



Quectel

Nexar/ Beam 4K-India Antenna Debugging Report

Reporter: Raoul.Rao
Tel: +86 18028787963
Email: Raoul.Rao@quectel.com
Date: 2025.10.30

Build a Smarter World

Revision History



Revision	Date	Reporter	Reviewer	Note
V1.0	2025-07-29	Raoul.Rao	Winfred.Wu	Antenna Commissioning Report for Indian Version
V1.1	2025-08-06	Raoul.Rao	Winfred.Wu	Add Global Band Test Data
V1.2	2025-08-12	Raoul.Rao	Winfred.Wu	Antenna Sample Test Report
V1.3	2025-08-15	Raoul.Rao	Winfred.Wu	Add WiFi Antenna Test Data
V1.4	2025-08-21	Raoul.Rao/ Faber.shen	Winfred.Wu	Add GNSS Antenna Test Data
V1.5	2025-10-22	Raoul.Rao	Winfred.Wu	Optimize Performance for the Global Version



Project Overview

Antenna Performance Debugging
Conclusion and Suggestion

Build a Smarter World



Project Overview



- Device Dimensions: 115 × 105 × 80mm
- Mainboard Dimensions: 95 × 55 mm
- Antenna Quantity: 4
- Antenna OC: Y5NEX00A1DA
- Network Standard and Frequency Band:
 - ✓ LTE Main: 824-960MHz&1710-2690MHz
 - ✓ LTE Div: 824-960MHz&1710-2690MHz
 - ✓ GNSS: 1176MHz&1575MHz
 - ✓ WIFI: 2400-2500MHz&5150-5850MHz
- Module Model: EG25-GL/LC29H/FC905A
- Performance Requirements: /



Project Overview

Antenna Performance Debugging

Conclusion and Suggestion

Build a Smarter World

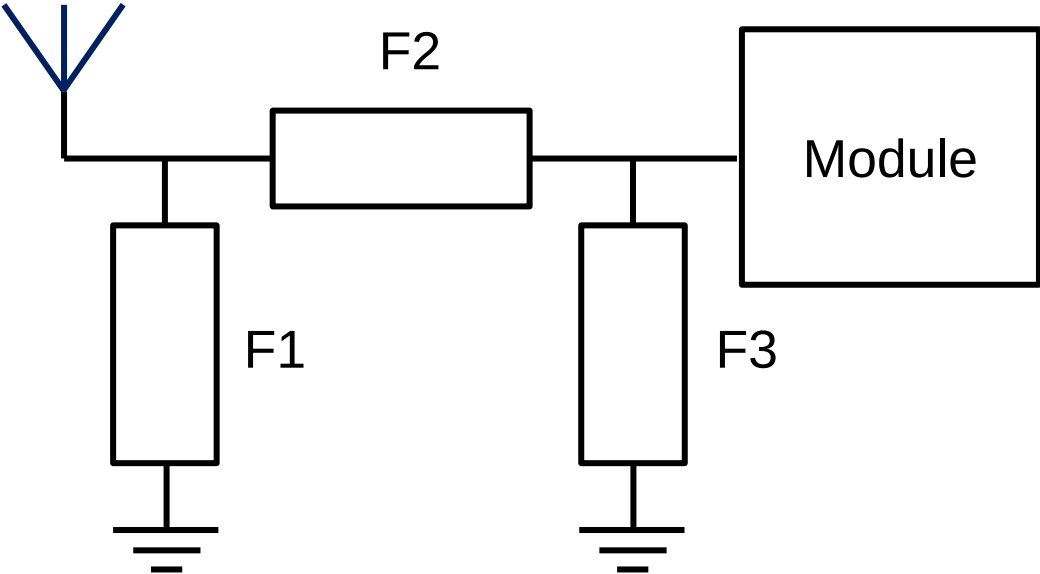


Antenna Matching Circuit – LTE MAIN Antenna



- Matching Circuit Diagram
- Match Value:

Antenna

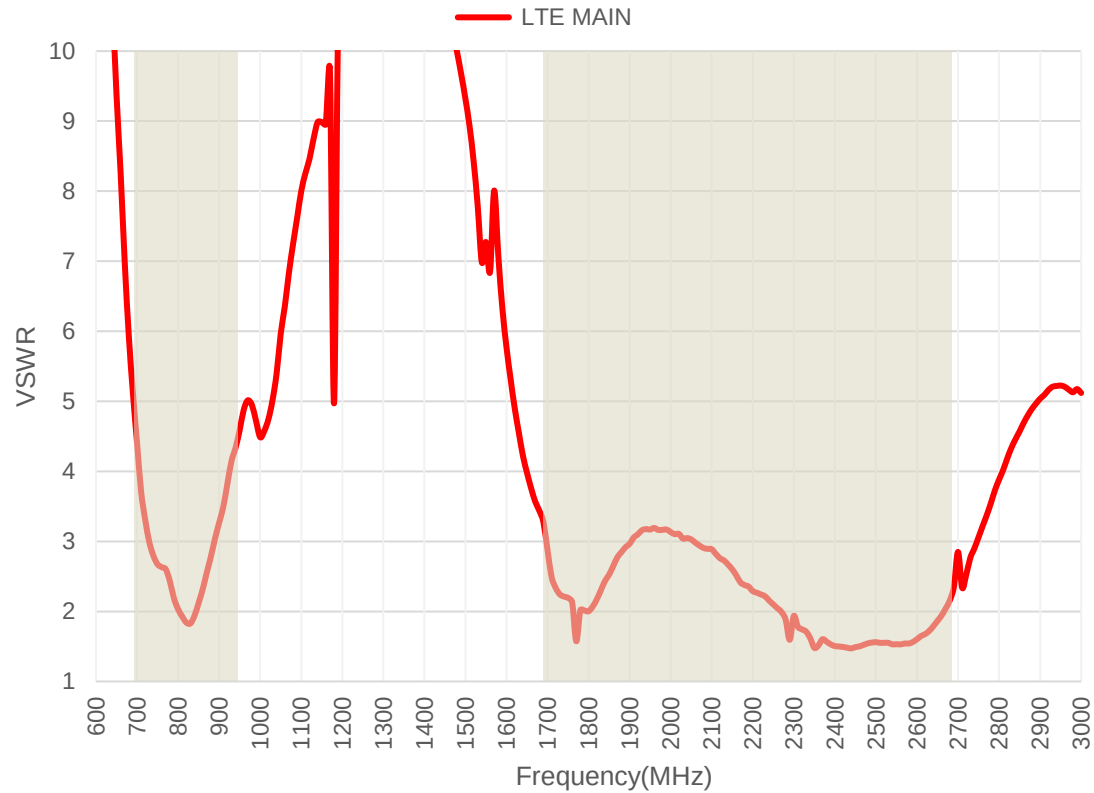


No.	L/C
F1	NA
F2	0Ω
F3	NA

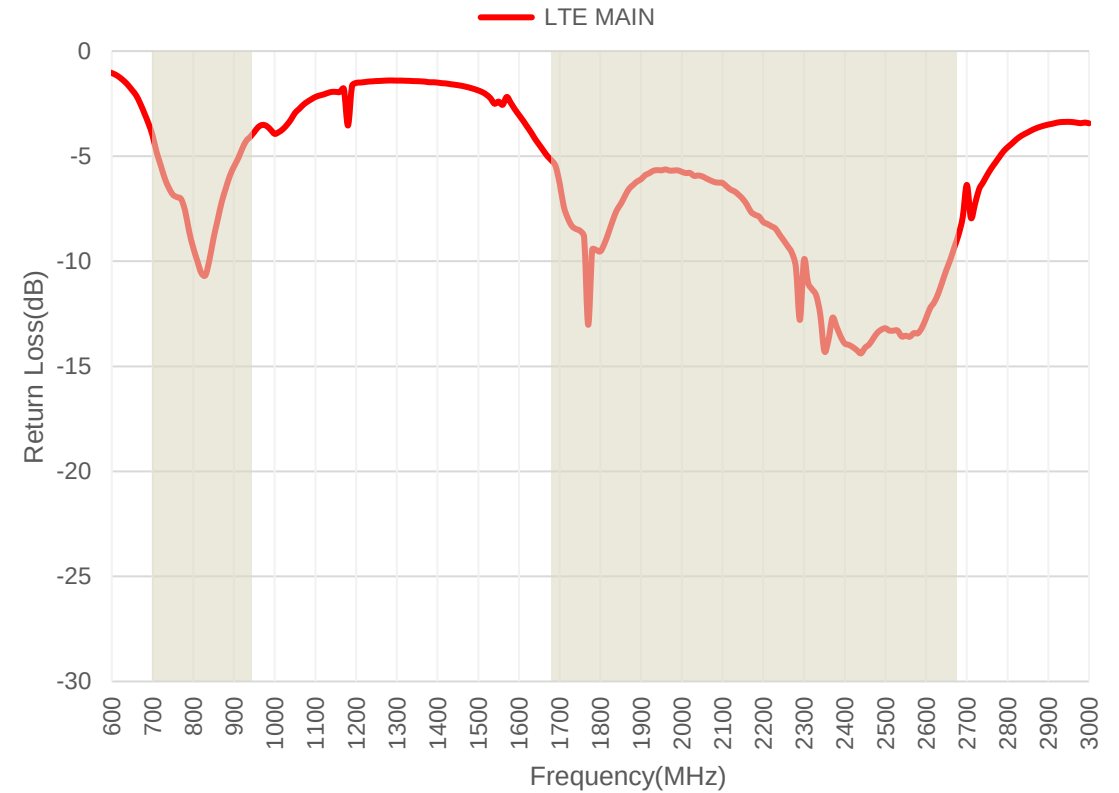
Passive Test- LTE MAIN Antenna



- VSWR (Voltage Standing Wave Ratio)

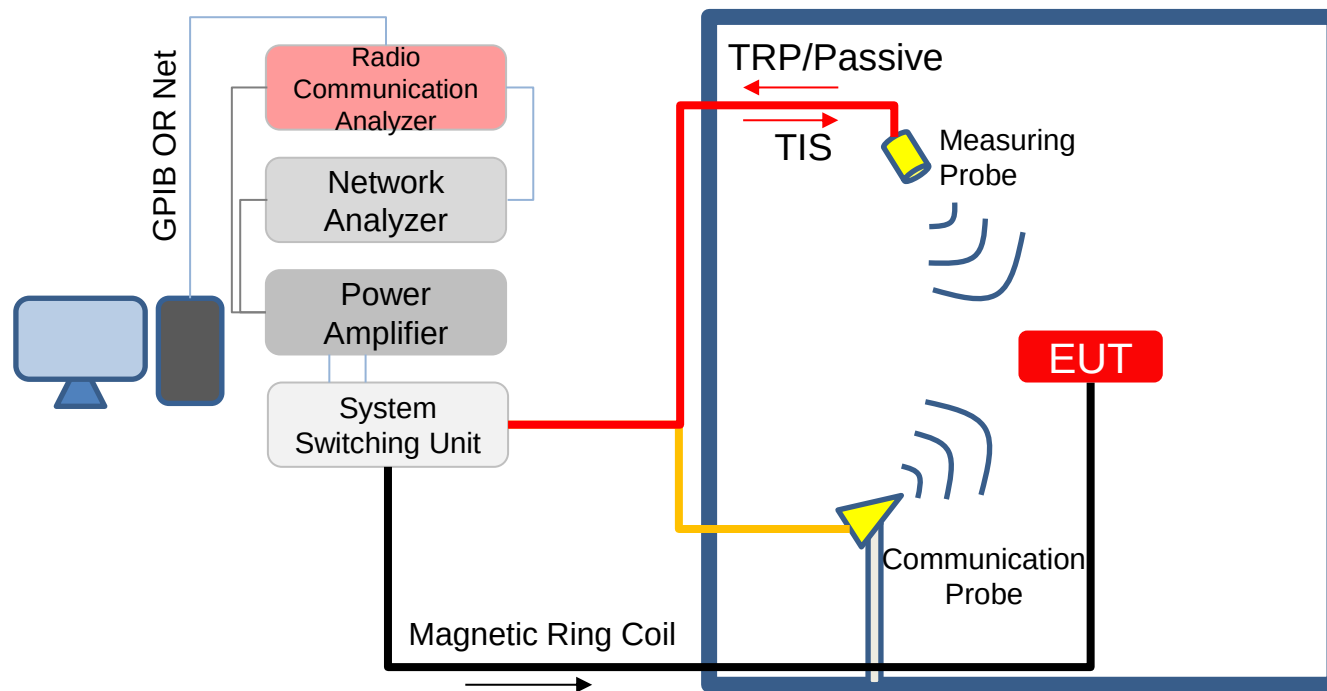


- RL (Return Loss)



