

## • General Description

Vectrawave's VM215D is a gallium arsenide (AsGa) self-biased amplifier designed specifically with high gain and wide bandwidth capabilities 2-20GHz under 5V

The device has a small signal gain of 16dB With a 1dB compression output power of 15dBm

The device contains internal DC block and internal drain bias

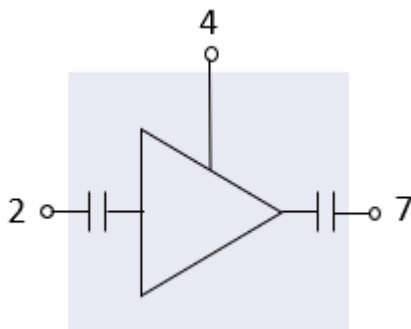
## • Features

- Operating frequency range: 2 to 20 GHz
- Single Bias
- Internal Drain Bias
- Input and Output DC block
- Input and Output 50Ω matched
- Linear Gain: 16dB
- OP1dB: 15dBm
- NF: 3dB
- DC bias:  $V_D = +5V$   
 $I_D = 75mA$
- Chip size : 3.12 x 1.5 x 0.1 (mm)

## • Applications

- Radar, Electronic warfare
- Microwave Radio & VSAT
- Test and Measurement
- Broadband Communication Infrastructure
- Fiber Optics

## • Pins Assignment & Functional Block Diagram



Function	Pin Number
RFIn	2
$V_D$	4
RFout	7

## • Electrical Specifications

### Test conditions: unless otherwise noted

- Room Temperature = +25°C
- $V_D = +5V$
- CW

Symbol	Parameter	Min	Typ	Max	Unit
F	Frequency range	2		20	GHz
G	Linear gain		15		dB
S11	Input return loss		-12		dB
S22	Output return loss		-12		dB
OP1dB	Output Power 1dB compression Point		15		dBm
OIP3	Output Third Order Intermodulation Point		25		dBm
NF	Noise Figure		3	4	dB
$I_D$	Associated drain current @Pin=25dBm		70		mA
$V_D$	Drain voltage		5		V

## • Recommended Operating Conditions

Symbol	Parameter	Value	Unit
$V_D$	Drain voltage	5	V

## • Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
$V_D$	Drain bias voltage	12	V
$I_D$	Drain bias current	120	mA
Pin	Maximum peak input power overdrive	20	dBm
Tj	Junction Temperature	-	°C
Ta	Operating temperature range	-40/+85	°C
Tstg	Storage temperature range	-55/+150	°C

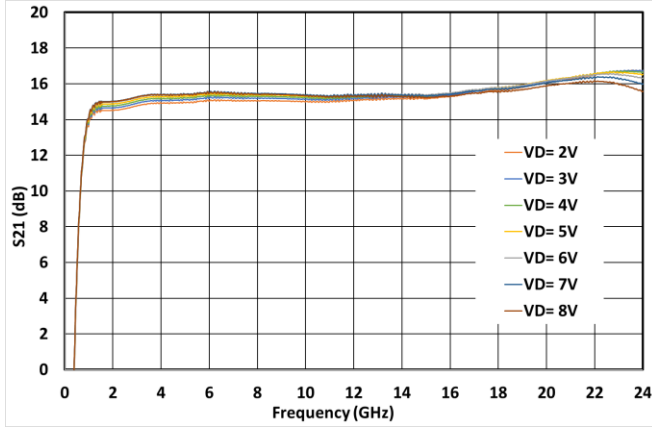
Operation of this device above any these parameters may cause permanent damage.

• **Typical Performance**  
(Small signal / Test Under Probe)

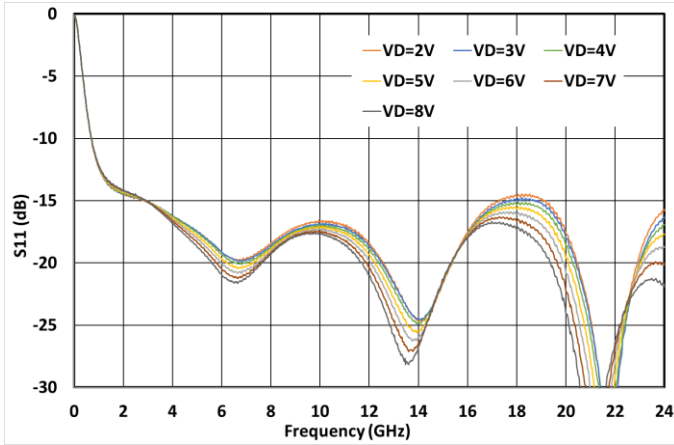
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- $V_D = +5V$
- Room Temperature : +25°C

