

10. WLAN Operational Description

Within USA:

- WiFi 2.4 GHz 802.11 (b/g/n)
- Wi-Fi 5.0 GHz 802.11(a/n) (HT20,HT40)
- Wi-Fi Direct(2.4GHz and 5.8GHz only)
- Mobile Hotspot(2.4GHz & 5.8GHz only)

This device is capable of operating in 802.11a/n mode. For 802.11a/n devices operating in the frequency range of 5.15 - 5.25 GHz, they are restricted for indoor operations to reduce any potential harmful interference for Mobile Satellite Services (MSS) in the US. WIFI Access Points that are capable of allowing your device to operate in 802.11a/n mode (5.15 - 5.25 GHz band) are optimized for indoor use only. If your WIFI network is capable of operating in this mode, please restrict your WIFI use indoors to not violate federal regulations to protect Mobile Satellite Services.

The GT-I9158V supports the following frequency ranges and is only client device in 5GHz bands.

The following table lists the actual channel/frequency plan for the 2.4GHz and 5GHz operation in USA.

This device only supports Active scanning on non-DFS frequencies.

WLAN: 2412-2462 MHz. 5745 – 5825MHz

UNII: 5180 – 5240MHz, 5260 – 5320MHz, 5500 – 5700MHz

- 2.4 GHZ 20MHz BW

Channel	Freq.(MHz)	Scanning	Channel	Freq.(MHz)	Scanning
1	2412	Active	7	2442	Active
2	2417	Active	8	2447	Active
3	2422	Active	9	2452	Active
4	2427	Active	10	2457	Active
5	2432	Active	11	2462	Active
6	2437	Active			

- 5 GHZ 20MHz BW

Channel	Freq. (MHz)	Scanning	Channel	Freq. (MHz)	Scanning	Channel	Freq. (MHz)	Scanning
36	5180	Active	64	5320	Passive	136	5680	Passive
40	5200	Active	100	5500	Passive	140	5700	Passive
44	5220	Active	104	5520	Passive	149	5745	Active
48	5240	Active	108	5540	Passive	153	5765	Active
52	5260	Passive	112	5560	Passive	157	5785	Active
56	5280	Passive	116	5580	Passive	161	5805	Active
60	5300	Passive	132	5660	Passive	165	5825	Active

- 5 GHZ 40MHz BW

Channel	Freq. (MHz)	Scanning	Channel	Freq. (MHz)	Scanning
38	5190	Active	110	5550	Passive
46	5230	Active	134	5670	Passive
54	5270	Passive	151	5755	Active
62	5310	Passive	159	5795	Active
102	5510	Passive			

Ad-hoc or peer-to-peer modes are not supported operating in the UNII DFS bands(Band 2 and 3). This NII transmitter is a client-only device without radar detection capability in the DFS bands.

The client software and associated drivers can not initiate any transmission on DFS frequencies, which includes transmissions for beacon, ad-hoc, and peer-to-peer modes. Operation as an access point on non-DFS legacy frequencies is also not supported. The software is locked by the module manufacturer such that there is no access and the settings can not be changed by the integrator of the module or the end user of the device. When Hotspot Mode is activated by the end-user, all 5GHz WIFI bands are disabled.

- This device is under the control of a local master that is acting as an access point and is connected to AC Power in the NII Band 1 for indoor operation.

In 5GHz band, WLAN chipset works only for necessary data transmission. When data transmission is not needed, this device actually shutdown Tx path. So, This device automatically discontinues its transmission in case of either absence of information to transmit or operational failure.

WI-FI Direct Description

Wi-Fi Direct Channel

- All Channels in the 2.4 GHz band spectrum.
- Limited to Channels 149-165 in the 5 GHz band spectrum.

The main transmitter of the antenna on the device is not restricted from simultaneously transmitting with Wi-Fi while Wi-Fi Direct is enabled.

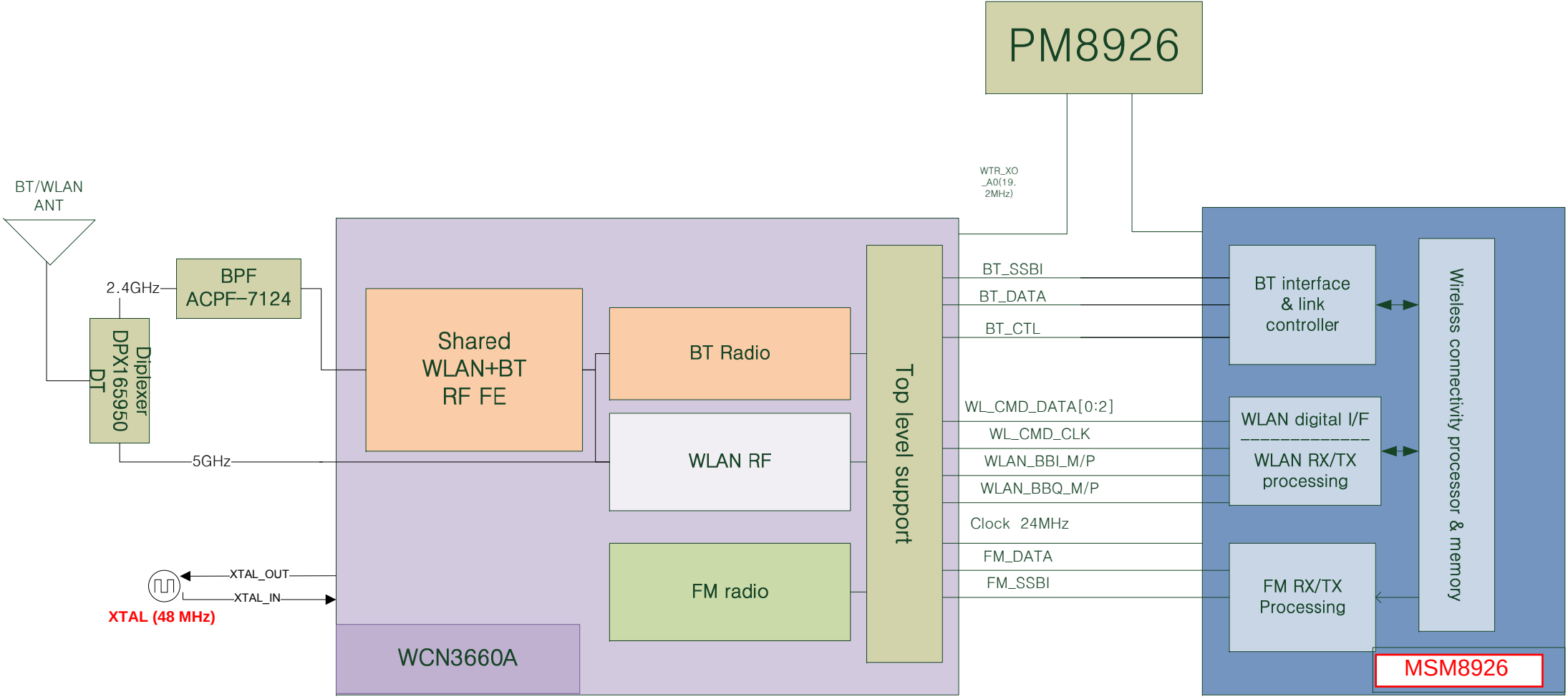
Wi-Fi Direct is not expected to be used simultaneously with another licensed transmitter held-to-ear, body-worn, or in the user's pocket. We expect Wi-Fi Direct to be used while in the person's hand (typical) or connected to the wall outlet (for more prolonged usage)

Wi-Fi Direct Certified devices can support either an infrastructure connection or a peer to peer connection. The devices connect by forming Groups that function like Infrastructure BSS (Basic Service Set). Keep in mind that Wi-Fi Direct devices don't have full Wi-Fi functionality like you would find in Access Points. Consider a Peer to Peer Group that is made up of a legacy Wi-Fi device and a couple of Wi-Fi Direct devices.

One of the Wi-Fi Direct devices has to serve as the Group owner.

As part of the specification, there are multiple mandatory mechanisms that must be filled by devices in the group.

1. Group Formation is the mechanism to determine which Wi-Fi Direct device is the leader of the group.
2. Device Discovery is the mechanism to locate Wi-Fi Direct devices and exchange pertinent information about each device in the group.
3. Client Discovery is the mechanism that enables a Wi-Fi Direct device to determine all the devices in the group.



The WCN3680/WCN3660A IC integrates four different wireless connectivity technologies into a single device suitable for handsets and other mobile devices:

- Dual-band 2.4 GHz and 5 GHz wireless local area network (WLAN) compliant with the IEEE802.11a/b/g/n/ac specification
- Bluetooth (BT) compliant with the BT specification version 4.0 (BR/EDR + BLE); ANT+ support
- Worldwide FM radio, with Rx and Tx modes supporting the Radio Data System (RDS) for Europe and the Radio Broadcast Data System (RBDS) for the USA

The WCN3680 IC uses low-power 65 nm RF CMOS fabrication technology, making it perfectly suited for battery-operated devices where power consumption and performance are critical.

Top-level support circuits that interface with the modem IC, buffer the TCXO input, generate the wireless connectivity network (WCN) internal clocks, and gate and distribute DC power to the other blocks.

The analog interface signals between the WLAN digital baseband of the wireless connectivity subsystem (WCS) in the host. The I/Q baseband analog interface consists of four transmission lines shared between the Tx and Rx paths. In Tx mode these four lines are used to connect DAC output pins to Tx BBF input pins; the ADC input pins and Rx BBF output pins are in high-Z mode. For Rx mode, conversely, the four lines are used to connect the Rx BBF output pins to ADC input pins as the DAC outputs and Tx BBF inputs are in high-Z mode.

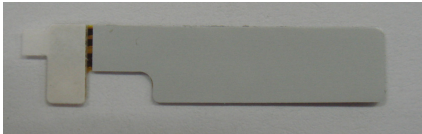
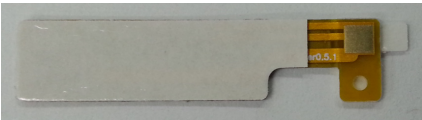
Receive

The WCN3680 has a wide dynamic range, direct conversion receiver. It employs high order on-chip channel filtering to ensure reliable operation in both noisy 2.4GHz ISM band and 5G band. The excellent noise figure of the receiver makes an external LNA unnecessary. The reverse operations are performed. The in-phase (I) and quadrature (Q) signals are send to digital baseband IC as like to MSM. Wireless connectivity subsystem block in baseband IC perform demodulation and then de-scrambled and de-framed.

