

FIT Hon Teng Limited

鴻騰六零八八精密科技股份有限公司

B01W033T02 Antenna Performance Evaluation Report

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Antenna Frequency Information & Requirements

■ Antenna Frequency Information:

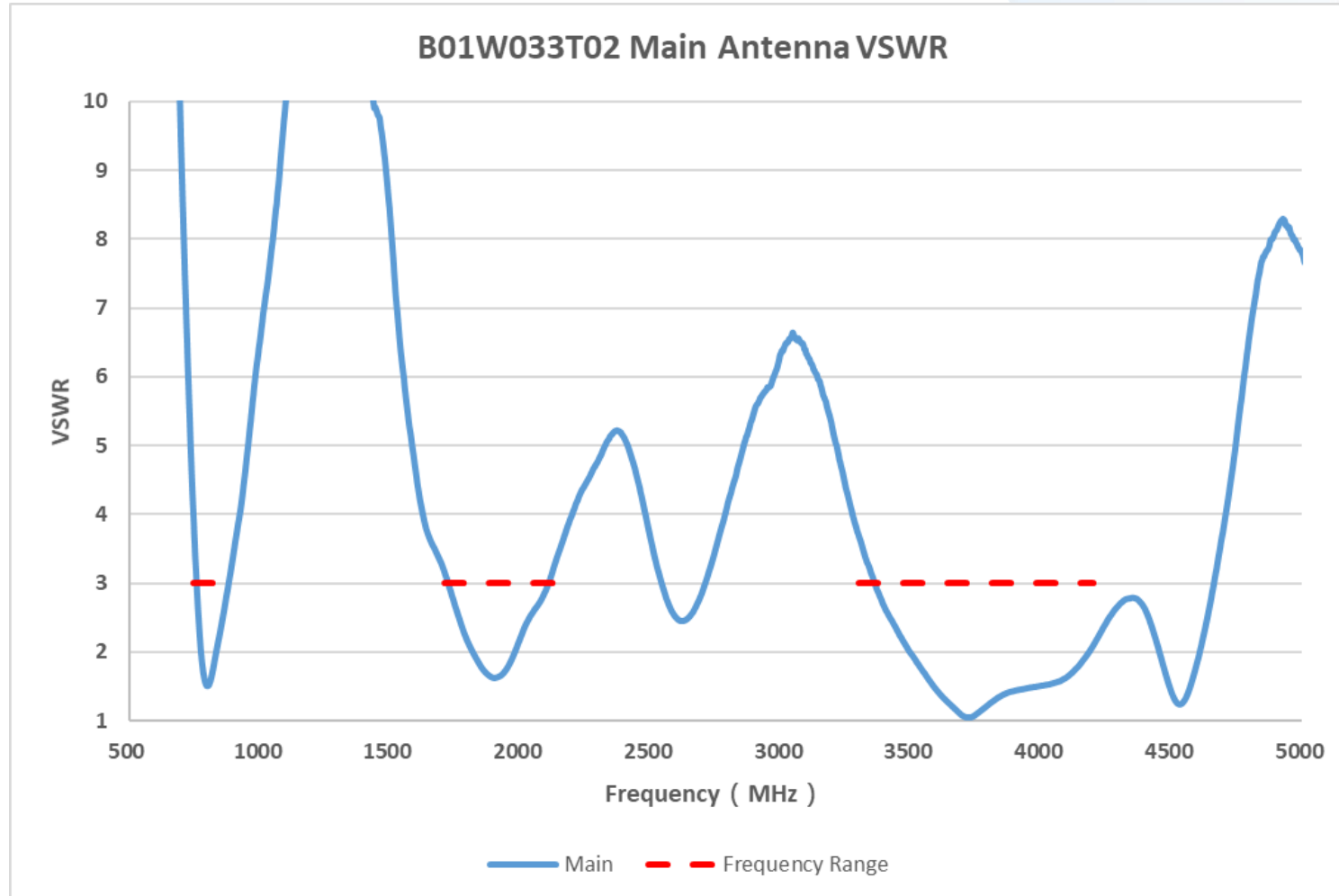
Antenna	Band List	Frequency(MHz)
Main	4G LTE : B2/B4/B5/B13/B66 5G FR1 : n2/n5/n66/n77	746~894 ; 1710~2200 ; 3300~4200
AUX	4G LTE : B2/B4/B5/B13/B66 5G FR1 : n2/n5/n66/n77	746~894 ; 1710~2200 ; 3300~4200

■ Requirements of Measurement :

Test Item	Specification	Remark
VSWR	4G/5G FR1 < 3:1	
Isolation	LB/MHB/UHB >15 dB	
Peak gain	0 ~ 5dBi	
Efficiency	LB > 40% 、 MHB/UHB > 50%	
Radiation pattern	Scale: +10 ~ -40dBi	
Polarization	Linear	

Antenna Evaluation Result _ Main Antenna

- Main antenna original switch PIN directly connected to GND, and tuned the matching circuits to cover the low band frequency range.



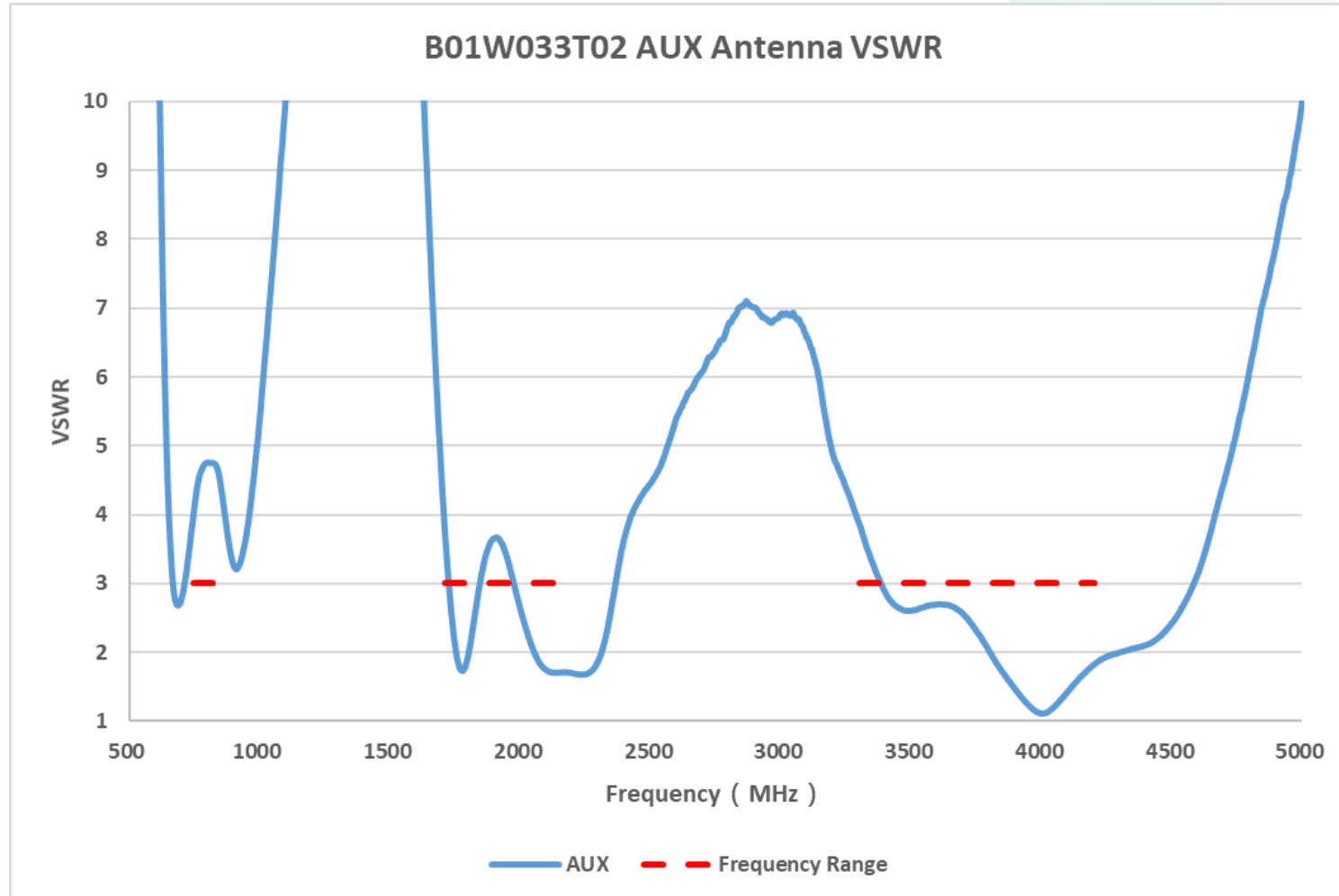
Antenna Evaluation Result _ Main Antenna

