

LoRa RF Module User Manual

[MSM320]



Ver 1.0

MCT CO., LTD.

1. Product Overview

MSM320 Talk Long is LoRa® Module consists of SX1276 transceiver.

MSM320 is advanced RF module optimized for use in sensor network and IoT application based on LoRa technology enables seamless connectivity in long distance communication.

This module is particularly suitable for applications like Internet of things (IoT), sensor networks, environment, intelligent buildings, metering, security or M2M.

MSM320 supports standard MAC of IEEE802.15.4 and supports optionally 6LoWPAN and IPv6.

■ Applications

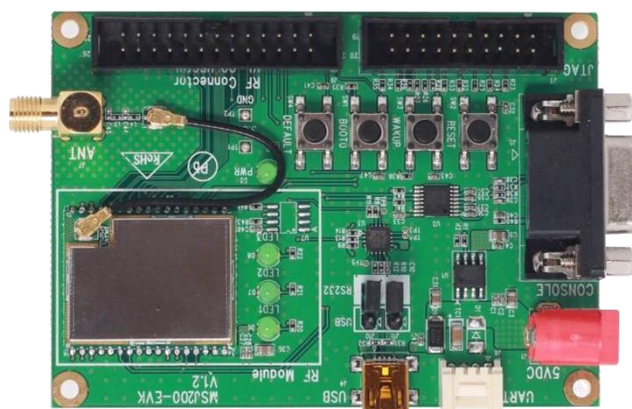
- ✧ Internet of things
- ✧ Smart Metering
- ✧ Sensor networks
- ✧ Wireless Alarm and Security Systems
- ✧ Industrial Monitoring and Control
- ✧ Long range Irrigation Systems



[MSM320 Antenna Connector]



[MSM320 Module]

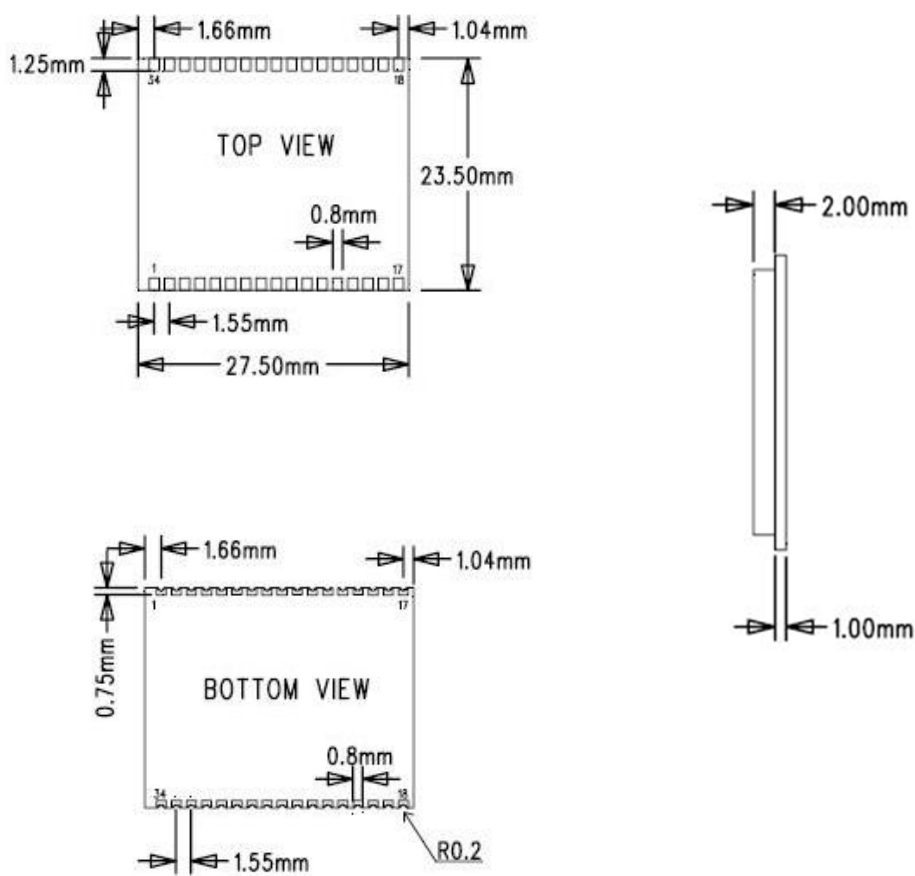


[Evaluation Board]

