

FCC Test Report

Product Name : Wireless Programming Tool
Trade Name : ORO
Model No. : UNI-PT01
FCC ID. : W55OPTAM07D

Applicant : Oro Technology Co., LTD
Address : 3F, No.29, 21th Road, Industrial Park,
Taichung 408, Taiwan

Date of Receipt : Jun. 27, 2018
Issued Date : Jul. 19, 2018
Report No. : 1860384R-RFUSP20V00
Report Version : V1.0



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Test Report Certification

Issued Date : Jul. 19, 2018

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Product Name : Wireless Programming Tool
Applicant : Oro Technology Co., LTD
Address : 3F, No.29, 21th Road, Industrial Park, Taichung 408, Taiwan
Manufacturer : Oro Technology Co., LTD
Model No. : UNI-PT01
FCC ID. : W55OPTAM07D
EUT Voltage : Mode 1: DC 15V (Power by Adapter)
Mode 2: DC 11.1V (Power by Battery)
Testing Voltage : Mode 1: DC 15V (Power by Adapter)
Mode 2: DC 11.1V (Power by Battery)
Trade Name : ORO
Applicable Standard : FCC 15 Subpart C Section 15.209: 2017
Laboratory Name : Hsin Chu Laboratory
Address : No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township,
Hsinchu County 310, Taiwan, R.O.C.
TEL: +886-3-582-8001 / FAX: +886-3-582-8958
Test Result : Complied

Documented By :



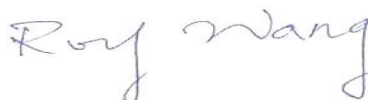
(Demi Chang / Senior Engineering Adm. Specialist)

Tested By :



(Andy Tsai / Senior Engineer)

Approved By :



(Roy Wang / Director)

Revision History

Report No.	Version	Description	Issued Date
1860384R-RFUSP20V00	V1.0	Initial issue of report.	Jul. 19, 2018

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1. General Information

1.1. EUT Description

Product Name	Wireless Programming Tool
Trade Name	ORO
Model No.	UNI-PT01
Frequency Range	125KHz
Channel Number	1
Type of Modulation	ASK

Antenna Information	
Antenna Type	Soldered on PCB
Antenna Gain	0 dBi

Working Frequency of Each Channel	
Channel	Frequency
01	125KHz

Note:

1. This device is a Wireless Programming Tool included 125kHz transceiver function.
2. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is Y axis shown in the report.

1.2. Test Mode

DEKRA verified the construction and function in typical operation. All the test modes are performed in normal operation and are defined as:

Test Mode	
TX	Mode 1: Transmit_Power by Adapter
	Mode 2: Transmit_Power by Battery

Emission		
Performed Item	Mode 1	Mode 2
Conducted Emission	Yes	No
Radiated Emission	Yes	Yes

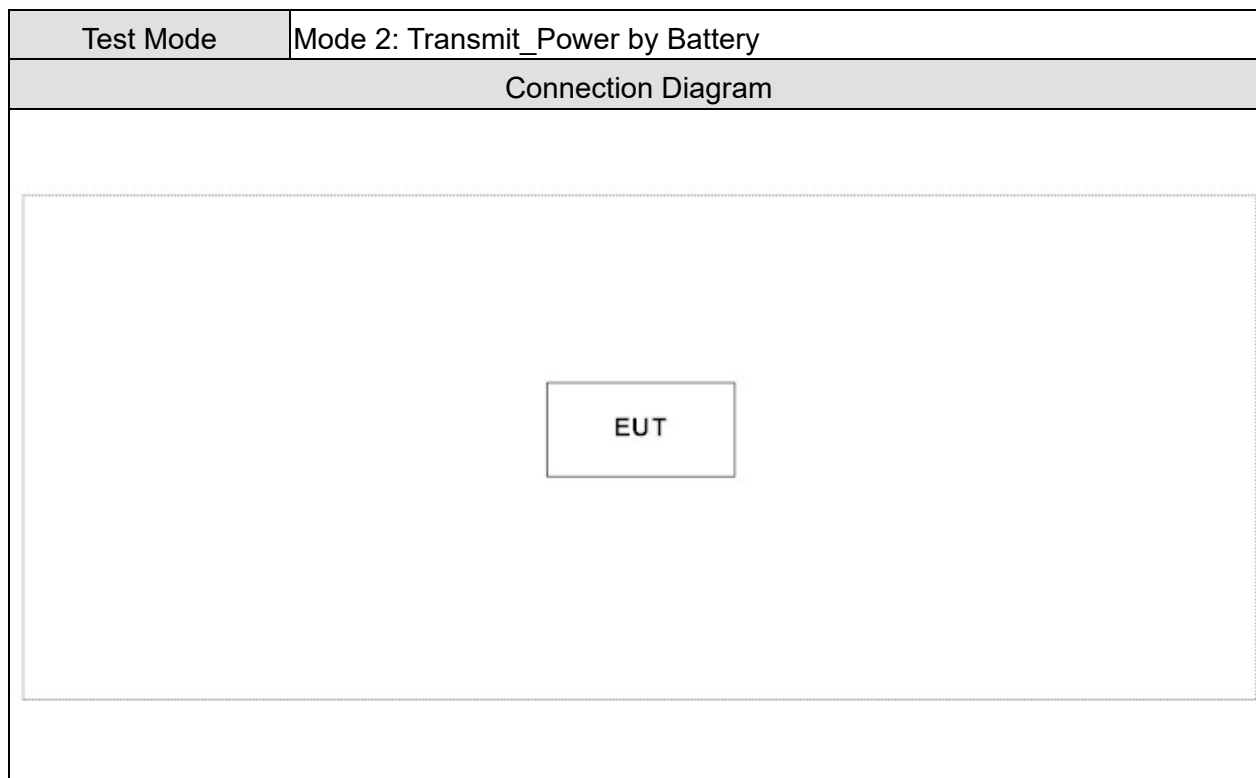
1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product	Manufacturer	Model No.	Serial No.	FCC ID	Power Cord
1	N/A				

