FCC 47 CFR PART 15 SUBPART C

CERTIFICATION TEST REPORT

For

Transmitter for R/C Helicopter

MODEL NUMBER: DEVO F8S

FCC ID: S29DEVOF8S

REPORT NUMBER: 4788110856-2-7

ISSUE DATE: October 16, 2017

Prepared for

GUANGZHOU Walkera Technology Co., Ltd
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Prepared by

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Revision History

Rev.	Issue Date	Revisions	Revised By
--	10/16/2017	Initial Issue	

Summary of Test Results			
Clause	Test Items	FCC/IC Rules	Test Results
1	6db DTS Bandwidth	FCC 15.247 (a) (2)	Complied
2	Peak Conducted Power	FCC 15.247 (b) (3)	Complied
3	Power Spectral Density	FCC 15.247 (e)	Complied
4	Conducted Band edge And Spurious emission	FCC 15.247 (d)	Complied
5	Radiated Band edges and Spurious emission	FCC 15.247 (d) FCC 15.209 FCC 15.205	Complied
6	Conducted Emission Test For AC Power Port	FCC 15.207	Complied
7	Antenna Requirement	FCC 15.203	Complied

.

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1. ATTESTATION OF TEST RESULTS

Applicant Information	
Company Name:	GuangZhou Walkera Technology Co., Ltd
Address:	Taishi Industrial Park, Dongchong Town, Panyu District, Guangzhou, China
Manufacturer Information	
Company Name:	GuangZhou Walkera Technology Co., Ltd
Address:	Taishi Industrial Park, Dongchong Town, Panyu District, Guangzhou, China
Factory Information	
Company Name:	GuangZhou Walkera Technology Co., Ltd
Address:	Taishi Industrial Park, Dongchong Town, Panyu District, Guangzhou, China
EUT Name:	Transmitter for R/C Helicopter
Model:	DEVO F8S
Brand:	WALKERA
Sample Received:	August 25, 2017
Date of Tested:	August 26, 2017~September 19, 2017

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	PASS

Tested By : Sam Li

Sam Li
Engineer

Check By: Shawn Wen

Shawn Wen
Laboratory Leader

Approved By:

Stephen Guo

Laboratory Manager

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2013, 558074 D01 DTS Meas Guidance v04, FCC CFR 47 Part 2, FCC CFR 47 Part 15.

3. FACILITIES AND ACCREDITATION

Test Location	Dongguan Dongdian Testing Service Co., Ltd
Address	No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Dongguan City, Guangdong Province, 523808, China
Accreditation Certificate	Dongguan Dongdian Testing Service Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in th eidentified field of testing. Valid time is until January 31, 2018. EMC Laboratory has been registered and fully described in a report filed wit hthe FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 270092, Renewal date March 11, 2015, valid time is until March 11, 2018. The 3m Alternate Test Site of Dongguan Dongdian Testing Service Co., Ltd. has been registered by Certification and Engineering Bureau of Industr y Canada for the performance of radiated measurements with Registration No.10288A on April 23, 2015, valid time is until April 23, 2018.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognize national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Bandwidth	1.1%
Peak Output Power(Conducted)(Spectrum analyzer)	0.86dB(10 MHz ≤ f < 3.6GHz);
	1.38dB(3.6GHz≤ f < 8GHz)
Peak Output Power(Conducted)(Power Sensor)	0.74dB
Dwell Time	0.6%
Conducted spurious emissions	0.86dB(10 MHz ≤ f < 3.6GHz);
	1.40dB(3.6GHz≤ f < 8GHz)
	1.66dB(8GHz≤ f < 22GHz)
Uncertainty for radio frequency (RBW<20KHz)	3×10-8
Temperature	0.4℃
Humidity	2%
Uncertainty for Radiation Emission test (30MHz-1GHz)	4.70 dB (Antenna Polarize: V)
	4.84 dB (Antenna Polarize: H)
Uncertainty for Radiation Emission test (1GHz-25GHz)	4.10dB(1-6GHz)
	4.40dB (6GHz-25Gz)
Uncertainty for Power line conduction emission test	3.32dB (150KHz-30MHz)
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

Equipment	Transmitter for R/C Helicopter	
Model Name	DEVO F8S	
Product Description	Operation Frequency	2405 MHz ~ 2479 MHz
	Modulation Technology	DSSS
Battery	DC 7.4V, 2200mAh	
Hardware Version	1.0	
Software Version	1.0	

5.2. MAXIMUM OUTPUT POWER

Frequency Range (MHz)	Number of Transmit Chains (NTX)	Frequency (MHz)	Channel Number	Max Output Power (dBm)
2405-2479	1	2405-2479	1-75[75]	17.61

5.3. CHANNEL LIST

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2405	2	2406	3	2407	4	2408
5	2409	6	2410	7	2411	8	2412
9	2413	10	2414	11	2415	12	2416
13	2417	14	2418	15	2419	16	2420
17	2421	18	2422	19	2423	20	2424
21	2425	22	2426	23	2427	24	2428
25	2429	26	2430	27	2431	28	2432
29	2433	30	2434	31	2435	32	2436
33	2437	34	2438	35	2439	36	2440
37	2441	38	2442	39	2443	40	2444
41	2445	42	2446	43	2447	44	2448
45	2449	46	2450	47	2451	48	2452
49	2453	50	2454	51	2455	52	2456
53	2457	54	2458	55	2459	56	2460
57	2461	58	2462	59	2463	60	2464
61	2465	62	2466	63	2467	64	2468
65	2469	66	2470	67	2471	68	2472
69	2473	70	2474	71	2475	72	2476
73	2477	74	2478	75	2479		

5.4. TEST CHANNEL CONFIGURATION

Test Mode	Test Channel	Frequency
DSSS	CH 1, CH 37, CH 75	2405MHz, 2441MHz, 2479MHz

5.5. THE WORSE CASE POWER SETTING PARAMETER

The Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band	
Test Software Version	N/A
Modulation Type	N/A
DSSS	MAX

5.6. DESCRIPTION OF AVAILABLE ANTENNAS

Ant.	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)
1	2405-2479	External Antenna	2.15

Test Mode	Transmit and Receive Mode	Description
DSSS	☒1TX, 1RX	Chain 1 can be used as transmitting/receiving antenna.

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	P/N
1	N/A	N/A	N/A	N/A

I/O CABLES

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	N/A	N/A	N/A	N/A	N/A

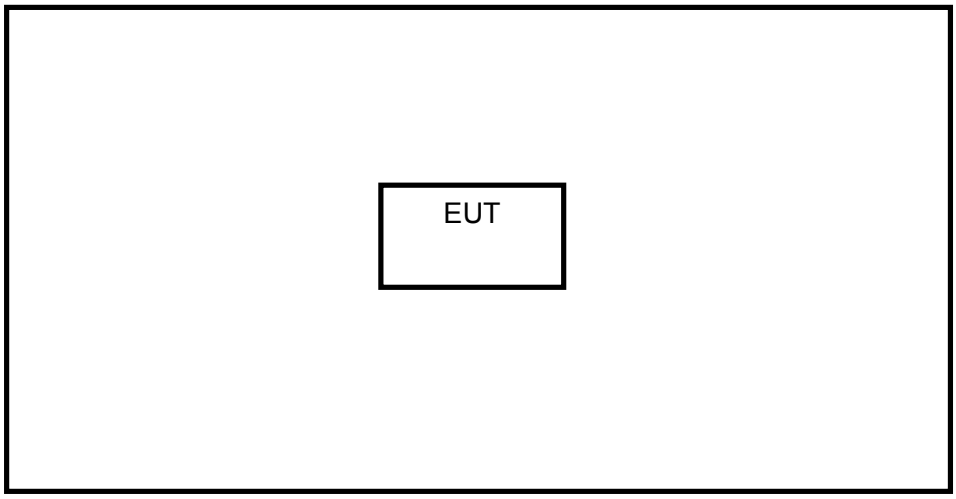
ACCESSORY

Item	Accessory	Brand Name	Model Name	Description
1	N/A	N/A	N/A	N/A

TEST SETUP

The EUT can work in engineering mode.