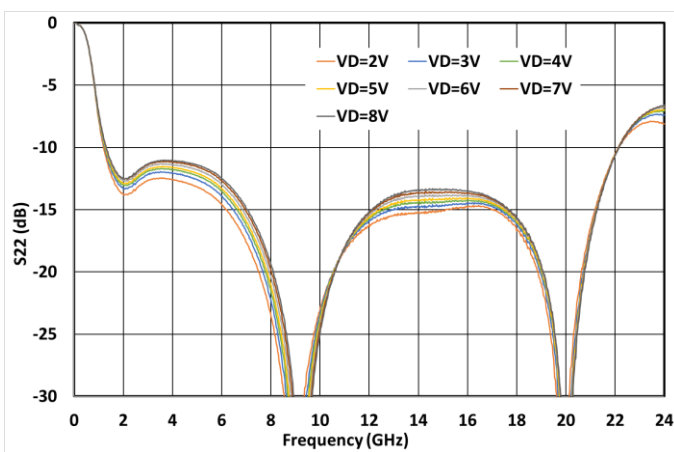
**GAIN VS FREQUENCY VS  $V_D$**



**INPUT RETURN LOSS VS  $V_D$**



**OUTPUT RETURN LOSS VS  $V_D$**

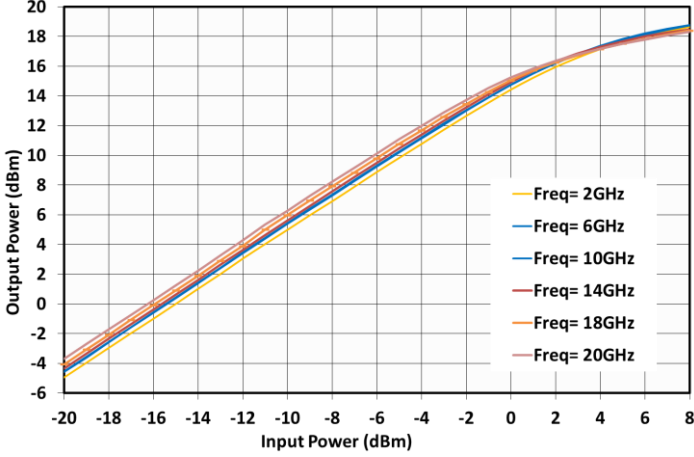


• **Typical Performance**  
(Large signal / Test Under Probe)

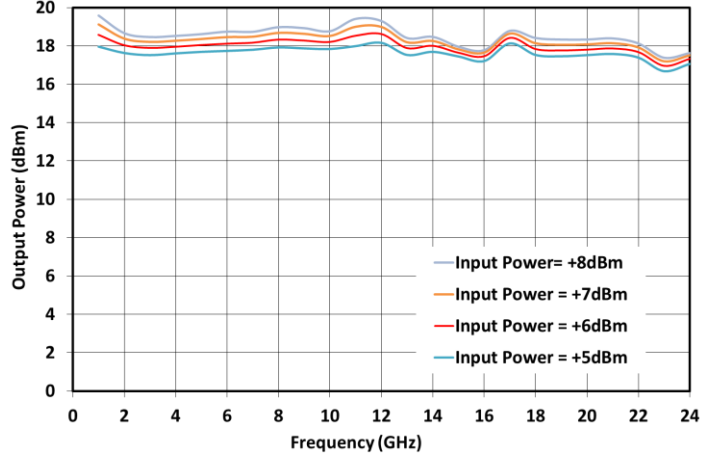
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- CW

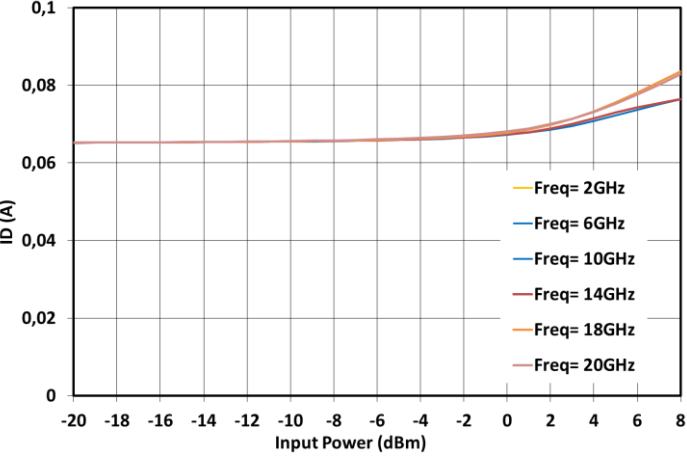
OUTPUT POWER VS INPUT POWER VS FREQUENCY



