FCC TEST REPORT
No. 160502248SHA-001

Applicant	:	Qingdao Richriver Electrics Co., Ltd. No. 43 Yanqing Rd, Jimo Qingdao, China
Manufacturer	:	Qingdao Richriver Electrics Co., Ltd. No. 43 Yanqing Rd, Jimo Qingdao, China
Product Name	:	Remote control module
Type/Model	:	HJC0
TEST RESULT	**:**	**PASS**

SUMMARY

The equipment complies with the requirements according to the following standard(s) or specification:

47CFR Part 15 (2015): Radio Frequency Devices (Subpart C)

ANSI C63.10 (2013): American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

Date of issue: July 12, 2016

Prepared by: Reviewed by:

Nemo Li (*Project Engineer*) Daniel Zhao (*Reviewer*)

Description of Test Facility

Name: Intertek Testing Service Limited Shanghai
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IC Assigned Code: 2402B-1

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Content

1 GENERAL INFORMATION

1.1 Description of Client

Applicant : Qingdao Richriver Electrics Co., Ltd
No. 43 Yanqing Rd, Jimo Qingdao, China

Manufacturer : Qingdao Richriver Electrics Co., Ltd
No. 43 Yanqing Rd, Jimo Qingdao, China

1.2 Identification of the EUT

Product Name : Remote control module
Type/model : HJC0
FCC ID : 2AJJGHJC0

1.3 Technical Specification

Operation Frequency Band	:	2405-2480MHz
Type of Modulation	:	FSK
Channel Number	:	151 channels, with 0.5MHz channel separation.
Description of EUT	:	EUT is a remote control module, it was used in the remote controller. It was tested in the remote controller with models of HJH8B, HJH29, HJH37, HJH39, HJH51, HJH13, HJH26, HJH12 and HJH55.
Port identification	:	None
Antenna	:	PCB antenna, 0dBi
Rating	:	DC 3.3V
EUT type	:	☒ Table top ☐ Floor standing
Sample received date	:	May 23, 2016
Date of test	:	May 23, 2016 ~ July 12, 2016

2 TEST SPECIFICATIONS

2.1 Standards or specification

47CFR Part 15 (2015)
ANSI C63.10 (2013)

2.2 Mode of operation during the test

While testing transmitting mode of EUT, the internal modulation and continuously transmission was applied. It was set up and tested in three axes (X, Y and Z) as its normal use.

2.3 Test software list

Test Items	Software	Manufacturer	Version
Conducted emission	ESxS-K1	R&S	V2.1.0
Radiated emission	ES-K1	R&S	V1.71

2.4 Test peripherals list

Item No.	Name	Band and Model	Description
-	-	-	-
-	-	-	-

2.5 Instrument list

Selected	Instrument	EC no.	Model	Valid until date
☐	Shielded room	EC 2838	GB88	2017-1-8
☐	EMI test receiver	EC 2107	ESCS 30	2016-10-19
☐	A.M.N.	EC 3119	ESH2-Z5	2016-12-16
☐	A.M.N.	EC 3394	ENV 216	2016-8-1
☒	Semi anechoic chamber	EC 3048	-	2017-5-11
☒	EMI test receiver	EC 3045	ESIB26	2016-10-19
☐	Broadband antenna	EC 4206	CBL 6112D	2017-4-27
☒	Broadband antenna	EC 3046-1	HL562	2016-12-17
☒	Horn antenna	EC 3049	HF906	2017-4-27
☐	Horn antenna	EC 4792-1	3117	2017-4-21
☐	Horn antenna	EC 4792-3	HAP18-26W	2017-6-11
☒	Pre-amplifier	EC 5262	pre-amp 18	2017-5-25
☐	Pre-amplifier	EC 4792-2	TPA0118-40	2017-4-10
☐	Test Receiver	EC 4501	ESCI 7	2017-1-13
☐	PXA Signal Analyzer	EC5338	N9030A	2016-11-17
☐	Power sensor/Power meter	EC4318	N1911A/N1921A	2017-4-8
☐	Power sensor	EC5338-1	U2021XA	2017-3-5
☐	MXG Analog Signal Generator	EC5338-2	N5181A	2017-3-5
☐	MXG Vector Signal Generator	EC5175	N51812B	2017-1-8

2.6 Test Summary

This report applies to tested sample only. The test results have been compared directly with the limits, and the measurement uncertainty is recorded. This report shall not be reproduced in part without written approval of Intertek Testing Service Shanghai Limited.

TEST ITEM	FCC REFERANCE	RESULT
Radiated emission	15.249 & 15.209	Pass
Assigned bandwidth (20dB bandwidth)	15.215(c)	Pass
Power line conducted emission	15.207	NA

Notes: 1: NA =Not Applicable

2: This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.

3 Radiated emission

Test result: **Pass**

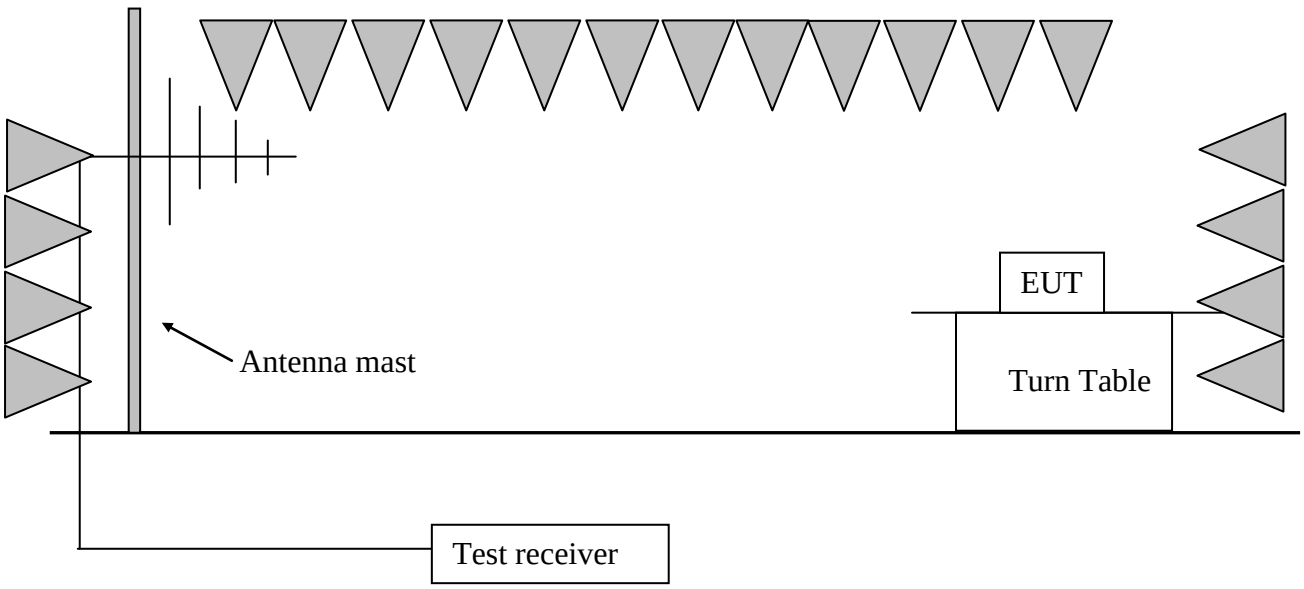
3.1 Test limit

Fundamental Frequency (MHz)	Fundamental limit (dBuV/m)	Harmonic limit (dBuV/m)
☐902 - 928	94	54
☒2400 - 2483.5	94	54
☐5725 - 5875	94	54
☐24000 - 24250	108	68

The radiated emissions which fall outside allocated band (2400-2483.5MHz), must also comply with the radiated emission limits specified in §15.209(a) showed as below:

Frequency (MHz)	Field Strength (dBuV/m)	Measurement Distance (m)
30 - 88	40.0	3
88 - 216	43.5	3
216 - 960	46.0	3
Above 960	54.0	3

3.2 Test Configuration



3.3 Test procedure and test setup

The measurement was applied in a semi-anechoic chamber. While testing for spurious emission higher than 1GHz, if applied, the pre-amplifier would be equipped just at the output terminal of the antenna.

Tabletop devices shall be placed on a nonconducting platform with nominal top surface dimensions 1 m by 1.5 m. For emissions testing at or below 1 GHz, the table height shall be 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m.

The turn table rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna mast. The antenna moved up and down between from 1meter to 4 meters to find out the maximum emission level.

