Report No. E19240.01

Test Report
Electromagnetic Compatibility

Product	Network Controller
Name and address of the applicant	InCoax Networks AB Utmarksvägen 4 80291 Gävle, Sweden
Name and address of the manufacturer	InCoax Networks AB Utmarksvägen 4 80291 Gävle, Sweden
Model	In:xtnd control C254
Rating	12VDC, 5A Max
Trademark	In:xtnd
Serial number	84:93:0c:00:7d:ae
Additional information	/
Tested according to	FCC CFR 47 Subpart 15B ICES-003, Issue 6
Order number	382051
Tested in period	2019-11-07 to 2019-12-10
Issue date	2020-01-22
Name and address of the testing laboratory	**Nemko Group** Nemko AS Philip Pedersens vei 11, 1366 Lysaker, Norway TEL: +47 22 96 03 30 FAX: +47 22 96 05 50

An accredited technical test executed under the Norwegian accreditation scheme

Prepared by [Thanh Tran]

Approved by [Tore Løvlien]

REPORT REVISIONS

Revision #	Date	Order #	Description
00	2020-01-13	382051	First issued
01	2020-01-22	382051	Correction the photo of marking label.

THIS REPORT APPLIES ONLY TO THE ITEM(S) AND CONFIGURATION(S) TESTED.

It is the manufacturer's responsibility to assure the additional production units of this product are manufactured with identical electrical and mechanical components. The manufacturer is responsible to the authorities for any modifications made to the product, which result in non-compliance to the relevant regulations.

Opinions expressed within this report regarding general assessments and qualifications for PASS or FAIL to the standards limits and requirements, are not part of the current accreditation. Neither is opinions expressed regarding model variants covered by the testing performed in this report.

Deviations from, additions to, or exclusions from the test specifications are described in “Testing Report Summary”.

DESCRIPTION OF TESTED ITEM(S)

Product description.....:	Network Controller. EUT uses the free capacity in coaxial network to enable high speed internet access, IPTV, VoIP and Web services without the need to pull new cables. It works for all coaxial cable networks used for TV signal distribution.
Model/type.....:	In:xtnd control C254
Serial number.....:	84:93:0c:00:7d:ae
Operating voltage.....:	12VDC, 5A Max Test performed with use an adaptor Inventus Power, model IPD5012 (Input: 100-240V AC, 50-60Hz, 1.5A; Output: 12VDC, 4.2A).
Maximum power/current.....:	60W / 5A
Insulation class.....:	III
Highest clock frequency.....:	10.3125GHz
Hardware version.....:	V1.0
Software version.....:	1.6.1

Mounting position.....:	☒ Table top equipment ☒ Wall/ceiling mounted equipment ☐ Floor standing equipment ☐ Handheld equipment ☒ Rack mounted equipment ☐ Console equipment ☐ Other:

CRITICAL MODULES/PARTS

Description	Manufacturer	Type
Copper Ethernet Transceiver	MikroTik	S+RJ10 SFP+10GBASE

INPUT/OUTPUT PORTS

Port name and description	Cable		
	> 3m	Attached during test	Shielded
AC mains supply (AC/DC adaptor)	☐	☒	☐
4x Coax	☒	☒	☒
2x Ethernet (MGT port and TRUNK port)	☒	☒	☒

OPERATING MODES

No.	Description	Applied for testing	
		Emissions	Immunity
1	Networks connection	☒	☐

ACCESSORIES USED DURING TEST

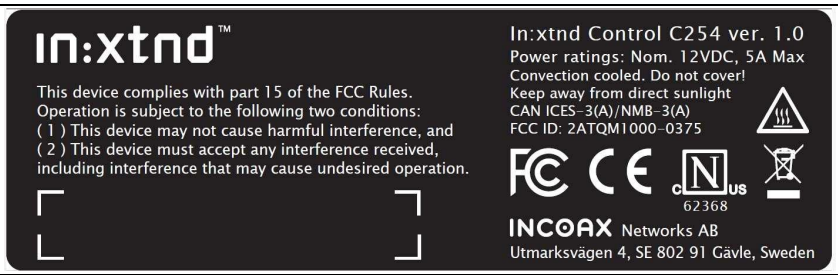
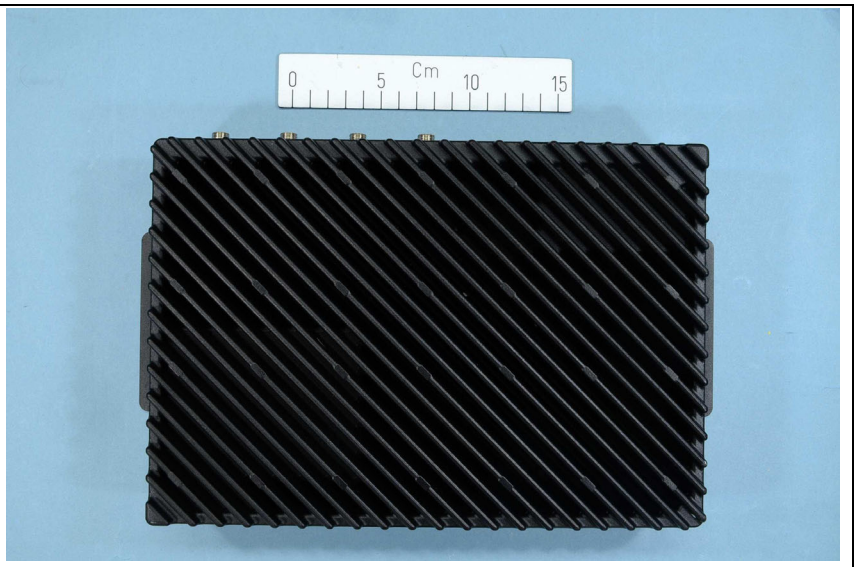
Description	Manufacturer	Type
Switch 1	Netgear	GS110EMX
Switch 2	Netgear	GS110EMX
Router	MicroTic	RB750Gr3
4x Incoax In:xtnd modem	Incoax	MA 2.5

MODEL VARIANTS

The following model variants have been inspected and are confirmed to be identical or believed to be less disposed with regard to electromagnetic compatibility.