SETUP DIAGRAM FOR TEST



5.8. MEASURING INSTRUMENT AND SOFTWARE USED

Instrument (Conducted for RF Port)						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Expired date
☑	Spectrum analyzer	R&S	FSU26	1166.1660.26	Oct. 16, 2016	Oct. 16, 2017
☑	Spectrum analyzer	Agilent	E4447A	MY50180031	Jun. 16, 2017	Jun. 16, 2018
☑	Vector Signal Generator	Agilent	E8267D	MY52098743	Oct. 20, 2016	Oct. 20, 2017
☑	Vector Signal Generator	Agilent	N5182A	MY48180737	Jul. 05, 2017	Jul. 05, 2018
☑	Power Sensor	Agilent	U2021XA	MY55150010	Apr. 18, 2017	Apr. 18, 2018
☑	Power Sensor	Agilent	U2021XA	MY55150011	Apr. 19, 2017	Apr. 19, 2018
☑	DC Power Source	MATRIS	MPS-3005L-3	D813058W	Oct. 24, 2016	Oct. 24, 2017
☑	Attenuator	Mini-Circuits	BW-S10W2	101109	Aug. 18, 2017	Aug. 18, 2018
☑	RF Cable	Micable	C10-01-01-1	100309	Aug. 18, 2017	Aug. 18, 2018
☑	Test Software	JS Tonscend	JS1120-2	Ver.2.5	N/A	N/A
☑	USB Data acquisition	Agilent	U2531A	TW55043503	N/A	N/A
☑	Auto control Unit	JS Tonscend	JS0806-2	158060010	N/A	N/A
Instrument (Radiated Tests)						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Expired date
☑	EMI Test Receiver	R&S	ESU8	100316	Oct. 16, 2016	Oct. 16, 2017
☑	Spectrum analyzer	R&S	FSU26	1166.1660.26	Oct. 16, 2016	Oct. 16, 2017
☑	Trilog Broadband Antenna	Schwarzbeck	VULB9163	9163-462	Oct. 27, 2016	Oct. 27, 2017
☑	Active Loop antenna	Schwarzbeck	FMZB-1519	1519-038	Oct. 16, 2016	Oct. 16, 2017
☑	Double Ridged Horn Antenna	R&S	HF907	100276	Oct. 12, 2016	Oct. 12, 2017
☑	Pre-amplifier	A.H.	PAM-0118	360	Oct. 16, 2016	Oct. 16, 2017
☑	RF Cable	HUBSER	CP-X2	W11.03	Oct. 16, 2016	Oct. 16, 2017
☑	RF Cable	HUBSER	CP-X1	W12.02	Oct. 16, 2016	Oct. 16, 2017
☑	MI Cable	HUBSER	C10-01-01-1M	1091629	Oct. 16, 2016	Oct. 16, 2017
☑	Test software	Audix	E3	V 6.11111b	/	/
Instrument (Line Conducted Emission (AC Main))						

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Expired date
☑	Test Receiver	R&S	ESU8	100316	Oct.16, 2016	Oct.16, 2017
☑	LISN 1	R&S	ENV216	101109	Oct.16, 2016	Oct.16, 2017
☑	LISN 2	R&S	ESH2-Z5	100309	Oct.16, 2016	Oct.16, 2017
☑	Pulse Limiter	R&S	ESH3-Z2	101242	Oct.16, 2016	Oct.16, 2017
☑	CE Cable 1	HUBSER	ESU8/RF2	W10.01	Oct.16, 2016	Oct.16, 2017
☑	Test software	Audix	E3	V 6.11111b	N/A	N/A

6. MEASUREMENT METHODS

No.	Test Item	KDB Name	Section
1	6 dB Bandwidth	KDB 558074 D01 DTS Meas Guidance v04	8.0
2	Peak Output Power	KDB 558074 D01 DTS Meas Guidance v04	9.1.1
3	Power Spectral Density	KDB 558074 D01 DTS Meas Guidance v04	10.2
4	Out-of-band emissions in non-restricted bands	KDB 558074 D01 DTS Meas Guidance v04	11.0
5	Out-of-band emissions in restricted bands	KDB 558074 D01 DTS Meas Guidance v04	12.1
6	Band-edge	KDB 558074 D01 DTS Meas Guidance v04	13.3.2
7	Conducted Emission Test For AC Power Port	ANSI C63.10-2013	7.3

7. ANTENNA PORT TEST RESULTS

7.1. 6 dB DTS BANDWIDTH

LIMITS

FCC Part15 (15.247) Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
FCC 15.247(a)(2)	6dB Bandwidth	>= 500KHz	2400-2483.5

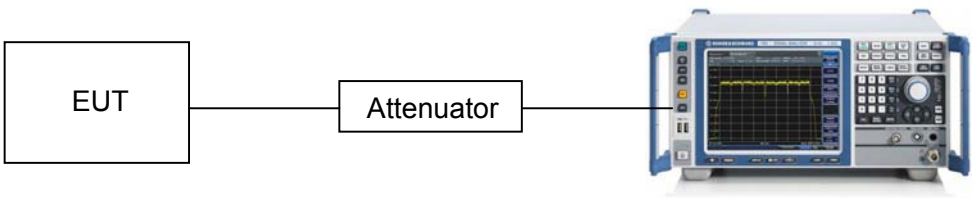
TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	100K
VBW	approximately 3×RBW
Trace	Max hold
Sweep	Auto couple

Allow the trace to stabilize and measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB and 99% relative to the maximum level measured in the fundamental emission.

TEST SETUP

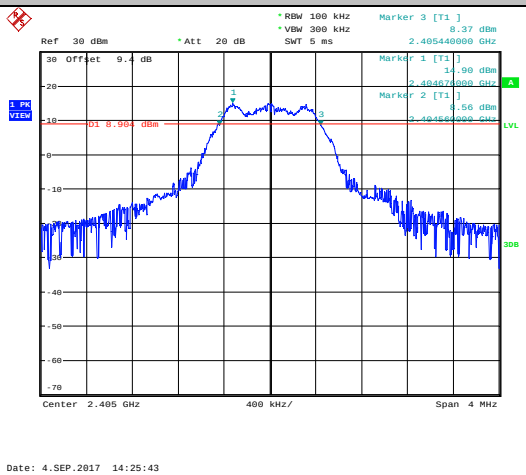
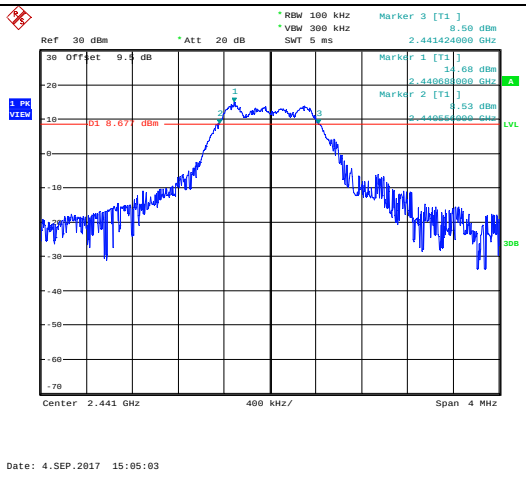


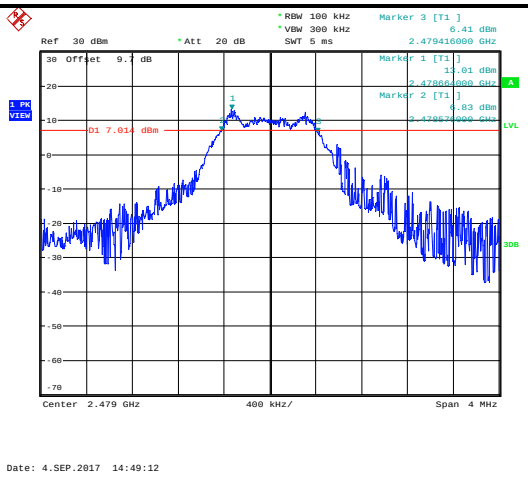
TEST CONDITIONS

Temperature: 28°C
Relative Humidity: 60%
Test Voltage: 7.4Vdcc

RESULTS

Channel	Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
LCH	2405	0.880	500	Pass
MCH	2441	0.868	500	Pass
HCH	2479	0.840	500	Pass

Graphs For 6dB Bandwidth	
LCH	
MCH	

HCH	

7.2. PEAK and Average CONDUCTED OUTPUT POWER

LIMITS

FCC Part15 (15.247) Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
FCC 15.247(b)(3)	Peak Output Power	1 watt or 30dBm	2400-2483.5

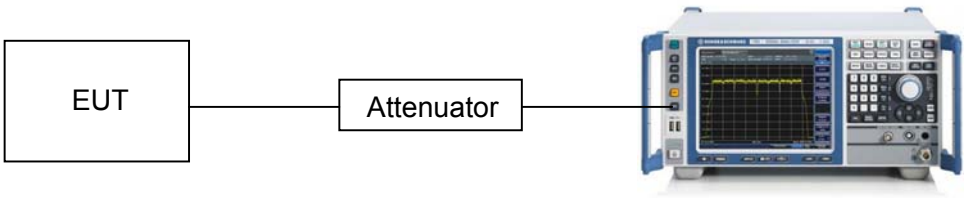
TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	≥DTS bandwidth(e.g. 1 MHz for BLE)
VBW	≥3 × RBW
Span	3 x RBW
Trace	Max hold
Sweep time	Auto couple.

Allow trace to fully stabilize and use peak marker function to determine the peak amplitude level.