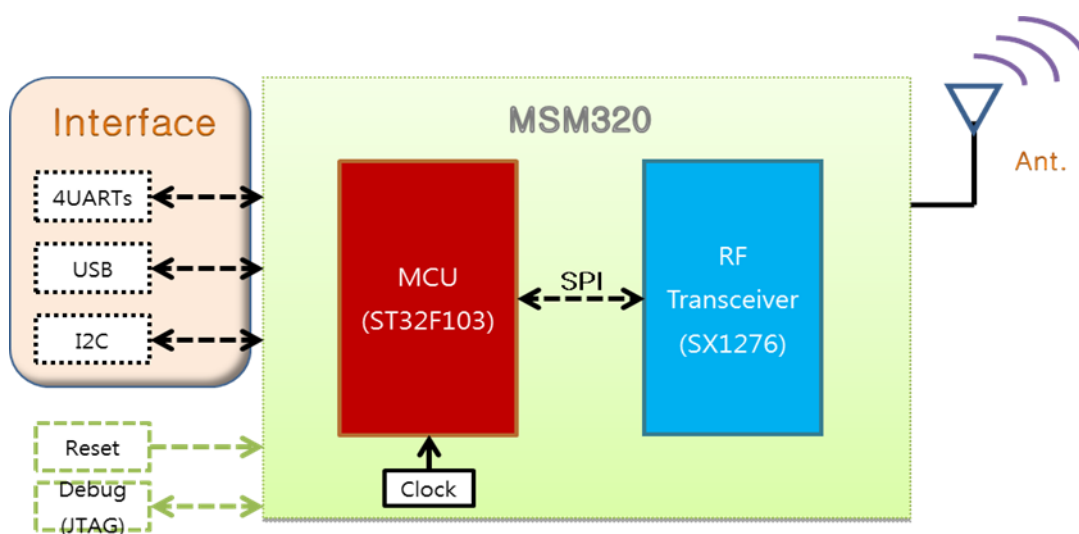
2. Specification

Item	Specification & Description
Standard/Protocol	<ul style="list-style-type: none"> • IEEE802.15.4g • IEEE802.15.4 MAC • IEEE802.15.4e TSCH MAC(TBD) • 6LoWPAN, IPv6, RPL, UDP, CoAP(TBD) • 6TiSCH, IPv6, RPL, UDP, CoAP(TBD) • LoRaWAN(TBD)
Frequency	<ul style="list-style-type: none"> • Korea : 917M~923.5MHz • Worldwide : 431M~433M, 862M~928MHz(TBD)
Data Rate	<ul style="list-style-type: none"> • 100bps ~ 300Kbps
RF Output Power	<ul style="list-style-type: none"> • -1dBm ~ +14dBm /-1dBm ~ +20dBm
Range	<ul style="list-style-type: none"> • 3.2Km(LOS 환경)
Main Chip	<ul style="list-style-type: none"> • STM32F103 + SX1276
Memory	<ul style="list-style-type: none"> • 768KB Flash, 96KB SRAM
Interface	<ul style="list-style-type: none"> • UART- 4 , I2C, USB2.0
Dimension	<ul style="list-style-type: none"> • 27.5 X 22.5 X 3 mm
Weight	<ul style="list-style-type: none"> • Less than 5g
Operating Temp.	<ul style="list-style-type: none"> • -20°C ~ +50°C
DC Input Voltage	<ul style="list-style-type: none"> • 2V ~ 3.6V

