

0.1-6GHz SPDT Switch for High Power Applications

Features

- Broadband frequency range: 0.1 to 6 GHz
- High power handing capability of up to 38 dBm
- Low insertion loss : 0.7 dB typical @ 6.0 GHz
- High isolation: 22 dB typical @ 6.0 GHz
- High switching speed: 1 us typical
- Low harmonic generation
- Small FCDFN 1.1mm x 0.7mm x 0.37mm-6L package

Applications

- Multi-Mode GSM/CDMA/WCDMA/LTE and NR including n77, n78, n79 bands
- Cellular modems, tablets and USB Devices
- Other RF front-end modules

General Description

The AW13612TFDR is a single-pole dual-throw switch with high power handing capability of up to 38dBm and low insertion loss. It can be used to support band switching and mode switching for GSM, WCDMA, LTE, and NR applications.

The symmetrical design of internal ports makes it convenient for PCB routing and adjustment of receiving and transmitting signals. The band/mode switching is realized by the GPIO pins as referenced in the chip block diagram and the control logic.

The AW13612TFDR is provided in a compact FCDFN 1.1mm x 0.7mm x 0.37mm-6L package.

Typical Application Circuit

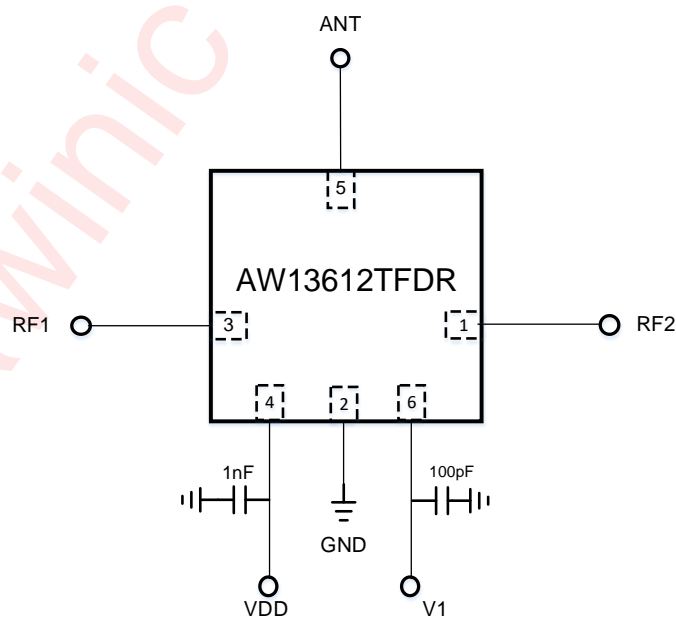


Figure 1 Typical Application Circuit of AW13612TFDR

Pin Configuration And Top Mark

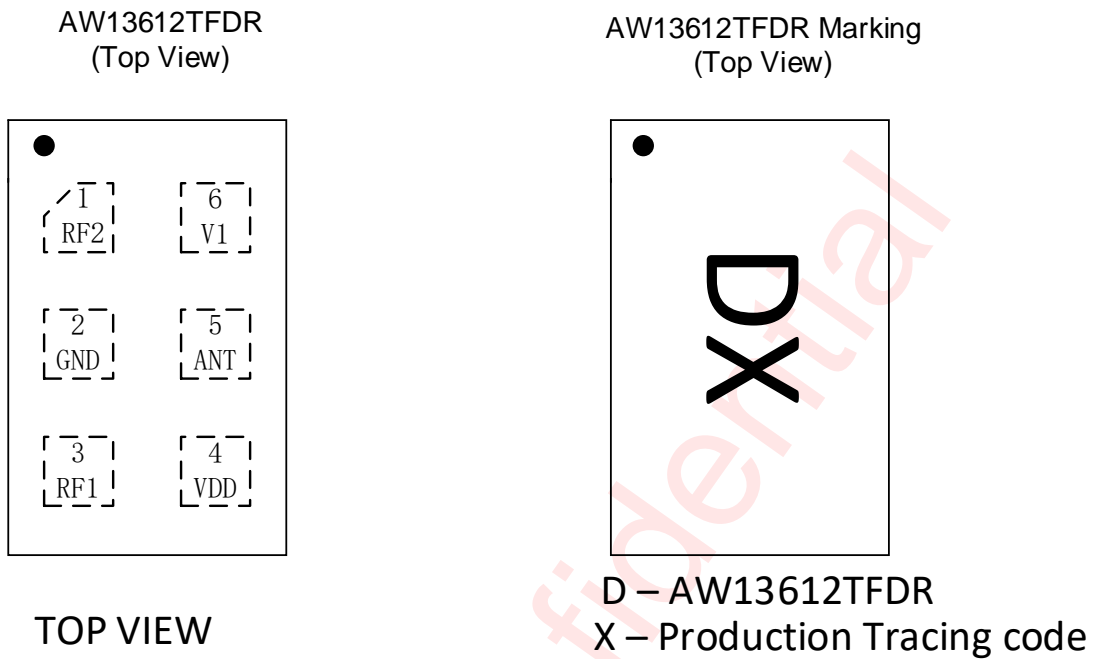


Figure 2 Pin Configuration and Top Mark

Pin Definition

| No. | NAME | DESCRIPTION |
|-----|------|----------------------|
| 1 | RF2 | RF I/O path 2 |
| 2 | GND | Ground |
| 3 | RF1 | RF I/O path 1 |
| 4 | VDD | DC power supply |
| 5 | ANT | Antenna port |
