



Preliminary Approval sheet

Main Internal Antenna

Part No. : AMMAL022

DASAN NETWORKS	Designed	Checked		Approved
Date	/	/	/	/

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

	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

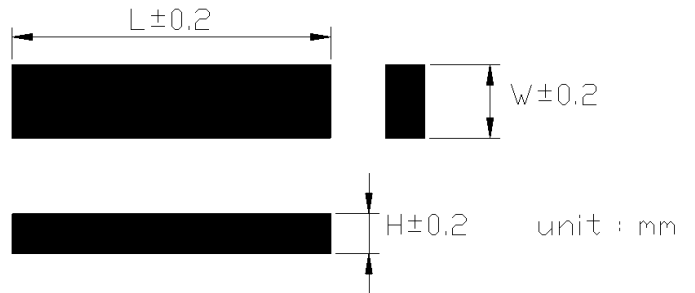
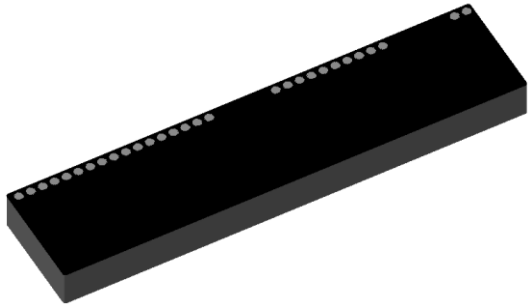
ITEM	LTE71	LTE12	LTE13	LTE14	LTE20	Remark
Frequency [MHz]	617~652 663~698	699~716 729~746	746~756 777~787	758~768 788~798	791~821 832~862	Notes :1)
Peak Gain[dBi]	0.4	-0.8	-1.4	-1.5	-1.1	
Eff.[%] @Avg.	37.5	38.0	35.1	32.3	34.9	
ITEM	LTE5	LTE8	LTE4	LTE3	LTE2	Notes :1)
Frequency [MHz]	824~849 869~894	880~915 925~960	1710~1755 2110~2155	1710~1785 1805~1880	1850~1910 1930~1990	
Peak Gain[dBi]	0.7	0.6	2.9	2.9	2.4	
Eff.[%] @Avg.	38.0	34.9	59.9	50.8	61.5	
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]	2.7	2.0	3.2	3.5		
Eff.[%] @Avg.	67.7	53.1	55.1	56.1		
ITEM	N77	N79	-	-	Notes :1)	
Frequency [MHz]	3300~4200	4400~5000	-	-		
Peak Gain[dBi]	3.5	6.1	-	-		
Eff.[%] @Avg.	48.6	36.3	-	-		
VSWR	Max. 7 : 1					Notes :1)
	TBD					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	°C



1.3 Marking



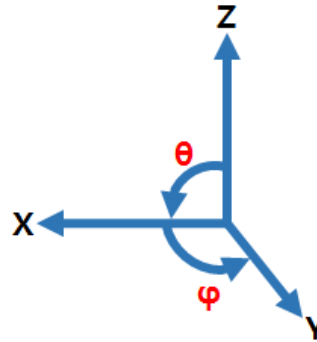
- : 1 pin position
- L022** : Model No.
- YY** : Year (ex: 2019 → 19)
- WW** : Week (ex: 1st week→01, 7th week→07)

