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

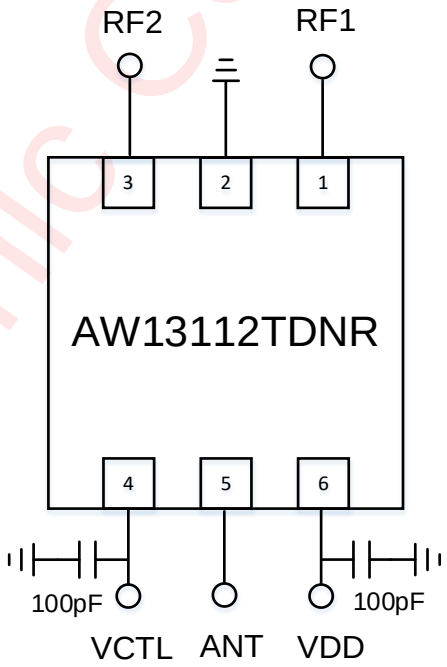
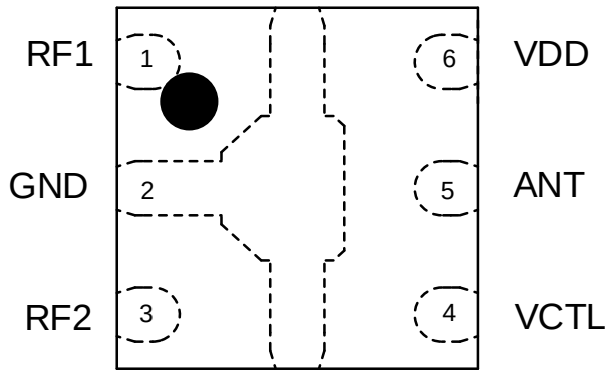


Figure 1 Typical Application Circuit of AW13112TDNR

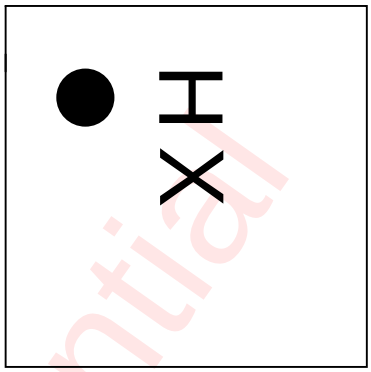
All trademarks are the property of their respective owners.

