

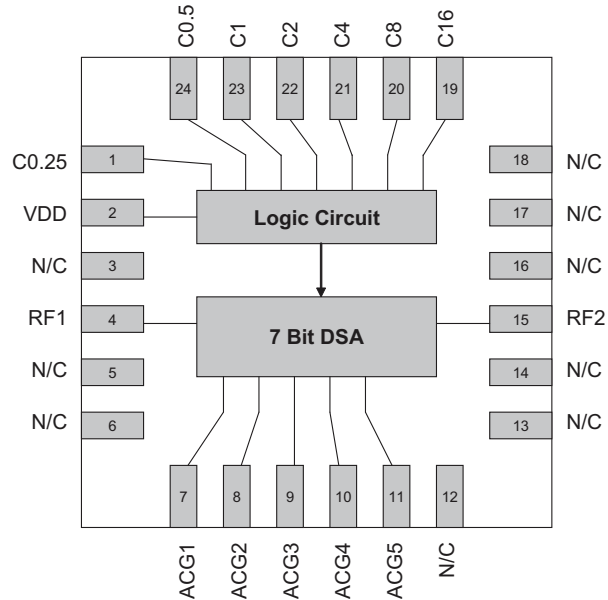


Features

- Frequency Range 50MHz to 4000MHz
- 7-Bit, 31.75dB Range, 0.25dB Step
- High Linearity, IP3 >50dBm
- 3V and 5V Logic Compatible
- On-chip Parallel Decoder
- Parallel Programming Interface
- On-chip ESD Protection >500V HBM
- Single Supply, 3V to 5V Operation

Applications

- Transceiver IF Applications
- Cellular, PCS, GSM, UMTS, LTE,
- WiMax/WiFi
- Wireless Data, Satellite Terminals
- Test Equipment



Functional Block Diagram

Product Description

RFMD's RFSA2714 is a 7-bit digital step attenuator (DSA) that features high linearity over the entire 31.75dB gain control range with excellent step accuracy in 0.25dB steps. The parallel-controlled RFSA2714 has an on-chip decoder that is both 3V and 5V compatible. The RFSA2714 also offers a rugged Class 1B HBM ESD rating via on-chip ESD circuitry.

Ordering Information

| | |
|-----------------|--|
| RFSA2714SR | 7" Sample reel with 100 pieces |
| RFSA2714SQ | Sample bag with 25 pieces |
| RFSA2714TR13 | 13" Reel with 2500 pieces |
| RFSA2714PCK-410 | 50MHz to 4GHz PCBA with 5-piece sample bag |

Absolute Maximum Ratings

| Parameter | Rating | Unit |
|--|-------------|------|
| Supply Voltage | +5.5 | V |
| DC Supply Current | 15 | mA |
| Power Dissipation | 83 | mW |
| Max RF Input Power | 27 | dBm |
| Operating Temperature (T _{CASE}) | -40 to +85 | °C |
| Storage Temperature | -40 to +150 | °C |
| Junction Temperature | 150 | °C |
| ESD Rating (HBM) | Class 1B | |
| Moisture Sensitivity Level | MSL1 | |



