

# TEST REPORT

**Product Name** : TLSR8258ARC48D  
**Brand Mark** : N/A  
**Model No.** : TLSR8258ARC48D  
**FCC ID** : OEOTLSR8258ARC48D  
**Report Number** : BLA-EMC-202102-A2301  
**Date of Sample Receipt** : 2021/2/5  
**Date of Test** : 2021/2/5 to 2021/3/1  
**Date of Issue** : 2021/3/10  
**Test Standard** : 47 CFR Part 15, Subpart C 15.247  
**Test Result** : Pass

Prepared for:

**Telink Semiconductor (Shanghai) CO.,LTD**

Bldg 3, No.1500, Zuchongzhi Rd, Zhangjiang Hi-Tech Park, Shanghai 201203, China

Prepared by:

**BlueAsia of Technical Services(Shenzhen) Co.,Ltd.**

Building C, No. 107, Shihuan Road, Shiyuan Sub-District, Baoan District,  
Shenzhen, Guangdong Province, China

**TEL: +86-755-23059481**

Compiled by:

*Sven*

Review by:

*Sweet. Liang*

Approved by:

*Jamen Li*

Date:

2021/3/10



**REPORT REVISE RECORD**

<b>Version No.</b>	<b>Date</b>	<b>Description</b>
00	2021/3/10	Original

BlueAsia

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## 1 TEST SUMMARY

Test item	Test Requirement	Test Method	Class/Severity	Result
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
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
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
Minimum 6dB Bandwidth	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.8.1	47 CFR Part 15, Subpart C 15.247a(2)	Pass
Antenna Requirement	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.203 & 15.247(c)	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 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
Power Spectrum Density	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.10.2	47 CFR Part 15, Subpart C 15.247(e)	Pass

## 2 GENERAL INFORMATION

<b>Applicant</b>	Telink Semiconductor (Shanghai) CO.,LTD
<b>Address</b>	Bldg 3, No.1500, Zuchongzhi Rd, Zhangjiang Hi-Tech Park, Shanghai 201203, China
<b>Manufacturer</b>	Telink Semiconductor (Shanghai) CO.,LTD
<b>Address</b>	Bldg 3, No.1500, Zuchongzhi Rd, Zhangjiang Hi-Tech Park, Shanghai 201203, China
<b>Factory</b>	Telink Semiconductor (Shanghai) CO.,LTD
<b>Address</b>	Bldg 3, No.1500, Zuchongzhi Rd, Zhangjiang Hi-Tech Park, Shanghai 201203, China
<b>Product Name</b>	TLSR8258ARC48D
<b>Test Model No.</b>	TLSR8258ARC48D

## 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
<b>Channel Spacing:</b>	2MHz
<b>Number of Channels:</b>	40
<b>Antenna Type:</b>	PCB Antenna
<b>Antenna Gain:</b>	0dBi (Provided by customer)

#### 4 TEST ENVIRONMENT

Environment	Temperature	Voltage
Normal	+22°C	3.0Vdc

#### 5 TEST MODE

TEST MODE	TEST MODE DESCRIPTION
TX mode with modulation	Keep the EUT in continuously transmitting with modulation mode. (New battery is used during all test)
Remark: Only the data of 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(30Mz-1000MHz)	±4.24dB
Radiated Emission(1GHz-18GHz)	±4.68dB
AC Power Line Conducted Emission(150kHz-30MHz)	±3.45dB

## 7 DESCRIPTION OF SUPPORT UNIT

Device Type	Manufacturer	Model Name	Serial No.	Remark
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**Note:**

"--" means no any support device during testing.

## 8 LABORATORY LOCATION

All tests were performed at:  
BlueAsia of Technical Services(Shenzhen) Co., Ltd.  
Building C, No. 107, Shihuan Road, Shiyuan Sub-District, Baoan District, Shenzhen, Guangdong Province,  
China  
Telephone: TEL: +86-755-28682673 FAX: +86-755-28682673  
No tests were sub-contracted.



## 9 TEST INSTRUMENTS LIST

Test Equipment Of Conducted Band Edges Measurement					
Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Spectrum	R&S	FSP40	100817	2020/10/12	2021/10/11
Spectrum	Agilent	N9020A	MY49100060	2020/10/12	2021/10/11
Signal Generator	Agilent	N5182A	MY49060650	2020/10/12	2021/10/11
Signal Generator	Agilent	E8257D	MY44320250	2020/10/12	2021/10/11

Test Equipment Of Radiated Spurious Emissions					
Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Chamber	SKET	966	N/A	2020/11/10	2023/11/9
Spectrum	R&S	FSP40	100817	2020/10/12	2021/10/11
Receiver	R&S	ESR7	101199	2020/10/12	2021/10/11
broadband Antenna	Schwarzbeck	VULB9168	00836 P:00227	2020/9/26	2022/9/25
Horn Antenna	Schwarzbeck	9120D	01892 P:00331	2020/9/26	2022/9/25
Amplifier	SKET	PA-000318G-45	N/A	2020/10/16	2021/10/15
EMI software	EZ	EZ-EMC	EEMC-3A1	N/A	N/A
Loop antenna	SCHNARZBECK	FMZB1519B	00102	2020/9/26	2022/9/25
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 Peak Output Power					
Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due

Spectrum	R&S	FSP40	100817	2020/10/12	2021/10/11
Spectrum	Agilent	N9020A	MY49100060	2020/10/12	2021/10/11
Signal Generator	Agilent	N5182A	MY49060650	2020/10/12	2021/10/11
Signal Generator	Agilent	E8257D	MY44320250	2020/10/12	2021/10/11

**Test Equipment Of Minimum 6dB Bandwidth**

Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Spectrum	R&S	FSP40	100817	2020/10/12	2021/10/11
Spectrum	Agilent	N9020A	MY49100060	2020/10/12	2021/10/11
Signal Generator	Agilent	N5182A	MY49060650	2020/10/12	2021/10/11
Signal Generator	Agilent	E8257D	MY44320250	2020/10/12	2021/10/11

**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	2020/11/10	2023/11/9
Spectrum	R&S	FSP40	100817	2020/10/12	2021/10/11
Receiver	R&S	ESR7	101199	2020/10/12	2021/10/11
broadband Antenna	Schwarzbeck	VULB9168	00836 P:00227	2020/9/26	2022/9/25
Horn Antenna	Schwarzbeck	9120D	01892 P:00331	2020/9/26	2022/9/25
Amplifier	SKET	PA-000318G-45	N/A	2020/10/16	2021/10/15
EMI software	EZ	EZ-EMC	EEMC-3A1	N/A	N/A
Loop antenna	SCHNARZBECK	FMZB1519B	00102	2020/9/26	2022/9/25
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 Spurious Emissions**

Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Spectrum	R&S	FSP40	100817	2020/10/12	2021/10/11
Spectrum	Agilent	N9020A	MY49100060	2020/10/12	2021/10/11
Signal Generator	Agilent	N5182A	MY49060650	2020/10/12	2021/10/11
Signal Generator	Agilent	E8257D	MY44320250	2020/10/12	2021/10/11

**Test Equipment Of Power Spectrum Density**

Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Spectrum	R&S	FSP40	100817	2020/10/12	2021/10/11
Spectrum	Agilent	N9020A	MY49100060	2020/10/12	2021/10/11
Signal Generator	Agilent	N5182A	MY49060650	2020/10/12	2021/10/11
Signal Generator	Agilent	E8257D	MY44320250	2020/10/12	2021/10/11

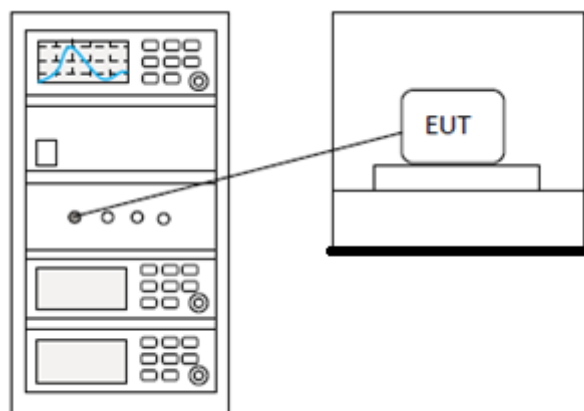
## 10 CONDUCTED BAND EDGES MEASUREMENT

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	Sven
Temperature	20°C
Humidity	47%

### 10.1 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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### 10.2 BLOCK DIAGRAM OF TEST SETUP



### 10.3 TEST DATA

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

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## 11 RADIATED SPURIOUS EMISSIONS

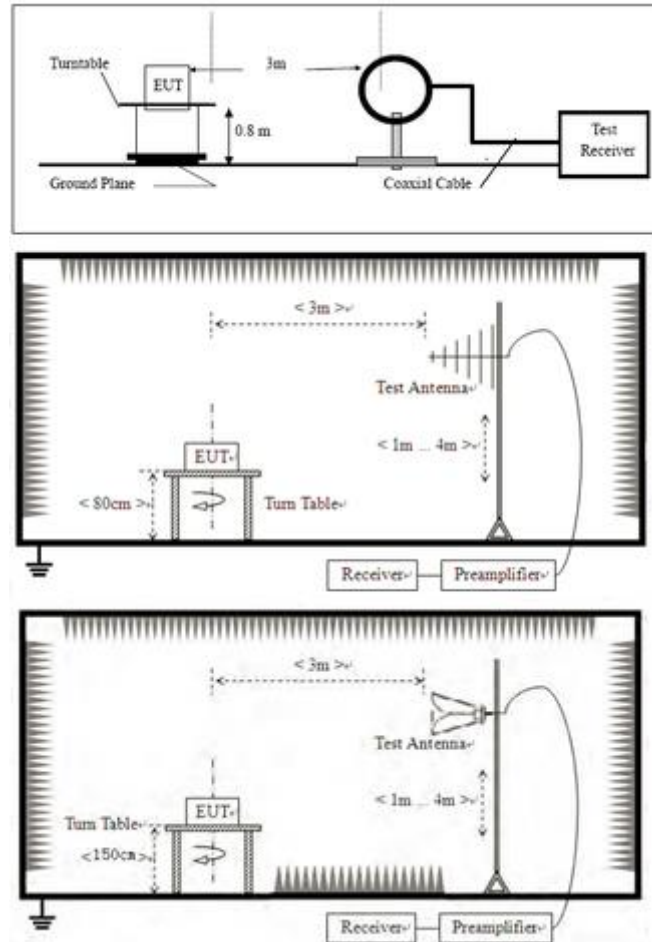
<b>Test Standard</b>	47 CFR Part 15, Subpart C 15.247
<b>Test Method</b>	ANSI C63.10 (2013) Section 6.4,6.5,6.6
<b>Test Mode (Pre-Scan)</b>	TX Low channel;TX high channel;TX middle channel;TX mode with modulation
<b>Test Mode (Final Test)</b>	TX Low channel;TX high channel;TX middle channel;TX mode with modulation
<b>Tester</b>	Sven
<b>Temperature</b>	20°C
<b>Humidity</b>	47%

