



## FCC Test Report

**Report No.:** CJPS-ESH-P23071150B-1

**FCC ID:** 2AL5X-YP2022020

**Product:** Smart Cat Litter Box

**Model:** YP2022020, MW-LR01

**Received Date:** Jul.20. 2023

**Test Date:** Jul.20 to Aug.07, 2023

**Issued Date:** Aug.08, 2023

**Applicant:** Hangzhou Tianyuan Pet Products Co., Ltd

**Address:** No.10-1,Xingling Rd, Xingqiao Town, Linping, Yuhang, Hangzhou, 311100, China

**Manufacturer:** Hangzhou Tianyuan Pet Products Co., Ltd

**Address:** No.10-1,Xingling Rd, Xingqiao Town, Linping, Yuhang, Hangzhou, 311100, China

**Issued By:** BUREAU VERITAS ADT (Shanghai) Corporation

**Lab Address:** No. 829, Xinzhuan Road, Shanghai, P.R.China (201612)

**FCC Registration /  
Designation Number:** 176467/ CN1213



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### Release Control Record

Issue No.	Description	Date Issued
CJPS-ESH-P23071150B-1	Original release	Aug.08, 2023



**1 Certificate of Conformity**

**Product:** Smart Cat Litter Box

**Brand:** **petstar** MEOWANT

**Model:** YP2022020, MW-LR01

**Applicant:** Hangzhou Tianyuan Pet Products Co., Ltd

**Test Date:** Jul.20 to Aug.07, 2023

**Standards:** **47 CFR FCC Part 15, Subpart C (Section 15.247)**  
**ANSI C63.10:2020**

The above equipment has been tested by **BUREAU VERITAS ADT (Shanghai) Corporation**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**Prepared by :**

**, Date:**

Aug.08, 2023

Yan ZHOU

Project Engineer

**Approved by :**

**, Date:**

Aug.08, 2023

Sean YU

RF Team Supervisor



## 2 Summary of Test Results

The EUT has been tested according to the following specifications:

47 CFR FCC Part 15, Subpart C (SECTION 15.247)			
FCC Clause	Test Item	Result	Remarks
15.203	Antenna Requirement	PASS	No antenna connector is used.
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit.
15.247(a)(2)	Minimum 6dB Bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted Output Power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.247(d)	Conducted Band Edges Measurement	PASS	Meet the requirement of limit.
15.247(d)	Conducted Spurious Emissions	PASS	Meet the requirement of limit.
15.247(d)	Emissions in restricted frequency bands	PASS	Meet the requirement of limit.
15.205 / 15.209 / 15.247(d)	Radiated Emissions Measurement	PASS	Meet the requirement of limit.



## 2.1 Test Instruments

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Hybrid Antenna(30MHz-1GHz)	Schwarzbeck	VULB9168	E1A1012	8/18/2021	8/17/2023
Horn Antenna(1GHz -18GHz)	Schwarzbeck	BBHA9120D	E1A1017	7/25/2022	7/24/2024
Horn Antenna(18GHz-40GHz)	Com-Power	AH-840	E1A1040	7/25/2022	7/24/2024
Pre-Amplifier(0.1MHz~1300MHz)	Agilent	8447D	E1A2001	3/3/2023	3/2/2024
Pre-Amplifier(18GHz-40GHz)	EMC Instruments Corporation	EMC184045SE	E1A2008	8/12/2022	8/11/2023
EMI Test Receiver	R&S	ESR7	E1R1005	3/3/2023	3/2/2024
EMI Test Spectrum	Keysight	N9030B	E1S1003	8/30/2022	8/29/2023
Signal Analyzer	Keysight	N9020A	E1S1004	3/2/2023	3/1/2024
LISN(single phase)	Rohde&Schwarz	ENV216	E1L1011	9/2/2022	9/1/2023
RF Control Unit	Toscend	JS0806-2	E1C5003	N/A	N/A
Test Software	Toscend	JS32-CE	5.0.0.1	N/A	N/A
Test Software	Toscend	JS32-RE	5.0.0	N/A	N/A
Test Software	Toscend	JS1120-3	V3.2.22	N/A	N/A

## 2.2 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=2$ .

Measurement	Frequency	Expanded Uncertainty ( $k=2$ ) ( $\pm$ )
Conducted Emissions at mains ports	150kHz ~ 30MHz	1.83 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.36 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	3.47 dB
	6GHz ~ 18GHz	3.75 dB
	18GHz ~ 40GHz	3.30 dB

## 2.3 Modification Record

There were no modifications required for compliance.





### 3 General Information

#### 3.1 General Description of EUT

Product	Smart Cat Litter Box
Brand	<b>petstar</b> MEOWANT
Test Model	YP2022020, MW-LR01
Model Difference	--
Power Rating	DC 12V 2A, Powered by adaptor
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Operating Frequency	2412MHz-2462MHz
Number of Channel	802.11b, 802.11g and 802.11n (HT20):11
Antenna Type	PCB Antenna
Antenna Connector	--
Antenna Gain	2.45 dBi

Note:

1. For more details, please refer to the User's manual of the EUT.

Modulation Mode	TX /RX Function
802.11b	1TX / 1RX
802.11g	1TX / 1RX
802.11n (HT20)	1TX / 1RX

#### 3.2 Description of Support Unit

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.
Adaptor	Guangdong Keerda Electronics Co., Ltd	DZ024EHL120200U	NA

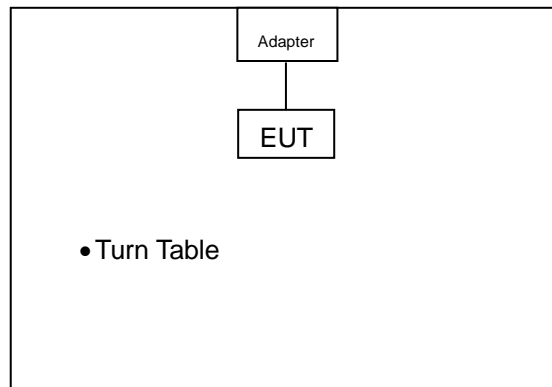
### 3.3 Description of Test Modes

11 channels are provided for 802.11b, 802.11g and 802.11n (HT20).

Channel	Frequency	Channel	Frequency
1	2412MHz	7	2442MHz
2	2417MHz	8	2447MHz
3	2422MHz	9	2452MHz
4	2427MHz	10	2457MHz
5	2432MHz	11	2462MHz
6	2437MHz	-	-

### 3.4 DESCRIPTION OF SYSTEM UNDER TEST

#### RADIATED TEST CONFIGURATION





### 3.4.1 Test Mode Applicability:

EUT Configure Mode	Applicable to				Description
	RE ≥ 1G	RE < 1G	PLC	APCM	
-	√	√	√	√	-

Where **RE≥1G**: Radiated Emission above 1GHz      **RE<1G**: Radiated Emission below 1GHz  
**PLC**: Power Line Conducted Emission      **APCM**: Antenna Port Conducted Measurement

#### Radiated Emission Test (Above 1 GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.
- For different antenna gain, select high gain antenna for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5

#### Radiated Emission Test (Below 1 GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.
- For different antenna gain, select high gain antenna for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	1	DSSS	DBPSK	1.0



**Power Line Conducted Emission Test:**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	1	DSSS	DBPSK	1.0

**Antenna Port Conducted Measurement**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5

**3.4.2 Test Condition:**

Applicable to	Normal Environmental Conditions	Normal Input Power
RE ≥ 1G	25deg. C, 60%RH	DC 12V 2A, Powered by adaptor
RE < 1G	25deg. C, 60%RH	DC 12V 2A, Powered by adaptor
PLC	25deg. C, 60%RH	DC 12V 2A, Powered by adaptor
APCM	25deg. C, 60%RH	DC 12V 2A, Powered by adaptor

