

6.POWER SPECTRAL DENSITY TEST

Test Requirement:	FCC Part15 C Section 15.247 (e)
Test Method:	KDB558074 D0115.247 Meas Guidance v 05r02

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247	Power Spectral Density	8dBm/3kHz	2400-2483.5	PASS

6.2 TEST PROCEDURE

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
4. Set the VBW $\geq 3 \times \text{RBW}$.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

6.3 DEVIATION FROM STANDARD

No deviation.

6.4 TEST SETUP



6.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.1 Unless otherwise a special operating condition is specified in the follows during the testing.

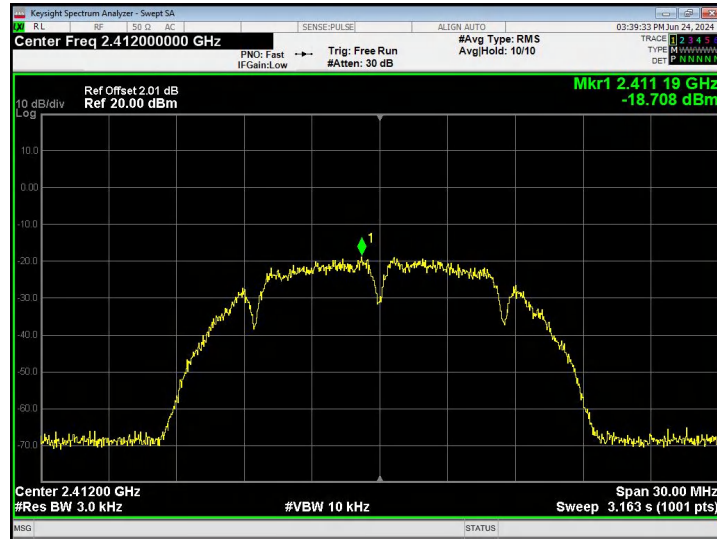
6.6 TEST RESULT

Temperature :	26°C	Relative Humidity :	54%
Pressure :	101kPa	Test Voltage :	AC 120V/60Hz
Test Mode :	TX b Mode		

ANT1			
Frequency	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
2412 MHz	-18.708	8	PASS
2437 MHz	-17.794	8	PASS
2462 MHz	-17.993	8	PASS

ANT2			
Frequency	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
2412 MHz	-18.182	8	PASS
2437 MHz	-17.990	8	PASS
2462 MHz	-18.999	8	PASS

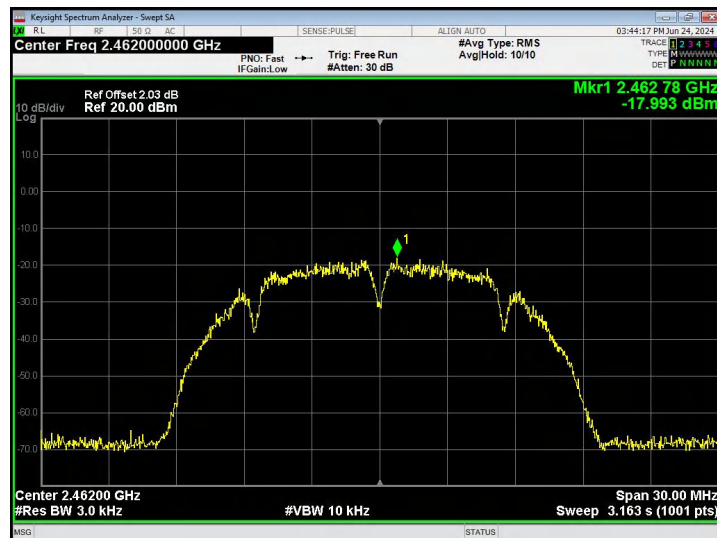
TX CH01-ANT1



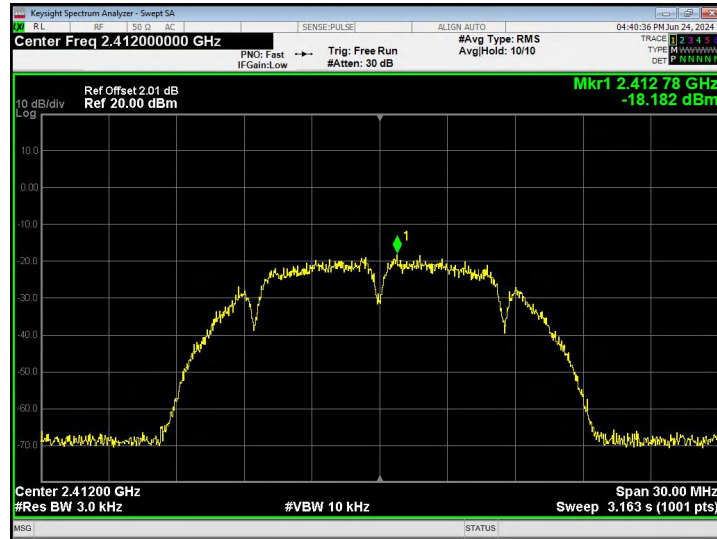
TX CH06-ANT1



TX CH11-ANT1



TX CH01-ANT2



TX CH06-ANT2



TX CH11-ANT2

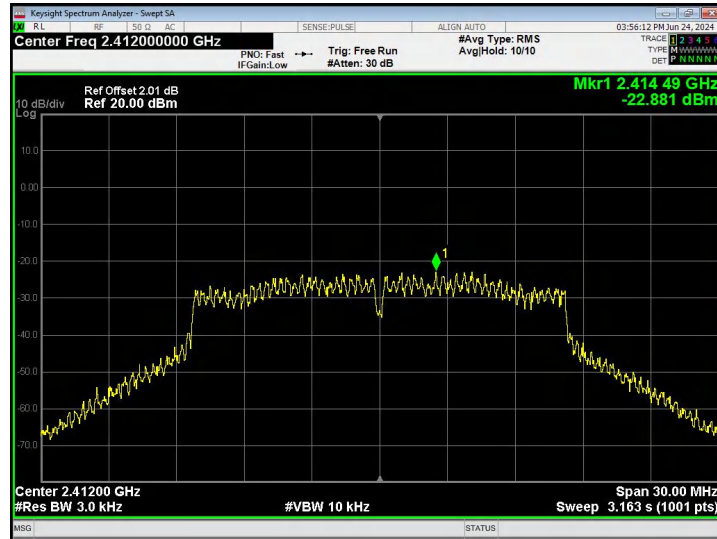


Temperature :	26°C	Relative Humidity :	54%
Pressure :	101kPa	Test Voltage :	AC 120V/60Hz
Test Mode :	TX g Mode		

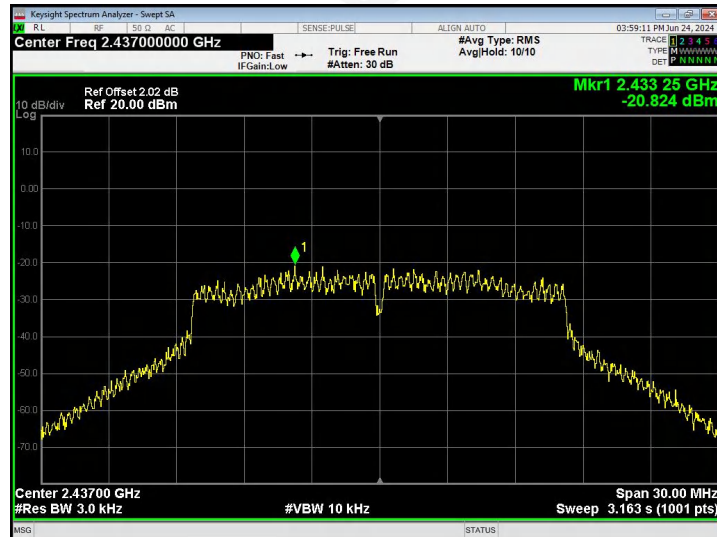
ANT1			
Frequency	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
2412 MHz	-22.881	8	PASS
2437 MHz	-20.824	8	PASS
2462 MHz	-20.152	8	PASS

ANT2			
Frequency	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
2412 MHz	-22.954	8	PASS
2437 MHz	-21.338	8	PASS
2462 MHz	-20.846	8	PASS

