0.1-8.2 GHz SPDT Switch

Features

- Broadband frequency range: 0.1 to 8.2 GHz
- Low insertion loss: 0.40dB typical @ 2.4 GHz
- Low insertion loss: 0.50dB typical @ 5.8 GHz
- High isolation: 37 dB @ 2.4 GHz
- High $P_{0.1dB}$ of 32 dBm
- Wide 1.65 to 3.3 V supply voltage range
- DFN 1.0 mm x 1.0 mm x 0.45 mm-6L package

Applications

- IEEE 802.11a/b/g/n/ac/ax/be WLAN Networks
- ISM band radios
- WLAN repeaters
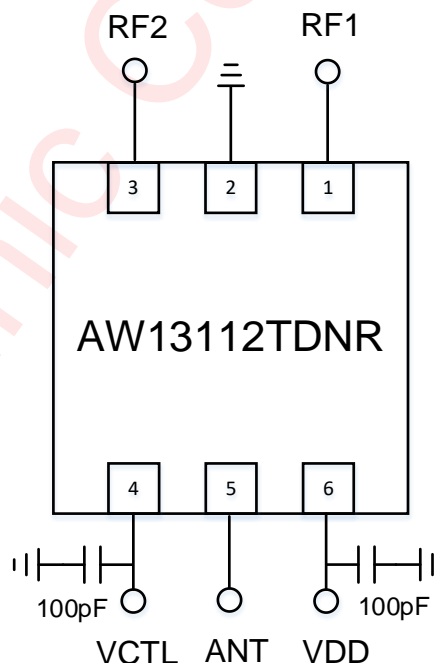- Low power transmit receive systems
- Smartphones

General Description

The AW13112TDNR is a Silicon-On-Insulator(SOI) SPDT switch with low insertion loss, high isolation and high linearity at low supply voltage. It can be used to support mode switching in WLAN applications.

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

The AW13112TDNR is provided in a compact DFN 1.0 mm x 1.0 mm x 0.45 mm-6L package.

Typical Application Circuit
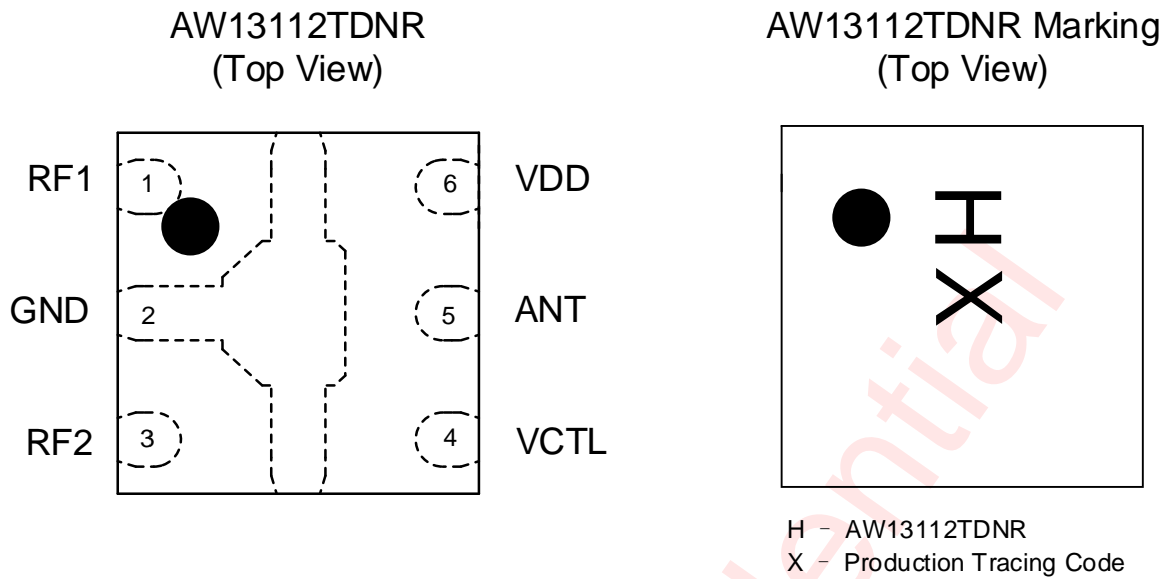

Figure 1   Typical Application Circuit of AW13112TDNR

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Pin Configuration and Top Mark

