

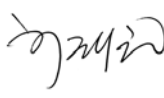


Antenna Datasheet

ANBIT_RFID
_915M21
/10-FCC-H

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APPROVAL SHEET

Product Name	915MHz RFID Reader Antenna(2X1)-Bistatic			
Date	14-Sep-2022			
Company Name	BlueWaveTel			
	Engineer	Check	Check	Approval
Approval				
	Jae su Jang	Inyong chung		Jae kwon Ha
	/	/	/	/

 **BlueWaveTel Co., Ltd.**

219 Daedeok Biz Center, 17 Techno 4-ro, Yuseong-gu, Daejeon 34013, Korea

Tel : +82-42-864-0283,

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1. Summaries

1.1 Function and Features

This specification of approval is explained information of RFID base station Antenna including general information, general specification, result of examination, examination procedure and assembling.

2. Specification

2.1 Applicable Boundary

This specification data is applicable to define the patch antenna' s specification of RFID base station Antenna for vehicle terminal transmitting and receiving

2.2 Electrical Specification

Model	ANBIT_RFID_915M21/10-FCC-H			
Type	Micro-Strip Patch Array Type			
Characteristic	Electrical Char.	Frequency Range	902MHz~928MHz	
		Polarization	Linear(Horizontal)	
		Gain	10dBi (Nom.)	
		Beam Width	El.	72°±3
			Az.	37°±3
		V. S. W. R	2 : 1	
		Power Capability	≤ 2 Watt	
		Impedance	50 Ω	
	Physical Char.	Radiation Element Material	Copper	
		Size	460 × 650 × 60 mm	
		Weight	8.5 kg	
		Input Connector	TNC(F)	

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2.3 Physical Specification

- 1) Product dimension should be satisfied according to defined specification of supplier. (within tolerances)
- 2) External painting, plating and silk of product should be in the range which is provided by supplier and according to PANTONE color.
- 3) Material should be anti-corrosion according to Korean Industrial Standards and should not influence on human body, specification of product and function of system.
- 4) All parts for coupling such as Bolt, Nut, Washer and Spacer should be stable.
- 5) All stickers on side of product should be stable and be attached on designated location.
- 6) Other specification of approval should be satisfied.

3. Examination Procedure

3.1 Physical Examination

1) Dimensional examination

Dimensions of each product are confirmed in accordance with designated drawing and catalogue.

2) Visual examination

- (1) The surface of product should not be stabbed, scratched or defecting such as no plating, no painting and different color.
- (2) Former and after treatments should be confirmed in accordance with designated specification and limit sample.
- (3) The screen printing of product should not be scratched, defecting or cutting.
- (4) Specification, Vender and dimension of Assembling Parts such as

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TNC(F) Type Connector and Cable should be confirmed.

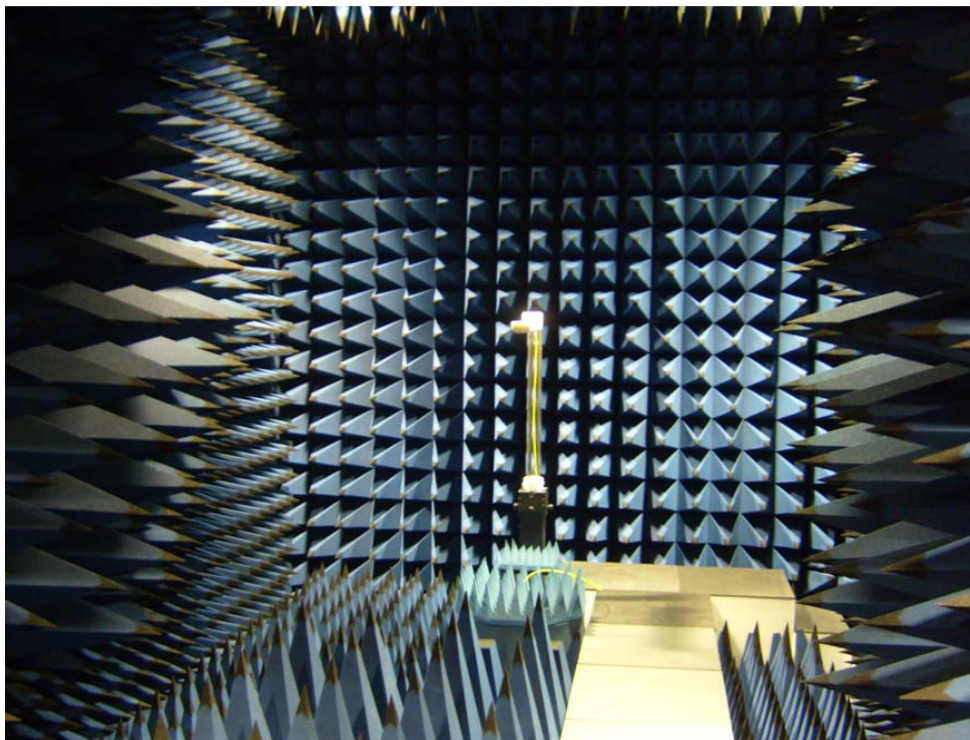
3) Assembling examination

- (1) Assembling status of Assembled parts should be checked.
- (2) Assembling parts should not be omitted, wrongly assembled.
- (3) Coupling parts such as Bolt, Nut, Washer and Spacer should not be omitted, different.
- (4) The exterior of product should be confirmed through visual check.

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3.2 Electrical examination

1) Examination Environment



Anechoic Chamber System

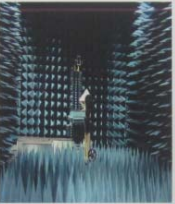
[안테나 측정용 시스템]

Antenna Far-Field Measurement System

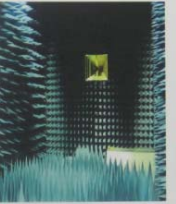
■ MODEL : 안테나 Far-Field 측정 시스템
■ ㈜창우통상/ORBIT_FR



[포지셔너]



[포지셔너]



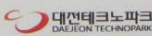
[기준안테나]



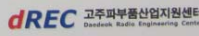
[컨트롤 룸]

사양 및 용도

안테나 특성 측정실	Specification	용도
챔버 Size	14m X 7m X 6.7m	안테나 Far-Field 측정 (안테나 패턴, 이득 측정)
챔버 Type	Rectangular type	
측정 주파수 Range	200MHz ~ 50GHz	



대전테크노파크
DAEJEON TECHNOPARK



고주파부품산업지원센터
Daejeon Radio Engineering Center

Far-Field System of DAEJEON TECHNOPARK

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2) Electrical test

- (1) Electrical specification of Antenna should be tested within appointed frequency range.
- (2) Electrical specification of Antenna is tested by using the antenna measurement system of supplier.
- (3) When electrical specification of Antenna is tested, the distance between the Source Antenna and the Measurement Antenna should be more than the Far Field minimum distance in Open Sight.
- (4) The uncertainty in the measurement is below 5%.

3) Voltage Standing Wave Ratio : V.S.W.R

- (1) Purpose: to check status of Antenna impedance matching.
- (2) Reference: $V.S.W.R \leq 2.0$ (toward wave absorber or Open Sight)
- (3) Examination procedure
 - A. 50Ω RF cable is Connected between S11 Port and S22 Port of Network Analyzer.
 - B. Network Analyzer Measurement parameter is setting S11 or S22.
 - C. Set up Frequency range, Scale and Marker. At this time, Marker should indicate measured frequency.
 - D. According to Calibration Menu of measurement equipment, calibrate connecting in order (Open, Short, Load).
 - E. Check calibration of Network Analyzer in each frequency.
 - F. Measure S11 (Return loss and V.S.W.R) after RF cable is connected to AUT input connector.
 - G. When measurement is complete, check measurement data and evaluate suitability in accordance with designated specification.

4) Measurement of Radiation Pattern and Gain

- (1) Purpose: to check Antenna radiation pattern and gain according to

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specification.

- (2) Reference: By using the pattern recording equipment in chamber or open sight, the horizontal and vertical beam pattern are measured. The gain of antenna is recorded refer to MAX figures.

