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Product Name	Type	Rev.	Hutec	IR
HEL3G-B160-SM	External Antenna		Franklin Technology	


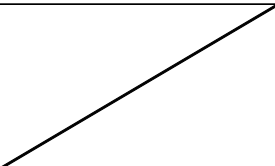

APPROVAL SHEET

Customer Name : Franklin Technology

Company Name : Hutec

Product Name : HEL3G-B160-SM

Description : T720 External Antenna

Written by	Checked by	Approved by
		

HUTEC Co.,Ltd

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1. Revision History of Product Specification

1.1 History List of Approval Sheet

History List of Approval Sheet							
NO.	Rev.		Rev. Date (Submission Date)	Revision Detail & Revised Contents	Amount	Request Dept.	Process Stage
	Franklin Technology	Hutec					
1		IR	2018.11.12	Approval publication	-	-	-

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2. Circuit Specification

2.1 Test Condition

2.1.1 Test Environment (Condition/Method)

① Voltage Standing Wave Ratio(VSWR)

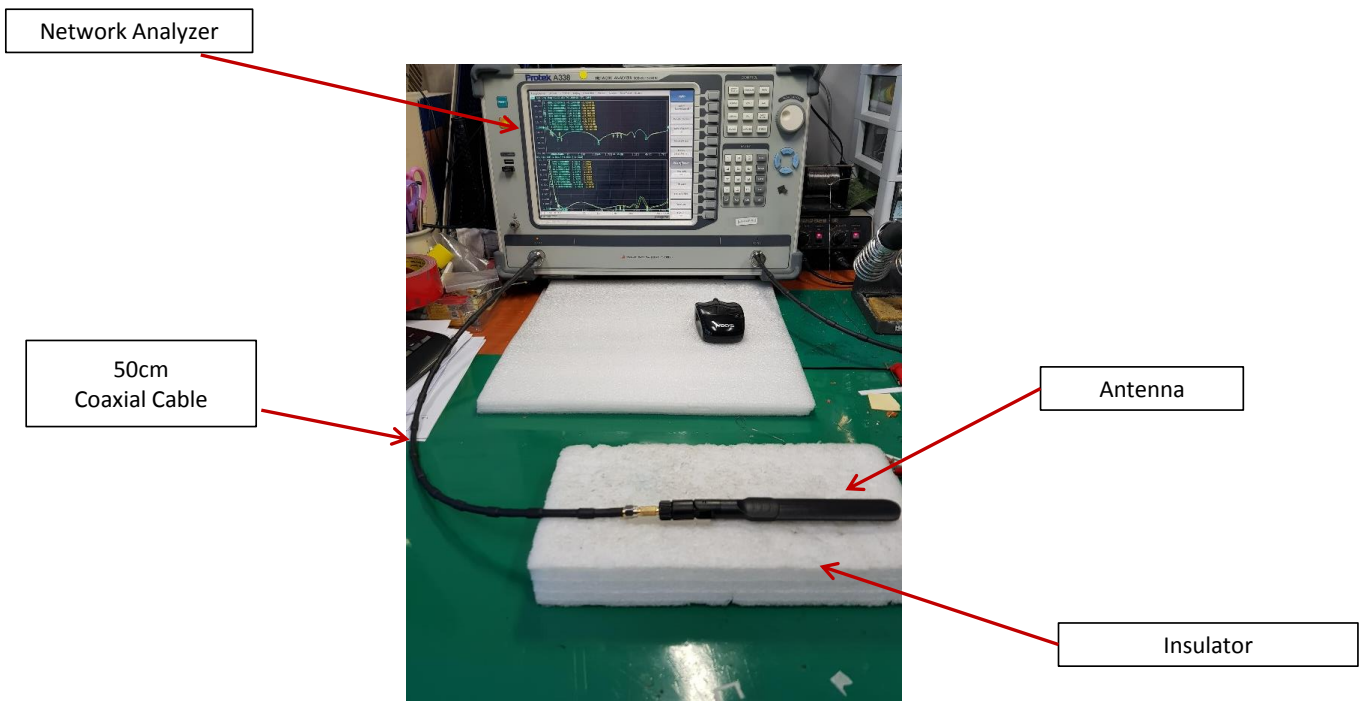
Step 1. Set the frequency range after connect 50cm cable to Network analyzer.

