RF TEST REPORT

Report No.: 16021423-FCC-R1
Supersede Report No.: N/A

Applicant	FrSky Electronic Co., Ltd.
Product Name	2.4G Receiver
Model No.	RX8R
Serial No.	X8R, XSR, X4R, X6R, X12R, L9R, L12R, S6R, S8R, S8R-Pro
Test Standard	FCC Part 15.247: 2016, ANSI C63.10: 2013
Test Date	January 03 to January 04, 2017
Issue Date	January 05, 2017
Test Result	☒Pass ☐ Fail
Equipment complied with the specification	☒
Equipment did not comply with the specification	☐

Deon Dai	Miro Bao	
Deon Dai Test Engineer	Miro Bao Checked By	

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Test result presented in this test report is applicable to the tested sample only

Issued by:
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Laboratories Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.

In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

Accreditations for Conformity Assessment

Country/Region	Scope
USA	EMC, RF/Wireless, SAR, Telecom
Canada	EMC, RF/Wireless, SAR, Telecom
Taiwan	EMC, RF, Telecom, SAR, Safety
Hong Kong	RF/Wireless, SAR, Telecom
Australia	EMC, RF, Telecom, SAR, Safety
Korea	EMI, EMS, RF, SAR, Telecom, Safety
Japan	EMI, RF/Wireless, SAR, Telecom
Singapore	EMC, RF, SAR, Telecom
Europe	EMC, RF, SAR, Telecom, Safety

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1. Report Revision History

Report No.	Report Version	Description	Issue Date
16021423-FCC-R1	NONE	Original	January 05, 2017

2. Customer information

Applicant Name	FrSky Electronic Co., Ltd.
Applicant Add	No.100 Jinxi Road ,Wuxi,Jiangsu,China
Manufacturer	FrSky Electronic Co., Ltd.
Manufacturer Add	No.100 Jinxi Road ,Wuxi,Jiangsu,China

3. Test site information

Lab performing tests	SIEMIC (Nanjing-China) Laboratories
Lab Add	2-1 Longcang Avenue Yuhua Economic andTechnology Development Park, Nanjing, China
FCC Test Site No.	986914
IC Test Site No.	4842B-1
Test Software	EZ_EMC

4. Equipment under Test (EUT) Information

Description of EUT:	2.4G Receiver
Main Model:	RX8R
Serial Model:	X8R, XSR, X4R, X6R, X12R, L9R, L12R, S6R, S8R, S8R-Pro
Date EUT received:	November 21, 2016
Test Date(s):	January 03 to January 04, 2017
Equipment Category ：	FHSS
Antenna Gain:	ANT1#: 2 dBi ANT2#: 2 dBi
Type of Modulation:	2-FSK
RF Operating Frequency (ies):	2405.1-2474.1 MHz
Max. Output Power:	ANT1#: 13.546dBm ANT2#: 13.780dBm
Number of Channels:	47CH
Port:	N/A
Input Power:	4~10V(5V@100mA)
Trade Name :	FrSky
FCC ID:	XYFN2409R

Note: the difference between these models please refers to Annex E. DECLARATION OF SIMILARITY in this report.

5. Test Summary

The product was tested in accordance with the following specifications.
All testing has been performed according to below product classification:

FCC Rules	Description of Test	Result
§15.247 (i), §2.1091	RF Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.247(a)(1)	Channel Separation	Compliance
§15.247(a)(1)	20 dB Bandwidth	Compliance
§15.247(b)(1)	Peak Output Power	Compliance
§15.247(a)(1)(iii)	Number of Hopping Channel	Compliance
§15.247(a)(1)(iii)	Time of Occupancy (Dwell Time)	Compliance
§15.247(d)	Band Edge	Compliance
§15.207(a)	AC Line Conducted Emissions	N/A
§15.205, §15.209, §15.247(d)	Radiated Emissions	Compliance

Measurement Uncertainty

Emissions		
Test Item	Description	Uncertainty
Conducted Emissions &Radiated Spurious Emissions	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	1.634dB / 3.952dB

Note: Two sets of antennas are not transmitting at the same time.

6. Measurements, Examination And Derived Results

6.1 RF Exposure

The EUT is a Mobile device, thus requires RF exposure evaluation;
Please refer to SIEMIC RF Exposure Report: 16021423-FCC-H1.

6.2 Antenna Requirement

Applicable Standard

According to § 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 user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit. And according to FCC 47 CFR section 15.247 (b), if the 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 6 dBi.

Antenna Connector Construction

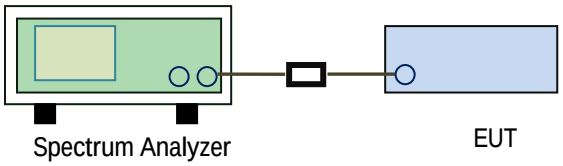
The EUT has 2 antennas:
A permanently attached PIFA antenna for 2.4G, the gain is 2dBi.
The antenna meets up with the ANTENNA REQUIREMENT.

Result: Compliance.

6.3 Channel Separation

Temperature	25°C
Relative Humidity	51%
Atmospheric Pressure	1018mbar
Test date :	January 03, 2017
Tested By :	Deon Dai

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.247(a)(1)	a)	Channel Separation < 20dB BW and 20dB BW < 25KHz ; Channel Separation Limit=25KHz Chanel Separation < 20dB BW and 20dB BW > 25kHz ; Channel Separation Limit=2/3 20dB BW	☒
Test Setup			
Test Procedure		The test follows FCC Public Notice DA 00-705 Measurement Guidelines. Use the following spectrum analyzer settings: - The EUT must have its hopping function enabled - Span = wide enough to capture the peaks of two adjacent channels - Resolution (or IF) Bandwidth (RBW) ≥1% of the span - Video (or Average) Bandwidth (VBW) ≥RBW - Sweep = auto - Detector function = peak - Trace = max hold - Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section. Submit this plot.	
Remark			
Result		☒ Pass ☐ Fail	

Test Data ☒ Yes ☐ N/A
Test Plot ☒ Yes (See below) ☐ N/A

Channel Separation measurement result

Type/ Modulation	CH	CH Freq (MHz)	CH Separation (MHz)	Limit (MHz)	Result
CH Separation ANT1#	Low Channel	2405.1	1.509	0.3304	Pass
	Adjacency Channel	2406.6			
	Mid Channel	2439.6	1.503	0.2658	Pass
	Adjacency Channel	2438.1			
	High Channel	2474.1	1.500	0.2649	Pass
	Adjacency Channel	2472.6			
CH Separation ANT2#	Low Channel	2405.1	1.503	0.3174	Pass
	Adjacency Channel	2406.6			
	Mid Channel	2439.6	1.503	0.2540	Pass
	Adjacency Channel	2438.1			
	High Channel	2474.1	1.497	0.2534	Pass
	Adjacency Channel	2472.6			

Test Plots

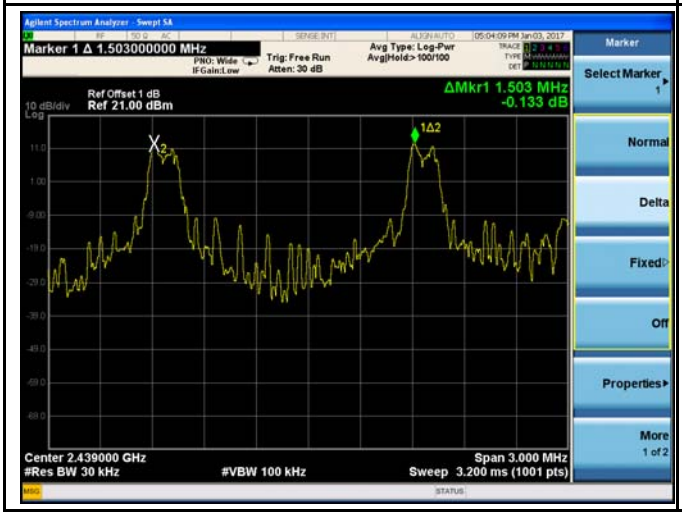
Channel Separation measurement result

2-FSK - Low Channel ANT1#

2-FSK - Middle Channel ANT1#

2-FSK - High Channel ANT1#

2-FSK - Low Channel ANT2#



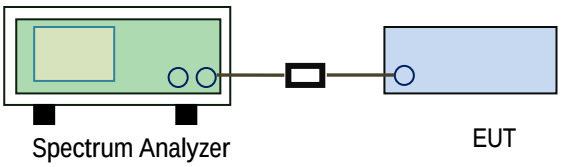
2-FSK - Middle Channel ANT2#

2-FSK - High Channel ANT2#

6.4 20dB Bandwidth

Temperature	23°C
Relative Humidity	51%
Atmospheric Pressure	1018mbar
Test date :	January 03, 2017
Tested By :	Deon Dai

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(a) (1)	a)	Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.	☒
Test Setup			
Test Procedure	The test follows FCC Public Notice DA 00-705 Measurement Guidelines. Use the following spectrum analyzer settings: - Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel - RBW ≥1% of the 20 dB bandwidth - VBW ≥RBW - Sweep = auto - Detector function = peak - Trace = max hold. - The EUT should be transmitting at its maximum data rate. Allow 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 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).		
Remark			
Result	☒ Pass ☐ Fail		

Test Data ☒Yes ☐N/A

Test Plot ☒Yes (See below) ☐N/A

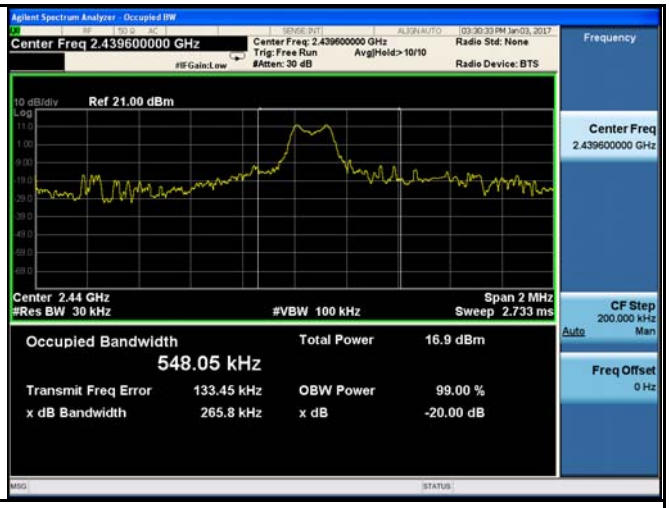
Measurement result

Modulation	CH	CH Freq (MHz)	20dB Bandwidth (MHz)
2-FSK ANT1#	Low	2405.1	0.3304
	Mid	2439.6	0.2658
	High	2474.1	0.2649
2-FSK ANT2#	Low	2405.1	0.3174
	Mid	2439.6	0.2540
	High	2474.1	0.2534

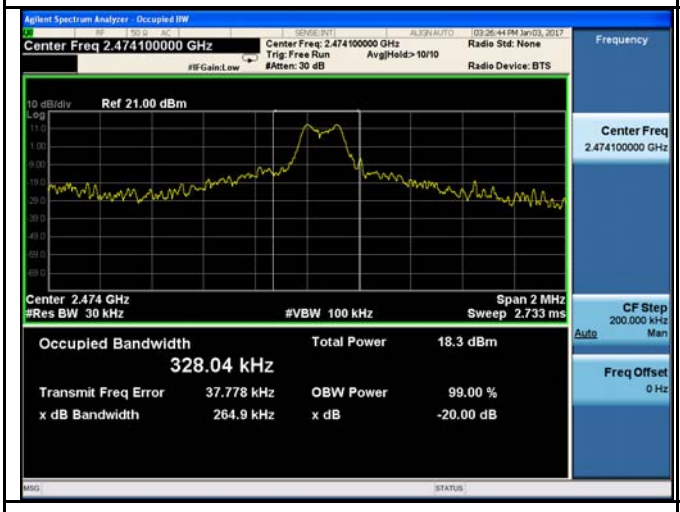
Test Plots

20dB Bandwidth measurement result

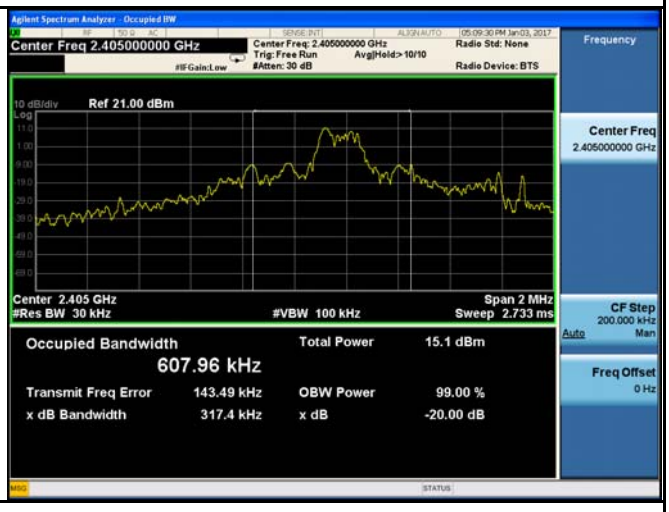
2-FSK - Low Channel-ANT1#



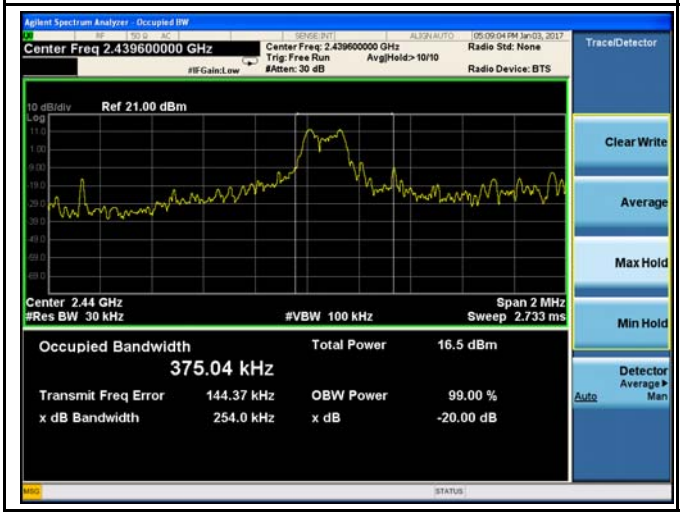
2-FSK - Middle Channel-ANT1#



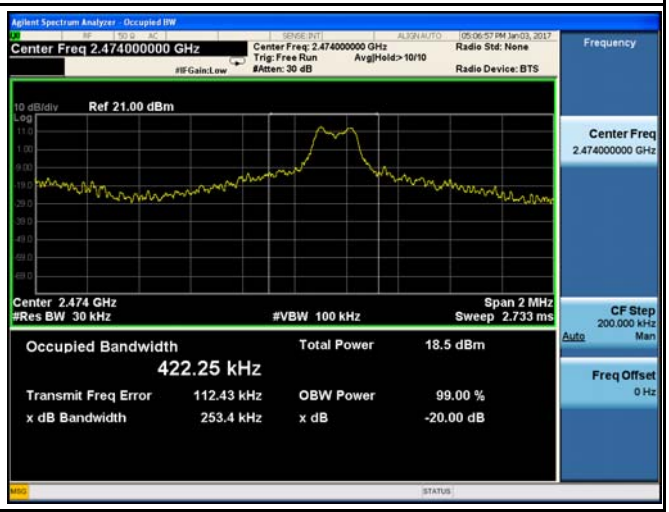
2-FSK - High Channel-ANT1#



2-FSK - Low Channel-ANT2#



2-FSK - Middle Channel-ANT2#

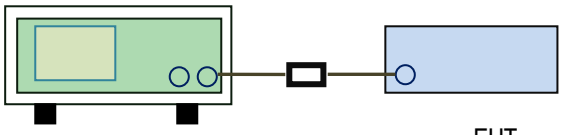


2-FSK - High Channel-ANT2#

6.5 Peak Output Power

Temperature	23°C
Relative Humidity	51%
Atmospheric Pressure	1018mbar
Test date :	January 03, 2017
Tested By :	Deon Dai

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(b) (2)	a)	FHSS in 2400-2483.5MHz with ≥ 75 channels: ≤1 Watt	☒
	b)	FHSS in 5725-5850MHz: ≤1 Watt	☐
	c)	For all other FHSS in the 2400-2483.5MHz band: ≤0.125 Watt.	☒
	d)	FHSS in 902-928MHz with ≥ 50 channels: ≤1 Watt	☐
	e)	FHSS in 902-928MHz with ≥ 25 & <50 channels: ≤0.25 Watt	☐
	f)	DSSS in 902-928MHz, 2400-2483.5MHz, 5725-5850MHz: ≤1 Watt	☐
Test Setup	 Spectrum Analyzer EUT		
Test Procedure	The test follows FCC Public Notice DA 00-705 Measurement Guidelines. Use the following spectrum analyzer settings: - Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel - RBW > the 20 dB bandwidth of the emission being measured - VBW ≥RBW - Sweep = auto - Detector function = peak - Trace = max hold - Allow the trace to stabilize. - Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power (see the note above regarding external attenuation and cable loss). The limit is specified in one of the subparagraphs of this Section. Submit this plot. A peak responding power meter may be used instead of a spectrum analyzer.		
Remark			
Result	☒ Pass ☐ Fail		

Test Data ☒Yes ☐N/A

Test Plot ☒Yes (See below) ☐N/A

Peak Output Power measurement result

Type	Modulation	CH	Freq (MHz)	Conducted Power (dBm)	Conducted Power (mW)	Limit (mW)	Result
Output power	2-FSK ANT1#	Low	2405.1	11.621	14.524	1000	Pass
		Mid	2439.6	12.258	16.819	1000	Pass
		High	2474.1	13.546	22.626	1000	Pass
	2-FSK ANT2#	Low	2405.1	11.788	15.094	1000	Pass
		Mid	2439.6	12.427	17.486	1000	Pass
		High	2474.1	13.780	23.878	1000	Pass

