

Extreme AP4020X Antenna Test Report

Dec. 25, 2024

Manufacturer: Sercomm Cooperation

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Antenna Design Department

Outline

- Antenna Specification
- Antenna Structure & Placement
- Radiation Pattern



Antenna Specification

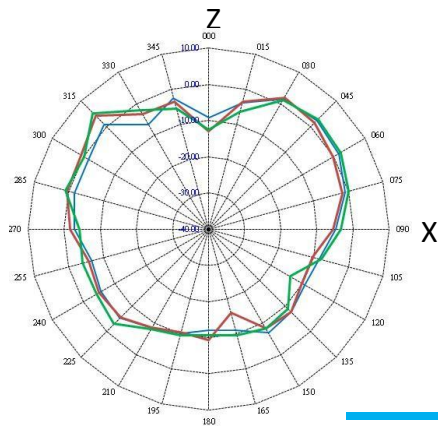
Item	Description		
Operation Band	Sensor (Ant 1)	BLE/IOT (Ant 2 ~ 4)	GPS (Ant 5)
Frequency (MHz)	2400 ~ 2500 5150 ~ 7125	2400 ~ 2500	1176 / 1575
Peak Gain (dBi)	4.5 dBi @2.4G 5.0 dBi @5G 5.0 dBi @6G	Ant2 : 4.9 dBi Ant3 : 3.7 dBi Ant4 : 4.1 dBi	3.6 dBi @1176 MHz 3.8 dBi @1575 MHz
Efficiency (%)	69 ~ 78	71 ~ 79	51 ~ 59
Beamwidth	Omni	Omni	Omni
Isolation (dB)	≥ 20 dB	≥ 20 dB	NA
Return Loss (dB)	≥ 10 dB	≥ 10 dB	≥ 10 dB
Pattern Gain Ripple	≤ 10dB	≤ 10dB	≤ 10dB
Type	PIFA	PIFA	PIFA
Feeding	Cable	Cable	Cable

Antenna Structure & Placement

Ant No.	Model Name	Operating Band	Polarization	Brand	Type	Material	Feeding	Dimension
Ant 1	6172005QWA03	WiFi 2.4G/5G/6G (Sensor)	V_Pol	Sercomm	PIFA	Metal	Cable	41 x 21.6 x 10.2 mm ³
Ant 2-4	6172005QWA08 6172005QWA10 6172005QWA09	BLE/IOT	V_Pol	Sercomm	PIFA	Metal	Cable	38 x 14 x 8.7 mm ³
Ant 5	6172005QWA11	GPS L1 & L5	V_Pol	Sercomm	PIFA	Metal	Cable	45.5 x 31.5 x 9.9 mm ³

2D Radiation Pattern – Ant 1 @ 2G Band

Spec : Pattern Gain Ripple $\leq 10\text{dB}$
Calculated Ripple $\leq 5\text{dB}$