2. MEASUREMENT

2.1. SET for Measurement



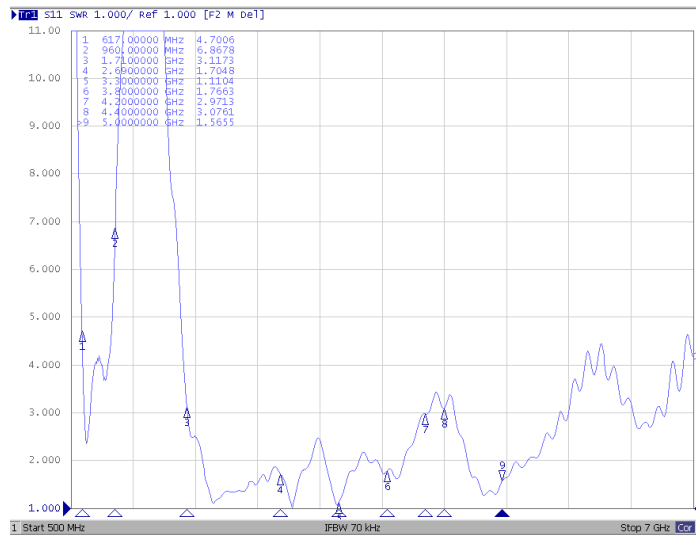
SET



Antenna Radiation coordinate system

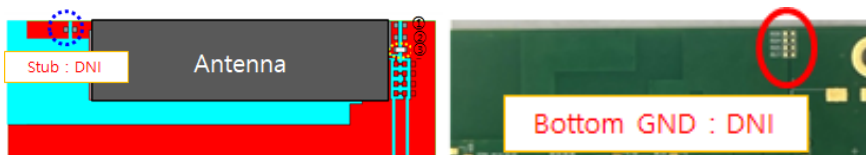
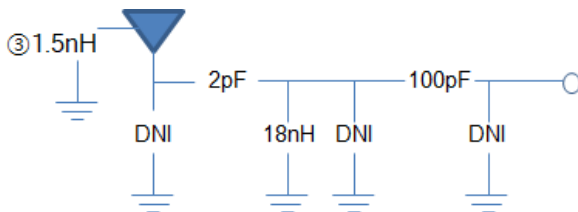
2.2. Electrical Characteristic

◆ S_{11} (VSWR)