Passive Test- LTE MAIN Antenna

- Chamber Coordinate System HF-G-1



Passive Test- LTE MAIN Antenna



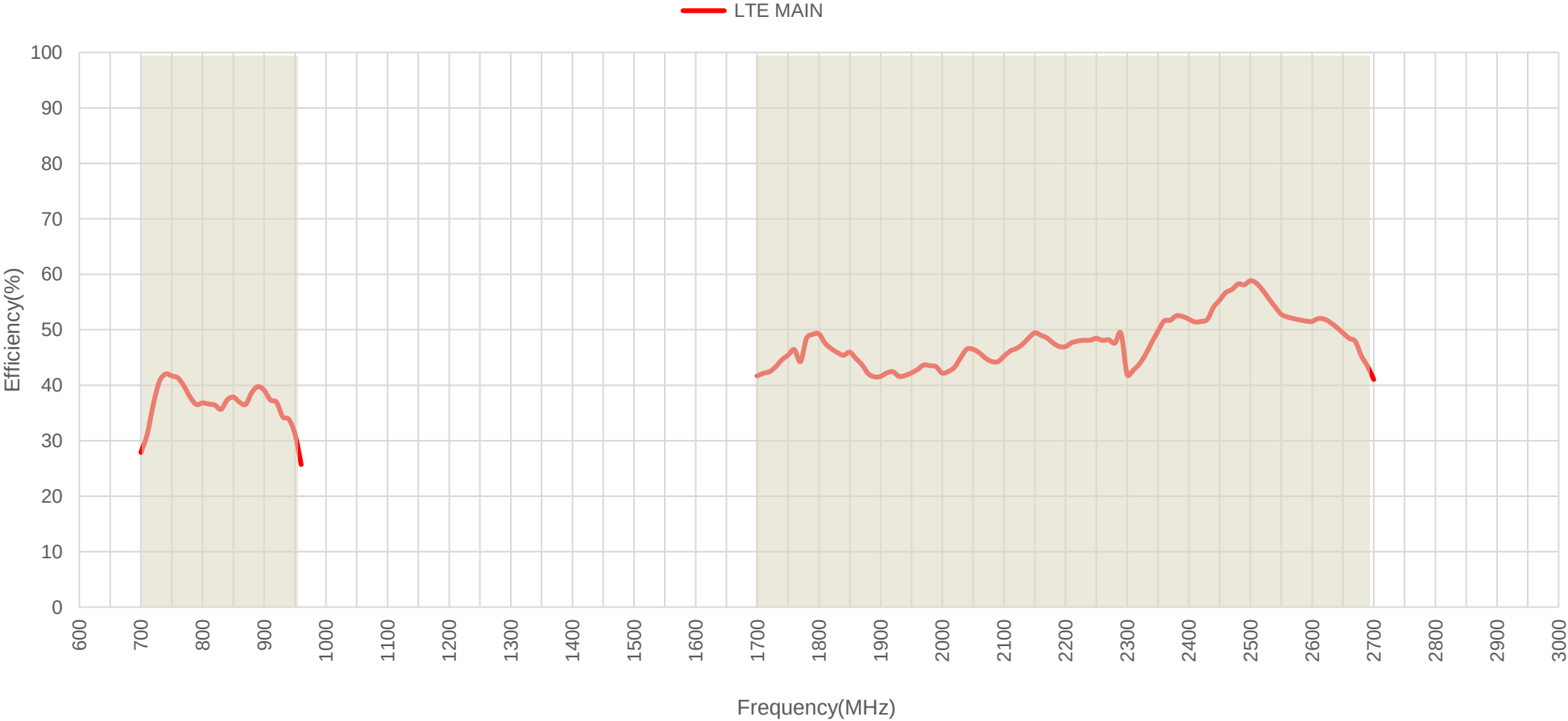
- Chamber Coordinate System HF-G-1



Passive Test- LTE MAIN Antenna



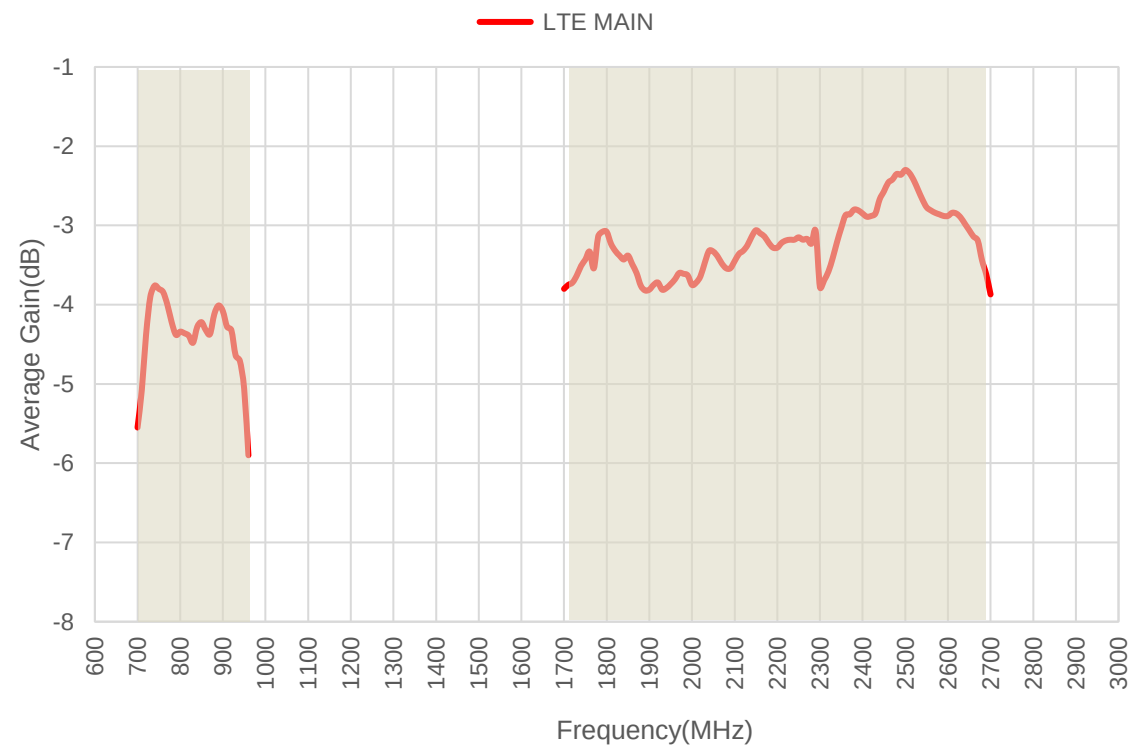
- Efficiency



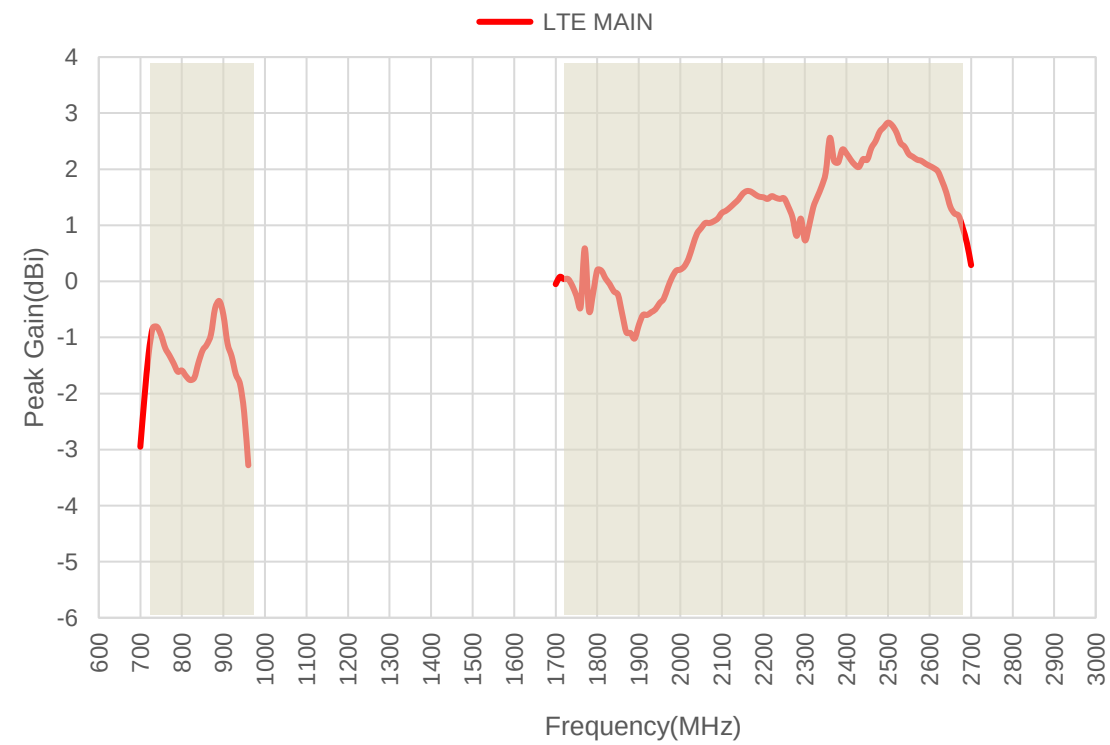
Passive Test- LTE MAIN Antenna



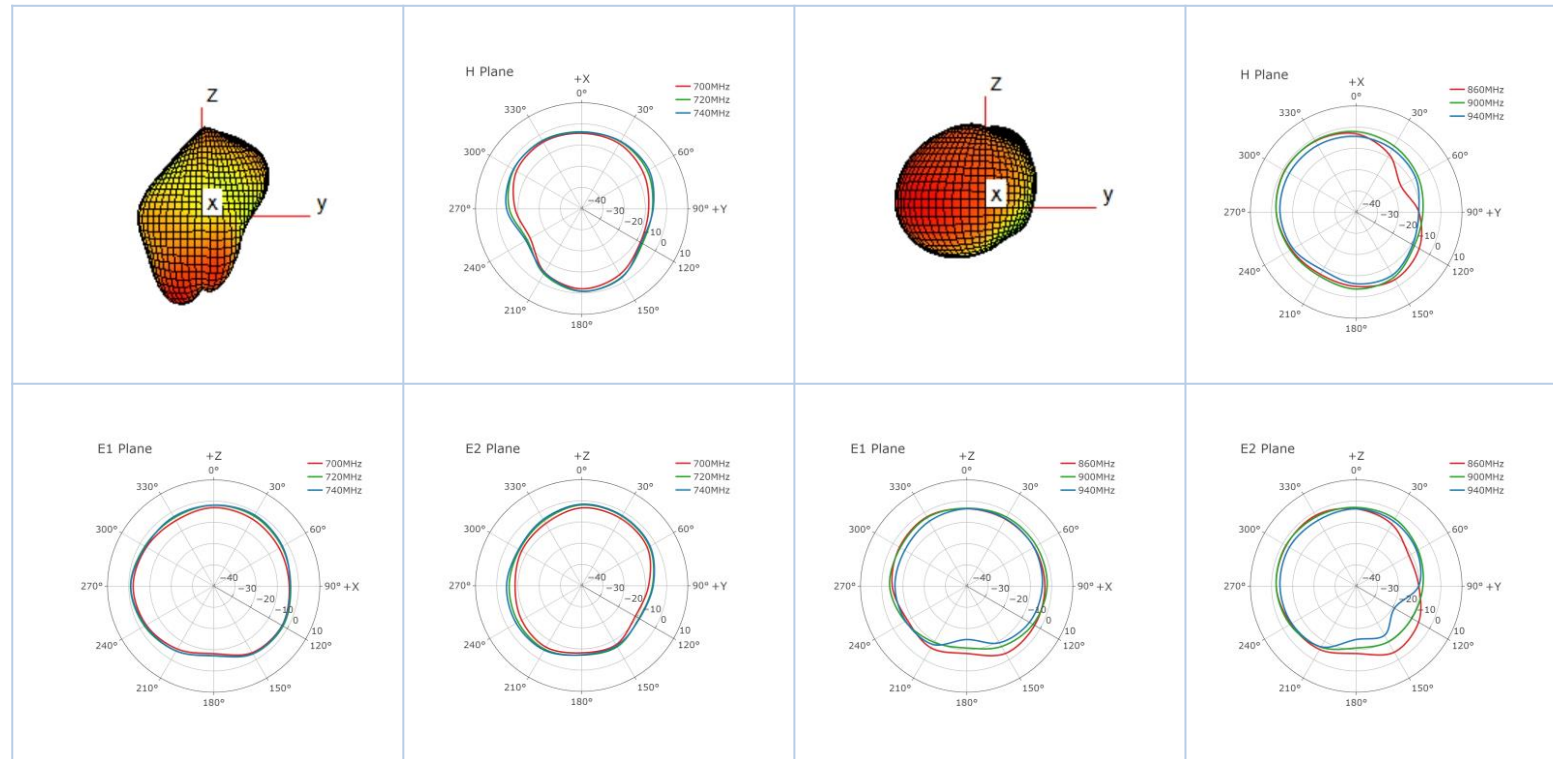
- Average Gain



- Peak Gain



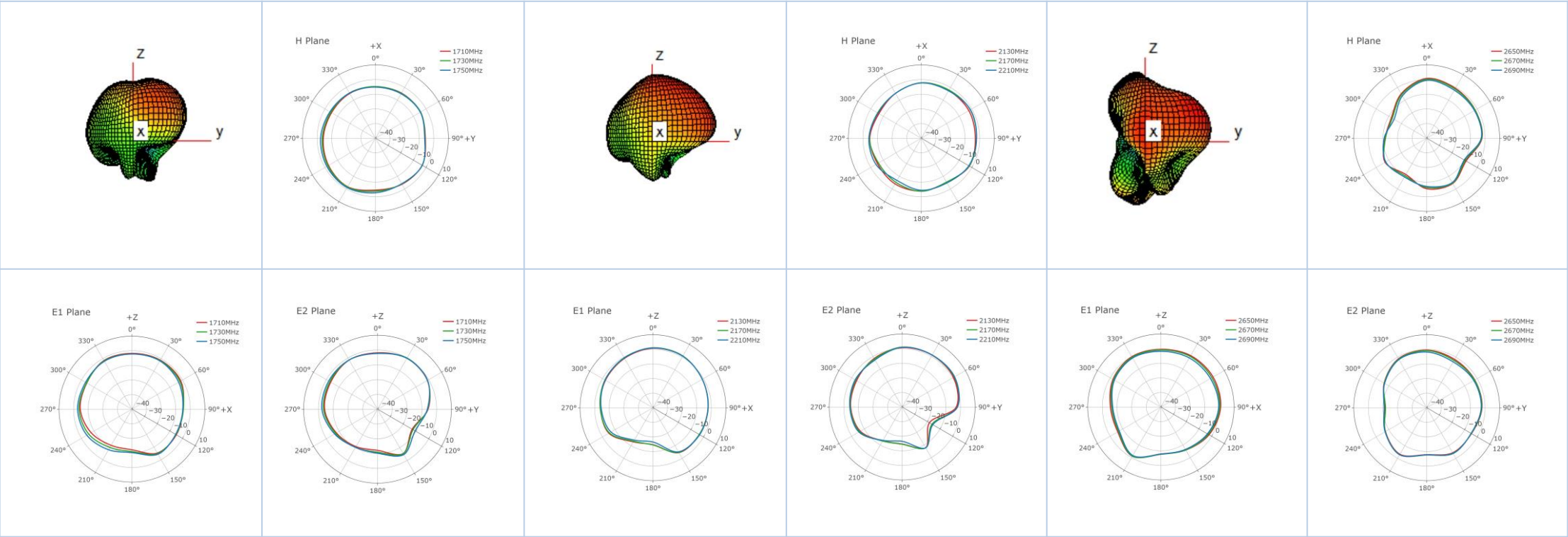
Passive Test-LTE MAIN Antenna



