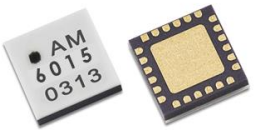
AM6015 – Switch

DC – 18 GHz SP6T

Description

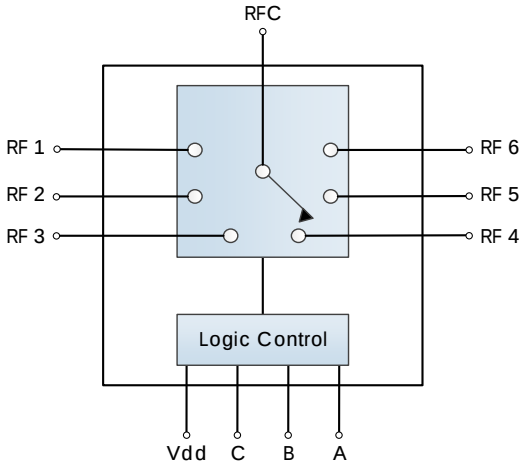
AM6015 is a Single-Pole Six-Throw (SP6T) switch covering the DC to 18 GHz frequency range. The positive control device provides low insertion loss, flat frequency response, and high isolation over the operating temperature range of -40C to +85C.



Features

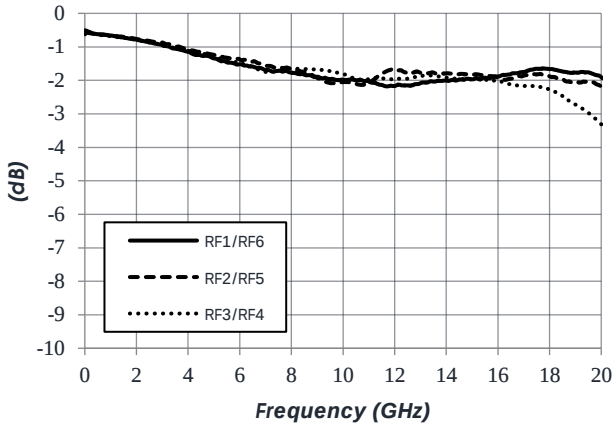
- 2.0 dB Insertion Loss
- +40 dBm Input IP3
- +3.3V to +5V Supply
- +3V to +5V Control
- 30dB Isolation
- 4mm QFN Package
- -40C to +85C Operation

Functional Diagram



Characteristic Performance

Insertion Loss at +25C



Isolation at +25C

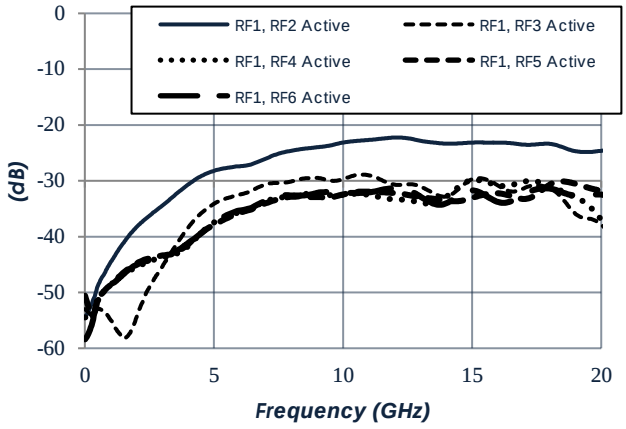
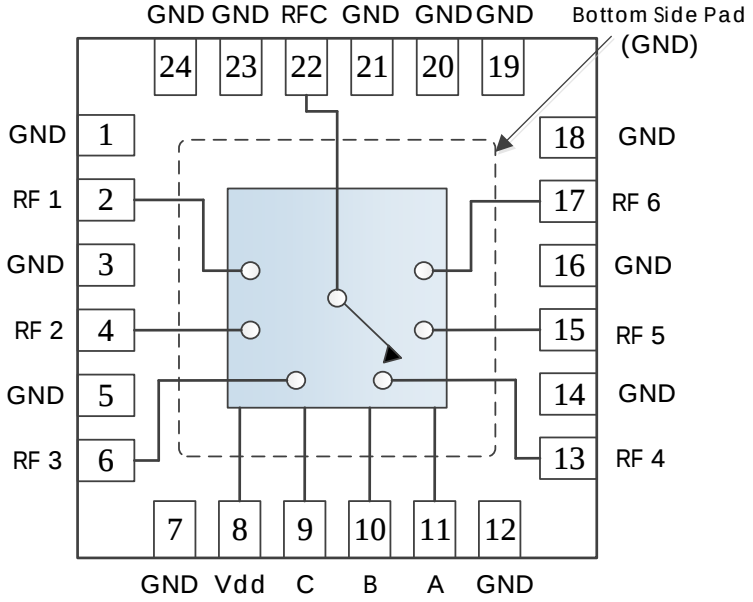


