EMI – TEST REPORT

- FCC 15.223 & FCC 15.247-

Type / Model Name	:	EVOLVE P10 iRange w/RFID upgrade kit EVOLVE E10 2.0 iRange w/RFID upgrade kit
Product Description	:	Electronic Article Surveillance Detection System with UHF RFID-Reader
Applicant	:	Checkpoint Systems, Inc.
Address	:	101 Wolf Drive, Thorofare
		New Jersey, USA 08086
Manufacturer	:	See general remarks
Address	:	

Test Result according to the standards listed in clause 1 test standards:	**POSITIVE**

Test Report No. : T41363-00-00HU	21. December 2016 Date of issue

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.

Contents

1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules and Regulations Part 15, Subpart A - General (October, 2016)

Part 15, Subpart A, Section 15.31	Measurement standards
Part 15, Subpart A, Section 15.33	Frequency range of radiated measurements
Part 15, Subpart A, Section 15.35	Measurement detector functions and bandwidths
Part 15, Subpart A, Section 15.38	Incorporation by reference

FCC Rules and Regulations Part 15, Subpart C - Intentional Radiators (October, 2016)

Part 15, Subpart C, Section 15.203	Antenna requirement
Part 15, Subpart C, Section 15.204	External radio frequency power amplifiers and antenna modifications
Part 15, Subpart C, Section 15.205	Restricted bands of operation
Part 15, Subpart C, Section 15.207	Conducted limits
Part 15, Subpart C, Section 15.209	Radiated emission limits, general requirements
Part 15, Subpart C, Section 15.215	Additional provisions to the general radiated emission limitations
Part 15, Subpart C, Section 15.223	Operation in the band 1.705-10 MHz §15.223(a) Radiated emissions, Fundamental & Harmonics
Part 15, Subpart C, Section 15.247	Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz and 5725 - 5850 MHz

FCC Rules and Regulations Part 1, Subpart I - Procedures Implementing the National Environmental Policy Act of 1969

Part 1, Subpart I, Section 1.1310	Radiofrequency radiation exposure limits
Part 1, Subpart 2, Section 2.1093	Radiofrequency radiation exposure evaluation: portable device

OET Bulletin 65, 65A, 65B, 65C Edition 97-01, August 1997 – Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields.

ANSI C63.10: 2013	Testing Unlicensed Wireless Devices
ANSI C95.1:2005	IEEE Standard for Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz
CISPR 16-4-2: 2003	Uncertainty in EMC measurement

2 EQUIPMENT UNDER TEST

2.1 Short description of the equipment under test (EUT)

The Evolve Antennas with TR7240 Rev04 are an Electronic Article Surveillance System (EAS). The system detects target tags attached to merchandise. The tags resonate around the frequency of 8.2 MHz. The tags on a purchased article can be deactivated. In this case the tags will not resonate in a defined magnetic field which covers an area 3-feet on either side of the antenna in the 7.0 to 10.0 MHz range and triggers an alarm when a non-deactivated target is detected.

The WRTZ-2000 is a UHF RFID reader. It can read active and passive Tags in the frequency range from 902 to 928 MHz. 8 antenna connectors are available.

Number of tested samples: 2

2.2 Transmit operating modes

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

- Continuous sweep mode at 8.2 MHz Band

- TAG reading mode supplying 30.0 dBm

2.3 Power supply system utilised

Power supply voltage, V_{nom}	:	Primary:	115 V / 60 Hz / 1ϕ
		Secondary:	24 V / DC – RF Electronic
		Secondary:	12 V / DC – WRTZ-2000

2.4 Peripheral devices and interface cables

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

- PSU (Power Supply Unit) EOS Model : LFZVC65SG24S92, S/N: E01-B-Q130-1853
- PSU (Power Supply Unit) GlobTek Model : GT-2S5024D-R-ES, GS-599ES, S/N: RoHS314194142/15
- Standard AC mains cable Model :
- PSU (Power Supply Unit), XP Power Model : AEB70US12

- customer specific cables

- Unscreened power cables

2.5 Operation in Restricted Bands

The EUT is a digital swept frequency hopping transmitter. The EUT hops on discrete frequencies. The discrete frequencies that can be transmitted by the EUT are as follows:

Frequency table:

Frequency Table For Standard 8.2							
8.450 E+06	8.450 E+06	8.450 E+06	8.450 E+06	8.325 E+06	8.325 E+06	8.325 E+06	8.325 E+06
8.075 E+06	8.075 E+06	8.075 E+06	8.075 E+06	7.950 E+06	7.950 E+06	7.950 E+06	7.950 E+06

Frequency Table For Corral 8.2/9.0							
9.125 E+06	9.125 E+06	9.125 E+06	9.125 E+06	8.875 E+06	8.875 E+06	8.875 E+06	8.875 E+06
8.325 E+06	8.325 E+06	8.325 E+06	8.325 E+06	8.075 E+06	8.075 E+06	8.075 E+06	8.075 E+06

Frequency Table For Library 9.5							
9.800 E+06	9.800 E+06	9.800 E+06	9.800 E+06	9.600 E+06	9.600 E+06	9.600 E+060	9.600 E+06
9.400 E+06	9.400 E+06	9.400 E+06	9.400 E+06	9.200 E+06	9.200 E+06	9.200 E+06	9.200 E+06

Frequency Table For Apparel 8.2/9.2							
9.325 E+06	9.325 E+06	9.325 E+06	9.325 E+06	9.075 E+06	9.075 E+06	9.075 E+06	9.075 E+06
8.325 E+06	8.325 E+06	8.325 E+06	8.325 E+06	8.075 E+06	8.075 E+06	8.075 E+06	8.075 E+06

Frequency Table For Japan 1&2 8.2/9.5							
9.625 E+06	9.625 E+06	9.625 E+06	9.625 E+06	9.375 E+06	9.375 E+06	9.375 E+06	9.375 E+06
8.325 E+06	8.325 E+06	8.325 E+06	8.325 E+06	8.075 E+06	8.075 E+06	8.075 E+06	8.075 E+06

Frequency Table For Immunity 8.2							
8.800 E+06	8.800 E+06	8.800 E+06	8.800 E+06	8.325 E+06	8.325 E+06	8.325 E+06	8.325 E+06
8.075 E+06	8.075 E+06	8.075 E+06	8.075 E+06	7.400 E+06	7.400 E+06	7.400 E+06	7.400 E+06

Frequency Table For Pharma/Razor Keeper 7.2/8.2							
8.325 E+06	8.325 E+06	8.325 E+06	8.325 E+06	8.075 E+06	8.075 E+06	8.075 E+06	8.075 E+06
7.600 E+06	7.600 E+06	7.600 E+06	7.600 E+06	7.200 E+06	7.200 E+06	7.200 E+06	7.200 E+06

The restricted frequency bands (per FCC Part 15 Clause 15.205) in the operating frequency band of the EuT are as follows:

8.291 – 8.294 MHz
8.362 – 8.366 MHz
8.37625 – 8.38675 MHz
8.41425 – 8.41475 MHz

The transmitter is not capable of hopping into, or operating, in the restricted frequency bands and therefore complies with the restriction.

2.6 Deviations or Exclusions from the Requirements and Standards

The Evolve Antennas are a digital swept frequency hopping transmitter. The EUT hops on discrete frequencies. The hop can not stop on one of the frequencies. It is not possible to find the “true peak” with a measuring receiver by using an average detector.

Following measurement method was used to find the “true peak”.

Measurement of the fundamental – 7.4 to 10.0 MHz – was perfomed by setting a spectrum analyzer to “max-hold”, peak detector, a 300 kHz bandwitdh and a span from 6.5 MHz to 10 MHz. A resolution bandwidth of 300 kHz was used in performing the “true peak” measurements, because increasing the bandwidth above 300 kHz did not increase the detected peak of the fundamental.

2.7 Connectable cables:

Name of the cable	Digital	Length/m	shielded
DC cable (Globtek)	O yes ■ no	4	O yes ■ no
DC cable (EOS)	O yes ■ no	1	O yes ■ no
DC cable (Intellquip AS/NZS)	O yes ■ no	1.5	O yes ■ no
DC cable (Planet)	O yes ■ no	0.2	O yes ■ no
Lights/sound cable	O yes ■ no	3	O yes ■ no
RF coax cable (P10, G10, G35, E10 2.0)	O yes ■ no	4	O yes ■ no
RF coax cable (G30)	O yes ■ no	12.5	O yes ■ no
Visiplus cable (G30)	O yes ■ no	11.5	O yes ■ no
RFID coax cable	O yes ■ no	4	■ yes O no
RFID lamp cable	O yes ■ no	1	O yes ■ no
Ethernet cable	■ yes O no	3	O yes ■ no
RFID Interpedestal cable	■ yes O no	3	O yes ■ no

3 Test result summary

FCC Rule Part	Description	Result
15.207	AC power line conducted emissions	passed
15.223	Field strength of the fundamental wave	passed
15.247	Maximum peak conducted output power	passed
15.209	Spurious emissions (magnetic field) 9 kHz – 30 MHz	passed
15.209	Spurious emissions radiated	passed

GENERAL REMARKS:

Manufacturer of the RF Electronic: Sidep Electronics (Shanghai) Co., Ltd

No 1695 Xin Tanwa Rd, Pudiong District

Shanghai 201321 China

Manufacturer of the WRTZ-2000: Welco Technology (Suzhou) Limited

198 XINGLONG STREET

SUZHOU 215126 CN

The frequency range was scanned from 9 kHz to 10 GHz.

All emissions not reported in this test report were more than 10 dB below the specified limit.

FCC ID: DO4TR7240R and DO4WRTZ2000

The EVOLVE P10 iRange w/RFID upgrade kit and EVOLVE E10 2.0 iRange w/RFID upgrade kit consists of following systems:

- WRTZ-2000 (FCCID: DO4WRTZ2000):
The UHF sytem is a frequency hopping system using 50 channels in the frequency band from 902 to 928 MHz.
The device has a maximum of eigth external antenna ports for connection of the transmission/reception antennas for communication with RFID tags.
Measurements have been made with power settings of 30.0 dBm.
For detailed information please refer to the user manual.
It is not possible to set the EuT only in receiving mode.

- RF Electronic (FCCID: DO4TR7240R):
The RF Electronic is a digital swept frequency hopping transmitter. The EUT hops on discrete frequencies. The hop can not stop on one of the frequencies.

In pratical use both systems (Evolve Antenna and WRTZ-2000) are in continuous sweep mode at the same time (simultan transmission) in the two different frequency ranges.

The EVOLVE 3 TR7240/TR4240 ELECTRONIC with RFID upgrade kit Family consists of different versions:

- ⇨ EVOLVE P10 iRange w/RFID upgrade kit
- ⇨ EVOLVE E10 2.0 iRange w/RFID upgrade kit

- ⇨ For more detailed information see technical documentation set

- ⇨ This test report covers testing on both systems:
  - EVOLVE P10 iRange w/RFID upgrade kit
  - EVOLVE E10 2.0 iRange w/RFID upgrade kit

3.1 FINAL ASSESSMENT:

The equipment under test **fulfills** the EMI requirements cited in clause 1 test standards.

Date of receipt of test sample	:	acc. to storage records
Testing commenced on	:	07. November 2016
Testing concluded on	:	17. November 2016

Checked by:

Klaus Gegenfurtner
I confirm the correctness and Integrity of this document
2016.12.21 14:09:45 +01'00'

Klaus Gegenfurtner
Teamleader Radio

Issued by:

Markus Huber
I'm the author of this document
2016.12.21 13:51:23 +01'00'

Markus Huber

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.

