FCC EMC TEST REPORT

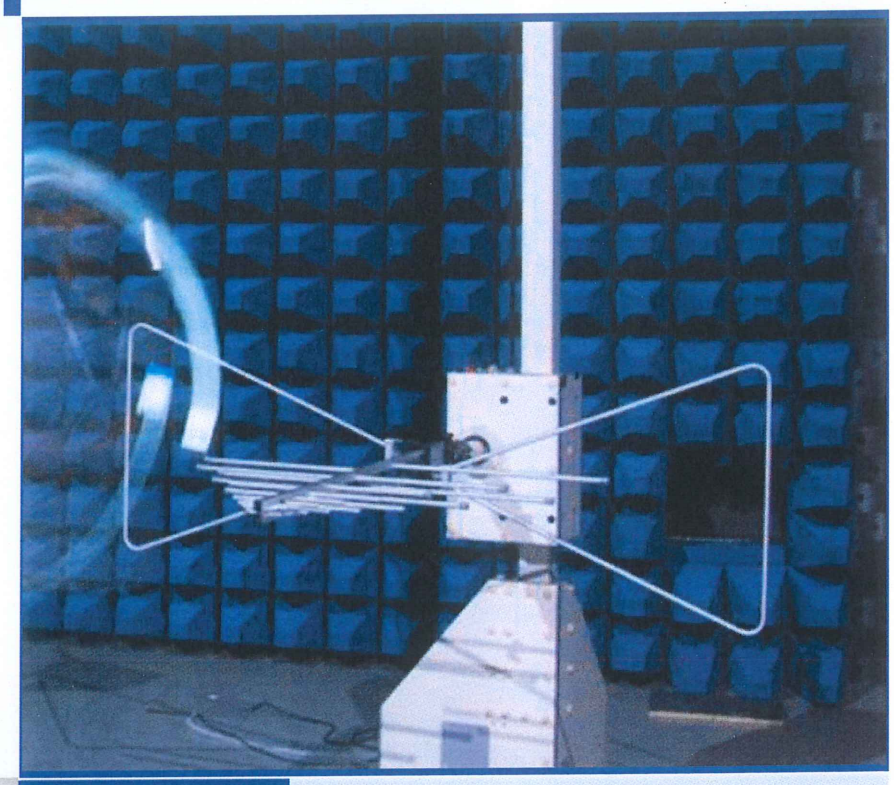
ISSUED BY
Shenzhen BALUN Technology Co., Ltd.

FOR

mPOS-39

ISSUED TO
Megabyte Limited

Unit 507, 5/F, Building 12W, No. 12 Science Park West Avenue, Hong Kong Science Park, Shatin, New Territories, Hong Kong



Tested by: Zhang Yanqing (Engineer) Date Jan. 10, 2017	Report No.: BL-SZ16B0261-401
	EUT Name: mPOS-39
	Model Name: 39-T1
	Brand Name: Myndar
	Test Standard: 47 CFR Part 15 Subpart B
Approved by: Liao Jianming (Technical Director) Date Jan. 10. 2017	Test Conclusion: Pass
	Test Date: Nov. 24, 2016 ~ Nov. 28, 2016
	Date of Issue: Jan. 10, 2017

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Revision History

Version	Issue Date	Revisions Content
Rev. 01	Jan. 10, 2017	Initial Issue

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1 GENERAL INFORMATION

1.1 Identification of the Testing Laboratory

Company Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Phone Number	+86 755 6685 0100
Fax Number	+86 755 6182 4271

1.2 Identification of the Responsible Testing Location

Test Location	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Accreditation Certificate	The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 11524A-1. The laboratory has been listed by US Federal Communications Commission to perform electromagnetic emission measurements. The recognition numbers of test site are 832625. The laboratory is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L6791.
Description	All measurement facilities used to collect the measurement data are located at Block B, FL 1, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China 518055

1.3 Laboratory Condition

Ambient Temperature	20°C~25°C
Ambient Relative Humidity	45% - 55%
Ambient Pressure	100 kPa - 102 kPa

1.4 Announce

(1) The test report reference to the report template version v4.3.

(2) The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.

(3) The test report is invalid if there is any evidence and/or falsification.

(4) The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein.

(5) This document may not be altered or revised in any way unless done so by BALUN and all revisions are duly noted in the revisions section.

(6) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	Megabyte Limited
Address	Unit 507, 5/F, Building 12W, No. 12 Science Park West Avenue, Hong Kong Science Park, Shatin, New Territories, Hong Kong

2.2 Manufacturer Information

Manufacturer	Megabyte Limited
Address	Unit 507, 5/F, Building 12W, No. 12 Science Park West Avenue, Hong Kong Science Park, Shatin, New Territories, Hong Kong

2.3 Factory Information

Factory	Megabyte Limited
Address	Unit 507, 5/F, Building 12W, No. 12 Science Park West Avenue, Hong Kong Science Park, Shatin, New Territories, Hong Kong

2.4 General Description for Equipment under Test (EUT)

EUT Name	mPOS-39
Model Name Under Test	39-T1
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	N/A
Software Version	N/A
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A
The Highest Speed of Processor	N/A
Network and Wireless connectivity	Bluetooth, WIFI, RFID