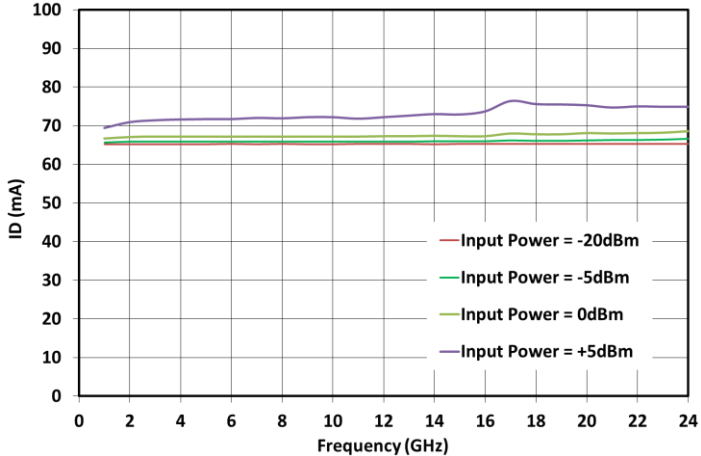
OUTPUT POWER VS FREQUENCY VS INPUT POWER



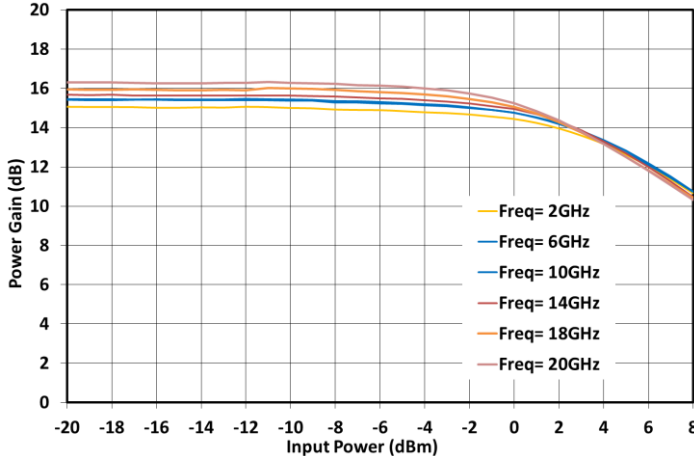
DRAIN CURRENT VS INPUT POWER VS FREQUENCY



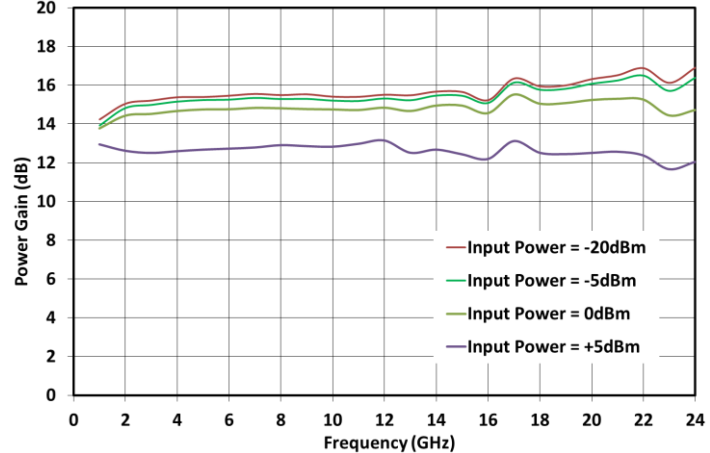
DRAIN CURRENT VS FREQUENCY VS INPUT POWER



