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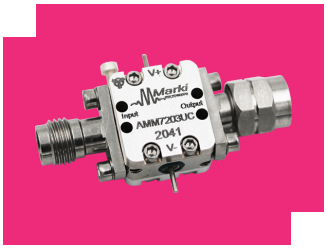
AMM-7203UC

30 GHz – 60 GHz Low Noise Amplifier

DEVICE OVERVIEW

General Description

The AMM-7203 is a broadband MMIC low noise amplifier that efficiently provides low noise figure and return losses in the 30-60 GHz frequency band. It is designed to provide less than 5 dB noise figure with greater than 10 dB gain at <200 mW DC power consumption. It has built-in DC blocking capacitors on the input and output.



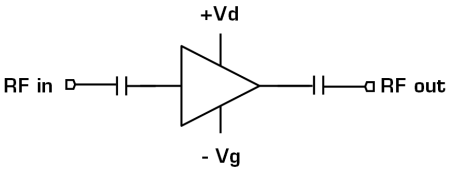
Features

- 4dB Noise Figure
- Broadband Performance
- 100-200mW DC Power Consumption
- Low Return Losses
- Small Die size

Applications

- Mobile test and measurement equipment
- 5G transceivers
- Radar and satellite communications

Functional Block Diagram



Part Ordering Options

Part Number	Description	Package	Connectors	Green Status	Product Lifecycle	Export Classification
AMM-7203UC	30 GHz – 60 GHz Low Noise Amplifier	UC	Standard	REACH RoHS	Released	EAR99

Table Of Contents

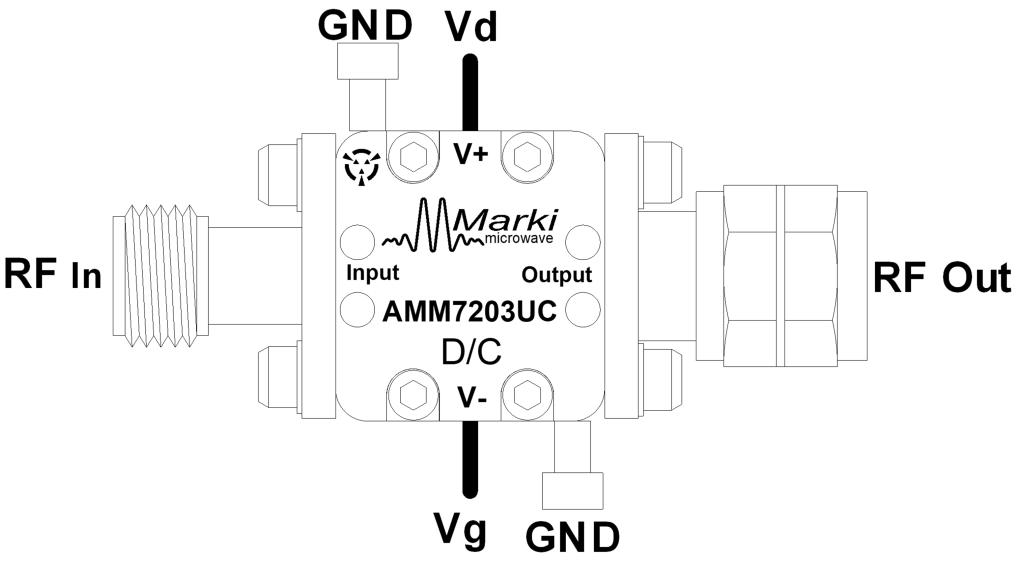
Revision History

Revision Code	Revision Date	Comment
-	2021-05-01	Datasheet Initial Release

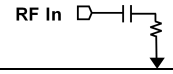
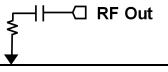
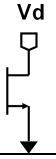
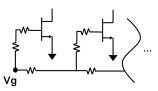
Port Configuration and Functions

Port Diagram

A port diagram of the AMM-7203UC is shown below.