■ Main antenna passive performance: Efficiency and Gain.

B01W033T02 Main Antenna Efficiency											
Frequency	Efficiency	Efficiency	Peak Gain	Frequency	Efficiency	Efficiency	Peak Gain	Frequency	Efficiency	Efficiency	Peak Gain
(MHz)	(dB)	(%)	(dBi)	(MHz)	(dB)	(%)	(dBi)	(MHz)	(dB)	(%)	(dBi)
LB				MHB				UHB			
740	-6.02	25.03	-3.46	1710	-3.07	49.29	-0.53	3300	-3.70	42.66	0.52
750	-5.75	26.58	-3.39	1730	-3.29	46.92	-0.77	3350	-2.50	56.24	2.20
760	-5.19	30.30	-3.05	1750	-2.80	52.51	-0.19	3400	-2.53	55.82	2.42
770	-4.63	34.46	-2.54	1770	-2.80	52.52	-0.09	3450	-2.98	50.37	1.92
780	-4.39	36.40	-2.31	1790	-3.09	49.06	-0.23	3500	-2.89	51.35	1.73
790	-4.29	37.20	-2.11	1810	-2.83	52.15	0.15	3550	-2.23	59.88	1.81
800	-4.00	39.80	-1.51	1830	-2.56	55.50	0.65	3600	-2.26	59.38	1.46
810	-3.71	42.55	-1.01	1850	-2.46	56.74	1.06	3650	-2.70	53.75	0.90
820	-3.78	41.85	-0.83	1870	-2.49	56.36	1.26	3700	-2.57	55.39	1.73
830	-3.82	41.49	-0.65	1890	-2.28	59.13	1.54	3750	-2.95	50.73	1.65
840	-4.15	38.48	-0.62	1910	-2.16	60.83	1.71	3800	-3.02	49.89	1.15
850	-4.28	37.28	-0.48	1930	-2.31	58.69	1.53	3850	-2.82	52.25	0.51
860	-4.34	36.79	-0.35	1950	-2.35	58.25	1.44	3900	-2.25	59.58	1.38
870	-4.27	37.37	-0.11	1970	-2.21	60.07	1.55	3950	-2.21	60.12	1.81
880	-4.60	34.69	-0.25	1990	-2.21	60.09	1.47	4000	-1.62	68.83	2.01
890	-5.02	31.45	-0.53	2010	-2.55	55.56	1.32	4050	-1.77	66.57	0.96
900	-5.70	26.92	-1.03	2030	-2.57	55.39	1.54	4100	-3.02	49.93	0.53
				2050	-2.71	53.59	1.42	4150	-3.56	44.08	0.60
				2070	-2.99	50.23	1.20	4200	-3.69	42.80	0.78
				2090	-3.51	44.61	0.52				
				2110	-3.50	44.69	0.59				
				2130	-3.67	42.91	0.56				
				2150	-3.98	39.97	0.34				
				2170	-4.33	36.90	0.13				
				2190	-4.52	35.32	0.08				
				2210	-4.70	33.87	0.02				

Antenna Evaluation Result _ AUX Antenna

- AUX antenna original switch PIN directly connected to GND, and tuned the matching circuits to cover the low band frequency range.

