FCC EMC TEST REPORT

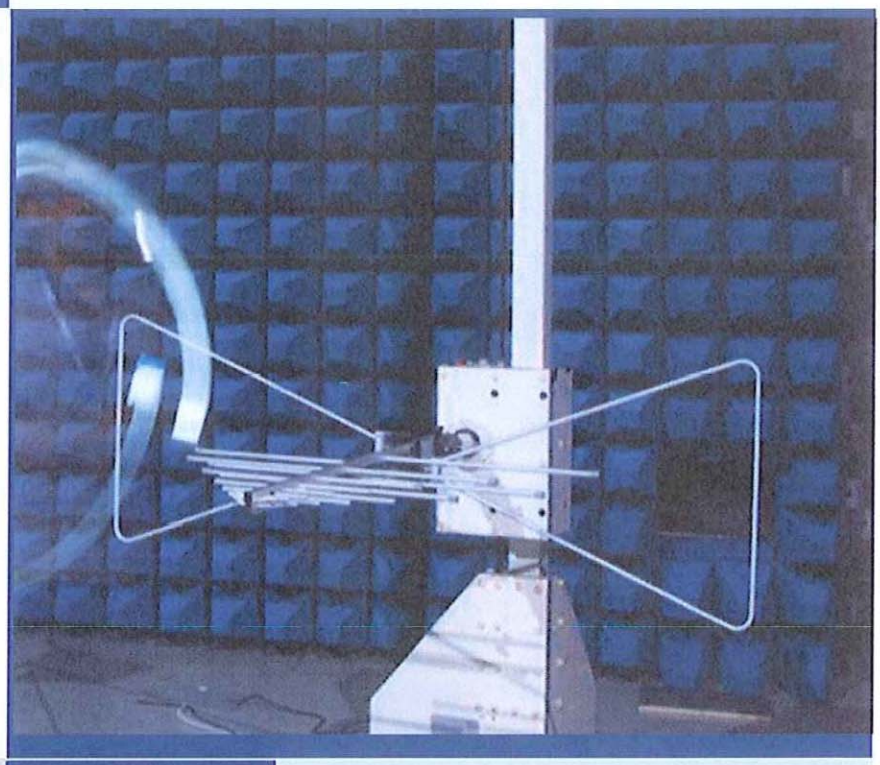
ISSUED BY
Shenzhen BALUN Technology Co., Ltd.

FOR

HP Tri-Mode Wireless Charging Pad

ISSUED TO
Neosen Energy LLC

1506 Capital Ave., Suite 150, Plano, TX, 75074



Tested by: Cao Shaodong
(Engineer)
Date Feb. 23. 2016

Approved by: Wei Yanquan
(Chief Engineer)
Date Feb. 23. 2016

Report No.:	BL-SZ15A0079-601
EUT Type:	HP Tri-Mode Wireless Charging Pad
Model Name:	NEO-031-1-1-3-5-2HP, NEO-032-1-1-3-5-2HP
Brand Name:	HP
Test Standard:	FCC Part 15 C
FCC ID:	2AF633211352HP
Test conclusion:	Pass
Test Date:	Nov. 2, 2015 ~ Feb. 21, 2016
Date of Issue:	Feb. 23, 2016

Block B, 1st FL,Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong, P. R. China 518055
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Revision History

Version	Issue Date	Revisions
Rev. 01	Feb. 23, 2016	Initial Issue

TABLE OF CONTENTS

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 v1.2.

(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	Neosen Energy LLC
Address	1506 Capital Ave., Suite 150, Plano, TX, 75074

2.2 Manufacturer Information

Manufacturer	Surface Mount Technology Ltd.
Address	12/F, Wyler Centre Phase 2, 200 Tai Lin Pai Road, Kwai Chung, NT, HKSAR.

2.3 Factory Information

Factory	Dongguan Superior Manufacturing Technology Co., Ltd
Address	No.1, 14 Hong Ye Road North, Tangxia Town, Dongguan, Guangdong Province, PR China 523710

2.4 General Description for Equipment under Test (EUT)

EUT Type	HP Tri-Mode Wireless Charging Pad
Model Name Under Test	NEO-031-1-1-3-5-2HP
Series Model Name	NEO-031-1-1-3-5-2HP, NEO-032-1-1-3-5-2HP
Hardware Version	3.0
Software Version	4.0
Network and Wireless connectivity	Qi, PMA, A4WP, Bluetooth
About the Product	Only the Qi and PMA was tested in this report.

2.5 Ancillary Equipment

Ancillary Equipment 1	Charger	
	Brand Name	N/A
	Model No.	WAE009
	Serial No.	N/A
	Rated Input	100-240 V~, 0.6 A, 50/60 Hz
	Rated Output	12 V⎓,1.5 A

2.6 Technical Information

The requirement for the following technical information of the EUT was tested in this report:

Operating Frequency	110~205 kHz
Antenna Type	Coil Antenna
Antenna Gain	0 dBi
About Product	The EUT support the QI and PMA technology, and they have the same operating frequency.

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 15, Subpart C	Intentional Radiators
2	ANSI C63.4-2014	American National Standard for 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	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

3.2 Verdict

No.	Description	FCC Rule	Test Verdict	Result
1	Radiated Emission	15.209,15.215(b)	Pass	Annex A.1
2	Conducted Emission, AC Ports	15.207	Pass	Annex A.2
3	20 dB Bandwidth	15.215(c)	Pass	Annex A.3

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)	2.79 dB
Radiated emissions (30 MHz-1 GHz)	3.45 dB
Radiated emissions (1 GHz-18 GHz)	3.67 dB

4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments

Relative Humidity	45% - 55%	
Atmospheric Pressure	100 kPa - 102 kPa	
Temperature	NT (Normal Temperature)	+22℃ to +25℃
Working Voltage of the EUT	NV (Normal Voltage)	AC 110 V/60 Hz

4.2 Test Equipment List

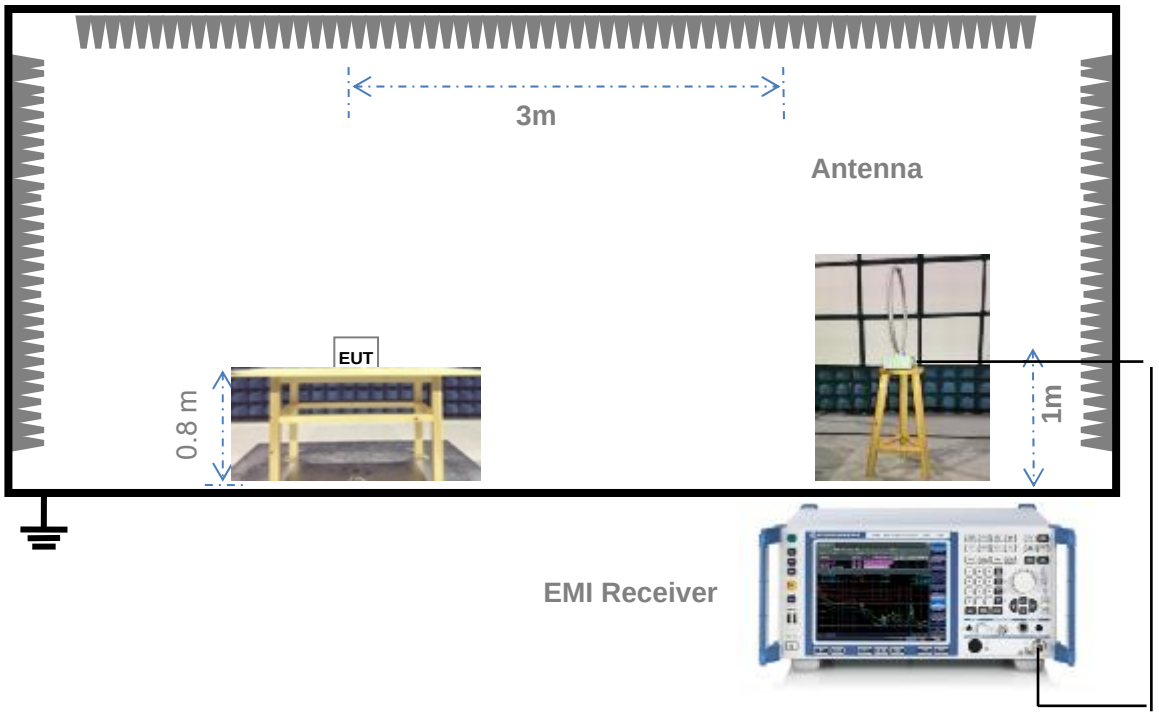
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2015.07.14	2016.07.13
Test Antenna-Loop(9 kHz-30 MHz)	SCHWARZBECK	FMZB 1519	1519-037	2015.07.22	2017.07.21
Test Antenna-Bi-Log(30 MHz-3 GHz)	SCHWARZBECK	VULB 9163	9163-624	2015.07.22	2017.07.21
Test Antenna-Horn(1-18 GHz)	SCHWARZBECK	BBHA 9120D	9120D-1148	2015.07.22	2017.07.21
Test Antenna-Horn(15-26.5 GHz)	SCHWARZBECK	BBHA 9170	9170-305	2015.07.22	2017.07.21
Anechoic Chamber	RAINFORD	9 m*6 m*6 m	N/A	2015.02.28	2016.02.27
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2015.07.14	2016.07.13
LISN	SCHWARZBECK	NSLK 8127	8127-687	2015.07.14	2016.07.13
AMN	SCHWARZBECK	NNBM8124	8124-509	2015.07.14	2016.07.13
AMN	SCHWARZBECK	NNBM8124	8124-510	2015.07.14	2016.07.13
ISN	TESEQ	ISN T800	34449	2015.07.14	2016.07.13
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	☐
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	☐
QI Load	N/A	N/A	N/A	N/A	5W	☒
PMA Load	N/A	N/A	N/A	N/A	N/A	☒
Phone	N/A	M.T.T	N/A	N/A	N/A	☒

