

# TEST REPORT

**Product Name** : Bluetooth Headset  
**Brand Mark** : SOUNDPEATS  
**Model No.** : Sonic, SP1029A,SP1029B,SP1029C,  
SP1029D,SP1029E,SP1029F,SP1029G,  
SP1029H,SP1029I  
**FCC ID** : 2AFTU-DD014  
**Report Number** : BLA-EMC-202009-A7001  
**Date of Sample Receipt** : 2020/9/23  
**Date of Test** : 2020/9/23 to 2020/10/28  
**Date of Issue** : 2020/11/4  
**Test Standard** : 47 CFR Part 15, Subpart C 15.247  
**Test Result** : Pass

Prepared for:

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2020/11/4



**REPORT REVISE RECORD**

<b>Version No.</b>	<b>Date</b>	<b>Description</b>
00	2020/11/4	Original

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## 1 TEST SUMMARY

Test item	Test Requirement	Test Method	Class/Severity	Result
Antenna Requirement	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.203 & 15.247(c)	Pass
Conducted Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.6 & Section 11.11	47 CFR Part 15, Subpart C 15.247(d)	Pass
Hopping Channel Number	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.3	47 CFR Part 15, Subpart C 15.247a(1)(iii)	Pass
Carrier Frequencies Separation	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.2	47 CFR Part 15, Subpart C 15.247a(1)	Pass
20dB Bandwidth	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.7	47 CFR Part 15, Subpart C 15.247(a)(1)	Pass
Conducted Peak Output Power	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.5	47 CFR Part 15, Subpart C 15.247(b)(3)	Pass
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207	Pass
Radiated Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.4,6.5,6.6	47 CFR Part 15, Subpart C 15.209 & 15.247(d)	Pass
Radiated Emissions which fall in the restricted bands	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.10.5	47 CFR Part 15, Subpart C 15.209 & 15.247(d)	Pass
Conducted Band Edges Measurement	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.8 & Section 11.13.3.2	47 CFR Part 15, Subpart C 15.247(d)	Pass
Dwell Time	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.4	47 CFR Part 15, Subpart C 15.247a(1)(iii)	Pass

## 2 GENERAL INFORMATION

<b>Applicant</b>	Shenzhen Soundsoul Information Technology Co.,Ltd
<b>Address</b>	Room 1308-1309, Building B,Huihai Square,Chuangye Road, Longhua District,Shenzhen,Guangdong,China
<b>Manufacturer</b>	Shenzhen Soundsoul Information Technology Co.,Ltd
<b>Address</b>	Room 1308-1309, Building B,Huihai Square,Chuangye Road, Longhua District,Shenzhen,Guangdong,China
<b>Factory</b>	Shenzhen yanhui zhongchuang electronics co. LTD
<b>Address</b>	3/F south, Building A, Huidong Industrial Zone, Jiuwei community, Xixiang Street, Baoan District, Shenzhen
<b>Product Name</b>	Bluetooth Headset
<b>Test Model No.</b>	Sonic

## 3 GENERAL DESCRIPTION OF E.U.T.

<b>Hardware Version</b>	N/A
<b>Software Version</b>	N/A
<b>Operation Frequency:</b>	2402MHz-2480MHz
<b>Modulation Type:</b>	GFSK, $\pi/4$ DQPSK, 8DPSK
<b>Channel Spacing:</b>	1MHz
<b>Number of Channels:</b>	79
<b>Antenna Type:</b>	Chip Antenna
<b>Antenna Gain:</b>	0.9dBi(Provided by the customer)

#### 4 TEST ENVIRONMENT

Environment	Temperature	Voltage
Normal	+25°C	3.7Vdc

#### 5 TEST MODE

TEST MODE	TEST MODE DESCRIPTION
Transmitting mode	Keep the EUT in continuously transmitting mode with modulation. (hopping and non hopping mode all have been tested, non hopping mode is worse case for RE )
Remark: Full battery is used during all test except ac conducted emission, DH1, DH3, DH5 all have been tested, during the test, GFSK, Pi/4QPSK, 8-DPSK modulation were all pre-scanned Only the worst mode would be recorded in this report.	

#### 6 MEASUREMENT UNCERTAINTY

Parameter	Expanded Uncertainty (Confidence of 95%)
Radiated Emission(9KHz~30MHz)	±4.34dB
Radiated Emission (30MHz ~ 1000MHz)	±4.35 dB
Radiated Emission (1GHz ~ 18GHz)	±4.44 dB
AC Power Line Conducted Emission	±3.45dB



## 7 DESCRIPTION OF SUPPORT UNIT

Device Type	Manufacturer	Model Name	Serial No.	Remark
AC Adapter	UGREEN	CD112	N/A	N/A
PC	HASEE	K610D	N/A	N/A

## 8 LABORATORY LOCATION

All tests were performed at:  
BlueAsia of Technical Services(Shenzhen) Co., Ltd.  
IOT Test Centre of BlueAsia  
No. 448 Bulong Road, Bantian Street, Longgang District, Shenzhen,China  
Telephone: TEL: +86-755-28682673 FAX: +86-755-28682673  
No tests were sub-contracted.

## 9 TEST INSTRUMENTS LIST

Test Equipment Of Conducted Spurious Emissions					
Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Spectrum	R&S	FSP40	100817	7/1/2020	6/30/2021
Spectrum	Agilent	N9020A	MY49100060	12/17/2019	12/16/2020
Signal Generator	Agilent	N5182A	MY49060650	12/17/2019	12/16/2020
Signal Generator	Agilent	E8257D	MY44320250	4/20/2020	4/19/2021

Test Equipment Of Hopping Channel Number					
Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Spectrum	R&S	FSP40	100817	7/1/2020	6/30/2021
Spectrum	Agilent	N9020A	MY49100060	12/17/2019	12/16/2020
Signal Generator	Agilent	N5182A	MY49060650	12/17/2019	12/16/2020
Signal Generator	Agilent	E8257D	MY44320250	4/20/2020	4/19/2021

Test Equipment Of Carrier Frequencies Separation					
Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Spectrum	R&S	FSP40	100817	7/1/2020	6/30/2021
Spectrum	Agilent	N9020A	MY49100060	12/17/2019	12/16/2020
Signal Generator	Agilent	N5182A	MY49060650	12/17/2019	12/16/2020
Signal Generator	Agilent	E8257D	MY44320250	4/20/2020	4/19/2021

Test Equipment Of 20dB Bandwidth					
Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due

Spectrum	R&S	FSP40	100817	7/1/2020	6/30/2021
Spectrum	Agilent	N9020A	MY49100060	12/17/2019	12/16/2020
Signal Generator	Agilent	N5182A	MY49060650	12/17/2019	12/16/2020
Signal Generator	Agilent	E8257D	MY44320250	4/20/2020	4/19/2021

**Test Equipment Of Conducted Peak Output Power**

Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Spectrum	R&S	FSP40	100817	7/1/2020	6/30/2021
Spectrum	Agilent	N9020A	MY49100060	12/17/2019	12/16/2020
Signal Generator	Agilent	N5182A	MY49060650	12/17/2019	12/16/2020
Signal Generator	Agilent	E8257D	MY44320250	4/20/2020	4/19/2021

**Test Equipment Of Conducted Emissions at AC Power Line (150kHz-30MHz)**

Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Shield room	SKET	833	N/A	6/10/2018	6/9/2021
Receiver	R&S	ESPI3	101082	4/20/2020	4/19/2021
LISN	R&S	ENV216	3560.6550.15	7/1/2020	6/30/2021
LISN	AT	AT166-2	AKK1806000003	12/17/2019	12/16/2020
EMI software	EZ	EZ-EMC	N/A	N/A	N/A

**Test Equipment Of Radiated Spurious Emissions**

Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Chamber	SKET	966	N/A	5/8/2018	5/7/2021
Spectrum	R&S	FSP40	100817	7/4/2020	7/3/2021

Receiver	R&S	ESR7	101199	4/20/2020	4/19/2021
broadband Antenna	Schwarzbeck	VULB9168	00836 P:00227	7/14/2019	7/13/2021
Horn Antenna	Schwarzbeck	9120D	01892 P:00331	7/14/2019	7/13/2021
Amplifier	SKET	LNPA-0118-45	N/A	7/4/2020	7/3/2021
EMI software	EZ	EZ-EMC	N/A	N/A	N/A
Loop antenna	SCHNARZBECK	FMZB1519B	00102	2/14/2019	2/13/2022
Controller	SKET	N/A	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-02	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-03	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-01	N/A	N/A	N/A

**Test Equipment Of Radiated Emissions which fall in the restricted bands**

Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Chamber	SKET	966	N/A	5/8/2018	5/7/2021
Spectrum	R&S	FSP40	100817	7/4/2020	7/3/2021
Receiver	R&S	ESR7	101199	4/20/2020	4/19/2021
broadband Antenna	Schwarzbeck	VULB9168	00836 P:00227	7/14/2019	7/13/2021
Horn Antenna	Schwarzbeck	9120D	01892 P:00331	7/14/2019	7/13/2021
Amplifier	SKET	LNPA-0118-45	N/A	7/4/2020	7/3/2021
EMI software	EZ	EZ-EMC	N/A	N/A	N/A
Loop antenna	SCHNARZBECK	FMZB1519B	00102	2/14/2019	2/13/2022
Controller	SKET	N/A	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-02	N/A	N/A	N/A

Coaxial Cable	BlueAsia	BLA-XC-03	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-01	N/A	N/A	N/A

**Test Equipment Of Conducted Band Edges Measurement**

Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Spectrum	R&S	FSP40	100817	7/1/2020	6/30/2021
Spectrum	Agilent	N9020A	MY49100060	12/17/2019	12/16/2020
Signal Generator	Agilent	N5182A	MY49060650	12/17/2019	12/16/2020
Signal Generator	Agilent	E8257D	MY44320250	4/20/2020	4/19/2021

**Test Equipment Of Dwell Time**

Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Spectrum	R&S	FSP40	100817	7/1/2020	6/30/2021
Spectrum	Agilent	N9020A	MY49100060	12/17/2019	12/16/2020
Signal Generator	Agilent	N5182A	MY49060650	12/17/2019	12/16/2020
Signal Generator	Agilent	E8257D	MY44320250	4/20/2020	4/19/2021

## ANTENNA REQUIREMENT

Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	N/A

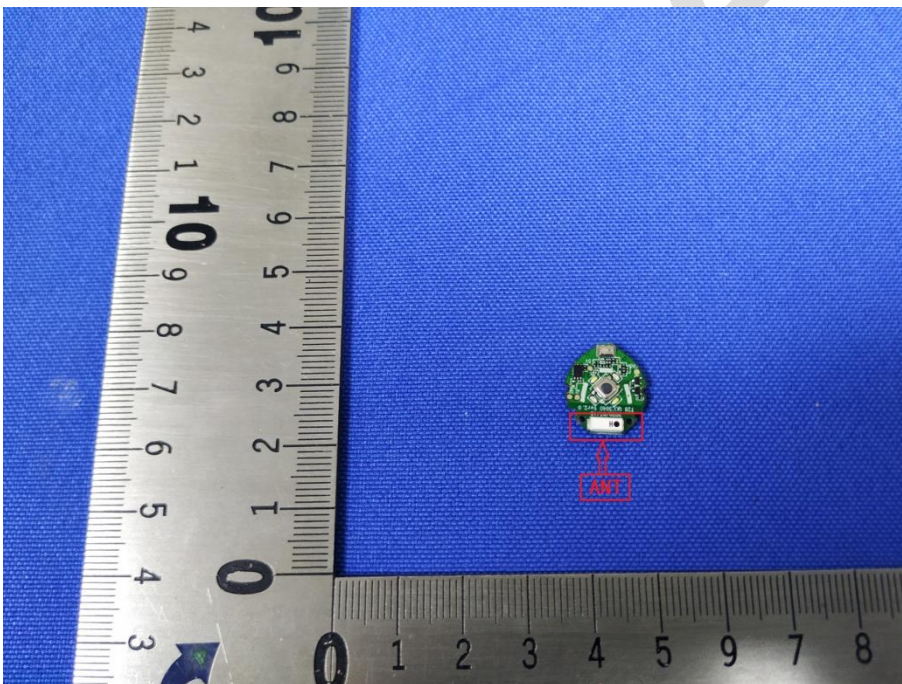
## CONCLUSION

Standard 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 an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit permanently attached antenna or of an so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 0.90dBi.



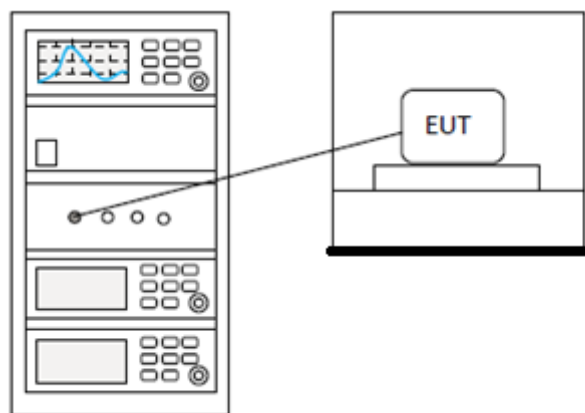
### CONDUCTED SPURIOUS EMISSIONS

Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 7.8.6 & Section 11.11
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX
Tester	Eason
Temperature	26°C
Humidity	54%

### LIMITS

<b>Limit:</b>	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)).
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### BLOCK DIAGRAM OF TEST SETUP



TEST DATA

Pass: Please Refer To Appendix: Appendix1 For Details

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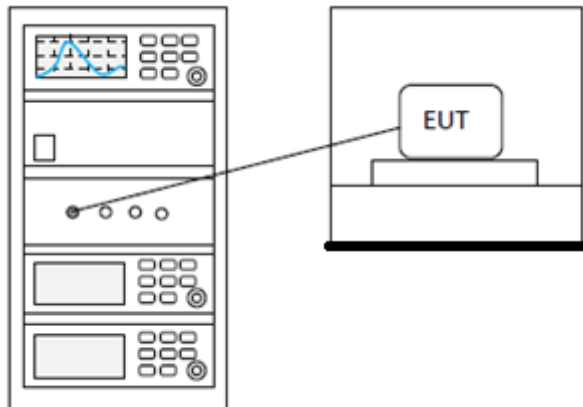
### HOPPING CHANNEL NUMBER

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
Test Mode (Final Test)	TX
Tester	Eason
Temperature	26°C
Humidity	54%

