2.0-7.2 GHz SPDT Switch

Features

- Broadband frequency range: 2.0 to 7.2 GHz
- Low insertion loss: 0.50dB typical @ 2.4 GHz
- Low insertion loss: 0.58dB typical @ 5.8 GHz
- High isolation: 40 dB @ 5.8 GHz
- High $P_{0.1dB}$ of 32 dBm
- Wide 1.6 to 5 V supply voltage range
- Integrated DC blocking capacitors
- Small DFN (6-pin, 1.0 mm x 1.0 mm x 0.45 mm) package (MSL1, 260 °C per JEDEC J-STD-020)

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 AW13112DNR 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 AW13112DNR has integrated DC blocking capacitors, so no external DC blocking capacitors are required.

The AW13112DNR is provided in a compact DFN 1.0 mm x 1.0 mm x 0.45 mm-6L package.
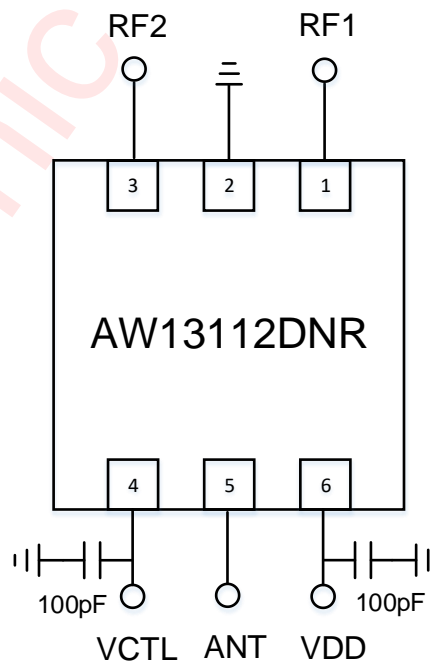
Typical Application Circuit

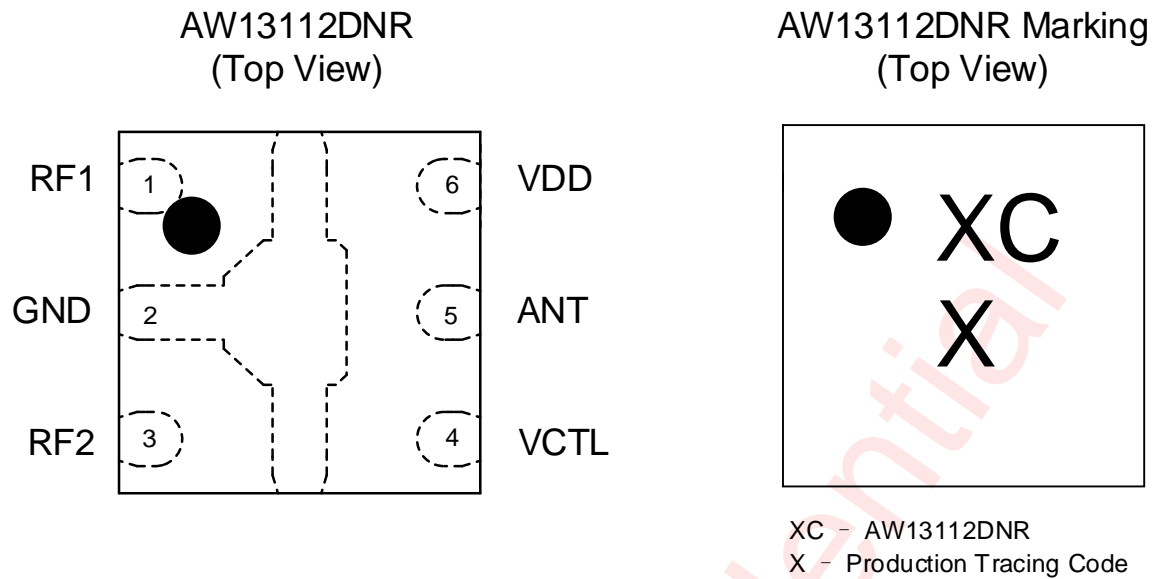**Figure 1   Typical Application Circuit of AW13112DNR**

All trademarks are the property of their respective owners.