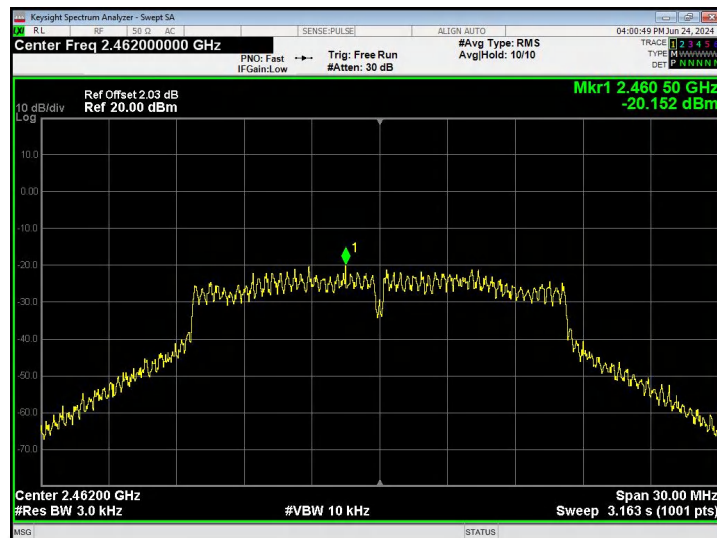
TX CH01-ANT1



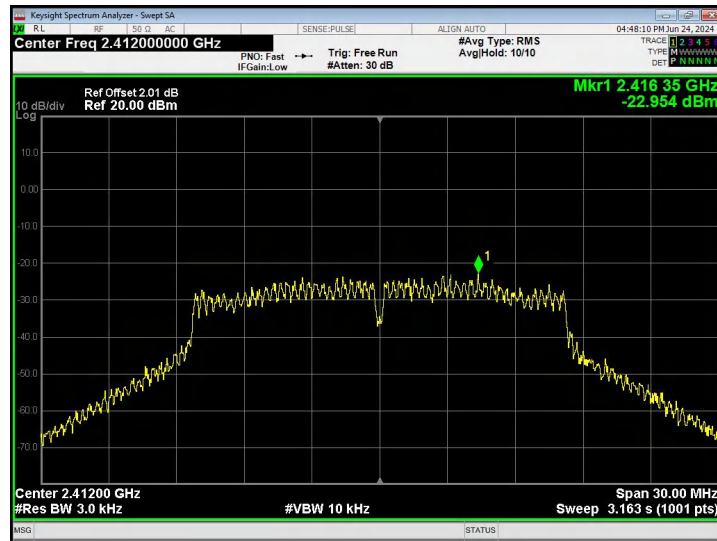
TX CH06-ANT1



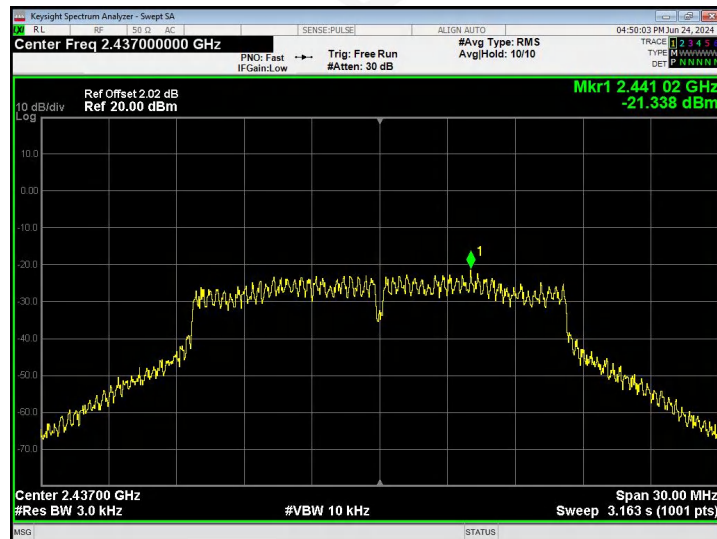
TX CH11-ANT1



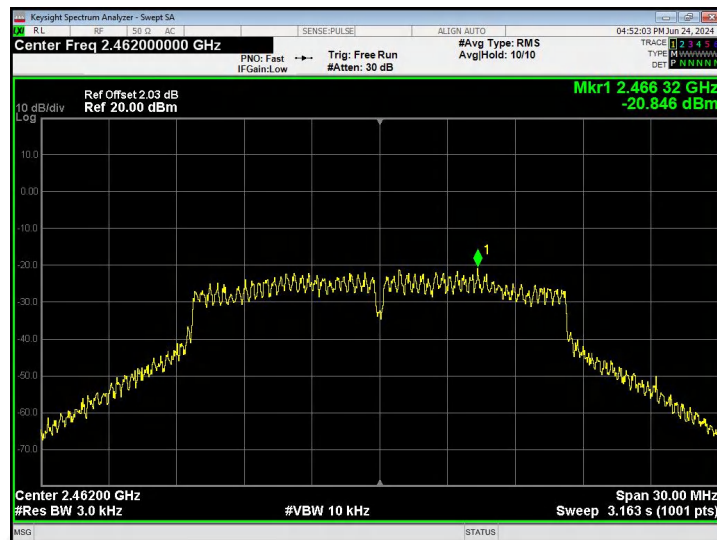
TX CH01-ANT2



TX CH06-ANT2



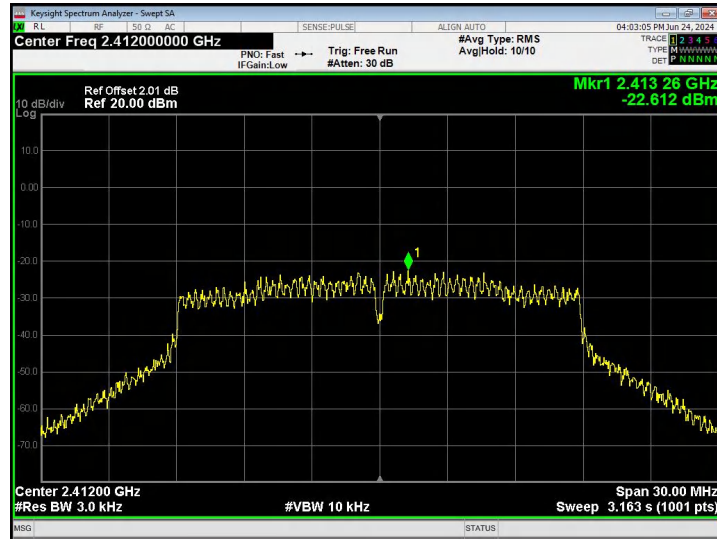
TX CH11-ANT2



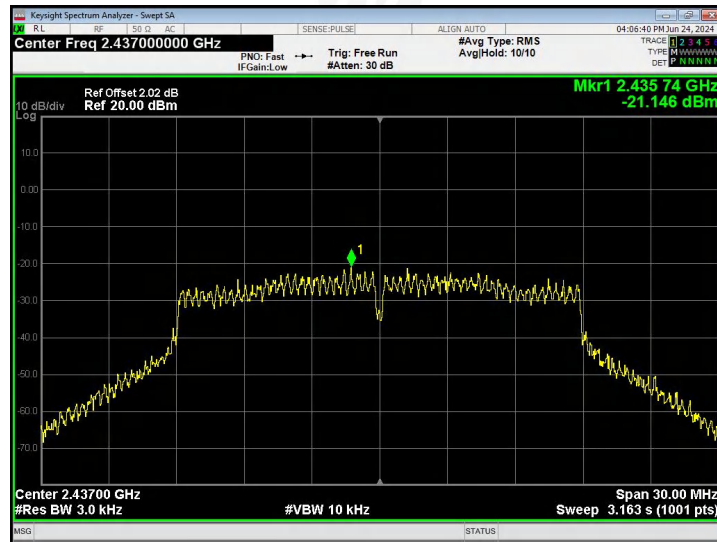
Temperature :	26°C	Relative Humidity :	54%
Pressure :	101kPa	Test Voltage :	AC 120V/60Hz
Test Mode :	TX n Mode(20M)		

Frequency (MHz)	Power Spectral Density (dBm/3kHz)		Power Spectral Density (mW)		Total Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
	ANT1	ANT2	ANT1	ANT2			
					/	/	/
2412 MHz	-22.612	-22.530	0.005	0.005	-20.00	8	PASS
2437 MHz	-21.146	-21.714	0.007	0.006	-18.86	8	PASS
2462 MHz	-20.788	-20.636	0.008	0.008	-17.95	8	PASS

