

FCC ID: DO4EVOLVE

EMI - TEST REPORT

- FCC Part 15.223 -



Test Report No. :	T35266-00-02HU	10. November 2011 Date of issue
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Type / Model Name : Evolve P20 Shielded - Emerald Family

Product Description : Electronic Article Surveillance Detection System

Applicant : Checkpoint Systems, Inc.

Address : 101 Wolf Drive, Thorofare

New Jersey, USA 08086

Manufacturer : Pikatron Feinwerktechnik GmbH & Co. KG

Address : Raiffeisenstrasse 10

D-61250 Usingen

Licence holder : Checkpoint Systems, Inc.

Address : 101 Wolf Drive, Thorofare

New Jersey, USA 08086

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

The tests were performed according to following standards:

FCC Rules and Regulations Part 15 Subpart C - Intentional Radiators (**October, 2010**)

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 15.35(b)	Measurement detector functions and bandwidths
Part 15, Subpart C, Section 15.207(a)	AC Line conducted emissions
Part 15, Subpart C, Section 15.209(a)	Radiated emissions, general requirements
Part 15, Subpart C, Section 15.215(c)	Additional Provisions to the general radiated emission limitations

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2 SUMMARY

GENERAL REMARKS:

None

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 : 29. June 2011

Testing concluded on : 07. July 2011

Checked by:



Eduard Stangl
I confirm the correctness
and integrity of this
document
2011.11.10 16:01:10
+01'00'

Stangl Eduard
Dipl.-Ing.(FH)
Technical Director

Tested by:



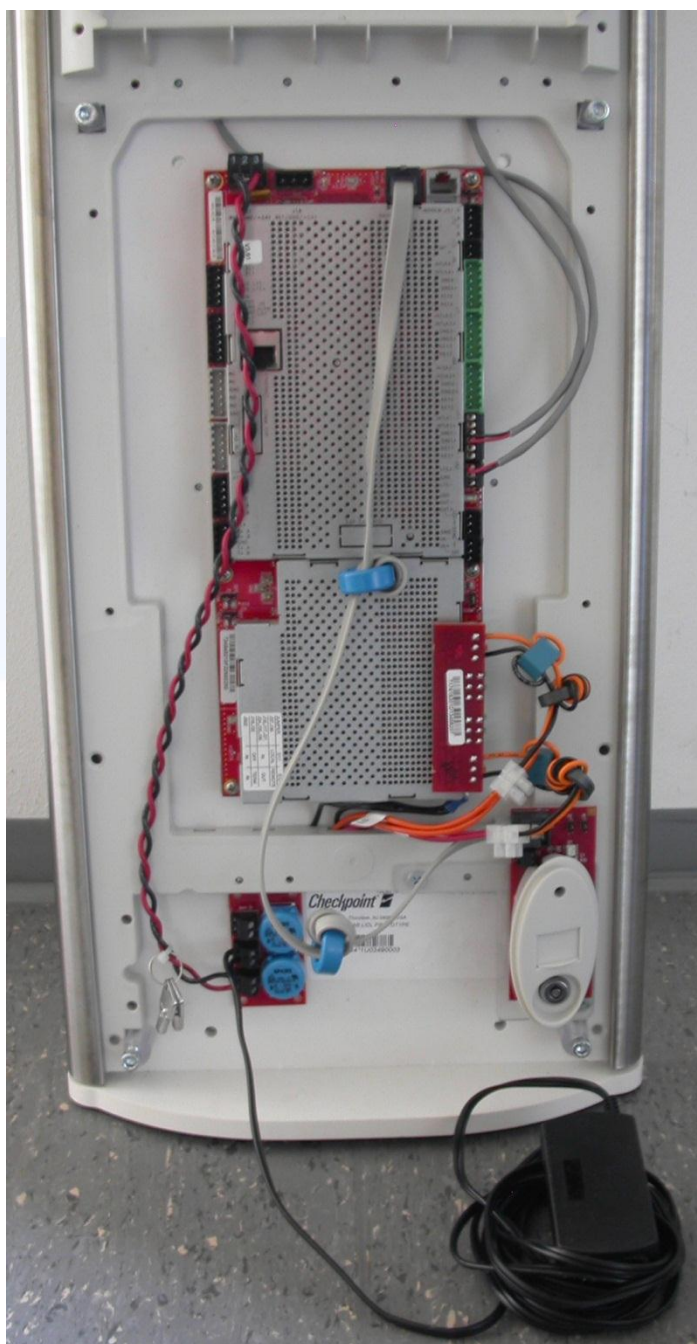
Markus Huber
I am the author of
the document
2011.11.10
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Huber Markus

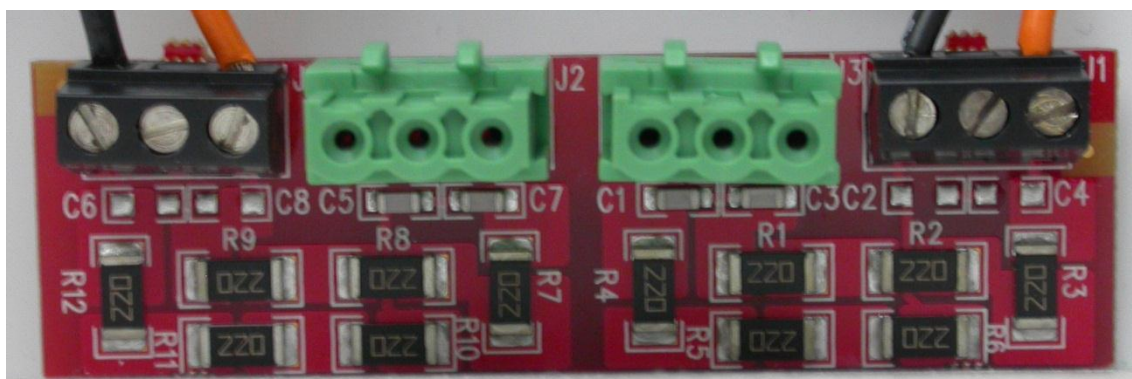
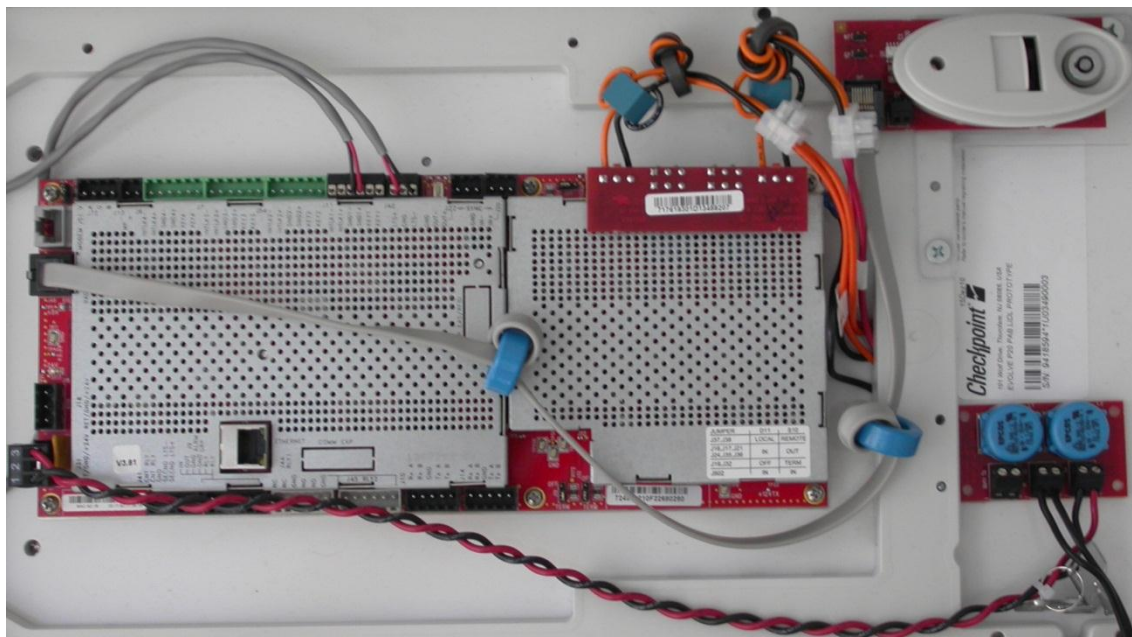
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3 EQUIPMENT UNDER TEST

