

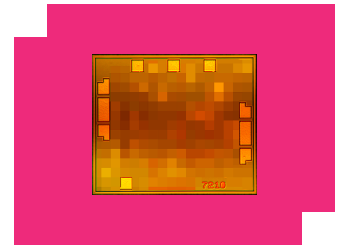
AMM-7210CH

22 GHz – 57 GHz GaAs Driver Amplifier

DEVICE OVERVIEW

General Description

The AMM-7210 is a general-purpose broadband MMIC driver amplifier that provides +21 dBm output power suitable for driving a Marki H or L diode mixer at 22-57 GHz and S diode mixer from 25-50 GHz. The small die size allows it to be used in a variety of applications, and has built-in DC-blocking capacitors on the input and output.



[Download s-parameters here](#)

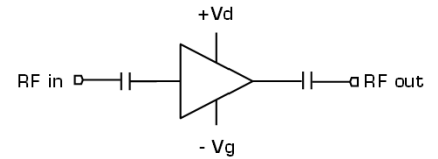
Features

- +21 dBm Output Power
- Broadband Performance
- Small Die size

Applications

- Mobile test and measurement equipment
- Radar and satellite communications
- 5G transceivers
- Driver amplifier L,H,S – diode mixers

Functional Block Diagram



Part Ordering Options

| Part Number | Description | Package | Connectors | Green Status | Product Lifecycle | Export Classification | Recommended Replacement |
|----------------------------|---------------------------------------|---------|--------------------------|---------------|--------------------------------|-----------------------|-----------------------------|
| AMM-7210UC | 22 GHz – 57 GHz GaAs Driver Amplifier | UC | Standard | REACH RoHS | Not Recommended for New Design | EAR99 | - |
| AMM-7210CH | 22 GHz – 57 GHz GaAs Driver Amplifier | CH | - | REACH RoHS | End of Life | 3A001.b.2.d | AMM-7210ACH |

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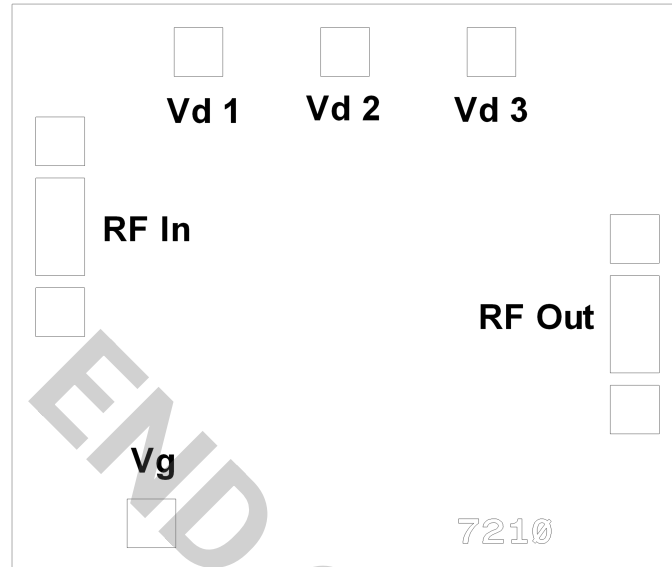
Revision History

| Revision Code | Revision Date | Comment |
|---------------|---------------|---------------------------|
| - | 2021-05-01 | Datasheet Initial Release |
| A | 2026-03-17 | End of Life |


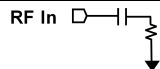
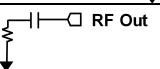
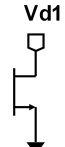
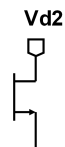

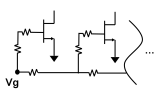
Port Configuration and Functions

Port Diagram

A port diagram of the AMM-7210CH is shown below.



Port Functions

| Port | Function | Description | DC Equivalent Circuit |
|--------|-----------------------|--|--|
| GND | Ground | Bottom side must be connected to a DC/RF ground potential with high thermal and electrical conductivity. | GND  |
| RF In | RF Input | This is the RF Input port of the amplifier die. It is internally DC blocked and RF matched to 50 Ω. RF input pad is GSG with 175 μm pitch. | RF In  |
| RF Out | RF Output | This is the RF Output port of the amplifier die. It is internally DC blocked and RF matched to 50 Ω. RF output pad is GSG with 175 μm pitch. |  RF Out |
| Vd1 | Drain Supply Port 1 | Pad Vd 1 supplies drain voltage to the first stage of the 3-stage amplifier IC. Apply gate voltage Vg before applying drain voltage. | Vd1  |
| Vd2 | Drain Supply Port 2 | Pad Vd 2 supplies drain voltage to the second stage of the 3-stage amplifier IC. Apply gate voltage Vg before applying drain voltage. | Vd2  |
| Vd3 | Drain Supply Port 3 | Pad Vd 3 supplies drain voltage to the third stage of the 3-stage amplifier IC. Apply gate voltage Vg before applying drain voltage. | Vd3  |
| Vg | Gate Bias Voltage Pad | The Vg pad is connected resistively on chip. The user should apply between 0.4V and -0.6V to Vg pad before applying positive DC voltage to any Vd port. Lower (more negative) voltages on a Vg pad will result in lower drain current and lower small signal gain. |  |

Specifications

Absolute Maximum Ratings

The Absolute Maximum Ratings indicate limits beyond which damage may occur to the device. If these limits are exceeded, the device may become inoperable or have a reduced lifetime. This amplifier is designed and characterized in a 50Ω system, and operation in a reflective environment can cause performance degradation.

