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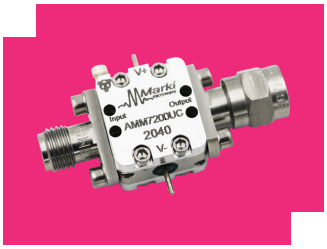
AMM-7200UC-K

12 GHz – 40 GHz GaAs Driver Amplifier

DEVICE OVERVIEW

General Description

The AMM-7200UC-K 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 12-40 GHz and S diode mixer from 14-40 GHz. The amplifier also has excellent return losses and a small die size which allows it to be used in a variety of applications. It has built in DC-blocking capacitors on the input and output.



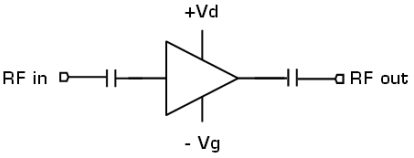
Features

- +21 dBm Output Power
- 18 dB gain
- Excellent Return Losses
- Small Die size

Applications

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

Functional Block Diagram



Part Ordering Options

Part Number	Description	Package	Connectors	Green Status	Product Lifecycle	Export Classification
AMM-7200UC-K	12 GHz – 40 GHz GaAs Driver Amplifier	UC	-	RoHS RoHS	Released	EAR99
AMM-7200UC	12 GHz – 46 GHz GaAs Driver Amplifier	UC	Standard	REACH RoHS	Released	EAR99

Table Of Contents

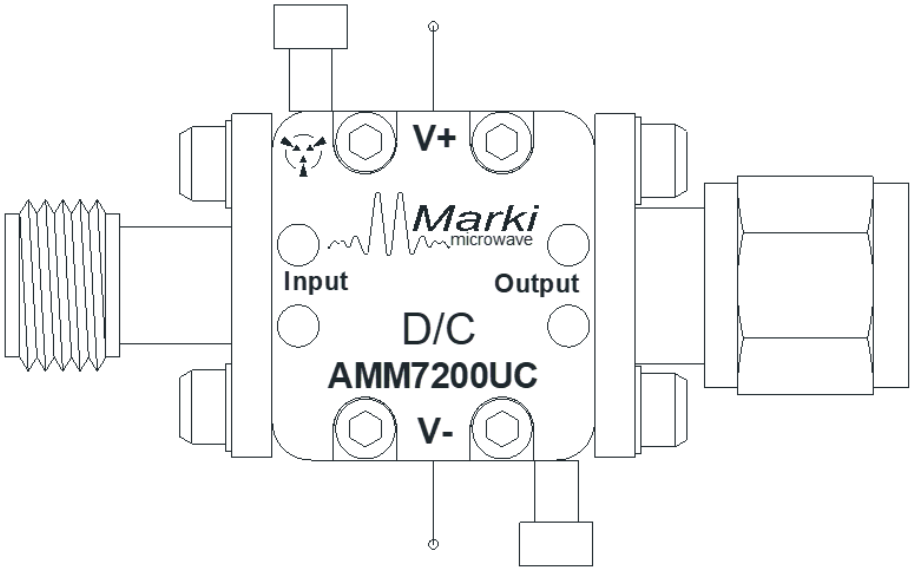
Revision History

Revision Code	Revision Date	Comment
-	2024-02-14	Datasheet Initial Release
A	2024-12-02	Update 220-07200A die
B	2026-02-13	MTTF Table Added.

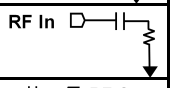
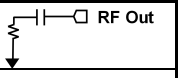
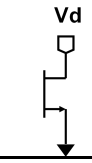
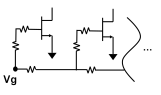
Port Configuration and Functions

Port Diagram

A port diagram of the AMM-7200UC-K is shown below.