### 11.1 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.

## 11.2 BLOCK DIAGRAM OF TEST SETUP



## 11.3 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.

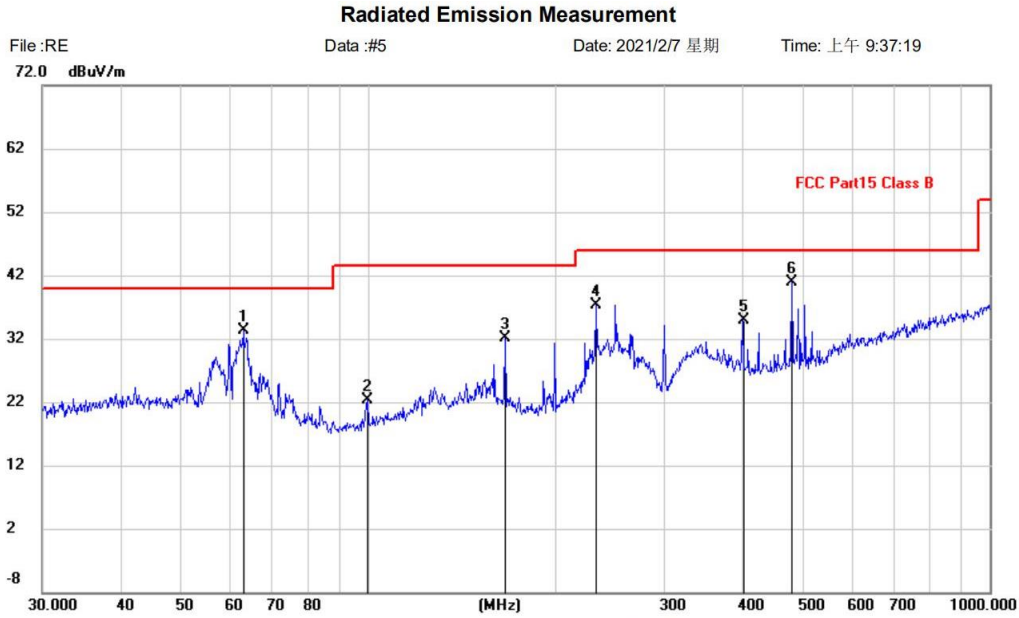
Remark:

- 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 12.75GHz 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. fundamental frequency is blocked by filter, and only spurious emission is shown.
- 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.



### 11.4 TEST DATA

[TestMode: TX mode with modulation]; [Polarity: Horizontal]

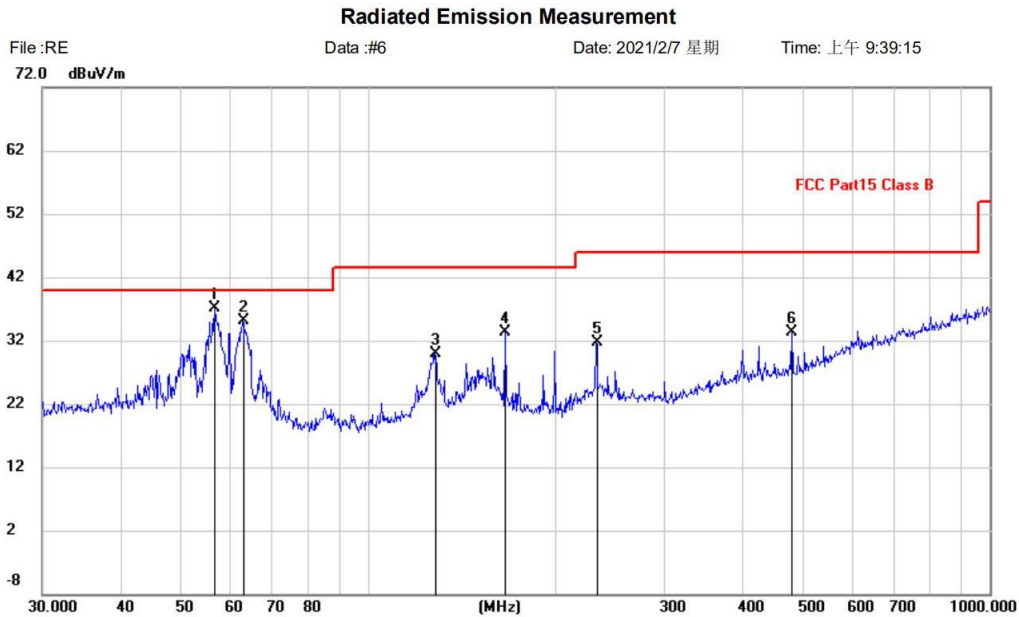


Site	Polarization: <b>Horizontal</b>	Temperature:
Limit: FCC Part15 Class B	Power:	Humidity: %
EUT:	Distance: 3m	
M/N: TLSR8258ARC48D		
Mode: TX		
Note:		

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		63.0916	10.69	22.61	33.30	40.00	-6.70	QP		
2		99.8777	1.98	20.32	22.30	43.50	-21.20	QP		
3		166.6514	9.55	22.51	32.06	43.50	-11.44	QP		
4		232.5318	15.01	22.37	37.38	46.00	-8.62	QP		
5		400.4319	7.61	27.28	34.89	46.00	-11.11	QP		
6	*	480.5276	13.01	27.99	41.00	46.00	-5.00	QP		

**Test Result: Pass**

[TestMode: TX mode with modulation]; [Polarity: Vertical]



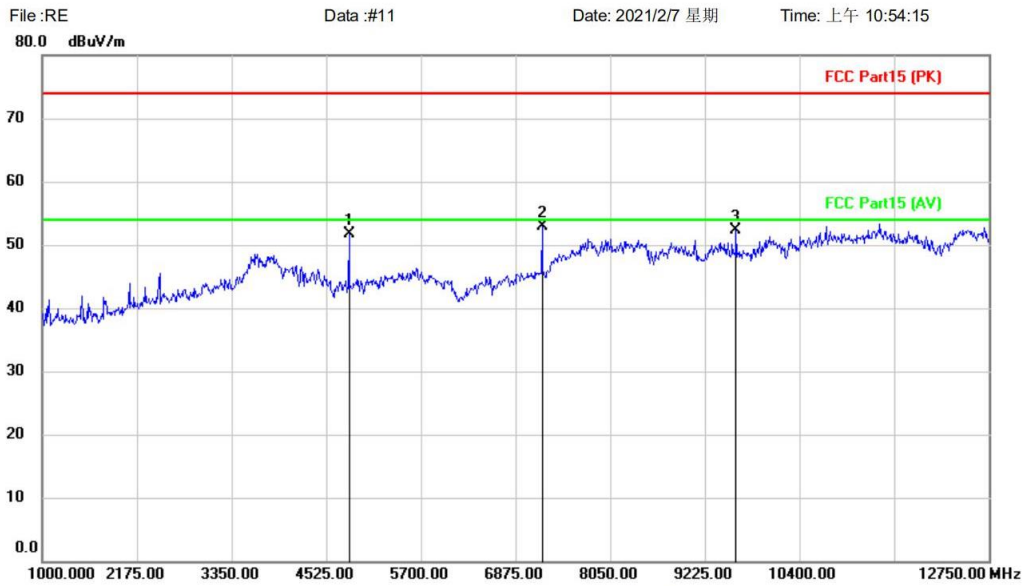
Site	Polarization: <b>Vertical</b>	Temperature:
Limit: FCC Part15 Class B	Power:	Humidity: %
EUT:	Distance: 3m	
M/N: TLSR8258ARC48D		
Mode: TX		
Note:		

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	*	56.7917	13.69	23.36	37.05	40.00	-2.95	QP		
2		62.8708	12.52	22.66	35.18	40.00	-4.82	QP		
3		128.1130	7.06	22.79	29.85	43.50	-13.65	QP		
4		166.6514	10.89	22.51	33.40	43.50	-10.10	QP		
5		233.3487	9.34	22.41	31.75	46.00	-14.25	QP		
6		480.5276	5.41	27.99	33.40	46.00	-12.60	QP		

**Test Result: Pass**

[TestMode: TX Low channel]; [Polarity: Horizontal]

**Radiated Emission Measurement**



Site: Polarization: **Horizontal** Temperature:   
 Limit: FCC Part15 (PK) Power: Humidity: %   
 EUT: Distance: 3m   
 M/N: TLSR8258ARC48D   
 Mode: TX-L   
 Note:

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		4807.000	59.01	-7.27	51.74	74.00	-22.26	peak		
2	*	7204.000	57.30	-4.45	52.85	74.00	-21.15	peak		
3		9612.750	52.66	-0.26	52.40	74.00	-21.60	peak		

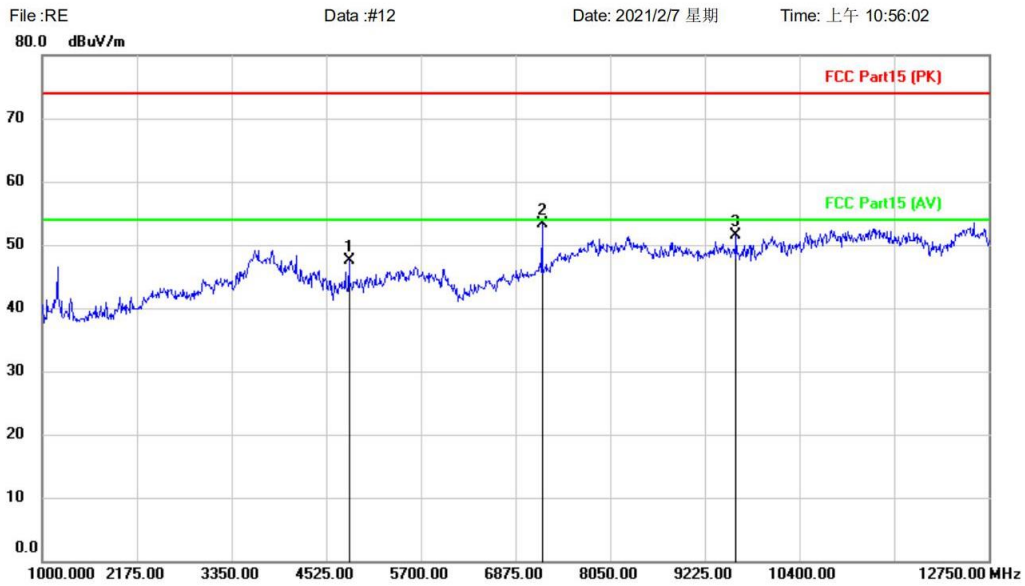
\*:Maximum data x:Over limit !:over margin

<Reference Only

**Test Result: Pass**

[TestMode: TX Low channel]; [Polarity: Vertical]