The radiated emission was measured using the Spectrum Analyzer with the resolutions bandwidth set as:

RBW = 300 Hz, VBW = 1 kHz (9 kHz~150 kHz);
RBW = 10 kHz, VBW = 30 kHz (150 kHz~30MHz);
RBW = 100 kHz, VBW = 300 kHz (30MHz~1GHz for PK)
RBW = 1MHz, VBW = 3MHz (>1GHz for PK);

3.4 Test protocol

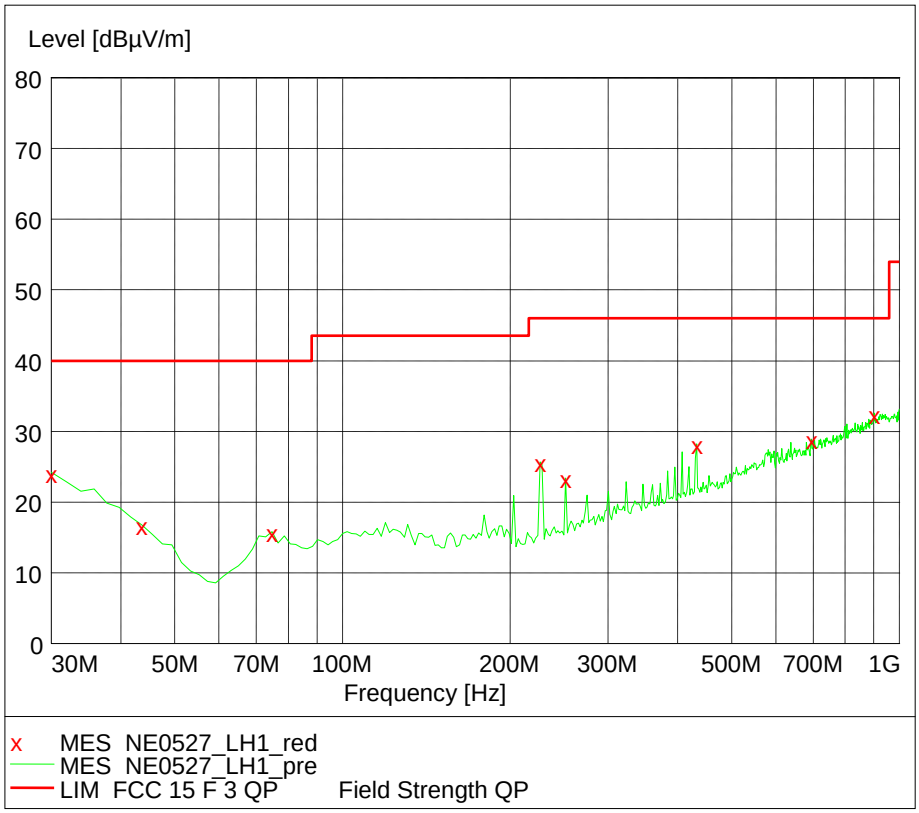
Temperature	:	22 °C
Relative Humidity	:	56 %

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

The worst test result (30MHz to 1GHz) of channel L (2405MHz) chosen to list in the report as representative.

Model of HJH26

Horizontal



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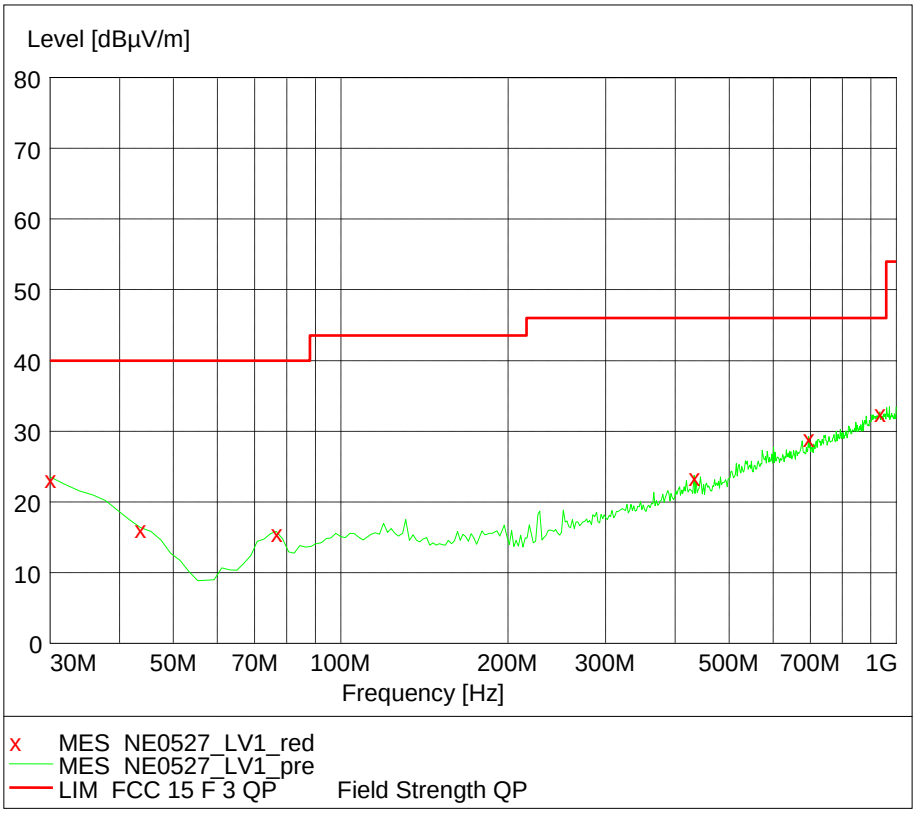

Model of HJH55

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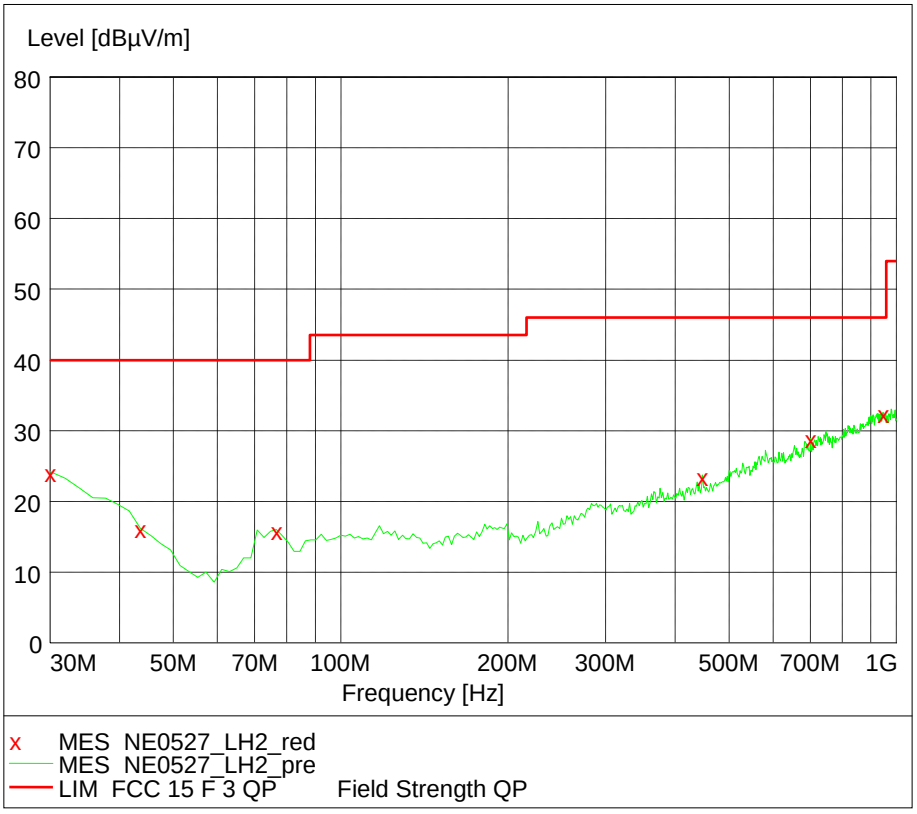

