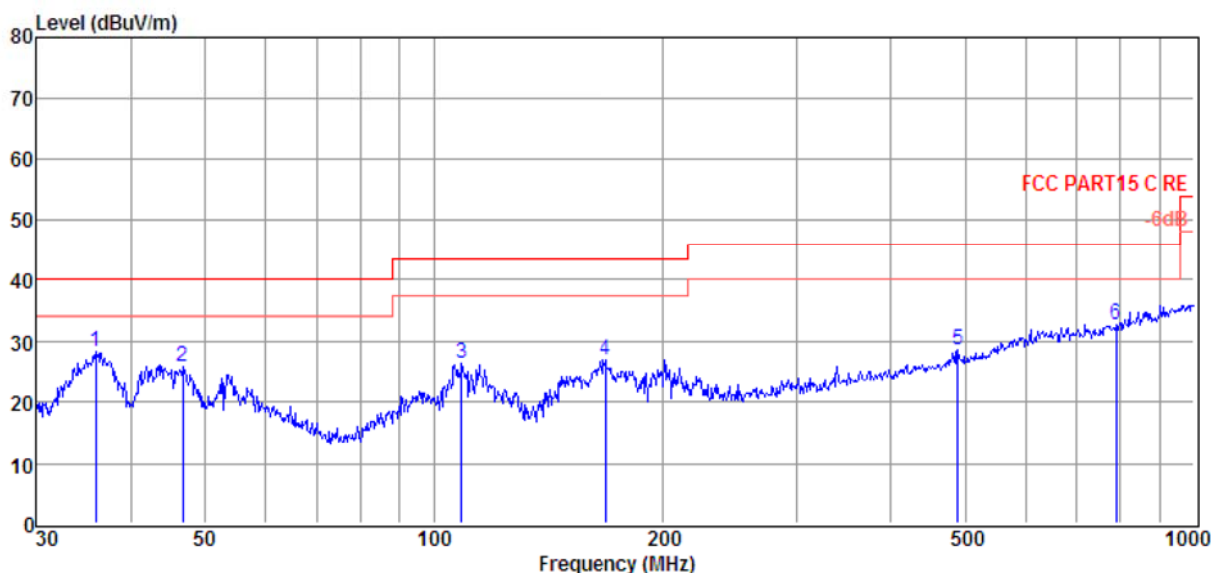


## Radiated Emission test (below 1GHz)

**TR-4-E-009 Radiated Emission Test Result**

**Test Site** : DDT 3m Chamber 1# **D:\2017 RE1# Report Data\Q17080804-080\RF-FCC IC 30M-1G.EM6**  
**Test Date** : 2017-09-12 **Tested By** : Jerry  
**EUT** : Roadie 2 **Model Number** : RD200  
**Power Supply** : AC 120V/60Hz **Test Mode** : TX mode  
**Condition** : Temp:24.5°C,Humi:55%,  
 Press:100.1kPa **Antenna/Distance** : 2016 VULB9163 1#/3m/VERTICAL  
**Memo** :

Data: 1



Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	35.88	12.50	11.98	3.74	28.22	40.00	-11.78	Peak	VERTICAL
2	46.67	9.72	12.23	3.86	25.81	40.00	-14.19	Peak	VERTICAL
3	108.65	10.81	11.16	4.35	26.32	43.50	-17.18	Peak	VERTICAL
4	168.41	13.98	8.34	4.71	27.03	43.50	-16.47	Peak	VERTICAL
5	489.03	5.43	17.10	6.13	28.66	46.00	-17.34	Peak	VERTICAL
6	790.62	4.71	20.92	7.09	32.72	46.00	-13.28	Peak	VERTICAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.

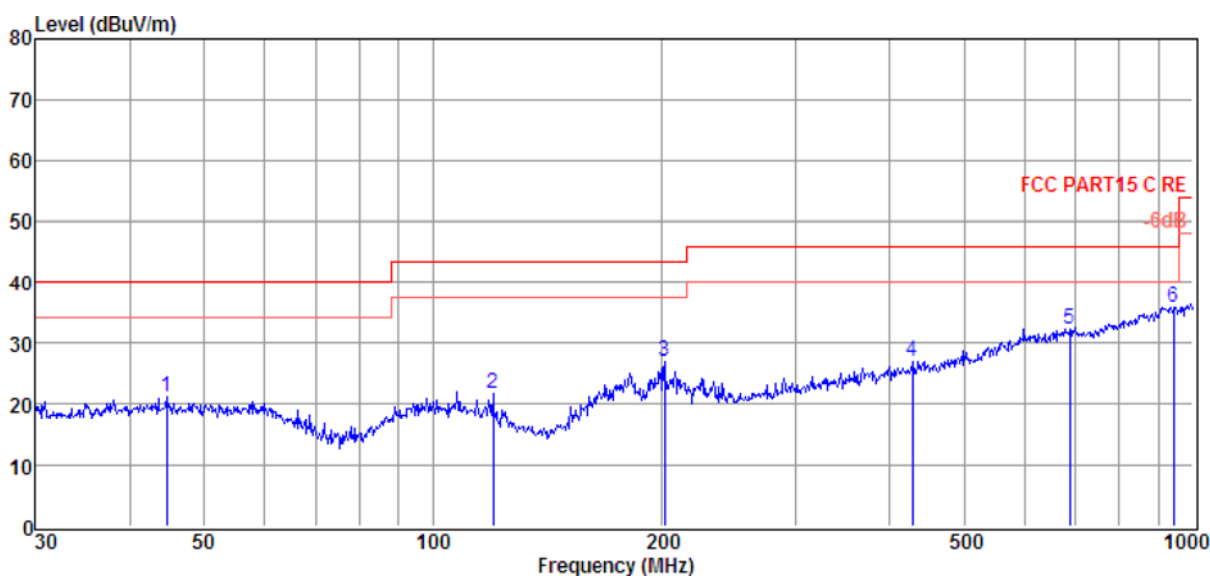
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.