Step 2. Connect Calibration Kit to Network analyzer and calibrate.

Step 3. Fix the cable and keep separation distance over 30cm for reducing effect by Network analyzer.

Step 4. Fix insulator over 5cm on the bottom of measuring antenna.

Step 5. Measure VSWR with setting marker of desired frequency.



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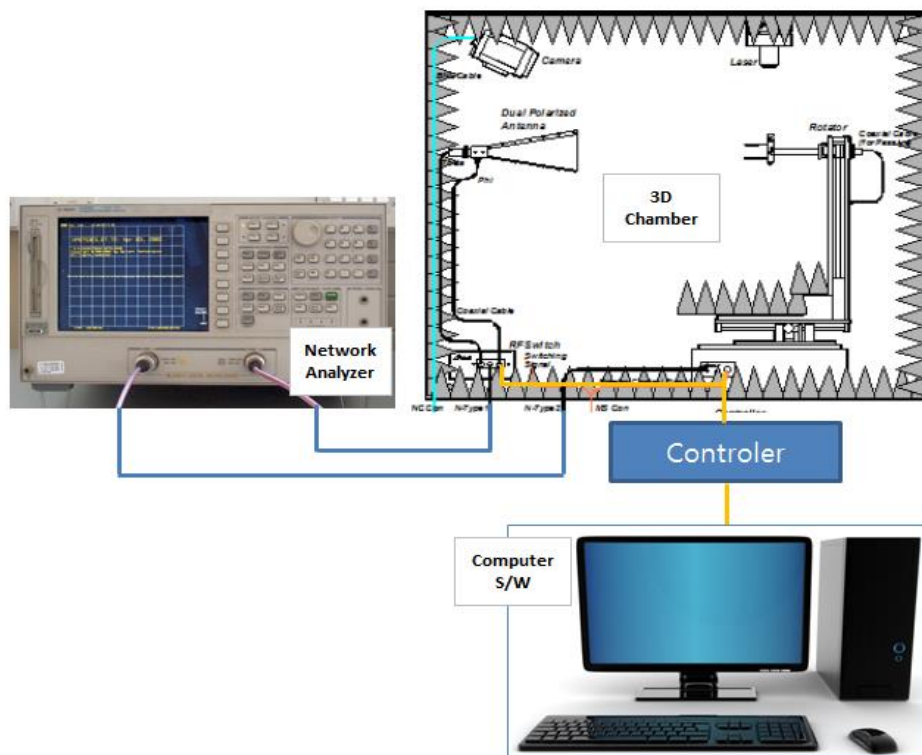
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② Radiation Pattern & Gain

Step 1. Calibrate the Chamber system using Horn antenna, and set up the software to control the Chamber system at the same time.

Step 2. Keep the measuring antenna to holder.

Step 3. Measure Gain & efficiency.



