



Mini-Circuits

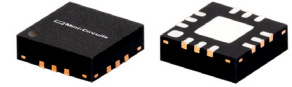
HIGH GAIN, LOW NOISE

Monolithic Amplifier **PMA3-313GLN+**

50Ω 26.5 to 31 GHz

THE BIG DEAL

- High Gain 18.2 dB at 30 GHz
- Excellent Gain Flatness, ± 1 dB from 26.5 to 31 GHz
- Low NF, 2.4 dB at 30 GHz
- P1dB, 11 typ. at 30 GHz
- OIP3, 23.4dBm typ. at 30 GHz
- Built-In Bias Tee and DC Blocks
- Patent pending



Generic photo used for illustration purposes only

CASE STYLE: DQ1225

+RoHS Compliant

The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

APPLICATIONS

- 5G
- Fixed Satellite
- Mobile

PRODUCT OVERVIEW

The PMA3-313GLN+ is a PHEMT based high gain, low noise MMIC amplifier with a unique combination of high gain, excellent gain flatness and low noise figure, making it ideal for using as the first stage driver amplifier of receiver applications. This design operates on a single 4V supply, is matched to 50Ω and comes in a tiny plastic package (3 x 3 x 0.89mm), accommodating dense circuit board layouts.

KEY FEATURES

| Feature | Advantages |
|-------------------------------|---|
| Low noise, 2.4 dB at 30 GHz | Enables lower system noise figure performance. |
| High Gain, 18.2 dB at 30 GHz | Enables signal amplification without the need for multiple gain stage, minimizing the effect of subsequent stages on noise figure. |
| Excellent Gain Flatness | Typical ± 1 dB gain flatness across the entire frequency range minimizes the need for external equalizer networks, making it a great fit for instrumentation and EW applications. |
| Built-in Bias Tee & DC Blocks | Minimizes the external component count & PC board space, making it less expensive and user friendly for system designers. |
| 3 x 3mm 12-lead MCLP package | Tiny footprint saves space in dense layouts while providing low inductance, repeatable transitions, and excellent thermal contact to the PCB. |

*Electrical maximum ratings are not intended for continuous normal operation.

REV. C
ECO-011519
PMA3-313GLN+
GY/RS/CP/AM
220120



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ELECTRICAL SPECIFICATIONS¹ AT 25°C, VS=4V AND R1=18Ω, UNLESS NOTED OTHERWISE

| Parameter | Condition (GHz) | Vs=4.0V | | | Units |
|---|-----------------|---------|------|------|-------|
| | | Min. | Typ. | Max. | |
| Frequency Range | | 26.5 | | 31 | GHz |
| Noise Figure | 26.5 | | 2.0 | | dB |
| | 27.5 | | 2.1 | | |
| | 30 | | 2.4 | | |
| | 31 | | 2.6 | | |
| Gain | 26.5 | 17.0 | 19.9 | 25.1 | dB |
| | 27.5 | 16.1 | 19.1 | 23.9 | |
| | 30 | 14.5 | 18.2 | 23.9 | |
| | 31 | | 17.8 | — | |
| Input Return Loss | 26.5 | | 8 | | dB |
| | 27.5 | | 8 | | |
| | 30 | | 8 | | |
| | 31 | | 8 | | |
| Output Return Loss | 26.5 | | 8 | | dB |
| | 27.5 | | 7 | | |
| | 30 | | 9 | | |
| | 31 | | 9 | | |
| Output Power @ 1 dB compression | 26.5 | | 11.0 | | dBm |
| | 27.5 | | 11.0 | | |
| | 30 | | 11.0 | | |
| | 31 | | 11.1 | | |
| Output IP3 | 26.5 | | 22.9 | | dBm |
| | 27.5 | | 22.8 | | |
| | 30 | | 23.4 | | |
| | 31 | | 23.2 | | |
| Supply Voltage (Vs) | | 3.75 | 4.0 | 4.25 | V |
| Device Operating Current (IDD) | | | 68 | 112 | mA |
| Device Current Variation vs. Temperature ² | | | -50 | | μA/°C |
| Device Current Variation vs. Voltage | | | 0.02 | | mA/mV |
| Thermal Resistance, junction-to-ground lead | | | 106 | | °C/W |

1. Measured on Mini-Circuits Characterization test board TB-PMA3-313GLN+ with thru-line loss being deducted. See Characterization Test Circuit (Fig. 1)

2. Device Current Variation vs. Temperature = (Current at 85°C - Current at -45°C)/130°C

MAXIMUM RATINGS³

| Parameter | Ratings |
|-------------------------------------|--|
| Operating Temperature (ground lead) | -40°C to 85°C |
| Storage Temperature | -65°C to 150°C |
| Junction Temperature | 146°C |
| Total Power Dissipation | 0.65W |
| Input Power (CW), Vs=4V | +23 dBm (5 minutes max.) +13 dBm (continuous) |
| DC Voltage at Port 2 & 8 | 2V |
| DC Voltage (Vs) | 6V |

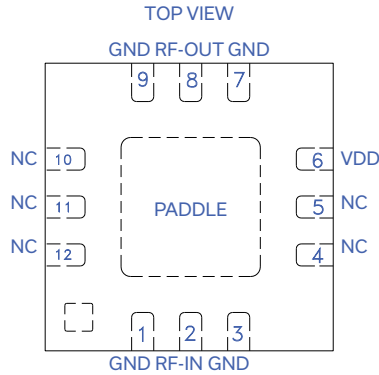
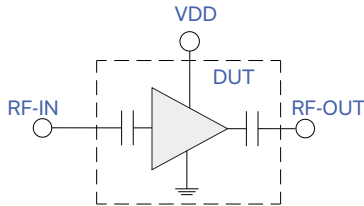
3. Permanent damage may occur if any of these limits are exceeded.



