



Appendix A

RF Test Data for Zigbee(Conducted Measurement)

Product Name: BALL ROLLING ROBOT set of 1 red NPD

Test Model: TOPR-000300

Environmental Conditions

Temperature:	23.8° C
Relative Humidity:	52.2%
ATM Pressure:	100.0 kPa
Test Engineer:	Nick Peng
Supervised by:	Ling Zhu



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A.1 DTS Bandwidth

Test Result

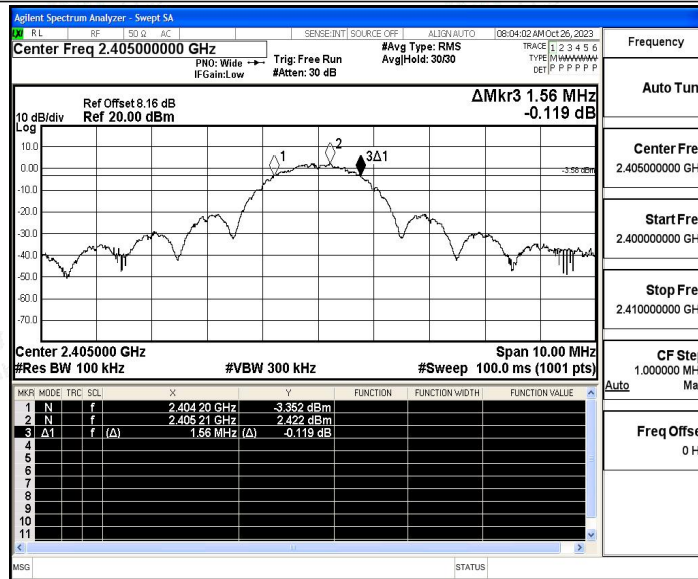
TestMode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
ZIGB	Ant1	2405	1.560	2404.200	2405.760	0.5	PASS
		2440	1.560	2439.200	2440.760	0.5	PASS
		2480	1.580	2479.190	2480.770	0.5	PASS



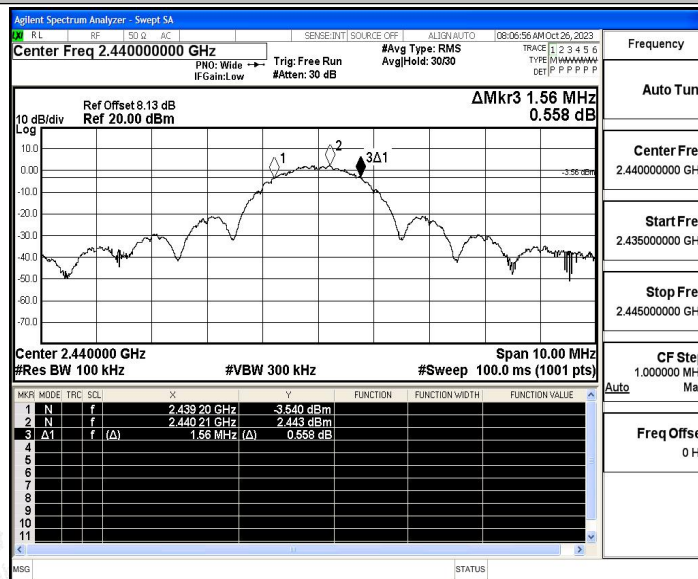


Test Graphs

ZIGB_Ant1_2405



ZIGB_Ant1_2440



ZIGB_Ant1_2480

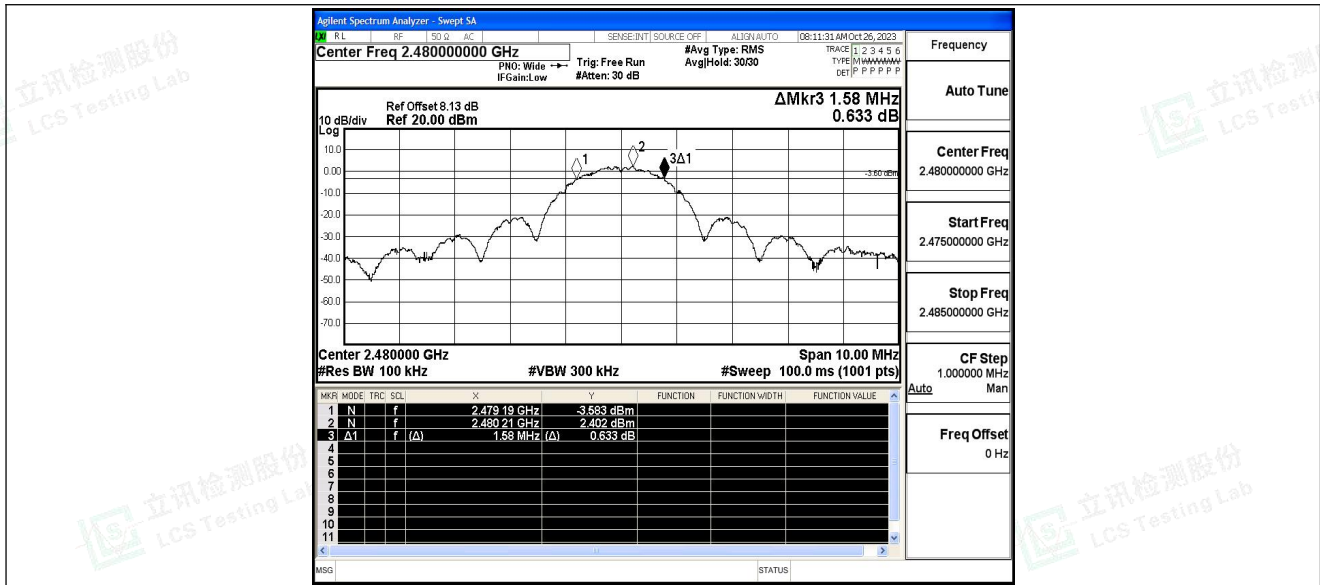


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A.2 Maximum conducted output power