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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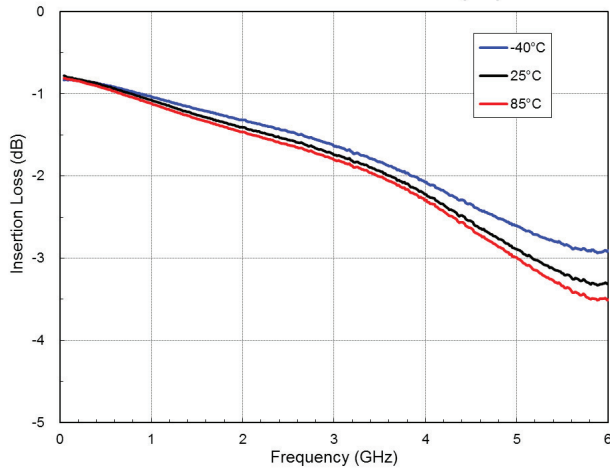
| Parameter | Specification | | | Unit | Condition |
|-------------------------------------|---|-----------------|------|------|--|
| | Min. | Typ. | Max. | | |
| Frequency Range | 50 | | 4000 | MHz | |
| Insertion Loss | | 0.85 | | dB | 150MHz, 0dB attenuation |
| | | 1.1 | | dB | 850MHz, 0dB attenuation |
| | | 1.7 | | dB | 2700MHz, 0dB attenuation |
| | | 2.1 | | dB | 3800MHz, 0dB attenuation |
| Gain Control Range | | 31.75 | | dB | 0.25dB step size |
| Step Accuracy | ±(0.1 + 5% attenuation setting) | | | dB | |
| Input IP3 | | 50 | | dBm | 100MHz to 4000MHz |
| Input P0.1dB | | 25 | | dBm | 1000MHz |
| Return Loss | | 15 | | dB | DC to 3000MHz, all states |
| Control Interface | | 7-bit, Parallel | | | Parallel Interface |
| Settling Time | | 200 | | ns | t _{RISE} , t _{FALL} (10%/90% RF) |
| Switching Speed | | 200 | | ns | t _{ON} , t _{OFF} (50% CTL to 10%/90% RF) |
| Supply Voltage (V _{DD}) | 4.75 | 5.0 | 5.25 | V | |
| Supply Current | | 7.5 | | mA | |
| Control Voltage (V _{CTL}) | Low, V _{CTL} = 0 to 0.8 | | | V | |
| | High, V _{CTL} = 2.0 to V _{DD} | | | | |

Notes:

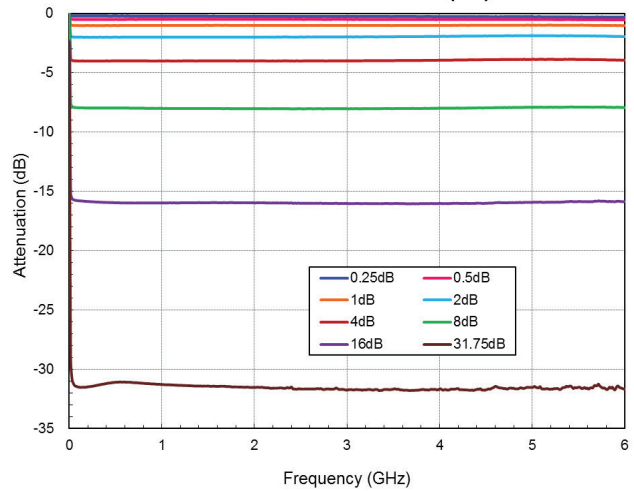
- V_{DD} = 5V, V_{CTL} = 5V, T = 25 °C.
- Broadband Application Circuit (with ACG caps).
- IIP3 measured with P_{IN} = +10dBm/tone, 1MHz spacing.

Typical Performance: Broadband Application Circuit (25 °C)

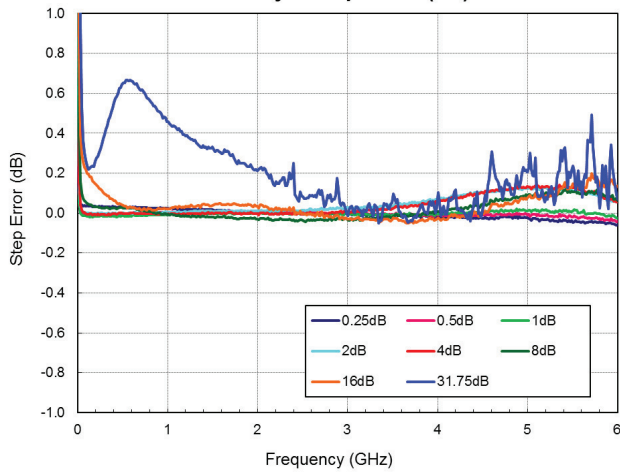
DSA 0dB State Insertion Loss (dB)



