MMG-121543-M5 20 Watt 1.2-1.5 GHz GaN Power Amplifier

FEATURES

- **Psat: +43dBm**
- **PAE: 50%**
- **Power Gain @ Psat: 24.5dB**
- **Small Signal Gain: 28.5dB**
- **QFN Package: 5.0 mm x 5.0 mm**

Testing conditions: Pulsed RF signal with 1ms pulse width and 20% duty cycle

DESCRIPTION

The MMG-121543-M5 is a high performance Gallium Nitride (GaN) power amplifier. The MMG-121543-M5 provides >20W of saturated output power, 50% power-added efficiency and 24.5 dB of large-signal gain between 1.2 GHz and 1.5 GHz. The RF input and RF output are matched to 50 ohms. Ideal applications include wireless mesh networks, point-to-point microwave data links, military wireless communications, telemetry, and avionics.

TYPICAL RF PERFORMANCE

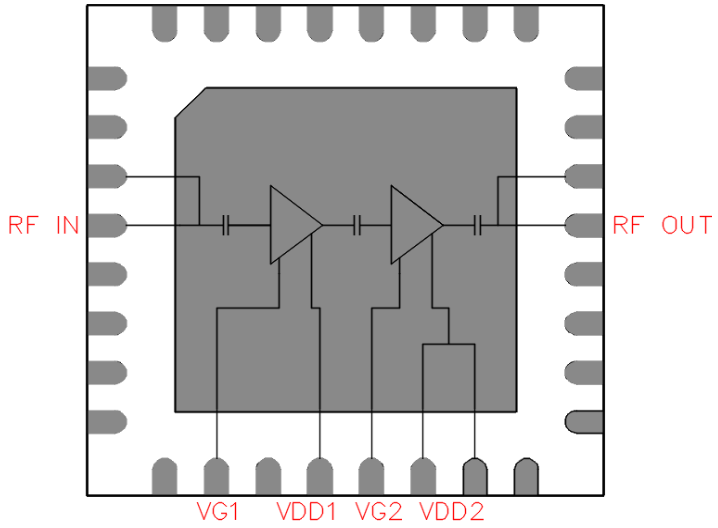
VDD1 = 12V, VDD2 = 28V, IDQ1 = 29mA, IDQ2 = 92mA, VG1 = -2.46V, VG2 = -2.44V, Ta = 25 ºC, Z0 = 50ohm

PARAMETER	UNITS	TYPICAL DATA
Frequency Range	GHz	1.2 - 1.5
Gain (Typ / Min)	dB	28.5
Gain Flatness (Typ /Max)	+/-dB	0.4
Input Return Loss	dB	11
Output Return Loss	dB	13
Output Psat	dBm	43
PAE	%	> 47
EVM @ Pout of 35dBm or below	%	< 5
Operating Current Range	mA	See plot on page 2
Thermal Resistance	ºC/W	4

APPLICATIONS

- **Wireless Mesh Networks**
- **Point-to-Point Microwave Data Links**
- **Military Wireless Communications**
- **Telemetry**
- **Avionics**