Test Result

TestMode	Antenna	Frequency[MHz]	Result[dBm]	Limit[dBm]	Verdict
ZIGB	Ant1	2405	6.61	≤30	PASS
		2440	6.57	≤30	PASS
		2480	6.62	≤30	PASS



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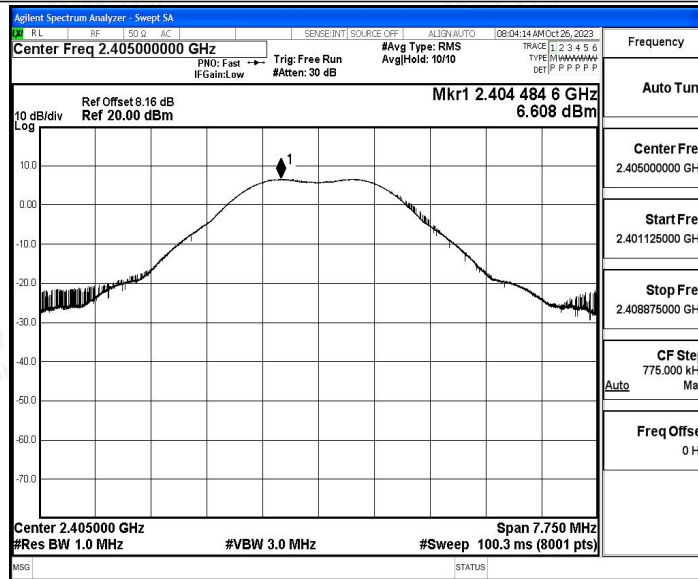
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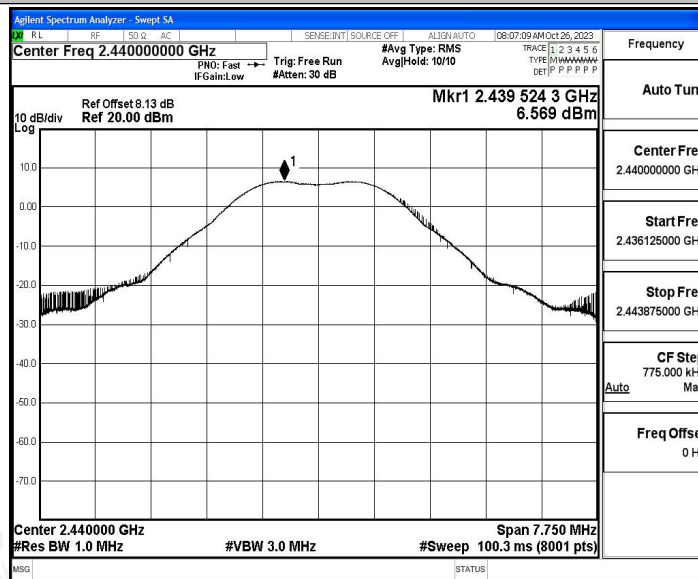


Test Graphs

ZIGB_Ant1_2405



ZIGB_Ant1_2440



ZIGB_Ant1_2480

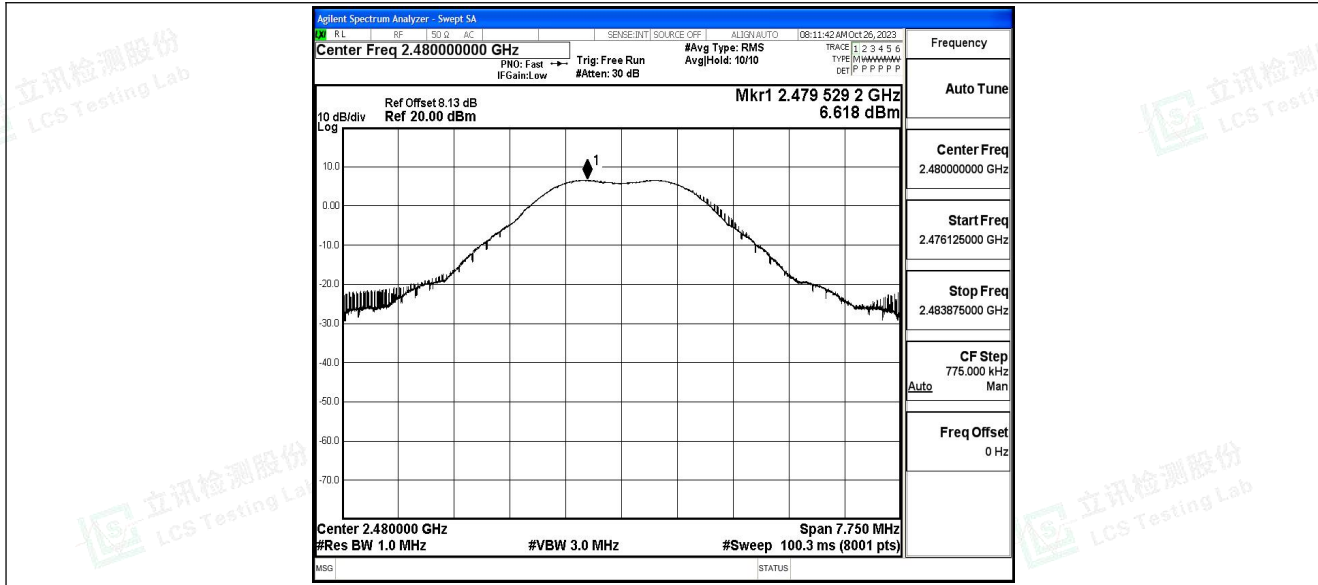


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A.3 Maximum power spectral density