| Parameter | Maximum Rating | Unit |
|---|----------------|------|
| Continuous Power Dissipation (PDISS) (at 85 °C case temp.) ¹ | 1 | W |
| Maximum Operating Temperature | 85 | °C |
| Maximum Storage Temperature | 150 | °C |
| Max Junction Temperature for MTTF > 1E6 Hours | 175 | °C |
| Minimum Operating Temperature | -40 | °C |
| Minimum Storage Temperature | -65 | °C |
| Negative Bias Voltage (Vg) | -2 | V |
| Positive Drain Supply Current (Id) (with RF Input) | 450 | mA |
| Positive Drain Supply Voltage (Vd) | 4.5 | V |
| RF Input Power | 20 | dBm |
| Thermal Resistance, θJC | 90 | °C/W |

^[1] Derates by 11 mW/ °C above 85 °C case temperature.

Package Information

| Parameter | Details | Rating |
|------------|---------|----------------|
| Dimensions | | 1.38 x 1.17 mm |

Recommended Operating Conditions

The Recommended Operating Conditions indicate the limits, inside which the device should be operated, to guarantee the performance given in Electrical Specifications. Operating outside these limits may not necessarily cause damage to the device, but the performance may degrade outside the limits of the electrical specifications. For limits, above which damage may occur, see Absolute Maximum Ratings.

| Parameter | Min | Nominal | Max | Unit |
|--|------|---------|------|------|
| Ambient Temperature | -40 | 25 | 85 | °C |
| Power Supply DC Voltage (Vd) | 2.5 | 3 | 4 | V |
| Negative Bias Voltage (Vg) | -0.6 | -0.5 | -0.4 | dBm |
| Input Power for Saturation | 8 | 11 | 13 | dBm |
| Power Supply DC Current (Id) (No RF Input) | 115 | 180 | 300 | mA |

Power Supply DC current should be modified by changing bias voltage Vg to maintain junction temperature within MTTF target for given operating conditions.

Sequencing Requirements

Turn-on Procedure:

1. Apply negative bias to Vg
2. Apply Vd

Turn-off Procedure:

1. Turn off Vd
2. Turn off Vg

Note: RF input power can be injected at any moment in the bias sequencing procedure.

Electrical Specifications

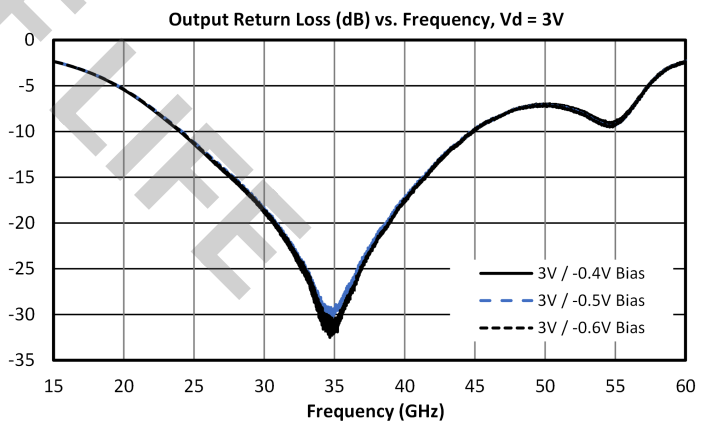
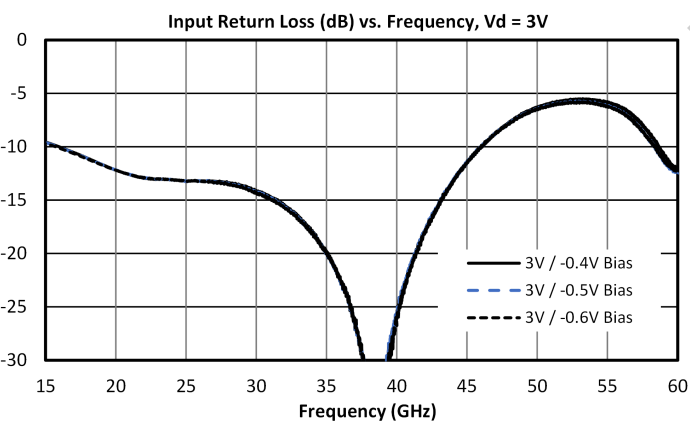
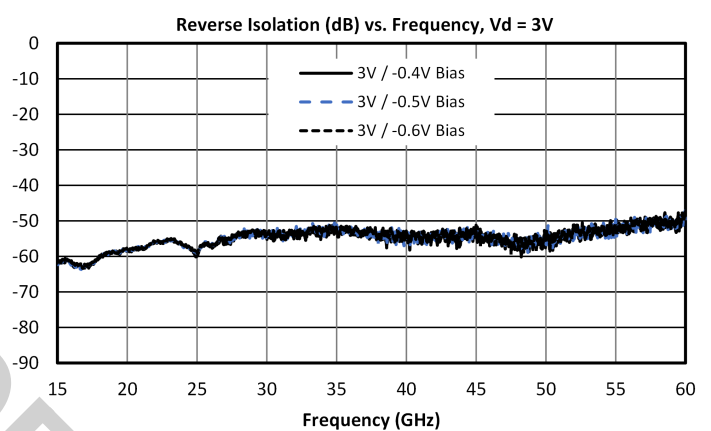
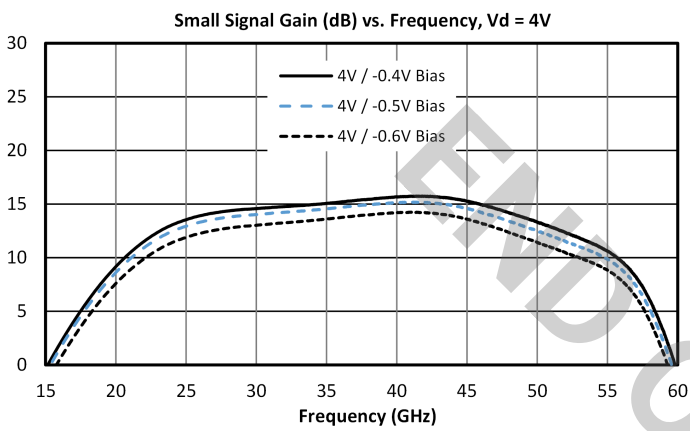
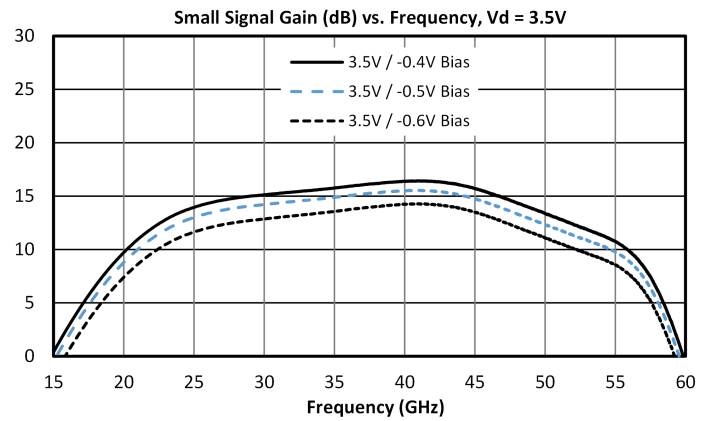
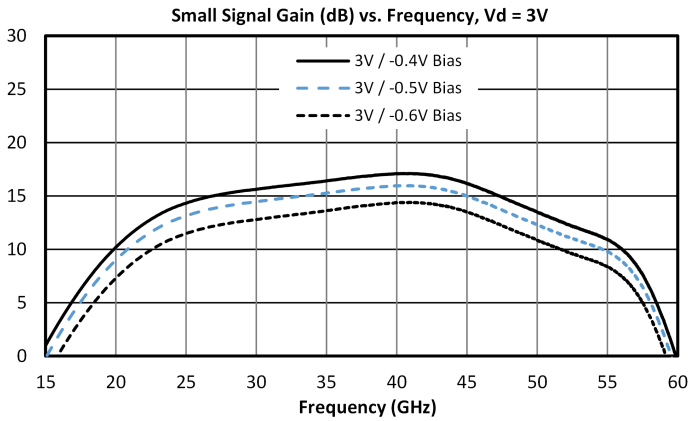
The electrical specifications apply at TA=+25°C in a 50Ω system. Min and Max limits apply only to our connectorized units and are guaranteed at TA=+25°C. Die are 100% DC tested and RF tested on a per lot basis

