



EMC TEST REPORT

Report No.: SET2023-00667

Product Name: Fault Circuit Indicator

FCC ID: 2A9ZW-JYZ-HW-GSM

Model No. : JYZ-HW-GSM

Applicant: Four-Faith Smart Power Technology Co., Ltd

Address: 11 / F, building A06, phase III, software park, Jimei District, Xiamen City

Received Date: 2022.12.19

Dates of Testing: 2022.12.19—2023.01.11

Issued by: CCIC Southern Testing Co., Ltd.

Lab Location: Electronic Testing Building, No. 43 Shahe Road, Xili Street, Nanshan District, Shenzhen, Guangdong, China.

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Test Report

Product Name..... Fault Circuit Indicator

Model No. JYZ-HW-GSM

Trade name..... Four-Faith

Brand Name..... Four-Faith

Applicant..... Four-Faith Smart Power Technology Co., Ltd

Applicant Address..... 11 / F, building A06, phase III, software park, Jimei District, Xiamen City

Manufacturer Four-Faith Electronic Technology Co., Ltd.

Manufacturer Address Fifth Floor, No. 11-8, Butang Middle Road, Xiamen Torch High-tech Zone (Tongxiang) Industrial Base

Test Standards..... 47 CFR Part 15 Subpart B

Test Result..... PASS

Tested by Ruihong Xie

Ruihong Xie Test Engineer

2023.01.11

Reviewed by Chris You

Chris You Senior Engineer

2023.01.11

Approved by Hou Tao

Hou Tao, Manager

2023.01.11

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Change History		
Issue	Date	Reason for change
1.0	2023.01.11	First edition

1. GENERAL INFORMATION

1.1 EUT Description

EUT Name : JYZ-HW-GSM
Trade Name..... : Four-Faith
Brand Name..... : Four-Faith
Hardware Version..... : MB-JYZ-HW-GSM V1.0
Software Version : JYZ_GSM-D_232_FF85900000052250_v0.0.6_20220701.bin
Power supply..... : Battery
Brand Name: YINKAI
Model No.: IFR18650-1500mAh3.2V
Rated Voltage: 3.7V
Charge Limit: 3.65V
Manufacturer:
SHENZHENVINKAPOWERTECHNOLOGYCo.,Ltd

Note1: The EUT is a Fault Circuit Indicator;

Note2 : For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

1.2 Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart B:

No.	Identity	Document Title
1	47 CFR Part 15 Subpart B	Radio Frequency Devices

Test detailed items/section required by FCC rules and results are as below:

No.	Section	Description	Result
1	15.107	Conducted Emission	N/A
2	15.109	Radiated Emission	PASS

NOTE:

- (1) The EUT has been tested according to 47 CFR Part 15 Subpart B, Class B. The test procedure is according to ANSI C63.4:2014.

Facilities and Accreditations

1.2.1 Facilities

FCC-Registration No.: CN1283

CCIC Southern Testing Co., Ltd EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Designation Number: CN1283, valid time is until April 19th, 2023.

ISED Registration: 11185A-1

CCIC Southern Testing Co., Ltd. EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 11185A-1 on Aug. 04, 2016, valid time is until April 20th, 2023.

A2LA Code: 5721.01

CCIC-SET is a third party testing organization accredited by A2LA according to ISO/IEC 17025. The accreditation certificate number is 5721.01.

1.2.2 Test Environment Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (°C):	15 °C - 35 °C
Relative Humidity (%):	25% -75%
Atmospheric Pressure (kPa):	86kPa-106kPa

1.2.3 Measurement Uncertainty

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in Measurement" (GUM) published by ISO.

