Part No.W5E-WO-03L
WiFi Dipole Antenna
(2.4 GHz, Left-handed SMA)
WINiZEN Co., Ltd.

	Check	Check	Approval

Revision History

E D	Date	Author	Description
IR	2009.8.29	W.I.Kwak	First issuance

To: WIZNET Co., Ltd.

Approval Sheet

Product	**WiFi Dipole Antenna**
Model No.	
Manufacturer P/N	**W5E-WO-03L**

NO	CODE	DESCRIPTION	REMARK
1		2.4 GHz WiFi Dipole Antenna	Left-handed SMA
2			
3			
4			
5			
6			

August 29, 2009

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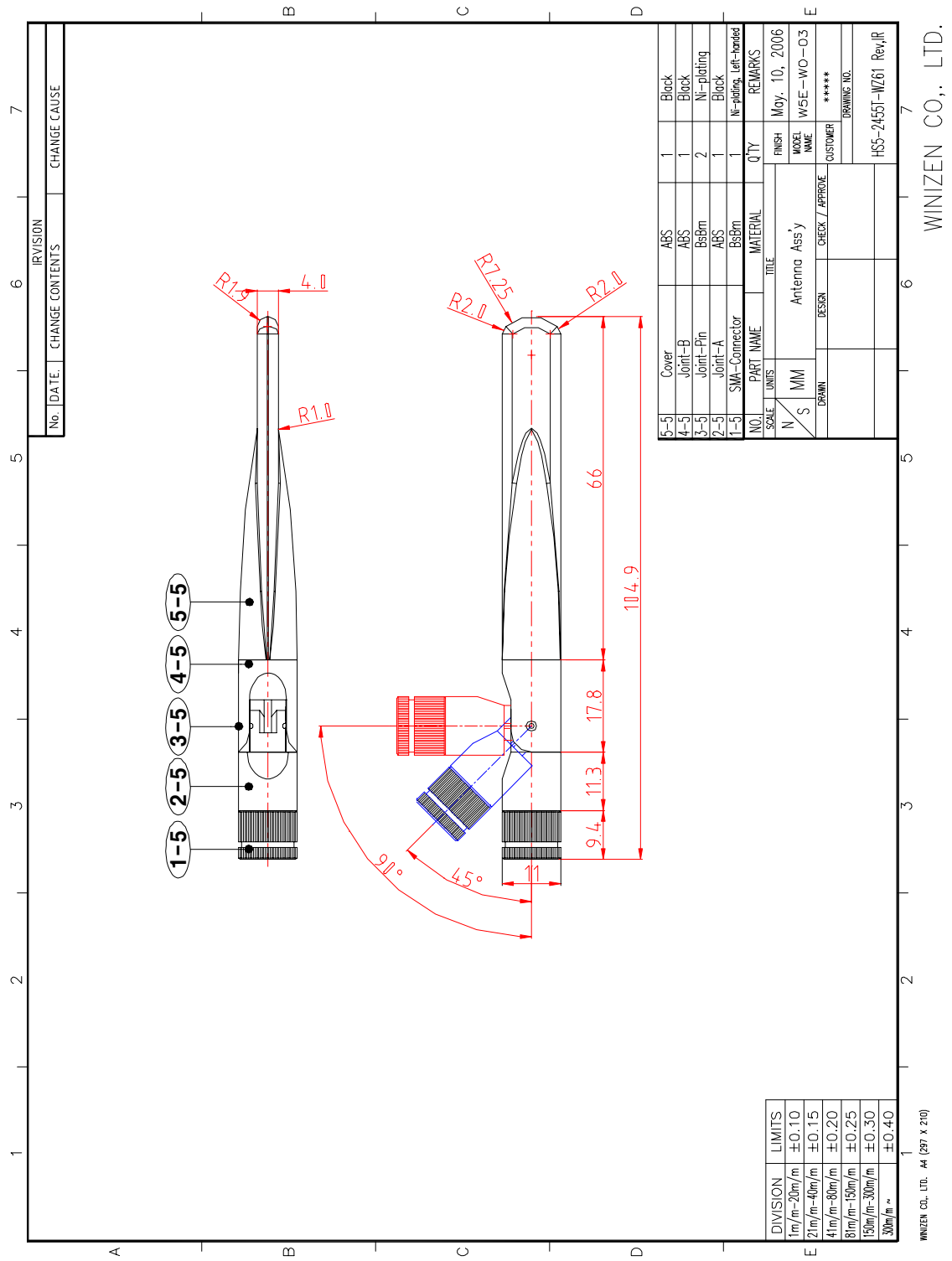
	Issue	Check	Approval
			