Test Plots

Output Power measurement result

2-FSK Output power - Low CH 2405-ANT1#

2-FSK Output power - Mid CH 2440-ANT1#

2-FSK Output power - High CH 2474-ANT1#

2-FSK Output power - Low CH 2405-ANT2#

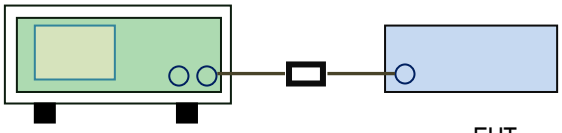
2-FSK Output power - Mid CH 2440-ANT2#

2-FSK Output power - High CH 2474-ANT2#

6.6 Number of Hopping Channel

Temperature	23°C
Relative Humidity	51%
Atmospheric Pressure	1018mbar
Test date :	January 03, 2017
Tested By :	Deon Dai

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(a)(1)(iii)	a)	FHSS in 2400-2483.5MHz ≥ 15 channels	☒
Test Setup			
Test Procedure	The test follows FCC Public Notice DA 00-705 Measurement Guidelines. Use the following spectrum analyzer settings: The EUT must have its hopping function enabled. - Span = the frequency band of operation - RBW ≥1% of the span - VBW ≥RBW - Sweep = auto - Detector function = peak - Trace = max hold - Allow trace to fully stabilize. - It may prove necessary to break the span up to sections, in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).		
Remark			
Result	☒ Pass ☐Fail		

Test Data ☒Yes ☐N/A
Test Plot ☒Yes (See below) ☐N/A

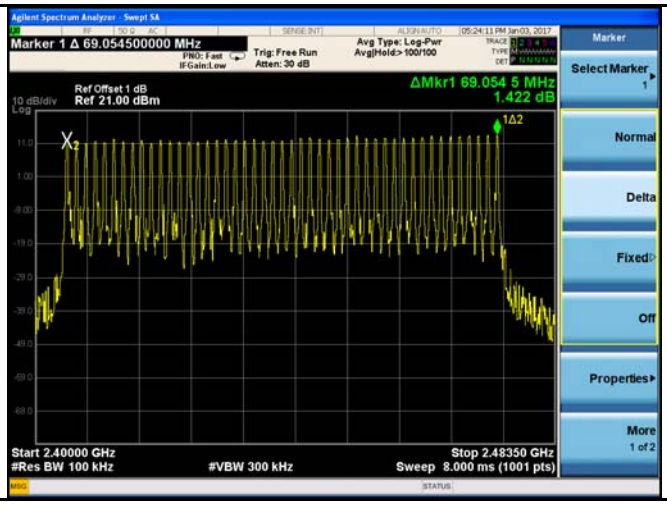
Number of Hopping Channel measurement result

Type	Modulation	Frequency Range	Number of Hopping Channel	Limit
Number of Hopping Channel	2-FSK ANT1#	2405.1-2474.1	47	15
Number of Hopping Channel	2-FSK ANT2#	2405.1-2474.1	47	15

Test Plots

Number of Hopping Channels measurement result

2-FSK ANT1#

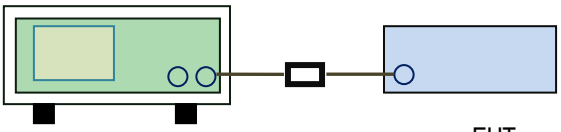


2-FSK ANT2#

6.7 Time of Occupancy (Dwell Time)

Temperature	23°C
Relative Humidity	51%
Atmospheric Pressure	1018mbar
Test date :	January 03, 2017
Tested By :	Deon Dai

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(a)(1)(iii)	a)	Dwell Time < 0.4s	☒
Test Setup			
Test Procedure	The test follows FCC Public Notice DA 00-705 Measurement Guidelines. Use the following spectrum analyzer - Span = zero span, centered on a hopping channel - RBW = 1 MHz - VBW ≥RBW - Sweep = as necessary to capture the entire dwell time per hopping channel - Detector function = peak - Trace = max hold - use the marker-delta function to determine the dwell time		
Remark			
Result	☒ Pass ☐ Fail		

Test Data ☒Yes ☐N/A

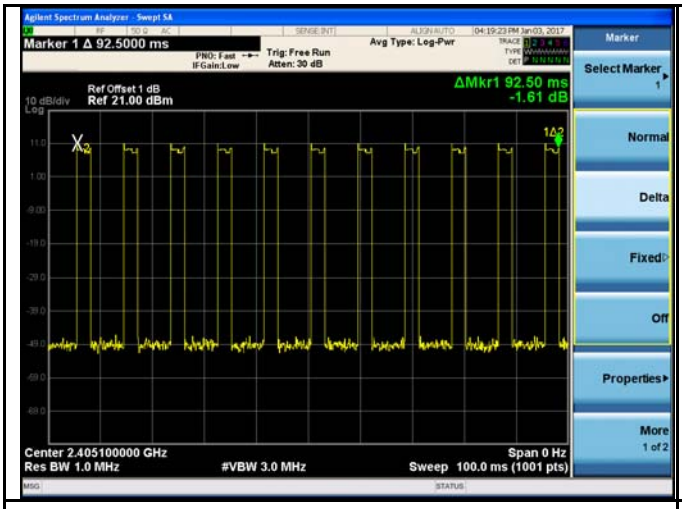
Test Plot ☒Yes (See below) ☐N/A

Dwell Time measurement result

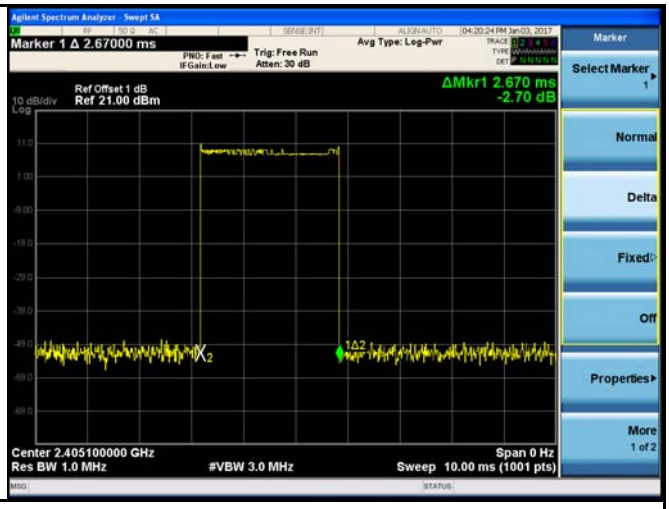
Type	Modulation	CH	Pulse Width (ms)	Dwell Time (ms)	Limit (ms)	Result
Dwell Time	2-FSK ANT1#	Low	2.67	117.48	400	Pass
		Mid	2.68	117.92	400	Pass
		High	2.67	117.48	400	Pass
	2-FSK ANT2#	Low	2.67	117.48	400	Pass
		Mid	2.67	117.48	400	Pass
		High	2.67	117.48	400	Pass
Note: Dwell time= time slot length *(number of hops on spectrum analyzer)/analyzer sweep time/47*(47*0.4)= 4.89*(11)/0.1/47*(47*0.4)						

Test Plots

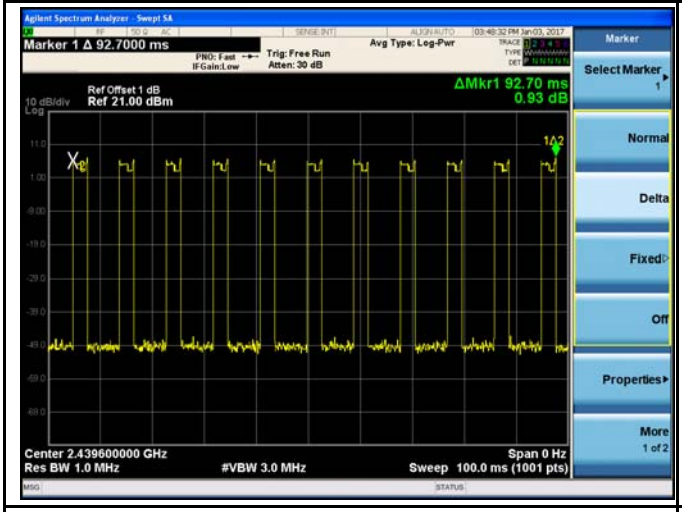
Dwell Time measurement result



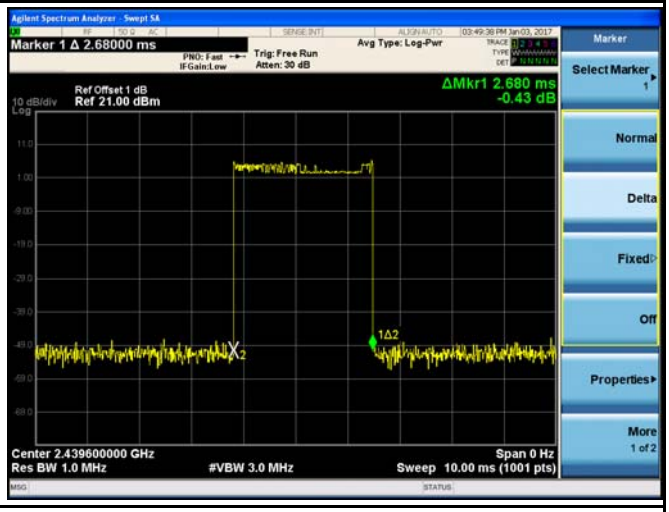
2-FSK - Low CH 2405-1-ANT1#



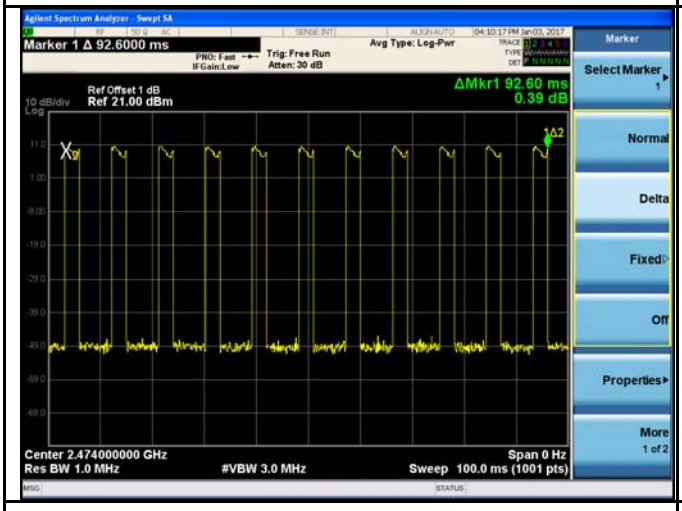
2-FSK - Low CH 2405-2-ANT1#



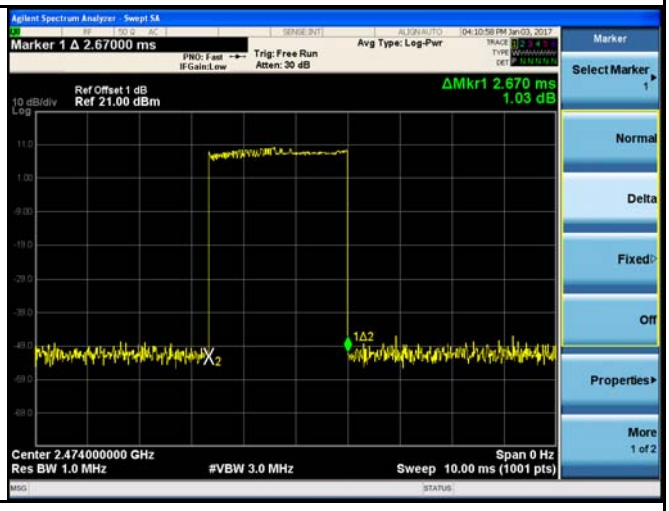
2-FSK - Mid CH 2440-1-ANT1#



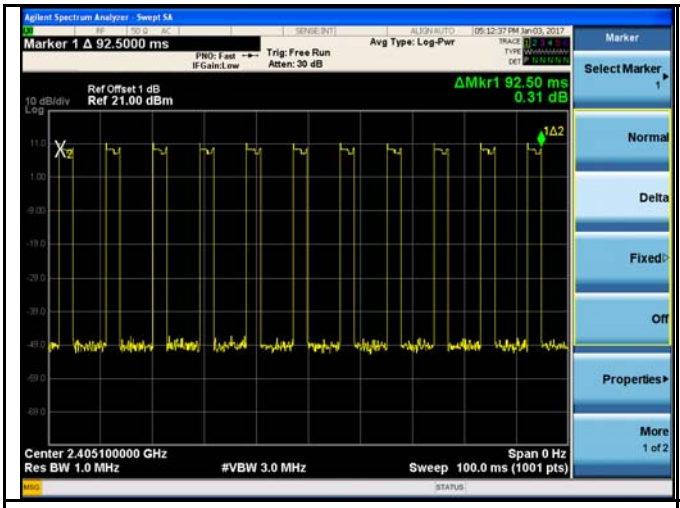
2-FSK - Mid CH 2440-ANT1#



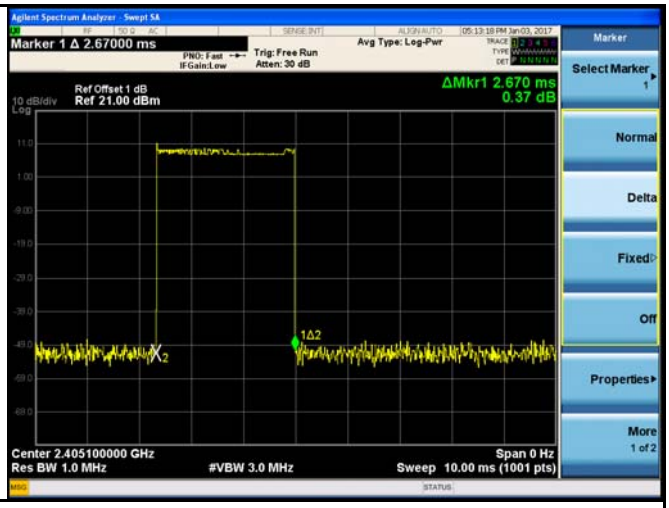
2-FSK - High CH 2474-ANT1#



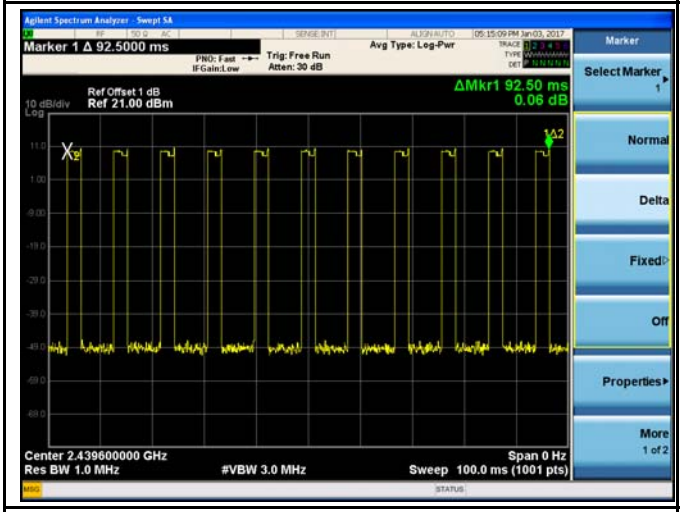
2-FSK - High CH 2474-ANT1#



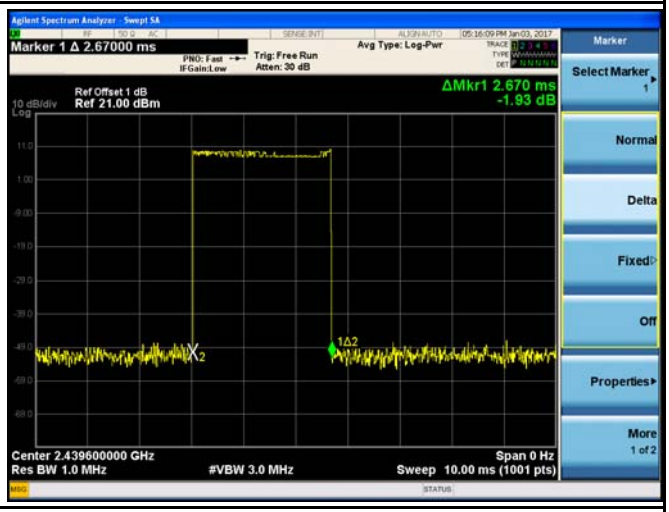
2-FSK - Low CH 2405-1-ANT2#



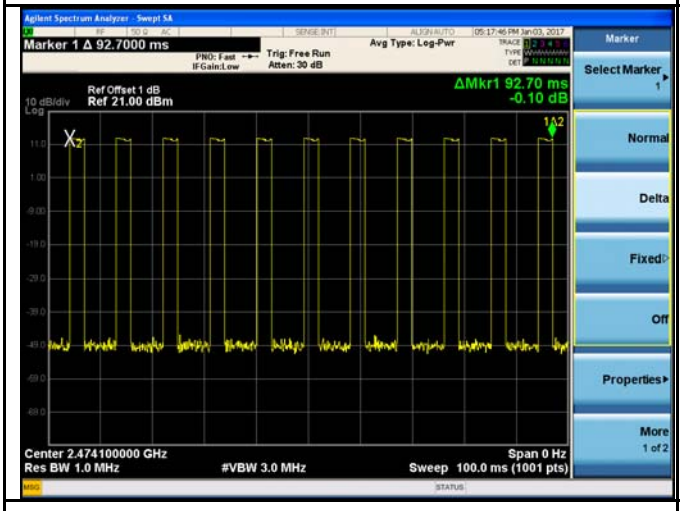
2-FSK - Low CH 2405-2-ANT2#



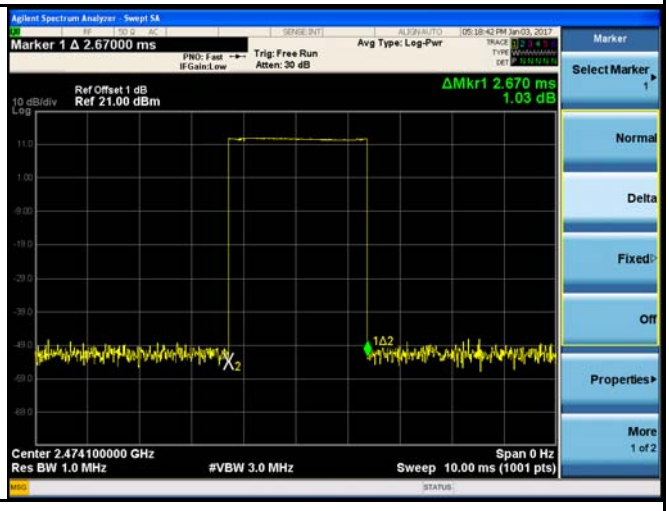
2-FSK - Mid CH 2440-1-ANT2#



2-FSK - Mid CH 2440-ANT2#



2-FSK - High CH 2474-ANT2#

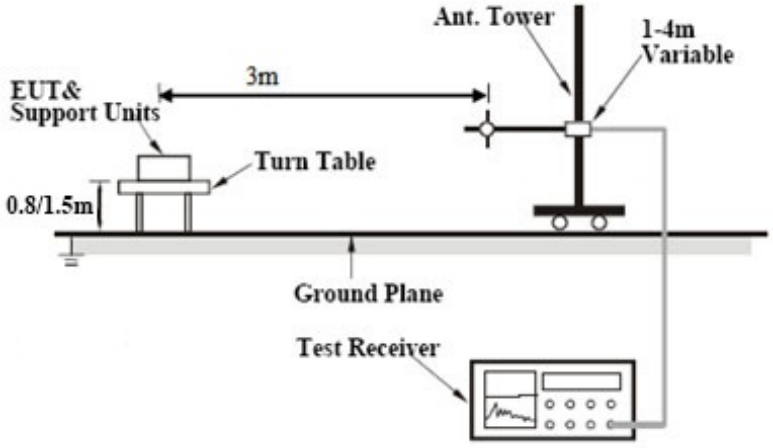


2-FSK - High CH 2474-ANT2#

6.8 Band Edge

Temperature	24°C
Relative Humidity	57%
Atmospheric Pressure	1015mbar
Test date :	January 04, 2017
Tested By :	Deon Dai

