



APPENDIX J

: ANTENNA SPECIFICATION

ANTENNA SPECIFICATIONS

Product Name	BLE Antenna
Model Name	C313 Antenna

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1. Features

- BLE Antenna
- Frequency range : 2.4GHz ~ 2.5GHz
- PCB Pattern Antenna

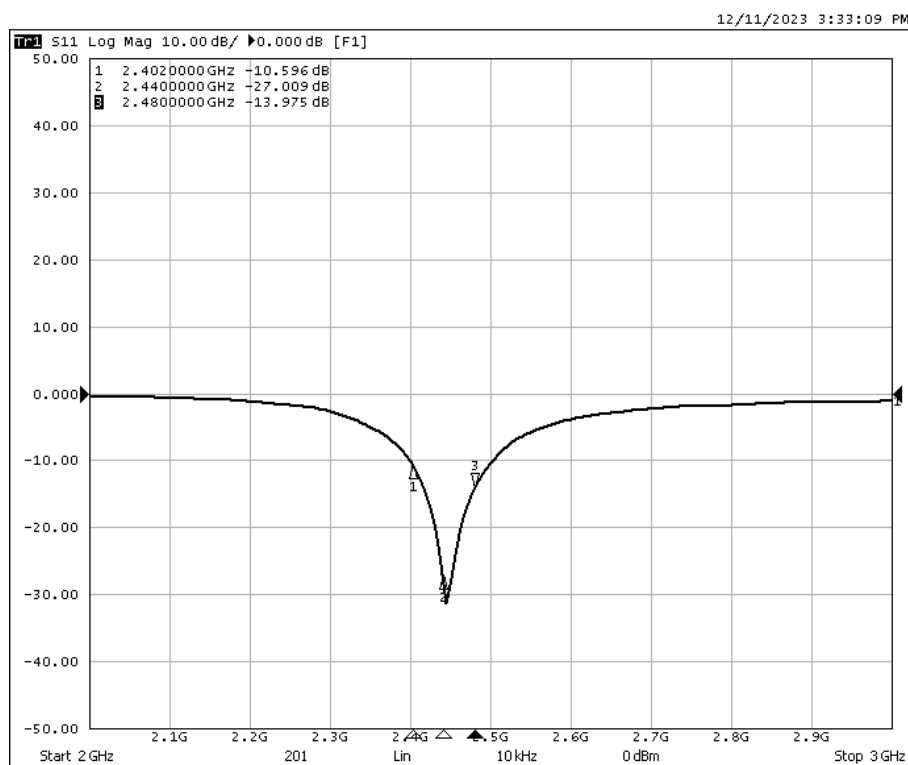
2. Antenna Characteristics

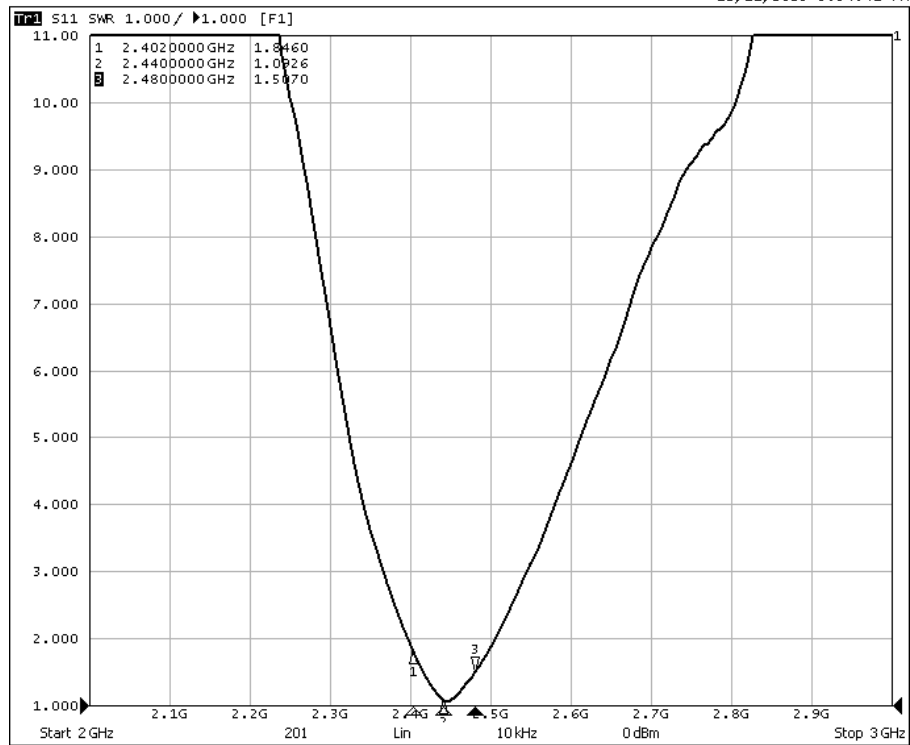
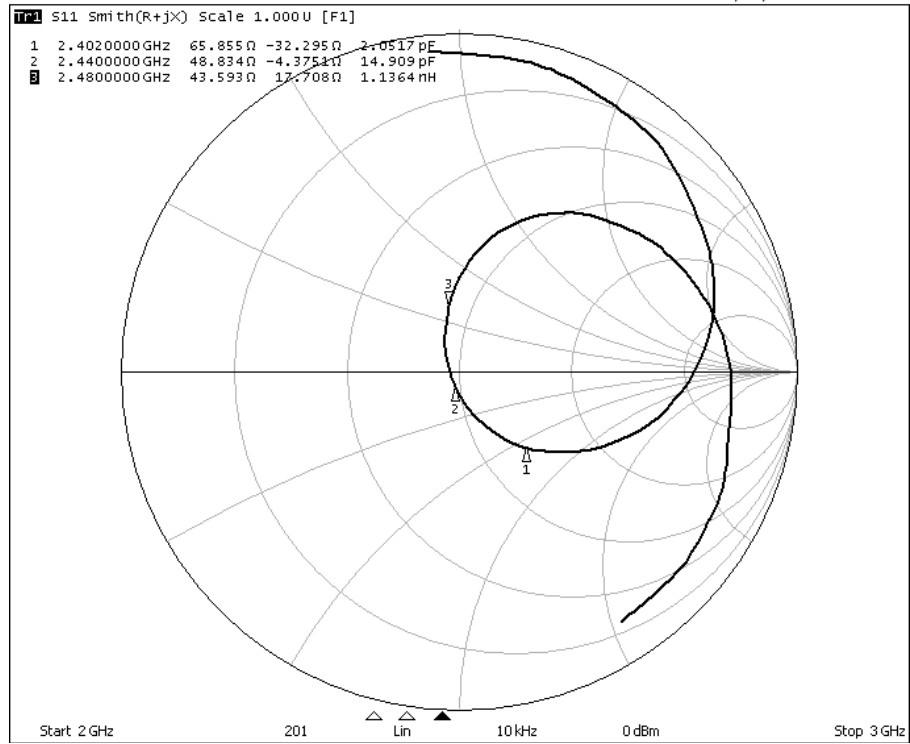
2.1 Antenna Performance

Parameter	Min.	Typ	Max.	Unit
Frequency Range	2400	2450	2500	MHz
Directivity		Omni		-
Polarization		Linear		-
VSWR	3:1			Under
Impedance		50		Ohm

