





Test Report Electromagnetic Compatibility

Product	USB Camera		
Name and address of the applicant	Huddly Gaustadalléen 21 0349 Oslo, Norway		
Name and address of the manufacturer	Huddly Gaustadalléen 21 0349 Oslo, Norway		
Model	Huddly GO 1.0		
Rating	5V DC 900mA		
Trademark	Huddly		
Serial number	-		
Additional information	-		
Tested according to	EN 55022:2010 Class B EN 55032:2012 Class B FCC CFR 47 Part 15 Class B ICES-003 Issue 6:2016 Class B EN 55024:2010		
Order number	318331		
Tested in period	2017-01-06 and 2017-01-26		
Issue date	2017-03-14		
Name and address of the testing laboratory	<div> <div> Nemko Group Nemko AS Gaustadalléen 30, P.O.Box 73 Blindern, 0314 Oslo, Norway </div> <div> Telephone (+47) 22 96 03 30 Fax (+47) 22 96 05 50 </div> <div>   </div> </div>		
An accredited technical test executed under the Norwegian accreditation scheme			
<div> <div>  </div> <div>  </div> </div> <div> <div>Prepared by [Kristian Osvoll]</div> <div>Approved by [Roger Berget]</div> </div>			
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REPORT REVISIONS

Revision #	Date	Order #	Description
00	2017-03-14	318331	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.....:	The tested device is a USB-connected video camera for desktop use
Model/type.....:	Huddly GO 1.0
Serial number.....:	-
Operating voltage.....:	5V DC
Maximum power/current.....:	900mA
Protection class.....:	III
Highest clock frequency.....:	Internal in CPU: 580 MHz, external oscillator: 27 MHz
Hardware version.....:	A6-01
Software version.....:	0.0.4
Mounting position.....:	<input checked="" type="checkbox"/> Table top equipment <input 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 equipment <input type="checkbox"/> Other:

INPUT/OUTPUT PORTS

Port name and description	Cable		
	> 3m	Attached during test	Shielded
USB port	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>



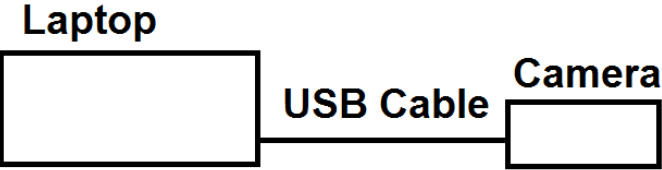
OPERATING MODES

No.	Description	Applied for testing	
		Emissions	Immunity
1	Video streaming to computer	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

ACCESSORIES USED DURING TEST

Description	Manufacturer	Type
Laptop computer	HP	Zbook 14

PHOTOS AND DRAWINGS


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

OTHER INFORMATION

Modifications to the test item.....:	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.....:	<input checked="" type="checkbox"/> GAUSTAD (Gaustadalleen 30, N-0314 Oslo, Norway)
	<input checked="" type="checkbox"/> KJELLER (Instituttveien 6, N-2007 Kjeller, Norway)
Laboratory accreditation.....:	 Norsk Akkreditering – TEST 033 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>Ambient temperature: 15 – 35 °C Relative humidity: 25 – 75 %RH Atmospheric pressure: 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 IECCE/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"/> 400V 3NAC 50Hz <input type="checkbox"/> 230V AC 50Hz <input type="checkbox"/> 230V 3AC 50Hz <input type="checkbox"/> 200V AC 60Hz <input checked="" type="checkbox"/> 5V DC <input type="checkbox"/> 115V AC 60Hz <input type="checkbox"/> 24V DC
	<input type="checkbox"/> The power supply voltage has been selected after a maximum disturbance investigation over the product's rated voltage range. Voltage: Frequency:
Grounding conditions	<input checked="" type="checkbox"/> Not grounded <input type="checkbox"/> Ground is received from its power supply connection <input type="checkbox"/> Additional chassis grounding

EVALUATION OF PERFORMANCE

PERFORMANCE TESTS

Performance checks.....:	Video signal checked on a laptop.
Performance tests.....:	Video signal checked on a laptop.
Monitoring during tests.....:	Video signal checked on a laptop.
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.	

