





Data sheet

Main Internal Antenna

Part No. : AMMAL004

	Designed	Checked		Approved
Date	/	/	/	/

Revision no	Content	Page	Date	Name
0	First, documented	-	2016.12.22	H.W. Oh

	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	
				/		
		12 / 22	12 / 22		12 / 22	

Notes

The contents of this data sheet are subject to change without notice. Please confirm the specifications and delivery conditions when placing your order.

1. SPECIFICATIONS

1.1. Electrical Specifications

ITEM	LTE12	LTE20	LTE23	LTE 40	LTE7, LTE41	Remark
Frequency [MHz]	699~716 734~746	791~821 832~862	2000~2020 2180~2200	2300~2400	2500~2690	Ndes 1)
Peak Gain[dBi]	1.97	2.09	3.12	1.85	1.46	Ndes 1)
Eff.[%] @Avg.	65.48 %	64.40 %	73.71 %	71.38 %	58.28 %	Ndes 1)
ITEM	GSM850 LTE5	GSM900 LTE8	DCS LTE3	PCS LTE2	WCDMA1 LTE1	Remark
Frequency [MHz]	824~849 869~894	880~960	1710~1785 1805~1880	1850~1910 1930~1950	1920~1980 2110~2170	Ndes 1)
Peak Gain[dBi]	1.94	1.31	3.14	2.98	3.01	Ndes 1)
Eff.[%] @Avg.	61.11 %	49.08 %	71.95 %	74.08 %	76.96 %	Ndes 1)
VSWR	4.0 : 1					Ndes 1)
	TBD					Ndes 2)
Polarization	Linear					Ndes 1)
Azimuth Beam Pattern	Omni-directional					Ndes 1)
Impedance	50 Ω					Ndes 1)

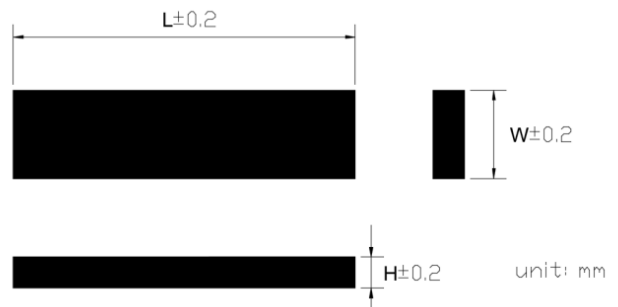
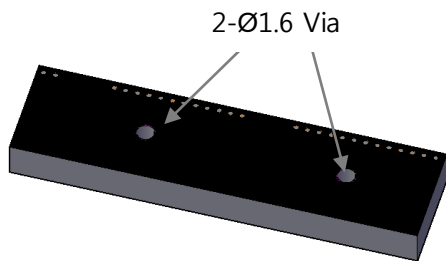
※Notes:1) Measured on the AMOTECH test board (141x50x1.6T)

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



1.2. Mechanical Specifications

Electrode	Copper	-
Dimensions (L x W x H)	35.0(L) x 9.0(W) x 3.2(H)	mm
Operating Temperature	-40 ~ +85	°C



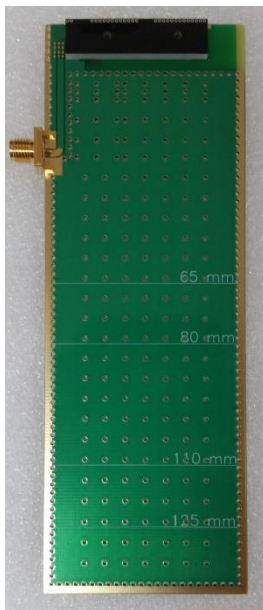
1.3 Marking



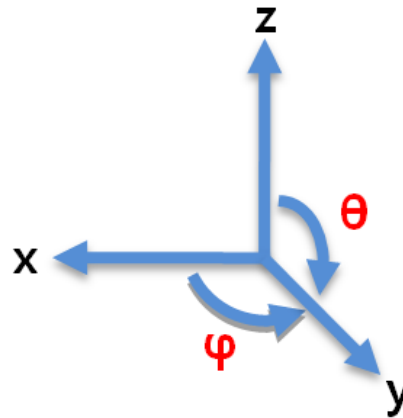
- : 1 pin position
- L004 : Model No.
- YY : Year (ex: 2015 → 15)
- WW : Week (ex: 1st week→01, 7th week→07)

