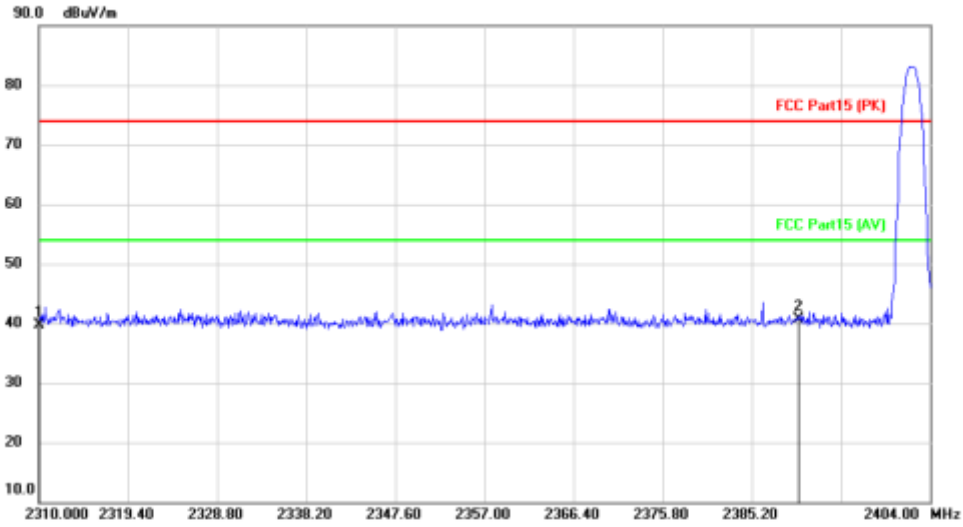
Radiated Emission Measurement

File :RE Data :#6 Date: 2020/7/31 星期 Time: 上午 10:09:18

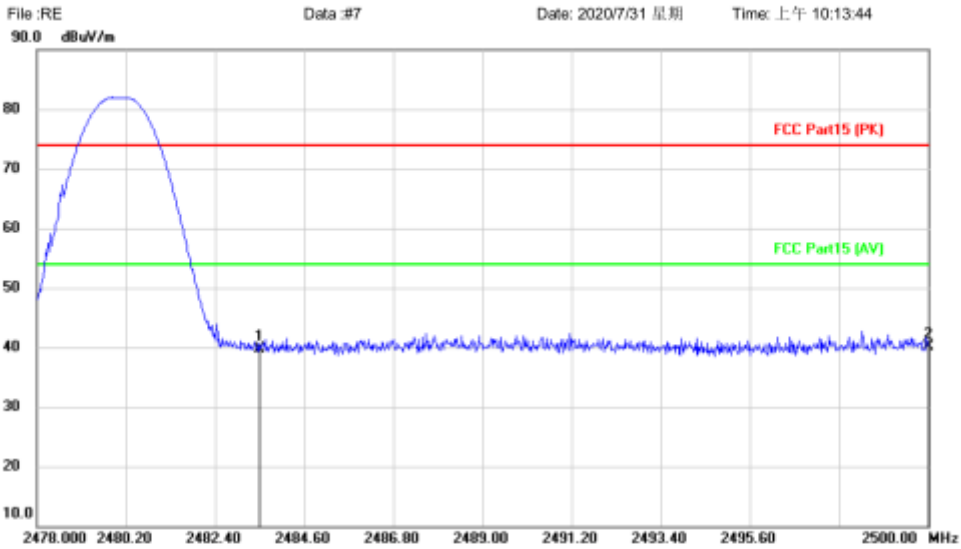


Site	Polarization: ***Horizontal***	Temperature:
Limit: FCC Part15 (PK)	Power:	Humidity: %
EUT: TWS Bluetooth earphones	Distance: 3m	
M/N: In2024		
Mode: TX-L		
Note:		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		2310.000	53.79	-14.01	39.78	74.00	-34.22	peak			
2	*	2390.000	54.26	-13.62	40.64	74.00	-33.36	peak			

Highest channel

Radiated Emission Measurement

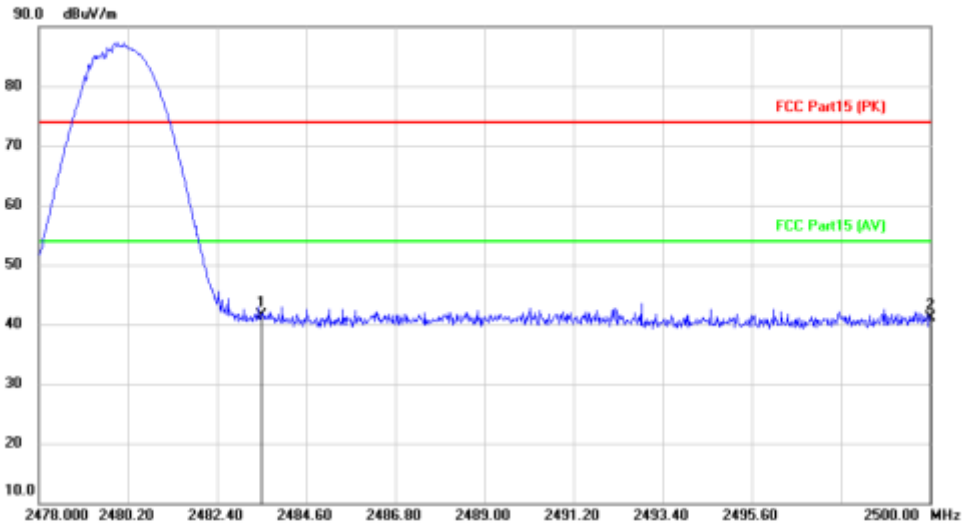


Site	Polarization: ***Horizontal***	Temperature:
Limit: FCC Part15 (PK)	Power:	Humidity: %
EUT: TWS Bluetooth earphones	Distance: 3m	
M/N: In2024		
Mode: TX-H		
Note:		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		2483.500	52.73	-13.11	39.62	74.00	-34.38	peak			
2	*	2500.000	53.08	-13.02	40.06	74.00	-33.94	peak			

Radiated Emission Measurement

File :RE Data :#8 Date: 2020/7/31 星期 Time: 上午 10:16:37



Site
Limit: FCC Part15 (PK)
EUT: TWS Bluetooth earphones
M/N: In2024
Mode: TX-H
Note:

Polarization: ***Vertical***
Power:
Distance: 3m

Temperature:
Humidity: %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	2483.500	54.98	-13.50	41.48	74.00	-32.52	peak			
2		2500.000	54.44	-13.42	41.02	74.00	-32.98	peak			

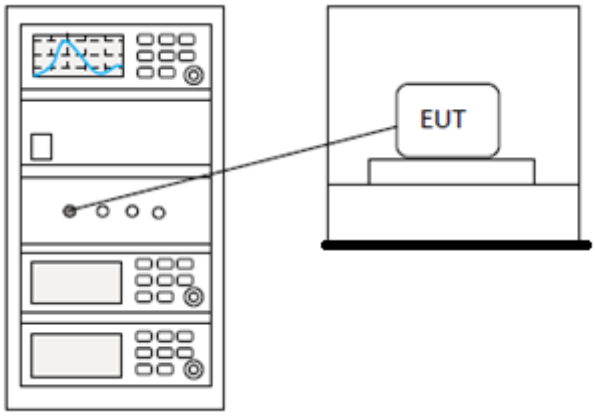
CONDUCTED BAND EDGES MEASUREMENT

Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 7.8.8 & Section 11.13.3.2
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX
Tester	Eason
Temperature	25℃
Humidity	60%

LIMITS

Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. 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)).

BLOCK DIAGRAM OF TEST SETUP



TEST DATA

Pass: Please Refer To Appendix: Appendix1 For Details

BlueAsia

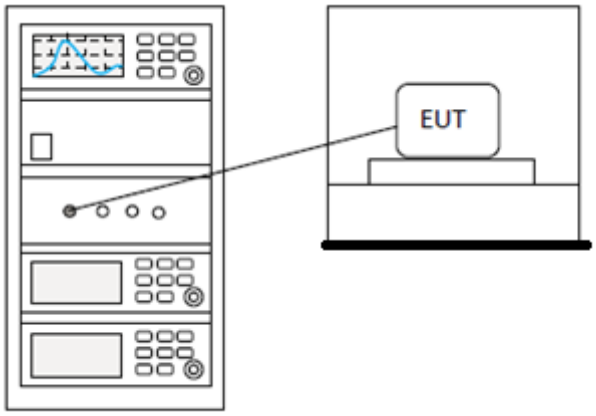
DWELL TIME

Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 7.8.4
Test Mode (Pre-Scan)	TX_non-Hop mode
Test Mode (Final Test)	TX_non-Hop mode
Tester	Eason
Temperature	25℃
Humidity	60%

LIMITS

Frequency(MHz)	Limit
902-928	0.4S within a 20S period(20dB bandwidth<250kHz)
	0.4S within a 10S period(20dB bandwidth≥250kHz)
2400-2483.5	0.4S within a period of 0.4S multiplied by the number of hopping channels
5725-5850	0.4S within a 30S period

BLOCK DIAGRAM OF TEST SETUP



BlueAsia

TEST DATA

Pass: Please Refer To Appendix: Appendix1 For Details

BlueAsia

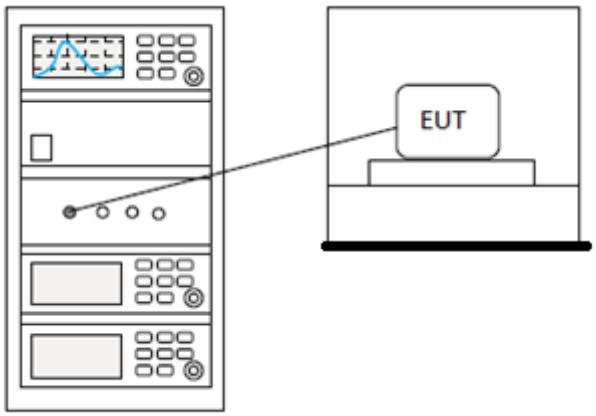
HOPPING CHANNEL NUMBER

Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 7.8.3
Test Mode (Pre-Scan)	TX_non-Hop mode
Test Mode (Final Test)	TX_non-Hop mode
Tester	Eason
Temperature	25℃
Humidity	60%

