Appendix B

RF Test Data for Zigbee(Conducted Measurement)

Product Name: BWMZB06 Module

Test Model: BWMZB06-AB

Environmental Conditions

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

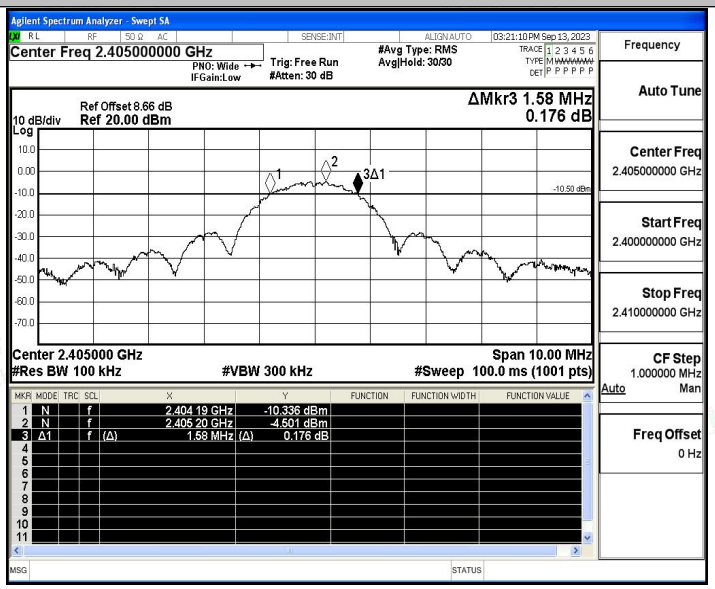
A.1 DTS Bandwidth

Test Result

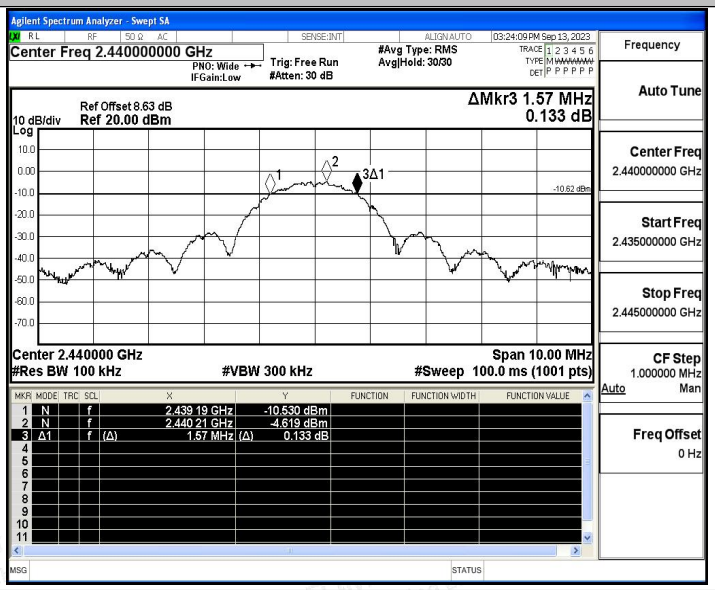
TestMode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
ZIGB	Ant1	2405	1.580	2404.190	2405.770	0.5	PASS
		2440	1.570	2439.190	2440.760	0.5	PASS
		2480	1.580	2479.190	2480.770	0.5	PASS

Test Graphs

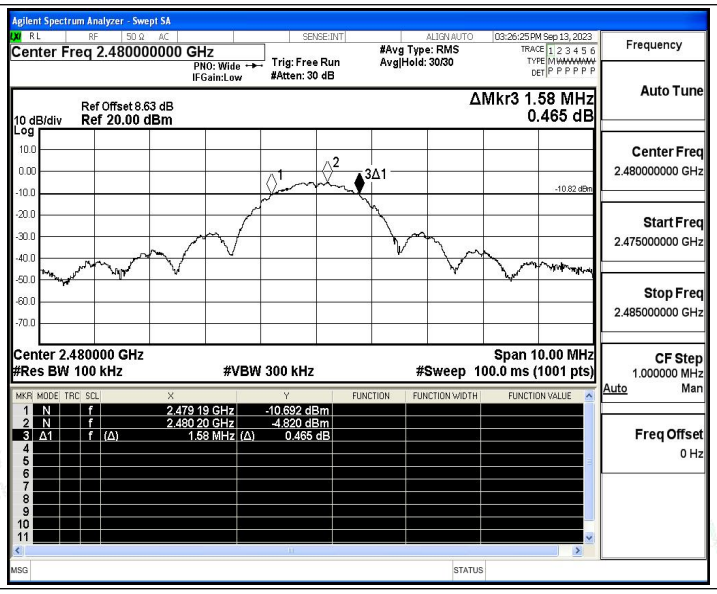
ZIGB_Ant1_2405



ZIGB_Ant1_2440



ZIGB_Ant1_2480


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold: 30/30
03:26:25 PM Sep 13, 2023
Ref Offset 8.63 dB
10 dB/div
Ref 20.00 dBm
ΔMkr3 1.58 MHz
0.465 dB
-10.82 dBm
Center 2.480000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 10.00 MHz
#Sweep 100.0 ms (1001 pts)
1 N 1 f 2.479 19 GHz -10.692 dBm
2 N 1 f 2.480 20 GHz -4.820 dBm
3 Δ1 1 f (Δ) 1.58 MHz (Δ) 0.465 dB
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.475000000 GHz
Stop Freq
2.485000000 GHz
CF Step
1.000000 MHz
Auto
Man
Freq Offset
0 Hz