### 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**

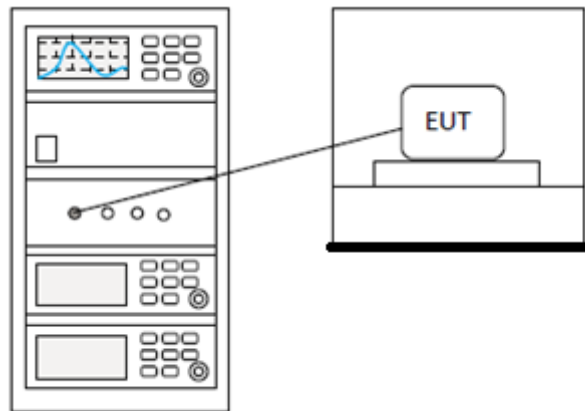
### CARRIER FREQUENCIES SEPARATION

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
Test Mode (Final Test)	TX
Tester	Eason
Temperature	26°C
Humidity	54%

### LIMITS

<b>Limit:</b>	2/3 of the 20dB bandwidth base on the transmission power is less than 0.125W
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### BLOCK DIAGRAM OF TEST SETUP



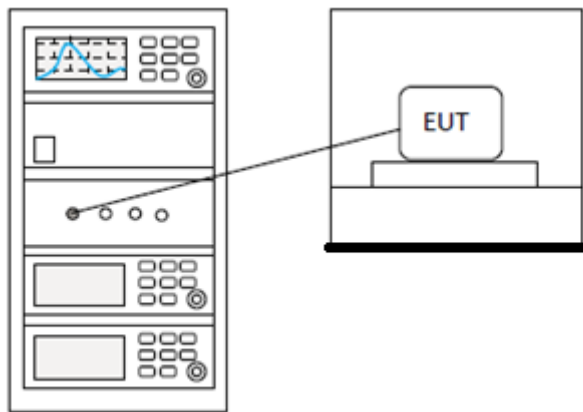
### TEST DATA

**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	26°C
Humidity	54%

### BLOCK DIAGRAM OF TEST SETUP



### TEST DATA

**Pass: Please Refer To Appendix: Appendix1 For Details**

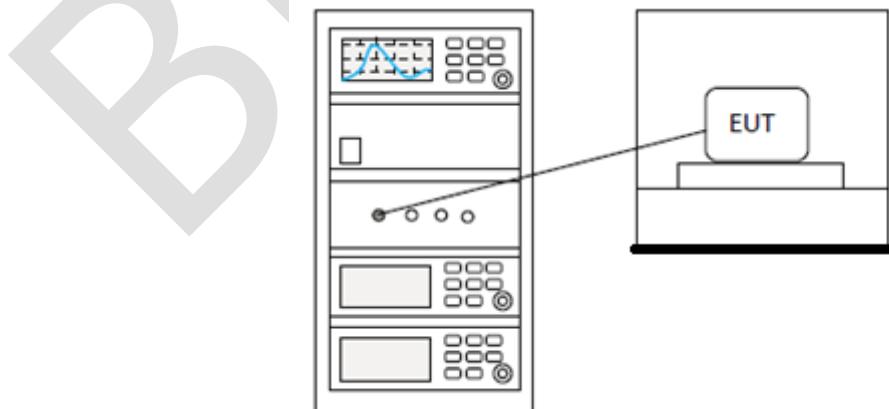
### CONDUCTED PEAK OUTPUT POWER

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	26°C
Humidity	54%

### LIMITS

Frequency range(MHz)	Output power of the intentional radiator(watt)
902-928	1 for $\geq 50$ hopping channels
	0.25 for $25 \leq$ hopping channels $< 50$
	1 for digital modulation
2400-2483.5	1 for $\geq 75$ 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**

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### CONDUCTED EMISSIONS AT AC POWER LINE (150KHZ-30MHZ)

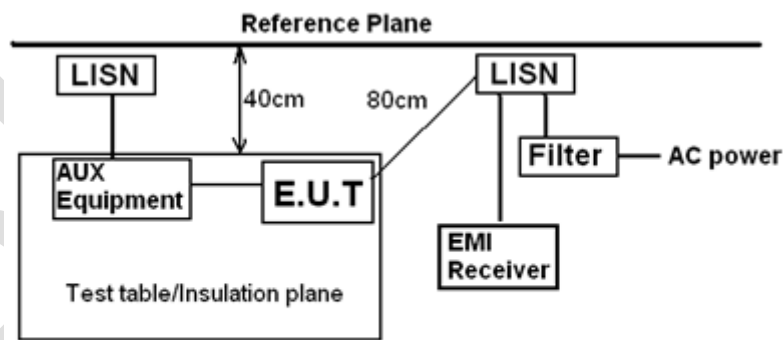
Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 6.2
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX
Tester	Eason
Temperature	26°C
Humidity	54%

#### LIMITS

Frequency of emission(MHz)	Conducted limit(dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

\*Decreases with the logarithm of the frequency.

#### BLOCK DIAGRAM OF TEST SETUP



Remark  
 E.U.T: Equipment Under Test  
 LISN: Line Impedance Stabilization Network  
 Test table height=0.8m

#### PROCEDURE

- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50?H + 5ohm linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.

- 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,
- 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
- 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

Remark: LISN=Read Level+ Cable Loss+ LISN Factor

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### RADIATED SPURIOUS EMISSIONS

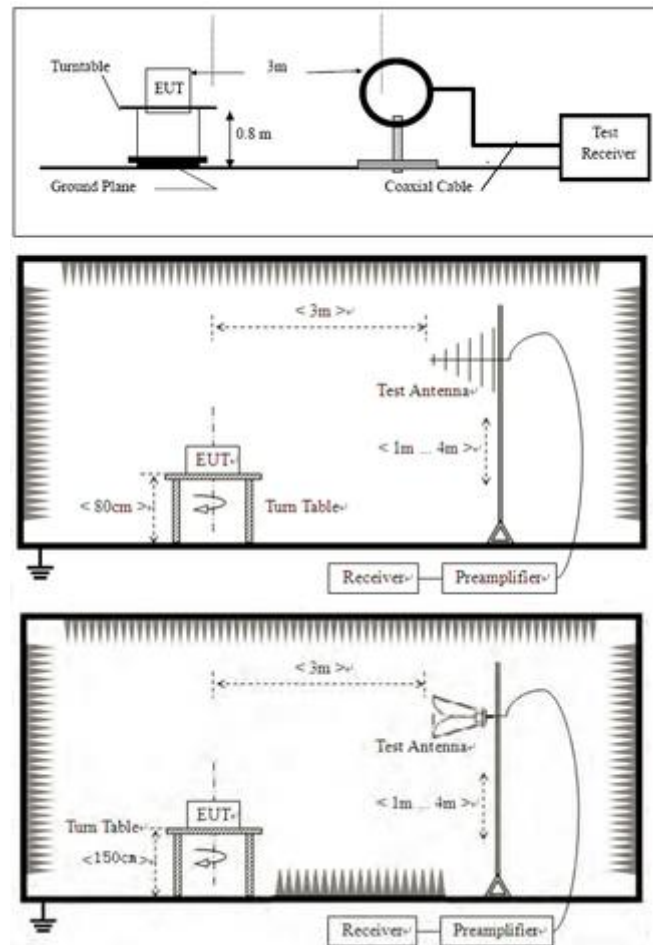
<b>Test Standard</b>	47 CFR Part 15, Subpart C 15.247
<b>Test Method</b>	ANSI C63.10 (2013) Section 6.4,6.5,6.6
<b>Test Mode (Pre-Scan)</b>	TX mode (SE) below 1G;TX mode (SE) above 1G
<b>Test Mode (Final Test)</b>	TX mode (SE) below 1G;TX mode (SE) above 1G
<b>Tester</b>	Eason
<b>Temperature</b>	25℃
<b>Humidity</b>	57%

### LIMITS

<b>Frequency(MHz)</b>	<b>Field strength(microvolts/meter)</b>	<b>Measurement distance(meters)</b>
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

## BLOCK DIAGRAM OF TEST SETUP



## PROCEDURE

- For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

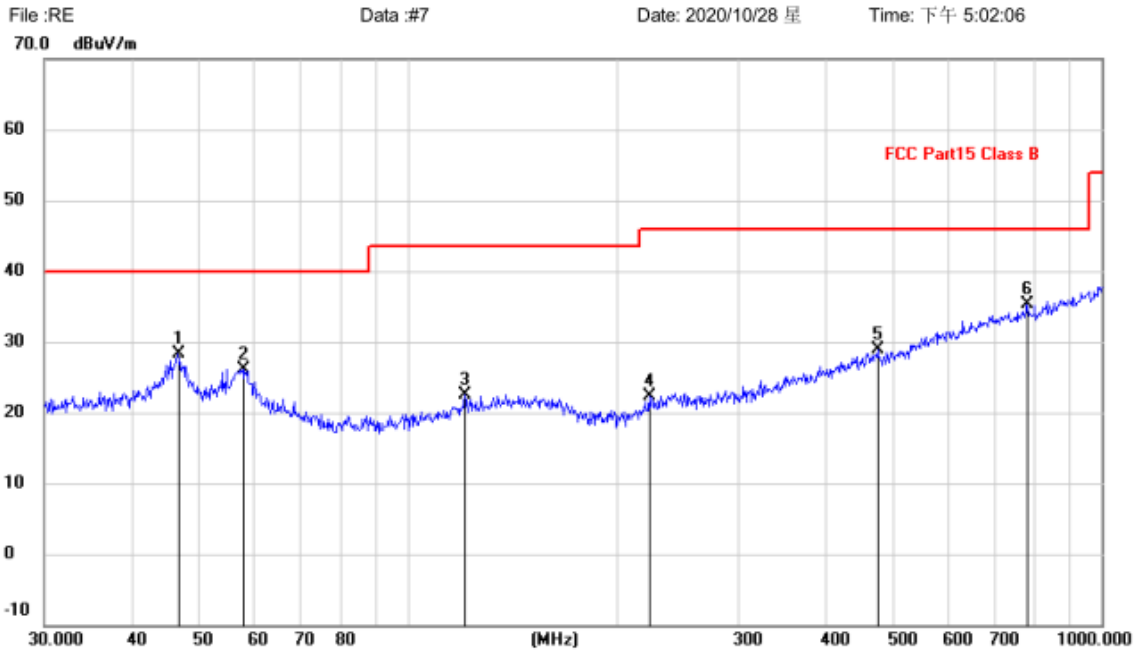
Remark:

- 1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.
- 2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:  
Final Test Level = Receiver Reading + Antenna Factor + Cable Factor + Preamplifier Factor
- 3) Scan from 9kHz to 25GHz, the disturbance above 18GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
- 4) For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

**TEST DATA**

[TestMode: TX mode (SE) below 1G]; [Polarity: Horizontal]  
Power:AC120V/60Hz

**Radiated Emission Measurement**



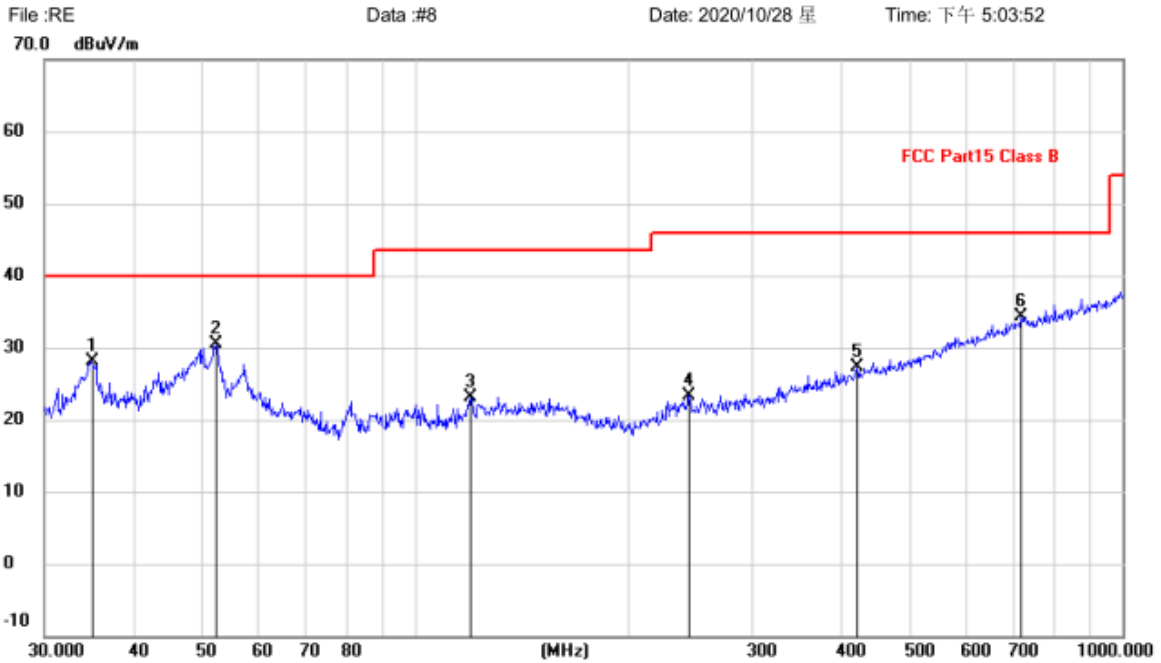
No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measurement dBuV/m	Limit dBuV/m	Over dB	Detector	Antenna Height cm	Table Degree	Comment
1	46.6664	4.04	24.19	28.23	40.00	-11.77	QP			
2	57.9993	2.76	23.38	26.14	40.00	-13.86	QP			
3	121.1231	-0.02	22.50	22.48	43.50	-21.02	QP			
4	222.9502	0.77	21.62	22.39	46.00	-23.61	QP			
5	475.4991	0.49	28.48	28.97	46.00	-17.03	QP			
6 *	779.6068	1.26	34.11	35.37	46.00	-10.63	QP			

**Test Result: Pass**

[TestMode: TX mode (SE) below 1G]; [Polarity: Vertical]

Power:AC120V/60Hz

**Radiated Emission Measurement**



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		34.8823	5.26	22.79	28.05	40.00	-11.95	QP		
2	*	52.3912	6.53	24.01	30.54	40.00	-9.46	QP		
3		119.8556	0.62	22.46	23.08	43.50	-20.42	QP		
4		244.2321	0.46	22.93	23.39	46.00	-22.61	QP		
5		422.0577	-0.21	27.46	27.25	46.00	-18.75	QP		
6		719.1995	1.23	33.13	34.36	46.00	-11.64	QP		