FUNCTIONAL DIAGRAM



ABSOLUTE MAXIMUM RATINGS

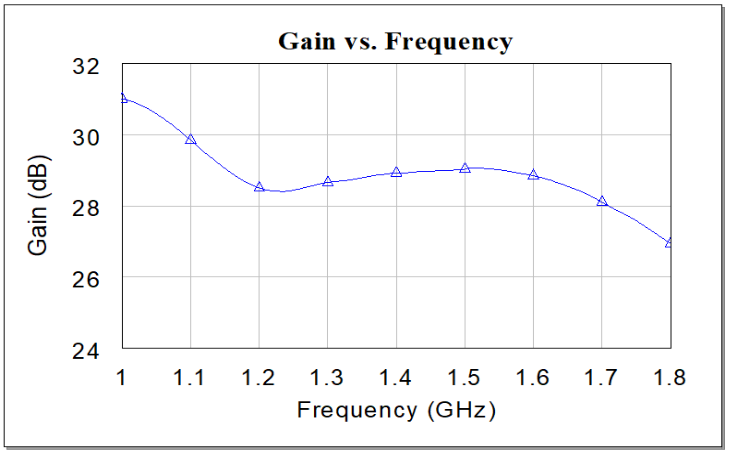
Ta=25 ºC

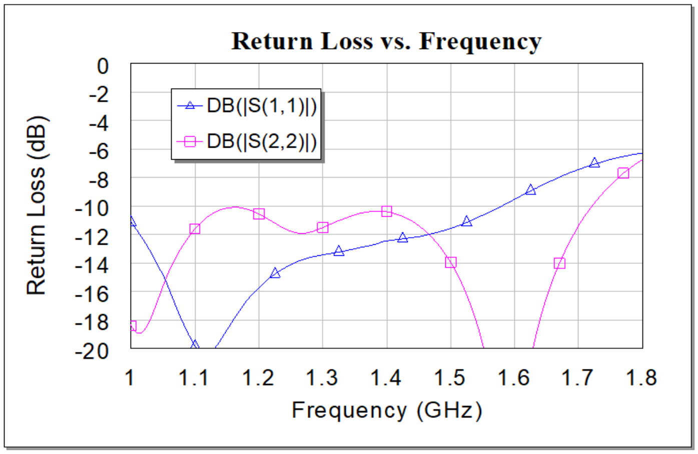
SYMBOL	PARAMETERS	UNITS	MAX
Vds	Drain to Source Voltage	V	50
Vgs	Gate to Source Voltage	V	10
Idd1	Drain Current of 1st Stage	mA	800
Idd2	Drain Current of 2nd Stage	mA	1500
Ig1	Gate Current of 1st Stage	mA	3
Ig2	Gate Current of 2nd Stage	mA	6
Pdiss	DC Power Dissipation	W	46
Pin max	Max RF Input Power	dBm	+20
Tch	Channel Temperature	ºC	210
Tstg	Storage Temperature	ºC	-55 to 150

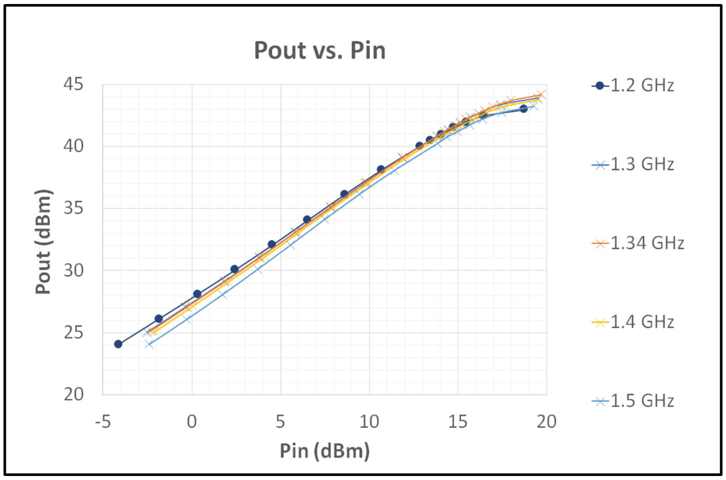
Exceeding any of these limits may cause permanent damage.

