

AM1178-D – Amplifier

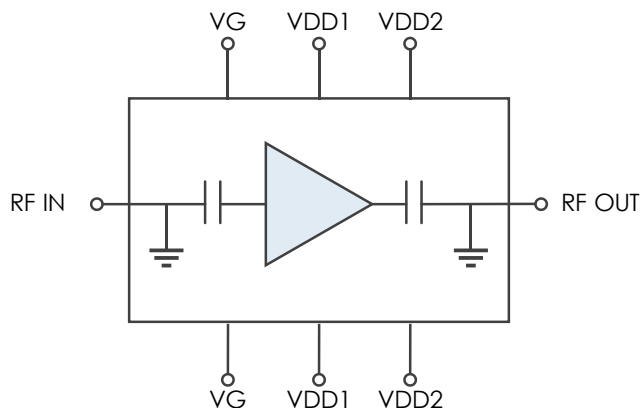
18 to 44 GHz Driver Amplifier

AM1178-D is a wideband, cascadable amplifier servicing the 18 to 44 GHz frequency range. The device exhibits excellent third order intermodulation performance and achieves a P1dB greater than 0.25W making it an ideal driver amplifier where high linearity is required. Available as bare die in a 1.42mm x 2.72mm footprint with internal 50Ω matching, the AM1178-D is a high-performance solution in a small form-factor.

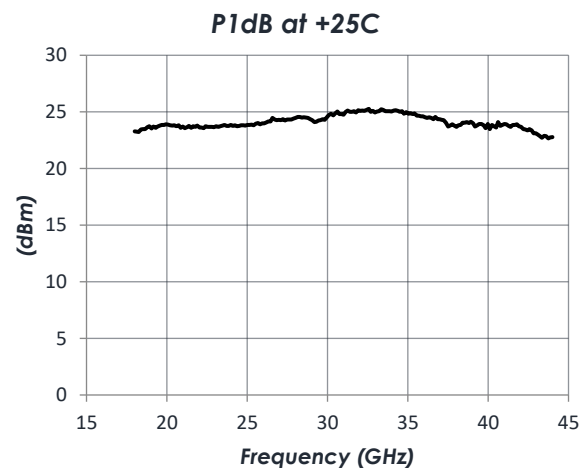
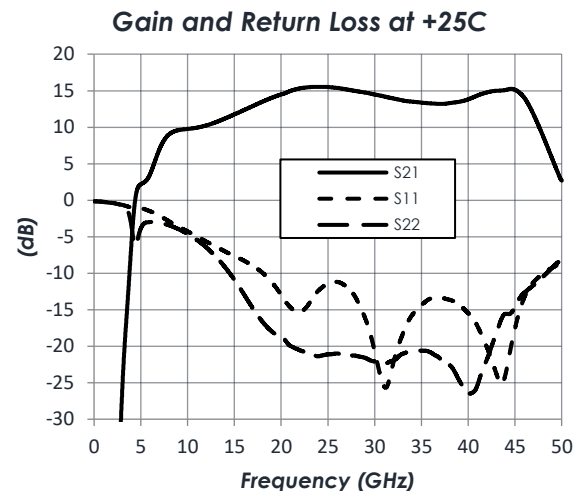
FEATURES

- 15 dB Gain
- +35 dBm OIP3
- +25 dBm P1dB
- 6 dB Noise Figure
- +5V/314 mA Operation
- 1.42mm x 2.72mm Bare Die
- -40C to +85C Operation