(3) Test Equipment

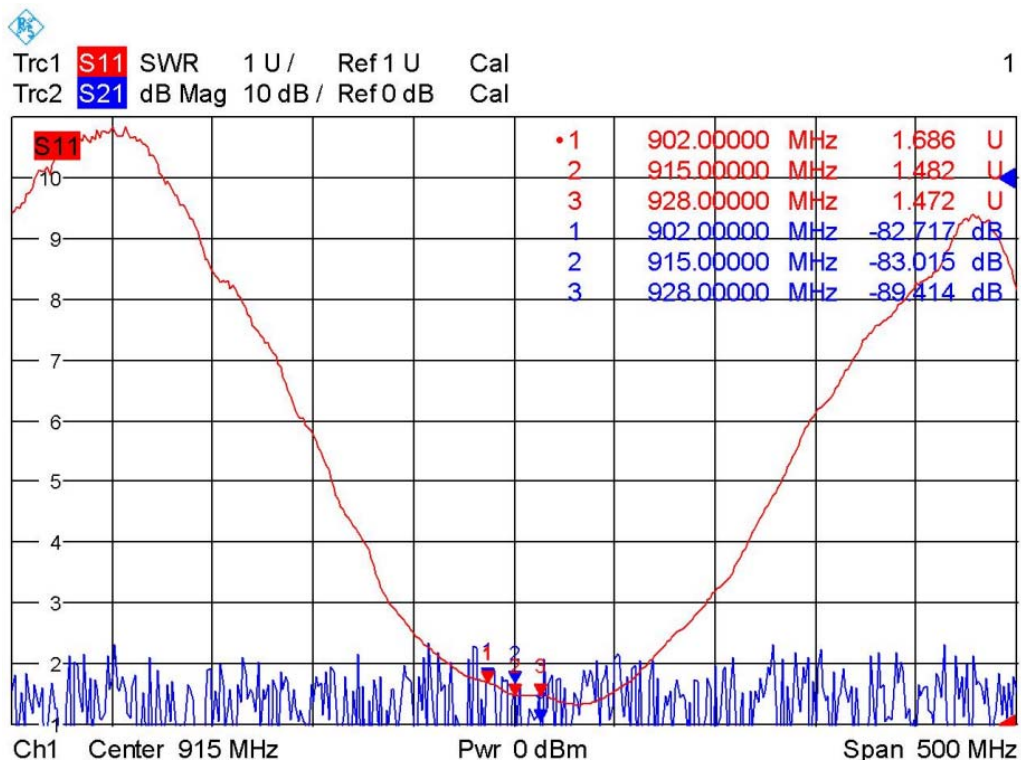
Part List					
No.	Part Name	Model	EA	Maker	Remark
1	Test System	Far-Field	1	changwooinc	
2	Network Analyzer	PNA 8362B	1	Agilent	
3	Position Controller	AL-4806-3C-OPT.1	1	ORBIT/FR	
4	Horn Antenna	BBHA 9120	1	SCHWARZBECK	Source
5	Horn Antenna	BBHA 9120	1	SCHWARZBECK	Standard
6	RF Cable	–	1	–	

(4) Examination procedure

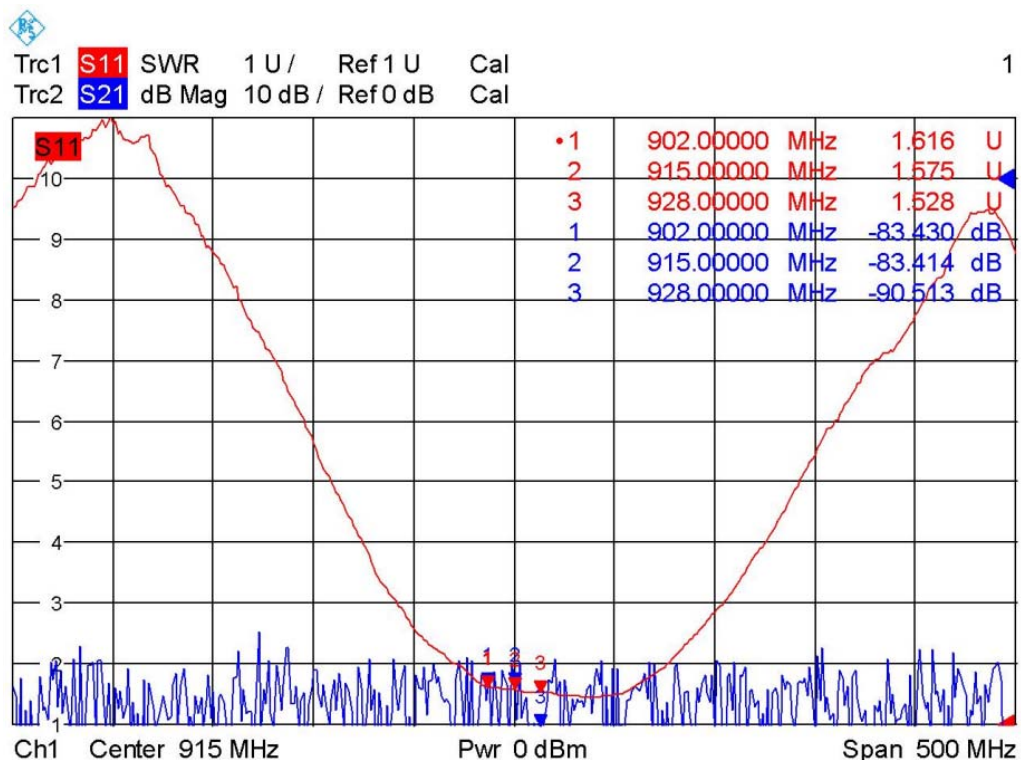
- A. All equipment in the test measurement system should be warming up and calibrated.
- B. Polarization plan of transmission Antenna should be maintained to synchronize with the Measurement Antenna.
- C. Measurement Antenna should be located at center of measurement equipment.
- D. After cable is connected, enter such parameter as frequency, output power, measuring speed, gain of standard antenna and level of mark in test measurement system.
- E. When measurement is complete, check measurement data and evaluate suitability in accordance with designated specification through Antenna Radiation Pattern Analyzer.
- F. When measurement is complete, data is printed or saved.

