

DATE	2018.11.12
Page	1 / 12

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

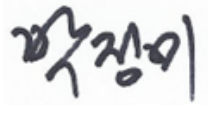
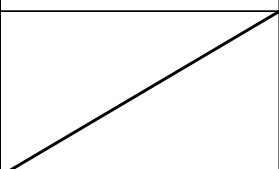
APPROVAL SHEET

Customer Name : Franklin Technology

Company Name : Hutec

Product Name : HEL3G-B160-SM

Description : T720 External Antenna

Writtern by	Checked by	Approved by
		

HUTEC Co.,Ltd

DATE	2018.11.12		
Page	2	/	12

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

► Contents ◀

1. Revision History of Product Specification

1.1 History List of Approval Sheet-----	3
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2. Circuit Specification

2.1 Test Condition-----	4~5
2.1.1 Test Environment (Condition/Method)	
2.2 Electronic Specifcation -----	6
2.2.1 VSWR -----	7
2.2.2 3D Gain & Radiation Pattern -----	8

3. Mechanical Specification

3.1 Material Certificate -----	9
3.2 Mechanical Drawing -----	10

4. Quality Specification

4.1 Test Requirement(Include Test Report) -----	11~12
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Product Name	Type	Rev.	Hutec	IR
HEL3G-B160-SM	External Antenna		Franklin Technology	

2. Circuit Specification

2.1 Test Condition

2.1.1 Test Environment (Condition/Method)

① Voltage Standing Wave Ratio(VSWR)

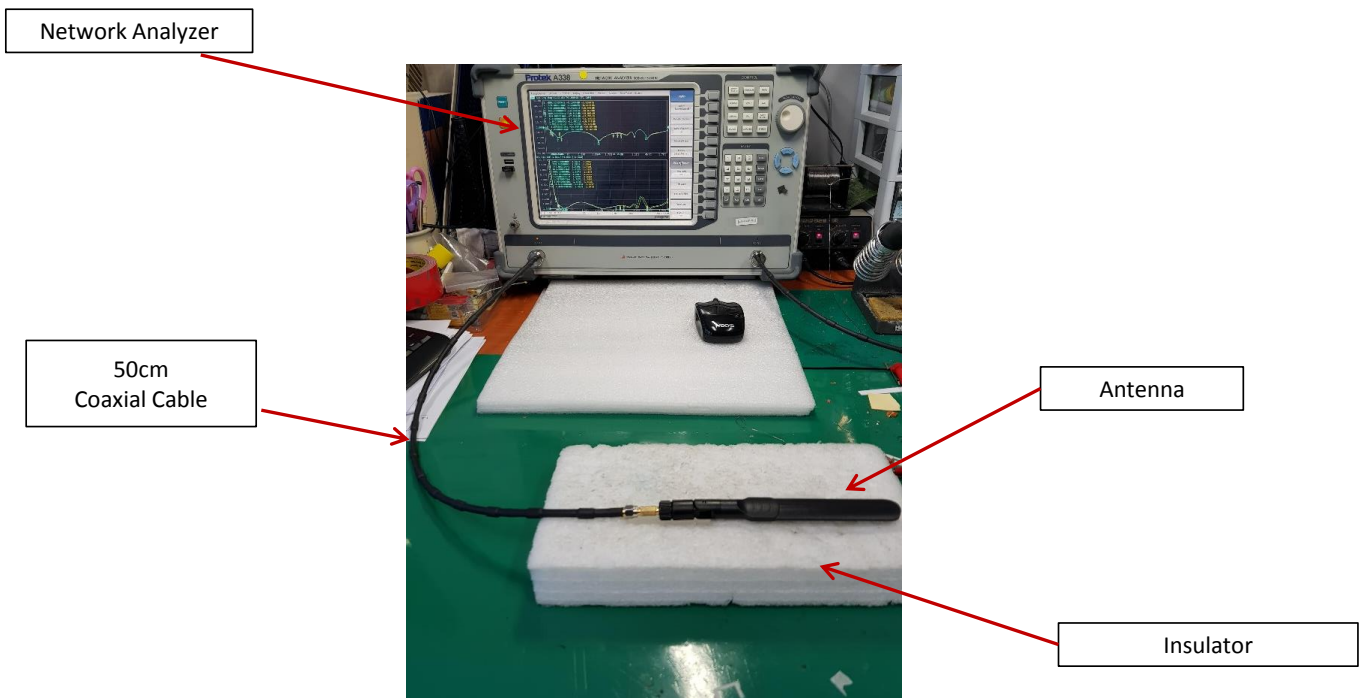
Step 1. Set the frequency range after connect 50cm cable to Network analyzer.

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.



