FCC CFR47 Part 15 Subpart B Certification Test Report

For the

Product	**: 3D Printer**
Model	**: 7X**
Multiple Model	**: 5X**
FCC ID	**: 2AB83-7X**
Applicant	**: Sindoh Co., Ltd.**
FCC Rule	**: CFR 47 Part 15 Subpart B**

We hereby certify that the above product has been tested by us with the listed rules and found in compliance with the regulation. The test data and results are issued on the test report no. **TR-W1811-009**

Signature

Choi, Young-min / Technical Manager
Date: 2018-11-19

Test Laboratory: ENG Co., Ltd.

FCC/ISED CANADA TEST REPORT

Project Number	**: EA1809C-184**
Test Report Number	**: TR-W1811-009**
Type of Equipment	**: 3D Printer**
Model Name	**: 7X**
Multiple Model Name	**: 5X**
FCC ID	**: 2AB83-7X**
Applicant	**: Sindoh Co., Ltd.**
Address	**: 3, Seongsuiro24(isipsa)-gil, Seongdong-gu, Seoul 04797, Republic of Korea**
Manufacturer	**: Sindoh Co., Ltd.**
Address	**: 3, Seongsuiro24(isipsa)-gil, Seongdong-gu, Seoul 04797, Republic of Korea**
Factory 1	**: SINDOH (QINGDAO) CO., LTD.**
Address	**: 1008 Emeisan-road, Qingdao Economics & Technology Development Zone, 266555 Qingdao, Shandong, PEOPLE'S REPUBLIC OF CHINA**
Factory 2	**: Sindoh Co., Ltd.**
Address	**: 1138, Suncheonhyang-ro, Baebang-eup, Asan-si, Chungcheongnam-do 31479, REPUBLIC OF KOREA**
FCC Rule	**: CFR 47 Part 15 Subpart B §15.101 Class A Peripheral Device**
ISED Canada Standard	**: ICES-003 Issue 6 Class A**
Total page of Report	**: 71 pages**
Date of Receipt	**: 2018-09-28**
Date of Issue	**: 2018-11-19**
Test Result	**: Pass**

This test report only contains the result of a single test of the sample supplied for the examination.
It is not a generally valid assessment of the features of the respective products of the mass-production.

Prepared by Chu, Woo-Sik / Senior Engineer _____ (Signature) 2018-11-19 (Date)

Reviewed by Choi, Young-min / Technical Manager _____ (Signature) 2018-11-19 (Date)

ENG Co., Ltd. 135-60 Gyeongchung-daero, Gonjiam-eup, Gwangju-si, Gyeonggi-do, Korea 12813 Report Form_02 (Rev.0)
TEL: +82-31-727-8300 FAX: +82-31-746-0800 http://www.the-eng.co.kr

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Release Control Record

Issue Report No.	Issued Date	Details/Revisions
TR-W1811-009	2018-11-19	Initial Release

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1. TEST SUMMARY

1.1 Test standards and results

The EUT (Equipment Under Test) has been tested according to the following specifications:

AGENCY NAME	APPLICABLE SECTION	TEST DESCRIPTION	RESULTS
FCC	Part 15 Subpart B Section 15.107 (b)	AC Power Line Conducted Emission	PASS
	Part 15 Subpart B Section 15.109 (b)	Radiated Emission	PASS
ISED Canada	ICES-003 Issue 6 Section 6.1, Class A	AC Power Line Conducted Emission	PASS
	ICES-003 Issue 6 Section 6.2, Class A	Radiated Emission	PASS

ENG Co., Ltd tested the EUT in accordance with the requirements set forth in the above FCC and ISED Canada Rules and Regulation and the EUT met all of the requirements of the standard.

1.2. Test Methodology

FCC: ANSI C 63.4: 2014, FCC CFR 47 Part 2, and Part 15

ISED Canada: ICES-003 Issue 6

1.3 Additions, deviations, exclusions from standards

No additions, deviations or exclusions have been made from standard.

1.4 Purpose of the test

To determine whether the equipment under test fulfills the FCC and ISED Canada Rules, Regulation and standards stated in section 1.1 and 1.2.

1.5 Test Facility

The measurement facilities are located at 135-60 Gyeongchung-daero, Gonjiam-eup, Gwangju-si, Gyeonggi-do 12813, Korea. Description details of test facilities were submitted to the ISED, Canada, accredited as a Conformity Assessment Body (CAB) by the FCC, designated by the RRA (Radio Research Agency), and accredited by KOLAS (Korea Laboratory Accreditation Scheme) in Korea and approved by TUV Rheinland and TUV SÜD according to the requirement of ISO 17025.

Laboratory Qualification	Registration No.	Mark
FCC	KR0160	
ISED (Canada)	IC 12721A-1	
RRA	KR0160	
TUV Rheinland	UA 50314109-0002	
TUV SÜD	CARAT 18 03 94465 003	
Korean Agency for Technology and Standards	KT733	

2. EUT (Equipment Under Test) Description

2.1 General Description

The Sindoh Co., Ltd., Model 7X (referred to as the EUT in this report) is a 3D Printer, The product specification described herein was obtained from product data sheet or user's manual.

Printing Method	Fused Filament Fabrication
Max. Print Length(mm)	7X: W(max):390, D(max):390, H(max):450 5X: W(max):350, D(max):350, H(max):450
Print Layer Thickness Setting	0.05 ~ 0.4 mm
Basic Nozzle diameter	0.4 mm
Filament width	1.75 mm
Printable materials	Sindoh : PLA, ABS, FLEXIBLE, PVA(Water-soluble) Open Material : PLA, ABS, FLEXIBLE, PVA(Water-soluble), ASA, PETG, etc
Printable color	White, Black, Gray, Red, Yellow, Green, Blue, Pink(PLA), Purple(PLA)
Continuous Nozzle Usage/ Maximum Temperature	Recommended Temperature(Nozzle): PLA 200 ℃, ABS 230 ℃, Flexible 240 ℃, PVA 230 ℃ / Max 250 ℃
Continuous Bed Usage/ Maximum Temperature	Recommended Temperature(Bed): PLA 60 ℃, ABS 90 ℃, Flexible 60 ℃, PVA 60 ℃ / Max 110 ℃
Recommended printing speed / maximum speed	40 mm/s Recommended / 200 mm/s max
Electrical Rating	100 - 240 V~, 50/60 Hz, 9.5 A
Power	1000 W
Dimensions	7X: 864 (W) x 810 (D) x 1690 (H) 5X: 864(W) x 810(D) x 853(H)
Weight	7X: 175 kg (excluding cartridge) 5X: 120 kg (excluding cartridge), Without Optional External Table
Interface	USB Device, USB Host, WiFi, Ethernet
Cartridge	Auto Load / Unload
Contained RF Module	FCC ID: 2AB83-TWFM-M311D IC : 2541A-TWFMM311D Model: TWFM-M311D Manufacturer: LG Innotek Co., Ltd.

2.2 Additional Model

Model Name	Model Difference
7X	Basic Model
5X	Identical to the basic model except for the model designation, optional external table and optional internal SSD.
Note: The manufacturer has declared to all the additional model names into basic model name without any further evaluation by ENG Co., Ltd, but the model 7X has internal SSD, so it seems to model 7X is worst case.	

2.3 Description of supported units

The following peripheral devices and/or interface cables were connected during the measurement:

Description	Model No.	FCC ID	Serial No	Manufacturer.
3D Printer (EUT) *	7X	**2AB83-7X**	N/A	Sindoh Co., Ltd.
Notebook PC	TRN-C125	DoC	N/A	HP
Adapter for Notebook PC	HSTNN-CA40	N/A	N/A	CHICONY Power Technology
Mouse	M-U0026	DOC	N/A	Logitech
Access Point (AP)	AW-A1	N/A	ABRE400975NT	Unicorn Information System
Adapter for AP	K02-1201000	N/A	N/A	Shenzhen KeYu Power Supply Technology Co., Ltd.
USB Memory Stick	8GB-WJ004	DoC	N/A	SHENZHEN CHENGE ELECTRONICS CO., LTD.

2.4 Cable Description

Test Mode	Ports Name	Shielded (Y/N)	Ferrite Bead (Y/N)	Length (m)	Connected to
Mode #1 - #5	AC IN	N	N	1.8	AC Mains
	LAN	N	N	3.0	Notebook PC
	USB	Y	N	1.5	
	USB	-	-	-	USB Memory Stick
Mode #6 - #9	AC IN	N	N	1.8	AC Mains
	LAN	N	N	3.0	Line terminated
	USB	Y	N	1.5	Notebook PC
	USB	-	-	-	USB Memory Stick

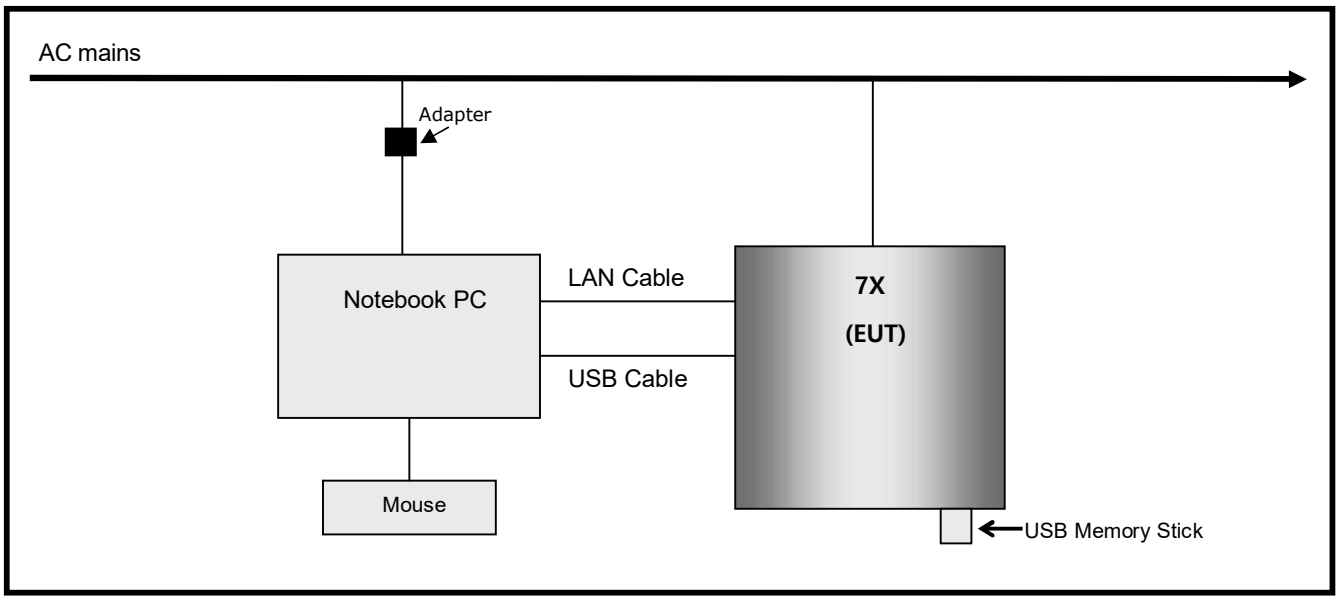
2.5 Mode of operation during the test

For finding worse case configuration and operating mode, the EUT was operated as following test mode.

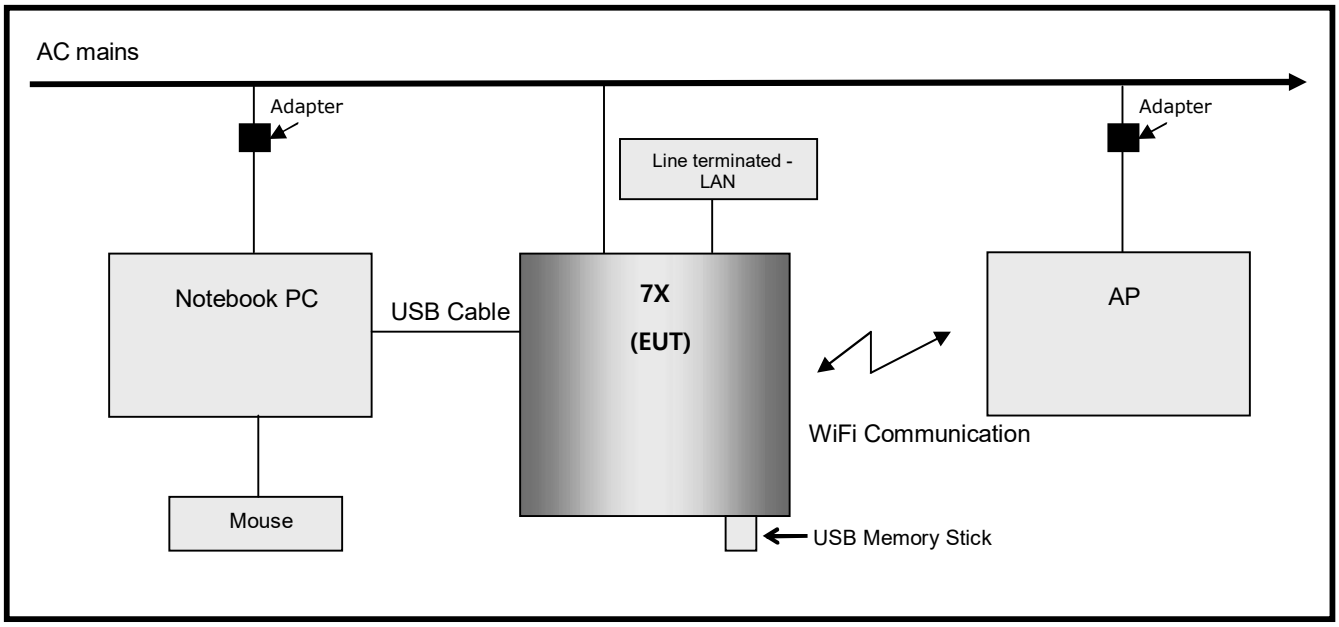
Test Mode	Description
# 1	The EUT was operated in standby mode
# 2	Printing mode using USB cable between the EUT and a Notebook PC
# 3	Printing mode using USB memory stick
# 4	Printing mode using Ethernet speed, 100 Mbps
# 5	Printing mode using Ethernet speed, 1 000 Mbps
# 6	Printing mode using Wi-Fi function, 802.11b
# 7	Printing mode using Wi-Fi function, 802.11g
# 8	Printing mode using Wi-Fi function, 802.11n HT20
# 9	Printing mode using Wi-Fi function, 802.11n HT40

2.6 Test Setup Drawing

[Mode #1 ~ #5]



[Mode #6 - #9]



2.7 EUT Modifications

- No EMC Relevant Modifications were performed by this test laboratory.

3. EMISSION TESTS

3.1 AC Power Line Conducted Emission

3.1.1 Test setup

The EUT and all supporting equipments were placed on a non-metallic table approximately 0.8 m above the ground plane.

Power was fed to the EUT through a 50 Ω/50 μH + 5 Ω Line Impedance Stabilization Network (LISN) and all supporting equipments were connected to another LISN. The ground plane was electrically bonded to the reference ground system and all power lines were filtered from ambient noise. Preliminary Power line Conducted Emission test was performed by using the procedure in ANSI C63.4: 2014 7.3.3 to determine the worse operating conditions.

The test set-up photos are included in appendix I.

Used Software for measurement is EMC 32 supplied by Rohde&Schwarz.

3.1.2 Measurement uncertainty

Frequency range	Uncertainty
150 kHz ~ 30 MHz	2.00 dB

The measurement uncertainties are given with 95 % confidence.

3.1.3 Test Result

Date of Test	2018-10-23		
Temperature	(19.3 ~ 21.5) °C	Relative humidity	(47.1 ~ 45.8) % R.H.
Operating Input Voltage	120 Vac	Input Frequency	60 Hz
Frequency range	RBW	VBW	Detector Mode
0.15 MHz ~ 30 MHz	9 kHz	30 kHz	Peak , Q.P and/or Average
Test Mode	Mode #1 ~ #9		
Test Result	***Pass***	Tested By	Kim, Kwang-hyun

3.1.4 Sample Calculated Example

At 5.31 MHz QP Limit = 60.0 dBμV

Correction Factor (C. Factor) of LISN, Pulse Limiter and cable loss at 5.31 MHz = 9.7 dB

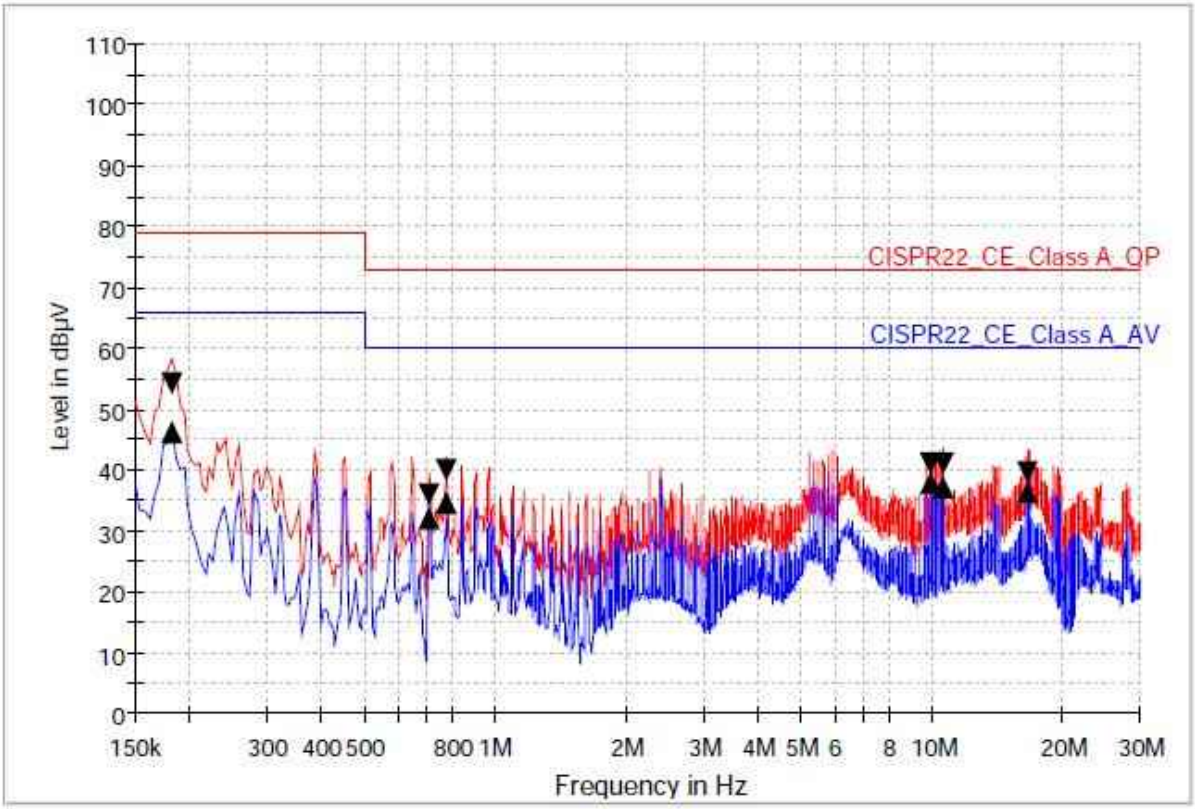
Q.P Reading from the Test receiver = 20.8 dBμV

