EMC TEST REPORT

Report No.:	20240417G06070X -W1
Product Name:	AI Safety System
FCC ID	NCI-M360-M500-T
IC ID	6673A-M500-T
Model No. :	Mobile360 M500-T
Applicant:	VIA Technologies, Inc
Address:	8F., NO. 535, ZHONGZHENG RD., XINDIAN DIST., NEW TAIPEI CITY 23148, TAIWAN
Received Date:	2024.04.09
Dates of Testing:	2024.04.11~2024.04.18
Issued by:	CCIC Southern Testing Co., Ltd.
Lab Location:	Electronic Testing Building, No. 43, Shahe Road, Xili Street, Nanshan District, Shenzhen, Guangdong, China. **Tel:** 86-755-26627338 **E-Mail:** manager@ccic-set.com

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Test Report

Product Name.....	AI Safety System
Model No.	Mobile360 M500-T
Trade name.....	VIA
Applicant.....	VIA Technologies, Inc
Applicant Address.....	8F., NO. 535, ZHONGZHENG RD., XINDIAN DIST., NEW TAIPEI CITY 23148, TAIWAN
Manufacturer	VIA Technologies, Inc
Manufacturer Address	8F., NO. 535, ZHONGZHENG RD., XINDIAN DIST., NEW TAIPEI CITY 23148, TAIWAN
Test Standards.....	ICES-003 Issue 7 47 CFR Part 15 Subpart B
Test Result.....	PASS

Tested by ..... Sun Jiaohui

Sun Jiaohui Test Engineer 2024.06.07

Reviewed by ..... Chris You

Chris You Senior Engineer 2024.06.07

Approved by ..... Yang Fan

2024.06.07

Yang Fan, Manager

TABLE OF CONTENTS

Change History		
Issue	Date	Reason for change
1.0	2024.06.07	First edition

1. GENERAL INFORMATION

1.1 EUT Description

EUT Name ..... .: AI Safety System
Trade Name……: VIA
Brand Name……: VIA
Hardware Version……..…….: RA
Software Version ..... : v0.6.1
Note1: The EUT is a AI Safety System;
Note2: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.
Note3: The auxiliary sample of this product has a total of two sets of cameras, one model is M500 PD Right, M500 DMOD FRONT, M500 DMOD Rear, The other sets are the Forklift front camera, Forklift driver camera and Forklift rear camera, both of which have undergone EMC testing.

1.2 Test Standards and Results

The objective of the report is to perform testing according to ICES-003 Issue 7:

No.	Identity	Document Title
1	47 CFR Part 15 Subpart B	Radio Frequency Devices
2	ICES-003 Issue 7	Information Technology Equipment (Including Digital Apparatus) — Limits and Methods of Measurement

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

No.	Section	Description	Result
1	ICES 003 Issue 7 Section3.2.1	Conducted Emission	PASS
2	ICES 003 Issue 7 Section3.2.2	Radiated Emission	PASS
3	15.107	Conducted Emission	PASS
4	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.

(2) The EUT has been tested according to ICES 003 Issue 7. The test procedure is according to ANSI C63.4:2014.

1.3 Facilities and Accreditations

1.3.1 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 Jun 30, 2025.

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 Jun 30, 2025.

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.

1.3.2 Test Environment Conditions

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

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

1.3.3 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:	Uc = 3.2 dB (k=2)
Uncertainty of Radiated Emission: (30MHz~1GHz)	Uc = 5.8 dB (k=2)
Uncertainty of Radiated Emission: (1~6GHz)	Uc = 5.1 dB (k=2)
Uncertainty of Radiated Emission: (6~18GHz)	Uc = 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	/	3.5m

2.2 Test Mode

Note 1: It could support the following operating mode and frequency band:
WCDMA BAND 2/4/5;
LTE BAND 2/4/5/7/12/13/26/66/38;
2.4G/5G WIFI; Bluetooth; GNSS

