

Evaluation WiFi Printing Antenna report for T77H533 LP board

1st Released Date

2015.11.18

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2017.03.15

Author

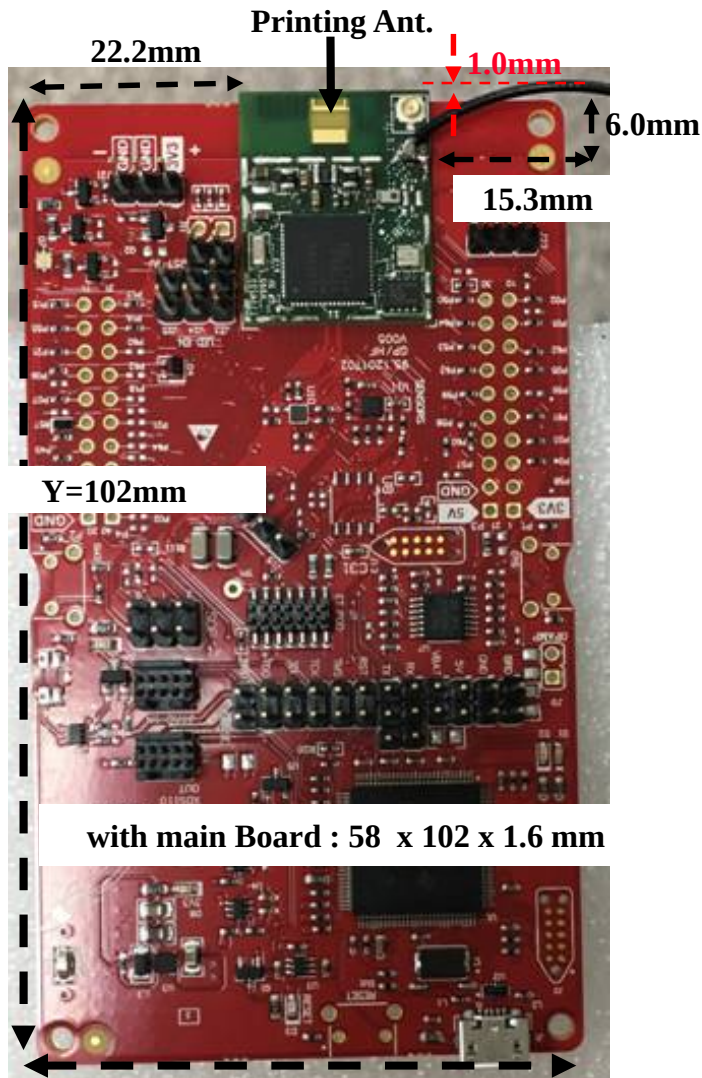
Willing Chang

Outline

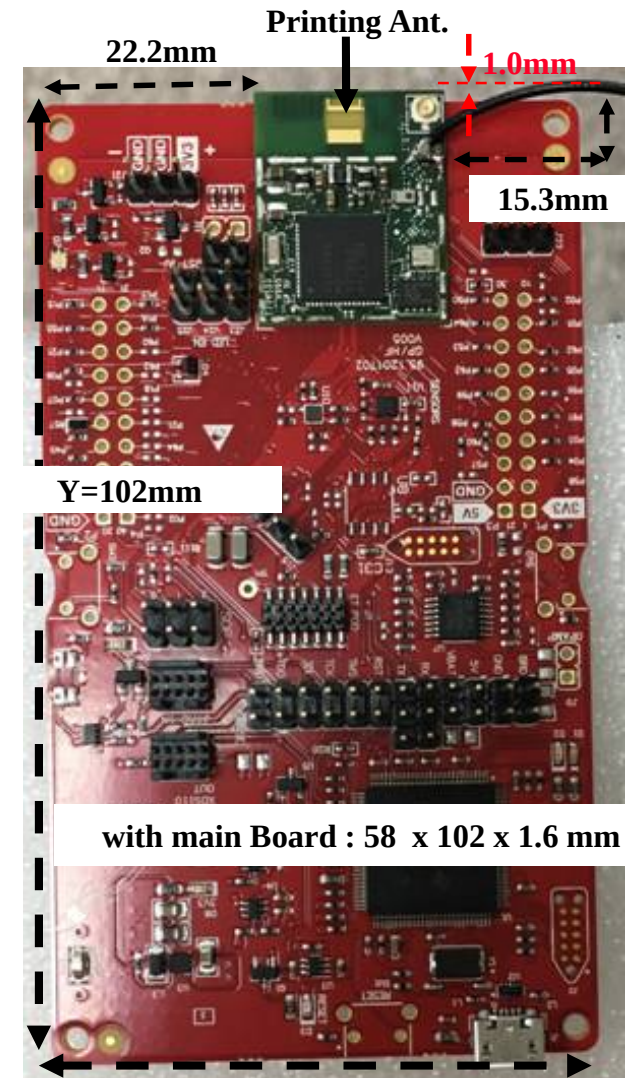
- 1.The antenna module on top of the LP board**
- 2. Measurement Antenna S-Parameter (for ZDT and APCB PCB Vendor)**
- 3. Measurement Ant. Radiation Patterns (for ZDT and APCB PCB Vendor)**
- 4. Ant. Performance comparison for (Different LP board clearance)**

1. The antenna module on top of the LP board

Ant. Clearance size : 58x 6.0 x 1.6 mm



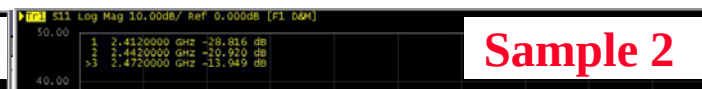
Ant. Clearance size : 58x 6.0 x 1.6 mm



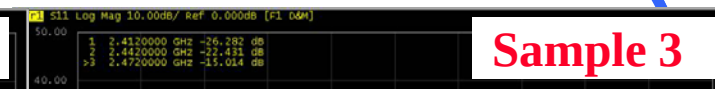
2. Measurement Antenna S-Parameter (ZDT PCB)



S-parameter	Frequency	Ant. Return loss (dB)
ZDT with Via hole trace	2412MHz	-29.06
	2442MHz	-21.72
	2472MHz	-14.50



S-parameter	Frequency	Ant. Return loss (dB)
ZDT with Via hole trace	2412MHz	-28.81
	2442MHz	-20.92
	2472MHz	-13.94