TEST SETUP

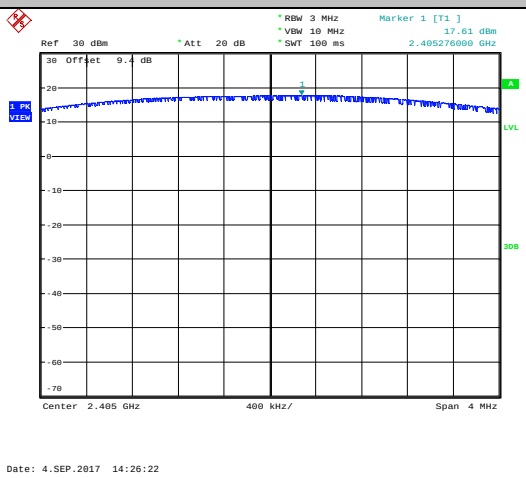
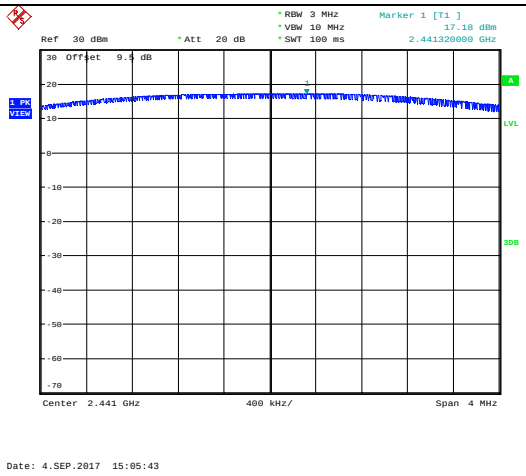


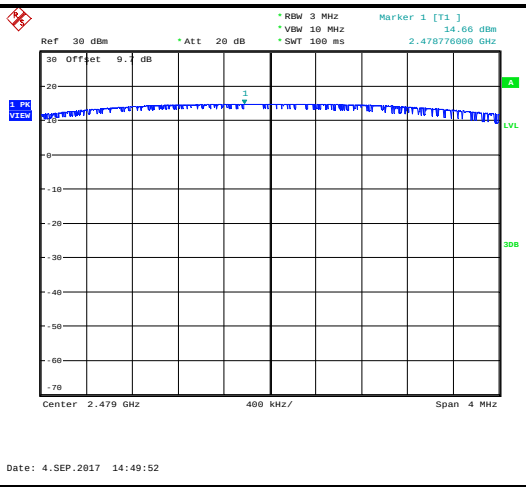
TEST CONDITIONS

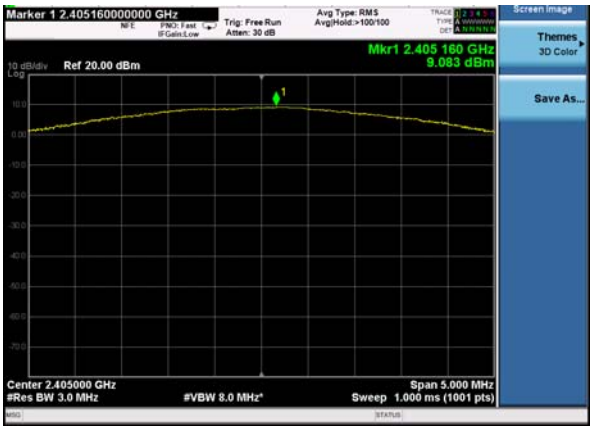
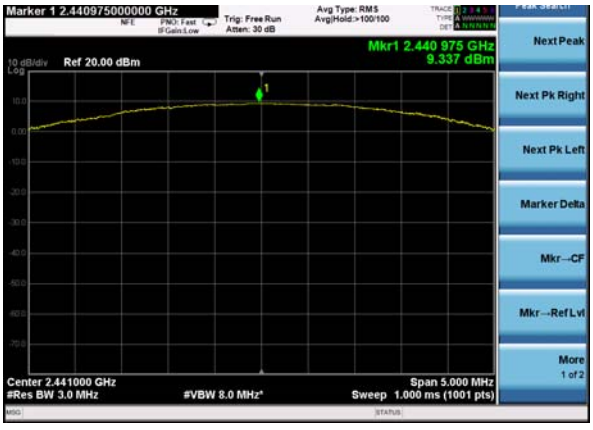
Temperature: 28°C
Relative Humidity: 60%
Test Voltage: 3.8Vdc

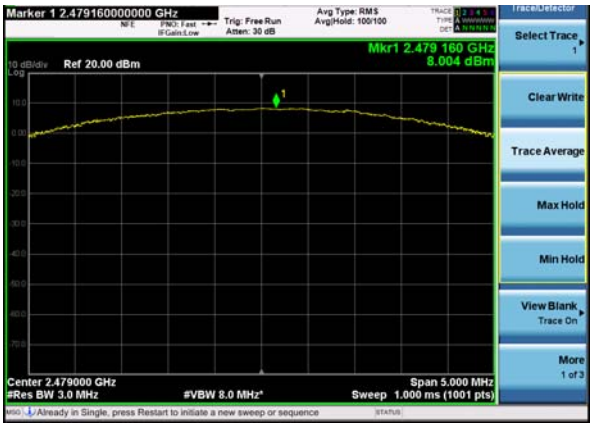
RESULTS

Test Channel	Frequency	Maximum Conducted Output Power(PK)	Average Output Power	Peak Power LIMIT
	(MHz)	(dBm)	(dBm)	dBm
LCH	2405	17.61	9.08	30
MCH	2441	17.18	9.33	30
HCH	2479	14.66	8.00	30

Peak Graphs	
LCH	
MCH	

HCH	

AV Graphs	
LCH	
MCH	

HCH	

7.3. POWER SPECTRAL DENSITY

LIMITS

FCC Part15 (15.247) Subpart C RSS-247 ISSUE 2			
Section	Test Item	Limit	Frequency Range (MHz)
FCC §15.247 (e)	Power Spectral Density	8 dBm in any 3 kHz band	2400-2483.5

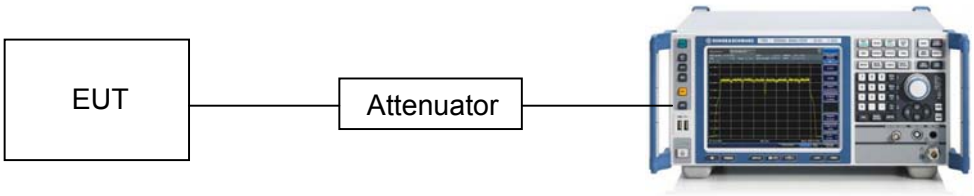
TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	3 kHz ≤ RBW 100 ≤ kHz
VBW	≥3 × RBW
Span	1.5 x DTS bandwidth
Trace	Max hold
Sweep time	Auto couple.

Allow trace to fully stabilize and use the peak marker function to determine the maximum amplitude level within the RBW.
If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

TEST SETUP

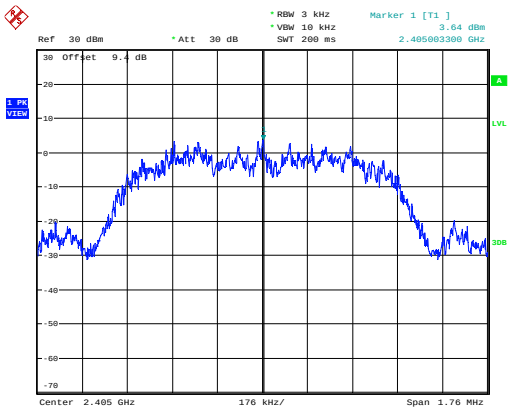
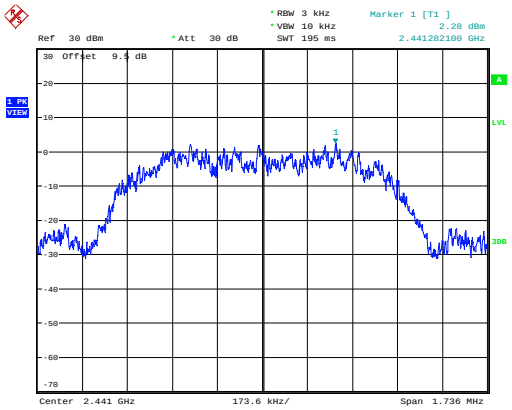


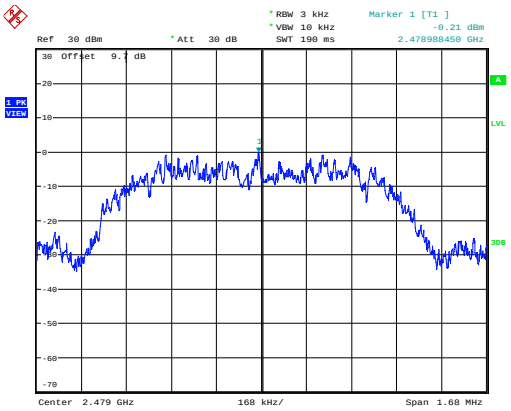
TEST CONDITIONS

Temperature: 28°C
Relative Humidity: 60%
Test Voltage: 3.8Vdc

RESULTS

Frequency	Power Spectral Density (dBm/3kHz)	Limit (dBm/3K)	Result
2405 MHz	3.64	8	PASS
2441 MHz	2.28	8	PASS
2479 MHz	-0.21	8	PASS

Graphs	
LCH	
MCH	

HCH	

7.4. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS

LIMITS

FCC Part15 (15.247) Subpart C		
Section	Test Item	Limit
FCC §15.247 (d)	Conducted Bandedge and Spurious Emissions	at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power

TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

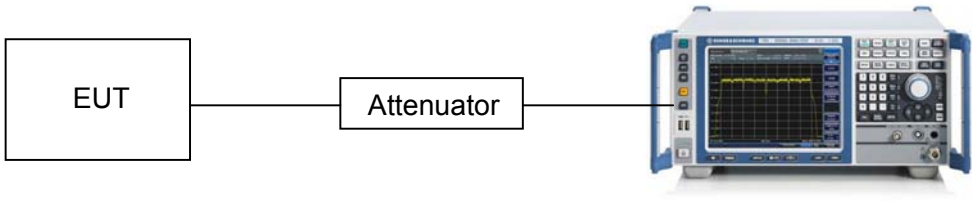
Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	100K
VBW	≥3 × RBW
Span	1.5 x DTS bandwidth
Trace	Max hold
Sweep time	Auto couple.

Use the peak marker function to determine the maximum PSD level.

Span	Set the center frequency and span to encompass frequency range to be measured
Detector	Peak
RBW	100K
VBW	≥3 × RBW
measurement points	≥span/RBW
Trace	Max hold
Sweep time	Auto couple.