Table of Contents

Revision History

Date	Revision Number	Notes
August 13, 2018	1	Initial Release
May 1, 2019	2	Various Plots Updated
June 6, 2019	2A	Component Compliance Information Updated
July 15, 2019	3	Package Drawing Corrected.
May 18, 2020	4	Package information moved to main product page

Pin Layout and Definitions



Pin Number	Pin Name	Pin Function
1, 3, 5, 7, 12, 14, 16, 18-21, 23, 24	GND	Ground
2	RF1	RF1 Output – 50 ohms – DC Coupled. External DC blocking capacitor required*
4	RF2	RF2 Output – 50 ohms – DC Coupled. External DC blocking capacitor required*
6	RF3	RF3 Output – 50 ohms – DC Coupled. External DC blocking capacitor required*
8	VDD	DC Power Input
9	C	Switch Control C
10	B	Switch Control B
11	A	Switch Control A
13	RF4	RF4 Output – 50 ohms – DC Coupled. External DC blocking capacitor required*
15	RF5	RF5 Output – 50 ohms – DC Coupled. External DC blocking capacitor required*
17	RF6	RF6 Output – 50 ohms – DC Coupled. External DC blocking capacitor required*
22	RFC	RFC Input – 50 ohms – DC Coupled. External DC blocking capacitor required*

***Note:** DC blocking caps not required if in series with other Atlanta Micro parts of the same reference voltage.

Specifications

Absolute Maximum Ratings

	Minimum	Maximum
Supply Input Voltage	-0.3 V	+6.0 V
RF Input Power		+27 dBm
Operating Junction Temperature	-40 C	+150 C
Storage Temperature Range	-50 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
Storage Temperature Range (Recommended)	-50 C	+125 C
Moisture Sensitivity Level	MSL 3	

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

Recommended Operating Conditions

	Minimum	Typical	Maximum
Supply Voltage	+2.5 V	+5.0 V	
Operating Case Temperature	-40 C		+85 C
Operating Junction Temperature	-40 C		+125 C

Thermal Information

	Thermal Resistance (°C / W)
Junction to Case Thermal Resistance (Θ_{JC})	144

DC Electrical Characteristics

(T = 25 °C unless otherwise specified)

Parameter	Testing Conditions	Minimum	Typical	Maximum
DC Supply Voltage		+2.5V	+5.0 V	
DC Supply Current	VDD = +3.3V		8 mA	
	VDD = +5.0V		9 mA	
Power Dissipated	VDD = +3.3V		26 mW	
	VDD = +5.0V		45 mW	
Logic Level Low		0.0V		+0.5V
Logic Level High		+2.0V		+VDD

RF Performance

(T = 25 °C, VDD = +5.0 V unless otherwise specified)

Parameter	Testing Conditions	Minimum	Typical	Maximum
Frequency Range		DC		18 GHz
Insertion Loss	VDD = +5.0V		2.0 dB	
Return Loss	VDD = +5.0V		12 dB	
Isolation	VDD = +5.0V		30 dB	
Input IP3	RF1/RF6		+40.8 dBm	
	RF2/RF5		+41.1 dBm	
	RF3/RF4		+41.6 dBm	

Timing Characteristics

Parameter	Minimum	Typical	Maximum
Switching Speed (Path Enabled → Disabled)		50 ns	
Switching Speed (Path Disabled → Enabled)		50 ns	

Note: Switching speed defined as 50% control to 10%/90% RF. Measurements made with no control line filtering.

