

AM1193 – Amplifier

20 MHz to 6.0 GHz Gain Block

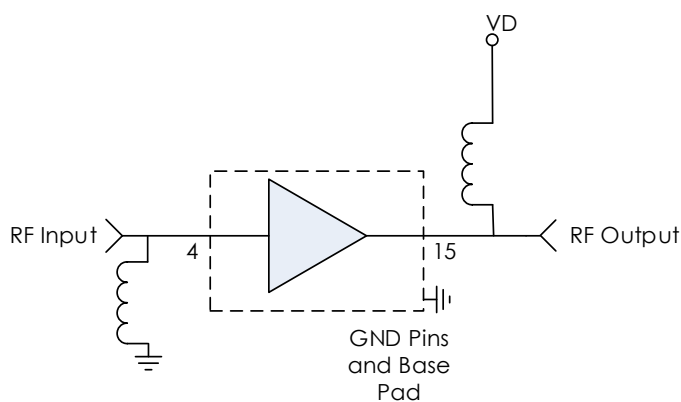
AM1193 is a high dynamic range cascadable gain block covering the 20 MHz to 6.0 GHz frequency range.

The device exhibits high P1dB, high second and third order intercept performance, and low noise figure while also providing excellent gain stability over the operating temperature range. With internal 50Ω matching and packaged in a 4mm QFN or a shielded module, the AM1193 represents a compact total PCB footprint.

FEATURES

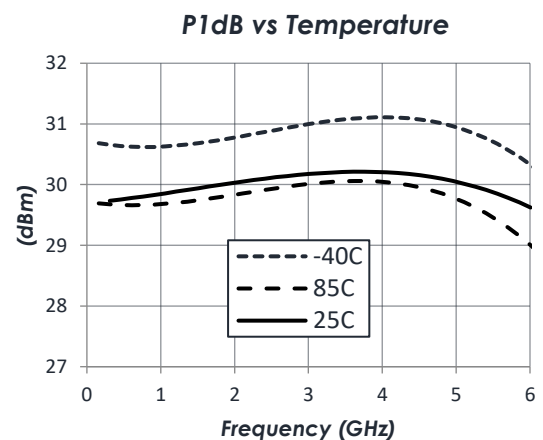
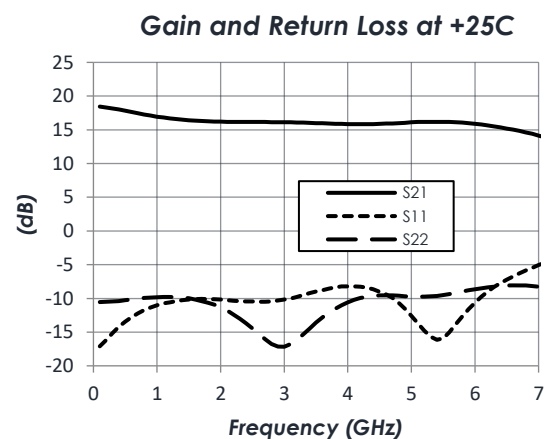
- 15 dB Gain
- +55 dBm OIP2
- +40 dBm OIP3
- +30 dBm P1dB
- +31 dBm PSat
- 2.0 dB Noise Figure
- +12.0V Supply Range
- 4mm QFN Package
- -40C to +85C Operation

FUNCTIONAL DIAGRAM



TYPICAL PERFORMANCE (Exclusive of Bias Tee)

(V Supply = +12.0V, Device Voltage [Vd] = +11.5V, Id = 250 mA)