| 6 | V1 | DC control voltage 1 |

Functional Block Diagram

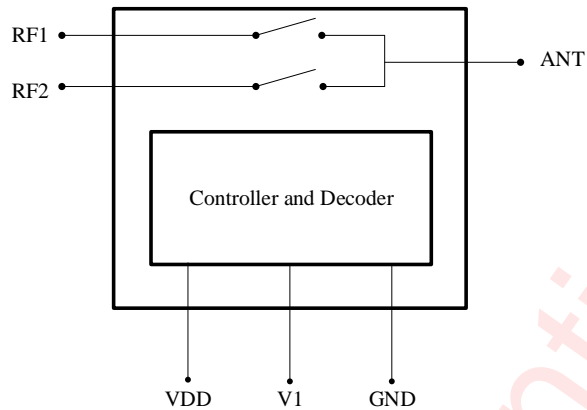


Figure 3 Functional Block Diagram

Ordering Information

| Part Number | Temperature | Package | Marking | Moisture Sensitivity Level | Environmental Information | Delivery Form |
|--------------|-------------|-------------------------|---------|----------------------------|---------------------------|------------------------------|
| AW13612 TFDR | -40°C~85°C | FCDFN 1.1mmX0.7mm-6L | D | MSL1 | RoHS+HF | 9000 units/ Tape and Reel |

Absolute Maximum Ratings^(NOTE1)

| PARAMETERS | RANGE |
|--|------------------|
| Supply voltage range V_{BUS} | -0.3V to 3.6V |
| Control Voltage Range | V1 0V to 3.3V |
| RF input power(RF1/RF2) | 39dBm |
| Operating Free-air Temperature Range | -40°C to 85°C |
| Storage temperature T_{STG} | -65°C to 150°C |
| Lead temperature (soldering 10 seconds) | 260°C |
| ESD | |
| HBM(Human Body Model) ^(NOTE 2) | ±1000V |
| CDM (Charged Device Model) ^(NOTE 3) | ±500V |

NOTE1: Conditions out of those ranges listed in "absolute maximum ratings" may cause permanent damages to the device. In spite of the limits above, functional operation conditions of the device should within the ranges listed in "recommended operating conditions". Exposure to absolute-maximum-rated conditions for prolonged periods may affect device reliability.

NOTE2: The human body model is a 100pF capacitor discharged through a 1.5kΩ resistor into each pin. Test method: ESDA/JEDEC JS-001-2017.

NOTE3: All pins. Test Condition: ESDA/JEDEC JS-002-2018.

