FCC 47 CFR PART 15 SUBPART C
ISED RSS-210 ISSUE 11

CERTIFICATION TEST REPORT

For

DC WallBOX EV Charger

MODEL NUMBER: EVA030SL-PN

REPORT NUMBER: 4791423656.1-RF-3

ISSUE DATE: December 9, 2024

FCC ID: BEJEVA030SLPN
IC: 2703H-EVA030SLPN

Prepared for

FCC: LG Electronics USA, Inc.
FCC: 111 Sylvan Avenue North Building, Englewood Cliffs New Jersey, 07632 United States
IC: LG ELECTRONICS INC.
IC: 222, LG-ro, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do 451-713 Korea (Rep.)

Prepared by

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Revision History

Rev.	Issue Date	Revisions	Revised By
V0	December 9, 2024	Initial Issue	

Summary of Test Results			
Clause	Test Items	FCC Rules	Test Results
1	Transmitter 99% Emission Bandwidth / 20dB Bandwidth	RSS-Gen 6.7/ Part 15.215 (c)	PASS
2	Transmitter Frequency Stability (Temperature & Voltage Variation)	CFR 47 FCC §15.225(e) ISED RSS-Gen Clause 6.11 ISED RSS-210 Annex B.6	PASS
3	Fundamental Field Strength	CFR 47 FCC §15.225(a)(b)(c)(d) ISED RSS-Gen Clause 6.12 ISED RSS-210 Annex B.6	PASS
4	Radiated Emissions	CFR 47 FCC§15.209(a) CFR 47 FCC§15.225(d) ISED RSS-Gen Clause 6.13 ISED RSS-210 Annex B.6	PASS
5	Band Edge Radiated Emissions	CFR 47 FCC §15.209(a) CFR 47 FCC §15.225(c)(d) ISED RSS-Gen Clause 6.13 ISED RSS-210 Annex B.6	PASS
6	Conducted Emission Test for AC Power Port	CFR 47 FCC §15.207 ISED RSS-Gen Clause 8.8	PASS
7	Antenna Requirement	CFR 47 FCC §15.203 ISED RSS-Gen Clause 6.8	Pass
Note 1: This test report is only published to and used by the applicant, and it is not for evidence purpose in China. Note 2: The measurement result for the sample received is <Pass> according to < CFR 47 FCC PART 15 SUBPART C, ISED RSS-210 Issue 11 and ISED RSS-GEN Issue 5 > when <simple acceptance> decision rule is applied.			

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1. ATTESTATION OF TEST RESULTS

Applicant Information

FCC Company Name:	LG Electronics USA, Inc.
FCC Address:	111 Sylvan Avenue North Building, Englewood Cliffs New Jersey, 07632 United States
IC Company Name:	LG ELECTRONICS INC.
IC Address:	222, LG-ro, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do 451-713 Korea (Rep.)

Manufacturer Information

Company Name:	LG Electronics USA, Inc.
Address:	111 Sylvan Avenue North Building, Englewood Cliffs New Jersey, 07632 United States
IC Company Name:	LG ELECTRONICS INC.
IC Address:	222, LG-ro, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do 451-713 Korea (Rep.)

EUT Information

EUT Name:	DC WallBOX EV Charger
Model:	EVA030SL-PN
Brand:	LG
Sample Received Date:	August 29, 2024
Sample Status:	Normal
Sample ID:	7603703
Date of Tested:	August 29, 2024 to December 9, 2024

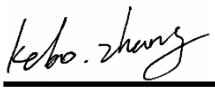
APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 FCC PART 15 SUBPART C	PASS
ISED RSS-210 Issue 11	PASS
ISED RSS-GEN Issue 5	PASS

Prepared By:

Wite Chen

Engineer Project Associate

Checked By:



Kebo zhang

Senior Project Engineer

Approved By:

Stephen Guo

Operations Manager

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with KDB 414788 D01 Radiated Test Site v01r01, FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2013, ISED RSS-210 Issue 11 and RSS-GEN Issue 5.

3. FACILITIES AND ACCREDITATION

Accreditation Certificate	**A2LA (Certificate No.: 4102.01)** UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with A2LA. **FCC (FCC Designation No.: CN1187)** UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. Has been recognized to perform compliance testing on equipment subject to the Commission's Delcaration of Conformity (DoC) and Certification rules **ISED (Company No.: 21320)** UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been registered and fully described in a report filed with ISED. The Company Number is 21320 and the test lab Conformity Assessment Body Identifier (CABID) is CN0046. **VCCI (Registration No.: G-20192, C-20153, T-20155 and R-20202)** UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with VCCI, the Membership No. is 3793. Facility Name: Chamber D, the VCCI registration No. is G-20192 and R-20202 Shielding Room B, the VCCI registration No. is C-20153 and T-20155

Note:

1. All tests measurement facilities use to collect the measurement data are located at Building 10, Innovation Technology Park, Song Shan Lake Hi tech Development Zone, Dongguan, 523808, China
2. The test anechoic chamber in UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch had been calibrated and compared to the open field sites and the test anechoic chamber is shown to be equivalent to or worst case from the open field site.
3. For below 30MHz, lab had performed measurements at test anechoic chamber and comparing to measurements obtained on an open field site. And these measurements below 30MHz had been correlated to measurements performed on an OFS.

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 recognize national standards.

4.2. MEASUREMENT UNCERTAINTY

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

Test Item	Uncertainty
Conduction emission	3.62 dB
Radiation Emission test (include Fundamental emission) (9KHz-30MHz)	2.2 dB
Radiation Emission test (include Fundamental emission) (30MHz-1GHz)	4.00 dB
Radiation Emission test (1GHz to 26GHz) (include Fundamental emission)	5.78 dB (1 GHz-18 GHz)
	5.23 dB (18 GHz-26 GHz)
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

EUT Name	DC WallBOX EV Charger
Model	EVA030SL-PN
Operation Frequency	13.56MHz
Modulation	ASK
Rated Input:	Input: 480 Vac, 60Hz,40A Max.

5.2. MAXIMUM FIELD STRENGTH

Frequency (MHz)	Max Peak field strength @30m(dBµV/m)
13.56	10.78

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

Frequency (MHz)	Antenna Type	Antenna Gain (dBi)
13.56	Loop antenna	0

5.4. TEST ENVIRONMENT

Environment Parameter	Selected Values During Tests	
Relative Humidity	55 ~ 65%	
Atmospheric Pressure:	1025Pa	
Temperature	TN	23 ~ 28°C
Voltage:	VL	AC 432V
	VN	AC 480V
	VH	AC 528V

Note: VL= Lower Extreme Test Voltage
VN= Nominal Voltage
VH= Upper Extreme Test Voltage
TN= Normal Temperature

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	Remarks
1	Laptop	Lenovo	E14	/
2	NFC CARD	/	/	

I/O CABLES

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	USB	Type C	/	1.0	/

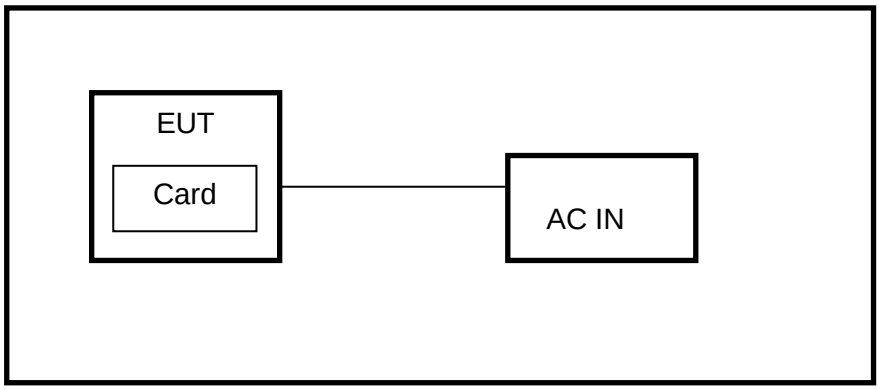
ACCESSORIES

Item	Accessory	Brand Name	Model Name	Description
/	/	/	/	/

TEST SETUP

The EUT can transmit the NFC signal through Swiping card (NFC)
NFC support both ISO /IEC 14443A and ISO /IEC 14443B. All lowest and highest data rates as per the standards are supported - 106 kbps, 212 kbps, 424 kbps and 848 kbps, all the modes had been tested, but only the worst data (ISO 14443A 106 kbps) was recorded in the report.

SETUP DIAGRAM FOR TESTS



Note: Test was performed with tag and without tag, but only the worst-case data (with tag) was recorded in the report.

5.6. MEASURING INSTRUMENT AND SOFTWARE USED

Conducted Emissions					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due Date
EMI Test Receiver	R&S	ESR3	101961	Sep.28, 2024	Sep.27, 2025
Two-Line V-Network	R&S	ENV216	101983	Sep.28, 2024	Sep.27, 2025
Artificial Mains Networks	Schwarzbeck	NSLK 8126	8126465	Sep.28, 2024	Sep.27, 2025
Software					
Description			Manufacturer	Name	Version
Test Software for Conducted Emissions			Farad	EZ-EMC	Ver. UL-3A1

R&S TS 8997 Test System					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due. Date
Power sensor, Power Meter	R&S	OSP120	100921	Mar.25,2024	Mar.24,2025
Vector Signal Generator	R&S	SMBV100A	261637	Sep.28, 2024	Sep.27, 2025
Signal Generator	R&S	SMB100A	178553	Sep.28, 2024	Sep.27, 2025
Signal Analyzer	R&S	FSV40	101118	Sep.28, 2024	Sep.27, 2025
Software					
Description		Manufacturer		Name	Version
For R&S TS 8997 Test System		Rohde & Schwarz		EMC 32	10.60.10

Tonsend RF Test System					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due. Date
Wireless Connectivity Tester	R&S	CMW270	1201.0002N75-102	Sep.13, 2024	Sep.12, 2025
PXA Signal Analyzer	Keysight	N9030A	MY55410512	Sep.28, 2024	Sep.27, 2025
MXG Vector Signal Generator	Keysight	N5182B	MY56200284	Sep.28, 2024	Sep.27, 2025
MXG Vector Signal Generator	Keysight	N5172B	MY56200301	Sep.28, 2024	Sep.27, 2025
DC power supply	Keysight	E3642A	MY55159130	Sep.28, 2024	Sep.27, 2025
Temperature & Humidity Chamber	SANMOOD	SG-80-CC-2	2088	Sep.28, 2024	Sep.27, 2025
Attenuator	Aglient	8495B	2814a12853	Sep.28, 2024	Sep.27, 2025
RF Control Unit	Tonscend	JS0806-2	23B80620666	Mar.25,2024	Mar.24,2025