700MHz

900 MHz

Passive Test-LTE MAIN Antenna



1710MHz

2170 MHz

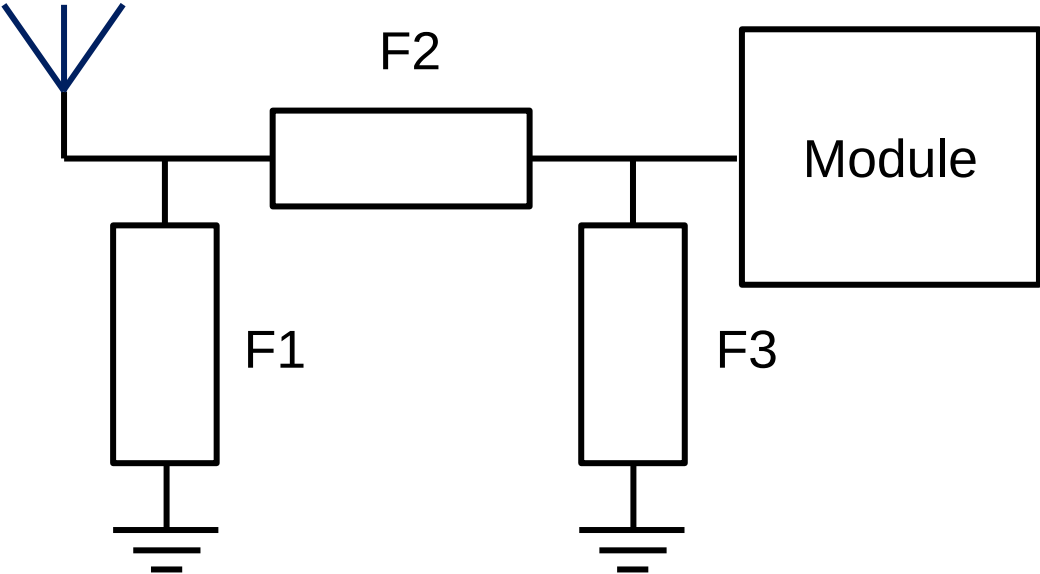
2690 MHz

Antenna Matching Circuit - LTE DIV Antenna



- Matching Circuit Diagram
- Match Value:

Antenna

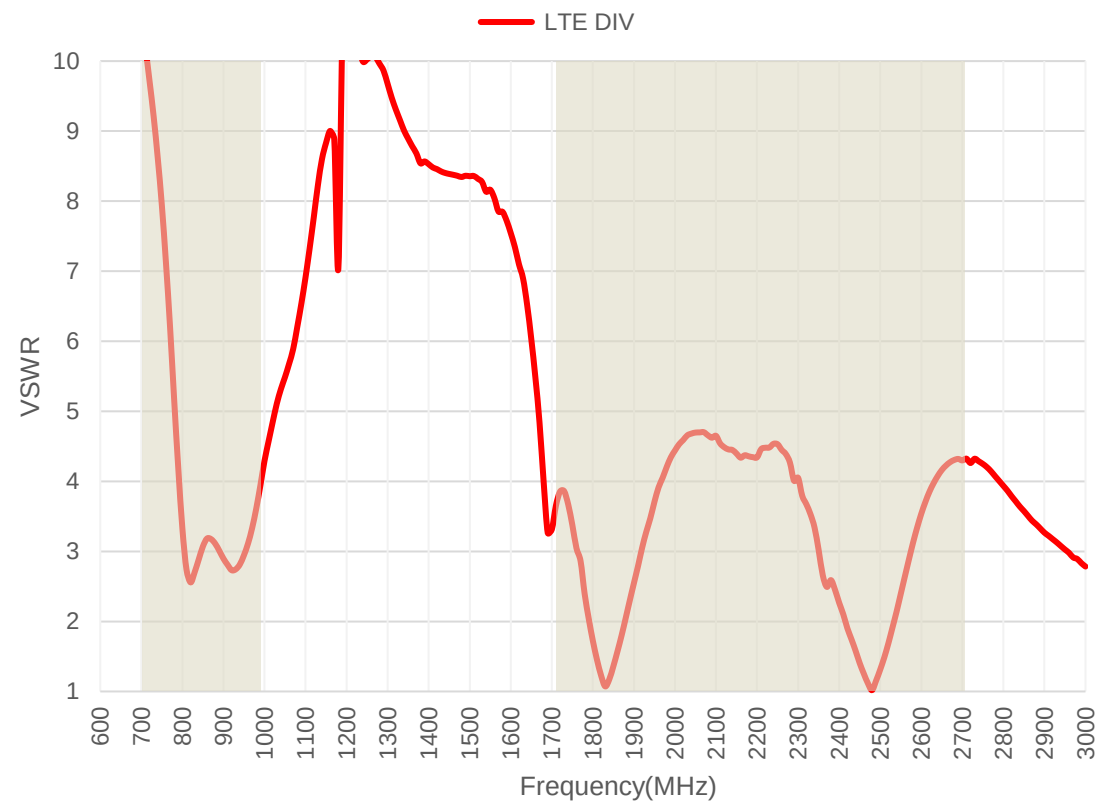


No.	L/C
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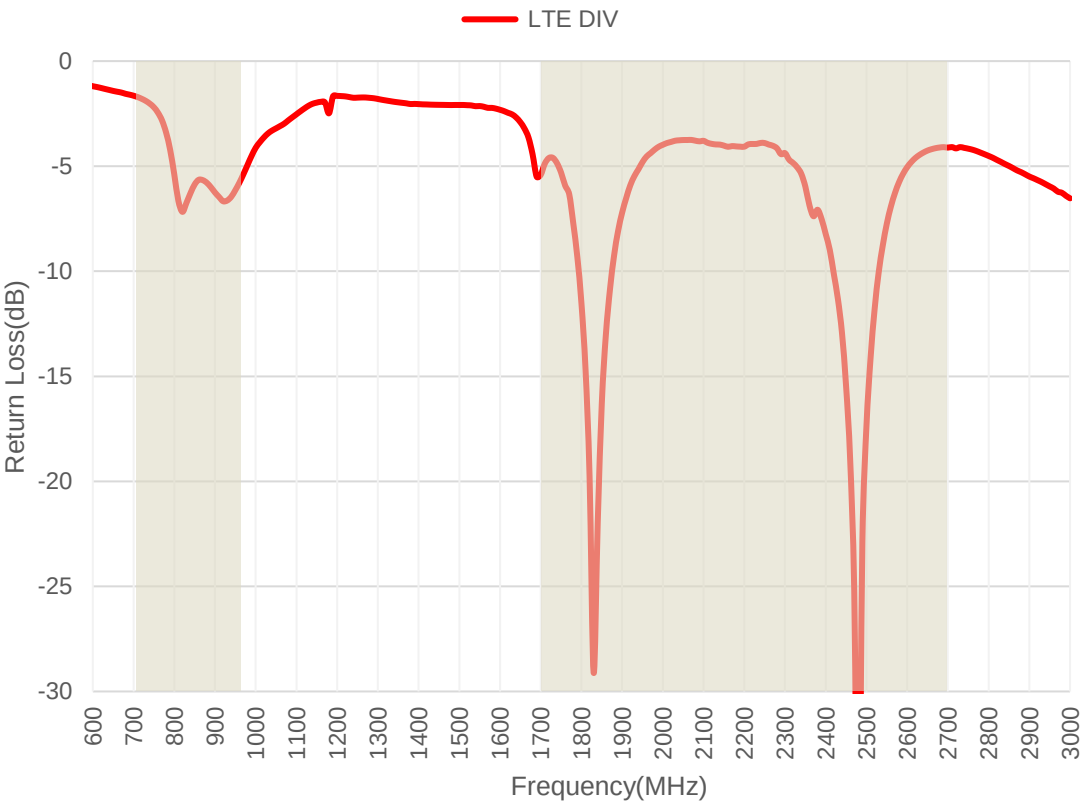
Passive Test- LTE DIV Antenna



- VSWR (Voltage Standing Wave Ratio)



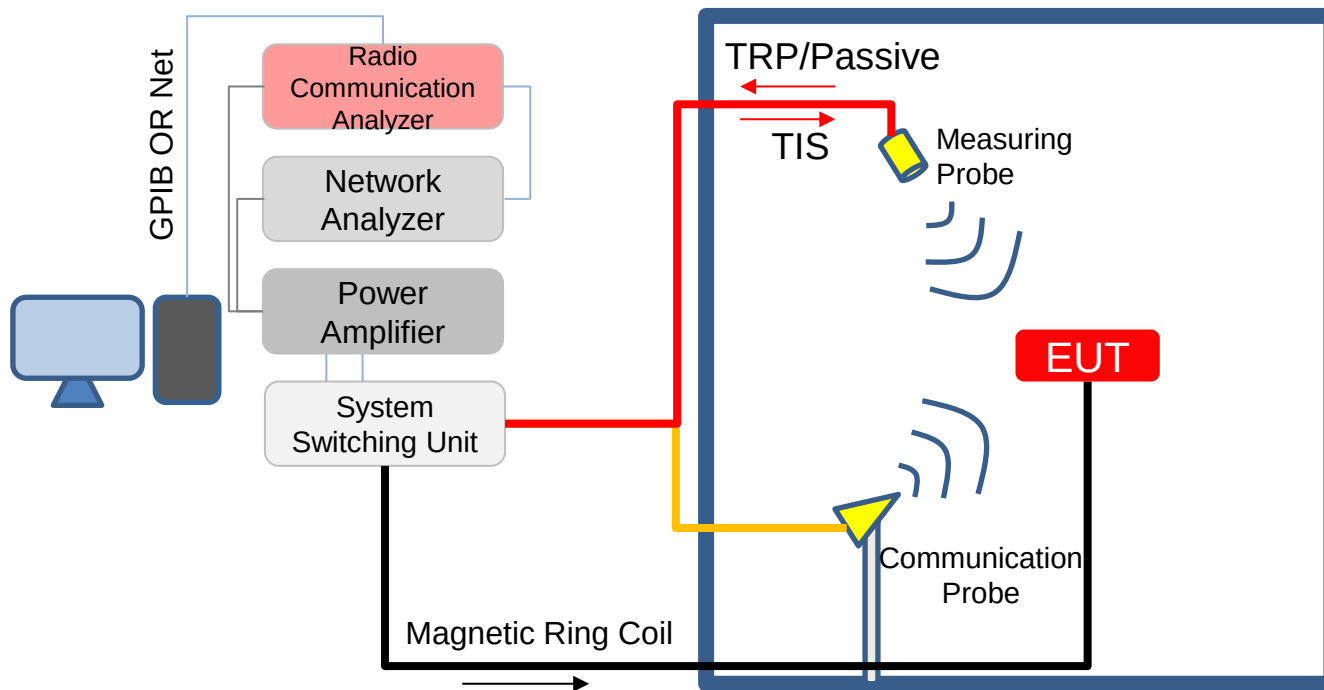
- RL (Return Loss)