DATE	2018.11.12
Page	5 / 12

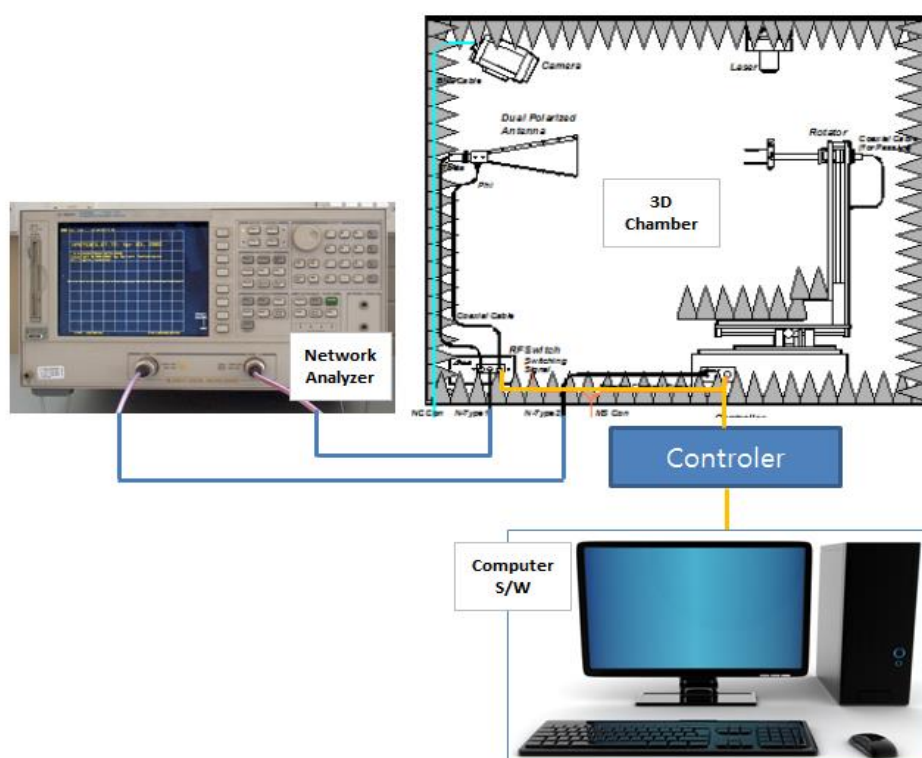
Product Name	Type	Rev.	Hutec	IR
HEL3G-B160-SM	External Antenna		Franklin Technology	

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.



