Intertek

Test Report

Electromagnetic Compatibility

Test Report - Nr.: 07KFE007857-O-FCC-02

Date: 2007-12-19

Type:	JA-80L
Description:	Wireless internal siren
Serial number:	0705069-006

Manufacturer:	Jablotron s.r.o.
Customer:	Jablotron s.r.o.
Address (Customer):	Pod Skalkou 33 CZ 646601 Jablonec nad Nisou Czech Republic

Test Laboratory:	Intertek Deutschland GmbH, Innovapark 20, D- 87600 Kaufbeuren
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Intertek Deutschland GmbH

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1. General description

1.1 Product description

The JA-80L is a component of Jablotron's Oasis 80 alarm system. It can be used as the following:

- An indoor alarm siren
- A wireless door bell
- A detector-triggered chime
- A sounder for entrance and exit delay beeps
- Thief verification

The siren is mains-powered 110 V 60Hz and communicates via OASIS wireless protocol. It can form part of an alarm system or be used as a stand-alone device. When used as part of an alarm system, it sounds when an intruder alarm has been triggered and confirms the actual presence of an intruder in the building by sending a tamper signal when it gets unplugged.
The operating frequency is f = 868.5 MHz.
Antenna of the device is internal, soldered to the PCB.
Under normal operating conditions (no alarm state) the device transmits 30 ms data pulse to control unit once in 540 s (9 minutes).

When activated / deactivated JA-82L transmits to the control unit data pulses each of length 30 ms. In 100 ms window there exists only one data pulse. The alarm message sent to control unit is formed by 3 pulses in time interval about 850 ms.

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-80L 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.
Conducted emission measurement was performed in shielded room.

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 B, verification - receiver

☐ FCC, Part 15, Class B, DoC

☐ FCC, Part 15, Class B, certification
☒ FCC, Part 15, intentional radiator, certification

2.1. Modifications to Test Report 07KFE007857-O-FCC-01

Chapter 5.3.3.4 Conducted emission : added explanation to test results, added table Final measurement Detector 1.

3. Description Of EUT

3.1. Configuration / Operating Conditions

☒ table-top EUT ☐ floor-standing EUT

The device is mains operated.

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		☐	☐	

4. Test Results - Overview

	required	passed	passed with modification	not passed
Bandwidth	< 2.17 MHz, 0.25 % f_{op}	☒	☐	☐
Duty cycle	< 2 s in 1 hour	☒	☐	☐
Emission radiated : transmitter				
30 MHz - 3000 MHz : transmitter	FCC 15.231	☒	☐	☐
3 GHz – 10 GHz : transmitter	FCC 15.231	☒	☐	☐
Emission conducted : transmitter and receiver				
150 kHz – 30 MHz : transmitter and receiver	FCC 15.107	☒	☐	☐
Emission radiated : receiver				
30 MHz – 3 GHz : receiver	FCC 15.109	☒	☐	☐

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 50 ms window.
Fig. 2 demonstrates the duty cycle under normal operation in 600 s window.
Fig. 3 / Fig. 4 demonstrate the pulse train at alarm / switching on.

