

FCC Part 15C Measurement and Test Report

For

Shenzhen Reiie intelligent technology Co., Itd

401, 4F, NO.1 Building, Zhongkenuo Industry park, Hezhou development

Zone, Xixiang Street, Bao'an District, Shenzhen City, China

FCC ID: 2AJU3RT719

FCC Rule(s): FCC Part 15.249

Product Description: Mini Wireless keyboard Mouse Combo

Tested Model: MX9

Report No.: <u>STR180583461</u>

Sample Receipt Date: 2018-05-30

Tested Date: <u>2018-05-31 to 2018-06-15</u>

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Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by Shenzhen SEM.Test Technology Co., Ltd.



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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: Shenzhen Reiie intelligent technology Co., ltd

Address of applicant: 401, 4F, NO.1 Building, Zhongkenuo Industry park,

Hezhou development Zone, Xixiang Street, Bao'an

District, Shenzhen City, China

Manufacturer: Shenzhen Reiie intelligent technology Co., Itd

Address of manufacturer: 401, 4F, NO.1 Building, Zhongkenuo Industry park,

Hezhou development Zone, Xixiang Street, Bao'an

District, Shenzhen City, China

Mini Wireless keyboard Mouse Combo
/
MX9
MX9+, RT719, RT719+, 719, MX9S, R719S,
ZW-719, ZW-719+, ZW-MX9, ZW-MX9+
DC 3.7V
/

Note: The test data is gathered from a production sample, provided by the manufacturer. The appearance of others models listed in the report is different from main-test model MX9, but the circuit and the electronic construction do not change, declared by the manufacturer.

Technical Characteristics of EUT	
Frequency Range:	2404-2479MHz
Max. Field Strength:	95.83 dBuV/m
Modulation:	GFSK
Antenna Type:	PCB Antenna
Antenna Gain:	0 dBi
Lowest Internal Frequency of EUT:	16MHz

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1.2 Test Standards

The following report is prepared on behalf of the Shenzhen Reiie intelligent technology Co., ltd in accordance with FCC Part 15, Subpart B, Subpart C, and section 15.107, 15.203, 15.205, 15.207, 15.209 and 15.249 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15, Subpart C, and section 15.107,15.203, 15.205, 15.207, 15.209 and 15.249 of the Federal Communication Commissions rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which results in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard for Testing Unlicensed Wireless Devices, and ANSI C63.4-2014, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

1.4 Test Facility

FCC – Registration No.: 125990

Shenzhen SEM Test Technology Co., Ltd. Laboratory has been recognized to perform compliance testing on equipment subject to the Commissions Declaration Of Conformity (DOC). The Designation Number is CN5010, and Test Firm Registration Number is 125990.

Industry Canada (IC) Registration No.: 11464A

The 3m Semi-anechoic chamber of Shenzhen SEM.Test Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

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1.5 EUT Setup and Test Mode

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List					
Test Mode	Description	Remark			
TM1	Low Channel	2404MHz			
TM2	Middle Channel	2444MHz			
TM3	High Channel	2479MHz			

Special Cable List and Details							
Cable Description Length (m) Shielded/Unshielded With / Without Ferrite							
/ /		/	/				

Auxiliary Equipment List and Details							
Description Manufacturer Model Serial Number							
/	/	/	/				

1.6 Measurement Uncertainty

Measurement uncertainty						
Parameter	Conditions	Uncertainty				
RF Output Power	Conducted	±0.42dB				
Occupied Bandwidth	Conducted					
Conducted Spurious Emission	Conducted	±2.17dB				
Conducted Emissions	Conducted	9-150kHz ±3.74dB				
Conducted Emissions	Conducted	$0.15-30 \text{MHz} \pm 3.34 \text{dB}$				
		±0.42dB ±1.5% ±2.17dB 9-150kHz ±3.74dB 0.15-30MHz ±3.34dB 30-200MHz ±4.52dB				
Transmitter Spyrious Emissions	Radiated	0.2-1GHz ±5.56dB				
Transmitter Spurious Emissions	Radiated	1-6GHz ±3.84dB				
		6-18GHz ±3.92dB				

