AMO
AMOTECH

Preliminary Approval sheet

Main Internal Antenna

Part No. : AMMAL021

	Designed	Checked		Approved
DASAN NETWORKS				
Date	/	/	/	/

Revision no	Content	Page	Date	Name
0	First, documented	-	2023.11.17	I.J. KIM

RoHS

AMOTECH CO., LTD
5B-1L, 617, NAMCHON-DONG, NAMDONG-GU,
INCHOEN-CITY, KOREA
TEL : 82-32-821-0363 FAX : 82-32-811-0283

Designed	Checked		Approved
23.11.17		23.11.17	23.11.17

1. SPECIFICATIONS

1.1. Electrical Specifications

ITEM	LTE71	LTE12	LTE13	LTE14	LTE20	Remark
Frequency [MHz]	617~652 663~698	699~716 729~746	746~756 777~787	758~768 788~798	791~821 832~862	Notes :1)
Peak Gain[dBi]	2.5	1.4	0.8	0.5	1.4	
Eff.[%] @Avg.	47.9	44.6	44.6	42.1	39.2	
ITEM	**LTE5**	**LTE8**	**LTE4**	**LTE3**	**LTE2**	Notes :1)
Frequency [MHz]	824~849 869~894	880~915 925~960	1710~1755 2110~2155	1710~1785 1805~1880	1850~1910 1930~1990	
Peak Gain[dBi]	1.4	1.2	4.8	5.4	5.1	
Eff.[%] @Avg.	38.7	28.5	62.1	61.0	65.7	

ITEM	LTE1	LTE30	LTE7	N78	Notes :1)
Frequency [MHz]	1920~1980 2110~2170	2305~2315 2350~2360	2500~2570 2620~2690	3300~3800	
Peak Gain[dBi]	4.6	3.4	4.5	5.7	
Eff.[%] @Avg.	68.7	54.0	50.3	58.3	
ITEM	**N77**	**N79**	**-**	**-**	Notes :1)
Frequency [MHz]	3300~4200	4400~5000	-	-	
Peak Gain[dBi]	5.3	4.7	-	-	
Eff.[%] @Avg.	48.5	36.3	-	-	

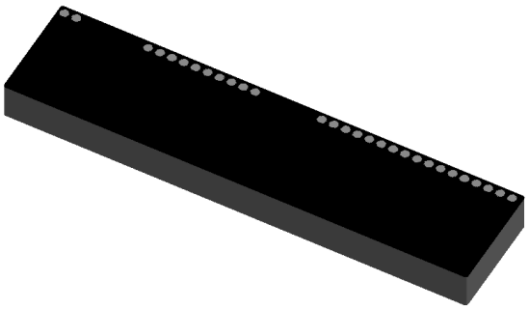
VSWR	Max. 7 : 1	Notes :1)
	Max. 4 : 1	Notes :2)
Polarization	Linear	Notes :1)
Azimuth Beam Pattern	Omni-directional	Notes :1)
Impedance	50 Ω	Notes :1)

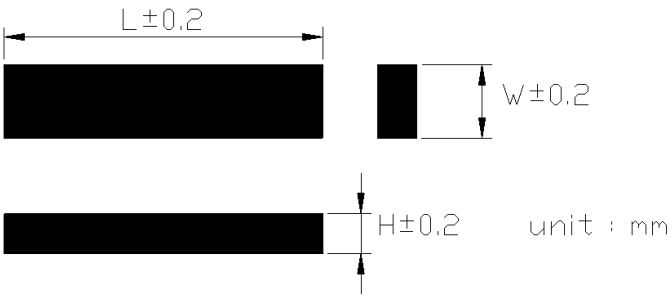
※Notes:1) Measured on the SET.

Notes:2) Measured on the matched AMOTECH manual jig.

1.2. Mechanical Specifications

Electrode	Copper	-
Dimensions (L x W x H)	39.0(L) x 9.0(W) x 3.2(H)	mm
Operating Temperature	-40 ~ +125	℃





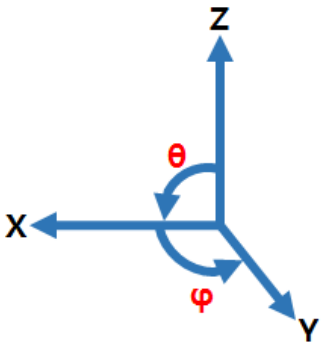
1.3 Marking

●	:	1 pin positon
L021	:	Model No.
YY	:	Year (ex: 2019 → 19)
WW	:	Week (ex: 1st week→01, 7th week→07)