(Calculated value for system losses by software EMC32 manufactured by Rohde & Schwarz)

Therefore Q.P Margin = 60 - 20.8 = 39.2 so the EUT has 39.2 dB margin at 5.31 MHz

3.1.5 Test Data

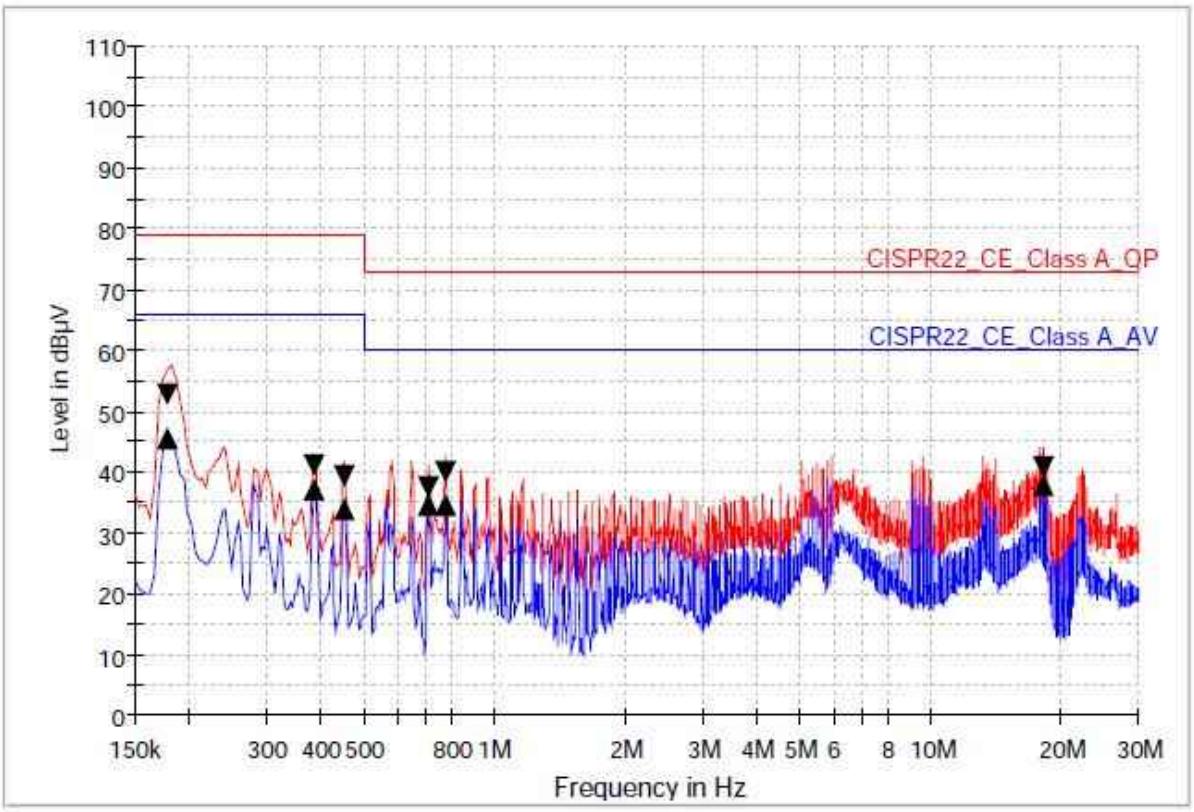
Mode #1	HOT LINE



Limit and Margin1

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)	Margin - CAV (dB)	Limit - CAV (dBµV)
0.182000	54.3	46.4	9.000	L1	9.6	24.7	79.0	19.6	66.0
0.710000	36.2	31.9	9.000	L1	9.7	36.8	73.0	28.1	60.0
0.774000	40.2	34.6	9.000	L1	9.7	32.8	73.0	25.4	60.0
9.890000	41.0	37.8	9.000	L1	9.9	32.0	73.0	22.2	60.0
10.598000	41.1	37.2	9.000	L1	9.9	31.9	73.0	22.8	60.0
16.670000	39.8	36.3	9.000	L1	10.0	33.2	73.0	23.7	60.0

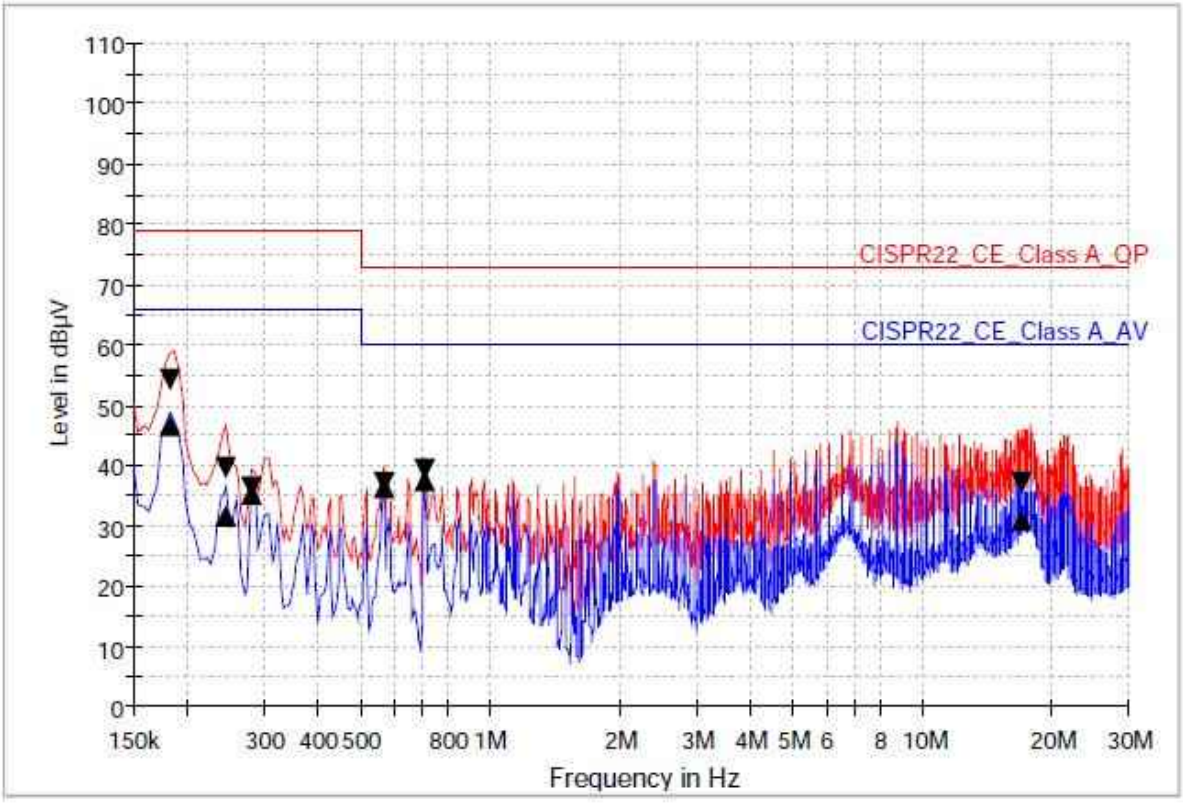
Mode #1	NEUTRAL LINE



Limit and Margin1

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)	Margin - CAV (dB)	Limit - CAV (dBµV)
0.178000	52.9	45.7	9.000	N	9.6	26.1	79.0	20.3	66.0
0.386000	41.2	37.3	9.000	N	9.6	37.8	79.0	28.7	66.0
0.454000	39.3	33.8	9.000	N	9.6	39.7	79.0	32.2	66.0
0.706000	37.5	34.7	9.000	N	9.7	35.5	73.0	25.3	60.0
0.774000	40.1	34.5	9.000	N	9.7	32.9	73.0	25.5	60.0
18.226000	40.9	37.9	9.000	N	10.0	32.1	73.0	22.1	60.0

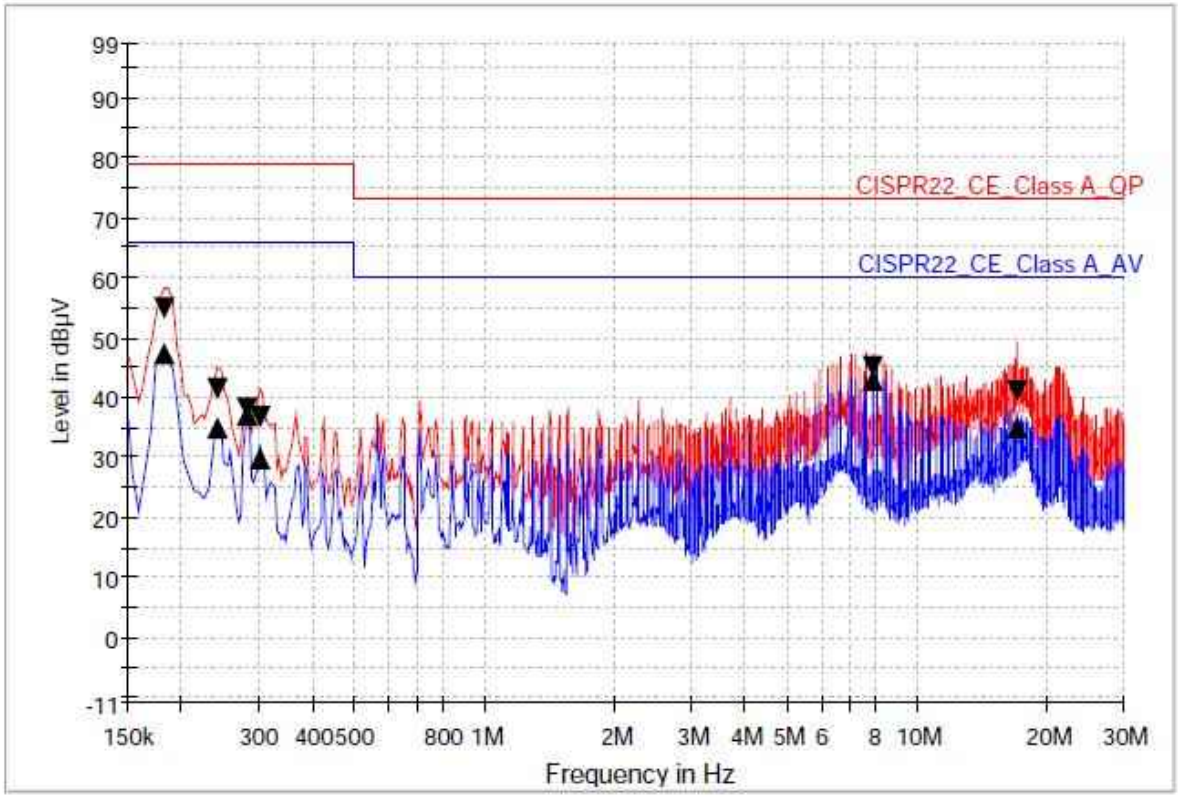
Mode #2	HOT LINE



Limit and Margin1

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)	Margin - CAV (dB)	Limit - CAV (dBµV)
0.182000	54.2	46.7	9.000	L1	9.6	24.8	79.0	19.3	66.0
0.246000	39.8	31.7	9.000	L1	9.6	39.2	79.0	34.3	66.0
0.282000	36.6	35.2	9.000	L1	9.6	42.4	79.0	30.8	66.0
0.566000	37.2	36.5	9.000	L1	9.6	35.8	73.0	23.5	60.0
0.706000	39.3	37.4	9.000	L1	9.7	33.7	73.0	22.6	60.0
17.002000	37.0	30.9	9.000	L1	10.0	36.0	73.0	29.1	60.0

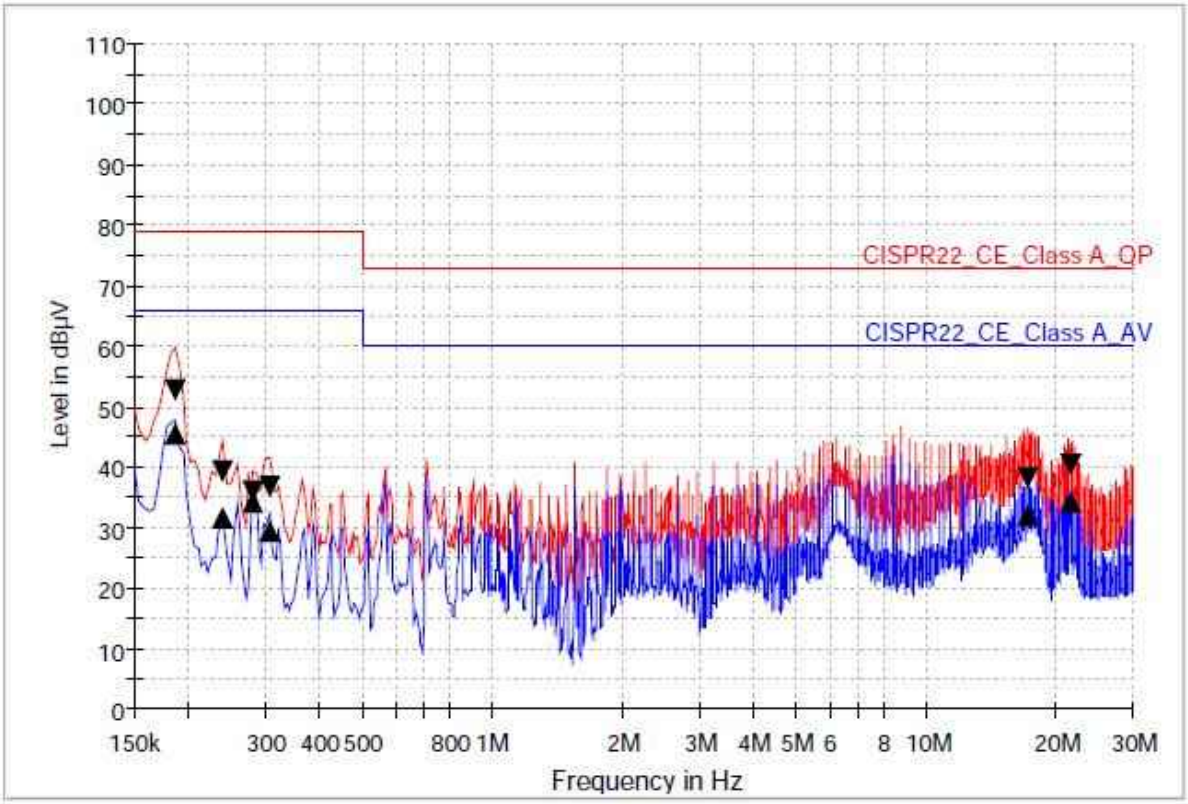
Mode #2	NEUTRAL LINE



Limit and Margin1

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)	Margin - CAV (dB)	Limit - CAV (dBµV)
0.182000	54.8	47.5	9.000	N	9.6	24.2	79.0	18.5	66.0
0.242000	41.5	34.8	9.000	N	9.6	37.5	79.0	31.2	66.0
0.282000	38.1	37.1	9.000	N	9.6	40.9	79.0	28.9	66.0
0.302000	36.6	29.6	9.000	N	9.6	42.4	79.0	36.4	66.0
7.918000	45.1	43.0	9.000	N	9.9	27.9	73.0	17.0	60.0
17.050000	41.2	35.0	9.000	N	10.0	31.8	73.0	25.0	60.0

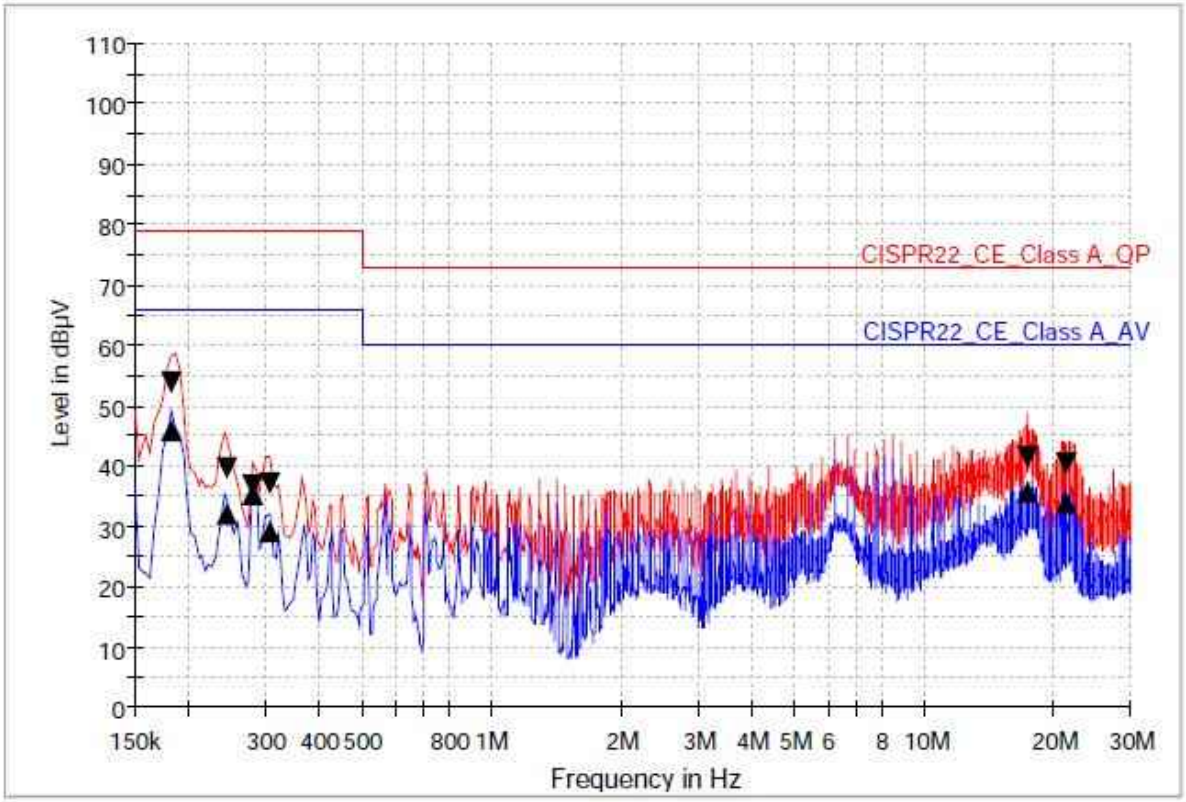
Mode #3	HOT LINE



Limit and Margin1

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)	Margin - CAV (dB)	Limit - CAV (dBµV)
0.186000	52.7	45.6	9.000	L1	9.6	26.3	79.0	20.4	66.0
0.238000	39.3	31.7	9.000	L1	9.6	39.7	79.0	34.3	66.0
0.282000	36.0	34.3	9.000	L1	9.6	43.0	79.0	31.7	66.0
0.306000	36.8	29.4	9.000	L1	9.6	42.2	79.0	36.6	66.0
17.142000	38.1	32.2	9.000	L1	10.0	34.9	73.0	27.8	60.0
21.498000	40.6	34.4	9.000	L1	10.1	32.4	73.0	25.6	60.0