CONTENTS

REVISION HISTORY..... 2

PIN LAYOUT AND DEFINITIONS 3

SPECIFICATIONS..... 4

TYPICAL PERFORMANCE (Exclusive of Bias Tee)..... 6

TYPICAL APPLICATION..... 8

RECOMMENDED COMPONENT LIST (OR EQUIVALENT) 8

PARTS ORDERING DETAILS..... 8

EVALUATION PC BOARD..... 9

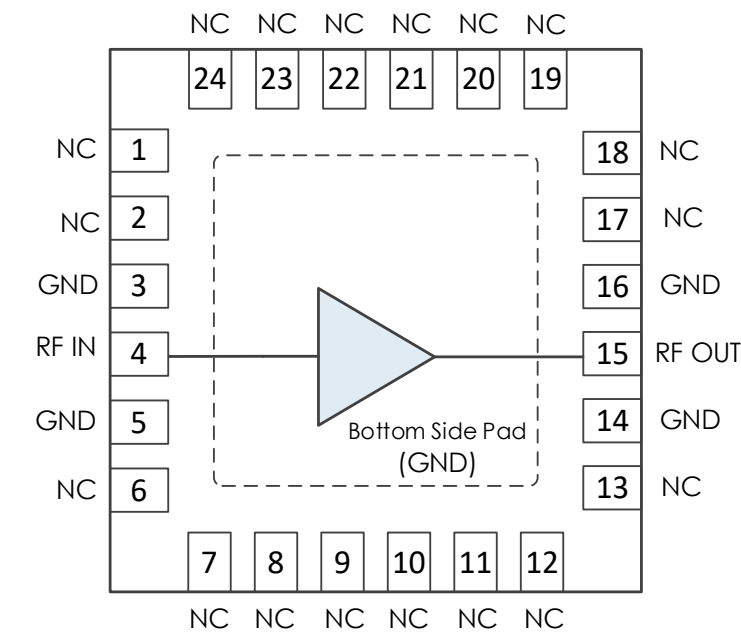
RELATED PARTS..... 9

COMPONENT COMPLIANCE INFORMATION10

REVISION HISTORY

Date	Revision	Notes
December 20, 2024	1	Preliminary Release.
April 30, 2025	1.1	Update application circuit
June 16, 2025	1.2	Corrected pin out table
August 11, 2025	2	Updated thermal information. Corrected formatting errors

PIN LAYOUT AND DEFINITIONS



Pin	Name	Function
1-2	NC	Not Connected
3	GND	Ground - Common
4	RF IN	RF Input - 50 Ohms - DC Coupled
5	GND	Ground - Common
6-13	NC	Not Connected
14	GND	Ground - Common
15	RF OUT	RF Output - 50 Ohms - DC Coupled
16	GND	Ground - Common
17-24	NC	Not Connected

Note: NC pins may be grounded or left open.

SPECIFICATIONS

Absolute Maximum Ratings

	Minimum	Maximum
Supply Voltage		+12.0 V
RF Input Power		+20 dBm
Storage Temperature Range	-55 C	+150 C

Note: Any device operation beyond the Absolute Maximum Ratings may result in permanent damage to the device. The values listed in this table are extremes and do not imply functional operation of the device at these or any other conditions beyond what is listed under Recommended Operating Conditions. Any part subjected to conditions outside of what is recommended for an extended amount of time may suffer from reliability concerns.

Handling Information

	Minimum	Maximum
Moisture Sensitivity Level	MSL 3	



Mercury products are electrostatic sensitive.
Follow safe handling practices to avoid damage.

Recommended Operating Conditions

	Minimum	Typical	Maximum
Supply Voltage	+10.0 V	+12.0 V	+12.5 V
Device Voltage	+9.5 V	+11.5 V	+12.0 V
Operating Case Temperature	-40 C		+85 C

Thermal information

Junction to Package Ground Thermal Resistance (θ_{JC})	25.4 C/W
Nominal Junction Temperature at +85C ambient	+181 C
Channel Temperature to Maintain 1 Million Hour MTTF	+196 C

DC Electrical Characteristics

(T = 25 °C unless otherwise specified)

Param	Testing Conditions	Min	Typical	Max
DC Supply Voltage		+10.0 V	+12.0 V	+12.0 V
DC Device Voltage (Vd)			+11.5 V	+12.0 V
DC Device Current	V Supply = +12.0 V		315 mA	
Power Dissipated	V Supply = +12.0 V		3.78 W	

RF Performance (exclusive of output bias tee)

(T = 25 °C unless otherwise specified)

Param	Testing Conditions	Min	Typical	Max
Frequency Range		20 MHz		6.0 GHz
Gain	V Supply = +12.0 V		15 dB	
Return Loss	V Supply = +12.0 V		9 dB	
Reverse Isolation	V Supply = +12.0 V		19 dB	
Output IP3	V Supply = +12.0 V		+40 dBm	
Output IP2	V Supply = +12.0 V		+50 dBm	
Output P1dB	V Supply = +12.0 V		+30 dBm	
Output Power Saturation	V Supply = +12.0 V		+31 dBm	
Noise Figure	V Supply = +12.0 V		2.0 dB	