**Radiated Emission Measurement**



Site: Polarization: **Vertical** Temperature:   
 Limit: FCC Part15 (PK) Power: Humidity: %   
 EUT: Distance: 3m   
 M/N: TLSR8258ARC48D   
 Mode: TX-L   
 Note:

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		4807.000	54.73	-7.27	47.46	74.00	-26.54	peak		
2	*	7204.000	57.75	-4.45	53.30	74.00	-20.70	peak		
3		9612.750	51.67	-0.26	51.41	74.00	-22.59	peak		

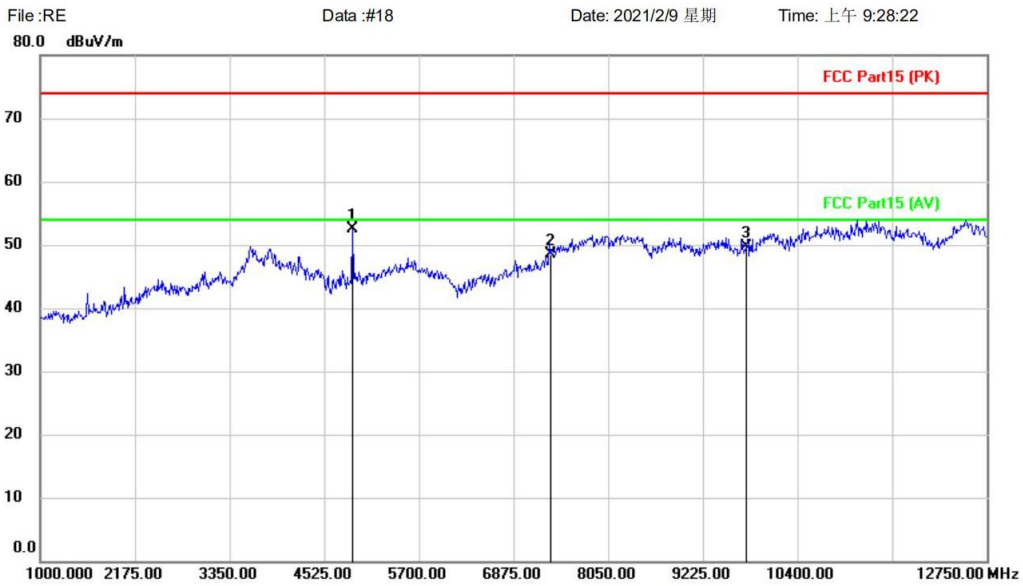
\*:Maximum data x:Over limit !:over margin

<Reference Only

**Test Result: Pass**

[TestMode: TX middle channel]; [Polarity: Horizontal]

**Radiated Emission Measurement**



Site Polarization: **Horizontal** Temperature:  
 Limit: FCC Part15 (PK) Power: Humidity: %  
 EUT: Distance: 3m  
 M/N: TLSR8258ARC48D  
 Mode: TX-M  
 Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree	Detector	Comment
1	*	4877.500	59.92	-7.50	52.42	74.00	-21.58			peak	
2		7323.000	51.95	-3.35	48.60	74.00	-25.40			peak	
3		9764.000	49.12	0.56	49.68	74.00	-24.32			peak	

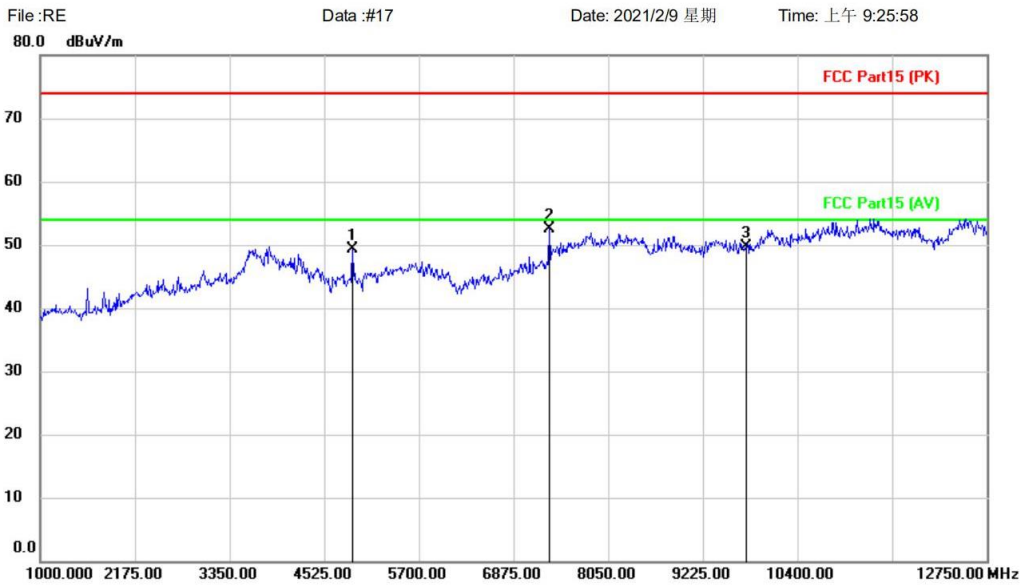
\*:Maximum data x:Over limit !:over margin

<Reference Only

**Test Result: Pass**

[TestMode: TX middle channel]; [Polarity: Vertical]

**Radiated Emission Measurement**



Site: Polarization: **Vertical** Temperature:   
 Limit: FCC Part15 (PK) Power: Humidity: %   
 EUT: Distance: 3m   
 M/N: TLSR8258ARC48D   
 Mode: TX-M   
 Note:

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		4877.500	56.87	-7.50	49.37	74.00	-24.63	peak		
2	*	7321.500	55.79	-3.37	52.42	74.00	-21.58	peak		
3		9764.000	49.16	0.56	49.72	74.00	-24.28	peak		

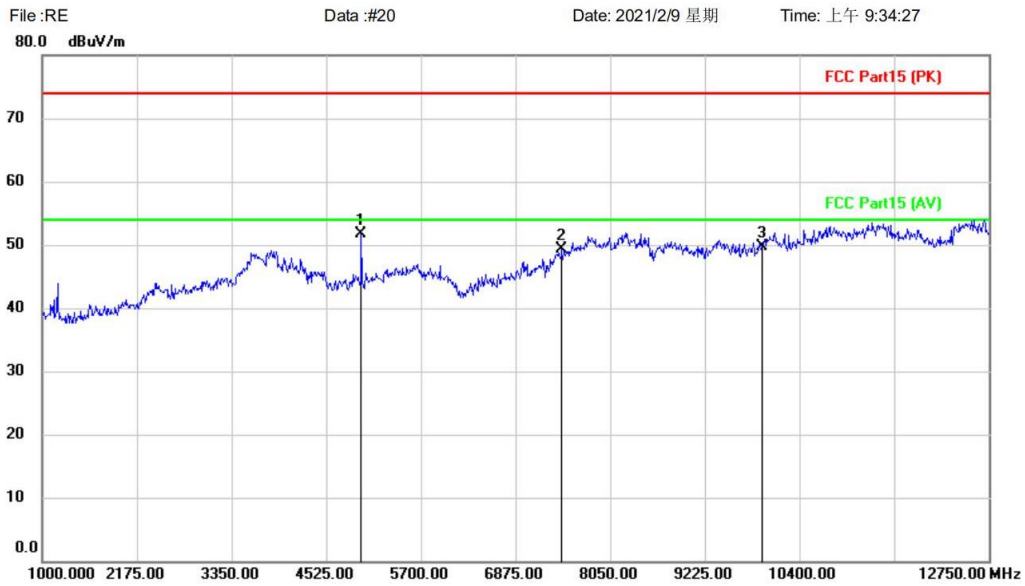
\*:Maximum data x:Over limit !:over margin

<Reference Only

**Test Result: Pass**

[TestMode: TX high channel]; [Polarity: Horizontal]

**Radiated Emission Measurement**



Site: Polarization: **Horizontal** Temperature:   
 Limit: FCC Part15 (PK) Power: Humidity: %   
 EUT: Distance: 3m   
 M/N: TLSR8258ARC48D   
 Mode: TX-H   
 Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	*	4959.750	58.73	-6.99	51.74	74.00	-22.26	peak		
2		7440.000	51.70	-2.43	49.27	74.00	-24.73	peak		
3		9920.000	48.16	1.63	49.79	74.00	-24.21	peak		

\*:Maximum data x:Over limit !:over margin

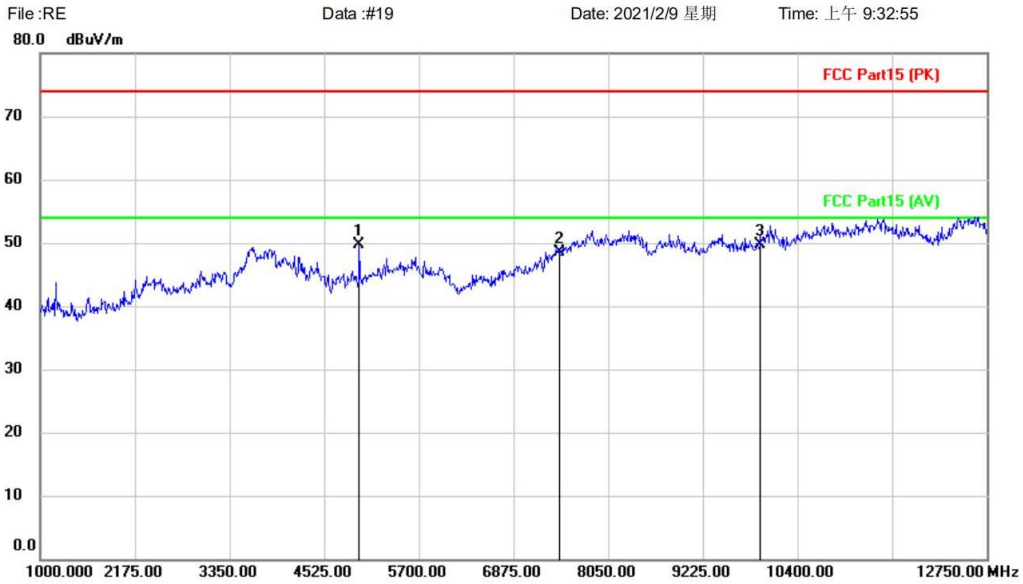
<Reference Only

**Test Result: Pass**



[TestMode: TX high channel]; [Polarity: Vertical]

**Radiated Emission Measurement**



Site: Polarization: **Vertical** Temperature:   
 Limit: FCC Part15 (PK) Power: Humidity: %   
 EUT: Distance: 3m   
 M/N: TLSR8258ARC48D   
 Mode: TX-H   
 Note:

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		4959.750	56.62	-6.99	49.63	74.00	-24.37	peak		
2		7440.000	50.84	-2.43	48.41	74.00	-25.59	peak		
3	*	9920.000	48.11	1.63	49.74	74.00	-24.26	peak		