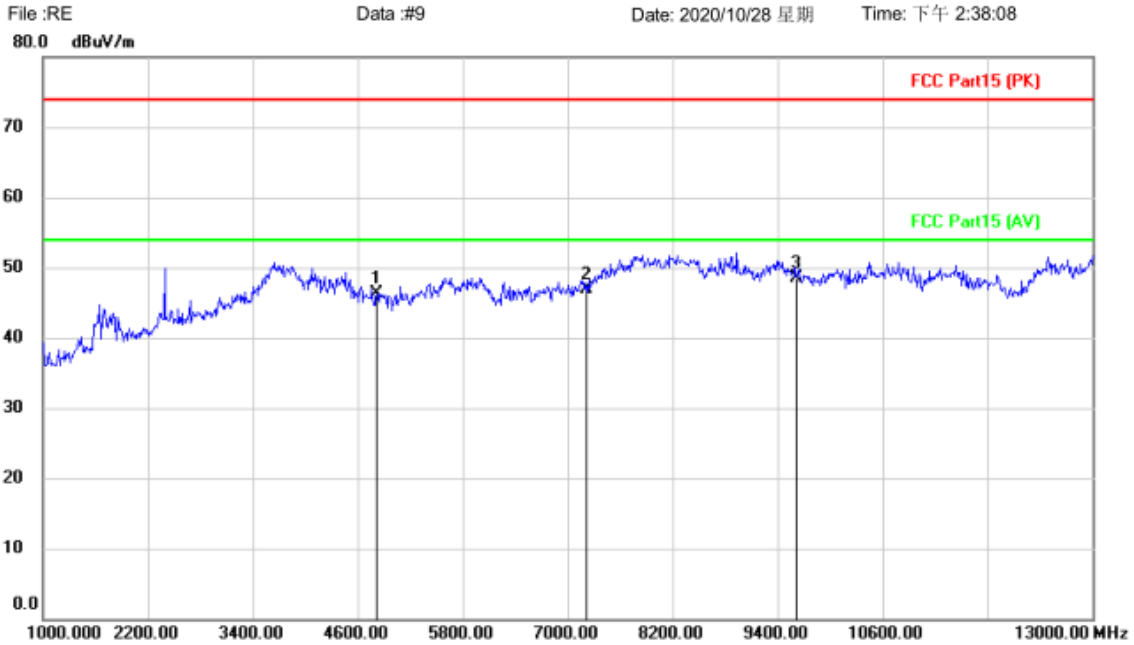
**Test Result: Pass**

[TestMode: 8DPSK]

Remark: During the test, pre-scan the GFSK, Pi/4QPSK and 8DPSK modulation, and found the 8DPSK modulation which it is worse case.

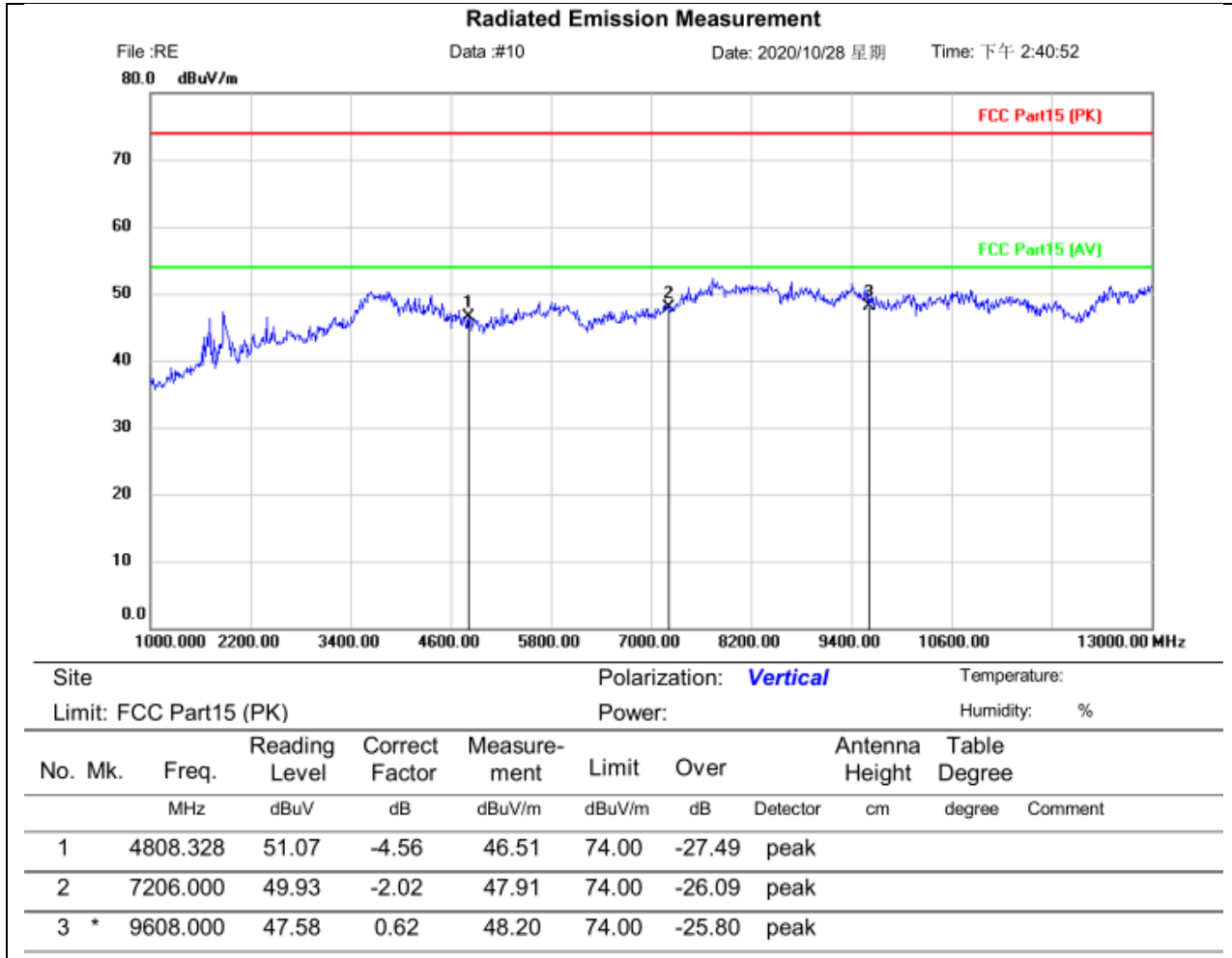
Test channel:lowest

Radiated Emission Measurement



Site Polarization: **Horizontal** Temperature:  
Limit: FCC Part15 (PK) Power: Humidity: %

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree	Comment
1		4808.328	50.80	-4.56	46.24	74.00	-27.76	peak		
2		7206.000	49.10	-2.27	46.83	74.00	-27.17	peak		
3	*	9608.000	47.79	0.81	48.60	74.00	-25.40	peak		



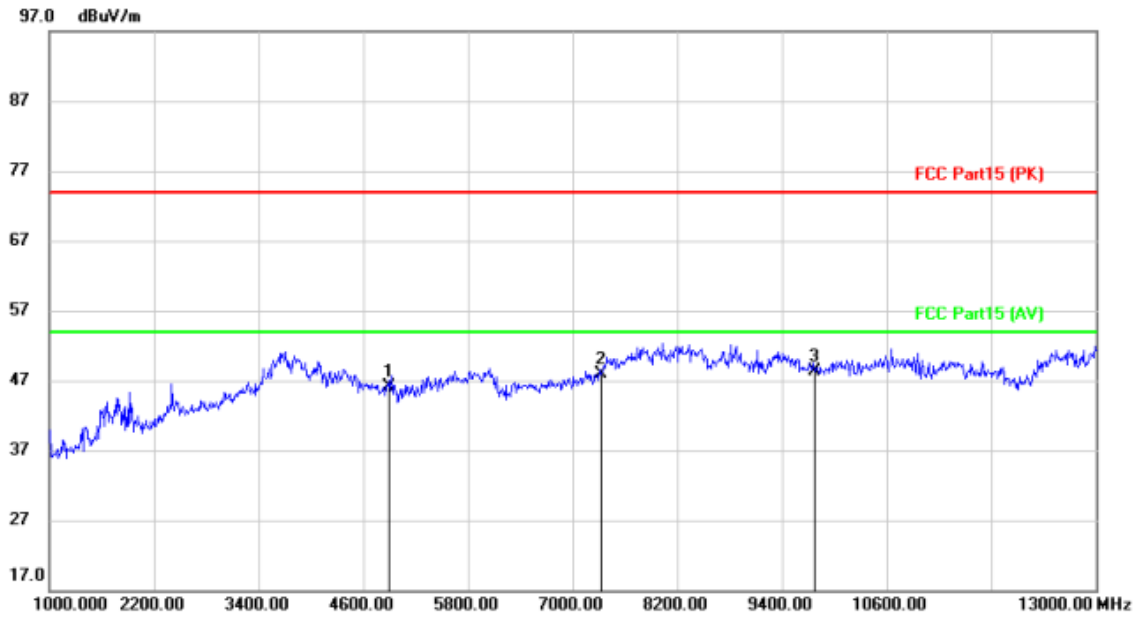
BLUE



Test channel: Middle

Radiated Emission Measurement

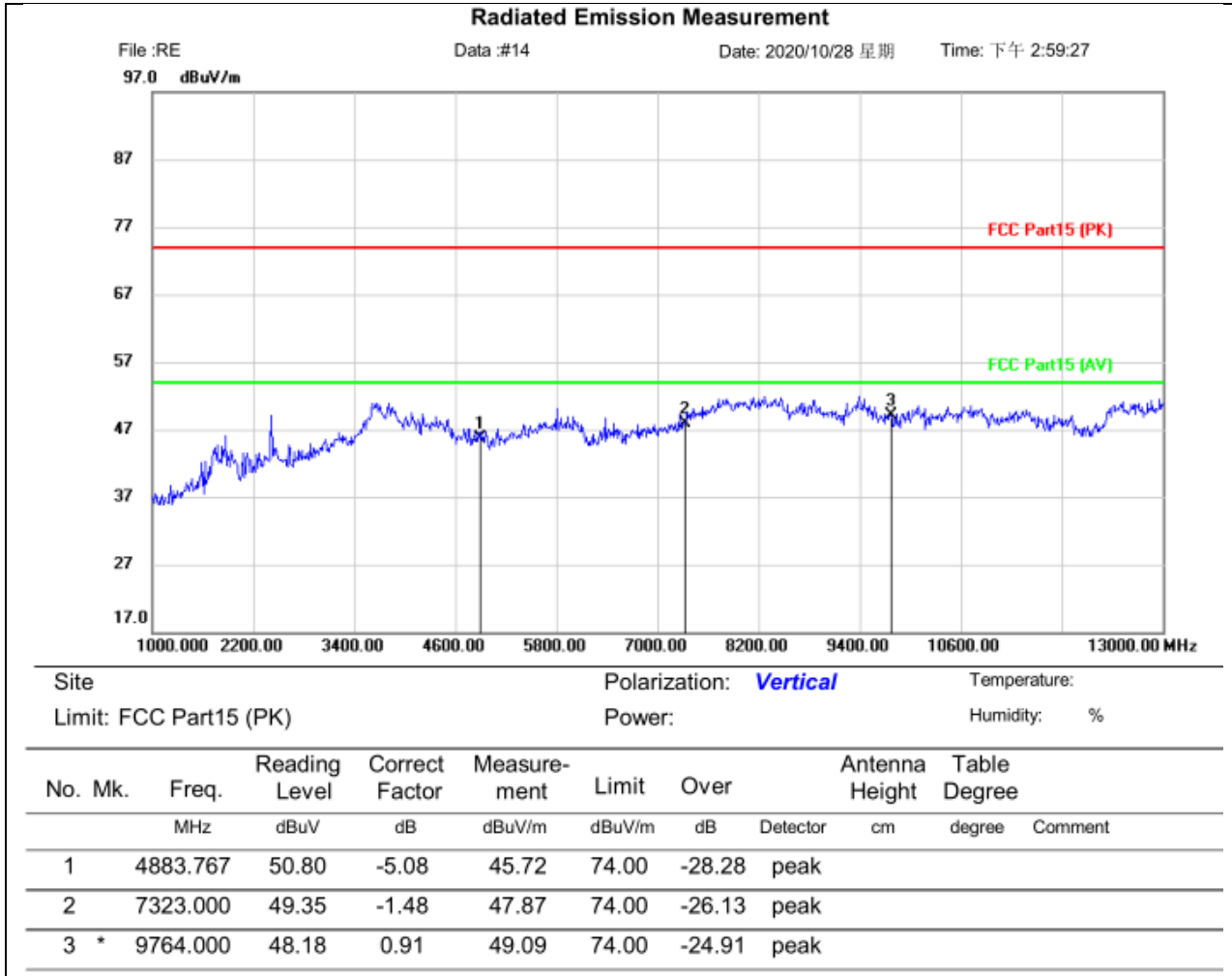
File :RE Data :#13 Date: 2020/10/28 星期 Time: 下午 2:57:53

