Audix Technology Corp.
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FCC 15.407 NII
5GHz Test Report

for

LG Electronics USA

111 Sylvan Avenue, North Building, Englewood Cliffs, NJ 07632

Product Name : Wireless Audio Module
Model Name : WL1BKT22
Brand LG
FCC ID : BEJ-WL1BKT22

Prepared by: : AUDIX Technology Corporation,
EMC Department

Testing Laboratory
1724

The test report is based on a single evaluation of one sample of the above-mentioned products. It does not imply an assessment of the whole production and does not permit the use of the test lab logo.

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TEST REPORT

Applicant	:	LG Electronics USA
Manufacturer	:	LG Electronics Inc.
Factory	:	Shenzhen Shi Xinzhongxin Technology Co., Ltd.
EUT Description		
(1) Product	:	Wireless Audio Module
(2) Model	:	WL1BKT22
(3) Brand	:	LG
(4) Power Supply	:	DC 3.3V

Applicable Standards:

Title 47 FCC CFR Part 15 Subpart E

Audix Technology Corp. tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report.
Audix Technology Corp. does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens and samples.

Date of Report: 2022. 06. 07

Reviewed by: Sabrina Wang (Sabrina Wang/Administrator)

Approved by: Johnny Hsueh (Johnny Hsueh/Section Manager)

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1. REVISION RECORD OF TEST REPORT

Edition No	Issued Date	Revision Summary	Report Number
0	2022. 06. 07	Original Report	EM-F220289

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2. SUMMARY OF TEST RESULTS

Rule	Description	Results
15.207	Conducted Emission	**PASS**
15.205/15.209/15.407	Undesirable Emissions Limits: Radiated Band Edge and Radiated Spurious Emission	**PASS**
15.407(a)(5)/15.407(e)	Emission/Occupied Bandwidth	**PASS**
15.407(a)	Maximum Output Power	**PASS**
15.407(a)	Power Spectral Density	**PASS**
15.407	Frequency Stability	**PASS**
15.203	Antenna Requirement	**Compliance**
Note: The uncertainties value is not used in determining the result.		

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3. GENERAL INFORMATION

3.1. Description of Application

Applicant	LG Electronics USA 111 Sylvan Avenue, North Building, Englewood Cliffs, NJ 07632
Manufacturer	LG Electronics Inc. 222, LG-ro, Jinwi-myeon Pyeongtaek-Si, Gyeonggi-Do, 17709 Republic of Korea
Factory	Shenzhen Shi Xinzhongxin Technology Co., Ltd. Block A1, Donghuan Industrial Zone, Nanpu Road Shajing Street, Baoan District, Shenzhen, China
Product	Wireless Audio Module
Model	WL1BKT22
Brand	LG

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3.2. Description of EUT

Test Model	WL1BKT22
Serial Number	N/A
Power Rating	DC 3.3V
Software Version	2.0
Hardware version	TX_V1.7
RF Features	GFSK
Transmit Type	1T1R
Device Category	☐Outdoor Access Point ☐Fixed point-to-point Access Point ■Indoor Access Point ■Mobile and Portable client device
Test Sample	Sample No. / Test Item / Firmware 02 / AC Conduction, Radiated / N/A 03 / RF Conducted / N/A
Sample Status	Trial sample
Date of Receipt	2022. 04. 12
Date of Test	2022. 04. 14 ~ 06. 01
Interface Ports of EUT	None
Accessories Supplied	None

3.3. Reference Test Guidance

KDB 789033 D02 General UNII Test Procedures New Rules v02r01
ANSI C63.10:2013

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3.4. Antenna Information

No.	Antenna Part Number	Manufacturer	Antenna Type	Frequency (MHz)	Max Gain(dBi)
1.	Antenna #1	N/A	PCB Printing Antenna	5150	2.66
				5170	2.87
				5190	2.94
				5210	3.25
				5230	3.23
				5250	3.11
				5450	2.98
				5470	2.98
				5490	2.77
				5500	2.59
				5750	2.38
				5770	2.38
				5790	2.48
				5810	2.33
				5830	2.37
				5850	2.22
No.	Antenna Part Number	Manufacturer	Antenna Type	Frequency (MHz)	Max Gain(dBi)
2.	Antenna #2	N/A	PCB Printing Antenna	5150	3.57
				5170	3.35
				5190	3.42
				5210	3.69
				5230	4.00
				5250	3.94
				5450	3.32
				5470	3.48
				5490	3.37
				5500	3.42
				5750	3.98
				5770	4.05
				5790	3.79
				5810	3.94
				5830	4.20
				5850	4.09

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3.5. EUT Specifications Assessed in Current Report

Modulation	U-NII Band	Fundamental Range (MHz)	Channel Number	Data Rate
GFSK	1	5155-5228	74	2 Mbps
	3	5731-5828	98	

Channel List									
U-NII Band 1									
Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)
0	5155	16	5171	32	5187	48	5203	64	5219
1	5156	17	5172	33	5188	49	5204	65	5220
2	5157	18	5173	34	5189	50	5205	66	5221
3	5158	19	5174	35	5190	51	5206	67	5222
4	5159	20	5175	36	5191	52	5207	68	5223
5	5160	21	5176	37	5192	53	5208	69	5224
6	5161	22	5177	38	5193	54	5209	70	5225
7	5162	23	5178	39	5194	55	5210	71	5226
8	5163	24	5179	40	5195	56	5211	72	5227
9	5164	25	5180	41	5196	57	5212	73	5228
10	5165	26	5181	42	5197	58	5213		
11	5166	27	5182	43	5198	59	5214		
12	5167	28	5183	44	5199	60	5215		
13	5168	29	5184	45	5200	61	5216		
14	5169	30	5185	46	5201	62	5217		
15	5170	31	5186	47	5202	63	5218		
Channel List									
U-NII Band 3									
Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)
0	5731	21	5752	42	5773	63	5794	84	5815
1	5732	22	5753	43	5774	64	5795	85	5816
2	5733	23	5754	44	5775	65	5796	86	5817
3	5734	24	5755	45	5776	66	5797	87	5818
4	5735	25	5756	46	5777	67	5798	88	5819
5	5736	26	5757	47	5778	68	5799	89	5820
6	5737	27	5758	48	5779	69	5800	90	5821
7	5738	28	5759	49	5780	70	5801	91	5822
8	5739	29	5760	50	5781	71	5802	92	5823
9	5740	30	5761	51	5782	72	5803	93	5824
10	5741	31	5762	52	5783	73	5804	94	5825
11	5742	32	5763	53	5784	74	5805	95	5826
12	5743	33	5764	54	5785	75	5806	96	5827
13	5744	34	5765	55	5786	76	5807	97	5828
14	5745	35	5766	56	5787	77	5808		
15	5746	36	5767	57	5788	78	5809		
16	5747	37	5768	58	5789	79	5810		
17	5748	38	5769	59	5790	80	5811		
18	5749	39	5770	60	5791	81	5812		
19	5750	40	5771	61	5792	82	5813		
20	5751	41	5772	62	5793	83	5814		

Note: Test modes are presented at section 3.7.

3.6. Description of Key Components

None

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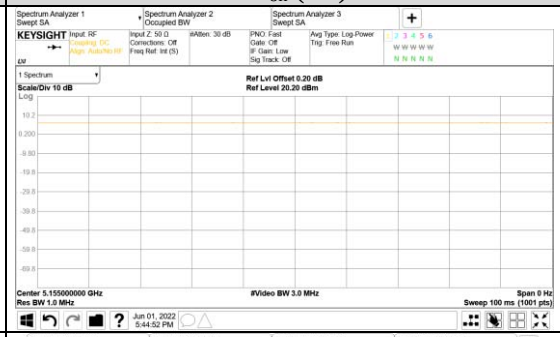
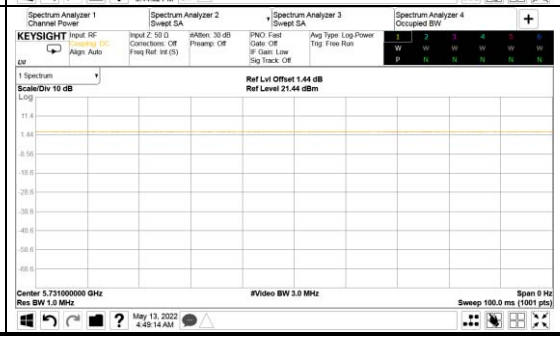
3.7. Test Configuration

Mode	TX_{on} (ms)	TX_{on+off} (ms)	Duty Cycle (x)	Duty Cycle Factor [10log(1/x)] (dB)
GFSK (U-NII Band 1)	N/A Note 2	N/A Note 2	1	N/A
GFSK (U-NII Band 3)	N/A Note 2	N/A Note 2	1	N/A

Note: 1. When duty cycle is less than 98% (0.98) that duty cycle factor 10log(1/x) is needed to add in conducted test items measured in average detector.
2. N/A is because the duty cycle is 100%, TX_{on} and TX_{on+off} cannot be measured.

Mode	TX_{on} (ms)	$T_{on}+T_{off}$(ms)
GFSK (U-NII Band 1)		---
GFSK (U-NII Band 3)		---

AC Conduction
Normal operation

Modulation: GFSK (2 Mbps)			
Item		Antenna	Test Frequency (MHz)
Radiated Test Case	Radiated Spurious Emission (30MHz~1GHz)	#1, #2	5190
	Radiated Band Edge Note1	#1, #2	5155, 5731, 5828
	Radiated Spurious Emission Note1	#1	5155, 5190, 5228, 5731, 5779, 5828
		#2	5155, 5190, 5228, 5731, 5779, 5828

Modulation: GFSK (2 Mbps)			
Item		Antenna	Test Frequency (MHz)
Conducted Test Case	Emission/Occupied Bandwidth	#1, #2	5155, 5190, 5228, 5731, 5779, 5828
	Maximum output power	#1, #2	5155, 5190, 5228, 5731, 5779, 5828
	Power spectral density	#1, #2	5155, 5190, 5228, 5731, 5779, 5828

Note 1: ☐Mobile Device
■Portable Device, and 3 axis were assessed. The worst scenario for Radiated Spurious Emission as follow:
■Lie ☐Side ☐Stand

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3.8. Output Power Setting

Mode	U-NII Band	Centre Frequency (MHz)	Power Setting	
			Antenna #1	Antenna #2
GFSK	1	5155	Default	Default
		5190	Default	Default
		5228	Default	Default
	3	5731	Default	Default
		5779	Default	Default
		5828	Default	Default

3.9. Tested Supporting System List

3.9.1. Support Peripheral Unit

No.	Product	Brand	Model No.	Serial No.	Approval
1.	DC Power Supply	TOP WARD	6303A	N/A	N/A
2.	USB Jig	N/A	N/A	N/A	N/A
3.	Notebook PC (Power Line & Radiated Emission Used)	ASUS	E403SA	N/A	N/A
	Notebook PC (RF Conducted Used)	hp	TPN-Q189	5CD8175992	Contains FCC ID: PD93168NG Contains IC: 1000M-3168NG

3.9.2. Cable Lists

No.	Cable Description Of The Above Support Units
1.	AC Power Cord: Unshielded, Detachable, 1.8m DC Cable x2 : Unshielded, Detachable, 1.0m DC Cable x2: Unshielded, Undetectable, 0.1m
2.	USB Cable: Unshielded, Undetectable, 1.5m Data Cable x3: Unshielded, Undetectable, 0.1m
3.	(Power Line & Radiated Emission Used) Adapter: ASUS, M/N AD890526 DC Power Cord: Unshielded, Undetectable, 2.0m
	(RF Conducted Used) Adapter: hp, M/N PPP-012C-S DC Power Cord: Unshielded, Undetectable, 2.0m, Bonded a ferrite core AC Power Cable: Unshielded, Detectable, 1.0m

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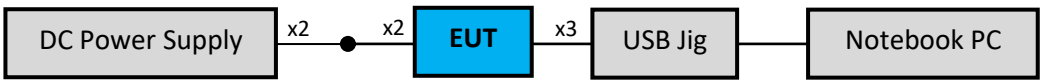
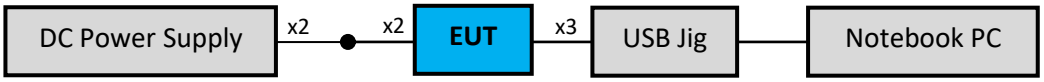
3.10.Setup Configuration

3.10.1. EUT Configuration for Power Line & Radiated Emission



3.10.2. EUT Configuration for RF Conducted Test Items



3.11.Operating Condition of EUT

Test program "SSCOM V5.13.1" is used for enabling EUT WLAN function under continues transmitting and choosing data rate/ channel.

3.12.Description of Test Facility

Name of Test Firm	Audix Technology Corporation / EMC Department No. 491, Zhongfu Rd., Linkou Dist., New Taipei City 244, Taiwan Tel: +886-2-26092133 Fax: +886-2-26099303 Website : www.audixtech.com Contact e-mail: attemc_report@audixtech.com
Accreditations	The laboratory is accredited by following organizations under ISO/IEC 17025:2017 (1) NVLAP(USA) NVLAP Lab Code 200077-0 (2) TAF(Taiwan) No. 1724
Test Facilities	FCC OET Designation Number under APEC MRA by NCC is : TW1724 ISED CAB Identifier Number under APEC TEL MRA by NCC is TW1724 (1) No.8 Shielded Room (2) No.1 3m Semi Anechoic Chamber

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3.13.Measurement Uncertainty

Test Items/Facilities			Frequency Range	Uncertainty
Conduction Test			9kHz-150kHz	±3.7dB
			150kHz-30MHz	±3.4dB
Radiation Test	☒	No.1 3m Semi Anechoic Chamber	30MHz-200MHz, 3m, Horizontal	±3.8dB
			200MHz-1000MHz, 3m, Horizontal	±4.1dB
			30MHz-200MHz, 3m, Vertical	±4.5dB
			200MHz-1000MHz, 3m, Vertical	±4.5dB
			1GHz-6GHz, 3m	±4.7dB
			6GHz-18GHz, 3m	±4.1dB
			18GHz-40GHz, 3m	±3.52dB
	☐	No.3 3m Semi Anechoic Chamber	30MHz-200MHz, 3m, Horizontal	±3.9dB
			200MHz-1000MHz, 3m, Horizontal	±4.2dB
			30MHz-200MHz, 3m, Vertical	±4.3dB
			200MHz-1000MHz, 3m, Vertical	±4.5dB
	☐	No.4 3m Semi Anechoic Chamber	30MHz-200MHz, 3m, Horizontal	±4.1dB
			200MHz-1000MHz, 3m, Horizontal	±4.5dB
			30MHz-200MHz, 3m, Vertical	±4.4dB
			200MHz-1000MHz, 3m, Vertical	±4.8dB
			1GHz-6GHz, 3m	±5.0dB
			6GHz-18GHz, 3m	±4.7dB
	☐	No.5 3m Semi Anechoic Chamber	30MHz-200MHz, 3m, Horizontal	±4.2dB
			200MHz-1000MHz, 3m, Horizontal	±4.3dB
			30MHz-200MHz, 3m, Vertical	±4.3dB
			200MHz-1000MHz, 3m, Vertical	±4.7dB
			1GHz-6GHz, 3m	±4.8dB
			6GHz-18GHz, 3m	±4.5dB

Remark：Uncertainty = $ku_c(y)$

Test Items	Uncertainty
Bandwidth	± 0.2kHz
Maximum output power	± 0.33dB
Power spectral density	± 0.13dB

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4. MEASUREMENT EQUIPMENTLIST

4.1. Conducted Emission Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Test Receiver	R&S	ESR3	101774	2022.01.11	1 Year
2.	FOUR-LINE V-NETWORK	R&S	ENV432	101567	2021.04.21	1 Year
3.	L.I.S.N.	Kyoritsu	KNW-407	8-855-9	2021.12.19	1 Year
4.	Pulse Limiter	R&S	ESH3-Z2	100354	2021.12.23	1 Year
5.	Digital Thermo-Hygro Meter	iMax	HTC-1	No.8 S/R	2022.04.14	1 Year
6.	Coaxial Cable	Yeida	RG/58AU	CE-08	2021.09.13	1 Year
7.	Test Software	Audix	e3	V6.120619c	N.C.R.	N.C.R.

