

EMI - TEST REPORT

- FCC 90.217 -

Type / Model Name : LOG D-3 4G16-913

Product Description : Universal data logger

Applicant : Seba Dynatronic Mess- und Ortungstechnik GmbH

Address : Dr.-Herbert-lann-Str. 6

96148 BAUNACH, GERMANY

Manufacturer : Seba Dynatronic Mess- und Ortungstechnik GmbH

Address : Dr.-Herbert-lann-Str. 6

96148 BAUNACH, GERMANY

Licence holder : Seba Dynatronic Mess- und Ortungstechnik GmbH

Address : Dr.-Herbert-lann-Str. 6

96148 BAUNACH, GERMANY

Test Result according to the standards listed in clause 1 test standards:	POSITIVE
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Test Report No. : T40170-00-00KJ	25. November 2015 <small>Date of issue</small>
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Deutsche
Akkreditierungsstelle
D-PL-12030-01-01
D-PL-12030-01-02

The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test results without the written permission of the test laboratory.

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Attachment A & B as separately supplement

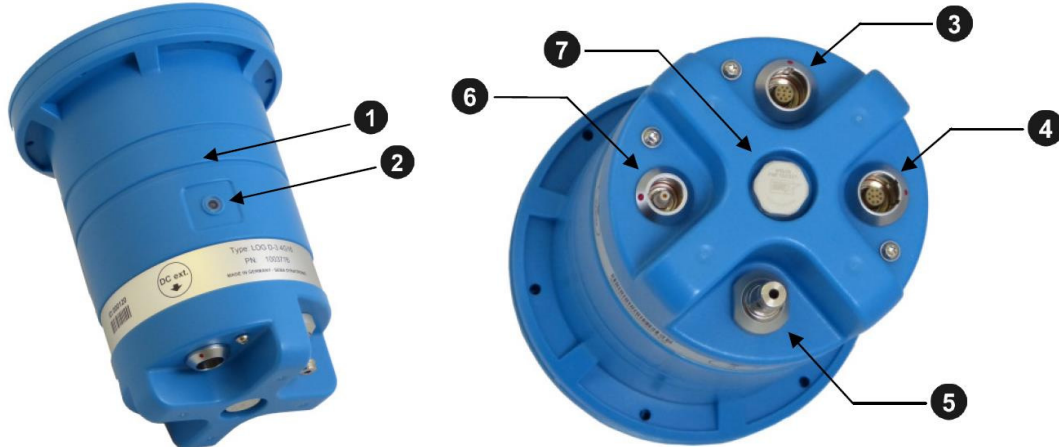
1 TEST STANDARDS

The tests were performed according to following standards:

FCC 47 CFR Part 2: 2015	Frequency allocations and radio treaty matters; General rules and regulations
FCC 47 CFR Part 15: 2015	Radio frequency devices
FCC 47 CFR Part 90: 2015	Private land mobile radio services
ANSI/TIA-603-C: 2004	Land Mobile FM or PM-Communications Equipment - Measurement and Performance Standards
ANSI C63.4: 2014	Methods of Measurement of Radio-Noise Emissions from Low- Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
KDB 412172 D01: 2010	Determining ERP and EIRP

2 EQUIPMENT UNDER TEST

2.1 Photo documentation of the EUT – Detailed photos see ATTACHMENT A



Item	Description
1	On/Off contact area
2	I/O control lamp
3	IN socket for connecting sensors, alarm triggering or peripheral devices
4	DC ext. socket for connecting an external power supply

Item	Description
5	Connector P (internal pressure sensor) for connecting hoses via quick-release coupling
6	GSM socket for connecting the external GSM antenna
7	Venting membrane

2.2 Short description of the equipment under test (EUT)

The LOG D-3 is a universal data logger for the surveillance of water pipe networks. It is able to record the water pressure with its built-in pressure-sensor and the sensor-data of several external sensors with the output signals voltage (0V...5V), current (0/4mA...20mA), pulses, frequency and PWM on up to 4 channels. Those sensors measure the water flow for example. The stored data can be read out via radio interface. Furthermore the logger can upload the data to a FTP server via GPRS/UMTS communication. You can also program the device by radio. Therefore you have to use an external radio-interface, the so called LOG RI.

The LOG D-3 radio-module is operating at 913 MHz (bidirectional radio) and has an internal ¼ lambda wire antenna. The logger is supplied by one or two (GSM logger) internal lithium primary batteries. It can also be supplied externally.

2.3 Variants of the EUT

- There are no other variants.

2.4 Test Jig

- No test jig is used.

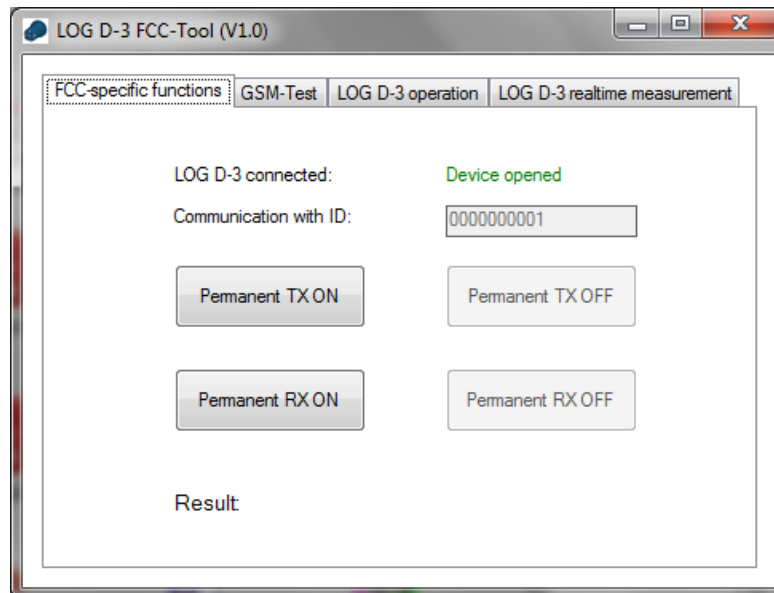
FCC ID: OV8-LOGD3

2.5 Technical description of the equipment under test (EUT)

Items	Description
Power supply - internal - external	2x 3.6 V primary battery (LiSoCl) 100-240 V AC; 50-60 HZ; 700 mA; 13.2 V DC 2 A
AC/DC adapter supply voltage	V _{nom} = 12.0 V V _{min} = 10.2 V V _{max} = 13.8 V
Type of modulation	FSK
Operating frequency	913.02 MHz
Frequency band	902 MHz to 928 MHz
Data rate	9.6 kBd
Channel spacing	-
Number of channels	1
Antenna type	internal wire antenna, 85 mm
Antenna connector	None
Antenna gain	1.0 dBi
Lowest internal frequency	32.768 kHz
Highest internal frequency	25.000 MHz
Serial number	10633940001
Firmware version	0.0.99
Number of tested samples	1

2.6 Test software

- A special test software was used, to performe the different radio tests.



FCC ID: OV8-LOGD3

2.7 Transmit operating modes

The equipment under test was operated during the measurement under the following conditions:

- cont. TX at 913.02 MHz (unmodulated)

- cont. TX at 913.02 MHz (modulated)

- cont. RX mode

2.8 Peripheral devices and interface cables

The following peripheral devices and interface cables are connected during the measurements:

- | | |
|---------------------|--------------------|
| - AC/DC Adapter | Model : FW7362/13 |
| - GSM antenna | Model : Hirschmann |
| - USB adapter cable | Model : Seba |

2.9 Determination of worst case conditions for final measurement

Measurements have been made in all three orthogonal axes and the settings of the EUT were changed to locate at which position and at what setting of the EUT produce the maximum of the emissions.

For the further measurement, the EUT is set in horizontal position with the orientation of the LED upwards.

3 Test result summary

FCC Rule Part	Test Procedure	Description	Result
15.107(a)	ANSI C63.4:2014	AC power line conducted emissions	passed
90.217	ANSI/TIA-603-C-2004	Maximum output power	passed
90.217(a)	ANSI/TIA-603-C-2004	Spurious emissions radiated	passed
90.217(a)	ANSI/TIA-603-C-2004	Modulation characteristics	passed
General	ANSI/TIA-603-C-2004	Occupied bandwidth	passed
90.213(a)(b)	ANSI/TIA-603-C-2004	Frequency stability	passed
15.109	ANSI C63.4:2014	Receiver spurious emissions	passed

3.1 FINAL ASSESSMENT

Select final Assessment

Date of receipt of test sample : acc. to storage records

Testing commenced on : 14 September 2015

Testing concluded on : 09 November 2015

Checked by:

Tested by:



Thomas Weise
I confirm the correctness and
integrity of this document
2015.11.25 11:18:42 +01'00'

Thomas Weise
Laboratory Manager



Josef Knab
I'm the autor of this document
2015.11.25 11:08:07 +01'00'

Josef Knab
Radio Team

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

**CSA Group Bayern GmbH
Ohmstrasse 1-4
94342 STRASSKIRCHEN
GERMANY**

4.2 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature: 15-35 ° C

Humidity: 30-60 %

Atmospheric pressure: 86-106 kPa

4.3 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. It is noted that the expanded measurement uncertainty corresponds to the measurement results from the standard measurement uncertainty multiplied by the coverage factor $k = 2$. The true value is located in the corresponding interval with a probability of 95 %. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16-4-2 / 11.2003 „Uncertainties, statistics and limit modelling – Uncertainty in EMC measurements“ and is documented in the quality system acc. to DIN EN ISO/IEC 17025. For all measurements shown in this report, the measurement uncertainty of the test laboratory, CSA Group Bayern GmbH, is below the measurement uncertainty as defined by CISPR. Therefore, no special measures must be taken into consideration with regard to the limits according to CISPR. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

5 TEST RESULTS

5.1 Conducted emissions

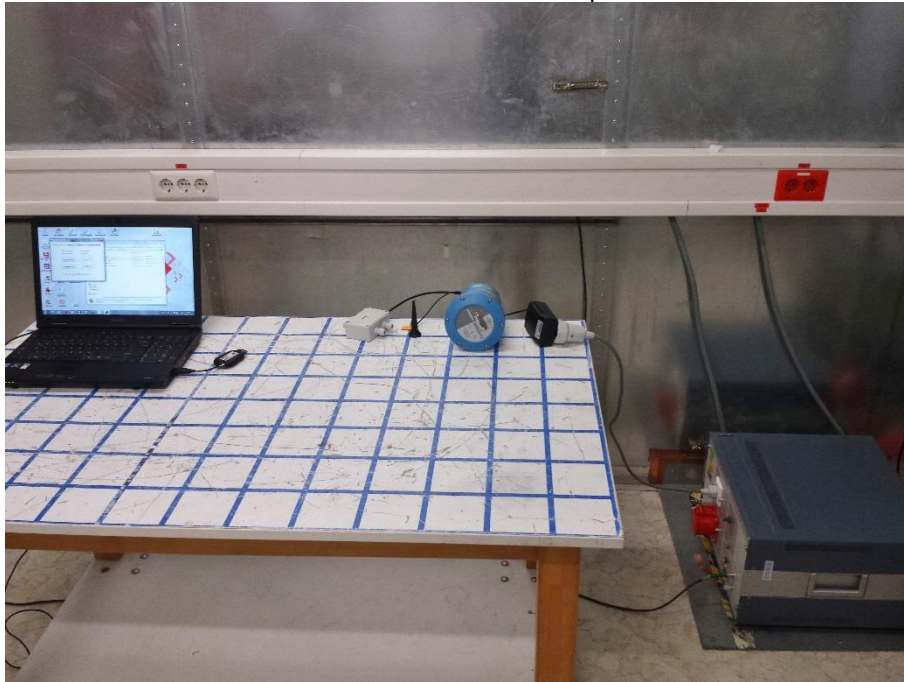
For test instruments and accessories used see section 6 Part A 4.

5.1.1 Description of the test location

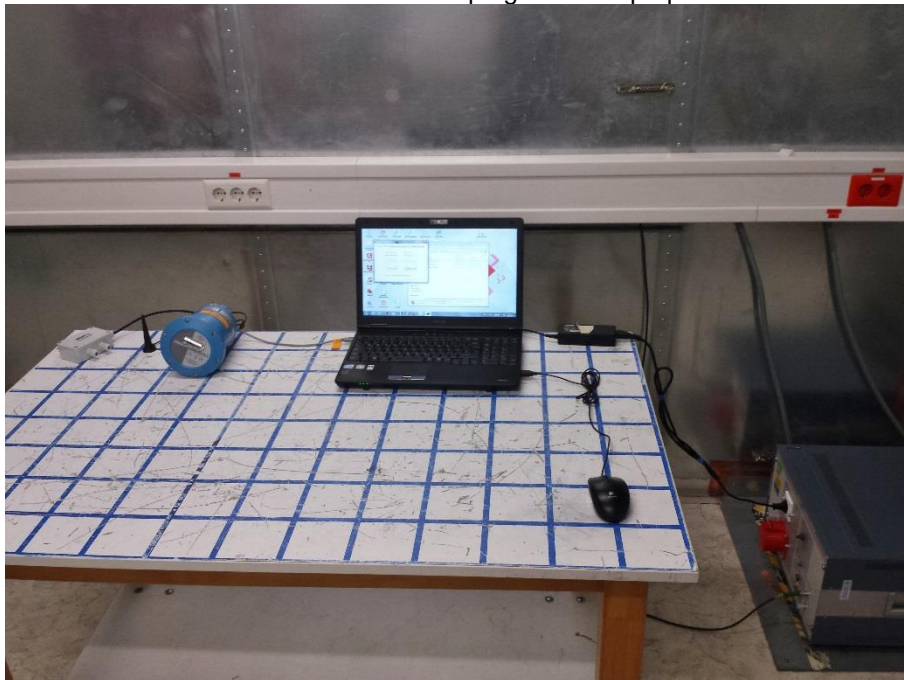
Test location: Shielded Room S2

5.1.2 Photo documentation of the test set-up

Powered over AC/DC Adapter



Powered over USB plug from a laptop



FCC ID: OV8-LOGD3

5.1.3 Applicable standard

According to FCC Part 15, Section 15.107(a):

Except for Class A devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the given limits.