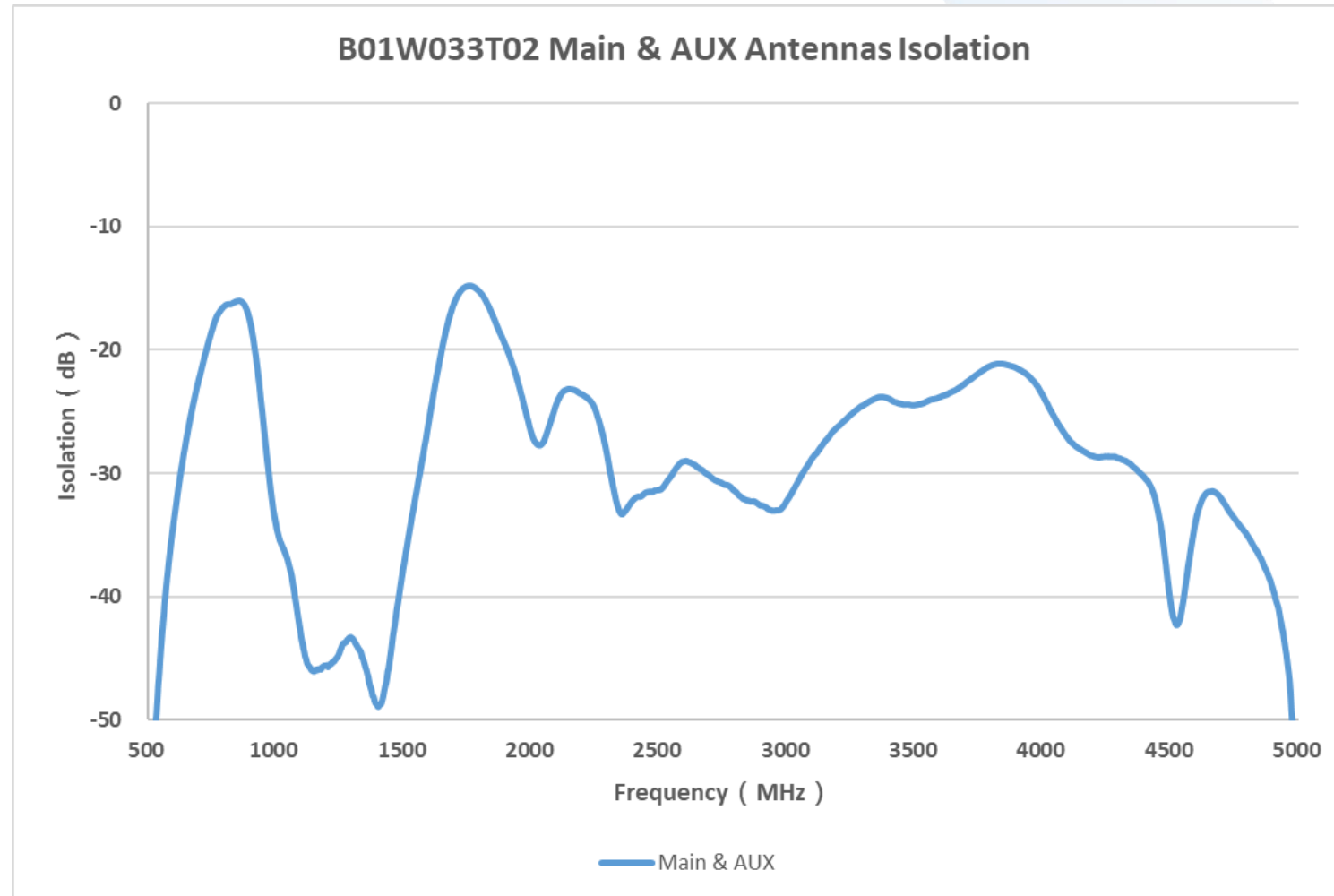


Antenna Evaluation Result _ AUX Antenna

■ AUX antenna passive performance: Efficiency and Gain.

B01W033T02 AUX Antenna Efficiency											
Frequency	Efficiency	Efficiency	Peak Gain	Frequency	Efficiency	Efficiency	Peak Gain	Frequency	Efficiency	Efficiency	Peak Gain
(MHz)	(dB)	(%)	(dBi)	(MHz)	(dB)	(%)	(dBi)	(MHz)	(dB)	(%)	(dBi)
LB				MHB				UHB			
740	-8.00	15.85	-4.46	1710	-4.75	33.49	-0.18	3300	-5.58	27.68	-0.21
750	-7.51	17.73	-3.77	1730	-4.57	34.90	0.42	3350	-4.94	32.09	0.56
760	-7.84	16.42	-4.02	1750	-4.01	39.76	0.92	3400	-4.45	35.85	0.79
770	-8.31	14.75	-4.48	1770	-3.61	43.56	1.34	3450	-4.22	37.81	1.50
780	-8.27	14.88	-4.49	1790	-3.44	45.32	1.54	3500	-3.92	40.58	1.99
790	-8.39	14.48	-4.70	1810	-3.57	43.96	1.51	3550	-3.65	43.18	2.28
800	-8.62	13.75	-4.84	1830	-3.62	43.47	1.49	3600	-3.26	47.16	2.80
810	-8.76	13.29	-4.90	1850	-3.56	44.05	1.54	3650	-3.90	40.74	1.96
820	-8.50	14.12	-4.64	1870	-3.86	41.11	1.32	3700	-3.80	41.66	1.63
830	-7.99	15.88	-4.12	1890	-4.45	35.88	0.93	3750	-4.19	38.08	0.72
840	-7.69	17.03	-3.80	1910	-4.49	35.53	0.76	3800	-4.59	34.74	-0.05
850	-7.32	18.55	-3.38	1930	-4.34	36.79	0.61	3850	-4.74	33.57	-0.04
860	-7.42	18.13	-3.48	1950	-4.55	35.05	0.03	3900	-4.34	36.79	1.03
870	-7.39	18.25	-3.69	1970	-4.22	37.88	-0.06	3950	-4.46	35.77	0.03
880	-7.25	18.83	-3.68	1990	-4.13	38.67	-0.43	4000	-4.26	37.51	-0.65
890	-6.75	21.11	-3.29	2010	-4.09	38.99	-0.15	4050	-4.68	34.01	-0.12
900	-6.75	21.14	-3.44	2030	-4.11	38.82	0.02	4100	-4.67	34.10	-1.47
				2050	-4.11	38.86	0.18	4150	-4.44	36.01	-1.03
				2070	-3.91	40.68	0.38	4200	-3.97	40.08	0.79
				2090	-3.90	40.70	0.02				
				2110	-4.53	35.21	-0.87				
				2130	-4.57	34.91	-0.84				
				2150	-4.40	36.31	-0.27				
				2170	-4.48	35.66	-0.09				
				2190	-4.05	39.32	0.23				
				2210	-3.53	44.36	0.67				

