

# AM6016 – Switch, Reflective

DC to 26.5 GHz SPDT



## Description

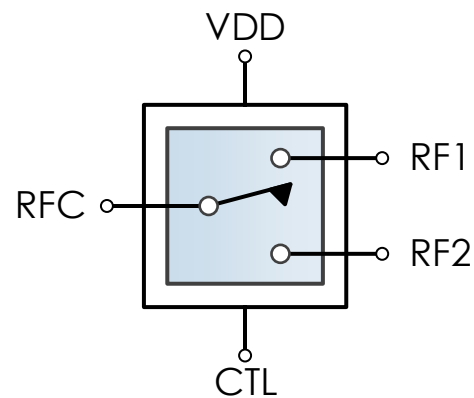
AM6016 is a Single-Pole Double-Throw (SPDT) switch covering the DC to 26.5 GHz frequency range. The positive control device exhibits low insertion loss, flat frequency response, and high isolation over the operating temperature range of -40C to +85C.



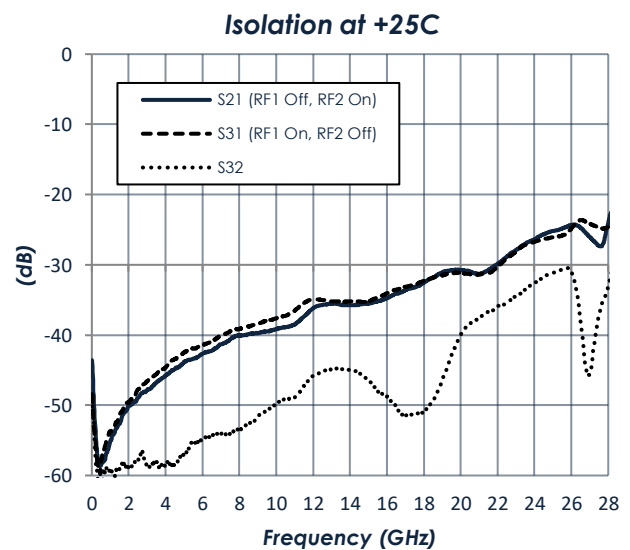
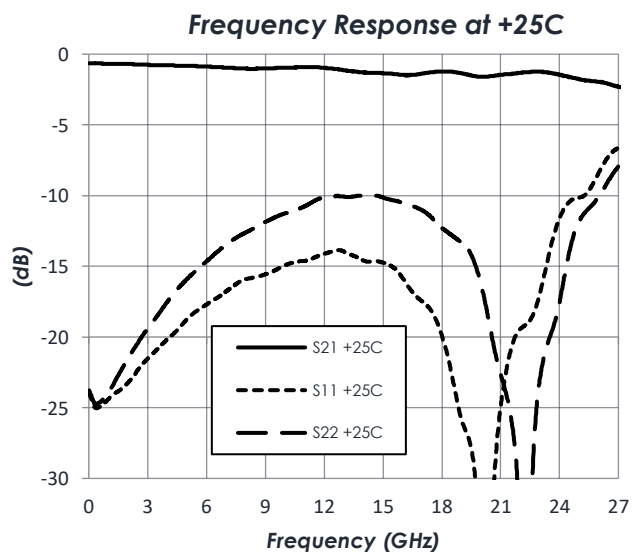
## Features

