CERTIFICATION TEST REPORT

Report Number. : 4789567118-FR1V2

Applicant	:	MEGABROS Co.,Ltd. 3rd floor, 307-ho, Technotel, Bongsu-daero 17, Michuhol-gu, Incheon, South Korea
Model	:	MC10A
FCC ID	:	2AW4I-MC10A
EUT Description	:	Black Horn with WPT
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C

Date Of Issue:
September 09, 2020

Prepared by:
UL Korea, Ltd.
26th floor, 152, Teheran-ro, Gangnam-gu Seoul, 06236, Korea

Suwon Test Site: UL Korea, LTD. Suwon Laboratory
218 Maeyeong-ro, Yeongtong-gu
Suwon-si, Gyeonggi-do, 16675, Korea
TEL: (031) 337-9902
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IAS ACCREDITED
Testing Laboratory
TL-637

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	09/07/20	Initial issue	Robby Lee
V2	09/09/20	Updated to address about the TCB's question	Robby Lee

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: MEGABROS Co.,Ltd.

EUT DESCRIPTION: Black Horn with WPT

MODEL NUMBER: MC10A

SERIAL NUMBER: Proto-type

DATE TESTED: AUG 25, 2020 – SEP 01, 2020

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Pass

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For
UL Korea, Ltd. By:

CY Choi
Suwon Lab Engineer
UL Korea, Ltd.

Tested By:

Robby Lee
Suwon Lab Engineer
UL Korea, Ltd.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with following methods.

1. FCC CFR 47 Part 2.
2. FCC CFR 47 Part 15.
3. ANSI C63.10-2013.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea. Line conducted emissions are measured only at the 218 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

218 Maeyeong-ro
☐ Chamber 1
☐ Chamber 2
☐ Chamber 3
☒ 10m Chamber

UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637. The full scope of accreditation can be viewed at http://www.iasonline.org/PDF/TL/TL-637.pdf.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.31 dB
Radiated Disturbance, 9 kHz to 30 MHz	4.40 dB

Uncertainty figures are valid to a confidence level of 95%.

4.1. DECISION RULE

Decision rule for statement(s) of conformity is based on Procedure 1, Clause 4.4.2 in IEC Guide 115:2007.

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a Black Horn with WPT.

5.2. MAXIMUM OUTPUT POWER

Fundamental Frequency (KHz)	Mode	E field (300m distance) FCC (dBuV/m)
110 - 191	Charging	-16.24

5.3. WORST-CASE CONFIGURATION

The spurious emissions was investigated in three orthogonal orientations X, Y and Z it was determined that X orientation was worst-case orientation.

Mode	Test Case	Description
Wireless charging mode	1	Charging from EUT to Phone
	2	Charging from EUT(Charging from TA) to Phone

For radiated test, the EUT can operate the wireless charging mode when battery level is over DC 3.2V. Because test results are not different between fully charged status and battery level DC 3.2V status(EUT condition), test were performed fully charged condition.

Also according to current client device's(Phone) battery level, test results are different.Because the test results were worst when the battery level was 1%~20%, tests were performed when the battery level was 1%~20%.(Client device)

The test was performed in worsted test case #2.

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5.4. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT & PERIPHERALS

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID/DoC**
AC adapter	SAMSUNG	EP-TA200	R37M14P3GY1SE3	N/A
Mobile Phone	SAMSUNG	SM-G977N	R3CM4083W5N	A3LSMG977KOR