2.2 Network Analyzer Data

- S11 SWR & SMITH CHART

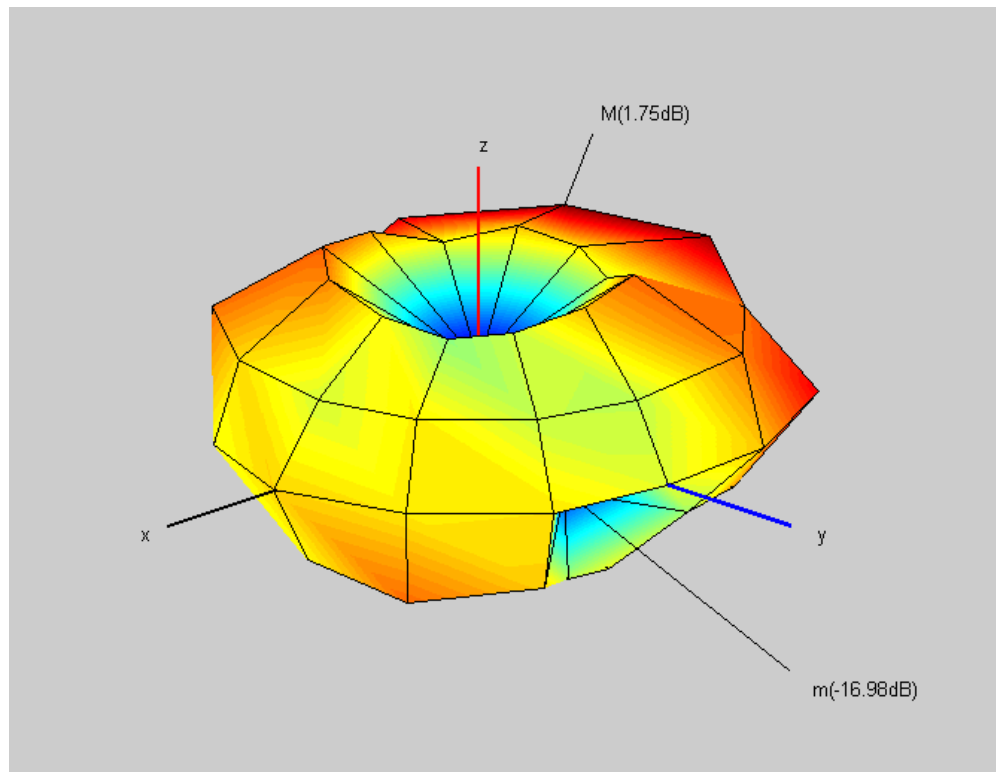




2.3 Efficiency

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Frequency [MHz]	2400	2405	2410	2415	2420	2425	2430	2435	2440	2445	2450	2455	2460	2465	2470	2475	2480	2485	2490	2500
Efficiency [dB]	-4.55	-4.54	-4.52	-4.44	-4.44	-4.47	-4.42	-4.38	-4.43	-4.38	-4.40	-4.50	-4.45	-4.62	-4.59	-4.68	-4.80	-4.88	-4.98	-5.12
Efficiency [%]	35.04	35.15	35.30	35.93	35.97	35.70	36.17	36.45	36.09	36.49	36.27	35.51	35.89	34.51	34.77	34.02	33.14	32.48	31.79	30.77
TRG [dB]	-4.55	-4.54	-4.52	-4.44	-4.44	-4.47	-4.42	-4.38	-4.43	-4.38	-4.40	-4.50	-4.45	-4.62	-4.59	-4.68	-4.80	-4.88	-4.98	-5.12
TRG ₀ [dB]	-6.89	-6.88	-6.89	-6.84	-6.83	-6.78	-6.80	-6.77	-6.83	-6.83	-6.90	-6.95	-6.94	-7.09	-7.08	-7.22	-7.36	-7.50	-7.59	-7.66
Gain _{Peak} [dB]	1.49	1.55	1.53	1.66	1.63	1.71	1.73	1.78	1.74	1.77	1.74	1.73	1.72	1.60	1.64	1.45	1.36	1.14	1.12	0.96
Gain _{Min} [dB]	-26.74	-26.53	-26.40	-26.20	-26.21	-25.86	-25.53	-25.23	-24.74	-24.85	-25.04	-25.49	-25.55	-25.86	-25.82	-25.59	-25.39	-25.02	-24.85	-24.96
TRG _m [dB]	-8.37	-8.34	-8.28	-8.17	-8.18	-8.32	-8.16	-8.12	-8.15	-8.03	-8.00	-8.15	-8.05	-8.25	-8.18	-8.23	-8.30	-8.33	-8.42	-8.65
Gain _{Peak} [dB]	-2.34	-2.29	-2.27	-2.05	-2.12	-2.16	-1.98	-1.90	-1.86	-1.82	-1.59	-1.87	-1.77	-1.95	-1.87	-1.89	-2.03	-2.02	-2.07	-2.35
Gain _{m,Min} [dB]	-26.38	-26.93	-27.37	-28.78	-29.94	-31.01	-31.23	-31.11	-30.46	-29.28	-27.88	-26.97	-26.11	-26.54	-26.69	-26.91	-26.94	-26.99	-26.86	-26.50
