Intertek

Test Report

Electromagnetic Compatibility

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

Date: 2007-10-29

Type:	JA-80S
Description:	Wireless fire detector
Serial number:	0705302-006

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
FCC registration number:	90714
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Approved by:	R. Dressler Project Engineer i.A.

Intertek Deutschland GmbH Intertek Deutschland

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1. General description

1.1. Product description

The JA-80S is a component of Jablotron's Oasis 80 alarm system. It is designed to detect the presence of fire inside residential or commercial buildings. It should not be installed in industrial premises. The battery-powered detector communicates via OASIS radio protocol and has a built-in local warning siren.
The detector combines an optical smoke sensor with a heat sensor. Both sensors have their outgoing signals processed digitally, resulting in higher false alarm immunity. The optical sensor works using a light diffusion principle and is very sensitive to the presence of large-sized particles which are characteristic of dense smokes. By contrast, the sensor is less sensitive to small-sized particles which are typical of cleanly burning fires. In particular, the smoke sensor is not capable of detecting the by-products of cleanly-burning fluids such as alcohols, for instance,. This deficiency is compensated for by the built-in heat sensor. This sensor provides a slower reaction when compared to the smoke sensor, but is much better at reacting to fires with rapidly rising heat producing only a little smoke.
Exposing fire conditions to the smoke and heat sensors requires some level of air circulation. It is therefore necessary to install the JA-80S detectors in such a place on the ceiling that (in the case of fire) smoke masses are forced to go in the direction of the detector's position. This can usually be achieved in most buildings. However, the JA-80S is not suitable for installation in outdoor spaces or interiors with an extremely high ceiling where fire by-products would not reach the detector position.

The device is wireless fire detector with built – in antenna. It is activated to transmit state when the sensor becomes activated.
The wireless transmitter (connection to control unit) has operating frequency f = 868.5 MHz.
The device is battery operated. The power source delivered by producer and used for testing was a new LiMh accumulator, type CR 14505; U = 3V.
Antenna type : built-in, Internal, Integral
Under normal operating conditions (no alarm state) the device transmits 30 ms data pulse to control unit once in 540 s (9 minutes).

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-80S 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 LiMh accumulator, type CR 14505; U = 3V.

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	< 200 ms in 1 hour	☒		
Emission				
30 MHz - 3000 MHz	FCC 15.231	☒	☐	☐
3 GHz – 10 GHz	FCC 15.231	☒	☐	☐

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 200 ms window.
Fig. 2 demonstrates the duty cycle under normal operation in 600 s window.

