

EMC Test Report for FCC No. 131100628SHA-002

Applicant : TELE RADIO AB
Datav ägen 21, SE-436 32 Askim, Sweden

Manufacturer : TELE RADIO AB
Datav ägen 21, SE-436 32 Askim, Sweden

Product Name : Transceiver Radio Modular

Type/Model : D00005-11

SUMMARY

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

47CFR Part 15 (2010): Radio Frequency Device: Subpart B; Unintentional radiators class B

ANSI C63.4 (2003): Interim Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40GHz.

RSS-210 Issue 8 (December 2010): Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment

RSS-Gen Issue 3 (December 2010): General Requirements and Information for the Certification of Radiocommunication Equipment

Date of issue: November 28, 2013

Prepared by:



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1. GENERAL INFORMATION

1.1 Description of equipment under Test (EUT)

Product Name : 902 - 928 MHz
Description of EUT : The EUT is a wireless module working in the 902-928MHz ISM band.
Model number : D00005-11
FCC ID : ONFC1303A
IC : 4807A-C1303A
Category of EUT : Class B
Rating : DC 3.3V powered by the host device indirectly
*Rating of host device:
Input 12-250V DC: 24-230V AC, 50/60Hz,
Max 2A*
EUT type : Table top
 Floor standing
Sample received date : August 2, 2013
Date of test : August 2, 2013 ~ October 15, 2013

1.2 Description of Client

Applicant: TELE RADIO AB
Datav ägen 21, SE-436 32 Askim, Sweden

Manufacturer: TELE RADIO AB
Datav ägen 21, SE-436 32 Askim, Sweden



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IC: 4807A-C1303A

1.3 Description of Test Facility

Name: Intertek Testing Services Limited Shanghai
Address: Building No.86, 1198 Qinzhou Road (North), Shanghai 200233, P.R. China

FCC Registration Number: 236597
IC Assigned Code: 2042B-1

Name of contact: Steve Li
Tel: +86 21 64956565 ext. 214
Fax: +86 21 54262335 ext. 214

2. TEST SPECIFICATIONS

2.1 Standards

47CFR Part 15 (2010): Radio Frequency Device: Subpart B; Unintentional radiators class B

ANSI C63.4 (2003): Interim Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40GHz.

RSS-210 Issue 8 (December 2010): Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment

RSS-Gen Issue 3 (December 2010): General Requirements and Information for the Certification of Radiocommunication Equipment

2.2 Mode of operation during the test / Test peripherals used

2.2.1 Description of operation

Within this test report, EUT was tested under its rating voltage and frequency. The EUT was set up as typically used. EUT was tested with receiver mode.



2.3 Instrument list

Equipment	Type	Manu.	Cal. Date	Due date
Test Receiver	ESIB 26	R&S	2013-10-21	2014-10-20
Semi-anechoic chamber	-	Albatross project	2013-5-21	2014-5-20
Bilog Antenna	CBL 6112D	TESEQ	2013-5-16	2015-5-15
Horn antenna	HF 906	R&S	2013-5-13	2015-5-12
Pre-amplifier	Pre-amp 18	R&S	2013-4-12	2014-4-11
Test Receiver	ESCS 30	R&S	2013-10-21	2014-10-20
A.M.N.	ESH2-Z5	R&S	2013-1-9	2014-1-8
A.M.N.	ESH3-Z5	R&S	2013-1-10	2014-1-9
High Pass Filter	WHKX 1.0/15G-10SS	Wainwright	2013-2-8	2014-2-7
High Pass Filter	WHKX 2.8/18G-12SS	Wainwright	2013-2-8	2014-2-7
High Pass Filter	WHKX 7.0/1.8G-8SS	Wainwright	2013-2-8	2014-2-7
Band Reject Filter	WRCGV 2400/2483-2390/2493-35/10SS	Wainwright	2013-2-8	2014-2-7



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2.4. Test Summary

This report applies to tested sample only. This report shall not be reproduced in part without written approval of Intertek Testing Service Shanghai.