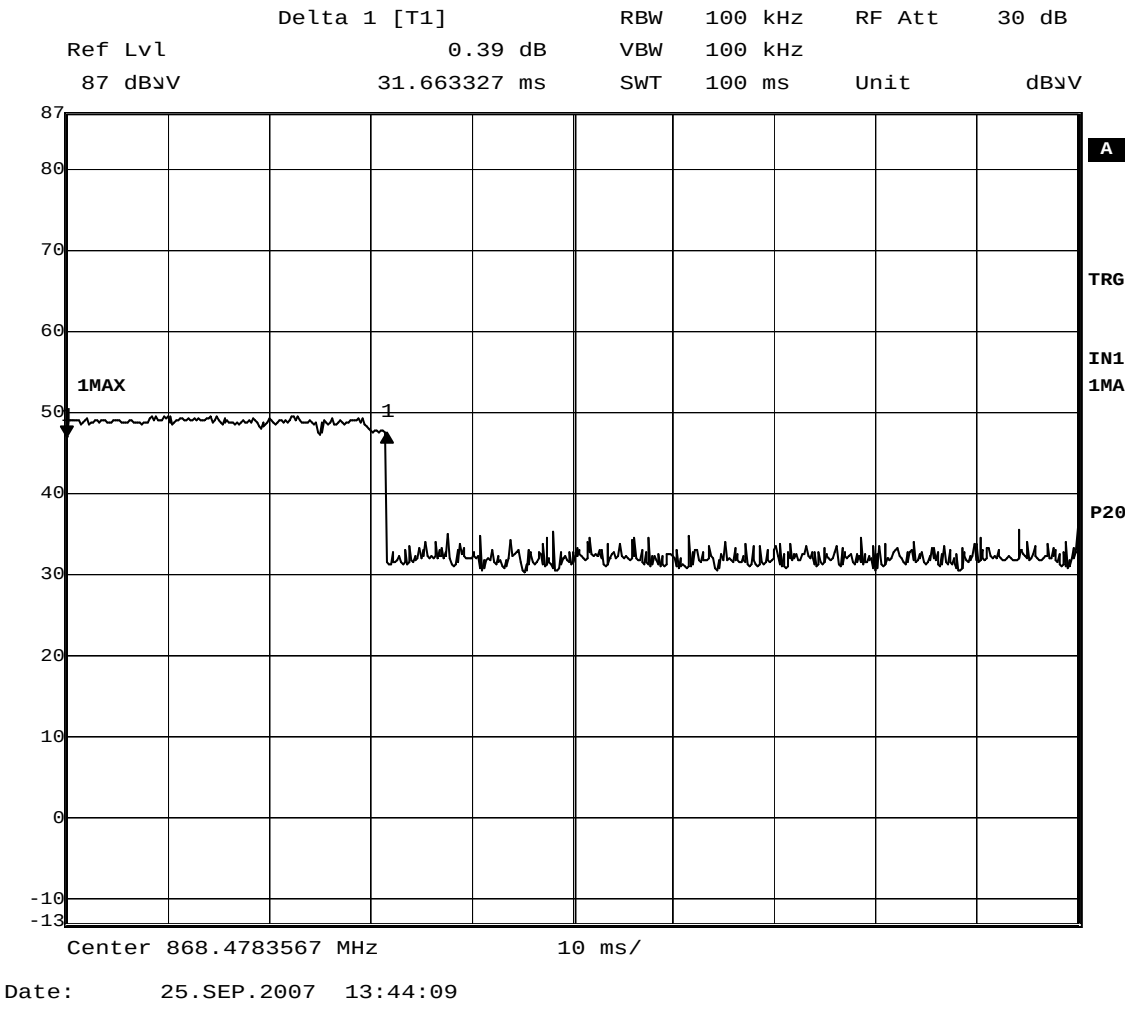


Fig .1

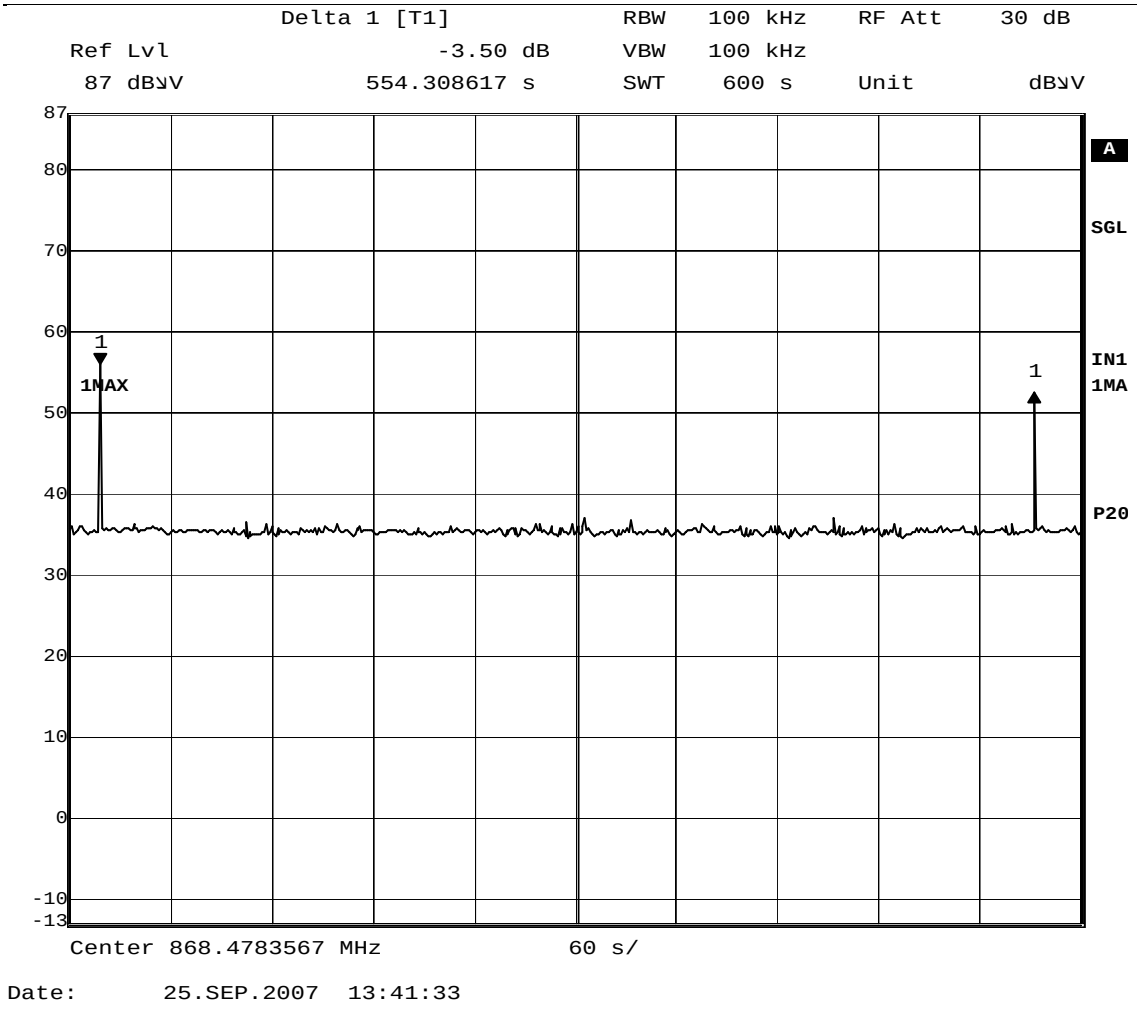

Delta 1 [T1]
RBW 100 kHz
RF Att 30 dB
Ref Lvl
-3.50 dB
VBW 100 kHz
87 dBµV
554.308617 s
SWT 600 s
Unit dBµV
87
80
70
60
50
40
30
20
10
0
-10
-13
1
1MAX
1
A
SGL
IN1
1MA
P20
Center 868.4783567 MHz
60 s/
Date: 25.SEP.2007 13:41:33

