

Test Report

Electromagnetic Compatibility

Test Report - Nr.: 07KFE007857-N-FCC-01

Date: 2007-12-17

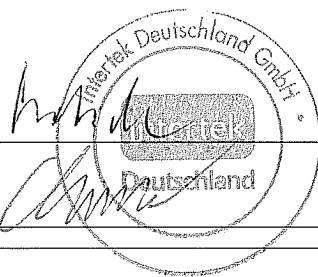
Type:	JA-80A
Description:	Wireless outdoor siren
Serial number:	0705597_005

Manufacturer:	Jablotron s.r.o.
Customer:	Jablotron s.r.o.
Address (Customer):	Pod Skalkou 33 466 01 Jablonec nad Nisou Czech Republic

Test Laboratory:	Intertek Deutschland GmbH, Innovapark 20, D- 87600 Kaufbeuren
FCC registration number:	90714

Compiled by:	Marek Svoboda Technical Leader
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Approved by:	R. Dressler Project Engineer
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This test report consists of 23 pages. All measurement results exclusively refer to the equipment, which was tested.
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1. General description

1.1. Product description

The JA-80A is a component of Jablotron's Oasis 80 system. It is designed to sound an external alarm and to indicate any tampering it experiences. It is powered by a long-life lithium battery and communicates wireless using Jablotron Oasis protocol. lithium battery BAT-80 Jablotron.

Antenna type : Internal

Under normal operating conditions (no alarm state) the device transmits 30 ms data pulse to control unit once in 60 s. The purpose is system integrity check.

The device includes the receiver with local oscillator frequency $f = 868.5$ MHz. Measured radiated field data of receiver for verification purposes are included in this report.

1.2. Related submittal(s) Grants

This is application for certification of the transmitter.
No related devices are present.

1.3. Test Methodology

- ☒ The test setup and test was done according to: **ANSI C63.4: 2003**
American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
- ☐ The test setup and test was done according to: **CISPR 22: 1998 + Corrigendum: 2003 + A1: 2000 + A2: 2003 and ANSI C63.4: 2003**
Compliance with CISPR 22 is being used to demonstrate conformity with FCC DoC requirements. This conforms with FCC Part 15.109(g).

The test results detailed in this report apply only to the JA-80A with the test setup described. Any modification such as a change, addition to or inclusion of another device into this product will require an additional evaluation.

The support equipment listed as part of the emission tests is required to properly exercise and test the device under test.

1.4. Test Facility

The test site was semi-anechoic chamber Intertek Germany (PM KF 1150). Measurement distance EUT – Antenna was $d = 3$ m.

1.5. List of exhibits

Following exhibits are delivered as separate pdf files. The name of file corresponds with description of exhibit with extension **.pdf**

EXHIBIT 1	Test setup photo documentation
EXHIBIT 2	External Photos
EXHIBIT 3	Internal Photos
EXHIBIT 4	Operational description
EXHIBIT 5	Block diagram
EXHIBIT 6	Circuit diagram
EXHIBIT 7	Instruction manual
EXHIBIT 8	Product label
EXHIBIT 9	Confidentiality request

2. Measurements And Test Specifications

Emission - Requirements according to

- ☐ FCC, Part 15, Class A, verification
- ☐ FCC, Part 15, Class B, DoC
- ☐ FCC, Part 15, Class B, certification
- ☒ FCC, Part 15, intentional radiator, certification

3. Description Of EUT

3.1. Configuration / Operating Conditions

☒ table-top EUT

☐ floor-standing EUT

The device is battery operated. The power source delivered by producer and used for testing was a new Li battery BAT 80 U = 6 V, consisting of 2 type CR 34615SL cells.

There were two samples of the device delivered :

Sample 1: was modified by manufacturer to transmit continuously. This sample was used for measurement of bandwidth and field strength ;

Sample 2 : has normal operation as specified by manufacturer . It was used for measurement of the duty cycle.

The equipment under test (EUT) is placed on wooden table 0,8 m above ground plane.

At all interference frequencies the height of the antenna is scanned in the range 1 m to 4 m with horizontal and vertical polarization and the turntable is rotated in the range 0° to 360° to obtain the highest field strength.