1.4. Configuration of tested System

Test Mode	Mode 1: Transmit_Power by Adapter
Connection Diagram	
	



1.5. EUT Exercise Software

1	Setup the EUT as shown in section 1.4.
2	The EUT will transmit automatically.
3	Verify that the EUT works properly.

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Test Item	Required (IEC 68-1)	Actual	Test Site
Temperature (°C)	FCC PART 15 C 15.207 Conducted Emission	15 - 35	20	3
Humidity (%RH)		25 - 75	50	
Barometric pressure (mbar)		860 - 1060	950-1000	
Temperature (°C)	FCC PART 15 C 15.209 Radiated Emission	15 - 35	25	2
Humidity (%RH)		25 - 75	54	
Barometric pressure (mbar)		860 - 1060	950-1000	

Note: Test site information refers to Laboratory Information.

Laboratory Information

USA : FCC, Registration Number: TW3024

The related certificate for our laboratories about the test site and management system can be downloaded from DEKRA Testing and Certification Co., Ltd. Web Site:

<http://www.dekra.com.tw/english/about/certificates.aspx?bval=5>

The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site : http://www.dekra.com.tw/index_en.aspx

If you have any comments, Please don't hesitate to contact us. Our test sites as below:

- 1 No. 75-2, 3rd Lin, WangYe Keng, Yonghxing Tsuen, Qionglin Shiang, Hsinchu County 307, Taiwan (R.O.C.)
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- 2 No.372, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 310, Taiwan, R.O.C.
TEL: +886-3-582-8001 / FAX: +886-3-582-8958 E-Mail : info.tw@dekra.com
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TEL: +886-3-582-8001 / FAX: +886-3-582-8958 E-Mail : info.tw@dekra.com

1.7. List of Test Equipment

Conducted Emission /SR2-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Artificial Mains Network	R&S	ENV4200	848411/010	2018/01/22	2019/01/21
Test Receiver	R&S	ESCS 30	836858/022	2018/03/30	2019/03/29
LISN	R&S	ENV216	100092	2017/07/31	2018/07/30

