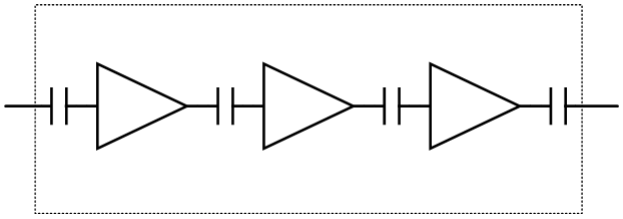
Product Overview

The ASA6004 is a GaN MMIC three-stage driver amplifier designed for X-band applications. The amplifier provides 26 dB of power gain, 41 dBm of saturated power and 41.5% PAE from a +29 V supply voltage. All data is measured with the chip in a 50 Ohm test fixture connected via four 0.025 mm (1 mil) diameter bond wires of minimal length 0.4 mm.

Functional Block Diagram



Note: AB Pin should be connected to GND so that the first stage biased in class AB.

Key Features

1. Integrated DC blocking at RF input/output
2. Frequency Range: 8.5 GHz to 10.5 GHz
3. Power Gain: 28 dB (Class C) & 31 (1st stage AB and others C)
4. PAE: 46.5%
5. Saturated Output Power: +41.25 dBm
6. 50 Ohm Matched Input/output
7. Die Size: 3.5 x 3.0 x 0.1 mm

Applications

1. General Communication Applications
2. VSAT
3. Point to Point Radios

Absolute Maximum Rating

Drain Bias Voltage (VDD)	+40 Vdc
Gate Bias Voltage (VGG)	-8 Vdc
Drain Current (ID)	1.3 A
RF Input Power (Pin),CW,50 Ω,(VDD = +28 V)	18 dBm
Channel Temperature	200 °C
Continuous Pdiss(T = 85 °C)	25 W
Storage Temperature	-65 to +150 °C
Operating Temperature	-40 to +85 °C

Typical Supply Current vs. VDD

	VDD=28 V	VDD=29 V	VDD=30 V
VGG=-3.5 V	98 mA	100 mA	102 mA
VGG=-3.8 V	0 mA	2 mA	0 mA
VGG=-3.9 V	0 mA	0 mA	0 mA

1. Currents are measured at 15 °C.
2. The typical operation of amplifier is for supply voltages VGG =-3.9 V and VDD =+29 V.


