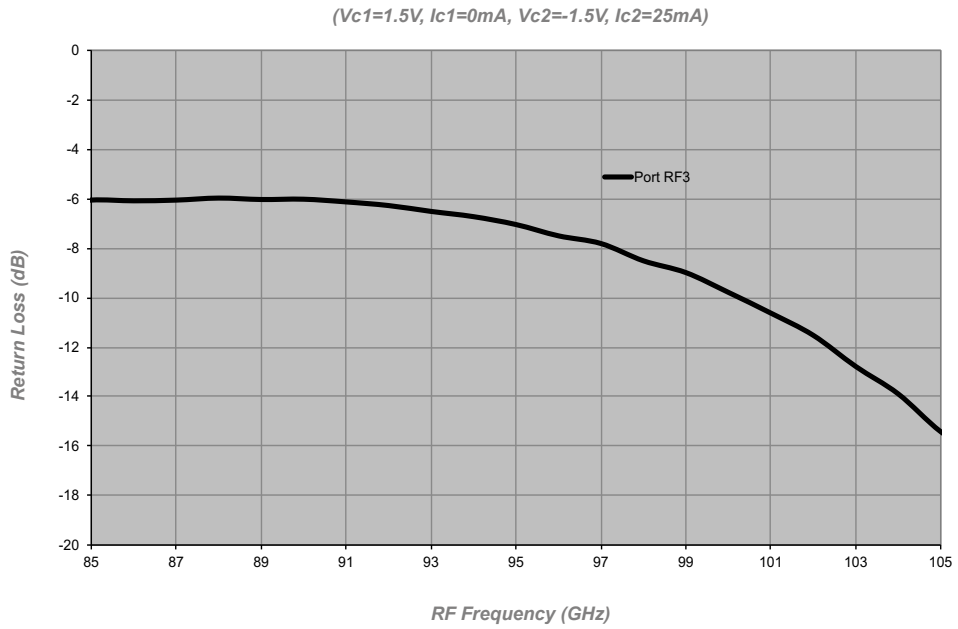


Figure 7
RF2 Open Return Loss

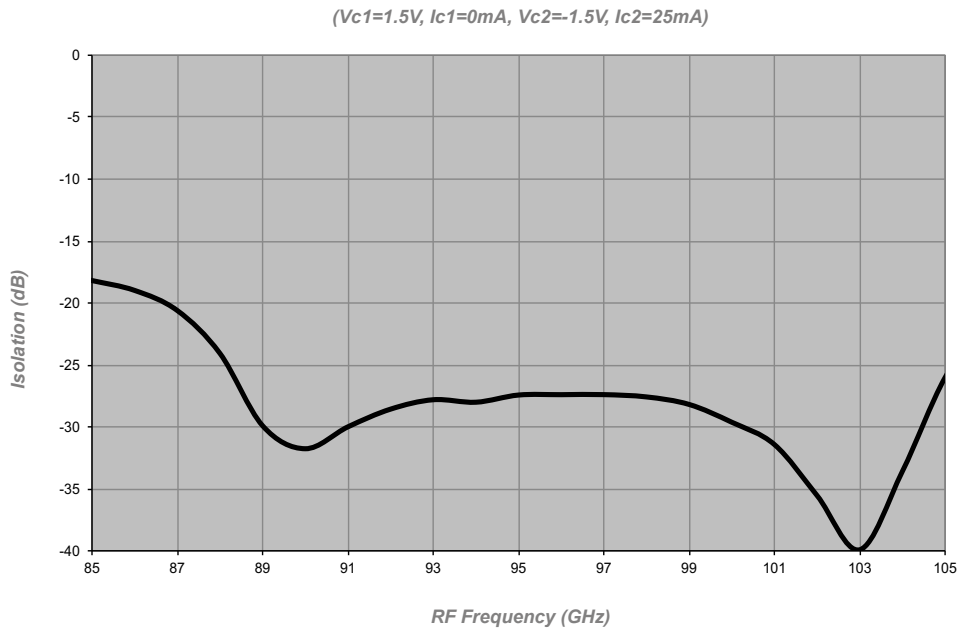
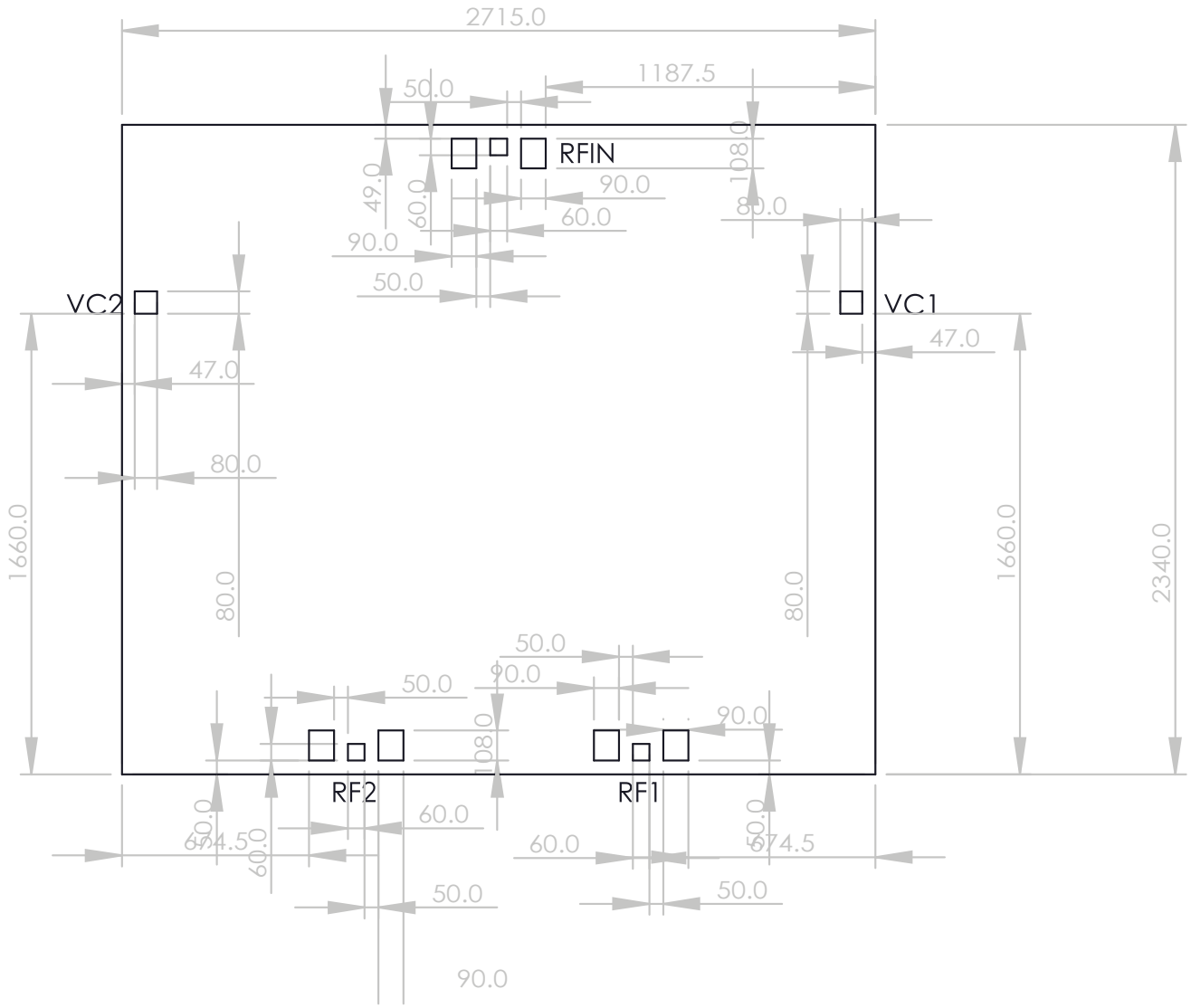