- VSWR @ SET -

2.3. Matching circuit @SET



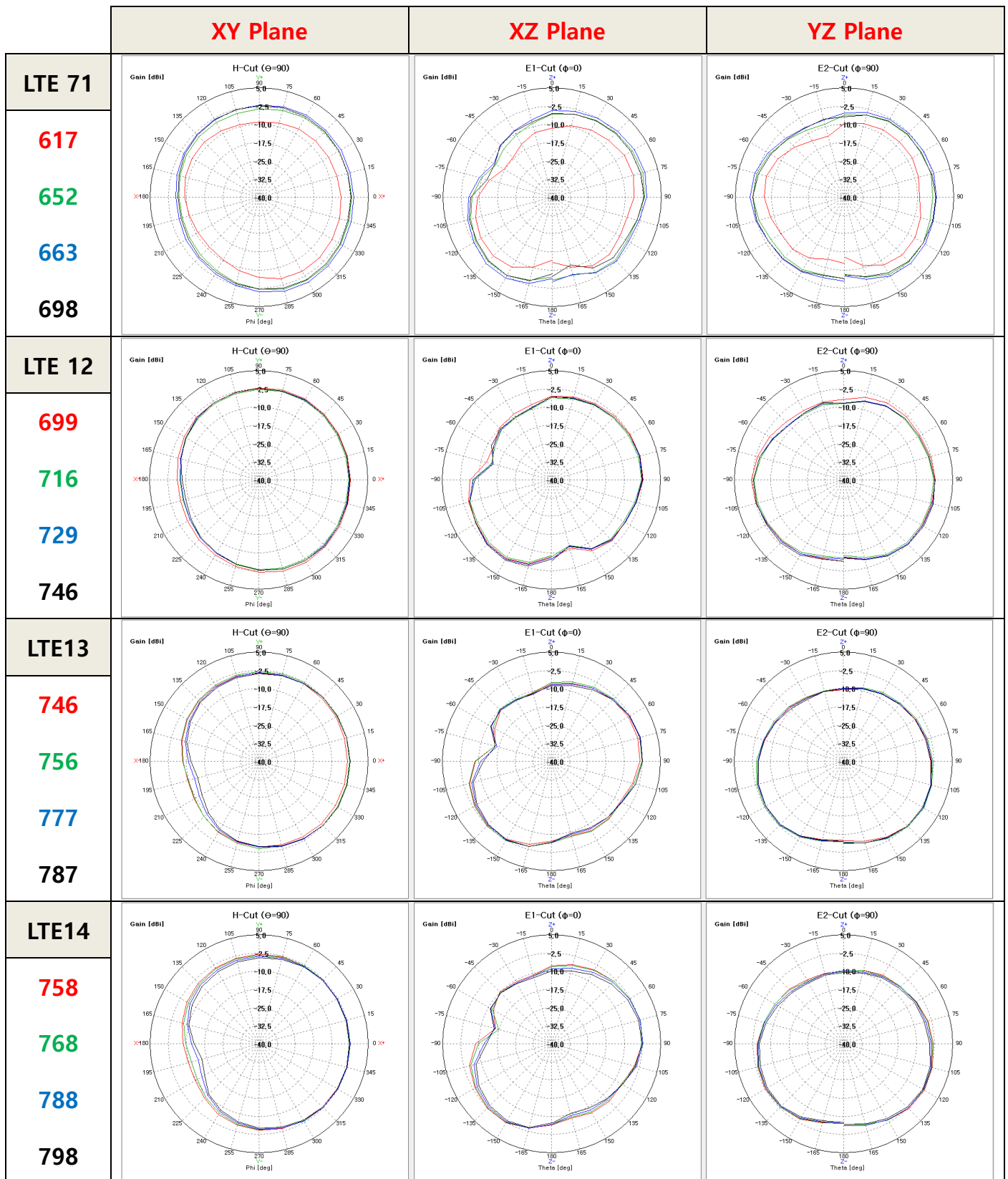
2.4. Radiation Characteristic

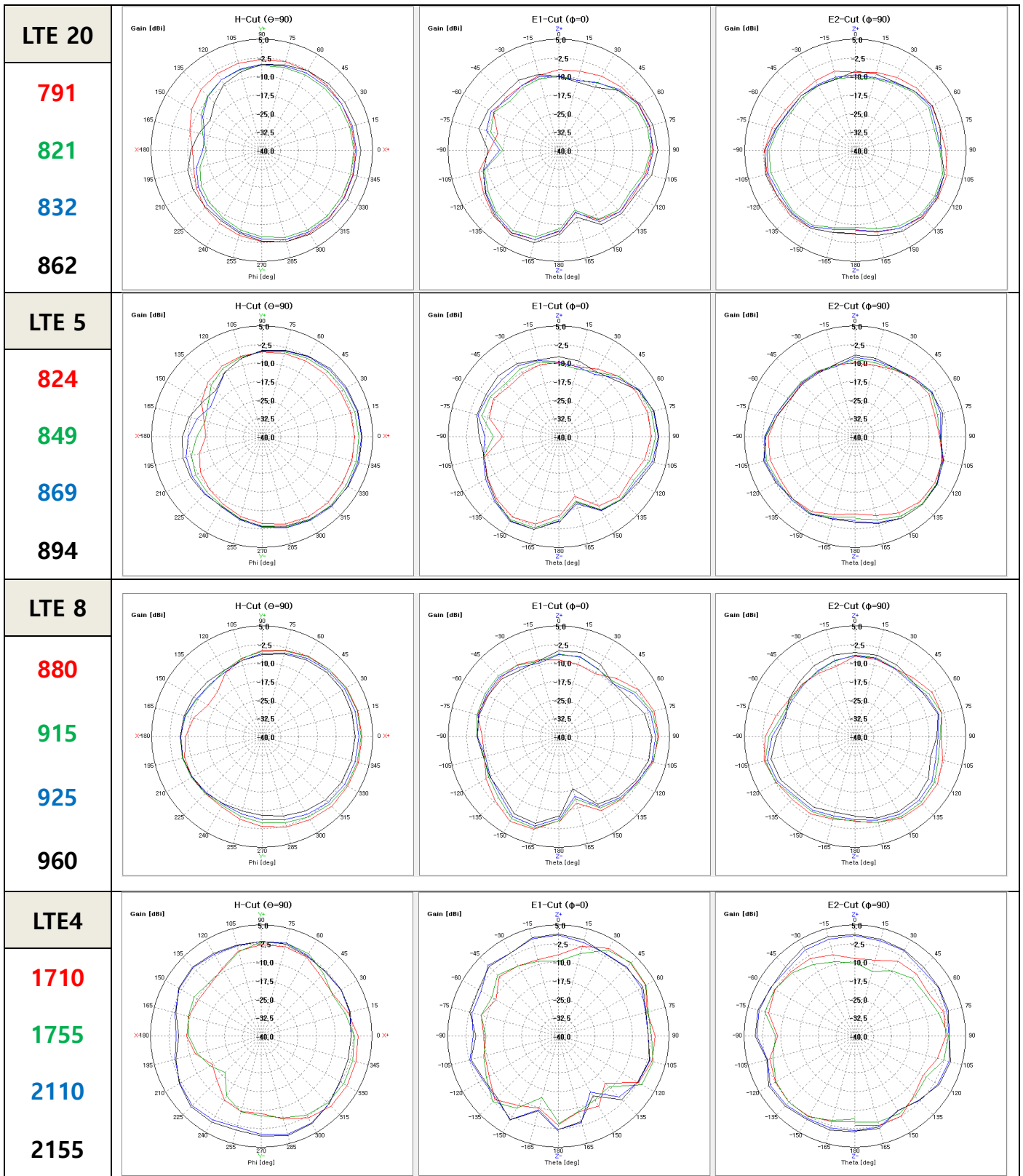
- Measurement Result

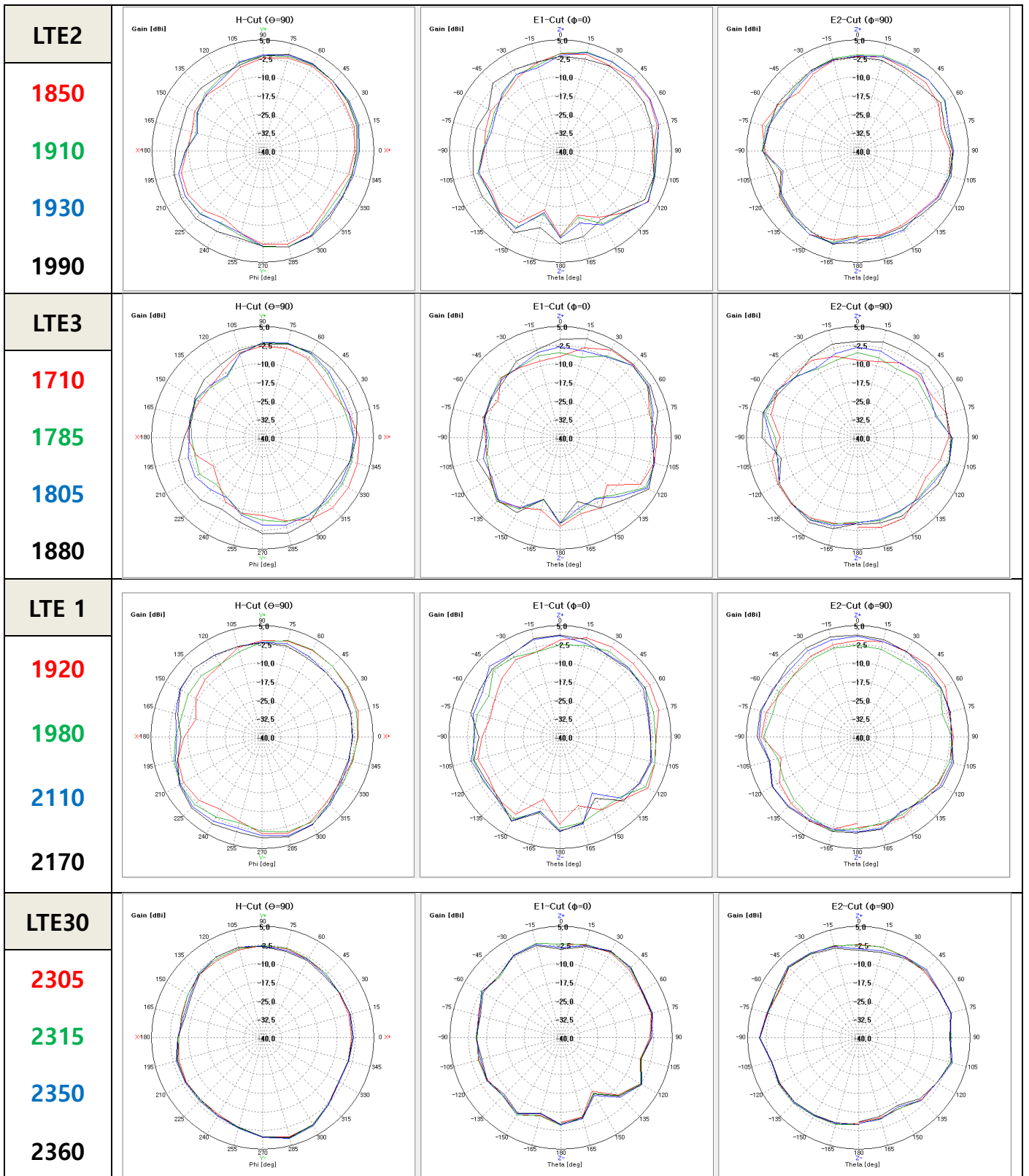
Band	Frequency [MHz]	EFF.[%]	Avg. (dBi)	Peak (dBi)
LTE 71	617	16.33	-7.87	-4.47
	652	41.20	-3.85	-0.44
	663	51.69	-2.87	0.40