Use the peak marker function to determine the maximum amplitude level**.**

TEST SETUP



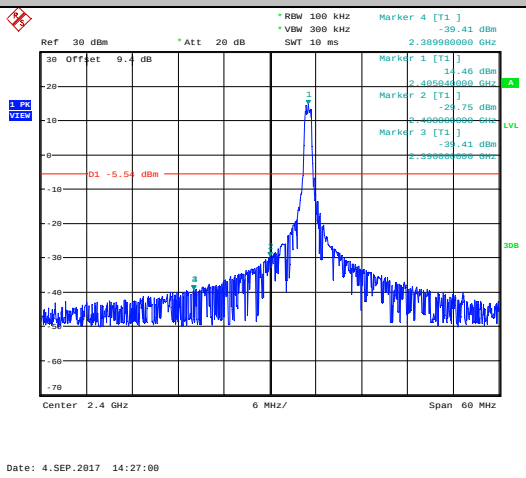
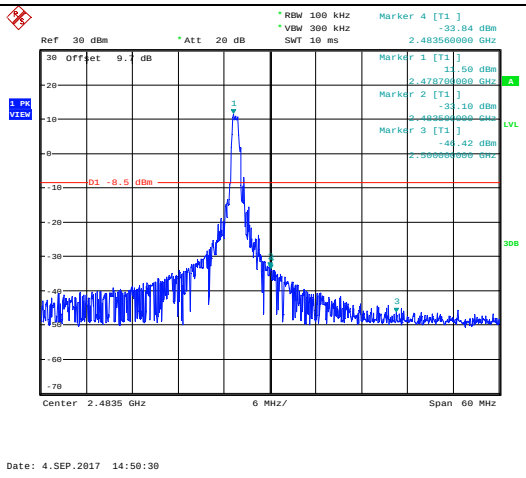
TEST CONDITIONS

Temperature: 28°C
Relative Humidity: 60%
Test Voltage: 3.8Vdc

RESULTS

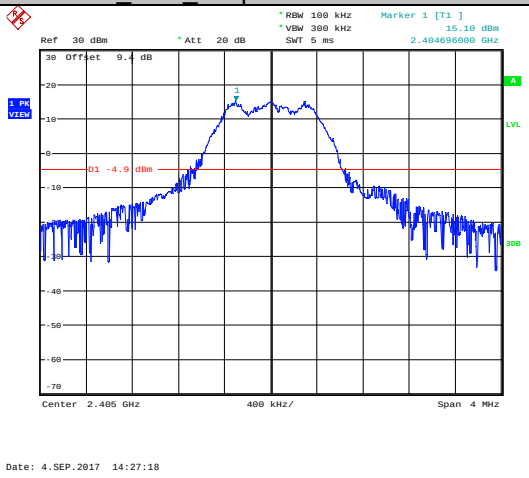
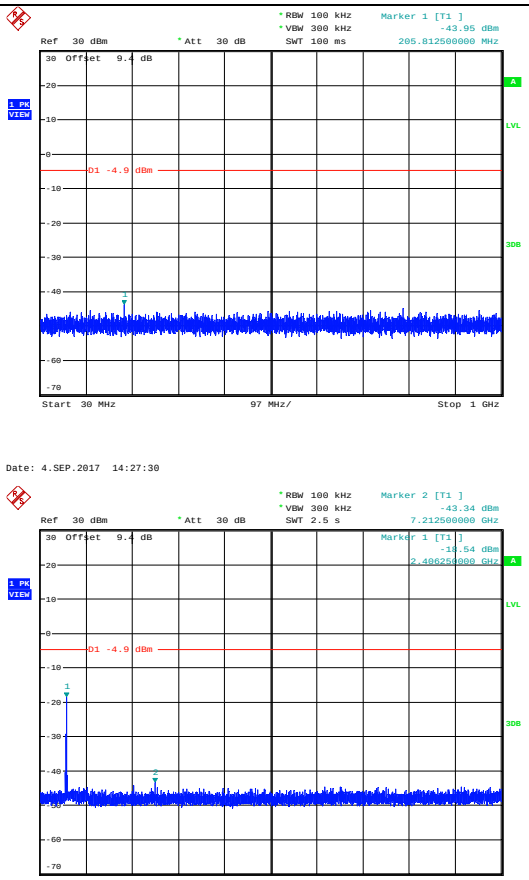
RF Conducted Bandedge

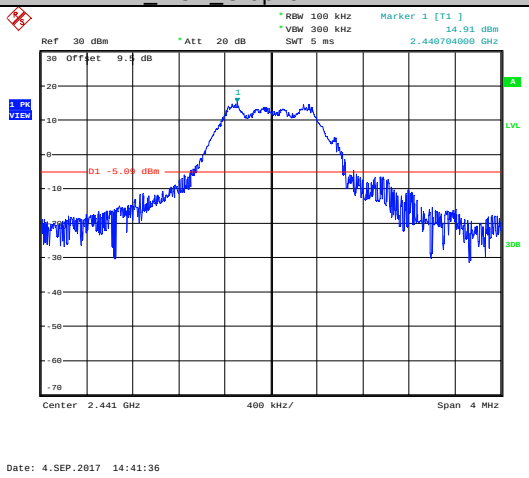
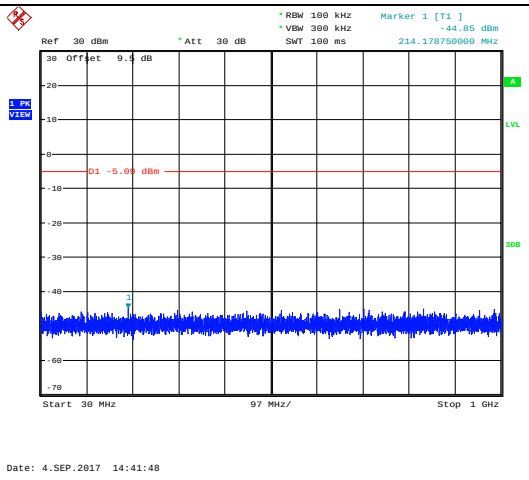
Channel	Carrier Power[dBm]	Max.Spurious Level [dBm]	Limit [dBm]	Verdict
LCH	14.460	-39.413	-5.54	PASS
HCH	11.500	-33.837	-8.5	PASS

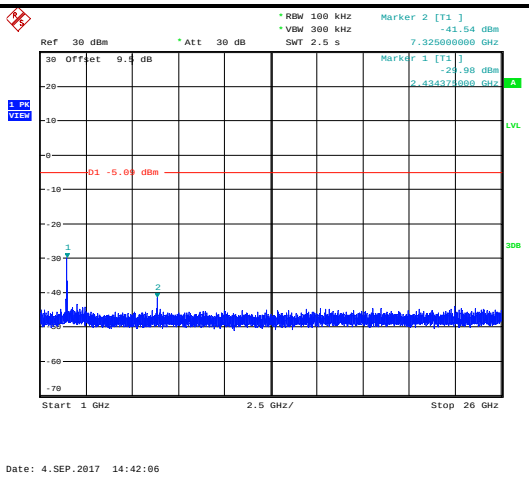
Graphs	
LCH	
HCH	

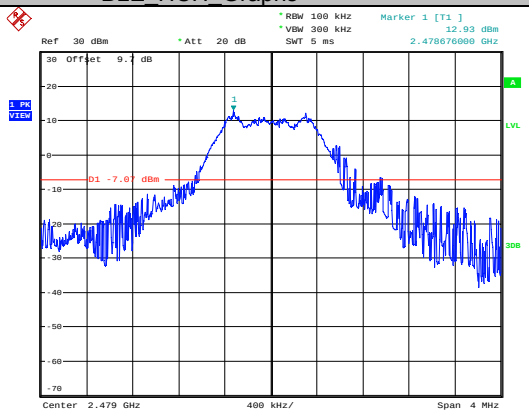
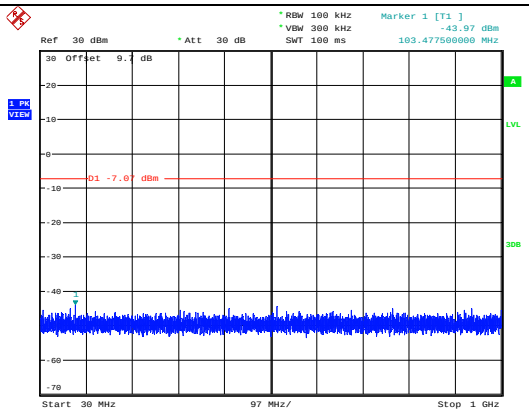
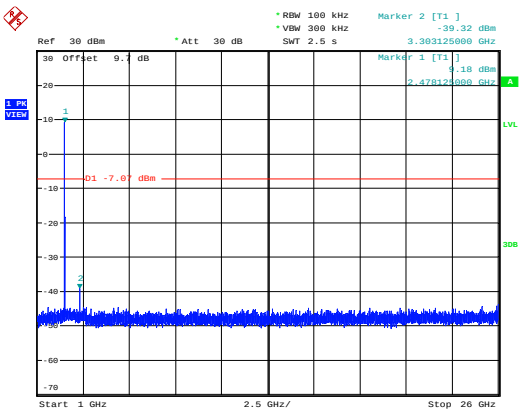
RF Conducted Spurious Emissions

