

EMI - TEST REPORT

- FCC Part 15.249, RSS210 -

Test Report No. : T36931-00-02KG

19. December 2013

Date of issue

Type / Model Name : Handset / B6R

Product Description : Handset of remote electronic ignition and control
system for gas applications

Applicant : Plättner Elektronik GmbH

Address : Lerchenbreite 8
38889 BLANKENBURG, GERMANY

Manufacturer : Mertik Maxitrol GmbH & Co. KG

Address : Warnstedter Strasse 3
06502 THALE, GERMANY

Licence holder : Mertik Maxitrol GmbH & Co. KG

Address : Warnstedter Strasse 3
06502 THALE, GERMANY

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

POSITIVE



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 A - General (September, 2013)

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

FCC Rules and Regulations Part 15, Subpart C - Intentional Radiators (September, 2013)

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 15.249	Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz, 5725 - 5875 MHz, and 24.0 - 24.25 GHz

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.
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ANSI C95.1:2005	IEEE Standard for Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz
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CISPR 16-4-2: 2003	Uncertainty in EMC measurement
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CISPR 22: 2005 EN 55022: 2006	Information technology equipment
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2 SUMMARY

2.1 GENERAL REMARKS:

None

2.2 Test result summary

Operating in the 902 MHz – 928 MHz band:

FCC Rule Part	RSS Rule Part	Description	Result
15.35(c)	RSS-Gen, 4.5	Pulsed operation	passed
15.205(a)	RSS-Gen, 7.2.2	Emissions in restricted bands	passed
15.207(a)	RSS Gen, 7.2.4	AC power line conducted emissions	passed
15.215(c)		-20 dBc EBW	passed
	RSS-Gen, 4.6.1	99 % Bandwidth	passed
15.249(a)	RSS-210, A2.9(a)	Field strength of fundamental	passed
15.249(d)	RSS Gen, 7.2.5	Out-of-band emission, radiated	passed
	RSS-Gen, 7.2.6	Transmitter frequency stability	not applicable

The mentioned RSS Rule Parts in the above table are related to:

RSS Gen, Issue 3, December 2010

RSS 210, Issue 8, December 2010

RSS 102, Issue 4, March 2010

2.3 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 : 18. October 2013

Testing concluded on : 12. December 2013

Checked by:

Tested by:

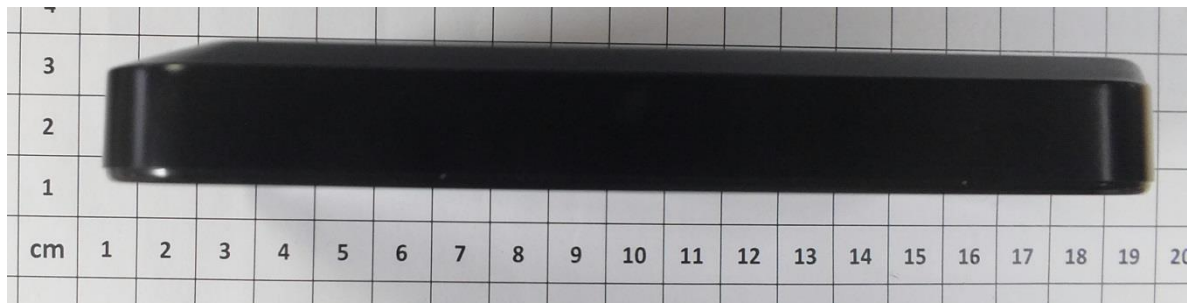
Thomas Weise
Dipl.-Ing.(FH)
Laboratory Manager

Klaus Gegenfurtner
Dipl.-Ing.(FH)

