



Appendix A

RF Test Data for BLE (Conducted Measurement)

Product Name: Contact Sensor

Test Model: SBD02

Environmental Conditions

Temperature:	23.5°C
Relative Humidity:	52.2%
ATM Pressure:	100.0 kPa
Test Engineer:	Jack Cheng
Supervised by:	Li Huan





A.1 6dB Bandwidth

Test Result

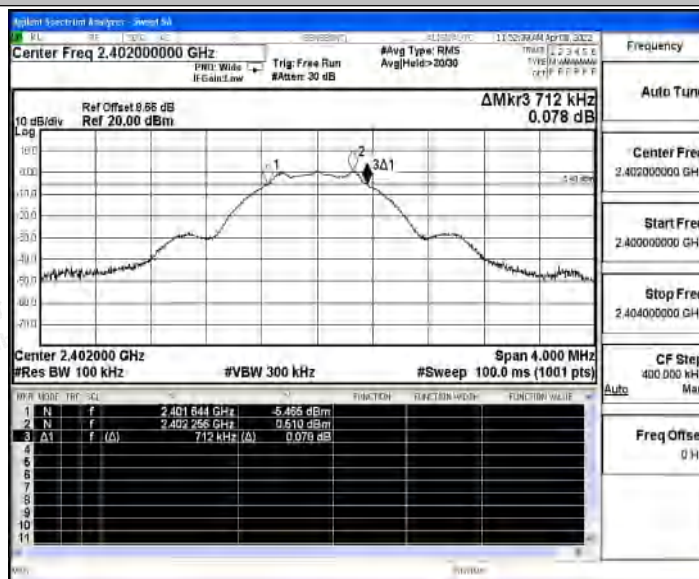
TestMode	Antenna	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.712	2401.644	2402.356	0.5	PASS
		2440	0.708	2439.644	2440.352	0.5	PASS
		2480	0.712	2479.644	2480.356	0.5	PASS
BLE_2M	Ant1	2402	1.140	2401.440	2402.580	0.5	PASS
		2440	1.140	2439.436	2440.576	0.5	PASS
		2480	1.144	2479.432	2480.576	0.5	PASS



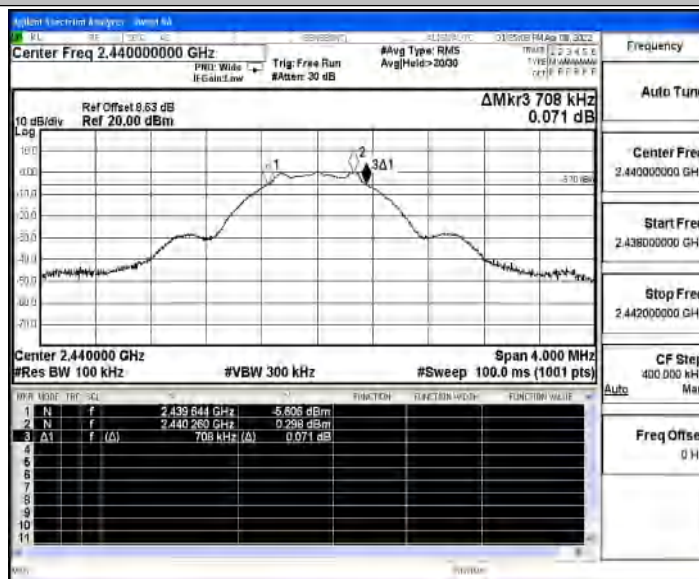


Test Graphs

BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



BLE_1M_Ant1_2480

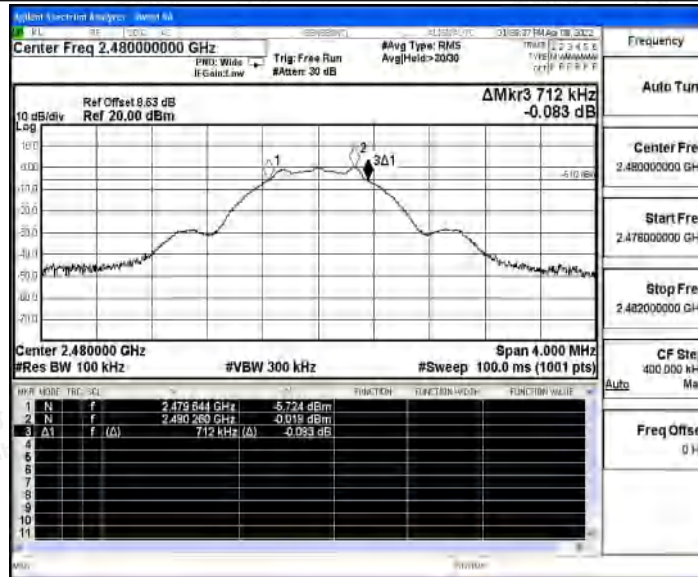


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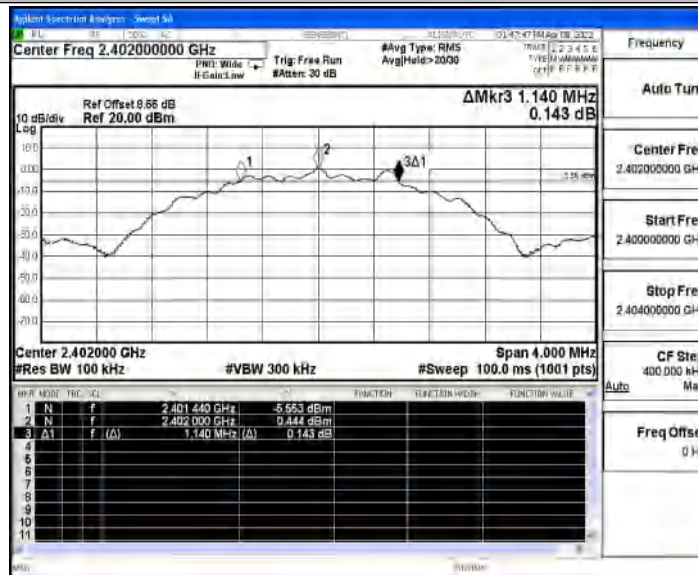
Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

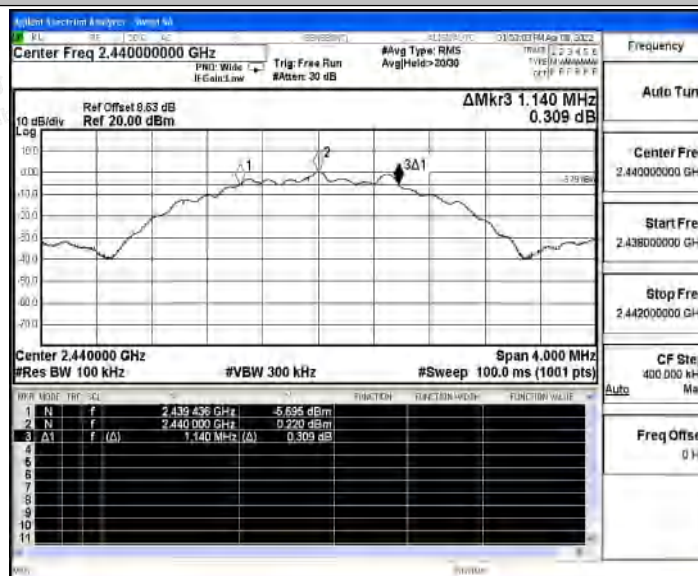
Scan code to check authenticity



BLE_2M_Ant1_2402



BLE_2M_Ant1_2440



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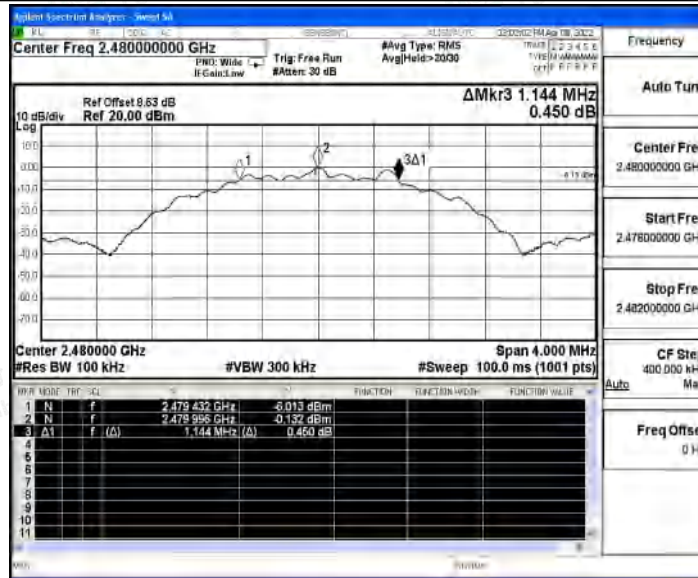
Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

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BLE_2M_Ant1_2480



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A.2 Maximum conducted output power

Test Result

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	0.6	≤30	PASS
		2440	0.39	≤30	PASS
		2480	0.09	≤30	PASS
BLE_2M	Ant1	2402	0.63	≤30	PASS
		2440	0.41	≤30	PASS
		2480	0.07	≤30	PASS



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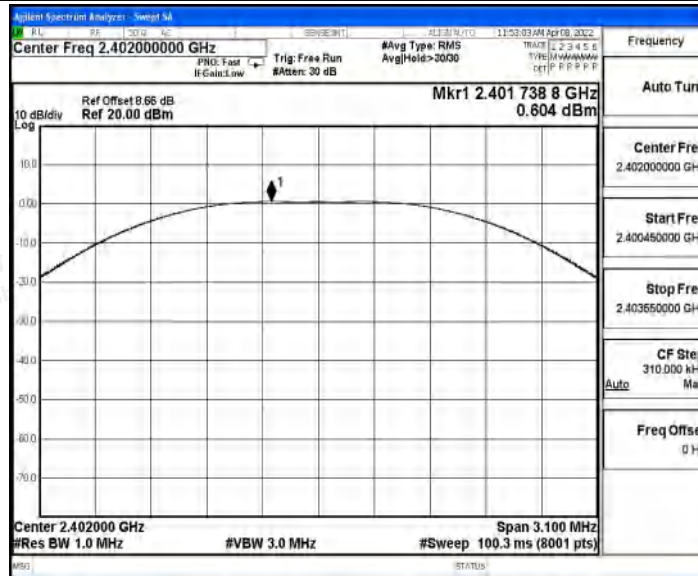
Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