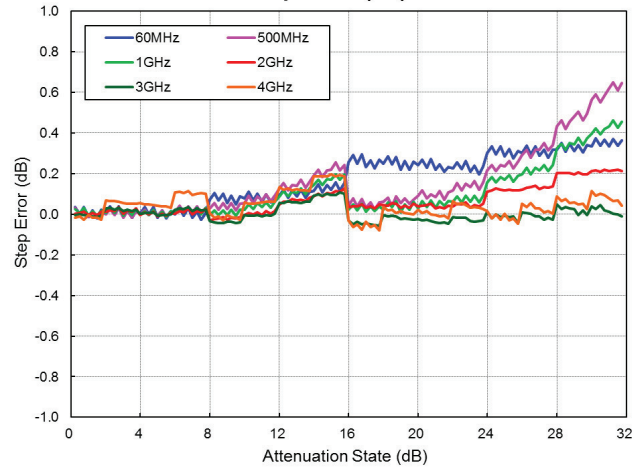
Normalized Attenuation (dB)



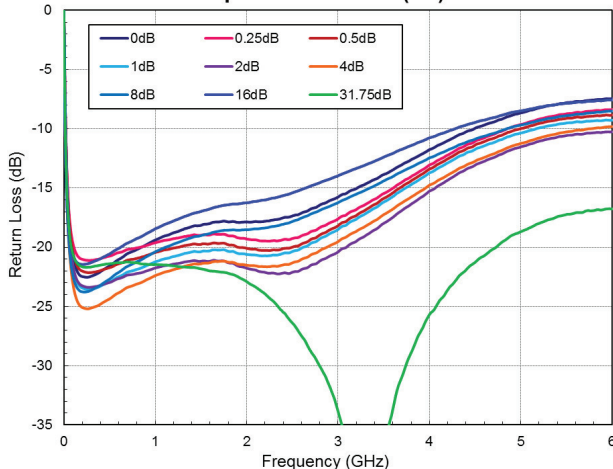
DSA Major Step Error (dB)



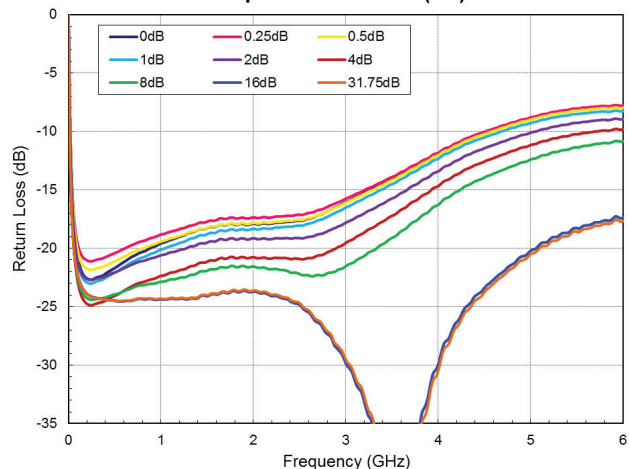
Step Error (dB)