2.5 Ancillary Equipment

Ancillary Equipment 1	Adapter	
	Brand Name	N/A
	Model No.	FSP065-REB
	Serial No.	N/A
	Rated Input	100-240 V~, 1.5 A, 50/60 Hz
	Rated Output	19 V⎓, 3.42 A
Ancillary Equipment 2	Battery 1	
	Brand Name	N/A
	Model No.	ABA 1202
	Serial No.	N/A
	Capacitance	2500 mAh
	Rated Voltage	11.1 V
	Limit Charge Voltage	12.6 V
Ancillary Equipment 3	Battery 2	
	Brand Name	N/A
	Model No.	AVA 1206
	Serial No.	N/A
	Capacitance	6600 mAh
	Rated Voltage	11.1 V
	Limit Charge Voltage	12.6 V
Ancillary Equipment 4	Power Line	
	Length (Approx.)	1.2 m

2.6 Technical Information

N/A

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	FCC 47 CFR Part 15 Subpart B (10-1-15 Edition)	Unintentional Radiators
2	ANSI C63.4-2014	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

3.2 Verdict

No.	Description	FCC Rule	Test Verdict	Result
1	Radiated Emission	15.109	Pass	Annex A .1
2	Conducted Emission, AC Ports	15.107	Pass	Annex A .2

3.3 Test Uncertainty

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	Value
Conducted emissions (9 kHz-30 MHz)	3.23 dB
Radiated emissions (9 kHz-30 MHz)	3.97 dB
Radiated emissions (30 MHz-1 GHz)	4.30 dB
Radiated emissions (1 GHz-18 GHz)	4.81 dB
Radiated emissions (18 GHz-26.5 GHz)	5.71 dB

4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments

Environment Parameter	Selected Values During Tests			
	Temperature	Voltage	Relative Humidity	Ambient Pressure
Normal Temperature, Normal Voltage (NTNV)	23°C~26°C	AC 120 V/60 Hz	50%-55%	100 to 102 kPa

4.2 Test Equipment List

Radiated Emission Test						
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2016.07.05	2017.07.04	☒
EMI Receiver	KEYSIGHT	N9038A	MY53220118	2016.09.09	2017.09.08	☒
Test Antenna-Bi-Log	SCHWARZBECK	VULB 9163	9163-624	2015.07.22	2017.07.21	☐
Test Antenna-Bi-Log	SCHWARZBECK	VULB 9163	9163-977	2016.07.19	2018.07.18	☒
Test Antenna-Horn	SCHWARZBECK	BBHA 9120D	9120D-1148	2015.07.22	2017.07.21	☒
Test Antenna-Loop	SCHWARZBECK	FMZB 1519	1519-037	2015.07.22	2017.07.21	☐
Anechoic Chamber	RAINFORD	9m*6m*6m	N/A	2015.02.28	2017.02.27	☒
Anechoic Chamber	EMC TECHNOLOGY LTD	20.10*11.60*7.35m	N/A	2016.08.09	2018.08.08	☒

Conducted disturbance Test						
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2016.07.05	2017.07.04	☒
LISN	SCHWARZBECK	NSLK 8127	8127-687	2016.07.05	2017.07.04	☒
Shielded Enclosure	ChangNing	CN-130701	130703	N/A	N/A	☒

4.3 Test Enclosure list

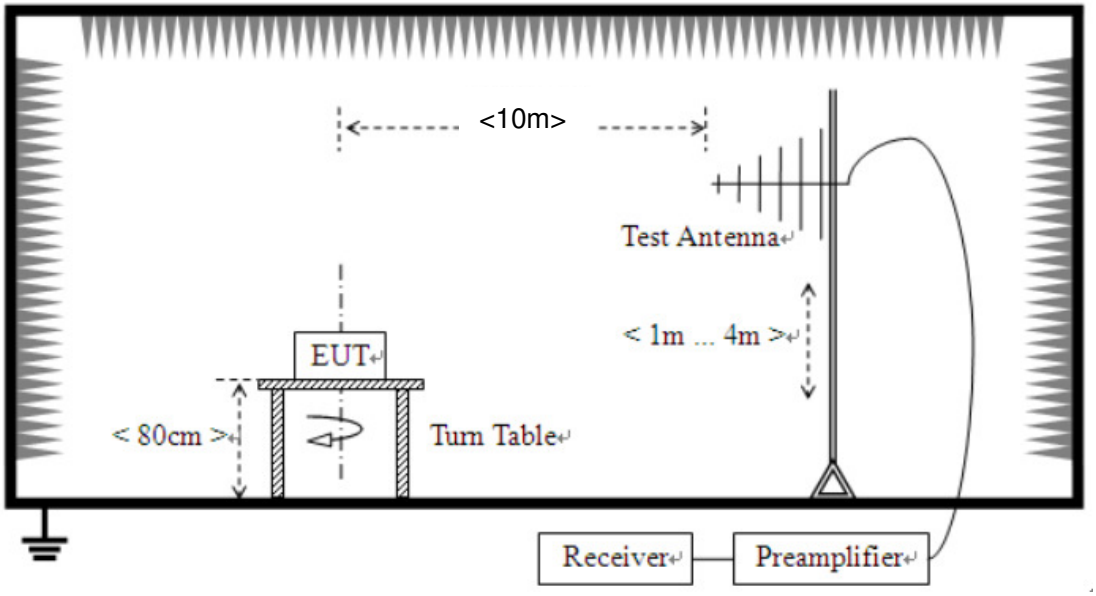
Description	Manufacturer	Model	Serial No.	Length	Description	Use
PC	N/A	N/A	N/A	N/A	Special Handled	☐
Laptop	Apple	A1465	N/A	N/A	N/A	☐
Printer	HP	DESKJET 1000	N/A	N/A	N/A	☐
Keyboard	Logitech	Y-BP62a	N/A	N/A	N/A	☐
Mouse	Logitech	M100	N/A	N/A	N/A	☐
USB Disk	Kingston	N/A	N/A	N/A	N/A	☒
TF Card	Kingston	N/A	N/A	N/A	N/A	☐
VGA Cable	N/A	N/A	N/A	1.5 m	Shielded with core	☐
HDMI Cable	N/A	N/A	N/A	1.5 m	Shielded with core	☐
DVI Cable	N/A	N/A	N/A	1.5 m	Shielded with core	☐
Coaxial video cable	N/A	N/A	N/A	2.0 m	Shielded with core	☐
iPhone	Apple	A1586	N/A	N/A	N/A	☐
Phone	MI	M4	N/A	N/A	N/A	☐
Laptop	LENOVO	K29	N/A	N/A	N/A	☐
Bluetooth Earphone	SAMSUNG	Gear Circle	N/A	N/A	N/A	☐
GPS/GLONASS Vector signal generator	R&S	N5172B EXG	N/A	N/A	N/A	☐
WIFI Router	TP-LINK	TL-WDR7500	N/A	N/A	N/A	☐
Earphone	N/A	OPPO	N/A	1.1 m	N/A	☐
Car Battery	Camel	55530	N/A	N/A	12 V/55 Ah	☐
Artificial load	N/A	N/A	N/A	N/A	2.5 Ω/100 W	☐
Artificial load	N/A	N/A	N/A	N/A	5 Ω/100 W	☐
Electronic Load	ITECH	IT8511	N/A	N/A	N/A	☐
USB Cable	N/A	N/A	N/A	1.5 m	Shielded with core	☐
DC Power Supply	ROHDE&SCHWARZ	HMP2020	18141664	N/A	N/A	☐
Television	SAMSUNG	UA32C4000P	N/A	N/A	N/A	☐