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
AC Conducted Spurious Emissions	0.15 MHz to 30 MHz	95%	± 3.29 dB
6 dB Bandwidth	Center frequency of EuT	95%	± 2.5 x 10^{-7}
20 dB Bandwidth	Center frequency of EuT	95%	± 2.5 x 10^{-7}
99% Occupied Bandwidth	Center frequency of EuT	95%	± 2.5 x 10^{-7}
Radiated Spurious Emissions	9 kHz to 30 MHz	95%	± 3.53 dB
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	± 3.71 dB
Radiated Spurious Emissions	1000 MHz to 10000 MHz	95%	± 2.34 dB
Peak conducted output power	902 MHz to 928 MHz	95%	± 0.35 dB
Conducted Spurious Emissions	9 kHz to 10000 MHz	95%	± 2.15 dB

4.4 Measurement Protocol for FCC

4.4.1 GENERAL INFORMATION

4.4.1.1 Test methodology

Conducted and radiated disturbance testing is performed according to the procedures in International Special Committee on Radio Interference (CISPR) Publication 22, European Standard EN 55022 as shown under section 1 of this report.

In compliance with 47 CFR Part 15 Subpart A Section 15.38 testing for FCC compliance may be done following the ANSI C63.4-2003 procedures and using the CISPR 22 Limits.

4.4.1.2 Justification

The equipment under test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral using the appropriate impedance characteristic or left unterminated. Where appropriate, cables are manually manipulated with respect to each other thus obtaining maximum disturbances from the unit.

4.4.1.3 General Standard information

The test methods used comply with CISPR Publication 22, EN 55022 - " Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement" and with ANSI C63.4 - "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz". In compliance with 47 CFR Part 15 Subpart A, Section 15.38 testing for FCC compliance may be achieved by following the procedures set out in ANSI C63.4 and applying the CISPR 22 limits.

4.4.2 Conducted emission

Description of measurement

The final level in dBμV is taken directly from the EMI receiver. This level is compared to the FCC limit or to the CISPR limit.

To convert dBμV to μV, the following conversions apply:

dBμV = 20*log(μV);
μV = 10^(dBμV/20);

Conducted emissions on the 50 Hz and/or 60 Hz power interface of the EUT are measured in the frequency range of 150 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection and a Line Impedance Stabilization Network (LISN) with 50Ω/50 μH (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 centimetres above the floor and is positioned 40 centimetres from the vertical ground plane (wall) of the screen room. If the minimum limit margin of a peak mode measurement appears to be less than 20 dB, the emissions are remeasured using a tuned receiver with quasi-peak and average detection and recorded on the data sheets.

4.4.3 Radiated emission (electrical field 30 MHz - 1 GHz)

Description of measurement

Spurious emissions 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 setup of the equipment under test is established in accordance with ANSI C63.4.The interface cables that are closer than 40 centimetres to the ground plane are bundled in the center 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 center of the table and to a screened room located outside the test area. The antenna is positioned 3, 10 or 30 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 dBµV/m is calculated by taking the reading from the EMI receiver (Level dBµV) 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.

The resolution bandwidth setting:
30 MHz – 1000 MHz: RBW: 120 kHz

Example:

Frequency	Level	+	Factor	=	Level	-	CISPR Limit	=	Delta
(MHz)	(dBµV)		(dB)		(dBµV/m)		(dBµV/m)		(dB)
719.0	75.0	+	32.6	=	107.6	-	110.0	=	-2.4

4.4.4 Radiated emission (electrical field 1 GHz - 40 GHz)

Description of measurement

Radiated emissions from the EUT are measured in the frequency range 1 GHz up to the maximum frequency as specified in 47 CFR Part 15, Subpart A, Section 15.33, 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 setup of the equipment under test is following set out in ANSI C63.4. The interface cables that are closer than 40 centimetres to the ground plane are bundled in the center 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 center 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 analyzer 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.

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: OATS 1

5.1.2 Photo documentation of the test set-up – See Attachment D

5.1.3 Applicable standard

According to FCC Part 15, Section 15.207(a):

5.1.4 Description of Measurement

The measurements are performed following the procedures set out in ANSI C63.10. 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

With PSU GT-2S5024D-R-ES and XP Power:
Min. limit margin 8.2 MHz Band:
Evolve P10: 5.31 dB at 0.453 MHz

With PSU LFZVC65SG24S92 and XP Power:
Min. limit margin 8.2 MHz Band:
Evolve E10: 2.91 dB at 2.409 MHz

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

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

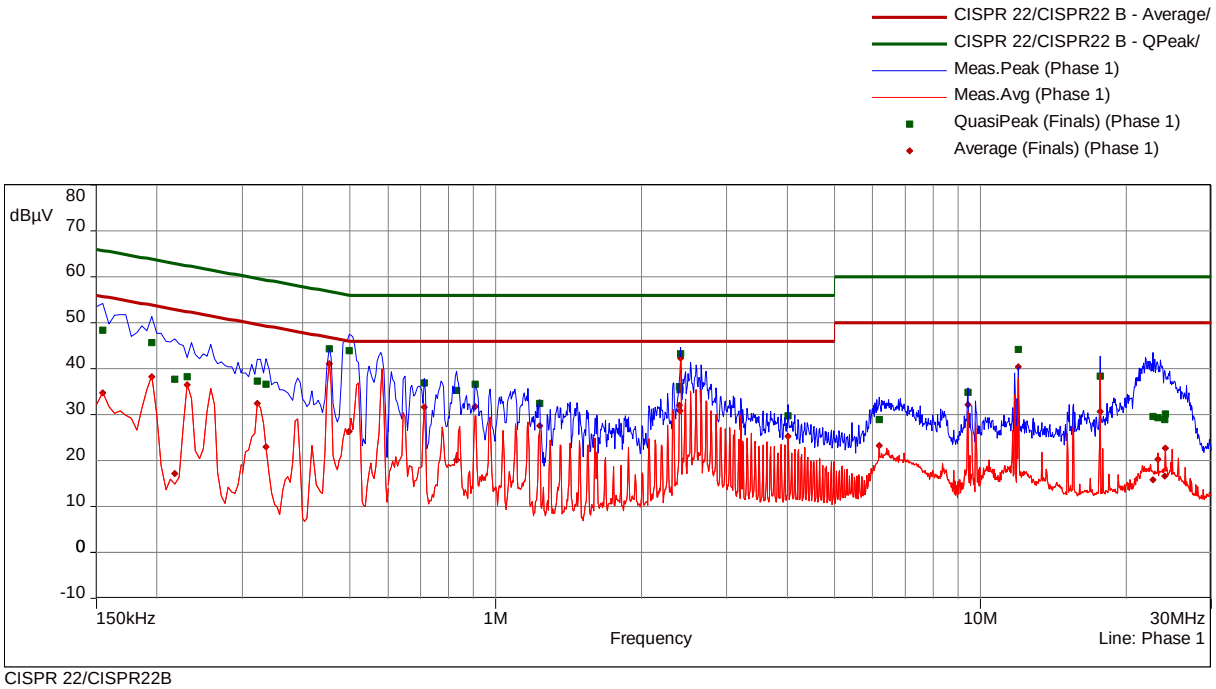
* Decreases with the logarithm of the frequency

The requirements are **FULFILLED.**

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

5.1.6 Test protocol

Test point	L1	Result: PASS
Operation mode:	Evolve E10 / Continuous sweep mode	
Remarks:	FCC/IC Requirements	
	With EOS and XP PowerPSU, Cable and Ferrite on DC line	
	8.2MHz Band, Tx1 & Tx2: 31 – Antenna dummy load	
Tested by:	Huber Markus	



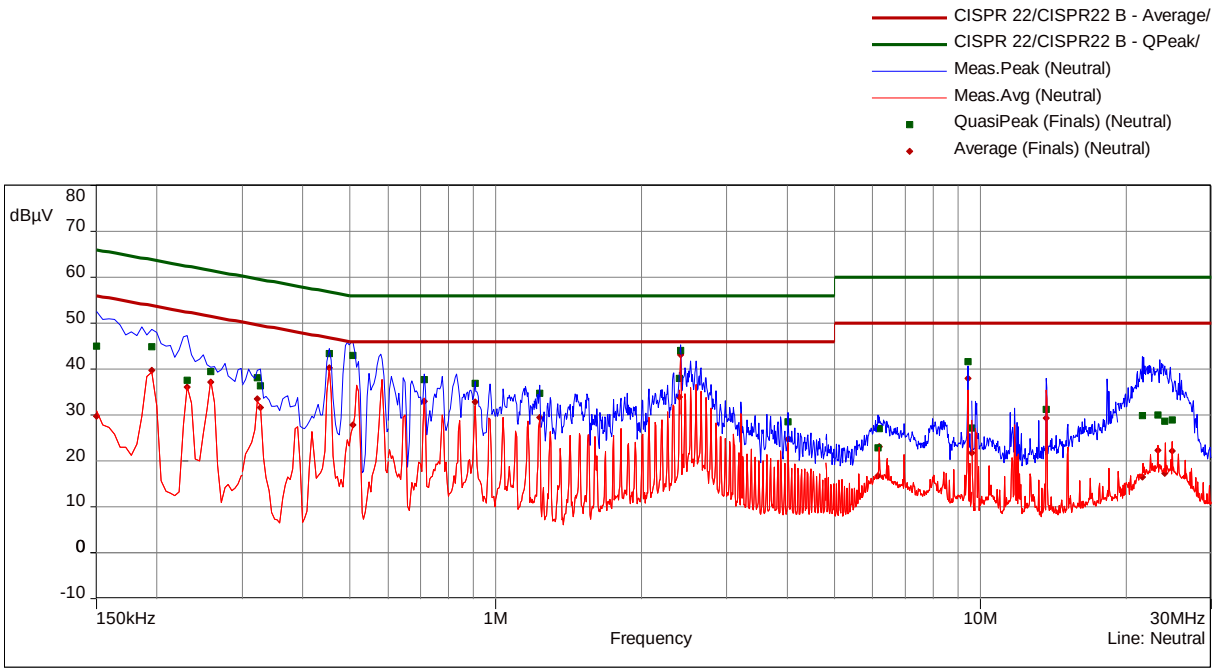
CISPR 22/CISPR22B

FCC ID: DO4TR7240R and DO4WRTZ2000

freq	SR	QP	margin	limit	AV	margin	limit	line	corr
MHz		dB(µV)	dB	dB	dB(µV)	dB	dB		dB
0.1545	1	48.35	17.40	65.75	34.71	21.05	55.75	Phase 1	9.98
0.195	1	45.73	18.09	63.82	38.28	15.54	53.82	Phase 1	9.98
0.2175	1	37.65	25.26	62.91	17.23	35.69	52.91	Phase 1	9.98
0.231	1	38.27	24.14	62.41	36.45	15.97	52.41	Phase 1	9.99
0.3225	2	37.33	22.31	59.64	32.39	17.25	49.64	Phase 1	10.00
0.336	2	36.60	22.70	59.30	22.99	26.31	49.30	Phase 1	10.00
0.453	2	44.27	12.55	56.82	41.08	5.74	46.82	Phase 1	10.01
0.498	2	43.98	12.05	56.03	26.35	19.69	46.03	Phase 1	10.01
0.7125	3	36.88	19.12	56.00	31.68	14.32	46.00	Phase 1	10.02
0.8295	3	35.29	20.71	56.00	20.20	25.80	46.00	Phase 1	10.02
0.906	3	36.56	19.44	56.00	31.77	14.23	46.00	Phase 1	10.03
1.2315	4	32.38	23.62	56.00	27.58	18.42	46.00	Phase 1	10.04
2.397	4	36.12	19.88	56.00	32.02	13.98	46.00	Phase 1	10.08
2.4	4	35.47	20.53	56.00	30.78	15.22	46.00	Phase 1	10.08
2.409	5	43.22	12.78	56.00	42.32	3.68	46.00	Phase 1	10.08
4.0155	5	29.74	26.26	56.00	25.27	20.73	46.00	Phase 1	10.13
6.195	6	28.89	31.11	60.00	23.23	26.77	50.00	Phase 1	10.22
9.4305	6	34.90	25.10	60.00	32.13	17.87	50.00	Phase 1	10.33
11.976	7	44.20	15.80	60.00	40.38	9.62	50.00	Phase 1	10.46
17.7045	7	38.39	21.61	60.00	30.75	19.25	50.00	Phase 1	10.76
22.7685	8	29.59	30.41	60.00	15.77	34.23	50.00	Phase 1	10.84
23.2815	8	29.33	30.67	60.00	20.27	29.73	50.00	Phase 1	10.84
24.051	8	28.93	31.07	60.00	16.61	33.39	50.00	Phase 1	10.83
24.087	8	30.15	29.85	60.00	22.67	27.33	50.00	Phase 1	10.83

