

TEST REPORT

Application No.: SZEM1904012648CR
FCC ID: 2ASDJ-ATMUBX0A
Applicant: Jiangsu Ascend Electronics Technology Co.,Ltd
Address of Applicant: S&T Center, No.18, Tiancheng Rd., Jiangning Binjiang Development Zone, Nanjing, Jiangsu Province, China
Manufacturer: Jiangsu Ascend Electronics Technology Co.,Ltd
Address of Manufacturer: S&T Center, No.18, Tiancheng Rd., Jiangning Binjiang Development Zone, Nanjing, Jiangsu Province, China
Factory: Jiangsu Ascend Electronics Technology Co.,Ltd
Address of Factory: S&T Center, No.18, Tiancheng Rd., Jiangning Binjiang Development Zone, Nanjing, Jiangsu Province, China

Equipment Under Test (EUT):

EUT Name: UWB Module
Model No.: ATMUBX0A
Standard(s) : 47 CFR Part 15, Subpart F
Date of Receipt: 2018-12-28
Date of Test: 2018-12-31 to 2019-01-23
Date of Issue: 2019-03-20

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.



Keny Xu
EMC Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.



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Report No.: SZEM190401264801

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Revision Record			
Version	Description	Date	Remark
00	Original	2019-03-20	/

Authorized for issue by:			
			
		Foray Chen /Project Engineer	
			
		Eric Fu /Reviewer	



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1 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15, Subpart C Section 15.203 & Subpart F Section 15.519 (a)(2)	ANSI C63.10 (2013)	PASS
UWB Bandwidth	47 CFR Part 15, Subpart F Section 15.503 (a)	ANSI C63.10 (2013)	PASS
Dwell Time	47 CFR Part 15, Subpart F Section 15.519 (a)(1)	ANSI C63.10 (2013)	PASS
Spurious Emissions	47 CFR Part 15, Subpart F Section 15.519 (c)(d)/15.209	ANSI C63.10 (2013)	PASS
EIRP	47 CFR Part 15, Subpart F Section 15.519 (e)	ANSI C63.10 (2013)	PASS



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3 General Information

3.1 Details of E.U.T.

Power supply: DC 3.6V
Test voltage: DC 3.6V
Antenna Gain: 1.5dBi
Antenna Type: Integrate Antenna
Number of Channels: 1
Operation Frequency: 6230MHz to 6860MHz

3.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Laptop	Lenovo	ThinkPad X100e	/
Serial port adapter plate	/	Test Plate 3	/

3.3 Measurement Uncertainty

No.	Parameter	Measurement Uncertainty
1	Radio Frequency	$< \pm 1 \times 10^{-5}$
2	Total RF power, conducted	$< \pm 1.5 \text{ dB}$
3	RF power density, conducted	$< \pm 3 \text{ dB}$
4	Spurious emissions, conducted	$< \pm 3 \text{ dB}$
5	All emissions, radiated	$< \pm 6 \text{ dB}$ (30MHz – 1GHz) $< \pm 6 \text{ dB}$ (above 1GHz)
6	Temperature	$< \pm 1^\circ\text{C}$
7	Humidity	$< \pm 5 \%$
8	DC and low frequency voltages	$< \pm 3 \%$

Note: The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.



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3.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch E&E Lab,

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China.
518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

3.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• **CNAS (No. CNAS L2929)**

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• **VCCI**

The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-823, R-4188, T-1153 and C-2383 respectively.

• **FCC – Registration No.: 556682**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No.: 556682.

• **Industry Canada (IC)**

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3.

3.6 Deviation from Standards

None

3.7 Abnormalities from Standard Conditions

None



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4 Equipment List

Conducted Emission						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy-mm-dd)	Cal.Due date (yyyy-mm-dd)
1	Shielding Room	ZhongYu Electron	GB-88	SEM001-06	2018-04-13	2019-04-13
2	LISN	Rohde & Schwarz	ENV216	SEM007-01	2018-10-09	2019-10-09
3	LISN	ETS-LINDGREN	3816/2	SEM007-02	2018-04-25	2019-04-25
4	8 Line ISN	Fischer Communication s Inc.	FCC- TLISN-T8- 02	EMC0120	2018-08-30	2019-08-30
5	4 Line ISN	Fischer Communication s Inc.	FCC- TLISN-T4- 02	EMC0121	2018-08-30	2019-08-30
6	2 Line ISN	Fischer Communication s Inc.	FCC- TLISN-T2- 02	EMC0122	2018-08-30	2019-08-30
7	EMI Test Receiver	Rohde & Schwarz	ESCI	SEM004-02	2018-04-25	2019-04-25
8	DC Power Supply	Zhao Xin	RXN-305D	SEM011-02	2018-10-09	2019-10-09