	2009/8/29		2009/8/29

- Contents –

1. Specifications

Specifications	
Electrical Specifications	**Frequency Range**
	2400 ~ 2483.5 MHz
Band Width	83.5 (MHz)
V.S.W.R (Min)	1.9 : 1
Gain (Max)	2.5 ± 1 (dBi)
Input Impedance	50 (Ω)
Polarization	Linear
Mechanical Specifications	
Antenna Size	See drawing
Connector	SMA Male (Left-handed)
Operation Temperature	-20 ~ 70 (℃)
Operation Humidity	10 ~ 90 (%)
Option	
Others	

2. Mechanical Drawing



3. Test Method

3-1. Test Equipments

Network Analyzer	Agilent **E8357A**
Calibration Kit	Agilent **E8357A**
Adaptor	**SMA Type Female ↔ SMA male**
Measurement Cable	**SPS-2801-400-SPS(Insulated Wire Inc.)**

3-2. Test Equipment Setting

Display	**Dual Channel : On**
	Split Display : On
Menu	**Number of Points : 201**
	Power : 0 dBm
Measure	**Channel 1 : S11**
	Channel 2 : S21

3-3. Calibration

Calibration-	**Cal. Kit : 50 Ω**
	Calibration menu → Full-2 Port Reflection
	Forward : Open → Short → Load
	Reverse : Open → Short → Load
	Done
	Transmission
	Do Both → FWD + REV
	Done
	Isolation
	Omit Isolation
	Done

4. Test Procedure

4-1. V.S.W.R

Step 1.

Connect the antenna to Port 1 of the Network Analyzer with a Cable Assembly.

Step 2.

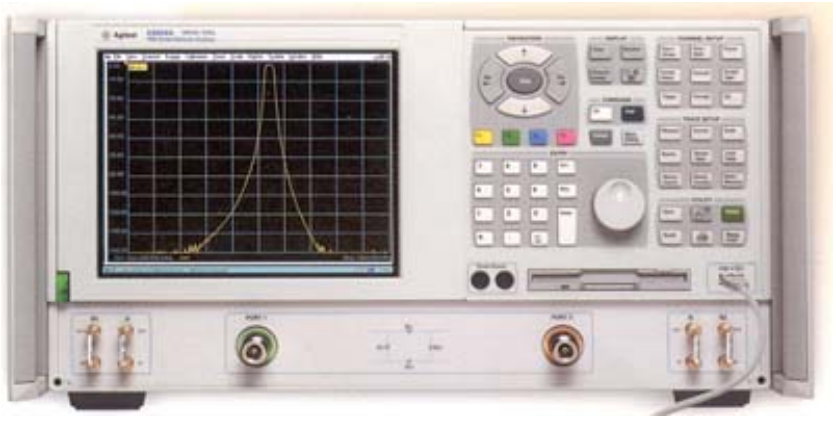
Set Marker Pointer of the Network Analyzer to the target frequency.

Step 3.

Measure and check if the V.S.W.R. values are within 1.9.

Step 4.

Record Data.



4-2. Gain and Radiation Patterns

Step 1

Calibrate the Anechoic Chamber and Measurement System with a Dipole Antenna and a Horn Antenna. Prepare the Software Program to control the system.

Step 2.

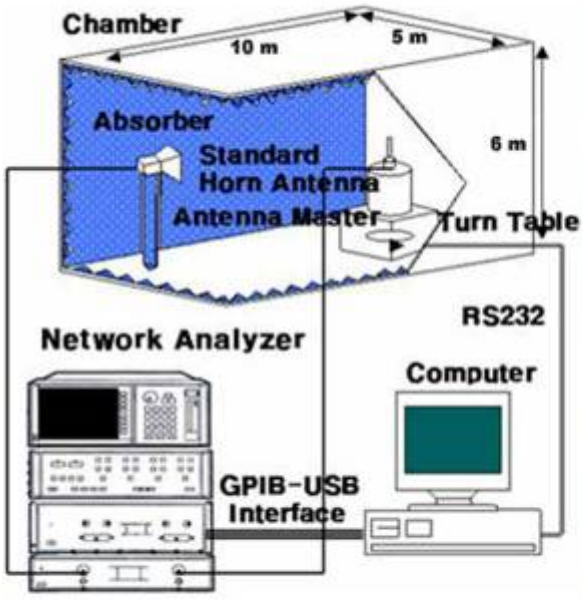
Place the Antenna for measurement, on the location within the Anechoic Chamber.