LIMITS

Frequency range(MHz)	Number of hopping channels (minimum)
902-928	50 for 20dB bandwidth <250kHz
	25 for 20dB bandwidth ≥250kHz
2400-2483.5	15
5725-5850	75

BLOCK DIAGRAM OF TEST SETUP



TEST DATA

Pass: Please Refer To Appendix: Appendix1 For Details

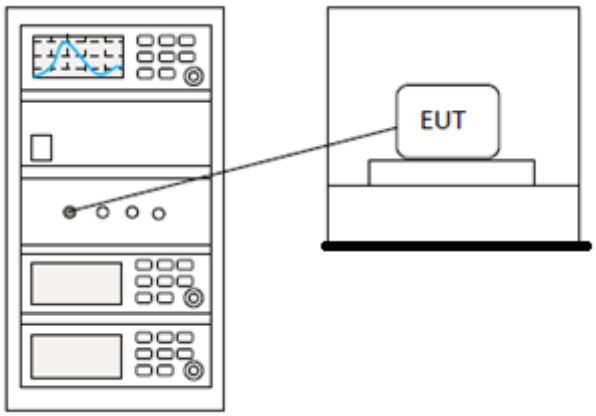
CARRIER FREQUENCIES SEPARATION

Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 7.8.2
Test Mode (Pre-Scan)	TX_non-Hop mode
Test Mode (Final Test)	TX_non-Hop mode
Tester	Eason
Temperature	25℃
Humidity	60%

LIMITS

Limit:	2/3 of the 20dB bandwidth base on the transmission power is less than 0.125W

BLOCK DIAGRAM OF TEST SETUP



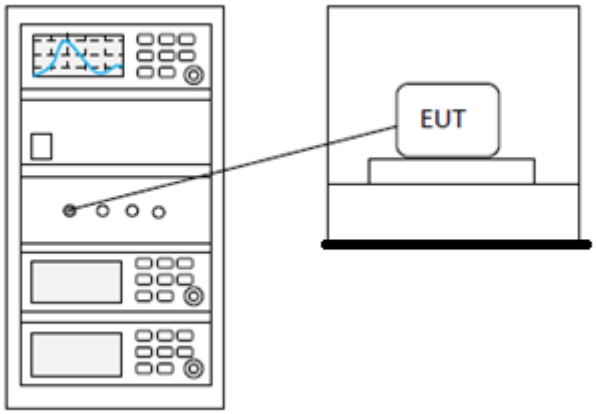
TEST DATA

Pass: Please Refer To Appendix: Appendix1 For Details

20DB BANDWIDTH

Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 7.8.7
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX
Tester	Eason
Temperature	25℃
Humidity	60%

BLOCK DIAGRAM OF TEST SETUP



TEST DATA

Pass: Please Refer To Appendix: Appendix1 For Details

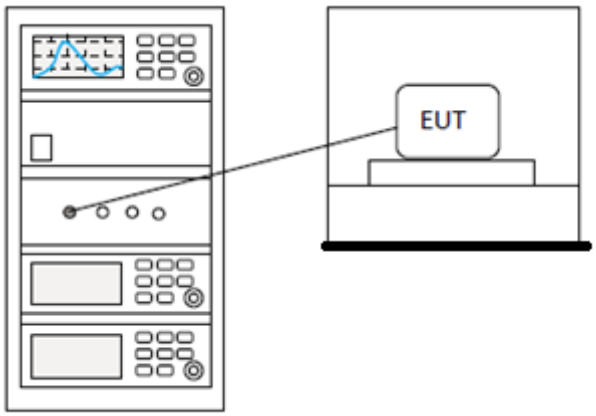
CONDUCTED PEAK OUTPUT POWER

Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 7.8.5
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX
Tester	Eason
Temperature	25℃
Humidity	60%

LIMITS

Frequency range(MHz)	Output power of the intentional radiator(watt)
902-928	1 for ≥50 hopping channels
	0.25 for 25≤ hopping channels <50
	1 for digital modulation
2400-2483.5	1 for ≥75 non-overlapping hopping channels
	0.125 for all other frequency hopping systems
	1 for digital modulation
5725-5850	1 for frequency hopping systems and digital modulation

BLOCK DIAGRAM OF TEST SETUP



TEST DATA

Pass: Please Refer To Appendix: Appendix1 For Details

BlueAsia

10 APPENDIX

Appendix1

10.1 APPENDIX: 20DBEMISSION BANDWIDTH

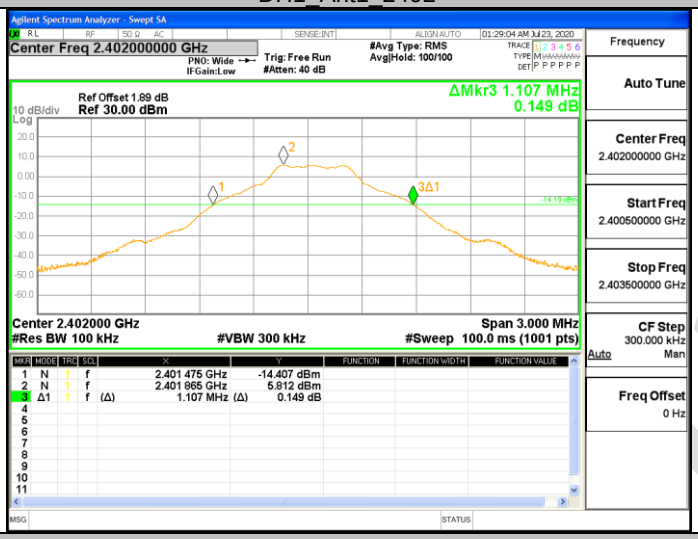
Test Result

TestMode	Antenna	Channel	20db EBW[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH1	Ant1	2402	1.107	2401.475	2402.582	---	PASS
		2441	1.101	2440.478	2441.579	---	PASS
		2480	1.104	2479.475	2480.579	---	PASS
2DH1	Ant1	2402	1.365	2401.340	2402.705	---	PASS
		2441	1.362	2440.340	2441.702	---	PASS
		2480	1.362	2479.340	2480.702	---	PASS
3DH1	Ant1	2402	1.335	2401.367	2402.702	---	PASS
		2441	1.332	2440.370	2441.702	---	PASS
		2480	1.329	2479.370	2480.699	---	PASS