TEST ITEM	RESULT	NOTE
Disturbance voltage at a.c. mains terminal	Pass	
Radiated emission	Pass	

Notes: 1: NA =Not Applicable

3. Conducted disturbance voltage at mains terminals

Test result: Pass

3.1 Limits

3.1.1 Limits for conducted disturbance voltage at the mains ports of class A device

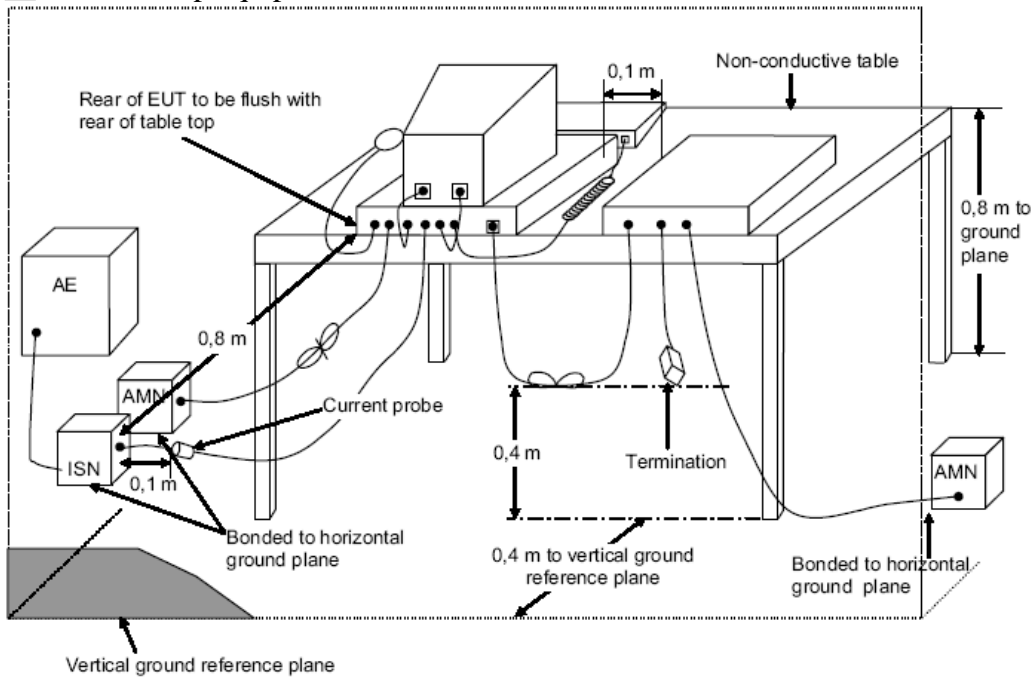
Frequency range (MHz)	Limits dB(μ V)	
	Quasi-peak	Average
0.15 ~ 0.5	79	66
0.5 ~ 30	73	60
Note: If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.		

3.1.2 Limits for conducted disturbance voltage at the mains ports of class B device

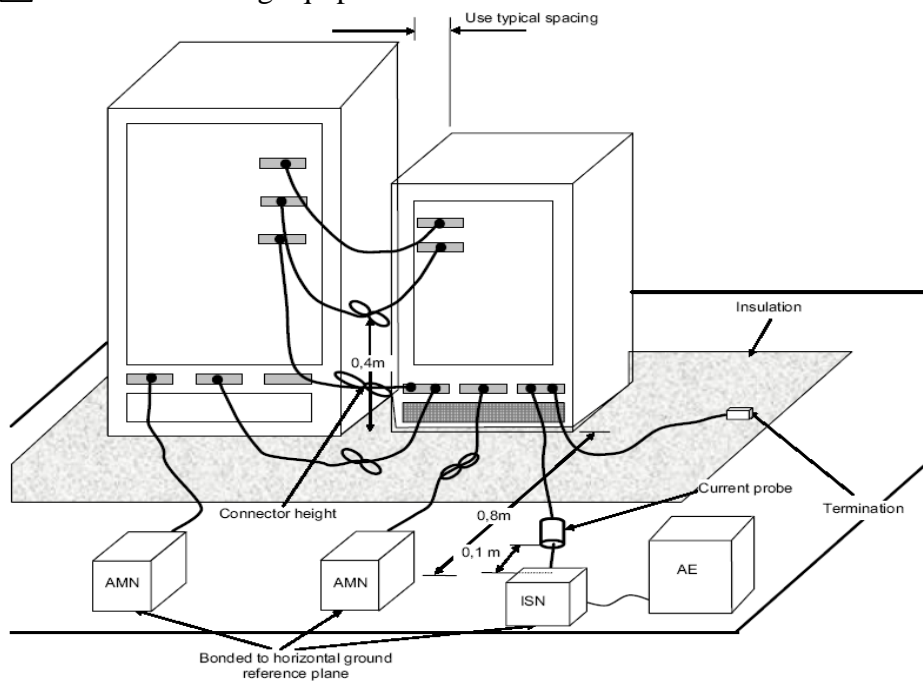
Frequency range (MHz)	Limits dB(μ V)	
	Quasi-peak	Average
0.15 ~ 0.5	66 ~ 56 *	56 ~ 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50
Note: 1. * Means the limit decreasing linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz 2. If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.		