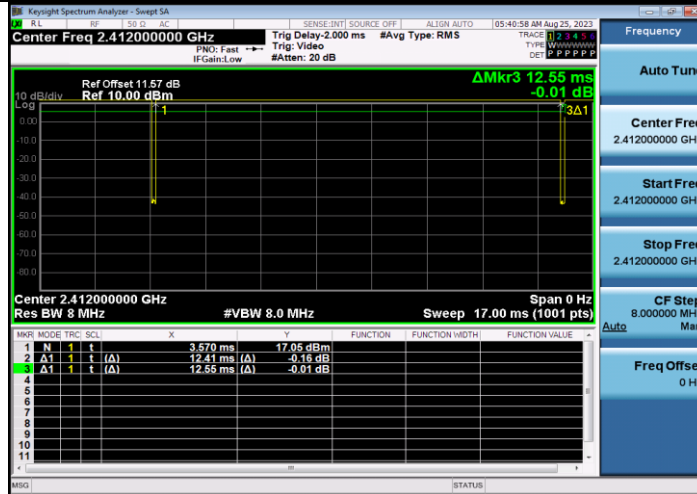


### 3.5 Duty Cycle of Test Signal

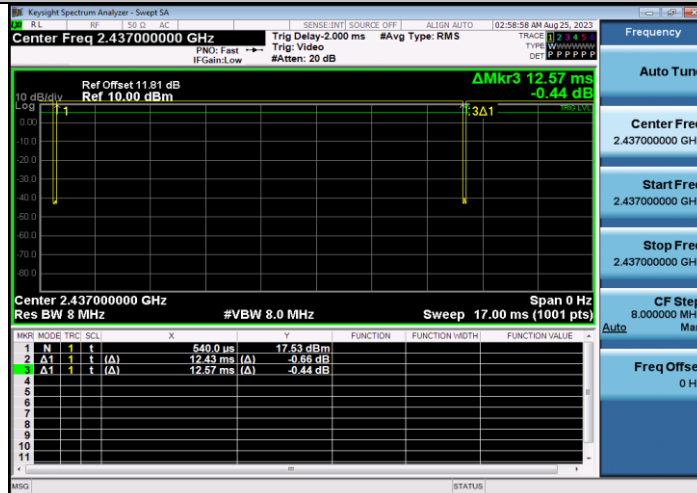
Test Mode	Antenna	Channel [MHz]	Duty Cycle [%]	10log(1/x) Factor[dB]
11B	Ant1	2412	98.88	0.05
		2437	98.89	0.05
		2462	99.04	0.04
11G	Ant1	2412	94.06	0.27
		2437	94.06	0.27
		2462	94.06	0.27
11N20SISO	Ant1	2412	93.66	0.28
		2437	93.66	0.28
		2462	93.66	0.28



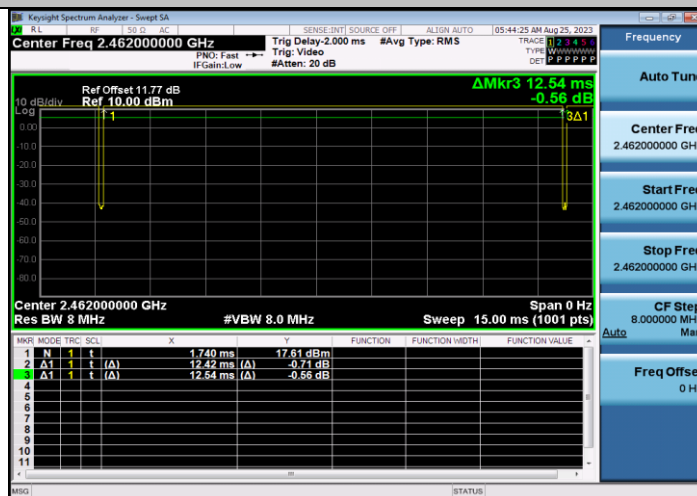
11B\_Ant1\_2412



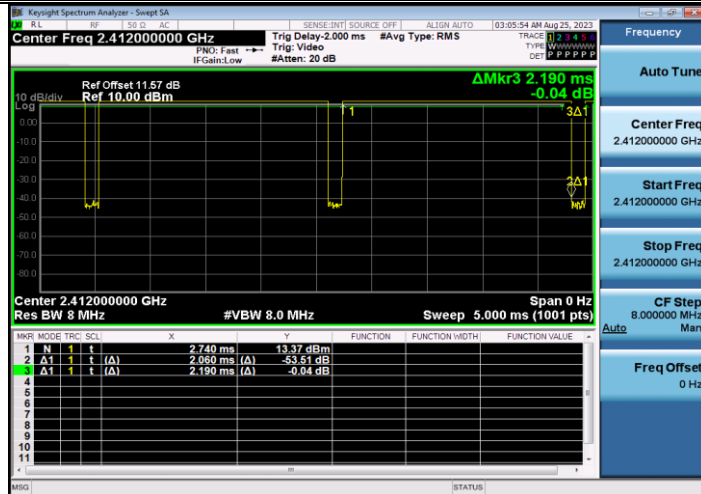
11B\_Ant1\_2437



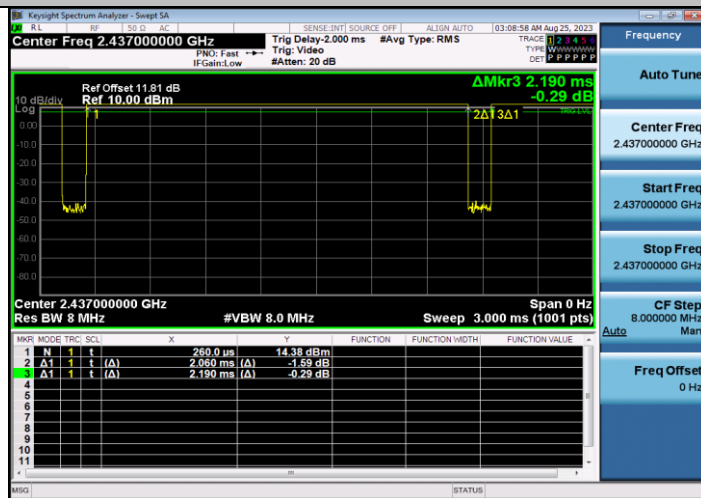
11B\_Ant1\_2462



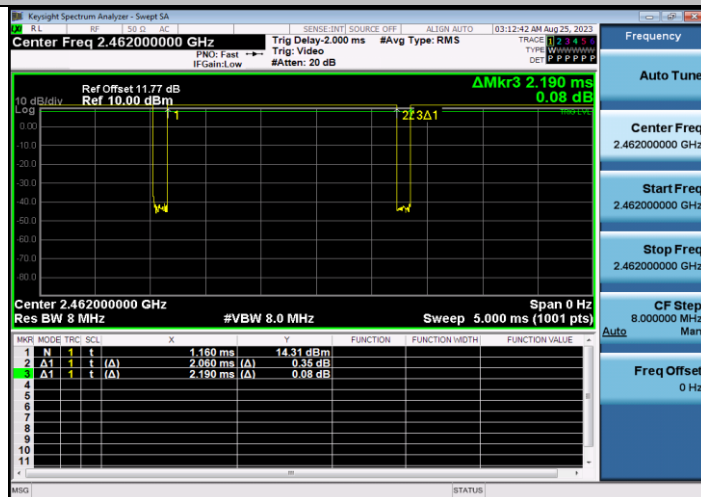
11G\_Ant1\_2412



11G\_Ant1\_2437



11G\_Ant1\_2462



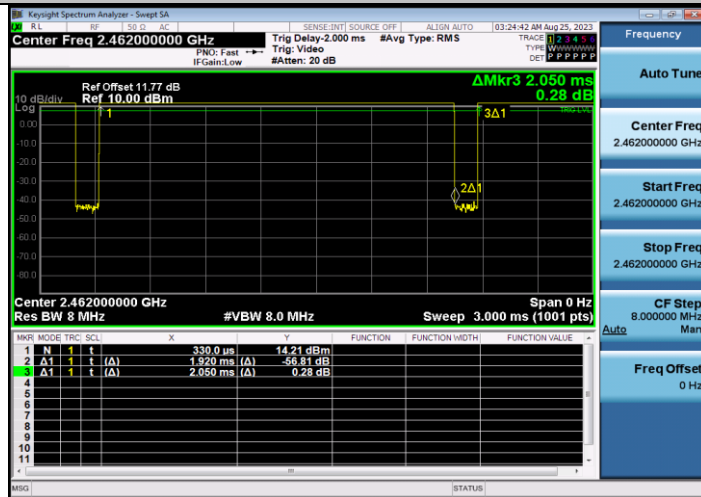
11N20SISO\_Ant1\_2412



11N20SISO\_Ant1\_2437



11N20SISO\_Ant1\_2462







### 3.6 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standard:

**FCC Part 15, Subpart C (15.247)**

**KDB 558074 D01 DTS Meas Guidance v05r02**

**ANSI C63.10:2020**

All related test items have been performed and recorded as per the above standard.



## 4 Test Procedure and Results

### 4.1 AC Power Conducted Emission

#### 4.1.1 Limits

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

#### 4.1.2 Test Procedures

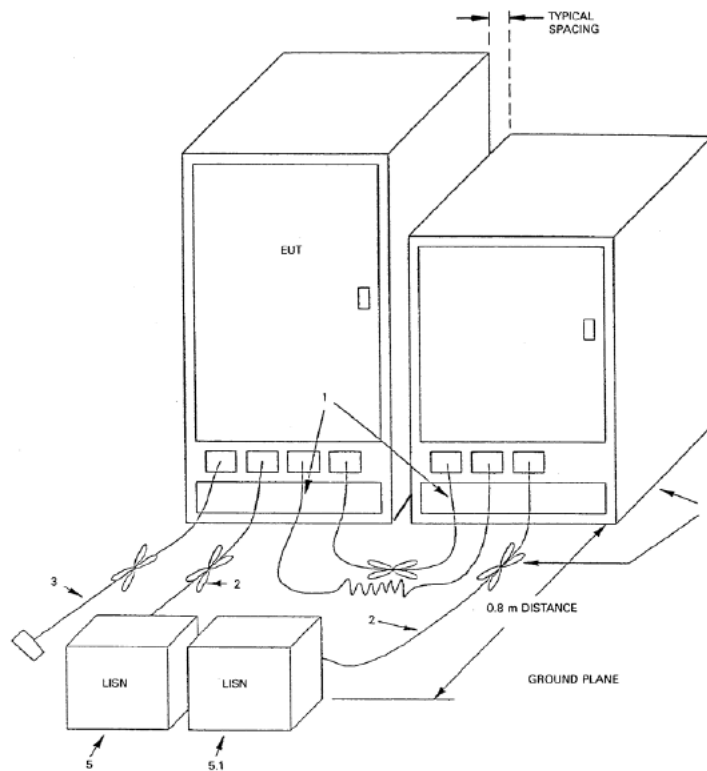
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

**NOTE:** The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

#### 4.1.3 Deviation from Test Standard

No deviation.