2. MEASUREMENT

2.1. SET for Measurement

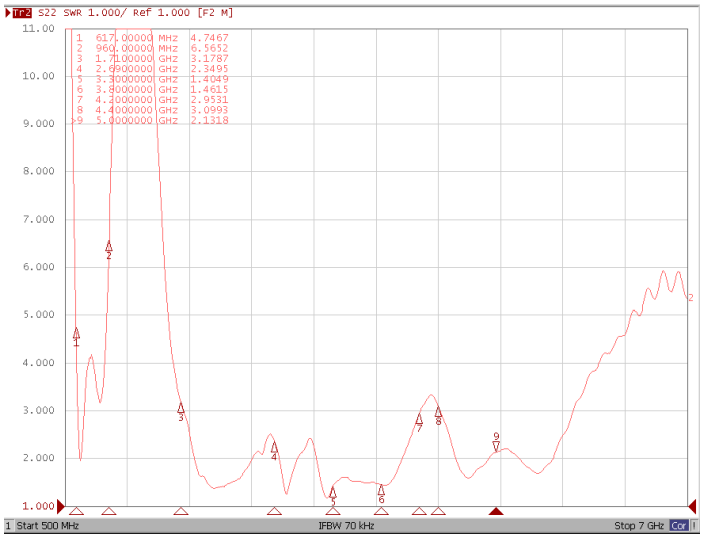
SET



Antenna Radiation coordinate system

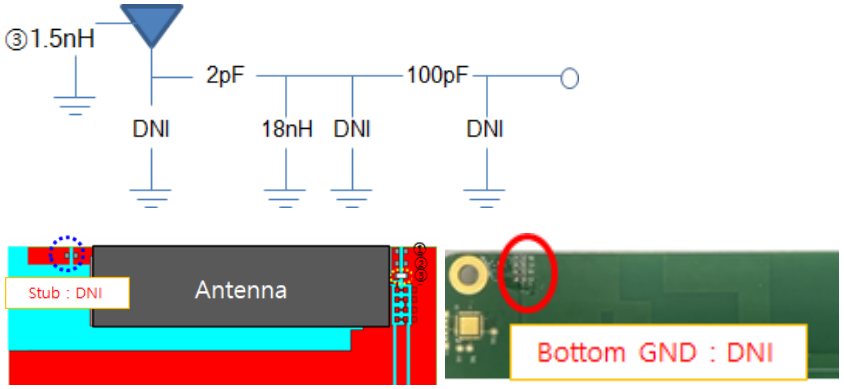
2.2. Electrical Characteristic

◆ ***S_{11}(VSWR)***



- VSWR @ SET –

2.3. Matching circuit @SET



2.4. Radiation Characteristic

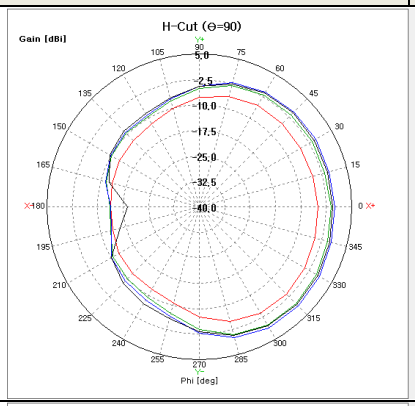
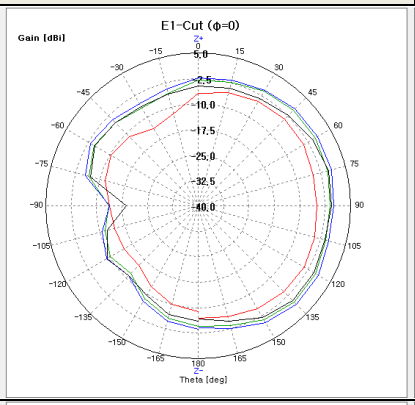
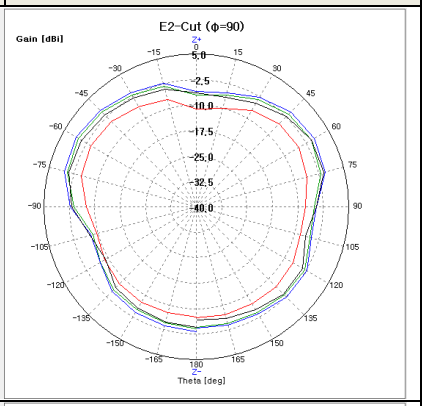
- Measurement Result

Band	Frequency [MHz]	EFF.[%]	Avg. (dBi)	Peak (dBi)
LTE 71	617	22.09	-6.56	-2.23
	652	53.66	-2.70	1.54
	663	66.28	-1.79	2.47
	698	49.40	-3.06	1.33
LTE 12	699	49.87	-3.02	1.36
	716	39.61	-4.02	0.31
	729	43.54	-3.61	0.62
	746	45.57	-3.41	0.78
LTE 13	746	45.57	-3.41	0.78
	756	45.64	-3.41	0.47
	777	44.52	-3.51	0.51
	787	42.59	-3.71	0.28
LTE 14	758	44.77	-3.49	0.44
	768	44.36	-3.53	0.47
	788	42.30	-3.74	0.23
	798	36.82	-4.34	-0.38
LTE 20	791	45.66	-3.41	1.21
	821	31.28	-5.05	-0.06
	832	37.08	-4.31	0.72
	862	42.82	-3.68	1.39
LTE 5	824	32.97	-4.82	0.20
	849	40.82	-3.89	1.22
	869	42.81	-3.69	1.36
	894	38.36	-4.16	0.92
LTE 8	880	41.24	-3.85	1.23
	915	30.54	-5.15	-0.17
	925	24.64	-6.08	-1.17
	960	17.56	-7.56	-2.58
LTE 4	1710	45.79	-3.39	2.42
	1755	52.93	-2.76	3.29
	2110	73.15	-1.36	4.14
	2155	76.59	-1.16	4.76

Band	Frequency [MHz]	EFF.[%]	Avg. (dBi)	Peak (dBi)
LTE 2	1850	70.47	-1.52	5.11
	1910	67.93	-1.68	4.68
	1930	60.10	-2.21	3.84
	1990	64.43	-1.91	4.10
LTE 3	1710	45.79	-3.39	2.42
	1785	59.27	-2.27	4.11
	1805	64.01	-1.94	4.59
	1880	74.95	-1.25	5.36
LTE 1	1920	67.46	-1.71	4.49
	1980	60.51	-2.18	3.39
	2110	73.15	-1.36	4.14
	2170	73.51	-1.34	4.62
LTE 30	2305	52.56	-2.79	2.89
	2315	55.98	-2.52	3.18
	2350	56.09	-2.51	3.37
	2360	51.02	-2.92	2.97
LTE 7	2500	60.66	-2.17	4.54
	2570	53.00	-2.76	3.90
	2620	48.92	-3.11	3.62
	2690	38.52	-4.14	3.27
n78	3300	56.42	-2.49	5.31
	3550	59.12	-2.28	4.18
	3800	59.34	-2.27	5.72
n77	3300	56.42	-2.49	5.31
	3750	55.53	-2.55	5.35
	4200	33.41	-4.76	3.01
n79	4400	30.68	-5.13	0.50
	4700	44.61	-3.51	4.67
	5000	33.68	-4.73	3.03

- Remark
  - 6mx3mx3m Anechoic Chamber
  - Matching on the SET
  - Temp. : 25℃ / Humidity : 50~55%