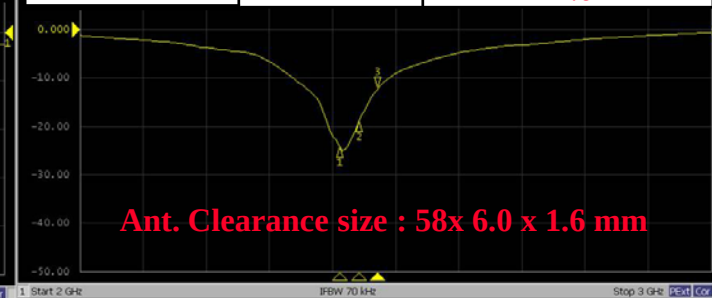
S-parameter	Frequency	Ant. Return loss (dB)
ZDT with Via hole trace	2412MHz	-26.28
	2442MHz	-22.43
	2472MHz	-15.01



S-parameter	Frequency	Ant. Return loss (dB)
ZDT with Via hole trace	2412MHz	-25.96
	2442MHz	-18.67
	2472MHz	-12.29

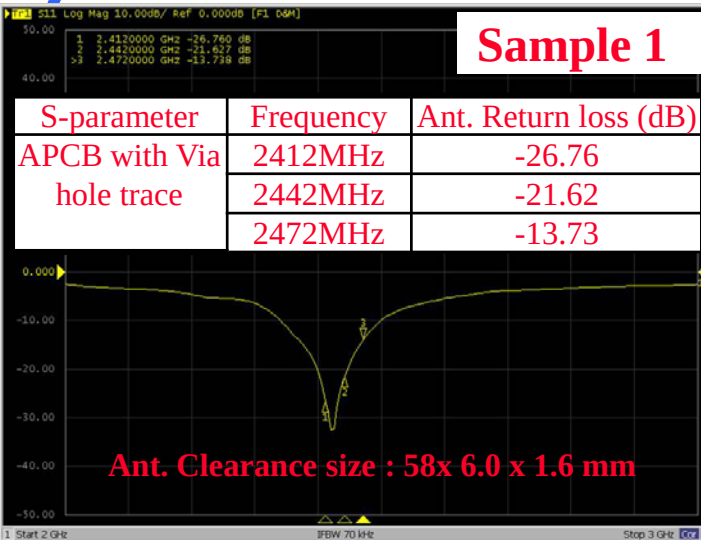


S-parameter	Frequency	Ant. Return loss (dB)
ZDT with Via hole trace	2412MHz	-24.16
	2442MHz	-18.84
	2472MHz	-12.01

