





# Test Report

## Electromagnetic Compatibility

Product	Wireless repeater/gateway for Emergency call systems		
Name and address of the applicant	Ascom (Sweden) AB Grimbodalen 2, Sweden		
Name and address of the manufacturer	Ascom (Sweden) AB Grimbodalen 2, Sweden		
Model	NUWBM3- Bed side Module (869.200 – 869.250/902 - 928 MHz ) NUUTX – Universal Transmitter (869.200 – 869.250/902 - 928 MHz ) NUWIR – Wireless PIR Sensor (869.200 – 869.250/902 - 928 MHz ) NUREP – Repeater (869.200 – 869.250/902 - 928 MHz /2.4 – 2.480MHz)		
Rating	NUREP/NUWBM3 : 5Vdc NUUTX/NUWIR: 3Vdc		
Trademark	Ascom		
Serial number	NUREP: G2974869 NUWBM3: G2978863 NUWIR:G2978901 NUUTX:G2978977		
Additional information	Social alarms as defined in ETSI EN 300 220-3-1		
Tested according to	Draft EN 301 489-01:V2.2.0 Final Draft EN 301 489-03:V2.1.1 Draft EN 301 489-17:V3.2.0 EN 55032:2012 FCC CFR 47 Part 15 ICES-003, Issue 6:2016		
Order number	327231		
Tested in period	2017-05-18 - 2017-06-08		
Issue date	2017-06-26		
Name and address of the testing laboratory	<b>Nemko Group</b> Nemko AS Gaustadalléen 30, P.O.Box 73 Blindern, 0314 Oslo, Norway	Telephone (+47) 22 96 03 30 Fax (+47) 22 96 05 50	 
An accredited technical test executed under the Norwegian accreditation scheme			
 Prepared by [G. Suhanthakumar]		 Approved by [Jon Fredrik Mo]	
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## REPORT REVISIONS

Revision #	Date	Order #	Description
00	2017-06-26	327231	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.

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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.....:	Wireless devices for emergency calls intended for use in nursing homes and in assisted living facilities.
Model/type.....:	NUREP NUUTX NUWBM3 NUWIR
Serial number.....:	NUREP: G2974869 NUWBM3: G2978863 NUWIR:G2978901 NUUTX:G2978977
Hardware version.....:	NUREP/NUWGTW: C NUUTX: C NUWBM3: C NUWIR: C
Software version.....:	NUREP: 0.6.0 NUUTX: 0.2.7 NUWBM3: 0.2.6 NUWIR: 0.2.7
Operating voltage.....:	NUREP/NUWBM3 5Vdc via USB or AC/DC adapter NUUTX/NUWIR: 3Vdc (2X AA battery)
Maximum power/current.....:	NUREP: 300mA at 5Vdc or battery operation NUWIR/NUUTX: 35mA at 3Vdc battery operation NUWBM3 : 40mA at 5Vdc or 35mA at battery operation
Highest clock frequency.....:	NUWIR/NUUTX: 920.2125MHz NUREP: 2.475GHz NUWBM3: 920.2125MHz
Mounting position.....:	<input type="checkbox"/> Table top equipment <input checked="" type="checkbox"/> Wall/ceiling mounted equipment <input type="checkbox"/> Floor standing equipment <input type="checkbox"/> Handheld equipment <input type="checkbox"/> Rack mounted equipment <input type="checkbox"/> Console mounted equipment <input type="checkbox"/> Other:

## RF CHARACTERISTICS OF THE TRANSMITTER

Frequency range.....:	NUWBM3- Bed side Module (869.200 – 869.250/902 - 928 MHz ) NUUTX – Universal Transmitter (869.200 – 869.250/902 - 928 MHz ) NUWIR – Wireless PIR Sensor (869.200 – 869.250/902 - 928 MHz ) NUREP – Repeater (869.200 – 869.250/902 - 928 MHz & 2.4 – 2.480MHz)
Number of channels.....:	SRD: 1 2.4GHz : 16 (only one is used)
Channel BW.....:	SRD: < 25kHz 2.4GHz: 2 MHz
Receiver Category.....:	SRD: 1.5 2.4GHz: 2
Classification.....:	Social Alarm
Operating modes.....:	NUREP: TX/RX NUUTX: Only TX NUWBM3: Only TX NUWIR: Only TX
Types of modulation.....:	SRD: 2.4GHz: O-QPSK (spread spectrum) IEEE 802.15.4
Tuneable bands.....:	None by user
User frequency adjustment.....:	None
Rated output power.....:	SRD: 14 dBm@50 ohm 2.4GHz: 10 dBm eirp
Antenna connector.....:	Integral antennas , 1 for SRD and 1 for 2.4GHz
Antenna diversity support.....:	N/A

## CRITICAL MODULES/PARTS

Description	Manufacturer	Type
NUREP X201, 24MHz, X400 32MHz	Epson, Texas Instruments	FA-128,CC1125
NUWIR/NUUTX, X300 32MHz	Epson	TG-5035
NUWBM3 X300, 32MHz	Epson	TG-5035

## INPUT/OUTPUT PORTS

Port name and description	Cable		
	> 3m	Attached during test	Shielded
ACIDC adapter type: PSAC05R-050L6	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
USB cable, 1m	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

## OPERATING MODES

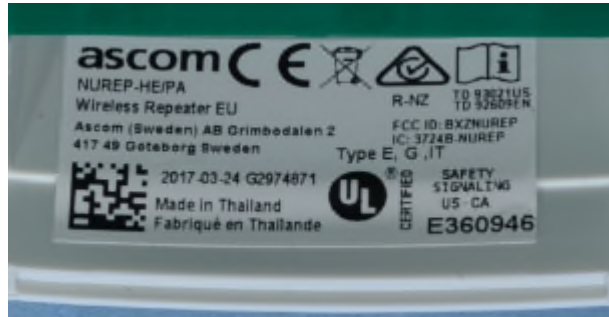
No.	Description	Applied for testing	
		Emissions	Immunity
1	Radio communication between the devices	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	Data traffic on USB	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

## ACCESSORIES USED DURING TEST

Description	Manufacturer	Type
NIRC3	Ascom	Room Controller
NIDM	Ascom	Door side module
NISM	Ascom	System Manager
Power supply	-	-

PHOTOS AND DRAWINGS

Copy of marking label.....:



NUREP



NUWBM3

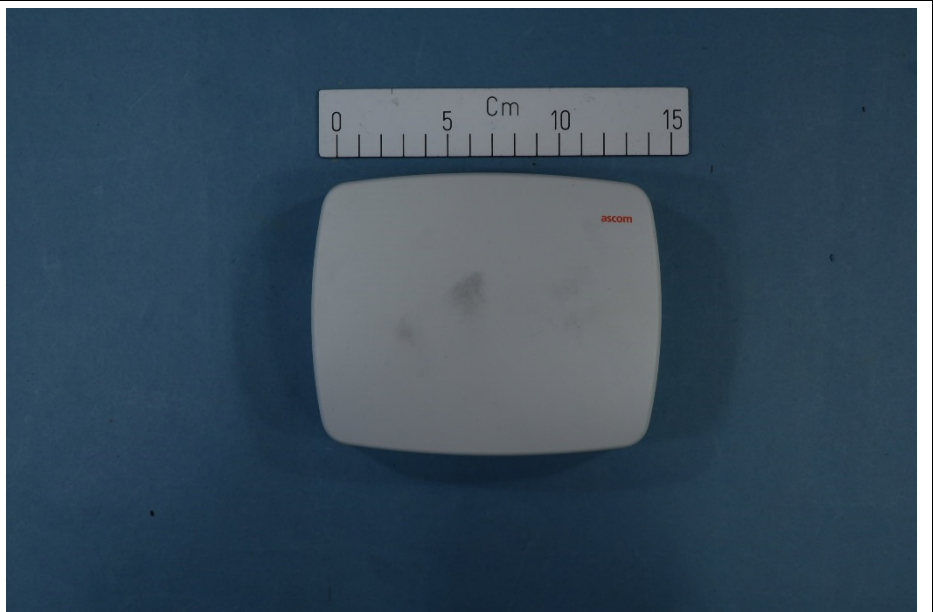


NUWR

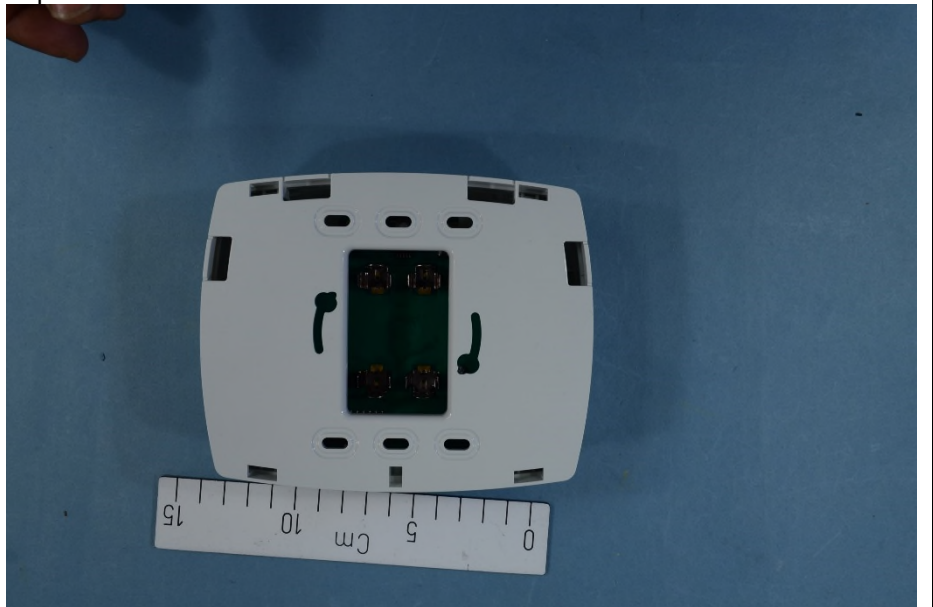


NUUTX

Photo of the test item.....:



Top view

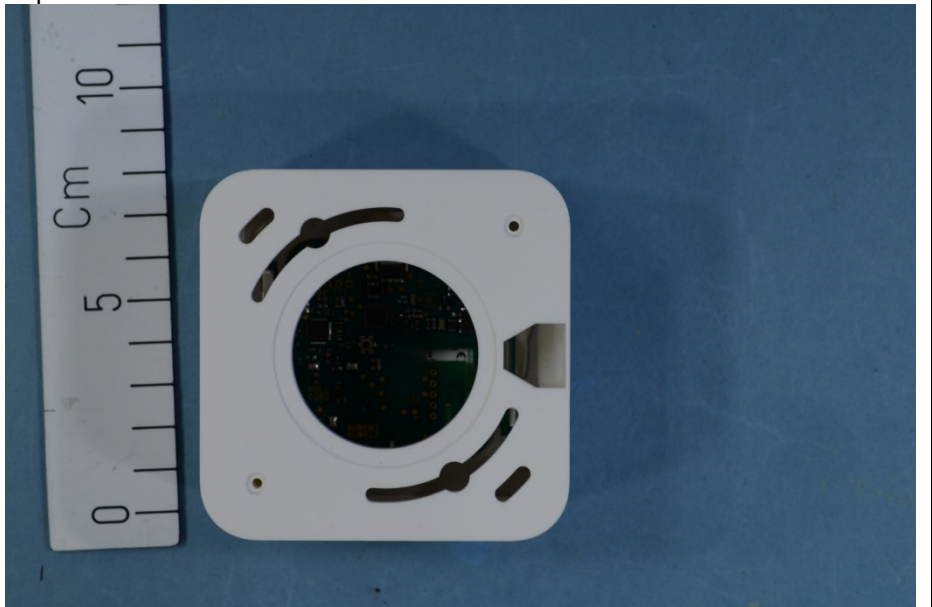


Bottom view  
NUREP





Top view

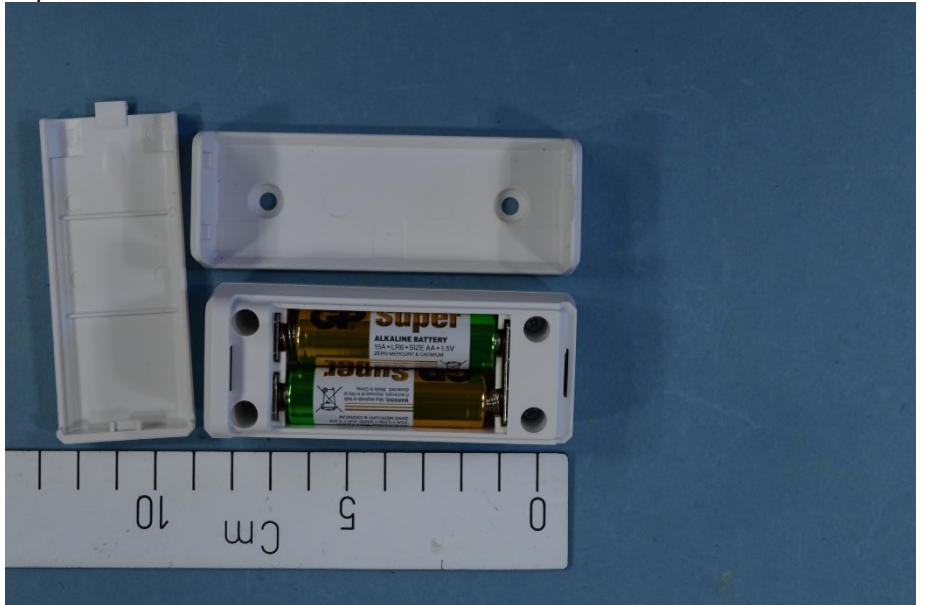


Bottom view  
NUWBM3

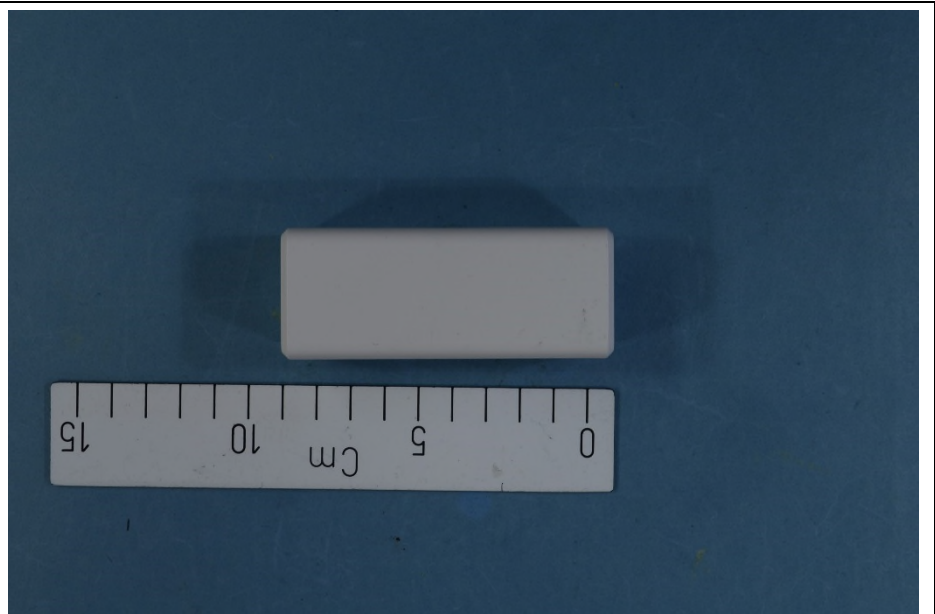




Top view



Bottom view  
NUWIR

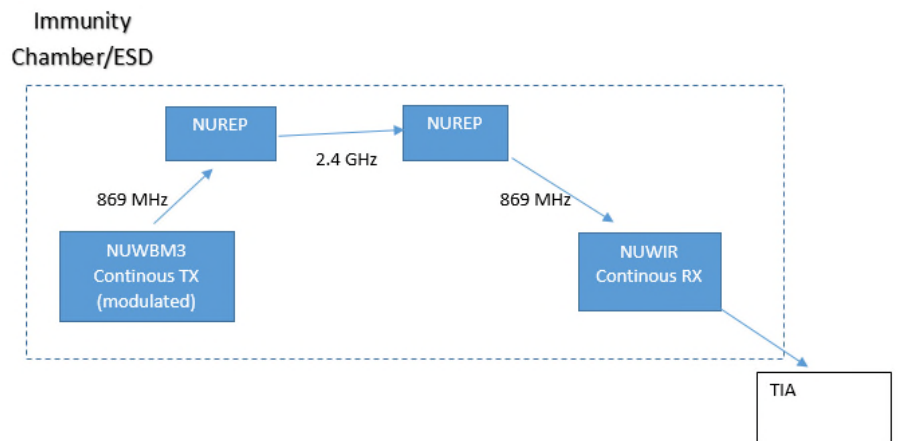


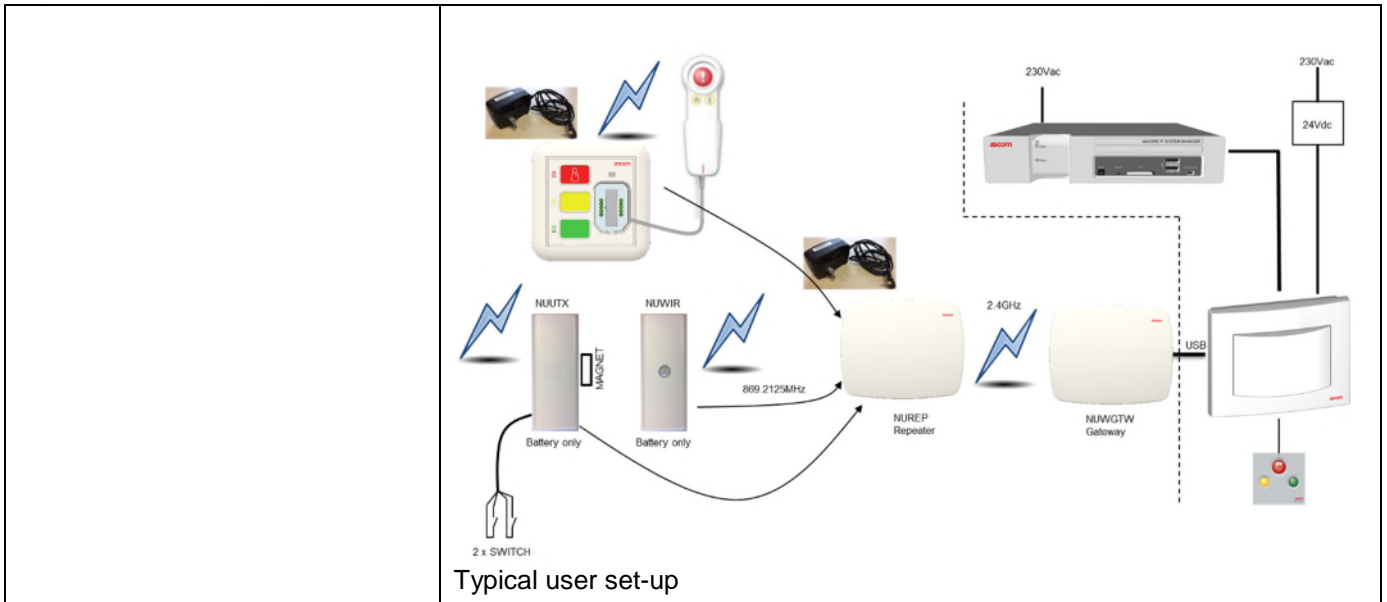
Top view  
NUUTX




AC/DC adapter for NUREP & NUWBM3

Drawing of test setup.....:






**OTHER INFORMATION**

Modifications to the test item.....:	None
Additional information.....:	<p>USB cable contains two ferites ( 1m cable)</p> 