2.5. Radiation patterns

	XY Plane	XZ Plane	YZ Plane
LTE 71			
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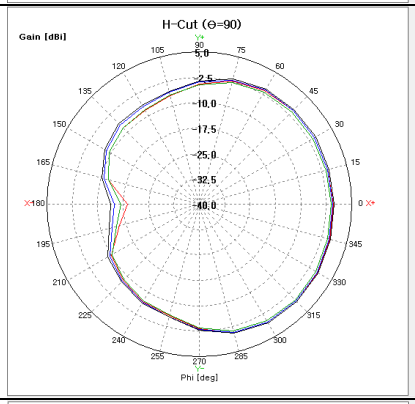
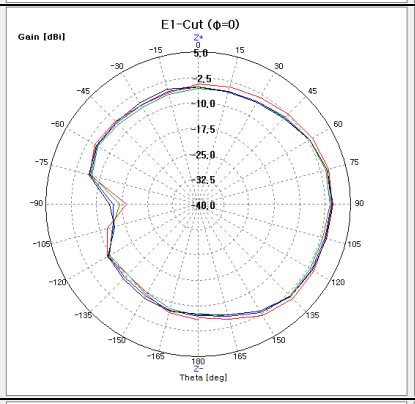
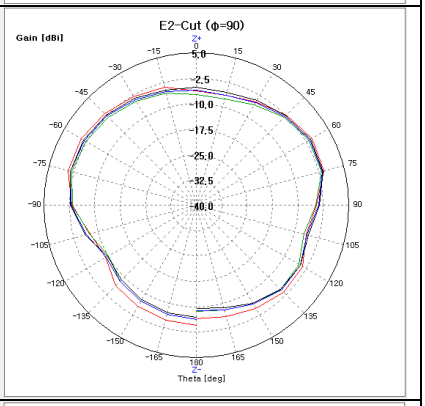
652			
663			
698			
LTE 12			
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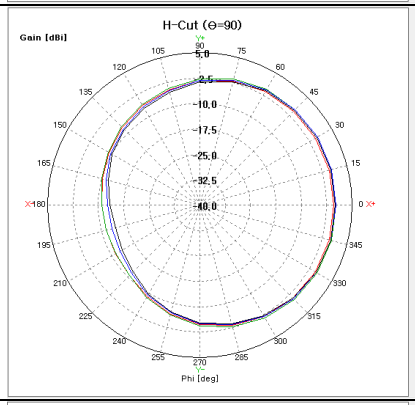
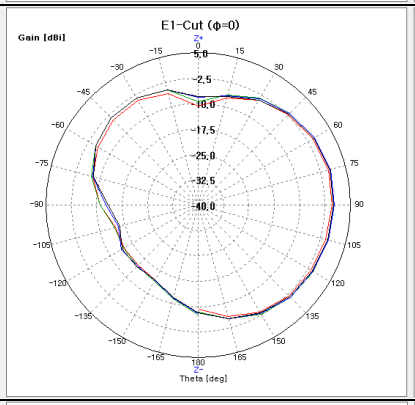
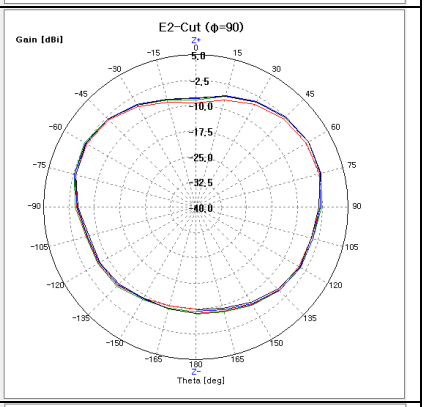
729			
746			
LTE13			
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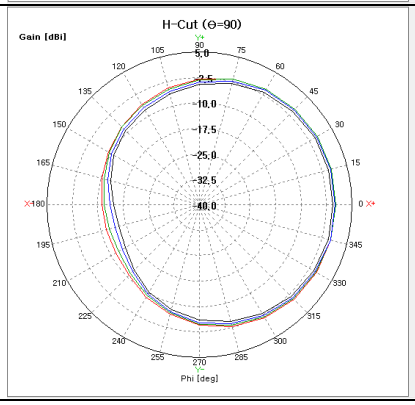
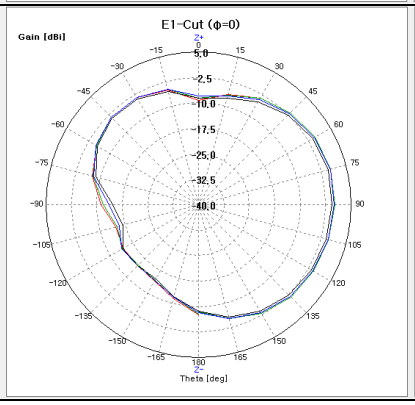
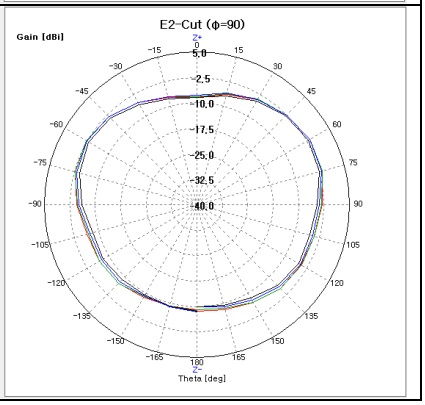