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1.7 Test Equipment List and Details

No.	Description	Manufacturer	Model	Serial No.	Cal Date	Due Date
SEMT-1072	Spectrum Analyzer	Agilent	E4407B	MY41440400	2018-05-22	2019-05-21
SEMT-1031	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2018-05-22	2019-05-21
SEMT-1007	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2018-05-22	2019-05-21
SEMT-1008	Amplifier	Agilent	8447F	3113A06717	2018-05-22	2019-05-21
SEMT-1043	Amplifier	C&D	PAP-1G18	2002	2018-05-22	2019-05-21
SEMT-1011	Broadband Antenna	Schwarz beck	VULB9163	9163-333	2017-06-08	2020-06-07
SEMT-1042	Horn Antenna	ETS	3117	00086197	2017-06-08	2020-06-07
SEMT-1121	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170582	2017-06-08	2020-06-07
SEMT-1069	Loop Antenna	Schwarz beck	FMZB 1516	9773	2017-06-08	2020-06-07
SEMT-1001	EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2018-05-22	2019-05-21
SEMT-1003	L.I.S.N	Schwarz beck	NSLK8126	8126-224	2018-05-22	2019-05-21
SEMT-1002	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2018-05-22	2019-05-21
SEMT-1168	Pre-amplifier	Direction Systems Inc.	PAP-0126	14141-12838	2018-05-22	2019-05-21
SEMT-1169	Pre-amplifier	Direction Systems Inc.	PAP-2640	14145-14153	2018-05-22	2019-05-21
SEMT-1163	Spectrum Analyzer	Rohde & Schwarz	FSP40	100612	2018-05-22	2019-05-21
SEMT-1170	DRG Horn Antenna	A.H. SYSTEMS	SAS-574	571	2018-03-19	2021-03-18



2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§ 15.203	Antenna Requirement	Compliant
§15.205	Restricted Band of Operation	N/A
§ 15.207(a)	Conducted Emission	Compliant
§ 15.209(a)(f)	Radiated Spurious Emissions	Compliant
§15.249(a)	Field Strength of Emissions	Compliant
§15.249(d)	Out of Band Emission	Compliant
§15.215 (c)	Emission Bandwidth Con	



3. Antenna Requirements

3.1 Standard Applicable

According to FCC Part 15.203, 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 shall be considered sufficient to comply with the provisions of this section.

3.2 Test Result

This product has an integral antenna, fulfill the requirement of this section.

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4. Radiated Emissions

4.1 Standard Applicable

According to §15.249(a), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field strength of fundamental	Field strength of Harmonics
	(milli-volts/meter)	(micro-volts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply. Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.

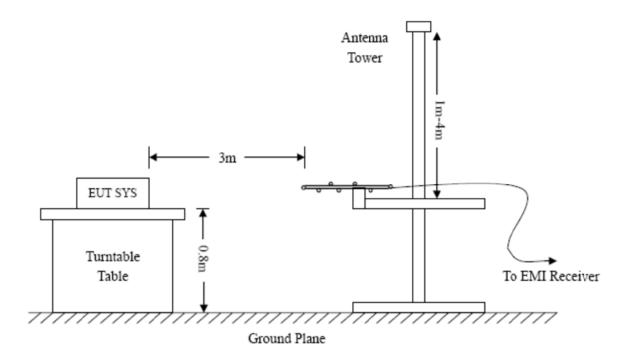
4.2 Test Procedure

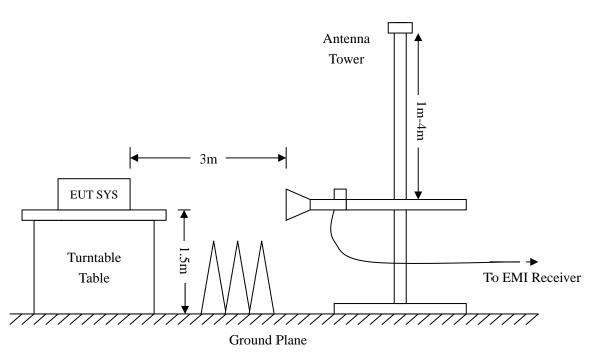
The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.205 15.249(a) and FCC Part 15.209 Limit.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle. The spacing between the peripherals was 10 cm.