Pin Configuration And Top Mark

AW13112DNR
(Top View)

AW13112DNR Marking
(Top View)

XC – AW13112DNR
X – Production Tracing Code

Figure 2   Pin Configuration and Top Mark

Pin Definition

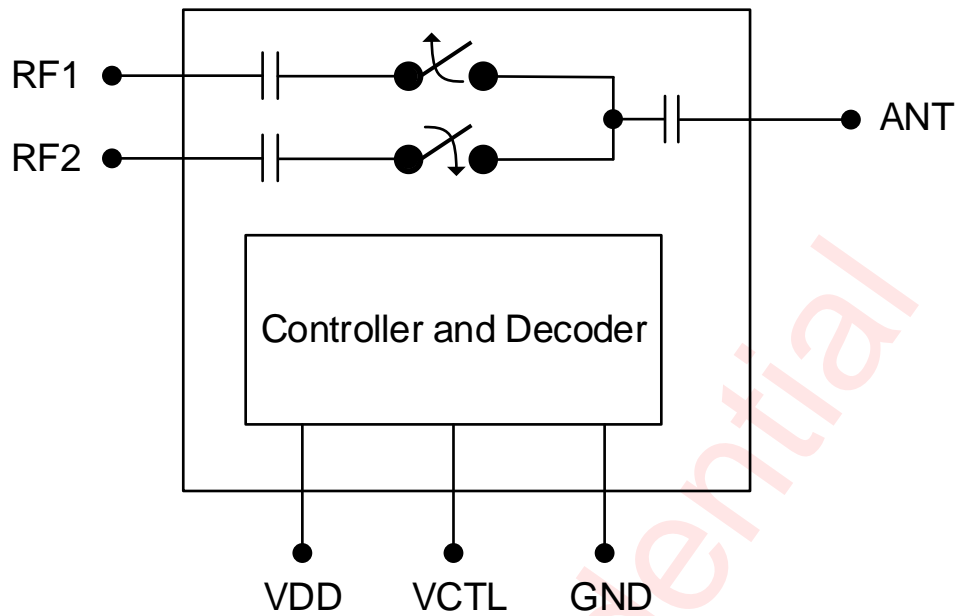| No.	NAME	DESCRIPTION
1	RF1	RF I/O path 1
2	GND	Ground
3	RF2	RF I/O path 2
4	VCTL	DC control voltage
5	ANT	Antenna port
6	VDD	DC power supply

2

Functional Block Diagram

Figure 3   Functional Block Diagram

Ordering Information

Part Number	Temperature	Package	Marking	Moisture Sensitivity Level	Environmental Information	Delivery Form
AW13112DNR	-40°C～90°C	DFN 1.0mmX1.0mm -6L	XC	MSL1	ROHS+HF	3000 units/ Tape and Reel

Absolute Maximum Ratings(NOTE1)

PARAMETERS		RANGE
Supply Voltage Range VDD		0 V to 5.5 V
Control Voltage Range	VCTL	0 V to 4.5 V
RF input power(RF1/RF2)		33 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 (ESDA/JEDEC JS-001)		±1000V
CDM (ESDA/JEDEC JS-002)		±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.