PERFORMANCE CRITERIA

Performance criteria is.....:	<input checked="" type="checkbox"/> based on the applied product standard
	<input type="checkbox"/> based on a declaration from the customer
Criterion A.....:	The device shall continue to operate as intended both during and after the test. No degradation of performance or loss of function is allowed below the expected performance level of the device
Criterion B.....:	The device shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below the expected performance level of the device
Criterion C.....:	Temporary loss of function during test is allowed, provided the function is self-recoverable or can be restored by the operation of the controls

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 table above (A, B or C).

TEST REPORT SUMMARY

APPLIED STANDARDS

Standards	Titles
EN 55022:2010	<i>Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement</i>
EN 55032:2012	<i>Electromagnetic compatibility of multimedia equipment - Emission requirements</i>
FCC CFR 47 Part 15	<i>Digital devices - Unintentional radiators</i>
ICES-003 Issue 6:2016	<i>Digital Apparatus – Spectrum Management and Telecommunications Policy Interference-Causing Equipment Standard</i>
EN 55024:2010	<i>Information technology equipment - Immunity characteristics - Limits and methods of measurement</i>

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.

TESTS SUMMARY

Requirements – Tests	Reference standards	Verdict
Conducted Emissions	EN 55022:2010 Class B EN 55032:2012 Class B FCC CFR 47 Part 15 Class B ICES-003 Issue 6:2016 Class B CISPR 16-2-1:2014, Ed.3.0	N/A
Conducted Emissions (Telecom Port)	EN 55022:2010 Class B EN 55032:2012 Class B FCC CFR 47 Part 15 Class B ICES-003 Issue 6:2016 Class B CISPR 16-2-1:2014, Ed.3.0	N/A
Radiated Emissions (30MHz-1000MHz)	EN 55022:2010 Class B EN 55032:2012 Class B FCC CFR 47 Part 15 Class B ICES-003 Issue 6:2016 Class B CISPR 16-2-3:2014, Ed.3.2	PASS
Radiated Emissions (1GHz-6GHz)	EN 55022:2010 Class B EN 55032:2012 Class B FCC CFR 47 Part 15 Class B ICES-003 Issue 6:2016 Class B CISPR 16-2-3:2014, Ed.3.2	PASS
Electrostatic Discharge (ESD) Immunity	EN 55024:2010 EN 61000-4-2:2009, Ed.2.0	PASS
Radiated RF Disturbance Immunity	EN 55024:2010 EN 61000-4-3:2010, Ed.3.2	PASS
Electric Fast Transients Immunity	EN 55024:2010 EN 61000-4-4:2012, Ed.3.0	N/A
Surge Immunity	EN 55024:2010 EN 61000-4-5:2014, Ed.3.0	N/A
Conducted RF Disturbance Immunity	EN 55024:2010 EN 61000-4-6:2014, Ed.4.0	N/A
Power Frequency Magnetic Field Immunity	EN 55024:2010 EN 61000-4-8:2010, Ed.2.0	N/A
Dips and Interruptions Immunity	EN 55024:2010 EN 61000-4-11:2004, Ed.2.0	N/A

- 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

Test Results

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) (02/2017)
 EMI Receiver: R&S / ESU40 (LR-1639) (11/2017)
 Preamplifier: Sonoma / 310N (LR-1686) (05/2017)