3. Module layout



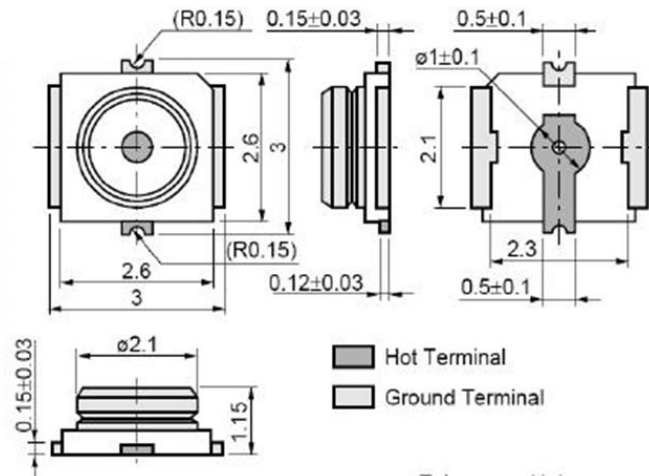
4. Block Diagram



5. Antenna connector



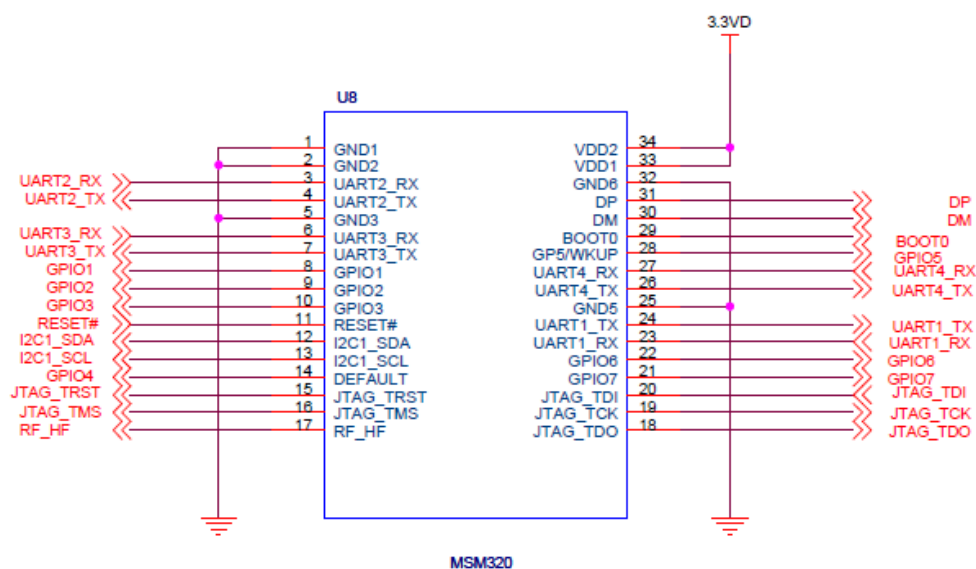
MM9329-2700



Tolerances Unless
Otherwise Specified: ± 0.2
(in mm)

Nominal Characteristic Impedance	50 Ω
Voltage rating	300V AC(rms)
Frequency range	DC to 6 GHz
Contact resistance	Center:20m Ω , Outside:10 m Ω / 10mA max
Insulation resistance	500M Ω / 250V DC
VSWR	1.2 Max / Up to 3GHz
Operating temperature range	-40 $^{\circ}$ C to +90 $^{\circ}$ C

6. Module Pin map



7. Module pin assignment

No	Pin function	Description
1	GND1	Ground
2	GND2	Ground
3	UART2_RX	UART2 receive data input
4	UART2_TX	UART2 transmit data output
5	GND3	Ground
6	UART3_RX	UART3 receive data input
7	UART3_TX	UART3 transmit data output
8	GPIO1	General purpose Input/Output
9	GPIO2	General purpose Input/Output
10	GPIO3	General purpose Input/Output
11	RESET#	Reset (active Low)
12	I2C_SDA	I2C Data
13	I2C_SCL	I2C clock
14	GPIO4	General purpose Input/Output
15	JTAG_TRST	JTAG reset
16	JTAG_TMS	JTAG mode select input
17	GND4	Ground
18	JTAG_TDO	JTAG data output
19	JTAG_TCK	JTAG clock input
20	JTAG_TDI	JTAG data input
21	GPIO7	General purpose Input/Output