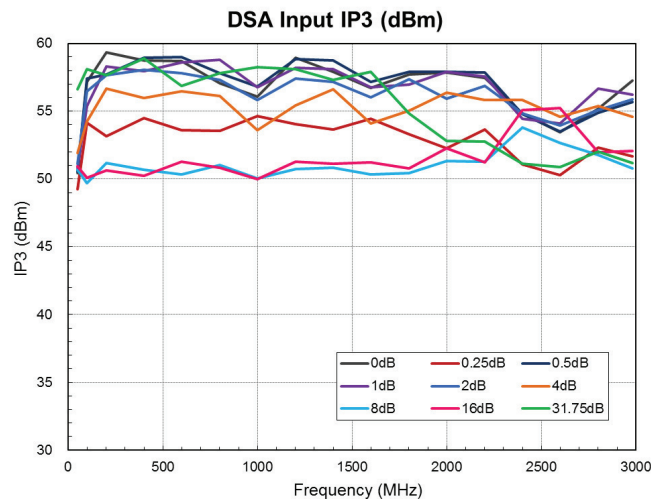
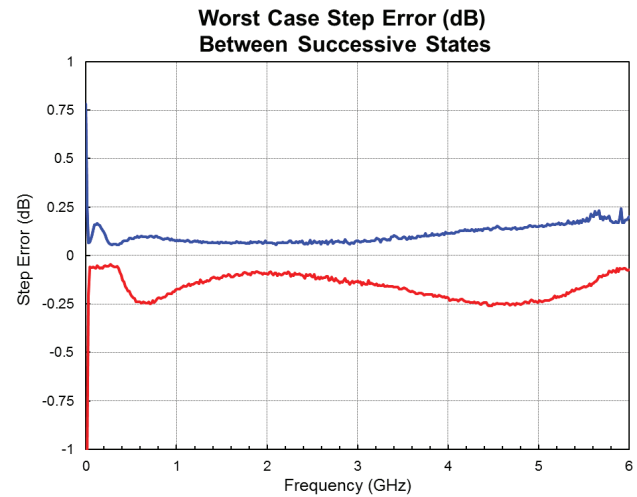
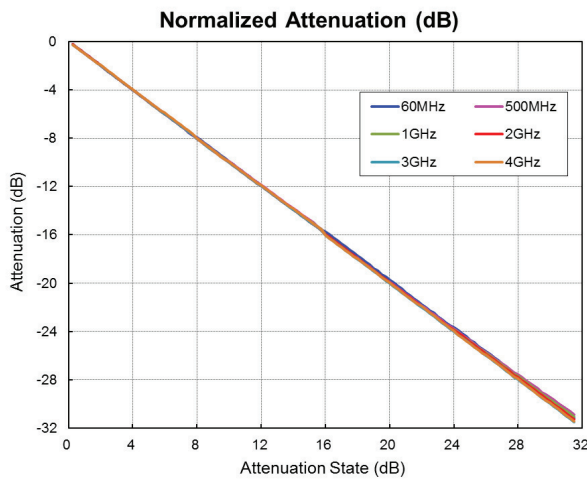
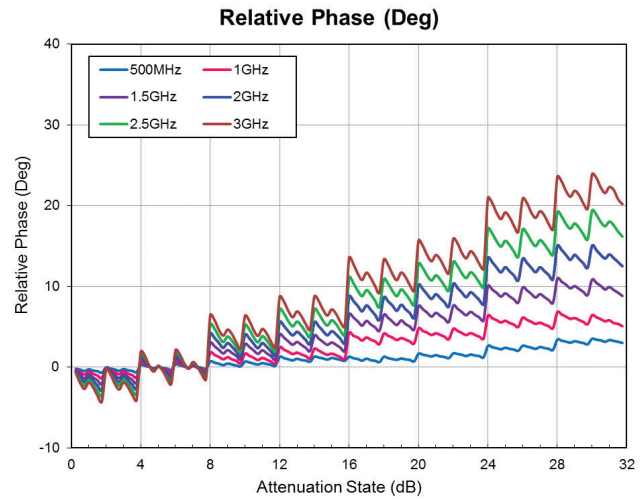
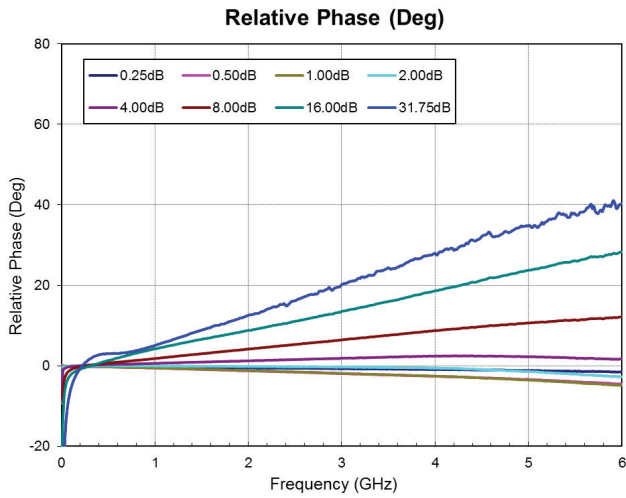
Input Return Loss (dB)