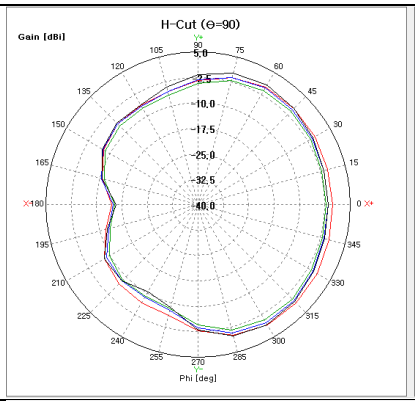
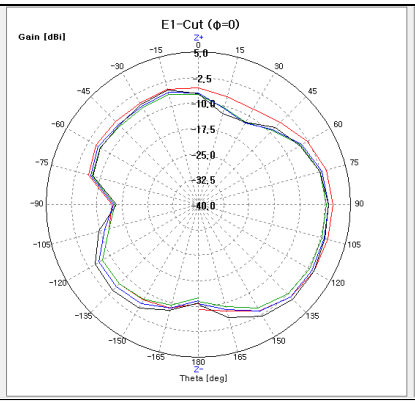
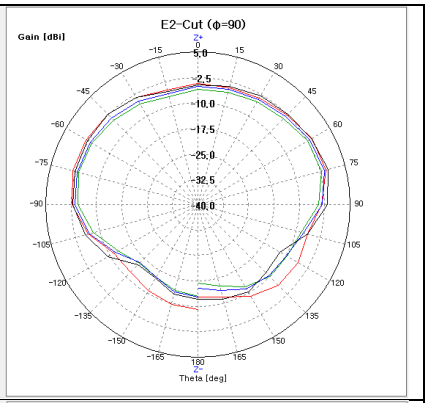
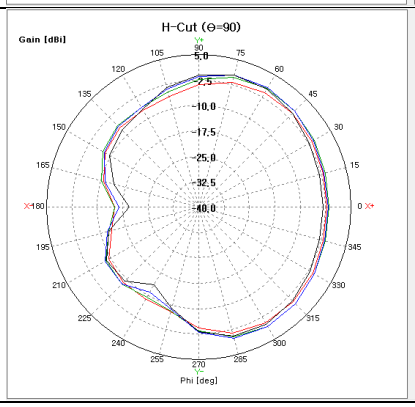
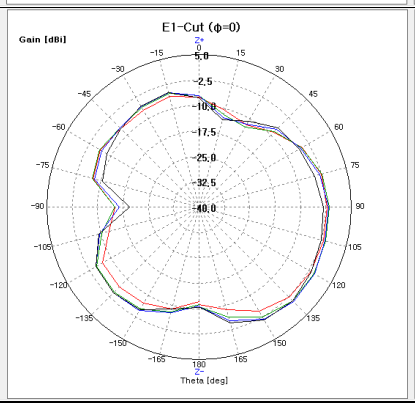
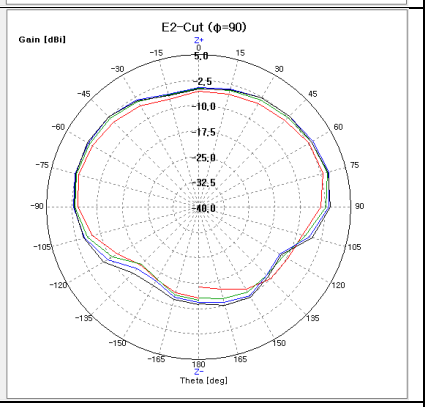
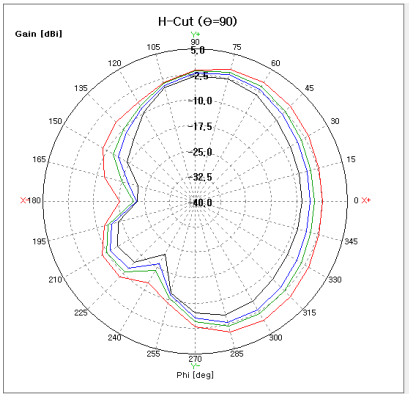
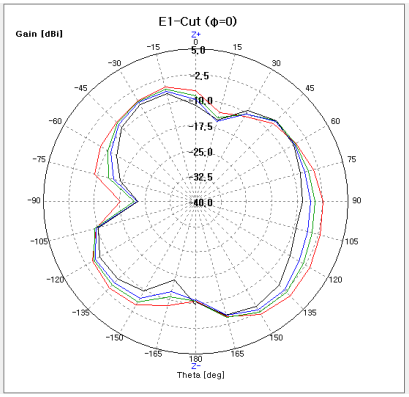
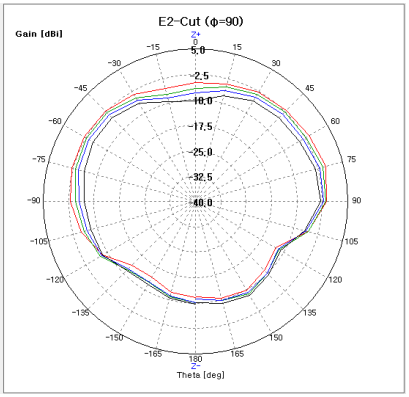
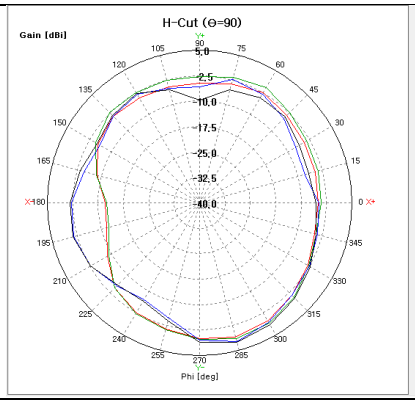
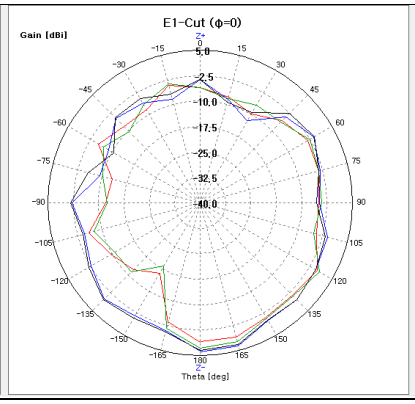
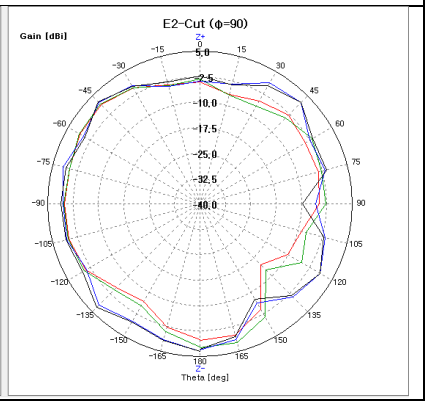
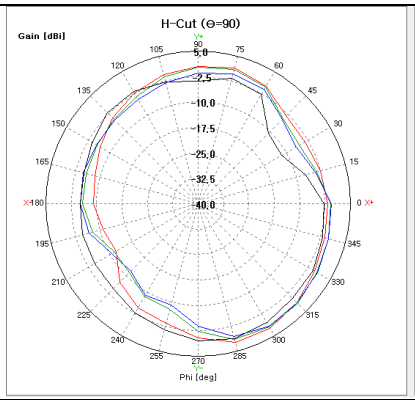
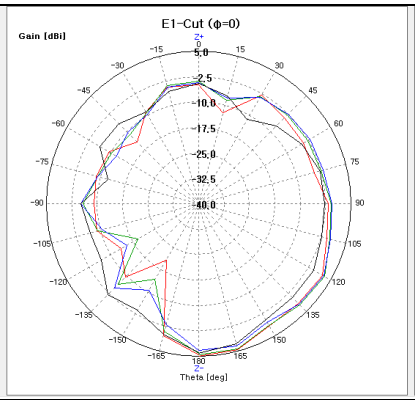
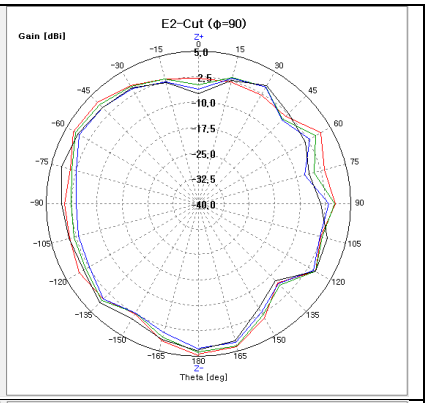
787			
LTE14			
758			
768			
788			
798			