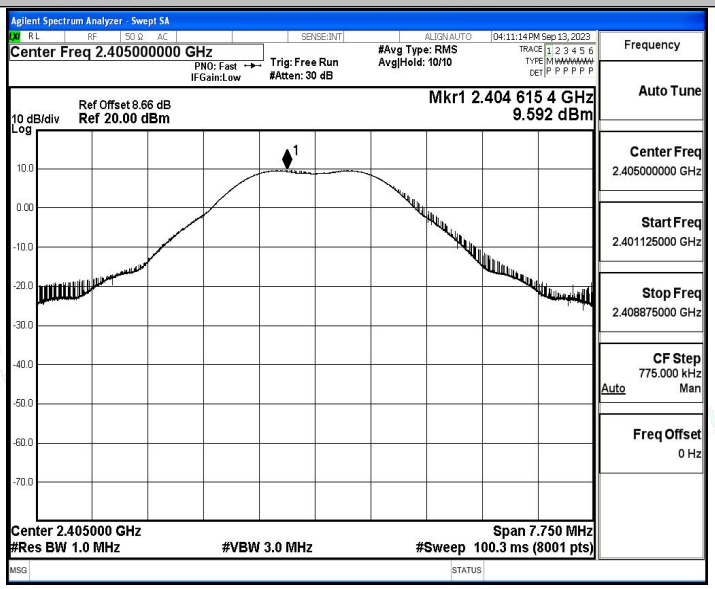
A.2 Maximum conducted output power

Test Result

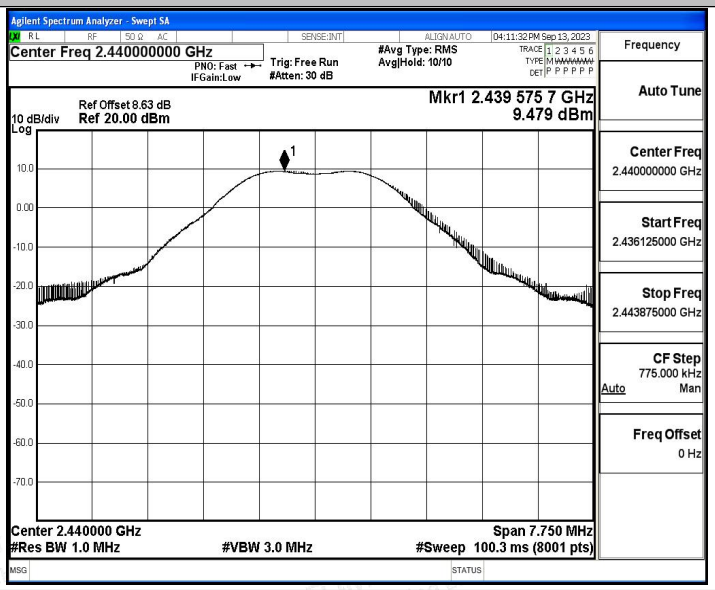
TestMode	Antenna	Frequency[MHz]	Result[dBm]	Limit[dBm]	Verdict
ZIGB	Ant1	2405	9.59	≤30	PASS
		2440	9.48	≤30	PASS
		2480	9.38	≤30	PASS

Test Graphs

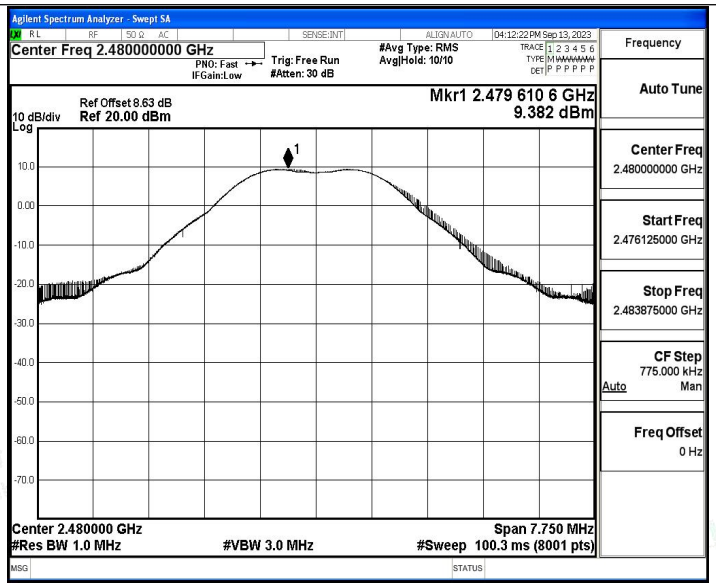
ZIGB_Ant1_2405



ZIGB_Ant1_2440



ZIGB_Ant1_2480


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold: 10/10
04:12:22 PM Sep 13, 2023
Ref Offset 8.63 dB
10 dB/div
Log
Ref 20.00 dBm
Mkr1 2.479 610 6 GHz
9.382 dBm
Center 2.480000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Span 7.750 MHz
#Sweep 100.3 ms (8001 pts)
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.476125000 GHz
Stop Freq
2.483875000 GHz
CF Step
775.000 kHz
Auto
Man
Freq Offset
0 Hz