3.1 Photo documentation of the EuT



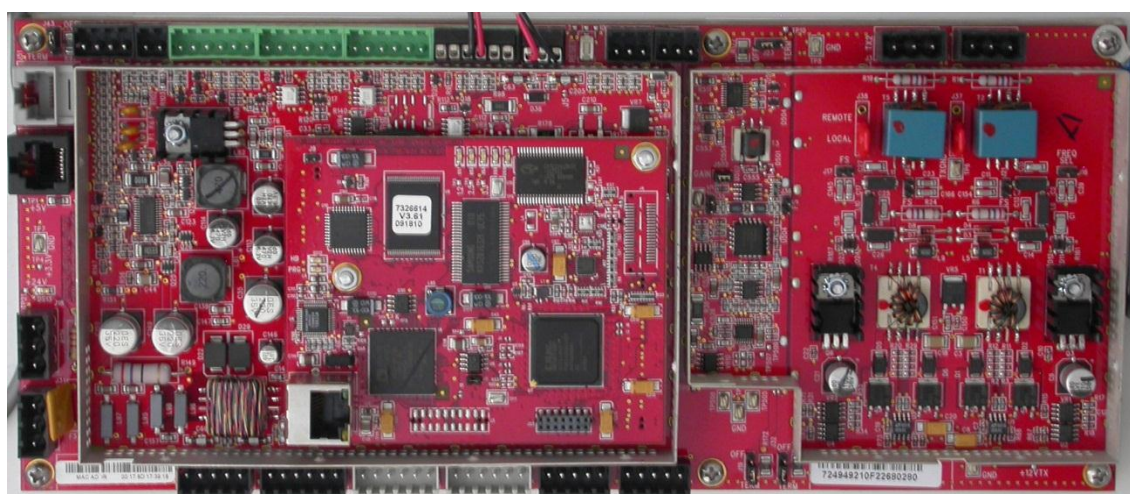
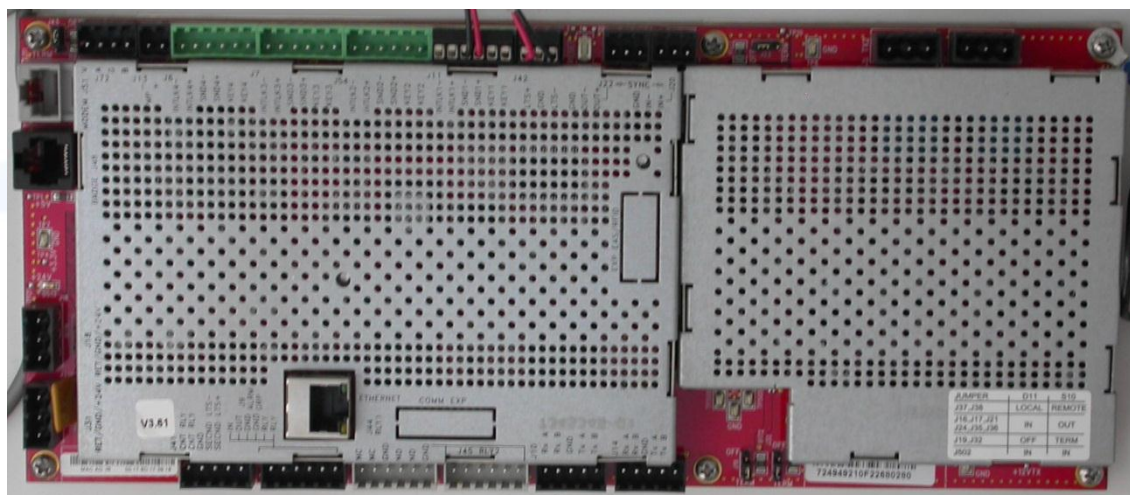
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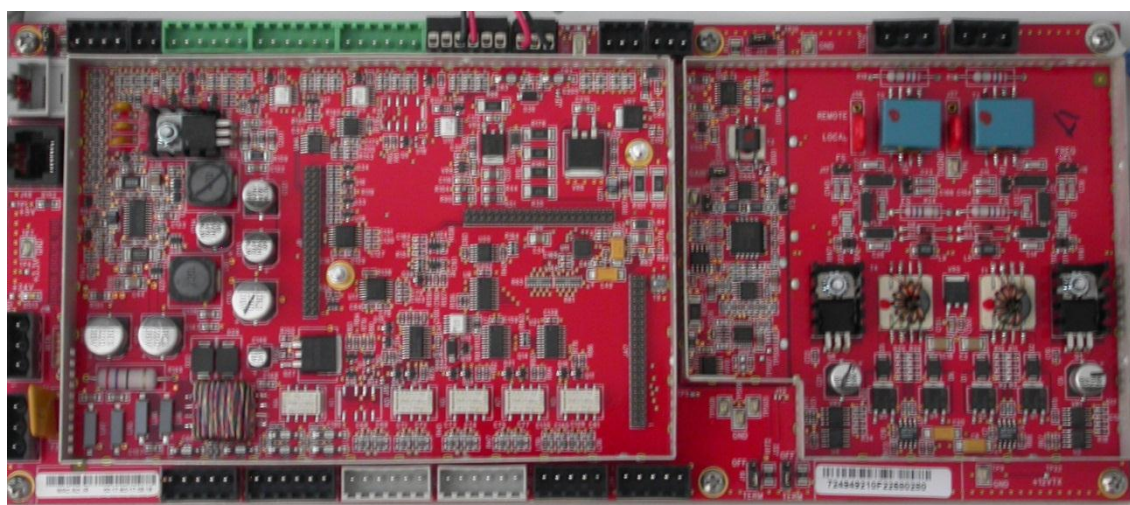
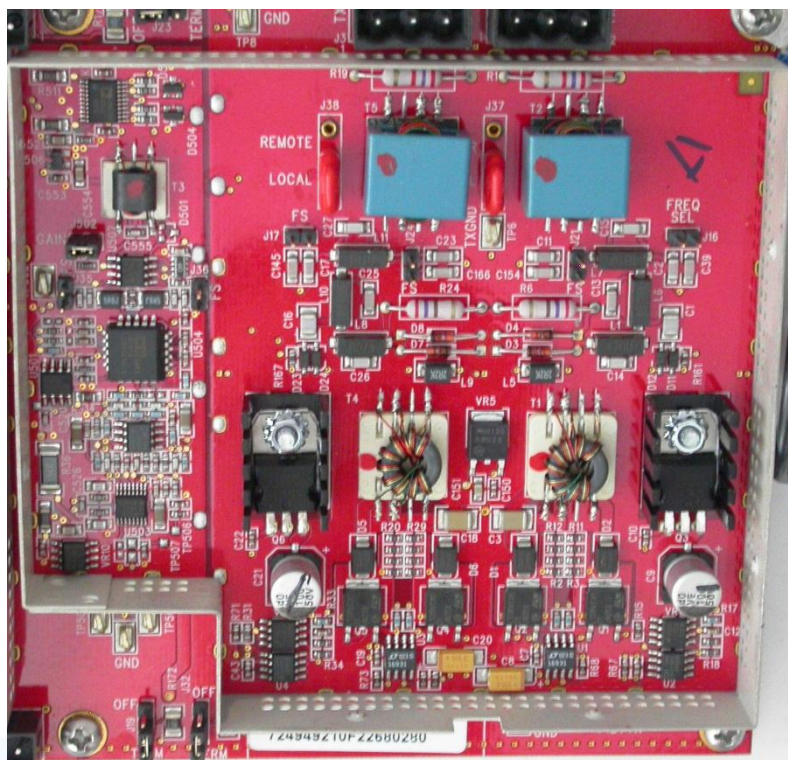
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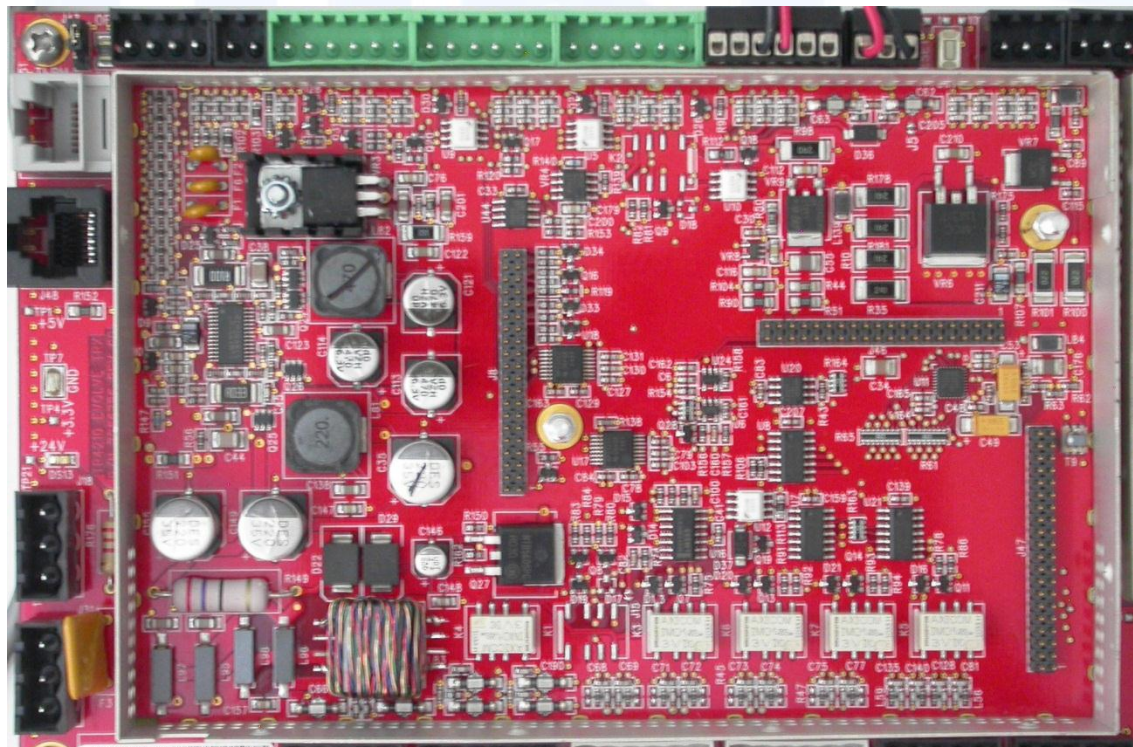
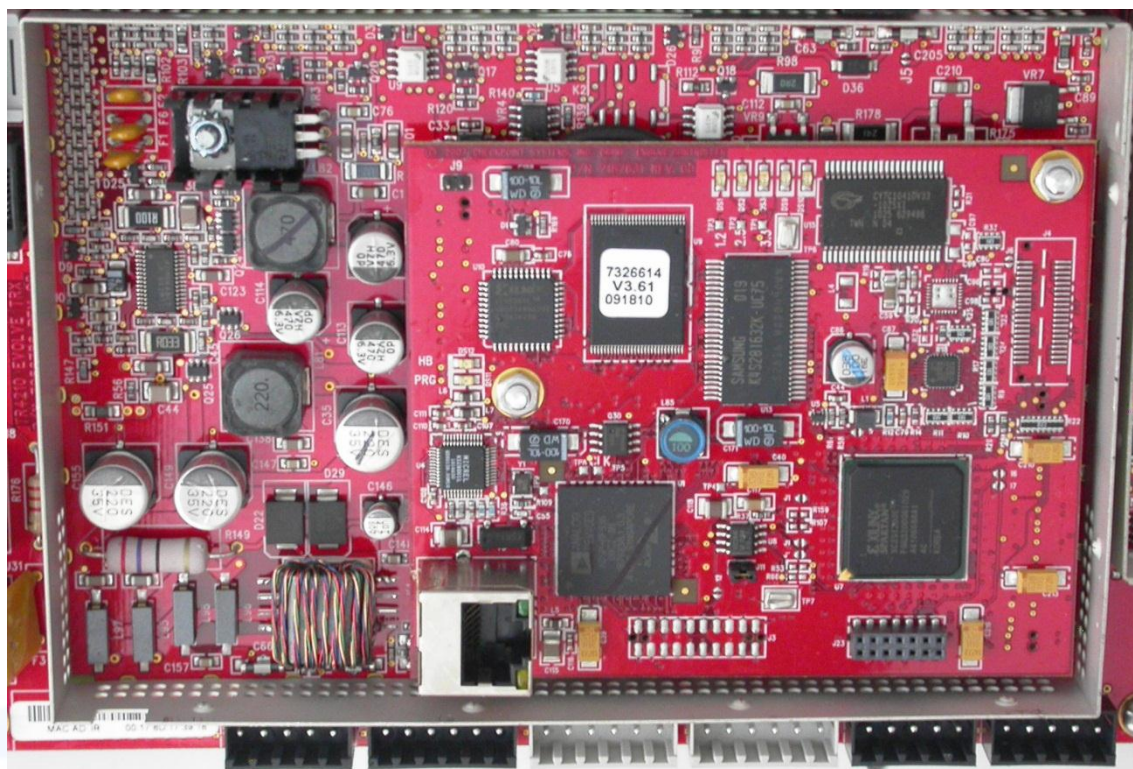
Electronic:



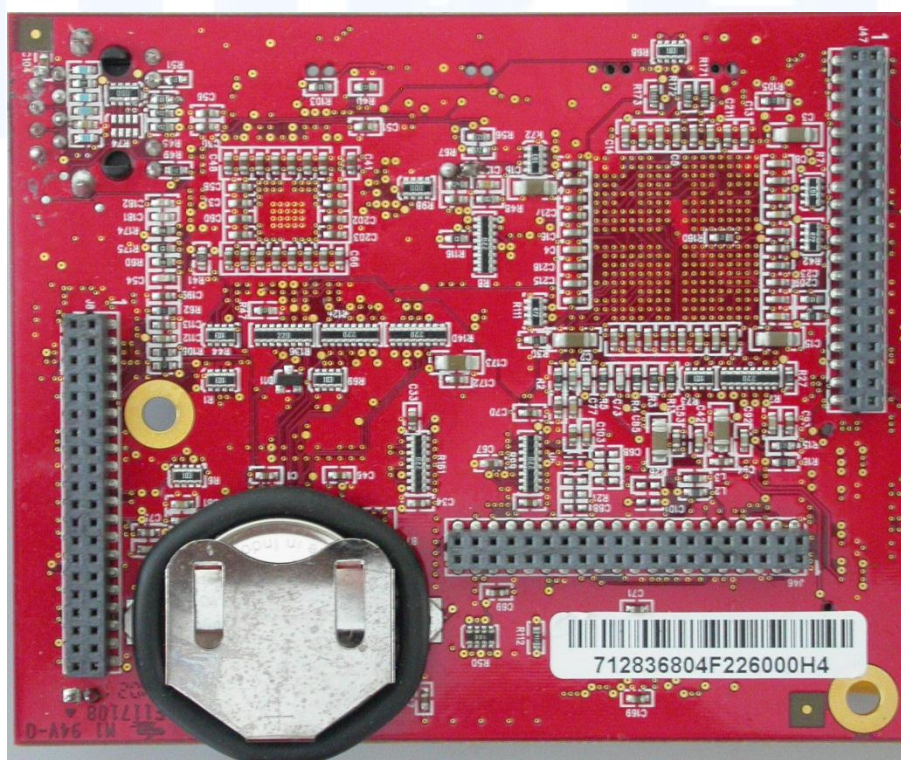
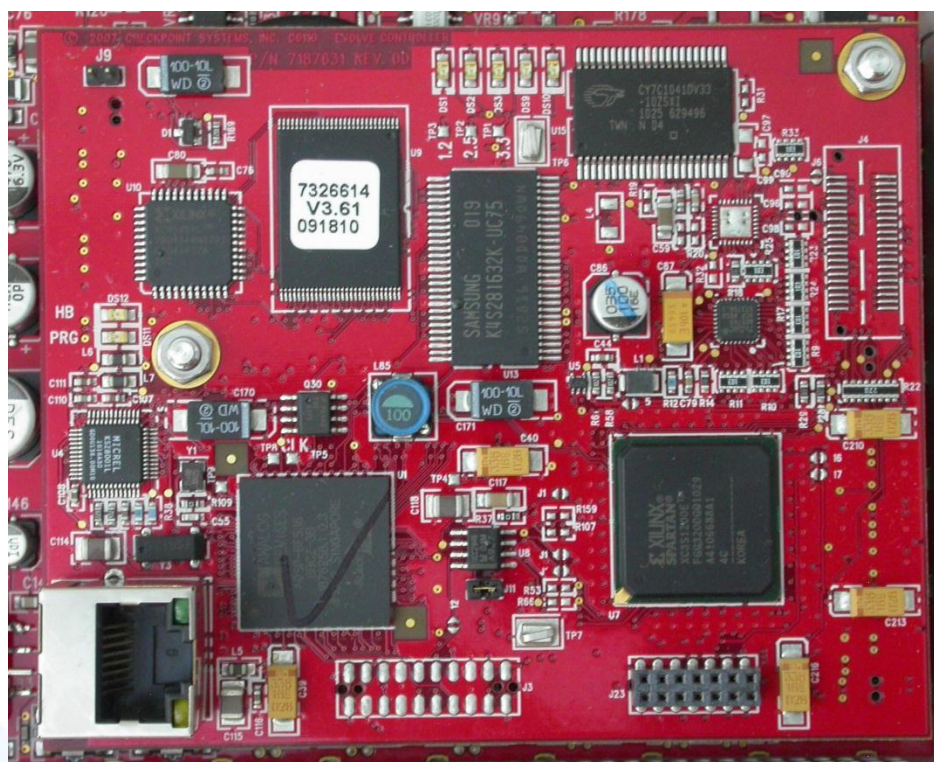
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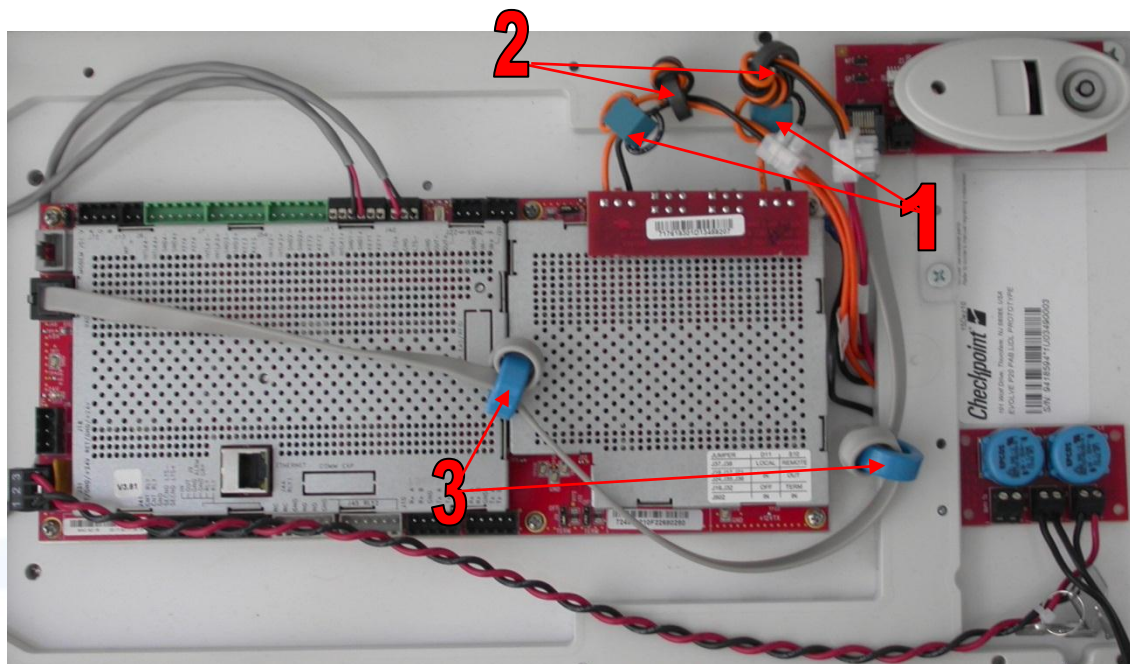
Power supply:



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3.2 Ferrite Locations

Evolve P20 Shielded



Ferrite Locations:

1. Chang Sung Corp P/N FS155090 (Order No 7235629) – Add one ferrite on the Tx1 and Tx2 cables with two turns.
2. Fair Rite P/N 5943000601 (Order No 7225873) – Add one ferrite on the Tx1 and Tx2 cables with four turns.
3. Fair Rite P/N 7118986 (Order No B6429-L618-X35) – Add a ferrite on each end of the Badge Board Cable with three turns through the ferrite.

Instead of ferrite 1 and ferrite 2 follow types can also be used:

4. Micrometals BLN3961-263/BU – Add one ferrite on the Tx1 and Tx2 cables with two turns.
5. Fair Rite P/N 5943000601 (Order No 7225873) – Add one ferrite on the Tx1 and Tx2 cables with four turns

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3.3 Power supply system utilised

Power supply voltage : 115 V / 60 Hz / 1 ϕ
24 V / DC

3.4 Short description of the Equipment under Test (EuT)

The Evolve Antenna's with Emerald Electronic are Electronic Article Surveillance System (EAS). The system detects target tags attached to merchandise. The targets resonate in the region of 8.2 MHz or 9.5 MHz. When an article of merchandise is purchased, the target is deactivated which causes it to no longer resonate. The Evolve Antenna's with Emerald Electronic monitors an area 3-feet on either side of the antenna in the 7.4 to 10.0 MHz range and triggers an alarm when a non-deactivated target is detected.