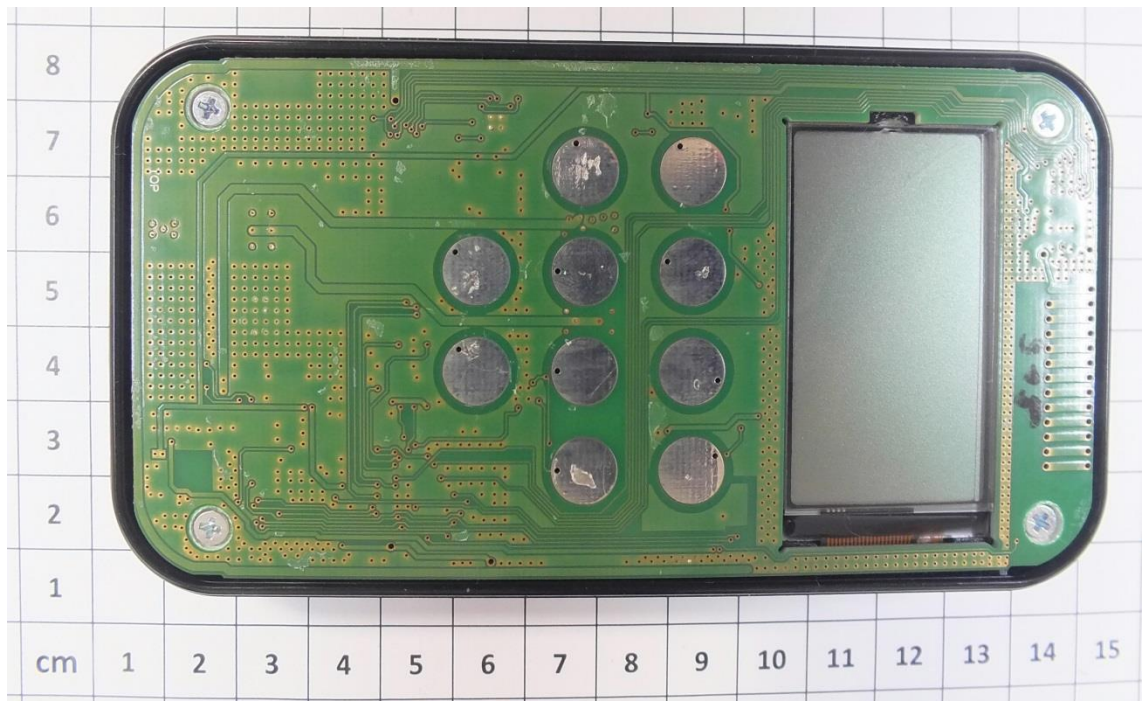
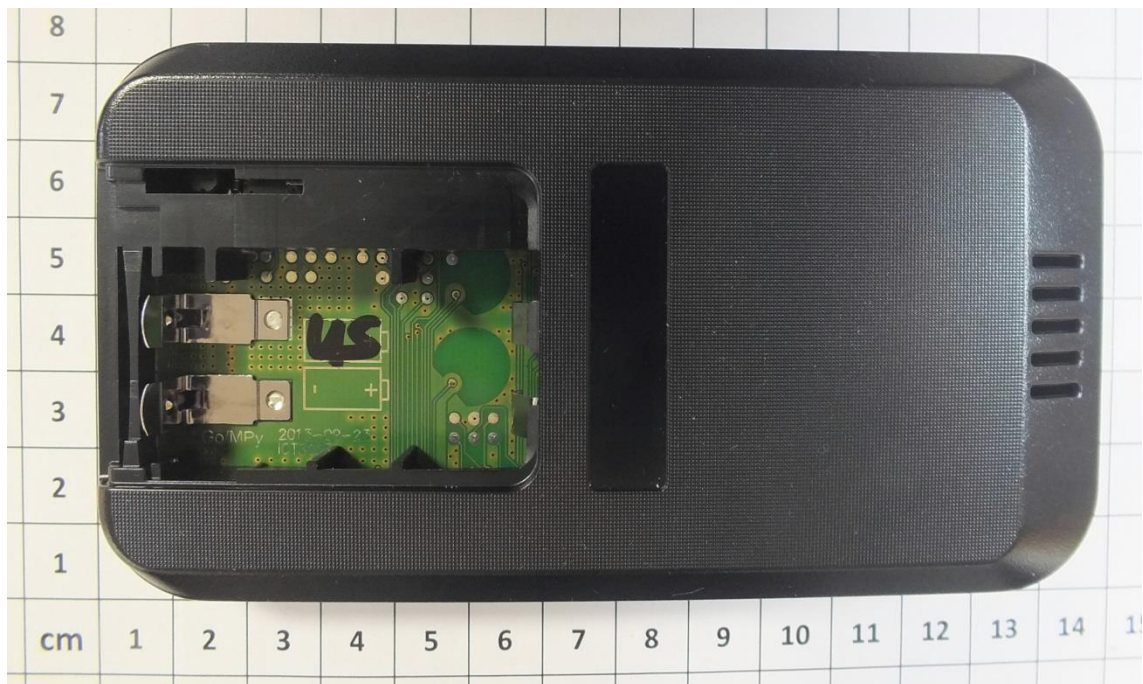
3 EQUIPMENT UNDER TEST

3.1 Photo documentation of the EUT

External view:

