



Mini-Circuits

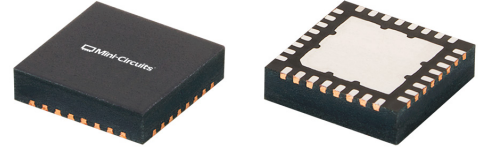
MMIC SURFACE MOUNT

Medium Power Amplifier **AVA-6183MPS+**

50Ω 6 to 18 GHz Self Biased

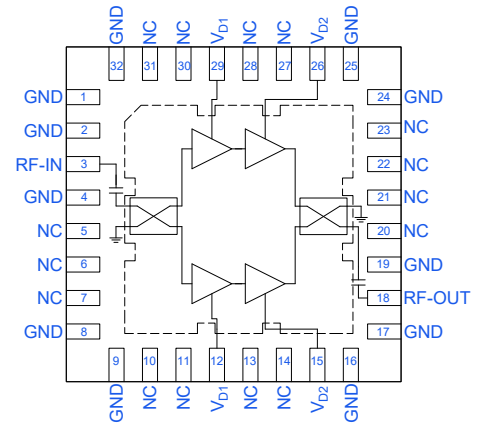
THE BIG DEAL

- High Saturated Output Power, Typ. +28.5 dBm
- High Gain, Typ. 20.9 dB
- Single Supply Voltage +6 V at 663 mA
- 5x5 mm 32-Lead QFN-Style Package



Generic photo used for illustration purposes only

FUNCTIONAL DIAGRAM (Top View)



APPLICATIONS

- 5G MIMO and Backhaul Radio
- Radar, EW, and ECM Defense Systems
- Satellite Communication
- Test and Measurement Equipment

PRODUCT OVERVIEW

Mini-Circuits' AVA-6183MPS+ is a wideband, medium power MMIC amplifier fabricated on a GaAs pHEMT process with high output power and broadband gain. Operating from 6 to 18 GHz, this amplifier features typical +26 dBm P1dB, +28.5 dBm P_{SAT}, and 20.9 dB Gain while operating from a single +6 V power supply. AVA-6183MPS+ is internally matched to 50 Ohms and comes in a 5x5 mm 32-Lead industry standard QFN-style package. These characteristics make it the ideal driver amplifier for a wide range of applications including back haul radio, radar and satellite communications.

KEY FEATURES

Features	Advantages
Self Biased	Simplifies circuit design by eliminating the need for external biasing components, reducing PCB footprint and lowering the cost of integration.
High Gain, Typ. 20.9 dB	The MMIC amplifier's high gain enables fewer system components in receiver signal chains.
High Saturated Output Power, Typ. +28.5 dBm	High saturated output power and high gain make this amplifier ideal as a driver amplifier in 5G MIMO, backhaul radio, satellite communication, and EW applications.
5x5 mm 32-Lead QFN-Style Package	Small footprint saves space in dense layouts while providing low inductance, repeatable transitions, and excellent thermal contact to the PCB. Industry standard packaging allows for ease of assembly in high volume manufacturing processes.