Number of tested samples: 1
Serial number: see Photo documentation of the EuT under Point 3 / Equipment Under Test

EuT operation mode:

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

- Continuous sweep mode at 8.2 MHz Band

- Continuous sweep mode at 9.0 MHz Dual Band

-

EuT configuration:

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

- | | |
|--------------------------------|---|
| - PSU (Power Supply Unit), EOS | Model: LFZVC36FS24S91, S/N:2590, E01-A-KA29 |
| - Standard AC mains cable | Model : |
| - | Model : |
| - | Model : |
| - | Model : |
| - | Model : |
| - | Model : |
| - customer specific cables | |

- For detailed information about the connected cables during the test and other technical details, see attached CDF (Subclause 7) which was filled out from the manufacturer and Photo documentation of the EuT under Point 3 / Equipment Under Test.

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

mikes-testingpartners gmbh
Ohmstrasse 2-4
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. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. 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. 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.

4.4 Measurement Protocol for FCC, VCCI and AUSTEL

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.

FCC ID: DO4EVOLVE**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.

4.4.2 DETAILS OF TEST PROCEDURES**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 C63.4-2003 - "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz."

4.5 Deviations or Exclusions from the Requirements and Standards

The EUT is 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 an measuring receiver by using a average detector.

Following measurement method was used to find the "true peak".

Measurement of the fundamental – 7.4 to 10.0 MHz – was performed by setting a spectrum analyzer to "max-hold", peak detector, a 300 kHz bandwidth 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.

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4.6 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:

Original Emerald frequency tables Vers. 2.79:

/* Center frequency 8.2MHz +/- 410KHz */
8610, 8555, 8500, 8446, 8391, 8337, 8282, 8227, 8173, 8118, 8063, 8009, 7954, 7899, 7845, 7790

/* Center frequency 8.6MHz +/- 430KHz */
9030, 8973, 8915, 8858, 8801, 8743, 8686, 8629, 8571, 8514, 8457, 8399, 8342, 8285, 8227, 8170

/* Center frequency 9.0MHz +/- 450KHz */
9450, 9390, 9330, 9270, 9210, 9150, 9090, 9030, 8970, 8910, 8850, 8790, 8730, 8670, 8610, 8550

/* Center frequency 9.2MHz +/- 460KHz */
9660, 9599, 9537, 9476, 9415, 9353, 9292, 9231, 9169, 9108, 9047, 8985, 8924, 8863, 8801, 8740

/* Center frequency 9.5MHz +/- 480KHz */
9980, 9916, 9852, 9788, 9724, 9660, 9596, 9532, 9468, 9404, 9340, 9276, 9212, 9148, 9084, 9020

/* This table is used for multi band (8.2/9.2) skinny pulse, using PW of 4us JRG_SP */
9325, 9325, 9325, 9325, 9075, 9075, 9075, 9075, 8325, 8325, 8325, 8325, 8075, 8075, 8075, 8075

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.

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5 TEST CONDITIONS AND RESULTS

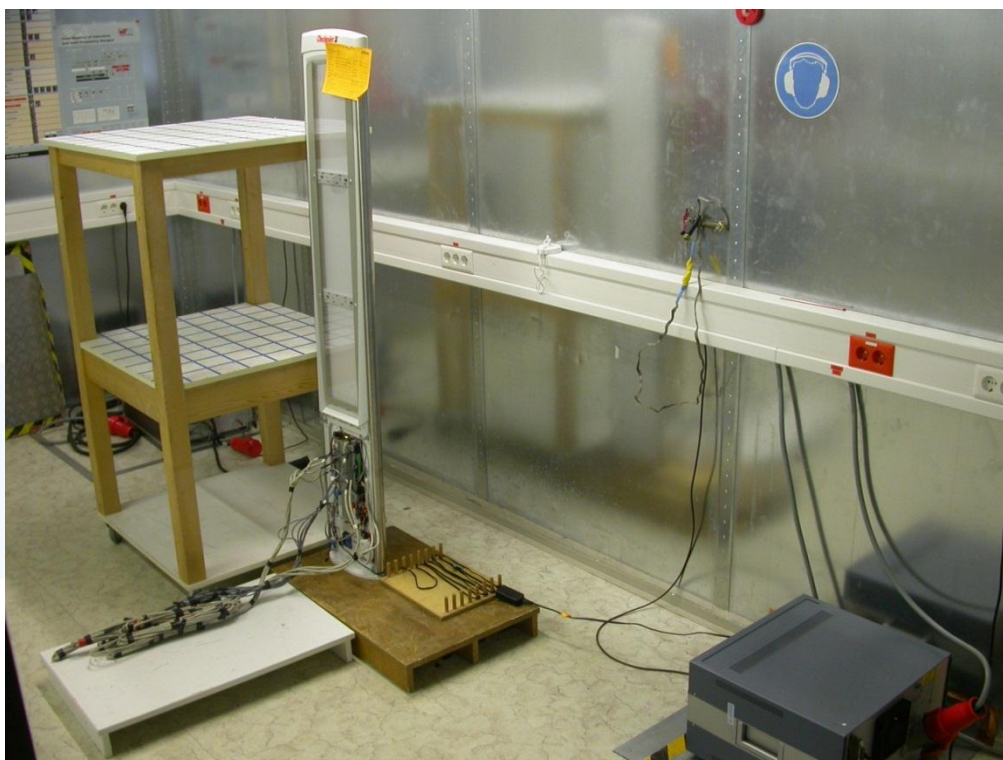
5.1 Conducted emissions

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



5.1.3 Description of Measurement

The final level, expressed in dB μ V, is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the FCC Limit or to the CISPR limit.

To convert between dB μ V and μ V, the following conversions apply:

$$\text{dB}\mu\text{V} = 20(\log \mu\text{V})$$

$$\mu\text{V} = \text{Inverse log}(\text{dB}\mu\text{V}/20)$$

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 50 Ω /50 μ H (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 centimeters above the floor and is positioned 40 centimeters from the vertical ground plane (wall) of the screen room. 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.

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5.1.4 Test result

Frequency range: 0.15 MHz - 30 MHz

Min. limit margin 9.0 MHz Dual Band
5.7 dB at 9.14 MHz

8.2 MHz Band
4.8 dB at 7.89 MHz

The requirements are **FULFILLED**.

Remarks:

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5.1.5 Test protocol

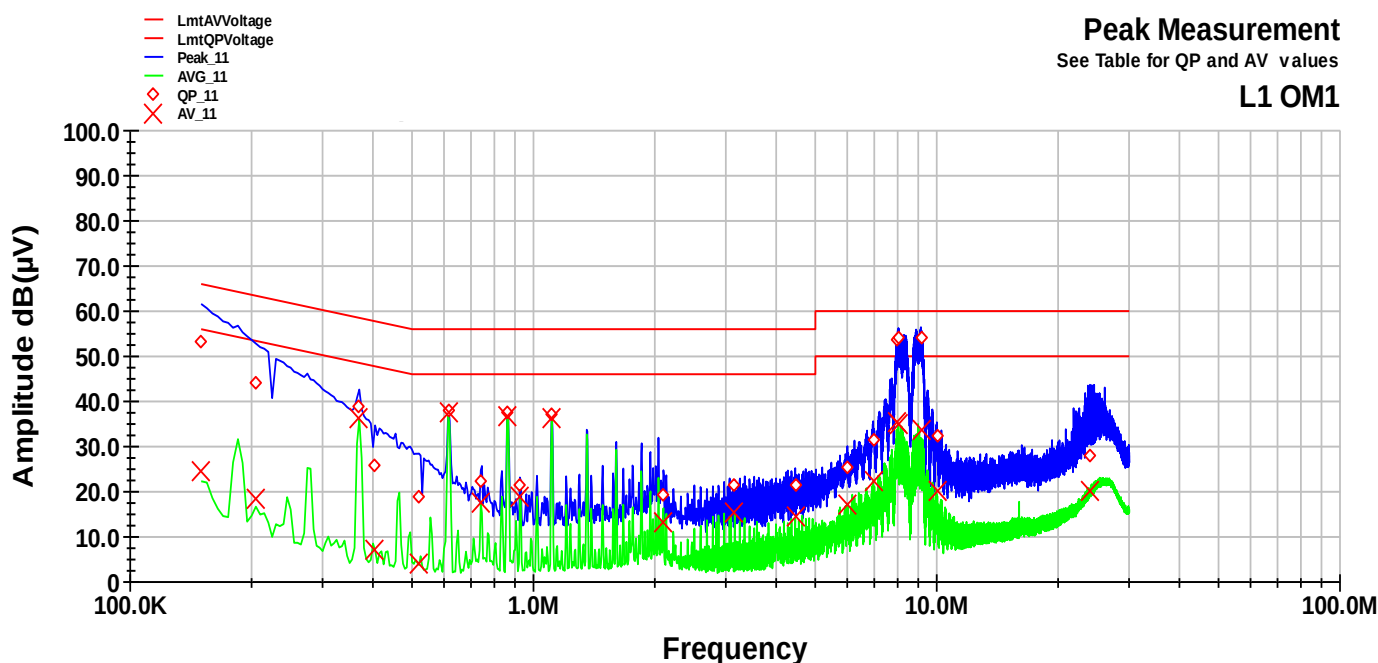
Test point L1
Operation mode: Continuous sweep mode
Remarks: FCC/IC Requirements
9.0MHz Band, Tx1 & Tx2: 31
Tested by: Huber Markus