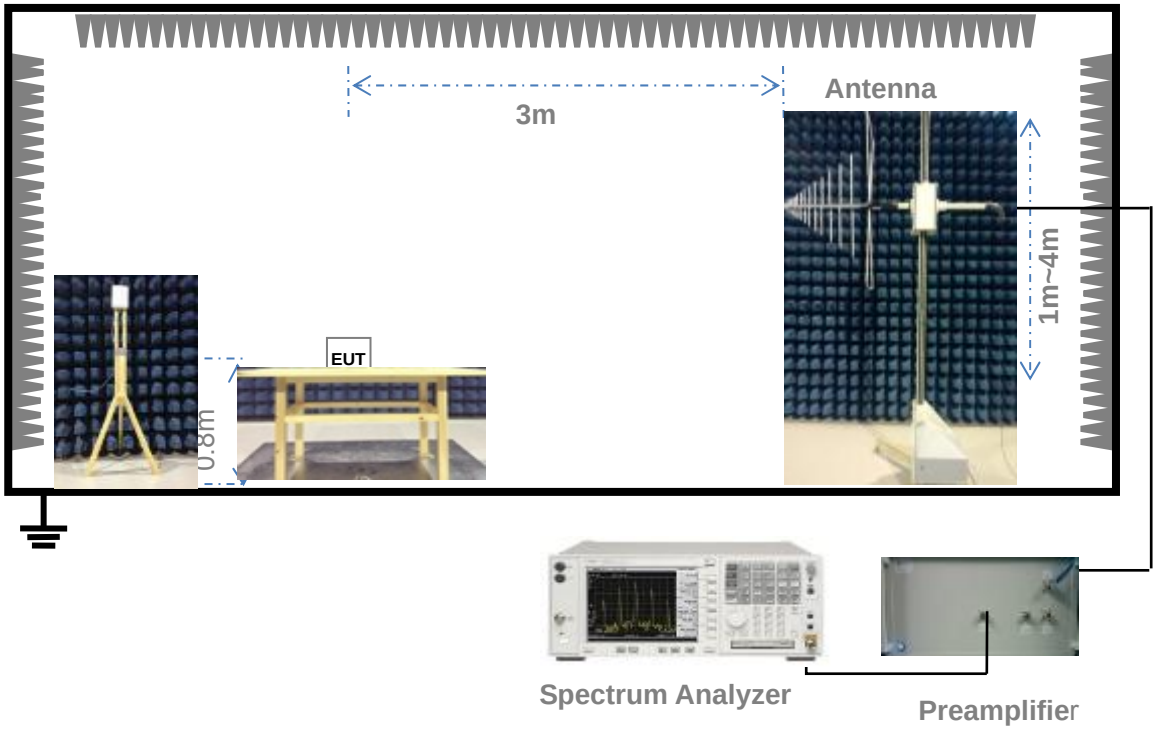
4.4 Test Setups

Test Setup 1



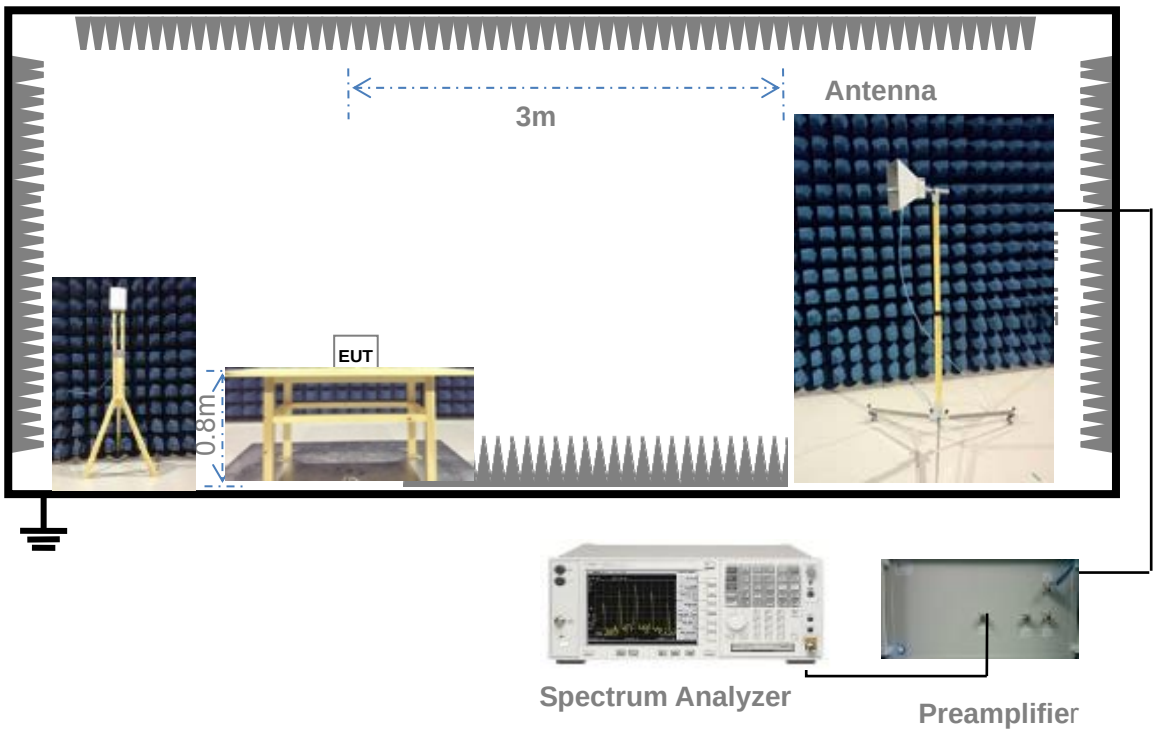
For Radiated Emission Test (Below 30 MHz))