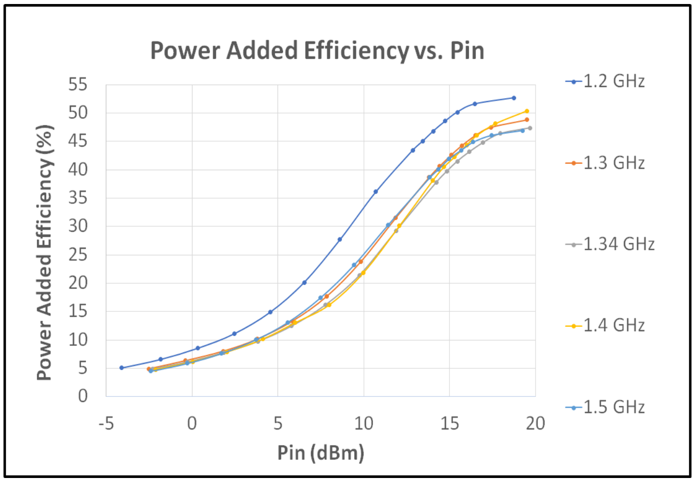
TYPICAL RF PERFORMANCE

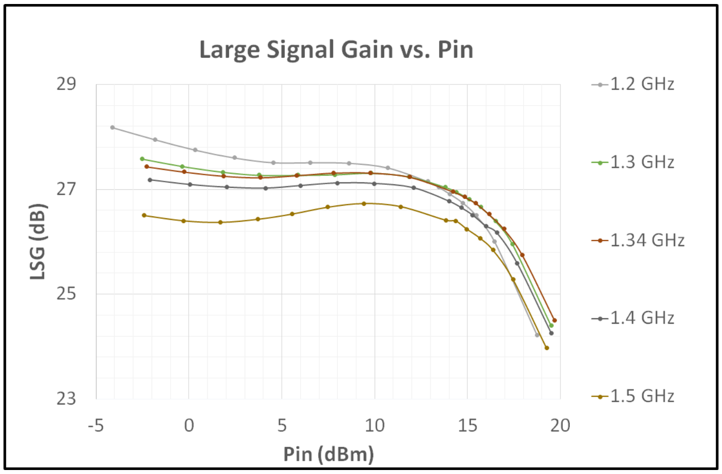
Test conditions unless otherwise noted: VDD1 = 12V, VDD2 = 28V, VG1 = -2.46V, VG2 = -2.44V, IDQ1 = 29mA, IDQ2 = 92mA, Ta = 25˚C, Z0 = 50ohm