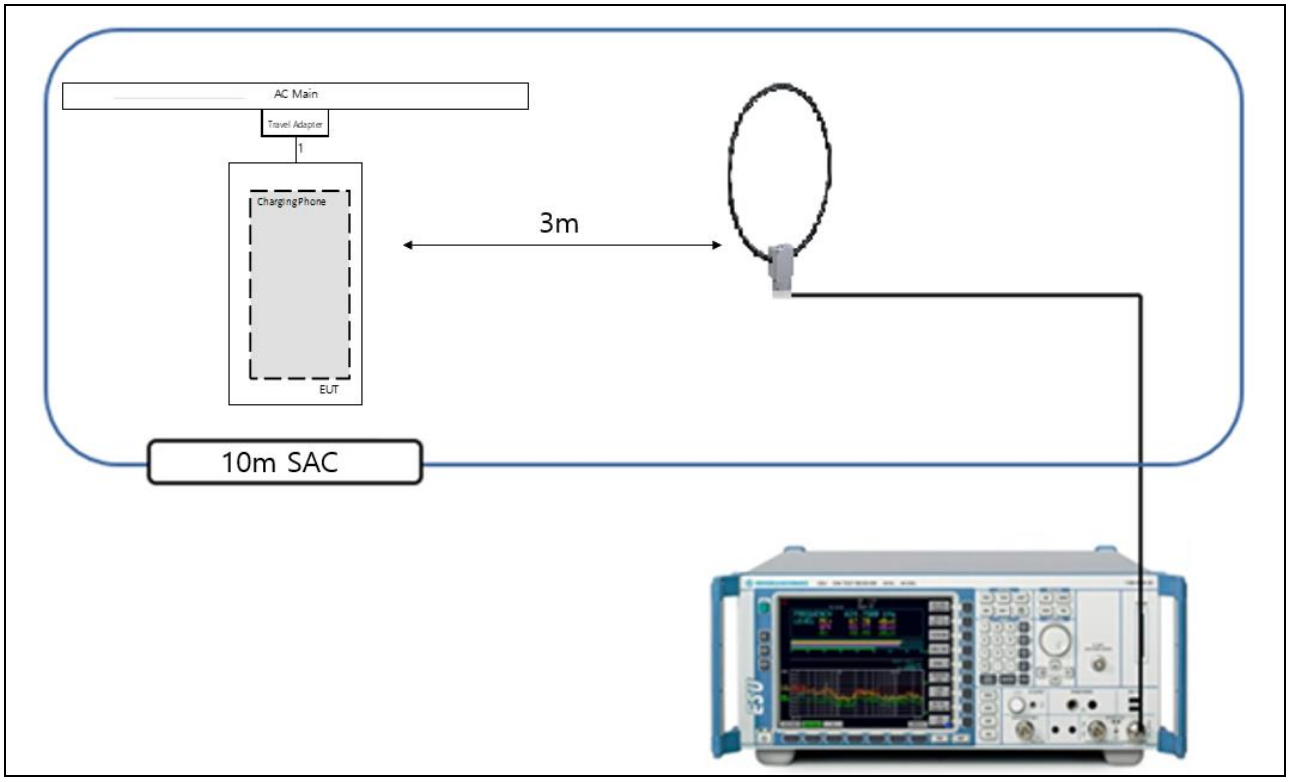
I/O CABLES

I/O Cable List						
Cable No	**Port**	**# of identical Ports**	**Connector Type**	**Cable Type**	**Cable Length(m)**	**Remarks**
1	DC Power	1	C type	Unshielded	0.1 m	From EUT to AC adapter

TEST SETUP

The EUT is installed in a typical configuration. Charging from EUT.

TEST SETUP DIAGRAM



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment List				
Description	**Manufacturer**	**Model**	**S/N**	**Cal Due**
Test Receiver	R&S	ESW44	101848	21.08.03
Active Loop Antenna	R&S	HFH2-Z2E	100900	21.09.30
Bias Unit	R&S	IN600	100974	21.09.30
Open Switch and Control Platform	R&S	OSP220	101456	N/A
Digital Multimeter	FLUKE	177	37850547	21.08.03
Signal Generator	R&S	SMB100A	180032	20.08.06
EMI Test Receiver	R&S	ESR3	102592	21.08.06
Two-Line V-Network	R&S	ENV216	102478	21.08.07
UL Software				
Description	**Manufacturer**	**Model**	**Version**	
AC Line Conducted software	R&S	EMC32	10.50.40	
Radiated software	R&S	EMC32	10.60.10	

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7. APPLICABLE LIMITS AND TEST RESULTS

7.1. RADIATED EMISSIONS

LIMIT

FCC §15.209 (a)

Frequency (MHz)	Field Strength (microvolts/meter)	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 to 216	150	3
216 to 960	200	3
Above 960 MHz	500	3
Note: The lower limit shall apply at the transition frequency.		