Radiated Emission / CB4-H

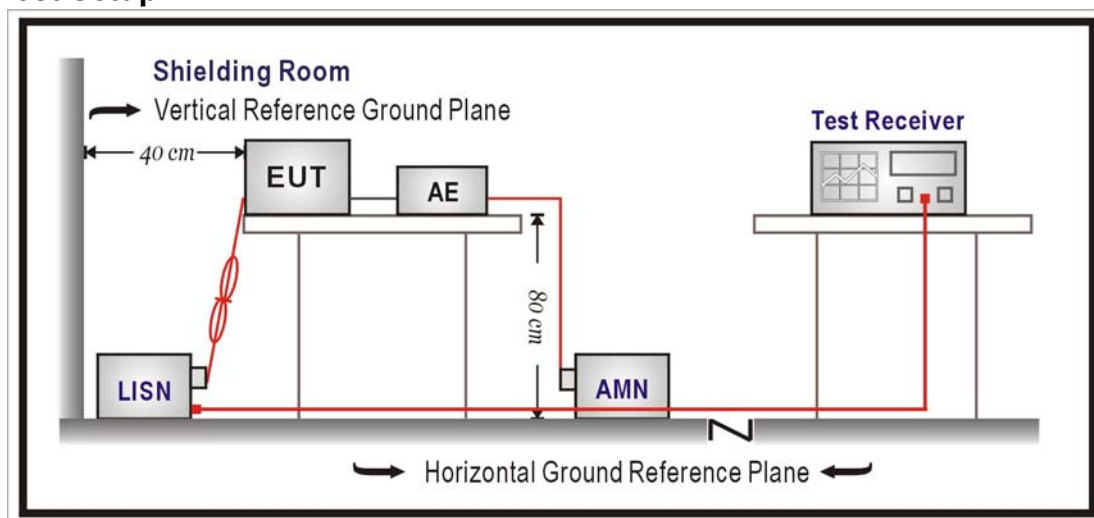
Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal Analyzer	R&S	FSVA40	101455	2017/11/21	2018/11/20
Signal & Spectrum Analyzer	R&S	FSV40	101049	2018/01/10	2019/01/09
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2018/03/05	2019/03/04
Bilog Antenna	Teseq	CBL6112D	23191	2017/06/28	2018/06/27
Horn Antenna	Schwarzbeck	BBHA 9120D	639	2018/06/01	2019/05/31
Horn Antenna	Schwarzbeck	BBHA 9170	202	2018/01/31	2019/01/30
Pre-Amplifier	Dekra	AP-025C	201801236	2018/02/26	2019/02/25
Pre-Amplifier	EMCI	EMC11830I	980366	2018/01/08	2019/01/07
Pre-Amplifier	Dekra	AP-400C	201801231	2017/12/13	2018/12/12

1.8. Measurement Uncertainty

Test Item	Uncertainty
Conducted Emission	± 2.26 dB
Radiated Emission (30MHz~1GHz)	± 3.43 dB
Radiated Emission (1GHz~26.5GHz)	± 3.65 dB

2. Conducted Emission

2.1. Test Setup



2.2. Limits

FCC Part 15 Subpart C Paragraph 15.207 Limits (dBuV)		
Frequency MHz	QP	AV
0.15 - 0.50	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30	60	50

Remarks: In the above table, the tighter limit applies at the band edges.

2.3. Test Procedure

The EUT was setup according to ANSI C63.10:2013 and tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.209 requirements.

The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs.)

Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.

The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.

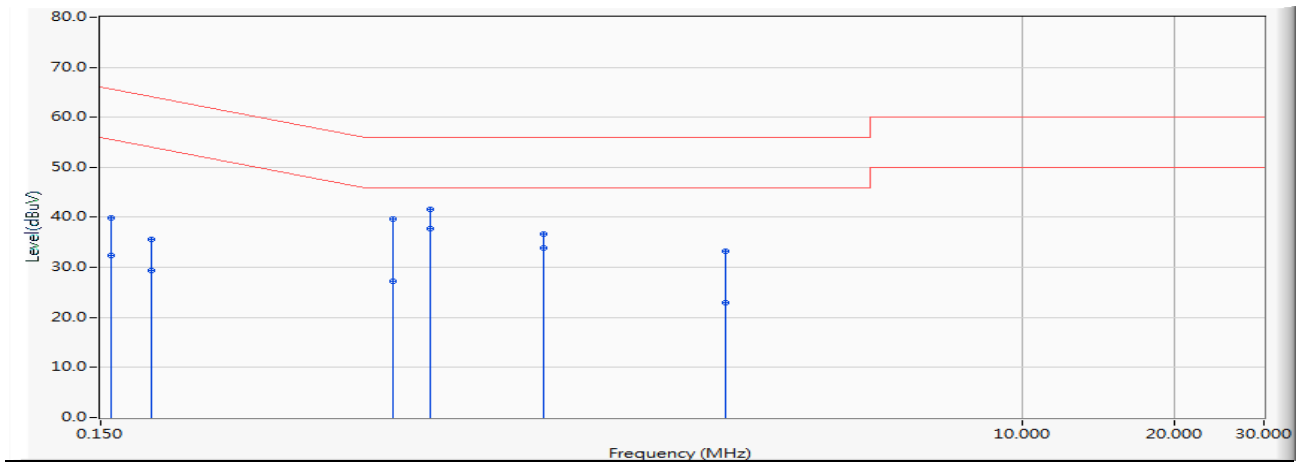
Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.