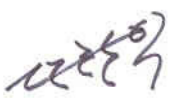
Transmit

A linear, high gain power amplifier is used externally. WCN3680 is capable of delivering 17/13dBm of nominal output power and adheres to IEEE 802.11 ac specifications with external power amplifier. Tx power resolution is 0.5dB. Modulated data which come from baseband IC is up-converted to the 2.4GHz and 5GHz. All kind of modulation and coding jobs are performed in baseband IC and then WCN3680 just do multiplexing and up-converting.

Approval Sheet

Products	FPCB Antenna	3D Structure
Supplier CODE	AFD2450I91QB	 Top  Bottom
Model	GT-I9152P [BT-WIFI]	
SEC CODE	GH42-04613A	
Revision	VER 1.0	
Supplier	PARTRON	
mold material	SKD-11	
Capa.	3,000K EA / Month	

MSL	LEAD FREE	BFRs-Free, Halogen-Free
MSL 1		

By designed	By checked	By approved
이 효 식		
Hyo-Sic Lee	Chan-Ik.Jeon	Nam-Sik.Min
12/11	12/11	12/11

- Contents -

※ Cover	1 p
※ Contents	2 p
1. Revision History	3 p
2. Introduction	4 p
3. Special Management	4 p
4. Electrical Characteristics	5 p
5. Measurement Process	15 p
6. Primary Inspection List	17 p
7. Reliability Condition	18 p
8. Mechanical Characteristics	20 p
9. Attention	22 p
10. Packing	23 p
11. Process control	24 p
12. Raw Material Part List	25 p
13. SAMPLE History	26 p

1. Revision History

Revision No	Originator	Description of changes	Date of changes
Ver 1.0	Chanik.Jeon	Issued	2013.12.11

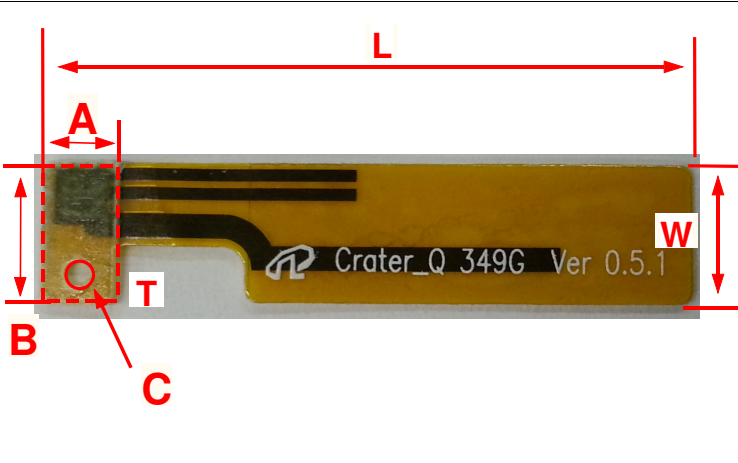


2. Introduction

2.1 Introduction of Product

This product is a FPCB BT antenna that the thin copper is printed inside FPCB

2.2 Specification and Dimension

Size [mm]	W = 5.84 ± 0.05 (CPK : 2.27)	
	L = 26.10 ± 0.05 (CPK : 2.07)	
	T = 0.60 ± 0.05 (CPK : 2.17)	
	A = 3.10 ± 0.05 (CPK : 2.17)	
	B = 6.00 ± 0.05 (CPK : 2.03)	
	C = 1.00 ± 0.05 (CPK : 2.17)	
Temperature [°C]	-40 ~ +80	
Humidity [%]	At the normal temperature, RH 100	
Cycle of management	Per LOT 1/day	
Inspection Set Number	30EA	
Inspection Item	Import Inspection, Characteristic Inspection, Aspect Inspection	

Electrical Characteristics (CTF)	Characteristics	VSWR(CTF)	Cycle	Set Number	CPK	note
	1225MHz	1.1 ~ 2.1 : 1.0	whole inspection	whole	2.60	4,7,17 Page
	1285MHz	1.1 ~ 2.1 : 1.0	whole inspection	whole	2.30	4,7,17 Page

3. Special Management()

- The below things are special management items

CTF 	Reason
SWR Measurement	This item is an important parameter that fix an electrical characteristic

- Care about the below things

ITEM	Content
Keeping	Sealing tightly when keeping for a long time
Action	Maybe characteristics is changed when changed any design

4. Electrical Characteristics

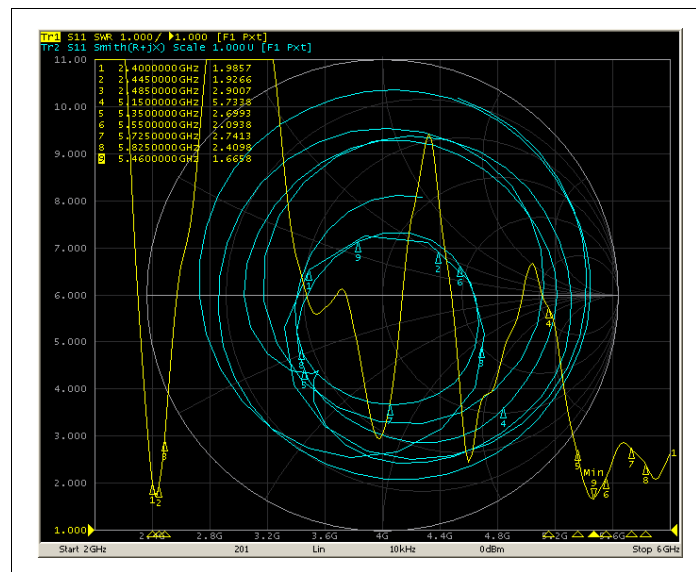
4.1-1 Set Condition(2.4GHz)

ITEM				SPEC
Frequency Range [MHz]				2400 ~ 2485
SWR [Max]				3.5 : 1 (Typ 3.0 : 1)
Input Impedance [Ω]				50 Ohm
Polarization				Linear
Gain [dBi]	Total Gain (Peak / Avg) [dBi]			-5.8 / -10.8
	Azimuth	Theta	Peak	-6.57
			Average	-9.96
		Phi	Peak	-8.45
			Average	-13.19
	Elevation 1	Theta	Peak	-5.26
			Average	-10.82
		Phi	Peak	-3.6
			Average	-9.13
	Elevation 2	Theta	Peak	-7.49
			Average	-12.8
		Phi	Peak	-5.43
			Average	-10.49

4.1-2 Set Condition(5GHz)

ITEM				SPEC
Frequency Range [MHz]				5150~5825
SWR [Max]				5.0 : 1 (Typ 4.5 : 1)
Input Impedance [Ω]				50 Ohm
Polarization				Linear
Gain [dBi]	Total Gain (Peak / Avg) [dBi]			-4.8 / -9.7
	Azimuth	Theta	Peak	-2.47
			Average	-6.85
		Phi	Peak	-9.55
			Average	-14.98
	Elevation 1	Theta	Peak	-8.6
			Average	-14.07
		Phi	Peak	-1.39
			Average	-7.28
	Elevation 2	Theta	Peak	-7.31
			Average	-10.98
		Phi	Peak	-5.66
			Average	-10.0