Software			
Description	Manufacturer	Name	Version
Tonsend SRD Test System	Tonsend	JS1120-3 RF Test System	V3.2.22

Radiated Emissions					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due Date
MXE EMI Receiver	KESIGHT	N9038A	MY56400036	Sep.28, 2024	Sep.27, 2025
Hybrid Log Periodic Antenna	TDK	HLP-3003C	130959	May.08, 2023	May.07 2026
Preamplifier	HP	8447D	2944A09099	Sep.28, 2024	Sep.27, 2025
EMI Measurement Receiver	R&S	ESR26	101377	Sep.28, 2024	Sep.27, 2025
Preamplifier	TDK	PA-02-0118	TRS-305-00067	Sep.28, 2024	Sep.27, 2025
Horn Antenna	Schwarzbeck	BBHA9170	697	Jun 30, 2024	Jun 29, 2027
Preamplifier	TDK	PA-02-2	TRS-307-00003	Sep.28, 2024	Sep.27, 2025
Preamplifier	TDK	PA-02-3	TRS-308-00002	Sep.28, 2024	Sep.27, 2025
Loop antenna	Schwarzbeck	1519B	00008	Dec.14, 2021	Dec.13, 2024
MXE EMI Receiver	KESIGHT	N9038A	MY56400036	Sep.28, 2024	Sep.27, 2025
Software					
Description			Manufacturer	Name	Version
Test Software for Radiated Emissions			Farad	EZ-EMC	Ver. UL-3A1

6. ANTENNA PORT TEST RESULTS

6.1. 99% & 20dB BANDWIDTH

LIMITS

Section	Test Item	Limit
ANSI C63.10 Section 6.9.2	20dB% Bandwidth	For reporting purposes only.
ISED RSS-Gen Clause 6.7 Issue 5	99 % Occupied Bandwidth	For reporting purposes only.

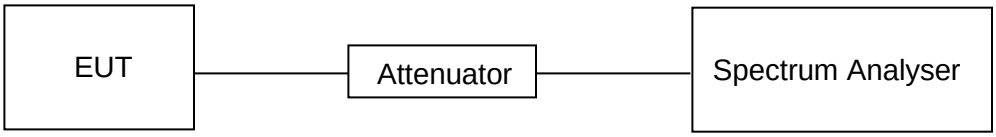
TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1 kHz. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

Note: Because the measured signal is CW or CW-like adjusting the RBW per C63.10 would not be practical since measured bandwidth will always follow the RBW and the result will be approximately twice the RBW.

The type of band for the signal is narrowband.

TEST SETUP



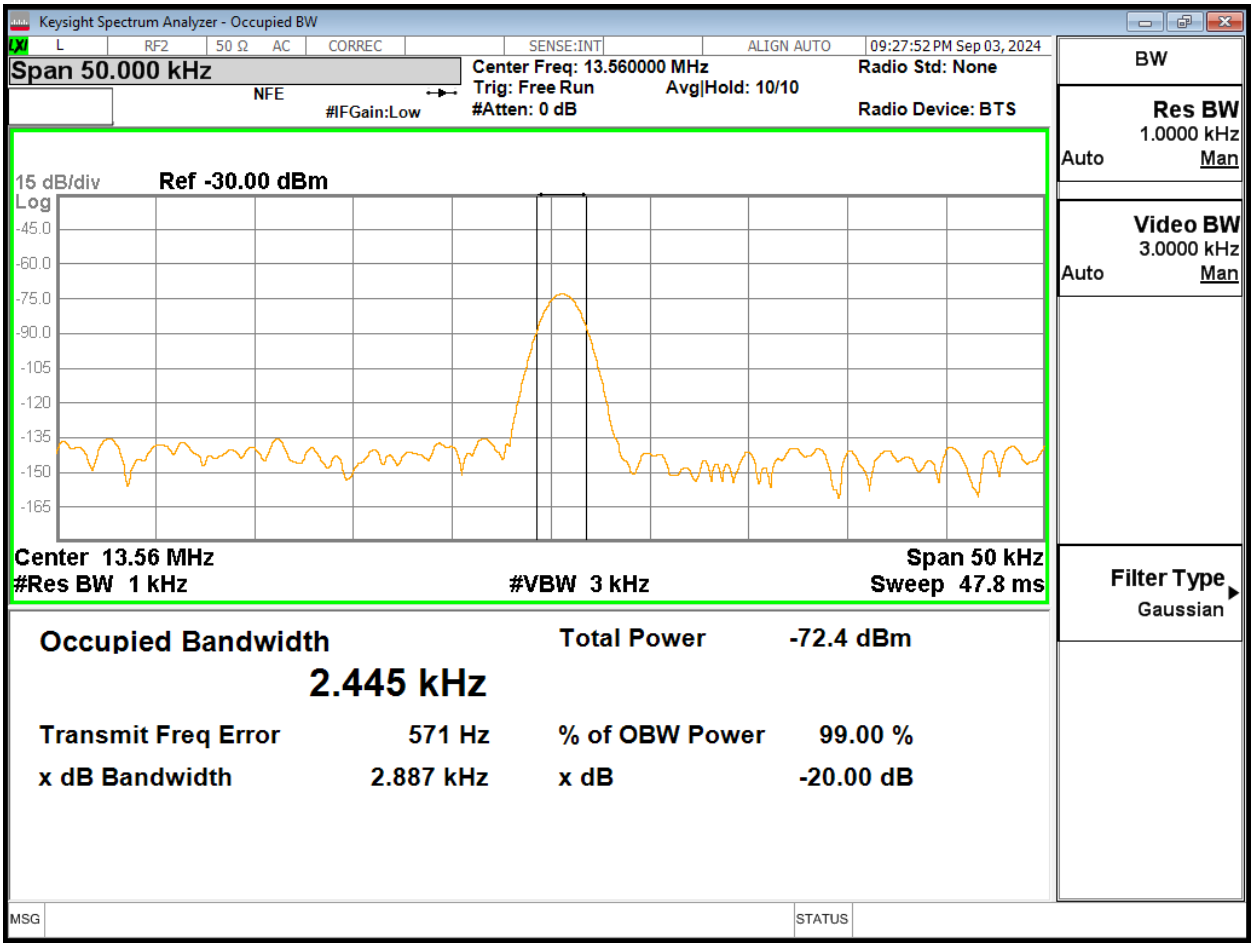
TEST ENVIRONMENT

Temperature	22.2°C	Relative Humidity	45%
Atmosphere Pressure	101kPa	Test Voltage	AC 480V

RESULTS

Frequency (MHz)	99% Occupied Bandwidth (kHz)	20dB bandwidth (kHz)
13.56	2.445	2.887

99%&20dB bandwidth



6.2. TRANSMITTER FREQUENCY STABILITY

LIMITS

CFR 47 FCC §15.225(e)
ISED RSS-210 Annex B B.6

The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency over a temperature variation of −20 degrees to + 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

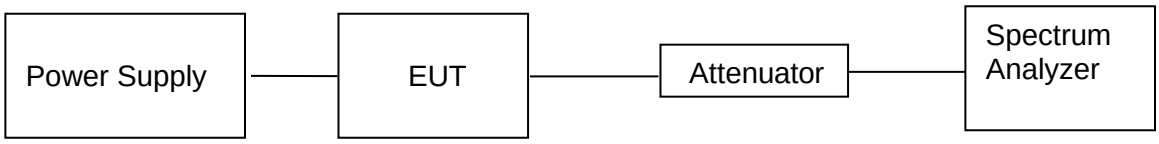
TEST SETUP AND PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The center frequency of the channel under test
Detector	PEAK
RBW	10KHz
VBW	≥3 × RBW
Span	Encompass the entire emissions bandwidth (EBW) of the signal
Trace	Max hold
Sweep time	Auto

Allow the trace to stabilize, find the peak value of the power envelope and record the frequency, then calculated the frequency drift.

TEST SETUP



TEST RESULTS

Maximum frequency error of the EUT with variations in ambient temperature

Temperature (°C)	Time after Start-up			
	0 minutes	2 minutes	5 minutes	10 minutes
-10	13.5606	13.5605	13.5609	13.5609
0	13.5607	13.5608	13.5606	13.5606
10	13.5611	13.5609	13.5609	13.5604
20	13.5604	13.5606	13.5608	13.5608
30	13.5610	13.5606	13.5605	13.5604
40	13.5611	13.5610	13.5606	13.5604
45	13.5608	13.5612	13.5610	13.5607
Maximum frequency error	0.0081%	0.0088%	0.0081%	0.0066%
Limit	0.01%			
Result	Pass	Pass	Pass	Pass

Maximum frequency error of the EUT with variations in nominal operating voltage at an ambient 20 degrees C temperature.

Supply Voltage (V)	Time after Start-up			
	0 minutes	2 minutes	5 minutes	10 minutes
AC 408V	13.5611	13.5606	13.5605	13.5608
AC 480V	13.5608	13.5609	13.5608	13.5609
AC 552V	13.5608	13.5610	13.5613	13.5608
Maximum frequency error	0.0081%	0.0074%	0.0096%	0.0081%
Limit	0.01%			
Result	Pass	Pass	Pass	Pass

7. RADIATED EMISSION TEST RESULTS

LIMITS

Fundamental field strength

FCC Reference:	Part 15.225(a)(b)(c)(d) & 15.209(a)
ISED Canada Reference:	RSS-Gen 6.13 & RSS-210 B.6 & RSS-GEN Clause 8.9
Test Method Used:	ANSI C63.10 Sections 6.3, 6.4 and 6.5

Frequency (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measured Distance (Meters)
13.553-13.567	15848	84	30
13.410-13.553/13.567-13.710	334	50.47	30
13.110-13.410/13.710-14.010	106	40.51	30

Note(s):
1. The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

2. The limit is specified at a test distance of 30 meters. However, as specified by FCC Section 15.31 (f)(2), measurements may be performed at a closer distance and the measured level corrected to the specified measurement distance by using the square of an inverse linear distance extrapolation factor (40dB/decade).