2.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.207: 2017

2.5. Test Result

Site : SR2-H	Time : 2018/07/09
Limit : CISPR_B_00M_QP	Margin : 10
Probe : SR2_LISN(16A)-7_0731 - Line1	Power : AC 120V/60Hz
EUT : Wireless Programming Tool	Note : Mode 1: Transmit_Power by Adapter

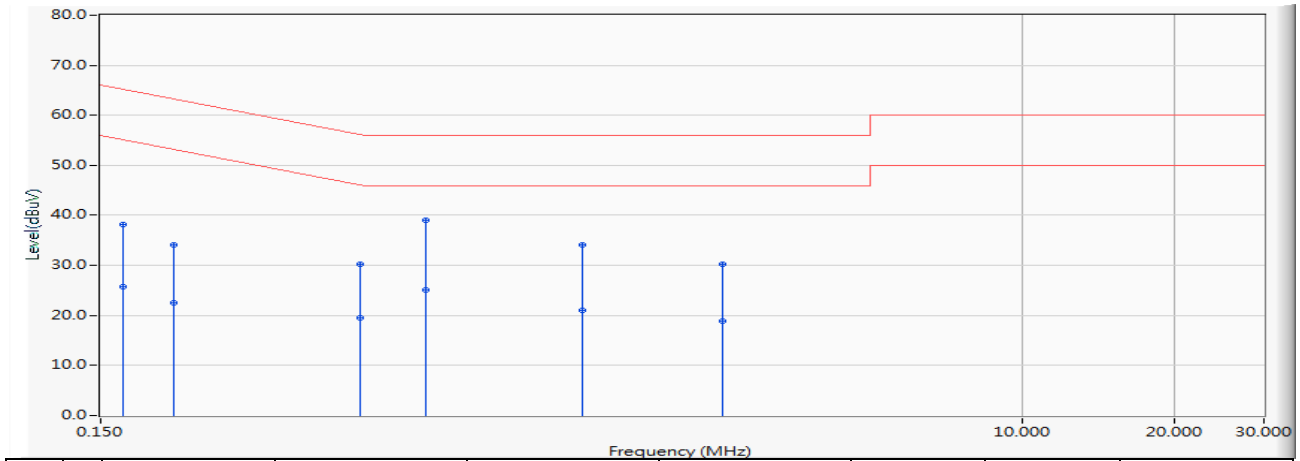


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1		0.158	9.687	30.240	39.927	-25.651	65.578	QUASIPeAK
2		0.158	9.687	22.720	32.407	-23.171	55.578	AVERAGE
3		0.189	9.690	25.990	35.680	-28.398	64.078	QUASIPeAK
4		0.189	9.690	19.600	29.290	-24.788	54.078	AVERAGE
5		0.568	9.706	29.910	39.616	-16.384	56.000	QUASIPeAK
6		0.568	9.706	17.570	27.276	-18.724	46.000	AVERAGE
7		0.673	9.730	31.980	41.709	-14.291	56.000	QUASIPeAK
8	*	0.673	9.730	27.980	37.709	-8.291	46.000	AVERAGE
9		1.130	9.801	26.870	36.671	-19.329	56.000	QUASIPeAK
10		1.130	9.801	24.020	33.821	-12.179	46.000	AVERAGE
11		2.580	9.813	23.350	33.163	-22.837	56.000	QUASIPeAK
12		2.580	9.813	13.040	22.853	-23.147	46.000	AVERAGE

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : SR2-H	Time : 2018/07/09
Limit : CISPR_B_00M_QP	Margin : 10
Probe : SR2_LISN(16A)-7_0731 - Line2	Power : AC 120V/60Hz
EUT : Wireless Programming Tool	Note : Mode 1: Transmit_Power by Adapter



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1		0.166	9.680	28.580	38.260	-26.917	65.177	QUASIPeAK
2		0.166	9.680	16.110	25.790	-29.387	55.177	AVERAGE
3		0.209	9.680	24.380	34.060	-29.201	63.261	QUASIPeAK
4		0.209	9.680	12.780	22.460	-30.801	53.261	AVERAGE
5		0.490	9.682	20.530	30.212	-25.959	56.170	QUASIPeAK
6		0.490	9.682	9.780	19.462	-26.709	46.170	AVERAGE
7	*	0.658	9.715	29.290	39.006	-16.994	56.000	QUASIPeAK
8		0.658	9.715	15.450	25.166	-20.834	46.000	AVERAGE
9		1.341	9.793	24.330	34.123	-21.877	56.000	QUASIPeAK
10		1.341	9.793	11.130	20.923	-25.077	46.000	AVERAGE
11		2.545	9.803	20.450	30.253	-25.747	56.000	QUASIPeAK
12		2.545	9.803	9.040	18.843	-27.157	46.000	AVERAGE