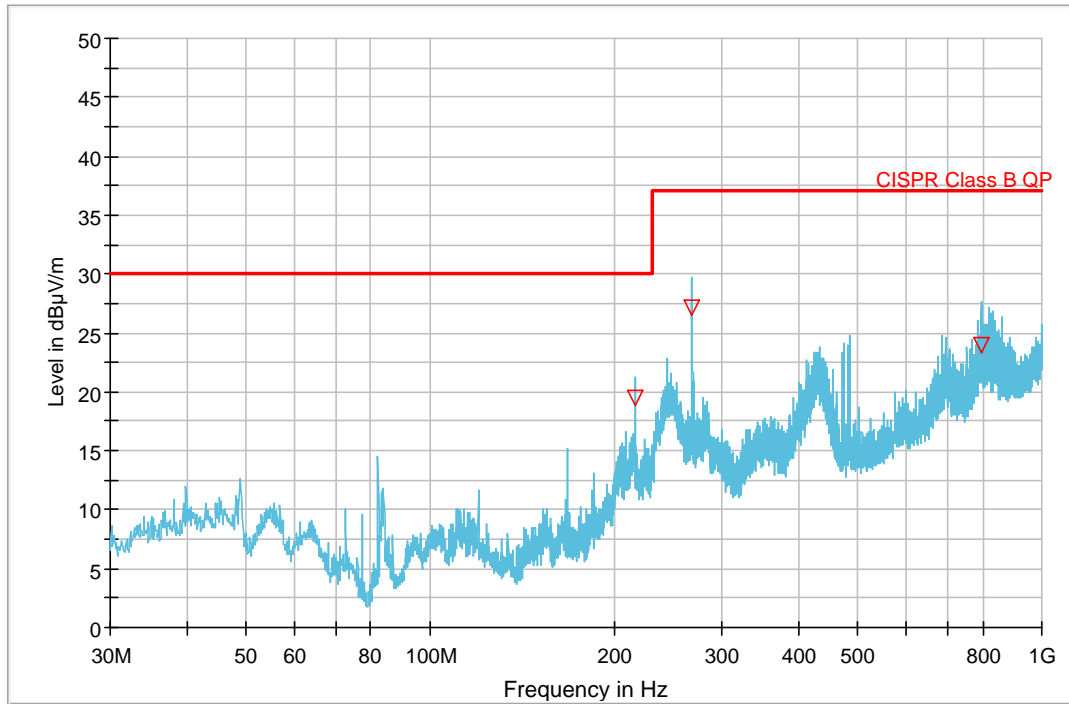
Conformity

Verdict: Pass

Test engineer: K Osvoll

EMISSION SPECTRUM

Full Spectrum



MEASUREMENTS DATA

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
216.001	19.54	30.00	10.46	1000.0	120.000	100.0	V	175	-19.3
268.253	27.15	37.00	9.85	1000.0	120.000	336.0	H	202	-17.8
796.583	24.03	37.00	12.97	1000.0	120.000	131.0	H	75	-7.5

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: ± 4.8 dB (1 GHz – 6 GHz)

Instruments used during measurement

Instrument list: [EMI Receiver: R&S / ESR7 \(LR-1675\) \(02/2018\)](#)
[EMI Receiver: R&S / ESU40 \(LR-1639\) \(11/2017\)](#)
[Preamplifier: HP / 8449B \(LR-1322\) \(07/2017\)](#)

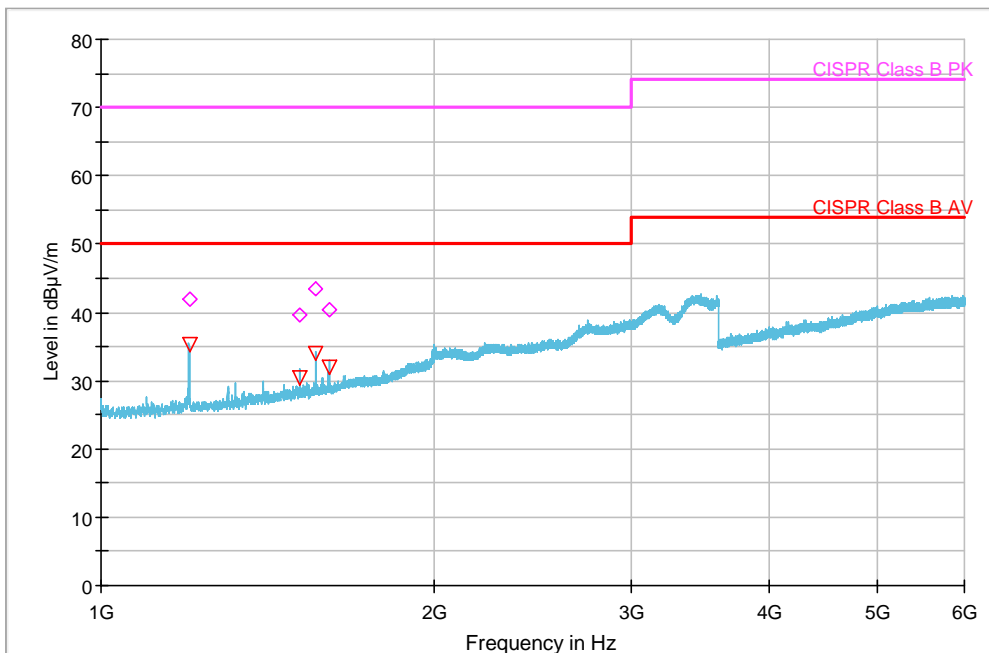
Conformity

Verdict: [Pass](#)
Test engineer: [K Osvoll](#)