	698	40.60	-3.92	-0.89
LTE 12	699	41.21	-3.85	-0.80
	716	34.01	-4.68	-1.96
	729	37.79	-4.23	-1.61
	746	39.12	-4.08	-1.48
LTE 13	746	39.12	-4.08	-1.48
	756	35.99	-4.44	-1.43
	777	33.57	-4.74	-1.65
	787	32.03	-4.94	-1.83
LTE 14	758	35.28	-4.53	-1.53
	768	33.75	-4.72	-1.71
	788	31.88	-4.96	-1.83
	798	28.32	-5.48	-2.27
LTE 20	791	38.62	-4.13	-0.97
	821	26.83	-5.71	-2.43
	832	33.05	-4.81	-1.31
	862	41.25	-3.85	0.18
LTE 5	824	28.39	-5.47	-2.13
	849	37.41	-4.27	-0.43
	869	42.68	-3.70	0.40
	894	43.71	-3.59	0.73
LTE 8	880	43.06	-3.66	0.59
	915	38.53	-4.14	0.28
	925	32.00	-4.95	-0.62
	960	26.20	-5.82	-2.08
LTE 4	1710	46.59	-3.32	2.92
	1755	46.17	-3.36	2.51
	2110	70.49	-1.52	2.00
	2155	76.38	-1.17	2.56