Result: passed

Peak Measurement

See Table for QP and AV values

L1 OM1



Frequency MHz	QP Level dB(μV)	QP Margin dB	QP Limit dB	AV Level dB(μV)	AV Margin dB	AV Limit dB
0.15	53.3	-12.7	66.0	24.4	-31.6	56.0
0.205	43.9	-19.5	63.4	18.3	-35.1	53.4
0.37	38.7	-19.8	58.5	36.5	-12.0	48.5
0.405	25.9	-31.8	57.8	7.3	-40.4	47.8
0.52	18.8	-37.2	56.0	4.1	-41.9	46.0
0.615	37.9	-18.1	56.0	37.5	-8.5	46.0
0.74	22.4	-33.6	56.0	17.5	-28.5	46.0
0.865	37.6	-18.4	56.0	36.9	-9.1	46.0
0.925	21.6	-34.4	56.0	18.9	-27.1	46.0
1.11	37.2	-18.8	56.0	36.4	-9.6	46.0
2.1	19.4	-36.7	56.0	13.2	-32.8	46.0
3.155	21.5	-34.5	56.0	15.5	-30.5	46.0
4.455	21.5	-34.5	56.0	14.6	-31.4	46.0
6	25.5	-34.5	60.0	17.3	-32.7	50.0
6.955	31.6	-28.4	60.0	22.2	-27.8	50.0
8	53.6	-6.4	60.0	35.4	-14.6	50.0
8.03	54.2	-5.8	60.0	34.9	-15.1	50.0
9.14	54.0	-6.0	60.0	33.8	-16.2	50.0
10.015	32.6	-27.4	60.0	20.3	-29.7	50.0
23.975	27.8	-32.2	60.0	20.0	-30.0	50.0

FCC ID: DO4EVOLVE

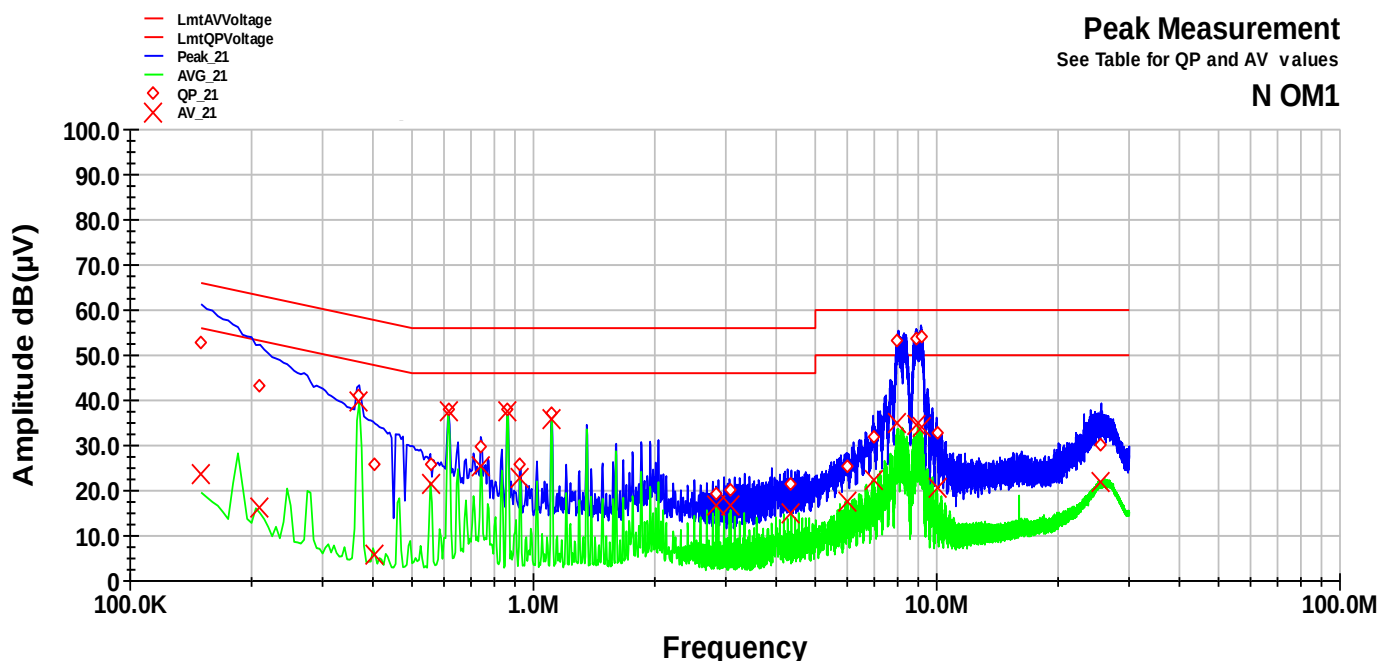
Test point: N
Operation mode: Continuous sweep mode
Remarks: FCC/IC Requirements
9.0MHz Band, Tx1 & Tx2: 31
Tested by: Huber Markus

Result: passed

Peak Measurement

See Table for QP and AV values

N OM1



Frequency MHz	QP Level dB(μV)	QP Margin dB	QP Limit dB	AV Level dB(μV)	AV Margin dB	AV Limit dB
0.15	53.0	-13.0	66.0	23.9	-32.2	56.0
0.21	43.3	-20.0	63.2	16.1	-37.1	53.2
0.37	41.2	-17.3	58.5	39.8	-8.7	48.5
0.405	25.9	-31.8	57.8	5.9	-41.9	47.8
0.555	25.7	-30.3	56.0	21.7	-24.3	46.0
0.615	38.0	-18.0	56.0	37.4	-8.6	46.0
0.74	29.7	-26.3	56.0	25.3	-20.7	46.0
0.86	38.0	-18.0	56.0	37.5	-8.5	46.0
0.925	25.8	-30.2	56.0	22.8	-23.2	46.0
1.11	37.2	-18.8	56.0	36.0	-10.0	46.0
2.835	19.1	-36.8	56.0	16.7	-29.3	46.0
3.08	20.0	-36.0	56.0	16.9	-29.1	46.0
4.36	21.3	-34.7	56.0	15.1	-30.9	46.0
6	25.5	-34.5	60.0	17.4	-32.6	50.0
6.955	31.9	-28.1	60.0	22.3	-27.7	50.0
8	53.2	-6.8	60.0	35.0	-15.0	50.0
8.905	53.5	-6.5	60.0	34.4	-15.6	50.0
9.14	54.3	-5.7	60.0	34.0	-16.0	50.0
10.015	32.7	-27.3	60.0	20.6	-29.4	50.0
25.575	30.0	-30.0	60.0	21.9	-28.1	50.0

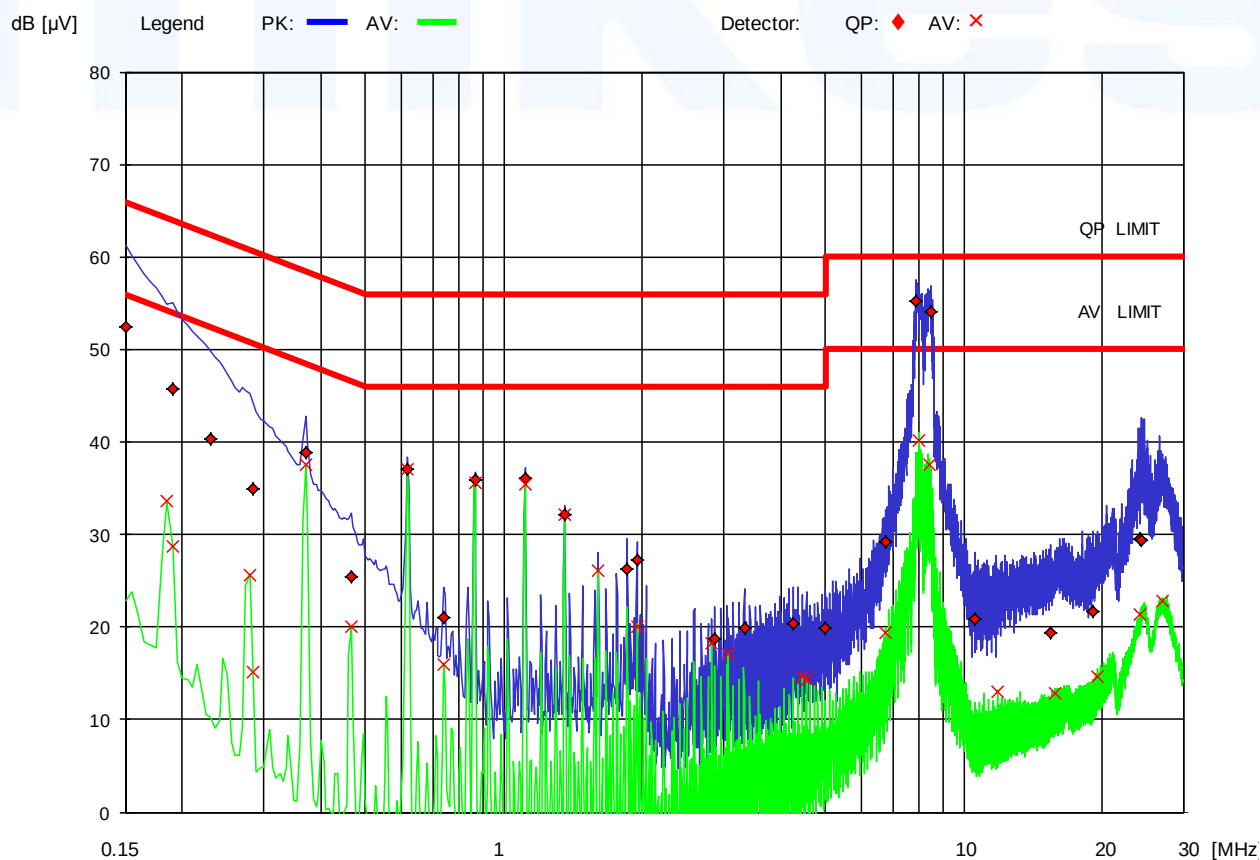
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Test point L1
Operation mode: Continuous sweep mode
Remarks: FCC/IC Requirements
8.2MHz Band, Tx1 & Tx2: 31
Tested by: Huber Markus