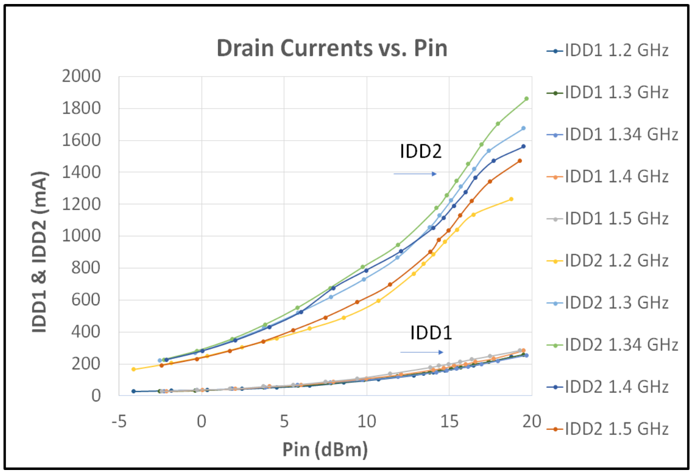






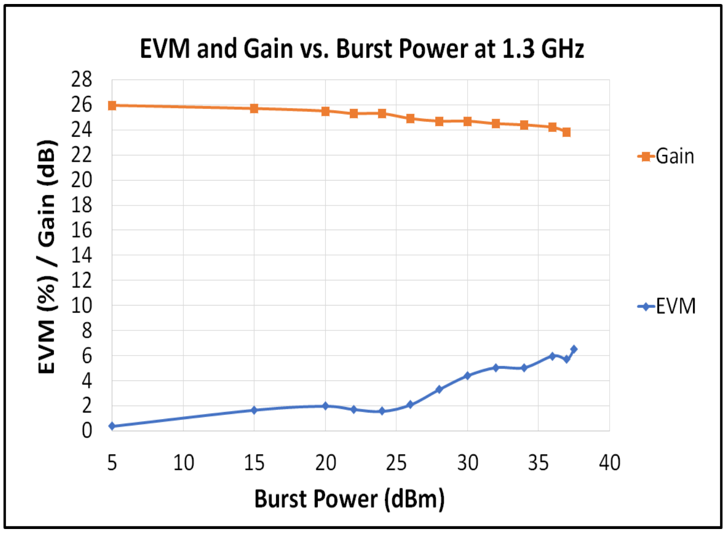


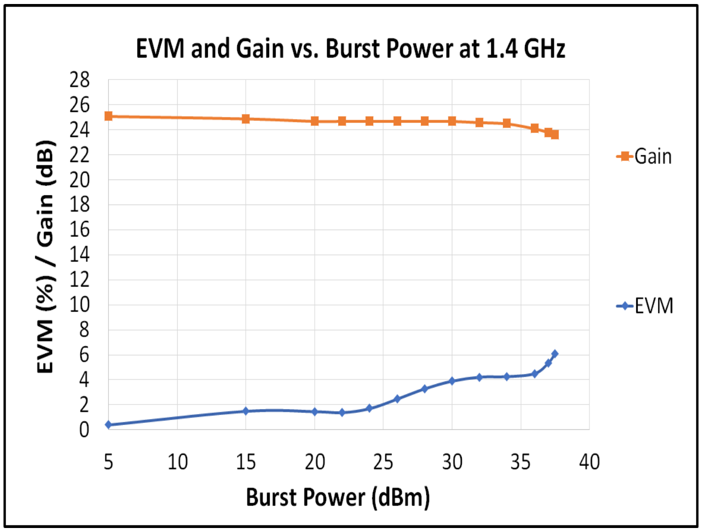




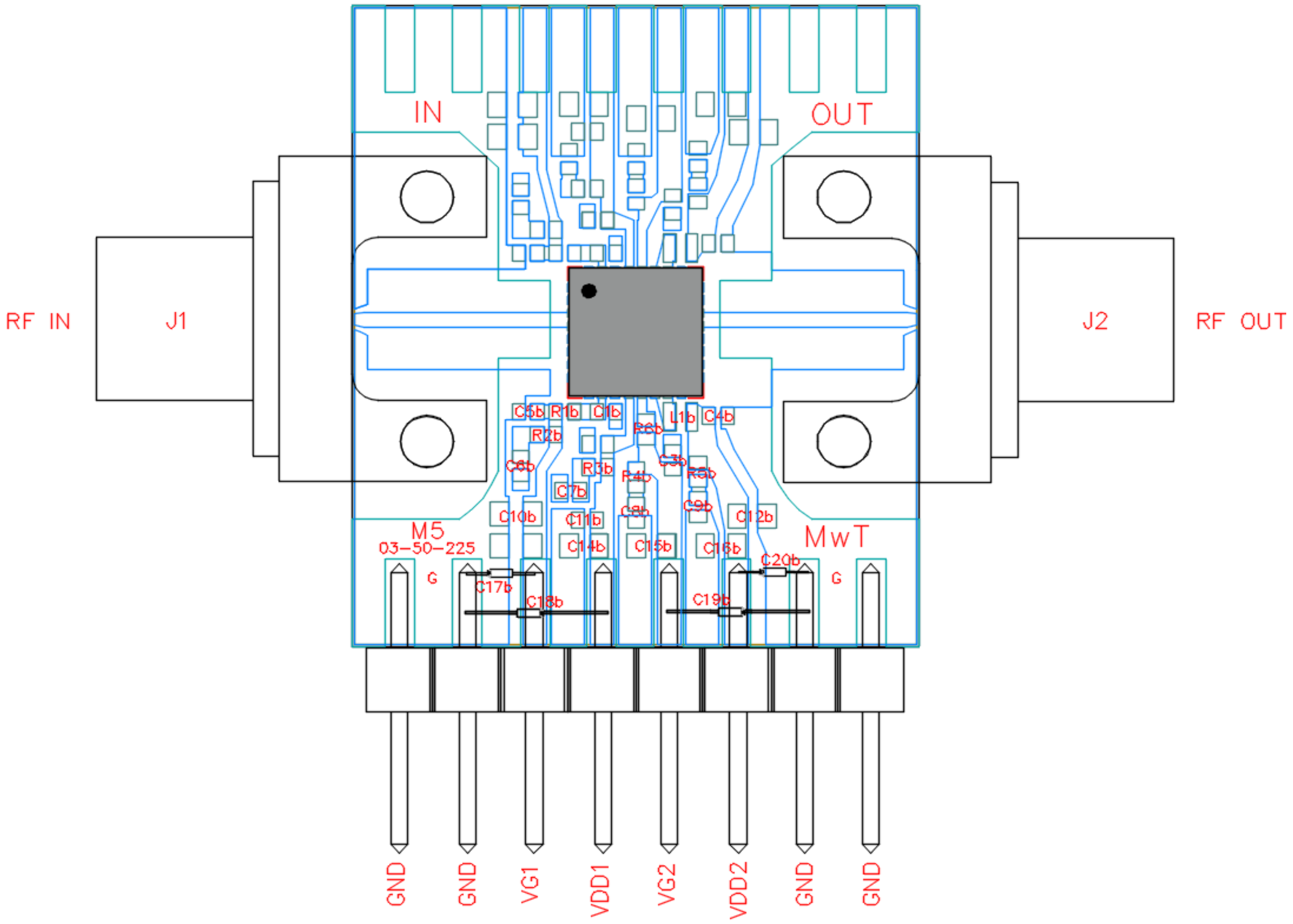
TYPICAL RF PERFORMANCE

Test conditions unless otherwise noted: VDD1 = 12V, VDD2 = 28V, VG1 = -2.48V, VG2 = -2.44V, IDQ1 = 23mA, IDQ2 = 92mA, Ta = 25˚C, Z0 = 50ohm, Wifi source: 802.11 64QAM3/4