| Parameter | Test Conditions | Minimum Frequency (GHz) | Maximum Frequency (GHz) | Min | Typ | Max | Unit |
|-------------------------------------|-------------------------------|-------------------------|-------------------------|-----|------|-----|------|
| Current Consumption ¹ | 3V/-0.4V | - | - | - | 230 | - | mA |
| Current Consumption ² | 3V/-0.5V | - | - | - | 180 | - | mA |
| Current Consumption ³ | 3V/-0.6V | - | - | - | 130 | - | mA |
| Input IP3 | 3V/-0.5V, -20 dBm Input Power | 22 | 57 | - | 13 | - | dBm |
| Input Power for Saturation | 3V/-0.5V bias | 22 | 57 | - | 11 | - | dBm |
| Input Return Loss | 3V/-0.5V Bias | 22 | 57 | - | 14 | - | dB |
| Noise Figure | 3V/-0.5V Bias | 22 | 57 | - | 6.3 | - | dB |
| Output IP3 | 3V/-0.5V, -20 dBm Input Power | 22 | 57 | - | 27 | - | dBm |
| Output P1dB | 3V/-0.5V bias | 22 | 57 | - | 19 | - | dBm |
| Output Return Loss | 3V/-0.5V Bias | 22 | 57 | - | 14 | - | dB |
| Reverse Isolation | 3V/-0.5V Bias | 22 | 57 | - | 47 | - | dB |
| Saturated Output Power ⁴ | 3V/-0.5V bias | 48 | 57 | - | 18 | - | dBm |
| Saturated Output Power ⁵ | 3V/-0.5V bias | 22 | 30 | - | 19 | - | dBm |
| Saturated Output Power ⁶ | 3V/-0.5V bias | 30 | 48 | 17 | 20.5 | - | dBm |
| Small Signal Gain | 3V/-0.5V bias | 45 | 57 | - | 11 | - | dB |
| Small Signal Gain | 3V/-0.5V bias | 30 | 48 | 10 | 14.5 | - | dB |
| Small Signal Gain | 3V/-0.5V bias | 22 | 30 | - | 13 | - | dB |

[1][2][3] Bias conditions tested with no RF input power. Bias conditions presented as Vd/Vg.