Uncertainty of Conducted Emission:	U _c = 3.2 dB (k=2)
Uncertainty of Radiated Emission: (30MHz~1GHz)	U _c = 5.8 dB (k=2)
Uncertainty of Radiated Emission: (1~6GHz)	U _c = 5.1 dB (k=2)
Uncertainty of Radiated Emission: (6~18GHz)	U _c = 5.5 dB (k=2)

2. TEST CONDITIONS SETTING

2.1 Test Peripherals

The following is a listing of the EUT and peripherals utilized during the performance of EMC test:

Support Equipment:

Description	Brand name	Model	Serial No.	FCCID
/	/	/	/	/

Support Cable:

Description	Shield Type	Ferrite Core	Length
DC Power Cable	Un- shielding	No	1.2m

2.2 Test Mode

The EUT have the following typical setups during the test:

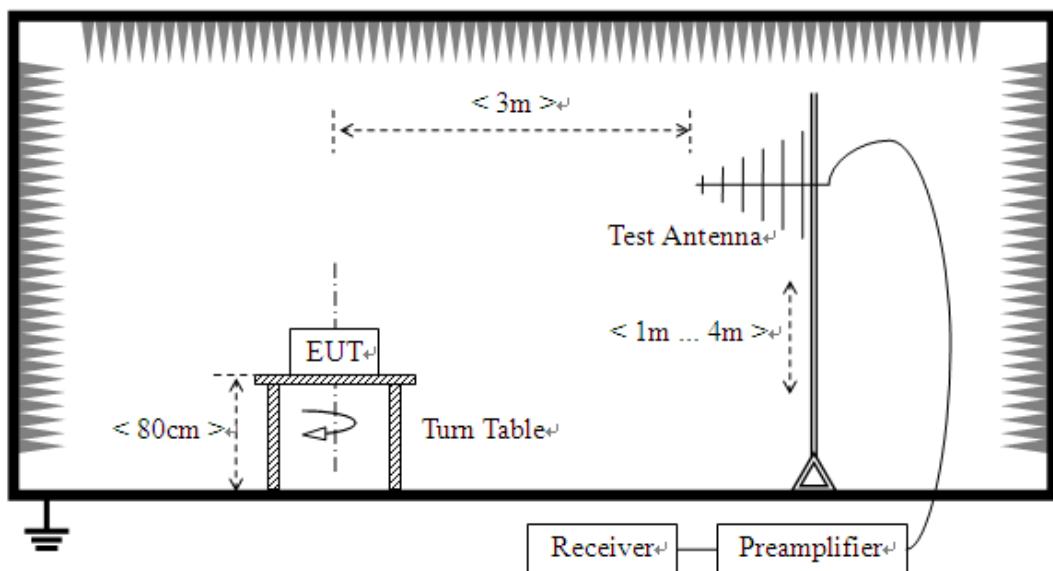
Setup1: EUT + Battery;