FCC ID: DO4TR7240R and DO4WRTZ2000

Test point N
Result: PASS
Operation mode: Evolve E10 / Continuous sweep mode
Remarks: FCC/IC Requirements
With EOS and XP PowerPSU, Cable and Ferrite on DC line
8.2MHz Band, Tx1 & Tx2: 31 – Antenna dummy load
Tested by: Huber Markus



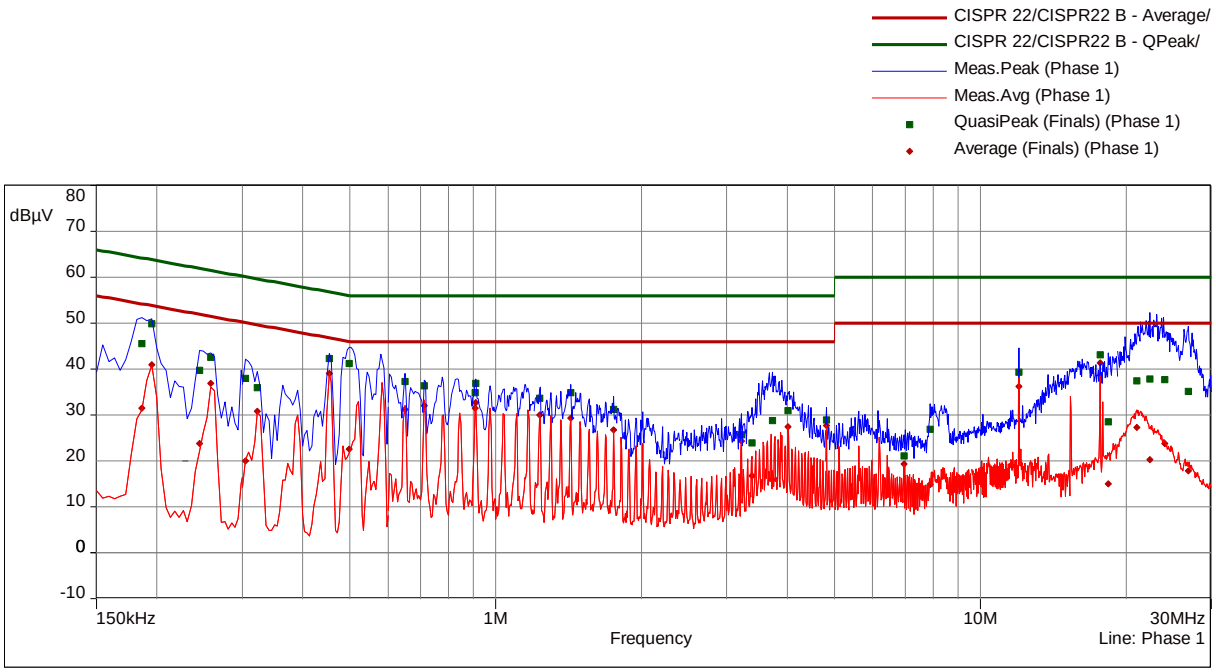
CISPR 22/CISPR22B

FCC ID: DO4TR7240R and DO4WRTZ2000

freq	SR	QP	margin	limit	AV	margin	limit	line	corr
MHz		dB(µV)	dB	dB	dB(µV)	dB	dB		dB
0.15	9	45.05	20.95	66.00	29.76	26.24	56.00	Neutral	9.99
0.195	9	44.85	18.97	63.82	39.72	14.10	53.82	Neutral	9.99
0.231	9	37.61	24.80	62.41	36.10	16.32	52.41	Neutral	10.00
0.258	9	39.43	22.07	61.50	37.19	14.31	51.50	Neutral	10.00
0.3225	10	38.12	21.52	59.64	33.48	16.17	49.64	Neutral	10.00
0.327	10	36.37	23.16	59.53	31.66	17.87	49.53	Neutral	10.00
0.453	10	43.45	13.37	56.82	40.29	6.53	46.82	Neutral	10.01
0.507	10	42.99	13.01	56.00	27.84	18.16	46.00	Neutral	10.01
0.7125	11	37.73	18.27	56.00	33.03	12.97	46.00	Neutral	10.02
0.906	11	36.93	19.07	56.00	32.82	13.18	46.00	Neutral	10.03
1.2315	12	34.75	21.25	56.00	29.44	16.56	46.00	Neutral	10.04
2.397	12	38.03	17.97	56.00	33.99	12.01	46.00	Neutral	10.08
2.409	13	44.00	12.00	56.00	43.09	2.91	46.00	Neutral	10.08
4.0155	13	28.51	27.49	56.00	24.70	21.30	46.00	Neutral	10.14
6.159	14	22.80	37.20	60.00	16.81	33.19	50.00	Neutral	10.25
6.195	14	27.10	32.90	60.00	23.10	26.90	50.00	Neutral	10.25
9.4305	14	41.57	18.43	60.00	37.94	12.06	50.00	Neutral	10.40
9.6045	15	27.14	32.86	60.00	21.73	28.27	50.00	Neutral	10.41
13.7085	15	31.21	28.79	60.00	29.38	20.62	50.00	Neutral	10.70
21.6255	16	29.93	30.07	60.00	16.47	33.53	50.00	Neutral	11.11
23.2815	16	30.00	30.00	60.00	22.31	27.69	50.00	Neutral	11.13
24.033	16	28.60	31.40	60.00	17.36	32.64	50.00	Neutral	11.14
24.888	16	28.93	31.07	60.00	22.11	27.89	50.00	Neutral	11.15

FCC ID: DO4TR7240R and DO4WRTZ2000

Test point L1 Result: PASS
Operation mode: Evolve E10 / Continuous sweep mode
Remarks: FCC/IC Requirements
With GlobTek and XP Power PSU, Cable and Ferrite on DC line
8.2MHz Band, Tx1 & Tx2: 31 – Antenna dummy load
Tested by: Huber Markus

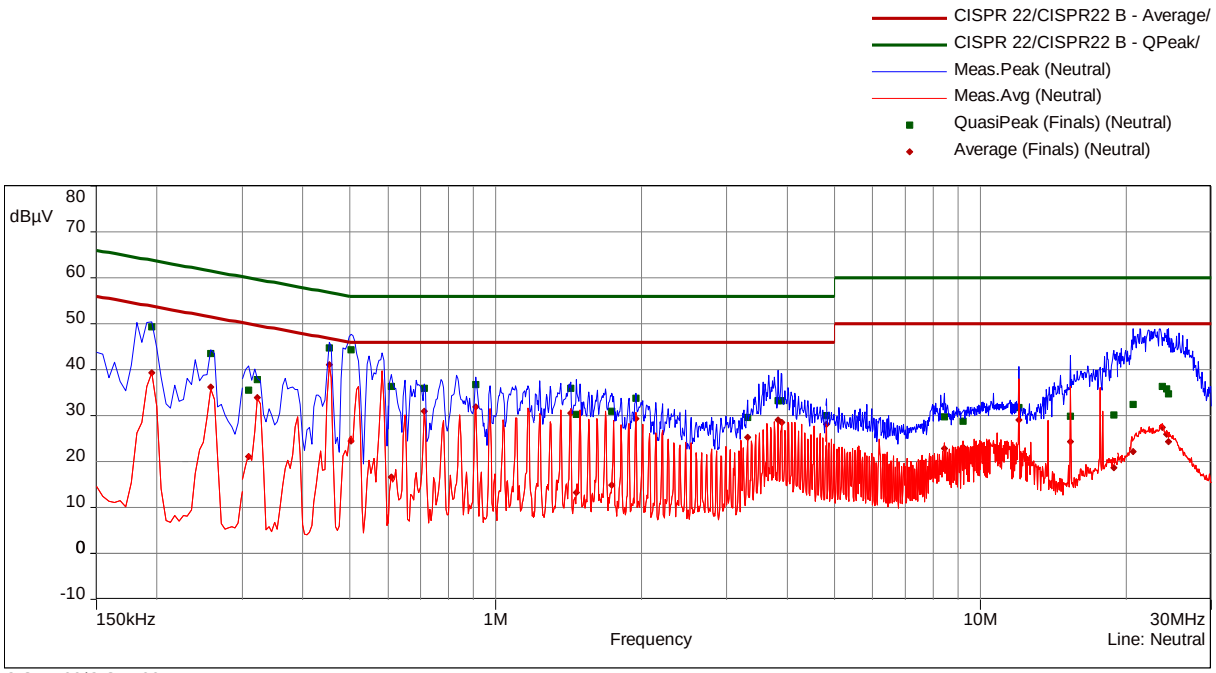


CISPR 22/CISPR22B

freq	SR	QP	margin	limit	AV	margin	limit	line	corr
MHz		dB(µV)	dB	dB	dB(µV)	dB	dB		dB
0.186	1	45.61	18.61	64.21	31.51	22.71	54.21	Phase 1	9.98
0.195	1	49.92	13.90	63.82	40.92	12.90	53.82	Phase 1	9.98
0.2445	1	39.78	22.16	61.94	23.79	28.16	51.94	Phase 1	9.99
0.258	1	42.62	18.88	61.50	36.88	14.61	51.50	Phase 1	9.99
0.3045	2	38.01	22.11	60.12	20.07	30.04	50.12	Phase 1	9.99
0.3225	2	35.92	23.73	59.64	30.83	18.81	49.64	Phase 1	10.00
0.453	2	42.32	14.50	56.82	39.08	7.74	46.82	Phase 1	10.01
0.498	2	41.27	14.76	56.03	22.54	23.49	46.03	Phase 1	10.01
0.6495	3	37.33	18.67	56.00	31.21	14.79	46.00	Phase 1	10.02
0.7125	3	36.35	19.65	56.00	32.08	13.92	46.00	Phase 1	10.02
0.906	3	34.81	21.19	56.00	31.54	14.46	46.00	Phase 1	10.03
0.9105	3	36.85	19.15	56.00	32.70	13.30	46.00	Phase 1	10.03
1.2315	4	33.70	22.30	56.00	30.02	15.98	46.00	Phase 1	10.04
1.4295	4	34.83	21.17	56.00	29.39	16.61	46.00	Phase 1	10.05
1.7535	4	31.29	24.71	56.00	26.79	19.21	46.00	Phase 1	10.06
3.2145	5	25.72	30.28	56.00	24.32	21.68	46.00	Phase 1	10.10
3.381	5	23.92	32.08	56.00	16.81	29.19	46.00	Phase 1	10.11
3.732	5	28.73	27.27	56.00	15.92	30.08	46.00	Phase 1	10.12
4.0155	5	30.96	25.04	56.00	27.44	18.56	46.00	Phase 1	10.13
4.8135	6	28.86	27.14	56.00	27.75	18.25	46.00	Phase 1	10.16
6.969	6	21.10	38.90	60.00	19.40	30.60	50.00	Phase 1	10.25
7.8915	6	26.93	33.07	60.00	14.84	35.16	50.00	Phase 1	10.28
12.0345	7	39.38	20.62	60.00	36.21	13.79	50.00	Phase 1	10.46
17.7045	7	43.18	16.82	60.00	41.30	8.70	50.00	Phase 1	10.76
18.3615	7	28.54	31.46	60.00	14.97	35.03	50.00	Phase 1	10.79
21.0675	8	37.50	22.50	60.00	27.36	22.64	50.00	Phase 1	10.85
22.3905	8	37.91	22.09	60.00	20.22	29.78	50.00	Phase 1	10.84
24.0465	8	37.68	22.32	60.00	23.84	26.16	50.00	Phase 1	10.83
26.8815	8	35.16	24.84	60.00	17.91	32.09	50.00	Phase 1	10.78

