

# GaAs SPDT Non-Reflective Switch

## 0.05- 26.5 GHz



**MASW-011128-DIE**

Rev. V1

### Features

- Broadband Performance
- Low Insertion Loss: 1.7 dB @ 20 GHz
- High Isolation: 48 dB @ 20 GHz
- Fast Switching Speed
- Non-Reflective Configuration
- Ultra Low DC Power Consumption
- Size: 1.3 × 0.85 × 0.1 mm
- RoHS\* Compliant

### Applications

- Test & Measurement
- EW
- Broadband Communications Systems

### Description

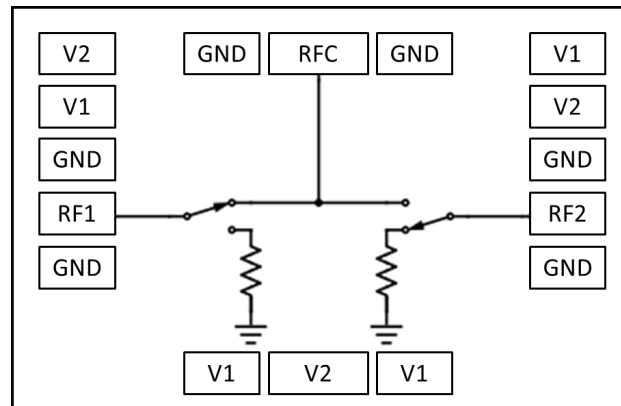
The MASW-011128-DIE is a versatile, broadband, non-reflective SPDT switch offered as bare die part. The switch operates from 0.05 to 26.5 GHz and provides less than 2 dB insertion loss and 50 dB isolation.

The combination of broadband performance along with very fast switching and excellent settling time make this device ideal for many applications, including Test & Measurement, EW and broadband communication systems.

### Ordering Information

| Part Number     | Package        |
|-----------------|----------------|
| MASW-011028-DIE | Die in Gel Pak |

### Functional Schematic



### Bondpad Configuration<sup>1</sup>

| Pad Name | Function          |
|----------|-------------------|
| GND      | Ground            |
| RF1      | RF 1              |
| V1       | Control Voltage 1 |
| V2       | Control Voltage 2 |
| RFC      | RF Common         |
| RF2      | RF 2              |

1. Backside of die must be connected to RF, DC and thermal ground.

\* Restrictions on Hazardous Substances, compliant to current RoHS EU directive.

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**Electrical Specifications:**  $T_A = +25^{\circ}\text{C}$ ,  $V_1, V_2 = -5 \text{ V} / 0 \text{ V}$ ,  $Z_0 = 50 \Omega$

| Parameter                             | Test Conditions                                    | Units         | Min. | Typ. | Max. |
|---------------------------------------|----------------------------------------------------|---------------|------|------|------|
| Insertion Loss                        | 0.05 GHz                                           | dB            | —    | 0.9  | —    |
|                                       | 12 GHz                                             |               | —    | 1.3  | —    |
|                                       | 18 GHz                                             |               | —    | 1.5  | —    |
|                                       | 20 GHz                                             |               | —    | 1.7  | 2.0  |
|                                       | 26.5 GHz                                           |               | —    | 1.9  | —    |
| Isolation                             | 0.05 GHz                                           | dB            | —    | 64   | —    |
|                                       | 12 GHz                                             |               | —    | 60   | —    |
|                                       | 18 GHz                                             |               | —    | 54   | —    |
|                                       | 20 GHz                                             |               | 42   | 48   | —    |
|                                       | 26.5 GHz                                           |               | —    | 42   | —    |
| Return Loss                           | RFC                                                | dB            | —    | 15   | —    |
|                                       | RF1, RF2 "on state"                                |               |      | 15   |      |
|                                       | RF1, RF2 "off state"                               |               |      | 20   |      |
| Input P1dB                            | 1.0 - 26.5 GHz                                     | dBm           | —    | 27   | —    |
| Input IP3                             | 2 Tone, 5 dBm/Tone, 5 MHz spacing,<br>1 - 26.5 GHz | dBm           | —    | 42   | —    |
| $T_{\text{RISE}}, T_{\text{FALL}}$    | 10% to 90% RF and 90% to 10% RF                    | ns            | —    | 5    | —    |
| $T_{\text{ON}}, T_{\text{OFF}}$       | 50% control to 90% RF and<br>50% control to 10% RF | ns            | —    | 15   | —    |
| Control Current (Complementary Logic) | —                                                  | $\mu\text{A}$ | —    | 5    | —    |

