Vectrawave
RF & Millimeter Wave MMIC Design

2 to 20GHz
WideBand Amplifier

VM215D

General Description

VM215D is a gallium arsenide (AsGa) self-biased amplifier designed specifically with high gain and wide bandwidth capabilities 2-20 GHz 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 is self-biased.

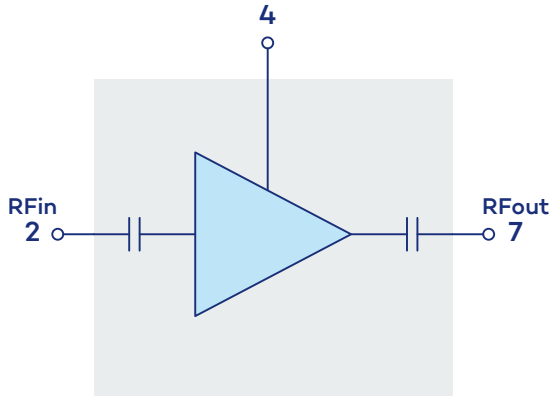
Features

Frequency range	**2 – 20GHz**
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 Assignement & Functional Block Diagram



Function	Pin number
RF in	2
V_D	4
RF out	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		70		mA
V_D	Drain voltage		5		V

Recommended Operating Conditions

Symbol	Parameter	Value	Unit
V_D	Drain voltage	10	V

Absolute Maximum Ratings

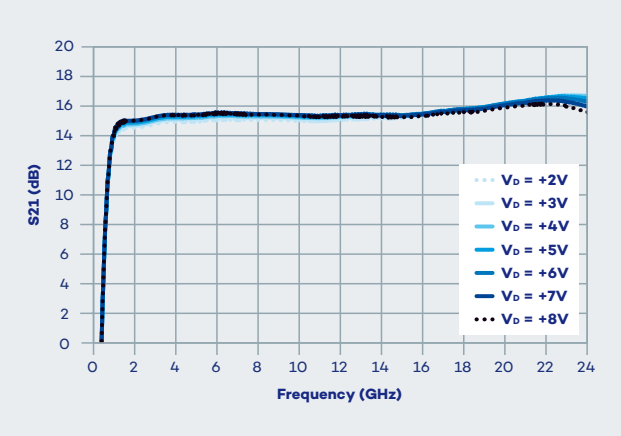
Symbol	Parameter	Value	Unit
V_D	Drain bias voltage	12	V
I_D	Drain bias current	120	mA
Pin	Maximum peak input power overdrive	20	dBm
Tj	Junction temperature	-	°C
Ta	Operating temperature range	-40/+85	°C
Tstg	Storage temperature range	-55/+150	°C

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

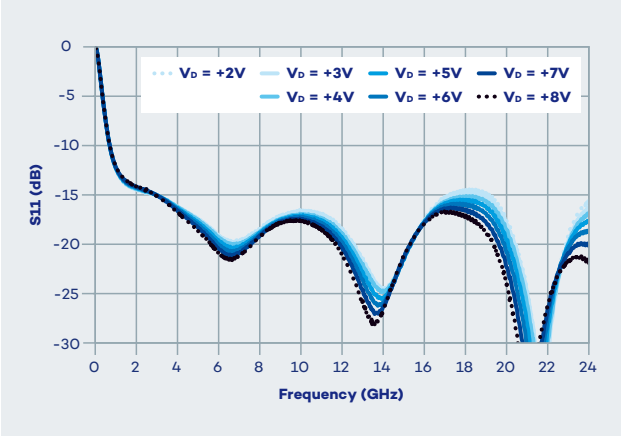
Typical Performance
(Small signal / Test Under Probe)

Test conditions: unless otherwise noted
- Reference plane: die access
- T_{amb} = +25°C
- V_D = +5V