Test Result

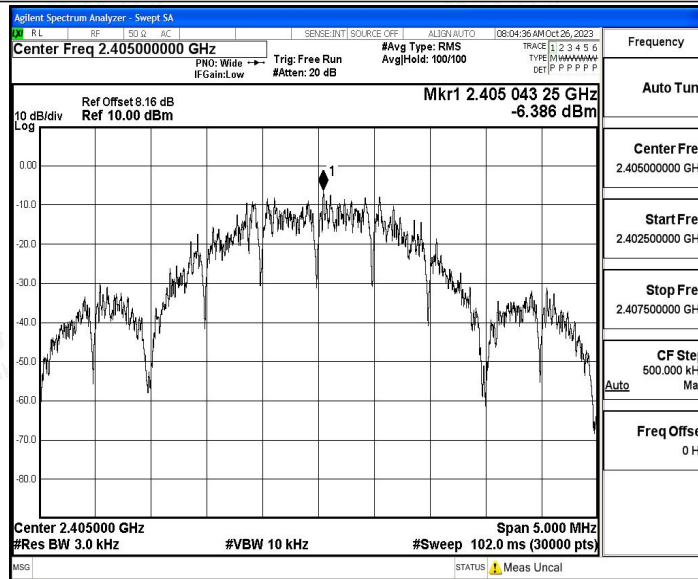
TestMode	Antenna	Frequency[MHz]	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
ZIGB	Ant1	2405	-6.39	≤8.00	PASS
		2440	-6.71	≤8.00	PASS
		2480	-6.34	≤8.00	PASS



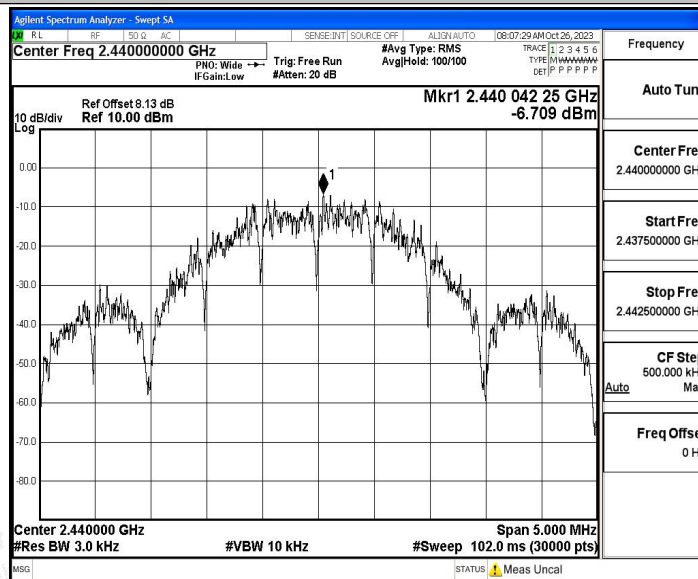


Test Graphs

ZIGB_Ant1_2405



ZIGB_Ant1_2440



ZIGB_Ant1_2480

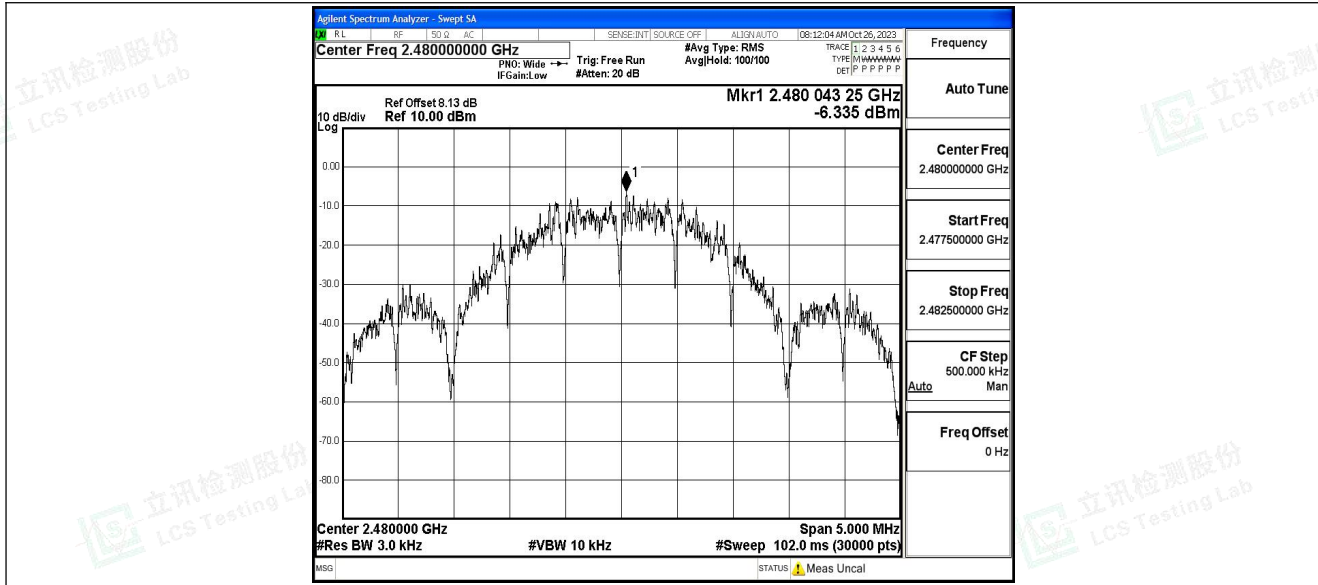


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A.4 Band edge measurements

Test Result

TestMode	Antenna	ChName	Frequency[MHz]	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
ZIGB	Ant1	Low	2405	2.21	-39.89	≤-17.79	PASS
		High	2480	2.69	-35.03	≤-17.31	PASS