Port Functions

Port	Function	Connector Type	Description	Equivalent Circuit for Package
GND	Ground	-	Exterior housing must be connected to a DC/RF ground potential with high thermal and electrical conductivity.	
RF In	RF Input	1.85F	This is the RF Input port of the amplifier die. It is internally DC blocked and RF matched to 50 Ω.	
RF Out	RF Output	1.85M	This is the RF Output port of the amplifier die. 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. 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.)	760	mW
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)	200	mA
Positive Drain Supply Voltage (Vd)	4.5	V
RF Input Power	20	dBm
Thermal Resistance, θJC	117	ºC/W

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
Power Supply DC Current (Id) (No RF Input)	45	80	135	mA
Power Supply DC Voltage (Vd)	1.5	2	3.5	V
Negative Bias Voltage (Vg)	-0.6	-0.5	-0.4	V
Ambient Temperature	-40	25	85	°C

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

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

Electrical Specifications

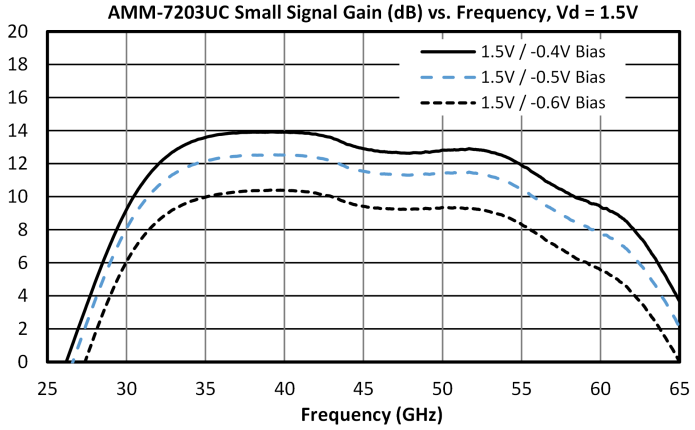
The electrical specifications apply at TA=+25°C in a 50Ω system. Min and Max limits apply only to our connectorized units and are guaranteed at TA=+25°C. Die are 100% DC tested and RF tested on a per lot basis

Parameter	Test Conditions	Minimum Frequency (GHz)	Maximum Frequency (GHz)	Min	Typ	Max	Unit
Small Signal Gain	1.5V/-0.6V Bias	30	60	-	9	-	dB
Small Signal Gain	2V/-0.5V Bias	30	35	-	10	-	dB
Small Signal Gain	3V/-0.5V Bias	30	60	-	10.5	-	dB
Small Signal Gain	2V/-0.5V Bias	35	53	8	11.5	-	dB
Small Signal Gain	2V/-0.5V Bias	53	60	-	9	-	dB
Noise Figure	1.5V/-0.6V Bias	30	55	-	4.2	-	dB
Noise Figure	2V/-0.5V Bias	30	55	-	4.4	-	dB
Noise Figure	3V/-0.5V Bias	30	55	-	4.8	-	dB
Saturated Output Power [1]	2V/-0.5V Bias	30	60	-	13	-	dBm
Saturated Output Power [2]	3V/-0.5V Bias	30	60	-	16	-	dBm
Output IP3	2V/-0.5V, -20 dBm Input Power	30	60	-	21	-	dBm
Input IP3	2V/-0.5V, -20 dBm Input Power	30	60	-	10	-	dBm
Output P1dB	2V/-0.5V Bias	30	60	-	11	-	dBm
Input Return Loss	2V/-0.5V Bias	30	60	-	14	-	dB
Output Return Loss	2V/-0.5V Bias	30	60	-	17	-	dB
Reverse Isolation	2V/-0.5V Bias	30	60	-	45	-	dB
Bias Requirements [3]	1.5V/-0.6V	-	-	-	45	-	mA
Bias Requirements [4]	2V/-0.5V	-	-	-	80	-	mA
Bias Requirements [5]	3V/-0.5V	-	-	-	100	-	mA