3.2 Test setup

For table top equipment



For floor standing equipment



3.3 Test Setup and Test Procedure

Measurement was performed in shielded room, and instruments used were following clause 4 and clause 5 of ANSI 63.4.

Detailed test procedure was following clause 7.2 of ANSI 63.4.

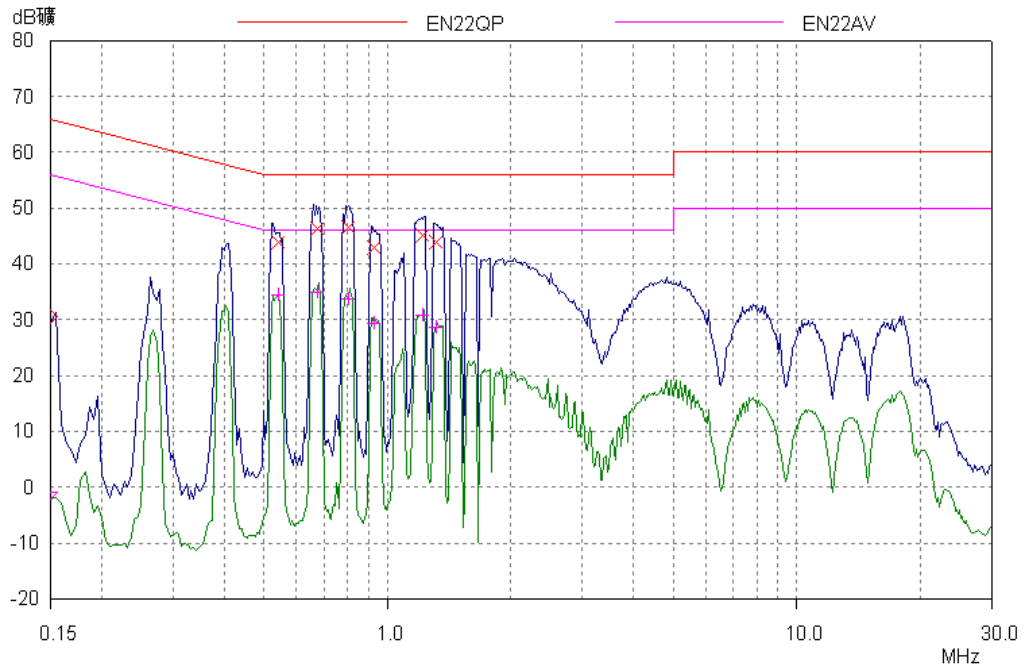
EUT arrangement and operation conditions were according to clause 6 and clause 7 of ANSI 63.4.

Frequency range 150kHz – 30MHz was checked and EMI receiver measurement bandwidth was set to 9 kHz.