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

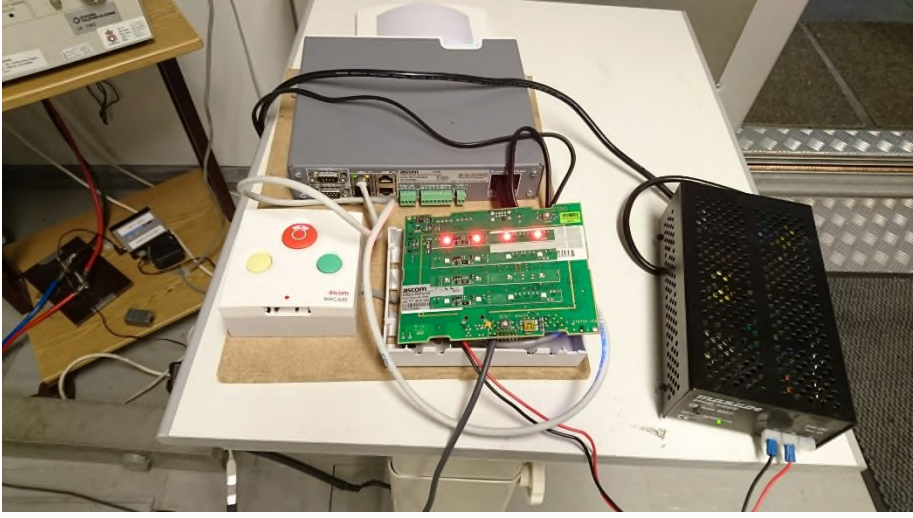
Test laboratory.....:	<input type="checkbox"/> GAUSTAD (Gaustadalleen 30, N-0314 Oslo, Norway) <input checked="" type="checkbox"/> KJELLER (Instituttveien 6, N-2007 Kjeller, Norway)
Laboratory accreditation.....:	 <b>Norsk Akkreditering – TEST 033</b> P06 – Electromagnetic Compatibility
Environmental ref. conditions.....:	<p>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:</p> <p><b>Ambient temperature:</b> 15 – 35 °C  <b>Relative humidity:</b> 25 – 75 %RH  <b>Atmospheric pressure:</b> 86 – 106 kPa</p> <p>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.</p>
Calibration.....:	<p>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.</p> <p>The instrumentation accuracy is within limits agreed by the IEC/IEC/CTL and defined by Nemko reference document TM-NO/301</p>
Measurement uncertainties.....:	<p>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.</p> <p>EMC test uncertainties for transient immunity are kept within the requirements of the relevant basic standard.</p> <p>Further information about measurement uncertainties is provided on request</p>

## POWER SUPPLY SYSTEM UTILISED

Power supply voltage.....:	<input type="checkbox"/> 240V AC 50Hz <input type="checkbox"/> 230V AC 50Hz <input type="checkbox"/> 200V AC 60Hz <input type="checkbox"/> 115V AC 60Hz <input type="checkbox"/> 400V 3NAC 50Hz <input type="checkbox"/> 230V 3AC 50Hz <input checked="" type="checkbox"/> 3 - 5V DC <input type="checkbox"/> 24V DC
Grounding conditions .....	<input checked="" type="checkbox"/> Not grounded <input type="checkbox"/> Grounded from its power supply connection <input type="checkbox"/> Additional chassis grounding

## EVALUATION OF PERFORMANCE

### PERFORMANCE TESTS

Performance checks.....:	The system shall keep on running. i.e. no hangups No unexpected calls /alarms shall be generated
Performance tests.....:	The system shall keep on running. i.e. no hangups No unexpected calls /alarms shall be generated
Monitoring during tests.....:	Orange LEDs blinks when the system operated correctly 
<p>Note 1: Performance check is a short functional test carried out during or after a technical test to confirm that the equipment operates.</p> <p>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.</p> <p>Note 3: Monitoring during tests describes which functions were monitored and how.</p>	



## GENERAL PERFORMANCE CRITERIA

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

During test	After test
<b>Performance criterion A:</b> Operate as intended. No loss of function. No unintentional responses.	<b>Performance criterion A:</b> Operate as intended. No loss of function. No degradation of performance. No loss of stored data or user programmable functions.
<b>Performance criterion B:</b> May be loss of function (one or more). No unintentional responses.	<b>Performance criterion B:</b> Operate as intended. Lost function(s) shall be self-recoverable. No degradation of performance. No loss of stored data or user programmable functions

## TRANSMITTER PERFORMANCE CRITERIA

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

During continuous tests	During transient tests
<b>Performance criterion CT:</b> 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.	<b>Performance criterion TT:</b> 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.
<b>Modification by the manufacturer:</b> Not modified	<b>Modification by the manufacturer:</b> 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
<p><b>Performance criterion CR :</b>            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.</p>	<p><b>Performance criterion TR :</b>            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.</p>
<p><b>Modification by the manufacturer:</b>            Not modified</p>	<p><b>Modification by the manufacturer:</b>            Not modified</p>

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
<b>Draft EN 301 489-01:V2.2.0</b>	<i>ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU</i>
<b>Final Draft EN 301 489-03:V2.1.1</b>	<i>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; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU</i>
<b>Draft EN 301 489-17: V3.2.0</b>	<i>ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Broadband Data Transmission Systems; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU</i>
<b>EN 55032:2012</b>	<i>Electromagnetic compatibility of multimedia equipment - Emission requirements</i>
<b>FCC CFR 47 Part 15</b>	<i>Digital devices - Unintentional radiators, Class B Digital Device</i>
<b>ICES-003, Issue 6:2016</b>	<i>Spectrum Management and Telecommunications Policy. Interference-Causing Equipment Standard. Information Technology Equipment (Including Digital Apparatus - Limits and Methods of Measurement (Issue 6, June 2016)</i>

## APPLIED TESTS

Requirements – Tests	Reference standards	Verdict
Conducted Emissions	EN 301 489-01:V2.2.0 EN 301 489-03:V2.1.1 EN 301 489-17:V3.2.0 EN 55032:2012 FCC CFR 47 Part 15 ICES-003, Issue 6:2016 CISPR 16-2-1:2014, Ed.3.0	PASS
Conducted Emissions (Telecom Port)	EN 301 489-01:V2.2.0 EN 301 489-03:V2.1.1 EN 301 489-17:V3.2.0 EN 55032:2012 ICES-003, Issue 6:2016 EN 55022:2010	N/A
Radiated Emissions (30MHz-1000MHz)	EN 301 489-01:V2.2.0 EN 301 489-03:V2.1.1 EN 301 489-17:V3.2.0 EN 55032:2012 FCC CFR 47 Part 15 ICES-003, Issue 6:2016 CISPR 16-2-3:2014, Ed.3.2	PASS§
Radiated Emissions (1GHz-10GHz)	EN 55032:2012 FCC CFR 47 Part 15 ICES-003, Issue 6:2016 CISPR 16-2-3:2014, Ed.3.2	PASS§
Harmonic Current Emissions	EN 301 489-01:V2.2.0 EN 301 489-03:V2.1.1 EN 301 489-17:V3.2.0	PASS
Voltage Variations/Fluctuations/Flicker	EN 301 489-01:V2.2.0 EN 301 489-03:V2.1.1 EN 301 489-17:V3.2.0	PASS
Electrostatic Discharge (ESD) Immunity	EN 301 489-01:V2.2.0 EN 301 489-03:V2.1.1 EN 301 489-17:V3.2.0 EN 61000-4-2:2009, Ed.2.0	PASS
Radiated RF Disturbance Immunity	EN 301 489-01:V2.2.0 EN 301 489-03:V2.1.1 EN 301 489-17:V3.2.0 EN 61000-4-3:2010, Ed.3.2	PASS
Electric Fast Transients Immunity	EN 301 489-01:V2.2.0 EN 301 489-03:V2.1.1 EN 301 489-17:V3.2.0 EN 61000-4-4:2012, Ed.3.0	PASS
Surge Immunity	EN 301 489-01:V2.2.0 EN 301 489-03:V2.1.1 EN 301 489-17:V3.2.0 EN 61000-4-5:2014, Ed.3.0	PASS
Conducted RF Disturbance Immunity	EN 301 489-01:V2.2.0 EN 301 489-03:V2.1.1 EN 301 489-17:V3.2.0 EN 61000-4-6:2014, Ed.4.0	PASS

Requirements – Tests	Reference standards	Verdict
Dips and Interruptions Immunity	EN 301 489-01:V2.2.0 EN 301 489-03:V2.1.1 EN 301 489-17:V3.2.0 EN 61000-4-11:2004, Ed.2.0	PASS

§ This report covers only spurious emissions for CISPR, FCC and ICES 003. The radio spurious emissions are covered in relevant radio standards.

- 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:  $\pm 3.8$  dB (9 kHz – 150 kHz);  $\pm 3.5$  dB (150 kHz – 30 MHz)

#### Instruments used during measurement

Instrument list:      AMN: R&S / ESH3-Z5 (N-3403) (09/2017)  
                              EMI Receiver: R&S / ESCI 3 (N-4259) (08/2017)  
                              Pulse Limiter: R&S / ESH3-Z2 (LR-1074) (05/2018)

