Report No. REP002049

Test Report
Electromagnetic Compatibility

Product	Codec for telepresence unit
Name and address of the applicant	Cisco Systems Norway AS Philip Pedersens vei 1, 1366 Lysaker, NORWAY
Name and address of the manufacturer	Cisco Systems, Inc. 170 West Tasman Drive, San Jose, CA 95134, USA
Model	TTC6-15
Rating	2A 100-240V AC 50-60Hz
Trademark	Cisco
Additional information	The tested device contains following radio modules: BLE/BT, 2.4GHz wi-fi and 5GHz wi-fi. Internal power supply: FSP Group Inc. type: FSP167-2F01 (Input: 100-240V AC, 50-60Hz, 2A)
Tested according to	ETSI EN 301 489-01:V2.2.3 ETSI EN 301 489-03:V2.1.1 ETSI EN 301 489-17:V3.2.4 EN 55032:2015 + AC:2016 + A11:2020 EN 55035:2017 + A11:2020 FCC CFR 47 Subpart 15B ISED Canada ICES-003, Issue 7
Order number	PRJ0014735
Tested in period	2022-10-24 to 2022-10-28
Issue date	2022-11-29
Name and address of the testing laboratory	Nemko Scandinavia AS Philip Pedersens vei 11, 1366 Lysaker, Norway

An accredited technical test executed under the Norwegian accreditation scheme

Prepared by [Martin Adams Kvam]

Approved by [Roger Berget]

REPORT REVISIONS

Revision #	Date	Project #	Description
00	2022-11-29	PRJ0014735	First issued

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.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Nemko accepts no responsibility for damages suffered by any third party as a result of decisions made or actions based on this report.

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 “Test Report Summary”.

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DESCRIPTION OF TESTED ITEM(S)

Product description..... :	The equipment under test (EUT) is an Audio/Video codec (encoder/decoder) for videoconferencing. The EUT is supplied from a separately approved internal power supply. Operation of the EUT is via an external touch panel.

Model/type ..... :	TTC6-15
Serial number..... :	FOC2635NVM2
Operating voltage..... :	100-240V AC
Maximum power/current..... :	2A
Insulation class ..... :	Class I
Highest clock frequency ..... :	2.5GHz
Hardware version..... :	Rev. D
Software version ..... :	S01845-2.38.0/ CE10.20.0

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

RF CHARACTERISTICS OF THE TRANSMITTER

Type.....:	**BLE**	**BT**	**2.4GHz wi-fi**
Frequency range..... :	2402-2480 MHz	2402-2480 MHz	2.412 – 2.472GHz
Number of channels..... :	40	79	13 (11 for FCC)
Channel BW..... :	2MHz max	1MHz	20
Rated output power..... :	<10dBm	<10dBm	<20dBm
Receiver category..... :	2	2	1
Operating modes..... :	TX/RX	TX/RX	TX/RX
Types of modulation..... :	GFSK	GFSK, π/4 DQPSK, 8DPSK	DSSS, CCK, OFDM
Tunable bands..... :	None	None	None
User frequency adjustment :	None	None	None
Antenna type..... :	External with SMA connector	External with SMA connector	External with SMA connector
Antenna gain..... :	2.5	2.5	3.1
Antenna connection..... :	SMA connector	SMA connector	SMA connector
Number of antennas..... :	1	1	2
Antenna diversity/MIMO.. :	No	No	Yes

CRITICAL MODULES/PARTS

Description	Manufacturer	Type
Internal PSU	FSP Group Inc.	FSP167-2F01

ACCESSORIES USED DURING TEST

Description	Manufacturer	Type
Touch device	Cisco	TTC5-15
Conferential unit	Cisco	TTC7-25
External microphone	Cisco	TTC5-14
PC	Lenovo	B50-10
Display	Samsung	U28E590DSL
Camera	Sony	EVI-X200C

INPUT/OUTPUT PORTS

Port name and description	Cable		
	Longer than 3m	Attached during test	Shielded
AC mains supply	☒	☒	☐
Ethernet, LAN	☒	☒	☐
Ethernet, PoE port 1	☒	☒	☐
Ethernet, PoE port 2	☒	☐	☐
Ethernet, touch panel	☒	☒	☐
HDMI in 1	☒	☒	☒
HDMI in 2	☒	☒	☒
HDMI in 3	☒	☐	☒
HDMI out 1	☒	☒	☒
HDMI out 2	☒	☐	☒
HDMI out 3	☒	☐	☒
USB A 1	☐	☒	☒
USB A 2	☐	☐	☒
USB A 3	☐	☐	☒
USB A 4	☐	☐	☒
USB C	☒	☒	☒
Micro USB (for debug only)	☐	☐	☐
Mic in 1	☒	☒	☐
Mic in 2	☒	☐	☐
Mic in 3	☒	☐	☐
Audio out	☒	☒	☒

OPERATING MODES

OP no.	Description	Applied for testing	
		Emissions	Immunity
OP1	In-call using ethernet	☒	☒
OP2	In-call using wireless (2.4GHz or 5GHz)	☒	☒
OP3	Idle	☐	☐

POWER SUPPLY CONDITIONS

The following nominal power supply conditions have been tested:

PC no.	Voltage	Frequency	Type	Ground terminal
PC1	100 V	☐ AC 50Hz / ☒ AC 60Hz / ☐ DC	☐ 3AC / ☐ 3ACN / ☐ PoE	☒ PE / ☐ GND / ☐ None
PC2	240 V	☒ AC 50Hz / ☐ AC 60Hz / ☐ DC	☐ 3AC / ☐ 3ACN / ☐ PoE	☒ PE / ☐ GND / ☐ None
PC3	115 V	☐ AC 50Hz / ☒ AC 60Hz / ☐ DC	☐ 3AC / ☐ 3ACN / ☐ PoE	☒ PE / ☐ GND / ☐ None

PHOTOS AND DRAWINGS

Copy of marking label..... :	

Photo of the test item ..... :	
Front view	
Rear view	

OTHER INFORMATION

Modifications ..... :	None
Additional information ..... :	None

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 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.
Measurement uncertainties ..... :	Uncertainty in EMC emission measurements stated in this report are calculated from the standard measurement uncertainties multiplied by the coverage factor k=2. It was determined in accordance with CISPR 16-4-2. The true value is in the corresponding interval with a probability of 95%. Uncertainties for continuous immunity tests are calculated based on the same principles as for EMC emission uncertainties. For Harmonics and Flicker measurements the measurement uncertainty is calculated based on the same principles as for EMC emission uncertainties. Uncertainties for transient immunity are kept within the requirements of the relevant basic standard. *Further information about measurement uncertainties is provided on request.*
Decision rules ..... :	As specified by CISPR 16-4-2; if our measurement uncertainty U_{LAB} is less than or equal to U_{CISPR} , compliance is deemed to occur if no measured disturbance level exceeds the limit hence “PASS” is indicated, and non-compliance is deemed to occur if any measured disturbance level exceeds the limits hence “FAIL” is indicated. For continuous immunity tests, uncertainties are not considered when applying the calibrated test levels. Tests are performed at the test levels specified by the test standard. PASS and FAIL decisions are based on behaviour observations of the specimen. For transient immunity tests, uncertainties are not considered if the test equipment is kept within the requirements of the relevant basic standard. Tests are performed at the test levels specified by the test standard. PASS and FAIL decisions are based on behaviour observations of the specimen. For Harmonics and Flicker measurements the measurement uncertainty is considered, and measurements are marked if necessary. In doing so, the associated uncertainty of measurement has been considered. *Further information about decision rules is provided on request.*

EVALUATION OF PERFORMANCE

PERFORMANCE TESTS

Performance checks ..... :	Transmission signal (audio/video) exchange between two video conferential units. Via Ethernet and wi-fi link.
Performance tests ..... :	Video conferential function was verified before, after and during tests via Ethernet and wi-fi link.
Monitoring during tests ..... :	Visually monitored video signal on display, and audio signal was monitored.
Note 1: Performance check is a short functional test carried out during or after a technical test to confirm that the equipment operates. Note 2: Performance test is a measurement or a group of measurements carried out during and/or after a technical test to confirm that the equipment complies with selected parameters as defined in the equipment standard. Note 3: Monitoring during tests describes which functions were monitored and how.	

GENERAL PERFORMANCE CRITERIA

In order to pass each test, the specimen shall meet the following general criteria:

During test	After test
Performance criterion A: Operate as intended. No loss of function. No unintentional responses. No demodulated audio above limits pr CISPR35	**Performance criterion A:** Operate as intended. No loss of function. No degradation of performance. No loss of stored data or user programmable functions.
Performance criterion B: May be loss of function (one or more). No unintentional responses.	**Performance criterion B:** Operate as intended. Lost function(s) shall be self-recoverable. No degradation of performance. No loss of stored data or user programmable functions.
Performance criterion C: May be loss of function (one or more).	**Performance criterion C:** Lost function(s) shall be recoverable by the operator. Operate as intended after recovering. No degradation of performance.

TRANSMITTER PERFORMANCE CRITERIA

In order to pass each test, the transmitter functions shall meet the following criteria:

During continuous tests	During transient tests
Performance criterion CT: During and after the test, the apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a permissible performance level specified by the manufacturer when the apparatus is used as intended. In some cases this permissible performance level may be replaced by a permissible loss of performance. During the test the EUT shall not unintentionally transmit or change its actual operating state and stored data. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be deduced from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.	**Performance criterion TT:** After the test, the apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a permissible performance level specified by the manufacturer, when the apparatus is used as intended. In some cases this permissible performance level may be replaced by a permissible loss of performance. During the EMC exposure to an electromagnetic phenomenon, a degradation of performance is, however, allowed. No change of the actual mode of operation (e.g. unintended transmission) or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be deduced from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.
Modification by the manufacturer: Not modified	**Modification by the manufacturer:** Not modified

RECEIVER PERFORMANCE CRITERIA

In order to pass each test, the receiver functions shall meet the following criteria:

During continuous tests	During transient tests
Performance criterion CR : During and after the test, the apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a permissible performance level specified by the manufacturer when the apparatus is used as intended. In some cases this permissible performance level may be replaced by a permissible loss of performance. During the test the EUT shall not unintentionally transmit or change its actual operating state and stored data. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be deduced from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.	**Performance criterion TR :** After the test, the apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a permissible performance level specified by the manufacturer, when the apparatus is used as intended. In some cases this permissible performance level may be replaced by a permissible loss of performance. During the EMC exposure to an electromagnetic phenomenon, a degradation of performance is, however, allowed. No change of the actual mode of operation (e.g. unintended transmission) or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be deduced from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.
Modification by the manufacturer: Not modified	**Modification by the manufacturer:** Not modified

Note: In the subsequent test sections of this report, the required and actual specimen performance during immunity testing is indicated by the nomenclatures as given by the tables above (A or B and CT, TT, CR or TR).

SUMMARY OF TESTING

APPLIED STANDARDS

Standards	Titles
ETSI EN 301 489-01:V2.2.3	*Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements*
ETSI EN 301 489-03:V2.1.1	*Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 246 GHz*
ETSI EN 301 489-17:V3.2.4	*Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data transmission systems*
EN 55032:2015 + AC:2016 + A11:2020	*Electromagnetic compatibility of multimedia equipment - Emission requirements*
EN 55035:2017 + A11:2020	*Electromagnetic compatibility of multimedia equipment - Immunity requirements*
FCC CFR 47 Subpart 15B	*Digital devices - Unintentinal radiators, Class B Digital Device*
ISED Canada ICES-003, Issue 7	*Spectrum Management and Telecommunications Policy. Interference-Causing Equipment Standard. Information Technology Equipment (Including Digital Apparatus - Limits and Methods of Measurement (Issue 7, June 2020)*

TEST SUMMARY

Requirements – Tests	Reference standards	Verdict
Conducted Emissions	ETSI EN 301 489-01:V2.2.3 ETSI EN 301 489-03:V2.1.1 ETSI EN 301 489-17:V3.2.4 EN 55032:2015 + AC:2016 + A11:2020 FCC CFR 47 Subpart 15B:0 ISED Canada ICES-003, Issue 7:0 CISPR 16-2-1:2017, Ed.3.1	PASS
Conducted Emissions (Telecom Port)	EN 55032:2015 + AC:2016 + A11:2020 CISPR 16-2-1:2017, Ed.3.1	PASS
Radiated Emissions (Below 1GHz)	ETSI EN 301 489-01:V2.2.3 ETSI EN 301 489-03:V2.1.1 ETSI EN 301 489-17:V3.2.4 EN 55032:2015 + AC:2016 + A11:2020 FCC CFR 47 Subpart 15B:0 ISED Canada ICES-003, Issue 7:0 CISPR 16-2-3:2019, Ed.4.1	PASS
Radiated Emissions (Above 1GHz)	ETSI EN 301 489-01:V2.2.3 ETSI EN 301 489-03:V2.1.1 ETSI EN 301 489-17:V3.2.4 EN 55032:2015 + AC:2016 + A11:2020 FCC CFR 47 Subpart 15B:0 ISED Canada ICES-003, Issue 7:0 CISPR 16-2-3:2019, Ed.4.1	PASS

Requirements – Tests	Reference standards	Verdict
Harmonic Current Emissions	ETSI EN 301 489-01:V2.2.3 ETSI EN 301 489-03:V2.1.1 ETSI EN 301 489-17:V3.2.4 EN IEC 61000-3-2:2021, Ed.5.1	PASS
Voltage Variations/Fluctuations/Flicker	ETSI EN 301 489-01:V2.2.3 ETSI EN 301 489-03:V2.1.1 ETSI EN 301 489-17:V3.2.4 EN 61000-3-3:2019, Ed.3.1	PASS
Electrostatic Discharge (ESD) Immunity	ETSI EN 301 489-01:V2.2.3 ETSI EN 301 489-03:V2.1.1 ETSI EN 301 489-17:V3.2.4 EN 55035:2017 + A11:2020 EN 61000-4-2:2009, Ed.2.0	PASS
Radiated RF Disturbance Immunity	ETSI EN 301 489-01:V2.2.3 ETSI EN 301 489-03:V2.1.1 ETSI EN 301 489-17:V3.2.4 EN 55035:2017 + A11:2020 EN 61000-4-3:2020, Ed.4.0	PASS
Electric Fast Transients Immunity	ETSI EN 301 489-01:V2.2.3 ETSI EN 301 489-03:V2.1.1 ETSI EN 301 489-17:V3.2.4 EN 55035:2017 + A11:2020 EN 61000-4-4:2012, Ed.3.0	PASS
Surge Immunity	ETSI EN 301 489-01:V2.2.3 ETSI EN 301 489-03:V2.1.1 ETSI EN 301 489-17:V3.2.4 EN 55035:2017 + A11:2020 EN 61000-4-5:2017, Ed.3.1	PASS
Conducted RF Disturbance Immunity	ETSI EN 301 489-01:V2.2.3 ETSI EN 301 489-03:V2.1.1 ETSI EN 301 489-17:V3.2.4 EN 55035:2017 + A11:2020 EN 61000-4-6:2014, Ed.4.0	PASS
Power Frequency Magnetic Field Immunity	EN 55035:2017 + A11:2020 EN 61000-4-8:2010, Ed.2.0	PASS
Voltage Dips and Interruptions Immunity	ETSI EN 301 489-01:V2.2.3 ETSI EN 301 489-03:V2.1.1 ETSI EN 301 489-17:V3.2.4 EN 55035:2017 + A11:2020 EN IEC 61000-4-11:2020, Ed.3.0	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)

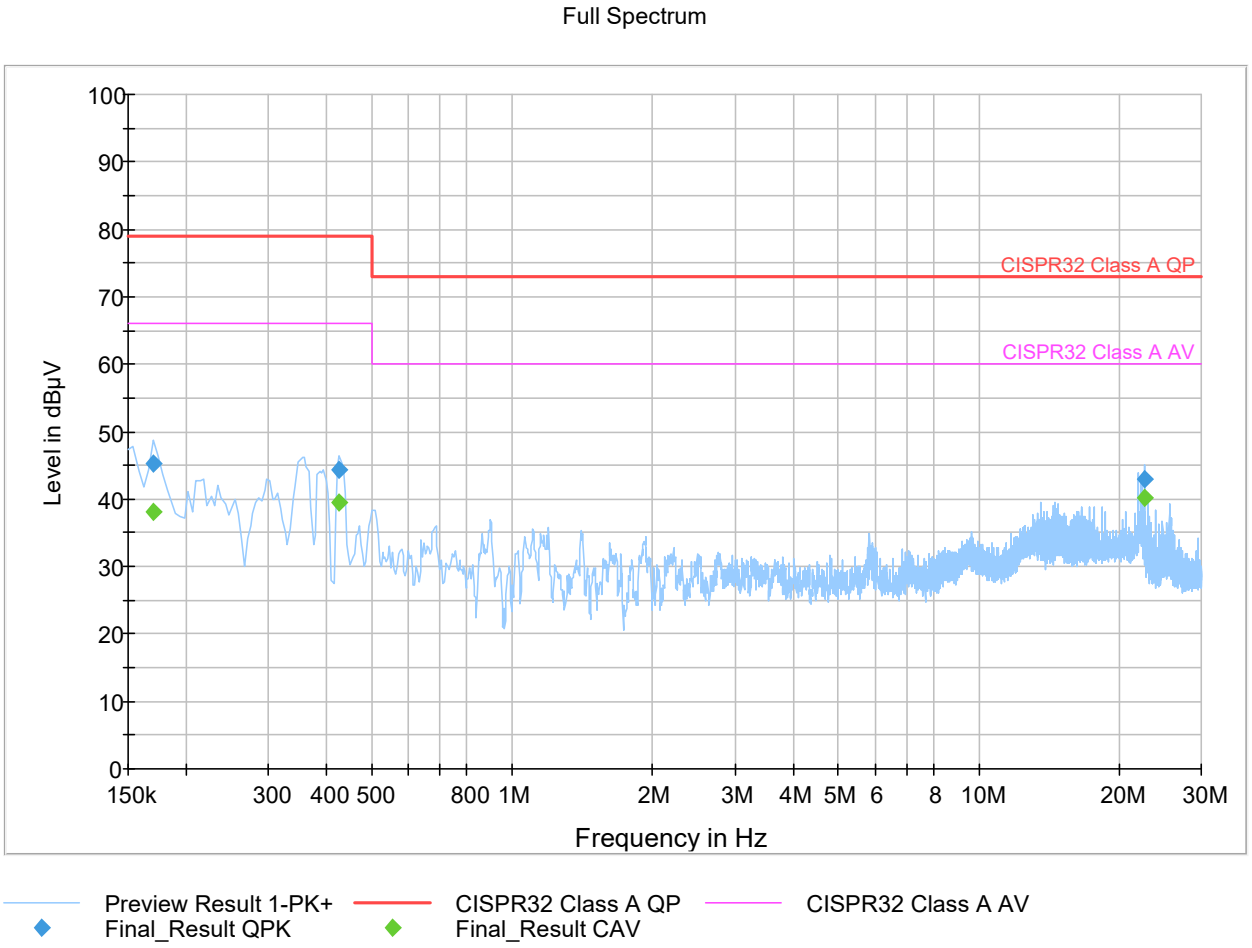
Instruments used during measurement

Instrument list: AMN: R&S / ENV216 (N-4775) (04/2022)
EMI Receiver: R&S / ESR 7 (N-4757) (01/2023)