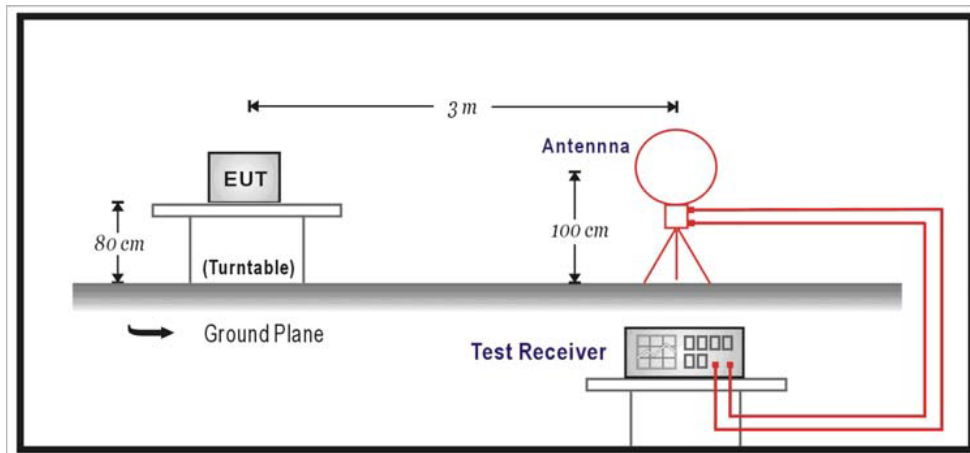
Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

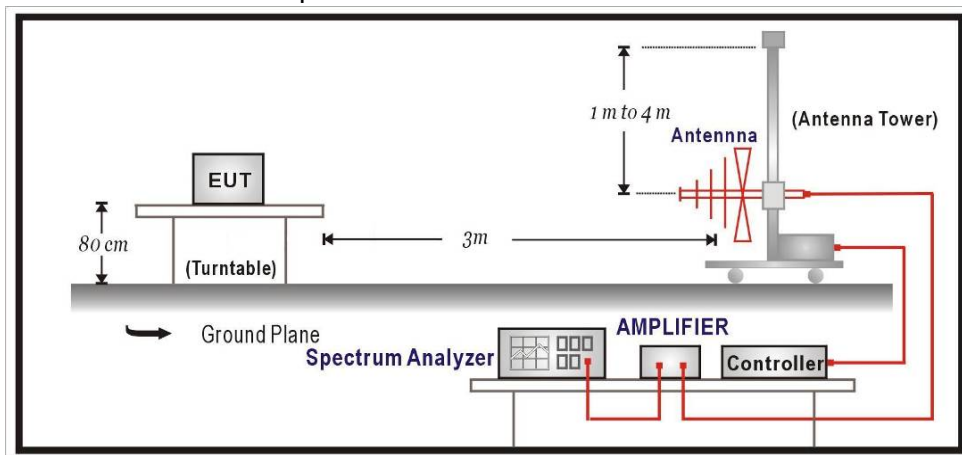
3. Radiated Emission

3.1. Test Setup

Under 30MHz Test Set up



Under 1GHz Test Setup:



3.2. Limits

➤ Spurious electric field strength limits

FCC Part 15 Subpart C Paragraph 15.209 Limits			
Frequency MHz	uV/m	dBuV/m	Measurement distance (meter)
0.009 - 0.490	2400/F(kHz)	See Remark ¹	300
0.490 - 1.705	24000/F(kHz)	See Remark ¹	30
1.705 - 30	30	29.5	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
Above 960	500	54	3

Remarks : 1. RF Voltage (dBuV) = 20 log RF Voltage (uV)

2. In the Above Table, the tighter limit applies at the band edges.

3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

3.3. Test Procedure

Under 30MHz Test:

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum electric field strength. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna which is 1.0 meter above ground. All X-axis, Y-axis and Z-axis polarization of the antenna are set on measurement.

The emission limit shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limit in these three bands are based on measurements employing an average detector.

Under 1GHz Test:

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4:2009 on radiated measurement.

On any frequency the radiated limits shown are based upon the use of measurement instrumentation employing an average detector function. When average radiated emission measurement are included emission measurement below 1000 MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.

The bandwidth below 30MHz setting on the field strength meter is 9kHz and above 30MHz is 120kHz.