4.2. Radiated Emission Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A-526	MY53400071	2021.09.19	1 Year
2.	Spectrum Analyzer	Keysight	N9010B	MY59071380	2022.03.10	1 Year
3.	Test Receiver	R&S	ESCI7	100746	2021.12.28	1 Year
4.	Amplifier	HP	8447D	2944A06305	2022.01.05	1 Year
5.	Amplifier	HP	8449B	3008A01284	2022.06.01	1 Year
6.	Amplifier	Keysight	83051A	MY53010042	2021.07.30	1 Year
7.	Loop Antenna	ETS-LINDGREN	6512	00035867	2021.09.29	2 Years
8.	Bilog Antenna	TESEQ	CBL6112D	33821	2021.07.16	1 Year
9.	Horn Antenna	ETS-Lindgren	3115	00114104	2022.04.27	1 Year
10.	Horn Antenna	COM-POWER	AH-840	101092	2022.01.06	1 Year
11.	5G Notch Filter	Microware Circuits	N0452502	459775	2022.05.04	1 Year
12.	5G Notch Filter	Microware Circuits	N0257881	459776	2021.08.16	1 Year
13.	Coaxial Cable	MIYAZAKI	5D2W	RE-11	2022.01.20	1 Year
14.	Coaxial Cable	HUBER+SUHNER	SUCOFLEX 106	RE-14	2022.01.20	1 Year
15.	Coaxial Cable	HUBER+SUHNER	SUCOFLEX 102	RE-30	2021.08.25	1 Year
16.	Digital Thermo-Hygro Meter	iMax	HTC-1	No.1 3m A/C	2022.04.14	1 Year
17.	Test Software	Audix	e3	V6.120619c	N.C.R.	N.C.R.

4.3. RF Conducted Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Keysight	N9030B	MY61330403	2021.12.21	1 Year
2.	Power Meter	Anritsu	ML2487A	6K00005406	2022.04.26	1 Year
3.	Power Sensor	Anritsu	MA2491A	030873	2022.04.27	1 Year
4.	Digital Thermo-Hygro Meter	iMax	HTC-1	RF-03	2022.04.14	1 Year

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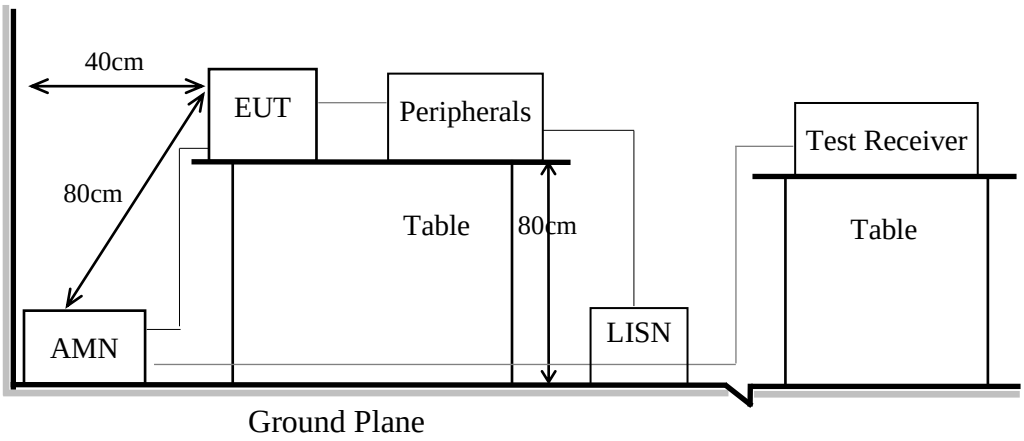
5. CONDUCTED EMISSION

5.1. Block Diagram of Test Setup

5.1.1. Block Diagram of EUT

Indicated as section 3.10

5.1.2. Shielded Room Setup Diagram



5.2. Conducted Emission Limit

Frequency	Conducted Limit	
	Quasi-Peak Level	Average Level
150kHz ~ 500kHz	66 ~ 56 dBμV	56 ~ 46 dBμV
500kHz ~ 5MHz	56 dBμV	46 dBμV
5MHz ~ 30MHz	60 dBμV	50 dBμV

Remark1.: If the average limit is met when using a Quasi-Peak detector, the measurement using the average detector is not required.

2.: The lower limit applies to the band edges.

5.3. Test Procedure

5.3.1. To set up the EUT as indicated in ANSI C63.10. The EUT was placed on the table which has 80 cm height to the ground and 40 cm distance to the conducting wall.

5.3.2. Power supplier of the EUT was connected to the AC mains through an Artificial Mains Network (A.M.N.).

5.3.3. The AC power supplies to all peripheral devices must be provided through line impedance stabilization network (L.I.S.N.)

5.3.4. Checking frequency range from 150kHz to 30 MHz and record the emission which does not have 20 dB below limit.

5.4. Test Results

Please refer to Appendix A.

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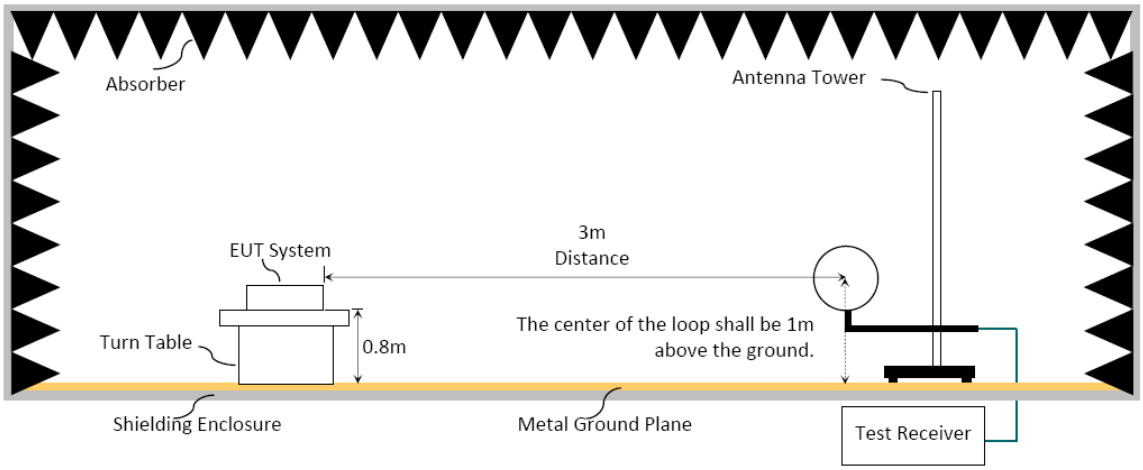
6. RADIATED EMISSION

6.1. Block Diagram of Test Setup

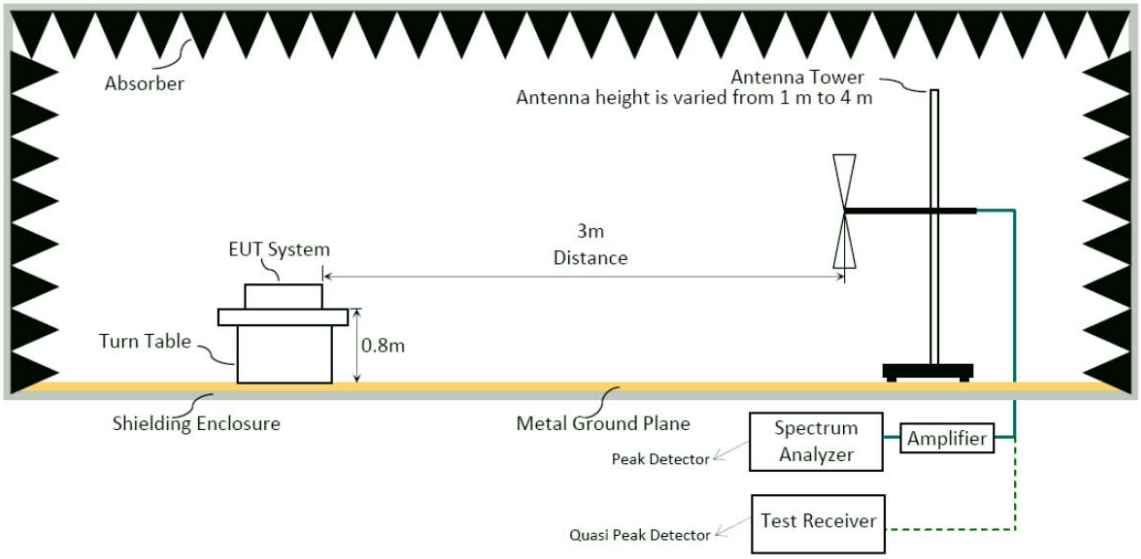
6.1.1. Block Diagram of EUT

Indicated as section 3.10

6.1.2. Setup Diagram for 9kHz-30MHz



6.1.3. Setup Diagram for 30-1000MHz



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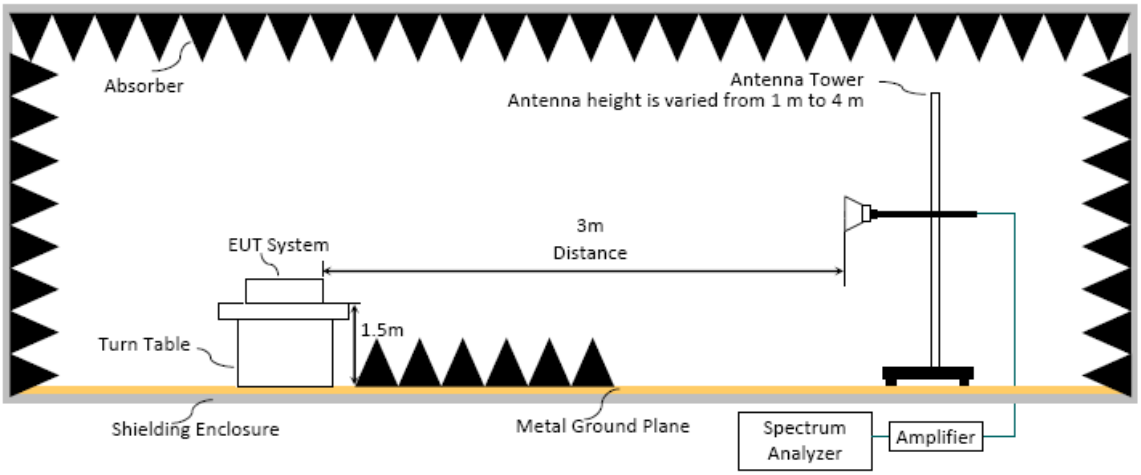
6.1.4. Setup Diagram for above 1GHz



6.2. Radiated Emission Limits

Radiated emissions fall in restricted bands, as defined in Section 15.205 must be in compliance with the radiated emission limits specified in 15.209 as below.

6.2.1. General Limit

Frequency (MHz)	Distance(m)	Limits	
		dBμV/m	μV/m
0.009 - 0.490	300	67.6-20 log f(kHz)	2400/f kHz
0.490 - 1.705	30	87.6-20 log f(kHz)	24000/f kHz
1.705 - 30	30	29.5	30
30 - 88	3	40.0	100
88- 216	3	43.5	150
216- 960	3	46.0	200
Above 960	3	54.0	500
Above 1000	3	74.0 dBμV/m (Peak) 54.0 dBμV/m (Average)	

Remark：(1) dBμV/m = 20 log (μV/m)
(2) The tighter limit applies to the edge between two frequency bands.
(3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
(4) Fundamental and emission fall within operation band are exempted from this section.
(5) Pursuant to ANSI C63.10: 6.6.4.3,if the maximized peak measured value complies with the average limit, then it is unnecessary to perform an average measurement.

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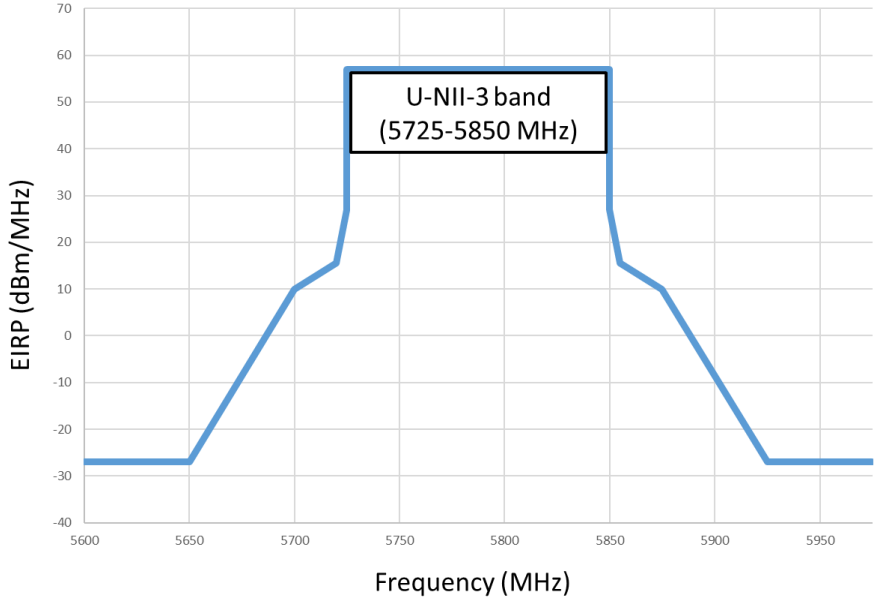
6.2.2. Limit for non-restricted frequency above 1 GHz

Frequency Band (MHz)	E.I.R.P. Limit	Field Strength Limit at 3 m
5150 to 5250	-27 dBm	68.2 dBμV/m
5250 to 5350		68.2 dBμV/m
5470 to 5725		68.2 dBμV/m

Note: Field Strength at 3 m= E.I.R.P. + 95.2 dB

Frequency Band (MHz)	Field Strength Limit at 3 m	
5725 to 5850	☒	15.407(b)(4)(i) All emissions shall be limited to a level of 68.2 dBμV/mat 75 MHz or more above or below the band edge increasing linearly to 105.2dBμV/m at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 110.8 dBμV/m at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 68.2 dBμV/m at the band edge.
	☐	15.407(b)(4)(ii) ,compliance with the emission limits in § 15.247(d) Shall be at least 30dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power,. Attenuation below the general limits specified in §15.209(a) is not required. In addition,radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c))



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6.3. Test Procedure

Frequency Range 9kHz~30MHz:
The EUT setup on the turntable which has 0.8 m height to the ground. The turn table rotated 360 degrees and antenna fixed to 1 m to find the maximum emission level.
In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

(1) RBW = 9kHz with peak and average detector.