Result: passed

Freq kHz	QP-L dB[μV]	D-Limit QP [dB]	Freq kHz	AV-L dB[μV]	D-Limit AV [dB]
150	52,5	13,5	185	33,6	20,7
190	45,8	18,2	190	28,7	25,3
230	40,3	22,1	280	25,6	25,2
285	34,9	25,8	285	15,2	35,5
370	38,9	19,6	370	37,5	11,0
465	25,4	31,2	465	20,1	26,5
615	37	19,0	615	37,1	8,9
740	21	35,0	740	16	30,0
865	35,9	20,1	865	35,6	10,4
1110	36	20,0	1110	35,4	10,6
1355	32,2	23,8	1355	32,2	13,8
1850	26,3	29,7	1600	26,1	19,9
1945	27,3	28,7	1945	20,1	25,9
2875	18,8	37,2	2835	18,3	27,7
3335	19,9	36,1	3080	17,1	28,9

Freq kHz	QP-L dB[μV]	D-Limit QP [dB]	Freq kHz	AV-L dB[μV]	D-Limit AV [dB]
4265	20,4	35,6	4450	14,6	31,4
5010	19,9	40,1	4545	14,3	31,7
6765	29,2	30,8	6765	19,4	30,6
7890	55,2	4,8	7970	40,1	9,9
8485	54	6,0	8420	37,6	12,4
10595	20,8	39,2	11835	13	37,0
15505	19,4	40,6	15855	12,8	37,2
19110	21,7	38,3	19535	14,7	35,3
24180	29,5	30,5	24260	21,4	28,6
24420	29,4	30,6	27110	22,9	27,1



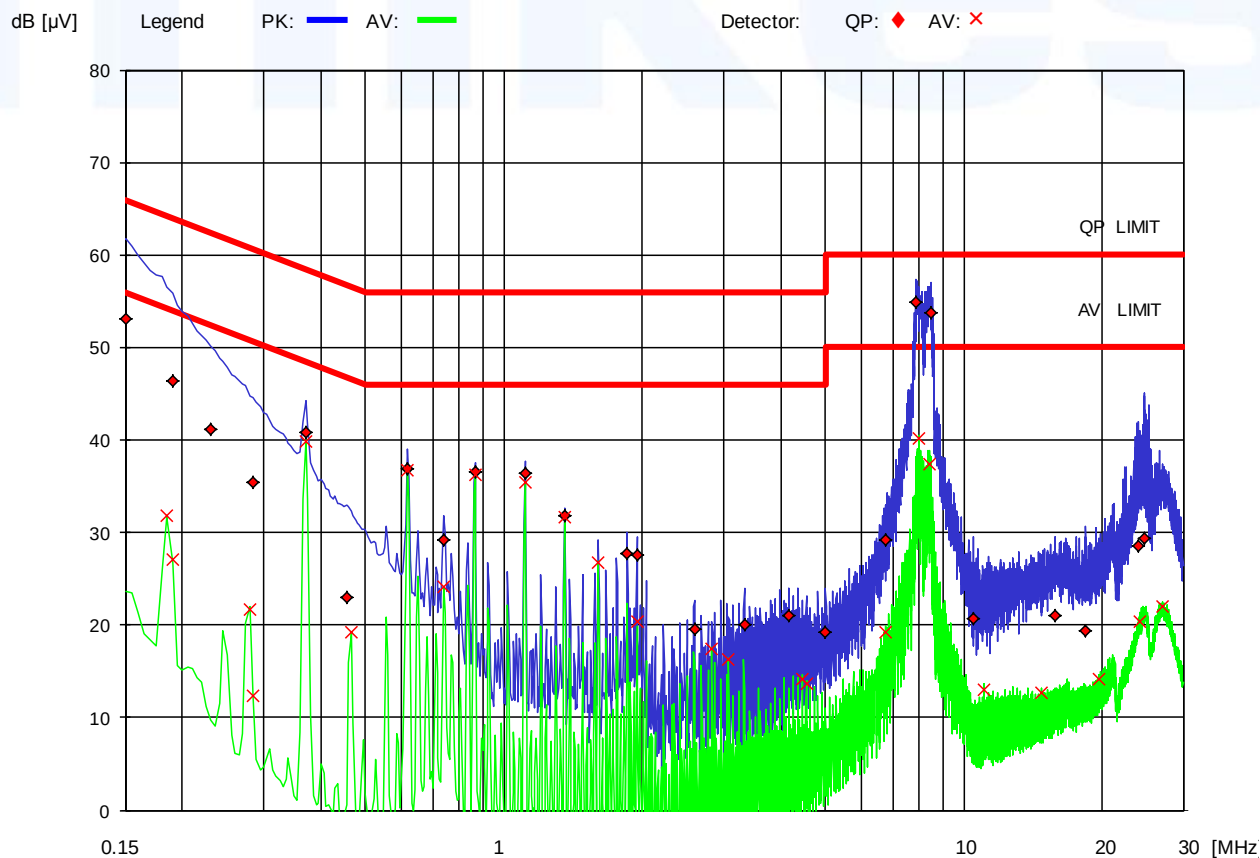
FCC ID: DO4EVOLVE

Test point: N
Operation mode: Continuous sweep mode
Remarks: FCC/IC Requirements
8.2MHz Band, Tx1 & Tx2: 31
Tested by: Huber Markus

Result: passed

Freq kHz	QP - L dB[μV]	D -Limit QP [dB]	Freq kHz	AV-L dB[μV]	D -Limit AV [dB]
150	53,1	12,9	185	31,9	22,4
190	46,4	17,6	190	27,1	26,9
230	41,1	21,3	280	21,7	29,1
285	35,5	25,2	285	12,4	38,3
370	40,8	17,7	370	39,9	8,6
455	23	33,8	465	19,2	27,4
615	36,9	19,1	615	36,8	9,2
740	29,2	26,8	740	24,1	21,9
865	36,5	19,5	865	36,2	9,8
1110	36,4	19,6	1110	35,5	10,5
1355	31,8	24,2	1355	31,7	14,3
1855	27,8	28,2	1605	26,8	19,2
1945	27,6	28,4	1945	20,3	25,7
2595	19,5	36,5	2835	17,5	28,5
3335	20,1	35,9	3085	16,3	29,7

Freq kHz	QP - L dB[μV]	D -Limit QP [dB]	Freq kHz	AV-L dB[μV]	D -Limit AV [dB]
4175	21,1	34,9	4450	14,2	31,8
5010	19,3	40,7	4545	13,7	32,3
6765	29,2	30,8	6765	19,3	30,7
7890	54,9	5,1	7985	40,2	9,8
8485	53,7	6,3	8420	37,4	12,6
10500	20,7	39,3	11095	13	37,0
15760	21,1	38,9	14800	12,6	37,4
18465	19,4	40,6	19625	14,1	35,9
23985	28,5	31,5	24140	20,3	29,7
24815	29,3	30,7	27010	22	28,0



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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: OATS1

Test distance: 10 metres

5.2.2 Photo documentation of the test set-up



5.2.3 Description of Measurement

The magnetic field strength from the EuT will be measured on 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 set up of the Equipment under test will be in accordance to ANSI C63.4-2003. The antenna was positioned 3, 10 or 30 meters horizontally from the EuT. Measurements have been made in all three orthogonal axes and the shielded loop antenna was rotated to locate the maximum of the emissions. In the case where larger measuring distances are required the results will extrapolated based on the values measured on the closer distances according to Section 15.31 (f) (2) [2]. The final measurement will be performed with an EMI Receiver set to an average and a peak detector.

The final level, expressed in dB μ V/m, is arrived at by taking the reading from the EMI receiver (Level dB μ V) and adding the antenna correction factor and cable loss factor (Factor dB) to it. This result then has to be compared with the relevant FCC limit.

The resolution bandwidth during the measurement was 300 kHz.

FCC ID: DO4EVOLVE

5.2.4 Test result

Evolve P20 Shielded:
10m Distance measured:

Frequency [MHz]	L: PK [dBμV]	Correct. [dB]	L: PK [dBμV/m]	Limit [dBμV/m]	Delta [dB]	Tx1 & Tx2:
8.2	55.06	20	75.06	80.0	4.9	31
9.0	54.92	20	74.92	80.0	5.1	30

30m Distance calculated:

Frequency [MHz]	L: PK [dBμV]	Correct. [dB]	L: PK [dBμV/m]	Limit [dBμV/m]	Delta [dB]
8.2	35.06	20	55.1	60.0	4.9
9.0	34.92	20	54.9	60.0	5.1

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

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

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

* At a test distance of 30 metres

The requirements are **FULFILLED**.

Remarks:

FCC ID: DO4EVOLVE**5.3 Spurious emissions (Magnetic field) 9 kHz – 30 MHz**

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

5.3.1 Description of the test location

Test location: OATS1

Test distance: 10 metres

5.3.2 Photo documentation of the test set-up**5.3.3 Description of Measurement**

The spurious emissions from the EuT will be measured on 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 antenna was positioned 3, 10 or 30 meters horizontally from the EuT. Measurements have been made in all three orthogonal axes and the shielded loop antenna was rotated to locate the maximum of the emissions. In the case where larger measuring distances are required the results will extrapolated based on the values measured on the closer distances according to Section 15.31 (f) (2) [2]. The final measurement will be performed with an EMI Receiver set to Quasi Peak detector except for the frequency bands 9 kHz to 90 kHz and 110 to 490 kHz where an average detector will be used according to Section 15.209 (d) [2].

FCC ID: DO4EVOLVE

The final level, expressed in dB μ V/m, is arrived at by taking the reading from the EMI receiver (Level dB μ V) and adding the antenna correction factor and cable loss factor (Factor dB) to it. This result then has to be compared with the relevant FCC limit.