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

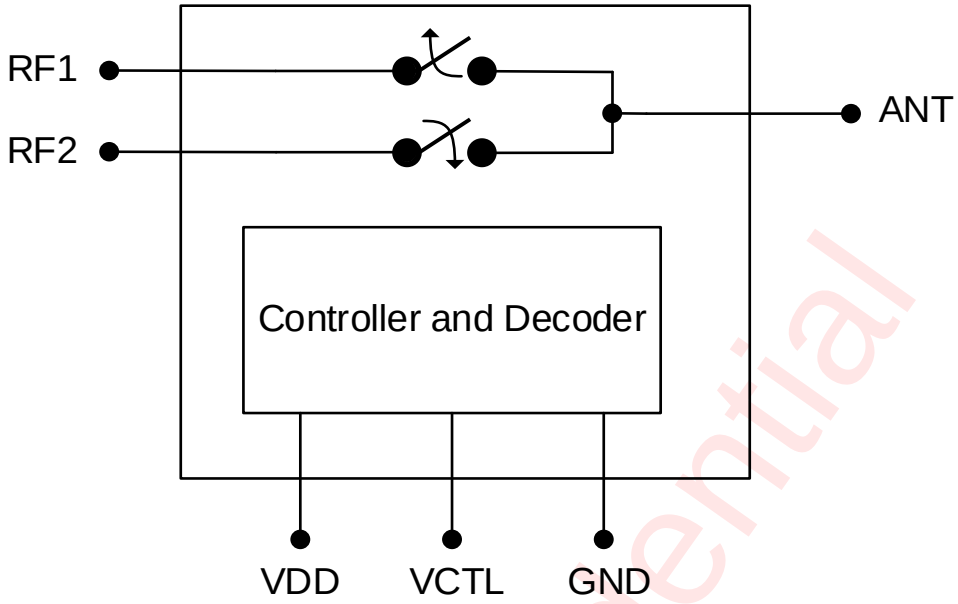


Figure 3 Functional Block Diagram

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

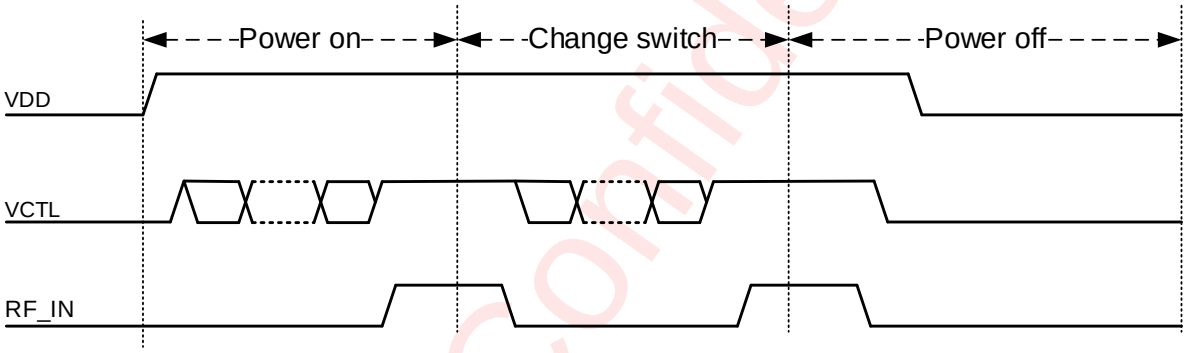


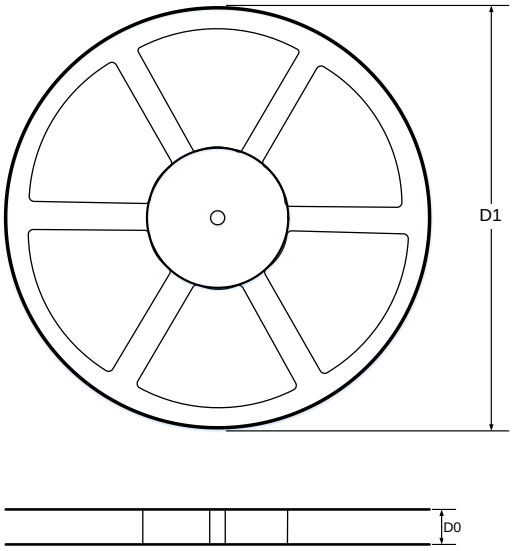
Figure 4 Power on/Change switch/Power off sequence

Control Logic

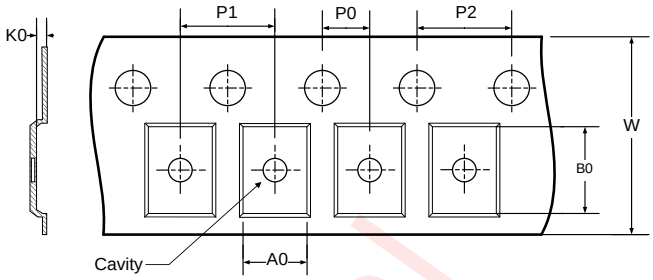
State	Active Path	VCTL
0	ANT to RF2	0
1	ANT to RF1	1