Test Setup 2



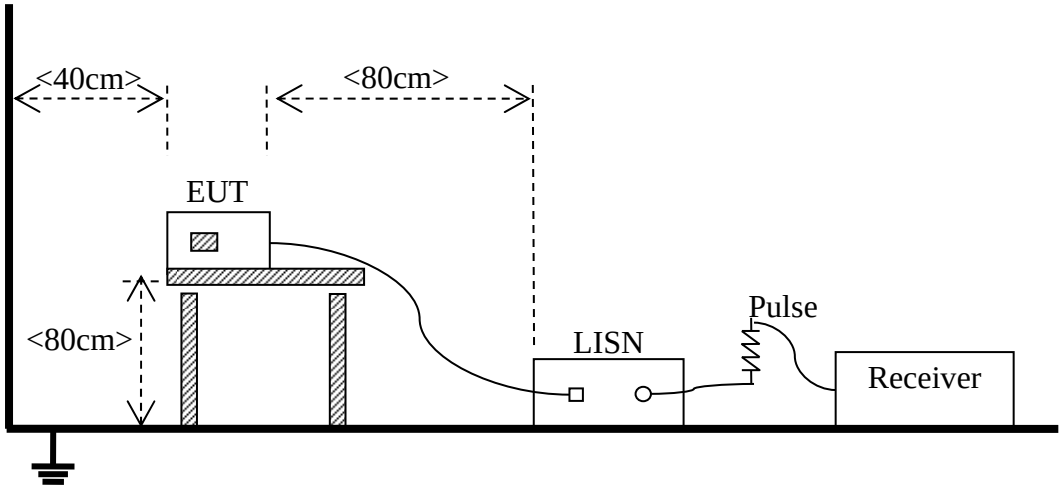
(For Radiated Emission Test (30 MHz-1 GHz))

Test Setup 3



(For Radiated Emission Test (above 1 GHz))

Test Setup 4



(For Conducted Emission, AC Ports Test)

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)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
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 setups3) 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 4) 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.

5.1.2.4 Test Result

Please refer to ANNEX A.2.

5.1.3 20 dB Bandwidth

5.1.3.1 Limit

FCC §15.215(c)

The 20 dB bandwidth is known as the 99% emission bandwidth, or 20 dB bandwidth (10*log1%=20 dB) taking the total RF output power.

5.1.3.2 Test Setup

Refer to 4.5 section test (test setup 5) for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.1.3.3 Test Procedure

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.

5.1.3.4 Test Result

Please refer to ANNEX A.3.

ANNEX A TEST RESULTS

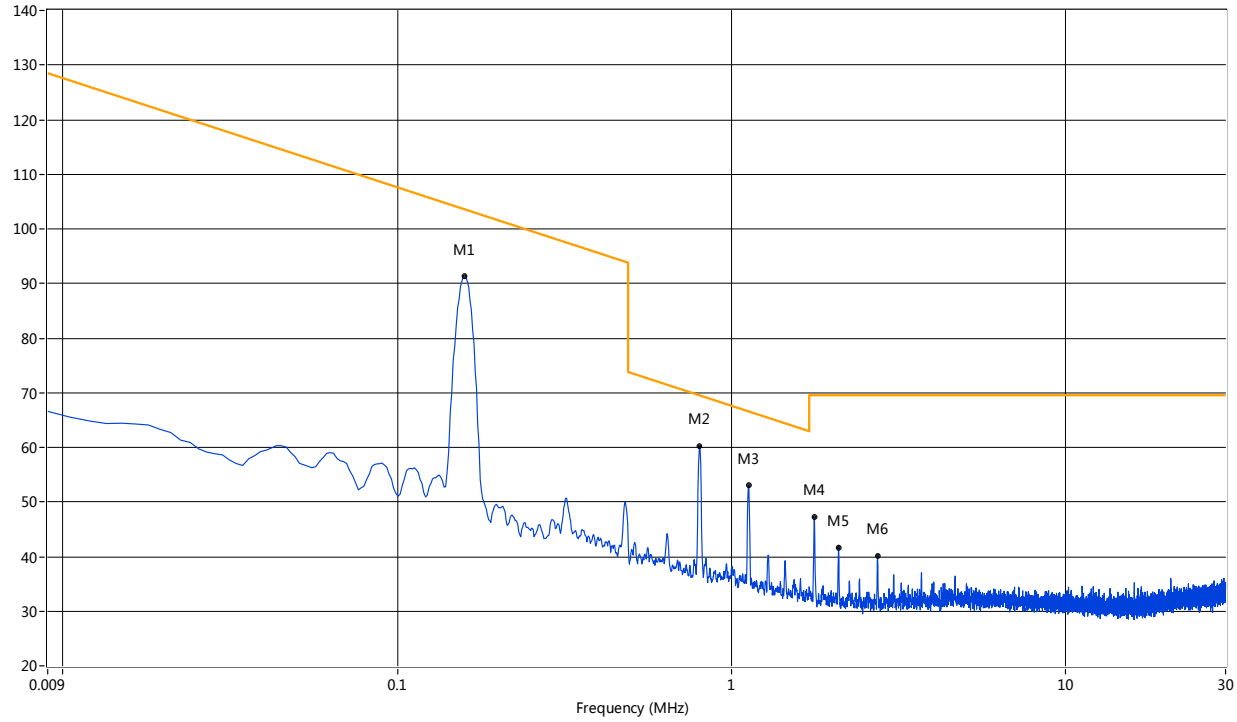
A.1 Radiated Emission

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.