ELECTROSTATIC SENSITIVE DEVICE OBSERVE HANDLING PRECAUTIONS

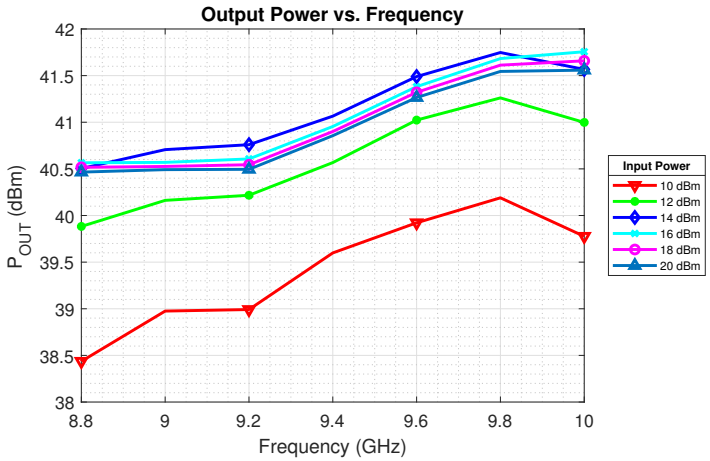
Electrical Specifications

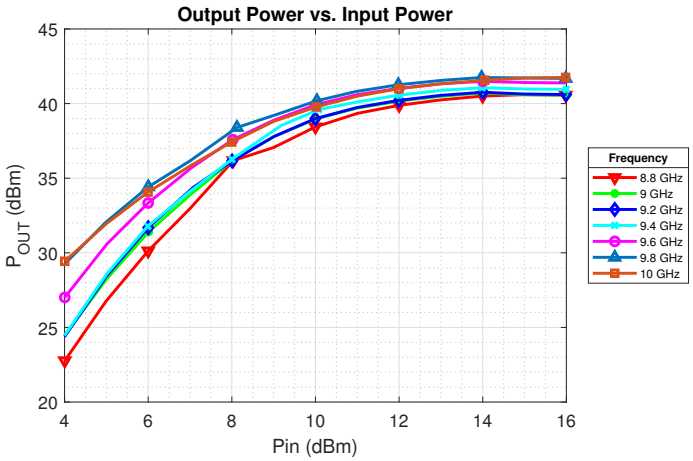
Parameter	Min.	Typ.	Max.	Units
Frequency Range	-	8.5-10.5	-	GHz
Power Gain(Class C)	-	26	-	dB
Power Gain(1st Stage AB)	-	31	-	dB
Small Signal Gain (IDQ = 100 mA)	30.7	34	36.7	dB
Input Return Loss	-	12	-	dB
Power Added Efficiency (PAE)	43.5	44.5	46.8	%
Saturated Output Power	40.3	41.1	41.25	dBm
Supply Current (with RF)	864	980	1015	mA

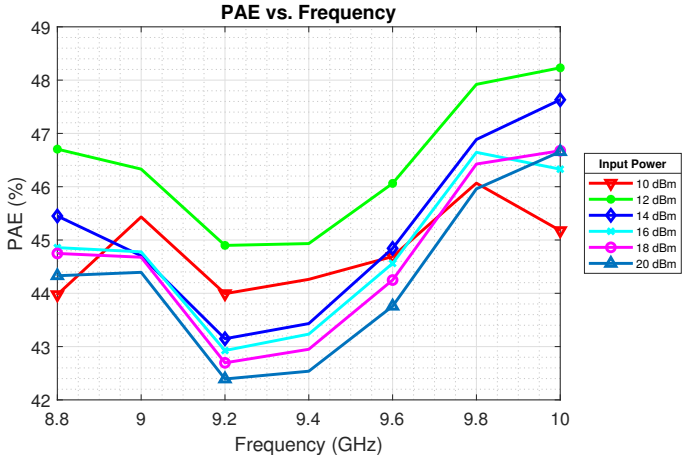
Test conditions unless otherwise noted: Tcase=15°C, VDD=29V, VGG=-3.9V, IDQ=0mA, Z0=50Ω, Pin=12dBm
Tcase is Cold Plate temperature, and Base Plate temperature (TBP) is 85°C.