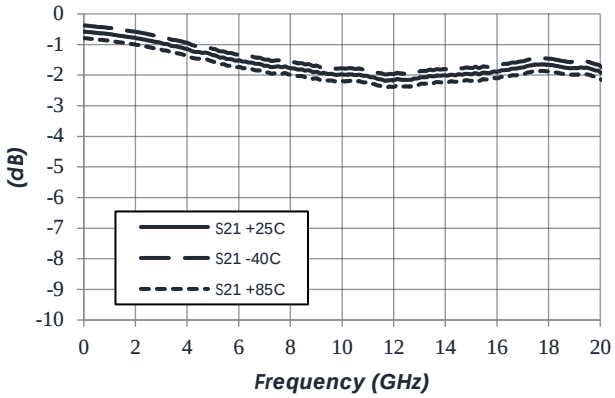
State Table

A	B	C	State
Low	Low	High	RF1
Low	High	Low	RF2
Low	High	High	RF3
High	Low	Low	RF4
High	Low	High	RF5
High	High	Low	RF6

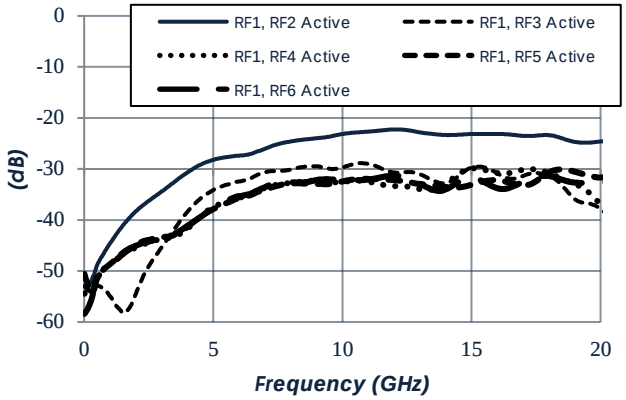
Typical Performance

(T = 25 °C, VDD = +5.0 V unless otherwise specified)