GAIN VS INPUT POWER VS FREQUENCY



GAIN VS VS FREQUENCY INPUT POWER

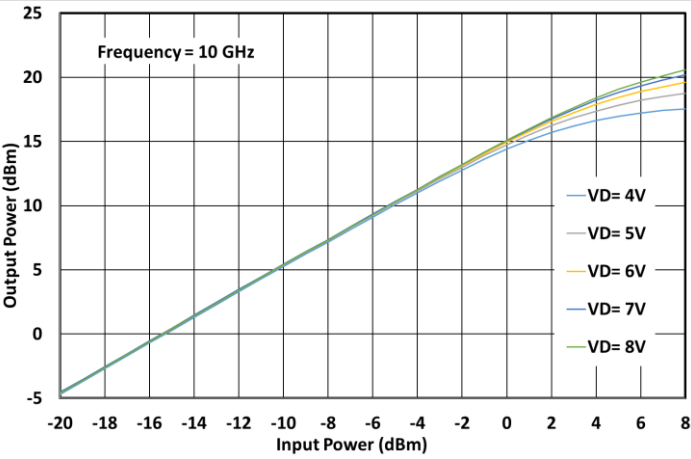


• **Typical Performance**  
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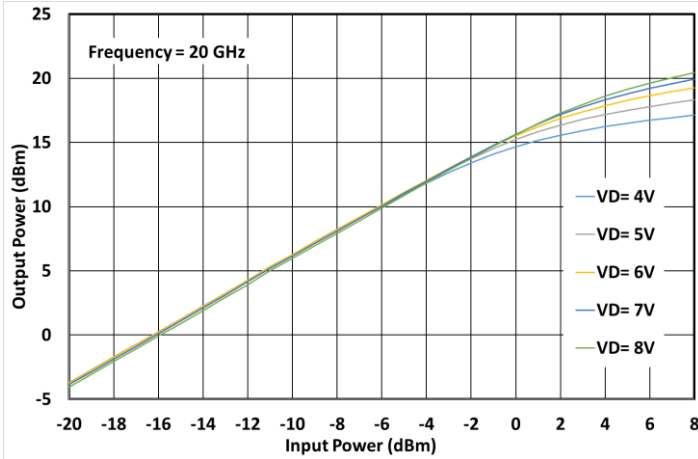
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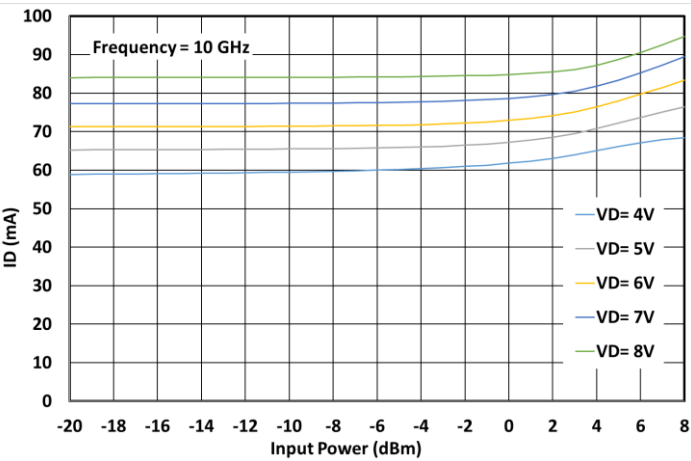
OUTPUT POWER VS INPUT POWER VS  $V_D$