Radiation Disturbance Test Limit for FCC (Class B) (9KHz-1GHz)

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
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
960~1000	500	3

ISED General field strength limits at frequencies below 30 MHz

Table 6 – General field strength limits at frequencies below 30 MHz

Frequency	Magnetic field strength (H-Field) (µA/m)	Measurement distance (m)
9 - 490 kHz[Note 1]	6.37/F (F in kHz)	300
490 - 1705 kHz	63.7/F (F in kHz)	30
1.705 - 30 MHz	0.08	30

Note 1: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

Note: 1) At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 meters unless it can be further demonstrated that measurements at a distance of 30 meters or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).

(2) At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). This paragraph (f) shall not apply to Access BPL devices operating below 30MHz.

Restricted bands of operation

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
[1]0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	([2])
13.36-13.41			

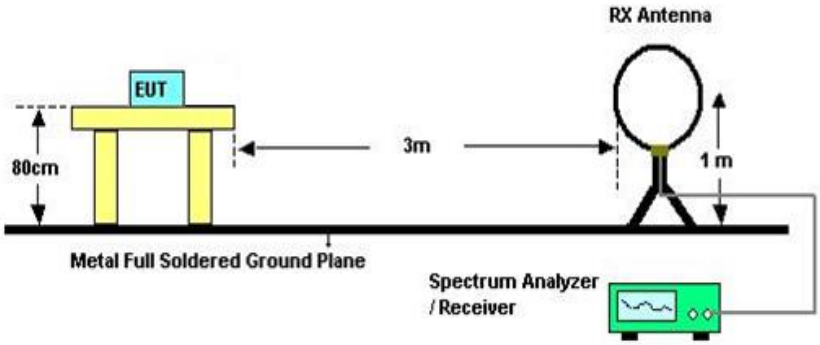
Note: [1]Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
[2]Above 38.6c

Table 7 – Restricted frequency bands[Note 1]		
MHz	MHz	GHz
0.090 - 0.110	149.9 - 150.05	9.0 - 9.2
0.495 - 0.505	156.52475 - 156.52525	9.3 - 9.5
2.1735 - 2.1905	156.7 - 156.9	10.6 - 12.7
3.020 - 3.026	162.0125 - 167.17	13.25 - 13.4
4.125 - 4.128	167.72 - 173.2	14.47 - 14.5
4.17725 - 4.17775	240 – 285	15.35 - 16.2
4.20725 - 4.20775	322 - 335.4	17.7 - 21.4
5.677 - 5.683	399.9 - 410	22.01 - 23.12
6.215 - 6.218	608 - 614	23.6 - 24.0
6.26775 - 6.26825	960 - 1427	31.2 - 31.8
6.31175 - 6.31225	1435 - 1626.5	36.43 - 36.5
8.291 - 8.294	1645.5 - 1646.5	Above 38.6
8.362 - 8.366	1660 - 1710	
8.37625 - 8.38675	1718.8 - 1722.2	
8.41425 - 8.41475	2200 - 2300	
12.29 - 12.293	2310 - 2390	
12.51975 - 12.52025	2483.5 - 2500	
12.57675 - 12.57725	2655 - 2900	
13.36 - 13.41	3260 – 3267	
16.42 - 16.423	3332 - 3339	
16.69475 - 16.69525	3345.8 - 3358	
16.80425 - 16.80475	3500 - 4400	
25.5 - 25.67	4500 - 5150	
37.5 - 38.25	5350 - 5460	
73 - 74.6	7250 - 7750	
74.8 - 75.2	8025 – 8500	
108 – 138		

Note 1: Certain frequency bands listed in table 7 and in bands above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to related devices are set out in the 200 and 300 series of RSSs.

TEST SETUP AND PROCEDURE

Below 30MHz



The setting of the spectrum analyser

RBW	200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)
VBW	200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)
Sweep	Auto
Detector	Peak/QP/ Average
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.

2. The EUT was arranged to its worst case and then turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both Horizontal, Face-on and Face-off polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 80cm meter above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a 1m height antenna tower.

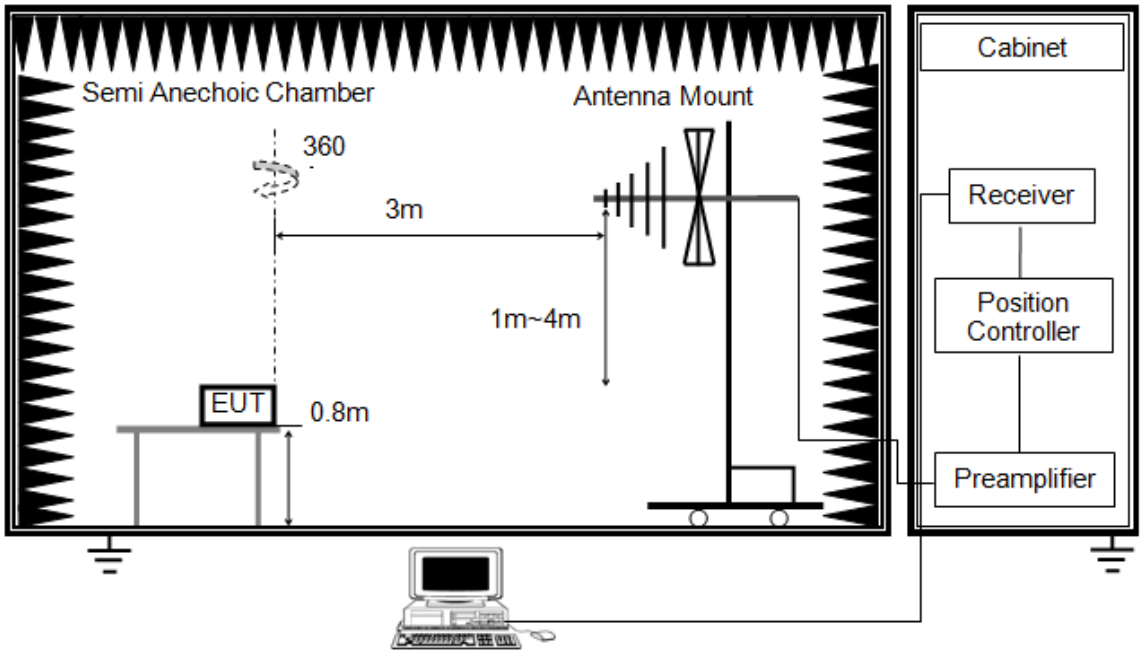
5. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

6. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

7. The radiated emission limits are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

8. Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30m open field site. Therefore, the sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

Below 1G



The setting of the spectrum analyser

RBW	120K
VBW	300K
Sweep	Auto
Detector	Peak/QP
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.

2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 80cm above ground.

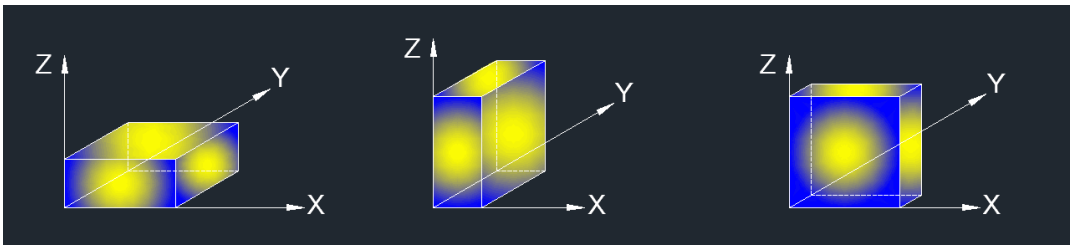
4. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

5. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

6. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

7. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.

X axis, Y axis, Z axis positions:



Note 1: For all radiated test, EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

TEST ENVIRONMENT

Temperature	23.2 °C	Relative Humidity	63 %
Atmosphere Pressure	101kPa	Test Voltage	AC 480 V, 60 Hz

RESULTS

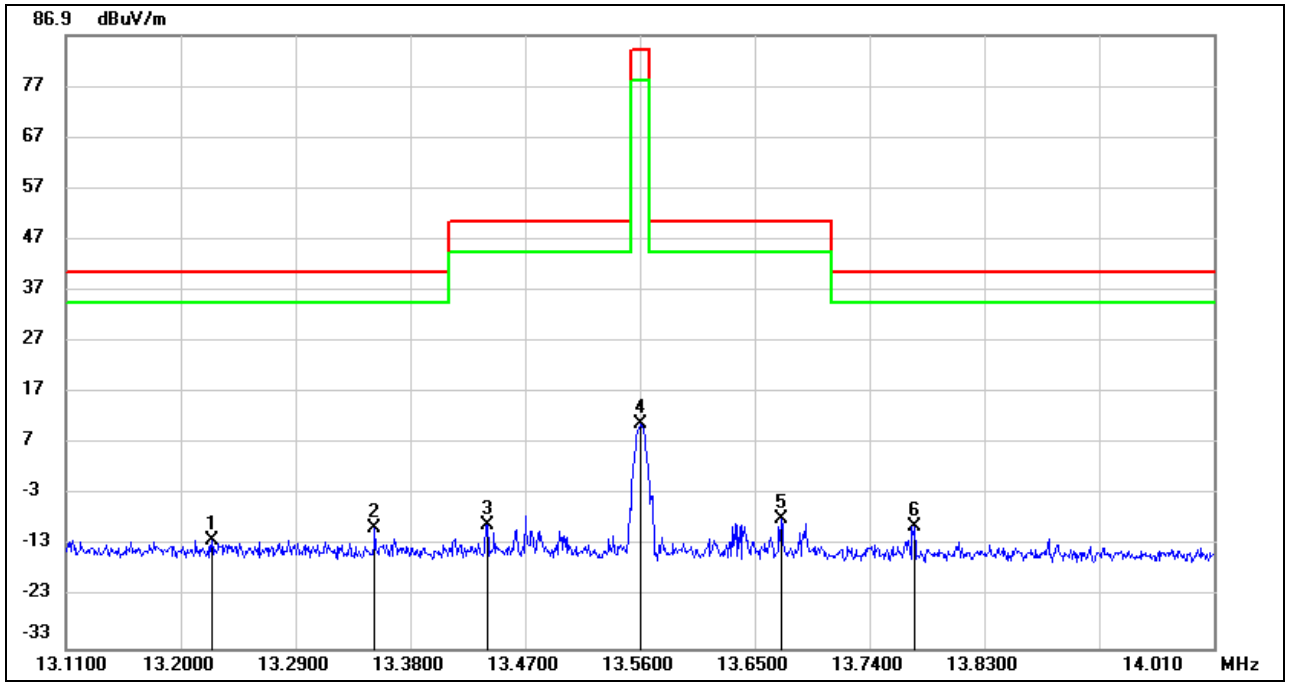
Note:
Simultaneously transmission condition:

Condition	Technology	
1	NFC	BLE
2	NFC	WIFI 2.4G
3	NFC	3/4G

Note:
1. The emission of the simultaneous operation has been evaluated and no non-compliance was found.
2. We have pre-tested all conditions, and no worst emissions were found.
3. Consider the NFC frequency band is far from BT/WIFI/3/4G frequency band, only the NFC test data recorded in the report.
4. BLE + WIFI 2.4G, BLE + 3/4G, WIFI 2.4G + 3/4G, BLE + WIFI 2.4G + 3/4G cannot support simultaneous transmission.