The resolution bandwidth during the measurement is as follows:

9 kHz – 150 kHz: ResBW: 200 Hz

150 kHz – 30 MHz: ResBW: 300 kHz

Example:

Frequency (MHz)	Level (dB μ V)	+	Factor (dB)	=	Level (dB μ V/m)	Limit (dB μ V/m)	=	Delta (dB)
1.705	5	+	20	=	25	30	=	5

5.3.4 Test result

Evolve P20 Shielded

Tx Frequency: 8.2 MHz Band, 9.0 MHz Dual Band

Frequency [MHz]	L: PK [dB μ V]	L: AV [dB μ V]	L: QP [dB μ V]	Correct. [dB]	L: PK [dB μ V/m]	L: AV [dB μ V/m]	L: QP [dB μ V/m]	Limit [dB μ V/m]	Delta [dB]
0.009 – 30.0				20				40.0	> 20

Limit according to FCC Part 15 Subpart 15.209(a), Subpart 15.223(a)

Frequency (MHz)	Field strength of spurious emissions		Measurement distance (meters)
	(μ V/m)	dB (μ V/m)	
0.009-0.490	2400/F(kHz)	--	300
0.490-1.705	24000/F (kHz)	--	30
1.705-10.0	100	40	30

The requirements are **FULFILLED**.

Remarks:

FCC ID: DO4EVOLVE**5.4 Radiated emissions (electric field) 30 MHz – 1 GHz**

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

5.4.1 Description of the test location

Test location: OATS1

Test distance: 3 metres

5.4.2 Photo documentation of the test set-up**5.4.3 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 polarized 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 meter non-conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. The set up of the Equipment under test will be in accordance to ANSI C63.4-2003. 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 screen room located outside the test area. The antenna was positioned 3, 10 or 30 meters horizontally from the EuT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarization's and the EuT are rotated 360 degrees.

FCC ID: DO4EVOLVE

The final level, expressed in dB μ V/m, is arrived by taking the reading from the EMI receiver (Level dB μ V) and adding the correction factors and cable loss factor (Factor dB) to it. This is done automatically in the EMI receiver, where the correction factors are stored. This result then has the FCC or CISPR limit subtracted from it to provide the Delta which gives the tabular data as shown in the data sheets at page.

The resolution bandwidth during the measurement is as follows:

30 MHz – 1000 MHz:

ResBW: 120 kHz

Example:

Frequency (MHz)	Level (dB μ V)	+	Factor (dB)	=	Level (dB μ V/m)	Limit (dB μ V/m)	=	Delta (dB)
719	75	+	32.6	=	107.6	110	=	-2.4

5.4.4 Test result

Extract of the critical values:

Evolve P20 Shielded, Tx Frequency: 9.0 MHz Dual Band, Tx1&Tx2:31

Frequency [MHz]	L: QP [dB μ V]	Correct. [dB]	L: QP [dB μ V/m]	Limit [dB μ V/m]	Delta [dB]
41.59	15.1	15.0	30.1	40.0	-9.9
42.74	20.5	14.9	35.4	40.0	-4.6
45.40	21.7	14.7	36.4	40.0	-3.6
50.55	23.1	14.4	37.5	40.0	-2.5
59.90	22.2	14.0	36.2	40.0	-3.8
63.51	20.9	13.4	34.3	40.0	-5.7
108.25	20.0	12.7	32.7	43.5	-10.8
111.92	20.1	13.1	33.2	43.5	-10.3
121.29	20.9	14.1	35.0	43.5	-8.5
240.00	22.4	14.0	36.4	46.0	-9.6

Limit according to FCC Part 15 Subpart 15.209(a)

Frequency (MHz)	Field strength of spurious emissions		Measurement distance (meters)
	(μ V/m)	dB (μ V/m)	
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
960-1000	500	54	3

The requirements are **FULFILLED**.

Remarks: The table shows an extract of the critical values.

FCC ID: DO4EVOLVE

5.5 Emission Bandwidth

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

5.5.1 Description of the test location

Test location: AREA4

5.5.2 Photo documentation of the test set-up



5.5.3 Test result

Tx Frequency: 8.2 MHz Dual Band

Fundamental [MHz] See Plot 1	6dB Bandwidth F1 [MHz]	6dB Bandwidth F2 [MHz]	Measured Bandwidth [MHz]
8.2	7.715	8.705	0.99

Tx Frequency: 9.0 MHz Dual Band

Fundamental [MHz] See Plot 2	6dB Bandwidth F1 [MHz]	6dB Bandwidth F2 [MHz]	Measured Bandwidth [MHz]
8.2 & 9.2	7.828	9.418	1.59

FCC ID: DO4EVOLVE

5.5.4 Test protocol

Emission Bandwidth FCC Part 15 Subpart 15.223(a)

Plot 1:

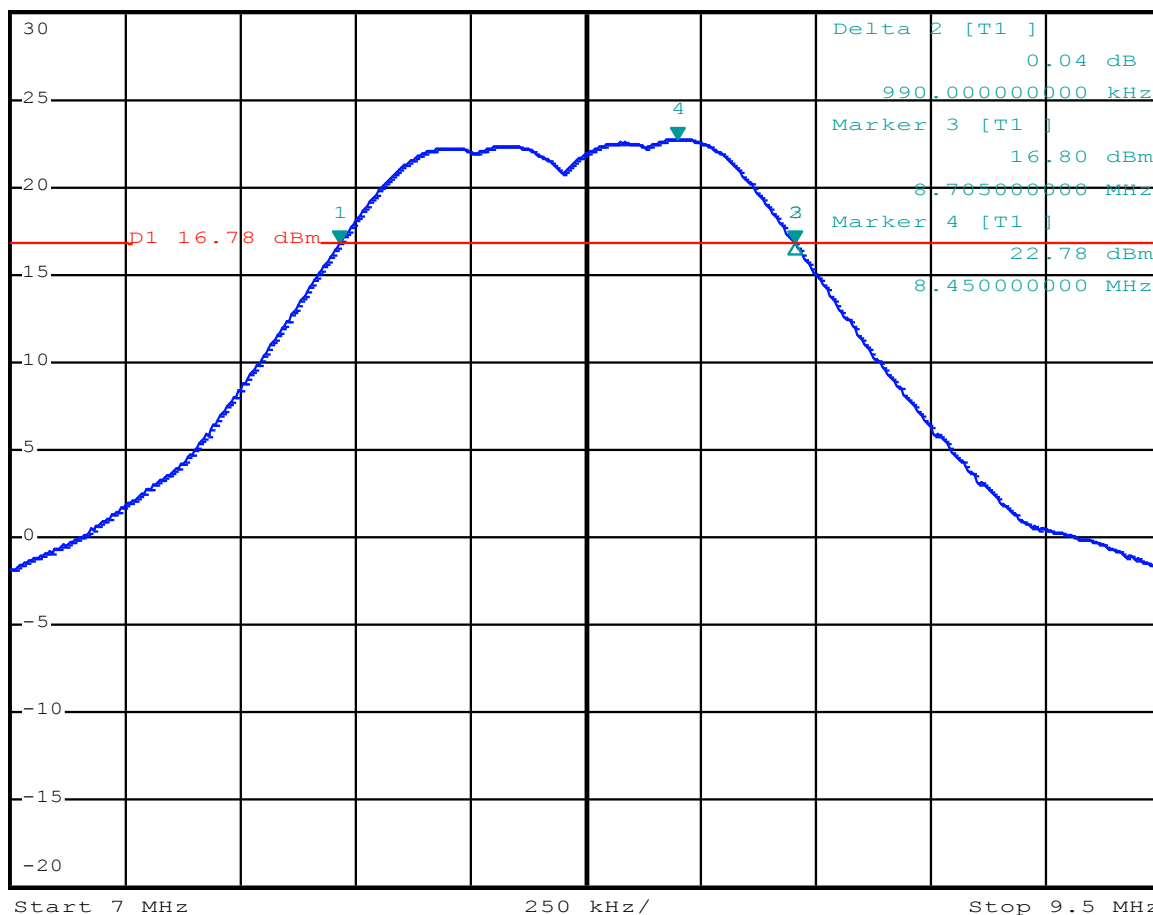


*RBW 300 kHz Marker 1 [T1]
*VBW 300 kHz 16.76 dBm
SWT 2.5 ms 7.715000000 MHz

Ref 30 dBm

Att 60 dB

1 PK
VIEW



FCC ID: DO4EVOLVE

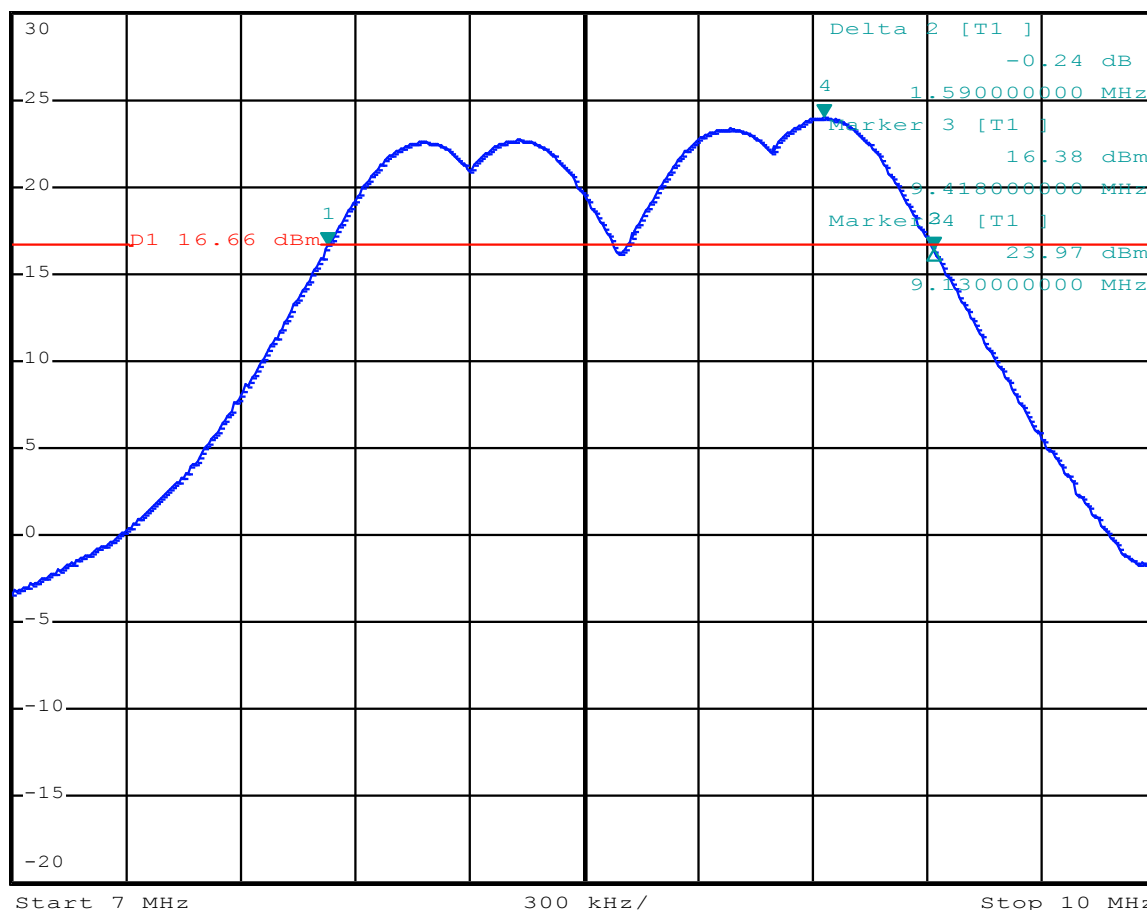
Emission Bandwidth
FCC Part 15 Subpart 15.223(a)