(2) Detector: average and peak (9kHz-490kHz)
Q.P. (490kHz-30MHz)

Frequency Range 30MHz ~ 40GHz:
The EUT setup on the turn table which has 80cm (for 30-1000MHz) and 1.5m (for above 1GHz) height to the ground. The turn table rotated 360 degrees and antenna varied from 1 m to 4 m to find the maximum emission level. Both horizontal and vertical polarization are required. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

Frequency below 1GHz:
Spectrum Analyzer is used for pre-testing with following setting:

(1)RBW = 120kHz

(2)VBW ≥ 3 x RBW.

(3)Detector = Peak.

(4)Sweep time = auto.

(5)Trace mode = max hold.

(6)Allow sweeps to continue until the trace stabilizes.

Note 1: When peak-detected value is lower than limit that the measurement using the Q.P. detector is not required, otherwise using Q.P. for final measurement.

Note 2: When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds.

Frequency above 1GHz to 10th harmonic(up to 40 GHz):
Peak Detector:

(1)RBW = 1MHz

(2)VBW ≥ 3 x RBW.

(3)Detector = Peak.

(4)Sweep time = auto.

(5)Trace mode = max hold.

(6)Allow sweeps to continue until the trace stabilizes.

Note: When peak-detected value is lower than limit that the measurement using the average detector is not required, otherwise using average detector for final measurement.

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Average Detector:

■**Option 1:**

(1)RBW = 1MHz

(2)VBW ≥ 1/ T. (Duty Cycle < 98%, when duty cycle presented in section 3.7)

(3)VBW = set VBW≤ RBW / 100, but not less than 10Hz (Duty Cycle ≥ 98%, when duty cycle presented in section 3.7)

Modulation Type	VBW Setting
GFSK	10 Hz

(4)Detector = Peak.

(5)Sweep time = auto.

(6)Trace mode = max hold.

(7)Allow sweeps to continue until the trace stabilizes.

□**Option 2:**

Average Emission Level(dBμV/m)= Peak Emission Level(dBμV/m)+ DCCF(dB).

6.4. Measurement Result Explanation

■Peak Emission Level(dBμV/m)=Antenna Factor(dB/m) + Cable Loss (dB)– Preamp Gain (dB)+ Reading(dBμV).

■Average Emission Level(dBμV/m)= Antenna Factor(dB/m) + Cable Loss (dB)– Preamp Gain (dB)+ Reading(dBμV).

□Average Emission Level(dBμV/m)= Peak Emission Level(dBμV/m)+ DCCF(dB)
Duty Cycle Correction Factor (DCCF)(dB)= 20log(TX_{on}/TX_{on+off}) presented in section 3.7.

□ERP(dBm)= Peak Emission Level(dBμV/m) -95.2dB-2.14dB

6.5. Test Results

Please refer to Appendix A.

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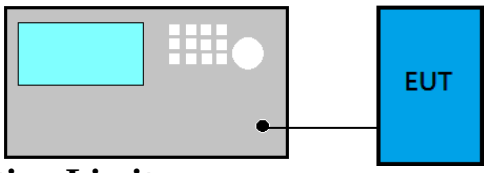
7. EMISSION/OCCUPIED BANDWIDTH

7.1. Block Diagram of Test Setup



7.2. Specification Limits

Frequency Band (MHz)	Limit
5150 to 5250	Reference only
5250 to 5350	
5470 to 5725	
5725 to 5850	≥ 500kHz

7.3. Test Procedure

Following measurement procedure is reference to KDB 789033 D02 General UNII Test Procedures New Rules v02r01:

For Emission Bandwidth

■ Applicable to all bands except to 5725 MHz- 5850 MHz

(1) Set RBW= 1% of the emission bandwidth
(2) Set VBW > RBW
(3) Detector = Peak
(4) Trace mode = max hold
(5) Setting channel bandwidth function x dB to -26 dB to record the final bandwidth.

■ 5725 MHz- 5850 MHz

(1) Set RBW = 100 kHz.
(2) Set the video bandwidth (VBW) ≥ 3 × RBW.
(3) Detector = Peak.
(4) Trace mode = max hold.
(5) Sweep = auto couple.
(6) Allow the trace to stabilize.
(7) Setting channel bandwidth function x dB to -6 dB to record the final bandwidth.

For 99% Occupied Bandwidth

(1) Set Span range 1.5~5 times the OBW
(2) Set RBW close to1% to 5% of OBW.
(3) Set VBW≥3xRBW.
(4) Detector = Peak.
(5) Trace mode = Max hold
(6) Sweep = Auto couple.
(7) Allow the trace to stabilize.

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7.4. Test Results

Please refer to Appendix A

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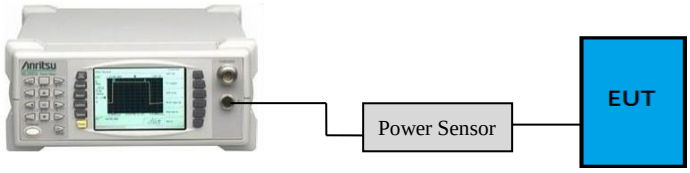
8. MAXIMUM OUTPUT POWER

8.1. Block Diagram of Test Setup



8.2. Specification Limits

Frequency Band (MHz)	Category	Limit
5150 to 5250	Outdoor Access Point	1 W(30 dBm)/ Max e.i.r.p. ≤125 mW(21 dBm) at any elevation angle above 30 degrees as measured from the horizon
	Fixed point-to-point Access Point	1 W(30 dBm)
	Indoor Access Point	1 W(30 dBm)
	Mobile and Portable client device	250 mW(24 dBm)
5250 to 5350	N/A	250 mW or 11 dBm + 10 log B[Note1]
5470 to 5725		250 mW or 11 dBm + 10 log B [Note1]
5725 to 5850		1 W(30 dBm)

Note 1: B is the 26 dB emission bandwidth, which presented in section 7 and appendix A.1.

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8.3. Test Procedure

Following measurement procedure is reference to KDB 789033 D02 General UNII Test Procedures New Rules v02r01:

■**Method AVGPM (Measurement using an RF average power meter):**

EUT is connected to power sensor and record the maximum average output power and duty cycle factor is added when duty cycle presented in section 3.7 is < 98%.

□**Method AVGSA-2 (Spectrum channel power) for 802.11ac-VHT80/160, 802.11ax-HE80/160 modes only**

(1) Set span to at least 1.5 times the OBW
(2) Set RBW = 1 MHz
(3) Set the video bandwidth (VBW) ≥ 3 MHz.
(4) Detector = RMS.
(5) Trace mode = trace average at least 100 traces
(6) Sweep = auto couple.
(7) Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function with band limits set equal to the OBW band edges.
(8) Duty cycle factor is added when duty cycle presented in section 3.7 is < 98%.

8.4. Test Results

Please refer to Appendix A

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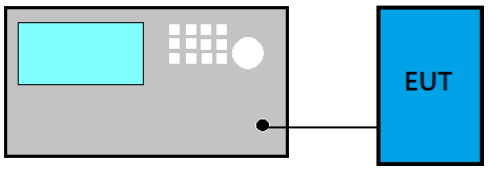
9. POWER SPECTRAL DENSITY

9.1. Block Diagram of Test Setup



9.2. Specification Limits

Frequency Band (MHz)	Category	Limit
5150 to 5250	Outdoor Access Point	17dBm/MHz
	Fixed point-to-point Access Point	
	Indoor Access Point	
	Mobile and Portable client device	11 dBm/MHz
5250 to 5350	N/A	11 dBm/MHz
5470 to 5725		11 dBm/MHz
5725 to 5850		30dBm/500 kHz

9.3. Test Procedure

Following measurement procedure is reference to KDB 789033 D02 General UNII Test Procedures New Rules v02r01:

■Method AVGSA-2 (Spectrum channel power)

(1) Set span to at least 1.5 times the OBW
(2) Set RBW = 1 MHz
(3) Set the video bandwidth (VBW) ≥ 3 MHz.
(4) Detector = RMS.
(5) Trace mode = trace average at least 100 traces
(6) Sweep = auto couple.
(7) Use peak search function to find out the maximum power density.
(8) Duty cycle factor is added when duty cycle presented in section 3.7 is < 98%.

9.4. Test Results

Please refer to Appendix A

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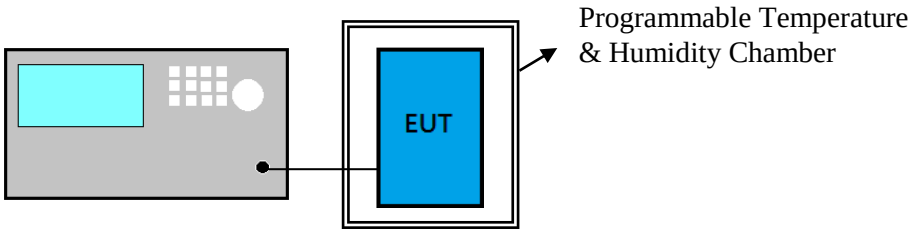
10. FREQUENCY STABILITY

10.1. Block Diagram of Test Setup



10.2. Specification Limits

NONE

10.3. Test Procedure

(1) Frequency: Test frequency.
(2) Span: enough to cover the complete power envelope
(3) RBW: 1MHz(modulation ON) ; 10KHz(CW)
(4) VBW: 1MHz(modulation ON) ; 10KHz(CW)
(5) Detector Mode: Positive Peak
(6) Indication mode: Max hold
(7) Find the peak frequency and take calculate by the formula:
(Measurement Value-declaration frequency)/ declaration frequency)

10.4. Test Results

Please refer to Appendix A

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11. DEVIATION TO TEST SPECIFICATIONS

【NONE】

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APPDNDIX A

TEST DATA AND PLOTS

(Model: WL1BKT22)

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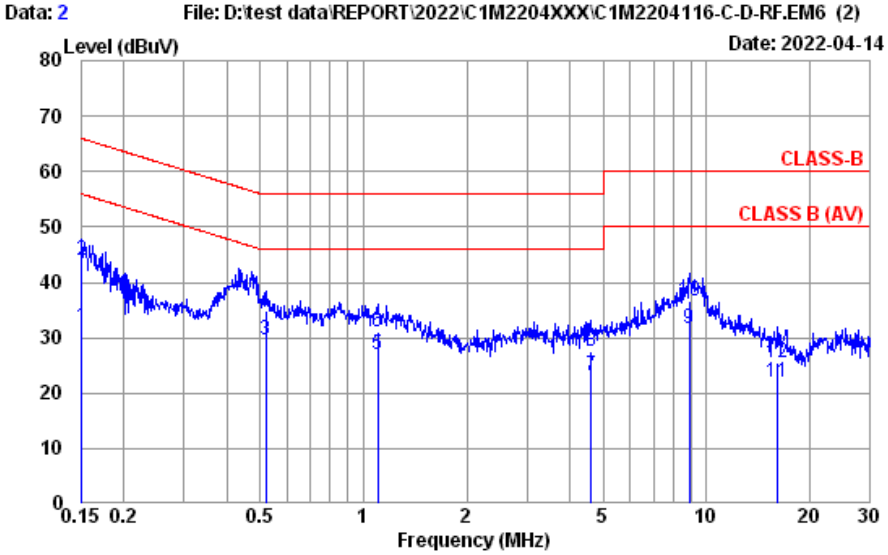
A.1 CONDUCTED EMISSION

Test Date	2022/04/14	Temp./Hum.	24℃/52%
Test Voltage	DC 3.3V	Tested By	Roy Hung



Site No. : No.8 Shielded Room Data No. : 2
Instrument 1 : Receiver ESR3(774)
Instrument 2 : ENV432 (567)(A)|CE-08|ESH3-Z2 (354)
Limit : CLASS-B Phase : NEUTRAL
Environment : 24*C / 52% Engineer : Roy Hung
EUT Model : WLIBKT22 Test Rating : DC3.3V
Test Mode : Operating

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBµV)	Emission Level (dBµV)	Limits (dBµV)	Margin (dB)	Remark
1	0.151	10.41	0.03	9.85	11.69	31.98	55.96	23.98	Average
2	0.151	10.41	0.03	9.85	23.77	44.06	65.96	21.90	QP
3	0.518	10.37	0.03	9.85	9.34	29.59	46.00	16.41	Average
4	0.518	10.37	0.03	9.85	14.62	34.87	56.00	21.13	QP
5	1.100	10.38	0.04	9.85	6.58	26.85	46.00	19.15	Average
6	1.100	10.38	0.04	9.85	10.81	31.08	56.00	24.92	QP
7	4.598	10.48	0.10	9.87	2.75	23.20	46.00	22.80	Average
8	4.598	10.48	0.10	9.87	6.98	27.43	56.00	28.57	QP
9	8.916	10.65	0.13	9.88	10.93	31.59	50.00	18.41	Average
10	8.916	10.65	0.13	9.88	15.89	36.55	60.00	23.45	QP
11	16.055	10.97	0.17	9.92	0.92	21.98	50.00	28.02	Average
12	16.055	10.97	0.17	9.92	4.30	25.36	60.00	34.64	QP

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.
2. If the average limit is met when using a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

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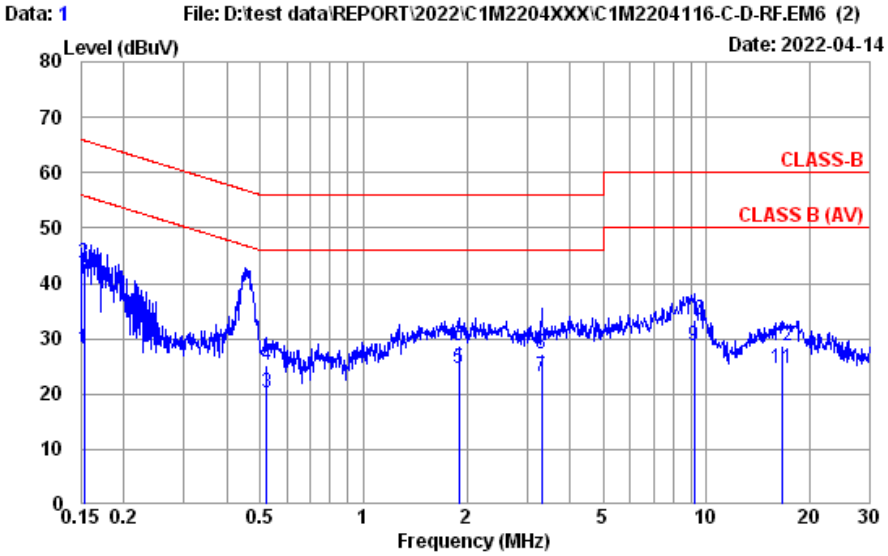
Test Date	2022/04/14	Temp./Hum.	24℃/52%
Test Voltage	DC 3.3V	Tested By	Roy Hung




```
Site No.        : No.8 Shielded Room            Data No.     : 1
Instrument 1    : Receiver ESR3(774)
Instrument 2    : ENV432 (567)(A)|CE-08|ESH3-Z2 (354)
Limit           : CLASS-B                       Phase        : LINE
Environment     : 24*C / 52%                    Engineer     : Roy Hung
EUT Model       : WLIBKT22                      Test Rating  : DC3.3V
Test Mode       : Operating
```

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBµV)	Emission Level (dBµV)	Limits (dBµV)	Margin (dB)	Remark
1	0.153	10.40	0.03	9.85	7.77	28.05	55.82	27.77	Average
2	0.153	10.40	0.03	9.85	23.36	43.64	65.82	22.18	QP
3	0.521	10.37	0.03	9.85	-0.09	20.16	46.00	25.84	Average
4	0.521	10.37	0.03	9.85	5.09	25.34	56.00	30.66	QP
5	1.898	10.40	0.06	9.86	4.36	24.68	46.00	21.32	Average
6	1.898	10.40	0.06	9.86	8.48	28.80	56.00	27.20	QP
7	3.310	10.41	0.08	9.86	2.70	23.05	46.00	22.95	Average
8	3.310	10.41	0.08	9.86	6.76	27.11	56.00	28.89	QP
9	9.204	10.55	0.13	9.88	8.18	28.74	50.00	21.26	Average
10	9.204	10.55	0.13	9.88	12.94	33.50	60.00	26.50	QP
11	16.573	10.71	0.18	9.92	3.82	24.63	50.00	25.37	Average
12	16.573	10.71	0.18	9.92	7.78	28.59	60.00	31.41	QP

```
Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.
         2. If the average limit is met when using a quasi-peak detector,
            the EUT shall be deemed to meet both limits and measurement
            with average detector is unnecessary.
```

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A.2 RADIATED EMISSION

Test Date	2022/05/31	Temp./Hum.	24℃/67%
Test Voltage	DC 3.3V	Tested By	Hua Wu

A.2.1 Emissions within Restricted Frequency Bands

A.2.1.1 Frequency 9kHz~30MHz

The emissions (9kHz~30MHz) not reported for there is no emission be found.