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

## Functional Diagram



## Characteristic Performance



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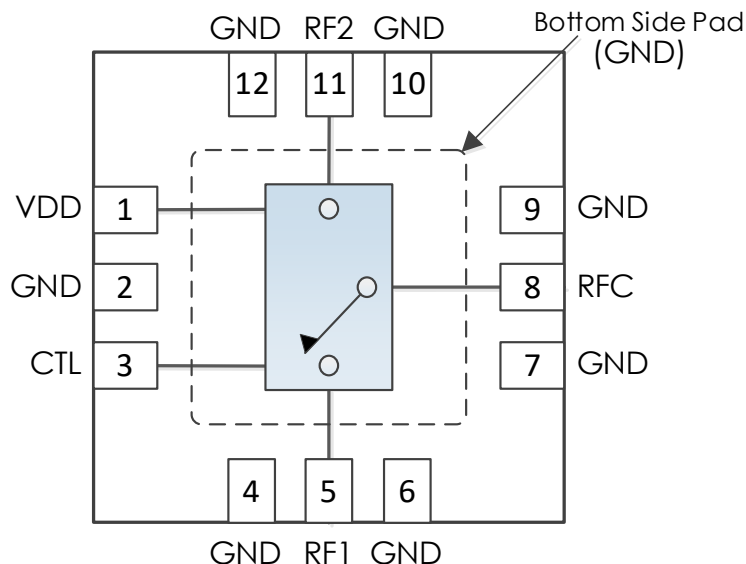
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### Revision History

| Date             | Revision Number | Notes                                                                      |
|------------------|-----------------|----------------------------------------------------------------------------|
| October 23, 2019 | 1               | Initial Release                                                            |
| May 13, 2020     | 2               | Updated S-parameter plots. Package information moved to main product page. |

### Pin Layout and Definitions



| Pin Number      | Pin Name | Pin Function                                                                |
|-----------------|----------|-----------------------------------------------------------------------------|
| 1               | VDD      | DC Power Input                                                              |
| 2               | GND      | Ground – Common                                                             |
| 3               | CTL      | Switch Control                                                              |
| 4               | GND      | Ground – Common                                                             |
| 5               | RF1      | RF1 Output – 50 Ohms – DC Coupled. External DC blocking capacitor required* |
| 6, 7            | GND      | Ground – Common                                                             |
| 8               | RFC      | RFC Input – 50 Ohms – DC Coupled. External DC blocking capacitor required*  |
| 9, 10           | GND      | Ground – Common                                                             |
| 11              | RF2      | RF2 Output – 50 Ohms – DC Coupled. External DC blocking capacitor required* |
| 12              | GND      | Ground – Common                                                             |
| Bottom Side Pad | Case GND | Ground – Common                                                             |

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

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## Specifications

### Absolute Maximum Ratings

|                                | Minimum | Maximum |
|--------------------------------|---------|---------|
| Supply 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  |

# AM6016 – Switch, Reflective

## DC to 26.5 GHz SPDT



### DC Electrical Characteristics

(T = 25 °C unless otherwise specified)

| Parameter         | Testing Conditions | Minimum | Typical | Maximum |
|-------------------|--------------------|---------|---------|---------|
| DC Supply Voltage |                    | +2.5 V  | +5.0 V  |         |
| DC Supply Current | VDD = +3.3 V       |         | 1 mA    |         |
|                   | VDD = +5.0 V       |         | 1 mA    |         |
| Power Dissipated  | VDD = +3.3 V       |         | 3.3 mW  |         |
|                   | VDD = +5.0 V       |         | 5 mW    |         |
| Logic Level Low   |                    | 0.0 V   |         | +0.5 V  |
| Logic Level High  |                    | +2.0 V  |         | + VDD   |

### RF Performance

(T = 25 °C unless otherwise specified)

| Parameter       | Testing Conditions | Minimum | Typical | Maximum  |
|-----------------|--------------------|---------|---------|----------|
| Frequency Range |                    | DC      |         | 26.5 GHz |
| Insertion Loss  | f = 0.01 GHz       |         | 0.6 dB  |          |
|                 | f = 13.25 GHz      |         | 1.2 dB  |          |
|                 | f = 26.5 GHz       |         | 3 dB    |          |
| Return Loss     | f = 0.01 GHz       |         | 26 dB   |          |
|                 | f = 13.25 GHz      |         | 26 dB   |          |
|                 | f = 26.5 GHz       |         | 10 dB   |          |
| Input IP3       | VDD = +5.0 V       |         | +40 dBm |          |