UHRG [dB]	-6.55	-6.54	-6.53	-6.45	-6.46	-6.49	-6.43	-6.40	-6.45	-6.40	-6.43	-6.51	-6.48	-6.65	-6.61	-6.71	-6.82	-6.92	-7.01	-7.15
UHRG/TRG [%]	63.17	63.14	62.98	62.97	62.84	62.91	62.89	62.80	62.78	62.75	62.71	62.91	62.70	62.69	62.76	62.65	62.76	62.51	62.66	62.61
H-Plane	-5.85	-5.84	-5.87	-5.82	-5.79	-5.74	-5.75	-5.72	-5.78	-5.78	-5.85	-5.87	-5.88	-6.03	-6.02	-6.13	-6.25	-6.37	-6.43	-6.43
E1-Plane, AVG [dB]	-5.27	-5.26	-5.24	-5.20	-5.19	-5.12	-5.15	-5.14	-5.17	-5.19	-5.23	-5.32	-5.29	-5.44	-5.42	-5.53	-5.67	-5.81	-5.90	-5.93
E2-Plane, AVG [dB]	-10.65	-10.68	-10.64	-10.71	-10.64	-10.68	-10.68	-10.65	-10.75	-10.71	-10.86	-10.90	-10.85	-11.05	-11.03	-11.13	-11.27	-11.37	-11.53	-11.62
Peak Gain [dB]	1.75	1.82	1.80	1.93	1.89	1.98	1.99	2.03	1.99	2.02	2.00	1.98	1.97	1.85	1.90	1.73	1.63	1.43	1.41	1.25
Directivity [dB]	6.30	6.36	6.32	6.37	6.33	6.45	6.40	6.41	6.42	6.40	6.40	6.47	6.42	6.47	6.49	6.41	6.43	6.32	6.39	6.37
Minimum Gain [dB]	-16.99	-17.35	-17.54	-17.44	-17.18	-16.81	-16.43	-16.13	-16.01	-15.94	-16.01	-16.19	-16.18	-16.40	-16.37	-16.33	-16.24	-15.95	-15.55	-14.84
Test Condition	FS																			
Antenna Type																				
FS=Free Space, BHR=Beside Head Right Side, BHL=Beside Head Left Side, HR=Hand Right, HL=Hand Left, BHRH=Beside Head and Hand Right Side, BHHL=Beside Head and Hand Left Side, NB=Notebook																				
Average Efficiency	-4.58 dB, 34.87 %																			