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RE in Chamber						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy-mm-dd)	Cal.Due date (yyyy-mm-dd)
1	3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEM001-01	2018-04-13	2019-04-13
2	EMI Test Receiver	Agilent Technologies	N9038A	SEM004-05	2018-09-16	2019-09-16
3	BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEM003-01	2018-11-01	2019-11-01
4	Double-ridged horn (1-18GHz)	ETS-LINDGREN	3117	SEM003-11	2018-10-17	2019-10-17
5	Horn Antenna (18-26GHz)	ETS-LINDGREN	3160	SEM003-12	2018-11-24	2019-11-24
6	Pre-amplifier (0.1-1300MHz)	Agilent Technologies	8447D	SEM005-01	2018-04-25	2019-04-25
7	Band filter	Amindeon	Asi 3314	SEM023-01	N/A	N/A
8	DC Power Supply	Zhao Xin	RXN-305D	SEM011-02	2018-10-09	2019-10-09
9	Loop Antenna	Beijing Daze	ZN30401	SEM003-09	2018-05-13	2019-05-13

RE in Chamber						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy-mm-dd)	Cal.Due date (yyyy-mm-dd)
1	3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2018-04-13	2019-04-13
2	EMI Test Receiver	Rohde & Schwarz	ESIB26	SEM004-04	2018-04-25	2019-04-25
3	BiConiLog Antenna (26-3000MHz)	ETS-Lindgren	3142C	SEM003-02	2018-11-15	2019-11-15
4	Amplifier (0.1-1300MHz)	HP	8447D	SEM005-02	2018-10-09	2019-10-09
5	Horn Antenna (1-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2018-06-14	2019-06-14
6	Low Noise Amplifier	Black Diamond Series	BDLNA-0118-352810	SEM005-05	2018-10-09	2019-10-09
7	Band filter	Amindeon	Asi 3314	SEM023-01	N/A	N/A



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RF connected test						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy-mm-dd)	Cal.Due date (yyyy-mm-dd)
1	DC Power Supply	ZhaoXin	RXN-305D	SEM011-02	2018-10-09	2019-10-09
2	EXA Signal Analyzer	Agilent Technologies	N9010A	SEM004-09	2018-07-18	2019-07-18
3	Signal Generator	Rohde & Schwarz	SML03	SEM006-02	2018-04-25	2019-04-25
4	Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2018-10-09	2019-10-09



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5 Test results and Measurement Data

5.1 Antenna Requirement

5.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203 & 15.247(c)

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

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:

The antenna is Integral antenna and no consideration of replacement. The best case gain of the antenna is 1.5dBi.



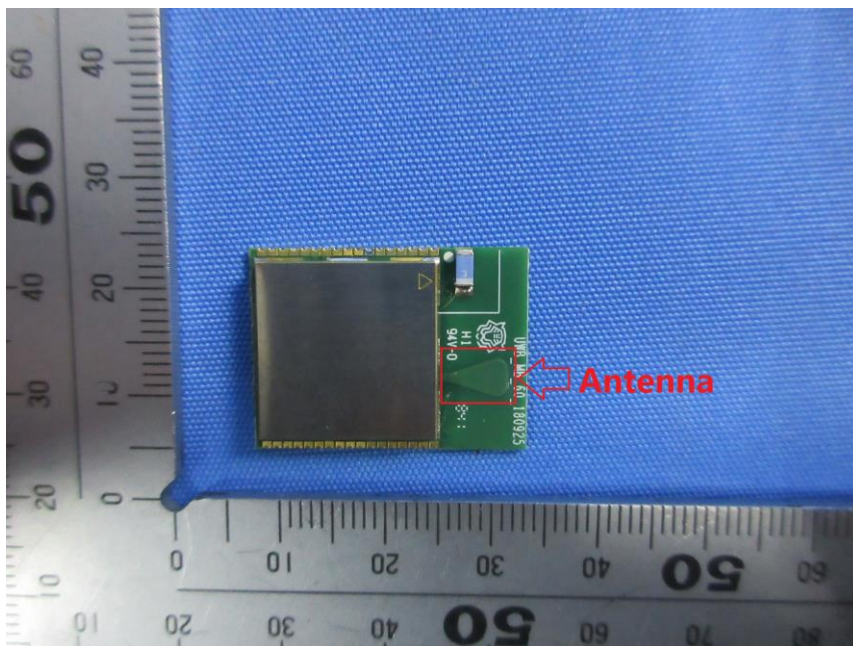
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5.2 Radiated Spurious Emissions