3.4 Test Protocol

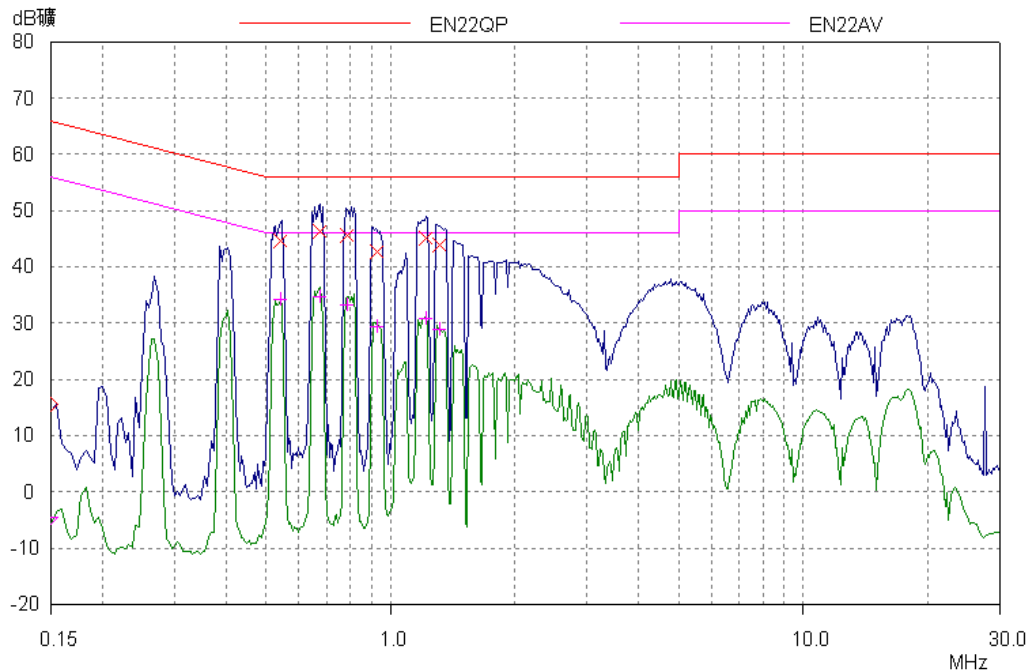
Temperature : 25 °C Relative Humidity : 55 %

Phase L



Frequency	Corrected Reading (dBuV)		Limit (dBuV)		Margin (dB)	
	QP	AV	QP	AV	QP	AV
0.537	43.97	34.41	56.00	46.00	12.03	11.59
0.672	46.28	34.94	56.00	46.00	9.72	11.06
0.803	46.43	33.66	56.00	46.00	9.57	12.34
0.924	42.79	29.35	56.00	46.00	13.21	16.65
1.212	45.08	30.80	56.00	46.00	10.92	15.20
1.307	43.84	28.65	56.00	46.00	12.16	17.35

Phase N



Frequency	Corrected Reading (dBuV)		Limit (dBuV)		Margin (dB)	
	QP	AV	QP	AV	QP	AV
0.537	44.47	34.24	56.00	46.00	11.53	11.76
0.672	46.34	34.77	56.00	46.00	9.66	11.23
0.785	45.47	33.17	56.00	46.00	10.53	12.83
0.924	42.61	29.35	56.00	46.00	13.39	16.65
1.212	45.16	30.88	56.00	46.00	10.84	15.12
1.307	43.92	28.81	56.00	46.00	12.08	17.19



4. Radiated emission

Test result: Pass

4.1 Radiated emission limits

4.1.1 Limits for radiated disturbance of class A device

Frequency (MHz)	Permitted limit in dB μ V/m (Quasi-peak) of Measurement Distance 10m
30 – 88	39
88 – 216	43.5
216 – 960	46.4
Above 960	49.5

Note: for the measurement distance other than 3m and 10m, the limit is varied according to 20dB/10 decades.