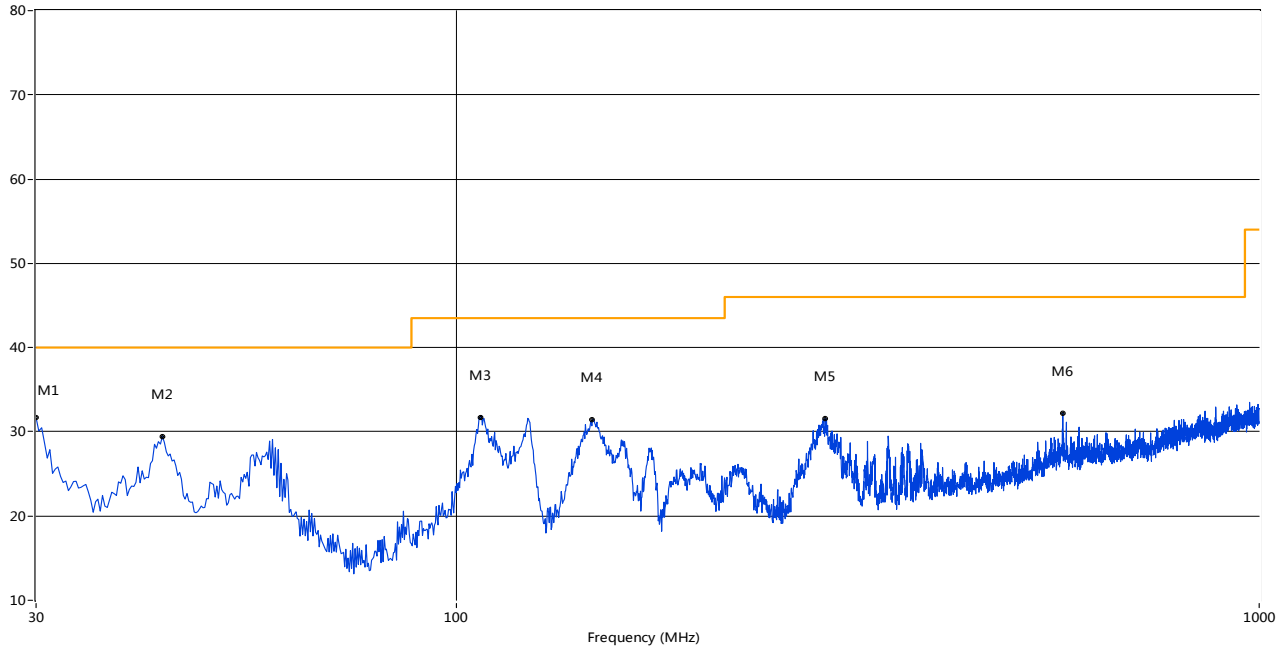
QI Test Data and Plots

A.1.1 9 kHz –30 MHz



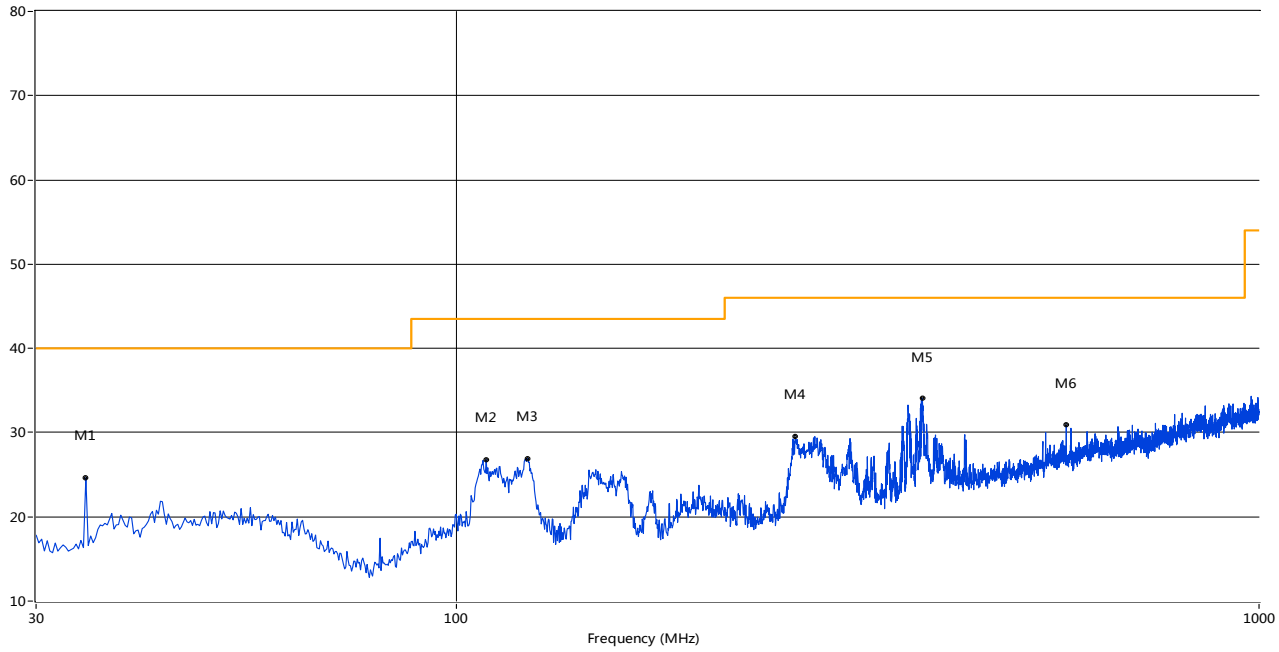
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	0.16	91.41	19.81	117.7	26.29	Peak	183.10	100	Vertical	Pass
2	0.80	60.18	20.21	71.0	10.82	Peak	178.30	100	Vertical	Pass
3	1.12	53.01	20.18	68.2	15.19	Peak	183.10	100	Vertical	Pass
4	1.77	47.19	20.15	69.5	22.31	Peak	183.10	100	Vertical	Pass
5	2.09	41.69	20.13	69.5	27.81	Peak	173.50	100	Vertical	Pass
6	2.73	40.11	20.29	69.5	29.39	Peak	163.90	100	Vertical	Pass

A.1.2 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	30.00	31.67	-21.72	40.0	8.33	Peak	348.70	100	Vertical	Pass
2	43.09	29.45	-18.99	40.0	10.55	Peak	1.70	100	Vertical	Pass
3	107.34	31.74	-20.22	43.5	11.76	Peak	101.60	100	Vertical	Pass
4	147.83	31.49	-23.49	43.5	12.01	Peak	217.40	100	Vertical	Pass
5	287.96	31.51	-18.11	46.0	14.49	Peak	356.70	100	Vertical	Pass
6	569.43	32.22	-11.72	46.0	13.78	Peak	35.60	100	Vertical	Pass

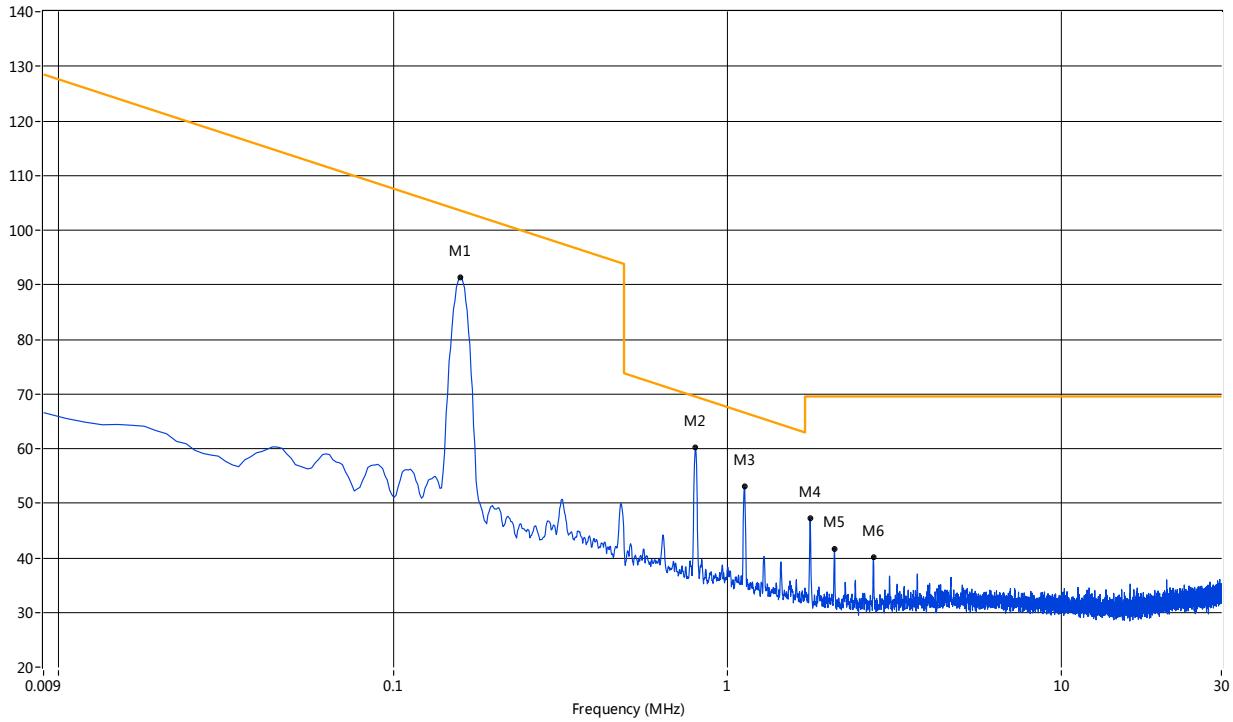
A.1.3 Test Antenna Horizontal, 30 MHz – 1 GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	34.61	24.65	-21.38	40.0	15.35	Peak	64.10	100	Horizontal	Pass
2	109.04	26.80	-20.23	43.5	16.70	Peak	-0.00	200	Horizontal	Pass
3	122.61	26.94	-22.19	43.5	16.56	Peak	-0.00	200	Horizontal	Pass
4	264.44	29.50	-18.52	46.0	16.50	Peak	64.10	100	Horizontal	Pass
5	380.81	34.03	-15.71	46.0	11.97	Peak	246.30	100	Horizontal	Pass
6	575.25	30.91	-11.64	46.0	15.09	Peak	-0.00	200	Horizontal	Pass