LTE 20 791 821 832 862			
LTE 5 824 849 869 894			
LTE 8 880 915 925 960			
LTE4 1710 1755 2110 2155			

LTE2			
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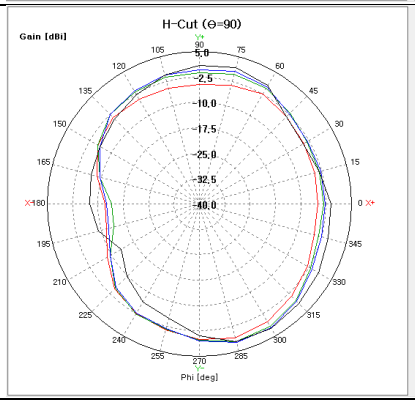
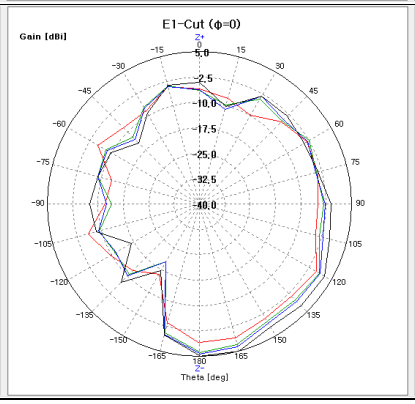
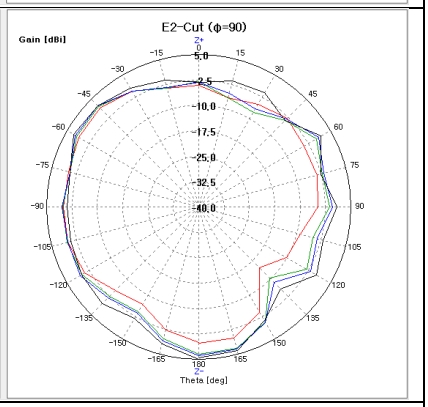
LTE3			
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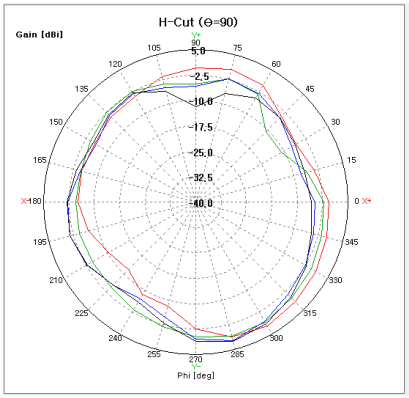
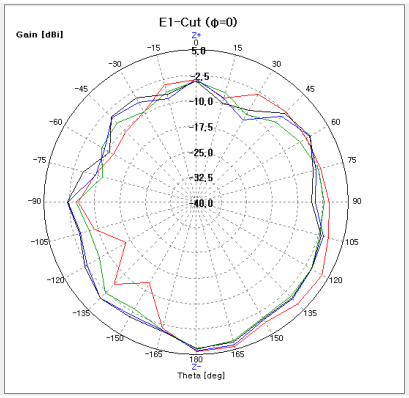
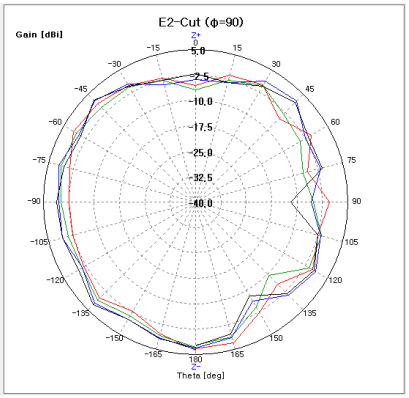
LTE 1			
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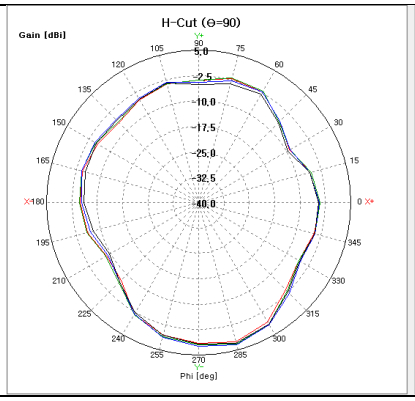