2.3 Test Setup and Equipments List

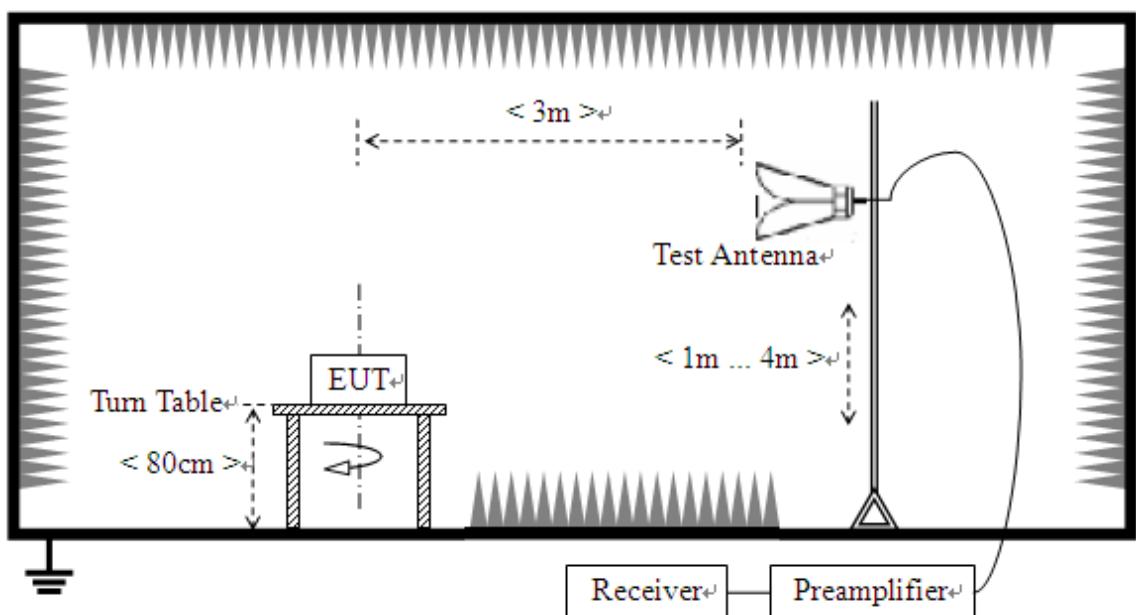
2.3.1 Radiated Emission

A. Test Setup:

- 1) For radiated emissions from 30MHz to 1GHz



- 2) For radiated emissions above 1GHz



B. Test Procedure

The test is performed in a 3m Semi-Anechoic Chamber; the antenna factor, cable loss and so on of the site (factors) is calculated to correct the reading. The EUT is placed on a 0.8m high insulating Turn Table, and keeps 3m away from the Test Antenna, which is mounted on a variable-height antenna master tower.

For the test Antenna:

- 1) In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) and Horn Test Antenna (above 1GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength. The emission levels at both horizontal and vertical polarizations should be tested.

C. Equipments List:

Description	Manufacturer	Model	Serial No.	Calibration Date	Calibration Due. Date
EMI Test Receiver	ROHDE&SCHWARZ	ESCI	A0902601	2022.05.23	2023.04.17
Broadband Ant.	2786	ETC	A150402239	2021.09.16	2024.03.03
3M Anechoic Chamber	Albatross	SAC-3MAC 9*6*6m	A0412375	2019.03.26	2023.03.25
EMI Test Receiver	ROHDE&SCHWARZ	ESW26	A180502935	2022.07.21	2023.07.20
5M Anechoic Chamber	Albatross	SAC-5MAC 12.8x6.8x6.4m	A0304210	2022.03.25	2023.03.24
EMI Horn Ant.	ROHDE&SCHWARZ	HF906	A0304225	2019.03.25	2023.03.24

3. 47 CFR PART 15B REQUIREMENTS

3.1 Conducted Emission

3.1.1 Requirement

According to FCC section 15.107, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 Ω line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dB μ V)	
	Quasi-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

Note:

- a) The limit subjects to the Class B digital device.
- b) The lower limit shall apply at the band edges.
- c) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

3.1.2 Test Result

Not applicable for this DC Power supply device

3.2 Radiated Emission

3.2.1 Requirement

According to FCC section 15.109, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency range (MHz)	Field Strength		Field Strength Limitation at 3m Measurement Dist	
	μV/m	Dist	(uV/m)	(dBuV/m)
30.0 - 88.0	100	3m	100	20log 100
88.0 - 216.0	150	3m	150	20log 150
216.0 - 960.0	200	3m	200	20log 200
Above 960.0	500	3m	500	20log 500

- a) For frequencies above 1000MHz, the field strength limits are based on average detector. When average radiated emission measurements are specified in this part, including emission measurements below 1000MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules.
- b) Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength.
- c) For below 1G :QP detector RBW 120kHz ,VBW 300kHz.

For Above 1G: PK detector RBW 1MHz,VBW 3MHz for PK value ;AV detector RBW 1MHz, VBW 10Hz for AV value.