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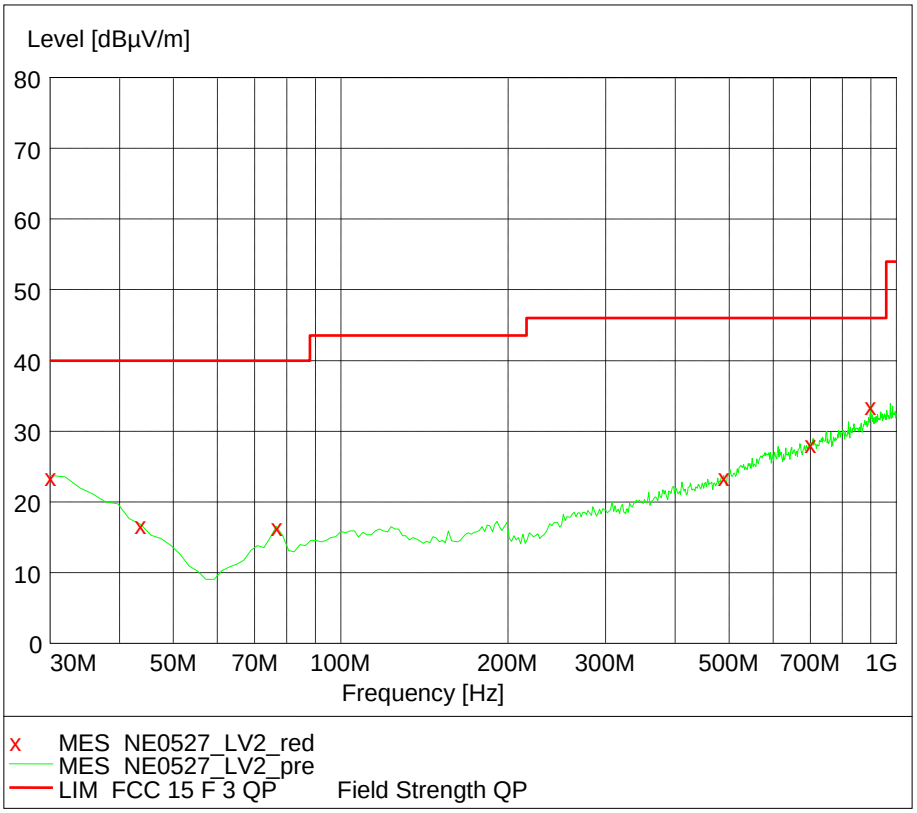
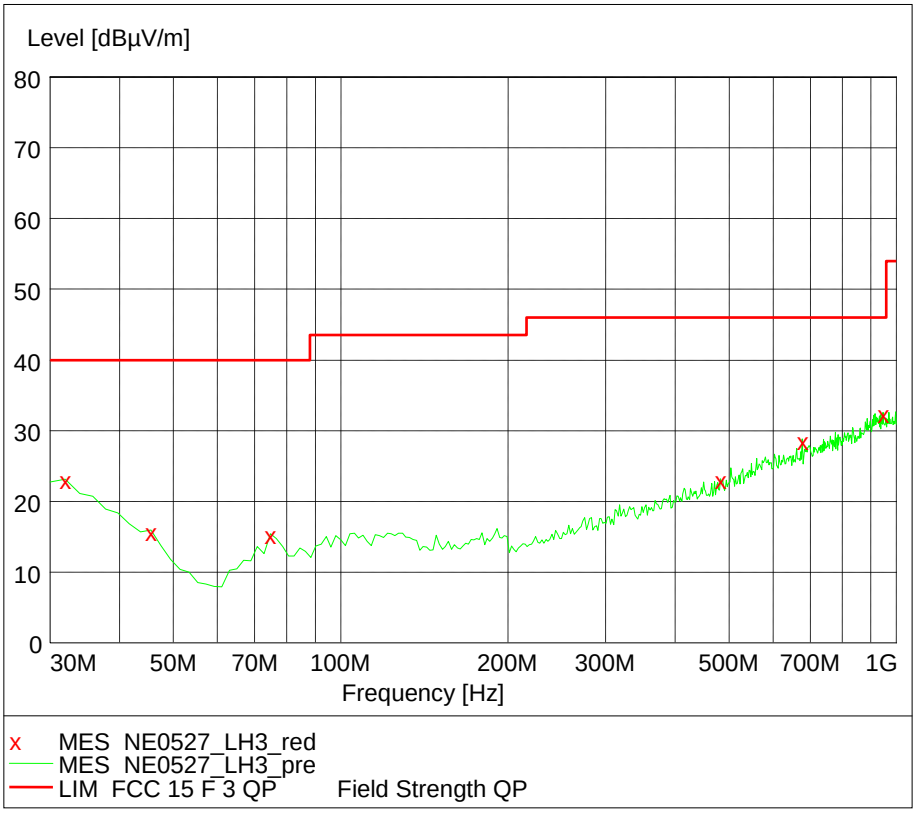


Model of HJH13

Horizontal



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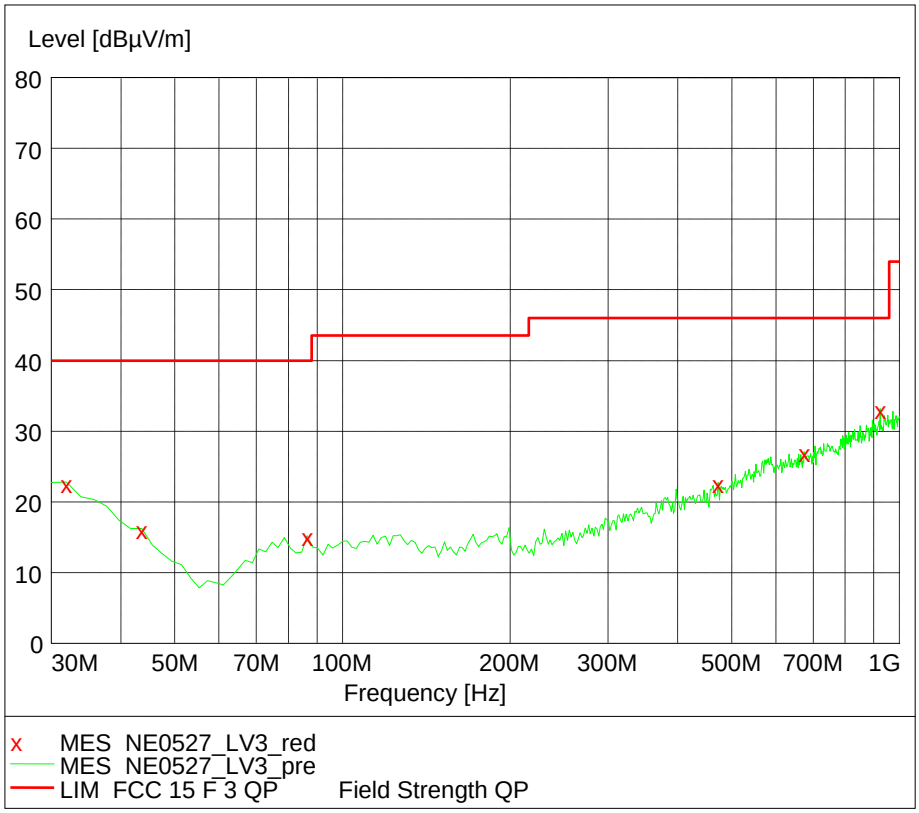

Model of HJH39

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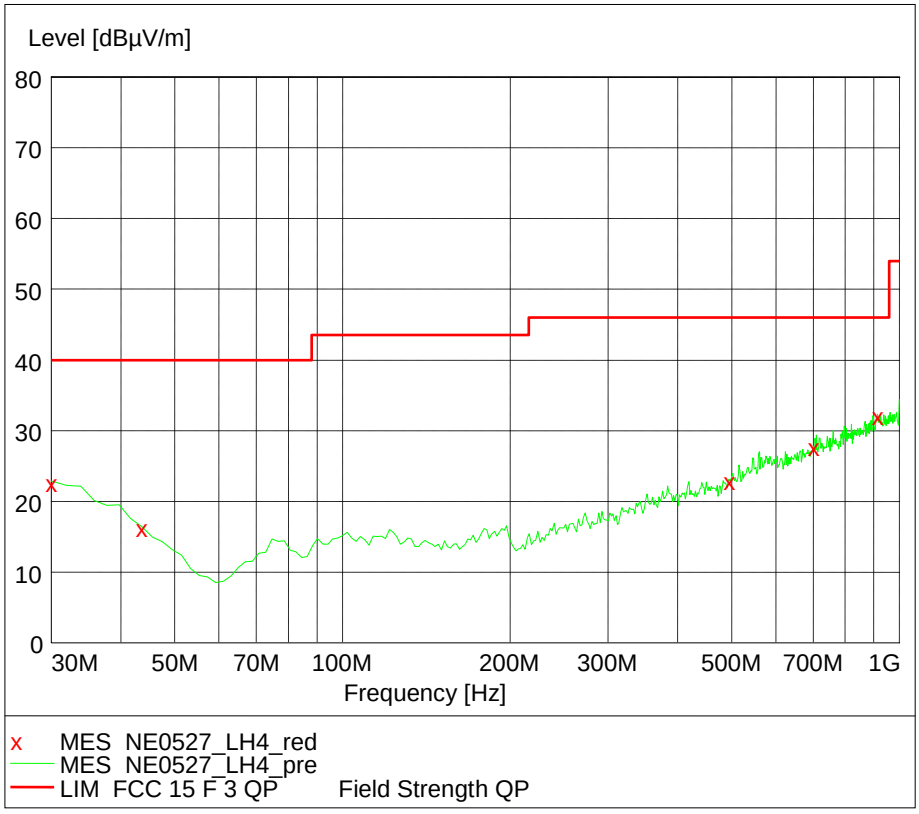

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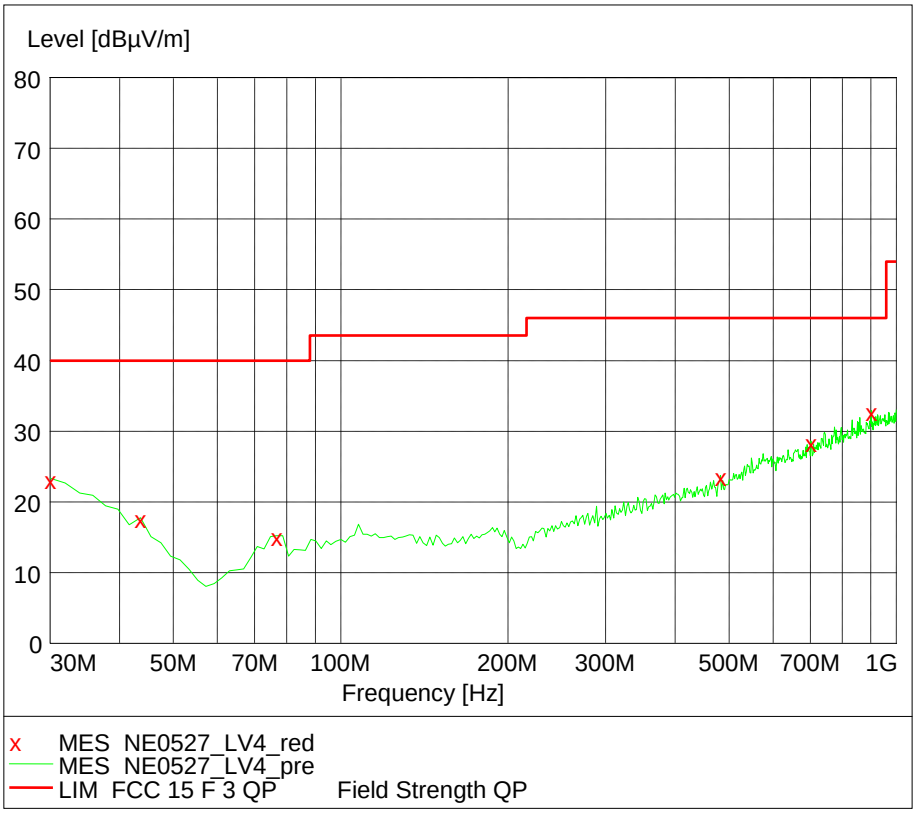