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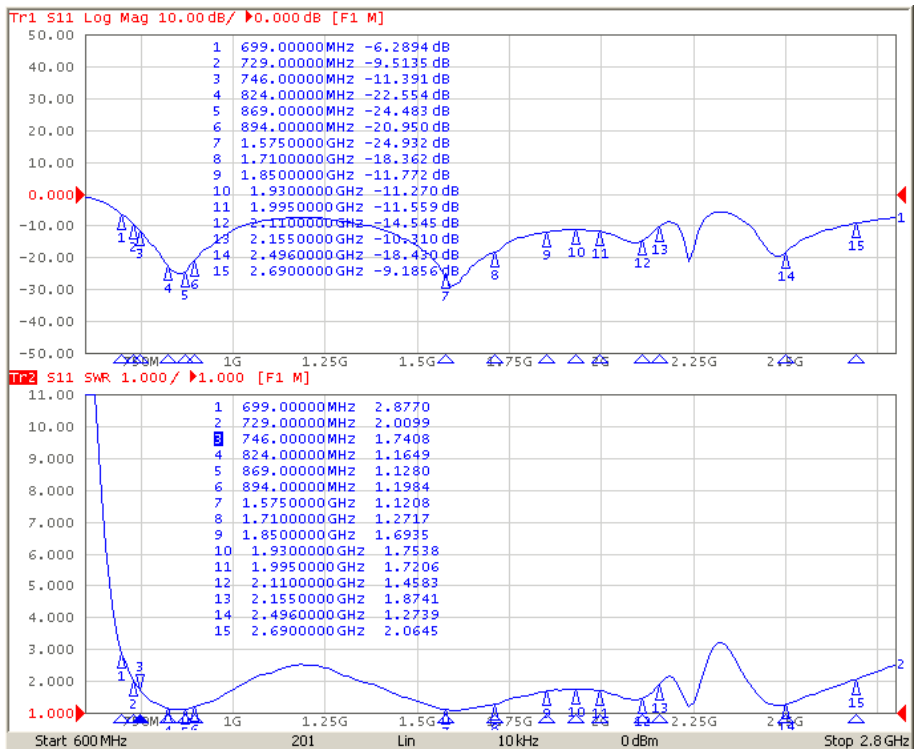
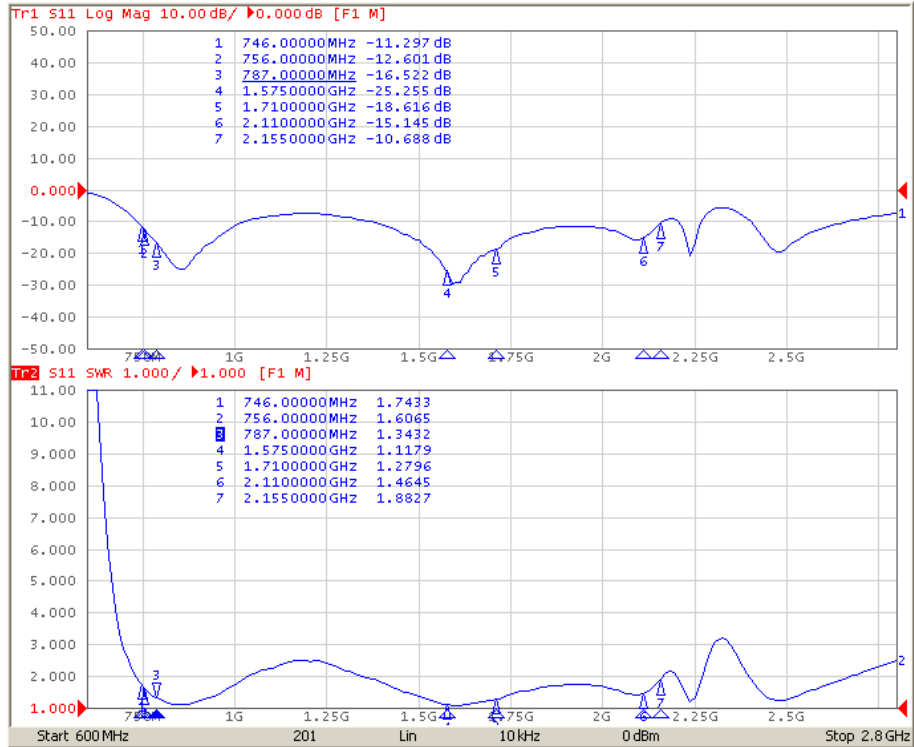
2.2 Electrical Requirement

Frequency	699MHz~746MHz	746~787MHz	824MHz~894MHz
VSWR	≤2.9	≤1.7	≤1.2
Peak Gain	3.7 dBi	5.6 dBi	5.2 dBi
Frequency	1575MHz	1710~2155MHz	2496Hz~2690MHz
VSWR	≤1.1	≤1.9	≤2.1
Peak Gain	3.7 dBi	4.8 dBi	5.1 dBi
Directivity	Omni-directional		
Polarization	Linear		
Feed Impedance	50 Ohms		
Power Handing	3Watt		