Port Functions

Port	Function	Connector Type	Description	DC Equivalent Circuit
GND	Ground	-	Exterior housing must be connected to a DC/RF ground potential with high thermal and electrical conductivity.	
RF In	RF Input	2.92F	This is the RF Input port of the amplifier module. It is internally DC blocked and RF matched to 50 Ω.	
RF Out	RF Output	2.92M	This is the RF Output port of the amplifier module. It is internally DC blocked and RF matched to 50 Ω.	
Vd	Drain Supply Pin	-	The Vd pin supplies drain voltage to the amplifier IC. Apply gate voltage Vg before applying drain voltage.	
Vg	Gate Bias Pin	-	The Vg pin supplies negative control voltage to the amplifier and controls the amplifier gain. 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	-45	˚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.

FIT and MTTF Table

T (°C)	λ (TIF)	MTTF (hr)	MTTF (yr)
105	2,441.45	4.10E+05	47
85	310.48	3.22E+06	368
55	8.79	1.14E+08	12,992
25	0.12	8.24E+09	941,063

Package Information

Parameter	Details	Rating
Weight	Package name: UC	12.4g
Dimensions	-	13.21 x 14.22 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
Input Power for Saturation	6	9	12	dBm
Power Supply DC Current (Id) (No RF Input)	115	180	300	mA
Ambient Temperature	-40	25	85	°C
Negative Bias Voltage (Vg)	-0.6	-0.5	-0.4	V
Power Supply DC Voltage (Vd)	2.5	3	3	V

Module conditions provided for laboratory settings. Bare die operating conditions should be followed when used in test systems with extended lifetimes.

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

Electrical Specifications

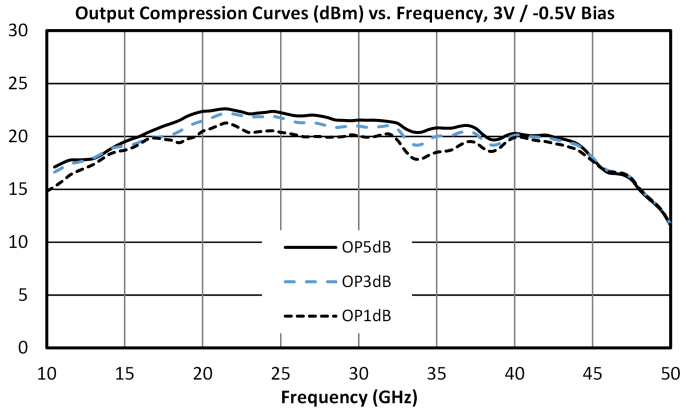
The electrical specifications apply at TA=+25°C in a 50Ω system. Min and Max limits apply only to our connectorized units and are guaranteed at TA=+25°C.

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	12	40	-	12	-	dBm
Input Power for Saturation	3V/-0.5V bias	12	40	-	9	-	dBm
Input Return Loss	3V/-0.5V Bias	12	40	-	19	-	dB
Noise Figure	3V/-0.5V bias	12	40	-	6.3	-	dB
Output IP3	3V/-0.5V, -20 dBm Input Power	12	40	-	29	-	dBm
Output P1dB	3V/-0.5V bias	12	40	-	19	-	dBm
Output Return Loss	3V/-0.5V Bias	12	40	-	18	-	dB
Reverse Isolation	3V/-0.5V Bias	12	40	-	52	-	dB
Saturated Output Power [4]	3V/-0.5V bias	18	35	17	21.5	-	dBm
Saturated Output Power [5]	3V/-0.5V bias	35	40	-	19.5	-	dBm
Saturated Output Power [6]	3V/-0.5V bias	12	18	-	19	-	dBm
Small Signal Gain	3V/-0.5V bias	35	40	-	15	-	dB
Small Signal Gain	3V/-0.5V bias	18	35	14	18	-	dB
Small Signal Gain	3V/-0.5V bias	12	18	-	17	-	dB