Model of HJH29

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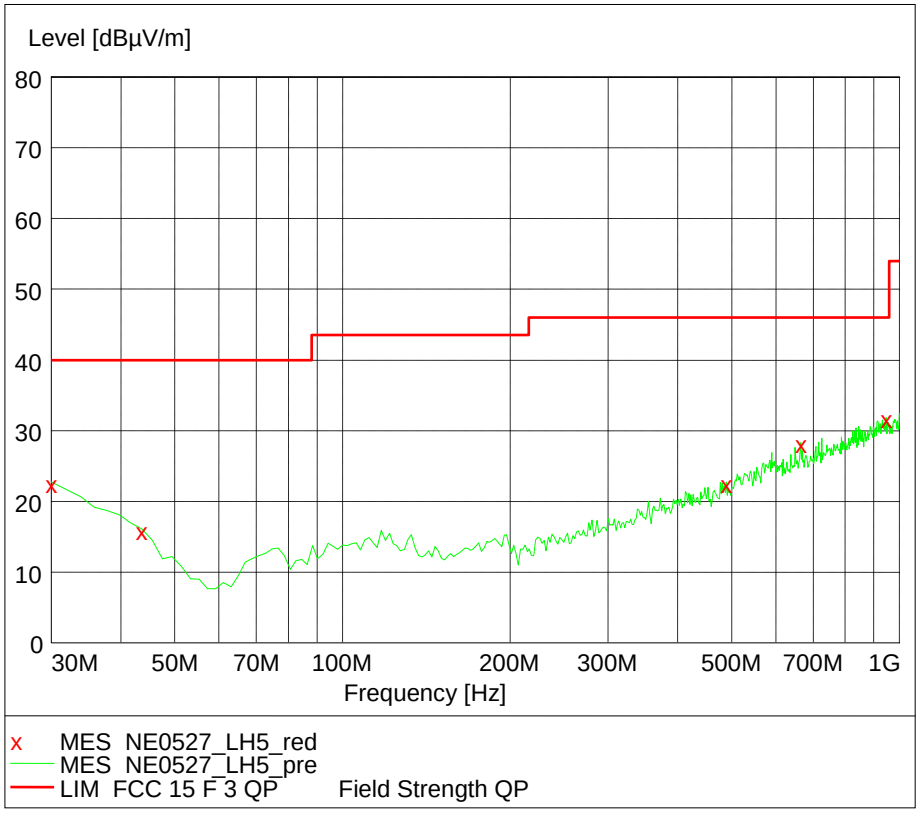

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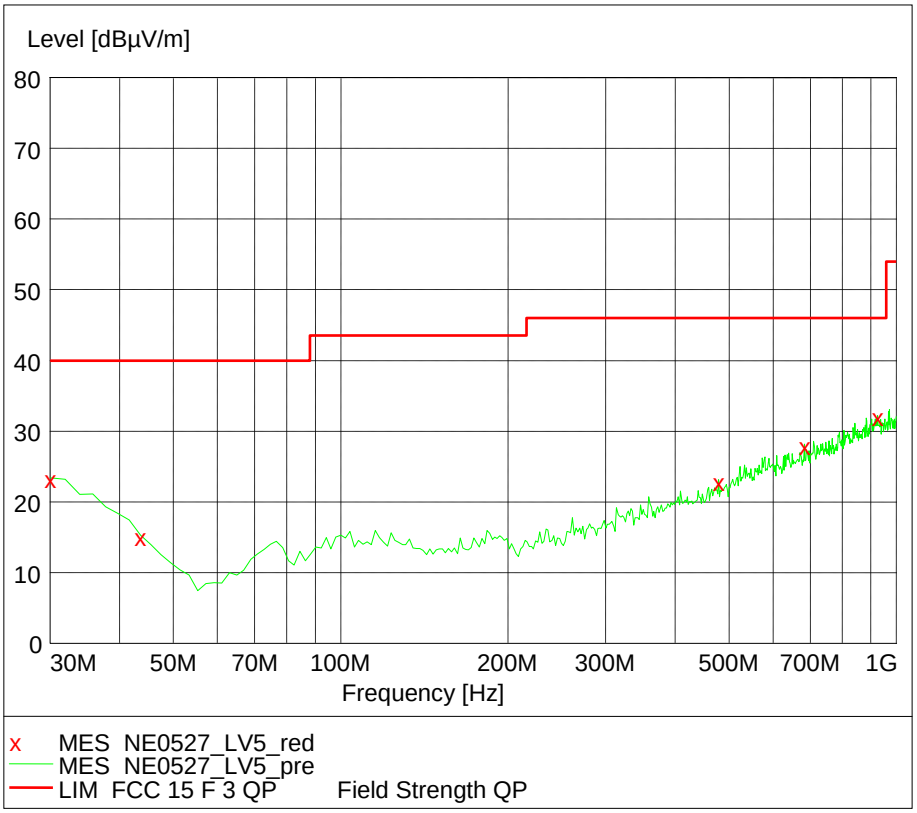

Model of HJH8B

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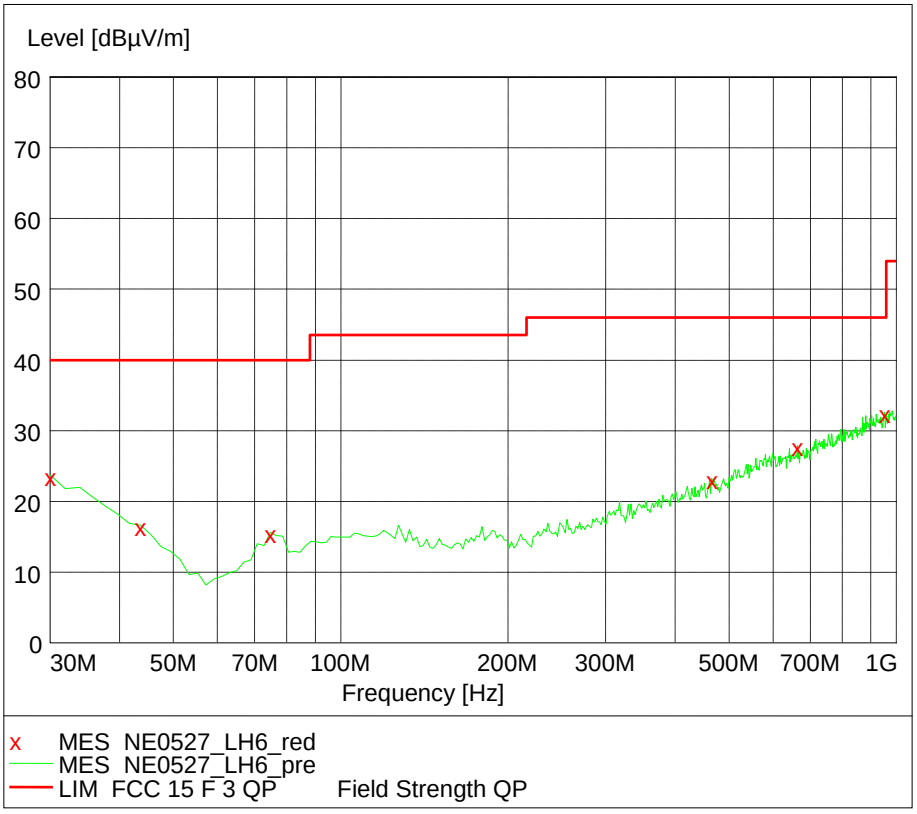