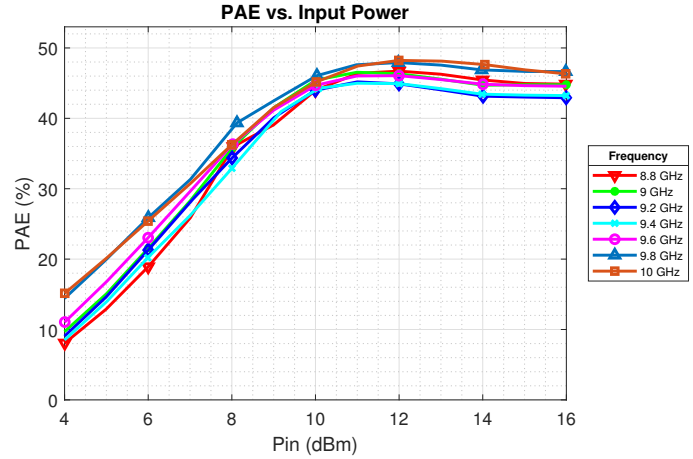
Performance Plots – Large Signal

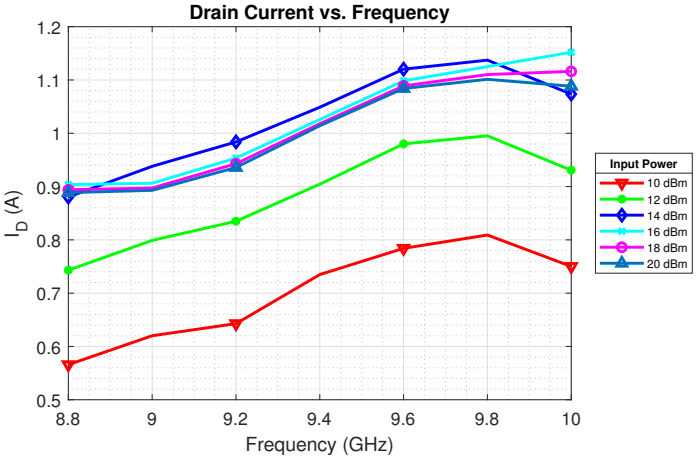
Test conditions unless otherwise noted:VDD=29 V, VGG=-3.9 V, Pin=12 dBm, Tcase=15 °C, CW