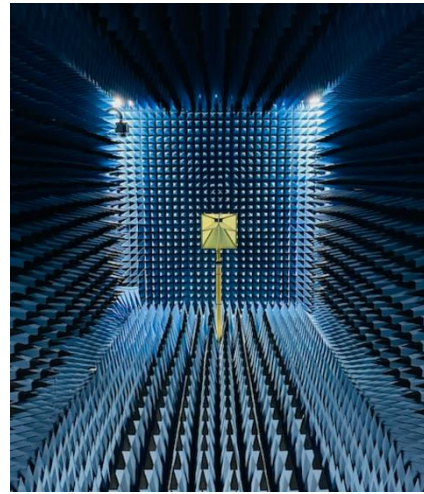
2.4 Radiation Pattern



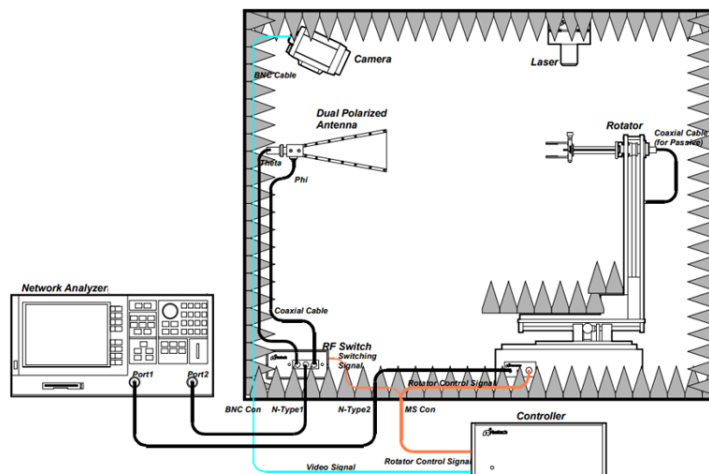
<2450MHz>

3. Antenna Test Condition

- CTIA OTA Test Chamber : 6.0 x 3.0 x 3.0 m



- Passive Test System



- Active Test System