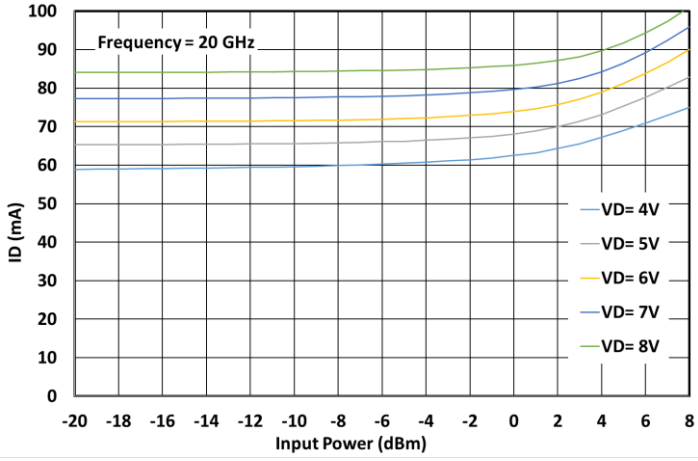
OUTPUT POWER VS INPUT POWER VS  $V_D$



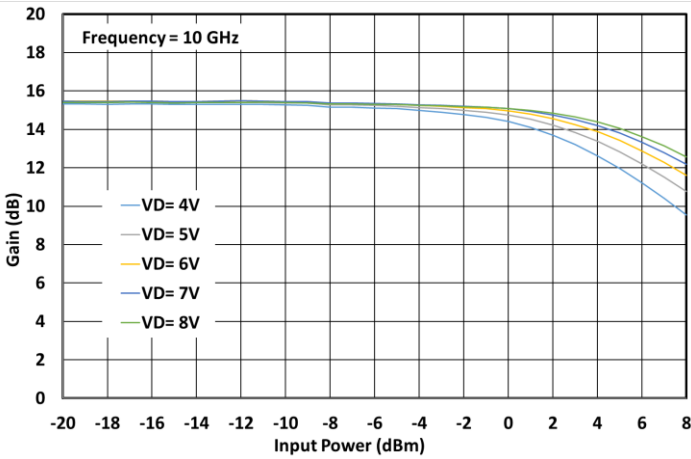
DRAIN CURRENT VS INPUT POWER VS  $V_D$



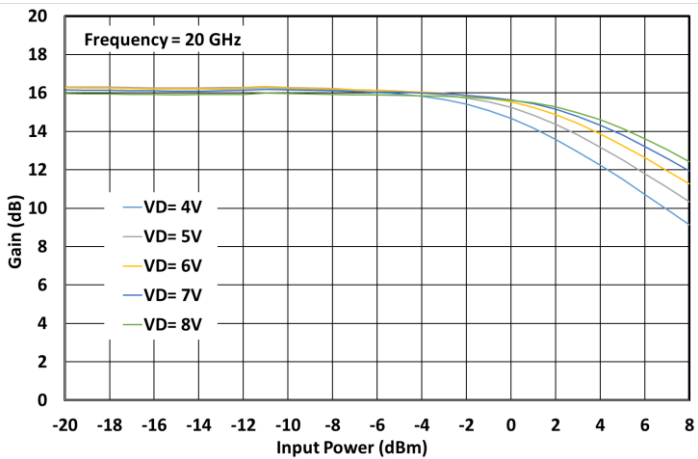
DRAIN CURRENT VS INPUT POWER VS  $V_D$



GAIN VS INPUT POWER VS  $V_D$



GAIN VS INPUT POWER VS  $V_D$

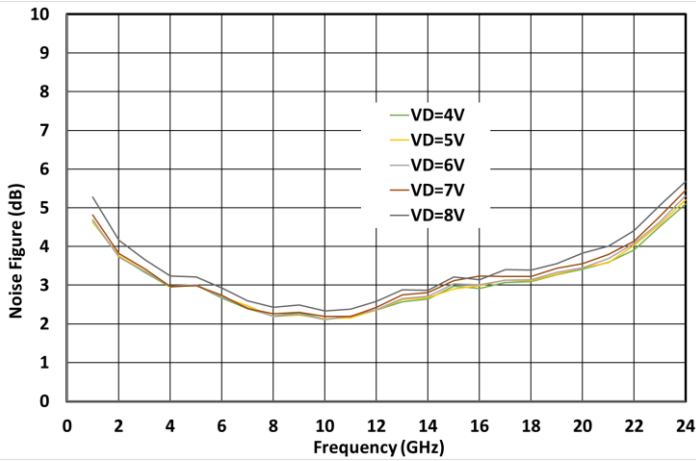


• **Typical Performance**  
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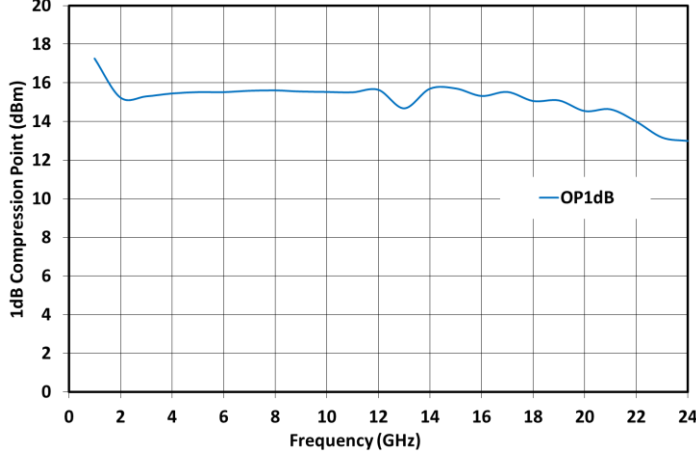
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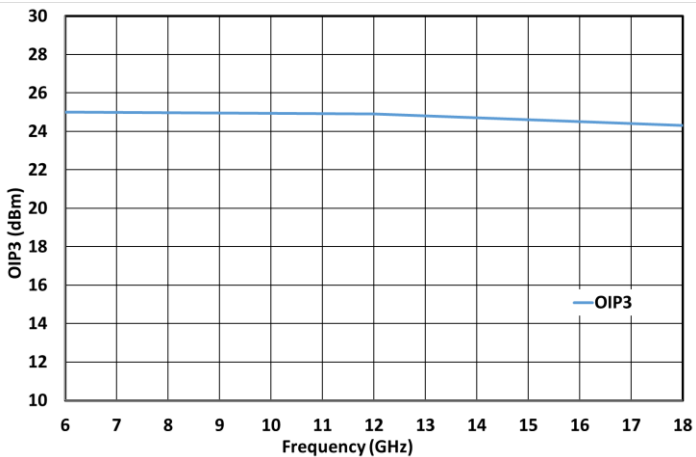
NOISE FIGURE VS FREQUENCY VS  $V_D$