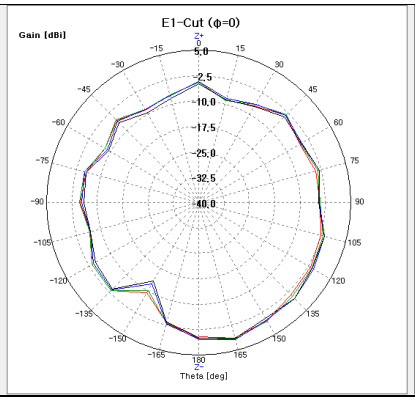
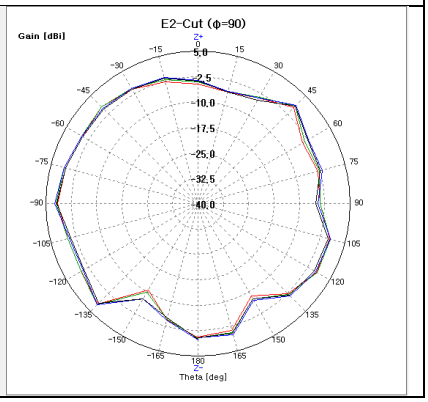
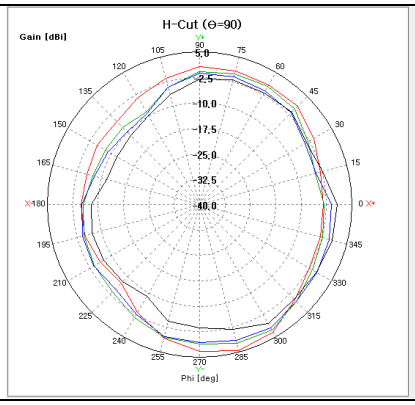
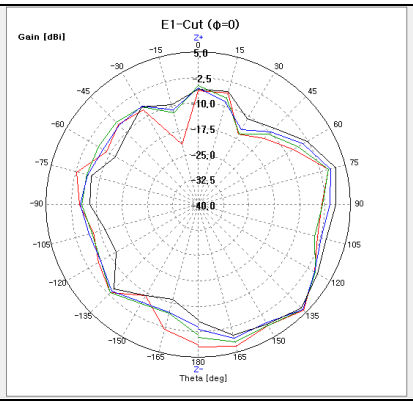
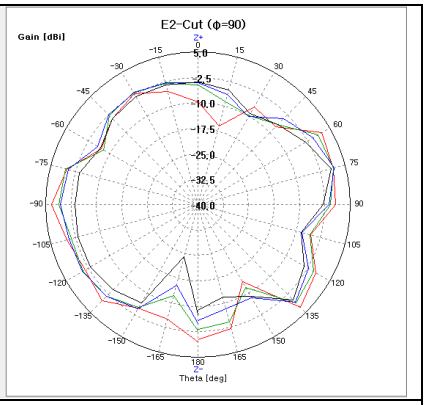
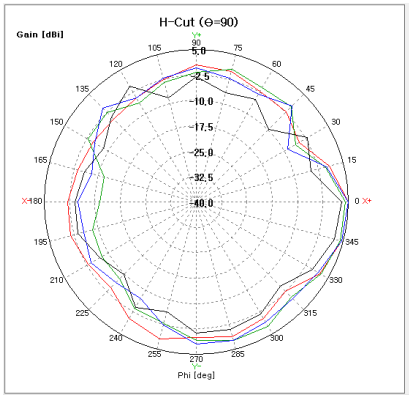
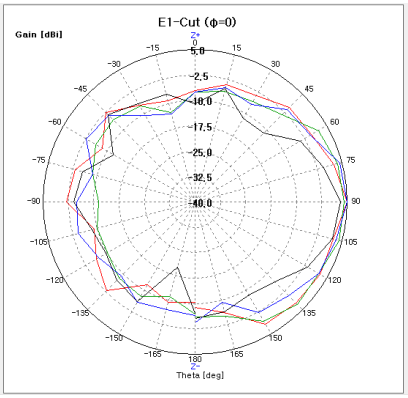
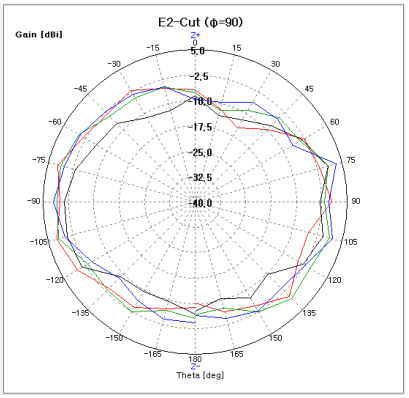
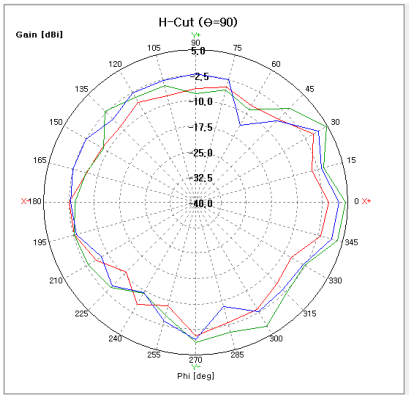
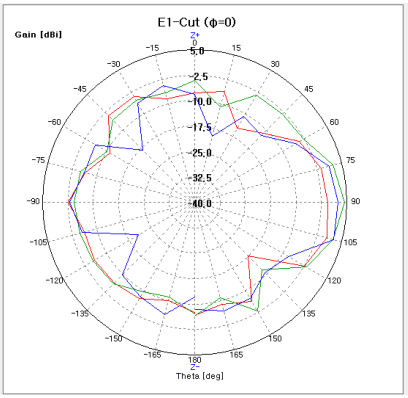
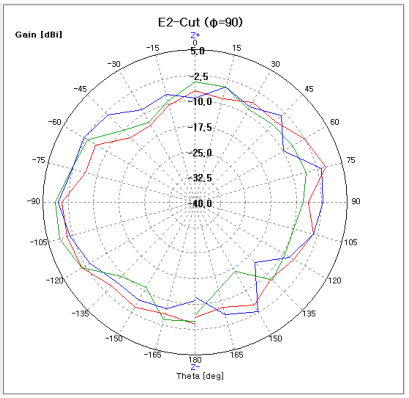
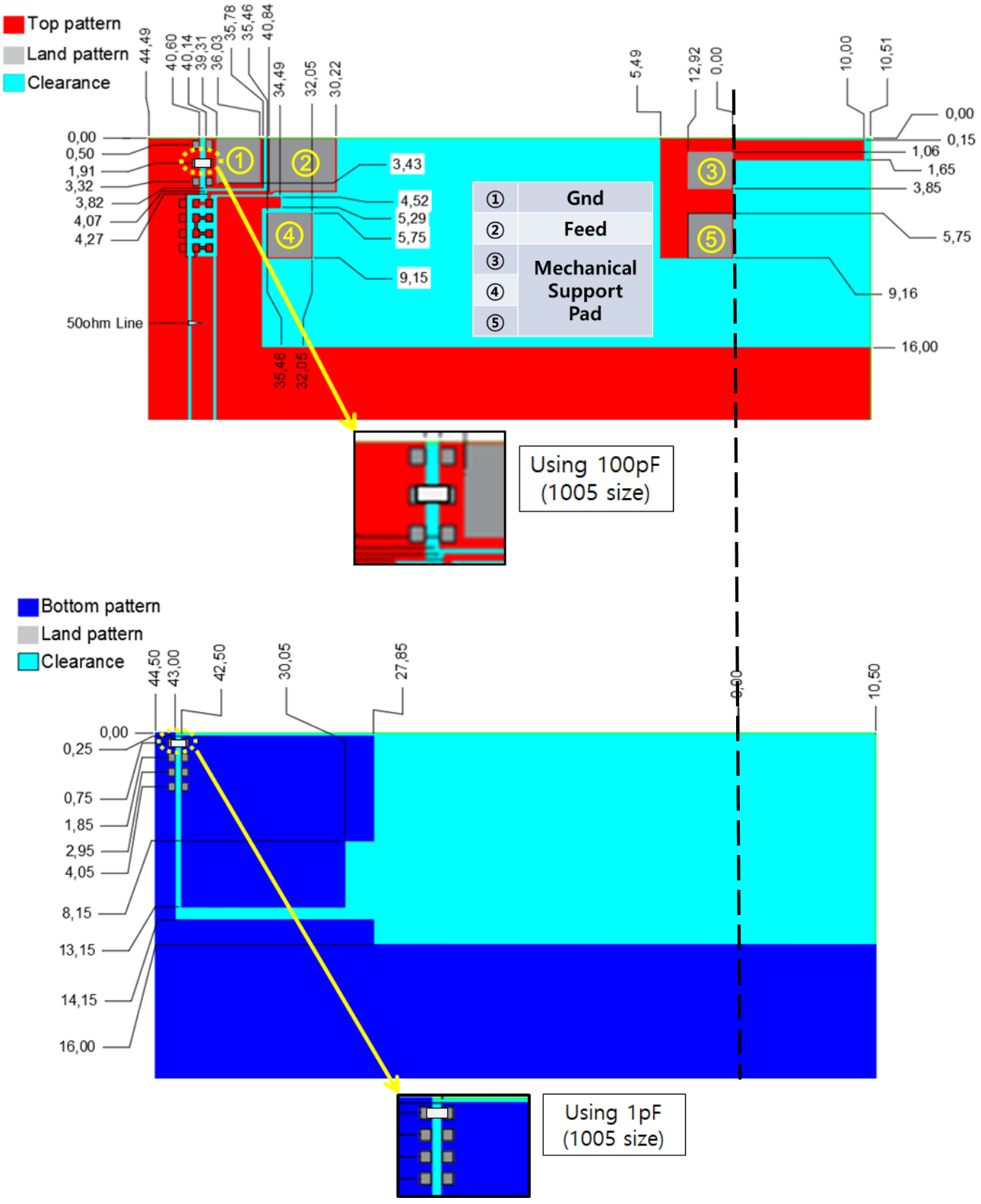
LTE30			
2305 2315 2350 2360			