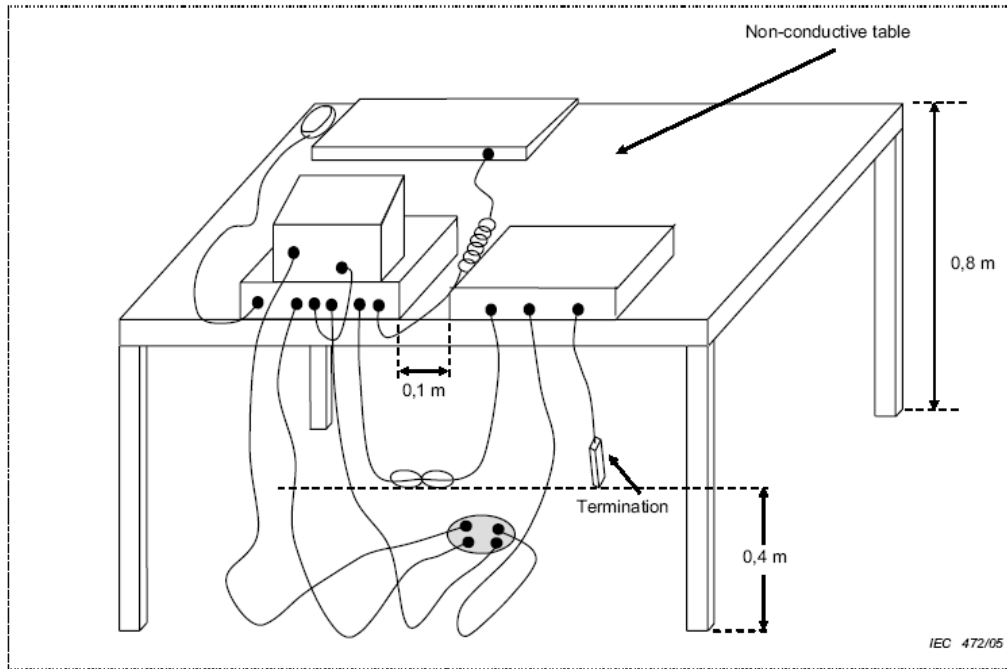
4.1.1 Limits for radiated disturbance of class B device

Frequency (MHz)	Permitted limit in dB μ V/m (Quasi-peak) of Measurement Distance 3m
30 – 88	40.0
88 – 216	43.5
216 – 960	46.0
Above 960	54.0

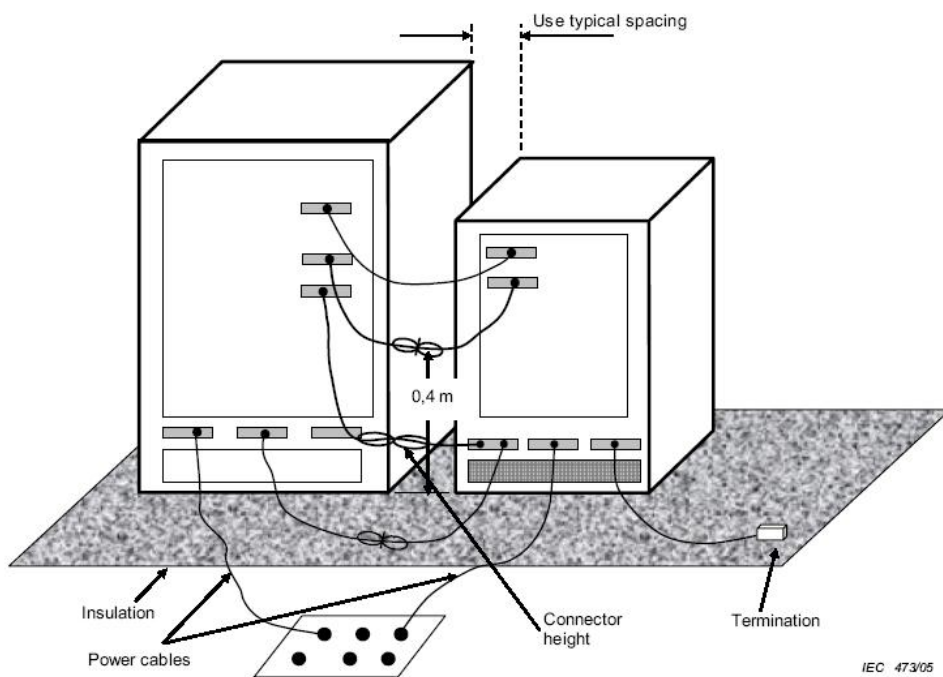
Note: for the measurement distance other than 3m and 10m, the limit is varied according to 20dB/10 decades.

4.2 Block diagram and test set up

For table top equipment



For floor standing equipment



4.3 Test Setup and Test Procedure

The measurement was performed in a semi-anechoic chamber.

The distance from EUT to receiving antenna is 3 meter.

Measurement was performed according to clause 4 and clause 5 of ANSI 63.4.

Test procedure was according to clause 8.3 of ANSI 63.4.

EUT arrangement and operate condition were according to clause 6 and clause 8 of ANSI 63.4.