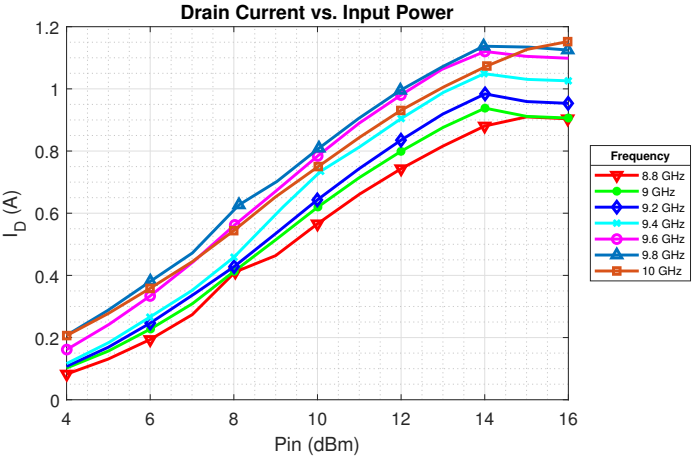








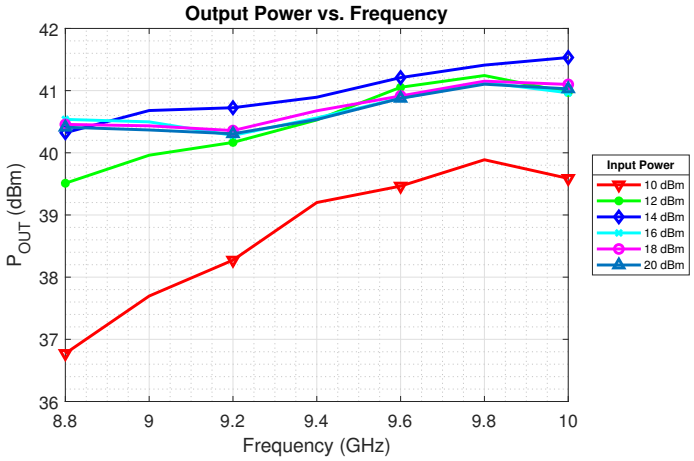


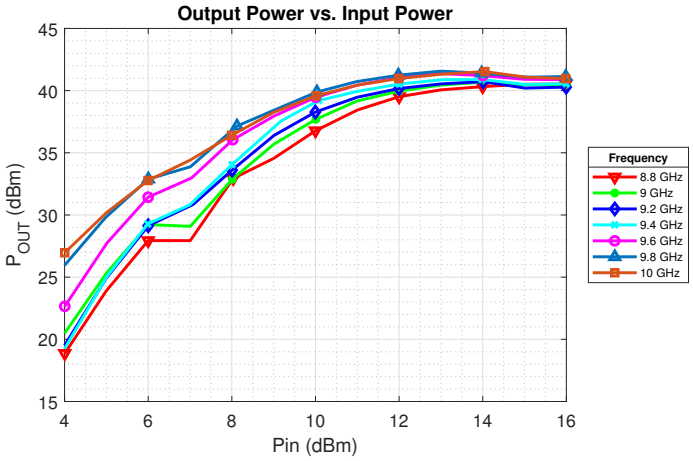


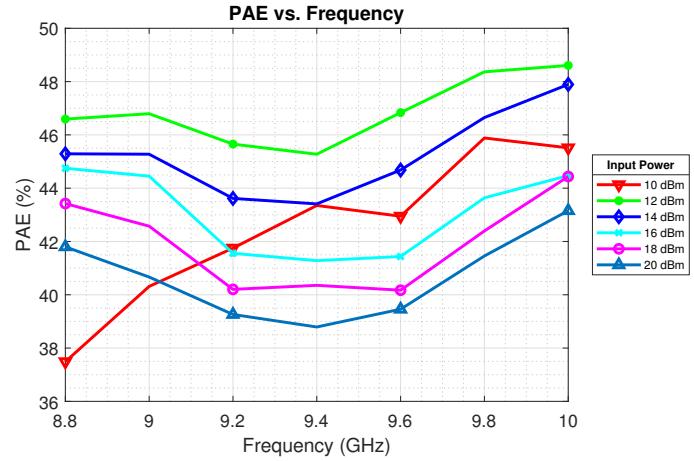
Performance Plots – Large Signal

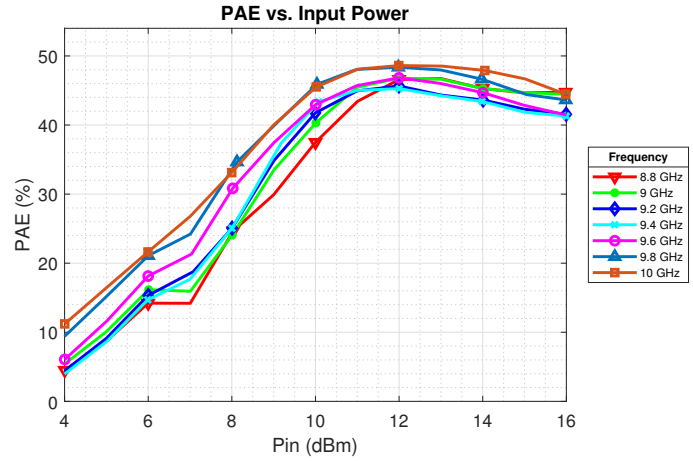
Test conditions unless otherwise noted:VDD=29 V, VGG=-3.9 V, Pin=12 dBm, Tcase=15 °C, 1 KHz