Measurements in frequency range 30 MHz – 3 GHz were performed with bilog antenna HL 562, measurements in frequency range 3 GHz – 10 GHz were performed with horn antenna HF 906 with preamplifier.

3.2. Major Subassemblies Or Internal Peripherals

Device	Manufacturer	Type	SN	FCC ID
none				

3.3. Peripheral Devices Used For Testing

Device	Manufacturer	Type	SN	FCC ID
none				

3.4. Supply- And Interconnecting Cables

Line	Length	shielded	non shielded	Shield on GND / PE
none		<input type="checkbox"/>	<input type="checkbox"/>	

4. Test Results - Overview

	required	passed	passed with modification	not passed
Bandwidth	< 2.17 MHz, 0.25 % f_{op}	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Duty cycle	< 2 s in 1 hour	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Emission radiated : transmitter				
30 MHz - 3000 MHz : transmitter	FCC 15.231	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3 GHz – 10 GHz : transmitter	FCC 15.231	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Emission radiated : receiver				
30 MHz – 3 GHz : receiver	FCC 15.109	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5. Measurement results detailed

5.1. Duty cycle and Averaging factor

The averaging factor was measured by means of the measuring receiver/spectrum analyzer ESIB 26 in "Analyzer mode".

Fig. 1 shows the length of single data pulse in 100 ms window.

Fig. 2 demonstrates the duty cycle under normal operation in 200 s window.