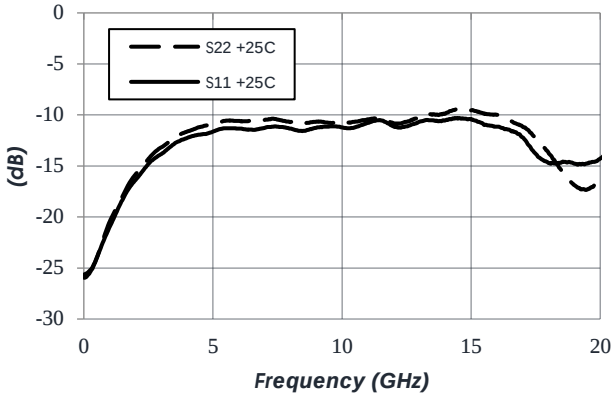
Insertion Loss vs Temperature*



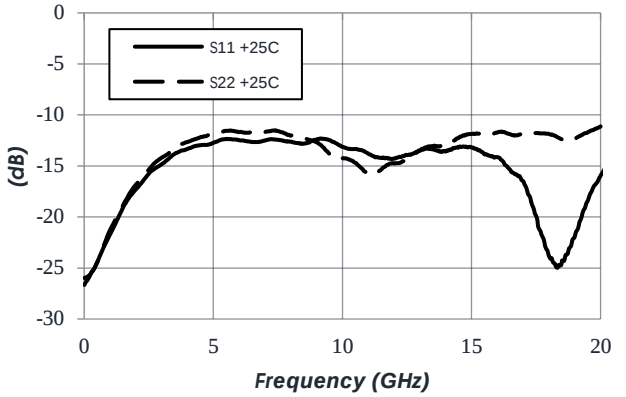
Isolation



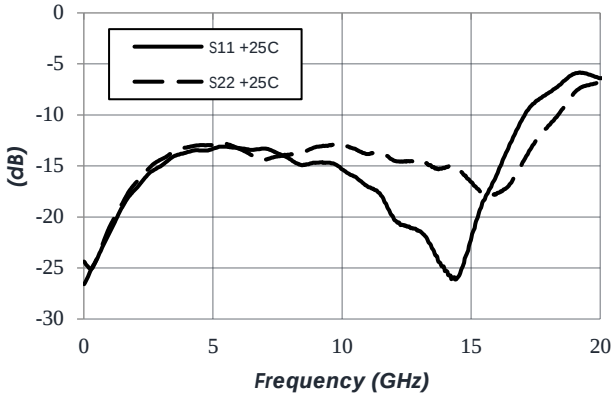
RF1/RF6 Return Loss



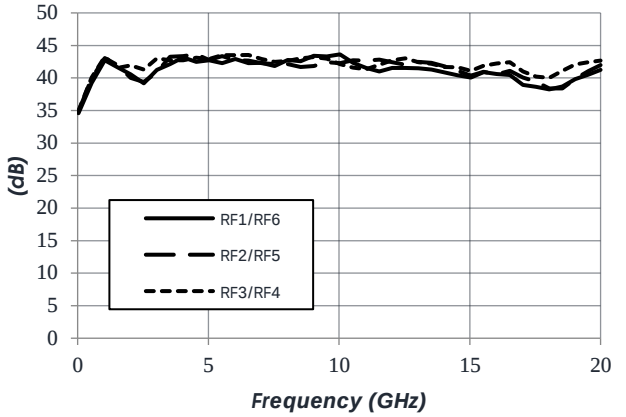
RF2/RF5 Return Loss



RF3/RF4 Return Loss