3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

## TR-4-E-009 Radiated Emission Test Result

<b>Test Site</b>	: DDT 3m Chamber 1#	D:\2017 RE1# Report Data\Q17080804-08O\RF-FCC IC 30M-1G.EM6
<b>Test Date</b>	: 2017-09-12	<b>Tested By</b> : Jerry
<b>EUT</b>	: Roadie 2	<b>Model Number</b> : RD200
<b>Power Supply</b>	: AC 120V/60Hz	<b>Test Mode</b> : TX mode
<b>Condition</b>	: Temp:24.5°C,Humi:55%, Press:100.1kPa	<b>Antenna/Distance</b> : 2016 VULB9163 1#/3m/HORIZONTAL
<b>Memo</b>	:	

Data: 2



Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	44.59	5.12	12.34	3.84	21.30	40.00	-18.70	Peak	HORIZONTAL
2	119.86	7.98	9.33	4.42	21.73	43.50	-21.77	Peak	HORIZONTAL
3	202.10	11.60	10.43	4.91	26.94	43.50	-16.56	Peak	HORIZONTAL
4	428.02	4.73	16.22	5.90	26.85	46.00	-19.15	Peak	HORIZONTAL
5	689.56	5.53	19.80	6.80	32.13	46.00	-13.87	Peak	HORIZONTAL
6	942.13	5.31	22.96	7.53	35.80	46.00	-10.20	Peak	HORIZONTAL

- Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.  
 2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.  
 3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