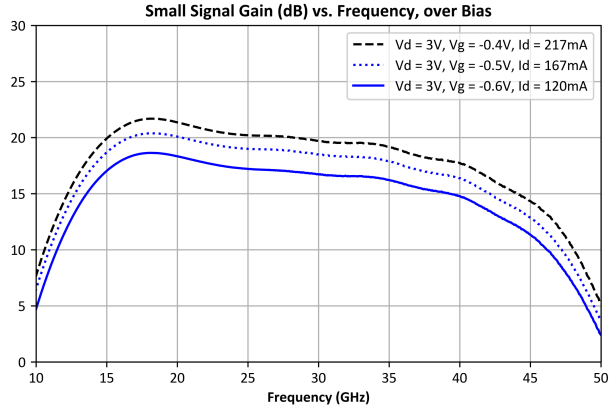
[1][2][3] Bias conditions tested with no RF input power. Bias conditions presented as Vd/Vg.
[4][5][6] Saturated Output Power specification defined using the AMM-7200UC P5dB compression curve shown in section 3.7.

AMM-7200UC Typical Performance Plots

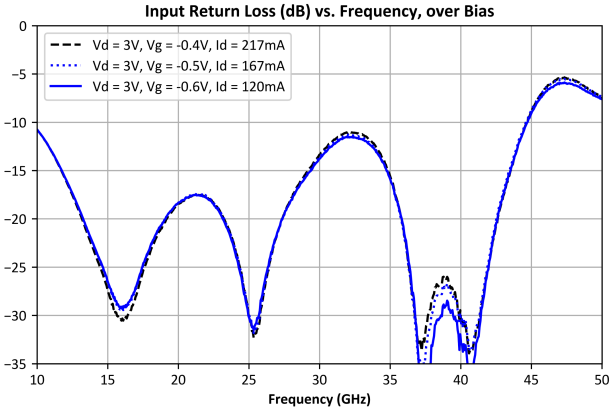
Output Compression Curves (dBm) vs. Frequency, 3V / -0.5V Bias



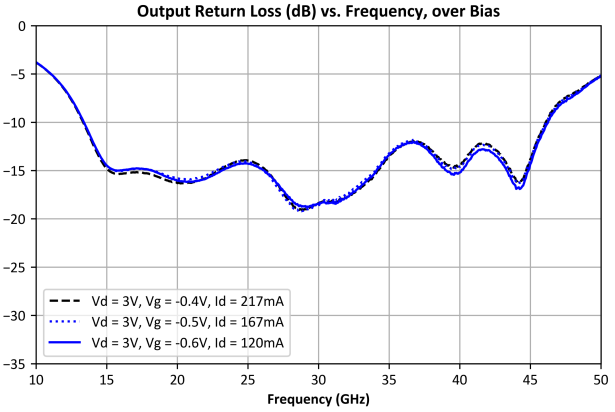
Small Signal Gain (dB) vs. Frequency, over Bias



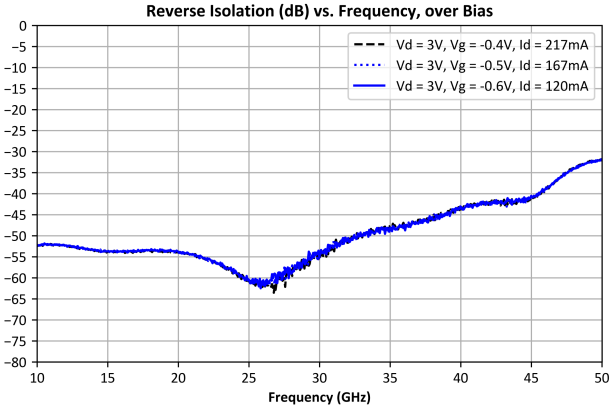
Input Return Loss (dB) vs. Frequency, over Bias



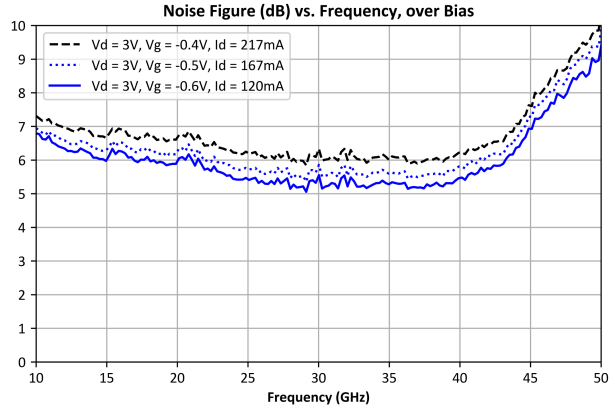
Output Return Loss (dB) vs. Frequency, over Bias