Step 3.

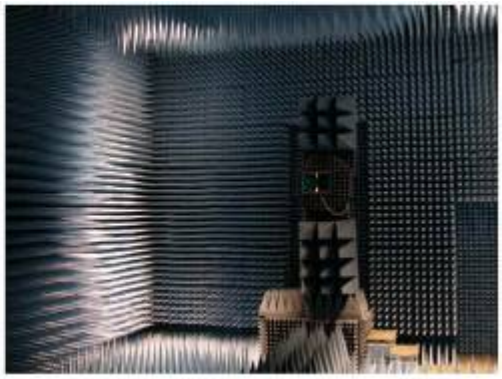
Start the Software Program and Measurement.

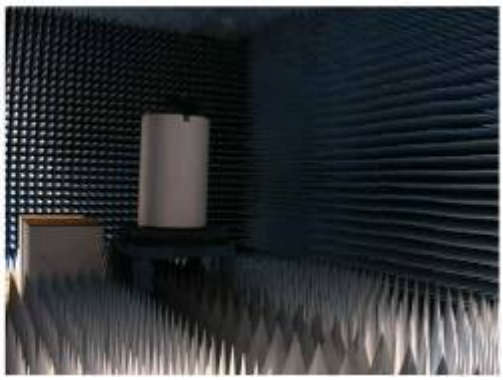
Step 4.

Measure and record Data.



Hewlett Packard 8722ES 50 MHz ~ 40 GHz
S-Parameter Network Analyzer





5. Measurement Data

Model Name	**W5E-WO-03L**		
Engineer	**W.I.Kwak**		
Antenna	**WiFi Dipole Antenna**		
Frequency	**2400 MHz ~ 2483.5 MHz**		

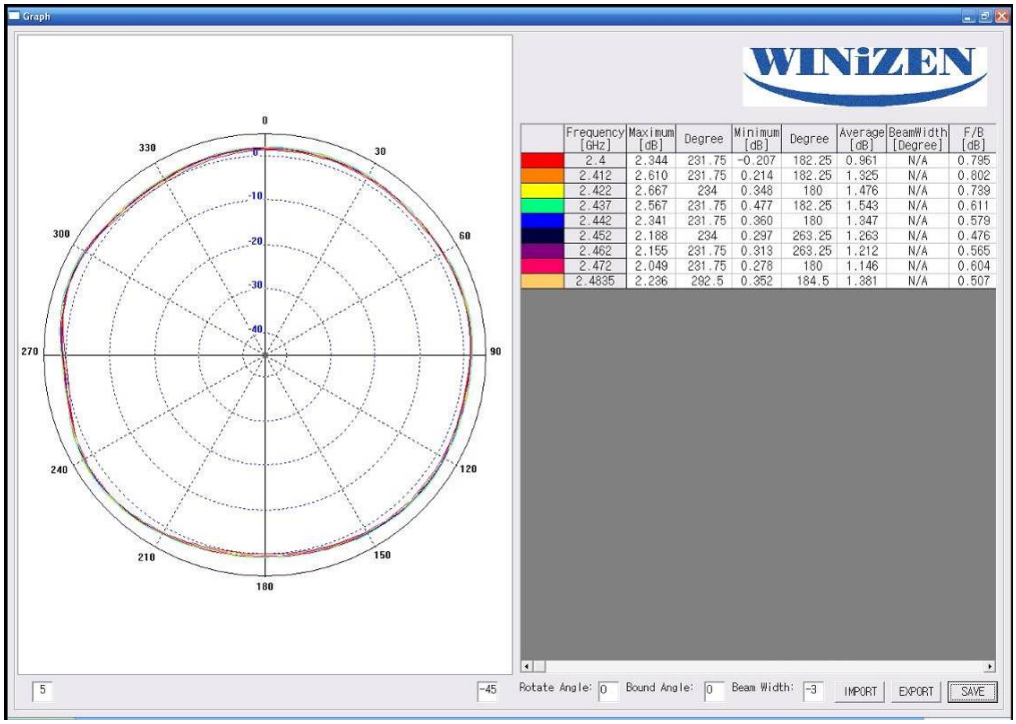
Items	Spec.	Test Result
Frequency	**2400 MHz ~ 2483.5 MHz**	**OK**
VSWR(Min)	**< 1.9**	**OK**
Gain(Max)	**2.5±1.0 dBi**	**OK**