Note:

- 1) The tighter limit shall apply at the boundary between two frequency range.
- 2) Limitation expressed in dBuV/m is calculated by 20log Emission Level(uV/m).
- 3) If measurement is made at 3m distance, then F.S Limitation at 3m distance is adjusted by using the formula of $Ld1 = Ld2 * (d2/d1)^2$

Example:

F.S Limit at 30m distance is 30uV/m, then F.S Limitation at 3m distance is adjusted as
 $Ld1 = L1 = 30uV/m * (10)^2 = 100 * 30uV/m.$

3.2.2 Test Description

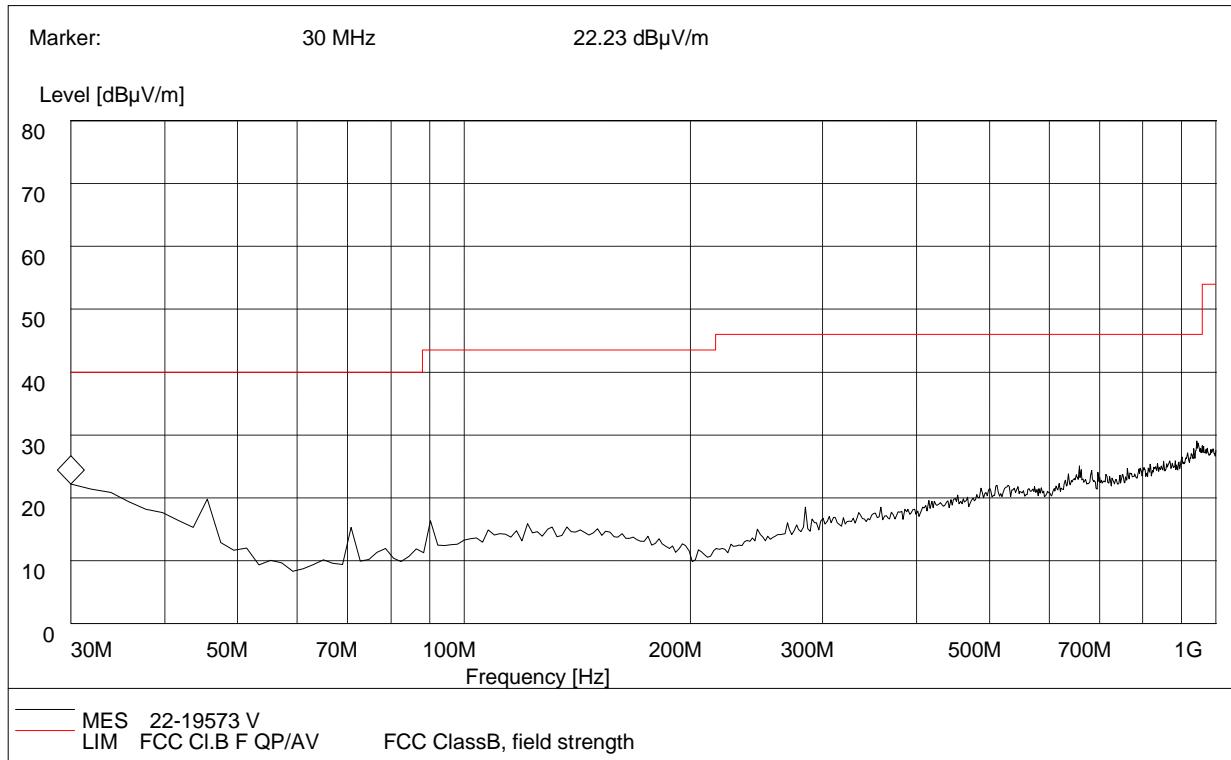
See section 2.3.2 of this report.

3.2.3 Test Result

The maximum radiated emission is searched using PK, QP and AV detectors; the emission levels more than the limits, and that have narrow margins from the limits will be re-measured with AV and QP detectors. Both the vertical and the horizontal polarizations of the Test Antenna are considered to perform the tests. All test modes are considered, refer to recorded points and plots below.

The amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be reported.