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A.2.1.2 Frequency Below 1GHz

Mode	GFSK (2 Mbps)	U-NII Band	1
Antenna	Antenna #1	Frequency	TX 5190MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
419.94	21.78	5.74	26.66	31.30	32.16	46.00	13.84	Peak
453.89	22.38	6.05	26.89	27.96	29.50	46.00	16.50	Peak
575.14	24.03	6.69	27.38	27.65	30.99	46.00	15.01	Peak
691.54	24.75	7.24	27.46	30.38	34.91	46.00	11.09	Peak
800.18	25.94	7.81	27.32	29.92	36.35	46.00	9.65	Peak
962.17	26.83	8.78	26.82	27.00	35.79	54.00	18.21	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
369.50	20.75	5.20	26.28	28.00	27.67	46.00	18.33	Peak
475.23	22.73	6.23	27.03	30.05	31.98	46.00	14.02	Peak
498.51	23.08	6.42	27.17	31.38	33.71	46.00	12.29	Peak
578.05	24.07	6.70	27.38	29.17	32.56	46.00	13.44	Peak
760.41	25.51	7.61	27.38	29.09	34.83	46.00	11.17	Peak
860.32	26.16	8.20	27.16	28.71	35.91	46.00	10.09	Peak

Mode	GFSK (2 Mbps)	U-NII Band	1
Antenna	Antenna #2	Frequency	TX 5190MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
359.80	20.52	5.07	26.20	30.29	29.68	46.00	16.32	Peak
478.14	22.78	6.26	27.03	28.20	30.21	46.00	15.79	Peak
639.16	24.50	6.97	27.44	27.92	31.95	46.00	14.05	Peak
742.95	25.30	7.51	27.40	28.83	34.24	46.00	11.76	Peak
819.58	26.01	7.94	27.27	27.93	34.61	46.00	11.39	Peak
960.23	26.80	8.76	26.82	28.07	36.81	54.00	17.19	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
417.03	21.73	5.71	26.63	29.51	30.32	46.00	15.68	Peak
495.60	23.06	6.40	27.14	29.64	31.96	46.00	14.04	Peak
573.20	24.00	6.68	27.38	28.28	31.58	46.00	14.42	Peak
752.65	25.42	7.57	27.39	27.94	33.54	46.00	12.46	Peak
820.55	26.02	7.96	27.27	27.53	34.24	46.00	11.76	Peak
965.08	26.85	8.79	26.79	27.54	36.39	54.00	17.61	Peak

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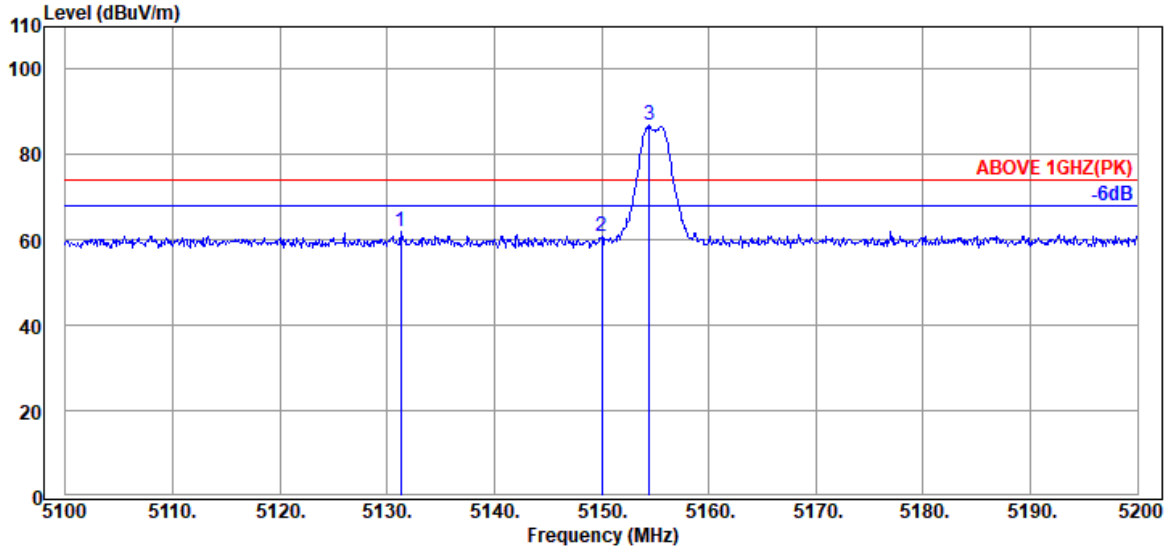
A.2.1.3 Frequency Above 1 GHz to 10th harmonics

Band Edge:

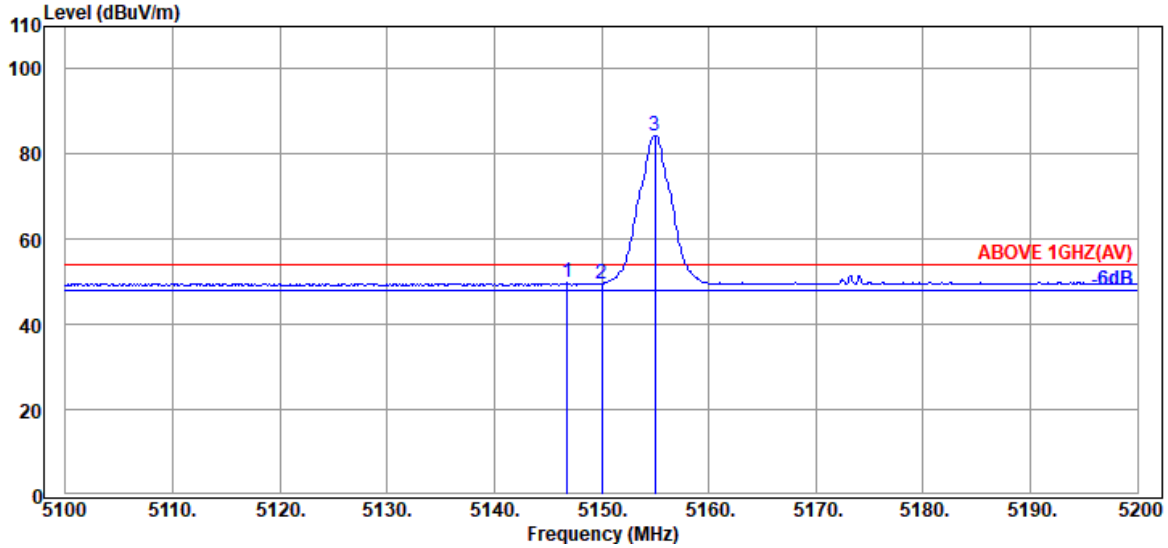
- **Antenna #1**

Mode	GFSK (2 Mbps)	U-NII Band	1
Antenna	Antenna #1	Frequency	TX 5155MHz



Antenna at Horizontal Polarization

	Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
	5131.30	33.70	8.88	31.88	51.21	61.91	74.00	12.09	Peak
	5150.00	33.70	8.88	31.88	50.09	60.79	74.00	13.21	Peak
@	5154.50	33.70	8.88	31.88	76.26	86.96	---	---	Peak



Antenna at Horizontal Polarization

	Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
	5146.80	33.70	8.88	31.88	39.06	49.76	54.00	4.24	Average
	5150.00	33.70	8.88	31.88	38.81	49.51	54.00	4.49	Average
@	5155.00	33.70	8.88	31.88	73.61	84.31	---	---	Average

Remark: The "@" means fundamental frequency, it is ignored in this section.

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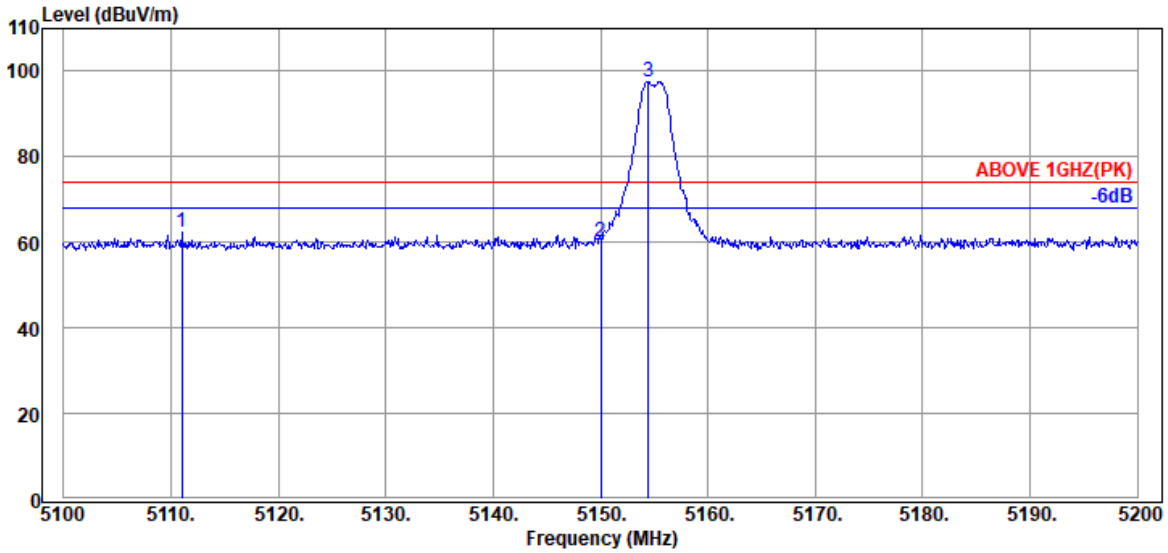
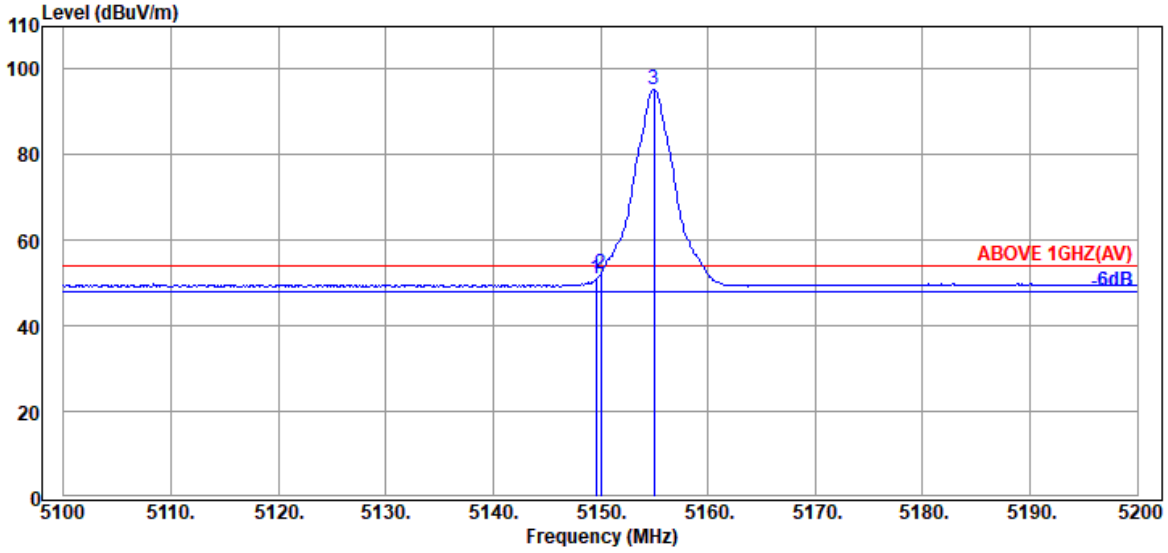
Mode	GFSK (2 Mbps)	U-NII Band	1
Antenna	Antenna #1	Frequency	TX 5155MHz



Antenna at Vertical Polarization

	Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
	5111.00	33.70	8.86	31.88	51.60	62.28	74.00	11.72	Peak
	5150.00	33.70	8.88	31.88	49.30	60.00	74.00	14.00	Peak
@	5154.50	33.70	8.88	31.88	86.93	97.63	---	---	Peak



Antenna at Vertical Polarization

	Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
	5149.60	33.70	8.88	31.88	40.48	51.18	54.00	2.82	Average
	5150.00	33.70	8.88	31.88	41.52	52.22	54.00	1.78	Average
@	5155.00	33.70	8.88	31.88	84.73	95.43	---	---	Average