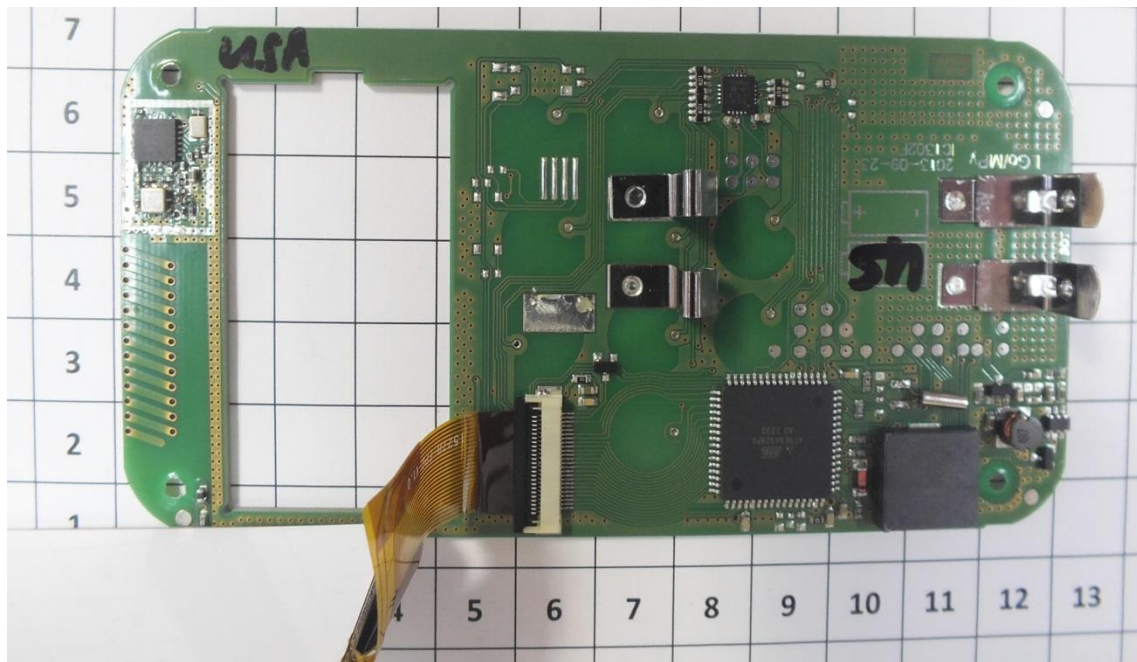
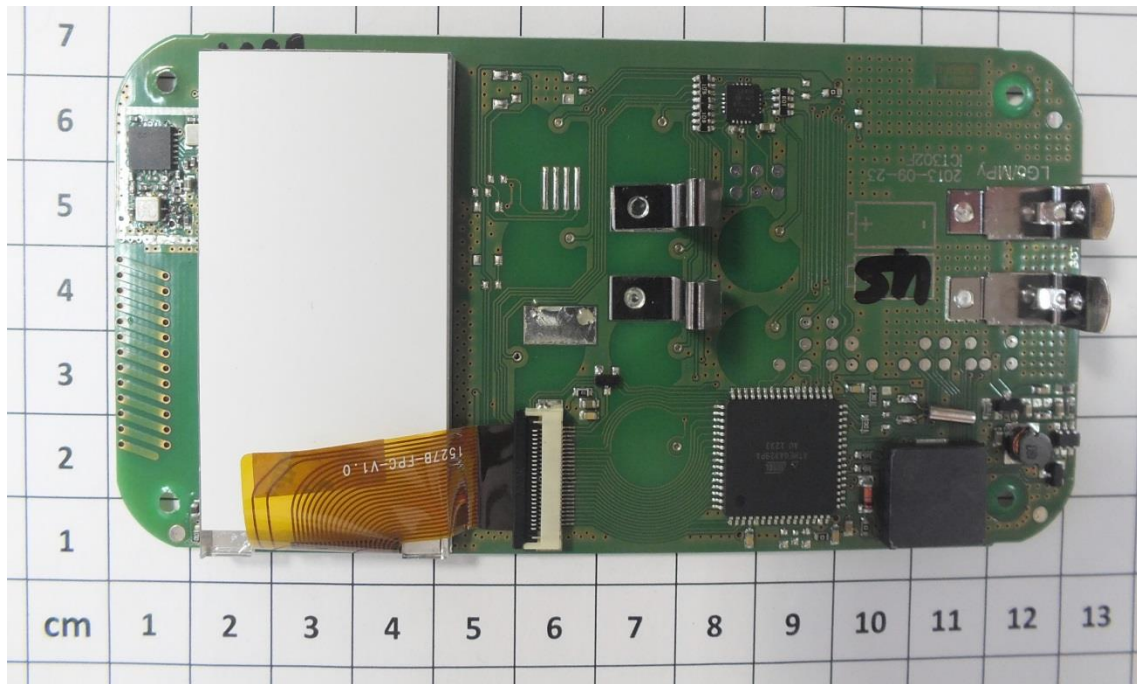


Internal view:



FCC ID: RTD-B6R

IC ID: 4943A-B6RH9



3.2 Power supply system utilised

Power supply voltage : 3 VDC Lithium ion battery

3.3 Short description of the equipment under test (EUT)

The EUT is a battery-powered remote control operates as a gas control and ignition device which is used in space heaters or decorative gas fires.

Number of tested samples: 2
Serial number: Prototype

EUT operation mode:

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

- TX continuous mode at 915 MHz

- Normal transmitting mode at 915 MHz

EUT configuration:

(The CDF filled by the applicant can be viewed at the test laboratory.)