### Timing Characteristics

| Parameter                                  | Minimum | Typical | Maximum |
|--------------------------------------------|---------|---------|---------|
| Switching Speed (Path Enabled to Disabled) |         | 7 ns    |         |
| Switching Speed (Path Disabled to Enabled) |         | 15 ns   |         |

### State Table

| CTL  | State      |
|------|------------|
| Low  | RFC to RF1 |
| High | RFC to RF2 |

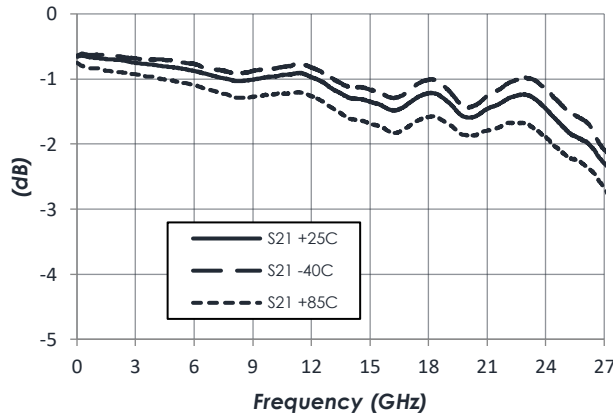
# AM6016 – Switch, Reflective

## DC to 26.5 GHz SPDT

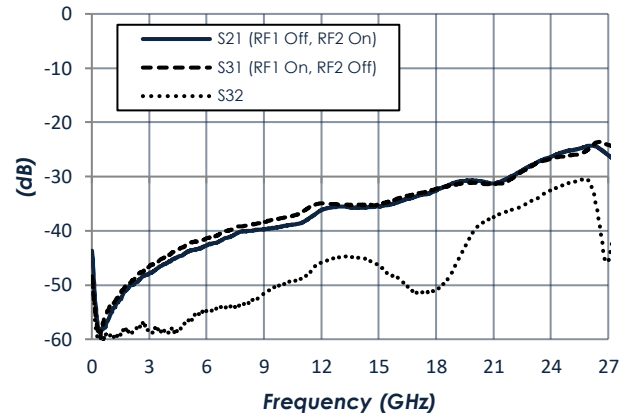
### Typical Performance

(VDD = +5.0 V. Data measured via probes outside IC package on 10 mil Rogers RO4350B™)