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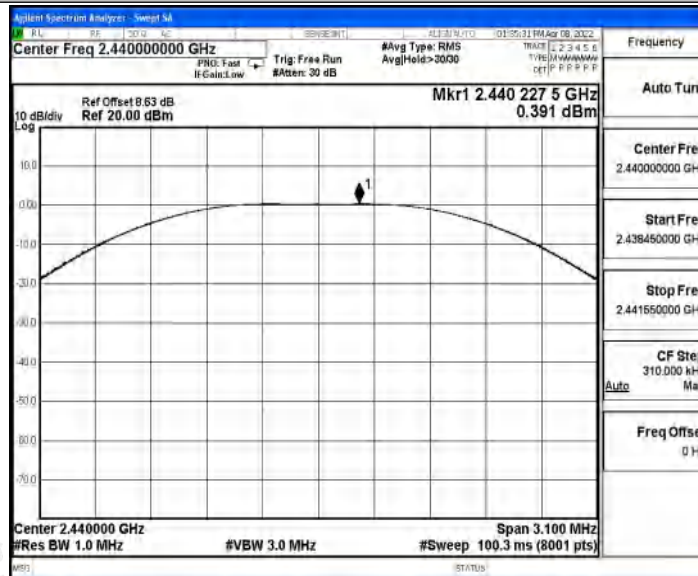


Test Graphs

BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



BLE_1M_Ant1_2480

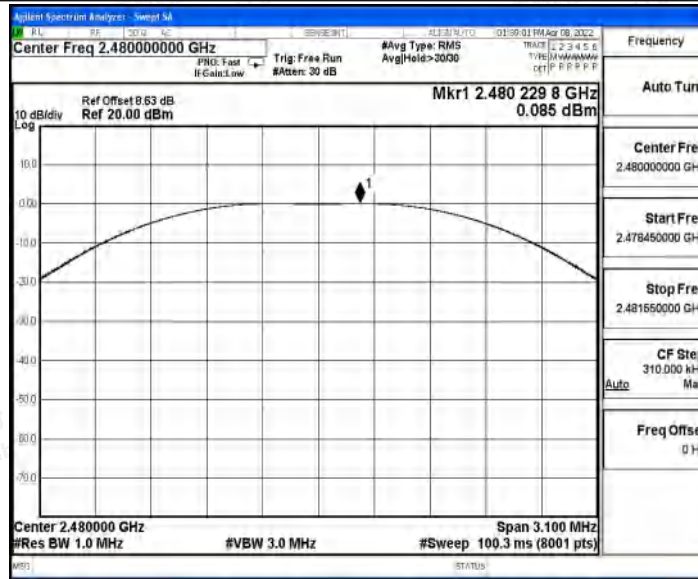


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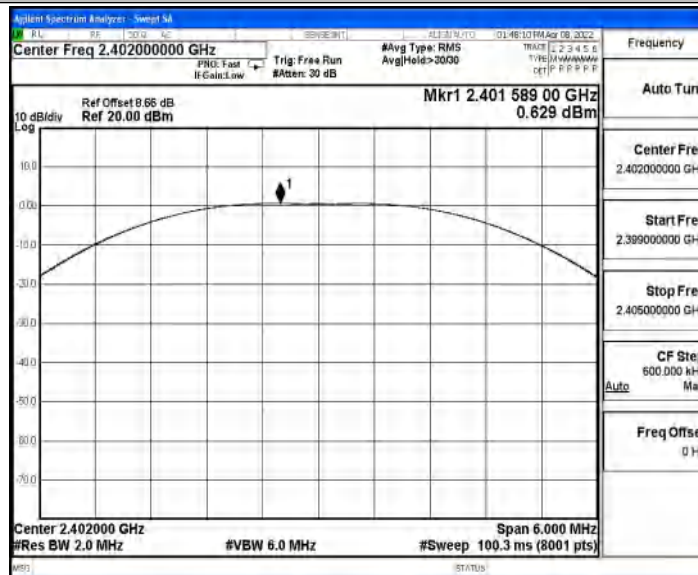
Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

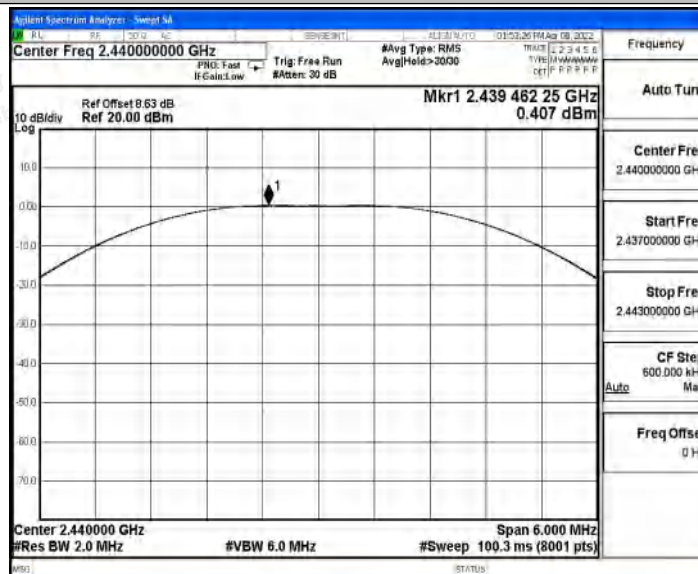
Scan code to check authenticity



BLE_2M_Ant1_2402



BLE_2M_Ant1_2440



Shenzhen LCS Compliance Testing Laboratory Ltd.

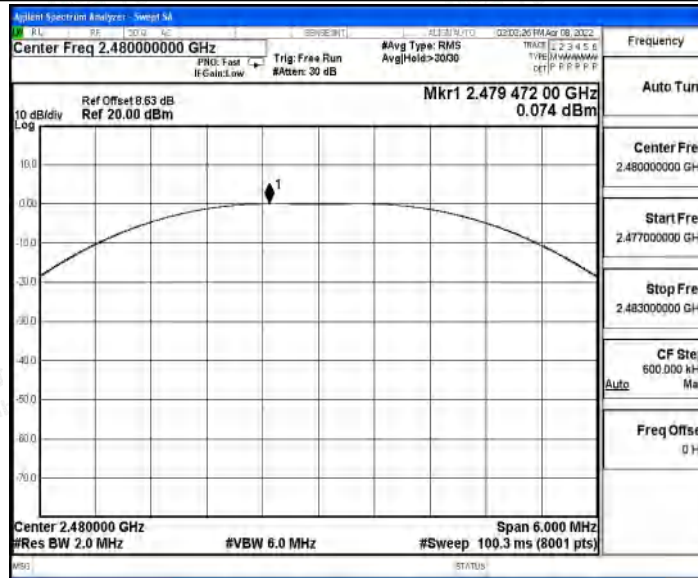
Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

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BLE_2M_Ant1_2480



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A.3 Maximum power spectral density

Test Result

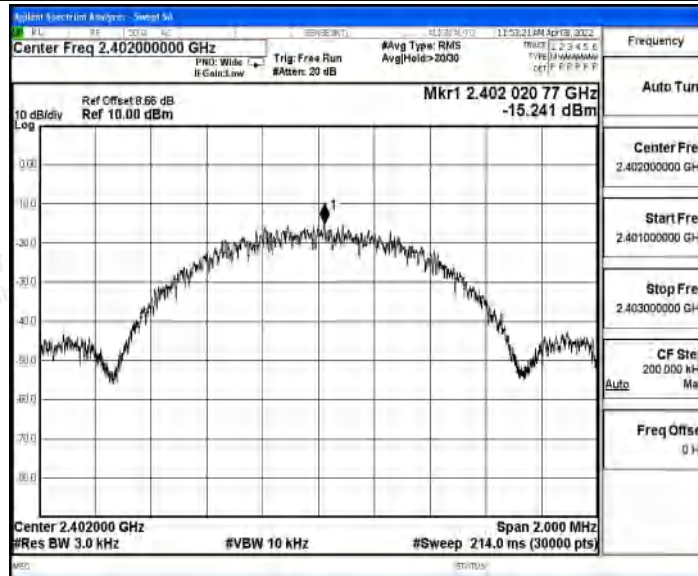
TestMode	Antenna	Channel	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-15.24	≤8.00	PASS
		2440	-15.47	≤8.00	PASS
		2480	-15.75	≤8.00	PASS
BLE_2M	Ant1	2402	-17.18	≤8.00	PASS
		2440	-17.36	≤8.00	PASS
		2480	-17.71	≤8.00	PASS



