



Package: QFN, 12-Pin, 2mm x 2mm x 0.55mm

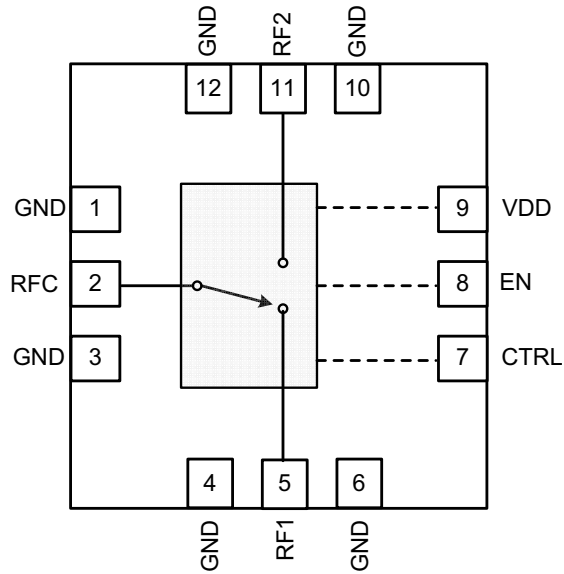


**Features**

- 5MHz to 6000MHz Operation
- 50Ω or 75Ω Applications
- Low Insertion Loss: 0.30dB at 1980MHz
- High Isolation: 37dB at 2GHz
- High IP3: >75dBm at 2GHz
- Compatible with Low Voltage Logic ( $V_{HIGH}$  Minimum = 1.3V)
- No External DC Blocking Capacitors Required on RF Paths Unless DC is Applied Externally
- 2000V HBM ESD Rating on All Ports
- CTB/CSO: >100dBc (41dBmV/ch., 137 Channels)

**Applications**

- LTE, WCDMA, GSM
- CATV, SATV Applications
- Post PA Switching
- General Purpose Switching Applications



Functional Block Diagram

**Product Description**

The RFSW1012 is a single-pole double-through (SPDT) switch designed for applications requiring very low insertion loss and high power handling capability. The excellent linearity performance of the RFSW1012 makes it ideal for use in LTE, WCDMA, and CDMA applications. This switch is ideally suited for use in CATV and SATV applications. The RFSW1012 is packaged in a compact 2mm x 2mm x 0.55mm, 12-pin, QFN package.

**Ordering Information**

|                 |                                  |
|-----------------|----------------------------------|
| RFSW1012SQ      | 25-Piece sample bag              |
| RFSW1012SR      | 7" Sample reel with 100 pieces   |
| RFSW1012TR13    | 13" Reel with 2500 pieces        |
| RFSW1012PCK-411 | 50Ω PCBA with 5-piece sample bag |
| RFSW1012PCK-410 | 75Ω PCBA with 5-piece sample bag |

**Optimum Technology Matching® Applied**

- |                                      |                                      |   |                                    |
|--------------------------------------|--------------------------------------|---|------------------------------------|
| <input type="checkbox"/> GaAs HBT    | <input type="checkbox"/> SiGe BiCMOS | <input type="checkbox"/> GaAs pHEMT         | <input type="checkbox"/> GaN HEMT  |
| <input type="checkbox"/> GaAs MESFET | <input type="checkbox"/> Si BiCMOS   | <input checked="" type="checkbox"/> Si CMOS | <input type="checkbox"/> BiFET HBT |
| <input type="checkbox"/> InGaP HBT   | <input type="checkbox"/> SiGe HBT    | <input type="checkbox"/> Si BJT             |                                    |

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## Absolute Maximum Ratings

| Parameter                                | Rating   | Unit |
|--|--|------|
| Maximum $V_{DD}$                         | 6.0  | V    |
| Maximum EN                               | 3.0  | V    |
| Maximum CTRL                             | 3.0  | V    |
| Hot-Switching Max Input Power (50Ω load) | 20   | dBm  |
| Max Input Power                          | 31dBm: 5MHz to 25MHz, 50Ω load<br>34dBm: 25MHz to 500MHz, 50Ω load<br>37dBm: >500MHz, 50Ω load<br>36dBm: >500MHz, 6:1 VSWR | dBm  |
| Operating Temperature ( $T_{CASE}$ )     | -40 to +85   | °C   |
| Storage Temperature                      | -40 to +150  | °C   |
| ESD Rating (HBM)                         | Class 2  |      |
| Moisture Sensitivity Level               | MSL-2  |      |



**Caution!** ESD sensitive device.

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability. Specified typical performance or functional operation of the device under Absolute Maximum Rating conditions is not implied.