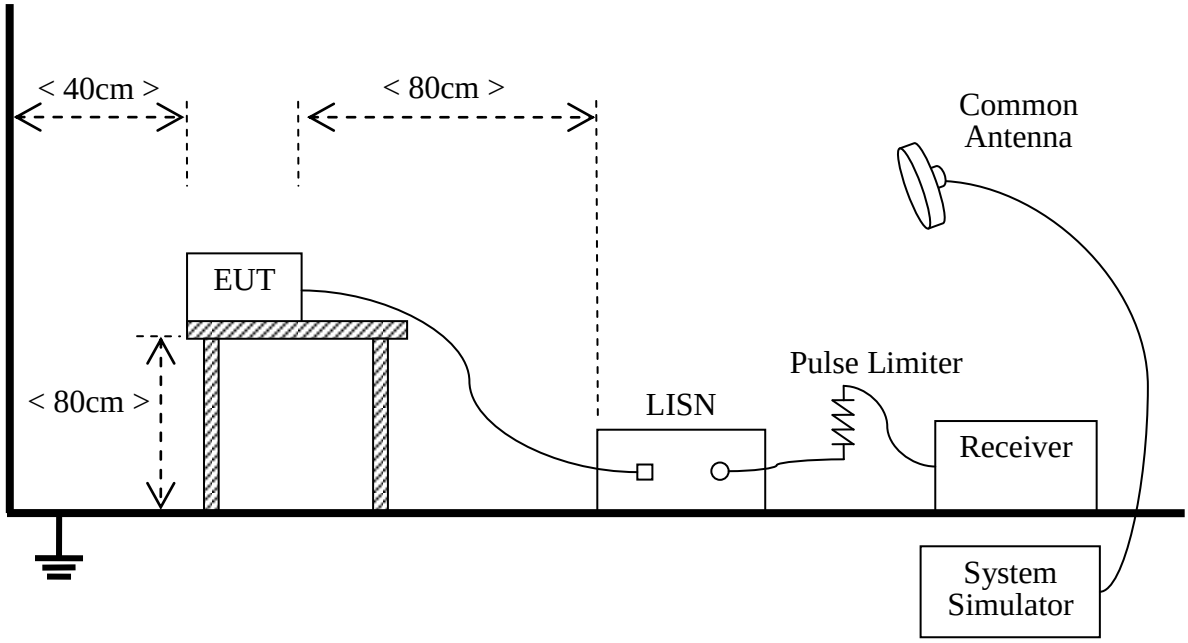
Note 2: The EUT have the following typical setups during the test:
Setup1: WCDMA BAND 2 Traffic + Charger;
Setup2: WCDMA BAND 4 Traffic + Charger;
Setup3: WCDMA BAND 5 Traffic + Charger;
Setup4: LTE BAND 2 Traffic + Charger;
Setup5: LTE BAND 4 Traffic + Charger;
Setup6: LTE BAND 5 Traffic + Charger;
Setup7: LTE BAND 7 Traffic + Charger;
Setup8: LTE BAND 12 Traffic + Charger;
Setup9: LTE BAND 13 Traffic + Charger;
Setup10: LTE BAND 26 Traffic + Charger;
Setup11: LTE BAND 66 Traffic + Charger;
Setup12: LTE BAND 38 Traffic + Charger;
Setup13: 2.4G WIFI + Charger;
Setup14: 5G WIFI + Charger;
Setup15: Bluetooth + Charger;
Setup16: GNSS+ Charger;
Setup17: Idle + Charger;

Note 3: Only worst-case mode data provide at the report.

2.3 Test Setup and Equipments List

2.3.1 Conducted Emission

A. Test Setup:



The EUT is placed on a 0.8m high insulating table, which stands on the grounded conducting floor, and keeps 0.4m away from the grounded conducting wall. The EUT is connected to the power mains through a LISN which provides 50Ω/50μH of coupling impedance for the measuring instrument. The Common Antenna is used for the call between the EUT and the System Simulator (SS). A Pulse Limiter is used to protect the measuring instrument. The factors of the whole test system are calibrated to correct the reading.

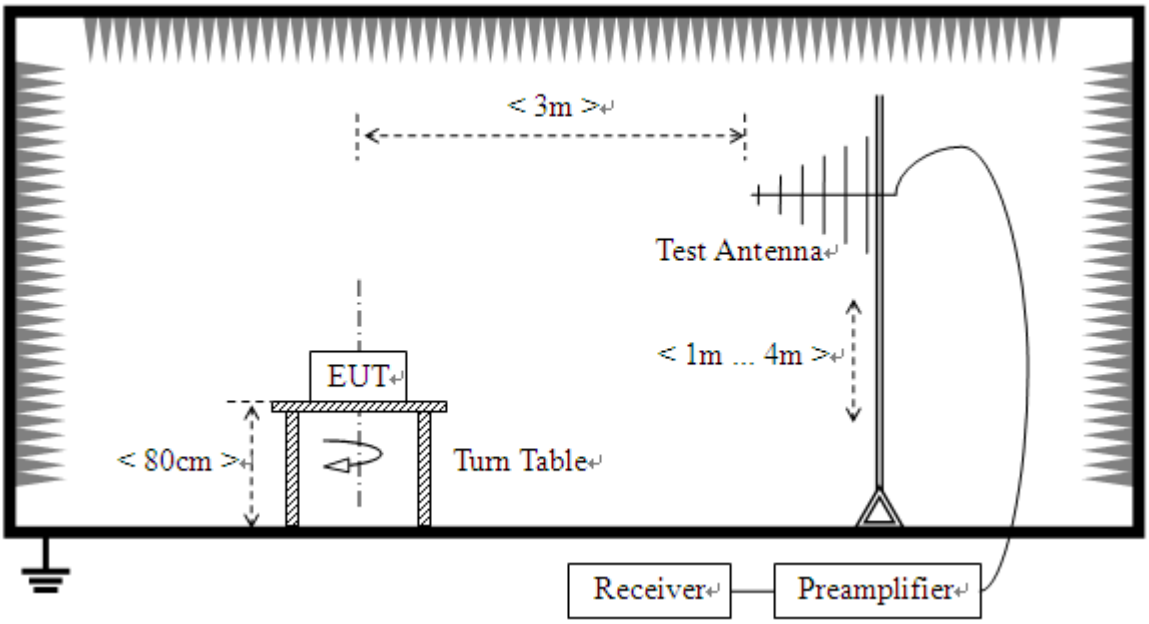
B. Equipments List:

Description	Manufacturer	Model	Serial No.	Calibration Date	Calibration Due. Date
Test Receiver	KEYSIGHT	N9038A	A141202036	2023.06.13	2024.06.12
LISN	ROHDE&SCHWARZ	ENV216	A140701847	2023.06.08	2024.06.07
Cable	MATCHING PAD	W7	/	2023.07.02	2024.07.02