**Radiated Emission test (above 1GHz)**

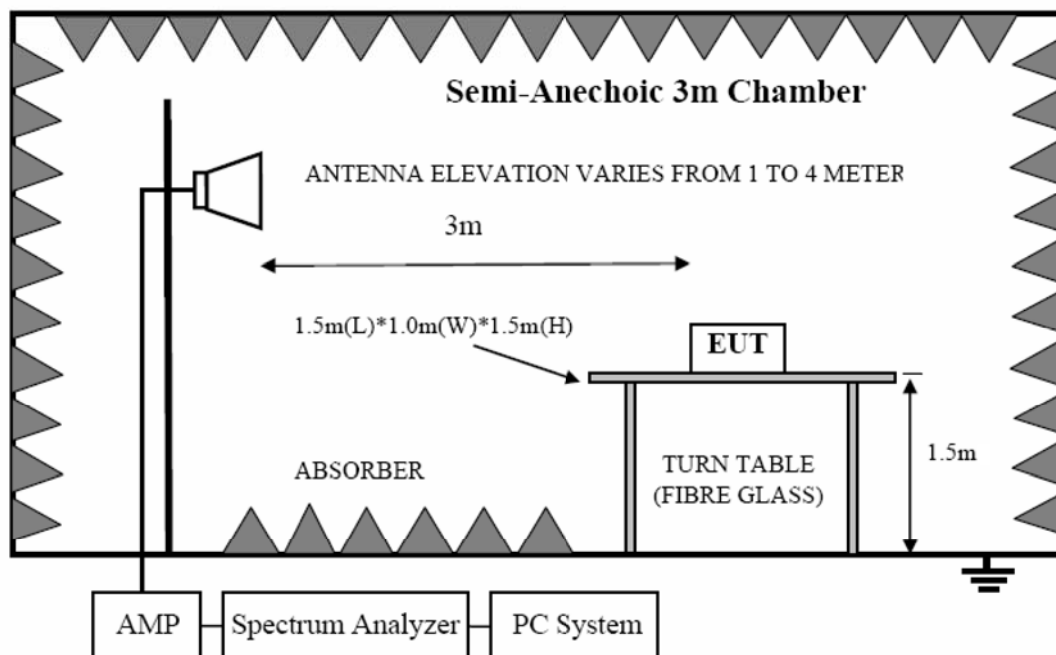
Freq. (MHz)	Read level (dB $\mu$ V)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Detector type	Polarization
GFSK Tx mode 2402MHz									
4825.00	34.55	33.73	29.32	8.50	47.46	74.00	-26.54	Peak	HORIZONTAL
6474.00	34.35	35.76	29.78	9.93	50.26	74.00	-23.74	Peak	HORIZONTAL
8004.00	34.21	36.69	31.13	11.13	50.90	74.00	-23.10	Peak	HORIZONTAL
9585.00	34.09	36.49	32.71	12.37	50.24	74.00	-23.76	Peak	HORIZONTAL
11319.00	33.50	37.09	34.38	13.54	49.75	74.00	-24.25	Peak	HORIZONTAL
12866.00	33.77	38.67	35.64	14.66	51.46	74.00	-22.54	Peak	HORIZONTAL
4111.00	34.63	33.49	29.06	7.71	46.77	74.00	-27.23	Peak	VERTICAL
6576.00	33.58	35.86	29.97	10.01	49.48	74.00	-24.52	Peak	VERTICAL
7409.00	34.93	36.53	30.67	10.78	51.57	74.00	-22.43	Peak	VERTICAL
9415.00	33.70	36.58	32.57	12.26	49.97	74.00	-24.03	Peak	VERTICAL
11166.00	33.00	37.43	34.21	13.52	49.74	74.00	-24.26	Peak	VERTICAL
11965.00	33.11	37.54	34.78	14.18	50.05	74.00	-23.95	Peak	VERTICAL
GFSK Tx mode 2440MHz									
4009.00	34.50	33.41	29.04	7.61	46.48	74.00	-27.52	Peak	HORIZONTAL
4944.00	34.00	33.71	29.34	8.63	47.00	74.00	-27.00	Peak	HORIZONTAL
6355.00	35.00	35.57	29.54	9.87	50.90	74.00	-23.10	Peak	HORIZONTAL
7800.00	34.71	36.66	31.04	11.02	51.35	74.00	-22.65	Peak	HORIZONTAL
9891.00	34.26	36.79	32.88	12.42	50.59	74.00	-23.41	Peak	HORIZONTAL
12050.00	34.02	37.67	34.82	14.26	51.13	74.00	-22.87	Peak	HORIZONTAL
4944.00	34.08	33.71	29.34	8.63	47.08	74.00	-26.92	Peak	VERTICAL
6474.00	33.12	35.76	29.78	9.93	49.03	74.00	-24.97	Peak	VERTICAL
8021.00	34.82	36.64	31.17	11.16	51.45	74.00	-22.55	Peak	VERTICAL
9364.00	34.21	36.69	32.52	12.22	50.60	74.00	-23.40	Peak	VERTICAL
11914.00	32.04	37.45	34.77	14.11	48.83	74.00	-25.17	Peak	VERTICAL
13036.00	33.62	38.84	35.67	14.68	51.47	74.00	-22.53	Peak	VERTICAL
GFSK Tx mode 2480MHz									
4009.00	34.56	33.41	29.04	7.61	46.54	74.00	-27.46	Peak	HORIZONTAL
5454.00	33.07	34.61	29.28	9.14	47.54	74.00	-26.46	Peak	HORIZONTAL
7001.00	34.34	36.20	30.39	10.44	50.59	74.00	-23.41	Peak	HORIZONTAL
9075.00	33.82	37.33	32.35	11.89	50.69	74.00	-23.31	Peak	HORIZONTAL
10945.00	32.54	37.65	33.80	13.39	49.78	74.00	-24.22	Peak	HORIZONTAL
13240.00	34.60	39.04	35.50	14.73	52.87	74.00	-21.13	Peak	HORIZONTAL
4060.00	35.32	33.45	29.05	7.67	47.39	74.00	-26.61	Peak	VERTICAL
6304.00	32.66	35.49	29.49	9.84	48.50	74.00	-25.50	Peak	VERTICAL
7511.00	33.90	36.60	30.78	10.87	50.59	74.00	-23.41	Peak	VERTICAL
9636.00	33.45	36.54	32.75	12.38	49.62	74.00	-24.38	Peak	VERTICAL
10775.00	32.86	37.18	33.59	13.14	49.59	74.00	-24.41	Peak	VERTICAL
12526.00	31.97	38.33	35.26	14.64	49.68	74.00	-24.32	Peak	VERTICAL
Result: Pass									

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.

2. For emissions above 1GHz. If peak results comply with AV limit, AV Result is deemed to comply with AV limit.

## 9. Band Edge Compliance

### 9.1. Block diagram of test setup



### 9.2. Limit

All the lower and upper band-edges emissions appearing within 2310MHz to 2390MHz and 2483.5MHz to 2500MHz restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation frequency band 2400MHz to 2483.5MHz and 5725MHz to 5850MHz shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

### 9.3. Test Procedure

Same with clause 8.3 except change investigated frequency range from 2310MHz to 2415MHz and 2475MHz to 2500MHz.

Remark: All restriction band have been tested, and only the worse case is shown in report.

