

VM205D

Preliminary Product Specification

General Description

The VM205D is 3 stage Low-Noise amplifier MMIC operating in the frequency range 27 to 32 GHz.

The device has a linear gain of 26 dB and a typical noise figure of 1.3 dB. Output RF power is 19 dBm for a biasing current of 78 mA at +3.5V supply voltage.

It is manufactured with a 100nm pHEMT GaAs process and is especially suited for radar and for telecommunication applications.

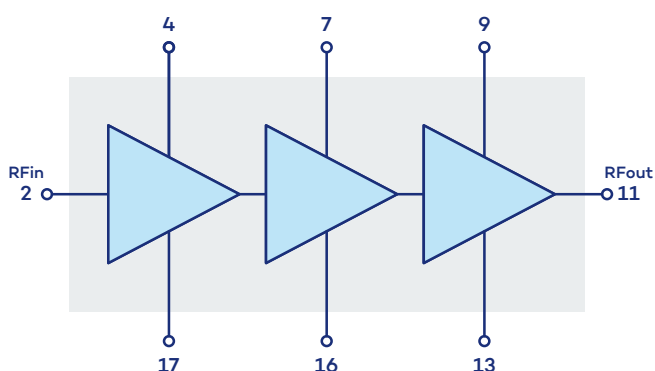
Features

Frequency range	27 – 32GHz
Gain	26dB
Noise figure	1.3dB
P1dB	19dBm
Gain Flatness	+/- 1dB
Input Return Loss	-10dB typ.
Output Return Loss	-10dB typ.
Power supply	78mA @V_D = +3.5V, V_G = -0.58V typ.
Die size	1.2 x 2.4 x 0.1 (mm)

Applications

- Radar
- Test and Measurement
- Telecommunications

Pins Assignment & Functional Block Diagram



Function	Pin number
RF in	2
V _{D1}	4
V _{D2}	7
V _{D3}	9
RF out	11
V _{G3}	13
V _{G2}	16
V _{G1}	17

• Electrical Specifications

Operating conditions: unless otherwise noted

$$V_D = V_{D1} = V_{D2} = V_{D3} = +3.5V$$

$$V_G = V_{G1} = V_{G2} = V_{G3} = -0.58V$$

$$I_D = I_{D1} + I_{D2} + I_{D3} = 78mA$$

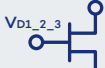
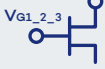
Symbol	Parameter	Min	Typ	Max	Unit
F	Frequency range	27		32	GHz
G	Linear gain		26		dB
P1dB	Output power @1dB gain compression		19		dBm
Psat	Output saturated power		21		dBm
NF	Noise Figure		1.3		dB
PAE	Power Added Efficiency		28		%
S11	Input return loss		-10		dB
S22	Output return loss		-10		dB
$V_{D1/2/3}$	Operating supply voltage		+3.5		V
I_D	Supply current		78		mA

• Absolute Maximum Ratings

Symbol	Parameter	Min	Max	Unit
V_D	Drain voltage		+8	V
I_D	Supply current	0	190	mA
V_G	Gate voltage	-2	0	V
P_{in}	CW input power		+10	dBm
T_{st}	Storage temperature	-55	+125	°C
T_{op}	Operating temperature	-40	+85	°C
T_{ch}	Channel temperature		+150	°C

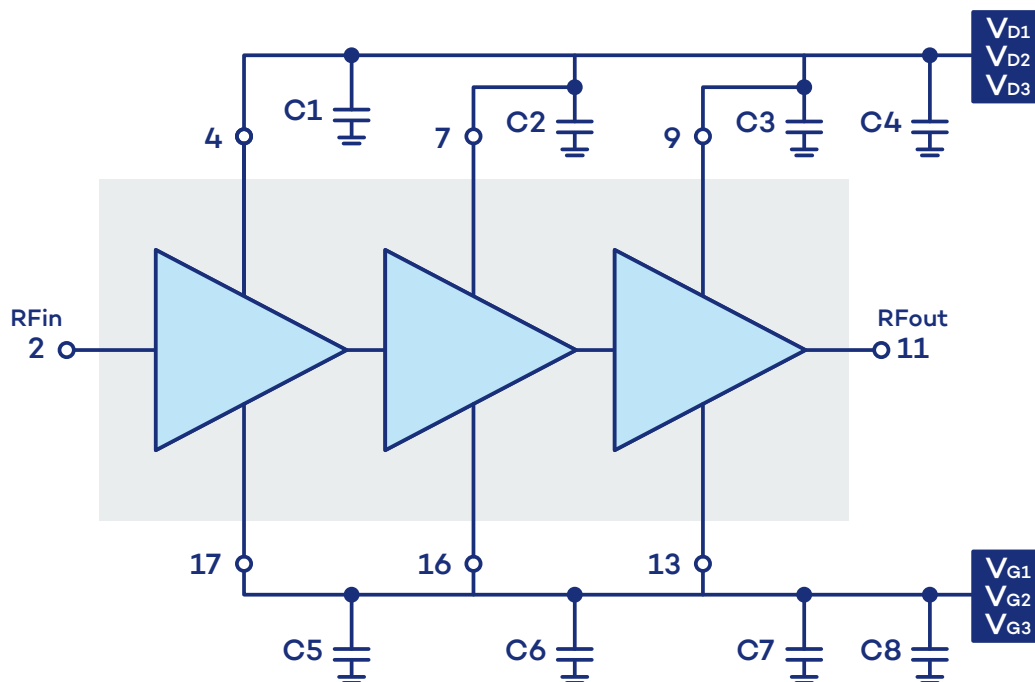
Operation of this device above any of these parameters may cause permanent damage.