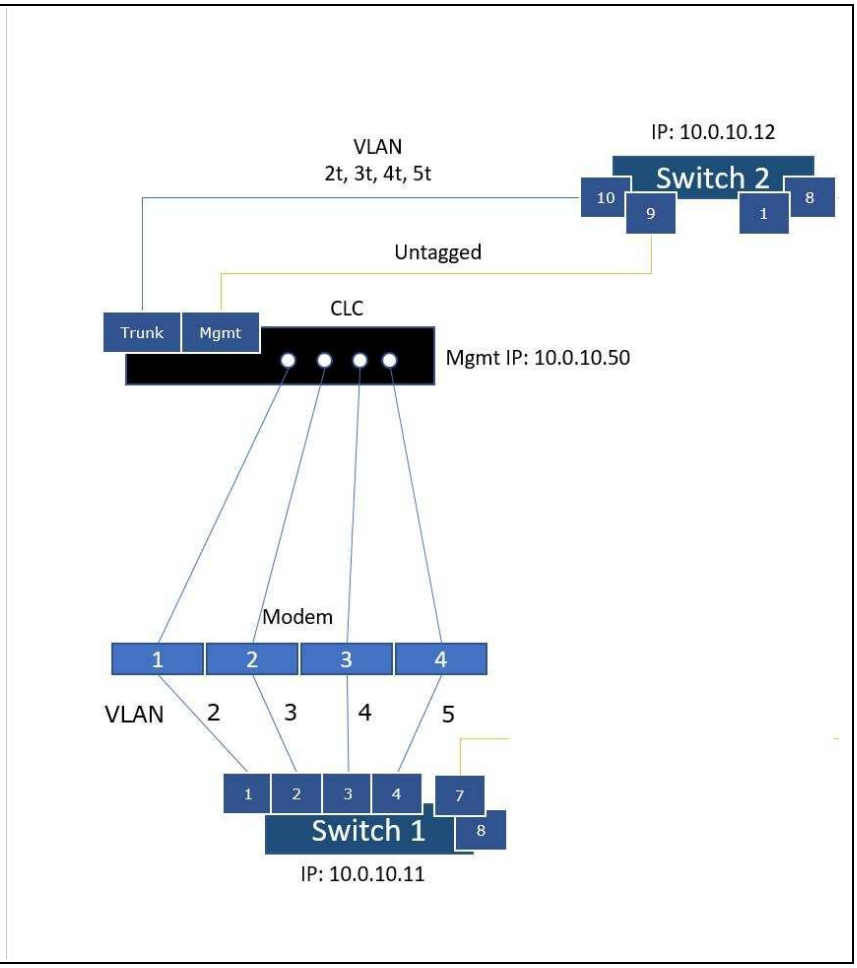
Model/type	Comment	Tested
In:xtnd Control C254	Tested model	☒
In:xtnd Control C251	Not tested variant The different is only one coax port on In:xtnd Control C251	☐

PHOTOS AND DRAWINGS

Copy of marking label test item...:	
Photo of the test item.....:	


0 5 Cm 10 15
in:xtnd
MGT
TRUNK
COAX 1
COAX 2
COAX 3
COAX 4


0 5 Cm 10 15

Drawing of test setup.....:	

OTHER INFORMATION

Modifications to the test item.....:	None
Additional information.....:	During radiated emission tests the network controller In: xtnd C254 is powered by using an adaptor Inventus Power, model IPD5012 (Input: 100-240V AC, 50-60Hz, 1.5A; Output: 12VDC, 4.2A).

Note: This equipment has been tested with certain cable types and cable configurations. Any changes to these parameters when installed may influence on the EMC properties of this equipment

TEST ENVIRONMENT

Test laboratory.....:	☒	KJELLER	(Instituttveien 6, N-2007 Kjeller, Norway)
	☐	LYSAKER	(Philip Pedersens vei 11, N-1366 Lysaker, Norway)
Laboratory accreditation.....:	NORWEGIAN ACCREDITATION TEST 033		**Norsk Akkreditering – TEST 033** P06 – Electromagnetic Compatibility
Environmental ref. conditions.....:	The climatic conditions during the tests are within limits specified by the manufacturer for the operation of the product and the test equipment. The climatic conditions during tests are within the following limits: **Ambient temperature:** 15 – 35 °C **Relative humidity:** 25 – 75 %RH **Atmospheric pressure:** 86 – 106 kPa If explicitly required by the test standard, or the requirements are tighter than the above; the climatic conditions are recorded and documented separately in this test report.		
Calibration.....:	All instruments used in the tests of this test report are calibrated and traceable to national or international standards. Between calibrations test set-ups are controlled and verified on a regular basis by intermediate checks to ensure, with 95% confidence that the instruments remain within their calibrated levels. The instrumentation accuracy is within limits agreed by the IECEE/CTL and defined by Nemko reference document TM-NO/301.		
Measurement uncertainties.....:	EMC uncertainty is specified in CISPR 16-4-2. Only if our uncertainty is larger than the maximum value UCISPR, the uncertainty is added to the measurement result. EMC test uncertainties for transient immunity are kept within the requirements of the relevant basic standard. Further information about measurement uncertainties is provided on request		