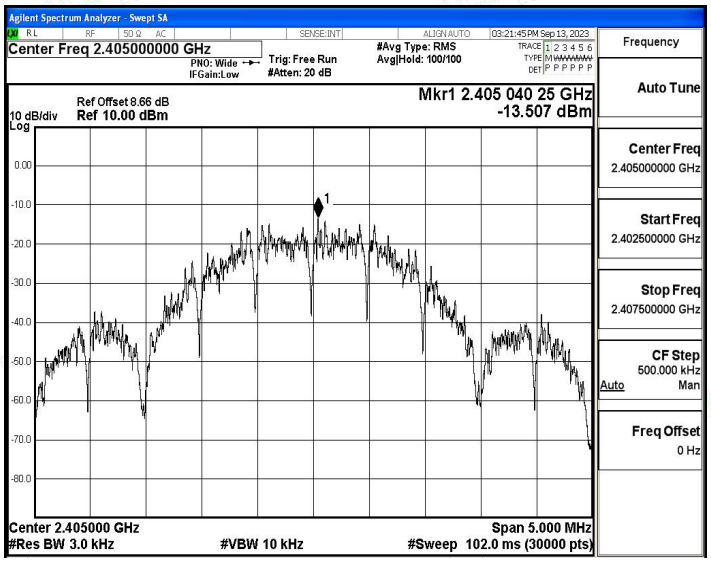
A.3 Maximum power spectral density

Test Result

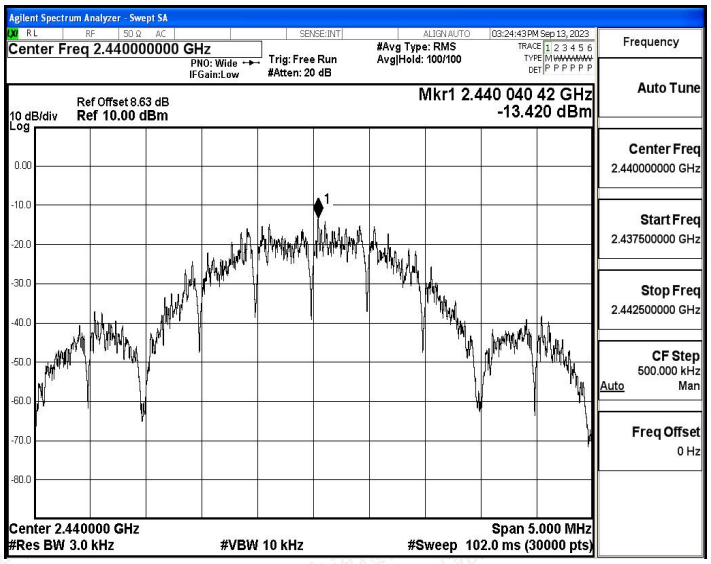
TestMode	Antenna	Frequency[MHz]	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
ZIGB	Ant1	2405	-13.51	≤8.00	PASS
		2440	-13.42	≤8.00	PASS
		2480	-13.92	≤8.00	PASS

Test Graphs

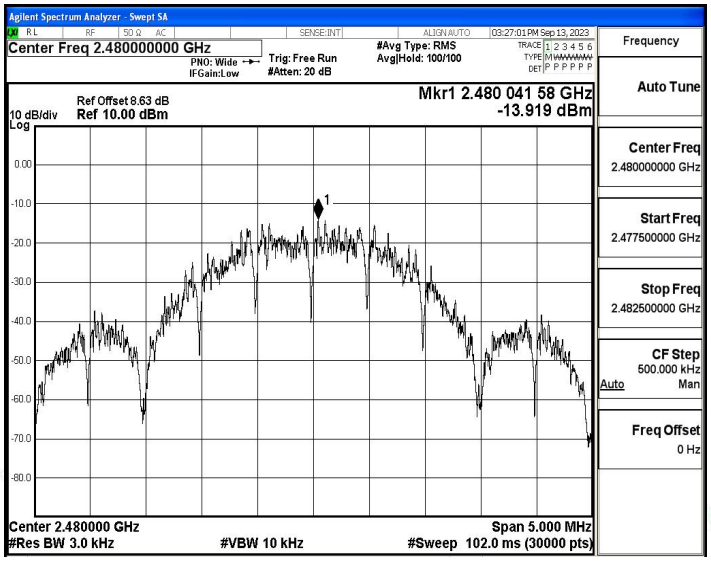
ZIGB_Ant1_2405



ZIGB_Ant1_2440



ZIGB_Ant1_2480


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 20 dB
#Avg Type: RMS
Avg|Hold: 100/100
03:27:01 PM Sep 13, 2023
Ref Offset 8.63 dB
10 dB/div
Log
Ref 10.00 dBm
Mkr1 2.480 041 58 GHz
-13.919 dBm
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
Center 2.480000 GHz
#Res BW 3.0 kHz
#VBW 10 kHz
Span 5.000 MHz
#Sweep 102.0 ms (30000 pts)
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.477500000 GHz
Stop Freq
2.482500000 GHz
CF Step
500.000 kHz
Auto
Man
Freq Offset
0 Hz