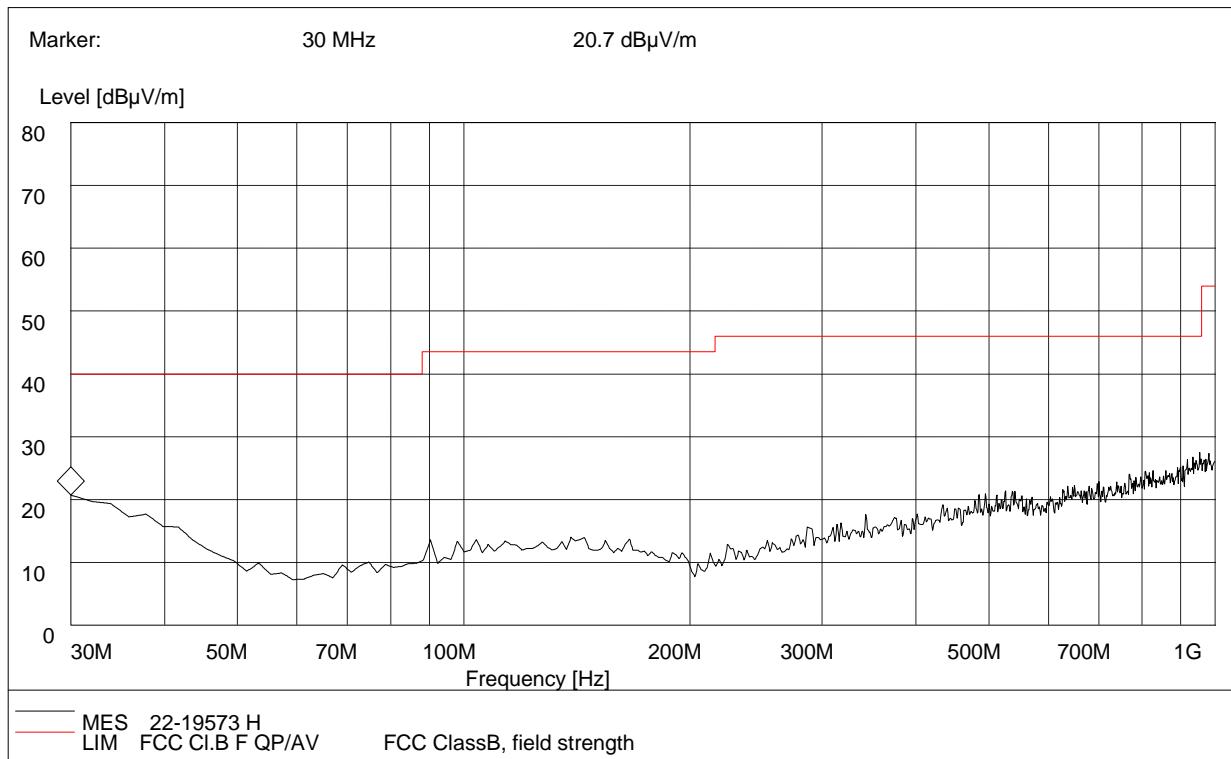
Note: All radiated emission tests were performed in X, Y, Z axis direction, and only the worst axis test condition was recorded in this test report.

A.Radiation disturbances, antenna polarization: Vertical, Setup1, 3.2V DC


(Plot C: Test Antenna Vertical 30M - 1G)

Frequency (MHz)	QuasiPeak (dB μ V/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dB μ V/m)	Margin (dB)	Antenna	Cable Loss(dB)	ANT. Factor(dB)	Verdict
30.00	22.01	120.000	114	40.00	14.37	Vertical	0.5	19.3	Pass
45.18	18.45	120.000	109	40.00	15.29	Vertical	0.5	10.7	Pass
90.29	16.10	120.000	127	43.50	21.50	Vertical	0.8	9.1	Pass
121.06	15.78	120.000	115	43.50	18.88	Vertical	1.0	11.3	Pass
284.37	18.12	120.000	108	46.00	9.56	Vertical	1.2	13.8	Pass
657.16	25.27	120.000	124	46.00	8.83	Vertical	1.7	20.2	Pass