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g. §§ 15.231 and 15.241.
§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

Formula for converting the filed strength from uV/m to dBuV/m is:
Limit (dBuV/m) = 20 log limit (uV/m)

TEST PROCEDURE

ANSI C63.10: 2013

The highest clock frequency generated or used in the EUT is 191 kHz therefore the frequency range was investigated from 9 kHz to 30 MHz.

Test result (dBuV/m) = Reading Value (dBuV) + Correction Factor (dB/m)

Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Loss + Distance Correction Factor (dB)

Distance Correction Factor:
3m vs 300m conversion factor = 40log(300/3) = -80 dB
3m vs 30m conversion factor = 40log(30/3) = -40 dB

RESULTS

See the following pages.

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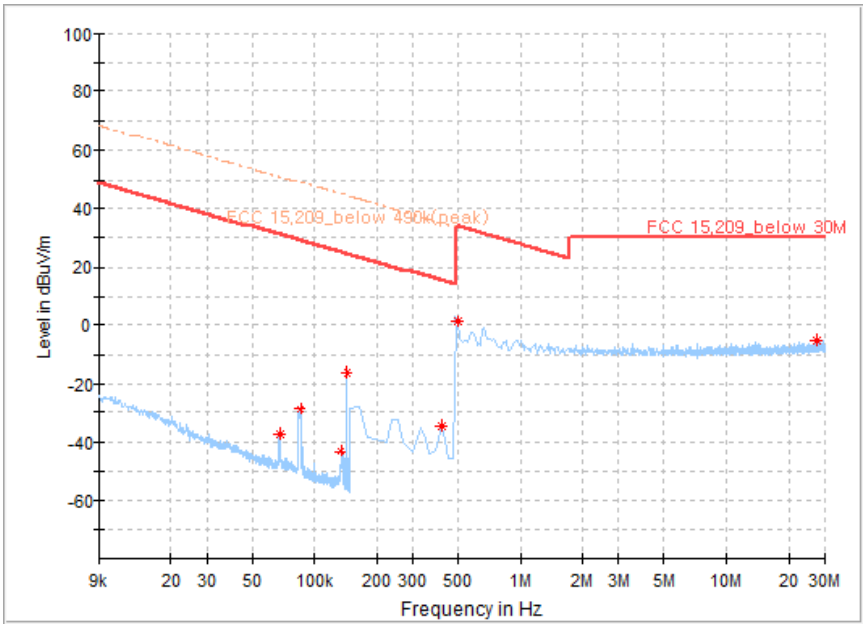
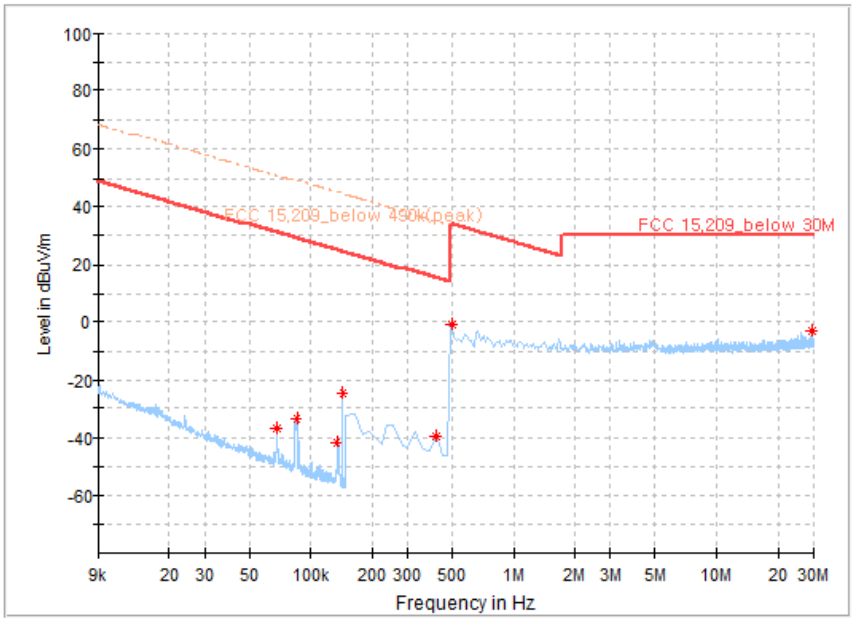
RADIATED EMISSIONS FUNDAMENTAL & 9 KHz to 30 MHz