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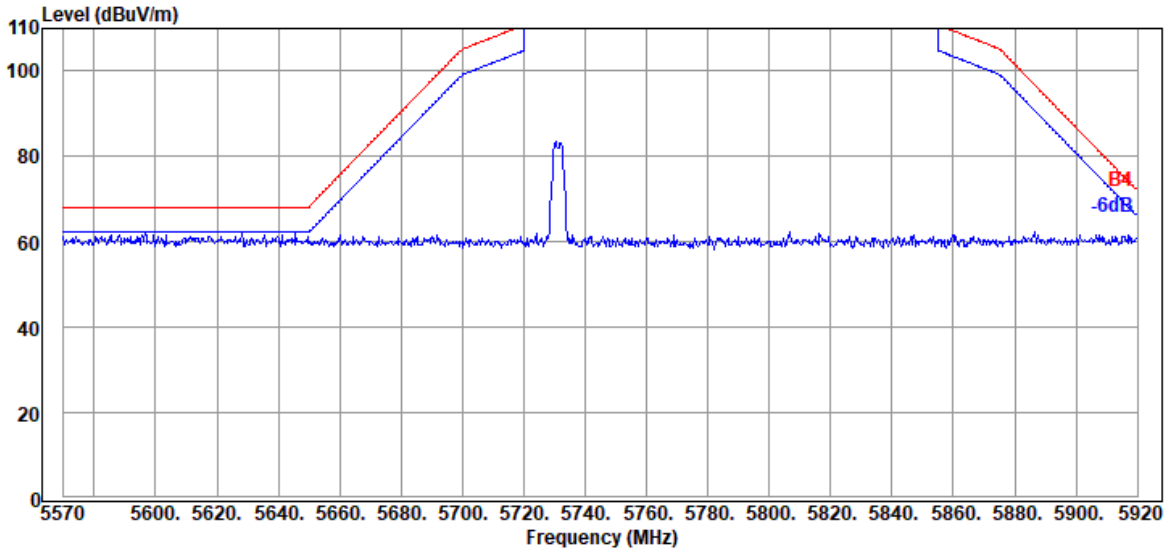
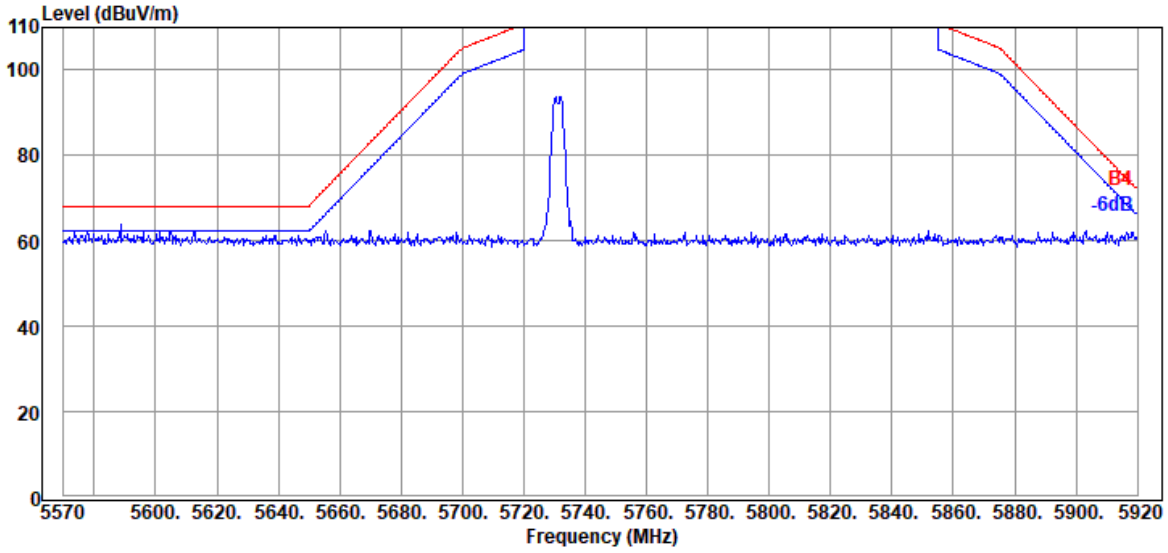
Mode	GFSK (2 Mbps)	U-NII Band	3
Antenna	Antenna #1	Frequency	TX 5731MHz

Antenna at Horizontal Polarization



Antenna at Vertical Polarization



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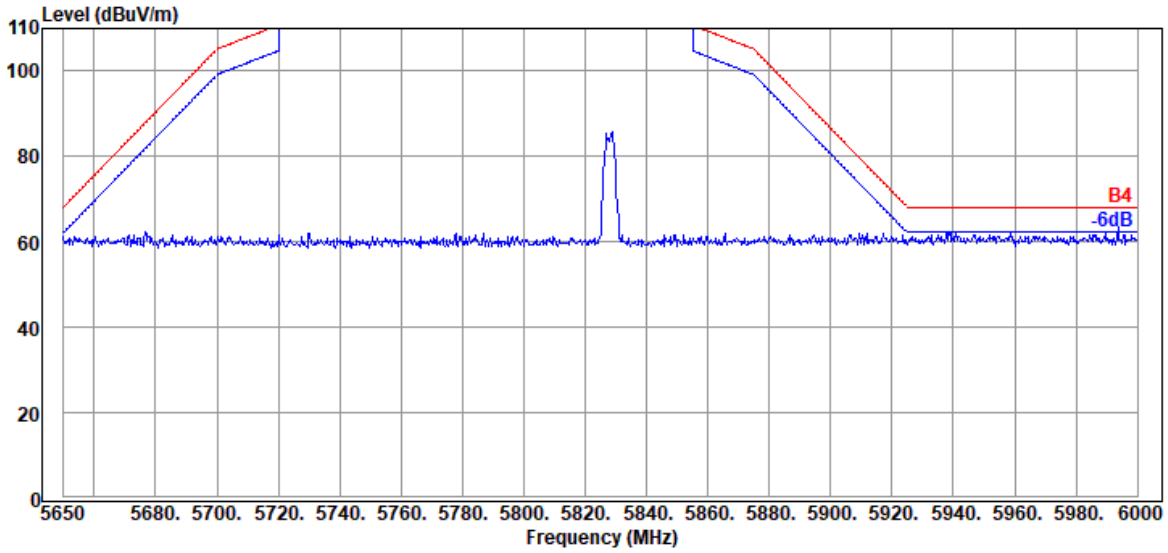
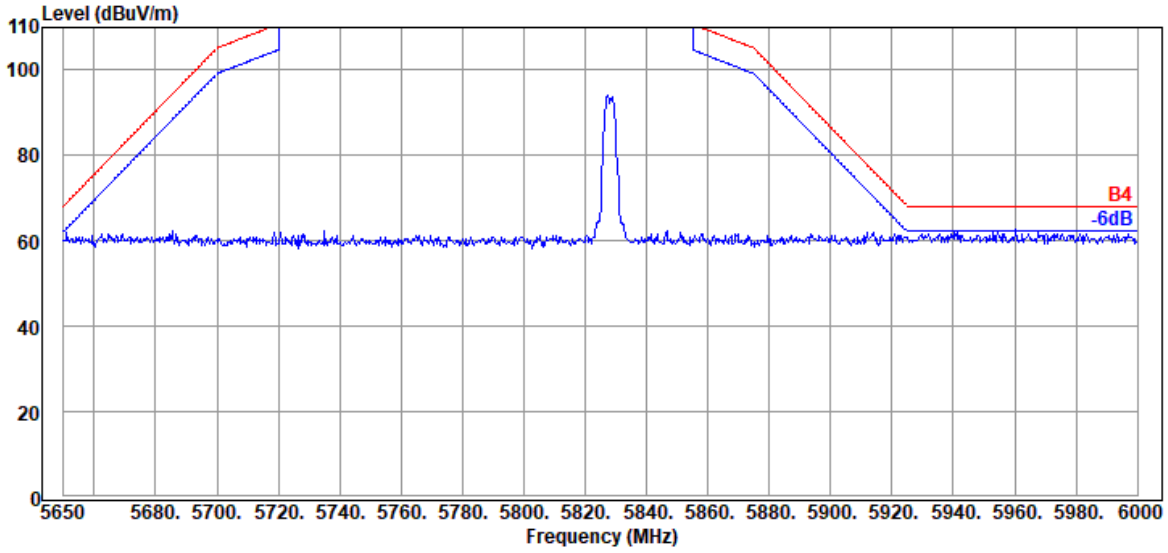
Mode	GFSK (2 Mbps)	U-NII Band	3
Antenna	Antenna #1	Frequency	TX 5828MHz

Antenna at Horizontal Polarization



Antenna at Vertical Polarization



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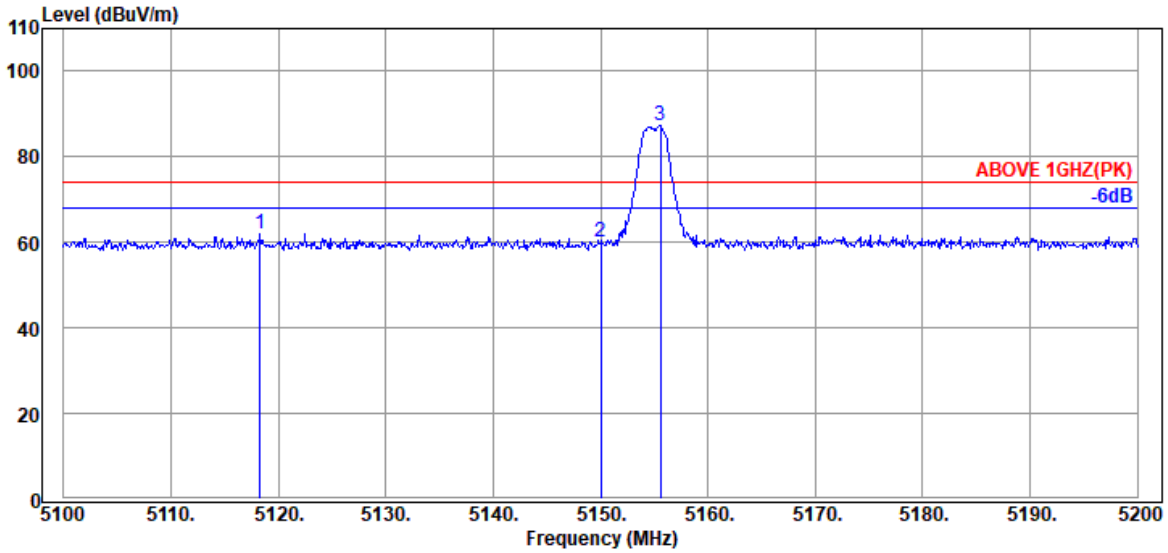
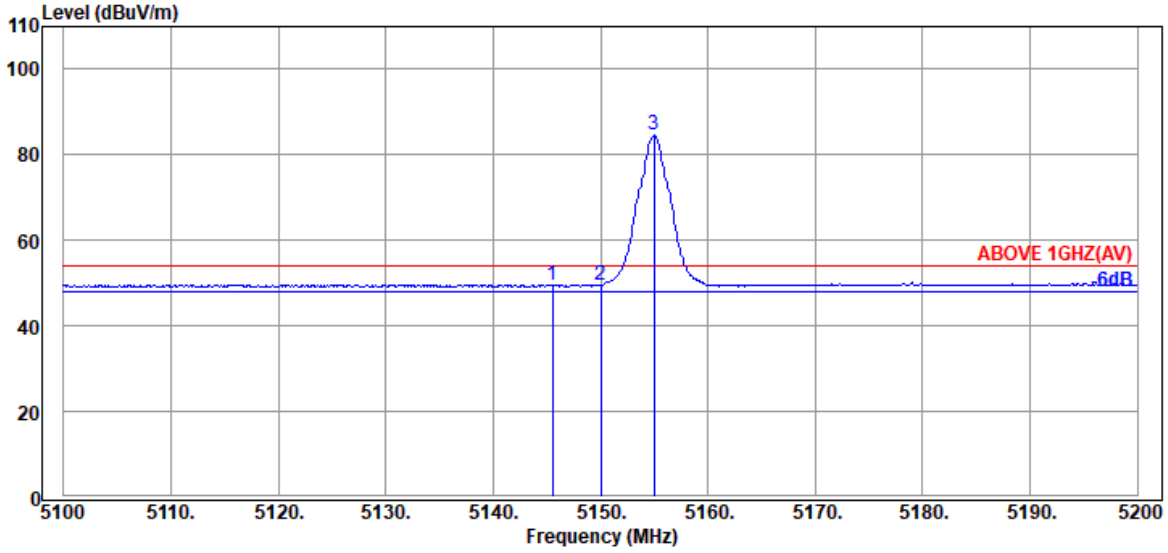
- **Antenna #2**

Mode	GFSK (2 Mbps)	U-NII Band	1
Antenna	Antenna #2	Frequency	TX 5155MHz



Antenna at Horizontal Polarization

	Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
	5118.30	33.70	8.87	31.88	51.34	62.03	74.00	11.97	Peak
	5150.00	33.70	8.88	31.88	49.46	60.16	74.00	13.84	Peak
@	5155.60	33.70	8.88	31.88	76.57	87.27	---	---	Peak



Antenna at Horizontal Polarization

	Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
	5145.50	33.70	8.88	31.88	39.00	49.70	54.00	4.30	Average
	5150.00	33.70	8.88	31.88	38.75	49.45	54.00	4.55	Average
@	5155.00	33.70	8.88	31.88	73.83	84.53	---	---	Average

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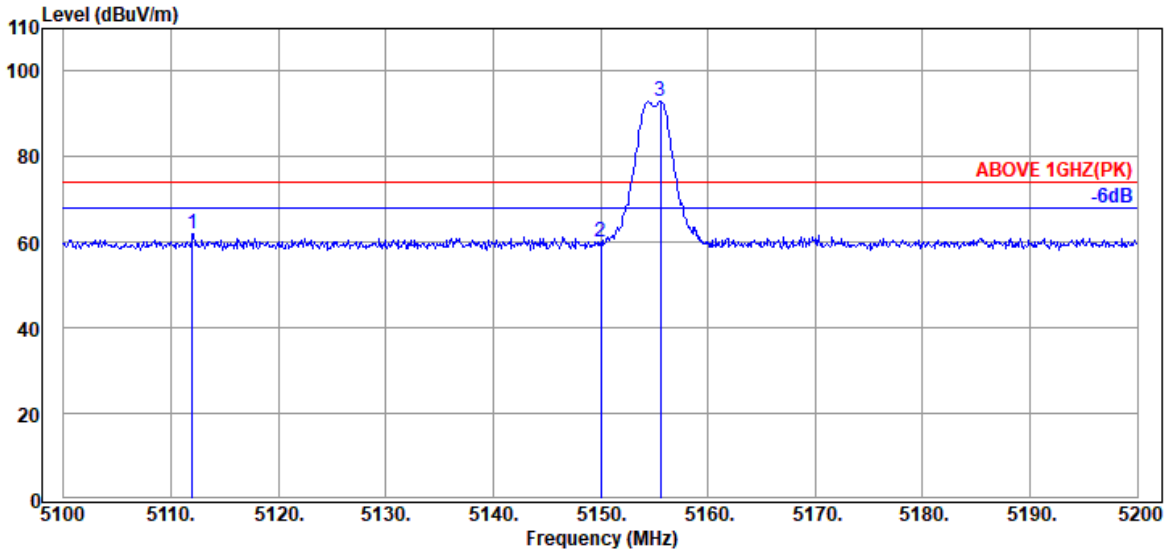
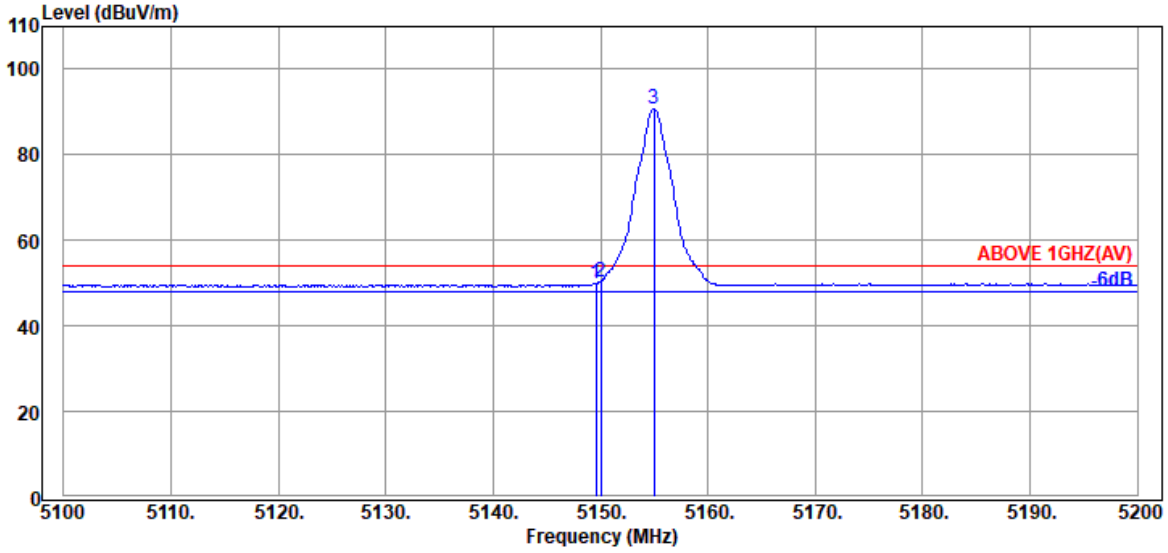
Mode	GFSK (2 Mbps)	U-NII Band	1
Antenna	Antenna #2	Frequency	TX 5155MHz



Antenna at Vertical Polarization

	Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
	5112.00	33.70	8.86	31.88	51.24	61.92	74.00	12.08	Peak
	5150.00	33.70	8.88	31.88	49.46	60.16	74.00	13.84	Peak
@	5155.60	33.70	8.88	31.88	82.26	92.96	---	---	Peak



Antenna at Vertical Polarization

	Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
	5149.60	33.70	8.88	31.88	39.14	49.84	54.00	4.16	Average
	5150.00	33.70	8.88	31.88	39.71	50.41	54.00	3.59	Average
@	5155.00	33.70	8.88	31.88	80.13	90.83	---	---	Average

Remark: The "@" means fundamental frequency, it is ignored in this section.