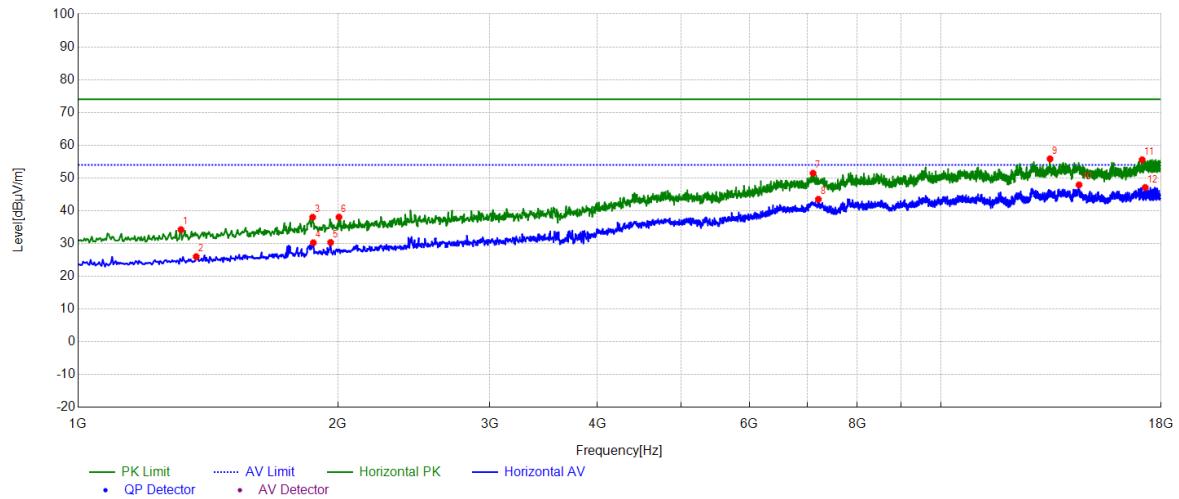
B.Radiation disturbances, antenna polarization: Horizontal, Setup1, 3.2V DC



(Plot D: Test Antenna Horizontal 30M - 1G)

Frequency (MHz)	QuasiPeak (dB μ V/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dB μ V/m)	Margin (dB)	Antenna	Cable Loss(dB)	ANT. Factor(dB)	Verdict
30.00	19.45	120.000	108	40.00	20.55	Vertical	0.5	18.8	Pass
39.21	15.43	120.000	114	40.00	24.57	Vertical	0.5	5.3	Pass
138.65	12.37	120.000	123	43.50	31.13	Vertical	1.0	10.9	Pass
166.06	12.73	120.000	119	43.50	30.77	Vertical	1.2	11.0	Pass
537.00	21.03	120.000	108	46.00	24.97	Vertical	1.2	18.6	Pass
826.46	23.40	120.000	126	46.00	22.60	Vertical	1.4	21.4	Pass