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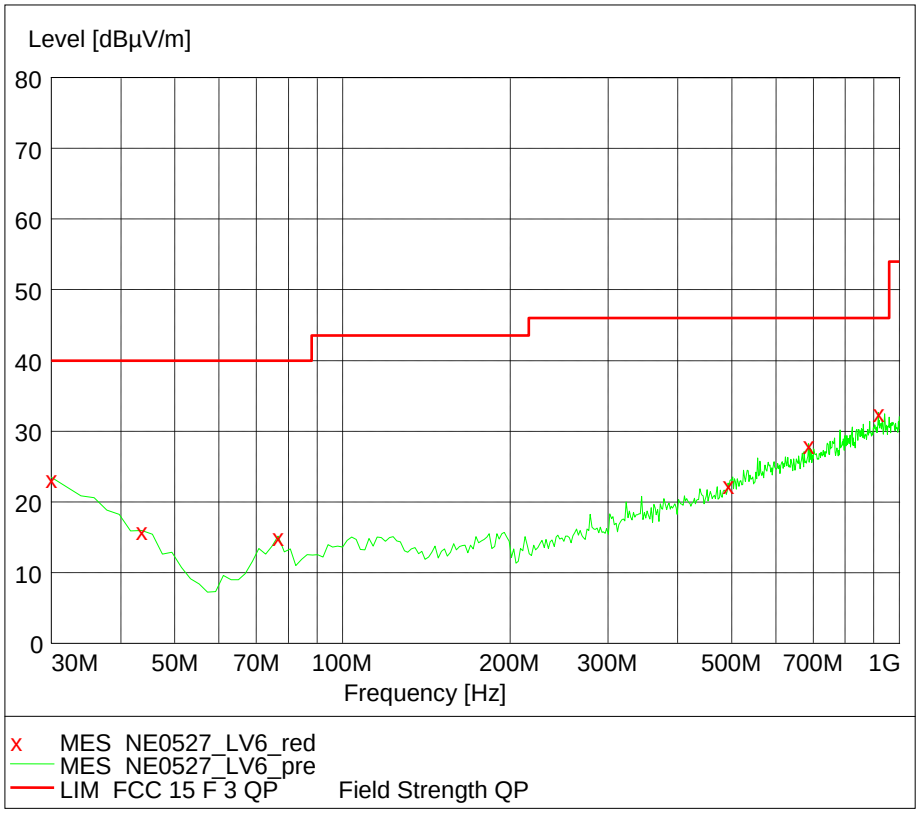

Model of HJH51

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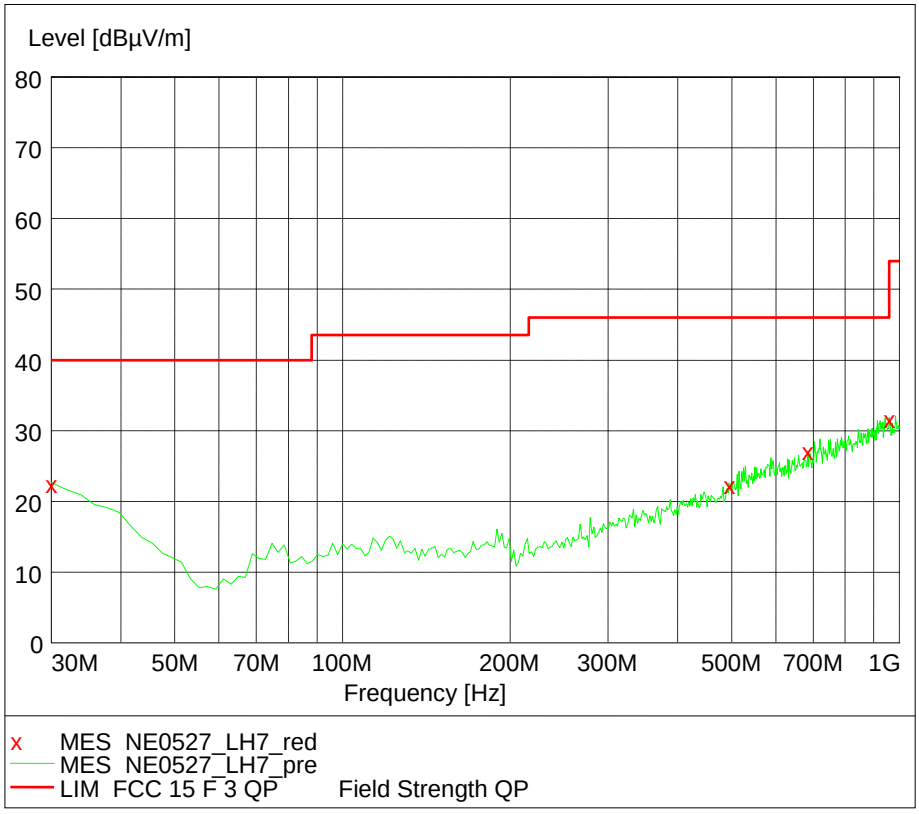

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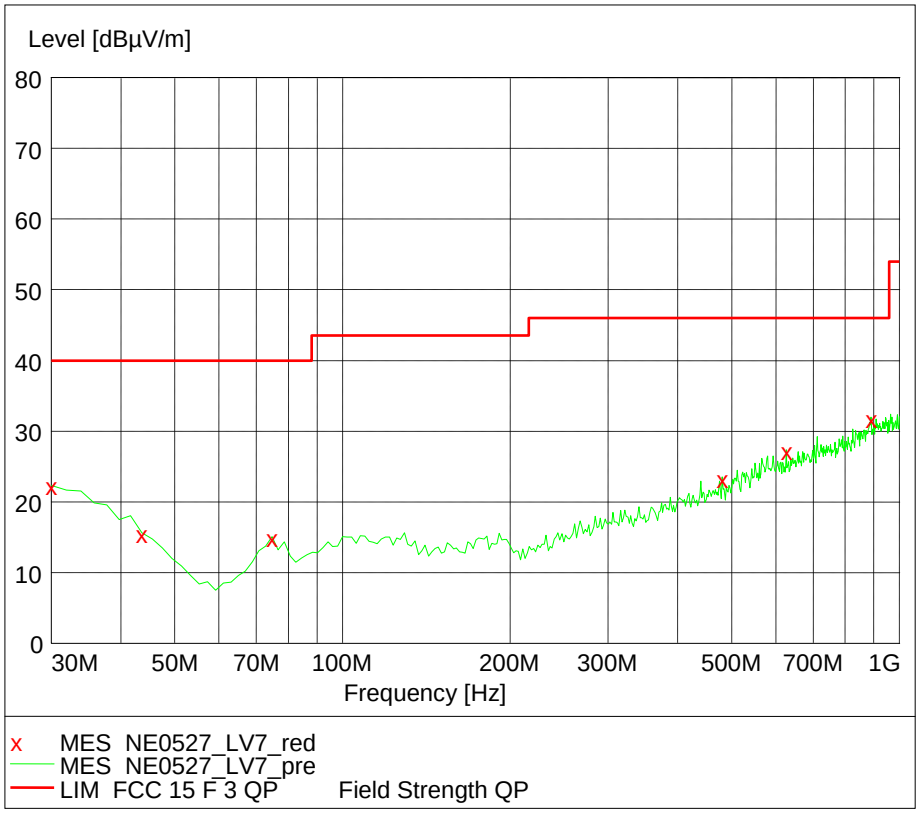
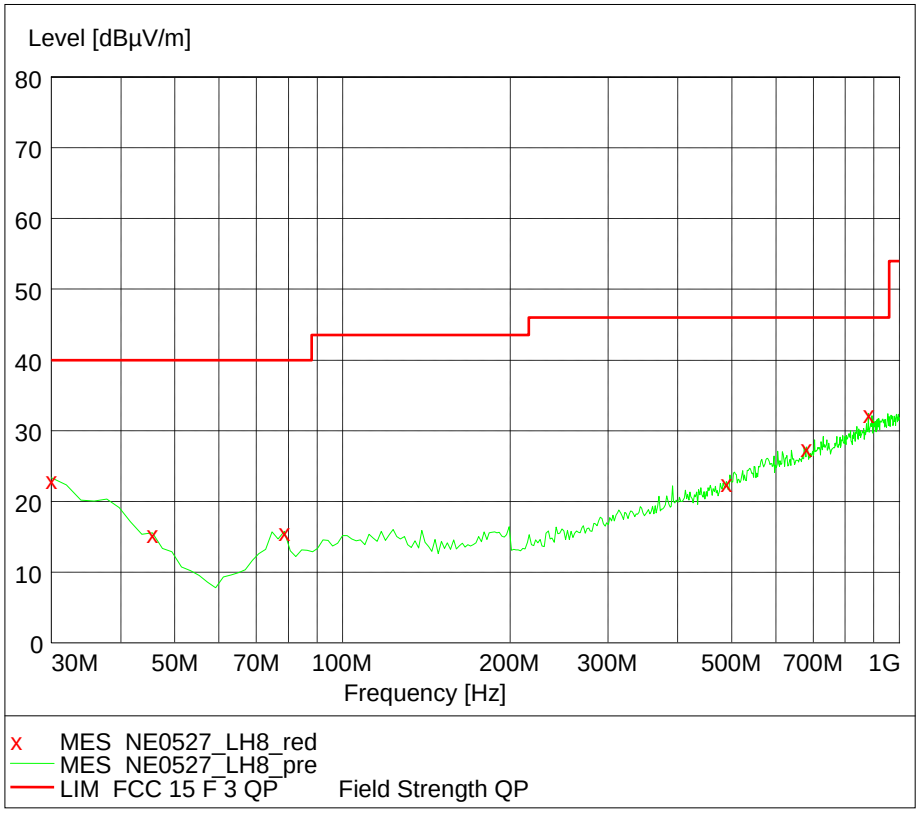