7.1. FIELD STRENGTH OF INTENTIONAL EMISSIONS

FIELD STRENGTH OF INTENTIONAL EMISSIONS (LOOP ANTENNA FACE ON TO THE EUT)

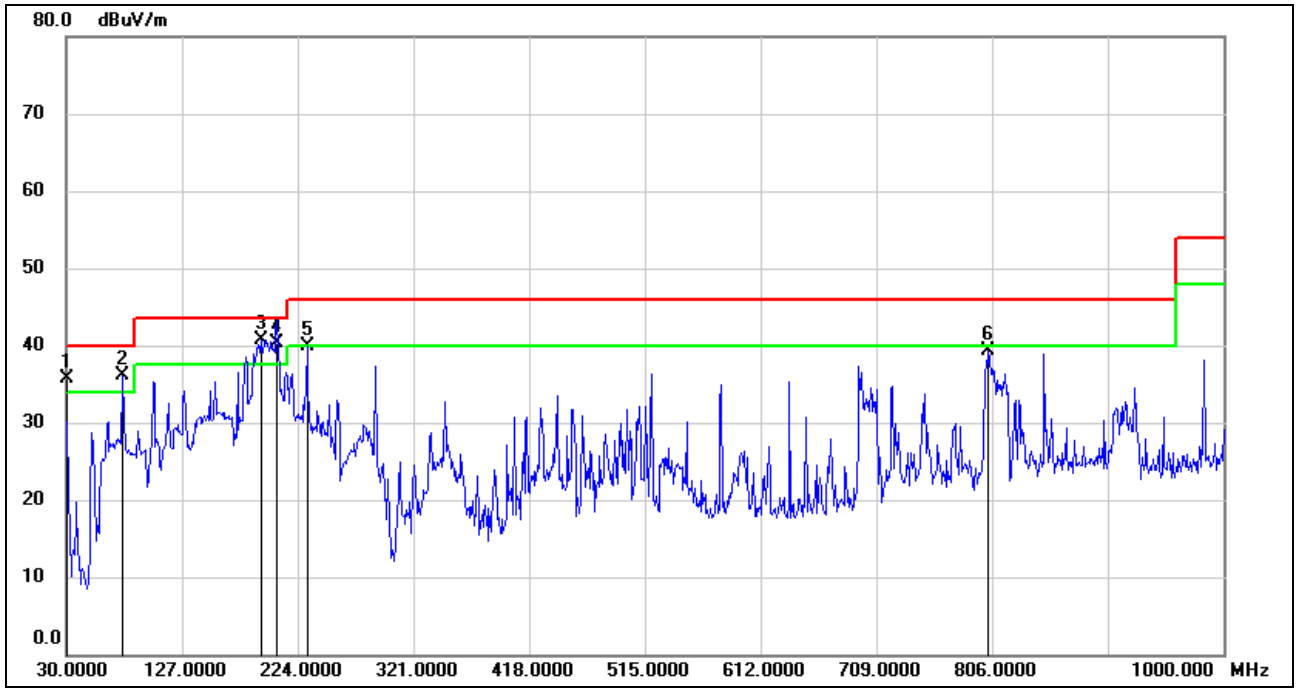


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	13.2242	35.45	-47.36	-11.91	40.51	-52.42	peak
2	13.3521	37.75	-47.37	-9.62	40.51	-50.13	peak
3	13.4403	38.55	-47.37	-8.82	50.47	-59.29	peak
4	13.5609	58.14	-47.36	10.78	84.00	-73.22	peak
5	13.6707	39.62	-47.36	-7.74	50.47	-58.21	peak
6	13.7751	38.03	-47.37	-9.34	40.51	-49.85	peak

Note: 1. Result Level = Read Level + Correct Factor.
2. All 3 polarizations (Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.
3. The test result is for 30m, the distance extrapolation factor (40dB/decade) has been considered in the test result.

7.2. SPURIOUS EMISSIONS BELOW 1GHz AND ABOVE 30MHz

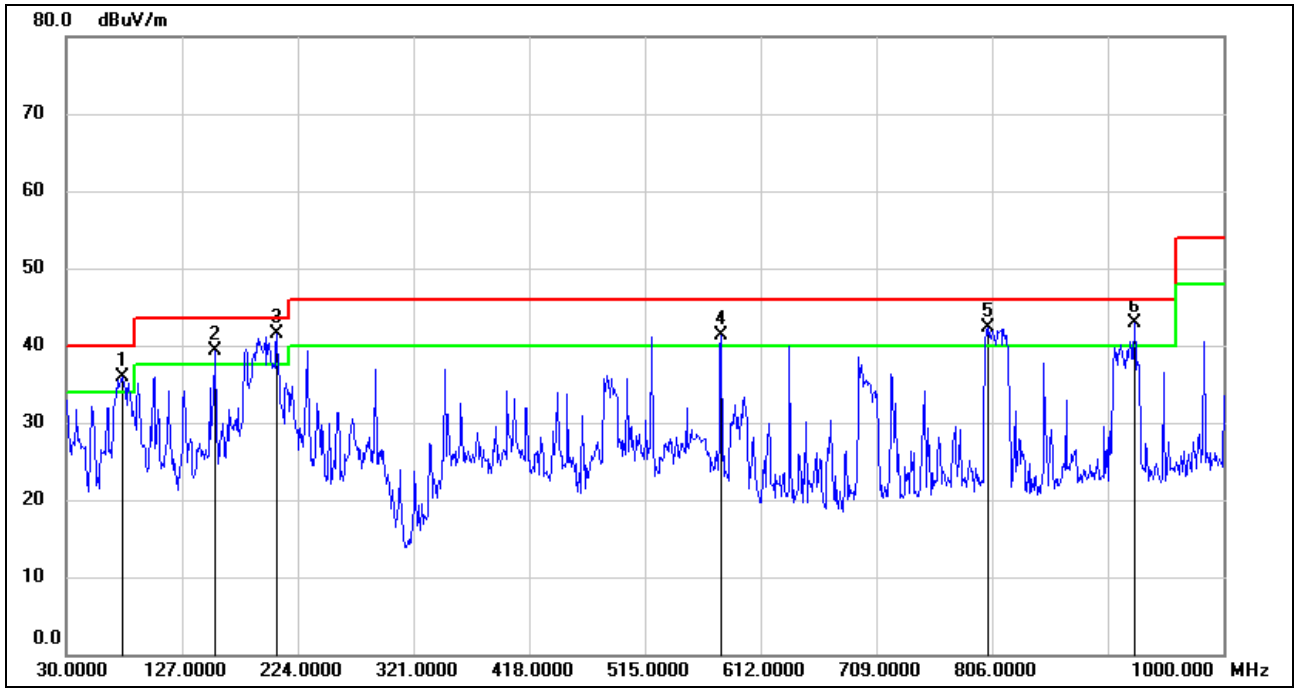
SPURIOUS EMISSIONS (HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	30.0000	49.99	-14.34	35.65	40.00	-4.35	QP
2	77.5300	52.42	-16.31	36.11	40.00	-3.89	QP
3	192.9600	52.29	-11.53	40.76	43.50	-2.74	QP
4	206.5399	52.30	-11.93	40.37	43.50	-3.13	QP
5	231.7600	53.26	-13.26	40.00	46.00	-6.00	QP
6	803.0900	41.41	-2.10	39.31	46.00	-6.69	QP

Note: 1. Result Level = Read Level + Correct Factor.

HARMONICS AND SPURIOUS EMISSIONS (VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	76.5600	52.17	-16.27	35.90	40.00	-4.10	QP
2	154.1600	51.89	-12.63	39.26	43.50	-4.24	QP
3	206.5399	53.37	-11.93	41.44	43.50	-2.06	QP
4	579.0200	47.45	-6.24	41.21	46.00	-4.79	QP
5	803.0900	44.37	-2.10	42.27	46.00	-3.73	QP
6	925.3100	44.07	-1.16	42.91	46.00	-3.09	QP

Note: 1. Result Level = Read Level + Correct Factor.

7.3. SPURIOUS EMISSIONS BELOW 30MHz

SPURIOUS EMISSIONS (LOOP ANTENNA FACE ON TO THE EUT)

