



BUREAU VERITAS

Test Report No.: FV160420N001



Test Lab
Cert 2951.01

TEST REPORT

Applicant	Innokin Technology Co., Ltd
Address	Building 6, XinXinTian Industrial Park, XinSha Road, ShaJing, Baoan District, ShenZhen, China

Manufacturer or Supplier	Innokin Technology Co., Ltd
Address	Building 6, XinXinTian Industrial Park, XinSha Road, ShaJing, Baoan District, ShenZhen, China
Product	Cool Fire IV TC100, iSub V
Brand Name	N/A
Model	Cool Fire IV TC100, iSub V
Additional Model & Model Difference	N/A
Date of tests	Apr. 20, 2016 ~ May 13, 2016

The submitted sample of the above equipment has been tested for according to the requirements of the following standards:

FCC Part 15 Subpart B Class B

CONCLUSION: The submitted sample was found to COMPLY with the test requirement

Tested by Tom Chen
Project Engineer / EMC Department

Approved by Madison Luo
Supervisor / EMC Department

Date: May 13, 2016

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Bureau Veritas Shenzhen Co., Ltd.
Dongguan Branch

No. 34, Chenwulu Section, Guantai Rd., Houjie
Town, Dongguan City,
Guangdong 523942, China

Tel.: +86 769 8593 5656
Fax: +86 769 8593 1080
Email: customerservice.dg@cn.bureauveritas.com



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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
FV160420N001	Original release	May 13, 2016



1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD			
Standard Section	Test Item	Result	Remark
FCC Part 15 Subpart B, Class B	Conducted emission test (150kHz ~ 30MHz)	PASS	Meets limit minimum passing margin is -10.65 dB at 0.4050 MHz
	Radiated emission test (30MHz ~ 1GHz)	PASS	Meet the requirement of limit. Minimum passing margin is -11.10 dB at 272.2776 MHz.

1.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	150kHz ~ 30MHz	+/-2.74 dB
Radiated emissions	30MHz ~ 1GHz	+/-4.27 dB



2 GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Cool Fire IV TC100, iSub V
MODEL NO.	Cool Fire IV TC100, iSub V
ADDITIONAL MODEL	N/A
POWER SUPPLY	DC 3.7V from Li-ion battery or DC 5V from Host Unit
DATA CABLE SUPPLIED	N/A
THE HIGHEST OPERATING FREQUENCY	Below 108MHz

NOTE:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
2. For the test results, the EUT had been tested with all conditions. But only the worst case was showed in test report.
3. Please refer to the EUT photo document (Reference No.: 160420N001) for detailed product photo.



2.2 DESCRIPTION OF TEST MODES

The EUT was tested under the following modes, the final worst mode was marked in boldface and recorded in this report.

FOR CE EMISSION TEST:

Test Mode	Test Voltage
Charging	DC 5V from Adapter

FOR RE EMISSION TEST:

Test Mode	Test Voltage
Charging	DC 5V from Adapter
Normal working	DC 3.7V from Li-ion battery

2.3 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an dependent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	AC ADAPTER(DC 5V/2A)	N/A	HNEB050200UX	N/A	N/A

NO.	CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	USB cable: Unshielded, Detachable, 1.0m



3 EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

TEST STANDARD: FCC Part 15, Subpart B (Section: 15.107)

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79	66	66 - 56	56 - 46
0.50 - 5.0	73	60	56	46
5.0 - 30.0	73	60	60	50

- NOTES:**
- (1) The lower limit shall apply at the transition frequencies.
 - (2) The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
 - (3) All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

3.1.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Test Receiver	Rohde & Schwarz	ESCI	26115-010-0027	May 16, 2015	1 Year
L.I.S.N.	Rohde & Schwarz	ENV216	101161	May 16, 2015	1 Year
50Ω Coaxial Switch	Anritsu	MP59B	6100175589	May 17, 2015	1 Year
Voltage Probe	Rohde & Schwarz	ESH2-Z3	100122	May 17, 2015	1 Year

- NOTE:**
1. The test was performed in CE Room, Shenzhen EMTEK Co., Ltd.
 2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.



3.1.3 TEST PROCEDURE

The basic test procedure was in accordance with ANSI C63.4:2014(section 7).