AW13112TDNR
(Top View)

AW13112TDNR Marking
(Top View)

H – AW13112TDNR
X – Production Tracing Code

Figure 2   Pin Configuration and Top Mark

Pin Definition

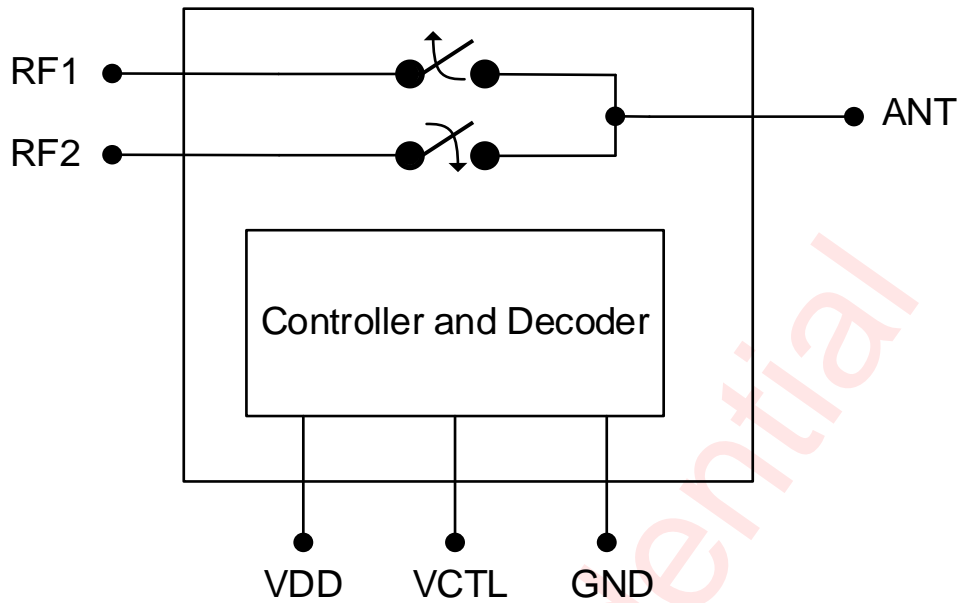| No.	NAME	DESCRIPTION
1	RF1	RF I/O path 1
2	GND	Ground
3	RF2	RF I/O path 2
4	VCTL	DC control voltage
5	ANT	Antenna port
6	VDD	DC power supply

Functional Block Diagram

Figure 3   Functional Block Diagram

Ordering Information

Part Number	Temperature	Package	Marking	Moisture Sensitivity Level	Environmental Information	Delivery Form
AW13112TDNR	-40°C～90°C	DFN 1.0mmX1.0mm -6L	H	MSL1	ROHS+HF	3000 units/ Tape and Reel

Absolute Maximum Ratings(NOTE1)

PARAMETERS		RANGE
Supply Voltage Range VDD		-0.3 V to 3.6 V
Control Voltage Range	VCTL	-0.3 V to 3.6 V
RF input power(RF1/RF2)		32 dBm
Operating Free-air Temperature Range		-40°C to 90°C
Storage Temperature T_{STG}		-65°C to 150°C
Lead Temperature (Soldering 10 Seconds)		260°C
ESD (NOTE 2)		
HBM		±1000V
CDM		±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. HBM Test method: ESDA/JEDEC JS-001-2017. CDM Test method: ESDA/JEDEC JS-002-2018.

Electrical Characteristics

VDD=3.3V, VCTL=0/3.3V, PIN=0dBm, TEMP=+25℃, Z_0=50Ω. (unless otherwise noted)