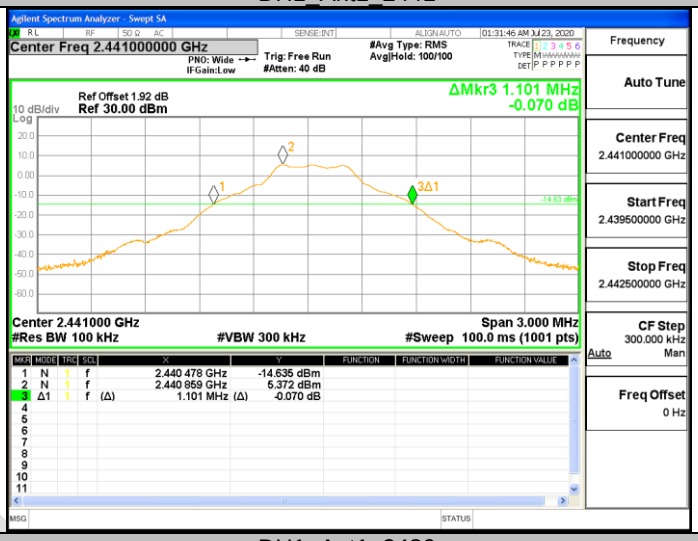
BlueAsia

Test Graphs

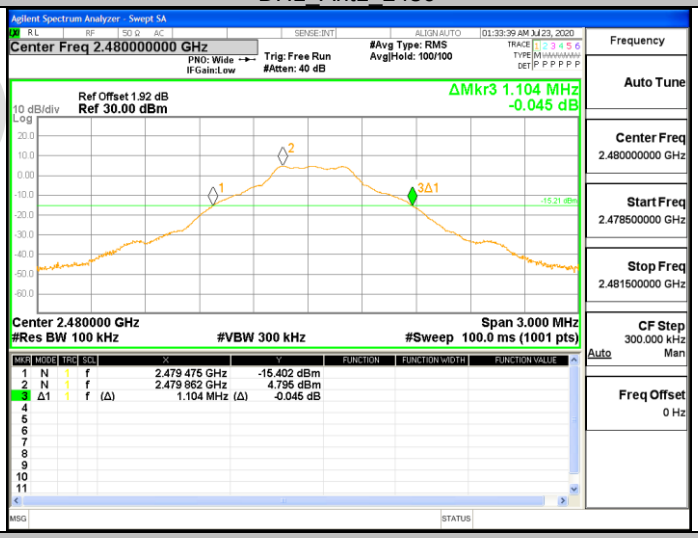
DH1_Ant1_2402



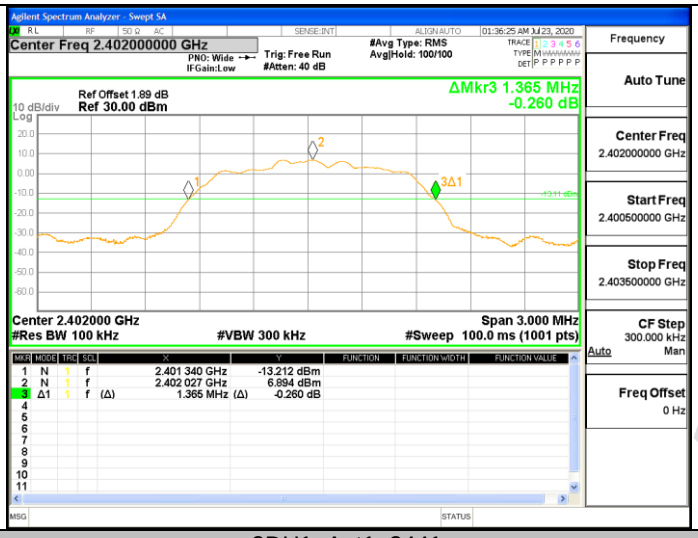
DH1_Ant1_2441



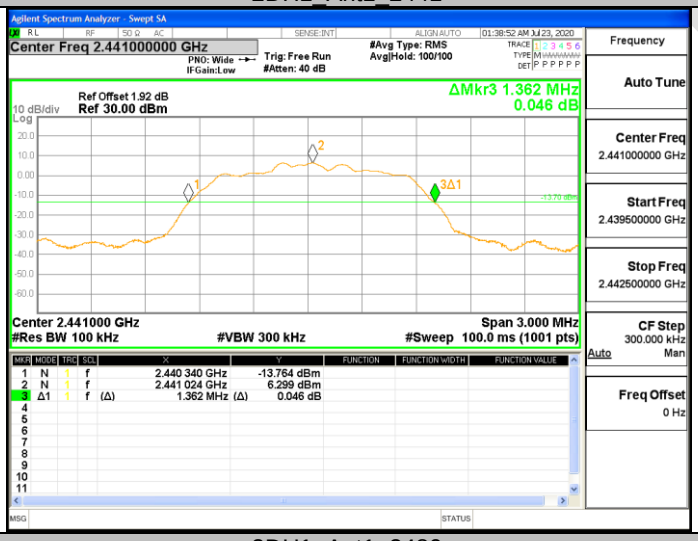
DH1_Ant1_2480



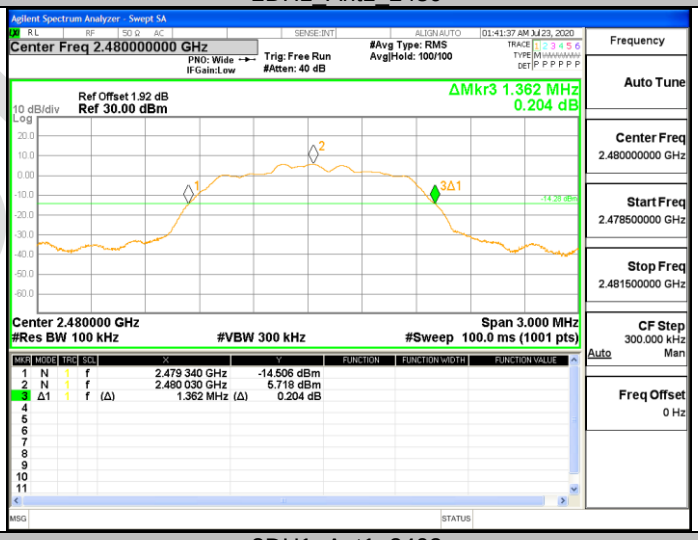
2DH1_Ant1_2402



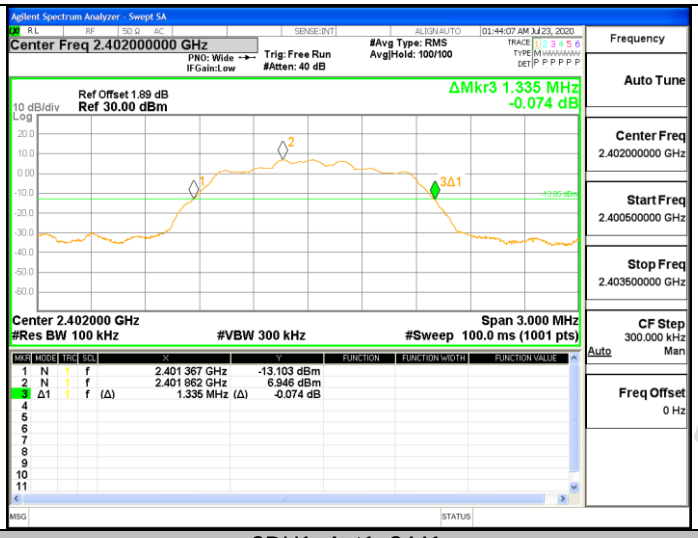
2DH1_Ant1_2441



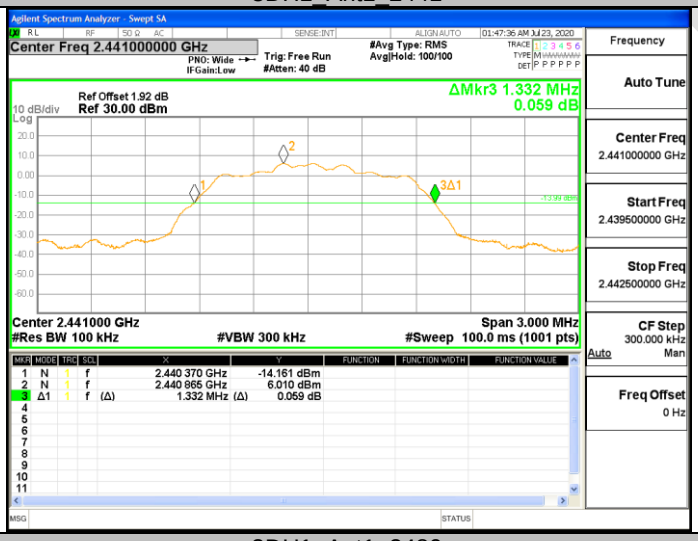
2DH1_Ant1_2480



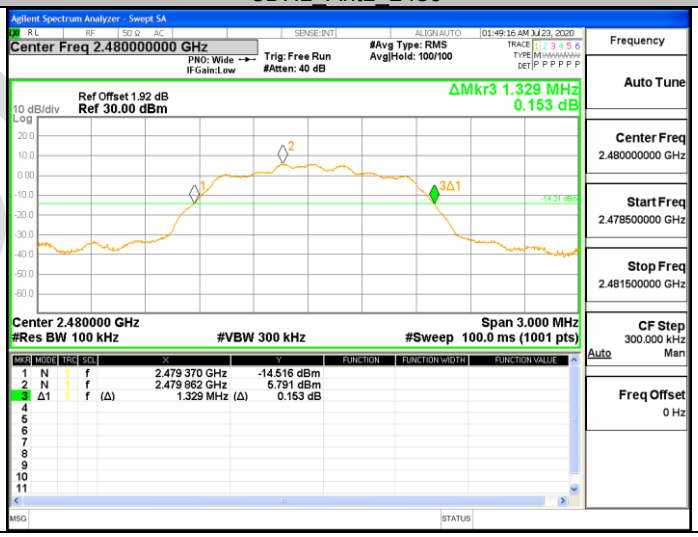
3DH1_Ant1_2402



3DH1_Ant1_2441



3DH1_Ant1_2480



10.2 APPENDIX: MAXIMUM CONDUCTED OUTPUT POWER

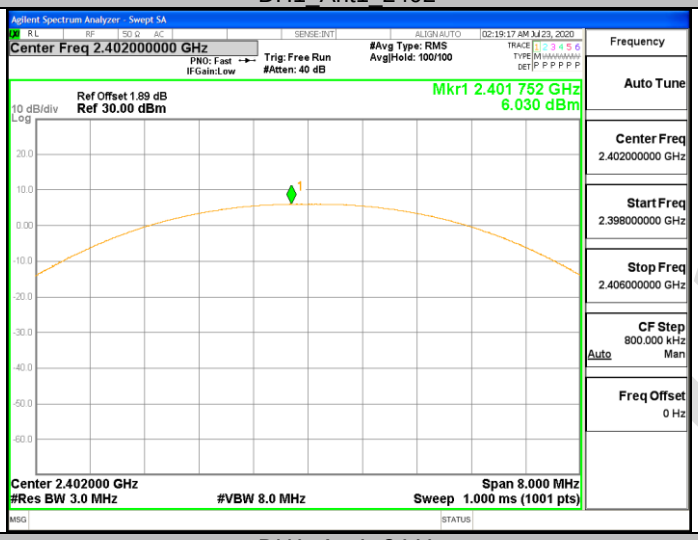
Test Result

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
DH1	Ant1	2402	6.03	<=20.97	PASS
		2441	5.32	<=20.97	PASS
		2480	4.71	<=20.97	PASS
2DH1	Ant1	2402	7.98	<=20.97	PASS
		2441	7.43	<=20.97	PASS
		2480	6.76	<=20.97	PASS
3DH1	Ant1	2402	8.55	<=20.97	PASS
		2441	7.98	<=20.97	PASS
		2480	7.48	<=20.97	PASS