DATE	2018.11.12
Page	6 / 12

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

2.2 Electrical Requirement

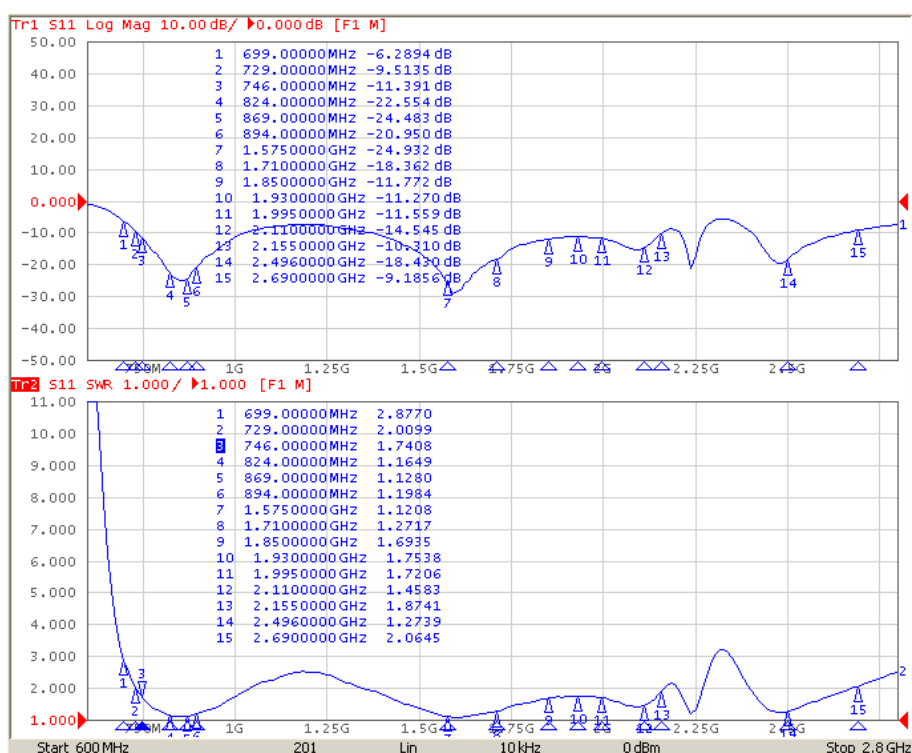
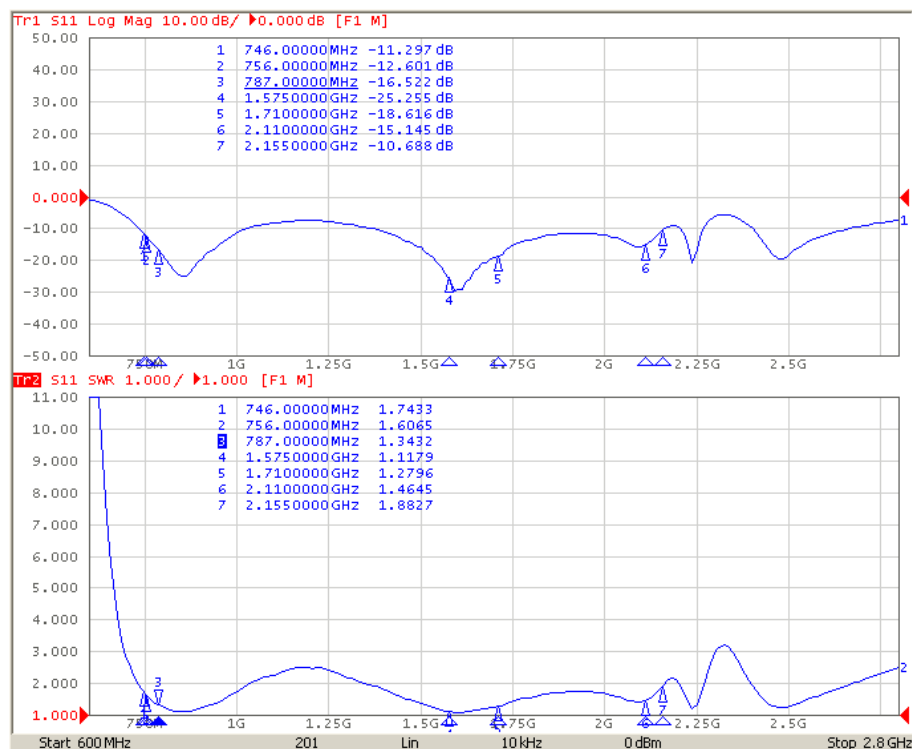
Frequency	699MHz~746MHz	746~787MHz	824MHz~894MHz
VSWR	≤2.9	≤1.7	≤1.2
Peak Gain	3.7 dBi	5.6 dBi	5.2 dBi

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 Handling	3Watt

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HEL3G-B160-SM	External Antenna		Franklin Technology	

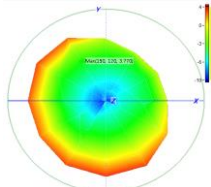
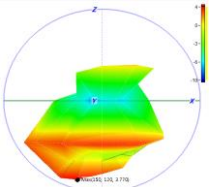
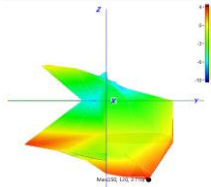
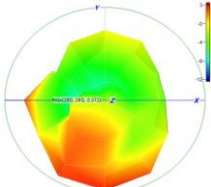
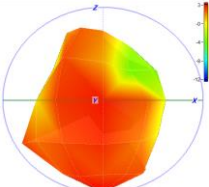
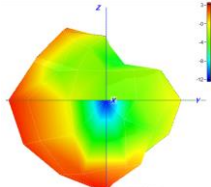
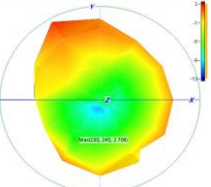
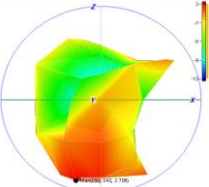
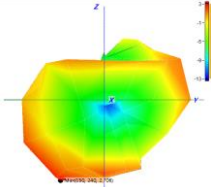
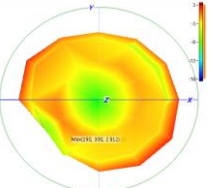
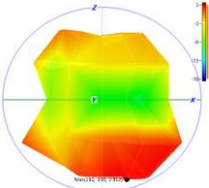
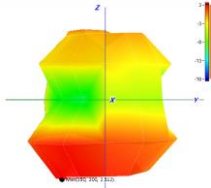
2.2.1 VSWR



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

2.2.2 3D Gain & Radiation Pattern

No	Frequency	Peak Value		Minimum Value		Avg. Gain	Efficiency
	[MHz]	Value[dBi]	Degree	Value[dBi]	Degree	[dBi]	[%]
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