\*:Maximum data x:Over limit !:over margin

<Reference Only

**Test Result: Pass**



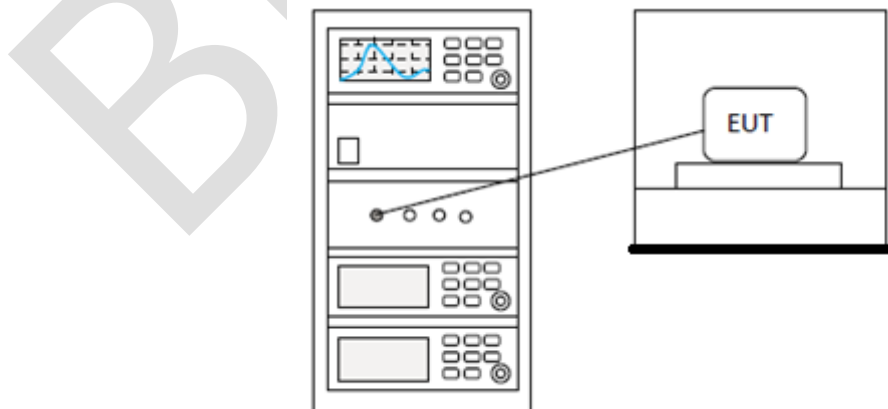
## 12 CONDUCTED PEAK OUTPUT POWER

<b>Test Standard</b>	47 CFR Part 15, Subpart C 15.247
<b>Test Method</b>	ANSI C63.10 (2013) Section 7.8.5
<b>Test Mode (Pre-Scan)</b>	TX
<b>Test Mode (Final Test)</b>	TX
<b>Tester</b>	Sven
<b>Temperature</b>	20°C
<b>Humidity</b>	47%

### 12.1 LIMITS

<b>Frequency range(MHz)</b>	<b>Output power of the intentional radiator(watt)</b>
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

### 12.2 BLOCK DIAGRAM OF TEST SETUP



### 12.3 TEST DATA

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

BlueAsia

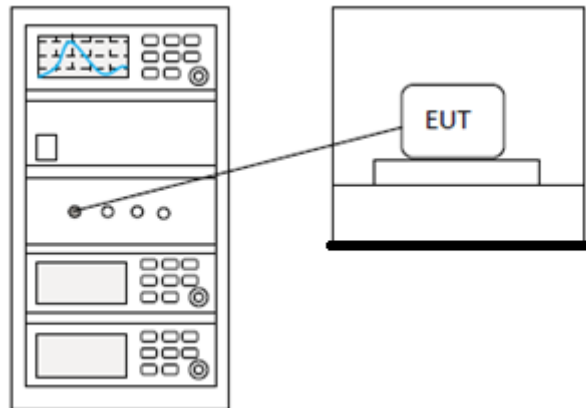
### 13 MINIMUM 6DB BANDWIDTH

Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 11.8.1
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX
Tester	Sven
Temperature	20°C
Humidity	47%

#### 13.1 LIMITS

<b>Limit:</b>	≥500 kHz
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#### 13.2 BLOCK DIAGRAM OF TEST SETUP



#### 13.3 TEST DATA

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

## 14 ANTENNA REQUIREMENT

Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 7.8.6 & Section 11.11

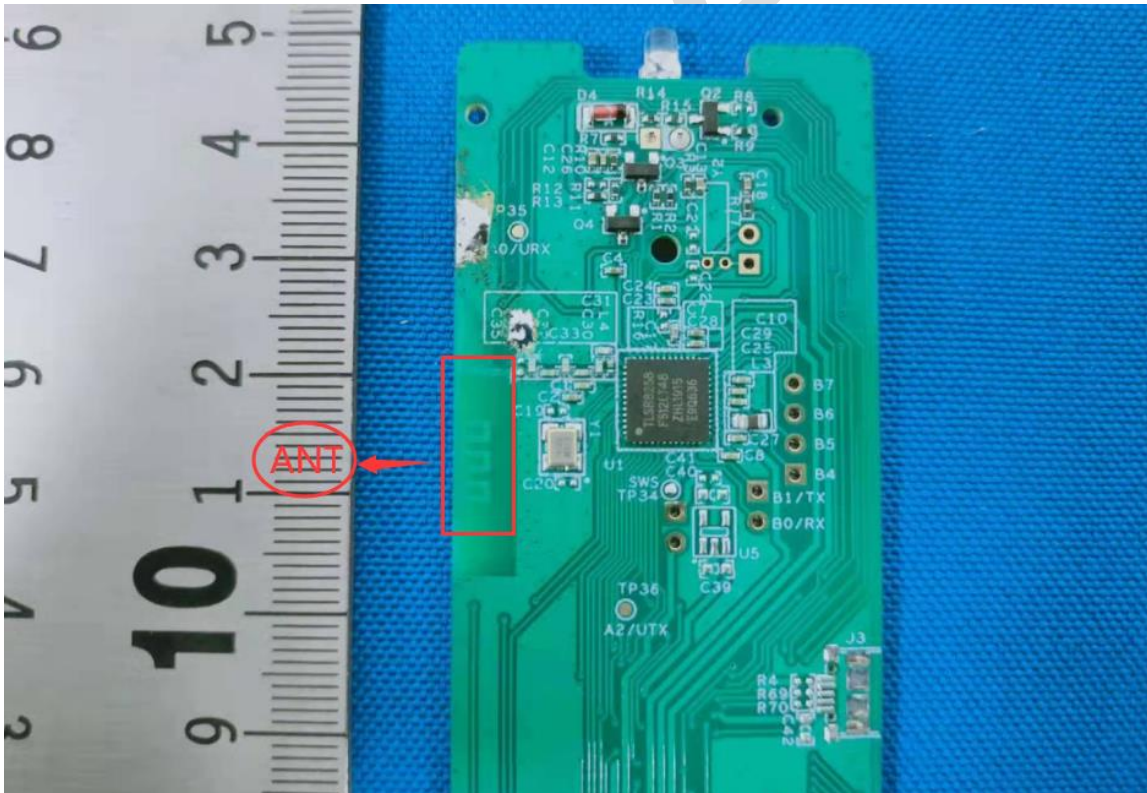
### 14.1 CONCLUSION

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 0.0dBi.



## 15 RADIATED EMISSIONS WHICH FALL IN THE RESTRICTED BANDS

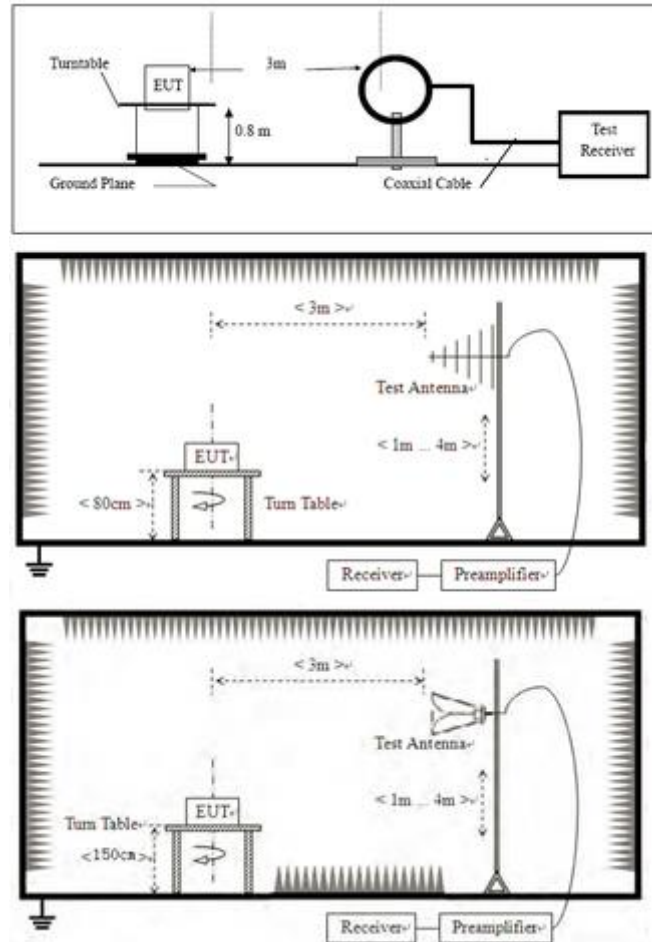
<b>Test Standard</b>	47 CFR Part 15, Subpart C 15.247
<b>Test Method</b>	ANSI C63.10 (2013) Section 6.10.5
<b>Test Mode (Pre-Scan)</b>	TX
<b>Test Mode (Final Test)</b>	TX
<b>Tester</b>	Sven
<b>Temperature</b>	20°C
<b>Humidity</b>	47%

### 15.1 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.

## 15.2 BLOCK DIAGRAM OF TEST SETUP



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

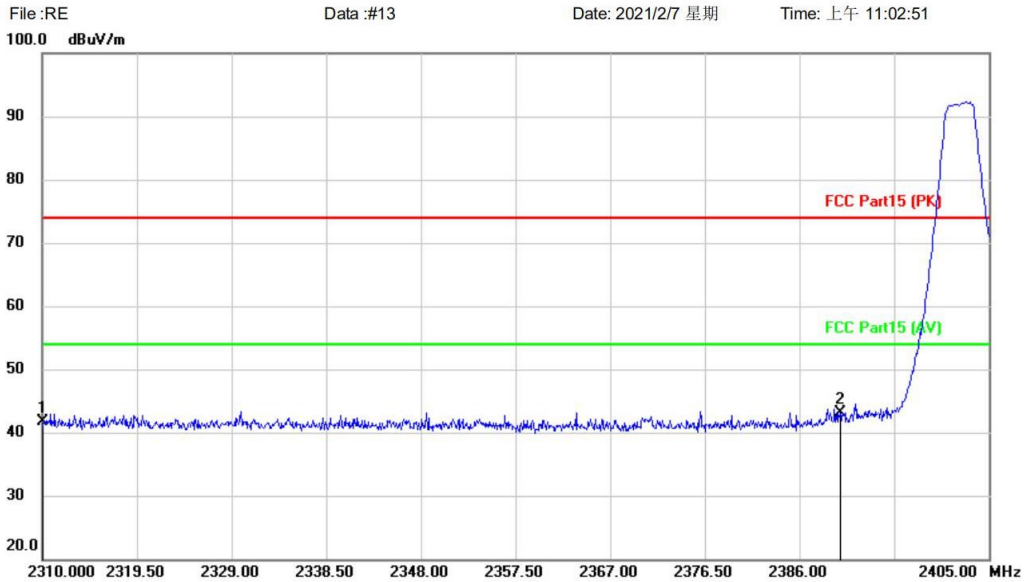
Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level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

BlueAsia

### 15.4 TEST DATA

[TestMode: TX]; [Polarity: Horizontal];[Lowest channel]

#### Radiated Emission Measurement



Site: Polarization: **Horizontal** Temperature:  
 Limit: FCC Part15 (PK) Power: Humidity: %  
 EUT: Distance: 3m  
 M/N: TLSR8258ARC48D  
 Mode: TX-L  
 Note:

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		2310.000	57.20	-15.49	41.71	74.00	-32.29	peak	
2	*	2390.000	58.37	-15.18	43.19	74.00	-30.81	peak	

\*:Maximum data x:Over limit !:over margin

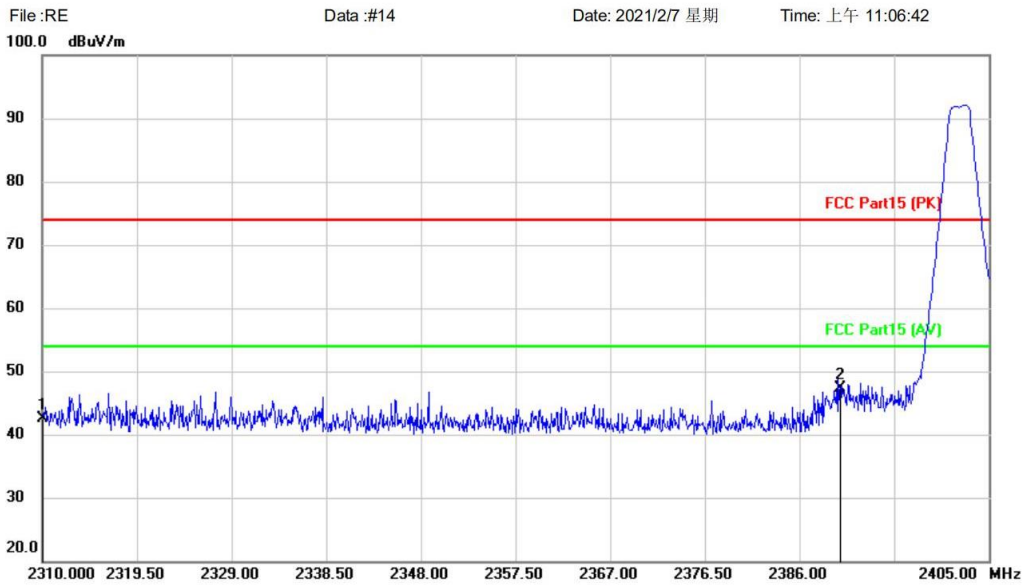
<Reference Only

### Test Result:



[TestMode: TX]; [Polarity: Vertical] ;[Lowest channel]

**Radiated Emission Measurement**



Site	Polarization: <b>Vertical</b>	Temperature:
Limit: FCC Part15 (PK)	Power:	Humidity: %
EUT:	Distance: 3m	
M/N: TLSR8258ARC48D		
Mode: TX-L		
Note:		

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	58.06	-15.49	42.57	74.00	-31.43	peak		
2	*	2390.000	62.42	-15.18	47.24	74.00	-26.76	peak		

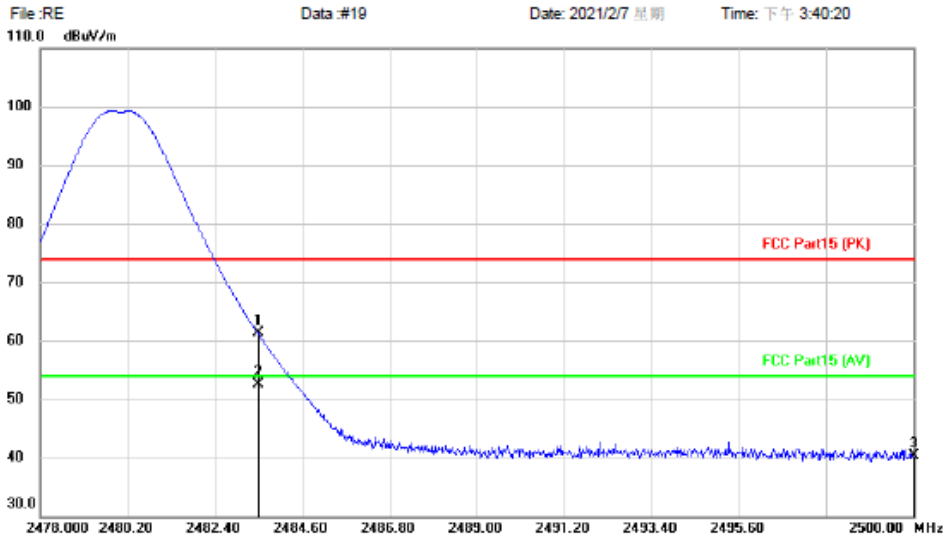
\*:Maximum data    x:Over limit    !:over margin

<Reference Only

**Test Result:**

[TestMode: TX]; [Polarity: Horizontal] ;[Highest channel]

Radiated Emission Measurement



Site Polarization: *Horizontal* Temperature:  
 Limit: FCC Part15 (PK) Power: Humidity: %  
 EUT: Distance: 3m  
 M/N: TLSR8258ARC48D  
 Mode: TX-H  
 Note:

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		2483.500	76.00	-14.79	61.21	74.00	-12.79	peak		
2	*	2483.500	67.36	-14.79	52.57	54.00	-1.43	AVG		
3		2500.000	55.07	-14.72	40.35	74.00	-33.65	peak		

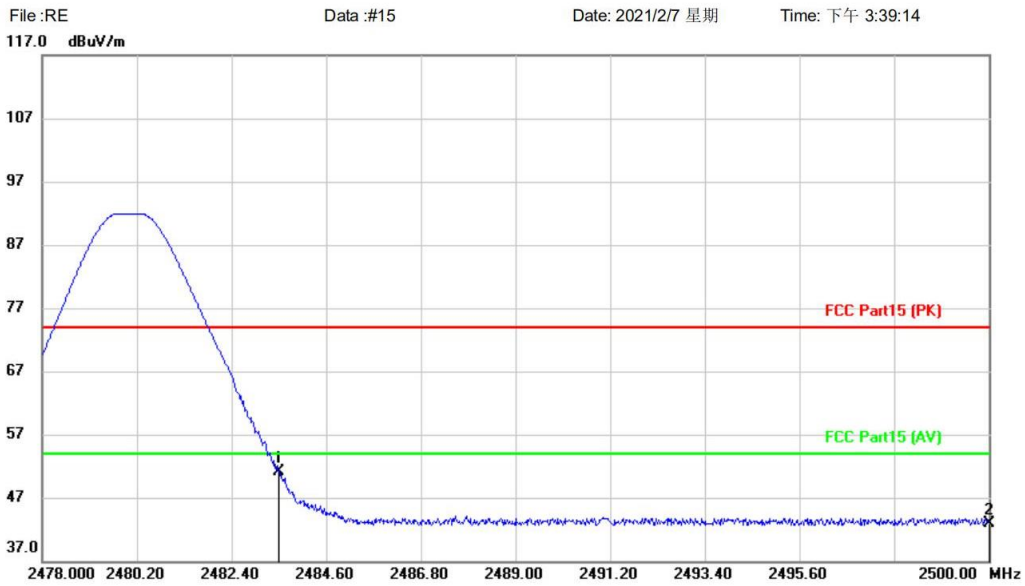
\*:Maximum data x:Over limit !:over margin

<Reference Only

**Test Result:**

[TestMode: TX]; [Polarity: Vertical] ;[Highest channel]

**Radiated Emission Measurement**



Site: Polarization: **Vertical** Temperature:   
 Limit: FCC Part15 (PK) Power: Humidity: %   
 EUT: Distance: 3m   
 M/N: TLSR8258ARC48D   
 Mode: TX-H   
 Note:

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	*	2483.500	65.98	-14.79	51.19	74.00	-22.81	peak		
2		2500.000	57.70	-14.72	42.98	74.00	-31.02	peak		

\*:Maximum data x:Over limit !:over margin

<Reference Only

**Test Result:**

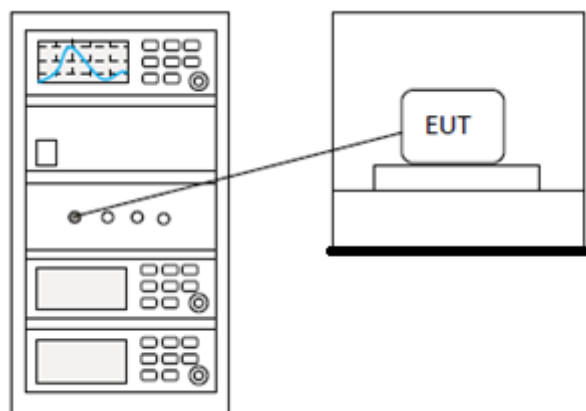
## 16 CONDUCTED SPURIOUS EMISSIONS

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	Sven
Temperature	20°C
Humidity	47%

### 16.1 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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### 16.2 BLOCK DIAGRAM OF TEST SETUP



### 16.3 TEST DATA

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

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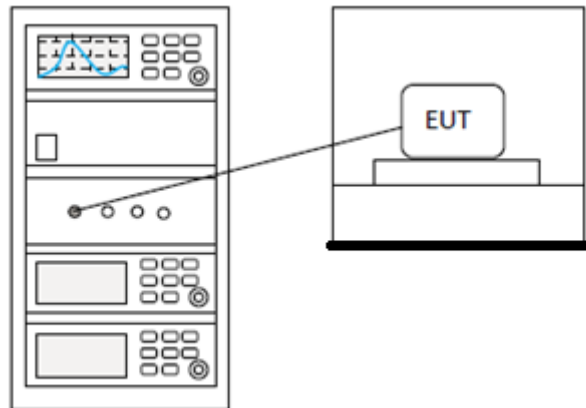
## 17 POWER SPECTRUM DENSITY

Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 11.10.2
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX
Tester	Sven
Temperature	20°C
Humidity	47%

### 17.1 LIMITS

<b>Limit:</b>	$\leq 8\text{dBm}$ in any 3 kHz band during any time interval of continuous transmission
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### 17.2 BLOCK DIAGRAM OF TEST SETUP