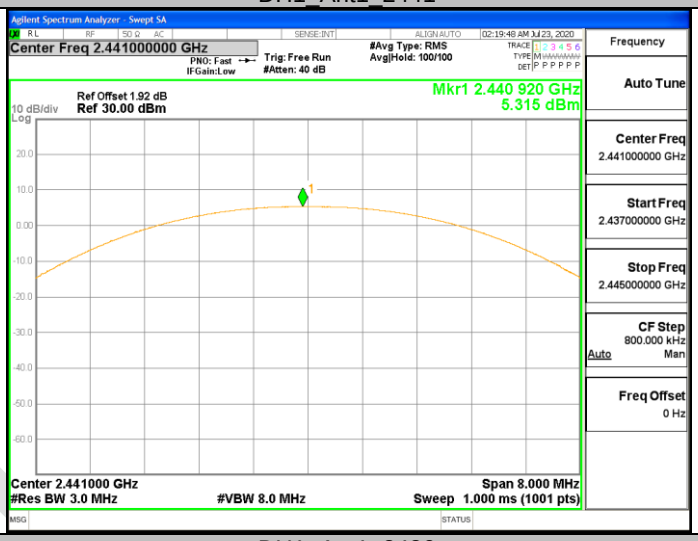
BlueAsia

Test Graphs

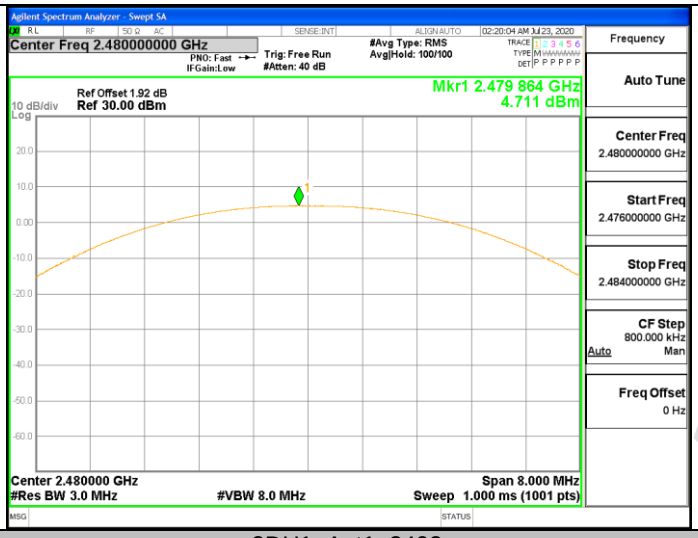
DH1_Ant1_2402



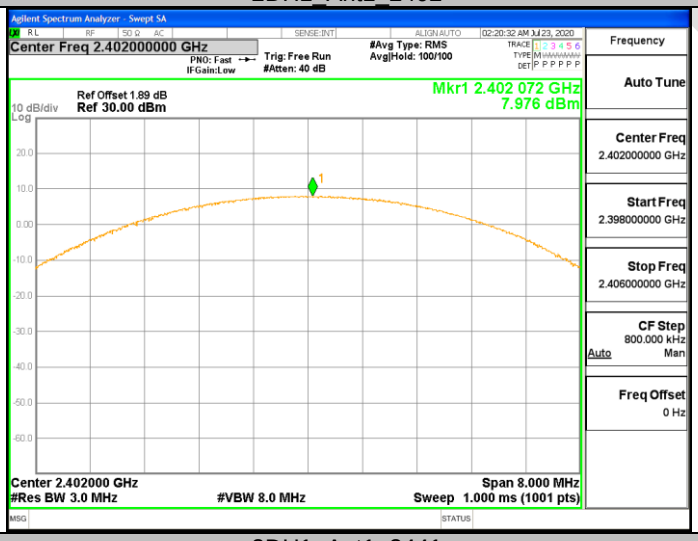
DH1_Ant1_2441



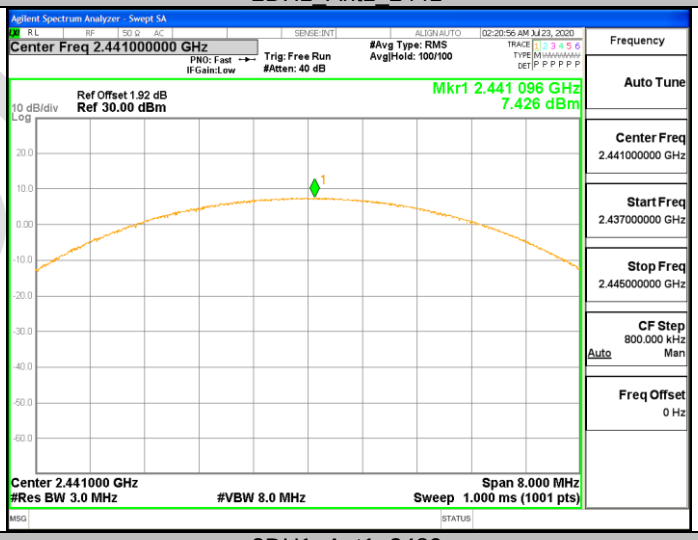
DH1_Ant1_2480



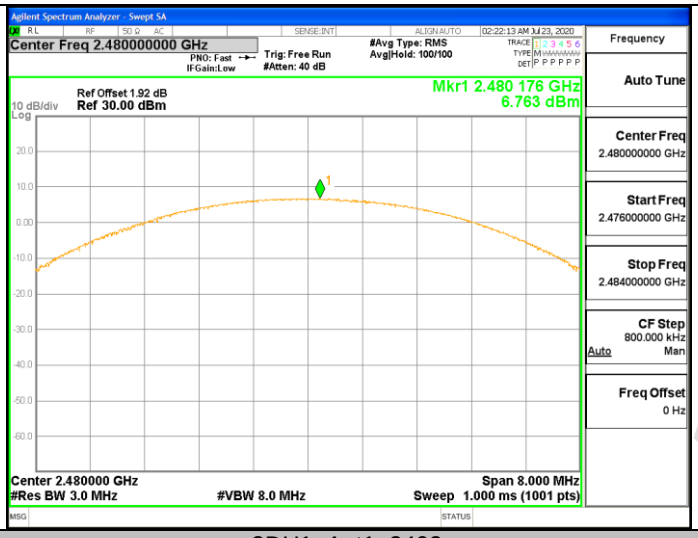
2DH1_Ant1_2402



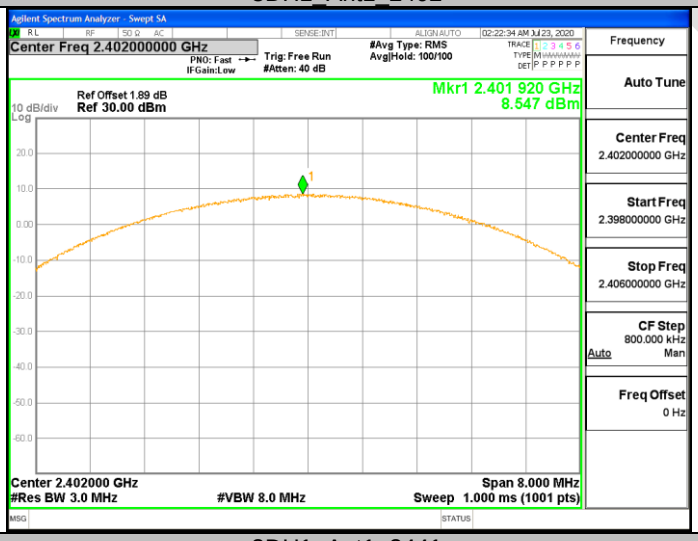
2DH1_Ant1_2441



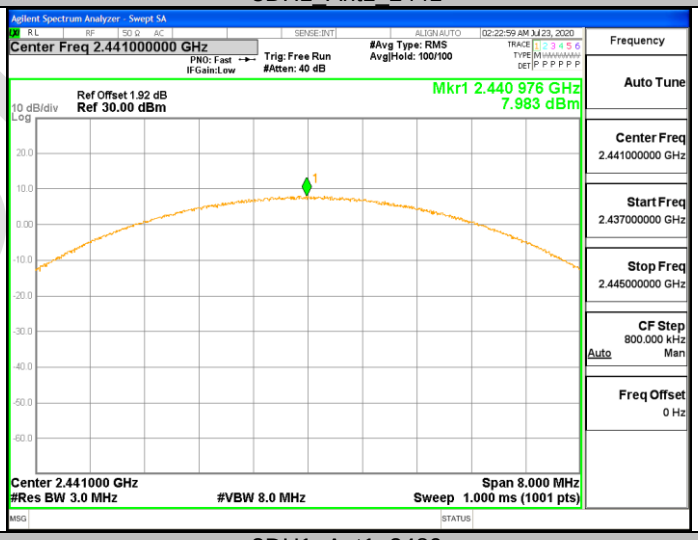
2DH1_Ant1_2480



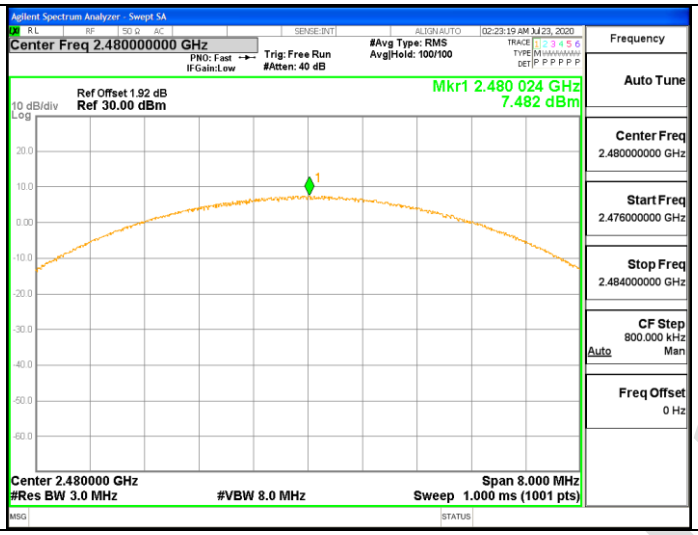
3DH1_Ant1_2402



3DH1_Ant1_2441



3DH1_Ant1_2480


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 40 dB
#Avg Type: RMS
Avg|Hold: 100/100
02:23:19 AM Jul 23, 2020
Frequency
Auto Tune
Ref Offset 1.92 dB
10 dB/div
Ref 30.00 dBm
Log
Mkr1 2.480 024 GHz
7.482 dBm
Center Freq
2.480000000 GHz
Start Freq
2.476000000 GHz
Stop Freq
2.484000000 GHz
CF Step
800.000 kHz
Auto
Man
Freq Offset
0 Hz
Center 2.480000 GHz
#Res BW 3.0 MHz
#VBW 8.0 MHz
Span 8.000 MHz
Sweep 1.000 ms (1001 pts)