Model of HJH12

Horizontal



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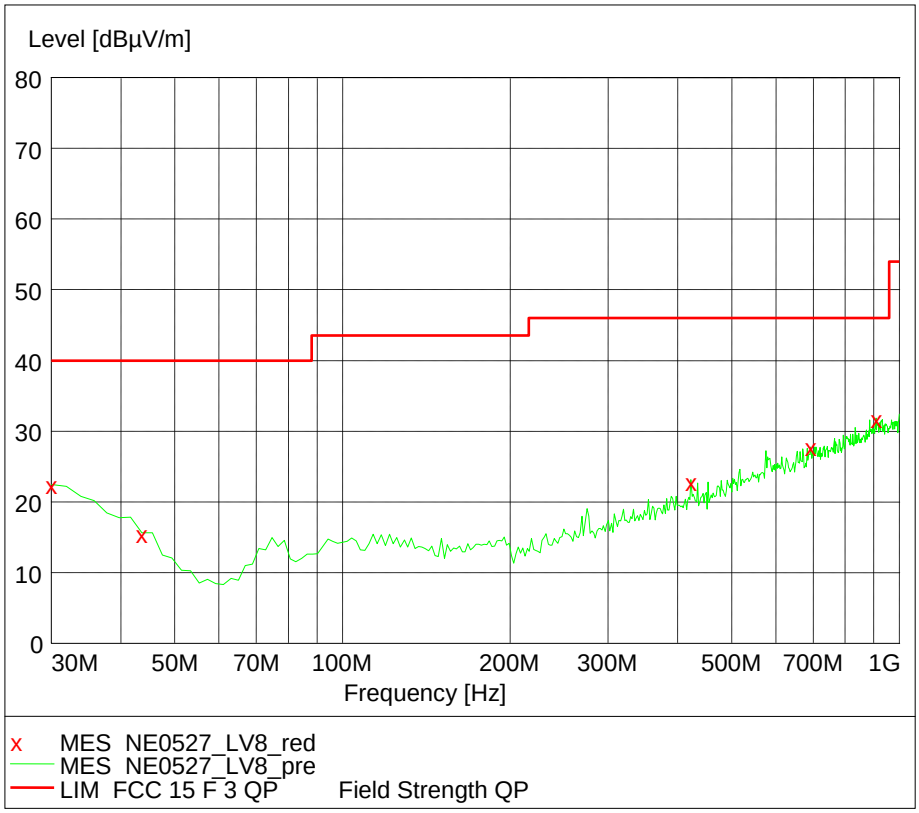

Model of HJH37

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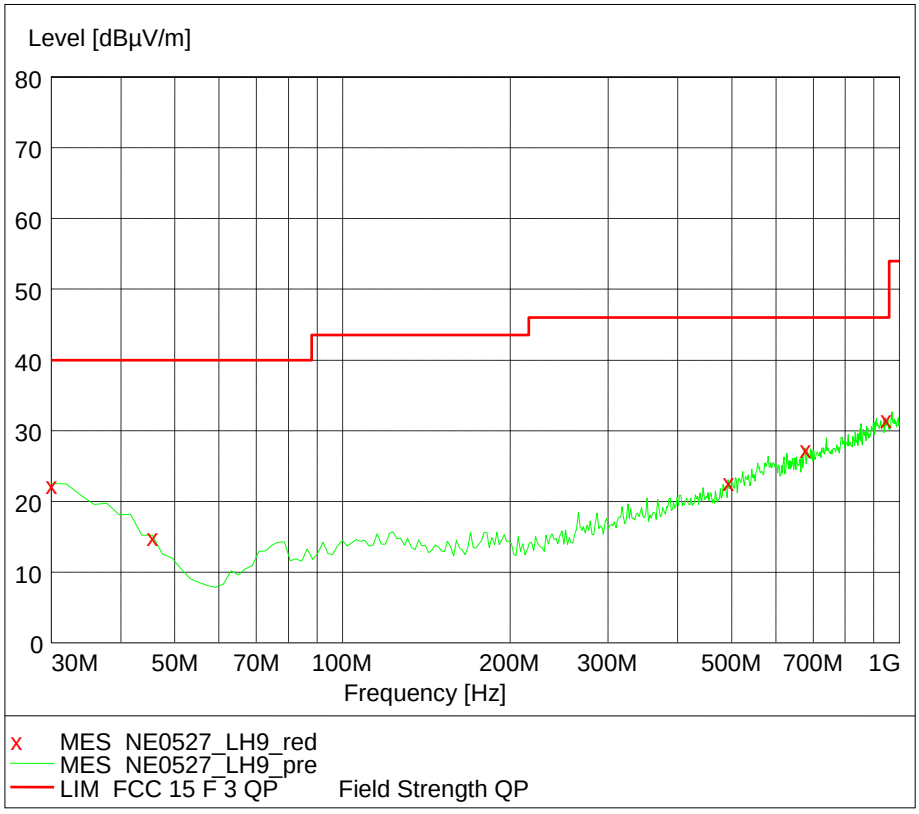

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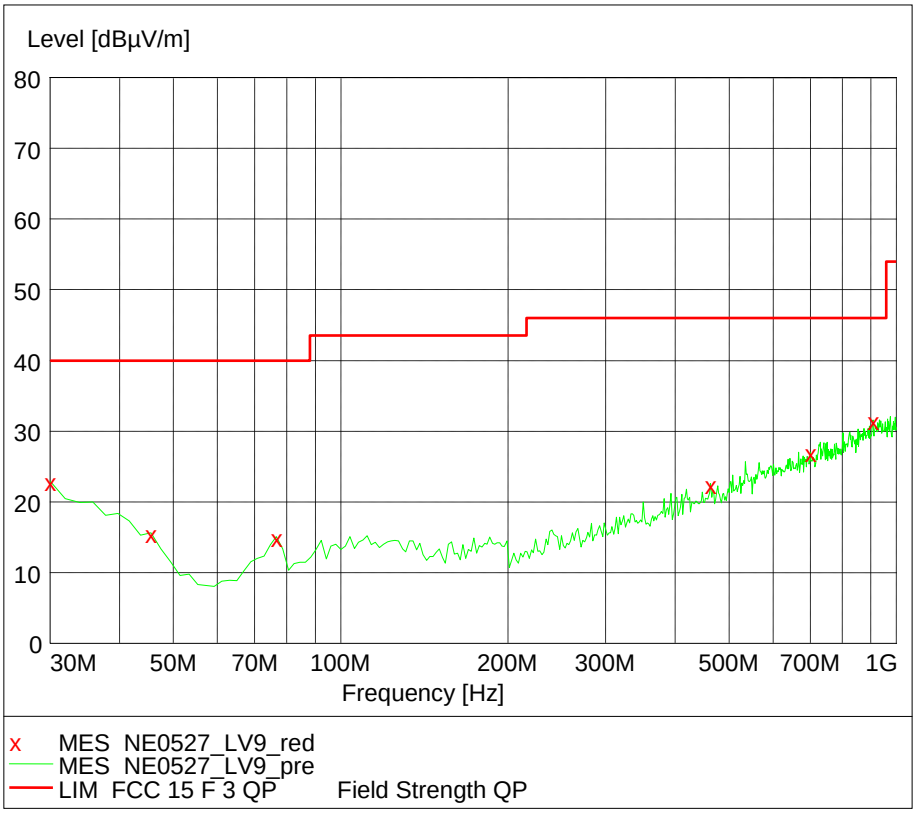


Test result from 30MHz to 1000MHz:

Model of HJH26

Polarization	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Detector
H	30.00	24.20	21.40	40.00	15.80	PK
	447.94	23.70	18.50	46.00	22.30	PK
	947.52	32.60	26.10	46.00	13.40	PK
V	30.00	23.70	21.40	40.00	16.30	PK
	488.76	23.70	19.20	46.00	22.30	PK
	898.92	33.70	25.90	46.00	12.30	PK

Model of HJH55

Polarization	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Detector
H	30.00	24.20	21.40	40.00	15.80	PK
	447.94	23.70	18.50	46.00	22.30	PK
	947.52	32.60	26.10	46.00	13.40	PK
V	30.00	23.70	21.40	40.00	16.30	PK
	488.76	23.70	19.20	46.00	22.30	PK
	898.92	33.70	25.90	46.00	12.30	PK

Model of HJH13

Polarization	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Detector
H	31.94	23.20	21.40	40.00	16.80	PK
	677.31	28.80	22.60	46.00	17.20	PK
	947.52	32.60	26.10	46.00	13.40	PK
V	31.94	22.80	20.40	40.00	17.20	PK
	675.37	27.10	22.60	46.00	18.90	PK
	924.19	33.20	26.10	46.00	12.80	PK

Model of HJH39

Polarization	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Detector
H	30.00	22.80	21.40	40.00	17.20	PK
	702.59	27.80	22.90	46.00	18.20	PK
	914.47	32.30	26.10	46.00	13.70	PK
V	30.00	23.30	21.40	40.00	16.70	PK
	702.59	28.60	22.90	46.00	17.40	PK
	900.86	32.90	25.90	46.00	13.10	PK

Model of HJH29

Polarization	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Detector
H	30.00	22.70	21.40	40.00	17.30	PK
	665.65	28.30	22.40	46.00	17.70	PK
	947.52	31.90	26.10	46.00	14.10	PK
V	30.00	23.40	21.40	40.00	16.60	PK
	683.15	28.10	22.60	46.00	17.90	PK
	926.13	32.20	26.10	46.00	13.80	PK

Model of HJH8B

Polarization	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Detector
H	30.00	23.70	21.40	40.00	16.30	PK
	663.71	27.90	22.40	46.00	18.10	PK
	951.40	32.60	26.10	46.00	13.40	PK
V	30.00	22.40	21.40	40.00	17.60	PK
	626.77	27.30	21.70	46.00	18.70	PK
	889.20	32.00	25.60	46.00	14.00	PK