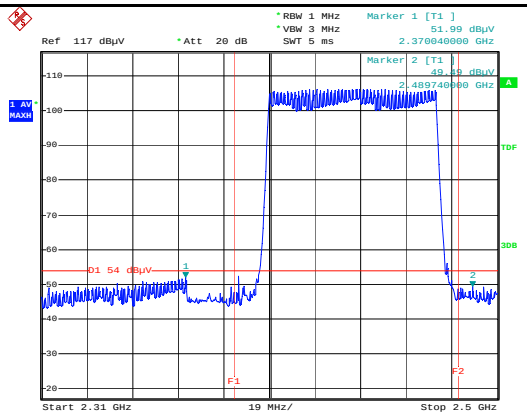
Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(a) (1)(iii)	a)	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.	☒
Test Setup			
Test Procedure	The test follows FCC Public Notice DA 00-705 Measurement Guidelines. Radiated Method Only - 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator. - 2. Position the EUT without connection to measurement instrument. Put it on the Rotated table and turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range. - 3. First, set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, check the emission of EUT, if pass then set Spectrum Analyzer as below: a. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasiy Peak detection at frequency below 1GHz. b. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz with Peak detection for Peak measurement at frequency above 1GHz. c. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz with Peak detection for Average Measurement as below at frequency above 1GHz. - 4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency. - 5. Repeat above procedures until all measured frequencies were complete.		
Remark			
Result	☒ Pass ☐ Fail		

Test Data ☐Yes ☒N/A
Test Plot ☒Yes (See below) ☐N/A

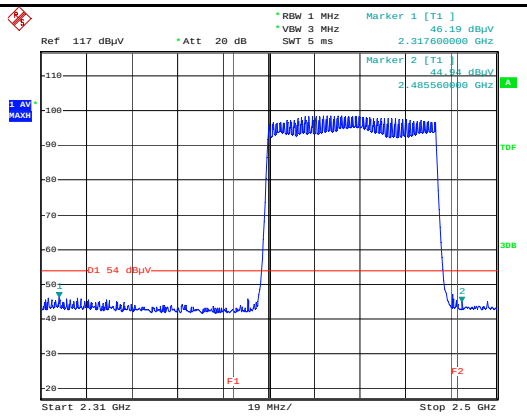
Test Plots

2-FSK Mode-ANT1:



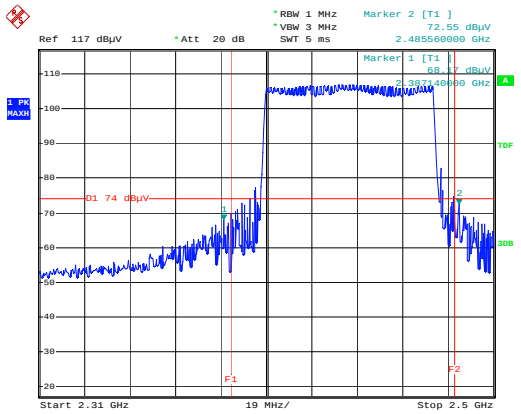
Date: 4.JAN.2017 09:49:44

2-FSK -Hopping-Ave-V



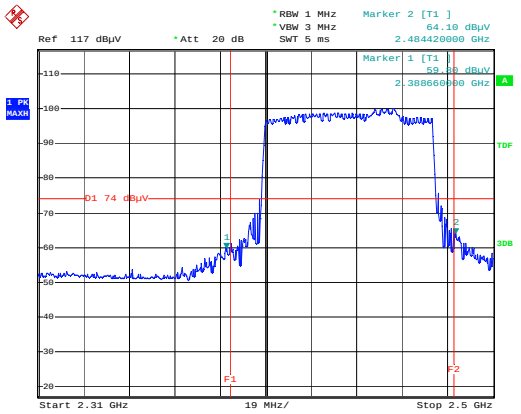
Date: 4.JAN.2017 09:51:55

2-FSK -Hopping-Ave-H



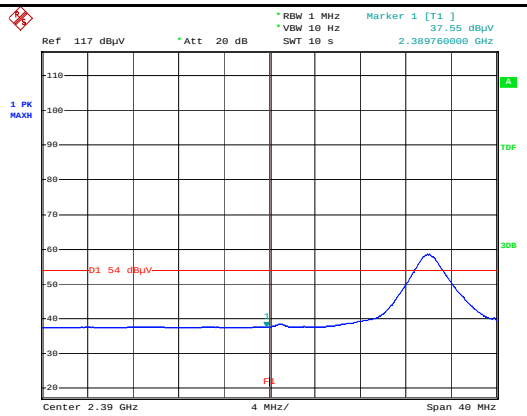
Date: 4.JAN.2017 09:45:41

2-FSK -Hopping-PK-V



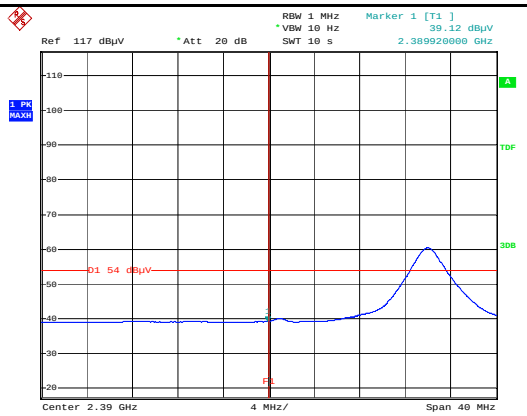
Date: 4.JAN.2017 10:01:28

2-FSK -Hopping-PK-H



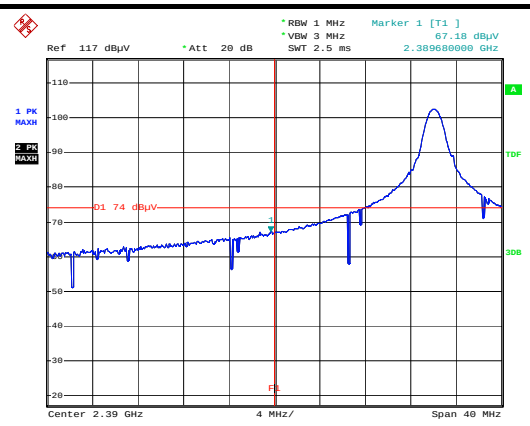
Date: 4.JAN.2017 10:24:28

2-FSK -Left Side-Ave-V

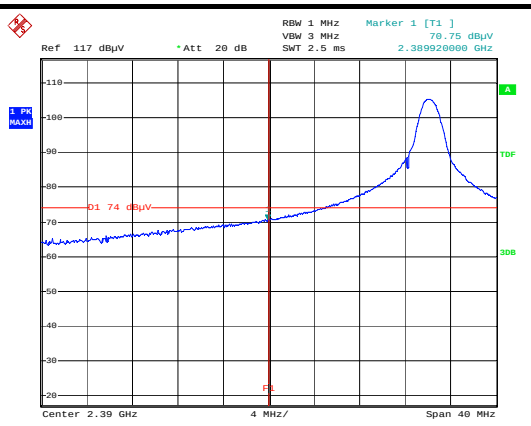


Date: 4.JAN.2017 11:03:59

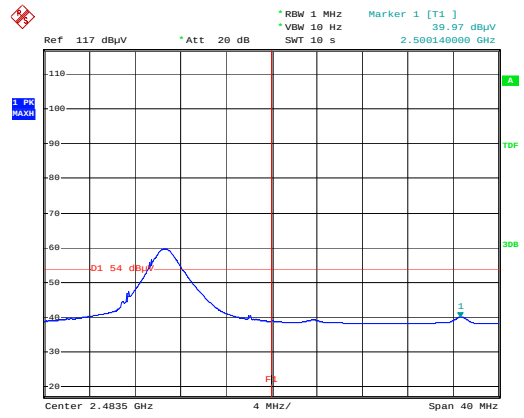
2-FSK -Left Side-Ave-H



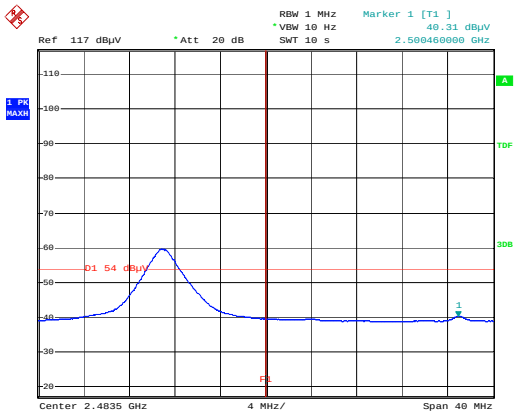
2-FSK -Left Side-PK-V



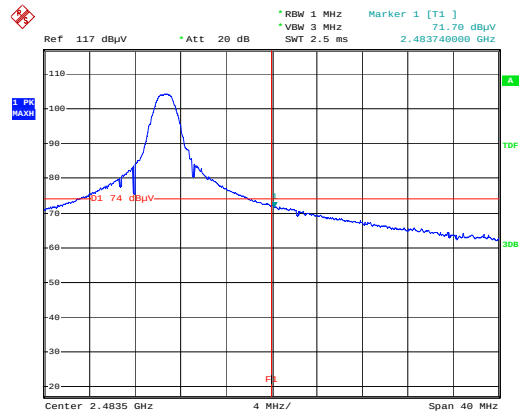
2-FSK -Left Side-PK-H



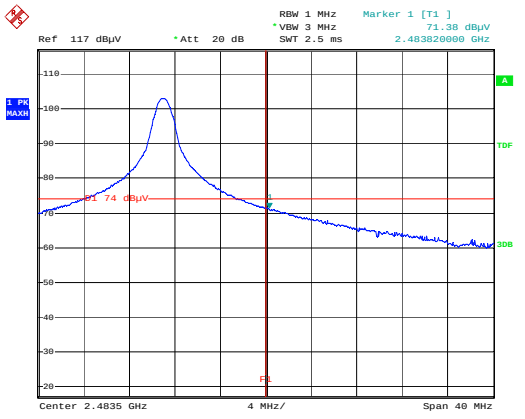
2-FSK -Right Side-Ave-V



2-FSK -Right Side-Ave-H

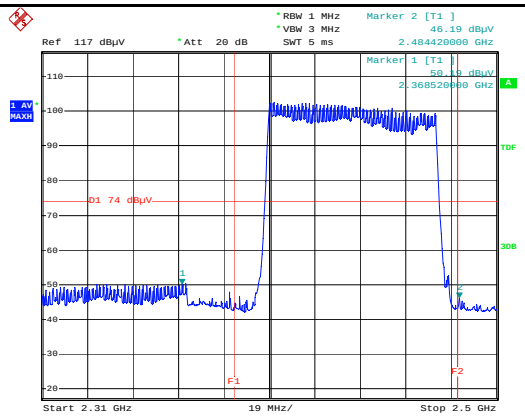


2-FSK -Right Side-PK-V

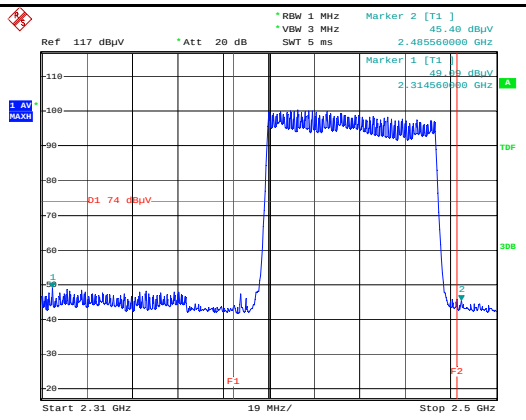


2-FSK -Right Side-PK-H

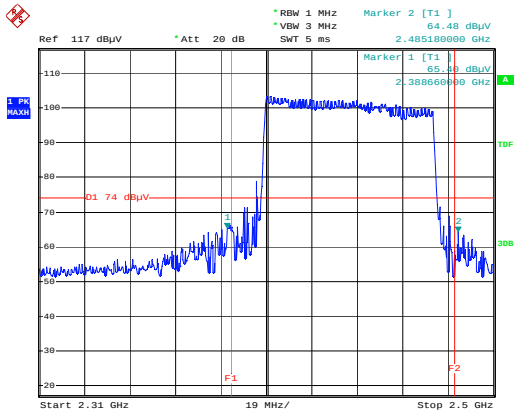
2-FSK Mode-ANT2:



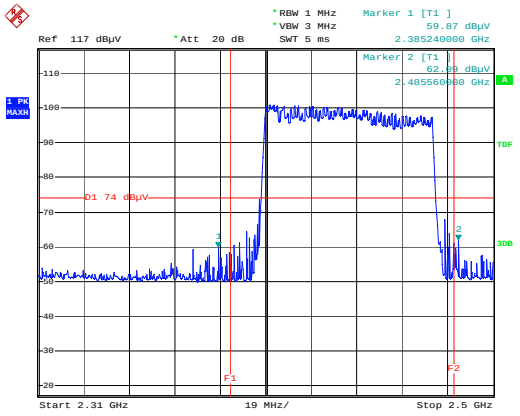
2-FSK -Hopping-Ave-V



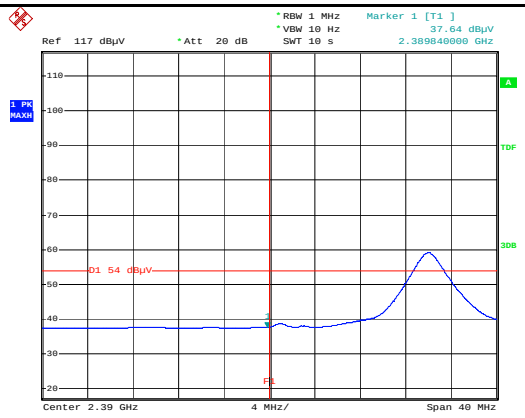
2-FSK -Hopping-Ave-H



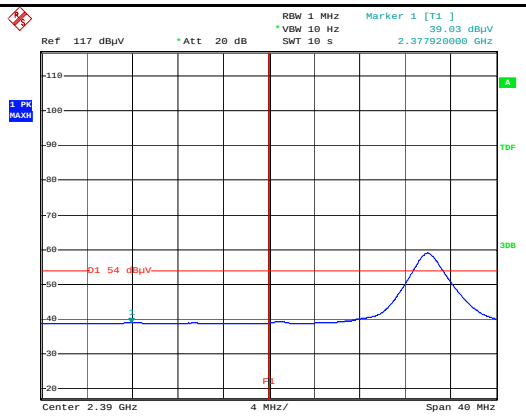
2-FSK -Hopping-PK-V



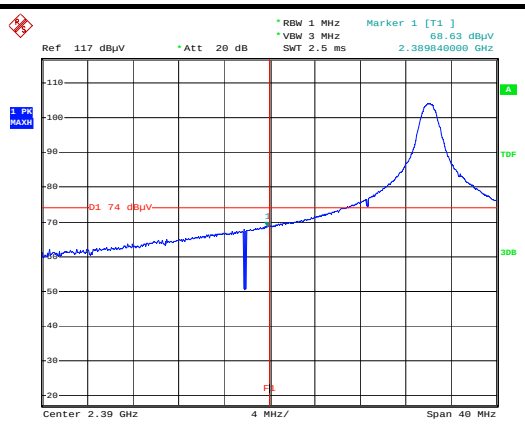
2-FSK -Hopping-PK-H



2-FSK -Left Side-Ave-V

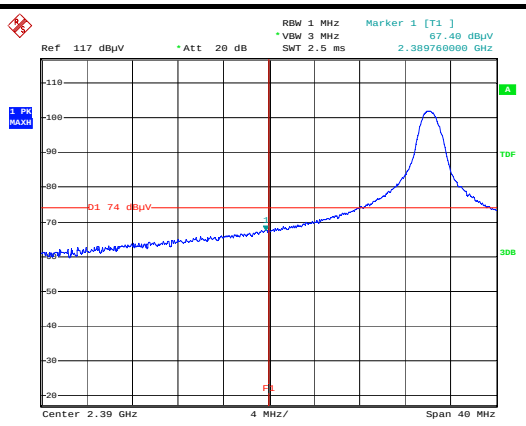


2-FSK -Left Side-Ave-H



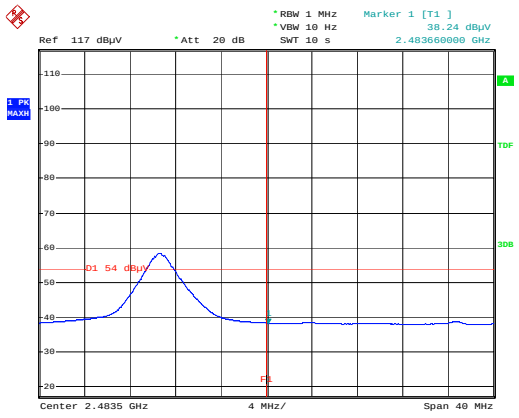
Date: 4.JAN.2017 10:31:54

2-FSK -Left Side-PK-V



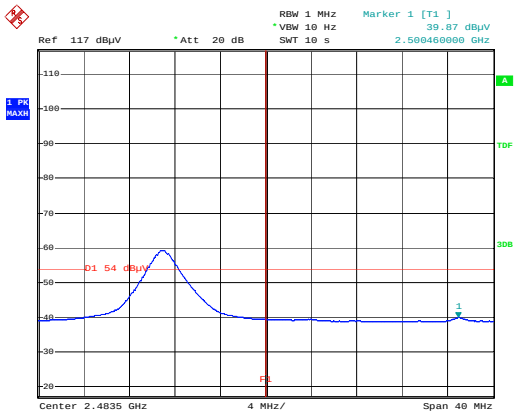
Date: 4.JAN.2017 11:08:05

2-FSK -Left Side-PK-H



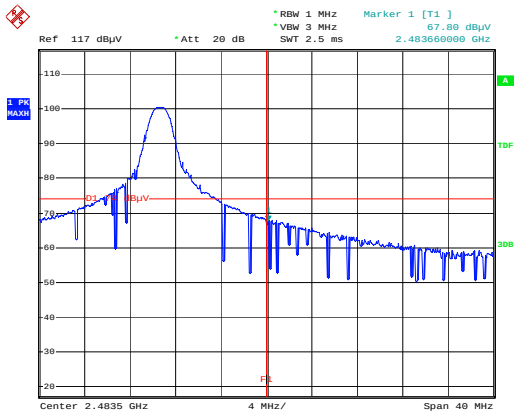
Date: 4.JAN.2017 10:47:14

2-FSK -Right Side-Ave-V



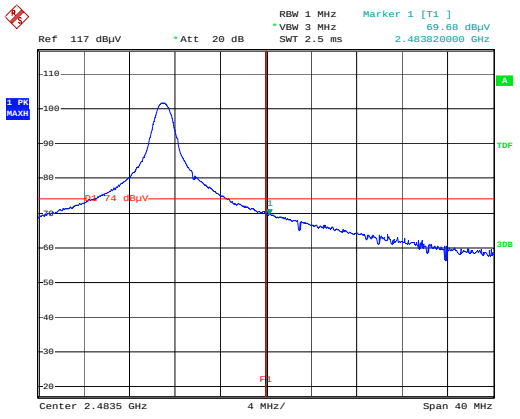
Date: 4.JAN.2017 11:34:27

2-FSK -Right Side-Ave-H



Date: 4.JAN.2017 10:44:39

2-FSK -Right Side-PK-V



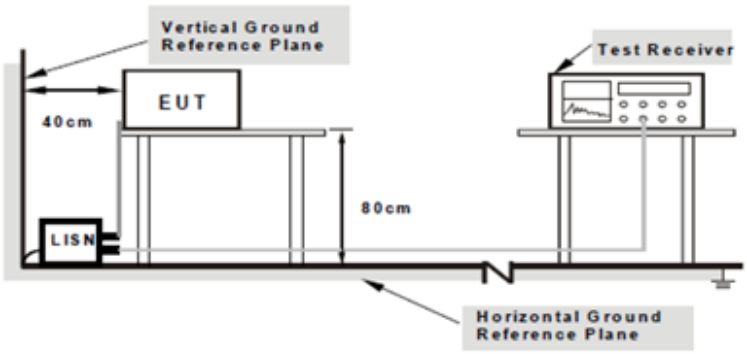
Date: 4.JAN.2017 11:34:02

2-FSK -Right Side-PK-H

6.9 AC Power Line Conducted Emissions

Temperature	---
Relative Humidity	---
Atmospheric Pressure	---
Test date :	---
Tested By :	---

Requirement(s):

<table>
<tr><th>Spec</th><th>Item</th><th>Requirement</th><th>Applicable</th></tr>
<tr><td>47CFR§15.207, RSS210 (A8.1)</td><td>a)</td><td>For Low-power radio-frequency devices that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 [mu]H/50 ohms line impedance stabilization network (LISN). The lower limit applies at the boundary between the frequencies ranges.
<table>
<tr><th rowspan="2">Frequency ranges (MHz)</th><th colspan="2">Limit (dBμV)</th></tr>
<tr><th>QP</th><th>Average</th></tr>
<tr><td>0.15 ~ 0.5</td><td>66 – 56</td><td>56 – 46</td></tr>
<tr><td>0.5 ~ 5</td><td>56</td><td>46</td></tr>
<tr><td>5 ~ 30</td><td>60</td><td>50</td></tr>
</table></td><td>☐</td></tr>
<tr><td>Test Setup</td><td colspan="3"> 

Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.</td></tr>
<tr><td>Procedure</td><td colspan="3">1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table.
2. The power supply for the EUT was fed through a 50W/50mH EUT LISN, connected to filtered mains.
3. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable.
4. All other supporting equipment were powered separately from another main supply.
5. The EUT was switched on and allowed to warm up to its normal operating condition.
6. A scan was made on the NEUTRAL line (for AC mains) or Earth line (for DC power) over the required frequency range using an EMI test receiver.
7. High peaks, relative to the limit line, The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 10 kHz.
8. Step 7 was then repeated for the LIVE line (for AC mains) or DC line (for DC power).</td></tr>
<tr><td>Remark</td><td colspan="3">Power Supply By Battery</td></tr>
<tr><td>Result</td><td colspan="3">☒ N/A ☐ Fail</td></tr>
</table>

Test Data ☐Yes ☒N/A

Test Plot ☐Yes (See below) ☒N/A

6.10 Radiated Spurious Emissions

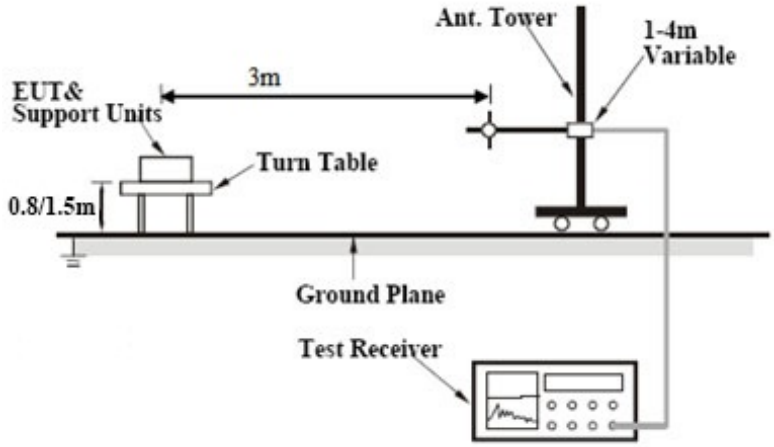
Temperature	25°C
Relative Humidity	58%
Atmospheric Pressure	1016mbar
Test date :	January 04, 2017
Tested By :	Deon Dai

Requirement(s):

Spec	Item	Requirement	Applicable
47CFR§15.205, §15.209, §15.247(d)	a)	Except higher limit as specified elsewhere in other section, the emissions from the low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges	☒

Frequency range (MHz)	Field Strength (μV/m)
30 – 88	100
88 – 216	150
216 – 960	200
Above 960	500

Test Setup



Procedure

1. The EUT was switched on and allowed to warm up to its normal operating condition.
2. The test was carried out at the selected frequency points obtained from the EUT characterization. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:
   a. Vertical or horizontal polarization (whichever gave the higher emission level over a full rotation of the EUT) was chosen.
   b. The EUT was then rotated to the direction that gave the maximum emission.
   c. Finally, the antenna height was adjusted to the height that gave the maximum emission.
3. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasiy Peak detection at frequency below 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz with Peak detection for Peak measurement at frequency above 1GHz.
   The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz with Peak detection for Average Measurement as below at frequency above 1GHz.
5. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.

Remark

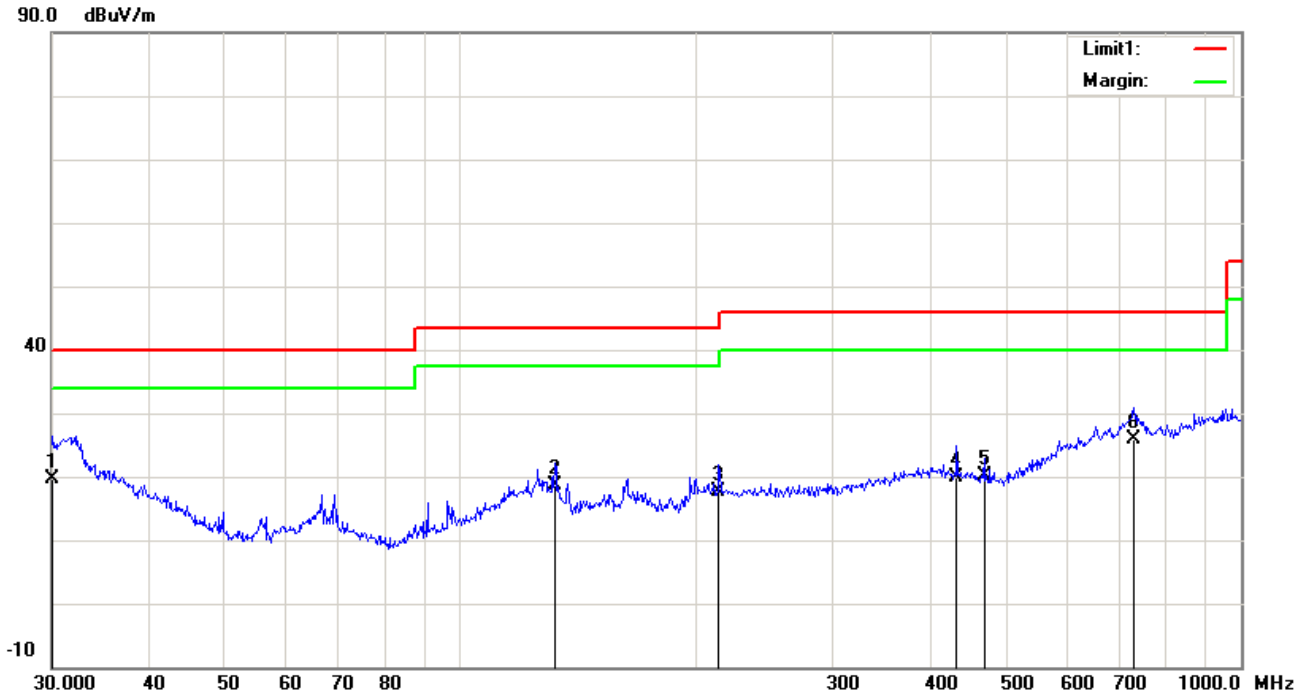
Result	☒ Pass ☐ Fail

Test Data ☒Yes ☐N/A

Test Plot ☒Yes (See below) ☐N/A

Test Mode:	Transmitting Mode (Low Channel)

(Below 1GHz)



Test Data

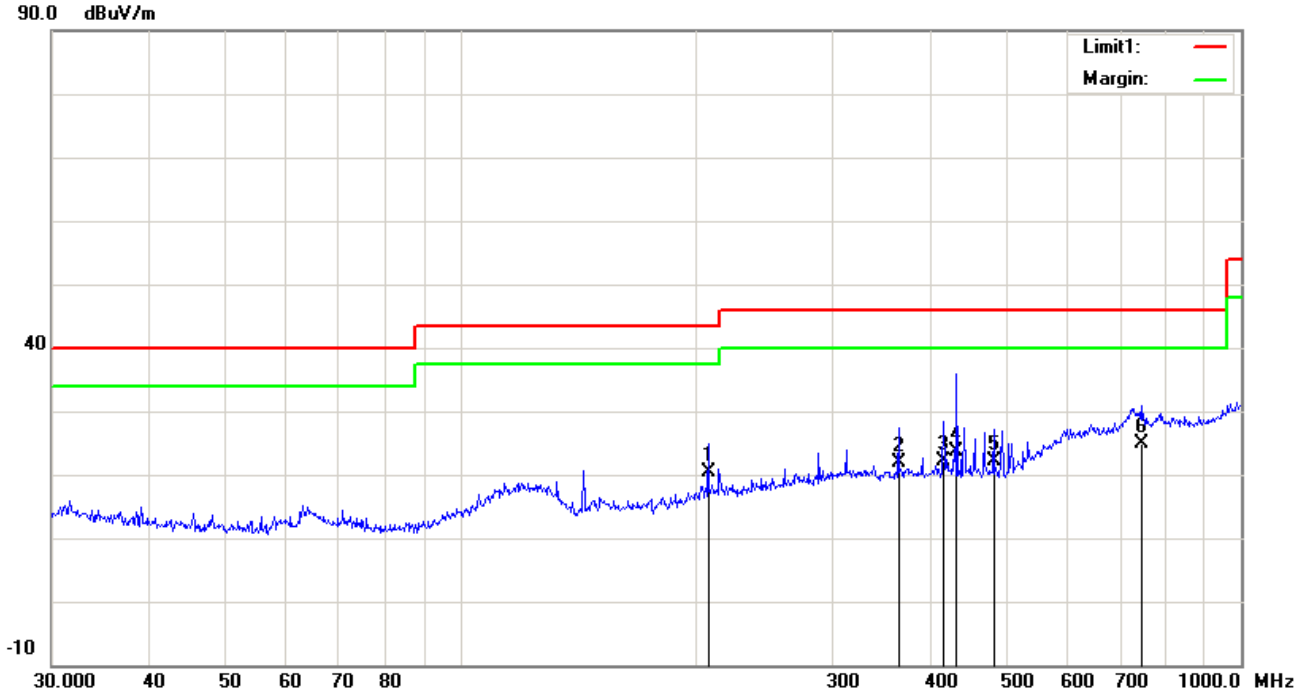
Vertical Polarity Plot @3m

No.	Frequency (MHz)	Reading (dBµV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)
1	30.1054	42.86	QP	21.54	45.69	0.87	19.58	40.00	-20.42	100	299
2	132.2206	48.63	QP	15.50	47.45	1.89	18.57	43.50	-24.93	110	187
3	214.5143	48.01	QP	14.86	47.69	2.33	17.51	43.50	-25.99	100	29
4	432.5457	49.18	QP	16.45	49.12	3.34	19.85	46.00	-26.15	100	173
5	468.8762	49.96	QP	15.84	49.21	3.46	20.05	46.00	-25.95	100	38
6	729.3583	44.68	QP	22.28	45.46	4.34	25.84	46.00	-20.16	100	128

Note: 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 recorded.

Test Mode:	Transmitting Mode (Low Channel)

(Below 1GHz)



Test Data

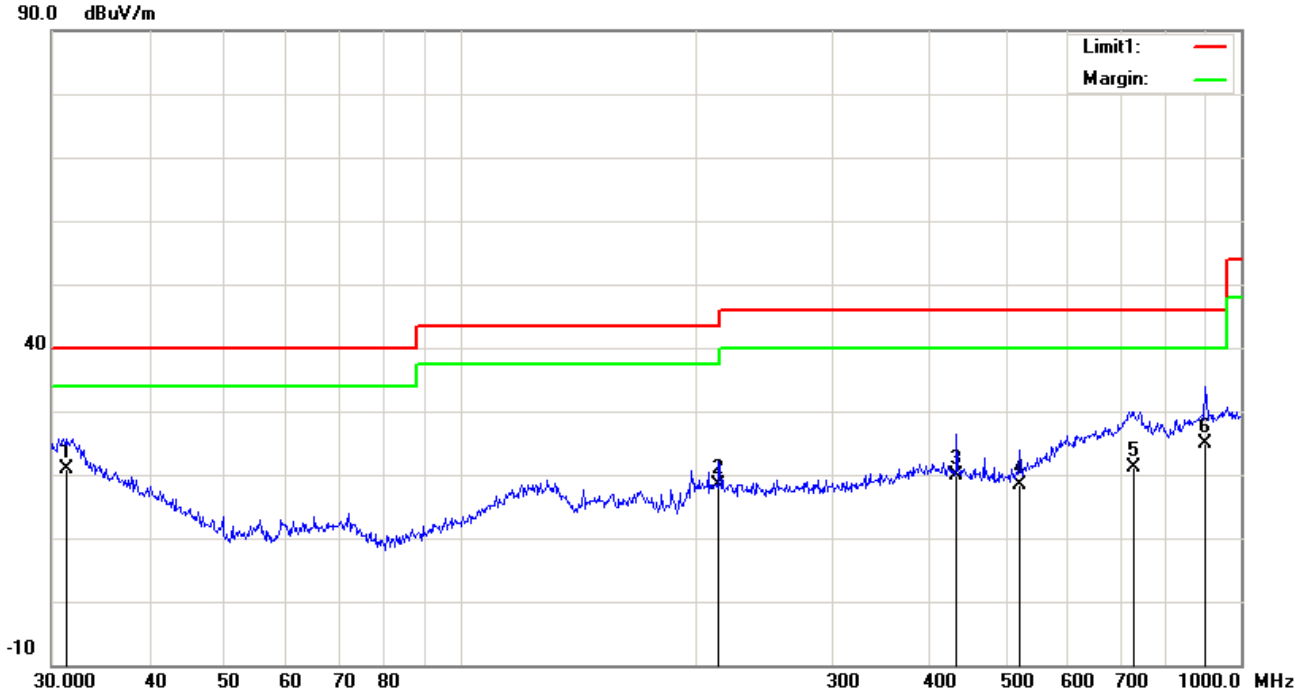
Horizontal Polarity Plot @3m

No.	Frequency	Reading	Detector	Ant_F	PA_G	Cab_L	Result	Limit	Margin	Height	Degree
	(MHz)	(dBµV/m)		(dB/m)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(cm)	(°)
1	207.8501	51.98	QP	13.67	47.53	2.30	20.42	43.50	-23.08	200	102
2	364.2595	51.31	QP	16.32	48.75	3.07	21.95	46.00	-24.05	190	205
3	416.1791	51.81	QP	16.00	49.04	3.28	22.05	46.00	-23.95	209	28
4	432.5457	53.32	QP	16.00	49.12	3.34	23.54	46.00	-22.46	200	284
5	482.2156	51.80	QP	16.00	49.25	3.50	22.05	46.00	-23.95	198	288
6	744.8661	42.86	QP	22.67	45.07	4.38	24.84	46.00	-21.16	200	127

Note: 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 recorded.