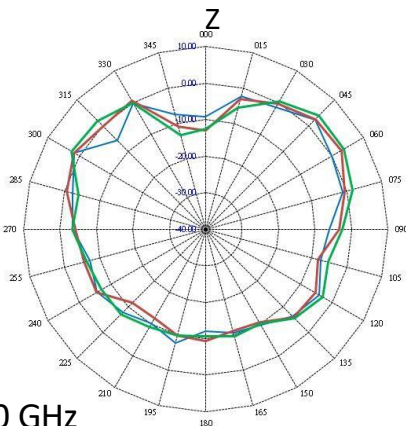
2.40 GHz

2.45 GHz

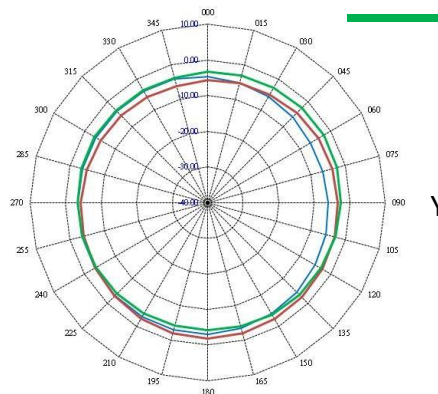
2.50 GHz

X-Z plane

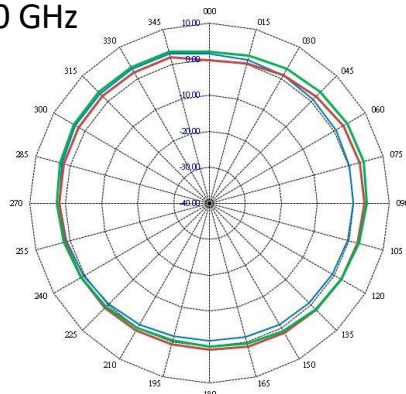
X



Y-Z plane



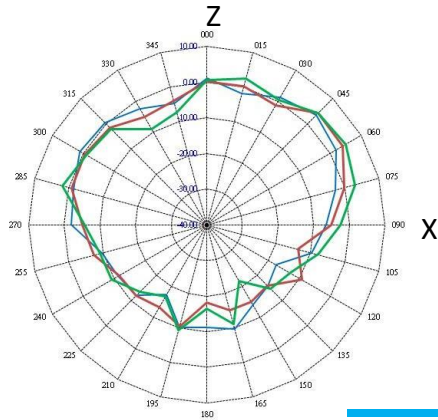
X-Y plane (Theta 90 deg)



X-Y plane (Theta 60 deg)

2D Radiation Pattern – Ant 1 @ 5G Band

Spec : Pattern Gain Ripple $\leq 10\text{dB}$
Calculated Ripple $\leq 6\text{dB}$



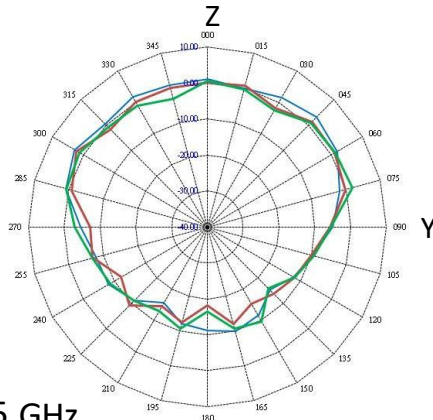
X-Z plane

X

5.15 GHz

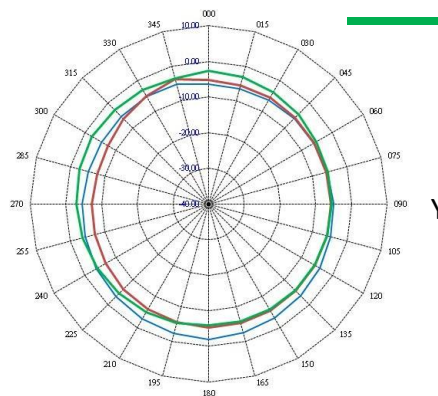
5.50 GHz

5.85 GHz

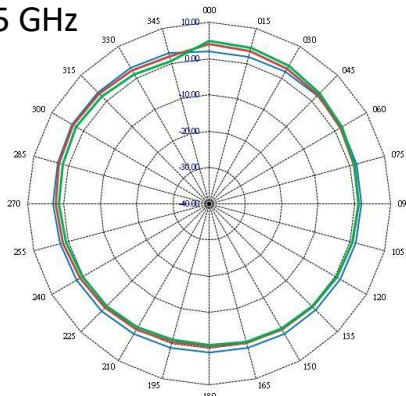


Y-Z plane

Y



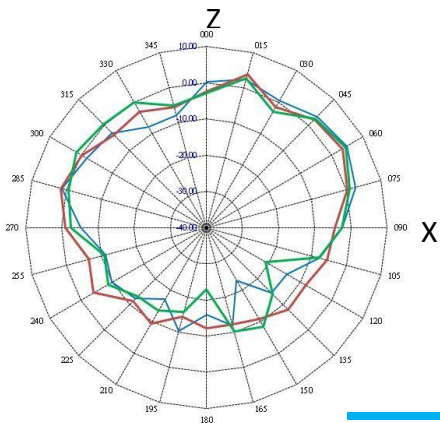
X-Y plane (Theta 90 deg)