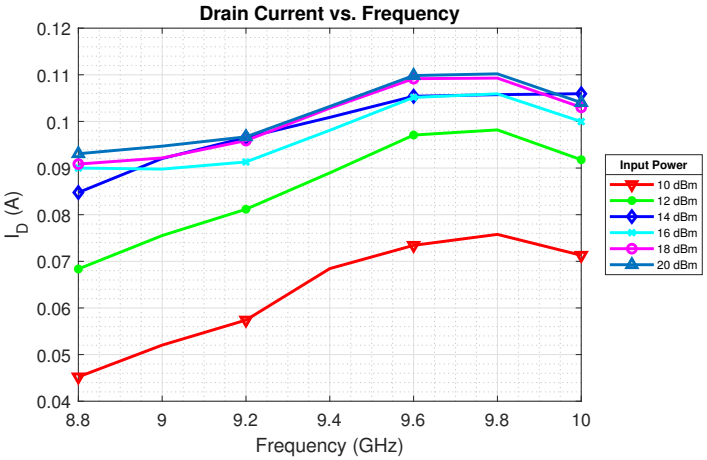
Pulse 10%

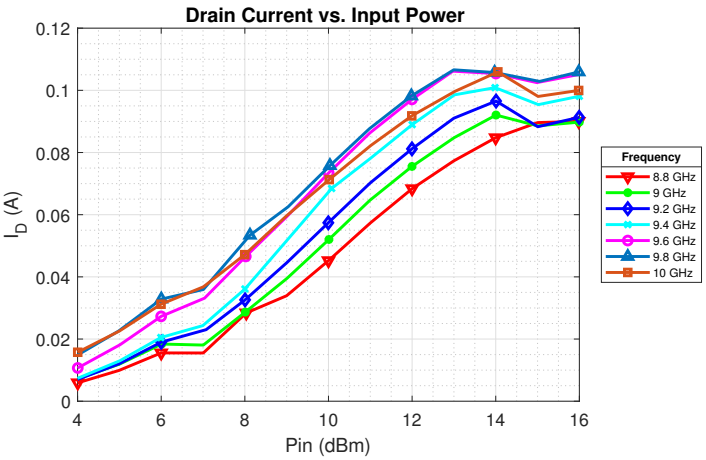






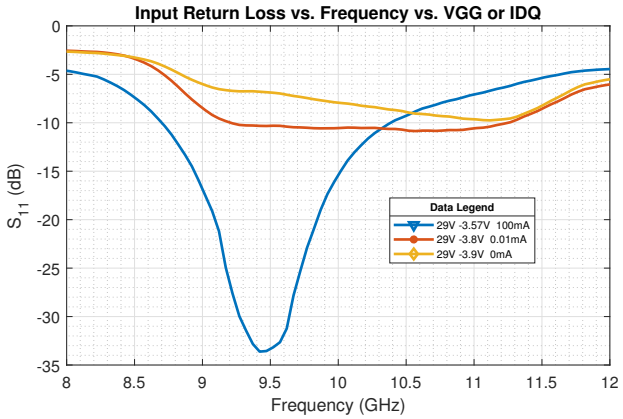


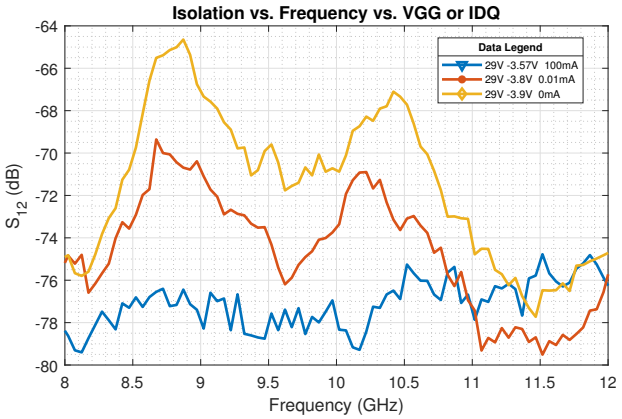