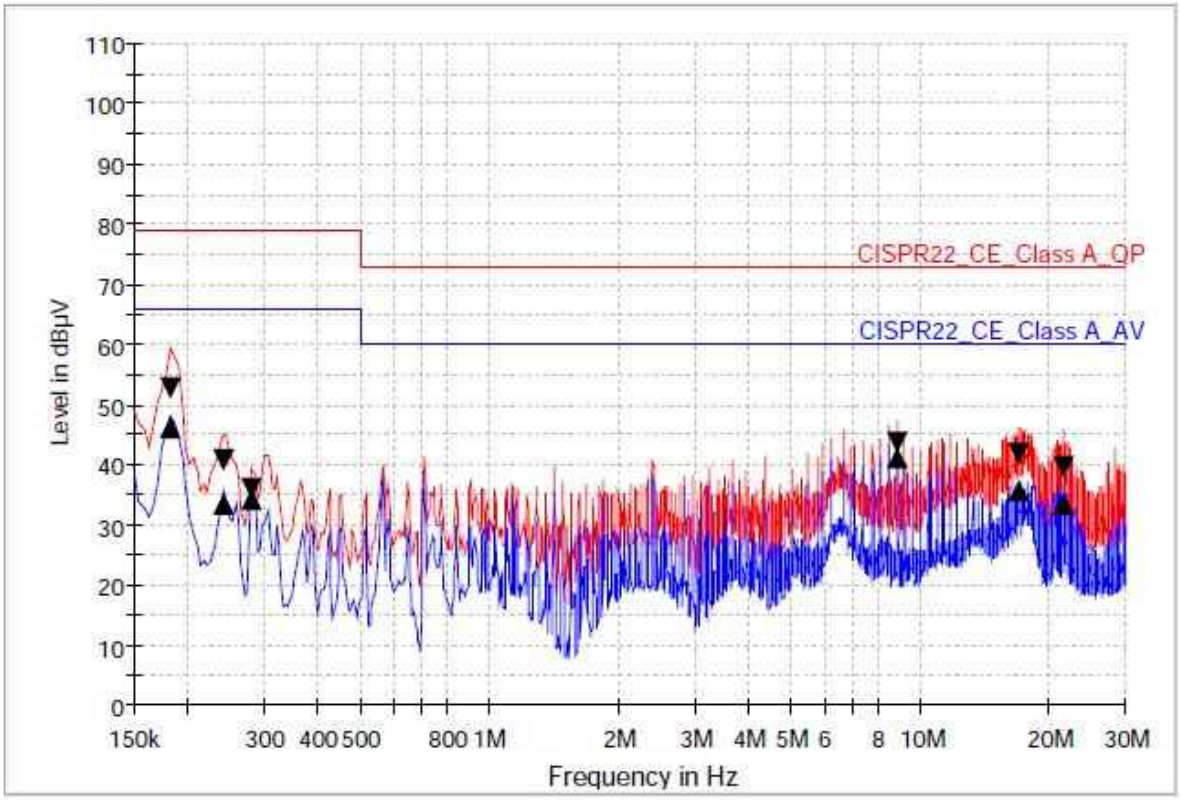
Mode #3	NEUTRAL LINE



Limit and Margin1

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)	Margin - CAV (dB)	Limit - CAV (dBµV)
0.182000	53.8	45.7	9.000	N	9.6	25.2	79.0	20.3	66.0
0.246000	39.6	32.0	9.000	N	9.6	39.4	79.0	34.0	66.0
0.282000	36.9	35.3	9.000	N	9.6	42.1	79.0	30.7	66.0
0.306000	37.1	29.1	9.000	N	9.6	41.9	79.0	36.9	66.0
17.302000	41.7	35.7	9.000	N	10.0	31.3	73.0	24.3	60.0
21.370000	40.3	33.9	9.000	N	10.1	32.7	73.0	26.1	60.0

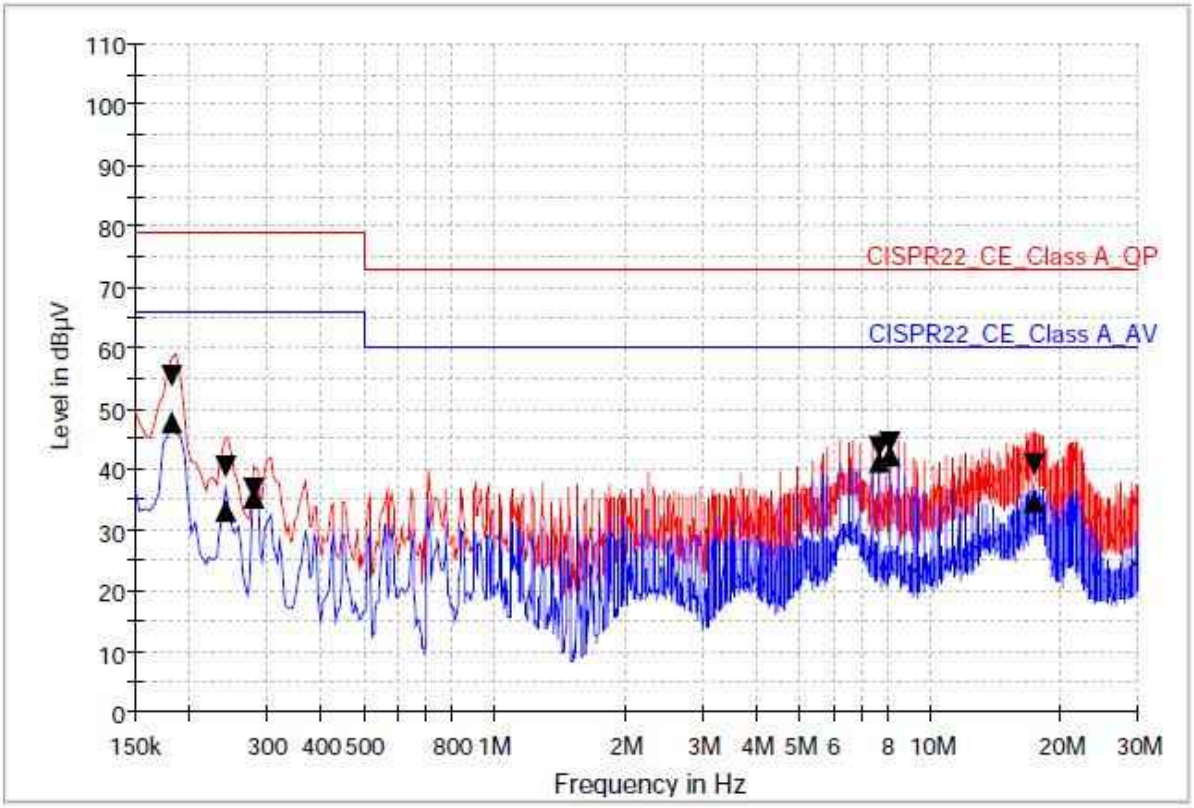
Mode #4	HOT LINE



Limit and Margin1

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)	Margin - CAV (dB)	Limit - CAV (dBµV)
0.182000	52.7	46.3	9.000	L1	9.6	26.3	79.0	19.7	66.0
0.242000	40.9	33.7	9.000	L1	9.6	38.1	79.0	32.3	66.0
0.282000	36.0	34.2	9.000	L1	9.6	43.0	79.0	31.8	66.0
8.906000	43.9	41.3	9.000	L1	9.9	29.1	73.0	18.7	60.0
16.974000	41.8	35.8	9.000	L1	10.0	31.2	73.0	24.2	60.0
21.486000	39.7	33.5	9.000	L1	10.1	33.3	73.0	26.5	60.0

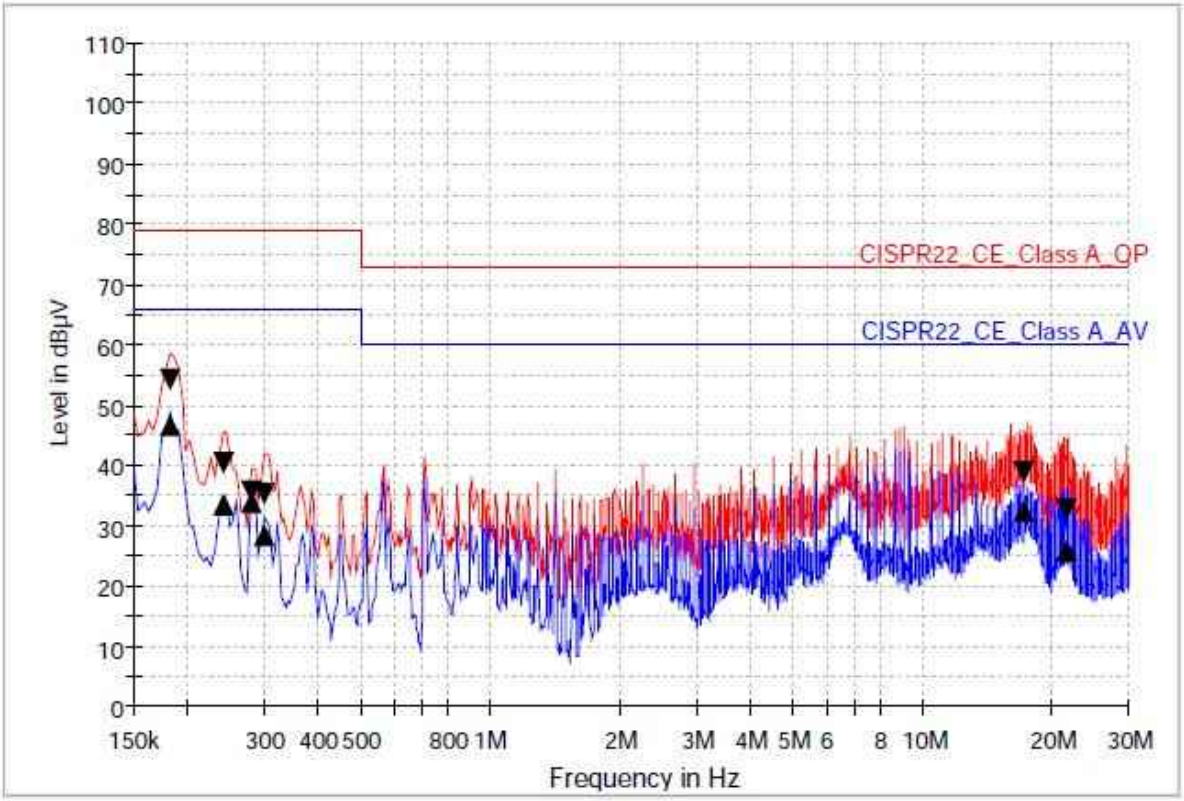
Mode #4	NEUTRAL LINE



Limit and Margin1

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)	Margin - CAV (dB)	Limit - CAV (dBµV)
0.182000	55.3	47.8	9.000	N	9.6	23.7	79.0	18.2	66.0
0.242000	40.5	33.1	9.000	N	9.6	38.5	79.0	32.9	66.0
0.282000	36.9	35.3	9.000	N	9.6	42.1	79.0	30.7	66.0
7.634000	43.6	41.0	9.000	N	9.8	29.4	73.0	19.0	60.0
8.058000	44.3	42.4	9.000	N	9.9	28.7	73.0	17.6	60.0
17.290000	40.7	34.6	9.000	N	10.0	32.3	73.0	25.4	60.0

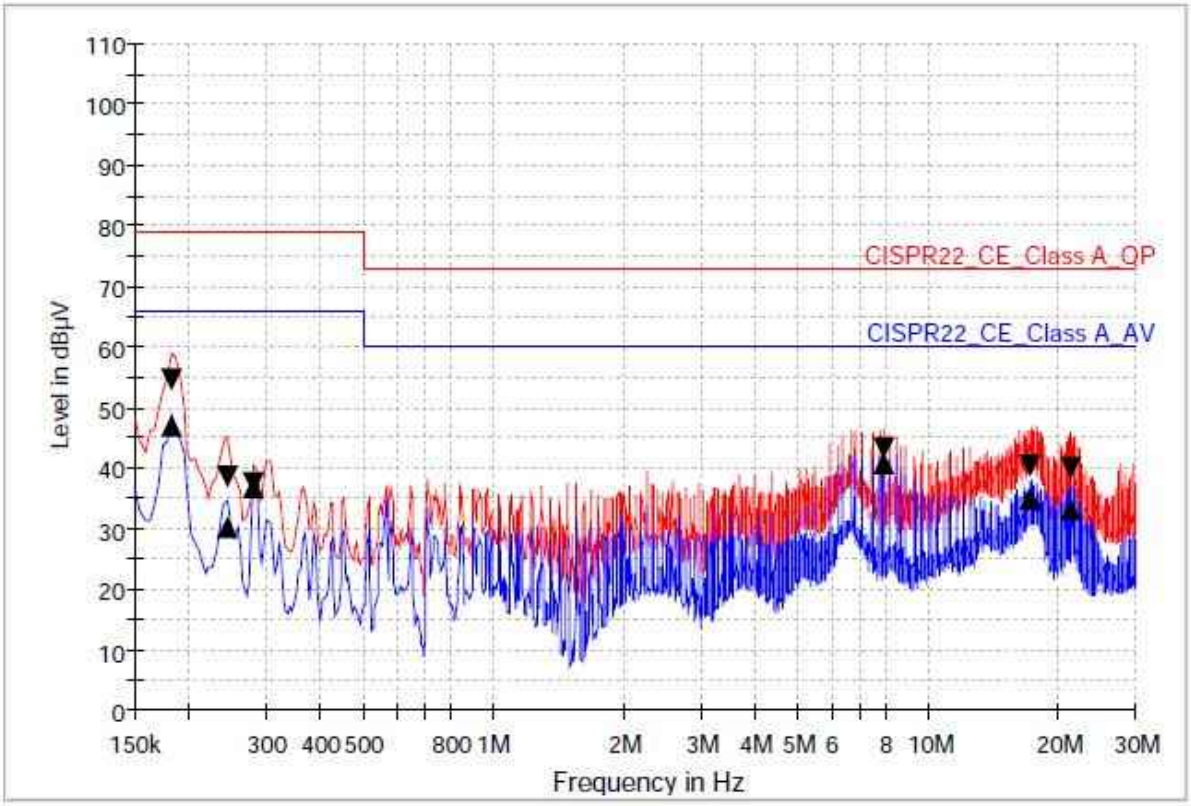
Mode #5	HOT LINE



Limit and Margin1

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)	Margin - CAV (dB)	Limit - CAV (dBµV)
0.182000	54.2	46.7	9.000	L1	9.6	24.8	79.0	19.3	66.0
0.242000	40.5	33.5	9.000	L1	9.6	38.5	79.0	32.5	66.0
0.282000	35.7	33.9	9.000	L1	9.6	43.3	79.0	32.1	66.0
0.302000	35.5	28.4	9.000	L1	9.6	43.5	79.0	37.6	66.0
17.118000	39.0	32.5	9.000	L1	10.0	34.0	73.0	27.5	60.0
21.590000	32.9	25.8	9.000	L1	10.1	40.1	73.0	34.2	60.0

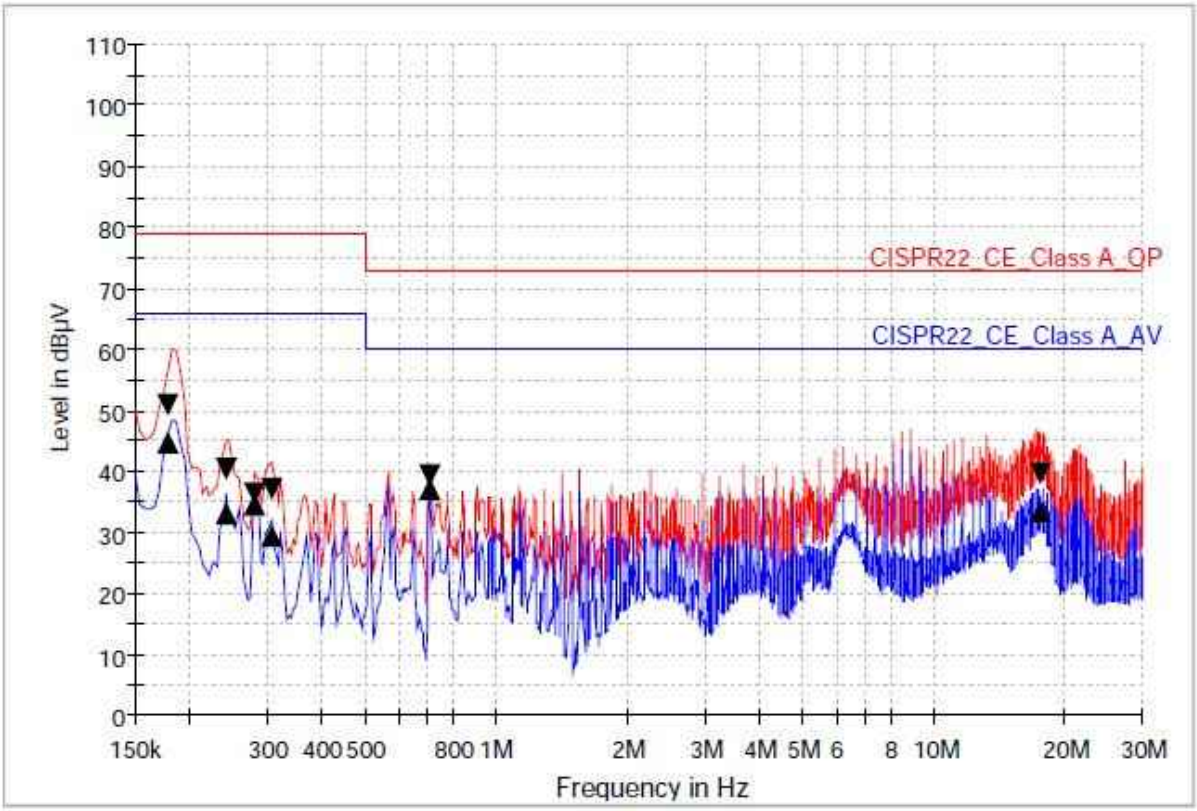
Mode #5	NEUTRAL LINE



Limit and Margin1

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)	Margin - CAV (dB)	Limit - CAV (dBµV)
0.182000	54.5	46.9	9.000	N	9.6	24.5	79.0	19.1	66.0
0.246000	38.7	30.4	9.000	N	9.6	40.3	79.0	35.6	66.0
0.282000	37.5	36.7	9.000	N	9.6	41.5	79.0	29.3	66.0
7.918000	43.3	40.8	9.000	N	9.9	29.7	73.0	19.2	60.0
17.242000	40.5	34.9	9.000	N	10.0	32.5	73.0	25.1	60.0
21.306000	39.9	33.0	9.000	N	10.1	33.1	73.0	27.0	60.0