FUNCTIONAL DIAGRAM



CHARACTERISTIC PERFORMANCE





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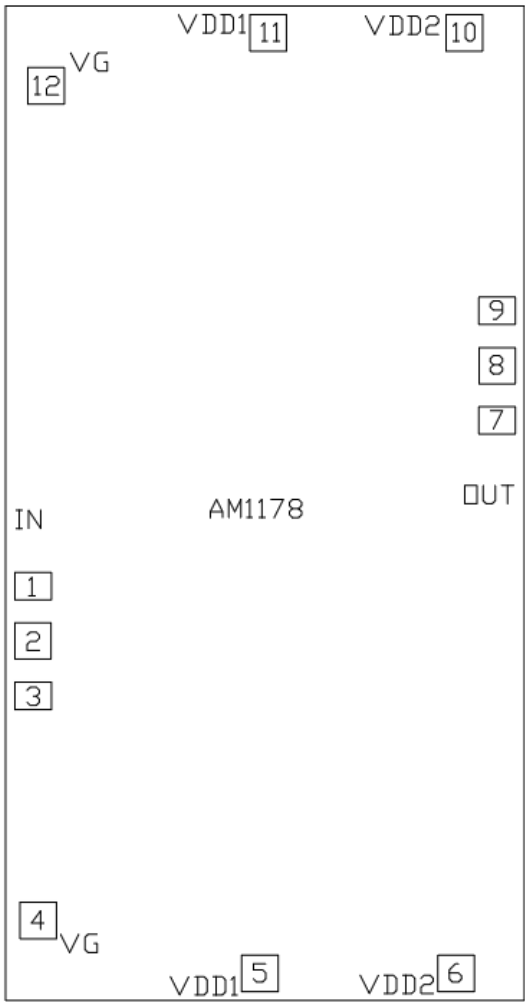
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REVISION HISTORY

Date	Revision	Notes
June 3, 2026	1	Initial Release

PIN LAYOUT AND DEFINITIONS



Pin	Name	Function
1, 3, 7, 9	GND	Ground – Common
2	RF In	RF Input – 50 Ohms – DC Connected to GND
4, 12	VG	Gate Bias Voltage Input
5, 11	VDD1	DC Power Input
6, 10	VDD2	DC Power Input
8	RF Out	RF Output – 50 Ohms – DC Connected to GND

SPECIFICATIONS

Absolute Maximum Ratings

	Minimum	Maximum
Supply Voltage	-0.3 V	+6 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
ESD Sensitivity – Human Body Model (HBM)		



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

Recommended Operating Conditions

	Minimum	Typical	Maximum
Supply Voltage		+5 V	
Operating Case Temperature	-40 C	+25 C	+85 C

Thermal Information

Thermal Resistance (channel to backside ground)	40.05 C/W
Nominal Junction Temperature at +85C Ambient	165.1 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 V	
DC Supply Current	VDD = +5 V		314 mA	
Power Dissipated	VDD = +5 V		1.57 W	

RF Performance

(T = 25 °C unless otherwise specified)

Param	Testing Conditions	Min	Typical	Max
Frequency Range		18 GHz		44 GHz
Gain	f = 18 GHz		13.5 dB	
	f = 31 GHz		14.2 dB	
	f = 44 GHz		15 dB	
Return Loss	f = 18 GHz		-9.9 dB	
	f = 31 GHz		-22.3 dB	
	f = 44 GHz		-15.5 dB	
Output IP3	f = 31 GHz		36 dBm	
Output P1dB	f = 31 GHz		24.8 dBm	
Noise Figure	f = 31 GHz		4.6 dB	

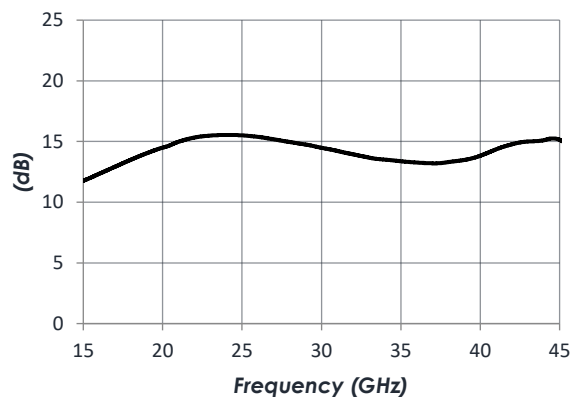
Notes:

- OIP3 measured with -12dBm input power tones at 10MHz spacing

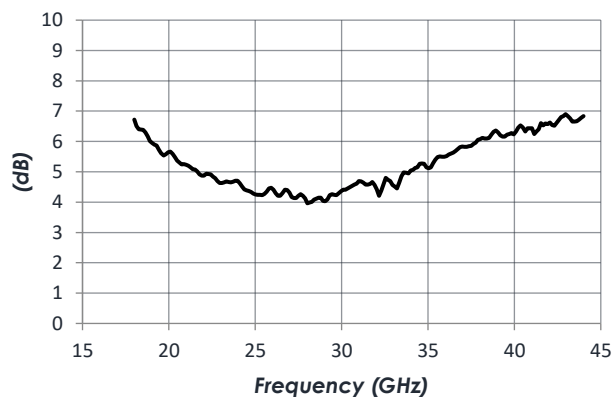
TYPICAL PERFORMANCE

(VDD = +5V, T = 25 °C, I_{DC} = 314 mA unless otherwise specified)