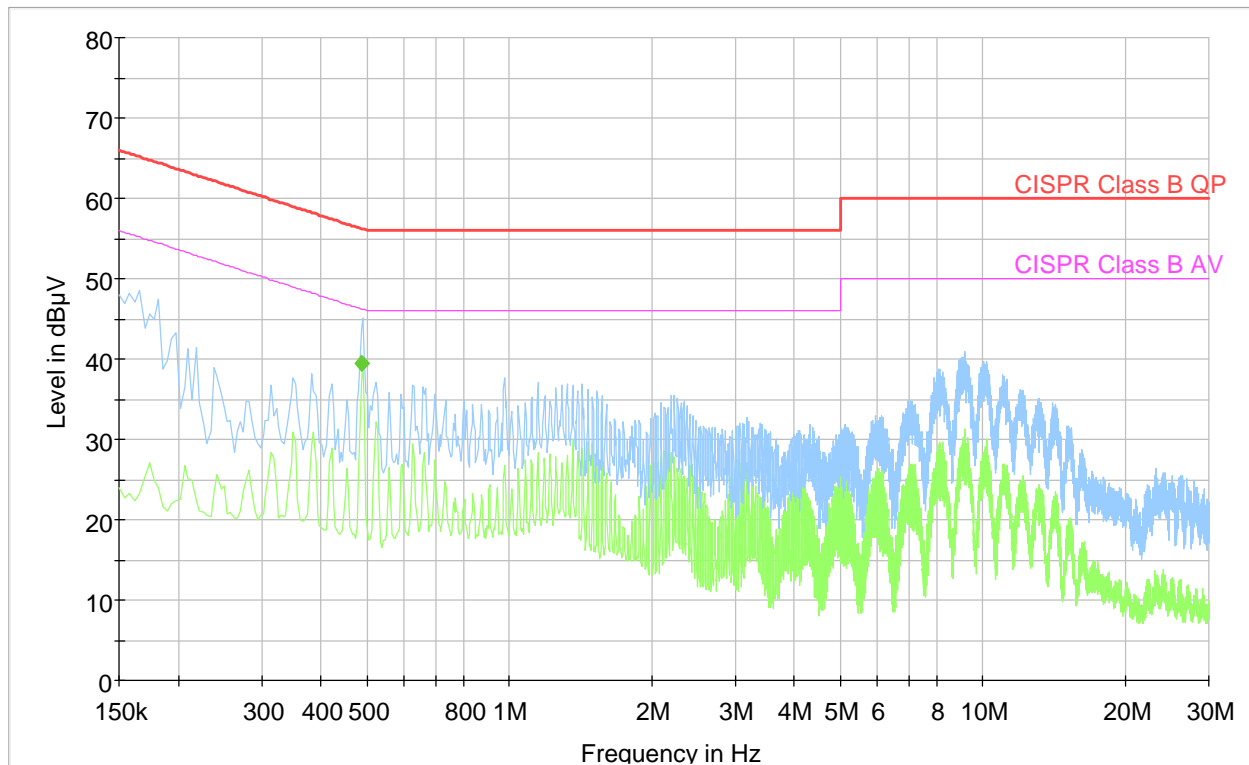
#### Conformity

Verdict: Pass

Test engineer: G.Suhanthakumar

## EMISSION SPECTRUM - EU

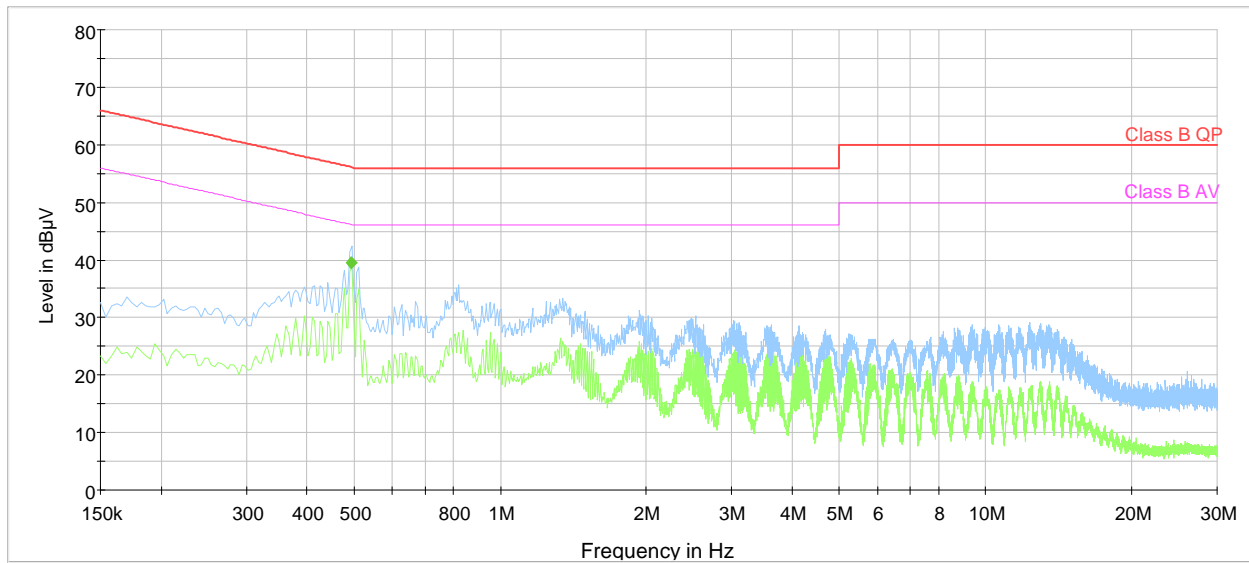
Full Spectrum



## MEASUREMENT DATA

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr. (dB)
0.488	---	39.50	46.20	6.70	1000	9	N	GND	10.1

### EMISSION SPECTRUM - FCC PART 15B/ICES 003



### MEASUREMENT DATA

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr. (dB)
0.492	---	39.48	46.13	6.66	1000	9	N	GND	10.1



## RADIATED EMISSIONS (30MHZ-1000MHZ)

### 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.

The measuring antenna was located 10 meters from the specimen. Measurements were performed with a hybrid bilog antenna. Antenna elevation = 100-400 cm above the ground reference plane. Specimen rotation = 0-360°.

#### 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: ± 4.1 dB (30 MHz – 200 MHz); ± 4.2 dB (200 MHz – 1000 MHz)

#### Instruments used during measurement

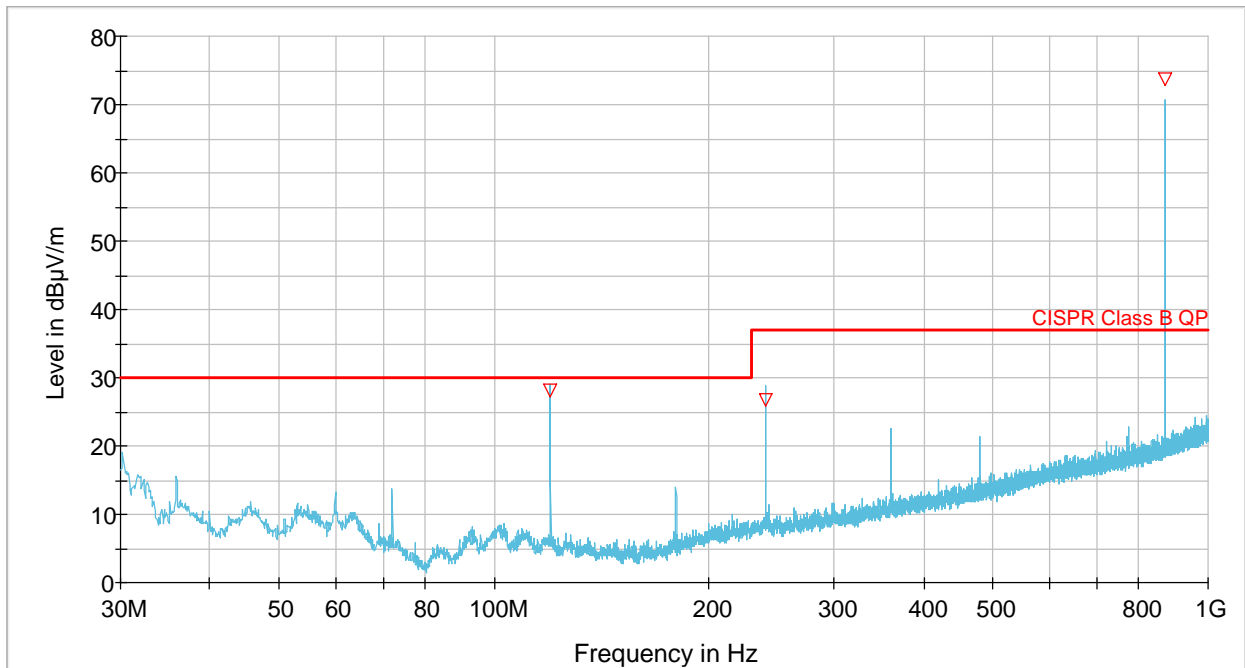
Instrument list:      Antenna, bilog: Schwarzbeck / VULB 9163 (LR-1616) (02/2019)  
                                 EMI Receiver: R&S / ESU40 (LR-1639) (11/2017)  
                                 Preamplifier: Sonoma / 310N (LR-1686) (05/2017)

#### Conformity

Verdict: Pass

Test engineer: G.Suhanthakumar

**EMISSION SPECTRUM - EN 55032**



30 – 1000MHz ( 869.216MHz is a wanted signal)

**MEASUREMENTS DATA**

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
120.012	28.11	30.00	1.89	1000.0	120.000	118.0	V	166	-21.3
240.025	26.73	37.00	10.27	1000.0	120.000	374.0	H	84	-18.6
869.216	Wanted signal								

### EMISSION SPECTRUM - FCC PART 15B/ICES 003

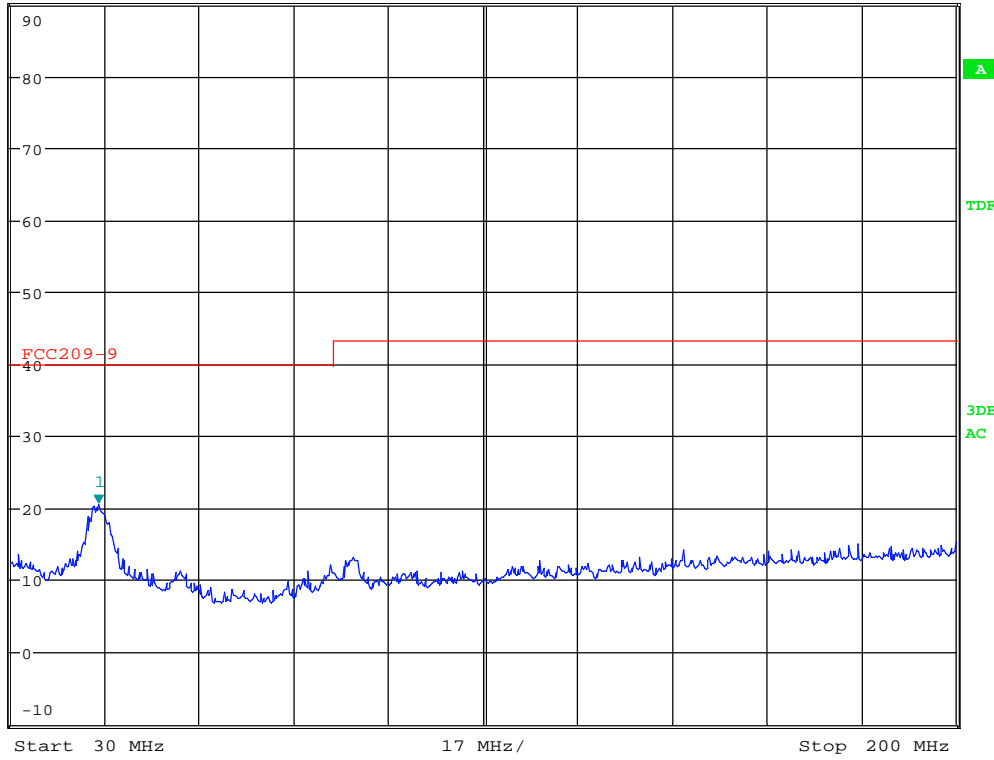


**MARKER 1**  
45.80128205 MHz

\*RBW 100 kHz      Marker 1 [T1 ]  
VBW 300 kHz      20.57 dBμV/m  
SWT 20 ms      45.801282051 MHz