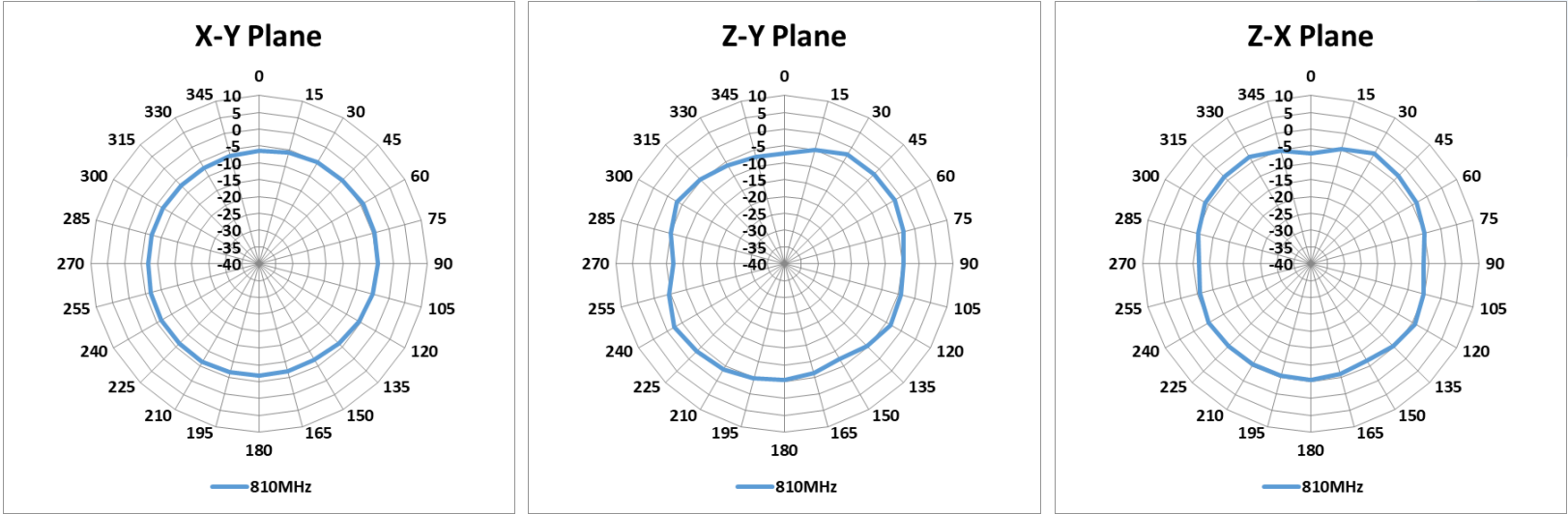
Antenna Evaluation Result _ Isolation



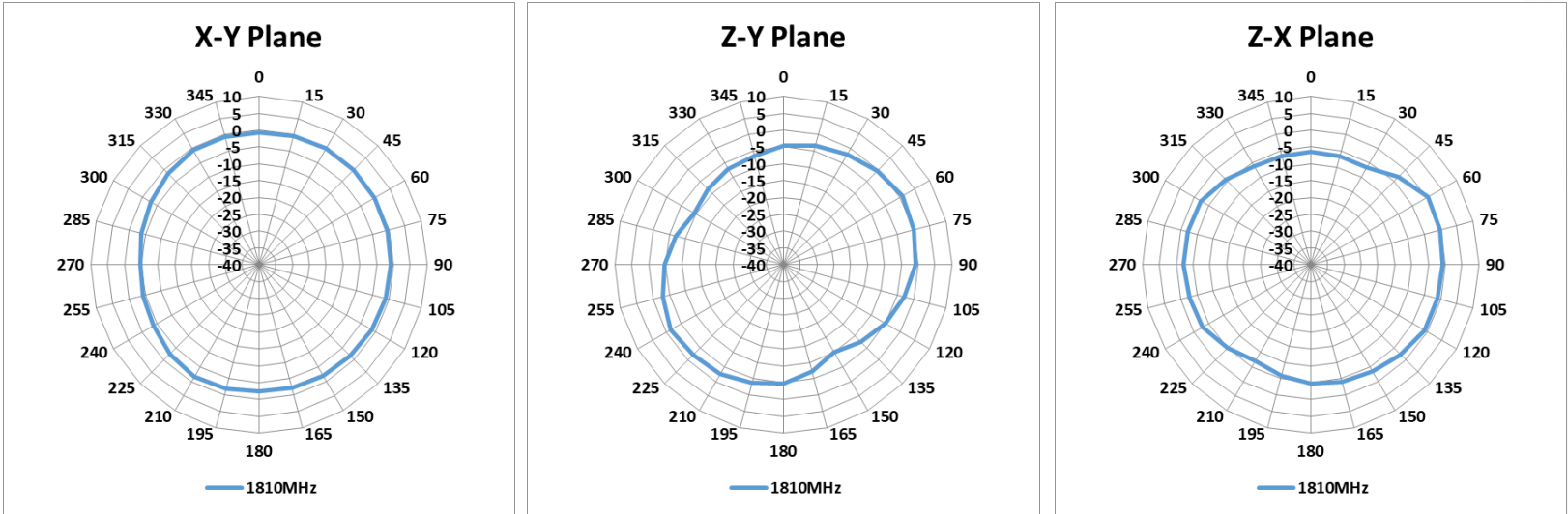
- The worst isolation is around -14.7dB between Main and AUX antennas.