4. Results of Antenna Measurement

4.1 Antenna VSWR



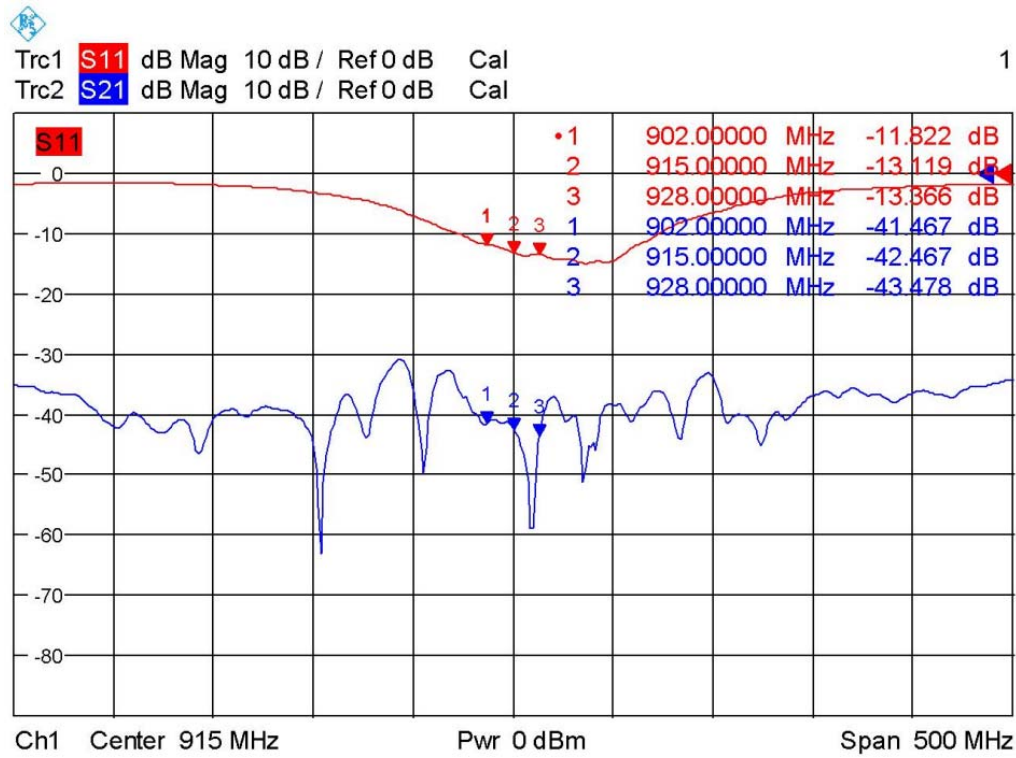
VSWR of Rx Antenna



VSWR of Tx Antenna

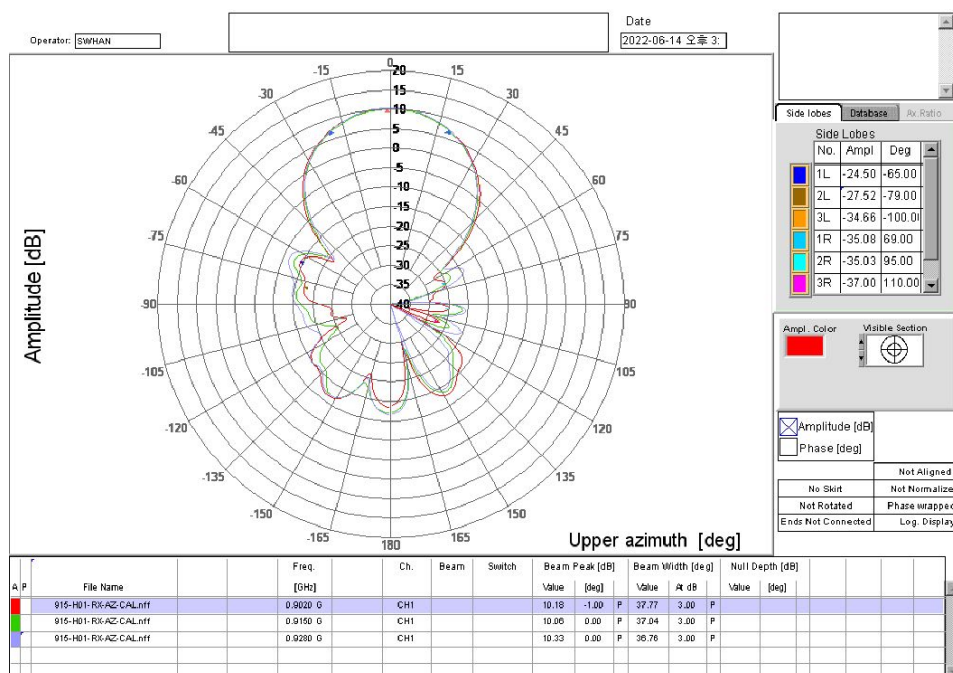
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4.2 Antenna Isolation

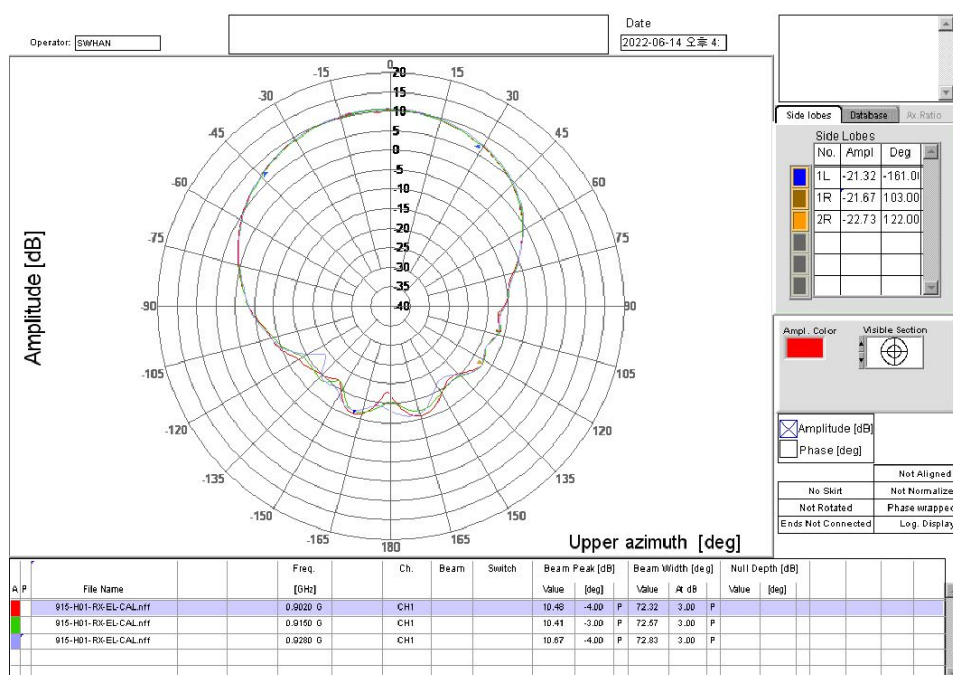


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4.3 Antenna Radiation Pattern