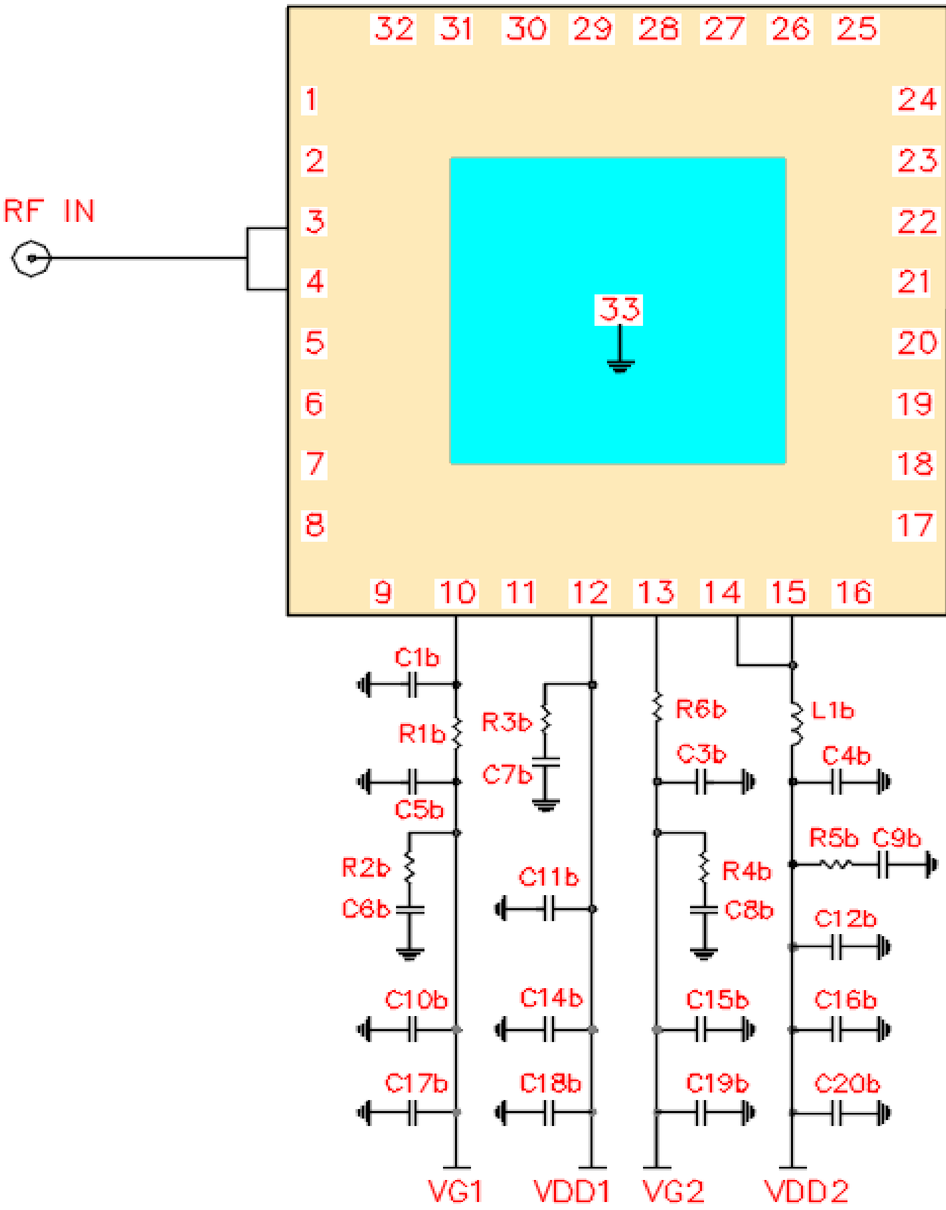
Evaluation Board



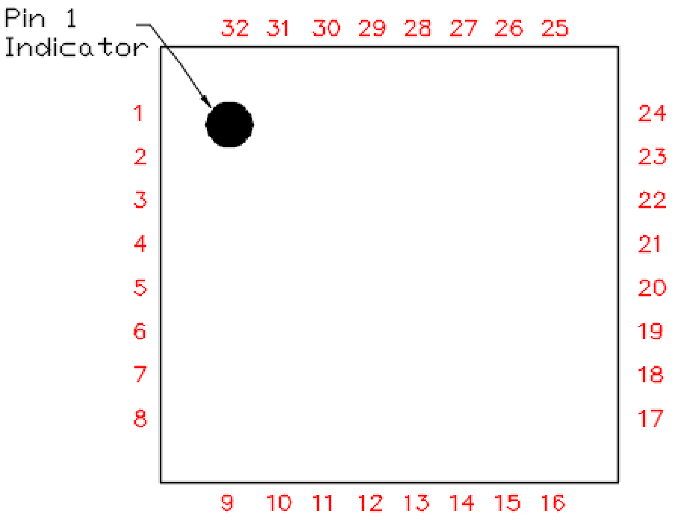
Bill of Materials

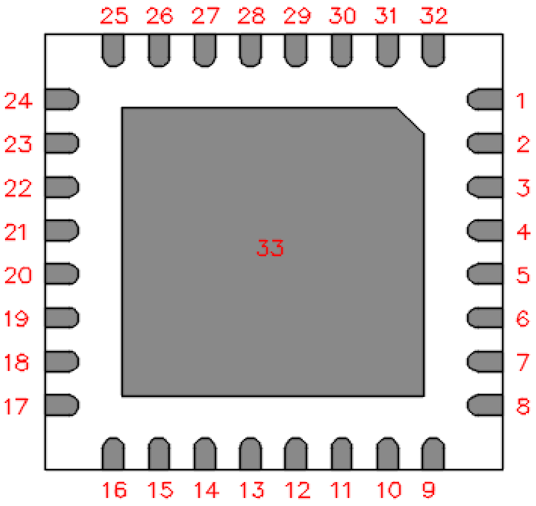
Reference	Value	Description	Manufacturer	Part Number
C1b	9 pF	CAP, 1.1%, 50V, C0G/NP0, 0402	Various	
C3b, C6b, C7b,	1000 pF	CAP, 10%, 50V, X7R, 0402	Various	
C4b	15 pF	CAP, 5%, 50V, C0G/NP0, 0402	Various	
C5b	100 pF	CAP, 5%, 50V, NPO, 0402	Various	
C8b, C12b	0.1 uF	CAP, 10%, 50V, X8L, 0402	Various	
C9b	10 pF	CAP, 5%, 50V, NP0, 0402	Various	
C10b, C11b, C14b, C15b,	1 uF	CAP, 10%, 35V, X5R, 0603	Various	
C16b C17b, C18b, C19b, C20b	1 uF	CAP, 10%, 50V, TANT, AXIAL	Various	M39003/01-2356
R1b, R6b	50 Ohm	RES, 5%, 0.0625W, 0402	Various	
R2b, R3b, R4b, R5b	10 Ohm	RES, 5%, 0.2W, 0402	Various	
L1b	1.9 nH	IND, 5%, 0403, Ceramic Chip	Coilcraft	0403HQ-1N9XJEW
J1, J2 (Connector)		SMA Female End Launch	Southwest Microwave	292-06A-6
03-50-225 (PCB)		RO4350B, 0.254mm Thick	Various	