Antenna Evaluation Result _ 2D Radiation Pattern-Main Antenna

Main Antenna LB 810MHz

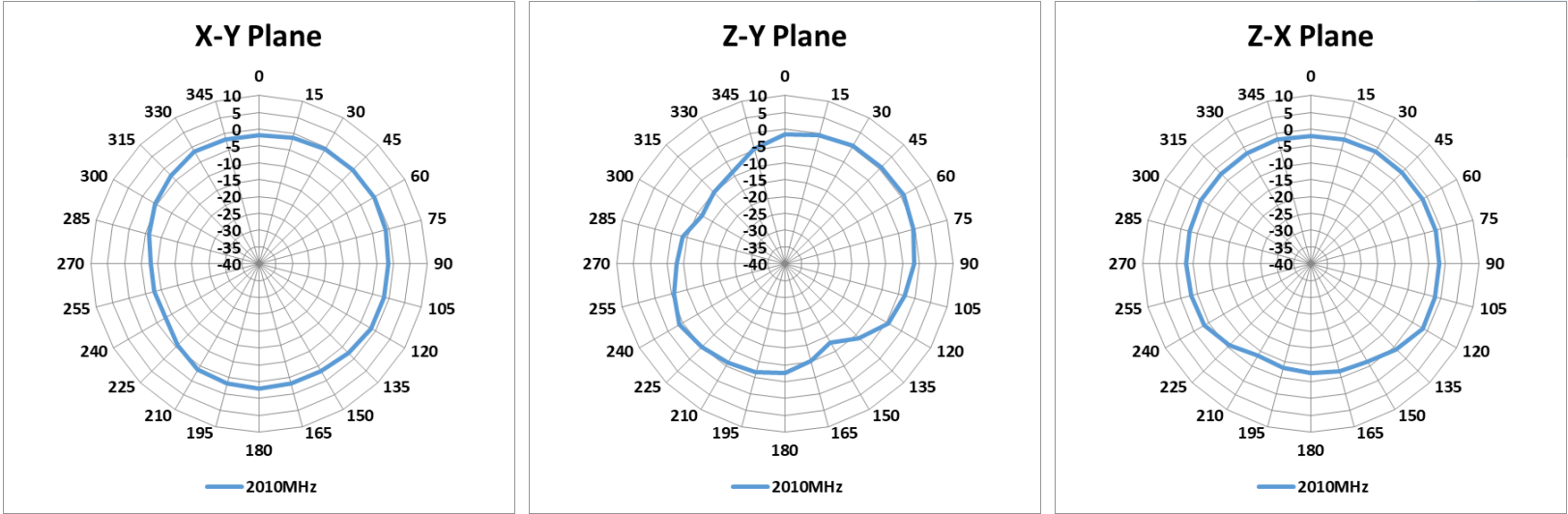


Main Antenna MHB 1810MHz

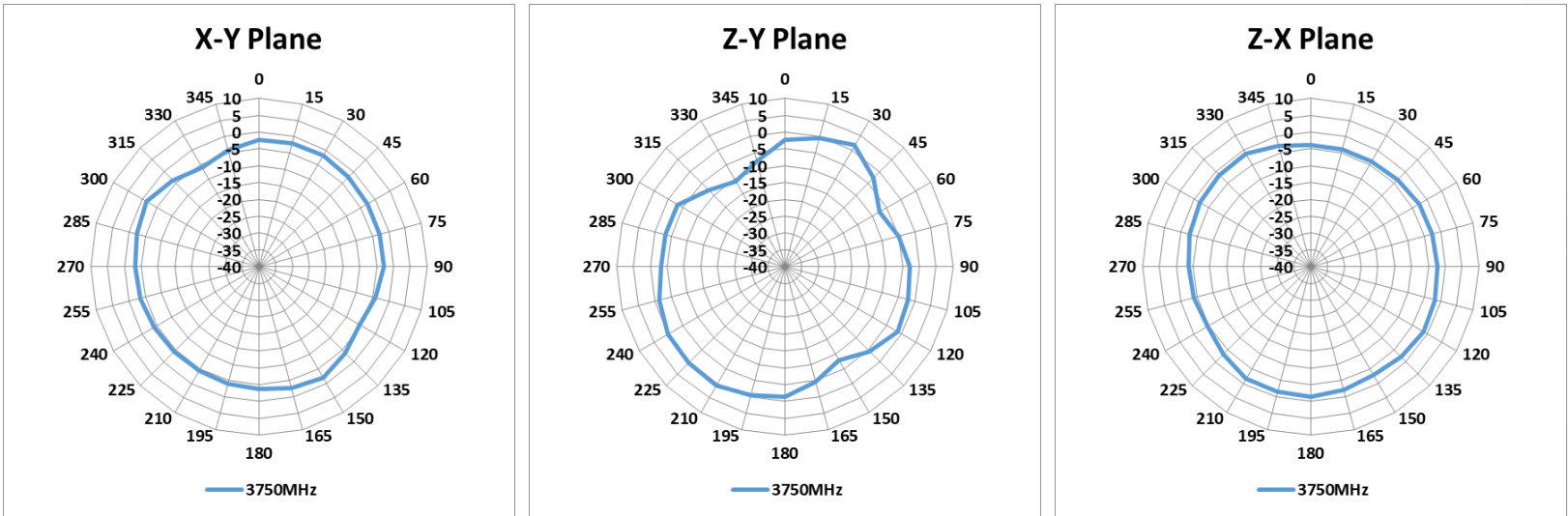


Antenna Evaluation Result _ 2D Radiation Pattern-Main Antenna

Main Antenna MHB 2010MHz

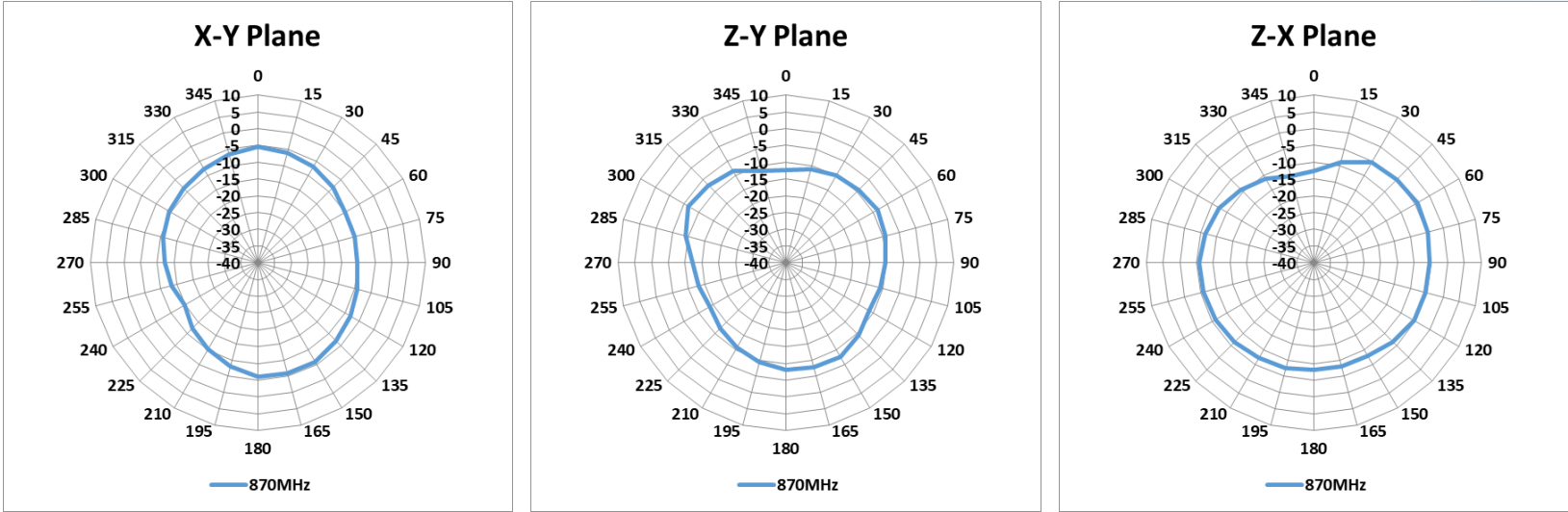


Main Antenna UHB 3750MHz

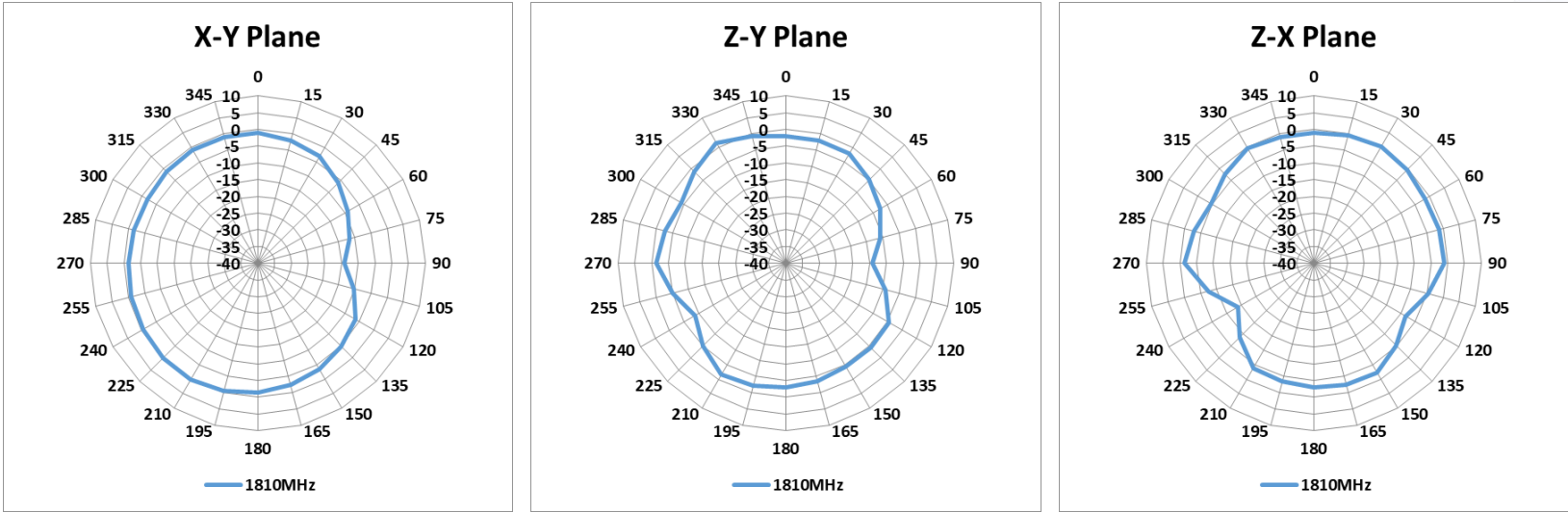


Antenna Evaluation Result _ 2D Radiation Pattern-AUX Antenna

AUX Antenna LB 870MHz

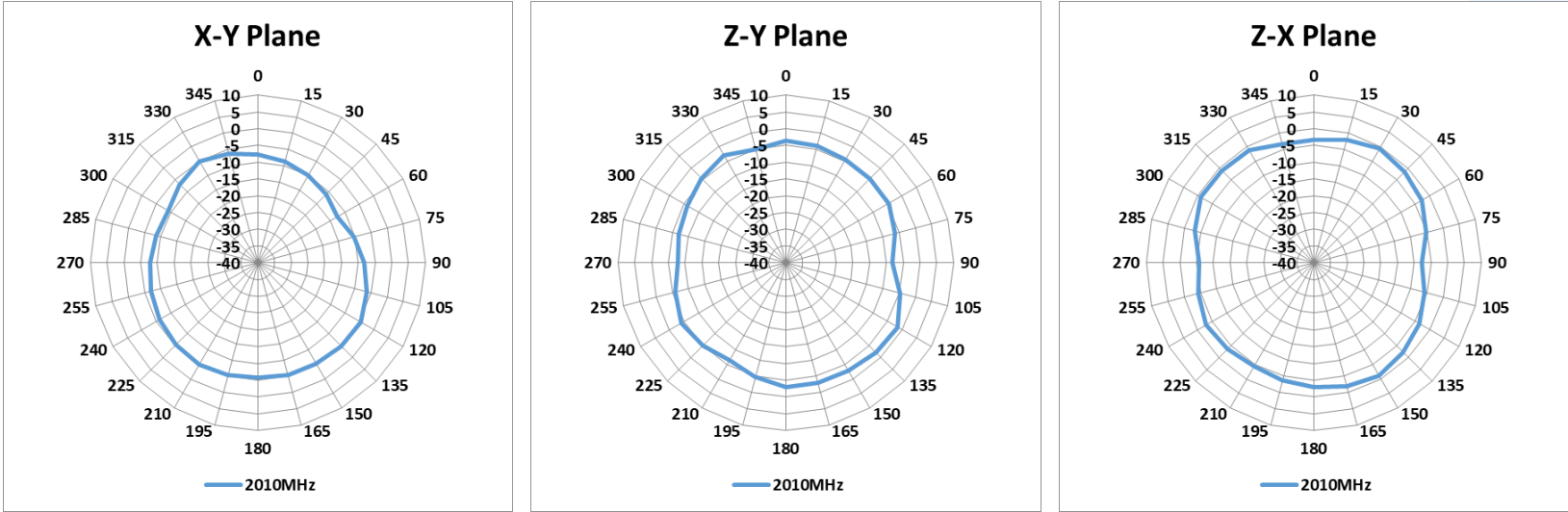


AUX Antenna MHB 1810MHz

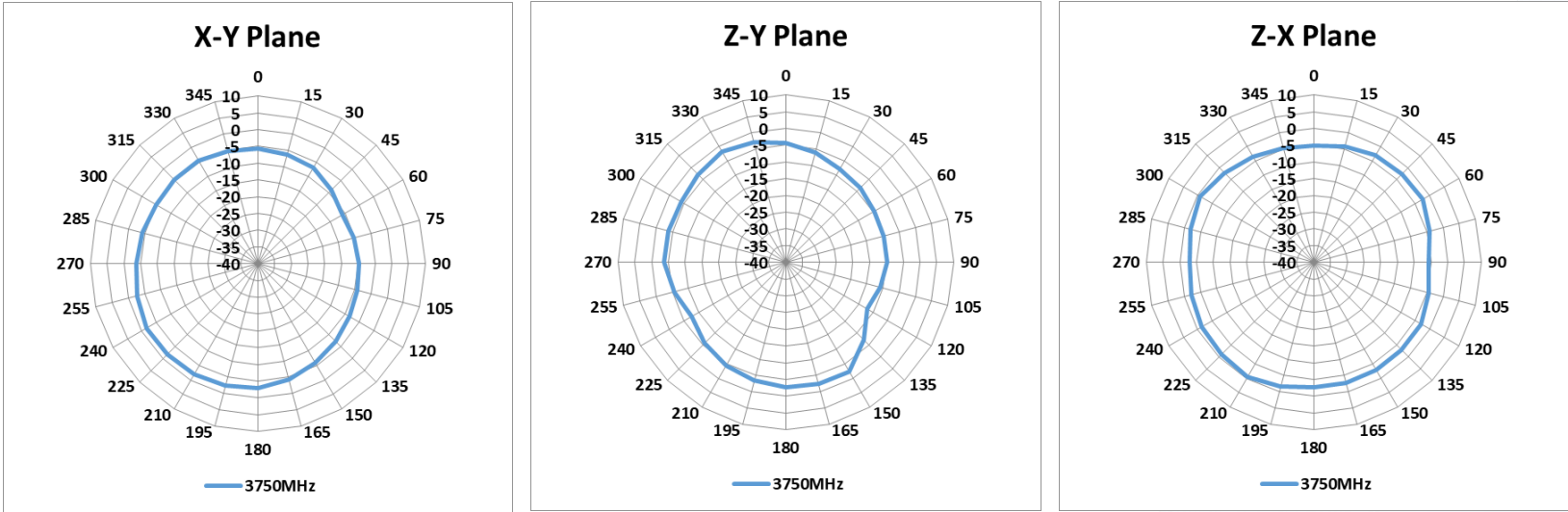


Antenna Evaluation Result _ 2D Radiation Pattern-AUX Antenna

AUX Antenna MHB 2010MHz