Conformity

Verdict:	PASS
Test engineer:	CB

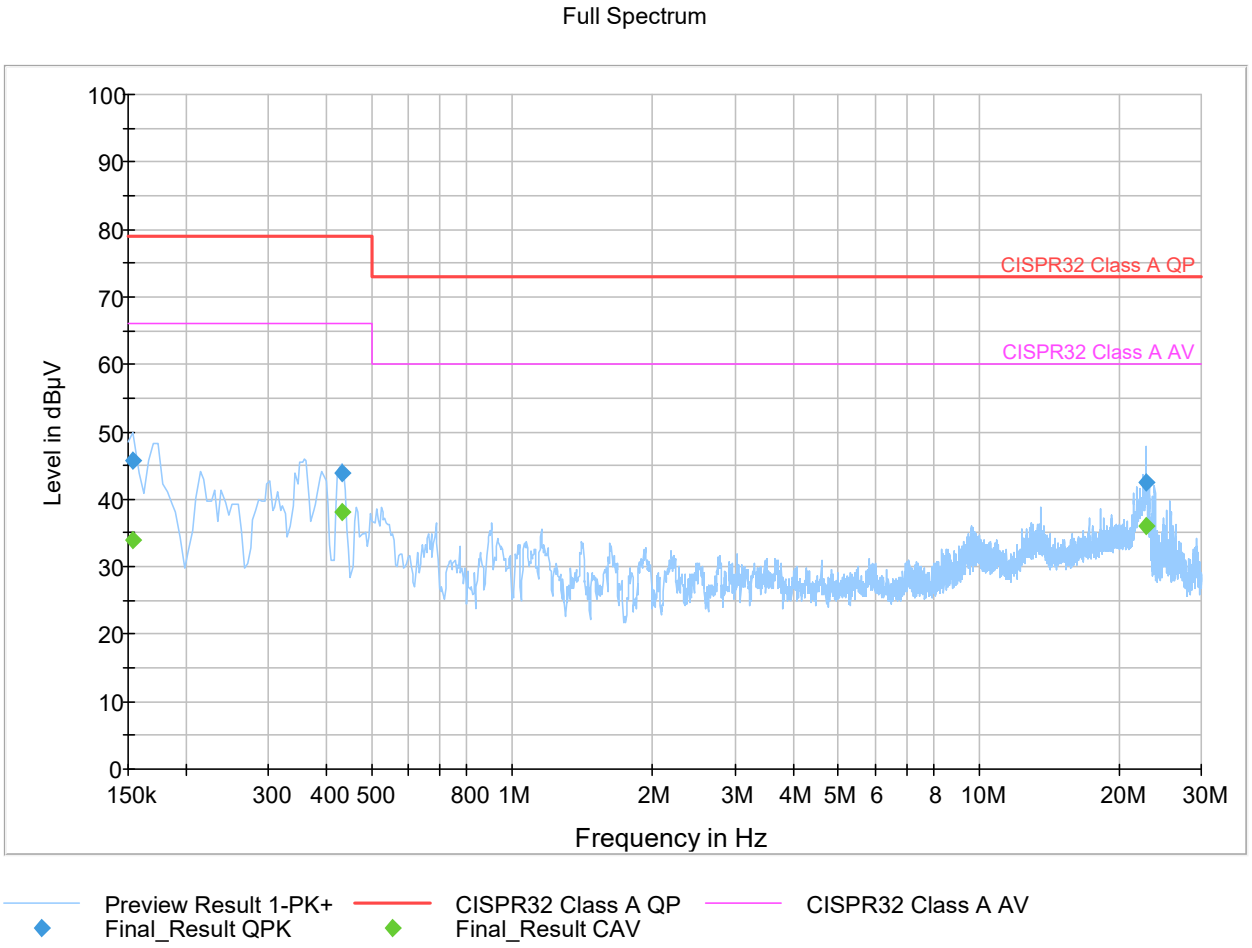
EMISSION SPECTRUM – 100VAC60HZ, CISPR LIMITS



MEASUREMENT DATA

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.170000	45.20	---	79.00	33.80	1000.0	9.000	L1	OFF	10.0
0.170000	---	38.10	66.00	27.90	1000.0	9.000	L1	OFF	10.0
0.426000	44.39	---	79.00	34.61	1000.0	9.000	L1	OFF	10.0
0.426000	---	39.42	66.00	26.58	1000.0	9.000	L1	OFF	10.0
22.670000	42.91	---	73.00	30.09	1000.0	9.000	N	OFF	10.3
22.670000	---	40.09	60.00	19.91	1000.0	9.000	N	OFF	10.3

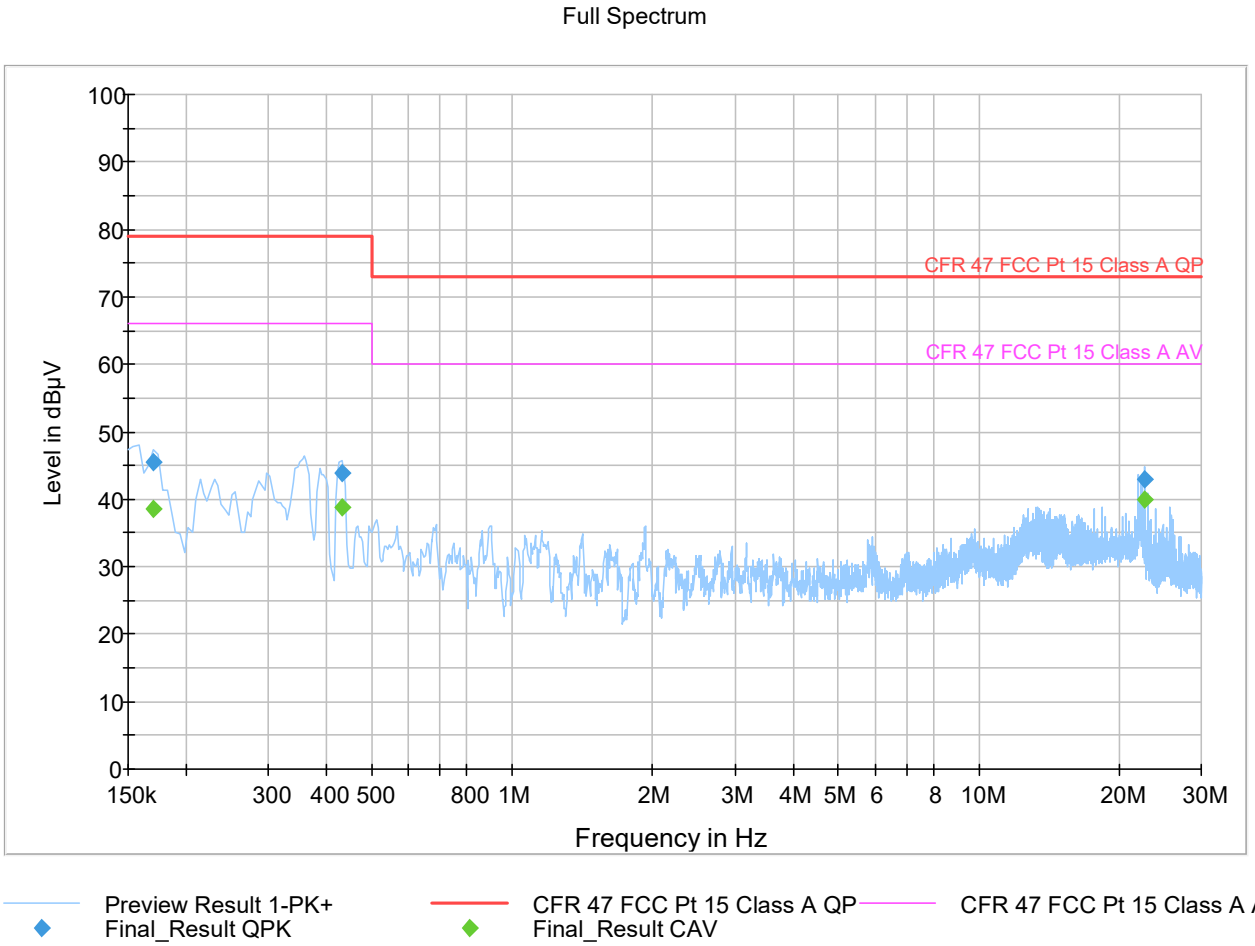
EMISSION SPECTRUM – 240VAC50HZ, CISPR LIMITS



MEASUREMENT DATA

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.154000	45.64	---	79.00	33.36	1000.0	9.000	L1	OFF	10.0
0.154000	---	33.85	66.00	32.15	1000.0	9.000	L1	OFF	10.0
0.430000	43.78	---	79.00	35.22	1000.0	9.000	N	OFF	10.0
0.430000	---	38.00	66.00	28.00	1000.0	9.000	N	OFF	10.0
22.862000	42.38	---	73.00	30.62	1000.0	9.000	N	OFF	10.3
22.862000	---	36.04	60.00	23.96	1000.0	9.000	N	OFF	10.3

EMISSION SPECTRUM – 115VAC60HZ, FCC LIMITS



MEASUREMENT DATA

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.170000	45.56	---	79.00	33.44	1000.0	9.000	N	OFF	10.0
0.170000	---	38.61	66.00	27.39	1000.0	9.000	N	OFF	10.0
0.430000	---	38.78	66.00	27.22	1000.0	9.000	L1	OFF	10.0
0.430000	43.96	---	79.00	35.04	1000.0	9.000	L1	OFF	10.0
22.678000	---	39.98	60.00	20.02	1000.0	9.000	L1	OFF	10.3
22.678000	42.92	---	73.00	30.08	1000.0	9.000	L1	OFF	10.3

CONDUCTED EMISSIONS (TELECOM TERMINAL)

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 above floor.

The specimen was connected to an Artificial Mains Network (AMN) by its power supply cable, which was adjusted to 100cm length by folding.

A T-ISN was placed on the reference ground plane and the telecom cable from the specimen was connected via the T-ISN to the auxiliary equipment. The length of the telecom cable between specimen and T-ISN was 100 cm.

Transmission speeds investigated:
☐ 10BaseT Ethernet.
☐ 100BaseT Ethernet.
☒ 1000BaseT Ethernet.

Measurement methods used:
☒ ISN-T method (unshielded)
☐ ISN-ST method (shielded)
☐ Current probe method
☐ Capacitive voltage probe method

Conditions
☒ Frequency range was 150 kHz – 30 MHz.

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: ± 4.6 dB (ISN-Cat5 method); ± 5.0 dB (ISN-Cat6 method); ± 3.4 dB (ISN-S method); ± 2.7 dB (Current probe method); ± 3.7 dB (CVP method)

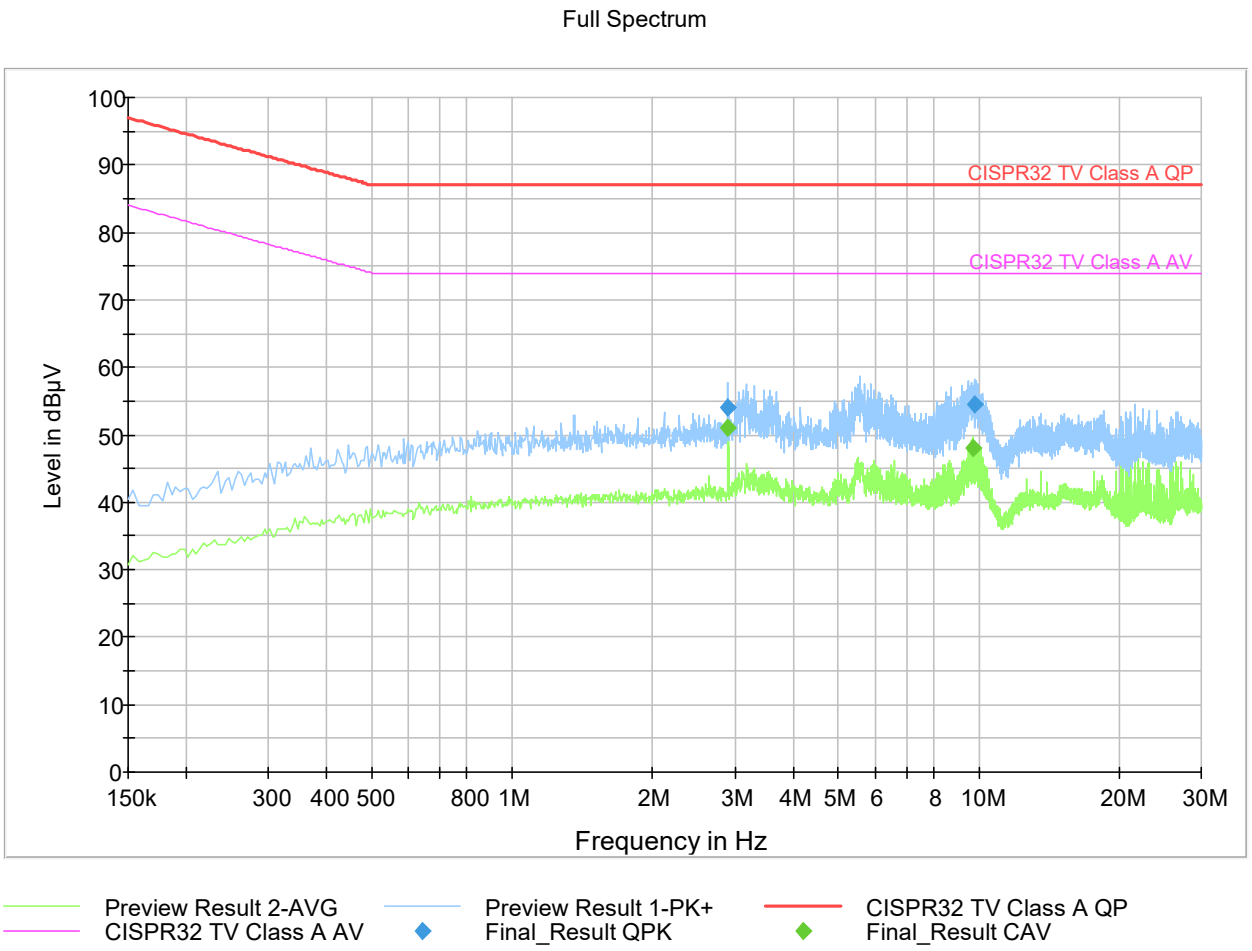
Instruments used during measurement

Instrument list: EMI Receiver: R&S / ESR 7 (N-4757) (01/2023)
ISN: Teseq / ISN T8-Cat6 (N-4404) (03/2022)

Conformity

Verdict:	PASS
Test engineer:	CB

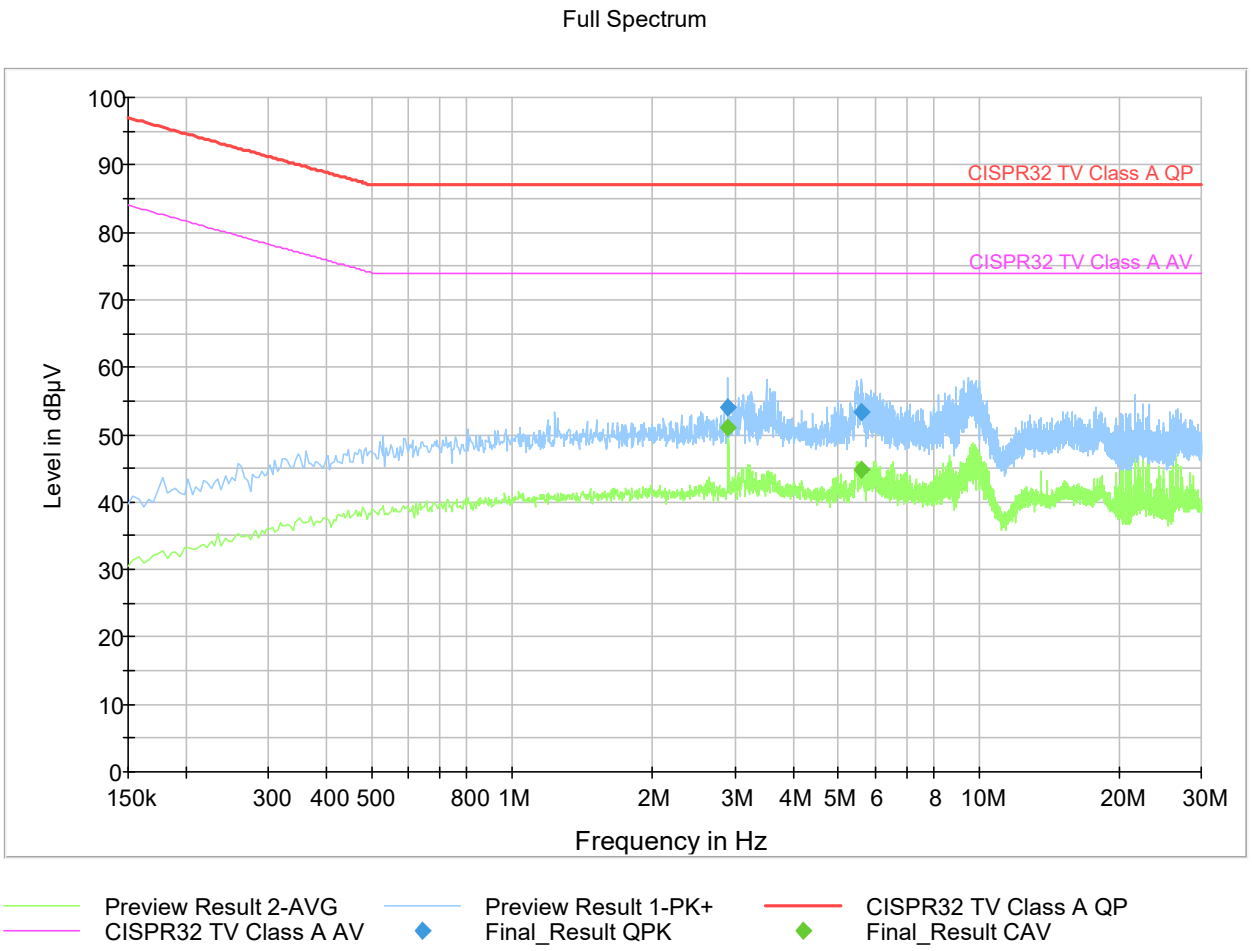
EMISSION SPECTRUM, LAN PORT – 100VAC60HZ, CISPR LIMITS



MEASUREMENTS DATA

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
2.894250	53.97	---	87.00	33.03	1000.0	9.000	Telecom line	9.6
2.902050	---	50.96	74.00	23.04	1000.0	9.000	Telecom line	9.6
9.729000	---	47.99	74.00	26.01	1000.0	9.000	Telecom line	9.7
9.780200	54.47	---	87.00	32.53	1000.0	9.000	Telecom line	9.7