Passive Test- LTE DIV Antenna

- Chamber Coordinate System HF-G-1

H Plane: XY
E1 Plane: XZ
E2 Plane: YZ



Passive Test- LTE DIV Antenna



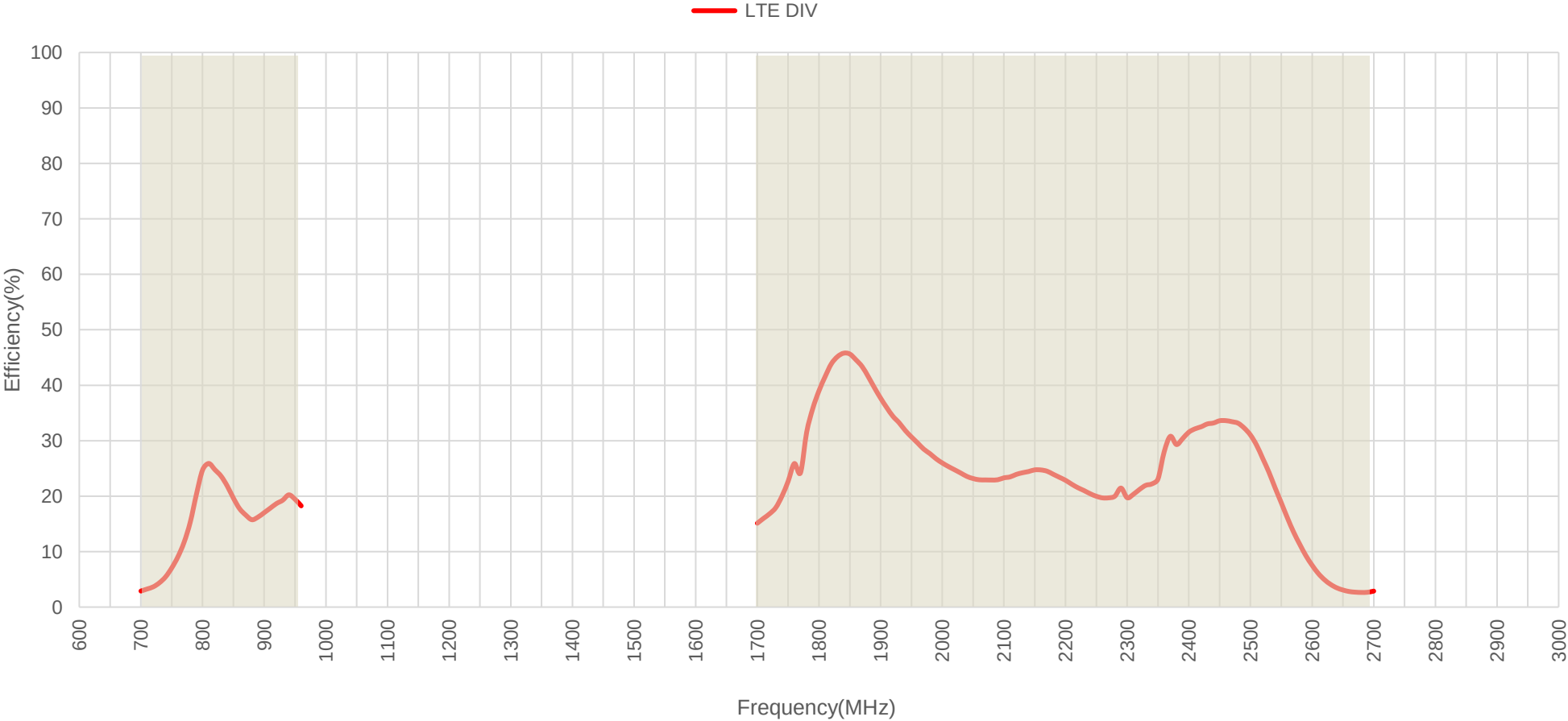
- Chamber Coordinate System HF-G-1



Passive Test- LTE DIV Antenna



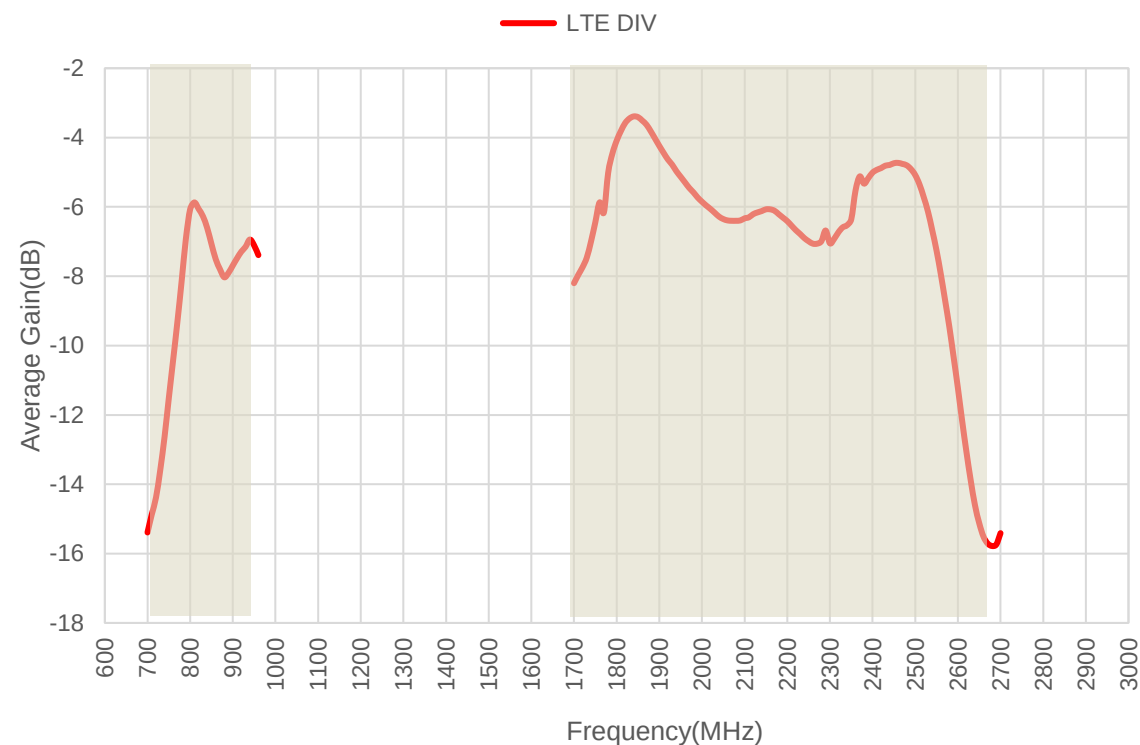
- Efficiency



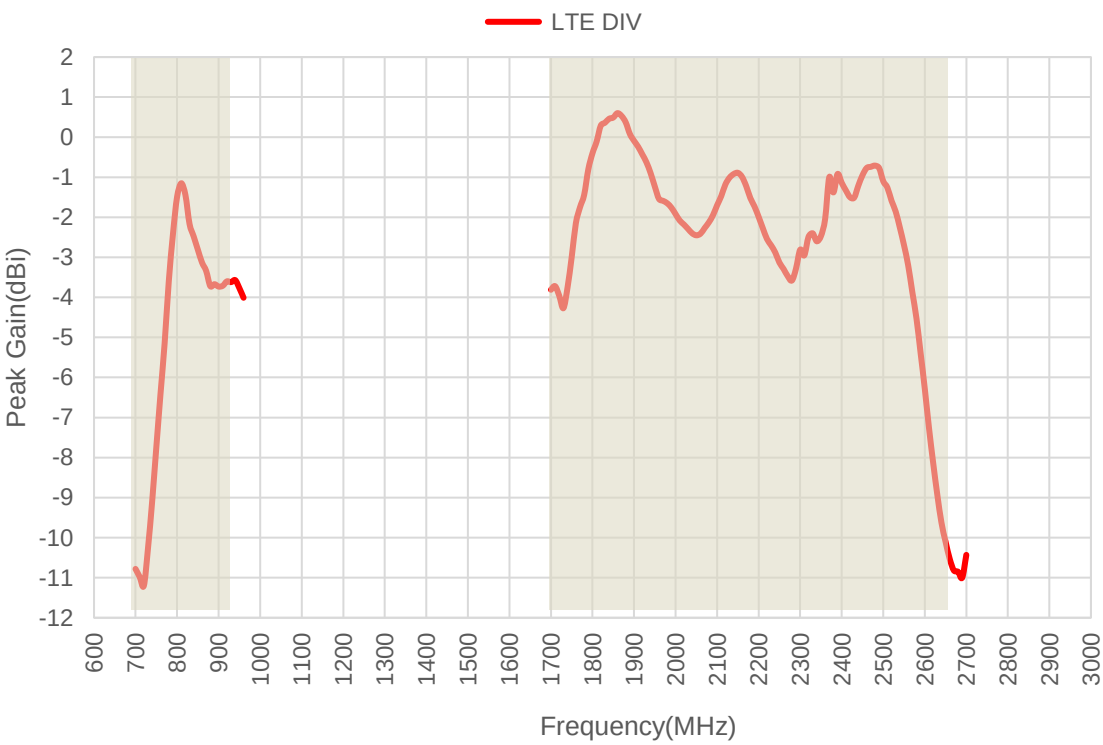
Passive Test- LTE DIV Antenna



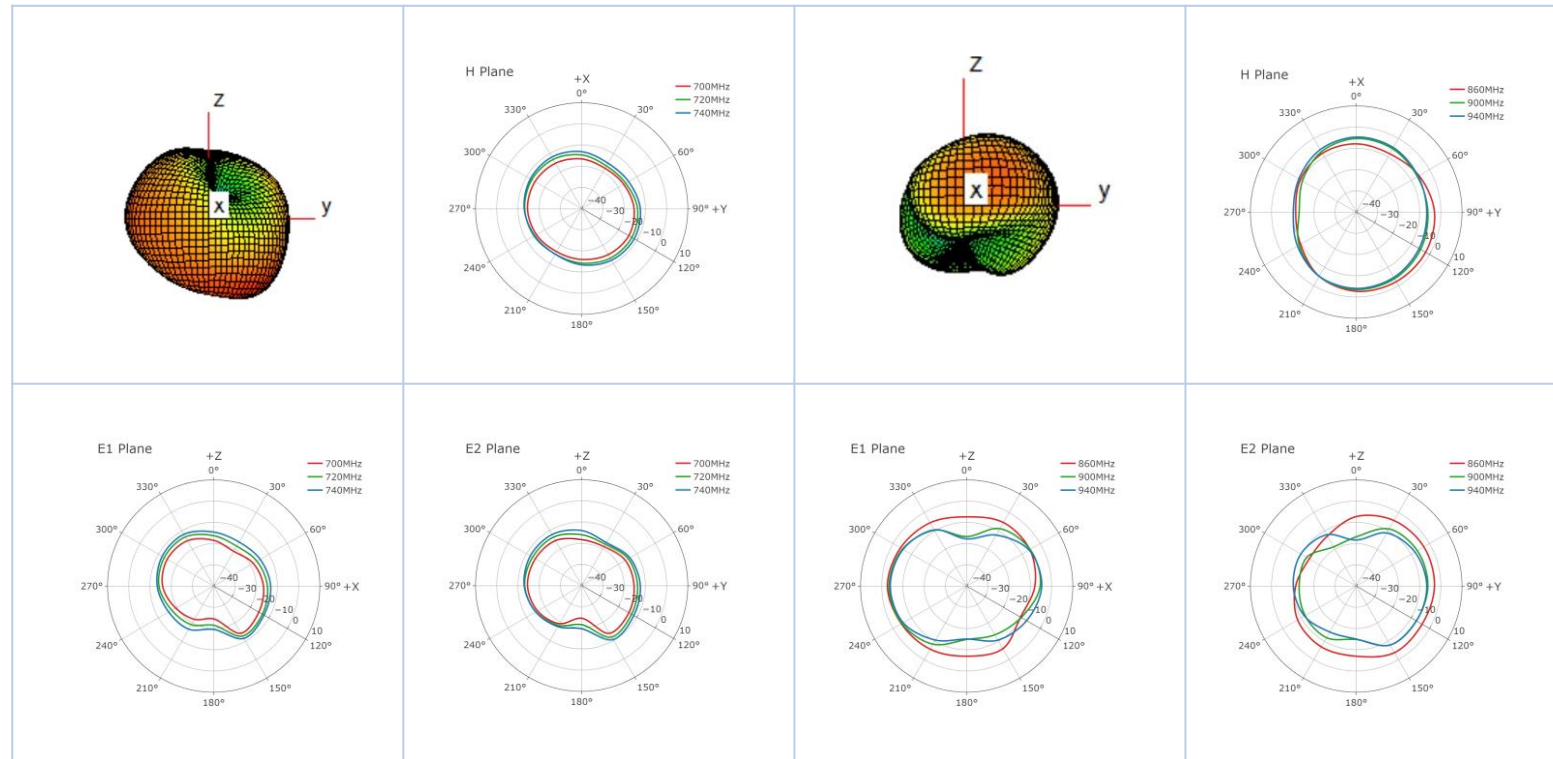
- Average Gain



- Peak Gain



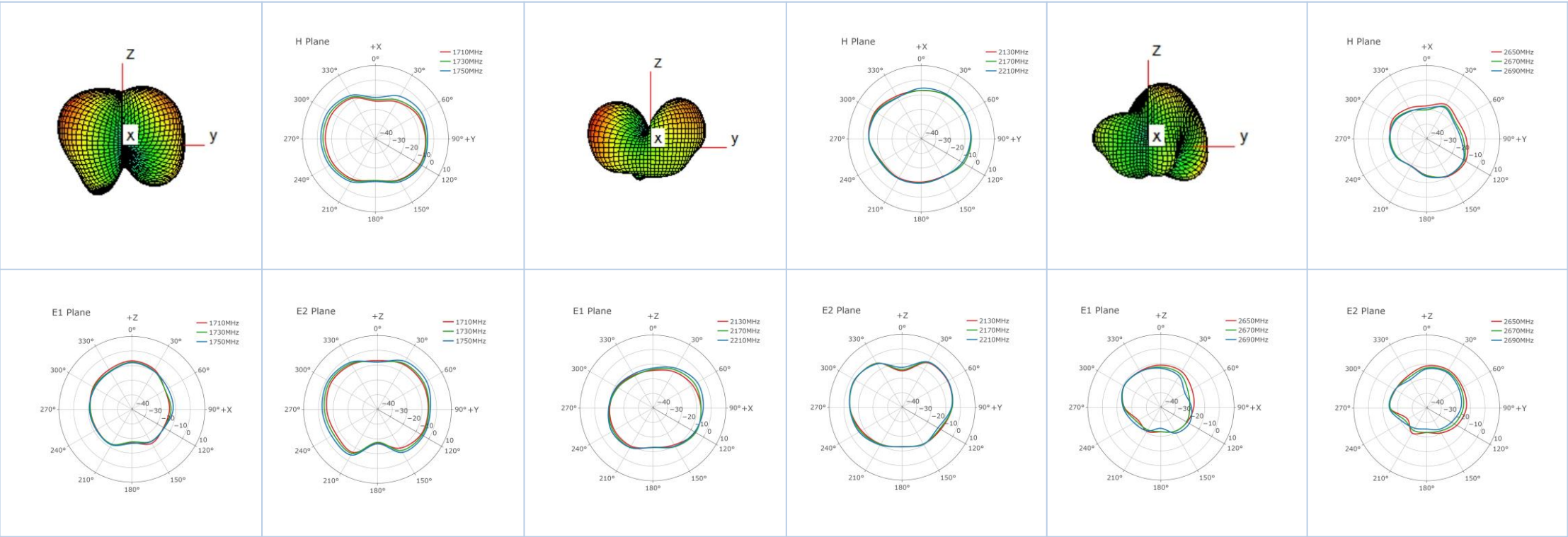
Passive Test-LTE DIV Antenna



700MHz

900 MHz

Passive Test-LTE DIV Antenna



1710MHz

2170 MHz

2690 MHz

Passive Test- LTE MAIN Antenna



- Efficiency

Frequency (MHz)	Efficiency (dB)	Gain (dBi)	Efficiency (%)
700	-5.55	-2.95	27.87
720	-4.38	-1.29	36.49
740	-3.76	-0.81	42.03
760	-3.84	-1.19	41.32
780	-4.22	-1.46	37.83
800	-4.34	-1.59	36.82
820	-4.39	-1.76	36.42
840	-4.28	-1.45	37.35
860	-4.32	-1.13	36.94
880	-4.12	-0.48	38.71
900	-4.08	-0.60	39.07
920	-4.32	-1.34	36.94
940	-4.71	-1.83	33.84
960	-5.90	-3.28	25.70

Frequency (MHz)	Efficiency (dB)	Gain (dBi)	Efficiency (%)
1700	-3.80	-0.05	41.68
1750	-3.43	-0.26	45.44
1800	-3.08	0.20	49.26
1850	-3.38	-0.24	45.96
1900	-3.81	-0.78	41.59
1950	-3.74	-0.39	42.24
2000	-3.75	0.21	42.17
2050	-3.33	0.95	46.47
2100	-3.45	1.22	45.21
2150	-3.06	1.56	49.45
2200	-3.28	1.50	46.98
2250	-3.15	1.48	48.45
2300	-3.78	0.73	41.91
2350	-3.03	1.94	49.74
2400	-2.85	2.28	51.91
2450	-2.57	2.17	55.34
2500	-2.30	2.83	58.85
2550	-2.77	2.27	52.79
2600	-2.88	2.06	51.50
2650	-3.06	1.33	49.45
2700	-3.87	0.29	41.05

Passive Test- LTE DIV Antenna



- Efficiency

Frequency (MHz)	Efficiency (dB)	Gain (dBi)	Efficiency (%)
700	-15.39	-10.78	2.89
720	-14.38	-11.20	3.65
740	-12.63	-9.09	5.45
760	-10.43	-6.42	9.07
780	-8.15	-3.60	15.30
800	-6.07	-1.49	24.72
820	-6.06	-1.44	24.77
840	-6.61	-2.48	21.84
860	-7.51	-3.13	17.75
880	-8.03	-3.72	15.75
900	-7.69	-3.73	17.03
920	-7.29	-3.60	18.67
940	-6.94	-3.57	20.24
960	-7.39	-4.01	18.25

Frequency (MHz)	Efficiency (dB)	Gain (dBi)	Efficiency (%)
1700	-8.20	-3.81	15.12
1750	-6.44	-2.99	22.69
1800	-4.09	-0.40	38.99
1850	-3.41	0.49	45.63
1900	-4.24	-0.09	37.67
1950	-5.13	-1.23	30.68
2000	-5.85	-1.92	25.99
2050	-6.35	-2.45	23.18
2100	-6.33	-1.70	23.30
2150	-6.07	-0.89	24.74
2200	-6.41	-1.99	22.86
2250	-6.99	-3.13	19.98
2300	-7.05	-2.81	19.72
2350	-6.36	-2.47	23.10
2400	-5.01	-1.14	31.54
2450	-4.74	-0.95	33.60
2500	-5.08	-1.10	31.03
2550	-7.26	-2.70	18.81
2600	-11.22	-6.28	7.55
2650	-15.12	-10.10	3.08
2700	-15.41	-10.43	2.88

Active Test



- OTA Data

Active Test For LTE												
Band	Channel	TRP					Channel	TIS				
		NA-Y5NEX00A1AA	India-Y5NEX00A1DA	Global-Y5NEX00A1EA				NA-Y5NEX00A1AA	India-Y5NEX00A1DA	Global-Y5NEX00A1EA		