2. MEASUREMENT

2.1. SET for Measurement



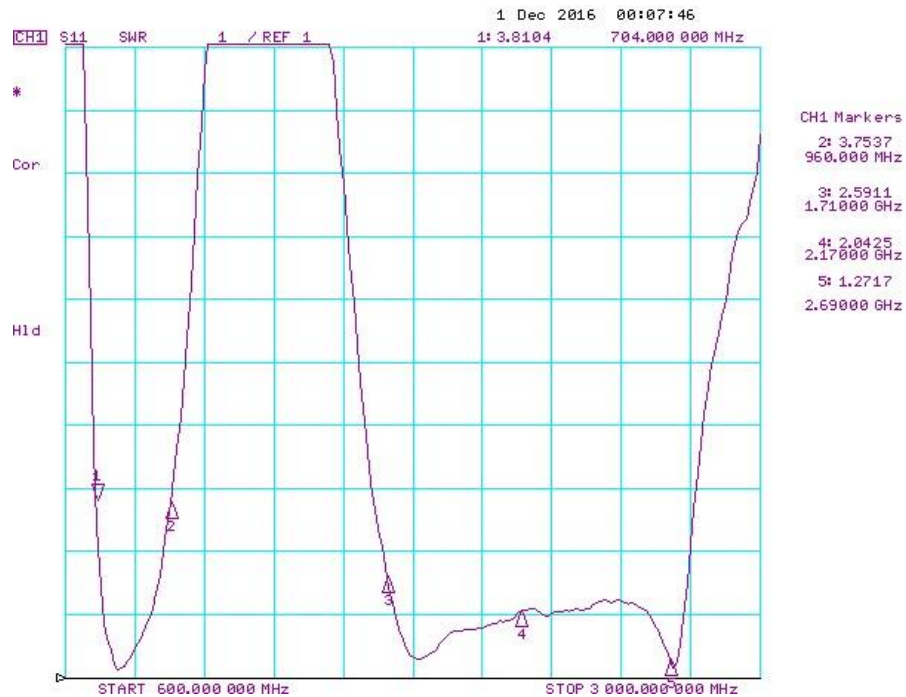
Board size mm: 141x50x1.6T



Antenna Radiation coordinate system

2.2. Electrical Characteristic

◆ S_{11} (VSWR)