BlueAsia

10.3 APPENDIX: CARRIER FREQUENCY SEPARATION

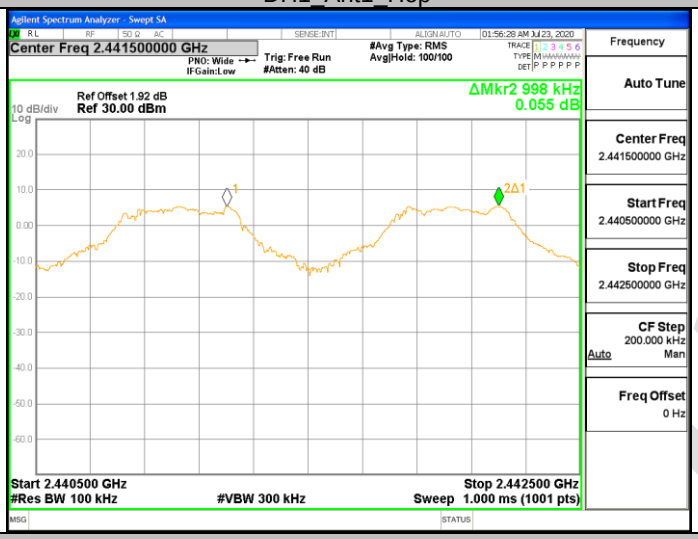
Test Result

TestMode	Antenna	Channel	Result[MHz]	Limit[MHz]	Verdict
DH1	Ant1	Hop	0.998	>=0.738	PASS
2DH1	Ant1	Hop	1.334	>=0.910	PASS
3DH1	Ant1	Hop	1.332	>=0.890	PASS

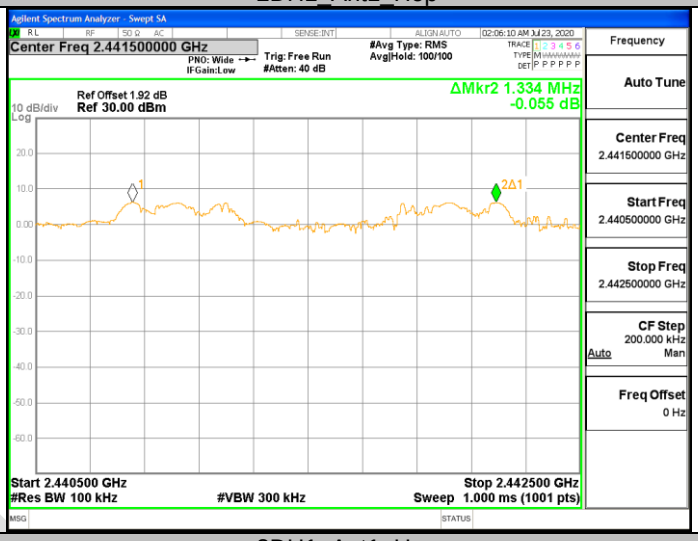
BlueAsia

Test Graphs

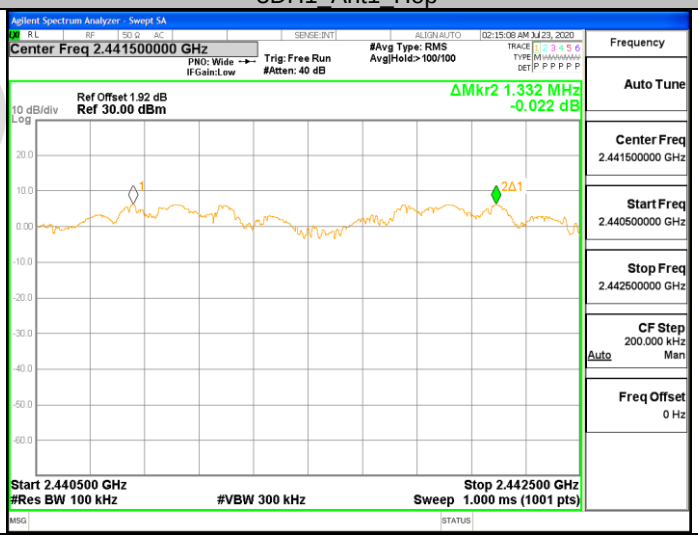
DH1_Ant1_Hop



2DH1_Ant1_Hop



3DH1_Ant1_Hop



10.4 APPENDIX: TIME OF OCCUPANCY

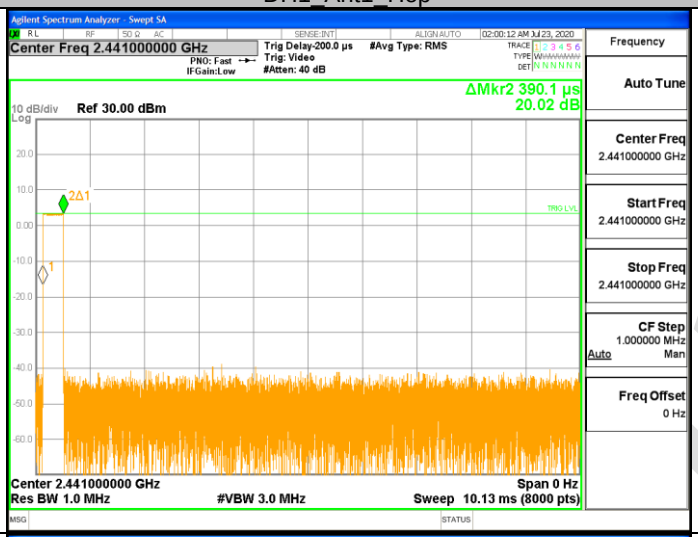
Test Result

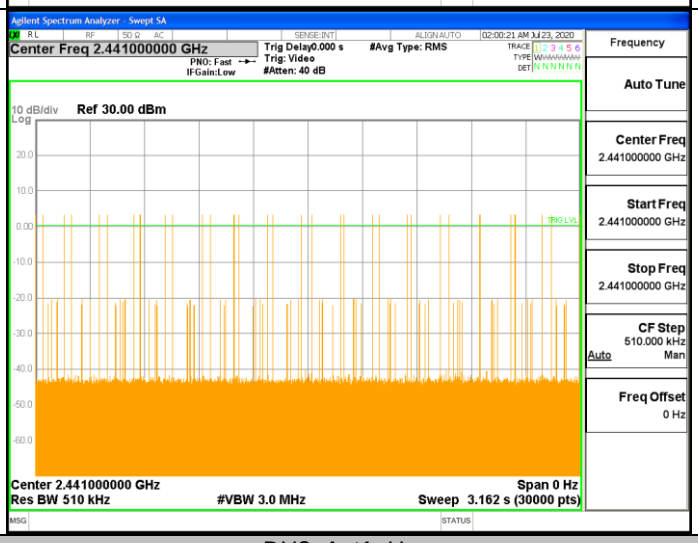
TestMode	Antenna	Channel	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH1	Ant1	Hop	0.39	330	0.129	<=0.4	PASS
DH3	Ant1	Hop	1.65	160	0.264	<=0.4	PASS
DH5	Ant1	Hop	2.89	120	0.347	<=0.4	PASS