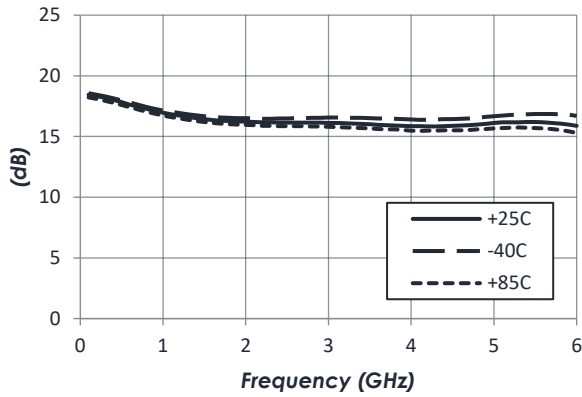
Notes:

- IP3 measured with 10MHz tone spacing.
- IP2 characterized with sum and difference measurements.
 - IP2 sum measured with 10MHz tone spacing. IM2 measured at $f_1 + f_2$
 - IP2 difference measured with tones at f_1 and $f_2 = (2 \times f_1) - 10MHz$. IM2 measured at $f_2 - f_1$

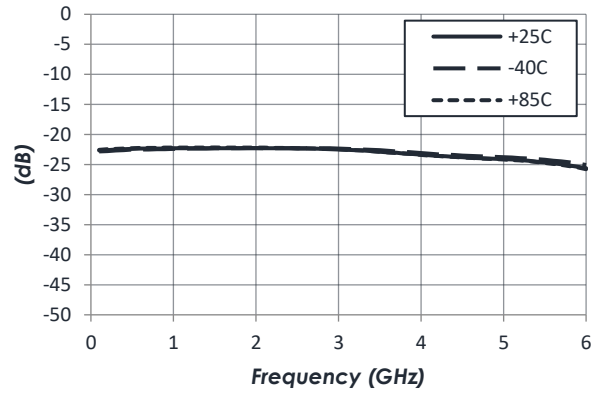
TYPICAL PERFORMANCE (Exclusive of Bias Tee)

(V Supply = +12.0V, Device Voltage [Vd] = +11.5V, Id = 315 mA)