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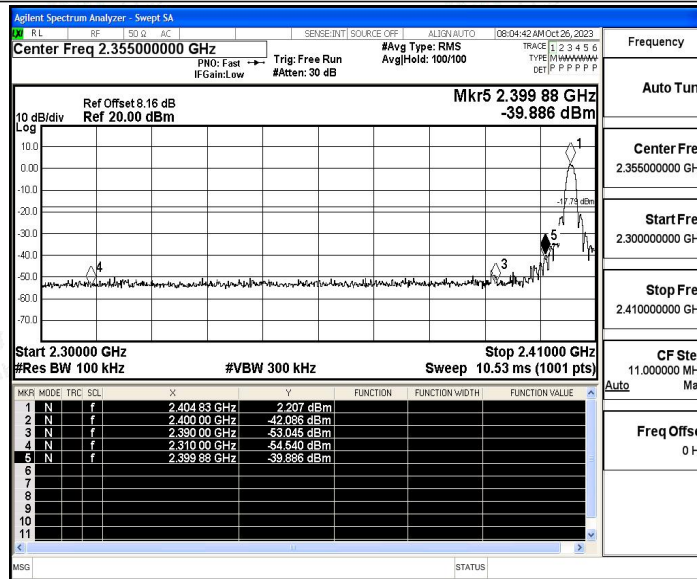
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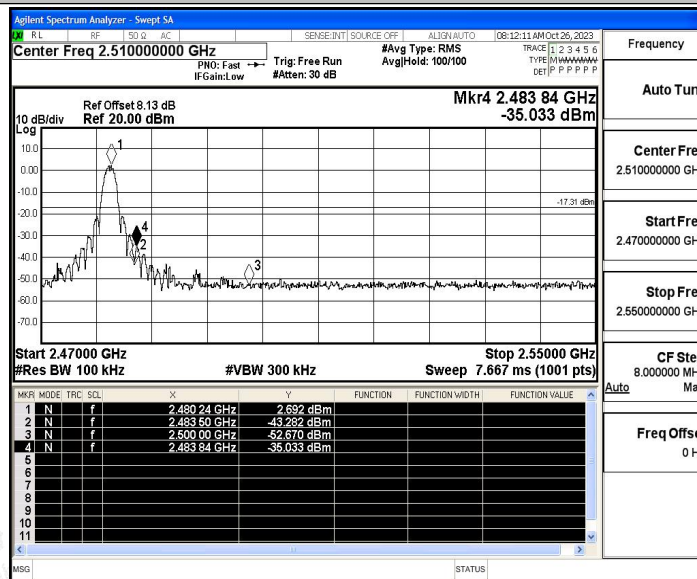


Test Graphs

ZIGB_Ant1_Low_2405



ZIGB_Ant1_High_2480



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A.5 Conducted Spurious Emission

Test Result

TestMode	Antenna	Frequency[MHz]	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
ZIGB	Ant1	2405	Reference	2.10	2.10	---	PASS
			30~1000	2.10	-61.83	≤-17.9	PASS
			1000~26500	2.10	-44.06	≤-17.9	PASS
		2440	Reference	1.32	1.32	---	PASS
			30~1000	1.32	-61.42	≤-18.68	PASS
			1000~26500	1.32	-45.25	≤-18.68	PASS
		2480	Reference	1.55	1.55	---	PASS
			30~1000	1.55	-61.93	≤-18.45	PASS
			1000~26500	1.55	-49.25	≤-18.45	PASS



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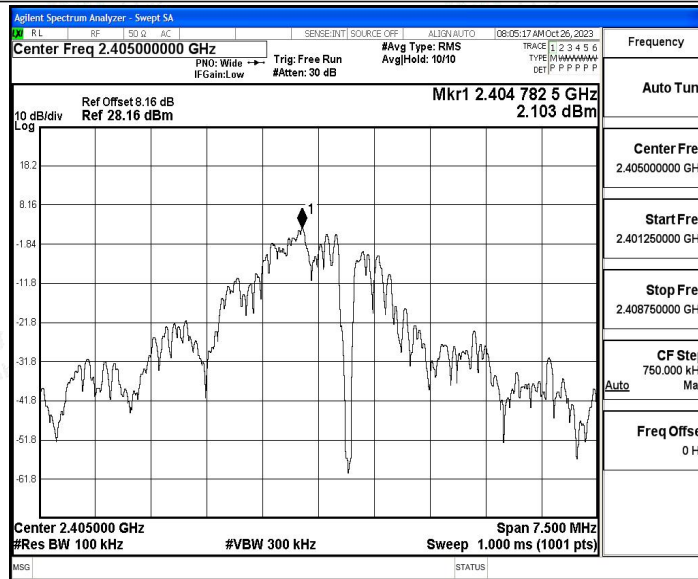
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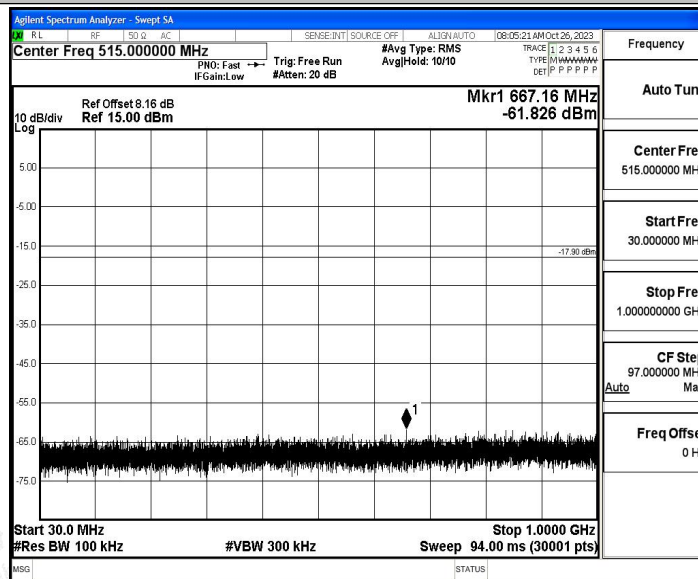