FCC ID: DO4TR7240R and DO4WRTZ2000

Test point N Result: PASS
Operation mode: Evolve E10 / Continuous sweep mode
Remarks: FCC/IC Requirements
With GlobTek and XP Power PSU, Cable and Ferrite on DC line
8.2MHz Band, Tx1 & Tx2: 31 – Antenna dummy load
Tested by: Huber Markus



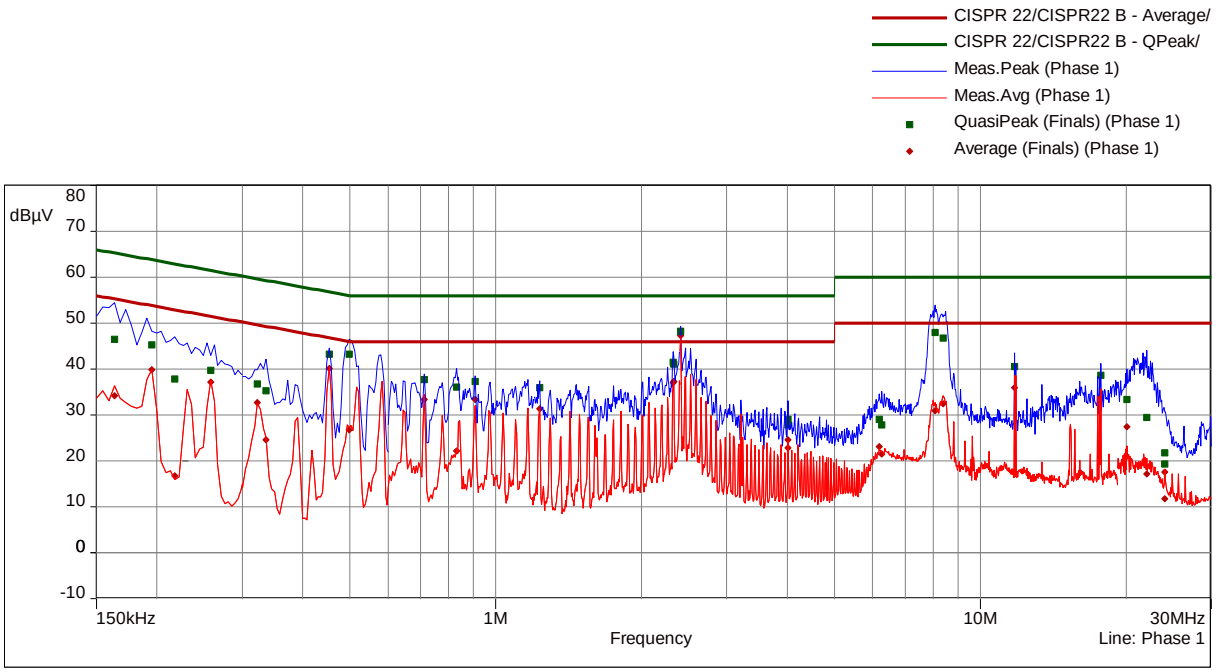
CISPR 22/CISPR22B

FCC ID: DO4TR7240R and DO4WRTZ2000

freq	SR	QP	margin	limit	AV	margin	limit	line	corr
MHz		dB(µV)	dB	dB	dB(µV)	dB	dB		dB
0.195	9	49.39	14.43	63.82	39.36	14.46	53.82	Neutral	9.99
0.258	9	43.50	18.00	61.50	36.25	15.24	51.50	Neutral	10.00
0.309	10	35.51	24.49	60.00	21.11	28.89	50.00	Neutral	10.00
0.3225	10	37.88	21.77	59.64	34.00	15.65	49.64	Neutral	10.00
0.453	10	44.73	12.09	56.82	41.10	5.72	46.82	Neutral	10.01
0.5025	10	44.34	11.66	56.00	24.48	21.52	46.00	Neutral	10.01
0.609	11	36.38	19.62	56.00	16.61	29.39	46.00	Neutral	10.02
0.7125	11	35.95	20.05	56.00	30.89	15.11	46.00	Neutral	10.02
0.9105	11	36.76	19.24	56.00	31.90	14.10	46.00	Neutral	10.03
1.4295	12	35.95	20.05	56.00	30.54	15.46	46.00	Neutral	10.05
1.4655	12	30.29	25.71	56.00	13.29	32.71	46.00	Neutral	10.05
1.7355	12	30.94	25.06	56.00	14.86	31.14	46.00	Neutral	10.06
1.947	12	33.77	22.23	56.00	29.34	16.66	46.00	Neutral	10.06
3.309	13	29.57	26.43	56.00	25.30	20.70	46.00	Neutral	10.12
3.8265	13	33.29	22.71	56.00	29.03	16.97	46.00	Neutral	10.14
3.894	13	33.25	22.75	56.00	28.53	17.47	46.00	Neutral	10.14
4.8135	14	30.05	25.95	56.00	28.13	17.87	46.00	Neutral	10.18
8.436	14	29.71	30.29	60.00	22.82	27.18	50.00	Neutral	10.35
9.2145	14	28.77	31.23	60.00	23.09	26.91	50.00	Neutral	10.39
12.0345	15	31.71	28.29	60.00	29.00	21.00	50.00	Neutral	10.57
15.351	15	29.89	30.11	60.00	24.29	25.71	50.00	Neutral	10.81
18.87	15	30.17	29.83	60.00	18.71	31.29	50.00	Neutral	11.02
20.6895	16	32.47	27.53	60.00	22.23	27.77	50.00	Neutral	11.10
23.745	16	36.35	23.65	60.00	27.40	22.60	50.00	Neutral	11.14
24.24	16	35.84	24.16	60.00	25.93	24.07	50.00	Neutral	11.14
24.483	16	34.75	25.25	60.00	24.28	25.72	50.00	Neutral	11.15

FCC ID: DO4TR7240R and DO4WRTZ2000

Test point	L1	Result: PASS
Operation mode:	Evolve P10 / Continuous sweep mode	
Remarks:	FCC/IC Requirements	
	With EOS and XP Power PSU, Cable and Ferrite on DC line	
	8.2MHz Band, Tx1 & Tx2: 31 – Antenna dummy load	
Tested by:	Huber Markus	

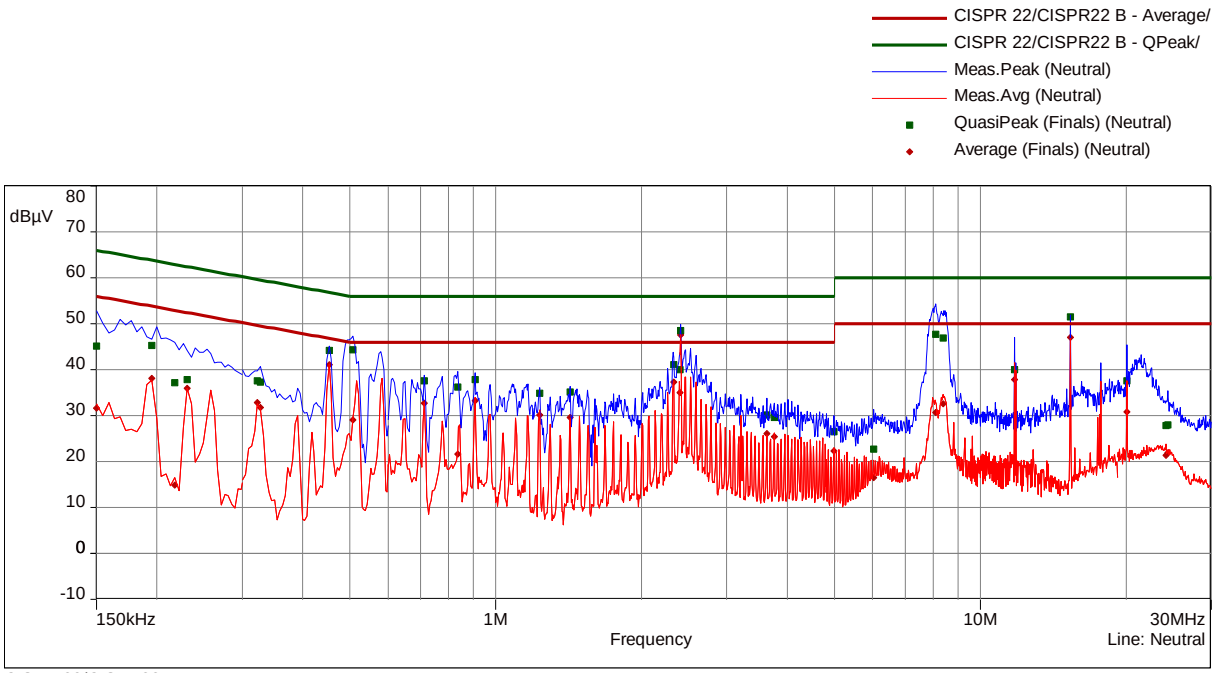


CISPR 22/CISPR22B

freq	SR	QP	margin	limit	AV	margin	limit	line	corr
MHz		dB(µV)	dB	dB	dB(µV)	dB	dB		dB
0.1635	1	46.44	18.84	65.28	34.15	21.14	55.28	Phase 1	9.98
0.195	1	45.28	18.55	63.82	39.86	13.96	53.82	Phase 1	9.98
0.2175	1	37.79	25.13	62.91	16.80	36.11	52.91	Phase 1	9.98
0.258	1	39.78	21.72	61.50	37.21	14.28	51.50	Phase 1	9.99
0.3225	2	36.77	22.87	59.64	32.71	16.94	49.64	Phase 1	10.00
0.336	2	35.29	24.01	59.30	24.66	24.64	49.30	Phase 1	10.00
0.453	2	43.27	13.55	56.82	40.19	6.63	46.82	Phase 1	10.01
0.498	2	43.25	12.78	56.03	26.81	19.22	46.03	Phase 1	10.01
0.7125	3	37.72	18.28	56.00	33.41	12.59	46.00	Phase 1	10.02
0.8295	3	36.05	19.95	56.00	22.22	23.78	46.00	Phase 1	10.02
0.906	3	37.31	18.69	56.00	33.42	12.58	46.00	Phase 1	10.03
1.2315	4	35.98	20.02	56.00	31.33	14.67	46.00	Phase 1	10.04
2.325	4	41.50	14.50	56.00	37.07	8.93	46.00	Phase 1	10.07
2.3295	4	41.11	14.89	56.00	37.37	8.63	46.00	Phase 1	10.07
4.011	5	27.84	28.16	56.00	22.81	23.19	46.00	Phase 1	10.13
4.0155	5	29.05	26.95	56.00	24.67	21.33	46.00	Phase 1	10.13
6.195	6	29.07	30.93	60.00	23.12	26.88	50.00	Phase 1	10.22
6.2715	6	27.82	32.18	60.00	21.49	28.51	50.00	Phase 1	10.22
8.085	6	48.04	11.96	60.00	30.91	19.09	50.00	Phase 1	10.29
8.4	6	46.74	13.26	60.00	32.49	17.51	50.00	Phase 1	10.29
11.787	7	40.48	19.52	60.00	36.01	13.99	50.00	Phase 1	10.45
17.7405	7	38.71	21.29	60.00	34.20	15.80	50.00	Phase 1	10.76
20.091	8	33.32	26.68	60.00	27.46	22.54	50.00	Phase 1	10.86
22.0665	8	29.53	30.47	60.00	17.17	32.83	50.00	Phase 1	10.85
24.051	8	19.30	40.70	60.00	11.79	38.21	50.00	Phase 1	10.83
24.078	8	21.81	38.19	60.00	17.59	32.41	50.00	Phase 1	10.83

FCC ID: DO4TR7240R and DO4WRTZ2000

Test point N Result: PASS
Operation mode: Evolve P10 / Continuous sweep mode
Remarks: FCC/IC Requirements
With EOS and XP Power PSU, Cable and Ferrite on DC line
8.2MHz Band, Tx1 & Tx2: 31 – Antenna dummy load
Tested by: Huber Markus