TX CH01-ANT1



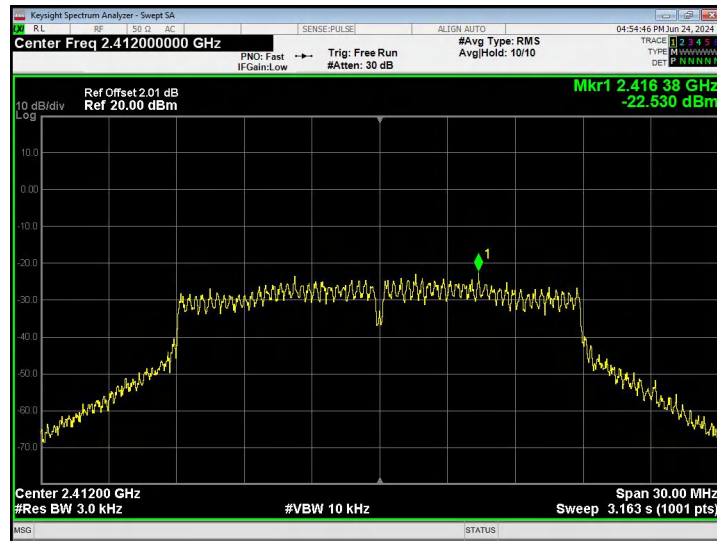
TX CH06-ANT1



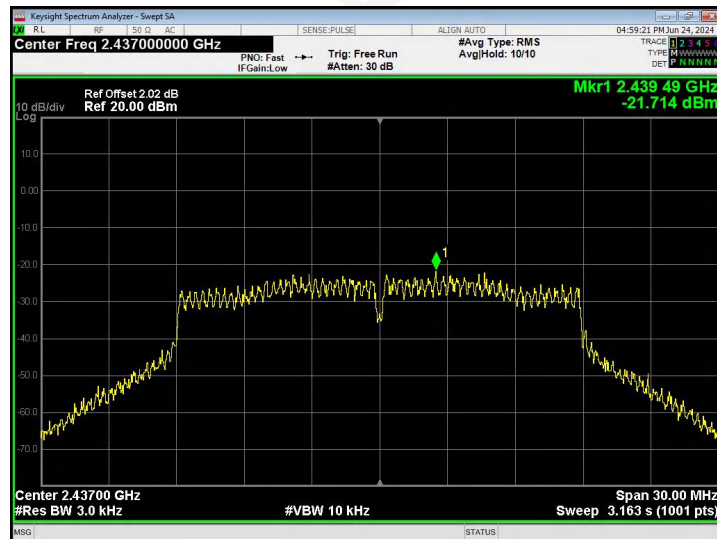
TX CH11-ANT1



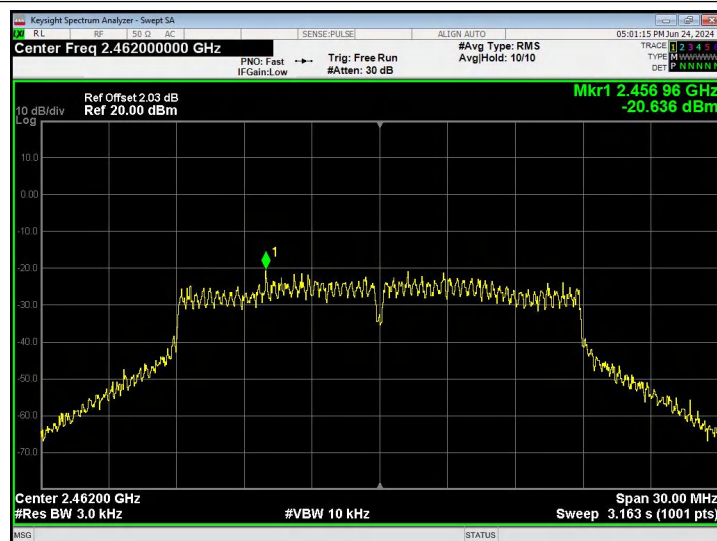
TX CH01-ANT2



TX CH06-ANT2



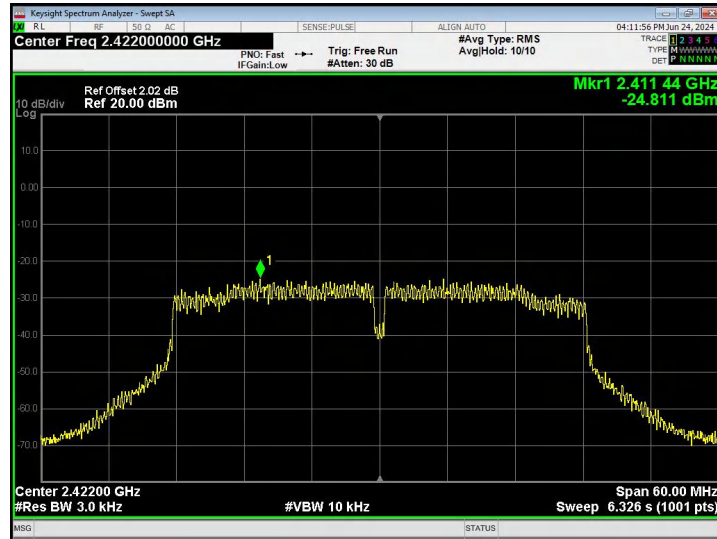
TX CH11-ANT2



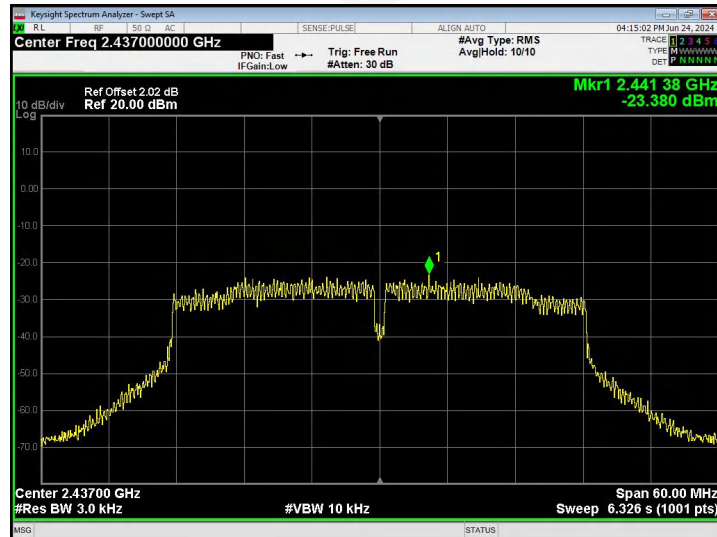
Temperature :	26°C	Relative Humidity :	54%
Pressure :	101kPa	Test Voltage :	AC 120V/60Hz
Test Mode :	TX n Mode(40M)		

Frequency (MHz)	Power Spectral Density (dBm/3kHz)		Power Spectral Density (mW)		Total Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
	ANT1	ANT2	ANT1	ANT2			
					/	/	/
2412 MHz	-24.811	-25.367	0.003	0.002	-23.01	8	PASS
2437 MHz	-23.380	-24.899	0.004	0.003	-21.54	8	PASS
2462 MHz	-23.229	-23.772	0.004	0.004	-20.96	8	PASS

