AM1175 – Amplifier

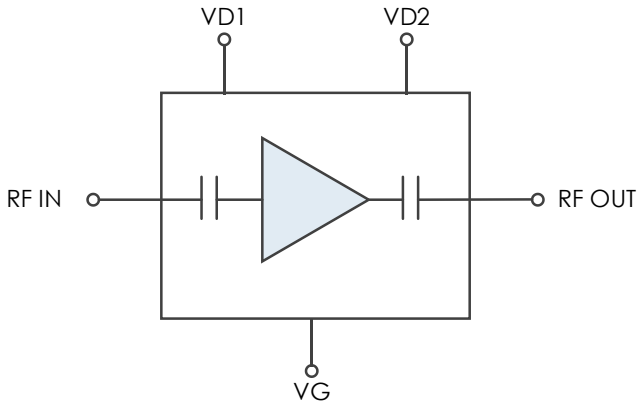
6 to 18 GHz Driver Amplifier

AM1175 is a wideband driver amplifier servicing the 6 to 18 GHz frequency range. The device exhibits high gain and high P1dB with excellent power added efficiency above 32% at saturation using a 5V supply rail. The AM1175 is packaged in a 4mm QFN with internal matching and DC blocking capacitors, and coupled with its high output power and efficiency, the AM1175 is an ideal choice for a driver amplifier that enables a wide variety of low SWaP applications.

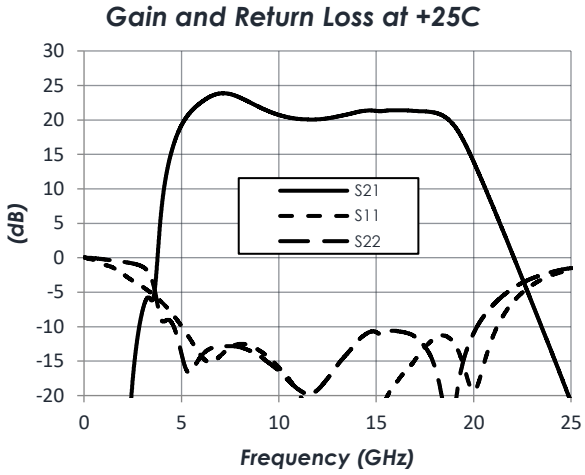
FEATURES

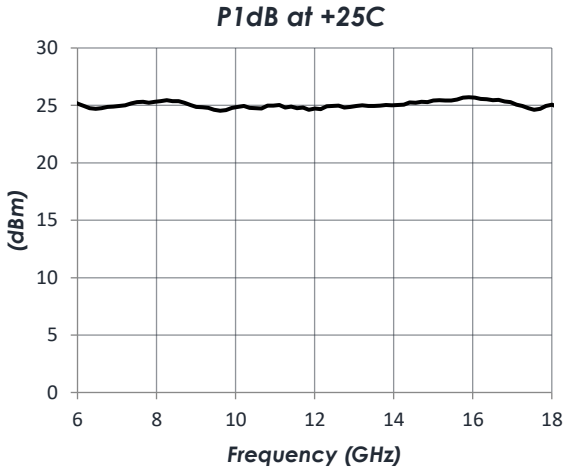
- 21 dB Gain
- +25 dBm P1dB
- +26 dBm Psat
- 27% PAE at P1dB
- 32% PAE at Psat
- +35 dBm OIP3
- +5V/175 mA Operation
- 4mm QFN
- -40C to +85C Operation

FUNCTIONAL DIAGRAM



CHARACTERISTIC PERFORMANCE





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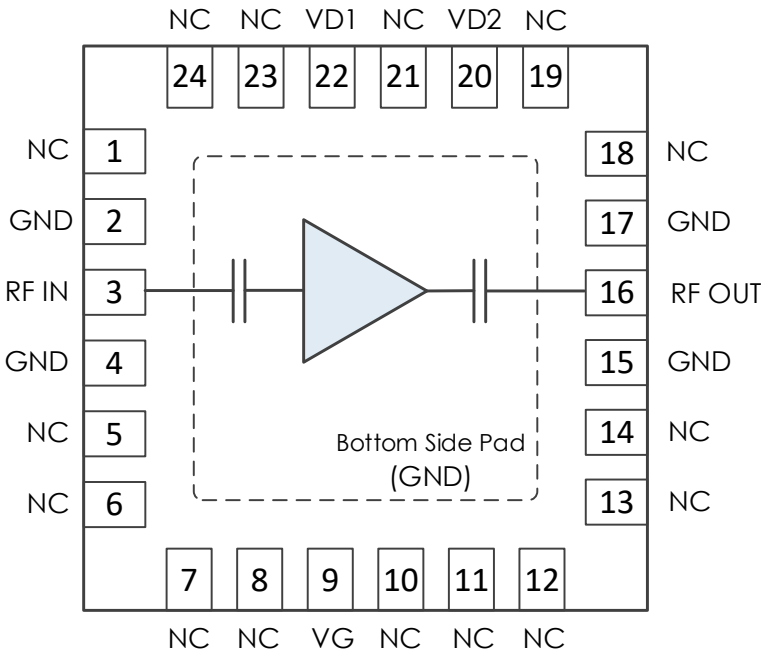
REVISION HISTORY