Test Graphs

ZIGB_Ant1_2405_0~Reference



ZIGB_Ant1_2405_30~1000



ZIGB_Ant1_2405_1000~26500

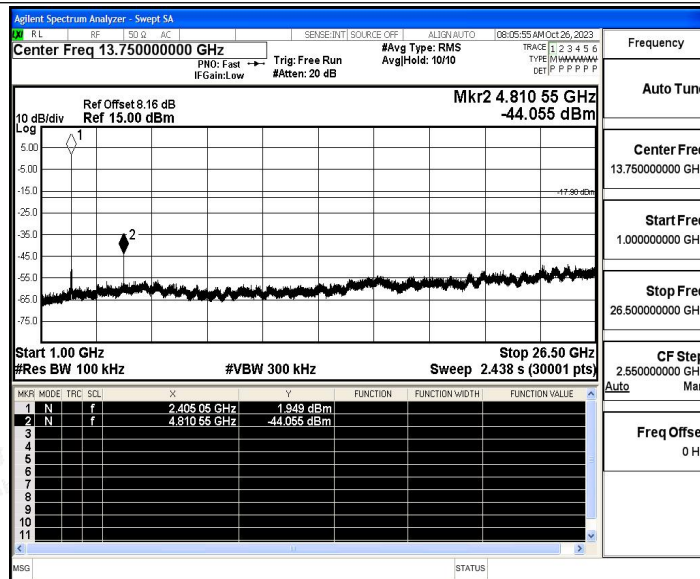


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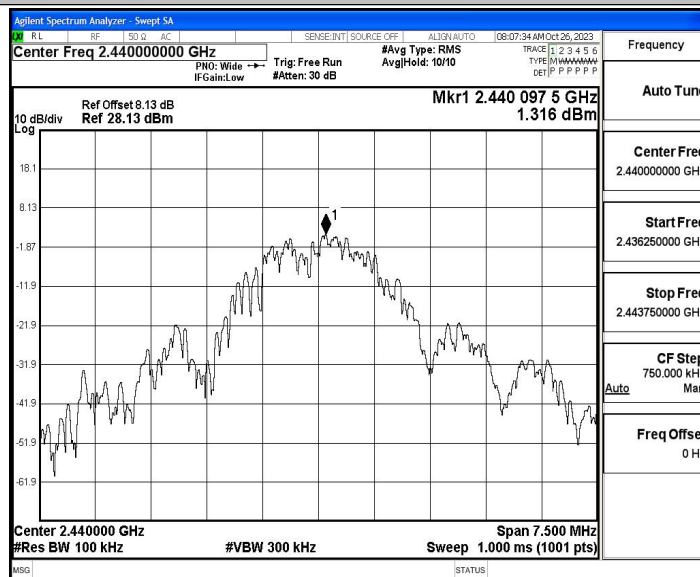
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ZIGB_Ant1_2440_0~Reference



ZIGB_Ant1_2440_30~1000

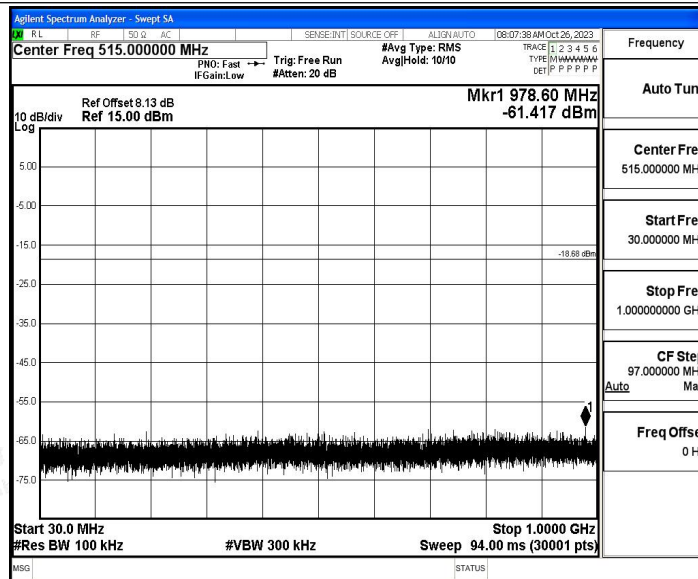


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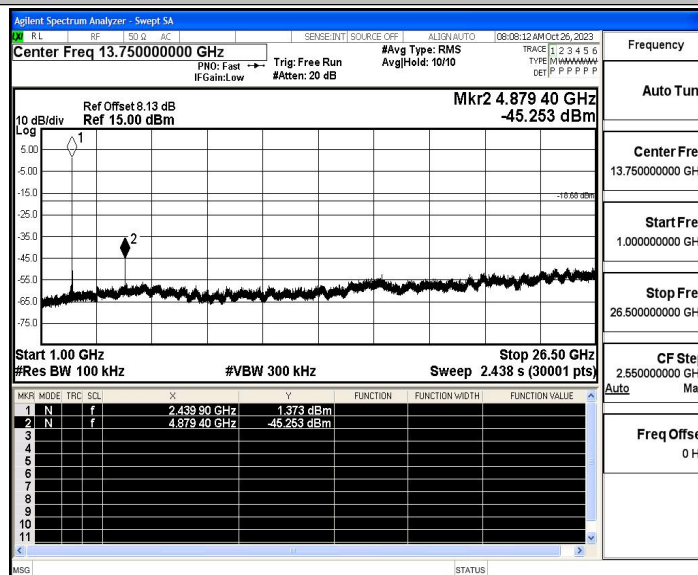
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ZIGB_Ant1_2440_1000~26500