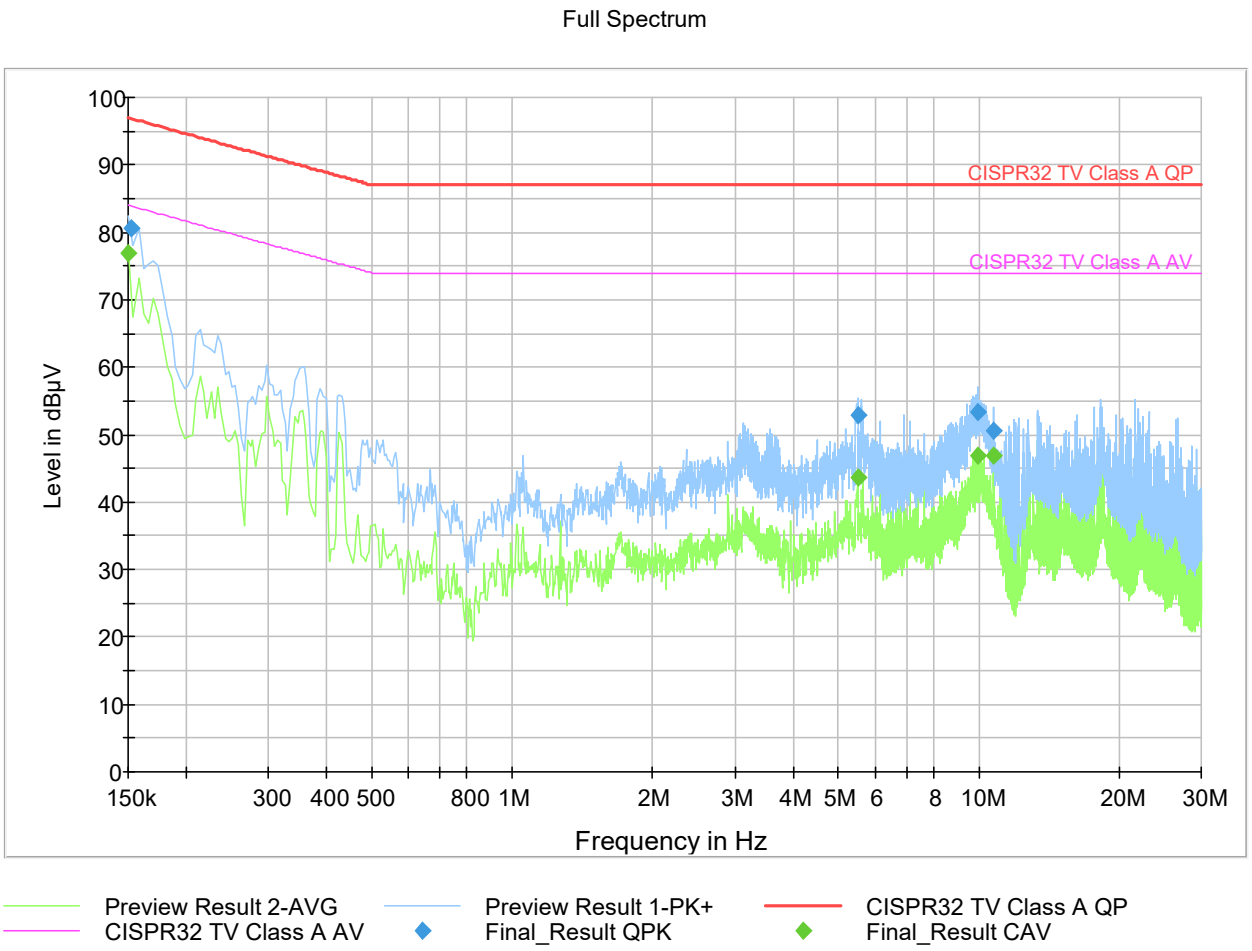
EMISSION SPECTRUM, LAN PORT – 240VAC50HZ, CISPR LIMITS



MEASUREMENTS DATA

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
2.896000	54.13	---	87.00	32.87	1000.0	9.000	Telecom line	9.6
2.902350	---	50.95	74.00	23.05	1000.0	9.000	Telecom line	9.6
5.599900	53.25	---	87.00	33.75	1000.0	9.000	Telecom line	9.6
5.620450	---	44.91	74.00	29.09	1000.0	9.000	Telecom line	9.6

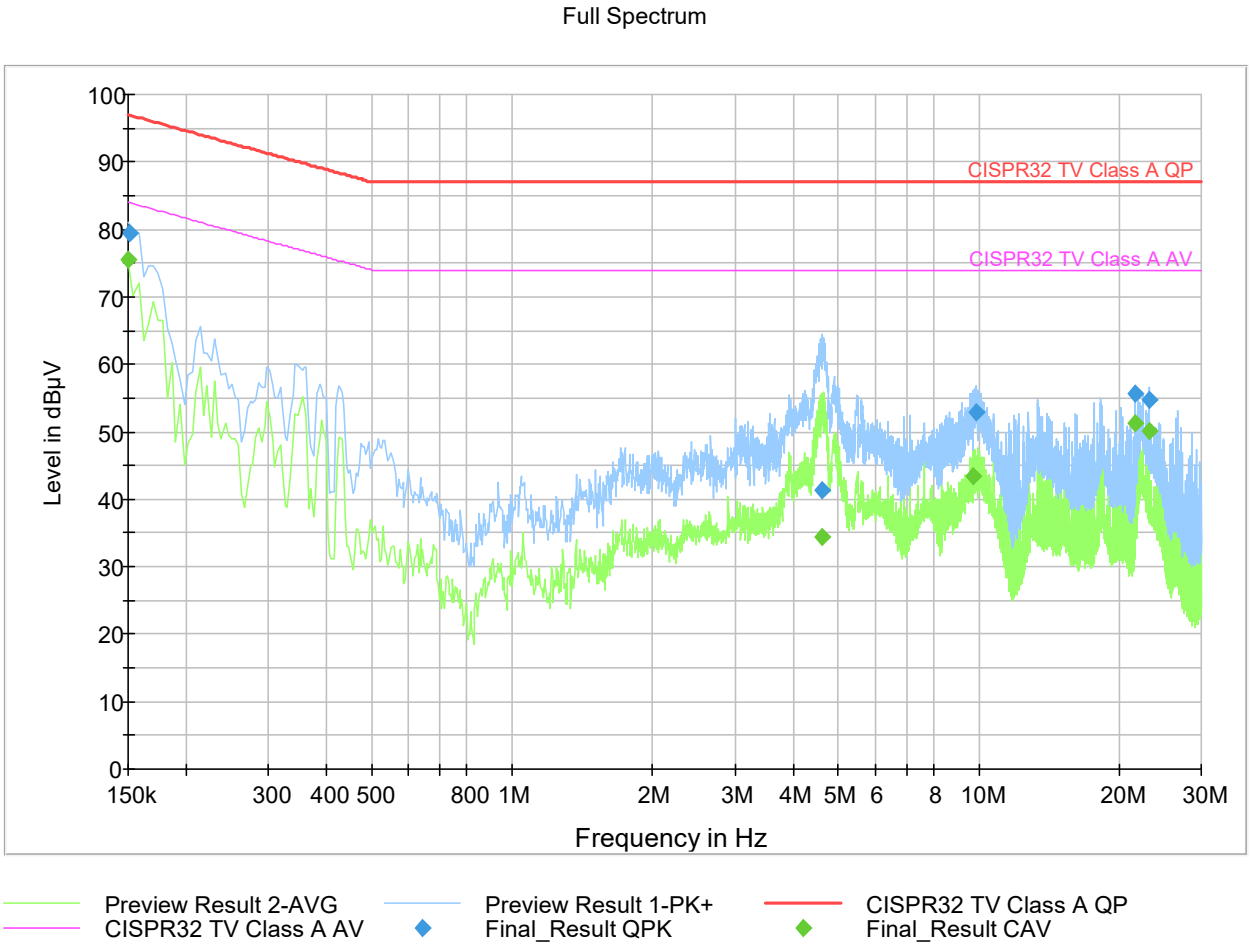
EMISSION SPECTRUM, POE PORT – 100VAC60HZ, CISPR LIMITS



MEASUREMENTS DATA

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.150150	---	76.92	83.99	7.07	1000.0	9.000	Telecom line	9.5
0.151800	80.71	---	96.90	16.19	1000.0	9.000	Telecom line	9.5
5.498900	---	43.74	74.00	30.26	1000.0	9.000	Telecom line	9.6
5.499900	52.89	---	87.00	34.11	1000.0	9.000	Telecom line	9.6
9.938500	53.33	---	87.00	33.67	1000.0	9.000	Telecom line	9.7
9.938500	---	46.90	74.00	27.10	1000.0	9.000	Telecom line	9.7
10.793400	50.56	---	87.00	36.44	1000.0	9.000	Telecom line	9.7
10.793450	---	46.80	74.00	27.20	1000.0	9.000	Telecom line	9.7

EMISSION SPECTRUM, POE PORT – 240VAC50HZ, CISPR LIMITS



MEASUREMENTS DATA

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.150000	---	75.45	84.00	8.55	1000.0	9.000	Telecom line	9.5
0.151300	79.49	---	96.93	17.44	1000.0	9.000	Telecom line	9.5
4.618250	41.45	---	87.00	45.55	1000.0	9.000	Telecom line	9.6
4.623400	---	34.38	74.00	39.62	1000.0	9.000	Telecom line	9.6
9.756750	---	43.44	74.00	30.56	1000.0	9.000	Telecom line	9.7
9.906300	52.80	---	87.00	34.20	1000.0	9.000	Telecom line	9.7
21.662250	55.60	---	87.00	31.40	1000.0	9.000	Telecom line	9.8
21.662250	---	51.27	74.00	22.73	1000.0	9.000	Telecom line	9.8
23.128750	---	50.06	74.00	23.94	1000.0	9.000	Telecom line	9.8
23.128750	54.73	---	87.00	32.27	1000.0	9.000	Telecom line	9.8

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 = 0-360º.

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

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

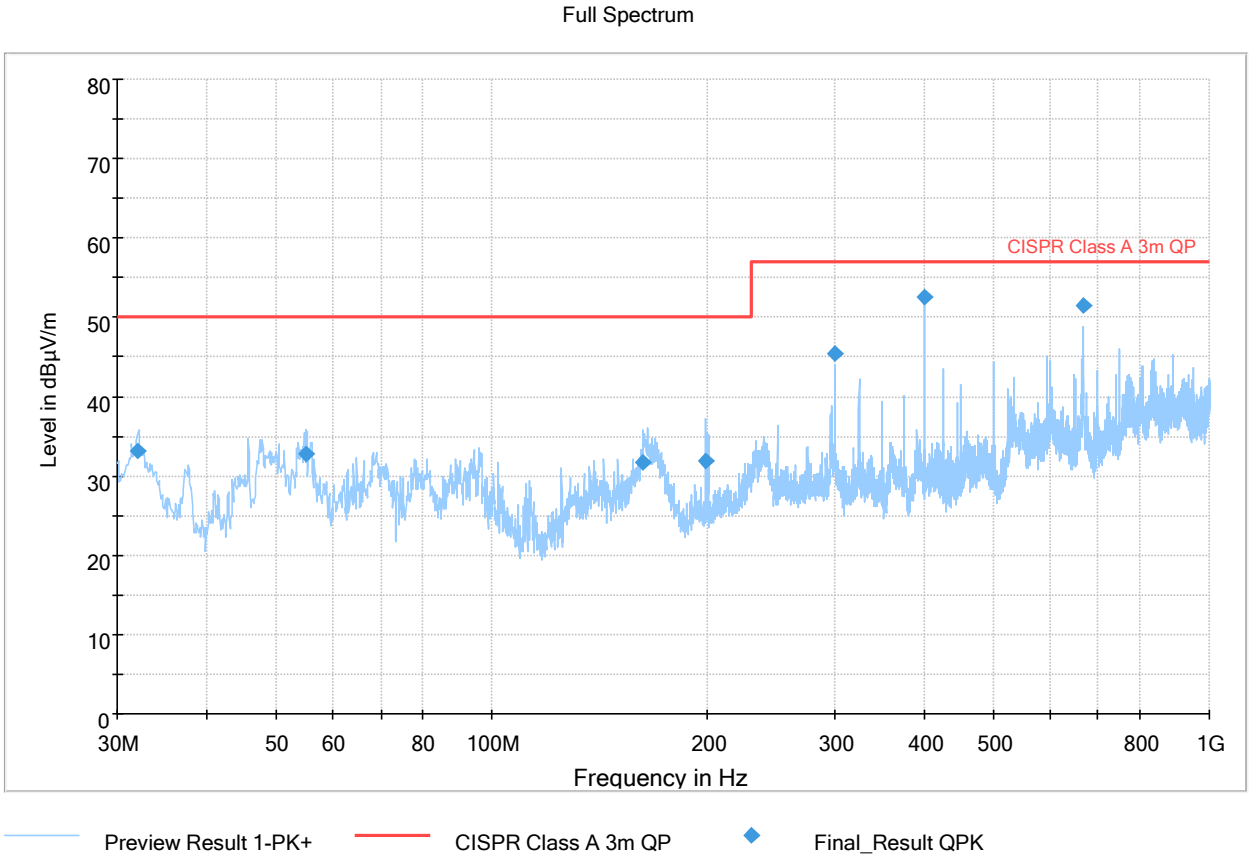
Instrument list:
Antenna, bilog: Sunar / JB1 (N-4839) (05/2023)
EMI Receiver: R&S / ESR26 (N-4871) (01/2023)
Preamplifier: Sonoma / 317 (N-4955) (09/2022)

Antenna, bilog: Sunol / JB3 (N-4525) (03/2024)
Antenna, bilog: Schwarzbeck / VULB 9163 (LR-1616) (05/2023)
EMI Receiver: R&S / ESU40 (LR-1639) (01/2023)
Preamplifier: Sonoma / 310N (LR-1686) (08/2022)

Conformity

Verdict:	PASS
Test engineer:	KO/ CB

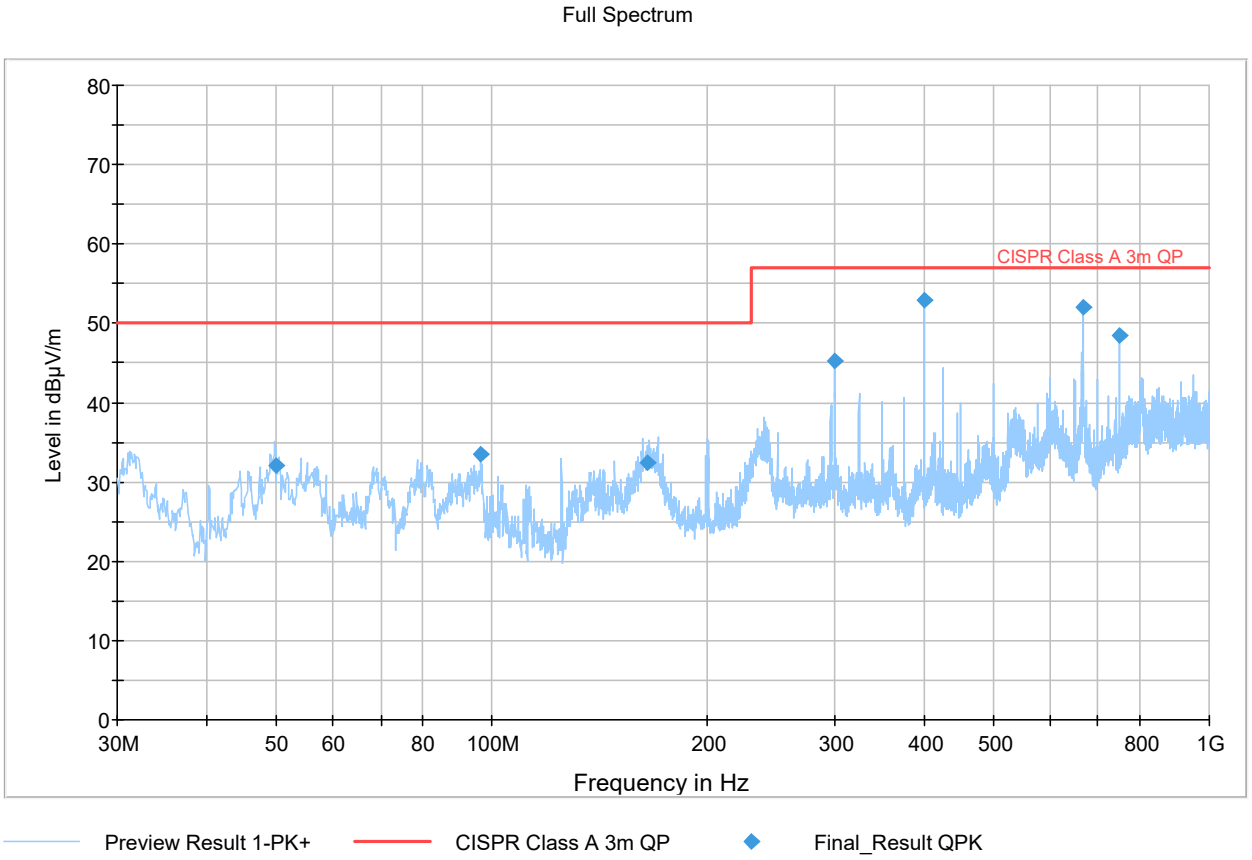
EMISSION SPECTRUM – 100VAC60HZ, CISPR LIMITS



MEASUREMENTS DATA

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
32.047294	33.10	50.00	16.90	15000.0	120.000	137.0	V	192.0	-12.8
55.066752	32.71	50.00	17.29	15000.0	120.000	145.0	V	28.0	-23.5
162.474856	31.78	50.00	18.22	15000.0	120.000	300.0	H	183.0	-19.0
198.660214	31.89	50.00	18.11	15000.0	120.000	132.0	V	279.0	-18.6
300.004676	45.45	57.00	11.55	15000.0	120.000	146.0	H	262.0	-17.1
400.006384	52.55	57.00	4.45	15000.0	120.000	100.0	H	9.0	-14.6
666.245068	51.53	57.00	5.47	15000.0	120.000	281.0	H	0.0	-9.8