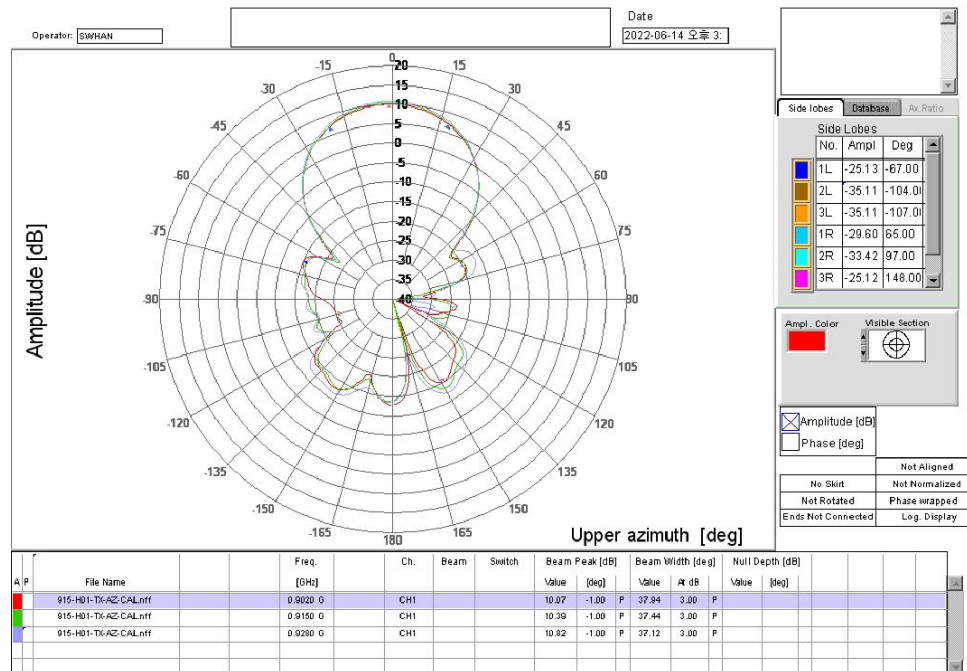


Rx-Azimuth – Peak Gain : 10.33dBi

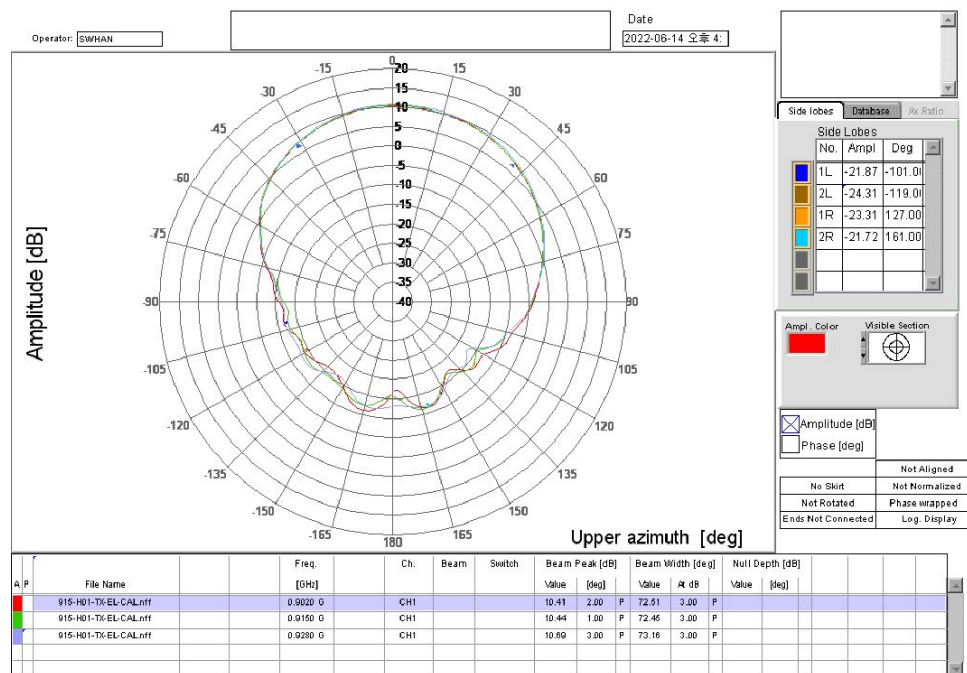


Rx-Elevation – Peak Gain : 10.67dBi

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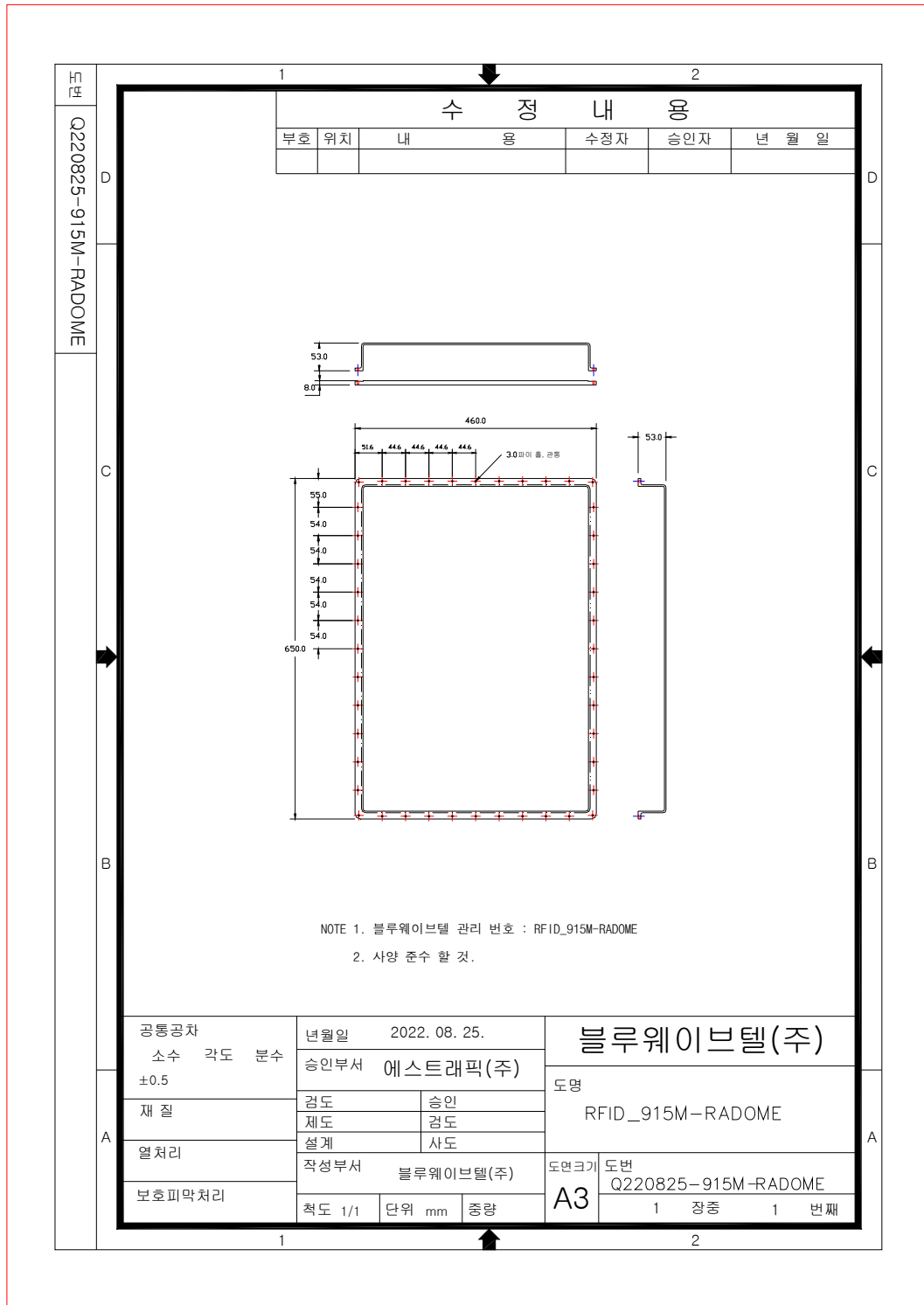
Tx-Azimuth – Peak Gain : 10.82dBi



Tx-Elevation – Peak Gain : 10.69dBi

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5.2 Antenna radome drawing



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6. PART LIST

NO.	NAME	SPEC.	QTY	UNIT	MATERIAL	MAKER	REMARKS
1	ANT GND	460X650X8t 1-LAYER	1	EA	AL6061	Daesung System	
2	ANT	152X154X1t 2-LAYER	4	EA	AL6061	Daesung System	
3	ANT RADOME	460X650X53t	1	EA	ABS	CNJ	
4	BRACKET	240X90X100t	1	EA	AL6061	Daesung System	
5	CONNECTOR	TNC(F)- RG316/D	2	EA	Ni, Au	DongjinTI KRF	

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7. Picture

7.1 Front Picture



7.2 Back Picture



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8. Packing and Mark

8.1 Packing

- (1) Packing should be fixed to protect product from being defected by vibrating, shock or static during storage and transportation.
- (2) The plastic package should be using antistatic material.
- (3) The cover package should be using cardboards box in order to protect product from being defected.

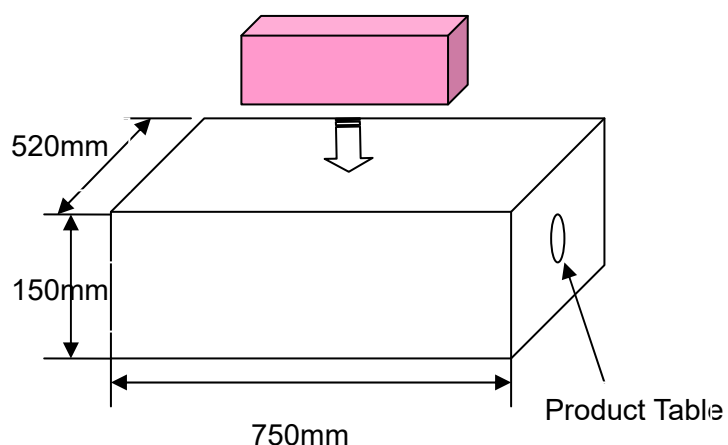
8.2 Mark

- Product name and quantity should be marked on the cover package.

MODEL	
PART NAME	
DESCRIPTON	
QTY(EA)/LOT	
Date of manufacture	2022. 00. 00.
BlueWaveTel Co., Ltd.	

8.3 CARTON PACKING

- (1) Pack the product in a standardized paper box.(The size can be changed according to the quantity)



1: SIZE

750(L)*520(W)*150(H)

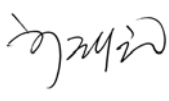
2: QUANTITY

1EA

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APPROVAL SHEET

Product Name	915MHz RFID Reader Antenna(2X1)-Bistatic			
Date	06-Feb-2017			
Company Name	BlueWaveTel			
	Engineer	Check	Check	Approval
Approval				
	/	/	/	/



BlueWaveTel Co., Ltd.

219 Daedeok Biz Center, 17 Techno 4-ro, Yuseong-gu, Daejeon 34013, Korea

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1. Summaries

1.1 Function and Features

This specification of approval is explained information of RFID base station Antenna including general information, general specification, result of examination, examination procedure and assembling.