5.1.4 Description of Measurement

The measurements are performed following the procedures set out in ANSI C63.4 described under item 4.4.3. If the minimum limit margin appears to be less than 20 dB with a peak mode measurement, the emissions are remeasured using a tuned receiver with quasi-peak and average detection and recorded on the data sheets.

5.1.5 Test result

Frequency range: 0.15 MHz - 30 MHz

Min. limit margin (AC powered) 13.2 dB at 21.51 MHz

Min. limit margin (USB powered) 9.76 dB at 20.80 MHz

Limit according to FCC Part 15, Section 15.207(a):

Frequency of Emission (MHz)	Conducted Limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency

The requirements are **FULFILLED**.

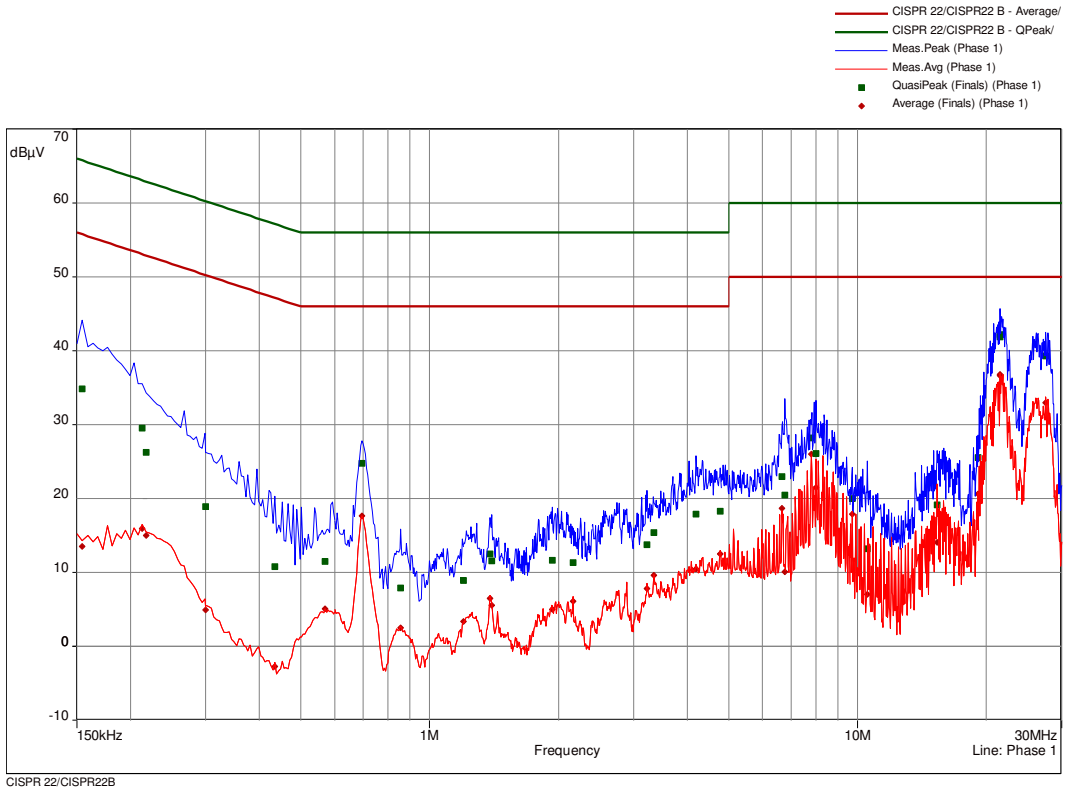
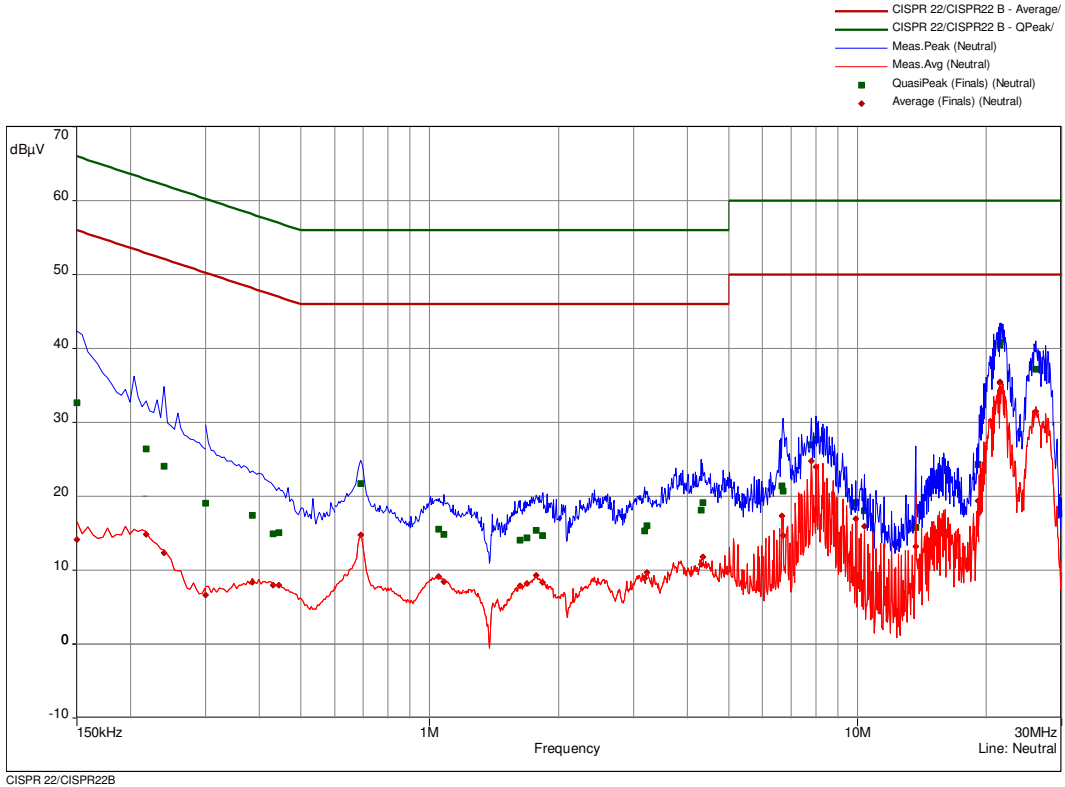
Remarks: For detailed test results please see the following test protocols.

FCC ID: OV8-LOGD3

5.1.6 Test protocol

Test point: N & L1 powered over AC/DC adapter
 Operation mode: TX continuous carrier
 Remarks: None
 Date: 09. November 2015

Result: passed



FCC ID: OV8-LOGD3

freq	SR	QP	margin	limit	AV	margin	limit	line	corr
MHz		dB(μV)	dB	dB	dB(μV)	dB	dB		dB
0.1545	1	34.83	30.92	65.75	13.53	42.23	55.75	Phase 1	9.83
0.213	1	29.55	33.53	63.09	15.98	37.11	53.09	Phase 1	9.82
0.2175	1	26.23	36.69	62.91	15.00	37.91	52.91	Phase 1	9.82
0.3	2	18.91	41.34	60.24	4.92	45.33	50.24	Phase 1	9.81
0.435	2	10.83	46.33	57.16	-2.75	49.91	47.16	Phase 1	9.81
0.57	2	11.47	44.53	56.00	5.08	40.92	46.00	Phase 1	9.81
0.6945	3	24.74	31.26	56.00	17.67	28.33	46.00	Phase 1	9.80
0.8565	3	7.93	48.07	56.00	2.49	43.51	46.00	Phase 1	9.80
1.2	3	8.87	47.13	56.00	3.34	42.66	46.00	Phase 1	9.79
1.3845	4	12.48	43.52	56.00	6.46	39.54	46.00	Phase 1	9.78
1.398	4	11.53	44.47	56.00	5.58	40.42	46.00	Phase 1	9.78
1.9335	4	11.61	44.39	56.00	5.01	40.99	46.00	Phase 1	9.80
2.163	4	11.37	44.63	56.00	6.10	39.90	46.00	Phase 1	9.80
3.2235	5	13.77	42.23	56.00	7.83	38.17	46.00	Phase 1	9.80
3.345	5	15.36	40.64	56.00	9.61	36.39	46.00	Phase 1	9.81
4.191	5	17.87	38.13	56.00	10.49	35.51	46.00	Phase 1	9.80
4.7805	5	18.29	37.71	56.00	12.52	33.48	46.00	Phase 1	9.82
6.6675	6	22.94	37.06	60.00	18.70	31.30	50.00	Phase 1	9.83
6.753	6	20.48	39.52	60.00	10.10	39.90	50.00	Phase 1	9.83
7.8105	6	28.19	31.81	60.00	25.99	24.01	50.00	Phase 1	9.85
8.0085	6	26.06	33.94	60.00	21.52	28.48	50.00	Phase 1	9.85
9.717	7	20.04	39.96	60.00	17.90	32.10	50.00	Phase 1	9.89
10.5405	7	13.24	46.76	60.00	7.04	42.96	50.00	Phase 1	9.92
15.351	7	19.18	40.82	60.00	14.08	35.92	50.00	Phase 1	10.12
19.1265	7	25.53	34.47	60.00	20.62	29.38	50.00	Phase 1	10.27
21.513	8	42.19	17.81	60.00	36.83	13.17	50.00	Phase 1	10.32
21.5175	8	41.86	18.14	60.00	36.67	13.33	50.00	Phase 1	10.32
27.489	8	39.28	20.72	60.00	33.00	17.00	50.00	Phase 1	10.30
0.15	9	32.69	33.31	66.00	14.11	41.89	56.00	Neutral	9.84
0.2175	9	26.43	36.49	62.91	14.84	38.07	52.91	Neutral	9.84
0.24	9	24.04	38.06	62.10	12.31	39.78	52.10	Neutral	9.83
0.3	10	19.06	41.18	60.24	6.67	43.58	50.24	Neutral	9.81
0.3855	10	17.41	40.75	58.16	8.39	39.77	48.16	Neutral	9.81
0.4305	10	14.91	42.33	57.24	7.99	39.25	47.24	Neutral	9.81
0.444	10	15.06	41.92	56.99	8.00	38.99	46.99	Neutral	9.81
0.69	11	21.74	34.26	56.00	14.79	31.21	46.00	Neutral	9.80
1.05	11	15.56	40.44	56.00	9.13	36.87	46.00	Neutral	9.80
1.0815	11	14.82	41.18	56.00	8.43	37.57	46.00	Neutral	9.80
1.6275	12	14.08	41.92	56.00	7.91	38.09	46.00	Neutral	9.78
1.6905	12	14.39	41.61	56.00	8.19	37.81	46.00	Neutral	9.78
1.776	12	15.42	40.58	56.00	9.28	36.72	46.00	Neutral	9.78
1.8345	12	14.66	41.34	56.00	8.38	37.62	46.00	Neutral	9.79
3.1785	13	15.33	40.67	56.00	8.91	37.09	46.00	Neutral	9.79
3.2235	13	16.02	39.98	56.00	9.69	36.31	46.00	Neutral	9.79
4.317	13	18.12	37.88	56.00	10.79	35.21	46.00	Neutral	9.80
4.353	13	19.16	36.84	56.00	11.77	34.23	46.00	Neutral	9.80
6.6675	14	21.43	38.57	60.00	17.33	32.67	50.00	Neutral	9.81
6.699	14	20.68	39.32	60.00	14.71	35.29	50.00	Neutral	9.80
7.8105	14	26.98	33.02	60.00	24.78	25.22	50.00	Neutral	9.81
8.004	14	27.76	32.24	60.00	23.97	26.03	50.00	Neutral	9.81
9.906	15	19.12	40.88	60.00	17.00	33.00	50.00	Neutral	9.82
10.383	15	18.06	41.94	60.00	15.97	34.03	50.00	Neutral	9.83
13.6635	15	15.76	44.24	60.00	13.18	36.82	50.00	Neutral	9.89
19.1265	15	24.33	35.67	60.00	19.41	30.59	50.00	Neutral	10.07
21.513	16	40.87	19.13	60.00	35.44	14.56	50.00	Neutral	10.05
21.5175	16	40.48	19.52	60.00	35.29	14.71	50.00	Neutral	10.05
26.058	16	37.21	22.79	60.00	31.50	18.50	50.00	Neutral	9.84