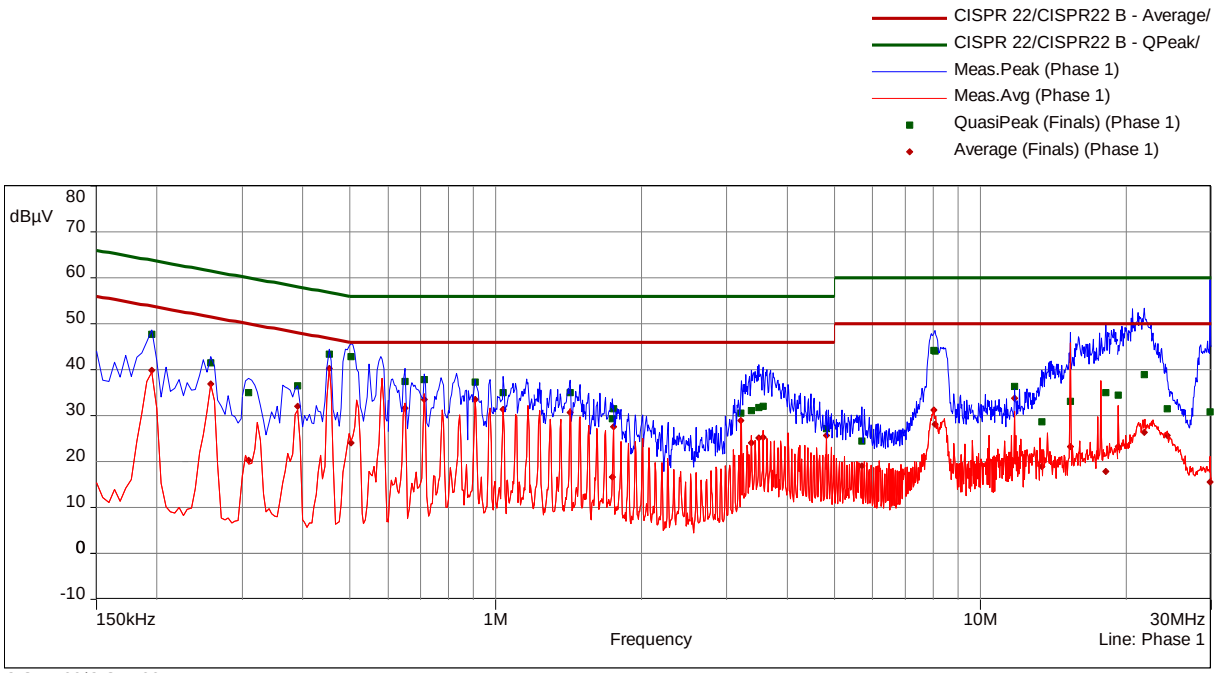


CISPR 22/CISPR22B

freq	SR	QP	margin	limit	AV	margin	limit	line	corr
MHz		dB(µV)	dB	dB	dB(µV)	dB	dB		dB
0.15	9	45.19	20.81	66.00	31.68	24.32	56.00	Neutral	9.99
0.195	9	45.27	18.55	63.82	38.08	15.75	53.82	Neutral	9.99
0.2175	9	37.17	25.75	62.91	14.86	38.05	52.91	Neutral	9.99
0.231	9	37.78	24.63	62.41	36.02	16.40	52.41	Neutral	10.00
0.3225	10	37.62	22.02	59.64	32.80	16.85	49.64	Neutral	10.00
0.327	10	37.25	22.28	59.53	31.80	17.73	49.53	Neutral	10.00
0.453	10	44.24	12.58	56.82	41.15	5.67	46.82	Neutral	10.01
0.507	10	44.33	11.67	56.00	29.12	16.88	46.00	Neutral	10.01
0.7125	11	37.53	18.47	56.00	32.69	13.31	46.00	Neutral	10.02
0.834	11	36.18	19.82	56.00	21.69	24.31	46.00	Neutral	10.02
0.906	11	37.78	18.22	56.00	33.24	12.76	46.00	Neutral	10.03
1.2315	12	34.90	21.10	56.00	30.17	15.83	46.00	Neutral	10.04
1.425	12	35.18	20.82	56.00	29.59	16.41	46.00	Neutral	10.05
2.3295	12	41.04	14.96	56.00	37.34	8.66	46.00	Neutral	10.08
2.4	12	40.04	15.96	56.00	35.06	10.94	46.00	Neutral	10.08
3.624	13	30.18	25.82	56.00	26.12	19.88	46.00	Neutral	10.13
3.7545	13	29.60	26.40	56.00	25.39	20.61	46.00	Neutral	10.13
4.9845	14	26.49	29.51	56.00	22.30	23.70	46.00	Neutral	10.18
6.033	14	22.72	37.28	60.00	16.51	33.49	50.00	Neutral	10.24
8.0985	14	47.68	12.32	60.00	30.69	19.31	50.00	Neutral	10.34
8.3775	14	46.84	13.16	60.00	32.60	17.40	50.00	Neutral	10.35
11.787	15	40.04	19.96	60.00	37.82	12.18	50.00	Neutral	10.55
15.351	15	51.45	8.55	60.00	47.05	2.95	50.00	Neutral	10.81
20.091	16	37.54	22.46	60.00	30.87	19.13	50.00	Neutral	11.09
24.222	16	27.85	32.15	60.00	21.41	28.59	50.00	Neutral	11.14
24.411	16	27.99	32.01	60.00	21.95	28.05	50.00	Neutral	11.15

FCC ID: DO4TR7240R and DO4WRTZ2000

Test point L1 Result: passed
Operation mode: Evolve P10 / Continuous sweep mode
Remarks: FCC/IC Requirements
With GlobTek and XP Power PSU, Cable and Ferrite on DC line
8.2MHz Band, Tx1 & Tx2: 31 – Antenna dummy load
Tested by: Huber Markus



CISPR 22/CISPR22B

FCC ID: DO4TR7240R and DO4WRTZ2000

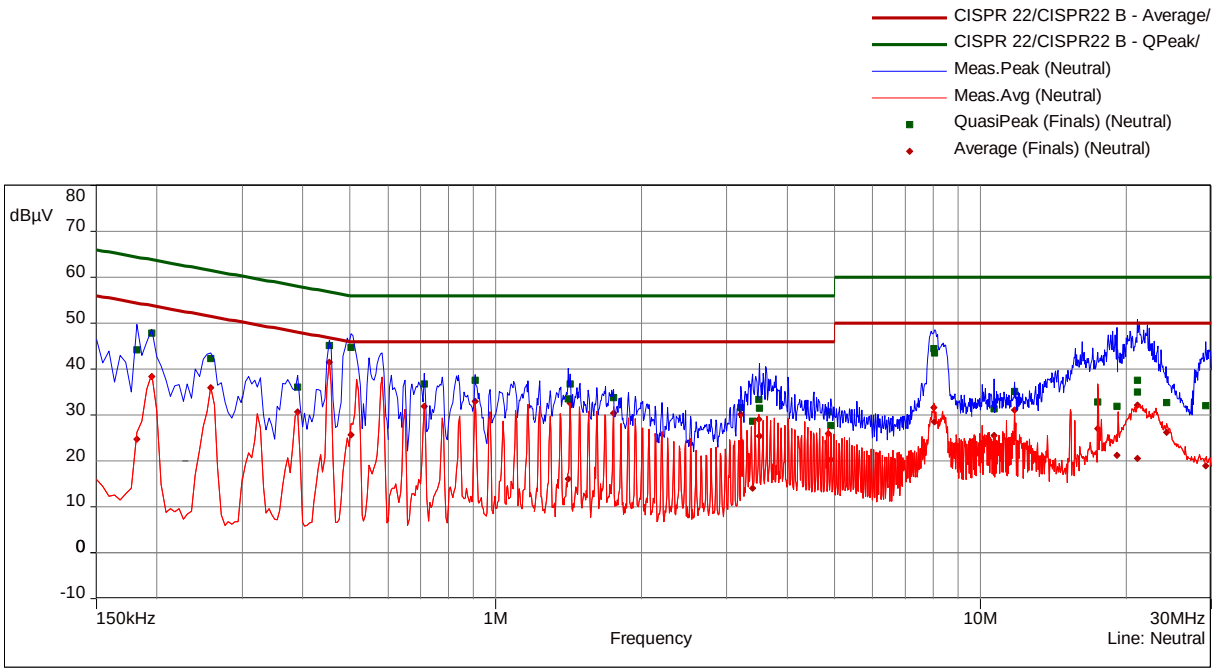
freq	SR	QP	margin	limit	AV	margin	limit	line	corr
MHz		dB(µV)	dB	dB	dB(µV)	dB	dB		dB
0.195	1	47.73	16.09	63.82	39.82	14.00	53.82	Phase 1	9.98
0.258	1	41.49	20.01	61.50	36.97	14.53	51.50	Phase 1	9.99
0.309	2	35.03	24.97	60.00	20.23	29.77	50.00	Phase 1	9.99
0.39	2	36.50	21.56	58.06	32.03	16.03	48.06	Phase 1	10.00
0.453	2	43.36	13.46	56.82	40.27	6.55	46.82	Phase 1	10.01
0.5025	2	42.85	13.15	56.00	24.13	21.87	46.00	Phase 1	10.01
0.6495	3	37.46	18.54	56.00	31.69	14.31	46.00	Phase 1	10.02
0.7125	3	37.84	18.16	56.00	33.57	12.43	46.00	Phase 1	10.02
0.906	3	37.28	18.72	56.00	33.58	12.42	46.00	Phase 1	10.03
1.0365	3	34.95	21.05	56.00	31.42	14.58	46.00	Phase 1	10.03
1.425	4	35.07	20.93	56.00	30.69	15.31	46.00	Phase 1	10.05
1.74	4	29.27	26.73	56.00	16.69	29.31	46.00	Phase 1	10.06
1.749	4	31.54	24.46	56.00	27.64	18.36	46.00	Phase 1	10.06
3.21	5	30.51	25.49	56.00	28.99	17.01	46.00	Phase 1	10.10
3.372	5	31.14	24.86	56.00	24.04	21.96	46.00	Phase 1	10.11
3.498	5	31.78	24.22	56.00	25.09	20.91	46.00	Phase 1	10.11
3.5655	5	32.01	23.99	56.00	25.33	20.67	46.00	Phase 1	10.12
4.818	6	27.22	28.78	56.00	25.65	20.35	46.00	Phase 1	10.16
5.7045	6	24.50	35.50	60.00	19.07	30.93	50.00	Phase 1	10.19
8.031	6	44.17	15.83	60.00	31.24	18.76	50.00	Phase 1	10.28
8.0715	6	44.07	15.93	60.00	28.12	21.88	50.00	Phase 1	10.29
11.787	7	36.33	23.67	60.00	33.79	16.21	50.00	Phase 1	10.45
13.4205	7	28.68	31.32	60.00	18.87	31.13	50.00	Phase 1	10.54
15.351	7	33.06	26.94	60.00	23.30	26.70	50.00	Phase 1	10.65
18.1905	7	35.04	24.96	60.00	17.90	32.10	50.00	Phase 1	10.78
19.29	8	34.51	25.49	60.00	23.19	26.81	50.00	Phase 1	10.83
21.81	8	38.97	21.03	60.00	26.30	23.70	50.00	Phase 1	10.85
24.3615	8	31.47	28.53	60.00	25.64	24.36	50.00	Phase 1	10.83
29.82	8	30.84	29.16	60.00	15.52	34.48	50.00	Phase 1	10.72

FCC ID: DO4TR7240R and DO4WRTZ2000

Test point N Result: passed
Operation mode: Evolve P10 / Continuous sweep mode
Remarks: FCC/IC Requirements

With GlobTek and XP Power PSU, Cable and Ferrite on DC line
8.2MHz Band, Tx1 & Tx2: 31 – Antenna dummy load