### 17.3 TEST DATA

<b>Pass: Please Refer To Appendix: For Details</b>
--

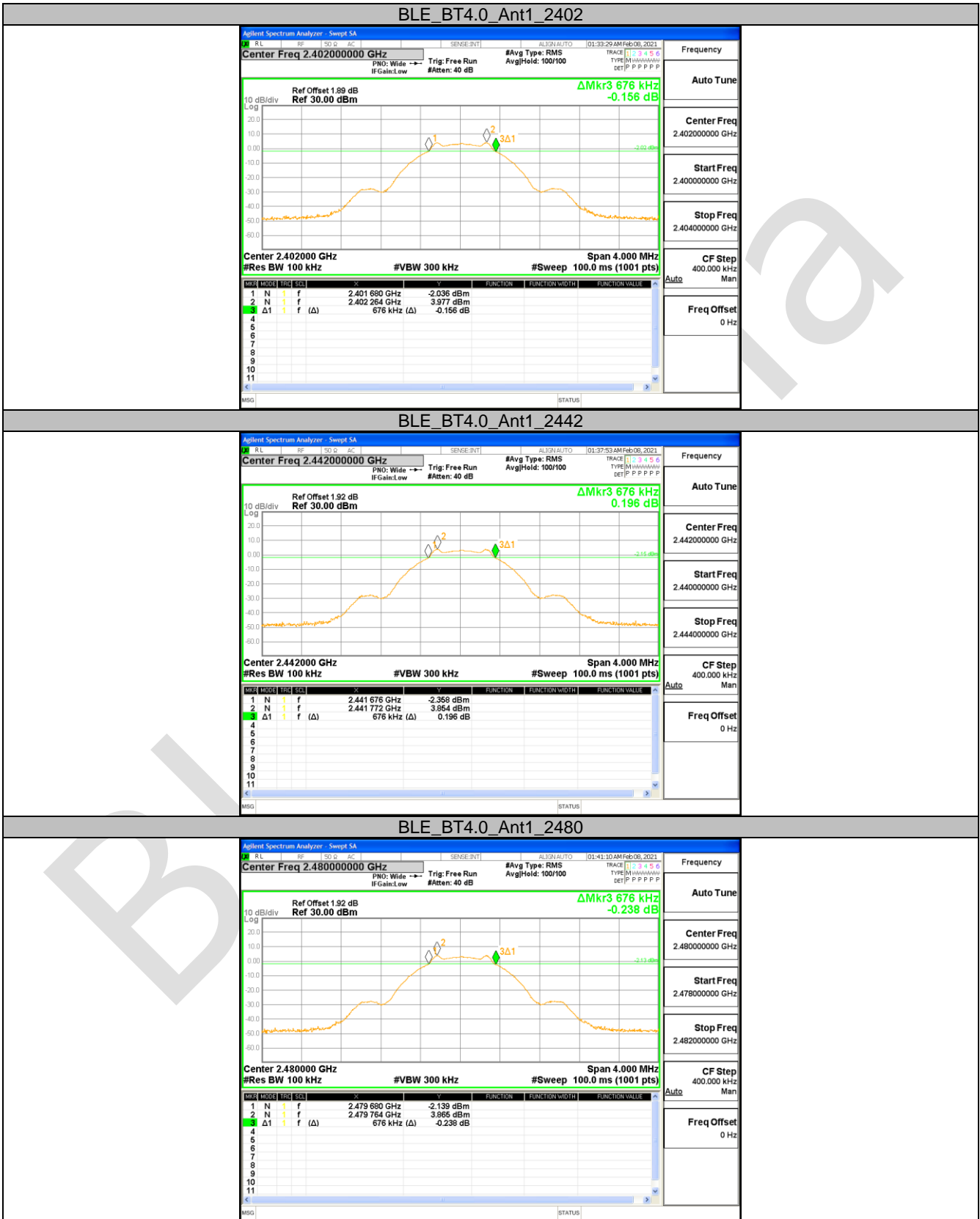
## 18 APPENDIX

### 18.1 APPENDIX A: DTS BANDWIDTH

#### Test Result

TestMode	Antenna	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE	Ant1	2402	0.676	2401.680	2402.356	$\geq 0.5$	PASS
		2442	0.676	2441.676	2442.352	$\geq 0.5$	PASS
		2480	0.676	2479.680	2480.356	$\geq 0.5$	PASS

### Test Graphs





**18.2 APPENDIX B: OCCUPIED CHANNEL BANDWIDTH****Test Result**

TestMode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE	Ant1	2402	1.0163	2401.506	2402.522	---	PASS
		2442	1.0253	2441.503	2442.528	---	PASS
		2480	1.0250	2479.502	2480.527	---	PASS

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### Test Graphs

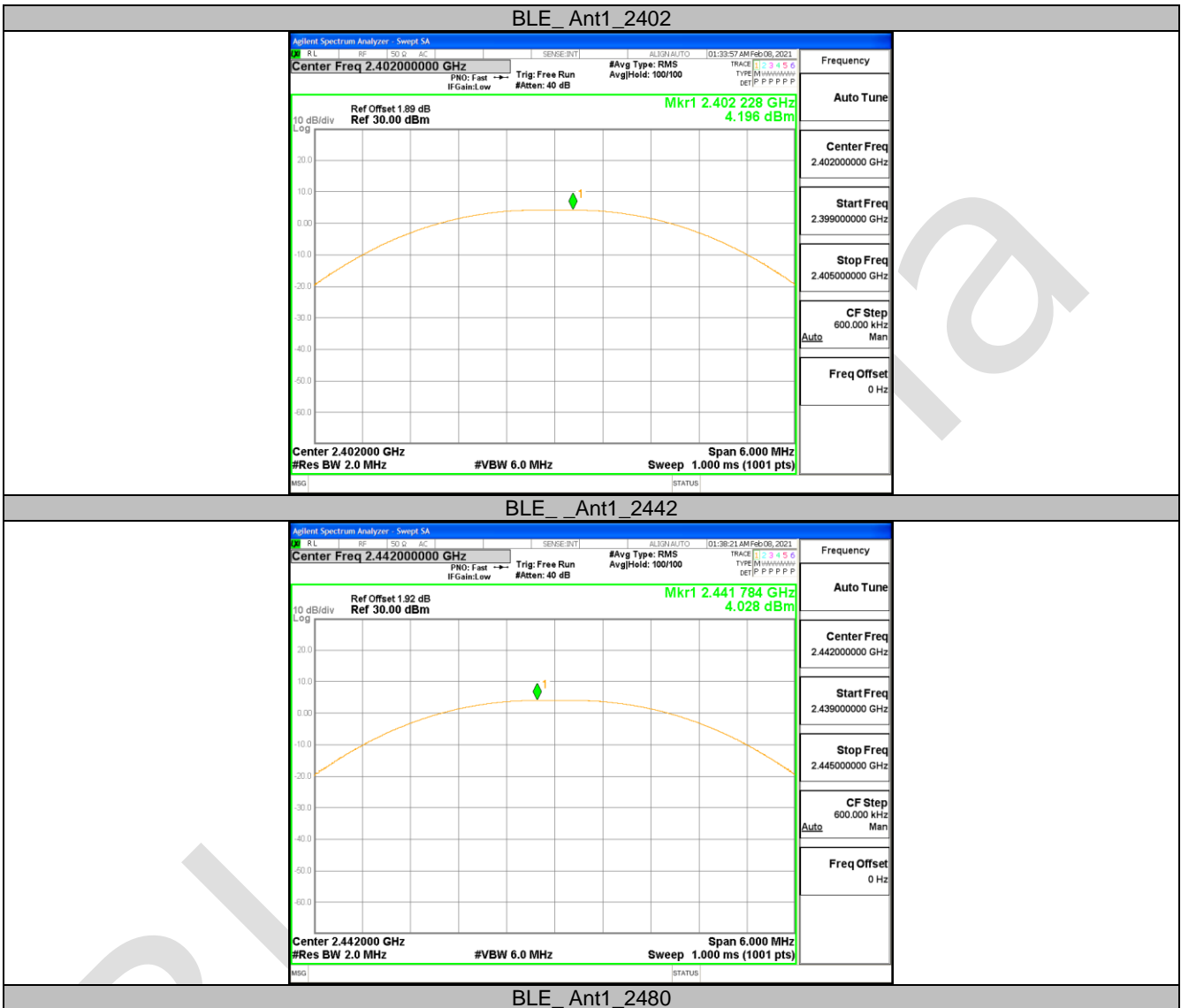


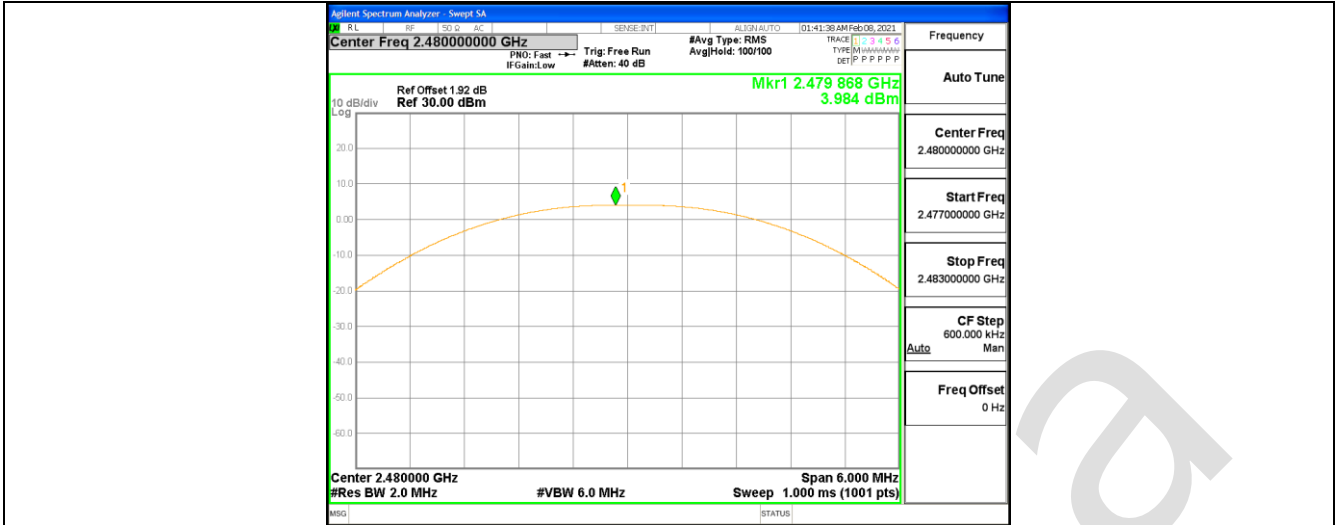
**18.3 APPENDIX C: MAXIMUM CONDUCTED OUTPUT POWER****Test Result**

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
BLE	Ant1	2402	4.2	<=30	PASS
		2442	4.03	<=30	PASS
		2480	3.98	<=30	PASS