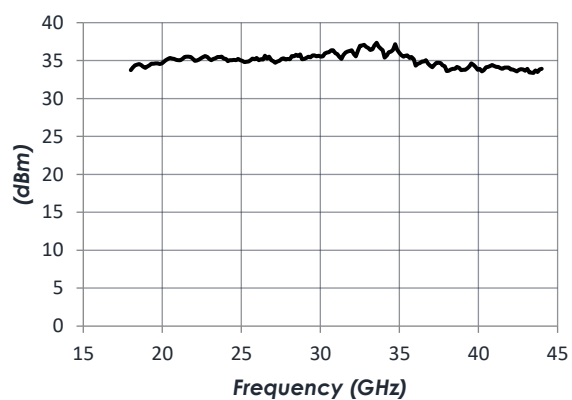
Gain vs Frequency



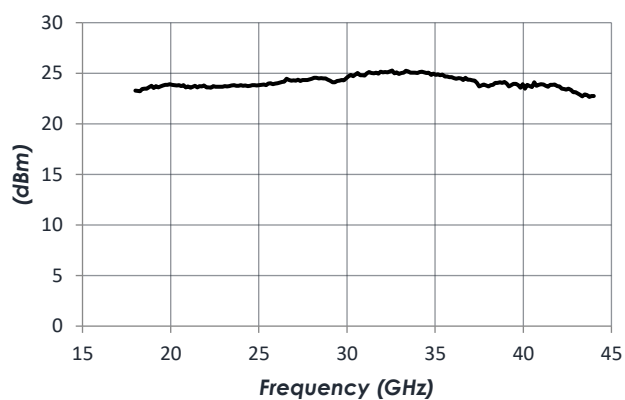
Noise Figure vs Frequency



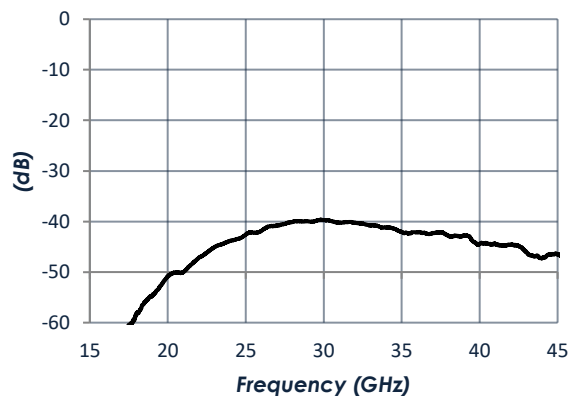
Output IP3 vs Frequency