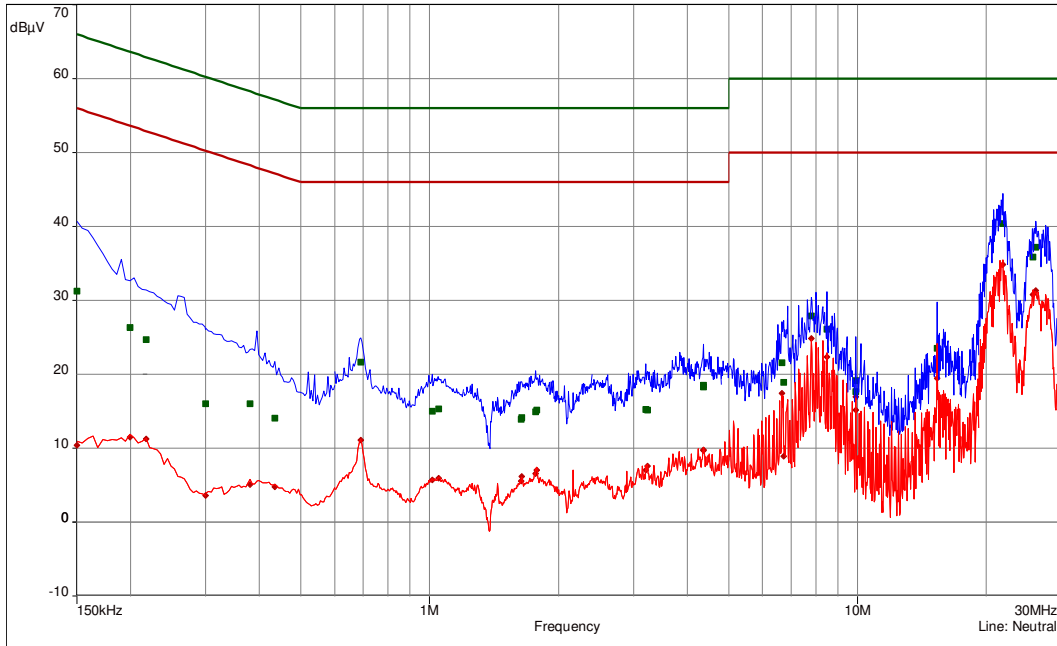
FCC ID: OV8-LOGD3

Test point
 Operation mode:
 Remarks:
 Date:

N & L1 powered over AC/DC adapter
 RX continuous mode
 None
 09. November 2015

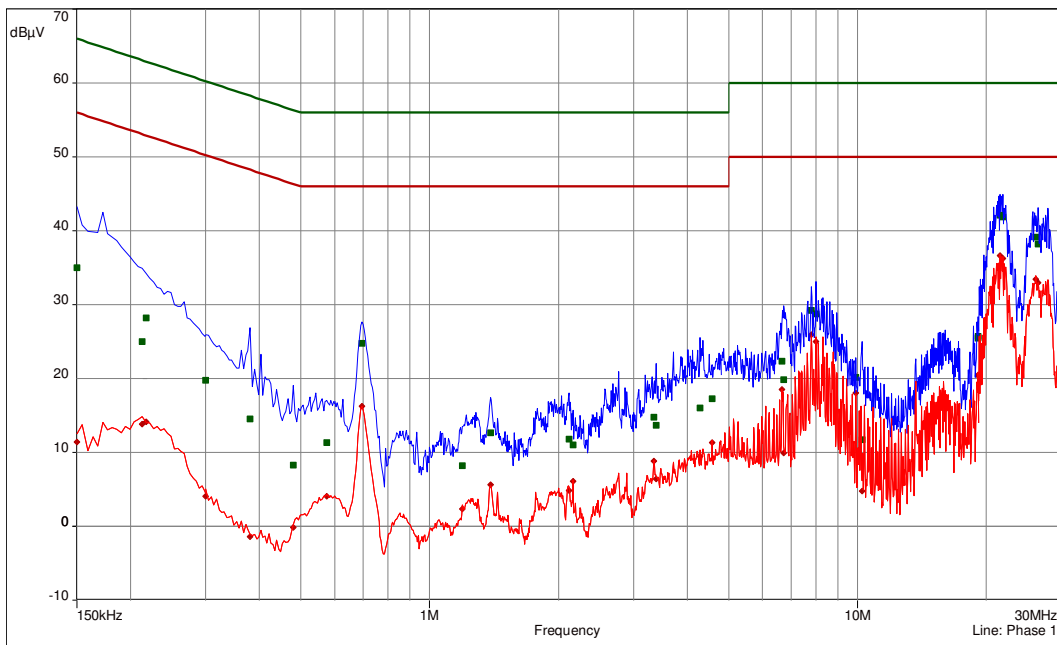
Result: passed

- CISPR 22/CISPR22 B - Average/
- CISPR 22/CISPR22 B - QPeak/
- Meas.Peak (Neutral)
- Meas.Avg (Neutral)
- QuasiPeak (Finals) (Neutral)
- ◆ Average (Finals) (Neutral)



CISPR 22/CISPR22B

- CISPR 22/CISPR22 B - Average/
- CISPR 22/CISPR22 B - QPeak/
- Meas.Peak (Phase 1)
- Meas.Avg (Phase 1)
- QuasiPeak (Finals) (Phase 1)
- ◆ Average (Finals) (Phase 1)



CISPR 22/CISPR22B

FCC ID: OV8-LOGD3

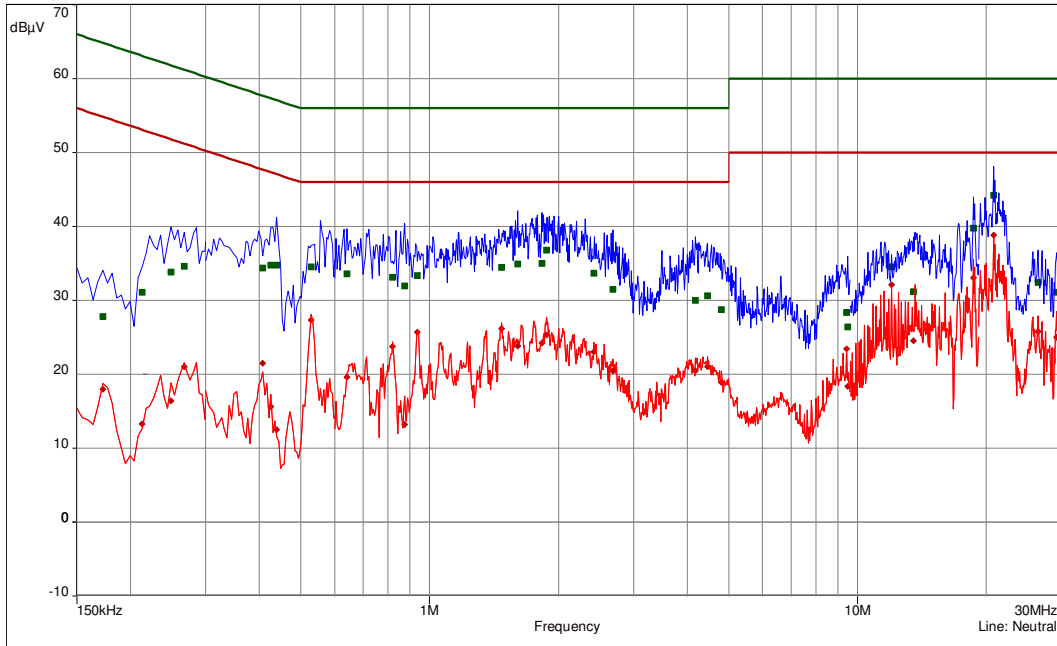
freq	SR	QP	margin	limit	AV	margin	limit	line	corr
MHz		dB(μ V)	dB	dB	dB(μ V)	dB	dB		dB
0.15	1	35.02	30.98	66.00	11.43	44.57	56.00	Phase 1	9.84
0.213	1	24.98	38.11	63.09	13.83	39.25	53.09	Phase 1	9.82
0.2175	1	28.17	34.74	62.91	14.12	38.79	52.91	Phase 1	9.82
0.3	2	19.78	40.46	60.24	4.06	46.18	50.24	Phase 1	9.81
0.381	2	14.55	43.71	58.26	-1.42	49.68	48.26	Phase 1	9.81
0.48	2	8.27	48.06	56.34	-0.16	46.50	46.34	Phase 1	9.81
0.5745	2	11.37	44.63	56.00	4.05	41.95	46.00	Phase 1	9.81
0.6945	3	24.73	31.27	56.00	16.29	29.71	46.00	Phase 1	9.80
1.194	3	8.23	47.77	56.00	2.31	43.69	46.00	Phase 1	9.79
1.389	4	12.67	43.33	56.00	5.66	40.34	46.00	Phase 1	9.78
2.118	4	11.79	44.21	56.00	4.87	41.13	46.00	Phase 1	9.80
2.163	4	11.02	44.98	56.00	6.07	39.93	46.00	Phase 1	9.80
3.345	5	14.80	41.20	56.00	8.83	37.17	46.00	Phase 1	9.81
3.381	5	13.69	42.31	56.00	6.45	39.55	46.00	Phase 1	9.81
4.2855	5	16.02	39.98	56.00	9.44	36.56	46.00	Phase 1	9.80
4.5735	5	17.25	38.75	56.00	11.30	34.70	46.00	Phase 1	9.81
6.6675	6	22.36	37.64	60.00	18.53	31.47	50.00	Phase 1	9.83
6.7215	6	19.86	40.14	60.00	9.96	40.04	50.00	Phase 1	9.83
7.8105	6	29.20	30.80	60.00	25.97	24.03	50.00	Phase 1	9.85
8.004	6	28.79	31.21	60.00	24.97	25.03	50.00	Phase 1	9.85
9.906	7	20.14	39.86	60.00	18.06	31.94	50.00	Phase 1	9.89
10.2615	7	11.74	48.26	60.00	4.77	45.23	50.00	Phase 1	9.91
19.122	7	25.69	34.31	60.00	20.45	29.55	50.00	Phase 1	10.27
19.1265	7	25.45	34.55	60.00	20.38	29.62	50.00	Phase 1	10.27
21.513	8	42.11	17.89	60.00	36.67	13.33	50.00	Phase 1	10.32
21.873	8	41.91	18.09	60.00	36.28	13.72	50.00	Phase 1	10.32
26.058	8	39.12	20.88	60.00	33.41	16.59	50.00	Phase 1	10.31
26.418	8	38.20	21.80	60.00	32.94	17.06	50.00	Phase 1	10.30
0.15	9	31.26	34.74	66.00	10.38	45.62	56.00	Neutral	9.84
0.1995	9	26.35	37.28	63.63	11.47	42.16	53.63	Neutral	9.85
0.2175	9	24.72	38.20	62.91	11.24	41.68	52.91	Neutral	9.84
0.3	10	15.98	44.26	60.24	3.59	46.65	50.24	Neutral	9.81
0.381	10	16.05	42.20	58.26	5.11	43.15	48.26	Neutral	9.81
0.435	10	14.08	43.07	57.16	4.79	42.37	47.16	Neutral	9.81
0.69	11	21.65	34.35	56.00	11.09	34.91	46.00	Neutral	9.80
1.014	11	14.98	41.02	56.00	5.74	40.26	46.00	Neutral	9.81
1.05	11	15.31	40.69	56.00	5.91	40.09	46.00	Neutral	9.80
1.6365	12	13.92	42.08	56.00	5.55	40.45	46.00	Neutral	9.78
1.641	12	14.15	41.85	56.00	6.15	39.85	46.00	Neutral	9.78
1.767	12	14.95	41.05	56.00	6.58	39.42	46.00	Neutral	9.78
1.7805	12	15.14	40.86	56.00	7.04	38.96	46.00	Neutral	9.79
3.2055	13	15.25	40.75	56.00	7.01	38.99	46.00	Neutral	9.79
3.228	13	15.18	40.82	56.00	7.57	38.43	46.00	Neutral	9.79
4.362	13	18.49	37.51	56.00	9.75	36.25	46.00	Neutral	9.80
4.3665	13	18.25	37.75	56.00	9.66	36.34	46.00	Neutral	9.80
6.6675	14	21.61	38.39	60.00	17.41	32.59	50.00	Neutral	9.81
6.7305	14	18.95	41.05	60.00	8.91	41.09	50.00	Neutral	9.80
7.8105	14	27.92	32.08	60.00	24.89	25.11	50.00	Neutral	9.81
8.481	14	26.07	33.93	60.00	22.35	27.65	50.00	Neutral	9.81
9.906	15	19.17	40.83	60.00	16.98	33.02	50.00	Neutral	9.82
9.9105	15	17.66	42.34	60.00	15.17	34.83	50.00	Neutral	9.82
15.351	15	23.49	36.51	60.00	19.46	30.54	50.00	Neutral	9.94
21.873	16	40.39	19.61	60.00	34.85	15.15	50.00	Neutral	10.03
25.7025	16	35.85	24.15	60.00	30.83	19.17	50.00	Neutral	9.86
26.058	16	37.21	22.79	60.00	31.35	18.65	50.00	Neutral	9.84

FCC ID: OV8-LOGD3

Test point: N & L1 powered over USB
 Operation mode: TX continuous carrier
 Remarks: None
 Date: 09. November 2015