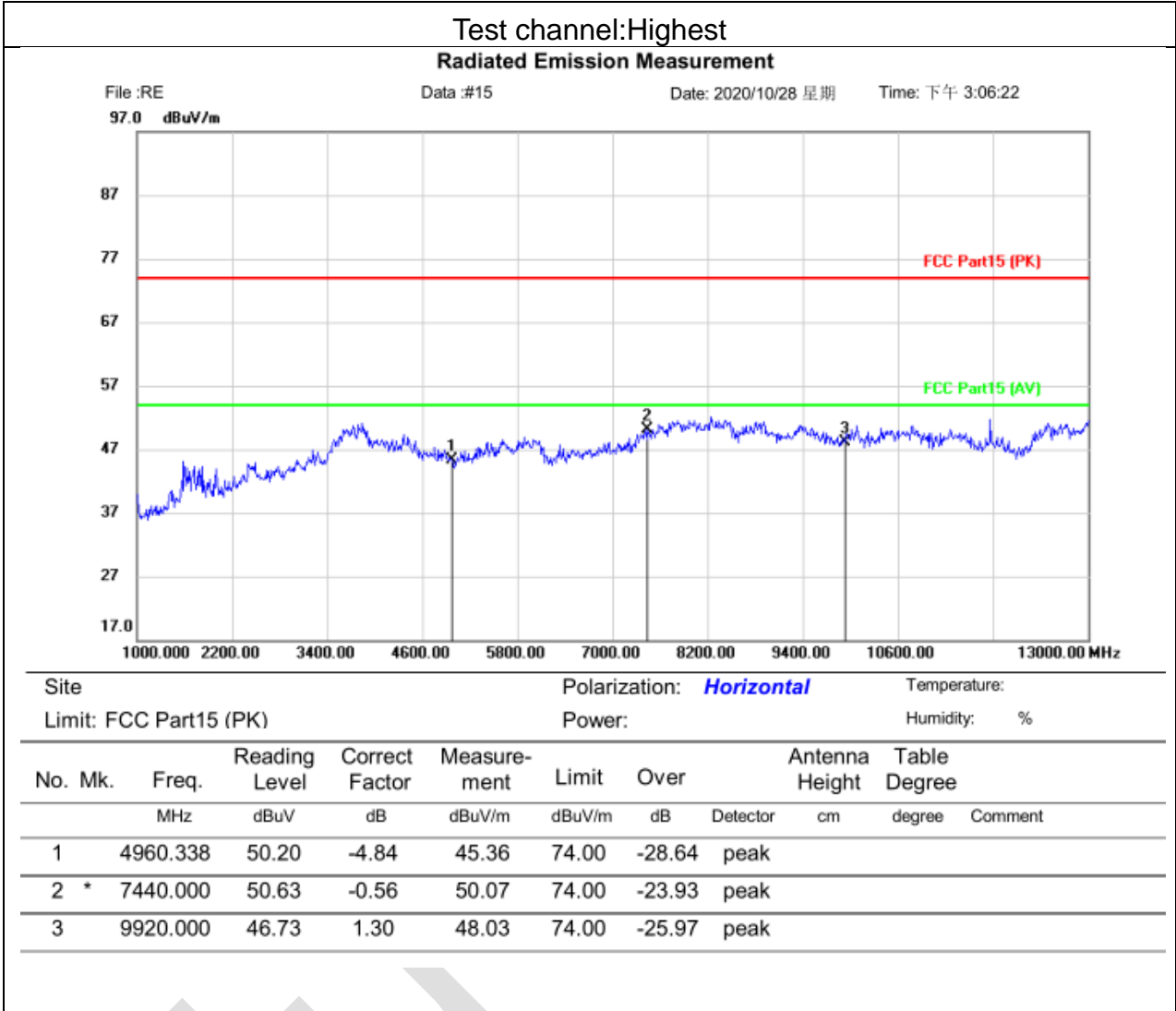


Site Polarization: **Horizontal** Temperature:  
Limit: FCC Part15 (PK) Power: Humidity: %

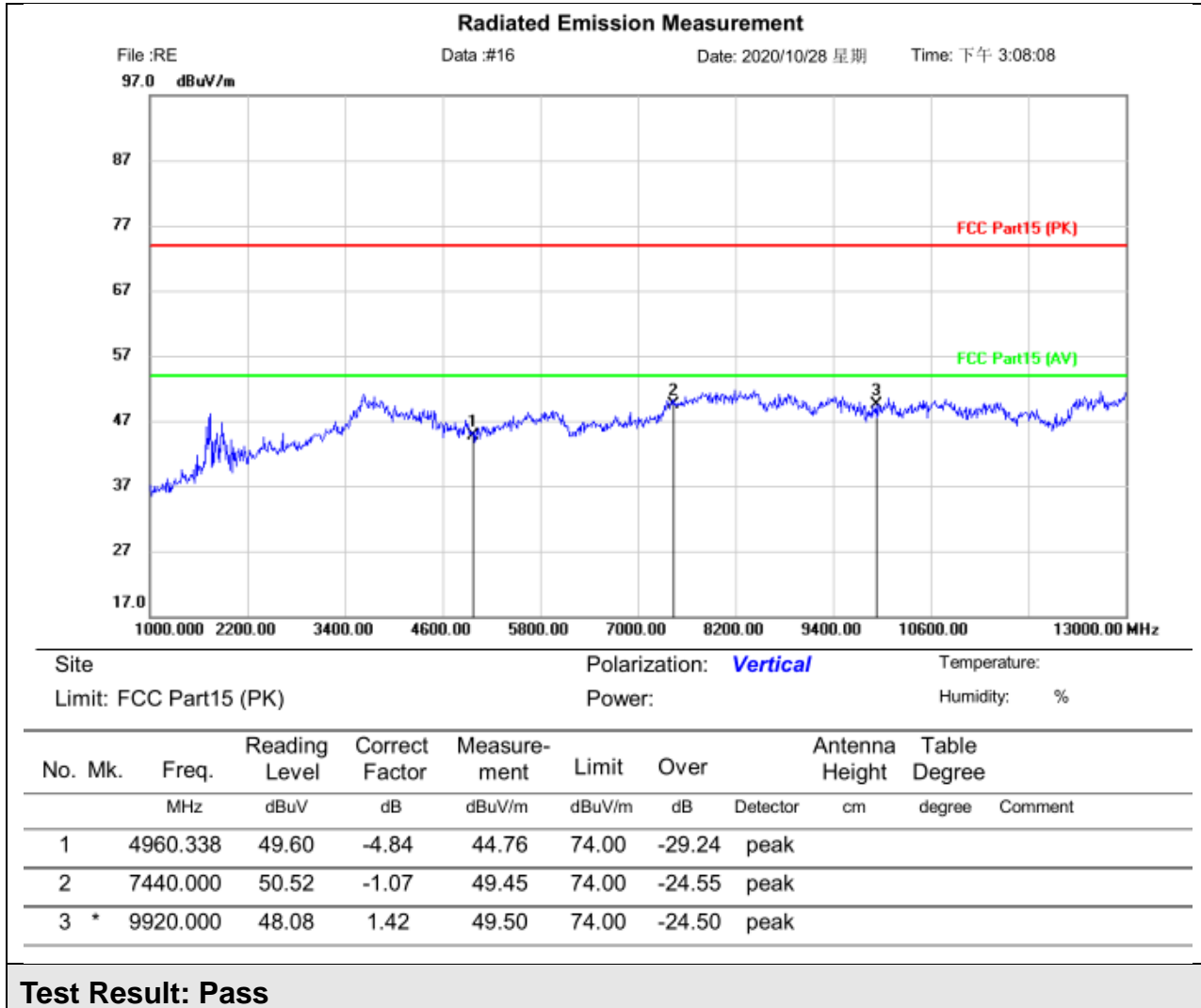
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree
1		4883.767	51.23	-5.08	46.15	74.00	-27.85	peak	
2		7323.000	49.33	-1.34	47.99	74.00	-26.01	peak	
3	*	9764.000	47.33	0.94	48.27	74.00	-25.73	peak	

BLA





BLA



**RADIATED EMISSIONS WHICH FALL IN THE RESTRICTED BANDS**

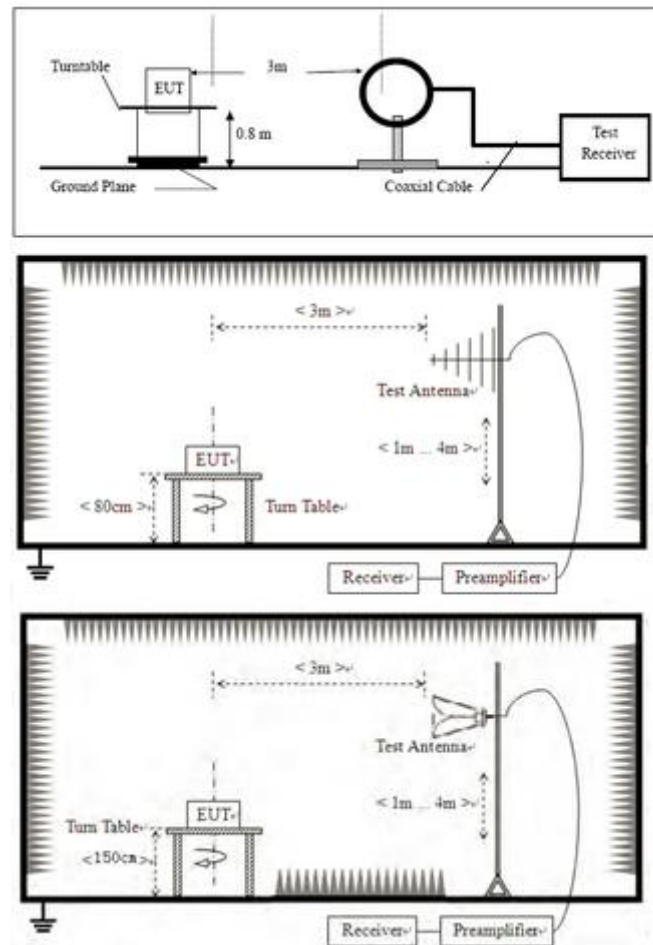
<b>Test Standard</b>	47 CFR Part 15, Subpart C 15.247
<b>Test Method</b>	ANSI C63.10 (2013) Section 6.10.5
<b>Test Mode (Pre-Scan)</b>	TX
<b>Test Mode (Final Test)</b>	TX
<b>Tester</b>	Eason
<b>Temperature</b>	25°C
<b>Humidity</b>	54%

**LIMITS**

<b>Frequency(MHz)</b>	<b>Field strength(microvolts/meter)</b>	<b>Measurement distance(meters)</b>
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

## BLOCK DIAGRAM OF TEST SETUP



## PROCEDURE

- For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

Remark 1:  $\text{Level} = \text{Read Level} + \text{Cable Loss} + \text{Antenna Factor} - \text{Preamp Factor}$

Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

BlueAsia

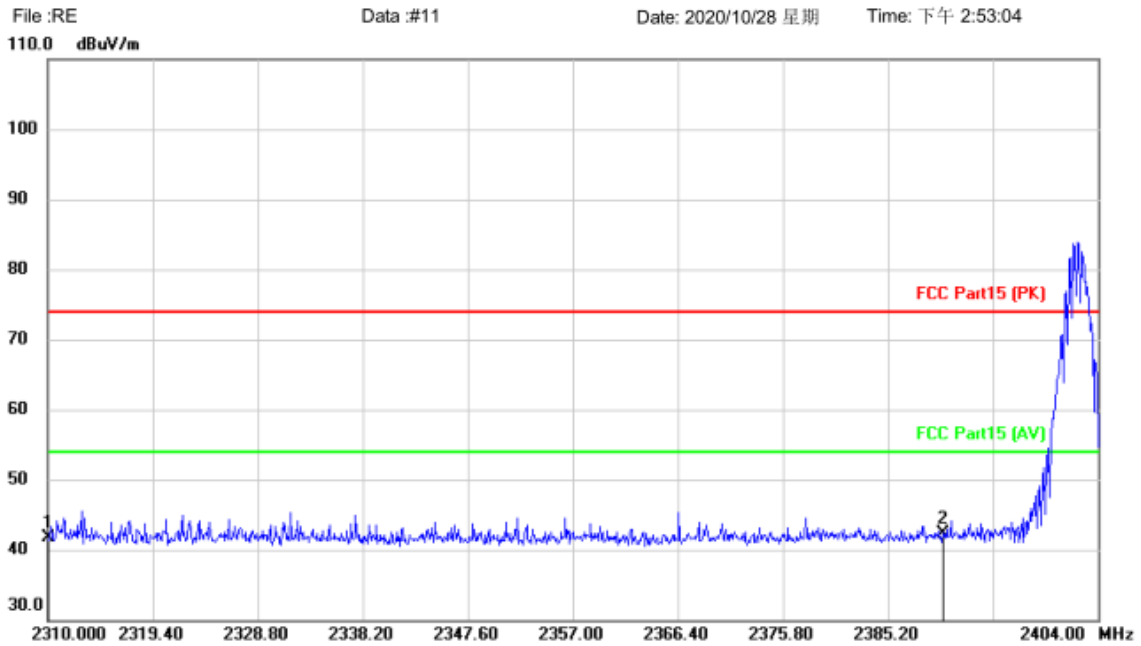
**TEST DATA**

Remark: During the test, pre-scan the GFSK, Pi/4QPSK and 8DPSK modulation, and found the 8DPSK modulation which it is worse case.

**Lowest channel**

**Peak Value**

**Radiated Emission Measurement**



File :RE Data :#11 Date: 2020/10/28 星期 Time: 下午 2:53:04

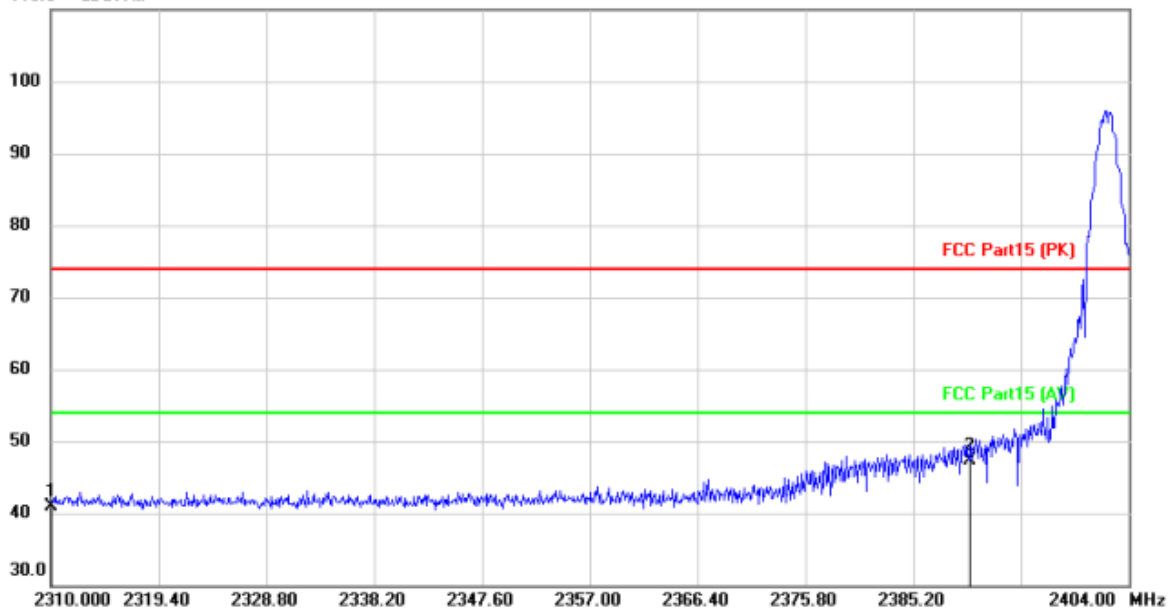
Site Polarization: *Vertical* Temperature:   
Limit: FCC Part15 (PK) Power: Humidity: %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		2310.000	56.03	-14.30	41.73	74.00	-32.27			peak
2	*	2390.000	56.18	-13.95	42.23	74.00	-31.77			peak