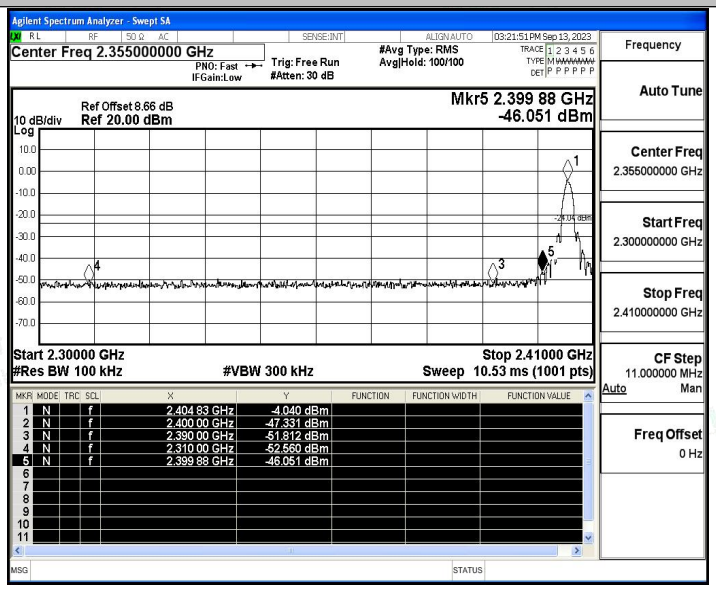
A.4 Band edge measurements

Test Result

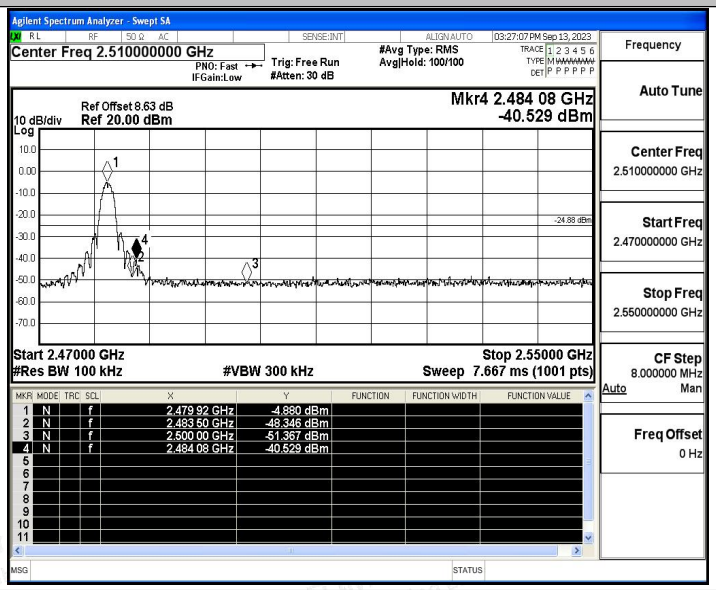
TestMode	Antenna	ChName	Frequency[MHz]	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
ZIGB	Ant1	Low	2405	-4.04	-46.05	≤-24.04	PASS
		High	2480	-4.88	-40.53	≤-24.88	PASS

Test Graphs

ZIGB_Ant1_Low_2405



ZIGB_Ant1_High_2480



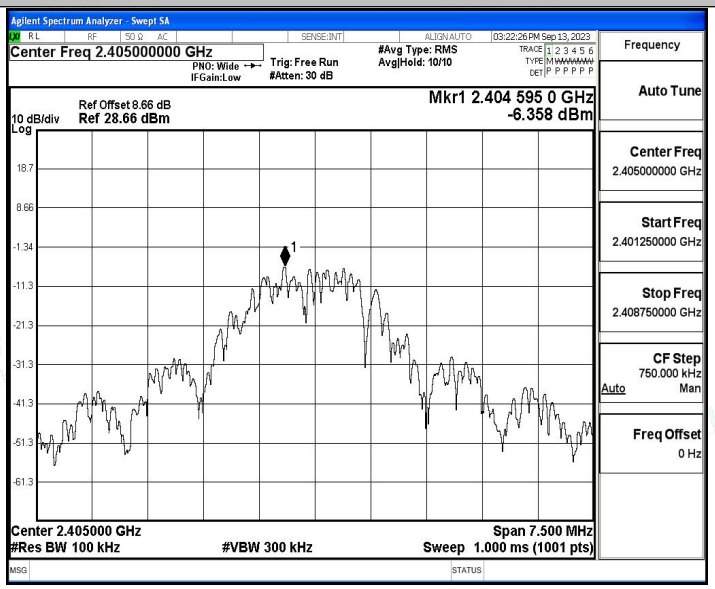
A.5 Conducted Spurious Emission

Test Result

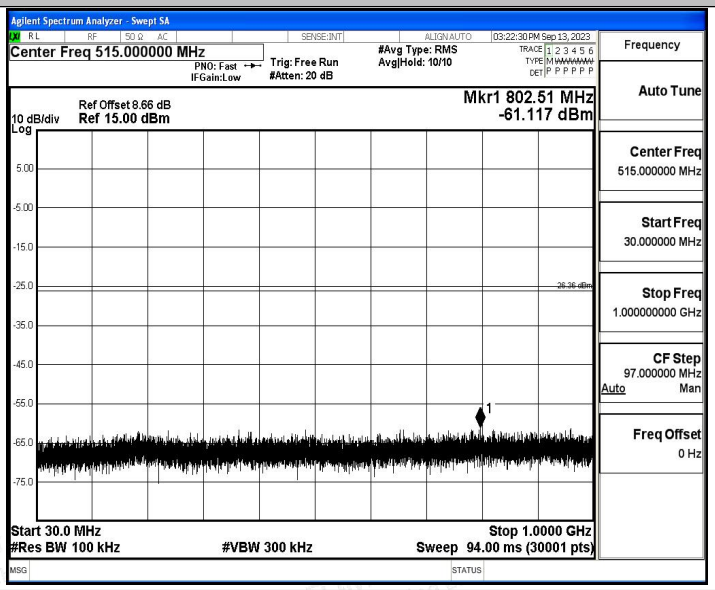
TestMode	Antenna	Frequency[MHz]	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
ZIGB	Ant1	2405	Reference	-6.36	-6.36	---	PASS
			30~1000	-6.36	-61.12	≤-26.36	PASS
			1000~26500	-6.36	-47.01	≤-26.36	PASS
		2440	Reference	-5.78	-5.78	---	PASS
			30~1000	-5.78	-60.5	≤-25.78	PASS
			1000~26500	-5.78	-46.54	≤-25.78	PASS
		2480	Reference	-6.22	-6.22	---	PASS
			30~1000	-6.22	-60.86	≤-26.22	PASS
			1000~26500	-6.22	-47.07	≤-26.22	PASS