X-Y plane (Theta 60 deg)

2D Radiation Pattern – Ant 1 @ 6G Band

Spec : Pattern Gain Ripple $\leq 10\text{dB}$
Calculated Ripple $\leq 7\text{dB}$



X-Z plane

X

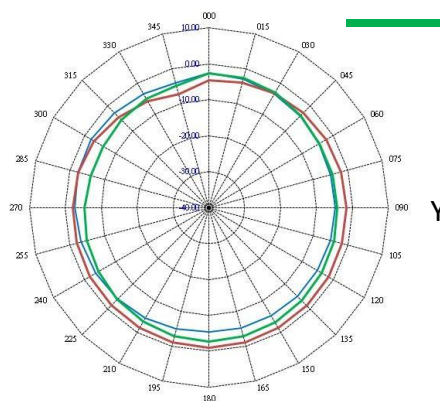
5.92 GHz

6.50 GHz

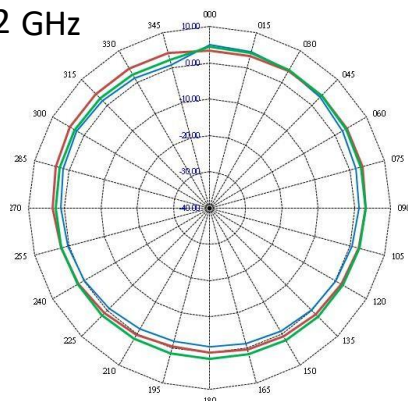
7.12 GHz

Y-Z plane

Y



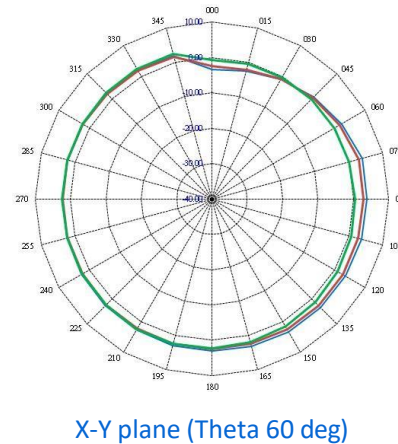
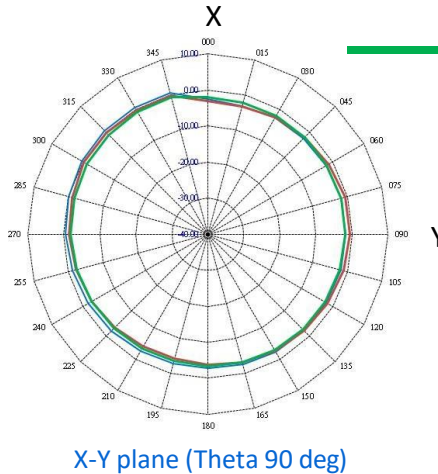
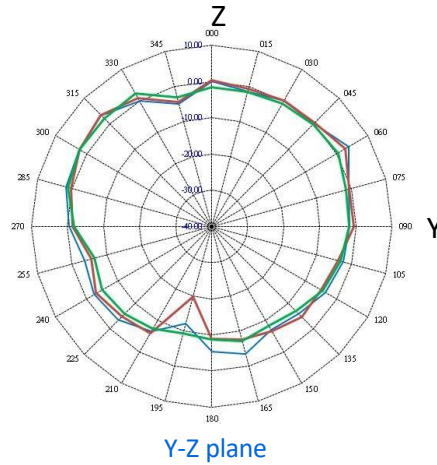
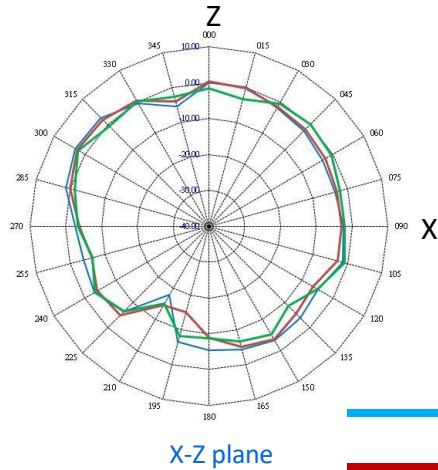
X-Y plane (Theta 90 deg)