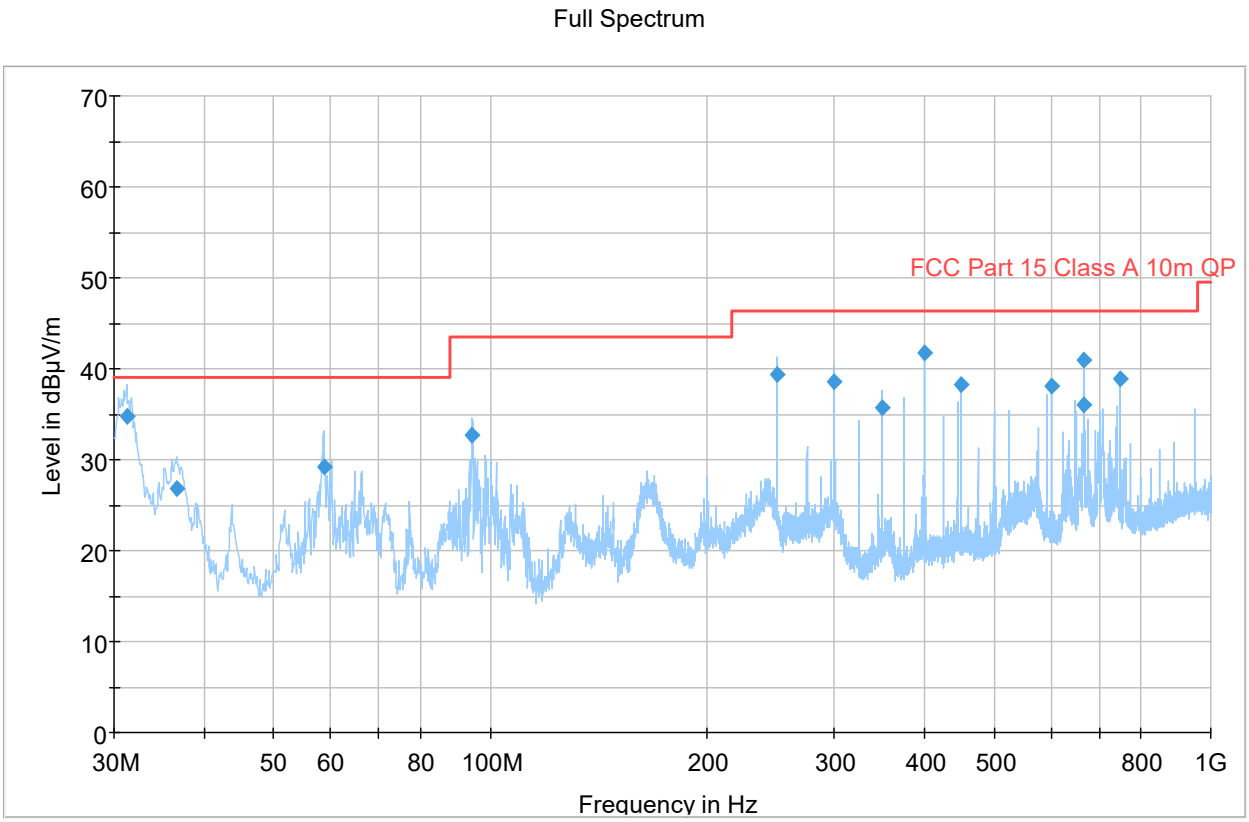
EMISSION SPECTRUM – 240VAC50HZ, CISPR LIMITS



MEASUREMENTS DATA

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
49.873752	32.07	50.00	17.93	15000.0	120.000	100.0	V	319.0	-22.0
96.314504	33.58	50.00	16.42	15000.0	120.000	364.0	H	148.0	-21.8
164.892152	32.41	50.00	17.59	15000.0	120.000	383.0	H	168.0	-19.1
300.004100	45.28	57.00	11.72	15000.0	120.000	150.0	H	261.0	-17.1
400.006870	53.01	57.00	3.99	15000.0	120.000	138.0	H	4.0	-14.6
666.246562	52.03	57.00	4.97	15000.0	120.000	250.0	H	10.0	-9.8
750.013828	48.54	57.00	8.46	15000.0	120.000	251.0	H	341.0	-8.5

EMISSION SPECTRUM – 115VAC60HZ, FCC LIMITS



MEASUREMENTS DATA

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
31.291708	34.80	39.10	4.30	15000.0	120.000	150.0	V	39.0	-15.7
36.658964	26.90	39.10	12.20	15000.0	120.000	150.0	V	3.0	-14.2
58.788896	29.23	39.10	9.87	15000.0	120.000	150.0	V	82.0	-13.5
94.357728	32.77	43.50	10.73	15000.0	120.000	141.0	V	69.0	-15.2
250.001202	39.40	46.40	7.00	15000.0	120.000	384.0	H	246.0	-12.0
300.004280	38.64	46.40	7.76	15000.0	120.000	100.0	V	217.0	-10.4
350.003864	35.66	46.40	10.74	15000.0	120.000	300.0	H	233.0	-9.1
400.005286	41.73	46.40	4.67	15000.0	120.000	112.0	V	11.0	-7.9
450.005500	38.25	46.40	8.15	15000.0	120.000	232.0	H	230.0	-7.0
600.010788	38.03	46.40	8.37	15000.0	120.000	150.0	H	316.0	-3.5
665.704538	36.03	46.40	10.37	15000.0	120.000	266.0	V	209.0	-2.9
666.242242	41.01	46.40	5.39	15000.0	120.000	385.0	V	214.0	-2.9
750.013036	38.85	46.40	7.55	15000.0	120.000	107.0	H	234.0	-1.8

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 = 0-360º.

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
☐ 1-12 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

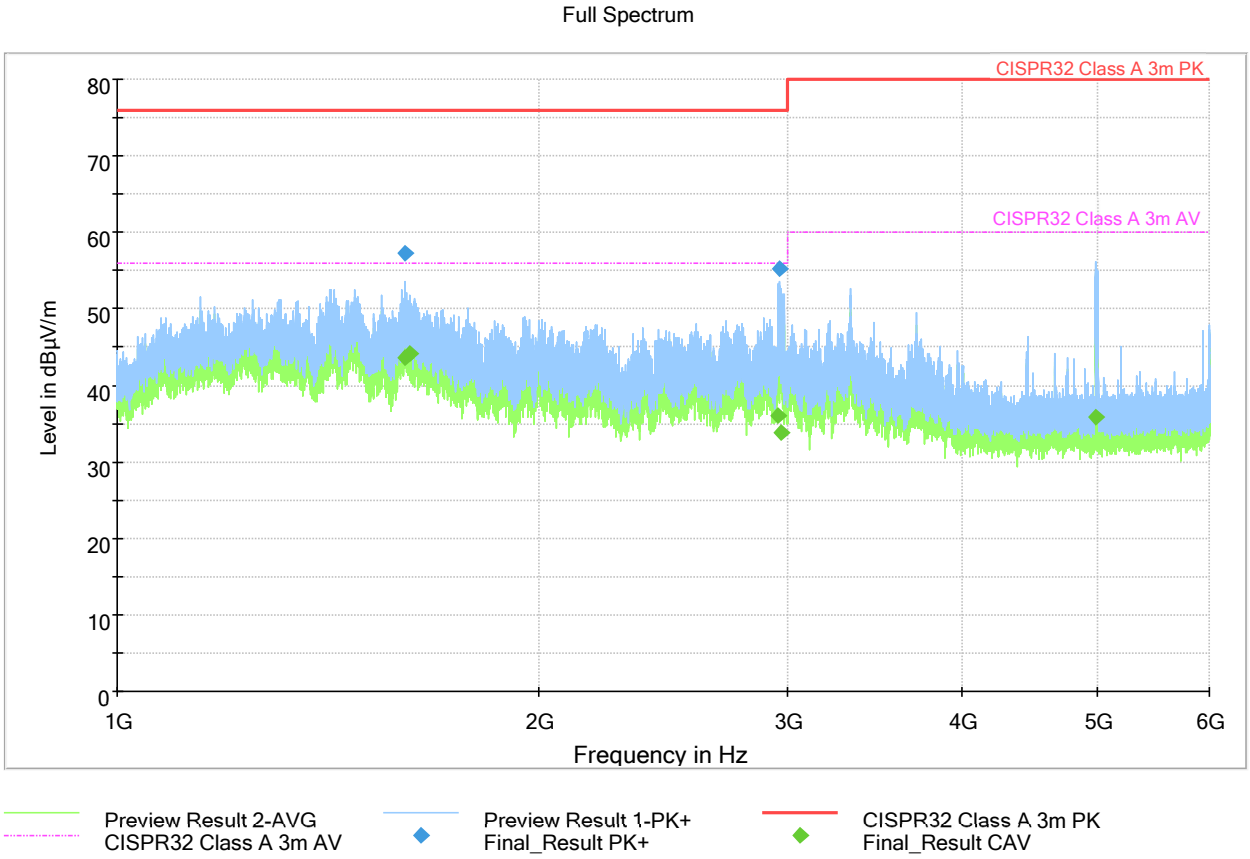
Instrument list:
Antenna Horn: R&S / HF907 (N-4885) (06/2025)
EMI Receiver: R&S / ESU40 (LR-1639) (01/2023)
Preamplifier: Schwarzbeck / BBV 9718 C (N-4945) (02/2023)

Antenna Horn: ETS / 3117 (LR-1717) (12/2022)
EMI Receiver: R&S / ESR26 (N-4871) (01/2023)
Preamplifier: ETS / 3117-PA (LR-1757) (08/2024)

Conformity

Verdict:	PASS
Test engineer:	KO / CB

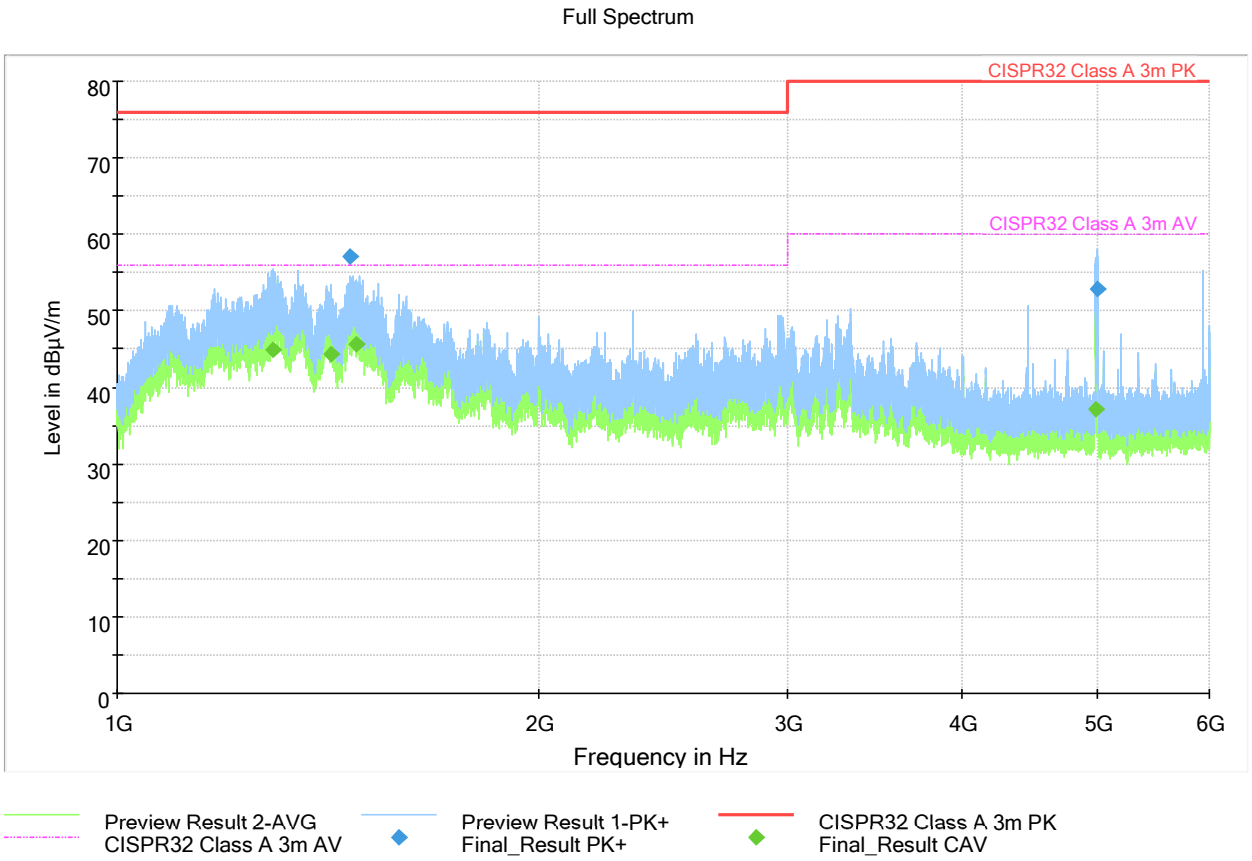
EMISSION SPECTRUM (HORIZONTAL POLARIZATION) – 100VAC60HZ, CISPR LIMITS



MEASUREMENTS DATA

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Azimuth (deg)	Corr. (dB/m)
1604.026240	57.32	---	76.00	18.68	1000.0	1000.000	H	208.0	-5.3
1604.200000	---	43.52	56.00	12.48	1000.0	1000.000	H	210.0	-5.3
1615.700000	---	44.09	56.00	11.91	1000.0	1000.000	H	215.0	-5.2
2960.200000	---	35.95	56.00	20.05	1000.0	1000.000	H	254.0	0.5
2961.740160	55.21	---	76.00	20.79	1000.0	1000.000	H	255.0	0.5
2973.300000	---	33.84	56.00	22.16	1000.0	1000.000	H	239.0	0.6
4977.100000	---	35.83	60.00	24.17	1000.0	1000.000	H	165.0	5.6

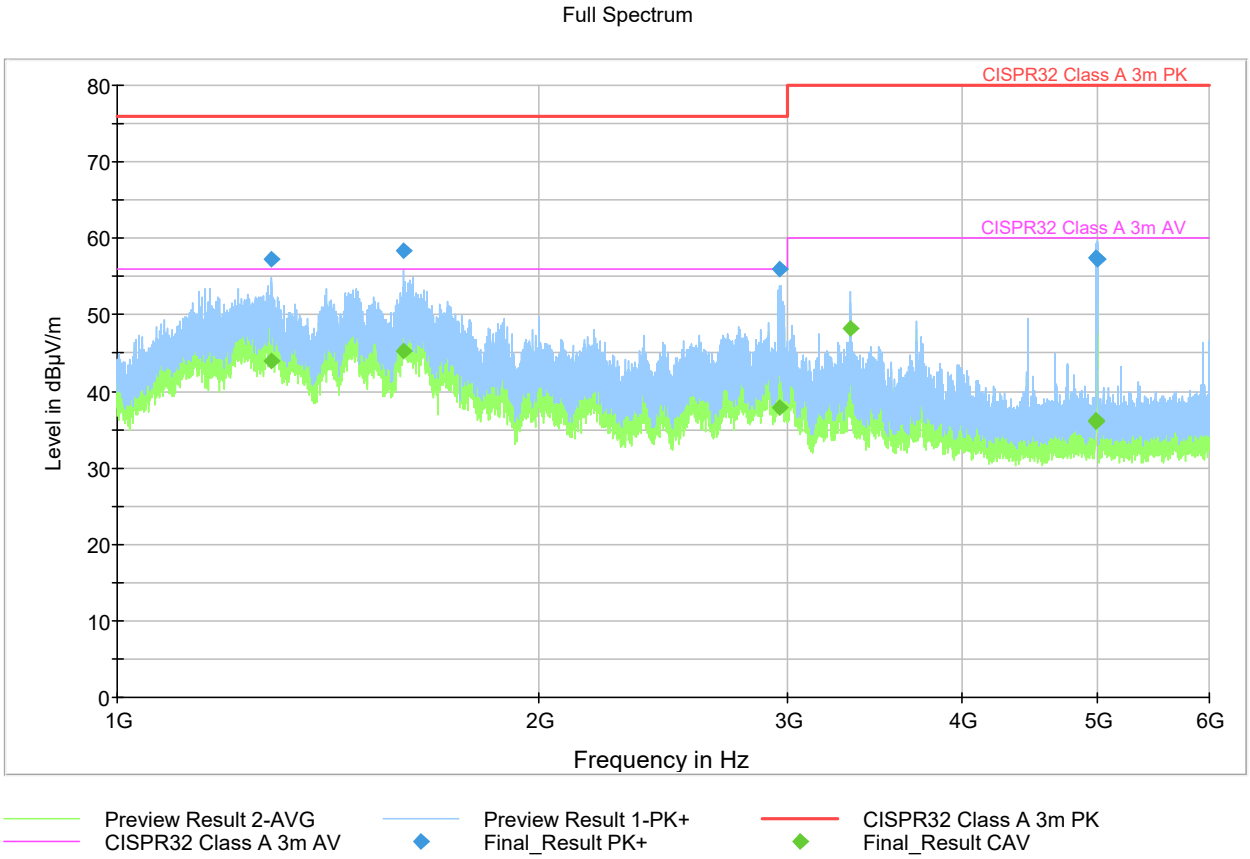
EMISSION SPECTRUM (VERTICAL POLARIZATION) – 100VAC60HZ, CISPR LIMITS



MEASUREMENTS DATA

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Azimuth (deg)	Corr. (dB/m)
1290.100000	---	44.93	56.00	11.07	1000.0	1000.000	V	171.0	-7.3
1419.600000	---	44.37	56.00	11.63	1000.0	1000.000	V	188.0	-6.4
1465.867840	57.18	---	76.00	18.82	1000.0	1000.000	V	179.0	-6.0
1481.400000	---	45.60	56.00	10.40	1000.0	1000.000	V	188.0	-5.9
4987.500000	---	37.15	60.00	22.85	1000.0	1000.000	V	14.0	5.7
5000.493280	52.90	---	80.00	27.10	1000.0	1000.000	V	19.0	5.7

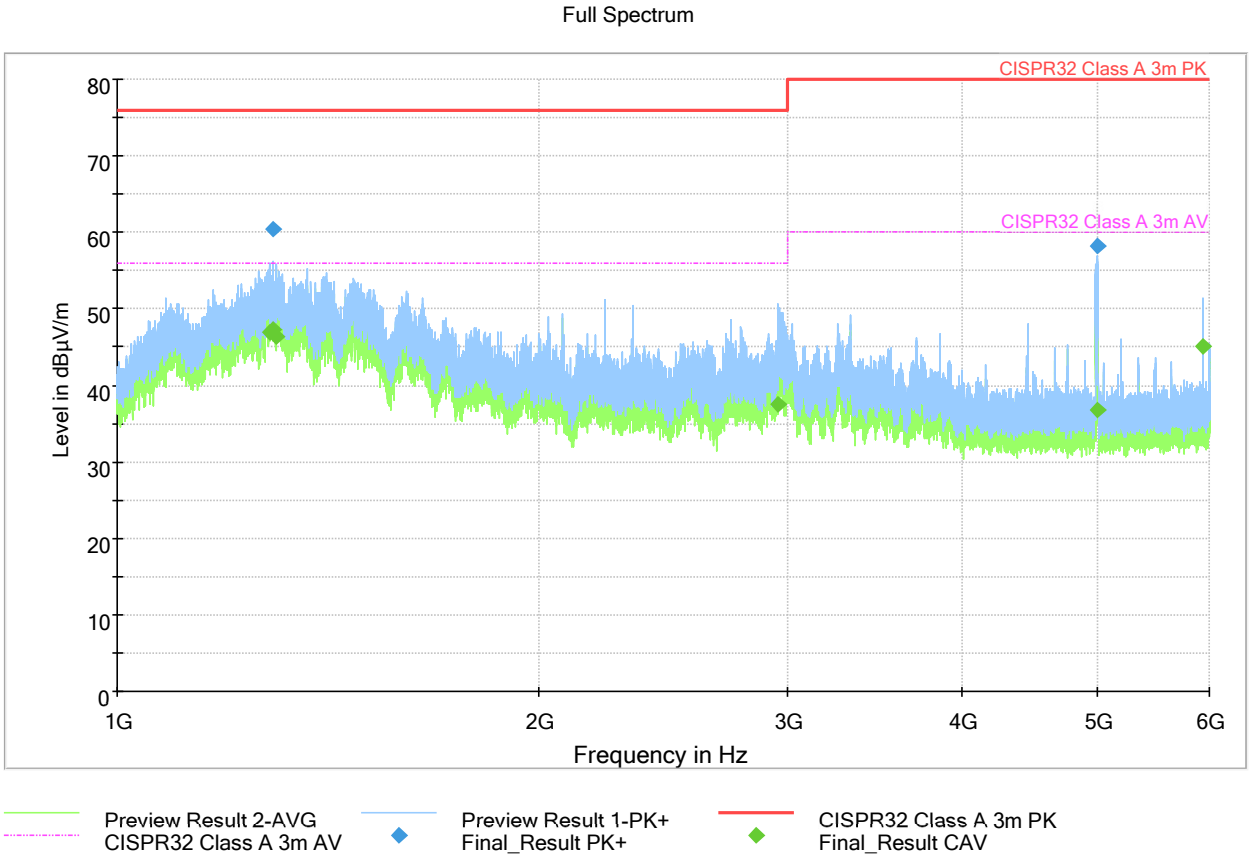
EMISSION SPECTRUM (HORIZONTAL POLARIZATION) – 240VAC50HZ, CISPR LIMITS



MEASUREMENTS DATA

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Azimuth (deg)	Corr. (dB/m)
1288.200000	---	43.96	56.00	12.04	1000.0	1000.000	H	49.0	-7.3
1289.376640	57.32	---	76.00	18.68	1000.0	1000.000	H	50.0	-7.3
1599.460000	58.34	---	76.00	17.67	1000.0	1000.000	H	208.0	-5.3
1599.700000	---	45.19	56.00	10.81	1000.0	1000.000	H	208.0	-5.3
2966.160000	55.96	---	76.00	20.04	1000.0	1000.000	H	246.0	0.5
2966.400000	---	37.82	56.00	18.18	1000.0	1000.000	H	246.0	0.5
3331.200000	---	48.17	60.00	11.84	1000.0	1000.000	H	253.0	1.7
4977.400000	---	36.17	60.00	23.83	1000.0	1000.000	H	227.0	5.6
4977.694400	57.50	---	80.00	22.50	1000.0	1000.000	H	227.0	5.6
4983.000000	---	36.05	60.00	23.95	1000.0	1000.000	H	227.0	5.7
4991.260640	57.34	---	80.00	22.66	1000.0	1000.000	H	41.0	5.7