Mini-Circuits



MMIC SURFACE MOUNT

Medium Power Amplifier

AVA-6183MPS+

Mini-Circuits

50Ω 6 to 18 GHz Self Biased

ELECTRICAL SPECIFICATIONS¹ AT +25°C, $V_{DD} = +6$ V, AND $Z_0 = 50\Omega$ UNLESS NOTED OTHERWISE

Parameter	Condition (GHz)	Min.	Typ.	Max.	Units
Frequency Range		6		18	GHz
Gain	6	19.2	22.3		dB
	9	18.4	21.8		
	12	17.0	20.9		
	15	16.9	20.7		
	18	18.8	23.1		
Input Return Loss	6		15		dB
	9		15		
	12		12		
	15		20		
	18		14		
Output Return Loss	6		14		dB
	9		13		
	12		15		
	15		17		
	18		16		
Isolation	6-18		60.7		dB
Output Power at 1 dB Compression (P_{1dB})	6		+25.0		dBm
	9		+26.6		
	12		+26.0		
	15		+26.1		
	18		+25.7		
Output Power at Saturation (P_{SAT}) ²	6		+27.9		dBm
	9		+29.4		
	12		+28.5		
	15		+28.8		
	18		+28.7		
Output Third-Order Intercept (OIP3) ($P_{OUT} = +12$ dBm/Tone)	6		+33.6		dBm
	9		+32.7		
	12		+32.6		
	15		+32.3		
	18		+31.1		
Noise Figure	6		9.0		dB
	9		6.3		
	12		5.6		
	15		5.1		
	18		5.6		
Device Operating Voltage (V_{DD}) ^{3,4}		+5	+6	+7	V
Device Operating Current (I_{DD}) ^{5,6}			663		mA
Device Current Variation Vs. Temperature ⁷			-0.325		mA/°C
Device Current Variation Vs. Voltage ⁸			+10.3		μA/mV

1. Tested on Mini-Circuits Characterization Test Board TB-AVA6183MPSC+. See Figure 2. Loss de-embedded to the device reference plane.

2. Defined as output power at which change is 0.1 dB per 1 dB change in input power.

3. $V_{DD} = V_{D1} = V_{D2}$

4. Voltage must be applied to all V_{D1} and V_{D2} pins for standard operation.

5. Current at $P_{IN} = -25$ dBm. Increases to 810 mA at P_{SAT} .

6. $I_{DD} = I_{D1} + I_{D2}$

7. (Current at +85°C - Current at -55°C)/(+85°C - -55°C).

8. (Current at +7 V - Current at +5 V)/(+7 V - +5 V).