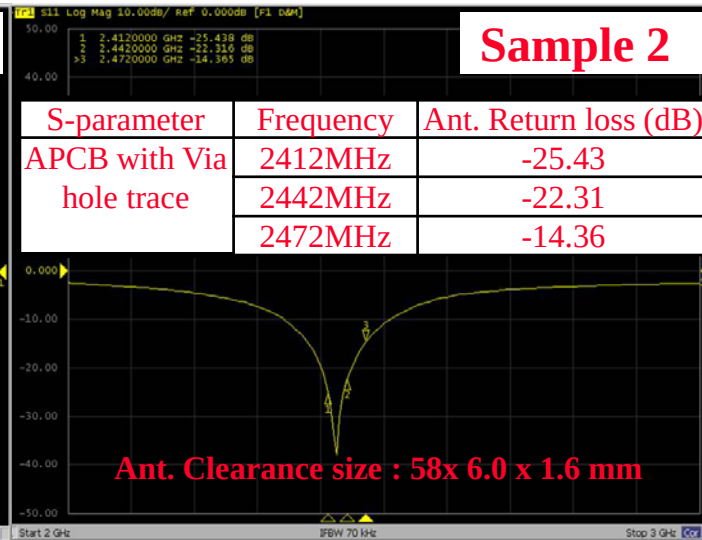


2. Measurement Antenna S-Parameter (APCB PCB)

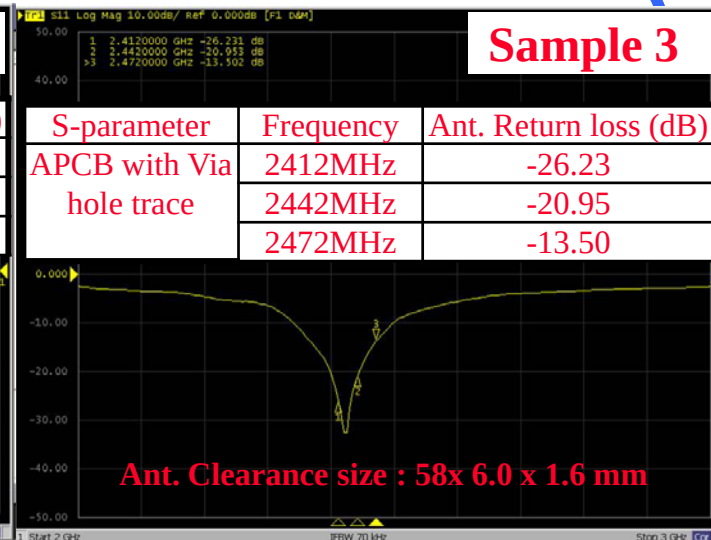
Sample 1



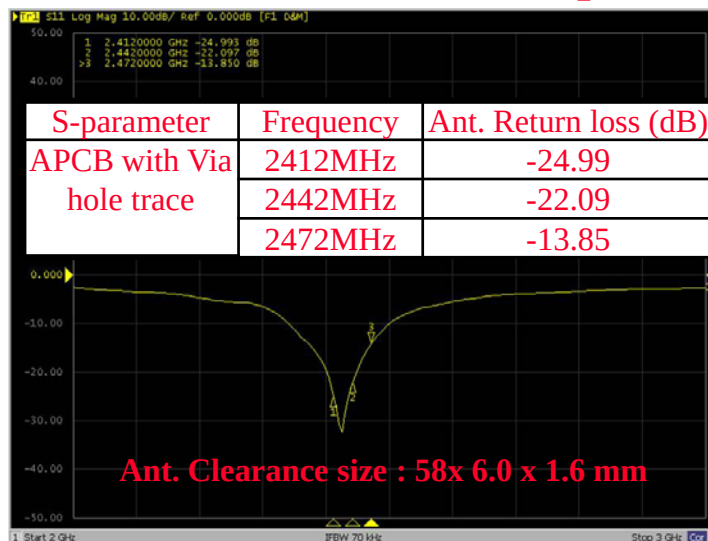
Sample 2



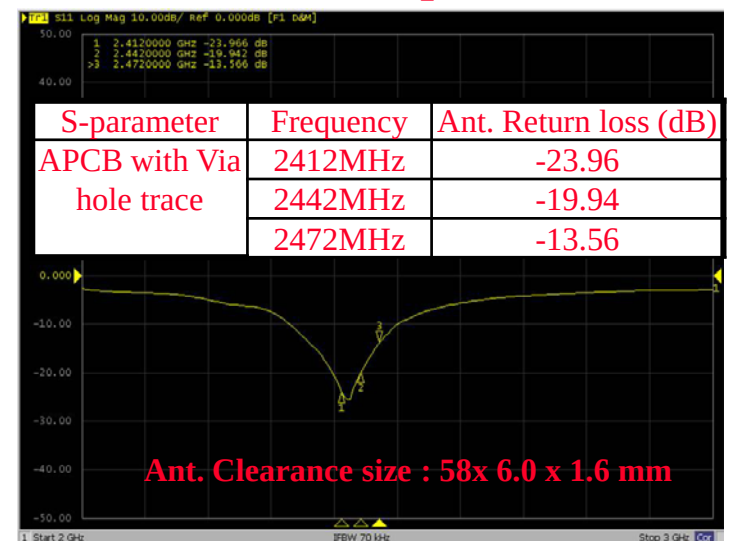
Sample 3



Sample 4



Sample 5

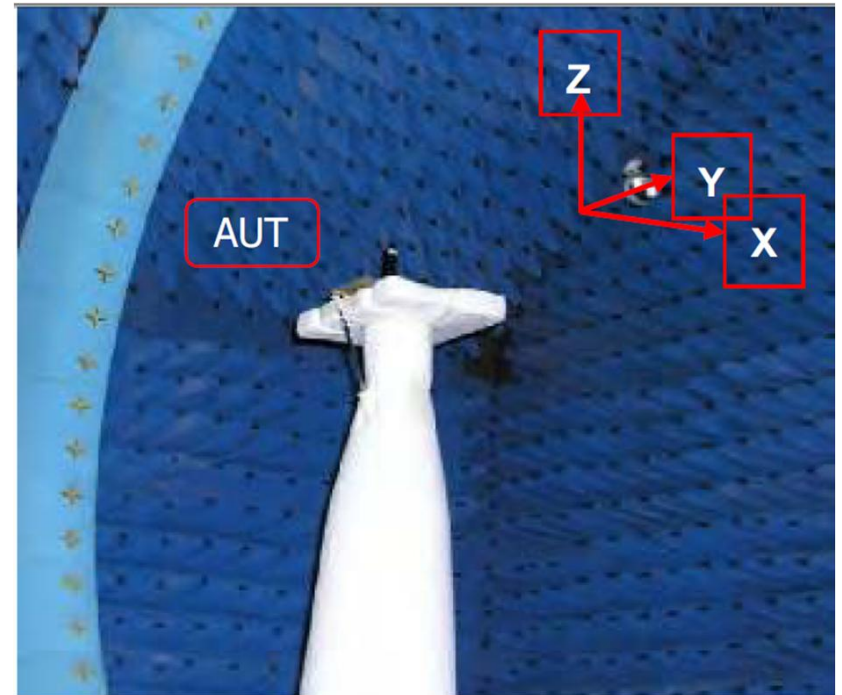
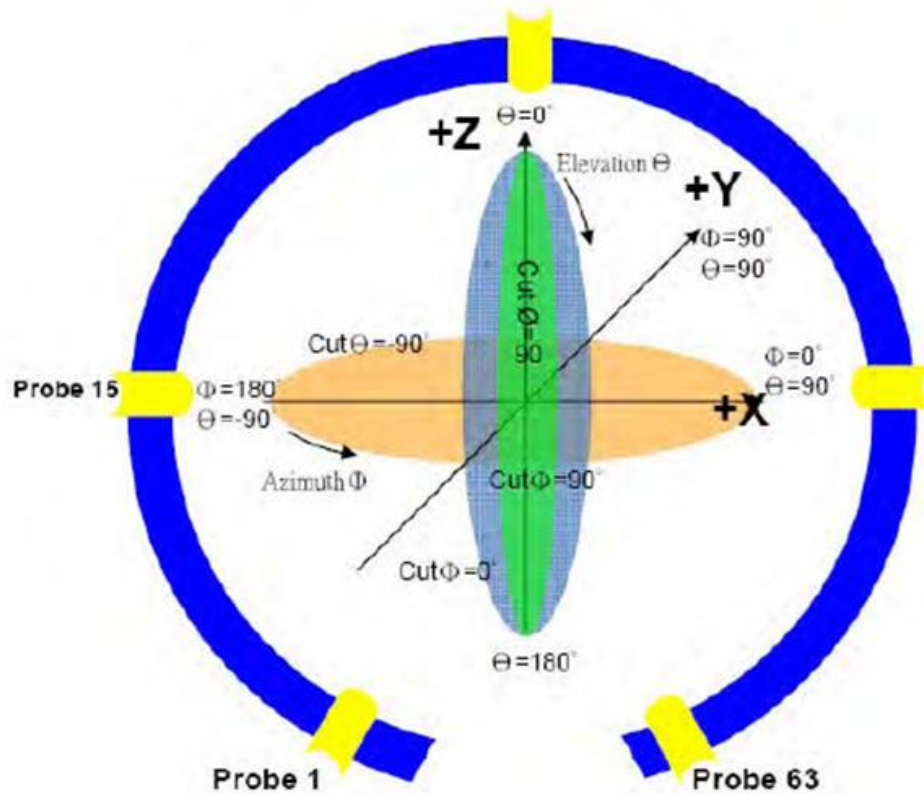


2. Ant. S-parameter comparison for ZDT and APCB PCB Vendor

- The ZDT PCB antenna s-parameter is similar to **APCB** PCB. (reference below table)