X-Y plane (Theta 60 deg)

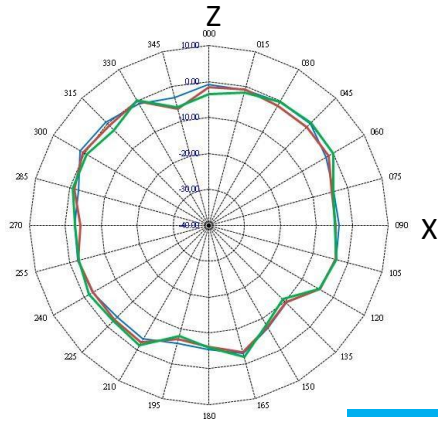
2D Radiation Pattern – Ant 2 @ 2G Band

Spec : Pattern Gain Ripple $\leq 10\text{dB}$
Calculated Ripple $\leq 5\text{dB}$

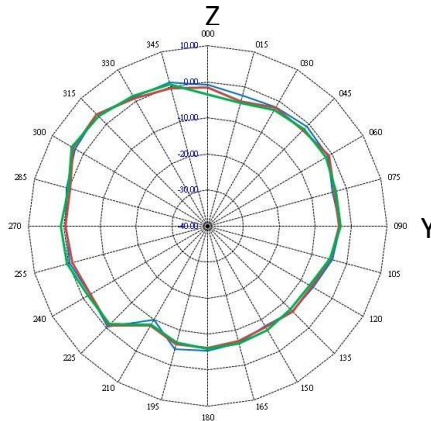


2D Radiation Pattern – Ant 3 @ 2G Band

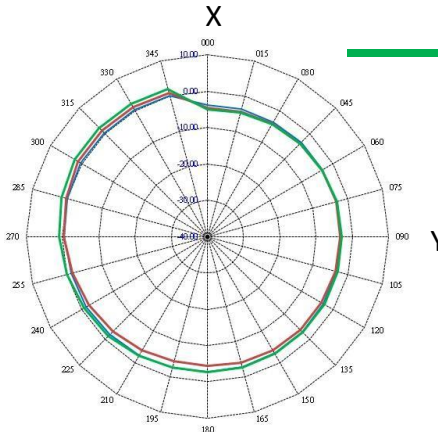
Spec : Pattern Gain Ripple $\leq 10\text{dB}$
Calculated Ripple $\leq 8\text{dB}$



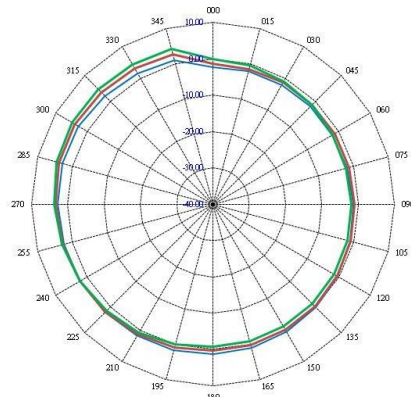
X-Z plane



Y-Z plane



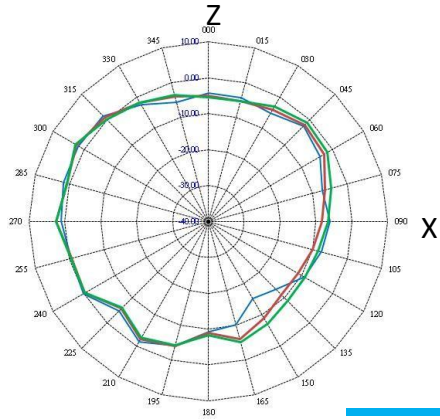
X-Y plane (Theta 90 deg)