POWER SUPPLY SYSTEM UTILISED

Power supply voltage.....:	☐	240V AC 50Hz	☐	400V 3NAC 50Hz
	☐	230V AC 50Hz	☐	230V 3AC 50Hz
	☐	200V AC 60Hz	☐	12V DC
	☒	120V AC 60Hz	☐	24V DC
Grounding conditions .....:	☐	Not grounded		
	☒	Ground is received from its power supply connection		
	☐	Additional chassis grounding		

TEST REPORT SUMMARY

APPLIED STANDARDS

Standards	Titles
FCC CFR 47 Subpart 15B	*Digital devices - Unintentinal radiators, Class B Digital Device*
ICES-003, Issue 6	*Spectrum Management and Telecommunications Policy. Interference-Causing Equipment Standard. Information Technology Equipment (Including Digital Apparatus - Limits and Methods of Measurement (Issue 6, June 2016)*

TEST SUMMARY

Requirements – Tests	Reference standards	Verdict
Conducted Emissions	FCC Part 15.107 ICES-003, Issue 6, Clause 6.2 ANSI C63.4-2014	PASS
Radiated Emissions (Below 1GHz)	FCC Part 15.109 ICES-003, Issue 6, Clause 6.2 ANSI C63.4-2014	PASS
Radiated Emissions (Above 1GHz)	FCC Part 15.109 ICES-003, Issue 6, Clause 6.2 ANSI C63.4-2014	PASS

PASS : Tested and complied with the requirements
FAIL : Tested and failed the requirements
N/A : Test not relevant to this specimen (evaluated by the test laboratory)
– : Test not performed (instructed by the applicant)
* : An asterisk (*) placed after the verdict in the Result column indicates test items that are not within Nemko's scope of accreditation
# : A grid (#) placed after the verdict in the Result column indicates test items that are only partly covered by Nemko's scope of accreditation. Further information is detailed in the test section

NOTES

Note 1: Product standards with dated references to basic standards may have been performed by Nemko AS according to the newest edition of the basic standard. This may impact the compliance criteria or technical performance of the test, still this is considered to be adequate as long as the test is expected to confirm compliance to the intention of the product standard. The table above lists the actual editions of the basic standards which have been used during testing.

Note 2: The choice of immunity test levels could be higher than those specified by the reference standards when we take into account the nature of the specimen and its intended use, or based on customer requests.

Test Results

CONDUCTED EMISSIONS

TEST DESCRIPTION

Method
The reference method for this test is listed in the table under clause TEST SUMMARY.

Set-up
The measurement was performed at the power supply terminal of the specimen. Nominal supply voltage was provided.
The specimen was energized and in normal operating mode during the measurement.

☐ The specimen and its cables were elevated 10 cm above a ground plane.
☐ The specimen and its cables were elevated 40 cm above a ground plane.
☒ The specimen and its cables were placed 40 cm from a vertical ground plane, 80 cm over ground plane.
☐ The specimen was mounted directly on, and bonded to a ground plane. Cables and auxiliary equipment were elevated by 1 cm

☒ The specimen was connected to an Artificial Mains Network (AMN) by its power supply cable, which was adjusted to 100cm length by folding.
☐ The specimen was connected to an Artificial Mains Network (AMN) by a 0.8 m shielded power supply cable directly connected to the AMN

Conditions
☐ Frequency range was 9kHz – 30MHz.
☐ Frequency range was 10kHz – 30MHz.
☒ Frequency range was 150kHz – 30MHz.

The measuring bandwidth is 200Hz in the frequency range 9 kHz – 150 kHz. Measurement was made with a 100 Hz step size and 100 ms dwell time.
The measuring bandwidth is 9 kHz in the frequency range 150 kHz – 30 MHz. Measurement was made with a 4.5 kHz step size and 20 ms dwell time.

Measurement uncertainty: ± 3.7 dB (9 kHz – 150 kHz); ± 3.3 dB (150 kHz – 30 MHz)