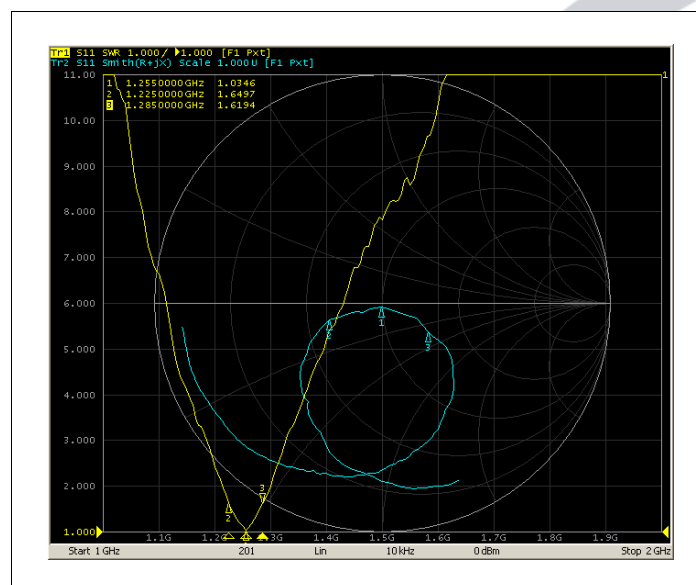
4.2 S11 Graph of Set Condition



4.3 Test Fixture Condition

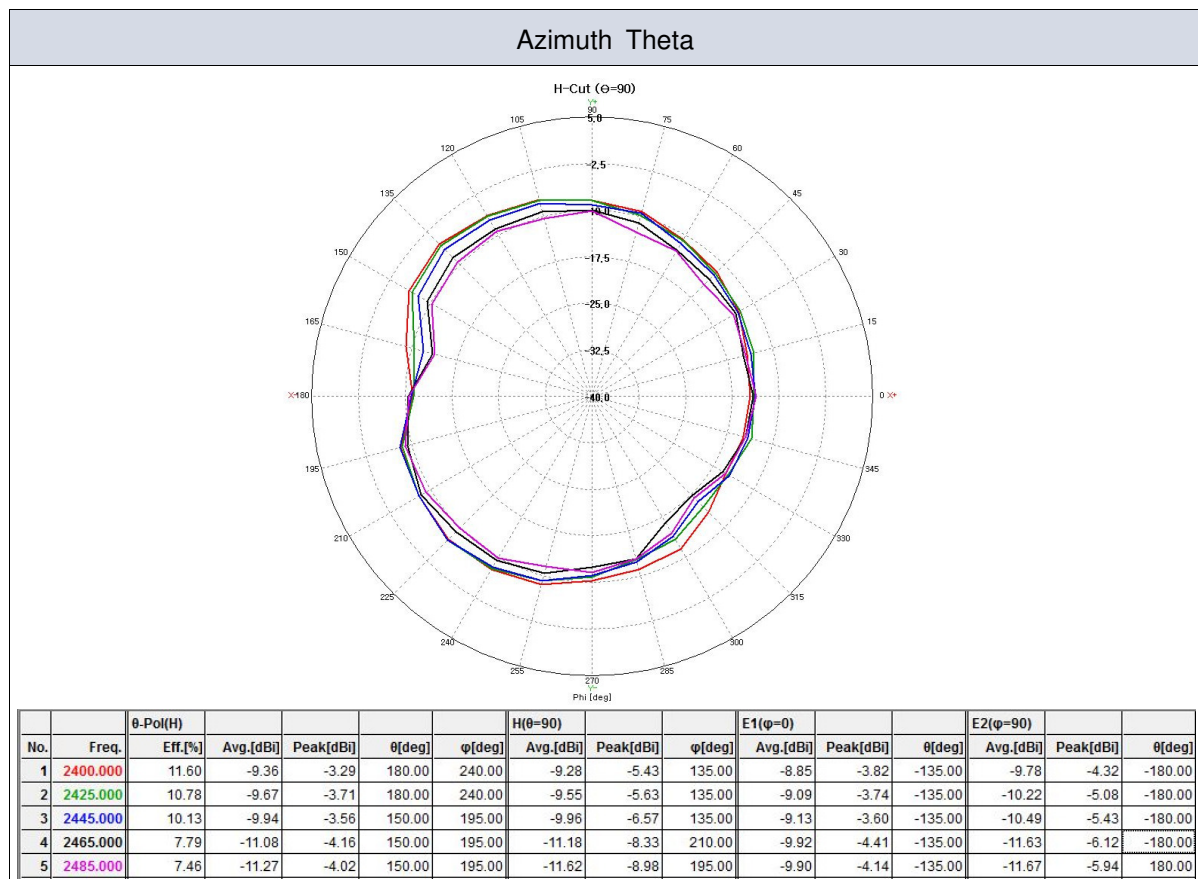
ITEM	SPEC
Frequency Range [MHz]	1225 ~ 1285
Lower Frequency (1225MHz) SWR [Min~Max]	1.1 ~ 2.1 : 1 (Ref 1.6 : 1)
Upper Frequency (1285MHz) SWR [Min~Max]	1.1 ~ 2.1 : 1 (Ref 1.6 : 1)

4.4 S11 Graph of Test Fixture Condition

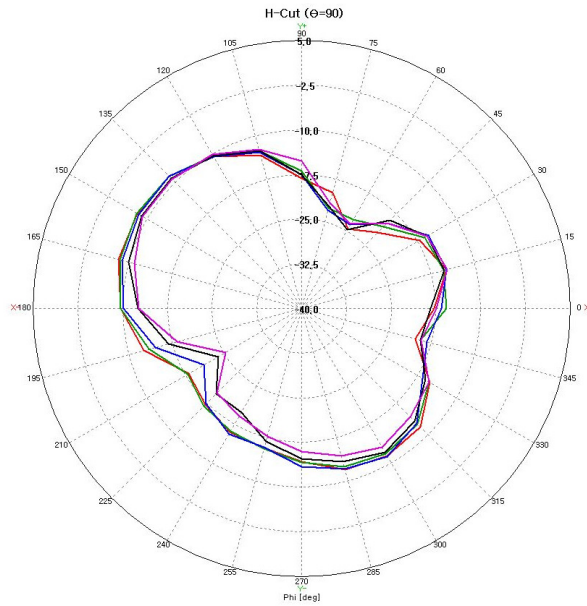


4.5-1 Radiation Pattern (2.4GHz)

Azimuth Plane	Elevation1 Plane	Elevation2 Plane
Theta	Vertical field of measured plane	
Phi	Horizontal field of measured plane	

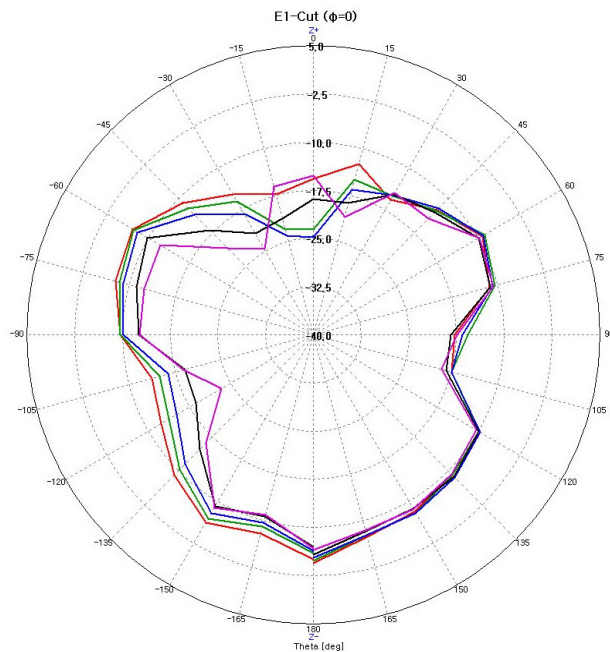


Azimuth Phi



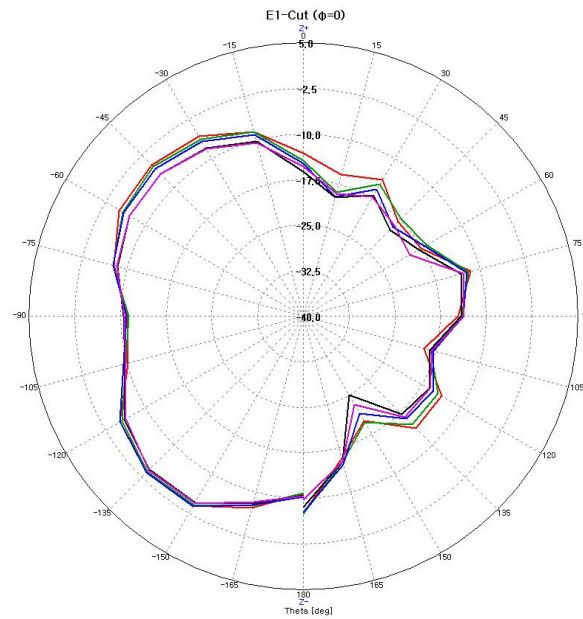
No.	Freq.	ϕ -Pol(V)	Eff.[%]	Avg.[dBi]	Peak[dBi]	θ [deg]	ϕ [deg]	H($\theta=90$)	Avg.[dBi]	Peak[dBi]	ϕ [deg]	E1($\phi=0$)	Avg.[dBi]	Peak[dBi]	θ [deg]	E2($\phi=90$)	Avg.[dBi]	Peak[dBi]	θ [deg]
1	2400.000		6.90	-11.61	-3.87	180.00	330.00	-13.00	-8.15	150.00	-9.88	-4.49	180.00	-12.33	-7.17	-150.00			
2	2425.000		6.43	-11.92	-3.98	180.00	330.00	-13.03	-8.11	150.00	-10.39	-4.86	180.00	-12.44	-7.05	-150.00			
3	2445.000		5.87	-12.32	-3.88	180.00	330.00	-13.19	-8.45	150.00	-10.82	-5.26	180.00	-12.80	-7.49	-150.00			
4	2465.000		4.45	-13.51	-4.48	180.00	330.00	-14.03	-9.04	135.00	-11.90	-5.78	180.00	-13.92	-8.55	-150.00			
5	2485.000		3.98	-14.00	-4.70	180.00	330.00	-14.26	-9.13	150.00	-12.10	-6.51	180.00	-14.15	-8.67	-150.00			

Elevation1 Theta



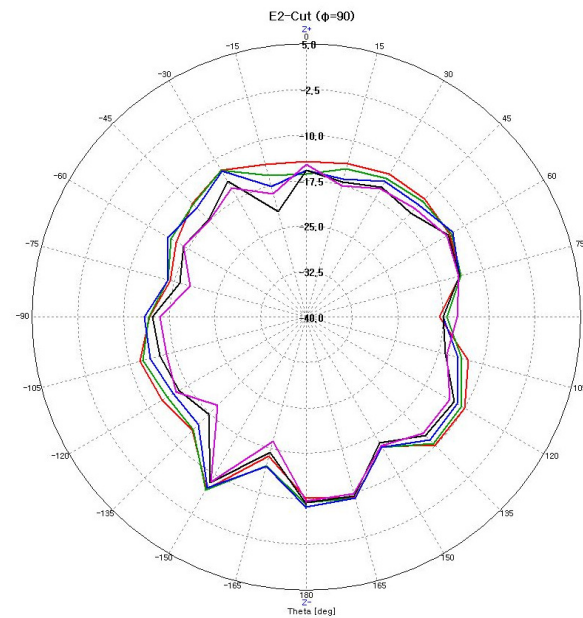
No.	Freq.	ϕ -Pol(V)	Eff.[%]	Avg.[dBi]	Peak[dBi]	θ [deg]	ϕ [deg]	H($\theta=90$)	Avg.[dBi]	Peak[dBi]	ϕ [deg]	E1($\phi=0$)	Avg.[dBi]	Peak[dBi]	θ [deg]	E2($\phi=90$)	Avg.[dBi]	Peak[dBi]	θ [deg]
1	2400.000		6.90	-11.61	-3.87	180.00	330.00	-13.00	-8.15	150.00	-9.88	-4.49	180.00	-12.33	-7.17	-150.00			
2	2425.000		6.43	-11.92	-3.98	180.00	330.00	-13.03	-8.11	150.00	-10.39	-4.86	180.00	-12.44	-7.05	-150.00			
3	2445.000		5.87	-12.32	-3.88	180.00	330.00	-13.19	-8.45	150.00	-10.82	-5.26	180.00	-12.80	-7.49	-150.00			
4	2465.000		4.45	-13.51	-4.48	180.00	330.00	-14.03	-9.04	135.00	-11.90	-5.78	180.00	-13.92	-8.55	-150.00			
5	2485.000		3.98	-14.00	-4.70	180.00	330.00	-14.26	-9.13	150.00	-12.10	-6.51	180.00	-14.15	-8.67	-150.00			