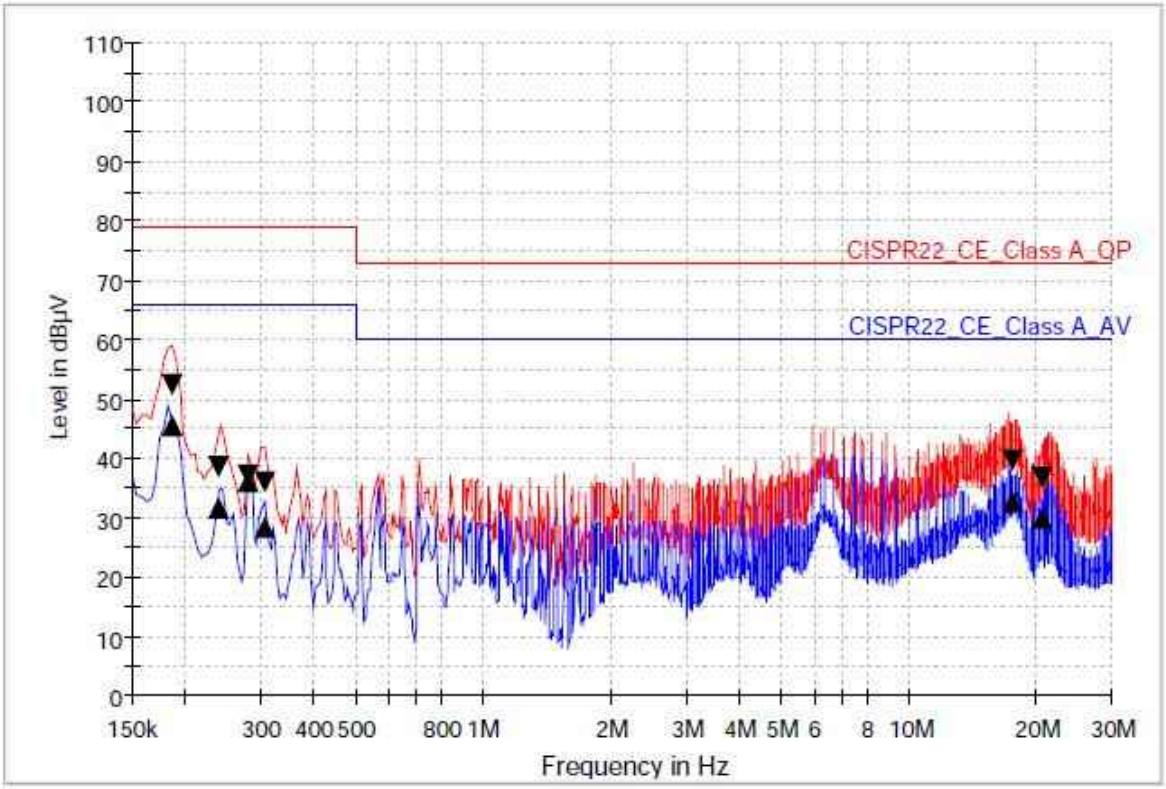
Mode #6	HOT LINE



Limit and Margin1

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)	Margin - CAV (dB)	Limit - CAV (dBµV)
0.178000	51.2	44.7	9.000	L1	9.6	27.8	79.0	21.3	66.0
0.242000	40.4	33.1	9.000	L1	9.6	38.6	79.0	32.9	66.0
0.282000	36.3	34.5	9.000	L1	9.6	42.7	79.0	31.5	66.0
0.306000	37.0	29.5	9.000	L1	9.6	42.0	79.0	36.5	66.0
0.706000	39.5	37.2	9.000	L1	9.7	33.5	73.0	22.8	60.0
17.650000	39.8	33.6	9.000	L1	10.0	33.2	73.0	26.4	60.0

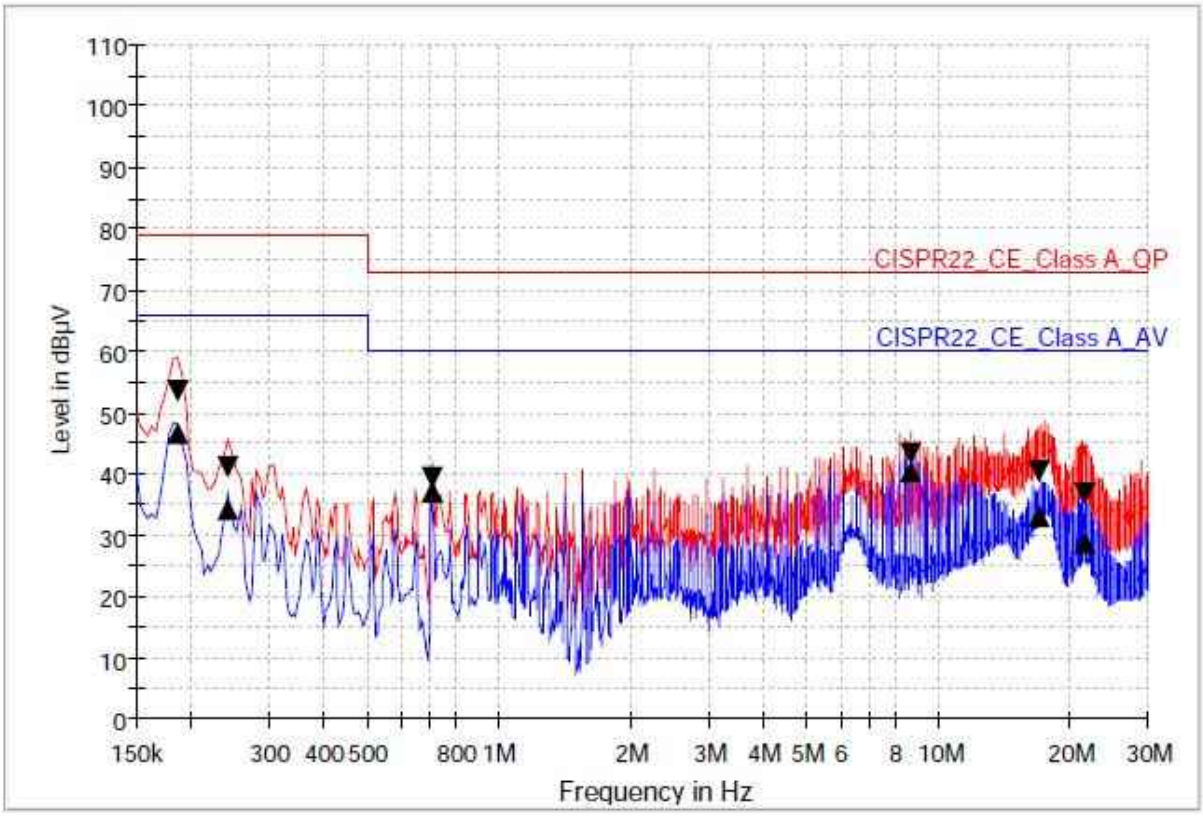
Mode #6	NEUTRAL LINE



Limit and Margin1

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)	Margin - CAV (dB)	Limit - CAV (dBµV)
0.186000	52.4	45.4	9.000	N	9.6	26.6	79.0	20.6	66.0
0.238000	38.8	31.6	9.000	N	9.6	40.2	79.0	34.4	66.0
0.282000	37.3	36.0	9.000	N	9.6	41.7	79.0	30.0	66.0
0.306000	36.2	28.2	9.000	N	9.6	42.8	79.0	37.8	66.0
17.602000	39.8	32.9	9.000	N	10.0	33.2	73.0	27.1	60.0
20.714000	36.7	29.7	9.000	N	10.1	36.3	73.0	30.3	60.0

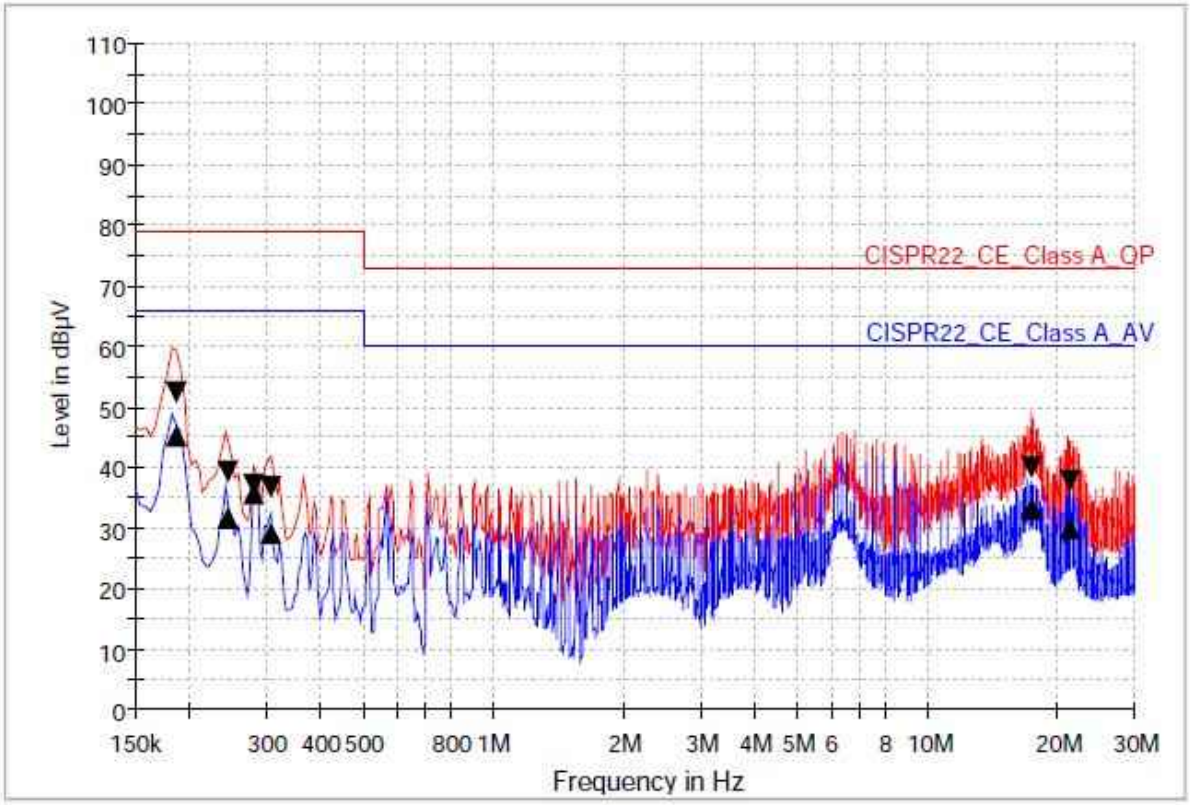
Mode #7	HOT LINE



Limit and Margin1

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)	Margin - CAV (dB)	Limit - CAV (dBµV)
0.186000	53.7	46.8	9.000	L1	9.6	25.3	79.0	19.2	66.0
0.242000	41.1	34.1	9.000	L1	9.6	37.9	79.0	31.9	66.0
0.706000	39.3	37.1	9.000	L1	9.7	33.7	73.0	22.9	60.0
8.622000	43.3	40.6	9.000	L1	9.9	29.7	73.0	19.4	60.0
17.026000	40.4	33.1	9.000	L1	10.0	32.6	73.0	26.9	60.0
21.570000	36.8	28.8	9.000	L1	10.1	36.2	73.0	31.2	60.0

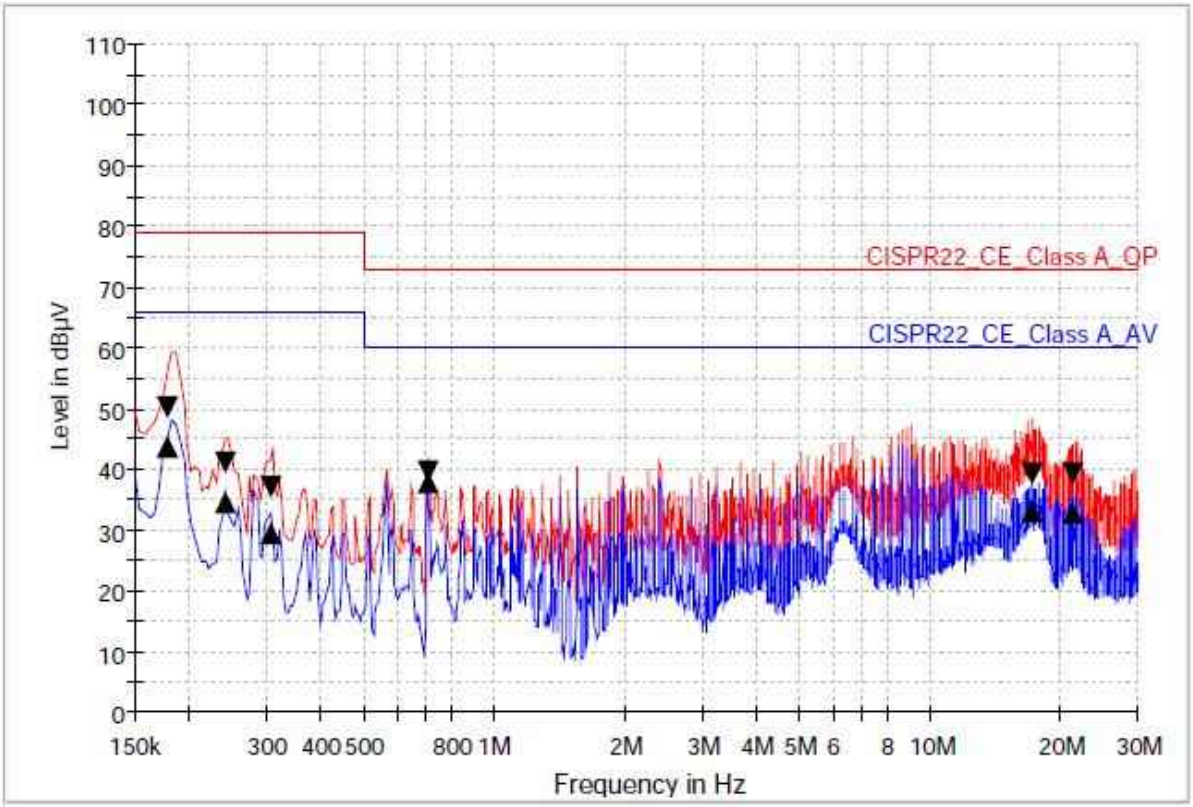
Mode #7	NEUTRAL LINE



Limit and Margin1

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)	Margin - CAV (dB)	Limit - CAV (dBµV)
0.186000	52.5	45.3	9.000	N	9.6	26.5	79.0	20.7	66.0
0.246000	39.4	31.7	9.000	N	9.6	39.6	79.0	34.3	66.0
0.282000	37.2	35.7	9.000	N	9.6	41.8	79.0	30.3	66.0
0.306000	36.7	29.2	9.000	N	9.6	42.3	79.0	36.8	66.0
17.398000	39.9	33.1	9.000	N	10.0	33.1	73.0	26.9	60.0
21.362000	37.9	29.8	9.000	N	10.1	35.1	73.0	30.2	60.0

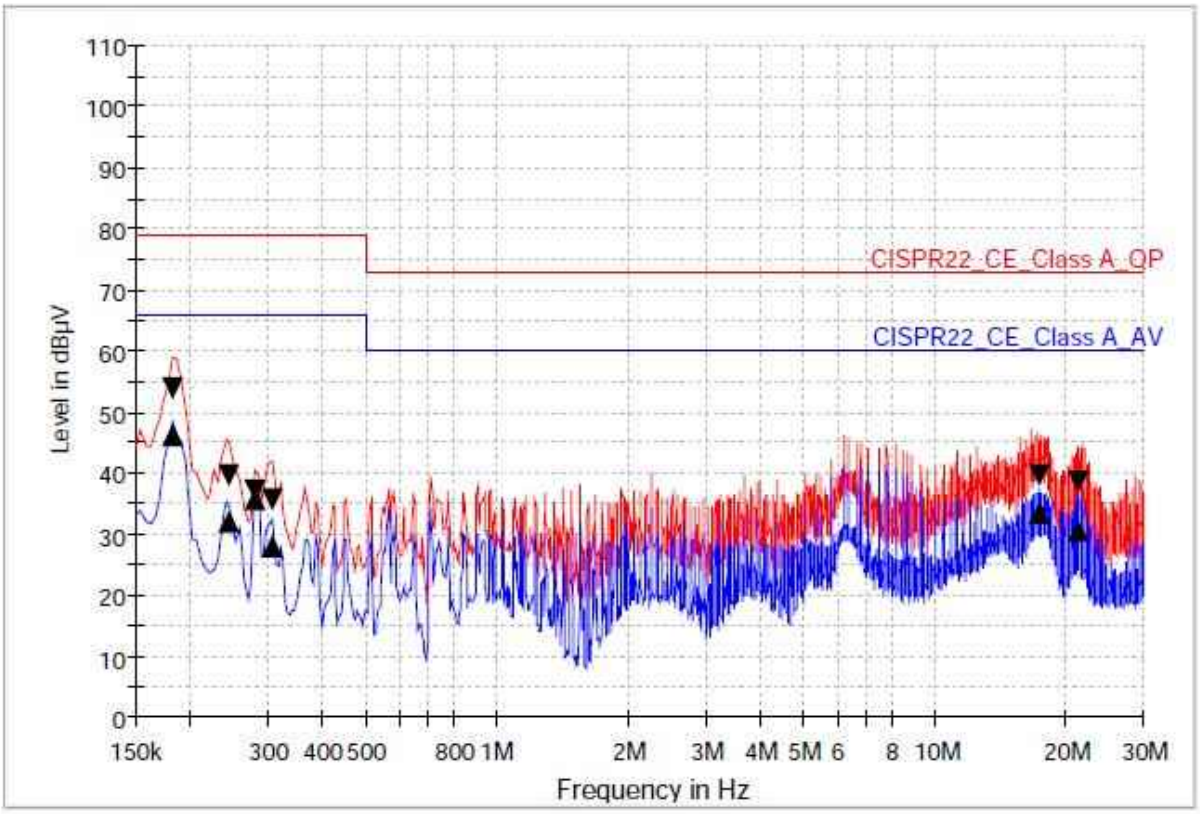
Mode #8	HOT LINE



Limit and Margin1

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)	Margin - CAV (dB)	Limit - CAV (dBµV)
0.178000	50.3	43.9	9.000	L1	9.6	28.7	79.0	22.1	66.0
0.242000	41.2	34.4	9.000	L1	9.6	37.8	79.0	31.6	66.0
0.306000	37.3	29.6	9.000	L1	9.6	41.7	79.0	36.4	66.0
0.706000	39.5	37.8	9.000	L1	9.7	33.5	73.0	22.2	60.0
17.262000	39.2	33.1	9.000	L1	10.0	33.8	73.0	26.9	60.0
21.434000	39.4	32.6	9.000	L1	10.1	33.6	73.0	27.4	60.0