EMISSION SPECTRUM

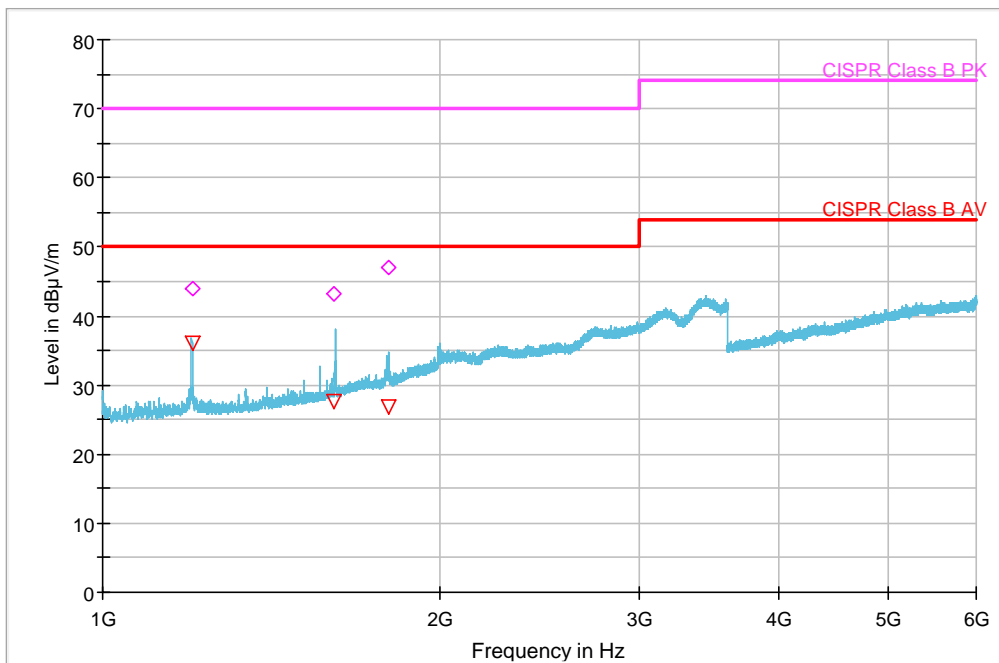
Horizontal:

Full Spectrum



Vertical:

Full Spectrum



MEASUREMENTS DATA

Frequency (MHz)	Average (dBμV/m)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Azimuth (deg)	Corr. (dB)
1200.609	---	41.85	70.00	28.15	1000.0	1000.000	H	323	-10.2
1200.609	35.21	---	50.00	14.79	1000.0	1000.000	H	323	-10.2
1512.768	30.46	---	50.00	19.54	1000.0	1000.000	H	162	-8.2
1512.768	---	39.54	70.00	30.46	1000.0	1000.000	H	162	-8.2
1560.792	---	43.55	70.00	26.45	1000.0	1000.000	H	303	-7.7
1560.792	33.91	---	50.00	16.09	1000.0	1000.000	H	303	-7.7
1608.816	31.83	---	50.00	18.17	1000.0	1000.000	H	305	-7.3
1608.816	---	40.41	70.00	29.59	1000.0	1000.000	H	305	-7.3
1200.612	35.95	---	50.00	14.05	1000.0	1000.000	V	323	-10.2
1200.612	---	44.01	70.00	25.99	1000.0	1000.000	V	323	-10.2
1608.816	27.53	---	50.00	22.47	1000.0	1000.000	V	1	-7.3
1608.816	---	43.31	70.00	26.69	1000.0	1000.000	V	1	-7.3
1797.827	---	47.00	70.00	23.00	1000.0	1000.000	V	337	-5.6
1797.827	26.95	---	50.00	23.05	1000.0	1000.000	V	337	-5.6