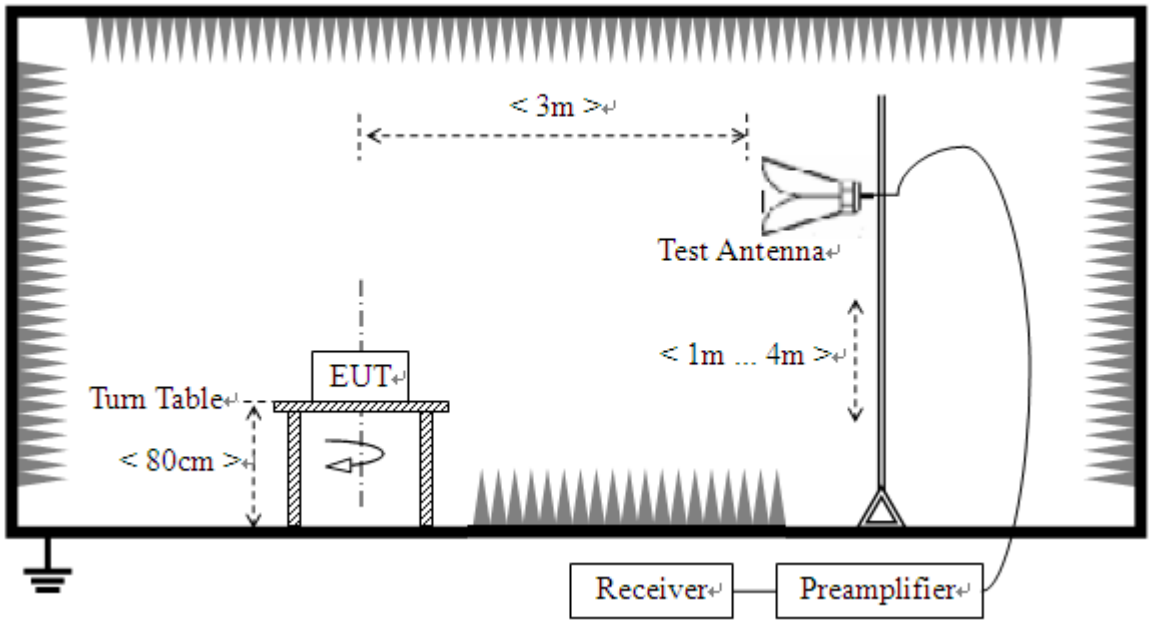
2.3.2 Radiated Emission

A. Test Setup:

1) For radiated emissions from 30MHz to1GHz



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	ESIB7	A0501375	2024.02.28	2025.02.27
Broadband Ant.	ETC	MCTD2786	A150402239	2021.12.27	2024.12.26
3M Anechoic Chamber	Albatross	SAC-3MAC 9*6*6m	A0412375	2024.02.27	2027.02.26
EMI Test Receiver	ROHDE&SCHWARZ	ESW26	A180502935	2023.06.08	2024.06.07
5M Anechoic Chamber	Albatross	SAC-5MAC 12.8x6.8x6.4m	A0304210	2022.03.25	2025.06.07
EMI Horn Ant.	ROHDE&SCHWARZ	HF906	A0304225	2022.04.12	2025.04.11

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 50μH/50Ω line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dBμV)	
	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 Description

See section 2.3.1 of this report.

3.1.3 Test Result

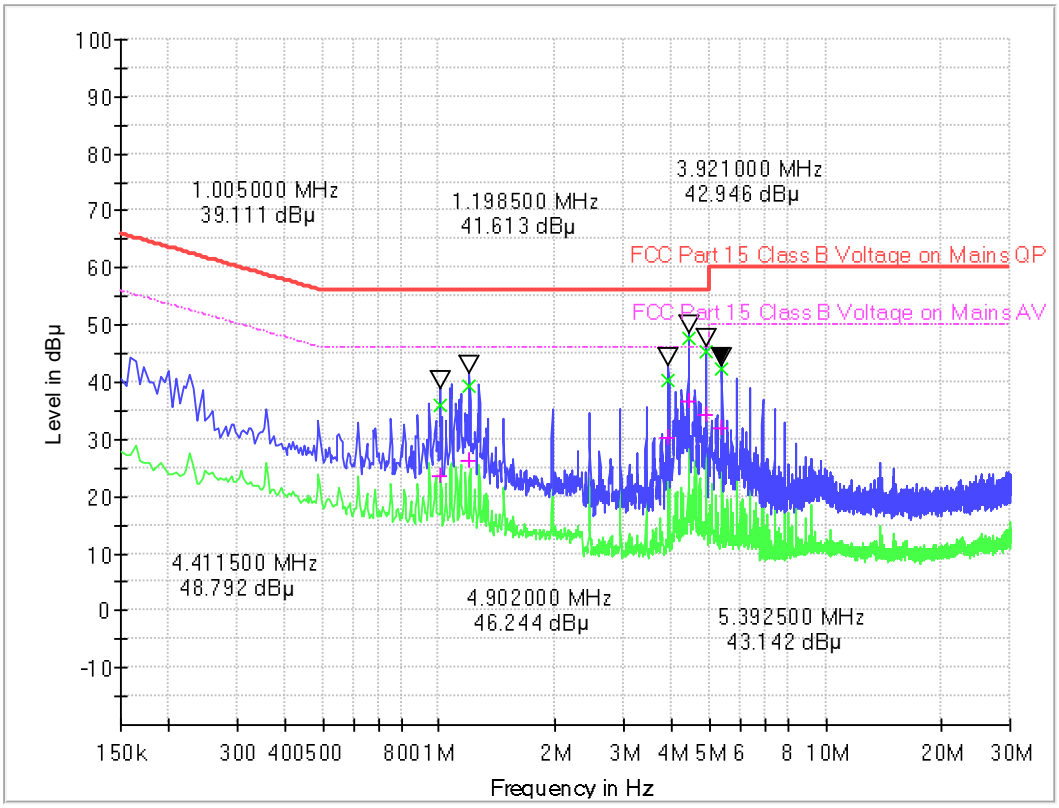
The maximum conducted interference is searched using Peak (PK), Quasi-peak (QP) and Average (AV) detectors; the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. All test modes are considered, refer to recorded points and plots below.