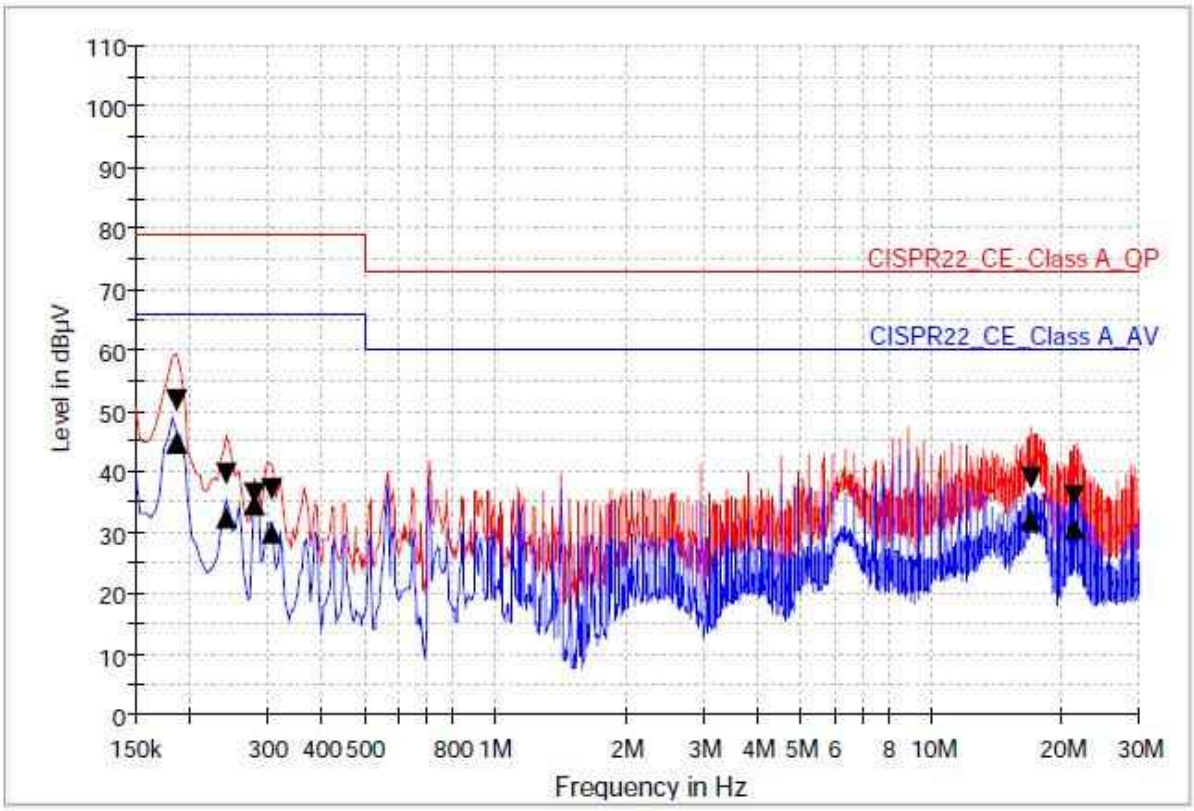
Mode #8	NEUTRAL LINE



Limit and Margin1

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)	Margin - CAV (dB)	Limit - CAV (dBµV)
0.182000	54.1	46.4	9.000	N	9.6	24.9	79.0	19.6	66.0
0.246000	39.7	31.9	9.000	N	9.6	39.3	79.0	34.1	66.0
0.282000	37.2	35.7	9.000	N	9.6	41.8	79.0	30.3	66.0
0.306000	35.8	27.9	9.000	N	9.6	43.2	79.0	38.1	66.0
17.458000	39.5	33.4	9.000	N	10.0	33.5	73.0	26.6	60.0
21.358000	38.4	30.5	9.000	N	10.1	34.6	73.0	29.5	60.0

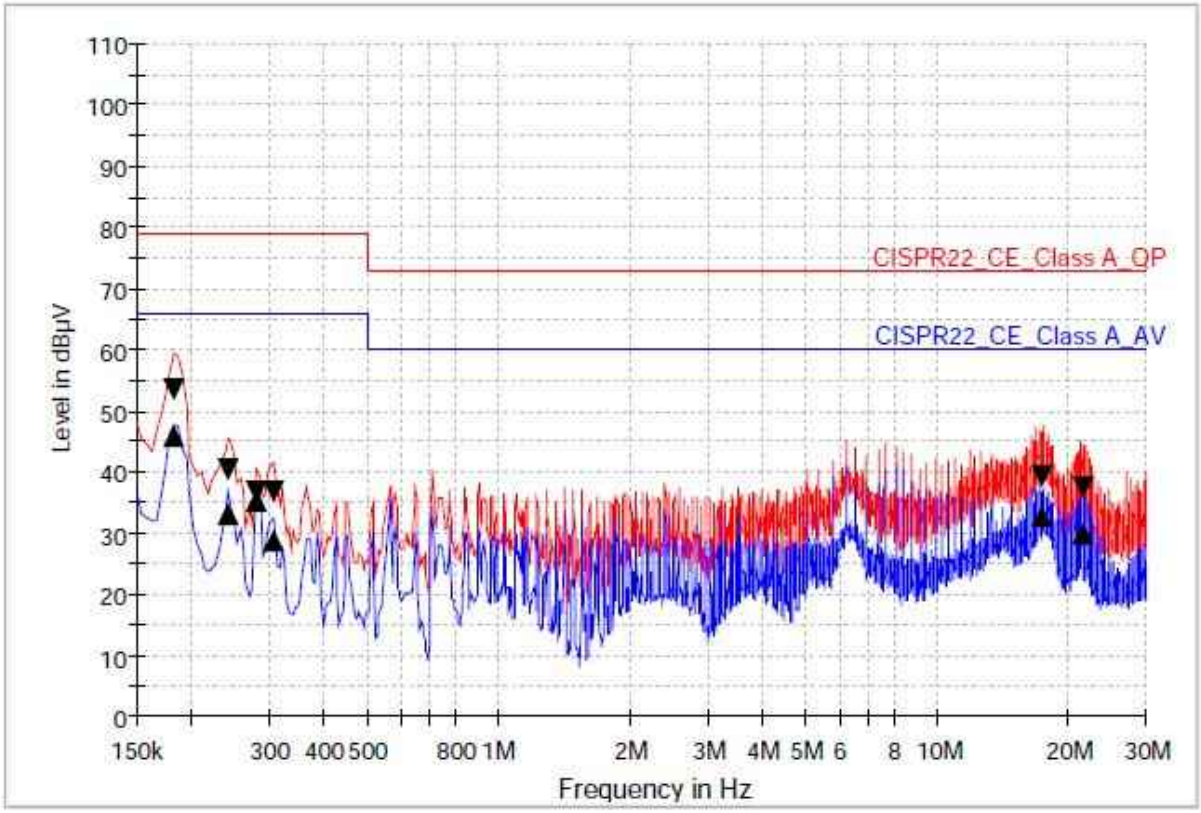
Mode #9	HOT LINE



Limit and Margin1

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)	Margin - CAV (dB)	Limit - CAV (dBµV)
0.186000	51.9	44.8	9.000	L1	9.6	27.1	79.0	21.2	66.0
0.242000	39.9	32.3	9.000	L1	9.6	39.1	79.0	33.7	66.0
0.282000	36.3	34.7	9.000	L1	9.6	42.7	79.0	31.3	66.0
0.306000	37.3	29.7	9.000	L1	9.6	41.7	79.0	36.3	66.0
17.022000	38.9	32.1	9.000	L1	10.0	34.1	73.0	27.9	60.0
21.342000	36.0	30.6	9.000	L1	10.1	37.0	73.0	29.4	60.0

Mode #9	NEUTRAL LINE



Limit and Margin1

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)	Margin - CAV (dB)	Limit - CAV (dBµV)
0.182000	53.4	45.8	9.000	N	9.6	25.6	79.0	20.2	66.0
0.242000	40.3	33.1	9.000	N	9.6	38.7	79.0	32.9	66.0
0.282000	36.8	35.2	9.000	N	9.6	42.2	79.0	30.8	66.0
0.306000	36.6	28.8	9.000	N	9.6	42.4	79.0	37.2	66.0
17.410000	39.4	32.8	9.000	N	10.0	33.6	73.0	27.2	60.0
21.566000	37.6	29.8	9.000	N	10.1	35.4	73.0	30.2	60.0

3.2 Radiated Emission

3.2.1 Test setup

The radiated emissions measurements were in the 3/10 m, Semi Anechoic Chamber. The EUT and all local supporting equipments were placed on a non-conductive table approximately 0.8 m above the ground plane.
The frequency spectrum from 30 MHz to the maximum frequency as specified in CFR 47 Part 15 section 15.33 was scanned and emission levels maximized at each frequency recorded. The system was rotated 360°, and the antenna was varied in height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.
Preliminary radiated emission test was conducted using the procedure in ANSI C63.4: 2014 8.3.1.1 below 1 000 MHz, 8.3.1.2 above 1 GHz to determine the worse operating conditions
Measurement distance between the EUT and an antenna was 3 m.

The test set-up photos are included in appendix II.

Used Software for measurement is manufactured by TSJ.

3.2.2 Measurement frequency range

Highest frequency generated or used in the device or on which the device operates or tunes	Upper Frequency of Measurement range (MHz)
Below 1.705 MHz	30
(1.705 ~ 108) MHz	1 000
(108 ~ 500) MHz	2 000
(500 ~ 1 000) MHz	5 000
Above 1 000 MHz	5th harmonic of the highest freq. or 40 GHz, whichever is lower

The measurement uncertainties are given with 95 % confidence.

3.2.3 Measurement uncertainty

Frequency range	Uncertainty
Below 1 000 MHz	4.66 dB
Above 1 000 MHz	4.79 dB

The measurement uncertainties are given with 95 % confidence.

3.2.4 Test result

Date of Test	2018-10-24 ~ 10-25			
Temperature	(17.7 ~ 20.4) °C	Relative humidity		(48.6 ~ 50.4) % R.H.
Operating Input Voltage	120 Vac	Input Frequency		60 Hz
Frequency range	RBW	VBW	Detector Mode	Measurement distance
Below 1 000 MHz	120 kHz	300 kHz	Peak or Q.P.	10 m
Date of Test	2018-10-24 ~ 10-25			
Temperature	(17.9 ~ 21.3) °C	Relative humidity		(48.3 ~ 50.7) % R.H.
Frequency range	RBW	VBW	Detector Mode	Measurement distance
Above 1 000 MHz	1 MHz	1 MHz or 10 Hz	Peak or Average	3 m
Test Mode	Mode #1 ~ #9			
Test Result	***Pass***	Tested By	Kim, Kwang-hyun	

3.2.5 Sample Calculated Example

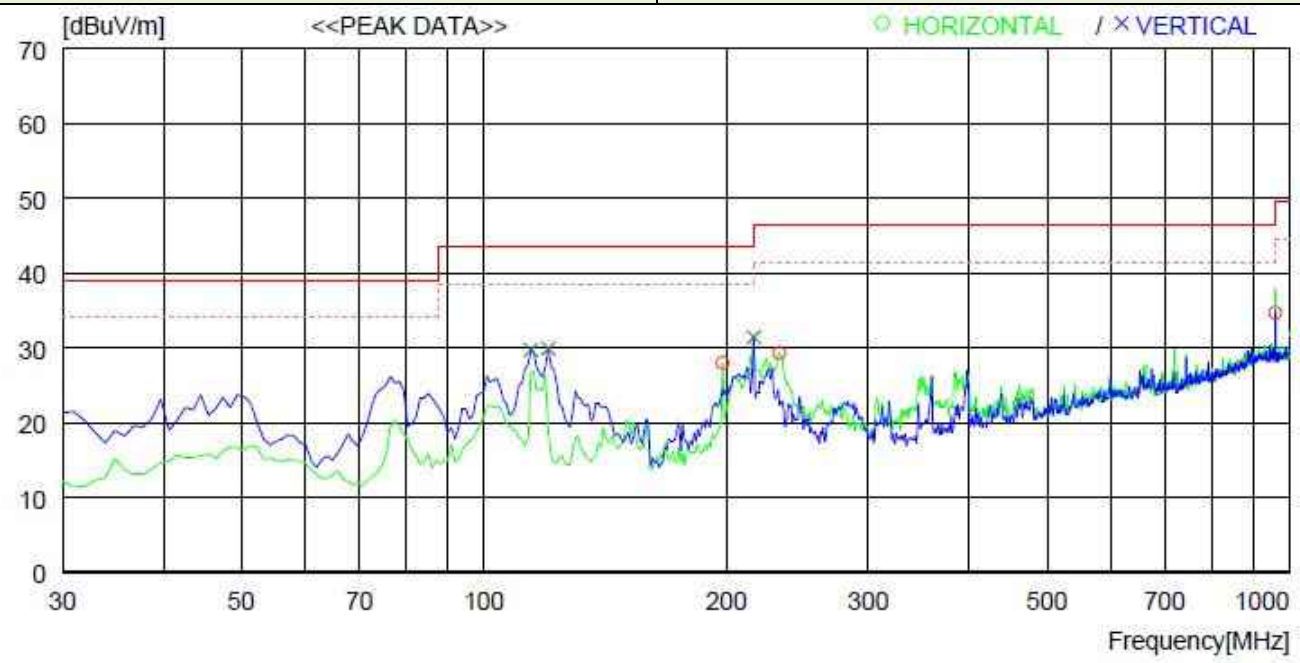
At 80 MHz Limit = 40.0 dBμV/m

Result =Receiver reading value + Antenna Factor + Cable Loss - Pre-amplifier gain = 30 dBμV/m

Margin = Limit - Result = 40 - 30 = 10 so the EUT has 10.0 dB margin at 80 MHz

3.2.6 Test Data

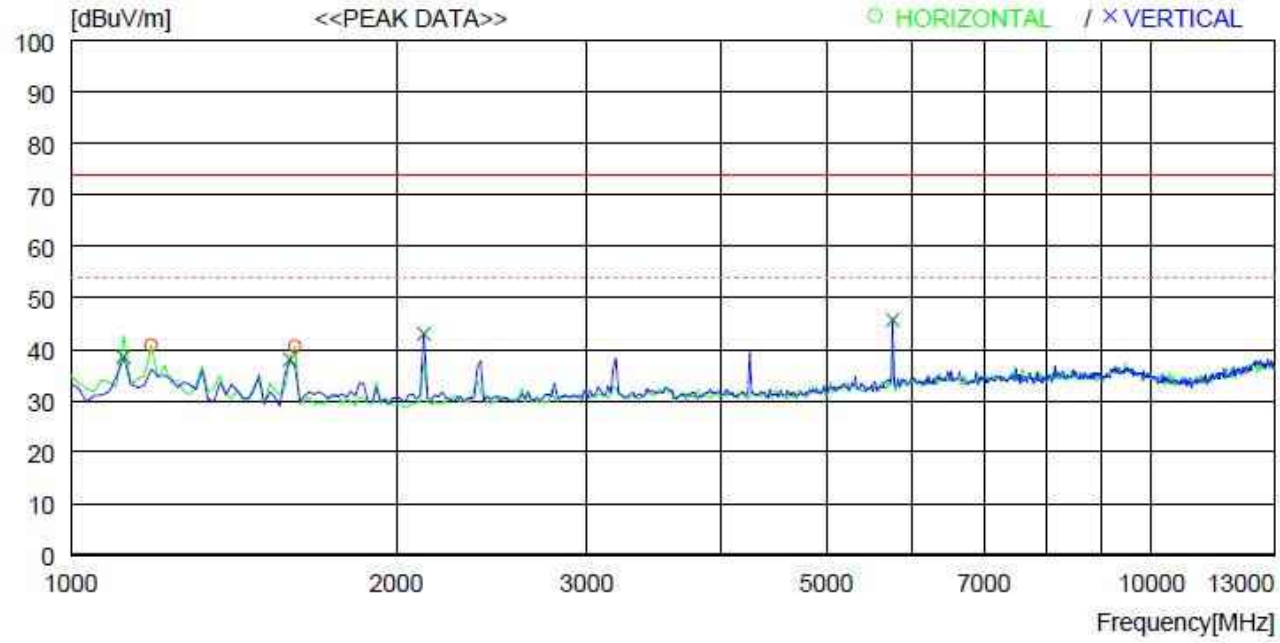
Mode #1	30 MHz – 1 GHz



No.	FREQ [MHz]	READING PEAK [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	197.810	41.4	11.2	8.1	32.7	28.0	43.5	15.5	300	200
2	232.730	41.4	12.3	8.2	32.6	29.3	46.4	17.1	200	0
3	960.217	35.9	23.1	8.3	32.6	34.7	49.5	14.8	300	359
----- Vertical ------										
4	114.390	45.2	9.7	7.5	32.7	29.7	43.5	13.8	100	0
5	120.210	46.2	8.9	7.5	32.7	29.9	43.5	13.6	100	50
6	216.240	43.9	11.9	8.2	32.6	31.4	46.4	15	100	0

NOTE: Quasi-Peak was not measured, because Peak values met Quasi-Peak limit.

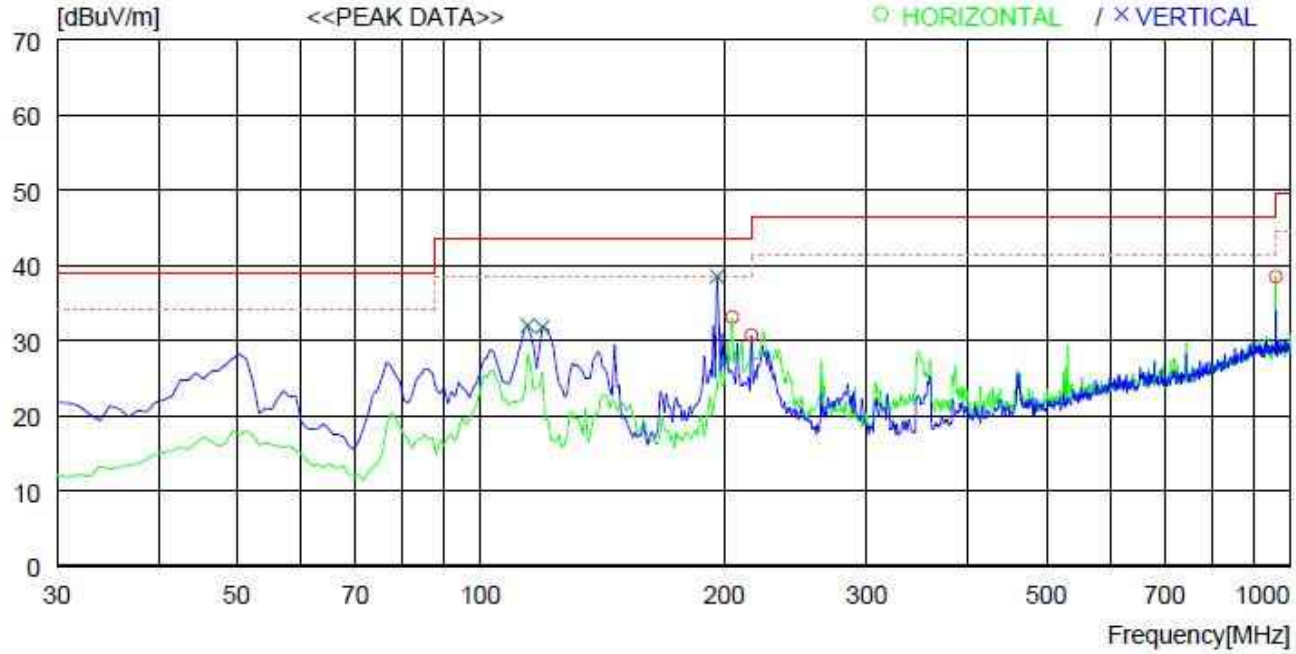
Mode #1	Above 1 000 MHz (Peak)



No.	FREQ [MHz]	READING PEAK [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	1187.000	54.9	24.7	1.6	40.4	40.8	74.0	33.2	200	75
2	1612.000	53.1	26.3	1.8	40.6	40.6	74.0	33.4	200	68
----- Vertical ------										
3	1119.000	53.0	24.4	1.5	40.4	38.5	74.0	35.5	200	0
4	1595.000	50.6	26.2	1.8	40.6	38.0	74.0	36	200	0
5	2122.000	53.3	28.0	2.1	40.4	43.0	74.0	31	300	243
6	5760.000	48.6	34.1	3.7	40.7	45.7	74.0	28.3	300	235

NOTE: Average mode was not measured, because Peak values were under the Average limit.