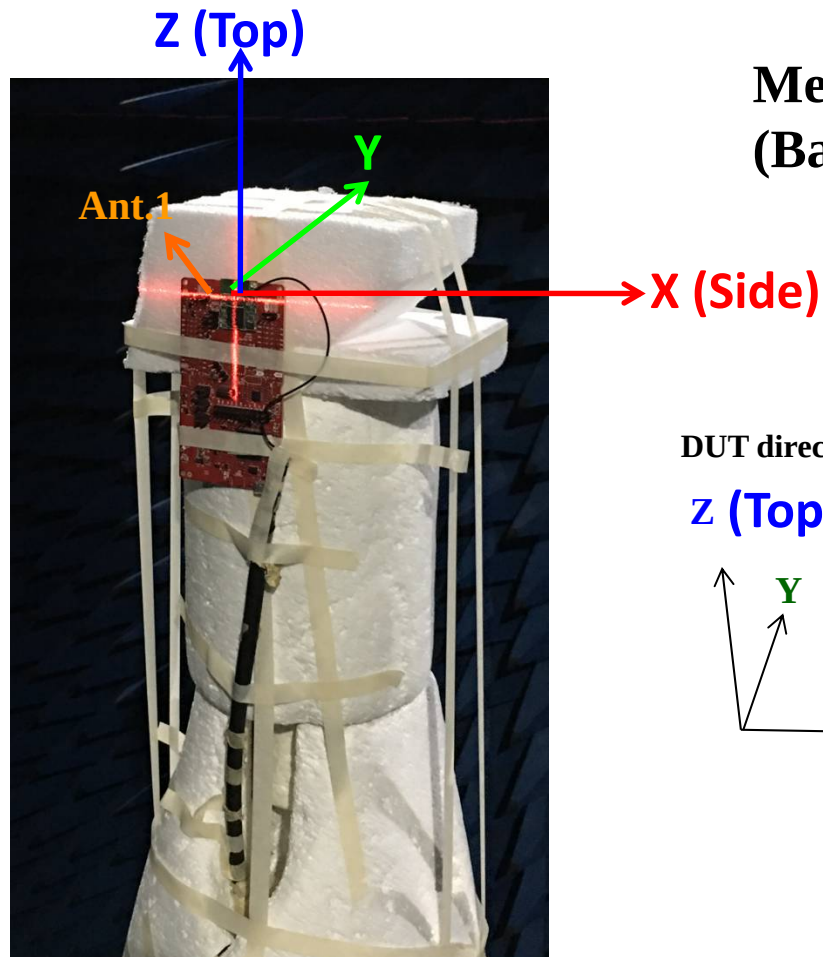
sample	Frequency	Ant. Return loss ZDT PCB (dB)	Ant. Return loss APCB PCB (dB)
with Via hole trace (sample 1)	2412MHz	-29.06	-26.76
	2442MHz	-21.72	-21.62
	2472MHz	-14.50	-13.73
with Via hole trace (sample 2)	2412MHz	-28.81	-25.43
	2442MHz	-20.92	-22.31
	2472MHz	-13.94	-14.36
with Via hole trace (sample 3)	2412MHz	-26.28	-26.23
	2442MHz	-22.43	-20.95
	2472MHz	-15.01	-13.50
with Via hole trace (sample 4)	2412MHz	-25.96	-24.99
	2442MHz	-18.67	-22.09
	2472MHz	-12.29	-13.85
with Via hole trace (sample 5)	2412MHz	-24.16	-23.96
	2442MHz	-18.84	-19.94
	2472MHz	-12.01	-13.56

Satimo 3D Chamber :



	θ	ϕ
Total angle	175°	360°
How many angle scan one point	5°	5°
Total scan point	36	73

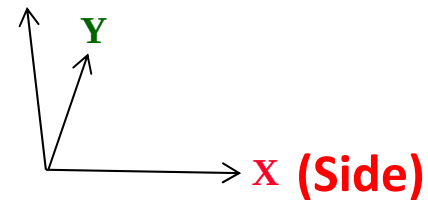
DUT direction definition :



Measurement
(Back view)

DUT direction definition :

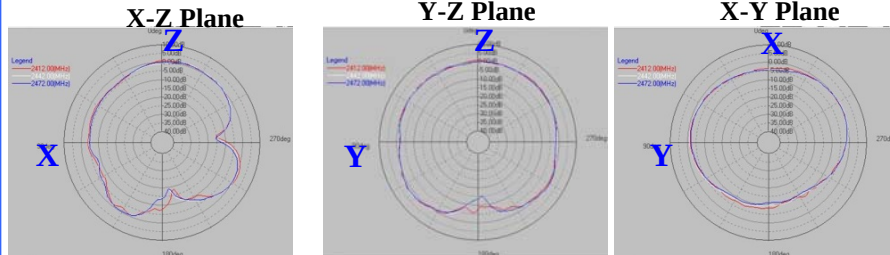
Z (Top)



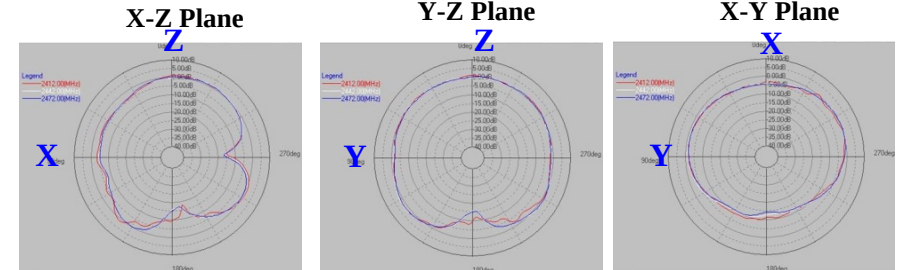
The X-Z plane, Y-Z and X-Y plane plane are the user direction .