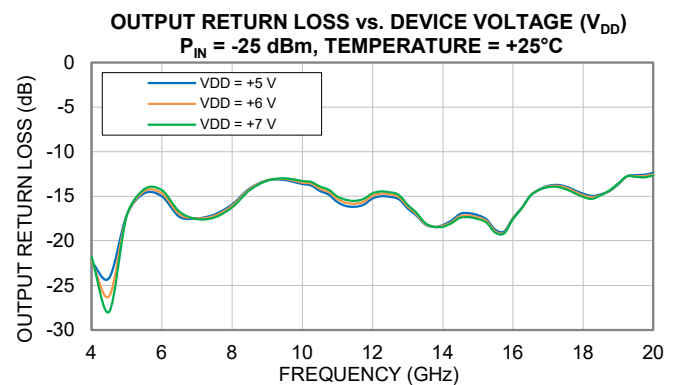
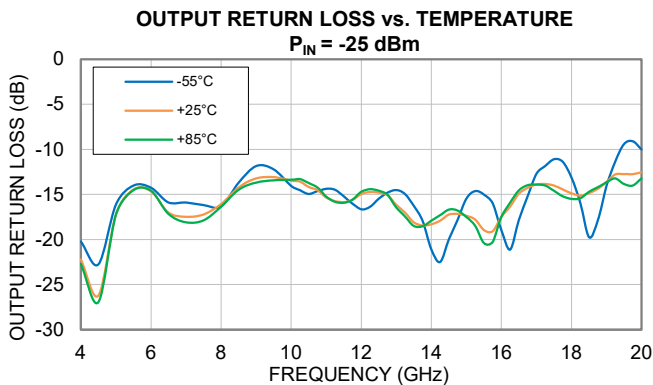
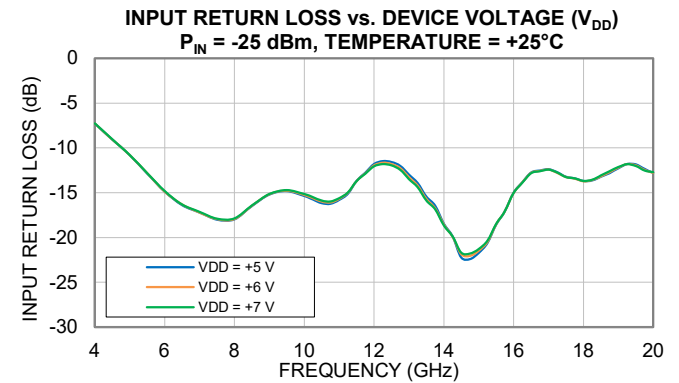
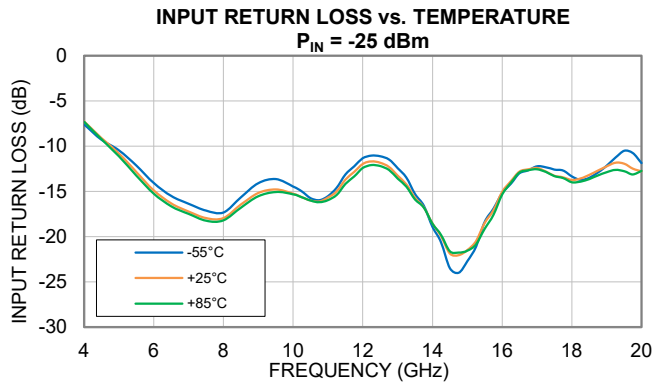
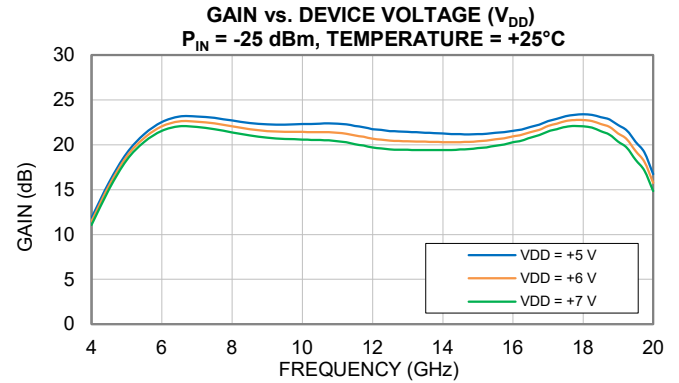
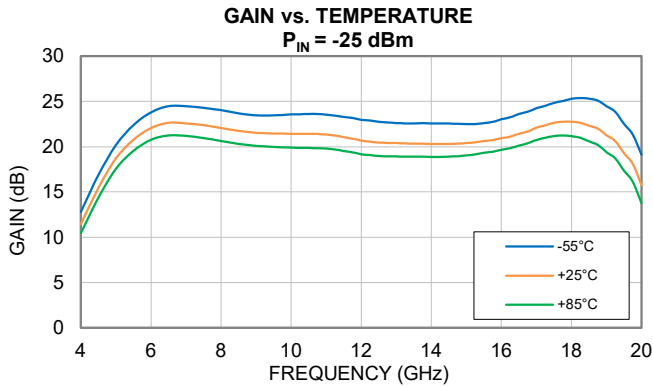
MMIC SURFACE MOUNT

Medium Power Amplifier **AVA-6183MPS+**

50Ω 6 to 18 GHz Self Biased

TYPICAL PERFORMANCE GRAPHS

Note: All data taken at $V_{DD} = +6$ V unless noted otherwise.