Elevation1 Phi



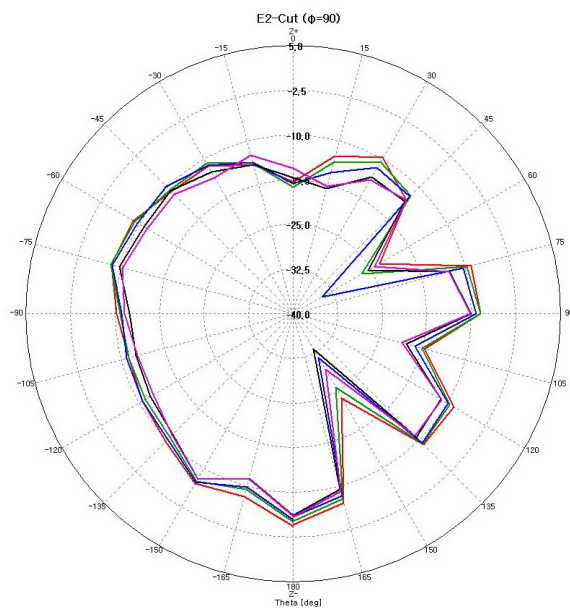
No.	Freq.	θ -Pol(H)					H($\theta=90$)			E1($\phi=0$)			E2($\phi=90$)		
		Eff.[%]	Avg.[dBi]	Peak[dBi]	θ [deg]	ϕ [deg]	Avg.[dBi]	Peak[dBi]	ϕ [deg]	Avg.[dBi]	Peak[dBi]	θ [deg]	Avg.[dBi]	Peak[dBi]	θ [deg]
1	2400.000	11.60	-9.36	-3.29	180.00	240.00	-9.28	-5.43	135.00	-8.85	-3.82	-135.00	-9.78	-4.32	-180.00
2	2425.000	10.78	-9.67	-3.71	180.00	240.00	-9.55	-5.63	135.00	-9.09	-3.74	-135.00	-10.22	-5.08	-180.00
3	2445.000	10.13	-9.94	-3.56	150.00	195.00	-9.96	-6.57	135.00	-9.13	-3.60	-135.00	-10.49	-5.43	-180.00
4	2465.000	7.79	-11.08	-4.16	150.00	195.00	-11.18	-8.33	210.00	-9.92	-4.41	-135.00	-11.63	-6.12	-180.00
5	2485.000	7.46	-11.27	-4.02	150.00	195.00	-11.62	-8.98	195.00	-9.90	-4.14	-135.00	-11.67	-5.94	180.00

Elevation2 Theta



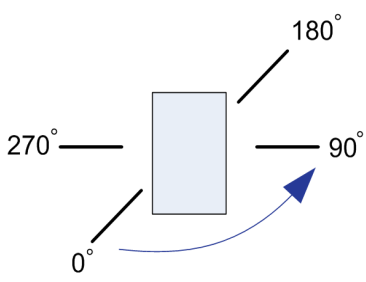
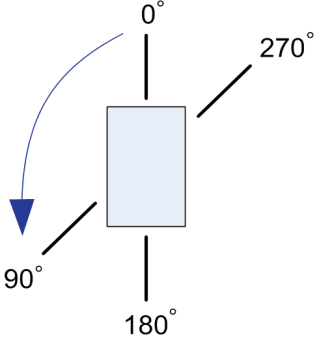
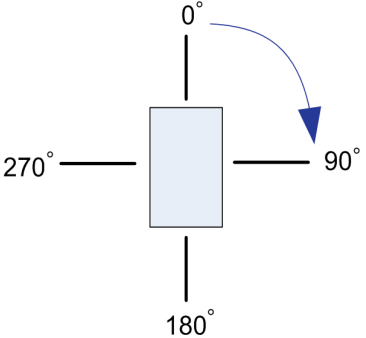
No.	Freq.	ϕ -Pol(V)					H($\theta=90$)			E1($\phi=0$)			E2($\phi=90$)		
		Eff.[%]	Avg.[dBi]	Peak[dBi]	θ [deg]	ϕ [deg]	Avg.[dBi]	Peak[dBi]	ϕ [deg]	Avg.[dBi]	Peak[dBi]	θ [deg]	Avg.[dBi]	Peak[dBi]	θ [deg]
1	2400.000	6.90	-11.61	-3.87	180.00	330.00	-13.00	-8.15	150.00	-9.88	-4.49	180.00	-12.33	-7.17	-150.00
2	2425.000	6.43	-11.92	-3.98	180.00	330.00	-13.03	-8.11	150.00	-10.39	-4.86	180.00	-12.44	-7.05	-150.00
3	2445.000	5.87	-12.32	-3.88	180.00	330.00	-13.19	-8.45	150.00	-10.82	-5.26	180.00	-12.80	-7.49	-150.00
4	2465.000	4.45	-13.51	-4.48	180.00	330.00	-14.03	-9.04	135.00	-11.90	-5.78	180.00	-13.92	-8.55	-150.00
5	2485.000	3.98	-14.00	-4.70	180.00	330.00	-14.26	-9.13	150.00	-12.10	-6.51	180.00	-14.15	-8.67	-150.00

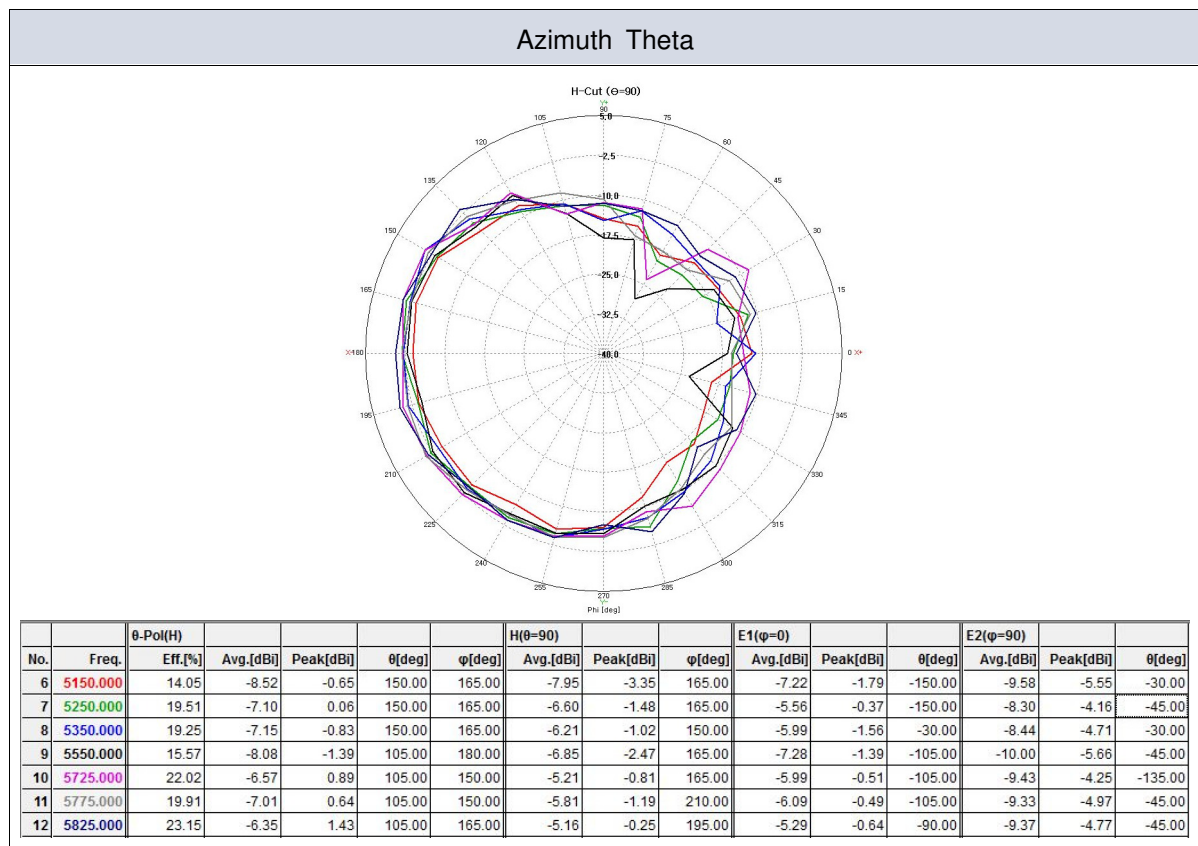
Elevation2 Phi



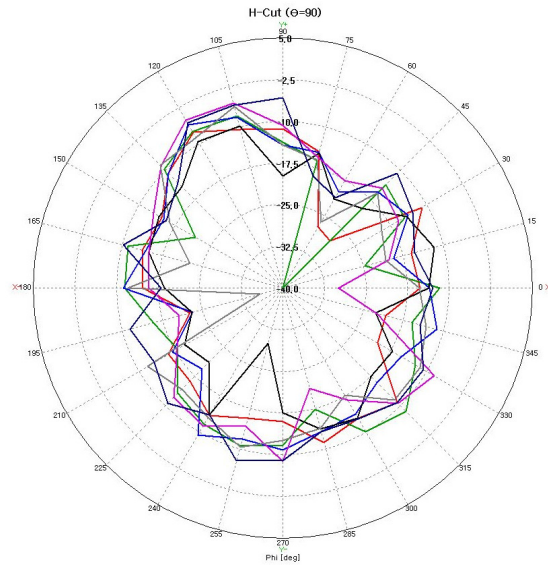
		θ -Pol(H)					$H(\theta=90)$				$E1(\phi=0)$				$E2(\phi=90)$	
No.	Freq.	Eff.[%]	Avg.[dBi]	Peak[dBi]	θ [deg]	ϕ [deg]	Avg.[dBi]	Peak[dBi]	ϕ [deg]	Avg.[dBi]	Peak[dBi]	θ [deg]	Avg.[dBi]	Peak[dBi]	θ [deg]	Avg.[dBi]
1	2400.000	11.60	-9.36	-3.29	180.00	240.00	-9.28	-5.43	135.00	-8.85	-3.82	-135.00	-9.78	-4.32	-180.00	
2	2425.000	10.78	-9.67	-3.71	180.00	240.00	-9.55	-5.63	135.00	-9.09	-3.74	-135.00	-10.22	-5.08	-180.00	
3	2445.000	10.13	-9.94	-3.56	150.00	195.00	-9.96	-6.57	135.00	-9.13	-3.60	-135.00	-10.49	-5.43	-180.00	
4	2465.000	7.79	-11.08	-4.16	150.00	195.00	-11.18	-8.33	210.00	-9.92	-4.41	-135.00	-11.63	-6.12	-180.00	
5	2485.000	7.46	-11.27	-4.02	150.00	195.00	-11.62	-8.98	195.00	-9.90	-4.14	-135.00	-11.67	-5.94	180.00	