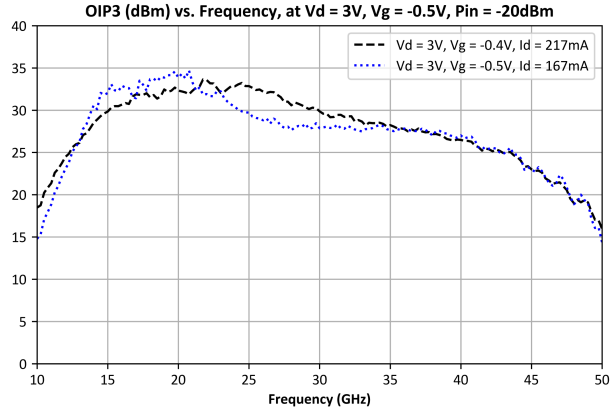
Reverse Isolation (dB) vs. Frequency, over Bias



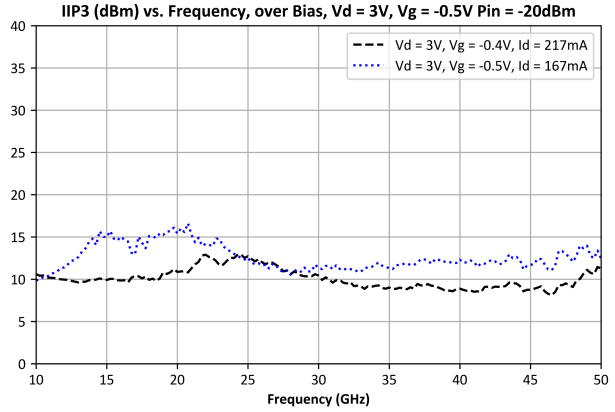
Noise Figure (dB) vs. Frequency, over Bias



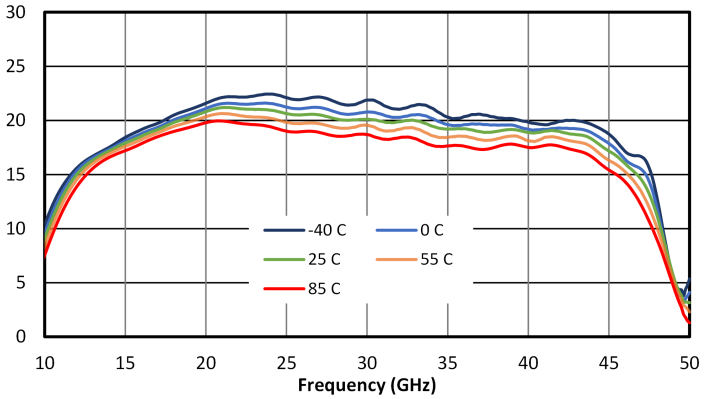
OIP3 (dBm) vs. Frequency, at Vd = 3V, Vg = -0.5V, Pin = -20dBm



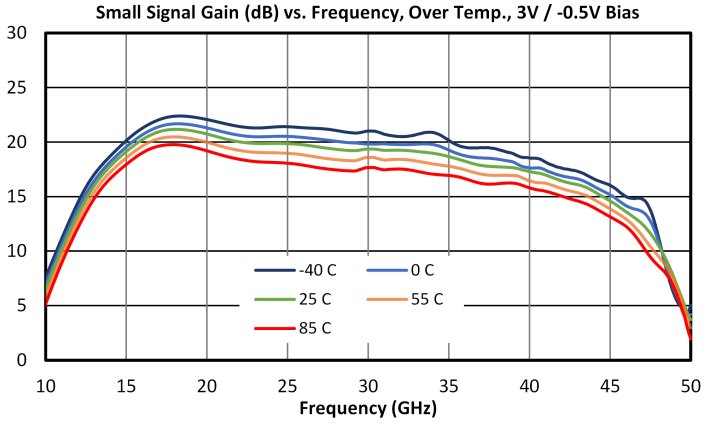
IIP3 (dBm) vs. Frequency, over Bias, Vd = 3V, Vg = -0.5V Pin = -20dBm