Model of HJH51

Polarization	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Detector
H	30.00	22.70	21.40	40.00	17.30	PK
	685.09	27.20	22.70	46.00	18.80	PK
	959.18	31.90	26.00	46.00	14.10	PK
V	30.00	22.40	21.40	40.00	17.60	PK
	626.77	27.30	21.70	46.00	18.70	PK
	889.20	32.00	25.60	46.00	14.00	PK

Model of HJH12

Polarization	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Detector
H	30.00	23.30	21.40	40.00	16.70	PK
	681.20	27.70	22.60	46.00	18.30	PK
	879.48	32.50	25.30	46.00	13.50	PK
V	30.00	22.50	21.40	40.00	17.50	PK
	692.87	27.80	22.80	46.00	18.20	PK
	908.64	31.90	56.00	46.00	14.10	PK

Model of HJH37

Polarization	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Detector
H	30.00	22.60	21.40	40.00	17.40	PK
	677.31	27.60	22.60	46.00	18.40	PK
	945.57	31.90	26.10	46.00	14.10	PK
V	30.00	23.00	21.40	40.00	17.00	PK
	700.64	27.00	22.90	46.00	19.00	PK
	908.64	31.60	26.00	46.00	14.40	PK

Test result above 1GHz:

Model of HJH26

Channel	Antenna	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	V	2405.25	34.50	90.60	114.00	23.40	PK
	V	4810.32	-3.40	53.60	74.00	20.40	PK
	V	7215.50	2.30	53.20	74.00	20.80	PK
M	V	2440.89	34.60	89.70	114.00	24.30	PK
	V	4880.39	-3.40	53.20	74.00	20.80	PK
	V	7320.55	2.30	52.80	74.00	21.20	PK
H	V	2480.82	34.70	89.10	114.00	24.90	PK
	V	4960.56	-3.40	52.80	74.00	21.20	PK
	V	7440.63	2.30	52.60	74.00	21.40	PK

Model of HJH55

Channel	Antenna	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	V	2405.32	34.50	90.50	114.00	23.50	PK
	V	4810.36	-3.40	53.20	74.00	20.80	PK
	V	7215.58	2.30	53.10	74.00	20.90	PK
M	V	2440.85	34.60	89.50	114.00	24.50	PK
	V	4880.34	-3.40	53.20	74.00	20.80	PK
	V	7320.56	2.30	52.60	74.00	21.40	PK
H	V	2480.50	34.70	89.20	114.00	24.80	PK
	V	4960.26	-3.40	52.80	74.00	21.20	PK
	V	7440.48	2.30	52.70	74.00	21.30	PK

Model of HJH13

Channel	Antenna	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	V	2405.15	34.50	90.80	114.00	23.20	PK
	V	4810.56	-3.40	53.30	74.00	20.70	PK
	V	7215.65	2.30	52.80	74.00	21.20	PK
M	V	2440.80	34.60	90.10	114.00	23.90	PK
	V	4880.32	-3.40	53.20	74.00	20.80	PK
	V	7320.56	2.30	52.60	74.00	21.40	PK
H	V	2480.83	34.70	89.30	114.00	24.70	PK
	V	4960.24	-3.40	52.70	74.00	21.30	PK
	V	7440.37	2.30	52.60	74.00	21.40	PK

Model of HJH39

Channel	Antenna	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	V	2405.26	34.50	90.80	114.00	23.20	PK
	V	4810.41	-3.40	53.20	74.00	20.80	PK
	V	7215.27	2.30	53.00	74.00	21.00	PK
M	V	2440.37	34.60	89.60	114.00	24.40	PK
	V	4880.64	-3.40	53.20	74.00	20.80	PK
	V	7320.56	2.30	52.80	74.00	21.20	PK
H	V	2480.25	34.70	89.00	114.00	25.00	PK
	V	4960.47	-3.40	52.80	74.00	21.20	PK
	V	7440.13	2.30	52.60	74.00	21.40	PK

Model of HJH29

Channel	Antenna	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	V	2405.31	34.50	90.70	114.00	23.30	PK
	V	4810.36	-3.40	53.40	74.00	20.60	PK
	V	7215.58	2.30	53.20	74.00	20.60	PK
M	V	2440.82	34.60	89.20	114.00	24.80	PK
	V	4880.46	-3.40	53.20	74.00	20.80	PK
	V	7320.37	2.30	52.80	74.00	21.20	PK
H	V	2480.25	34.70	89.10	114.00	24.90	PK
	V	4960.50	-3.40	52.80	74.00	21.20	PK
	V	7440.89	2.30	52.60	74.00	21.40	PK

Model of HJH8B

Channel	Antenna	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	V	2405.42	34.50	90.60	114.00	23.40	PK
	V	4810.45	-3.40	53.60	74.00	20.40	PK
	V	7215.25	2.30	53.20	74.00	20.60	PK
M	V	2440.75	34.60	89.60	114.00	24.40	PK
	V	4880.63	-3.40	53.20	74.00	20.80	PK
	V	7320.28	2.30	52.60	74.00	21.40	PK
H	V	2480.75	34.70	89.20	114.00	24.80	PK
	V	4960.63	-3.40	52.60	74.00	21.40	PK
	V	7440.29	2.30	52.40	74.00	21.60	PK

Model of HJH51

Channel	Antenna	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	V	2405.15	34.50	90.40	114.00	23.60	PK
	V	4810.25	-3.40	53.40	74.00	20.60	PK
	V	7215.68	2.30	53.20	74.00	20.60	PK
M	V	2440.21	34.60	89.40	114.00	24.60	PK
	V	4880.31	-3.40	53.20	74.00	20.80	PK
	V	7320.69	2.30	52.80	74.00	21.20	PK
H	V	2480.74	34.70	89.00	114.00	25.00	PK
	V	4960.56	-3.40	52.80	74.00	21.20	PK
	V	7440.58	2.30	52.60	74.00	21.40	PK

Model of HJH12

Channel	Antenna	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	V	2405.11	34.50	90.90	114.00	23.10	PK
	V	4810.36	-3.40	53.60	74.00	20.40	PK
	V	7215.25	2.30	53.20	74.00	20.60	PK
M	V	2440.25	34.60	89.80	114.00	24.20	PK
	V	4880.36	-3.40	53.20	74.00	20.80	PK
	V	7320.49	2.30	52.90	74.00	21.10	PK
H	V	2480.28	34.70	89.10	114.00	24.90	PK
	V	4960.68	-3.40	52.90	74.00	21.10	PK
	V	7440.36	2.30	52.60	74.00	21.40	PK

Model of HJH37

Channel	Antenna	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	V	2405.74	34.50	90.40	114.00	23.60	PK
	V	4810.36	-3.40	53.20	74.00	20.80	PK
	V	7215.48	2.30	53.10	74.00	20.90	PK
M	V	2440.59	34.60	89.50	114.00	24.50	PK
	V	4880.56	-3.40	53.10	74.00	20.90	PK
	V	7320.37	2.30	52.40	74.00	21.60	PK
H	V	2480.91	34.70	89.00	114.00	25.00	PK
	V	4960.34	-3.40	52.90	74.00	21.10	PK
	V	7440.56	2.30	52.80	74.00	21.20	PK

Remark:

1. Correct Factor = Antenna Factor + Cable Loss (-Amplifier, is employed);
2. Corrected Reading = Original Receiver Reading + Correct Factor;
3. Margin = Limit – Corrected Reading;
4. If the PK Corrected reading is lower than AV limit, the AV test can be elided;

Example:

Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,
Gain of Preamplifier = 32.00dB, Original Receiver Reading = 10dBuV,
Then Correct Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m,
Corrected Reading = 10dBuV + 0.20dB/m = 10.20dBuV/m,
Assuming limit = 54dBuV/m, Corrected Reading = 10.20dBuV/m,
Then Margin = 54 -10.20 = 43.80dBuV/m.

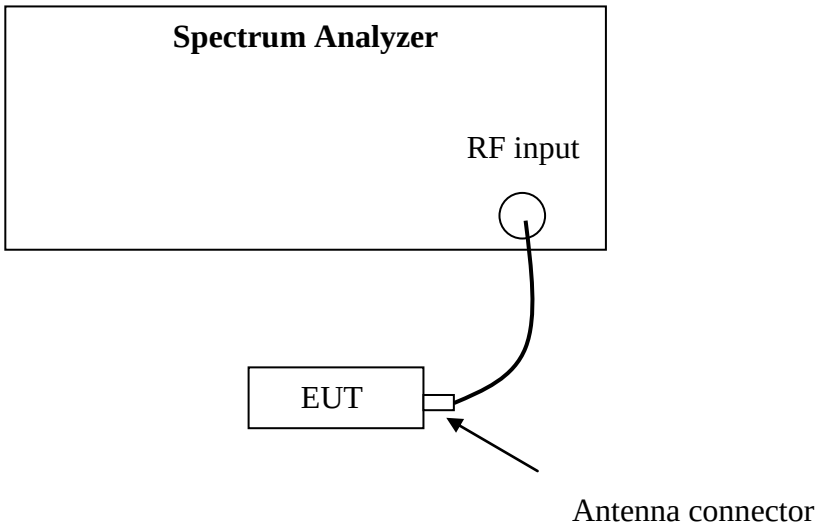
4 Assigned bandwidth (20dB bandwidth)

Test result: **Pass**

4.1 Limit

Intentional radiators must be designed to ensure that the 20 dB bandwidth of the emission is contained within the allocated frequency band.