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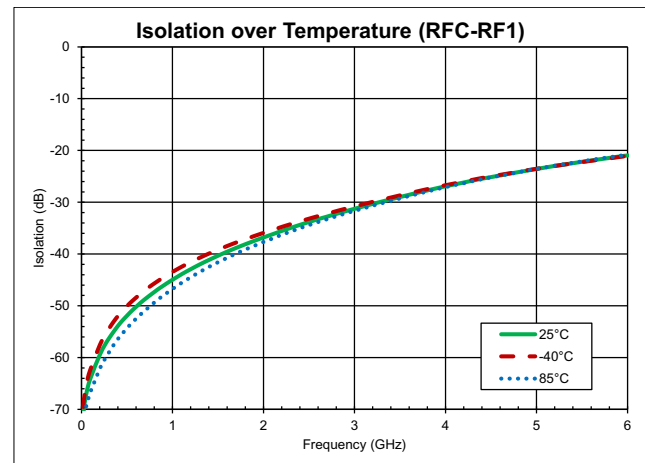
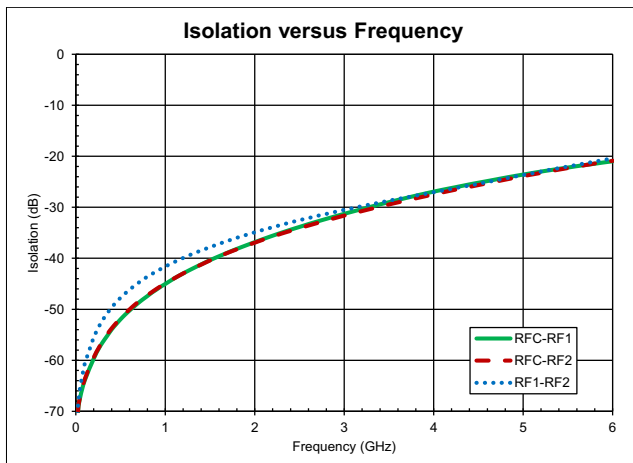
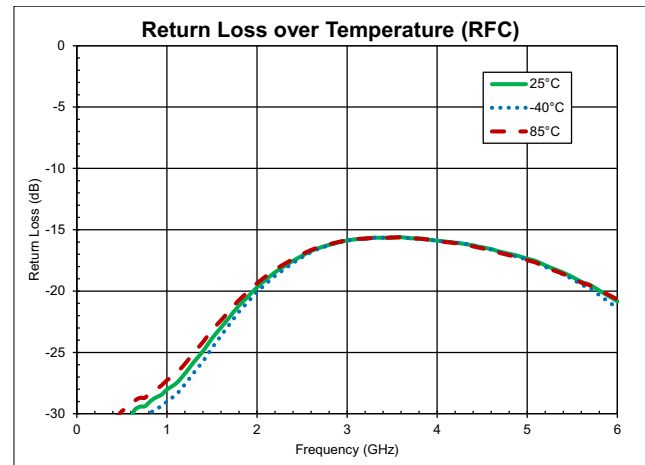
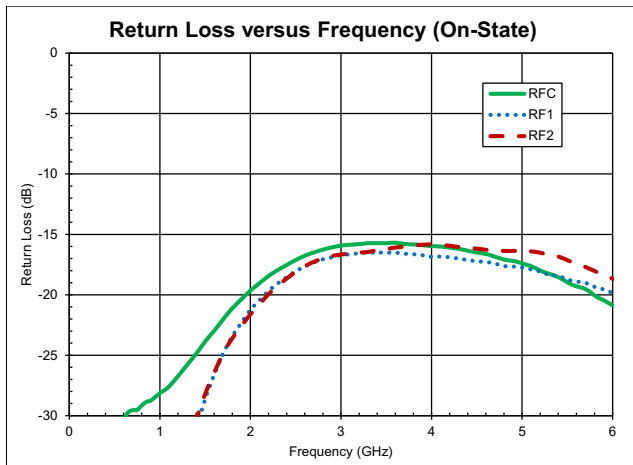
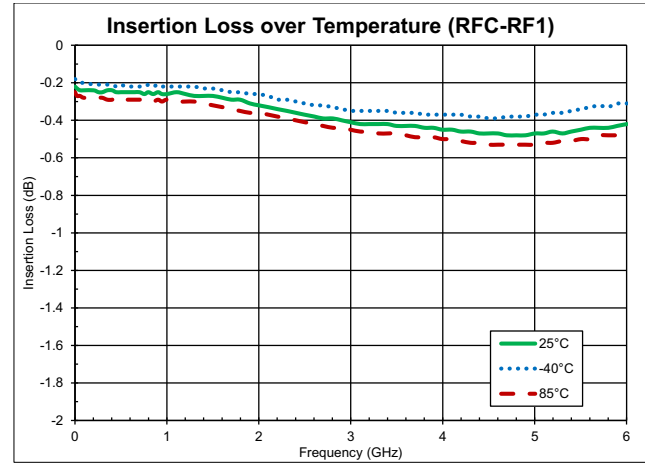
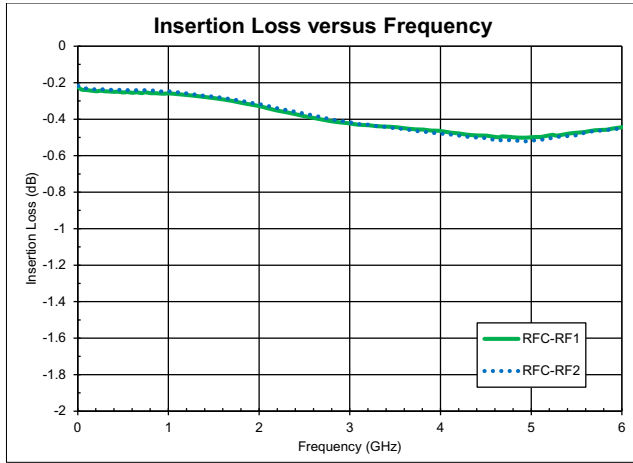


RFMD Green: RoHS compliant per EU Directive 2002/95/EC, halogen free per IEC 61249-2-21, < 1000ppm each of antimony trioxide in polymeric materials and red phosphorus as a flame retardant, and <2% antimony in solder.