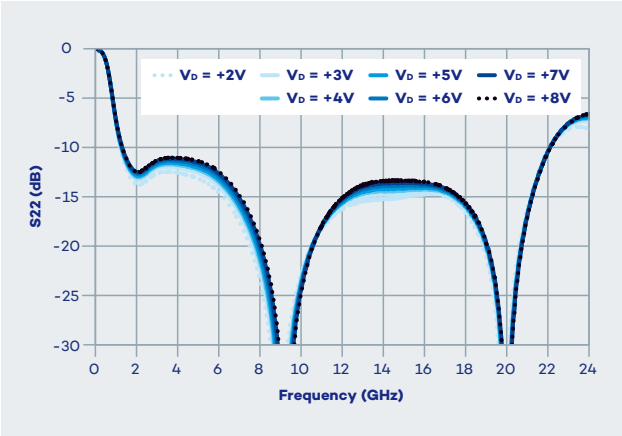
Gain vs Frequency vs V_D



Input Return Loss vs V_D



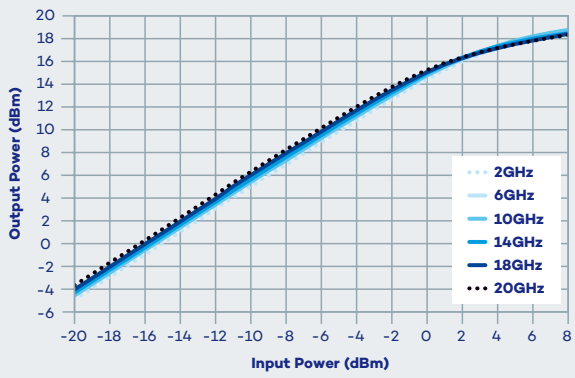
Output Return Loss vs V_D



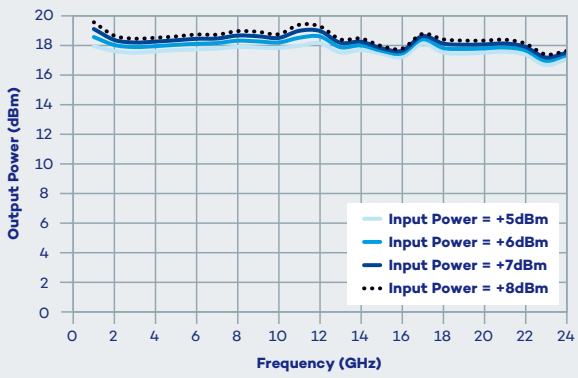
Typical Performance
(Large signal / Test Under Probe)

Test conditions: unless otherwise noted
- Reference plane: die access
- T_{amb} = +25°C
- V_D = +5V

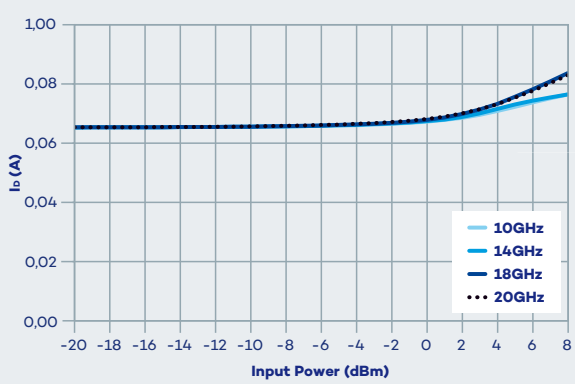
Output Power vs Input Power vs Frequency



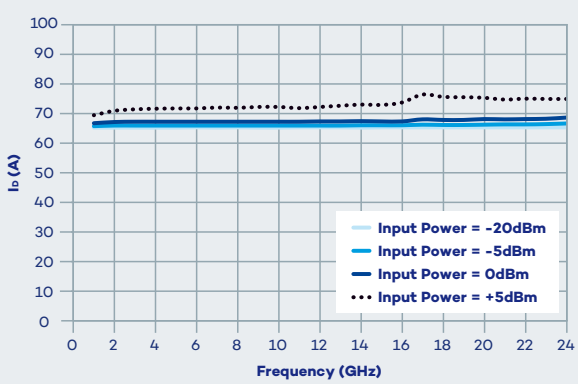
Output Power vs Frequency vs Input Power



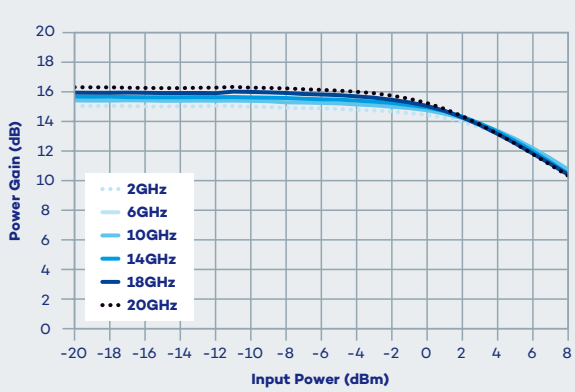
Drain Current vs Input Power vs Frequency