Instruments used during measurement

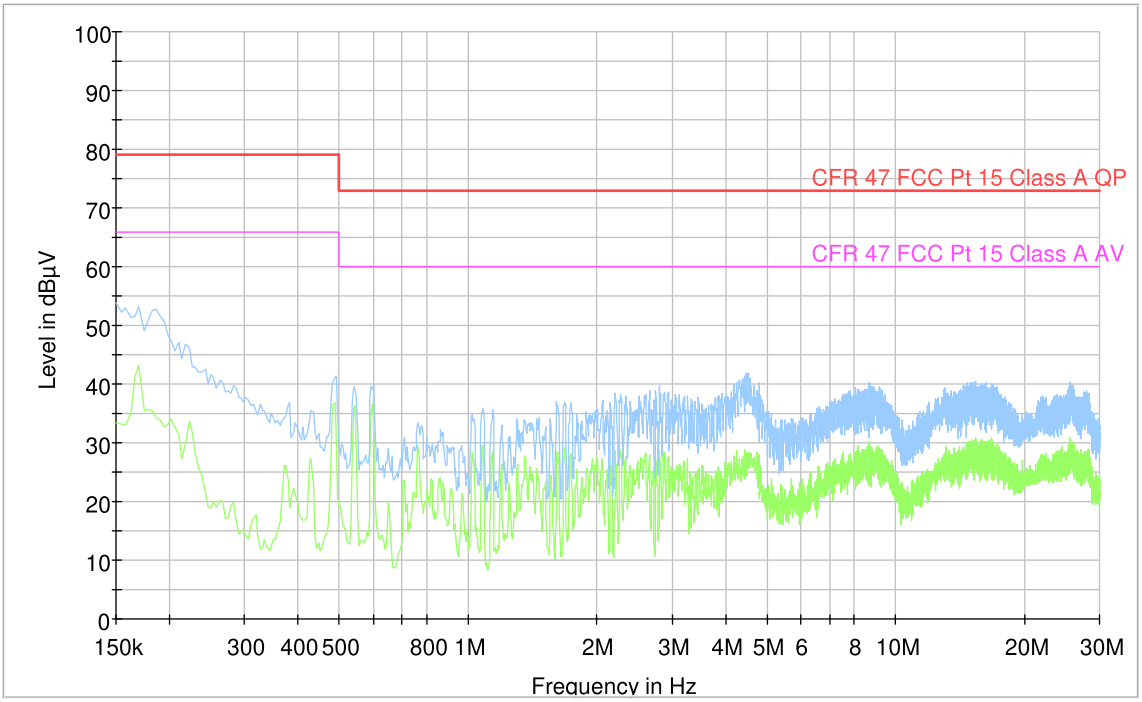
Instrument list: AMN: R&S / ESH2-Z5 (N-4097) (03/2020)
EMI Receiver: R&S / ESCI 3 (N-4259) (10/2021)

Conformity

Verdict:	PASS
Test engineer:	Thanh Tran

EMISSION SPECTRUM AND MEASUREMENT DATA

Full Spectrum



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
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RADIATED EMISSIONS (BELOW 1GHZ)

TEST DESCRIPTION

Method
The reference method for this test is listed in the table under clause TEST SUMMARY.

Set-up
The measurements were performed in a semi-anechoic chamber (SAC). Nominal supply voltage was provided.
The specimen was energized and in normal operating mode during the measurement.

☐ The specimen and its cables were elevated 10 cm above the site ground plane and placed in the centre of the turntable.
☒ The specimen and its cables were placed on a table 80 cm above the site ground plane and placed in the centre of the turntable.
☒ Ferrite clamps type CMAD were applied to cables leaving the test volume.
☐ A CDNE was applied to the power supply cable.

Antenna type = Hybrid bilog antenna
Antenna elevation = 100-400 cm above the ground reference plane.
Specimen rotation = 0-360°.

Frequency range:	Measurement distance:
☐ 30-300MHz	☐ 3m
☒ 30-1000MHz	☐ 5m
☐ Other:	☒ 10m

Conditions
The measuring bandwidth is 120 kHz in the frequency range 30 MHz – 1000 MHz. Frequency sweeps with RBW = 120 kHz and VBW = 1 MHz was applied with a sweep time of 20 ms (step size resolution < 60 kHz).

Measurement uncertainty: ± 4.9 dB (3m distance in SAC10); ± 4.6 dB (3m distance in SAC3); ± 4.6 dB (10m distance in SAC10)

Instruments used during measurement

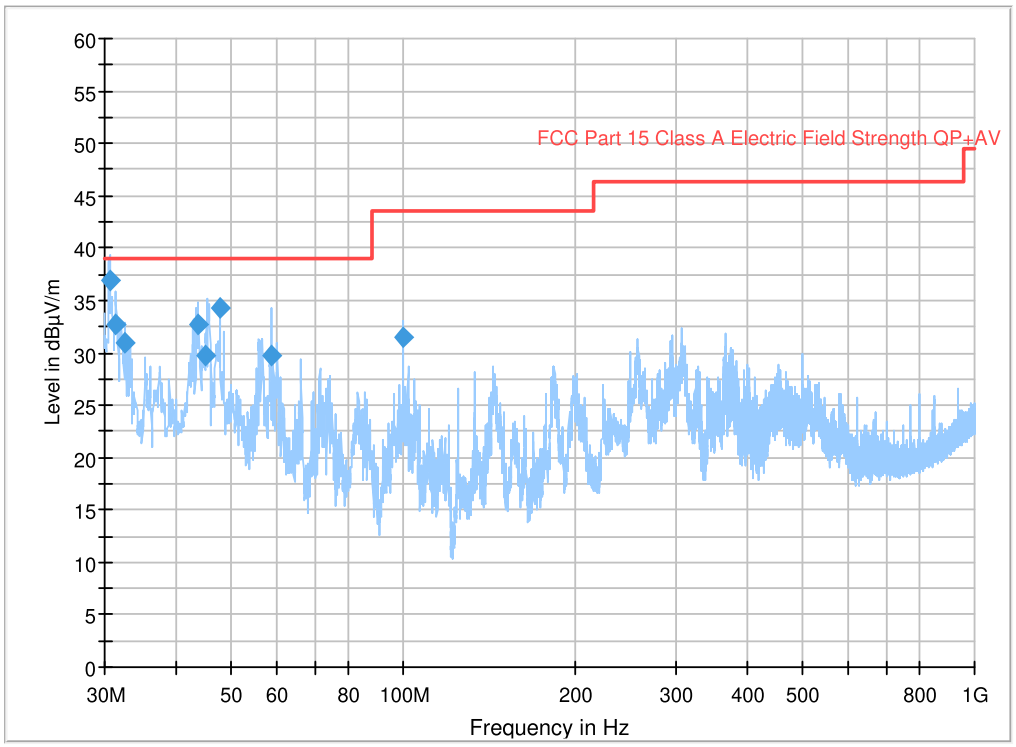
Instrument list:
Antenna, bilog: Sunol / JB3 (N-4525) (11/2019)
EMI Receiver: R&S / ESU40 (LR-1639) (01/2020)
Preamplifier: Sonoma / 310N (LR-1686) (07/2020)