Ref 90 dBμV/m      \*Att 15 dB

1 PK  
MAXH

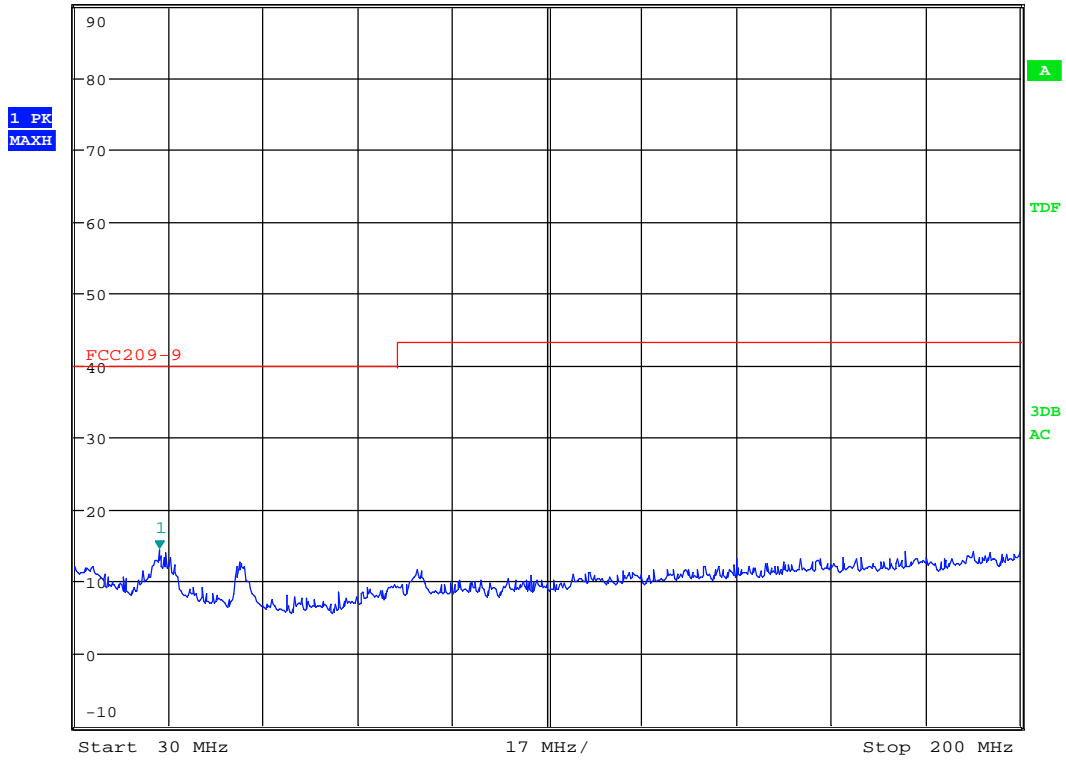


Date: 18.MAY.2017 14:37:15

VP: 30 - 200MHz @ 3m distance.



**MARKER 1**  
 45.25641026 MHz  
 Ref 90 dB $\mu$ V/m \* Att 15 dB  
 \* RBW 100 kHz Marker 1 [T1 ]  
 VBW 300 kHz 14.41 dB $\mu$ V/m  
 SWT 20 ms 45.256410256 MHz



Date: 18.MAY.2017 14:39:55

HP: 30 - 200MHz @ 3m distance

### MEASUREMENTS DATA

Frequency (MHz)	QuasiPeak (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
-	-	-	-	-	-	-	-	-	-

## RADIATED EMISSIONS (ABOVE 1GHZ)

### TEST DESCRIPTION

#### Method

The reference method for this test is CISPR 16-1-4 (2007).

#### 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 (SAC) (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.

The measuring antenna was located 3 meters from the specimen. Measurements were performed with a double-ridged guide horn antenna. Antenna elevation = fixed at centre of specimen height. Specimen rotation = 0-360°.

#### Conditions

- Frequency range was 1-2GHz (Highest internal frequency is between 108MHz and 500MHz).
- Frequency range was 1-5GHz (Highest internal frequency is between 500MHz and 1000MHz).
- Frequency range was 1-6GHz (Highest internal frequency is above 1000MHz).
- Frequency range was 1-12GHz (Highest internal frequency is 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 in order to obtain step size resolution < 500 kHz).

Measurement uncertainty:  $\pm 4.8$  dB (1 GHz – 6 GHz)

#### Instruments used during measurement

Instrument list:      Antenna Horn: EMCO / 3115 (LR-1330) (12/2019)  
                                 EMI Receiver: R&S / ESU40 (LR-1639) (11/2017)  
                                 Preamplifier: HP / 8449B (LR-1322) (07/2017)

#### Conformity

Verdict:

PASS

Test engineer:

G.Suhanthakumar

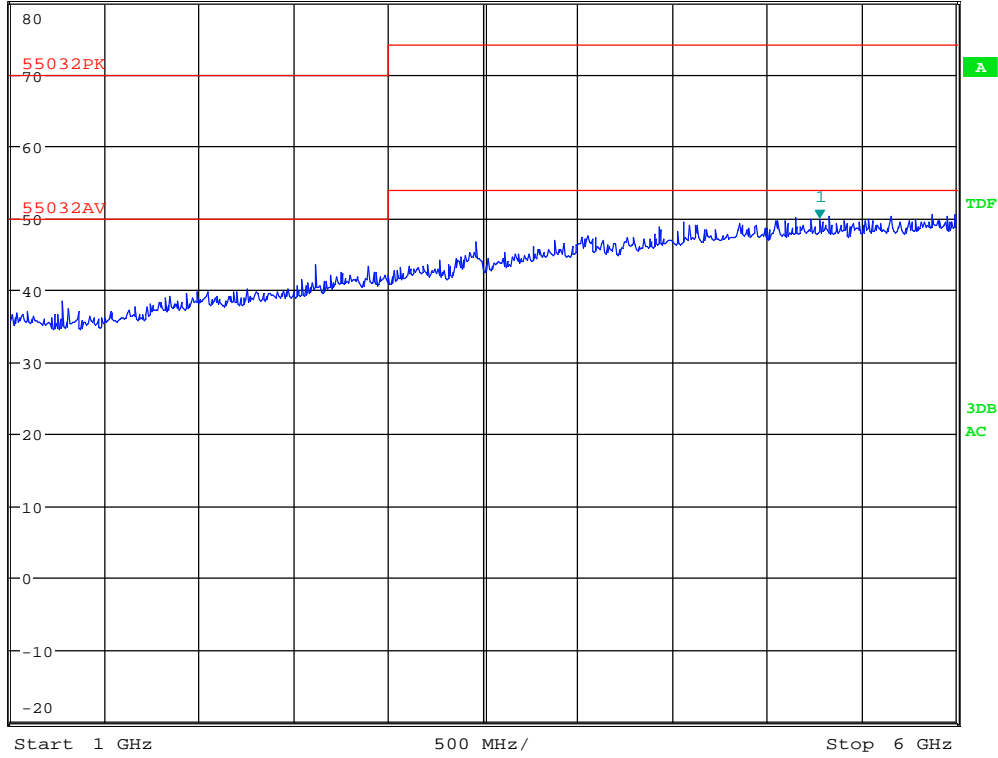
### EMISSION SPECTRUM - EN 55032



**MARKER 1**  
 5.278846154 GHz  
 Ref 80 dB $\mu$ V/m \* Att 5 dB

\* RBW 1 MHz Marker 1 [T1 ]  
 VBW 3 MHz 49.92 dB $\mu$ V/m  
 SWT 30 ms 5.278846154 GHz

1 PK  
 MAXH



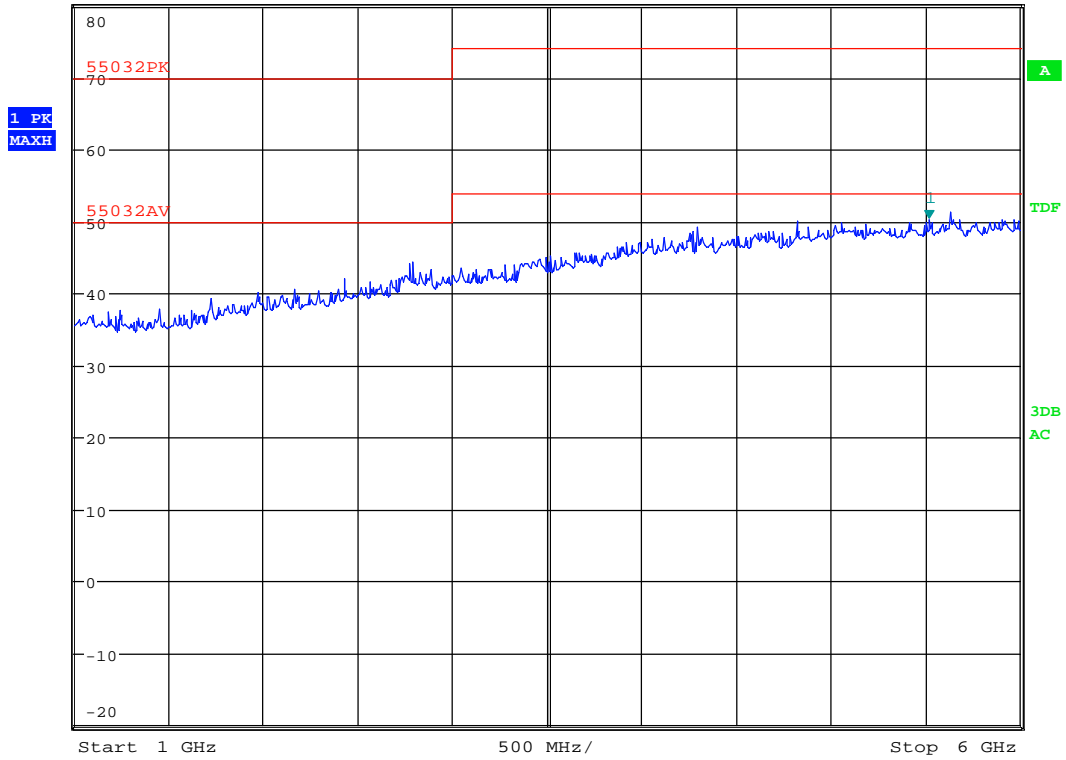
Date: 19.MAY.2017 17:06:01

VP: 1 – 6GHz



**MARKER 1**  
5.519230769 GHz  
Ref 80 dB $\mu$ V/m \* Att 5 dB

\* RBW 1 MHz Marker 1 [T1 ]  
VBW 3 MHz 50.27 dB $\mu$ V/m  
SWT 30 ms 5.519230769 GHz