4.4 Test Configurations

Test Configurations (TC) No.	Description
TC01	The Video Play test mode EUT + Battery 1 + Battery 2 + Adapter + Power Line + USB Disk
TC02	The Data Copies test mode EUT + Battery 1 + Battery 2 + Adapter + Power Line + USB Disk
TC03	The Idle test mode EUT + Battery 1 + Battery 2

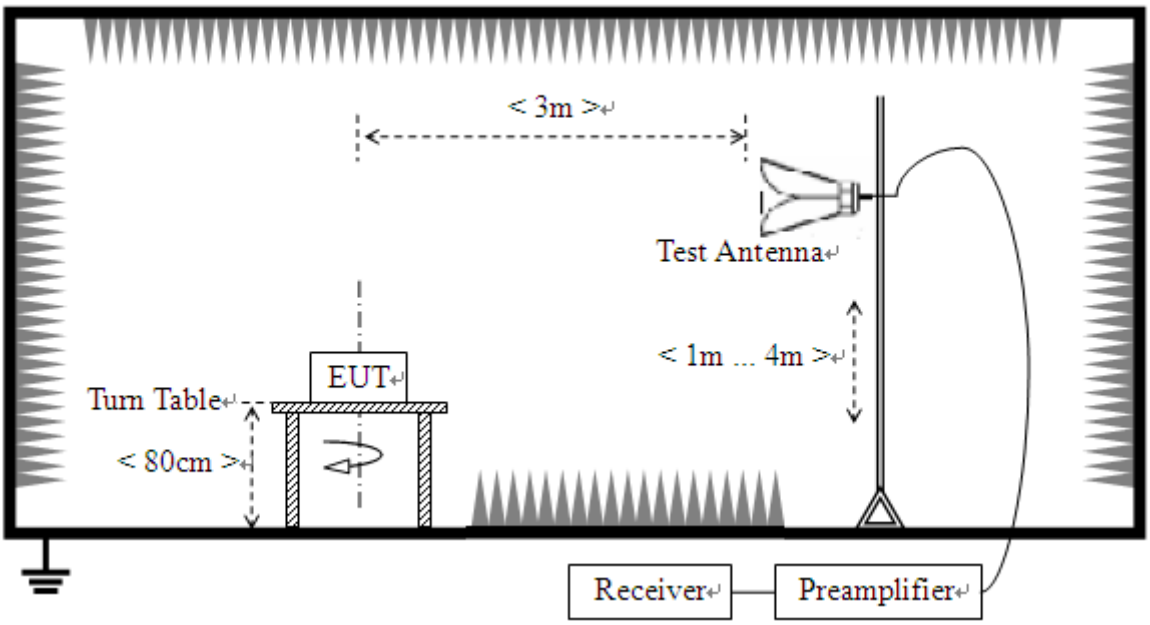
4.5 Test Setups

Test Setup 1



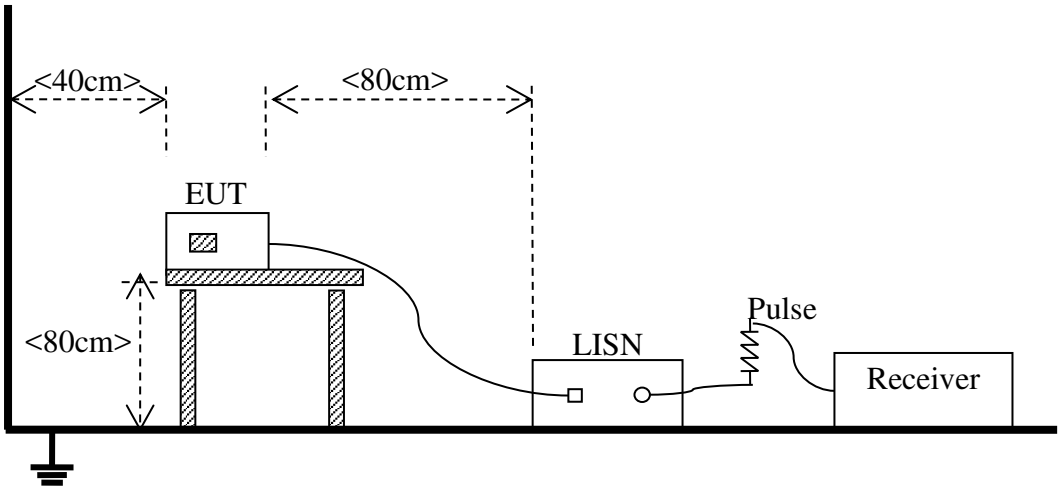
(For Radiated Emission Test (30 MHz-1 GHz))

Test Setup 2



(For Radiated Emission Test (above 1 GHz))

Test Setup 3



(For Conducted Emission, AC Ports Test)

4.6 Test Conditions

Test Case	Test Conditions	
Radiated Emission	Test Env.	NTNV
	Test Setup	Test Setup 1&2
	Test Configuration	TC01~TC03 Note
Conducted Emission, AC Ports	Test Env.	NTNV
	Test Setup	Test Setup 3
	Test Configuration	TC01~TC03 Note

Note: Based on client request, all normal using modes of the normal function were tested but only the worst test data of the worst mode is reported by this report. The Video Play test mode is the worst mode in this repor.

5 TEST ITEMS

5.1 Emission Tests

5.1.1 Radiated Emission

5.1.1.1 Limit

Frequency (MHz)	Field Strength (µV/m)	Measurement Distance (m)
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

NOTE:

1) Field Strength (dBµV/m) = 20*log [Field Strength (µV/m)].
2) In the emission tables above, the tighter limit applies at the band edges.
3) For above 1000 MHz, limit field strength of harmonics: 54 dBuV/m@3 m (AV) and 74 dBuV/m@3 m (PK)

5.1.1.2 Test Setup

Refer to 4.5 section (test setups1 to test setups2) for radiated emission test, the photo of test setup please refer to ANNEX B.

5.1.1.3 Test Procedure

All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

An initial pre-scan was performed in the chamber using the EMI Receiver in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by Bi-Log antenna with 2 orthogonal polarities.

5.1.1.4 Test Result

Please refer to ANNEX A.1.

5.1.2 Conducted Emission

5.1.2.1 Test Limit

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:

1) The limit is applicable to Class B ITE.
2) The lower limit shall apply at the band edges.
3) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50 MHz.

5.1.2.2 Test Setup

Refer to 4.5 section test (test setup 3) for conducted emission, the photo of test setup please refer to ANNEX B.

5.1.2.3 Test Procedure

The EUT is connected to the power mains through a LISN which provides 50 Ω/50 μH of coupling impedance for the measuring instrument. The test frequency range is from 150 kHz to 30 MHz. The maximum conducted interference is searched using Peak (PK), Quasi-peak (QP) and Average (AV) detectors; the emission levels that are 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.

Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a nominal 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz) 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.

5.1.2.4 Test Result

Please refer to ANNEX A.2.

ANNEX A TEST RESULTS

A.1 Radiated Emission

Note 1: The symbol of "--" in the table which means not application.