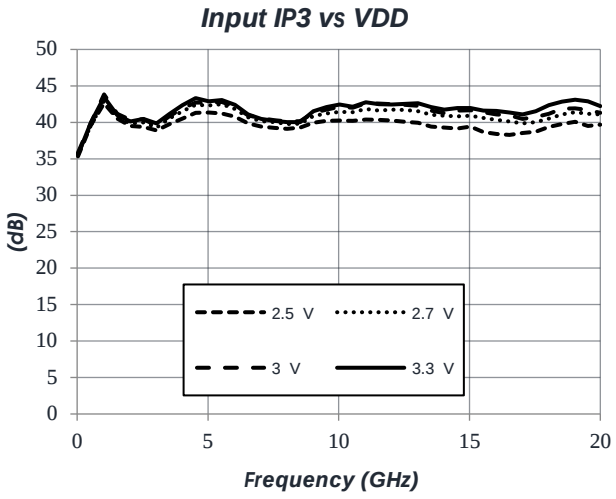
Input IP3 at +25 C

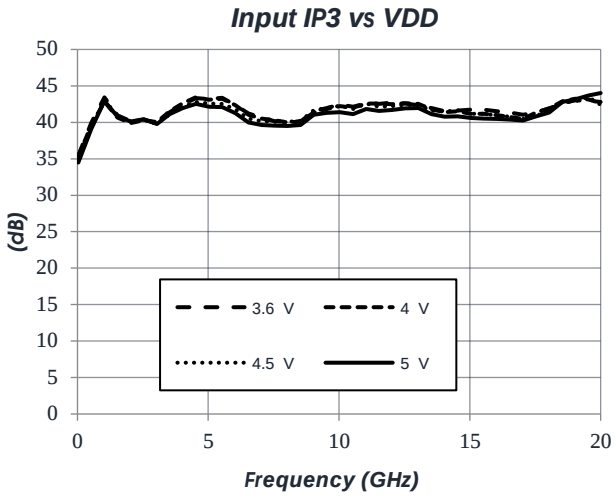


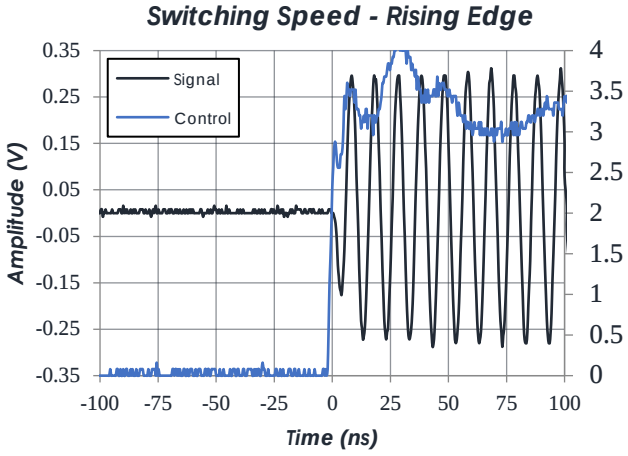
***Note:** Data for RF1 shown here

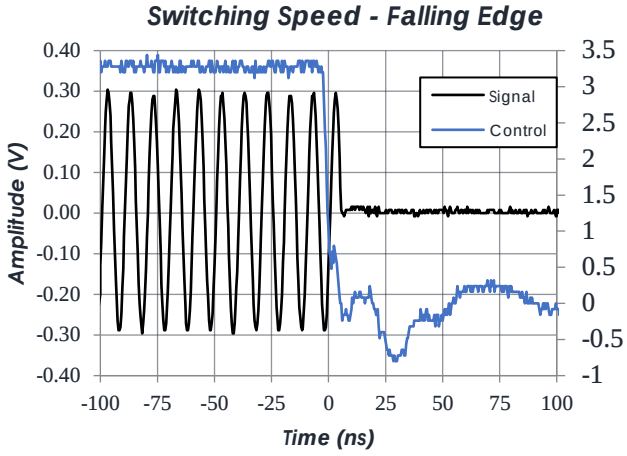
Typical Performance (continued)

(T = 25 °C unless otherwise specified)