Pin description

Pin number	Name	Description	Electrical interface
2	RF in	AC coupled, amplifier input access. Internally matched 50Ω.	
11	RF out	AC coupled amplifier output access. Internally matched 50Ω.	
4, 7, 9	V _{D1} , V _{D2} , V _{D3}	1 st , 2 nd and 3 rd stage drain biasing access.	
17, 16, 13	V _{G1} , V _{G2} , V _{G3}	1 st , 2 nd and 3 rd stage gate biasing access.	
Die Bottom	Gnd	Die Bottom must be connected to RF and DC Ground.	

Application circuit

- C1, C2, C3, C5, C6, C7 = 100 pF MIM Capacitor (close to the die)
- C4 & C8 = 1μF
- RF_{in} and RF_{out}: 1 Gold Wire (25μm diameter Au)



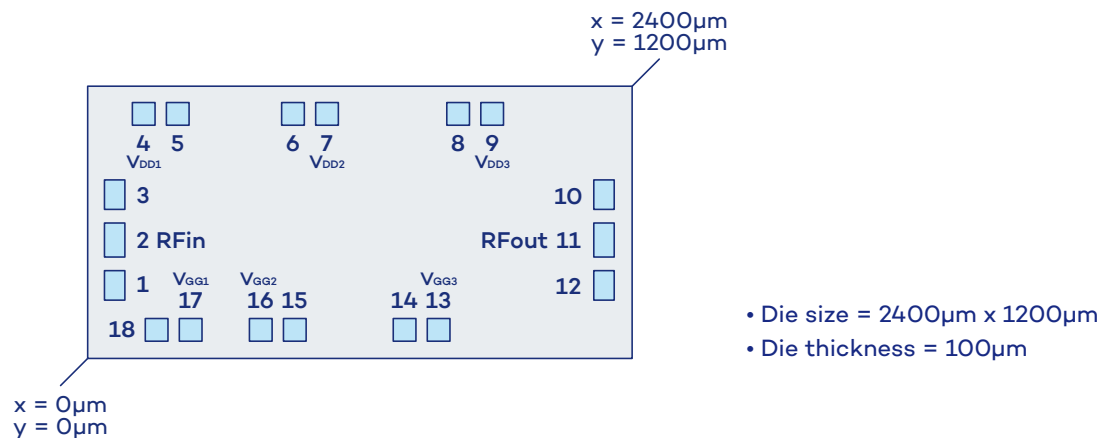
Bias-up procedure

1. Set V_{G1}, V_{G2} and V_{G3} to -1V,
2. Set V_{D1}, V_{D2} and V_{D3} to +3.5V.
3. Increase V_{G1}, V_{G2} and V_{G3} to obtain I_D = 78mA
(V_G = -0.58V Typ.),
4. Turn on RF signal

Bias-down procedure

1. Turn off RF signal
2. Decrease V_{G1}, V_{G2} and V_{G3} to -1V,
3. Decrease V_{D1}, V_{D2} and V_{D3} to 0V,
4. Set V_{G1}, V_{G2} and V_{G3} to 0V

• Die Layout & Pin Out



Pad number	X (µm)	Pad center Y (µm)	Size (µm x µm)	Name	Function
1	119	322	90 x 130	Gnd	
2	119	522	90 x 150	RFin	RF Input
3	119	722	90 x 130	Gnd	
4	247	1078	100 x 100	V _{DD1}	Drain Bias
5	397	1078	100 x 100	Gnd	
6	905	1078	100 x 100	Gnd	
7	1055	1078	100 x 100	V _{DD2}	Drain Bias
8	1633	1078	100 x 100	Gnd	
9	1783	1078	100 x 100	V _{DD3}	Drain Bias
10	2276	722	90 x 130	Gnd	
11	2276	522	90 x 150	RFout	RF Output
12	2276	322	90 x 130	Gnd	
13	1547	126	100 x 100	V _{GG3}	Gate Bias
14	1397	126	100 x 100	Gnd	
15	913	126	100 x 100	Gnd	
16	763	126	100 x 100	V _{GG2}	Gate Bias
17	454	126	100 x 100	V _{GG1}	Gate Bias
18	304	126	100 x 100	Gnd	

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

• Ordering information

Product Code	Parameter
VM205D	27 to 32GHz - 26dB - 1.3dB NF Low Noise 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.

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