PARAMETER		TEST CONDITION	MIN	TYP	MAX	UNIT
DC Specifications						
IDD	Supply Current			25	50	μA
VCTL_H VCTL_L	Control Voltage High Low		0.9 0		VDD 0.3	V
ICTL	Control Current	VCTL = 3.3V		1	5	μA
RF Specifications						
IL	Insertion loss(ANT pin to RF1/RF2)	0.1-0.96GHz 0.96-1.9GHz 1.9-3.0GHz 3.0-5.8GHz 5.8-7.125GHz 7.125-8.2GHz		0.27 0.37 0.39 0.48 0.55 0.7	0.33 0.46 0.55 0.65 0.75 0.9	dB dB dB dB dB dB
ISO	Isolation (ANT pin to RF1/RF2)	0.1-0.96GHz 0.96-1.9GHz 1.9-3.0GHz 3.0-5.8GHz 5.8-7.125GHz 7.125-8.2GHz	38 30 29 25 20 18	41 34 34 29 24 21		dB dB dB dB dB dB
RL	Input return loss (ANT pin to RF1/RF2)	0.1-0.96GHz 0.96-1.9GHz 1.9-3.0GHz 3.0-5.8GHz 5.8-7.125GHz 7.125-8.2GHz	25 20 17 16 15 12	30 25 20 19 18 16		dB dB dB dB dB dB
$P_{0.1dB}$	0.1dB Compression Point (ANT pin to RF1/RF2)	0.1GHz–6GHz, 25% DC		32		dBm
$2f_0$	Second Harmonics	f_0=2.4GHz, PIN=+26dBm,CW		91		dBc
$3f_0$	Third Harmonics	f_0=2.4GHz, PIN=+26dBm,CW		96		dBc
T_{SW}	Switching On/Off Time	50% of final control voltage to 10%/90% of final RF power, switching between RF1/2		190	270	ns

VDD=1.8V, VCTL=0/1.8V, PIN=0dBm, TEMP=+25℃, Z_0=50Ω. (unless otherwise noted)

PARAMETER		TEST CONDITION	MIN	TYP	MAX	UNIT
DC Specifications						
IDD	Supply Current			20	40	μA
VCTL_H VCTL_L	Control Voltage High Low		0.9 0		VDD 0.3	V
ICTL	Control Current	VCTL = 3.3V		1	5	μA
RF Specifications						
IL	Insertion loss(ANT pin to RF1/RF2)	0.1-0.96GHz 0.96-1.9GHz 1.9-3.0GHz 3.0-5.8GHz 5.8-7.125GHz 7.125-8.2GHz		0.31 0.40 0.42 0.54 0.58 0.75	0.35 0.50 0.60 0.70 0.75 1	dB dB dB dB dB dB
ISO	Isolation (ANT pin to RF1/RF2)	0.1-0.96GHz 0.96-1.9GHz 1.9-3.0GHz 3.0-5.8GHz 5.8-7.125GHz 7.125-8.2GHz	37 29 28 24 20 18	41 34 33 29 24 21		dB dB dB dB dB dB
RL	Input return loss (ANT pin to RF1/RF2)	0.1-0.96GHz 0.96-1.9GHz 1.9-3.0GHz 3.0-5.8GHz 5.8-7.125GHz 7.125-8.2GHz	25 19 16 15 14 12	30 24 20 19 18 16		dB dB dB dB dB dB
$P_{0.1dB}$	0.1dB Compression Point (ANT pin to RF1/RF2)	0.1GHz–6GHz, 25% DC		32		dBm
$2f_0$	Second Harmonics	f_0=2.4GHz, PIN=+26dBm,CW		88		dBc
$3f_0$	Third Harmonics	f_0=2.4GHz, PIN=+26dBm,CW		86		dBc
T_{SW}	Switching On/Off Time	50% of final control voltage to 10%/90% of final RF power, switching between RF1/2		200	300	ns

Timing Diagram (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 VCTL should be set to 0V unless VDD is set in the operating voltage range.

Power ON:

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

Change switch position from one RF port to another:

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

Power OFF:

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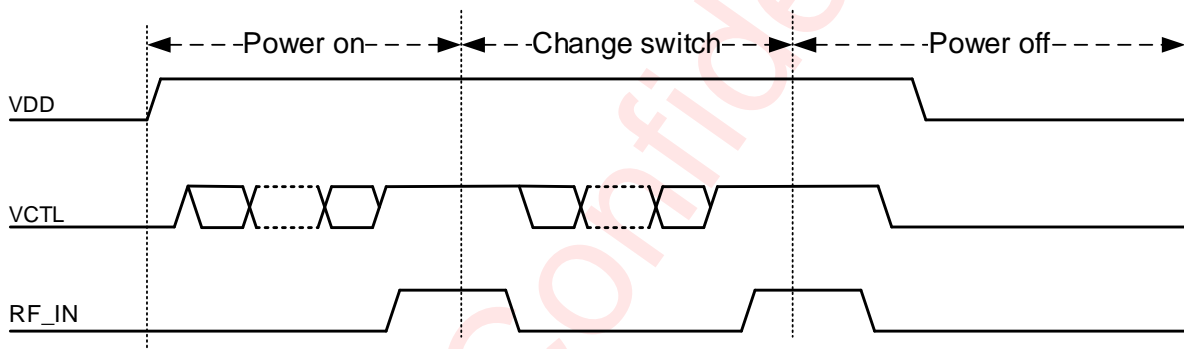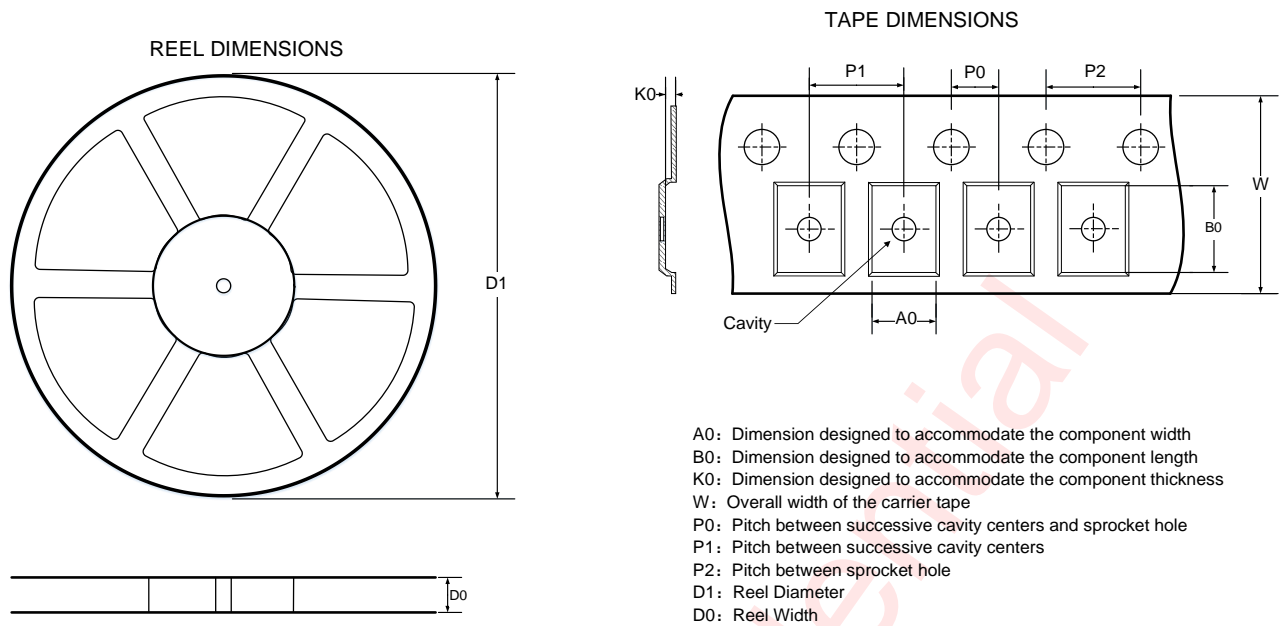 2) Remove control voltages-VCTL
  3) Remove VDD input

Figure 4 Power on/Change switch/Power off sequence
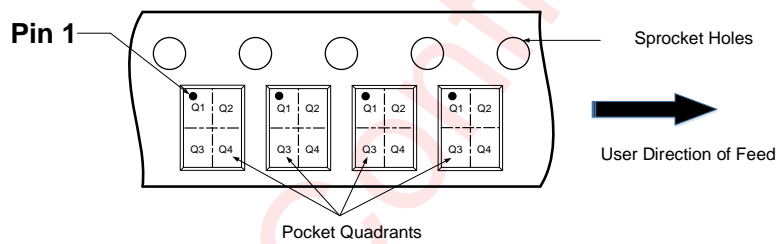
Control Logic

State	Active Path	VCTL
0	ANT to RF2	0
1	ANT to RF1	1

Tape and Reel Information

REEL DIMENSIONS

TAPE DIMENSIONS

A0：Dimension designed to accommodate the component width
B0：Dimension designed to accommodate the component length
K0：Dimension designed to accommodate the component thickness
W：Overall width of the carrier tape
P0：Pitch between successive cavity centers and sprocket hole
P1：Pitch between successive cavity centers
P2：Pitch between sprocket hole
D1：Reel Diameter
D0：Reel Width