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels under (Limit - 20dB) were not recorded.

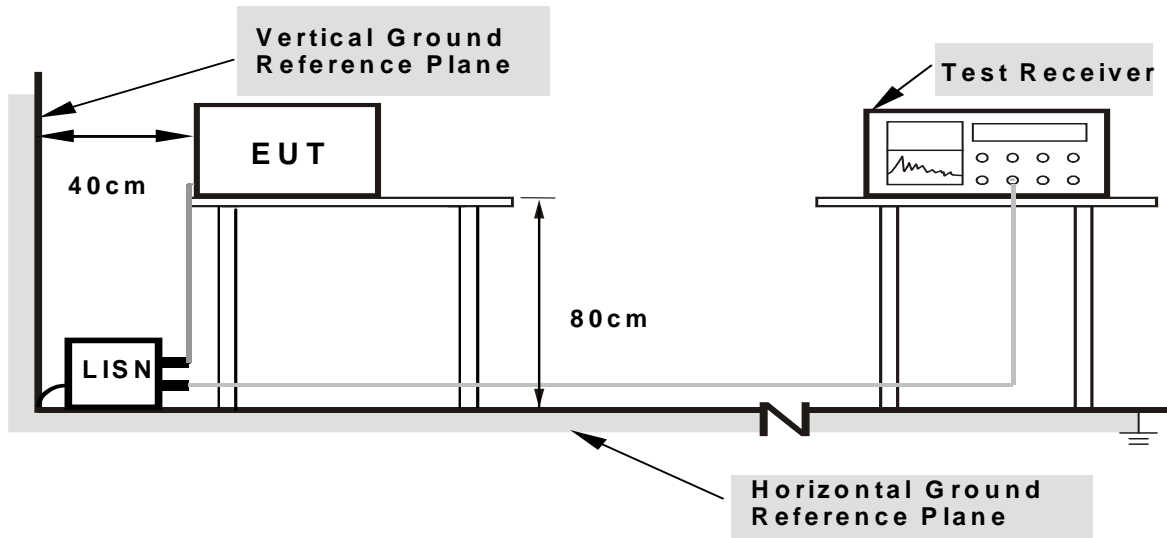
NOTE:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

3.1.4 DEVIATION FROM TEST STANDARD

No deviation.

3.1.5 TEST SETUP



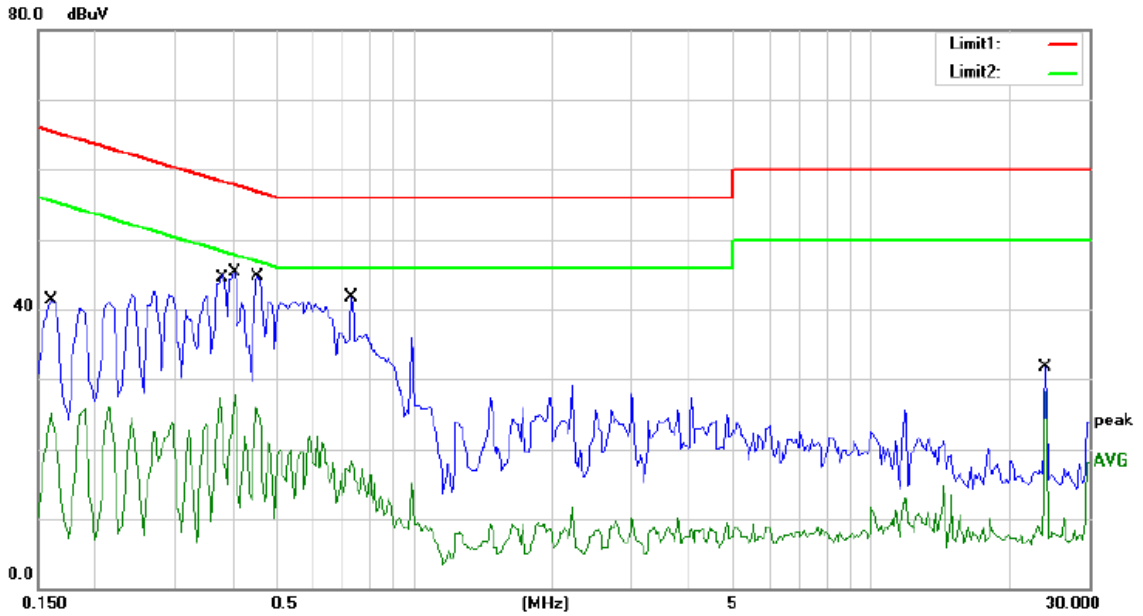
- Note:**
1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.