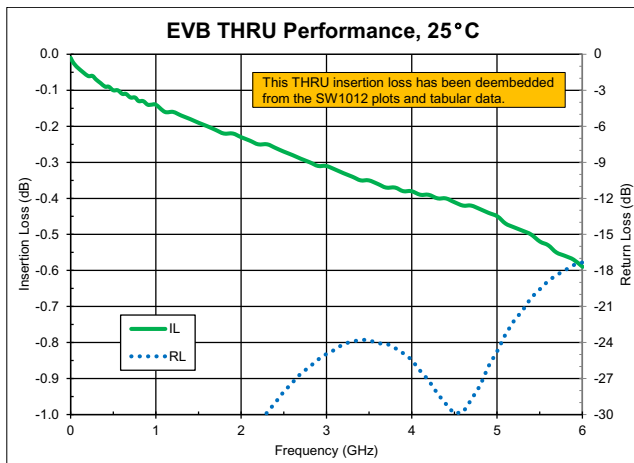
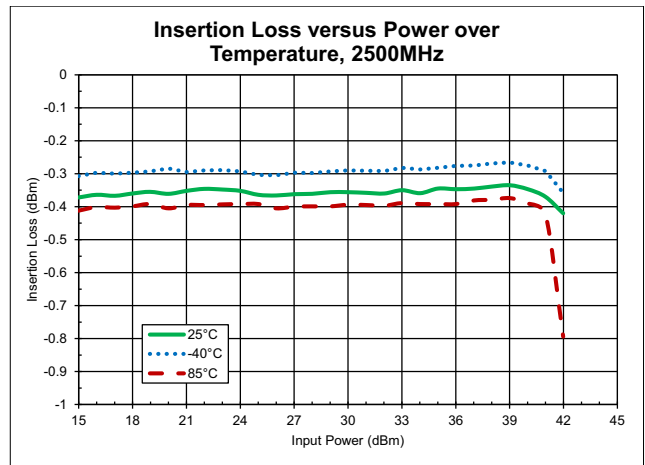
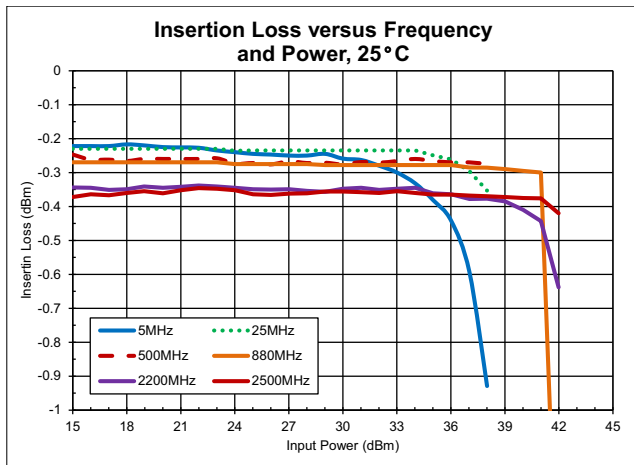
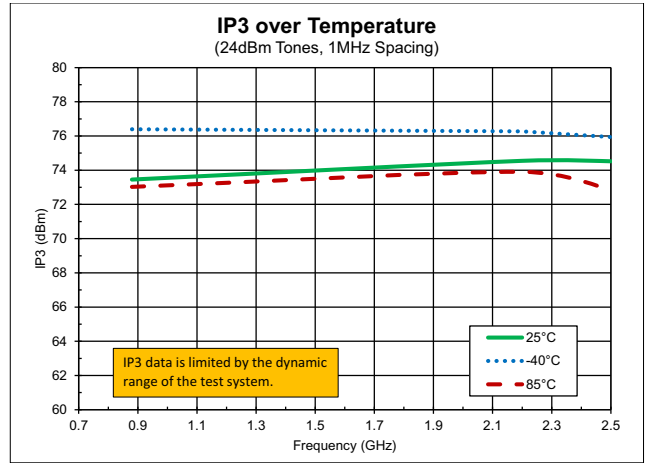
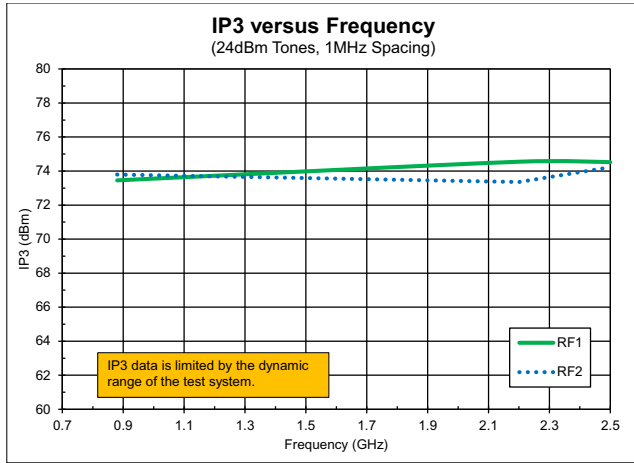
| Parameter                                      | Specification |       |      | Unit | Condition  |
|--|---------------|-------|------|------|--|
|  | Min.          | Typ.  | Max. |      |  |
| <b>50Ω Performance Using SW1012-411(A) EVB</b> |               |       |      |      | Nominal Test Conditions Unless Otherwise Stated:<br>$V_{DD} = 3V$ , $T = 25^{\circ}C$ , All RF ports terminated in 50Ω |
| Operational Frequency Range                    | 5             |       | 6000 | MHz  |  |
| Insertion Loss (RFC to RF1/RF2)                |               | 0.25  | 0.40 | dB   | 915MHz   |
|  |               | 0.30  | 0.45 | dB   | 1980MHz  |
|  |               | 0.40  |      | dB   | 2650MHz  |
|  |               | 0.45  |      | dB   | 5850MHz  |
| Isolation (RFC to RF1/RF2)                     | 38            | 45    |      | dB   | 915MHz   |
|  | 33            | 37    |      | dB   | 1980MHz  |
|  |               | 33    |      | dB   | 2650MHz  |
|  |               | 21    |      | dB   | 5850MHz  |
| Isolation (RF1 to RF2)                         |               | 42    |      | dB   | 915MHz   |
|  |               | 35    |      | dB   | 1980MHz  |
|  |               | 32    |      | dB   | 2650MHz  |
|  |               | 21    |      | dB   | 5850MHz  |
| Return Loss (On-State)                         |               | >15   |      | dB   | 5MHz to 6GHz   |
| Input IP3                                      |               | 75    |      | dBm  | 2.2GHz, 24dBm per tone, 1MHz spacing   |
| Input IP2                                      |               | 129   |      | dBm  | Tone 1: 836.5MHz at +26dBm; Tone 2: 1718MHz at -20dBm; Rx Freq: 881.5MHz   |
|  |               | 129   |      | dBm  | Tone 1: 1880MHz at +26dBm; Tone 2: 3840MHz at -20dBm; Rx Freq: 1960MHz   |
| Spurious Output                                |               | <-105 |      | dBm  | Freq >5MHz, all ports terminated, no RF Inputs   |
|  |               | <-100 |      | dBm  | Freq <5MHz, all ports terminated, no RF Inputs   |
| 900MHz Second Harmonic                         |               | -95   | -75  | dBc  | $P_{IN} = 35dBm$   |
| 900MHz Third Harmonic                          |               | -90   | -75  | dBc  |  |
| 1800MHz Second Harmonic                        |               | -95   | -75  | dBc  | $P_{IN} = 33dBm$   |
| 1800MHz Third Harmonic                         |               | -90   | -75  | dBc  |  |
| Max Operational Input Power                    |               |       | 30   | dBm  | 5MHz to 25MHz, 50Ω load  |
|  |               |       | 33   | dBm  | 25MHz to 500MHz, 50Ω load  |
|  |               |       | 36   | dBm  | >500MHz, 50Ω load  |