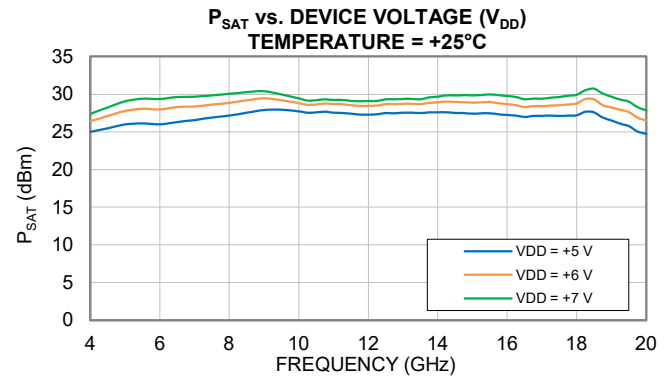
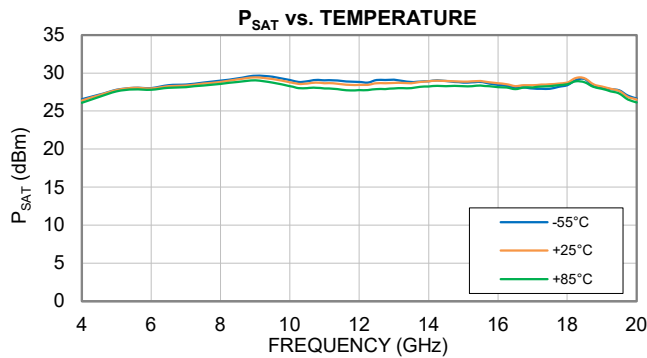
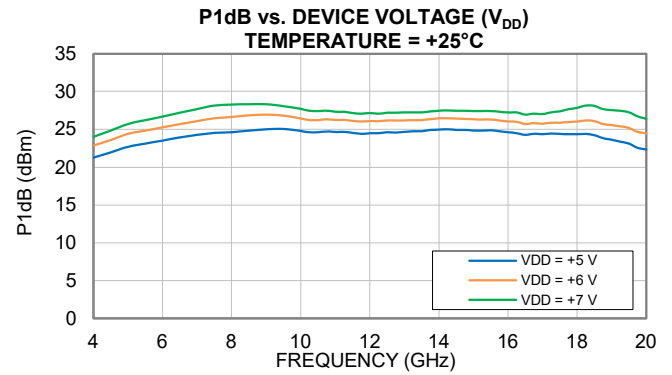
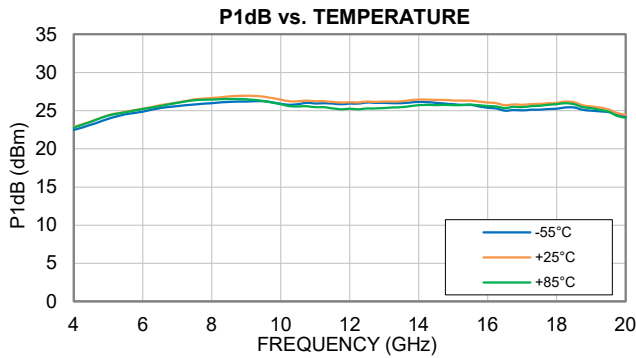
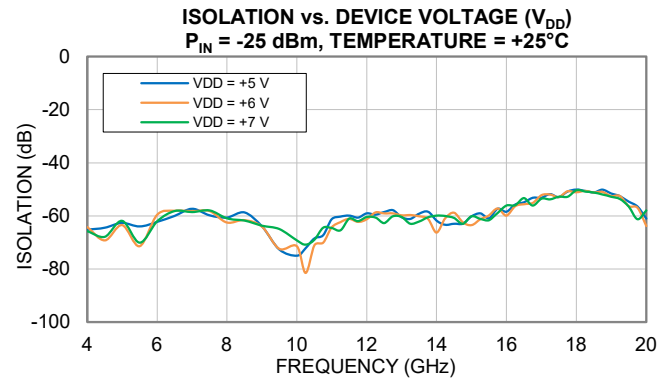
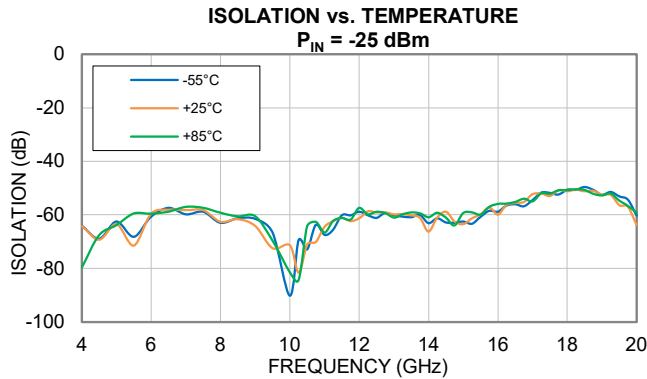
MMIC SURFACE MOUNT