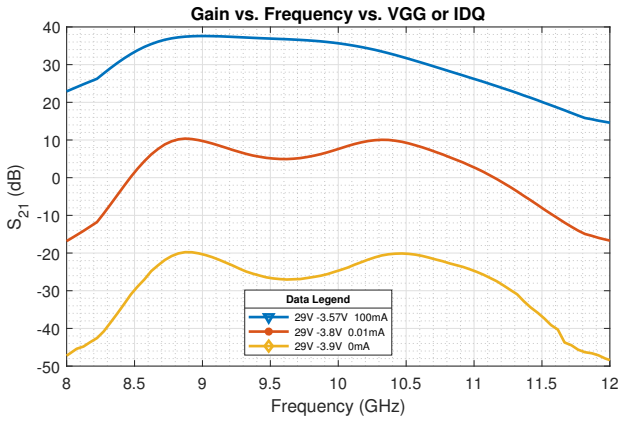


Performance Plots – Small Signal

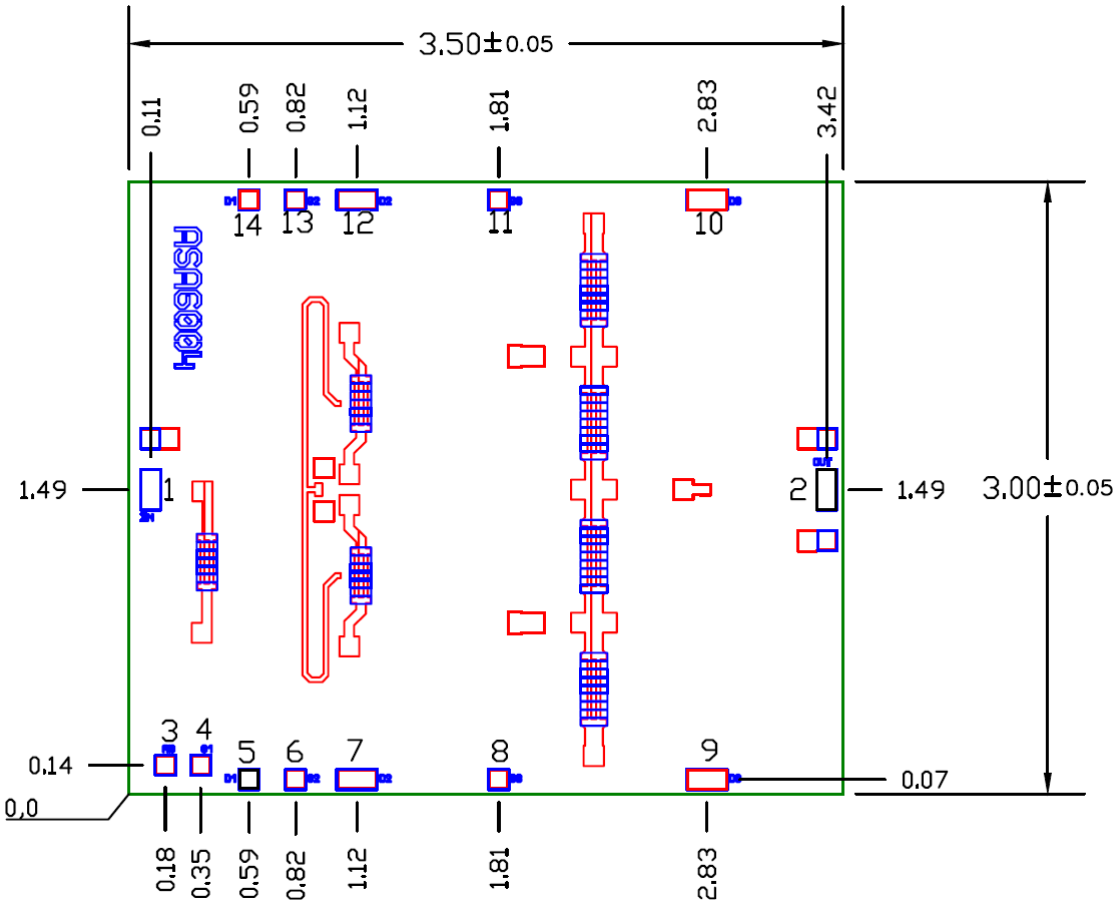
Test conditions unless otherwise noted:VDD=29 V, Tcase=15 °C