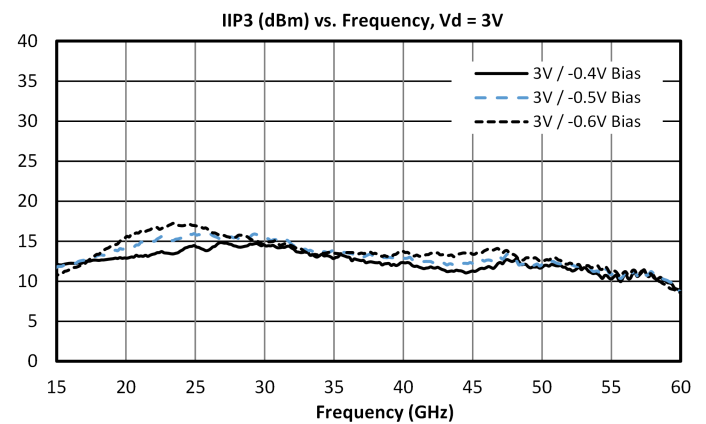
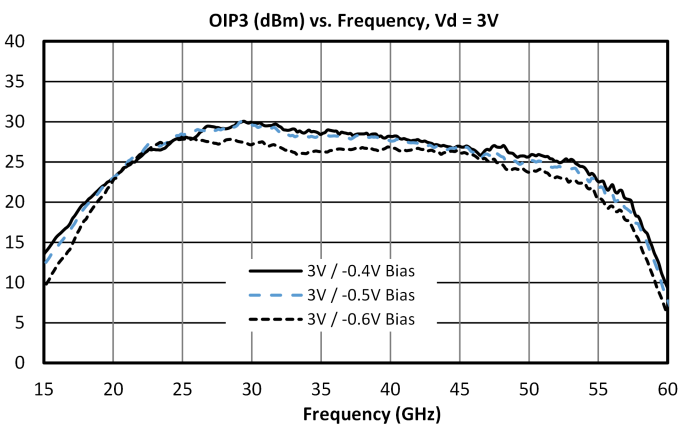
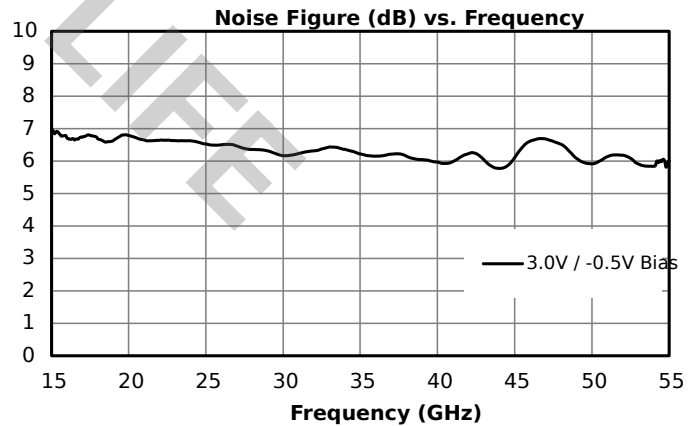
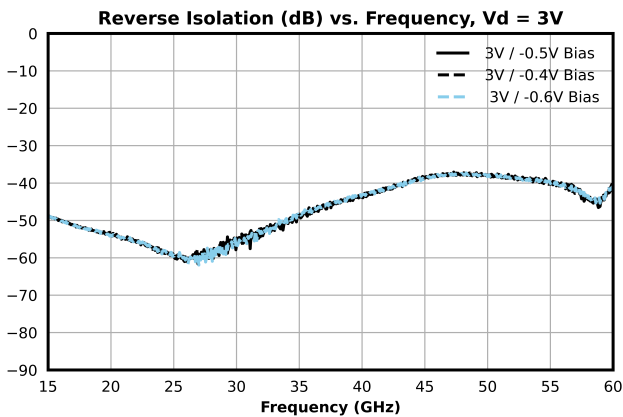
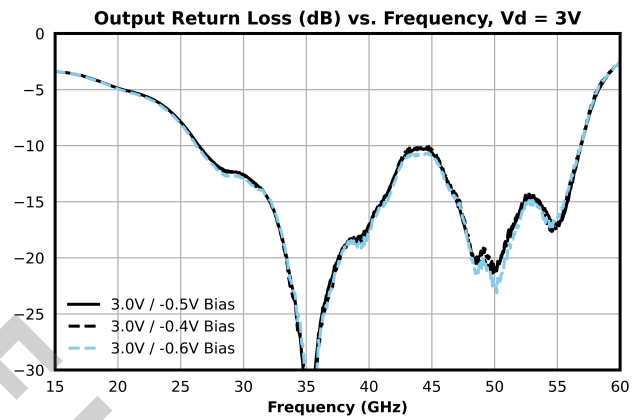
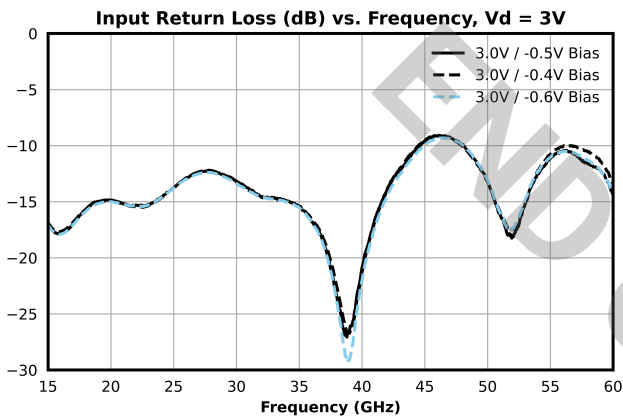
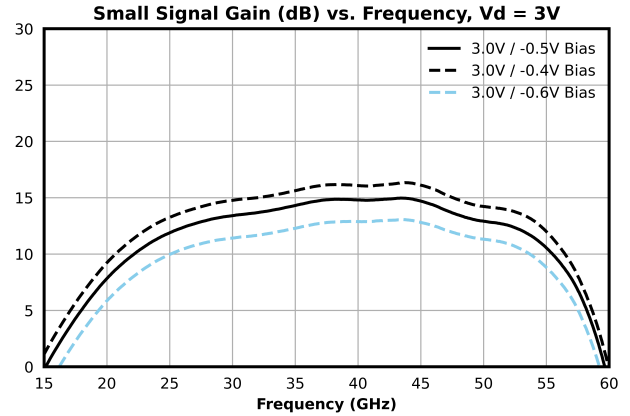
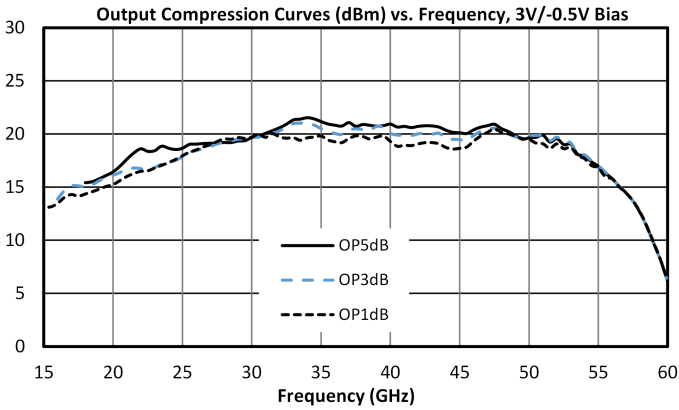
[4][5][6] Saturated Output Power specification defined using the AMM-7210UC P5dB compression curve shown in section 3.7.