Test Graphs

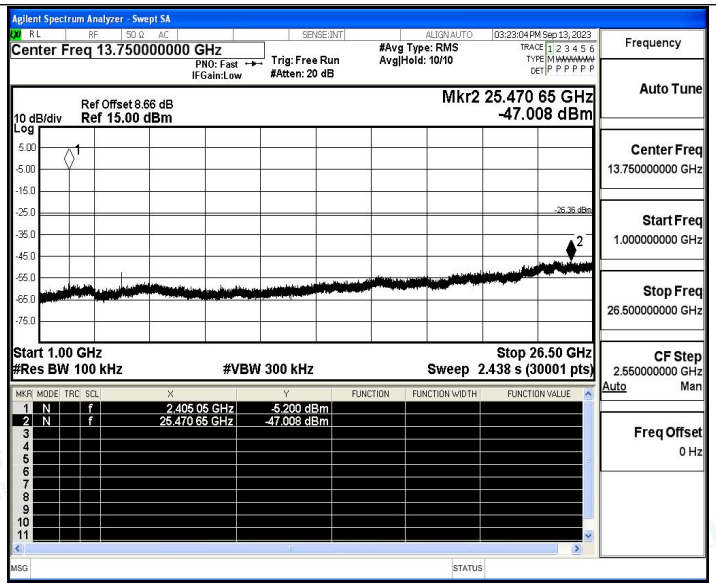
ZIGB_Ant1_2405_0~Reference



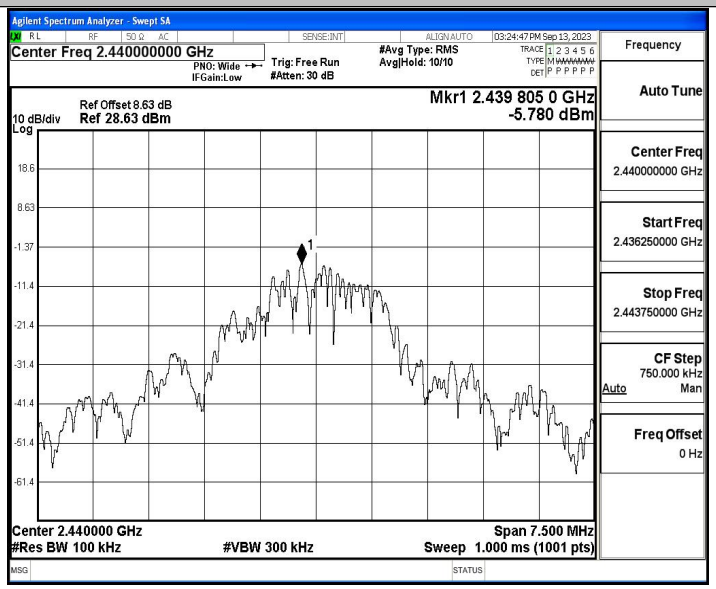
ZIGB_Ant1_2405_30~1000



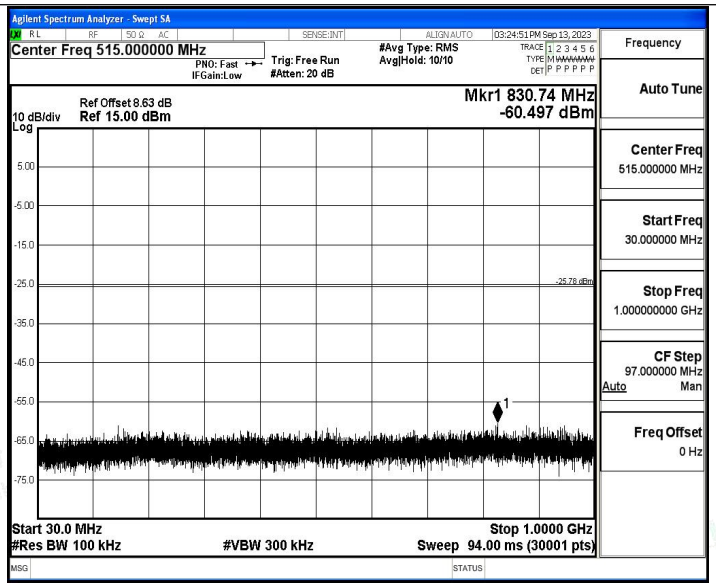
ZIGB_Ant1_2405_1000~26500



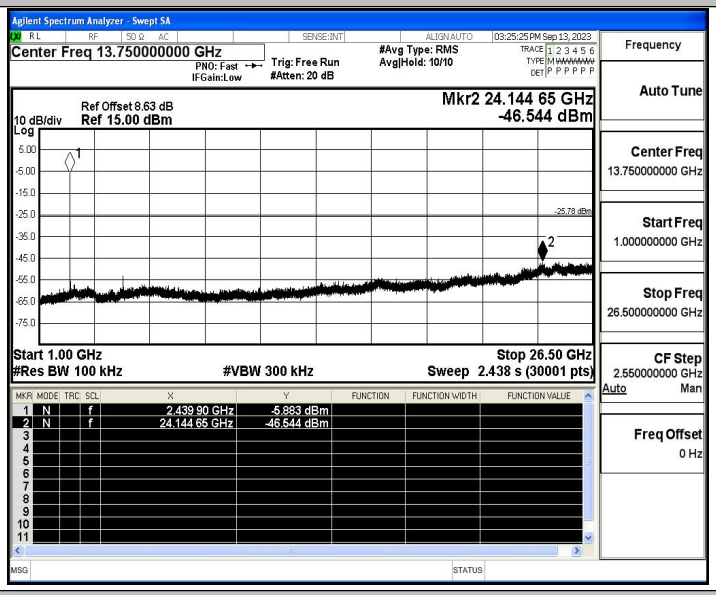
ZIGB_Ant1_2440_0~Reference



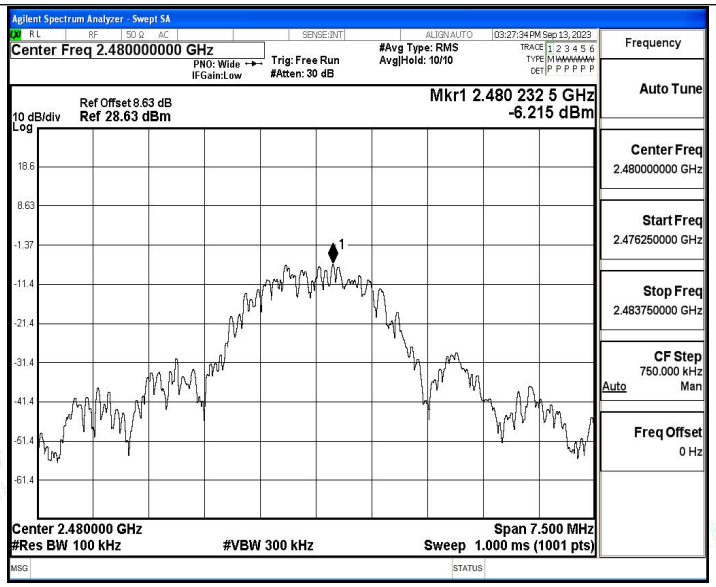
ZIGB_Ant1_2440_30~1000



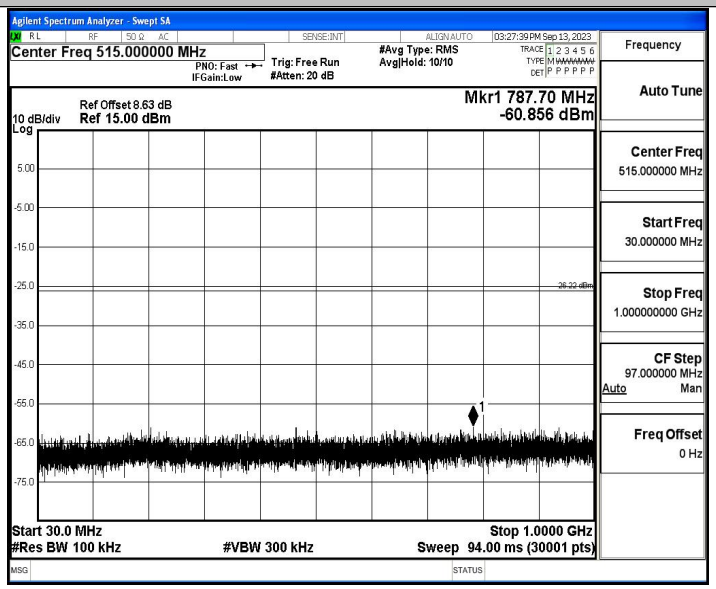
ZIGB_Ant1_2440_1000~26500



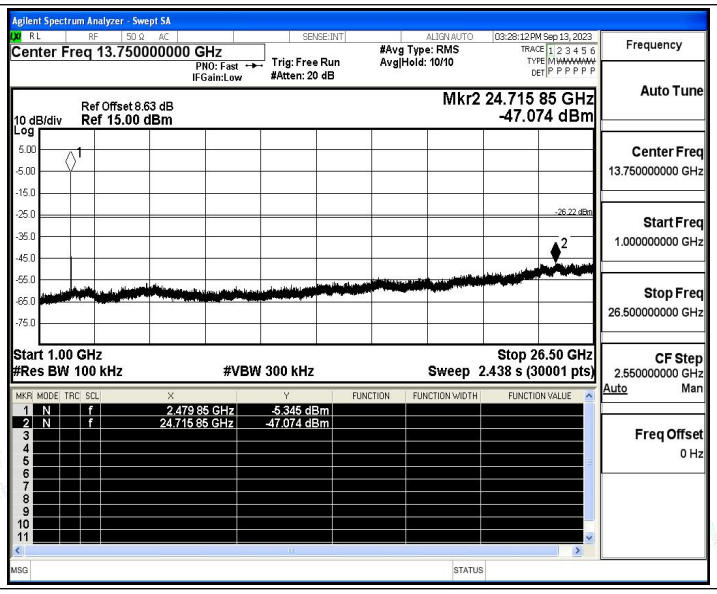
ZIGB_Ant1_2480_0~Reference



ZIGB_Ant1_2480_30~1000



ZIGB_Ant1_2480_1000~26500

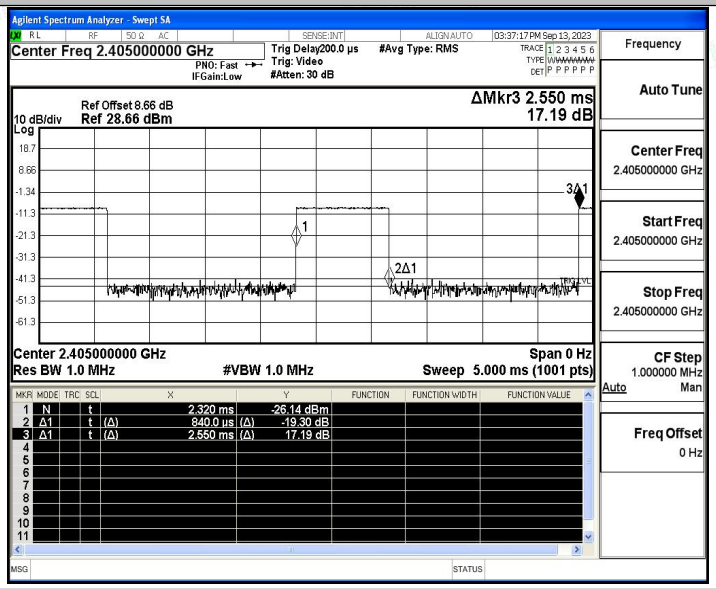

Agilent Spectrum Analyzer - Swept SA
Center Freq 13.750000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