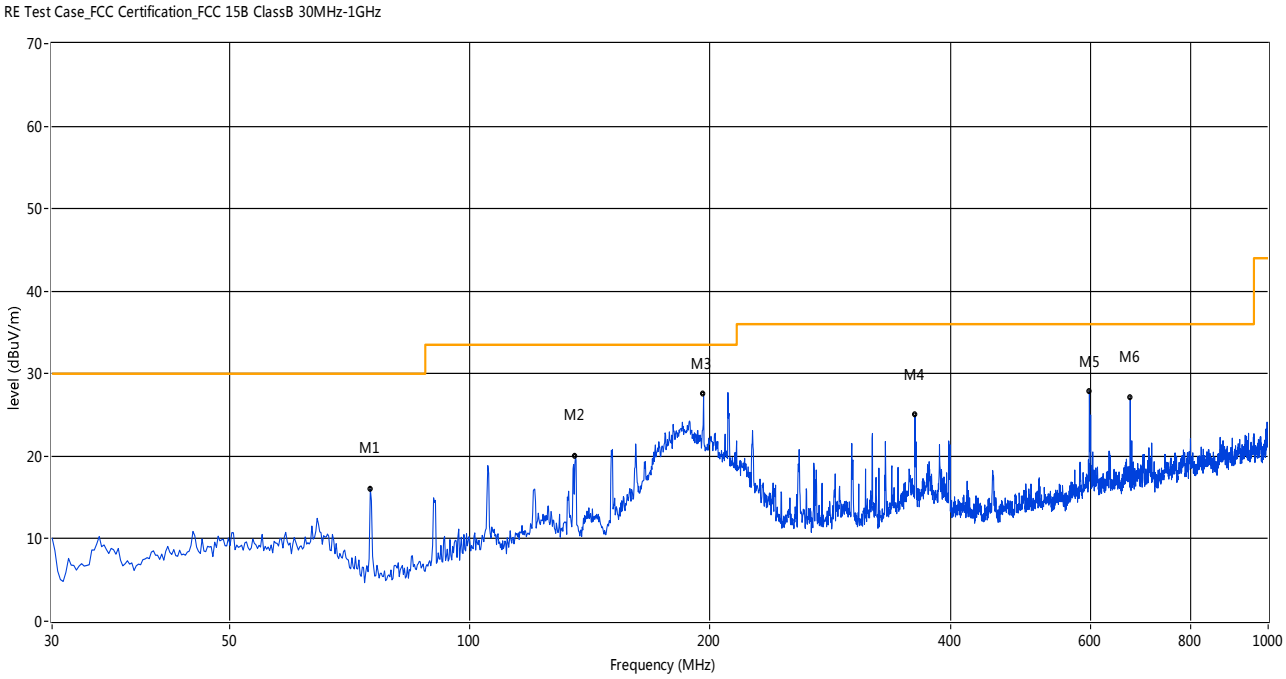
Note 2: For the test data above 1 GHz, according the ANSI C63.4-2014, where limits are specified for both average and peak (or quasi-peak) detector functions, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.

Note 3: Below 1 GHz test at 10 m measurement distance, above 1 GHz test at 3 m measurement distance.

