

FCC Part 15 Subpart C §15.225

Test Report

Equipment Under Test	INCREDIST PREMIUM
Model Name	INP-BNBI002
Applicant	FLIGHT SYSTEM CONSULTING Inc.
FCC ID	2AHKH-BNBI002
Manufacturer	SAMILCTS Co., LTD
Date of Test(s)	2016.03.02 ~ 2016.03.22
Date of Issue	2016.03.23

In the configuration tested, the EUT complied with the standards specified above.

Issue to	Issue by
FLIGHT SYSTEM CONSULTING Inc. 3F Ebisu MF Bldg. 4-6-1. Ebisu, Shibuya-ku, Tokyo, Japan Tel.: +81-3-3440-6100 Fax: +81-3-5791-2241	MOVON CORPORATION 498-2, Geumeo-ro, Pogok-eup, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea, 449-812 Tel.: +82-31-338-8837 Fax: +82-31-338-8847

Revision history

Revision	Date of issue	Description	Revised by
--	March 23, 2016	Initial	--

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1. General information

1.1. Details of applicant

Applicant : FLIGHT SYSTEM CONSULTING Inc.
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Contact Person : Atsuko Fukuhara
Telephone : +81-3-3440-6100
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1.2. Details of Manufacturer

Manufacturer : SAMILCTS Co., LTD.
Address : Rm807, Woolim Lion's Valley 3cha, 24, Dunchon-daero
388beon-gill, Jungwon-gu, Seongnam-si, Gyeonggi-do, Korea

1.3. Summary of test results

The EUT has been tested according to the following specifications;

Section in FCC part 15	Description	Result
15.225(a)	Electric Field Strength - Fundamental Emission	C
15.225(b) (c)	Electric Field Strength - Outside the Band	C
15.225(d) / 15.209	Electric Field Strength - Spurious Emission	C
15.225(e)	Frequency Tolerance	C
15.207 / 15.107	AC Conducted Emissions	C
15.215(c)	20dB Bandwidth	C

The sample was tested according to the following specification:

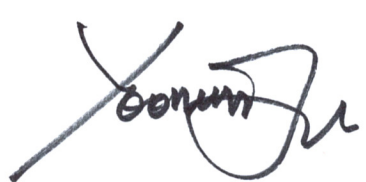
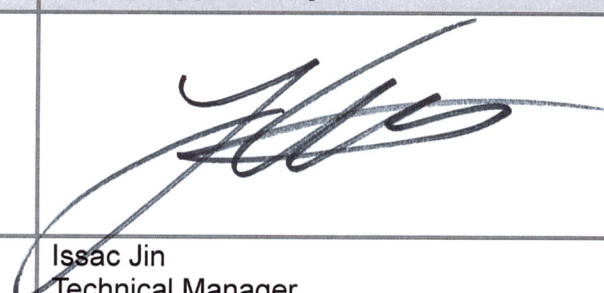
FCC Part 15.225; ANSI C63.10-2013

TEST SITE REGISTRATION NUMBER: FCC(670686)

※ Abbreviation

C Complied
N/A Not applicable
F Fail

Approval Signatories

Test and Report Completed by :	Report Approval by :
	
Nanju Yoo Test Engineer MOVON CORPORATION	Issac Jin Technical Manager MOVON CORPORATION

2. EUT Description

Kind of product	INCREDIST PREMIUM
Model Name	INP-BNBI002
Serial Number	N/A
Power supply	DC 3.7V
Frequency range	13.56 MHz
Modulation technique	ASK
Number of channels	1
Test Site Registration Number	FCC(670686)