#Avg Type: RMS
Avg|Hold: 10/10
03:28:12 PM Sep 13, 2023
Ref Offset 8.63 dB
10 dB/div Ref 15.00 dBm
Log
Mkr2 24.715 85 GHz
-47.074 dBm
-26.22 dBm
Start 1.00 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 26.50 GHz
Sweep 2.438 s (30001 pts)
1 N 1 f 2.479 85 GHz -5.345 dBm
2 N 1 f 24.715 85 GHz -47.074 dBm
Frequency
Auto Tune
Center Freq
13.750000000 GHz
Start Freq
1.000000000 GHz
Stop Freq
26.500000000 GHz
CF Step
2.550000000 GHz
Auto
Man
Freq Offset
0 Hz
MSG
STATUS

A.6 Duty Cycle

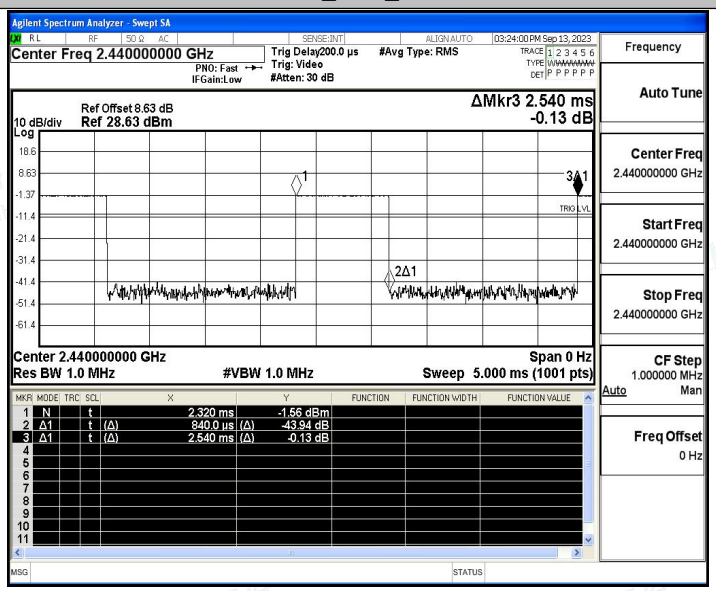
TestMode	Antenna	Frequency[MHz]	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	Factor	Limit	Verdict
ZIGB	Ant1	2405	0.84	2.55	32.94	2.45	---	---