OP1dB VS FREQUENCY

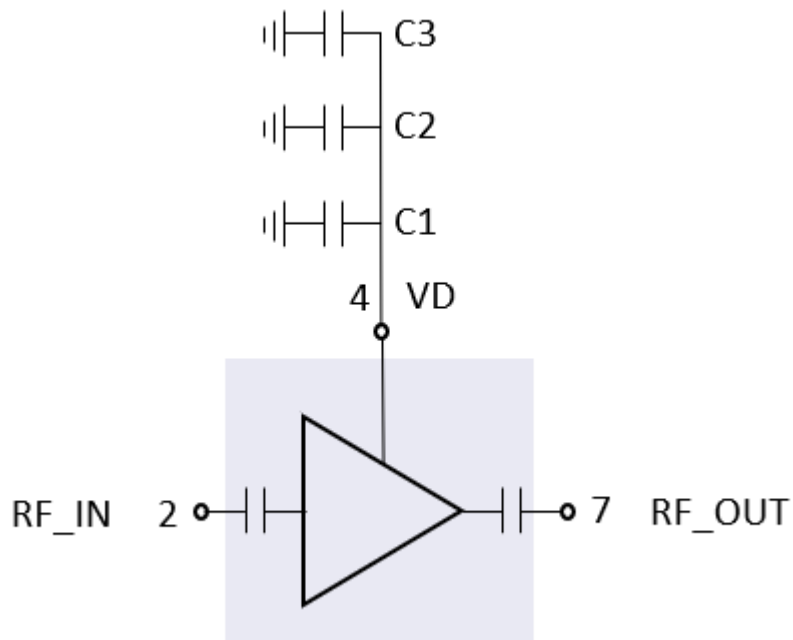


OIP3 VS FREQUENCY