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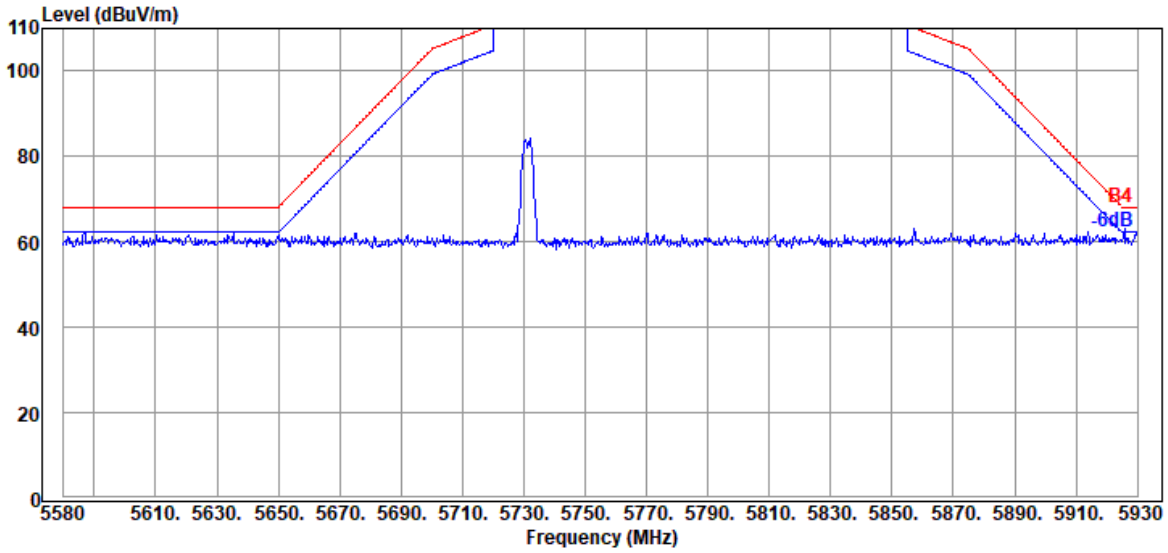
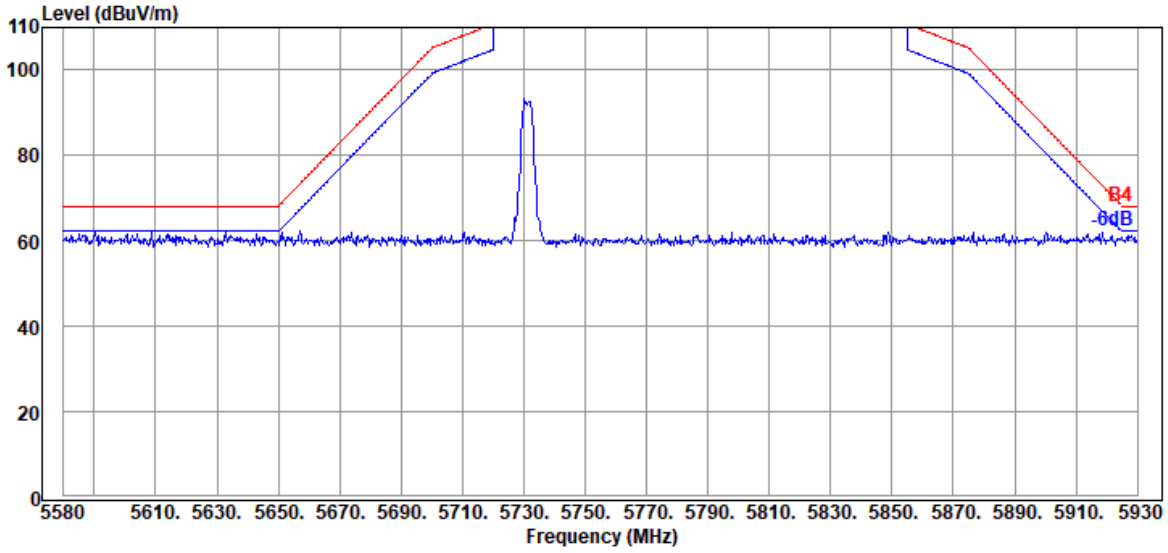
Mode	GFSK (2 Mbps)	U-NII Band	3
Antenna	Antenna #2	Frequency	TX 5731MHz

Antenna at Horizontal Polarization



Antenna at Vertical Polarization



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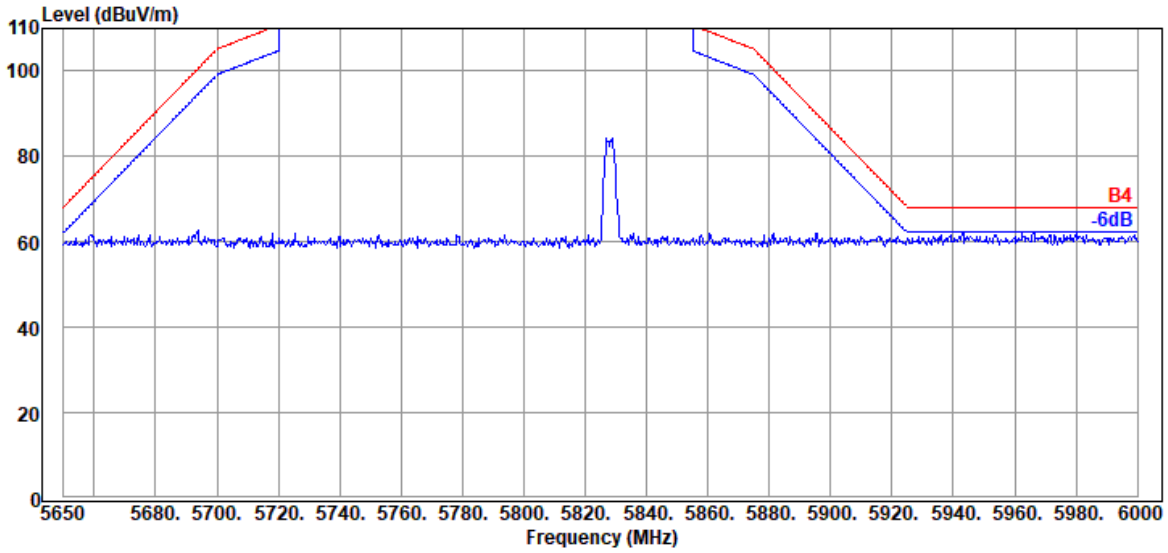
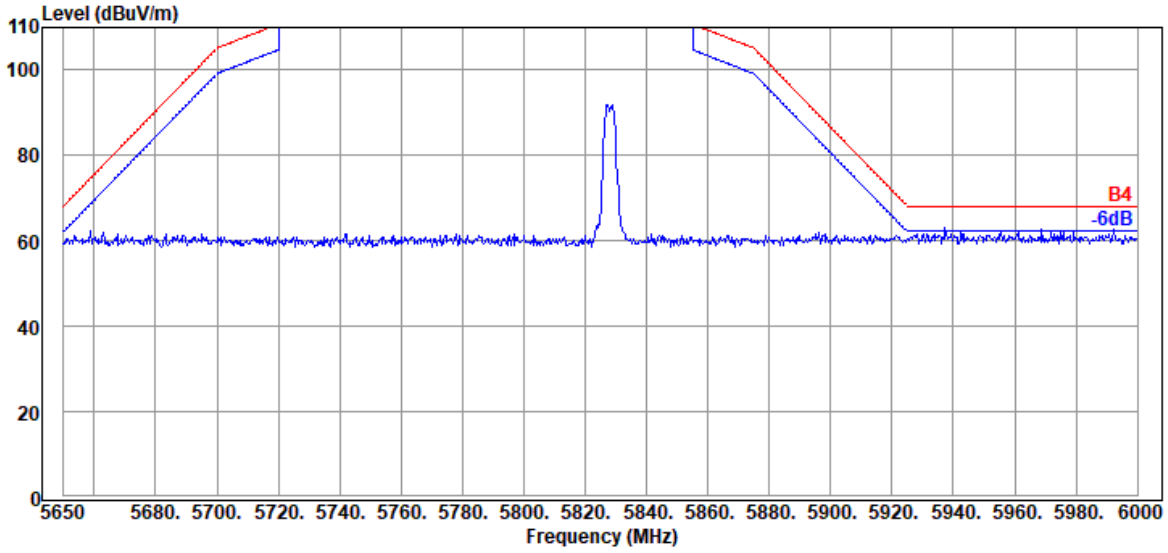
Mode	GFSK (2 Mbps)	U-NII Band	3
Antenna	Antenna #2	Frequency	TX 5828MHz

Antenna at Horizontal Polarization



Antenna at Vertical Polarization



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A.2.2 Emissions outside the frequency band

The emissions (up to 40GHz) not reported for there is no emission be found.

- **Antenna #1**

Mode	GFSK (2 Mbps)	U-NII Band	1
Antenna	Antenna #1	Frequency	TX 5155MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
10310.000	38.10	12.57	33.57	33.00	50.10	54.00	3.90	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
10310.000	38.10	12.57	33.57	32.25	49.35	54.00	4.65	Peak

Mode	GFSK (2 Mbps)	U-NII Band	1
Antenna	Antenna #1	Frequency	TX 5190MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
10380.000	38.20	12.64	33.62	33.65	50.87	54.00	3.13	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
10380.000	38.20	12.64	33.62	32.48	49.70	54.00	4.30	Peak

Mode	GFSK (2 Mbps)	U-NII Band	1
Antenna	Antenna #1	Frequency	TX 5228MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
10456.000	38.20	12.68	33.66	32.91	50.13	54.00	3.87	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
10456.000	38.20	12.68	33.66	33.23	50.45	54.00	3.55	Peak

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Mode	GFSK (2 Mbps)	U-NII Band	3
Antenna	Antenna #1	Frequency	TX 5731MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
11462.000	38.93	13.58	33.72	32.88	51.67	54.00	2.33	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
11462.000	38.93	13.58	33.72	33.53	52.32	54.00	1.68	Peak

Mode	GFSK (2 Mbps)	U-NII Band	3
Antenna	Antenna #1	Frequency	TX 5779MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
11558.000	39.07	13.69	33.69	32.75	51.82	54.00	2.18	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
11558.000	39.07	13.69	33.69	33.35	52.42	54.00	1.58	Peak

Mode	GFSK (2 Mbps)	U-NII Band	3
Antenna	Antenna #1	Frequency	TX 5828MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
11656.000	39.17	13.79	33.66	33.00	52.30	54.00	1.70	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
11656.000	39.17	13.79	33.66	32.59	51.89	54.00	2.11	Peak

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- **Antenna #2**

Mode	GFSK (2 Mbps)	U-NII Band	1
Antenna	Antenna #2	Frequency	TX 5155MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
10310.000	38.10	12.57	33.57	32.46	49.56	54.00	4.44	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
10310.000	38.10	12.57	33.57	32.12	49.22	54.00	4.78	Peak

Mode	GFSK (2 Mbps)	U-NII Band	1
Antenna	Antenna #2	Frequency	TX 5190MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
10380.000	38.20	12.64	33.62	32.76	49.98	54.00	4.02	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
10380.000	38.20	12.64	33.62	32.76	49.98	54.00	4.02	Peak

Mode	GFSK (2 Mbps)	U-NII Band	1
Antenna	Antenna #2	Frequency	TX 5228MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
10456.000	38.20	12.68	33.66	32.46	49.68	54.00	4.32	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
10456.000	38.20	12.68	33.66	32.78	50.00	54.00	4.00	Peak

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Mode	GFSK (2 Mbps)	U-NII Band	3
Antenna	Antenna #2	Frequency	TX 5731MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
11462.000	38.93	13.58	33.72	32.95	51.74	54.00	2.26	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
11462.000	38.93	13.58	33.72	32.38	51.17	54.00	2.83	Peak

Mode	GFSK (2 Mbps)	U-NII Band	3
Antenna	Antenna #2	Frequency	TX 5779MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
11558.000	39.07	13.69	33.69	33.05	52.12	54.00	1.88	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
11558.000	39.07	13.69	33.69	32.75	51.82	54.00	2.18	Peak

Mode	GFSK (2 Mbps)	U-NII Band	3
Antenna	Antenna #2	Frequency	TX 5828MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
11656.000	39.17	13.79	33.66	33.02	52.32	54.00	1.68	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
11656.000	39.17	13.79	33.66	33.31	52.61	54.00	1.39	Peak

A.2.3 Emissions in Non-restricted Frequency Bands

Pursuant to KDB 789033 D02 General UNII Test Procedures New Rules v02r01 that emission levels below the 15.209 general radiated emissions limits is not required.