Plot 2:



*RBW 300 kHz Marker 1 [T1]
*VBW 300 kHz 16.62 dBm
Ref 30 dBm Att 60 dB SWT 2.5 ms 7.828000000 MHz

1 PK
VIEW



3DB
AC

FCC ID: DO4EVOLVE
6 USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used, in addition to the test accessories, are calibrated and verified regularly.

Test ID	Model Type	Equipment No.	Next Calib.	Last Calib.	Next Verif.	Last Verif.
A 4	ESHS 30	02-02/03-05-002	30/06/2012	30/06/2011		
	ESH 2 - Z 5	02-02/20-05-004	12/05/2013	12/05/2011	12/11/2011	12/05/2011
	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			06/10/2011	06/04/2011
	SP 103 /3.5-60	02-02/50-05-182				
CPR 1	FMZB 1516	01-02/24-01-018			16/02/2012	16/02/2011
	ESCI	02-02/03-05-005	19/11/2011	19/11/2010		
	S10162-B	02-02/50-05-031				
	KK-EF393-21N-16	02-02/50-05-033				
	NW-2000-NB	02-02/50-05-113				
MB	ESCI	02-02/03-05-004	21/02/2012	21/02/2011		
	HZ-10	02-02/24-05-012				
SER 1	FMZB 1516	01-02/24-01-018			16/02/2012	16/02/2011
	ESCI	02-02/03-05-005	19/11/2011	19/11/2010		
	S10162-B	02-02/50-05-031				
	KK-EF393-21N-16	02-02/50-05-033				
	NW-2000-NB	02-02/50-05-113				
SER 2	ESVS 30	02-02/03-05-006	20/06/2012	20/06/2011		
	VULB 9168	02-02/24-05-005	07/03/2012	07/03/2011	17/09/2011	17/03/2011
	S10162-B	02-02/50-05-031				
	KK-EF393-21N-16	02-02/50-05-033				
	NW-2000-NB	02-02/50-05-113				

FCC ID: DO4EVOLVE

7 Constructional dataform for testing

Licence	Checkpoint Systems, Inc.				
Address:	101 Wolf Drive, Thorofare, New Jersey, USA 08086				
Manufacturer:	Pikatron Feinwerktechnik GmbH & Co. KG				
Address:	Raiffeisenstrasse 10, 61250 Usingen				
Type:	Electronic Article Surveillance Detection Systems				
Model Names:	EVOLVE (EMERALD ELECTRONIC) Models: EVOLVE P20 Shielded				
Serial-No.:	EVOLVE P20 Shielded S/N: 9418594*1U03490003				

Additional information to the above named model:

Antenna: transmitter-receiver Antenna Width Height	Type: Loop Antennas			
	EVOLVE P20 Shielded			
	270 mm			
	1550 mm			
Power supply of the transmitter: Type:	nominal voltage: 24.0 V			
	lowest voltage: 18.0 V			
	highest voltage: 25.0 V			
	current consumption 0.5 A			
Power supply of the receiver: Type:	Same as transmitter			
	nominal voltage: V			
	current consumption A			

Ancillary equipment:

Description:	PSU	Type:	LFZVC36FS24S91	Serial-no.:	2590
Description:		Type:		Serial-no.:	
Description:		Type:		Serial-no.:	
Description:		Type:		Serial-no.:	

Extreme temperature range in which the approval test should be performed:

- ☒ Category I: General (-20°C to +55°C)
☐ Category II: Portable (-10°C to +55°C)
☐ Category III: Equipment for normal indoor use (0°C to +55°C)

Connectable cables:

Name of the cable	Digital	Length/m	shielded
DC cable from PSU	O yes ☒ no	5.0	O yes ☒ no
DC cable Master to Sub-Master	O yes ☒ no	1.5	☒ yes O no
Additional cables listed in the attachment	O yes O no		O yes O no

FCC ID: DO4EVOLVE

Type designation: EVOLVE (EMERALD ELECTRONIC) Antenna Models: G10, G20, P10, P20 and PX			
Name and type designation of individual units comprising the radio equipment: PSU: LFZVC36FS24S91, LVC36FS24E1, LFZVC65SG24E, FW7405M/24			
Type of equipment:			
☐ Radiotelephone equipment ☐ One-way radiotelephone equipment ☐ Personal paging system ☐ Satellite earth station ☐ Data transmission equipment ☐ Remote-control equipment ☒ Inductive loop system ☐ Radio-relay system ☐ CB radiotelephone equipment ☐ Movement detector ☐ Radiomaritime equipment ☐ Inland waterways equipment ☐ Radionavigation equipm. ☐ Antenna ☐ Aeronautical equipment ☐ LPD ☐ RLAN ☐ ☐			
Technical characteristics:			
	Transmitter-receiver	Transmitter	Receiver
Frequency range	7.4 – 10.0 MHz		
Maximum no. of channels	1		
Channel spacing			
Class of emission (type of modulation)	P0N		
Maximum RF output power			
Maximum effective radiated power (ERP)	60 dBµV/m at 30 m		
Output power variable	Yes		
Channel switching frequency range			
Method of frequency generation	☒ Synthesizer ☐ Crystal ☐ Other		
Frequency generation TX			
Frequency generation RX			
IF	1st IF	2nd IF	3rd IF
Integral selective calling			
Audio-frequency interface level at external data socket			
Modes of operation	☐ Duplex mode ☐ Semi-duplex mode ☒ Simplex mode		
Power source	☒ Mains ☐ Vehicle-regulated ☐ Integral		
Antenna socket	☐ BNC ☐ TNC ☐ N ☐ M ☐ UHF ☐ Adapter ☒ None ☐		
Test specifications: FCC Part 15 Subpart C (September 2010) RSS-210 Issue 8 (December 2010)			

FCC ID: DO4EVOLVE

Declarations:

- We declare that the above information are correct and the named model was supplied with the maximum configuration to the accredited test laboratory.

Heppenheim
place of issue

,date

8/3/11

H. Günter

Seal and signature of applicant

H. Günter

FCC / IC System Setup				
	Serial Number	PSU	Max Tx Pwr in DMS (Ant 1, Ant 2)	Frequency Band in DMS
EVOLVE P20 Shielded	9418594*1U03490003	LVC36FS24E1	31 30	8.2 9.0 Dual Band

FCC ID: DO4EVOLVE

Connected Cables								
Connector	Pin #	Wire Color	Termination Resistors	Function	Cable Length (meters)	Supplier Part #	Termination Resistor	
J72 (MAIN)	1	Green	R1/1	People Counter Sensor	2.4 m	Belden - 82723 plenum rated	100Ohm	
	2	Black	R1/2					
	3	White						
	4	Red						
J13	1	Black	R1/1	Metal Point		Belden - 82723 plenum rated	10KOhm	
	2	Red	R1/2					
J6/J7/J54	1	Green	R1/1	Deactivator Interlock 4/3/2	2.4 m	Belden - 82723 plenum rated	10KOhm	
	2	White	R1/2	Ext. Sounder 4				10KOhm
	3	Black	R2/1					
	4	Red	R2/2					
J20/J22	1	Red	R1/1	Pedestal Synchronization	2.4 m	Belden - 82723 plenum rated	100Ohm	
	2	Black	R1/2					
	3	Ground						
J48				BADGE	0.5 m	Pedestal Integrated		
J18 or J31				Pedestal Main Power	0.5 m	From filter pcb		
J41	1	white-blue	R1/1	External Counter	4.2 m	Olympic - 3804M5-6 plenum rated	10KOhm	
	2	blue	R1/2	External Alarm Lights				10KOhm
	3	ground	R2/1					
	4	white-orange					R2/2	
	5	orange						
J9	1	white-blue	R1/1	Alarm Group	4.2 m	Olympic - 3804M5-6 plenum rated	10KOhm	
	2	blue	R1/2	External Alarm Group				10KOhm
	3	white-green	R2/1					
	4	green+ground					R2/2	
	5	white-orange						
	6	orange						
J44/J45	1	white-blue	R1/1	External Relay 0/1	4.2 m	Olympic - 3804M5-6 plenum rated	10KOhm	
	2	blue	R1/2					
	3	white-green	R2/1					
	4	white-orange						R2/2
	5	orange						
	6	green+ground						
J10/J14	1	red	R1/1	Inter-Pedestal Network Com.	2.4 m	Belden - 82723 plenum rated	100Ohm 100Ohm	
	2	white	R2/1					
	3	ground	R1/2					
	4	black						
	5	green						R2/2
J7				Ethernet /LAN	5 m	Cat5e		