| Parameter   | Specification |      |      | Unit | Condition   |
|---|---------------|------|------|------|---|
|   | Min.          | Typ. | Max. |      |   |
| <b>75Ω Performance Using SW1012-410(A) EVB</b>        |               |      |      |      | Nominal Test Conditions Unless Otherwise Stated:<br>V <sub>DD</sub> = 3V, T = 25 °C, All RF ports terminated in 75Ω |
| Operational Frequency Range                           | 5             |      | 2500 | MHz  |   |
| Insertion Loss (RFC to RF1/RF2)                       |               | 0.15 |      | dB   | 5MHz  |
|   |               | 0.20 |      | dB   | 200MHz  |
|   |               | 0.30 | 0.45 | dB   | 915MHz  |
|   |               | 0.35 | 0.50 | dB   | 1980MHz   |
|   |               | 0.40 |      |      | 2200MHz   |
| Isolation (RFC to RF1/RF2)                            |               | 70   |      | dB   | 5MHz  |
|   |               | 50   |      | dB   | 200MHz  |
|   |               | 36   |      | dB   | 915MHz  |
|   |               | 28   |      | dB   | 1980MHz   |
|   |               | 26   |      | dB   | 2200MHz   |
| Isolation (RF1 to RF2)                                |               | >70  |      | dB   | 5MHz  |
|   |               | >70  |      | dB   | 200MHz  |
|   |               | 48   |      | dB   | 915MHz  |
|   |               | 34   |      | dB   | 1980MHz   |
|   |               | 32   |      | dB   | 2200MHz   |
| Return Loss (On-State)                                |               | >15  |      | dB   | Freq <1200MHz   |
|   |               | >13  |      | dB   | 1200MHz < Freq < 2500MHz  |
| CSO   |               | >100 |      | dBc  | 41dBmV/ch, 137 channels)  |
| CTB   |               | >100 |      | dBc  |   |
| XMOD  |               | >90  |      | dBc  |   |
| Max Operational Input Power                           |               |      | 30   | dBm  | 5MHz to 25MHz, 75Ω load   |
|   |               |      | 33   | dBm  | 25MHz to 500MHz, 75Ω load   |
|   |               |      | 36   | dBm  | >500MHz, 75Ω load   |
| <b>Power Supply</b>                                   |               |      |      |      |   |
| Device Voltage, V <sub>DD</sub>                       | 2.7           | 3    | 4.6  | V    |   |
| Leakage Current, I <sub>DD</sub>                      |               | 100  | 200  | μA   | EN = High   |
|   |               | 14   | 20   | μA   | EN = Low  |
| Control Voltage (EN, CTRL)                            | 1.3           | 1.8  | 2.7  | V    |   |
|   |               | 0    | 0.45 | V    |   |
| Control Current                                       |               | 2.5  | 5    | μA   | CTRL = High, EN = High  |
|   |               | 1    | 3    | μA   | CTRL = Low, EN = High   |
| Switching Speed (T <sub>ON</sub> , T <sub>OFF</sub> ) |               | 2    | 5    | μs   | 50% Control to 10/90% RF  |