### Absolute Maximum Ratings<sup>2,3</sup>

| Parameter             | Absolute Maximum |
|-----------------------|------------------|
| Control Voltage       | -8.5 V           |
| Input Power           | 27 dBm           |
| Operating Temperature | -40°C to +85°C   |
| Storage Temperature   | -65°C to +150°C  |

- Exceeding any one or combination of these limits may cause permanent damage to this device.
- MACOM does not recommend sustained operation near these survivability limits.

### Truth Table<sup>4,5</sup>

| Control Input |      | Condition of Switch |     |
|---------------|------|---------------------|-----|
| V1            | V2   | RF1                 | RF2 |
| Low           | High | On                  | Off |
| High          | Low  | Off                 | On  |

- $V_{\text{low}} = -5 \text{ V}$ ,  $V_{\text{high}} = 0 \text{ V}$ .
- All V1 bondpads and V2 bondpads are connected on die, respectively. Bias voltages can be supplied to any combination of V1 and V2 bondpads.

### Handling Procedures

Please observe the following precautions to avoid damage:

### Static Sensitivity (ESD)

This device is sensitive to electrostatic discharge and can be damaged by static electricity. Proper ESD control techniques should be used when handling these class 1A devices.

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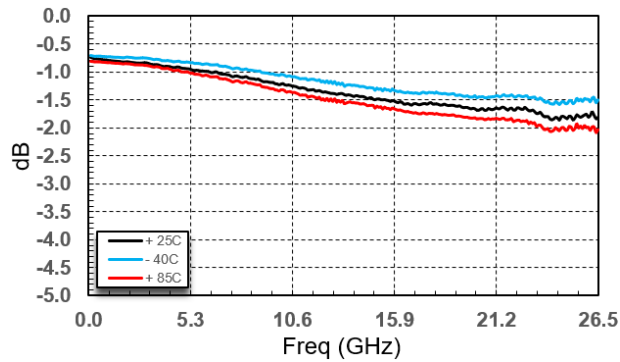


MASW-011128-DIE

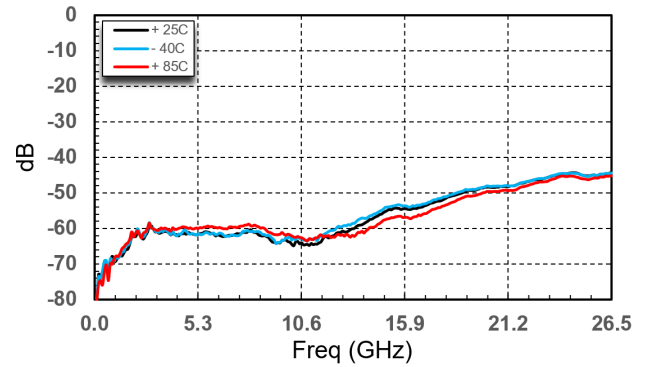
Rev. V1

## Typical RF Performance Curves, (RF Symmetrical)

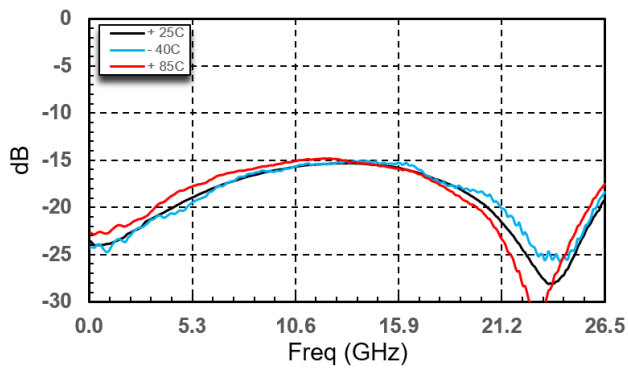
Insertion Loss, (S21)