22	GPIO6	General purpose Input/Output
23	UART1_RX	UART1 receive data input
24	UART1_TX	UART1 transmit data output
25	GND5	Ground
26	UART4_TX	UART4 transmit data output
27	UART4_RX	UART4 receive data input
28	GPIO5	General purpose Input/Output
29	BOOT0	Boot mode
30	DM	USB 2.0 Data + signal
31	DP	USB 2.0 Data - signal
32	GND6	Ground
33	VDD1	Voltage Input DC 3.3V(*battery:2.2~3.6V)
34	VDD2	Voltage Input DC 3.3V(*battery:2.2~3.6V)

FCC compliance Information

FCC Information to User

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Caution

Modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Compliance Information : This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation MSM320

This device is intended only for OEM integrators under the following conditions:

- 1) The transmitter module may not be co-located with any other transmitter or antenna,
- 2) OEM shall not supply any tool or info to the end-user regarding to Regulatory Domain change.

As long as 2 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

IMPORTANT NOTE: In the event that these conditions can not be met (for example certain

laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

Maximum antenna gain allowed for use with this device is 2.11 dBi

End Product Labeling

To satisfy FCC exterior labeling requirements, the following text must be placed on the exterior of the end product : **Contains Transmitter Module FCC ID : 2AGMY-MSM320**

Manual Information To the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as show in this manual.

<Antenna Notice>

This Module should be used only supplied antenna. MCT Co., Ltd. will not be held responsible for the problem caused when using a different antenna.

<RF Exposure>

This module is used for a fixed RF Reader. Therefore, It isn't necessary for the SAR testing.

<MPE Evaluation>

※ This device operates at separate distance above 20cm.





Record of Revision


Anray PART NO:Anray140000139AA02		CUSTOMER APPROVED BY:		
CUSTOMER PART NO:		DATE:		
REV.	DESCRIPTION OF CHANGES	CHECKED BY	APPROVED BY	DATE



Product Specification

For 917MHz

External Antenna

CUSTOMER APPROVAL			CHECKED	APPROVED
		SIGNATURE		
		DATE		
ANRAY APPROVAL			CHECKED	APPROVED
		SIGNATURE		
VERSION		DATE		



北京偶极通信设备有限责任公司

Anray Communication Technology CO.LTD



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1、Part Number:

Anray140000139AA02



2、Electrical Properties

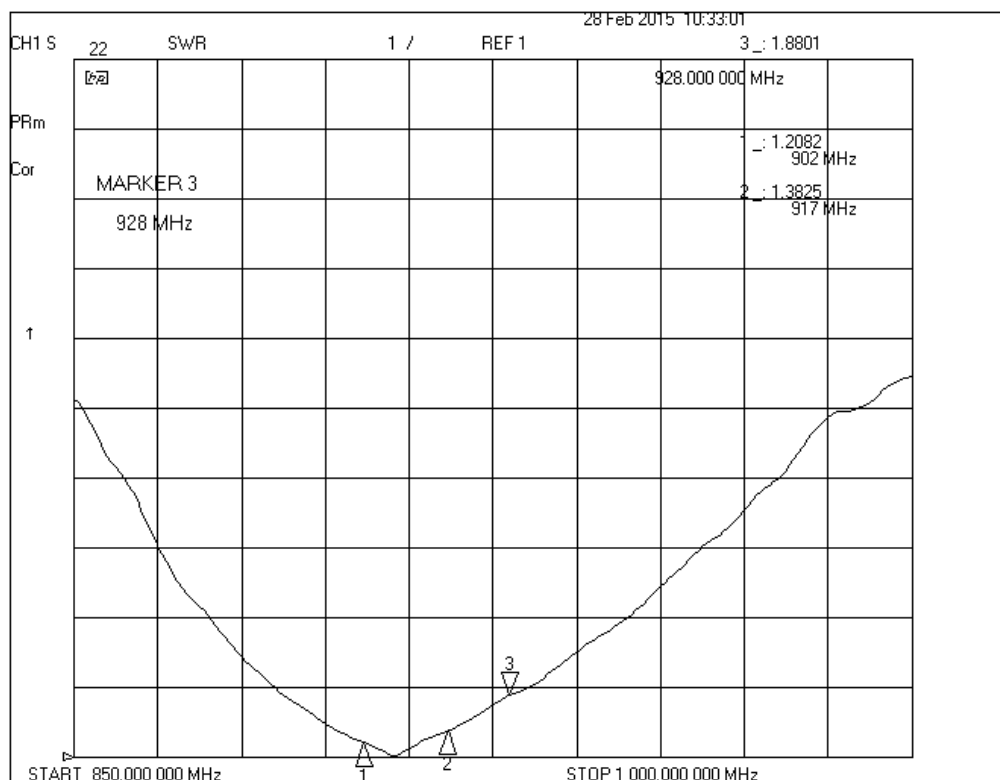
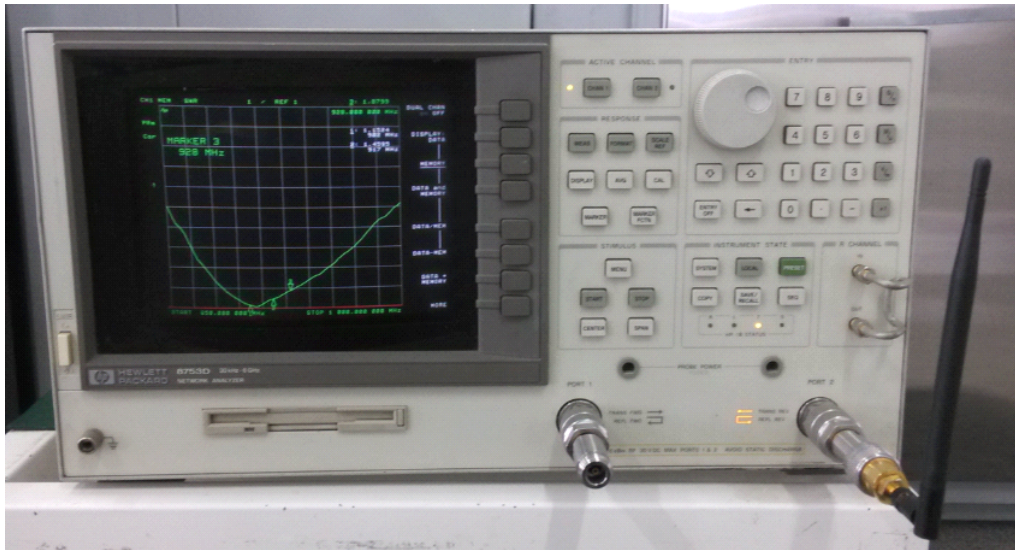
Item	Property
Frequency Range	902~928MHz
Impedance	50 Ohm nominal
VSWR	≤ 2.5
Gain _{Max}	2 dBi
Polarization	Vertical
Radiation Pattern	Omni-Directional (nominal)
Admitted Power	5W maximum
Electricle	$1/2\lambda$ Dipole



3、VSWR

The Testing Condition: Free Space

- a) Test instrument: HEWLETT PACKARD 8753D Network Analyzer(NA)
- b) Test condition: Free space
- c) The VSWR of the coaxial cable : < 1.05