Tested by: Huber Markus



CISPR 22/CISPR22B

freq	SR	QP	margin	limit	AV	margin	limit	line	corr
MHz		dB(µV)	dB	dB	dB(µV)	dB	dB		dB
0.1815	9	44.21	20.21	64.42	24.68	29.73	54.42	Neutral	9.99
0.195	9	47.80	16.02	63.82	38.42	15.40	53.82	Neutral	9.99
0.258	9	42.25	19.25	61.50	36.01	15.48	51.50	Neutral	10.00
0.39	10	36.05	22.02	58.06	30.70	17.36	48.06	Neutral	10.01
0.453	10	45.09	11.73	56.82	41.51	5.31	46.82	Neutral	10.01
0.5025	10	44.73	11.27	56.00	25.73	20.27	46.00	Neutral	10.01
0.7125	11	36.83	19.17	56.00	31.89	14.11	46.00	Neutral	10.02
0.906	11	37.60	18.40	56.00	33.05	12.95	46.00	Neutral	10.03
1.4115	12	33.55	22.45	56.00	16.12	29.88	46.00	Neutral	10.05
1.425	12	36.78	19.22	56.00	32.53	13.47	46.00	Neutral	10.05
1.749	12	33.85	22.15	56.00	30.36	15.64	46.00	Neutral	10.06
3.21	13	31.67	24.33	56.00	30.18	15.82	46.00	Neutral	10.11
3.3945	13	28.63	27.37	56.00	14.08	31.92	46.00	Neutral	10.12
3.498	13	33.33	22.67	56.00	29.08	16.92	46.00	Neutral	10.12
3.5025	13	31.50	24.50	56.00	25.40	20.60	46.00	Neutral	10.12
4.8585	14	30.71	25.29	56.00	26.00	20.00	46.00	Neutral	10.18
4.917	14	27.73	28.27	56.00	20.31	25.69	46.00	Neutral	10.18
8.031	14	44.43	15.57	60.00	31.63	18.37	50.00	Neutral	10.34
8.058	14	43.55	16.45	60.00	28.47	21.53	50.00	Neutral	10.34
10.689	15	31.30	28.70	60.00	25.48	24.52	50.00	Neutral	10.47
11.787	15	35.20	24.80	60.00	31.14	18.86	50.00	Neutral	10.55
17.4885	15	32.78	27.22	60.00	27.04	22.96	50.00	Neutral	10.94
19.149	15	31.88	28.12	60.00	21.27	28.73	50.00	Neutral	11.04
21.108	16	34.94	25.06	60.00	20.59	29.41	50.00	Neutral	11.11
21.1305	16	37.62	22.38	60.00	32.12	17.88	50.00	Neutral	11.11
24.2985	16	32.66	27.34	60.00	26.23	23.77	50.00	Neutral	11.14
29.2305	16	32.04	27.96	60.00	18.87	31.13	50.00	Neutral	11.10

5.2 Field strength of the fundamental wave

For test instruments and accessories used see section 6 Part **CPR 1**.

5.2.1 Description of the test location

Test location: OATS 1
Test distance: 3 m

5.2.1 Applicable standard

According to FCC Part 15C, Section 15.223:

5.2.2 Description of Measurement

The radiated field strength of the fundamental wave from the EUT is measured using a tuned EMI-receiver. The setup of the EUT and the measurement procedure is in accordance to ANSI C63.10. The EUT is measured in TX continuous mode, unmodulated, under normal conditions.

5.2.3 Test result

EVOLVE E10 2.0 iRange w/RFID upgrade kit:
3m Distance measured:

Frequency [MHz]	L: PK [dBµV]	Correct. [dB]	L: PK [dBµV/m]	Limit [dBµV/m]	Delta [dB]	Tx1 & Tx2:
8.2	77.41	20	97.41	100.0	-2.59	31
7.2 & 8.2	76.48	20	96.48	100.0	-3.52	31
9.5	75.32	20	95.32	100.0	-4.68	31

30m Distance calculated:

Frequency [MHz]	L: PK [dBµV]	Correct. [dB]	L: PK [dBµV/m]	Limit [dBµV/m]	Delta [dB]
8.2	37.41	20	57.41	60.0	-2.59
7.2 & 8.2	36.48	20	56.48	60.0	-3.52
9.5	35.32	20	55.32	60.0	-4.68

EVOLVE P10 iRange w/RFID upgrade kit:
3m Distance measured:

Frequency [MHz]	L: PK [dBµV]	Correct. [dB]	L: PK [dBµV/m]	Limit [dBµV/m]	Delta [dB]	Tx1 & Tx2:
8.2	70.94	20	90.94	100.0	-9.06	31
7.2 & 8.2	70.88	20	90.88	100.0	-9.12	31
9.5	69.91	20	89.91	100.0	-10.09	31

30m Distance calculated:

Frequency [MHz]	L: PK [dBµV]	Correct. [dB]	L: PK [dBµV/m]	Limit [dBµV/m]	Delta [dB]
8.2	30.94	20	50.94	60.0	-9.06
7.2 & 8.2	30.88	20	50.88	60.0	-9.12
9.5	29.91	20	49.91	60.0	-10.09

Limit according to FCC Part 15 Subpart 15.223, 15.35(b):

Frequency (MHz)	Field strength of fundamental – Average Detector @ 30m	
	(µV/m)	dB (µV/m)
1.705-10.0	100	40

Frequency (MHz)	Field strength of fundamental – Peak Detector @ 30m	
	(µV/m)	dB (µV/m)
1.705-10.0	1000	60

The requirements are **FULFILLED.**

Remarks: Please refer to subclause 2.6 of this report.

5.4 Maximum peak conducted output power

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

5.4.1 Description of the test location

Test location: Shielded Room S4

5.4.2 Applicable standard

According to FCC Part 15C, Section 15.247(b)(2):

5.4.3 Description of Measurement

A spectrum analyzer is connected to the output of the transmitter via a suitable attenuator while EUT was operating in transmit mode using the assigned frequency.

Spectrum analyser settings:

RBW	300 kHz	Sweep time	5 ms (Auto)
VBW	1 MHz	Power Mode	Max. hold
Detector	Peak	Span	500 kHz

5.4.4 Test result

a.) Power setting 30.0 dBm
= Antenna gain: 4.5 dBi

Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Delta (dB)
1	902.75	23.27	30.0	-6.73
25	914.75	22.99	30.0	-7.01
50	927.25	22.84	30.0	-7.16

Note: Correction means fixed attenuation of 20 dB.
Test cable loss is included in the analyzer reading (Transducer factor).

Peak Power Limit according to FCC Part 15C, Section 15.247(b)(2):

Frequency	Hopping channels	Hop. CH carrier frequ. separation	Peak Power Limit	
(MHz)			(dBm)	(W)
902-928	**≥ 50**		**30**	**1.0**

The requirements are **FULFILLED.**

Remarks: This measurement was only performed with WRTZ-2000 which is necessary accd. the relevant standard.

5.5 Spurious emissions (magnetic field) 9 kHz – 30 MHz

For test instruments and accessories used see section 6 Part **SER 1**.

5.5.1 Description of the test location

Test location: OATS1

Test distance: 3 m

5.5.2 Applicable standard

According to FCC Part 15C, Section 15.209:

5.5.3 Description of Measurement

The magnetic field strength of spurious emission from the EUT is measured in an open area test site in the frequency range of 9 kHz to 30 MHz using a tuned receiver and a shielded loop antenna. The setup of the EUT and the measurement procedure is in accordance to ANSI C63.4, Item 8.3. The EUT is measured in TX continuous mode, unmodulated, under normal conditions.
According to Section 15.31 (f) (2): The measurement below 30 MHz is performed at a distance of 3 m. The results are extrapolated to the specified distance by using the square of an inverse linear distance extrapolation factor of 40 dB/decade.

The resolution bandwidth during the measurement is as follows:
9 kHz – 150 kHz: RBW: 200 Hz
150 kHz – 30 MHz: RBW: 9 kHz

5.5.4 Test result

Results at a measurement distance of 3m

P10, PAB/SAB TXI, 2=31, No Binoculuar Cores, EOS PS, Mid 8.2 Mhz

Frequency [MHz]	PK [dBµV]	AV [dBµV]	QP [dBµV]	Correct. [dB]	PK [dBµV/m]	AV [dBµV/m]	QP [dBµV/m]	Limit [dBµV/m]
10,0	21,2	7	11,7	20,5	41,7	27,5	32,2	69,5
26,61	24,8	7,7	12,4	20,5	45,3	28,2	32,9	69,5
16,62	20,1	9,4	15,8	20,5	40,6	29,9	36,3	69,5

P10, PAB/SAB TXI, 2=31, No Binoculuar Cores, GlobTek PS, Mid 8.2 Mhz

Frequency [MHz]	PK [dBµV]	AV [dBµV]	QP [dBµV]	Correct. [dB]	PK [dBµV/m]	AV [dBµV/m]	QP [dBµV/m]	Limit [dBµV/m]
10,0	22,3	6,5	11,9	20,5	42,8	27	32,4	69,5
26,61	25,2	7,6	12,6	20,5	45,7	28,1	33,1	69,5
16,62	20,2	9,5	15,6	20,5	40,7	30	36,1	69,5

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E10, PAB/SAB TXI, 2=31, No Binoculuar Cores, HyperGuard, EOS PS, Mid 8.2 Mhz

Frequency [MHz]	PK [dBµV]	AV [dBµV]	QP [dBµV]	Correct. [dB]	PK [dBµV/m]	AV [dBµV/m]	QP [dBµV/m]	Limit [dBµV/m]
10,0	23,4	10,2	15,9	20,5	43,9	30,7	36,4	69,5
26,61	22,7	9,1	13,7	20,5	43,2	29,6	34,2	69,5
16,62	15,9	1,4	8,5	20,5	36,4	21,9	29	69,5

NOTE: The measured values are represents and extract of the critical values from both systems (RF electronic and WRTZ-2000) during the continuous sweep mode from both systems in the different frequency ranges.

Limit according to FCC Part 15C Section 15.209(a):

Frequency	Field strength of spurious emissions		Measurement distance
(MHz)	(µV/m)	dB(µV/m)	(metres)
0.009-0.490	2400/F(kHz)	--	300
0.490-1.705	24000/F(kHz)	--	30
1.705-30.0	30	29.5	30

The requirements are **FULFILLED.**

Remarks: Both systems (RF and UHF) are in continuous sweep mode in the relevant frequency ranges.

No unwanted emissions from the EuT could be measured in the relevant frequency ranges.

Only ambient noises could be detected.

5.6 Spurious emissions radiated (electric field)

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

5.6.1 Description of the test location

Test location: OATS1
Test location: Anechoic Chamber A1

Test distance: 3 m

5.6.2 Applicable standard

According to FCC Part 15C, Section 15.209:

5.6.3 Description of Measurement

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, Item 8.3. If the emission level of the EUT in peak mode complies with the average limit, 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 – 4500 MHz RBW: 1 MHz
Example:

Frequency (MHz)	Level (dBµV)	+	Factor (dB)	=	Level dB(µV/m)	-	Limit dB(µV/m)	=	Delta (dB)
170.5	5	+	20	=	25	-	30	=	-5