				4#	CET 2	Single Camera				4#	CET 2	Single Camera
1	18050	22.2	21.14	20.96	20.95	20.44	50	-93.4	-92.92	-94.27		-94.8
	18300	22.6	21.39	21.40	21.23	20.72	300	-93.7	-93.00	-94.57		-94.89
	18550	22.3	21.54	21.56	21.61	20.81	550	-92.2	-92.21	-94.04		-94.16
2	18650	21.9	20.33	20.03	19.19	19.06	650	-92.1	-89.65	-91.91		-92.34
	18900	21.6	20.53	20.32	20.75	19.46	900	-91.9	-89.54	-91.46		-94.08
	19150	21.9	20.51	20.33	21.17	19.46	1150	-92.3	-90.17	-92.4		-93.47
3	19250	19.2	19.11	18.49	18.03	18.21	1250	-93.1	-91.38	-91.86		-95.04
	19575	20.3	19.79	18.59	19.71	18.37	1575	-92.2	-91.74	-92.71		-95.12
	19900	20.3	20.18	19.08	19.04	18.73	1900	-92.1	-90.72	-91.79		-92.81
4	20000	19.0	18.83	18.40	19.06	18.18	2000	-92.9	-92.82	-93.42		-93.46
	20175	19.9	19.27	18.59	19.01	18.18	2175	-93.7	-92.90	-93.54		-93.52
	20350	19.5	19.74	19.06	19.23	18.63	2350	-92.2	-92.51	-93.34		-93.01
5	20450	18.6	18.63	18.76	18.61	19.47	2450	-91.3	-88.69	-87.86		-90.48
	20525	18.0	19.07	18.59	18.47	19.4	2525	-89.5	-88.24	-87.88		-90.07
	20600	17.2	19.94	18.76	18.54	19.56	2600	-87.6	-87.52	-87.09	-89.96	-89.88
7	20850	19.2	19.73	19.15	20.13	19.29	2850	-93.4	-90.50	-91.03		-91.48
	21100	18.4	19.58	19.19	19.96	19.09	3100	-92.8	-89.34	-90.66		-90.48
	21350	17.4	18.98	19.09	19.9	19.01	3350	-92.5	-93.08	-90.51		-89.47

Active Test



- OTA Data

Active Test For LTE												
Band	Channel	TRP					Channel	TIS				
		NA-Y5NEX00A1AA	India-Y5NEX00A1DA	Global-Y5NEX00A1EA				NA-Y5NEX00A1AA	India-Y5NEX00A1DA	Global-Y5NEX00A1EA		
				4#	CET 2	Single Camera				4#	CET 2	Single Camera
8	21500	15.9	19.59	18.45	18.53	19.24	3500	-87.4	-87.26	-88.74		-90.15
	21625	15.6	19.19	18.29	18.33	19.76	3625	-88.4	-87.49	-90.07		-90.01
	21750	15.9	18.65	18.01	18.06	18.28	3750	-87.7	-87.88	-88.75	-89.89	-87.76
12	23035	19.6	16.62	17.96	18.32	18.06	5035	-93.7	-90.21	-91.07		-91.45
	23095	19.7	17.26	18.57	19.01	18.25	5095	-92.2	-90.67	-90.87		-91.31
	23155	18.9	17.43	18.76	19.12	18.42	5155	-93	-90.25	-90.97	-91.33	-91.44
13	23230	19.6	18.48	18.89	18.92	18.87	5230	-89.2	-88.47	-89.51	-90.51	-87.43
18	23900	19.8	18.43	18.94	19.14	18.94	5900	-90.2	-87.29	-87.35		-89.42
	23925	19.7	18.22	18.98	19.08	18.81	5925	-86.2	-86.67	-86.45		-88.19
	23950	19	18.46	19.11	19.27	18.82	5950	-91.5	-87.86	-88.02	-89.85	-90.31
19	24050	18.5	18.53	18.86	18.86	18.6	6050	-89.6	-87.64	-88.83		-89.67
	24075	18.6	18.67	18.81	18.83	18.59	6075	-88.5	-86.79	-88.39		-90.23
	24100	18.4	19.19	19.03	19.08	19.49	6100	-87.4	-86.17	-87.68	-89.1	-91.26
20	24200	19.4	18.03	18.91	19.02	19.47	6200	-91.2	-88.25	-89.14		-90.16
	24300	19.4	18.70	19.02	19.16	19.6	6300	-91.7	-89.06	-90.16		-89.83
	24400	18.4	18.88	18.80	19.46	19.46	6400	-90.1	-88.02	-89.11		-89.53