4.5-2 Radiation Pattern (5GHz)

Azimuth Plane	Elevation1 Plane	Elevation2 Plane
		
Theta	Vertical field of measured plane	
Phi	Horizontal field of measured plane	

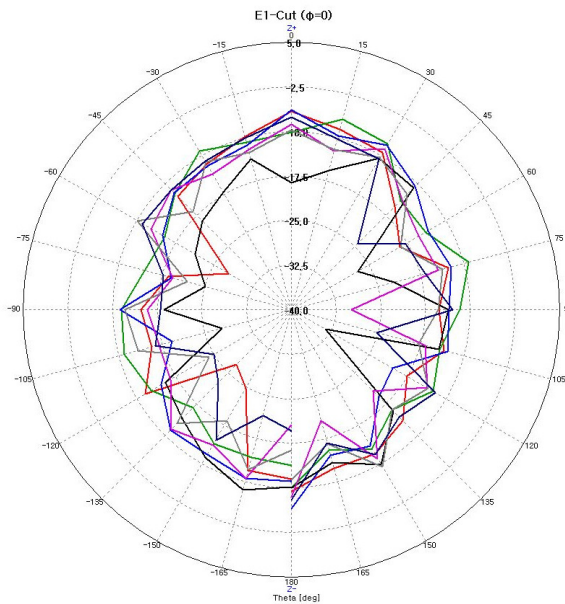


Azimuth Phi



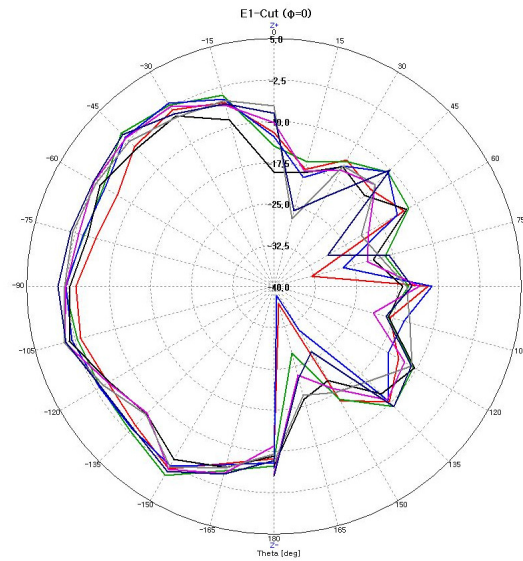
No.	Freq.	ϕ -Pol(V)	Eff.[%]	Avg.[dBi]	Peak[dBi]	θ [deg]	ϕ [deg]	H($\theta=90$)	Peak[dBi]	ϕ [deg]	E1($\phi=0$)	Peak[dBi]	θ [deg]	E2($\phi=90$)	Peak[dBi]	θ [deg]
6	5150.000		5.62	-12.50	-5.94	30.00	135.00	-13.51	-7.70	120.00	-12.59	-6.69	0.00	-11.59	-8.33	135.00
7	5250.000		7.23	-11.41	-5.14	180.00	315.00	-12.19	-7.55	120.00	-11.77	-6.85	15.00	-9.89	-7.61	165.00
8	5350.000		6.37	-11.96	-5.09	135.00	120.00	-12.54	-6.09	120.00	-11.92	-6.34	0.00	-10.45	-7.23	-180.00
9	5550.000		4.99	-13.02	-3.99	180.00	330.00	-14.98	-9.55	120.00	-14.07	-8.60	-165.00	-10.98	-7.31	-180.00
10	5725.000		6.82	-11.66	-4.83	135.00	120.00	-11.76	-5.13	120.00	-13.38	-8.49	180.00	-9.89	-6.17	-165.00
11	5775.000		5.47	-12.62	-4.95	180.00	300.00	-12.75	-6.25	105.00	-13.27	-9.43	150.00	-11.04	-7.78	30.00
12	5825.000		6.40	-11.94	-3.40	135.00	105.00	-10.70	-5.73	120.00	-13.53	-7.61	0.00	-10.13	-5.81	-165.00

Elevation1 Theta



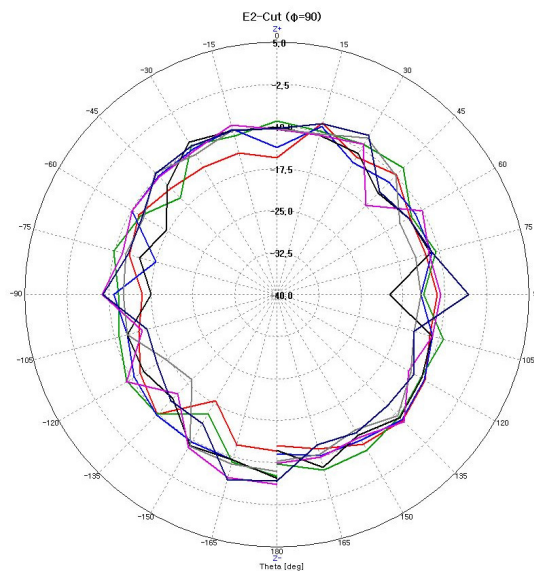
No.	Freq.	ϕ -Pol(V)	Eff.[%]	Avg.[dBi]	Peak[dBi]	θ [deg]	ϕ [deg]	H($\theta=90$)	Peak[dBi]	ϕ [deg]	E1($\phi=0$)	Peak[dBi]	θ [deg]	E2($\phi=90$)	Peak[dBi]	θ [deg]
6	5150.000		5.62	-12.50	-5.94	30.00	135.00	-13.51	-7.70	120.00	-12.59	-6.69	0.00	-11.59	-8.33	135.00
7	5250.000		7.23	-11.41	-5.14	180.00	315.00	-12.19	-7.55	120.00	-11.77	-6.85	15.00	-9.89	-7.61	165.00
8	5350.000		6.37	-11.96	-5.09	135.00	120.00	-12.54	-6.09	120.00	-11.92	-6.34	0.00	-10.45	-7.23	-180.00
9	5550.000		4.99	-13.02	-3.99	180.00	330.00	-14.98	-9.55	120.00	-14.07	-8.60	-165.00	-10.98	-7.31	-180.00
10	5725.000		6.82	-11.66	-4.83	135.00	120.00	-11.76	-5.13	120.00	-13.38	-8.49	180.00	-9.89	-6.17	-165.00
11	5775.000		5.47	-12.62	-4.95	180.00	300.00	-12.75	-6.25	105.00	-13.27	-9.43	150.00	-11.04	-7.78	30.00
12	5825.000		6.40	-11.94	-3.40	135.00	105.00	-10.70	-5.73	120.00	-13.53	-7.61	0.00	-10.13	-5.81	-165.00

Elevation1 Phi



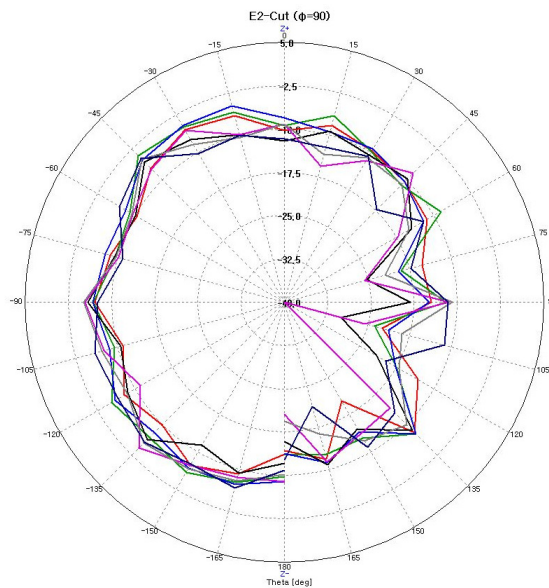
No.	Freq.	θ -Pol(H)	Eff.[%]	Avg.[dBi]	Peak[dBi]	θ [deg]	ϕ [deg]	H($\theta=90$)	Avg.[dBi]	Peak[dBi]	ϕ [deg]	E1($\phi=0$)	Avg.[dBi]	Peak[dBi]	θ [deg]	E2($\phi=90$)	Avg.[dBi]	Peak[dBi]	θ [deg]
6	5150.000		14.05	-8.52	-0.65	150.00	165.00		-7.95	-3.35	165.00	-7.22	-1.79	-150.00	-9.58	-5.55	-30.00		
7	5250.000		19.51	-7.10	0.06	150.00	165.00		-6.60	-1.48	165.00	-5.56	-0.37	-150.00	-8.30	-4.16	-45.00		
8	5350.000		19.25	-7.15	-0.83	150.00	165.00		-6.21	-1.02	150.00	-5.99	-1.56	-30.00	-8.44	-4.71	-30.00		
9	5550.000		15.57	-8.08	-1.39	105.00	180.00		-6.85	-2.47	165.00	-7.28	-1.39	-105.00	-10.00	-5.66	-45.00		
10	5725.000		22.02	-6.57	0.89	105.00	150.00		-5.21	-0.81	165.00	-5.99	-0.51	-105.00	-9.43	-4.25	-135.00		
11	5775.000		19.91	-7.01	0.64	105.00	150.00		-5.81	-1.19	210.00	-6.09	-0.49	-105.00	-9.33	-4.97	-45.00		
12	5825.000		23.15	-6.35	1.43	105.00	165.00		-5.16	-0.25	195.00	-5.29	-0.64	-90.00	-9.37	-4.77	-45.00		