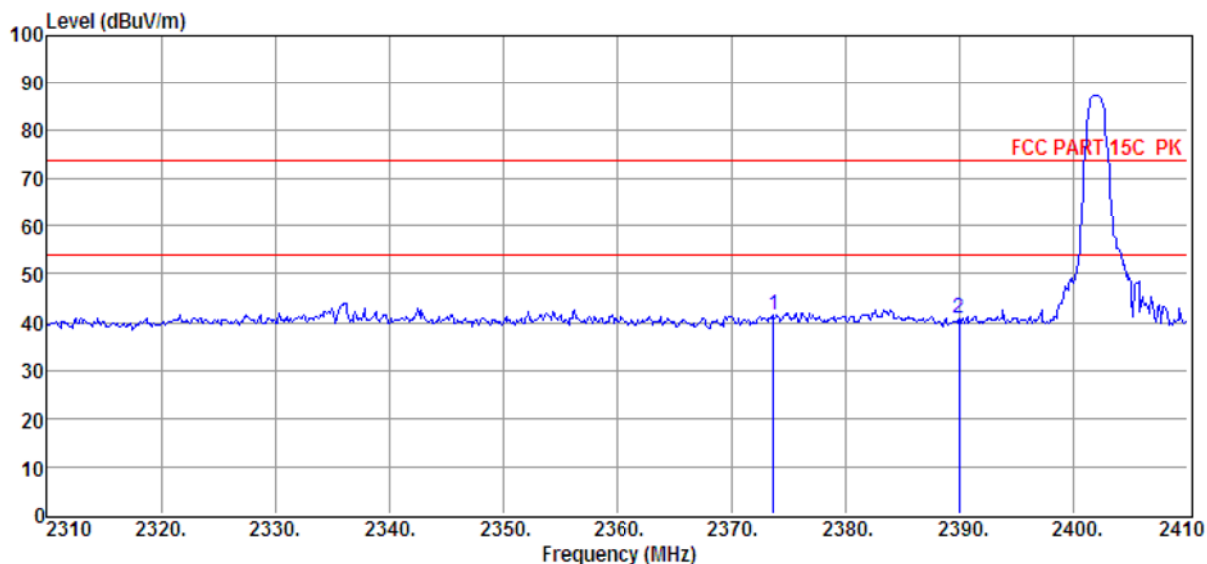
### 9.4. Test result

**PASS.** (See below detailed test result)

## TR-4-E-009 Radiated Emission Test Result

<b>Test Site</b> : DDT 3m Chamber 1#  <b>Test Date</b> : 2017-09-06  <b>EUT</b> : Roadie 2  <b>Power Supply</b> : AC 120V/60Hz  <b>Condition</b> : Temp:24.5°C,Humi:55%, Press:100.1kPa  <b>Memo</b> :	D:\2017 RE1# Report Data\Q17080804-080\RF-FCC IC 1G-18G.EM6  <b>Tested By</b> : Sunny  <b>Model Number</b> : RD200  <b>Test Mode</b> : TX mode 2402MHz  <b>Antenna/Distance</b> : 2016 HF907/3m/HORIZONTAL
---	---

Data: 1



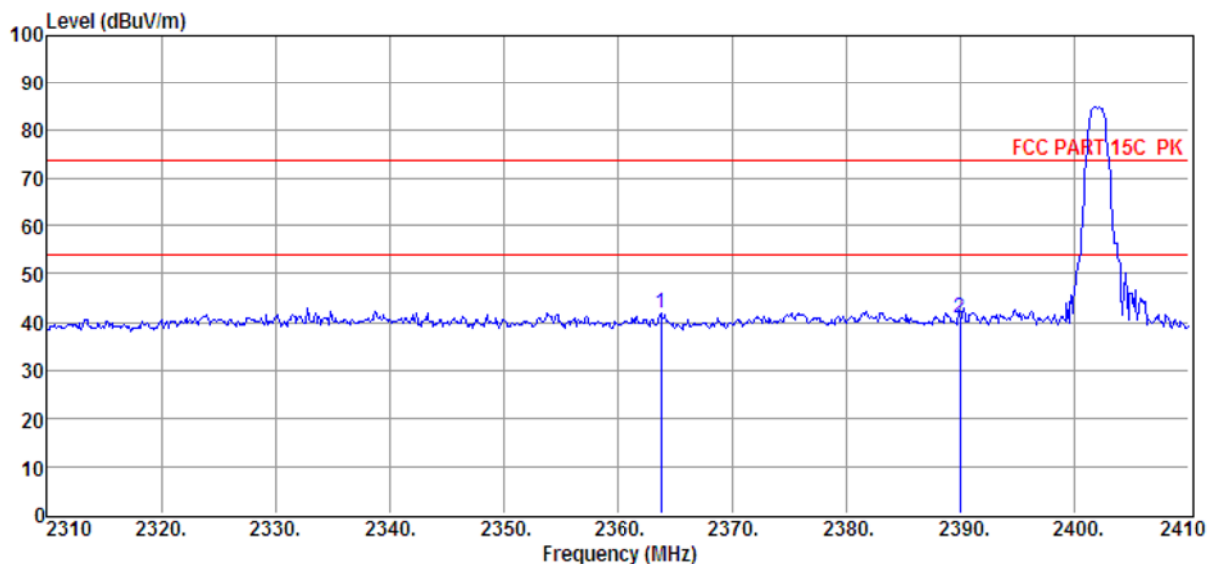
Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2373.70	35.36	29.71	29.39	6.01	41.69	74.00	-32.31	Peak	HORIZONTAL
2	2390.00	34.57	29.78	29.42	6.03	40.96	74.00	-33.04	Peak	HORIZONTAL

- Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.  
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
 3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

## TR-4-E-009 Radiated Emission Test Result

<b>Test Site</b> : DDT 3m Chamber 1#  <b>Test Date</b> : 2017-09-06  <b>EUT</b> : Roadie 2  <b>Power Supply</b> : AC 120V/60Hz  <b>Condition</b> : Temp:24.5°C,Humi:55%, Press:100.1kPa  <b>Memo</b> :	D:\2017 RE1# Report Data\Q17080804-08O\RF-FCC IC 1G-18G.EM6  <b>Tested By</b> : Sunny  <b>Model Number</b> : RD200  <b>Test Mode</b> : TX mode 2402MHz  <b>Antenna/Distance</b> : 2016 HF907/3m/VERTICAL
---	---

Data: 2



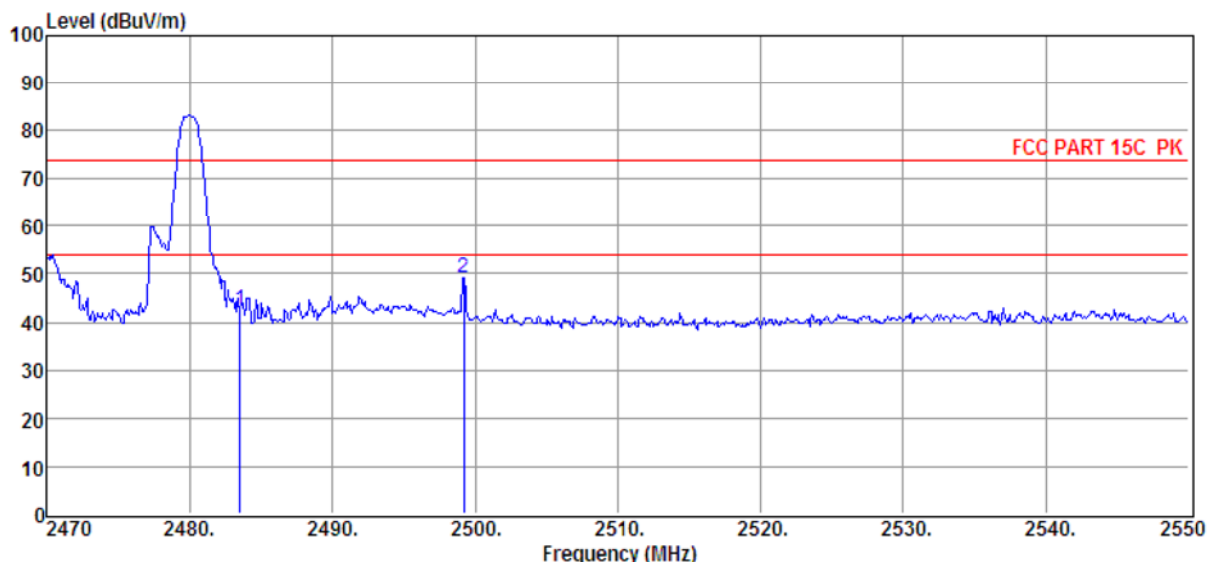
Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2363.80	35.56	29.67	29.35	5.96	41.84	74.00	-32.16	Peak	VERTICAL
2	2390.00	34.42	29.78	29.42	6.03	40.81	74.00	-33.19	Peak	VERTICAL

- Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.  
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
 3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

## TR-4-E-009 Radiated Emission Test Result

<b>Test Site</b> : DDT 3m Chamber 1#  <b>Test Date</b> : 2017-09-06  <b>EUT</b> : Roadie 2  <b>Power Supply</b> : AC 120V/60Hz  <b>Condition</b> : Temp:24.5°C,Humi:55%, Press:100.1kPa  <b>Memo</b> :	D:\2017 RE1# Report Data\Q17080804-080\RF-FCC IC 1G-18G.EM6  <b>Tested By</b> : Sunny  <b>Model Number</b> : RD200  <b>Test Mode</b> : TX mode 2480MHz  <b>Antenna/Distance</b> : 2016 HF907/3m/VERTICAL
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Data: 9