3.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.209: 2017

3.5. Test Result

Product	Wireless Programming Tool		
Test Item	Fundamental Radiated Emission		
Test Mode	Mode 1: Transmit_Power by Adapter		
Date of Test	2017/06/30	Test Site	CB4-H

Fundamental Power

Frequency: 125kHz					
Test Conditions	Frequency (MHz)	Reading Level (dBuV)	Factor(AFE) (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m) @3m
X-axis	0.125	41.95	20	61.95	105.666
Y-axis	0.125	42.88	20	62.88	105.666
Z-axis	0.125	30.66	20	50.66	105.666

Position 2

Frequency: 125kHz					
Test Conditions	Frequency (MHz)	Reading Level (dBuV)	Factor(AFE) (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m) @3m
X-axis	0.125	38.03	20	58.03	105.666
Y-axis	0.125	38.82	20	58.82	105.666
Z-axis	0.125	14.61	20	34.61	105.666

Position 3

Frequency: 125kHz					
Test Conditions	Frequency (MHz)	Reading Level (dBuV)	Factor(AFE) (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m) @3m
X-axis	0.125	35.33	20	55.33	105.666
Y-axis	0.125	32.94	20	52.94	105.666
Z-axis	0.125	37.38	20	57.38	105.666

$$E(\text{dB}\mu\text{V/m}) = R(\text{dB}\mu\text{V}) + AF_E$$

Note:

Peak Measurement Level = Reading Level +Correct factor

Product	Wireless Programming Tool		
Test Item	Spurious Emission (<30MHz) at 3m		
Test Mode	Mode 1: Transmit_Power by Adatper		
Date of Test	2018/06/30	Test Site	CB4-H

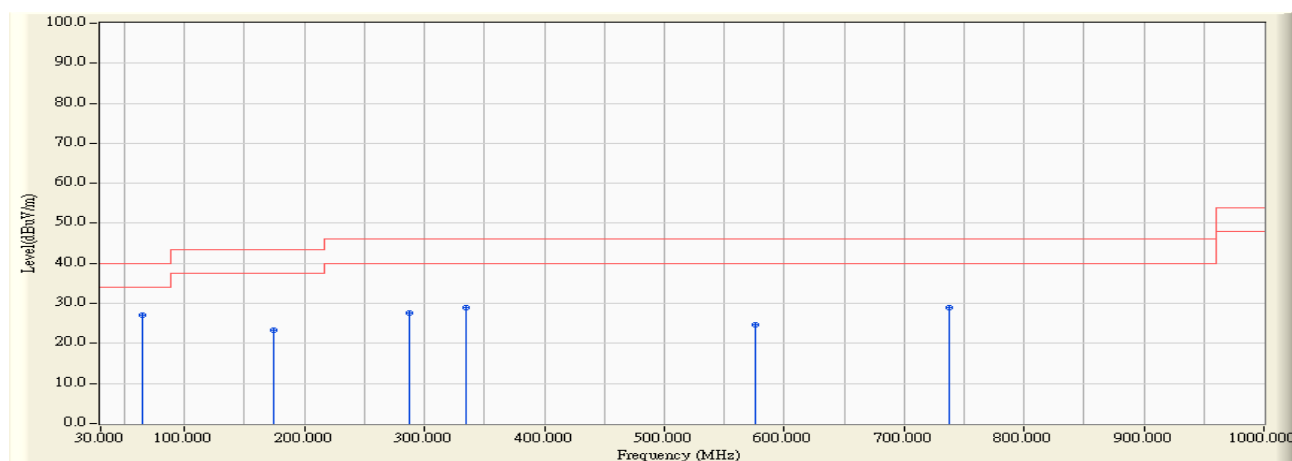
Transmit Mode				
Frequency (MHz)	Reading Level (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m) @3m	Margin (dB)
0.250	34.95	54.95	99.645	-44.695
0.375	31.25	51.25	96.124	-44.874
0.500	31.17	51.17	73.625	-22.455
0.625	29.39	49.39	71.687	-22.297
8.492	-1.15	18.85	69.542	-50.692
15.384	-2.24	17.76	69.542	-51.782

Measure level (dBuV/m) = Reading Level (dBuV/m) + cable loss(0.29)

$\text{dBuV/m} = 20\log(\mu\text{V/m})$, Limit dBuV/m at 3m = dBuV/m at 300m + $40\log(300\text{m}/3\text{m})$

30MHz-1GHz Spurious :

Site : CB4-H	Time : 2018/06/29
Limit : FCC_SpartC_15.209_03M_QP	Margin : 6
Probe : CB4_FCC_EFS_S2_30M-1GHz_1116 - HORIZONTAL	Power : AC 120V/60Hz
EUT : Wireless Programming Tool	Note : Mode 1: Transmit_Power by Adatper