Typical Performance Plots



AMM-7210UC - Typical Performance Plots

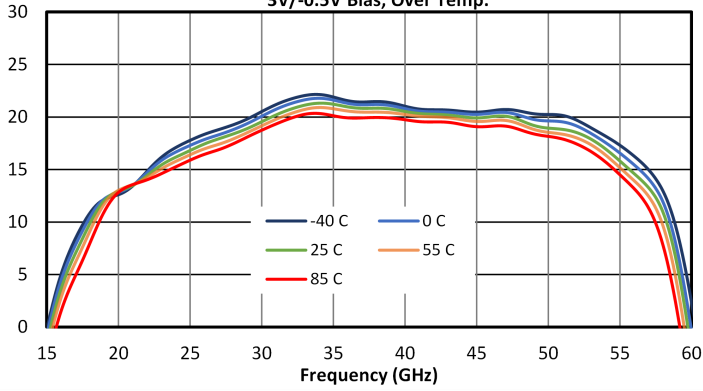
Performance plots for the connectorized module are shown for measurements where directly probed measurements of the die are unavailable. Note that the following measurements include losses from connectors and microstrip traces.



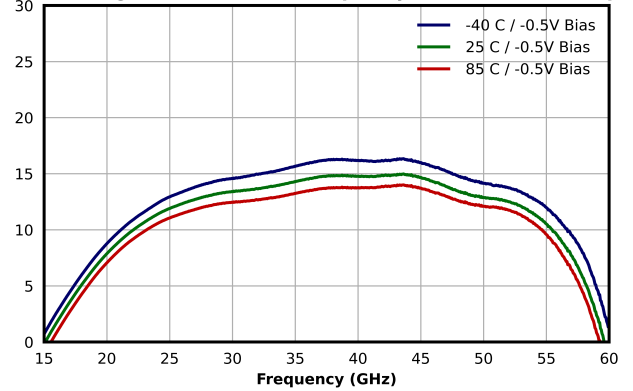
AMM-7210CH

22 GHz – 57 GHz GaAs Driver Amplifier

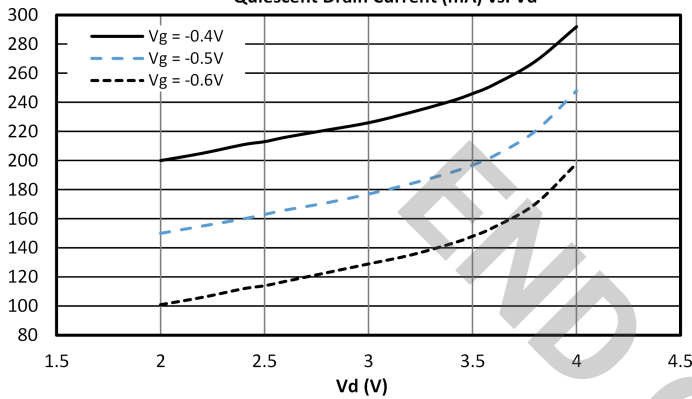
Saturated Output Power (dBm) vs. Frequency,
3V/-0.5V Bias, Over Temp.