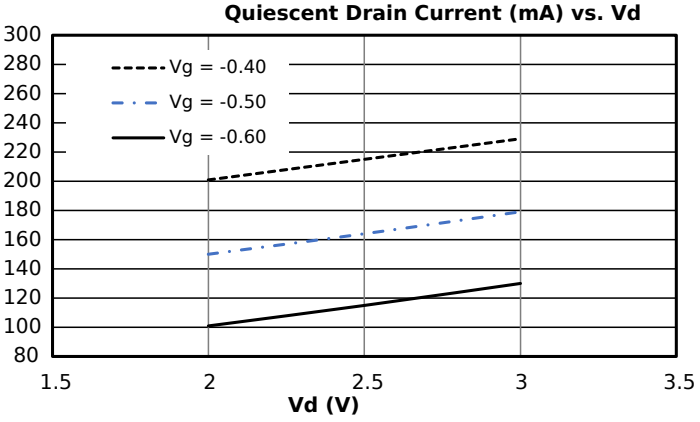
Output Power (dBm) vs. Frequency, Over Temp., 3V / -0.5V Bias



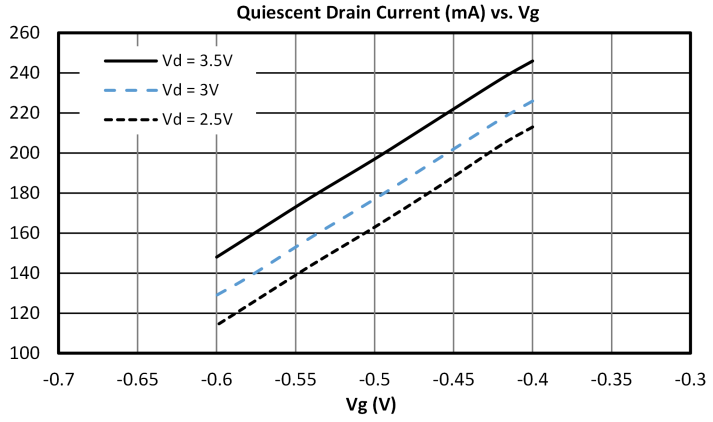
Small Signal Gain (dB) vs. Frequency, Over Temp., 3V / -0.5V Bias



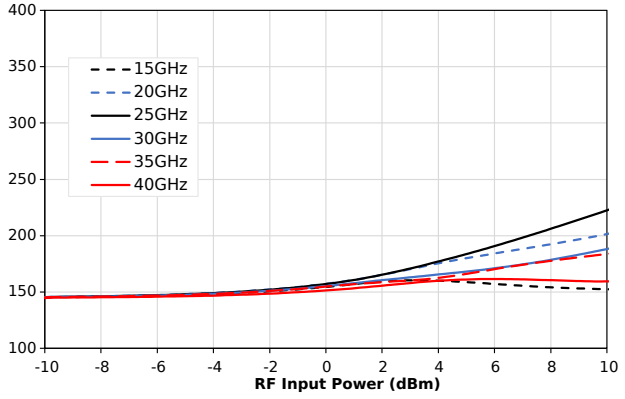
Quiescent Drain Current (mA) vs. Vd



Quiescent Drain Current (mA) vs. Vg



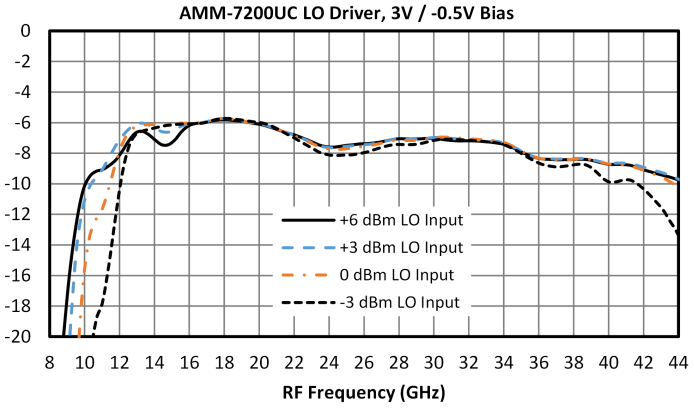
Drain Current (mA) vs. Input Power and Vgq, 3Vd/