Fig .2

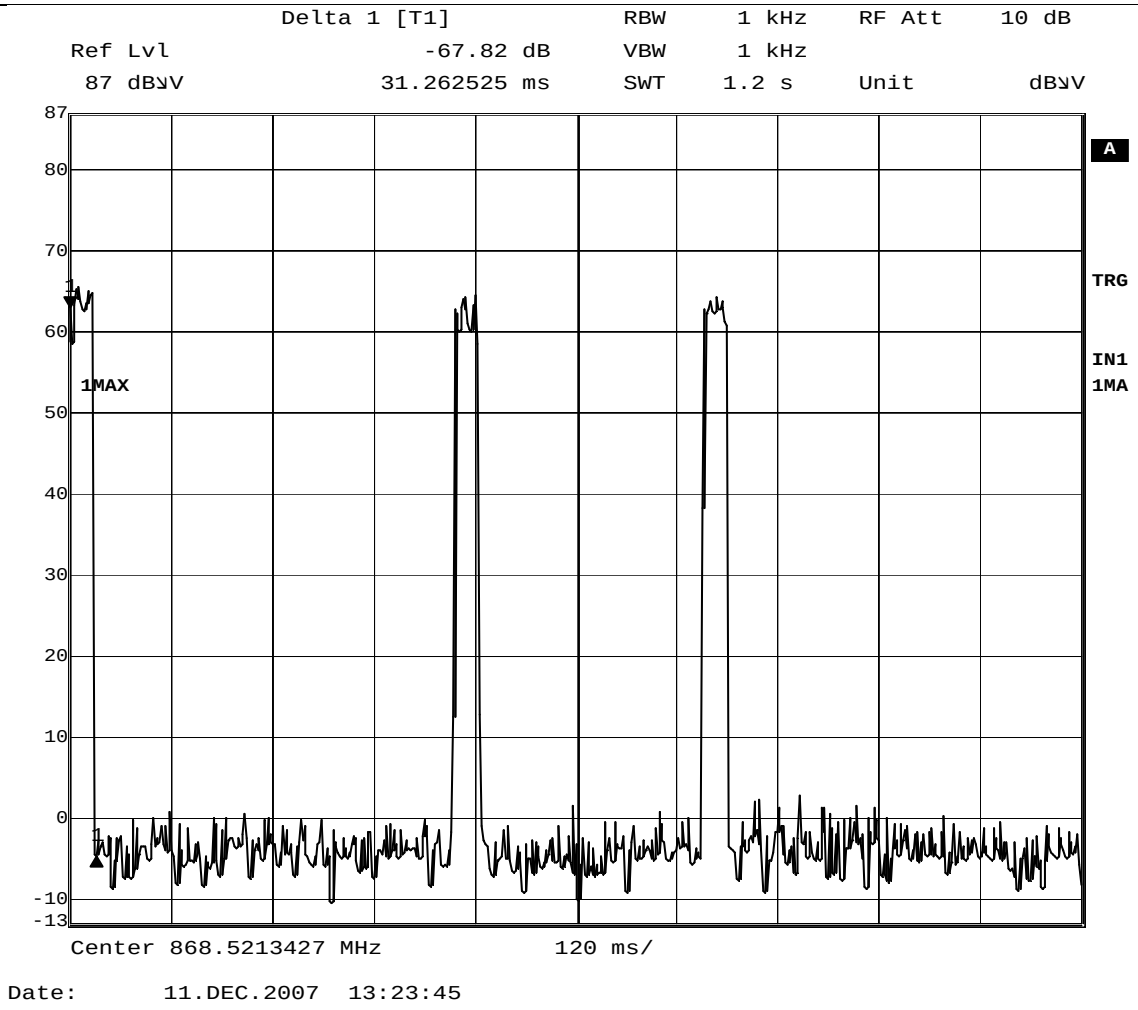


Fig.3 Pulse train on alarm

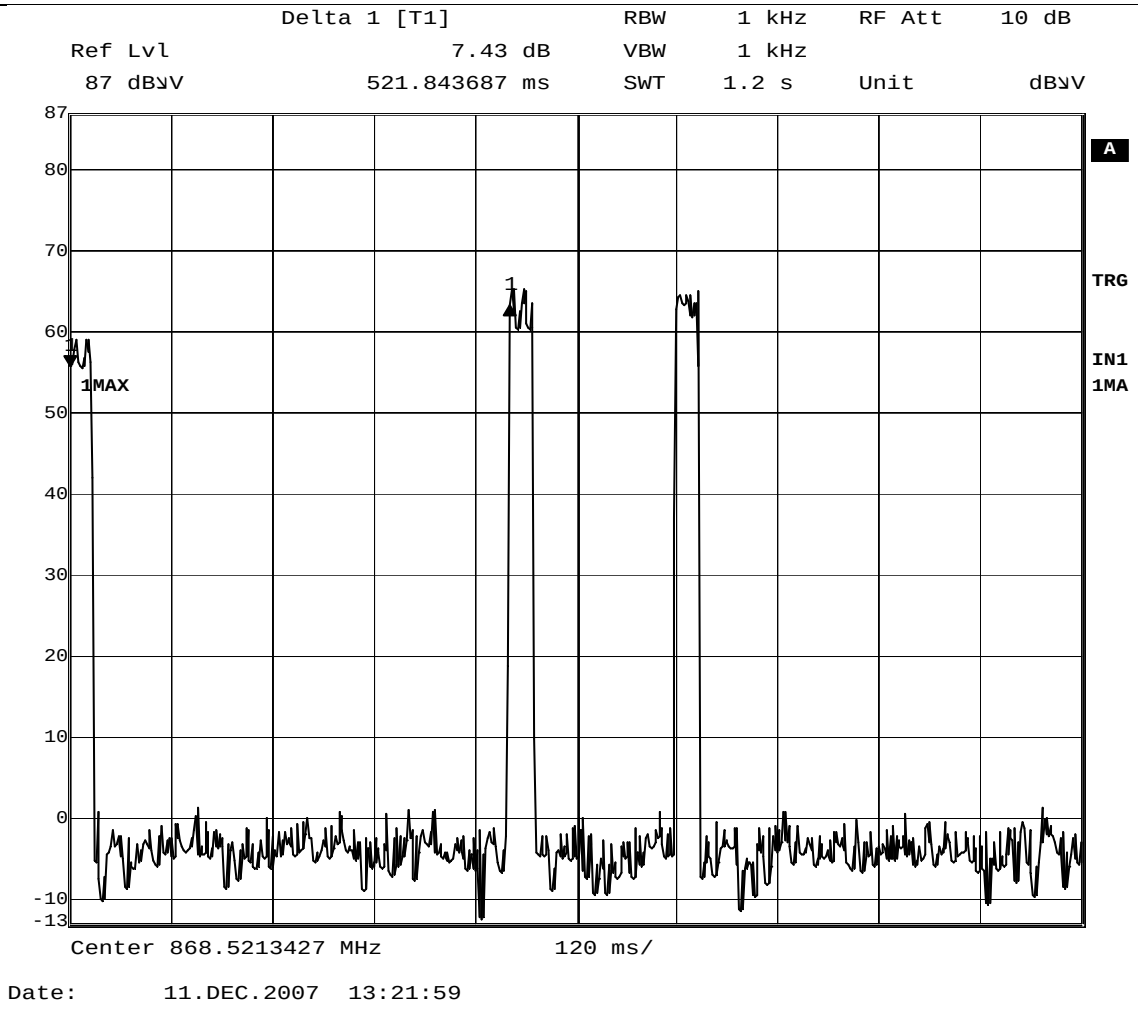


Fig.3 Pulse train on power on

Total transmission time in period T = 100 ms is t = 31.66 ms.
The pulse is transmitted once in 554 s.

The Averaging factor is:

20* log (31.66 /100) = - 9.98 dB.

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

Transmission time in 1 hour period is :