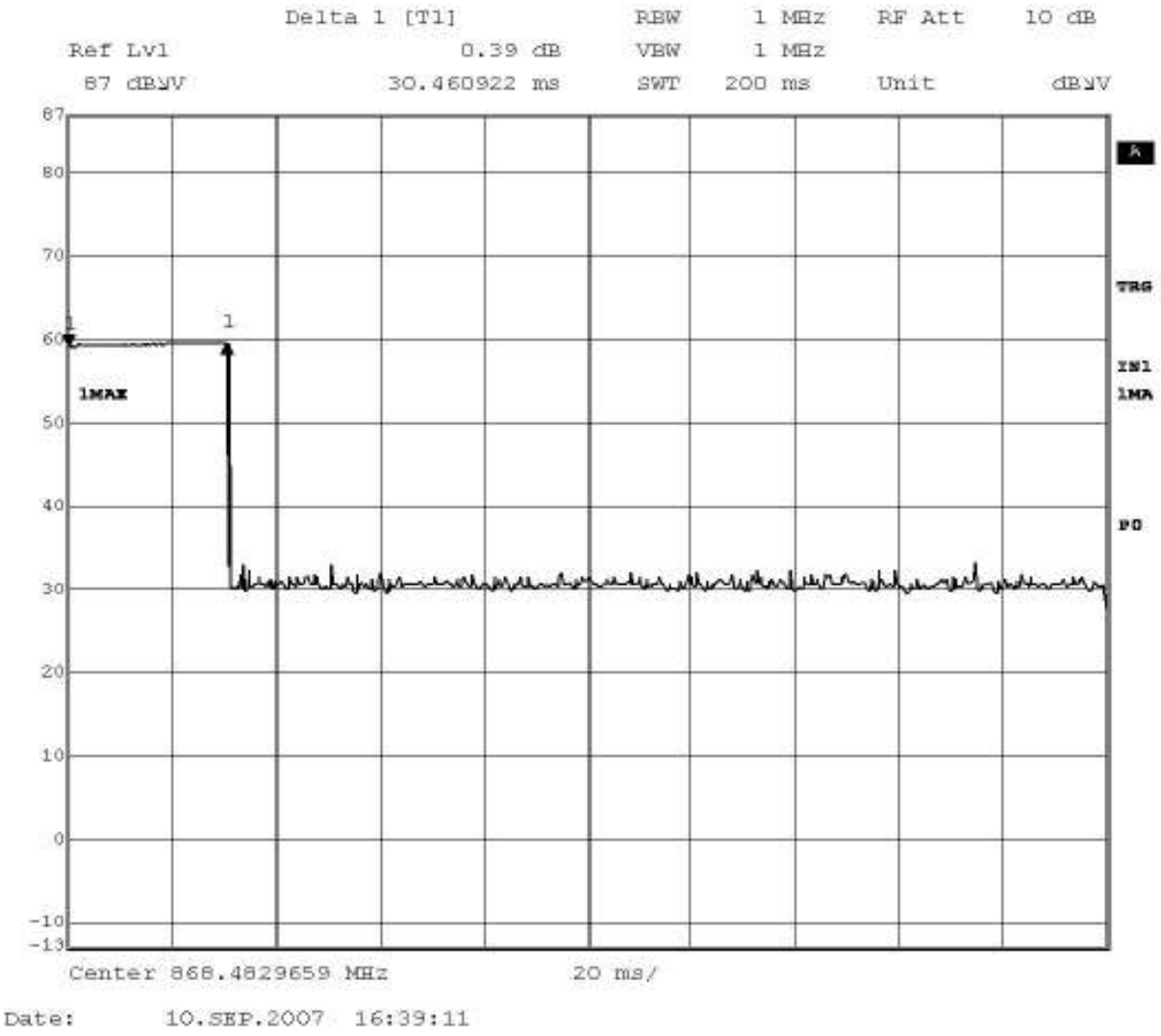


Fig .1

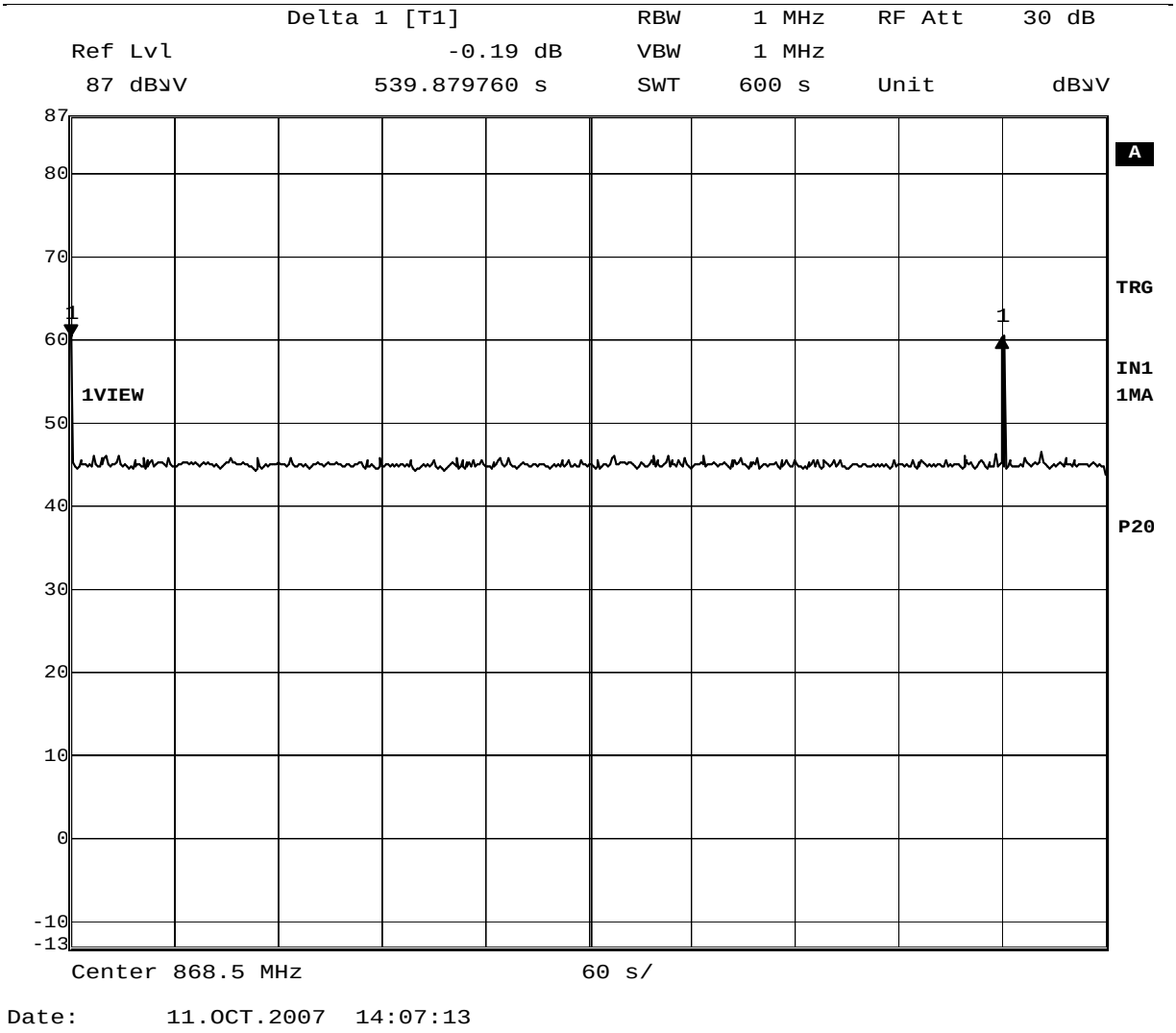


Fig .2

Total transmission time in period T = 100 ms is t = 30.46 ms.
The pulse is transmitted once in 539.8 s, that is once in 8.996 minutes

The Averaging factor is:

20* log (30.46/100) = -10.3 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(60/8.996) * 30.46 = 6 * 30.46 = 182 ms