3.1.6 EUT OPERATING CONDITIONS

- a. Turned on the power of all equipment.
- b. EUT was operated according to the type described in manufacturer's specifications or the user's manual.



3.1.7 TEST RESULTS



Site: Conduction #1

Phase: **L1**

Temperature: 22

Limit: (CE)FCC PART 15 class B_QP

Power: AC 120V/60Hz

Humidity: 55 %

EUT: Cool Fire IV TC100, iSub V

M/N:

Mode: Charging

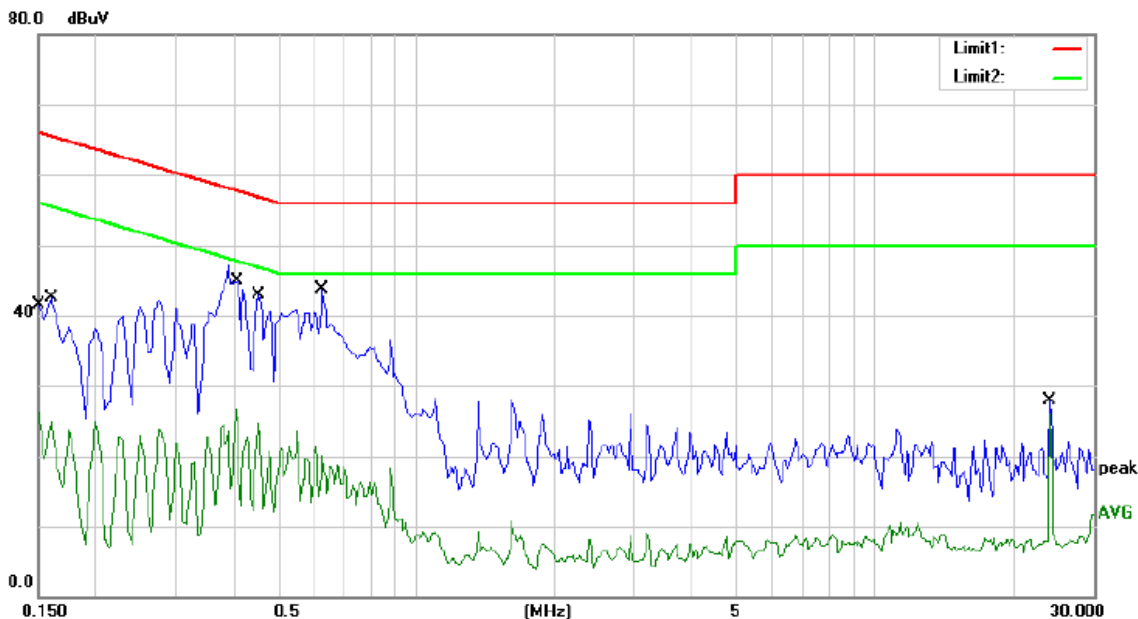
Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1600	41.30	0.00	41.30	65.46	-24.16	QP	
2		0.1600	25.10	0.00	25.10	55.46	-30.36	AVG	
3		0.3750	45.00	0.00	45.00	58.39	-13.39	QP	
4		0.3750	27.30	0.00	27.30	48.39	-21.09	AVG	
5		0.4050	45.30	0.00	45.30	57.75	-12.45	QP	
6		0.4050	27.60	0.00	27.60	47.75	-20.15	AVG	
7	*	0.4500	44.60	0.00	44.60	56.88	-12.28	QP	
8		0.4500	25.90	0.00	25.90	46.88	-20.98	AVG	
9		0.7300	41.70	0.00	41.70	56.00	-14.30	QP	
10		0.7300	18.20	0.00	18.20	46.00	-27.80	AVG	
11		24.0250	31.70	0.00	31.70	60.00	-28.30	QP	
12		24.0250	28.30	0.00	28.30	50.00	-21.70	AVG	