t = int(3600/554) * 31.66 = 190 ms

5.2 Bandwidth

The measured 20 dB bandwidth is shown on Fig. 3

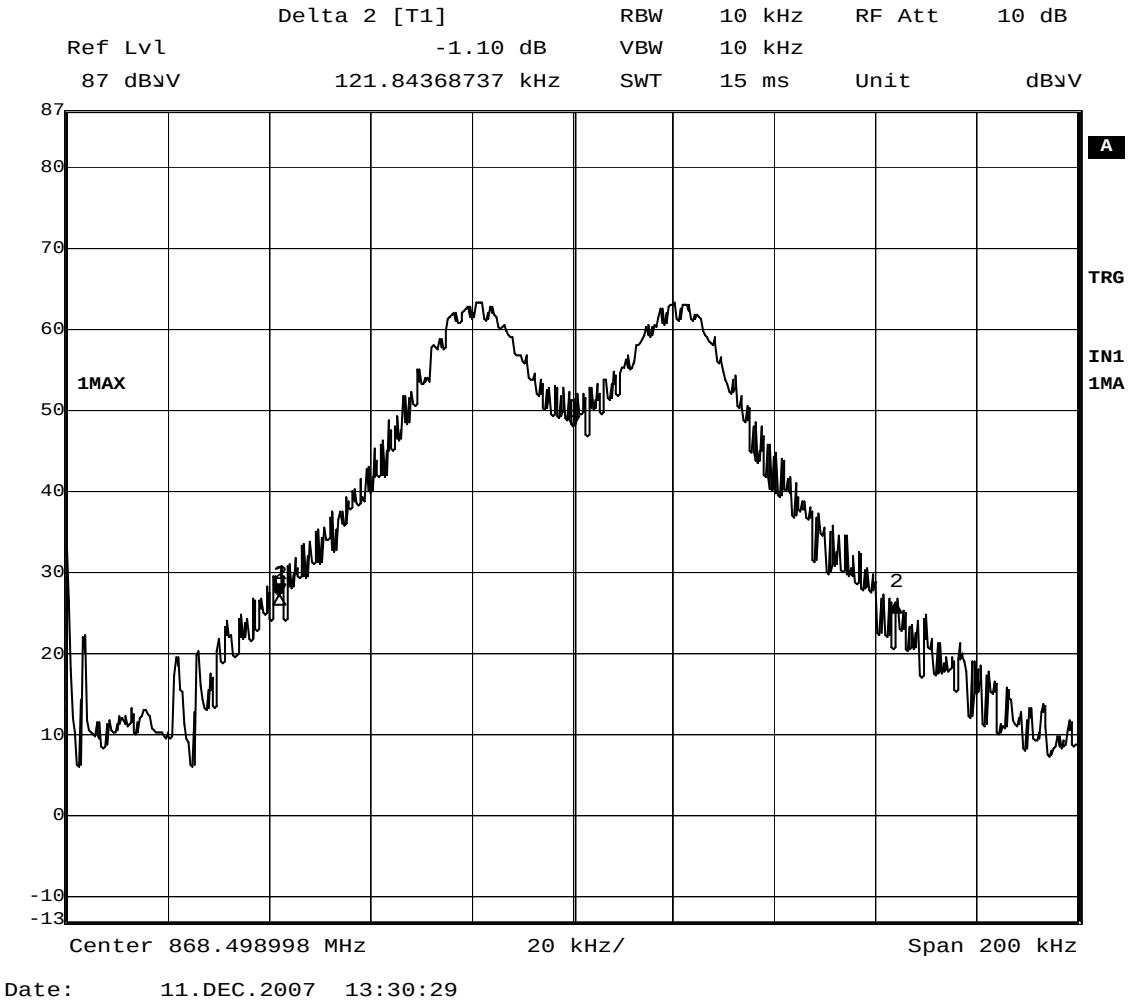


Fig .3

The BW is 122 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 desensitation 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 dBµV/m
RR	receiver reading including preamplifier in dBµV
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 :

Asssume that measured values and factors are as follows :

RR	= 60 dBµV
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 dBµV/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

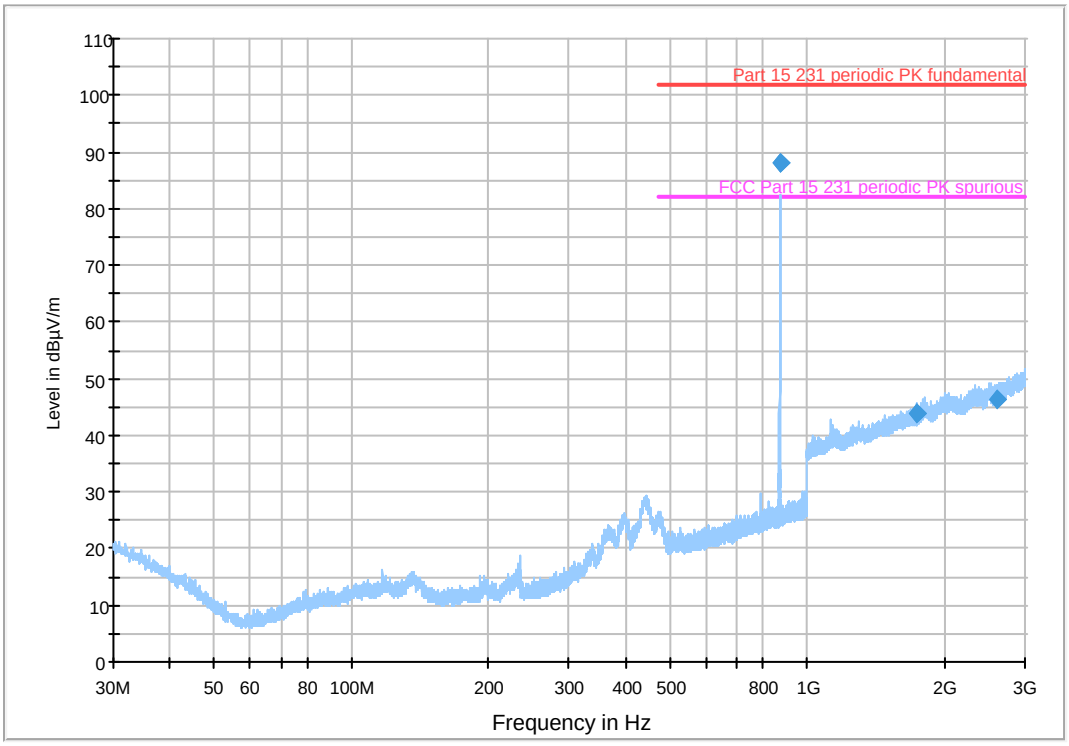
Measurement device	Manufacturer	Type	SN	Asset No.	Last Calibr.ation	Inter-val
☒ Test receiver, 20Hz-26GHz	ESIB26	Rohde & Schwarz	100150	PM KF 0948	07-03	1
☒ Antenna, 30-3000 MHz	HL562	Rohde & Schwarz	100354	PM KF 1123	07-03	2
☒ Horn antenna, 1-18 GHz	Rohde & Schwarz	HF906	100188	PM KF 0947	07-05	2
☒ Horn antenna preamp.	Bonn	BLMA0118-4A	35352	PM KF 0946	07-05	2
☒ V-Artifical mains-network, 2 Line	Rohde & Schwarz	ESH3-Z5	838576/016	PM KF 0141	07-03	2