Test Mode:	Transmitting Mode (Middle Channel)

(Below 1GHz)



Test Data

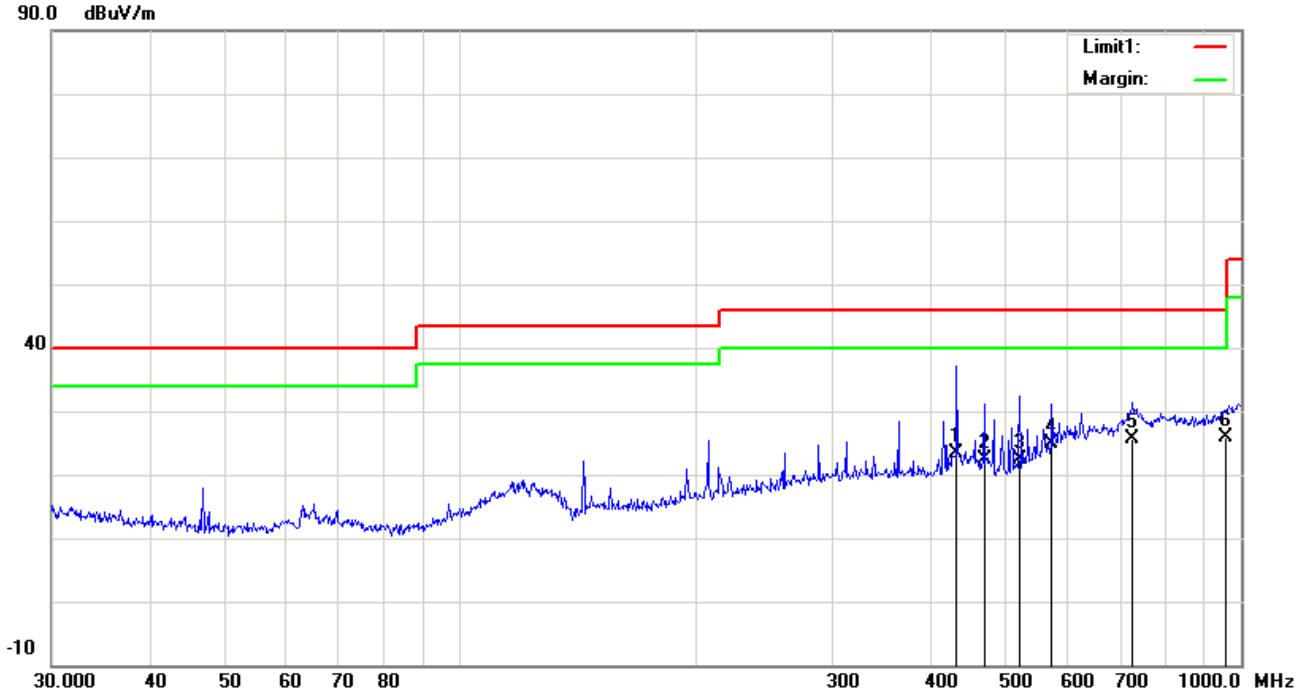
Vertical Polarity Plot @3m

No.	Frequency (MHz)	Reading (dBµV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)
1	31.3992	44.97	QP	20.79	45.67	0.90	20.99	40.00	-19.01	102	293
2	214.5143	48.82	QP	14.86	47.69	2.33	18.32	43.50	-25.18	100	201
3	432.5457	49.18	QP	16.45	49.12	3.34	19.85	46.00	-26.15	100	199
4	520.8882	47.84	QP	16.35	49.36	3.63	18.46	46.00	-27.54	100	200
5	729.3583	40.09	QP	22.28	45.46	4.34	21.25	46.00	-24.75	100	277
6	900.1474	42.98	QP	23.67	46.64	4.86	24.87	46.00	-21.13	100	309

Note: 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 recorded.

Test Mode:	Transmitting Mode (Middle Channel)

(Below 1GHz)



Test Data

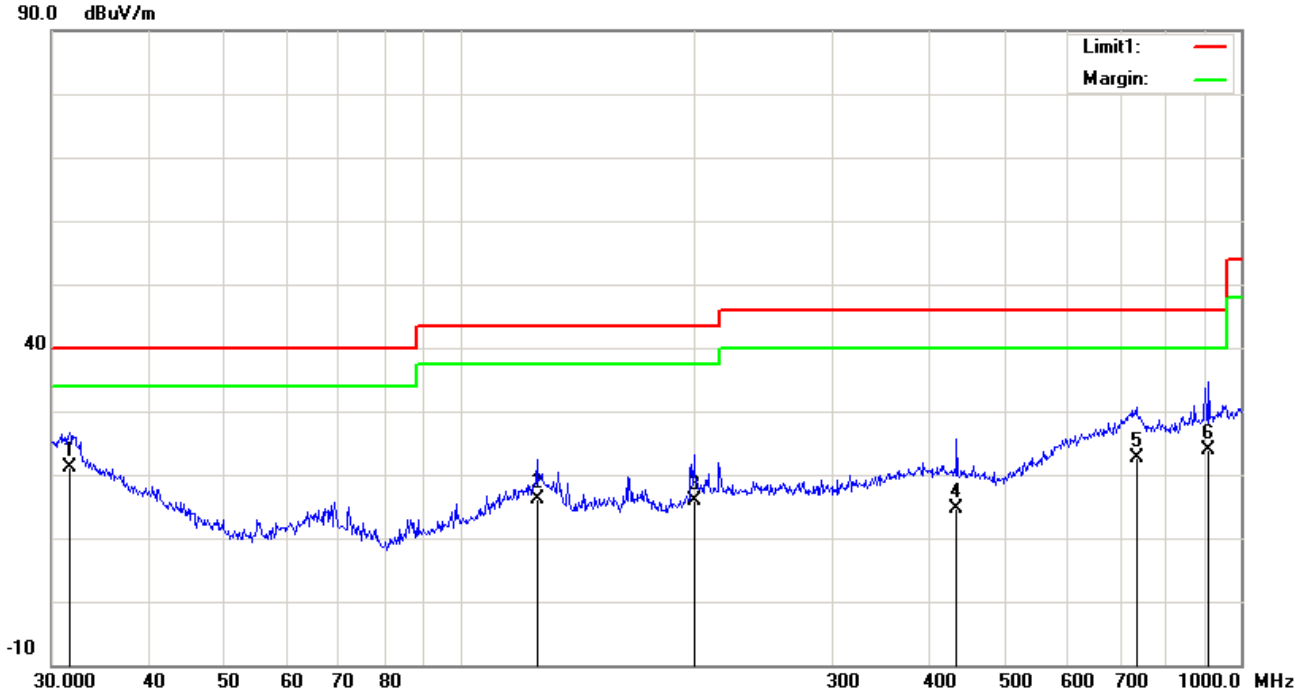
Horizontal Polarity Plot @3m

No.	Frequency (MHz)	Reading (dBµV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)
1	432.5457	53.09	QP	16.00	49.12	3.34	23.31	46.00	-22.69	200	198
2	468.8762	52.16	QP	16.00	49.21	3.46	22.41	46.00	-23.59	199	211
3	520.8882	50.96	QP	17.10	49.36	3.63	22.33	46.00	-23.67	102	33
4	572.6144	49.77	QP	19.82	48.47	3.83	24.95	46.00	-21.05	200	196
5	726.8052	44.31	QP	22.56	45.55	4.33	25.65	46.00	-20.35	202	277
6	955.4381	43.15	QP	24.03	46.16	4.97	25.99	46.00	-20.01	190	265

Note: 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 recorded.

Test Mode:	Transmitting Mode (High Channel)

(Below 1GHz)



Test Data

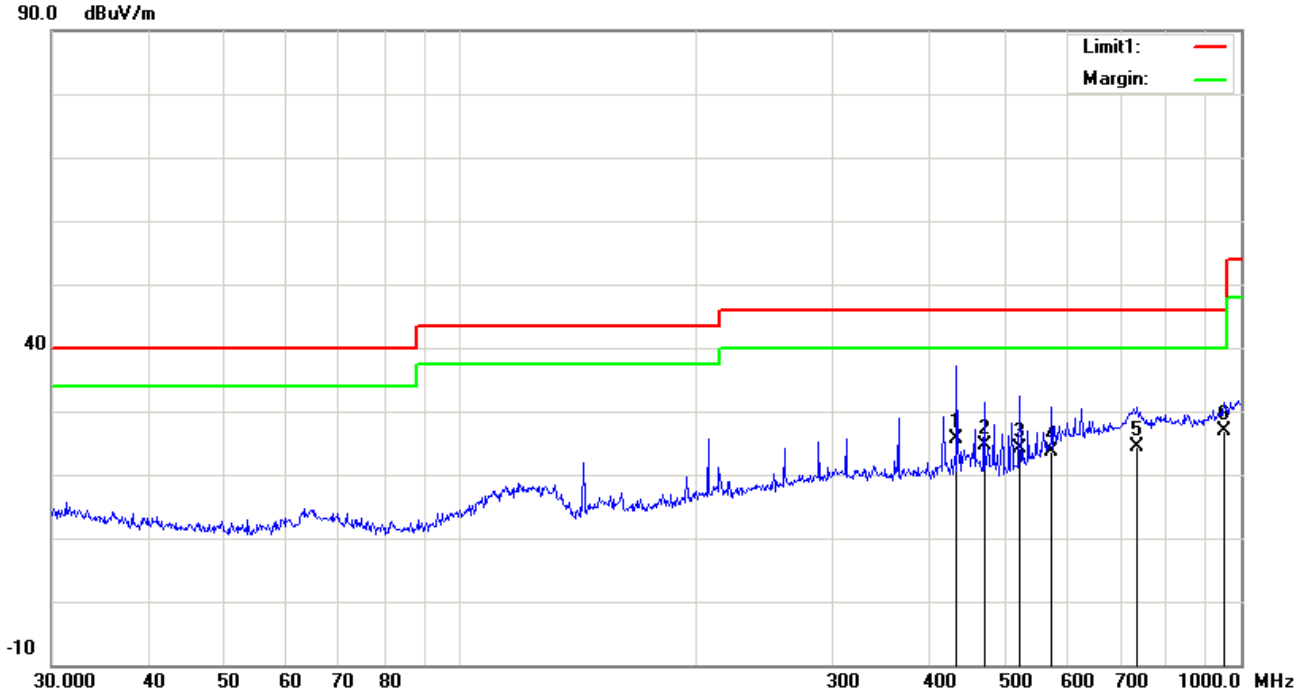
Vertical Polarity Plot @3m

No.	Frequency (MHz)	Reading (dBµV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)
1	31.6202	45.19	QP	20.66	45.67	0.90	21.08	40.00	-18.92	100	123
2	125.4457	45.24	QP	16.13	46.96	1.82	16.23	43.50	-27.27	110	231
3	199.2855	46.13	QP	14.68	47.29	2.26	15.78	43.50	-27.72	100	98
4	432.5457	43.91	QP	16.45	49.12	3.34	14.58	46.00	-31.42	101	287
5	734.4913	41.29	QP	22.23	45.29	4.35	22.58	46.00	-23.42	100	355
6	909.6667	42.03	QP	23.67	46.63	4.88	23.95	46.00	-22.05	100	293

Note: 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 recorded.

Test Mode:	Transmitting Mode (High Channel)

(Below 1GHz)



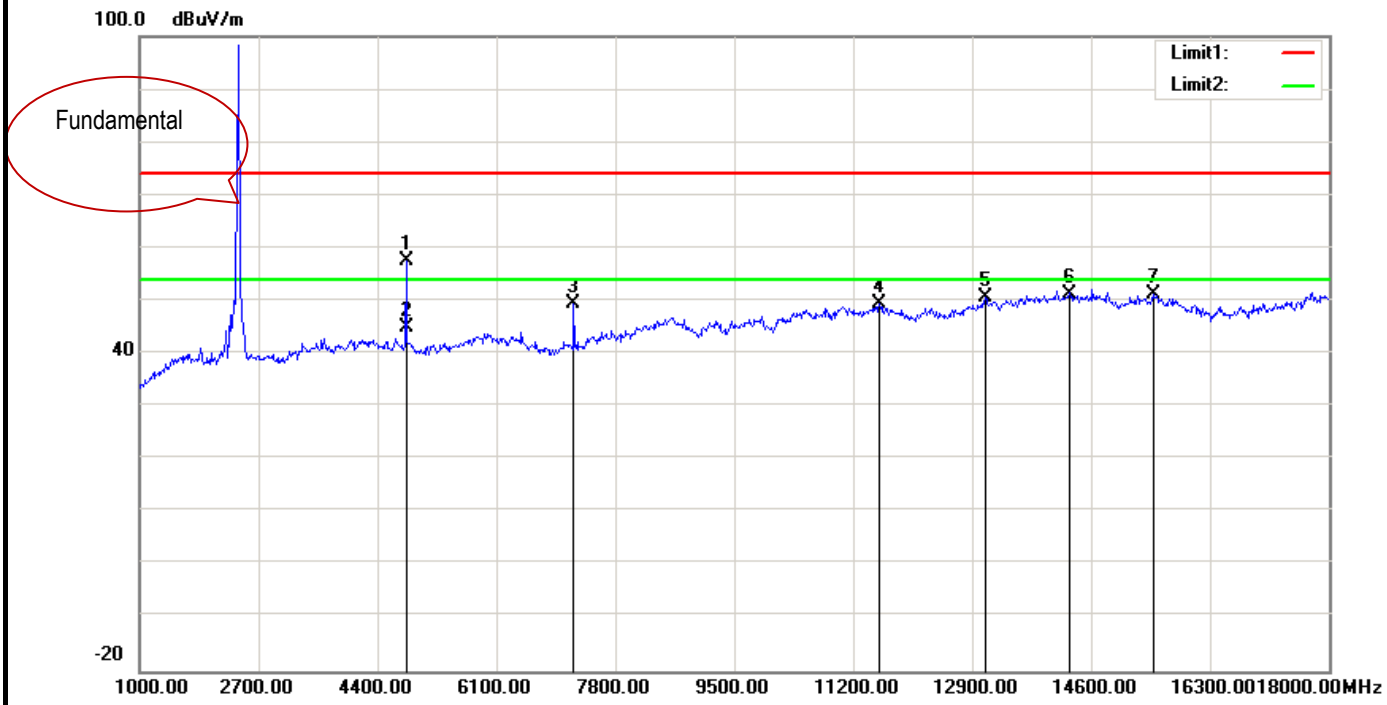
Test Data

Horizontal Polarity Plot @3m

No.	Frequency	Reading	Detector	Ant_F	PA_G	Cab_L	Result	Limit	Margin	Height	Degree
	(MHz)	(dBμV/m)		(dB/m)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(cm)	(°)
1	432.5457	55.46	QP	16.00	49.12	3.34	25.68	46.00	-20.32	198	102
2	468.8762	54.49	QP	16.00	49.21	3.46	24.74	46.00	-21.26	200	202
3	520.8882	52.65	QP	17.10	49.36	3.63	24.02	46.00	-21.98	199	177
4	572.6144	48.56	QP	19.82	48.47	3.83	23.74	46.00	-22.26	100	209
5	737.0714	42.54	QP	22.62	45.21	4.36	24.31	46.00	-21.69	199	311
6	952.0937	44.06	QP	23.95	46.09	4.96	26.88	46.00	-19.12	200	192

Note: 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 recorded.

Test Mode:	Transmitting Mode Above 1GHz (Low Channel)

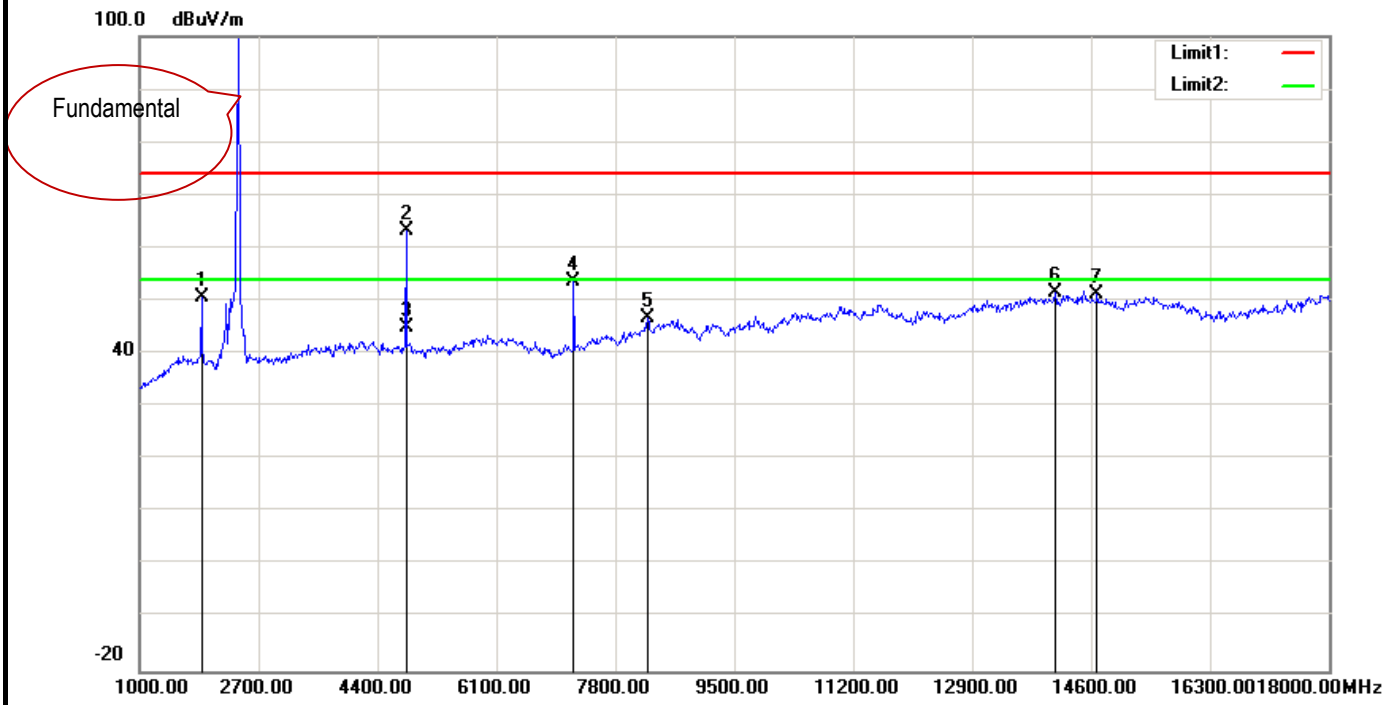


Vertical Polarity Plot @3m

No.	Frequency (MHz)	Reading (dBµV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)
1	4808.000	71.76	peak	33.12	53.35	6.10	57.63	74.00	-16.37	100	33
2	4808.000	59.20	AVG	33.12	53.35	6.10	45.07	54.00	-8.93	100	33
3	7205.000	62.05	peak	35.53	55.21	6.97	49.34	74.00	-24.66	100	206
4	11574.000	54.34	peak	38.40	53.27	10.07	49.54	74.00	-24.46	100	220
5	13087.000	53.82	peak	39.00	51.83	9.61	50.60	74.00	-23.40	100	203
6	14294.000	53.93	peak	40.63	52.41	9.25	51.40	74.00	-22.60	100	22
7	15484.000	54.16	peak	36.98	50.10	10.14	51.18	74.00	-22.82	100	84

Note: The data above 18 GHz which below 20 dB to the limit was not recorded.