BlueAsia

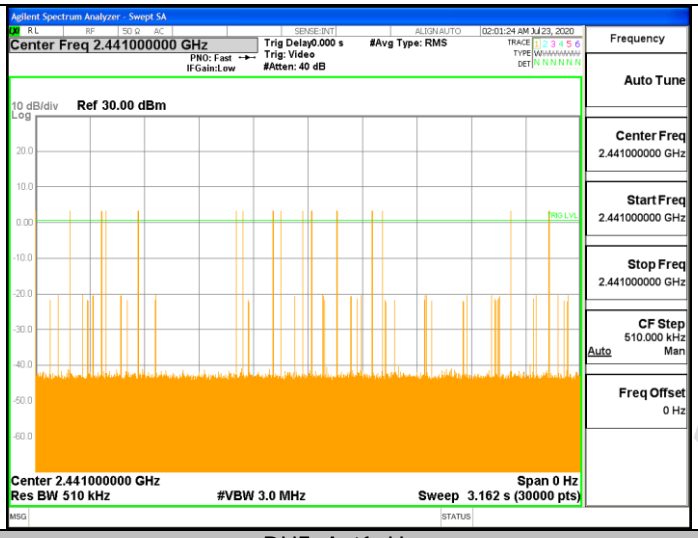
Test Graphs

DH1_Ant1_Hop

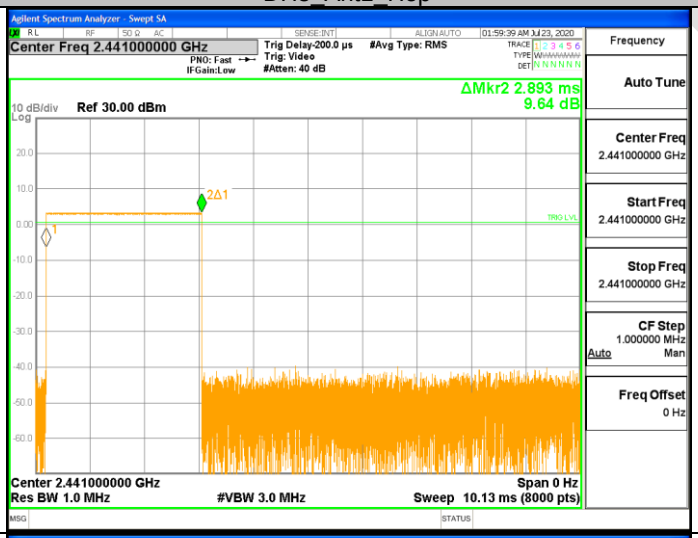


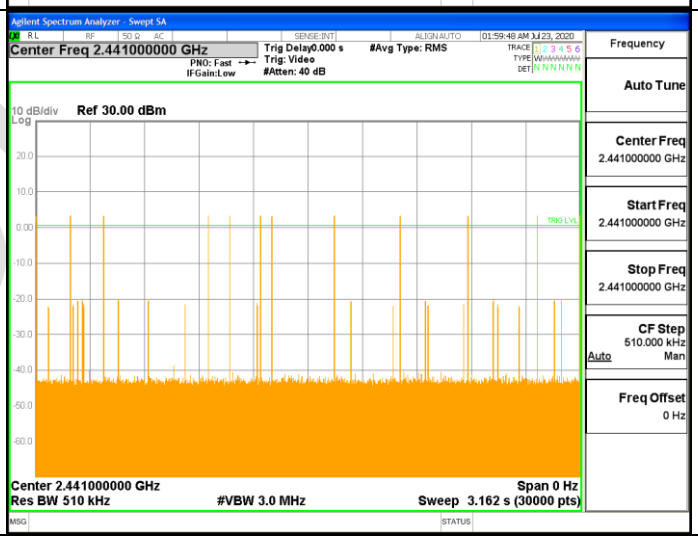


DH3_Ant1_Hop


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441000000 GHz
Trig Delay0.000 s
#Avg Type: RMS
Trig: Video
#Atten: 40 dB
PNO: Fast
IFGain:Low
10 dB/div
Ref 30.00 dBm
Center 2.441000000 GHz
Span 0 Hz
Res BW 510 kHz
#VBW 3.0 MHz
Sweep 3.162 s (30000 pts)
Frequency
Auto Tune
Center Freq
2.441000000 GHz
Start Freq
2.441000000 GHz
Stop Freq
2.441000000 GHz
CF Step
510.000 kHz
Auto
Man
Freq Offset
0 Hz

DH5_Ant1_Hop


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441000000 GHz
Trig Delay-200.0 µs
#Avg Type: RMS
Trig: Video
#Atten: 40 dB
PNO: Fast
IFGain:Low
ΔMkr2 2.893 ms
9.64 dB
10 dB/div
Ref 30.00 dBm
Center 2.441000000 GHz
Span 0 Hz
Res BW 1.0 MHz
#VBW 3.0 MHz
Sweep 10.13 ms (8000 pts)
Frequency
Auto Tune
Center Freq
2.441000000 GHz
Start Freq
2.441000000 GHz
Stop Freq
2.441000000 GHz
CF Step
1.000000 MHz
Auto
Man
Freq Offset
0 Hz


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441000000 GHz
Trig Delay0.000 s
#Avg Type: RMS
Trig: Video
#Atten: 40 dB
PNO: Fast
IFGain:Low
10 dB/div
Ref 30.00 dBm
Center 2.441000000 GHz
Span 0 Hz
Res BW 510 kHz
#VBW 3.0 MHz
Sweep 3.162 s (30000 pts)
Frequency
Auto Tune
Center Freq
2.441000000 GHz
Start Freq
2.441000000 GHz
Stop Freq
2.441000000 GHz
CF Step
510.000 kHz
Auto
Man
Freq Offset
0 Hz

10.5 APPENDIXF: NUMBER OF HOPPING CHANNELS

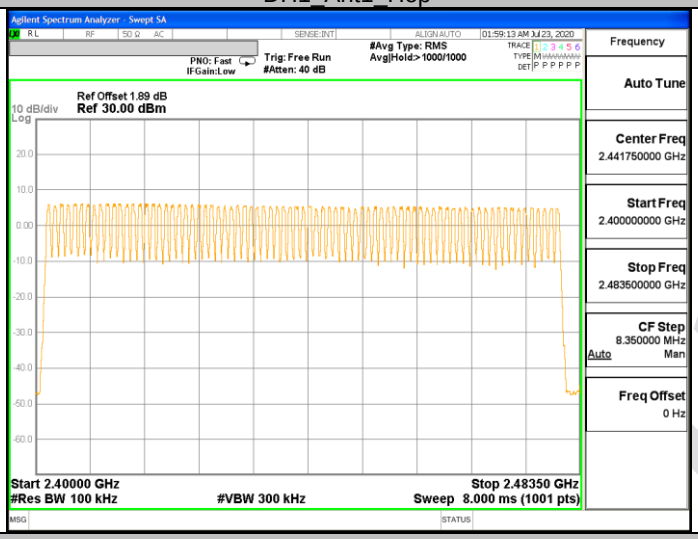
Test Result

TestMode	Antenna	Channel	Result[Num]	Limit[Num]	Verdict
DH1	Ant1	Hop	79	>=15	PASS
2DH1	Ant1	Hop	79	>=15	PASS
3DH1	Ant1	Hop	79	>=15	PASS

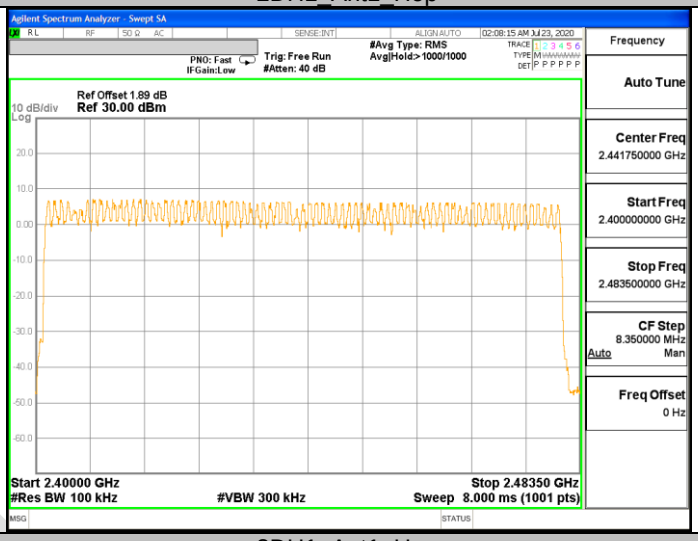
BlueAsia

Test Graphs

DH1_Ant1_Hop



2DH1_Ant1_Hop



3DH1_Ant1_Hop

10.6 APPENDIX:BAND EDGE MEASUREMENTS

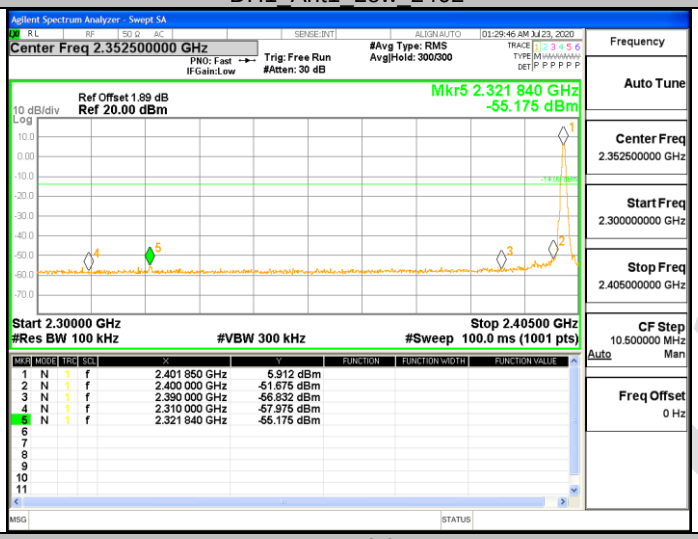
Test Result

TestMode	Antenna	ChName	Channel	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH1	Ant1	Low	2402	5.91	-55.18	<=-14.09	PASS
		High	2480	4.73	-55.11	<=-15.27	PASS
		Low	Hop_2402	5.65	-54.88	-14.35	PASS
		High	Hop_2480	4.65	-55.57	-15.35	PASS
2DH1	Ant1	Low	2402	6.78	-53.8	<=-13.22	PASS
		High	2480	5.66	-54.6	<=-14.35	PASS
		Low	Hop_2402	5.77	-54.86	-14.23	PASS
		High	Hop_2480	5.73	-54.94	-14.27	PASS
3DH1	Ant1	Low	2402	6.82	-54.69	<=-13.18	PASS
		High	2480	5.71	-55.36	<=-14.29	PASS
		Low	Hop_2402	6.02	-54.21	-13.98	PASS
		High	Hop_2480	5.75	-55.09	-14.25	PASS