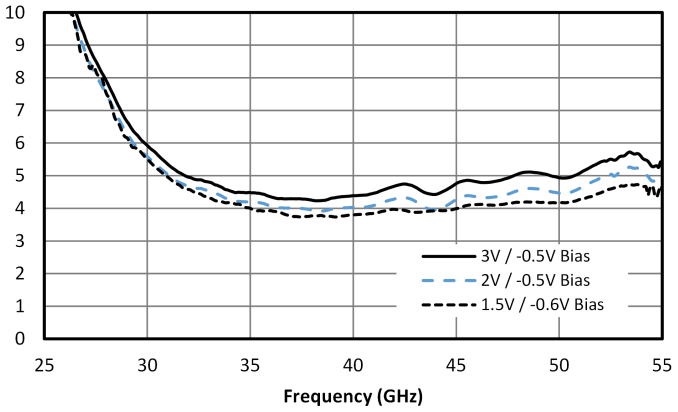
[1][2] Saturated Output Power specification defined using the AMM-7203UC P5dB compression curve shown in Typical Performance Plot.
[3][4][5] Bias conditions tested with no RF input power. Bias conditions presented as Vd/Vg.

AMM-7203UC Typical Performance Plots

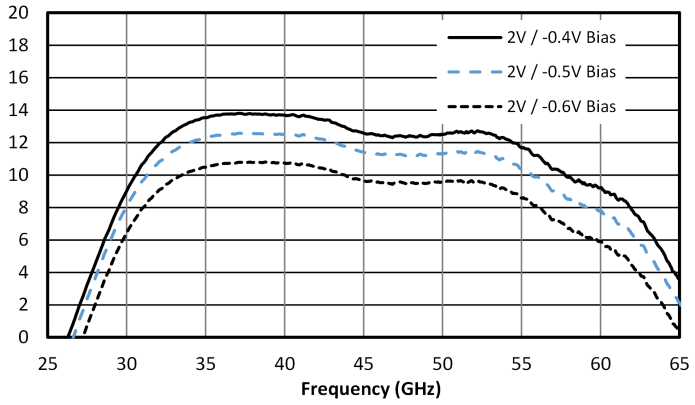
AMM-7203UC Small Signal Gain (dB) vs. Frequency, Vd = 1.5V



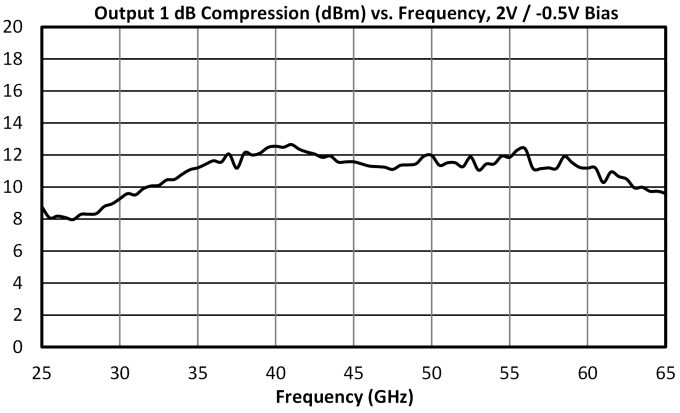
Noise Figure (dB) vs. Frequency



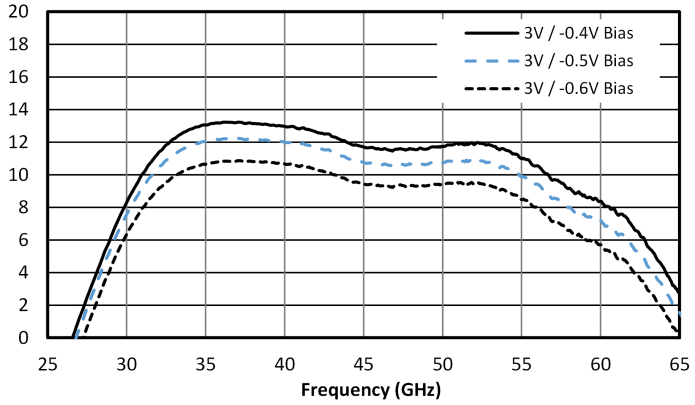
Small Signal Gain (dB) vs. Frequency, Vd = 2V