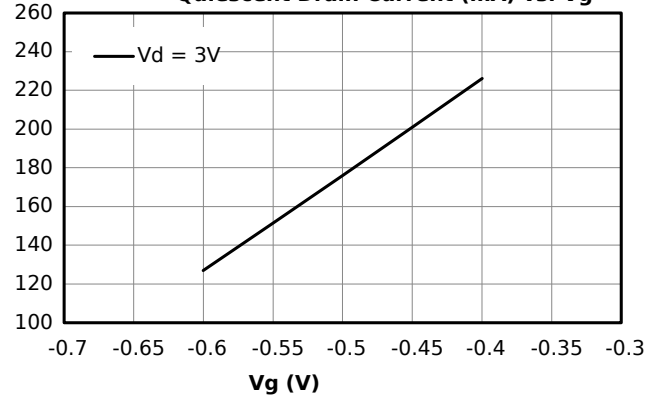
Small Signal Gain (dB) vs. Frequency, $V_d = 3V$, Over Temp



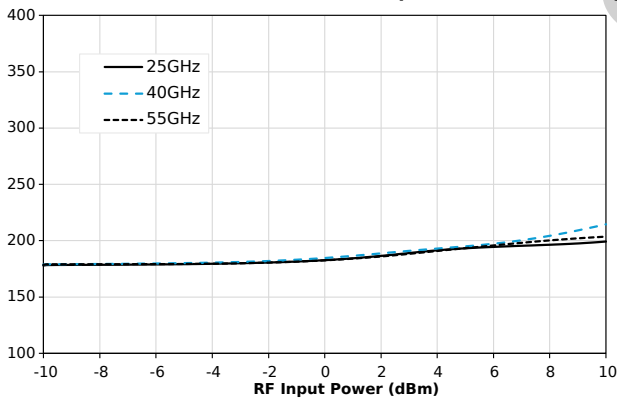
Quiescent Drain Current (mA) vs. V_d



Quiescent Drain Current (mA) vs. V_g



Drain Current (mA) vs. RF Input Power, $V_d = 3V$, $V_g =$

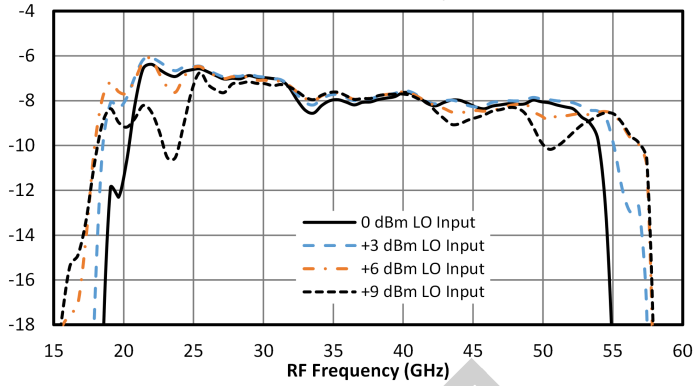


AMM-7210UC - Typical Marki Mixer Performance Plots with AMM-7210UC LO Driver

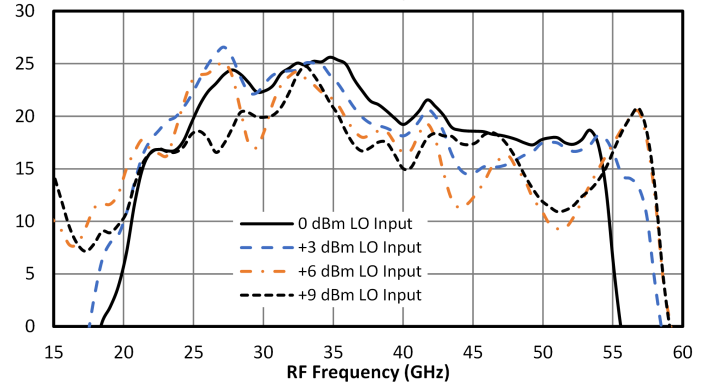
LO Input Powers specified as the input power into the AMM-7210UC LO driver

Performance plots for the connectorized module are shown for measurements where directly probed measurements of the die are unavailable. Note that the following measurements include losses from connectors and microstrip traces.

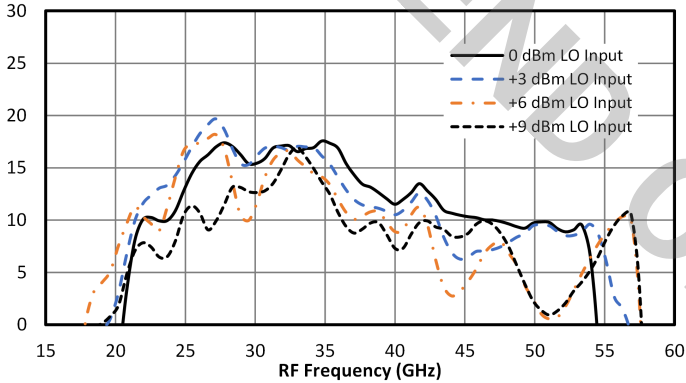
MM1-1857H Config. A Conv. Loss (dB) vs. Frequency, 91 MHz IF, AMM-7210UC LO Driver, 3V / -0.5V Bias



MM1-1857H Config. A IIP3 (dBm) vs. Frequency, 91 MHz IF, AMM-7210UC LO Driver, 3V / -0.5V Bias



MM1-1857H Config. A OIP3 (dBm) vs. Frequency, 91 MHz IF, AMM-7210UC LO Driver, 3V / -0.5V Bias