Conformity

Verdict:	PASS
Test engineer:	Thanh Tran

EMISSION SPECTRUM AND MEASUREMENTS DATA

Full Spectrum



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
30.640028	36.86	39.00	2.14	1000.0	120.000	100.0	V	121.0	-10.9
31.433472	32.78	39.00	6.22	1000.0	120.000	103.0	V	322.0	-11.6
32.593867	31.03	39.00	7.97	1000.0	120.000	103.0	V	316.0	-12.5
43.769506	32.78	39.00	6.22	1000.0	120.000	358.0	V	0.0	-19.3
45.051256	29.78	39.00	9.22	1000.0	120.000	384.0	V	326.0	-19.7
47.799433	34.33	39.00	4.67	1000.0	120.000	388.0	V	346.0	-20.6
58.791778	29.67	39.00	9.33	1000.0	120.000	241.0	V	109.0	-23.6
100.005467	31.45	43.50	12.05	1000.0	120.000	112.0	V	85.0	-20.8

RADIATED EMISSIONS (ABOVE 1GHZ)

TEST DESCRIPTION

Method
The reference method for this test is listed in the table under clause TEST SUMMARY.

Set-up
Nominal supply voltage was provided. The specimen was energized and in normal operating mode during the measurement.

☐ The measurements were performed in a semi-anechoic chamber (SAC3) (calibrated volume: D=2.0m / H=2.0m).
☒ The measurements were performed in a semi-anechoic chamber (SAC10) (calibrated volume: D=1.5m / H=2.0m).
☐ The measurements were performed in a fully anechoic room (FAR) (calibrated volume: D=1.2m / H=2.0m).

☐ The specimen and its cables were elevated 10 cm above the site ground plane, and placed in the centre of the turntable.
☒ The specimen and its cables were placed on a table 80 cm above the site ground plane, and placed in the centre of the turntable.

The reference ground plane was covered with ferrite absorbers in the reflecting area between the specimen and the measuring antenna.
Measurement distance = ☒ 3m.
Antenna elevation = fixed at centre of specimen height.
Specimen rotation = 0-360°.
Measurements were performed with a double-ridged guide horn antenna.

Frequency range:	Highest internal frequency of specimen:
☐ 1-2 GHz	☐ Below 108MHz
☐ 1-5 GHz	☐ Between 108MHz and 500MHz
☐ 1-6 GHz	☐ Between 500MHz and 1000MHz
☒ 1-40 GHz	☒ Above 1000MHz

The measuring bandwidth is 1 MHz in the above frequency range. Frequency sweeps with RBW = 1 MHz and VBW = 1 MHz was applied with a sweep time of 100 ms (proper segmentation of the frequency range was applied to obtain step size resolution < 500 kHz).
Measurement uncertainty: ± 5.1 dB

Instruments used during measurement

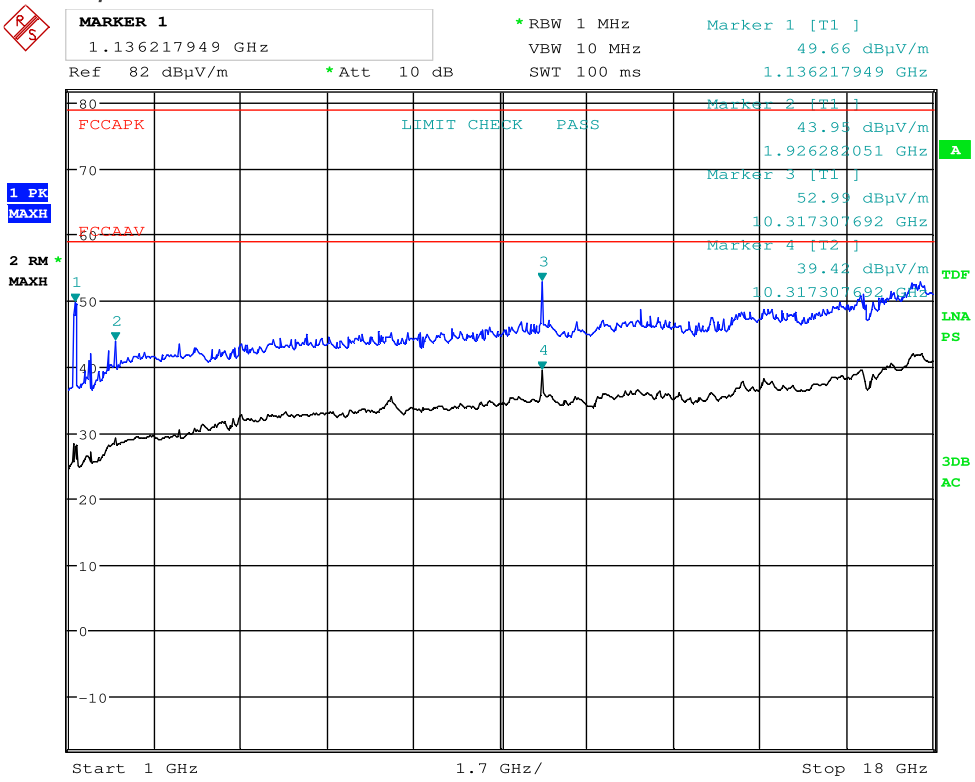
Instrument list:
Antenna Horn: ETS / 3117-PA (LR-1717) (12/2019)
EMI Receiver: R&S / ESU40 (LR-1639) (01/2020)
Preamplifier: HP / 8449B (LR-1322) (N/A)
Antenna Horn: Narda / 638 (LR-1480) (N/A)
Antenna Horn: Narda / V4607 (LR-099) (N/A)
EMI Receiver: R&S / FSW43 (LR-1690) (01/2020)
Preamplifier: Miteq / JS4 (LR-1591) (07/2020)