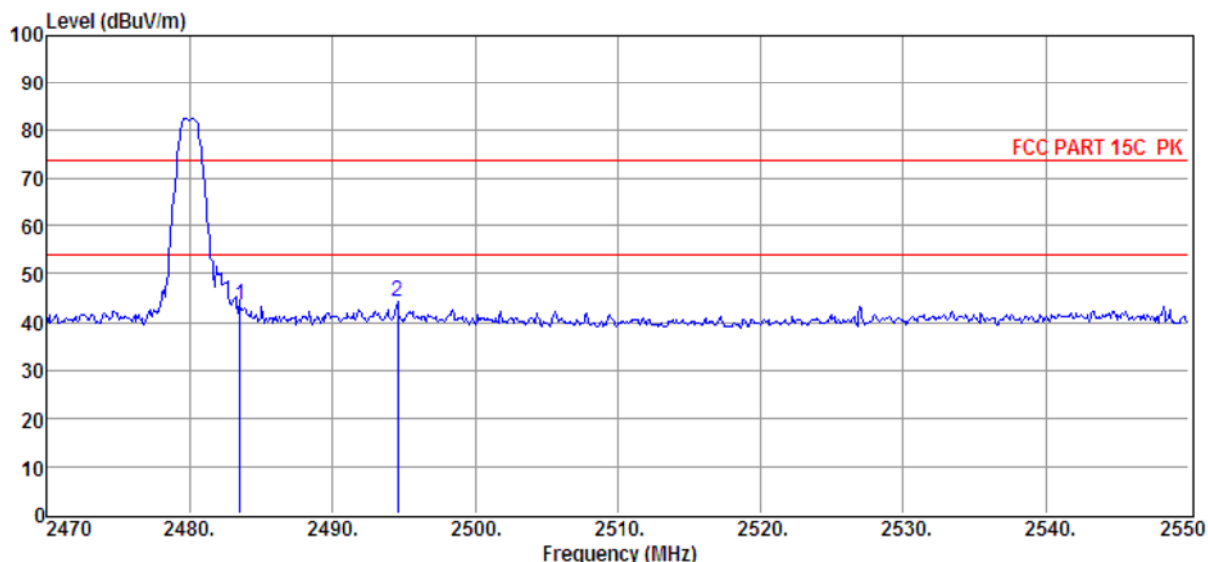
Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2483.50	36.07	30.14	29.71	6.13	42.63	74.00	-31.37	Peak	VERTICAL
2	2499.20	42.51	30.20	29.75	6.17	49.13	74.00	-24.87	Peak	VERTICAL

- Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.  
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
 3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

## TR-4-E-009 Radiated Emission Test Result

<b>Test Site</b>	: DDT 3m Chamber 1#		D:\2017 RE1# Report Data\Q17080804-080\RF-FCC IC 1G-18G.EM6
<b>Test Date</b>	: 2017-09-06	<b>Tested By</b>	: Sunny
<b>EUT</b>	: Roadie 2	<b>Model Number</b>	: RD200
<b>Power Supply</b>	: AC 120V/60Hz	<b>Test Mode</b>	: TX mode 2480MHz
<b>Condition</b>	: Temp:24.5°C,Humi:55%, Press:100.1kPa	<b>Antenna/Distance</b>	: 2016 HF907/3m/HORIZONTAL
<b>Memo</b>	:		

Data: 10



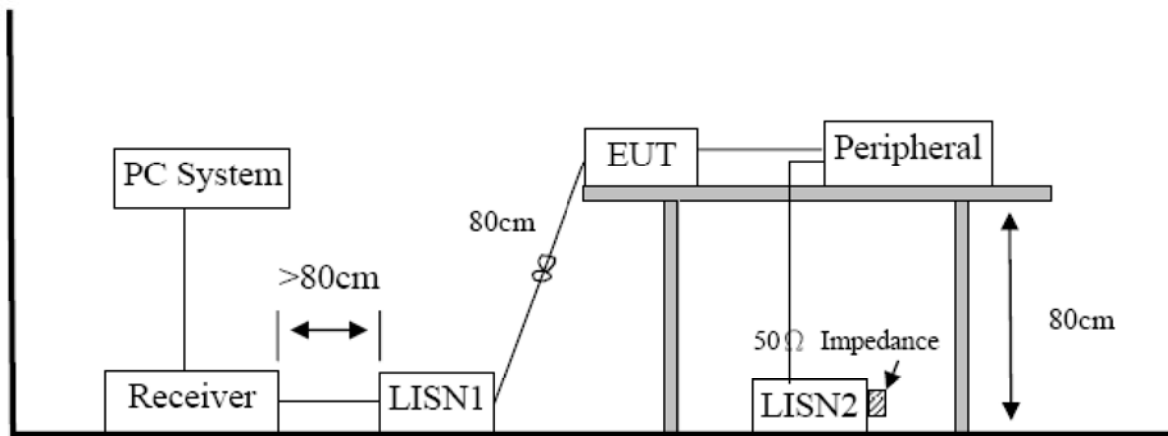
Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2483.50	37.06	30.14	29.71	6.13	43.62	74.00	-30.38	Peak	HORIZONTAL
2	2494.56	37.59	30.18	29.73	6.17	44.21	74.00	-29.79	Peak	HORIZONTAL

- Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.  
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
 3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.



## 10. Power Line Conducted Emission

### 10.1. Block diagram of test setup



### 10.2. Power Line Conducted Emission Limits

Frequency	Quasi-Peak Level dB( $\mu$ V)	Average Level dB( $\mu$ V)
150kHz ~ 500kHz	66 ~ 56*	56 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

Note 1: \* Decreasing linearly with logarithm of frequency.

Note 2: The lower limit shall apply at the transition frequencies.

### 10.3. Test Procedure

The EUT and Support equipment, if needed, were put placed on a non-metallic table, 80cm above the ground plane.