5-1 VSWR

5-2 Return Loss

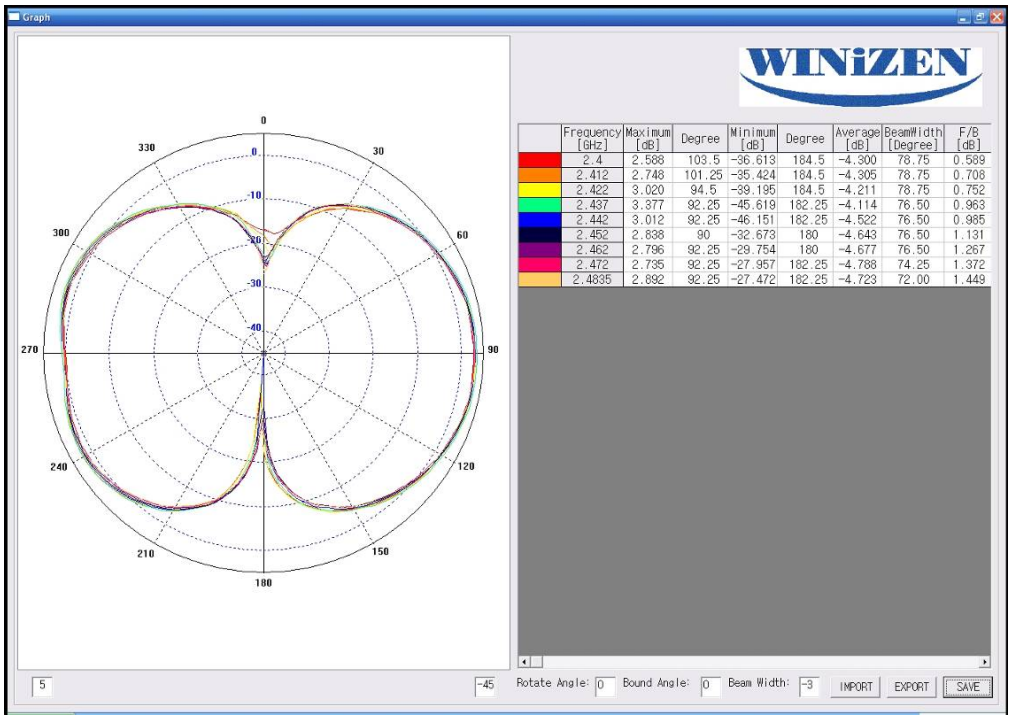
5-4 Radiation Pattern

a. Azimuth Pattern



	Frequency [GHz]	Maximum [dB]	Degree	Minimum [dB]	Degree	Average [dB]	BeamWidth [Degree]	F/B [dB]
	2.4	2.344	231.75	-0.207	182.25	0.961	N/A	0.795
	2.412	2.610	231.75	0.214	182.25	1.325	N/A	0.802
	2.422	2.667	234	0.348	180	1.476	N/A	0.739
	2.437	2.567	231.75	0.477	182.25	1.543	N/A	0.611
	2.442	2.341	231.75	0.360	180	1.347	N/A	0.579
	2.452	2.188	234	0.297	263.25	1.263	N/A	0.476
	2.462	2.155	231.75	0.313	263.25	1.212	N/A	0.565
	2.472	2.049	231.75	0.278	180	1.146	N/A	0.604
	2.4835	2.236	282.5	0.352	184.5	1.381	N/A	0.507

c. Elevation Pattern



	Frequency [GHz]	Maximum [dB]	Degree	Minimum [dB]	Degree	Average [dB]	BeamWidth [Degree]	F/B [dB]
	2.4	2.588	103.5	-36.613	184.5	-4.300	78.75	0.589
	2.412	2.748	101.25	-35.424	184.5	-4.305	78.75	0.708
	2.422	3.020	94.5	-39.195	184.5	-4.211	78.75	0.752
	2.437	3.377	92.25	-45.619	182.25	-4.114	76.50	0.963
	2.442	3.012	92.25	-46.151	182.25	-4.522	76.50	0.985
	2.452	2.838	90	-32.673	180	-4.643	76.50	1.131
	2.462	2.796	92.25	-29.754	180	-4.677	76.50	1.267
	2.472	2.735	92.25	-27.957	182.25	-4.788	74.25	1.372
	2.4835	2.892	92.25	-27.472	182.25	-4.723	72.00	1.449