5.3.3. Emission Test results

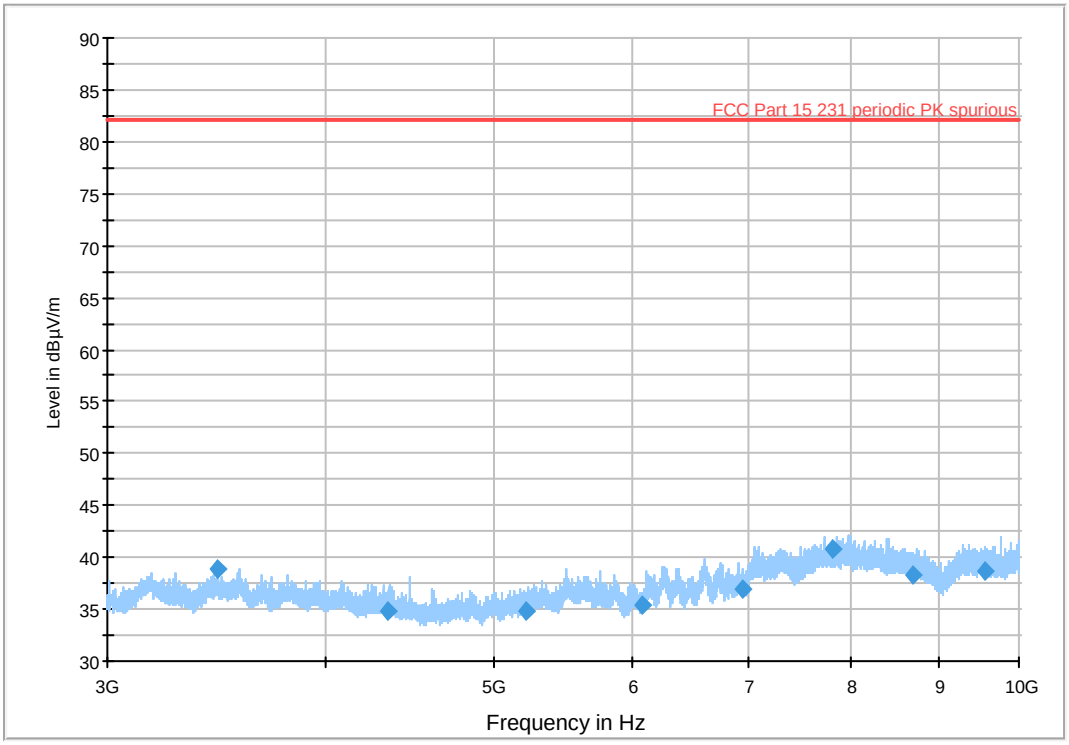
Test requirements ☒ **passed** ☐ **passed with modification** ☐ **not passed**

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

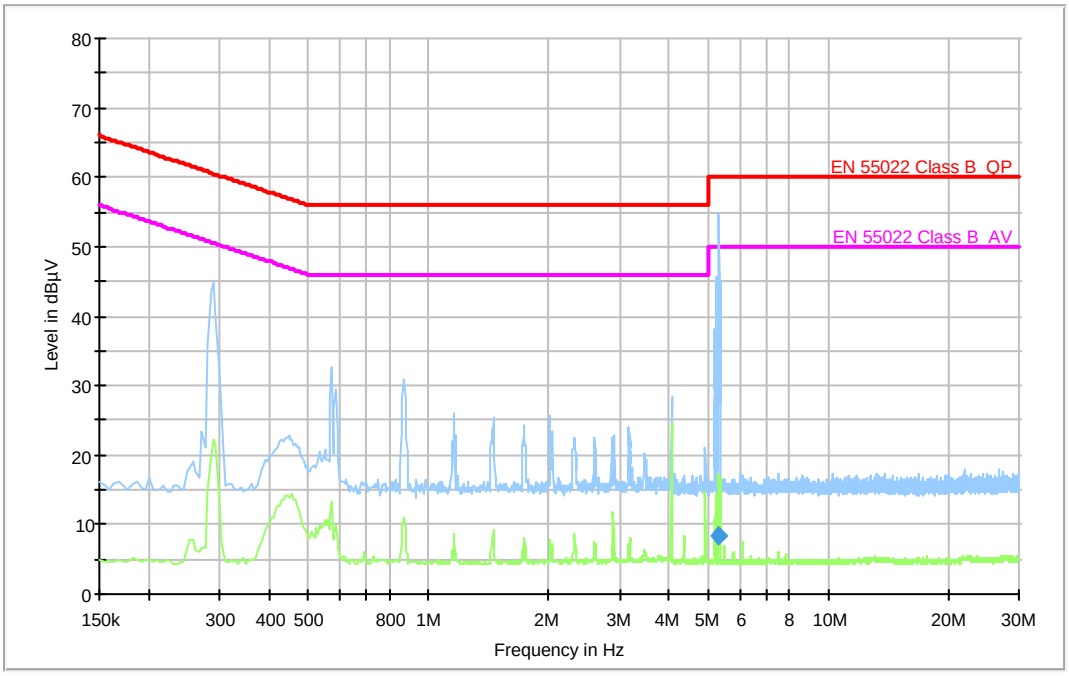
Measurements based on a measurement time of 10 ms unless otherwise noted.
Measurement bandwidth is 120 kHz bellow 1 MHz, and 1 MHz above 1000 MHz.