Face-On



Face-Off



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TEST DATA

[Face-On]

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Azimuth (deg)	Corr. (dB/m)
0.067593	-37.46	31.00	68.46	0.200	100.0	149.0	-59.5
0.085218	-28.95	28.99	57.93	0.200	100.0	227.0	-59.6
0.134412	-43.05	25.03	68.08	0.200	100.0	36.0	-59.6
0.143733**	-16.24	24.45	40.69	0.200	100.0	252.0	-59.6
0.418650	-34.72	15.17	49.89	9.000	100.0	257.0	-59.6
0.493275	1.11	33.74	32.63	9.000	100.0	139.0	-19.6
27.686625	-5.04	30.00	35.04	9.000	100.0	155.0	-18.5

** Fundamental

[Face-Off]

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Azimuth (deg)	Corr. (dB/m)
0.067985	-36.94	30.95	67.89	0.200	100.0	256.0	-59.5
0.085218	-33.74	28.99	62.72	0.200	100.0	300.0	-59.6
0.135117	-41.44	24.98	66.42	0.200	100.0	211.0	-59.6
0.143733**	-24.37	24.45	48.82	0.200	100.0	333.0	-59.6
0.418650	-39.31	15.17	54.47	9.000	100.0	165.0	-59.6
0.493275	-0.94	33.74	34.68	9.000	100.0	262.0	-19.6
29.537325	-2.88	30.00	32.88	9.000	100.0	150.0	-18.4

** Fundamental

Note 1: Radiated test were investigated with three receiving antenna axes: Face-on, Face-off and horizontal (parallel to the ground plane) and the worse orientations of Face-on and Face-off were set for final test.

Note 2: Although these tests were performed other than open field test site, adequate comparison measurements were confirmed against 10m open field test site. Therefore, sufficient tests were made to demonstrate that the alternative site produces results that correlated with the one of tests made in an open field site based on KDB 414788.

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7.2. AC MAINS LINE CONDUCTED EMISSIONS

TEST PROCEDURE

ANSI C63.10: 2013

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both NEUTRAL and HOT lines.

LIMIT

FCC §15.207 (a)