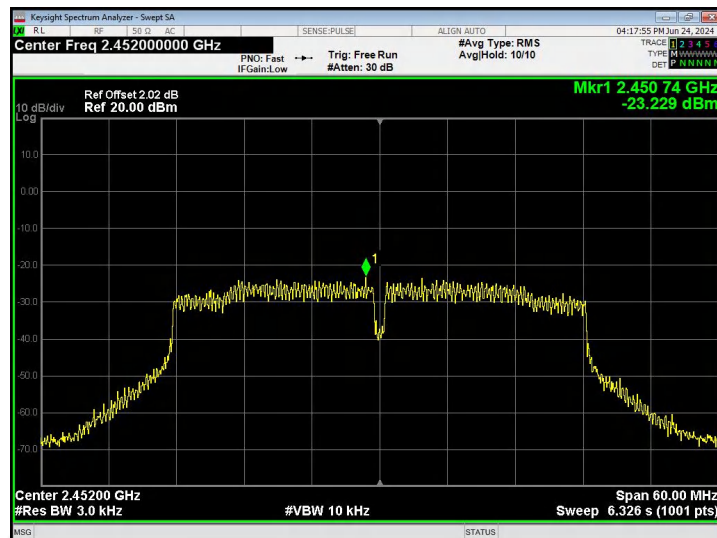
TX CH03-ANT1



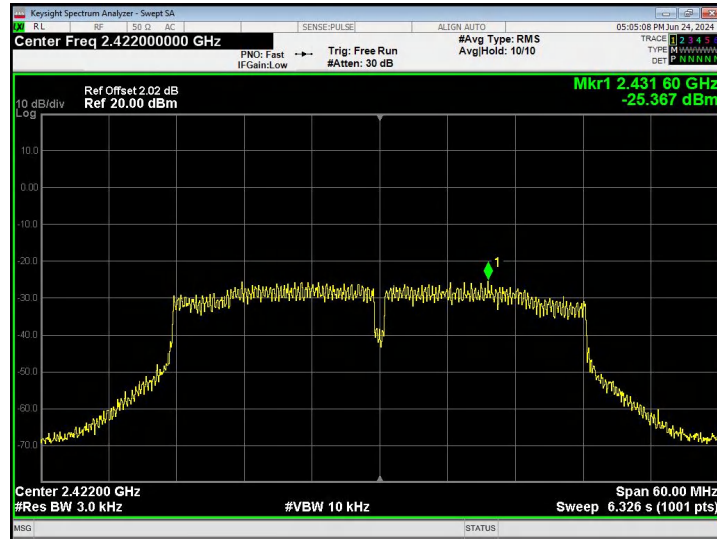
TX CH06-ANT1



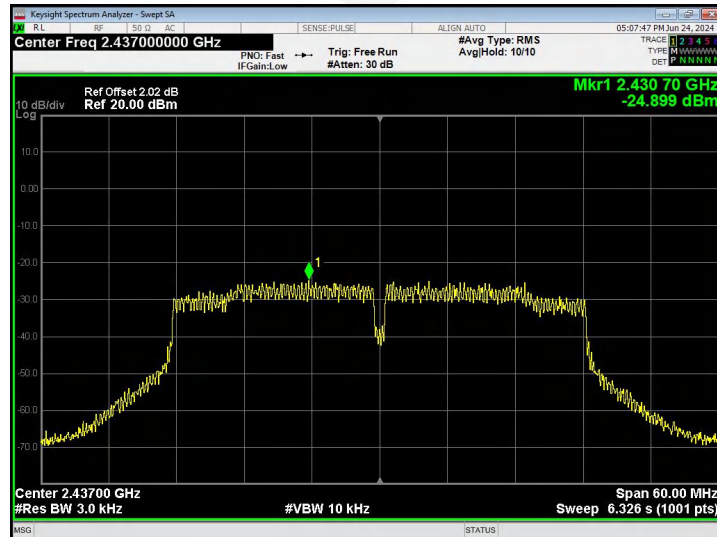
TX CH09-ANT1



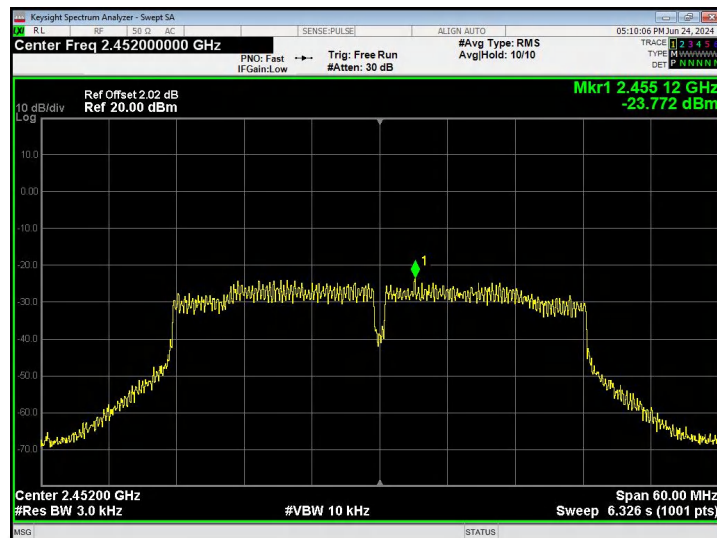
TX CH03-ANT2



TX CH06-ANT2



TX CH09-ANT2



7. CHANNEL BANDWIDTH

Test Requirement:	FCC Part15 C Section 15.247 (a)(2)
Test Method:	KDB558074 D0115.247 Meas Guidance v05r02

7.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2)	Bandwidth	$\geq 500\text{KHz}$ (6dB bandwidth)	2400-2483.5	PASS

7.2 TEST PROCEDURE

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

7.3 DEVIATION FROM STANDARD

No deviation.

7.4 TEST SETUP



7.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

7.6 TEST RESULT

Temperature :	26°C	Relative Humidity :	54%
Pressure :	101kPa	Test Voltage :	AC 120V/60Hz
Test Mode :	TX Mode-ANT1-Worst mode		

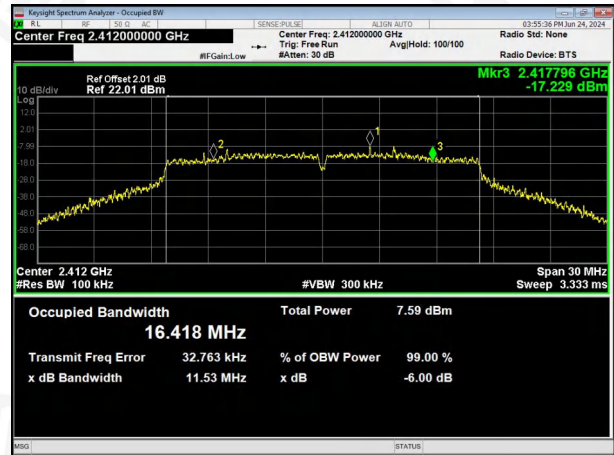
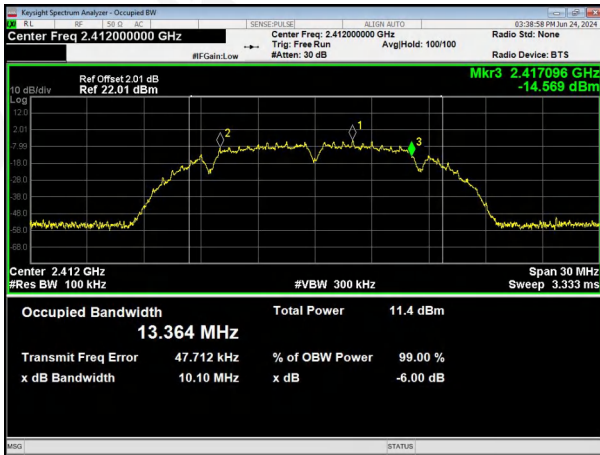
	Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
802.11b	2412	10.097	>500	Pass
	2437	10.071	>500	Pass
	2462	10.077	>500	Pass
802.11g	2412	11.527	>500	Pass
	2437	14.833	>500	Pass
	2462	13.885	>500	Pass
802.11n20	2412	15.321	>500	Pass
	2437	15.908	>500	Pass
	2462	16.551	>500	Pass
802.11n40	2422	27.965	>500	Pass
	2437	35.027	>500	Pass
	2452	35.106	>500	Pass

Test plot as follows:

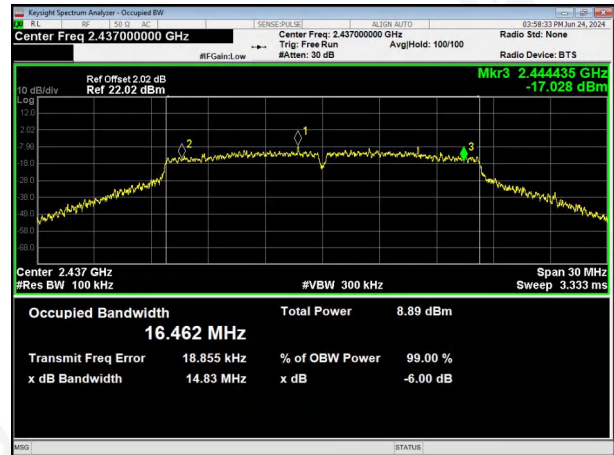
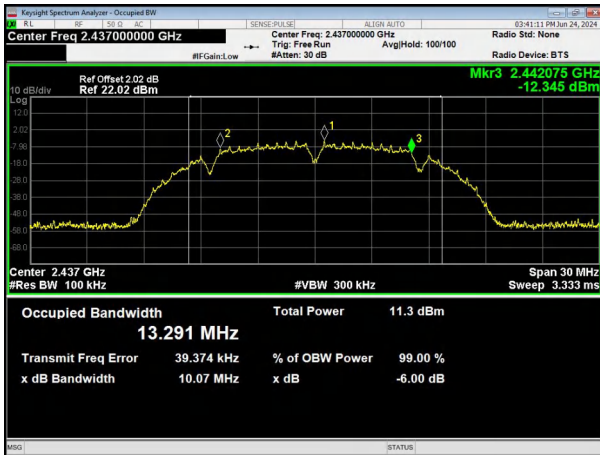
802.11b