Date: 19.MAY.2017 17:06:59

HP: 1 – 6GHz

## MEASUREMENTS DATA

Frequency (MHz)	QuasiPeak (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
-	-	-	-	-	-	-	-	-	-

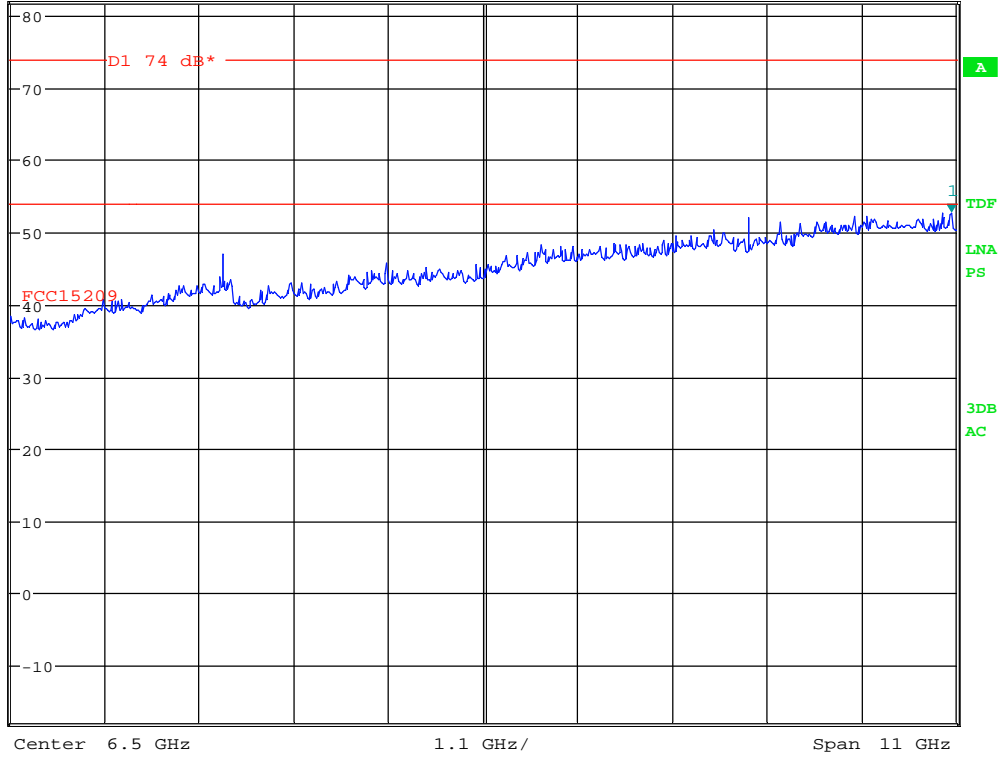


### EMISSION SPECTRUM - FCC PART 15B/ICES003



**MARKER 1**  
 11.94711538 GHz  
 Ref 82 dB $\mu$ V/m \* Att 10 dB \* RBW 1 MHz Marker 1 [T1 ]  
 VBW 3 MHz 52.71 dB $\mu$ V/m  
 SWT 65 ms 11.947115385 GHz

1 PK  
MAXH

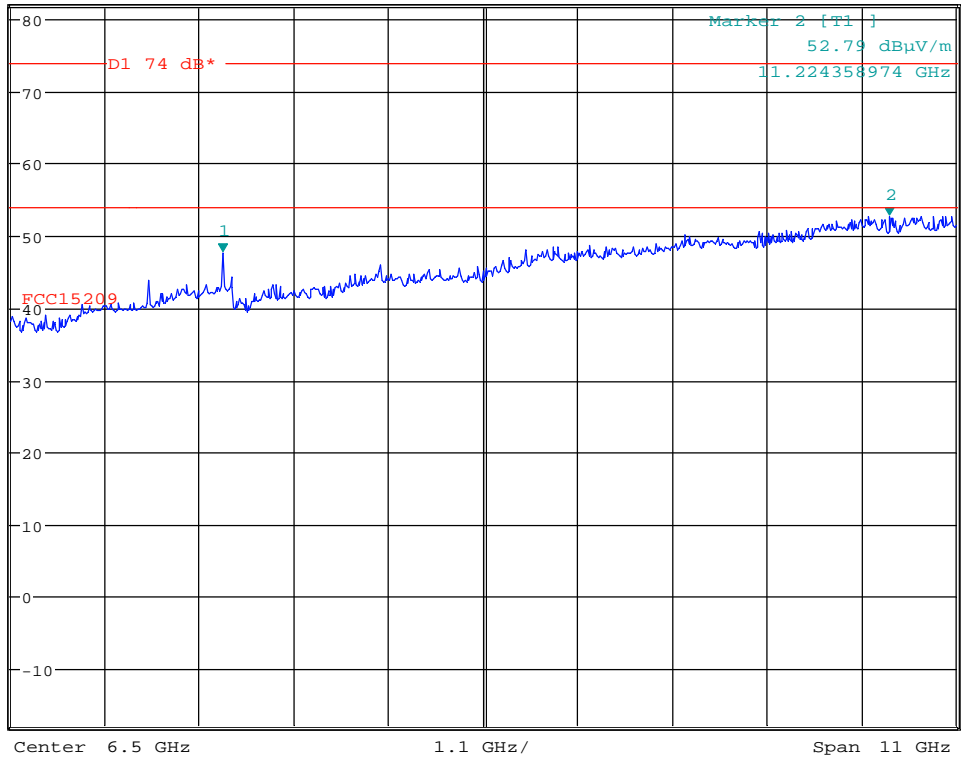


Date: 9.JUN.2017 17:46:11

VP: 1- 12GHz



**MARKER 1**  
 3.467948718 GHz  
 Ref 82 dB $\mu$ V/m \*Att 10 dB \*RBW 1 MHz Marker 1 [T1 ]  
 VBW 3 MHz 47.75 dB $\mu$ V/m  
 SWT 65 ms 3.467948718 GHz



Date: 9.JUN.2017 17:47:56

HP: 1 – 12GHz

## MEASUREMENTS DATA

Frequency (MHz)	QuasiPeak (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
-	-	-	-	-	-	-	-	-	-

# HARMONIC CURRENT EMISSIONS

## TEST DESCRIPTION

### Method

EN 61000-3-2:2014

Electro-magnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current  $\leq 16$  A per phase).

### 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  $> 25$ W
- Class C with active input power  $\leq 25$ W
- Class C with active input power  $\leq 25$ W (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 1<sup>st</sup> to 40<sup>th</sup> of the mains frequency (50 Hz or 60 Hz).

Measurement uncertainty:  $\pm 7.1$  %

### Instruments used during measurement

Instrument list: [Power Analyzer: CI / 10001iX-CTS \(LR-1549\) \(10/2020\)](#)

### Conformity

Verdict:

PASS

Test engineer:

G.Suhanthakumar

## MEASUREMENT DATA

Test Result: Pass      Source qualification: Normal  
 THC(A): 0.005    I-THD(%): 240.5    POHC(A): 0.002    POHC Limit(A): 0.377

Highest parameter values during test:

V_RMS (Volts):	229.94	Frequency(Hz):	50.00
I_Peak (Amps):	0.042	I_RMS (Amps):	0.006
I_Fund (Amps):	0.002	Crest Factor:	8.533
Power (Watts):	0.4	Power Factor:	0.395

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.002	1.620	N/A	0.002	2.430	N/A	Pass
3	0.002	3.450	N/A	0.003	5.175	N/A	Pass
4	0.001	0.645	N/A	0.001	0.968	N/A	Pass
5	0.001	1.710	N/A	0.002	2.565	N/A	Pass
6	0.001	0.450	N/A	0.001	0.675	N/A	Pass
7	0.001	1.155	N/A	0.002	1.733	N/A	Pass
8	0.000	0.345	N/A	0.000	0.518	N/A	Pass
9	0.001	0.600	N/A	0.001	0.900	N/A	Pass
10	0.000	0.276	N/A	0.000	0.414	N/A	Pass
11	0.001	0.495	N/A	0.001	0.743	N/A	Pass
12	0.000	0.230	N/A	0.000	0.345	N/A	Pass
13	0.001	0.315	N/A	0.001	0.473	N/A	Pass
14	0.000	0.197	N/A	0.000	0.295	N/A	Pass
15	0.001	0.225	N/A	0.001	0.338	N/A	Pass
16	0.000	0.173	N/A	0.000	0.260	N/A	Pass
17	0.001	0.199	N/A	0.001	0.299	N/A	Pass
18	0.000	0.153	N/A	0.000	0.230	N/A	Pass
19	0.001	0.178	N/A	0.001	0.267	N/A	Pass
20	0.000	0.138	N/A	0.000	0.207	N/A	Pass
21	0.001	0.161	N/A	0.001	0.241	N/A	Pass
22	0.000	0.125	N/A	0.000	0.188	N/A	Pass
23	0.001	0.147	N/A	0.001	0.221	N/A	Pass
24	0.000	0.115	N/A	0.000	0.173	N/A	Pass
25	0.001	0.135	N/A	0.001	0.203	N/A	Pass
26	0.000	0.106	N/A	0.000	0.159	N/A	Pass
27	0.001	0.125	N/A	0.001	0.188	N/A	Pass
28	0.000	0.099	N/A	0.000	0.149	N/A	Pass
29	0.001	0.116	N/A	0.001	0.174	N/A	Pass
30	0.000	0.092	N/A	0.000	0.138	N/A	Pass
31	0.001	0.110	N/A	0.001	0.164	N/A	Pass
32	0.000	0.086	N/A	0.000	0.129	N/A	Pass
33	0.001	0.102	N/A	0.001	0.153	N/A	Pass
34	0.000	0.081	N/A	0.000	0.122	N/A	Pass
35	0.001	0.096	N/A	0.001	0.144	N/A	Pass
36	0.000	0.077	N/A	0.000	0.116	N/A	Pass
37	0.001	0.092	N/A	0.001	0.137	N/A	Pass
38	0.000	0.073	N/A	0.000	0.110	N/A	Pass
39	0.001	0.087	N/A	0.001	0.131	N/A	Pass
40	0.000	0.069	N/A	0.000	0.104	N/A	Pass