Configuration EUT to simulate typical usage as described in clause 2.4 and test equipment as described in clause 10.2 of this report.

All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.

All support equipment power received from a second LISN.

Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.

The Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.

During the above scans, the emissions were maximized by cable manipulation.

The test mode(s) described in clause 2.4 were scanned during the preliminary test.

After the preliminary scan, we found the test mode producing the highest emission level.

The EUT configuration and worse cable configuration of the above highest emission levels were recorded for reference of the final test.

EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test.

A scan was taken on both power lines, Neutral and Line, recording at least the six highest emissions.

Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.

The test data of the worst-case condition(s) was recorded.

The bandwidth of test receiver is set at 9 KHz.

#### **10.4. Test Result**

**PASS. (See below detailed test result)**

Note1: All emissions not reported below are too low against the prescribed limits.

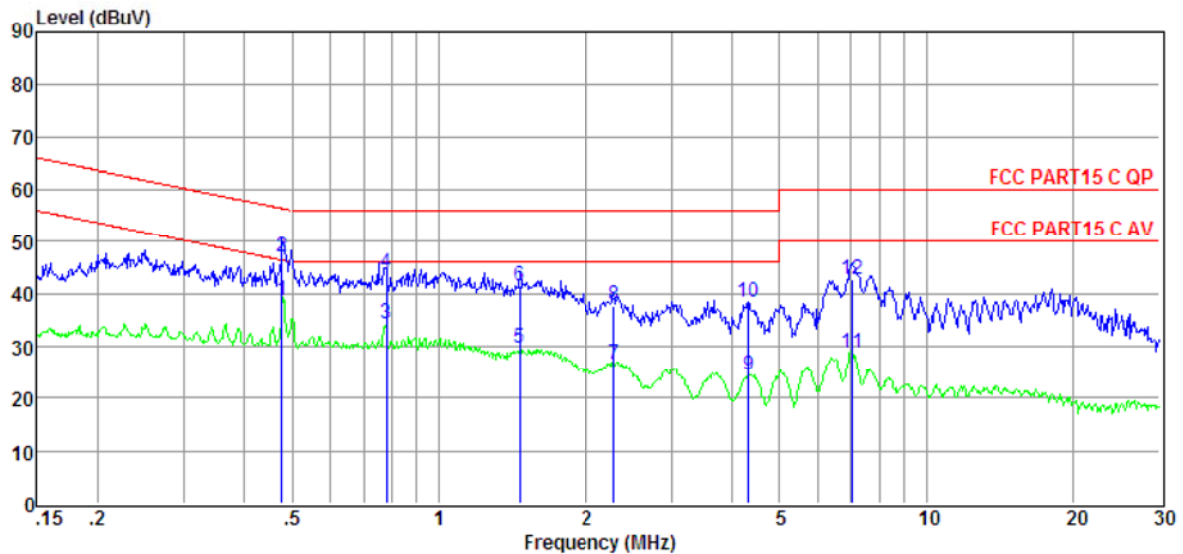
Note2: “----” means Peak detection; “-----” means Average detection

Note3: Pre-test AC conducted emission at both voltage AC 120V/60Hz and AC 240V/50Hz, recorded worst case (AC 120V/60Hz).

## TR-4-E-010 Conducted Emission Test Result

**Test Site** : DDT 1# Shield Room E:\2017 CE report data\Q17080804-08O\CE.EM6  
**Test Date** : 2017-08-30 **Tested By** : Xian  
**EUT** : Roadie 2 **Model Number** : RD200  
**Power Supply** : AC 120V/60Hz **Test Mode** : TX mode  
**Condition** : Temp:24.5°C,Humi:55%,  
**LISN** : 2016 ENV216/NEUTRAL  
Press:100.1kPa  
**Memo** :

Data: 18



Item (Mark)	Freq. (MHz)	Read Level (dBμV)	LISN Factor (dB)	Cable Loss (dB)	Pulse Limiter Factor (dB)	Result Level (dBμV)	Limit Line (dBμV)	Over Limit (dB)	Detector	Phase
1	0.48	19.26	9.61	0.02	9.86	38.75	46.41	-7.66	Average	NEUTRAL
2	0.48	27.61	9.61	0.02	9.86	47.10	56.41	-9.31	QP	NEUTRAL
3	0.78	14.88	9.61	0.03	9.86	34.38	46.00	-11.62	Average	NEUTRAL
4	0.78	24.41	9.61	0.03	9.86	43.91	56.00	-12.09	QP	NEUTRAL
5	1.46	10.24	9.62	0.03	9.86	29.75	46.00	-16.25	Average	NEUTRAL
6	1.46	22.04	9.62	0.03	9.86	41.55	56.00	-14.45	QP	NEUTRAL
7	2.29	6.97	9.63	0.04	9.87	26.51	46.00	-19.49	Average	NEUTRAL
8	2.29	18.20	9.63	0.04	9.87	37.74	56.00	-18.26	QP	NEUTRAL
9	4.32	4.86	9.65	0.06	9.88	24.45	46.00	-21.55	Average	NEUTRAL
10	4.32	18.64	9.65	0.06	9.88	38.23	56.00	-17.77	QP	NEUTRAL
11	7.03	9.09	9.69	0.09	9.89	28.76	50.00	-21.24	Average	NEUTRAL
12	7.03	22.92	9.69	0.09	9.89	42.59	60.00	-17.41	QP	NEUTRAL

Note: 1. Result Level = Read Level + LISN Factor + Pulse Limiter Factor + Cable loss.