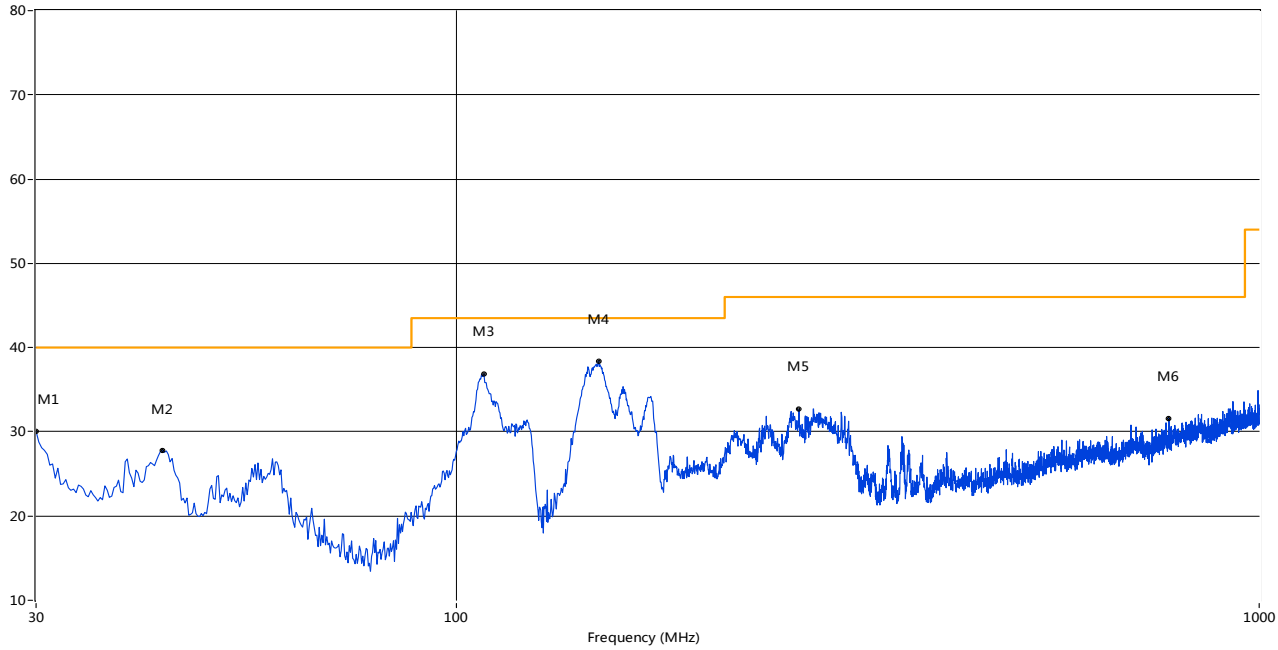
PMA Test Data and Plots

A.1.4 9 kHz –30 MHz



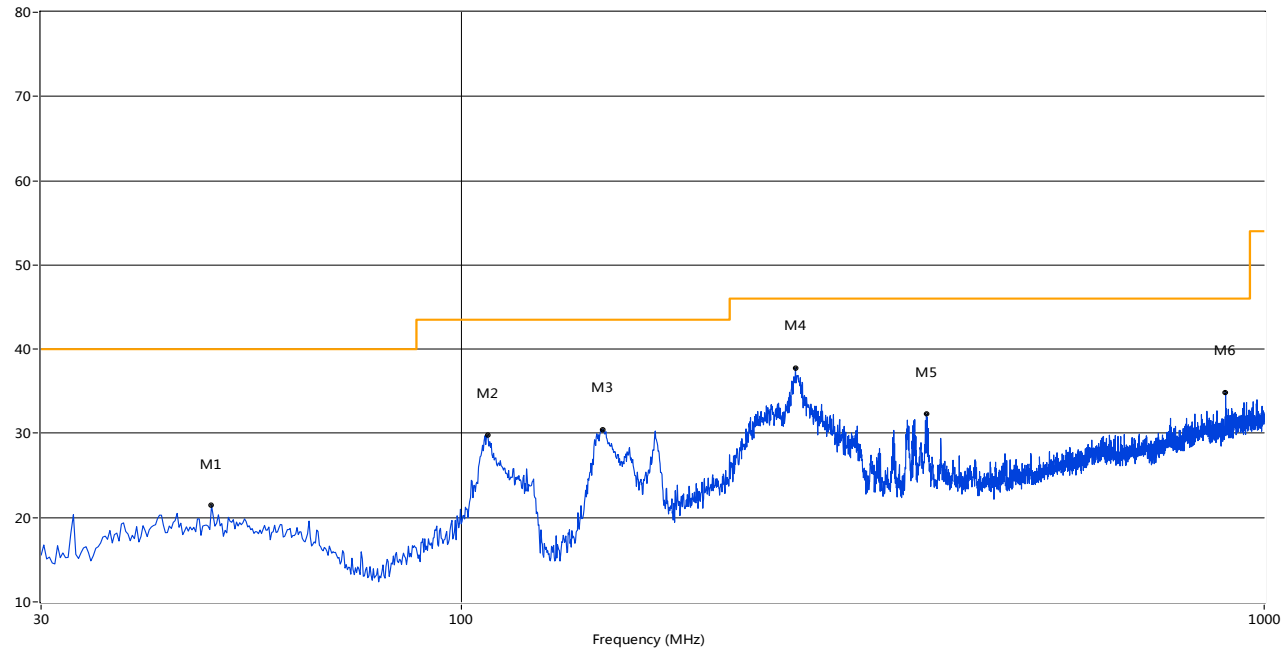
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	0.16	91.41	19.81	117.7	26.29	Peak	183.10	100	Vertical	Pass
2	0.80	60.18	20.21	71.0	10.82	Peak	178.30	100	Vertical	Pass
3	1.12	53.01	20.18	68.2	15.19	Peak	183.10	100	Vertical	Pass
4	1.77	47.19	20.15	69.5	22.31	Peak	183.10	100	Vertical	Pass
5	2.09	41.69	20.13	69.5	27.81	Peak	173.50	100	Vertical	Pass
6	2.73	40.11	20.29	69.5	29.39	Peak	163.90	100	Vertical	Pass

A.1.5 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	30.00	30.07	-21.72	40.0	9.93	Peak	22.10	100	Vertical	Pass
2	43.09	27.77	-18.99	40.0	12.23	Peak	7.50	100	Vertical	Pass
3	108.31	36.89	-20.20	43.5	6.61	Peak	47.30	100	Vertical	Pass
4	150.49	38.36	-23.46	43.5	5.14	Peak	183.20	100	Vertical	Pass
5	267.35	32.64	-18.56	46.0	13.36	Peak	358.70	100	Vertical	Pass
6	771.86	31.60	-8.01	46.0	14.40	Peak	347.80	100	Vertical	Pass