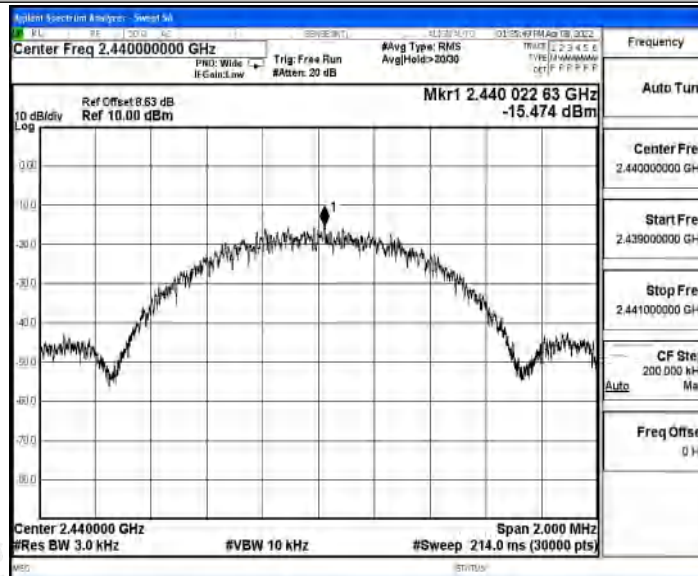


Test Graphs

BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



BLE_1M_Ant1_2480

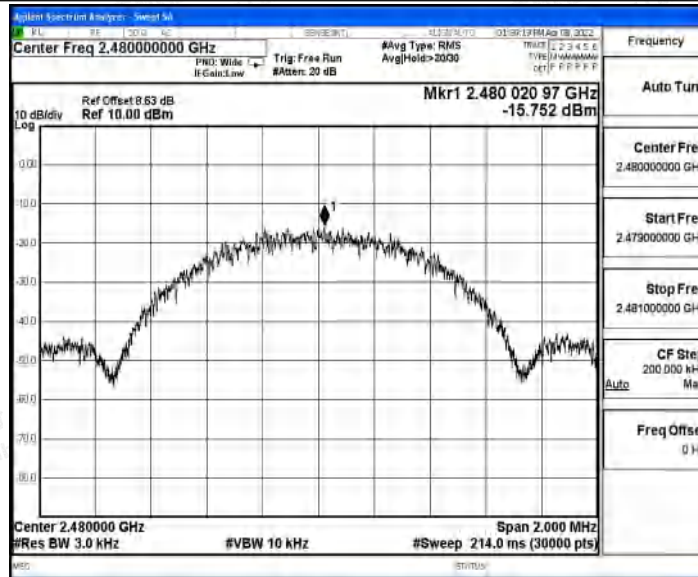


Shenzhen LCS Compliance Testing Laboratory Ltd.

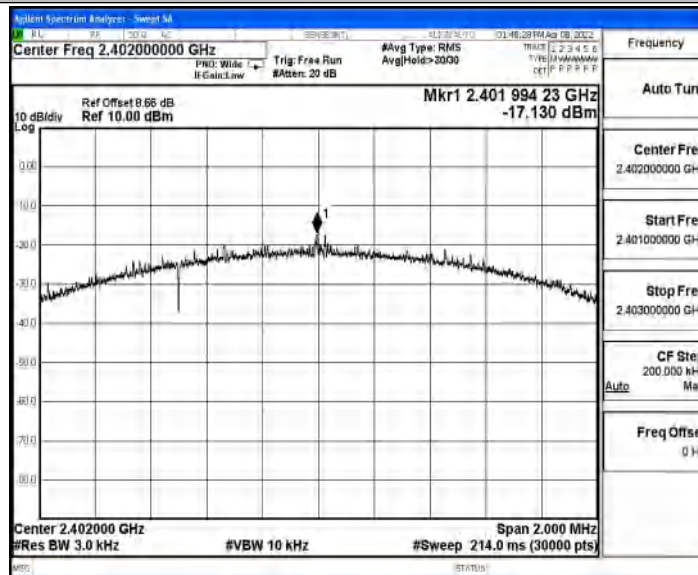
Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

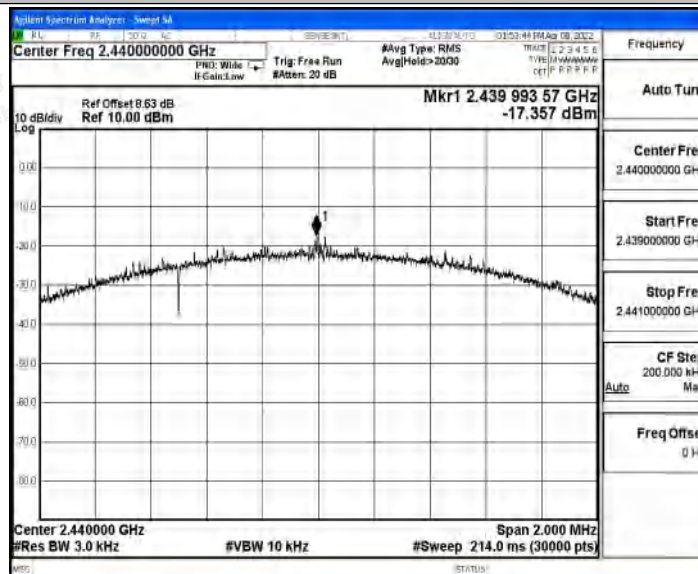
Scan code to check authenticity



BLE_2M_Ant1_2402



BLE_2M_Ant1_2440



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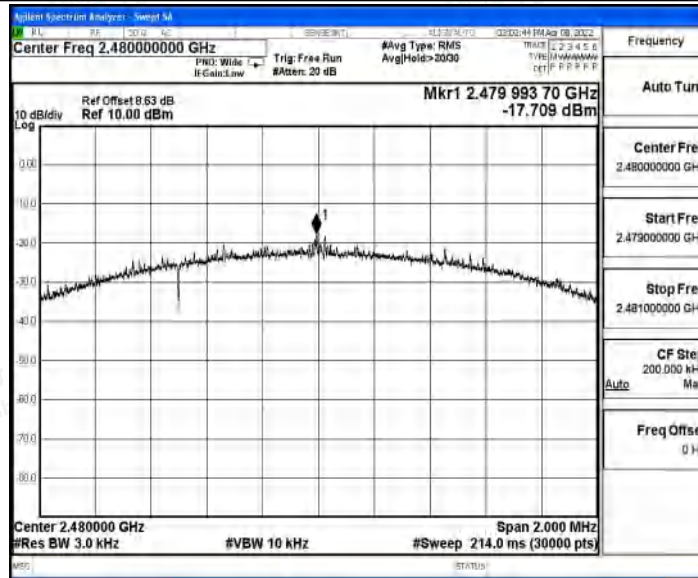
Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

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BLE_2M_Ant1_2480



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A.4 Band edge measurements

Test Result

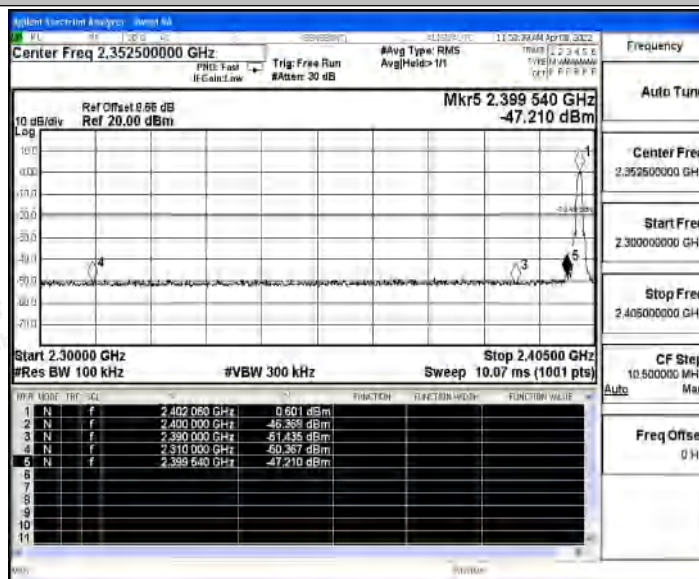
TestMode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	0.60	-47.21	≤ -19.4	PASS
		High	2480	0.16	-47.33	≤ -19.84	PASS
BLE_2M	Ant1	Low	2402	-0.40	-31.93	≤ -20.4	PASS
		High	2480	-0.50	-47.69	≤ -20.5	PASS



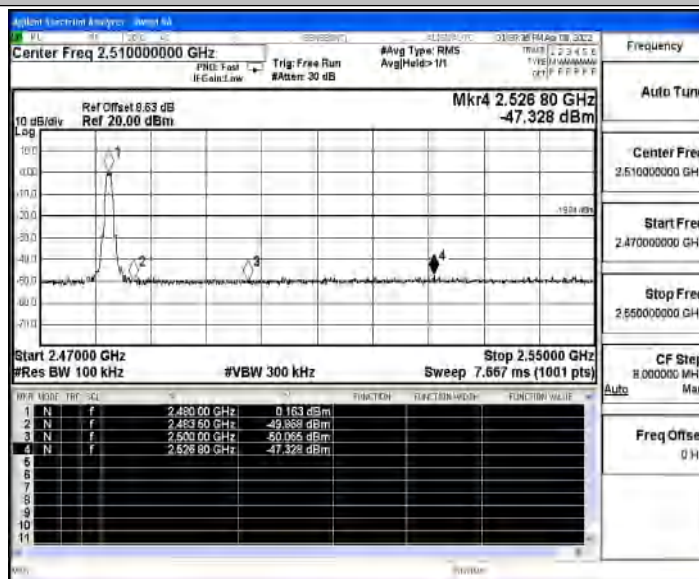


Test Graphs

BLE_1M_Ant1_Low_2402



BLE_1M_Ant1_High_2480



BLE_2M_Ant1_Low_2402

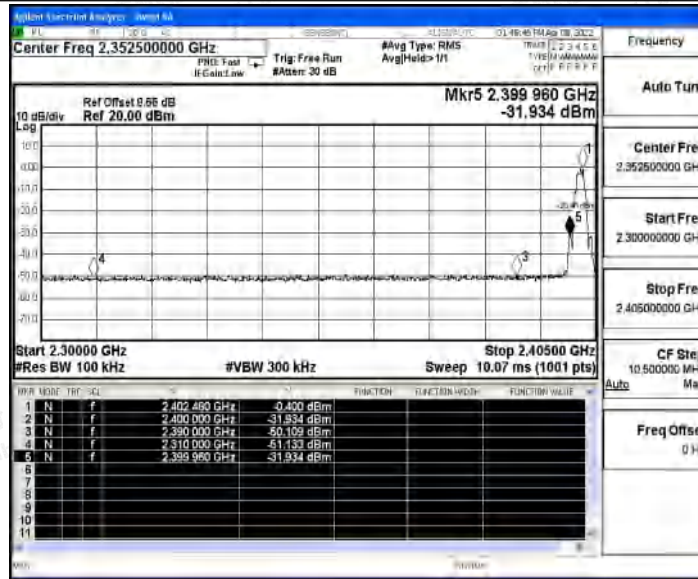


Shenzhen LCS Compliance Testing Laboratory Ltd.