Test Data and Plots

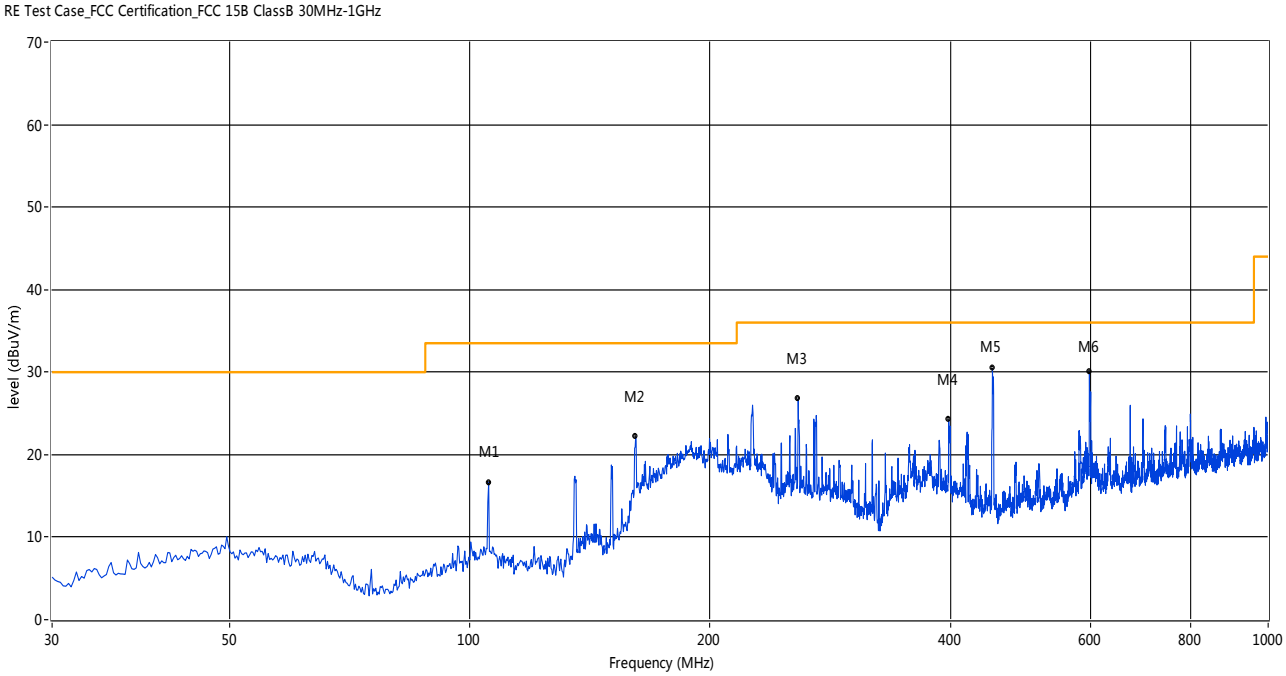
The Video Play test mode

A.1.1 Test Antenna Vertical, 30 MHz – 1 GHz



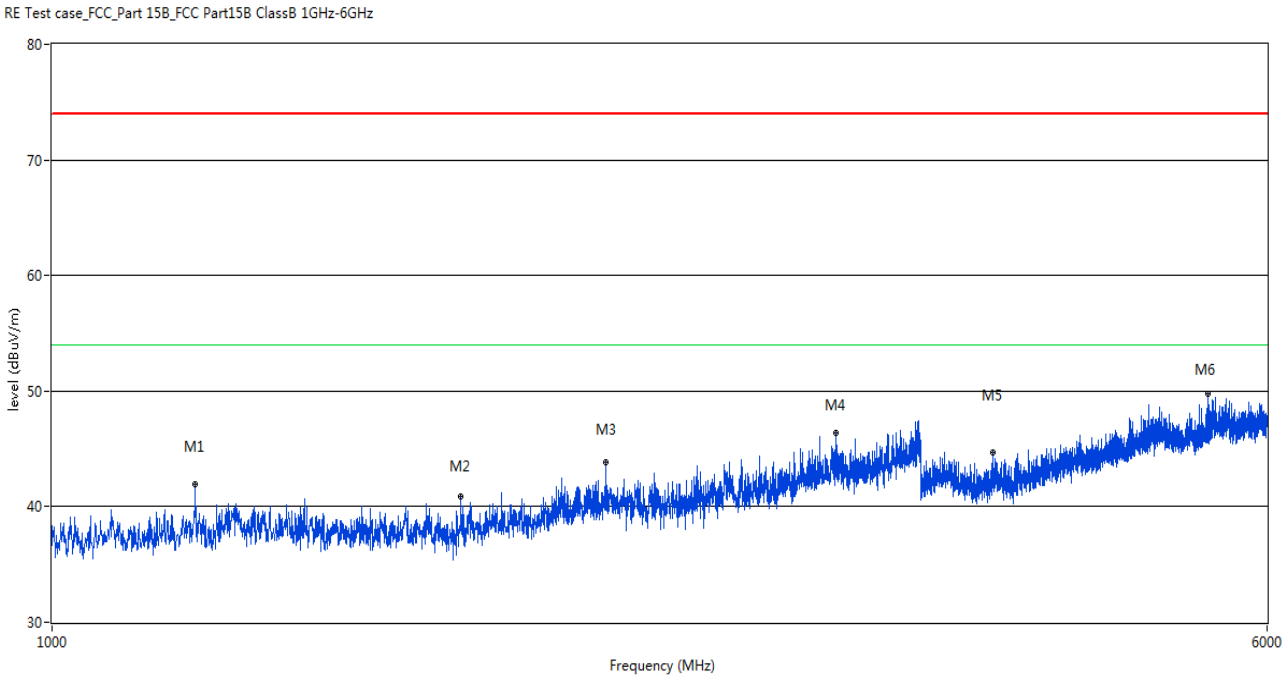
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	75.094	16.03	-19.83	30.0	13.97	Peak	223.00	200	Vertical	Pass
2	135.704	20.01	-19.62	33.5	13.49	Peak	342.00	100	Vertical	Pass
3	196.313	27.49	-16.22	33.5	6.01	Peak	360.00	300	Vertical	Pass
4	361.172	24.95	-11.85	36.0	11.05	Peak	24.00	100	Vertical	Pass
5	597.308	27.88	-7.03	36.0	8.12	Peak	113.00	300	Vertical	Pass