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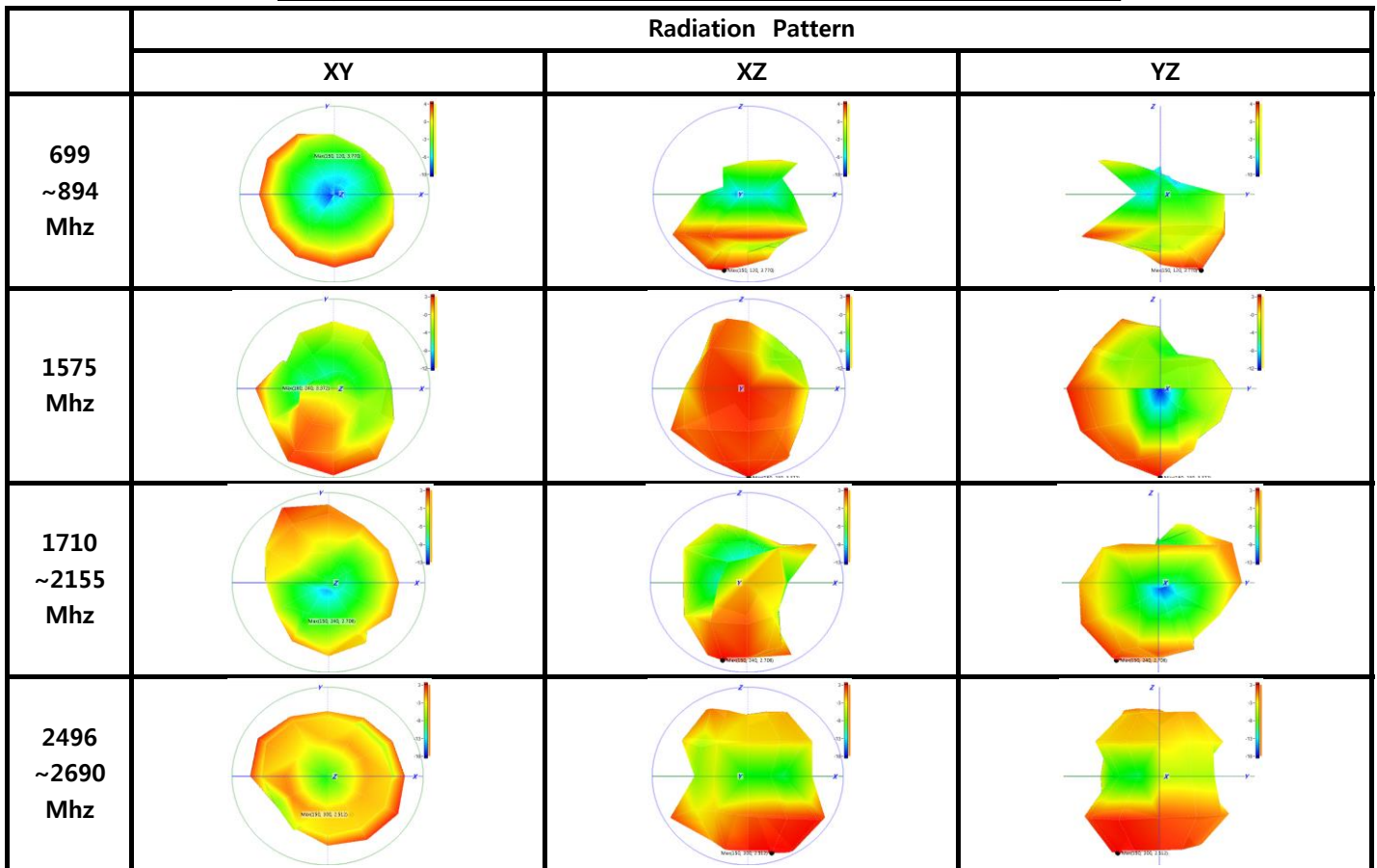
2.2.1 VSWR



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2.2.2 3D Gain & Radiation Pattern