Active Test



- OTA Data

Active Test For LTE												
Band	Channel	TRP					Channel	TIS				
		NA- Y5NEX00A 1AA	India- Y5NEX00A 1DA	Global-Y5NEX00A1EA				NA- Y5NEX00A 1AA	India- Y5NEX00A 1DA	Global-Y5NEX00A1EA		
				4#	CET 2	Single Camera				4#	CET 2	Single Camera
25	26065	20.9	20.09	19.80	20.49	19.39	8065	/	-93.80	-92.65		-93.66
	26365	20.8	20.10	19.97	20.34	19.4	8365	/	-93.93	-92.68		-93.29
	26665	21.2	19.99	19.87	20.01	19.58	8665	-96.5	-93.71	-92.10		-93.15
26	26715	17.5	18.30	18.78	18.91	19.58	8715	/	-90.27	-89.97		-90.68
	26865	17.2	18.44	19.15	19.10	19.53	8865	/	-90.59	-91.45		-91.73
	27015	16.7	19.15	19.03	18.79	19.52	9015	-90.9	-89.45	-90.61	-91.21	-90.96
28	27260	19.1	17.13	18.01	18.32	18.08	9260	/	-88.72	-89.73		-90.04
	27435	20.5	18.16	19.14	19.12	19.38	9435	/	-89.13	-90.46		-90.62
	27610	21.2	17.58	18.96	18.64	19.57	9460	-89.8	-89.53	-89.80	-90.43	-89.64
34	36250	20.7	19.72	19.73	19.1	20.67	36250	/	-89.52	-91.69		-92.8
	36275	20.7	19.71	19.79	19.51	20.75	36275	/	-89.52	-91.66		-93.24
	36300	20.8	19.81	19.93	19.47	20.98	36300	-93.9	-89.29	-91.47		-93.66
38	37800	18.9	19.32	19.35	19.68	19.26	37850	/	-90.76	-90.17		-91.53
	38000	18.3	19.80	19.94	20.24	19.73	38000	/	-90.76	-90.22		-91.16
	38200	18.8	19.55	19.72	19.25	19.8	38150	-93.5	-90.83	-90.39		-92.03
39	38300	21.0	20.44	19.97	20.16	19.35	38350	/	-91.16	-91.32		-92.72
	38450	21.6	20.73	20.29	19.46	19.74	38450	/	-90.67	-90.71		-90.13
	38600	21.7	20.38	19.95	19.26	19.65	38550	-94.4	-90.90	-91.54		-93.82

- OTA Data

Active Test For LTE												
Band	Channel	TRP					Channel	TIS				
		NA-Y5NEX00A1AA	India-Y5NEX00A1DA	Global-Y5NEX00A1EA				NA-Y5NEX00A1AA	India-Y5NEX00A1DA	Global-Y5NEX00A1EA		
				4#	CET 2	Single Camera				4#	CET 2	Single Camera
40	38700	18.9	18.87	19.00	19.57	18.78	38750	/	-92.66	-92.07		-93.18
	39150	19.9	18.71	18.96	19.04	18.81	39150	/	-92.90	-92.19		-93.26
	39600	19.7	18.48	18.71	19.05	18.2	39550	-94.6	-93.37	-92.27		-94.03
41	40090	19.1	19.29	19.37	18.66	19.37	39750	/	-89.63	-89.86		-90.11
	40740	18.4	19.36	19.55	19.82	19.5	40620	/	-90.56	-90.59		-81.23
	41390	19.0	19.89	20.14	19.62	19.7	41490	-92.2	-89.24	-89.08		-90.99
66	132022	19.1	18.51	18.31	18.7	18.01	66486	-93.4	-93.12	-93.65		-92.67
	132322	20.2	19.41	18.84	19.02	18.12	66786	-93.1	-93.17	-93.89		-92.54
	132622	20.2	19.71	19.24	19.74	18.55	67086	-91.1	-92.26	-93.00		-91.38

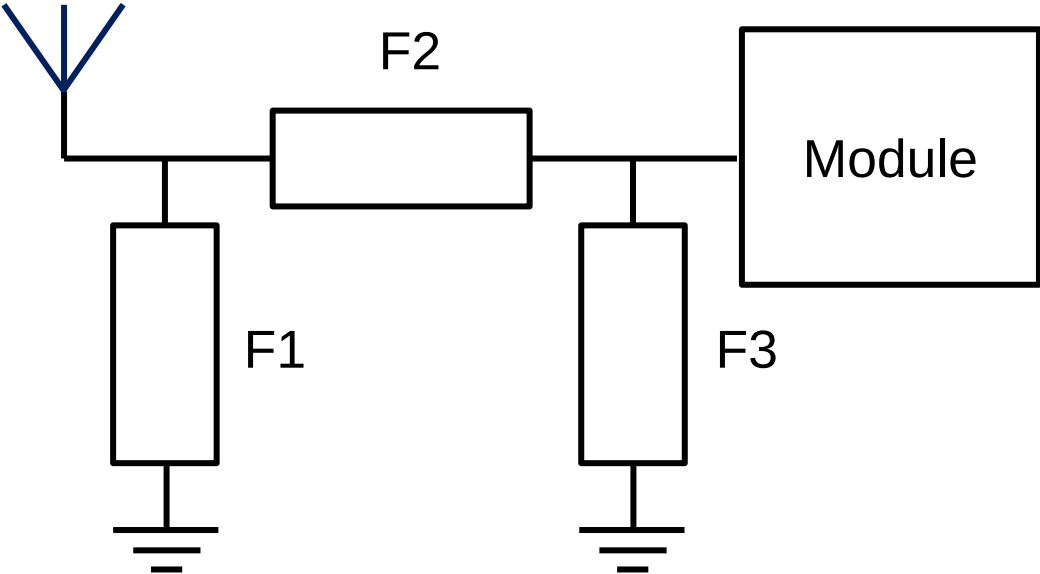
Antenna Matching Circuit - WiFi Antenna



- Matching Circuit Diagram

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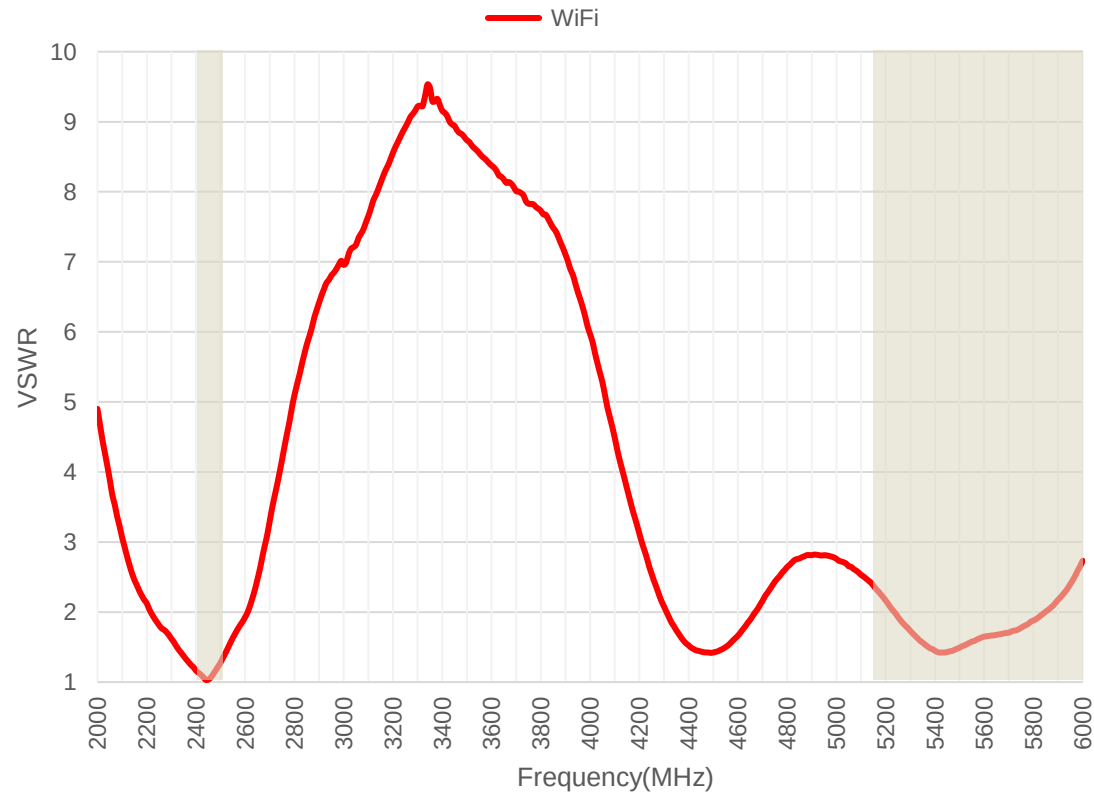


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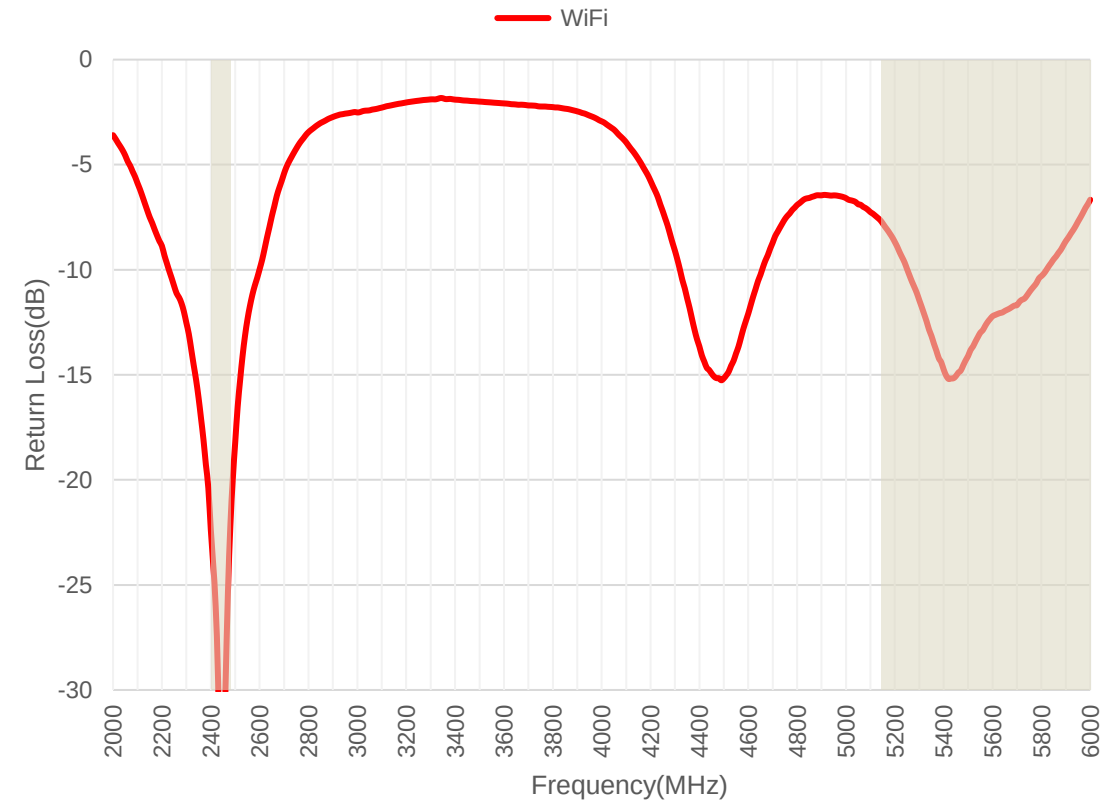
Passive Test- WiFi Antenna



- VSWR (Voltage Standing Wave Ratio)