#### 4.1.4 Test Setup



1. Excess I/O cables shall be bundled in the center. If bundling is not possible, the cables shall be arranged in a serpentine fashion. Bundling shall not exceed 40 cm in length (see 6.2.5 and 11.5.5).
2. Excess power cords shall be bundled in the center or shortened to appropriate length (see 7.3.1).
3. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. If bundling is not possible, the cable shall be arranged in a serpentine fashion (see 6.2.5).
4. EUT and all cables shall be insulated, if required, from the ground plane by up to 12 mm of insulating material (see 6.2.5 and 6.3.3).
5. EUT connected to one LISN. LISN can be placed on top of, or immediately beneath, the ground plane.
  - 5.1 All other equipment powered from a second LISN or additional LISN(s) (see 5.2.4 and 7.3.1).
  - 5.2 A multiple outlet strip can be used for multiple power cords of non-EUT equipment.

Figure 9—Test arrangement for conducted emissions of floor-standing equipment

For the actual test configuration, please refer to the attached file (Test Setup Photo).

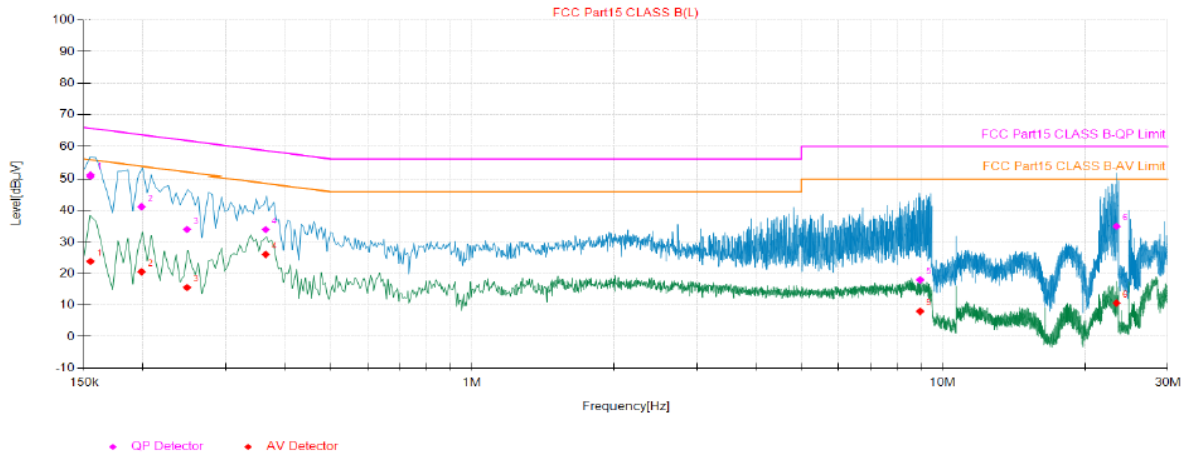
#### 4.1.5 EUT Operating Conditions

Same as 4.1.6.

#### 4.1.6 Test Results

Phase: L Voltage: 120V 60Hz

#### Test Graph



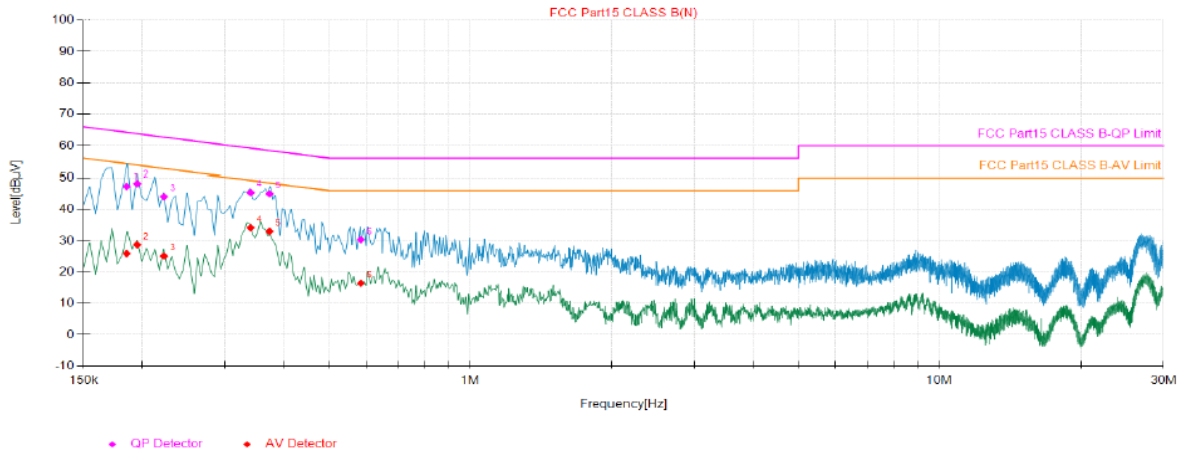
Final Data List												
N O.	Freq. [MHz]	Factor [dB]	QP Reading [dB µ V]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Reading [dB µ V]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]	Type	Verdict
1	0.15	9.76	41.11	50.87	65.74	14.87	14.10	23.86	55.74	31.88	L	PASS
2	0.20	9.80	31.40	41.20	63.67	22.47	10.77	20.57	53.67	33.10	L	PASS
3	0.25	9.70	24.34	34.04	61.82	27.78	5.91	15.61	51.82	36.21	L	PASS
4	0.36	9.60	24.39	33.99	58.62	24.63	16.46	26.06	48.62	22.56	L	PASS
5	8.94	10.10	7.92	18.02	60.00	41.98	-2.10	8.00	50.00	42.00	L	PASS
6	23.36	10.21	24.78	34.99	60.00	25.01	0.46	10.67	50.00	39.33	L	PASS

#### REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

Phase: N Voltage: 120V 60Hz

**Test Graph**



Final Data List												
N O.	Freq. [MHz]	Factor [dB]	QP Reading [dB µV]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Reading [dB µV]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]	Type	Verdict
1	0.19	9.76	37.54	47.30	64.24	16.94	16.15	25.91	54.24	28.33	N	PASS
2	0.20	9.76	38.43	48.19	63.81	15.62	18.95	28.71	53.81	25.10	N	PASS
3	0.22	9.71	34.37	44.08	62.73	18.65	15.38	25.09	52.73	27.64	N	PASS
4	0.34	9.56	35.82	45.38	59.19	13.81	24.62	34.18	49.19	15.01	N	PASS
5	0.37	9.56	35.43	44.99	58.42	13.43	23.45	33.01	48.42	15.41	N	PASS
6	0.58	9.54	20.80	30.34	56.00	25.66	6.87	16.41	46.00	29.59	N	PASS

**REMARKS:**

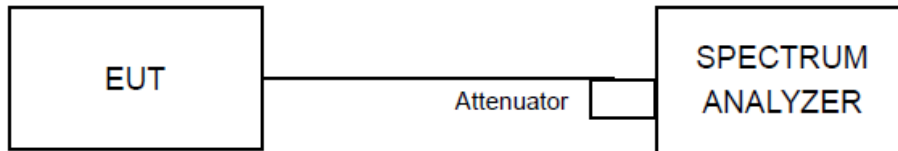
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

## 4.2 Minimum 6dB Bandwidth

### 4.2.1 Limit

For digital modulation systems, the minimum 6dB bandwidth shall be at least 500 kHz

### 4.2.2 Test Setup



### 4.2.3 Test Procedures

The EUT was tested according to DTS test procedure of “KDB558074 D01 DTS Meas Guidance” for compliance to FCC 47CFR 15.247 requirements (clause 8.2).

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW  $\geq$  3 RBW, peak detector with maximum hold) is implemented by the instrumentation function.

### 4.2.4 Deviation of Test Standard

No deviation.