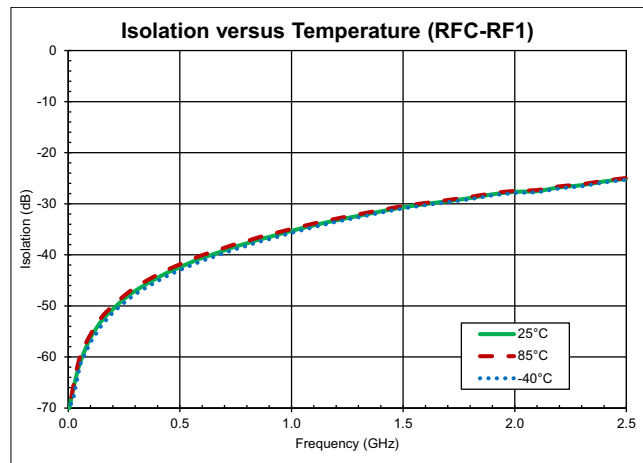
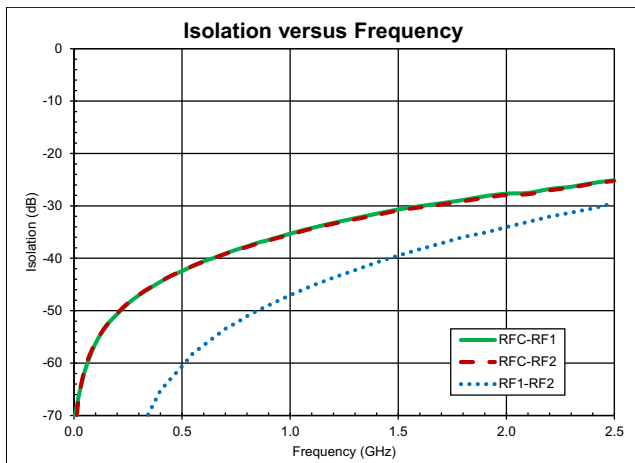
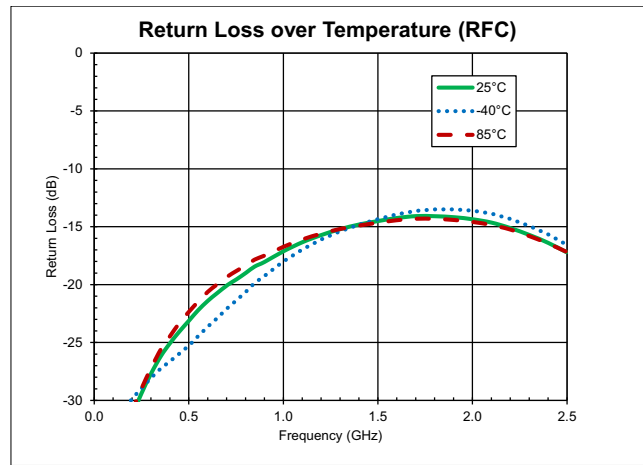
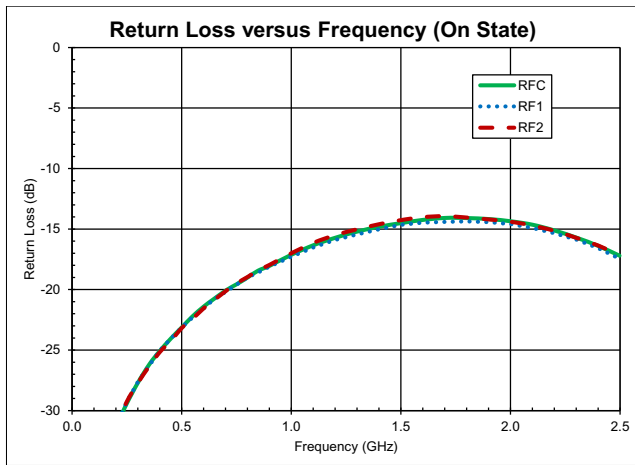
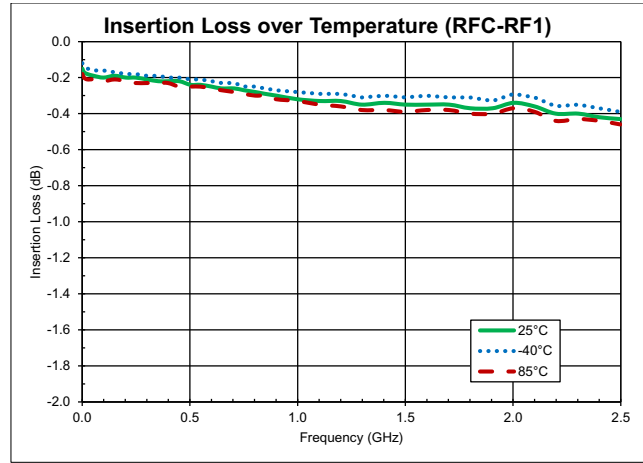
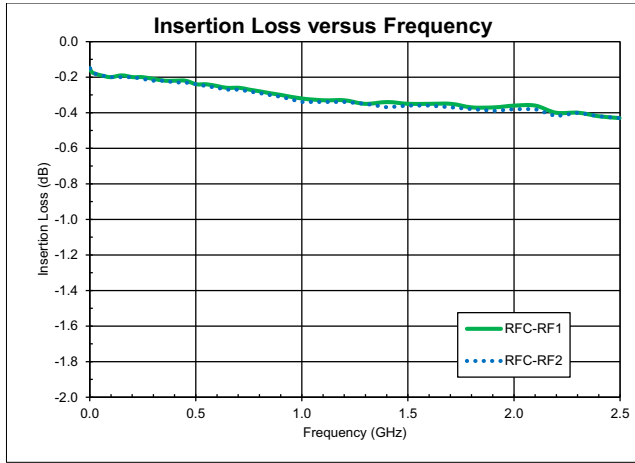
## Typical Performance: 50Ω Evaluation Board