802.11g

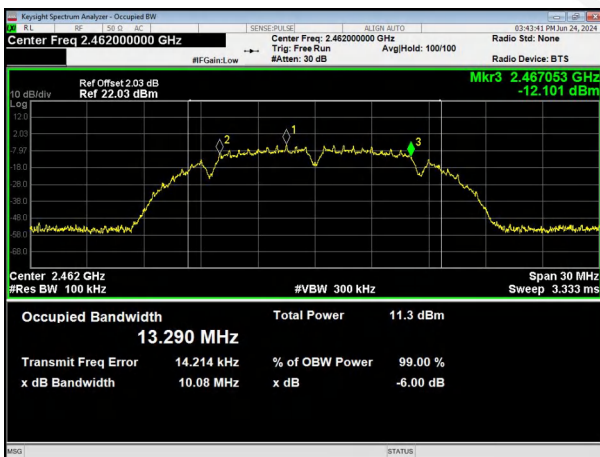
Lowest channel



Middle channel



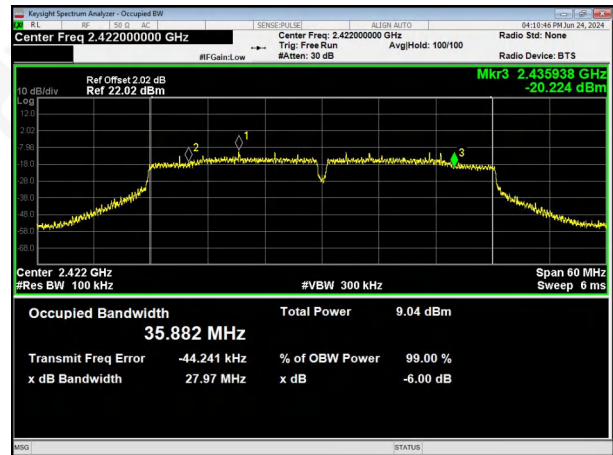
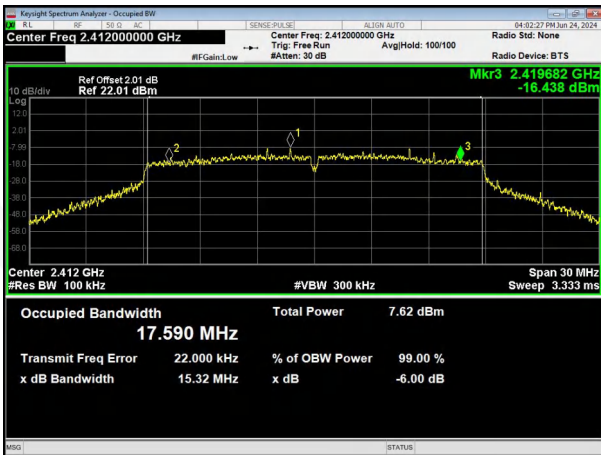
Highest channel



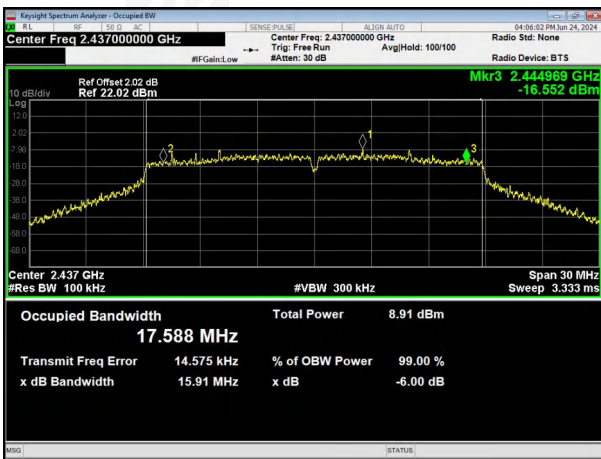
802.11n20

801.11n40

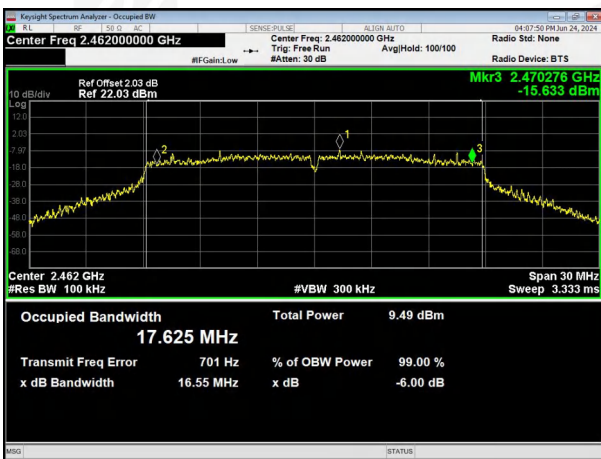
Lowest channel



Middle channel



Highest channel



8. PEAK OUTPUT POWER TEST

Test Requirement:	FCC Part15 C Section 15.247 (b)(3)
Test Method:	KDB558074 D0115.247 Meas Guidance v05r02

8.1 APPLIED PROCEDURES/LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3)	Peak Output Power	1 watt or 30dBm	2400-2483.5	PASS

8.2 TEST PROCEDURE

- a. The EUT was directly connected to the Power meter

8.3 DEVIATION FROM STANDARD

No deviation.

8.4 TEST SETUP



8.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

8.6 TEST RESULT

Temperature :	26℃	Relative Humidity :	54%
Pressure :	101kPa	Test Voltage :	AC 120V/60Hz

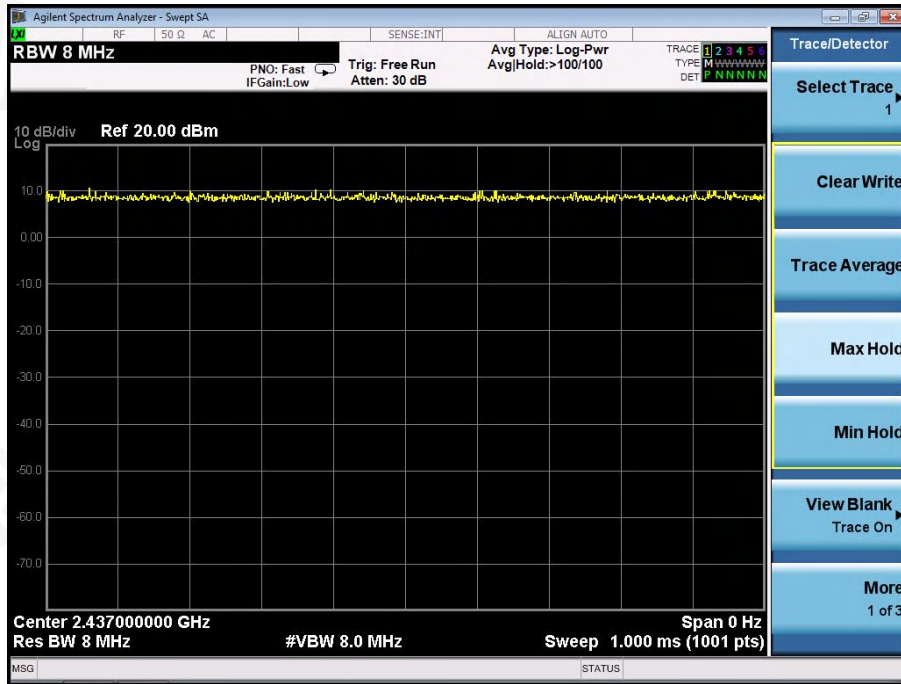
Test CH	Peak Output Power (dBm)				Limit(dBm)	Result
	802.11b		802.11g			
	ANT1	ANT2	ANT1	ANT2		
Lowest	9.257	9.834	10.465	10.966	30.00	Pass
Middle	9.331	9.672	10.837	10.947		
Highest	9.316	9.812	10.305	10.982		

Test CH	Peak Output Power (dBm)								Total power(dBm)	
	802.11n(HT20) (dBm)		802.11n(HT40) (dBm)		802.11n(HT20) (mW)		802.11n(HT40) (mW)		802.11n (HT20) (dBm)	802.11n (HT40) (dBm)
	ANT1	ANT2	ANT1	ANT2	ANT1	ANT2	ANT1	ANT2	/	/
Lowest	8.335	9.125	8.276	9.168	6.816	8.175	6.724	8.257	11.758	11.755
Middle	8.248	9.114	8.165	9.225	6.680	8.155	6.554	8.366	11.712	11.737
Highest	8.276	9.183	8.184	9.176	6.724	8.285	6.583	8.272	11.763	11.718