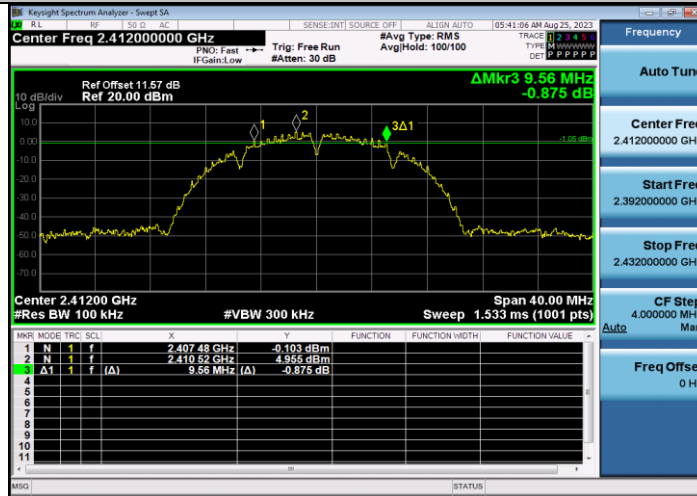
#### 4.2.5 Test Results

##### DTS Bandwidth

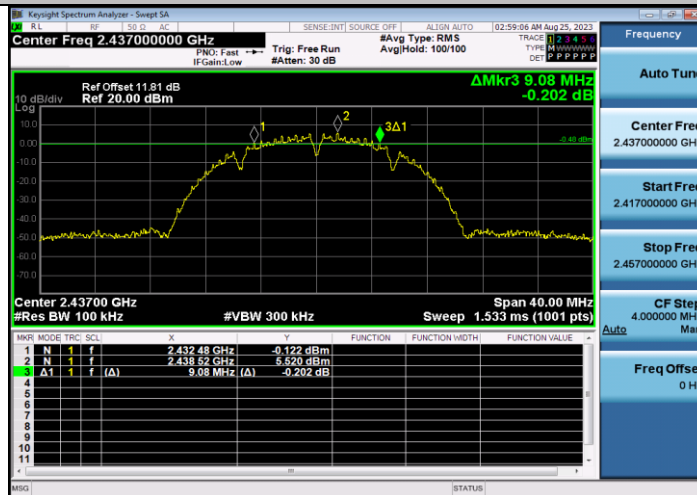
TestMode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	9.560	2407.480	2417.040	0.5	PASS
		2437	9.080	2432.480	2441.560	0.5	PASS
		2462	8.560	2457.480	2466.040	0.5	PASS
11G	Ant1	2412	16.360	2403.840	2420.200	0.5	PASS
		2437	16.320	2428.880	2445.200	0.5	PASS
		2462	16.360	2453.840	2470.200	0.5	PASS
11N20SISO	Ant1	2412	17.560	2403.240	2420.800	0.5	PASS
		2437	17.560	2428.240	2445.800	0.5	PASS
		2462	17.560	2453.240	2470.800	0.5	PASS