2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.

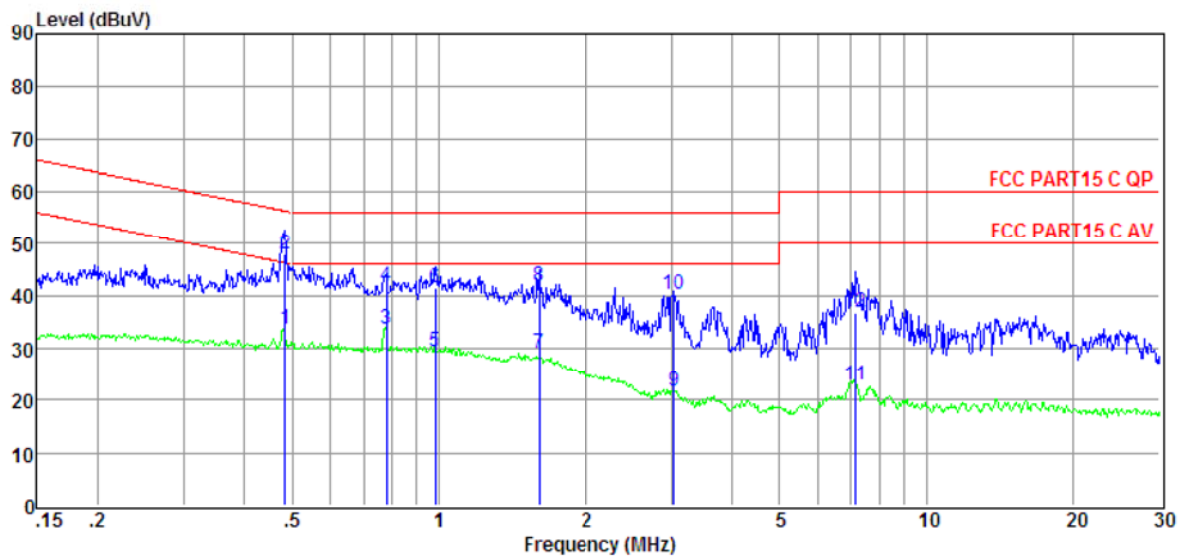
3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).

4. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.

## TR-4-E-010 Conducted Emission Test Result

**Test Site** : DDT 1# Shield Room E:\2017 CE report data\Q17080804-080\CE.EM6  
**Test Date** : 2017-08-30 **Tested By** : Xian  
**EUT** : Roadie 2 **Model Number** : RD200  
**Power Supply** : AC 120V/60Hz **Test Mode** : TX mode  
**Condition** : Temp:24.5°C,Humi:55%,  
**LISN** : 2016 ENV216/LINE  
 Press:100.1kPa  
**Memo** :

Data: 20



Item (Mark)	Freq. (MHz)	Read Level (dB $\mu$ V)	LISN Factor (dB)	Cable Loss (dB)	Pulse Limiter Factor (dB)	Result Level (dB $\mu$ V)	Limit Line (dB $\mu$ V)	Over Limit (dB)	Detector	Phase
1	0.48	14.24	9.61	0.02	9.86	33.73	46.27	-12.54	Average	LINE
2	0.48	28.52	9.61	0.02	9.86	48.01	56.27	-8.26	QP	LINE
3	0.78	14.22	9.61	0.03	9.86	33.72	46.00	-12.28	Average	LINE
4	0.78	22.28	9.61	0.03	9.86	41.78	56.00	-14.22	QP	LINE
5	0.98	9.83	9.61	0.03	9.86	29.33	46.00	-16.67	Average	LINE
6	0.98	22.01	9.61	0.03	9.86	41.51	56.00	-14.49	QP	LINE
7	1.60	9.57	9.62	0.04	9.86	29.09	46.00	-16.91	Average	LINE
8	1.60	22.34	9.62	0.04	9.86	41.86	56.00	-14.14	QP	LINE
9	3.04	1.99	9.64	0.05	9.87	21.55	46.00	-24.45	Average	LINE
10	3.04	20.70	9.64	0.05	9.87	40.26	56.00	-15.74	QP	LINE
11	7.18	3.21	9.69	0.09	9.89	22.88	50.00	-27.12	Average	LINE
12	7.18	17.04	9.69	0.09	9.89	36.71	60.00	-23.29	QP	LINE

Note: 1. Result Level = Read Level + LISN Factor + Pulse Limiter Factor + Cable loss.

2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).

4. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.

## **11. Antenna Requirements**

### **11.1. Limit**

For intentional device, according to FCC 47 CFR Section 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. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

### **11.2. Result**

The antennas used for this product is integrated antenna and that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is only 1.4dBi

**END OF REPORT**