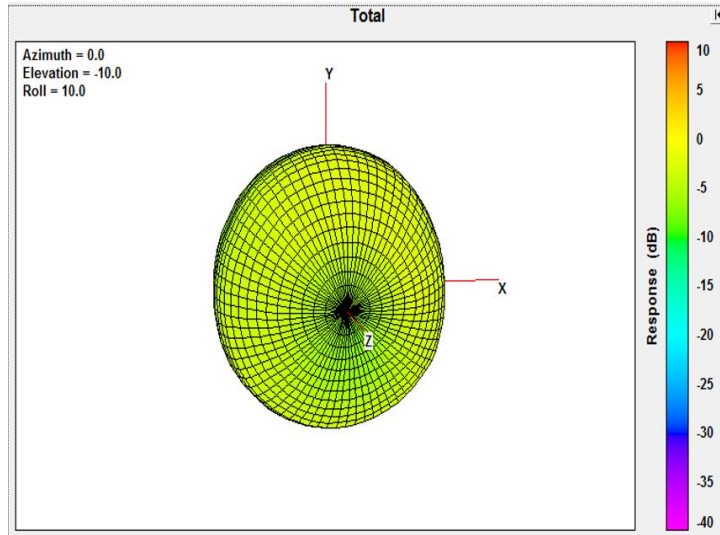


AUX Antenna UHB 3750MHz

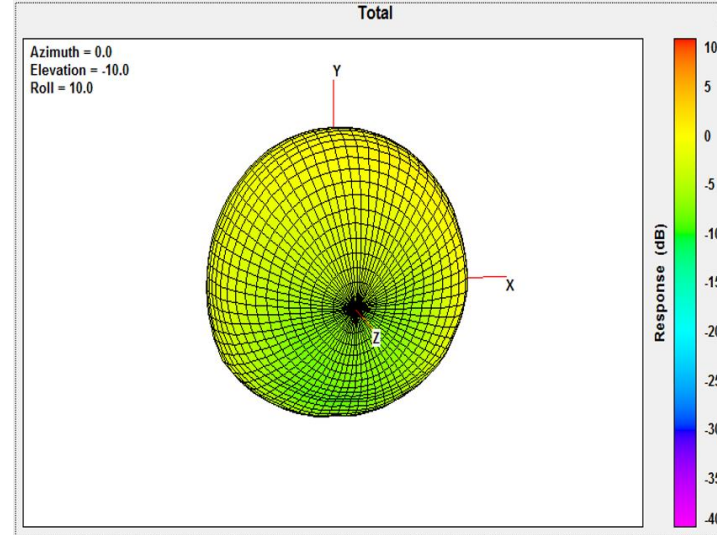


Antenna Evaluation Result _ 3D Radiation Pattern-Main Antenna

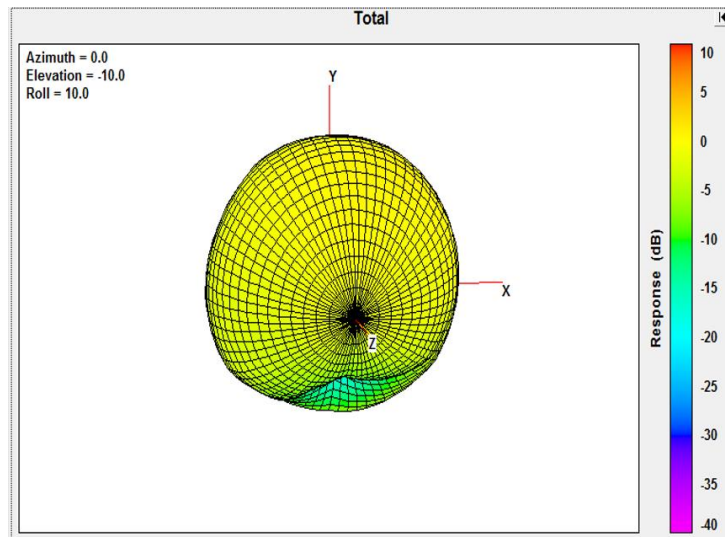
Main Antenna LB 810MHz



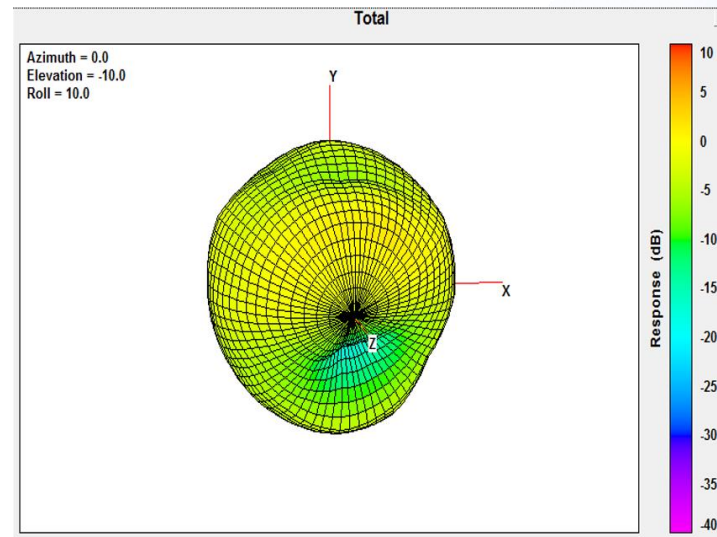
Main Antenna MHB 1810MHz



Main Antenna MHB 2010MHz

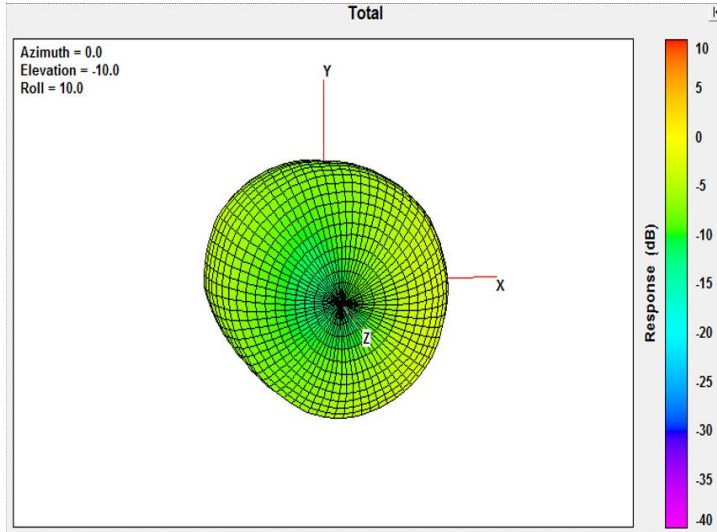


Main Antenna UHB 3750MHz

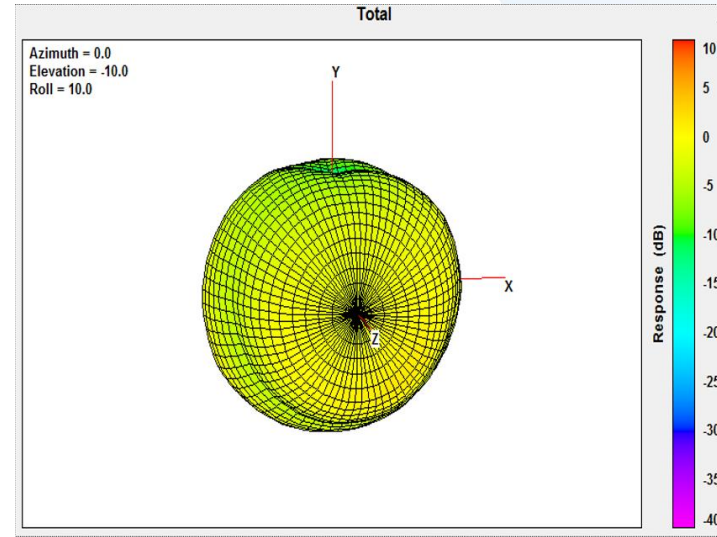


Antenna Evaluation Result _ 3D Radiation Pattern-AUX Antenna

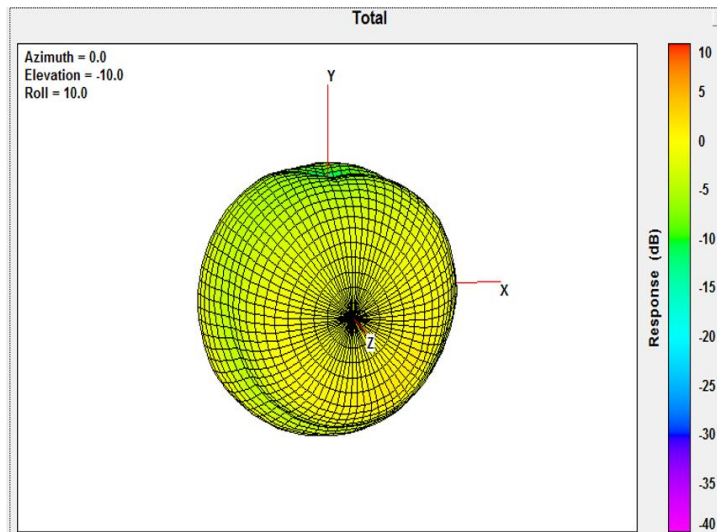
AUX Antenna LB 870MHz



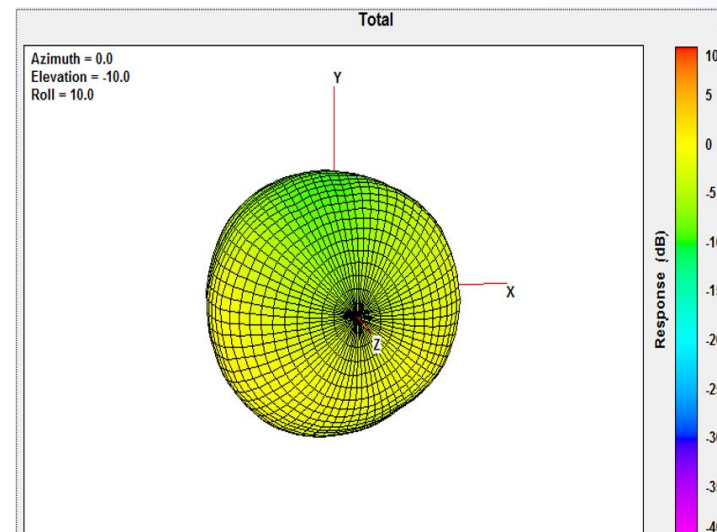
AUX Antenna MHB 1810MHz



AUX Antenna MHB 2010MHz

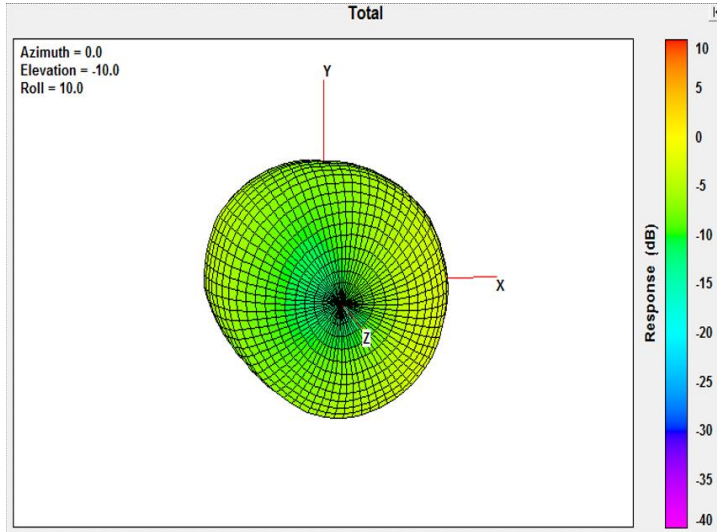


AUX Antenna UHB 3750MHz