Frequency	MaxPeak E	Averaging factor (dB)	Average value E (dBµV/m)	Limit Average	Margin average	Limit peak	Margin peak
(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(dBµV/m)	(dB)
868,5	87,9	9,98	77,92	82	-4,08	102	-14,1
1737	43,7	9,98	33,72	62	-28,28	82	-38,3
2613	46,5	9,98	36,52	62	-25,48	82	-35,5
3474,2	38,8	-9,98	28,82	62	-33,18	82	-43,2
*)4341,9	34,9	-9,98	24,92	54	-29,08	74	-39,1
5211,6	34,8	-9,98	24,82	62	-37,18	82	-47,2
6077,3	35,5	-9,98	25,52	62	-36,48	82	-46,5
6949,8	36,9	-9,98	26,92	62	-35,08	82	-45,1
7814,3	40,8	-9,98	30,82	62	-31,18	82	-41,2
8686	38,2	-9,98	28,22	62	-33,78	82	-43,8
9552,1	38,7	-9,98	28,72	62	-33,28	82	-43,3

*) Frequencies governed by 15.209

5.3.3.4 Conducted Emission Transmitter and receiver

The conducted emissions were measured in the state “alarm on” with transmitter on, acoustic siren on, receiver on.
Blue trace is prescan – peak detector, green trace is prescan – average detector.
Final measurements are performed at frequencies where prescan values exceed or are close to limits (PK value vs. QP limit, AV value vs. AV limit).
Final measurements are given in table bellow.



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line
5.338000	8.4	1000.000	10.000	GND	L1

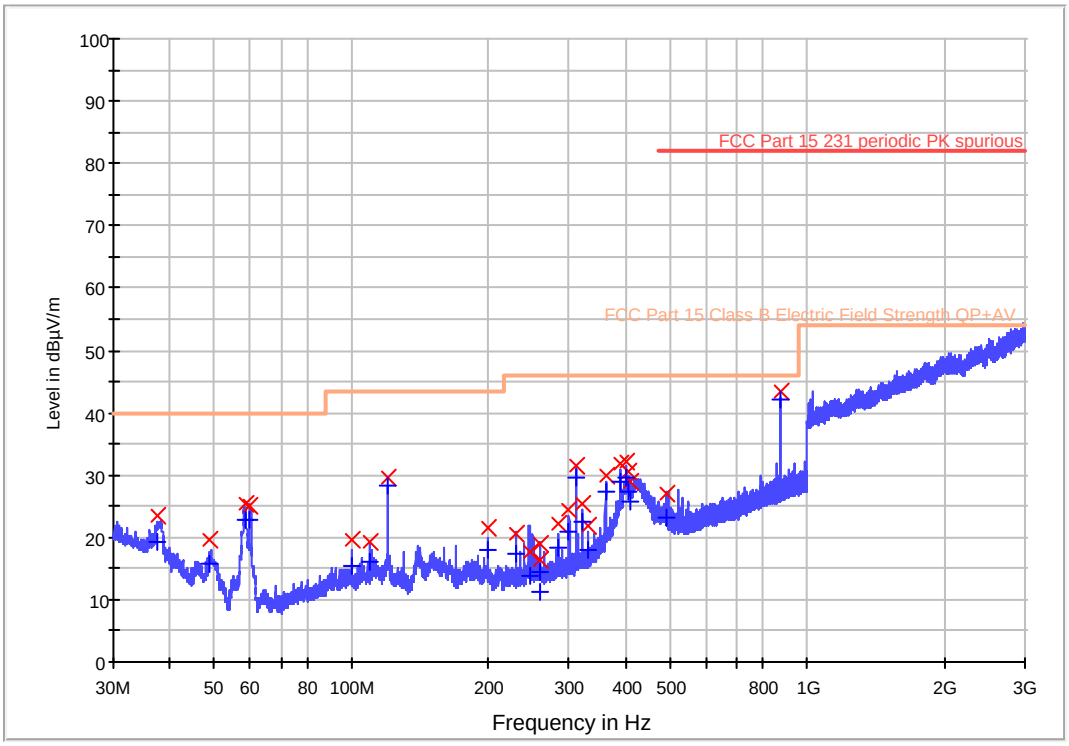
(continuation of the "Final Measurement Detector 1" table from column 6 ...)

Frequency (MHz)	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
5.338000	10.0	51.6	60.0	

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 MHz.