Electrical Characteristics

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

PARAMETER		TEST CONDITION	MIN	TYP	MAX	UNIT
DC Specifications						
VDD	Supply Voltage		1.6	3.3	5.0	V
IDD	Supply Current			6	20	μA
VCTL_H VCTL_L	Control Voltage High Low		1.6 0		3.6 0.3	V
ICTL	Control Current	VCTL = 3.3V		0.1	1	μA
RF Specifications						
IL	Insertion loss(ANT pin to RF1/RF2)	2.0-3.0GHz 3.0-6.0GHz 6.0-7.2GHz		0.50 0.58 1.00	0.75 0.90 1.40	dB dB
ISO	Isolation (ANT pin to RF1/RF2)	2.0-3.0GHz 3.0-6.0GHz 6.0-7.2GHz	25 30 25	30 40 30		dB dB
RL	Input return loss (ANT pin to RF1/RF2)	2.0-3.0GHz 3.0-6.0GHz 6.0-7.2GHz	10 14 10	17 20 15		dB dB
$P_{0.1dB}$	0.1dB Compression Point (ANT pin to RF1/RF2)	0.5GHz–6GHz		32		dBm
2f0	Second Harmonics	f_0=2.4GHz, PIN=+24dBm,CW		-68		dBm
3f0	Third Harmonics	f_0=2.4GHz, PIN=+24dBm,CW		-58		dBm
t_{ON}	Turn-on Switching Time	50% of final control voltage to 90% of final RF power, switching between RF1/2		180	380	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
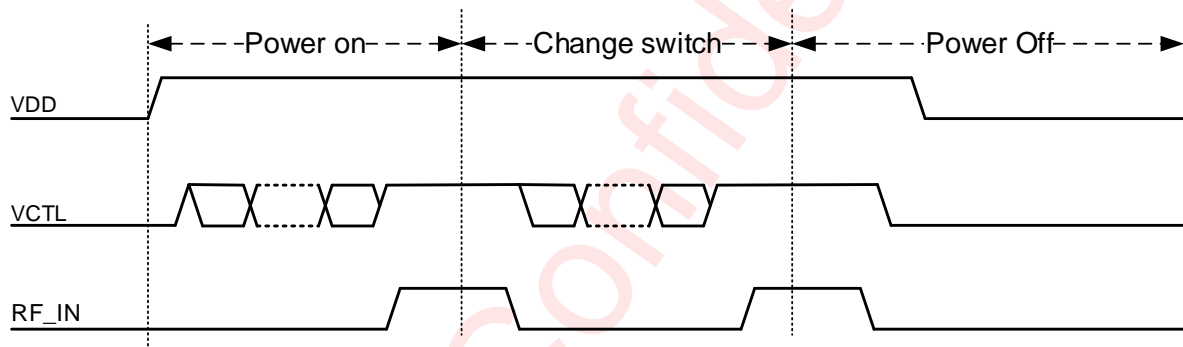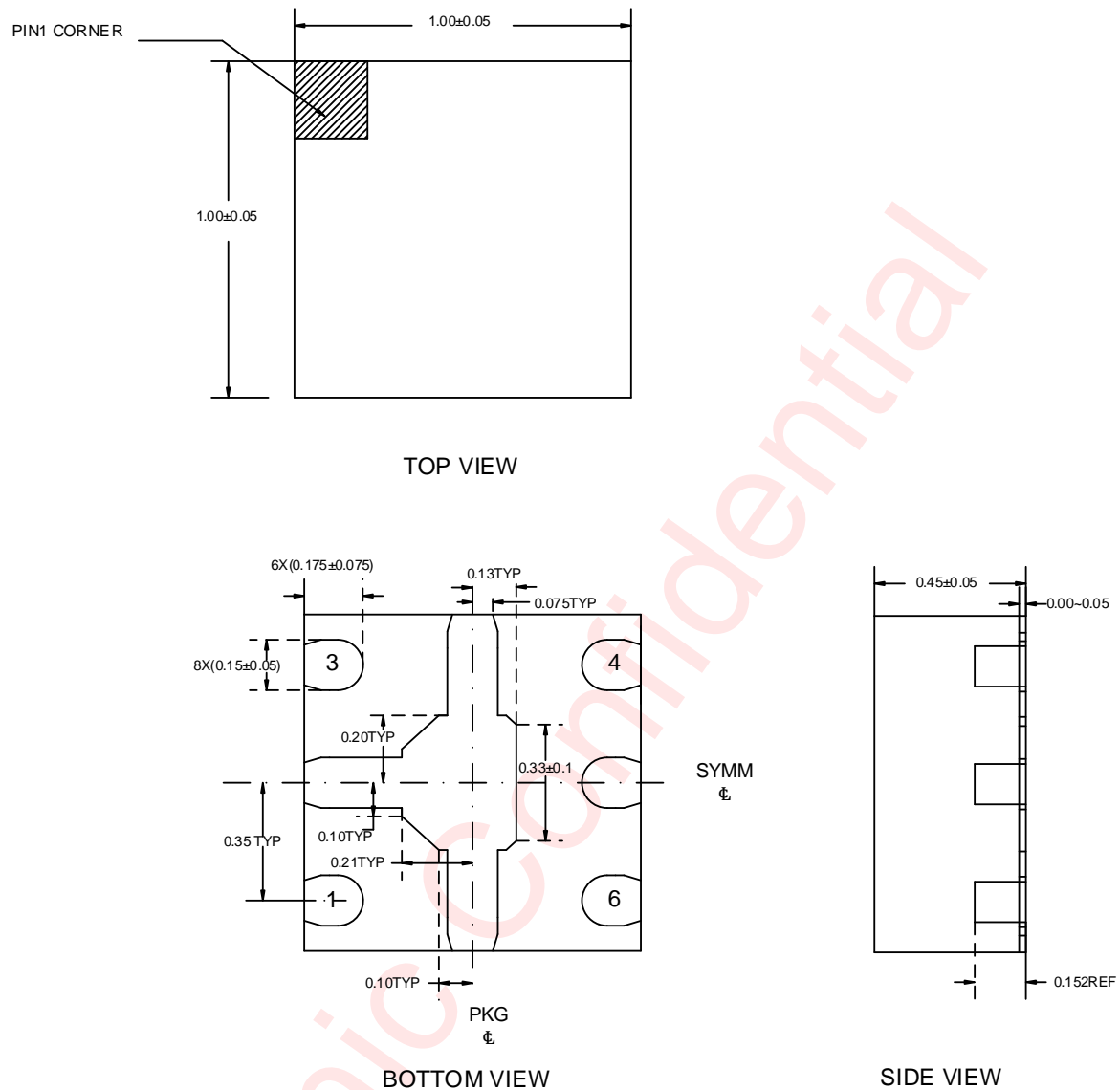2) Remove control voltages-VCTL
3) Remove VDD input