A.1.6 Test Antenna Horizontal, 30 MHz – 1 GHz

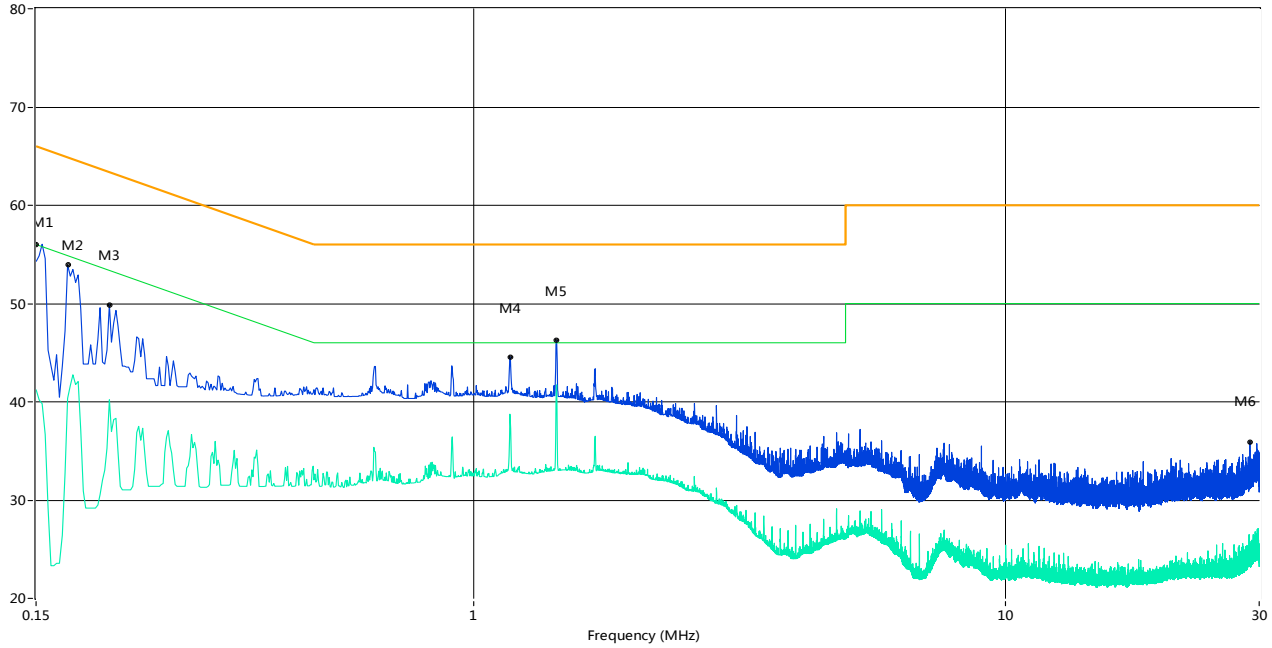


No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	48.91	21.44	-18.66	40.0	18.56	Peak	205.00	100	Horizontal	Pass
2	107.82	29.77	-20.18	43.5	13.73	Peak	331.00	100	Horizontal	Pass
3	150.01	30.48	-23.52	43.5	13.02	Peak	255.00	100	Horizontal	Pass
4	260.80	37.74	-18.60	46.0	8.26	Peak	353.00	100	Horizontal	Pass
5	379.60	32.29	-15.75	46.0	13.71	Peak	319.00	100	Horizontal	Pass
6	895.27	34.90	-5.70	46.0	11.10	Peak	356.00	100	Horizontal	Pass

A.2 Conducted Emission

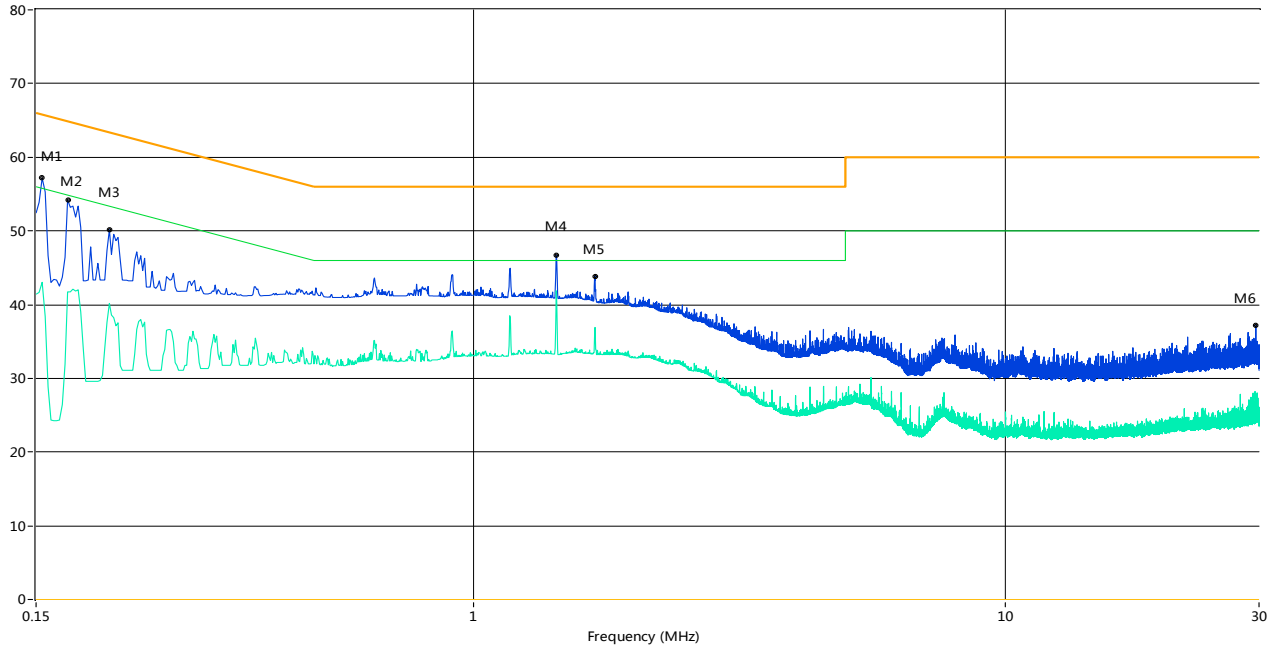
QI Test Data and Plots

A.2.1 L Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.15	56.0	13.00	65.9	9.90	Peak	L Line	Pass
1**	0.15	39.8	13.00	55.9	16.10	AV	L Line	Pass
2	0.17	53.9	13.00	65.4	11.50	Peak	L Line	Pass
2**	0.17	40.4	13.00	55.4	15.00	AV	L Line	Pass
3	0.21	49.9	13.00	64.4	14.50	Peak	L Line	Pass
3**	0.21	40.2	13.00	54.4	14.20	AV	L Line	Pass
4	1.17	44.6	13.00	56.0	11.40	Peak	L Line	Pass
4**	1.17	38.7	13.00	46.0	7.30	AV	L Line	Pass
5	1.43	46.2	13.00	56.0	9.80	Peak	L Line	Pass
5**	1.43	41.1	13.00	46.0	4.90	AV	L Line	Pass
6	28.80	35.9	13.00	60.0	24.10	Peak	L Line	Pass
6**	28.80	24.9	13.00	50.0	25.10	AV	L Line	Pass