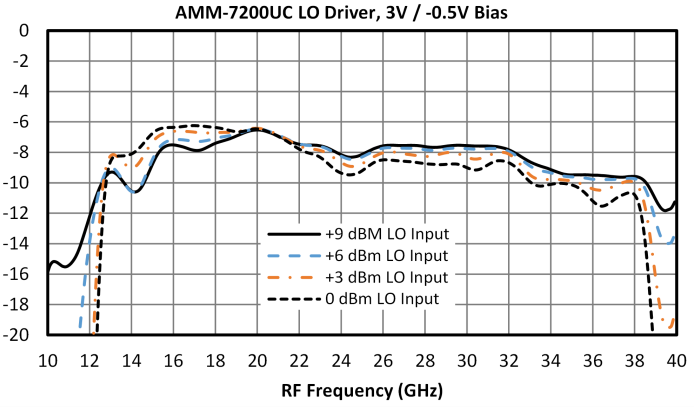
Typical Marki Mixer Performance Plots with AMM-7200UC LO Driver

LO Input Powers specified as the input power into the AMM-7200UC LO driver

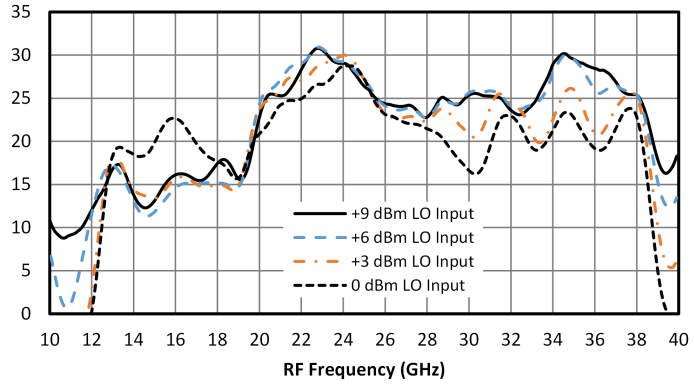
MM1-1140H Config. A Conv. Loss (dB) vs. Frequency, 91 MHz IF, AMM-7200UC LO Driver, 3V / -0.5V Bias



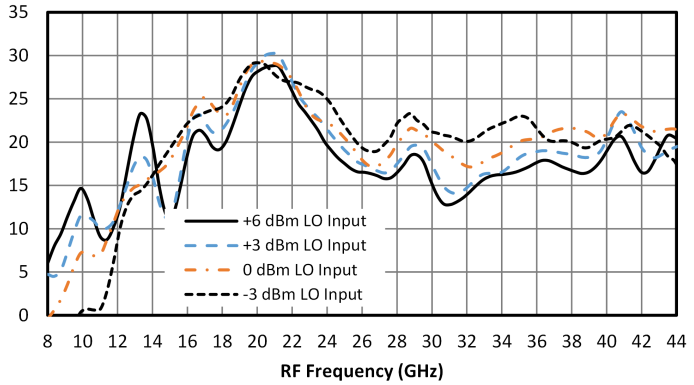
MM1-1240S Config. A Conv. Loss (dB) vs. Frequency, 91 MHz IF, AMM-7200UC LO Driver, 3V / -0.5V Bias



MM1-1240S Config. A IIP3 (dBm) vs. Frequency, 91 MHz IF, AMM-7199UC LO Driver, 3V / -0.5V Bias