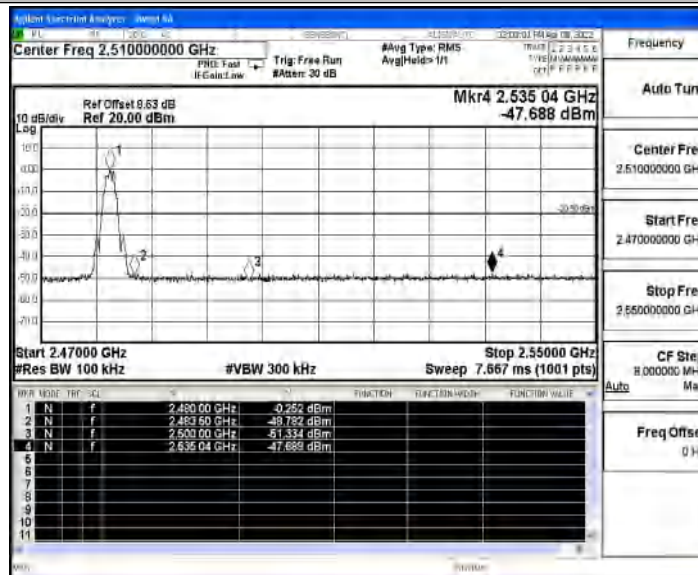
Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

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BLE_2M_Ant1_High_2480





A.5 Conducted Spurious Emission

Test Result

TestMode	Antenna	Channel	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	Reference	0.50	0.50	---	PASS
			30~1000	0.50	-60.43	≤-19.5	PASS
			1000~26500	0.50	-46.32	≤-19.5	PASS
		2440	Reference	0.18	0.18	---	PASS
			30~1000	0.18	-60.91	≤-19.82	PASS
			1000~26500	0.18	-46.2	≤-19.82	PASS
		2480	Reference	-0.26	-0.26	---	PASS
			30~1000	-0.26	-60.76	≤-20.26	PASS
			1000~26500	-0.26	-46.47	≤-20.26	PASS
BLE_2M	Ant1	2402	Reference	0.47	0.47	---	PASS
			30~1000	0.47	-59.58	≤-19.53	PASS
			1000~26500	0.47	-46.38	≤-19.53	PASS
		2440	Reference	-0.05	-0.05	---	PASS
			30~1000	-0.05	-60.81	≤-20.05	PASS
			1000~26500	-0.05	-46.04	≤-20.05	PASS
		2480	Reference	-0.13	-0.13	---	PASS
			30~1000	-0.13	-60.89	≤-20.13	PASS
			1000~26500	-0.13	-45.57	≤-20.13	PASS



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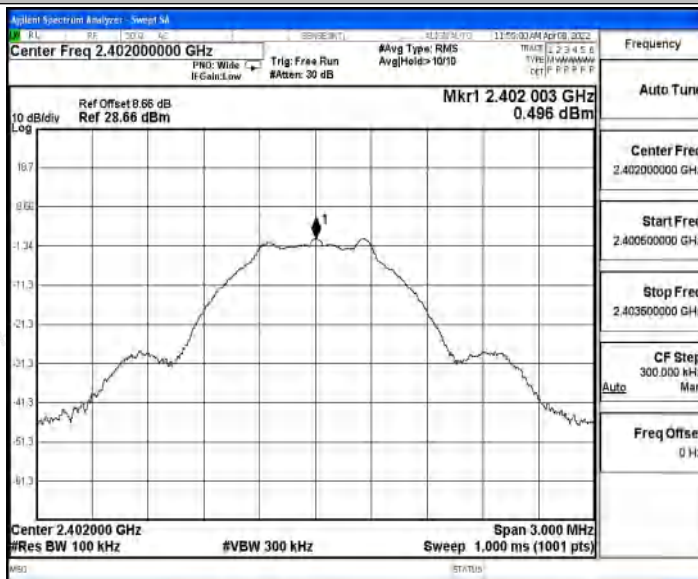
Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity

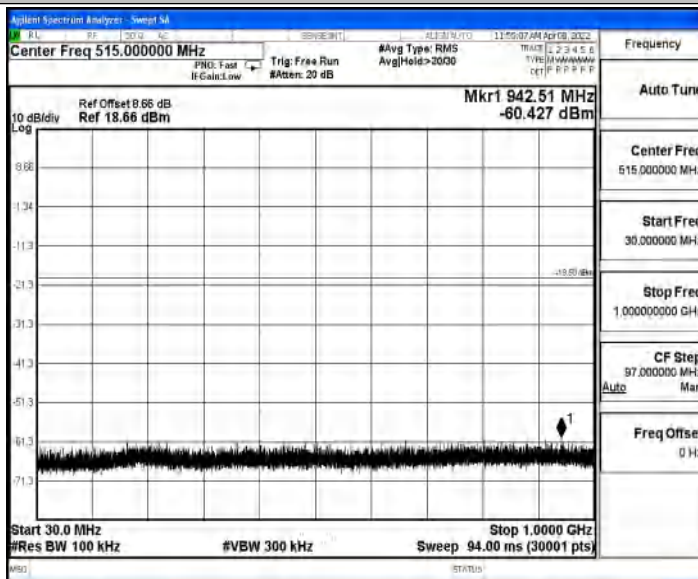


Test Graphs

BLE_1M_Ant1_2402_0~Reference



BLE_1M_Ant1_2402_30~1000



BLE_1M_Ant1_2402_1000~26500

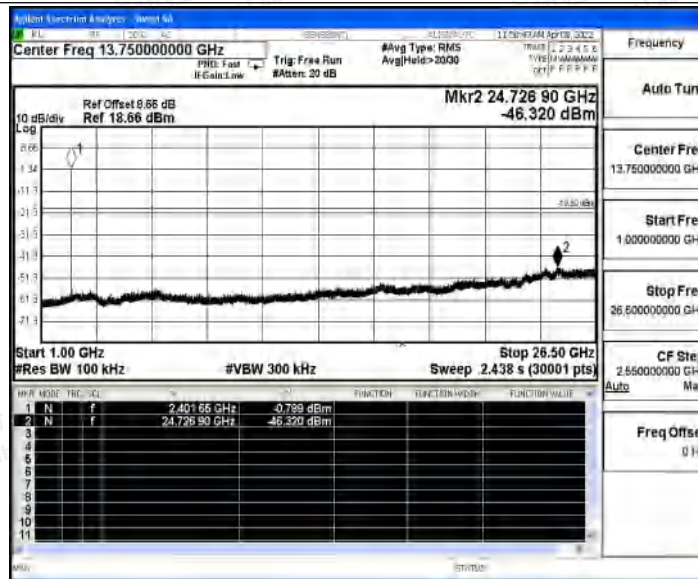


Shenzhen LCS Compliance Testing Laboratory Ltd.

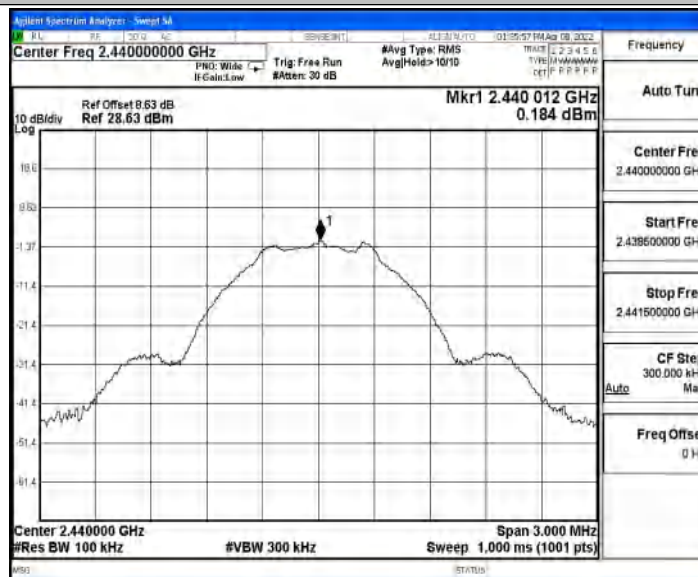
Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

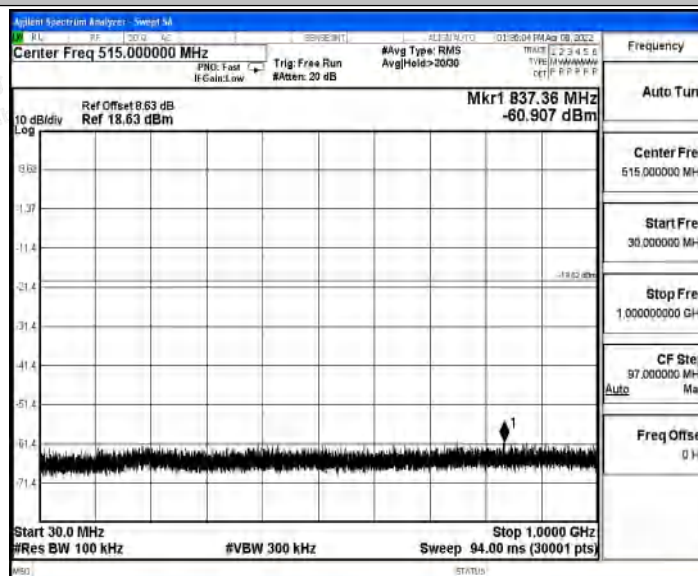
Scan code to check authenticity



BLE_1M_Ant1_2440_0~Reference



BLE_1M_Ant1_2440_30~1000



Shenzhen LCS Compliance Testing Laboratory Ltd.