Elevation2 Theta



No.	Freq.	ϕ -Pol(V)	Eff.[%]	Avg.[dBi]	Peak[dBi]	θ [deg]	ϕ [deg]	H($\theta=90$)	Avg.[dBi]	Peak[dBi]	ϕ [deg]	E1($\phi=0$)	Avg.[dBi]	Peak[dBi]	θ [deg]	E2($\phi=90$)	Avg.[dBi]	Peak[dBi]	θ [deg]
6	5150.000		5.62	-12.50	-5.94	30.00	135.00		-13.51	-7.70	120.00	-12.59	-6.69	0.00	-11.59	-8.33	135.00		
7	5250.000		7.23	-11.41	-5.14	180.00	315.00		-12.19	-7.55	120.00	-11.77	-6.85	15.00	-9.89	-7.61	165.00		
8	5350.000		6.37	-11.96	-5.09	135.00	120.00		-12.54	-6.09	120.00	-11.92	-6.34	0.00	-10.45	-7.23	-180.00		
9	5550.000		4.99	-13.02	-3.99	180.00	330.00		-14.98	-9.55	120.00	-14.07	-8.60	-165.00	-10.98	-7.31	-180.00		
10	5725.000		6.82	-11.66	-4.83	135.00	120.00		-11.76	-5.13	120.00	-13.38	-8.49	180.00	-9.89	-6.17	-165.00		
11	5775.000		5.47	-12.62	-4.95	180.00	300.00		-12.75	-6.25	105.00	-13.27	-9.43	150.00	-11.04	-7.78	30.00		
12	5825.000		6.40	-11.94	-3.40	135.00	105.00		-10.70	-5.73	120.00	-13.53	-7.61	0.00	-10.13	-5.81	-165.00		

Elevation2 Phi

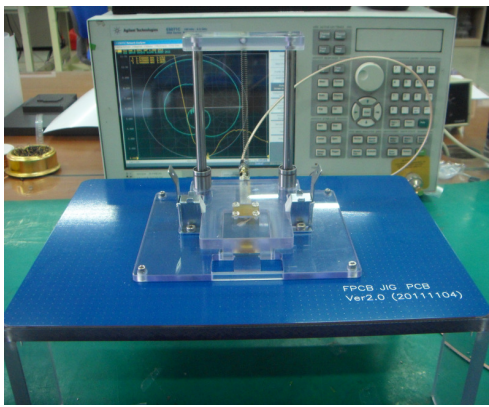


No.	Freq.	θ-Pol(H)	Eff.[%]	Avg.[dBi]	Peak[dBi]	θ[deg]	φ[deg]	H(θ=90)	Avg.[dBi]	Peak[dBi]	φ[deg]	E1(φ=0)	Avg.[dBi]	Peak[dBi]	θ[deg]	E2(φ=90)	Avg.[dBi]	Peak[dBi]	θ[deg]
6	5150.000		14.05	-8.52	-0.65	150.00	165.00	-7.95	-3.35	165.00	-7.22	-1.79	-150.00	-9.58	-5.55	-30.00			
7	5250.000		19.51	-7.10	0.06	150.00	165.00	-6.60	-1.48	165.00	-5.56	-0.37	-150.00	-8.30	-4.16	-45.00			
8	5350.000		19.25	-7.15	-0.83	150.00	165.00	-6.21	-1.02	150.00	-5.99	-1.56	-30.00	-8.44	-4.71	-30.00			
9	5550.000		15.57	-8.08	-1.39	105.00	180.00	-6.85	-2.47	165.00	-7.28	-1.39	-105.00	-10.00	-5.66	-45.00			
10	5725.000		22.02	-6.57	0.89	105.00	150.00	-5.21	-0.81	165.00	-5.99	-0.51	-105.00	-9.43	-4.25	-135.00			
11	5775.000		19.91	-7.01	0.64	105.00	150.00	-5.81	-1.19	210.00	-6.09	-0.49	-105.00	-9.33	-4.97	-45.00			
12	5825.000		23.15	-6.35	1.43	105.00	165.00	-5.16	-0.25	195.00	-5.29	-0.64	-90.00	-9.37	-4.77	-45.00			

5. Measurement Process

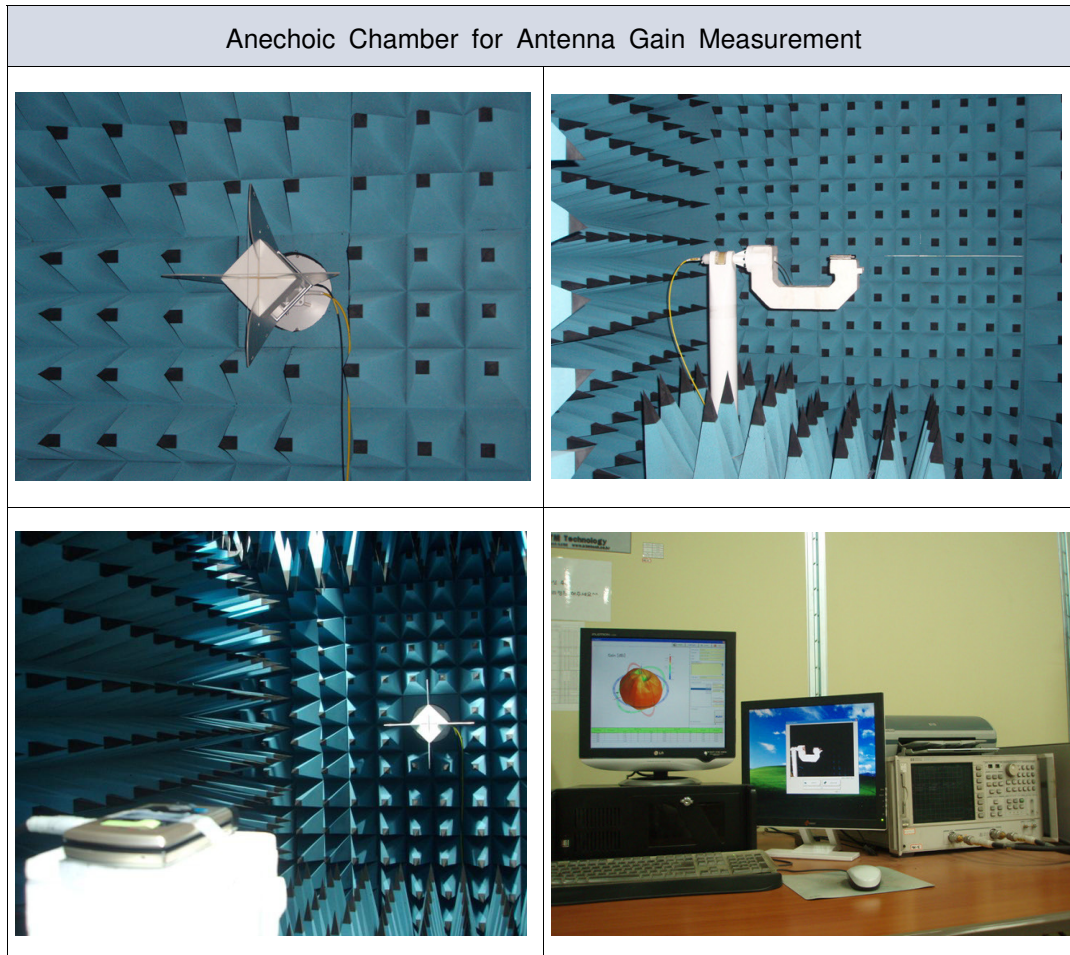
5.1 SWR/Return loss

The SWR / Return loss is measured by Network Analyzer. Using the test fixture, the Selected reference sample is a standard product.

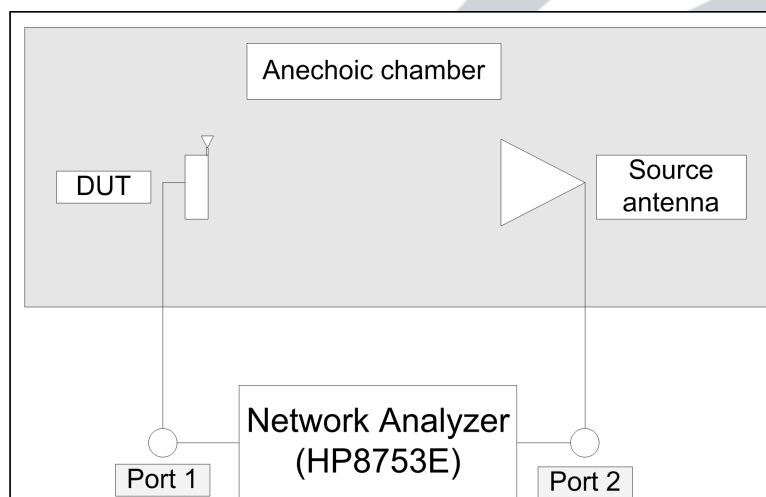
	Set Condition	Test Fixture Condition
Network Analyzer	Agilent HP8753E	AGILENT - E5071
Cable	RF cable (300 mm)	RF cable (500 mm)
Test condition		

5.2 Gain

The Antenna Gain is measured by using the Passive DUT at Anechoic Chamber.