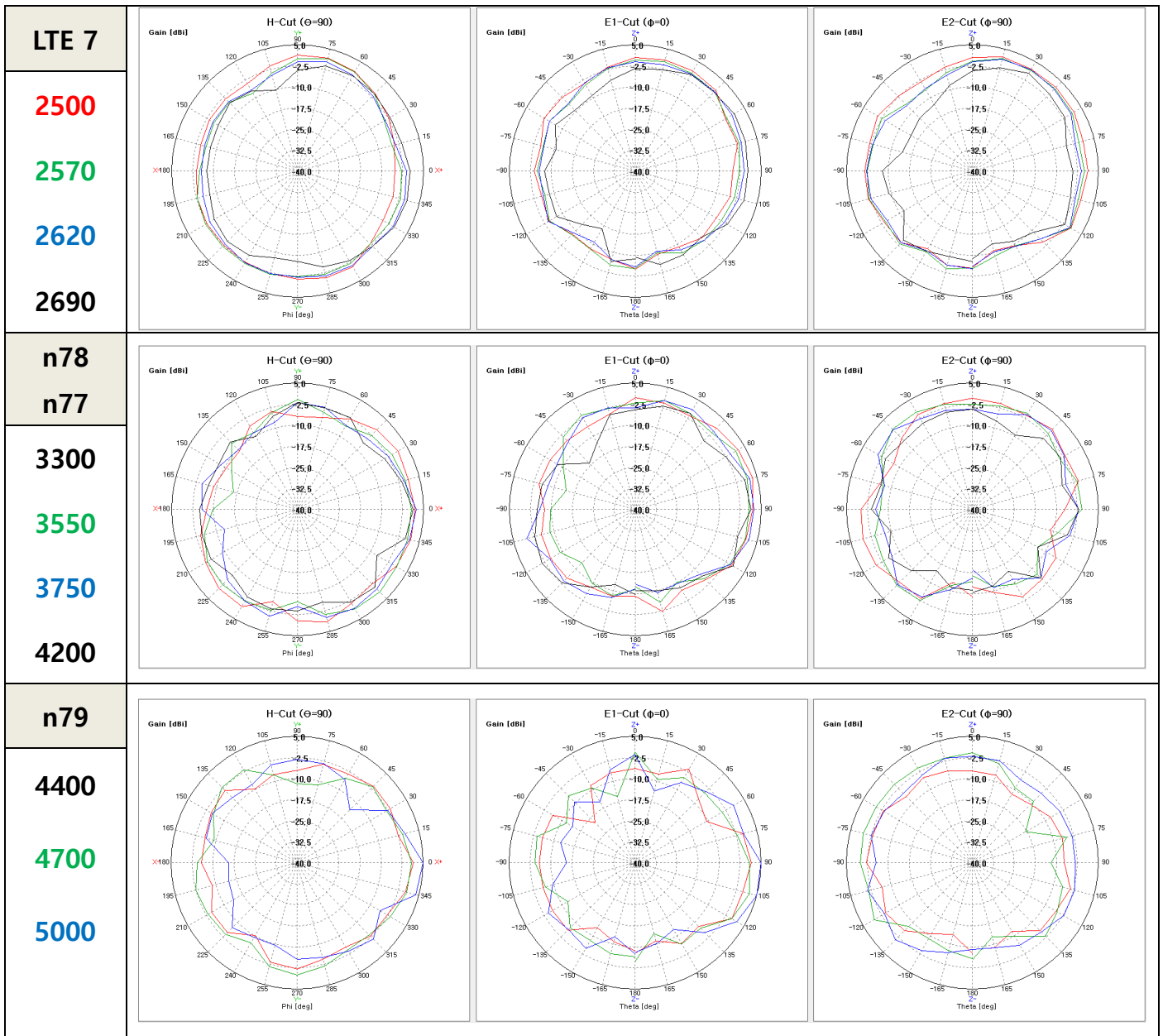
Band	Frequency [MHz]	EFF.[%]	Avg. (dBi)	Peak (dBi)
LTE 2	1850	55.78	-2.54	1.77
	1910	65.62	-1.83	2.25
	1930	64.77	-1.89	2.35
	1990	60.02	-2.22	1.16
LTE 3	1710	46.59	-3.32	2.92
	1785	44.44	-3.52	2.00
	1805	47.52	-3.23	1.88
	1880	64.48	-1.91	2.18
LTE 1	1920	67.77	-1.69	2.43
	1980	57.89	-2.37	1.44
	2110	70.49	-1.52	2.00
	2170	74.49	-1.28	2.65
LTE 30	2305	51.41	-2.89	1.49
	2315	54.57	-2.63	1.89
	2350	55.13	-2.59	2.01
	2360	51.24	-2.90	1.55
LTE 7	2500	64.21	-1.92	3.15
	2570	57.55	-2.40	2.97
	2620	55.48	-2.56	1.77
	2690	43.19	-3.65	1.67
n78	3300	60.04	-2.22	3.53
	3550	52.62	-2.79	1.75
	3800	55.55	-2.55	3.47
n77	3300	60.04	-2.22	3.53
	3750	50.96	-2.93	2.40
	4200	34.71	-4.60	1.39
n79	4400	30.16	-5.21	1.52
	4700	39.09	-4.08	2.38
	5000	39.67	-4.02	6.10
<ul style="list-style-type: none"> ● Remark - 6mx3mx3m Anechoic Chamber - Matching on SET - Temp. : 25°C / Humidity : 50~55% 				