Test Requirement:	47 CFR Part 15, Subpart F Section 15.519 (c)(d)/15.209				
Test Method:	ANSI C63.10: 2013				
Test Site:	Measurement Distance: 3m				
Receiver Setup:	Frequency	Detector	RBW	VBW	Remark
	0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak
	0.009MHz-0.090MHz	Average	10kHz	30kHz	Average
	0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak
	0.110MHz-0.490MHz	Average	10kHz	30kHz	Average
	0.490MHz-30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	30MHz-960MHz	Quasi-peak	100 kHz	300kHz	Quasi-peak
	Above 960MHz	RMS	1MHz	3MHz	RMS
Limit: (Spurious Emissions)	Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
	0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
	1.705MHz-30MHz	30	-	-	30
	30MHz-88MHz	100	40.0	Quasi-peak	3
	88MHz-216MHz	150	43.5	Quasi-peak	3
	216MHz-960MHz	200	46.0	Quasi-peak	3
	960MHz-1610MHz	-75.3 dBm (EIRP, RBW=1MHz)		RMS	3
	1610MHz-1990MHz	-63.3 dBm (EIRP, RBW=1MHz)		RMS	3
	1990MHz-3100MHz	-61.3 dBm (EIRP, RBW=1MHz)		RMS	3
	3100MHz-10600MHz	-41.3 dBm (EIRP, RBW=1MHz)		RMS	3
	3100MHz-10600MHz	0 dBm (EIRP, RBW=50MHz)		Peak	3
	Above 10600MHz	-61.3 dBm (EIRP, RBW=1MHz)		RMS	3
	1164MHz-1240MHz	-85.3 dBm (EIRP, RBW=1kHz)		RMS	3
	1559MHz-1610MHz	-85.3 dBm (EIRP, RBW=1kHz)		RMS	3

Test Setup:

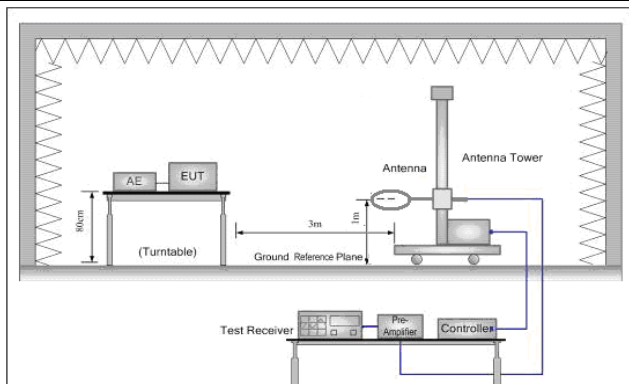


Figure 1. Below 30MHz

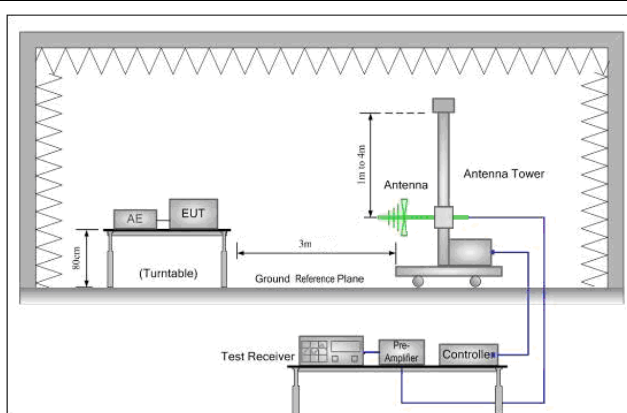


Figure 2. 30MHz to 1GHz

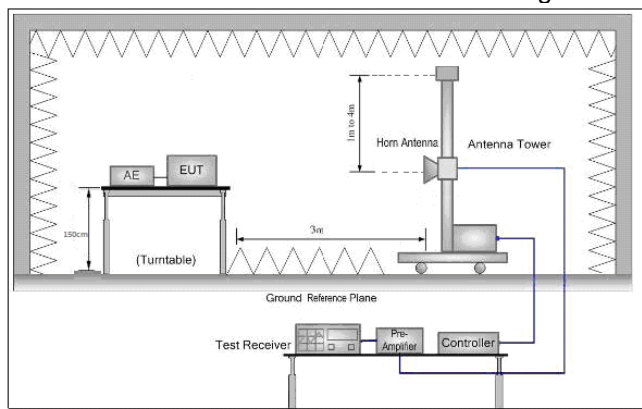


Figure 3. Above 1 GHz

Test Procedure:

- 1) For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- 2) For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- 3) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 4) 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.



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	<p>5) 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.</p> <p>6) The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</p> <p>7) 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.</p> <p>8) Test the EUT in the lowest channel,the middle channel,the Highest channel</p> <p>9) The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode,And found the X axis positioning which it is worse case.</p> <p>10) Repeat above procedures until all frequencies measured was complete.</p>
Exploratory Test Mode:	Transmitting mode
Final Test Mode:	Transmitting mode
Instruments Used:	Refer to section 4 for details
Test Results:	Pass

According to ANSI 63.10 Clause 10.3.9, the EIRP to field strength at a specified measurement distance of 3 m is below:

$$E \text{ (dBuV/m)} = \text{EIRP(dBm)} + 95.3$$

Thus, the field strength limit for the test above 1GHz is below:

Frequency	Limit		Detector	Measurement Distance
	EIRP (dBm)	Field Strength (dBuV/m)		
960MHz-1610MHz	-75.3 (RBW=1MHz)	20.00	RMS	3
1610MHz-1990MHz	-63.3 (RBW=1MHz)	32.00	RMS	3
1990MHz-3100MHz	-61.3 (RBW=1MHz)	34.00	RMS	3
3100MHz-10600MHz	-41.3 (RBW=1MHz)	54.00	RMS	3
3100MHz-10600MHz	0 (RBW=50MHz)	95.3	Peak	3
Above 10600MHz	-61.3 (RBW=1MHz)	34.00	RMS	3
1164MHz-1240MHz	-85.3 (RBW=1kHz)	10.00	RMS	3
1559MHz-1610MHz	-85.3 (RBW=1kHz)	10.00	RMS	3



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Measurement Data

5.2.1.1 Peak Power

Field Strength for fundamental @ RBW=10MHz						
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Polarization
6540	32.10	9.75	37.93	77.12	81.04	Horizontal
6540	32.10	9.75	37.93	75.45	79.37	Vertical

Calculated Field Strength of fundamental @ RBW=50MHz						
Frequency (MHz)	Measured Field Strength of fundamental (FS _M) (dBuV/m)	Calculated factor for RBW=10MHz to RBW=50MHz	Calculated Field Strength of fundamental (FS _C) (dBuV/m)	Limit (dBuV/m)	Over Limit(dB)	Polarization
6540	81.04	13.98	95.02	95.30	-0.28	Horizontal
6540	79.37	13.98	93.35	95.30	-1.95	Vertical
Note: FS _C = FS _M + 20log(50MHz/10MHz) = FS _M + 13.98						

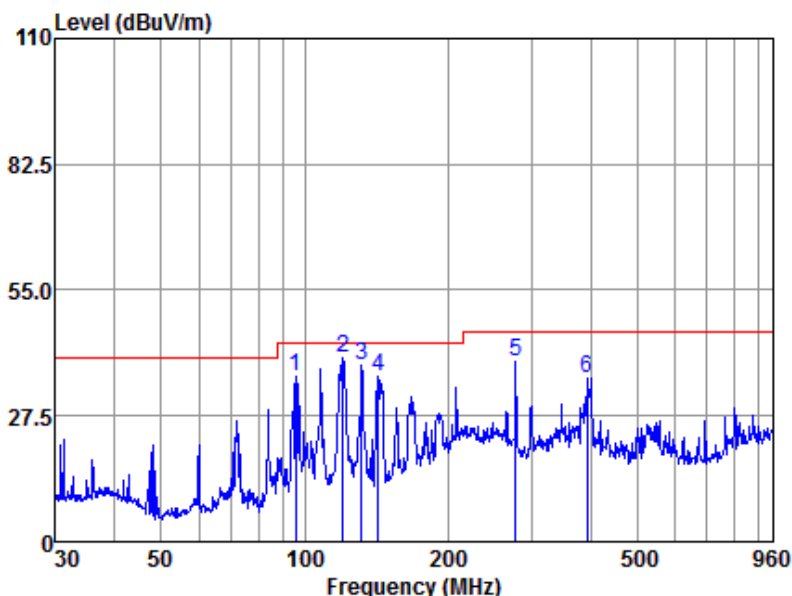


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5.2.1.2 Spurious Emissions

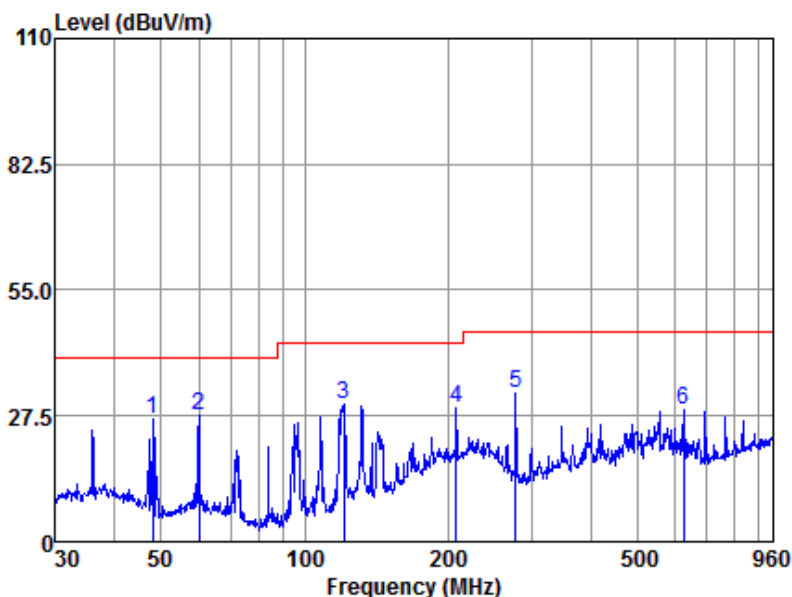
30MHz-960MHz



Antenna Polarity :HORIZONTAL
EUT/Project :10245CR
Test mode :a

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
1	95.80	70.11	8.94	0.80	43.73	36.12	43.50	-7.38	QP
2	120.42	73.05	10.12	0.68	43.75	40.10	43.50	-3.40	QP
3	131.77	69.11	12.51	0.63	43.74	38.51	43.50	-4.99	QP
4	142.70	67.69	11.48	0.57	43.73	36.01	43.50	-7.49	QP
5	277.61	69.94	12.48	0.60	43.74	39.28	46.00	-6.72	QP
6	391.23	63.45	14.94	0.84	43.61	35.62	46.00	-10.38	QP