Date	Revision	Notes
February 11, 2025	1	Initial Release

PIN LAYOUT AND DEFINITIONS



Pin	Name	Function
1	NC	Not Connected
2	GND	Ground - Common
3	RF IN	RF Input – 50 Ohms – AC Coupled
4	GND	Ground – Common
5-8	NC	Not Connected
9	VG	Amplifier Gate Control – External bypass capacitors required
10-14	NC	Not Connected
15	GND	Ground - Common
16	RF OUT	RF Output – 50 Ohms – AC Coupled
17	GND	Ground – Common
18, 19	NC	Not Connected
20	VD2	DC Power Input 2
21	NC	Not Connected
22	VD1	DC Power Input
23, 24	NC	Not Connected

Note: NC pins may be grounded or left open.

SPECIFICATIONS

Absolute Maximum Ratings

	Minimum	Maximum
Supply Voltage	-0.3 V	+6.0 V
RF Input Power		10 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		+5.0 V	
Operating Case Temperature	-40 C		+85 C

Thermal Information

Thermal Resistance (channel to backside ground)	86.7 C/W
Nominal Junction Temperature at +85C Ambient	161 C
Channel Temperature to Maintain 1 Million Hour MTTF	175 C

DC Electrical Characteristics

(T = 25 °C unless otherwise specified)

Param	Testing Conditions	Min	Typical	Max
DC Supply Voltage			+5.0 V	
DC Supply Current	Note 1.		175 mA	
Power Dissipated	VDD = +5 V		875 mW	

Notes:
1. Adjust VG between -4V to 0V to achieve 175mA quiescent drain current

RF Performance

(VDD = +5V, IDD = 175mA, and T = 25 °C unless otherwise specified)

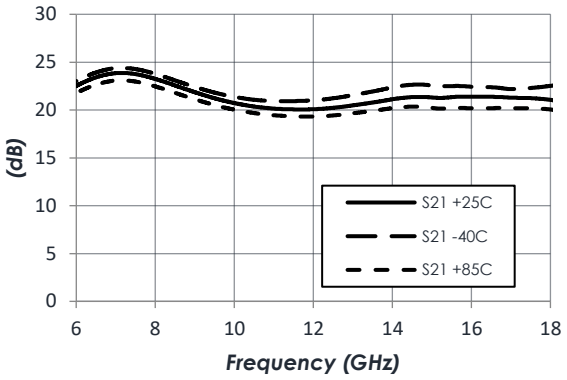
Param	Testing Conditions	Min	Typical	Max
Frequency Range		6 GHz		18 GHz
Gain	f = 6 GHz		22.5 dB	
	f = 12 GHz		20 dB	
	f = 18 GHz		21 dB	
Return Loss	f = 6 GHz		-14 dB	
	f = 12 GHz		-19 dB	
	f = 18 GHz		-12 dB	
Output IP3	f = 12 GHz		35.6 dBm	
Output P1dB	f = 12 GHz		24.7 dBm	
Noise Figure	f = 12 GHz		3.7 dB	

Notes:
1. OIP3 measured with -20dBm input power tones at 1MHz tone spacing

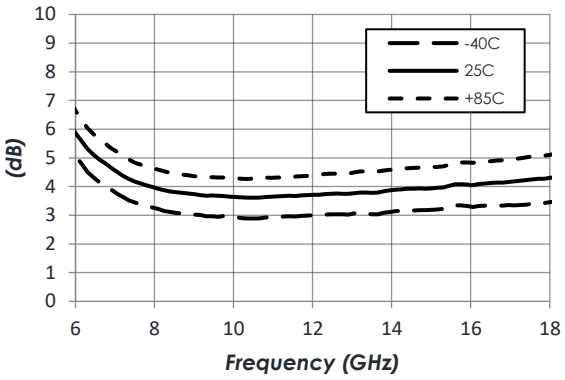
TYPICAL PERFORMANCE

(VDD = +5V, IDD = 175mA, T = 25 °C unless otherwise specified)