- VSWR @ EV Board -

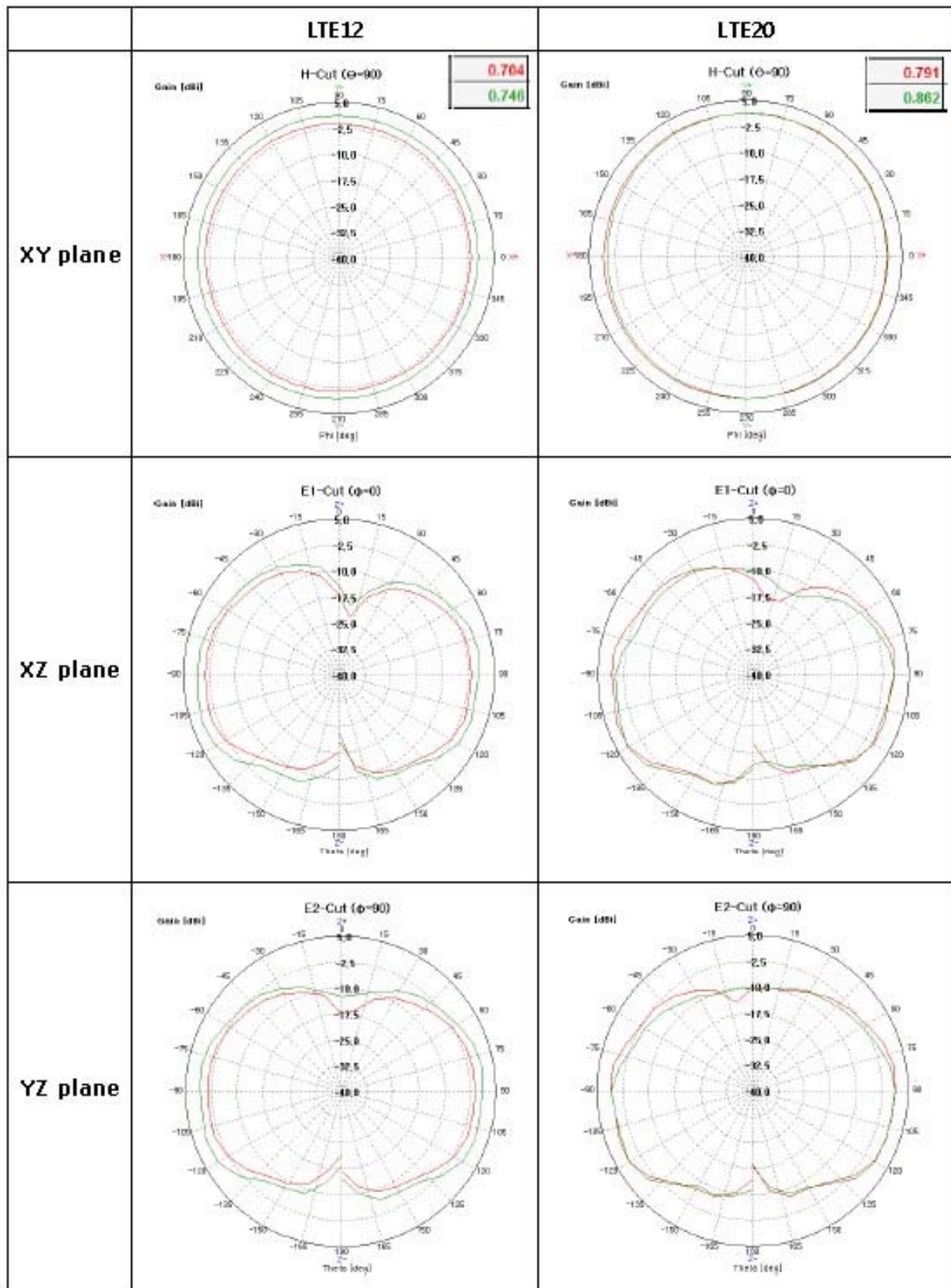
2.3. Radiation Characteristic

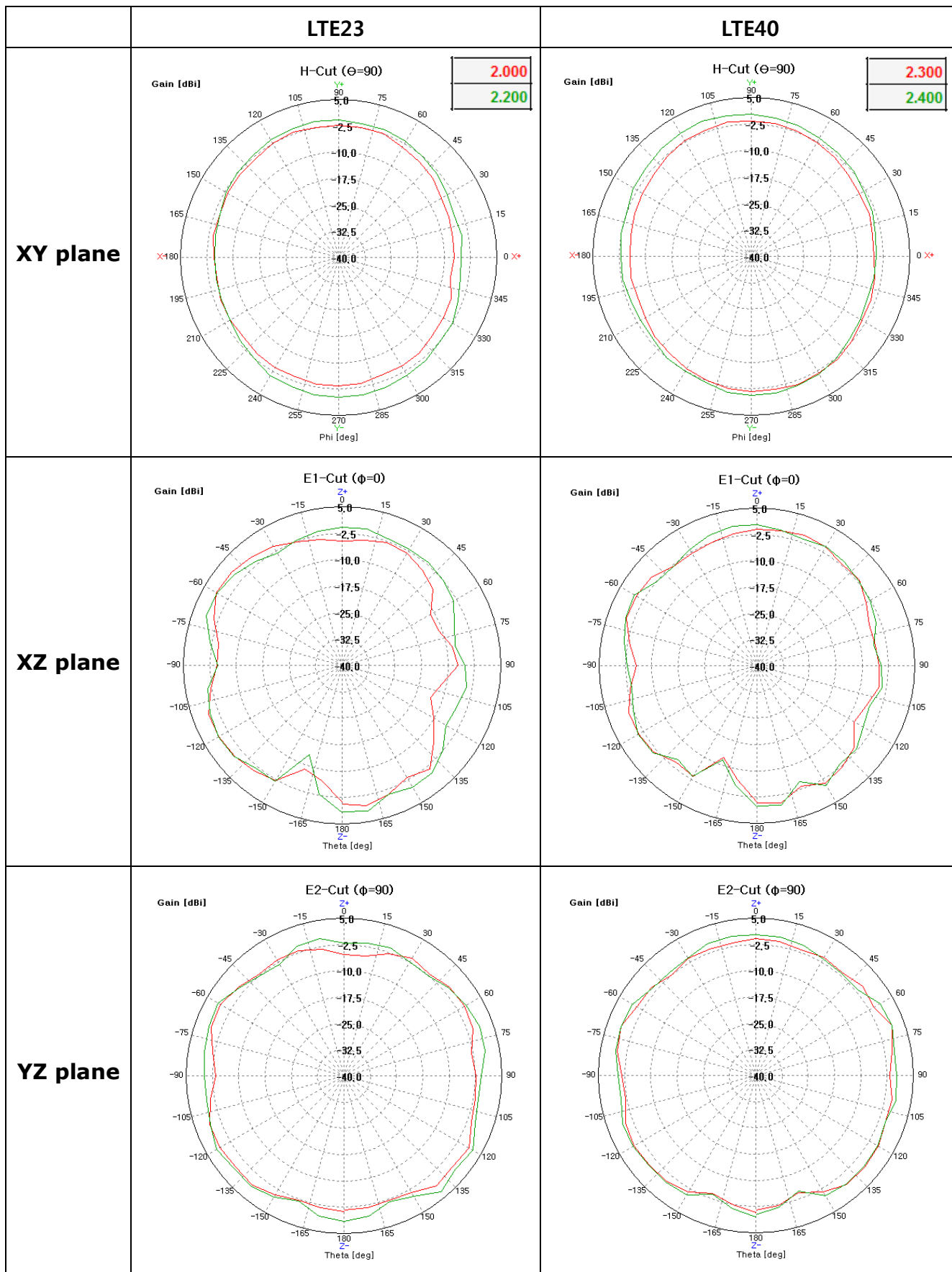
- Measurement Result

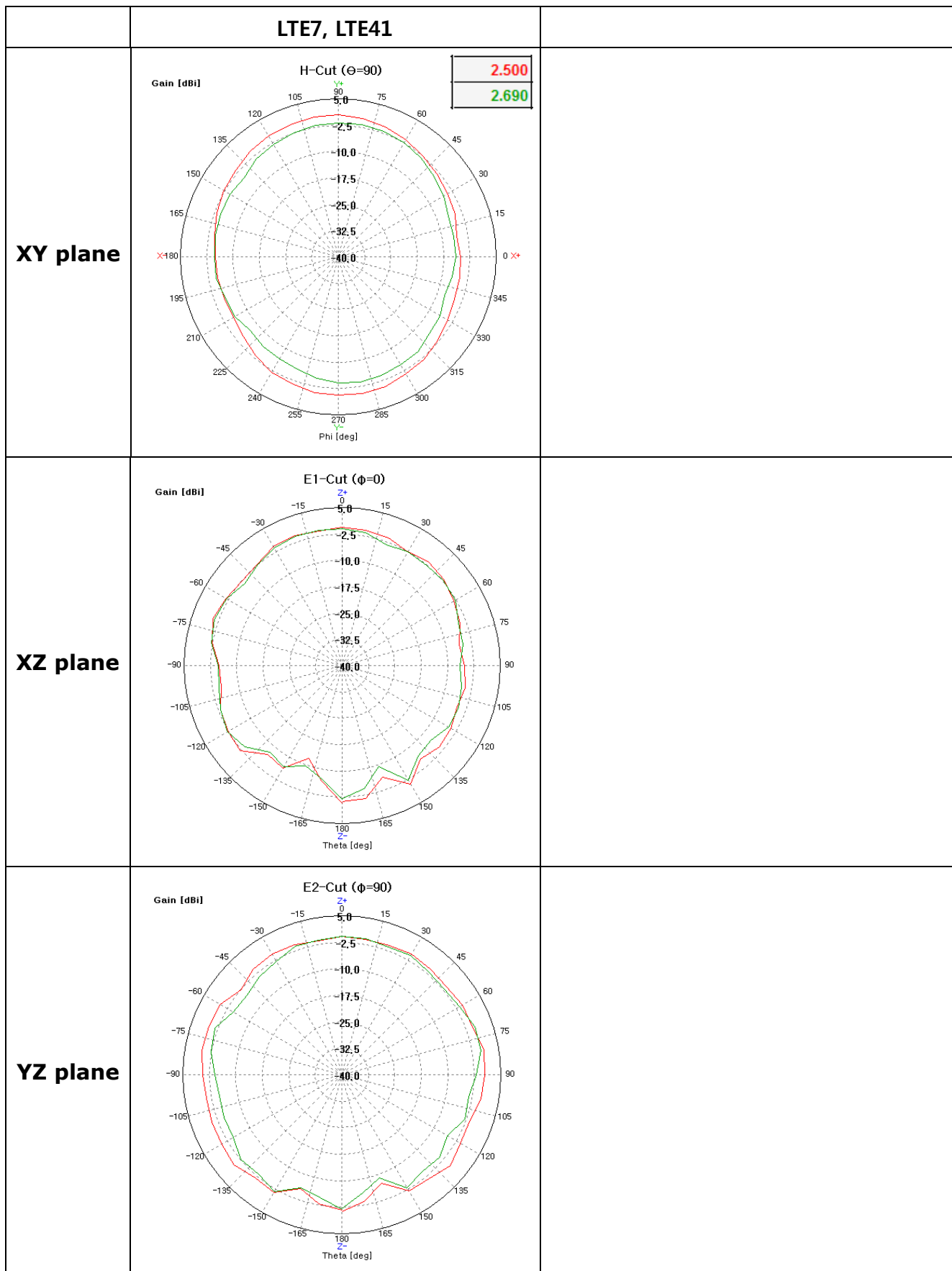
Band	Frequency MHz]	EFF.[%]	Avg. (dB)	Peak (dB)
LTE12	704	47.72	-3.21	-0.77
	716	60.14	-2.21	0.4
	734	72.98	-1.37	1.45
	746	81.1	-0.91	1.97
LTE20	791	77.29	-1.12	1.87
	821	54.37	-2.65	0.72
	832	58.62	-2.32	1.13
	862	67.34	-1.72	2.09
GSM850 LTE5	824	54.36	-2.65	0.7
	849	66.1	-1.8	1.84
	869	63.8	-1.95	1.94
	894	60.18	-2.21	1.64
GSM900 LTE8	880	55.22	-2.58	1.31
	960	42.95	-3.67	0.15
DCS LTE3	1710	58.66	-2.32	1.32
	1785	77.95	-1.08	3.03
	1805	69.83	-1.56	2.73
	1880	81.38	-0.89	3.14
PCS LTE2	1850	77.03	-1.13	2.98
	1910	79.65	-0.99	2.88
	1930	70.77	-1.5	2.42
	1990	68.89	-1.62	2.21
WCDMA1 LTE1	1920	76.33	-1.17	2.63
	1980	70.31	-1.53	2.12
	2110	79.87	-0.98	2.79
	2170	81.36	-0.9	3.01
LTE23	2000	67.01	-1.74	2.04
	2020	71.69	-1.45	2.64
	2180	71.73	-1.44	2.48
	2200	84.42	-0.74	3.12
LTE40	2300	67.71	-1.69	1.85
	2400	75.05	-1.25	1.48
LTE7, LTE41	2500	63.49	-1.97	1.33
	2570	63.78	-1.95	1.46
	2620	60.09	-2.21	1.14
	2690	45.78	-3.39	0.08
<ul style="list-style-type: none"> ● Remark - 6m×8m×3m Anechoic Chamber - Matching on the standard test board (141×50 mm) - Temp. : 25℃ / Humidity : 50~55% 				