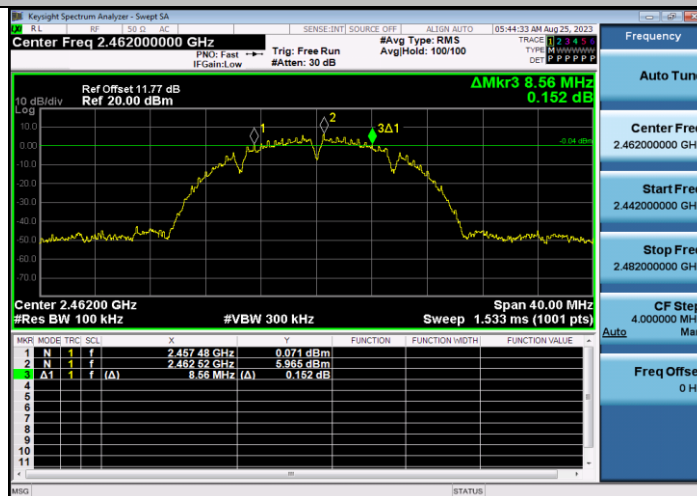
### 11B\_Ant1\_2412



### 11B\_Ant1\_2437

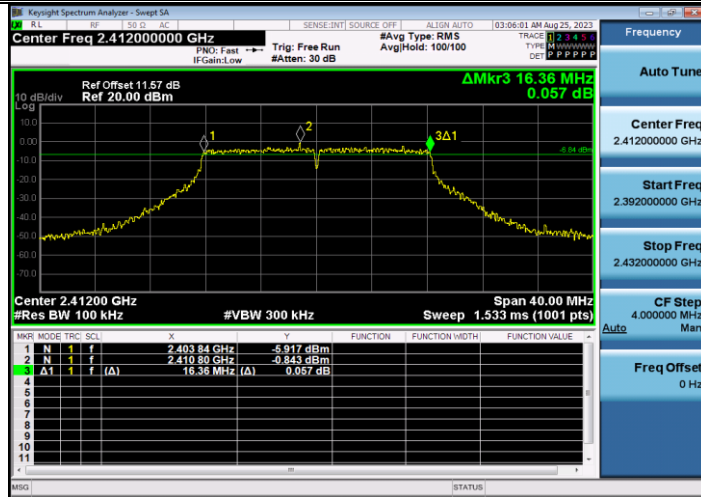


### 11B\_Ant1\_2462

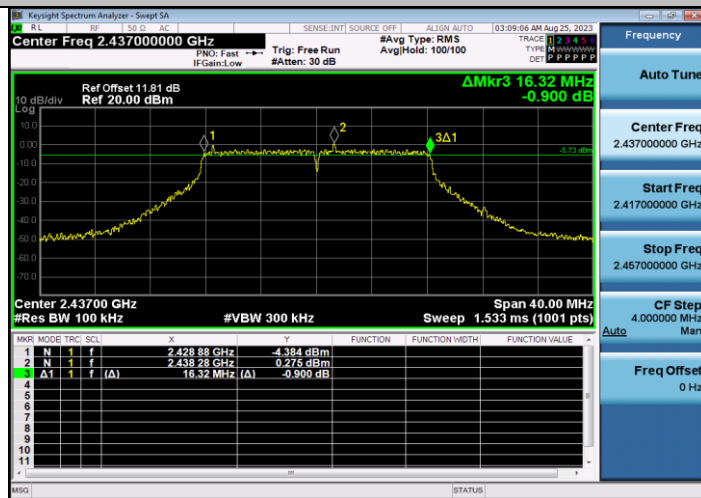


### 11G\_Ant1\_2412





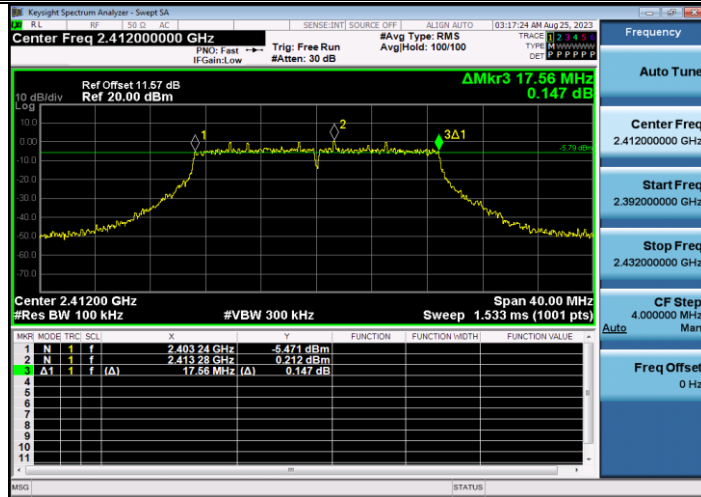
11G\_Ant1\_2437



11G\_Ant1\_2462



11N20SISO\_Ant1\_2412



11N20SISO\_Ant1\_2437



11N20SISO\_Ant1\_2462

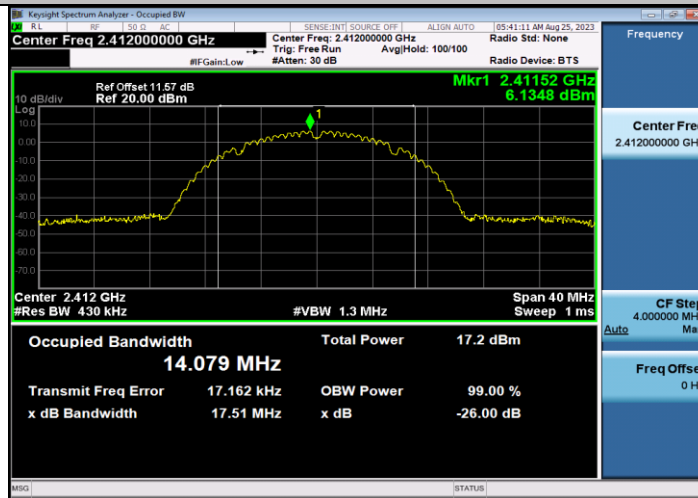




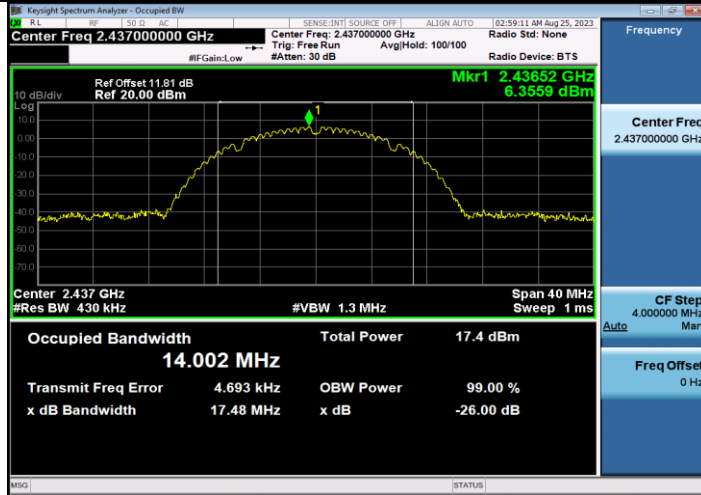
99% Bandwidth

TestMode	Antenna	Channel Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	14.079	2404.9777	2419.0567	---	PASS
		2437	14.002	2430.0037	2444.0057	---	PASS
		2462	14.081	2454.9811	2469.0621	---	PASS
11G	Ant1	2412	17.202	2403.4236	2420.6256	---	PASS
		2437	17.215	2428.4349	2445.6499	---	PASS
		2462	17.243	2453.4035	2470.6465	---	PASS
11N20SISO	Ant1	2412	18.160	2402.9671	2421.1271	---	PASS
		2437	18.211	2427.9425	2446.1535	---	PASS
		2462	18.288	2452.9131	2471.2011	---	PASS