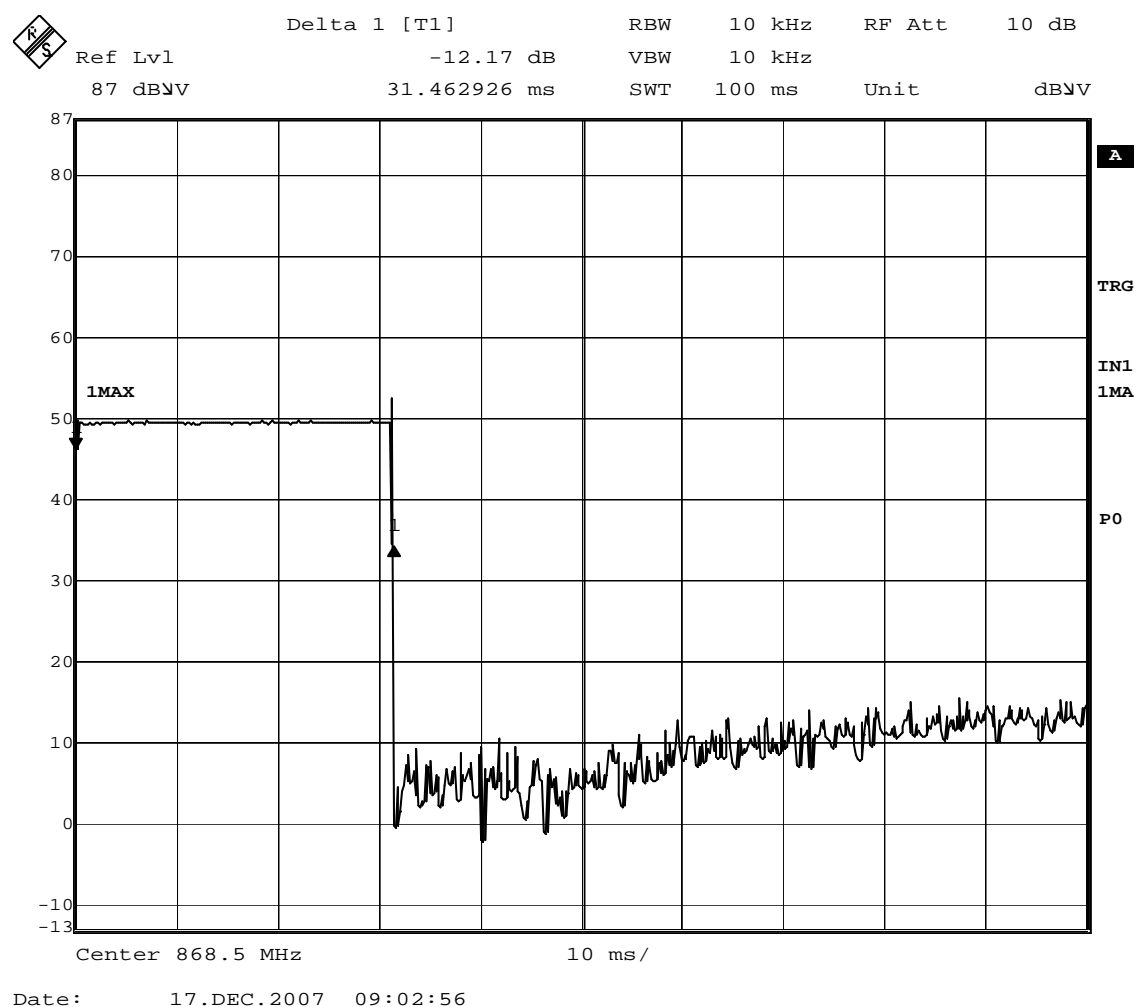


Fig .1

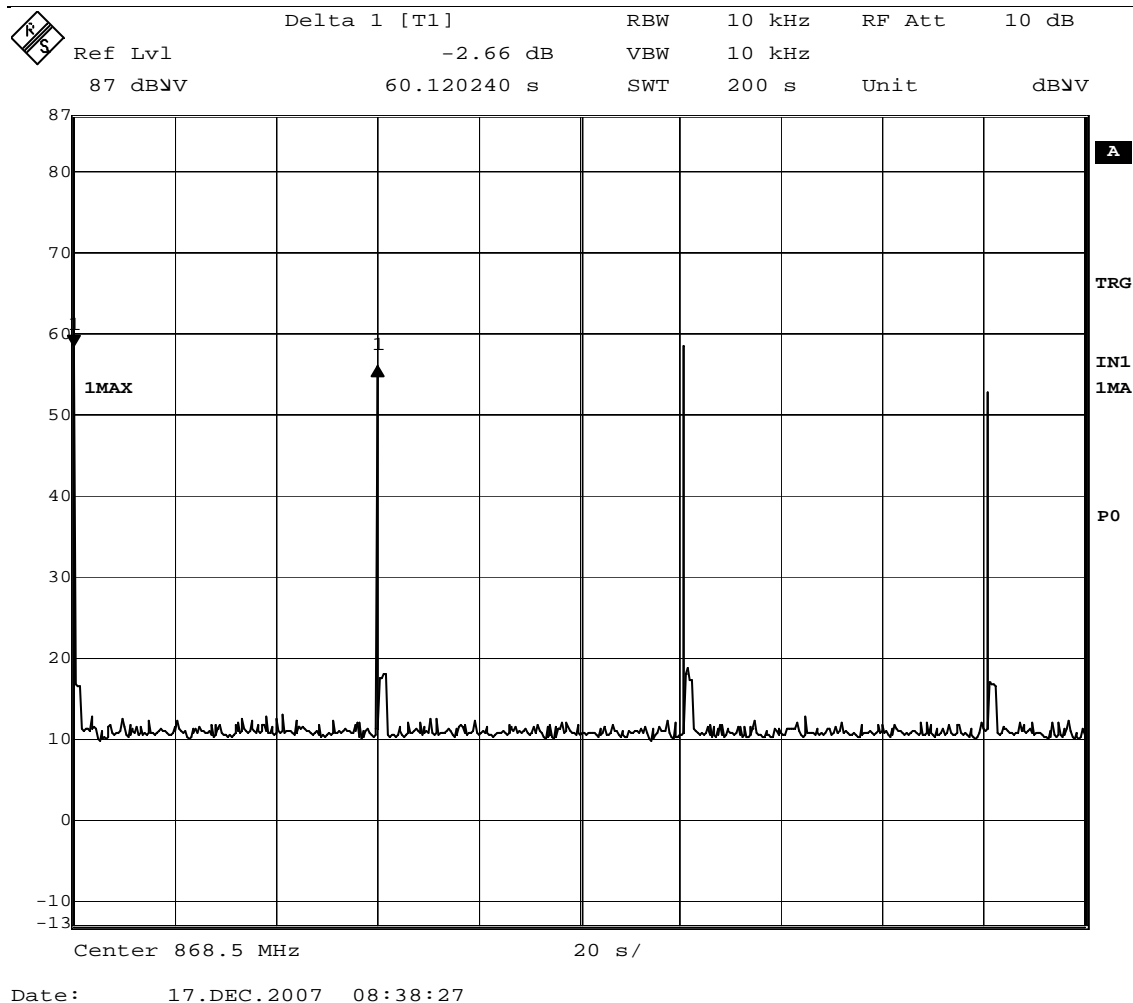


Fig .2

Total transmission time in period $T = 100$ ms is $t = 31.46$ ms.
 The pulse is transmitted once in 60.12 s.

The Averaging factor is:

$$20 * \log (31.46/100) = -10.04 \text{ dB.}$$

The measured peak values are to be reduced by averaging factor to obtain average values.

Transmission time in 1 hour period is :