9 kHz~ 150 kHz

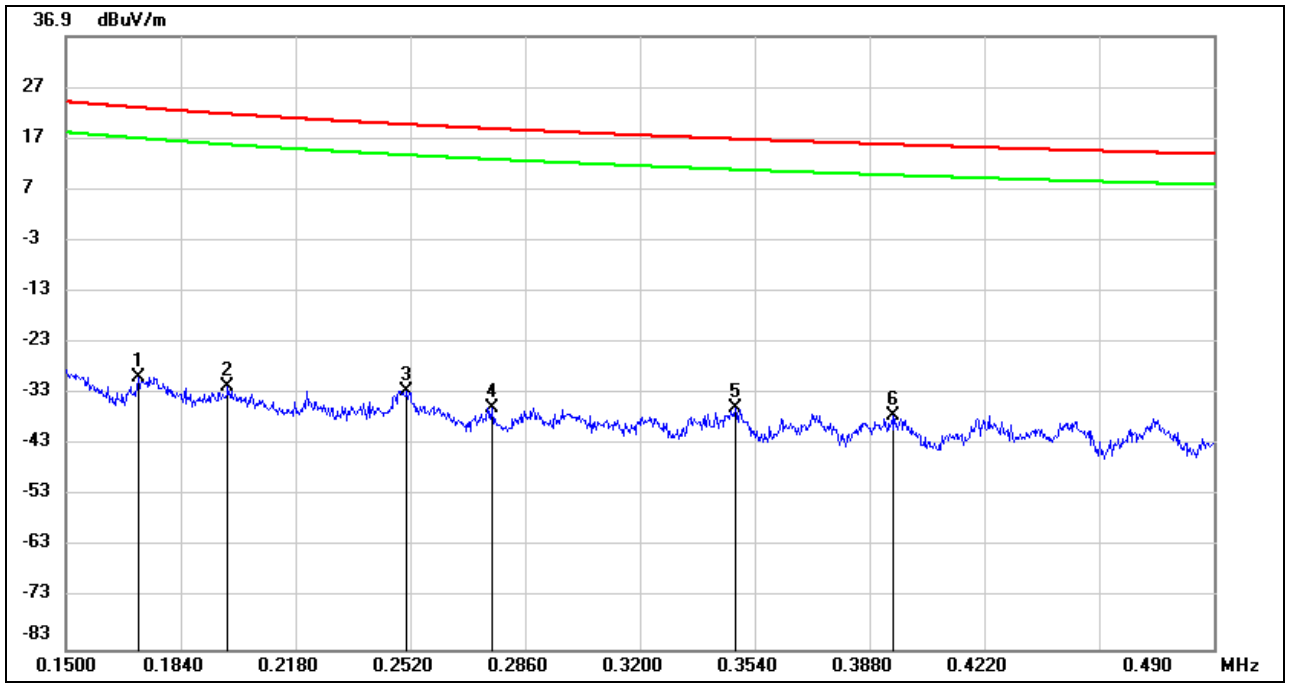
No.	Frequency	Reading	Correct	FCC Result	FCC Limit	ISED Result	ISED Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dBuA/m)	(dBuA/m)	(dB)	
1	0.0097	65.03	-87.80	-22.77	47.82	-74.27	-3.68	-70.59	peak
2	0.0334	67.93	-88.15	-20.22	37.13	-71.72	-14.37	-57.35	peak
3	0.0482	65.52	-88.64	-23.12	33.94	-74.62	-17.56	-57.06	peak
4	0.0802	55.62	-88.26	-32.64	29.52	-84.14	-21.98	-62.16	peak
5	0.0871	56.15	-88.34	-32.19	28.8	-83.69	-22.70	-60.99	peak
6	0.0998	54.84	-88.50	-33.66	27.62	-85.16	-23.88	-61.28	peak

Note: 1. Measurement = Reading Level + Correct Factor (dBuA/m= dBuV/m- 20Log10[120π] = dBuV/m- 51.5).

2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.

3. All 3 polarizations (Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.

150 kHz ~ 490 kHz



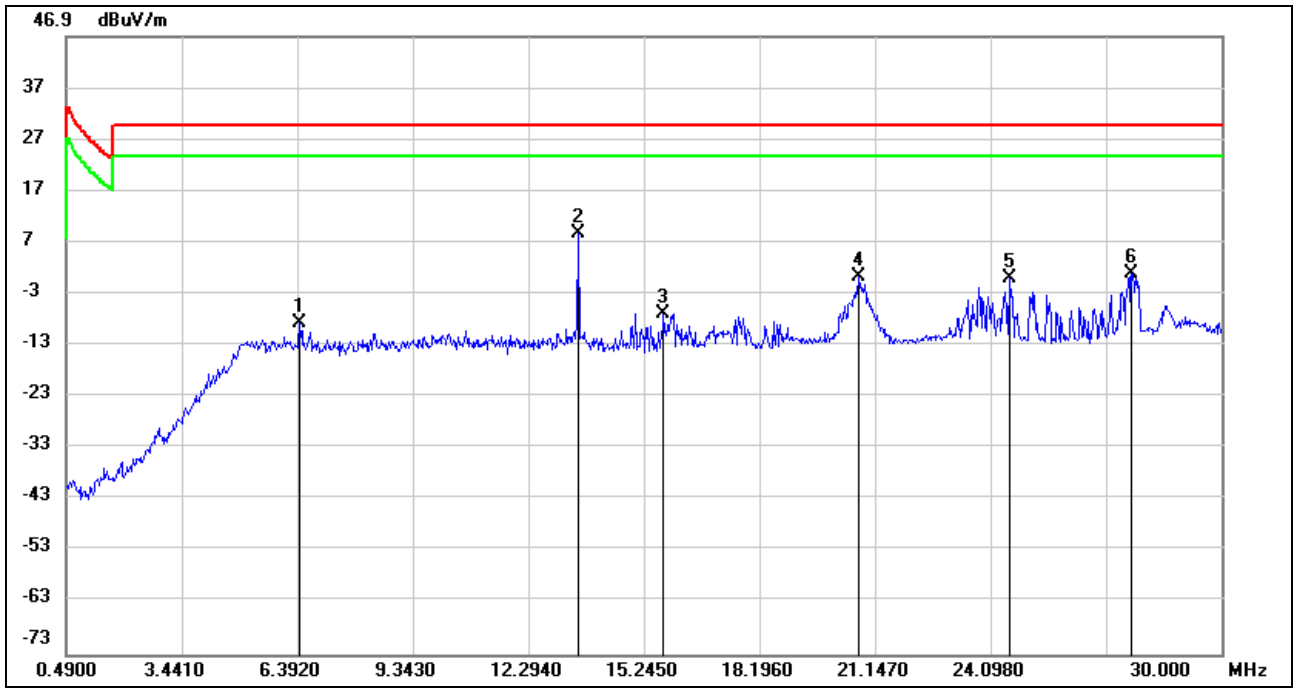
No.	Frequency	Reading	Correct	FCC Result	FCC Limit	ISED Result	ISED Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dBuA/m)	(dBuA/m)	(dB)	
1	0.1714	59.30	-89.12	-29.82	22.93	-81.32	-28.57	-52.75	peak
2	0.1979	57.57	-89.10	-31.53	21.67	-83.03	-29.83	-53.20	peak
3	0.2510	56.60	-89.08	-32.48	19.61	-83.98	-31.89	-52.09	peak
4	0.2761	53.31	-89.08	-35.77	18.78	-87.27	-32.72	-54.55	peak
5	0.3482	53.15	-89.06	-35.91	16.77	-87.41	-34.73	-52.68	peak
6	0.3948	51.80	-89.04	-37.24	15.67	-88.74	-35.83	-52.91	peak

Note: 1. Measurement = Reading Level + Correct Factor (dBuA/m= dBuV/m- 20Log10[120π] = dBuV/m- 51.5).

2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.

3. All 3 polarizations (Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.

490kHz ~ 30MHz



No.	Frequency	Reading	Correct	FCC Result	FCC Limit	ISED Result	ISED Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dBuA/m)	(dBuA/m)	(dB)	
1	6.4509	39.43	-48.22	-8.79	29.54	-60.29	-21.96	-38.33	peak
2	13.5629	55.87	-47.36	8.51	/	-42.99	/	/	fundamental
3	15.7466	40.37	-47.24	-6.87	29.54	-58.37	-21.96	-36.41	peak
4	20.7337	46.70	-46.59	0.11	29.54	-51.39	-21.96	-29.43	peak
5	24.5701	46.33	-46.51	-0.18	29.54	-51.68	-21.96	-29.72	peak
6	27.6981	47.12	-46.34	0.78	29.54	-50.72	-21.96	-28.76	peak

Note: 1. Measurement = Reading Level + Correct Factor (dBuA/m= dBuV/m- 20Log10[120π] = dBuV/m- 51.5).

2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.

3. All 3 polarizations (Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.

4. About the Fundamental emission test result please refer to section 7.1.

8. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

Please refer to CFR 47 FCC §15.207 (a).

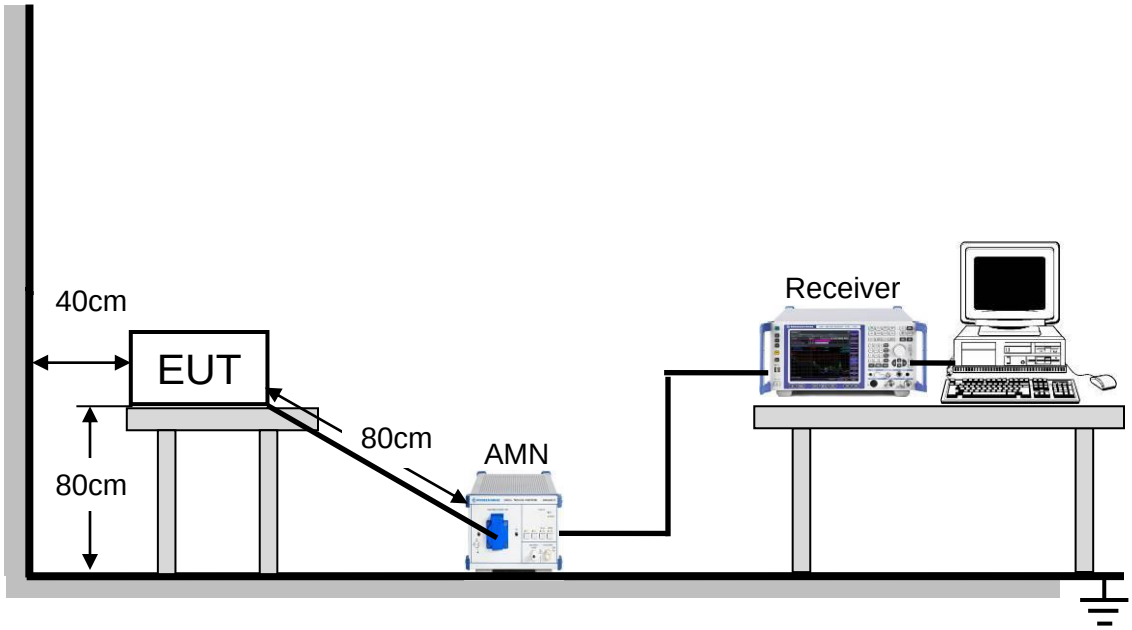
FREQUENCY (MHz)	Quasi-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

Note:

(1) The tighter limit applies at the band edges.

(2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

TEST SETUP AND PROCEDURE



The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

1. The testing follows the guidelines in ANSI C63.10-2013.

2. The EUT was placed on the top of a rotating table 0.8 meters above the horizontal ground plane and being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.

3. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

4. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

5. LISN at least 80 cm from nearest part of EUT chassis.

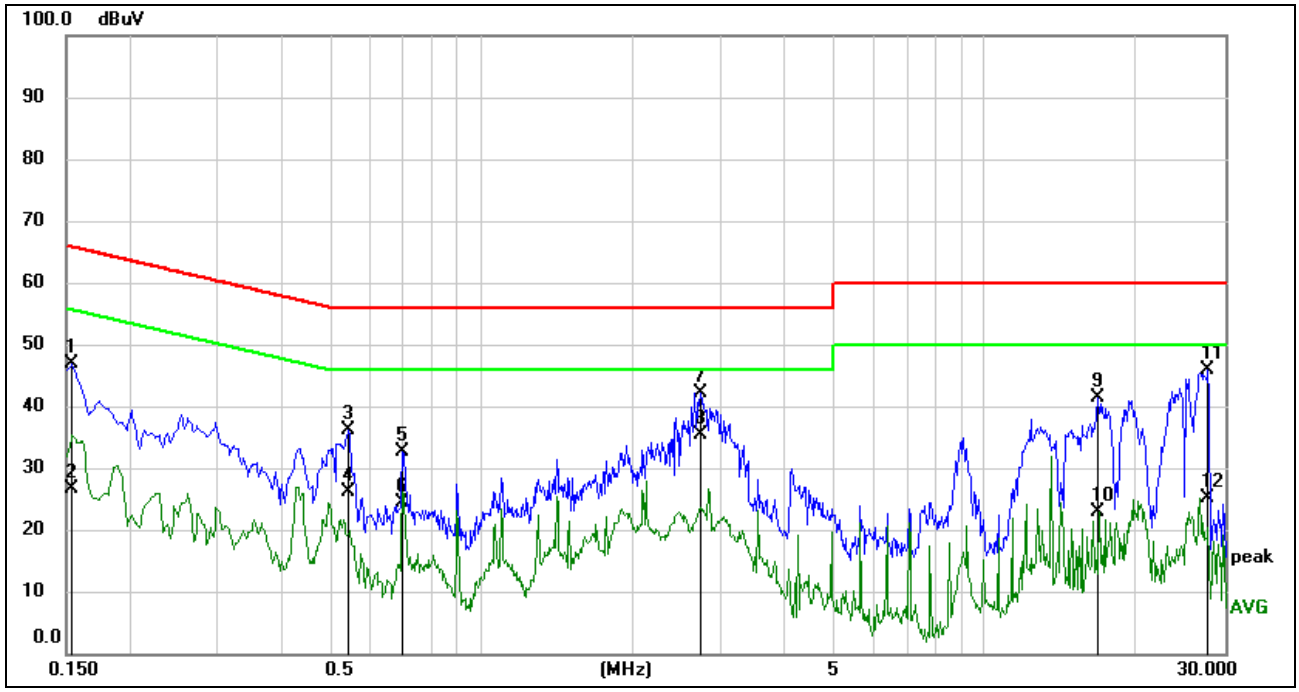
6. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode.

7. The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application.

TEST ENVIRONMENT

Temperature	22.4°C	Relative Humidity	46%
Atmosphere Pressure	101kPa	Test Voltage	AC 480V_60Hz

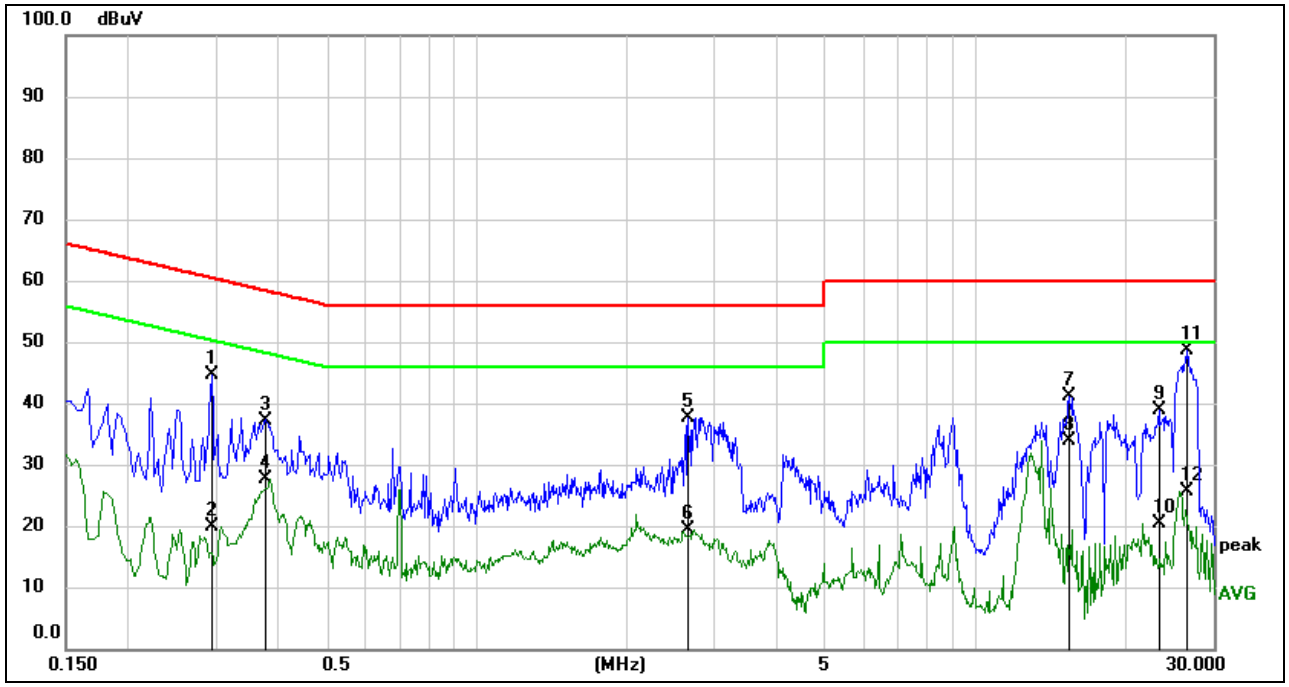
LINE N RESULTS with modified sample (transmitter terminated into a dummy load)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1539	46.42	0.46	46.88	65.79	-18.91	QP
2	0.1539	26.21	0.46	26.67	55.79	-29.12	AVG
3	0.5460	35.82	0.37	36.19	56.00	-19.81	QP
4	0.5460	25.66	0.37	26.03	46.00	-19.97	AVG
5	0.6976	32.23	0.41	32.64	56.00	-23.36	QP
6	0.6976	24.03	0.41	24.44	46.00	-21.56	AVG
7	2.7300	41.59	0.47	42.06	56.00	-13.94	QP
8	2.7300	34.90	0.47	35.37	46.00	-10.63	AVG
9	16.8379	40.37	1.04	41.41	60.00	-18.59	QP
10	16.8379	21.76	1.04	22.80	50.00	-27.20	AVG
11	27.7340	44.27	1.51	45.78	60.00	-14.22	QP
12	27.7340	23.50	1.51	25.01	50.00	-24.99	AVG

Note: 1. Result = Reading +Correct Factor.
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.

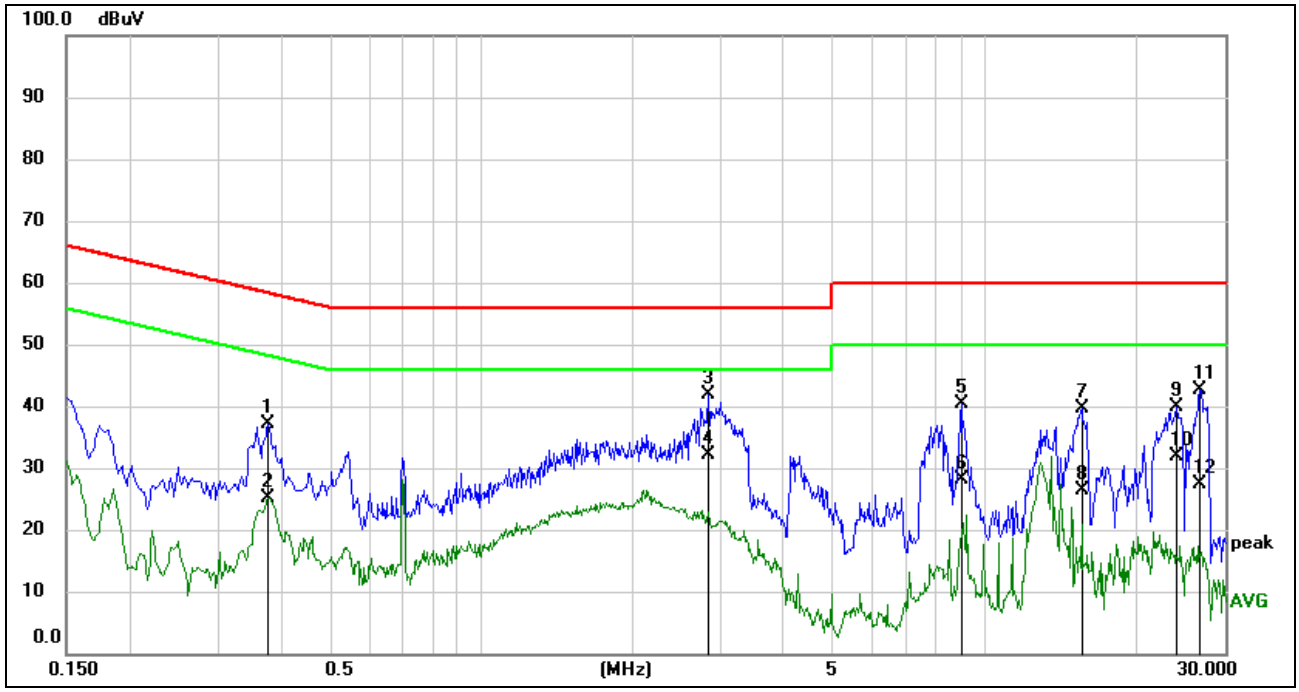
LINE L1 RESULTS with modified sample (transmitter terminated into a dummy load)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.2939	44.36	0.33	44.69	60.41	-15.72	QP
2	0.2939	19.44	0.33	19.77	50.41	-30.64	AVG
3	0.3780	36.96	0.29	37.25	58.32	-21.07	QP
4	0.3780	27.30	0.29	27.59	48.32	-20.73	AVG
5	2.6538	37.18	0.47	37.65	56.00	-18.35	QP
6	2.6538	18.80	0.47	19.27	46.00	-26.73	AVG
7	15.4300	40.09	0.94	41.03	60.00	-18.97	QP
8	15.4300	32.92	0.94	33.86	50.00	-16.14	AVG
9	23.2700	37.60	1.38	38.98	60.00	-21.02	QP
10	23.2700	19.00	1.38	20.38	50.00	-29.62	AVG
11	26.5979	47.09	1.47	48.56	60.00	-11.44	QP
12	26.5979	24.11	1.47	25.58	50.00	-24.42	AVG

Note: 1. Result = Reading +Correct Factor.
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.