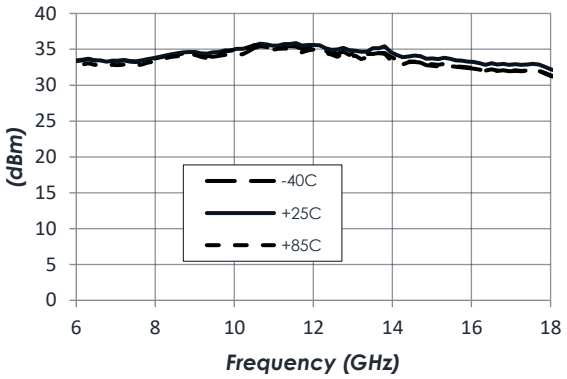
Gain vs Temperature



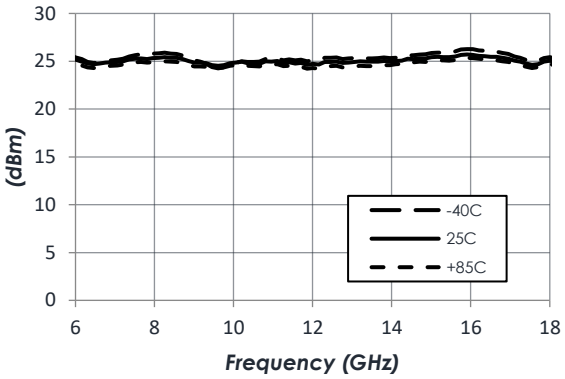
Noise Figure vs Temperature



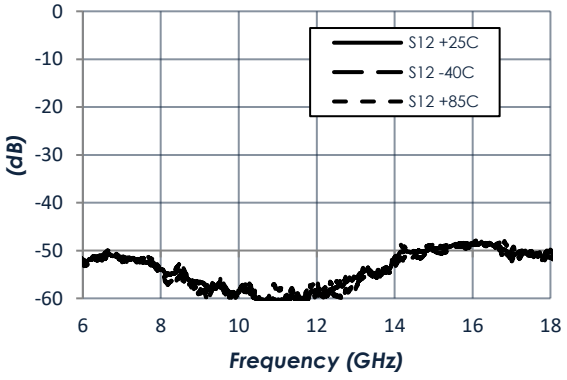
Output IP3 vs Temperature



P1dB vs Temperature

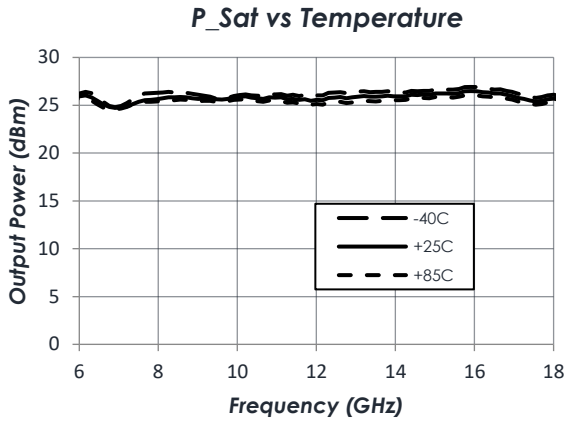


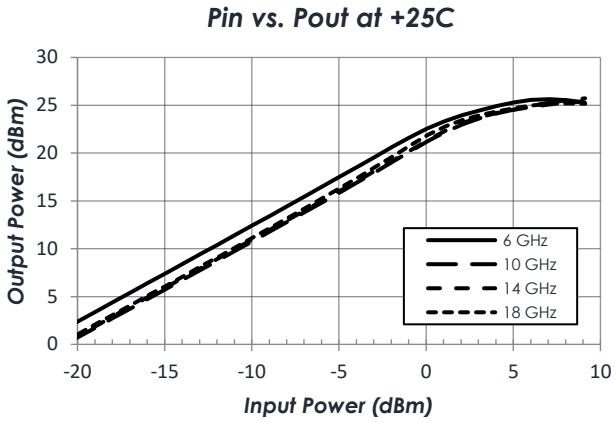
Reverse Isolation vs Temperature

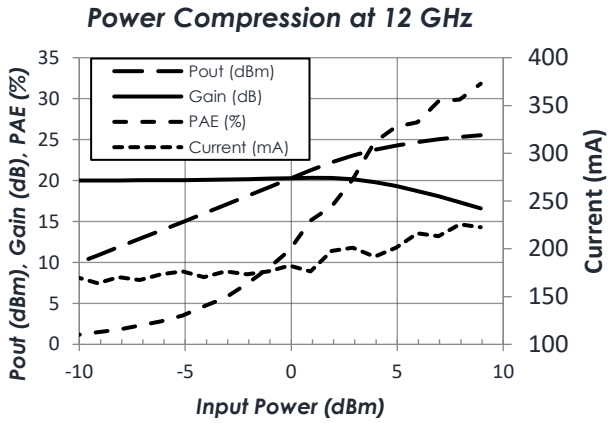


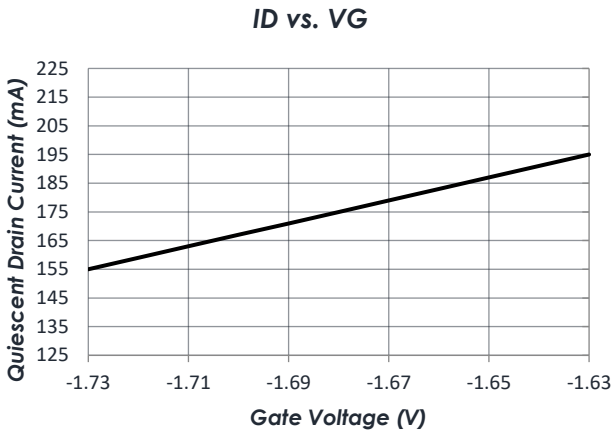
TYPICAL PERFORMANCE (continued)

(VDD = +5V, IDD = 175mA, T = 25 °C unless otherwise specified)