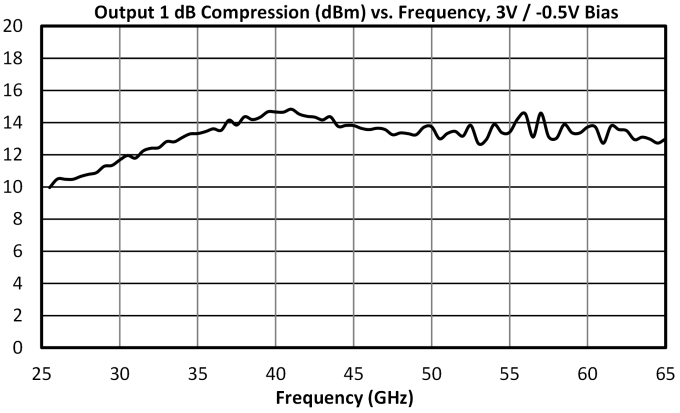
Output 1 dB Compression (dBm) vs. Frequency, 2V / -0.5V Bias



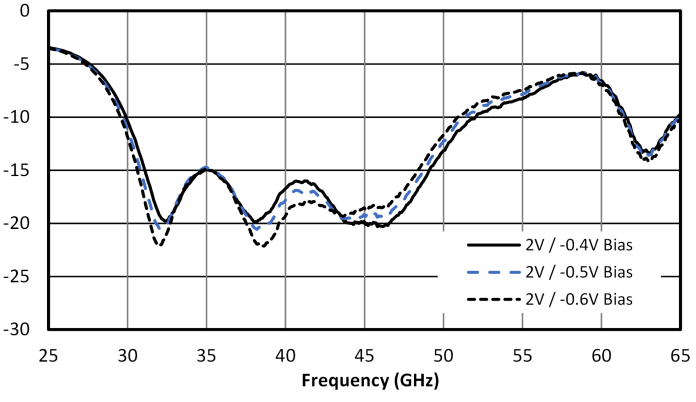
Small Signal Gain (dB) vs. Frequency, Vd = 3V



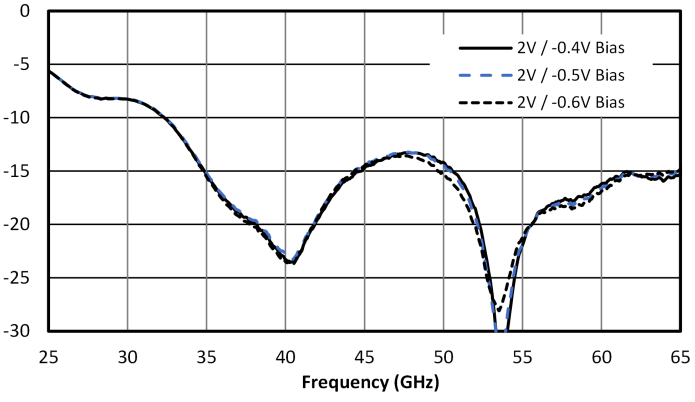
Output 1 dB Compression (dBm) vs. Frequency, 3V / -0.5V Bias