6	671.980	27.06	-6.27	36.0	8.94	Peak	72.00	300	Vertical	Pass

A.1.2 Test Antenna Horizontal, 30 MHz – 1 GHz



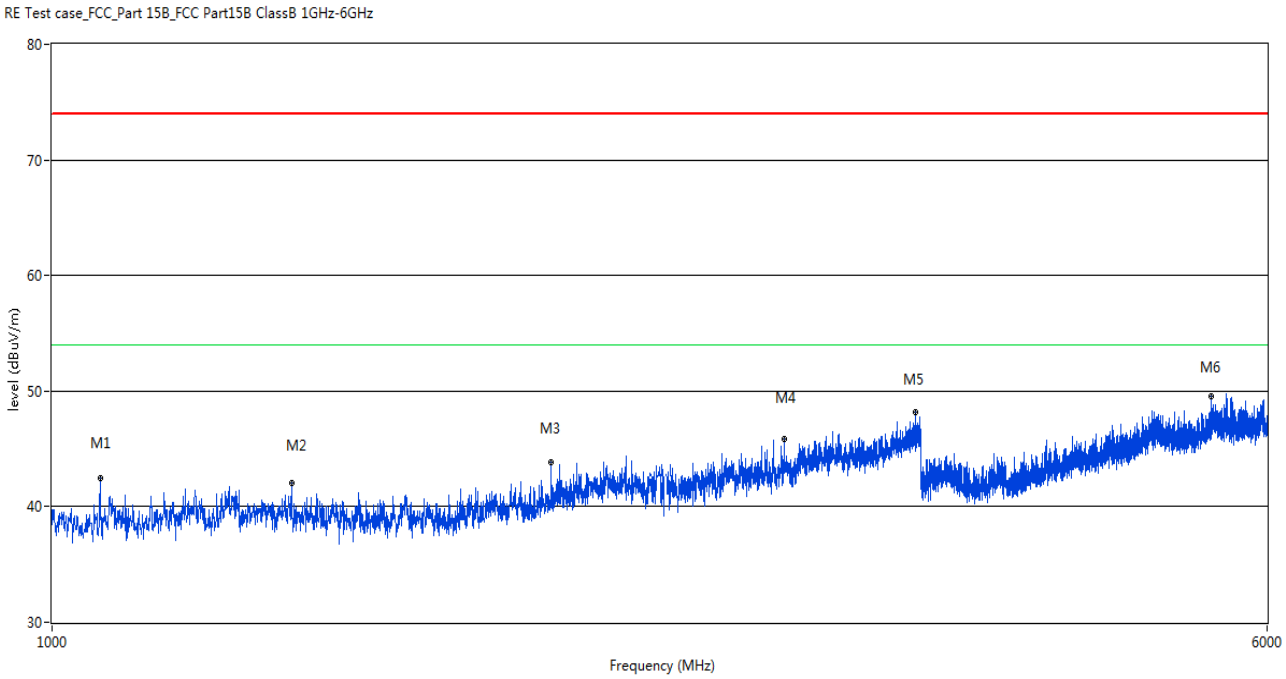
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	105.641	16.60	-15.67	33.5	16.90	Peak	0.00	300	Horizontal	Pass
2	161.402	22.15	-18.83	33.5	11.35	Peak	356.00	300	Horizontal	Pass
3	257.893	26.73	-14.37	36.0	9.27	Peak	0.00	300	Horizontal	Pass
4	398.023	24.20	-10.74	36.0	11.80	Peak	76.00	300	Horizontal	Pass
5	451.602	30.41	-10.11	36.0	5.59	Peak	108.00	200	Horizontal	Pass
6	597.308	30.02	-7.03	36.0	5.98	Peak	208.00	200	Horizontal	Pass