		2440	0.84	2.54	33.07	2.45	---	---
		2480	0.84	2.54	33.07	2.45	---	---

Test Graphs

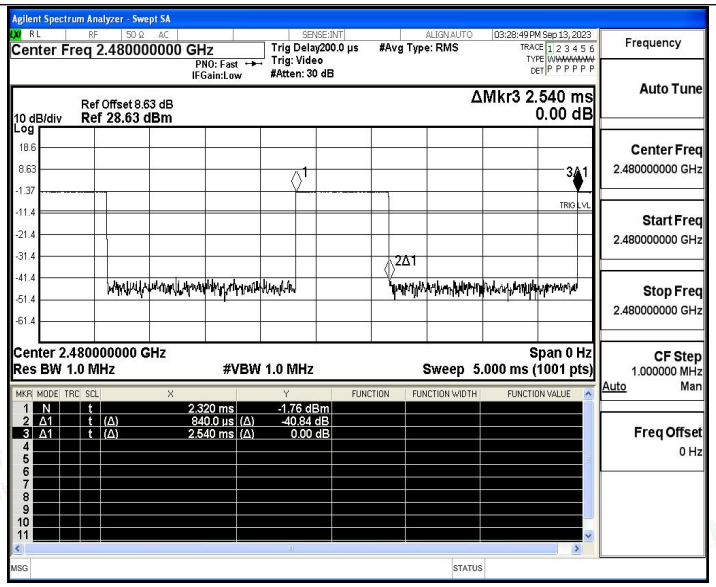
ZIGB_Ant1_2405



ZIGB_Ant1_2440



ZIGB_Ant1_2480


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Fast
IFGain:Low
Trig Delay200.0 µs
Trig: Video
#Avg Type: RMS
#Atten: 30 dB
03:28:49 PM Sep 13, 2023
Ref Offset 8.63 dB
10 dB/div Ref 28.63 dBm
ΔMkr3 2.540 ms
0.00 dB
Center 2.480000000 GHz
Res BW 1.0 MHz
#VBW 1.0 MHz
Span 0 Hz
Sweep 5.000 ms (1001 pts)
1 N 1 t 2.320 ms -1.76 dBm
2 Δ1 t (Δ) 840.0 µs (Δ) -40.84 dB
3 Δ1 t (Δ) 2.540 ms (Δ) 0.00 dB
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.480000000 GHz
Stop Freq
2.480000000 GHz
CF Step
1.000000 MHz
Auto
Man
Freq Offset
0 Hz