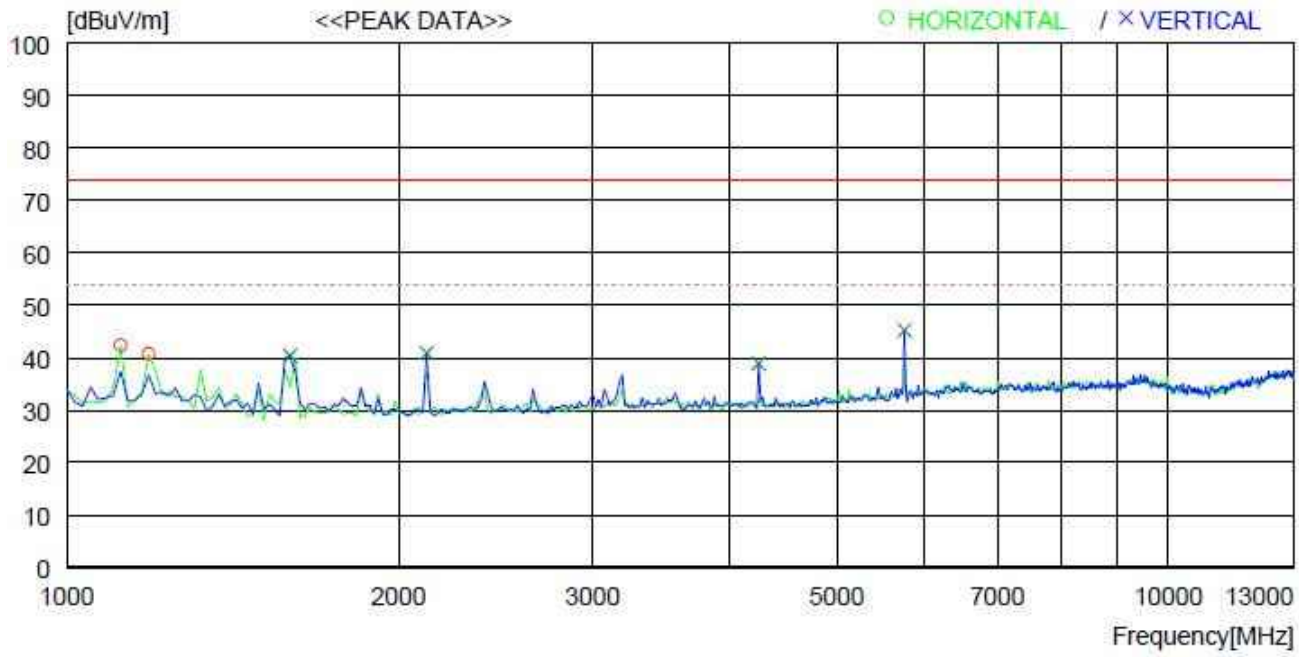
Mode #2	30 MHz – 1 GHz



No.	FREQ [MHz]	READING PEAK [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal -----										
1	204.600	46.1	11.5	8.1	32.6	33.1	43.5	10.4	400	0
2	216.240	43.2	11.9	8.2	32.6	30.7	46.4	15.7	400	0
3	960.217	36.5	23.1	10.8	31.9	38.5	49.5	11	100	359
----- Vertical -----										
4	114.390	47.5	9.7	7.5	32.7	32.0	43.5	11.5	100	0
5	119.240	48.0	9.0	7.5	32.7	31.8	43.5	11.7	100	0
6	195.870	52.2	11.0	8.0	32.7	38.5	43.5	5	100	61

NOTE: Quasi-Peak was not measured, because Peak values met Quasi-Peak limit.

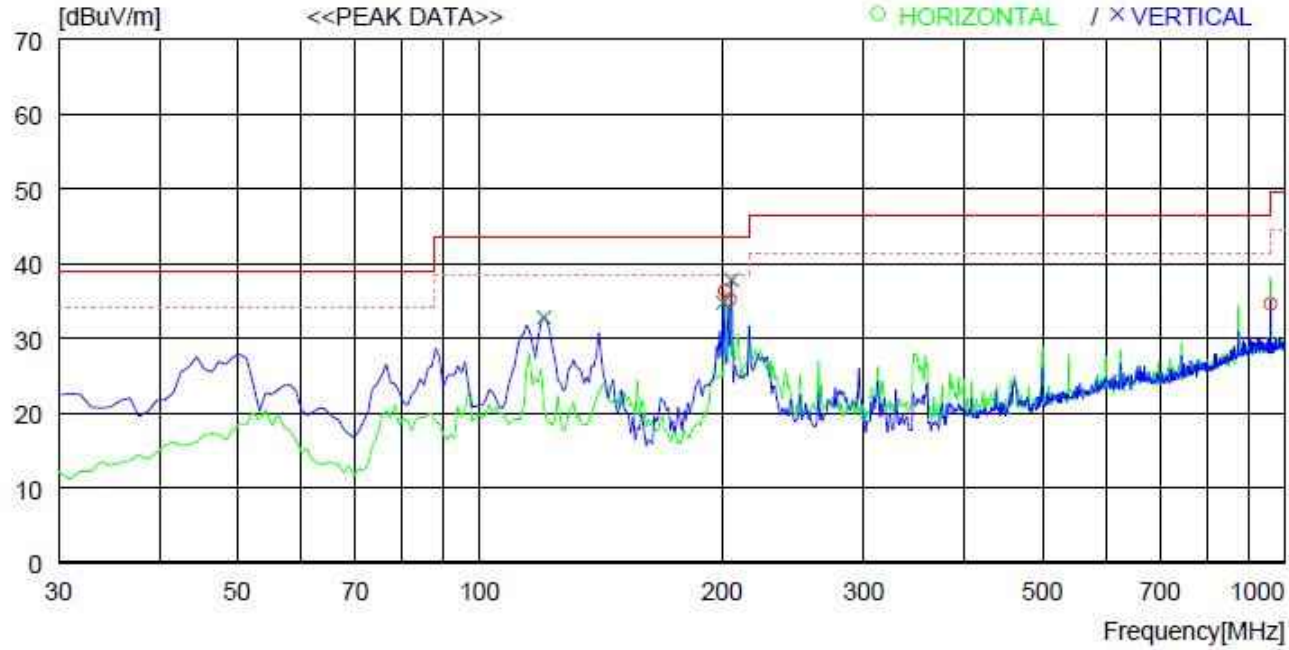
Mode #2	Above 1 000 MHz (Peak)



No.	FREQ [MHz]	READING PEAK [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	1119.000	56.9	24.4	1.5	40.4	42.4	74.0	31.6	200	77
2	1187.000	54.8	24.7	1.6	40.4	40.7	74.0	33.3	200	77
----- Vertical ------										
3	1595.000	53.0	26.2	1.8	40.6	40.4	74.0	33.6	200	282
4	2122.000	51.2	28.0	2.1	40.4	40.9	74.0	33.1	300	208
5	4247.000	45.0	31.8	3.0	40.9	38.9	74.0	35.1	200	210
6	5760.000	48.1	34.1	3.7	40.7	45.2	74.0	28.8	300	236

NOTE: Average mode was not measured, because Peak values were under the Average limit.

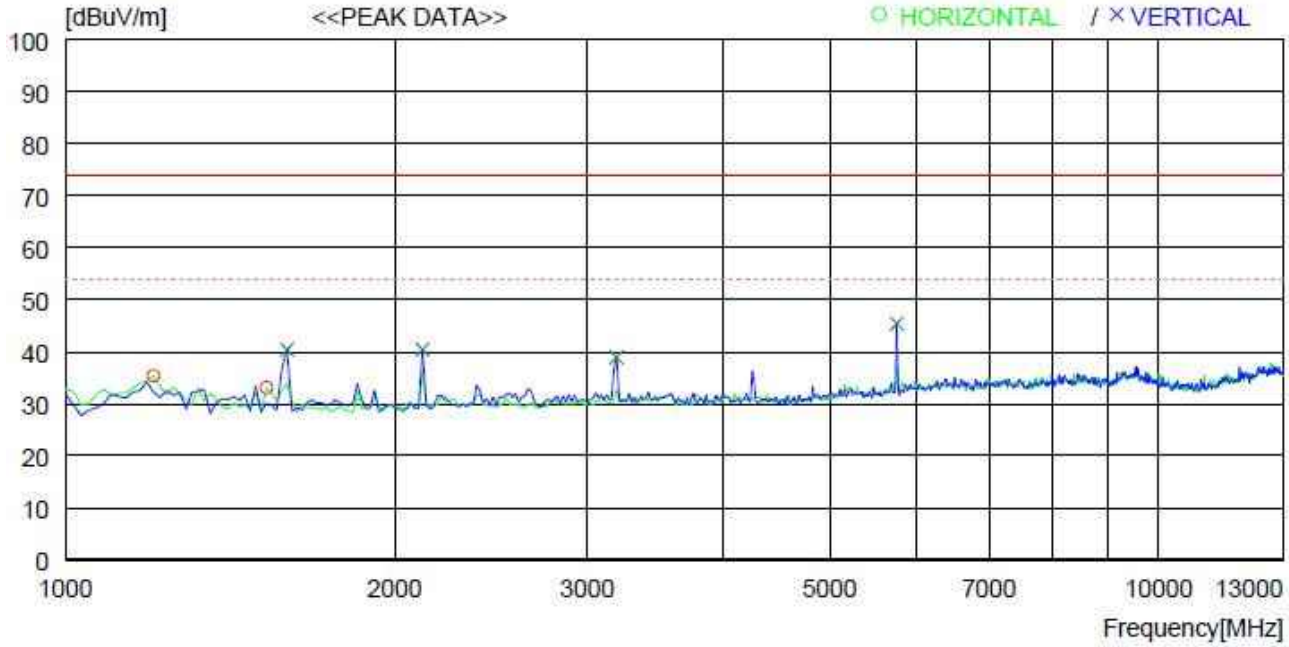
Mode #3	30 MHz – 1 GHz



No.	FREQ [MHz]	READING PEAK [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal -----										
1	201.690	49.4	11.5	8.1	32.6	36.4	43.5	7.1	200	0
2	204.600	48.2	11.5	8.1	32.6	35.2	43.5	8.3	300	359
3	960.217	36.0	23.1	8.1	32.6	34.6	49.5	14.9	100	218
----- Vertical -----										
4	120.210	49.1	8.9	7.5	32.7	32.8	43.5	10.7	100	6
5	200.720	48.6	11.4	7.5	32.7	34.8	43.5	8.7	300	60
6	205.570	50.7	11.6	8.1	32.6	37.8	43.5	5.7	100	307

NOTE: Quasi-Peak was not measured, because Peak values met Quasi-Peak limit.

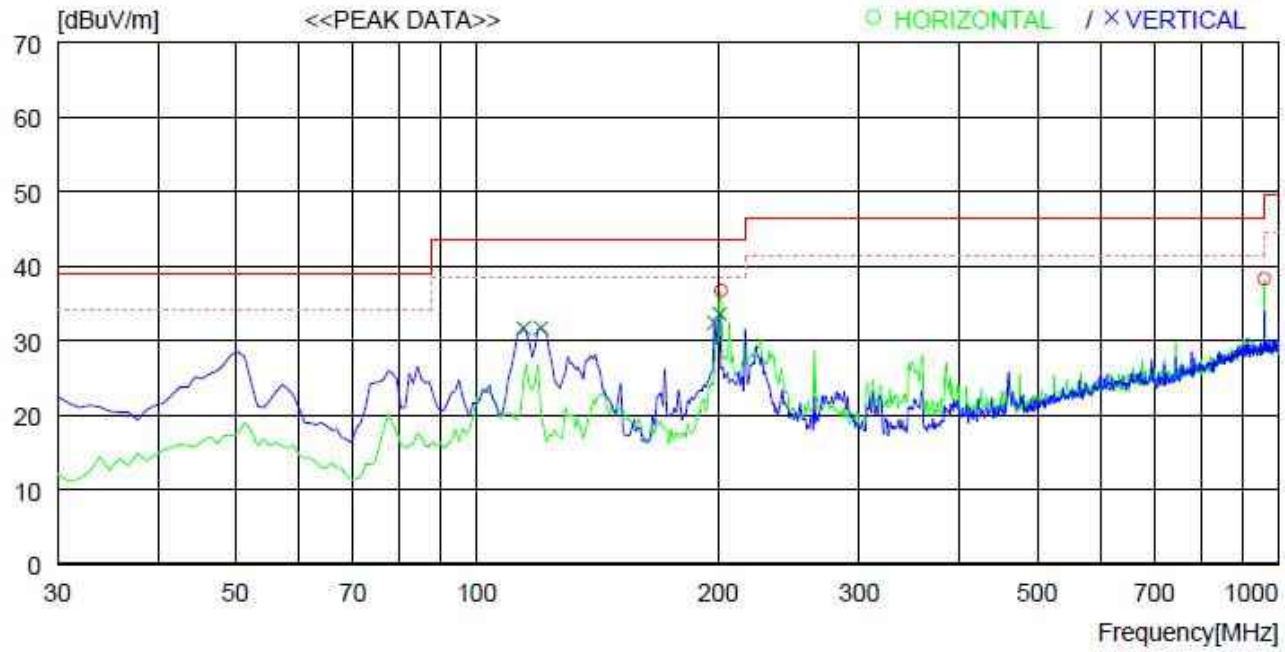
Mode #3	Above 1 000 MHz (Peak)



No.	FREQ [MHz]	READING PEAK [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	1204.000	49.6	24.7	1.6	40.5	35.4	74.0	38.6	300	0
2	1527.000	46.1	26.0	1.7	40.7	33.1	74.0	40.9	100	311
----- Vertical ------										
3	1595.000	53.0	26.2	1.8	40.6	40.4	74.0	33.6	200	0
4	2122.000	50.7	28.0	2.1	40.4	40.4	74.0	33.6	300	359
5	3193.000	46.8	30.3	2.5	40.7	38.9	74.0	35.1	300	260
6	5760.000	48.3	34.1	3.7	40.7	45.4	74.0	28.6	200	0

NOTE: Average mode was not measured, because Peak values were under the Average limit.

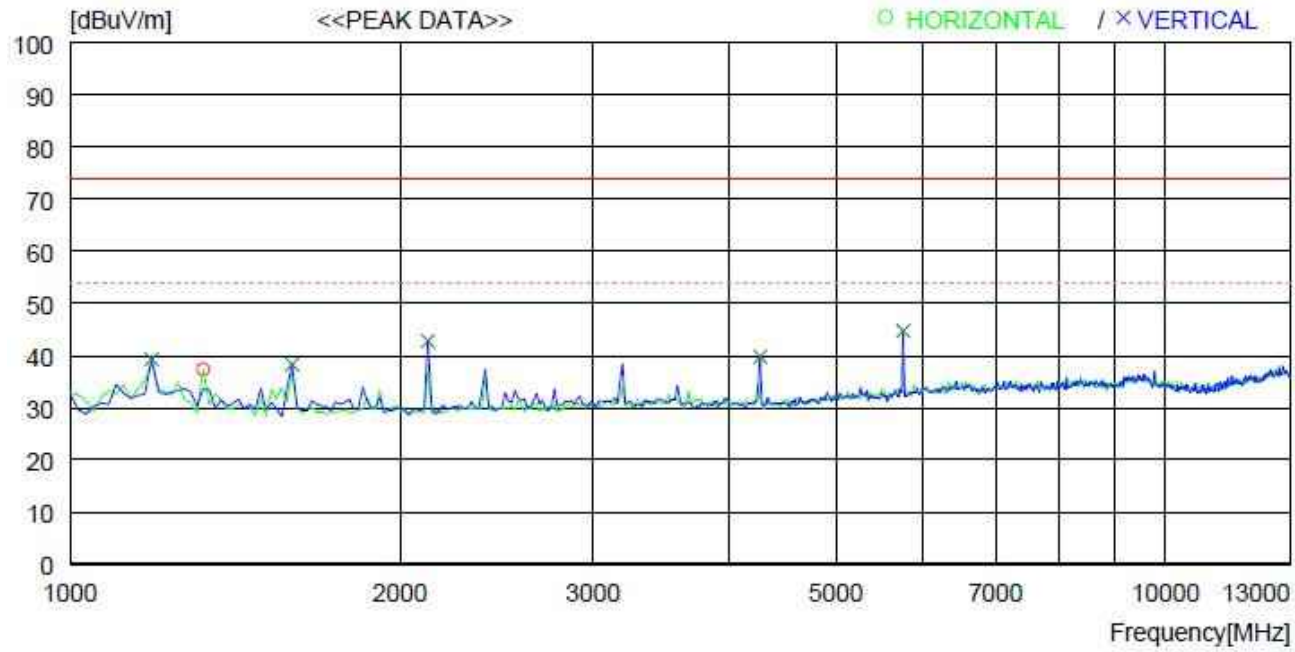
Mode #4	30 MHz – 1 GHz



No.	FREQ [MHz]	READING PEAK [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	201.690	49.7	11.5	8.1	32.6	36.7	43.5	6.8	300	359
2	960.217	36.3	23.1	10.8	31.9	38.3	49.5	11.2	100	359
----- Vertical ------										
3	114.390	47.2	9.7	7.5	32.7	31.7	43.5	11.8	100	0
4	120.210	48.0	8.9	7.5	32.7	31.7	43.5	11.8	100	20
5	197.810	45.8	11.2	8.1	32.7	32.4	43.5	11.1	200	345
6	200.720	46.7	11.4	8.1	32.6	33.6	43.5	9.9	200	359

NOTE: Quasi-Peak was not measured, because Peak values met Quasi-Peak limit.