Test Mode:	Transmitting Mode Above 1GHz (Low Channel)

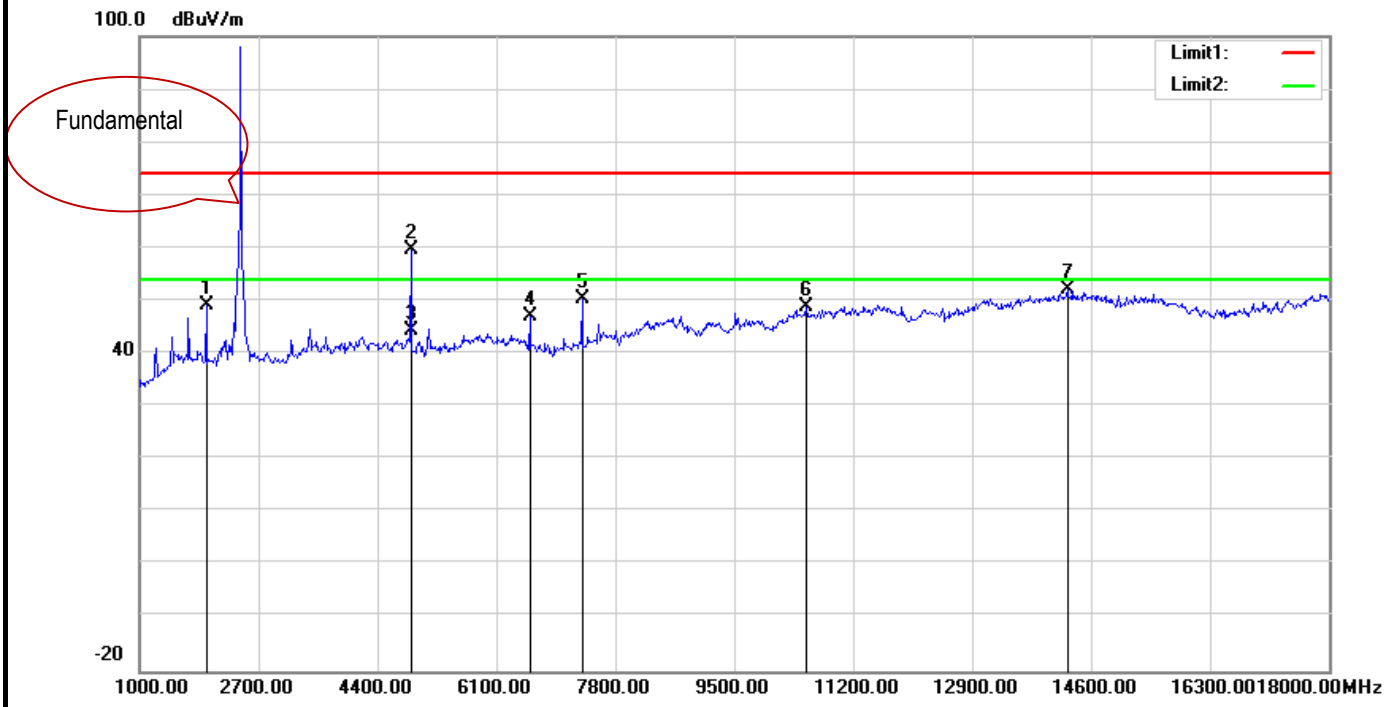


Horizontal Polarity Plot @3m

No.	Frequency (MHz)	Reading (dBµV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)
1	1884.000	71.67	peak	26.61	51.69	3.99	50.58	74.00	-23.42	100	19
2	4808.000	77.36	peak	33.12	53.35	6.10	63.23	74.00	-10.77	100	272
3	4808.000	59.20	AVG	33.12	53.35	6.10	45.07	54.00	-8.93	100	272
4	7205.000	66.32	peak	35.53	55.21	6.97	53.61	74.00	-20.39	100	95
5	8259.000	55.91	peak	36.87	54.22	8.13	46.69	74.00	-27.31	100	202
6	14090.000	54.46	peak	40.26	52.22	9.10	51.60	74.00	-22.40	100	194
7	14685.000	54.06	peak	40.45	52.72	9.37	51.16	74.00	-22.84	100	266

Note: The data above 18 GHz which below 20 dB to the limit was not recorded.

Test Mode:	Transmitting Mode Above 1GHz

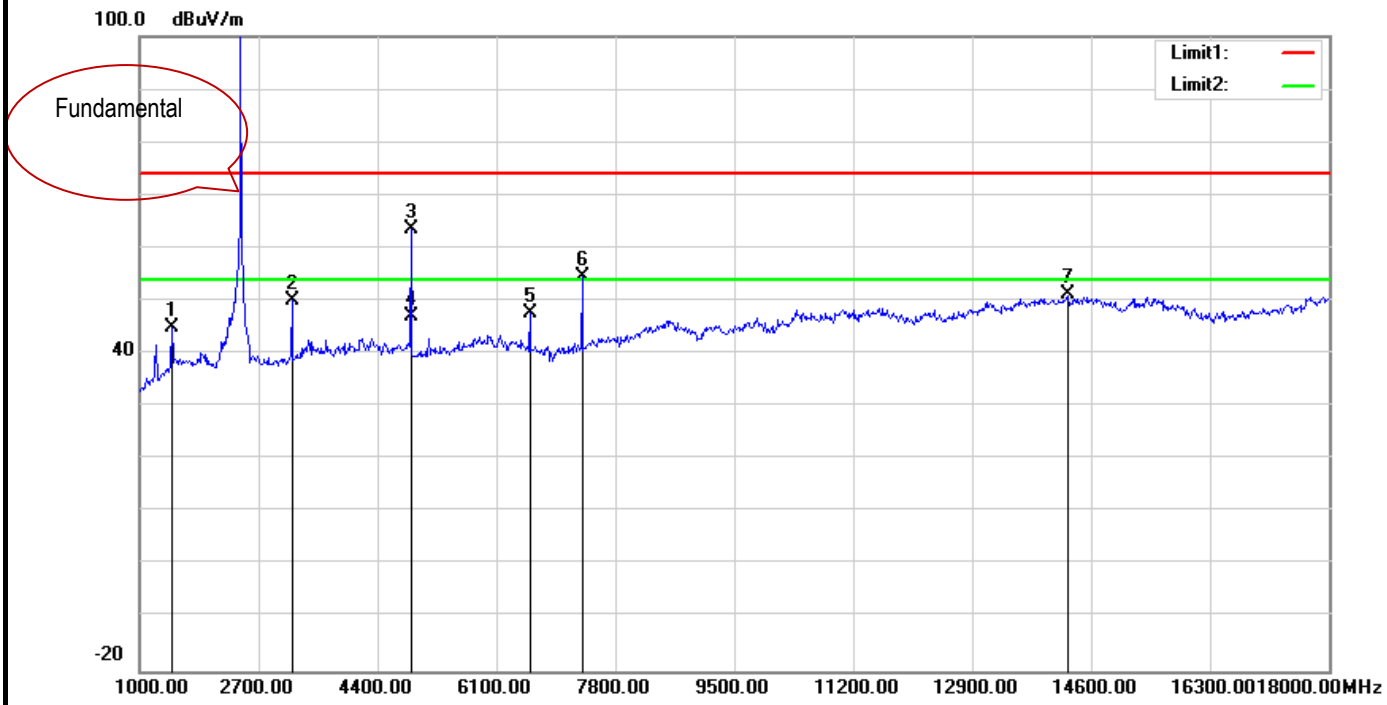


Vertical Polarity Plot @3m

No.	Frequency (MHz)	Reading (dBµV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)
1	1952.000	70.43	peak	26.90	52.01	3.96	49.28	74.00	-24.72	100	222
2	4876.000	74.06	peak	33.33	53.66	6.00	59.73	74.00	-14.27	100	21
3	4876.000	58.69	AVG	33.33	53.66	6.00	44.36	54.00	-9.64	100	21
4	6576.000	59.74	peak	34.52	53.24	5.96	46.98	74.00	-27.02	100	264
5	7324.000	62.64	peak	35.72	55.04	7.15	50.47	74.00	-23.53	100	24
6	10537.000	54.40	peak	38.01	53.04	9.36	48.73	74.00	-25.27	100	134
7	14260.000	54.61	peak	40.57	52.38	9.22	52.02	74.00	-21.98	100	135

Note: The data above 18 GHz which below 20 dB to the limit was not recorded.

Test Mode:	Transmitting Mode Above 1GHz (Middle Channel)

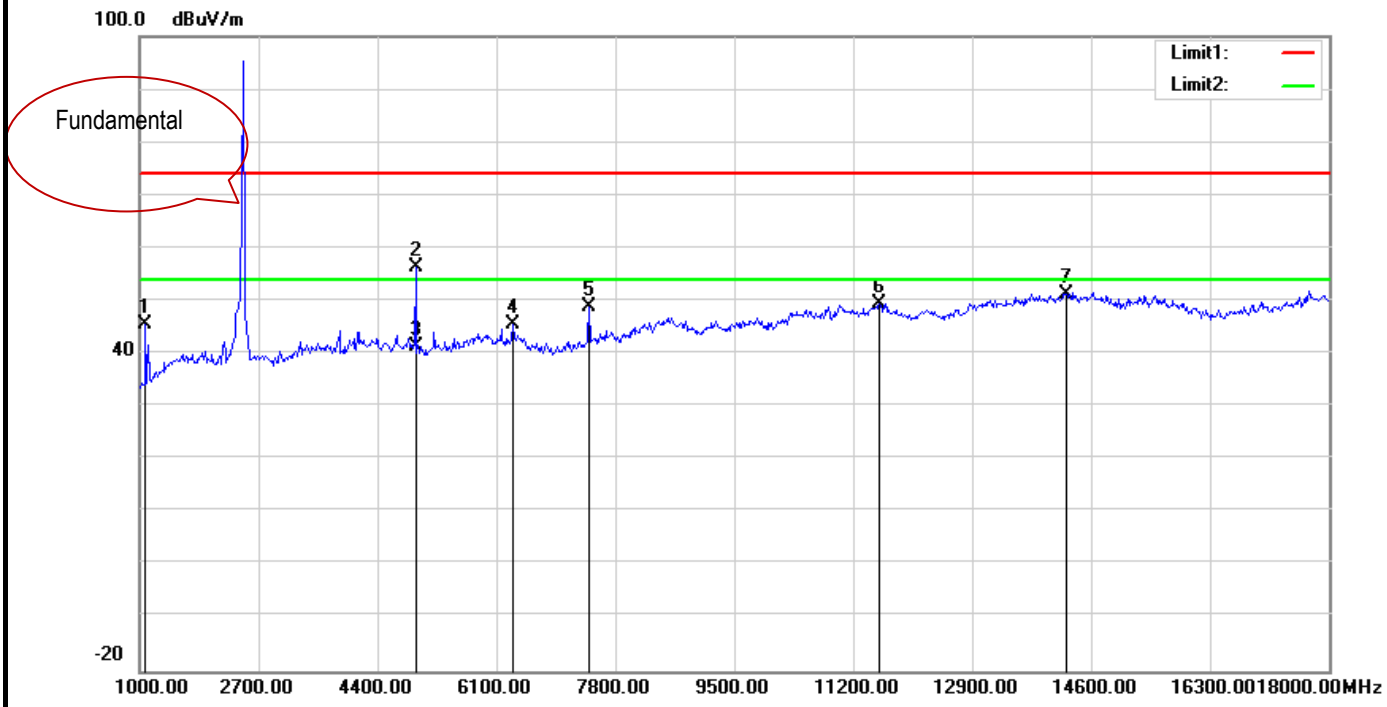


Horizontal Polarity Plot @3m

No.	Frequency (MHz)	Reading (dBµV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)
1	1459.000	67.17	peak	24.93	50.21	3.19	45.08	74.00	-28.92	100	166
2	3176.000	67.89	peak	30.19	52.83	4.72	49.97	74.00	-24.03	100	3
3	4876.000	77.77	peak	33.33	53.66	6.00	63.44	74.00	-10.56	100	350
4	4876.000	61.30	AVG	33.33	53.66	6.00	46.97	54.00	-7.03	100	350
5	6576.000	60.34	peak	34.52	53.24	5.96	47.58	74.00	-26.42	100	163
6	7324.000	66.80	peak	35.72	55.04	7.15	54.63	74.00	-19.37	100	356
7	14260.000	53.69	peak	40.57	52.38	9.22	51.10	74.00	-22.90	100	350

Note: The data above 18 GHz which below 20 dB to the limit was not recorded.

Test Mode:	Transmitting Mode Above 1GHz (High Channel)

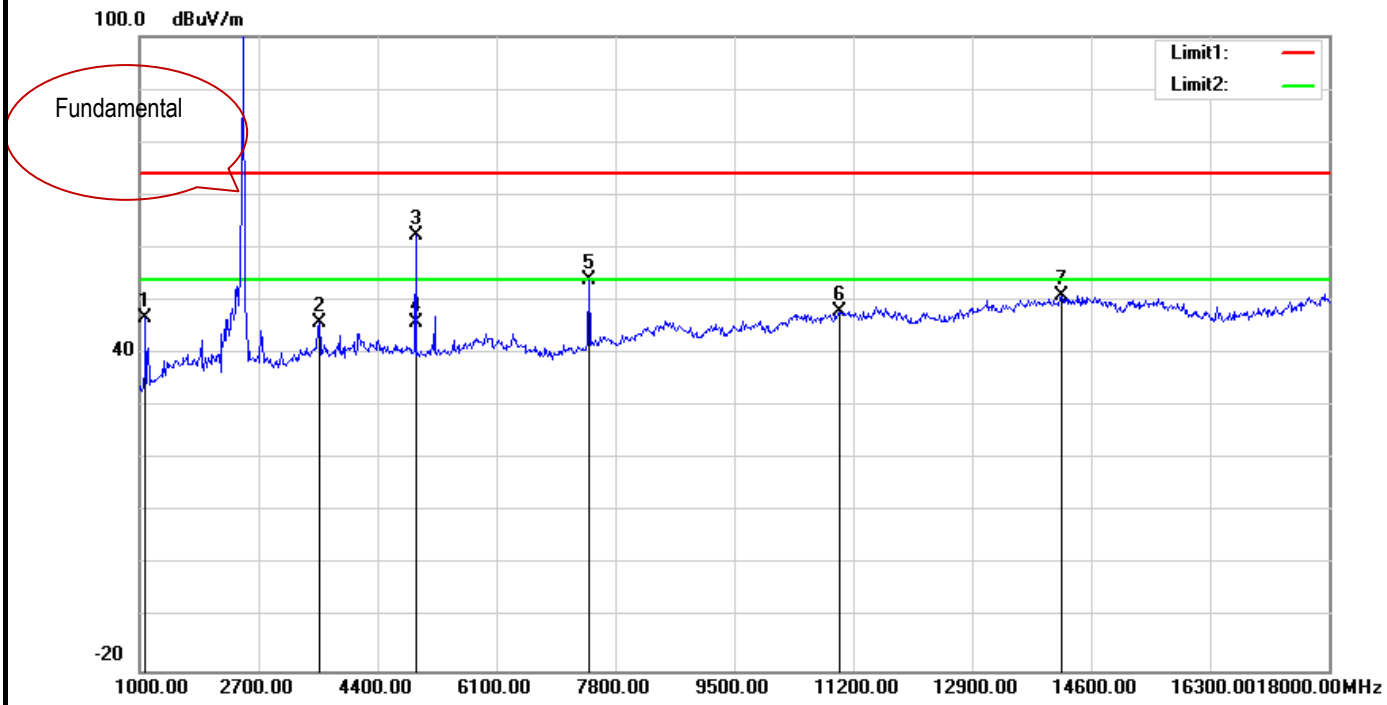


Vertical Polarity Plot @3m

No.	Frequency (MHz)	Reading (dBµV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)
1	1085.000	72.08	peak	24.25	53.42	2.60	45.51	74.00	-28.49	100	359
2	4944.000	70.73	peak	33.53	53.96	5.91	56.21	74.00	-17.79	100	155
3	4944.000	55.78	AVG	33.53	53.96	5.91	41.26	54.00	-12.74	100	155
4	6338.000	57.61	peak	34.34	52.33	5.84	45.46	74.00	-28.54	100	22
5	7426.000	60.45	peak	35.88	54.90	7.31	48.74	74.00	-25.26	100	318
6	11574.000	54.27	peak	38.40	53.27	10.07	49.47	74.00	-24.53	100	84
7	14243.000	53.82	peak	40.54	52.36	9.21	51.21	74.00	-22.79	100	47

Note: The data above 18 GHz which below 20 dB to the limit was not recorded.