3. Measurement Ant. Radiation Patterns (ZDT PCB Vendor)

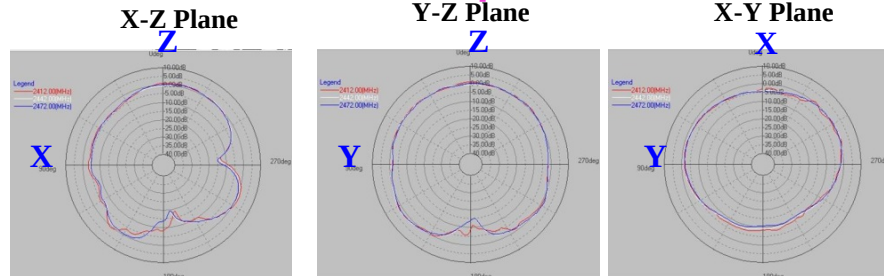
sample 1



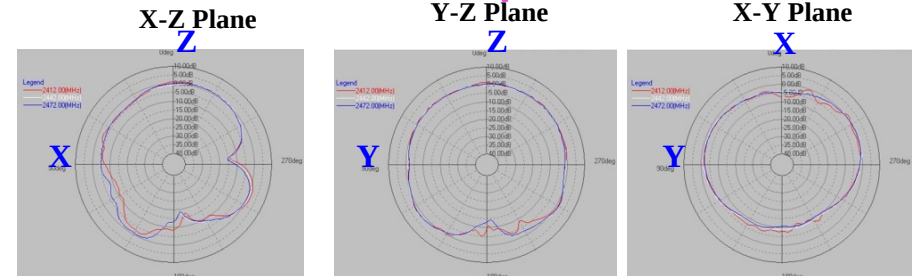
sample 2



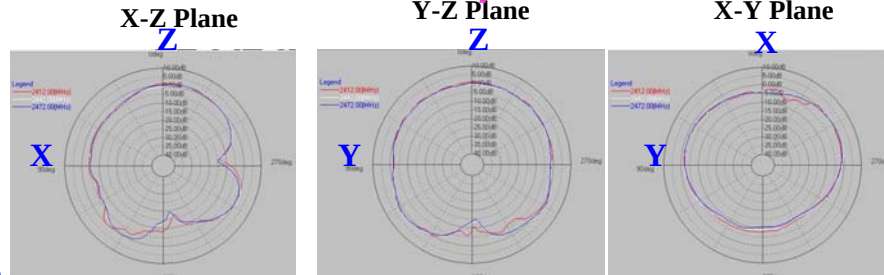
sample 3



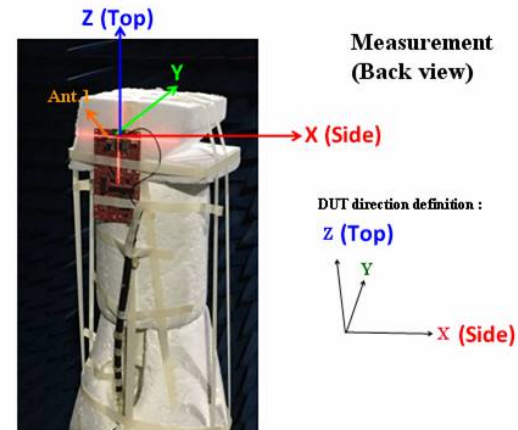
sample 4



sample 5



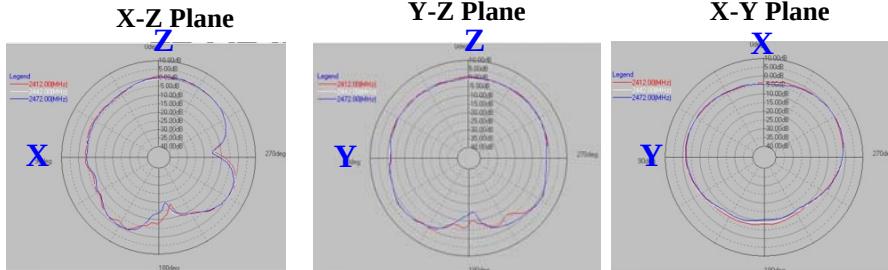
DUT direction definition :



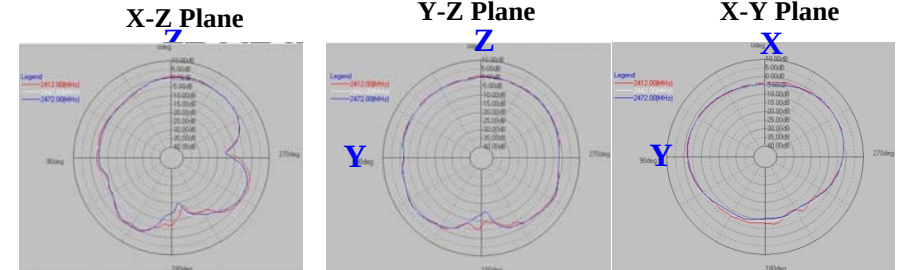
The X-Z plane, Y-Z and X-Y plane are the user direction .

3. Measurement Ant. Radiation Patterns (APCB PCB Vendor)

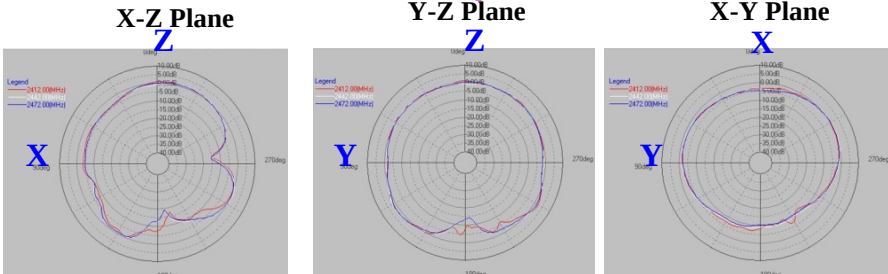
sample 1



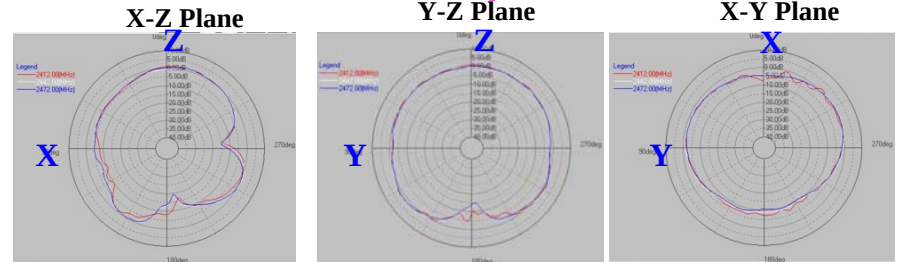
sample 2



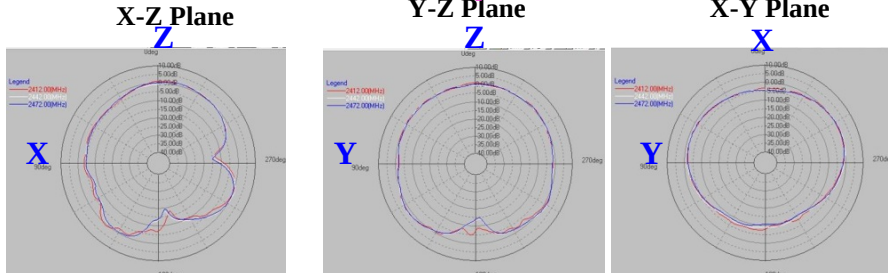
sample 3



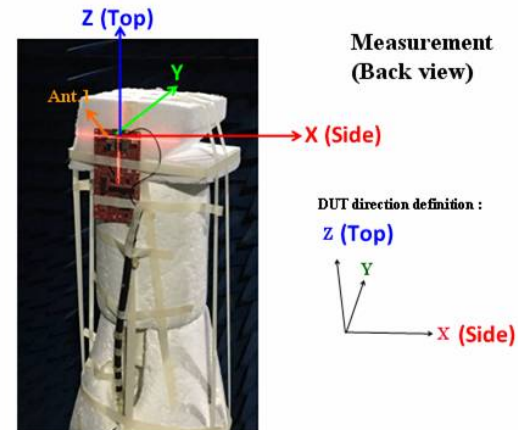
sample 4



sample 5



DUT direction definition :



The X-Z plane, Y-Z and X-Y plane are the user direction .