4.2 Test Configuration



4.3 Test procedure and test setup

The 20dB Bandwidth per FCC § 15.215(c) is measured using the Spectrum Analyzer. Set Span = 2 to 3 times the 20 dB bandwidth, RBW = approximately 1% of the 20 dB bandwidth, VBW>RBW, Sweep = auto, Detector = peak, Trace = max hold.
The test was performed at 3 channels (lowest, middle and highest channel).

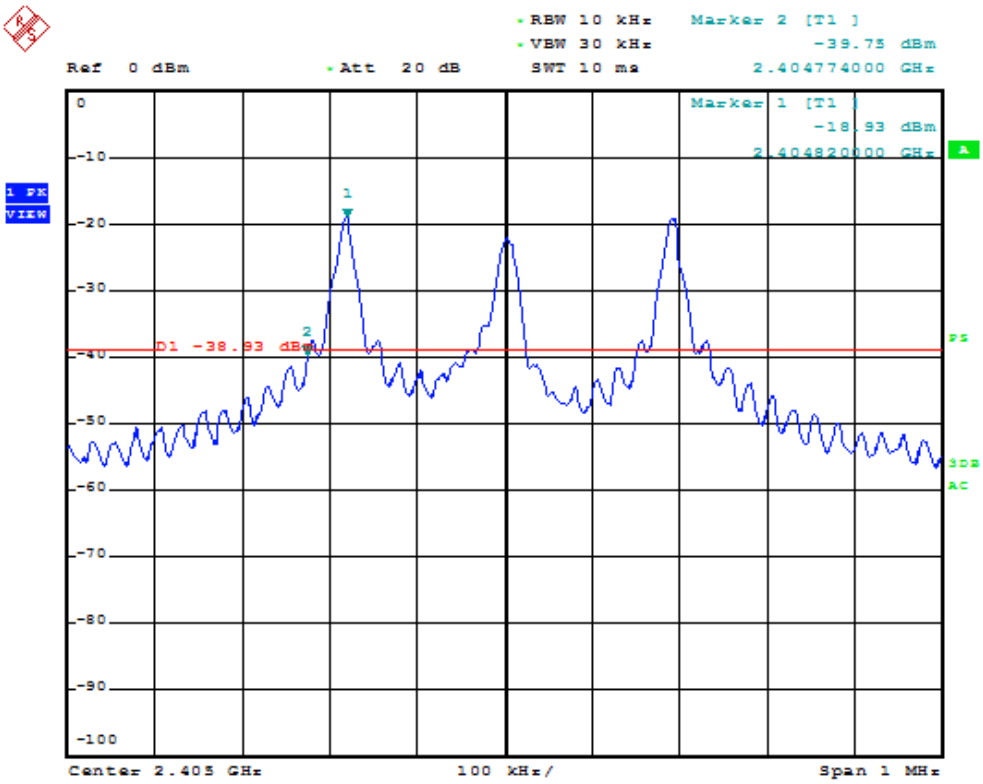
4.4 Test protocol

Temperature : 22 °C
Relative Humidity : 56 %

The worst data was tested as below:

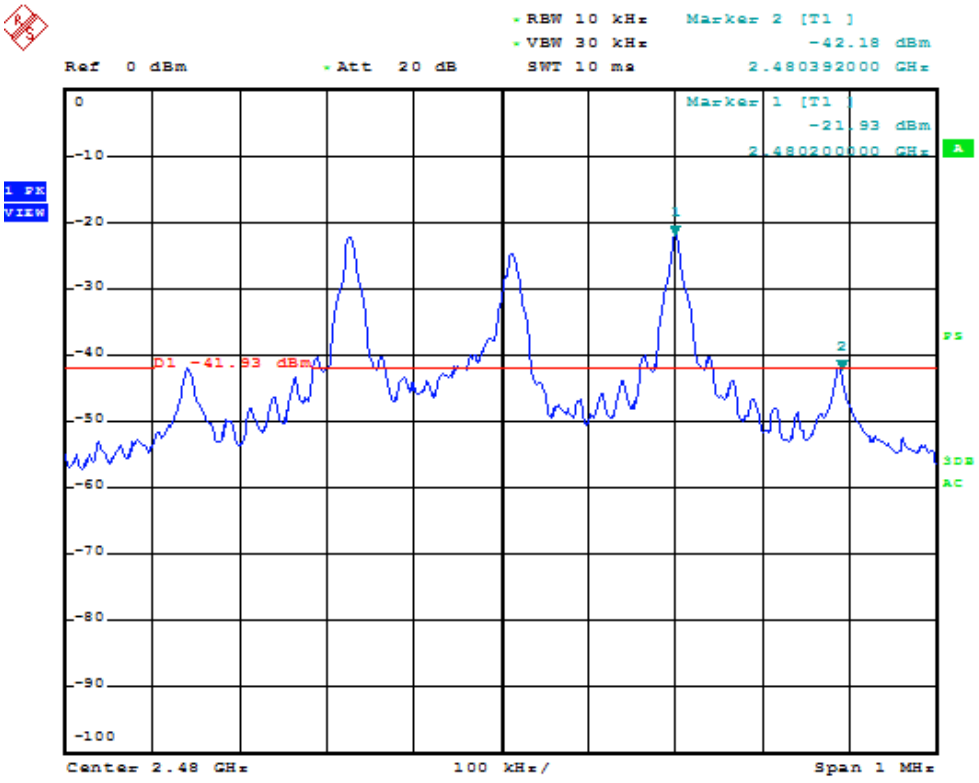
Mode	20dB Bandwidth		Permitted Bandwidth (MHz)	Result
	F_L (MHz)	F_H (MHz)		
-	2404.774	2480.392	2400-2483.5	Pass

Channel L



Date: 11.JUL.2016 09:50:16

Channel H



Date: 11.JUL.2016 09:57:17

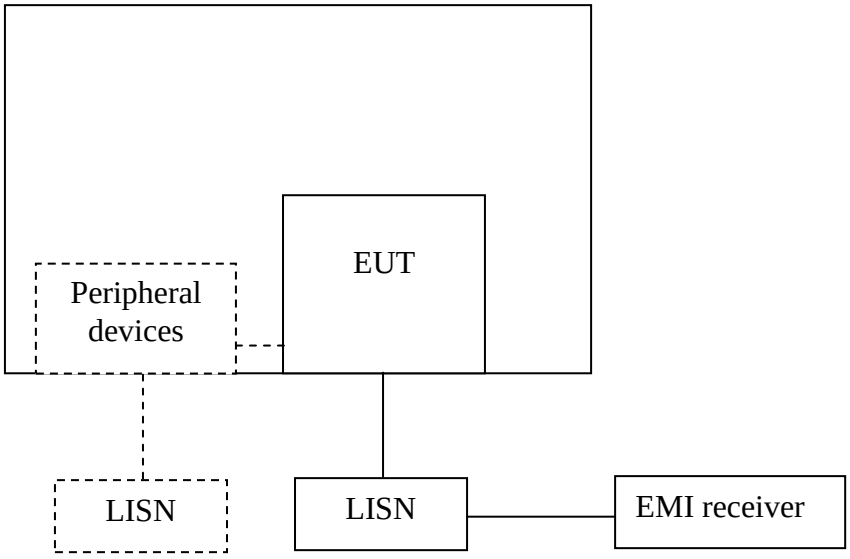
5 Power line conducted emission

Test result: **NA**

5.1 Limit

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	QP	AV
0.15-0.5	66 to 56*	56 to 46 *
0.5-5	56	46
5-30	60	50
* Decreases with the logarithm of the frequency.		

5.2 Test configuration



☐ For table top equipment, wooden support is 0.8m height table

☐ For floor standing equipment, wooden support is 0.1m height rack.

5.3 Test procedure and test set up

Measured levels of ac power-line conducted emission shall be the emission voltages from the voltage probe, where permitted, or across the 50 Ω LISN port (to which the EUT is connected), where permitted, terminated into a 50 Ω measuring instrument. All emission voltage and current measurements shall be made on each current-carrying conductor at the plug end of the EUT power cord by the use of mating plugs and receptacles on the LISN, if used. Equipment shall be tested with power cords that are normally supplied or recommended by the manufacturer and that have electrical and shielding characteristics that are the same as those cords normally supplied or recommended by the manufacturer. For those measurements using a LISN, the 50 Ω measuring port is terminated by a measuring instrument having 50 Ω input impedance. All other ports are terminated in 50 Ω loads.

Tabletop devices shall be placed on a platform of nominal size 1 m by 1.5 m, raised 80 cm above the reference ground plane. The vertical conducting plane or wall of an RF-shielded (screened) room shall be located 40 cm to the rear of the EUT. Floor-standing devices shall be placed either directly on the reference ground-plane or on insulating material as described in ANSI C63.4. All other surfaces of tabletop or floor-standing EUTs shall be at least 80 cm from any other grounded conducting surface, including the case or cases of one or more LISNs.

The bandwidth of the test receiver is set at 9 kHz.

5.4 Test protocol

Temperature : °C
Relative Humidity : %

L line

Test Data:

Frequency (MHz)	Quasi-peak			Average		
	level dB(μV)	Limit dB(μV)	Margin (dB)	level dB(μV)	limit dB(μV)	Margin (dB)

N line

Test Data:

Frequency (MHz)	Quasi-peak			Average		
	level dB(μV)	Limit dB(μV)	Margin (dB)	level dB(μV)	limit dB(μV)	Margin (dB)