Note:

Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a Nominal 230V AC,50/60Hz) for which the device is capable of operation. A device rated for 50/60 Hz operation need not be tested at both frequencies provided the radiated and line conducted emissions are the same at both frequencies.

Test voltage and frequency (12V DC)

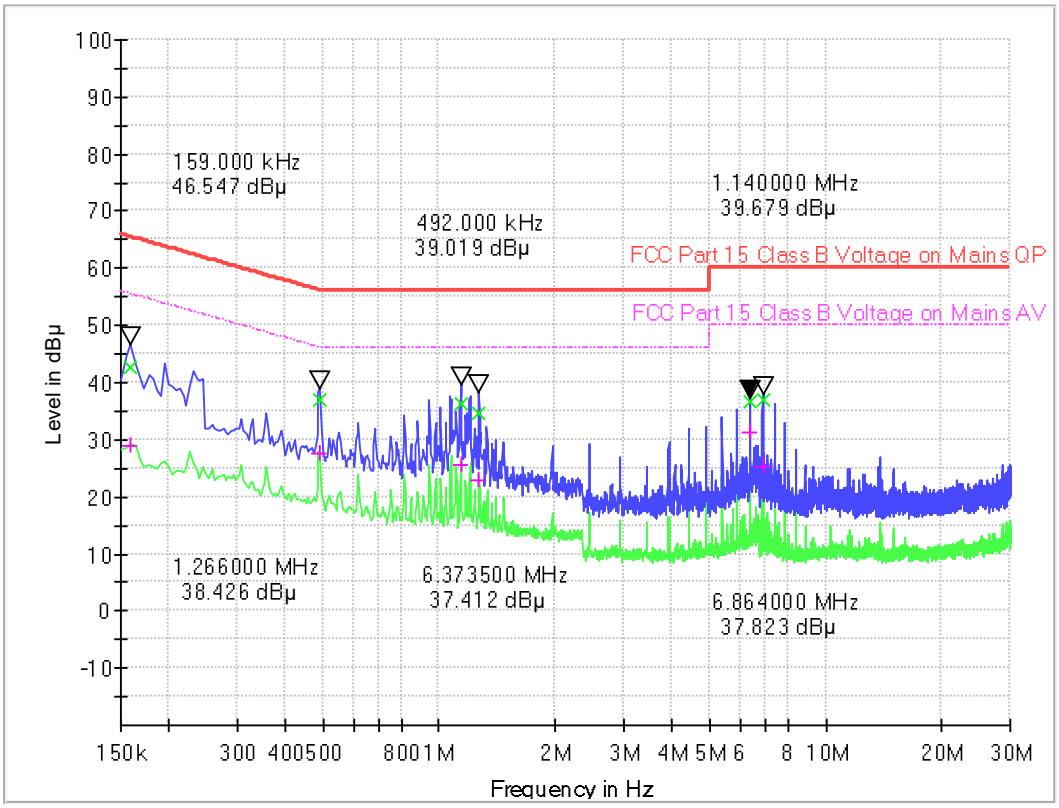
D. Mains terminal disturbance voltage, L phase, Setup 1



(Plot A: L Phase)

Frequency (MHz)	QuasiPeak	CAverage (dB µ V)	Cabel Loss (dB)	Corr. (dB)	Margin - QPK	Limit - QPK	Margin - AV	Limit - AV (dB µ V)
1.005000	35.90	23.53	0.2	10.2	20.10	56.0	22.47	46.0
1.198500	39.17	26.16	0.2	10.2	16.83	56.0	19.84	46.0
3.921000	40.38	30.38	0.5	10.5	15.62	56.0	15.62	46.0
4.411500	47.58	36.49	0.5	10.5	8.42	56.0	9.51	46.0
4.902000	45.42	34.26	0.5	10.5	10.58	56.0	11.74	46.0
5.392500	42.42	31.81	0.5	10.5	17.58	60.0	18.19	50.0

E. Mains terminal disturbance voltage, N phase, Setup 1



(Plot B: N Phase)

Frequency (MHz)	QuasiPeak	CAverage (dB µ V)	Cabel Loss (dB)	Corr. (dB)	Margin - QPK	Limit - QPK	Margin - AV	Limit - AV (dB µ V)
0.159000	42.68	28.92	0.1	10.1	22.84	65.5	26.60	55.5
0.492000	36.97	27.75	0.1	10.1	19.16	56.1	18.38	46.1
1.140000	36.31	25.60	0.2	10.2	19.69	56.0	20.40	46.0
1.266000	34.51	22.88	0.2	10.2	21.49	56.0	23.12	46.0
6.373500	36.78	31.27	0.5	10.5	23.22	60.0	18.73	50.0
6.864000	36.85	25.31	0.5	10.5	23.15	60.0	24.69	50.0