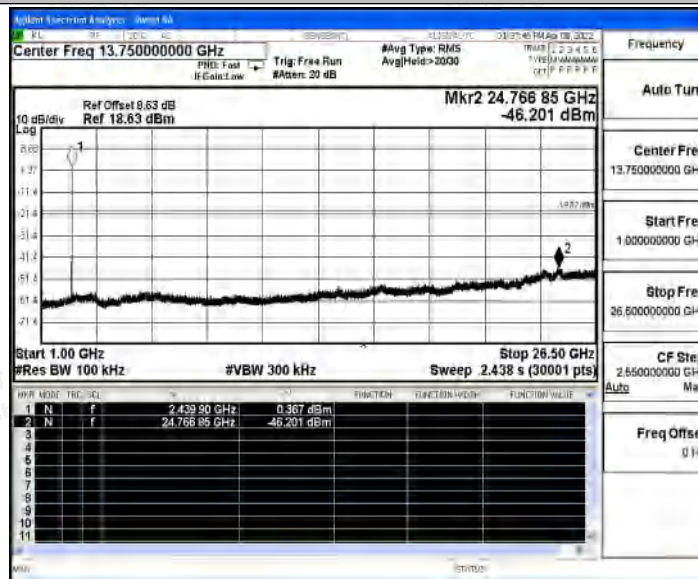
Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

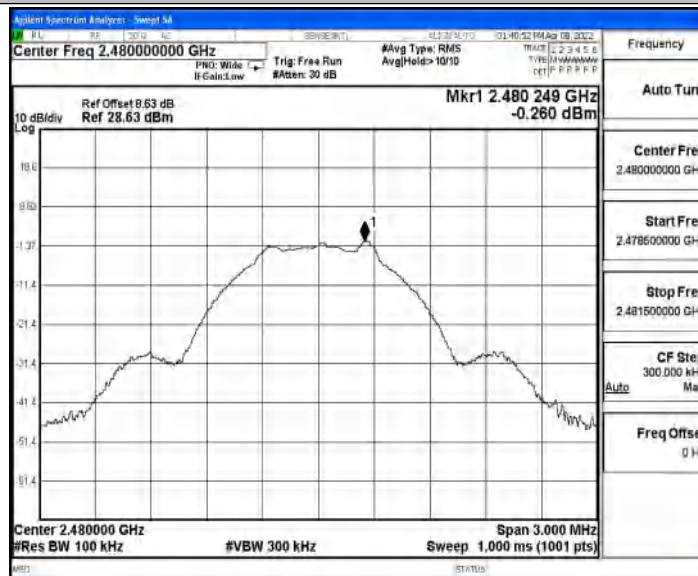
Scan code to check authenticity



BLE_1M_Ant1_2440_1000~26500



BLE_1M_Ant1_2480_0~Reference



BLE_1M_Ant1_2480_30~1000

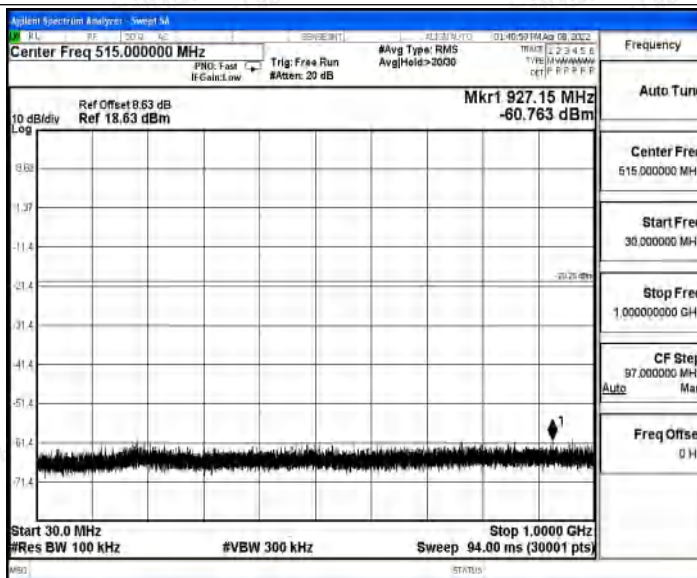


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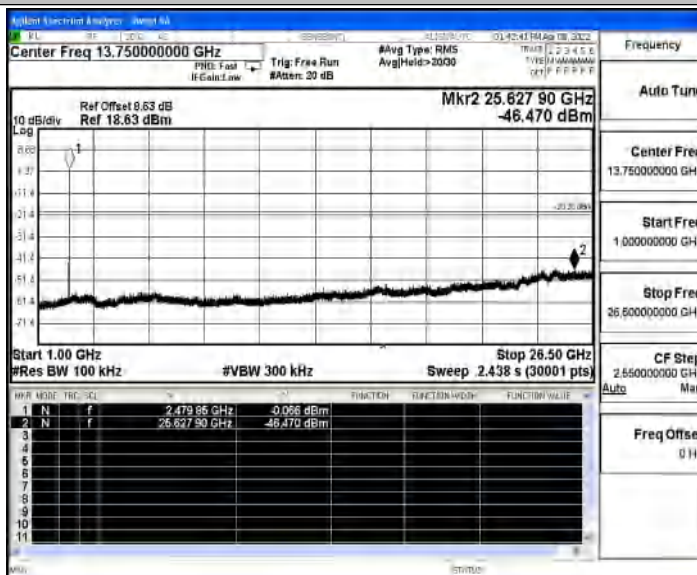
Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

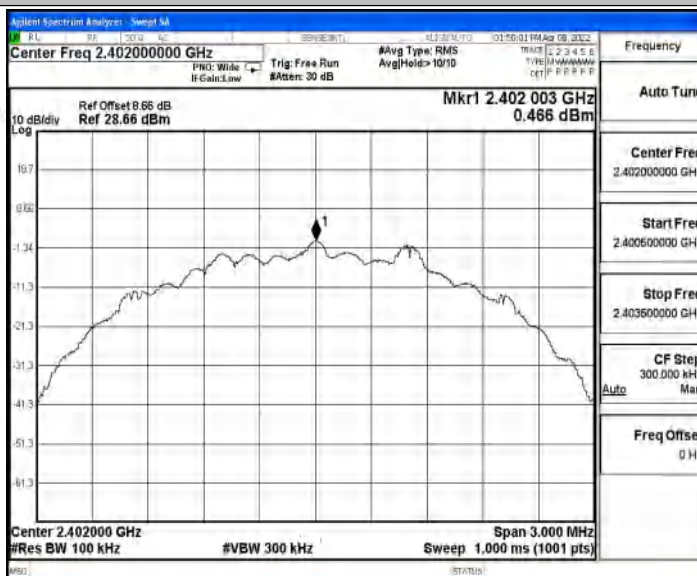
Scan code to check authenticity



BLE_1M_Ant1_2480_1000~26500



BLE_2M_Ant1_2402_0~Reference



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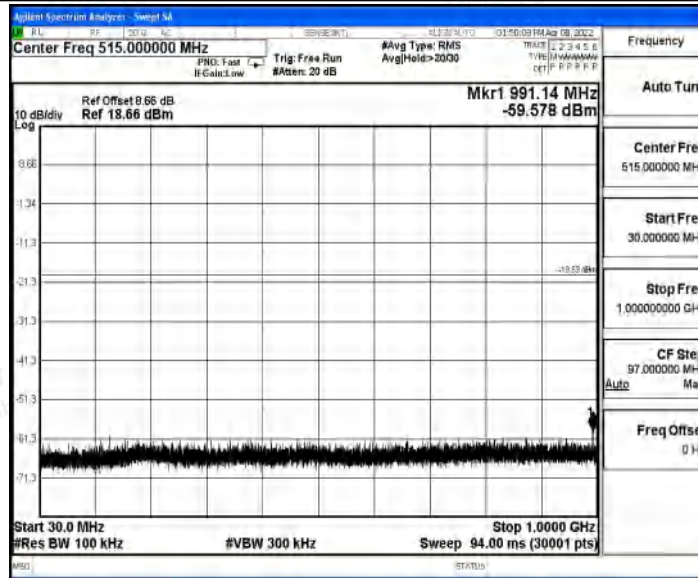
Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

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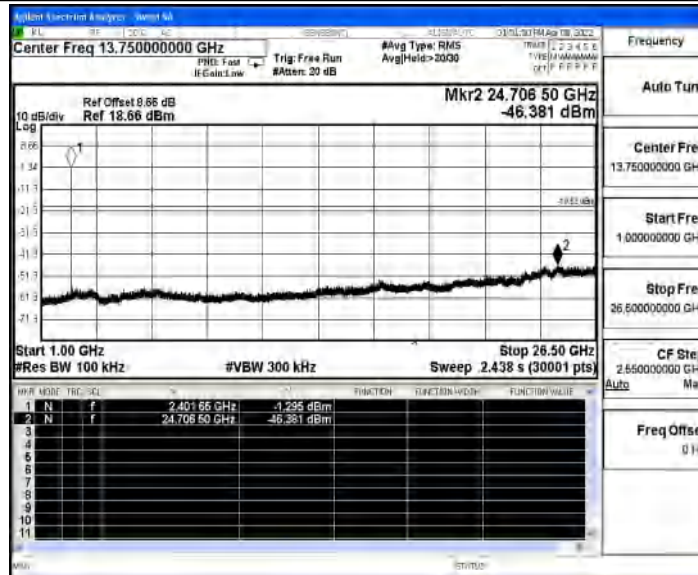
Scan code to check authenticity