Schematic of Bias Circuit



Pin Layout

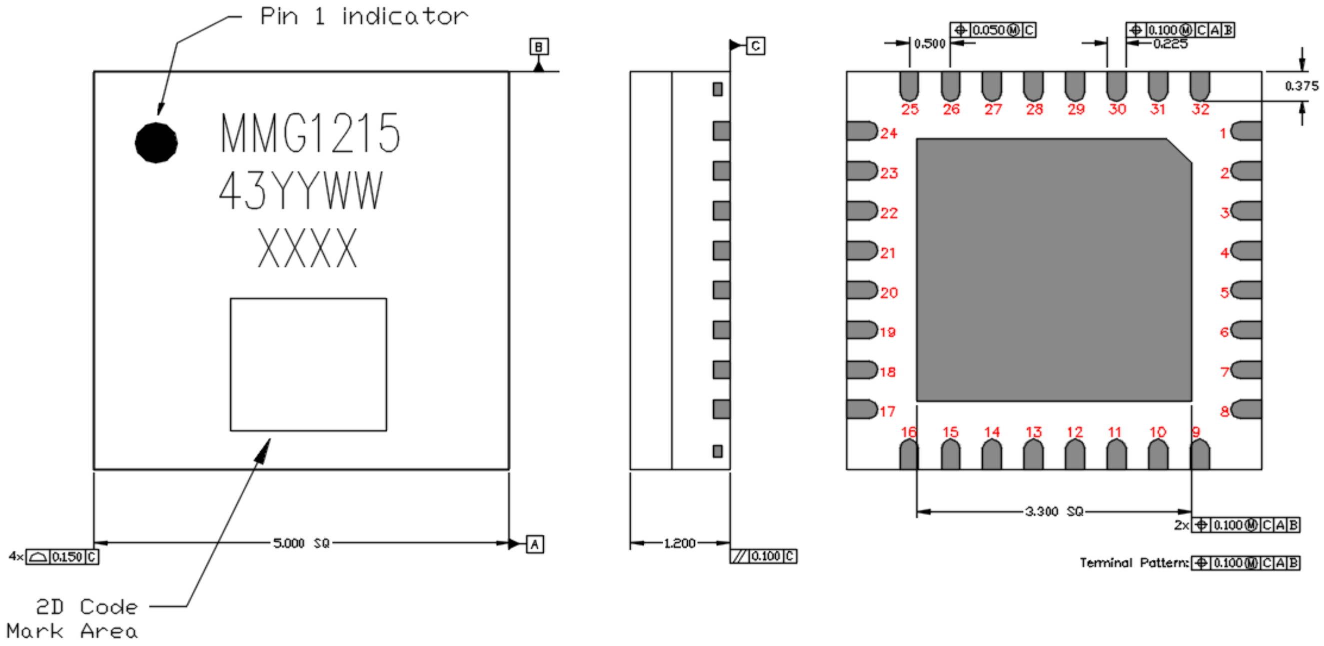




Pin Description

Pin Number	Symbol	Description
1, 2, 5-9, 11, 16-20, 23-32	NC	No connection inside of package.
3, 4	RF IN	RF input, 50 Ohms, DC blocked
21, 22	RF OUT	RF output, 50 Ohms, DC blocked
10	VG1	Gate voltage of 1st stage. Biasing circuitry required
12	VDD1	Drain voltage of 1st stage. Biasing circuitry required
13	VG2	Gate voltage of 2nd stage. Biasing circuitry required
14, 15	VDD2	Drain voltage of 2nd stage. Biasing circuitry required
33	GND	Center ground

Mechanical Information



Notes:

1. All dimensions are in millimeters
2. Markings:
   Line 1: MMG1215
   Line 2: 43YYWW: YY for the last two digits of the year and WW for the work week
   Line 3: XXXX (Lot code)
   Line 4: 2D code for XXXX (Lot code) from line 3
3. Plating of the Package
   Ni: 0.5um. MIN.
   Pd: 0.02um. MIN.
   Au: 0.05um. MAX.

Contact Information

For additional information please visit www.cmlmicro.com or contact a sales office.

Europe	**America**	**Asia**
• Maldon, UK • Tel +44 (0) 1621 875500 • sales@cmlmicro.com	• Winston-Salem, NC • Tel +1 336 744 5050 • us.sales@cmlmicro.com	• Singapore • Tel +65 6288129 • sg.sales@cmlmicro.com