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

According to ICES-003 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 Limitation at 3m Measurement Dist	
	Class A(3m) QP (dBμV/m)	Class B(3m) QP (dBμV/m)
30 - 88	50.0	40.0
88 - 216	54.0	43.5
216 - 230	56.9	46.0
230 - 960	57.0	47.0
960-1000	60.0	54.0
Frequency range (MHz)	Field Strength Limitation at 3m Measurement Dist	
	Class A(3m) (dBμV/m)	Class B(3m) (dBμV/m)
Above 1G	60(AV) /80(PK)	54(AV) /74(PK)

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.

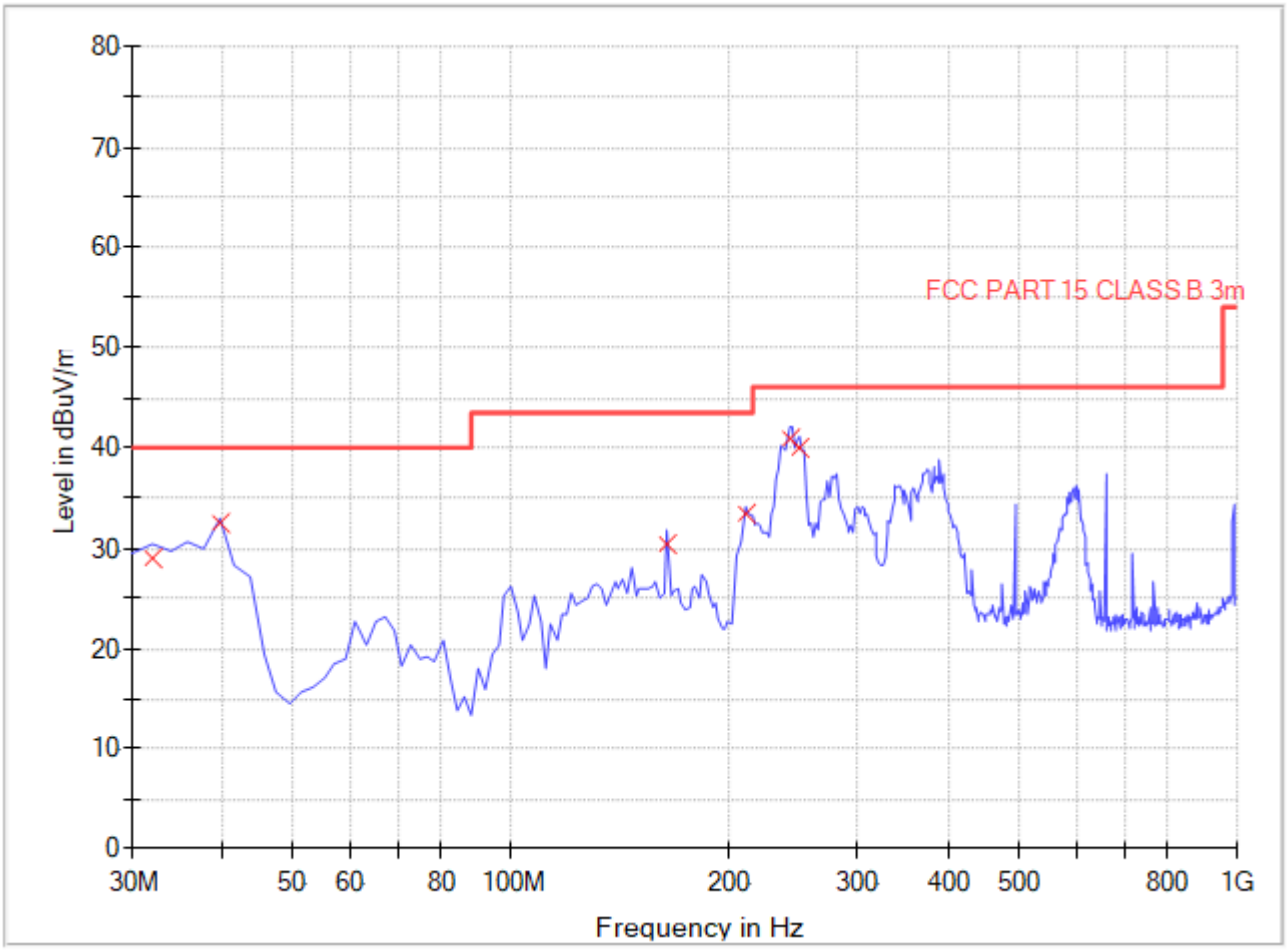
3.2.3 Test Result

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.