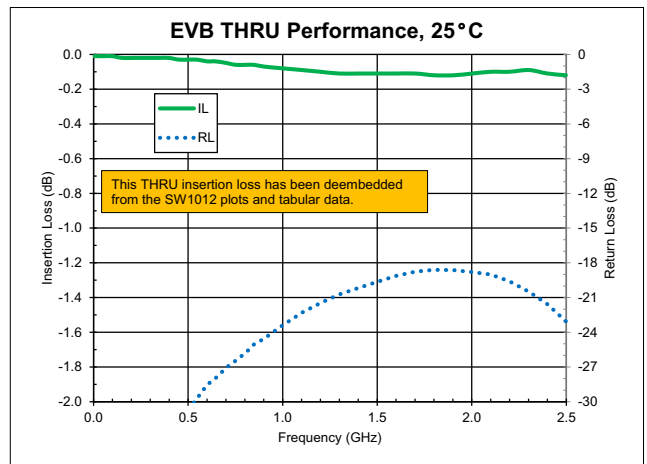
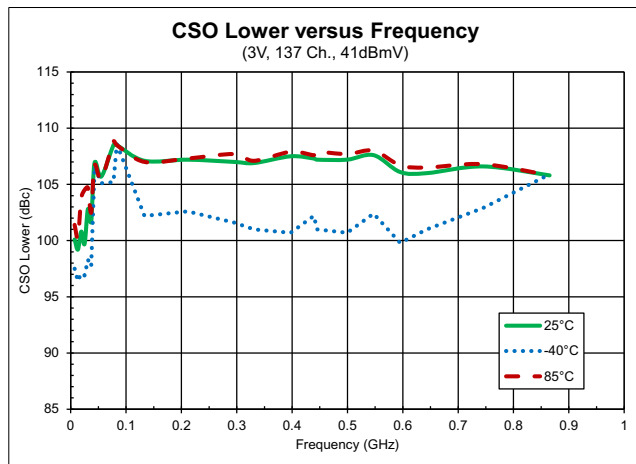
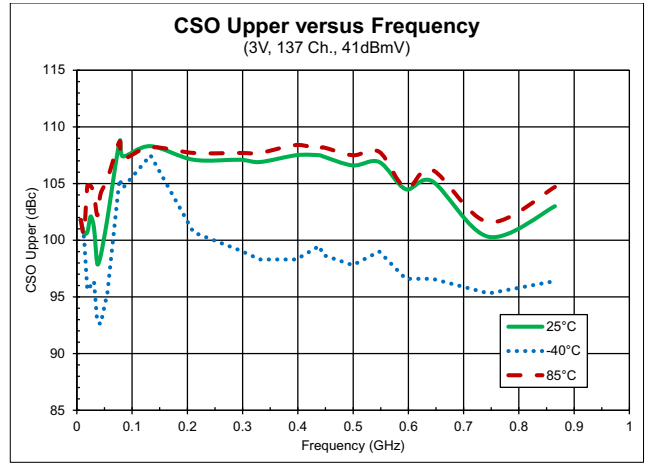
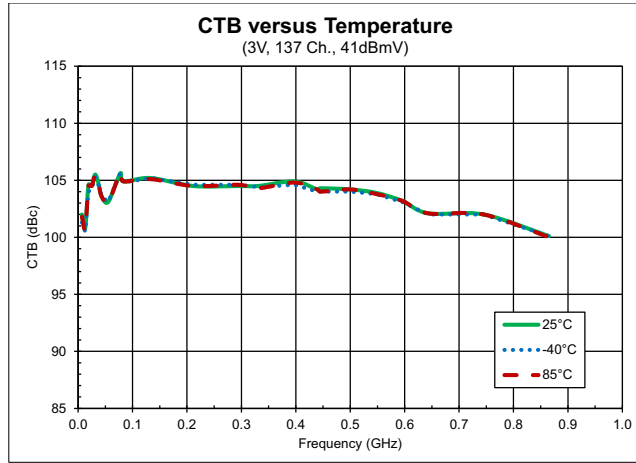
Typical Performance: 50Ω Evaluation Board