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE

Pin 1

Sprocket Holes

User Direction of Feed

Pocket Quadrants

Note：The above picture is for reference only. Please refer to the value in the table below for the actual size

DIMENSIONS AND PIN1 ORIENTATION
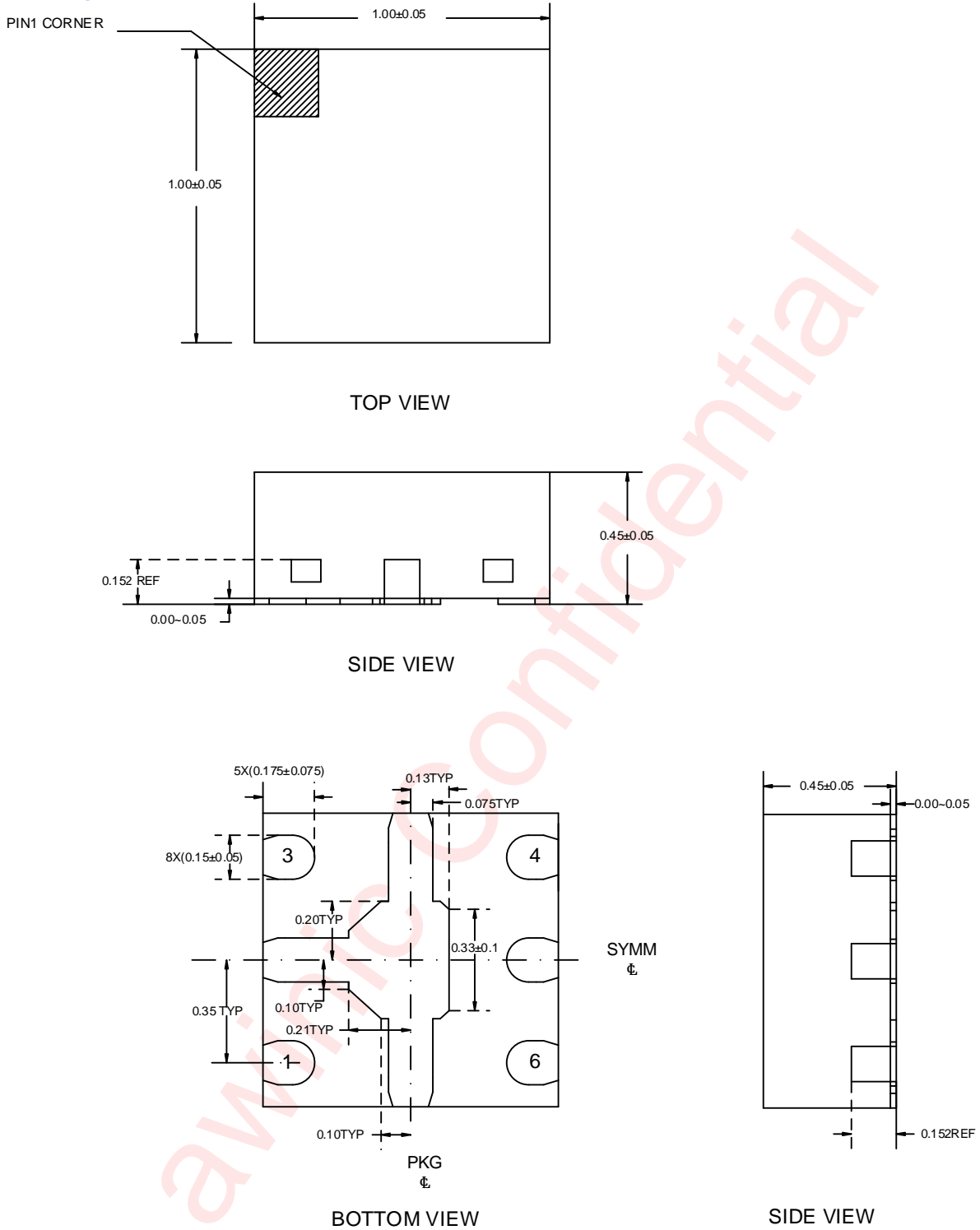
D1 (mm)	D0 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
178	8.4	1.14	1.17	0.56	2	4	4	8	Q1