LTE 7 2500 2570 2620 2690			
n78 **n77** 3300 3550 3750 4200			
n79 4400 4700 5000			

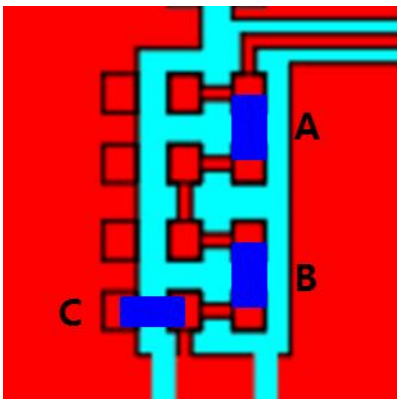
3. SOLDERING RECOMMENDATIONS

3.1. Soldering Land Pattern

*** PCB Thickness (mm): FR4 1.6T**

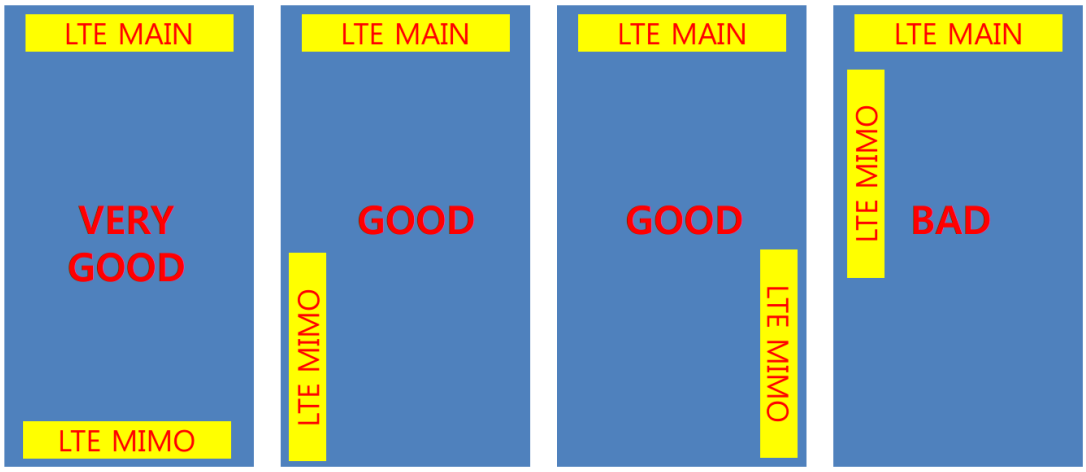


3.2. Matching circuit @ EVB



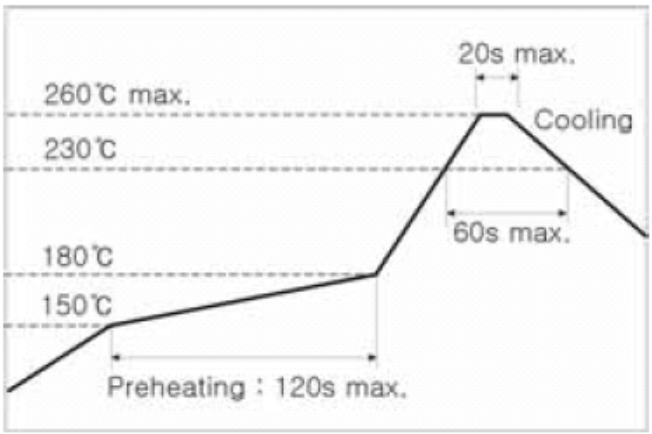
A (Series)	2.7 pF
B (Series)	100 pF
C (Shunt)	8.2 nH

3.3. Recommended position for LTE Main/MIMO Antenna



3.4. Soldering Profile

Solder paste : Sn/Ag/Cu:96.5/3.0/0.5



This product is designed for reflow soldering only. Do not use flow (wave) soldering.

① Use non-activated flux (Cl content 0.2% max.)

② Follow the recommended soldering conditions to avoid damage.

③ Reflow-cycle is max. 3times.