Medium Power Amplifier **AVA-6183MPS+**

50 Ω 6 to 18 GHz Self Biased

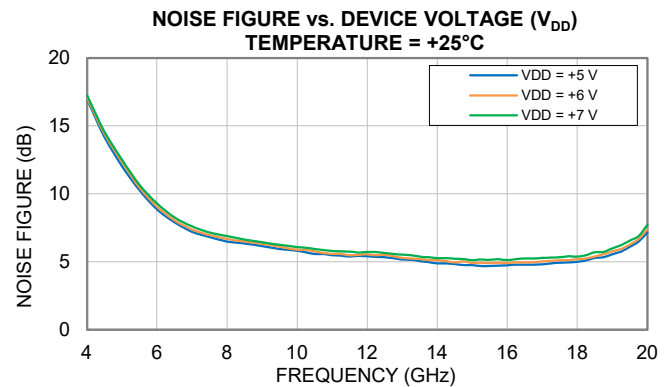
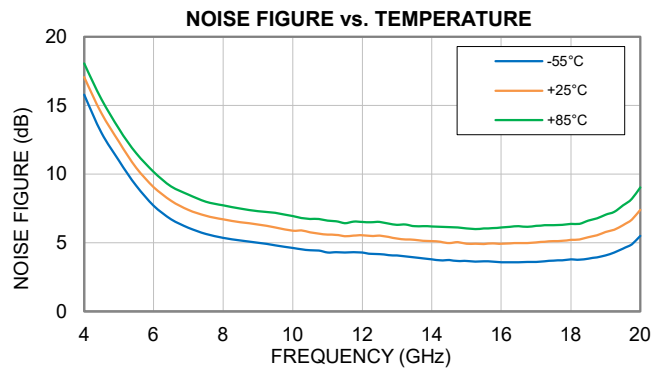
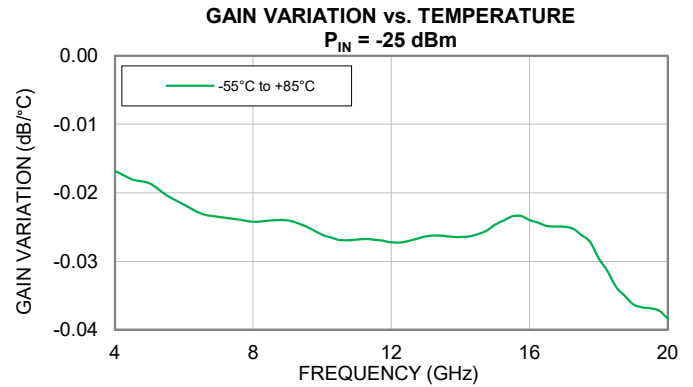
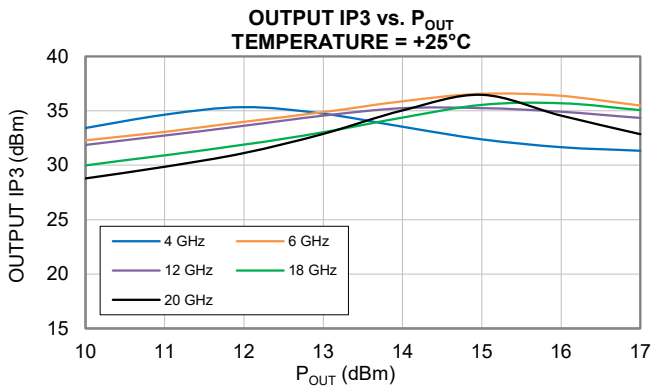
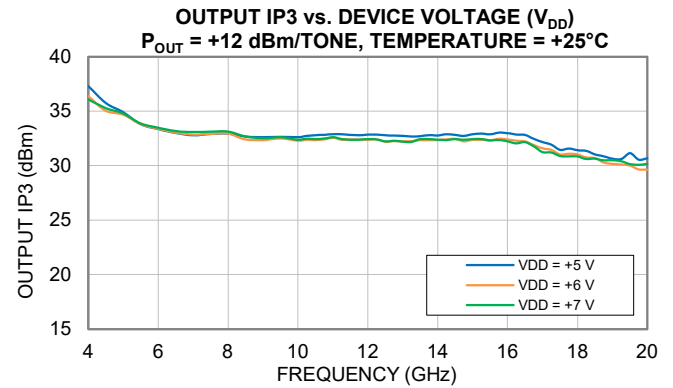
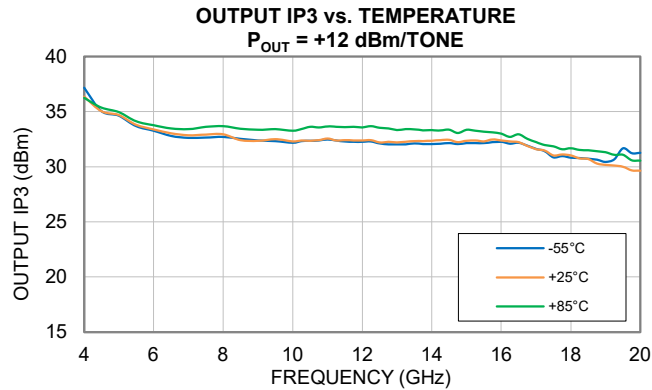
TYPICAL PERFORMANCE GRAPHS