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A.3 EMISSION/OCCUPIED BANDWIDTH

Test Date	2022/06/01	Temp./Hum.	23℃/59%
Cable Loss	0.20dB	Tested By	Hua Wu
Test Voltage	DC 3.3V		

A.3.1 Emission/Occupied Bandwidth Result

- **Antenna #1**

Mode	U-NII Band	Centre Frequency (MHz)	Bandwidth (MHz)		Limit
			Emission (26dB)	Occupied (99%)	
GFSK (2 Mbps)	1	5155	4.382	2.3738	Reference only
		5190	4.391	2.4022	
		5228	4.388	2.3886	
	U-NII Band	Centre Frequency (MHz)	Bandwidth (MHz)		Limit
			Emission (6dB)	Occupied (99%)	
	3	5731	2.165	4.925	≥ 500kHz
		5779	2.115	4.932	
		5828	2.131	4.929	

- **Antenna #2**

Mode	U-NII Band	Centre Frequency (MHz)	Bandwidth (MHz)		Limit
			Emission (26dB)	Occupied (99%)	
GFSK (2 Mbps)	1	5155	4.384	2.3738	Reference only
		5190	4.391	2.4015	
		5228	4.388	2.3916	
	U-NII Band	Centre Frequency (MHz)	Bandwidth (MHz)		Limit
			Emission (6dB)	Occupied (99%)	
	3	5731	2.119	4.929	≥ 500kHz
		5779	2.268	4.935	
		5828	2.133	4.930	

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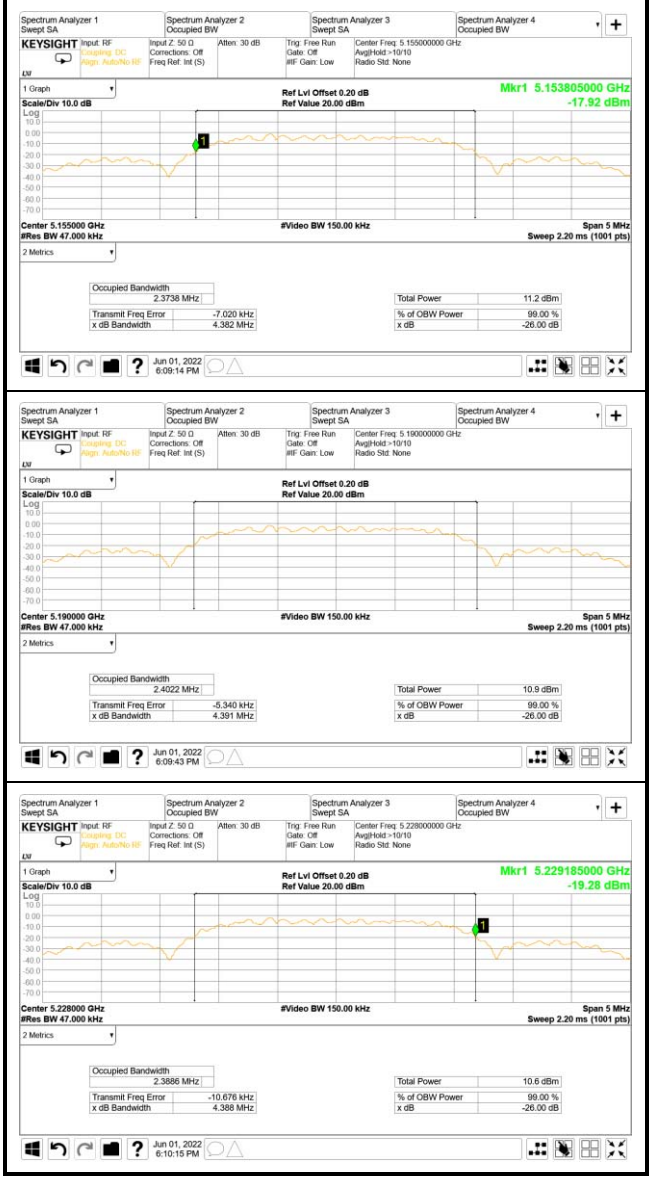
A.3.2 Measurement Plots

- **Antenna #1**

GFSK (2 Mbps)
Antenna #1
U-NII Band 1
Emission (26dB) & Occupied (99%) Bandwidth



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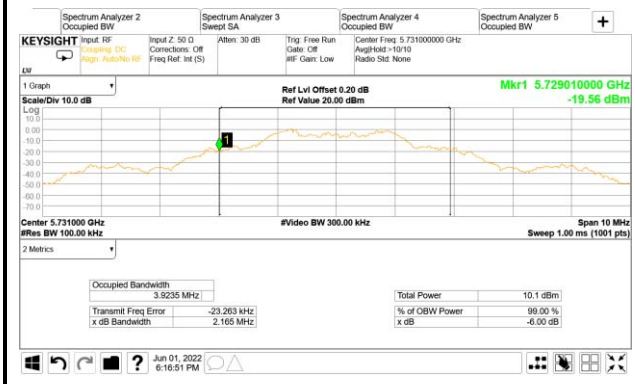
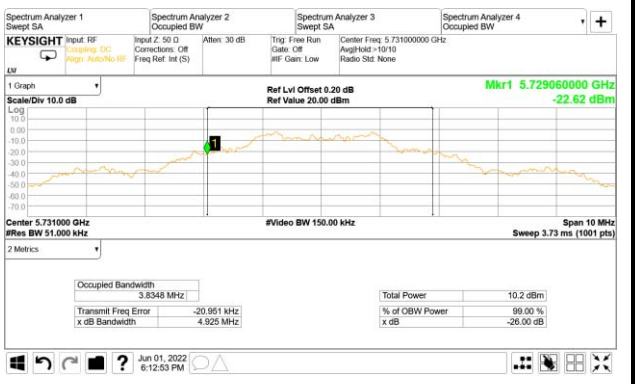
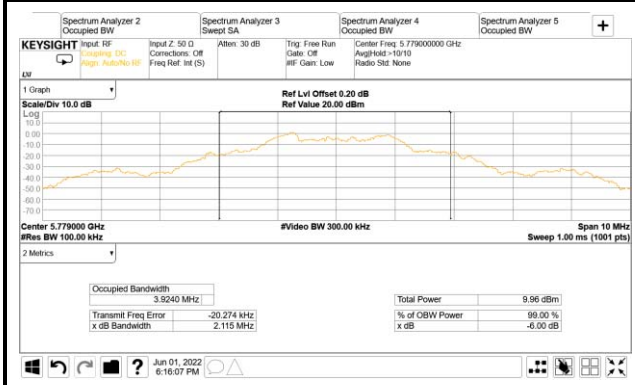
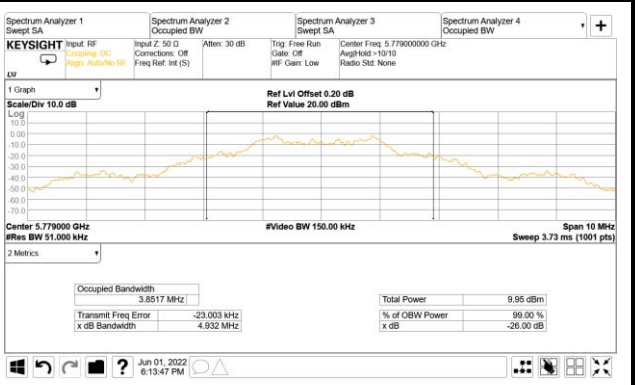
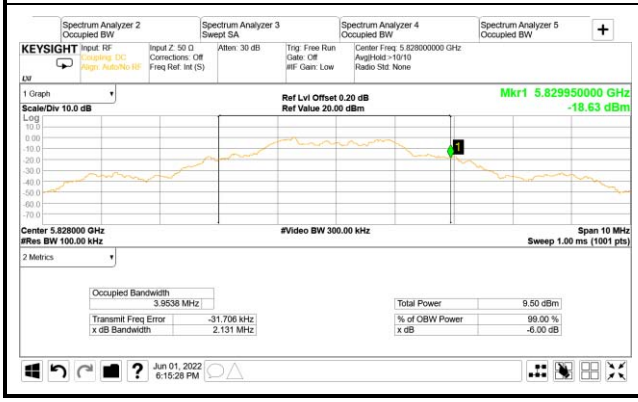
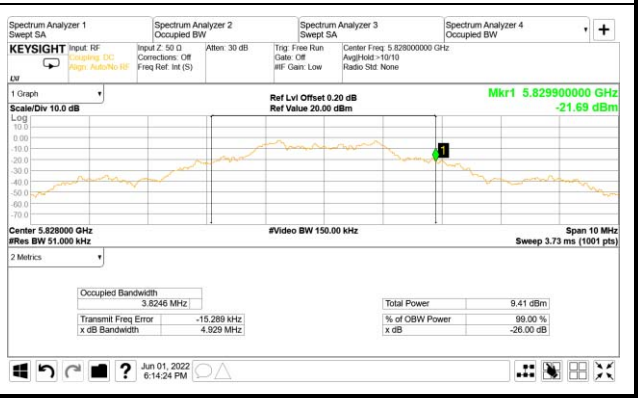
GFSK (2 Mbps)	
Antenna #1	
U-NII Band 3	
Emission (6dB) Bandwidth	Occupied (99%) Bandwidth
	
	
	

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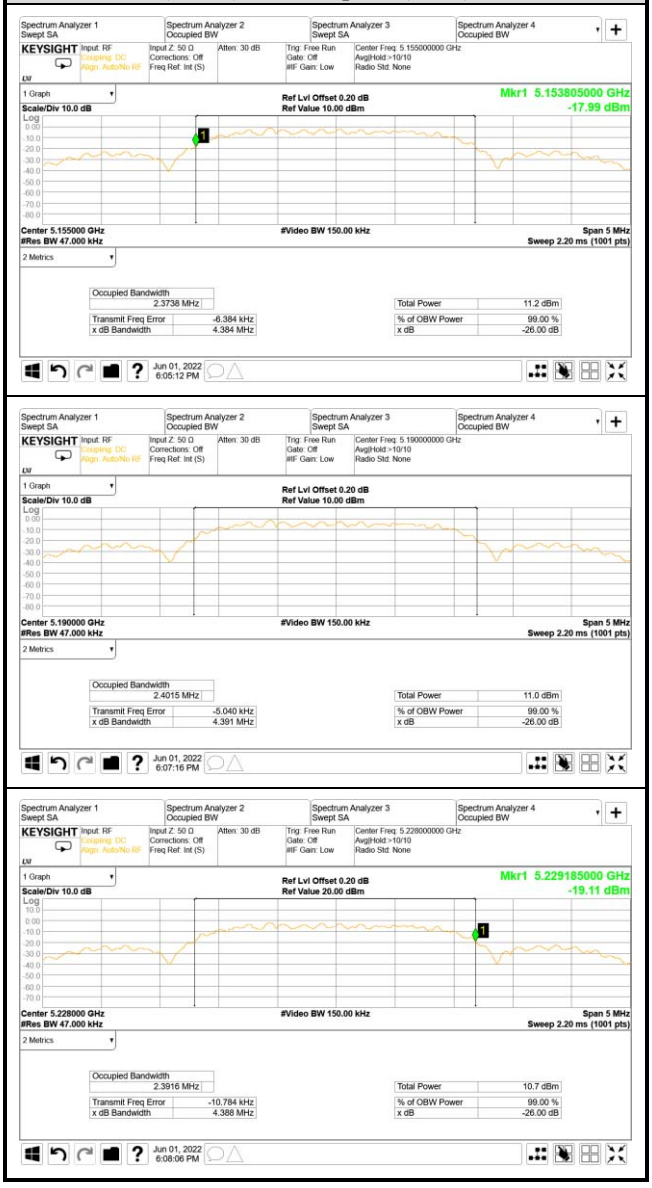
- **Antenna #2**

GFSK (2 Mbps)
Antenna #2
U-NII Band 1
Emission (26dB) & Occupied (99%) Bandwidth



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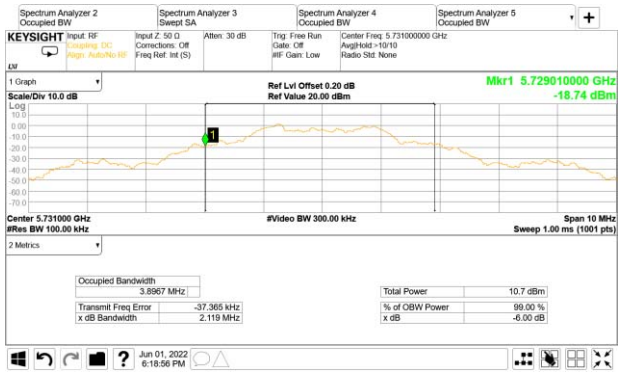
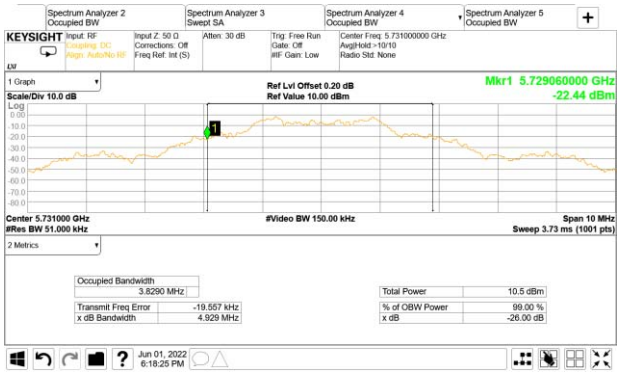
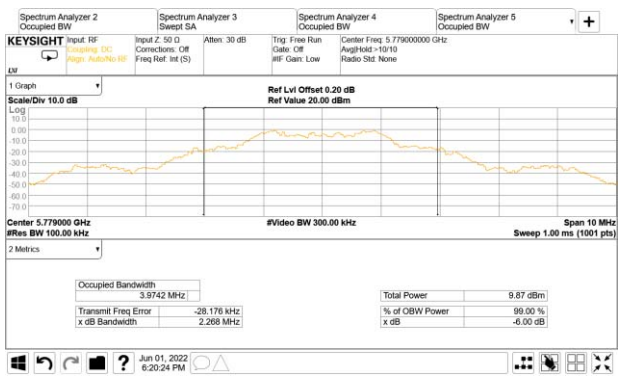
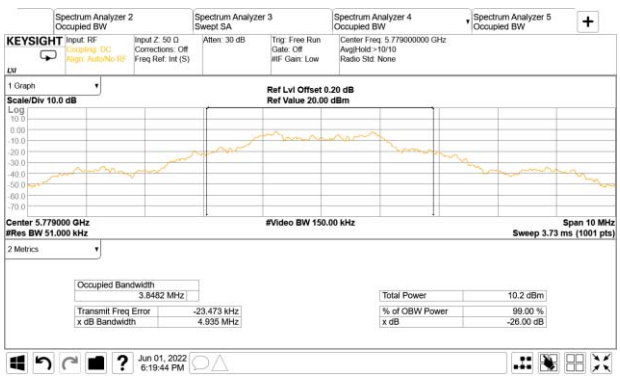
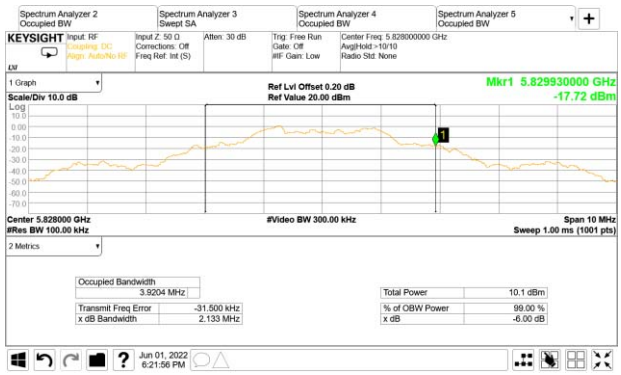
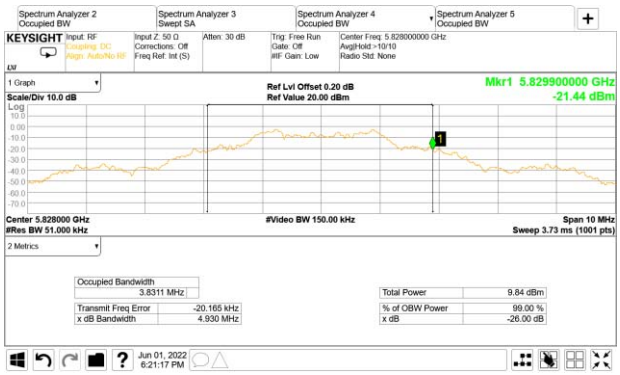
GFSK (2 Mbps)	
Antenna #2	
U-NII Band 3	
Emission (6dB) Bandwidth	Occupied (99%) Bandwidth
	
	
	

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A.4 MAXIMUM OUTPUT POWER

Test Date	2022/06/01	Temp./Hum.	23℃/59%
Cable Loss	0.20dB	Tested By	Hua Wu
Test Voltage	DC 3.3V		

A.4.1 Average Output Power

- **Antenna #1**

Mode	U-NII Band	Centre Frequency (MHz)	Average Output Power (dBm)	Duty Cycle Factor 10log(1/X)	Average Output Power		Limit
					(dBm)	(W)	
GFSK (2 Mbps)	1	5155	6.81	N/A	6.81	0.0048	< 250 mW (24 dBm)
		5190	7.18	N/A	**7.18**	**0.0052**	
		5228	6.85	N/A	6.85	0.0048	
	3	5731	7.04	N/A	7.04	0.0051	< 1 W (30 dBm)
		5779	7.05	N/A	7.05	0.0051	
		5828	6.56	N/A	**6.56**	**0.0045**	

Note: The results have been included cable loss.