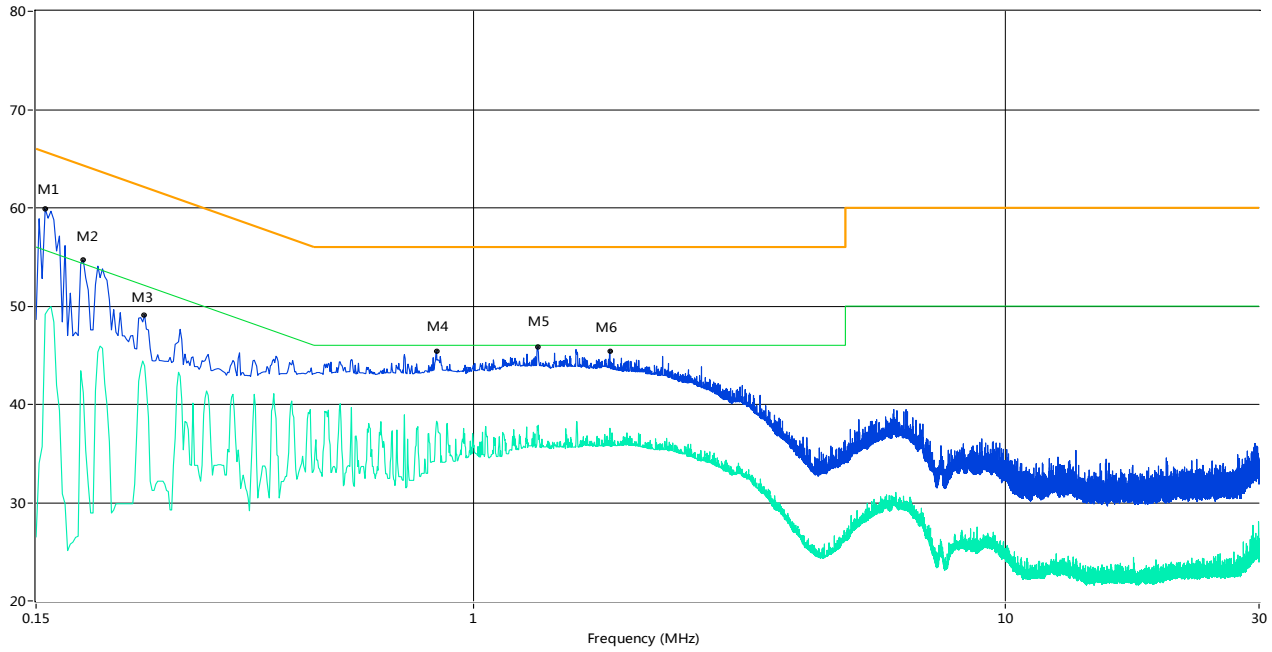
A.2.2 N Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.15	57.2	13.00	65.9	8.70	Peak	N Line	Pass
1**	0.15	43.0	13.00	55.9	12.90	AV	N Line	Pass
2	0.17	54.2	13.00	65.4	11.20	Peak	N Line	Pass
2**	0.17	41.7	13.00	55.4	13.70	AV	N Line	Pass
3	0.21	50.1	13.00	64.4	14.30	Peak	N Line	Pass
3**	0.21	40.2	13.00	54.4	14.20	AV	N Line	Pass
4	1.43	46.7	13.00	56.0	9.30	Peak	N Line	Pass
4**	1.43	41.9	13.00	46.0	4.10	AV	N Line	Pass
5	1.69	43.9	13.00	56.0	12.10	Peak	N Line	Pass
5**	1.69	36.9	13.00	46.0	9.10	AV	N Line	Pass
6	29.58	37.1	13.00	60.0	22.90	Peak	N Line	Pass
6**	29.58	27.8	13.00	50.0	22.20	AV	N Line	Pass

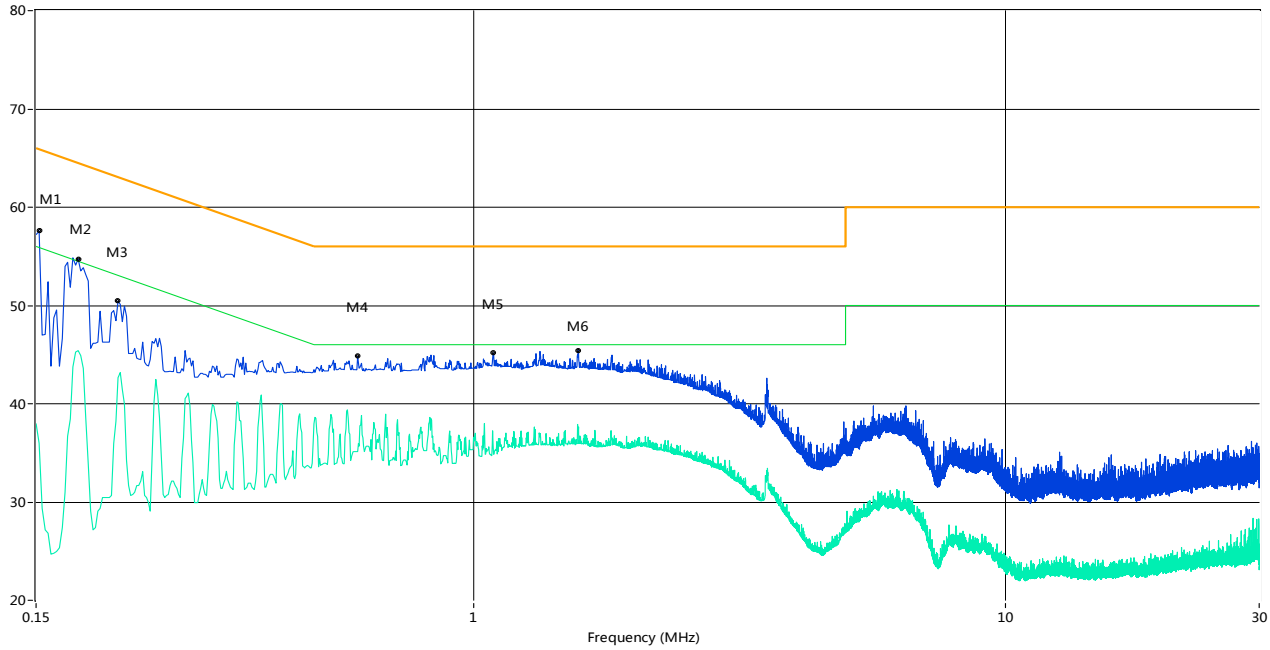
PMA Test Data and Plots

A.2.3 L Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.16	59.9	13.00	65.8	5.90	Peak	L Line	Pass
1**	0.16	49.2	13.00	55.8	6.60	AV	L Line	Pass
2	0.18	54.7	13.00	65.0	10.30	Peak	L Line	Pass
2**	0.18	41.2	13.00	55.0	13.80	AV	L Line	Pass
3	0.24	49.1	13.00	63.4	14.30	Peak	L Line	Pass
3**	0.24	43.9	13.00	53.4	9.50	AV	L Line	Pass
4	0.85	45.4	13.00	56.0	10.60	Peak	L Line	Pass
4**	0.85	38.3	13.00	46.0	7.70	AV	L Line	Pass
5	1.32	45.9	13.00	56.0	10.10	Peak	L Line	Pass
5**	1.32	37.4	13.00	46.0	8.60	AV	L Line	Pass
6	1.80	45.4	13.00	56.0	10.60	Peak	L Line	Pass
6**	1.80	37.6	13.00	46.0	8.40	AV	L Line	Pass