$$t = \text{int}(3600/ 60.12) * 31.46 = 1.86 \text{ s}$$

5.2. Bandwidth

The measured 20 dB bandwidth is shown on Fig. 3

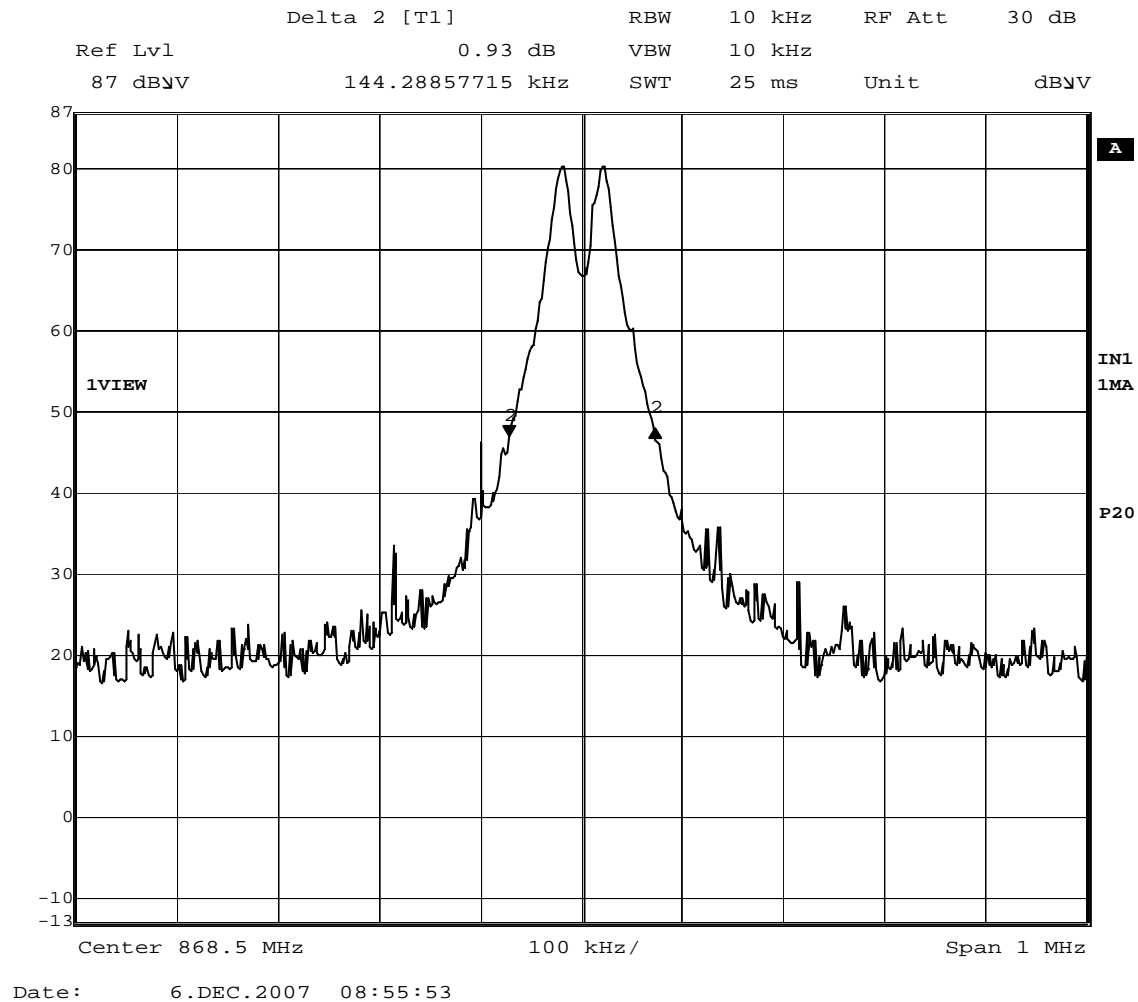


Fig .3

The BW is 144.2 kHz, operating frequency $f = 868.5$ MHz.

5.3. Radiated Emission Transmitter 30 MHz – 10 GHz

Data was measured for worst case configuration which resulted in highest emission levels. A sample calculation, configuration photographs and data tables of emissions are included.

The detector used was PEAK.

5.3.1. Field strength calculation

The field strength is calculated by adding the reading on the measuring receiver to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when the specified limit is related to average detector and measurements are made with peak detector).

A sample of calculation is included below :

$$E = RR + AF + CF - AG + PD + AV$$

Where

E	field strength in dB μ V/m
RR	receiver reading including preamplifier in dB μ V
CF	cable attenuation factor in dB
AF	antenna factor in dB/m
AG	amplifier gain in dB
PD	pulse desensitization in dB
AV	average factor in dB

Example :

Assume that measured values and factors are as follows :

RR	= 60 dB μ V
CF	= 1.2 dB
AF	= 12.6 dB/m
AG	= 20 dB
PD	= 0 dB
AV	= -10 dB

Then

$$E = 60 + 1.2 + 12.6 - 20 + 0 - 10 = 43.8 \text{ dB}\mu\text{V/m}$$

The radiated emission tables which follow the graphical presentation of results were created by the EMC 32 software by Rohde-Schwarz. The data of field strength (peak detector) include the components given above with the exception of PD and AV.

5.3.2. Normative references

Limits equivalent:	FCC, Part 15.231, Part 15.209 where appropriate
Methods of Measurement equivalent:	ANSI C63.4, CISPR 22

Test requirement

Class	B
Distance Antenna – EUT	3 m
Frequency range	30 MHz - 10000 MHz

Place of measurement

- ☒ Semi anechoic chamber Intertek Germany PM KF 1150.
☐ Open Area Test Site

Measurement devices

Measurement device	Manufacturer	Type	SN	Asset No.	Last Calibr. at ion	Inter- val
<input checked="" type="checkbox"/> Test receiver, 20Hz-26GHz	ESIB26	Rohde & Schwarz	100150	PM KF 0948	07-03	1
<input checked="" type="checkbox"/> Antenna, 30-3000 MHz	HL562	Rohde & Schwarz	100354	PM KF 1123	07-03	2
<input checked="" type="checkbox"/> Horn antenna, 1-18 GHz	Rohde & Schwarz	HF906	100188	PM KF 0947	07-05	2
<input checked="" type="checkbox"/> Horn antenna preamp.	Bonn	BLMA0118-4A	35352	PM KF 0946	07-05	2