2.1. Declarations by the manufacturer

None

2.2. Details of modification

None

3. Measurement equipment

Equipment	Manufacturer	Model	Serial number	Calibration Interval	Calibration due.
Test Receiver	R&S	ESVS30	829673/015	1 year	2016-12-10
Signal Generator	R&S	SMBV100A	257379	1 year	2016-09-23
Spectrum Analyzer	R&S	FSV-40	100832	1 year	2016-12-11
Power Meter	Agilent	E4416A	GB41290645	1 year	2016-09-23
Power Sensor	Agilent	9327A	US40441490	1 year	2016-12-10
Horn Antenna	R&S	HF906	100236	2 year	2017-07-24
Biolog Antenna	A.H.System	SAS-521-7	128	2 year	2017-11-02
Power Amplifier	MITEQ	AM-1431	1497315	1 year	2016-09-24
Power Amplifier	MITEQ	AFS43-01002600	1374382	1 year	2016-09-24
High Pass Filter	Wainwright	WHK3.0/18G-10SS	508	1 year	2016-09-23
DC Power Supply	HP	6674A	3637A01351	1 year	2016-09-23
Controller	INNCO	CO2000	co200/064/6961003/L	N/A	N/A
Antenna Master	INNCO	MA4000	MA4000/038/6961003/L	N/A	N/A
Loop Antenna	ETS LINDGREN	6502	00118166	2 year	2018-02-23
TWO LINE-V-NETWORK	R&S	ESH3-Z5	100296	1 year	2016-12-10
EMI TEST RECEIVER	R&S	ESR3	101873	1 year	2016-11-06

※ Remark;
Support equipment

Description	Manufacturer	Model	Serial number
Smart Phone	Samsung	SHV-E370K	-

4. Transmitter requirements

4.1. Electric Field Strength

Procedure: About the Fundamental Emission, Outside the Band and Spurious Emission
The Radiated Electric Field Strength intensity has been measured with a ground plane and at a distance of 3m.

→ From 9kHz to 30MHz at distance 3m

The EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

The measurements were performed for each antenna angle 0deg., 45deg. and 90deg.

→ From 30MHz to 1000MHz at distance 3m

The measuring antenna height was varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

The measurements were performed for both vertical and horizontal antenna polarization.

Bandwidth settings per frequency range;

	From 9kHz to 150kHz	From 150kHz to 30MHz	From 30MHz to 1000MHz
IF Bandwidth	200Hz	9kHz	120kHz

Part 15 Section 15.31 (f)(2) (9kHz ~ 30MHz)

9kHz ~ 490kHz [Limit at 3m] = [Limit at 300m]-20log(3[m]/300[m])

490kHz ~ 30MHz [Limit at 3m] = [Limit at 30m]-20log(3[m]/30[m])

4.1.1 Electric Field Strength - Fundamental Emission

Test method : Part 15.225(a)
Tx Frequency : 13.56 MHz
Result : **Complies**

Measurement data:

Freq (MHz)	Pol.	Azimut (Degree)	Reading (dBμV/m)	T.F (dB)	Field Strength @3m (dBμV/m)	Limit @3m (dBuV/m)	Margin (dB)
13.56	0°	0	33.07	10.3	43.37	104	60.63
13.56	45°	0	34.41	10.3	44.71	104	59.29
13.56	90°	0	35.35	10.3	45.65	104	58.35

-- Note 1--

Field strength of 13.553MHz to 13.567MHz Limit@3m = 84dBuV/m + 20log30m/3m
= 104dBuV/m

-- Note 2--

T.F(Total Factor) = Antenna Factor + Cable Loss
Field Strength @3m = Reading + T.F