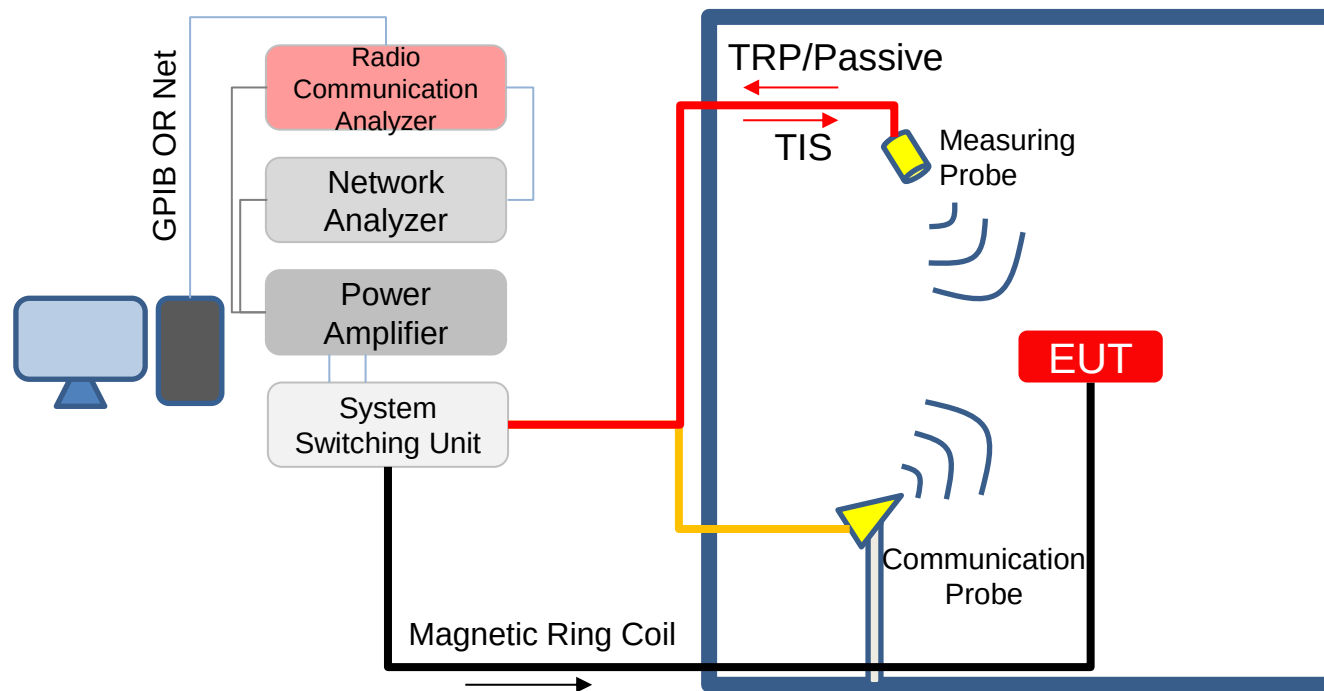
- RL (Return Loss)