3. Ant. Performance comparison for ZDT and APCB PCB Vendor

- The ZDT PCB antenna s-parameter , efficiency and radiation pattern are similar to **APCB** PCB . (reference below table)
- Measurement Tolerance is +/-0.1dB -> The antenna's peak gain will not exceed **2.5dBi**.

Location	Frequency	Ant. Return loss (dB)	Ant. Efficiency (%)	Ant. Peak Gain (dBi)
ZDT with Via hole trace (sample 1)	2412MHz	-29.06	81	2.37
	2442MHz	-21.72	77	2.25
	2472MHz	-14.50	76	2.12
ZDT with Via hole trace (sample 2)	2412MHz	-28.81	82	2.33
	2442MHz	-20.92	76	2.16
	2472MHz	-13.94	76.	2.08
ZDT with Via hole trace (sample 3)	2412MHz	-26.28	82	2.40
	2442MHz	-22.43	78	2.27
	2472MHz	-15.01	76	2.11
ZDT with Via hole trace (sample 4)	2412MHz	-25.96	82	2.35
	2442MHz	-18.67	77	2.18
	2472MHz	-12.29	76	2.15
ZDT with Via hole trace (sample 5)	2412MHz	-24.16	82	2.34
	2442MHz	-18.84	77	2.16
	2472MHz	-12.01	75	2.10

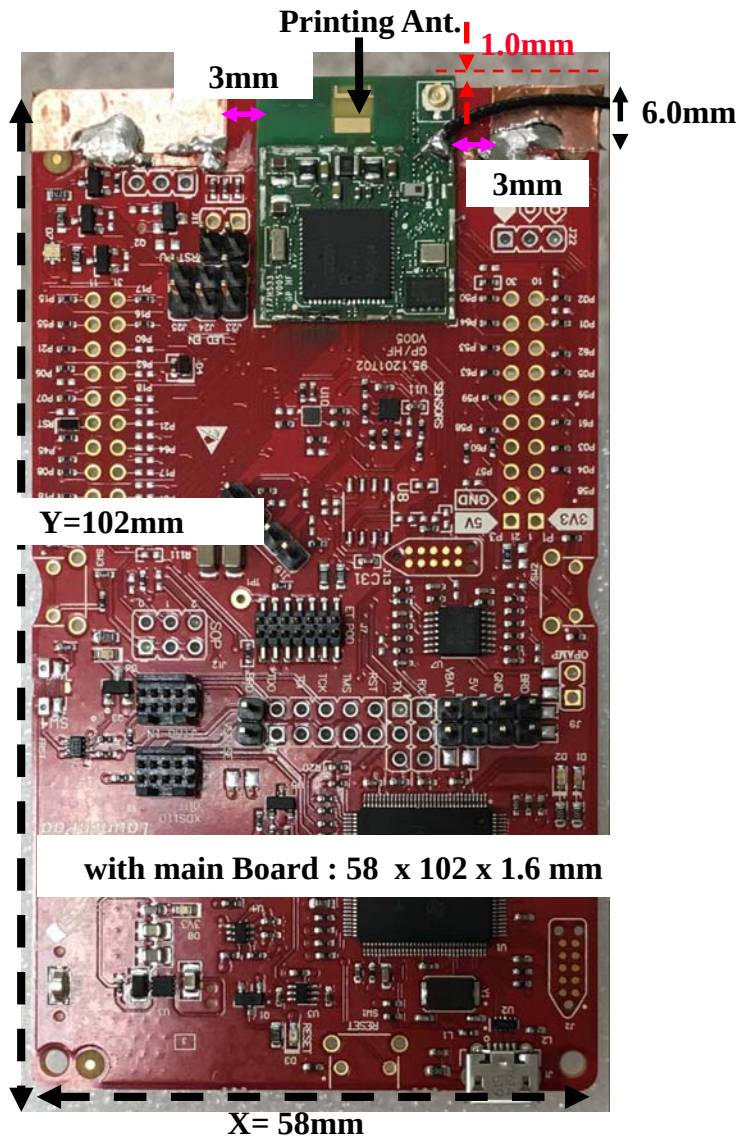
3. Ant. Performance comparison for ZDT and APCB PCB Vendor

- The ZDT PCB antenna s-parameter , efficiency and radiation pattern are similar to **APCB** PCB . (reference below table)
- Measurement Tolerance is +/-0.1dB -> The antenna's peak gain will not exceed **2.5dBi**.

Location	Frequency	Ant. Return loss (dB)	Ant. Efficiency (%)	Ant. Peak Gain (dBi)
APCB with Via hole trace (sample 1)	2412MHz	-26.76	81	2.29
	2442MHz	-21.62	78	2.24
	2472MHz	-13.73	76	2.03
APCB with Via hole trace (sample 2)	2412MHz	-25.43	82	2.32
	2442MHz	-22.31	76	2.18
	2472MHz	-14.36	75	2.10
APCB with Via hole trace (sample 3)	2412MHz	-26.23	81	2.27
	2442MHz	-20.95	77	2.20
	2472MHz	-13.50	76	2.11
APCB with Via hole trace (sample 4)	2412MHz	-24.99	81	2.35
	2442MHz	-22.09	78	2.17
	2472MHz	-13.85	75	2.13
APCB with Via hole trace (sample 5)	2412MHz	-23.96	81	2.31
	2442MHz	-19.94	77	2.18
	2472MHz	-13.56	76	2.09