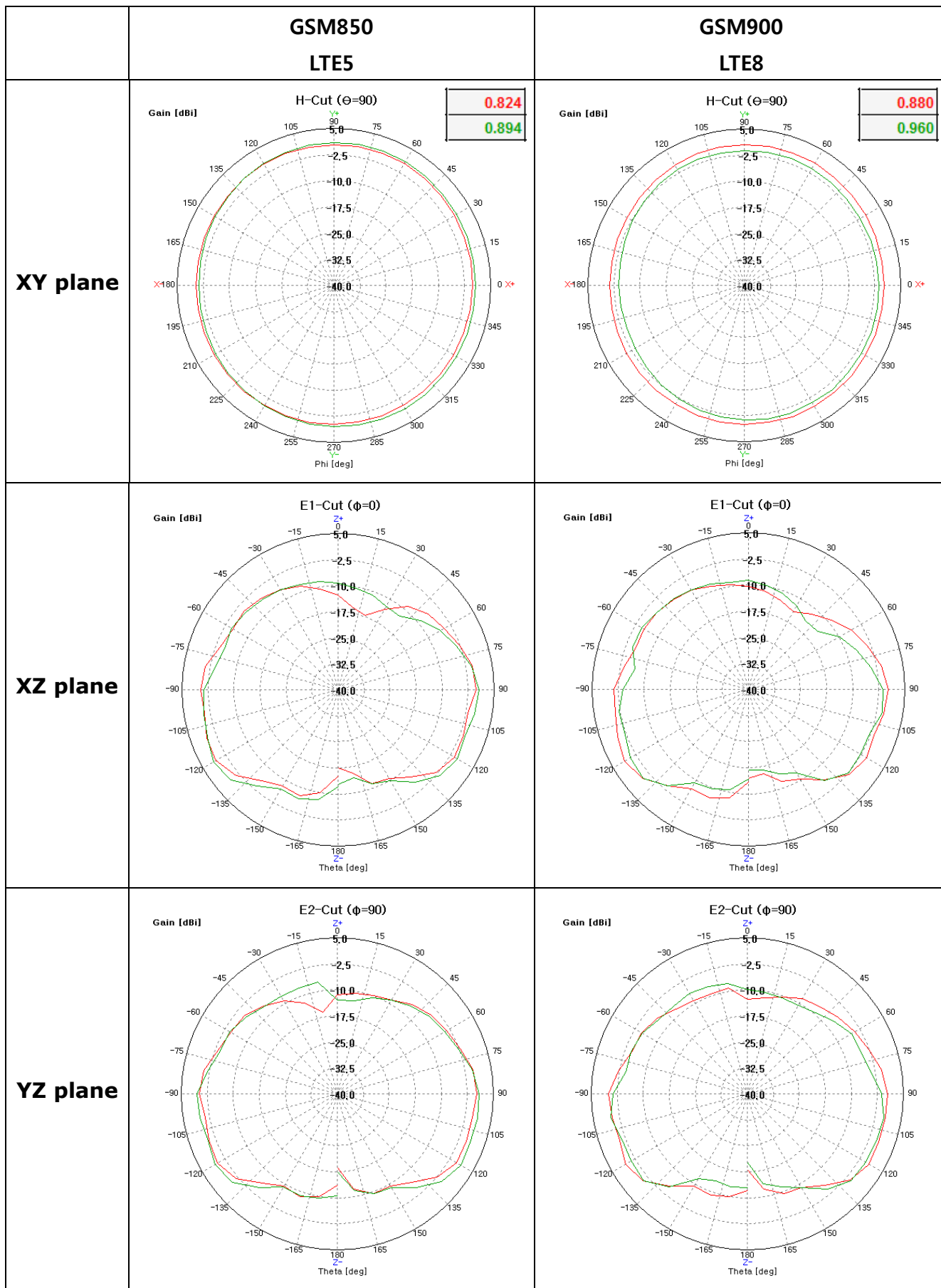


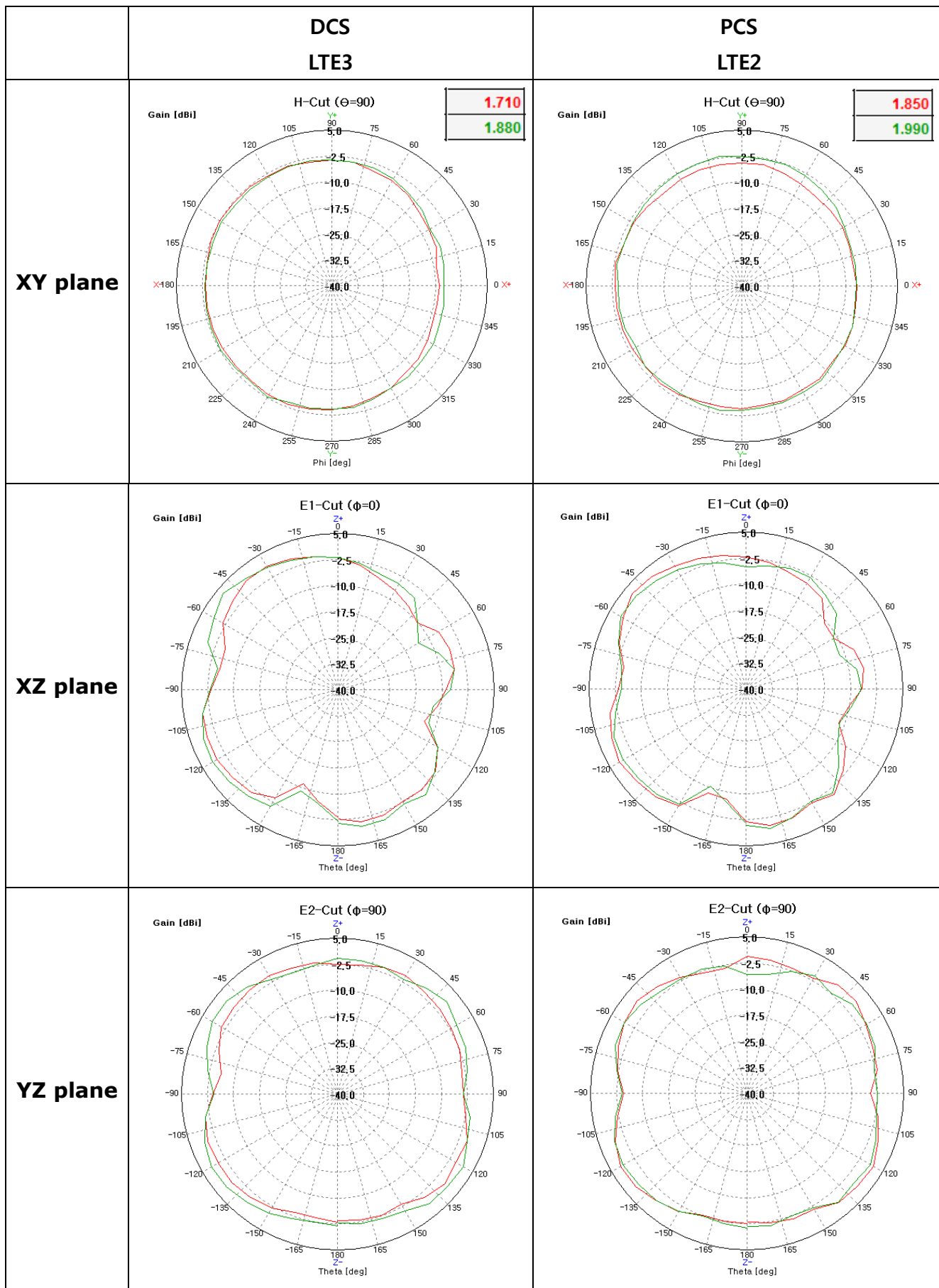
2.4. Radiation patterns





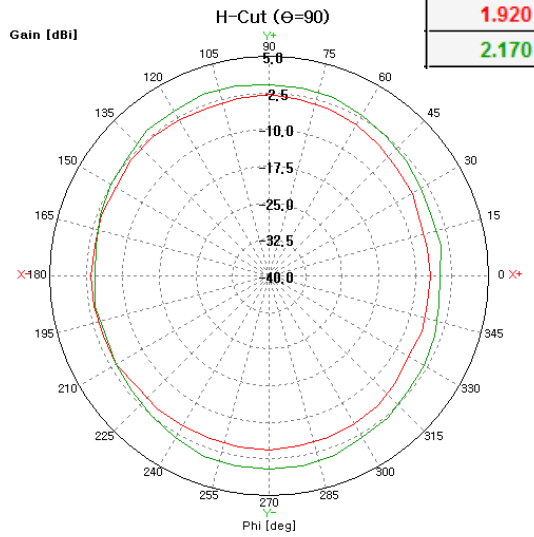