### Radiated Emission Measurement

File :RE      Data :#12      Date: 2020/10/28 星期      Time: 下午 2:54:58



Site:      Polarization: **Horizontal**      Temperature:      Limit: FCC Part15 (PK)      Power:      Humidity: %

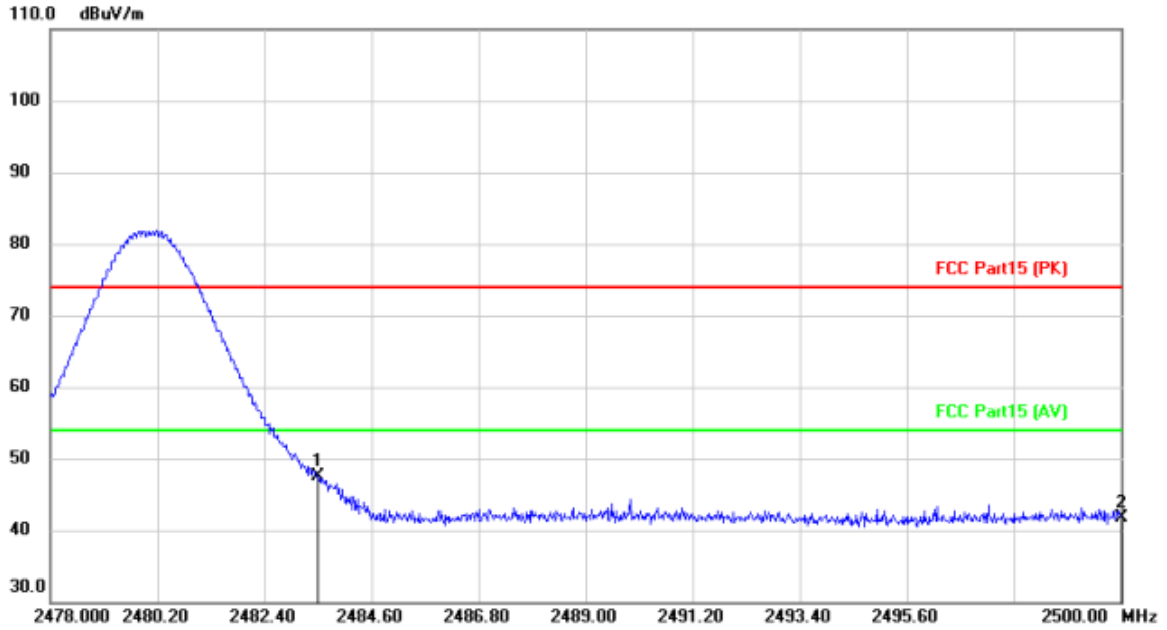
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	
1		2310.000	54.95	-14.01	40.94	74.00	-33.06			peak
2	*	2390.000	61.02	-13.62	47.40	74.00	-26.60			peak



**Highest channel  
Peak Value**

**Radiated Emission Measurement**

File :RE Data :#17 Date: 2020/10/28 星期 Time: 下午 3:20:44



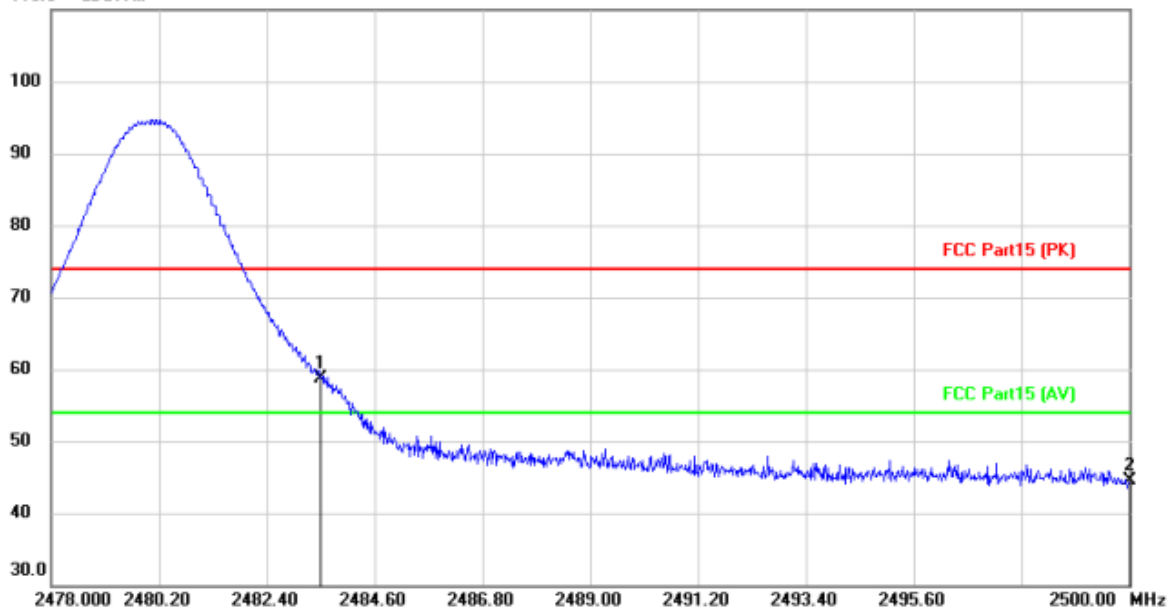
Site Limit: FCC Part15 (PK) Polarization: **Vertical** Temperature: Power: Humidity: %

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree degree	Comment
1	*	2483.500	61.07	-13.50	47.57	74.00	-26.43	peak		
2		2500.000	55.20	-13.42	41.78	74.00	-32.22	peak		



### Radiated Emission Measurement

File :RE Data :#18 Date: 2020/10/28 星期 Time: 下午 3:22:17



Site Limit: FCC Part15 (PK) Polarization: *Horizontal* Temperature: Power: Humidity: %

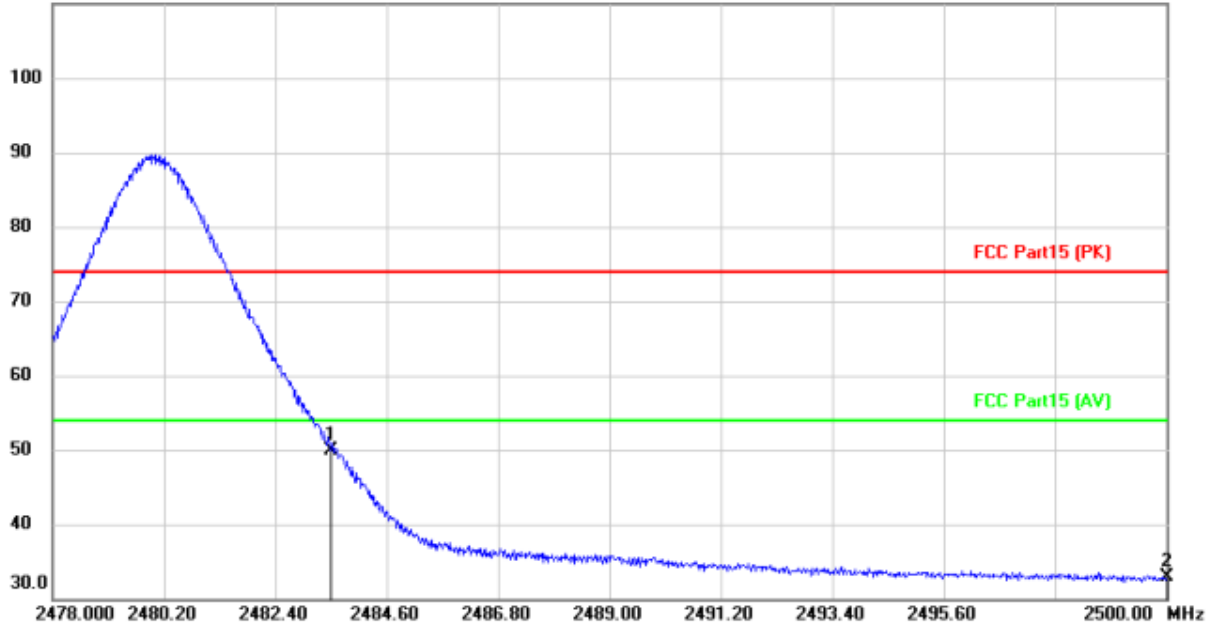
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Antenna Height cm	Table Degree degree	Comment
1	*	2483.500	71.88	-13.11	58.77	74.00	-15.23	peak			
2		2500.000	57.58	-13.02	44.56	74.00	-29.44	peak			

BLA

**AVG Value**

**Radiated Emission Measurement**

File :RE Data :#19 Date: 2020/10/28 星期 Time: 下午 3:23:56  
110.0 dBuV/m



Site Limit: FCC Part15 (PK) Polarization: **Horizontal** Temperature: Power: Humidity: %

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree degree	Comment
1	*	2483.500	62.94	-13.11	49.83	54.00	-4.17	AVG		
2		2500.000	45.91	-13.02	32.89	54.00	-21.11	AVG		



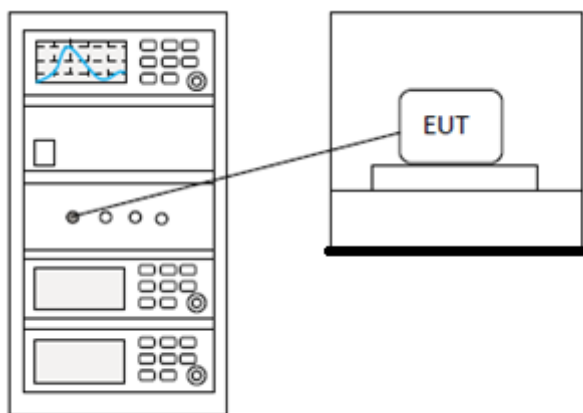
### CONDUCTED BAND EDGES MEASUREMENT

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	26°C
Humidity	54%

### LIMITS

<b>Limit:</b>	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)).
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### BLOCK DIAGRAM OF TEST SETUP



TEST DATA

**Pass: Please Refer To Appendix: Appendix1 For Details**

BlueAsia

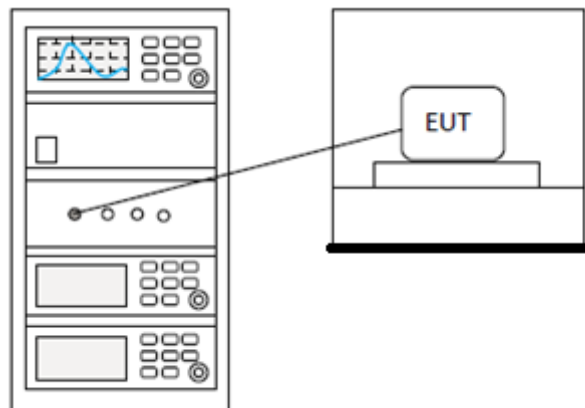
### DWELL TIME

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
Test Mode (Final Test)	TX
Tester	Eason
Temperature	26°C
Humidity	54%

### 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



TEST DATA

**Pass: Please Refer To Appendix: Appendix1 For Details**

BlueAsia



## 10 APPENDIX

### Appendix1

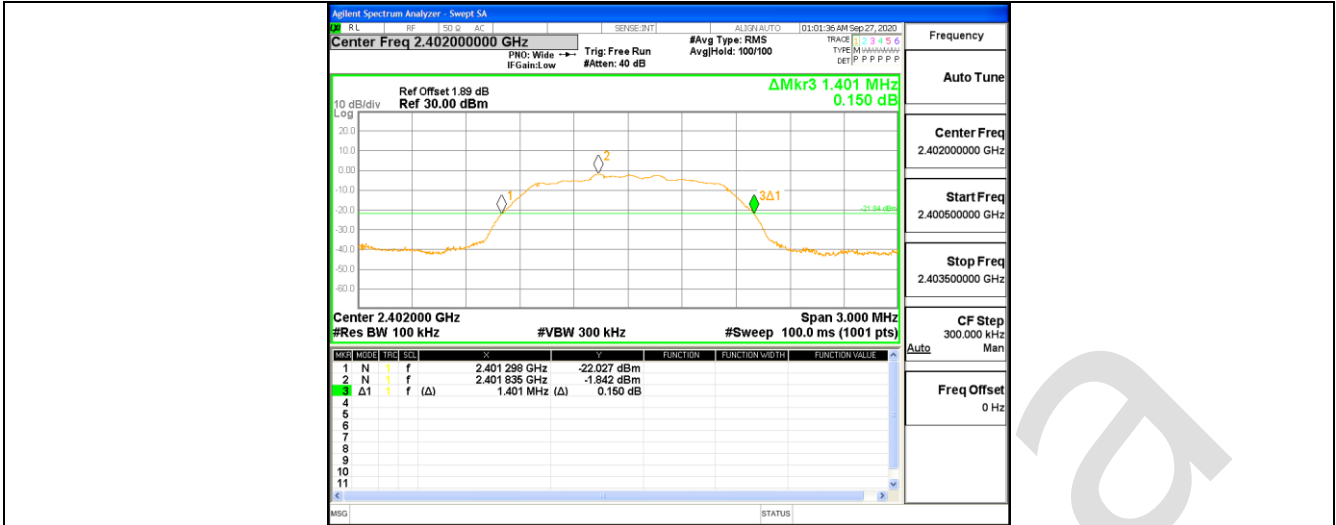
#### 10.1 APPENDIX: 20DB EMISSION BANDWIDTH