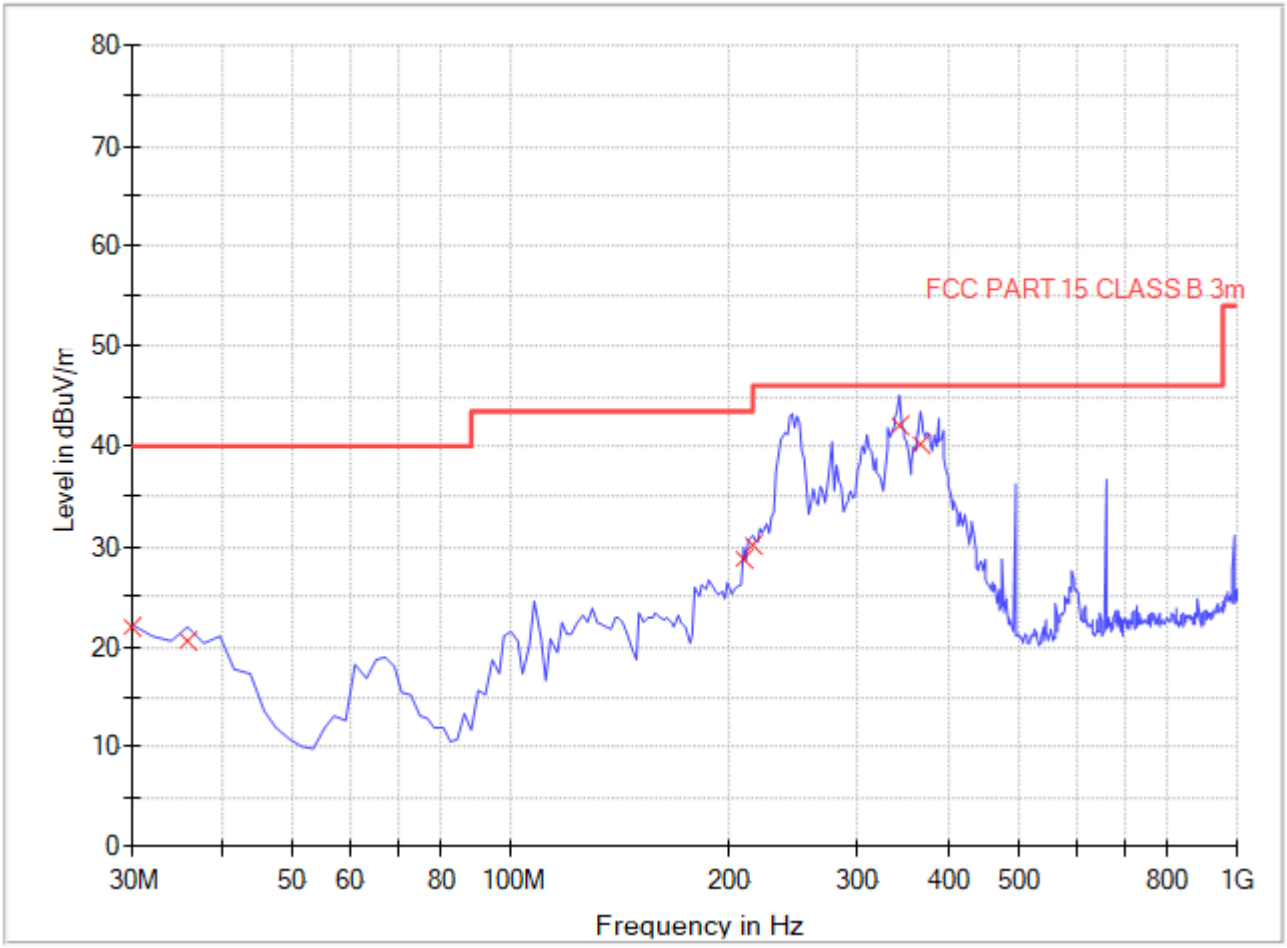
A. Radiation disturbances, antenna polarization: Vertical, Setup1



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

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dBµV/m)	Margin (dB)	Antenna	Cable Loss(dB)	ANT. Factor(dB)	Verdict
31.96	29.08	120.000	105	40.00	10.92	Vertical	0.5	18.0	Pass
39.72	32.58	120.000	102	40.00	7.42	Vertical	0.5	13.6	Pass
164.12	30.46	120.000	103	43.50	13.04	Vertical	1.2	11.0	Pass
210.80	33.48	120.000	106	43.50	10.02	Vertical	1.2	10.9	Pass
241.88	40.84	120.000	102	46.00	5.16	Vertical	1.2	10.8	Pass
249.64	39.93	120.000	105	46.00	6.07	Vertical	1.2	11.8	Pass

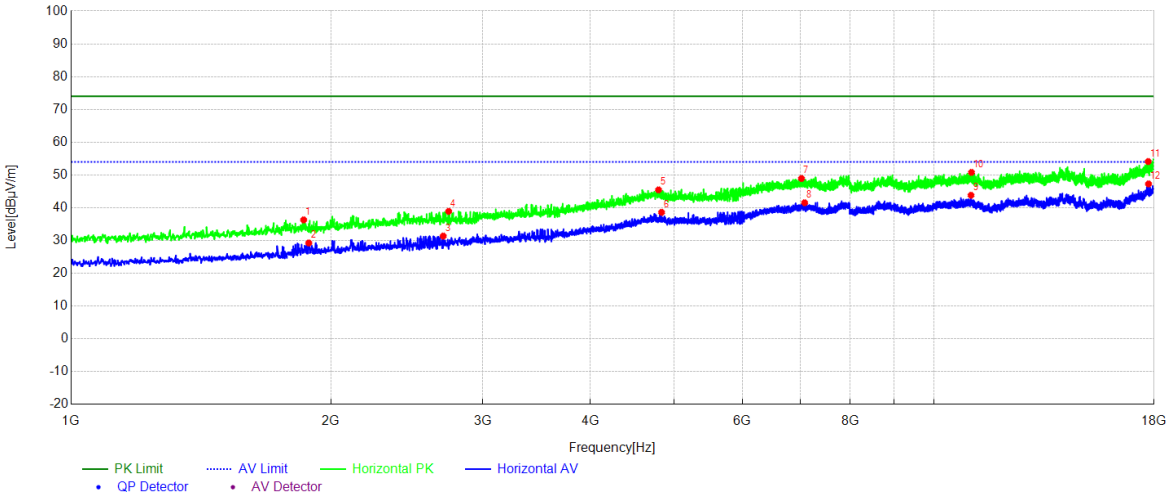
B. Radiation disturbances, antenna polarization: Horizontal, Setup1