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### Test Graphs





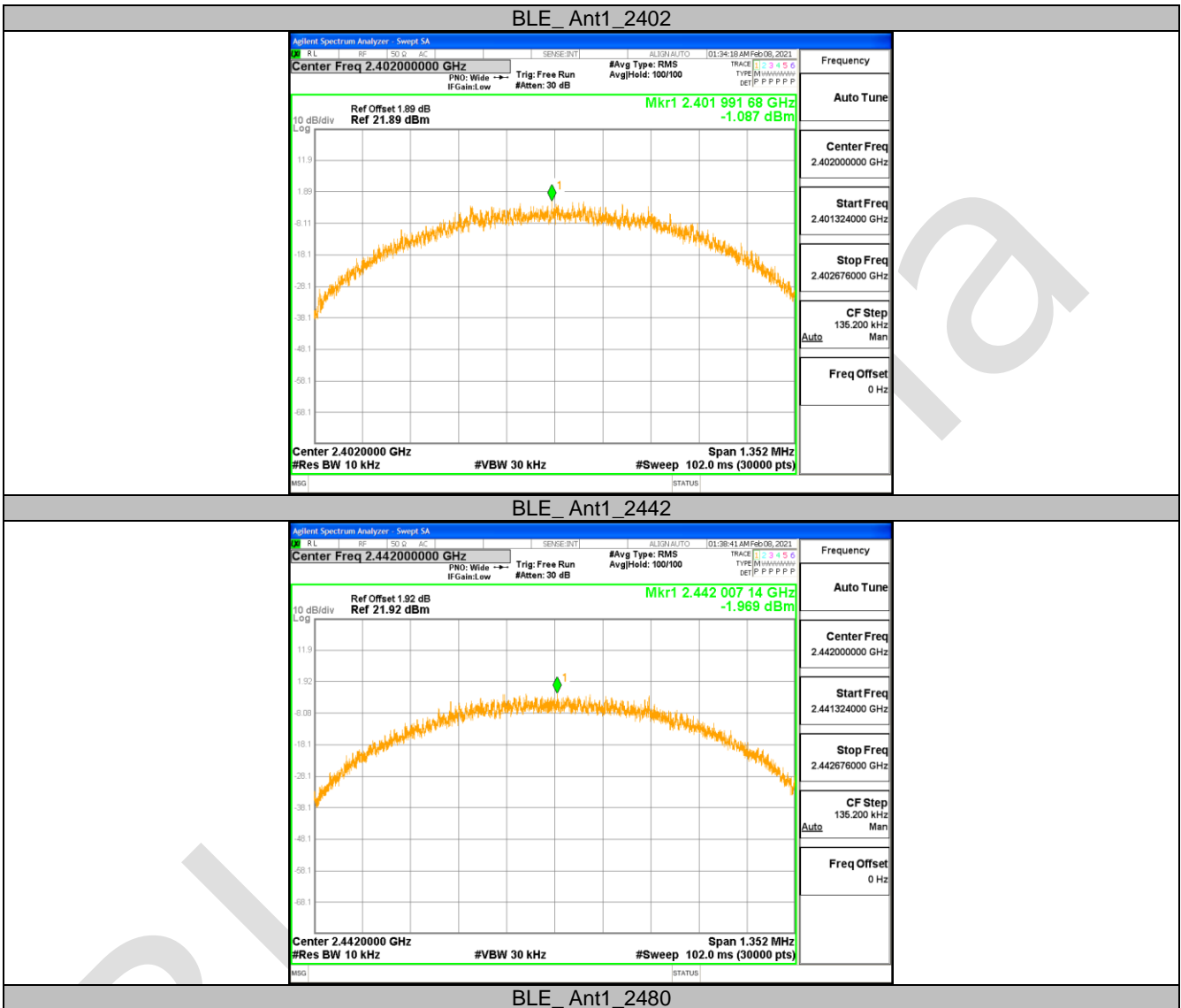
BlueAsia

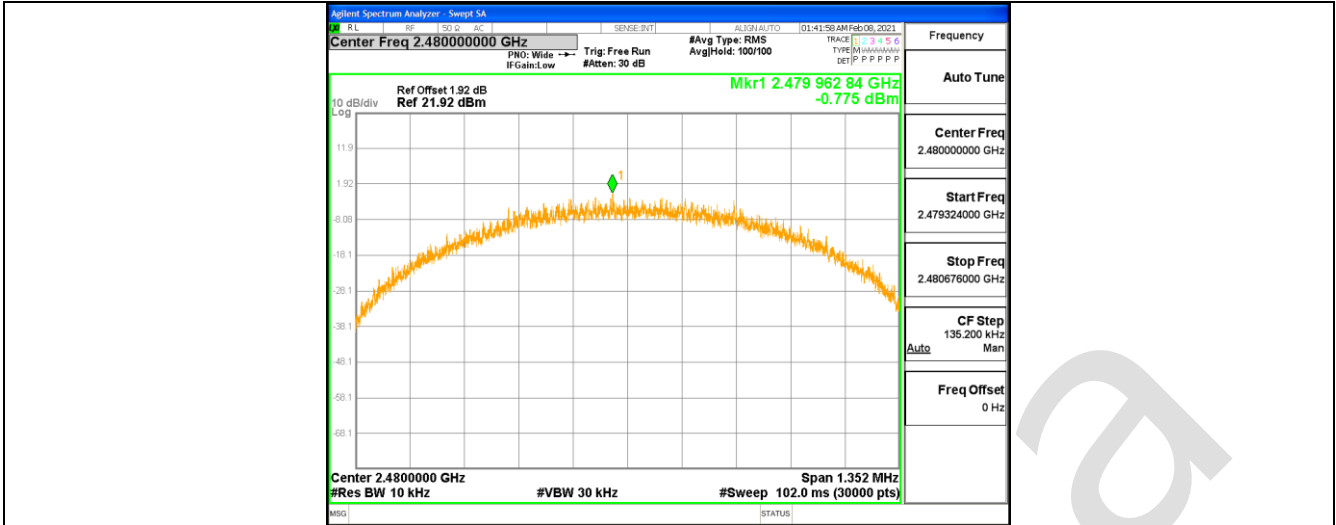
**18.4 APPENDIX D: MAXIMUM POWER SPECTRAL DENSITY****Test Result**

TestMode	Antenna	Channel	Result[dBm/3-100kHz]	Limit[dBm/3kHz]	Verdict
BLE	Ant1	2402	-1.09	<=8	PASS
		2442	-1.97	<=8	PASS
		2480	-0.78	<=8	PASS

BlueAsia

### Test Graphs





BlueAsia



**18.5 APPENDIX E: BAND EDGE MEASUREMENTS****Test Result**

TestMode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE	Ant1	Low	2402	3.84	-55.96	<=-16.16	PASS
		High	2480	3.54	-55.01	<=-16.46	PASS

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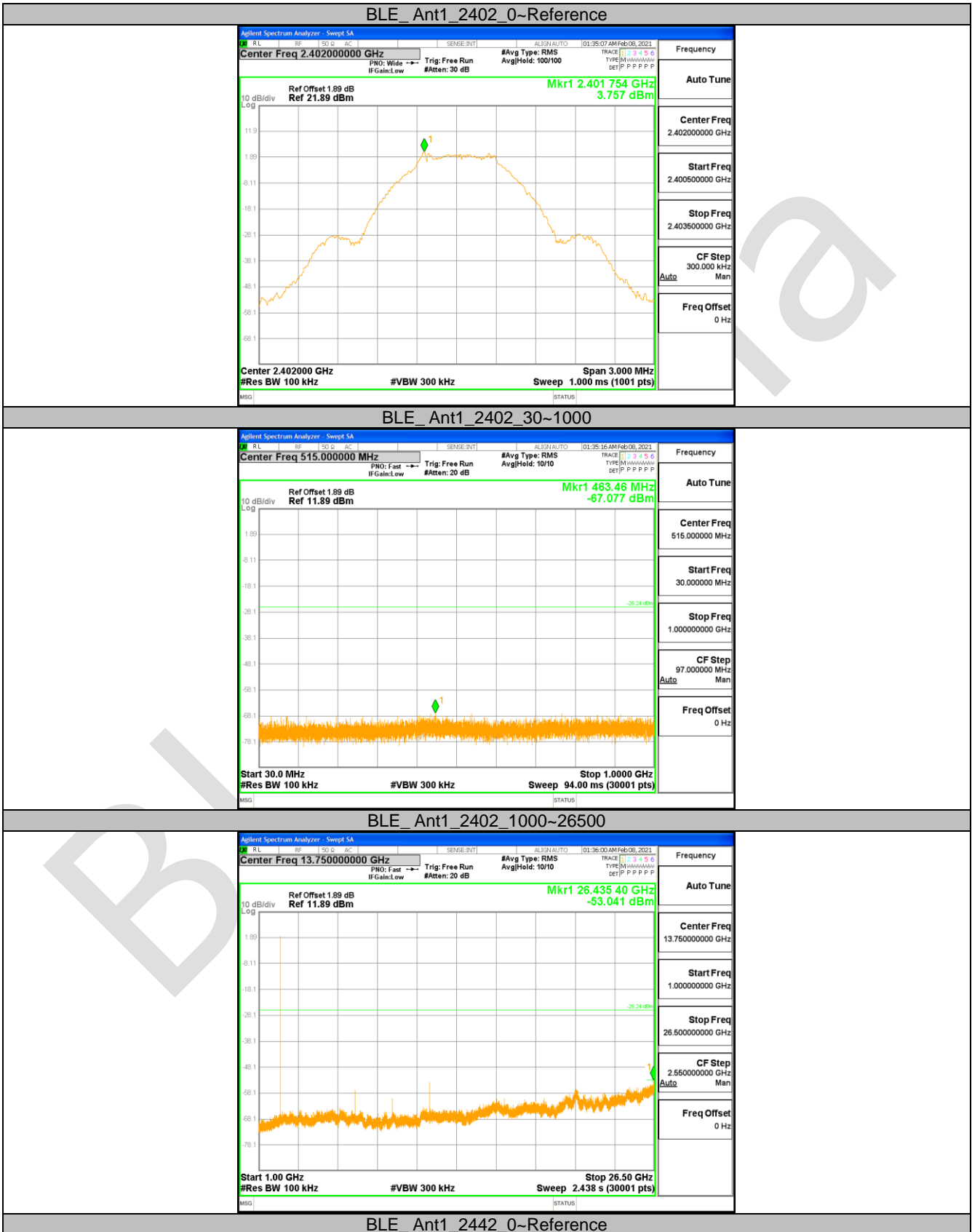
### Test Graphs