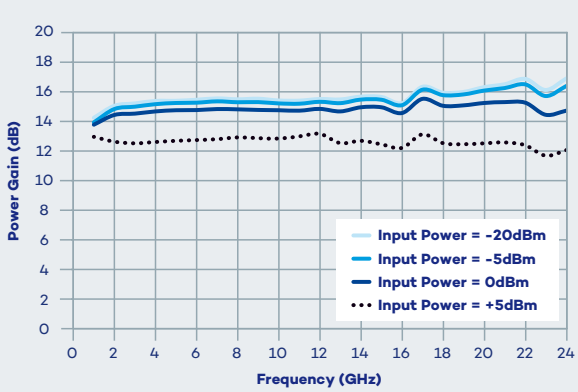
Drain Current vs Frequency vs Input Power



Gain vs Input Power vs Frequency



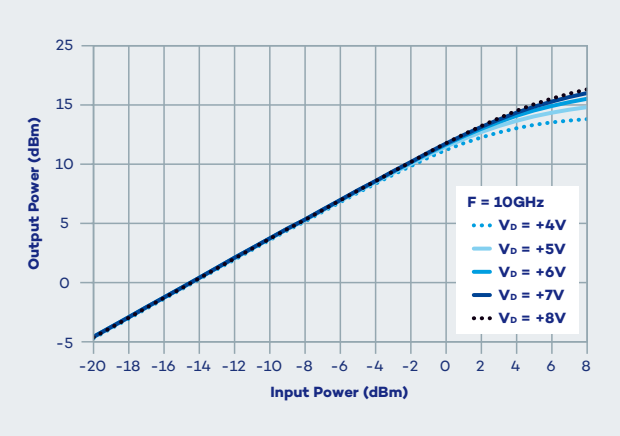
Gain vs Frequency vs Input Power



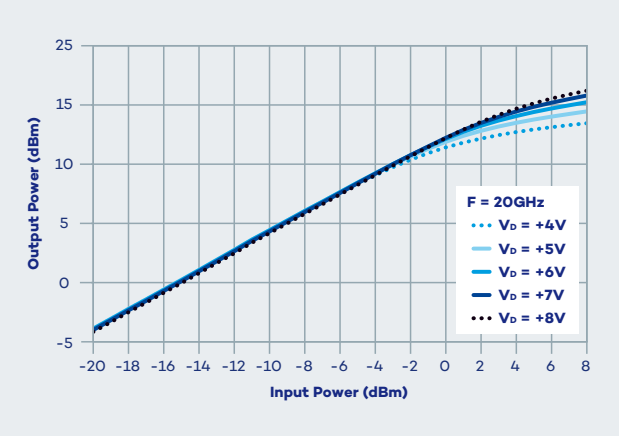
Typical Performance
(Large signal / Test Under Probe)

Test conditions: unless otherwise noted
- Reference plane: die access
- T_{amb} = +25°C
- V_D = +5V
- CW