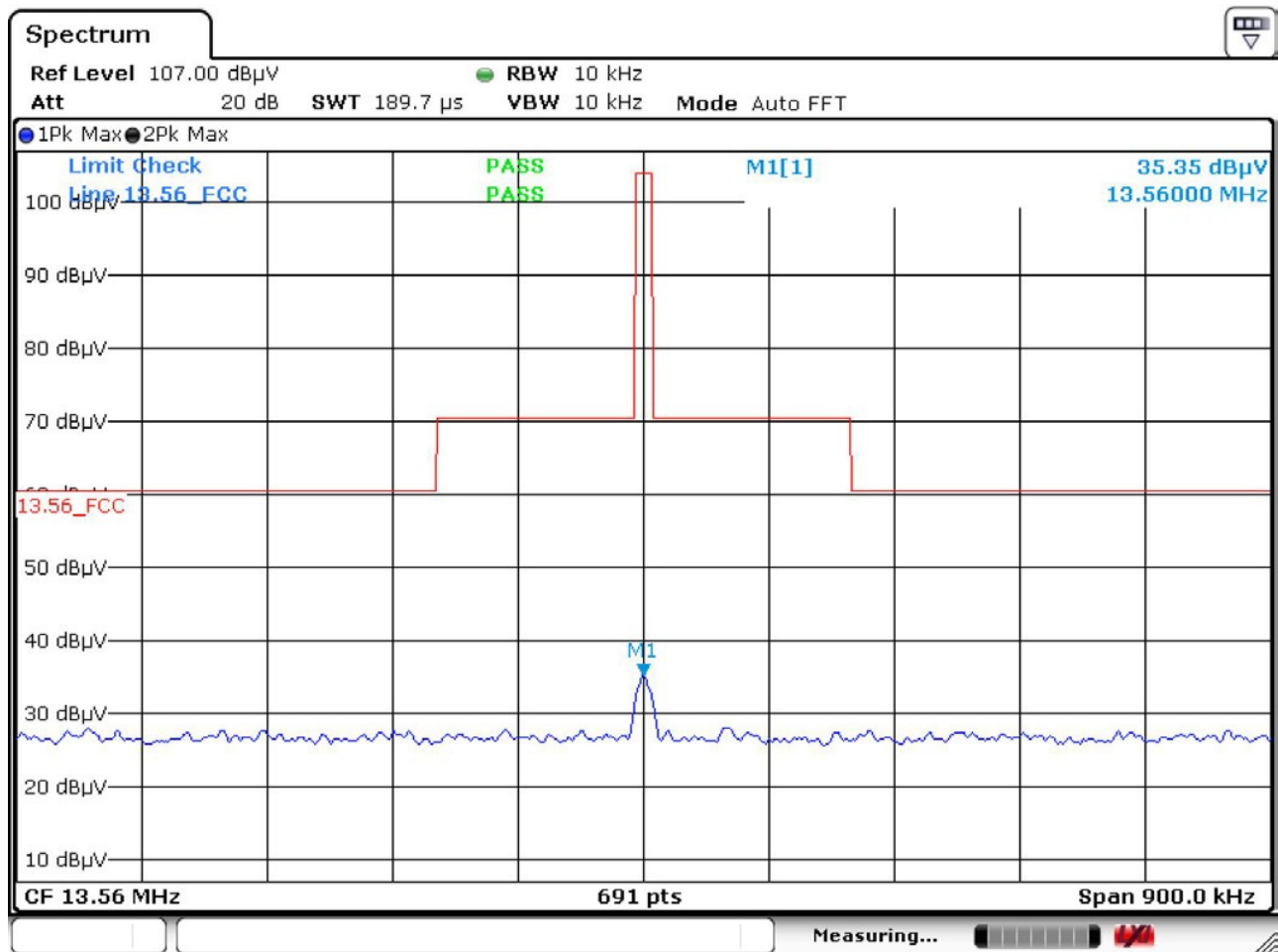
-- Note 3--

To get a maximum emission levels from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes.

4.1.2 Electric Field Strength - Outside the Allocated Band

Test method : Part 15.225(b) (c)
Tx Frequency : 13.56 MHz
Result : **Complies**

Measurement Data:



Date: 8.MAR.2016 10:17:57

4.1.3 Electric Field Strength – Spurious Emission

Test method : Part 15.225(d) / Part 15.209
Tx Frequency : 13.56 MHz
Result : **Complies**

Measurement Data:

Freq (MHz)	Pol.	Reading (dBμV/m)	T.F (dB)	Field Strength @3m (dBμV/m)	Limit @3m (dBμV/m)	Margin (dB)
140.06	V	16.25	18.77	35.02	43.50	8.48
432.37	V	17.31	16.42	33.73	46.00	12.27
581.23	V	18.32	19.74	38.06	46.00	7.94
793.98	V	18.46	21.82	40.28	46.00	5.72
140.20	H	18.43	18.77	37.20	43.50	6.30
433.58	H	18.09	16.42	34.51	46.00	11.49
588.00	H	19.58	19.74	39.32	46.00	6.68
791.50	H	19.90	21.82	41.72	46.00	4.28

-- Note 1--

T.F(Total Factor) = Antenna Factor + Cable Loss –Amp Gain
Field Strength @3m = Reading + T.F

-- Note 2--

No other emissions were detected at a level greater than 20dB below limit.

-- Note 3--

To get a maximum emission levels from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes.