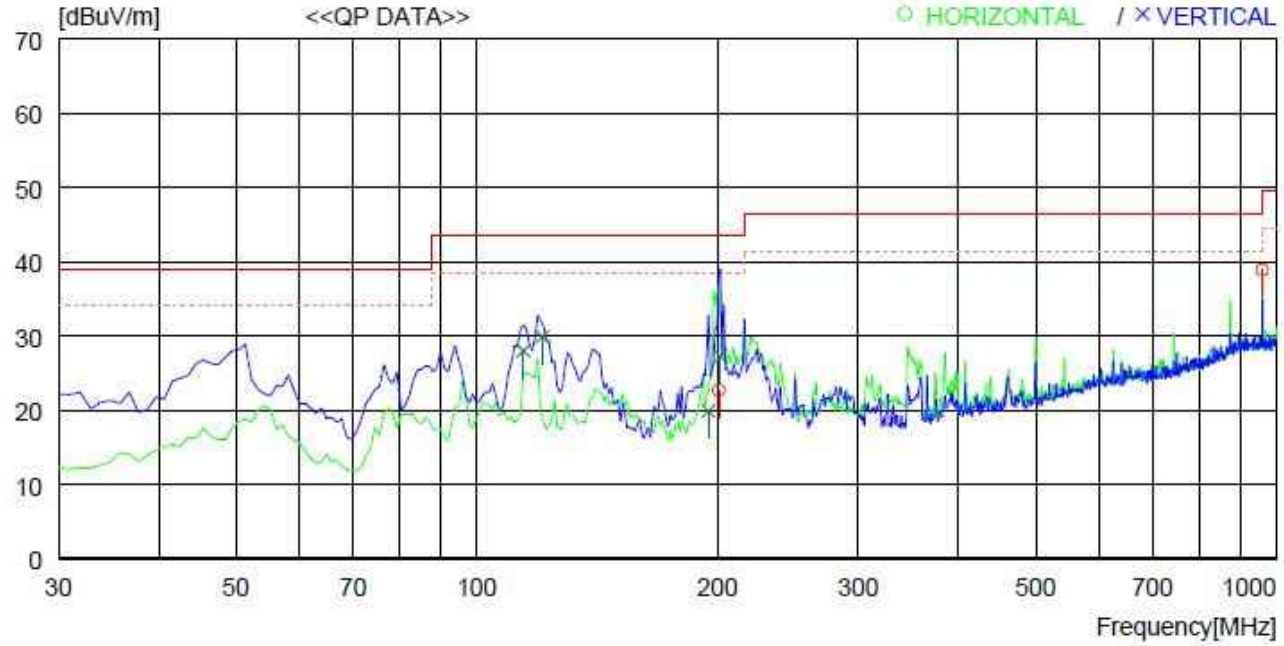
Mode #4	Above 1 000 MHz (Peak)



No.	FREQ [MHz]	READING PEAK [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	1323.000	51.2	25.2	1.6	40.6	37.4	74.0	36.6	100	228
----- Vertical ------										
2	1187.000	53.4	24.7	1.6	40.4	39.3	74.0	34.7	300	247
3	1595.000	50.9	26.2	1.8	40.6	38.3	74.0	35.7	100	359
4	2122.000	53.1	28.0	2.1	40.4	42.8	74.0	31.2	300	359
5	4264.000	45.8	31.8	3.1	40.9	39.8	74.0	34.2	200	0
6	5760.000	47.7	34.1	3.7	40.7	44.8	74.0	29.2	200	0

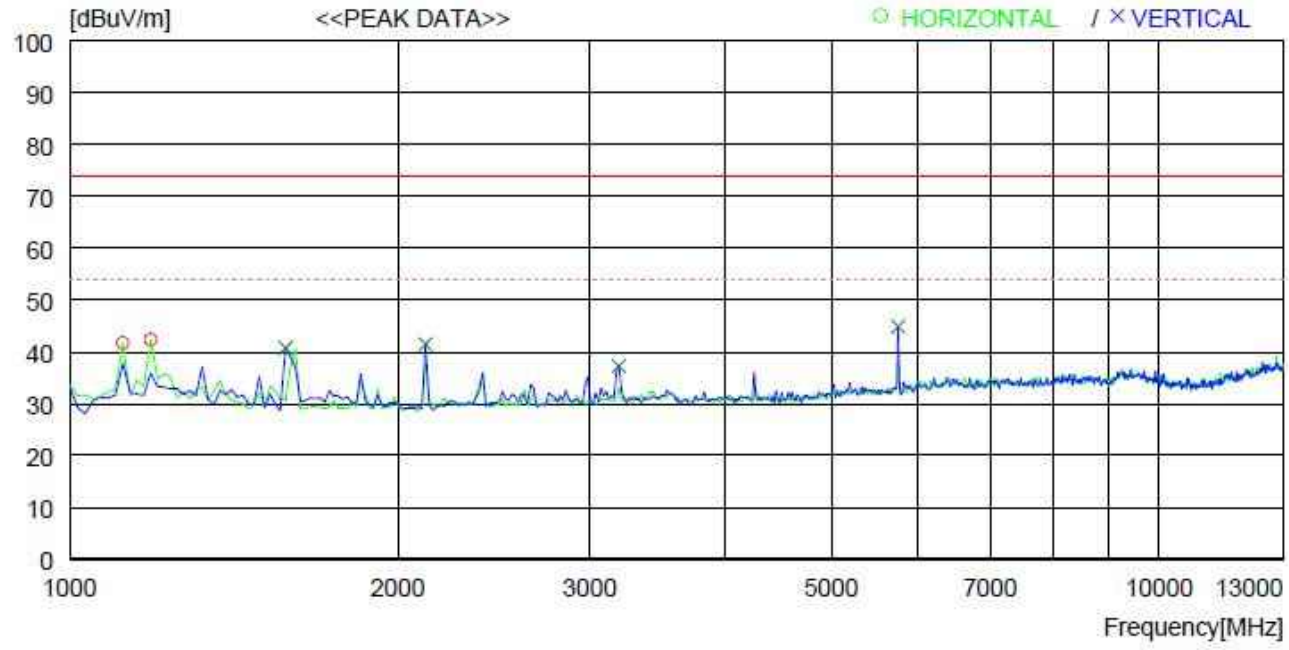
NOTE: Average mode was not measured, because Peak values were under the Average limit.

Mode #5	30 MHz – 1 GHz



No.	FREQ	READING QP	ANT FACTOR	LOSS	GAIN	RESULT	LIMIT	MARGIN	ANTENNA	TABLE
	[MHz]	[dBuV]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[cm]	[DEG]
----- Horizontal ------										
1	200.720	35.8	11.4	8.1	32.6	22.7	43.5	20.8	200	0
2	960.217	36.9	23.1	10.8	31.9	38.9	49.5	10.6	100	359
----- Vertical ------										
3	114.390	43.5	9.7	7.5	32.7	28.0	43.5	15.5	100	27
4	120.775	46.3	8.8	7.5	32.7	29.9	43.5	13.6	100	0
5	194.900	33.7	10.9	8.0	32.7	19.9	43.5	23.6	200	79
6	201.690	40.2	11.5	8.1	32.6	27.2	43.5	16.3	100	47

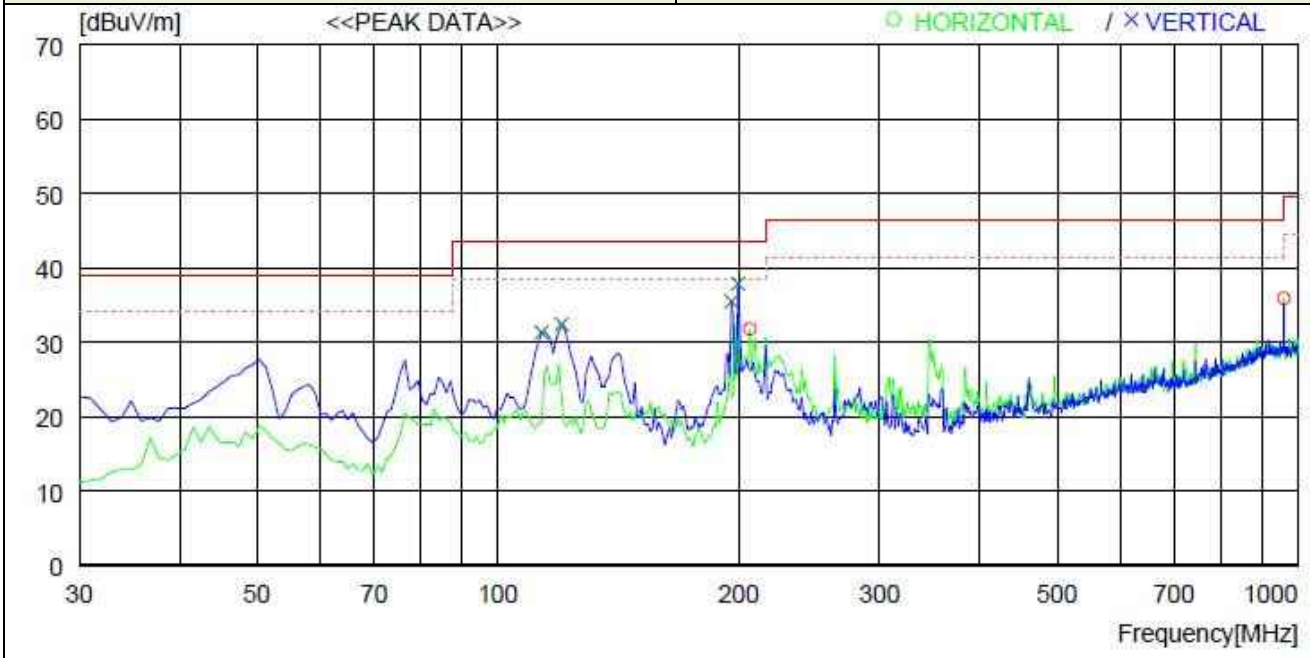
Mode #5	Above 1 000 MHz (Peak)



No.	FREQ [MHz]	READING PEAK [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	1119.000	56.2	24.4	1.5	40.4	41.7	74.0	32.3	200	359
2	1187.000	56.5	24.7	1.6	40.4	42.4	74.0	31.6	100	0
----- Vertical ------										
3	1578.000	53.4	26.1	1.8	40.6	40.7	74.0	33.3	200	0
4	2122.000	51.8	28.0	2.1	40.4	41.5	74.0	32.5	300	244
5	3193.000	45.2	30.3	2.5	40.7	37.3	74.0	36.7	300	293
6	5760.000	47.8	34.1	3.7	40.7	44.9	74.0	29.1	300	232

NOTE: Average mode was not measured, because Peak values were under the Average limit.

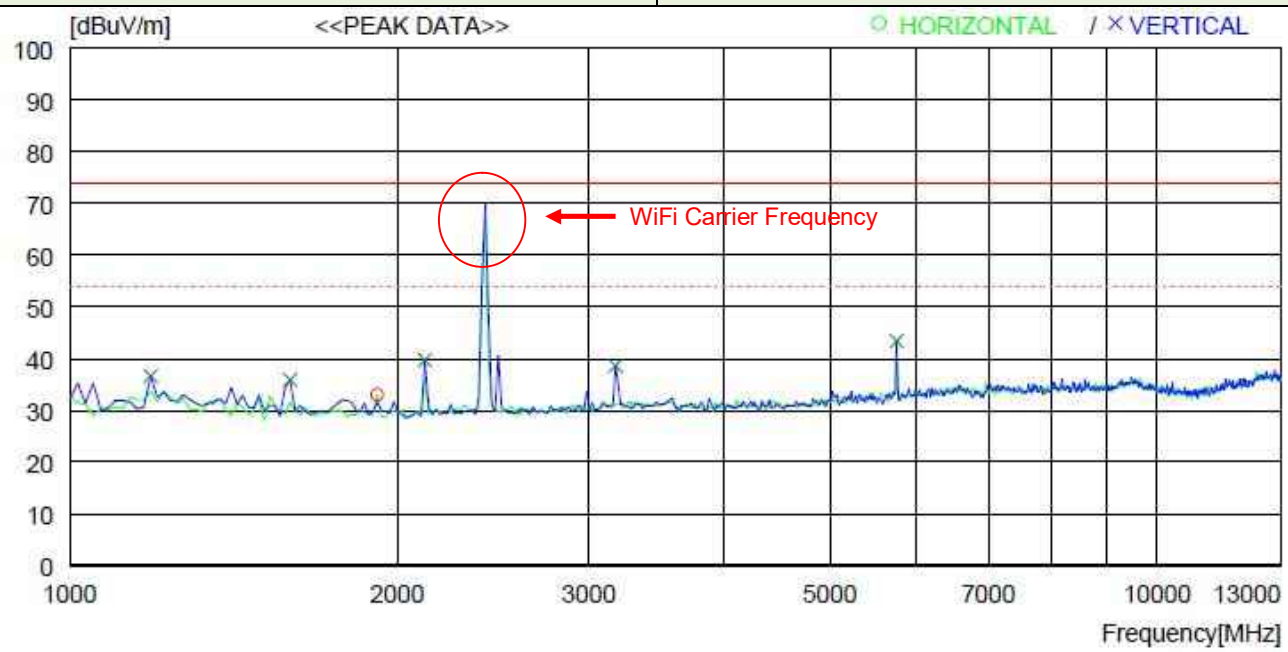
Mode #6	30 MHz – 1 GHz



No.	FREQ [MHz]	READING PEAK [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	206.540	44.7	11.6	8.1	32.6	31.8	43.5	11.7	400	0
2	960.217	33.9	23.1	10.8	31.9	35.9	49.5	13.6	100	142
----- Vertical ------										
3	113.420	46.6	9.9	7.5	32.7	31.3	43.5	12.2	100	18
4	120.210	48.7	8.9	7.5	32.7	32.4	43.5	11.1	100	10
5	195.870	49.2	11.0	8.0	32.7	35.5	43.5	8	200	302
6	199.750	51.1	11.4	8.1	32.7	37.9	43.5	5.6	300	0

NOTE: Quasi-Peak was not measured, because Peak values met Quasi-Peak limit.

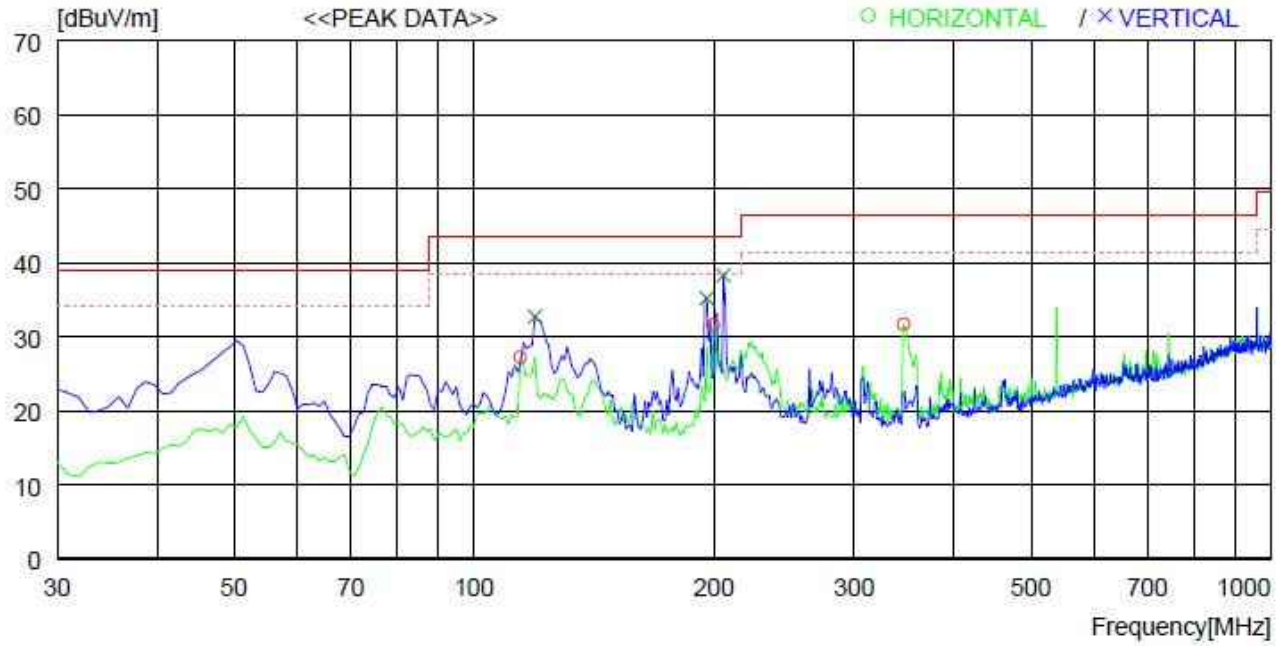
Mode #6	Above 1 000 MHz (Peak)



No.	FREQ [MHz]	READING PEAK [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	1918.000	44.0	27.4	2.0	40.4	33.0	74.0	41	200	359
----- Vertical ------										
2	1187.000	50.7	24.7	1.6	40.4	36.6	74.0	37.4	100	359
3	1595.000	48.5	26.2	1.8	40.6	35.9	74.0	38.1	200	270
4	2122.000	50.0	28.0	2.1	40.4	39.7	74.0	34.3	300	226
5	3176.000	46.6	30.2	2.5	40.7	38.6	74.0	35.4	300	359
6	5760.000	46.3	34.1	3.7	40.7	43.4	74.0	30.6	200	245

NOTE: Average mode was not measured, because Peak values were under the Average limit.

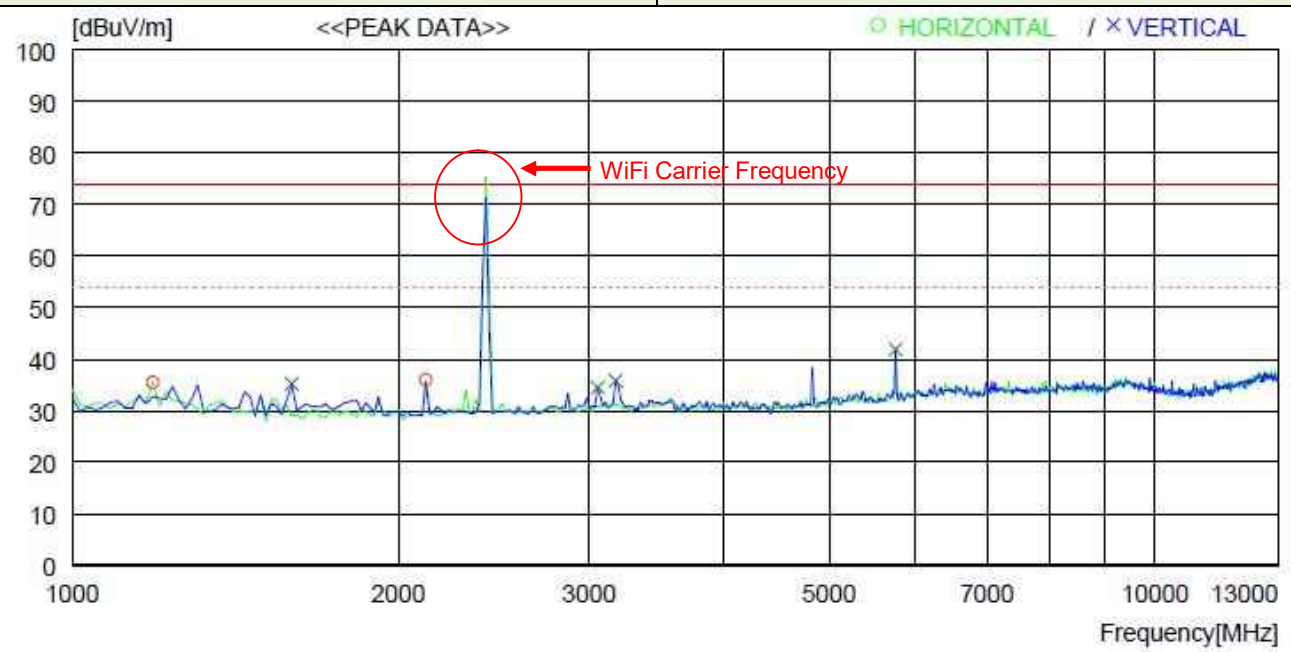
Mode #7	30 MHz – 1 GHz



No.	FREQ [MHz]	READING PEAK [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	114.390	42.7	9.7	7.5	32.7	27.2	43.5	16.3	400	59
2	199.750	44.8	11.4	8.1	32.7	31.6	43.5	11.9	400	0
3	346.220	41.0	14.6	8.9	32.8	31.7	46.4	14.7	200	0
----- Vertical ------										
4	119.240	48.9	9.0	7.5	32.7	32.7	43.5	10.8	100	357
5	195.870	48.9	11.0	8.0	32.7	35.2	43.5	8.3	300	287
6	205.570	51.2	11.6	8.1	32.6	38.3	43.5	5.2	100	0

NOTE: Quasi-Peak was not measured, because Peak values met Quasi-Peak limit.