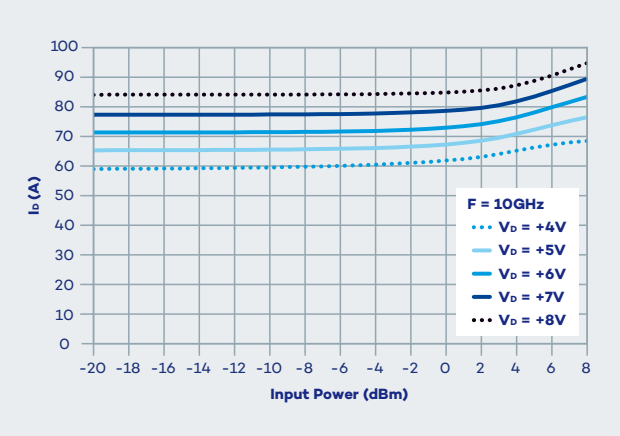
Output Power vs Input Power vs V_D



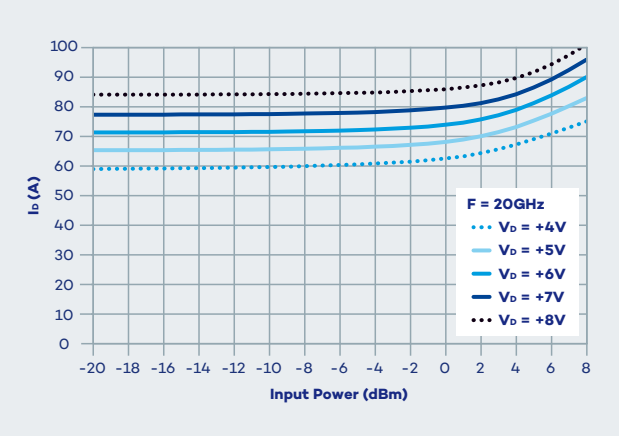
Output Power vs Input Power vs V_D



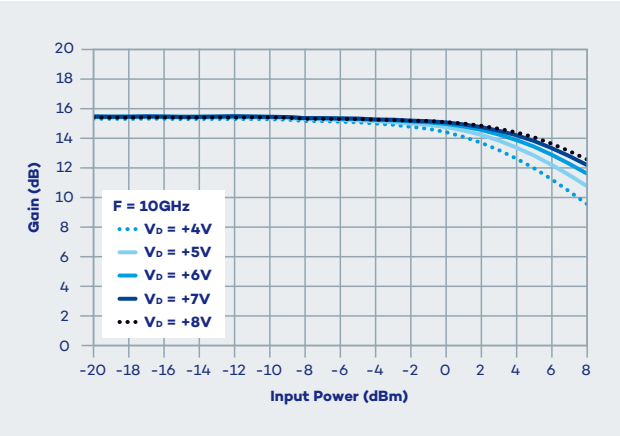
Drain Current vs Input Power vs V_D



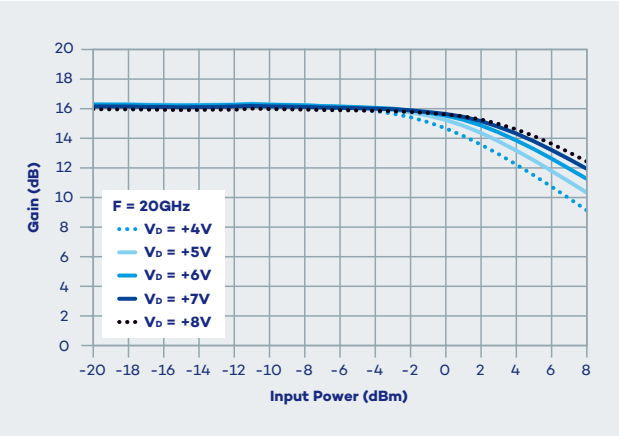
Drain Current vs Input Power vs V_D



Gain vs Input Power vs V_D



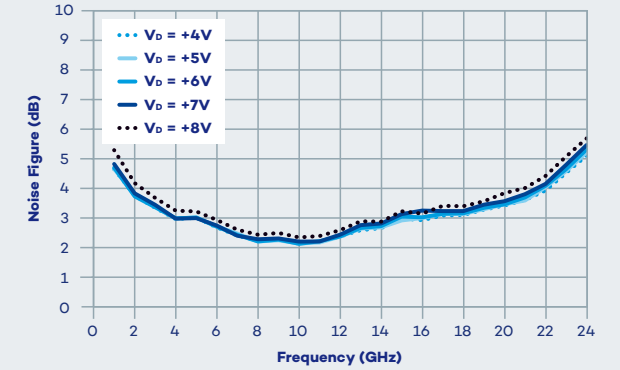
Gain vs Input Power vs V_D



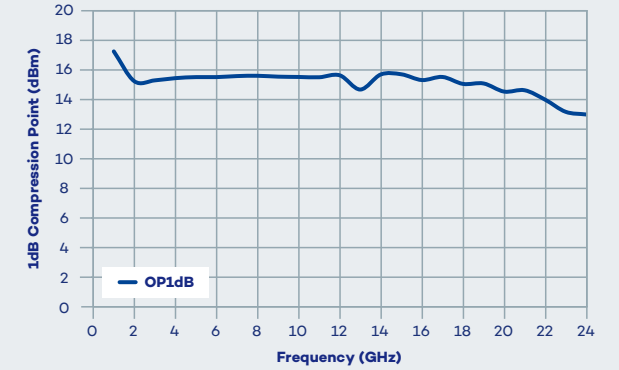
Typical Performance
(Large signal / Test Under Probe)

Test conditions: unless otherwise noted
- Reference plane: die access
- T_{amb} = +25°C
- V_D = +5V
- CW