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

- _____ Model : _____
- _____ Model : _____

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. The reader may notice that tolerances within the calibration of the equipment and facilities may cause additional uncertainty. The measurement uncertainty is calculated for all measurements listed in this test report acc. to CISPR 16-4-2 „Uncertainties, statistics and limit modelling – Uncertainty in EMC measurement“ and documented in the CSA Group Bayern GmbH 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 diversity and modifications in production processes may result in additional deviation. If necessary, refer to the test lab for the actual measurement uncertainty for specific tests. The manufacturer has the sole responsibility of continued compliance of the EUT.

4.4 Measurement protocol for FCC and IC

4.4.1 General information

4.4.1.1 Test methodology

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

The Open Area test site is a listed Open Site under the Canadian Test-Sites File-No:

IC 3009A-1

In compliance with RSS 210 testing for RSS compliance may be achieved by following the procedures set out in ANSI C63.4 and applying 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 Details of test procedures

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.

4.5 Determination of worst case measurement conditions

According to the manufacturer all components for radio- frequency and the other hardware components are identical in all handset- variants. The different variants were realized only with software options and printings of the foils.

4-Button Handset B6R-H9D...
(Display variant)



6-Button Handset B6R-H9T...
(Thermostat variant)



8-Button Handset B6R-H9TL...
(Thermostat variant with 2. Burner)



10-Button Handset B6R-H9TV...
(Thermostat variant with Fan, Dimmer
and 2. Burner)



Due to this statement, we performed all tests on the 10-Button Handset, because of worst case model.

The measurements have been made in all three orthogonal axes and the settings of the EUT were changed to locate at which position and at what setting of the EUT produce the maximum of the emissions.

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: NONE

Remarks: Not applicable, the EUT is battery powered.

5.2 Radiated emission of the fundamental wave

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

5.2.1 Description of the test location

Test location: OATS 1

Test distance: 3 m

5.2.2 Photo documentation of the test set-up



5.2.1 Applicable standard

According to FCC Part 15C, Section 15.249(a):

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the effective limits.

5.2.2 Description of Measurement

The radiated power of the fundamental wave from the EUT is measured in the frequency range of 30 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 metres 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 EUT will be in accordance to ANSI C63.4. The Interface cables that are closer than 40 centimetres to the ground plane are bundled in the centre 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 centre of the table and to a screen room located outside the test area. The antenna was positioned 3, 10 or 30 metres horizontally from the EUT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 metres, measurement scans are made in horizontal and vertical antenna polarization's and the EUT is rotated 360 degrees.

The resolution bandwidth during the measurement is as follows:

30 MHz – 1000 MHz: RBW: 120 kHz

Frequency (MHz)	Level QP (dB μ V)	Bandwidth (kHz)	Correct. factor (dB)	Corrected level dB(μ V/m)	Effective limit dB(μ V/m)	Delta (dB)
915.0	55.5	120	28.5	84.0	94.0	-10.0

Average-Limit according to FCC Part 15C, Section 15.249(a):

Frequency (MHz)	Field strength of fundamental	
	(mV/m)	dB(μ V/m)
902 - 928	50	94
2400 - 2483.5	50	94
5725-5875	50	94
24000 - 24250	250	108

Peak-Limit according to FCC Part 15C, Section 15.249(e):

However the peak fieldstrength shall not exceed the maximum permitted average limit by more than 20 dB.

The requirements are **FULFILLED**.

Remarks:

5.3 Spurious emissions radiated

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

5.3.1 Description of the test location

Test location: OATS 1
Test location: Anechoic chamber 2

Test distance: 3 m

5.3.2 Photo documentation of the test set-up

Test setup 9 kHz – 30 MHz:



Test setup 30 MHz – 1000 MHz:



Test setup 1 GHz – 18 GHz:



5.3.3 Applicable standard

According to FCC Part 15C, Section 15.249 (d):

Emission radiated outside of the specified frequency bands, except harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated limit in FCC Part 15C, Section 15.209, whichever is the lesser attenuation.

5.3.4 Description of Measurement

The radiated emissions from the EUT are measured in the frequency range of 9 kHz to 1000 MHz using a tuned receiver and appropriate broadband linearly polarized antennas. The setup of the EUT and the measurement procedure is in accordance to ANSI C63.4, Item 8.3. In the frequency range above 1 GHz a spectrum analyser is used with appropriate linear polarized antennas. If the emission level in peak mode complies with the average limit testing is stopped and peak values will be reported, otherwise, the emission is measured in average mode again and reported. The EUT is measured in TX continuous mode unmodulated under normal conditions.