BLE_2M_Ant1_2402_30~1000



BLE_2M_Ant1_2402_1000~26500



BLE_2M_Ant1_2440_0~Reference

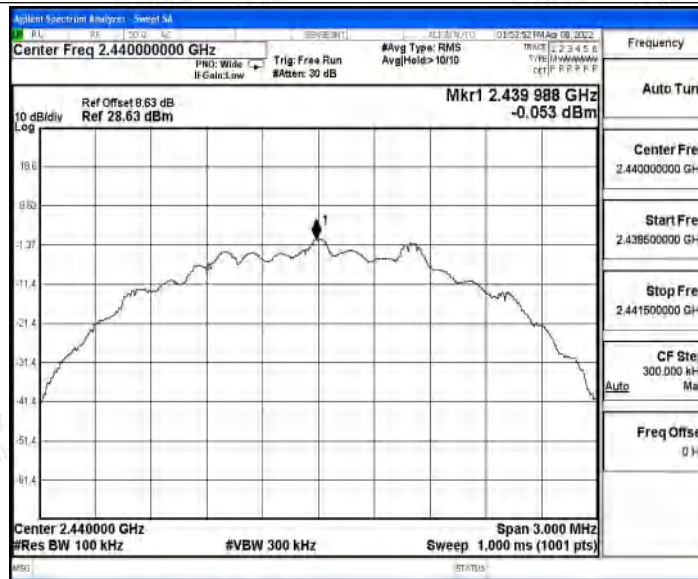


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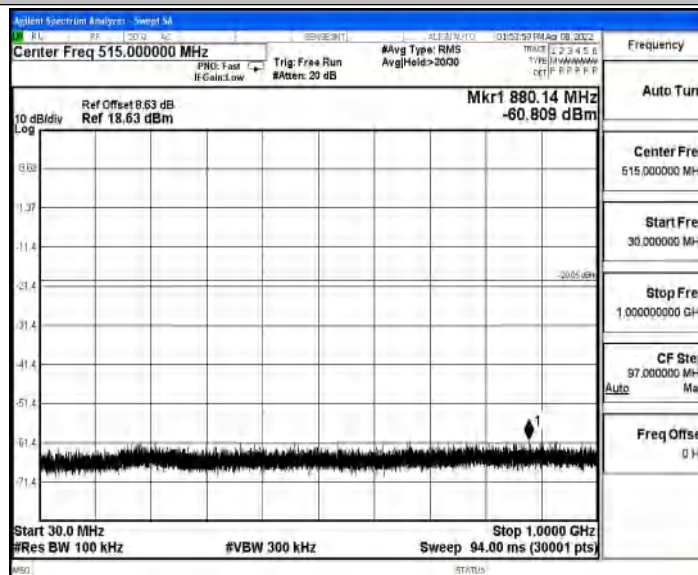
Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

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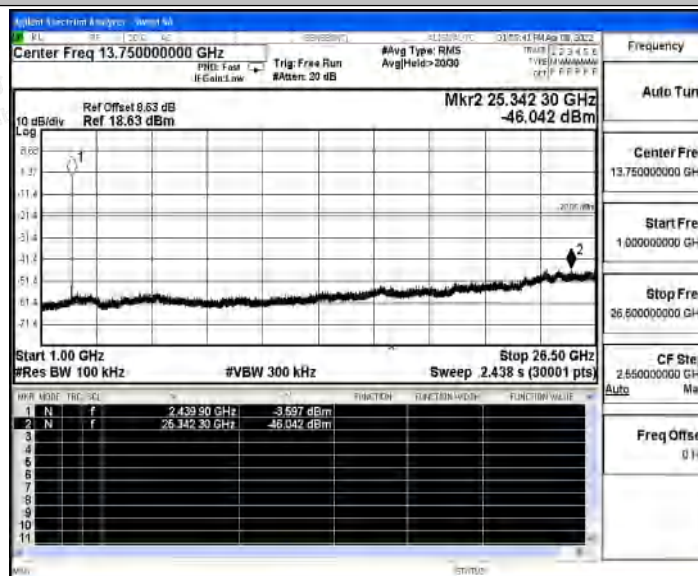
Scan code to check authenticity



BLE_2M_Ant1_2440_30~1000

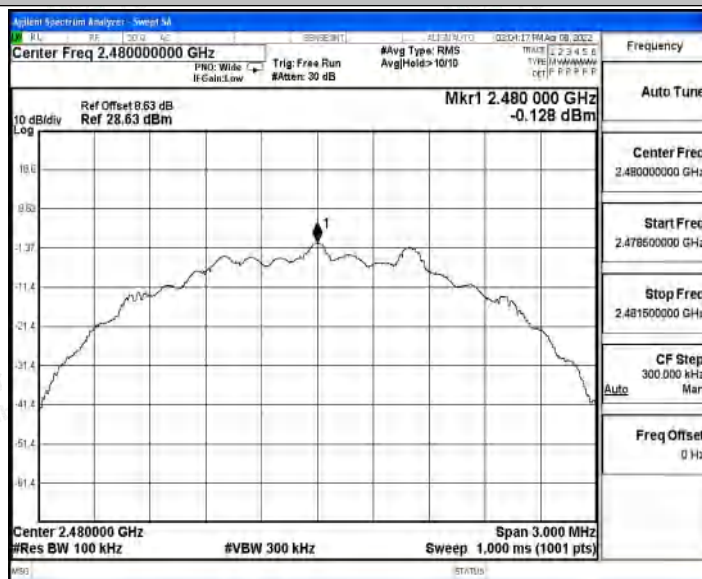


BLE_2M_Ant1_2440_1000~26500

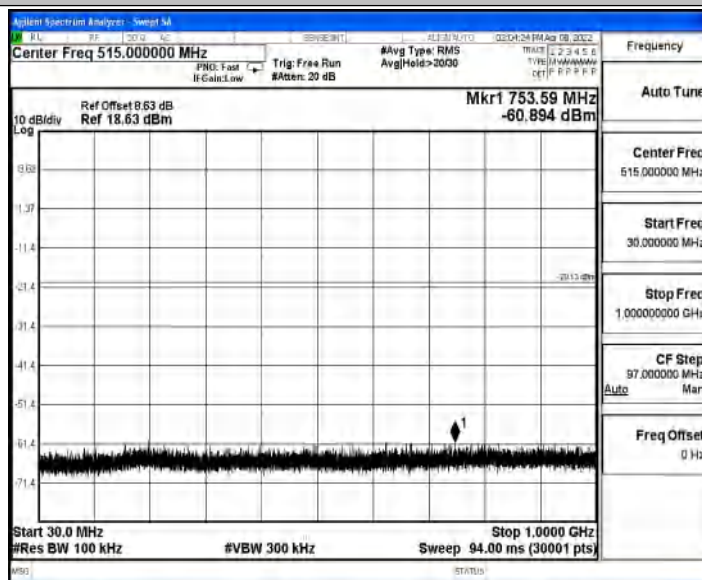




BLE_2M_Ant1_2480_0~Reference



BLE_2M_Ant1_2480_30~1000



BLE_2M_Ant1_2480_1000~26500

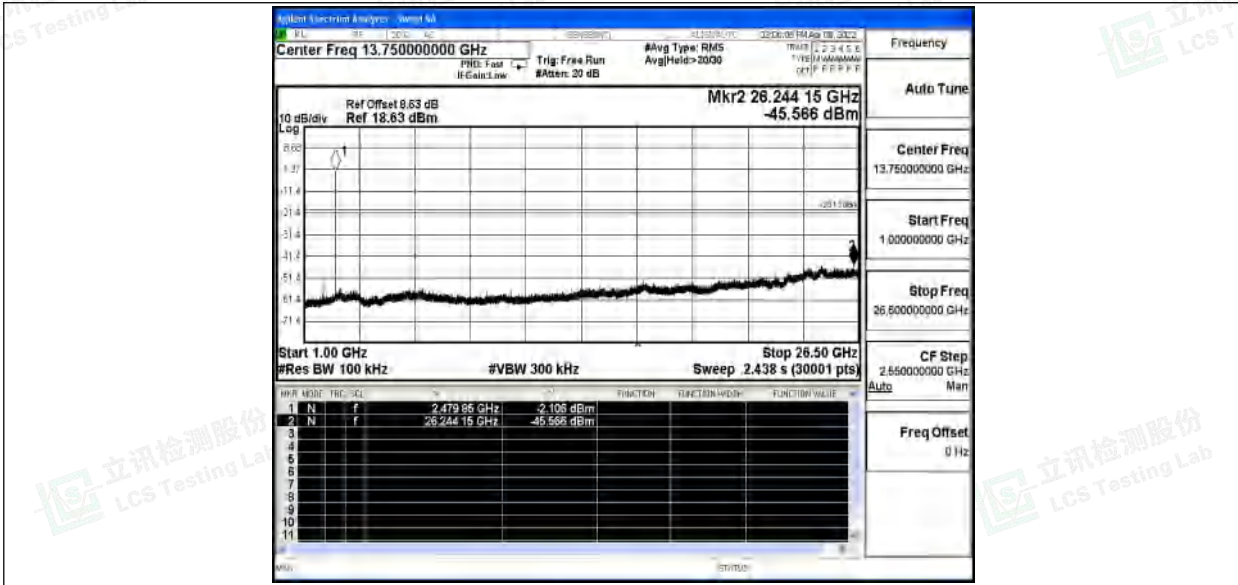


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A.6 Duty Cycle

Test Result

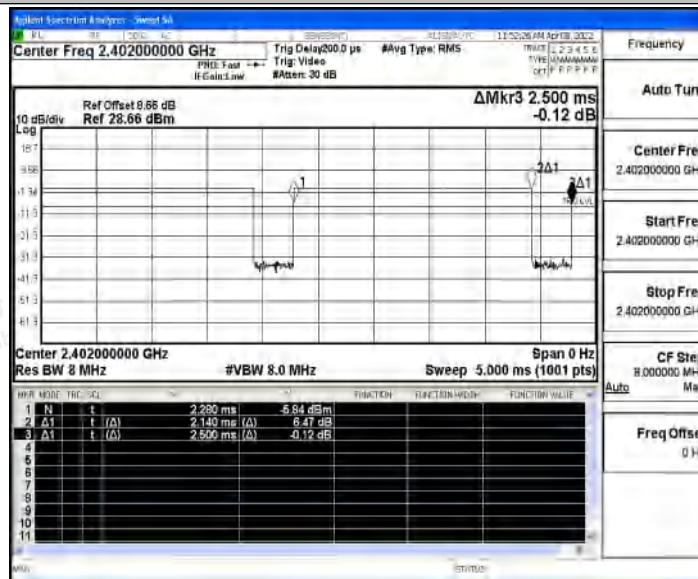
TestMode	Antenna	Channel	ON Time [ms]	Period [ms]	X	DC [%]	xFactor	Limit	Verdict
BLE_1M	Ant1	2402	2.14	2.50	0.8560	85.60	0.68	---	---
		2440	2.14	2.50	0.8560	85.60	0.68	---	---
		2480	2.14	2.50	0.8560	85.60	0.68	---	---
BLE_2M	Ant1	2402	1.08	1.87	0.5775	57.75	2.38	---	---
		2440	1.08	1.87	0.5775	57.75	2.38	---	---
		2480	1.08	1.87	0.5775	57.75	2.38	---	---