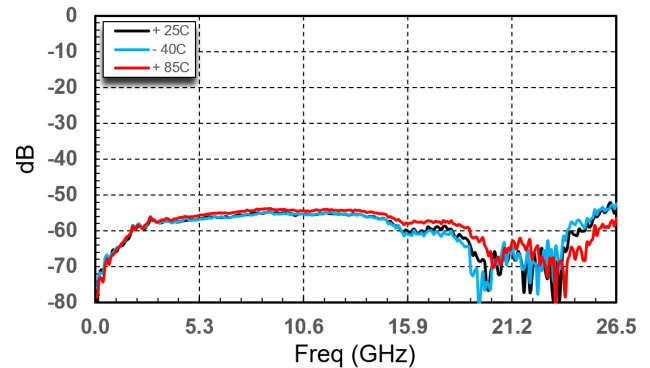
Isolation, (S31)



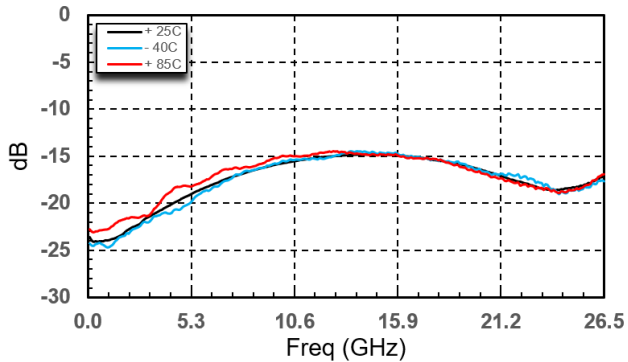
RFc R. Loss, (S11)



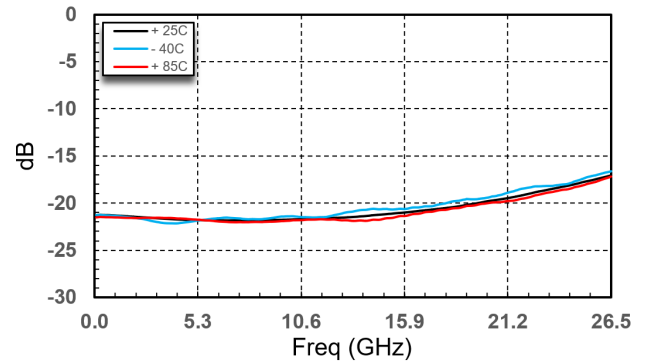
Isolation, (S32)



RF1 or RF2 R. Loss, (S22)



Isolated Port R. Loss, (S22)



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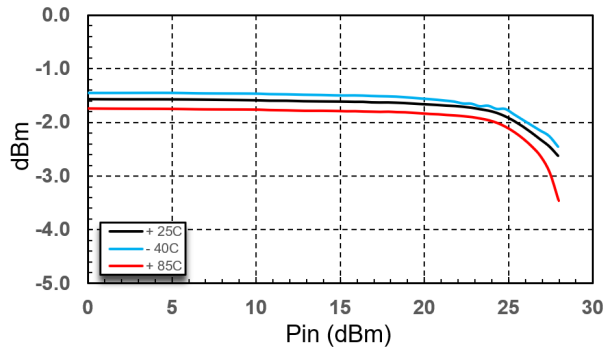


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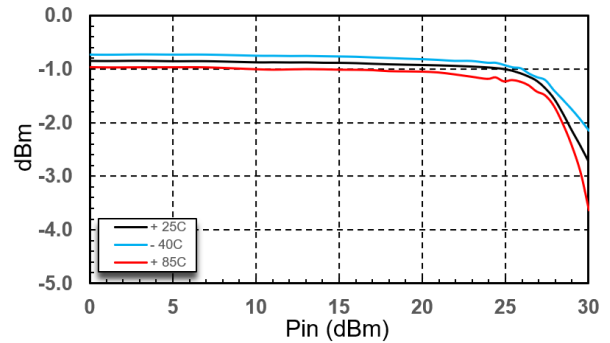
Rev. V1