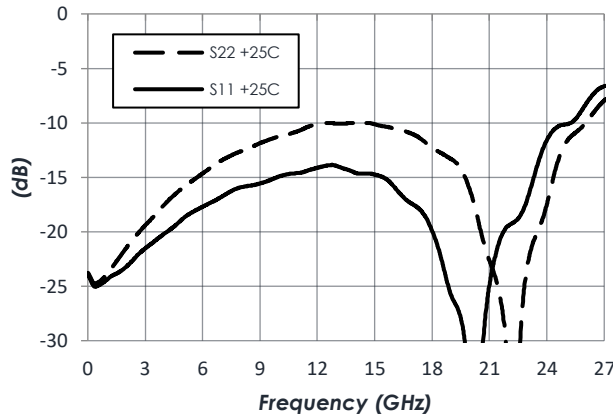
**Insertion Loss vs Temperature**



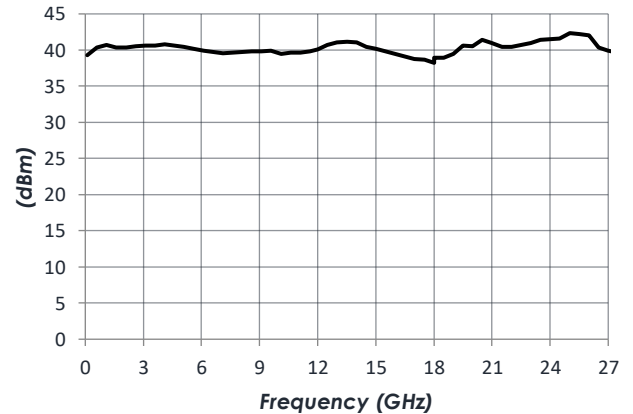
**Isolation at +25C**



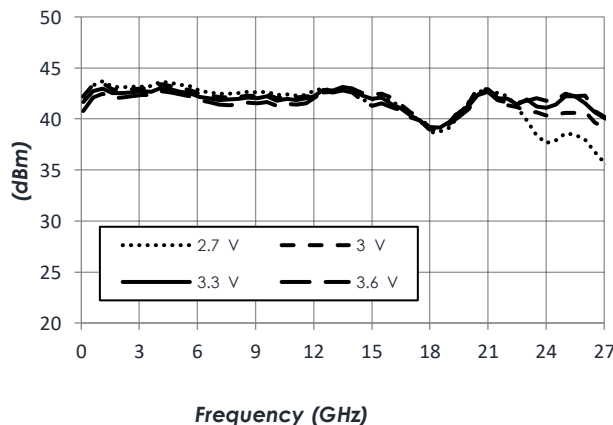
**Return Loss at +25C**



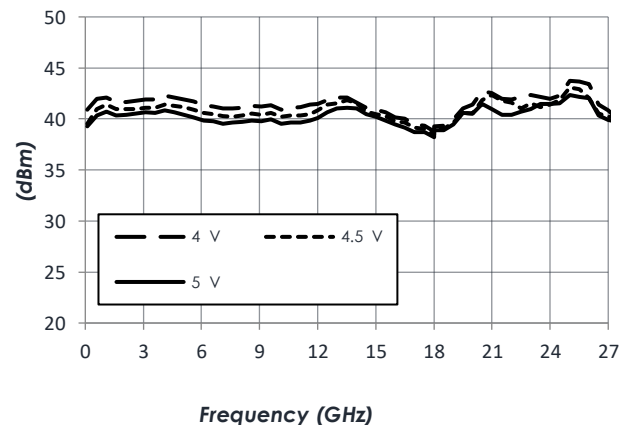
**Input IP3 at +25C**



**Input IP3 at +25 C**



**Input IP3 at +25 C**



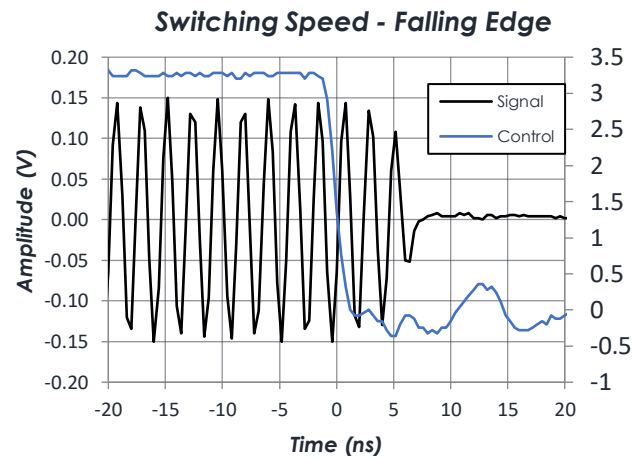
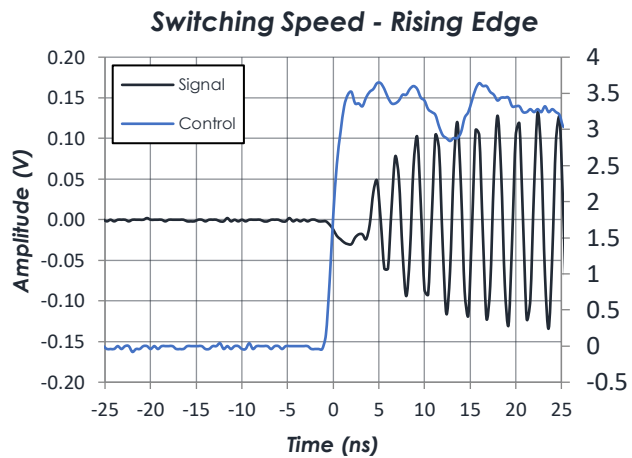
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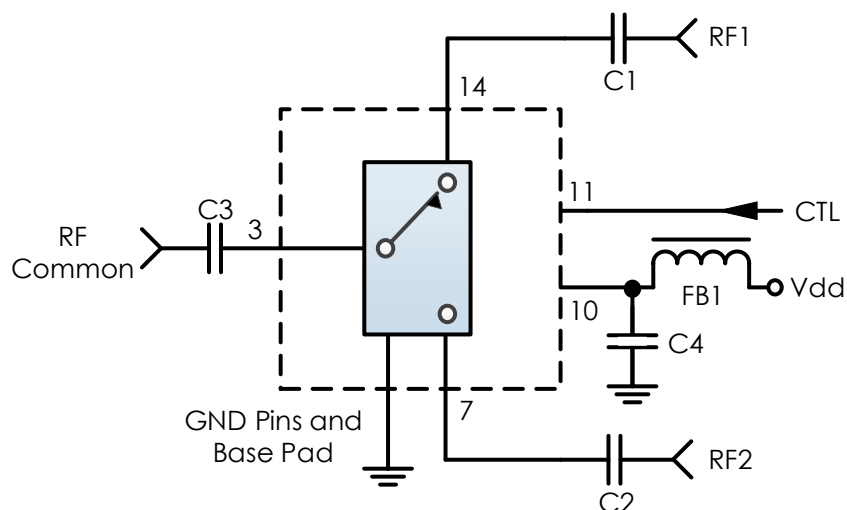
## Typical Performance (continued)

(VDD = +5.0 V, T = 25 C. Data measured on 10 mil Rogers RO4350B™)



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### Typical Application



### Recommended Component List (or equivalent):

| Part  | Value       | Part Number         | Manufacturer  |
|-------|-------------|---------------------|---------------|
| C1-C3 | 0.1 $\mu$ F | 0201BB104KW160      | Passives Plus |
| C4    | 0.1 $\mu$ F | C1005X7R1H104K050BB | TDK           |