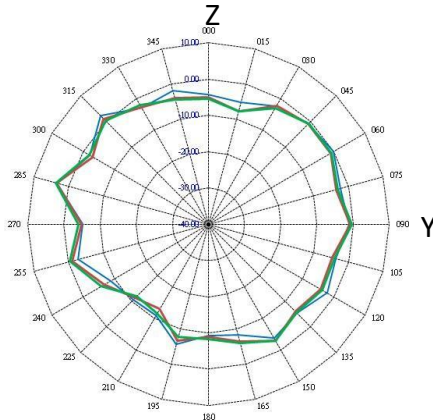
X-Y plane (Theta 60 deg)

2D Radiation Pattern – Ant 4 @ 2G Band

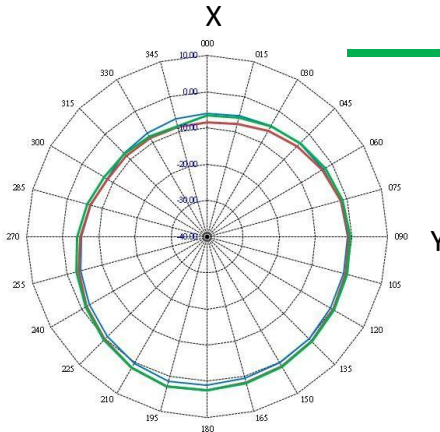
Spec : Pattern Gain Ripple $\leq 10\text{dB}$
Calculated Ripple $\leq 10\text{dB}$



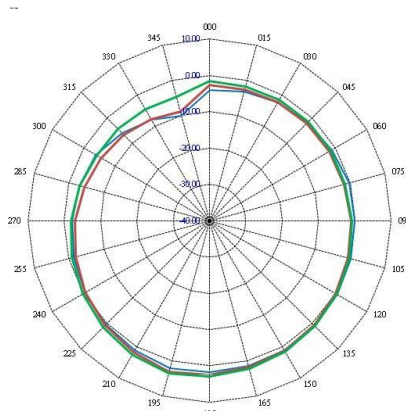
X-Z plane



Y-Z plane

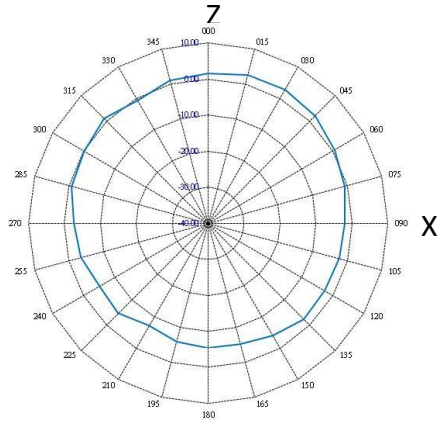


X-Y plane (Theta 90 deg)

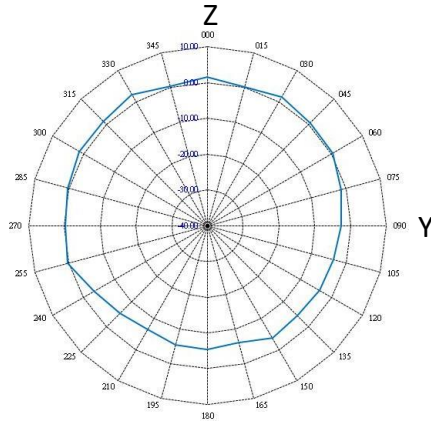


X-Y plane (Theta 60 deg)