Test Mode:	Transmitting Mode Above 1GHz (High Channel)



Horizontal Polarity Plot @3m

No.	Frequency (MHz)	Reading (dBµV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)
1	1085.000	73.23	peak	24.25	53.42	2.60	46.66	74.00	-27.34	100	177
2	3567.000	61.72	peak	32.21	52.89	4.87	45.91	74.00	-28.09	100	330
3	4944.000	76.75	peak	33.53	53.96	5.91	62.23	74.00	-11.77	100	262
4	4944.000	60.40	AVG	33.53	53.96	5.91	45.88	54.00	-8.12	100	262
5	7426.000	65.62	peak	35.88	54.90	7.31	53.91	74.00	-20.09	100	265
6	10996.000	53.69	peak	38.10	53.23	9.50	48.06	74.00	-25.94	100	33
7	14175.000	53.69	peak	40.41	52.30	9.16	50.96	74.00	-23.04	100	0

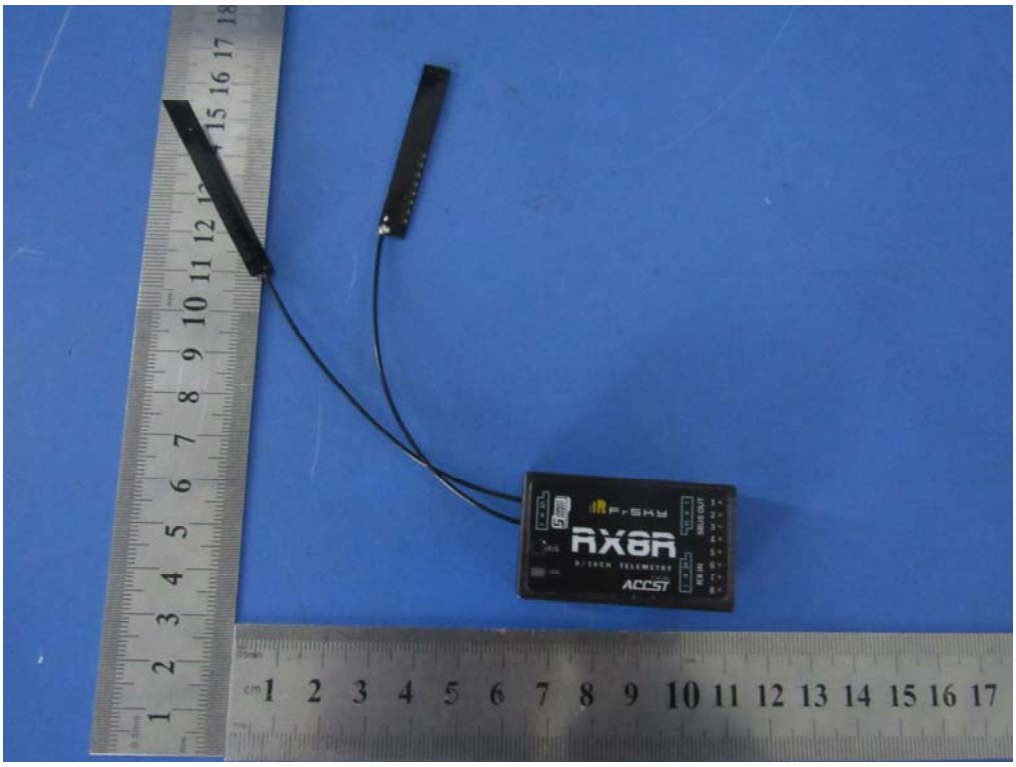
Note: The data above 18 GHz which below 20 dB to the limit was not recorded.

Annex A. TEST INSTRUMENT

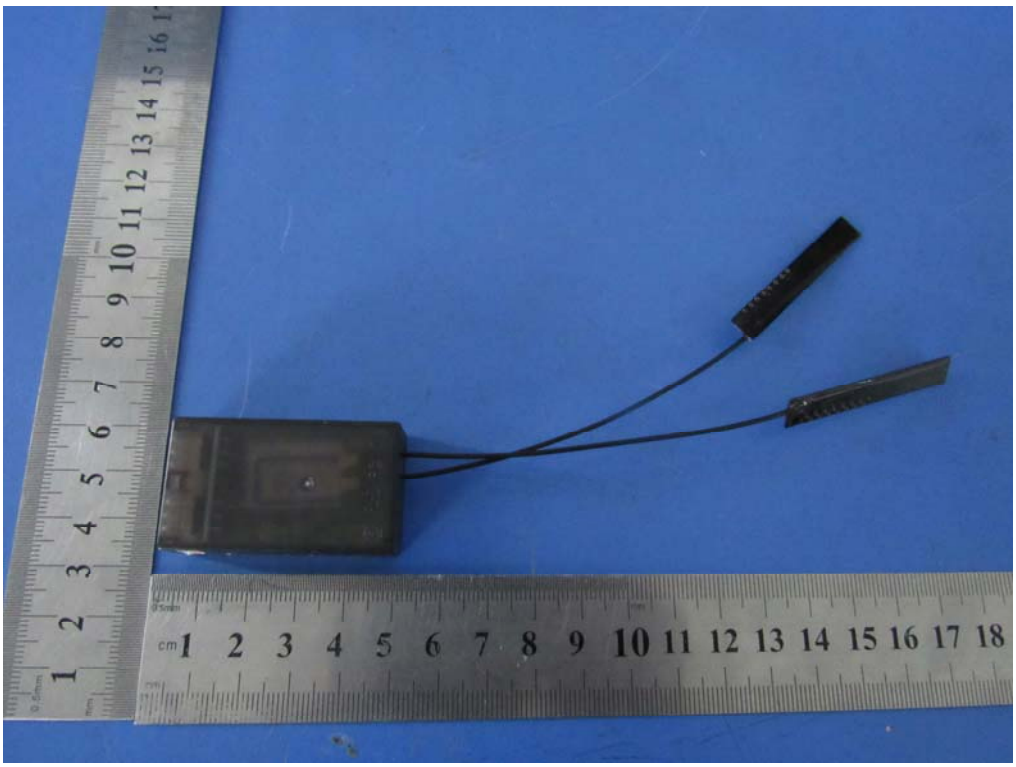
Instrument	Model	Serial #	Cal Date	Cal Due	In use
AC Line Conducted Emissions Emission					
R&S EMI Test Receiver	ESPI3	101216	03/31/2016	03/31/2017	☐
V-LISN	ESH3-Z5	838979/005	03/31/2016	03/31/2017	☐
SIEMIC EZ_EMC Conducted Emissions software	Ver.ICP-03A1	N/A	N/A	N/A	☐
RF conducted test					
R&S EMI Receiver	ESPI3	101216	03/31/2016	03/31/2017	☒
Radiated Emissions					
Agilent Technologies Spectrum Analyzer	N9010A	MY47191130	03/11/2016	03/10/2017	☒
R&S EMI Receiver	ESPI3	101216	03/31/2016	03/31/2017	☒
Antenna (30MHz~6GHz)	JB6	A121411	10/20/2016	10/20/2017	☒
EMCO Horn Antenna (1 ~18GHz)	3115	N/A	10/09/2016	10/08/2017	☒
INFOMW Antenna (1 ~18GHz)	JXTXLB-10180	J2031081120092	10/20/2016	10/20/2017	☒
Hp Agilent Pre-Amplifier	8447F	1937A01160	10/20/2016	10/20/2017	☒
SIEMIC EZ_EMC Radiated Emissions software	Ver.ICP-03A1	N/A	N/A	N/A	☒

Annex B. EUT And Test Setup Photographs

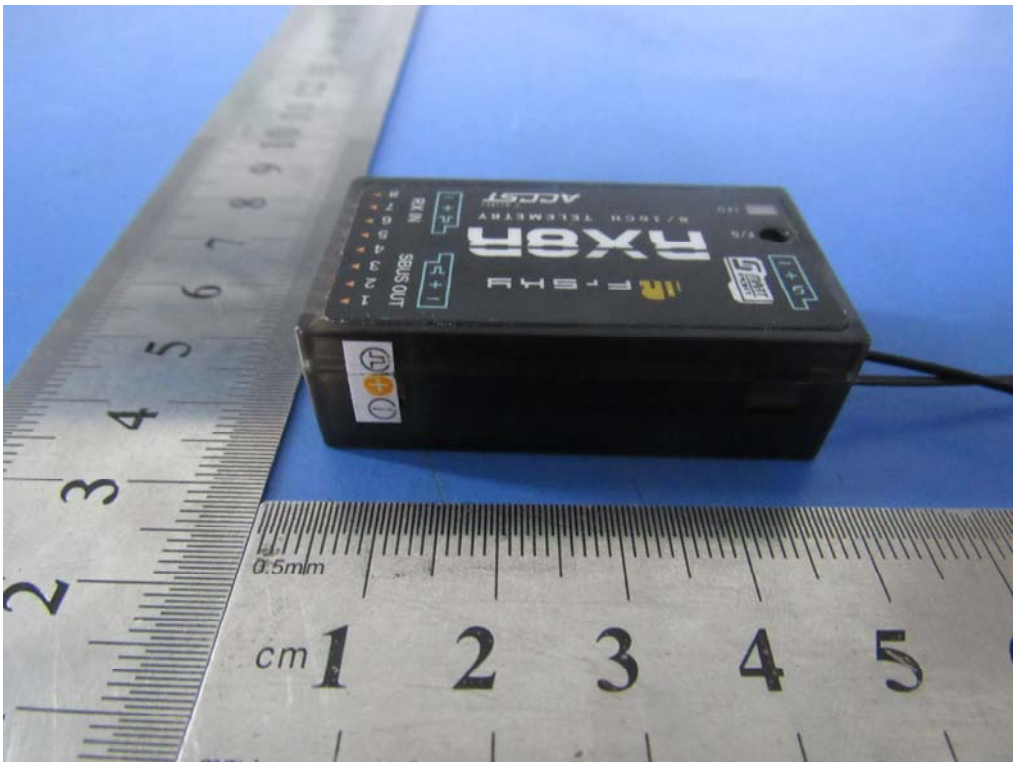
Annex B.i. Photograph EUT Internal Photo