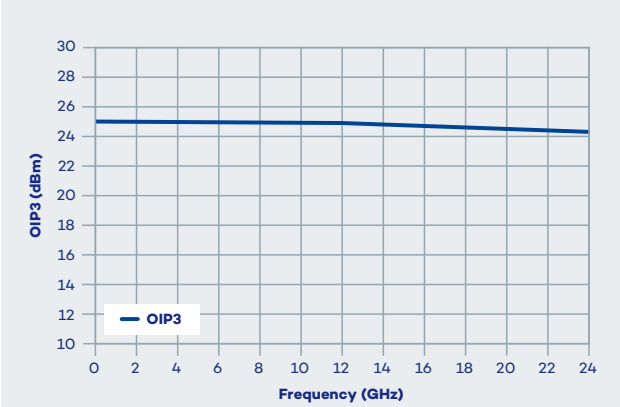
Noise Figure vs Frequency vs V_D



OP1dB vs Frequency

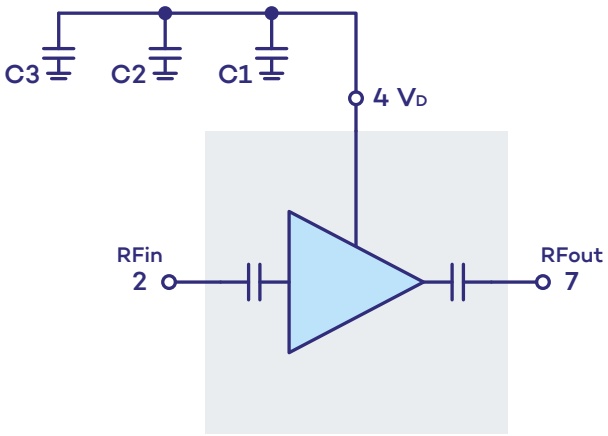


OIP3 vs Frequency

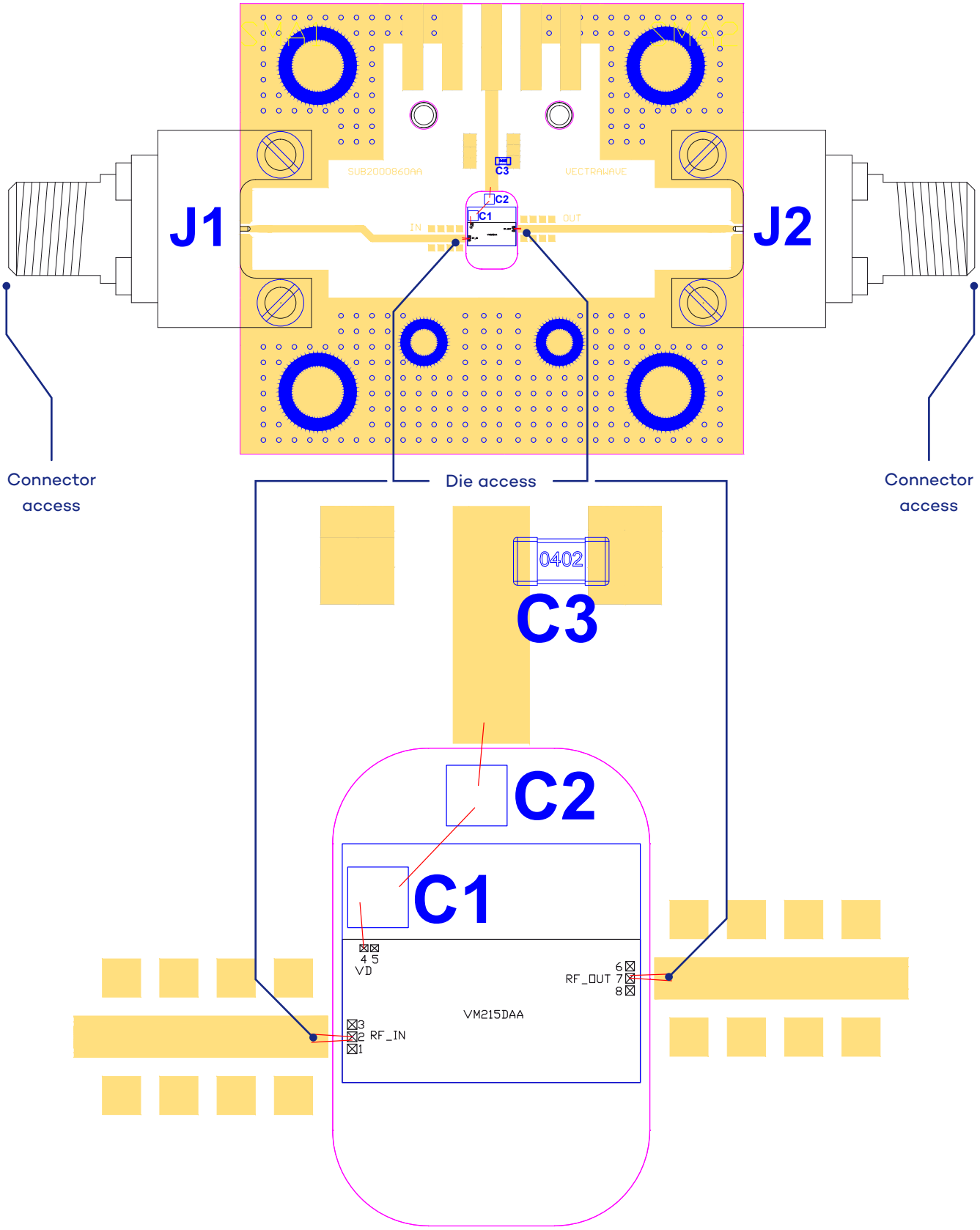


Application circuit

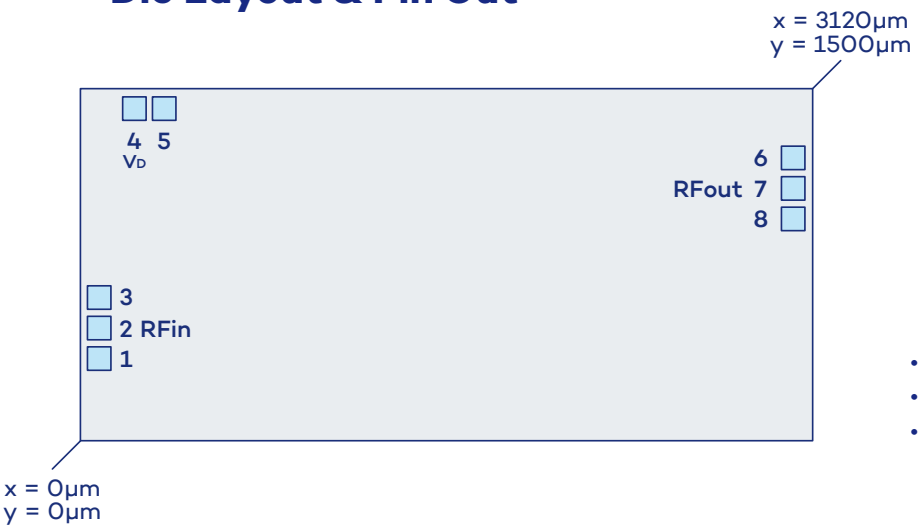
- C1 = 1nF (MIM capacitors)
- C2 = 10nF (MIM capacitors)
- C3 = 1µF



• Evaluation Board (EVB) Layout Assembly



Die Layout & Pin Out



- Die size = 3120µm x 1500µm
- Die thickness = 100µm
- Die size tolerance = 50µm

Pad number	Pad center X (µm)	Pad center Y (µm)	Size (µm x µm)	Name	Function
1	80	350	100 x 100	Gnd	
2	80	480	100 x 100	RFin	RF Input
3	80	610	100 x 100	Gnd	
4	230	1415	100 x 100	V_D	Bias +5V
5	357	1415	100 x 100	Gnd	
6	3037	1205	100 x 100	Gnd	
7	3037	1075	100 x 100	RFout	RF Output
8	3037	945	100 x 100	Gnd	

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

Ordering information

Product Code	Parameter
VM215D	2 to 20GHz WideBand Amplifier in die form

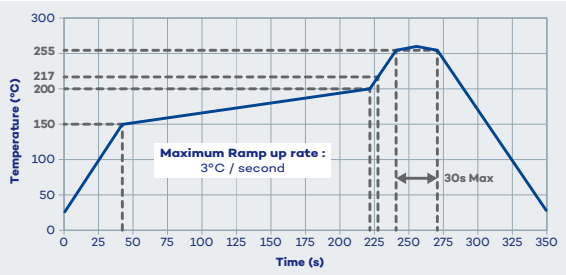
Associated Material

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

Product Compliance Information

Solderability

Solder Stencil thickness: 127µm
Solder: SAC 305 (ROHS)
Temperature profile example: maximum recommended reflow profile (leadfree)



ESD Sensitivy 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 (C15H12Br402) Free
- PFOS Free
- SVHC Free

Contact information

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

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