Channel	Pref [dBm]	Puw[dBm]	Verdict
LCH	15.10	<Limit	PASS
MCH	14.91	<Limit	PASS
HCH	12.93	<Limit	PASS

_LCH_Graphs	
LCH	
LCH	

BLE_MCH_Graphs	
MCH	
MCH	



BLE_HCH_Graphs	
HCH	 Date: 4.SEP.2017 14:50:49
HCH	 Date: 4.SEP.2017 14:51:00  Date: 4.SEP.2017 14:51:18

8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

Please refer to FCC §15.205 and §15.209

Radiation Disturbance Test Limit for FCC (Class B) (9KHz -1GHz)

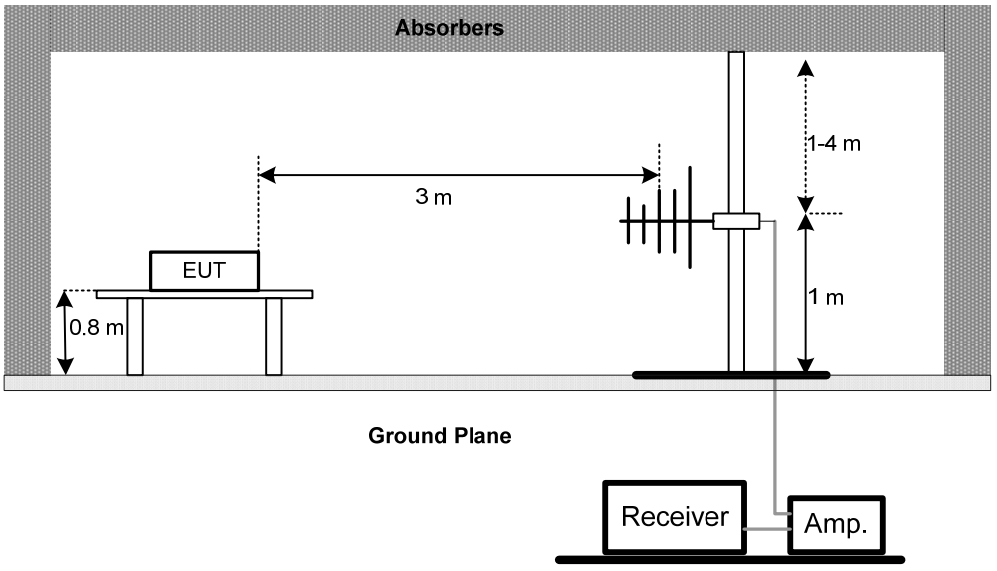
Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
960~1000	500	3

Radiation Disturbance Test Limit for FCC (Above 1G)

Frequency (MHz)	dB(uV/m) (at 3 meters)	
	Peak	Average
Above 1000	74	54

TEST SETUP AND PROCEDURE

Below 1G



The setting of the spectrum analyser

RBW	120KHz
VBW	300KHz
Sweep	Auto
Detector	Peak/QP
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.

2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 0.8 meter above ground.

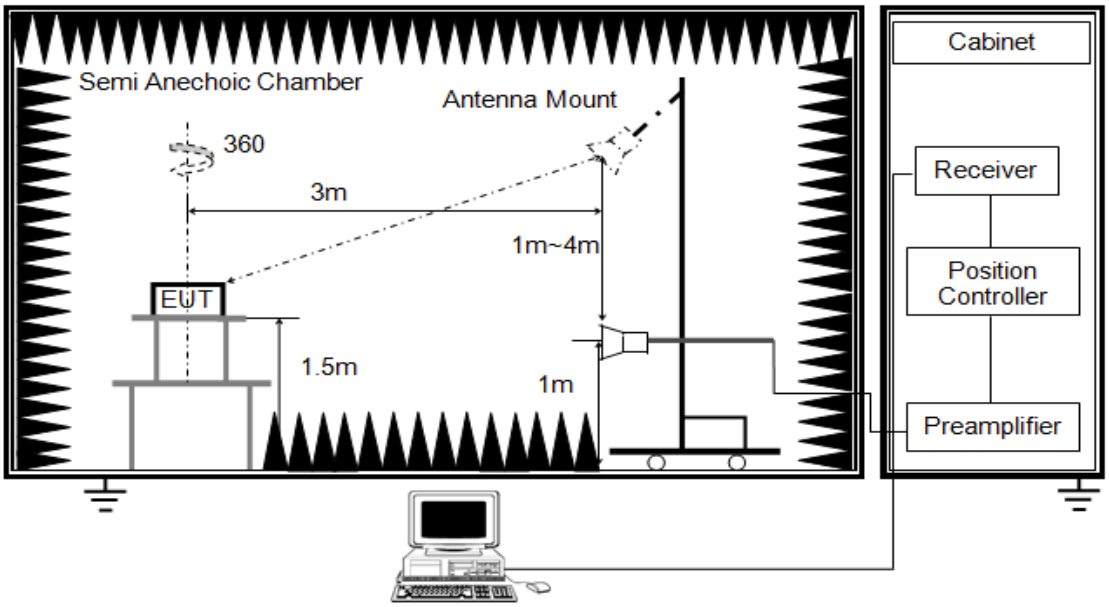
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

6. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

7. For the actual test configuration, please refer to the related Item in this test report (Photographs of the Test Configuration)

ABOVE 1G



The setting of the spectrum analyser

RBW	1M MHz
VBW	3MHz
Sweep	Auto
Detector	Peak and CISPR Average
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.

2. The EUT was arranged to its worst case and then tune the antenna tower (1.5 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

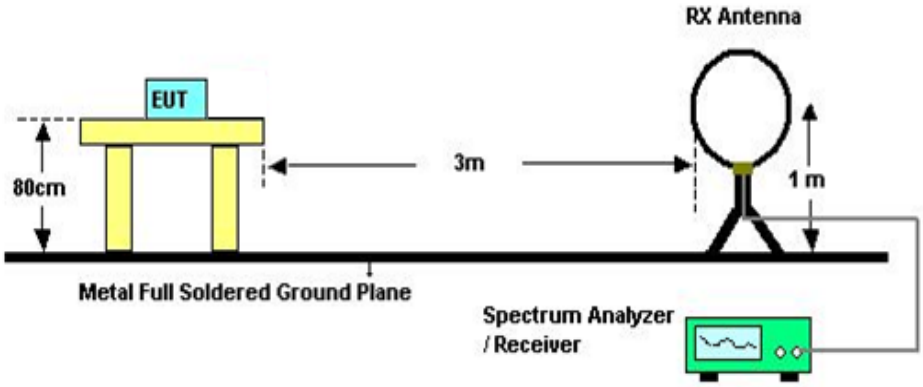
3. The EUT was placed on a turntable with 1.5 meter above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

6. For measurement above 1GHz, the emission measurement will be measured by the peak detector and the AV detector.

Below 30MHz



The setting of the spectrum analyser

RBW	200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)
VBW	200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)
Sweep	Auto
Detector	Peak/QP/ Average
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013

2. The EUT was arranged to its worst case and then turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 0.8 meter above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

6. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

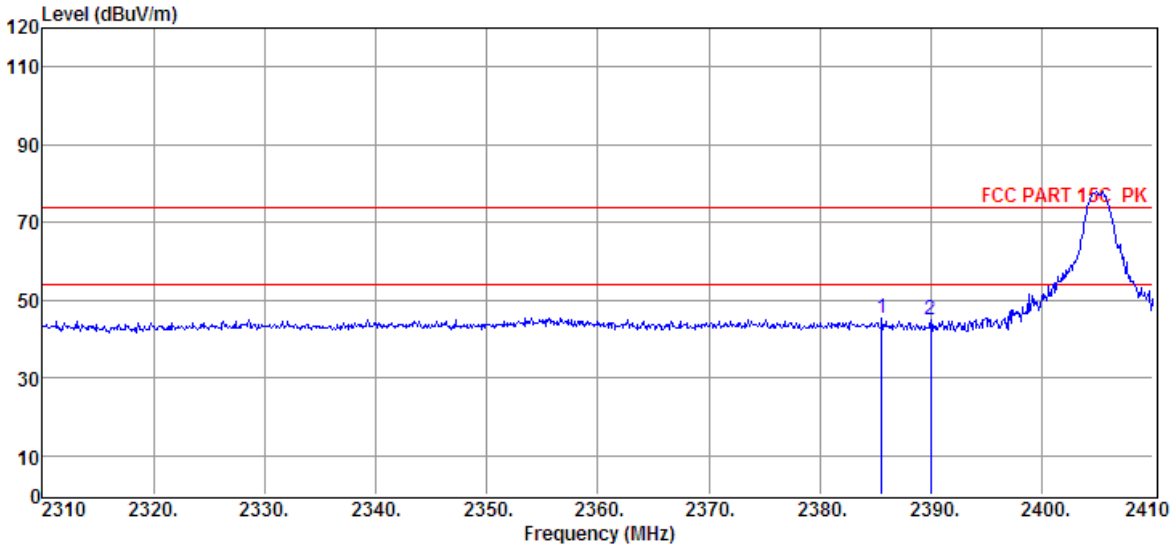
7. For the actual test configuration, please refer to the related item in this test report (Photographs of the Test Configuration)