2.5. Radiation patterns





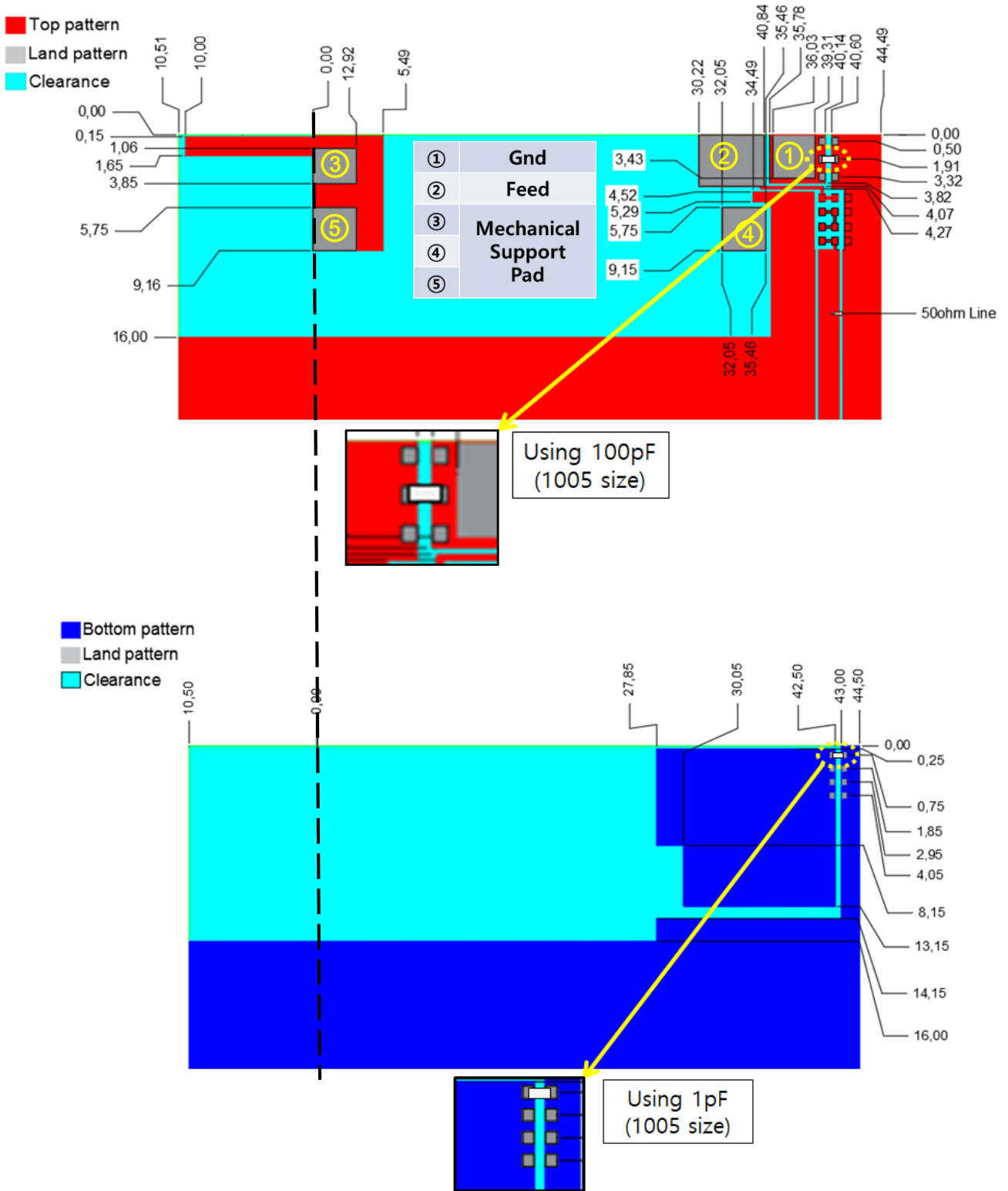




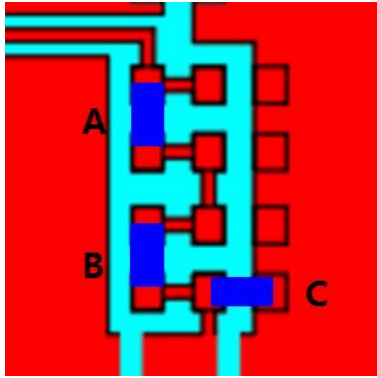
3. SOLDERING RECOMMENDATIONS

3.1. Soldering Land Pattern

* PCB Thickness (mm): FR4 1.6T

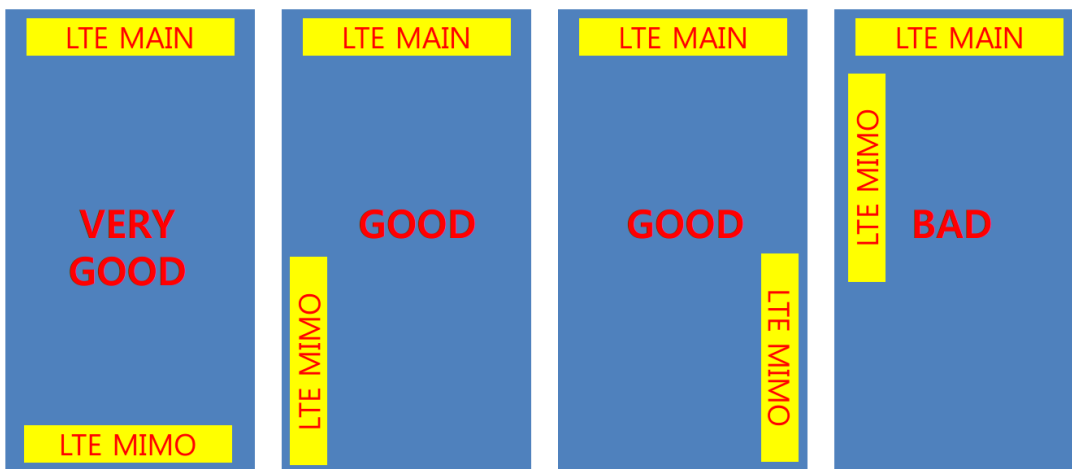


3.2. Matching circuit @EVB



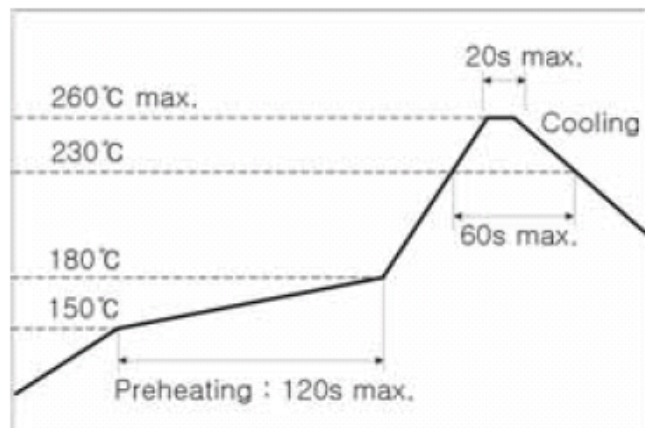
A (Series)	2.7 pF
B (Series)	100 pF
C (Shunt)	8.2 nH

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.