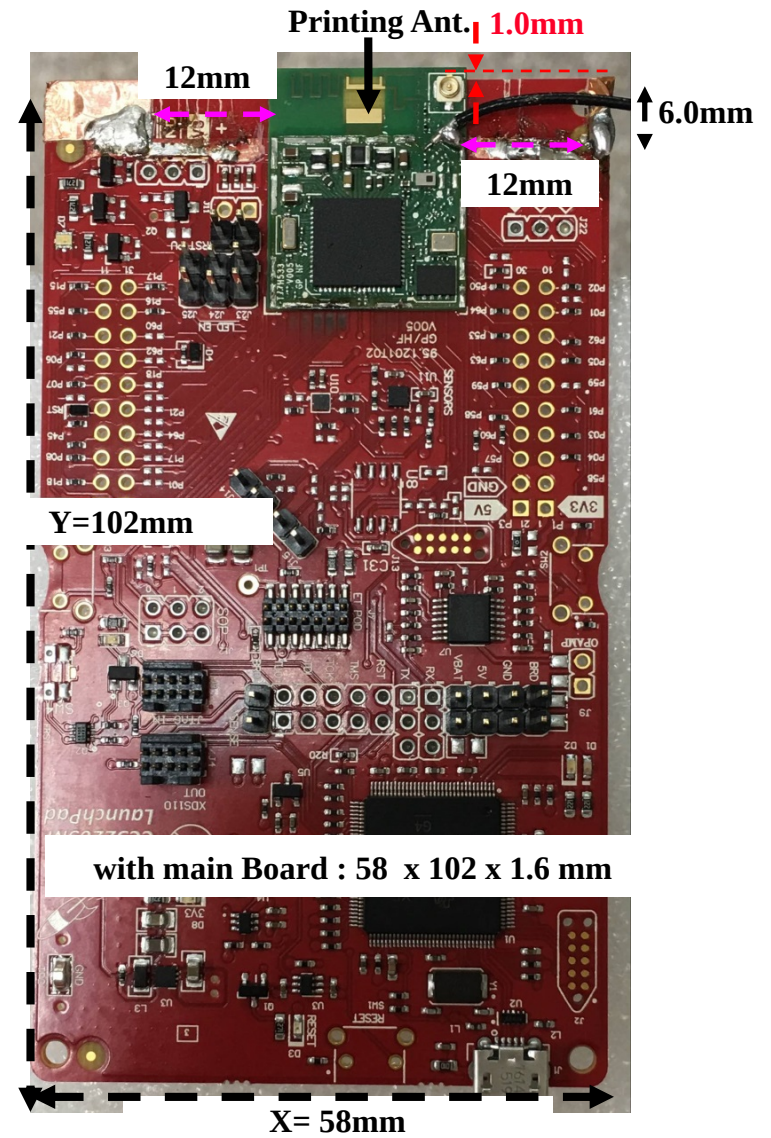
4. Different LP board clearance for printing Ant.

Ant. Clearance size : 26.5x 6.0 x 1.6 mm



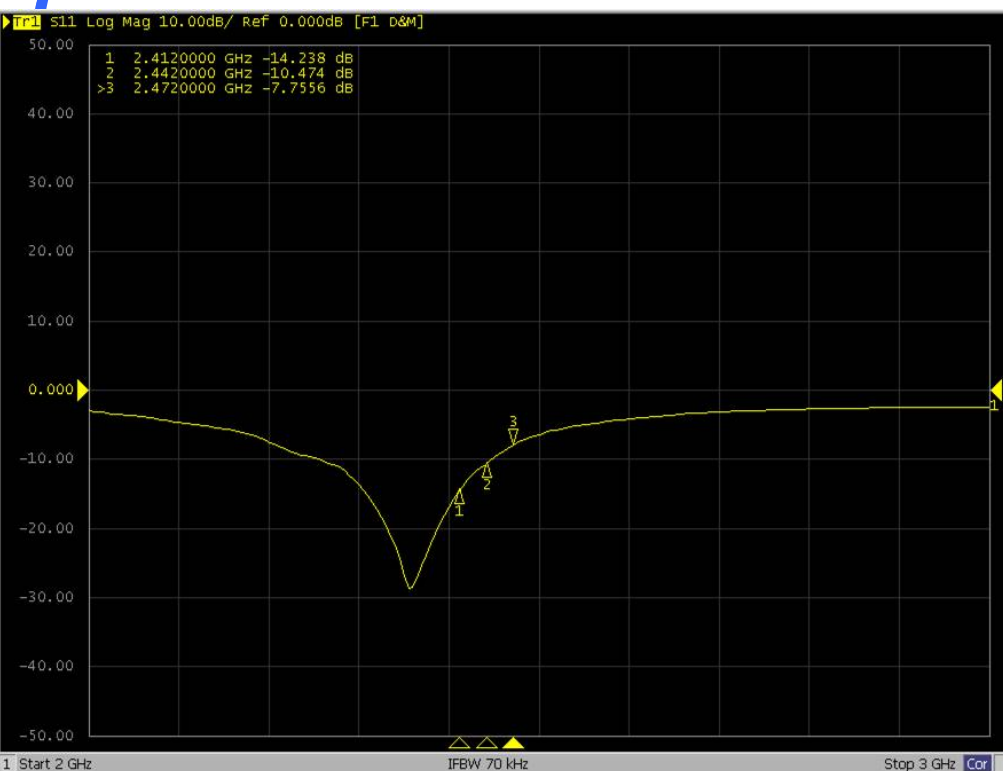
(ZDT with Via hole trace)

Ant. Clearance size : 50.5x 6.0 x 1.6 mm



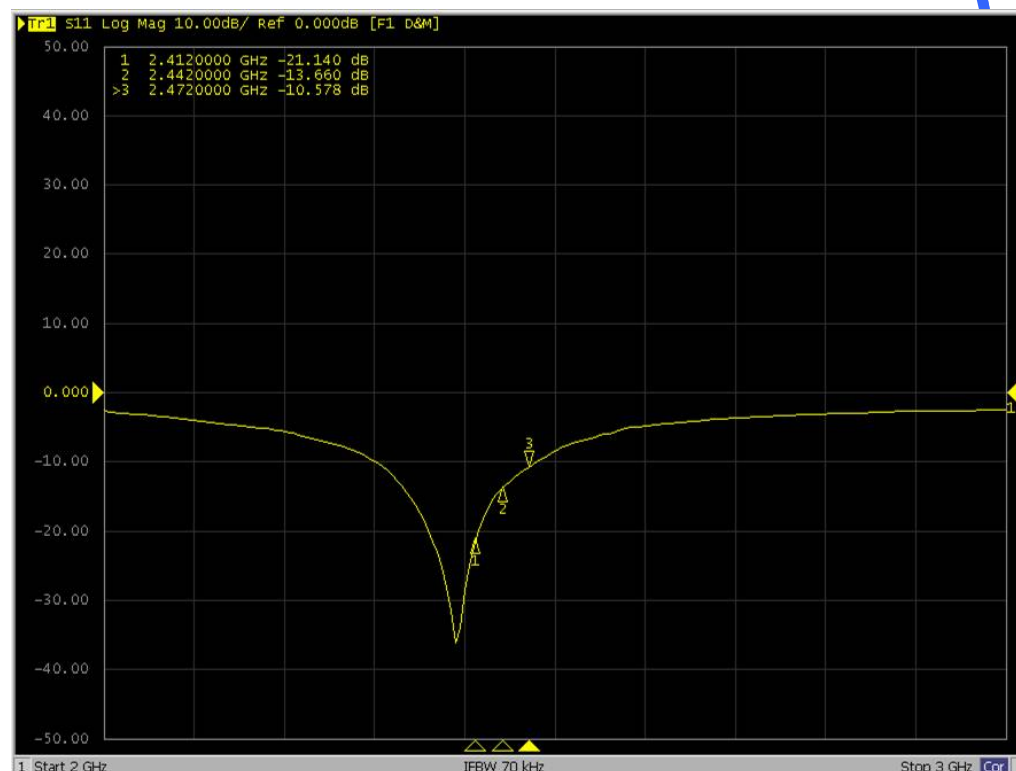
(ZDT with Via hole trace)