ZIGB_Ant1_2480_0~Reference

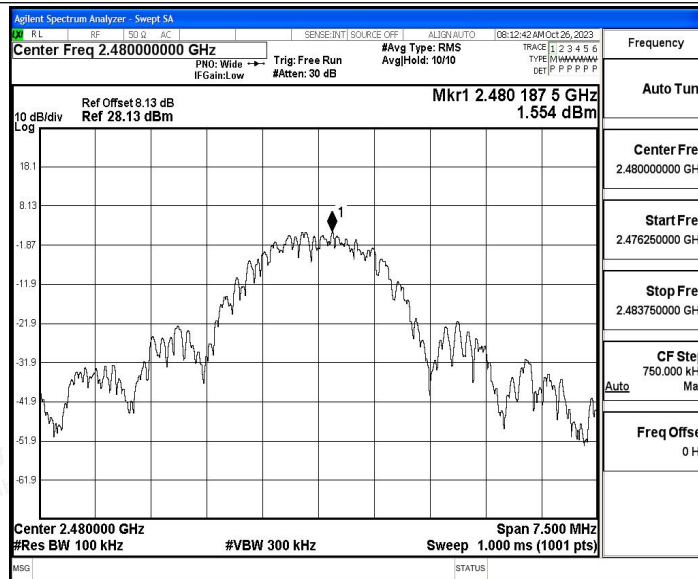


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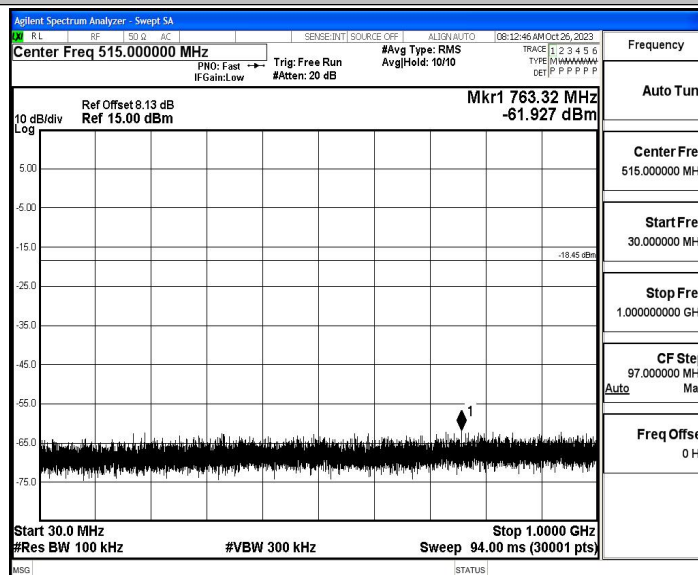
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ZIGB_Ant1_2480_30~1000



ZIGB_Ant1_2480_1000~26500

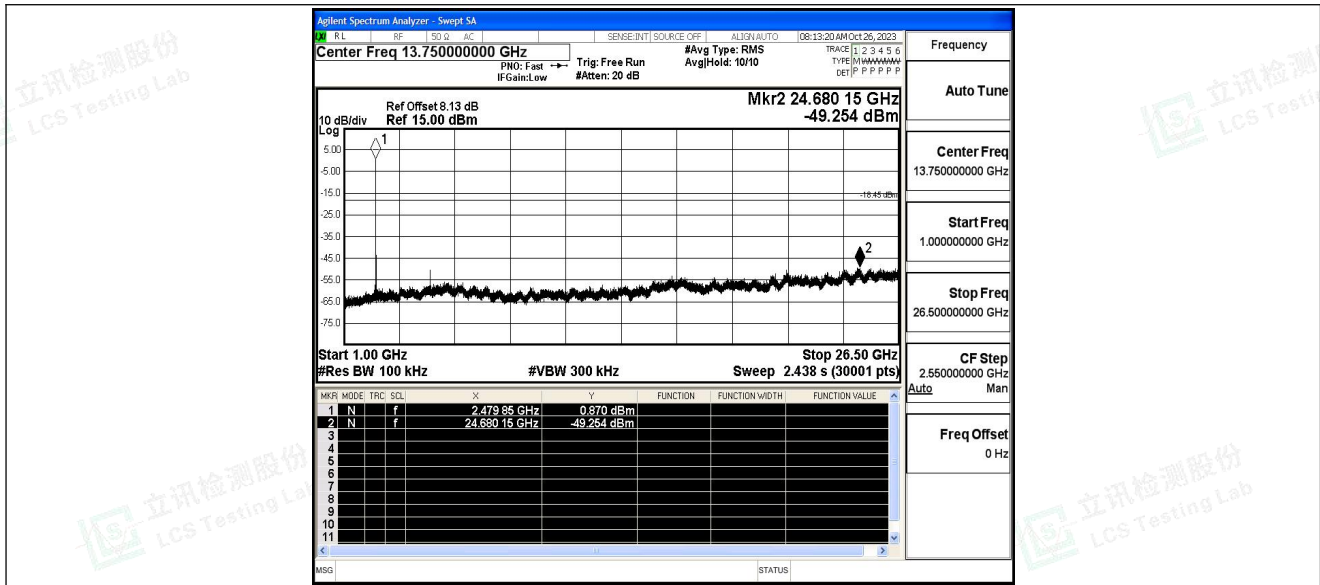


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A.6 Duty Cycle

Test Result

TestMode	Antenna	Frequency[MHz]	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	Limit	Verdict
ZIGB	Ant1	2405	0.83	2.55	32.55	---	---
		2440	0.84	2.54	33.07	---	---
		2480	0.84	2.54	33.07	---	---