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Frequency:9kHz-30MHz

RBW=10KHz,

VBW = 30KHz

Sweep time= Auto

 $Trace = max \ hold$

 $Detector\ function = peak$

Frequency:30MHz-1GHz

RBW=120KHz,

VBW=300KHz

Sweep time= Auto

Trace = max hold

Detector function = peak, QP

Frequency : Above 1GHz

RBW=1MHz,

VBW=3MHz(Peak), 10Hz(AV)

Sweep time= Auto

 $Trace = max \ hold$

Detector function = peak, AV



4.3 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Ant. Factor + Cable Loss - Ampl. Gain

The "Margin" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of $-6dB\mu V$ means the emission is $6dB\mu V$ below the maximum limit. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – FCC Part 15C Limit

4.4 Environmental Conditions

Temperature:	24 °C
Relative Humidity:	60 %
ATM Pressure:	1012 mbar

4.5 Summary of Test Results/Plots

According to the data below, the FCC Part 15.205, 15.209 and 15.249 standards, and had the worst margin of:

-17.12 dB at 929.0082 MHz in the Vertical polarization, Low Channel of Antenna 1, 9 kHz to 25 GHz, 3Meters

Note: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.

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Plot of Radiated Emissions Test Data (30MHz to 1GHz)

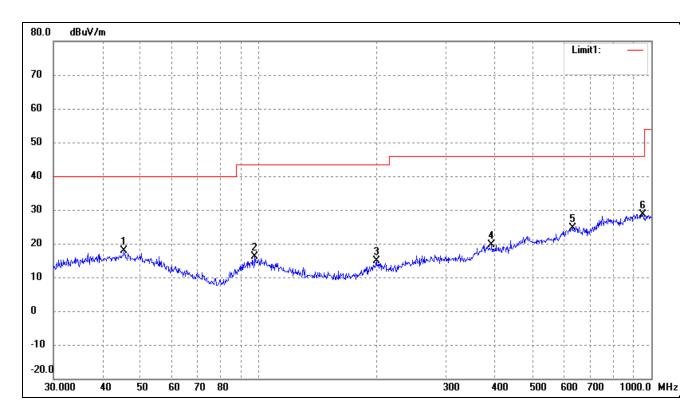
EUT: Mini Wireless keyboard Mouse Combo

Tested Model: MX9

Operating Condition: Transmitting Low Channel (2404MHz)

Comment: DC 3.7V

Test Specification: Horizontal

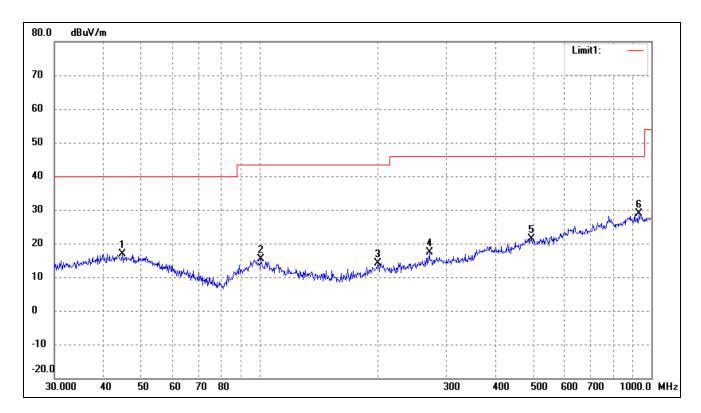


No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	()	(cm)	
1	45.3755	28.42	-10.60	17.82	40.00	-22.18	248	100	peak
2	97.7983	27.99	-11.88	16.11	43.50	-27.39	92	100	peak
3	199.2855	26.53	-11.69	14.84	43.50	-28.66	254	100	peak
4	392.0951	26.89	-7.36	19.53	46.00	-26.47	114	100	peak
5	629.4772	27.64	-2.99	24.65	46.00	-21.35	189	100	peak
6	952.0937	26.84	1.85	28.69	46.00	-17.31	295	100	peak