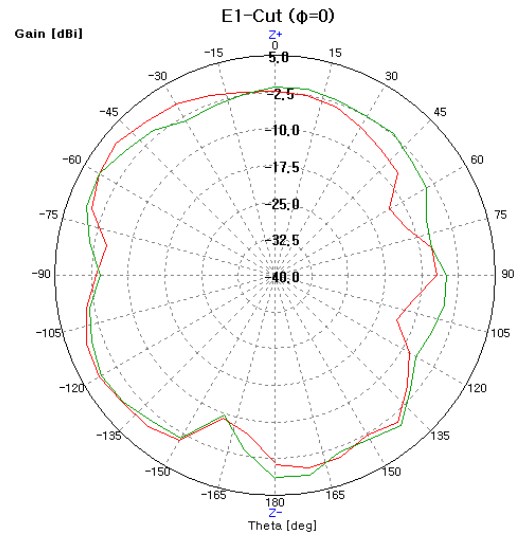


**WCDMA1
LTE1**

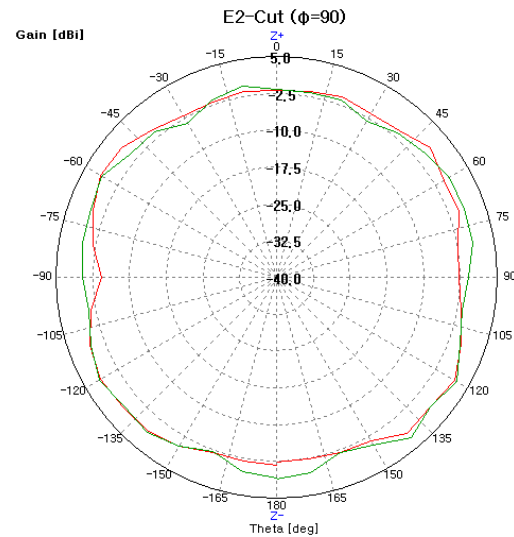
XY plane



XZ plane