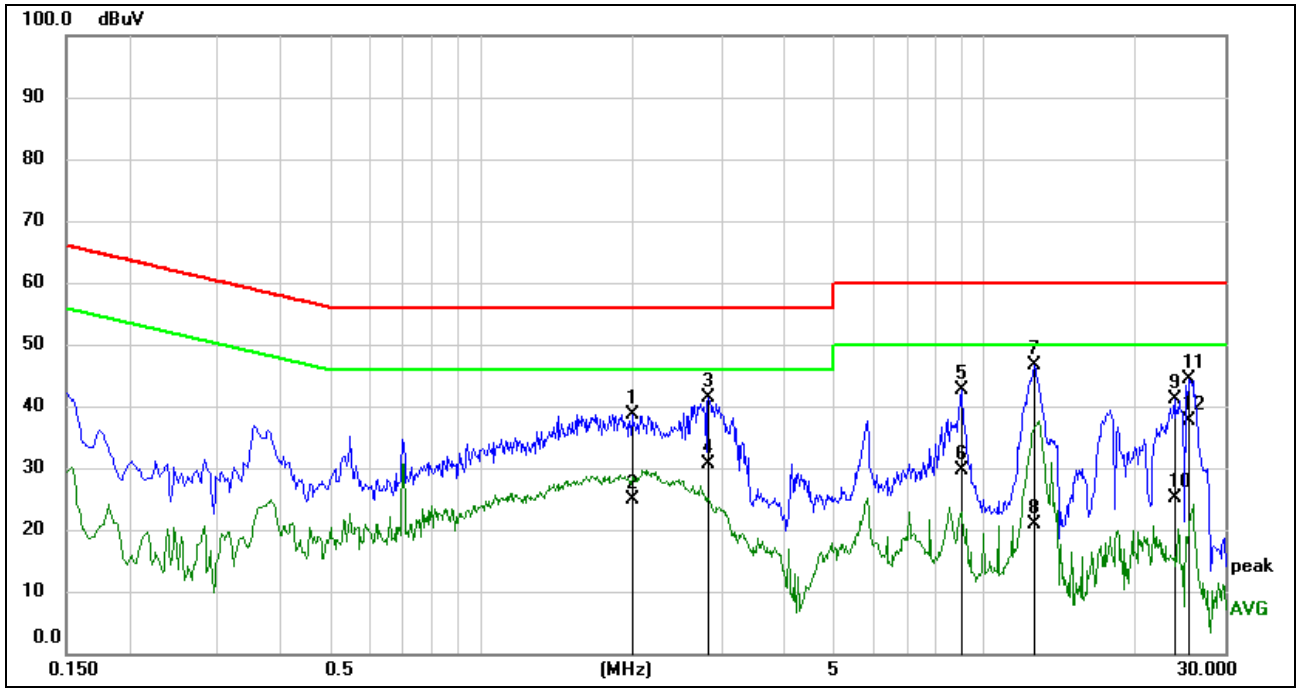
LINE L2 RESULTS with modified sample (transmitter terminated into a dummy load)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.3780	36.87	0.29	37.16	58.32	-21.16	QP
2	0.3780	24.80	0.29	25.09	48.32	-23.23	AVG
3	2.8340	41.42	0.47	41.89	56.00	-14.11	QP
4	2.8340	31.62	0.47	32.09	46.00	-13.91	AVG
5	8.9700	39.63	0.82	40.45	60.00	-19.55	QP
6	8.9700	27.23	0.82	28.05	50.00	-21.95	AVG
7	15.6138	38.60	0.96	39.56	60.00	-20.44	QP
8	15.6138	25.51	0.96	26.47	50.00	-23.53	AVG
9	24.0259	38.40	1.40	39.80	60.00	-20.20	QP
10	24.0259	30.52	1.40	31.92	50.00	-18.08	AVG
11	26.8260	41.18	1.49	42.67	60.00	-17.33	QP
12	26.8260	25.78	1.49	27.27	50.00	-22.73	AVG

Note: 1. Result = Reading +Correct Factor.
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.

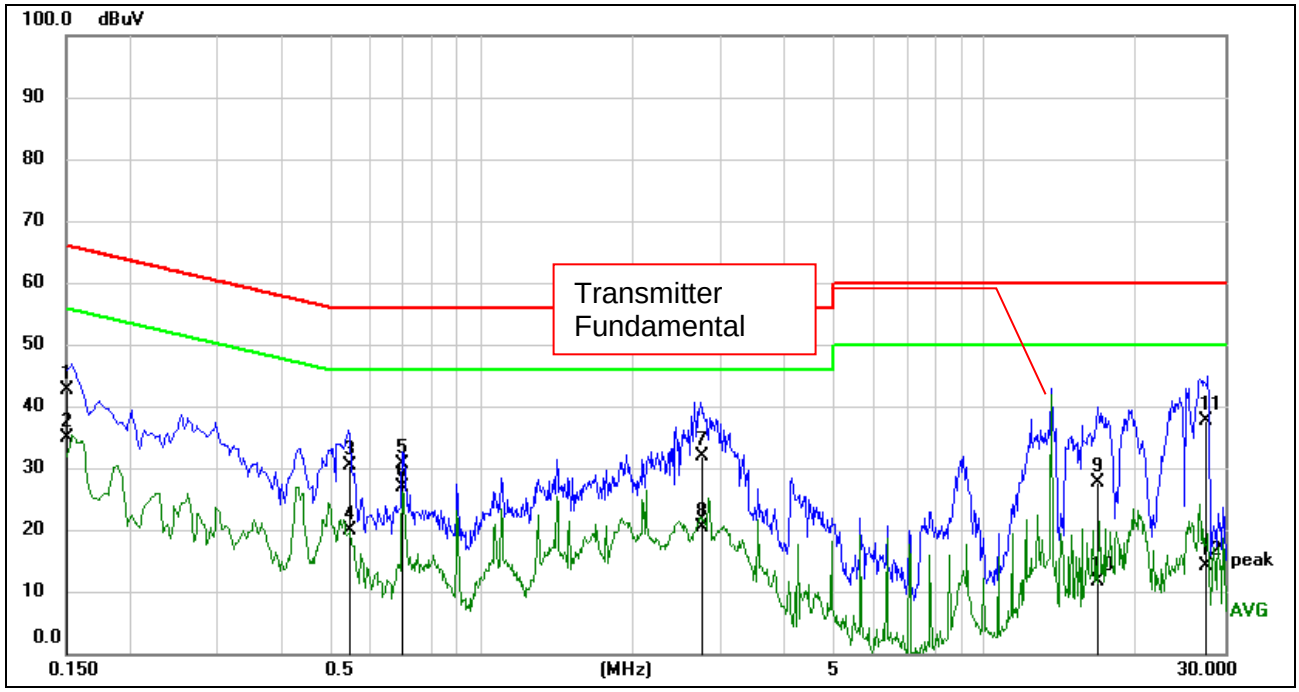
LINE L3 RESULTS with modified sample (transmitter terminated into a dummy load)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	1.9939	38.28	0.43	38.71	56.00	-17.29	QP
2	1.9939	24.45	0.43	24.88	46.00	-21.12	AVG
3	2.8340	40.81	0.47	41.28	56.00	-14.72	QP
4	2.8340	30.16	0.47	30.63	46.00	-15.37	AVG
5	8.9818	41.92	0.82	42.74	60.00	-17.26	QP
6	8.9818	28.76	0.82	29.58	50.00	-20.42	AVG
7	12.5500	45.67	0.88	46.55	60.00	-13.45	QP
8	12.5500	19.92	0.88	20.80	50.00	-29.20	AVG
9	23.8779	39.72	1.40	41.12	60.00	-18.88	QP
10	23.8779	23.81	1.40	25.21	50.00	-24.79	AVG
11	25.5700	42.86	1.44	44.30	60.00	-15.70	QP
12	25.5700	36.16	1.44	37.60	50.00	-12.40	AVG

Note: 1. Result = Reading +Correct Factor.
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.

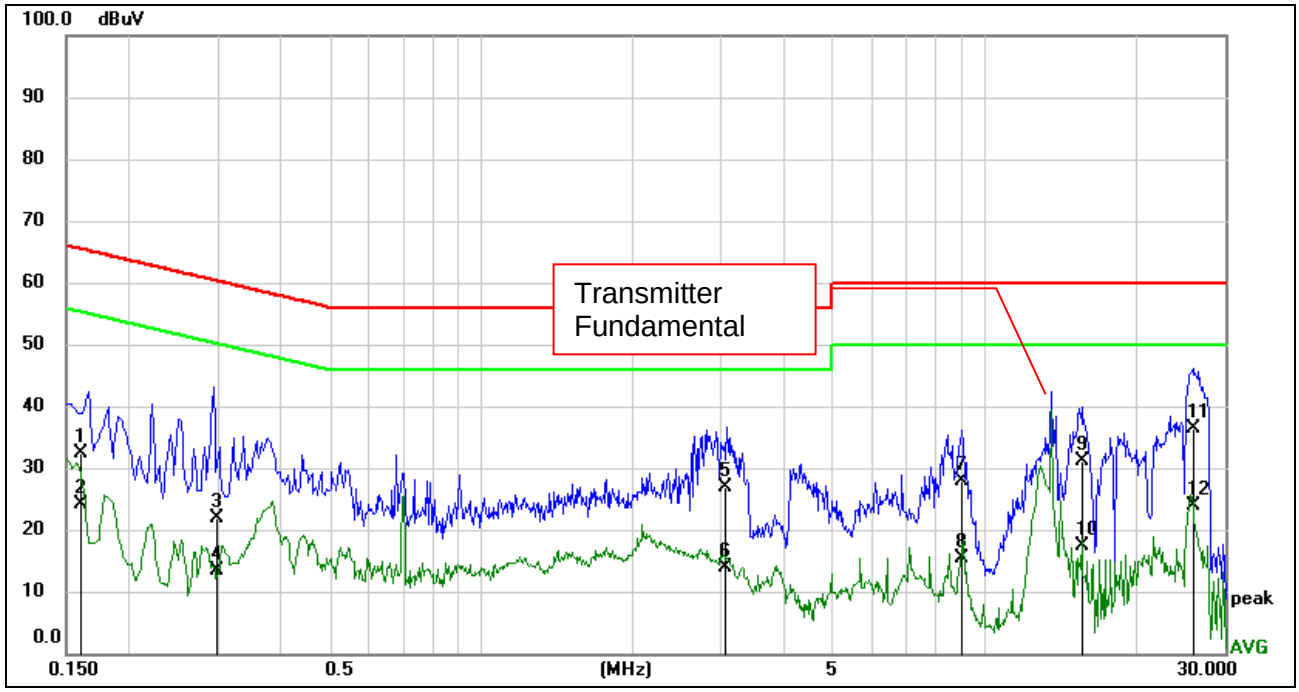
LINE N RESULTS with unmodified sample (antenna present)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1507	42.12	0.47	42.59	65.96	-23.37	QP
2	0.1507	34.30	0.47	34.77	55.96	-21.19	AVG
3	0.5472	29.94	0.37	30.31	56.00	-25.69	QP
4	0.5472	19.51	0.37	19.88	46.00	-26.12	AVG
5	0.7000	30.33	0.41	30.74	56.00	-25.26	QP
6	0.7000	26.45	0.41	26.86	46.00	-19.14	AVG
7	2.7528	31.50	0.47	31.97	56.00	-24.03	QP
8	2.7528	20.02	0.47	20.49	46.00	-25.51	AVG
9	16.8386	26.55	1.04	27.59	60.00	-32.41	QP
10	16.8386	10.50	1.04	11.54	50.00	-38.46	AVG
11	27.6869	36.03	1.51	37.54	60.00	-22.46	QP
12	27.6869	12.50	1.51	14.01	50.00	-35.99	AVG

Note: 1. Result = Reading +Correct Factor.
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.