	Frequency	Output Power	Antenna gain	EIRP
	(MHz)	(dBm)	(dBi)	(dBm)
802.11b	Lowest	9.834	1.67	11.504
	Middle	9.672	1.67	11.342
	Highest	9.812	1.67	11.482
802.11g	Lowest	10.966	1.67	12.636
	Middle	10.947	1.67	12.617
	Highest	10.982	1.67	12.652
802.11n20	Lowest	11.758	4.68	16.438
	Middle	11.712	4.68	16.392
	Highest	11.763	4.68	16.443
802.11n40	Lowest	11.755	4.68	16.435
	Middle	11.737	4.68	16.417
	Highest	11.718	4.68	16.398

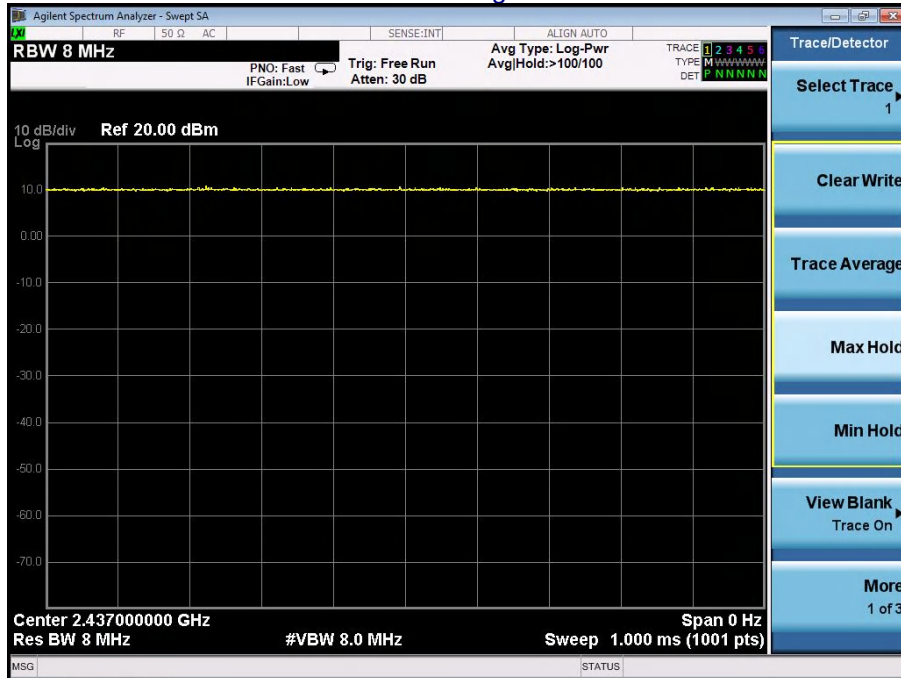
Duty Cyclcy:

802.11b



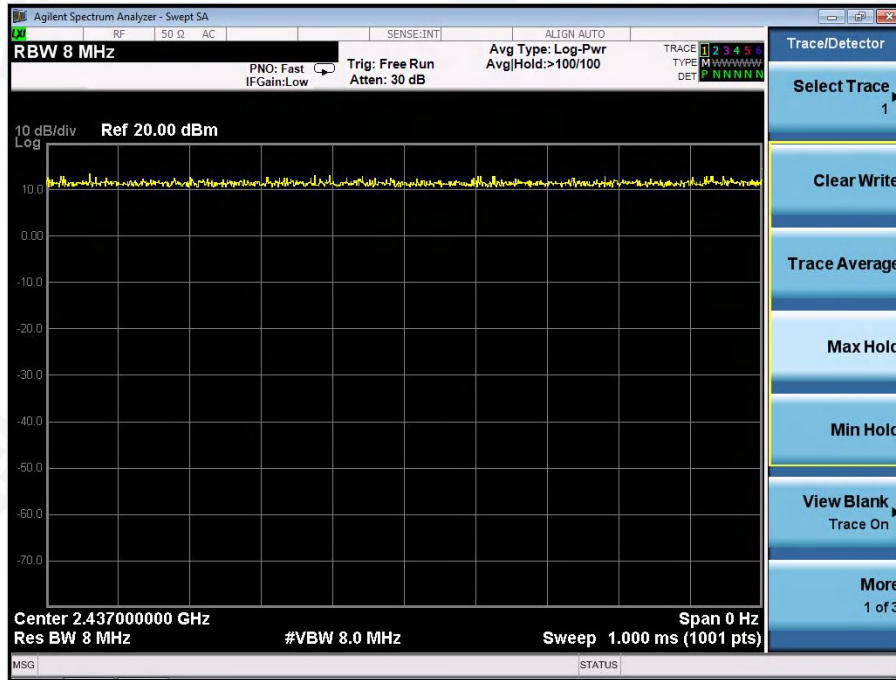
Ton	Tp	Duty cyclcy(%)	Duty factor(dB)
100.00	100.00	100.00%	0.00

802.11g



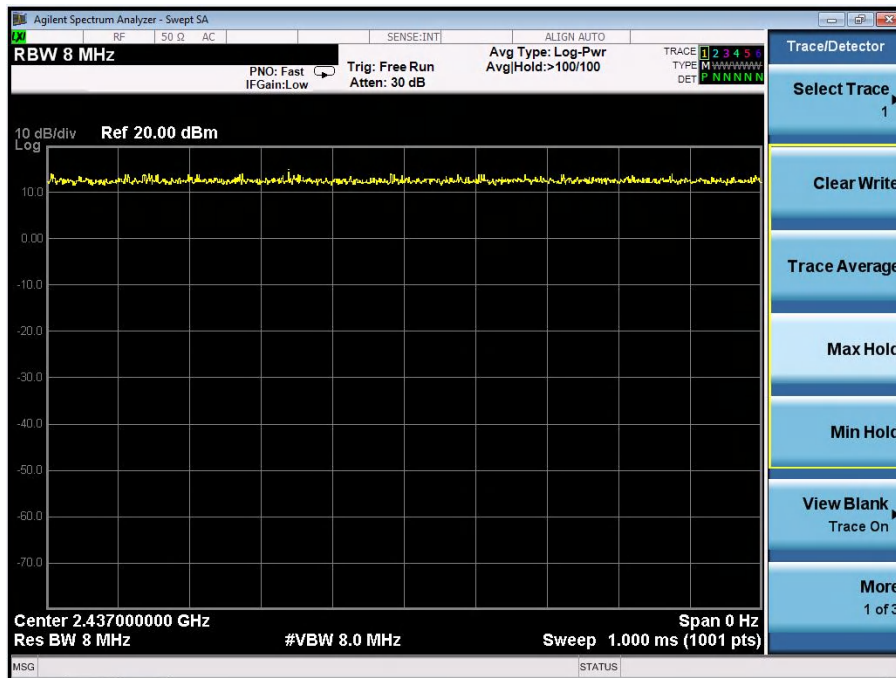
Ton	Tp	Duty cyclcy(%)	Duty factor(dB)
100.00	100.00	100.00%	0.00

802.11n20



Ton	Tp	Duty cyclcy(%)	Duty factor(dB)
100.00	100.00	100.00%	0.00

802.11n40



Ton	Tp	Duty cyclcy(%)	Duty factor(dB)
100.00	100.00	100.00%	0.00

9. CONDUCTED BAND EDGE AND SPURIOUS EMISSION

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	KDB558074 D0115.247 Meas Guidance v05r02

9.1 APPLICABLE STANDARD

in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, 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 in15.209(a).

9.2 TEST PROCEDURE

Using the following spectrum analyzer setting:

- A) Set the RBW = 100KHz.
- B) Set the VBW = 300KHz.
- C) Sweep time = auto couple.
- D) Detector function = peak.
- E) Trace mode = max hold.
- F) Allow trace to fully stabilize.

9.3 DEVIATION FROM STANDARD

No deviation.