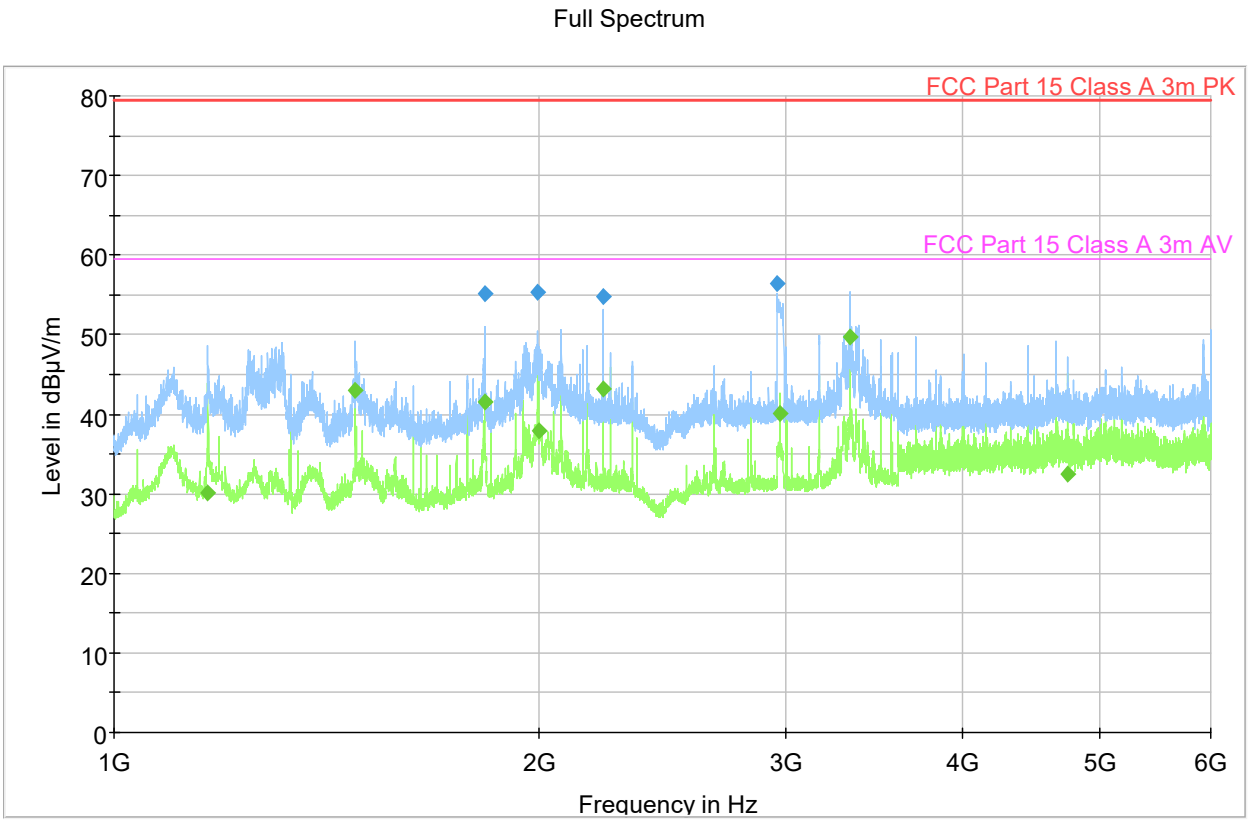
EMISSION SPECTRUM (VERTICAL POLARIZATION) – 240VAC50HZ, CISPR LIMITS



MEASUREMENTS DATA

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Azimuth (deg)	Corr. (dB/m)
1283.000000	---	46.96	56.00	9.04	1000.0	1000.000	V	180.0	-7.4
1290.151200	60.44	---	76.00	15.56	1000.0	1000.000	V	181.0	-7.3
1290.300000	---	47.22	56.00	8.78	1000.0	1000.000	V	181.0	-7.3
1297.500000	---	46.43	56.00	9.57	1000.0	1000.000	V	177.0	-7.2
2958.200000	---	37.60	56.00	18.40	1000.0	1000.000	V	-2.0	0.5
4989.006560	58.22	---	80.00	21.78	1000.0	1000.000	V	172.0	5.7
5000.200000	---	36.70	60.00	23.30	1000.0	1000.000	V	16.0	5.7
5933.500000	---	45.05	60.00	14.95	1000.0	1000.000	V	189.0	7.4

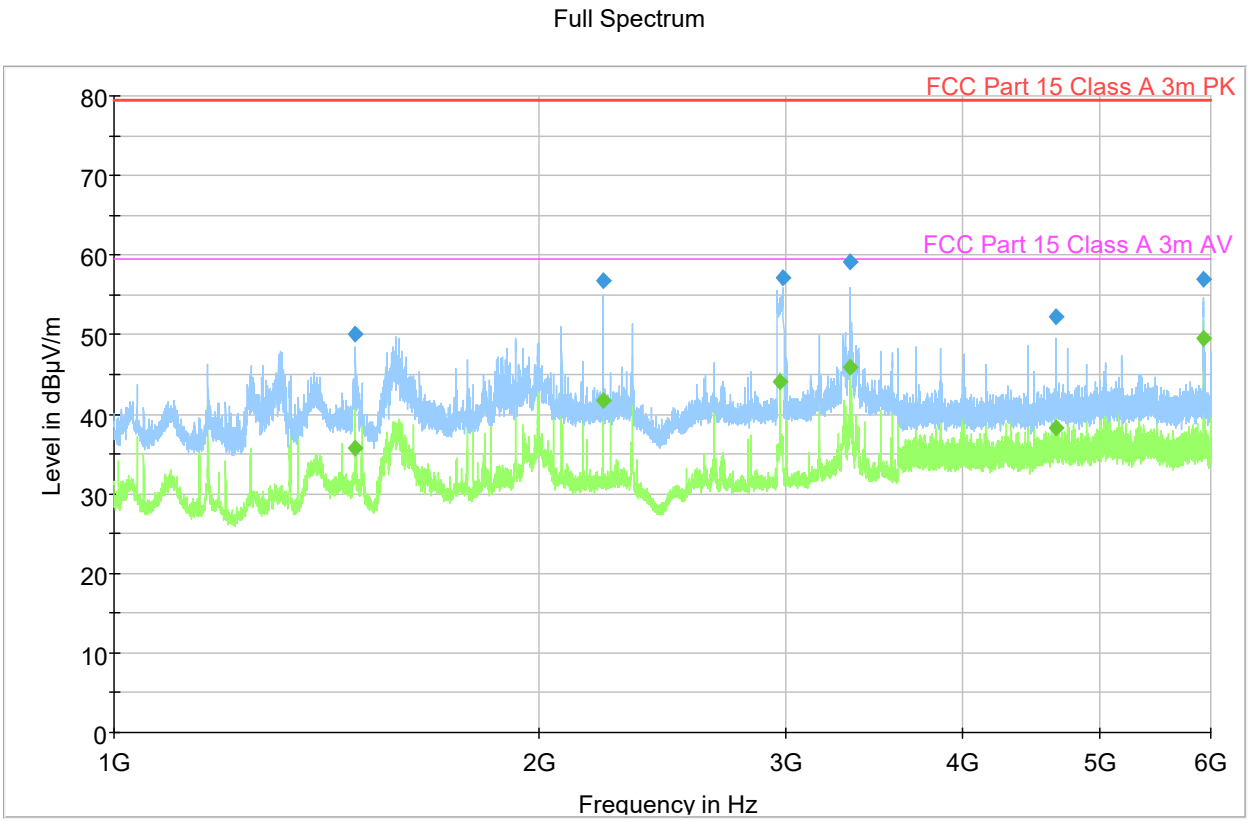
EMISSION SPECTRUM 1-6GHZ (HORIZONTAL POLARIZATION) – 115VAC60HZ, FCC LIMITS



MEASUREMENTS DATA

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1165.750000	---	30.13	59.50	29.37	15000.0	1000.000	100.0	H	315.0	-15.3
1483.250000	---	42.93	59.50	16.57	15000.0	1000.000	100.0	H	315.0	-15.0
1832.000000	---	41.54	59.50	17.96	15000.0	1000.000	100.0	H	315.0	-12.0
1832.184800	55.22	---	79.50	24.28	15000.0	1000.000	100.0	H	292.0	-12.0
1998.715200	55.25	---	79.50	24.25	15000.0	1000.000	100.0	H	305.0	-10.7
2000.000000	---	37.95	59.50	21.55	15000.0	1000.000	100.0	H	315.0	-10.7
2225.202000	54.85	---	79.50	24.65	15000.0	1000.000	100.0	H	315.0	-9.9
2225.250000	---	43.20	59.50	16.30	15000.0	1000.000	100.0	H	315.0	-9.9
2955.463600	56.47	---	79.50	23.03	15000.0	1000.000	100.0	H	312.0	-6.9
2967.000000	---	40.06	59.50	19.44	15000.0	1000.000	100.0	H	315.0	-6.9
3331.250000	---	49.73	59.50	9.77	15000.0	1000.000	100.0	H	315.0	-5.7
4752.000000	---	32.53	59.50	26.97	15000.0	1000.000	100.0	H	315.0	-1.3

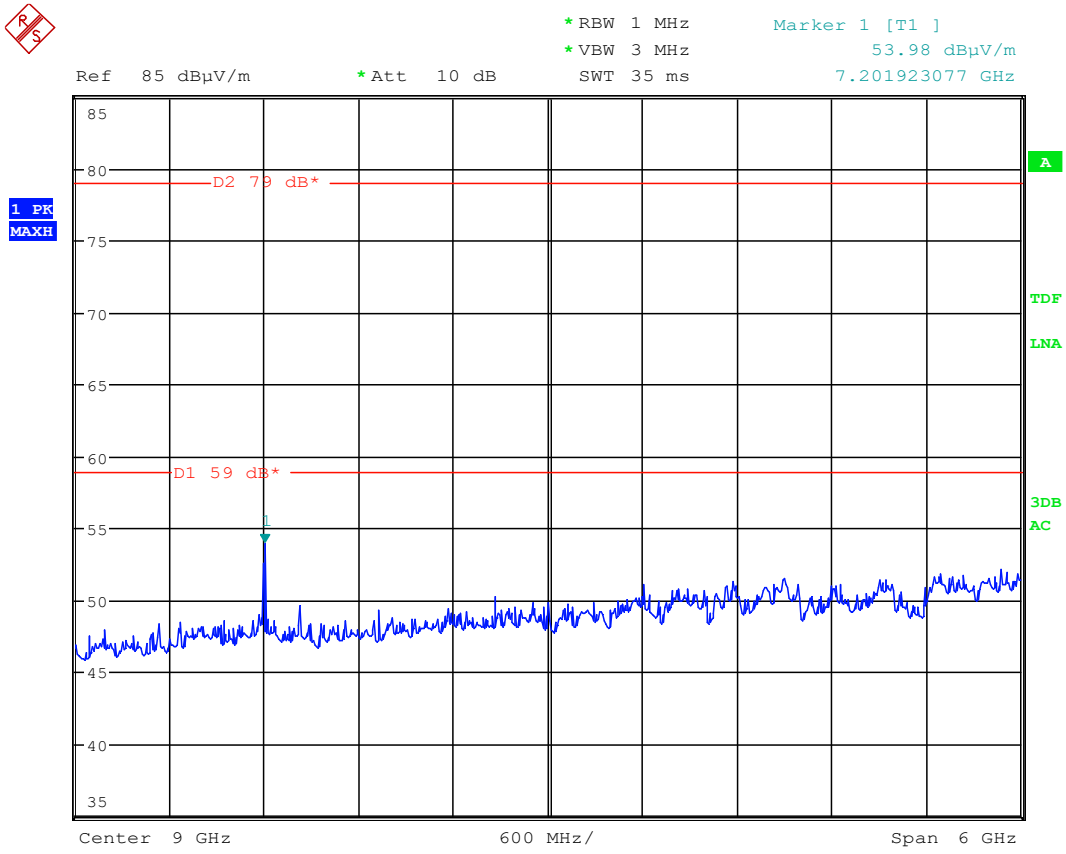
EMISSION SPECTRUM 1-6GHZ (VERTICAL POLARIZATION) – 115VAC60HZ, FCC LIMITS



MEASUREMENTS DATA

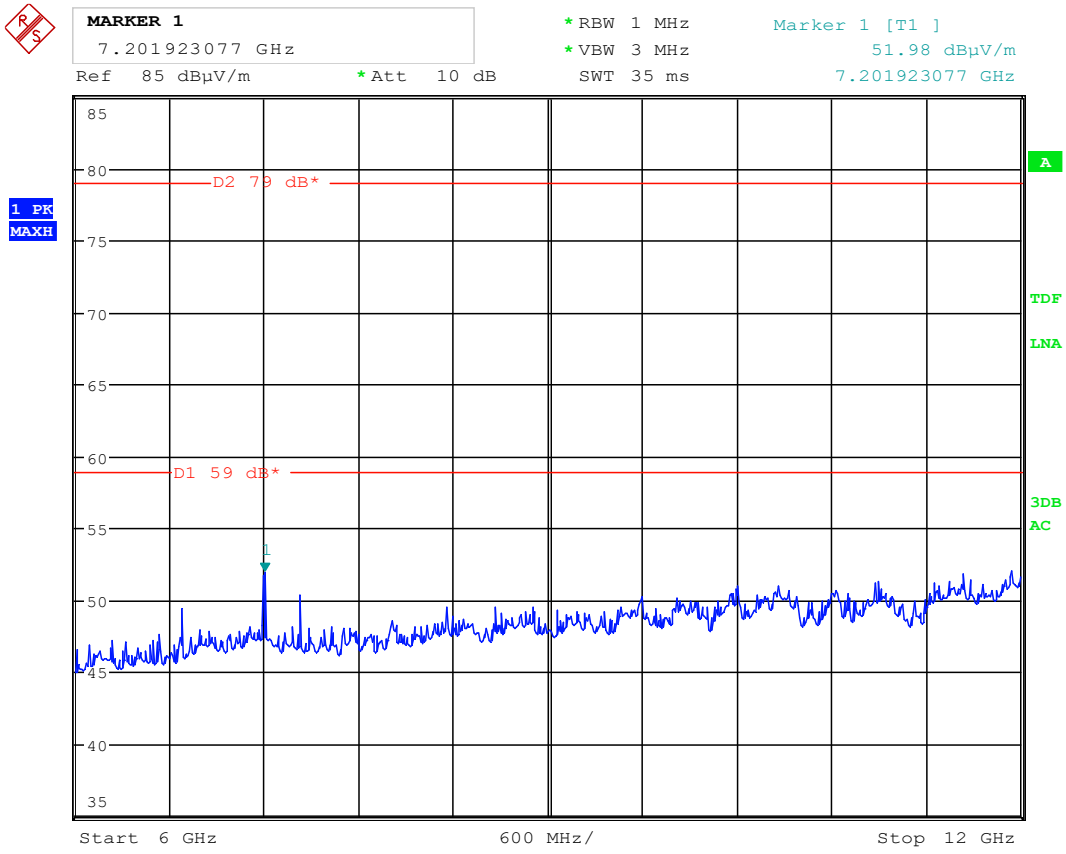
Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1483.250000	---	35.81	59.50	23.69	15000.0	1000.000	100.0	V	352.0	-15.0
1483.554800	50.06	---	79.50	29.44	15000.0	1000.000	100.0	V	218.0	-15.0
2225.250000	---	41.66	59.50	17.84	15000.0	1000.000	100.0	V	352.0	-9.9
2225.305200	56.79	---	79.50	22.71	15000.0	1000.000	100.0	V	144.0	-9.9
2967.000000	---	44.01	59.50	15.49	15000.0	1000.000	100.0	V	352.0	-6.9
2985.014800	57.09	---	79.50	22.41	15000.0	1000.000	100.0	V	286.0	-6.8
3331.222800	59.20	---	79.50	20.30	15000.0	1000.000	100.0	V	353.0	-5.7
3331.250000	---	45.82	59.50	13.68	15000.0	1000.000	100.0	V	352.0	-5.7
4663.726000	52.18	---	79.50	27.32	15000.0	1000.000	100.0	V	298.0	-1.4
4663.750000	---	38.37	59.50	21.13	15000.0	1000.000	100.0	V	352.0	-1.4
5934.000000	---	49.50	59.50	10.00	15000.0	1000.000	100.0	V	352.0	0.0
5934.070800	56.88	---	79.50	22.62	15000.0	1000.000	100.0	V	352.0	0.0

EMISSION SPECTRUM 6-12GHZ(HORIZONTAL POLARIZATION) – 115V AC 60HZ, FCC LIMITS



Date: 27.SEP.2022 15:42:52

EMISSION SPECTRUM 6-12GHZ (VERTICAL POLARIZATION) – 115V AC 60HZ, FCC LIMITS



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HARMONIC CURRENT EMISSIONS

TEST DESCRIPTION

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

Limit Classification
☐ The specimen has rated power of 75W or less, thus no limits are specified in the reference standard.
☒ Class A
☐ Class B
☐ Class C with active input power > 25W
☐ Class C with active input power ≤ 25W
☐ Class C with active input power ≤ 25W (second requirement)
☐ Class D

Set-up
The specimen was connected to the Power Analyser system. A steady and undistorted AC mains was supplied to the specimen from a power supply matrix.