5.2. Bandwidth

The measured 20 dB bandwidth is shown on Fig. 3

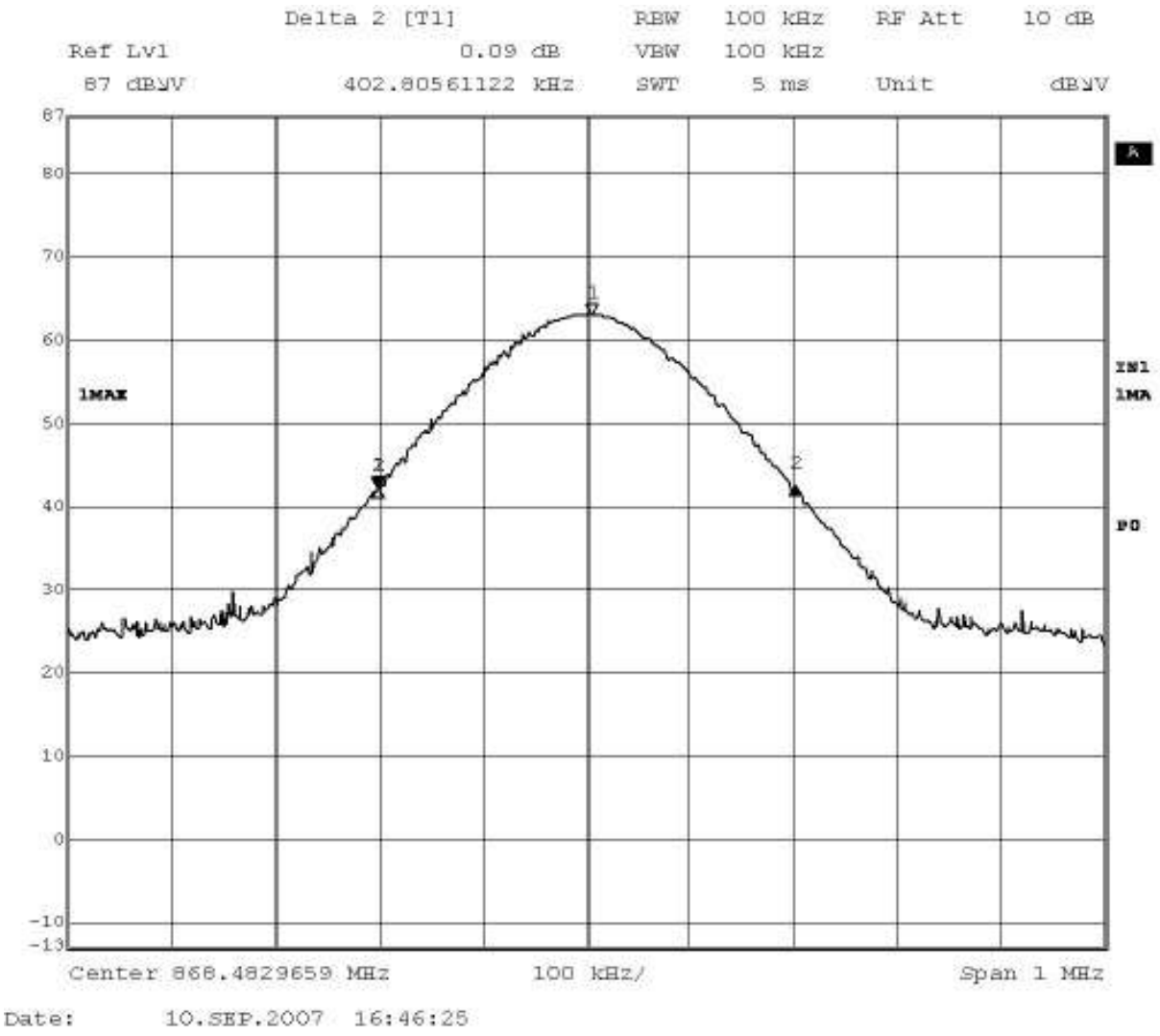


Fig .3

The BW is 336 kHz, operating frequency f = 868.48 MHz.

5.3. Radiated Emission 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

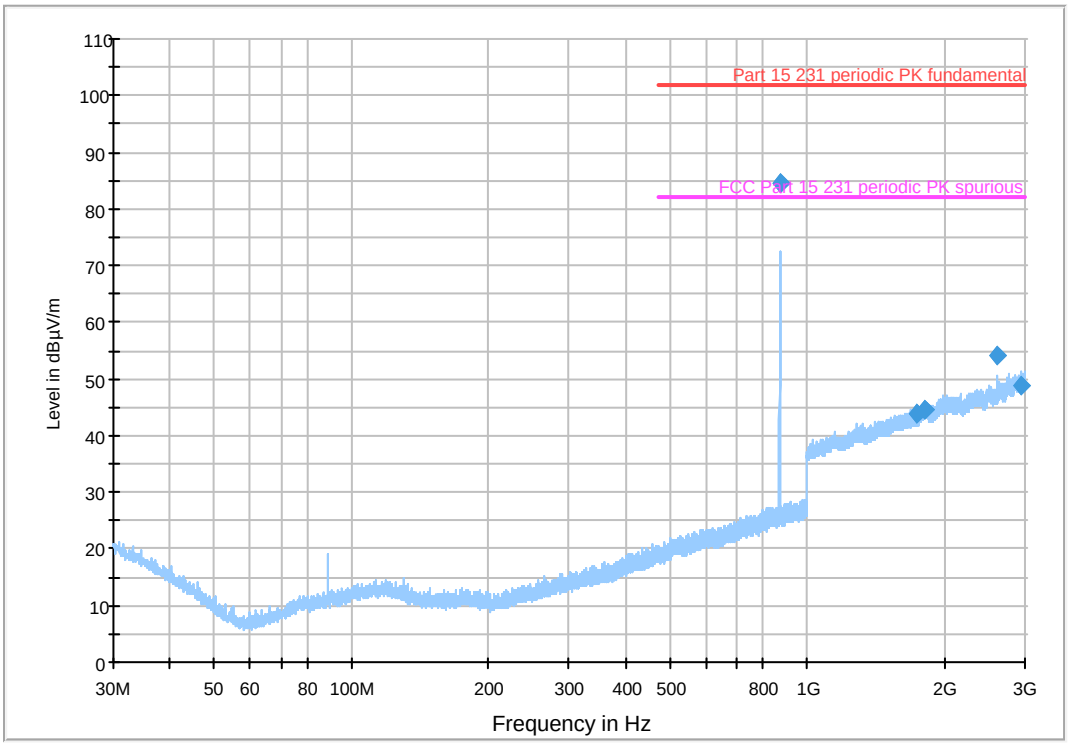
Measurement device	Manufacturer	Type	SN	Asset No.	Last Calibr.ation	Inter-val
☒ Test receiver, 20Hz-26GHz	ESIB26	Rohde & Schwarz	100150	PM KF 0948	07-03	1
☒ Antenna, 30-3000 MHz	HL562	Rohde & Schwarz	100354	PM KF 1123	07-03	2
☒ Horn antenna, 1-18 GHz	Rohde & Schwarz	HF906	100188	PM KF 0947	07-05	2
☒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