A.1.3 Test Antenna Vertical, 1 GHz – 6 GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	1235.300	41.95	-1.94	74.0	32.05	Peak	165.30	100	Vertical	Pass
2	1826.800	40.92	-0.88	74.0	33.08	Peak	151.10	100	Vertical	Pass
3	2263.600	43.88	1.95	74.0	30.12	Peak	37.50	100	Vertical	Pass
4	3179.450	46.39	4.93	74.0	27.61	Peak	92.70	100	Vertical	Pass
5	4001.400	44.72	8.59	74.0	29.28	Peak	278.20	100	Vertical	Pass
6	5495.400	49.81	11.48	74.0	24.19	Peak	119.00	100	Vertical	Pass

A.1.4 Test Antenna Horizontal, 1 GHz – 6 GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	1073.450	42.47	-3.76	74.0	31.53	Peak	276.00	100	Horizontal	Pass
2	1423.150	42.09	-2.81	74.0	31.91	Peak	5.00	100	Horizontal	Pass
3	2086.150	43.81	0.03	74.0	30.19	Peak	3.00	100	Horizontal	Pass
4	2943.500	45.88	4.27	74.0	28.12	Peak	2.00	100	Horizontal	Pass
5	3573.350	48.20	5.16	74.0	25.80	Peak	251.00	100	Horizontal	Pass
6	5529.000	49.60	11.85	74.0	24.40	Peak	249.00	100	Horizontal	Pass