Note: All data taken at $V_{DD} = +6$ V unless noted otherwise.





TYPICAL PERFORMANCE GRAPHS

Note: All data taken at $V_{DD} = +6$ V unless noted otherwise.



MMIC SURFACE MOUNT

Medium Power Amplifier **AVA-6183MPS+**

50Ω 6 to 18 GHz Self Biased

ABSOLUTE MAXIMUM RATINGS⁹

Parameter	Ratings
Operating Temperature	-55°C to +85°C
Storage Temperature	-65°C to +150°C
Total Power Dissipation	4.8 W
Junction Temperature ¹⁰	+175°C
Input Power (CW), $V_{DD}^{11} = +6$ V	+26 dBm
DC Voltage on RF-OUT	+10 V
DC Voltage on RF-IN	+10 V
DC Drain Voltage on V_{DD}	+10 V
DC Drain Current I_{DD}^{12}	900 mA

9. Permanent damage may occur if any of these limits are exceeded. Maximum ratings are not intended for continuous normal operation.

10. Peak temperature on top of die.

11. $V_{DD} = V_{D1} = V_{D2}$

12. $I_{DD} = I_{D1} + I_{D2}$

THERMAL RESISTANCE

Parameter	Ratings
Thermal Resistance (Θ_{JC}) ¹³	18.6°C/W

13. $\Theta_{JC} = (\text{Hot Spot Temperature on Die} - \text{Temperature at Ground Lead}) / \text{Dissipated Power}$

ESD RATING

	Class	Voltage Range	Reference Standard
Human Body Model (HBM)	1A	250 V < 500 V	ANSI/ESDA/JEDEC JS-001-2023
Charged Device Model (CDM)	C3	> 1000 V	ANSI/ESDA/JEDEC JS-002-2022



ESD HANDLING PRECAUTION: This device is designed to be Class 1A for HBM. Static charges may easily produce potentials higher than this with improper handling and can discharge into DUT and damage it. As a preventive measure Industry standard ESD handling precautions should be used at all times to protect the device from ESD damage.

MSL RATING

Moisture Sensitivity: MSL3 in accordance with IPC/JEDEC J-STD-020E/JEDEC J-STD-033C





MMIC SURFACE MOUNT

Medium Power Amplifier **AVA-6183MPS+**

50Ω 6 to 18 GHz Self Biased

FUNCTIONAL DIAGRAM (TOP VIEW)