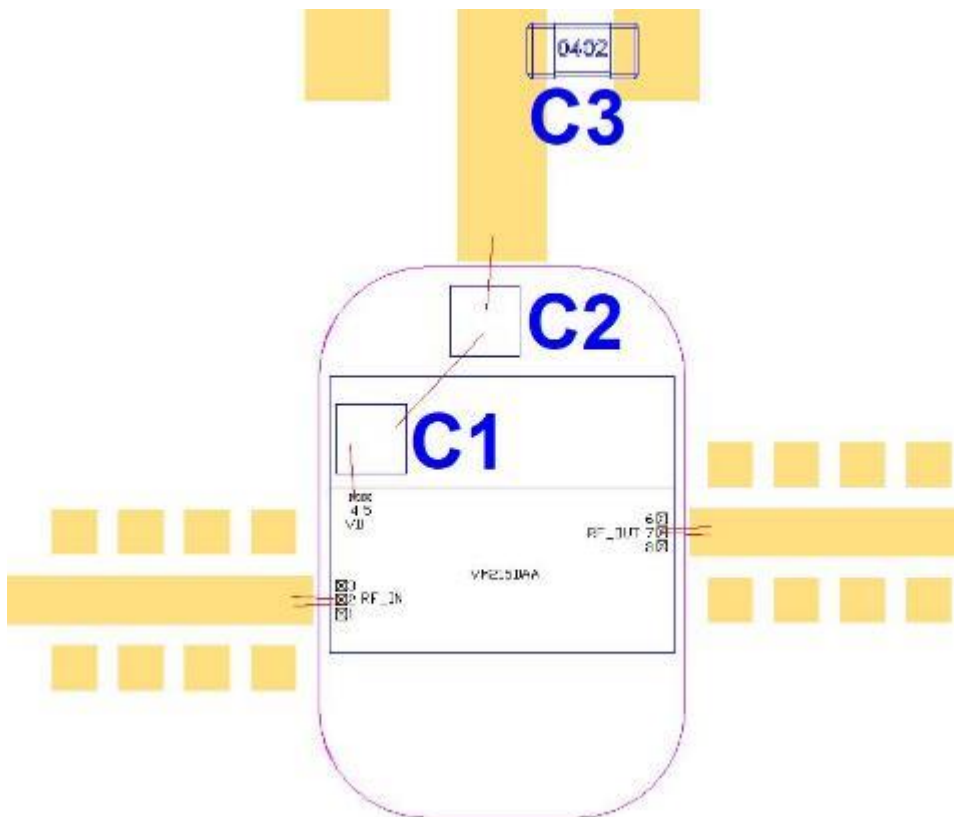
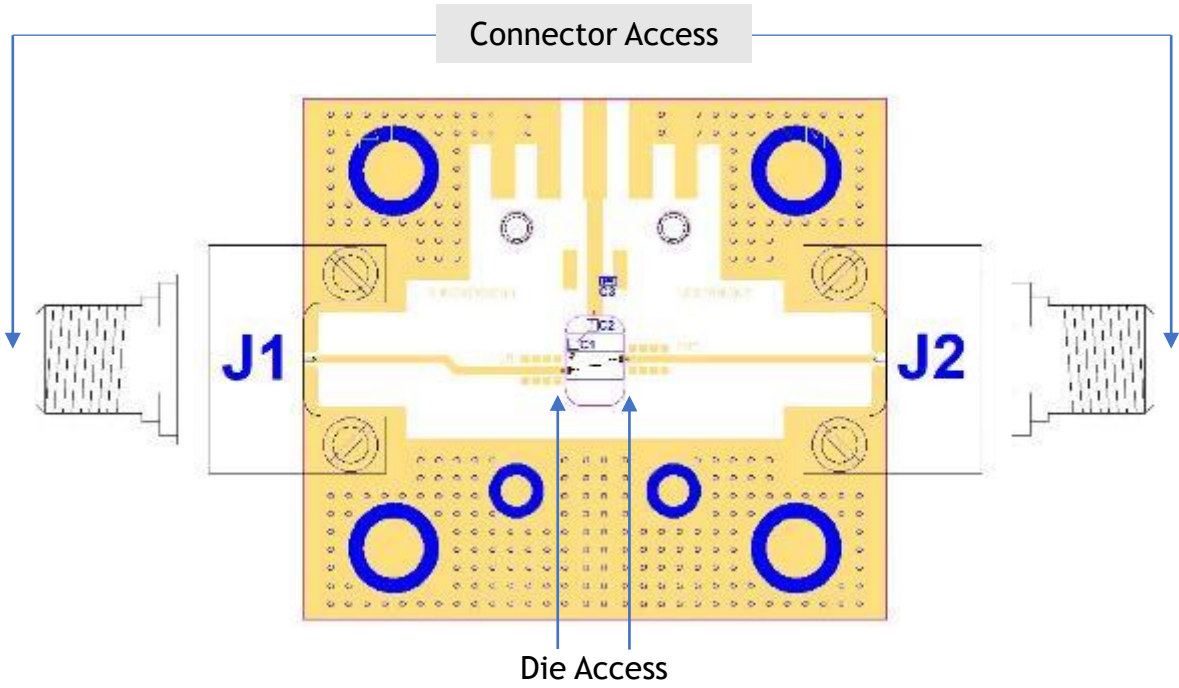