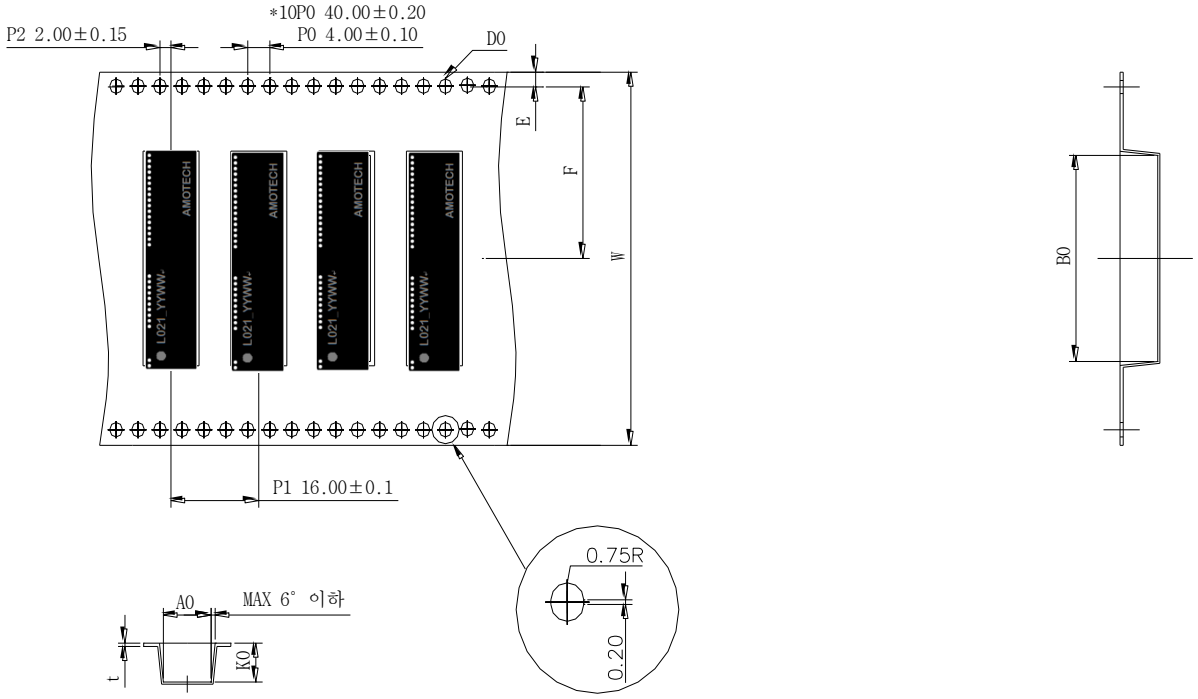
4. Reliability test

No.	Test Items	Test Condition	Requirement
1	High Temperature Exposure	+125±3℃, 96Hrs	1. No visible defects. 2. Satisfy VSWR spec.
2	Temperature Cycling	-40℃/30min ↔ +125℃/30min, 10 Cycle	1. No visible defects. 2. Satisfy VSWR spec.
3	Biased Humidity	- Humidity: 85%RH - Temperature: 85℃ - Time: 1000Hrs	1. No visible defects. 2. Satisfy VSWR spec.
4	Mechanical Shock	- Peak 100g - Duration 6 ms - X.Y.Z each 3 times	1. No visible defects. 2. Satisfy VSWR spec.
5	Vibration	- 5-55-5 ㎐, 1 Octave/min - Amp.=1.5mm,acceleration=2x9.8 ㎨(G) - Crossover Freq.=18 ㎐	1. No visible defects. 2. Satisfy VSWR spec.
6	ESD	- ESD Level: 8KV, - Mode: Contact discharge, 100 times	1. No visible defects. 2. Satisfy VSWR spec.
7	Adhesion Strength of Soldering	- Used of push pull gauge	1. Spec (Min: 5Kgf)
8	Solderability	- Dipping 250±5℃ / 5 sec	1. No visible defects.
9	Board Flex	- 2mm, Duration time: 1min - No open parts, No crack at soldering points	1. No visible defects. 2. Satisfy VSWR spec.

5. PACKING

5.1 Tape Dimension (unit : mm)

5.1.1 Size



A0	9.40±0.10	E	1.75±0.10
B0	39.50±0.10	F	26.20±0.10
K0	3.70±0.10	W	56.00±0.30
D0	1.50±0.1	t	0.40±0.05

5.1.2 Surface resistance

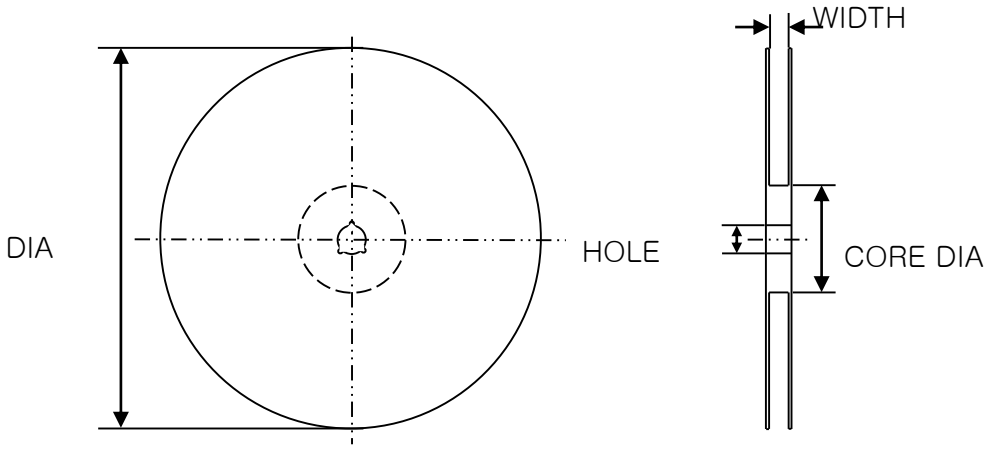
1) Carrier tape : Max $10^{11}\Omega$

2) Cover tape : Max $10^{11}\Omega$

3) Reel : Max $10^{11}\Omega$

5.2 Description of Reel

5.2.1 Size



ITEM	DIA	WIDTH	CORE DIA	HOLE
Size(mm)	330.0 ±2	57.5 ± 1.0	80.0 ± 1.0	13.0 ± 0.3

5.2.2 Material

1) Plastic reel : GPPS (General Purpose Poly Styrene) resin

5.3 Description of Packing Box

5.3.1 Reel

Size: 56 (W), Dia. Φ330 (mm)

Quantity: 1,000ea/reel

5.3.2 Inner Box

Size: 368 (W) x 346 (D) x 65 (T) (mm)

Quantity: 1 reel (1,000 ea/reel × 1 reel = 1,000 ea)

5.3.3 Outer Box

Size: 405 (W) x 360 (D) x 300 (T) (mm)

Quantity: 4 Inner Box (1,000 ea/Inner Box × 4 Inner Box=4,000 ea)

6. Caution and Warranty

6.1 Chip antennas must avoid shock and drop, to prevent damage of the antenna.

6.2 Chip antennas should be used within 12 months after delivery, antennas older than 12 months should be checked for solderability before using