TEST CONDITIONS

Temperature: 22.2°C
Relative Humidity: 61%

8.2. RESTRICTED BANDEDGE

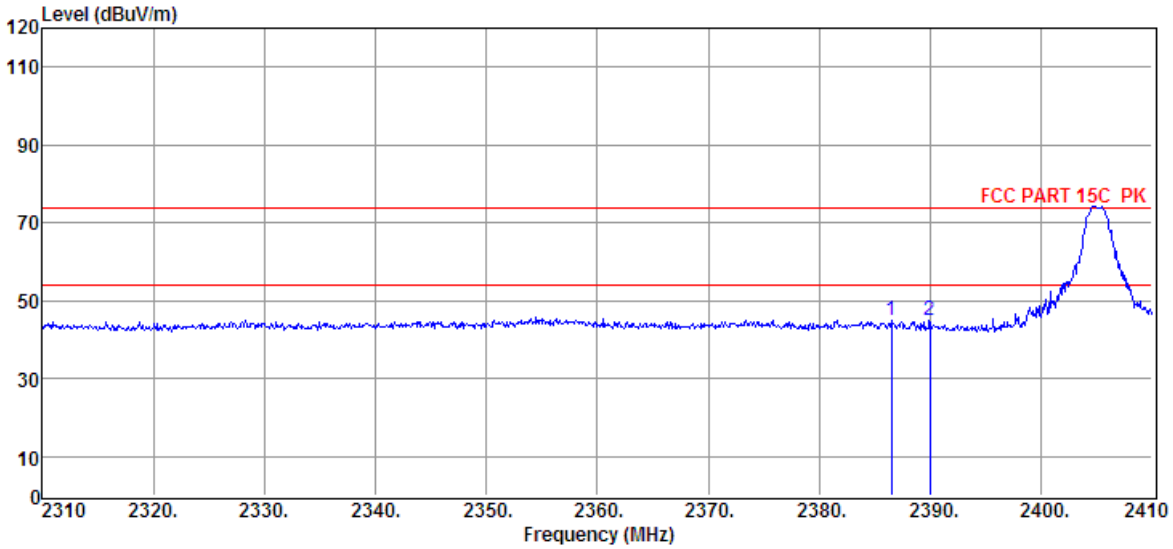
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



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	2385.60	39.19	29.76	29.41	6.01	45.55	74.00	-28.45	Peak	HORIZONTAL
2	2390.00	38.35	29.78	29.42	6.03	44.74	74.00	-29.26	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.
4. EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

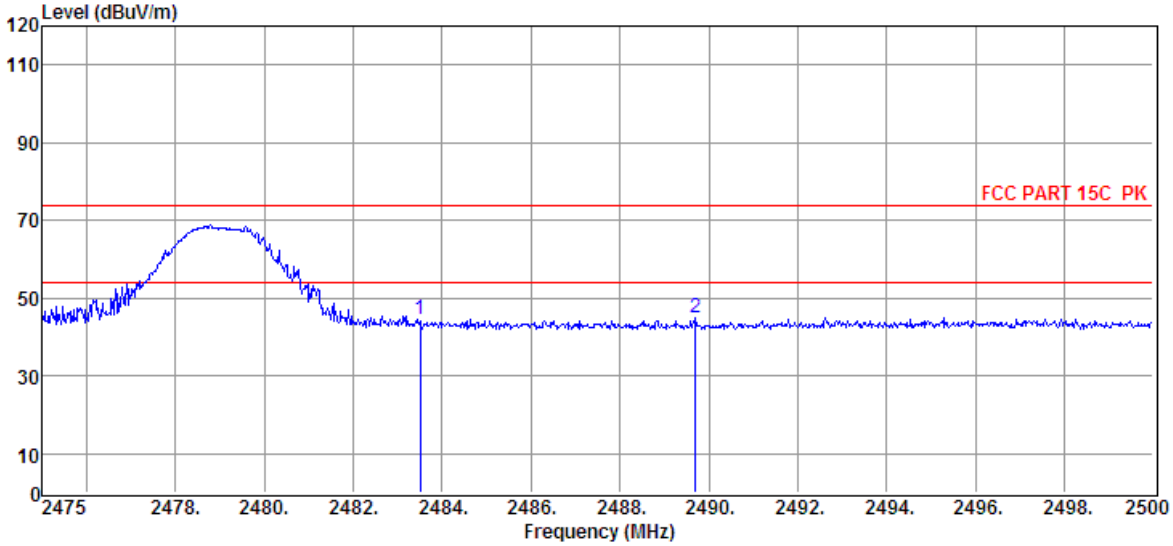
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



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	2386.50	38.78	29.76	29.41	6.01	45.14	74.00	-28.86	Peak	VERTICAL
2	2390.00	38.38	29.78	29.42	6.03	44.77	74.00	-29.23	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.
4. EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

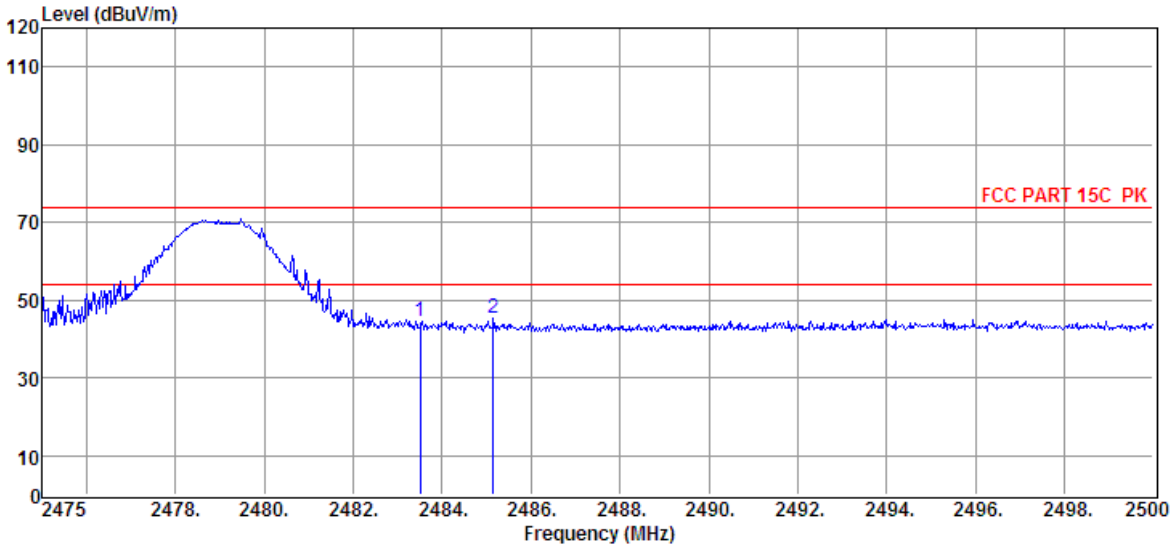
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



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	37.93	30.14	29.71	6.13	44.49	74.00	-29.51	Peak	HORIZONTAL
2	2489.70	38.35	30.16	29.71	6.17	44.97	74.00	-29.03	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.
4. EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



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	38.07	30.14	29.71	6.13	44.63	74.00	-29.37	Peak	VERTICAL
2	2485.15	38.65	30.14	29.71	6.13	45.21	74.00	-28.79	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.
4. EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

8.3. SPURIOUS EMISSIONS (1~25GHz)

HARMONICS AND SPURIOUS EMISSIONS

Freq (MHz)	Read level (dBμV)	Antenna Factor (dB/m)	PRM Factor(dB)	Cable Loss (dB)	Result Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector type	Polarization
GFSK Tx mode 2405MHz									
4791.00	40.74	33.74	29.31	8.46	53.63	74.00	-20.37	Peak	VERTICAL
7290.00	34.85	36.44	30.55	10.68	51.42	74.00	-22.58	Peak	VERTICAL
8106.00	33.86	36.40	31.22	11.23	50.27	74.00	-23.73	Peak	VERTICAL
9449.00	33.80	36.51	32.59	12.30	50.02	74.00	-23.98	Peak	VERTICAL
11659.00	34.98	36.99	34.62	13.81	51.16	74.00	-22.84	Peak	VERTICAL
13240.00	34.15	39.04	35.50	14.73	52.42	74.00	-21.58	Peak	VERTICAL
4791.00	40.65	33.74	29.31	8.46	53.54	74.00	-20.46	Peak	HORIZONTAL
7290.00	36.01	36.44	30.55	10.68	52.58	74.00	-21.42	Peak	HORIZONTAL
8174.00	34.95	36.20	31.29	11.31	51.17	74.00	-22.83	Peak	HORIZONTAL
10129.00	33.99	36.77	32.99	12.50	50.27	74.00	-23.73	Peak	HORIZONTAL
12101.00	34.50	37.74	34.87	14.30	51.67	74.00	-22.33	Peak	HORIZONTAL
12951.00	34.40	38.75	35.70	14.67	52.12	74.00	-21.88	Peak	HORIZONTAL
GFSK Tx mode 2441MHz									
4876.00	40.62	33.72	29.33	8.56	53.57	74.00	-20.43	Peak	VERTICAL
6049.00	34.11	35.08	29.23	9.71	49.67	74.00	-24.33	Peak	VERTICAL
7307.00	36.33	36.45	30.57	10.68	52.89	74.00	-21.11	Peak	VERTICAL
8820.00	34.45	36.72	32.18	11.75	50.74	74.00	-23.26	Peak	VERTICAL
10775.00	33.76	37.18	33.59	13.14	50.49	74.00	-23.51	Peak	VERTICAL
12220.00	34.30	37.91	34.95	14.41	51.67	74.00	-22.33	Peak	VERTICAL
4876.00	38.47	33.72	29.33	8.56	51.42	74.00	-22.58	Peak	HORIZONTAL
7324.00	36.80	36.46	30.59	10.71	53.38	74.00	-20.62	Peak	HORIZONTAL
8106.00	35.11	36.40	31.22	11.23	51.52	74.00	-22.48	Peak	HORIZONTAL
10775.00	33.86	37.18	33.59	13.14	50.59	74.00	-23.41	Peak	HORIZONTAL
12050.00	34.40	37.67	34.82	14.26	51.51	74.00	-22.49	Peak	HORIZONTAL
12815.00	34.40	38.62	35.58	14.66	52.10	74.00	-21.90	Peak	HORIZONTAL
GFSK Tx mode 2479MHz									
4961.00	38.73	33.71	29.35	8.63	51.72	74.00	-22.28	Peak	VERTICAL
6049.00	34.84	35.08	29.23	9.71	50.40	74.00	-23.60	Peak	VERTICAL
7426.00	36.94	36.54	30.70	10.78	53.56	74.00	-20.44	Peak	VERTICAL
8990.00	34.24	37.46	32.32	11.81	51.19	74.00	-22.81	Peak	VERTICAL
12101.00	34.66	37.74	34.87	14.30	51.83	74.00	-22.17	Peak	VERTICAL
13325.00	34.99	39.13	35.42	14.75	53.45	74.00	-20.55	Peak	VERTICAL
4961.00	37.61	33.71	29.35	8.63	50.60	74.00	-23.40	Peak	HORIZONTAL
7341.00	34.17	36.48	30.59	10.72	50.78	74.00	-23.22	Peak	HORIZONTAL
9364.00	35.12	36.69	32.52	12.22	51.51	74.00	-22.49	Peak	HORIZONTAL
10775.00	34.09	37.18	33.59	13.14	50.82	74.00	-23.18	Peak	HORIZONTAL
12169.00	33.28	37.84	34.90	14.36	50.58	74.00	-23.42	Peak	HORIZONTAL
13495.00	34.91	39.30	35.22	14.80	53.79	74.00	-20.21	Peak	HORIZONTAL