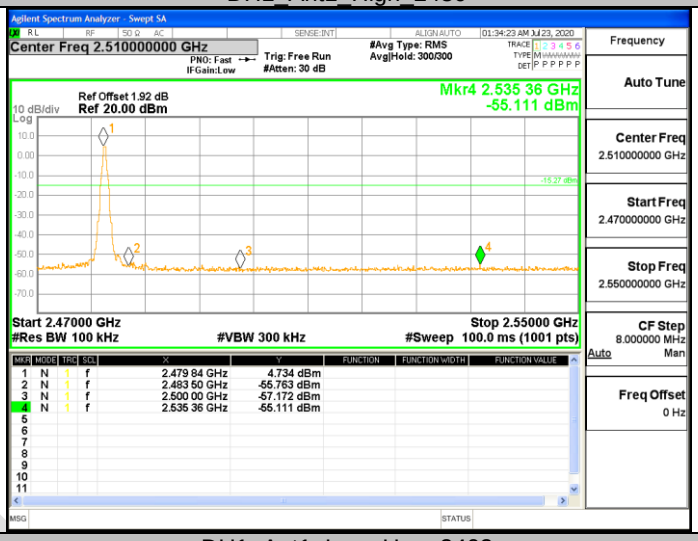
BlueAsia

Test Graphs

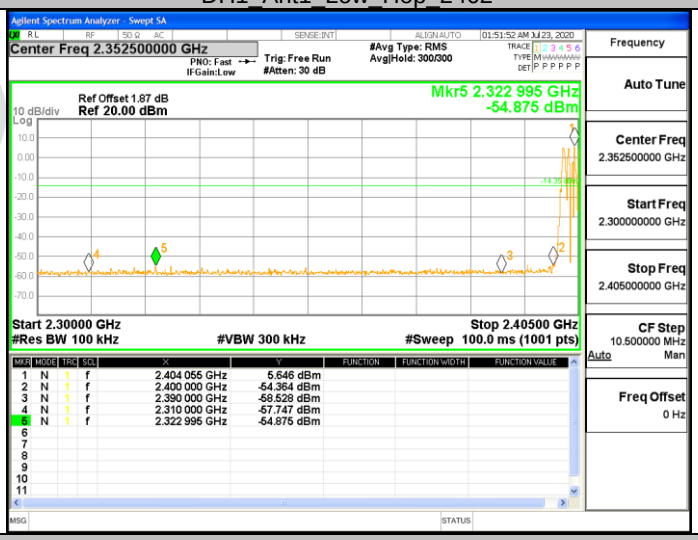
DH1_Ant1_Low_2402



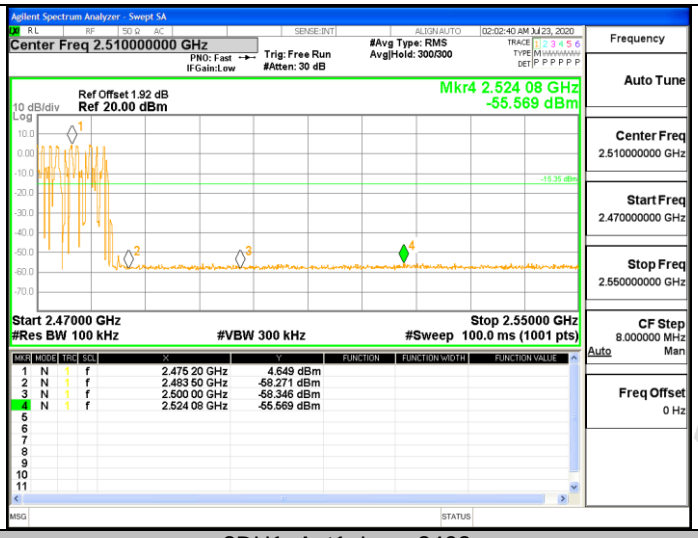
DH1_Ant1_High_2480



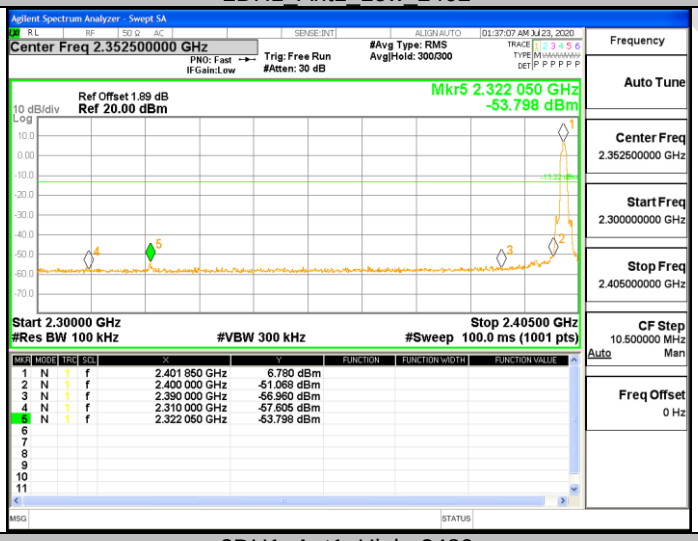
DH1_Ant1_Low_Hop_2402



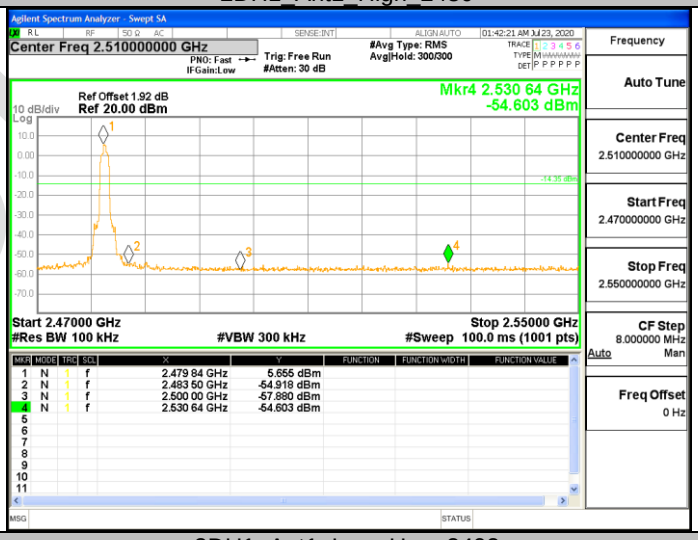
DH1_Ant1_High_Hop_2480



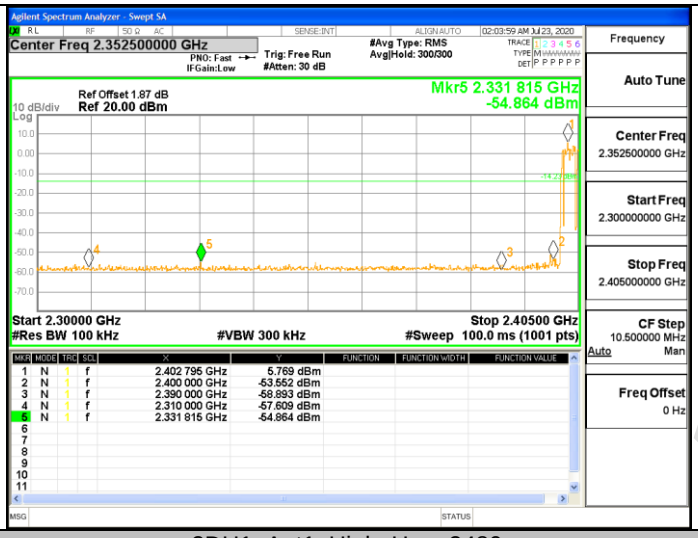
2DH1_Ant1_Low_2402



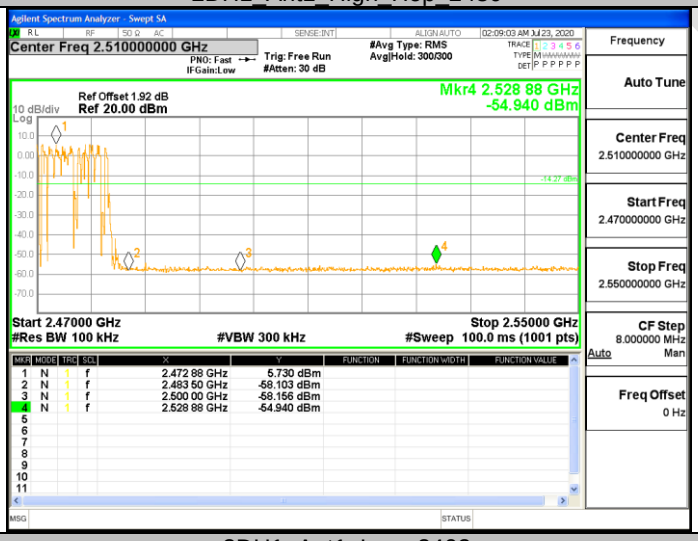
2DH1_Ant1_High_2480



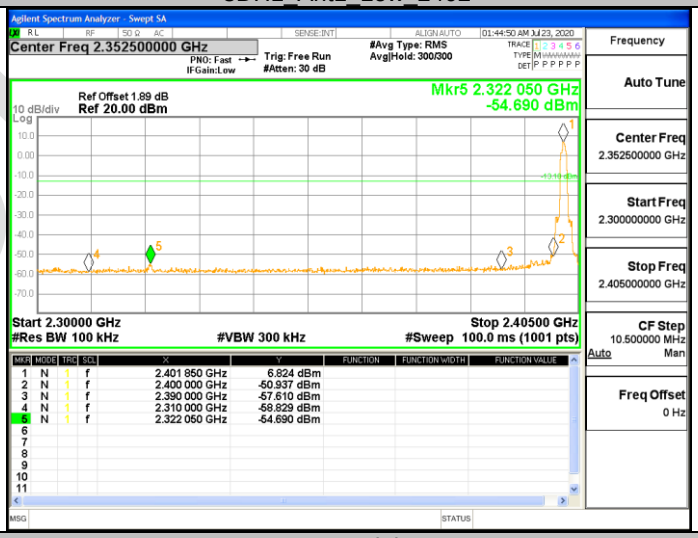
2DH1_Ant1_Low_Hop_2402



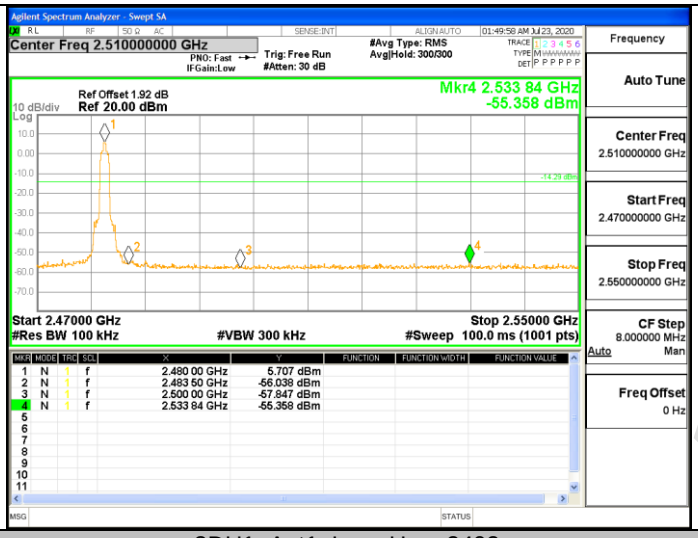
2DH1_Ant1_High_Hop_2480



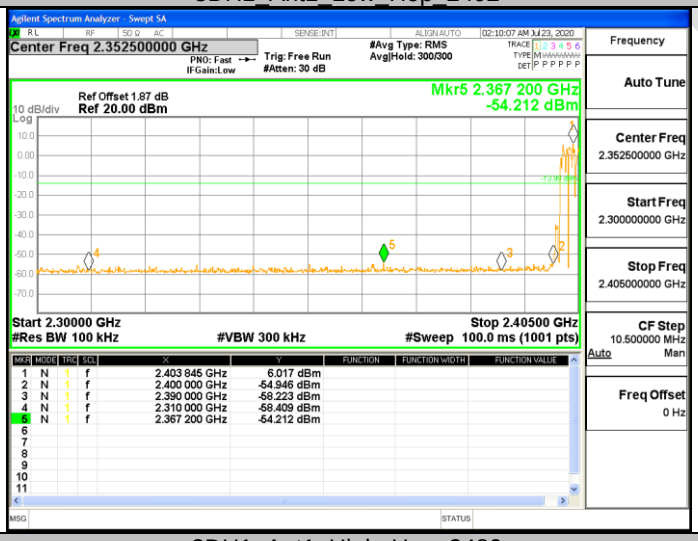
3DH1_Ant1_Low_2402



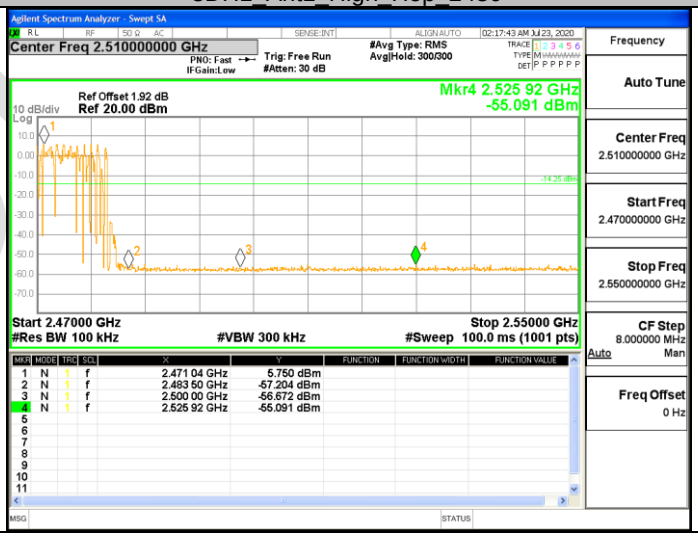
3DH1_Ant1_High_2480



3DH1_Ant1_Low_Hop_2402



3DH1_Ant1_High_Hop_2480



10.7 APPENDIX:CONDUCTED SPURIOUSEMISSION

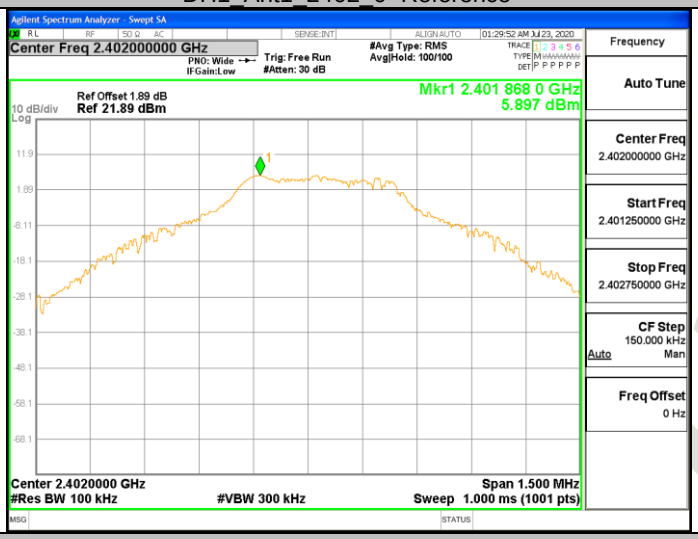
Test Result

TestMode	Antenna	Channel	FreqRange [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH1	Ant1	2402	Reference	5.90	5.90	---	PASS
			30~1000	30~1000	-67.648	<=-14.103	PASS
			1000~26500	1000~26500	-35.105	<=-14.103	PASS
		2441	Reference	5.21	5.21	---	PASS
			30~1000	30~1000	-67.795	<=-14.789	PASS