5.3.3. Emission Test results

Test requirements

☒ passed

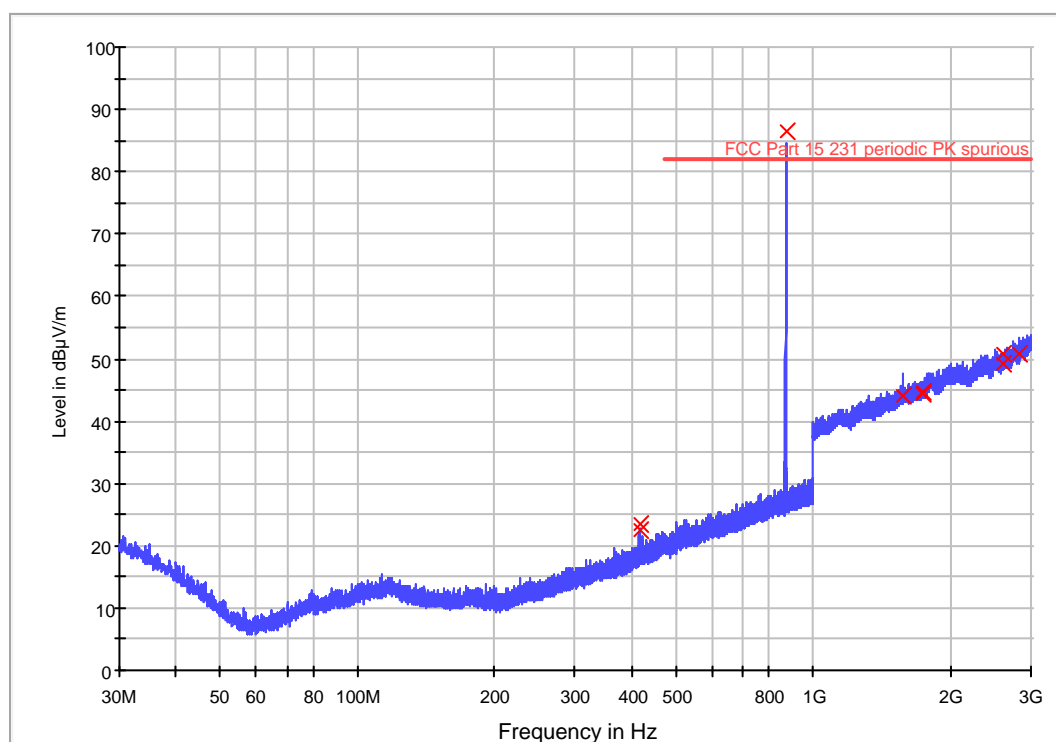
☐ passed with
modification

☐ not passed

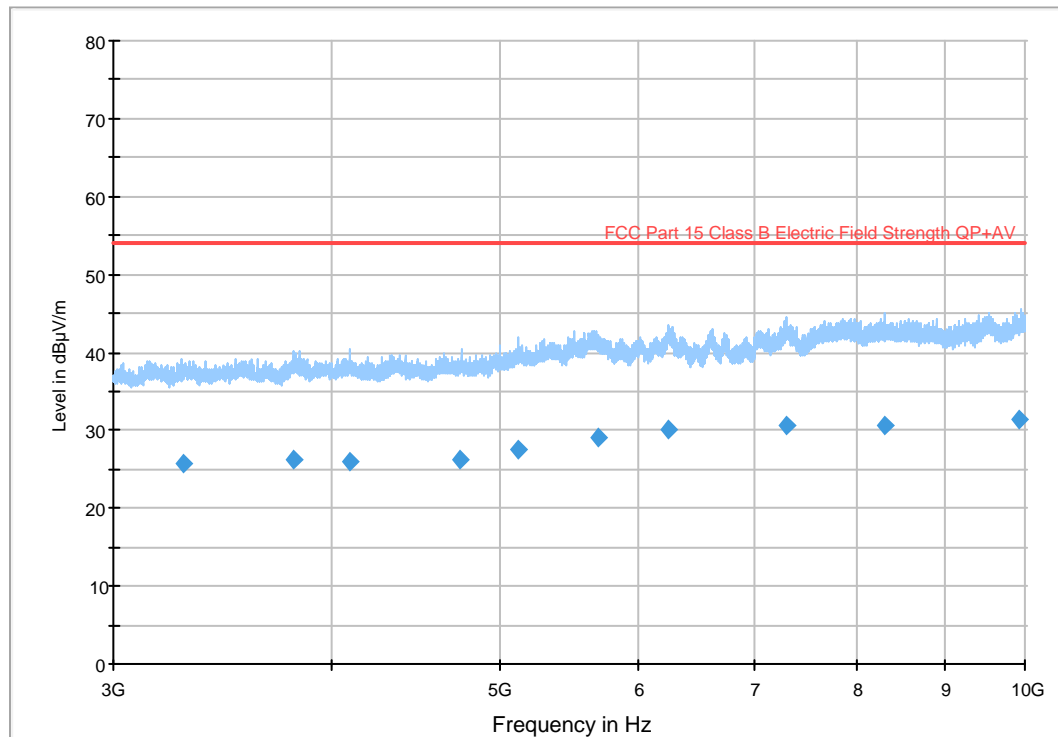
Comment:

The radiated emissions between 30 MHz and 10 000 MHz are under the limit
specified in FCC 15.231

5.3.3.1 Radiated Emission Transmitter 30 MHz – 3 GHz



5.3.3.2 Radiated Emission Transmitter 3 GHz – 10 GHz



5.3.3.3 Radiated Emission Transmitter : table 30 MHz – 10 GHz

Measurements based on a measurement time of 10 ms unless otherwise noted.
Measurement bandwidth is 120 kHz below 1 MHz, and 1 MHz above 1000 MHz.

Frequency	MaxPeak E	Averaging factor	Average value E	Limit Average	Margin average	Limit peak	Margin peak
(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(dBμV/m)	(dB)
414,76	23,6	10,07	13,56	60,1	-46,54	80,1	-56,5
868,48	86,5	10,07	76,46	82	-5,54	102	-15,5
*)1572,7	44,1	10,07	34,06	54	-19,94	74	-29,9
1736,7	44,7	10,07	34,66	62	-27,34	82	-37,3
2605,3	50,9	10,07	40,86	62	-21,14	82	-31,1
*) 2834	50,7	10,07	40,66	54	-13,34	74	-23,3

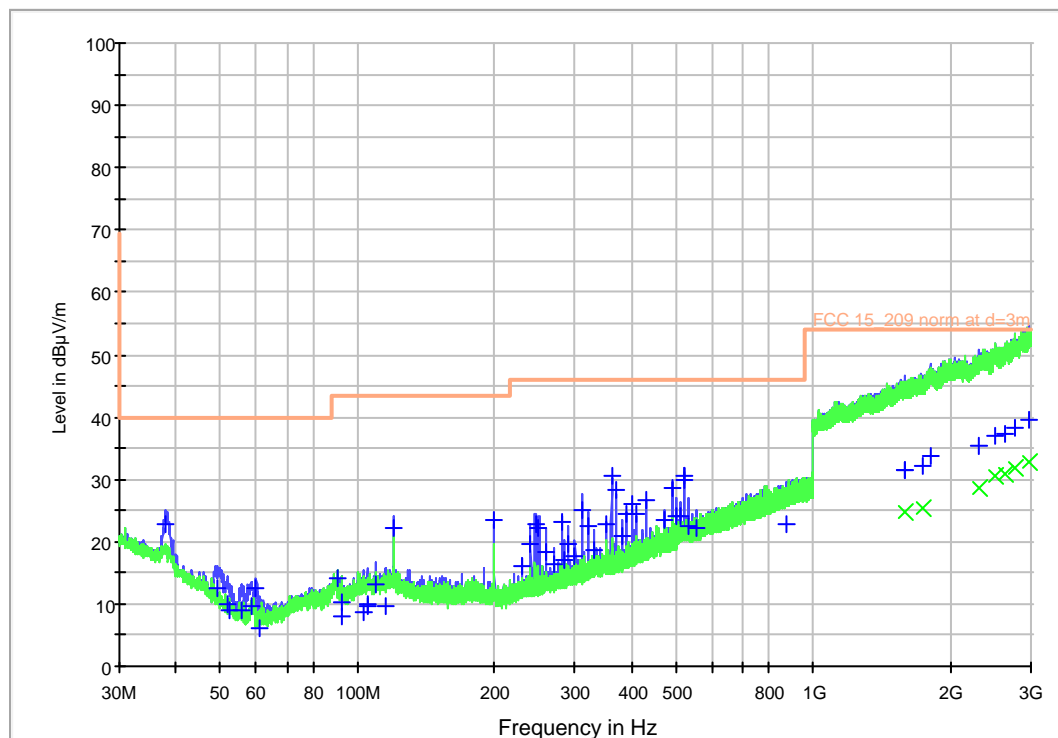
No emissions above noise level in frequency range 3 GHz-10 GHz were found.