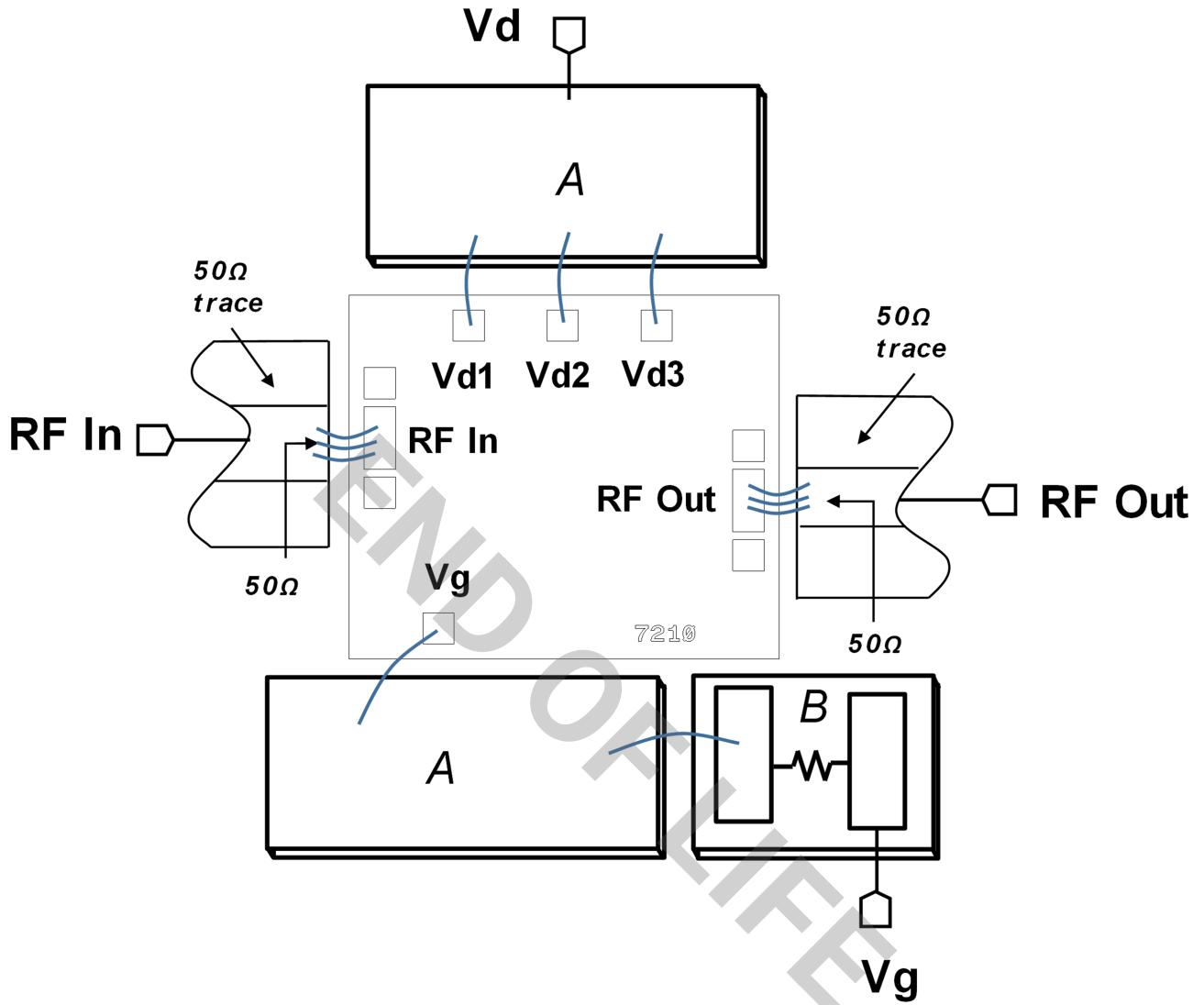
Application Information

AMM-7210CH Application Circuit

Below are the recommended application circuits for the AMM-7210CH. This application circuit is used for the performance plots shown in this datasheet. However, each PCB layout and environment are different which may require minor modifications of the biasing network. Please contact support@markimicrowave.com for more information.

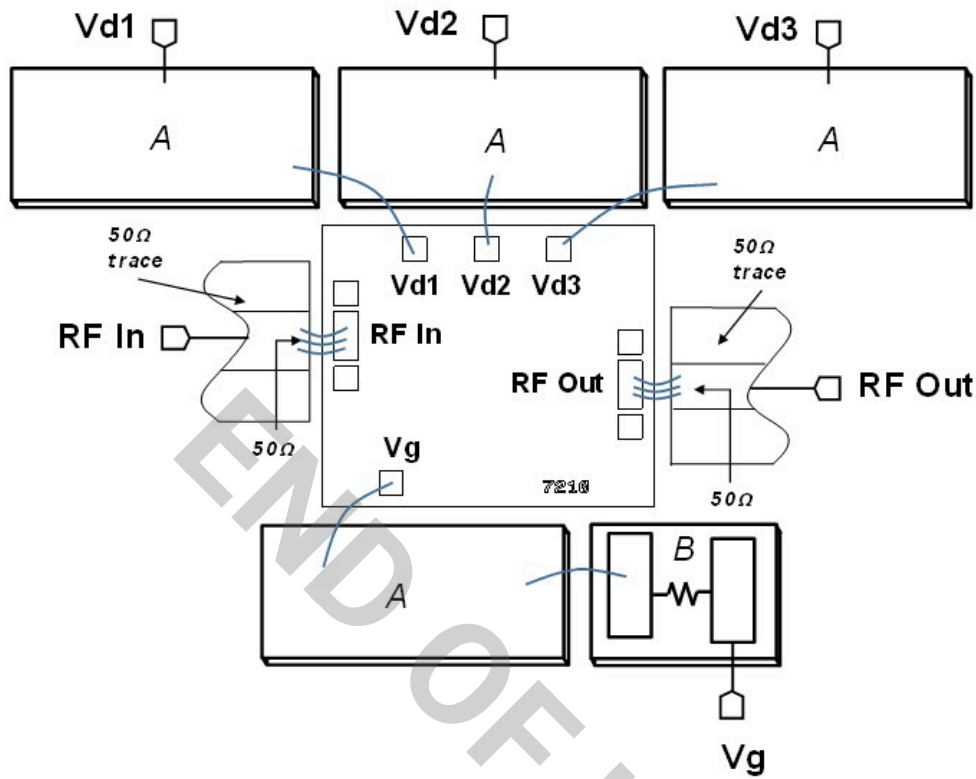
END OF LIFE

Application Circuit



Application Circuit Description

One can also choose to break out Vd1, Vd2, and Vd3 to separate power supply lines to increase gain control and further strengthen amplifier stability.