**• Application circuit**

- C1 = 1nF (MIM capacitors)
- C2 = 10nF (MIM capacitors)
- C3 = 1uF

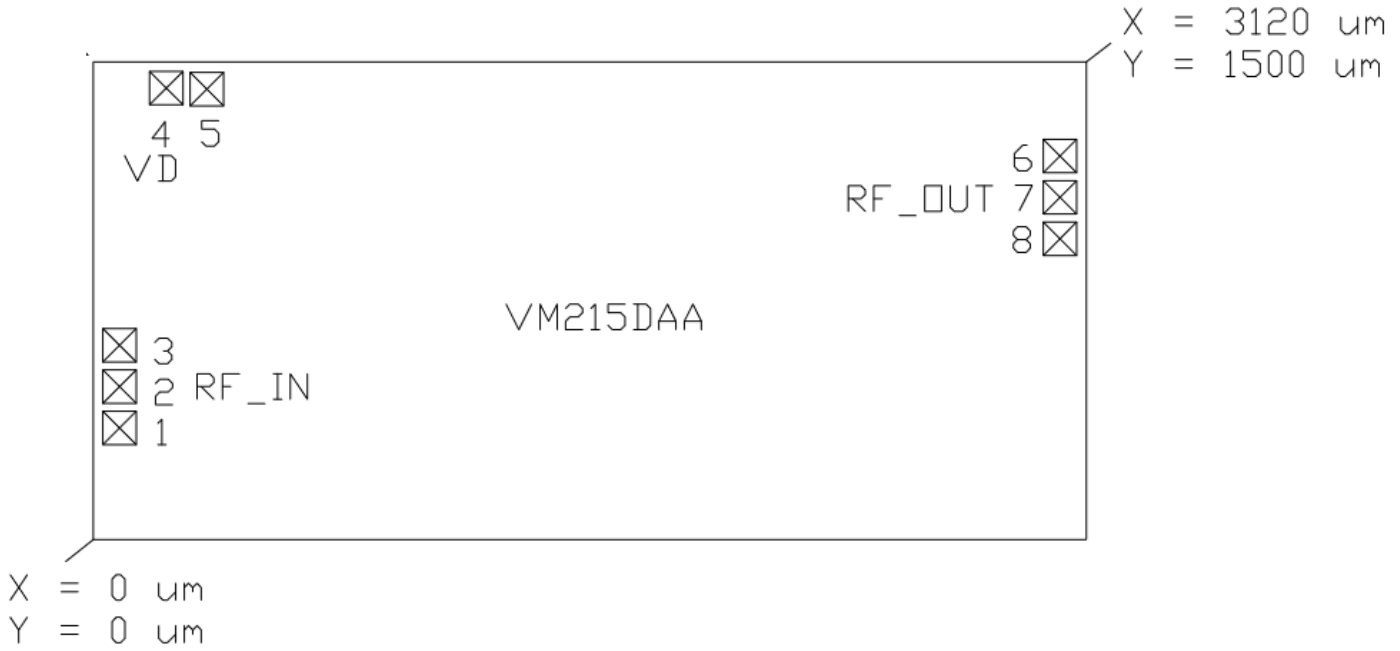


- Evaluation Board (EVB) Layout Assembly





• Die Layout & Pin Out



Pad Number	Pad center		Size $\mu\text{m} \times \mu\text{m}$	Description	
	x( $\mu\text{m}$ )	y( $\mu\text{m}$ )		Name	Function
1	80	350	100x100	GND	
2	80	480	100x100	RFin	RF Input
3	80	610	100x100	GND	
4	230	1415	100x100	V <sub>D</sub>	BIAS +5V
5	357	1415	100x100	GND	
6	3037	945	100x100	GND	
7	3037	1075	100x100	RFout	RF Output
8	3037	1205	100x100	GND	

• Die bottom must be connected to ground (RF and DC)

## • Ordering information

Product Code	Parameter
VM215D	2 to 22GHZ WideBand Amplifier in die form

## • Associated Material

- Packaged die
- Die Evaluation Board (die EVB)
- Packaged die Evaluation Board (packaged die EVB)
- Mechanical files (DXF)
- Measurements files (S2P)

## • Product Compliance Information

### Solderability

Use only AuSn (80/20) solder and limit exposure to temperature above 300 °C during 3-4 minutes, maximum.

### ESD Sensitivity Rating

Test: Human Body Model (HBM)  
Std: JEDEC Standard JESD22-A114



### RoHS-Compliance

This part is compliant with EU 2011/65/EU RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment).

### Other attributes

- Lead Free
- Halogen Free (Chlorine, Bromine)
- Antimony Free
- TBBP-A (C15H12Br4O2) Free
- PFOS Free
- SVHC Free

## • Contact information

For the latest specifications, additional product information, worldwide sales and distribution locations, and information about Vectrawave.

### vectrawave.com

+33 (0)2 57 63 00 20  
contact\_sales@vectrawave.com

### Vectrawave SA

5, rue de Louis de Broglie  
22300 Lannion  
France

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Writer	Reviewer	Edition	Date	Status
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