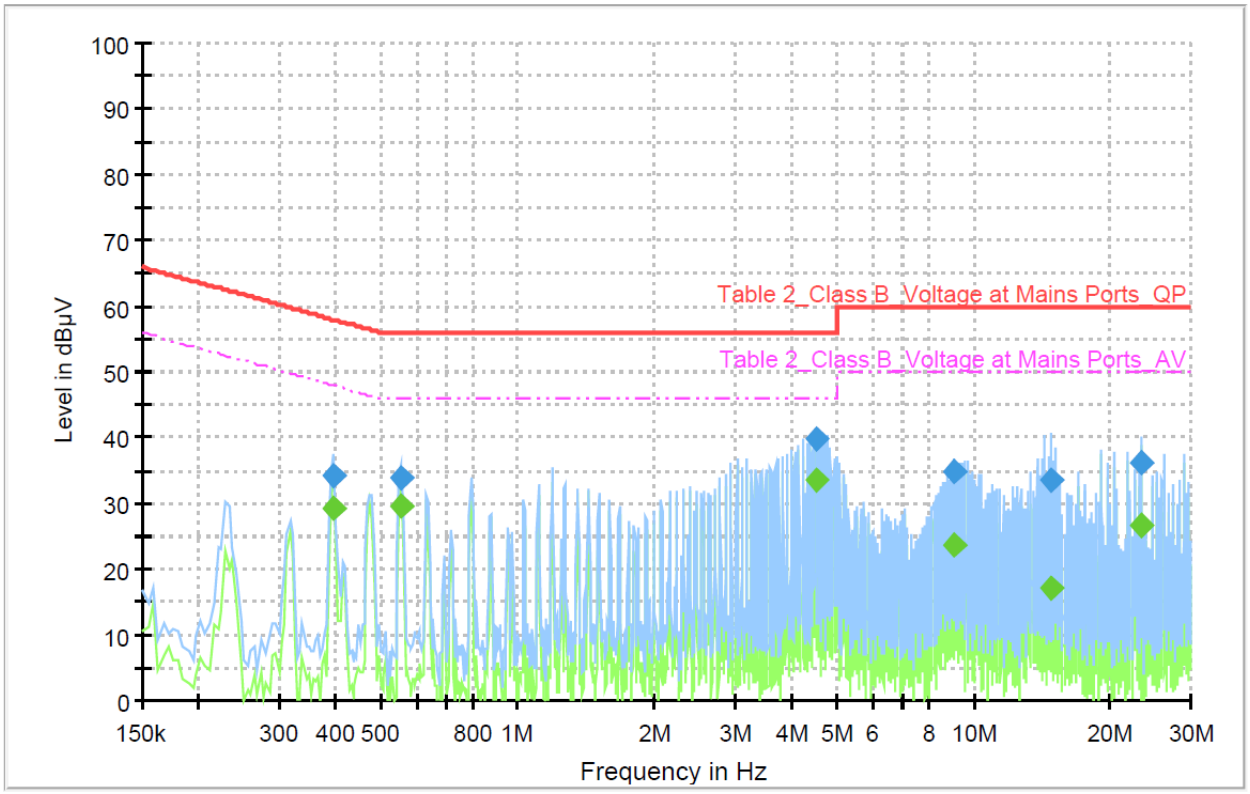
Frequency range (MHz)	Limits (dBµV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50
*Decreases with the logarithm of the frequency.		

RESULTS

See the following pages.

7.2.1. AC Power Line

LINE 1 RESULTS



Final_Result_QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.395824	34.21	57.94	23.73	L1	ON	9.9
0.553853	34.02	56.00	21.98	L1	ON	10.0
4.548485	39.77	56.00	16.23	L1	ON	9.9
9.105000	34.82	60.00	25.18	L1	ON	9.9
14.741382	33.63	60.00	26.37	L1	ON	10.0
23.270581	36.13	60.00	23.87	L1	ON	10.1

Final_Result_CAV

Frequency (MHz)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.395824	29.32	47.94	18.62	L1	ON	9.9
0.553853	29.58	46.00	16.42	L1	ON	10.0
4.548485	33.44	46.00	12.56	L1	ON	9.9
9.105000	23.59	50.00	26.41	L1	ON	9.9
14.741382	17.22	50.00	32.78	L1	ON	10.0
23.270581	26.71	50.00	23.29	L1	ON	10.1