*) Frequencies governed by 15.209

5.4. Radiated Emission Receiver 30 MHz – 3 GHz

The emissions of receiver were measured during the periods when transmitter was not on.
The local oscillator frequency is $f = 868.5 \text{ MHz}$.
Receiver emissions were measured with QP and AV detectors according to FCC Part 15.109.

5.4.1. Radiated Emission Receiver 30 MHz – 3 GHz



5.4.2. Radiated Emission Receiver Table 30 MHz – 3 GHz

Frequency (MHz)	QuasiPeak (dBμV/m)	Average (dBμV/m)	LimitQP/AV (dBμV/m)	Margin QP (dB)	Margin AV (dB)
37,96	22,7	---	40	-17,3	
49,2	12,7	---	40	-27,3	
51,92	9,9	---	40	-30,1	
52,12	9	---	40	-31	
55,68	9,1	---	40	-30,9	
58,44	9,8	---	40	-30,2	
60	12,4	---	40	-27,6	
61,2	6,2	---	40	-33,8	
90	14,2	---	43,5	-29,3	
92,04	7,9	---	43,5	-35,6	
92,04	10,3	---	43,5	-33,2	
102,76	8,8	---	43,5	-34,7	
104,72	10	---	43,5	-33,5	
104,72	9,6	---	43,5	-33,9	
110	13,1	---	43,5	-30,4	
114,8	9,8	---	43,5	-33,7	
120,04	22,2	---	43,5	-21,3	
200	23,5	---	43,5	-20	
230	16	---	46,4	-30,4	
240,04	19,7	---	46,4	-26,7	
245,04	22,8	---	46,4	-23,6	
250	22,2	---	46,4	-24,2	
260,04	18,2	---	46,4	-28,2	
270	16,3	---	46,4	-30,1	
280	23,2	---	46,4	-23,2	
285,04	17,2	---	46,4	-29,2	
290	19,7	---	46,4	-26,7	
300	17,7	---	46,4	-28,7	
310	25,1	---	46,4	-21,3	
320	22,5	---	46,4	-23,9	
330	18,7	---	46,4	-27,7	
350	23	---	46,4	-23,4	
360	30,6	---	46,4	-15,8	
370,04	28,3	---	46,4	-18,1	
380	21	---	46,4	-25,4	
390,04	24,3	---	46,4	-22,1	
400	26,1	---	46,4	-20,3	
410,04	24,4	---	46,4	-22	
430,04	26,7	---	46,4	-19,7	
470,04	23,4	---	46,4	-23	
490,04	28,7	---	46,4	-17,7	
500,04	24,2	---	46,4	-22,2	
510	24,2	---	46,4	-22,2	
520,04	30,6	---	46,4	-15,8	
520,04	30	---	46,4	-16,4	
530,08	22,4	---	46,4	-24	

Frequency (MHz)	QuasiPeak (dB μ V/m)	Average (dB μ V/m)	LimitQP/AV (dB μ V/m)	Margin QP (dB)	Margin AV (dB)
555	22,1	---	46,4	-24,3	
868,52	22,8	---	46,4	-23,6	
1579,52	---	24,1	54		-29,9
1807,52	---	26,7	54		-27,3
1735,8	---	25,6	54		-28,4
1735,8	---	25,4	54		-28,6
1579,52	---	24,8	54		-29,2
2316,32	---	28,8	54		-25,2
2492,8	---	30,5	54		-23,5
2639,32	---	30,8	54		-23,2
2756	---	31,8	54		-22,2
2960,2	---	32,7	54		-21,3

6. Test setup Photo documentation

EXHIBIT 1



Fig. 1 Front view



Fig. 2 Rear view

7. EUT Photo documentation

External Photos : EXHIBIT 2

Internal Photos : EXHIBIT 3

8. Technical specification

Operational description : EXHIBIT 4

8.1. Block Diagram Of The EUT

EXHIBIT 5

8.2. Circuit Diagram Of The Layout

EXHIBIT 6

8.3. Instruction manual

EXHIBIT 7

8.4. Product Labelling

EXHIBIT 8