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

RBW = 100kHz, VBW = 300kHz (30MHz~1GHz)

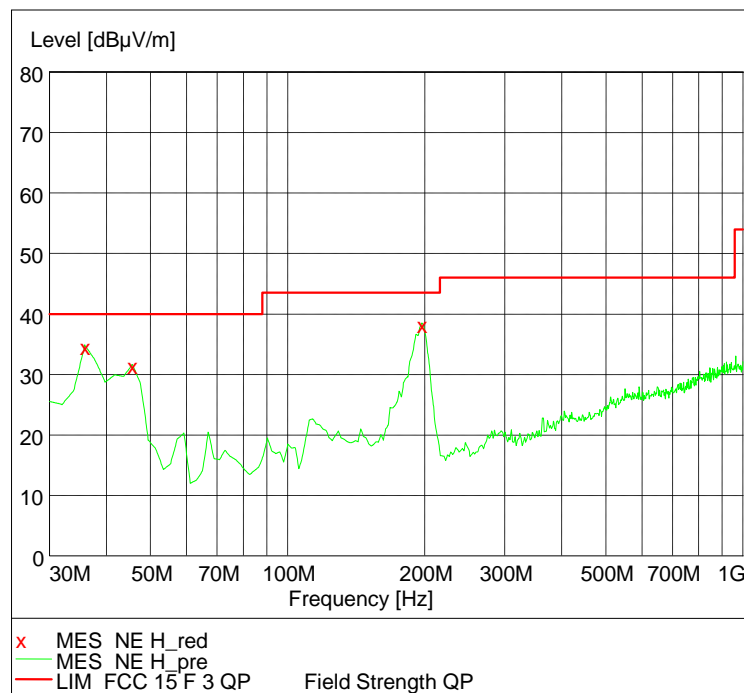
RBW = 1MHz, VBW = 3MHz (>1GHz for PK);