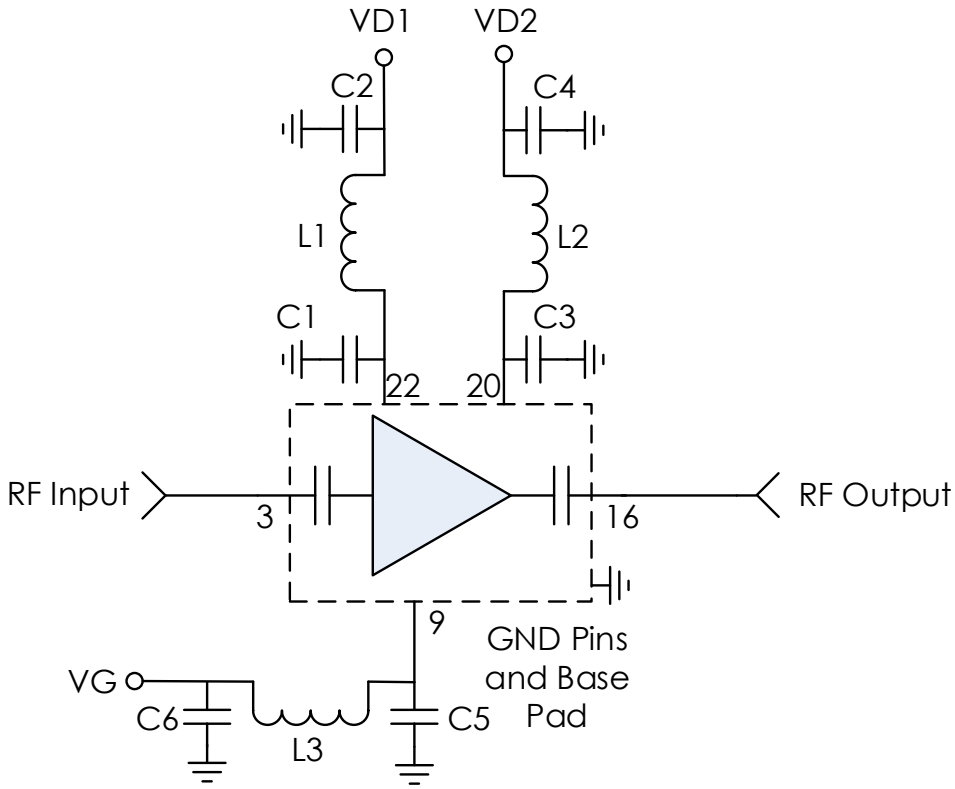








TYPICAL APPLICATION



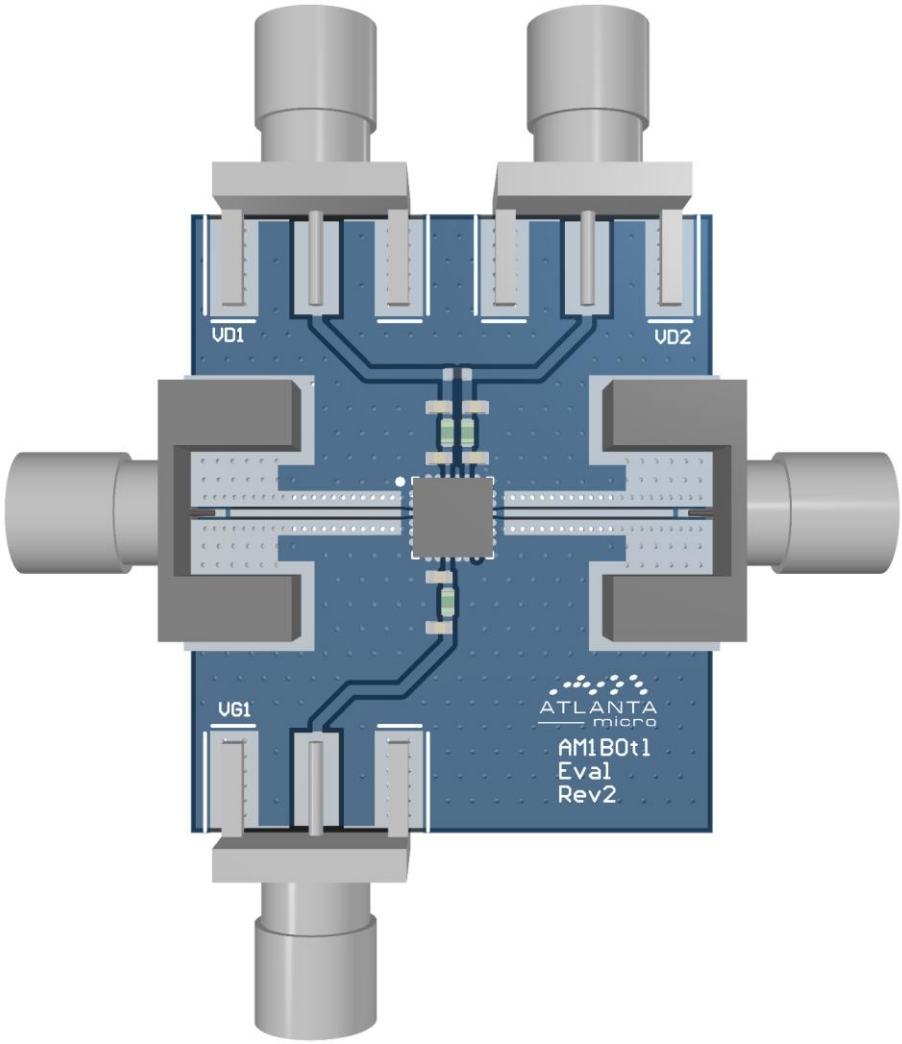
RECOMMENDED COMPONENT LIST (OR EQUIVALENT)

Part	Value	Part Number	Manufacturer
C1, C3, C5	100 pF	GRM1555C1H101FA01J	Murata
C2, C4, C6	0.1 uF	GRM155R71H104KE14D	Murata
L1, L2, L3	1.0 nH	0402DC-1N0XJRW	Coilcraft

Notes:

1. The AM1175 is biased with a positive drain supply and negative gate supply. Biasing procedure is as follows:
    a. Turn On Procedure
        i. Apply -4V to the VG pin
        ii. Apply 5V to the VD1 and VD2 pins
        iii. Increase (towards zero) the VG voltage until the current draw from the 5V rail totals 175 mA. Nominally -1.68V
    b. Turn Off Procedure
        i. Reduce the VG voltage to -4V
        ii. Remove 5V from the VD1 and VD2 pins
        iii. Remove -4V from the VG pin

EVALUATION PC BOARD



RELATED PARTS

Part Number		Manufacturer
AM1109	2 GHz to 20 GHz	Low Noise Amplifier
AM1136	1.4 GHz to 20 GHz	Driver Amplifier
AM1142	20 MHz to 18GHz	Driver Amplifier

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-ethylheyl) 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)

REACH: Mercury Systems, Inc. neither uses nor intentionally adds any of the substances considered to be a Substance of Very High Concern (SVHC) as defined by the EU Regulation (EC) No. 1907-2006 on Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH).

Conflict Materials: Mercury does not knowingly use materials that are sourced from the Democratic Republic of Congo (DRC) or any other known conflict regions. Mercury's supply chain is comprised of sources that are both environmentally and socially responsible. We periodically review this requirement with our vendors to ensure continued compliance.

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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