	Radiation Pattern		
	XY	XZ	YZ
699 ~894 Mhz			
1575 Mhz			
1710 ~2155 Mhz			
2496 ~2690 Mhz			

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HEL3G-B160-SM	External Antenna		Franklin Technology	

3. Mechanical Specification

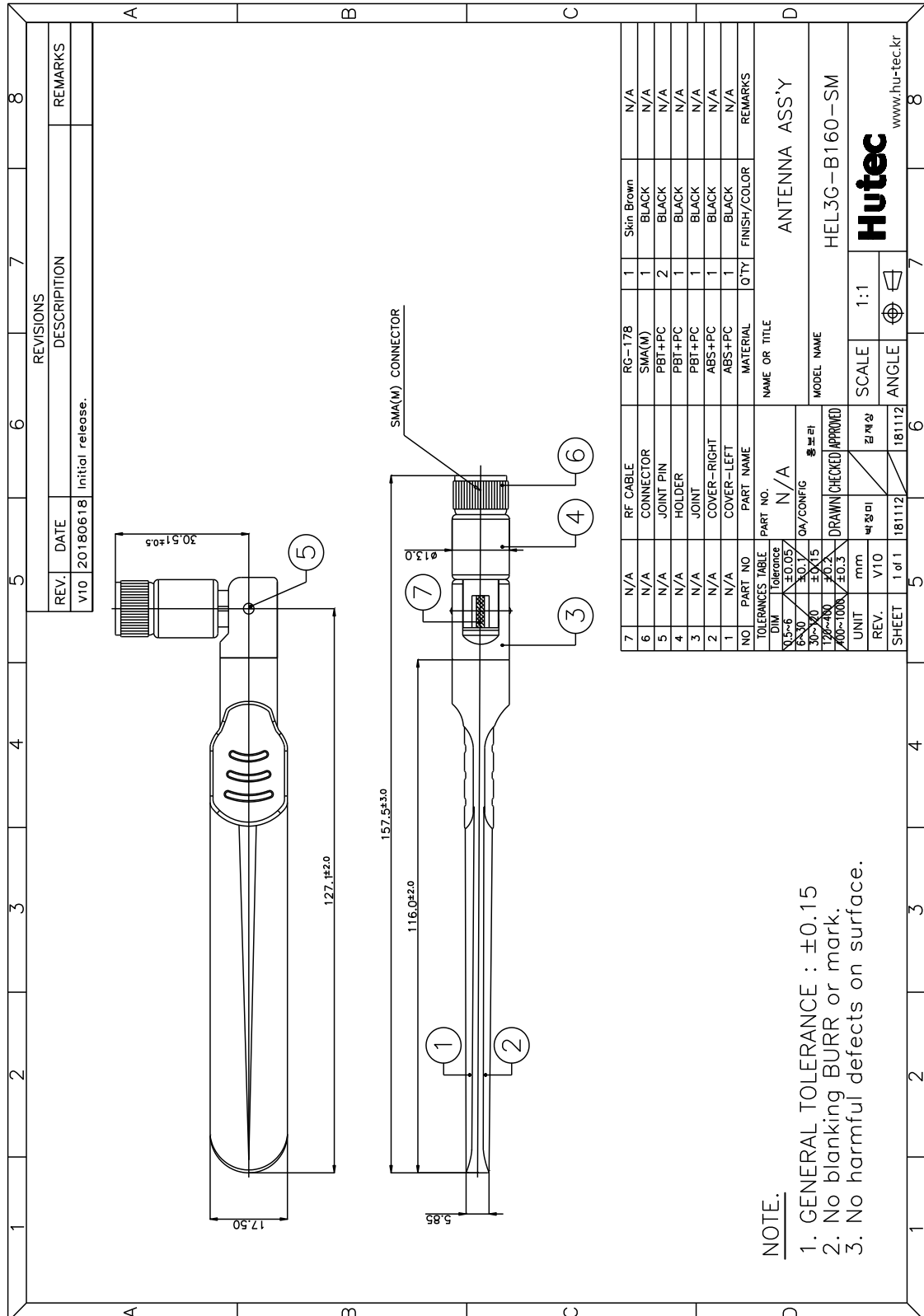
3.1 Material Certificate

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	-

DATE	2018.11.12		
Page	10	/	12

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

3.2 Mechanical Drawing

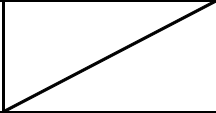


DATE	2018.11.12
Page	11 / 12

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

4. Quality Specification

4.1 Test Requirement(Include Test Report)

Reliability Test Report		작 성	검 토	승 인
				
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	- 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	Characteristics	Apperance - 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 - 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 - 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

DATE	2018.11.12
Page	12 / 12

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

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