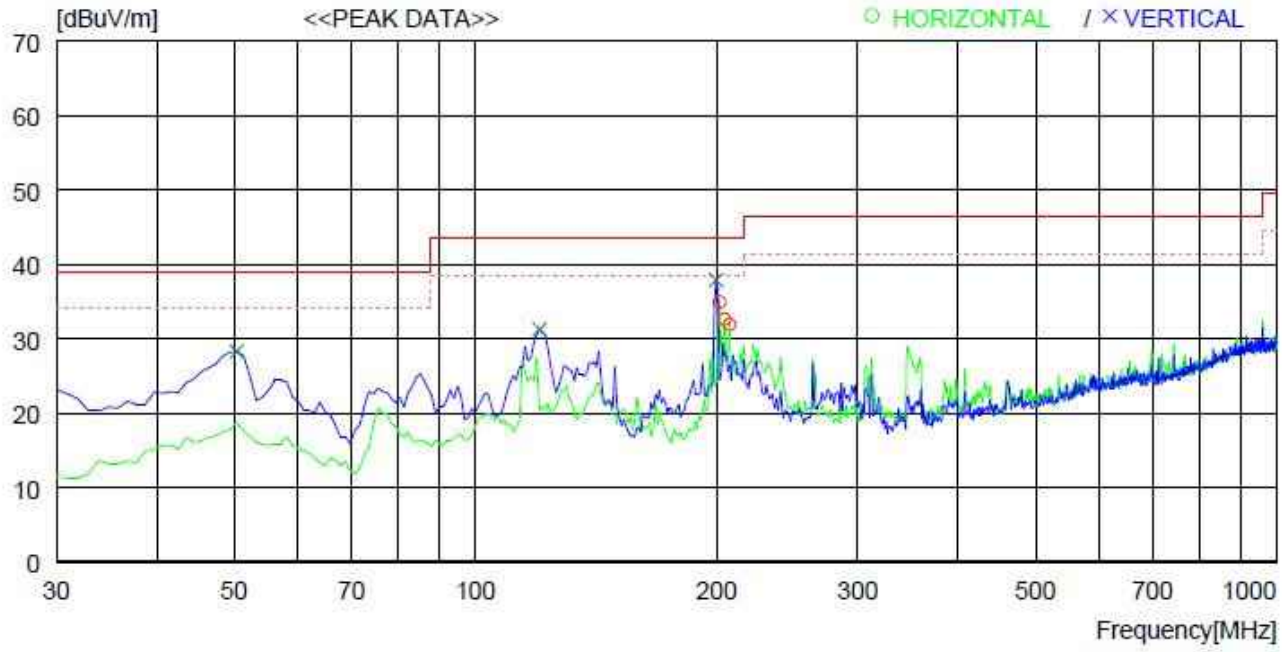
Mode #7	Above 1 000 MHz (Peak)



No.	FREQ [MHz]	READING PEAK [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal -----										
1	1187.000	49.6	24.7	1.6	40.4	35.5	74.0	38.5	100	0
2	2122.000	46.3	28.0	2.1	40.4	36.0	74.0	38	300	228
----- Vertical -----										
3	1595.000	47.8	26.2	1.8	40.6	35.2	74.0	38.8	100	305
4	3057.000	42.8	29.9	2.5	40.7	34.5	74.0	39.5	300	359
5	3176.000	43.8	30.2	2.5	40.7	35.8	74.0	38.2	300	359
6	5760.000	44.8	34.1	3.7	40.7	41.9	74.0	32.1	200	242

NOTE: Average mode was not measured, because Peak values were under the Average limit.

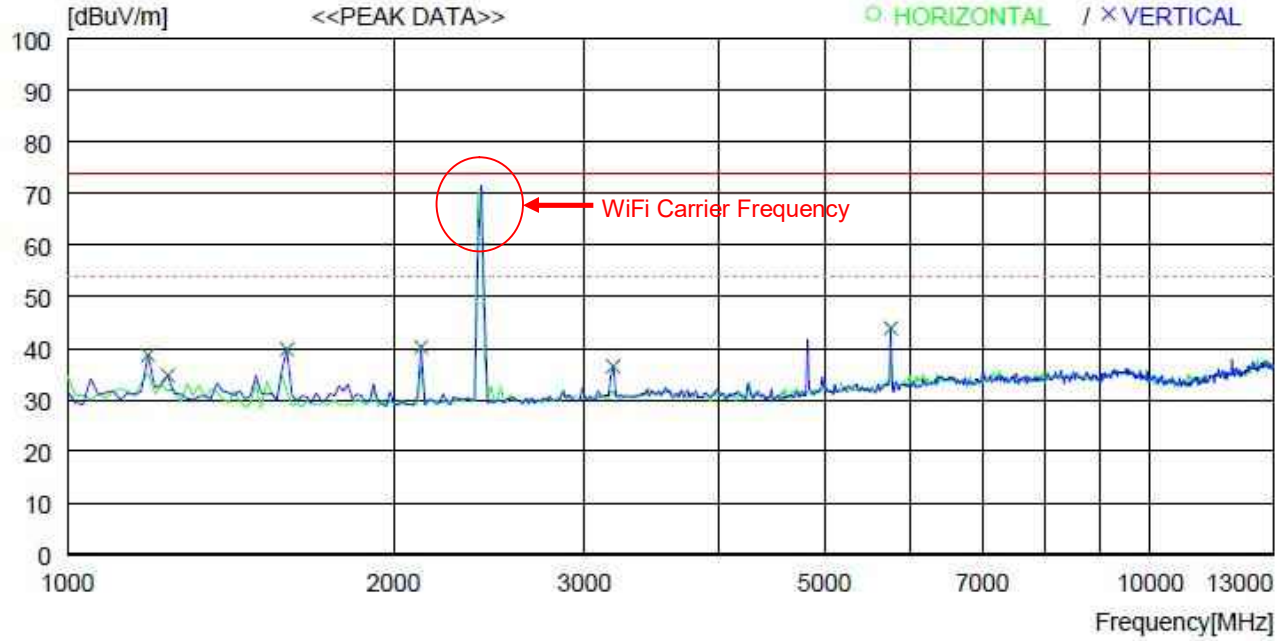
Mode #8	30 MHz – 1 GHz



No.	FREQ [MHz]	READING PEAK [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	201.690	47.9	11.5	8.1	32.6	34.9	43.5	8.6	200	0
2	204.600	45.6	11.5	8.1	32.6	32.6	43.5	10.9	200	148
3	207.510	44.8	11.6	8.1	32.6	31.9	43.5	11.6	200	334
----- Vertical ------										
4	50.370	40.0	14.2	6.8	32.7	28.3	39.1	10.8	100	330
5	120.210	47.6	8.9	7.5	32.7	31.3	43.5	12.2	100	14
6	199.750	51.1	11.4	8.1	32.7	37.9	43.5	5.6	100	14

NOTE: Quasi-Peak was not measured, because Peak values met Quasi-Peak limit.

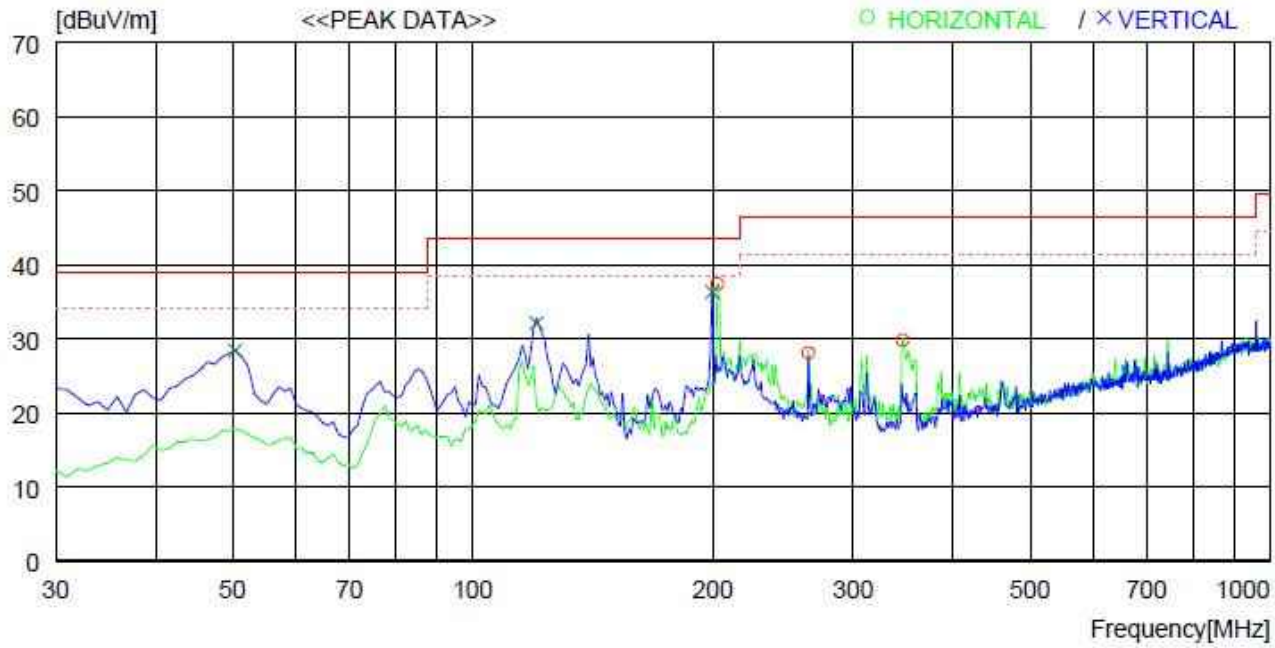
Mode #8	Above 1 000 MHz (Peak)



No.	FREQ [MHz]	READING PEAK [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Vertical ------										
1	1187.000	52.8	24.7	1.6	40.4	38.7	74.0	35.3	200	240
2	1238.000	48.7	24.9	1.6	40.5	34.7	74.0	39.3	100	359
3	1595.000	52.4	26.2	1.8	40.6	39.8	74.0	34.2	100	178
4	2122.000	50.5	28.0	2.1	40.4	40.2	74.0	33.8	300	192
5	3193.000	44.4	30.3	2.5	40.7	36.5	74.0	37.5	200	232
6	5760.000	46.8	34.1	3.7	40.7	43.9	74.0	30.1	200	240

NOTE: Average mode was not measured, because Peak values were under the Average limit.

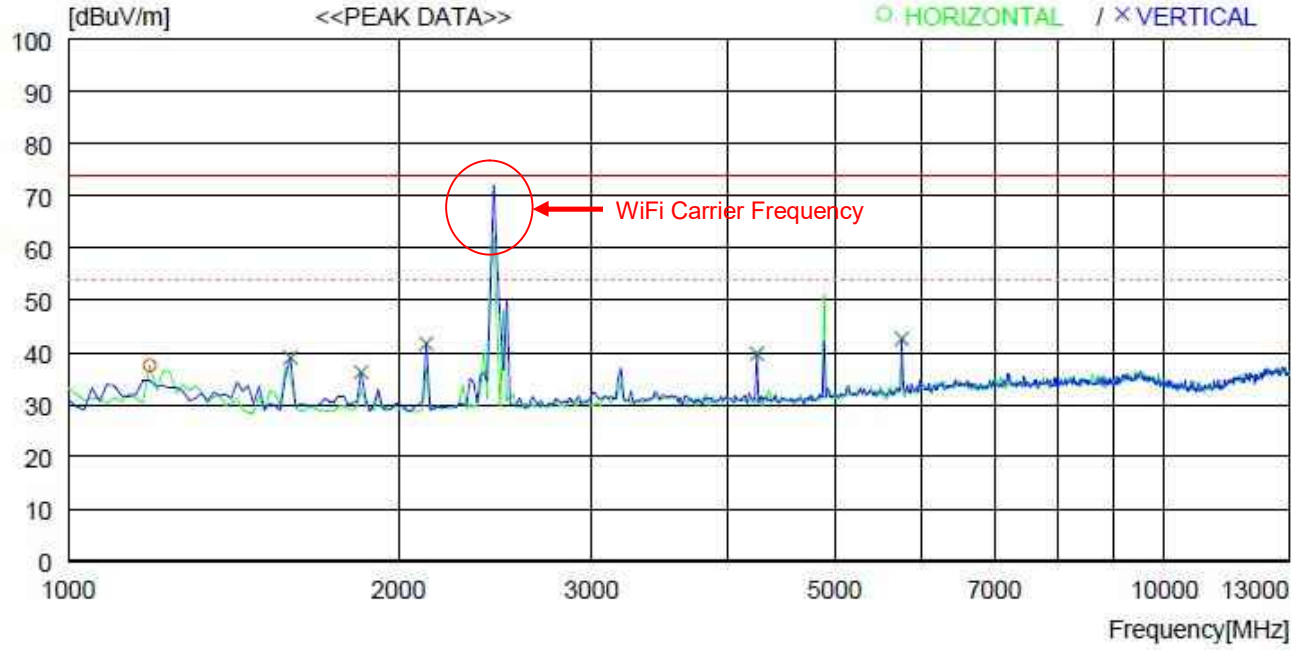
Mode #9	30 MHz – 1 GHz



No.	FREQ [MHz]	READING PEAK [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	202.660	50.5	11.5	8.1	32.7	37.4	43.5	6.1	300	213
2	263.770	39.6	13.0	8.1	32.6	28.1	46.4	18.3	300	359
3	346.220	39.4	14.6	8.4	32.6	29.8	46.4	16.6	200	0
----- Vertical ------										
4	50.370	40.1	14.2	6.8	32.7	28.4	39.1	10.7	100	3
5	120.210	49.1	8.9	6.8	32.7	32.1	43.5	11.4	100	0
6	199.750	50.1	11.4	7.5	32.7	36.3	43.5	7.2	100	272

NOTE: Quasi-Peak was not measured, because Peak values met Quasi-Peak limit.

Mode #9	Above 1 000 MHz (Peak)



No.	FREQ [MHz]	READING PEAK [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	1187.000	51.6	24.7	1.6	40.4	37.5	74.0	36.5	200	83
----- Vertical ------										
2	1595.000	51.6	26.2	1.8	40.6	39.0	74.0	35	100	258
3	1850.000	47.6	27.1	1.9	40.4	36.2	74.0	37.8	200	0
4	2122.000	52.0	28.0	2.1	40.4	41.7	74.0	32.3	100	194
5	4247.000	45.8	31.8	3.0	40.9	39.7	74.0	34.3	300	359
6	5760.000	45.5	34.1	3.7	40.7	42.6	74.0	31.4	200	245

NOTE: Average mode was not measured, because Peak values were under the Average limit.

Appendix I - Test Instrumentation

Name of Equipment	Model Number	Manufacturer	Serial Number	Last Cal. (Interval)	USE
For EMISSION					
EMI Test Receiver	ESCI 7	Rohde & Schwarz	100722	2018-02-12(1Y)	■
Test Receiver	ESIB 26	Rohde & Schwarz	100298	2018-01-18(1Y)	□
LISN	ENV4200	Rohde & Schwarz	100203	2018-01-18(1Y)	□
LISN	ENV216	Rohde & Schwarz	100110	2018-07-27(1Y)	■
LISN	LS16C	AFJ	16011403310	2018-07-27(1Y)	■
LISN	NNLK8121	SchwarzBeck	8121-163	2018-07-27(1Y)	□
Voltage Probe	TK9420	Schwarzbeck	9420-165	2018-01-18(1Y)	□
Loop Antenna	HFH2-Z2	Rohde & Schwarz	100341	2017-06-15(2Y)	□
8-Wire ISN CAT 3	CAT3 8158	Schwarzbeck	CAT3 8158 #70	2018-01-22(1Y)	□
8-Wire ISN CAT 5	CAT5 8158	Schwarzbeck	CAT5 8158 #126	2018-01-22(1Y)	□
8-Wire ISN CAT 6	NTFM 8158	Schwarzbeck	NTFM 8158 #95	2018-01-22(1Y)	□
Test Receiver	ESU	Rohde & Schwarz	100303	2018-01-18(1Y)	■
TRILog Broadband Antenna	VULB9163	Schwarzbeck	9163-799	2017-10-23(2Y)	■
DOPPEL STEG HORN Antenna	HF 907	Rohde & Schwarz	102426	2017-01-06(2Y)	■
Preamp (1-18) GHz	SCU 18D	Rohde & Schwarz	19006450	2018-04-23(1Y)	■
Preamp 9 kHz-1 GHz	310N	Sonoma Instrument	344015	2018-01-18(1Y)	■
Attenuators	6 dB	Rohde & Schwarz	272.4110.50	2018-01-18(1Y)	■
Antenna Master (Below 1 GHz)	MA4000-EP	INNCO SYSTEM	4600814	N/A	■
Antenna Master (Above 1 GHz)	MA4000-XP-ET	INNCO SYSTEM	N/A	N/A	■
Turn Table	DT3000-3t	INNCO SYSTEM	1310814	N/A	■
CO3000 Controller (Below 1 GHz)	CO3000-4PORT	INNCO SYSTEM	CO3000/806/34130814/L	N/A	■
CO3000 Controller (Above 1 GHz)	CO3000-4PORT	INNCO SYSTEM	CO3000/807/34130814/L	N/A	■
Digital Power Analyzer For Harmonic & Flicker	DPA 500	EM Test	V0713102356	2018-01-25(1Y)	□
AC Power Source	ACS 500	EM Test	V0713102357	2018-07-27(1Y)	□

The above measuring equipments have been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipments, which is traceable to recognized national standards.