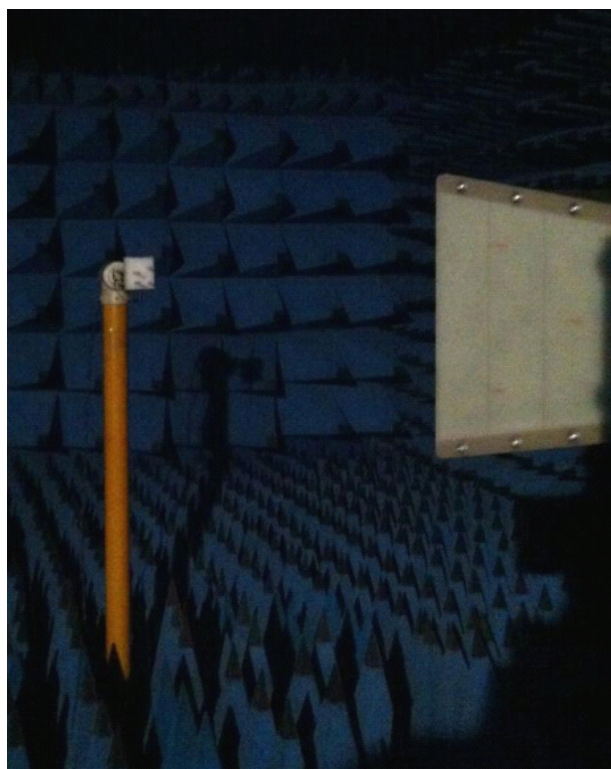
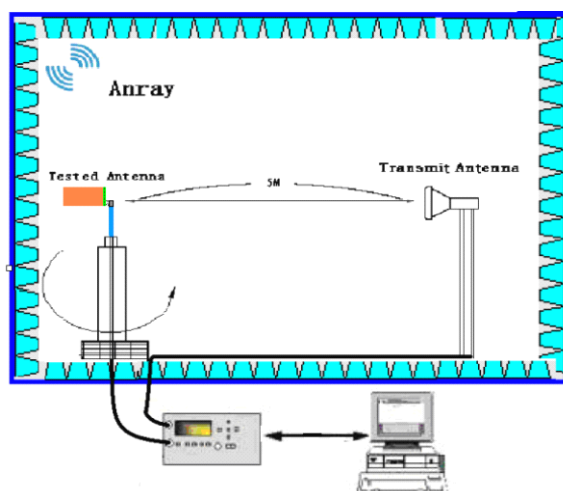




4、3-D Radiation Pattern:

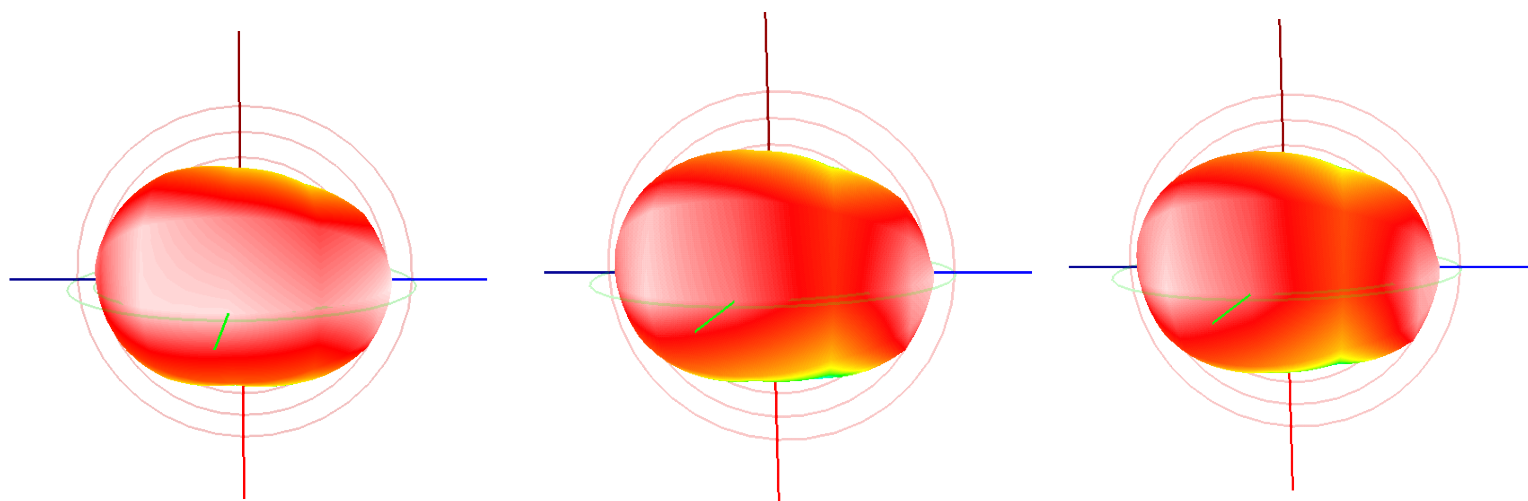
Testing Condition:

- a) Test site: Anray 3D Chamber
- b) System : Refer to picture





3-D Radiation Pattern



902MHz

917MHz

928MHz

Gain Result:

Frequency(MHz)	902	917	928
Gain _{Max} (dBi)	2.06	2.11	2.03



5、Mechanical Properties

Item	Property
Color	Black
Coaxial-Cable	RG-178
Plastic Cover	TPEE or other
Connector	SMA MALE