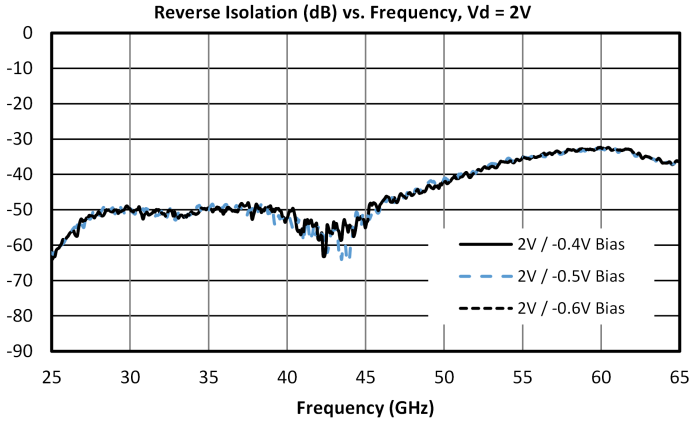
Input Return Loss (dB) vs. Frequency, Vd = 2V



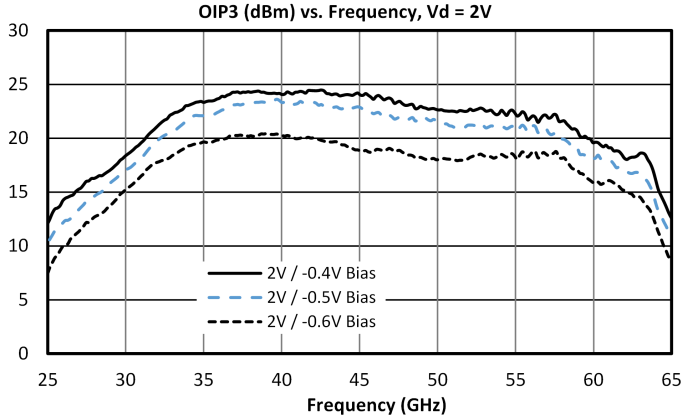
Output Return Loss (dB) vs. Frequency, Vd = 2V



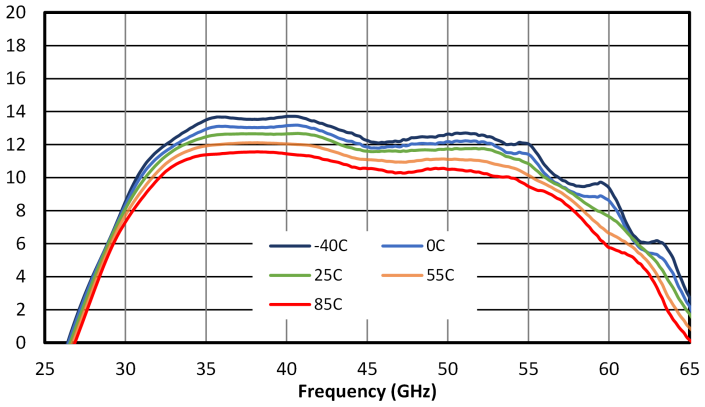
Reverse Isolation (dB) vs. Frequency, Vd = 2V