2. Specification

2.1 Applicable Boundary

This specification data is applicable to define the patch antenna' s specification of RFID base station Antenna for vehicle terminal transmitting and receiving

2.2 Electrical Specification

Model	ANBIT_RFID_915M21/12-US			
Type	Micro-Strip Patch Array Type			
Characteristic	Electrical Char.	Frequency Range	902MHz~928MHz	
		Polarization	Circular(RHCP)	
		Gain	12dBic (Nom.)	
		Beam Width	El.	67°±3
			Az.	40°±3
		V. S. W. R	2 : 1	
		Power Capability	≤ 2 Watt	
		Impedance	50 Ω	
	Physical Char.	Radiation Element Material	Copper	
		Size	460 × 650 × 60 mm	
		Weight	8.5 kg	
		Input Connector	TNC(F)	

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2.3 Physical Specification

- 1) Product dimension should be satisfied according to defined specification of supplier. (within tolerances)
- 2) External painting, plating and silk of product should be in the range which is provided by supplier and according to PANTONE color.
- 3) Material should be anti-corrosion according to Korean Industrial Standards and should not influence on human body, specification of product and function of system.
- 4) All parts for coupling such as Bolt, Nut, Washer and Spacer should be stable.
- 5) All stickers on side of product should be stable and be attached on designated location.
- 6) Other specification of approval should be satisfied.

3. Examination Procedure

3.1 Physical Examination

1) Dimensional examination

Dimensions of each product are confirmed in accordance with designated drawing and catalogue.

2) Visual examination

- (1) The surface of product should not be stabbed, scratched or defecting such as no plating, no painting and different color.
- (2) Former and after treatments should be confirmed in accordance with designated specification and limit sample.
- (3) The screen printing of product should not be scratched, defecting or cutting.
- (4) Specification, Vender and dimension of Assembling Parts such as

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TNC(F) Type Connector and Cable should be confirmed.

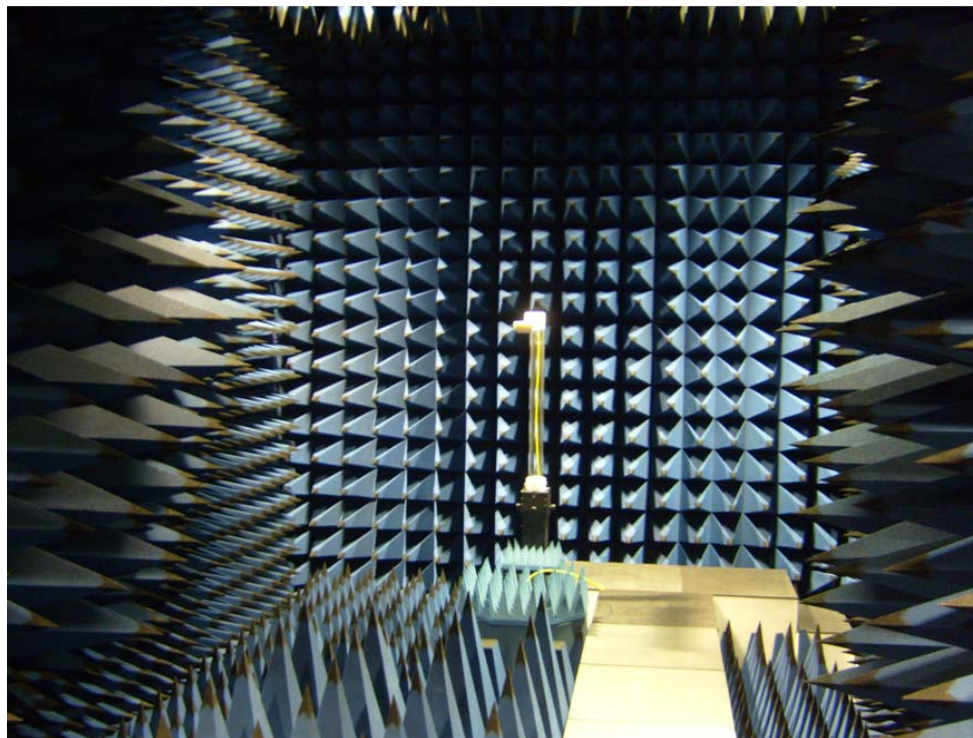
3) Assembling examination

- (1) Assembling status of Assembled parts should be checked.
- (2) Assembling parts should not be omitted, wrongly assembled.
- (3) Coupling parts such as Bolt, Nut, Washer and Spacer should not be omitted, different.
- (4) The exterior of product should be confirmed through visual check.

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3.2 Electrical examination

1) Examination Environment



Anechoic Chamber System

2) Electrical test

- (1) Electrical specification of Antenna should be tested within appointed frequency range.
- (2) Electrical specification of Antenna is tested by using the antenna measurement system of supplier.
- (3) When electrical specification of Antenna is tested, the distance between the Source Antenna and the Measurement Antenna should be more than the Far Field minimum distance in Open Sight.
- (4) The uncertainty in the measurement is below 5%.

3) Voltage Standing Wave Ratio : V.S.W.R

- (1) Purpose: to check status of Antenna impedance matching.
- (2) Reference: $V.S.W.R \leq 2.0$ (toward wave absorber or Open Sight)

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(3) Examination procedure

- A. 50Ω RF cable is Connected between S11 Port and S22 Port of Network Analyzer.
- B. Network Analyzer Measurement parameter is setting S11 or S22.
- C. Set up Frequency range, Scale and Marker. At this time, Marker should indicate measured frequency.
- D. According to Calibration Menu of measurement equipment, calibrate connecting in order (Open, Short, Load).
- E. Check calibration of Network Analyzer in each frequency.
- F. Measure S11 (Return loss and V.S.W.R) after RF cable is connected to AUT input connector.
- G. When measurement is complete, check measurement data and evaluate suitability in accordance with designated specification.

4) Measurement of Radiation Pattern and Gain

- (1) Purpose: to check Antenna radiation pattern and gain according to specification.
- (2) Reference: By using the pattern recording equipment in chamber or open sight, the horizontal and vertical beam pattern are measured. The gain of antenna is recorded refer to MAX figures.

(3) Examination procedure

- A. All equipment in the test measurement system should be warming up and calibrated.
- B. Polarization plan of transmission Antenna should be maintained to synchronize with the Measurement Antenna.
- C. Measurement Antenna should be located at center of measurement equipment.
- D. After cable is connected, enter such parameter as frequency, output power, measuring speed, gain of standard antenna and

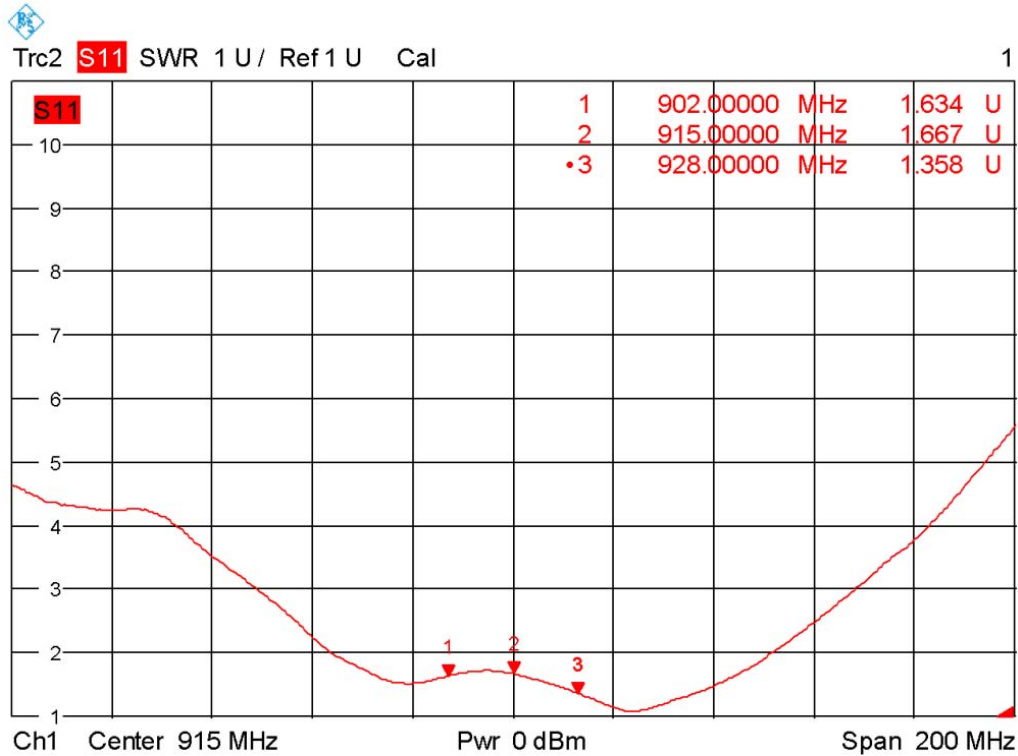
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level of mark in test measurement system.