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Test Specification: Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	()	(cm)	
1	44.7434	27.25	-10.44	16.81	40.00	-23.19	231	100	peak
2	100.9340	26.77	-11.51	15.26	43.50	-28.24	91	100	peak
3	200.6881	25.76	-11.63	14.13	43.50	-29.37	201	100	peak
4	271.3246	27.09	-9.76	17.33	46.00	-28.67	115	100	peak
5	494.1984	27.42	-5.95	21.47	46.00	-24.53	204	100	peak
6	929.0082	26.88	2.00	28.88	46.00	-17.12	132	100	peak

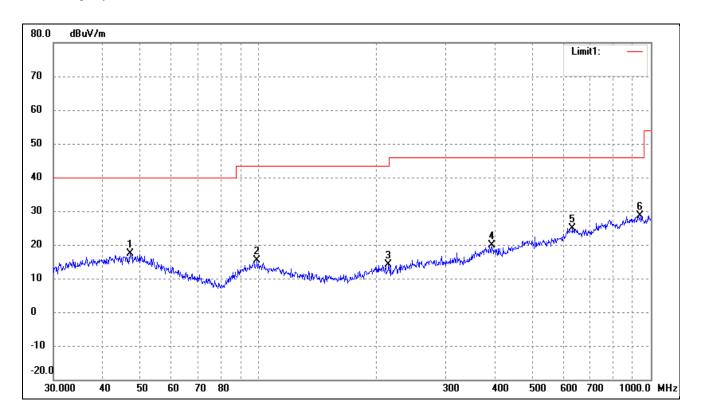




Operating Condition: Transmitting Middle Channel (2444MHz)

Comment: DC 3.7V

Test Specification: Horizontal

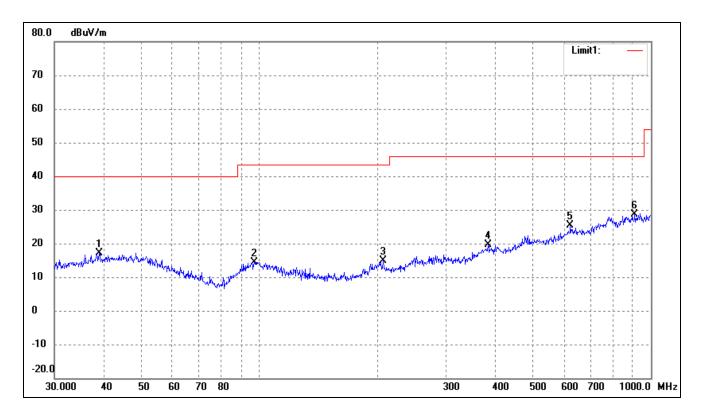


No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	()	(cm)	
1	46.9948	28.05	-10.64	17.41	40.00	-22.59	225	100	peak
2	99.1797	27.02	-11.58	15.44	43.50	-28.06	101	100	peak
3	214.5143	26.44	-12.24	14.20	43.50	-29.30	72	100	peak
4	393.4724	27.35	-7.41	19.94	46.00	-26.06	230	100	peak
5	631.6884	27.99	-3.03	24.96	46.00	-21.04	342	100	peak
6	938.8326	26.24	2.27	28.51	46.00	-17.49	256	100	peak

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Test Specification: Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	()	(cm)	
1	39.0245	27.74	-10.63	17.11	40.00	-22.89	94	100	peak
2	97.1148	26.51	-12.04	14.47	43.50	-29.03	208	100	peak
3	207.1226	26.92	-11.92	15.00	43.50	-28.50	71	100	peak
4	383.9318	26.83	-7.12	19.71	46.00	-26.29	186	100	peak
5	622.8900	28.19	-2.85	25.34	46.00	-20.66	106	100	peak
6	909.6667	26.96	1.57	28.53	46.00	-17.47	333	100	peak