6. QC Process

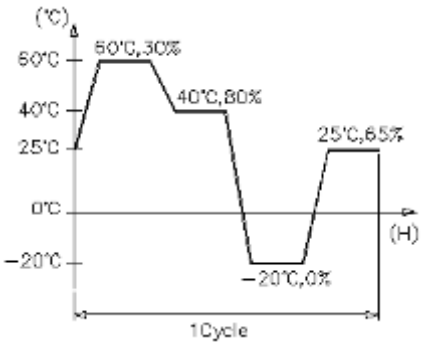
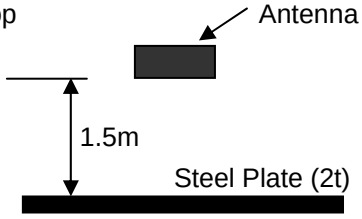
QC Process

Product	WiMAX/WLAN Dipole Antenna	Drawing No.		Document No.	WSQP-003	Issued	2006.9.1

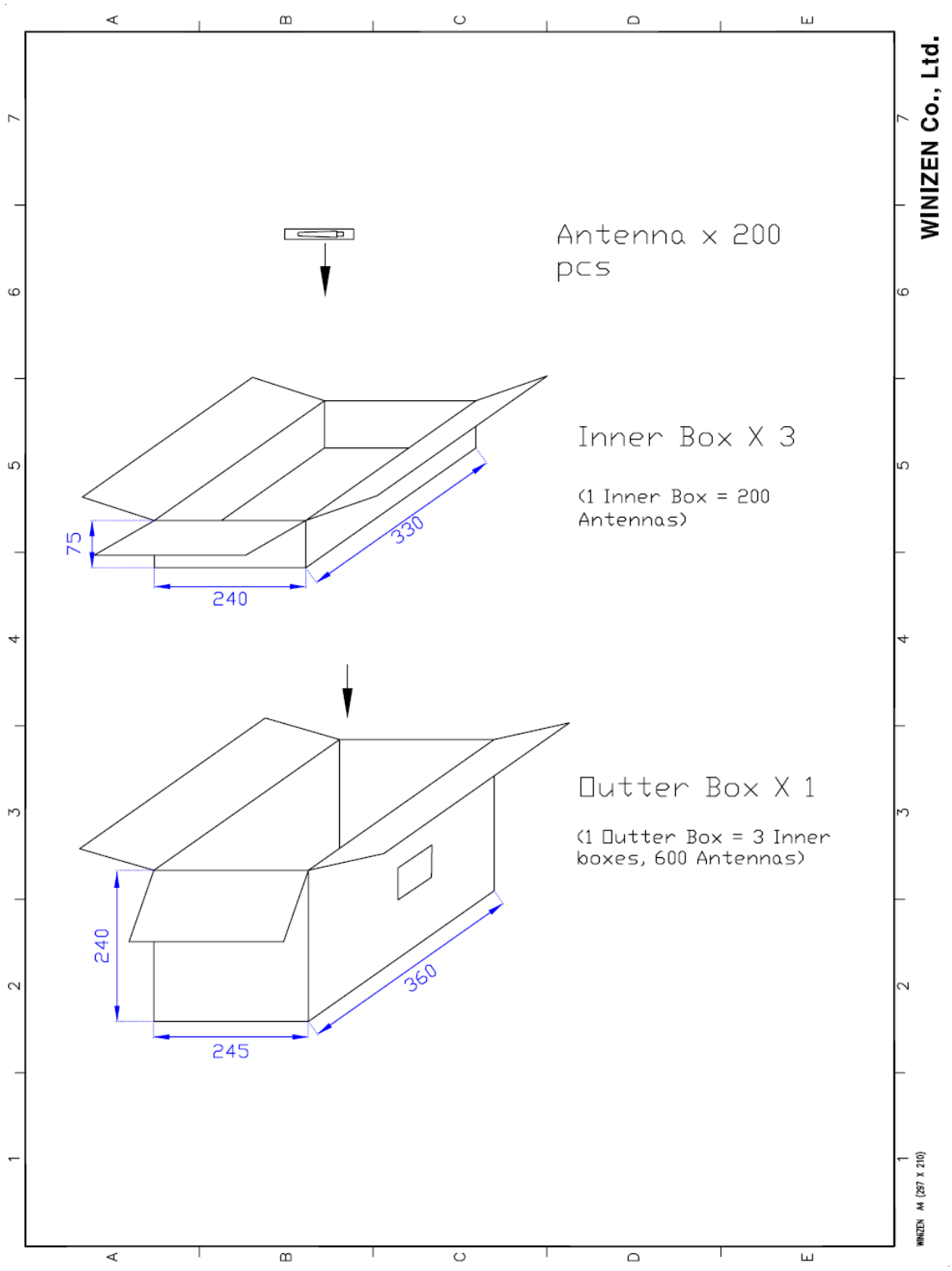
No	Mark	Process	Work	Facility	Checking Point (Method)	Standard			Note
						Item	Standard	Cycle	
1		Material	· Check Vendor	· Drawing	· Lot (FIFO)				
2		Incoming Inspection	· Outlook/Spec Inspection	· Network Analyzer, Vernier Calipers · Manual		· Appearance · Dimensions/ Electrical Spec.	· To be good (Color, Damage, Dimensions) · Meet Spec.	Lot	
3		Material	· Take items out of the warehouse (Moulds, Connector, Cable, etc.)		· Lot (FIFO)				
4		Assembly	· Assemby between connector and cable · Assembly of cable and PCB, Coil · Assembly of moulds	· Assembly Jig	· Full assembly				
5		Mechanical Inspection	· Check Ass'y status	· Manual	· Appearance (Moulds, Connector) · Bonding, Assembly	· Appearance · Assembly	· To be good, No bending and twisted. No damage, crack. · Assembly result to be good and solid.	All	
6		Electrical Inspection	· Test of electrical spec	· Network Analyzer	· Electrical spec	· VSWR	· Meet spec (less than 1.9)	All	CTQ
7		Packaging	· Pack the antenna into a plastic bag and a carton	· Manual, scale	· Packaging, Contents, Quantity · Appearance (Moulds, Connector)	· Appearance · Quantity	· Appearance to be good, No damage, crack. · Packaging to be solid, no damage. · Quantity to be correct.	All	
8		Outgoing Inspection	· Check electrical spec, Appearance, Packaging	· Network Analyzer, Vernier Calipers	· Appearance Inspection · Electrical spec Insspection	· Appearance · Electrical spec · Packaging	· To be good · Meet spec · To be good, Correct quantity	Sampling	
9		Shipment	· Load the products into the warehouse	· Hand car	· Check Lot · Storage conditions	· Packaging			