Instrument settings:

9 kHz – 150 kHz	RBW:	200 Hz
150 kHz - 30 MHz	RBW:	9 kHz
30 MHz – 1000 MHz:	RBW:	120 kHz
1000 MHz – 10 GHz	RBW:	1 MHz

5.3.1 Test result $f < 30$ MHz

Frequency (kHz)	L: PK (dB μ V)	L: AV (dB μ V)	Bandwidth (kHz)	Correct. (dB)	L: PK dB(μ V/m)	L: AV dB(μ V/m)	Limit AV dB(μ V/m)	Delta (dB)
536.8	24.1	19.7	9.0	20.0	44.1	39.7	73.0	-33.3
1073.6	23.4	18.0	9.0	20.0	43.4	38.0	67.0	-29.0
1342.0	21.6	15.9	9.0	20.0	41.6	35.9	65.0	-29.1

Note: In the frequency range 9 kHz to 30 MHz no emission from the EuT could be detected. Therefore only ambient noises are reported.

5.3.2 Test result f < 1 GHz

Frequency (MHz)	Level QP (dB μ V)	Bandwidth (kHz)	Correct. factor (dB)	Corrected level dB(μ V/m)	Limit dB(μ V/m)	Delta (dB)
33.78	3.7	120.0	13.4	17.1	40.0	-22.9
118.54	9.3	120.0	12.9	22.2	43.5	-21.3
517.43	4.8	120.0	21.9	26.7	46.0	-19.3

Note: In the frequency range 30 MHz to 1000 MHz no emission from the EuT could be detected. Therefore only ambient noises are reported.

5.3.3 Test result f > 1 GHz

Frequency (MHz)	L: PK (dB μ V)	Duty Cycle (dB)	L: AV (dB μ V)	Bandwidth (kHz)	Correct. (dB)	L: PK dB(μ V/m)	L: AV dB(μ V/m)	Limit AV dB(μ V/m)	Delta (dB)
1829.56	53.3	-10.6	42.7	1000	10.4	63.7	53.1	54.0	-0.9
2745.25	44.2	-10.6	33.6	1000	11.3	55.5	44.9	54.0	-9.1
3660.13	44.6	-10.6	34.0	1000	12.0	56.6	46.0	54.0	-8.0
4575.00	35.2	-10.6	24.6	1000	12.2	47.4	36.8	54.0	-17.2
7320.44	36.3	-10.6	25.7	1000	13.4	49.7	39.1	54.0	-14.9

Limit according to FCC Part 15C, Section 15.209:

Frequency (MHz)	15.209 Limits (μ V/m)	Measurement distance (m)
0.009 - -0.49	2400/f(kHz)	300
0.49 - 1.705	24000/f(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

Average limit according to FCC Part 15C, Section 15.249(a):

Fundamental frequency (MHz)	Field strength of harmonics	
	(μ V/m)	dB(μ V/m)
902 - 928	500	54
2400 - 2483.5	500	54
5725 - 5875	500	54
24000 - 24250	2500	68

The requirements are **FULFILLED**.

Remarks:

5.4 EBW and OBW

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

5.4.1 Description of the test location

Test location: AREA4

5.4.2 Photo documentation of the test set-up



5.4.3 Applicable standard

According to FCC Part 15, Section 15.215(c):

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in Section 15.217 through Section 15.257, must be designed to ensure that the 20 dB bandwidth of the emission is contained within the frequency band designated in the rule section under which the equipment is operated.

According to RSS-Gen, Section 4.6.1:

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured.

5.4.4 Description of Measurement

The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio of -20 dB (99%). The x-dB-down (OBW) function of the analyser is used. The measurement is performed with normal modulation in TX continuous mode.

Spectrum analyser settings:

RBW: 1 kHz, VBW: 3 kHz, Trace mode: max. hold, Detector: max. peak;
 OBW: 10 kHz, VBW: 30 kHz, Trace mode: max. hold, Detector: max. peak;

5.4.5 Test result

Operating frequency band (MHz)	20 dB Bandwidth (MHz)
$f_{low} > 902$	$f_{low} = 914,912$
$f_{high} < 918$	$f_{high} = 915,093$

Fundamental frequency (MHz)	99 % Bandwidth (MHz)
915.004	0.176

Limit according to FCC Part 15C, Section 15.215(c):

The EUT must be designed to ensure that the 20 dB bandwidth of the emission is contained within the frequency band is designated in the rule section under which the equipment is operated. The requirement includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well the frequency stability. If frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