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



Antenna Polarity : VERTICAL

EUT/Project : 10245CR

Test mode : a

	Freq	Read Level	Antenna Factor	Cable Loss	Preamplifier Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	47.90	57.91	11.76	0.89	43.72	26.84	40.00	-13.16	QP
2	60.00	57.93	12.60	0.89	43.75	27.67	40.00	-12.33	QP
3	120.83	62.88	10.24	0.68	43.75	30.05	43.50	-13.45	QP
4	208.21	62.71	9.76	0.41	43.67	29.21	43.50	-14.29	QP
5	277.61	63.26	12.48	0.60	43.74	32.60	46.00	-13.40	QP
6	624.64	50.88	19.62	1.60	43.20	28.90	46.00	-17.10	QP

Note: Emission Level = Read Level + Antenna Factor + Cable loss - Preamplifier Factor



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Test Data:

Transmitting with modulation Mode								
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
1164MHz ≤ f ≤ 1240MHz & 1559MHz ≤ f ≤ 1610MHz								
1213.31	22.16	3.98	36.86	16.34	5.62	10.00	-4.38	Vertical
1582.72	23.62	4.88	36.93	14.92	6.49	10.00	-3.51	Vertical
960MHz ≤ f ≤ 3100MHz (except for above frequency range)								
1098.76	21.67	3.98	36.92	25.00	13.73	20.00	-6.27	Vertical
2281.93	25.87	6.37	37.36	21.71	16.59	34.00	-17.41	Vertical
f > 3100MHz								
3871.53	29.67	8.70	38.22	41.57	41.72	54.00	-12.28	Vertical
4732.51	30.68	9.22	38.27	37.16	38.79	54.00	-15.21	Vertical
6540.00	32.10	9.75	37.93	46.44	50.36	54.00	-3.64	Vertical
11311.45	35.72	11.02	35.64	16.12	27.22	34.00	-6.78	Vertical
12789.62	36.17	12.28	37.30	18.83	29.98	34.00	-4.02	Vertical
15382.91	37.55	14.87	40.76	18.51	30.17	34.00	-3.83	Vertical
1164MHz ≤ f ≤ 1240MHz & 1559MHz ≤ f ≤ 1610MHz								
1191.27	22.07	3.94	46.95	27.06	6.12	10.00	-3.88	Horizontal
1601.43	23.71	4.90	36.92	12.29	3.98	10.00	-6.02	Horizontal
960MHz ≤ f ≤ 3100MHz (except for above frequency range)								
1108.82	21.71	3.99	36.93	25.37	14.14	20.00	-5.86	Horizontal
1482.76	23.14	4.63	36.87	30.78	21.68	34.00	-12.32	Horizontal
f > 3100MHz								
3975.72	29.94	8.49	38.28	43.03	43.18	54.00	-10.82	Horizontal
5424.18	31.99	9.34	38.66	43.15	45.82	54.00	-8.18	Horizontal
6540.00	32.10	9.75	37.93	48.00	51.92	54.00	-2.08	Horizontal
11225.78	35.69	10.96	35.51	30.62	41.76	54.00	-12.24	Horizontal
13724.95	37.72	14.37	37.70	15.84	30.23	34.00	-3.77	Horizontal
16832.37	39.45	13.79	35.98	11.70	28.96	34.00	-5.04	Horizontal

Remark:

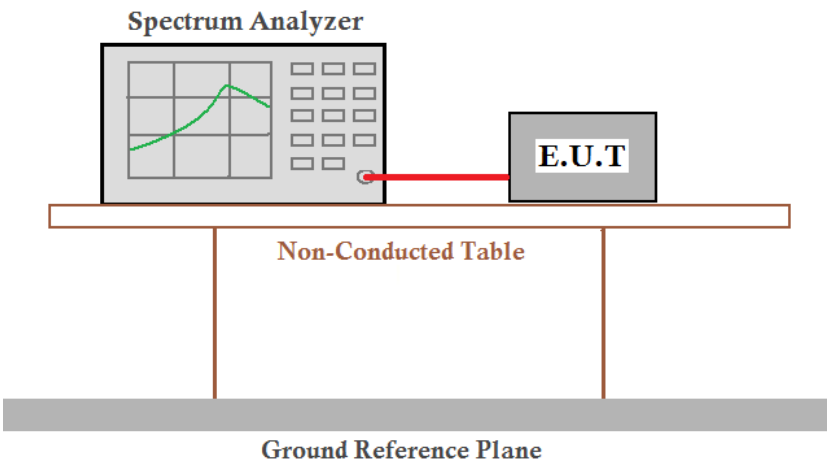
- 1) Scan from 9kHz to 40GHz, The disturbance above 18GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.