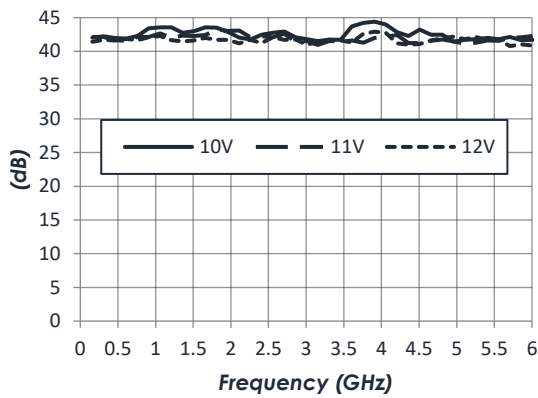
Gain vs Temperature



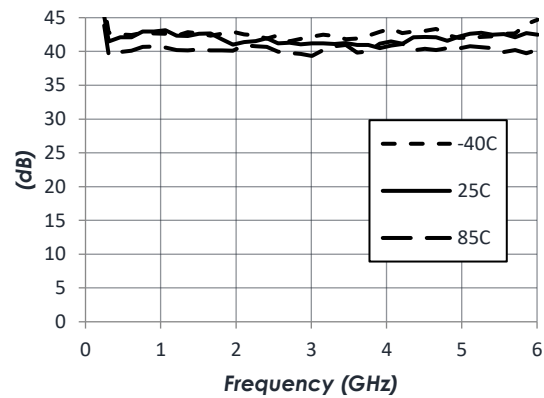
Reverse Isolation vs Temperature

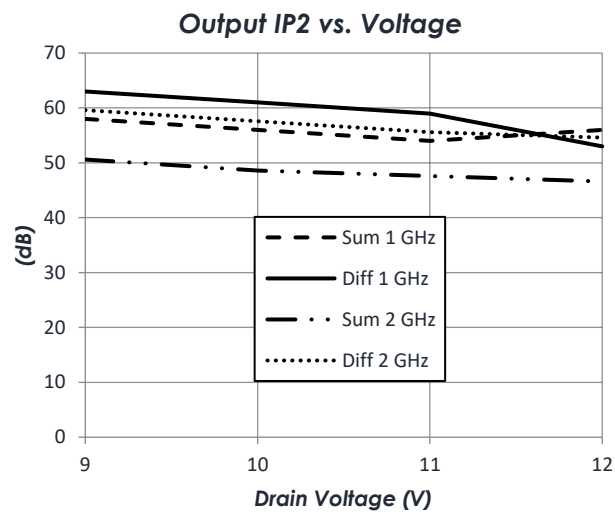
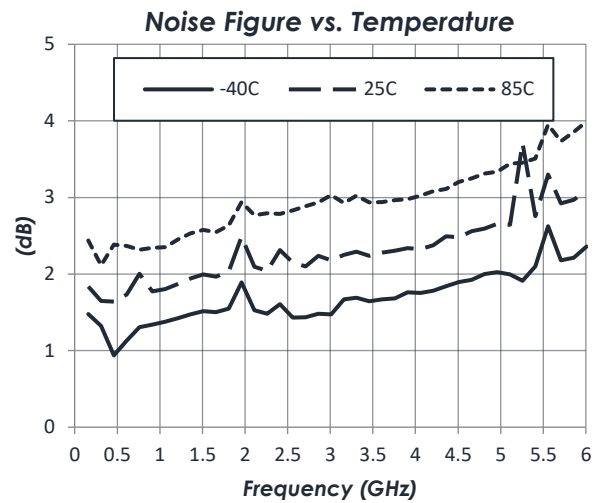
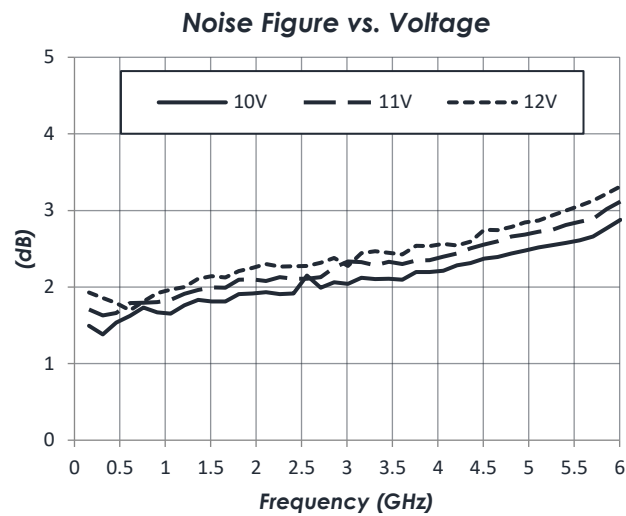


Output IP3 vs. Voltage

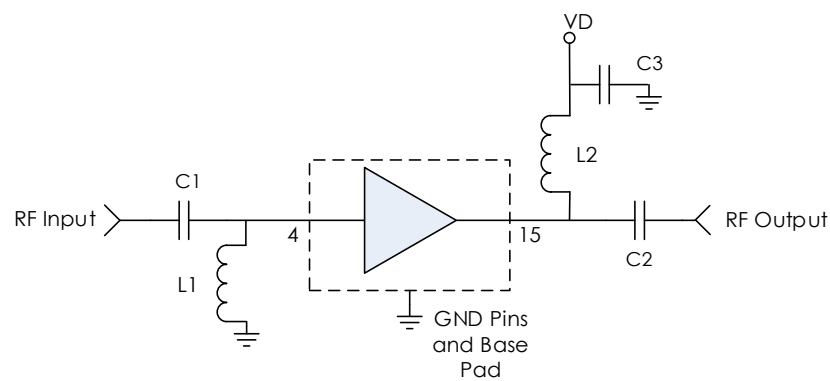


Output IP3 vs. Temperature





TYPICAL APPLICATION



RECOMMENDED COMPONENT LIST (OR EQUIVALENT)

Part	Value	Part Number	Manufacturer
C1, C2, C3	0.1 μ F	0201BB104KW160	Passives Plus
L1	-	MMZ1005A222E	Murata
L2	-	CC19T40K240G5	Piconics