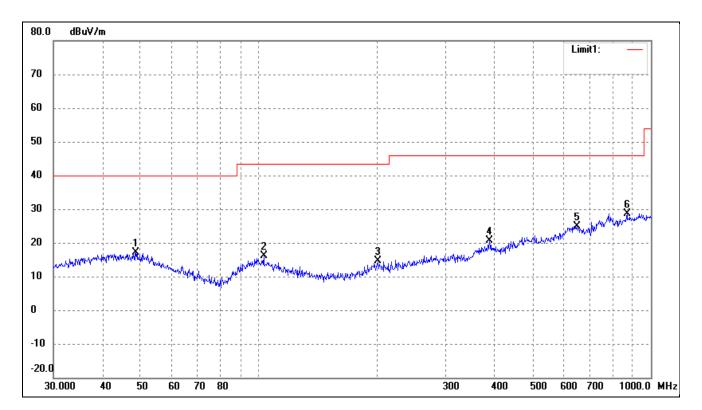




Operating Condition: Transmitting High Channel (2479MHz)

Comment: DC:3.7V

Test Specification: Horizontal

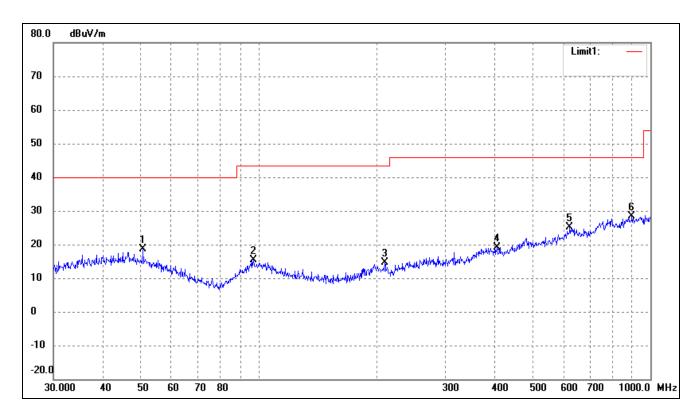


No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	()	(cm)	
1	48.6719	27.84	-10.68	17.16	40.00	-22.84	112	100	peak
2	103.0800	27.86	-11.75	16.11	43.50	-27.39	177	100	peak
3	201.3930	26.38	-11.66	14.72	43.50	-28.78	145	100	peak
4	387.9920	27.76	-7.24	20.52	46.00	-25.48	114	100	peak
5	647.3856	28.25	-3.39	24.86	46.00	-21.14	247	100	peak
6	869.1302	27.48	1.26	28.74	46.00	-17.26	291	100	peak

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Test Specification: Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	()	(cm)	
1	50.7637	29.32	-10.65	18.67	40.00	-21.33	99	100	peak
2	97.1148	27.33	-12.04	15.29	43.50	-28.21	97	100	peak
3	210.0482	26.57	-12.04	14.53	43.50	-28.97	143	100	peak
4	406.0880	26.90	-7.70	19.20	46.00	-26.80	123	100	peak
5	622.8900	27.99	-2.85	25.14	46.00	-20.86	111	100	peak
6	896.9965	27.02	1.41	28.43	46.00	-17.57	166	100	peak