No	Frequency	Peak Value		Minimum Value		Avg. Gain [dBi]	Efficiency [%]
	[MHz]	Value[dBi]	Degree	Value[dBi]	Degree		
1	699	3.418	120 / 240	-15.32	150 / 0	-1.839	65.483
2	708	3.767	120 / 240	-13.261	150 / 0	-1.271	74.63
3	716	3.648	120 / 240	-11.516	150 / 0	-1.174	76.316
4	729	3.33	120 / 240	-10.776	150 / 0	-1.293	74.252
5	738	2.105	150 / 240	-10.932	150 / 0	-2.057	62.275
6	746	2.96	150 / 240	-10.736	150 / 0	-1.578	69.53
7	751	3.241	150 / 240	-10.706	150 / 0	-1.54	70.148
8	756	3.621	150 / 240	-10.31	150 / 0	-1.389	72.63
9	777	5.134	120 / 270	-8.422	150 / 0	-0.704	85.039
10	782	5.409	120 / 270	-7.929	150 / 0	-0.634	86.408
11	787	5.63	120 / 270	-7.629	150 / 0	-0.55	88.107
12	824	4.876	120 / 270	-11.379	150 / 0	-0.939	80.562
13	837	4.873	120 / 270	-8.094	90 / 60	-0.721	84.701
14	849	4.871	120 / 270	-8.074	90 / 30	-0.515	88.82
15	869	5.267	150 / 240	-8.673	90 / 0	-0.385	91.51
16	882	4.498	150 / 240	-8.718	90 / 330	-0.77	83.759
17	894	3.613	150 / 240	-10.489	90 / 330	-1.014	79.182
18	1575	3.726	150 / 300	-8.311	120 / 210	-1.094	77.729
19	1710	4.002	150 / 300	-9.066	120 / 120	-1.508	70.661
20	1755	4.247	150 / 300	-9.311	120 / 330	-1.135	77.003
21	1850	4.885	150 / 300	-10.514	120 / 330	-0.873	81.796
22	1915	4.469	150 / 300	-13.001	30 / 30	-1.267	74.691
23	1930	4.637	150 / 300	-12.775	30 / 30	-1.005	79.348
24	1995	4.627	150 / 300	-15.264	30 / 30	-1.032	78.843
25	2110	3.652	90 / 210	-15.862	30 / 30	-1.408	72.303
26	2155	2.34	90 / 210	-11.415	30 / 90	-2.635	54.518
27	2496	3.732	150 / 300	-23.421	180 / 0	-1.677	67.975
28	2574	4.855	150 / 300	-19.452	180 / 0	-0.41	90.986
29	2612	5.194	150 / 300	-24.325	180 / 0	0.104	102.421
30	2690	3.049	120 / 300	-13.837	0 / 270	-0.796	83.25



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3. Mechanical Specification

3.1 Material Certificate

Product Name		HEL3G-B160-SM		
Ant Type		External Antenna		
No	Part Name	Raw Material	FINISH/COLOR	REMARKS
1	CONNECTOR	Brass etc	BLACK	-
2	COVER-LEFT	PC+ABS	BLACK	-
3	COVER-RIGHT	PC+ABS	BLACK	-
4	JOINT PIN	PC+PBT	BLACK	-
5	HOLDER	PC+PBT	BLACK	-
6	JOINT PIN	PC+PBT	BLACK	-
7	RF-CABLE	RG178	SKIN BROWN	-

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3.2 Mechanical Drawing

REVISIONS

REV.	DATE	DESCRIPTION	REMARKS
V10	20180618	Initial release.	

NOTE.

- GENERAL TOLERANCE : ± 0.15
- No blanking BURR or mark.
- No harmful defects on surface.