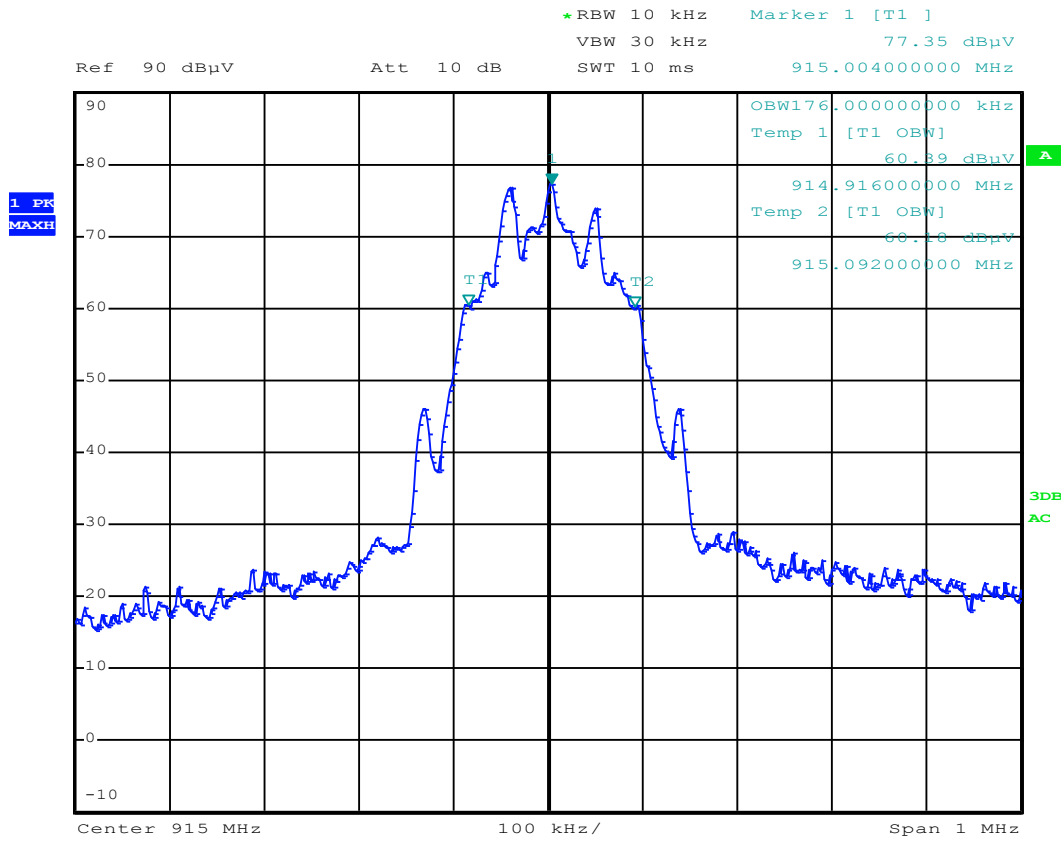
The requirements are **FULFILLED**.

Remarks: For detailed test result please refer to following test protocols.

The OBW99 is measured for RSS only. The RSS Gen defines no limit for the occupied bandwidth!

5.4.6 Test protocols

OBW 99%



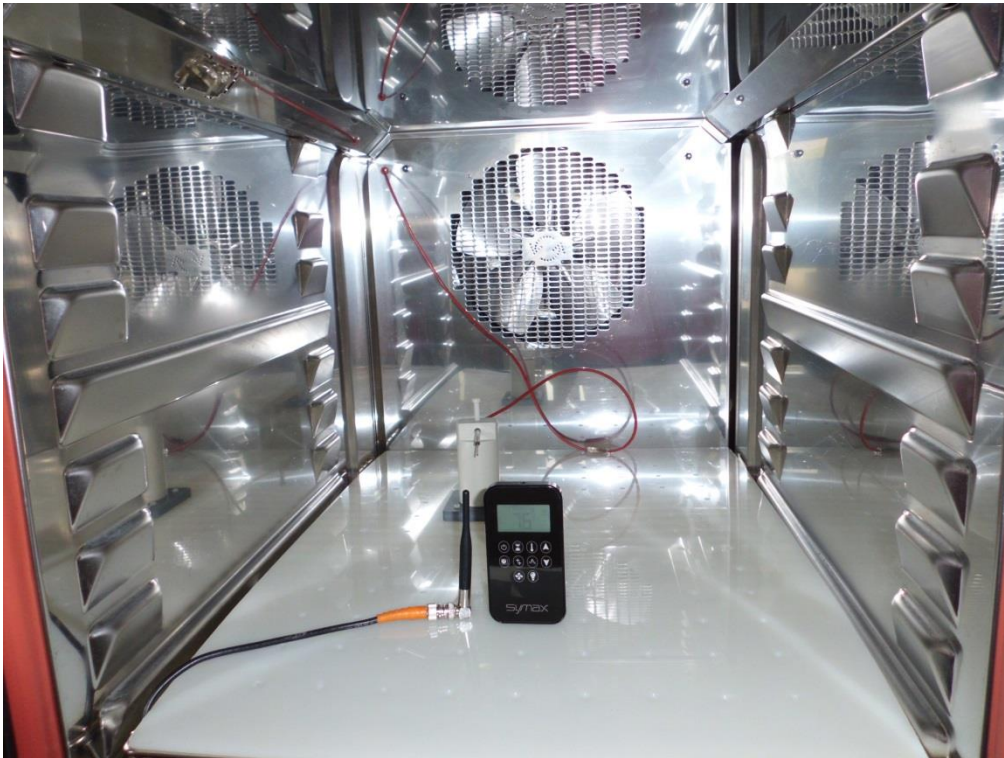
5.5 Correction for pulse operation (duty cycle)

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

5.5.1 Description of the test location

Test location: AREA4

5.5.2 Photo documentation of the test set-up



5.5.3 Applicable standard

According to FCC Part 15A, Section 15.35(c):

When the radiated emission limits are expressed in terms of average value and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete puls train, including blanking intervals, as long as the pulse train does not exceed 0.1s. in cases where the puls train exceeds 0.1s, the measured field strength shall be determined from the average absolute voltage during a 0.1s interval during which the field strength is at its maximum. The exact method of calculating the average field strength shall be submitted.