Spurious Emissions Above 1GHz

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	H/V	
			Low Channe	el-2404MHz			•
2404	97.33	-3.59	93.74	114	-20.26	Н	PK
2404	79.90	-3.59	76.31	94	-17.69	Н	AV
4808	48.74	-3.59	45.15	74	-28.85	Н	PK
4808	40.36	-3.59	36.77	54	-17.23	Н	AV
7212	40.24	-0.52	39.72	74	-34.28	Н	PK
7212	31.95	-0.52	31.43	54	-22.57	Н	AV
2404	99.42	-3.59	95.83	114	-18.17	V	PK
2404	75.95	-3.59	72.36	94	-21.64	V	AV
4808	47.42	-3.59	43.83	74	-30.17	V	PK
4808	39.00	-3.59	35.41	54	-18.59	V	AV
7212	40.56	-0.52	40.04	74	-33.96	V	PK
7212	33.27	-0.52	32.75	54	-21.25	V	AV
			Middle Chan	nel-2444MHz			
2444	97.92	-3.59	94.33	114	-19.67	Н	PK
2444	77.82	-3.59	74.23	94	-19.77	Н	AV
4888	48.10	-3.49	44.61	74	-29.39	Н	PK
4888	37.67	-3.49	34.18	54	-19.82	Н	AV
7332	42.98	-0.47	42.51	74	-31.49	Н	PK
7332	32.09	-0.47	31.62	54	-22.38	Н	AV
2444	99.08	-3.59	95.49	114	-18.51	V	PK
2444	79.93	-3.59	76.34	94	-17.66	V	AV
4888	49.77	-3.49	46.28	74	-27.72	V	PK
4888	37.65	-3.49	34.16	54	-19.84	V	AV
7332	39.72	-0.47	39.25	74	-34.75	V	PK
7332	30.80	-0.47	30.33	54	-23.67	V	AV





Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	H/V	
			High Chann	el-2479MHz			
2479	94.78	-3.59	91.19	114	-22.81	Н	PK
2479	75.87	-3.59	72.28	94	-21.72	Н	AV
4958	49.83	-3.41	46.42	74	-27.58	Н	PK
4958	37.28	-3.41	33.87	54	-20.13	Н	AV
7437	44.73	-0.42	44.31	74	-29.69	Н	PK
7437	33.21	-0.42	32.79	54	-21.21	Н	AV
2479	96.75	-3.59	93.16	114	-20.84	V	PK
2479	73.68	-3.59	70.09	94	-23.91	V	AV
4958	48.69	-3.41	45.28	74	-28.72	V	PK
4958	35.94	-3.41	32.53	54	-21.47	V	AV
7437	41.80	-0.42	41.38	74	-32.62	V	PK
7437	33.02	-0.42	32.60	54	-21.40	V	AV

Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, which above 5th Harmonics are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured. The measurements greater than 20dB below the limit from 9kHz to 30MHz..



5. Out of Band Emissions

5.1 Standard Applicable

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

5.2 Test Procedure

As the radiation test, set the Lowest and Highest Transmitting Channel, observed the outside band of 2400MHz to 2483.5MHz, than mark the higher-level emission for comparing with the FCC rules.

5.3 Environmental Conditions

Temperature:	24 °C
Relative Humidity:	60 %
ATM Pressure:	1012 mbar

5.4 Summary of Test Results/Plots

Tratana da	Frequency	Limit	D14	
Test mode	MHz	dBuV / dBc	Result	
	2310.00	<54 dBuV	Pass	
Lowest	2390.00	<54 dBuV	Pass	
	2400.00	<54 dBuV	Pass	
II: -14	2483.50	<54 dBuV	Pass	
Highest	2500.00	<54 dBuV	Pass	

The edge emissions are below the FCC 15.209 Limits or complies with the 15.249 requirements.

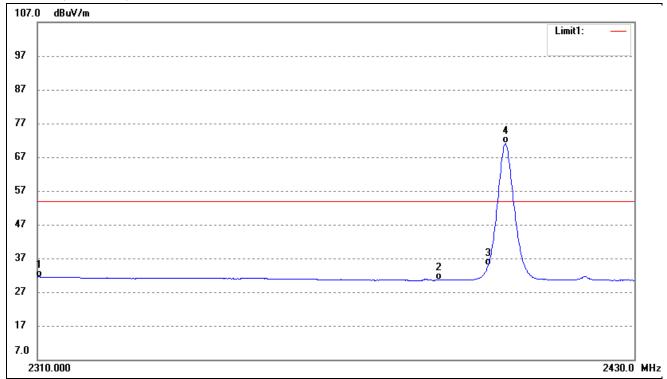
Please refer to the test plots as below.