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 Ω 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 Ω 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:

24 °C

Humidity:

33 %RH

Conformity

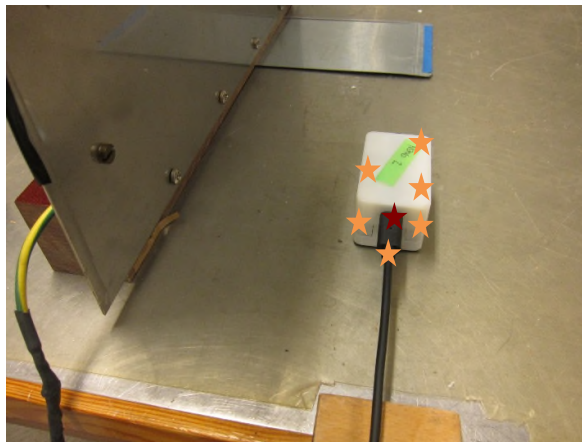
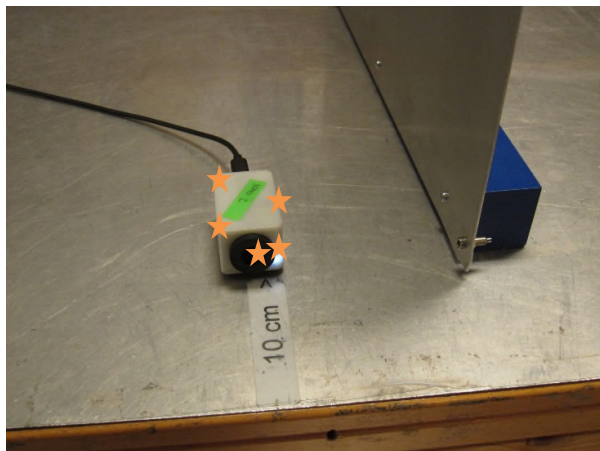
Verdict:

Pass

Test engineer:

K Osvoll

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
Camera enclosure	±4, ±8	Air	ND	B	A	PASS
USB cable	±4, ±8	Air	ND	B	A	PASS
USB connector	±2, ±4	Contact	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 ≤ 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
- ☐ 1.5×10^{-3} decades/sec (80 – 1000MHz)
- ☐ 0.5×10^{-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: ± 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, RF: Amplifier Research / 500W100A (LR-1354) (N/A)
Antenna Log-periodic: Rohde&Schwarz / HL 023A1 (LR-0282) (N/A)
Field Probe: Amplifier Research / FP4080 (LR-1424) (02/2017)
Generator, RF: Rohde&Schwarz / SMB100A (LR-1603) (04/2017)
Power Meter: Rohde&Schwarz / NRVD 857.8008.02 (LR-1347) (03/2017)
Probe, RF: Rohde&Schwarz / NRV-Z5 (LR-1372) (03/2017)

Conformity

Verdict:

Pass

Test engineer:

K Osvoll

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

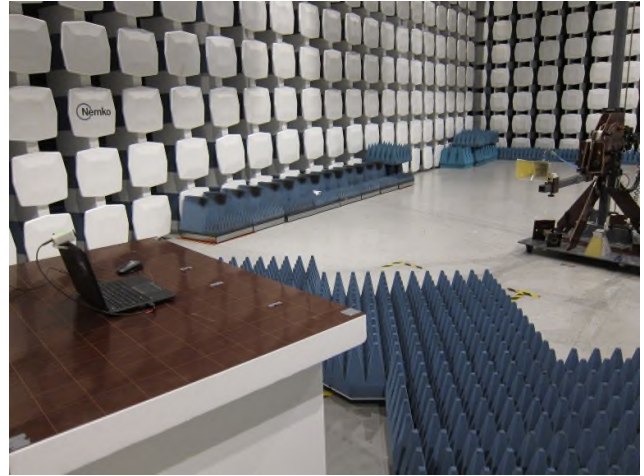
OBSERVATIONS

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

Annexes

PHOTOS

Test set-up for EMC emissions measurements



Test set-up for EMC immunity tests