4.2. Frequency Tolerance

Procedure:

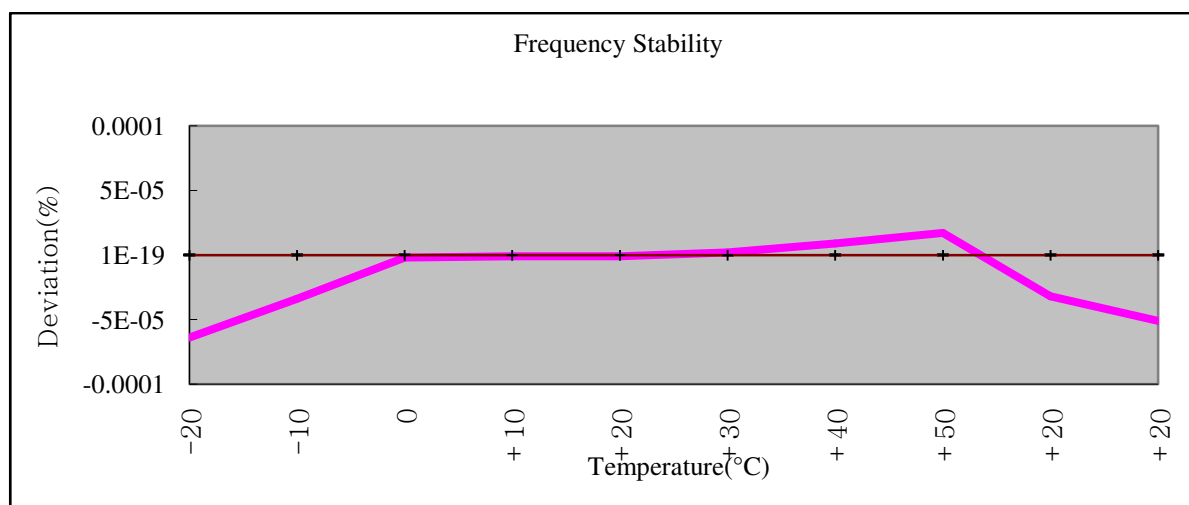
The temperature test was started after the temperature stabilization time of 30 minutes.

Test method : Part 15.225(e)
Tx Frequency : 13.56 MHz
Result : **Complies**

Measurement Data:

OPERATING FREQUENCY: 13,560,000 Hz
Freq. Tolerance Limit: ± 0.01 %

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQ (Hz)	Deviation (%)
100	3.70	-20	13,559,125	-0.000064
100		-10	13,559,534	-0.000034
100		0	13,559,971	-0.000002
100		10	13,559,988	-0.000001
100		20	13,559,996	-0.000001
100		30	13,560,025	0.000002
100		40	13,560,121	0.000009
100		50	13,560,228	0.000017
85	3.15	20	13,559,562	-0.000032
115	4.26	20	13,559,312	-0.000051