| FB1   | -           | MMZ1005A222E        | TDK           |

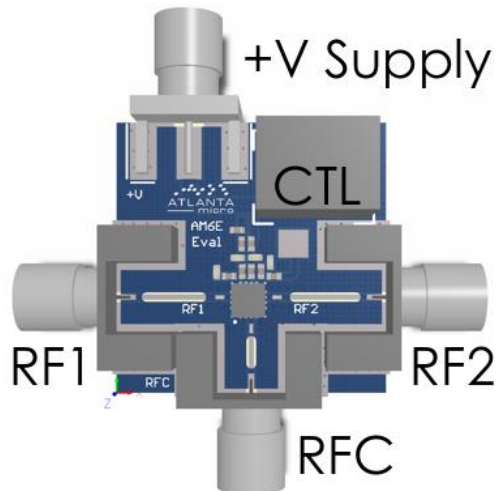
### Notes:

1. DC blocking capacitors should be high performance, low-loss, broadband capacitors for optimal performance.
2. RC Filtering on the control line 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.

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## Evaluation PC Board



## Related Parts

| Part Number |    | Description |                  |  |
|-------------|----|-------------|------------------|--|
| AM6012      | DC | to 18 GHz   | SPDT, Reflective |  |
| AM6013      | DC | to 18 GHz   | SP4T, Reflective |  |
| AM6015      | DC | to 18 GHz   | SP6T, Reflective |  |
| AM6029      | DC | to 18 GHz   | SP4T, Reflective |  |
| AM6031      | DC | to 20 GHz   | SPDT, Absorptive |  |

### Component Compliance Information

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| 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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