- **Antenna #2**

Mode	U-NII Band	Centre Frequency (MHz)	Average Output Power (dBm)	Duty Cycle Factor 10log(1/X)	Average Output Power		Limit
					(dBm)	(W)	
GFSK (2 Mbps)	1	5155	7.35	N/A	7.35	0.0054	< 250 mW (24 dBm)
		5190	7.65	N/A	**7.65**	**0.0058**	
		5228	6.92	N/A	6.92	0.0049	
	3	5731	7.39	N/A	**7.39**	**0.0055**	< 1 W (30 dBm)
		5779	6.83	N/A	6.83	0.0048	
		5828	6.34	N/A	6.34	0.0043	

Note: The results have been included cable loss.

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A.5 POWER SPECTRAL DENSITY

Test Date	2022/06/01	Temp./Hum.	23℃/59%
Cable Loss	0.20dB	Tested By	Hua Wu
Test Voltage	DC 3.3V		

A.5.1 Power Spectral Density Result

- **Antenna #1**

Mode	U-NII Band	Centre Frequency (MHz)	Power Spectral Density (dBm)	Duty Cycle Factor 10log(1/X)	Power Spectral Density (dBm)	Limit
GFSK (2 Mbps)	1	5155	4.647	N/A	4.647	11 dBm/MHz
		5190	4.393	N/A	4.393	
		5228	3.680	N/A	3.680	
	3 Note2	5731	3.203	N/A	3.203	30dBm/500 kHz
		5779	2.618	N/A	2.618	
		5828	2.605	N/A	2.605	

Note 1: All results have been included cable loss and duty cycle factor.
Note 2: BWCF 7dB (100kHz converted to 500kHz) has been included in the test result.

- **Antenna #2**

Mode	U-NII Band	Centre Frequency (MHz)	Power Spectral Density (dBm)	Duty Cycle Factor 10log(1/X)	Power Spectral Density (dBm)	Limit
GFSK (2 Mbps)	1	5155	4.541	N/A	4.541	11 dBm/MHz
		5190	4.336	N/A	4.336	
		5228	3.948	N/A	3.948	
	3 Note2	5731	3.277	N/A	3.277	30dBm/500 kHz
		5779	3.402	N/A	3.402	
		5828	2.923	N/A	2.923	

Note 1: All results have been included cable loss and duty cycle factor.
Note 2: BWCF 7dB (100kHz converted to 500kHz) has been included in the test result.

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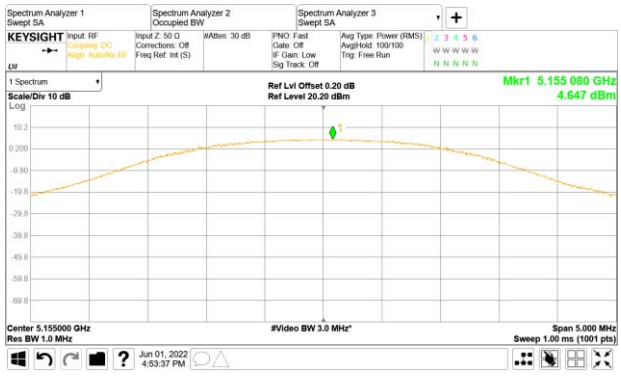
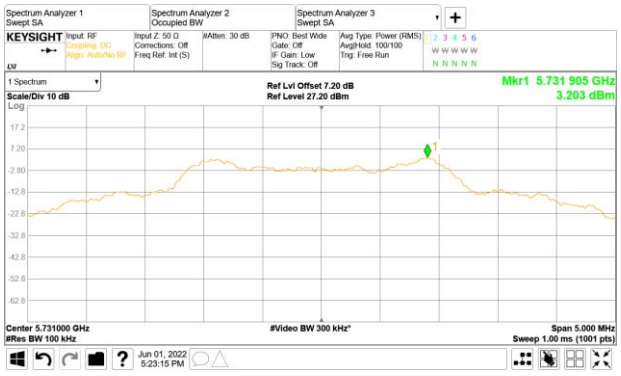
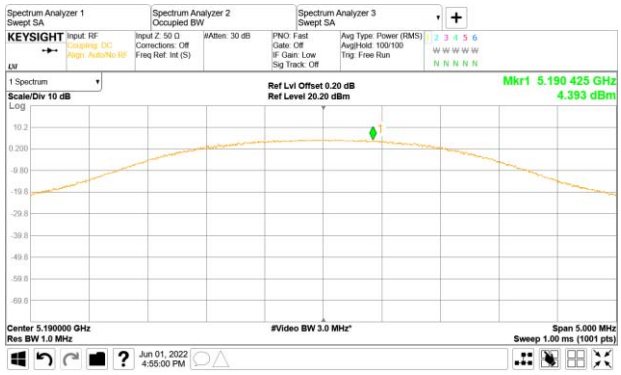
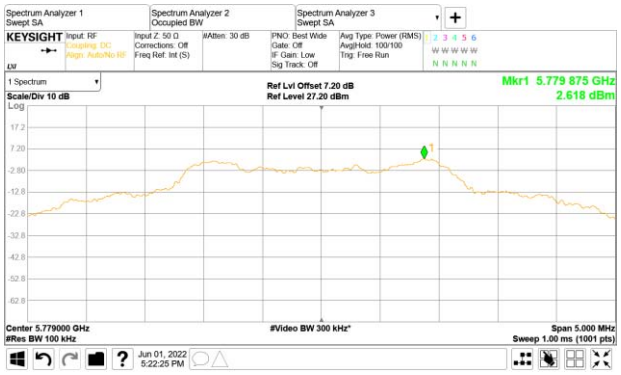
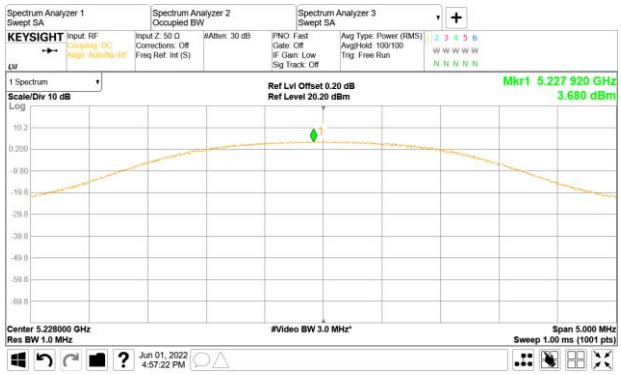
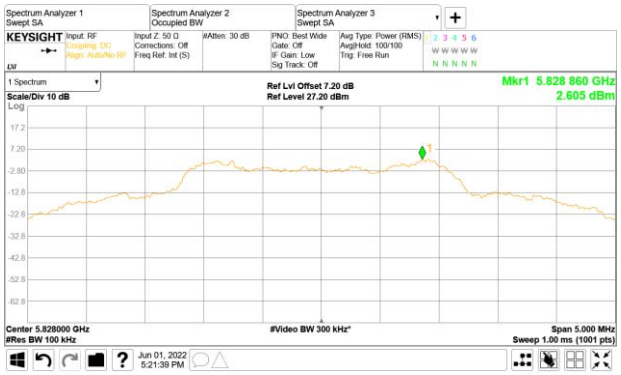
A.5.2 Measurement Plots

- **Antenna #1**

GFSK (2 Mbps)	
Antenna #1	
U-NII Band 1	U-NII Band 3
	
	
	

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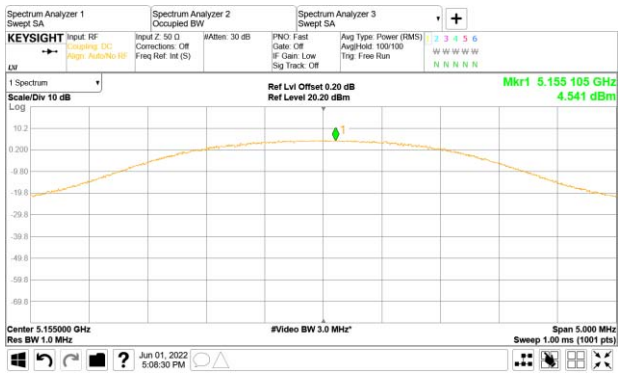
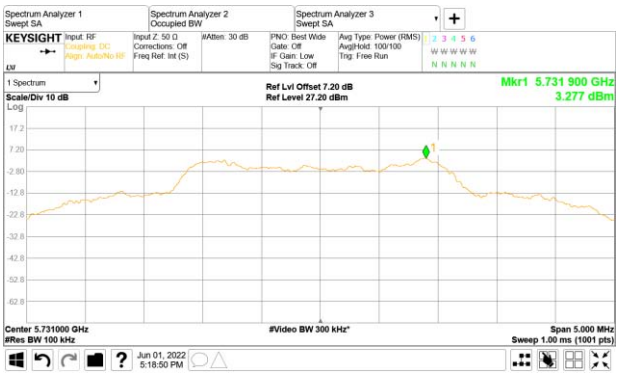
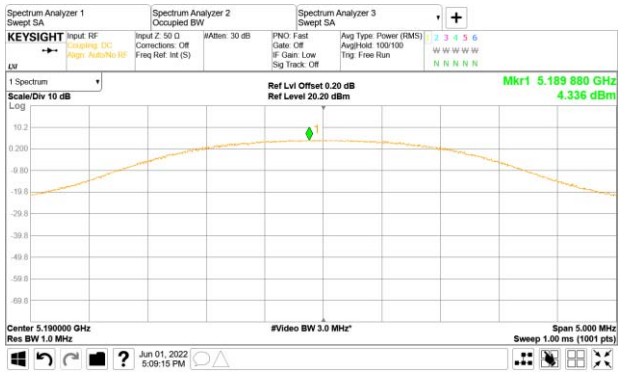
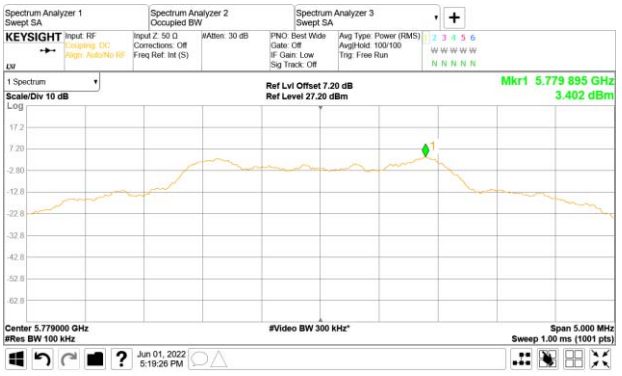
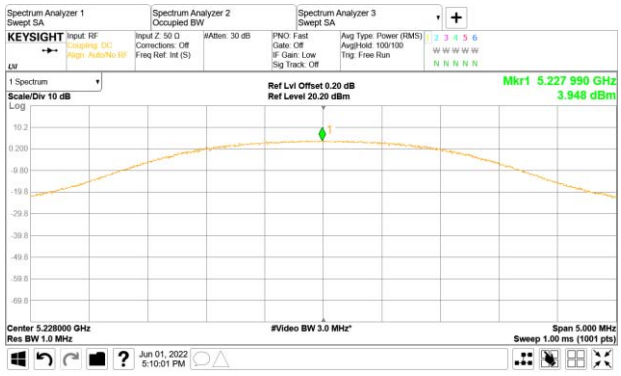
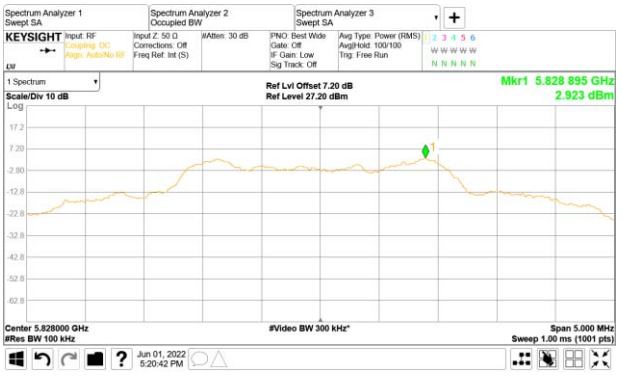
- **Antenna #2**

GFSK (2 Mbps)	
Antenna #2	
U-NII Band 1	U-NII Band 3
	
	
	

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A.6 FREQUENCY STABILITY

Test Date	2022/06/01	Temp./Hum.	23℃/59%
Test Voltage	DC 3.3V	Tested By	Hua Wu

A.6.1 Frequency stability Result

- **Antenna #1**

Temperature (℃)	Voltage (Vdc)	Centre Frequency (MHz)	Measurement Value (MHz)	Frequency Stability (ppm)
25	3.30	5155	5155.006	1.164
-30	2.97		5154.981	-3.686
	3.63		5154.989	-2.134
-20	2.97		5155.002	0.388
	3.63		5154.993	-1.358
-10	2.97		5154.989	-2.134
	3.63		5155.014	2.716
0	2.97		5155.004	0.776
	3.63		5154.99	-1.940
10	2.97		5154.984	-3.104
	3.63		5155.011	2.134
20	2.97		5154.988	-2.328
	3.63		5154.986	-2.716
30	2.97		5155.012	2.328
	3.63		5154.986	-2.716
40	2.97		5154.990	-1.940
	3.63		5155.010	1.940
50	2.97		5154.989	-2.134
	3.63		5154.993	-1.358

- **Antenna #2**

Temperature (℃)	Voltage (Vdc)	Centre Frequency (MHz)	Measurement Value (MHz)	Frequency Stability (ppm)
25	3.30	5155	5155.001	0.194
-30	2.97		5154.984	-3.104
	3.63		5154.987	-2.522
-20	2.97		5155.004	0.776
	3.63		5155.01	1.940
-10	2.97		5154.985	-2.910
	3.63		5155.011	2.134
0	2.97		5155.008	1.552
	3.63		5154.989	-2.134
10	2.97		5154.990	-1.940
	3.63		5155.009	1.746
20	2.97		5154.989	-2.134
	3.63		5154.991	-1.746
30	2.97		5155.011	2.134
	3.63		5154.985	-2.910
40	2.97		5154.991	-1.746
	3.63		5155.004	0.776
50	2.97		5154.988	-2.328
	3.63		5154.989	-2.134

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APPDNDIX B

TEST PHOTOGRAPHS

(Model: WL1BKT22)