Procedure
10 seconds after the energizing of the specimen, the current harmonics analysis was started and measurements were performed for 2.5 minutes.
Measurements were performed on all active phases at the AC supply port, searching for current harmonics 1st to 40th of the mains frequency (50 Hz or 60 Hz).

Measurement uncertainty (CI15003iX system): ± 6.2 %
Measurement uncertainty (CI10001iX system): ± 6.2 %
Measurement uncertainty (Netwave system): ± 3.1 %

Instruments used during measurement

Instrument list: Power Analyzer: EMTest / DPA 503N (N-4777) (07/2024)
Power Supply: EMTest / NetWave 60.2-400 (N-4776) (04/2024)

Conformity

Verdict:	PASS
Test engineer:	CB

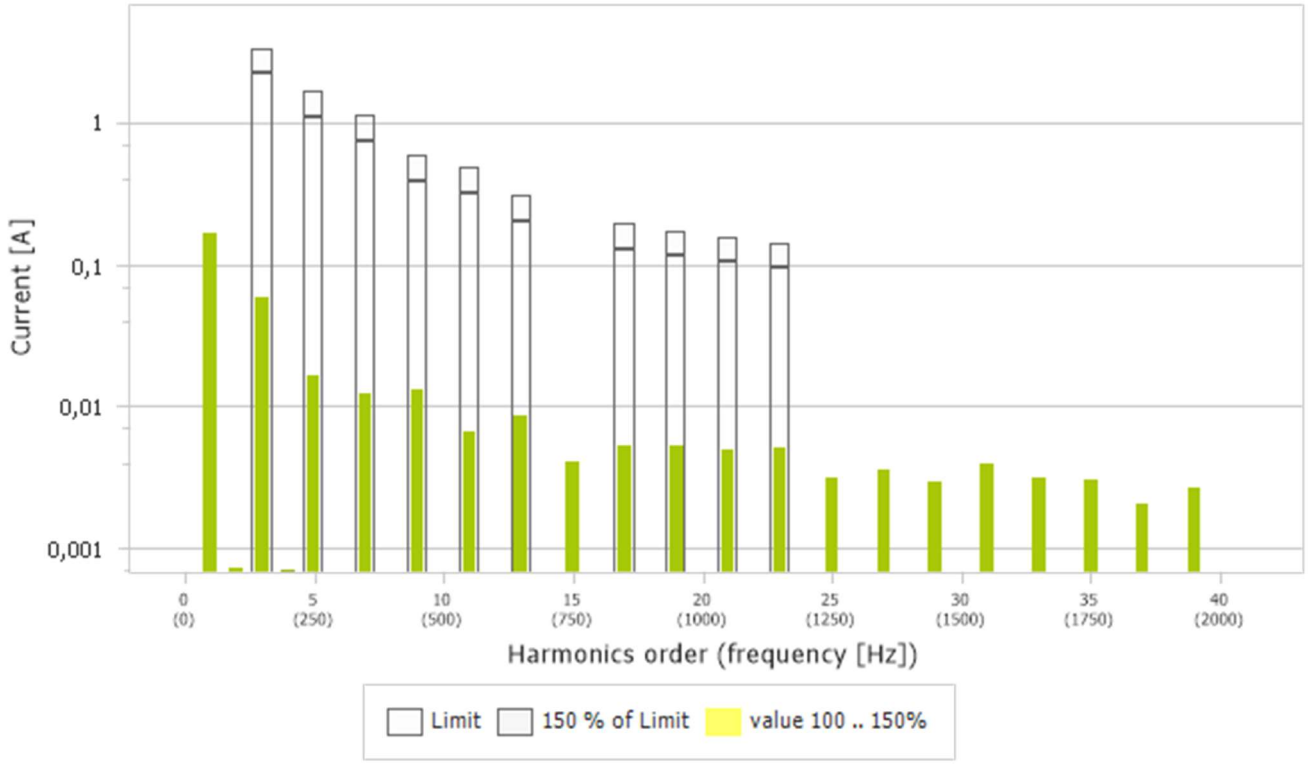
MEASUREMENT DATA

Current Test Result

Average and Maximum harmonic current results									
Hn	Average				Maximum				Harmonic Result
	Ieff [A]	of Limit [%]	Limit [A]	Result	Ieff [A]	of Limit [%]	Limit [A]	Result	
1	0,169				0,172				
2	0,000	0,045	1,080	n/a	0,001	0,046	1,620	n/a	PASS
3	0,059	2,569	2,300	PASS	0,060	1,730	3,450	PASS	PASS
4	0,000	0,114	0,430	n/a	0,001	0,113	0,645	n/a	PASS
5	0,016	1,444	1,140	PASS	0,017	0,981	1,710	PASS	PASS
6	0,000	0,146	0,300	n/a	0,001	0,132	0,450	n/a	PASS
7	0,012	1,607	0,770	PASS	0,012	1,081	1,155	PASS	PASS
8	0,000	0,171	0,230	n/a	0,001	0,169	0,345	n/a	PASS
9	0,013	3,369	0,400	PASS	0,014	2,259	0,600	PASS	PASS
10	0,000	0,181	0,184	n/a	0,000	0,177	0,276	n/a	PASS
11	0,007	2,058	0,330	PASS	0,007	1,391	0,495	PASS	PASS
12	0,000	0,205	0,153	n/a	0,000	0,194	0,230	n/a	PASS
13	0,009	4,087	0,210	PASS	0,009	2,825	0,315	PASS	PASS
14	0,000	0,218	0,131	n/a	0,000	0,210	0,197	n/a	PASS
15	0,004	2,681	0,150	n/a	0,004	1,841	0,225	n/a	PASS
16	0,000	0,303	0,115	n/a	0,000	0,245	0,173	n/a	PASS
17	0,005	3,987	0,132	PASS	0,005	2,711	0,199	PASS	PASS
18	0,000	0,280	0,102	n/a	0,000	0,265	0,153	n/a	PASS
19	0,005	4,424	0,118	PASS	0,005	3,017	0,178	PASS	PASS
20	0,000	0,315	0,092	n/a	0,000	0,293	0,138	n/a	PASS
21	0,005	4,690	0,107	PASS	0,005	3,176	0,161	PASS	PASS
22	0,000	0,309	0,084	n/a	0,000	0,276	0,125	n/a	PASS
23	0,005	4,888	0,098	n/a	0,005	3,584	0,147	PASS	PASS
24	0,000	0,326	0,077	n/a	0,000	0,307	0,115	n/a	PASS
25	0,003	3,452	0,090	n/a	0,003	2,348	0,135	n/a	PASS
26	0,000	0,347	0,071	n/a	0,000	0,293	0,106	n/a	PASS
27	0,004	4,399	0,083	n/a	0,004	2,966	0,125	n/a	PASS
28	0,000	0,418	0,066	n/a	0,000	0,330	0,099	n/a	PASS
29	0,003	3,820	0,078	n/a	0,003	2,592	0,116	n/a	PASS
30	0,000	0,504	0,061	n/a	0,000	0,426	0,092	n/a	PASS
31	0,004	5,541	0,073	n/a	0,004	3,736	0,109	n/a	PASS
32	0,000	0,484	0,058	n/a	0,000	0,403	0,086	n/a	PASS
33	0,003	4,383	0,068	n/a	0,003	3,117	0,102	n/a	PASS
34	0,000	0,507	0,054	n/a	0,000	0,456	0,081	n/a	PASS
35	0,003	4,660	0,064	n/a	0,003	3,197	0,096	n/a	PASS
36	0,000	0,539	0,051	n/a	0,000	0,433	0,077	n/a	PASS
37	0,002	3,381	0,061	n/a	0,002	2,345	0,091	n/a	PASS
38	0,000	0,529	0,048	n/a	0,000	0,412	0,073	n/a	PASS
39	0,003	4,680	0,058	n/a	0,003	3,184	0,087	n/a	PASS
40	0,000	0,568	0,046	n/a	0,000	0,446	0,069	n/a	PASS

Note: Harmonic currents less than 0.6 % of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

EMISSION SPECTRUM



VOLTAGE CHANGES/FLUCTUATIONS/FLICKER

TEST DESCRIPTION

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

Set-up
The specimen was connected to the Power Analyser system. A steady and undistorted AC supply was provided to the specimen from an ideal power supply unit. The power supply unit provided standardized supply impedance by means of synthetic programmable impedances.

Equipment control method
☒ Without additional conditions
☐ Switched manually, or switched automatically more frequently than twice per day, and also has either a delayed restart (the delay not less than a few tens of seconds), or manual restart, after a power supply interruption
☐ Attended whilst in use (for example: hair dryers, vacuum cleaners, kitchen equipment such as mixers, garden equipment such as lawn mowers, portable tools such as electric drills), or switched on automatically, or is intended to be switched on manually, no more than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds) or manual restart, after a power supply interruption

Procedure
Measurements were performed to monitor the required flicker parameters on all active phases at the AC supply port.

The measuring time depends on which parameters are measured:
☐ 1 minute (manual Dmax only)
☒ 10 minutes
☐ 120 minutes
☐ 24 times switching according to Annex B

A measurement table and a graphic presentation of the probability function of Short Time Flicker during this session (if measured) are presented in the report.

Measurement uncertainty (CI15003iX system): ± 7.5 %
Measurement uncertainty (CI10001iX system): ± 5,9 %
Measurement uncertainty (Netwave system): ± 4,7 %

Instruments used during measurement

Instrument list: Impedance network: EMTest / AIF 503N63.1 (N-4778) (04/2024)
Power Analyzer: EMTest / DPA 503N (N-4777) (07/2024)
Power Supply: EMTest / NetWave 60.2-400 (N-4776) (04/2024)

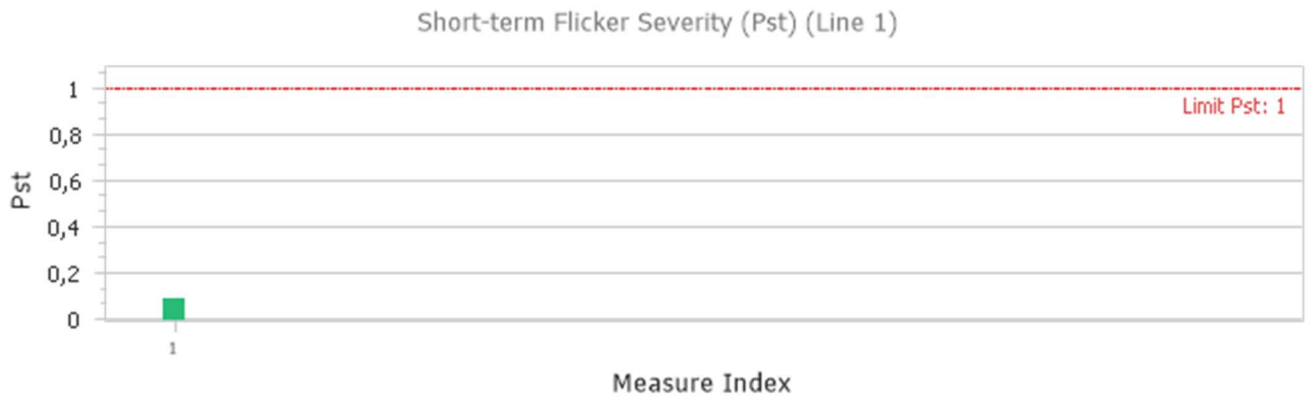
Conformity

Verdict:	PASS
Test engineer:	CB

MEASUREMENT DATA

Parameter	Limit	Measured	Result
Dmax	4 %	< 0.2 %	PASS
Dc	3.3 %	0 %	PASS
Dt	500 msec	0 msec	PASS
Pst	1.0	0.092	PASS

FLICKER PROBABILITY



ELECTROSTATIC DISCHARGE (ESD) IMMUNITY

TEST DESCRIPTION

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

Set-up
The specimen was energized and in normal operating condition.

☐ Floor standing equipment. Specimen was elevated 10 cm above the ground reference plane.
☒ Table top equipment. Specimen was placed on a test table 80 cm above the reference ground plane.
A horizontal coupling plane (HCP) of 160x80 cm was placed on the test table, just beneath the specimen, and connected to the reference plane via a cable with two 470kΩ resistors located one in each end of the cable. The specimen was separated from the HCP by a 0.5mm insulating support.

A vertical coupling plane (VCP) of 50x50 cm was placed 10 cm from the specimen exterior. This VCP is connected to the reference plane via a cable with two 470kΩ resistors located one in each end of the cable.

The ESD generator's reference ground was connected to the reference ground plane.

Procedure
☒ Indirect contact discharges were applied to the mid edge of the VCP.
☒ Indirect contact discharges were applied to the mid edge of the HCP.
☒ Direct contact discharges were applied to various selected test points of the specimen at conductive surfaces,
☒ Direct air discharges were applied to various selected test points of the specimen at non-conductive surfaces.

Discharges were applied at increasing levels to each test point.

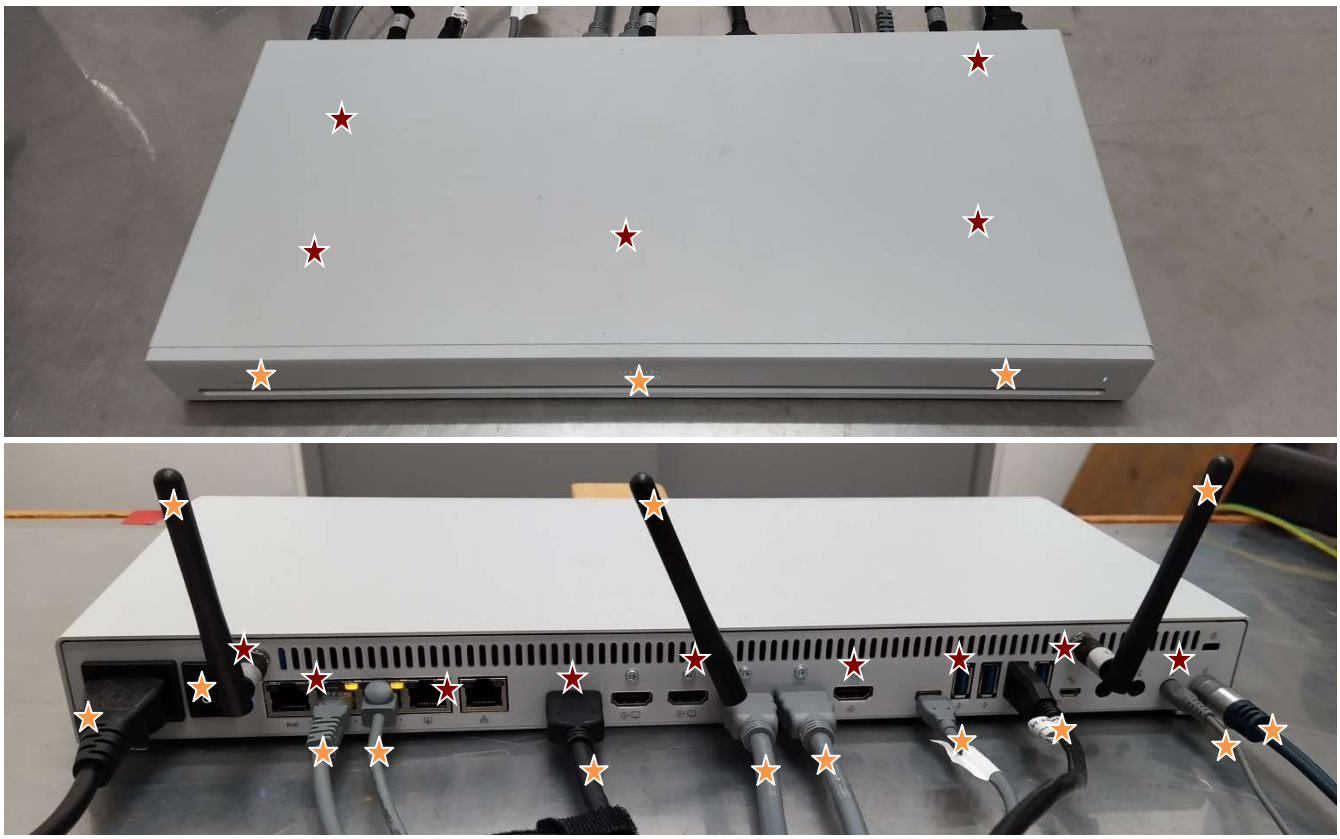
Uncertainty figures: Peak voltage: ± 10 %; Transient shape: ± 30 %

A functional test was performed before and after the exposure. The specimen was observed during exposure in order to detect unintended responses.

Instruments used during measurement
Instrument list: ESD Generator: AMETEK / Dito (N-5035) (11/2022)

		Conformity	
Temperature:	20.5 ºC	Verdict:	PASS
Humidity:	52.8 %RH	Test engineer:	Martin Adams Kvam
Atmos. pressure:	1021.4 hPA		

PHOTO OF SELECTED TEST POINTS



★ = Contact discharge points

★ = Air discharge points

DETAILED TEST LOG

Test Point	Applied Level [kV]	Discharge Type	Discharges per test level	Required Criteria	Complied Criteria	Result
Front panel	±4, ±8kV	Air	ND	B	A	PASS
Power LED	±4, ±8kV	Air	ND	B	A	PASS
Antennas	±4, ±8kV	Air	ND	B	A	PASS
Metal chassis	±2, ±4kV	Contact	10	B	B[1]	PASS
Cable shields	±2, ±4kV	Contact	10	B	B[1]	PASS
Antenna connectors	±2, ±4kV	Contact	10	B	A	PASS
HCP	±2, ±4kV	Contact	10	B	A	PASS
VCP	±2, ±4	Contact	10	B	A	PASS

Note: ND = No Discharge, indicates discharge attempts, which have given no actual observable discharge.

OBSERVATIONS

No malfunctions were recorded during or after the applied test(s).
Observations showed following unintended responses during test(s).
1: HDMI output goes down momentarily at both positive and negative pulses.

RADIATED RF DISTURBANCE IMMUNITY

TEST DESCRIPTION

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

Set-up
The tests were performed at 3 meter antenna distance in an anechoic chamber.

☐ The specimen was placed on a Styrofoam support 10 cm above the floor.
☒ The specimen was placed on a Styrodur/styrofoam table 80 cm above the floor.

The specimen was placed within the calibrated volume, and the cables connected to the specimen was arranged so that 100 cm of each cable was exposed to the electromagnetic field.
Interconnecting cables specified ≤ 300 cm whose length exceeded 100 cm were bundled to achieve 100 cm length.
Interconnecting cables specified > 300 cm and other cables connected to the specimen are exposed for 100 cm, and the remaining cable length was decoupled with the use of ferrites.

Procedure
The specimen was exposed to the RF electromagnetic field generated by one or more antennas. The polarization of the field requires testing each side of the specimen twice, once with the antenna horizontally and again with the antenna vertically. The antenna height during test was 150 cm.

Exposed side of the specimen:
☒ 0º (front)
☒ 90º
☒ 180º (rear)
☒ 270º
☐ Top (handheld)
☐ Bottom (handheld)

Frequency sweep rate:
☒ 1% step with 3 sec dwell time
☐ $1.5x10^{-3}$ decades/sec (80 – 1000MHz)
☐ $0.5x10^{-3}$ decades/sec (1000 – 2000MHz)
☐ Other:

Frequency range:
☐ 80MHz – 1000MHz
☐ 1400MHz – 2000MHz
☐ 2000MHz – 2700MHz
☐ 80MHz – 2000MHz
☒ 80MHz – 6000MHz

Modulation:
☒ 80% AM @ 1000Hz
☐ 80% AM @ 400Hz
☐ 50% PM @ 217Hz

Uncertainty figures:
Field level: ± 2.4 dB

A functional test was performed before and after the exposure. The specimen was observed during exposure in order to detect unintended responses.