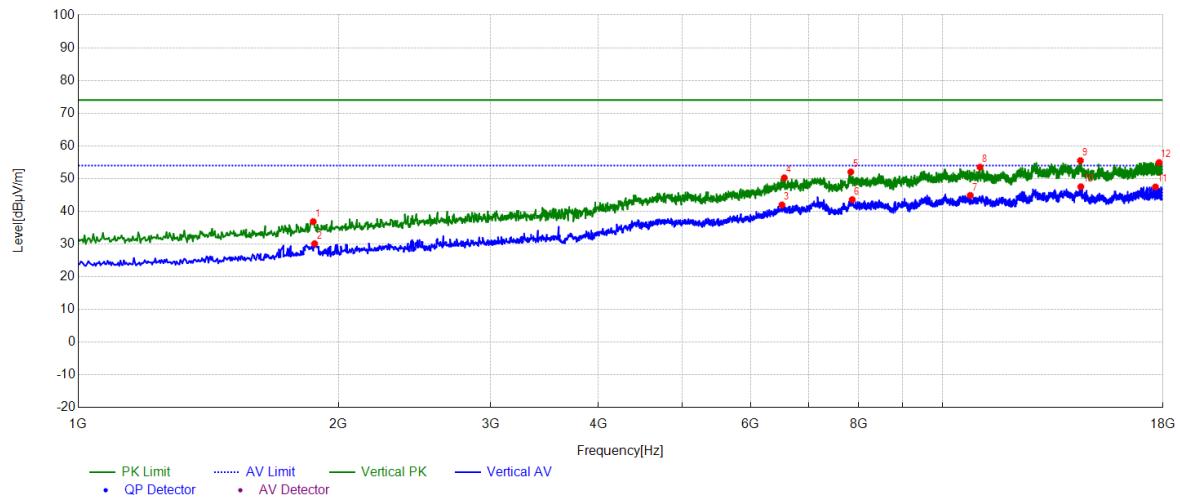
A.Radiation disturbances, antenna polarization: Horizontal ,Setup1



(Plot M: Test Antenna Horizontal 1G – 18G)

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin[dB μV/m]	Trace	Height [cm]	Angle [°]	Polarity
1	1316.21	34.23	-14.69	74.00	39.77	PK	114	194	Horizontal
2	1370.65	26.01	-14.47	54.00	27.99	AV	121	231	Horizontal
3	1870.40	38.02	-12.43	74.00	35.98	PK	109	65	Horizontal
4	1873.86	30.25	-12.41	54.00	23.75	AV	133	80	Horizontal
5	1962.27	30.32	-12.04	54.00	23.68	AV	124	108	Horizontal
6	2006.44	38.07	-11.87	74.00	35.93	PK	108	154	Horizontal
7	7109.80	51.45	3.43	74.00	22.55	PK	136	253	Horizontal
8	7211.37	43.51	3.46	54.00	10.49	AV	114	289	Horizontal
9	13382.25	55.84	8.16	74.00	18.16	PK	109	327	Horizontal
10	14460.09	47.90	9.50	54.00	6.10	AV	123	10	Horizontal
11	17112.63	55.56	11.90	74.00	18.44	PK	116	244	Horizontal
12	17255.47	47.10	12.03	54.00	6.90	AV	137	351	Horizontal

B.Radiation disturbances, antenna polarization: Vertical,Setup1



(Plot N: Test Antenna Vertical 1G – 18G)

NO.	Freq. [MHz]	Level [dB μ V/m]	Factor [dB]	Limit [dB μ V/m]	Margin[dB μ V/m]	Trace	Height [cm]	Angle [°]	Polarity
1	1870.41	36.86	-12.43	74.00	37.14	PK	120	84	Vertical
2	1877.23	30.12	-12.39	54.00	23.88	AV	117	182	Vertical
3	6521.66	41.96	2.46	54.00	12.04	AV	134	170	Vertical
4	6562.40	50.24	2.60	74.00	23.76	PK	109	153	Vertical
5	7834.07	52.04	4.00	74.00	21.96	PK	104	180	Vertical
6	7864.60	43.57	4.05	54.00	10.43	AV	125	346	Vertical
7	10771.2	44.86	6.42	54.00	9.14	AV	119	44	Vertical
8	11053.4	53.48	6.61	74.00	20.52	PK	144	341	Vertical
9	14443.3	55.50	9.41	74.00	18.50	PK	107	50	Vertical
10	14460.4	47.53	9.50	54.00	6.47	AV	118	137	Vertical
11	17643.2	47.46	13.20	54.00	6.54	AV	121	122	Vertical
12	17813.0	54.91	13.66	74.00	19.09	PK	135	310	Vertical

-----End of Report-----