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5.3 UWB Bandwidth (10dB Bandwidth)

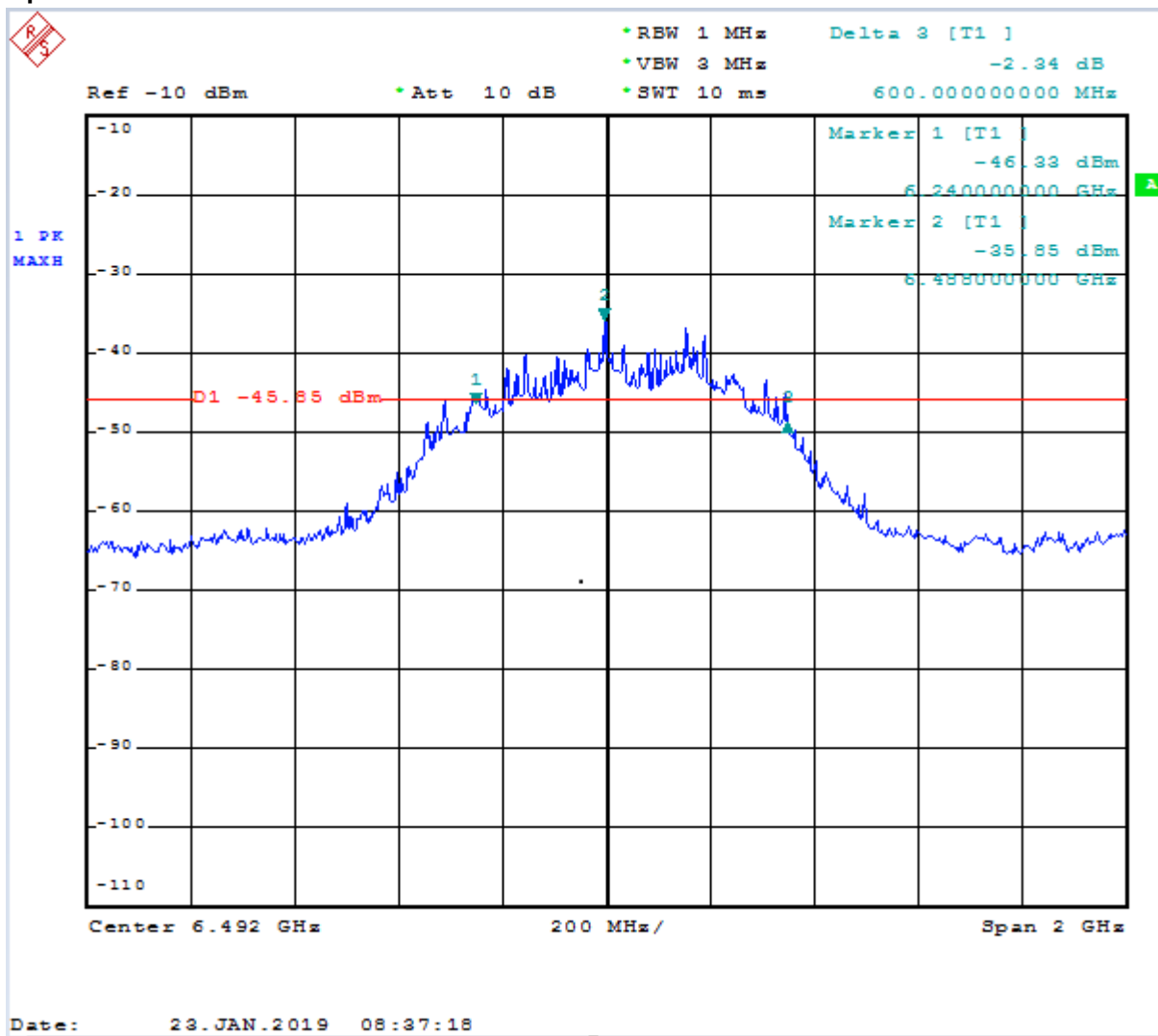
Test Requirement:	47 CFR Part 15F Section 15.503(a)
Test Method:	ANSI C63.10:2013
Test Setup:	
Limit:	≥500MHz
Exploratory Test Mode:	Transmitter mode
Instruments Used:	Refer to section 4 for details
Test Results:	Pass

Measurement Data

Test Frequency (MHz)	F _L (MHz)	F _H (MHz)	10dB bandwidth (MHz)	Limit (MHz)	Results
6540	6240	6840	600	≥500MHz	Pass