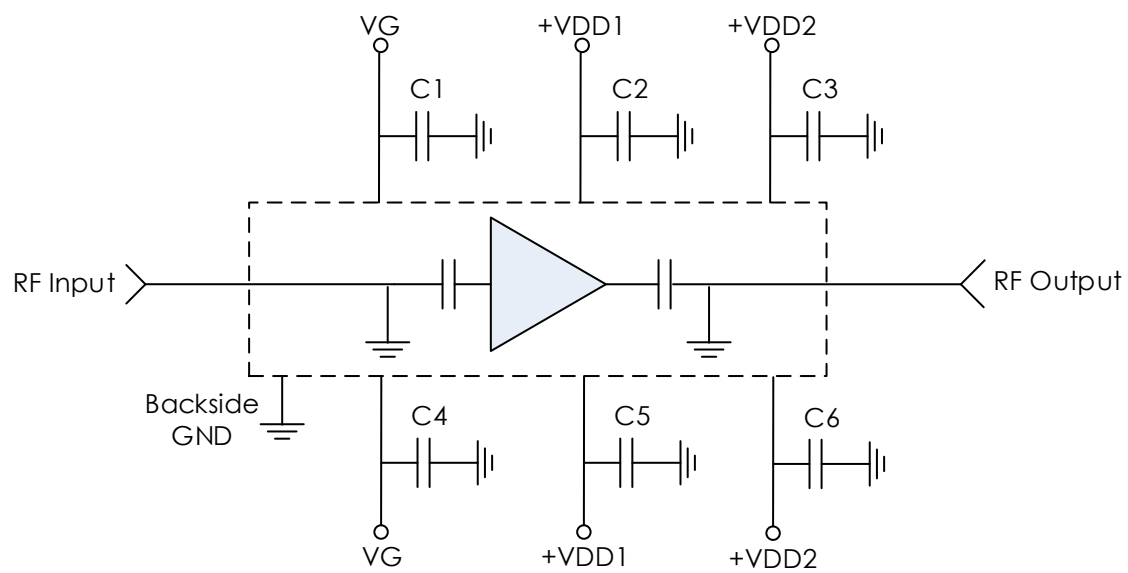
P1dB vs Frequency



Reverse Isolation vs Frequency



TYPICAL APPLICATION



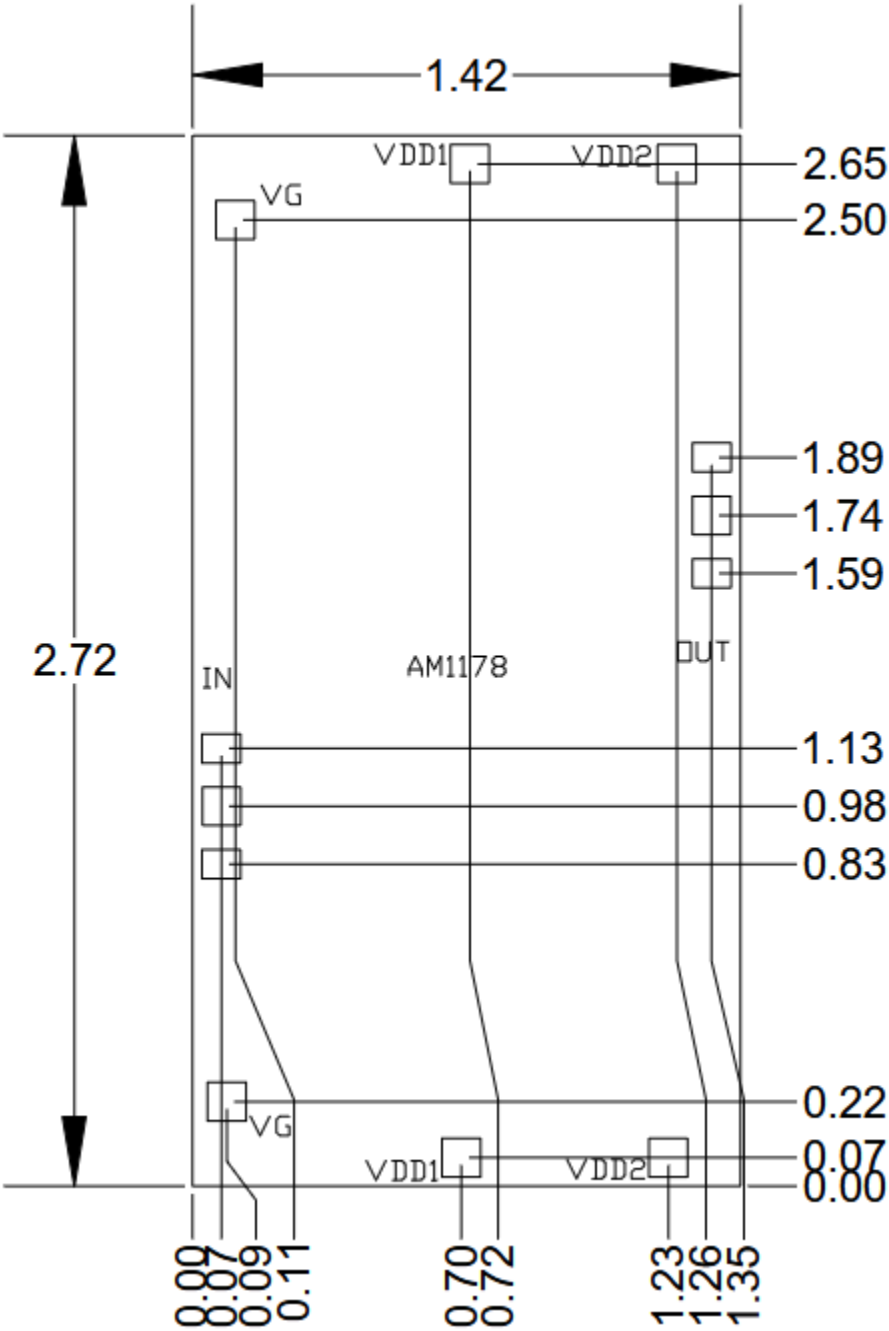
RECOMMENDED COMPONENT LIST (OR EQUIVALENT)