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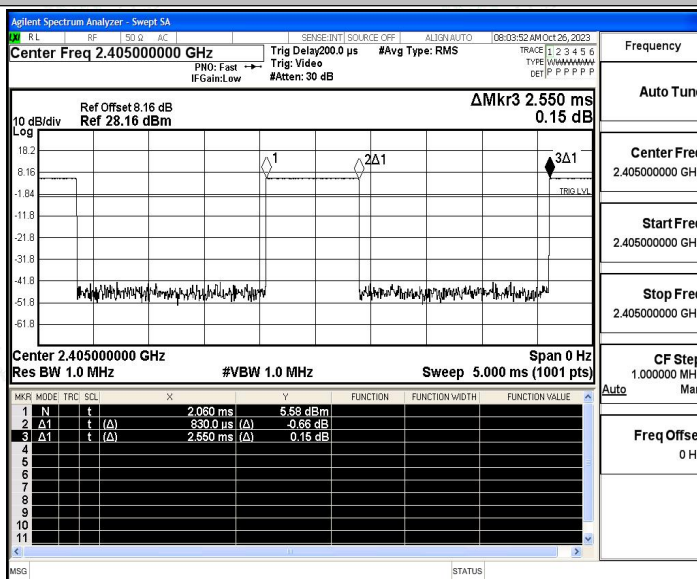
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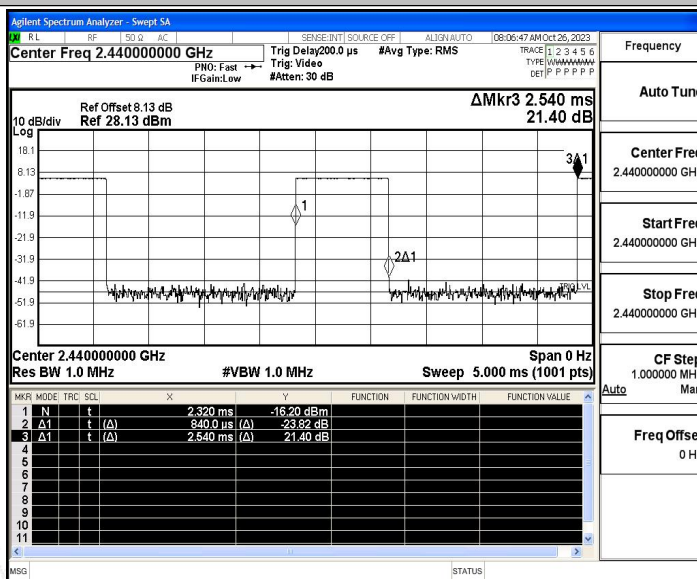
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Test Graphs

ZIGB Ant1 2405



ZIGB Ant1 2440



ZIGB Ant1 2480

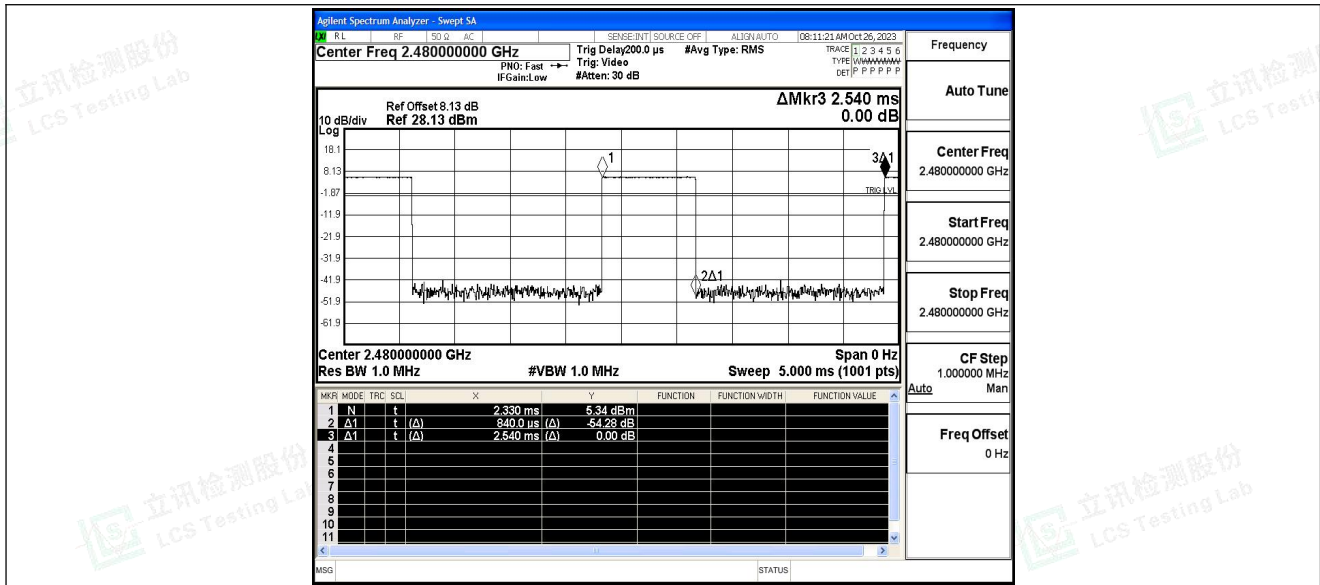


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A.7 Emissions in Restricted Bands

Test Result

TestMode	Antenna	ChName	Frequency[MHz]	Detector	Freq.[MHz]	Result[dBm]	Limit[dBm]	Verdict
ZIGB	Ant1	Low	2405	AV	2310.000	-48.68	≤-41.20	PASS
				AV	2389.430	-47.27	≤-41.20	PASS
				AV	2390.000	-47.94	≤-41.20	PASS
				Peak	2310.000	-43.09	≤-21.20	PASS
				Peak	2389.870	-31.37	≤-21.20	PASS
				Peak	2390.000	-31.75	≤-21.20	PASS
		High	2480	AV	2483.500	-42.51	≤-41.20	PASS
				AV	2483.520	-42.51	≤-41.20	PASS
				AV	2500.000	-48.52	≤-41.20	PASS
				Peak	2483.500	-34.06	≤-21.20	PASS
				Peak	2484.320	-32.47	≤-21.20	PASS
				Peak	2500.000	-41.54	≤-21.20	PASS

Note:

1. The Antenna Gain is compensated in the graph.
2. The limit in dBm for average detector is conversion from 54dBuV/m, according to 15.209(a). The limit in dBm for peak detector is 20dB above the limit of average detector in dBm.