### Voltage Source Verification Data (Run time)

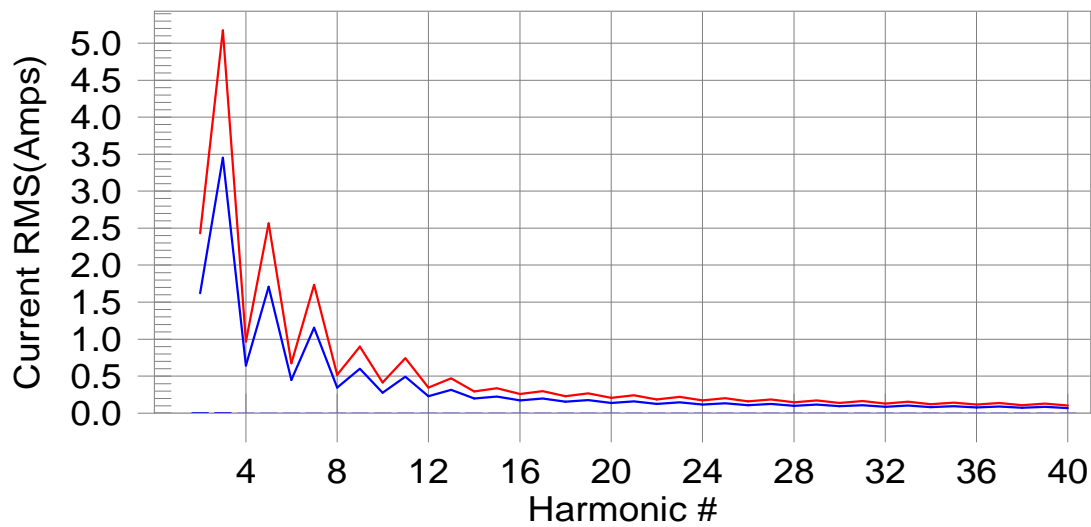
Test Result: Pass      Source qualification: Normal

Highest parameter values during test:

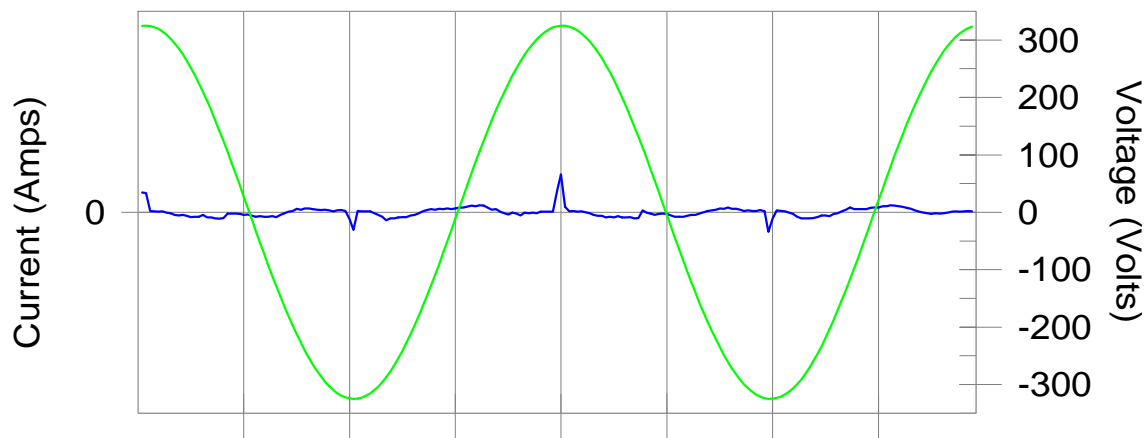
Voltage (Vrms):	229.94	Frequency(Hz):	50.00
I_Peak (Amps):	0.042	I_RMS (Amps):	0.006
I_Fund (Amps):	0.002	Crest Factor:	8.533
Power (Watts):	0.4	Power Factor:	0.395

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.079	0.460	17.20	OK
3	0.504	2.069	24.36	OK
4	0.055	0.460	12.06	OK
5	0.059	0.919	6.41	OK
6	0.034	0.460	7.42	OK
7	0.053	0.690	7.70	OK
8	0.008	0.460	1.66	OK
9	0.029	0.460	6.20	OK
10	0.011	0.460	2.48	OK
11	0.006	0.230	2.82	OK
12	0.012	0.230	5.41	OK
13	0.010	0.230	4.27	OK
14	0.008	0.230	3.58	OK
15	0.011	0.230	4.80	OK
16	0.005	0.230	2.29	OK
17	0.009	0.230	3.70	OK
18	0.007	0.230	2.93	OK
19	0.007	0.230	2.98	OK
20	0.012	0.230	5.33	OK
21	0.013	0.230	5.87	OK
22	0.004	0.230	1.73	OK
23	0.011	0.230	4.96	OK
24	0.002	0.230	0.90	OK
25	0.005	0.230	2.11	OK
26	0.003	0.230	1.15	OK
27	0.007	0.230	3.15	OK
28	0.003	0.230	1.16	OK
29	0.010	0.230	4.26	OK
30	0.003	0.230	1.20	OK
31	0.005	0.230	2.25	OK
32	0.002	0.230	0.84	OK
33	0.009	0.230	3.81	OK
34	0.002	0.230	1.03	OK
35	0.010	0.230	4.29	OK
36	0.002	0.230	0.88	OK
37	0.006	0.230	2.66	OK
38	0.002	0.230	0.81	OK
39	0.005	0.230	2.23	OK
40	0.008	0.230	3.37	OK

### EMISSION SPECTRUM



### CURRENT AND VOLTAGE WAVESHAPES



# VOLTAGE CHANGES/FLUCTUATIONS/FLICKER

## TEST DESCRIPTION

### Method

EN 61000-3-3:2013

Electro-magnetic compatibility (EMC) – Part 3-3: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current  $\leq 16$  A per phase and not subject to conditional connection.

### 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.

### 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:  $\pm 7.7$  %

### Instruments used during measurement

Instrument list: Power Analyser: CI / 10001iX-CTS (LR-1549) (10/2020)

### Conformity

Verdict: **PASS**

Test engineer: **G.Suhanthakumar**

## MEASUREMENT DATA

Parameter	Limit	Measured	Result
Dmax	4 % / 6 % / 7 %	0 %	PASS
Dc	3.3 %	0 %	PASS
Dt	500 msec	0 msec	PASS
Pst	1.0	-	PASS
Plt	0.65	-	PASS

## FLICKER PROBABILITY

Time is too short for Pst and Plt plots

# 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 470k $\Omega$  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 470k $\Omega$  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:  $\pm 10\%$ ; Transient shape:  $\pm 30\%$

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: Schaffner / NSG 435 (LR-1281) (05/2017)

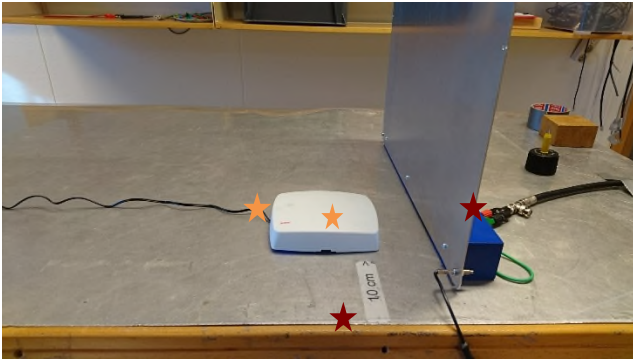
Temperature:	23 °C
Humidity:	42 %RH
Atmos. pressure:	998 hPA

### Conformity

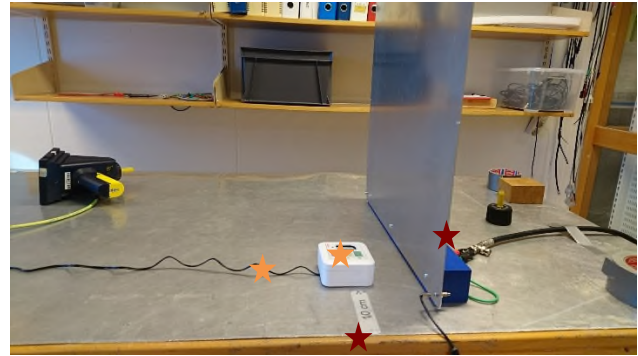
Verdict:	PASS
Test engineer:	G.Suwanthakumar



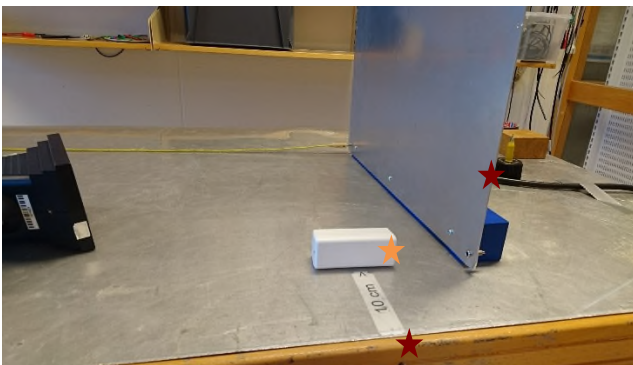
## PHOTO OF SELECTED TEST POINTS



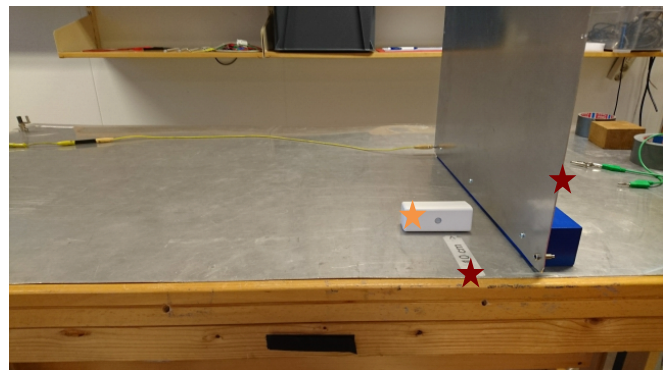
NUREP



NUWBM3



NUUTX



NUWIR

- ★ = 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
Enclosure , all sides	±4, ±8	Air	10	B	A	PASS
Power cable	±4, ±8	Air	10	B	A	PASS
Touch switches	±4, ±8	Air	10	B	A	PASS
HCP	±2, ±4	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 no unintended responses during test(s).