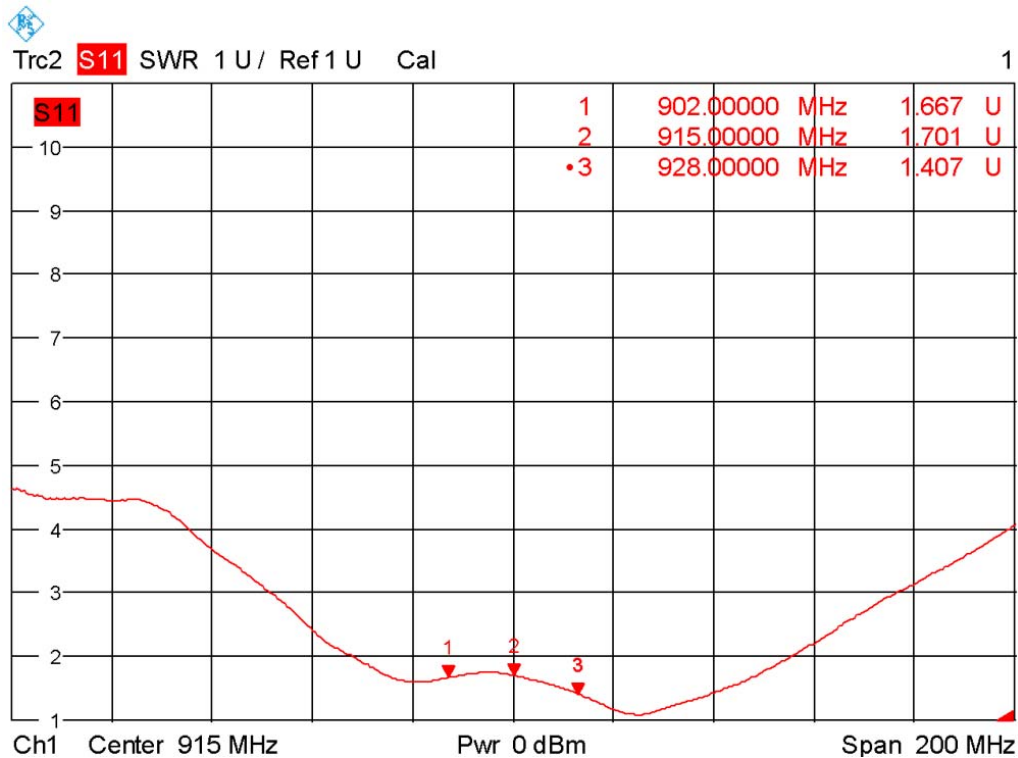
- E. When measurement is complete, check measurement data and evaluate suitability in accordance with designated specification through Antenna Radiation Pattern Analyzer.
- F. When measurement is complete, data is printed or saved.

4. Results of Antenna Measurement

4.1 Antenna VSWR



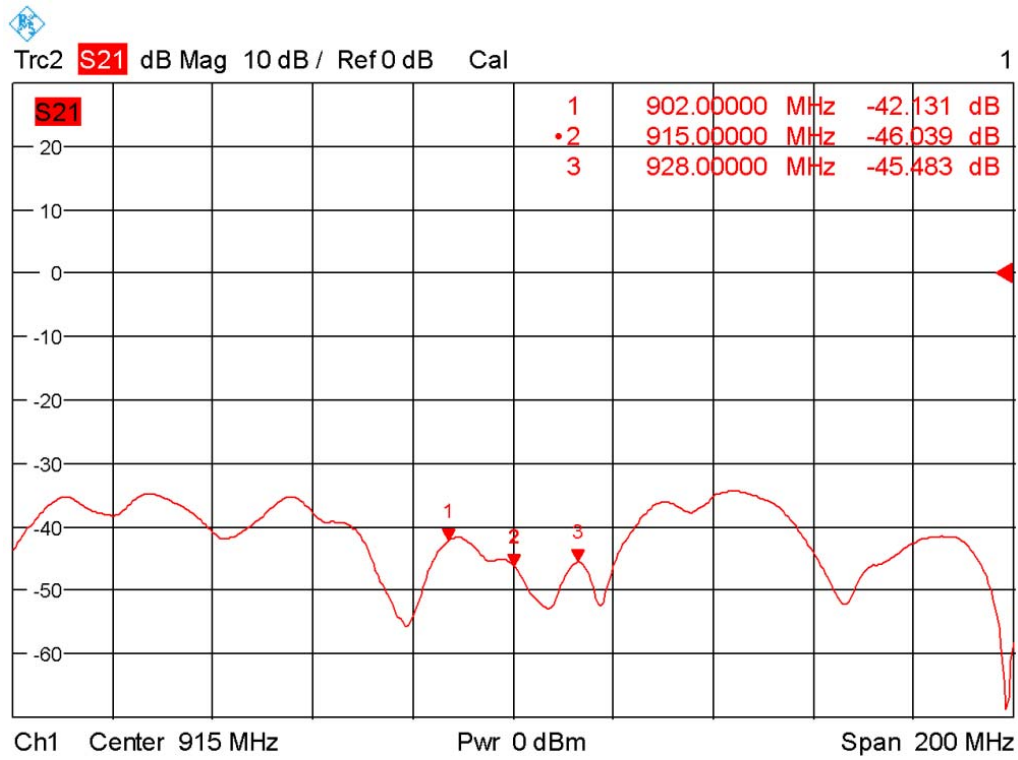
VSWR of Rx Antenna



VSWR of Tx Antenna

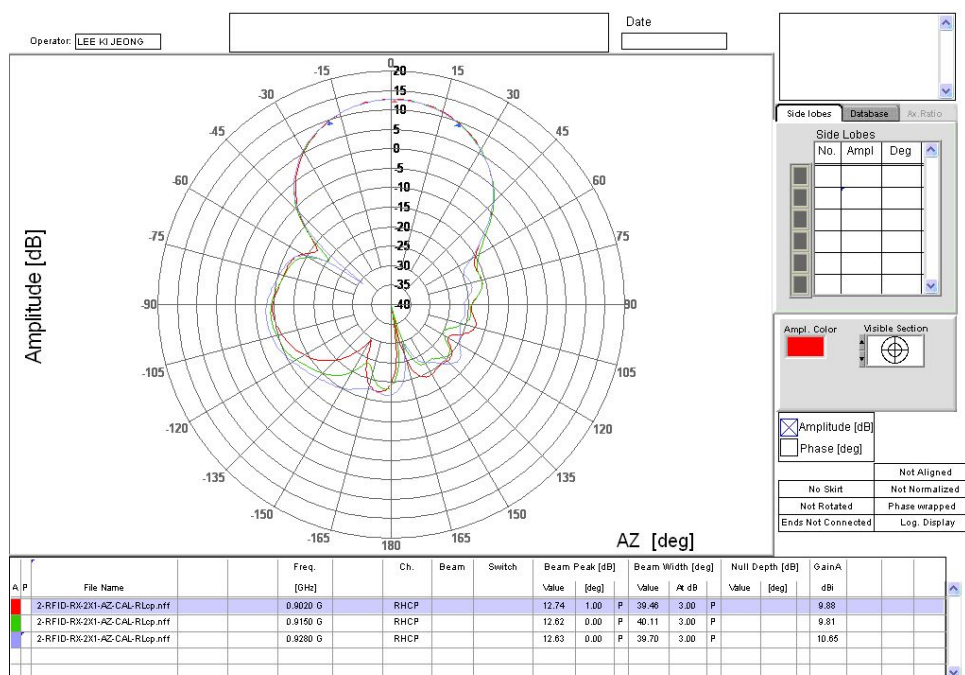
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4.2 Antenna Isolation