Electrical Characteristics

VDD=1.8V, V1=0/1.8V, PIN=0dBm, TOP=+25°C, Zo=50Ω. (unless otherwise noted)

| PARAMETER | TEST CONDITION | MIN | TYP | MAX | UNIT | |
|--------------------------|-------------------------|--|-----|------|------|-----|
| DC Specifications | | | | | | |
| VDD | Supply Voltage | 1.62 | 1.8 | 3.3 | V | |
| IDD | Supply Current | | 40 | 100 | μA | |
| VCTL_H | Control Voltage High | 0.9 | 1.8 | 3.3 | V | |
| VCTL_L | Control Voltage Low | -0.3 | | 0.3 | | |
| ICTL | Control Current | VCTL = 1.8V | | 0.1 | 1 | μA |
| Tsw | Turn-on Switching Time | 50% of final control voltage to 90% of final RF power, switching between RF1/2 | | 1.0 | 2.0 | μs |
| RF Specifications | | | | | | |
| IL | Insertion loss | 617-960MHz | | 0.24 | 0.33 | dB |
| | | 960-2170 MHz | | 0.29 | 0.38 | dB |
| | | 2170-2700 MHz | | 0.34 | 0.45 | dB |
| | | 3300-3800 MHz | | 0.41 | 0.57 | dB |
| | | 3800-5000 MHz | | 0.53 | 0.69 | dB |
| | | 5150-5925 MHz | | 0.7 | 0.79 | dB |
| ISO | Isolation | 617-960MHz | 37 | 42 | | dB |
| | | 960-2170 MHz | 30 | 34 | | dB |
| | | 2170-2700 MHz | 25 | 30 | | dB |
| | | 3300-3800 MHz | 22 | 26 | | dB |
| | | 3800-5000 MHz | 21 | 25 | | dB |
| | | 5150-5925 MHz | 18 | 22 | | dB |
| RL | Input return loss | 617-960MHz | 21 | 25 | | dB |
| | | 960-2170 MHz | 16 | 19 | | dB |
| | | 2170-2700 MHz | 15 | 18 | | dB |
| | | 3300-3800 MHz | 14 | 17 | | dB |
| | | 3800-5000 MHz | 12 | 15 | | dB |
| | | 5150-5925 MHz | 10 | 12 | | dB |
| 2fo | Second harmonics | PIN=+35dBm, 915MHz,CW | | -62 | -52 | dBm |
| 3fo | Third harmonics | PIN=+35dBm, 915MHz,CW | | -58 | -50 | dBm |

| PARAMETER | | TEST CONDITION | MIN | TYP | MAX | UNIT |
|-----------|-------------------------|----------------|-----|-----|-----|------|
| P0.1dB | 0.1dB Compression Point | 0.1-6 GHz | | 38 | | dBm |

Power ON and OFF Sequence

It is very important that the user adheres to the correct power-on/off sequence in order to avoid damaging the device. The control signal V1 should be set to 0V unless VDD is set in the operating voltage range.

Power ON:

- 1) Apply voltage supply --- VDD
- 2) Set Controls---V1
- 3) Apply RF input

Change switch position from one RF port to another:

- 1) Remove RF input
- 2) Change control voltages V1 to set the switch to desired RF port
- 3) Apply RF input

Power OFF:

- 1) Remove RF input
- 2) Remove control voltages-V1
- 3) Remove VDD input

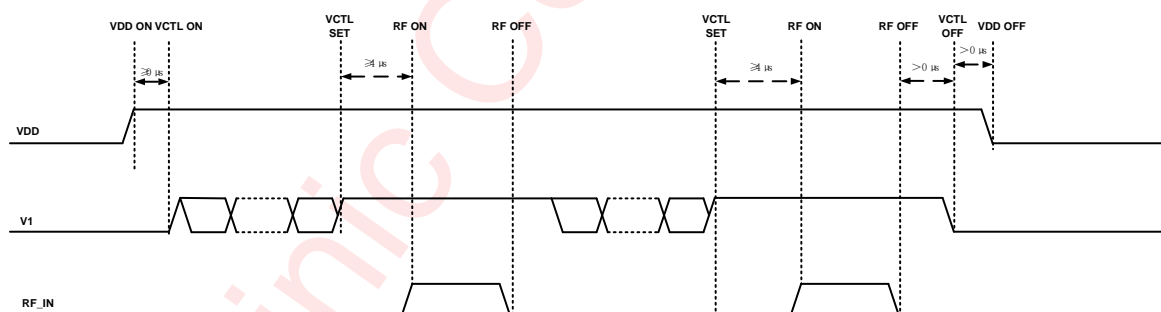
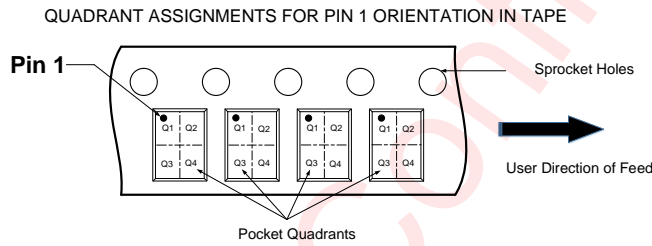
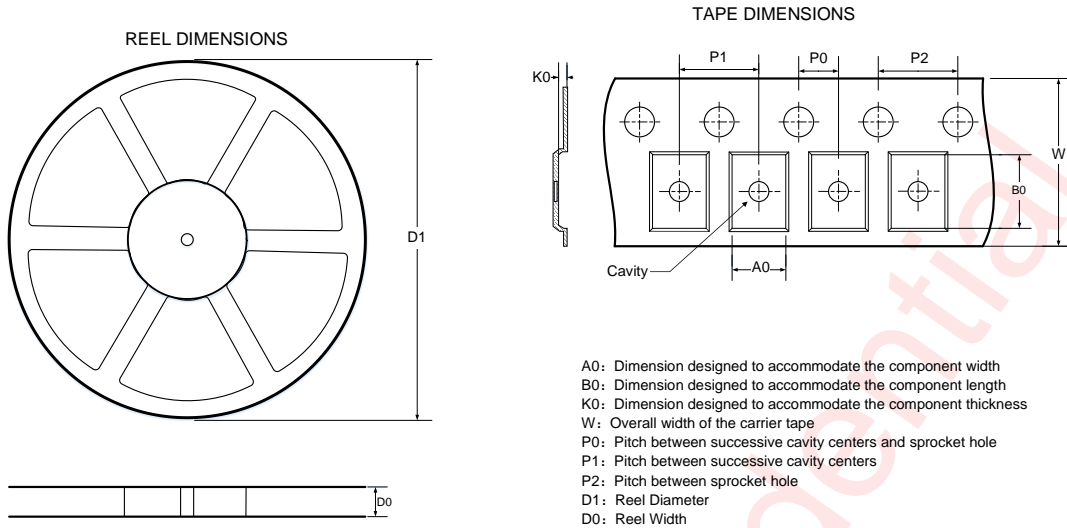


Figure 4 Power on/Change switch/Power off sequence

Control Logic

| State | Active Path | V1 |
|-------|-------------|----|
| 0 | ANT to RF1 | 0 |
| 1 | ANT to RF2 | 1 |