A.7 Emissions in Restricted Bands

Test Result

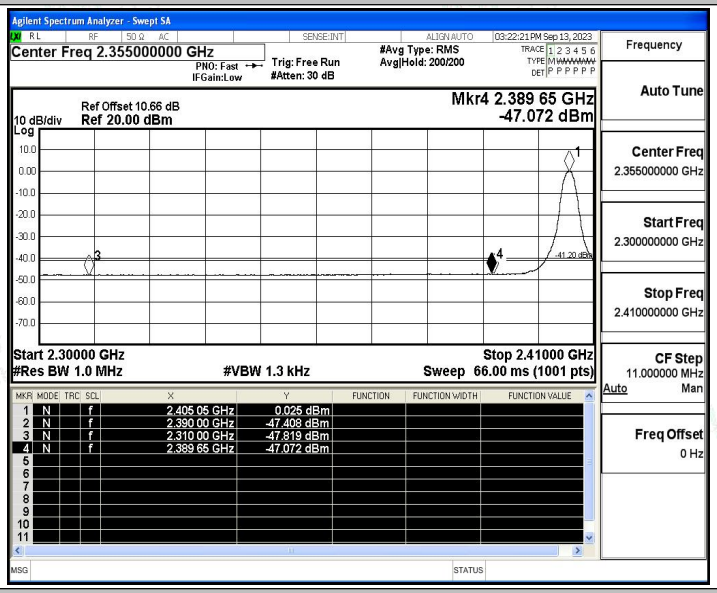
TestMode	Antenna	ChName	Frequency[MHz]	Detector	Freq. [MHz]	Result [dBm]	Limit [dBm]	Verdict
ZIGB	Ant1	Low	2405	AV	2310.000	-47.82	≤-41.20	PASS
				AV	2389.650	-47.07	≤-41.20	PASS
				AV	2390.000	-47.41	≤-41.20	PASS
				Peak	2310.000	-41.72	≤-21.20	PASS
				Peak	2381.290	-37.59	≤-21.20	PASS
				Peak	2390.000	-39.61	≤-21.20	PASS
		High	2480	AV	2483.500	-41.36	≤-41.20	PASS
				AV	2483.520	-41.36	≤-41.20	PASS
				AV	2500.000	-46.78	≤-41.20	PASS
				Peak	2483.500	-33.71	≤-21.20	PASS
				Peak	2484.400	-31.08	≤-21.20	PASS
				Peak	2500.000	-39.94	≤-21.20	PASS

Note：

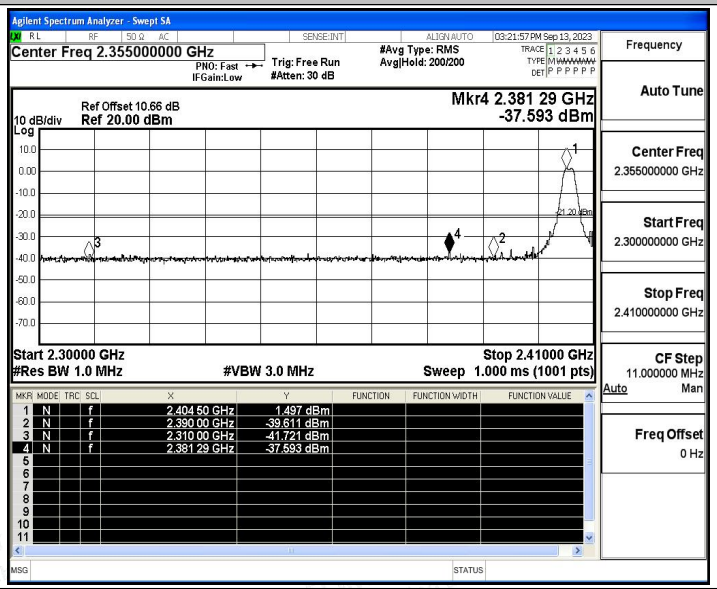
1. The Antenna Gain is compensated in the graph.
2. The limit in dBm for average detector is conversion from 54dBuV/m, according to 15.209(a). The limit in dBm for peak detector is 20dB above the limit of average detector in dBm.

Test Graphs

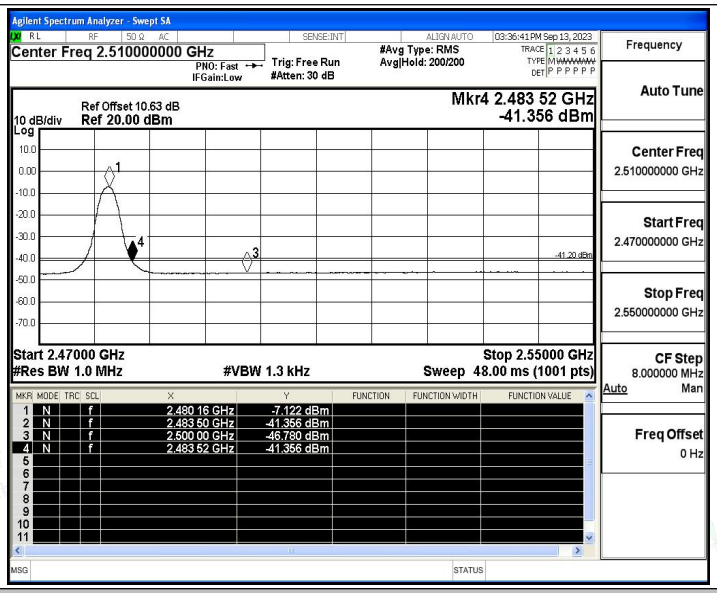
ZIGB_Ant1_Low_2405_AV



ZIGB_Ant1_Low_2405_Peak



ZIGB_Ant1_High_2480_AV



ZIGB_Ant1_High_2480_Peak