| Designator | Description | Sample Part Number |
|------------|---|--------------------------|
| A | Presidio 0.1 μ F + 1800 pF Capacitor | MVB4080X104ZGH5R3 |
| B | PPI 10 Ω Wire-bondable series resistor | PRT135-14x12x10A10R00FQE |

Constant Drain Current vs. Constant Gate Voltage Operation

The AMM-7210 pHEMT amplifier can be biased with a constant gate and drain voltage, or with a constant drain current by regulating the gate voltage. Using a constant gate and drain voltage reduces circuit complexity, but has variable current consumption during operation. However, regulating the gate voltage using feedback circuitry which controls the drain current to a constant value minimizes unit-to-unit variation in gain, output power, and compression points.

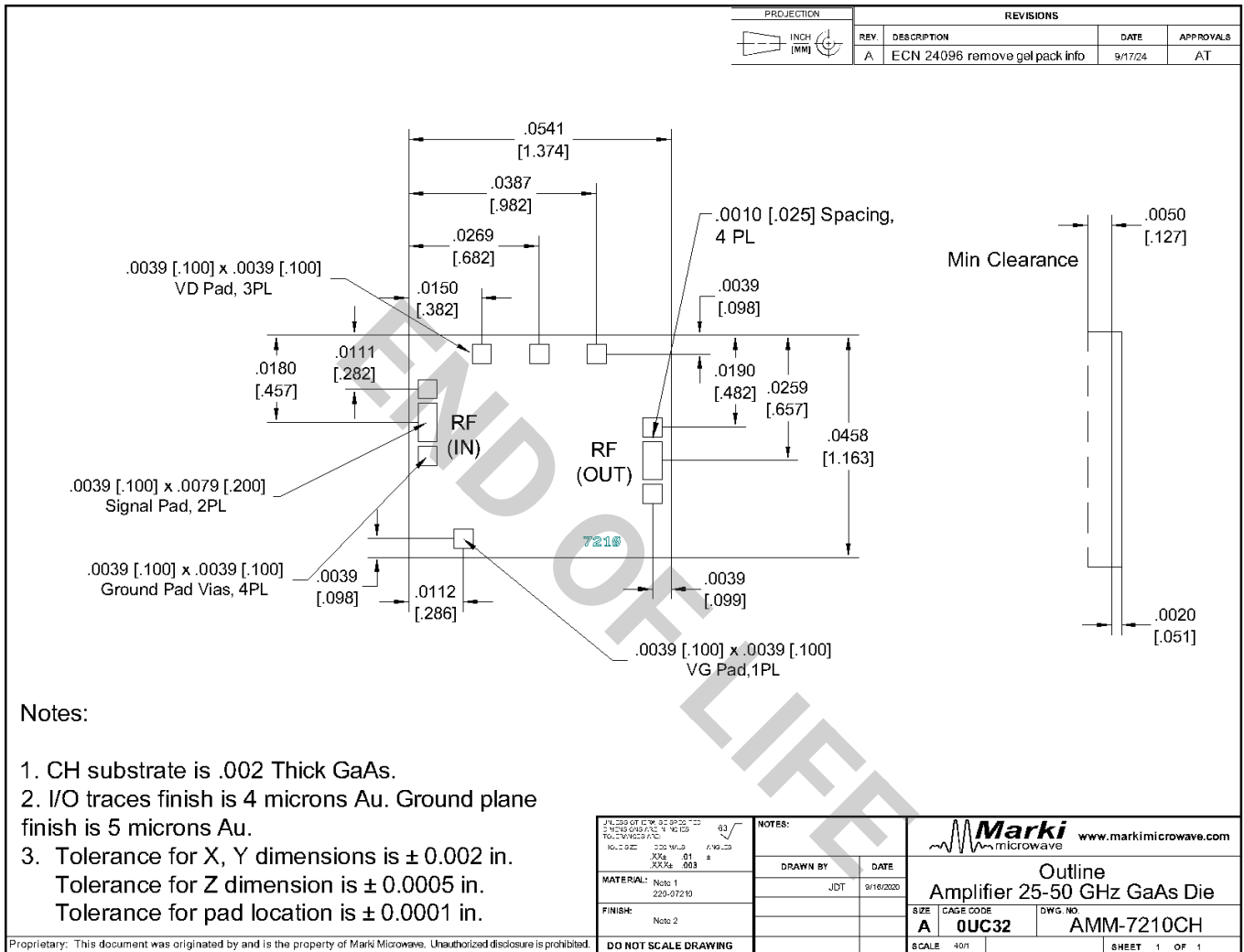
Under small signal excitation at a fixed temperature, these two approaches are equivalent because the current draw versus frequency is relatively constant in small signal. However, they will diverge in large signal conditions, where the drain current is affected the input signal's frequency and power. The output power in saturation is relatively unchanged, as it is more strongly dependent on the drain voltage. However, output referred 1dB compression point will decrease by 2-3dB when operated with a constant drain current.

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Mechanical Data

Outline Drawing

Download : [Outline 2D Drawing](#)



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