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SIMPLIFIED SCHEMATIC AND PAD DESCRIPTION



| Function | Pad Number | Description (See Application Circuit, Fig. 1) |
|---------------|------------------|---|
| RF-IN | 2 | RF Input Pad. Connects to RF input |
| RF-OUT | 8 | RF Output Pad. Connects to RF output |
| VDD | 6 | DC Power Supply Pad. Connects to Voltage Source Vs via R1 |
| Ground | 1,3,7,9 & Paddle | Connects to ground |
| No Connection | 4,5,10,11& 12 | Not used internally. Connected to ground on test board |

RECOMMENDED APPLICATION AND CHARACTERIZATION TEST CIRCUIT

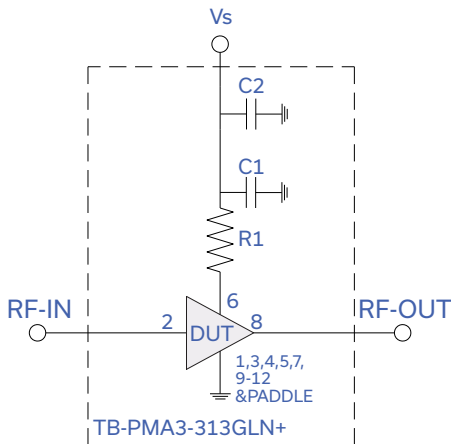


Fig 1. Application and Characterization Circuit

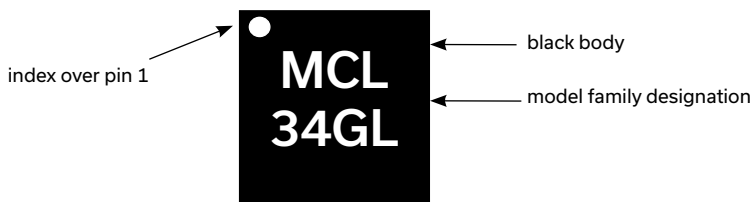
Note: This block diagram is used for characterization. (DUT is soldered on Mini-Circuits Characterization test board TB-PMA3-313GLN+) Gain, Return loss, Output power at 1dB compression (P1 dB), output IP3 (OIP3) and noise figure measured using Agilent's N5245A microwave network analyzer.

Conditions:

- Gain and Return loss: Pin= -25dBm
- Output IP3 (OIP3): Two tones, spaced 1 MHz apart, -5dBm/tone at output.

| Component | Size | Value | Part Number | Manufacturer |
|-----------|------|--------|--------------------|--------------|
| R1 | 0603 | 18 Ohm | SG73G1JTTD18R0C | KOA |
| C1 | 0402 | 5 pF | GJM1555C1H5R0CB01D | Murata |
| C2 | 0402 | 0.1 uF | GRM155R71C104KA88D | Murata |

PRODUCT MARKING



Marking may contain other features or characters for internal lot control





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ADDITIONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASH BOARD. TO ACCESS [CLICK HERE](#)

| | |
|--|---|
| Performance Data | Data Table graphs, s-parameter data set (.zip file) |
| Case Style | DQ1225 Plastic package, exposed paddle, lead finish: Matte Tin |
| Tape & Reel Standard quantities available on reel | F66 7" reels with 20, 50, 100, 200, 500, 1K, or 2K devices. |
| Suggested Layout for PCB Design | PL-674 |
| Evaluation Board | TB-PMA3-313GLN+ (Without connectors) TB-PMA3313GLNC+ (With connectors) |
| Environmental Ratings | ENV08T1 |

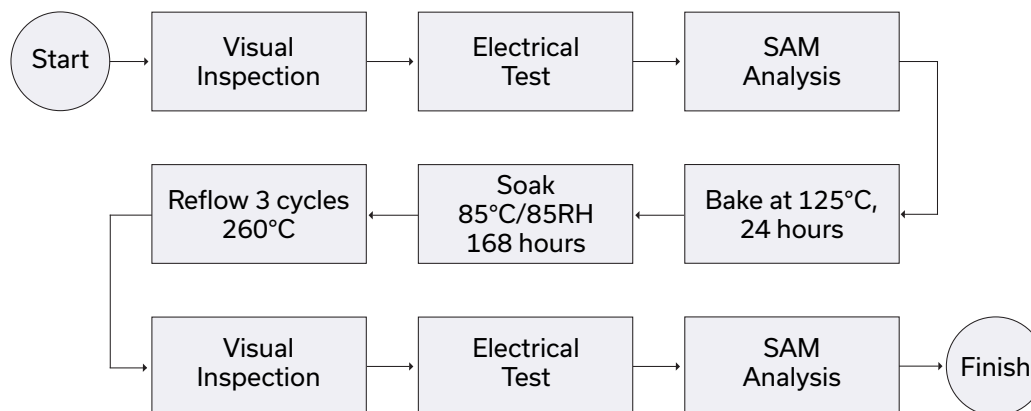
ESD RATING

Human Body Model (HBM): Class 1A (250 to <500V) in accordance with ANSI/ESD STM 5.1 - 2001

MSL RATING

Moisture Sensitivity: MSL1 in accordance with IPC/JEDEC J-STD-020D

MSL TEST FLOW CHART



- NOTES**
- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
 - B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
 - C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the standard. Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp



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