All dimensions are nominal

Figure 5　Tape and Reel

Package Description

TOP VIEW

SIDE VIEW

BOTTOM VIEW

SIDE VIEW

Unit：mm

Figure 6   Package Outline

Land Pattern Data
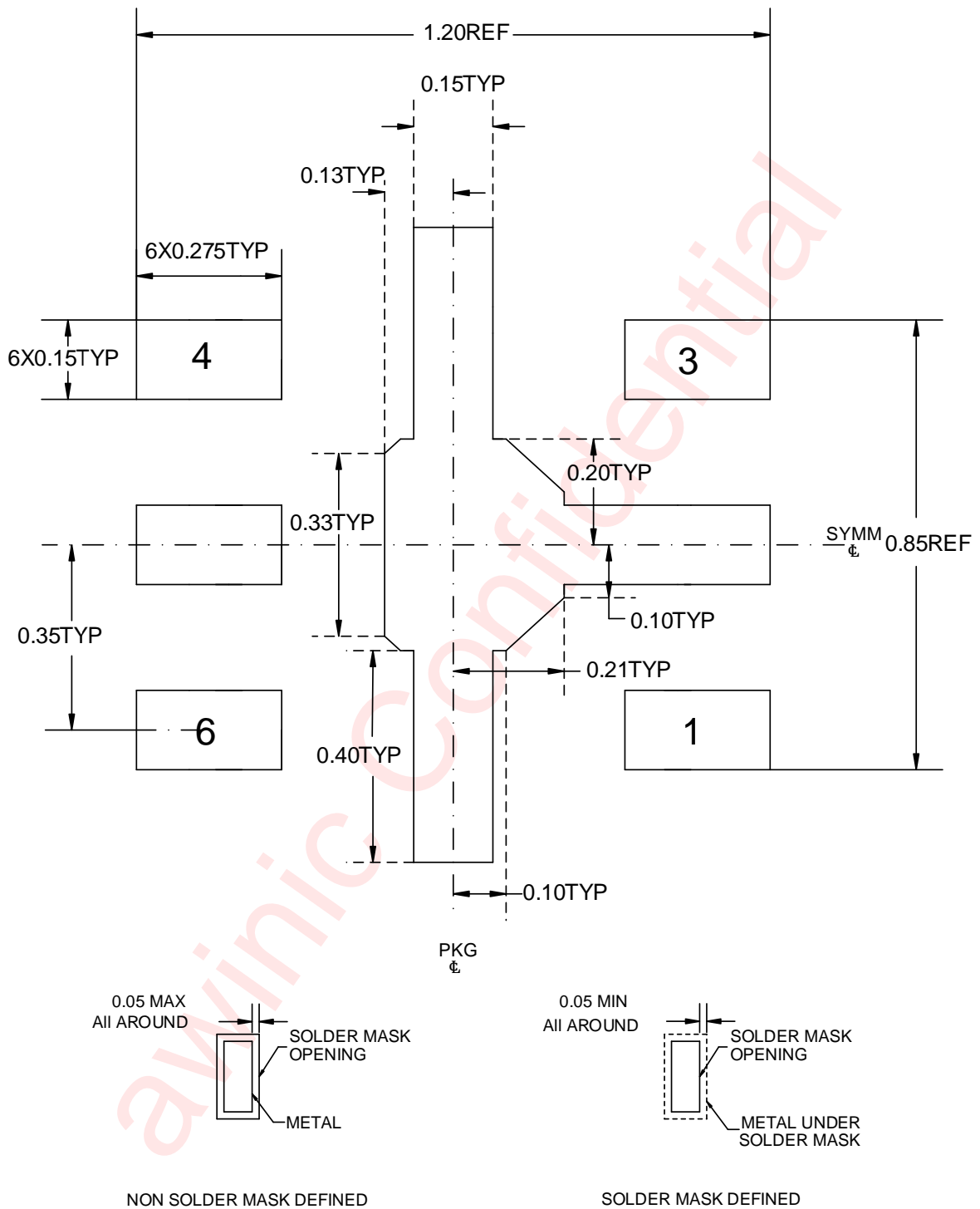
Figure 7   Land Pattern

Unit：mm

Revision History

Vision	Date	Change Record
V1.0	Sep. 2021	Officially Released
V1.1	Aug. 2022	Update Electrical Characteristics and Fix Some Formatting Issues
V1.2	Aug. 2022	Update AMR
V1.3	Jun. 2023	Update the description of applications

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