NO	PART NO	PART NAME	MATERIAL	QTY	FINISH/COLOR	REMARKS
7	N/A	RF CABLE	RG-178	1	Skin Brown	N/A
6	N/A	CONNECTOR	SMA(M)	1	BLACK	N/A
5	N/A	JOINT PIN	PBT+PC	2	BLACK	N/A
4	N/A	HOLDER	PBT+PC	1	BLACK	N/A
3	N/A	JOINT	PBT+PC	1	BLACK	N/A
2	N/A	COVER-RIGHT	ABS+PC	1	BLACK	N/A
1	N/A	COVER-LEFT	ABS+PC	1	BLACK	N/A

TOLERANCES TABLE		PART NO.		NAME OR TITLE	
DIM	Tolerance				
0.5~6	± 0.05	N/A		ANTENNA ASS'Y	
6~30	± 0.1	0A/CONFIG	용보리	HEL3G-B160-SM	
30~70	± 0.15				
70~100	± 0.2				
100~1000	± 0.3				

UNIT	SCALE	ANGLE
mm	1:1	
REV. V10	김계상	
SHEET 1 of 1	181112	181112

Hutec
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본사의 동의없이 도면을 불법으로 복사/복제할수 없음. HUTEC FORM A2 (594mm X 420mm)

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4. Quality Specification

4.1 Test Requirement(Include Test Report)

Reliability Test Report		작 성	검 토	승 인
		<i>AB.</i>	/	<i>[Signature]</i>
Test Purpose	Approval	Person in Charge	Hong Bo Ra	
Test Period	2018.12.08~2018.12.11.	Date	2018.12.12.	
Product Name	HEL3G-B160-SM	ANTENNA TYPE	External Antenna	
Request Dep.	R & D	Smample Amount	30ea	
Product Info.	N/A	Customer	Franklin Technology	
Final Result		PASS		

Test Item		Test Conditions / Judgment Standards	RESULT
1	Document Evaluation	<ul style="list-style-type: none"> - Check if there is any omission or error of drawing, approval sheet, requested document. - Sould meet the required specification and test standard of EWAVE. 	OK
2	Characterisitic	Apperance <ul style="list-style-type: none"> - Check if there is any external defect by visual inspection - Do not have disorder such as Scratch, Deformation, BURR, Discolor, MISREGISTRATION, Stain, etc. 	OK
		Size <ul style="list-style-type: none"> - Should meet management standards on drawing and approval sheet. - Measure major point using vernier calipers, microscope, etc. * Basic Measurement Point: full length/width, thickness and other major point 	OK
		Electrical Characteristic <ul style="list-style-type: none"> - Should meet management standards on drawing and approval sheet. - Test with setting as following. 1. Recommend to test in place where shield from outer electromagnetic wave completely for equipment setting and test environment. (Shield Room etc.) 2. Calibrate Network Analyze before test. 3. Measure VSWR item using Test JIG 4. Check each frequency when measure VSWR. ※ Note: Set up measurement instrumnet with over 30Cm seperation distance and over 5Cm from the floor using sponge to minimize influence of electromagnetic waves. 	OK

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Test Item		Test Conditions / Judgment Standards	RESULT
3	Heat Shock	1.Test Conditions - Test temperature/Time: -30°C/30min, 50°C/30min - Test Cycle: Keep 4Hrs at room temperature after 24 Cycle 2.Judgement Standards - Do not have damage outside, Do not have problem for using, Do not have problem with VSWR.	OK
4	High Temperature/ High Humidity Storage	1.Test Conditions - Test Condition: 60°C/95% - Test Time: Keep 4Hrs at room temperature after 48Hrs 2.Judgement Standards - Do not have damage outside, Do not have problem for using, Do not have problem with VSWR.	OK
5	High Temperature Storage	1.Test Conditions - Test temperature: 60°C - Test Time: Keep 4Hrs at room temperature after 48Hrs 2.Judgement Standards - Do not have damage outside, Do not have problem for using, Do not have problem with VSWR.	OK
6	Low Temperature Storage	1.Test Conditions - Test temperature: -30°C - Test Time: Keep 4Hrs at room temperature after 48Hrs 2.Judgement Standards - Do not have damage outside, Do not have problem for using, Do not have problem with VSWR.	OK
7	Salt Spray	1.Test Conditions - Test temperature: 35°C salinity 5% - Test Time: 48Hr 2.Judgement Standards - Do not have damage outside, Do not have problem for using, Do not have problem with VSWR.	OK