5.6.4 Test result f < 1 GHz

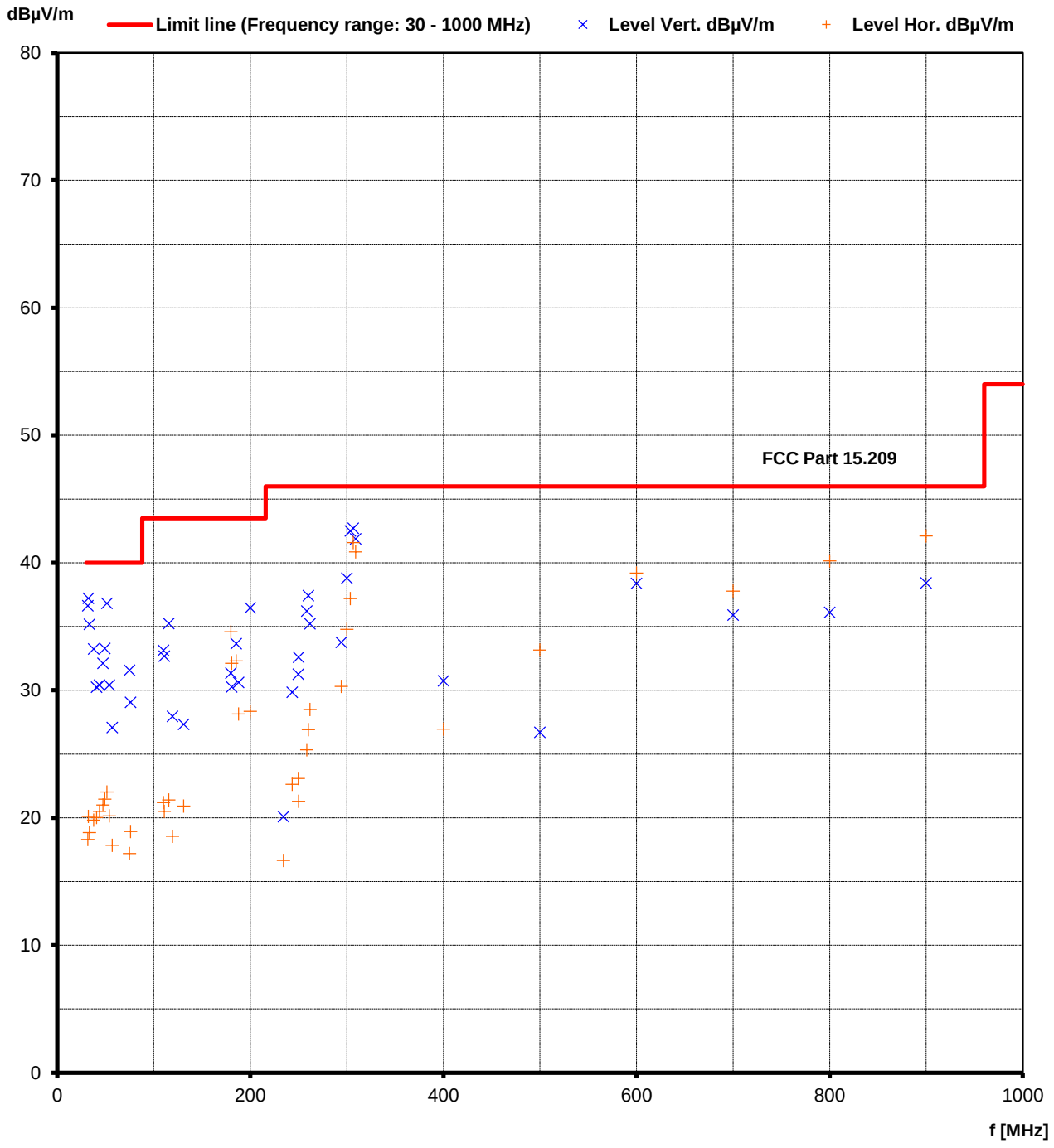
Extract of the critical values:

Evolve P10, Tx Frequency Dual Band, Tx1&Tx2:31
WRTZ-2000, Power setting 30.0 dBm

NOTE: The measured values are represents and extract of the critical values from both systems (RF electronic and WRTZ-2000) during the continuous sweep mode from both systems in the different frequency ranges.

FCC ID: DO4TR7240R and DO4WRTZ2000

Frequency (MHz)	Reading Vert. (dBµV)	Reading Hor. (dBµV)	Correct. Vert. (dB)	Correct. Hor. (dB)	Level Vert. (dBµV/m)	Level Hor. (dBµV/m)	Limit (dBµV/m)	Dlimit (dB)
31,84	22,6	5,7	14,0	12,6	36,6	18,3	40,0	-3,4
32,30	23,2	7,5	14,0	12,6	37,2	20,1	40,0	-2,8
33,28	21,2	6,2	14,0	12,6	35,2	18,8	40,0	-4,8
37,80	18,9	6,7	14,3	13,1	33,2	19,8	40,0	-6,8
40,70	15,5	6,5	14,7	13,5	30,2	20,0	40,0	-9,8
43,90	15,3	6,6	15,1	13,9	30,4	20,5	40,0	-9,6
47,50	16,9	6,9	15,2	14,1	32,1	21,0	40,0	-7,9
49,40	18,1	7,3	15,2	14,2	33,3	21,5	40,0	-6,7
51,40	21,7	7,9	15,1	14,1	36,8	22,0	40,0	-3,2
54,00	15,4	6,1	15,0	14,0	30,4	20,1	40,0	-9,6
57,10	12,2	3,9	14,9	13,9	27,1	17,8	40,0	-12,9
74,90	19,0	5,1	12,6	12,1	31,6	17,2	40,0	-8,4
76,00	16,8	7,1	12,3	11,8	29,1	18,9	40,0	-10,9
110,00	22,5	9,7	10,6	11,5	33,1	21,2	43,5	-10,4
110,80	21,9	8,9	10,8	11,6	32,7	20,5	43,5	-10,8
115,60	23,6	9,1	11,6	12,3	35,2	21,4	43,5	-8,3
119,50	15,6	5,7	12,3	12,8	27,9	18,5	43,5	-15,6
130,90	14,4	7,3	12,9	13,6	27,3	20,9	43,5	-16,2
179,90	18,0	20,5	13,3	14,1	31,3	34,6	43,5	-8,9
180,70	17,0	18,1	13,3	14,0	30,3	32,1	43,5	-11,4
185,50	20,9	18,8	12,8	13,5	33,7	32,3	43,5	-9,8
187,90	18,1	14,9	12,5	13,2	30,6	28,1	43,5	-12,9
200,00	25,2	16,4	11,3	12,0	36,5	28,4	43,5	-7,0
234,22	7,1	3,3	13,0	13,3	20,1	16,6	46,0	-25,9
243,30	16,4	8,9	13,4	13,7	29,8	22,6	46,0	-16,2
249,70	17,5	9,1	13,8	14,0	31,3	23,1	46,0	-14,7
250,00	18,8	7,3	13,8	14,0	32,6	21,3	46,0	-13,4
258,60	21,9	10,9	14,3	14,4	36,2	25,3	46,0	-9,8
260,20	23,0	12,4	14,4	14,5	37,4	26,9	46,0	-8,6
261,80	20,7	13,9	14,5	14,6	35,2	28,5	46,0	-10,8
294,30	17,2	14,1	16,5	16,2	33,7	30,3	46,0	-12,3
300,00	21,9	18,3	16,9	16,5	38,8	34,8	46,0	-7,2
303,50	25,5	20,6	17,0	16,6	42,5	37,2	46,0	-3,5
306,70	25,6	24,9	17,1	16,7	42,7	41,6	46,0	-3,3
309,10	24,7	24,1	17,2	16,8	41,9	40,9	46,0	-4,1
400,00	10,9	7,4	19,8	19,6	30,7	27,0	46,0	-15,3
500,00	4,2	10,9	22,5	22,3	26,7	33,2	46,0	-12,8
600,00	12,9	13,9	25,5	25,3	38,4	39,2	46,0	-6,8
700,00	8,9	11,3	27,0	26,5	35,9	37,8	46,0	-8,2
800,00	6,6	11,2	29,5	29,0	36,1	40,2	46,0	-5,8
900,00	7,3	11,4	31,1	30,7	38,4	42,1	46,0	-3,9


dBµV/m
Limit line (Frequency range: 30 - 1000 MHz)
Level Vert. dBµV/m
Level Hor. dBµV/m
80
70
60
50
40
30
20
10
0
0
200
400
600
800
1000
f [MHz]
FCC Part 15.209

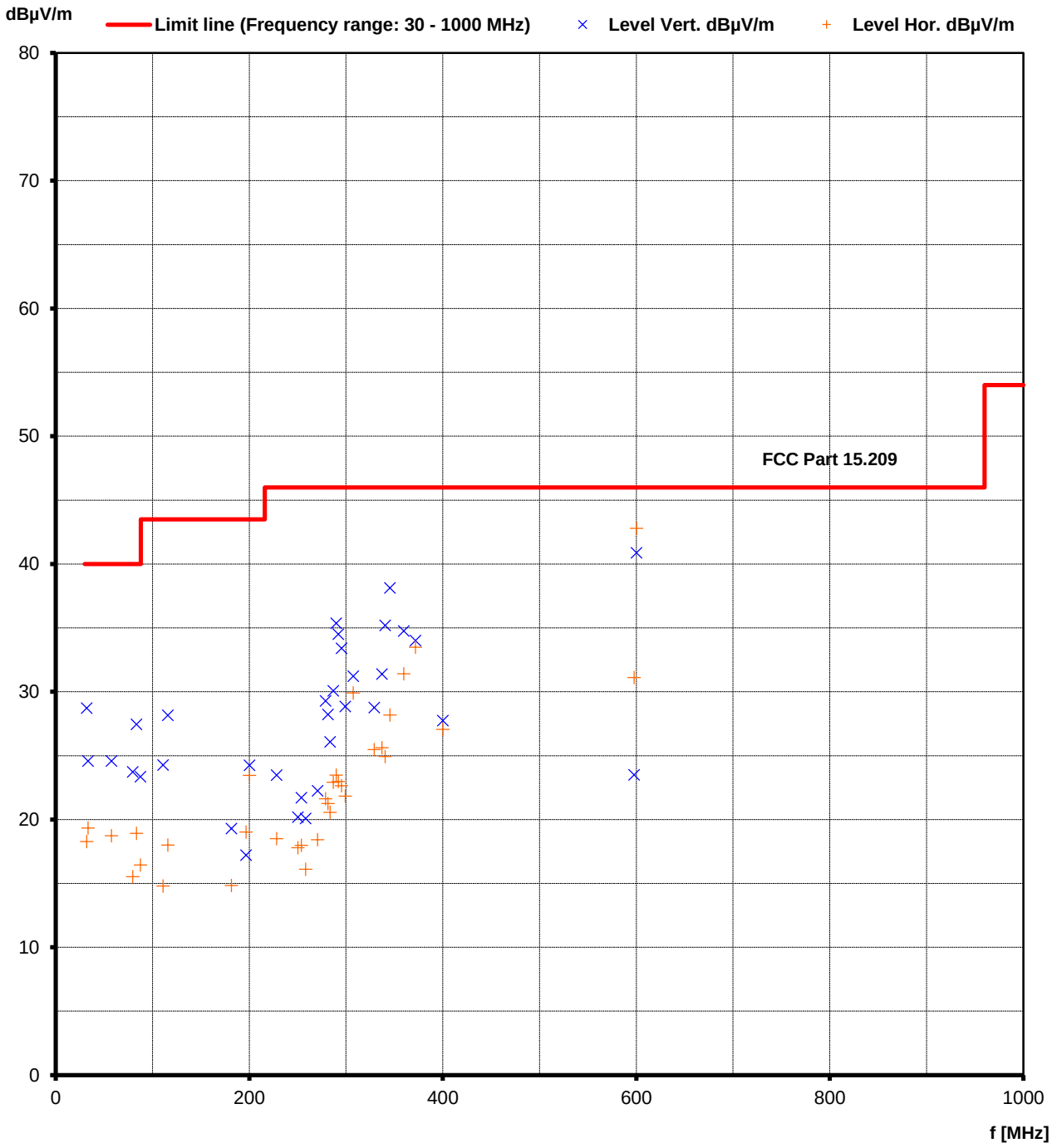
FCC ID: DO4TR7240R and DO4WRTZ2000

Extract of the critical values:

Evolve P10, Tx Frequency Dual Band, Tx1&Tx2:31
WRTZ-2000, Power setting 30.0 dBm

NOTE: The measured values are represents and extract of the critical values from both systems (RF electronic and WRTZ-2000) during the continuous sweep mode from both systems in the different frequency ranges.