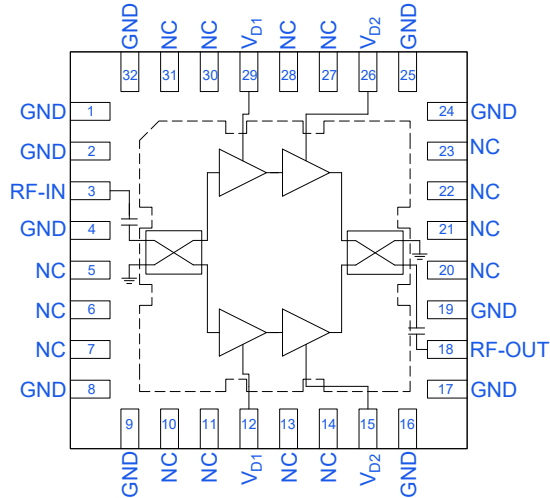


Figure 1. AVA-6183MPS+ Functional Diagram

PAD DESCRIPTION

Function	Pad Number	(Refer to Figure 2)
RF-IN	3	RF-IN pad connects to RF-Input port.
RF-OUT	18	RF-OUT pad connects to RF-Output port.
V_{D1}	12, 29	DC Input pads connects to voltage input ports, V_{D1} .
V_{D2}	15, 26	DC Input pads connects to voltage input ports, V_{D2} .
GND	1, 2, 4, 8, 9, 16, 17, 19, 20, 21, 24, 25, 32, & Paddle	Connects to ground.
NC	5-7, 10, 11, 13, 14, 20, 23, 27, 28, 30, 31	Not used internally. Connected to ground on test board.

EVALUATION BOARD

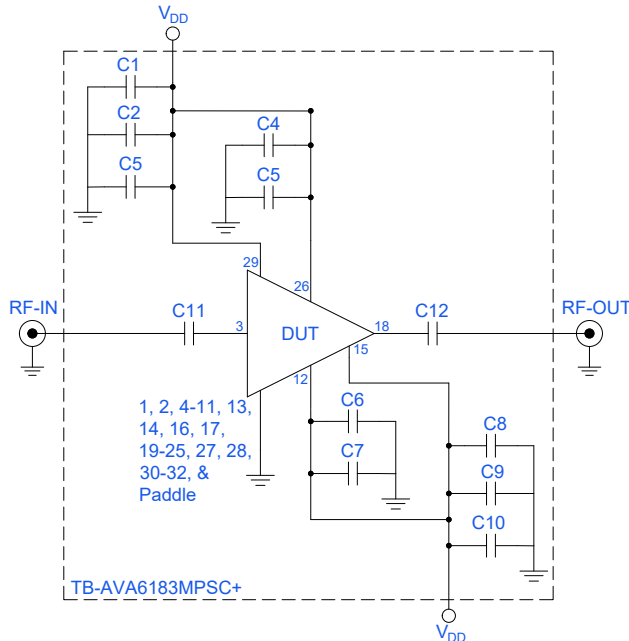


Figure 2. AVA-6183MPS+ Evaluation and Application Circuit

Electrical Parameters and Conditions

Gain, Return Loss, Output Power at 1 dB Compression (P_{1dB}), Output Power at Saturation (P_{SAT}), Output IP3 (OIP3), and Noise Figure measured using N52425B PNA-X Microwave Network Analyzer.

Conditions:

- Gain and Return Loss: $P_{IN} = -25$ dBm
- Output IP3 (OIP3): Two tones, spaced 1 MHz apart, +12 dBm/tone at output.

Power ON/Power OFF Sequence:

AVA-6183MPS+ is not sensitive to power ON/OFF sequence. V_{D1} and V_{D2} can be applied in any order. All voltage lines may be tied together and applied simultaneously.

Component	Value	Size	Part Number	Manufacturer
C3, C5, C6, C8	10 pF	0603	GRM1885C1H101GA01D	Murata
C2, C4, C7, C9	0.01 μ F	0402	GRM155R71E103KA01D	Murata
C1, C10	10 μ F	1206	CL31B106KBHNNNE	Samsung
C11, C12	30 pF	0201	P21BNL300M5ST	DLI