9.4 TEST SETUP



9.5 EUT OPERATION CONDITIONS

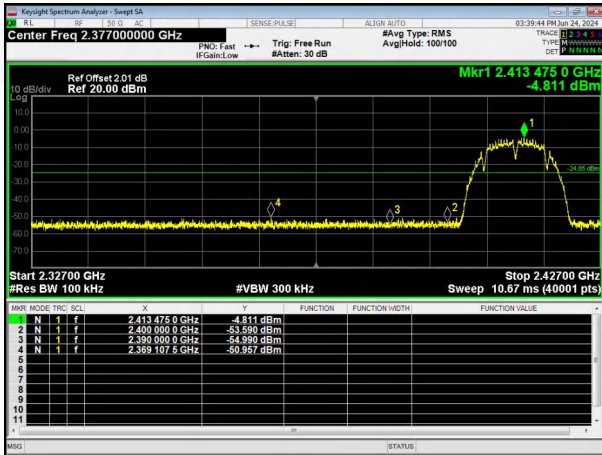
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

9.6 TEST RESULTS

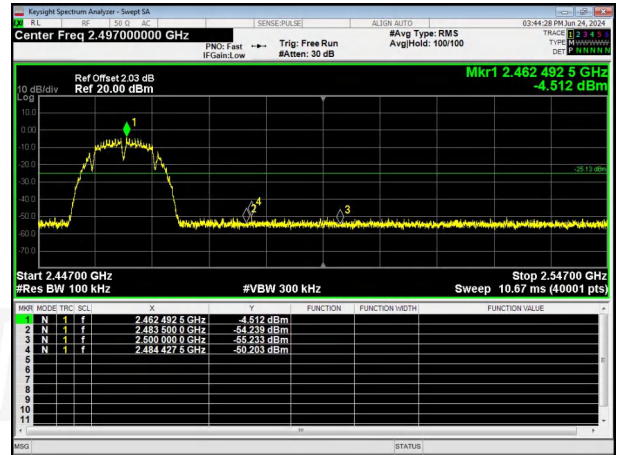
Pre-test the EUT in continuous transmitting mode with setup as stand-alone in only ANT1 transmits and only ANT2 transmits, found the worst case is ANT1 transmit and report the data.

Test plot as follows:

Test mode: 802.11b

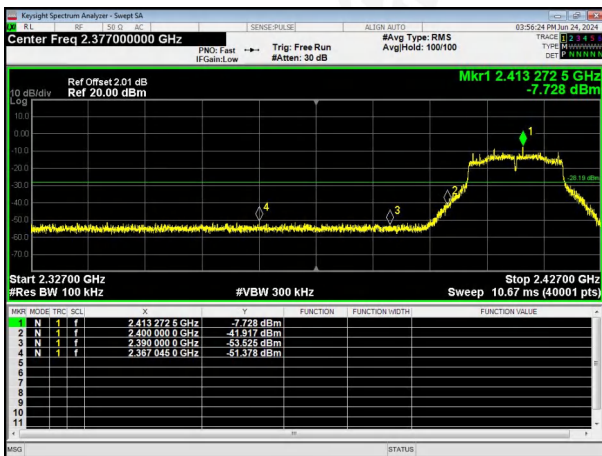


Lowest channel



Highest channel

Test mode: 802.11g

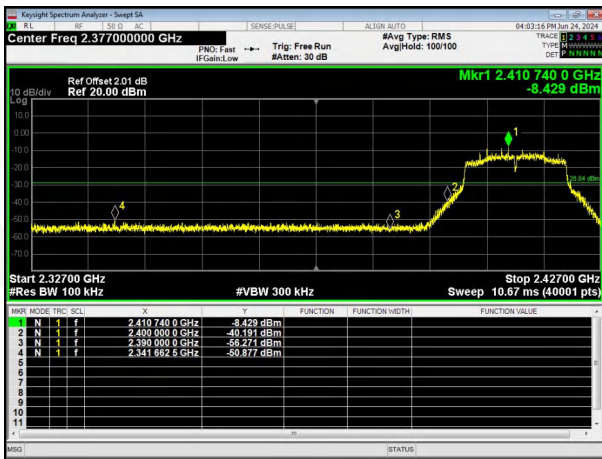


Lowest channel

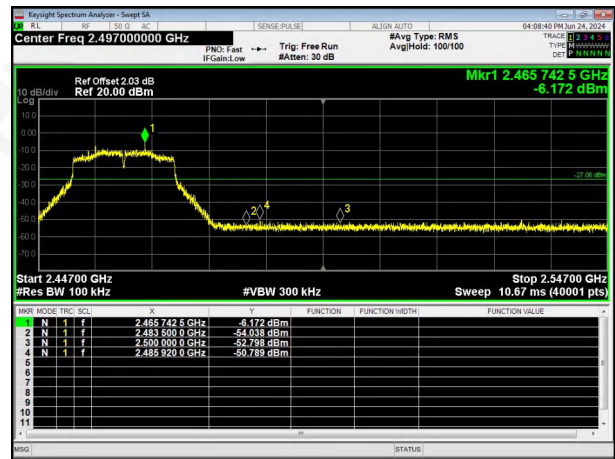


Highest channel

Test mode: 802.11n(HT20)

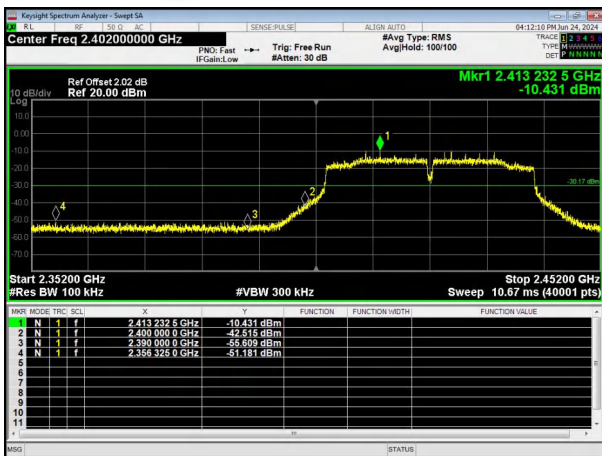


Lowest channel

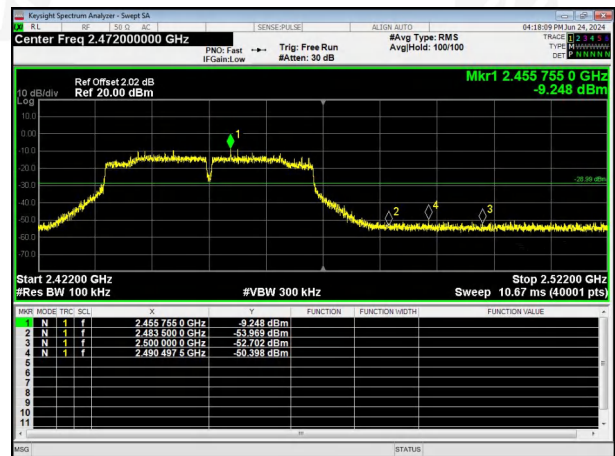


Highest channel

Test mode: 802.11n(HT40)



Lowest channel

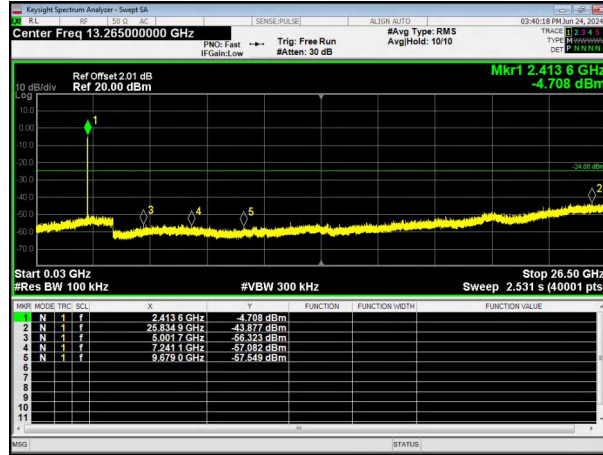


Highest channel

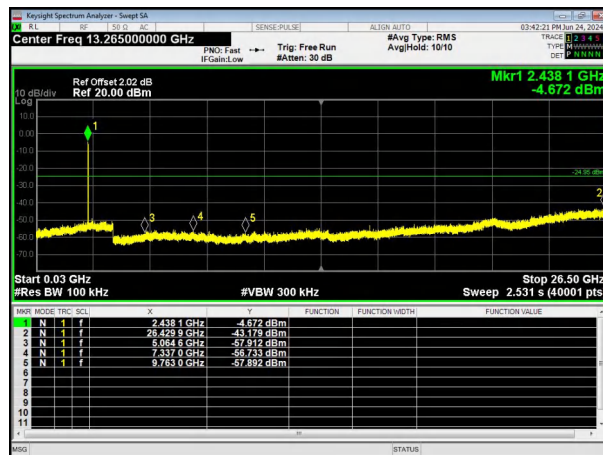
Pre-test the EUT in continuous transmitting mode with setup as stand-alone in only ANT1 transmits and only ANT2 transmits, found the worst case is ANT1 transmit and report the data.