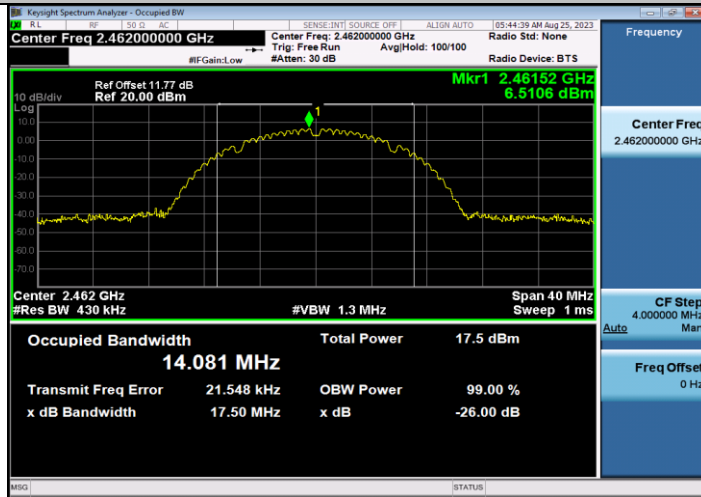
11B\_Ant1\_2412



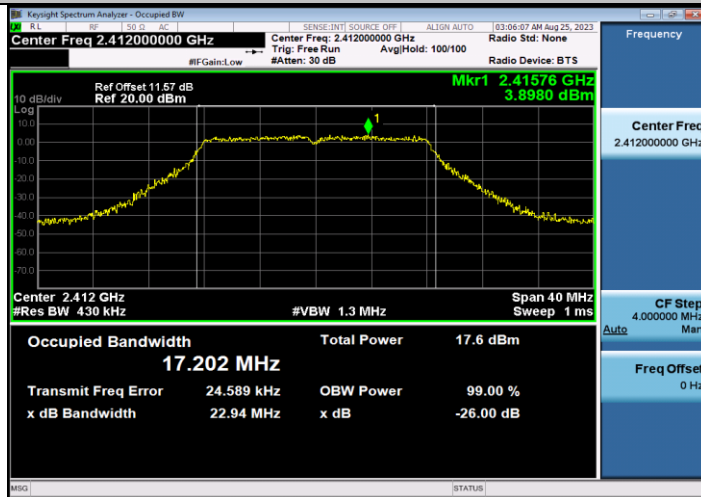
11B\_Ant1\_2437



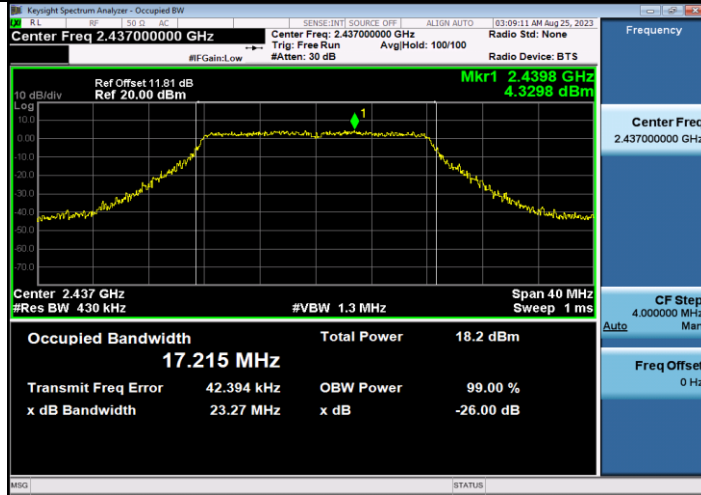
11B\_Ant1\_2462



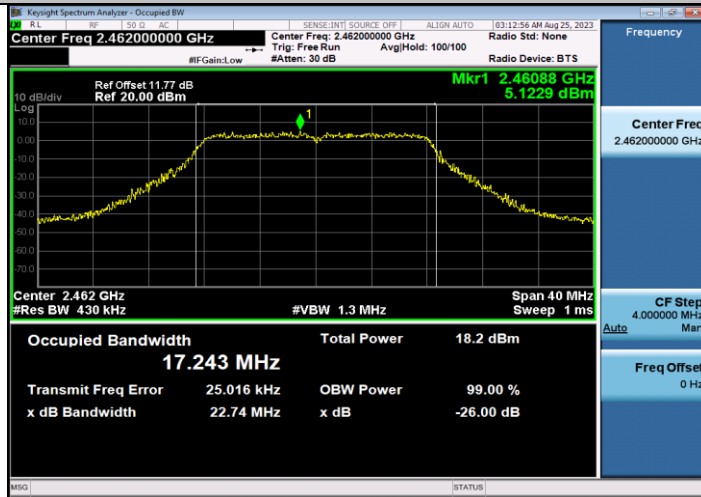
11G\_Ant1\_2412



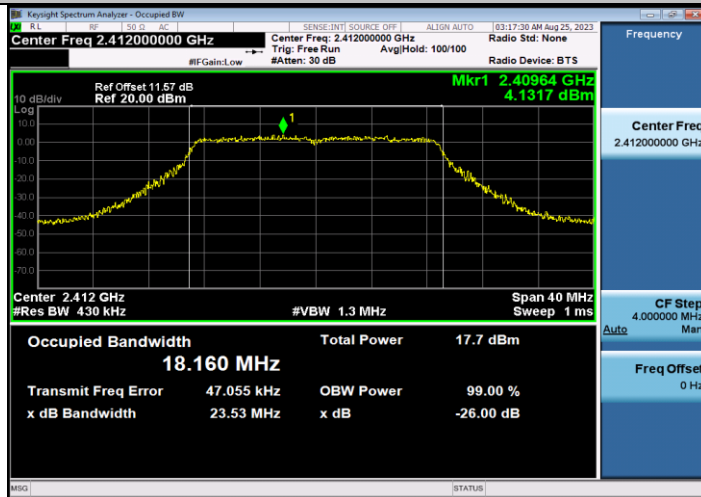
11G\_Ant1\_2437



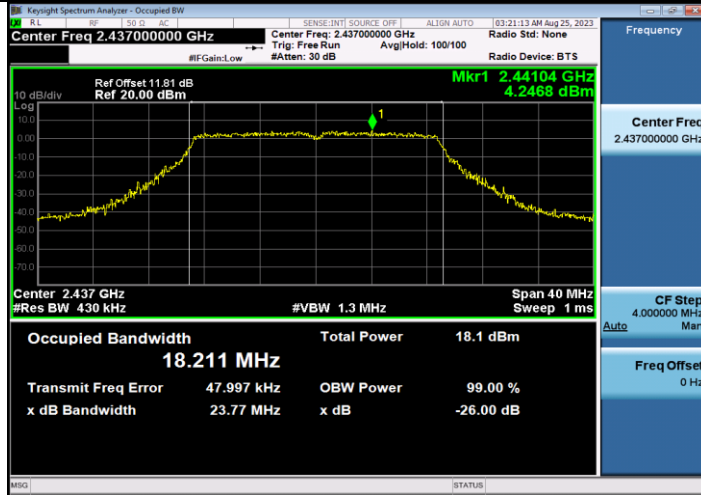
11G\_Ant1\_2462



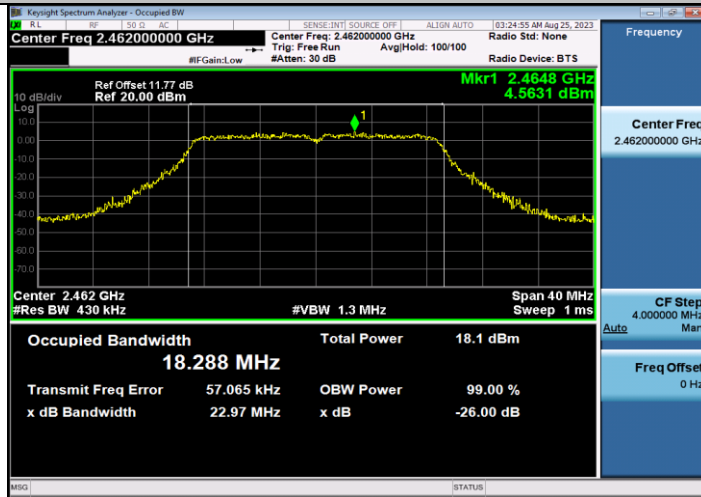
11N20SISO\_Ant1\_2412



11N20SISO\_Ant1\_2437



11N20SISO\_Ant1\_2462

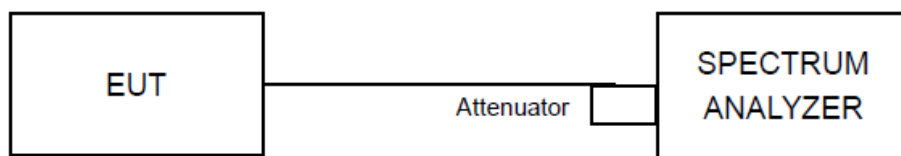


### 4.3 Conducted Output Power

#### 4.3.1 Limit

For systems using digital modulation in the 2400 – 2483.5 MHz bands: 1 Watt (30 dBm)

#### 4.3.2 Test Setup



#### 4.3.3 Test Procedures

The EUT was tested according to DTS test procedure of “KDB558074 D01 DTS Meas Guidance” for compliance to FCC 47CFR 15.247 requirements (clause 9.2.2.4).

- a) Measure the duty cycle,  $x$ , of the transmitter output signal as described in Section 6.0.
- b) Set span to at least 1.5 OBW.
- c) Set RBW = 1 % to 5 % of the OBW, not to exceed 1 MHz.
- d) Set VBW  $\geq$  3 RBW.
- e) Number of points in sweep  $\geq$  2 span / RBW. (This gives bin-to-bin spacing  $\leq$  RBW/2, so that narrowband signals are not lost between frequency bins.)
- f) Sweep time = auto.
- g) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
- h) Do not use sweep triggering. Allow the sweep to “free run”.
- i) Trace average at least 100 traces in power averaging (i.e., RMS) mode; however, the number of traces to be averaged shall be increased above 100 as needed such that the average accurately represents the true average over the on and off periods of the transmitter.
- j) 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. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.
- k) Add  $10 \log (1/x)$ , where  $x$  is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on- and off-times of the transmission). For example, add  $10 \log (1/0.25) = 6 \text{ dB}$  if the duty cycle is 25 %.

#### 4.3.4 Deviation of Test Standard

No deviation.



### 4.3.5 Test Results

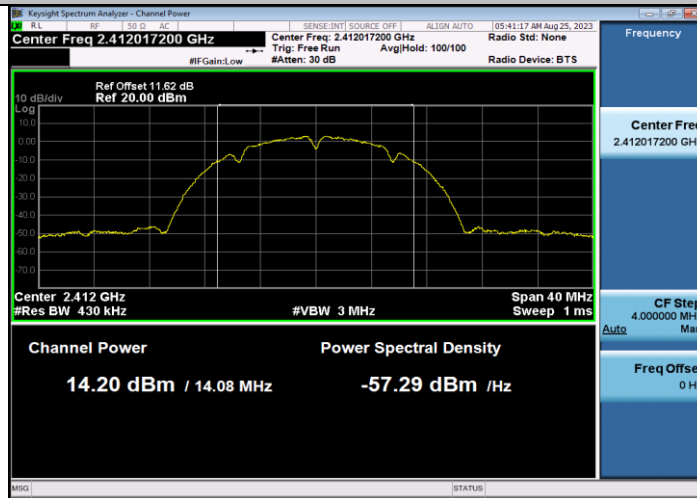
Test Mode	Antenna	Channel [MHz]	Level [dBm]	10log(1/x) Factor[dB]	Power [dBm]	Limit [dBm]	Verdict
11B	Ant1	2412	14.15	0.05	14.20	<=30	PASS
		2437	14.35	0.05	14.40	<=30	PASS
		2462	14.59	0.04	14.63	<=30	PASS
11G	Ant1	2412	11.25	0.27	11.52	<=30	PASS
		2437	11.88	0.27	12.15	<=30	PASS
		2462	11.89	0.27	12.16	<=30	PASS
11N20SISO	Ant1	2412	11.32	0.28	11.60	<=30	PASS
		2437	11.83	0.28	12.11	<=30	PASS
		2462	11.90	0.28	12.18	<=30	PASS

Test Mode	Antenna	Channel [MHz]	Power [dBm]	Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Verdict
11B	Ant1	2412	14.20	2.45	16.65	≤36.00	PASS
		2437	14.40	2.45	16.85	≤36.00	PASS
		2462	14.63	2.45	17.08	≤36.00	PASS
11G	Ant1	2412	11.52	2.45	13.97	≤36.00	PASS
		2437	12.15	2.45	14.60	≤36.00	PASS
		2462	12.16	2.45	14.61	≤36.00	PASS
11N20SISO	Ant1	2412	11.60	2.45	14.05	≤36.00	PASS
		2437	12.11	2.45	14.56	≤36.00	PASS
		2462	12.18	2.45	14.63	≤36.00	PASS