Part	Value	Part Number	Manufacturer
C1, C2, C3, C4, C5, C6	100 pF	SKT01A101Z10A6	Tecdia

Notes:

- AM1178-D is biased with a positive drain supply and negative gate supply. Biasing procedure is as follows:
 - Turn on Procedure
 - Apply -2V to the VG pins
 - Apply 5V to the VDD1 and VDD2 pins
 - Increase (towards zero) the VG voltage until the current draw from the 5V rail is 314 mA. Nominally -0.51V
 - Apply RF signal
 - Turn off Procedure
 - Remove RF signal
 - Reduce VG voltage to -2V
 - Remove 5V from the VDD1 and VDD2 pins
 - Remove -2V from the VG pin.
- AM1178-D is DC grounded. If a non-zero voltage is present at RF input or RF output, external DC blocking capacitors are required.
- +VDD1 and +VDD2 connected to C2 and C3 can be tied together. +VDD1 and +VDD2 connected C5 and C6 to can be tied together

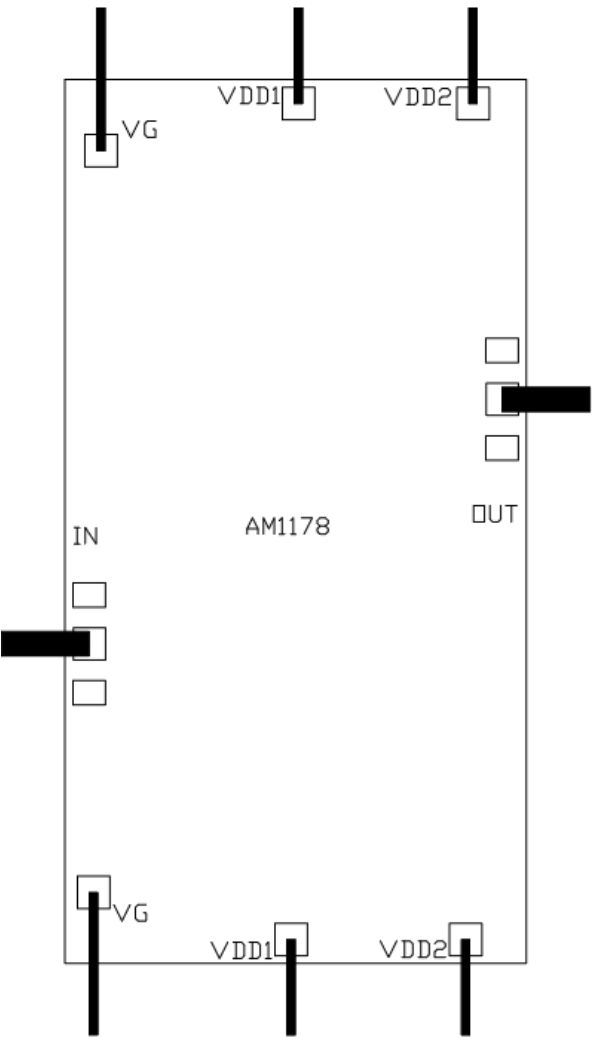
DIE DIMENSIONS



PART ORDERING DETAILS

Description	Part Number
Gelpack of 1.42mm x 2.72mm Bare Die (Qty = 25)	AM1178-D

RECOMMENDED WIRE BONDS



Notes:

- 1. RF input and output pads should use minimum length 3.0 x 0.5 mil ribbon bonds for optimum performance.
- 2. DC bonds should be 1 mil, gold.

RELATED PARTS

Part Number		Manufacturer
AM1144	17 GHz to 40 GHz	Driver Amplifier
AM1162-D	24 GHz to 40 GHz	Low Noise Amplifier
AM1172-D	18 GHz to 50 GHz	Driver Amplifier
AM1168-D	15 GHz to 40 GHz	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-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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