No	Revise	Revised item	Responsible
1	2007.8.20	Increase appearance inspection times	I.K.Lee

7. Reliability Test

Item	Specifications	Conditions	Test Result
Salt-water Resistance	No change of material characteristic	Temperature of 35℃, Concentration of 5%, Let stand for 48 hours	OK
Humidity Resistance	Changeable range of V.S.WR value± 0.5 No change of material characteristic	Temperature of 40℃, Humidity of 95%, Let stand for 96 hours	OK
Temperature Test **Temperature(˚C)**  	Changeable range of V.S.WR value± 0.5 No change of material characteristic	Increasing from +25℃, 65% to +60℃, 30%; 35min / Keeping on +60℃, 30% for 6hour / Decreasing from +60℃, 30% to +40℃, 80%; 20min / Keeping on +40℃, 80% for 8hour / Decreasing from +40℃, 80% to -20℃, 0%; 60min / Keeping on -20℃, 0% for 4hour / Increasing from -20℃, 0% to 25℃, 65%; 45min / Keeping on 25℃ for 3hour / 5Cycle time = 118hour and 20min	OK
Drop  	No disconnection No crack or damage	Drop the antenna at 1.5m height to the steel plate (2t) of ground	OK

8. Packaging


Antenna x 200 pcs
Inner Box X 3
(1 Inner Box = 200 Antennas)
75
240
330
Outter Box X 1
(1 Outter Box = 3 Inner boxes, 600 Antennas)
240
245
360
WINIZEN Co., Ltd.