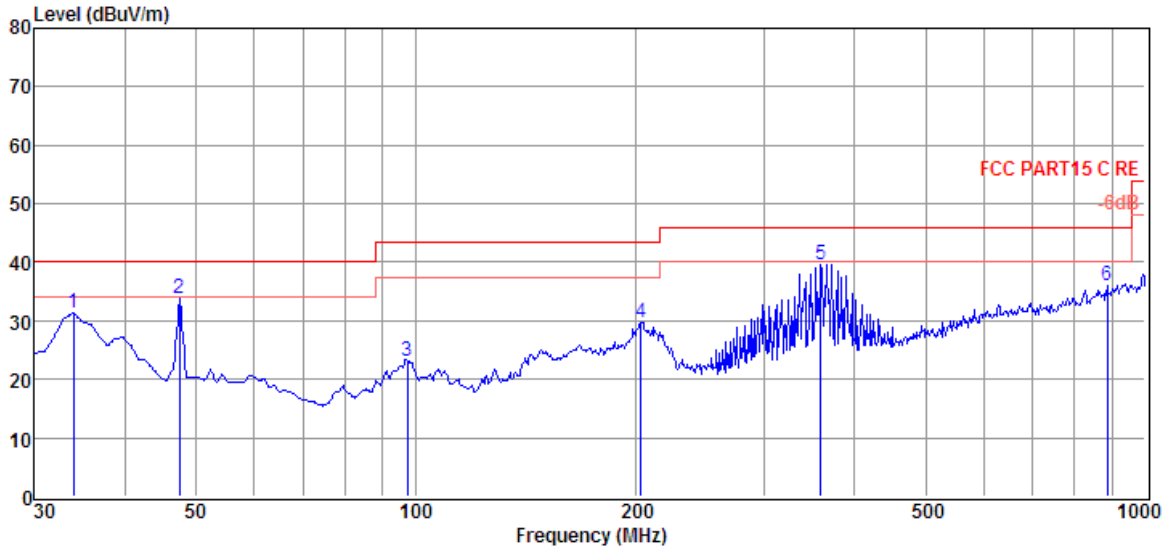
Result: Pass

Note:
1. 30MHz~25GHz: Only show the worst cast data in this report.
2. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
3. EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.
4. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

8.4. SPURIOUS EMISSIONS BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)

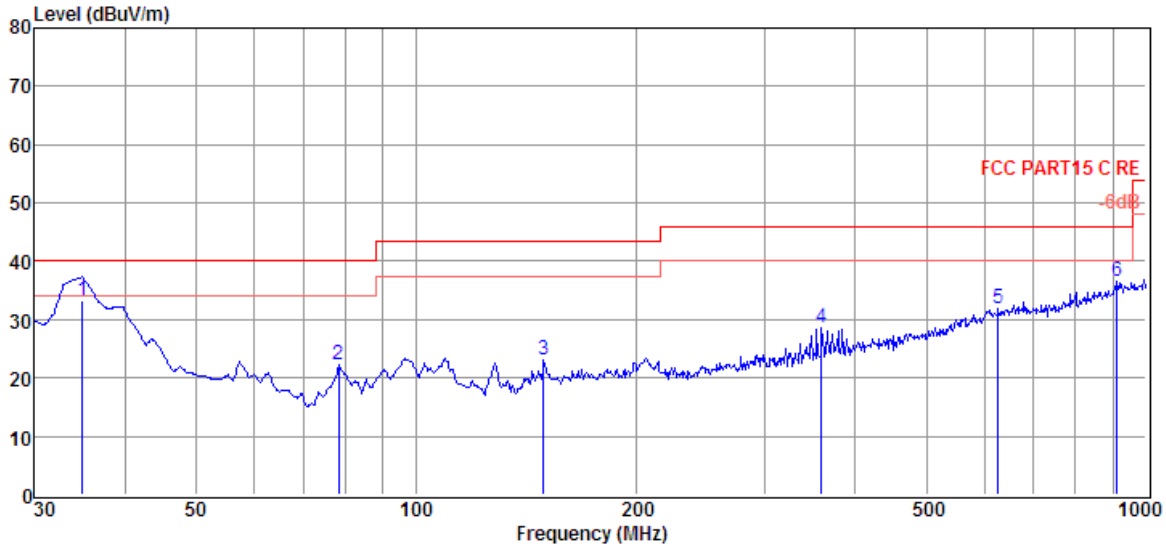
Temperature:	24.5°C	Relative Humidity:	55%
Pressure:	1012 hPa	Test Voltage:	7.4Vdc
Test Mode:	Tx Mode	Polarization:	HORIZONTAL



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	33.92	16.04	11.59	3.72	31.35	40.00	-8.65	Peak	HORIZONTAL
2	47.49	17.78	12.27	3.86	33.91	40.00	-6.09	Peak	HORIZONTAL
3	97.46	7.08	11.80	4.28	23.16	43.50	-20.34	Peak	HORIZONTAL
4	203.52	14.38	10.51	4.92	29.81	43.50	-13.69	Peak	HORIZONTAL
5	359.19	19.06	14.98	5.63	39.67	46.00	-6.33	Peak	HORIZONTAL
6	887.61	6.71	22.00	7.38	36.09	46.00	-9.91	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.
4. EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

Temperature:	24.5°C	Relative Humidity:	55%
Pressure:	1012 hPa	Test Voltage:	7.4Vdc
Test Mode:	Tx Mode	Polarization:	VERTICAL



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	34.88	17.75	11.78	3.73	33.26	40.00	-6.74	QP	VERTICAL
2	78.41	11.03	6.98	4.13	22.14	40.00	-17.86	Peak	VERTICAL
3	149.49	11.12	7.49	4.59	23.20	43.50	-20.30	Peak	VERTICAL
4	359.19	8.01	14.98	5.63	28.62	46.00	-17.38	Peak	VERTICAL
5	627.27	5.93	19.40	6.60	31.93	46.00	-14.07	Peak	VERTICAL
6	912.86	6.54	22.56	7.45	36.55	46.00	-9.45	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.
4. EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

8.5. SPURIOUS EMISSIONS BELOW 30M

The emissions don't show in following result tables are more than 20dB below the limits. The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

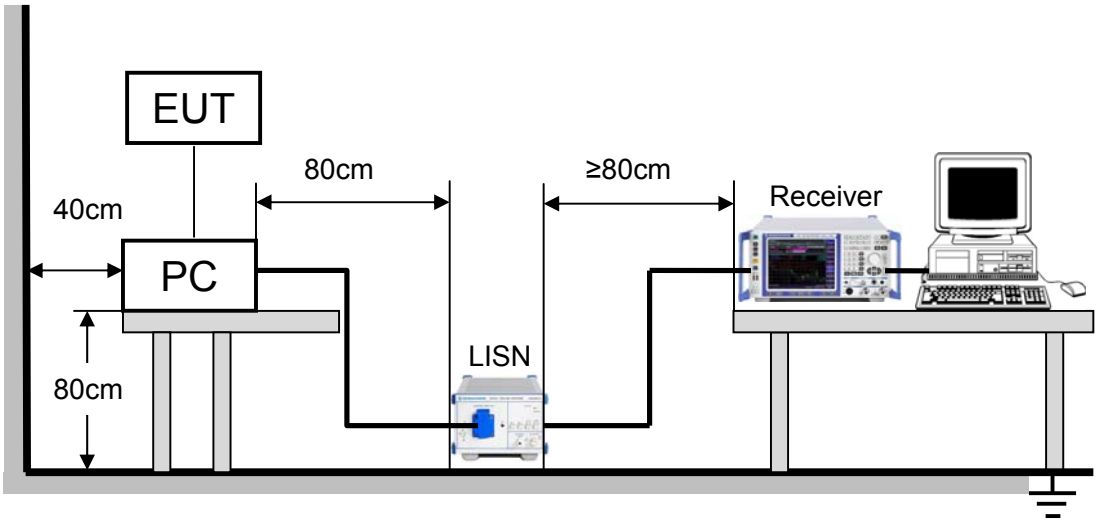
9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

Please refer to FCC §15.207 (a)

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *
0.50 -5.0	73.00	60.00	56.00	46.00
5.0 -30.0	73.00	60.00	60.00	50.00

TEST SETUP AND PROCEDURE



The EUT is put on a table of non-conducting material that is 80cm high. The vertical conducting wall of shielding is located 40cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI Measurement Receiver (R&S Test Receiver ESR3) is used to test the emissions from both sides of AC line. According to the requirements in Section 7 and 13 of ANSI C63.4-2003.Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode. The bandwidth of EMI test receiver is set at 9kHz.