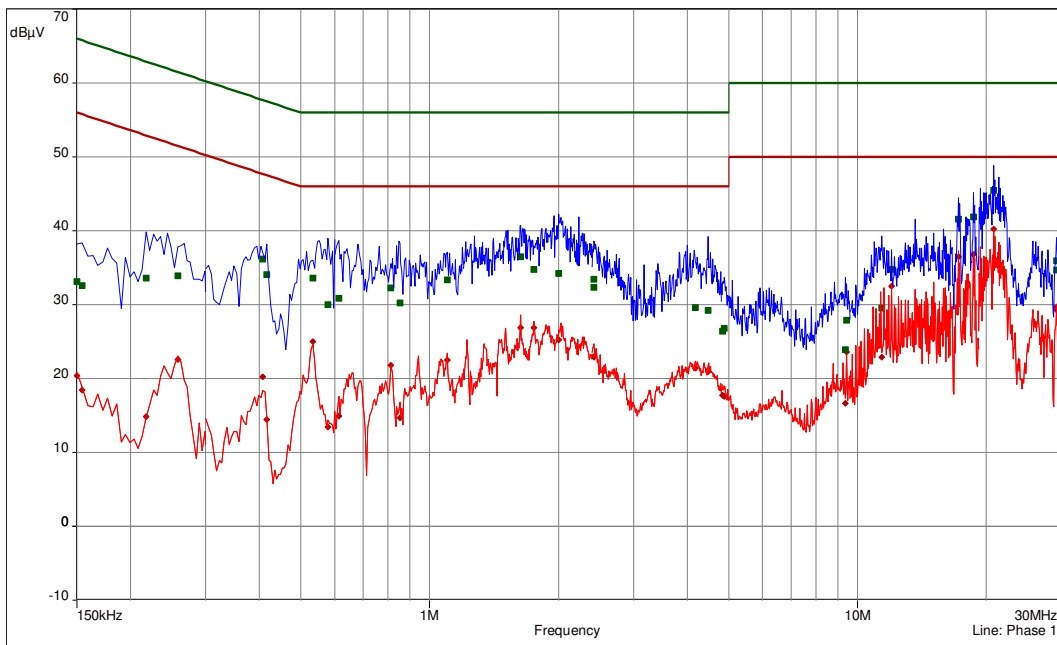
Result: passed

- CISPR 22/CISPR22 B - Average/
- CISPR 22/CISPR22 B - QPeak/
- Meas.Peak (Neutral)
- Meas.Avg (Neutral)
- QuasiPeak (Finals) (Neutral)
- ◆ Average (Finals) (Neutral)



CISPR 22/CISPR22B

- CISPR 22/CISPR22 B - Average/
- CISPR 22/CISPR22 B - QPeak/
- Meas.Peak (Phase 1)
- Meas.Avg (Phase 1)
- QuasiPeak (Finals) (Phase 1)
- ◆ Average (Finals) (Phase 1)



CISPR 22/CISPR22B

FCC ID: OV8-LOGD3

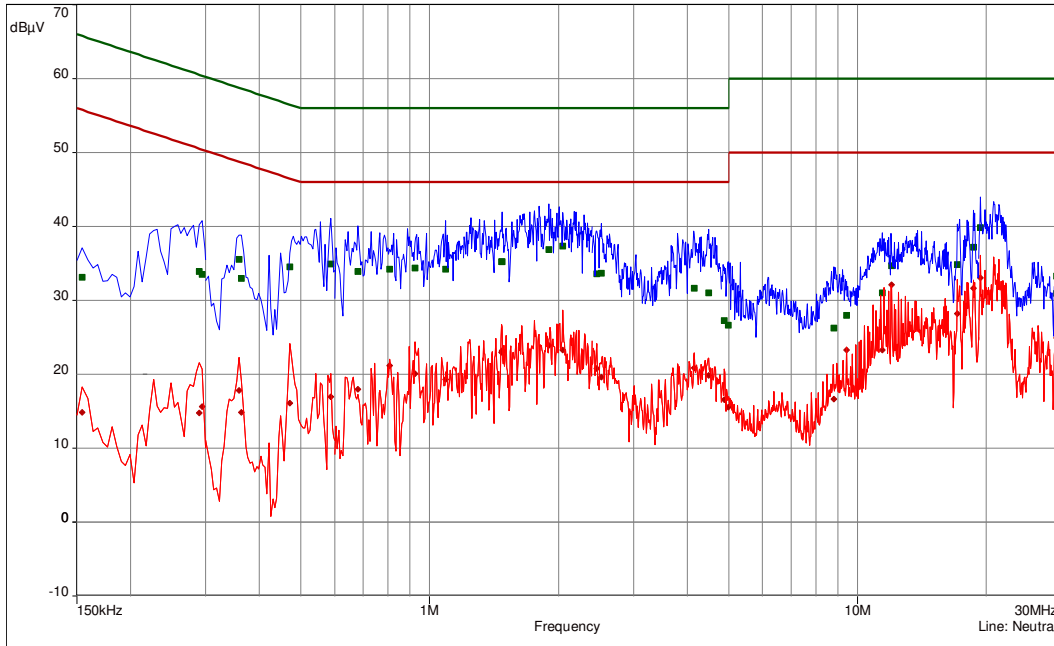
freq	SR	QP	margin	limit	AV	margin	limit	line	corr
MHz		dB(μV)	dB	dB	dB(μV)	dB	dB		dB
0.15	1	33.12	32.88	66.00	20.38	35.62	56.00	Phase 1	9.84
0.1545	1	32.62	33.14	65.75	18.43	37.32	55.75	Phase 1	9.83
0.2175	1	33.59	29.32	62.91	14.85	38.06	52.91	Phase 1	9.82
0.258	1	33.87	27.62	61.50	22.58	28.91	51.50	Phase 1	9.82
0.408	2	36.18	21.51	57.69	20.25	27.44	47.69	Phase 1	9.81
0.417	2	34.08	23.43	57.51	14.49	33.02	47.51	Phase 1	9.81
0.534	2	33.58	22.42	56.00	25.04	20.96	46.00	Phase 1	9.81
0.579	2	29.99	26.01	56.00	13.43	32.57	46.00	Phase 1	9.81
0.6135	3	30.90	25.10	56.00	14.89	31.11	46.00	Phase 1	9.81
0.8115	3	32.24	23.76	56.00	21.82	24.18	46.00	Phase 1	9.80
0.852	3	30.21	25.79	56.00	14.68	31.32	46.00	Phase 1	9.80
1.0995	3	33.34	22.66	56.00	22.54	23.46	46.00	Phase 1	9.80
1.632	4	36.51	19.49	56.00	26.91	19.09	46.00	Phase 1	9.78
1.7535	4	34.74	21.26	56.00	26.87	19.13	46.00	Phase 1	9.78
2.0055	4	34.24	21.76	56.00	25.24	20.76	46.00	Phase 1	9.80
2.418	5	32.34	23.66	56.00	22.95	23.05	46.00	Phase 1	9.78
2.4225	5	33.45	22.55	56.00	22.93	23.07	46.00	Phase 1	9.78
4.182	5	29.63	26.37	56.00	21.39	24.61	46.00	Phase 1	9.80
4.479	5	29.21	26.79	56.00	20.92	25.08	46.00	Phase 1	9.81
4.8315	6	26.38	29.62	56.00	17.78	28.22	46.00	Phase 1	9.82
4.8765	6	26.79	29.21	56.00	17.55	28.45	46.00	Phase 1	9.82
9.3585	6	23.87	36.13	60.00	16.64	33.36	50.00	Phase 1	9.88
9.4305	6	27.93	32.07	60.00	23.58	26.42	50.00	Phase 1	9.88
11.3865	7	29.54	30.46	60.00	22.92	27.08	50.00	Phase 1	9.94
12.003	7	34.77	25.23	60.00	32.52	17.48	50.00	Phase 1	9.97
17.2095	7	41.57	18.43	60.00	36.50	13.50	50.00	Phase 1	10.19
18.645	7	41.91	18.09	60.00	36.84	13.16	50.00	Phase 1	10.25
20.7975	8	45.48	14.52	60.00	40.24	9.76	50.00	Phase 1	10.32
29.163	8	35.96	24.04	60.00	29.29	20.71	50.00	Phase 1	10.30
29.1675	8	34.69	25.31	60.00	29.66	20.34	50.00	Phase 1	10.30
0.1725	9	27.80	37.04	64.84	17.96	36.88	54.84	Neutral	9.84
0.213	9	31.13	31.96	63.09	13.32	39.77	53.09	Neutral	9.84
0.249	9	33.82	27.97	61.79	16.43	35.36	51.79	Neutral	9.83
0.267	9	34.65	26.56	61.21	20.99	30.22	51.21	Neutral	9.82
0.408	10	34.41	23.28	57.69	21.51	26.18	47.69	Neutral	9.81
0.426	10	34.81	22.52	57.33	15.62	31.71	47.33	Neutral	9.81
0.4395	10	34.78	22.29	57.07	12.52	34.55	47.07	Neutral	9.81
0.5295	10	34.55	21.45	56.00	27.39	18.61	46.00	Neutral	9.81
0.6405	11	33.61	22.39	56.00	19.63	26.37	46.00	Neutral	9.81
0.8205	11	33.12	22.88	56.00	23.75	22.25	46.00	Neutral	9.80
0.8745	11	31.97	24.03	56.00	13.18	32.82	46.00	Neutral	9.80
0.9375	11	33.33	22.67	56.00	25.69	20.31	46.00	Neutral	9.81
1.4745	12	34.50	21.50	56.00	26.16	19.84	46.00	Neutral	9.78
1.605	12	34.91	21.09	56.00	23.86	22.14	46.00	Neutral	9.78
1.83	12	35.03	20.97	56.00	24.22	21.78	46.00	Neutral	9.79
1.875	12	36.84	19.16	56.00	25.28	20.72	46.00	Neutral	9.79
2.418	13	33.71	22.29	56.00	23.06	22.94	46.00	Neutral	9.78
2.6835	13	31.49	24.51	56.00	20.49	25.51	46.00	Neutral	9.78
4.1775	13	29.99	26.01	56.00	20.47	25.53	46.00	Neutral	9.80
4.461	13	30.65	25.35	56.00	21.03	24.97	46.00	Neutral	9.80
4.8045	14	28.78	27.22	56.00	18.95	27.05	46.00	Neutral	9.81
9.4305	14	28.38	31.62	60.00	23.48	26.52	50.00	Neutral	9.82
9.471	14	26.40	33.60	60.00	18.33	31.67	50.00	Neutral	9.82
12.003	15	34.51	25.49	60.00	32.14	17.86	50.00	Neutral	9.85
13.4925	15	31.20	28.80	60.00	24.50	25.50	50.00	Neutral	9.89
18.645	15	39.75	20.25	60.00	33.06	16.94	50.00	Neutral	10.05
20.7975	16	44.20	15.80	60.00	38.86	11.14	50.00	Neutral	10.08
26.4135	16	32.43	27.57	60.00	25.81	24.19	50.00	Neutral	9.82
29.172	16	31.13	28.87	60.00	25.01	24.99	50.00	Neutral	9.70

FCC ID: OV8-LOGD3

Test point: N & L1 powered over USB
 Operation mode: RX continuous mode
 Remarks: None
 Date: 09. November 2015

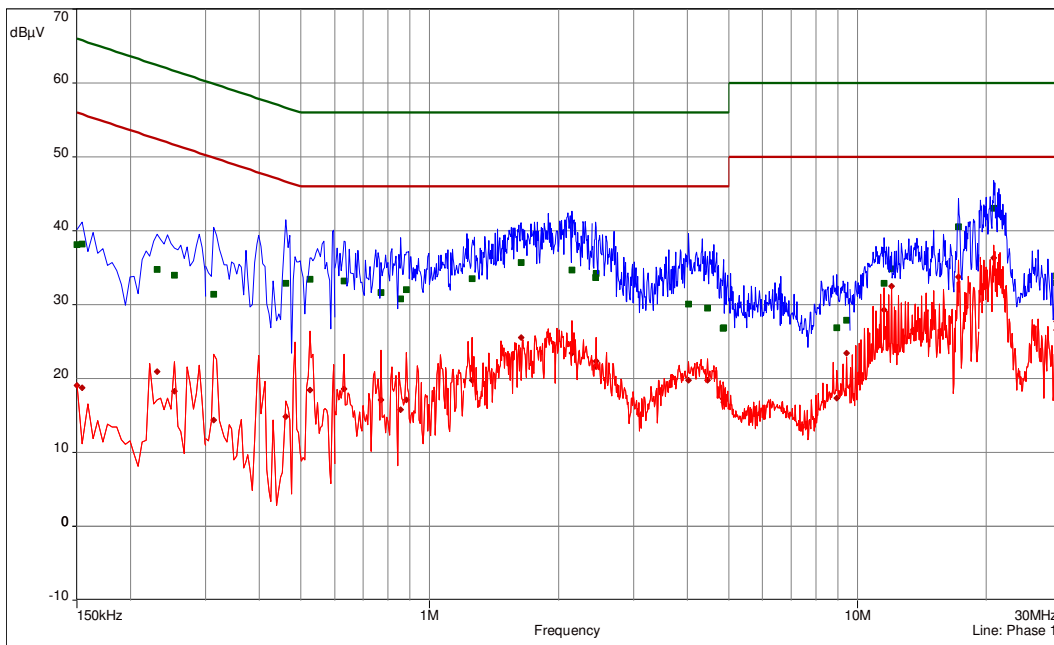
Result: passed

- CISPR 22/CISPR22 B - Average/
- CISPR 22/CISPR22 B - QPeak/
- Meas.Peak (Neutral)
- Meas.Avg (Neutral)
- QuasiPeak (Finals) (Neutral)
- ◆ Average (Finals) (Neutral)