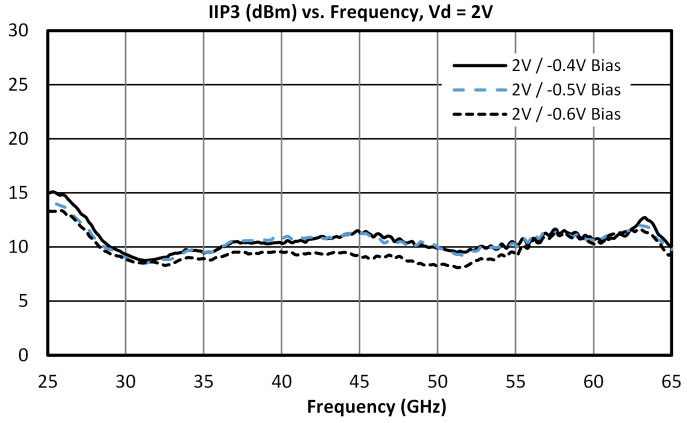
OIP3 (dBm) vs. Frequency, Vd = 2V



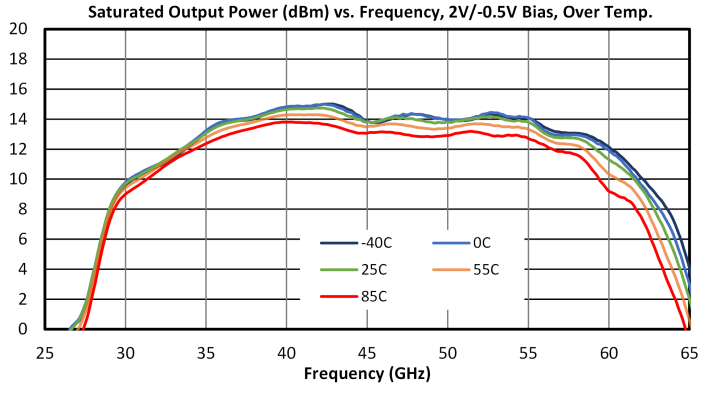
Small Signal Gain (dB) vs. Frequency, 2V/-0.5V Bias, Over Temp.



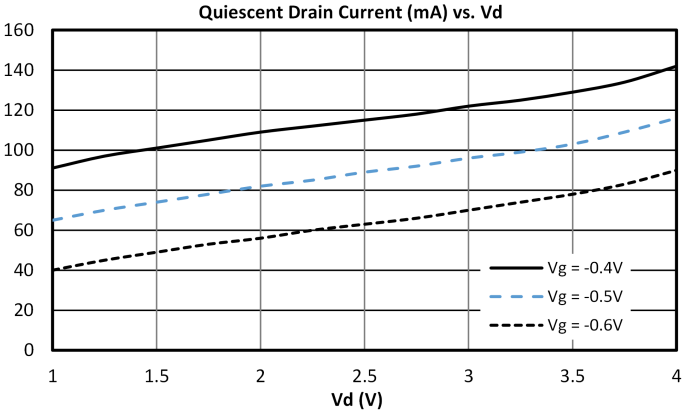
IIP3 (dBm) vs. Frequency, Vd = 2V



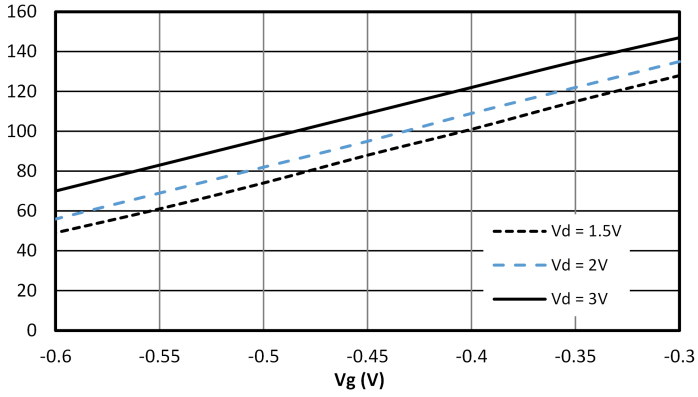
Saturated Output Power (dBm) vs. Frequency, 2V/-0.5V Bias, Over Temp.