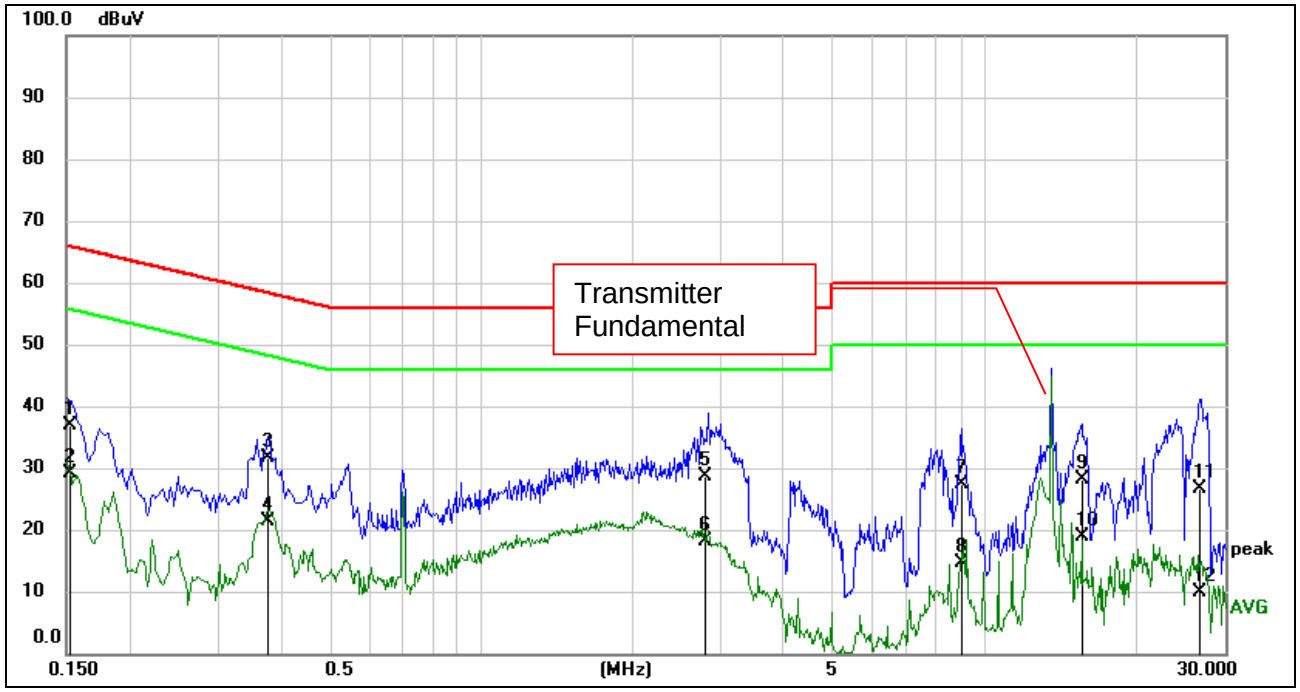
LINE L1 RESULTS with unmodified sample (antenna present)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1612	31.89	0.45	32.34	65.40	-33.06	QP
2	0.1612	23.57	0.45	24.02	55.40	-31.38	AVG
3	0.2986	21.59	0.33	21.92	60.28	-38.36	QP
4	0.2986	13.09	0.33	13.42	50.28	-36.86	AVG
5	3.0546	26.32	0.50	26.82	56.00	-29.18	QP
6	3.0546	13.36	0.50	13.86	46.00	-32.14	AVG
7	9.0536	27.15	0.82	27.97	60.00	-32.03	QP
8	9.0536	14.65	0.82	15.47	50.00	-34.53	AVG
9	15.6164	30.26	0.96	31.22	60.00	-28.78	QP
10	15.6164	16.42	0.96	17.38	50.00	-32.62	AVG
11	25.8836	35.04	1.46	36.50	60.00	-23.50	QP
12	25.8836	22.46	1.46	23.92	50.00	-26.08	AVG

Note: 1. Result = Reading +Correct Factor.
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.

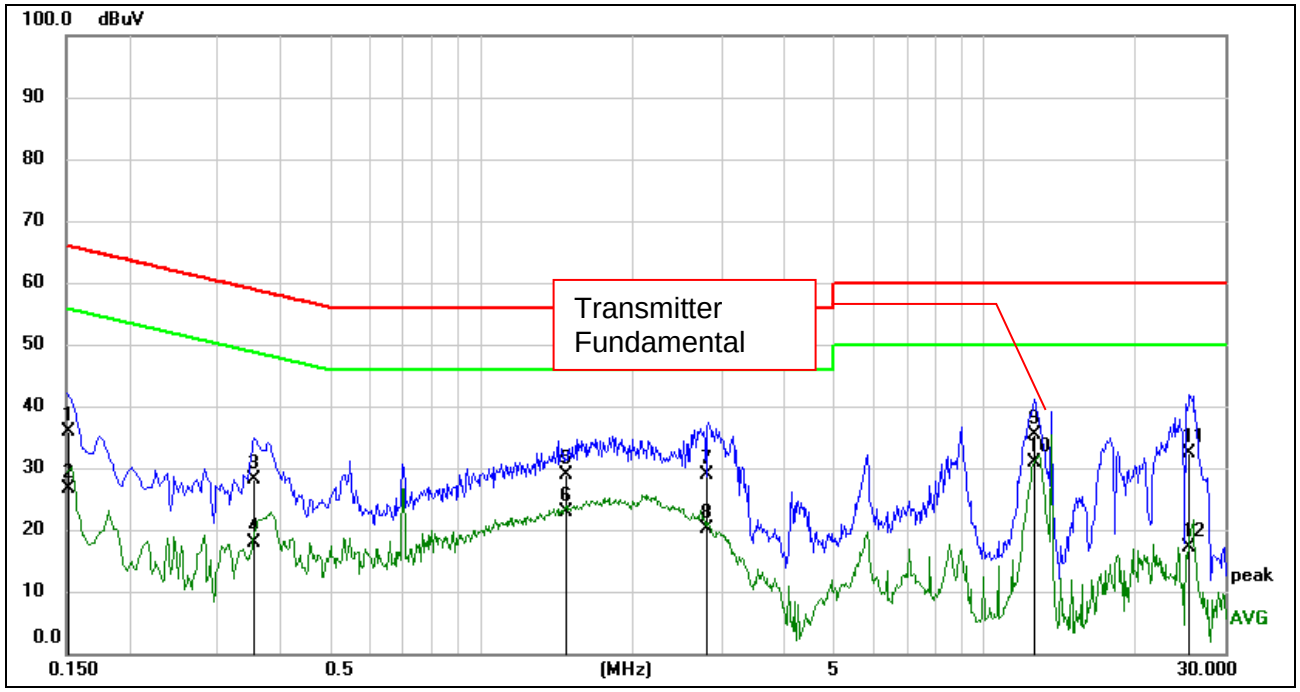
LINE L2 RESULTS with unmodified sample (antenna present)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1524	36.29	0.47	36.76	65.87	-29.11	QP
2	0.1524	28.55	0.47	29.02	55.87	-26.85	AVG
3	0.3752	31.42	0.29	31.71	58.39	-26.68	QP
4	0.3752	21.21	0.29	21.50	48.39	-26.89	AVG
5	2.7805	28.15	0.47	28.62	56.00	-27.38	QP
6	2.7805	17.69	0.47	18.16	46.00	-27.84	AVG
7	9.0269	26.45	0.82	27.27	60.00	-32.73	QP
8	9.0269	13.70	0.82	14.52	50.00	-35.48	AVG
9	15.6157	27.18	0.96	28.14	60.00	-31.86	QP
10	15.6157	17.97	0.96	18.93	50.00	-31.07	AVG
11	26.8809	25.03	1.49	26.52	60.00	-33.48	QP
12	26.8809	8.49	1.49	9.98	50.00	-40.02	AVG

Note: 1. Result = Reading +Correct Factor.
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.

LINE L3 RESULTS with unmodified sample (antenna present)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1519	35.37	0.47	35.84	65.90	-30.06	QP
2	0.1519	26.25	0.47	26.72	55.90	-29.18	AVG
3	0.3530	27.94	0.30	28.24	58.89	-30.65	QP
4	0.3530	17.67	0.30	17.97	48.89	-30.92	AVG
5	1.4707	28.48	0.44	28.92	56.00	-27.08	QP
6	1.4707	22.43	0.44	22.87	46.00	-23.13	AVG
7	2.8083	28.40	0.47	28.87	56.00	-27.13	QP
8	2.8083	19.59	0.47	20.06	46.00	-25.94	AVG
9	12.5904	34.57	0.88	35.45	60.00	-24.55	QP
10	12.5904	30.09	0.88	30.97	50.00	-19.03	AVG
11	25.6508	31.05	1.45	32.50	60.00	-27.50	QP
12	25.6508	15.64	1.45	17.09	50.00	-32.91	AVG

Note: 1. Result = Reading +Correct Factor.
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.

9. ANTENNA REQUIREMENTS

APPLICABLE REQUIREMENTS

Please refer to FCC §15.203
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

RESULTS

Complies

END OF REPORT