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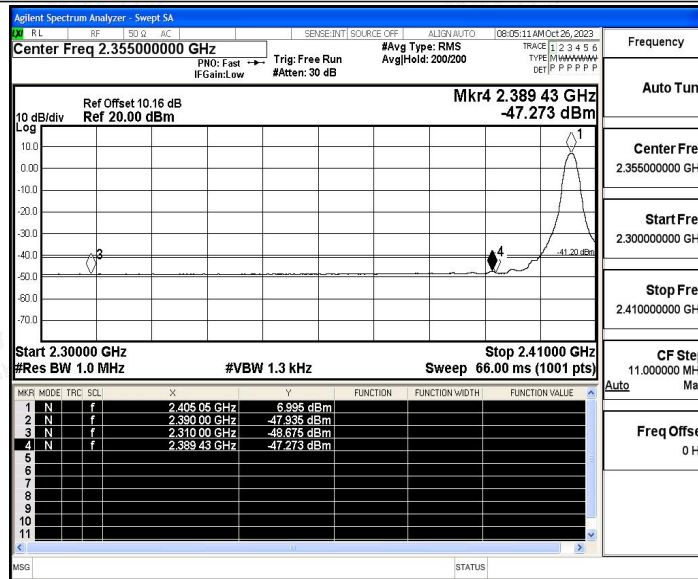
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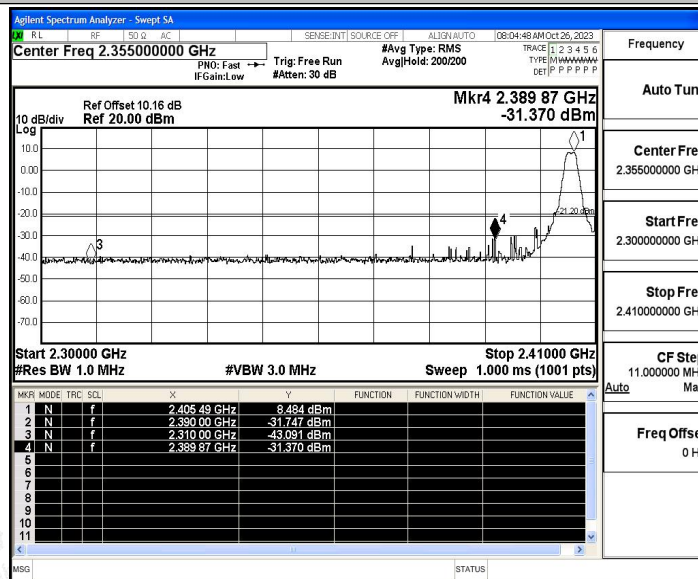


Test Graphs

ZIGB_Ant1_Low_2405_AV



ZIGB_Ant1_Low_2405_Peak



ZIGB_Ant1_High_2480_AV

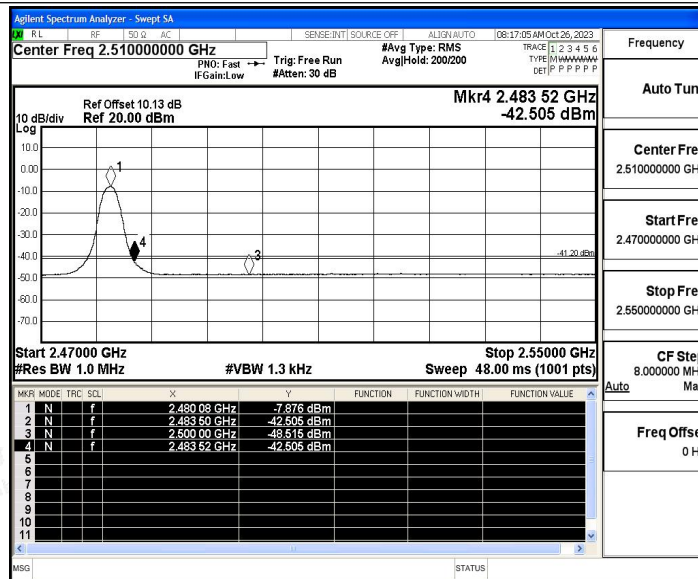


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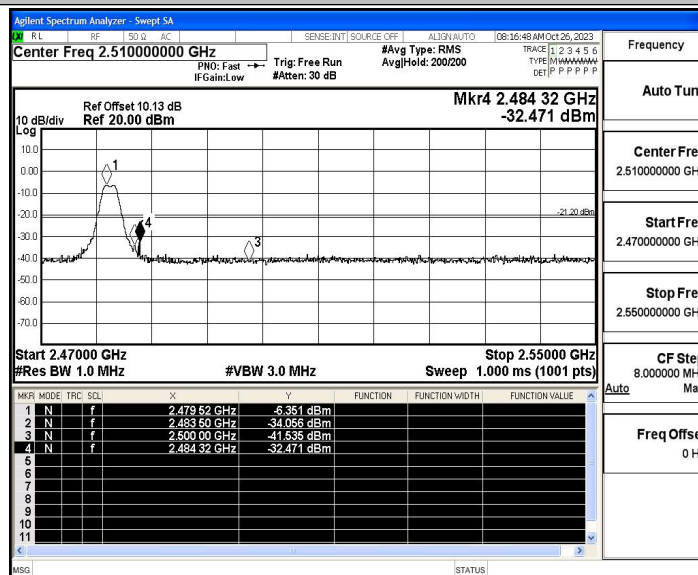
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ZIGB_Ant1_High_2480_Peak



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