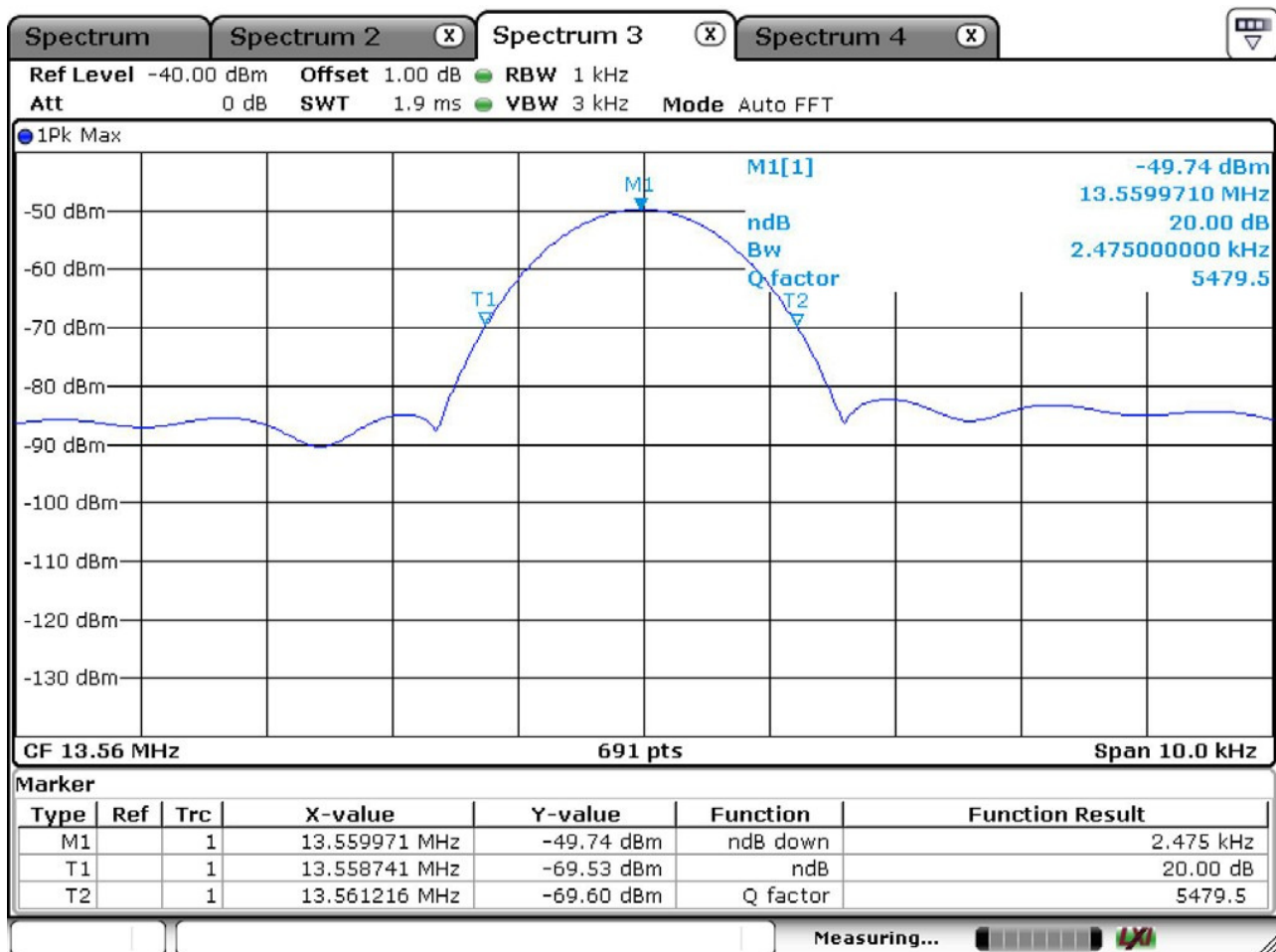
4.3 20dB Bandwidth

Procedure:

The bandwidth of the fundamental frequency was measured by spectrum analyzer with 1kHz RBW and 3kHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

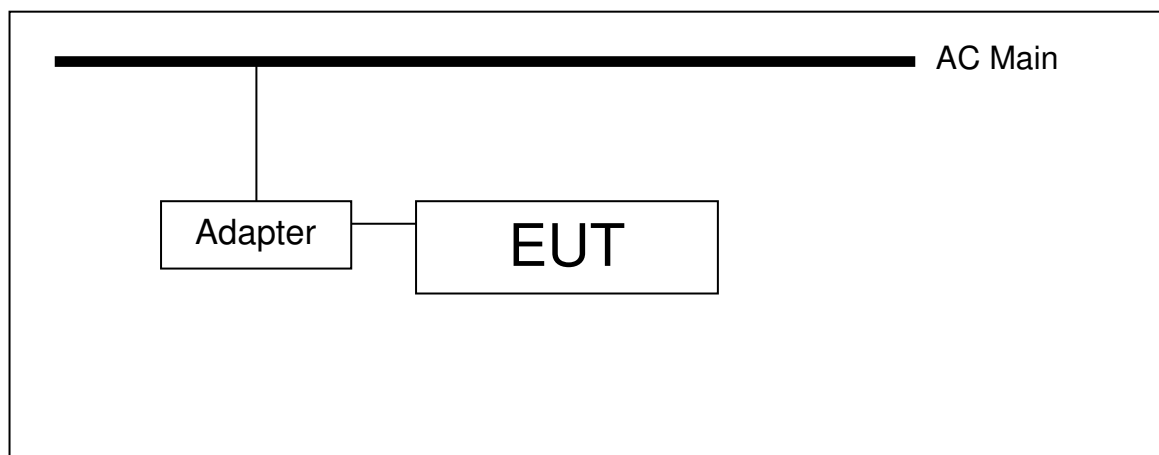
Test method : Part 15.215(c)
Tx Frequency : 13.56 MHz
Result : **Complies**

Measurement Data:



5. AC Conducted power line test

5.1. Test setup



5.2. Limit

According to §15.107(a) for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 uH/ 50 ohm line impedance stabilization network (LISN).

Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequencies ranges.

Frequency of Emission (MHz)	Conducted limit (dB μ V/m)	
	Quasi-peak	Average
0.15 – 0.50	66 - 56*	56 - 46*
0.50 – 5.00	56	46
5.00 – 30.0	60	50

※ **Remark**

Decreases with the logarithm of the frequency.

5.3. Test procedures

The test procedure is performed in a 6.5 m × 3.6 m × 3.6 m (L × W × H) shielded room. The EUT along with its peripherals were placed on a 1.0 m(W) × 1.5 m(L) and 0.8 m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane.

The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room. All peripherals were connected to the second LISN and the chassis ground also bounded to the horizontal ground plane of shielded room. The excess power cable between the EUT and the LISN was bundled. The power cables of peripherals were unbundled. All connecting cables of EUT and peripherals were moved to find the maximum emission.

-Basic Model

5.4. Test results

Ambient temperature: 23 °C

Relative humidity: 45 % R.H.

Frequency range: 0.15 MHz ~ 30 MHz

Measured bandwidth: 9 kHz

Freq. (MHz)	Line	Q-Peak		
		Level(dB μ V/m)	Limit(dB μ V/m)	Margin(dB)
0.29	N	41.37	60.41	19.04
0.44	N	40.61	57.02	16.41
0.64	H	33.99	56.00	22.01
0.98	N	32.02	56.00	23.98
16.26	H	20.83	60.00	39.17
20.87	N	35.94	60.00	24.06

Freq. (MHz)	Line	Q-Peak		
		Level(dB μ V/m)	Limit(dB μ V/m)	Margin(dB)
0.29	N	31.80	50.41	18.61
0.44	N	32.87	47.02	14.15
0.64	H	22.19	46.00	23.81
0.98	N	28.71	46.00	17.29
16.25	H	14.15	50.00	35.85
20.87	N	28.90	50.00	21.10