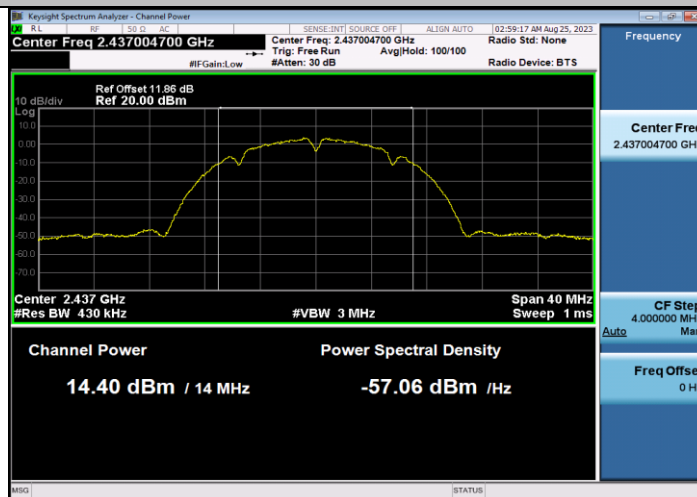




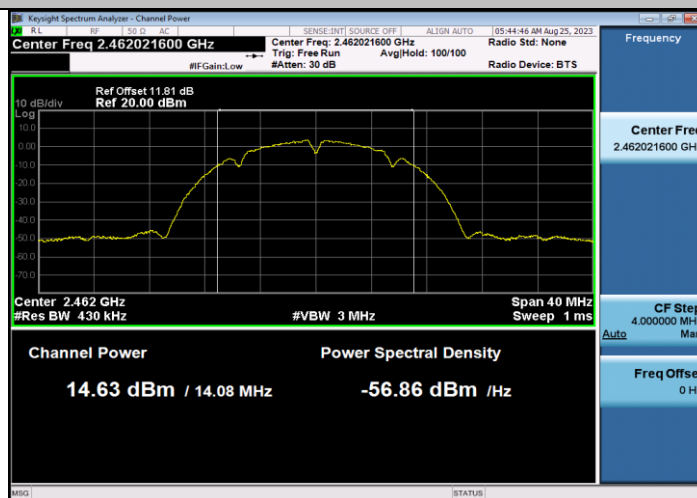
11B\_Ant1\_2412



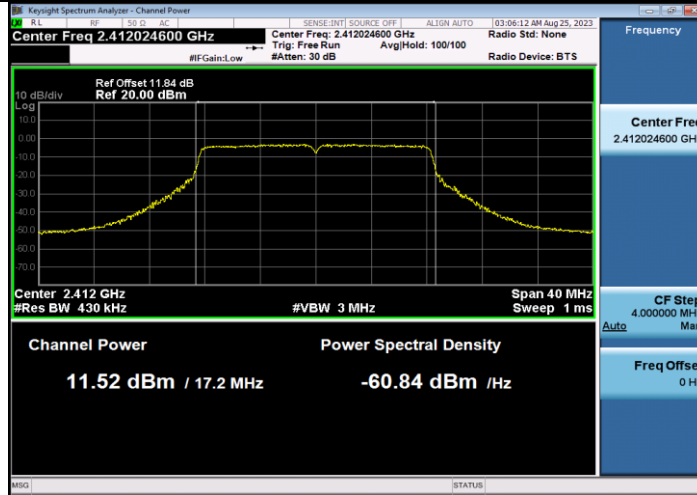
11B\_Ant1\_2437



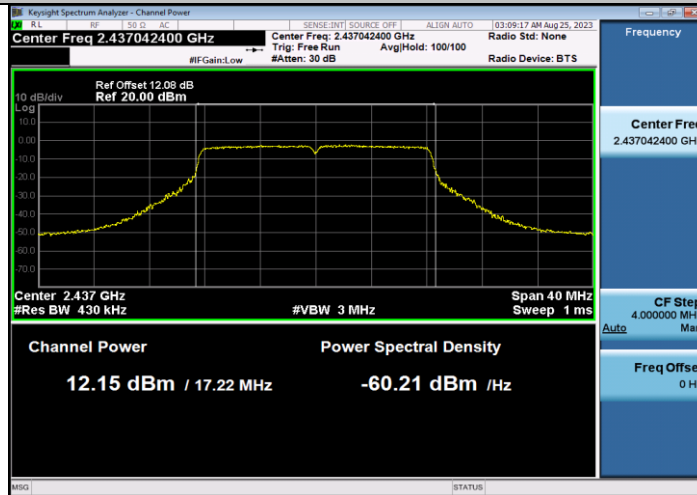
11B\_Ant1\_2462



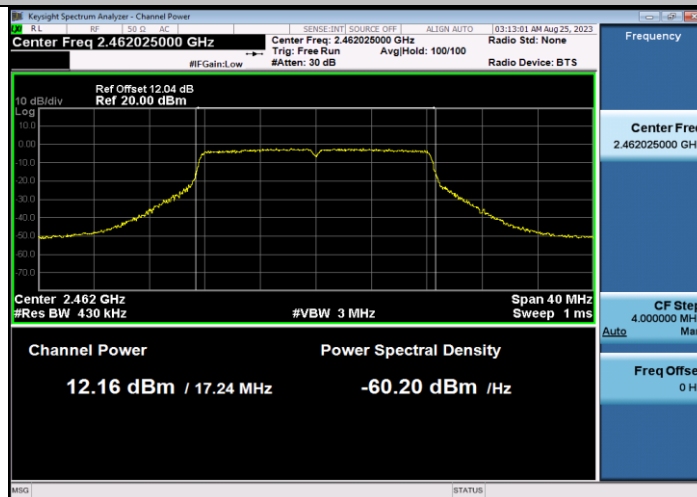
11G\_Ant1\_2412



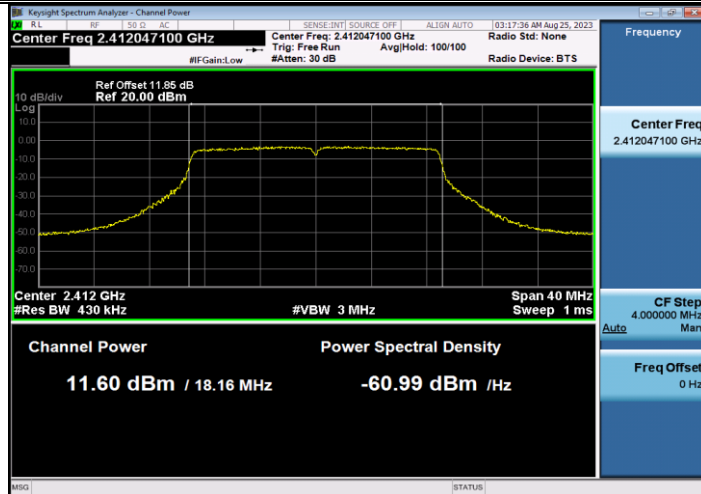
11G\_Ant1\_2437



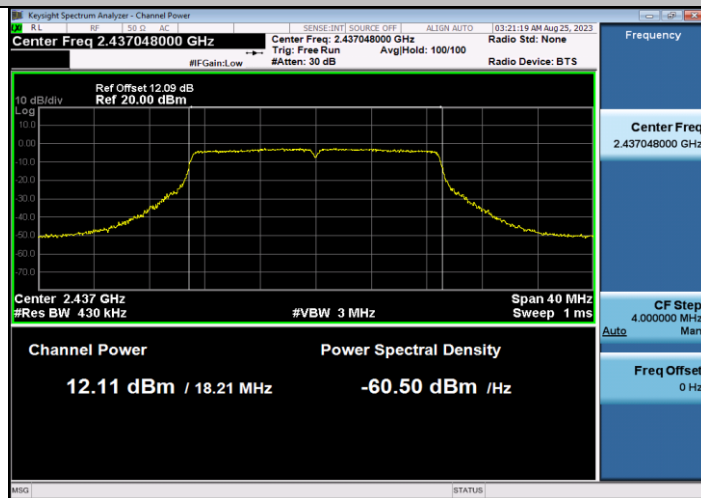
11G\_Ant1\_2462



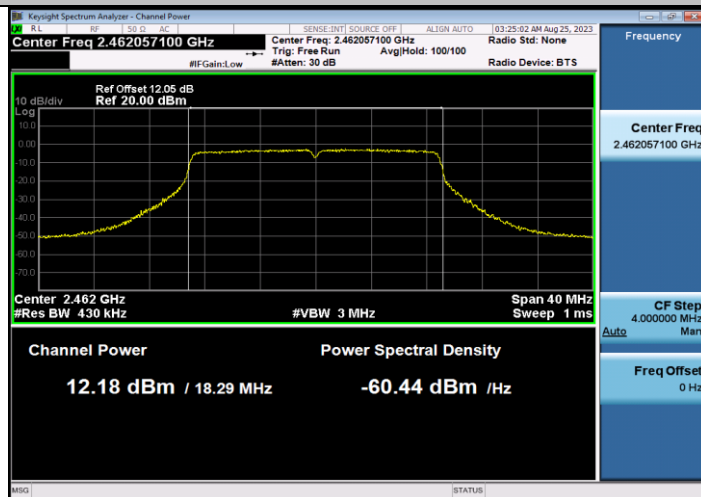
11N20SISO\_Ant1\_2412



11N20SISO\_Ant1\_2437



11N20SISO\_Ant1\_2462

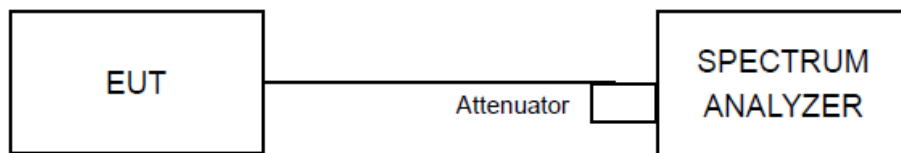


## 4.4 Power Spectral Density

### 4.4.1 Limit

The Maximum of Power Spectral Density Measurement is 8 dBm in any 3 kHz band.

### 4.4.2 Test Setup



### 4.4.3 Test Procedures

The power output per FCC § 15.247(e) was tested according to DTS test procedure of “KDB558074 D01 DTS Meas Guidance” (clause 10.5) for compliance to FCC 47CFR 15.247 requirements.

- a) Measure the duty cycle (x) of the transmitter output signal.
- b) Set instrument center frequency to DTS channel center frequency.
- c) Set span to at least 1.5 OBW.
- d) Set RBW to:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
- e) Set VBW  $\geq 3 \text{ RBW}$ .
- f) Detector = power averaging (RMS) or sample detector (when RMS not available).
- g) Ensure that the number of measurement points in the sweep  $\geq 2 \text{ span/RBW}$ .
- h) Sweep time = auto couple.
- i) Do not use sweep triggering. Allow sweep to “free run”.
- j) Employ trace averaging (RMS) mode over a minimum of 100 traces.
- k) Use the peak marker function to determine the maximum amplitude level.
- l) Add  $10 \log (1/x)$ , where x is the duty cycle measured in step (a), to the measured PSD to compute the average PSD during the actual transmission time.
- m) If resultant value exceeds the limit, then reduce RBW (no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span in order to meet the minimum measurement point requirement as the RBW is reduced).

### 4.4.4 Deviation of Test Standard

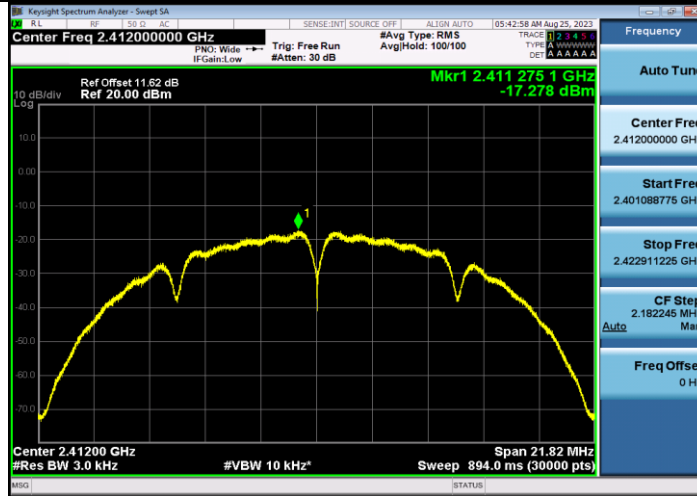
No deviation.