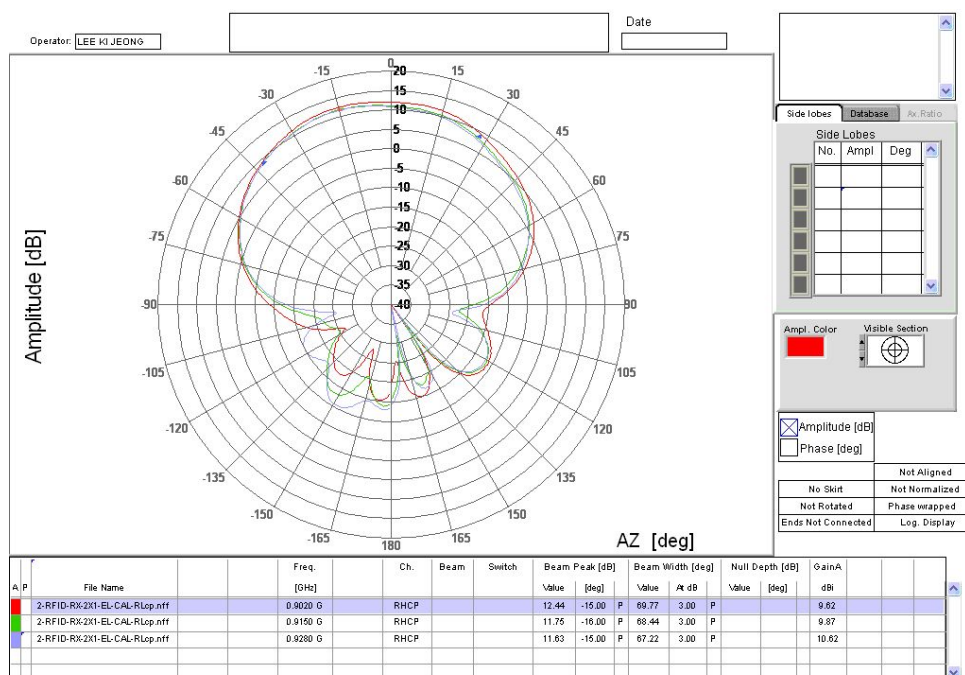


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4.3 Antenna Radiation Pattern