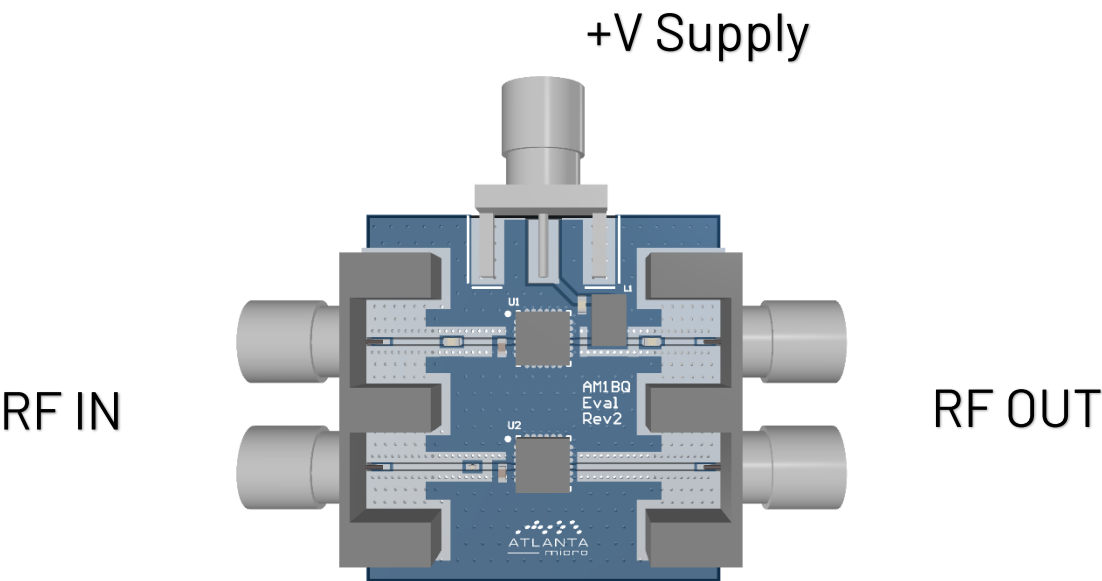
Notes:

1. NC pins may be grounded or left open.
2. External DC blocking capacitors and RF choke are required.
 - a. DC blocking capacitors should be high performance, low-loss, broadband capacitors for optimum performance.
 - b. Select values for the frequency range of interest.
3. No input or output matching is required.

PARTS ORDERING DETAILS

Description	Part Number
4mm 24 Lead QFN	AM1193
AM1193 Evaluation Board	AM1193-Eval

EVALUATION PC BOARD



RELATED PARTS

Part Number		Description
AM1016B	20 MHz to 6 GHz	+3.3V Gain Block
AM1018B	20 MHz to 6 GHz	+5.0V Gain Block
AM1018C	20 MHz to 6 GHz	+5.0V Gain Block
AM1031C	20 MHz to 8 GHz	+3.3V Gain Block
AM1063-1	DC to 10 GHz	Gain Block
AM1063-2	DC to 10 GHz	Miniature Gain Block
AM1064-1	DC to 8 GHz	Gain Block
AM1064-2	DC to 8 GHz	Miniature Gain Block
AM1025B	20 MHz to 3 GHz	+8.0V Gain Block
AM1127	20 MHz to 6 GHz	+6.0V Gain Block
AM1143	20 MHz to 6 GHz	+8.0V Gain Block

COMPONENT COMPLIANCE INFORMATION

RoHS: Mercury Systems, Inc. hereby certifies that all products comply with the EC Directive 2011/65/EC on the Restriction of Hazardous Substances, commonly known as EU-RoHS 6 and 10. All products supplied by Mercury shall be compliant with the European Directive 2011/65/EC based on the following substance list.

Substance List	Allowable Maximum Concentration
Lead (Pb)	<1000 PPM (0.1% by weight)
Mercury (Hg)	<1000 PPM (0.1% by weight)
Cadmium (Cd)	<75 PPM (0.0075% by weight)
Hexavalent Chromium (CrVI)	<1000 PPM (0.1% by weight)
Polybrominated Biphenyls (PBB)	<1000 PPM (0.1% by weight)
Polybrominated Diphenyl ethers (PBDE)	<1000 PPM (0.1% by weight)
Decabromodiphenyl Deca BDE	<1000 PPM (0.1% by weight)
Bis (2-ethylhexyl) Phthalate (DEHP)	<1000 PPM (0.1% by weight)
Butyl Benzyl Phthalate (BBP)	<1000 PPM (0.1% by weight)
Dibutyl Phthalate (DBP)	<1000 PPM (0.1% by weight)
Diisobutyl Phthalate (DIBP)	<1000 PPM (0.1% by weight)

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Mercury takes its responsibility as a global partner seriously and will use due diligence within our supply chain to ensure all standards are met to the best of our knowledge.



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