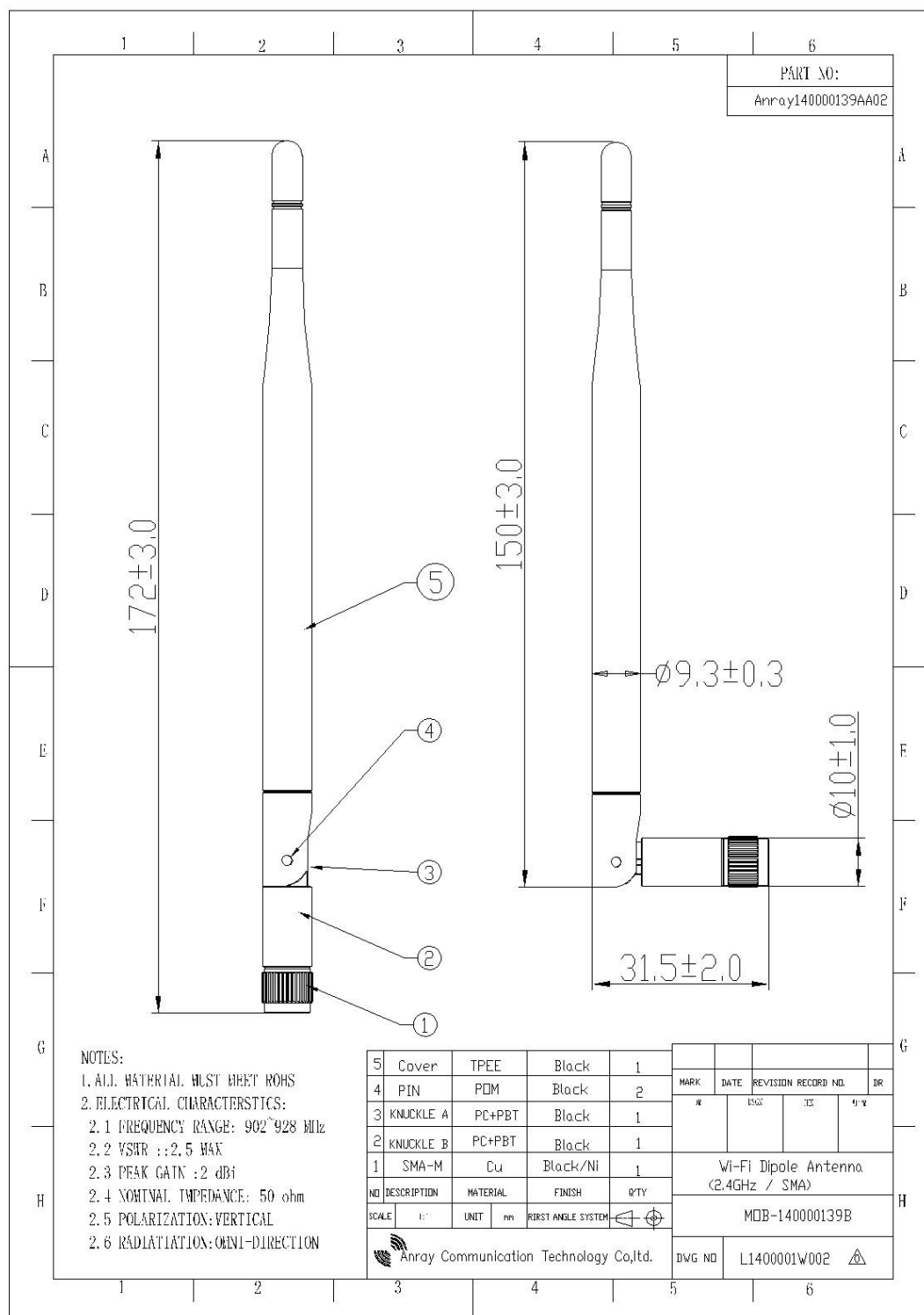
6、Environmental Characteristics

Operation Temperature: -30~+60℃/Storage Temperature: -30~+60℃

NO	Item	Test Condition	Specification
6-1	High Temperature Operating Test	1、 Temperature:+60±2℃ 2、 Time:24hrs	1、 Nomal function test must be satisfied safter the test. 2 、 No material deformation is allowed.
6-2	Low Temperature Operating Test	1、 Temperature:-30±2℃ 2、 Time:24hrs	
6-3	High Temperature Storage	1、 Temperature:+60±2℃ 2、 Time:24hrs	
6-4	Low Temperature Storage	1、 Temperature:-30±2℃ 2、 Time:24hrs	
6-5	Temperature Shock Test	1、 Temprature:-30~+60℃ 2、 TIME:30minutes/dwelling 5minutes/transition,24hrs	