Figure 8
RF2 Isolation

Outline Drawing



Pad Descriptions

Name	Description
RFIN	Input RF pad. This pad is AC coupled.
RF1	Output RF pad 1. This pad is AC coupled. RF1 should only be closed when RF2 is open.
RF2	Output RF pad 2. This pad is AC coupled. RF2 should only be closed when RF1 is open.
VC1	Control Voltage pad for RF1.
VC2	Control Voltage pad for RF2.
BOTTOM	The die backside must be connected to RF/DC ground.

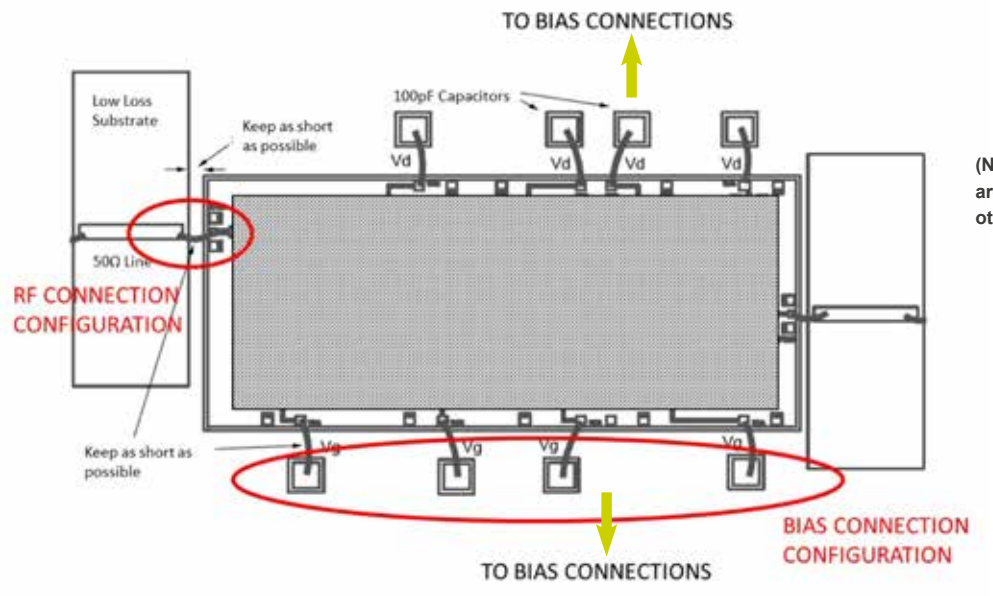
Notes

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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