##### Test Result

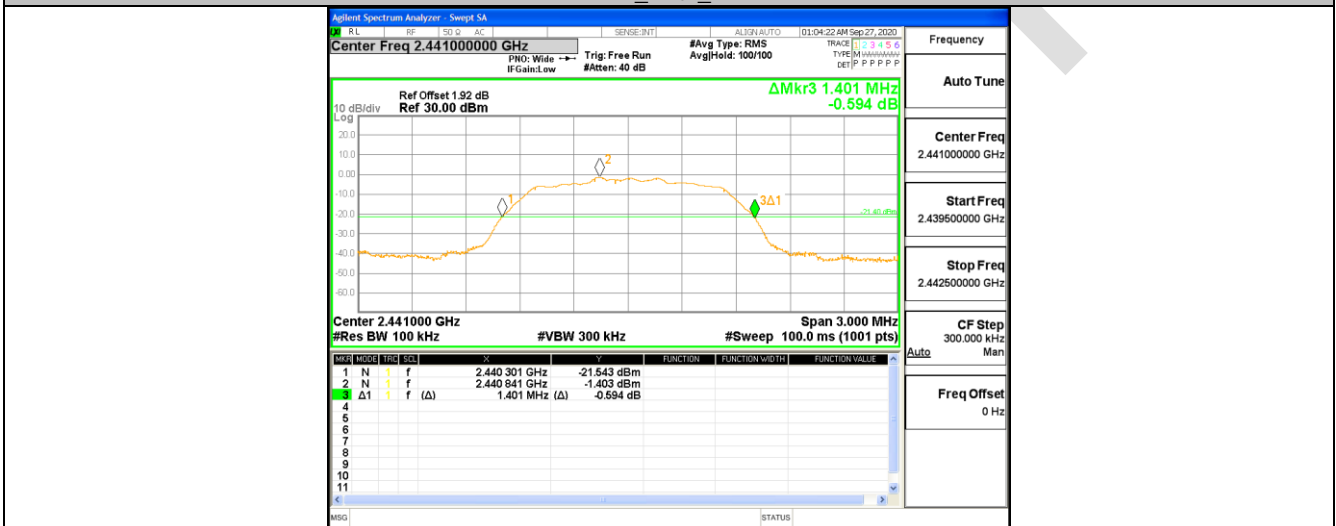
TestMode	Antenna	Channel	20db EBW[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH1	Ant1	2402	1.098	2401.451	2402.549	---	PASS
		2441	1.095	2440.451	2441.546	---	PASS
		2480	1.086	2479.454	2480.540	---	PASS
2DH1	Ant1	2402	1.401	2401.298	2402.699	---	PASS
		2441	1.401	2440.301	2441.702	---	PASS
		2480	1.398	2479.301	2480.699	---	PASS
3DH1	Ant1	2402	1.395	2401.313	2402.708	---	PASS
		2441	1.398	2440.310	2441.708	---	PASS
		2480	1.395	2479.313	2480.708	---	PASS