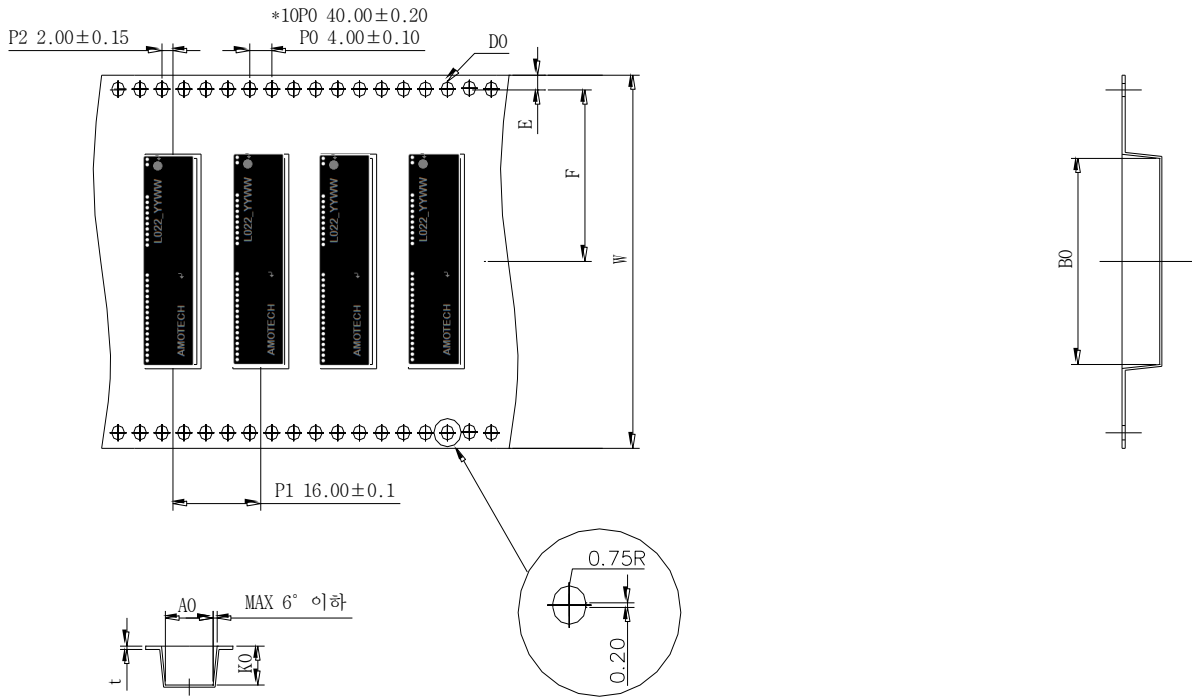
4. Reliability test

No.	Test Items	Test Condition	Requirement
1	High Temperature Exposure	+125±3°C, 96Hrs	1. No visible defects. 2. Satisfy VSWR spec.
2	Temperature Cycling	-40°C/30min ↔ +125°C/30min, 10 Cycle	1. No visible defects. 2. Satisfy VSWR spec.
3	Biased Humidity	- Humidity: 85%RH - Temperature: 85°C - 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 Hz, 1 Octave/min - Amp.=1.5mm,acceleration=2x9.8 m/s ² (G) - Crossover Freq.=18 Hz	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°C / 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



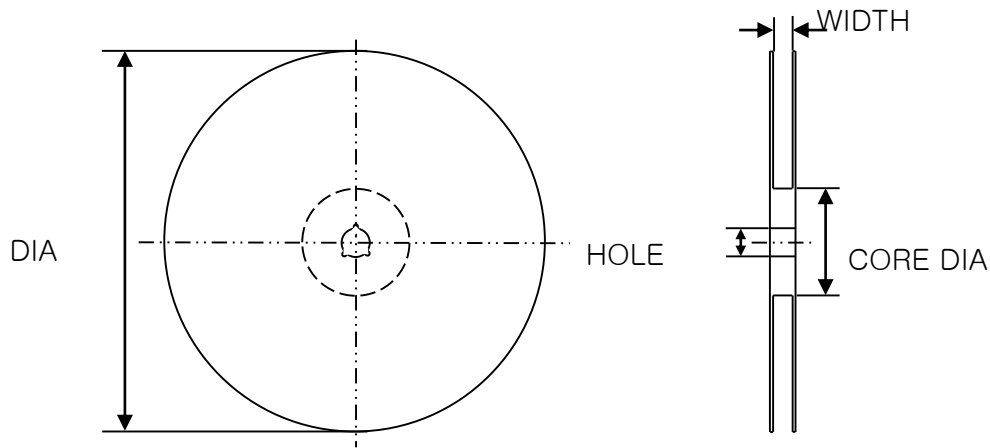
A0	9.40±0.10	E	1.75±0.10
B0	39.50±0.10	F	26.20±0.10
K0	3.70±0.10	W	56.00±0.30
D0	1.50±0.1	t	0.40±0.05

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. Φ 330 (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