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Site Conduction #1

Phase: **N**

Temperature: 22

Limit: (CE)FCC PART 15 class B_QP

Power: AC 120V/60Hz

Humidity: 55 %

EUT: Cool Fire IV TC100, iSub V

M/N:

Mode: Charging

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1500	41.40	0.00	41.40	66.00	-24.60	QP	
2		0.1500	26.20	0.00	26.20	56.00	-29.80	AVG	
3		0.1600	42.50	0.00	42.50	65.46	-22.96	QP	
4		0.1600	24.90	0.00	24.90	55.46	-30.56	AVG	
5	*	0.4050	47.10	0.00	47.10	57.75	-10.65	QP	
6		0.4050	26.70	0.00	26.70	47.75	-21.05	AVG	
7		0.4550	42.80	0.00	42.80	56.78	-13.98	QP	
8		0.4550	24.60	0.00	24.60	46.78	-22.18	AVG	
9		0.6250	43.60	0.00	43.60	56.00	-12.40	QP	
10		0.6250	20.10	0.00	20.10	46.00	-25.90	AVG	
11		24.0250	27.80	0.00	27.80	60.00	-32.20	QP	
12		24.0250	26.20	0.00	26.20	50.00	-23.80	AVG	



3.2 RADIATED EMISSION MEASUREMENT

3.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

TEST STANDARD: FCC Part 15, Subpart B (Section: 15.109)

Emissions radiated outside of the specified bands, shall be according to the general radiated limits as following:

Radiated Emissions Limits at 10 meters (dBµV/m)				
Frequencies (MHz)	FCC 15B/ ICES-003, Class A	FCC 15B / ICES-003, Class B	CISPR 22, Class A	CISPR 22, Class B
30-88	39	29.5	40	30
88-216	43.5	33.1		
216-230	46.4	35.6		
230-960			47	37
960-1000	49.5	43.5	Not defined	Not defined
1000-3000	Avg: 49.5	Avg: 43.5		
Above 3000	Peak: 69.5	Peak: 63.5	Not defined	Not defined

Radiated Emissions Limits at 3 meters (dBµV/m)				
Frequencies (MHz)	FCC 15B / ICES-003, Class A	FCC 15B / ICES-003, Class B	CISPR 22, Class A	CISPR 22, Class B
30-88	49.5	40	50.5	40.5
88-216	54	43.5		
216-230	56.9	46		
230-960			57.5	47.5
960-1000	60	54	Avg: 56 Peak: 76	Avg: 50 Peak: 70
1000-3000	Avg: 60	Avg: 54		
Above 3000	Peak: 80	Peak: 74	Avg: 60 Peak: 80	Avg: 54 Peak: 74



FREQUENCY RANGE OF RADIATED MEASUREMENT (For unintentional radiators)

Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 1.705	30
1.705 – 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower

Note: (1) The lower limit shall apply at the transition frequencies.

(2) Emission level (dBuV/m) = 20 log Emission level (uV/m).

(3) All emanation from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.



3.2.2 TEST INSTRUMENTS

FREQUENCY RANGE BELOW 1GHz

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde & Schwarz	ESU	1302.6005.26	May 17, 2015	1 Year
Pre-Amplifier	HP	8447F	2944A07999	May 16, 2015	1 Year
Bilog Antenna	Schwarzbeck	VULB9163	659	Sep 02, 2015	1 Year
Cable	Schwarzbeck	AK9513	ACRX1	May 17, 2015	1 Year
Cable	Rosenberger	N/A	FP2RX2	May 17, 2015	1 Year
Cable	Schwarzbeck	AK9513	CRPX1	May 28, 2015	1 Year
Cable	Schwarzbeck	AK9513	CRRX2	May 28, 2015	1 Year

FREQUENCY RANGE ABOVE 1GHz

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde & Schwarz	ESU	1302.6005.26	May 17, 2015	1 Year
Pre-Amplifier	A.H.	PAM-0126	1415261	May 16, 2015	1 Year
Horn Antenna	Schwarzbeck	BBHA 9120	707	May 16, 2015	1 Year
Cable	H+B	0.5M SF104-26.5	289147/4	May 28, 2015	1 Year
Cable	H+B	3M SF104-26.5	295838/4	May 28, 2015	1 Year
Cable	H+B	6M SF104-26.5	295840/4	May 28, 2015	1 Year

- NOTES:**
1. The test was performed in 3m Chamber, Shenzhen EMTEK Co., Ltd.
 2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
 3. The FCC Site Registration No. is 709623.