CISPR 22/CISPR22B

- CISPR 22/CISPR22 B - Average/
- CISPR 22/CISPR22 B - QPeak/
- Meas.Peak (Phase 1)
- Meas.Avg (Phase 1)
- QuasiPeak (Finals) (Phase 1)
- ◆ Average (Finals) (Phase 1)



CISPR 22/CISPR22B

FCC ID: OV8-LOGD3

freq	SR	QP	margin	limit	AV	margin	limit	line	corr
MHz		dB(μ V)	dB	dB	dB(μ V)	dB	dB		dB
0.15	1	38.15	27.85	66.00	19.10	36.90	56.00	Phase 1	9.84
0.1545	1	38.24	27.51	65.75	18.74	37.02	55.75	Phase 1	9.83
0.231	1	34.74	27.68	62.41	20.94	31.48	52.41	Phase 1	9.82
0.2535	1	33.99	27.65	61.64	18.26	33.38	51.64	Phase 1	9.82
0.3135	2	31.42	28.45	59.88	14.39	35.48	49.88	Phase 1	9.81
0.462	2	32.92	23.74	56.66	14.89	31.77	46.66	Phase 1	9.81
0.525	2	33.43	22.57	56.00	18.44	27.56	46.00	Phase 1	9.81
0.6315	3	33.17	22.83	56.00	18.62	27.38	46.00	Phase 1	9.81
0.771	3	31.68	24.32	56.00	17.14	28.86	46.00	Phase 1	9.80
0.8565	3	30.80	25.20	56.00	15.79	30.21	46.00	Phase 1	9.80
0.8835	3	32.03	23.97	56.00	17.09	28.91	46.00	Phase 1	9.81
1.2585	4	33.55	22.45	56.00	19.77	26.23	46.00	Phase 1	9.79
1.6365	4	35.73	20.27	56.00	25.56	20.44	46.00	Phase 1	9.78
2.154	4	34.68	21.32	56.00	23.47	22.53	46.00	Phase 1	9.80
2.445	5	33.68	22.32	56.00	21.62	24.38	46.00	Phase 1	9.78
2.4495	5	34.21	21.79	56.00	22.33	23.67	46.00	Phase 1	9.78
4.0245	5	30.08	25.92	56.00	19.74	26.26	46.00	Phase 1	9.81
4.4565	5	29.57	26.43	56.00	19.76	26.24	46.00	Phase 1	9.81
4.8585	6	26.79	29.21	56.00	17.30	28.70	46.00	Phase 1	9.82
4.863	6	26.90	29.10	56.00	16.81	29.19	46.00	Phase 1	9.82
8.931	6	26.91	33.09	60.00	17.36	32.64	50.00	Phase 1	9.87
9.4305	6	27.88	32.12	60.00	23.42	26.58	50.00	Phase 1	9.88
11.5305	7	32.88	27.12	60.00	29.34	20.66	50.00	Phase 1	9.95
12.003	7	34.82	25.18	60.00	32.48	17.52	50.00	Phase 1	9.97
17.214	7	40.55	19.45	60.00	33.73	16.27	50.00	Phase 1	10.19
20.7975	8	43.09	16.91	60.00	36.33	13.67	50.00	Phase 1	10.32
29.1585	8	33.95	26.05	60.00	27.70	22.30	50.00	Phase 1	10.30
29.163	8	32.96	27.04	60.00	26.55	23.45	50.00	Phase 1	10.30
0.1545	9	33.11	32.65	65.75	14.82	40.94	55.75	Neutral	9.84
0.2895	9	33.90	26.64	60.54	14.80	35.74	50.54	Neutral	9.82
0.294	9	33.56	26.85	60.41	15.64	34.77	50.41	Neutral	9.82
0.3585	10	35.54	23.22	58.76	17.82	30.94	48.76	Neutral	9.80
0.363	10	32.95	25.71	58.66	14.83	33.83	48.66	Neutral	9.81
0.471	10	34.57	21.93	56.50	16.13	30.37	46.50	Neutral	9.81
0.588	10	34.90	21.10	56.00	16.95	29.05	46.00	Neutral	9.81
0.681	11	33.88	22.12	56.00	18.01	27.99	46.00	Neutral	9.80
0.807	11	34.25	21.75	56.00	21.20	24.80	46.00	Neutral	9.80
0.924	11	34.37	21.63	56.00	20.06	25.94	46.00	Neutral	9.81
1.0905	11	34.20	21.80	56.00	19.34	26.66	46.00	Neutral	9.80
1.4745	12	35.22	20.78	56.00	22.95	23.05	46.00	Neutral	9.78
1.479	12	35.25	20.75	56.00	23.24	22.76	46.00	Neutral	9.78
1.902	12	36.89	19.11	56.00	23.95	22.05	46.00	Neutral	9.80
2.046	12	37.36	18.64	56.00	23.27	22.73	46.00	Neutral	9.80
2.4585	13	33.62	22.38	56.00	20.81	25.19	46.00	Neutral	9.78
2.517	13	33.65	22.35	56.00	19.61	26.39	46.00	Neutral	9.78
4.1595	13	31.65	24.35	56.00	20.85	25.15	46.00	Neutral	9.80
4.488	13	31.03	24.97	56.00	19.87	26.13	46.00	Neutral	9.80
4.8855	14	27.29	28.71	56.00	16.55	29.45	46.00	Neutral	9.81
4.989	14	26.64	29.36	56.00	15.53	30.47	46.00	Neutral	9.81
8.805	14	26.24	33.76	60.00	16.66	33.34	50.00	Neutral	9.81
9.4305	14	27.98	32.02	60.00	23.26	26.74	50.00	Neutral	9.82
11.4315	15	31.04	28.96	60.00	23.31	26.69	50.00	Neutral	9.84
12.003	15	34.66	25.34	60.00	32.15	17.85	50.00	Neutral	9.85
17.0925	15	34.85	25.15	60.00	28.23	21.77	50.00	Neutral	9.99
18.6585	15	37.18	22.82	60.00	31.68	18.32	50.00	Neutral	10.05
19.362	16	39.84	20.16	60.00	33.03	16.97	50.00	Neutral	10.08
29.1585	16	33.25	26.75	60.00	26.07	23.93	50.00	Neutral	9.70
29.163	16	30.92	29.08	60.00	24.92	25.08	50.00	Neutral	9.70

FCC ID: OV8-LOGD3

5.2 Maximum output power radiated

For test instruments and accessories used see section 6 Part CPR 2.

5.2.1 Description of the test location

Test location: OATS 1

Test distance: 10 m

5.2.2 Photo documentation of the test set-up



FCC ID: OV8-LOGD3

5.2.3 Applicable standard

According to FCC Part 90.217:

Except as noted herein, transmitters used at stations licensed below 800 MHz on any frequency listed in subparts B and C of this part or licensed on a business category channel above 800 MHz which have an output power not exceeding 120 mW are exempt from the technical requirements set out in this subpart, but must instead comply with the following:

(a) For equipment designed to operate with a 25 kHz channel bandwidth, the sum of the bandwidth occupied by the emitted signal plus the bandwidth required for frequency stability shall be adjusted so that any emission appearing on a frequency 40 kHz or more removed from the assigned frequency is attenuated at least 30 dB below the unmodulated carrier.

5.2.4 Description of Measurement

The maximum output power from the EUT is measured in the frequency range of 30 MHz to 1000 MHz using a tuned receiver and appropriate broadband linearly polarised antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and peak detection. Table top equipment is placed on a 1.0 X 1.5 m non-conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. The interface cables that are closer than 40 centimetres to the ground plane are bundled in the centre in a serpentine fashion so that they are at least 40 centimetres from the ground plane. Cables to simulators/testers (if used in this test) are routed through the centre of the table and to a screened room located outside the test area. The antenna is positioned 10 metres horizontally from the EUT and is repeated vertically. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 metres and the EUT is rotated 360 degrees.

The final level in dBm is calculated by taking the reading from the EMI receiver (Level dB μ V) and adding the correction factors (cable loss, antenna gain, free space attenuation). The FCC or CISPR limit is subtracted from this result in order to provide the limit margin listed in the measurement protocol.

The substitution antenna is used to replace the EUT for test the effective radiated. For measurements in the frequency band 30 MHz to 1 000 MHz, the substitution antenna is a $\frac{1}{2}$ wave dipole antenna. The centre of this antenna should coincide with either the phase centre or volume centre. A signal generator is connected to the dipole and its output is adjusted to match the level previously noted for each frequency. The output of the signal generator is recorded, and by factoring in the cable loss to the dipole antenna and its gain.

The radiated power of the fundamental emission from the EUT is measured in a test setup following the procedures set out in ANSI/TIA-603-C Section 2.2.17.

The resolution bandwidth during the measurement is as follows:

30 MHz – 1000 MHz: RBW: 120 kHz

FCC ID: OV8-LOGD3
5.2.5 Test result

EuT in x-axis

Frequency (MHz)	Level PK (dB μ V)	Bandwidth (kHz)	Correct. factor (dB)	Corrected power ERP (dBm)	Power limit (dBm)	Delta (dB)
913.02	54.8	120	-61.7	-6.9	20.8	27.7

EuT in y-axis

Frequency (MHz)	Level PK (dB μ V)	Bandwidth (kHz)	Correct. factor (dB)	Corrected power ERP (dBm)	Power limit (dBm)	Delta (dB)
913.02	55.4	120	-59.7	-4.3	20.8	25.1

EuT in z-axis

Frequency (MHz)	Level PK (dB μ V)	Bandwidth (kHz)	Correct. factor (dB)	Corrected power ERP (dBm)	Power limit (dBm)	Delta (dB)
913.02	51.6	120	-59.7	-8.1	20.8	28.9

Power limit according to FCC Part 90.217:

Frequency (MHz)	Radiated power limit	
	(dBm)	(mW)
>800	20.8	120

 The requirements are **FULFILLED**.

Remarks:

FCC ID: OV8-LOGD3

5.3 Spurious emissions radiated (electric field)

For test instruments and accessories used see section 6 Part SER 2, SER 3.

5.3.1 Description of the test location

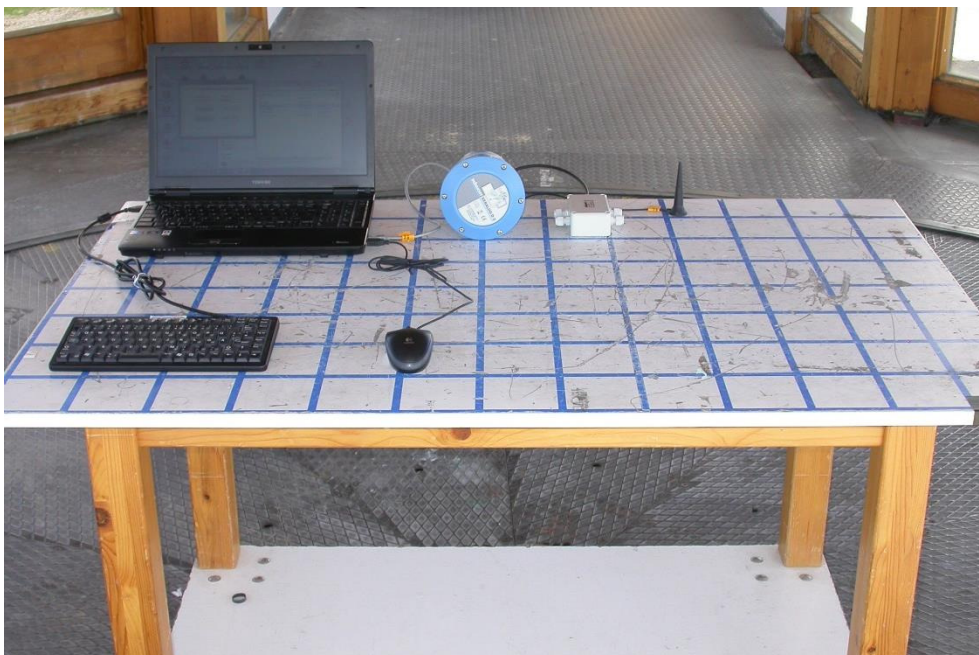
Test location: OATS 1
Test distance: 10 m