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Lowest Bandedge

Vertical (Worst case)

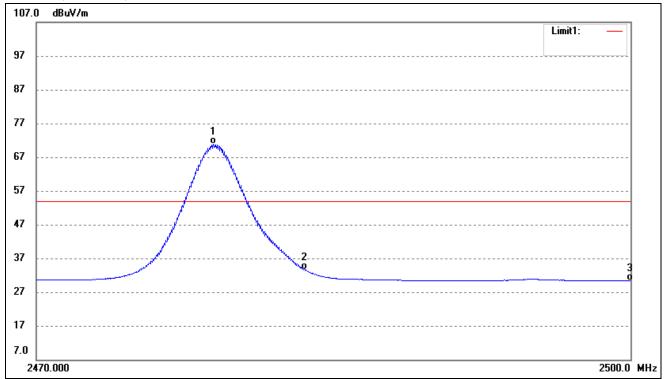


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2310.000	37.87	-6.38	31.49	54.00	-22.51	Ave Detector
	2310.000	51.00	-6.38	44.62	74.00	-29.38	Peak Detector
2	2390.000	37.83	-7.26	30.57	54.00	-23.43	Ave Detector
	2390.000	65.83	-7.26	58.57	74.00	-15.43	Peak Detector
3	2400.000	42.18	-7.37	34.81	54.00	-19.19	Ave Detector
	2400.000	80.35	-7.37	72.98	74.00	-1.02	Peak Detector



Highest Bandedge

Vertical (Worst case)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2478.902	78.10	-7.28	70.82	/	/	Ave Detector
	2478.633	107.56	-7.28	100.28	/	/	Peak Detector
2	2483.500	41.00	-7.28	33.72	54.00	-20.28	Ave Detector
	2483.500	71.03	-7.28	63.75	74.00	-10.25	Peak Detector
3	2500.000	37.59	-7.25	30.34	54.00	-23.66	Ave Detector
	2500.000	64.80	-7.25	57.55	74.00	-16.45	Peak Detector



6. Emission Bandwidth

6.1 Standard Applicable

According to 15.215 (c), intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

6.2 Test Procedure

According to the ANSI 63.10-2013, the emission bandwidth test method as follows.

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

Set span = 1MHz, centered on a transmitting channel

RBW ≥1% 20dB Bandwidth, VBW ≥RBW

Sweep = auto

Detector function = peak

Trace = max hold

All the trace to stabilize, use the marker-to-peak function to set the marker to the peak of the emission, use the marker-delta function to measure and record the 20dB down and 99% bandwidth of the emission.

6.3 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	53%
ATM Pressure:	1018 mbar

6.4 Summary of Test Results/Plots

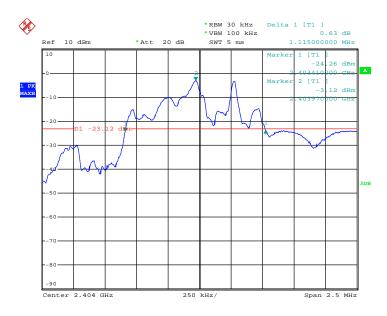
Channel	Frequency	20dB Bandwidth
	MHz	kHz
Low Channel	2404	1115
Middle Channel	2444	1110
High Channel	2479	1285

Please refer to the following test plots

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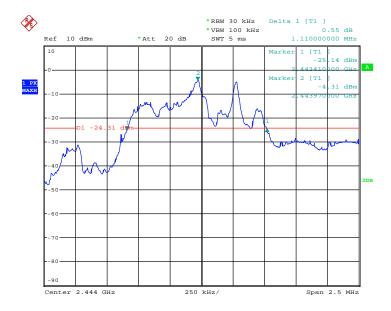


Low Channel:



Date: 15.JUN.2018 11:53:57

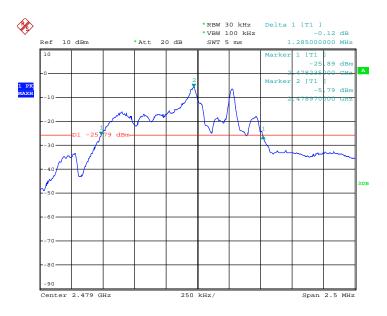
Middle Channel:



Date: 15.JUN.2018 11:55:19



High Channel:



Date: 15.JUN.2018 12:01:34

***** END OF REPORT *****