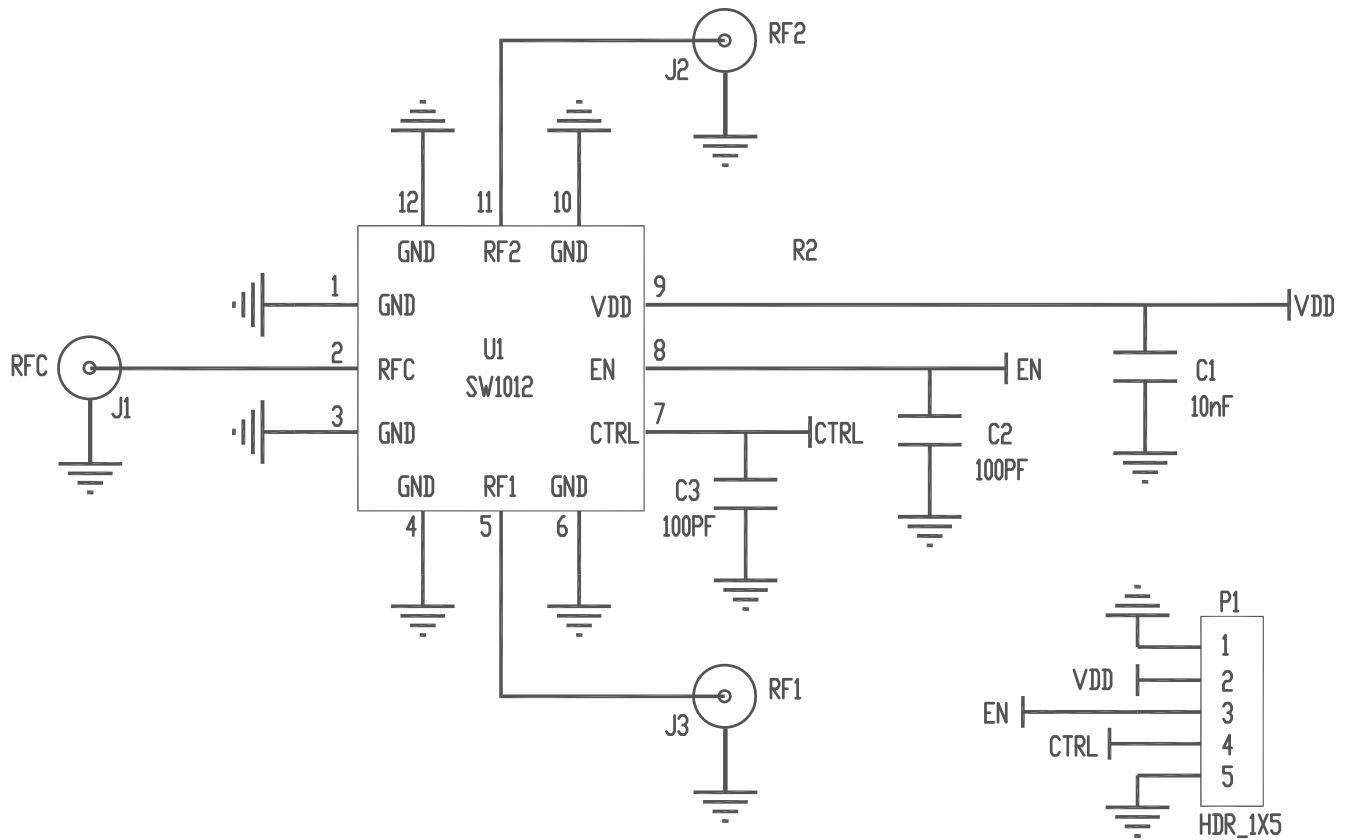
## Typical Performance: 75Ω Evaluation Board