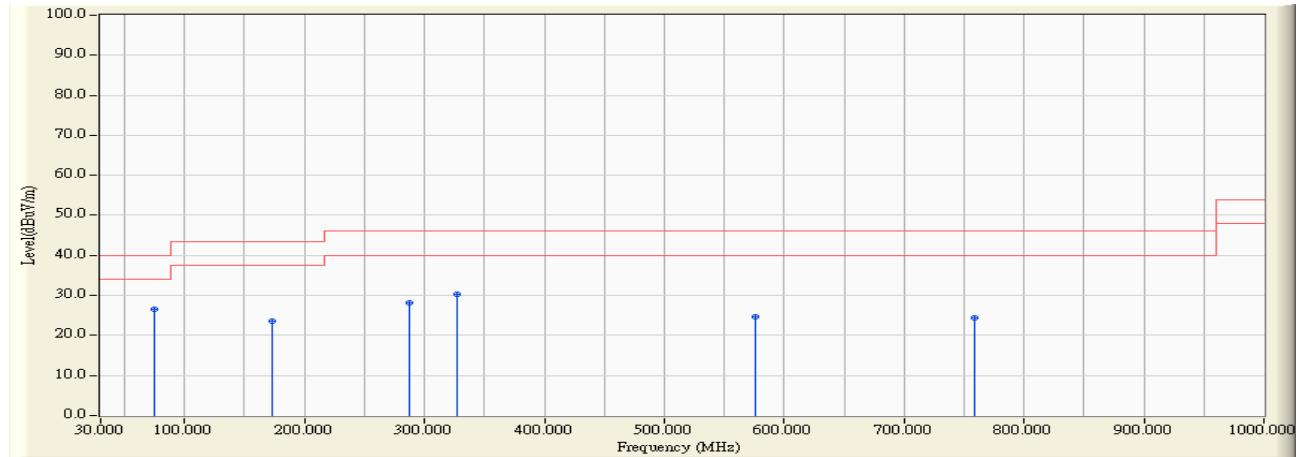


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	64.556	-25.152	52.114	26.962	-13.038	40.000	QUASIPeAK
2		174.409	-22.588	45.787	23.199	-20.321	43.520	QUASIPeAK
3		288.020	-19.367	47.113	27.746	-18.274	46.020	QUASIPeAK
4		334.095	-18.030	47.011	28.981	-17.039	46.020	QUASIPeAK
5		575.989	-12.458	37.183	24.725	-21.295	46.020	QUASIPeAK
6		737.373	-10.550	39.618	29.069	-16.951	46.020	QUASIPeAK

Note:

1. All Reading Levels are Quasi-Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB4-H	Time : 2018/06/29
Limit : FCC_SpartC_15.209_03M_QP	Margin : 6
Probe : CB4 FCC EFS_S2_30M-1GHz_1116 - VERTICAL	Power : AC 120V/60Hz
EUT : Wireless Programming Tool	Note : Mode 1: Transmit_Power by Adatper

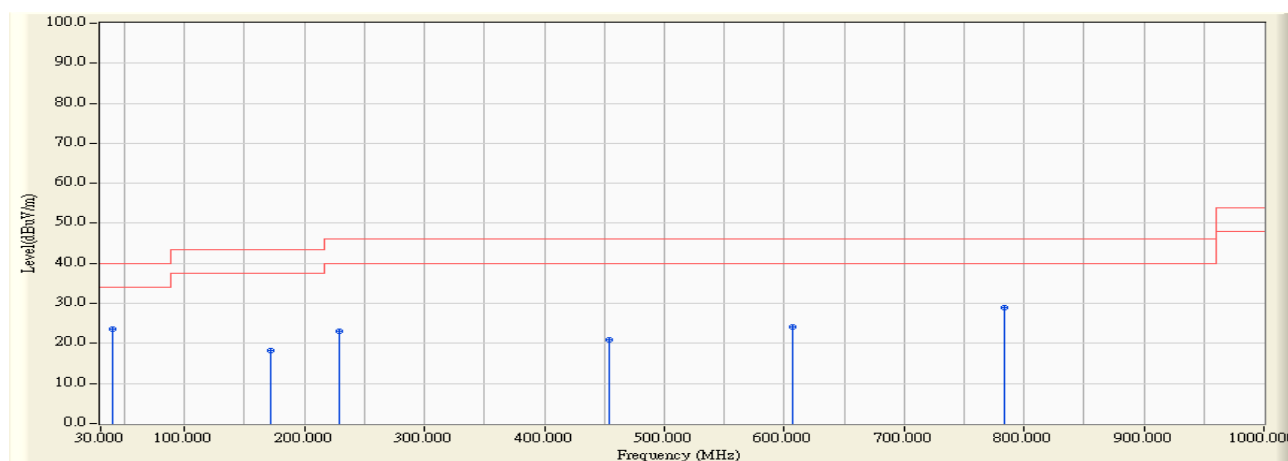


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	74.863	-26.098	52.767	26.669	-13.331	40.000	QUASIPeak
2		172.954	-22.517	46.113	23.596	-19.924	43.520	QUASIPeak
3		288.020	-19.367	47.613	28.246	-17.774	46.020	QUASIPeak
4		327.062	-18.112	48.333	30.221	-15.799	46.020	QUASIPeak
5		575.989	-12.458	37.187	24.729	-21.291	46.020	QUASIPeak
6		758.591	-10.848	35.252	24.405	-21.615	46.020	QUASIPeak