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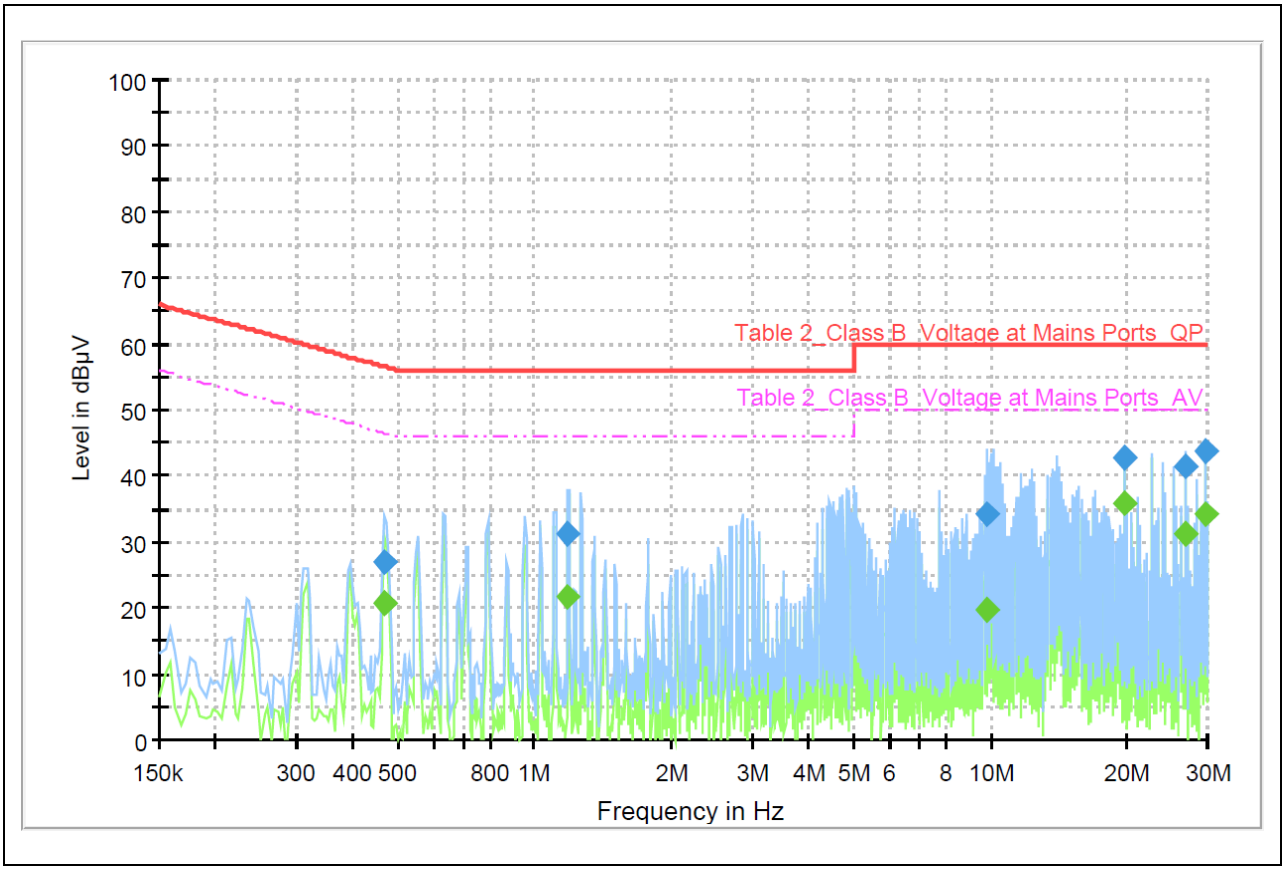
LINE 2 RESULTS



Final_Result_QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.470449	27.01	56.51	29.50	N	ON	9.9
1.185971	31.14	56.00	24.86	N	ON	9.8
9.829302	34.32	60.00	25.68	N	ON	10.0
19.763206	42.65	60.00	17.35	N	ON	10.1
26.821853	41.31	60.00	18.69	N	ON	10.3
29.561029	43.87	60.00	16.13	N	ON	10.3

Final_Result_CAV

Frequency (MHz)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.470449	20.61	46.51	25.90	N	ON	9.9
1.185971	21.59	46.00	24.41	N	ON	9.8
9.829302	19.73	50.00	30.27	N	ON	10.0
19.763206	35.71	50.00	14.29	N	ON	10.1
26.821853	31.27	50.00	18.73	N	ON	10.3
29.561029	34.10	50.00	15.90	N	ON	10.3

END OF REPORT

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