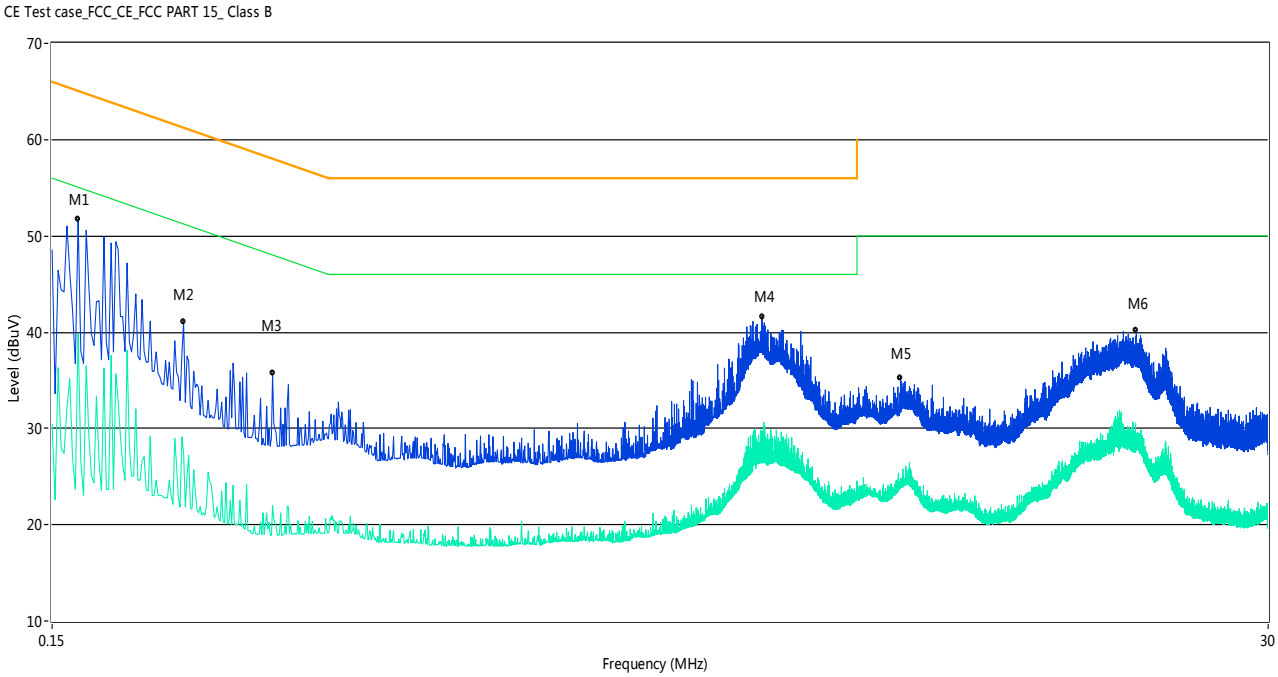
A.2 Conducted Emission

Test Data and Plots

The Video Play test mode

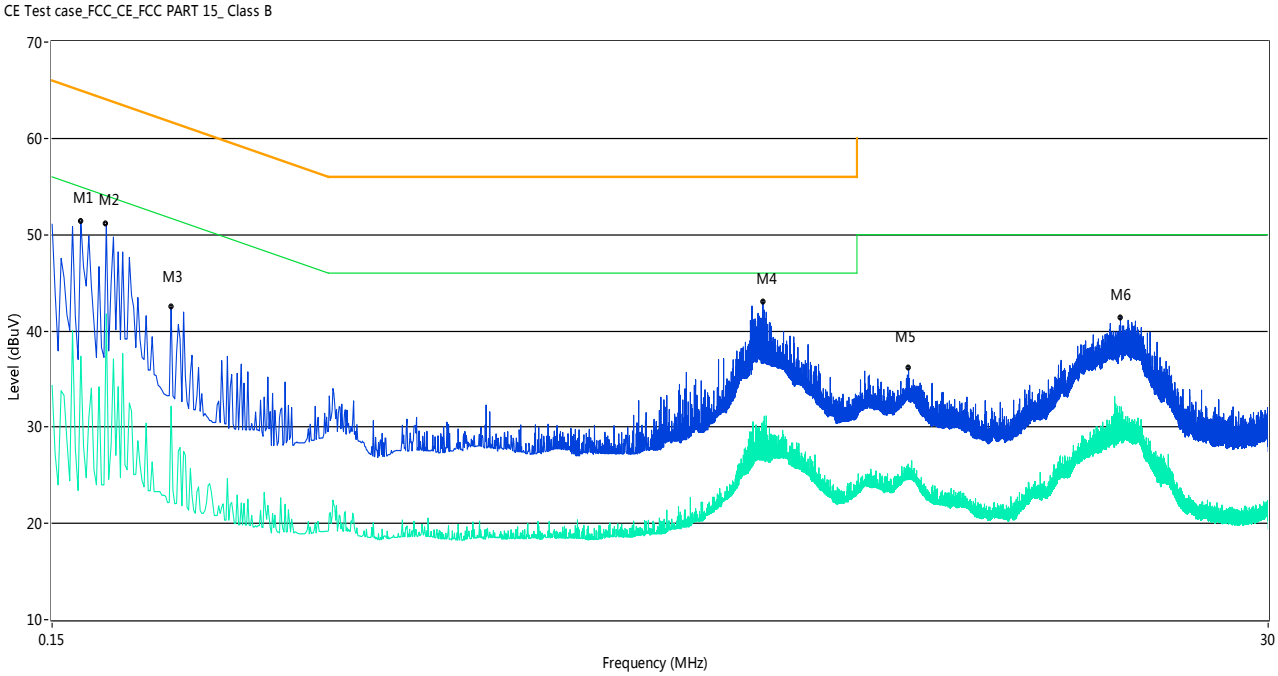
Note: Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a nominal 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz) for which the device is capable of operation. So, The configuration 120 VAC, 60 Hz and 240 VAC, 50 Hz were tested respectively, but only the worst configuration (120 VAC, 60 Hz) shown here.

A.2.1 L Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.168	51.7	11.00	65.1	13.40	Peak	L Line	Pass
1**	0.168	39.8	11.00	55.1	15.30	AV	L Line	Pass
2	0.266	41.0	11.00	61.2	20.20	Peak	L Line	Pass
2**	0.266	27.4	11.00	51.2	23.80	AV	L Line	Pass
3	0.392	35.7	11.00	58.0	22.30	Peak	L Line	Pass
3**	0.392	22.0	11.00	48.0	26.00	AV	L Line	Pass
4	3.312	41.6	11.00	56.0	14.40	Peak	L Line	Pass
4**	3.312	29.7	11.00	46.0	16.30	AV	L Line	Pass
5	6.046	35.2	11.00	60.0	24.80	Peak	L Line	Pass
5**	6.046	24.4	11.00	50.0	25.60	AV	L Line	Pass
6	16.888	40.2	11.00	60.0	19.80	Peak	L Line	Pass
6**	16.888	29.1	11.00	50.0	20.90	AV	L Line	Pass

A.2.2 N Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.170	51.3	11.00	65.0	13.70	Peak	N Line	Pass
1**	0.170	37.4	11.00	55.0	17.60	AV	N Line	Pass
2	0.190	51.2	11.00	64.0	12.80	Peak	N Line	Pass
2**	0.190	41.8	11.00	54.0	12.20	AV	N Line	Pass
3	0.252	42.5	11.00	61.7	19.20	Peak	N Line	Pass
3**	0.252	32.2	11.00	51.7	19.50	AV	N Line	Pass
4	3.320	43.0	11.00	56.0	13.00	Peak	N Line	Pass
4**	3.320	29.1	11.00	46.0	16.90	AV	N Line	Pass
5	6.262	36.2	11.00	60.0	23.80	Peak	N Line	Pass
5**	6.262	25.1	11.00	50.0	24.90	AV	N Line	Pass
6	15.768	41.4	11.00	60.0	18.60	Peak	N Line	Pass
6**	15.768	31.3	11.00	50.0	18.70	AV	N Line	Pass

ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-SZ16B0261-AE.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “BL-SZ16B0261-AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “BL-SZ16B0261-AI.PDF”.

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