Instruments used during measurement

Instrument list:
Amplifier, GF: Bonn / BLMA 1060-200/100DS (N-4879) (N/A)
Amplifier, RF: Bonn / BLWA 0810-1000/400 (N-4878) (N/A)
Antenna: Schwarzbeck / STLP 9129 (N-4872) (N/A)
Audio Analyzer: R&S / UPP800 (N-4936) (N/A)
Field Probe: LumiLoop / LSProbe 1.2 (N-4856) (04/2023)
Generator, RF: R&S / SMB100A (N-4877) (04/2025)
Power Sensor: R&S / NRP8SN (N-4842) (03/2023)
Power Sensor: R&S / NRP8SN (N-4841) (03/2023)

Conformity

Verdict:	PASS
Test engineer:	CB

DETAILED TEST LOG

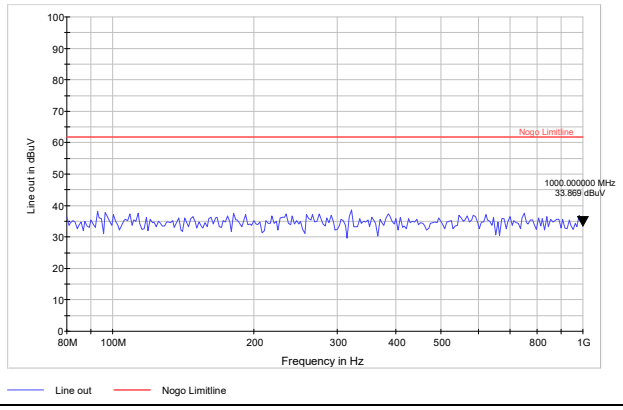
Frequency range [MHz]	Field strength [V/m]	Polarization	Required Criteria	Complied Criteria	Result
80 - 1000	3	HOR	A	A	PASS
80 - 1000	3	VER	A	A	PASS
1000 – 6000	3	HOR	A	A	PASS
1000 – 6000	3	VER	A	A	PASS

☒ Additional tests were performed at discrete spot frequencies with 3V/m test level. Spot frequencies which were tested: 1800 MHz, 2600 MHz, 3500 MHz, and 5000 MHz

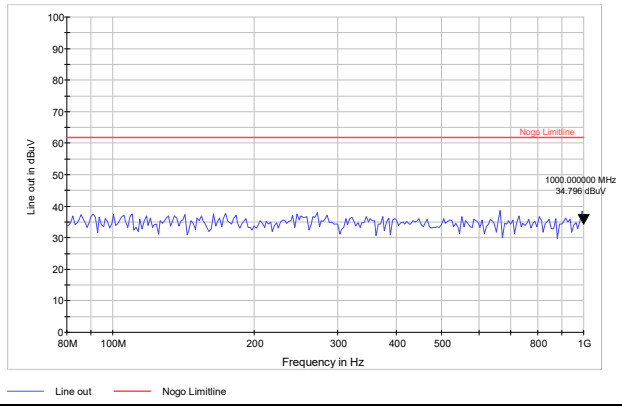
OBSERVATIONS

No malfunctions were recorded during or after the applied test(s).
Observations showed levels of demodulated audio within the acceptance criteria at the receiving end (see logs). No other unintended responses observed during test(s).

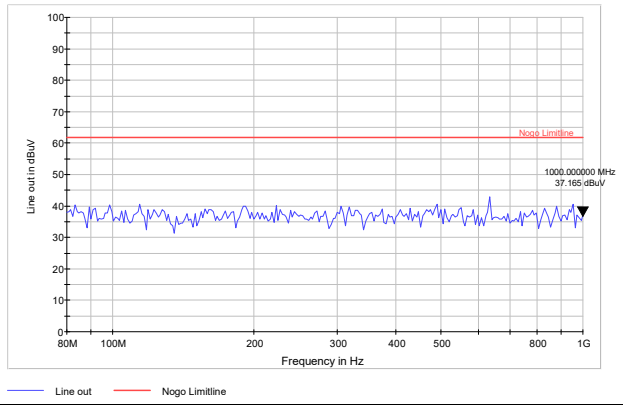
AUDIO BREAKTHROUGH LOGS



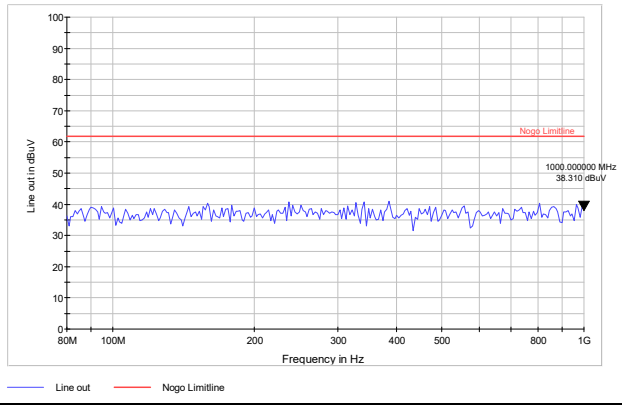
80-1000 MHz, 0 deg, horizontal polarization



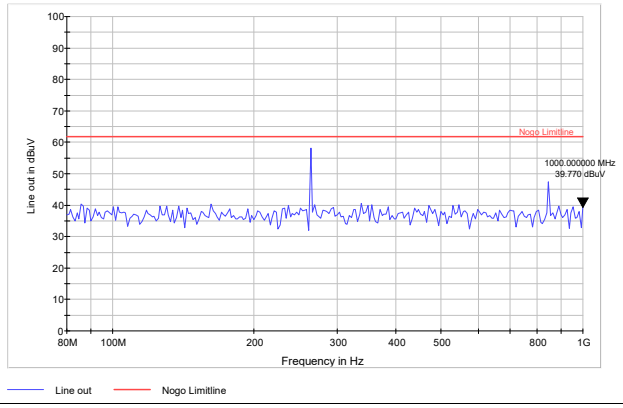
80-1000 MHz, 0 deg, vertical polarization



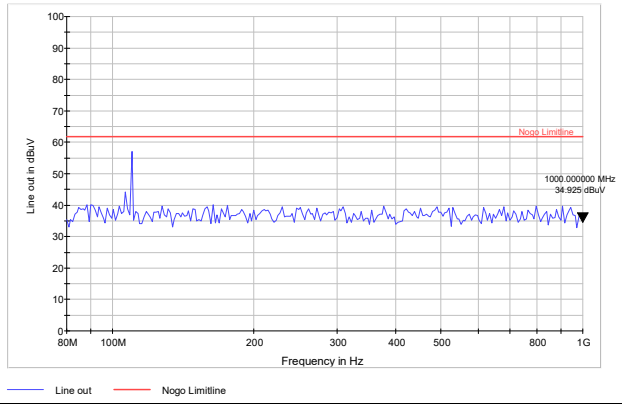
80-1000 MHz, 90 deg, horizontal polarization



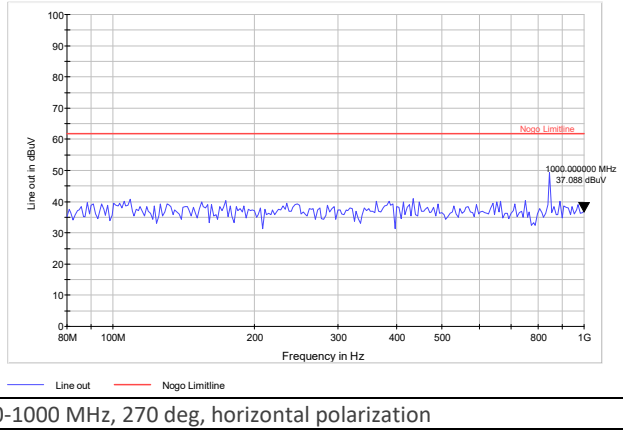
80-1000 MHz, 90 deg, vertical polarization



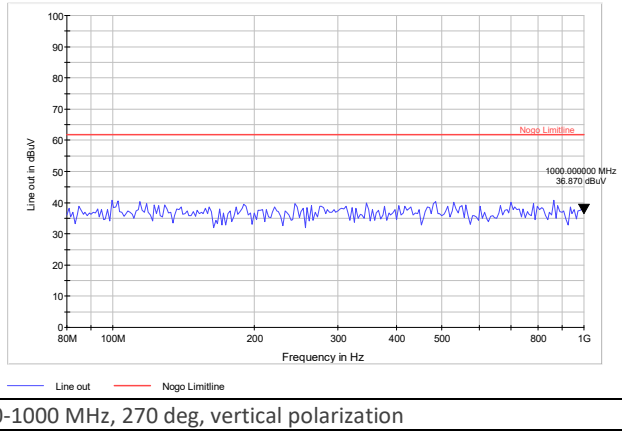
80-1000 MHz, 180 deg, horizontal polarization



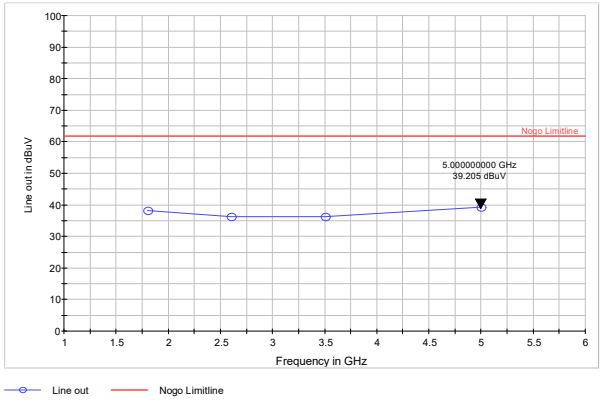
80-1000 MHz, 180 deg, vertical polarization



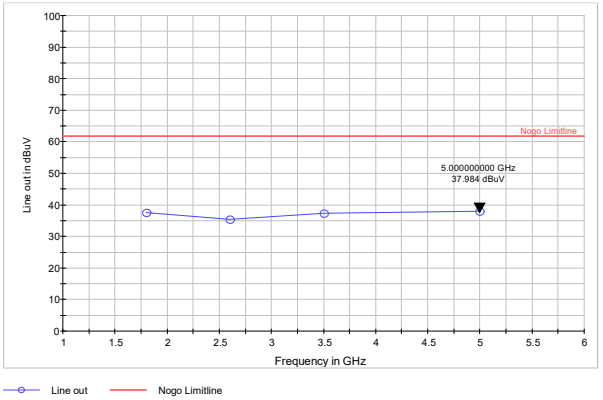
80-1000 MHz, 270 deg, horizontal polarization



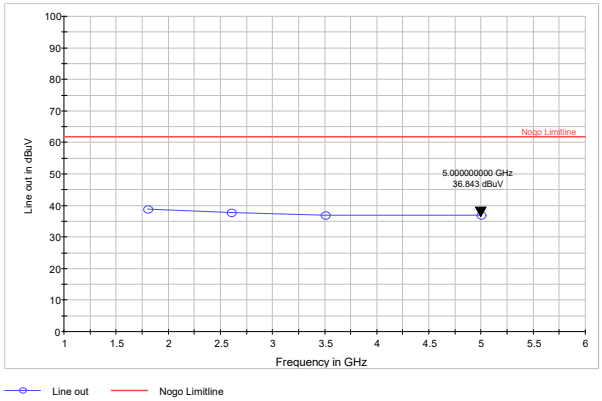
80-1000 MHz, 270 deg, vertical polarization



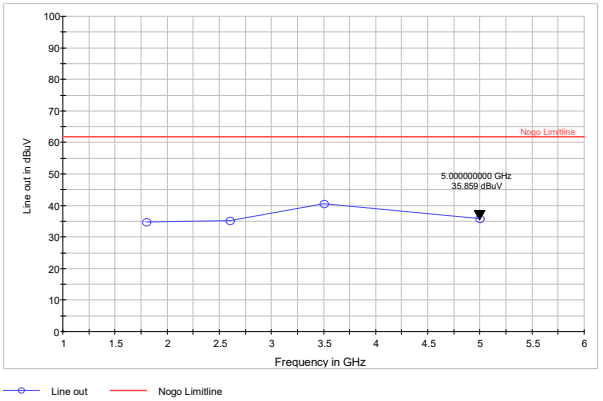
1800, 2600, 3500, 5000 MHz, 0 deg, horizontal polarization



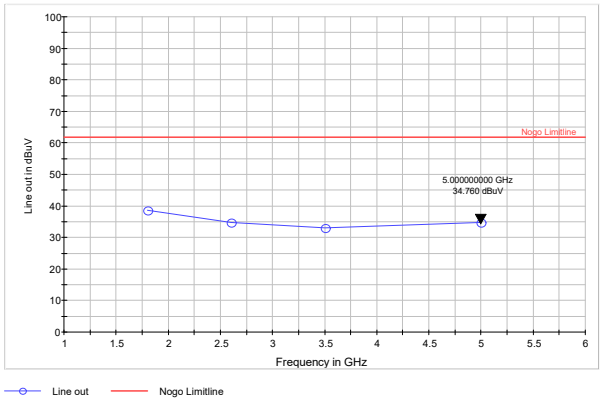
1800, 2600, 3500, 5000 MHz, 0 deg, vertical polarization



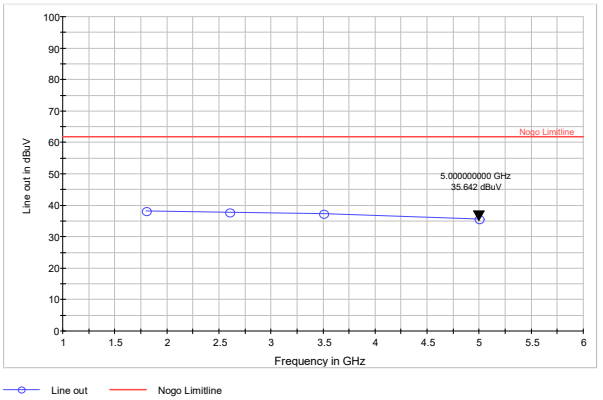
1800, 2600, 3500, 5000 MHz, 90 deg, horizontal polarization



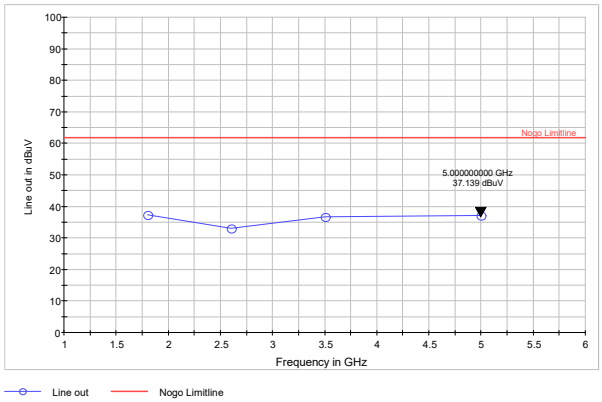
1800, 2600, 3500, 5000 MHz, 90 deg, vertical polarization



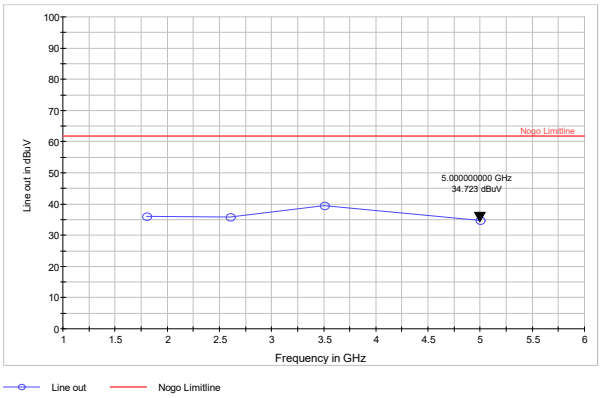
1800, 2600, 3500, 5000 MHz, 180 deg, horizontal polarization



1800, 2600, 3500, 5000 MHz, 180 deg, vertical polarization



1800, 2600, 3500, 5000 MHz, 270 deg, horizontal polarization



1800, 2600, 3500, 5000 MHz, 270 deg, vertical polarization

ELECTRIC FAST TRANSIENTS IMMUNITY

TEST DESCRIPTION

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

Set-up
Mains power was supplied to the specimen via the coupling network. The specimen was energized and in normal operating condition.

☒ The specimen and its cables were elevated 10 cm above the reference ground plane.
☐ Artificial hand was applied during test (for location see photos).

Procedure
Transients were applied at increasing levels to each single line at the AC or DC input port using a coupling network, and to relevant signal ports using a capacitive coupling clamp.

Duration:	Repetition frequency:	Uncertainty figures:
☐ 1 minute	☒ 5kHz	Peak voltage: ± 10 %
☒ 2 minutes	☐ 100kHz	Transient shape: ± 30 %
☐ 5 minutes		

A functional test was performed before and after the exposure. The specimen was observed during exposure in order to detect unintended responses.

Instruments used during measurement

Instrument list: Coupling Clamp, EFT/B: EMTest / CCI (N-4918) (N/A)
Generator: EMTest / UCS 500 N7 (N-4561) (06/2023)

Conformity

Verdict:	PASS
Test engineer:	CB

DETAILED TEST LOG

Port	Applied Level [kV]	Injection Method	Required Criteria	Complied Criteria	Result
AC Input Port (N+L1+PE)	±0.5kV	CDN	B	B[1]	PASS
AC Input Port (N+L1+PE)	±1kV	CDN	B	B[1]	PASS
Signal Port (Mic in)	±0.5kV	CLAMP	B	A	PASS
Signal Port (LAN)	±0.5kV	CLAMP	B	A	PASS
Signal Port (PoE)	±0.5kV	CLAMP	B	A	PASS
Signal Port (HDMI in)	±0.5kV	CLAMP	B	A	PASS
Signal Port (HDMI out)	±0.5kV	CLAMP	B	B[1]	PASS
Signal Port (USB C)	±0.5kV	CLAMP	B	A	PASS
Signal Port (Mic in)	±0.5kV	CLAMP	B	A	PASS
Signal Port (LAN)	±0.5kV	CLAMP	B	A	PASS

OBSERVATIONS

No malfunctions were recorded during or after the applied test(s).
Observations showed the following unintended responses during test(s).
1: During bursts the image on the external monitor flickers intermittently. Self-recovers after test.

SURGE IMMUNITY

TEST DESCRIPTION

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

Set-up
The specimen was energized and in normal operating condition. The specimen and its cables were elevated 10 cm above the reference ground plane

Procedure for supply ports
☒ Differential mode surges were applied line-to-neutral on AC supply port, with a source impedance of 2Ω.
☐ Differential mode surges were applied line-to-line on 3-phase AC supply port, with a source impedance of 2Ω.
☒ Common mode surges were applied line-to-ground and neutral-to-ground on AC supply port, with a source impedance of 12Ω.
☐ Differential mode surges were applied line-to-line on DC supply ports, with a source impedance of 2Ω.
☐ Differential mode surges were applied line-to-line on DC supply ports, with a source impedance of 42Ω.
☐ Common mode surges were applied line-to-ground on DC supply ports, with a source impedance of 12Ω.
☐ Common mode surges were applied line-to-ground on DC supply ports, with a source impedance of 42Ω.