Test location: Anechoic chamber 2
Test distance: 3 m

5.3.2 Photo documentation of the test set-up

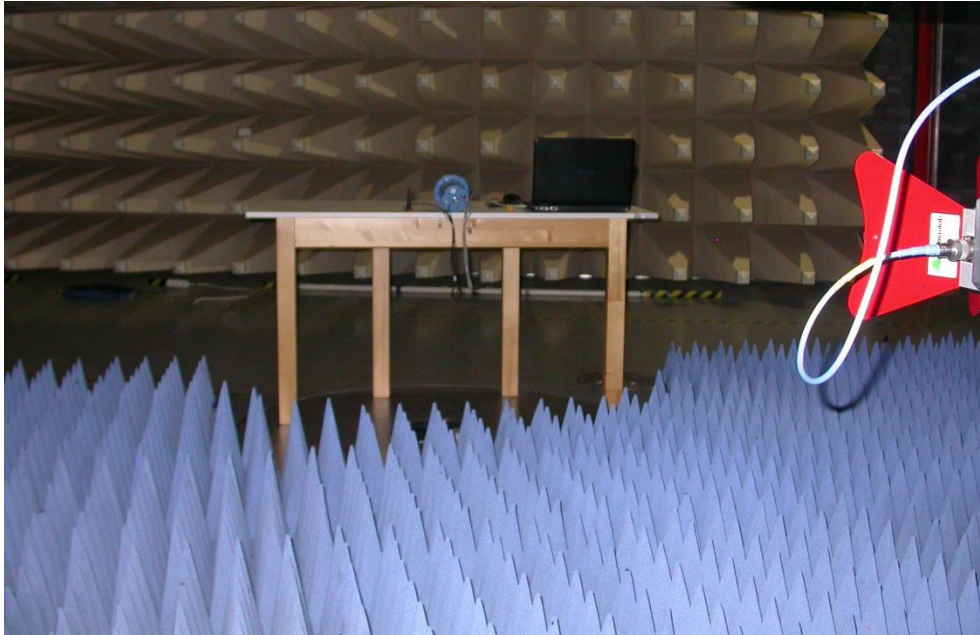


OATS1 – 10 m – 30 MHz to 1000 MHz

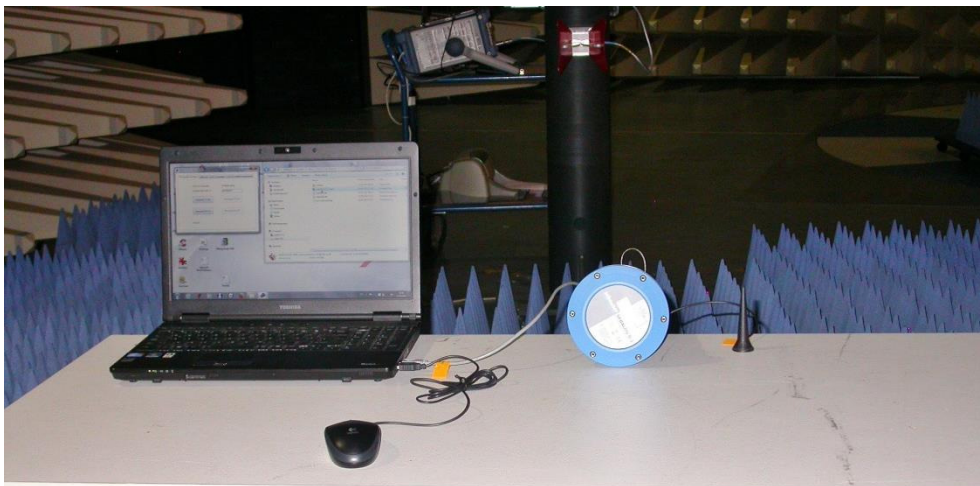


OATS1 – 10 m – 30 MHz to 1000 MHz

FCC ID: OV8-LOGD3



A1 – 3 m – 1 GHz to 12.75 GHz



A1 – 3 m – 1 GHz to 12.75 GHz

FCC ID: OV8-LOGD3

5.3.3 Applicable standard

According to FCC Part 90.217(a):

(a) For equipment designed to operate with a 25 kHz channel bandwidth, the sum of the bandwidth occupied by the emitted signal plus the bandwidth required for frequency stability shall be adjusted so that any emission appearing on a frequency 40 kHz or more removed from the assigned frequency is attenuated at least 30 dB below the unmodulated carrier.

5.3.4 Description of Measurement

Spurious emission from the EUT is measured in the frequency range of 30 MHz to 1000 MHz using a tuned receiver and appropriate broadband linearly polarised antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and peak detection. Table top equipment is placed on a 1.0 X 1.5 m non-conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. The interface cables that are closer than 40 centimetres to the ground plane are bundled in the centre in a serpentine fashion so that they are at least 40 centimetres from the ground plane. Cables to simulators/testers (if used in this test) are routed through the centre of the table and to a screened room located outside the test area. The antenna is positioned 10 metres horizontally from the EUT and is repeated vertically. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 metres and the EUT is rotated 360 degrees.

The final level in dBm is calculated by taking the reading from the EMI receiver (Level dB μ V) and adding the correction factors (cable loss, antenna gain, free space attenuation). The FCC or CISPR limit is subtracted from this result in order to provide the limit margin listed in the measurement protocol.

Spurious emission from the EUT are measured in the frequency range 1 GHz up to 12.75 GHz, using a spectrum analyser and appropriate linearly polarized antennas. Table top equipment is placed on a 1.0 X 1.5 metre non-conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. The interface cables that are closer than 40 centimetres to the ground plane are bundled in the centre in a serpentine fashion so they are at least 40 centimetres from the ground plane. Cables to simulators/testers (if used in this test) are routed through the centre of the table and to a screened room located outside the test area. Measurements are made in both the horizontal and vertical polarization planes in a fully anechoic room using a spectrum analyser set to max peak detector function and a resolution 1 MHz and video bandwidth 3 MHz for peak and 10 Hz for average measurement. The conditions determined as worst case will then be used for the final measurements. When the EUT is larger than the beam width of the measuring antenna it will be moved over the surface for the four sides of the equipment. Where appropriate, the test distance may be reduced in order to detect emissions under better uncertainty and are calculated at the specified test distance.

The final level in dBm is calculated by taking the reading from the spectrum analyser (Level dBm) and adding the correction factors (cable loss, antenna gain, free space attenuation). The FCC or CISPR limit is subtracted from this result in order to provide the limit margin listed in the measurement protocol.

The substitution antenna is used to replace the EUT for test the effective radiated power and spurious emissions. For measurements in the frequency band 30 MHz to 1 000 MHz, the substitution antenna is a 1/2 wave dipole antenna. For measurements above 1000 MHz, a waveguide horn is taken. The centre of this antenna should coincide with either the phase centre or volume centre. A signal generator is connected to the dipole (horn antenna for frequencies above 1 GHz), and its output is adjusted to match the level previously noted for each frequency. The output of the signal generator is recorded, and by factoring in the cable loss to the dipole antenna and its gain; the power (dBm) into an ideal 1/2 wave dipole antenna is determined for each radiated spurious emission.

The radiated power of the spurious emission from the EUT is measured in a test setup following the procedures set out in ANSI/TIA-603-C Section 2.2.12.

Instrument settings:

30 MHz – 1000 MHz:	RBW: 120 kHz
1000 MHz – 12750 MHz	RBW: 1 MHz

FCC ID: OV8-LOGD3

5.3.5 Test result f < 1 GHz

Frequency (MHz)	Level PK (dBμV)	Bandwidth (kHz)	Correct. factor (dB)	Corrected power ERP (dBm)	Power limit (dBm)	Delta (dB)
30 - 1000	-	-	-	-	-23.8	>10

5.3.6 Test result f > 1 GHz:

Frequency (MHz)	Level PK (dBm)	Bandwidth (kHz)	Correct. factor (dB)	Corrected power ERP (dBm)	Power limit (dBm)	Delta (dB)
1200.25	-48.4	1000	-18.4	-66.8	-34.3	32.5
1439.88	-45.7	1000	-18.3	-64.0	-34.3	29.7
1826.13	-35.5	1000	-16.4	-51.9	-34.3	17.6
1920.25	-41.0	1000	-18.4	-59.4	-34.3	25.1
2640.25	-48.3	1000	-12.4	-60.7	-34.3	26.4
3601.00	-50.6	1000	-9.0	-59.6	-34.3	25.3
3652.00	-49.1	1000	-9.0	-58.1	-34.3	23.8
3841.00	-41.1	1000	-9.6	-50.7	-34.3	16.4
4565.47	-57.8	1000	4.2	-53.6	-34.3	19.3
5477.65	-43.4	1000	6.6	-36.8	-34.3	2.5
6390.94	-43.4	1000	8.2	-35.2	-34.3	0.9
7304.21	-49.6	1000	9.4	-40.2	-34.3	5.9
8217.50	-61.4	1000	10.6	-50.8	-34.3	16.5
9130.78	-52.2	1000	12.1	-40.1	-34.3	5.8
10044.06	-58.6	1000	12.0	-46.6	-34.3	12.3
10956.25	-57.8	1000	11.9	-45.9	-34.3	11.6

Spurious emission limit according to FCC Part 90.217:

Spurious emission limit (dBm)	
30 dB down	-34.3

The requirements are **FULFILLED**.

Remarks: The measurement was performed up to the 10th harmonic.

For detailed test results please see the following test protocols.

No spurious emissions detected in the frequency range from 30 MHz to 1000 MHz.

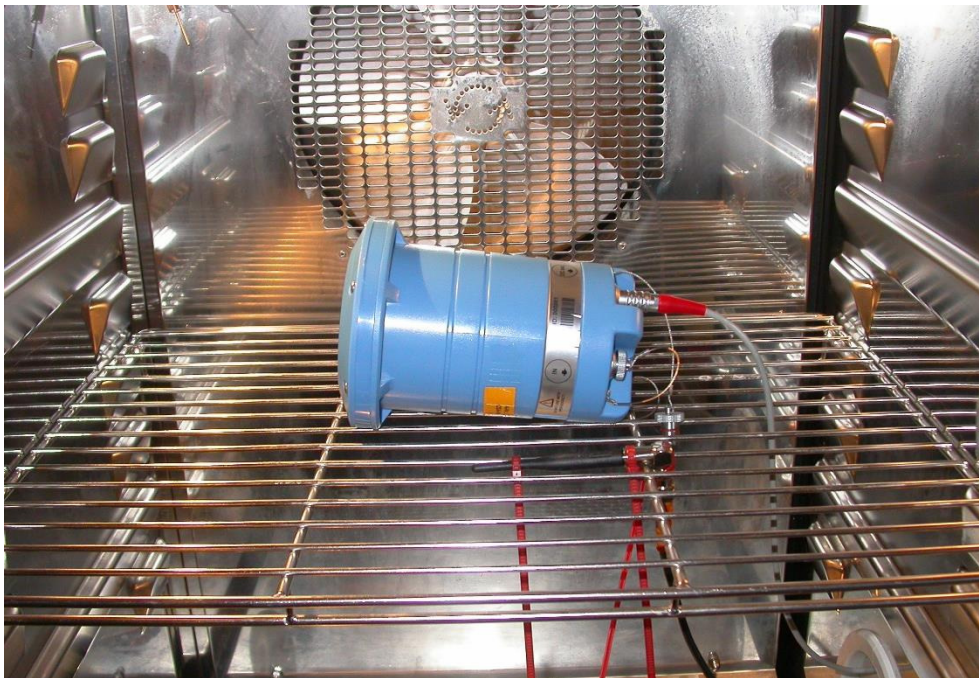
5.4 Modulation characteristics

For test instruments and accessories used see section 6 Part MB.

5.4.1 Description of the test location

Test location: METROLOGY

5.4.2 Photo documentation of the test set-up



FCC ID: OV8-LOGD3

5.4.3 Applicable standard

According to FCC Part 90.217(a):

(a) For equipment designed to operate with a 25 kHz channel bandwidth, the sum of the bandwidth occupied by the emitted signal plus the bandwidth required for frequency stability shall be adjusted so that any emission appearing on a frequency 40 kHz or more removed from the assigned frequency is attenuated at least 30 dB below the unmodulated carrier.

5.4.4 Description of Measurement

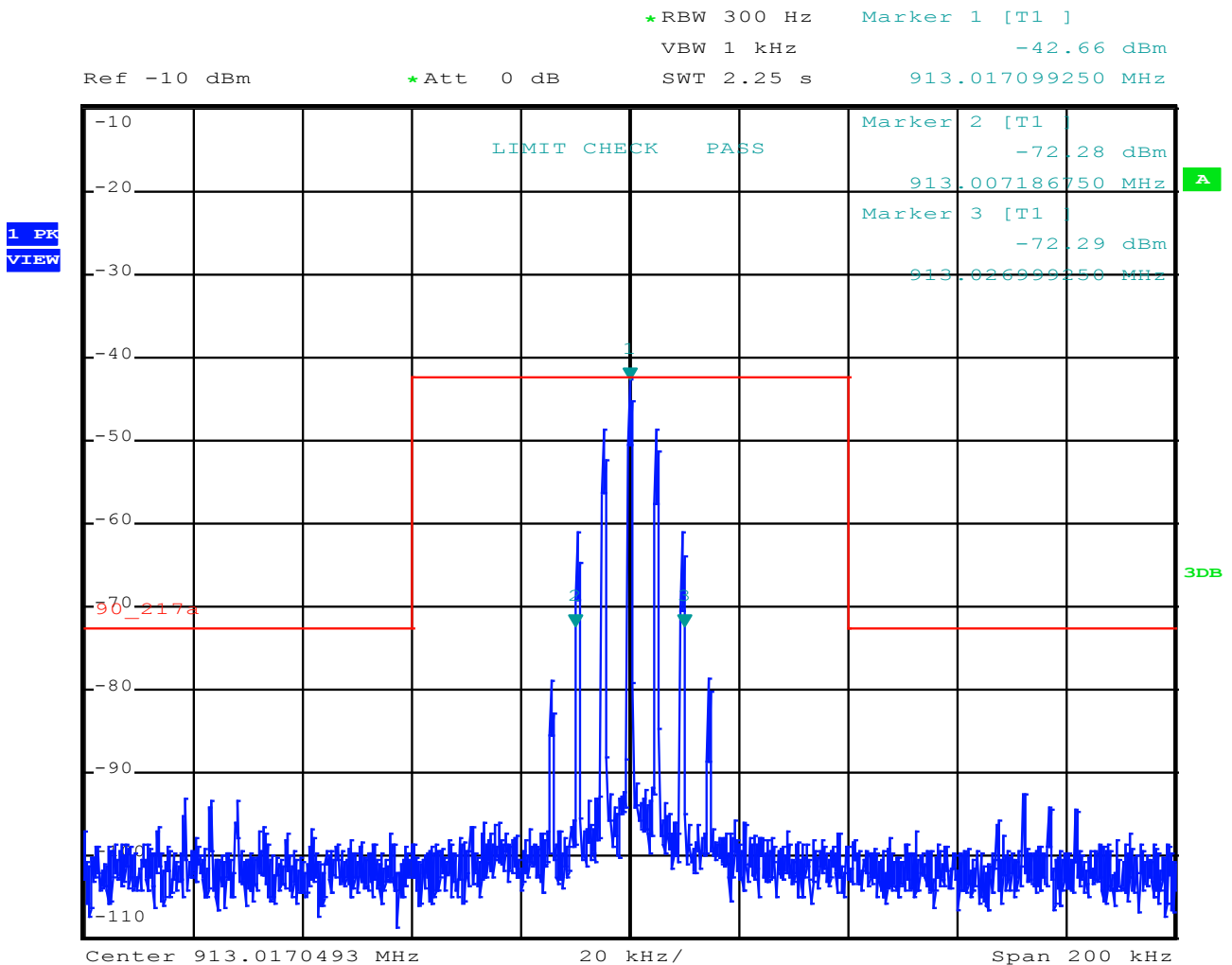
The measurement was performed conducted with intentional modulation on and off. The emission mask defined for 25 kHz channel bandwidth devices is shown on each plot. The 0 dB reference for the mask is the measured output power of the unmodulated carrier at that frequency.