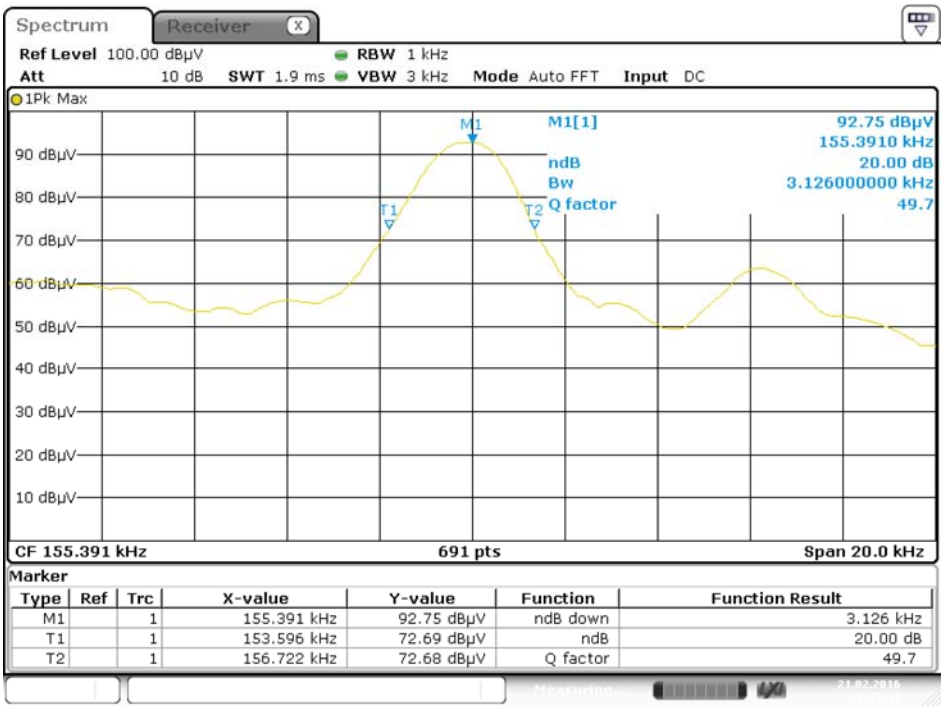
A.2.4 N Phase



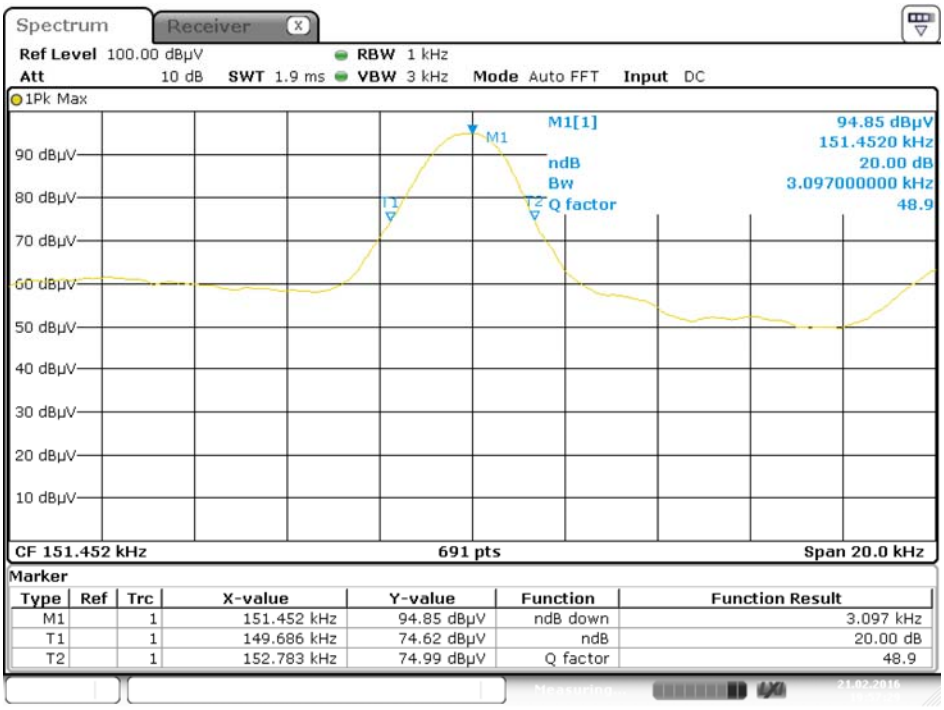
No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.15	57.6	13.00	65.9	8.30	Peak	N Line	Pass
1**	0.15	36.0	13.00	55.9	19.90	AV	N Line	Pass
2	0.18	54.7	13.00	65.1	10.40	Peak	N Line	Pass
2**	0.18	45.4	13.00	55.1	9.70	AV	N Line	Pass
3	0.21	50.4	13.00	64.2	13.80	Peak	N Line	Pass
3**	0.21	42.6	13.00	54.2	11.60	AV	N Line	Pass
4	0.60	44.8	13.00	56.0	11.20	Peak	N Line	Pass
4**	0.60	35.1	13.00	46.0	10.90	AV	N Line	Pass
5	1.09	45.2	13.00	56.0	10.80	Peak	N Line	Pass
5**	1.09	34.6	13.00	46.0	11.40	AV	N Line	Pass
6	1.57	45.4	13.00	56.0	10.60	Peak	N Line	Pass
6**	1.57	36.9	13.00	46.0	9.10	AV	N Line	Pass

A.3 20 dB Bandwidth

QI Test Data and Plots

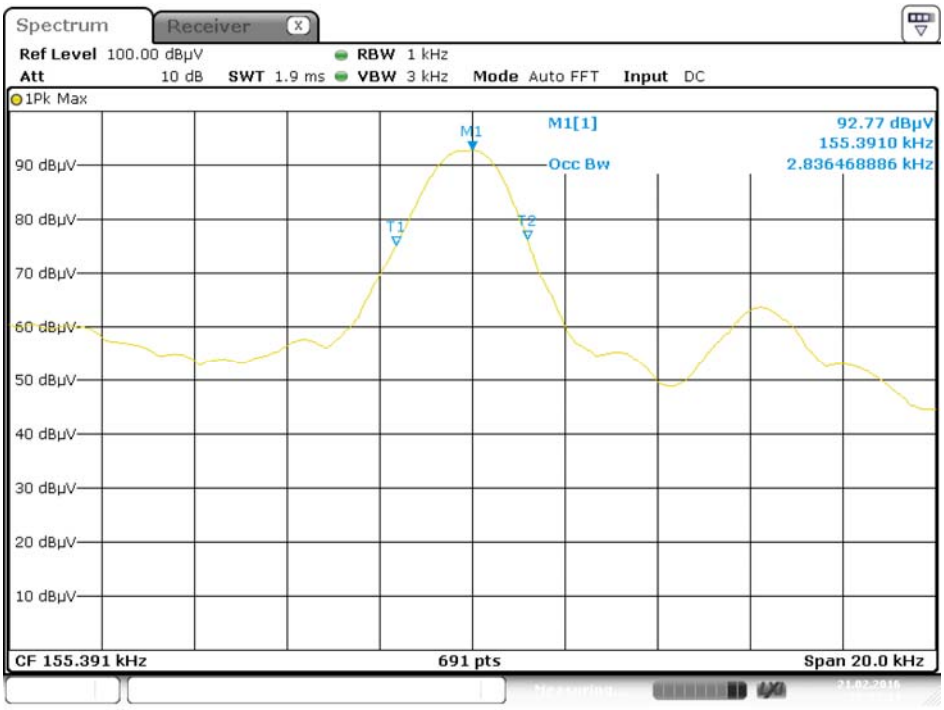


PMA Test Data and Plots

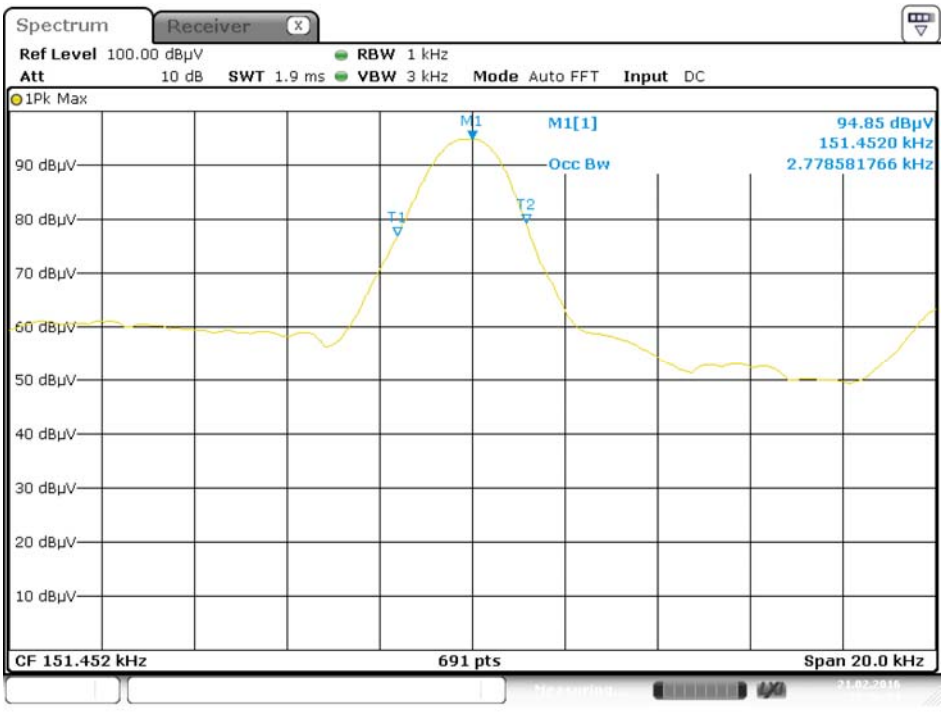


99% Occupied Bandwidth

QI Test Data and Plots



PMA Test Data and Plots



ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-SZ15A0079-AR.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “BL-SZ15A0079-AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “BL-SZ15A0079-AI.PDF”.

--END OF REPORT--