Passive Test- WiFi Antenna

- Chamber Coordinate System HF-G-1

H Plane: XY
E1 Plane: XZ
E2 Plane: YZ



Passive Test- WiFi Antenna

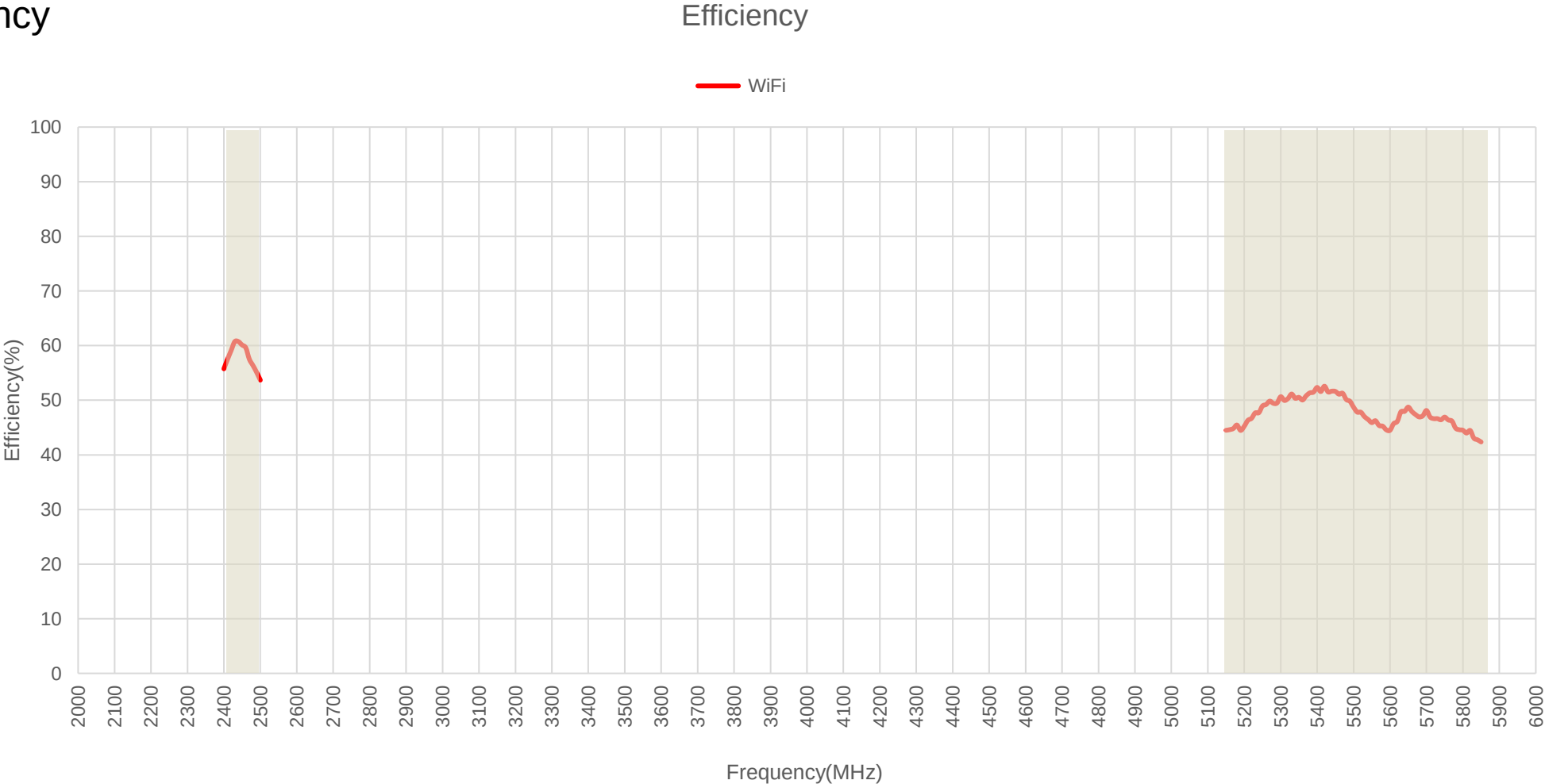
- Chamber Coordinate System HF-G-1



Passive Test- WiFi Antenna



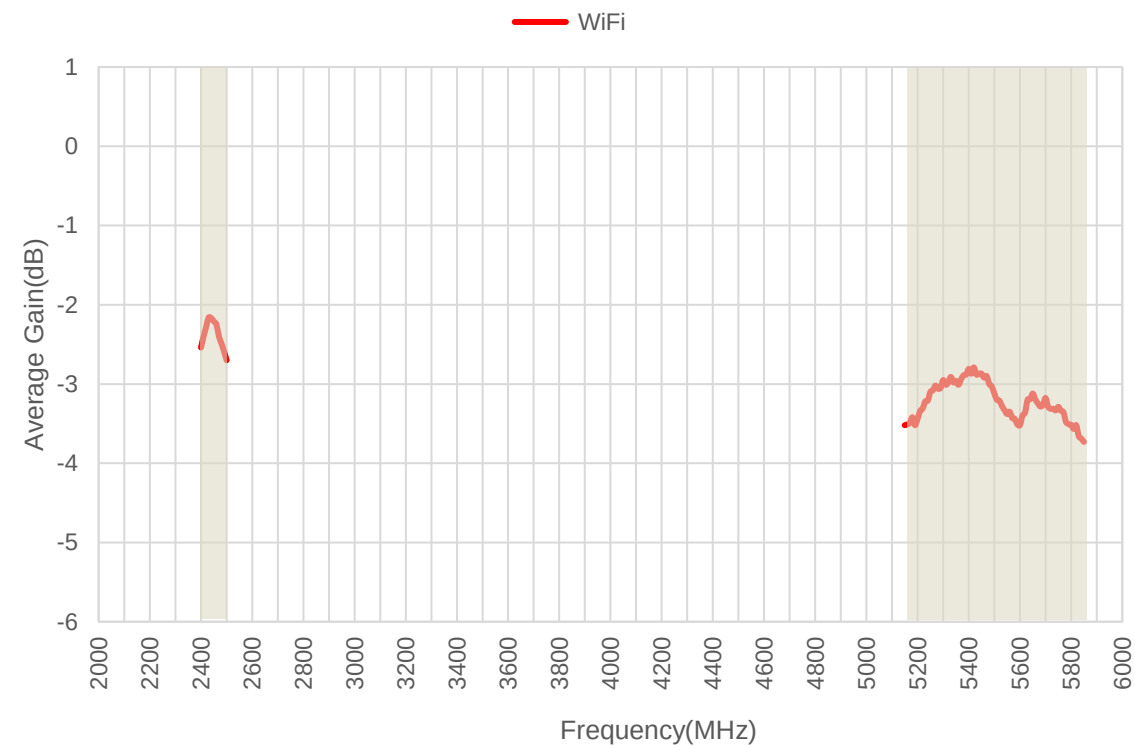
- Efficiency



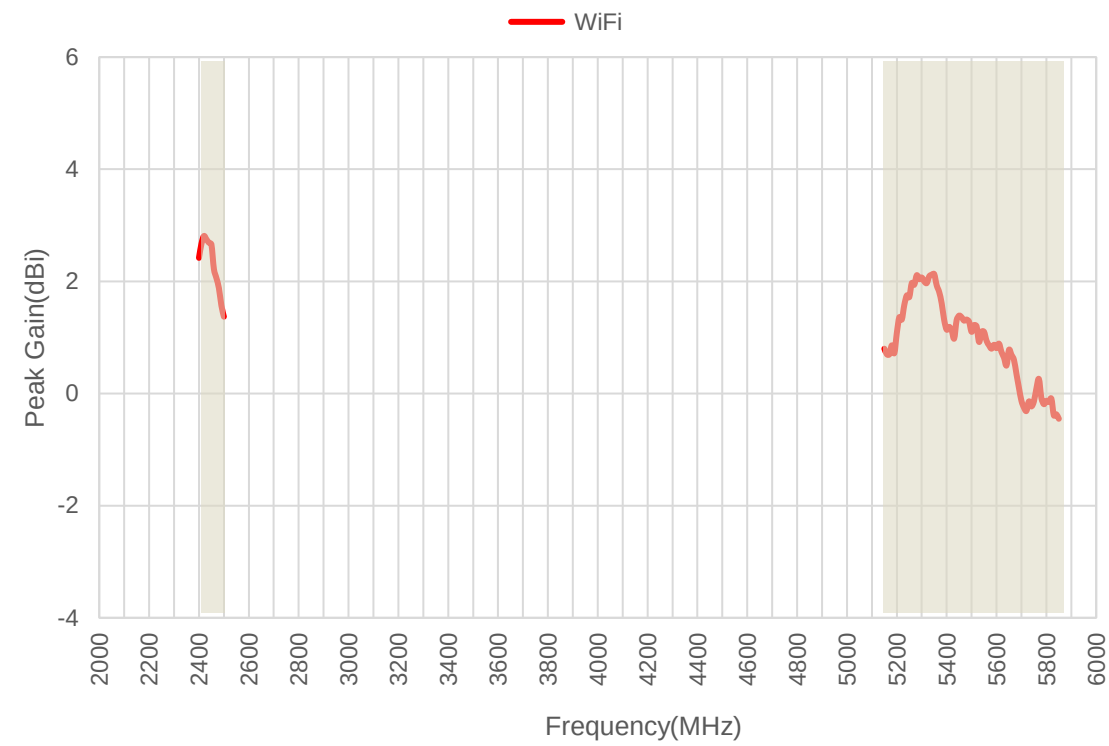
Passive Test- WiFi Antenna



- Average Gain



- Peak Gain



Passive Test- WiFi Antenna



- Efficiency

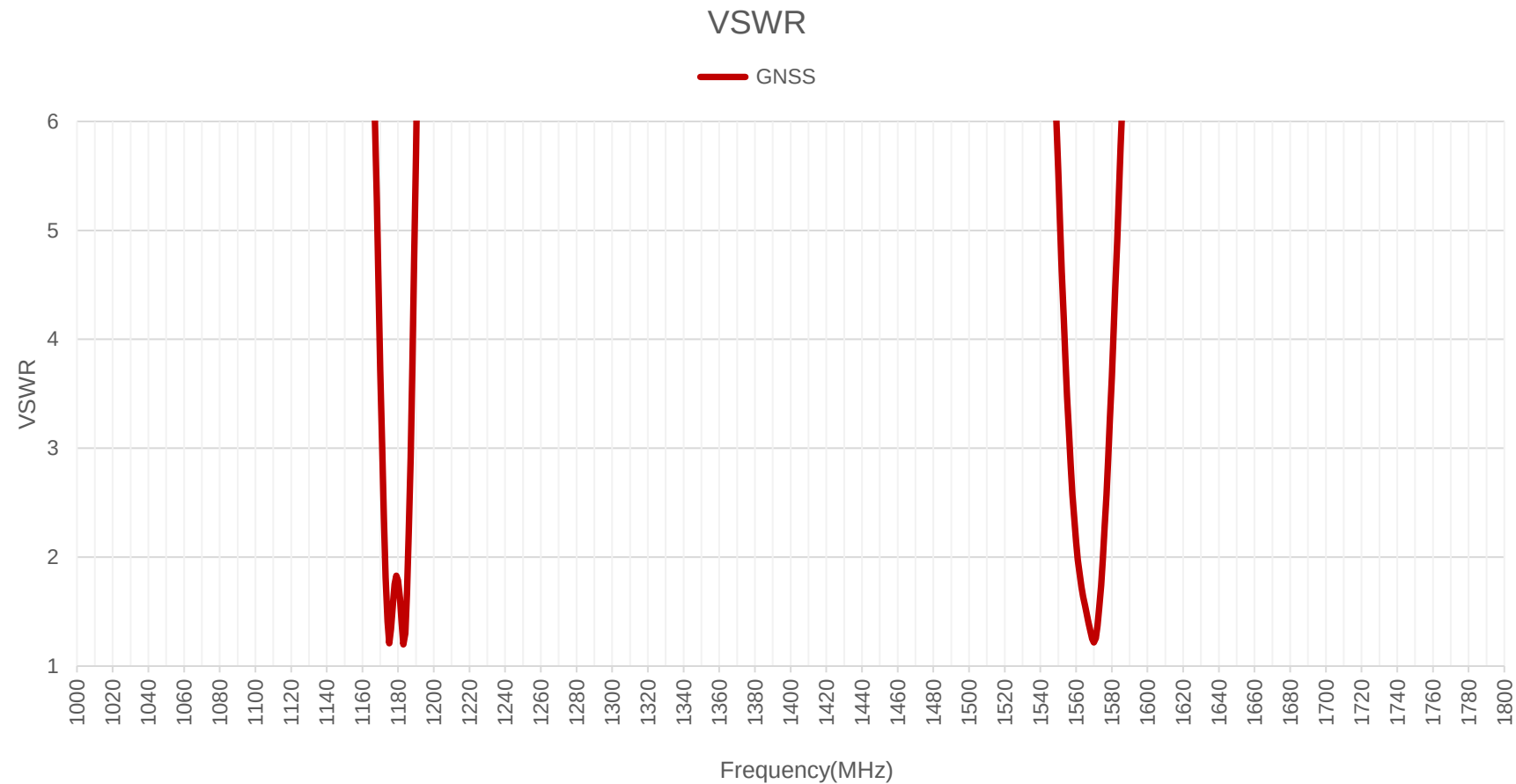
Frequency (MHz)	Efficiency (dB)	Gain (dBi)	Efficiency (%)
2400	-2.54	2.42	55.75
2410	-2.4	2.67	57.49
2420	-2.28	2.81	59.13
2430	-2.16	2.75	60.75
2440	-2.17	2.69	60.73
2450	-2.21	2.66	60.11
2460	-2.25	2.22	59.62
2470	-2.4	2.06	57.49
2480	-2.49	1.88	56.34
2490	-2.59	1.57	55.09
2500	-2.7	1.37	53.68

Frequency (MHz)	Efficiency (dB)	Gain (dBi)	Efficiency (%)
5150	-3.52	0.8	44.50
5200	-3.44	1.08	45.24
5250	-3.1	1.72	48.95
5300	-2.95	2.07	50.65
5350	-2.96	2.13	50.53
5400	-2.81	1.14	52.35
5450	-2.87	1.39	51.62
5500	-3.12	1.1	48.73
5550	-3.38	1.1	45.90
5600	-3.52	0.81	44.50
5650	-3.12	0.78	48.75
5700	-3.18	-0.13	48.13
5750	-3.29	-0.14	46.91
5800	-3.52	-0.13	44.51
5850	-3.73	-0.45	42.36

Passive Test- GNSS Antenna



- VSWR (Voltage Standing Wave Ratio)



VSWR

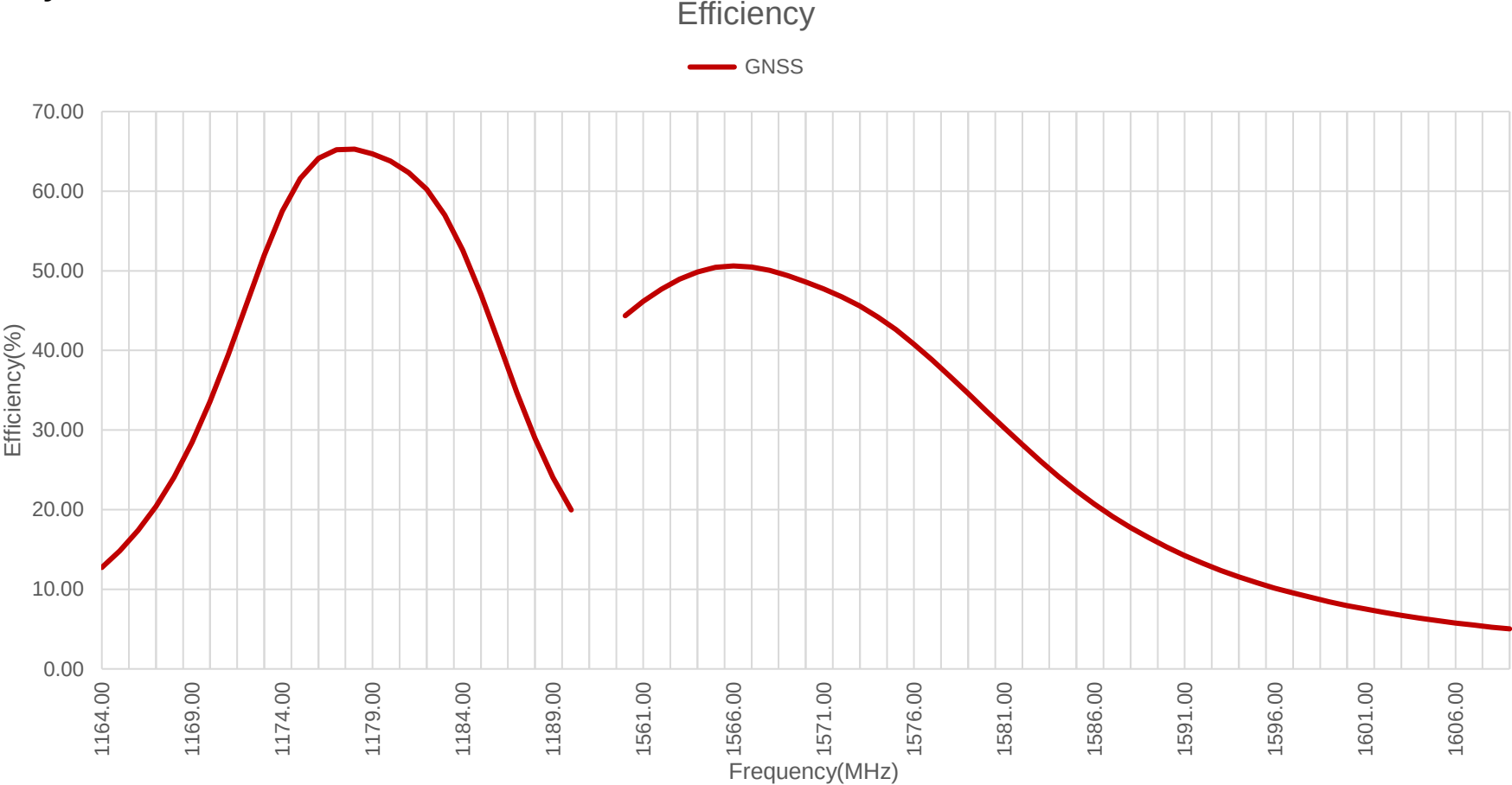
1176MHz: 1.34

1575MHz: 1.74

Passive Test- GNSS Antenna



- Efficiency



Efficiency

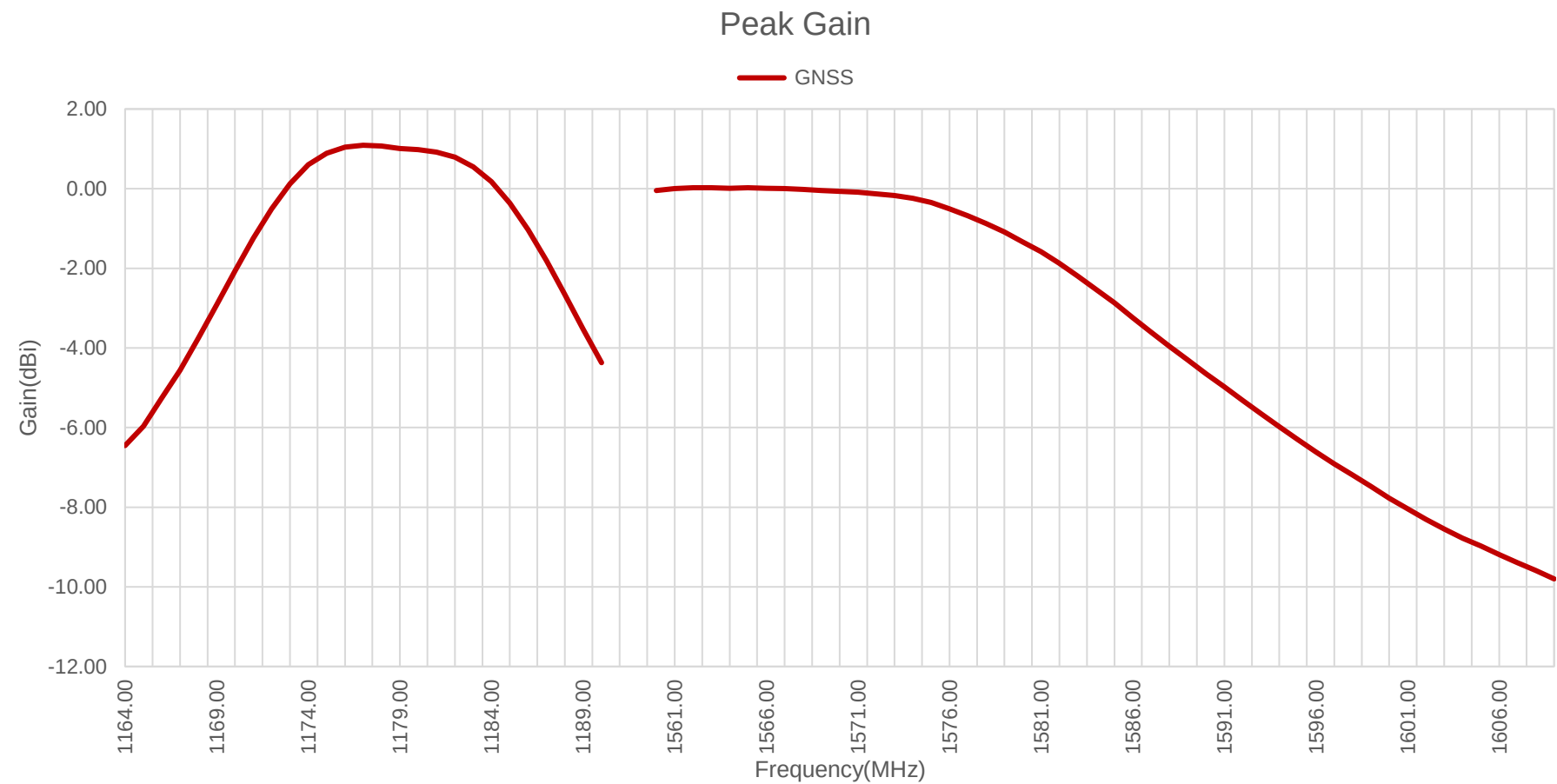
1176MHz: 64.1%

1575MHz: 44.2%

Passive Test- GNSS Antenna



- Peak Gain



Peak Gain

1176MHz: 1.04dBi

1575MHz: -0.24dBi



Project Overview

Antenna Performance Debugging

Conclusion and Suggestion

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- ## Antenna Performance

- LTE MAIN & DIV Antenna form is PIFA form.
- After optimizing the performance of the global version, the low-frequency TRP will improve, with the current overall TRP exceeding 17.5 dBm..
- The efficiency of WiFi antennas ranges between 50% and 60%.
- GNSS antenna test data

Frequency(MHz)	1176	1575
VSWR	1.34	1.74
Efficiency(%)	63.1	44.2
Peak Gain(dBi)	1.04	-0.24

- ## Next step

- Wait for customer feedback.



**We are a global IoT solutions provider,
backed by outstanding support and
services, to deliver a smarter world.**

- Unbeatable choice from the broadest module portfolio in the world
- High quality range of off-the-shelf and customized antennas
- Superb support with the largest R&D team in the industry
- Continuous innovation – in 5G, LPWA, Automotive, Smart module technology
- A passionate, dedicated team of "Quectelers" ensures our customers always come first

Thank You

Build a Smarter World

Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai 200233, China

Tel: +86 21 5108 6236 Sales Support: sales@quectel.com

Technical Support: support@quectel.com General: info@quectel.com