Mechanical Information



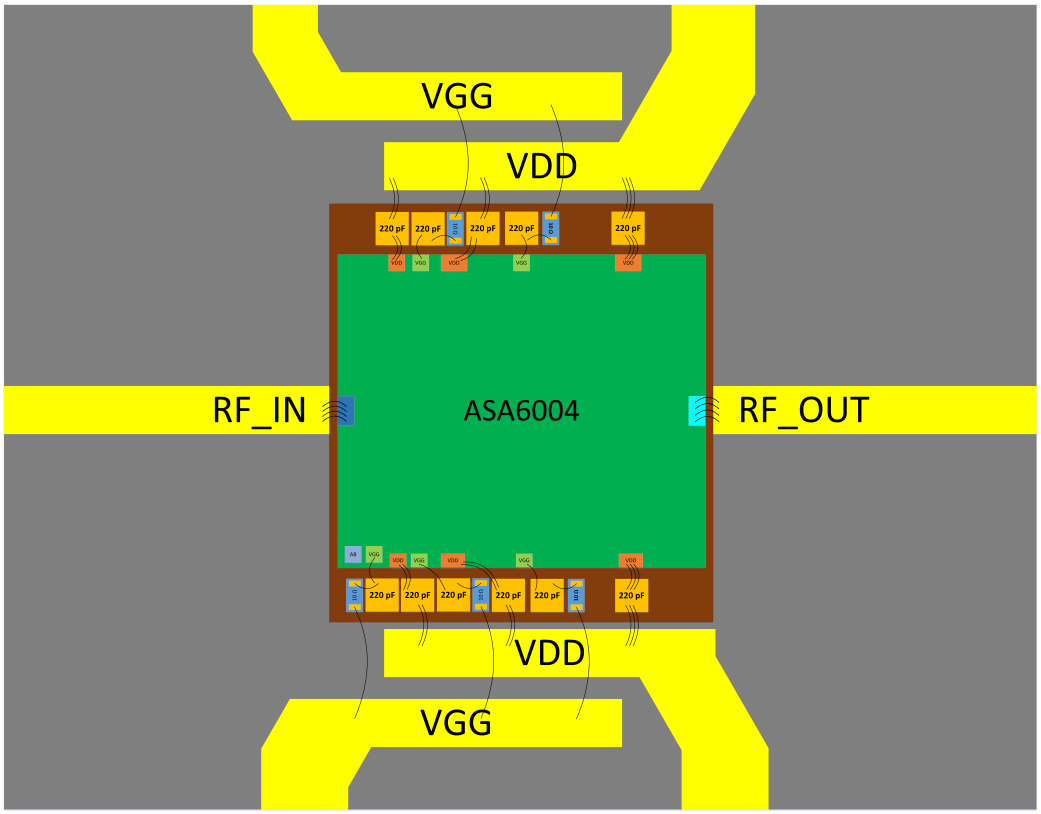
NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS
2. CHIP SIZE = 3.50 mm × 3.0 mm (DICING STREET INCLUDED) ± 0.05 mm
3. RF pads (1,2) = 0.1 × 0.2 mm
4. DC pads (3) = 0.1 × 0.1 mm
5. DC pads (4,6,8,11,13) = 0.1 × 0.1 mm
6. DC pads (5,14) = 0.1 × 0.1 mm
7. DC pads (7,9,10,12) = 0.1 × 0.15 mm
8. BACKSIDE METALLIZATION: GOLD
9. BACKSIDE METAL IS GROUND
10. BOND PAD METALIZATION: GOLD
11. NO CONNECTION REQUIRED FOR UNLABELED BOND PADS
12. OVERALL DIE SIZE ±50 µm

Bond Pad Description

1	RF-IN	This pad is AC coupled and matched to 50 Ohms.
2	RF-OUT	This pad is AC coupled and matched to 50 Ohms.
3	AB	AB Pin should be connected to GND so that the first stage biased in class AB.
5,7,9,10,12,14	VDD	Positive Supply Voltage for the amplifier. External bypass capacitors of 220 pF are required.
4,6,8,11,13	VGG	Negative Supply Voltage for the amplifier.

Assembly Diagram



Assembly Notes

Component Placement and Adhesive Attachment Assembly Notes:

1. Use vacuum collet to pick up the die.
2. The force should be controlled during placement and mounting specially no force should be applied to air bridges.

Reflow process assembly notes:

1. Use CMC or MoCu carrier to decrease thermal expansion mechanical stress
2. Use AuSn (80/20) solder and limit exposure to temperatures above 300 °C to 3-4 minutes, maximum.
3. An alloy station or conveyor furnace with reducing atmosphere should be used.
4. Do not use any kind of flux.
5. Devices must be stored in a dry nitrogen atmosphere.
6. Use Au bond wire.

Contact Information

For the latest specifications, additional product information:
Web: `www.abba-semi.com`
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