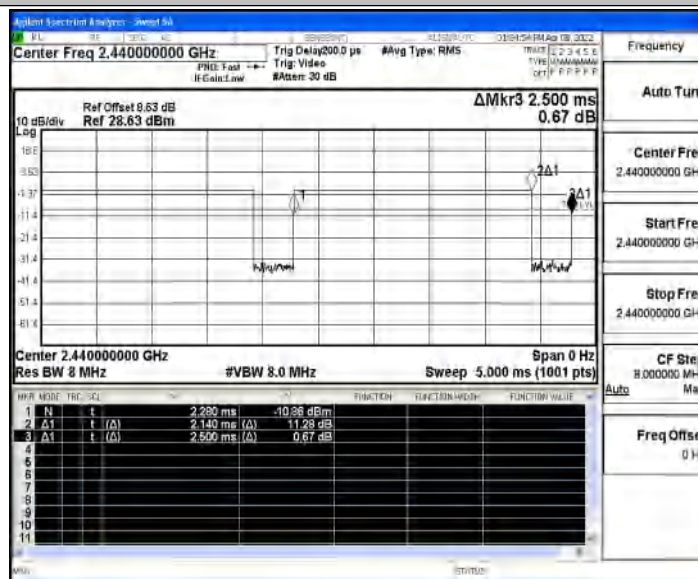


Test Graphs

BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



BLE_1M_Ant1_2480

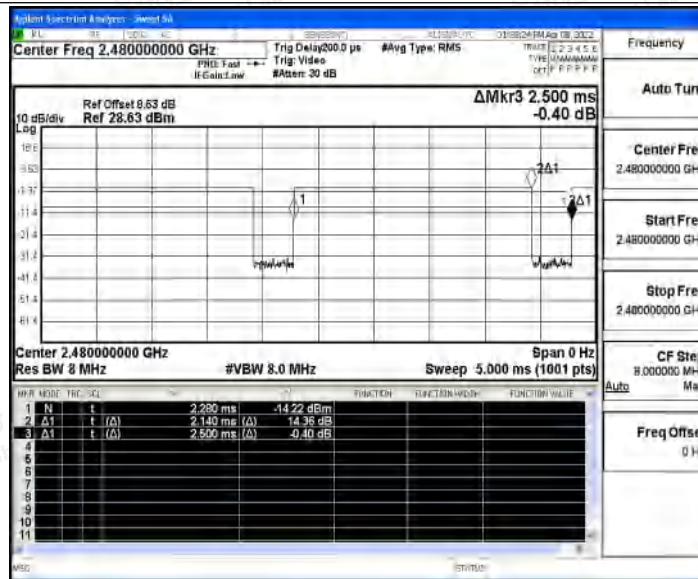


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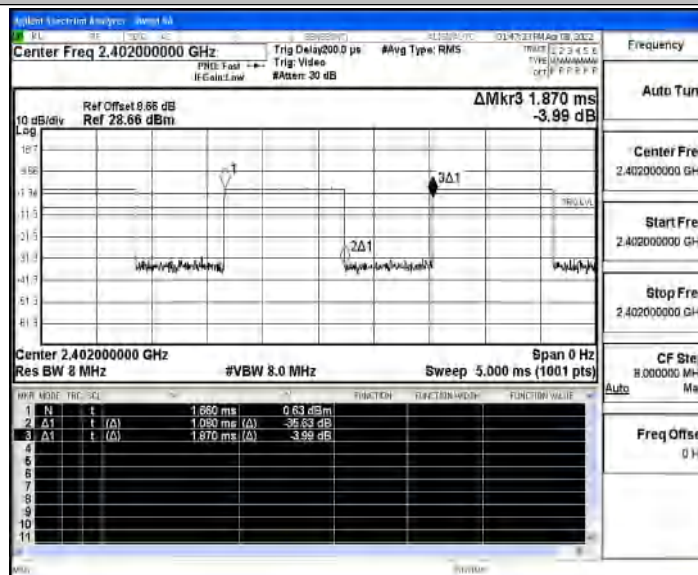
Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

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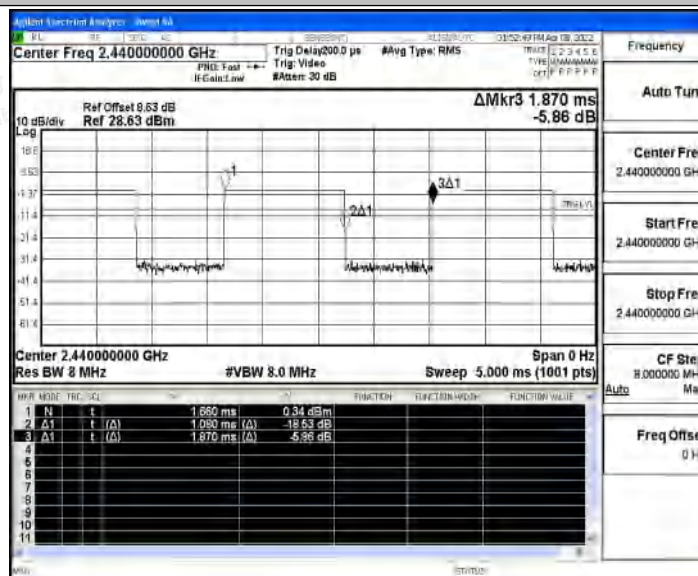
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BLE_2M_Ant1_2402



BLE_2M_Ant1_2440



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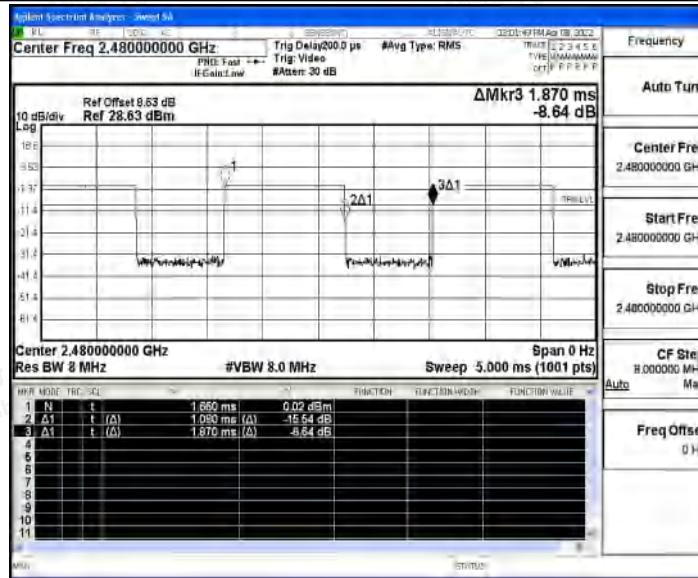
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BLE_2M_Ant1_2480



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A.7 Emissions in Restricted Bands

Test Result

TestMode	Antenna	ChName	Channel	Detector	Freq. [MHz]	Result [dBm]	Limit [dBm]	Result [dBuV/m]	Limit [dBuV/m]	Verdict
BLE_1M	Ant1	Low	2402	AV	2310.000	-48.19	≤-41.20	47.01	≤54	PASS
				AV	2370.035	-47.65	≤-41.20	47.55	≤54	PASS
				AV	2390.000	-47.84	≤-41.20	47.36	≤54	PASS
				Peak	2310.000	-38.76	≤-21.20	56.44	≤74	PASS
				Peak	2324.465	-36.74	≤-21.20	58.46	≤74	PASS
				Peak	2390.000	-38.24	≤-21.20	56.96	≤74	PASS
		High	2480	AV	2483.500	-46.85	≤-41.20	48.35	≤54	PASS
				AV	2483.520	-46.85	≤-41.20	48.35	≤54	PASS
				AV	2500.000	-47.39	≤-41.20	47.81	≤54	PASS
				Peak	2483.500	-36.76	≤-21.20	58.44	≤74	PASS
				Peak	2483.680	-35.85	≤-21.20	59.35	≤74	PASS
				Peak	2500.000	-37.5	≤-21.20	57.70	≤74	PASS
BLE_2M	Ant1	Low	2402	AV	2310.000	-48.18	≤-41.20	47.02	≤54	PASS
				AV	2389.880	-47.41	≤-41.20	47.79	≤54	PASS
				AV	2390.000	-47.58	≤-41.20	47.62	≤54	PASS
				Peak	2310.000	-39.47	≤-21.20	55.73	≤74	PASS
				Peak	2345.990	-36.3	≤-21.20	58.90	≤74	PASS
				Peak	2390.000	-38.68	≤-21.20	56.52	≤74	PASS
		High	2480	AV	2483.500	-44.91	≤-41.20	50.29	≤54	PASS
				AV	2483.520	-44.91	≤-41.20	50.29	≤54	PASS
				AV	2500.000	-47.11	≤-41.20	48.09	≤54	PASS
				Peak	2483.500	-37.46	≤-21.20	57.74	≤74	PASS
				Peak	2495.520	-36.02	≤-21.20	59.18	≤74	PASS
				Peak	2500.000	-37.68	≤-21.20	57.52	≤74	PASS