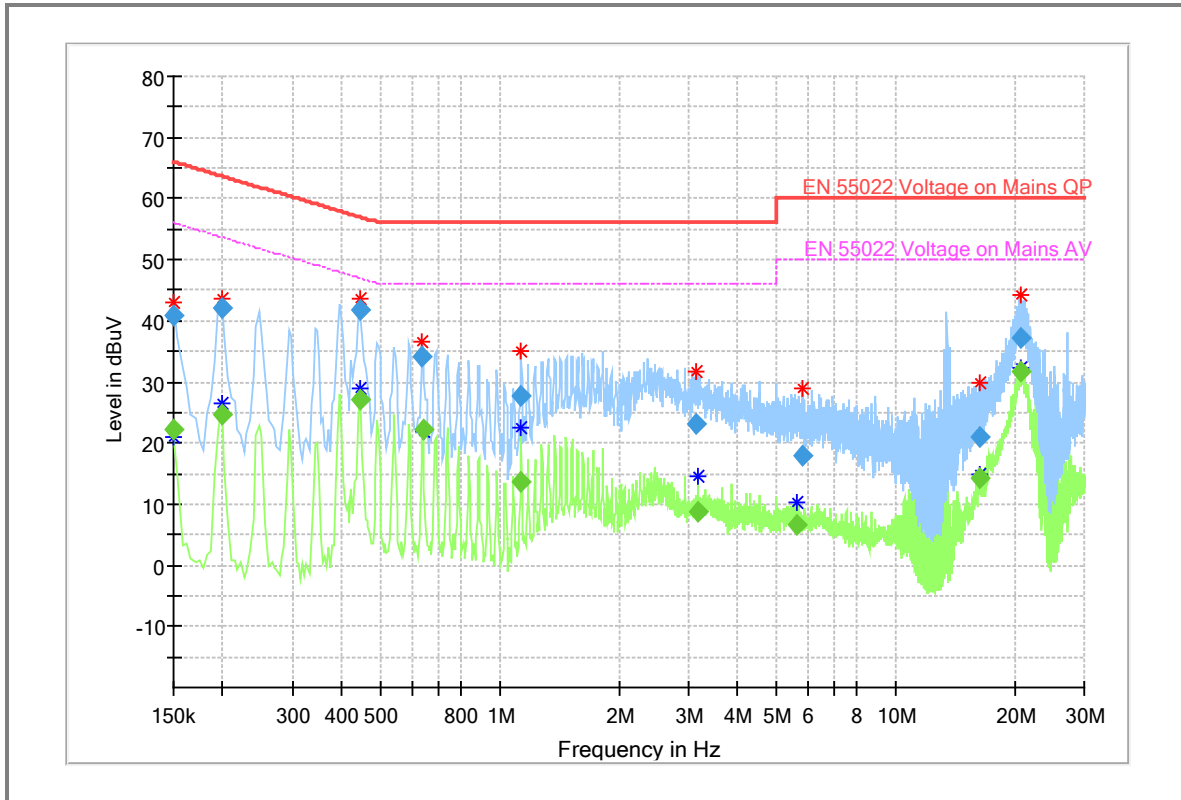
※ Remark

Line(H): Hot

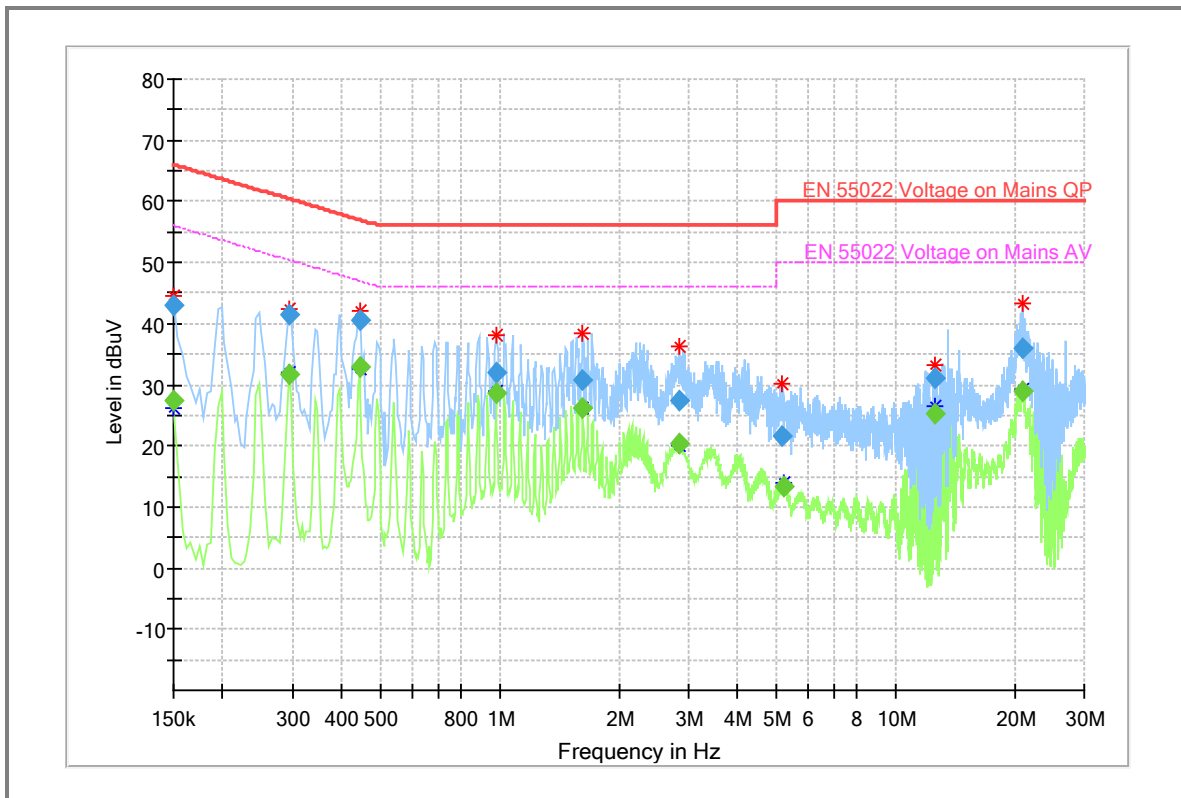
Line(N): Neutral

Plot of conducted power line

Test mode: Hot



Test mode: Neutral



-Variant Model

5.4. Test results

Ambient temperature: 23 °C

Relative humidity: 45 % R.H.