### Test Graphs

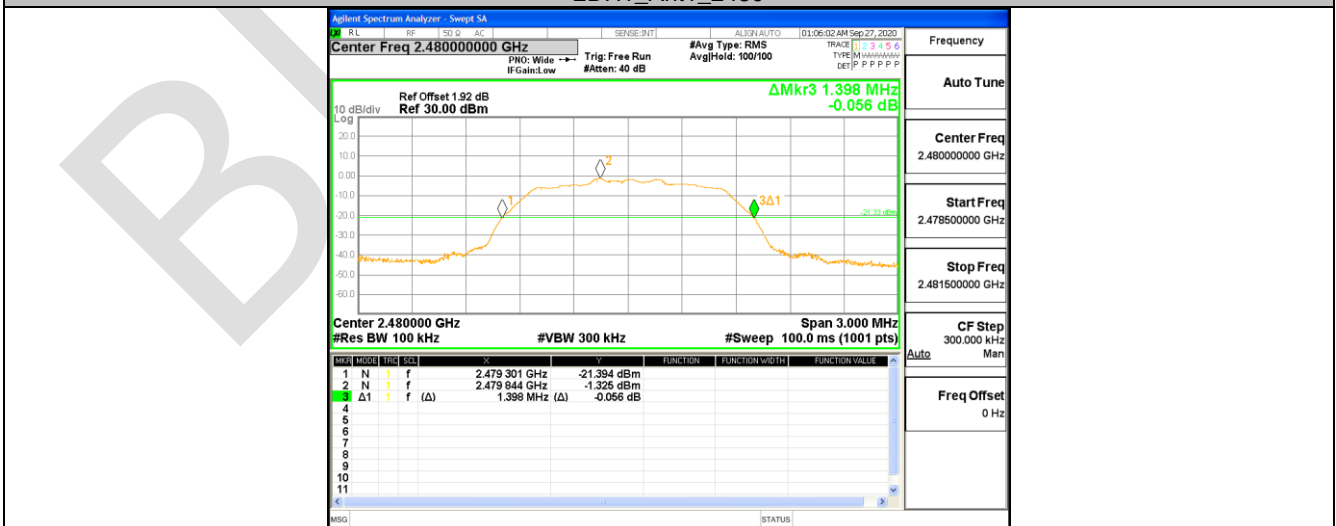




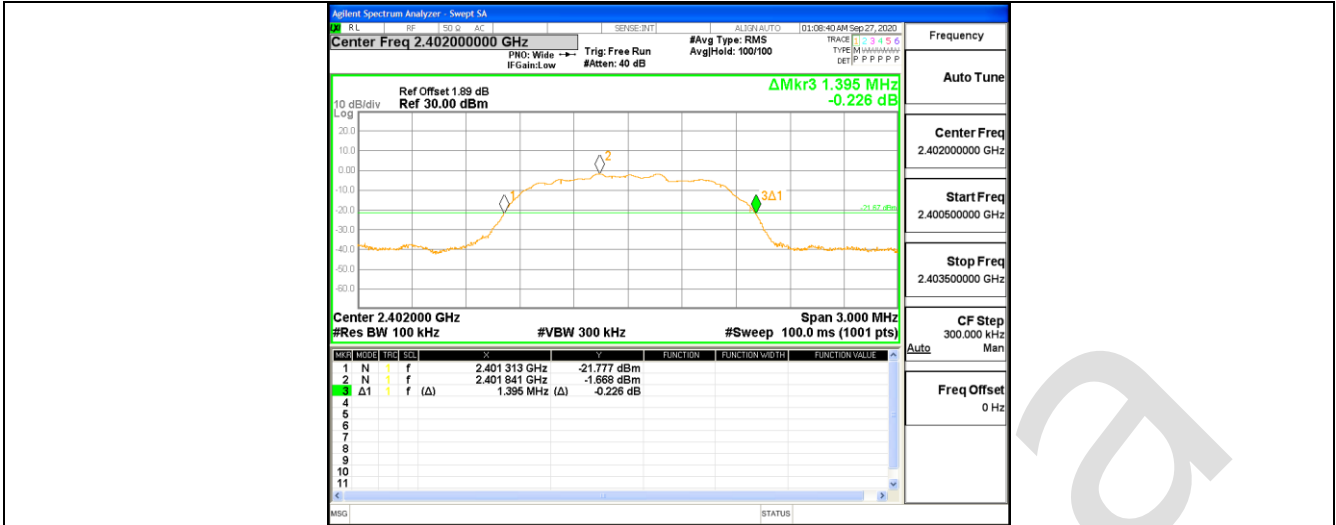
2DH1\_Ant1\_2441



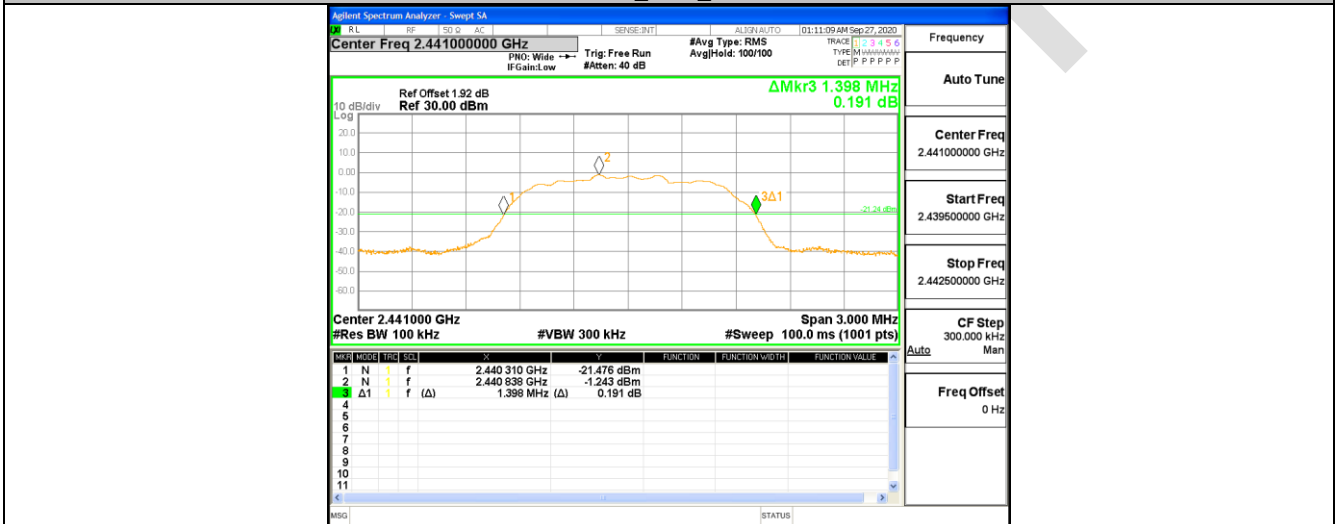
2DH1\_Ant1\_2480



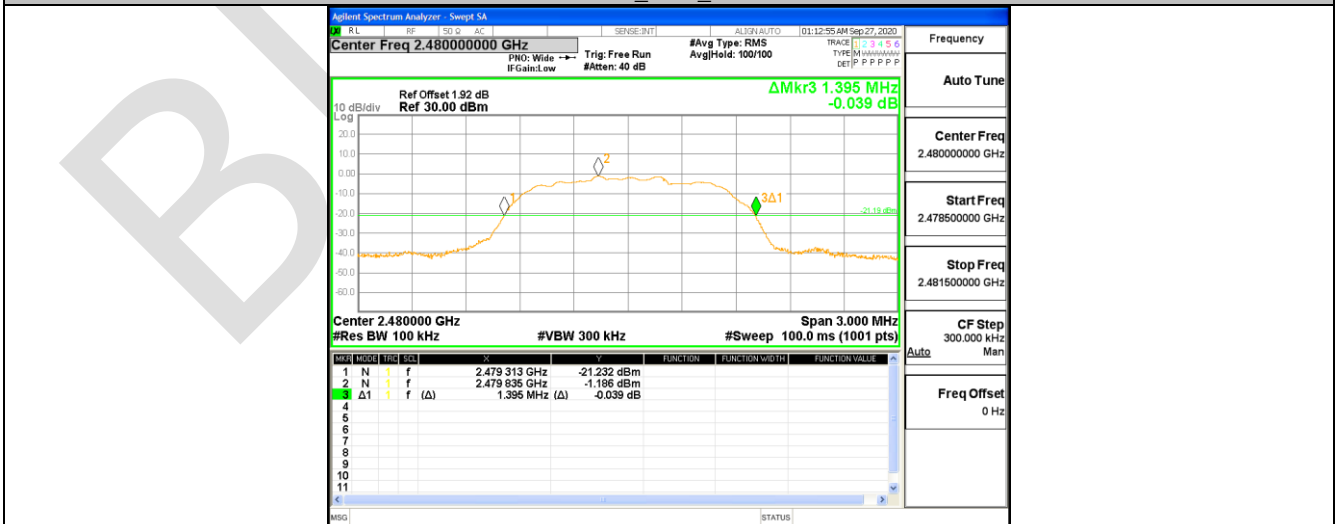
3DH1\_Ant1\_2402



3DH1\_Ant1\_2441



3DH1\_Ant1\_2480

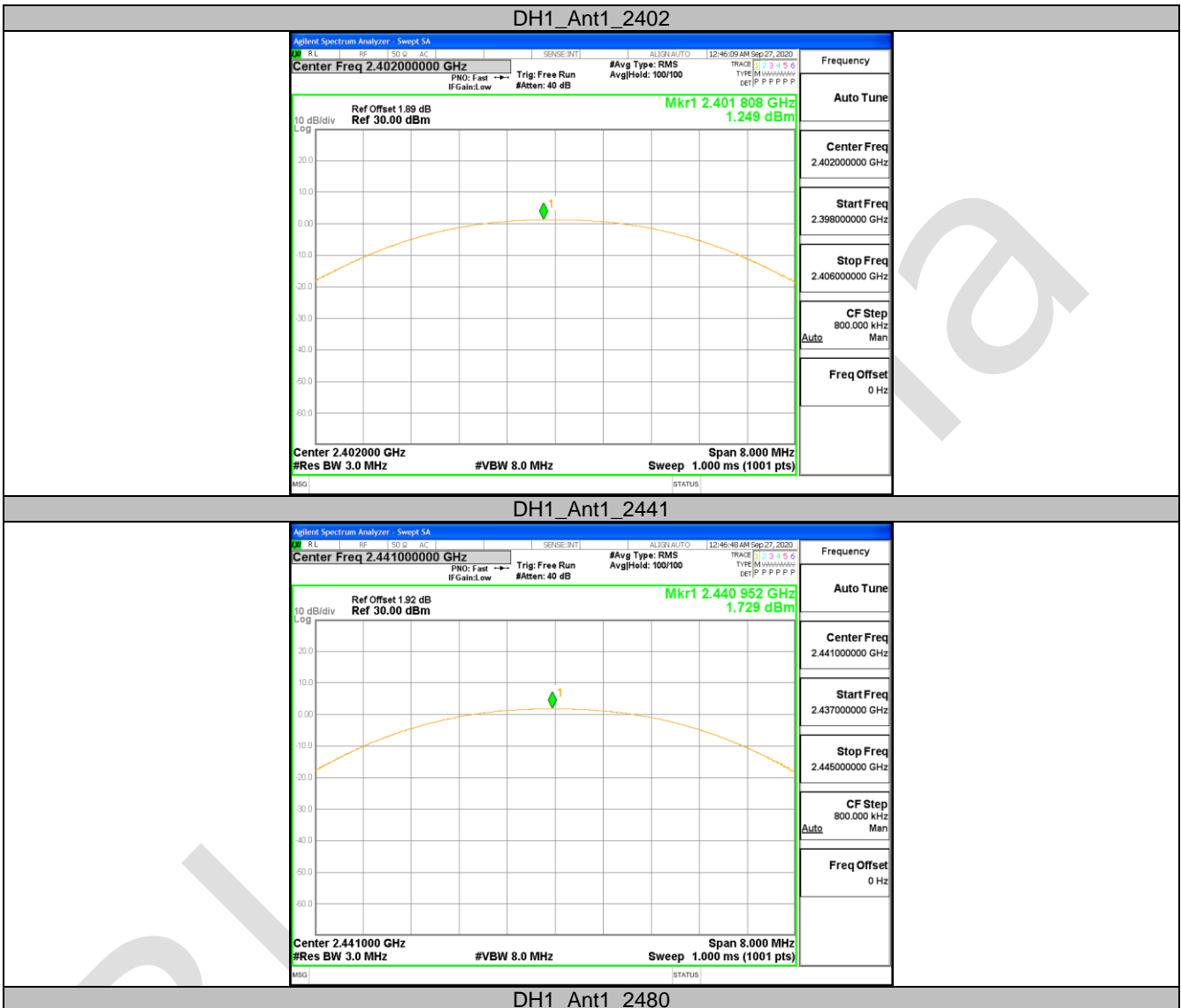


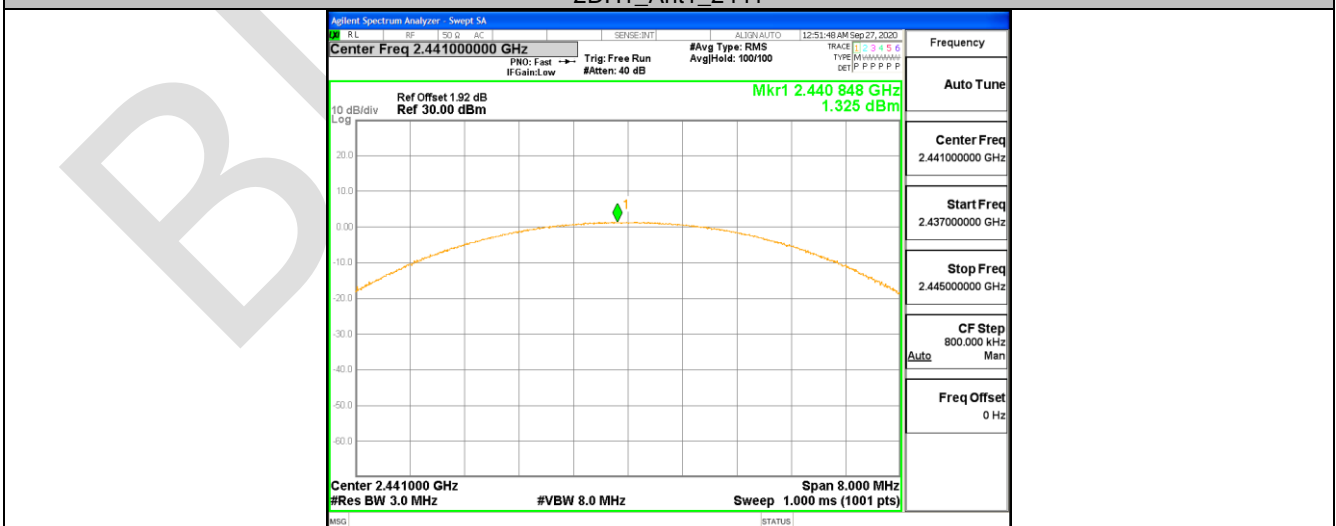
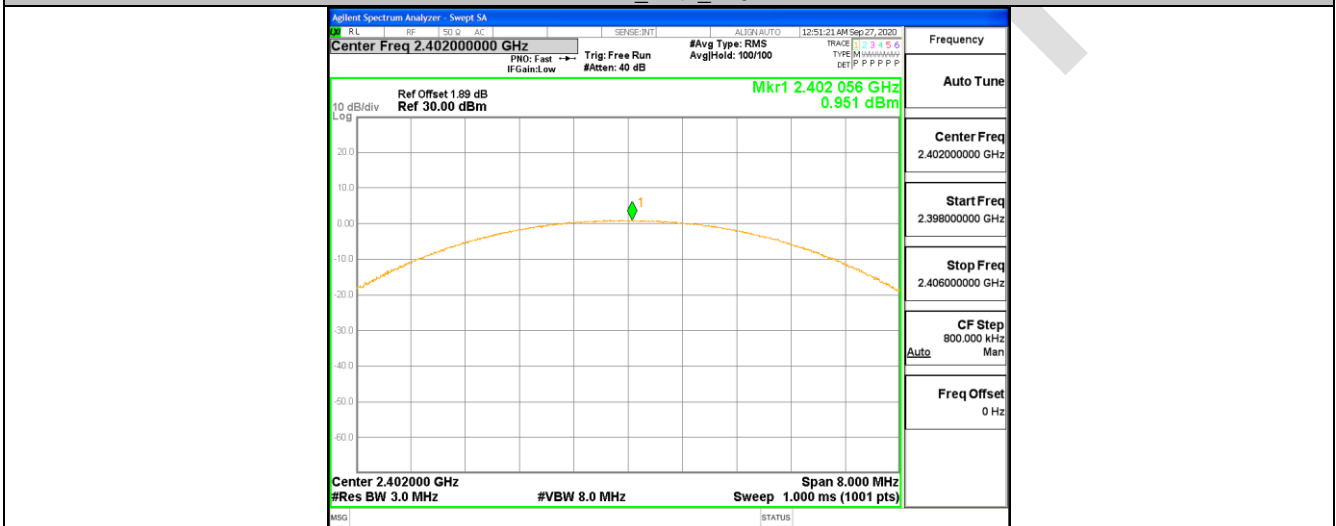
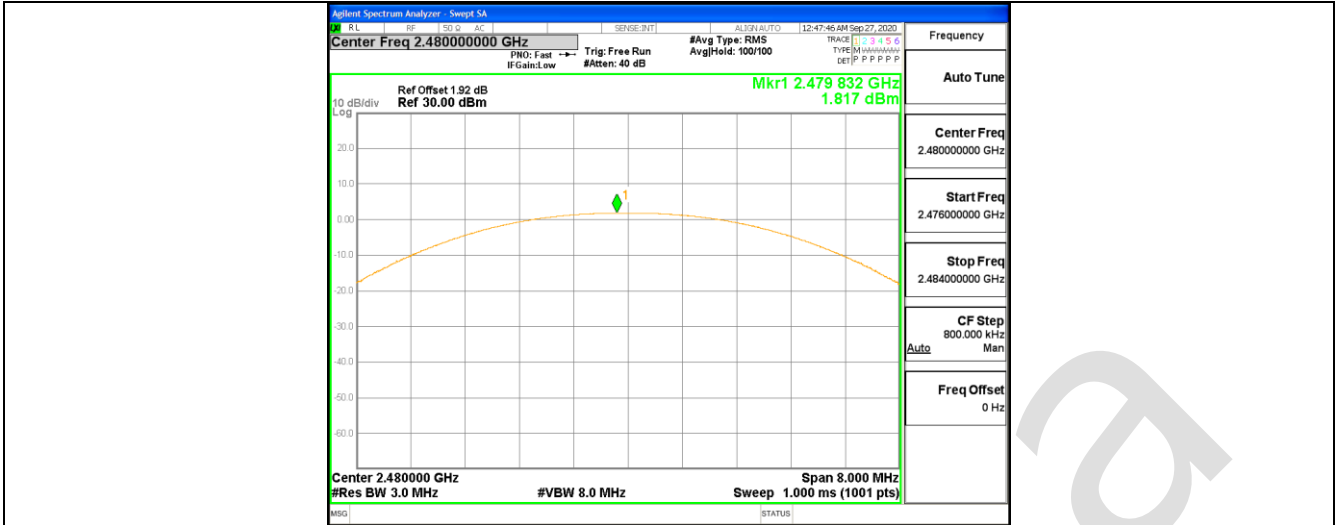
## 10.2 APPENDIX: MAXIMUM CONDUCTED OUTPUT POWER

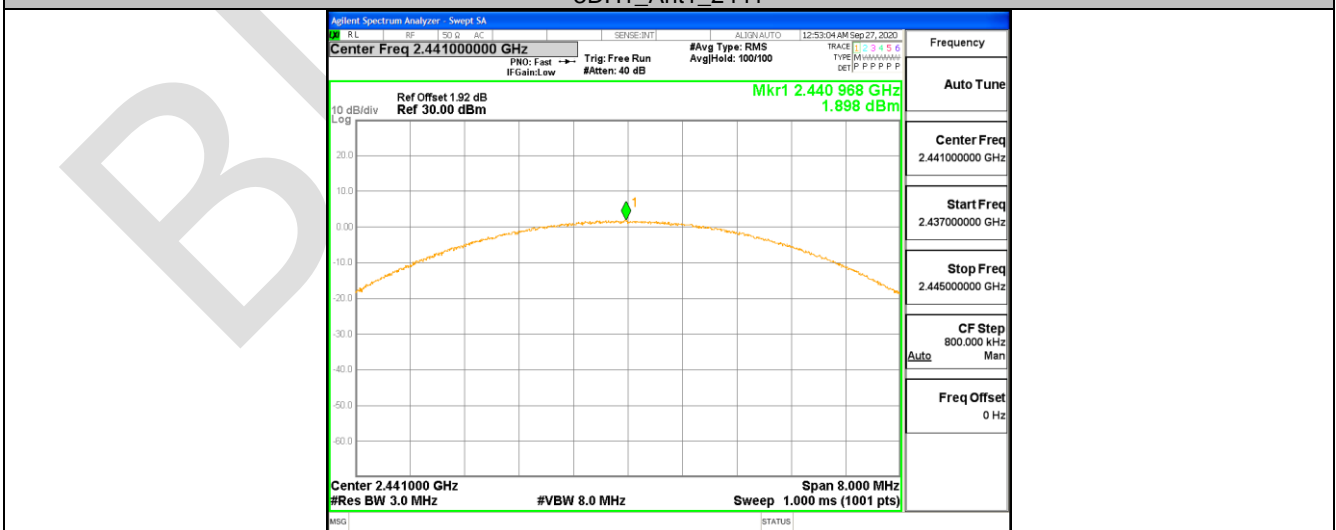
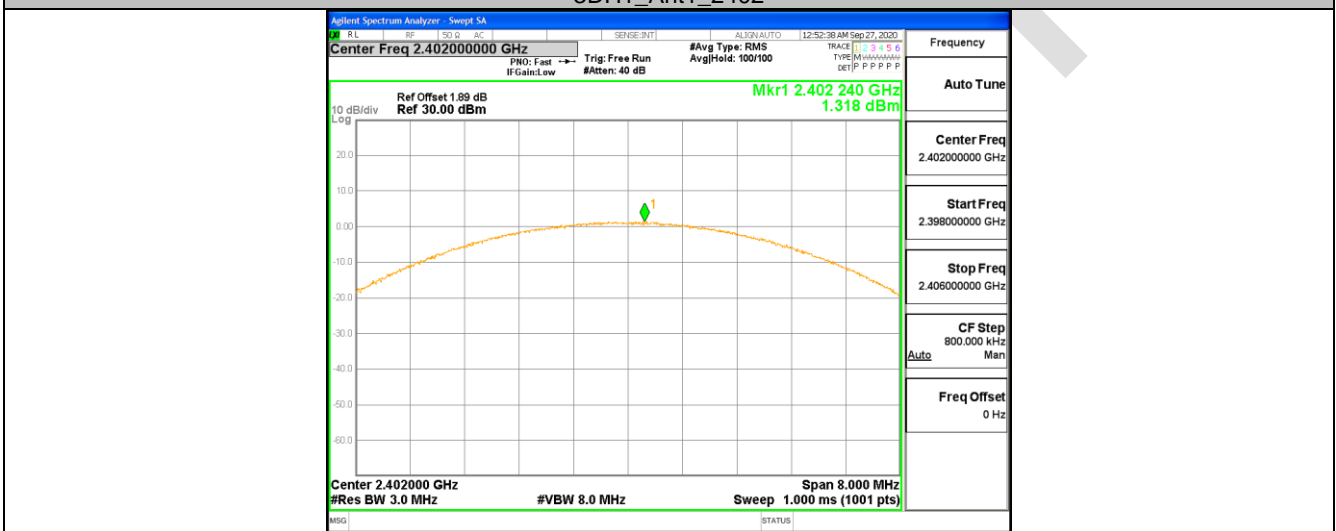
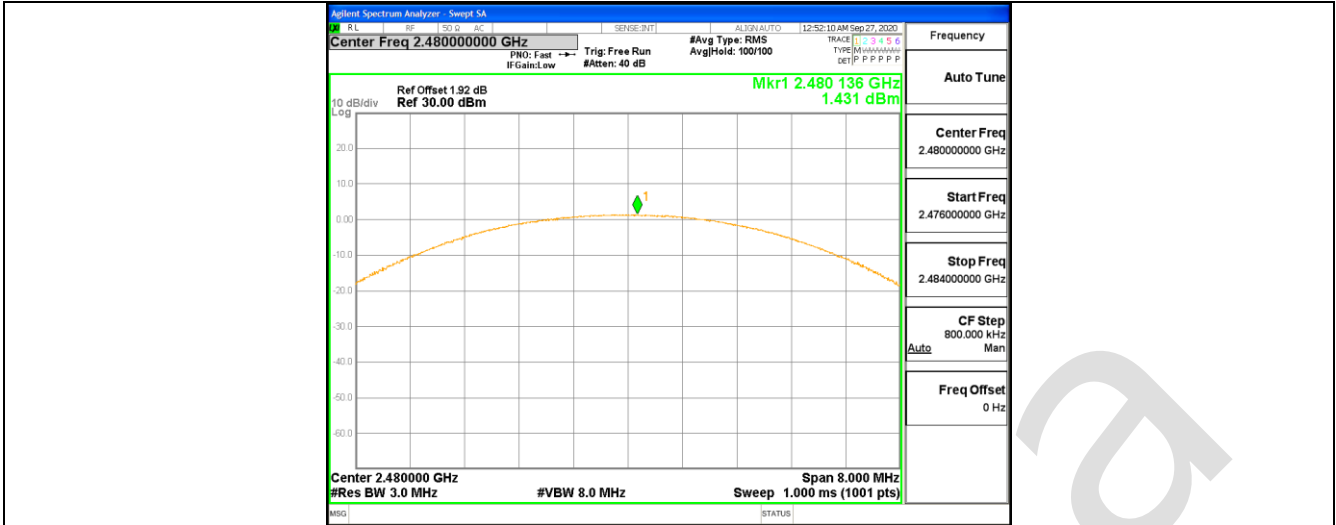
### Test Result

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
DH1	Ant1	2402	1.25	<=21	PASS
		2441	1.73	<=21	PASS
		2480	1.82	<=21	PASS
2DH1	Ant1	2402	0.95	<=21	PASS
		2441	1.33	<=21	PASS
		2480	1.43	<=21	PASS
3DH1	Ant1	2402	1.32	<=21	PASS
		2441	1.9	<=21	PASS
		2480	2.03	<=21	PASS