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

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dBµV/m)	Margin (dB)	Antenna	Cable Loss(dB)	ANT. Factor(dB)	Verdict
30.00	21.95	120.000	105	40.00	18.05	Horizontal	0.5	18.8	Pass
35.84	20.48	120.000	102	40.00	19.52	Horizontal	0.5	16.0	Pass
208.84	28.68	120.000	107	43.50	14.82	Horizontal	1.2	10.6	Pass
214.68	30.25	120.000	102	43.50	13.25	Horizontal	1.2	10.9	Pass
342.96	42.14	120.000	103	46.00	3.86	Horizontal	1.4	15.2	Pass
366.28	40.24	120.000	104	46.00	5.76	Horizontal	1.4	15.9	Pass

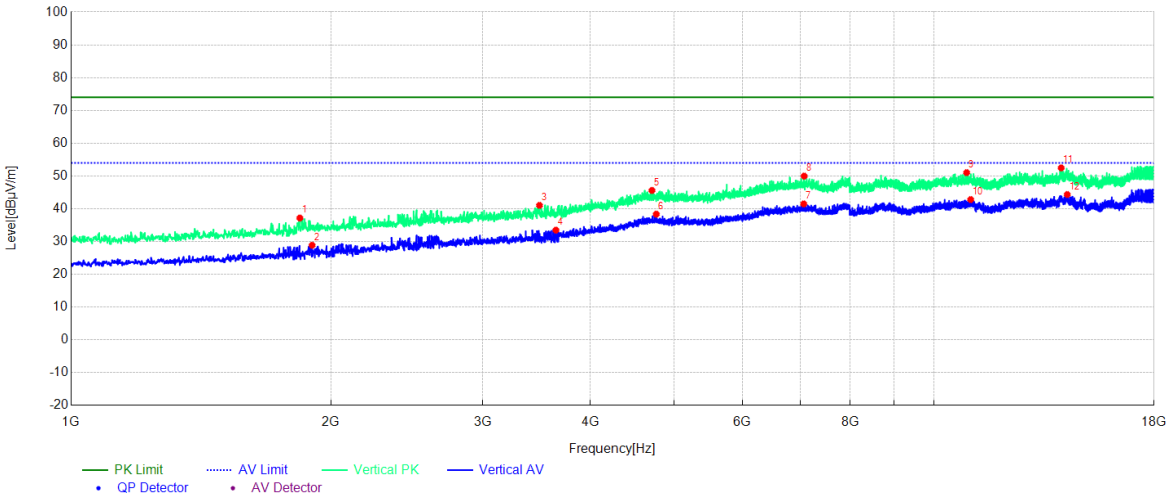
A. Radiation disturbances, antenna polarization: Horizontal, Setup1



(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	1860.29	36.30	-12.48	74.00	37.70	PK	103	275	Horizontal
2	1885.79	29.26	-12.36	54.00	24.74	AV	102	142	Horizontal
3	2700.17	31.36	-9.44	54.00	22.64	AV	105	294	Horizontal
4	2739.27	38.90	-9.44	74.00	35.10	PK	103	41	Horizontal
5	4796.48	45.45	-0.84	74.00	28.55	PK	106	117	Horizontal
6	4835.58	38.61	-1.06	54.00	15.39	AV	101	113	Horizontal
7	7023.70	48.93	3.36	74.00	25.07	PK	107	262	Horizontal
8	7083.21	41.52	3.41	54.00	12.48	AV	104	85	Horizontal
9	11042.90	43.81	6.62	54.00	10.19	AV	102	309	Horizontal
10	11056.51	50.78	6.60	74.00	23.22	PK	105	103	Horizontal
11	17719.47	54.09	13.66	74.00	19.91	PK	102	142	Horizontal
12	17734.77	47.28	13.63	54.00	6.72	AV	108	101	Horizontal