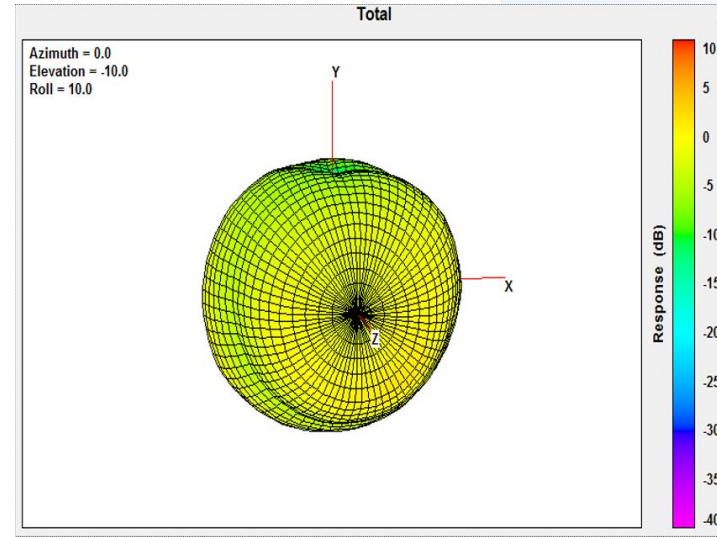


Antenna Evaluation Result _ 3D Radiation Pattern-AUX Antenna

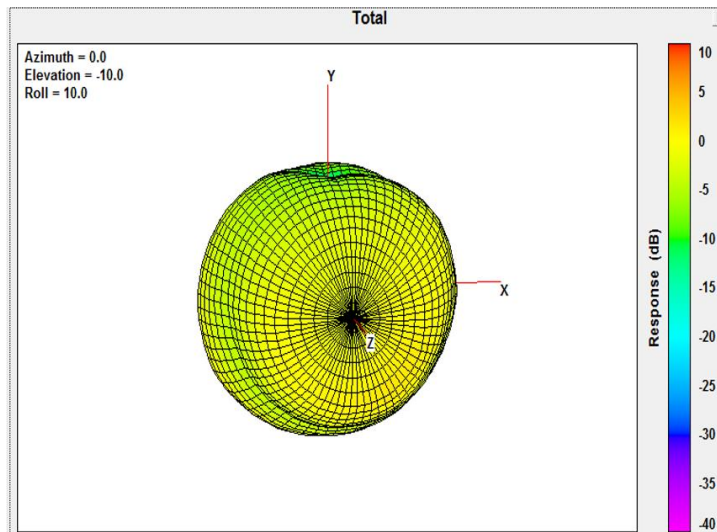
AUX Antenna LB 870MHz



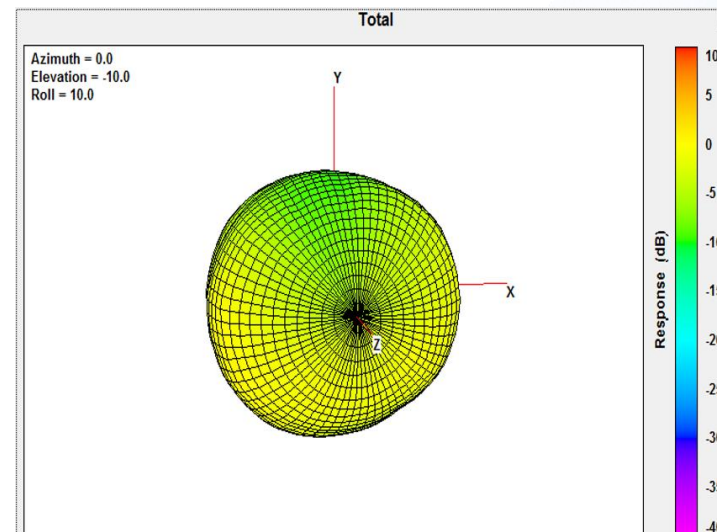
AUX Antenna MHB 1810MHz



AUX Antenna MHB 2010MHz



AUX Antenna UHB 3750MHz



Antenna Evaluation Result _ OTA Active Results

LTE	BW	CH	Result	
			TRP	TIS
Band 2	10M	Low	21.95	-96.32
		Mid	20.82	-97.35
		High	20.77	-97.65
Band 4	10M	Low	21.48	-95.42
		Mid	18.46	-96.04
		High	22.02	-96.48
Band 5	10M	Low	17.39	-94.06
		Mid	19.42	-94.53
		High	19.36	-94.54
Band 13	10M	Low	17.83	
		Mid	18.21	-93.40
		High	18.56	
Band 66	10M	Low	20.49	-95.46
		Mid	20.15	-96.77
		High	18.71	-94.22

Summary

- Based on current structure, evaluate 2 antennas passive performance as below:
 - Main and AUX antennas switch PINs directly connected to GND, disconnected to the switches as the picture shown in Page 4 , and tuned the matching circuits to cover all the low band frequency range 746MHz~894MHz.
 - Test the antenna passive performance with mockup connected to the laptop with the length of 15cm cable.
 - Antenna efficiency and isolation result summary:

Antenna	LB (746~894MHz)	MHB (1710~2200MHz)	UHB (3300~4200MHz)
Main Antenna Efficiency	25%~42%	33%~60%	42%~68%
AUX Antenna Efficiency	15%~21%	33%~45%	27%~47%
Isolation	< -14.7 dB		



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