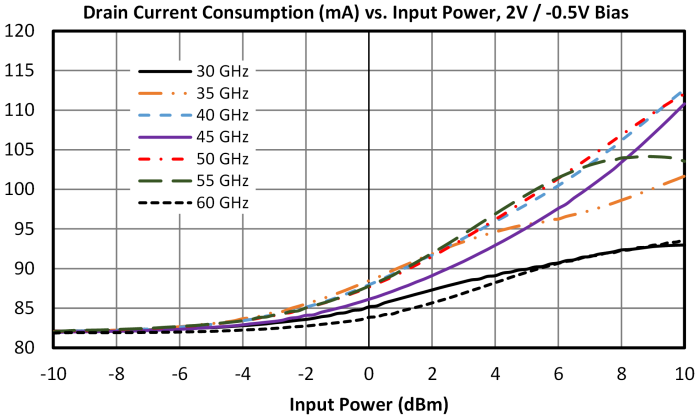
Quiescent Drain Current (mA) vs. Vd



Quiescent Drain Current (mA) vs. Vg



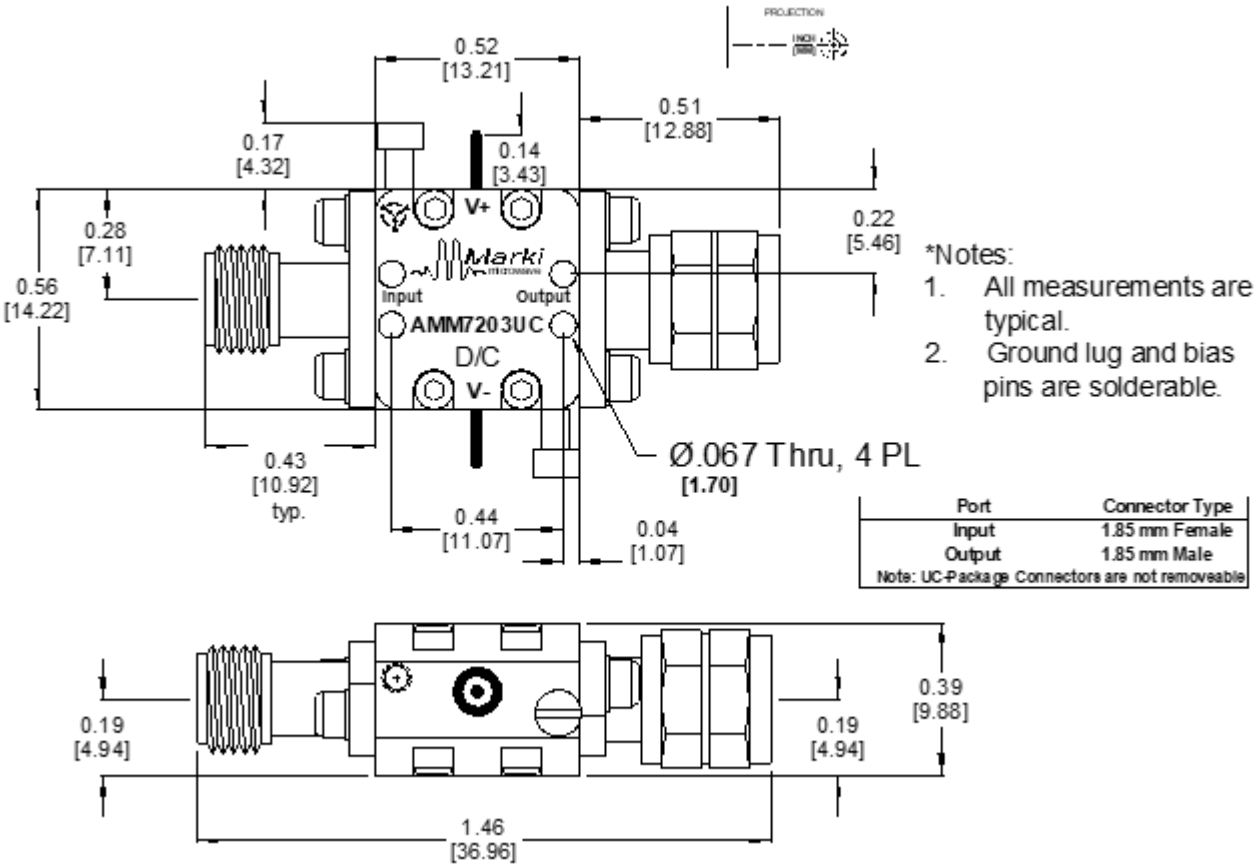
Drain Current Consumption (mA) vs. Input Power, 2V / -0.5V Bias



Mechanical Data

Outline Drawing

Download : Outline 2D Drawing | Outline 3D Drawing | Outline 3D STP



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

Port	Connector Type
Input	1.85 mm Female
Output	1.85 mm Male

Note: UC-Package Connectors are not removeable

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