Frequency (MHz)	Reading Vert. (dBµV)	Reading Hor. (dBµV)	Correct. Vert. (dB)	Correct. Hor. (dB)	Level Vert. (dBµV/m)	Level Hor. (dBµV/m)	Limit (dBµV/m)	Dlimit (dB)
31,80	14,7	5,7	14,0	12,6	28,7	18,3	40,0	-11,3
33,20	10,6	6,7	14,0	12,6	24,6	19,3	40,0	-15,4
57,30	9,7	4,8	14,9	13,9	24,6	18,7	40,0	-15,4
79,50	12,5	4,6	11,2	10,9	23,7	15,5	40,0	-16,3
83,30	17,1	8,5	10,3	10,4	27,4	18,9	40,0	-12,6
87,30	13,9	6,5	9,4	9,9	23,3	16,4	40,0	-16,7
110,80	13,5	3,2	10,8	11,6	24,3	14,8	43,5	-19,2
115,70	16,5	5,7	11,7	12,3	28,2	18,0	43,5	-15,3
181,40	6,1	0,9	13,2	13,9	19,3	14,8	43,5	-24,2
196,60	5,6	6,7	11,6	12,3	17,2	19,0	43,5	-24,5
200,00	13,0	11,5	11,3	12,0	24,3	23,5	43,5	-19,2
228,00	10,8	5,4	12,7	13,1	23,5	18,5	46,0	-22,5
250,00	6,4	3,8	13,8	14,0	20,2	17,8	46,0	-25,8
253,60	7,7	3,8	14,0	14,2	21,7	18,0	46,0	-24,3
258,10	5,8	1,7	14,3	14,4	20,1	16,1	46,0	-25,9
270,40	7,2	3,4	15,1	15,0	22,3	18,4	46,0	-23,7
278,80	13,7	6,2	15,6	15,4	29,3	21,6	46,0	-16,7
281,20	12,5	5,7	15,7	15,5	28,2	21,2	46,0	-17,8
283,50	10,2	4,9	15,9	15,7	26,1	20,6	46,0	-19,9
286,60	14,0	7,1	16,1	15,8	30,1	22,9	46,0	-15,9
289,70	19,1	7,5	16,3	16,0	35,4	23,5	46,0	-10,6
292,00	18,1	6,9	16,4	16,1	34,5	23,0	46,0	-11,5
295,10	16,8	6,4	16,6	16,2	33,4	22,6	46,0	-12,6
299,00	12,0	5,4	16,8	16,4	28,8	21,8	46,0	-17,2
307,40	14,1	13,2	17,1	16,7	31,2	29,9	46,0	-14,8
329,10	11,0	8,1	17,8	17,4	28,8	25,5	46,0	-17,2
337,00	13,4	8,0	18,0	17,6	31,4	25,6	46,0	-14,6
340,40	17,1	7,2	18,1	17,7	35,2	24,9	46,0	-10,8
345,20	19,9	10,3	18,2	17,9	38,1	28,2	46,0	-7,9
359,60	16,1	13,1	18,7	18,3	34,8	31,4	46,0	-11,2
371,70	15,0	14,8	19,0	18,7	34,0	33,5	46,0	-12,0
400,00	7,9	7,5	19,8	19,6	27,7	27,1	46,0	-18,3
597,60	-1,9	5,9	25,4	25,2	23,5	31,1	46,0	-14,9
600,00	15,4	17,5	25,5	25,3	40,9	42,8	46,0	-3,2


dBµV/m
Limit line (Frequency range: 30 - 1000 MHz)
Level Vert. dBµV/m
Level Hor. dBµV/m
80
70
60
50
40
30
20
10
0
0
200
400
600
800
1000
f [MHz]
FCC Part 15.209

5.6.5 Test result f > 1 GHz

Frequency (MHz)	L: PK (dBµV)	Bandwidth (kHz)	Correct. (dB)	L: PK dB(µV/m)	Limit AV dB(µV/m)	Delta (dB)
2.710	47.5	1000	3.7	51.2	54	-2.8
2.752	46.8	1000	3.4	50.2	54	-3.8
3.613	42.8	1000	2.5	45.3	54	-8.7

Peak level is below average limit → no average measurement was performed.

NOTE: The measured values (5.5.4 and 5.5.5) are represents and extract of the critical values from both systems (RF electronic and WRTZ-2000) during the continuous sweep mode from both systems in the different frequency ranges.

Limit according to FCC Part 15C Section 15.209(a):

Frequency (MHz)	15.209 Limits (µV/m)	15.209 Limits dB(µV/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 up to the 10th harmonic.

Both systems (RF and UHF) are in continuous sweep mode in the relevant frequency ranges.

The table shows an extract of the critical values.

5.7 Spurious radiated emissions in restricted bands

For test instruments and accessories used see section 6 Part **SER 1, SER 2, SER 3**.

5.7.1 Description of the test location

Test location: OATS1
Test distance: 3 metres

Test location: Anechoic Chamber A1
Test distance: 3 metres

5.7.2 Photo documentation of the test set-up

See Attachment C

5.7.3 Applicable standard

According to FCC Part 15, Section 15.247(d):
In any 100 kHz bandwidth outside the frequency bands 902 to 928 MHz, the digitally modulated radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or an radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limit specified in Section 15.209(a) (see Section 15.205(c)).

5.7.4 Description of Measurement

Radiated spurious emissions from the EUT are measured in the frequency range of 9 kHz to 1000 MHz using a tuned receiver and appropriate broadband linear polarized antennas. The measurements are made with 120 kHz bandwidth and quasi-peak detection (200 Hz, 9 kHz up to 30 MHz). The EUT was placed on a 1.0 X 1.5 metres non-conducting table 80 centimetres above the ground plane. The set up of the equipment under test will be in accordance to ANSI C63.4. The antenna was positioned 3 metres horizontally from the EUT. To locate maximum emissions from the EUT the antenna is shifted in height from 1 to 4 metres, after the EUT is rotated 360 degrees. The measurement scan is made in horizontal and vertical polarization of the antenna. The correction factors for antenna gain and cable loss are stored in the EMI receiver and automatically added to a measurement data to display the final level in dBµV/m.

For the radiated measurement up from 1 GHz to maximum frequency as specified in Section 15.33, a spectrum analyzer and appropriate linear polarized antennas are used. The EUT is placed on a 1.0 X 1.5 metres non-conducting table 80 centimetres above the ground plane. The set up of the EUT will be in accordance to ANSI C63.4. The antenna was positioned 3 m horizontally from the EUT. To locate maximum emissions the EUT was rotated 360 degrees in the fully anechoic chamber. The measurement scan is made in horizontal and vertical polarization of the antenna. For testing above 1 GHz, 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.

5.7.5 Test result

5.7.5.1 Radiated emission test f < 1 GHz

Frequency [kHz]	L: QP [dBµV]	L: AV [dBµV]	Bandwidth [kHz]	Correct. [dB]	L: QP [dBµV/m]	L: AV [dBµV/m]	Limit [dBµV/m]	Delta [dB]
536.8	24.1	19.7	9.0	20	44.1	39.7	73.0	-33.3
1073.6	23.4	18.0	9.0	20	43.4	38.0	67.0	-29.0
1342.0	21.6	15.9	9.0	20	41.6	35.9	65.0	-29.1

Frequency [MHz]	L: QP [dBµV]	Correct. [dB]	L: QP [dBµV/m]	Limit [dBµV/m]	Delta [dB]
8.377	-68.5	20	-48.5	69.5	-122.5
33.78	3.7	13.4	17.1	40.0	-22.9
118.54	9.3	12.9	22.2	43.5	-21.3
517.43	4.8	21.9	26.7	46.0	-19.3

Note: No unwanted emissions from the EuT could be measured in the relevant frequency ranges and each antenna with the different power setting. Only ambient nosies could be detected!
Both systems (RF and UHF) are in continuous sweep mode in the relevant frequency ranges.

5.7.5.2 Radiated emission test f > 1GHz

- Power setting 30.0 dBm
- Antenna: PAM915UN1CP01SK110MM

Frequency (GHz)	L: PK (dBµV)	L: AV (dBµV)	Bandwidth (kHz)	Correct. (dB)	L: PK dB(µV/m)	L: AV dB(µV/m)	Limit AV dB(µV/m)	Delta (dB)
2.710	47.5	42.9	1000	3.7	51.2	46.6	54.0	-7.4
2.752	46.8	39.7	1000	3.4	50.2	43.1	54.0	-10.9
3.613	42.8	37.5	1000	2.5	45.3	40.0	54.0	-14.0

Radiated limits according to FCC Part 15C, Section 15.209(a) for spurious emissions which fall in restricted bands:

Frequency	Field strength of spurious emissions		Measurement distance
(MHz)	(µV/m)	dB(µV/m)	(metres)
0.009 - 0.490	2400/F(kHz)		300
0.490 - 1.705	24000/F(kHz)		30
1.705 - 30	30	29.5	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
Above 960	500	54	3

Restricted bands of operation:

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209:

MHz	MHz	MHz	GHz
0.090 – 0.110	16.42 – 16.423	399.9 – 410	4.5 – 5.15
0.495 – 0.505	16.69475 – 16.69525	608 – 614	5.35 – 5.46
2.1735 – 2.1905	16.80425 – 16.80475	960 – 1240	7.25 – 7.75
4.125 – 4.128	25.5 – 25.67	1300 – 1427	8.025 – 8.5
4.17725 – 4.17775	37.5 – 38.25	1435 – 1626.5	9.0 – 9.2
4.20725 – 4.20775	73 – 74.6	1645.5 – 1646.5	9.3 – 9.5
6.215 – 6.218	74.8 – 75.2	1660 – 1710	10.6 – 12.7
6.26775 – 6.26825	108 – 121.94	1718.8 – 1722.2	13.25 – 13.4
6.31175 – 6.31225	123 – 138	2200 – 2300	14.47 – 14.5
8.291 – 8.294	149.9 – 150.05	2310 – 2390	15.35 – 16.2
8.362 – 8.366	156.52475 – 156.52525	2483.5 – 2500	17.7 – 21.4
8.37625 – 8.38675	156.7 – 156.9	2690 – 2900	22.01 – 23.12
8.41425 – 8.41475	162.0125 – 167.17	3260 – 3267	23.6 – 24.0
12.29 – 12.293	167.72 – 173.2	3332 – 3339	31.2 – 31.8
12.51975 – 12.52025	240 – 285	3345.8 – 3358	36.43 – 36.5
12.57675 – 12.57725	322 – 335.4	3600 – 4400	Above 38.6

The requirements are **FULFILLED.**

Remarks: During the test the EUT was set into TX continuous mode with normal modulation.

The measurement was performed up to the 10th harmonic (10000 MHz).

Both systems (RF and UHF) are in continuous sweep mode in the relevant frequency ranges.

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	ESCI	02-02/03-05-004	12/09/2017	12/09/2016		
	ESH 2 - Z 5	02-02/20-05-003	15/04/2017	15/04/2014	15/06/2017	15/12/2016
	NSLK 8127	02-02/20-05-005			24/05/2017	24/11/2016
	N-1500-N	02-02/50-05-141				
	N-3000-BNCW	02-02/50-05-142				
	ESH 3 - Z 2	02-02/50-05-185	27/10/2019	27/10/2016	27/04/2017	27/10/2016
CPC 2	FSP 40	02-02/11-11-001	13/10/2017	13/10/2016		
	18N50W-20dB	02-02/50-16-031				
CPR 1	ESCI	02-02/03-05-004	12/09/2017	12/09/2016		
	HFH 2 - Z 2	02-02/24-15-001	23/03/2017	23/03/2016	23/09/2016	23/03/2016
	KK-EF393-21N-16	02-02/50-05-033				
	NW-2000-NB	02-02/50-05-113				
	KK-SD_7/8-2X21N-33,0M	02-02/50-15-028				
SER 1	ESCI	02-02/03-05-004	12/09/2017	12/09/2016		
	HFH 2 - Z 2	02-02/24-15-001	23/03/2017	23/03/2016	23/09/2016	23/03/2016
	KK-EF393-21N-16	02-02/50-05-033				
	NW-2000-NB	02-02/50-05-113				
	KK-SD_7/8-2X21N-33,0M	02-02/50-15-028				
SER 2	ESVS 30	02-02/03-05-003	08/07/2017	08/07/2016		
	VULB 9168	02-02/24-05-005	20/04/2017	20/04/2016	01/03/2017	01/09/2016
	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 40	02-02/11-11-001	13/10/2017	13/10/2016		
	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	24/05/2017	24/05/2016		
	Sucoflex N-2000-SMA	02-02/50-05-075				
	SF104/11N/11N/1500MM	02-02/50-13-015				