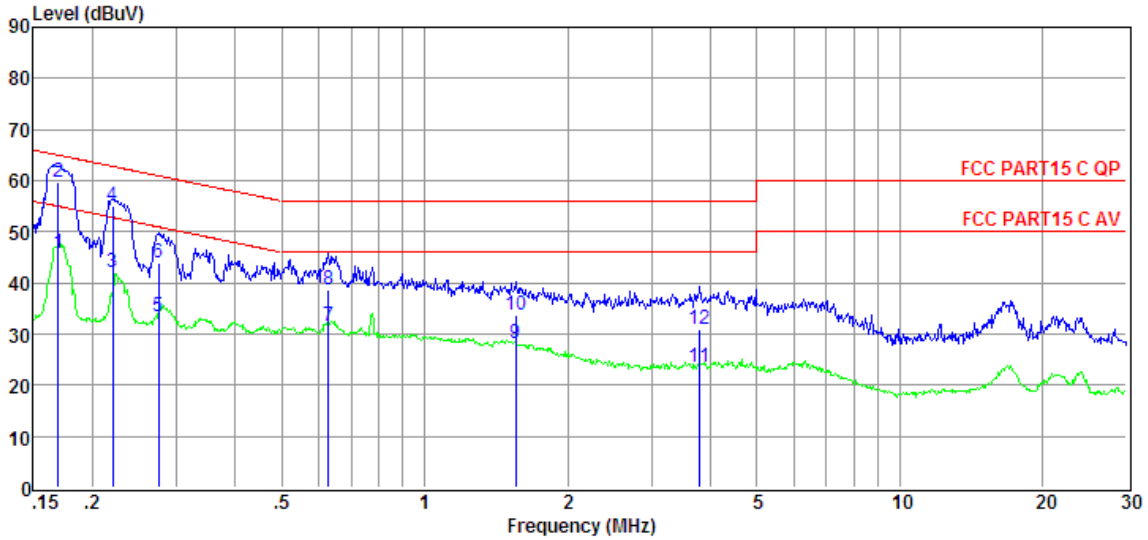
The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application.

TEST CONDITIONS

Temperature: 23.8°C
Relative Humidity: 58%
Test Voltage: 7.4Vdc

TEST RESULTS

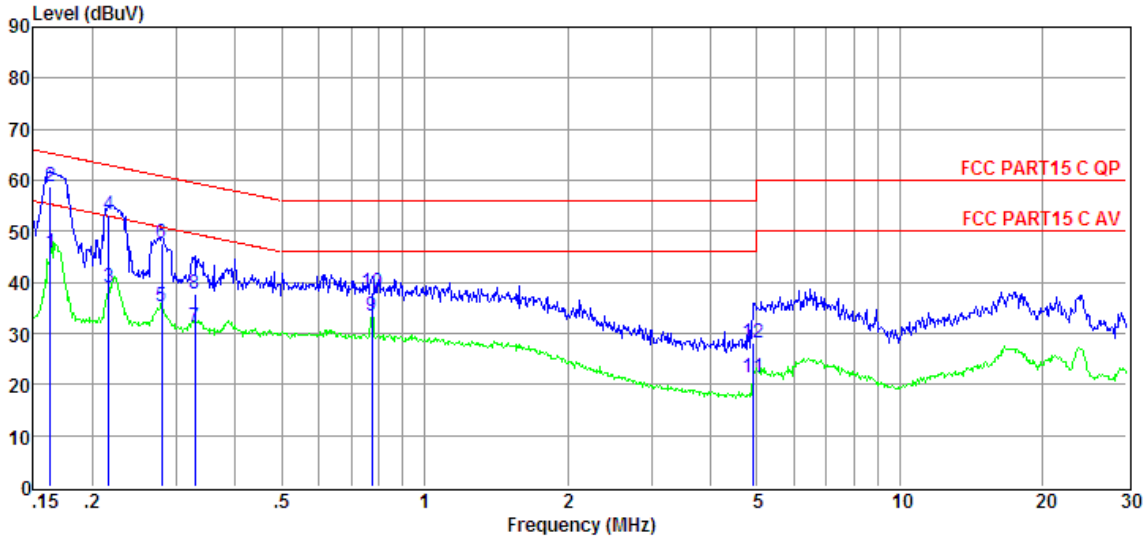
Temperature:	24.5°C	Relative Humidity:	55%
Pressure:	1012 hPa	Test Voltage:	AC120V,60Hz
Test Mode:	Tx Mode	Phase :	L
Remark:	N/A		



Item	Freq.	Read Level	LISN Factor	Cable Loss	Pulse Limiter Factor	Result Level	Limit Line	Over Limit	Detector	Phase
(Mark)	(MHz)	(dBμV)	(dB)	(dB)	(dB)	(dBμV)	(dBμV)	(dB)		
1	0.17	26.20	9.61	0.02	9.86	45.69	54.99	-9.30	Average	LINE
2	0.17	40.19	9.61	0.02	9.86	59.68	64.99	-5.31	QP	LINE
3	0.22	22.43	9.61	0.02	9.86	41.92	52.79	-10.87	Average	LINE
4	0.22	35.57	9.61	0.02	9.86	55.06	62.79	-7.73	QP	LINE
5	0.28	13.83	9.61	0.02	9.86	33.32	50.94	-17.62	Average	LINE
6	0.28	24.39	9.61	0.02	9.86	43.88	60.94	-17.06	QP	LINE
7	0.63	12.15	9.61	0.03	9.86	31.65	46.00	-14.35	Average	LINE
8	0.63	19.02	9.61	0.03	9.86	38.52	56.00	-17.48	QP	LINE
9	1.55	8.74	9.62	0.04	9.86	28.26	46.00	-17.74	Average	LINE
10	1.55	14.05	9.62	0.04	9.86	33.57	56.00	-22.43	QP	LINE
11	3.80	3.87	9.65	0.06	9.87	23.45	46.00	-22.55	Average	LINE
12	3.80	11.48	9.65	0.06	9.87	31.06	56.00	-24.94	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.

Temperature:	24.5°C	Relative Humidity:	55%
Pressure:	1012 hPa	Test Voltage:	AC120V,60Hz
Test Mode:	Tx Mode	Phase :	N
Remark:	N/A		



Item	Freq.	Read Level	LISN Factor	Cable Loss	Pulse Limiter Factor	Result Level	Limit Line	Over Limit	Detector	Phase
(Mark)	(MHz)	(dBµV)	(dB)	(dB)	(dB)	(dBµV)	(dBµV)	(dB)		
1	0.16	26.23	9.61	0.02	9.86	45.72	55.30	-9.58	Average	NEUTRAL
2	0.16	39.38	9.61	0.02	9.86	58.87	65.30	-6.43	QP	NEUTRAL
3	0.22	19.49	9.61	0.02	9.86	38.98	52.96	-13.98	Average	NEUTRAL
4	0.22	33.63	9.61	0.02	9.86	53.12	62.96	-9.84	QP	NEUTRAL
5	0.28	15.80	9.61	0.02	9.86	35.29	50.81	-15.52	Average	NEUTRAL
6	0.28	28.08	9.61	0.02	9.86	47.57	60.81	-13.24	QP	NEUTRAL
7	0.33	11.82	9.61	0.02	9.86	31.31	49.49	-18.18	Average	NEUTRAL
8	0.33	18.26	9.61	0.02	9.86	37.75	59.49	-21.74	QP	NEUTRAL
9	0.78	13.84	9.61	0.03	9.86	33.34	46.00	-12.66	Average	NEUTRAL
10	0.78	18.45	9.61	0.03	9.86	37.95	56.00	-18.05	QP	NEUTRAL
11	4.93	1.70	9.66	0.07	9.88	21.31	46.00	-24.69	Average	NEUTRAL
12	4.93	8.45	9.66	0.07	9.88	28.06	56.00	-27.94	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.

10. ANTENNA REQUIREMENTS

Applicable requirements

Please refer to FCC §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. 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.

Please refer to FCC §15.247(b)(4)
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.

Antenna Connector

Antenna Connector is on the PCB within enclosure and not accessible to user.

Antenna Gain

The antenna gain of EUT is less than 6 dBi.

END OF REPORT