Output Return Loss (dB)



Typical Performance: Broadband Application Circuit (25 °C)



Truth Table

| Control Bit | | | | | | | Relative Gain Setting |
|-------------|----|----|----|----|------|-------|-----------------------|
| C16 | C8 | C4 | C2 | C1 | C0.5 | C0.25 | |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | Max gain |
| 1 | 1 | 1 | 1 | 1 | 1 | 0 | -0.25dB |
| 1 | 1 | 1 | 1 | 1 | 0 | 1 | -0.5dB |
| 1 | 1 | 1 | 1 | 0 | 1 | 1 | -1dB |
| 1 | 1 | 1 | 0 | 1 | 1 | 1 | -2dB |
| 1 | 1 | 0 | 1 | 1 | 1 | 1 | -4dB |
| 1 | 0 | 1 | 1 | 1 | 1 | 1 | -8dB |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | -16dB |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | -31.75dB |

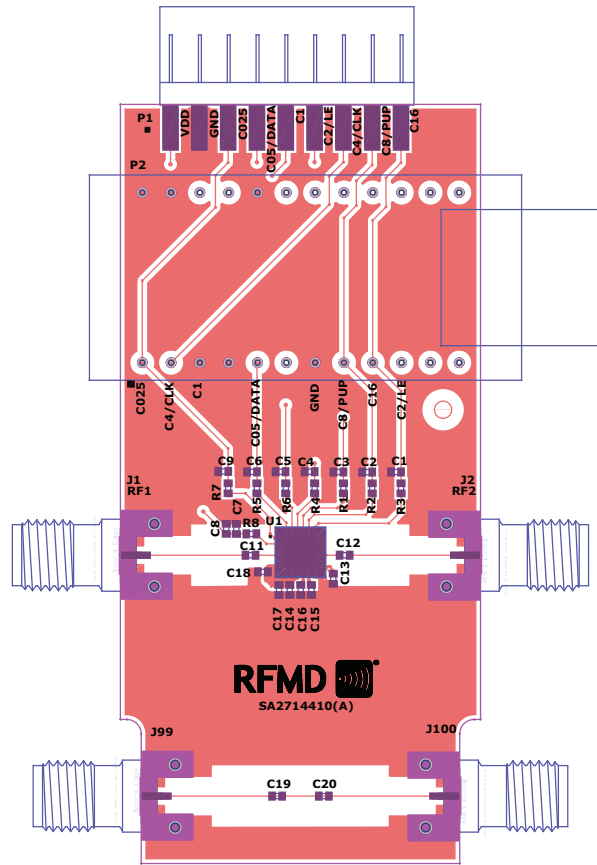
Note: C0.25 = D0, C0.5 = D1, ..., C16 = D6 (for the purpose of the example below)

| Logic Voltage Levels | |
|----------------------|--------------|
| State | Logic |
| Low | 0V to 0.8V |
| High | 2.0V to 5.0V |