Conformity

Verdict:	PASS
Test engineer:	Thanh Tran Gnanamanikan Suhanthakumar

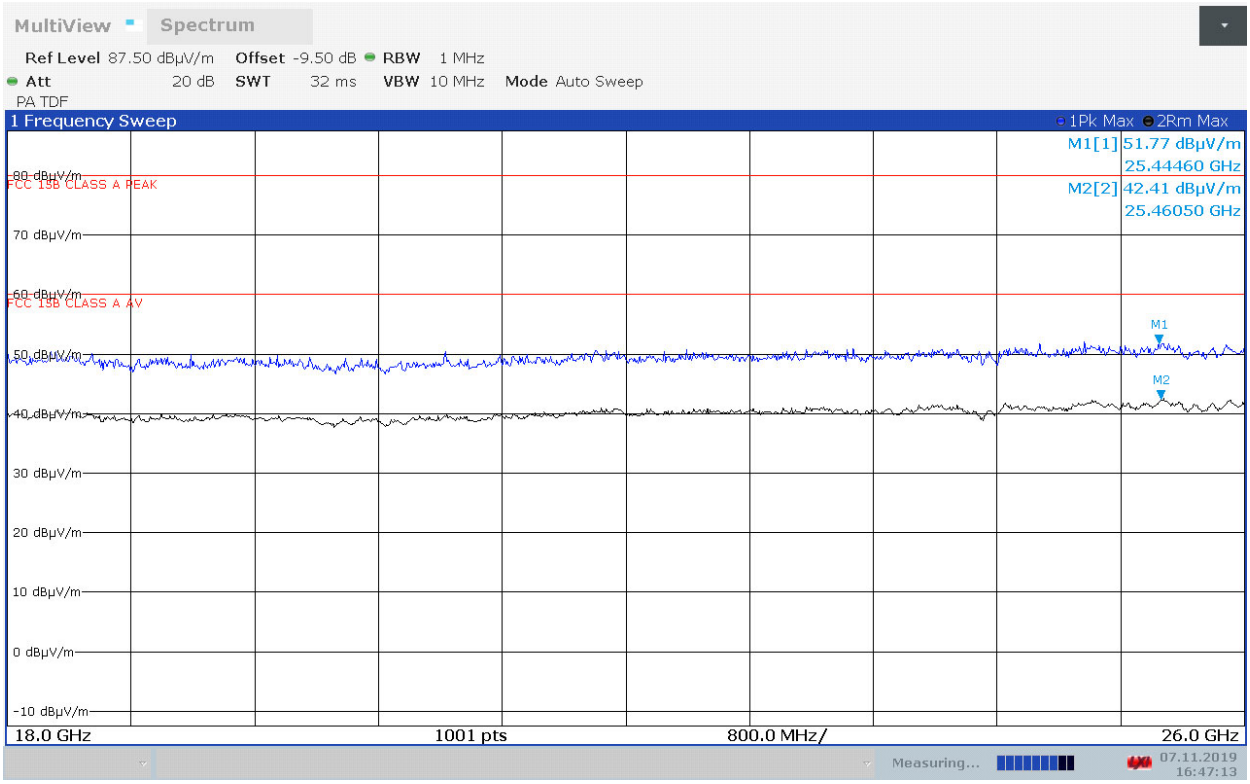
EMISSION SPECTRUM (HORIZONTAL POLARIZATION) AND MEASUREMENTS DATA

1-18GHz, Horizontal Polarization:

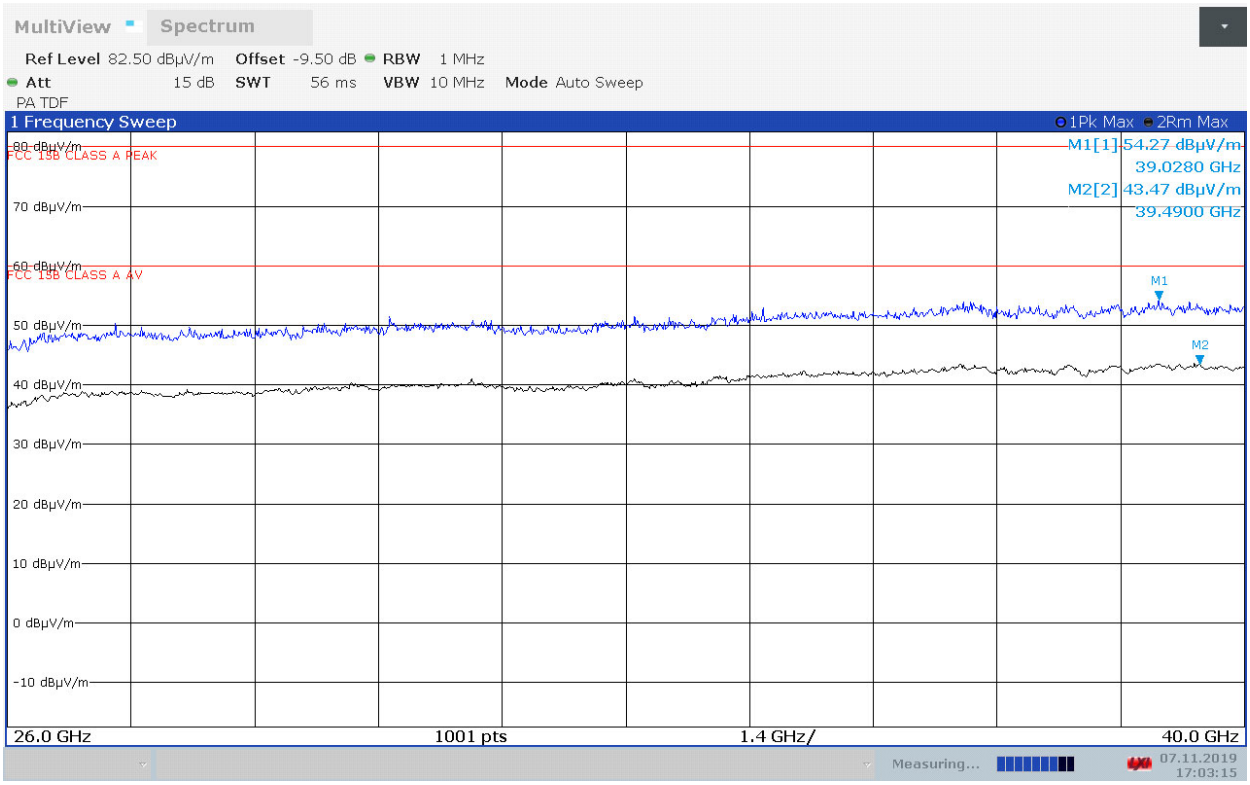


Date: 7.NOV.2019 16:05:08

18-26GHz, Horizontal Polarization:

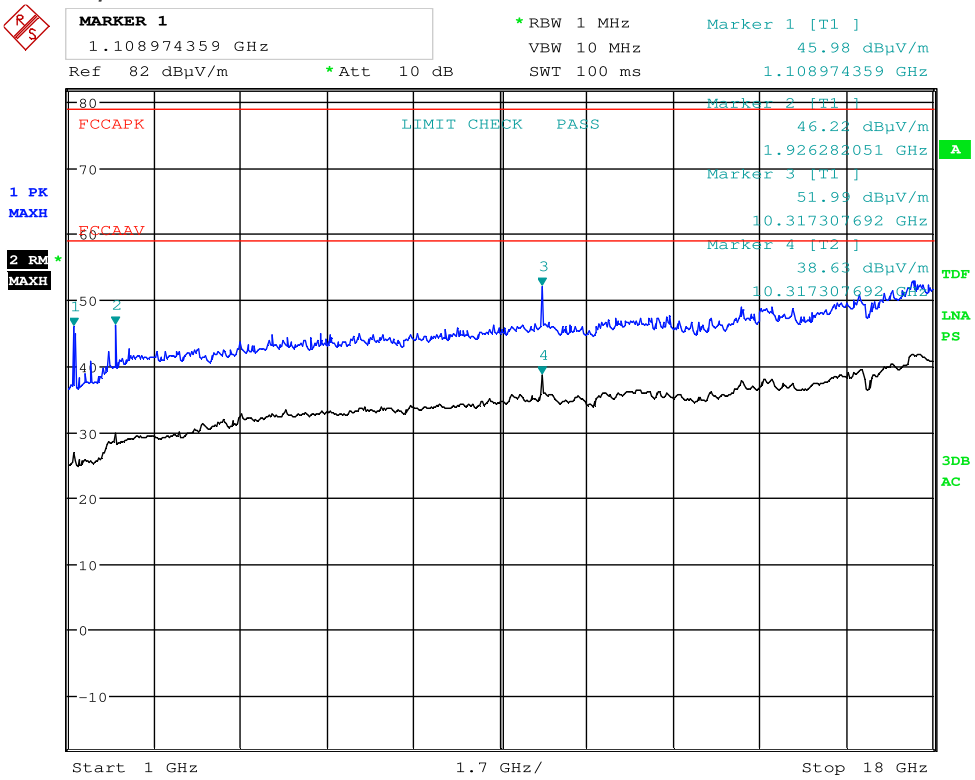


26-40GHz, Horizontal Polarization:



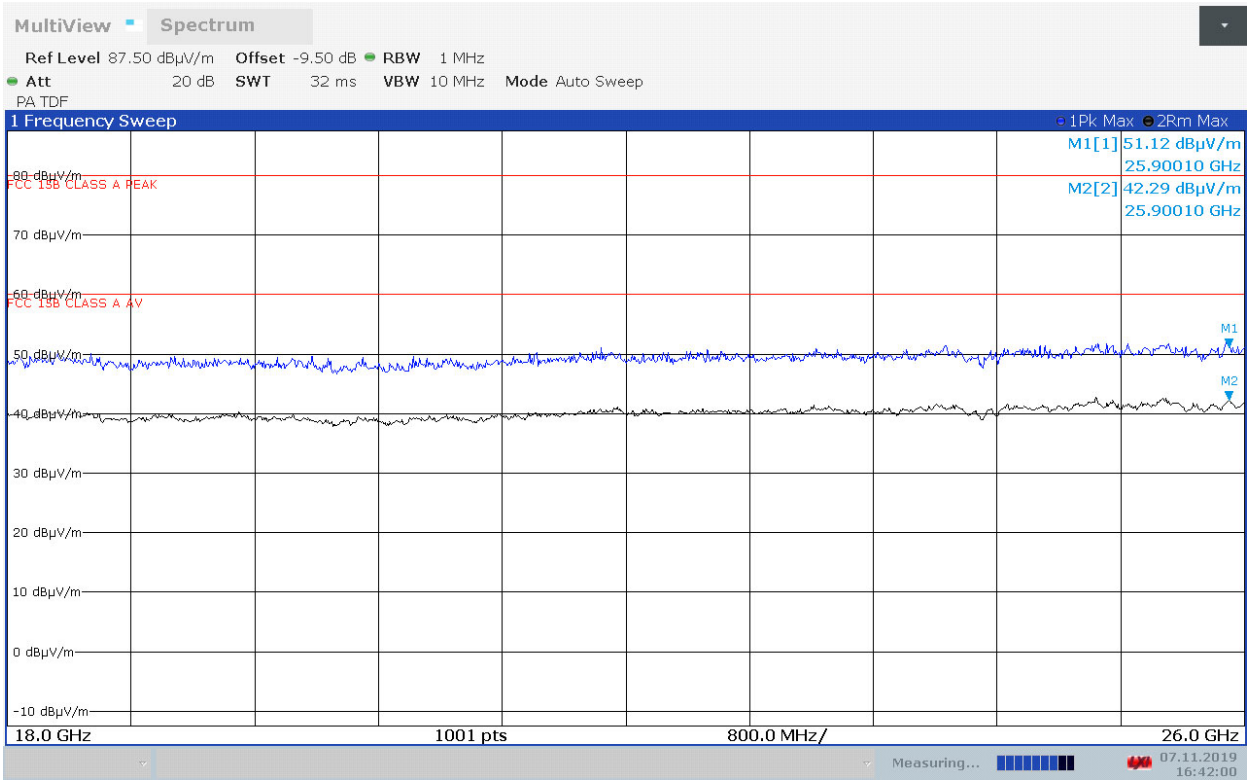
EMISSION SPECTRUM (VERTICAL POLARIZATION) AND MEASUREMENTS DATA

1-18GHz, Vertical Polarization:

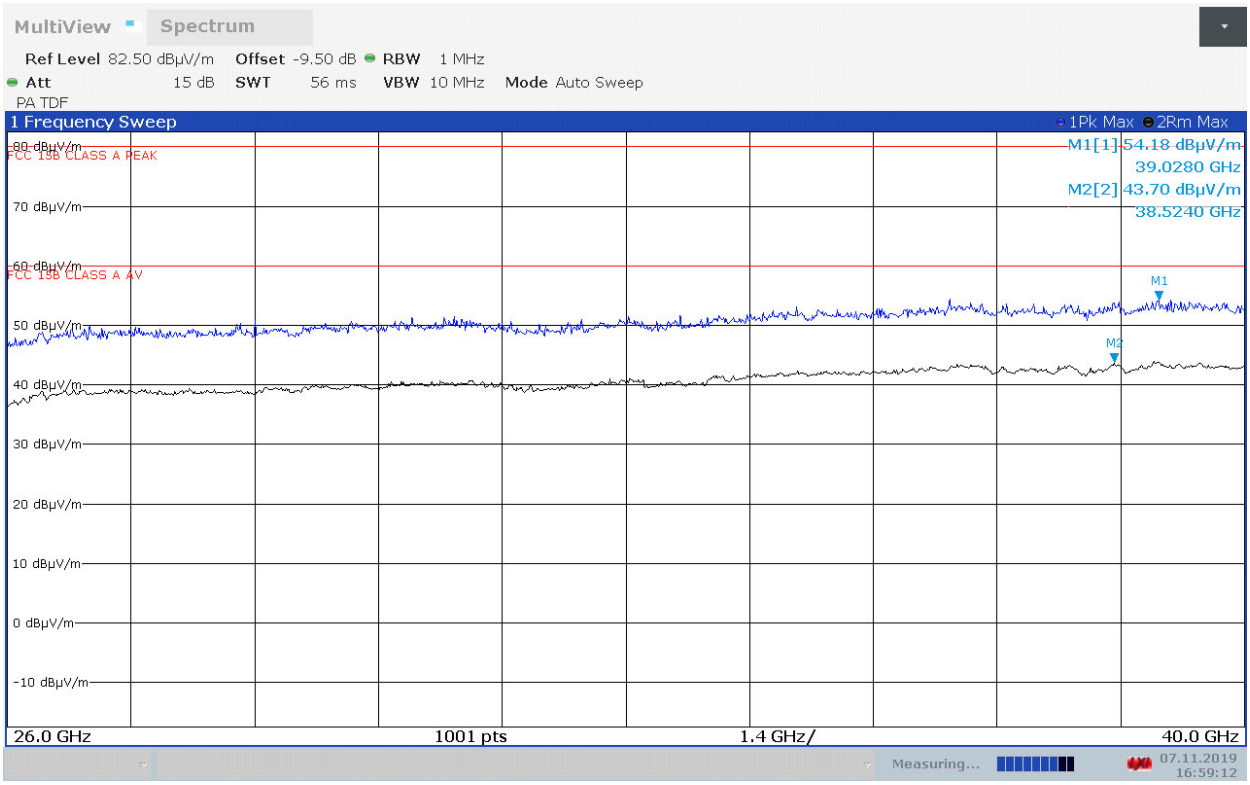


Date: 7.NOV.2019 15:56:27

18-26GHz, Vertical Polarization:



26-40GHz, Vertical Polarization:



Annexes

PHOTOS

Test set-up for EMC emissions measurements