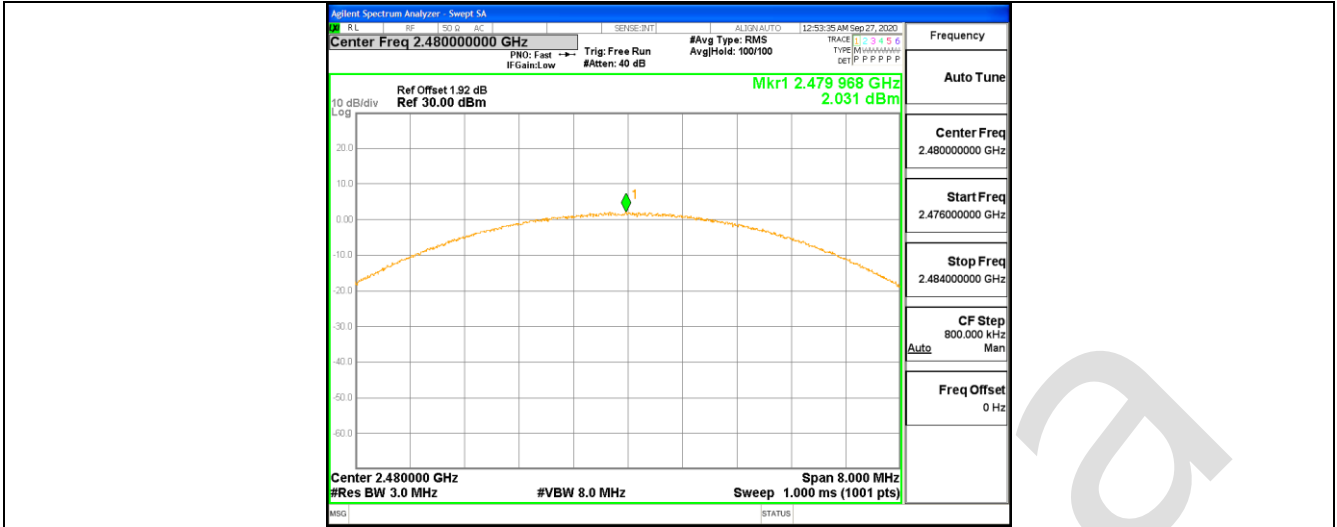
### Test Graphs











### 10.3 APPENDIX: CARRIER FREQUENCY SEPARATION

#### Test Result

TestMode	Antenna	Channel	Result[MHz]	Limit[MHz]	Verdict
DH1	Ant1	Hop	1.008	$\geq 0.732$	PASS
2DH1	Ant1	Hop	0.996	$\geq 0.934$	PASS
3DH1	Ant1	Hop	0.986	$\geq 0.932$	PASS

BlueAsia

### Test Graphs



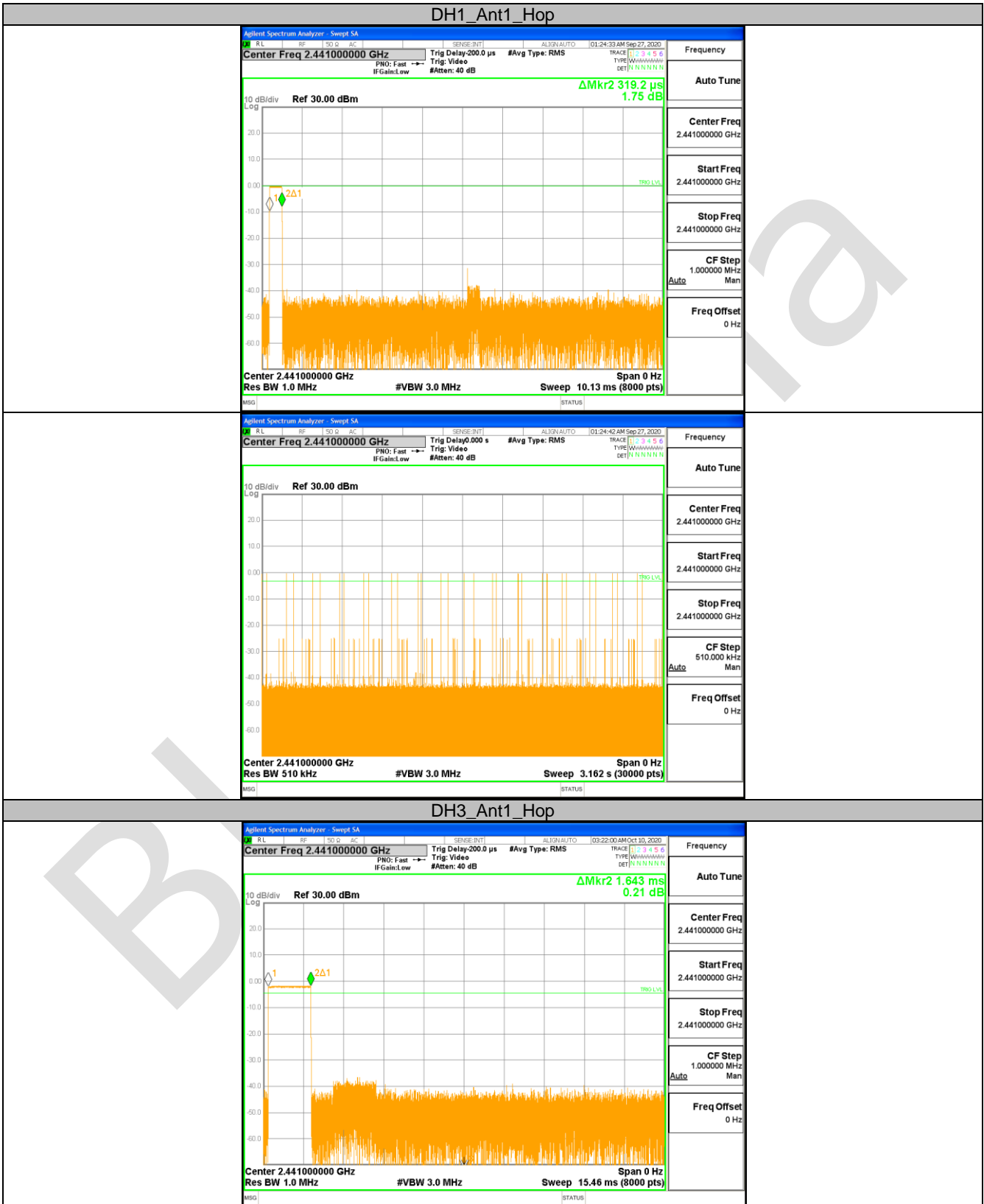
#### 10.4 APPENDIX: TIME OF OCCUPANCY

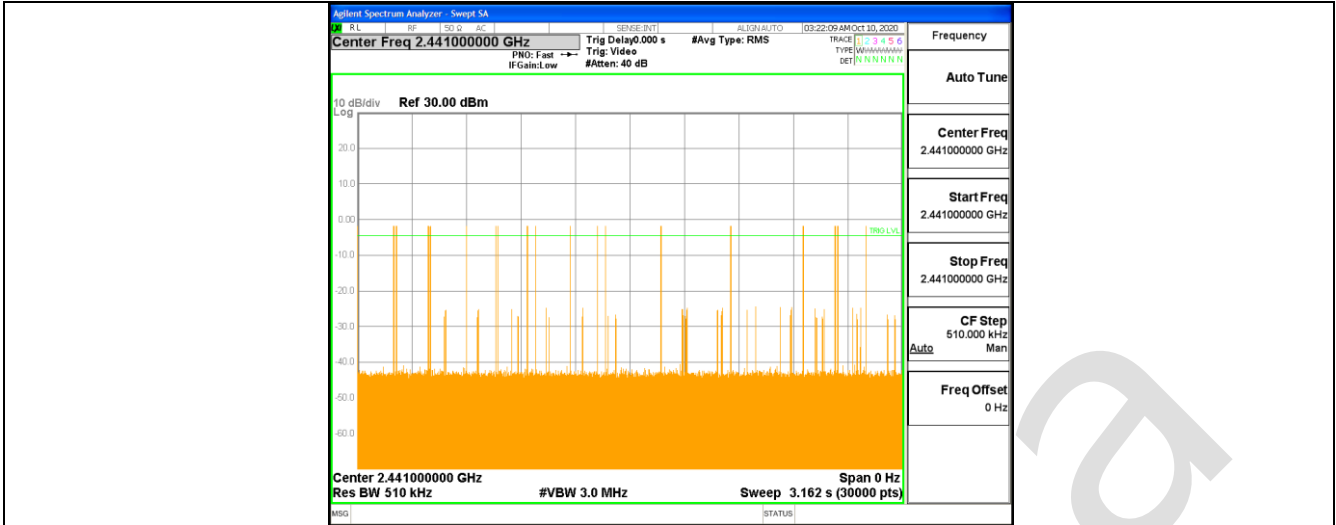
##### Test Result

TestMode	Antenna	Channel	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH1	Ant1	Hop	0.32	330	0.105	<=0.4	PASS
DH3	Ant1	Hop	1.64	190	0.312	<=0.4	PASS
DH5	Ant1	Hop	2.89	120	0.346	<=0.4	PASS

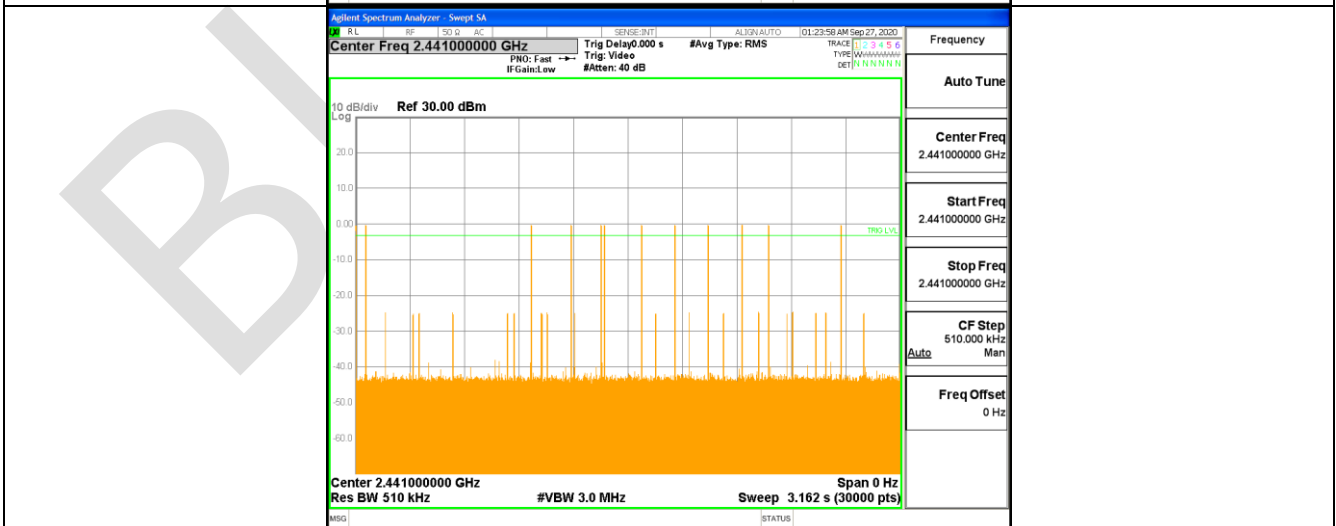
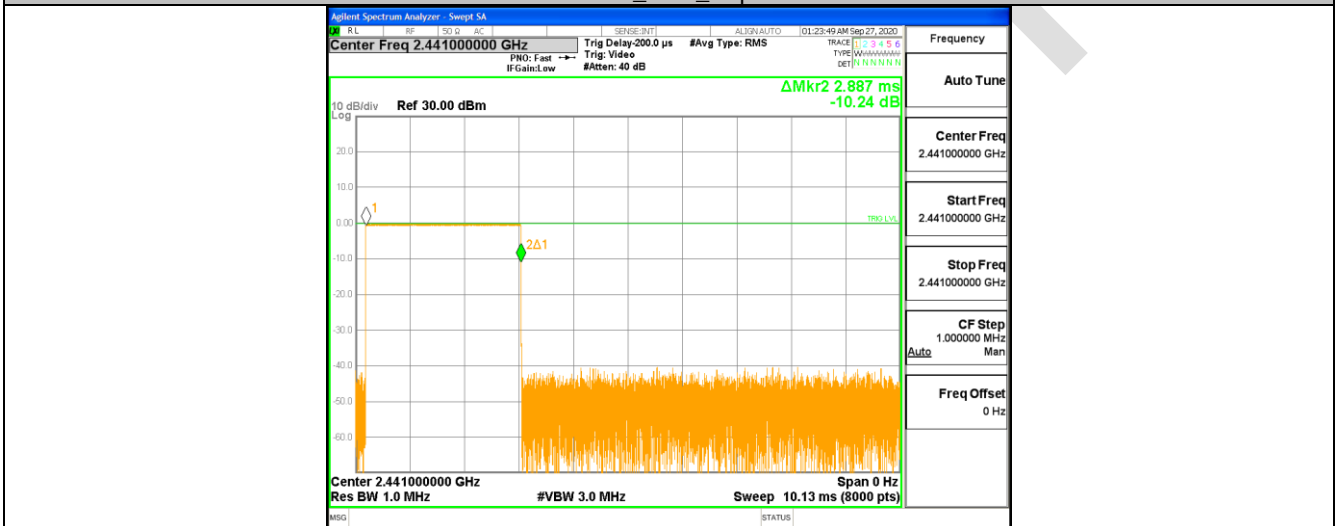
BlueAsia

### Test Graphs





DH5\_Ant1\_Hop



**10.5 APPENDIX: NUMBER OF HOPPING CHANNELS****Test Result**

TestMode	Antenna	Channel	Result[Num]	Limit[Num]	Verdict
DH1	Ant1	Hop	79	$\geq 15$	PASS
2DH1	Ant1	Hop	79	$\geq 15$	PASS
3DH1	Ant1	Hop	79	$\geq 15$	PASS

BlueAsia

### Test Graphs





## 10.6 APPENDIX: BAND EDGE MEASUREMENTS

### Test Result

TestMode	Antenna	ChName	Channel	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH1	Ant1	Low	2402	0.83	-56.51	<=-19.17	PASS
		High	2480	1.47	-55.42	<=-18.53	PASS
		Low	Hop_2402	0.78	-55.88	-19.22	PASS
		High	Hop_2480	1.50	-55.19	-18.5	PASS
2DH1	Ant1	Low	2402	-1.90	-55.75	<=-21.9	PASS
		High	2480	-1.34	-55.6	<=-21.34	PASS
		Low	Hop_2402	-3.76	-56.58	-23.76	PASS
		High	Hop_2480	-2.17	-55.7	-22.17	PASS
3DH1	Ant1	Low	2402	-1.95	-56.12	<=-21.95	PASS
		High	2480	-1.22	-55.66	<=-21.22	PASS
		Low	Hop_2402	-3.69	-55.85	-23.69	PASS
		High	Hop_2480	-1.23	-55.14	-21.23	PASS

### Test Graphs