MM1-1140H Config. A IIP3 (dBm) vs. Frequency, 91 MHz IF, AMM-7199UC LO Driver, 3V / -0.5V Bias



Application Information

Constant Drain Current vs. Constant Gate Voltage Operation

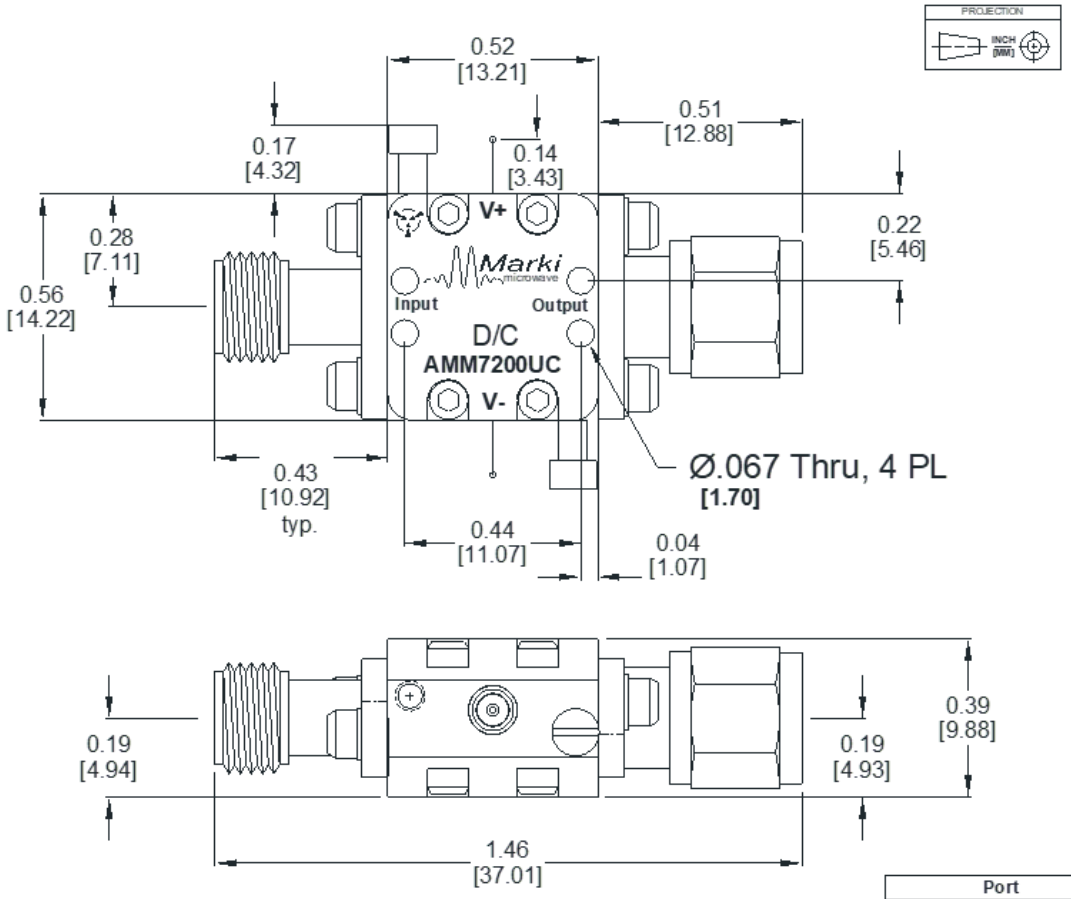
The AMM-7200 pHEMT amplifier can be biased with a constant gate and drain voltage, or with a constant drain current by regulating the gate voltage. Using a constant gate and drain voltage reduces circuit complexity, but has variable current consumption during operation. However, regulating the gate voltage 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 1 dB compression point will decrease by 2-3 dB when operated with a constant drain current.

Mechanical Data

Outline Drawing

Download : Outline 2D Drawing



*Notes:
1. All measurements are typical.
2. Ground lug and bias pins are solderable.

Port	Connector Type
Input	2.92 mm Female
Output	2.92 mm Male
Note: UC-Package Connectors are not removeable	

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