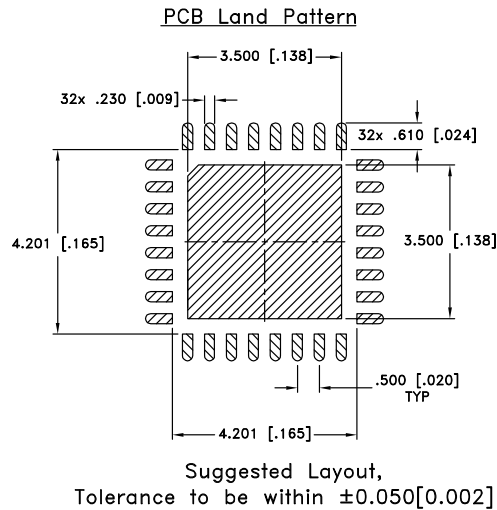
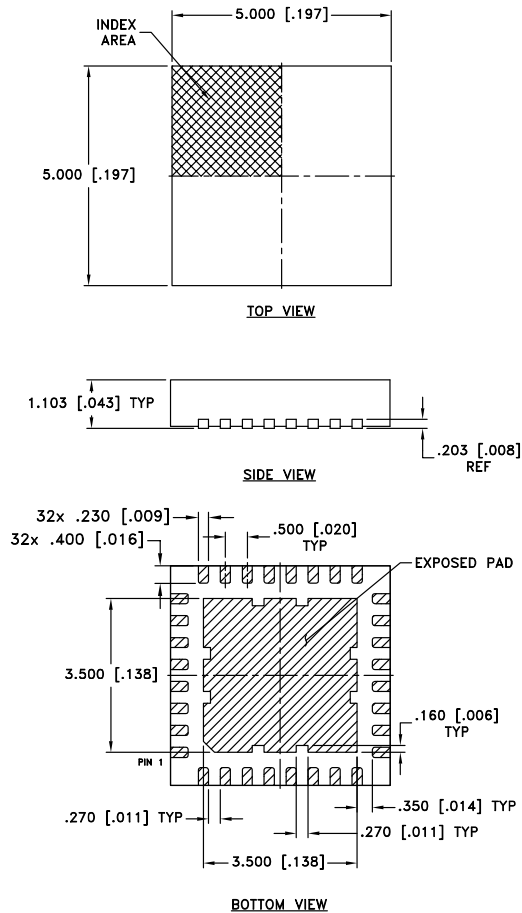


MMIC SURFACE MOUNT

Medium Power Amplifier **AVA-6183MPS+**

50Ω 6 to 18 GHz Self Biased

CASE STYLE DRAWING

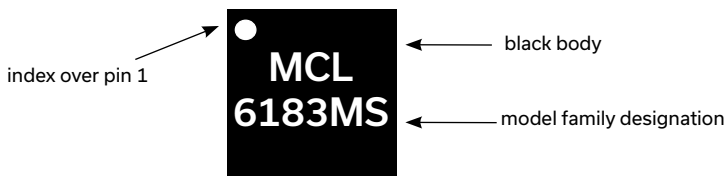


DENOTES METALLIZATION

Weight: .056 Grams

Dimensions are in mm [Inches]. Tolerances: 2 Pl. ± 0.254 [0.01]; 3 Pl. ± 0.127 [0.005] mm [inches]

PRODUCT MARKING



Marking may contain other features or characters for internal lot control



Mini-Circuits

MMIC SURFACE MOUNT

Medium Power Amplifier **AVA-6183MPS+**

50Ω 6 to 18 GHz Self Biased

ADDITIONAL DETAILED INFORMATION IS AVAILABLE ON OUR DASHBOARD

[CLICK HERE](#)

Performance Data & Graphs	Data
	Graphs
	S-Parameter (S2P Files) Data Set (.zip file)
Case Style	DG1677-8. QFN-style package, exposed paddle, Lead Finish: Nickle Palladium Gold
RoHs Status	Compliant
Tape & Reel Standard quantities available on reel	F102 7" reels with 20, 50, 100, 200, or 500 devices 13" 1,000 devices
Suggested Layout for PCB Design	PL-808
Evaluation Board	TB-AVA6183MPSC+
	Gerber File
Environmental Ratings	ENV08T10
Product Handling	The use of no-clean solder is recommended. This package cannot be subjected to aqueous wash.

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/terms/viewterm.html