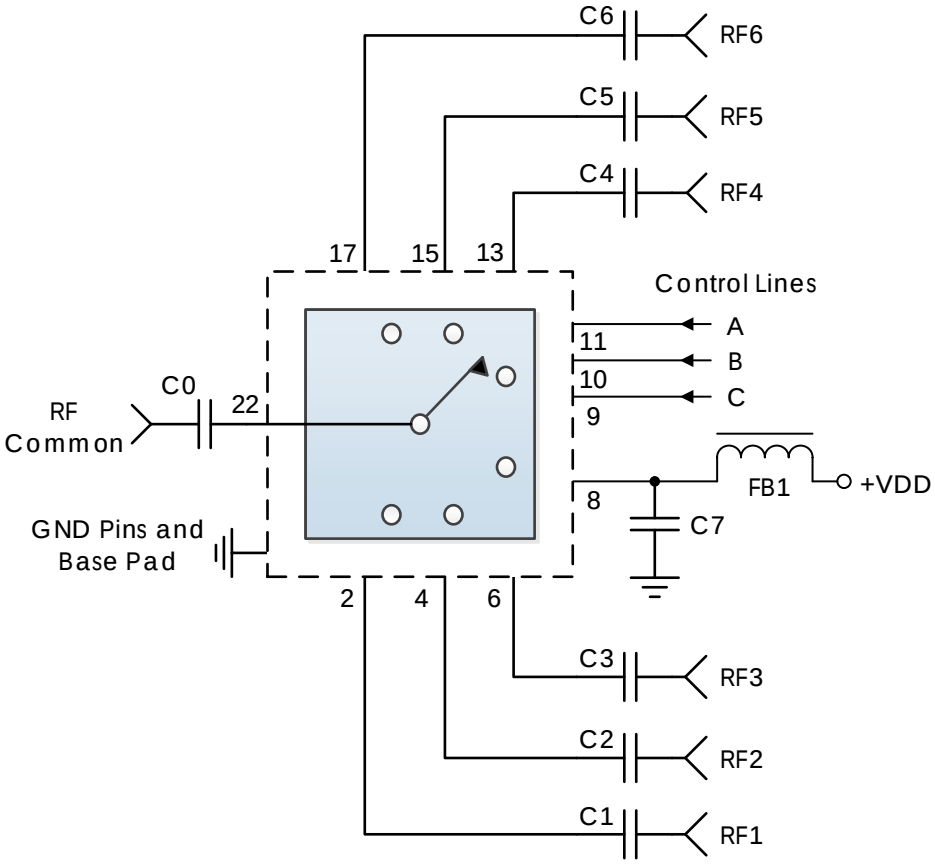








Typical Application



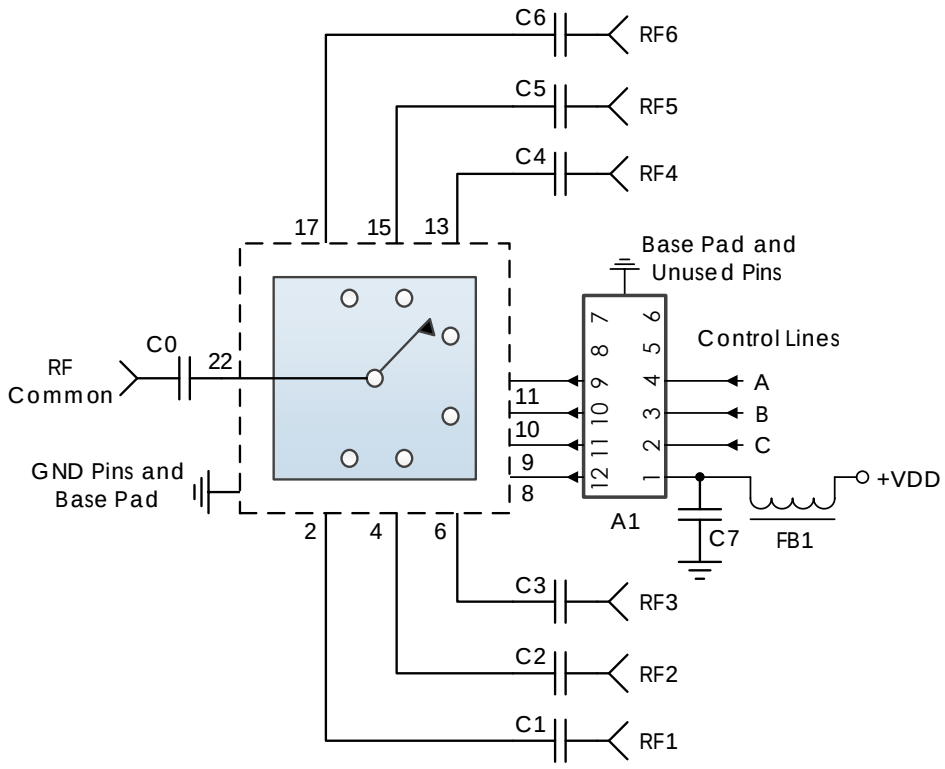
Recommended Component List (or equivalent):

Part	Value	Part Number	Manufacturer
C0-C6	0.1µF	0201BB104KW160	Passives Plus
C7	0.1µF	C1005X7R1H104K050BB	TDK
FB1	-	MMZ1005A222E	TDK

Notes:

1. RF blocking capacitors should be high performance, low-loss, broadband capacitors for optimum performance.
2. RC filtering on the control lines is recommended to prevent digital noise from coupling to the RF path.
    a. Select control line RC filter values based on desired logic source decoupling and switching speed.