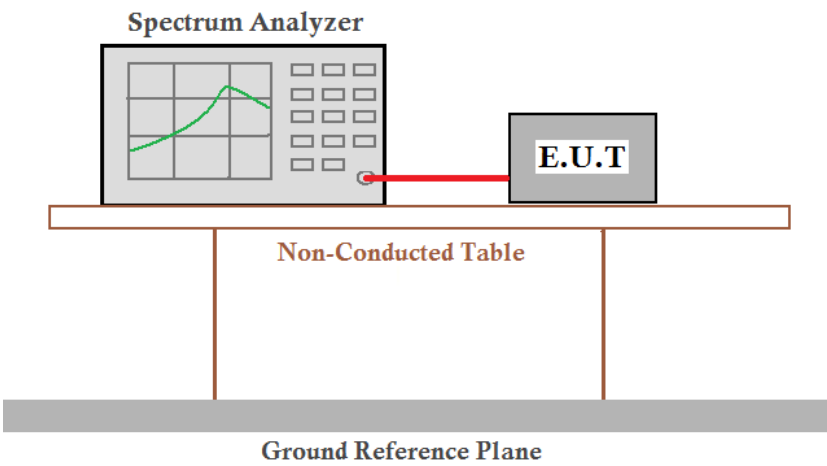


Test plot as follows:





5.4 Dwell Time

Test Requirement:	47 CFR Part 15F Section 15.519(a)(1)
Test Method:	ANSI C63.10:2013
Test Setup:	
Limit:	The UWB intentional radiator shall cease transmission within 10 seconds unless it receives an acknowledgement from the associated receiver that its transmission is being received
Exploratory Test Mode:	Operation mode
Instruments Used:	Refer to section 4 for details
Test Results:	Pass

Measurement Data

Test Frequency (MHz)	Dwell Time (s)	Limit (s)	Results
6540	0.072	≤10	Pass



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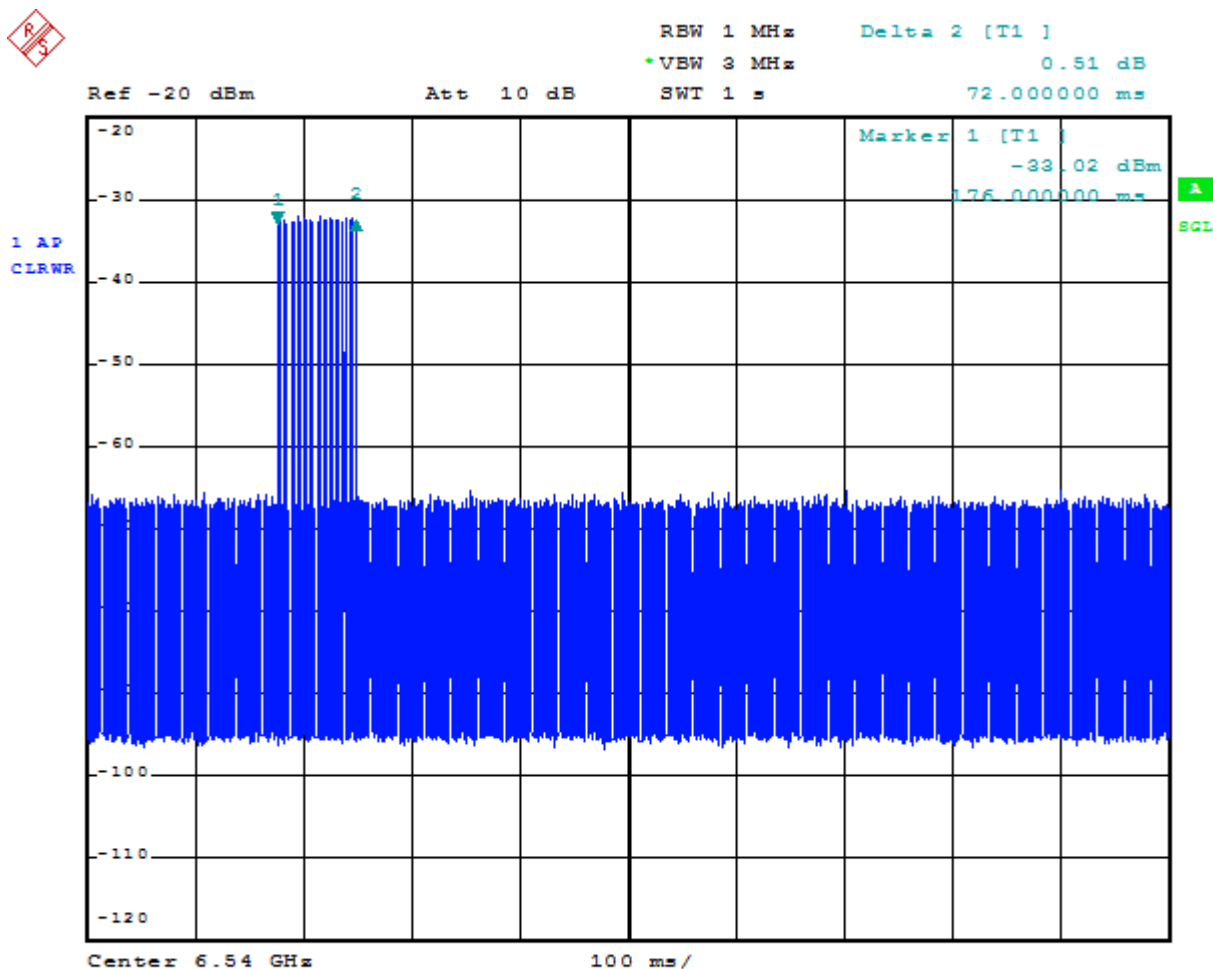
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Test plot as follows:



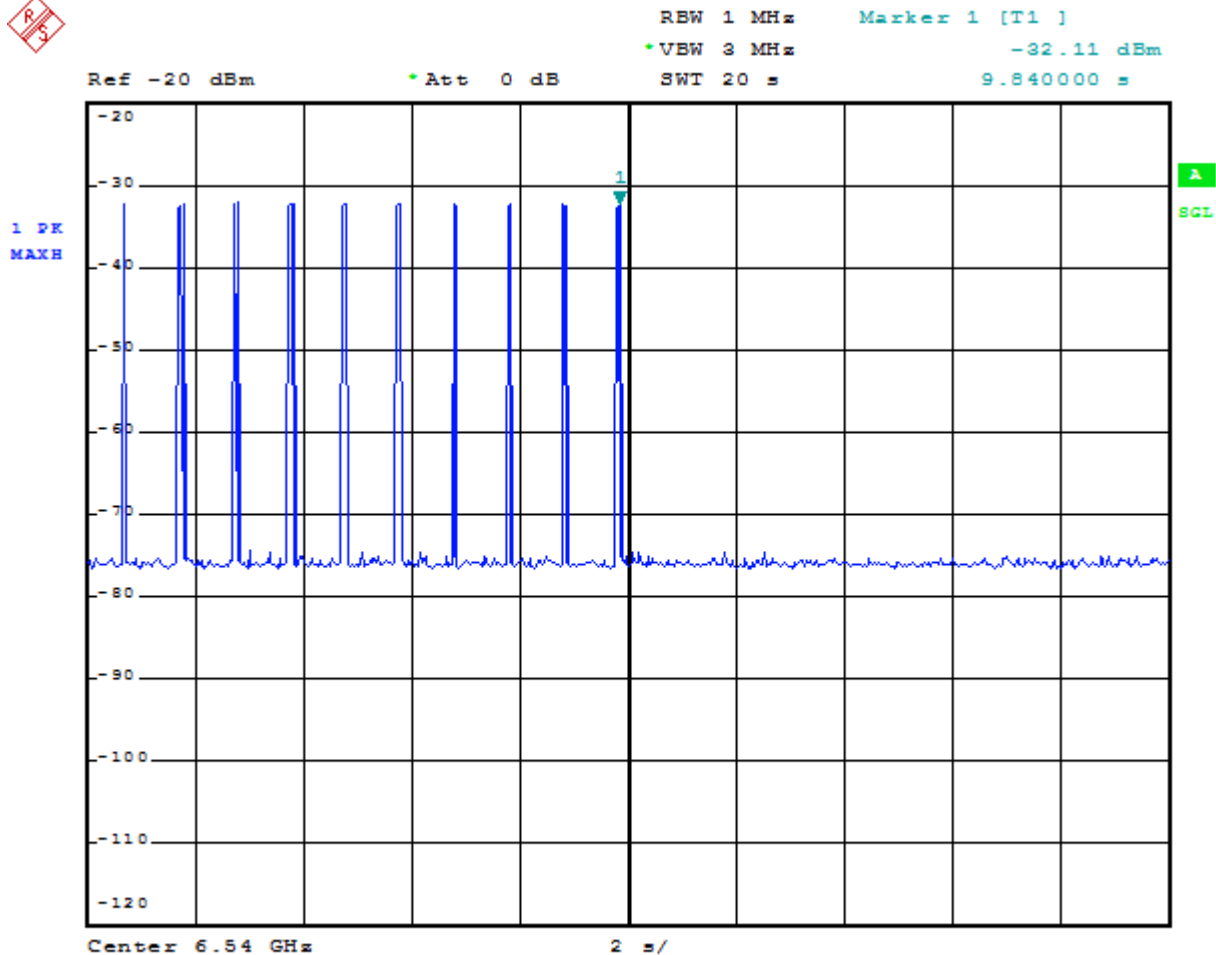
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6 Test Setup Photographs

Refer to the < Test Setup photos-FCC>.

7 EUT Constructional Details

Refer to the < Photos >.

- End of the Report -