Test plot as follows:

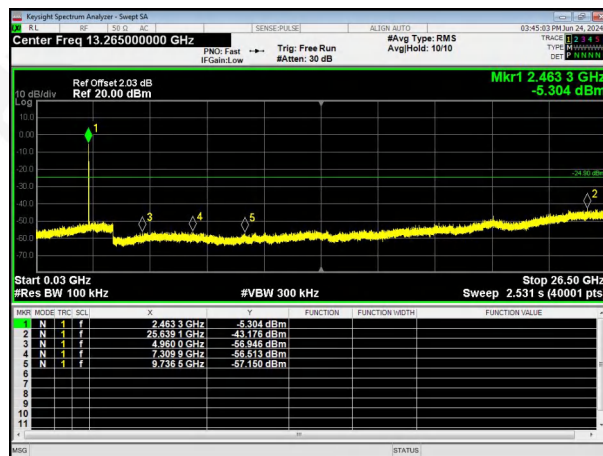
802.11b
Lowest channel



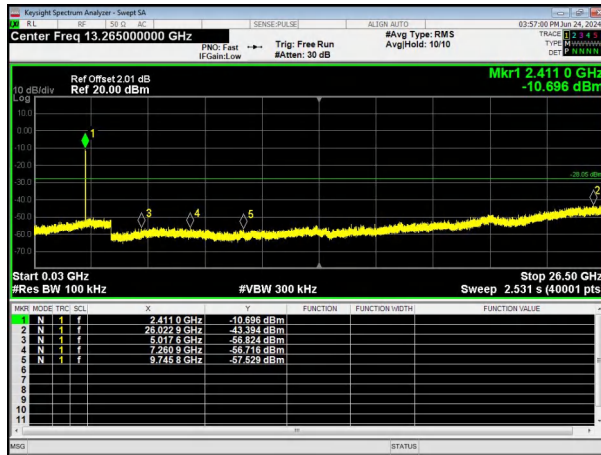
Middle channel



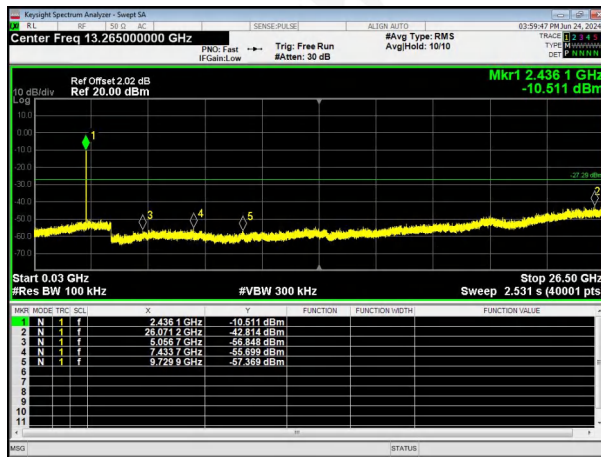
Highest channel



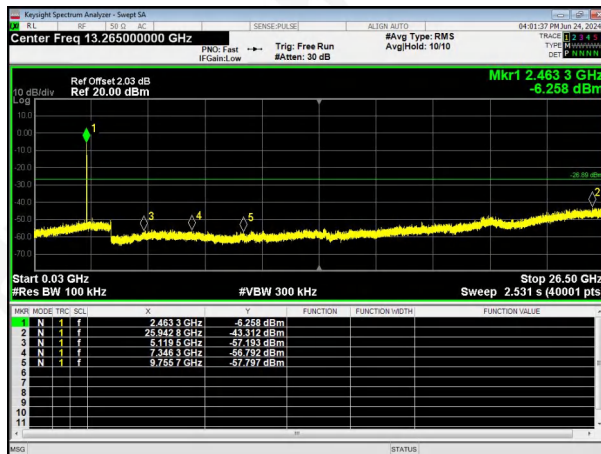
802.11g
Lowest channel



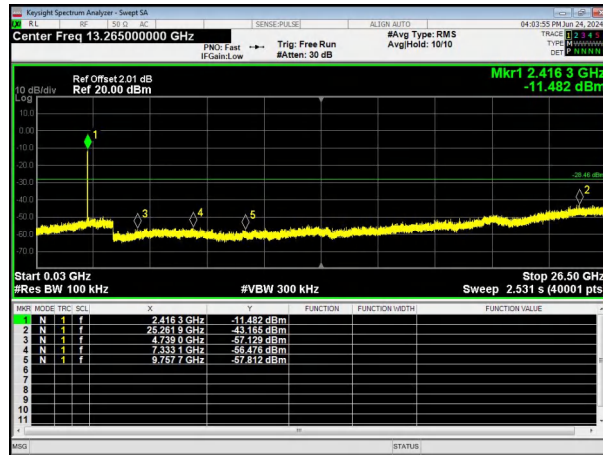
Middle channel



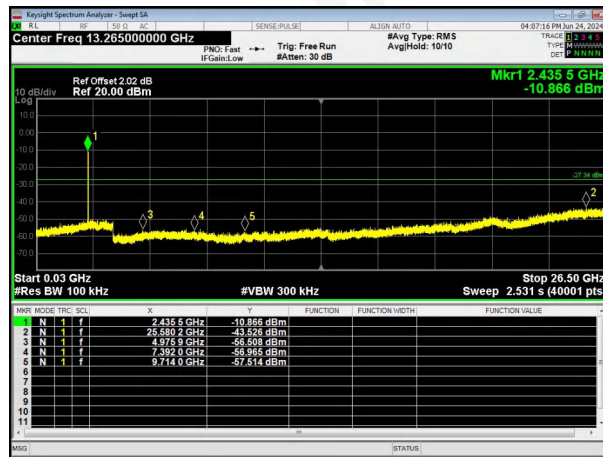
Highest channel



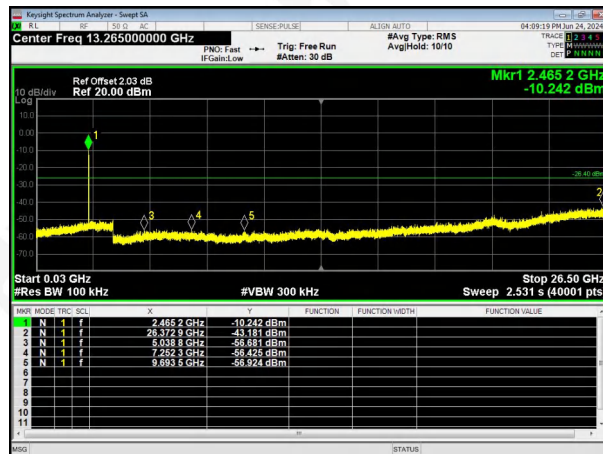
802.11n(HT20)
Lowest channel



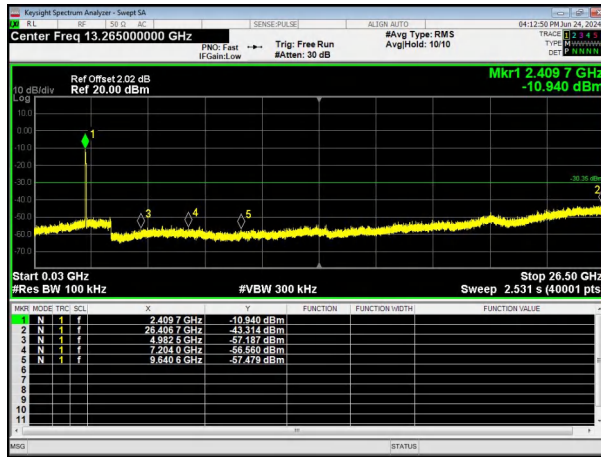
Middle channel



Highest channel



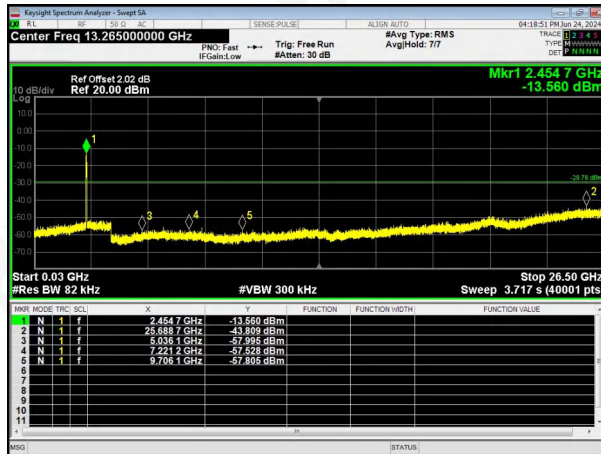
802.11n(HT40)
Lowest channel



Middle channel



Highest channel



10. ANTENNA REQUIREMENT

Standard requirement:	FCC Part15 C Section 15.203 /247(c)
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.	
15.247(c) (1)(i) requirement: (i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.	
EUT Antenna:	
The antennas are FPCB antenna, the best case gain of the antennas are 1.67dBi, reference to the appendix II for details	

11. TEST SETUP PHOTO

Reference to the appendix I for details.

12. EUT CONSTRUCTIONAL DETAILS

Reference to the appendix II for details.

***** END OF REPORT *****