3.2.3 TEST PROCEDURE

The basic test procedure was in accordance with ANSI C63.4:2014 (section 12).

<Frequency Range below 1GHz>

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from 1 meter to 4 meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1GHz.

NOTE:

1. The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
3. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) (if the raw value not contains the amplifier)
4. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Amplifier Gain(dB) (if the raw value contains the amplifier)
5. Margin value = Emission level – Limit value



<Frequency Range above 1GHz>

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna can be varied from one meter-to four meters, the height of adjustment depends on the EUT height and the antenna 3dB beamwidth both, to detect the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. The bore sight should be used during the test above 1GHz.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test receiver/spectrum was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.

NOTE:

1. The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak detection at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz for Average detection (AV) at frequency above 1GHz.
2. For measurement of frequency above 1000 MHz, the EUT was set 3 meters away from the receiver antenna.
3. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
4. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) (if the raw value not contains the amplifier)
5. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Amplifier Gain(dB) (if the raw value contains the amplifier)
6. Margin value = Emission level – Limit value

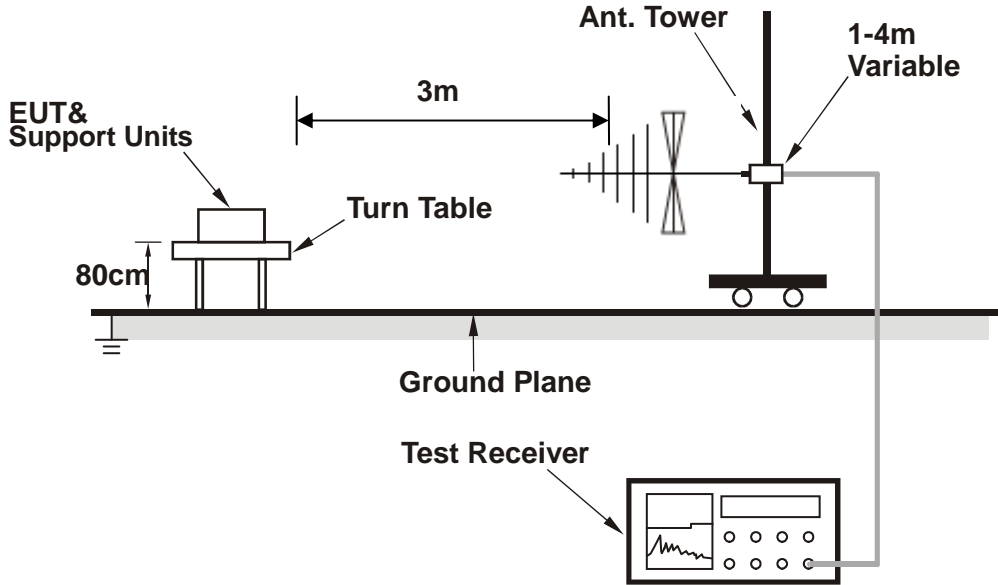
3.2.4 DEVIATION FROM TEST STANDARD

No deviation.