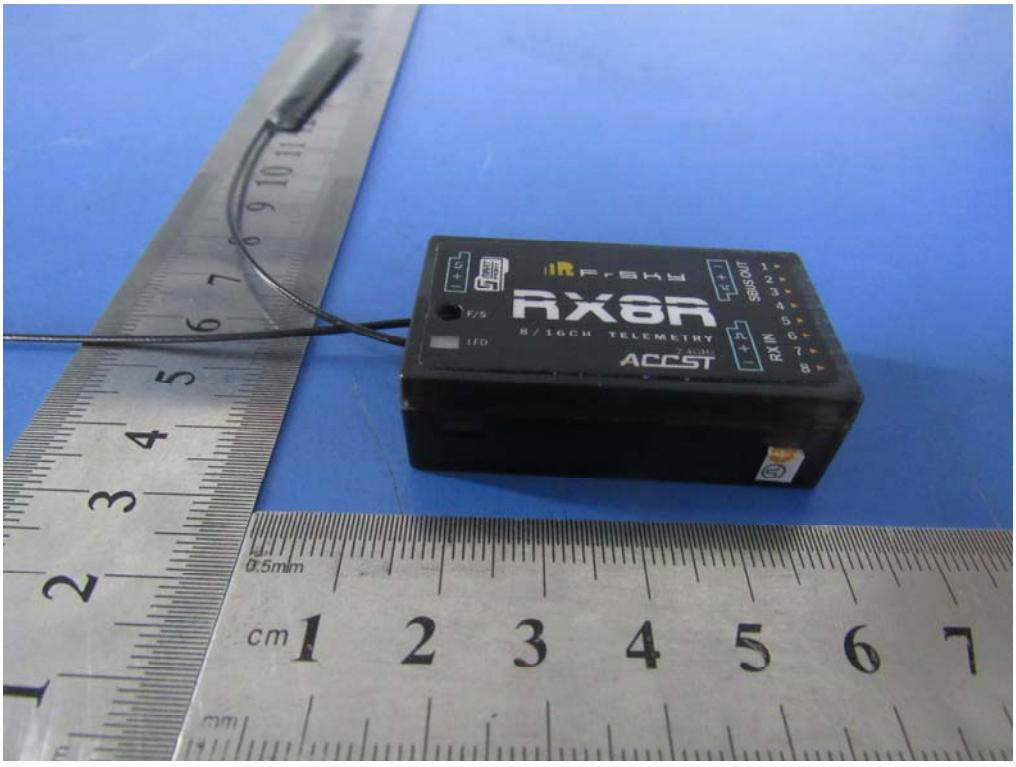
Top View of EUT



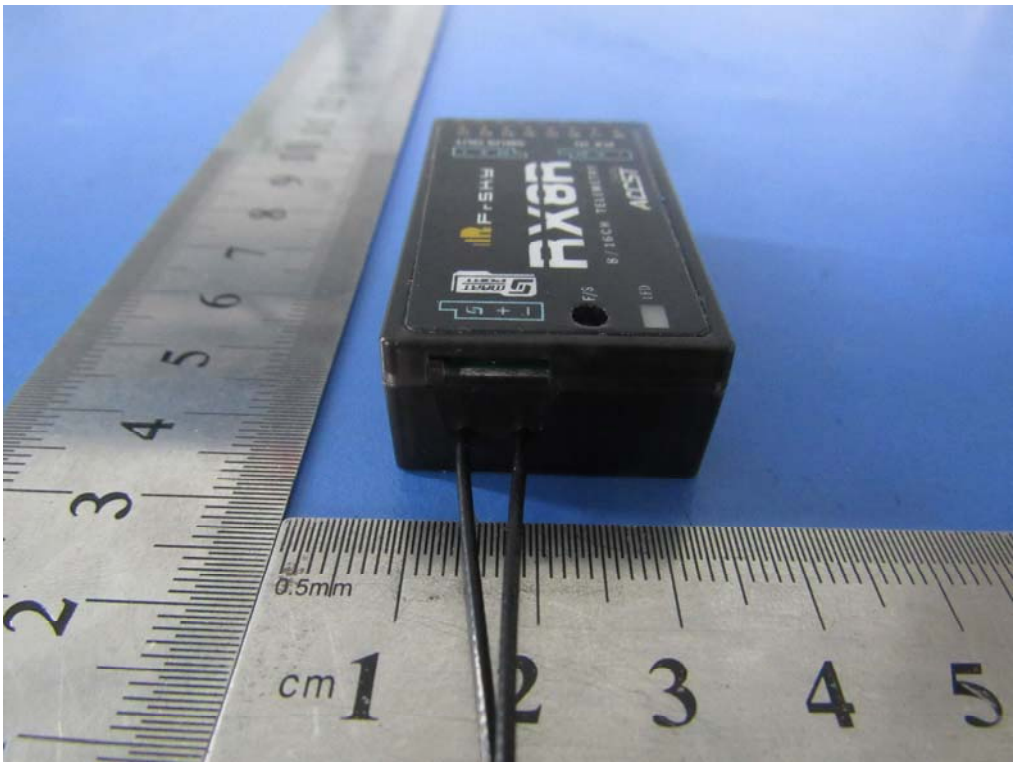
Bottom View of EUT



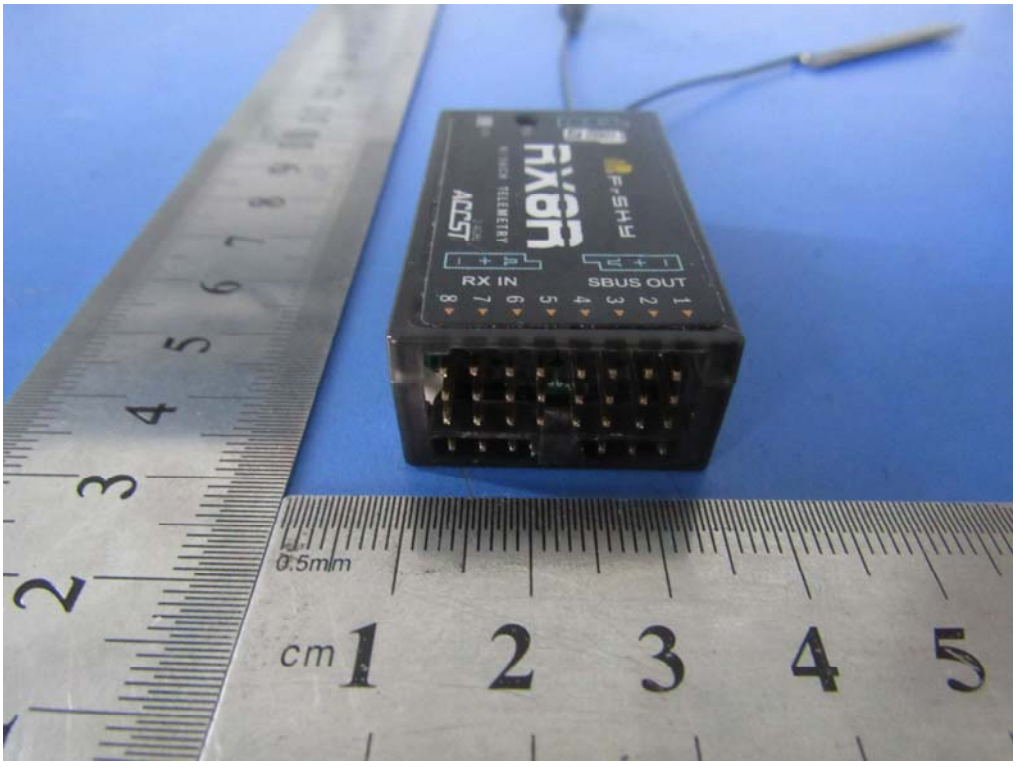
Front View of EUT



Rear View of EUT

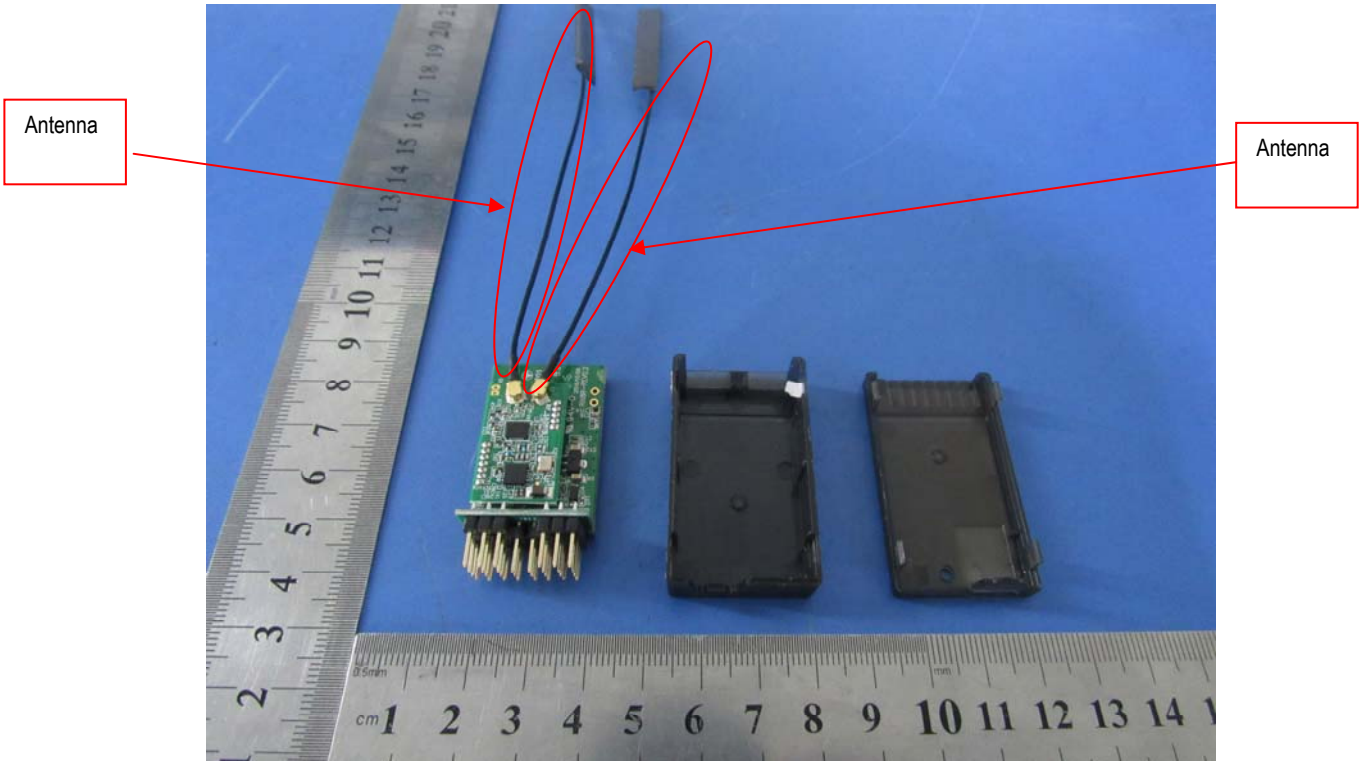


Left View of EUT

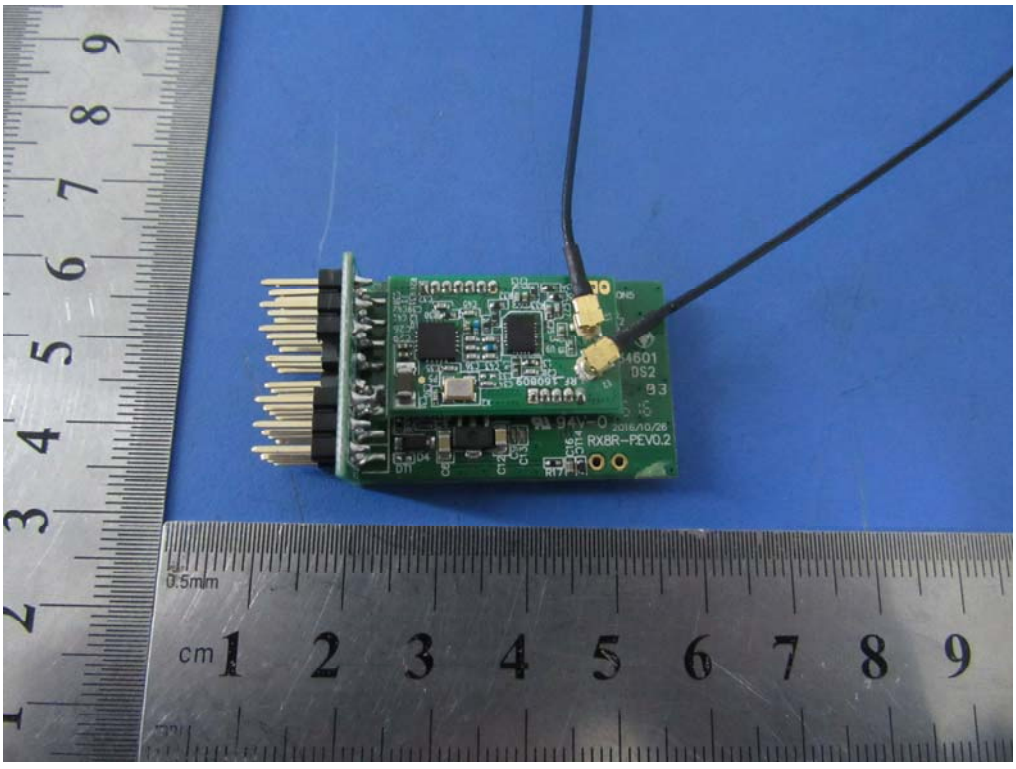


Right View of EUT

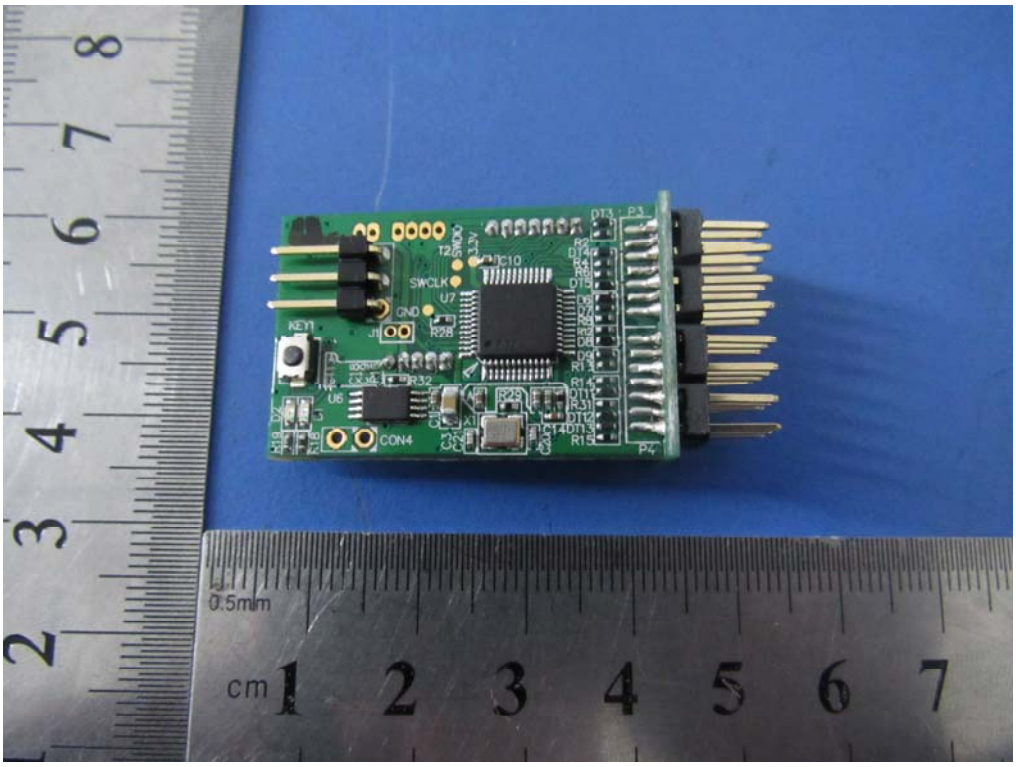
Annex B.ii. Photograph EUT Internal Photo



Uncover- Front View 1

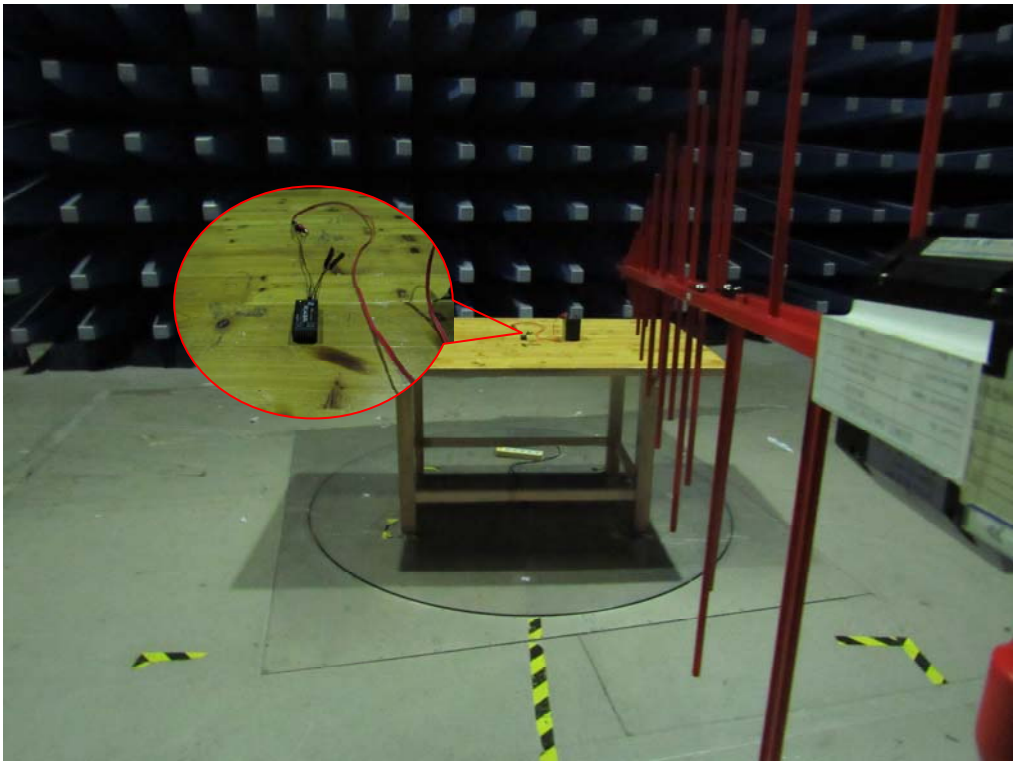


EUT PCBA – Front View

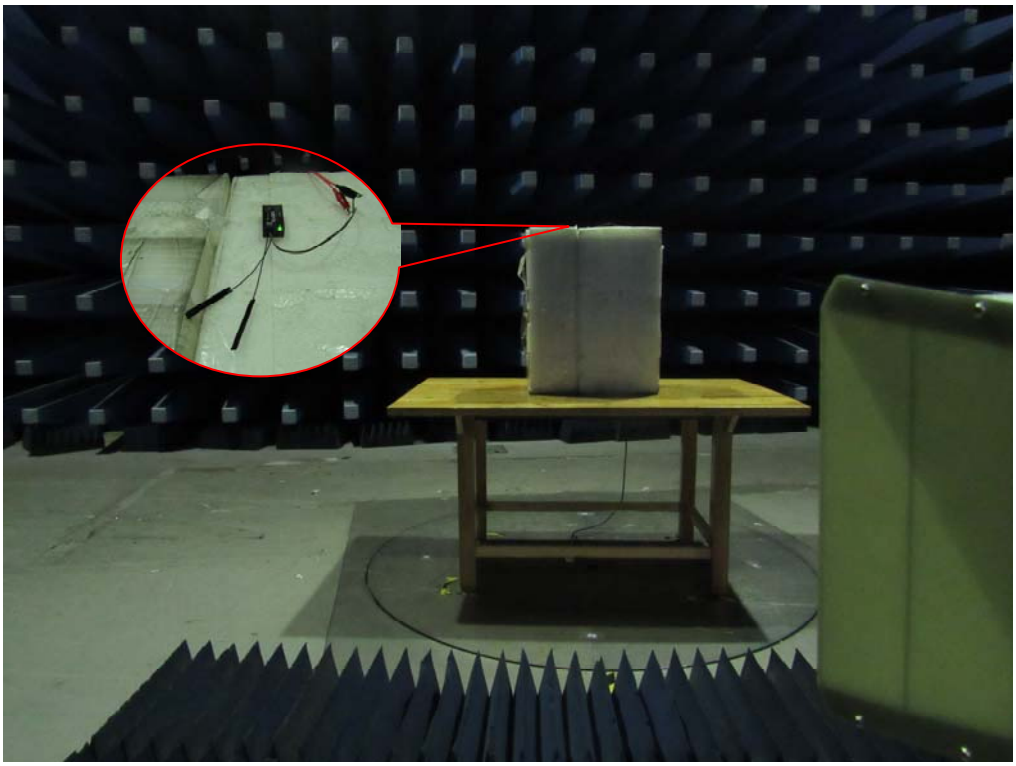


EUT PCBA – Rear View

Annex B.iii. Photograph: Test Setup Photo



Radiated Spurious Emissions Test Setup Below 1GHz

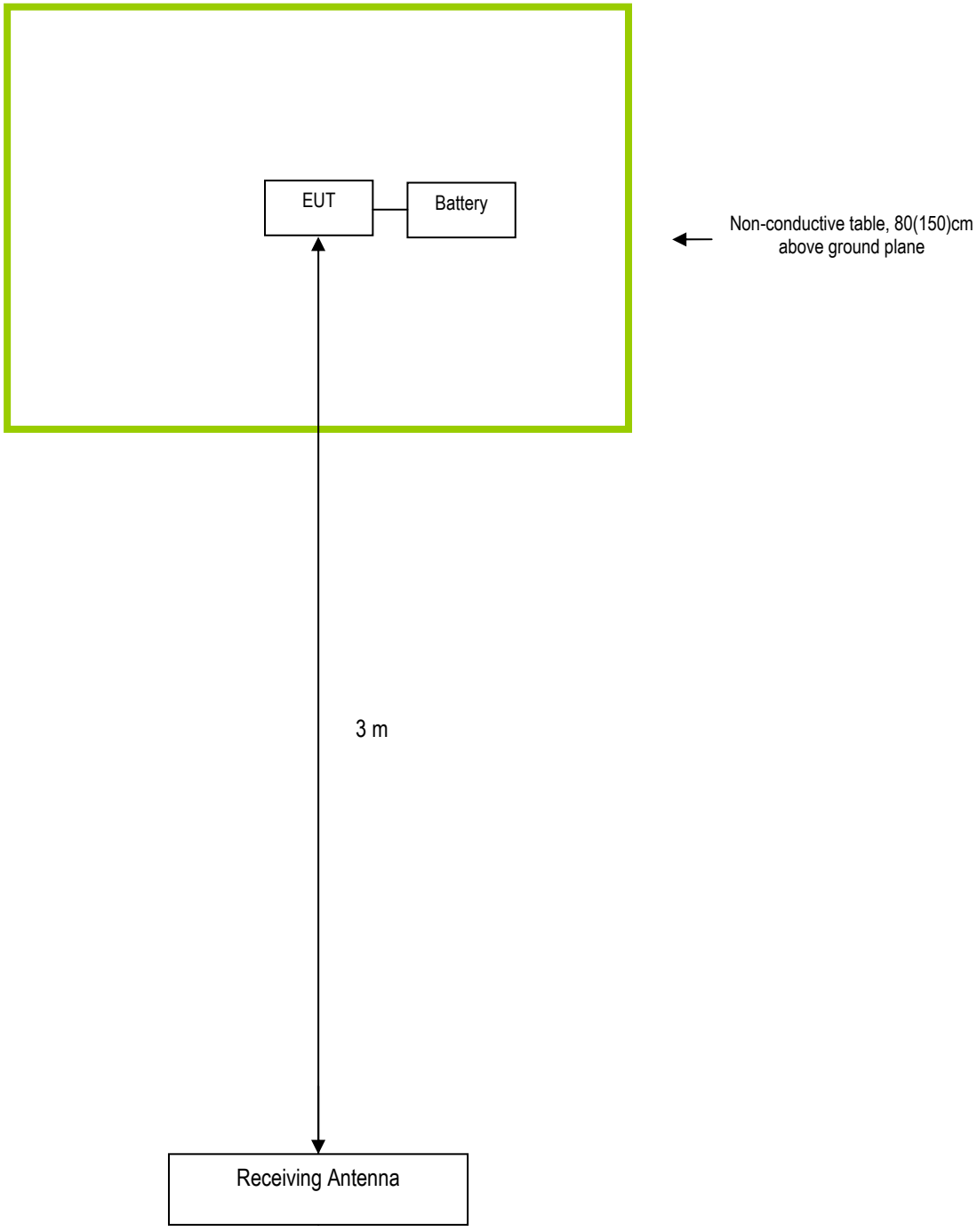


Radiated Spurious Emissions Test Setup Above 1GHz

Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

Annex C.i. TEST SET UP BLOCK

Block Configuration Diagram for Radiated Emissions



Annex C. ii. SUPPORTING EQUIPMENT DESCRIPTION

The following is a description of supporting equipment and details of cables used with the EUT.

Manufacturer	Equipment Description	Model
N/A	Battery	N/A

Annex D. User Manual / Block Diagram / Schematics / Partlist

Please see attachment

Annex E. DECLARATION OF SIMILARITY

FrSky Electronic Co., Ltd

To：SIEMIC INC.

Declaration letter

Dear Sir，

For our business issue and marketing requirement, we would like to list different models numbers on the FCC/CE certificates and reports, as following:

Model No.: RX8R, XSR, X8R, X4R, X6R, X12R, L9R, L12R, S6R, S8R, S8R-Pro

The difference between RX8R and XSR, X8R, X4R, X6R, X12R, L9R, L12R, S6R, S8R, S8R-Pro are as follows:

The Serial Model Name XSR, X8R, X4R, X6R, X12R, L9R, L12R, S6R, S8R, S8R-Pro Different model name only, like all the other.

Thank you!

Signature: Bryan Shao

Printed name/title: Bryan Shao/ Manager

Contact information / address FrSky Electronic Co., Ltd.

No.100 Jinxi Road ,Wuxi,Jiangsu,China