Alternate Application



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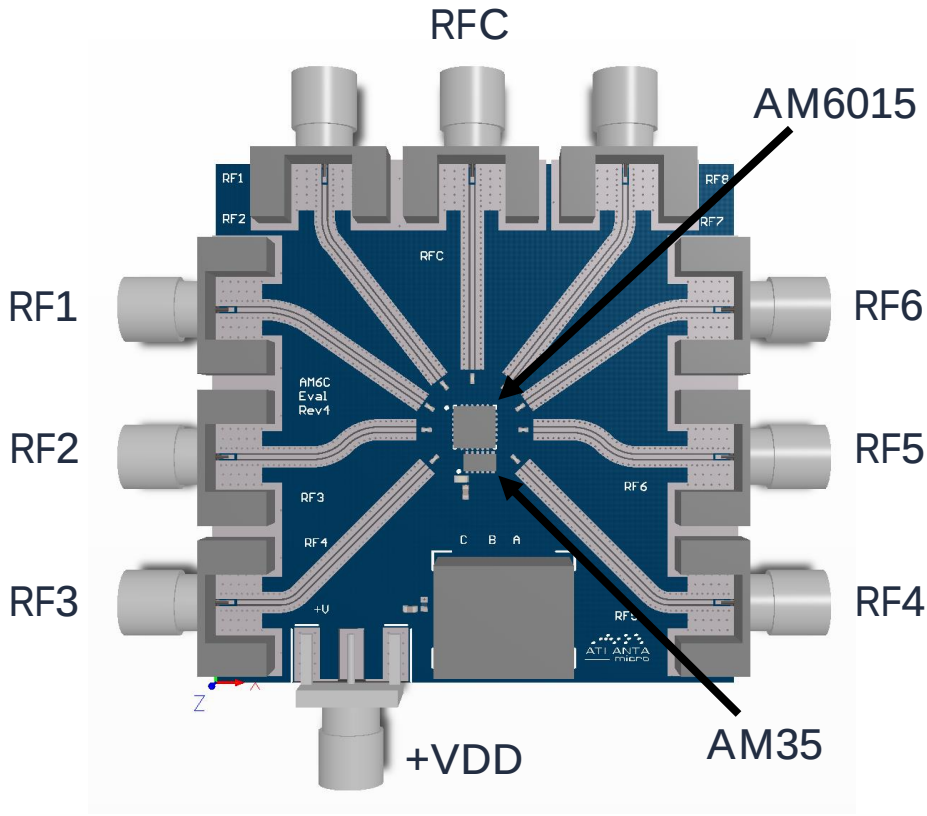
Part	Value	Part Number	Manufacturer
C0-C6	0.1µF	0201BB104KW160	Passives Plus
C7	0.1µF	C1005X7R1H104K050BB	TDK
FB1	-	MMZ1005A222E	TDK
A1	-	AM35	Atlanta Micro

Notes:

1. RF blocking capacitors should be high performance, low-loss, broadband capacitors for optimum performance
2. AM35 provides power and control line filtering with high frequency isolation to 40+ GHz.
    a. AM35 is a 1.5mm x 3mm (0.5mm pitch) EMI filter bank providing a small total footprint for applications with tight space requirements.
    b. Ferrite bead and shunt capacitor in series with power line provides better low frequency isolation.
    c. See AM35 datasheet for performance details.

Evaluation PC Board



*Note: Some of the components show will not be installed.

Related Parts

Part Number	Description
AM6002	DC – 14 GHz SPDT
AM6011	DC – 10 GHz SP8T
AM6012	DC – 18 GHz SPDT

Component Compliance Information

RoHS: Atlanta Micro, 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 Atlanta Micro 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)

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