Tape and Reel Information

REEL DIMENSIONS

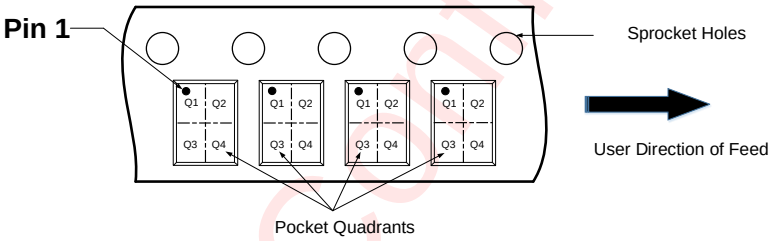


TAPE DIMENSIONS



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



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

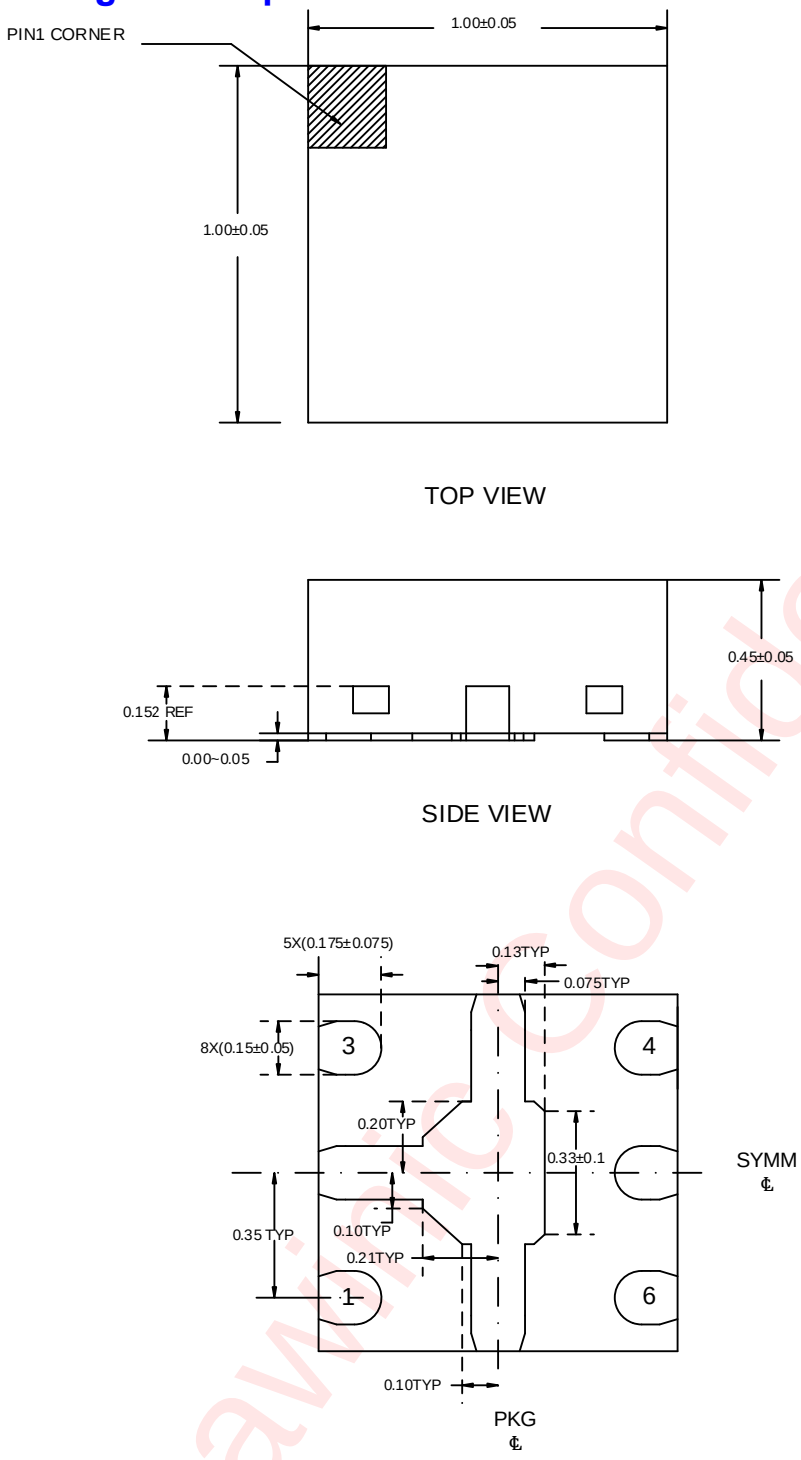
DIMENSIONS AND PIN1 ORIENTATION

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

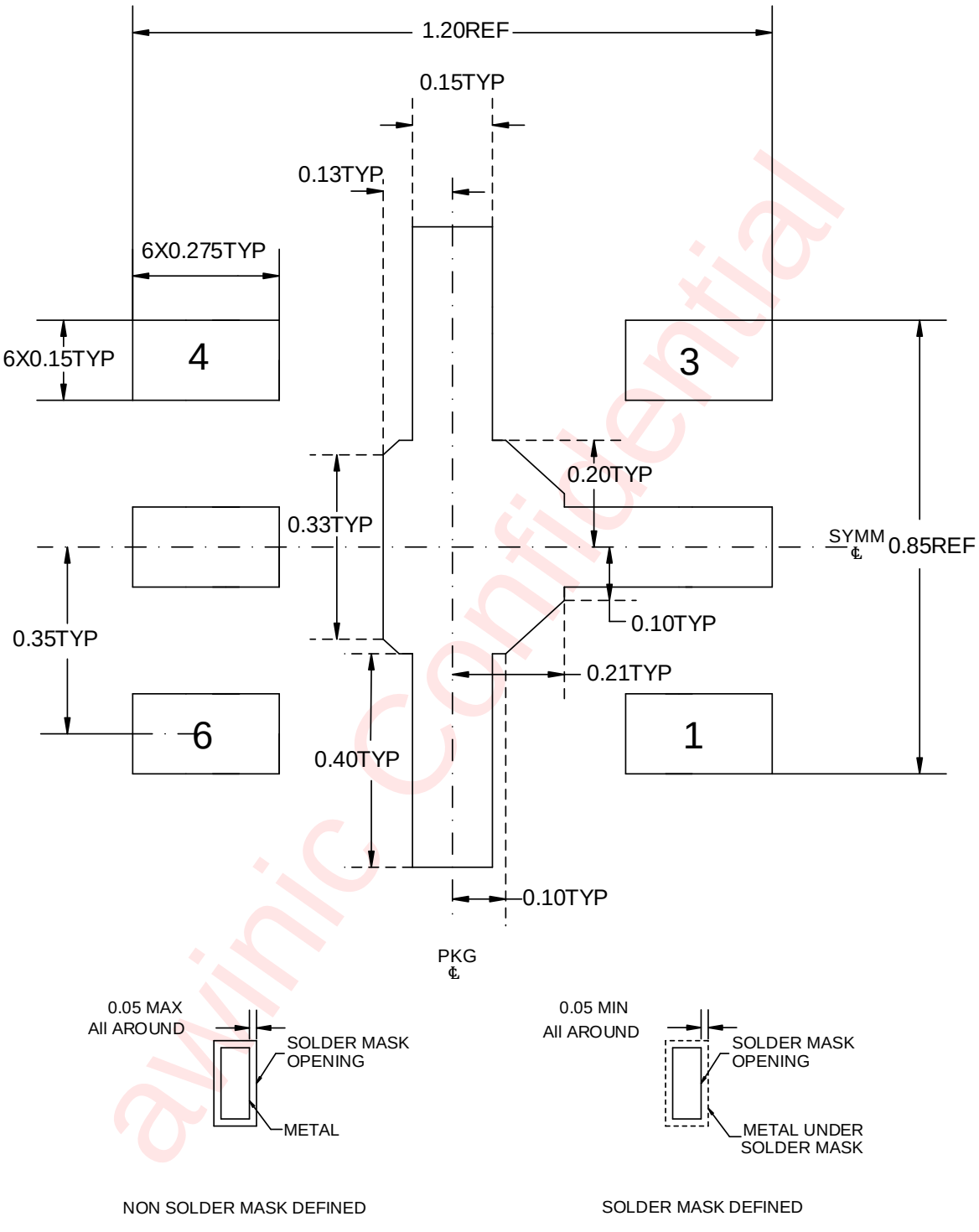
Package Description



Unit：mm

Figure 6 Package Outline

Land Pattern Data



Unit：mm

Figure 7 Land Pattern

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

Disclaimer

Information in this document is believed to be accurate and reliable. However, Shanghai AWINIC Technology Co., Ltd (AWINIC Technology) does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information.

AWINIC Technology reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. Customers shall obtain the latest relevant information before placing orders and shall verify that such information is current and complete. This document supersedes and replaces all information supplied prior to the publication hereof.

AWINIC Technology products are not designed, authorized or warranted to be suitable for use in medical, military, aircraft, space or life support equipment, nor in applications where failure or malfunction of an AWINIC Technology product can reasonably be expected to result in personal injury, death or severe property or environmental damage. AWINIC Technology accepts no liability for inclusion and/or use of AWINIC Technology products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

Applications that are described herein for any of these products are for illustrative purposes only. AWINIC Technology makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.
All products are sold subject to the general terms and conditions of commercial sale supplied at the time of order acknowledgement.

Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

Reproduction of AWINIC information in AWINIC data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. AWINIC is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of AWINIC components or services with statements different from or beyond the parameters stated by AWINIC for that component or service voids all express and any implied warranties for the associated AWINIC component or service and is an unfair and deceptive business practice. AWINIC is not responsible or liable for any such statements.