**Typical Performance: 75Ω Evaluation Board**



## Evaluation Board Schematic

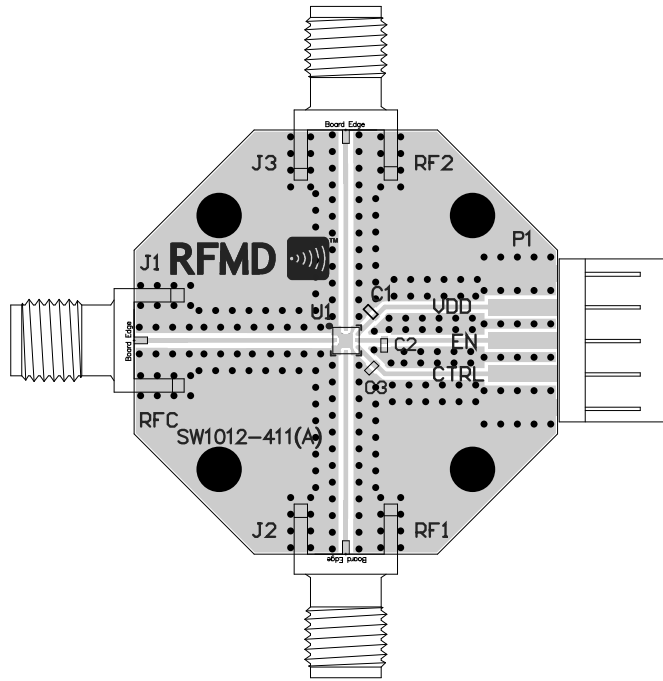


## Evaluation Board Bill of Materials (BOM)

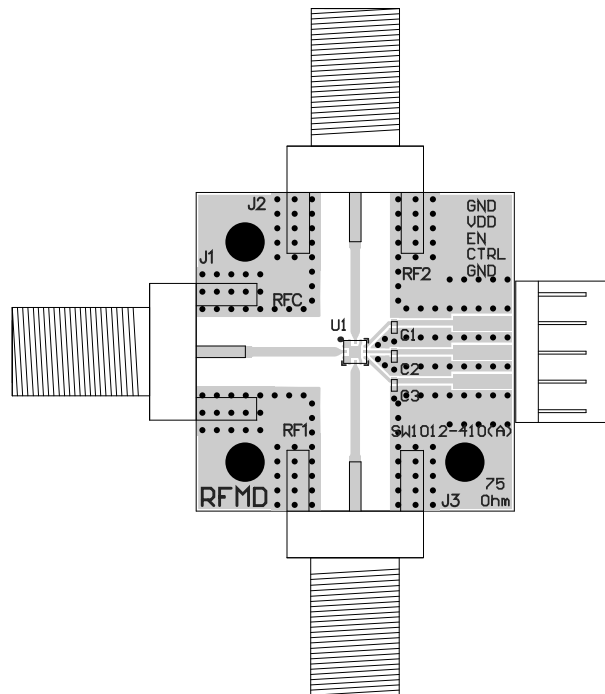
| Description  | Reference Designator | Manufacturer                 | Manufacturer's P/N |
|--|----------------------|------------------------------|--------------------|
| 50Ω PCB, SW1012-411  |                      |                              | SW1012-411(A)      |
| CAP, 10000pF, 10%, 25V, X7R, 0402                            | C1                   | Murata Electronics           | GRM155R71E103KA01D |
| CAP, 100pF, 5%, 50V, COG, 0402                               | C2-C3                | Taiyo Yuden (USA), Inc.      | RM UMK105CG101JV-F |
| CONN, SMA, END LNCH, MINI, FLT, 0.068"                       | J1-J3                | Emerson Network Power        | 142-0741-851       |
| CONN, HDR, ST, PLRZD, 5-PIN, 0.100"                          | P1                   | ITW Pancon                   | MPSS100-5-C        |
| SPDT MMIC Switch   | U1                   | RFMD                         |                    |
| For 75Ω applications use the following PCB and RF connector: |                      |                              |                    |
| 75Ω PCB, SW1012-410  |                      |                              | SW1012-410(A)      |
| CONN, F, FEM EDGE MOUNT, 75Ω, 0.068"                         | J1- J3               | Millimeter Wave Technologies | MW-846-C-DD-75     |



**50Ω Evaluation Board Assembly Drawing**



**75Ω Evaluation Board Assembly Drawing**



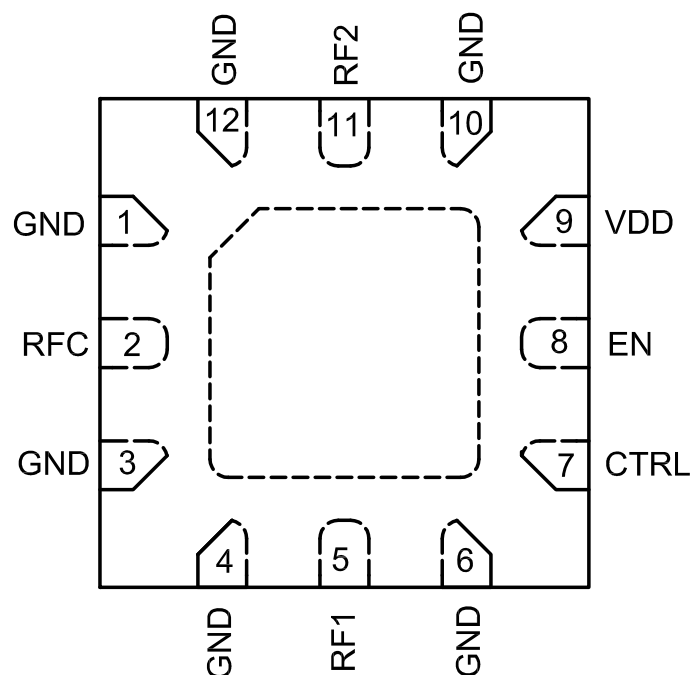
## Control Logic for Valid Operational States

| State    | V <sub>DD</sub> | CTRL              | EN                | RF Path  |
|----------|-----------------|-------------------|-------------------|----------|
| 1        | 2.7V to 4.6V    | V <sub>HIGH</sub> | V <sub>HIGH</sub> | ANT-RF2  |
| 2        | 2.7V to 4.6V    | V <sub>LOW</sub>  | V <sub>HIGH</sub> | ANT-RF1  |
| Shutdown | 2.7V to 4.6V    | Don't Care        | V <sub>LOW</sub>  | Shutdown |

## Pin Names and Descriptions

| Pin  | Name | Description  |
|------|------|--|
| 1    | GND  | No-connect internal, recommend GND at the EVB level.       |
| 2    | RFC  | Single-ended RF port.                                      |
| 3    | GND  | No-connect internal, recommend GND at the EVB level.       |
| 4    | GND  | Ground.  |
| 5    | RF1  | Single-ended RF port.                                      |
| 6    | GND  | Ground.  |
| 7    | CTRL | Switch logic control input.                                |
| 8    | EN   | Shutdown logic control input.                              |
| 9    | VDD  | Supply voltage.  |
| 10   | GND  | Ground.  |
| 11   | RF2  | Single-ended RF port.                                      |
| 12   | GND  | Ground.  |
| EPAD | GND  | Ground. Must be soldered to EVB GND over one or more vias. |

## Pin Out



**Package Drawing and Branding Diagram**  
(Dimensions in millimeters)