5.3.3. Emission Test results

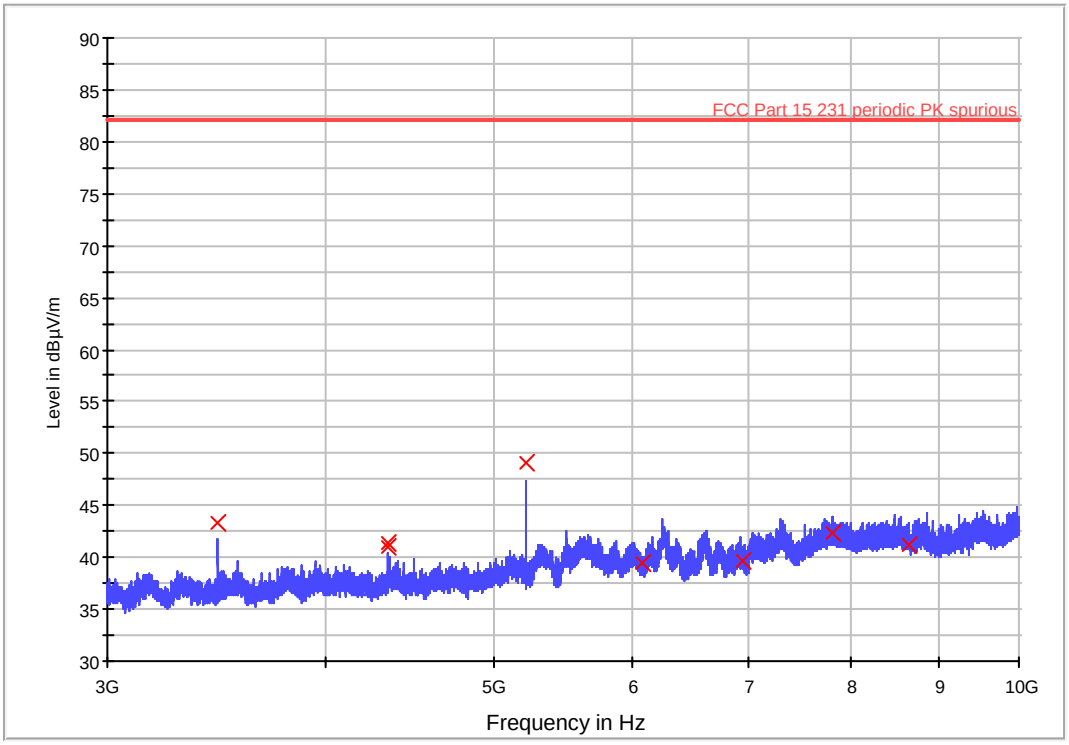
Test requirements	☒ **passed**	☐ **passed with modification**	☐ **not passed**

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 30 MHz – 3 GHz



5.3.3.2 Radiated Emission 3 GHz – 10 GHz



5.3.3.3 Radiated Emission : 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)
868,50	84,5	-10,3	74,2	82	-7,8	102	-17,5
1.736,80	43,9	-10,3	33,6	62	-28,4	82	-38,1
1.808,30	44,6	-10,3	34,3	62	-27,7	82	-37,4
2.605,30	54,2	-10,3	43,9	62	-18,1	82	-27,8
2.931,40	48,7	-10,3	38,4	62	-23,6	82	-33,3
3.474,00	43,3	-10,3	33	62	-29	82	-38,7
*)4.342,50	41,4	-10,3	31,1	54	-22,9	74	-32,6
5.211,00	49,1	-10,3	38,8	62	-23,2	82	-32,9
6.079,00	39,5	-10,3	29,2	62	-32,8	82	-42,5
6.948,00	39,7	-10,3	29,4	62	-32,6	82	-42,3

*) Frequencies governed by 15.209

6. Test setup Photo documentation

EXHIBIT 1

Fig. 1 Front view

Fig.2 Rear view

7. EUT Photo documentation

External Photos : **EXHIBIT 5**
Internal Photos : **EXHIBIT 6**

8. Technical specification

Operational description : **EXHIBIT 7**

8.1. Block Diagram Of The EUT

EXHIBIT 8

8.2. Circuit Diagram Of The Layout

EXHIBIT 9

8.3. Instruction manual

EXHIBIT 10

8.4. Product Labelling

EXHIBIT 11