## Typical RF Performance Curves

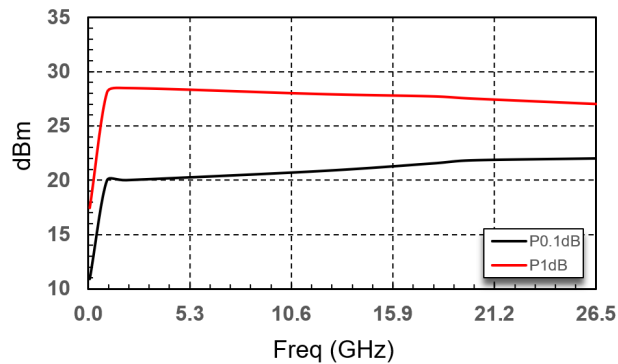
12 GHz Input Compression



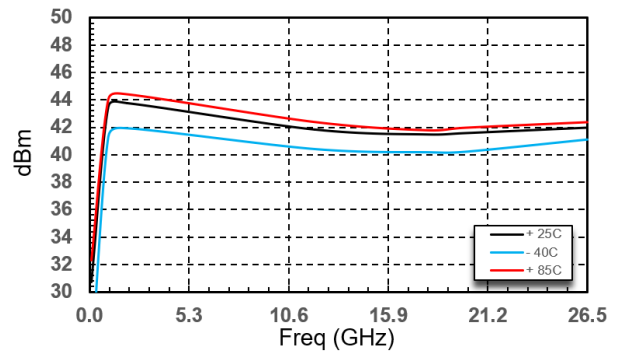
2 GHz Input Compression



Input Compression (0.1dB & 1dB)



Input IP3

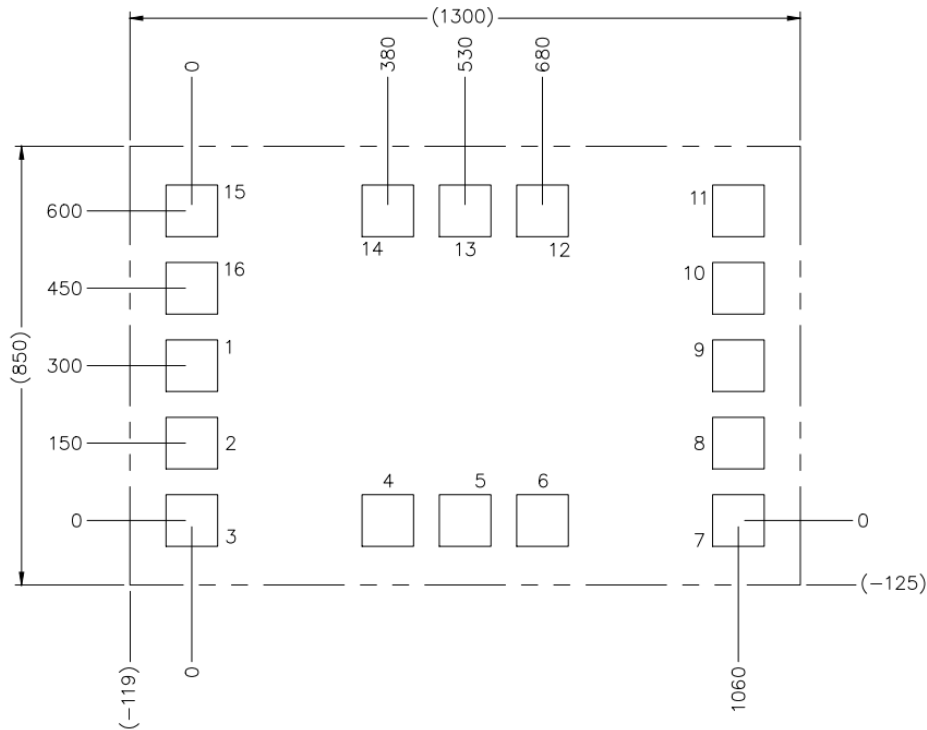


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### Die Dimensions<sup>6,7,8</sup>



| BOND PAD DIM (μm) |     |     |
|-------------------|-----|-----|
| PAD               | X   | Y   |
| 1 – 16            | 100 | 100 |

- NOTES:
1. UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS SHOWN ARE μm WITH A TOLERANCE OF ±5μm.
  2. DIE THICKNESS IS 100 ±10μm
  3. BOND PAD/BACKSIDE METALLIZATION: GOLD.
  4. DIE SIZE REFLECTS UN-CUT DIMENSIONS. SAW OR LASER KERF REDUCES DIE SIZE BY ~25μm EACH DIMENSION.

6. All units are in μm, unless otherwise noted, with a tolerance of ±5 μm.
7. Die thickness is 100±10 μm.
8. All square bond pads are 100 μm by 100 μm.

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