			1000~26500	1000~26500	-37.668	<=-14.789	PASS
		2480	Reference	4.71	4.71	---	PASS
			30~1000	30~1000	-68.536	<=-15.286	PASS
			1000~26500	1000~26500	-38.182	<=-15.286	PASS
2DH1	Ant1	2402	Reference	6.76	6.76	---	PASS
			30~1000	30~1000	-68.049	<=-13.239	PASS
			1000~26500	1000~26500	-33.349	<=-13.239	PASS
		2441	Reference	6.16	6.16	---	PASS
			30~1000	30~1000	-67.892	<=-13.845	PASS
			1000~26500	1000~26500	-38.046	<=-13.845	PASS
		2480	Reference	5.65	5.65	---	PASS
			30~1000	30~1000	-67.48	<=-14.346	PASS
			1000~26500	1000~26500	-38.236	<=-14.346	PASS
3DH1	Ant1	2402	Reference	6.73	6.73	---	PASS
			30~1000	30~1000	-67.914	<=-13.266	PASS
			1000~26500	1000~26500	-37.439	<=-13.266	PASS
		2441	Reference	6.22	6.22	---	PASS
			30~1000	30~1000	-68.198	<=-13.784	PASS
			1000~26500	1000~26500	-35.351	<=-13.784	PASS
		2480	Reference	5.73	5.73	---	PASS
			30~1000	30~1000	-68.42	<=-14.269	PASS
			1000~26500	1000~26500	-39.009	<=-14.269	PASS

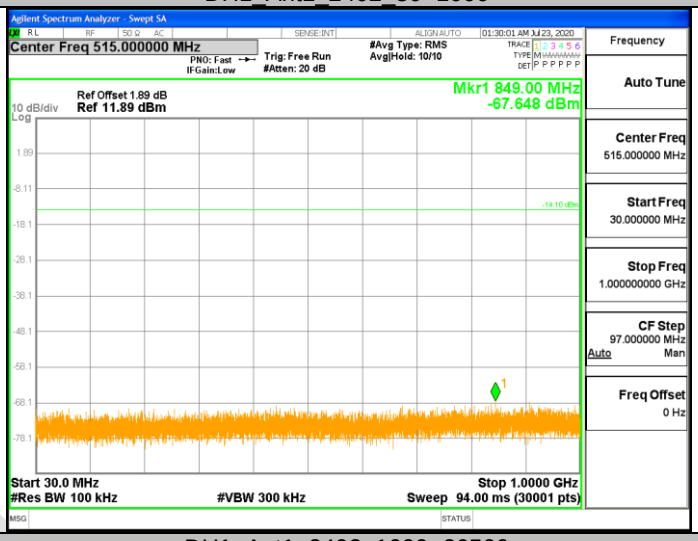
BlueAsia

Test Graphs

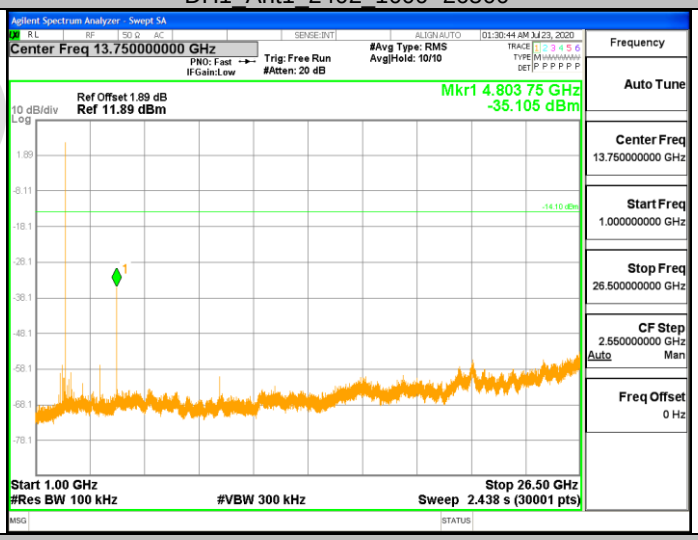
DH1_Ant1_2402_0~Reference



DH1_Ant1_2402_30~1000



DH1_Ant1_2402_1000~26500



DH1_Ant1_2441_0~Reference