7、Physical Dimension



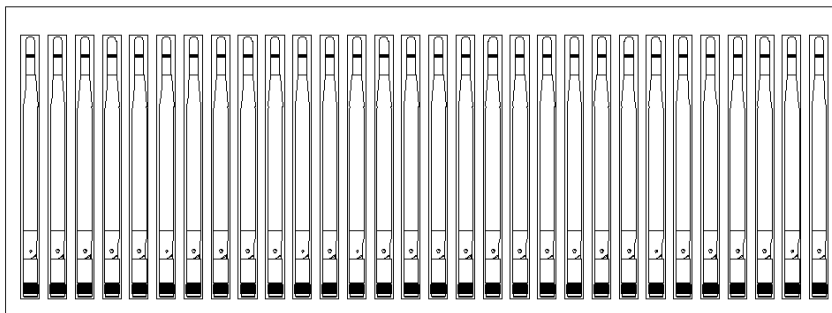


8、Packing Specification

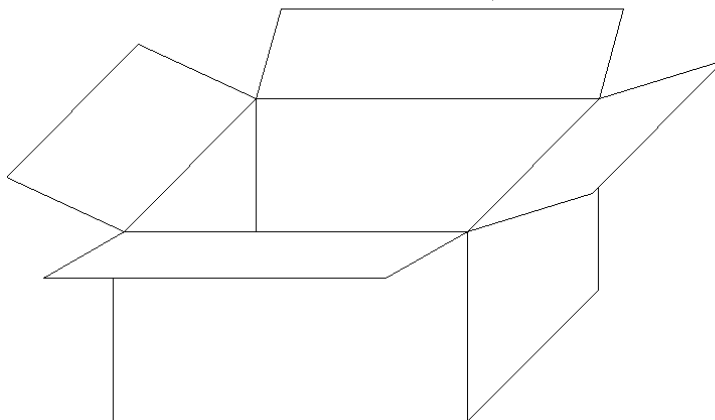
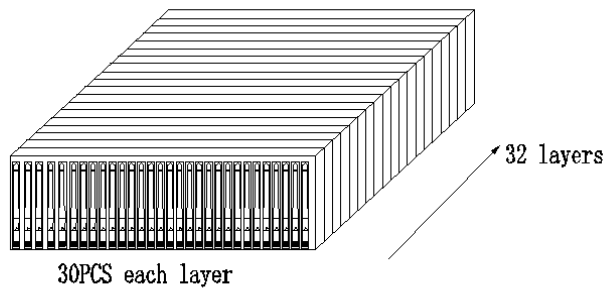
Packing pocket: one product one pocket



30 products each layer



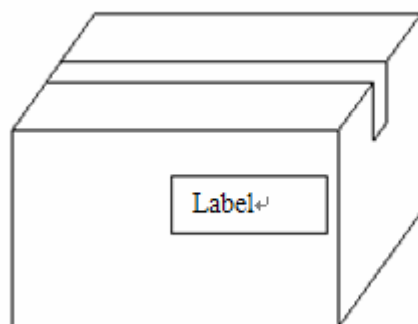
Box : 960pcs





9、 Packing Box

960 products each box.



10、 Label Style

SHIP TO:	_____
PARTS NAME:	<u>917MHz External ANT</u>
CUSTOMER P/N:	_____
ANRAY P/N:	<u>Anray140000139AA02</u>
P.O.NO:	_____
QTY:	_____
N.W:	_____
G.W:	_____
DATE:	_____
NO: _____ CTN , TOTAL _____ CTNS	