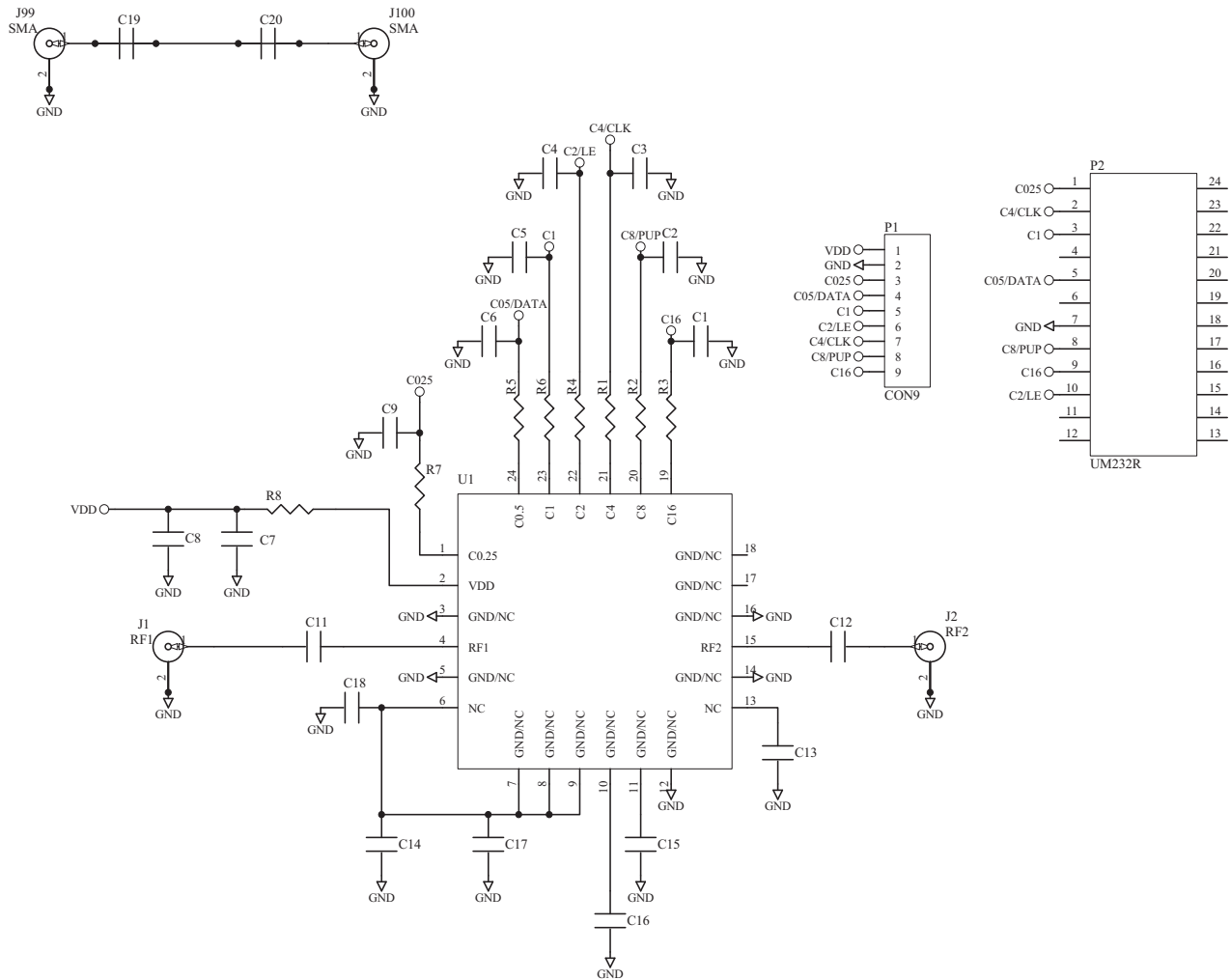
Pin Names and Description

| Pin | Name | Description |
|------|--------------|---|
| 1 | C0.25 | 0.25dB Control Bit. |
| 2 | VDD | Power Supply. |
| 3 | NC | No Internal Connection. EVB can be ground or no connect. |
| 4 | RF1 | RF Port. External DC Block Required. |
| 5 | NC | No Internal Connection. EVB can be ground or no connect. |
| 6 | NC | No Internal Connection. EVB can be ground or no connect. |
| 7 | ACG | AC Ground Connection for Operation below 500MHz. |
| 8 | ACG | AC Ground Connection for Operation below 500MHz. |
| 9 | ACG | AC Ground Connection for Operation below 500MHz. |
| 10 | ACG | AC Ground Connection for Operation below 500MHz. |
| 11 | ACG | AC Ground Connection for Operation below 500MHz. |
| 12 | NC | No Internal Connection. EVB can be ground or no connect. |
| 13 | NC | No Internal Connection. EVB can be ground or no connect. |
| 14 | NC | No Internal Connection. EVB can be ground or no connect. |
| 15 | RF2 | RF Port. External DC Block Required. |
| 16 | NC | No Internal Connection. EVB can be ground or no connect. |
| 17 | NC | No Internal Connection. EVB can be ground or no connect. |
| 18 | NC | No Internal Connection. EVB can be ground or no connect. |
| 19 | C16 | 16dB Control Bit. |
| 20 | C8 | 8dB Control Bit. |
| 21 | C4 | 4dB Control Bit. |
| 22 | C2 | 2dB Control Bit. |
| 23 | C1 | 1dB Control Bit. |
| 24 | C0.5 | 0.5dB Control Bit. |