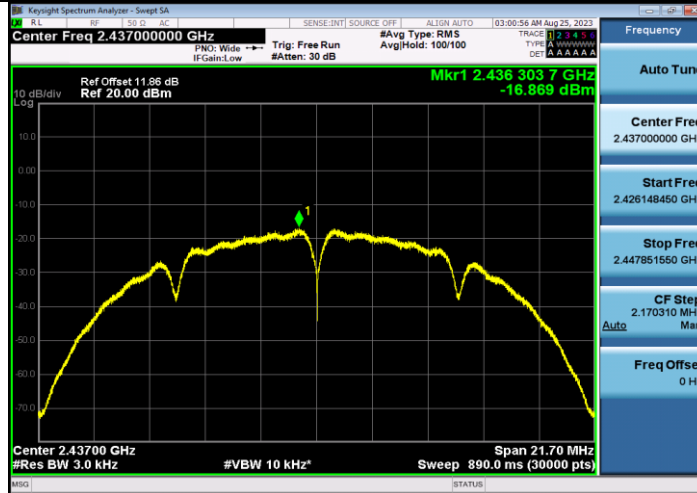
#### 4.4.5 Test Results

Test Mode	Antenna	Channel [MHz]	Level [dBm]	10log(1/x) Factor[dB]	PSD [dBm/3kHz]	Limit [dBm/3kHz]	Verdict
11B	Ant1	2412	-17.28	0.05	-17.23	<=8	PASS
		2437	-16.87	0.05	-16.82	<=8	PASS
		2462	-16.84	0.04	-16.80	<=8	PASS
11G	Ant1	2412	-22.43	0.27	-22.16	<=8	PASS
		2437	-21.17	0.27	-20.90	<=8	PASS
		2462	-21.57	0.27	-21.30	<=8	PASS
11N20SI SO	Ant1	2412	-22.13	0.28	-21.85	<=8	PASS
		2437	-22.1	0.28	-21.82	<=8	PASS
		2462	-21.63	0.28	-21.35	<=8	PASS

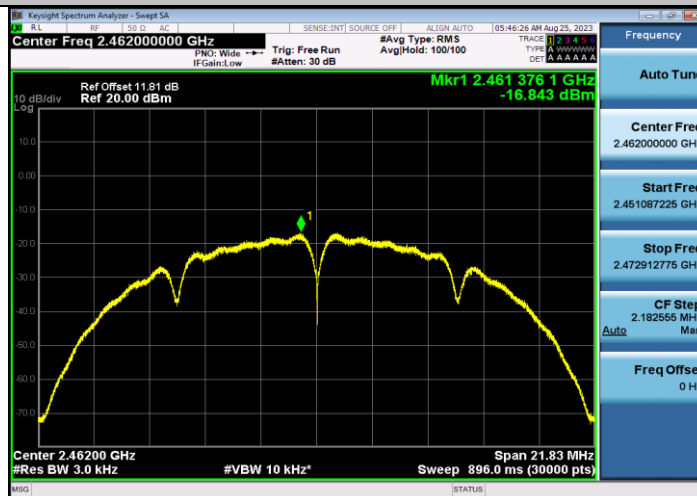
11B\_Ant1\_2412



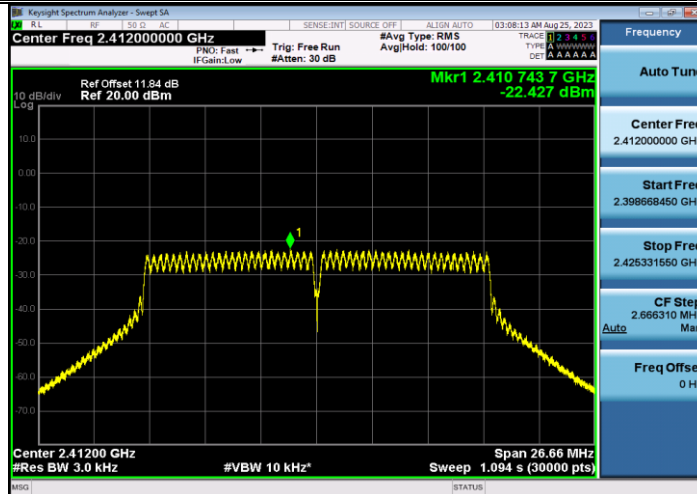
11B\_Ant1\_2437



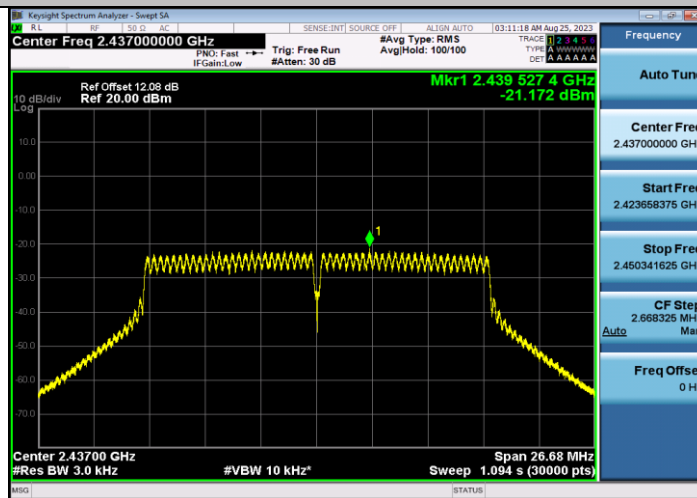
11B\_Ant1\_2462



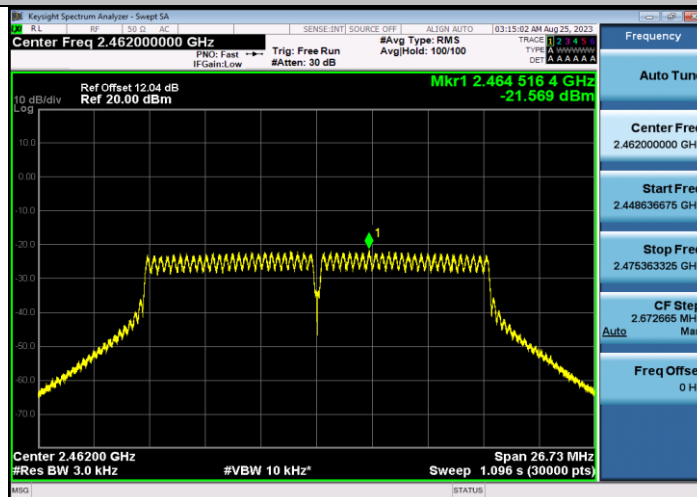
11G\_Ant1\_2412



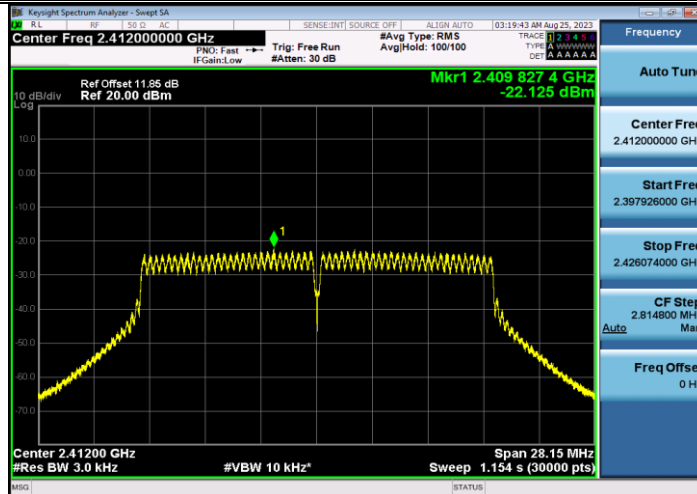
11G\_Ant1\_2437



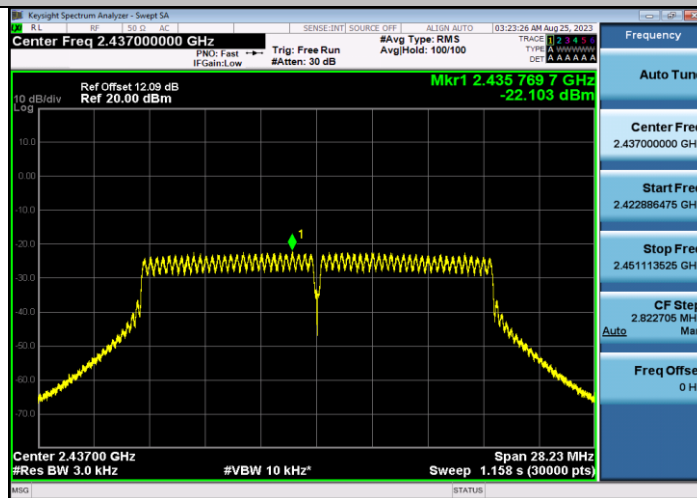
11G\_Ant1\_2462



11N20SISO\_Ant1\_2412



11N20SISO\_Ant1\_2437



11N20SISO\_Ant1\_2462