# 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 wooden table 10 cm above the floor.
- The specimen was placed on a wooden 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  $\leq 300$  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:

- 0° (front)       Top (handheld)
- 90°               Bottom (handheld)
- 180° (rear)
- 270°

Frequency sweep rate:

- 1% step with 3 sec dwell time
- $1.5 \times 10^{-3}$  decades/sec (80 – 1000MHz)
- $0.5 \times 10^{-3}$  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:  $\pm 2.4$  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: AR / 120S1G4M3 (LR-1595) (N/A)  
 Amplifier, RF: AR / 500W100A (LR-1354) (N/A)  
 Antenna Log-periodic: R&S / HL 023A1 (LR-0282) (N/A)  
 Field Probe: AR / FP4080 (LR-1424) (02/2019)  
 Generator, RF: R&S / SMB100A (LR-1603) (04/2017)  
 Power Meter: R&S / NRVD 857.8008.02 (LR-1347) (05/2019)  
 Probe, RF: R&S / NRV-Z5 (LR-1372) (05/2019)

### Conformity

Verdict:

PASS

Test engineer:

G.Suhanthakumar

**DETAILED TEST LOG**

Frequency range [MHz]	Field strength [V/m]	Polarization	Required Criteria	Complied Criteria	Result
80 - 1000	10	HOR	A	A	PASS
80 - 1000	10	VER	A	A	PASS
1000 - 4000	10	HOR	A	A	PASS
1000 - 4000	10	VER	A	A	PASS
4000 - 6000	3	HOR	A	A	PASS
4000 - 6000	3	VER	A	A	PASS

**OBSERVATIONS**

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

# 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:
<input type="checkbox"/> 1 minute	<input checked="" type="checkbox"/> 5kHz	Peak voltage: $\pm 10\%$
<input type="checkbox"/> 2 minutes	<input type="checkbox"/> 100kHz	Transient shape: $\pm 30\%$
<input checked="" type="checkbox"/> 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: Haefely / IP4A (LR-1638) (N/A)  
Generator: EMTesT / UCS 500 N7 (LR-1608) (05/2018)

### Conformity

Verdict: **PASS**  
Test engineer: **G.Suhandhakumar**

## DETAILED TEST LOG

Port	Applied Level [kV]	Injection Method	Required Criteria	Complied Criteria	Result
AC Input Port (N+L1+PE)	$\pm 1\text{kV}, \pm 2\text{kV}$	CDN	B	B	PASS

## OBSERVATIONS

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

# SURGE 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

### Procedure

The surge test was only applied to the supply terminals.

Differential mode surges were applied line-to-neutral and line-to-line, with a source impedance of  $2\Omega$ . Common mode surges were applied line-to-ground and neutral-to-ground, with a source impedance of  $12\Omega$ .

Phase angles:	Repetition rate:	Impulses per test level:	Uncertainty figures:
<input checked="" type="checkbox"/> $0^\circ$	<input type="checkbox"/> 20 sec.	<input checked="" type="checkbox"/> 5 impulses	Peak voltage: $\pm 10\%$
<input checked="" type="checkbox"/> $90^\circ$	<input checked="" type="checkbox"/> 60 sec.	<input type="checkbox"/> Other:	Rise time: $\pm 30\%$
<input checked="" type="checkbox"/> $180^\circ$	<input type="checkbox"/> Other:		Duration: $\pm 20\%$
<input checked="" type="checkbox"/> $270^\circ$			

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 (LR-1608) (05/2018)

### Conformity

Verdict: **PASS**  
 Test engineer: **G.Suhandhakumar**

## DETAILED TEST LOG

Line	Source impedance	CDN	Applied Level [kV]	Required Criteria	Complied Criteria	Result
AC Input Port (N to L1)	$2\Omega$	MCN	$\pm 1kV$	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:

- 150kHz – 80MHz
- 150kHz – 230MHz

#### Modulation:

- 80% AM @ 1000Hz
- 80% AM @ 400Hz
- 50% PM @ 217Hz

#### Frequency sweep rate:

- 1% step with 3 sec dwell time
- $1.5 \times 10^{-3}$  decades/sec
- Other:

Measurement uncertainty:  $\pm 2.8$  dB (150 kHz – 26 MHz);  $\pm 3.7$  dB (26 MHz – 80 MHz)

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: AR / 75A250 (N-3816) (N/A)  
 CDN: TESEQ / CDN-M3-16 (LR-1653) (N/A)  
 CDN: FCC / FCC-801-M2-16 (LR-1312) (N/A)  
 Generator, signal: R&S / SMB100A (LR-1649) (05/2019)  
 Power Meter: R&S / NRP2 (LR-1652) (10/2017)

### Conformity

Verdict: **PASS**  
 Test engineer: **G.Suhanthakumar**

## DETAILED TEST LOG

Tested Port	Injection Method	Return Path	Applied Level [Vrms]	Required Criteria	Complied Criteria	Result
AC Input Port	CDN-M2	Capacitive	10 Vrms	A	A	PASS

## OBSERVATIONS

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

# 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:                            | Repetitions:                                       | Phase angle:   |
| <input checked="" type="checkbox"/> 10 sec. | <input checked="" type="checkbox"/> 3 occurrences. | <input type="checkbox"/> Not applicable (DC supply).           |
| <input type="checkbox"/> 20 sec.            | <input type="checkbox"/> Other:                    | <input type="checkbox"/> Only at 0°.                           |
| <input type="checkbox"/> Other:             |  | <input type="checkbox"/> Only at zero crossings (0° and 180°). |
|   |  | <input type="checkbox"/> 0-270°; each 90°.                     |
|   |  | <input checked="" type="checkbox"/> 0-315°; each 45°.          |

Measurement uncertainty: Voltage level:  $\pm 5\%$ ; Zero crossing control:  $\pm 10\%$ ; Phase control:  $\pm 10^\circ$

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 (LR-1608) (05/2018)  
Motorized Variac: EMTesT / MV 2616 (LR-1610) (05/2018)

### Conformity

Verdict: **PASS**  
Test engineer: **G.Suhanthakumar**

## DETAILED TEST LOG

Voltage Reduction	Voltage Levels		Duration [cycles]	Required Criteria	Complied Criteria	Result
	Nominal	Test				
30% Dip	230	161	25	B	A	PASS
60% Dip	230	92	10	B	A	PASS
>95% Dip	230	0	0.5, 1	B	A	PASS
100% Interruption	230	0	250	B	B	PASS

## OBSERVATIONS

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

# Annexes



# PHOTOS

Test set-up for EMC emissions measurements

Conducted emissions



NUREP

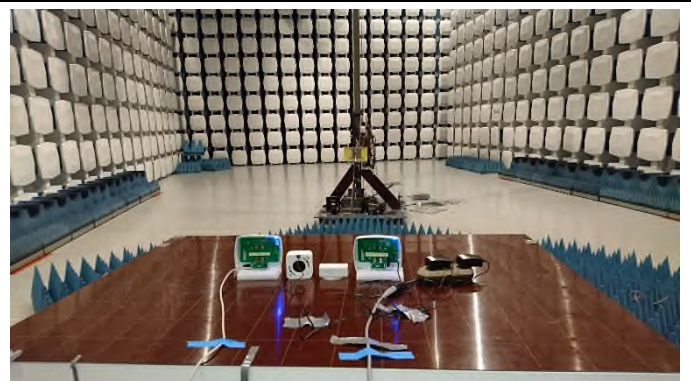


NUWMB3

< 1GHz



>1GHz



Harmonic & Flicker



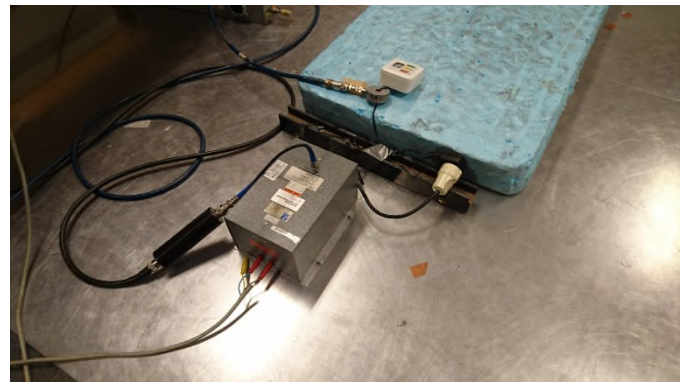
NUWBM3



NUREP

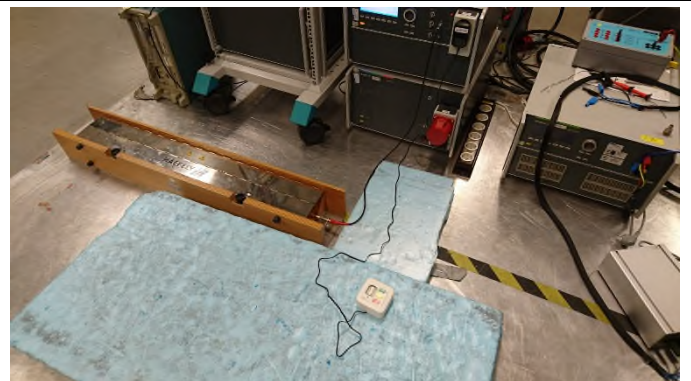
Test set-up for EMC immunity tests

Conducted RF immunity

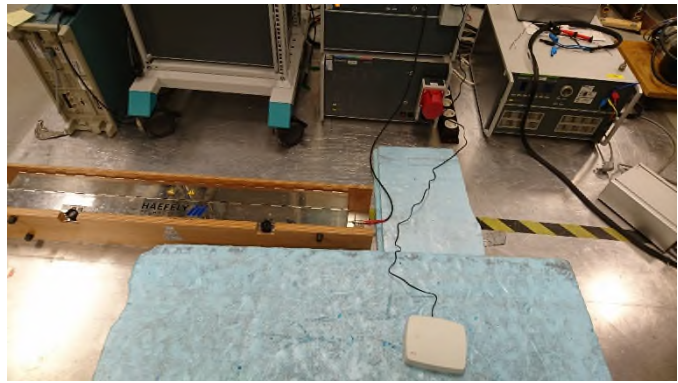


NUWBM3

Transient, voltage dips & Surge



NUWBM3

	 <p>NUREP</p>