Note:

1. All Reading Levels are Quasi-Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB4-H	Time : 2018/06/29
Limit : FCC_SpartC_15.209_03M_QP	Margin : 6
Probe : CB4_FCC_EFS_S2_30M-1GHz_1116 - HORIZONTAL	Power : DC 11.1V (Power by Battery)
EUT : Wireless Programming Tool	Note : Mode 2: Transmit_Power by Battery

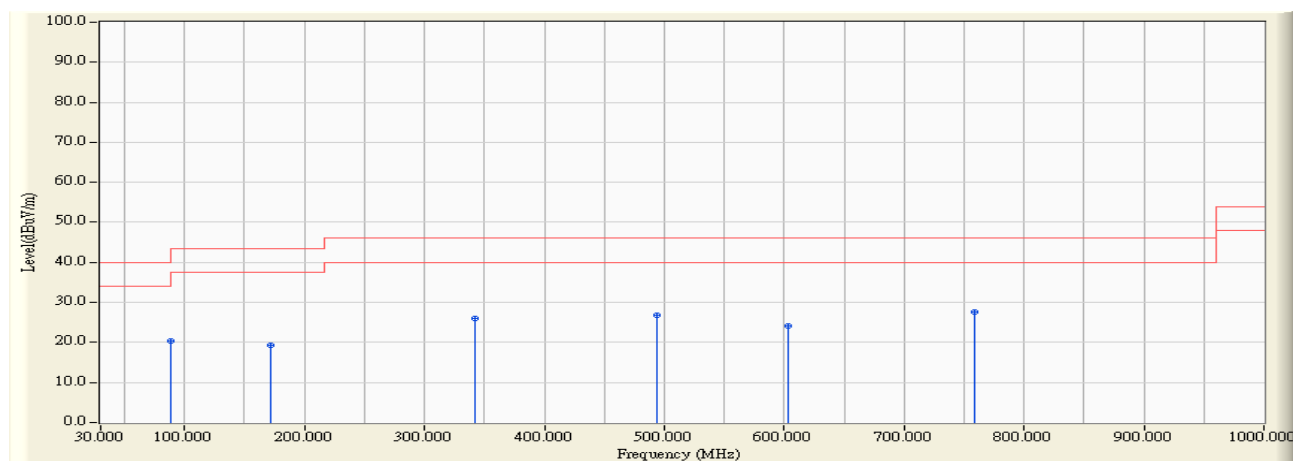


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	39.943	-16.355	40.081	23.726	-16.274	40.000	QUASIPeAK
2		171.984	-22.361	40.563	18.203	-25.317	43.520	QUASIPeAK
3		229.578	-20.654	43.675	23.021	-22.999	46.020	QUASIPeAK
4		453.769	-14.327	35.236	20.909	-25.111	46.020	QUASIPeAK
5		606.422	-11.709	35.784	24.075	-21.945	46.020	QUASIPeAK
6		784.054	-11.226	40.244	29.018	-17.002	46.020	QUASIPeAK

Note:

1. All Reading Levels are Quasi-Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB4-H	Time : 2018/06/29
Limit : FCC_SpartC_15.209_03M_QP	Margin : 6
Probe : CB4 FCC EFS_S2_30M-1GHz_1116 - VERTICAL	Power : DC 11.1V (Power by Battery)
EUT : Wireless Programming Tool	Note : Mode 2: Transmit_Power by Battery



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		89.049	-24.154	44.474	20.320	-23.200	43.520	QUASIPeAK
2		171.984	-22.361	41.644	19.284	-24.236	43.520	QUASIPeAK
3		342.461	-17.771	43.887	26.116	-19.904	46.020	QUASIPeAK
4		494.024	-14.894	41.750	26.856	-19.164	46.020	QUASIPeAK
5		603.755	-11.780	35.842	24.062	-21.958	46.020	QUASIPeAK
6	*	758.591	-10.848	38.349	27.502	-18.518	46.020	QUASIPeAK

Note:

1. All Reading Levels are Quasi-Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.