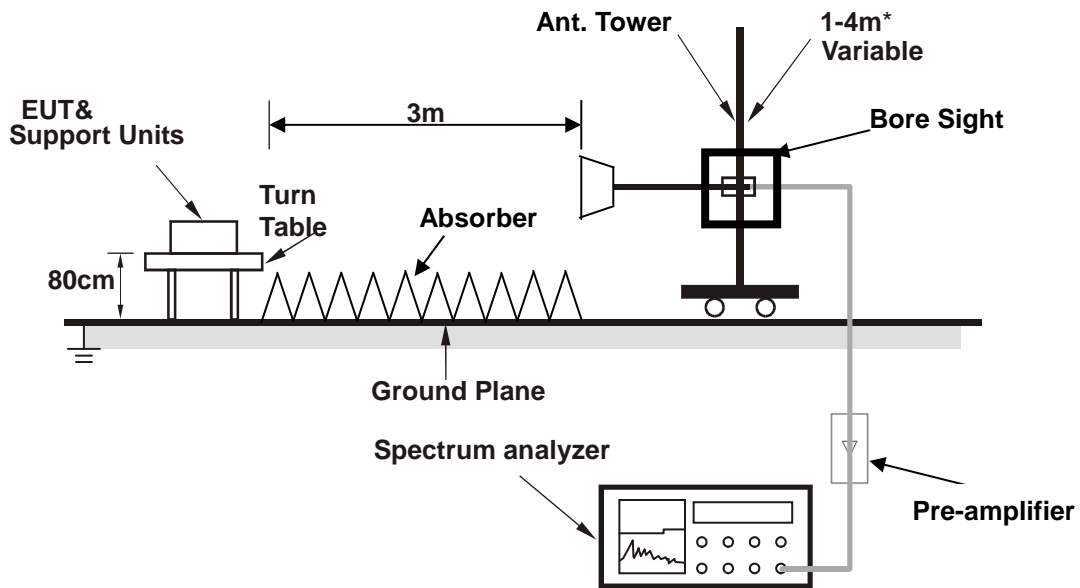


3.2.5 TEST SETUP

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



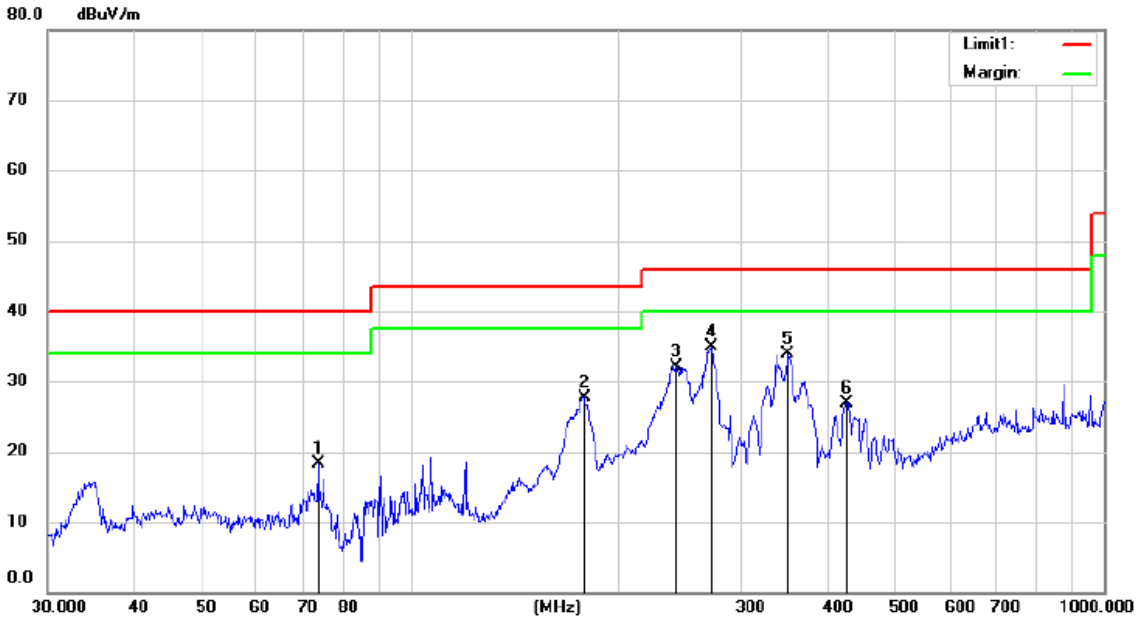
* : depends on the EUT height and the antenna 3dB beamwidth both, refer to section 7.3 of CISPR 16-2-3.

3.2.6 EUT OPERATING CONDITIONS

Same as item 3.1.6.