5.5.4 Test result

The Duty cycle factor (dB) is calculated applying the following formula:

$$KE = 20 \log \left(\frac{t_B}{100} \right)$$

KE: pulse operation correction factor (dB)
 t_B: pulse duration for one pulse (ms)

Maximum transmitting duration in every 100ms period:

$$KE = 20 \log \left(\frac{29,4}{100} \right) = -10.63 \text{ dB}$$

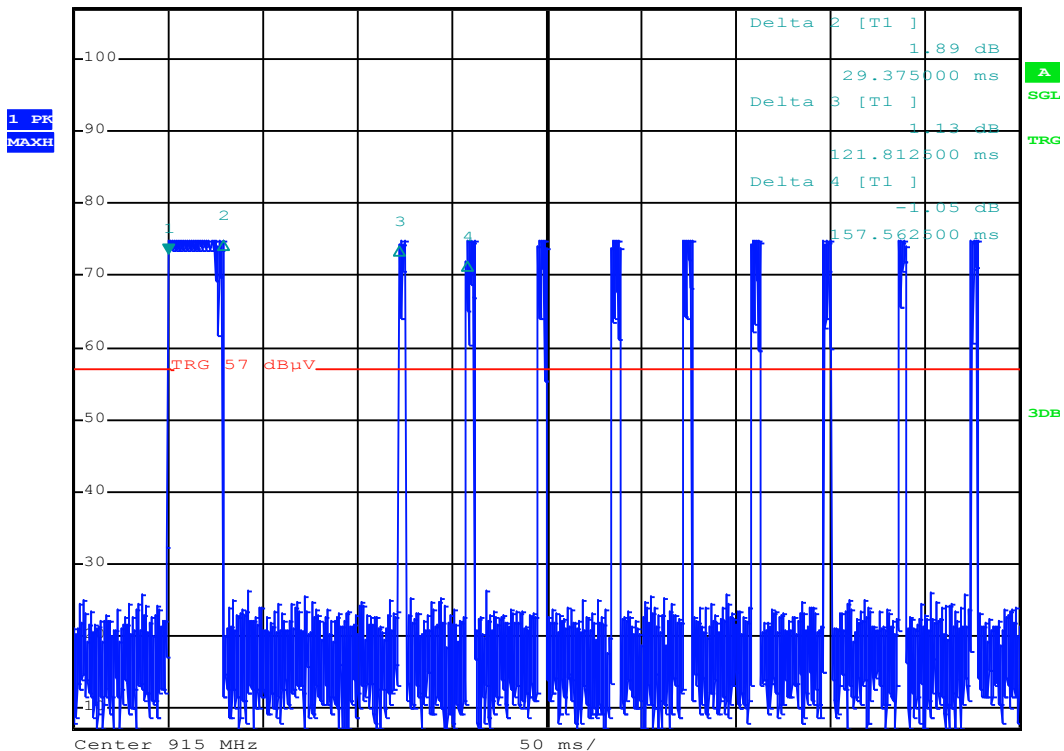
Remarks:

5.5.5 Test protocol

Correction for pulse operation (duty cycle) FCC Part 15C, Section 15.35(c)



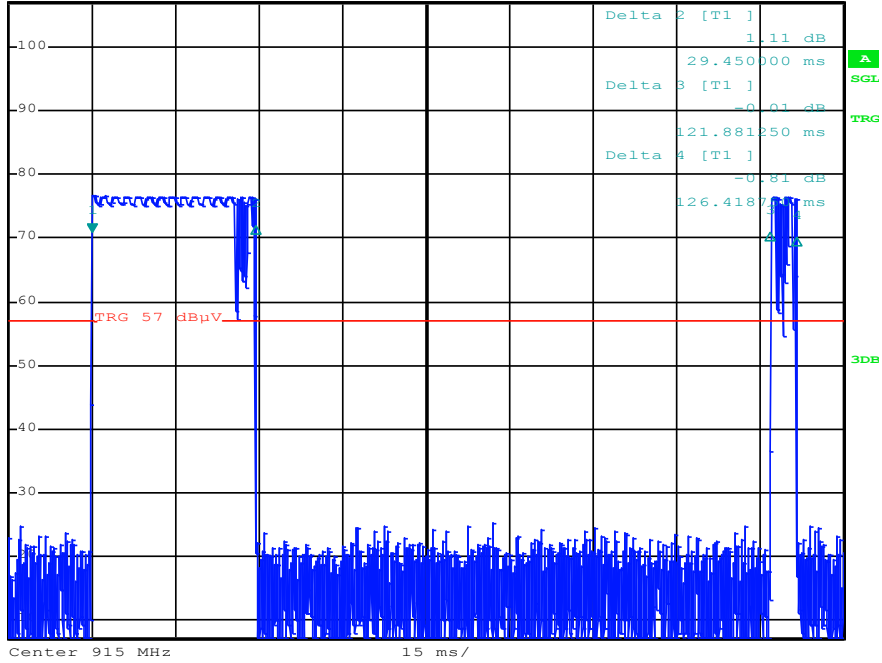
RBW 10 kHz Marker 1 [T1]
 *VBW 30 kHz 72.96 dBµV
 Ref 107 dBµV *Att 10 dB SWT 500 ms -3.469447 as