4. Measurement Antenna S-Parameter (Different LP board clearance)



Ant. Clearance size : 26.5x 6.0 x 1.6 mm

S-parameter	Frequency	Ant. Return loss (dB)
ZDT with Via hole trace	2412MHz	-14.23
	2442MHz	-10.47
	2472MHz	-7.75



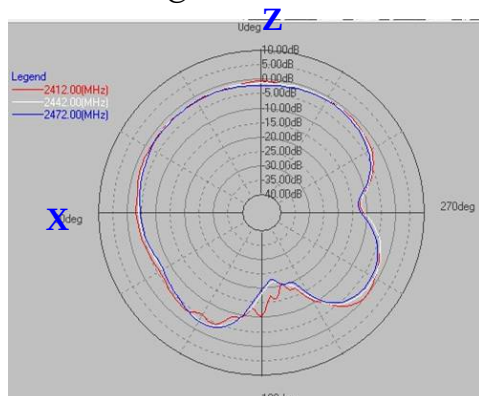
Ant. Clearance size : 50.5x 6.0 x 1.6 mm

S-parameter	Frequency	Ant. Return loss (dB)
ZDT with Via hole trace	2412MHz	-21.14
	2442MHz	-13.66
	2472MHz	-10.57

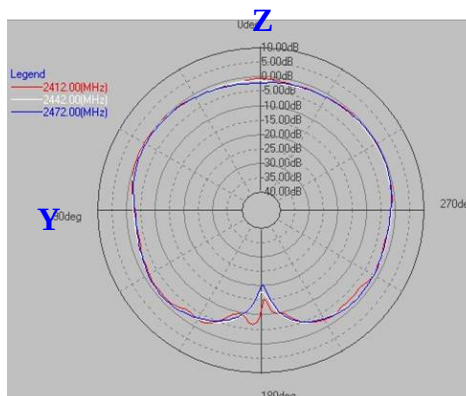
4. Measurement Ant. Radiation Patterns (Different LP board clearance)

ZDT with Via hole trace
Ant. Clearance size : 26.5x 6.0 x 1.6 mm

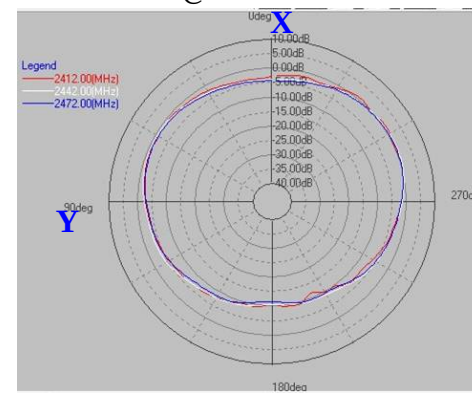
@2.4G: X-Z Plane



2.4G: Y-Z Plane

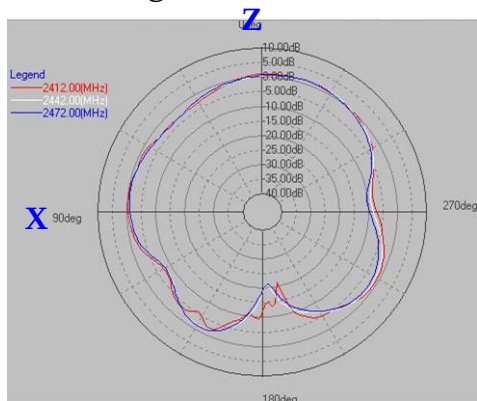


@2.4G: X-Y Plane

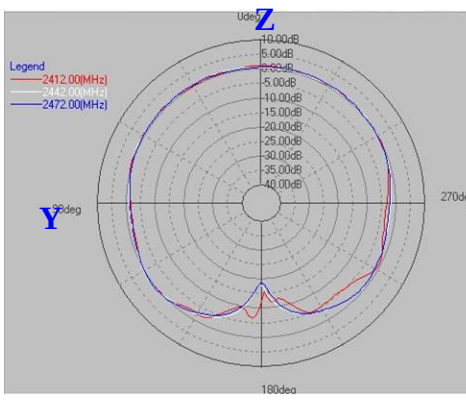


ZDT without Via hole trace
Ant. Clearance size : 50.5x 6.0 x 1.6 mm

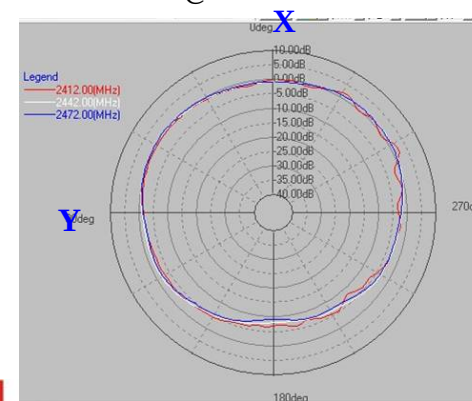
@2.4G: X-Z Plane



2.4G: Y-Z Plane



@2.4G: X-Y Plane



4. Ant. Performance comparison for (Different LP board clearance)

- We are suggest antenna Min. Size is 50.5x6.0x1.6mm (reference below table) .

Location	Frequency	Ant. Return loss (dB)	Ant. Efficiency (%)	Ant. Average Gain (dB)	Ant. Peak Gain (dBi)
ZDT with Via hole trace (sample 1) Ant. Clearance size : 26.5x 6.0 x 1.6 mm	2412MHz	-14.23	78.01	-1.08	2.18
	2442MHz	-10.47	73.14	-1.36	2.10
	2472MHz	-7.75	67.48	-1.71	1.87
ZDT with Via hole trace (sample 1) Ant. Clearance size : 50.5x 6.0 x 1.6 mm	2412MHz	-21.14	79.98	-0.97	2.22
	2442MHz	-13.66	77.98	-1.08	2.14
	2472MHz	-10.57	73.96	-1.31	1.96