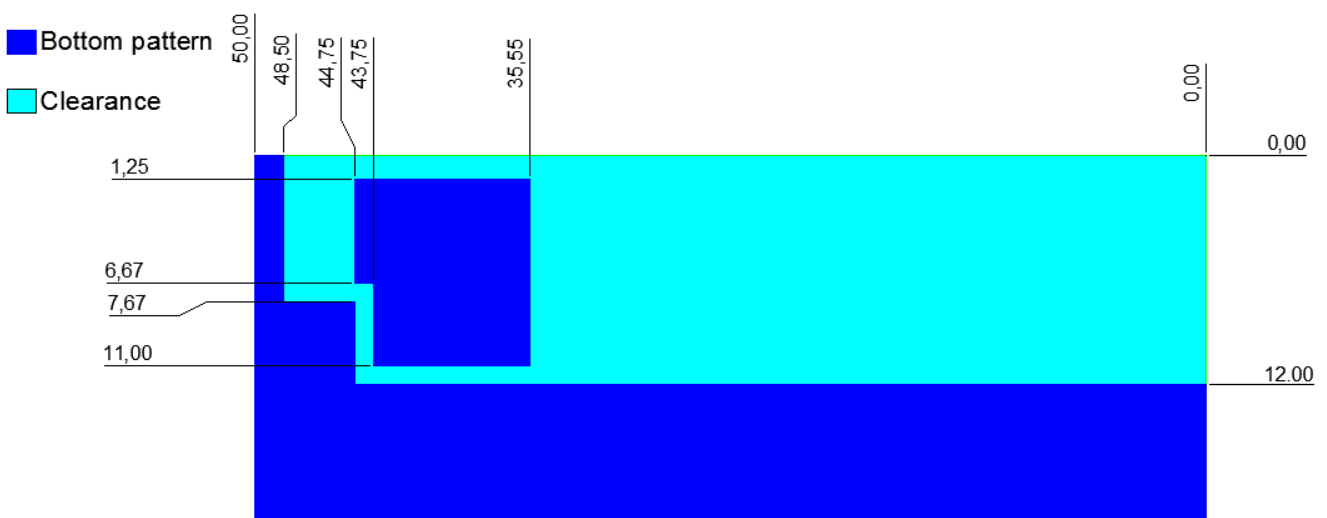
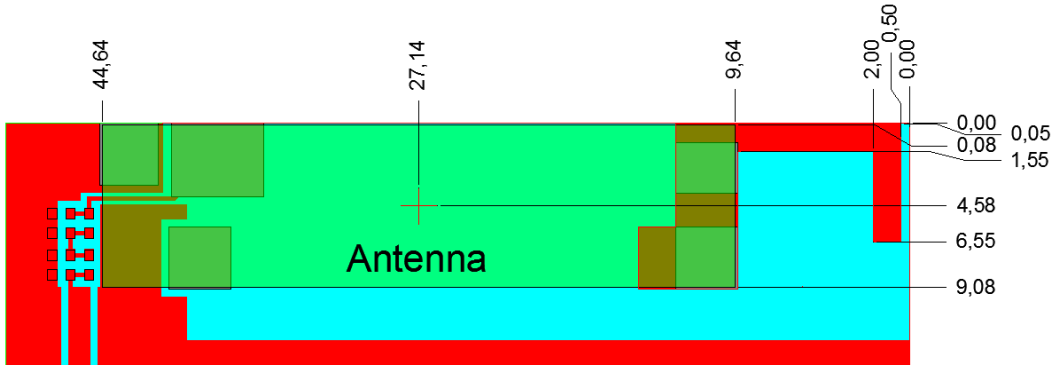
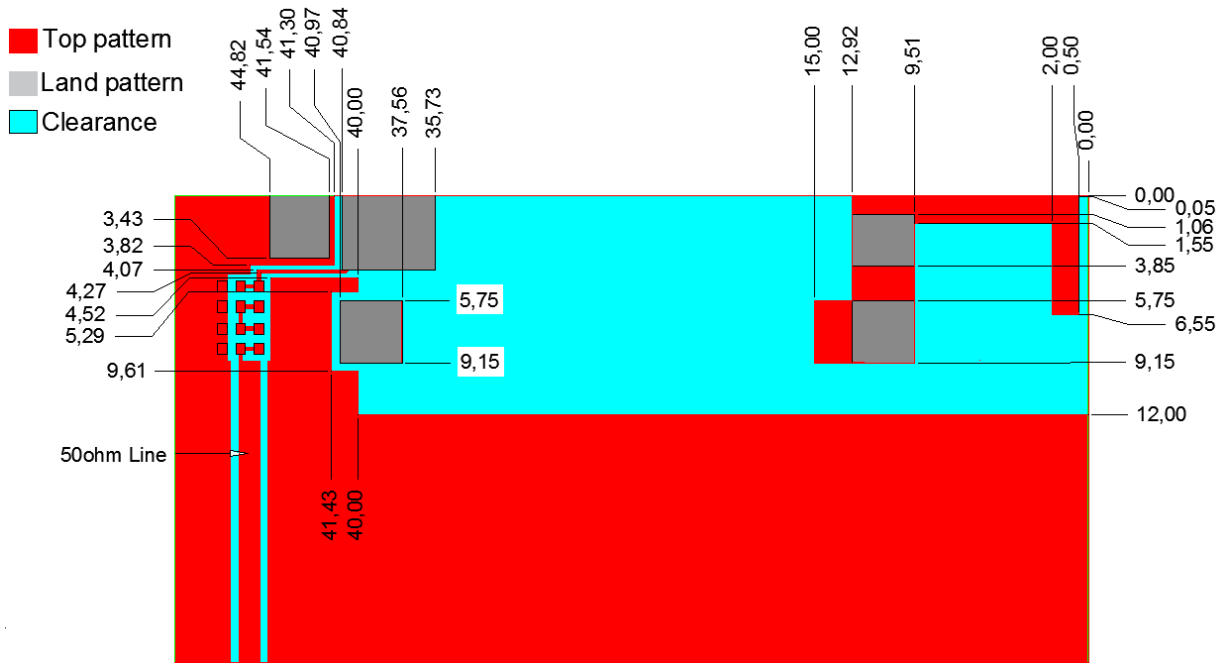
YZ plane