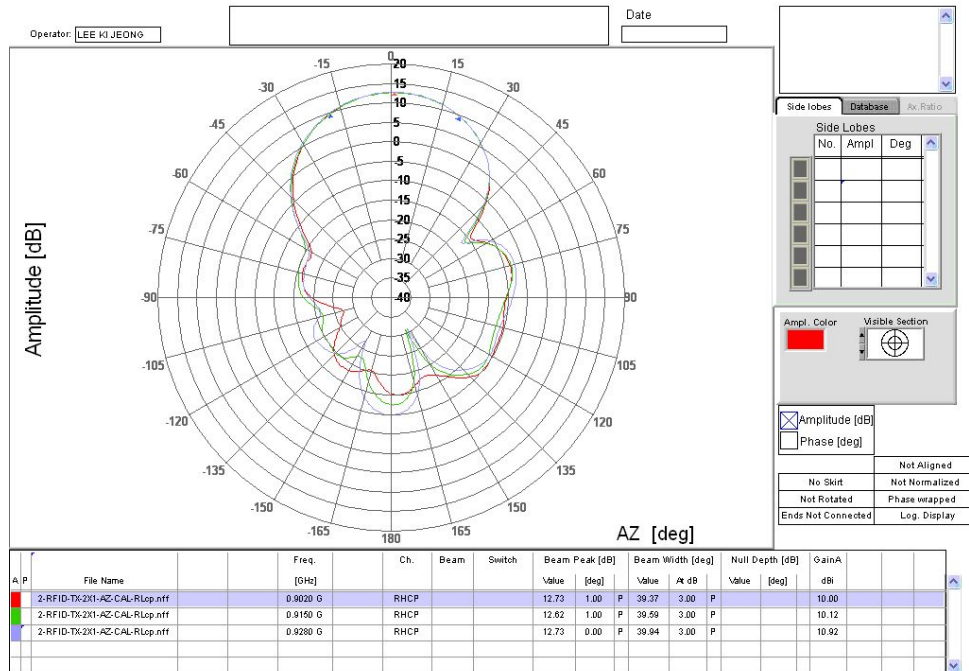


Rx-Azimuth

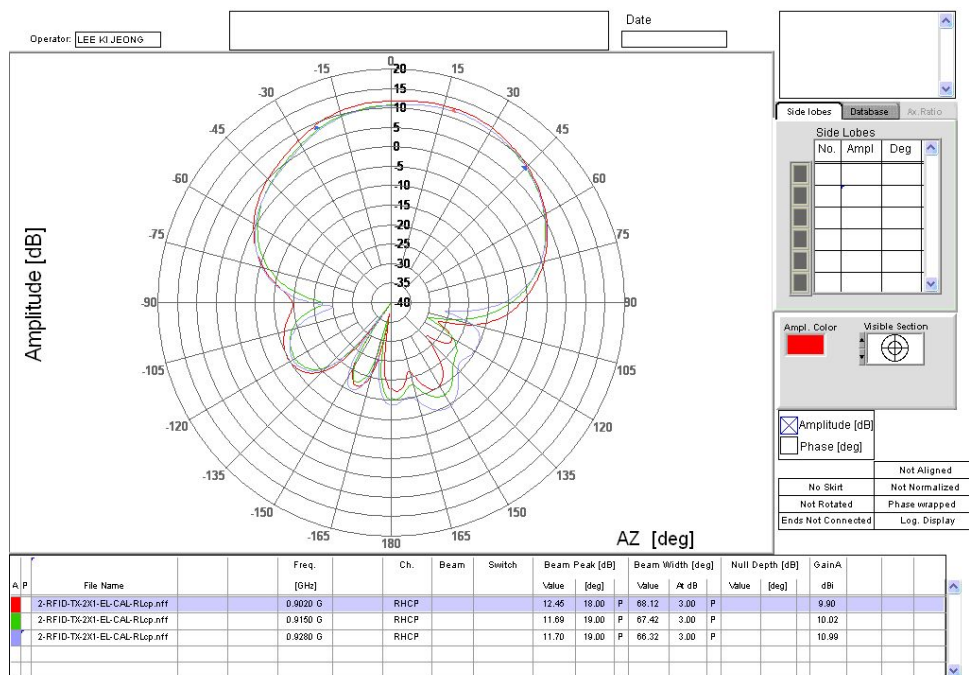


Rx-Elevation

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Tx-Azimuth

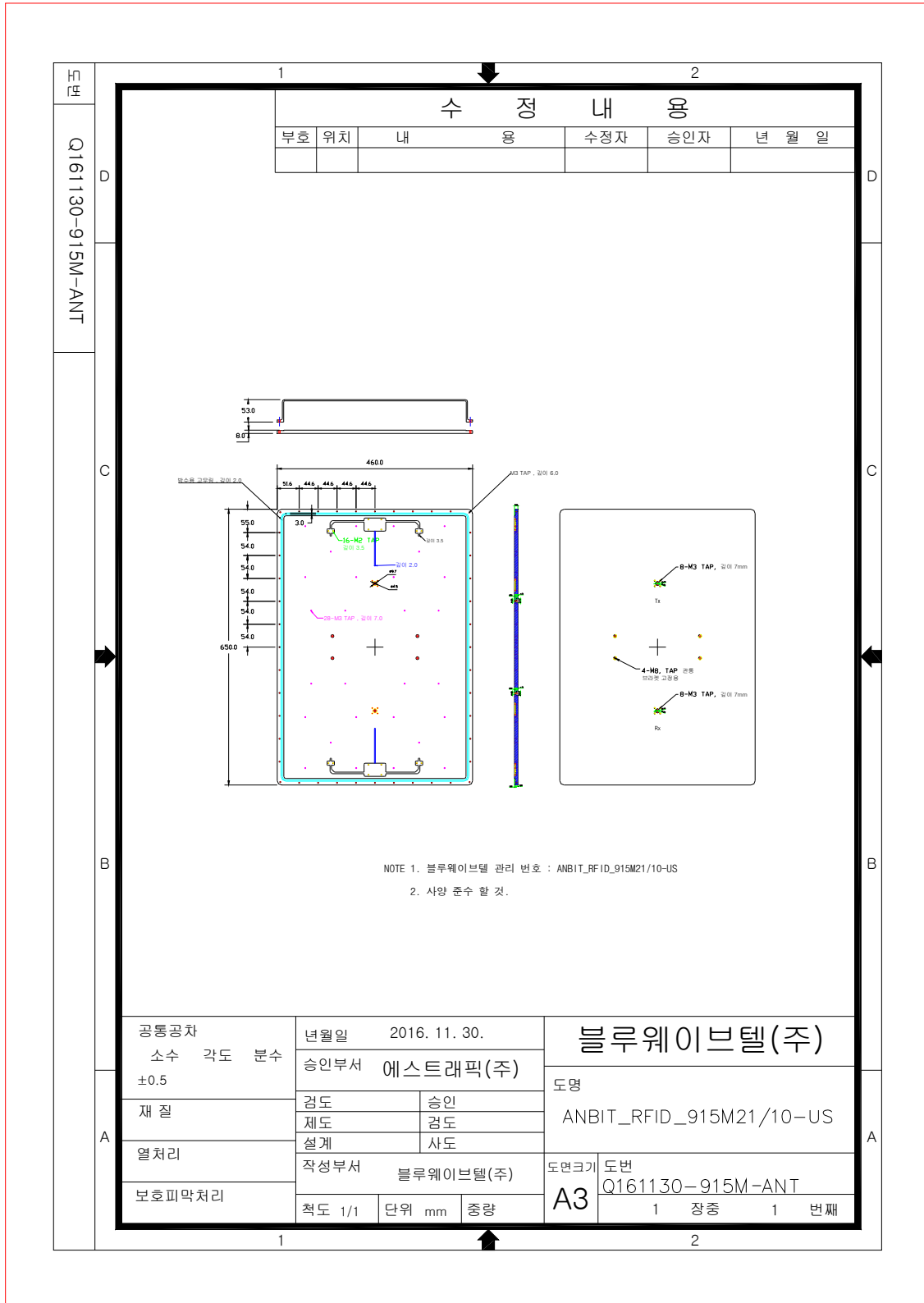


Tx-Elevation

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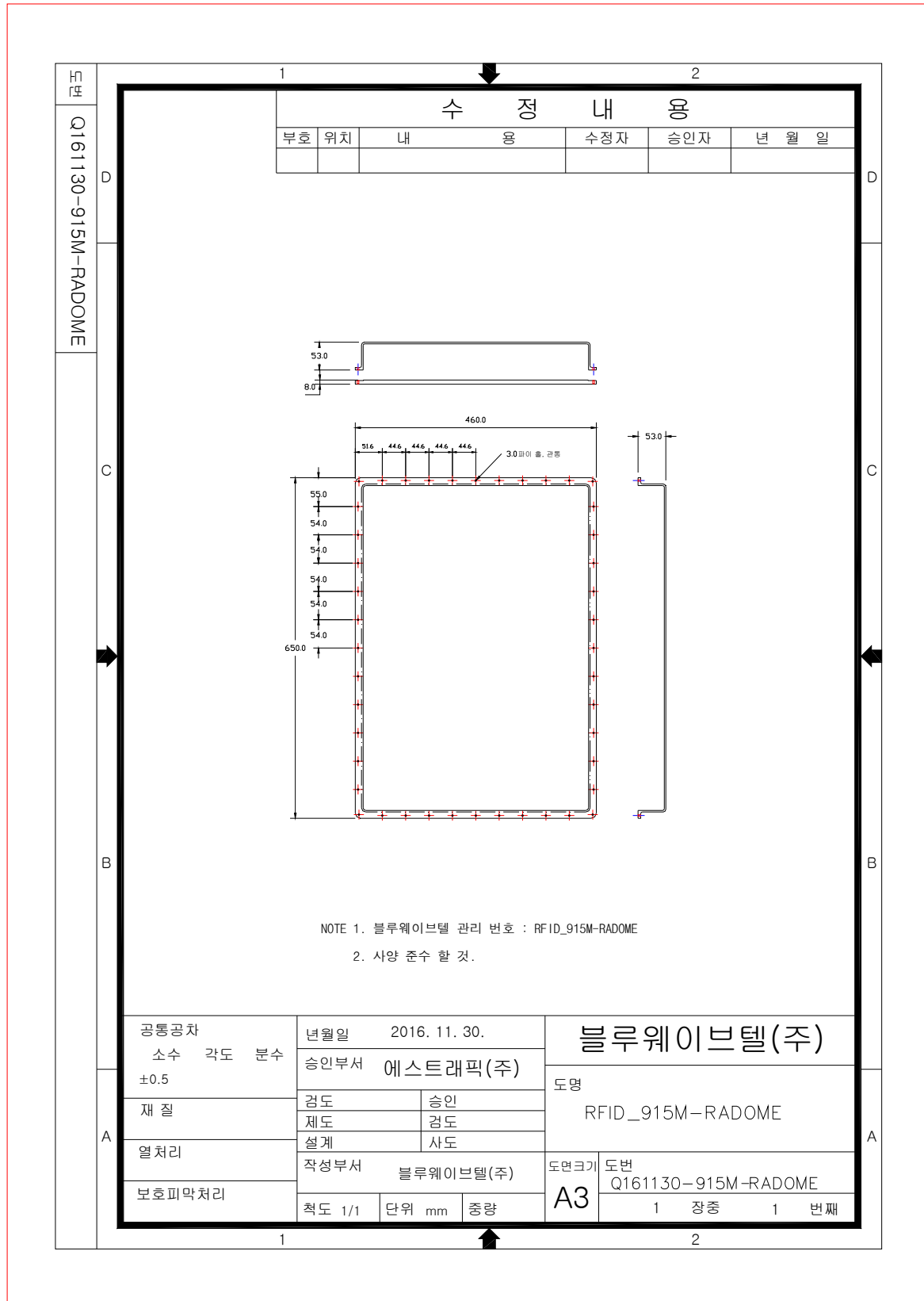
5. Drawings

5.1 Antenna assembly drawing



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5.2 Antenna radome drawing



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6. PART LIST

NO.	NAME	SPEC.	QTY	UNIT	MATERIAL	MAKER	REMARKS
1	ANT GND	460X650X8t 1-LAYER	1	EA	AL6061	Daesung System	
2	ANT	137X137X1t 2-LAYER	4	EA	AL6061	Daesung System	
3	ANT RADOME	460X650X53t	1	EA	ABS	CNJ	
4	CONNECTOR	TNC(F)	2	EA	Ni, Au	DongjinTI	

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7. Picture

7.1 Front Picture



7.2 Back Picture



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8. Packing and Mark

8.1 Packing

- (1) Packing should be fixed to protect product from being defected by vibrating, shock or static during storage and transportation.
- (2) The plastic package should be using antistatic material.
- (3) The cover package should be using cardboards box in order to protect product from being defected.

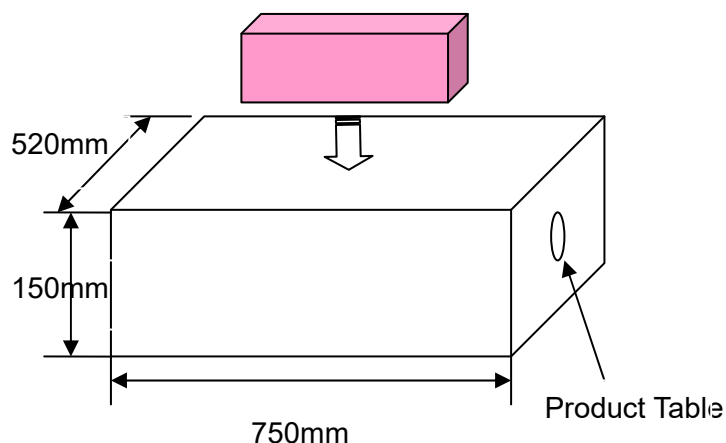
8.2 Mark

- Product name and quantity should be marked on the cover package.

MODEL	
PART NAME	
DESCRIPTON	
QTY(EA)/LOT	
Date of manufacture	2017. 00. 00.
BlueWaveTel Co., Ltd.	

8.3 CARTON PACKING

- (1) Pack the product in a standardized paper box.(The size can be changed according to the quantity)



1: SIZE

750(L)*520(W)*150(H)

2: QUANTITY

1EA