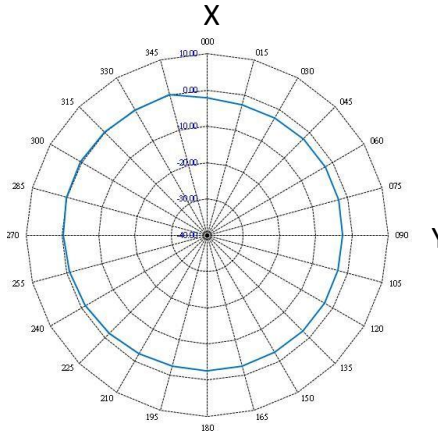
2D Radiation Pattern – Ant 5 @ 1.176GHz



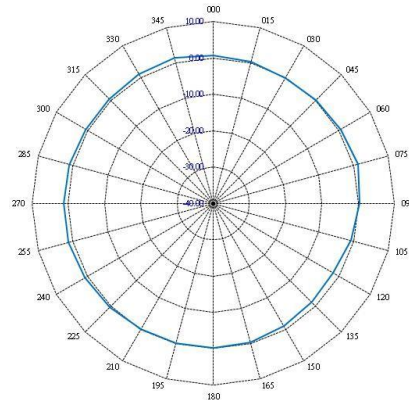
X-Z plane



Y-Z plane



X-Y plane (Theta 90 deg)



X-Y plane (Theta 60 deg)

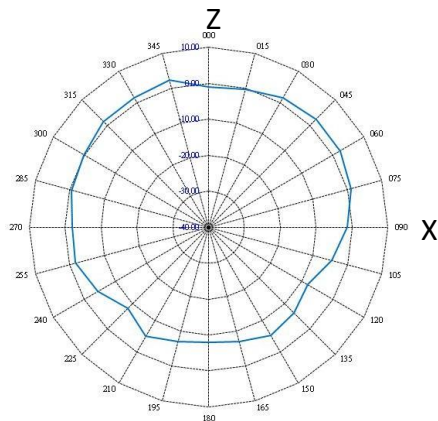
Peak Gain

3.6 dBi

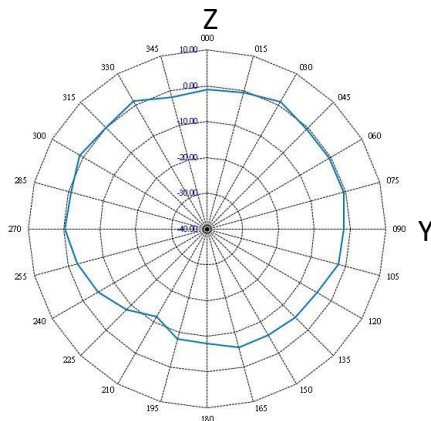
Efficiency

52 %

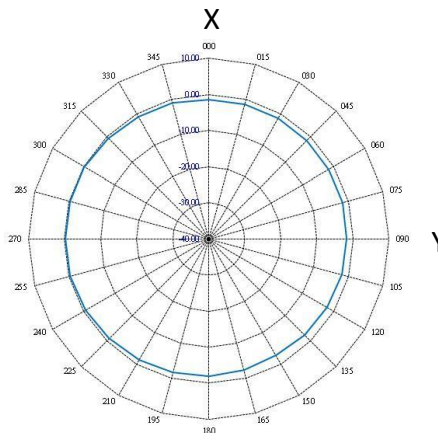
2D Radiation Pattern – Ant 5 @ 1.575GHz



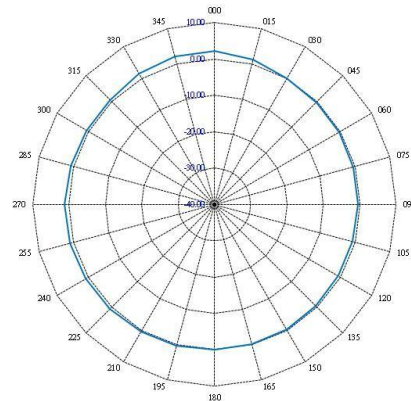
X-Z plane



Y-Z plane



X-Y plane (Theta 90 deg)



X-Y plane (Theta 60 deg)

Peak Gain

3.8 dBi

Efficiency

53 %

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