Spectrum analyser settings:

RBW: 300 Hz, VBW: 1 kHz, Detector: PK sampling detector, Sweep time: auto

5.4.5 Test result

Cont. TX with modulation



FCC ID: OV8-LOGD3

Peak power limit according to FCC Part 90.217(a):

Limit	Lower envelope point minimum frequency	Upper envelope point maximum frequency
30 dB down	912.98 MHz ($f_{e, lower} - 40 \text{ kHz}$)	913.06 MHz ($f_{e, upper} + 40 \text{ kHz}$)

The requirements are **FULFILLED**.

Remarks:

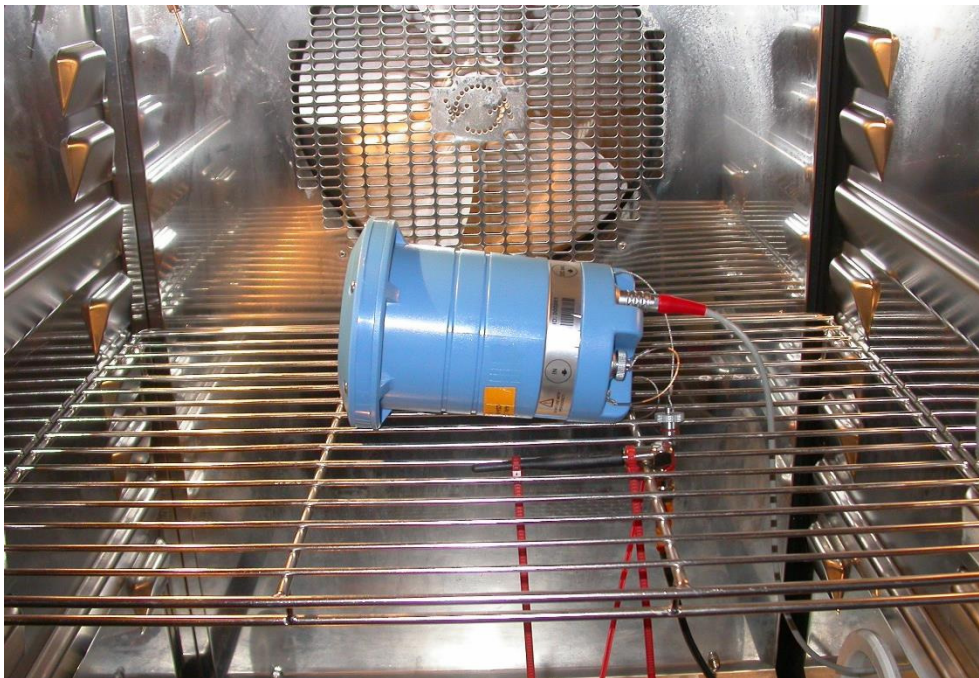
5.5 Occupied bandwidth

For test instruments and accessories used see section 6 Part MB.

5.5.1 Description of the test location

Test location: METROLOGY

5.5.2 Photo documentation of the test set-up



FCC ID: OV8-LOGD3

5.5.3 Applicable standard

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 per cent of the total mean power radiated by a given emission shall be measured under the following conditions as applicable:

Transmitters in which the modulating baseband comprises not more than three independent channels—when modulated by the full complement of signals for which the transmitter is rated. The level of modulation for each channel should be set to that prescribed in rule parts applicable to the services for which the transmitter is intended. If specific modulation levels are not set forth in the rules, the tests should provide the manufacturer's maximum rated condition.

5.5.4 Description of Measurement

The bandwidth was measured conducted with the function “bandwidth measurement” of the spectrum analyser.

Spectrum analyser settings:

RBW: 300 Hz, VBW: 1 kHz, Detector: PK sampling detector, Sweep time: auto

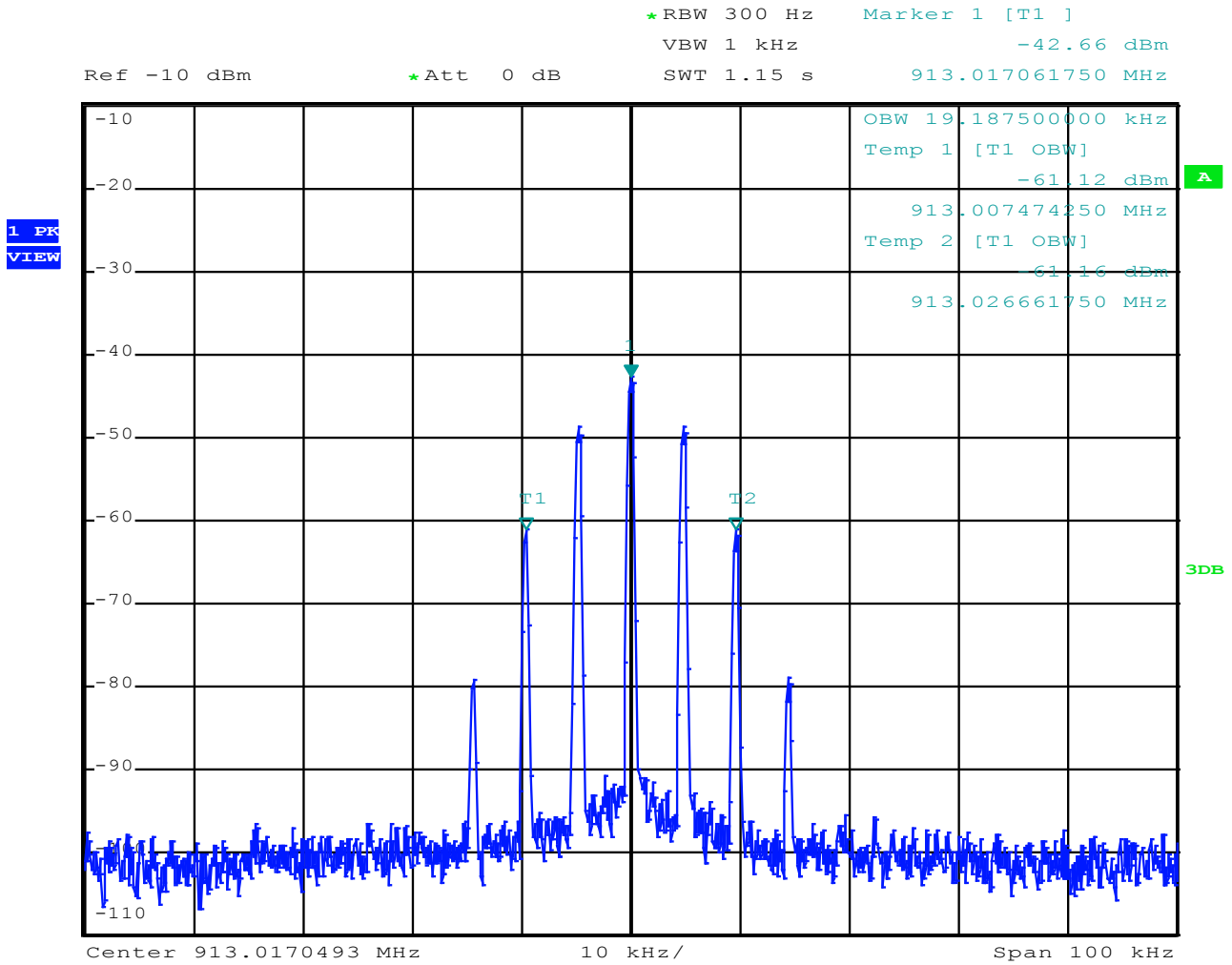
5.5.5 Test result

Channel number	Fundamental frequency (MHz)	99 % Bandwidth (kHz)
1	913.02	19.19

FCC ID: OV8-LOGD3

5.5.6 Test protocol

99% Bandwidth measurement plots



The requirements are **FULFILLED**.

Remarks:

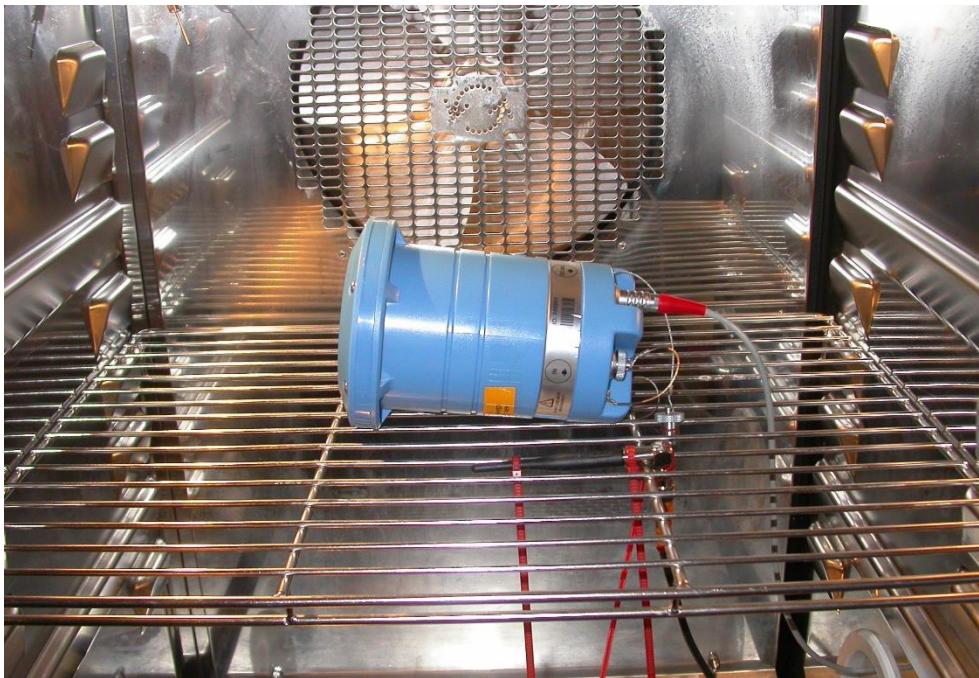
5.6 Frequency stability

For test instruments and accessories used see section 6 Part MB.

5.6.1 Description of the test location

Test location: METROLOGY

5.6.2 Photo documentation of the test set-up



FCC ID: OV8-LOGD3

5.6.3 Applicable standard

According to FCC Part 90.217(a):

(a) For equipment designed to operate with a 25 kHz channel bandwidth, the sum of the bandwidth occupied by the emitted signal plus the bandwidth required for frequency stability shall be adjusted so that any emission appearing on a frequency 40 kHz or more removed from the assigned frequency is attenuated at least 30 dB below the unmodulated carrier.

5.6.4 Description of Measurement

This test has been performed over variations in temperature and voltage. The temperature stability was measured with the EUT in a climatic chamber and was powered DC voltage supplied externally. The frequency stability of the transmitter was examined at the voltage extremes and for the temperature range of -30°C to +50°C. The carrier frequency was measured conducted with a spectrum analyser.

5.6.5 Test result

Test conditions		Test result	
		Frequency reading (MHz)	Frequency error (kHz)
T (50°C)	V _{min}	913.01482	-5.18
	V _{nom}	913.01479	-5.21
	V _{max}	913.01479	-5.21
T (40°C)	V _{min}	913.01499	-5.01
	V _{nom}	913.01499	-5.01
	V _{max}	913.01500	-5.00
T (30°C)	V _{min}	913.01595	-4.05
	V _{nom}	913.01581	-4.19
	V _{max}	913.01570	-4.30
T _{nom} (20°C)	V _{min}	913.01718	-2.82
	V _{nom}	913.01713	-2.87
	V _{max}	913.01711	-2.89
T (10°C)	V _{min}	913.01821	-1.79
	V _{nom}	913.01822	-1.78
	V _{max}	913.01822	-1.78
T (0°C)	V _{min}	913.01872	-1.28
	V _{nom}	913.01874	-1.26
	V _{max}	913.01876	-1.24
T (-10°C)	V _{min}	913.01820	-1.80
	V _{nom}	913.01823	-1.77
	V _{max}	913.01825	-1.75
T (-20°C)	V _{min}	913.01623	-3.78
	V _{nom}	913.01626	-3.74
	V _{max}	913.01630	-3.70
T (-30°C)	V _{min}	913.01181	-8.19
	V _{nom}	913.01180	-8.20
	V _{max}	913.01180	-8.20
Measurement uncertainty		± 3 dB	

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Measured frequency 30 dB down nearest at the lower frequency (see page 22):

$$f_L + FE_{\min} = 913.0072 \text{ MHz} + -8.2 \text{ kHz} = \mathbf{912.9990 \text{ MHz}}$$

Measured frequency 30 dB down nearest at the higher frequency (see page 22):

$$f_H + FE_{\max} = 913.0270 \text{ MHz} + -1.2 \text{ kHz} = \mathbf{913.0258 \text{ MHz}}$$

Bandwidth limit according to FCC Part 90.217(a):

Limit	Lower envelope point minimum frequency	Upper envelope point maximum frequency
30 dB down	912.98 MHz ($f_{e, \text{lower}} - 40 \text{ kHz}$)	913.06 MHz ($f_{e, \text{upper}} + 40 \text{ kHz}$)

The requirements are **FULFILLED**.