Note:

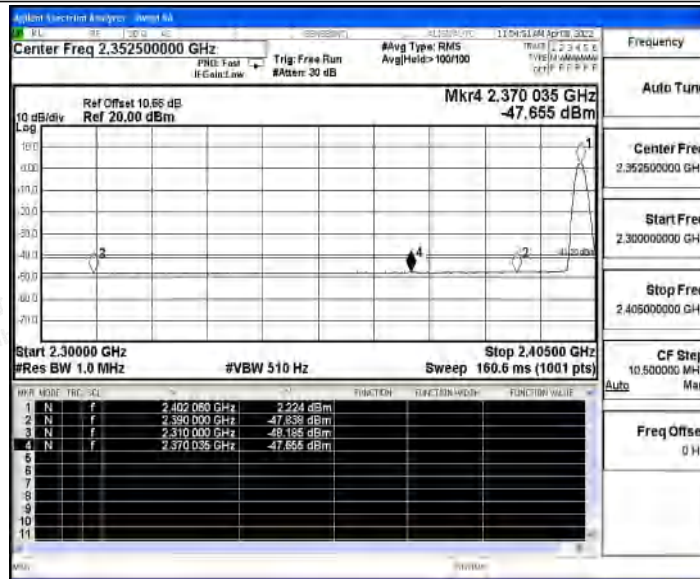
1. The Antenna Gain is compensated in the graph.
2. The limit in dBm for average detector is conversion from 54dBuV/m, according to 15.209(a). The limit in dBm for peak detector is 20dB above the limit of average detector in dBm.



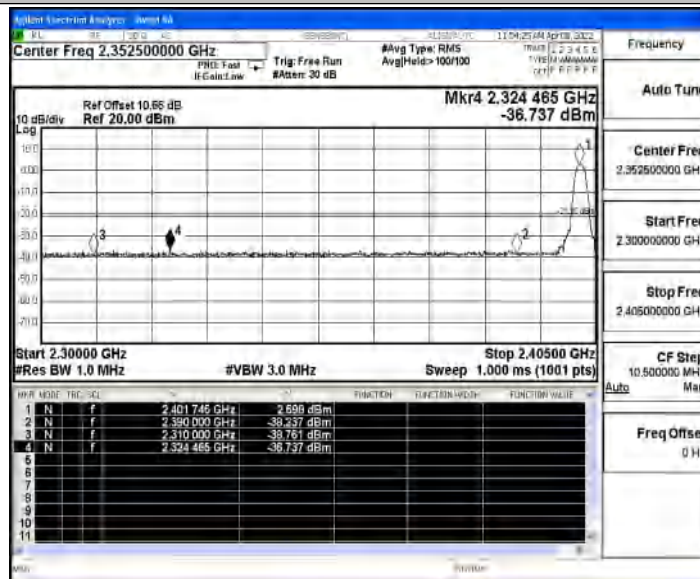


Test Graphs

BLE_1M_Ant1_Low_2402_AV



BLE_1M_Ant1_Low_2402_Peak



BLE_1M_Ant1_High_2480_AV

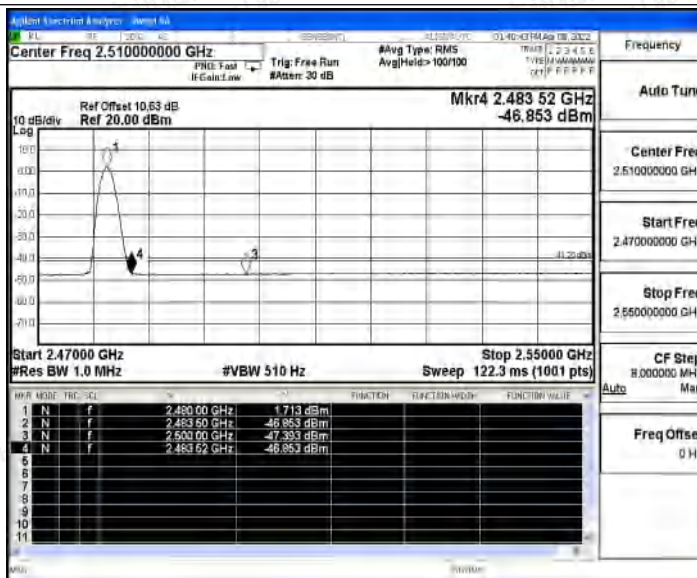


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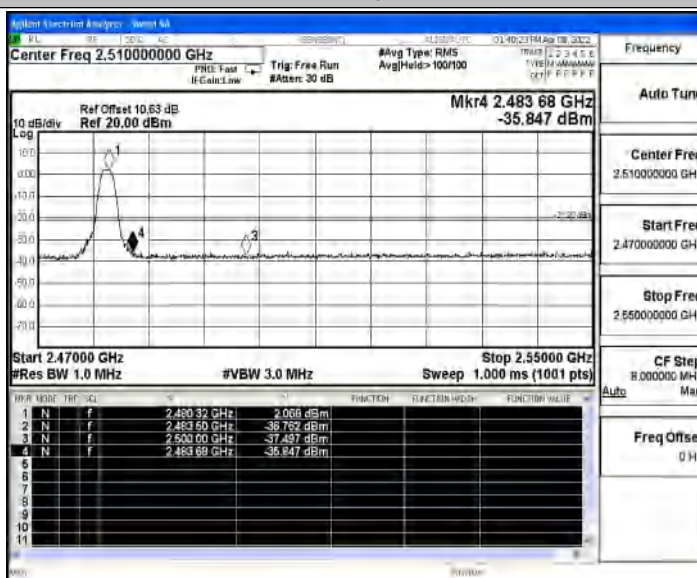
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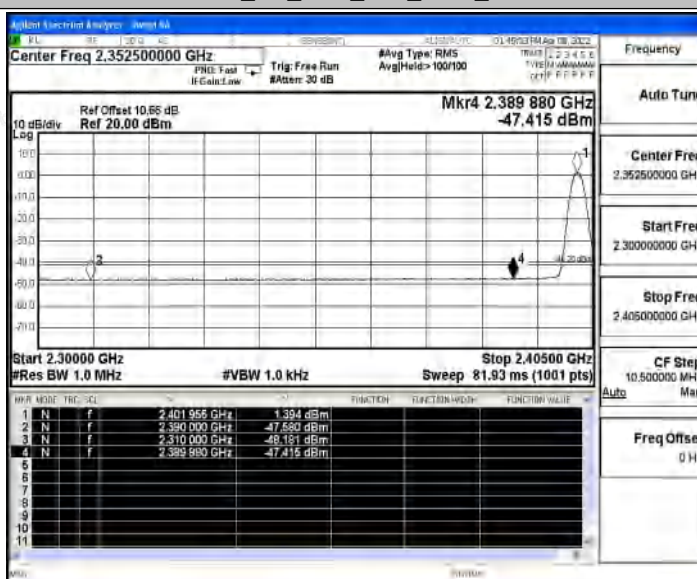
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BLE_1M_Ant1_High_2480_Peak



BLE_2M_Ant1_Low_2402_AV



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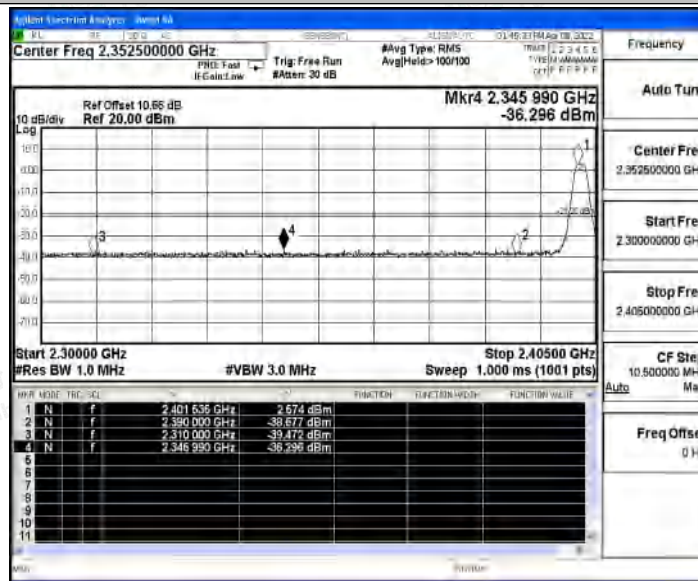
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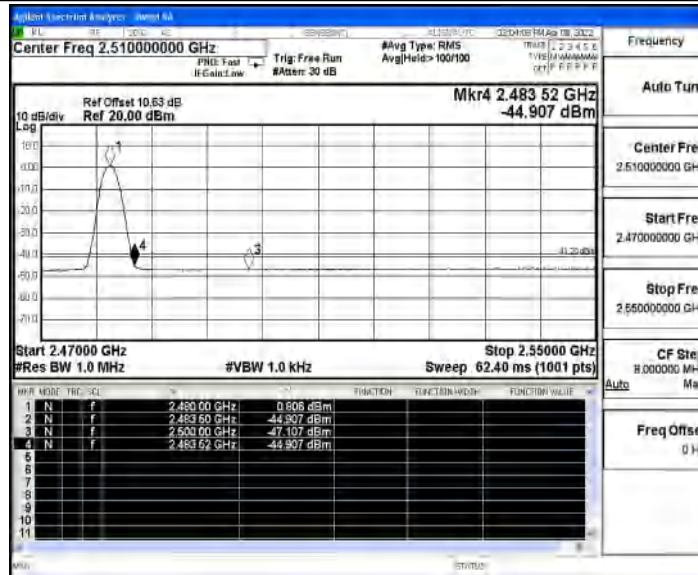
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BLE_2M_Ant1_Low_2402_Peak



BLE_2M_Ant1_High_2480_AV



BLE_2M_Ant1_High_2480_Peak



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