5.3 Gain Measurement block diagram



6. Primary Inspection List

Item	Frequency [MHz] 		Dimension [mm]					
Standard	SWR 2.1 MAX		W= 5.84 ±0.05	L= 26.10 ±0.05	T= 0.60 ±0.05	A= 3.10 ±0.05	B= 6.00 ±0.05	C= 1.00 ±0.05
	SWR 1.1 MIN							
	1225 [MHz]	1285 [MHz]						
1	1.68	1.65	5.84	26.10	0.59	3.10	6.00	1.00
2	1.62	1.57	5.85	26.10	0.59	3.11	6.00	0.99
3	1.65	1.78	5.84	26.09	0.60	3.09	6.00	0.99
4	1.54	1.61	5.84	26.09	0.60	3.09	6.00	1.00
5	1.68	1.62	5.86	26.10	0.60	3.10	6.00	1.00
6	1.56	1.66	5.84	26.10	0.60	3.10	5.99	1.00
7	1.55	1.62	5.83	26.10	0.60	3.11	6.00	1.00
8	1.58	1.64	5.84	26.11	0.61	3.10	6.01	1.00
9	1.63	1.62	5.84	26.09	0.62	3.10	6.01	1.01
10	1.65	1.56	5.83	26.10	0.60	3.10	6.00	1.01
11	1.53	1.74	5.85	26.11	0.59	3.10	6.00	1.00
12	1.75	1.65	5.84	26.10	0.60	3.10	6.02	1.00
13	1.65	1.58	5.84	26.10	0.61	3.10	6.01	1.00
14	1.68	1.71	5.84	26.10	0.61	3.10	6.00	1.02
15	1.67	1.63	5.83	26.11	0.60	3.09	6.00	1.00
16	1.58	1.67	5.84	26.09	0.60	3.09	6.01	1.01
17	1.56	1.60	5.84	26.08	0.60	3.11	6.00	0.99
18	1.53	1.62	5.84	26.11	0.60	3.10	6.00	1.01
19	1.61	1.78	5.85	26.10	0.59	3.10	6.01	1.00
20	1.66	1.73	5.84	26.10	0.60	3.12	6.02	1.00
X	1.62	1.65	5.84	26.10	0.60	3.10	6.00	1.00
σ	0.06	0.06	0.01	0.01	0.01	0.01	0.01	0.01
Cpk	2.60	2.30	2.27	2.07	2.17	2.17	2.03	2.17
판정	ok	ok	ok	ok	ok	ok	ok	ok

7. Reliability Condition

7.1 Environment Test

ITEM	TEST CONDITION	LIMIT
PCT	+121±5 °C, RH=100%, 96 hr	Same as 4.4
Low Temperature Operation	After leaving that for 1 hr at -40±3 °C Measure that at test temperature	
Low Temperature Resistance	Leaving that for 120 hr at -40±3 °C	
Humidity Operation	After leaving that for 1 hr at +80±3 °C, RH 80% Measure that at test temperature	
Humidity Resistance	Leaving that for 120 hr at +80±3 °C, RH 8%	

7.2 Mechanical Test

ITEM	TEST CONDITION	LIMIT
Vibration	Freq : 10~500 Hz , Acceleration : 10×9.8 m/s ² (G) Sweep time : 15 min, X.Y.Z each 5 times	Same as 4.4
Drop	18 times free fall Using the drop jig 152 cm high Jig : 120±20 g Plastic Jig Bottom : Concrete or Iron	

7.3 MSL LEVEL Test

1) JEDEC J-STD-020C Condition

	Floor Life		Soak Requirements	
	Time	Conditions	Time	Conditions
1	Unlimited	= < 30 °C / RH 85%	168+5 / -0	= < 85 °C / RH 85%

2) Test Condition

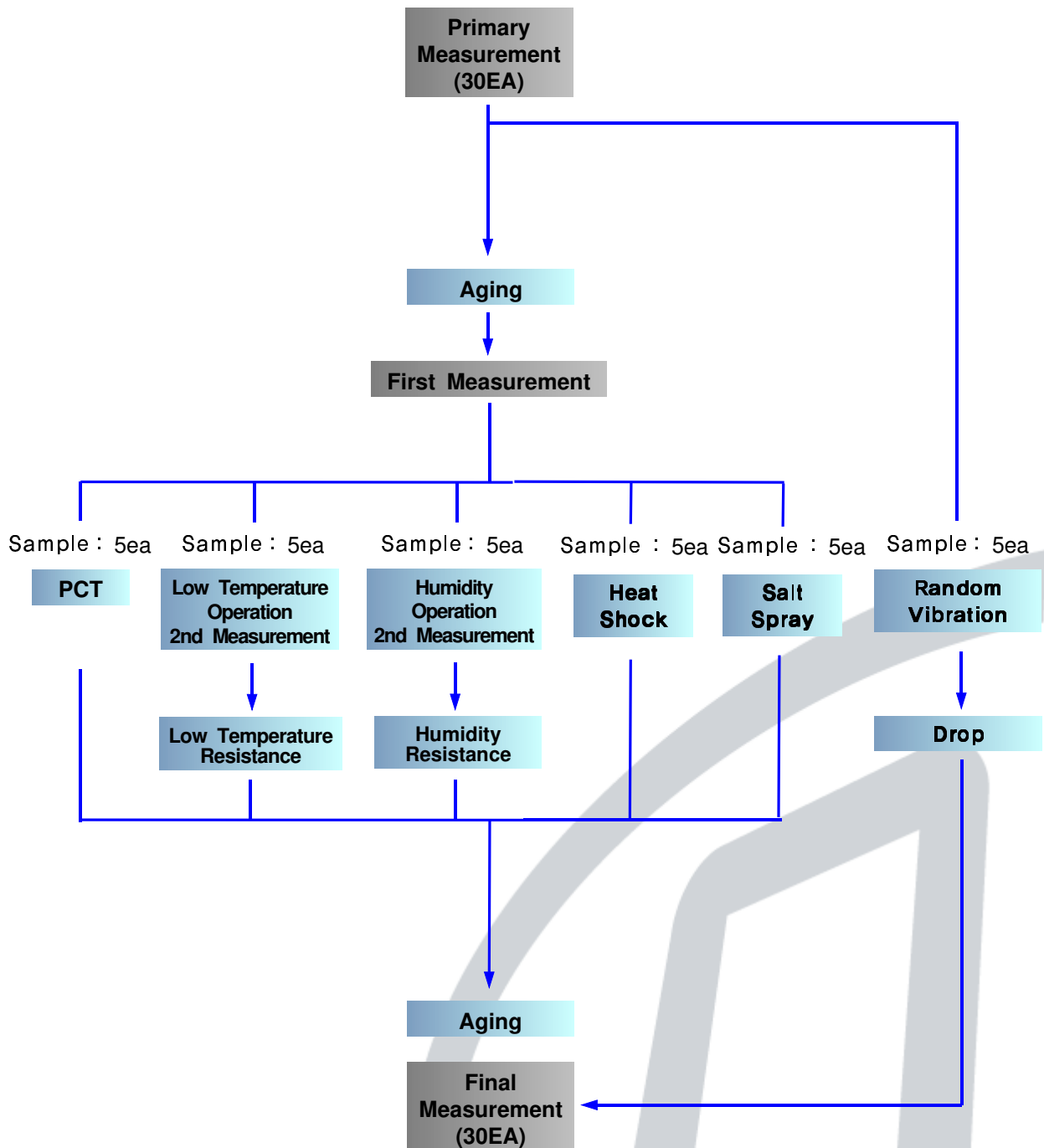
ITEM	Condition	LIMIT
Soak Requirements	After leaving that for 168 hr at +85±3 °C, RH 85%, without Aging, Reflow 3 times	Same as 4.4

7.4 Heat shock Test

ITEM	Condition	LIMIT
Heat shock	Condition : -40±3 °C/hr ↔ +85±3 °C/hr Test CYCLE : 30 cycle Temperature conversion time: below 5 min	Same as 4.4

7.5 Reliability Flow

Reliability FLOW



※Aging : at Normal Temperature, Humidity, after keeping for 1 hr

※In case of vibration and drop test, Being to mounted chip antenna on the PCB

8. Mechanical Characteristics

8.1 Antenna Pattern Drawing

Antenna Pattern View

ITEM	DESCRIPTION	Q'TY	MATERIAL	TREATMENT/FINISH
①	FPCB-ANTENNA	1	Copper Foil,Aromatic Polyimide (Halogen Free)	Au 0.03um MIN Ni 3~8um
②	양면 TAPE	3	PE	
③	Cover Sheet	1	PET	
④	Stiffener	1	FR4	

① FPCB-ANTENNA

The drawing shows the FPCB-ANTENNA assembly with various dimensions and labels. Key features include:

- 이형지** (Heterogeneous material) label pointing to the antenna area.
- Cover Sheet** label pointing to the top layer.
- FPCB** label pointing to the main board.
- FPCB 총두께 : 0.60T** (FPCB total thickness: 0.60T).
- 보강판** (Reinforcement plate) label pointing to the stiffener.
- 양면 Tape** (Double-sided tape) label pointing to the adhesive layers.

② 양면 TAPE

The drawing shows two pieces of double-sided tape, one yellow and one blue, used for bonding the components.

③ Cover Sheet

The drawing shows a single piece of cover sheet, which is a thin, flexible material used to protect the antenna.

④ Stiffener

The drawing shows a single piece of stiffener, which is a rigid material used to support the antenna.

(OQA-2049)에 지정된 환경관리물질을 사용하지 말 것.
파트론 RoHS 관리규정<PRQA-C118J>에 만족해야 한다.

REVISED MARK	DATE	REVISD	APPROVAL	CONTENTS		
UNIT	mm	PROJECTION	DESIGNED	CHECKED	APPROVAL	PROJECT
SCALE	1/1		Hyo Sic Lee	Cheong Soo Kim	Chanik Jeon	GT-I9152P_BT/WIFI
TOLER.	±0.05		13.12.05	13.12.05	13.12.05	

parton

FILE NO.