Procedure for signal ports
☐ Common mode surges were applied line-to-ground on non-shielded signal ports, with a source impedance of 42Ω.
☐ Common mode surges were applied shield-to-ground on shielded signal ports, with a source impedance of 2Ω.

Phase angles for AC:	Repetition rate:	Impulses per test level:	Uncertainty figures:
☒ 0° ☒ 90°	☐ 20 sec.	☒ 5 impulses	Peak voltage: ± 10 %
☒ 180° ☒ 270°	☒ 60 sec.	☐ Other:	Rise time: ± 30 %
☐ No AC ports	☐ Other:		Duration: ± 20 %

A functional test was performed before and after the exposure. The specimen was observed during exposure in order to detect unintended responses.

Instruments used during measurement
Instrument list: Generator: EMTest / UCS 500 N7 (N-4561) (06/2023)

Conformity

Verdict:	PASS
Test engineer:	CB

DETAILED TEST LOG

Line	Source impedance	CDN	Applied Level [kV]	Required Criteria	Complied Criteria	Result
AC Input Port (N to PE)	12Ω	MCN	±0.5kV	B	A	PASS
AC Input Port (N to PE)	12Ω	MCN	±1kV	B	A	PASS
AC Input Port (N to PE)	12Ω	MCN	±2kV	B	A	PASS
AC Input Port (L1 to PE)	12Ω	MCN	±0.5kV	B	A	PASS
AC Input Port (L1 to PE)	12Ω	MCN	±1kV	B	A	PASS
AC Input Port (L1 to PE)	12Ω	MCN	±2kV	B	A	PASS
AC Input Port (N to L1)	2Ω	MCN	±0.5kV	B	A	PASS
AC Input Port (N to L1)	2Ω	MCN	±1kV	B	A	PASS

Note: MCN = Mains coupling network; ICN = Coupling network for interconnecting lines; D = Direct coupling (shielded lines)

OBSERVATIONS

No malfunctions were recorded during or after the applied test(s).
Observations showed no unintended responses during test(s).

CONDUCTED RF DISTURBANCE IMMUNITY

TEST DESCRIPTION

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

Set-up
Mains power was supplied to the specimen via the coupling network. The specimen was energized and in normal operating condition.

☒ The specimen was elevated 10 cm above the reference ground plane.
☒ Cables were elevated 5 cm above the reference ground plane.
☐ Artificial hand was applied during test (for location see photos).

All specimen ports, which are not subject to testing, are furnished with decoupling networks to achieve RF isolation of the specimen during test. A return path was created according to the priority given in §7.2 of the reference standard.

Procedure
Disturbance was applied via a coupling/decoupling network (CDN) or an electromagnetic coupling clamp (EM Clamp) to each port separately.

Frequency range:	Modulation:	Frequency sweep rate:
☒ 150kHz – 80MHz	☒ 80% AM @ 1000Hz	☒ 1% step with 3 sec dwell time
☐ 150kHz – 230MHz	☐ 80% AM @ 400Hz	☐ $1.5x10^{-3}$ decades/sec
☐ Spot frequencies	☐ 50% PM @ 217Hz	☐ Other:

Measurement uncertainty: ± 1.7dB (CDN method); ± 3.2dB (EM Clamp method); ± 3.3dB (BCI method)

A functional test was performed before and after the exposure. The specimen was observed during exposure in order to detect unintended responses.

Instruments used during measurement

Instrument list:
Amplifier, RF: R&S / BBA150-A125 (N-5017) (N/A)
Attenuator: Diconex / 16-6763 (N-5043) (N/A)
Audio Analyzer: R&S / UPP800 (N-4936) (N/A)
CDN: Teseq / T8-10 (N-4725) (N/A)
CDN: FCC / FCC-801-6-M3 (N-3599) (N/A)
CDN: Schaffner / USB/c (N-4276) (N/A)
EM Clamp: FCC / F-2031 EM (N-3438) (N/A)
Generator, RF: R&S / SMC100A (N-4891) (06/2024)
Power Sensor: R&S / NRP-Z91 (N-4924) (11/2023)

Conformity

Verdict:	PASS
Test engineer:	MAK

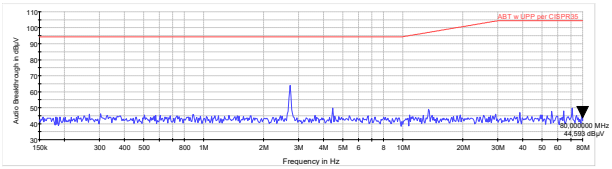
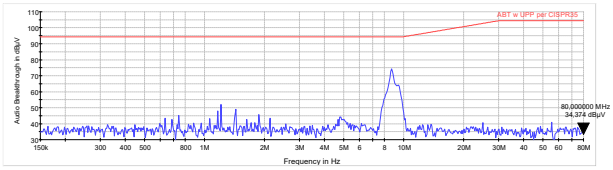
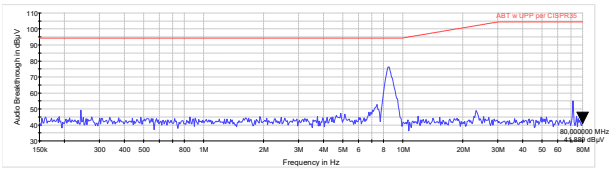
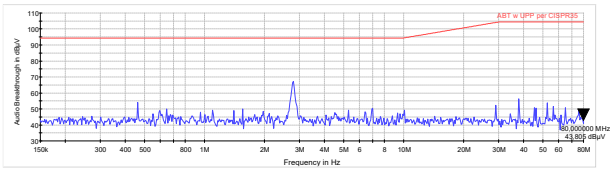
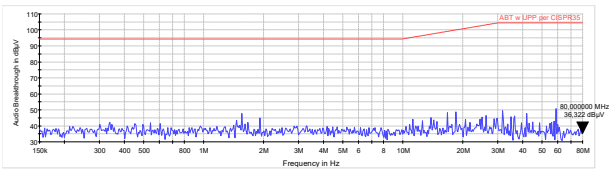
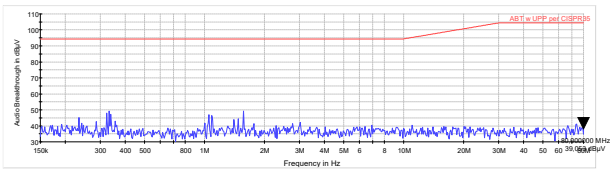
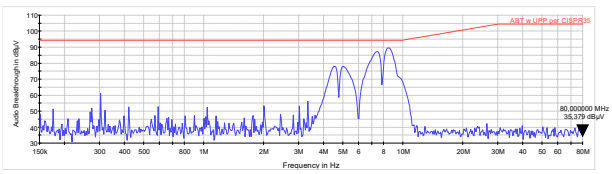
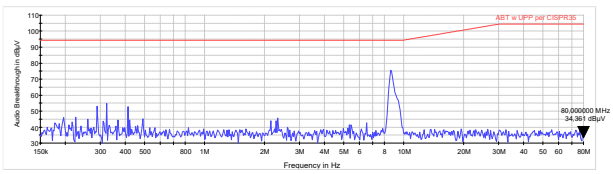
DETAILED TEST LOG

Tested Port	Injection Method	Return Path	Applied Level [Vrms]	Required Criteria	Complied Criteria	Result
AC Input Port	CDN-M3	CDN-USB	3Vrms	A	A	PASS
Signal Port (Mic in)	EM CLAMP	CDN-M3	3Vrms	A	A	PASS
Signal Port (LAN)	CDN-T8	CDN-M3	3Vrms	A	A	PASS
Signal Port (PoE)	CDN-T8	CDN-M3	3Vrms	A	A	PASS
Signal Port (HDMI in)	EM CLAMP	CDN-M3	3Vrms	A	A	PASS
Signal Port (HDMI out)	EM CLAMP	CDN-M3	3Vrms	A	A	PASS
Signal Port (USB C)	EM CLAMP	CDN-M3	3Vrms	A	A	PASS

OBSERVATIONS

No malfunctions were recorded during or after the applied test(s).
Observations showed levels of demodulated audio within the acceptance criteria at the receiving end (see logs). No other unintended responses observed during test(s).

AUDIO BREAKTHROUGH LOGS

	
AC mains	USB C
	
HDMI in	HDMI out
	
LAN	Power over Ethernet
	
Microphone input	Line out

Note: Limit recalculated pr CISPR35 to consider 3V test level in the entire range, instead of 3-1V level.

VOLTAGE DIPS AND INTERRUPTIONS IMMUNITY

TEST DESCRIPTION

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

Set-up
Only the general laboratory conditions were applied. No special requirements are defined for the configuration of the specimen. The main supply port of the specimen was connected to the power simulator system which generates the dips and interruptions. The specimen was energized and in normal operating condition.

Procedure
The specimen was subject to voltage reductions a given number of times, separated by a sufficient interval for the specimen to recover. The reductions were fired at different phase angles according to the requirements of the test standard.

Repetition rate:
☒ 10 sec.
☐ 20 sec.
☐ Other:

Repetitions:
☒ 3 occurrences.
☐ Other:

Phase angle:
☐ N/A (DC supply).
☐ Only at 0º.
☐ Only at zero crossings (0º and 180º).
☐ 0-270º; each 90º.
☐ 0-315º; each 45º.

Measurement uncertainty: Voltage level: ± 5 %; Zero crossing control: ± 10º; Phase relationship: ± 10º

A functional test was performed before and after the exposure. The specimen was observed during exposure in order to detect unintended responses.

Instruments used during measurement

Instrument list: Generator: EMTest / UCS 500 N7 (N-4561) (06/2023)
Motorized Variac: EMTest / MV2616 (N-4561.03) (06/2024)

Conformity

Verdict:	PASS
Test engineer:	CB

DETAILED TEST LOG

Voltage Reduction	Voltage Levels		Duration [cycles]	Required Criteria	Complied Criteria	Result
	Nominal	Test				
30% Dip	240	168	25	C	A	PASS
30% Dip	100	70	25	C	C[1]	PASS
>95% Dip	230	0	0.5	B	A	PASS
100% Interruption	230	0	250	C	C[1]	PASS

OBSERVATIONS

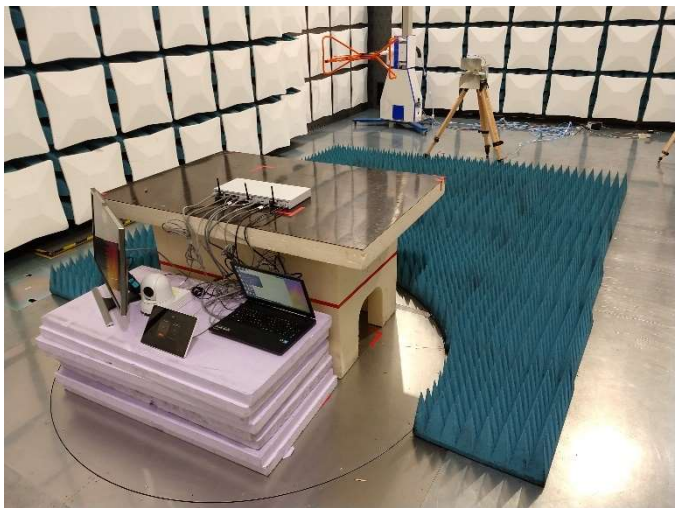
No malfunctions were recorded during or after the applied test(s).
Observations showed the following unintended responses during test(s).
1: Units powers down during test, and self-recovers after voltage is restored. Manual re-establishing of communication is necessary.

Annexes

PHOTOS

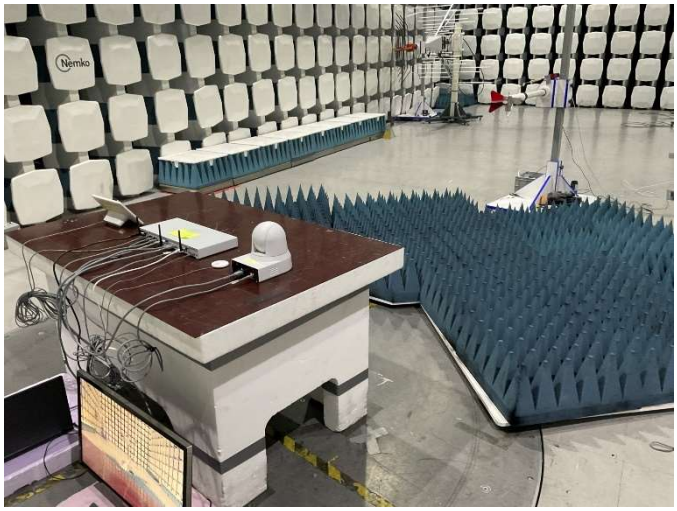
Test set-up for EMC emissions measurements

Test set-up for Radiated emissions measurements (Below 1GHz, CISPR)



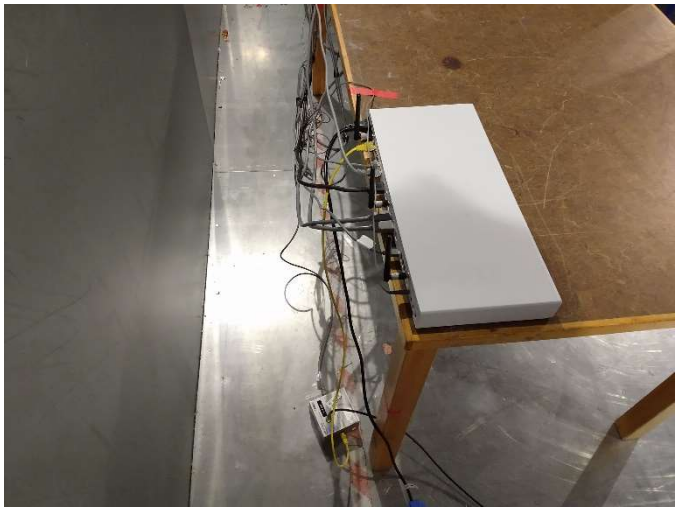
Test set-up for Radiated emissions measurements (Above 1 GHz, CISPR)

Test set-up for Radiated emissions measurements (Below 1GHz, FCC)



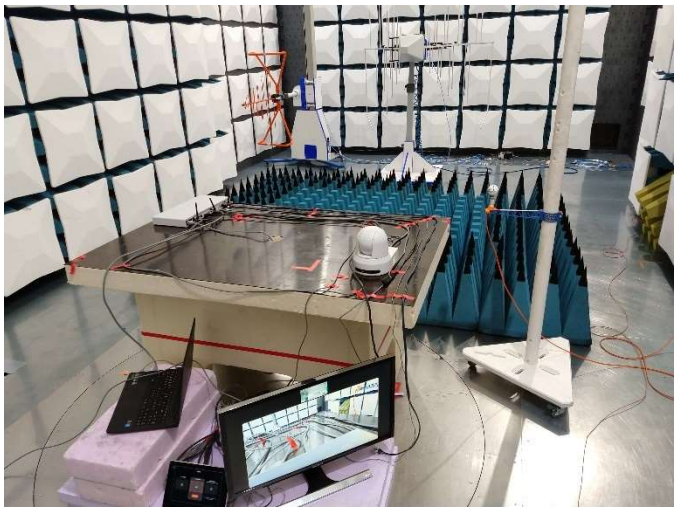
Test set-up for Radiated emissions measurements (Above 1 GHz, FCC)

Test set-up for Conducted emissions measurements (AC mains)



Test set-up for Conducted emissions measurements (Ethernet ports)

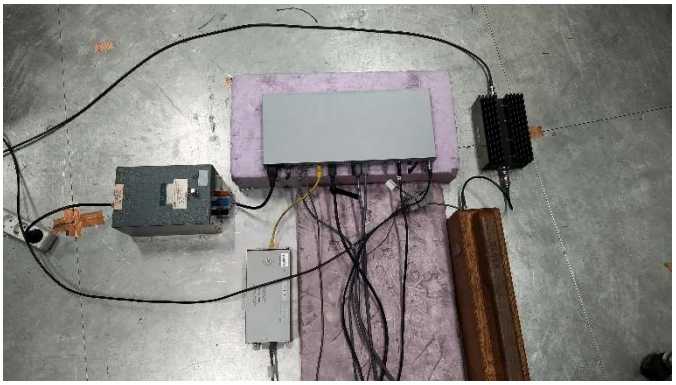
Test set-up for EMC immunity tests



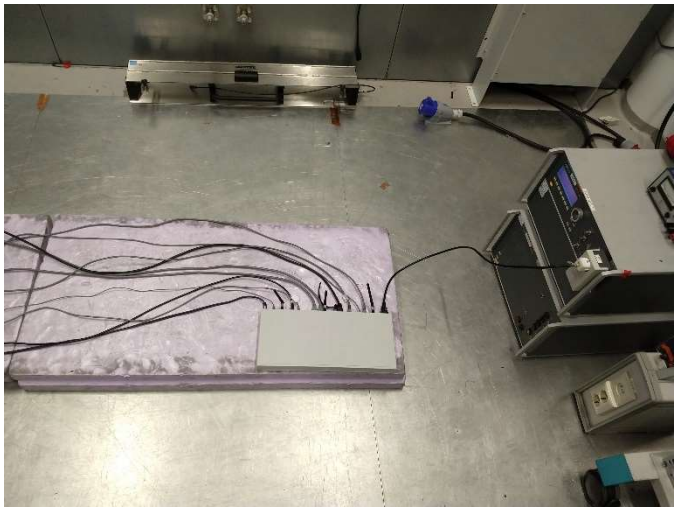
Test set-up for Radiated RF disturbance immunity

Test set-up for Conducted RF disturbance immunity (AC mains)

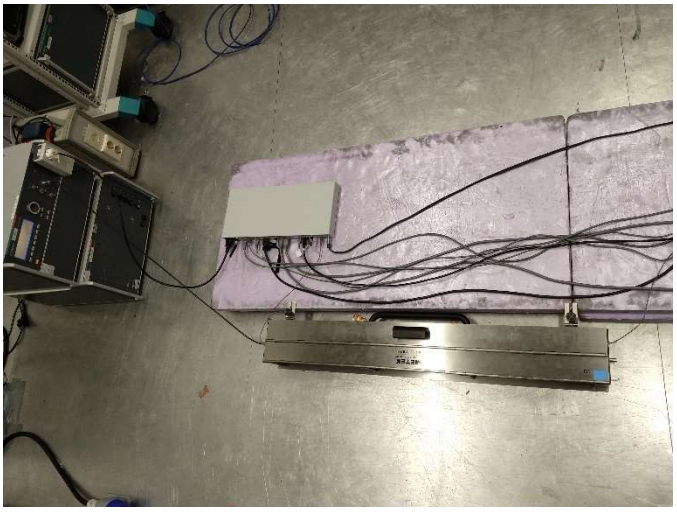
Test set-up for Conducted RF disturbance immunity (LAN/PoE-port)



Test set-up for Conducted RF disturbance immunity (Signal ports)



Test set-up for Electric fast transients, Surge and Voltage dips and interruptions immunity (AC mains)



Test set-up for Electric fast transients immunity (Signal ports)