Remarks:

FCC ID: OV8-LOGD3

5.7 Receiver spurious emissions, radiated

For test instruments and accessories used see section 6 Part **SER 2**, **SER 3**.

5.7.1 Description of the test location

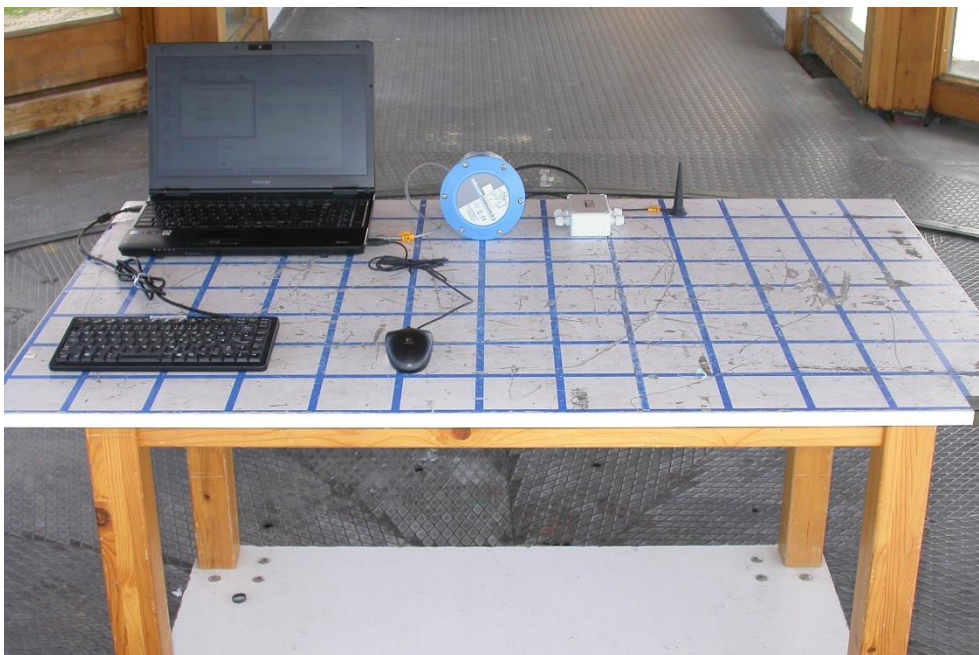
Test location: OATS 1
Test distance: 10 m

Test location: Anechoic chamber 2
Test distance: 3 m

5.7.2 Photo documentation of the test set-up

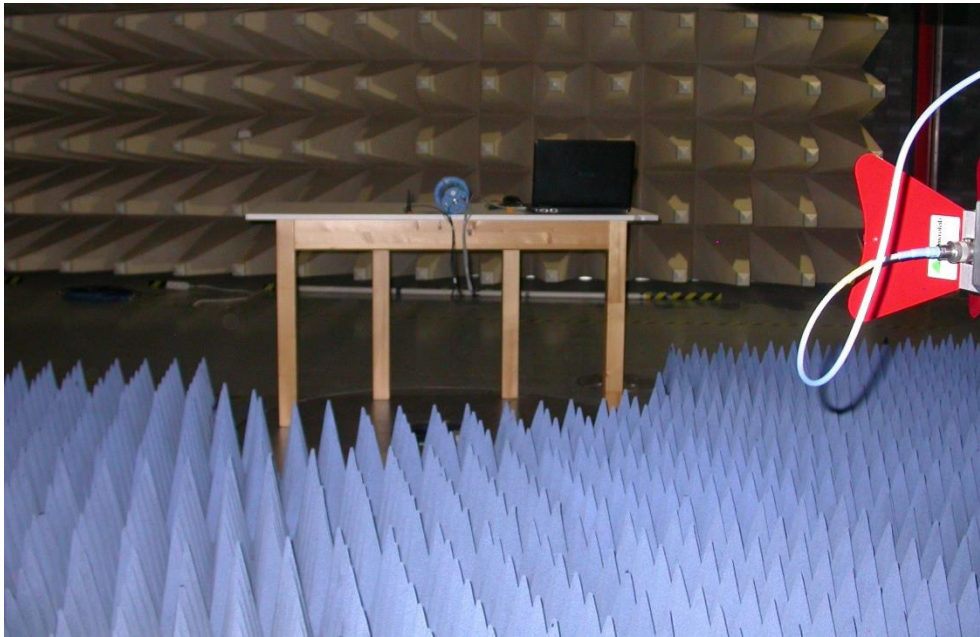


OATS1 – 10 m – 30 MHz to 1000 MHz

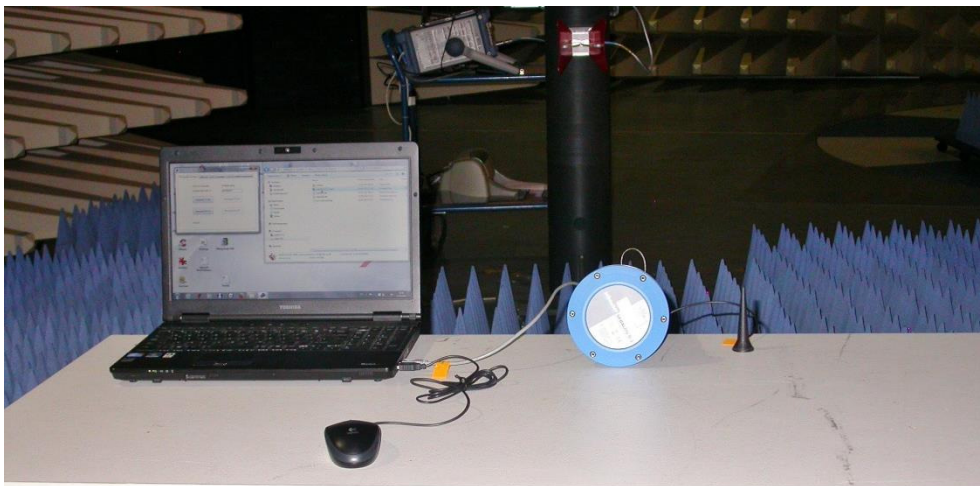


OATS1 – 10 m – 30 MHz to 1000 MHz

FCC ID: OV8-LOGD3



A1 – 3 m – 1 GHz to 12.75 GHz



A1 – 3 m – 1 GHz to 12.75 GHz

FCC ID: OV8-LOGD3

5.7.3 Applicable standard

According to ANSI/TIA-603-C Section 3.1.1 and FCC Part 15B, Section 15.109 (a) and:
Except for Class A digital devices, the field strength of radiated emission from unintentional radiators at a distance of 3 m shall not exceed the given limit.

5.7.4 Description of Measurement

Spurious emission from the EUT are measured in the frequency range of 30 MHz to 1000 MHz using a tuned receiver and appropriate broadband linearly polarised antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection. Table top equipment is placed on a 1.0 X 1.5 m non-conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. The interface cables that are closer than 40 centimetres to the ground plane are bundled in the centre in a serpentine fashion so that they are at least 40 centimetres from the ground plane. Cables to simulators/testers (if used in this test) are routed through the centre of the table and to a screened room located outside the test area. The antenna is positioned 10 metres horizontally from the EUT and is repeated vertically. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 metres and the EUT is rotated 360 degrees.

The final level in dB μ V/m is calculated by taking the reading from the EMI receiver (Level dB μ V) and adding the correction factors and cable loss factor (dB). The FCC or CISPR limit is subtracted from this result in order to provide the limit margin listed in the measurement protocol.

Spurious emission from the EUT are measured in the frequency range 1 GHz up to 12.75 GHz, using a spectrum analyser and appropriate linearly polarized antennas. Table top equipment is placed on a 1.0 X 1.5 metre non-conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. The interface cables that are closer than 40 centimetres to the ground plane are bundled in the centre in a serpentine fashion so they are at least 40 centimetres from the ground plane. Cables to simulators/testers (if used in this test) are routed through the centre of the table and to a screened room located outside the test area. Measurements are made in both the horizontal and vertical polarization planes in a fully anechoic room using a spectrum analyser set to max peak detector function and a resolution 1 MHz and video bandwidth 3 MHz for peak and 10 Hz for average measurement. The conditions determined as worst case will then be used for the final measurements. When the EUT is larger than the beam width of the measuring antenna it will be moved over the surface for the four sides of the equipment. Where appropriate, the test distance may be reduced in order to detect emissions under better uncertainty and are calculated at the specified test distance.

The radiated power of the spurious emission from the EUT is measured in a test setup following the procedures set out in ANSI C63.4. If the emission level of the EUT in peak mode complies with the average limit is 20 dB lower, then testing will be stopped and peak values of the EUT will be reported, otherwise the emission will be measured in average mode again and reported.

Instrument settings:

30 MHz – 1000 MHz:	RBW: 120 kHz
1000 MHz – 5000 MHz	RBW: 1 MHz

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5.7.5 Test result

Frequency (MHz)	Level QP (dB μ V)	Level AV (dB μ V)	Bandwidth (kHz)	Correct. factor (dB)	Level QP (dB μ V/m)	Level AV (dB μ V/m)	Limit (dB μ V/m)	Delta (dB)
30 - 1000	-	-	-	-	-	-	40.0	>10

Frequency (MHz)	Level PK (dB μ V)	Level AV (dB μ V)	Bandwidth (kHz)	Correct. factor (dB)	Level PK (dB μ V/m)	Level AV (dB μ V/m)	Limit AV (dB μ V/m)	Delta (dB)
1000 - 5000	-	-	-	-	-	-	54.0	>10

Limit according to FCC Part 15B, Section 15.109(a):

Frequency (MHz)	Limit (μ V/m)	Limit (dB μ V/m)
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

The requirements are **FULFILLED**.

Remarks: The measurement was performed according to FCC Part 15A, Section 15.33(b), up to the 5 MHz.
No spurious emissions detected in the frequency range from 30 MHz to 5000 MHz.

FCC ID: OV8-LOGD3
6 USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used are calibrated and verified regularly. The calibration history is available on request.

Test ID	Model Type	Equipment No.	Next Calib.	Last Calib.	Next Verif.	Last Verif.
A 4	ESHS 30	02-02/03-05-002	17/07/2016	17/07/2015		
	ESH 2 - Z 5	02-02/20-05-004	26/10/2016	26/10/2015	21/01/2016	21/07/2015
	N-4000-BNC	02-02/50-05-138				
	N-1500-N	02-02/50-05-140				
	ESH 3 - Z 2	02-02/50-05-155	06/11/2016	06/11/2015	06/05/2016	06/11/2015
CPR 2	ESVS 30	02-02/03-05-003	09/07/2016	09/07/2015		
	VULB 9168	02-02/24-05-005	17/04/2016	17/04/2015	29/02/2016	31/08/2015
	NW-2000-NB	02-02/50-05-113				
	KK-EF393/U-16N-21N20 m	02-02/50-12-018				
	KK-SD_7/8-2X21N-33,0M	02-02/50-15-028				
MB	FSP 40	02-02/11-11-001	28/10/2016	28/10/2015		
	RF Antenna	02-02/24-05-032				
	METRA HIT World	02-02/32-10-001	17/10/2016	17/10/2015		
	WK-180/40	02-02/45-08-001	08/07/2016	08/07/2015		
	EA-PS 3032-20B	02-02/50-11-013				
SER 2	ESVS 30	02-02/03-05-003	09/07/2016	09/07/2015		
	VULB 9168	02-02/24-05-005	17/04/2016	17/04/2015	29/02/2016	31/08/2015
	NW-2000-NB	02-02/50-05-113				
	KK-EF393/U-16N-21N20 m	02-02/50-12-018				
	KK-SD_7/8-2X21N-33,0M	02-02/50-15-028				
SER 3	FSP 30	02-02/11-05-001	01/10/2016	01/10/2015		
	AFS5-12001800-18-10P-6	02-02/17-06-002				
	AFS4-01000400-10-10P-4	02-02/17-13-002				
	AMF-4F-04001200-15-10P	02-02/17-13-003				
	3117	02-02/24-05-009	12/05/2016	12/05/2015		
	WHJS 1000-10EE	02-02/50-05-070				
	Sucoflex N-2000-SMA	02-02/50-05-075				
	WHK 3.0/18G-10EF	02-02/50-05-180				
	SF104/11N/11N/1500MM	02-02/50-13-015				