3.2.7 TEST RESULTS (BELOW 1GHZ)



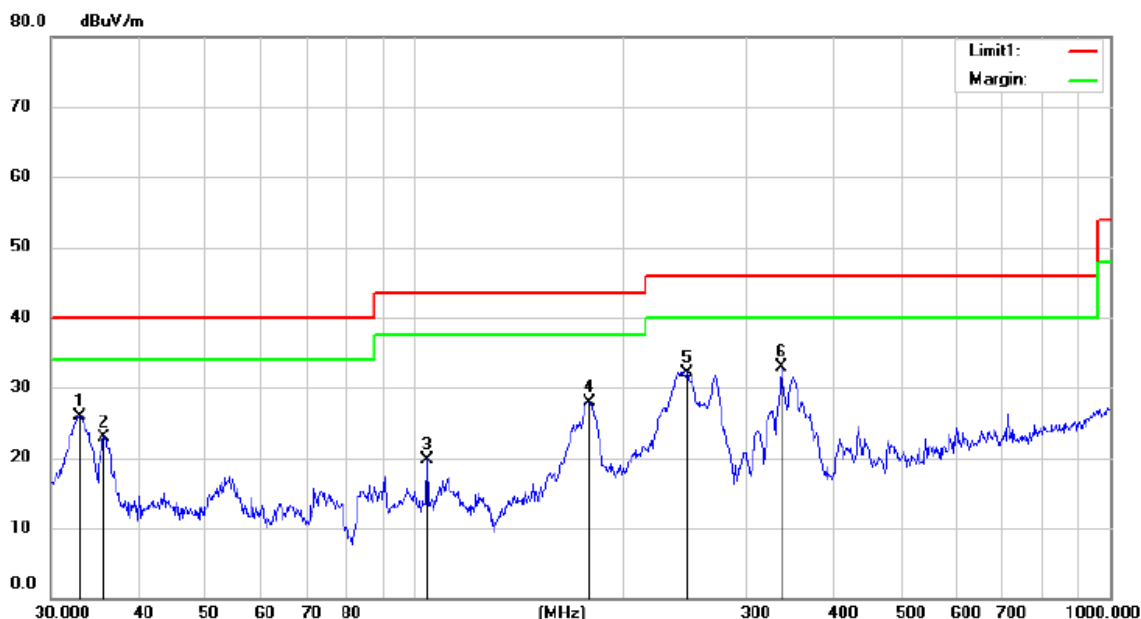
Site 3m Chamber #3 Polarization: **Horizontal** Temperature: 24 C
 Limit: (RE)FCC PART 15 CLASS B Power: DC 3.7V Humidity: 53 %
 EUT: Cool Fire IV TC 100, isubV
 M/N:
 Mode: Normal working
 Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		73.6170	36.91	-18.61	18.30	40.00	-21.70	QP		
2		178.1327	44.87	-17.17	27.70	43.50	-15.80	QP		
3		241.6763	45.96	-13.86	32.10	46.00	-13.90	QP		
4	*	272.2776	47.56	-12.66	34.90	46.00	-11.10	QP		
5		350.4768	44.36	-10.46	33.90	46.00	-12.10	QP		
6		425.0280	36.09	-9.19	26.90	46.00	-19.10	QP		



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Site 3m Chamber #3

Polarization: **Vertical**

Temperature: 24 C

Limit: (RE)FCC PART 15 CLASS B

Power: DC 3.7V

Humidity: 53 %

EUT: Cool Fire IV TC 100, isubV

M/N:

Mode: Normal working

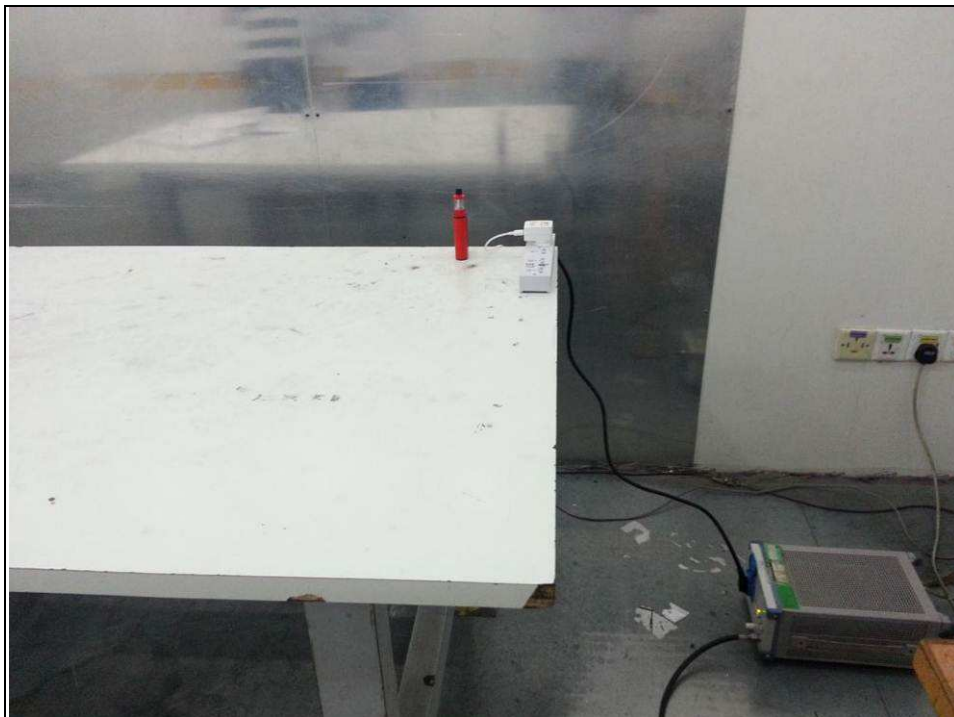
Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree degree	Detector	Comment
1		32.9791	43.03	-17.13	25.90	40.00	-14.10			QP	
2		35.7490	39.80	-16.80	23.00	40.00	-17.00			QP	
3		104.1701	35.11	-15.31	19.80	43.50	-23.70			QP	
4		178.1327	45.07	-17.17	27.90	43.50	-15.60			QP	
5		246.8150	45.82	-13.62	32.20	46.00	-13.80			QP	
6	*	337.2155	43.33	-10.43	32.90	46.00	-13.10			QP	



4 PHOTOGRAPHS OF THE TEST CONFIGURATION

CONDUCTED EMISSION TEST

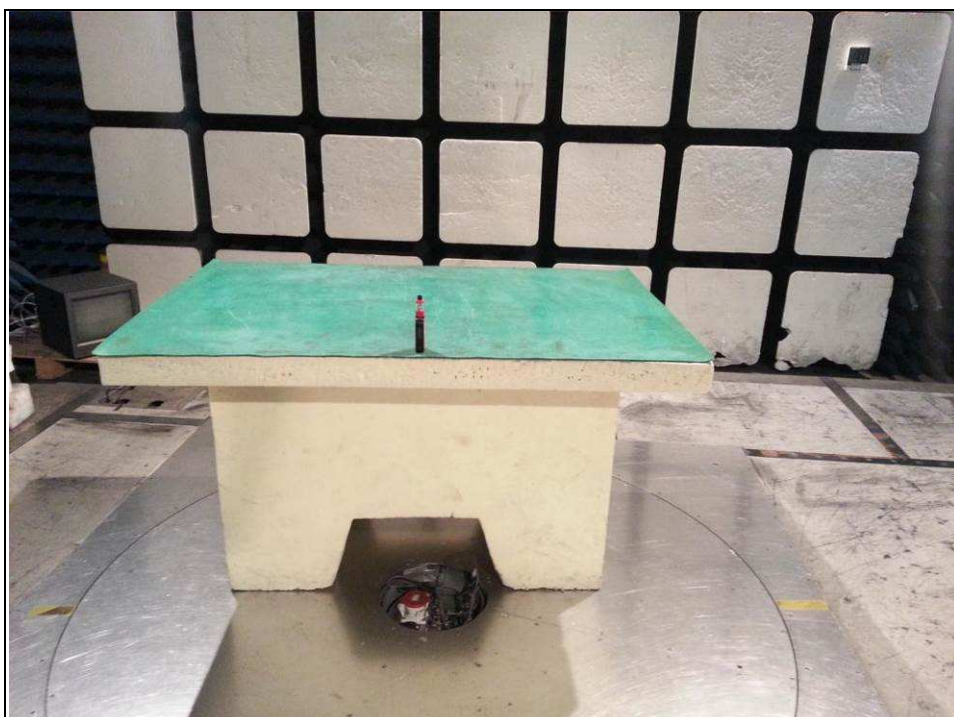




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Test Report No.: FV160420N001

RADIATED EMISSION TEST (30MHz-1GHz)





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Test Report No.: FV160420N001

5 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications were made to the EUT by the lab during the test.

---END---