Frequency range: 0.15 MHz ~ 30 MHz

Measured bandwidth: 9 kHz

Freq. (MHz)	Line	Q-Peak		
		Level(dB μ V/m)	Limit(dB μ V/m)	Margin(dB)
0.15	N	40.07	66.00	25.93
0.44	N	42.10	57.02	14.92
1.38	N	26.20	56.00	29.80
12.15	H	11.73	60.00	48.27
21.39	N	33.47	60.00	26.53
29.19	H	21.54	60.00	38.46

Freq. (MHz)	Line	Q-Peak		
		Level(dB μ V/m)	Limit(dB μ V/m)	Margin(dB)
0.15	N	19.78	56.00	36.22
0.44	N	28.54	47.02	18.48
1.38	N	13.49	46.00	32.51
12.15	H	6.43	50.00	43.57
21.12	N	29.02	50.00	20.98
29.19	H	14.26	50.00	35.74

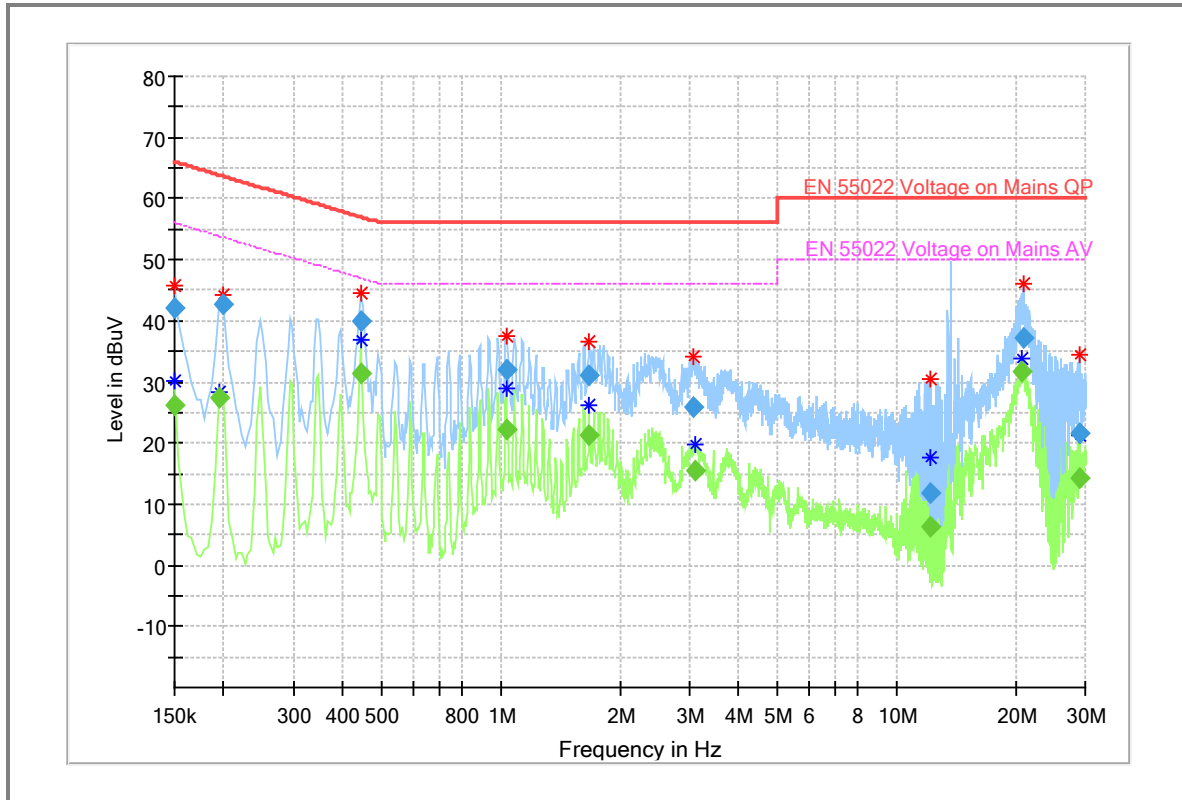
※ Remark

Line(H): Hot

Line(N): Neutral

Plot of conducted power line

Test mode: Hot



Test mode: Neutral