| EPAD | GND | DC and RF Ground. Must be soldered to EVB ground plane over a bed of vias for thermal and RF performance. |

Evaluation Board Assembly Drawing



Evaluation Board Schematic

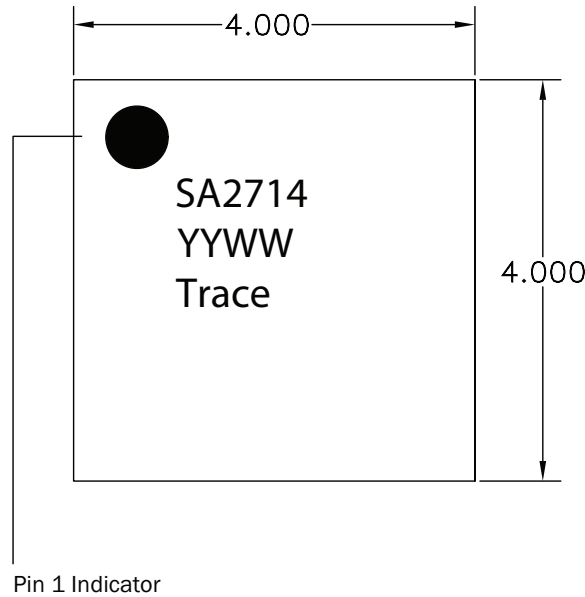


Evaluation Board Bill of Materials (BOM)

| Description | Reference Designator | Manufacturer | Manufacturer's P/N |
|--|----------------------------|---------------------------------|--------------------|
| SA2714410(A) | | Dynamic Details (DDI) Toronto | SA2714410(A) |
| Digital Step Attenuator 50MHz to 4000MHz | U1 | RFMD | RFSA2714SB |
| CAP, 1000pF, 10%, 50V, X7R, 0402 | C7 | Taiyo Yuden (USA), Inc. | RM UMK105BJ102KV-F |
| CAP, 470pF, 10%, 50V, X7R, 0402 | C11-C12 | Murata Electronics | GRM155R71H471KA01E |
| CAP, 680pF, 5%, 50V, C0G, 0402 | C14, C15, C16 | Murata Electronics | GRM1555C1H681JA01D |
| RES, 0Ω, 0402 | R1-R8 | Kamaya, Inc | RMC1/16SJPTH |
| CONN, SMA, END LNCH, UNIV, HYB MNT, FLT | J1-J2, J99-J100 | Molex | SD-73251-4000 |
| CONN, HDR, ST, PLRZD, 9-PIN | P1 | ITW Pancon | MPSS100-9-C |
| CONN, SKT, 24-PIN DIP, .600", T/H | P2 | Aries Electronics Inc. | 24-6518-10 |
| MOD, USB TO SERIAL UART, SSOP-28 | M1 (See Note Below) | Future Technology Devices Int'l | UM232R |
| DNP | C1-C6, C8-C9, C13, C17-C20 | NA | NA |

Note: M1 should be mounted into P2 with respect to the Pin 1 alignment of M1 and P2

Branding Drawing



Fill in the YYWW Notation with the Date Code

YY = Year

WW = Week

Trace to be assigned by SubCon

Package Drawing