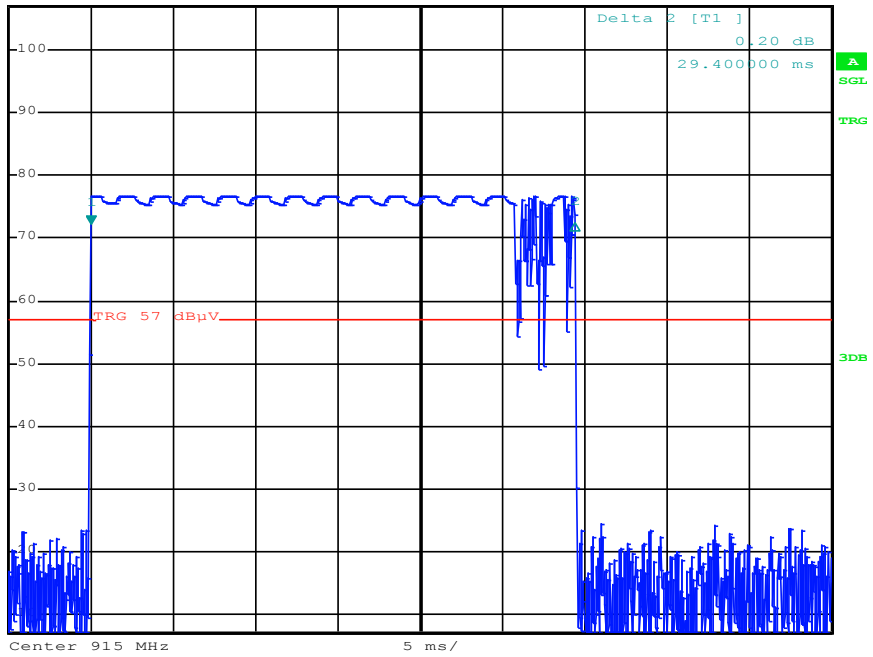
Ref 107 dB μ V *Att 10 dB RBW 10 kHz Marker 1 [T1] 70.89 dB μ V
 *VBW 30 kHz 37.500000 μ s
 SWT 150 ms

1 PR
MAXH



Ref 107 dB μ V *Att 10 dB RBW 10 kHz Marker 1 [T1] 72.28 dB μ V
 *VBW 30 kHz 37.500000 μ s
 SWT 50 ms

1 PR
MAXH



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.
CPR 3	FSP 30	02-02/11-05-001	24/10/2014	24/10/2013		
	AMF-4F-04001200-15-10P	02-02/17-05-004				
	AFS5-12001800-18-10P-6	02-02/17-06-002				
	3117	02-02/24-05-009	04/04/2014	04/04/2013		
	Sucoflex N-1600-SMA	02-02/50-05-073				
	Sucoflex N-2000-SMA	02-02/50-05-075				
DC	ESR7	02-02/03-13-001	21/05/2014	21/05/2013		
	RF Antenna	02-02/24-05-032				
MB	ESR7	02-02/03-13-001	21/05/2014	21/05/2013		
	RF Antenna	02-02/24-05-032				
SER 1	FMZB 1516	01-02/24-01-018	17/10/2014	17/10/2013	14/02/2014	14/02/2013
	ESCI	02-02/03-05-004				
	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	28/06/2014	28/06/2013	04/03/2014	04/09/2013
	VULB 9168	02-02/24-05-005	11/04/2014	11/04/2013		
	S10162-B	02-02/50-05-031				
	NW-2000-NB	02-02/50-05-113				
	KK-EF393/U-16N-21N20 m	02-02/50-12-018				
SER 3	FSP 30	02-02/11-05-001	24/10/2014	24/10/2013		
	AMF-4F-04001200-15-10P	02-02/17-05-004				
	AFS5-12001800-18-10P-6	02-02/17-06-002				
	3117	02-02/24-05-009	04/04/2014	04/04/2013		
	Sucoflex N-1600-SMA	02-02/50-05-073				
	Sucoflex N-2000-SMA	02-02/50-05-075				