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

Package Outline Dimensions

PIN1 CORNER

1.00±0.05

1.00±0.05

TOP VIEW

6X(0.175±0.075)

0.13TYP

0.075TYP

8X(0.15±0.05)

3

4

0.20TYP

0.33±0.1

SYMM

0.35 TYP

0.10TYP

0.21TYP

1

6

0.10TYP

PKG

BOTTOM VIEW

0.45±0.05

-0.00~0.05

0.152REF

SIDE VIEW

Unit：mm

Figure 5   Package Outline

Land Pattern Data
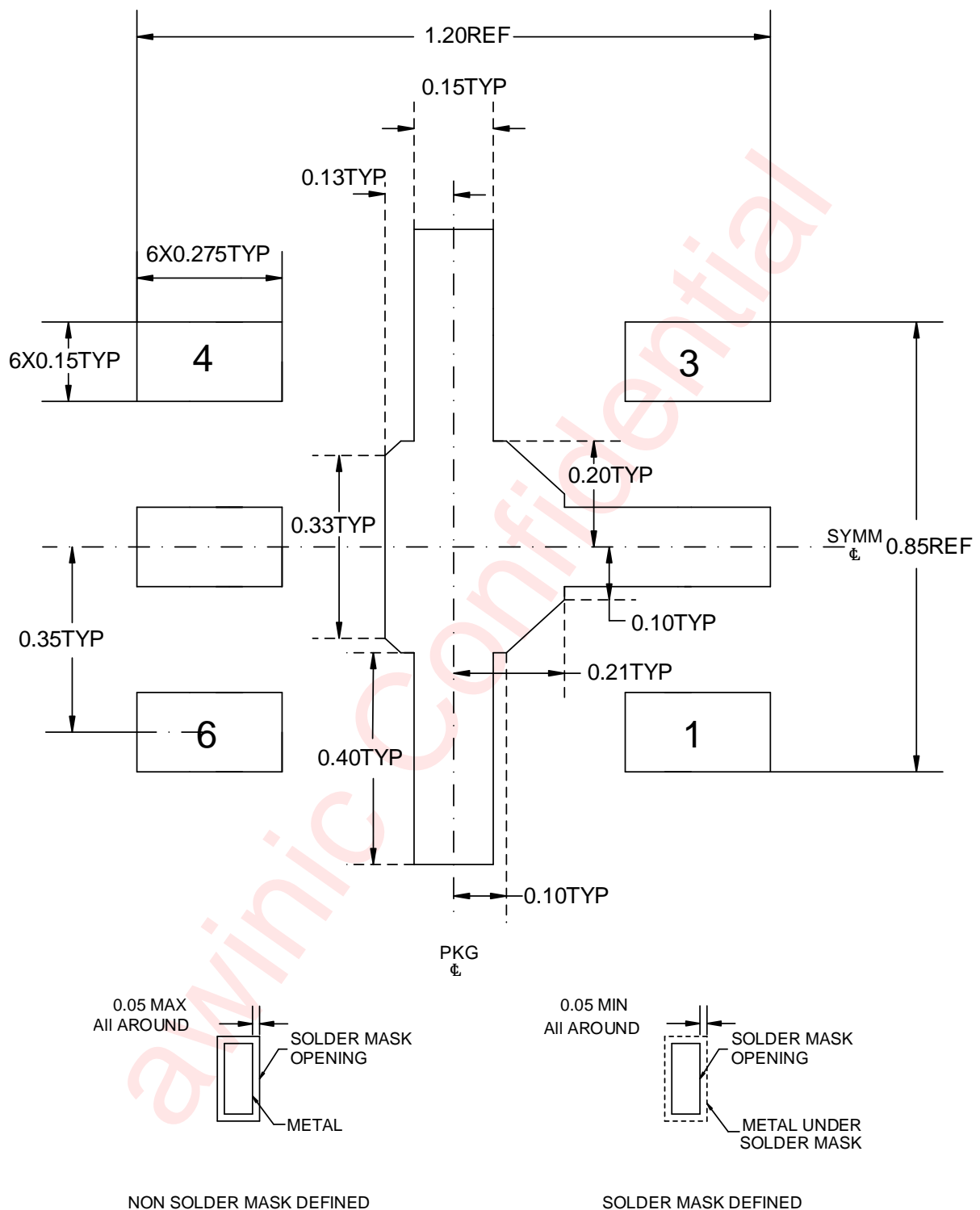
Figure 6   Land Pattern

Unit：mm

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

User Direction of Feed

Pocket Quadrants
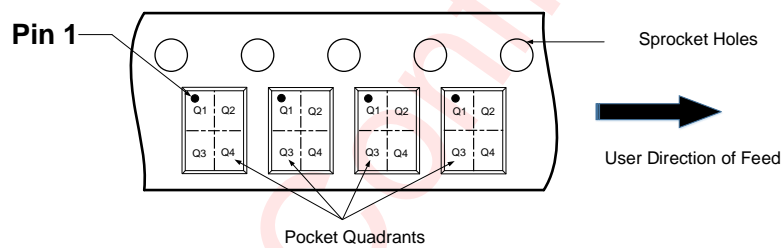
DIMENSIONS AND PIN1 ORIENTATION

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 7   Tape and Reel

Revision History

Vision	Date	Change Record
V1.0	August 2020	Officially Released
V1.1	October 2020	Add the spec IL, ISO, RL and tON
V1.2	December 2020	Change minimum VDD to 1.6 V
V1.3	April 2021	Update spec RL , ISO and frequency
V1.4	December 2021	Support Ax
V1.5	April 2023	Update package outline
V1.6	June 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.