5.4.1. Radiated Emission Receiver 30 MHz – 3 GHz



5.4.2. Radiated Emission Receiver Table 30 MHz – 3 GHz

Frequency (MHz)	MaxPeak (dBµV/m)	QuasiPeak (dBµV/m)	limit QP (dBµV/m)	Margin (dB)
37,64	23,4	19,2	40	-20,8
48,88	19,7	15,7	40	-24,3
58,28	25,4	22,8	40	-17,2
60	25,1	22,7	40	-17,3
100,04	19,5	15,5	43,5	-28
110,04	19,3	16	43,5	-27,5
120	29,7	28,2	43,5	-15,3
200	21,5	18,1	43,5	-25,4
230,04	20,5	17,2	46	-28,8
245,04	17,6	13,9	46	-32,1
258,76	18,8	14,5	46	-31,5
260	16,5	11,3	46	-34,7
285	22,2	18,4	46	-27,6
300	24,5	21	46	-25
310,04	31,5	29,5	46	-16,5
320	25,4	22,4	46	-23,6
330	21,9	18	46	-28
360,04	29,9	27,4	46	-18,6
390,04	31,7	28,8	46	-17,2
400	32,3	29,5	46	-16,5
405,04	30,6	27,5	46	-18,5
410	29	25,7	46	-20,3
490	27,1	23,1	46	-22,9
868,5	43,4	42,3	46	-3,7

No emissions exceeding noise level were found above 1 GHz.

5.5. Test setup Photo documentation

EXHIBIT 1

Fig. 1 Front view

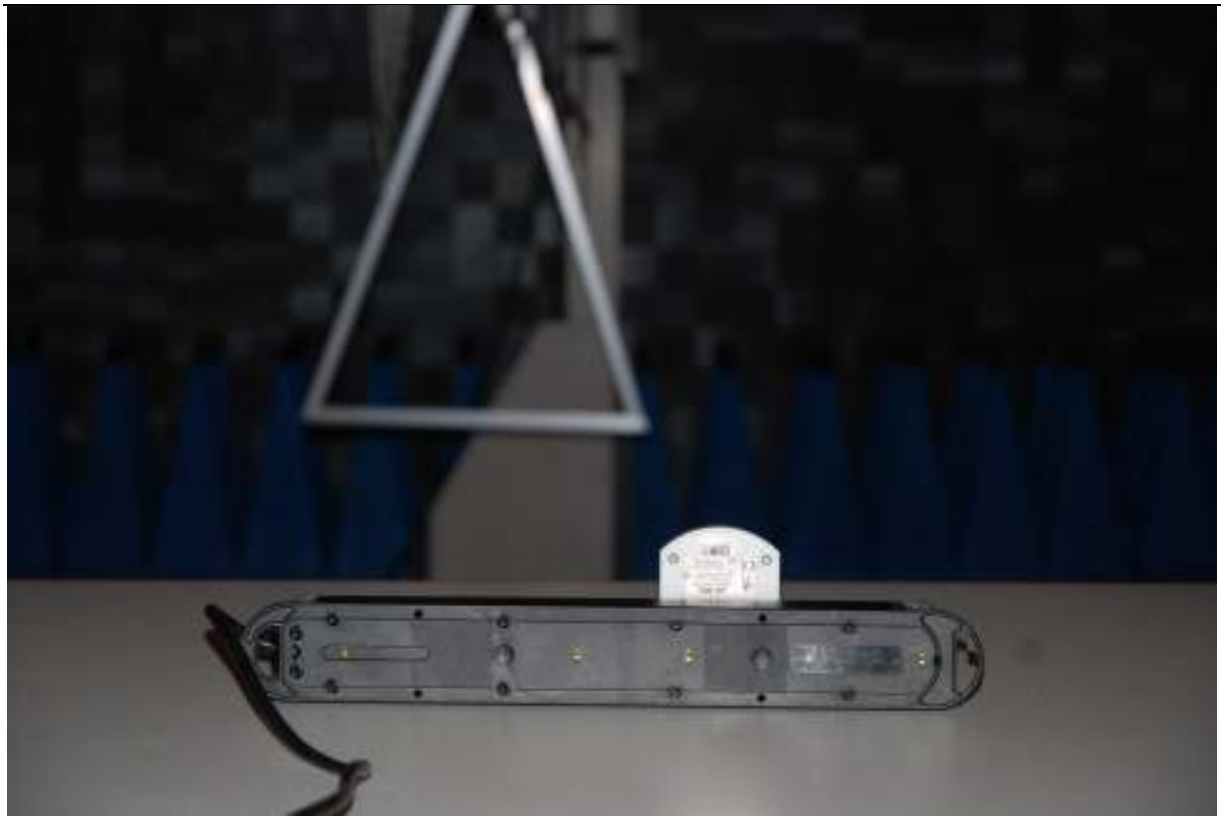


Fig. 2 Rear view

6. EUT Photo documentation

External Photos : **EXHIBIT 2**
Internal Photos : **EXHIBIT 3**

7. Technical specification

Operational description : **EXHIBIT 4**

7.1. Block Diagram Of The EUT

EXHIBIT 5

7.2. Circuit Diagram Of The Layout

EXHIBIT 6

7.3. Instruction manual

EXHIBIT 7

7.4. Product Labelling

EXHIBIT 8