DRAWING NUMBER

Ver 2.0

8.2 Lot Notation

<u>3</u>	<u>5</u>	<u>2</u>	<u>G</u>
①	②	③	

- ① Year : 1 - 2011, 2 - 2012, 3 - 2013 ····
 ② Week : 1 - First week, 2 - Second, ···· 52 - Fifty second
 ③ Green : Halogen Free

8.3 Marking



<u>Crater_Q</u>	<u>3</u>	<u>49</u>	<u>G</u>	<u>Ver0.5.1</u>
①	②	③	④	⑤

- ① Serial
 ② Year : 3 - 2013
 ③ Week : 49 - forty ninth
 ④ Green : Halogen Free
 ⑤ Antenna Version

9. Attention

9.1 Temperature Condition

	Range	Unit
Operating Temperature	-40 ~ +100	℃
Keeping Temperature	-40 ~ + 70	℃

9.2 Temperature Test Condition

Item	Condition	Temperature Range
Operating Temperature	Low	at -75 ℃, for 24 hr, Good Operating
	High	at +150 ℃, for 24 hr, Good Operating
Keeping Temperature	Low	at -75 ℃, after 1000 hr, Good Operating
	High	at +85 ℃, after 1000 hr, Good Operating

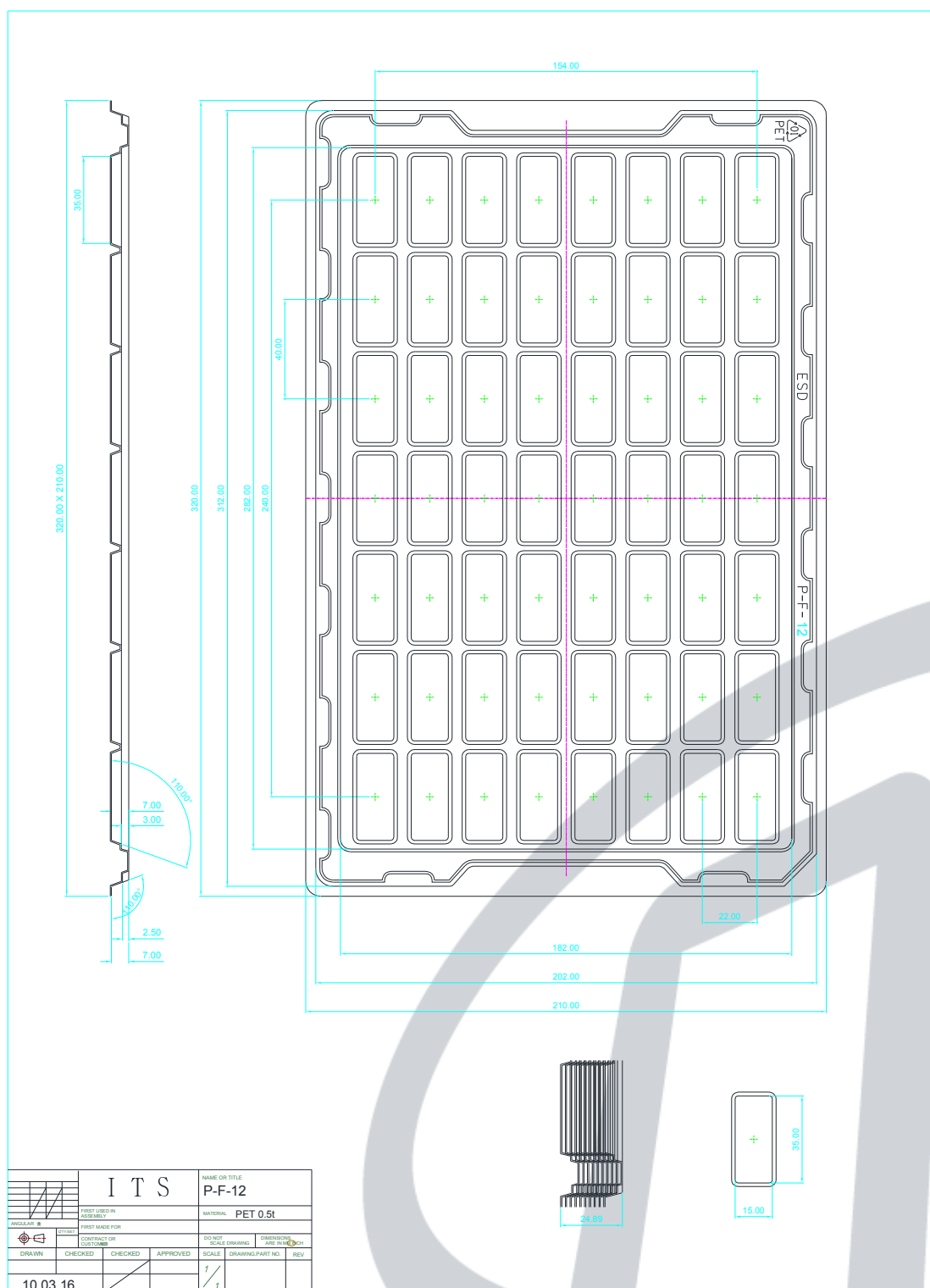
* In case of "High Temperature Resistance", because the packing material is broken at higher temperature than +85 ℃, the test is not able.



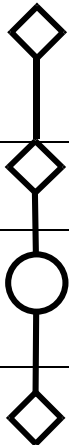
10. Packing

10.1 Tray

Material	Surface Resistance	Method
A-PET	Typical $10^8 \Omega$	Heat press



11. Process control

Input Materials	FLOW CHART	Process name	Management of Factors					Management of quality					
			Equipment Name	Checked	Condition	Cycle of management	Record	Checked Item	Method of Inspection	Margin	Cycle of management	Record	Action
FPCB Tape		import inspection	Network	proofreading Condition		Per LOT 1/day	C/sheet	aspect dimension Electrical Characteristic	Network microscope Visual Inspection	refer to Guide Sheet	Per LOT 1/day	Result Paper	return
Tape		Attachment						aspect	visual inspection	refer to Guide Sheet	all		rework
A'SSY		Characteristic inspection (CTF)	Network	proofreading Condition	refer to Guide Sheet	Per LOT 1/day	C/sheet	VSWR 1225MHz 1.1~2.1:1 1285MHz 1.1~2.1:1 (CTF)	Network	refer to Guide Sheet	all	LOT CARD	exhaust
A'SSY		aspect inspection						aspect	visual inspection	refer to Guide Sheet	all	LOT CARD	exhaust
Tray A'ssy Package		packing						quantity packing Mixing	visual inspection	refer to Guide Sheet	all	LOT CARD	rework
A'SSY		Pack	Network	proofreading Condition	refer to Guide Sheet	Per LOT 1/day	-	Electrical Characteristic aspect packing	Network microscope Visual Inspection	refer to Guide Sheet	Per LOT 1/day	Result Paper	rework

12. Raw Material Part List

Part List 정보				종량관리	표준중량 (g)	0.057	Self XRF or 정밀 측정 DATA										
					실측중량 (g)	0.057											
					오차율 (±5%)	0%											
SEC CODE	Ass'y 부품명	원재질 구분	Material Name	물질구분	성적서 정보		장비명	SEA-1000A				maker	SEIKO			측정일	2013년 10월 18일
					분석일자	성적서No.	Cd	Pb	Hg	Cr	Br	Cl	Sb	Spot	판정 및 예외 포함		
							유:50 무:70	유:200 무:700	700	700	유:900	유:900	700	보라색			
GH42-04613A	FPCB	기존 등록	FCCL (MCH)	Inorganic	2012-10-10	RT12R-S4039-E1-RA	N.D	N.D	N.D	N.D	N.D	56	N.D	-	합격		
		기존 등록	Coverlay (MAH)	Organic	2013-03-14	RT13R-S0979-003-E1											
		기존 등록	SILK INK(SPM-700-2W)	Organic	2012-02-27	AYAA12-07648	5	N.D	N.D	N.D	N.D	269	N.D	-	합격		
		기존 등록	보강판 (CBY)	Inorganic	2012-12-27	CANEC1217656601	1	2	N.D	1	10	355	N.D	-	합격		
		기존 등록	TAPE (467MP)	Organic	2012-06-14	RT12R-U1096-E1	N.D	N.D	N.D	N.D	N.D	56	N.D	-	합격		
		기존 등록	TAPE (3M 9293)	Organic	2012-11-29	RT12R-U2200-E1	N.D	N.D	N.D	N.D	N.D	N.D	N.D	-	합격		
		기존 등록	외장보호 tape(CPSC50)	Organic	2013-04-01	AYAA13-15150	N.D	N.D	N.D	3	N.D	N.D	N.D	-	합격		
		기존 등록	Acryl 유성 접착제	Organic	2012-09-25	AYAA12-34571											
		기존 등록	Ni Plating (MPN-5A)	Inorganic	2013-01-14	AYAA13-01440	N.D	N.D	N.D	3	N.D	N.D	N.D	-	합격		
		기존 등록	Au Plating (TUD 21M)	Inorganic	2013-01-14	AYAA13-01440											
※ 원재질 구분 및 물질구분은 셀클릭후 선택																	
※ 이원화 진행되는 부품이 있을시 필히 구분을 하여 모두 기입																	
※ 측정결과에는 소수점 이하 버림하여 기입, 0 이하는 N.D 로 기입.																	
※ XRF 장비 보유 협력사 전체 Self Test 측정할것																	
-. 미보유시 정밀분석 성적서 결과 작성할것(기준은 별도)																	
■ SEC Import 기능으로 불러온 원재질 - 타 협력사에서 승인된 코드 사용시							Cd	Pb	Hg	Cr	Br	Cl	Sb	Spot	판정 및 예외 포함		
No	SEC-CODE		Maker	Maker P/N			유:50 무:70	유:200 무:700	700	700	유:900	유:900	700	보라색			
1																	
2																	
3																	

13. SAMPLE History

Antenna 2 Team	Quality Assurance
이효식	
Hyo-Sic Lee	Nam-Sik.Min

Framing Post : Antenna 2 Team Hyo-Sic Lee

Framing Date : 2013. 12. 09

Manufacture Place	Research Line (Suwon)		Manufacture Date	2013.12.05	
Input Quantity	2000ea		Manufacturer	Inno flex	
Yield Goal	90%		Metalic Pattern / CAVITY NO.	1/1	
Inferior Probability Result	Assy	-	Guide Sheet	Ass'y	O
	Seal	-		Seal	O
	Tension Inspect	0.7%		Tension Inspect	O
	Characteristic Inspect	0.4%		Characteristic Inspect	O
	Aspect Inspect	1.4%		Aspect Inspect	O
Yield Probability	97.5%		Inferior Probability	2.5%	

Worst Inferiority & Reform Measure in P.P			
No	Inferiority Item	Cause	Measure
Worst 1	Piercing Inferiority	Piercing Fail, No Piercing	Dimension Reconfirm & Inferior Product Exclusion
Worst 2	Gilt Inferiority	Oxidation	Stage-of-Process Visual Inspect
Worst 3			
Worst 4			
Note			