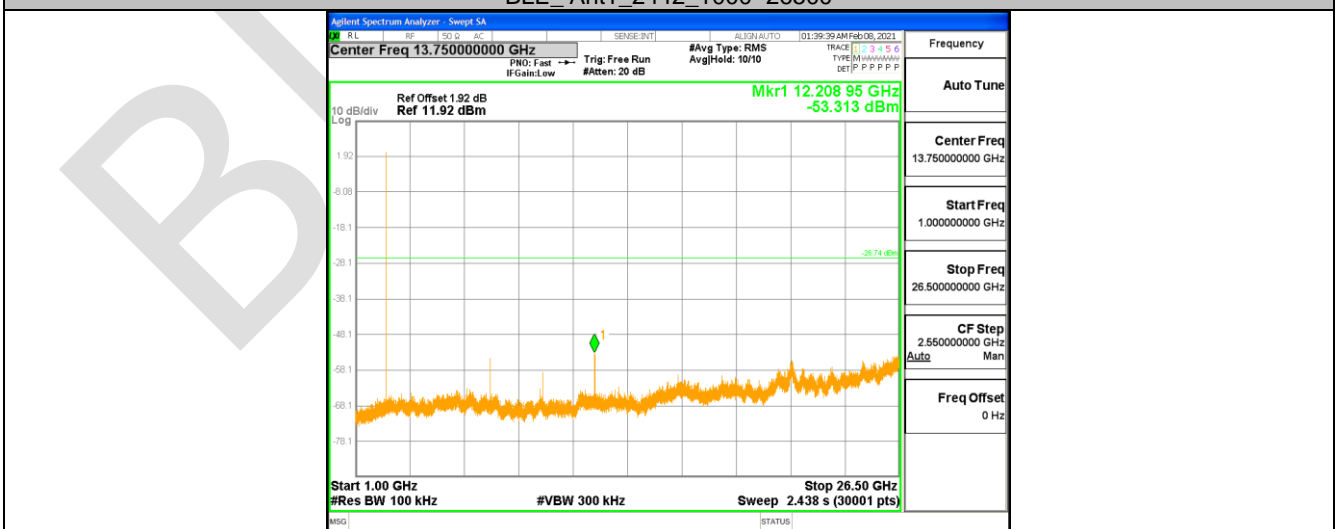
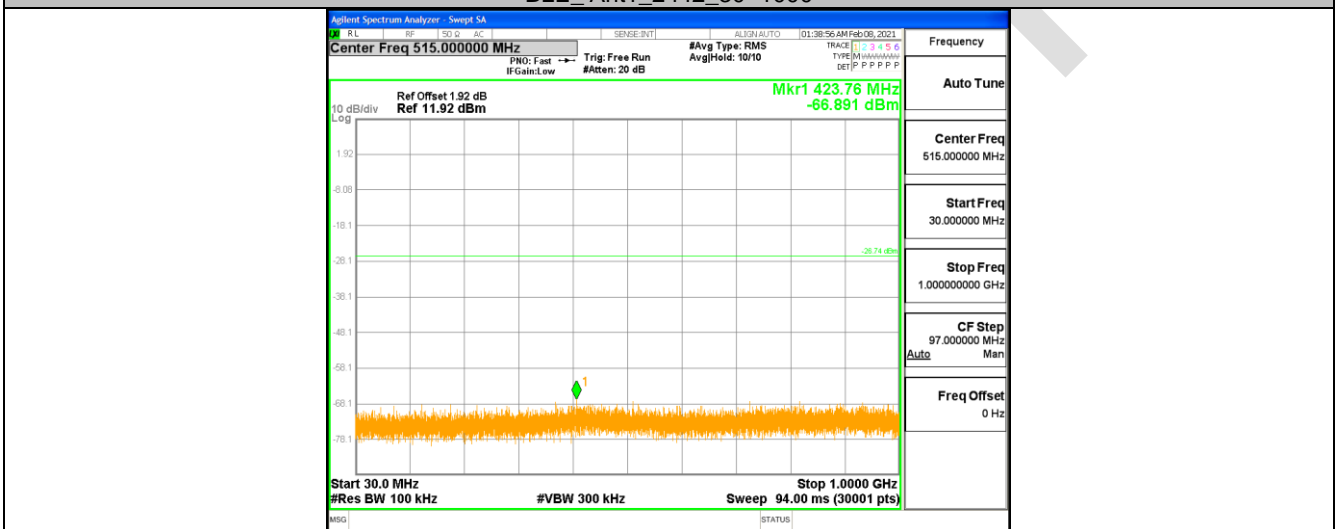
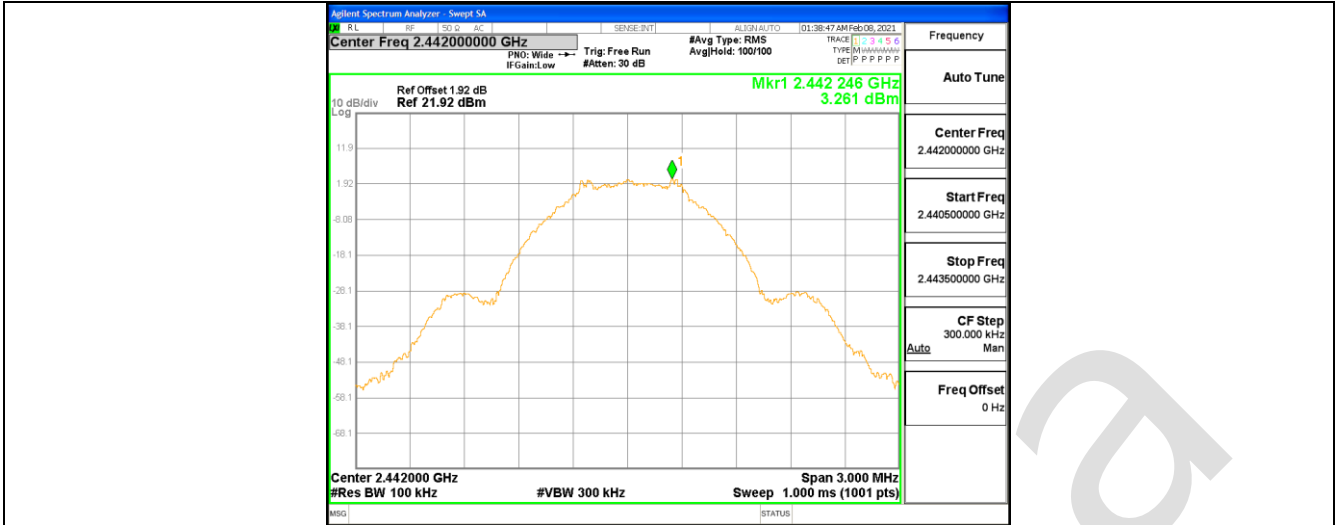


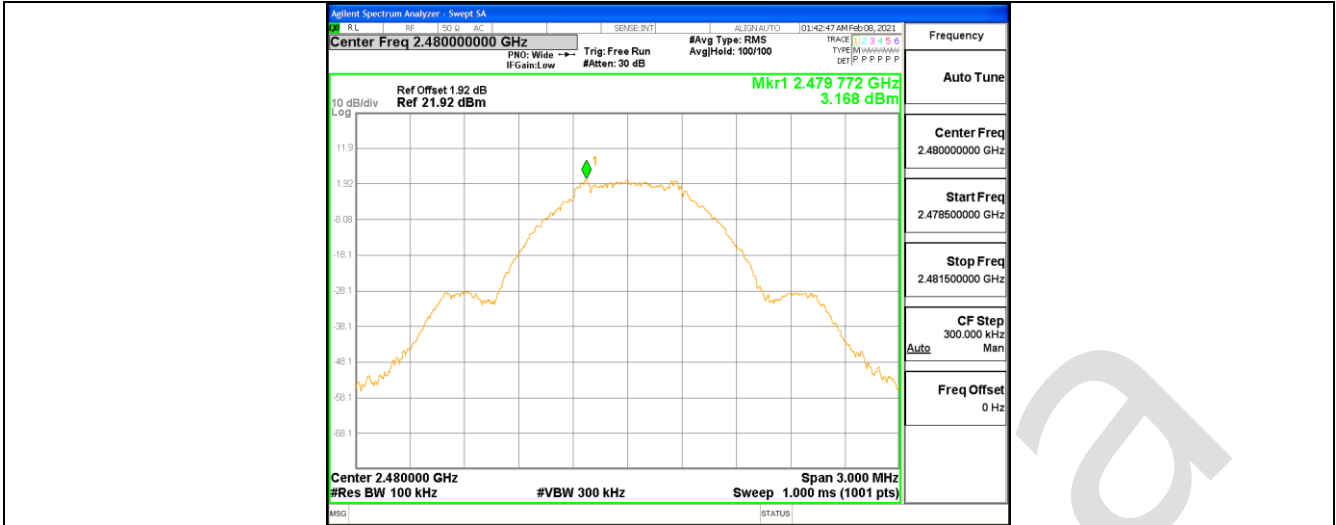
**18.6 APPENDIX F: CONDUCTED SPURIOUS EMISSION**
**Test Result**

TestMode	Antenna	Channel	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE	Ant1	2402	Reference	3.76	3.76	---	PASS
			30~1000	30~1000	-67.077	<=-26.243	PASS
			1000~26500	1000~26500	-53.041	<=-26.243	PASS
		2442	Reference	3.26	3.26	---	PASS
			30~1000	30~1000	-66.891	<=-26.739	PASS
			1000~26500	1000~26500	-53.313	<=-26.739	PASS
		2480	Reference	3.17	3.17	---	PASS
			30~1000	30~1000	-66.978	<=-26.832	PASS
			1000~26500	1000~26500	-54.036	<=-26.832	PASS

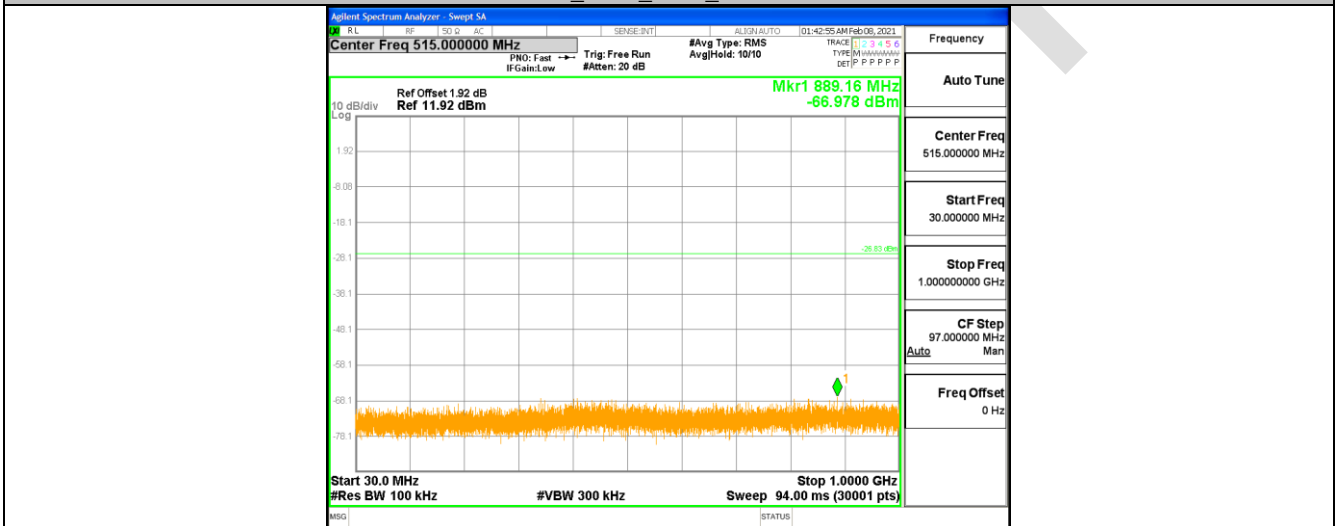
### Test Graphs







BLE\_Ant1\_2480\_30~1000



BLE\_Ant1\_2480\_1000~26500