B. Radiation disturbances, antenna polarization: Vertical, Setup1



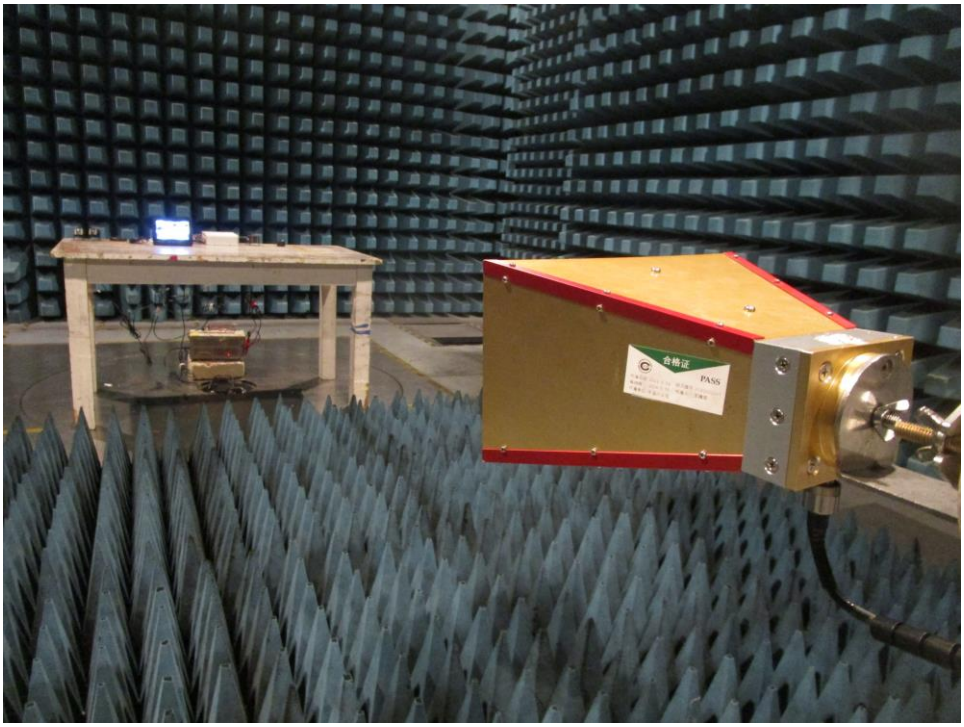
(Plot N: Test Antenna Vertical 1G – 18G)

NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin[dBµV/m]	Trace	Height [cm]	Angle [°]	Polarity
1	1841.58	37.17	-12.55	74.00	36.83	PK	104	124	Vertical
2	1902.79	28.87	-12.28	54.00	25.13	AV	102	221	Vertical
3	3490.75	41.04	-7.31	74.00	32.96	PK	106	224	Vertical
4	3647.16	33.48	-6.52	54.00	20.52	AV	105	165	Vertical
5	4713.17	45.59	-1.05	74.00	28.41	PK	101	263	Vertical
6	4767.58	38.35	-0.92	54.00	15.65	AV	102	247	Vertical
7	7066.21	41.48	3.40	54.00	12.52	AV	104	52	Vertical
8	7074.71	49.96	3.41	74.00	24.04	PK	103	273	Vertical
9	10915.39	51.02	6.60	74.00	22.98	PK	107	294	Vertical
10	11032.70	42.80	6.63	54.00	11.20	AV	104	131	Vertical
11	14047.10	52.46	9.38	74.00	21.54	PK	102	325	Vertical
12	14276.63	44.34	9.79	54.00	9.66	AV	105	87	Vertical

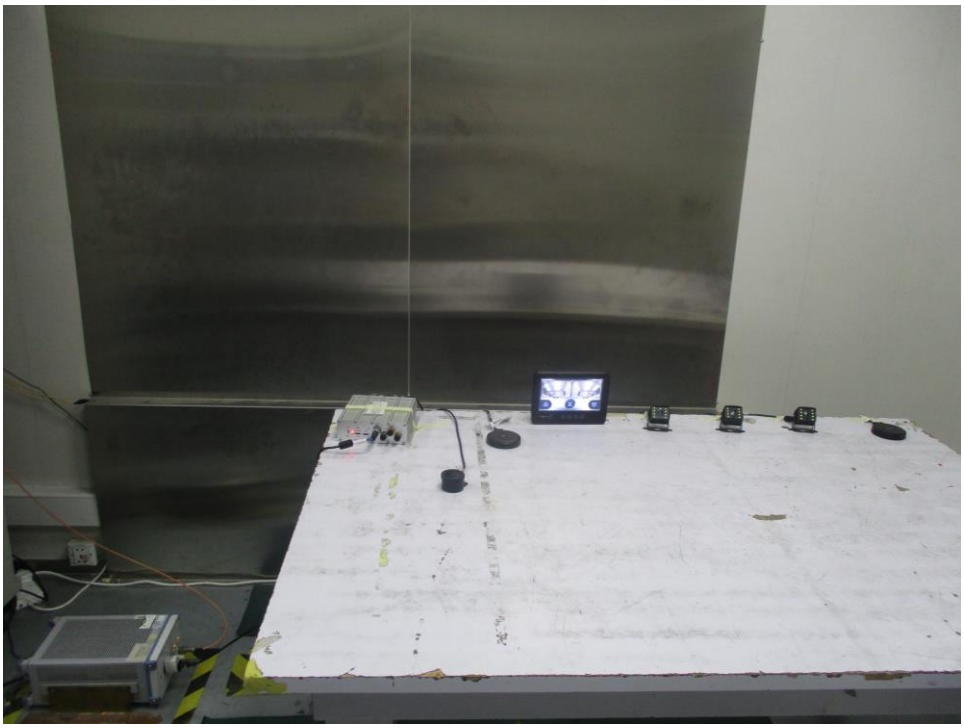
Appendix II：Photographs of EMC Test Configuration

1. Radiated Emission Measurement below 1GHz

2. Radiated Emission Measurement above 1GHz



3. Conducted emission at AC mains input/output port Measurement



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