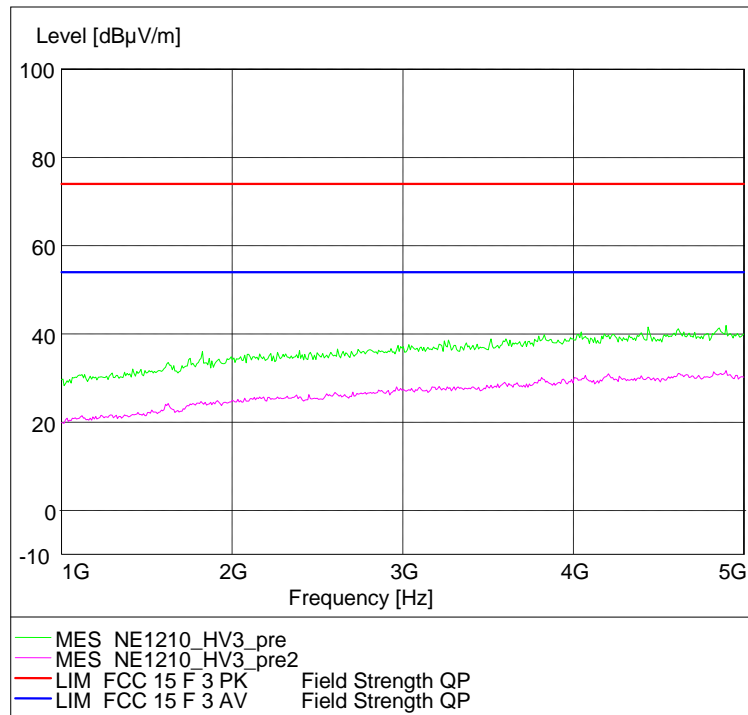
4.4 Test Protocol

Temperature : 25 °C
Relative Humidity : 55 %

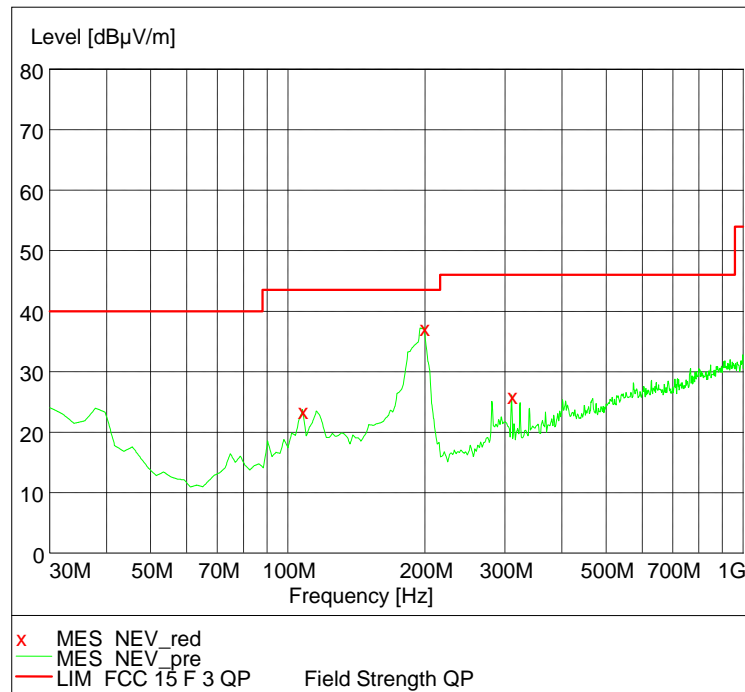
Test data:

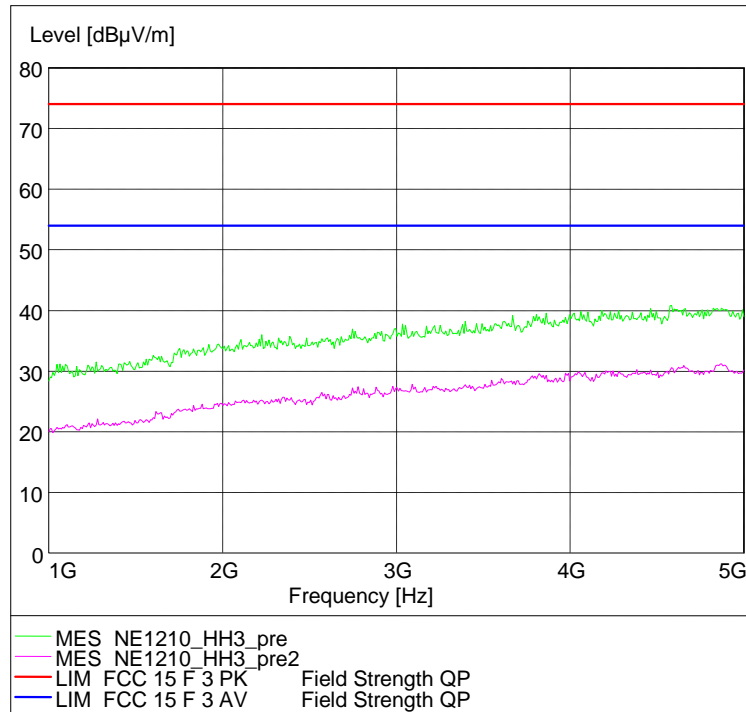
Vertical Polarization





Horizontal Polarization





Polarization (H/V)	Frequency (MHz)	Corrected Reading (dBµV/m)	Correct Factor	Limits (dBµV/m)	Margin (dBµV/m)	Detector
V	35.83	34.8	17.8	40.0	5.2	PK
V	45.55	31.7	12.9	40.0	8.3	PK
V	197.17	38.5	12.5	43.5	5.0	PK
H	107.76	23.7	15.3	43.5	19.8	PK
H	199.12	37.4	12.6	43.5	6.1	PK
H	309.92	26.2	15.6	46.0	19.8	PK

- Remark: 1. Transducer = Antenna Factor + Cable Loss (-Amplifier, is employed)
 2. Corrected Reading = Original Receiver Reading + Transducer
 3. Margin = limit – Corrected Reading
 4. The test is performed from 30MHz to 18GHz.
 5. For the frequency points assessed with QP detector, it has been confirmed the pulse-repetition frequency of their emission is higher than 20 Hz.



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Example: Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,
Gain of Preamplifier = 32.00dB, Original Receiver Reading = 10dBuV.
Then Transducer = $30.20 + 2.00 - 32.00 = 0.20\text{dB/m}$; Corrected Reading =
 $10\text{dBuV} + 0.20\text{dB/m} = 10.20\text{dBuV/m}$
Assuming limit = 54dBuV/m, Corrected Reading = 10.20dBuV/m, then Margin =
 $54 - 10.20 = 43.80\text{dBuV/m}$