Tape And Reel Information



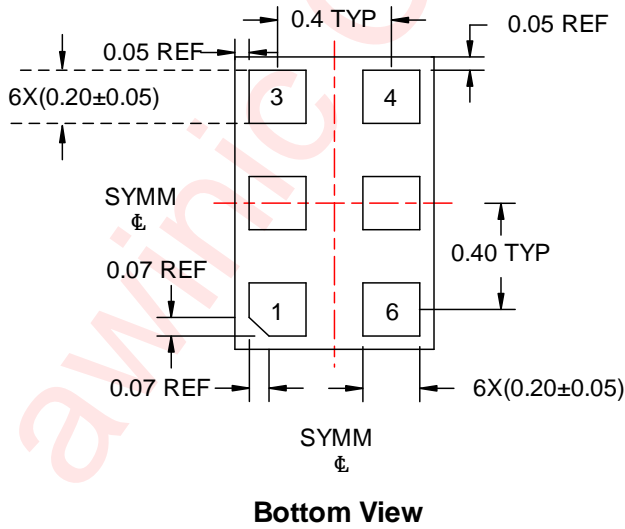
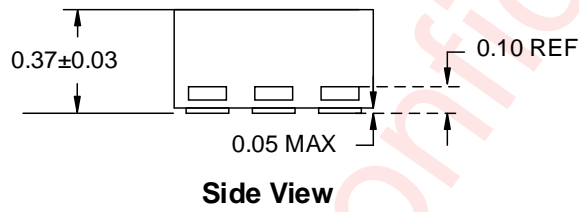
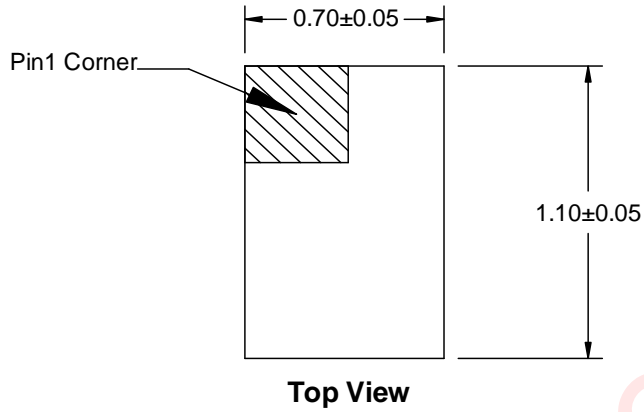
DIMENSIONS AND PIN1 ORIENTATION

| D1 (mm) | D0 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P0 (mm) | P1 (mm) | P2 (mm) | W (mm) | Pin1 Quadrant |
|---------|---------|---------|---------|---------|---------|---------|---------|--------|---------------|
| 178.0 | 8.40 | 0.82 | 1.22 | 0.46 | 2.00 | 2.00 | 4.00 | 8.00 | Q1 |

All dimensions are nominal

Figure 5 Tape and Reel

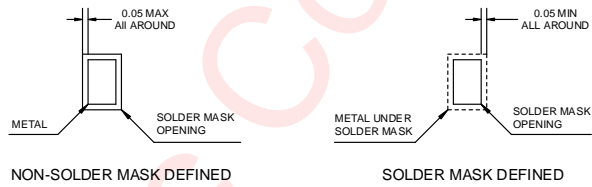
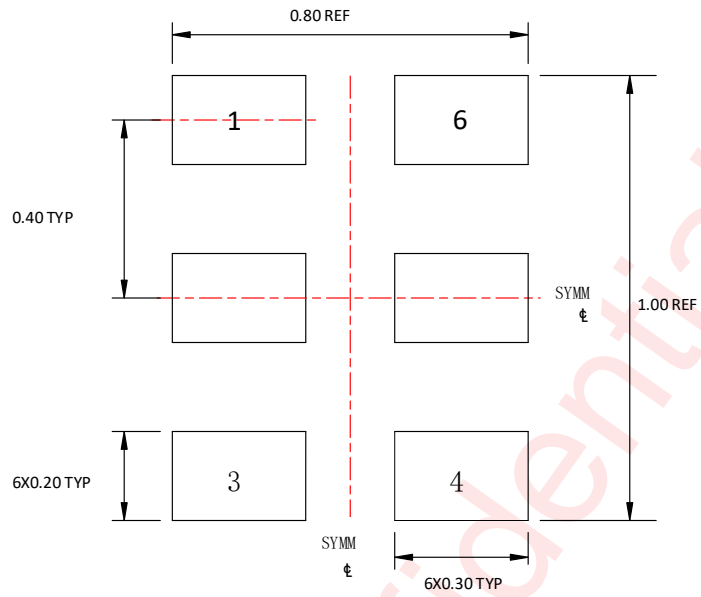
Package Description



Unit:mm

Figure 6 Package Outline

Land Pattern Data



Unit: mm

Figure 7 Land Pattern Data

Revision History

| Version | Date | Change Record |
|---------|-----------|---------------------|
| V1.0 | Nov. 2021 | Officially Released |

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