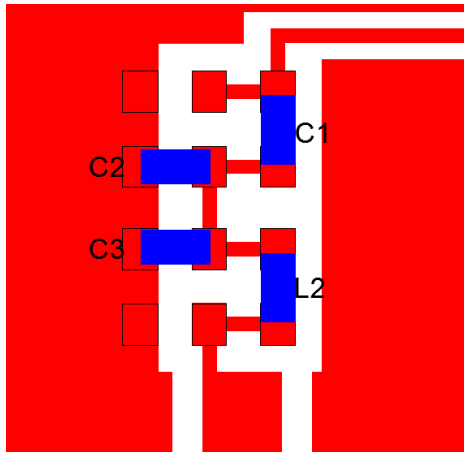
3. SOLDERING RECOMMENDATIONS

3.1. Soldering Land Pattern

* PCB Thickness (mm): FR4 1.6T



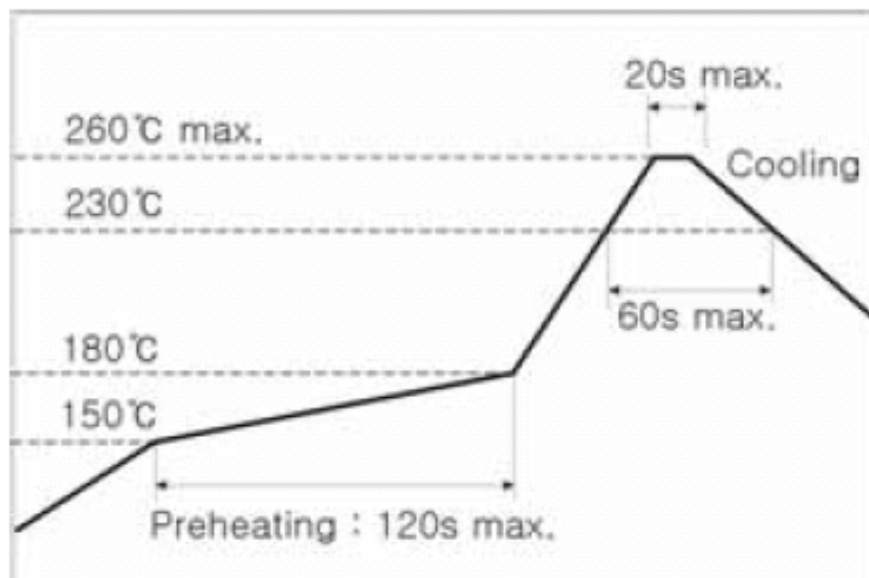
3.2. Matching circuit



C1 (Series)	2.2 pF
C2 (Shunt)	0.5 pF
C3 (Shunt)	NC
L2 (Series)	1.8 nH

3.3. Soldering Profile

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



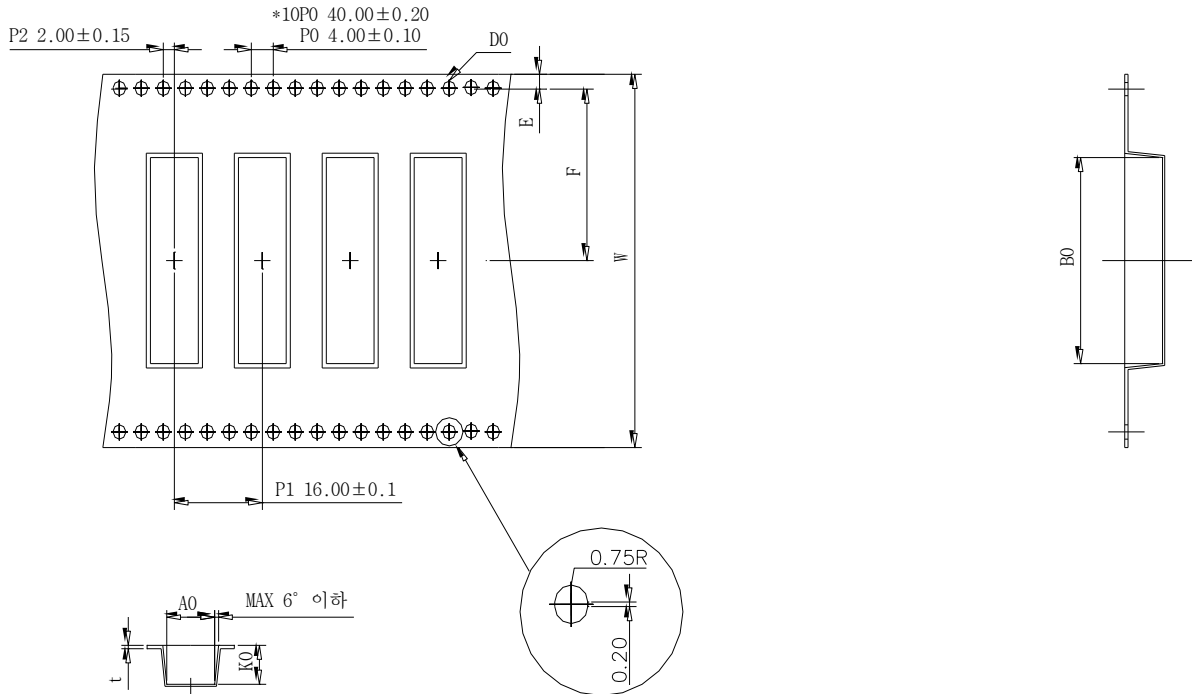
This product is designed for reflow soldering only. Do not use flow (wave) soldering.

- 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. PACKING

4.1 Tape Dimension (unit : mm)

4.1.1 Size



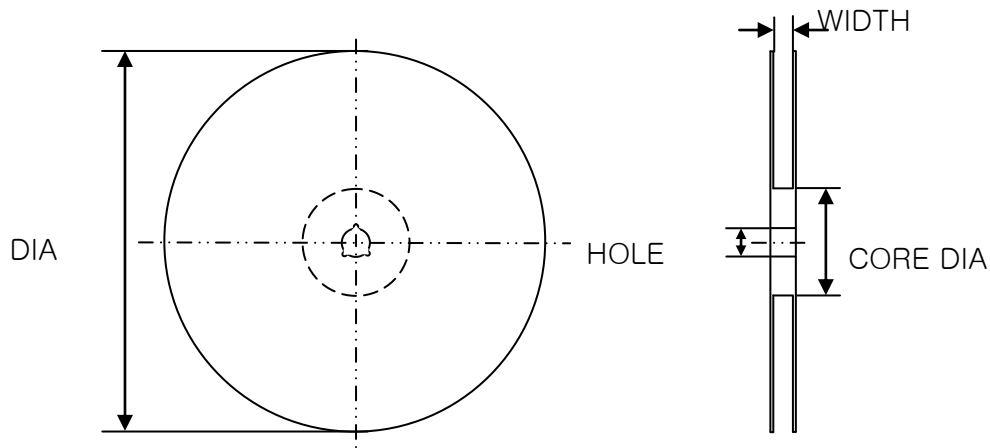
A0	9.40 ± 0.10	E	1.75 ± 0.10
B0	35.50 ± 0.10	F	26.20 ± 0.10
K0	3.70 ± 0.10	W	56.00 ± 0.30
D0	$1.50 +0.1$ -0.0	t	0.40 ± 0.05

4.1.2 Surface resistance

- 1) Carrier tape : Max $10^{11}\Omega$
- 2) Cover tape : Max $10^{11}\Omega$
- 3) Reel : Max $10^{11}\Omega$

4.2 Description of Reel

4.2.1 Size



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

4.2.2 Material

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

4.3 Description of Packing Box

4.3.1 Reel

Size: 56 (W), Dia. Φ 330 (mm)

Quantity: 1,000ea/reel

4.3.2 Inner Box

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

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



4.3.3 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)



5. Reliability Test

No.	Test Items	Test Condition	Requirement
1	High Temperature Exposure	+85±3°C, 1000hrs	1. No visible defects. 2. Satisfy VSWR spec.
2	Temperature Cycling	-40°C/30min ↔ +85°C/30min, 1000 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	- Acceleration: 40 m/s ² - Duration Time: 11min - 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.