



EMI - TEST REPORT

- FCC Part 15.249, RSS210 -

Type / Model Name : B6R-RAP (Receiver unit)

Product Description : Receiver unit for gas burning appliances (room heaters)

Applicant : Plättner Elektronik GmbH

Address : Lerchenbreite 8

38889 BLANKENBURG, GERMANY

Manufacturer : Mertik Maxitrol GmbH & Co.KG

Address : Warnstedter Str.3

06502 THALE, GERMANY

Test Result according to the standards listed in clause 1 test standards:	POSITIVE
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Test Report No. : T40604-03-00KJ	24. January 2019 Date of issue
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Deutsche
Akkreditierungsstelle
D-PL-12030-01-01
D-PL-12030-01-02

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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Attachment A, B and C as separately supplement

1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules and Regulations Part 15, Subpart A - General (May, 2018)

FCC Rules and Regulations Part 15, Subpart C - Intentional Radiators (May, 2018)

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

RSS-Gen Issue 5, April 2018	General Requirements for Compliance of Radio Apparatus
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RSS-210 Issue 9, August 2016	Licence-Exempt Radio Apparatus: Category I Equipment
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ANSI C63.10: 2013	Testing Unlicensed Wireless Devices
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CISPR 16-4-2: 2013	Uncertainty in EMC measurement
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2 EQUIPMENT UNDER TEST

2.1 Photo documentation of the EUT

Detailed photos see T40604-03-00KJ attachment B and T40604-03-00KJ attachment C.

2.2 Short description of the equipment under test (EUT)

The EuT is a transceiver unit for electronic remote ignition and control system for gas appliances with pilot burners and ODS system.

All tests were carried out with the test sample "B6R-RAP".

	Used test sample	
Setup for testing	Radiated test sample	
Operating frequency	918.0 MHz	
Frequency range	902 MHz – 928 MHz	
Test signals	cont. modulated & normal operation mode	
Serial number	CW mod.: 4618978945 (with temporary SMA antenna connector) CW mod.: 4618978944 CW unmod.: 4618978946 Normal operation mode: 4418911899	
Firmware	1.111.x.x.x	
Modulation	GFSK	
Data rate	32000 bps (bps = bits per second)	
Voltage range	2.8 V _{nom} DC	110 V _{nom} AC
	2.3 V _{min} DC	93 V _{min} AC
	3.3 V _{max} DC	127 V _{max} AC
Temperature range	20 °C _{nom}	
	-20 °C _{min}	
	50 °C _{max}	

2.3 Variants of the EUT

Receiver B6R-R			
B6R-R	Frequency		Receiver
	A	US (918,0 MHz)	P Universal, Interface
			PT Universal, Interface, 2.TC, 22 sec.
			PT2 Universal, Interface, 2.TC, 29 sec.

2.4 Operation frequency and channel plan

The EuT works on just one frequency.

2.5 Antenna

The following antennas shall be used with the EUT:

Number	Characteristic	Model number	Plug	Frequency range (MHz)	Gain (dBi)	Cable loss (dB)
1	wired antenna (8 cm)	-	-	918	-10	-

2.6 Power supply system utilised

Power supply voltage, V_{nom} : 120 V / 60 Hz / 1 ϕ or
6 V DC (Battery powered 4x 1.5 V AA batteries)

2.7 Peripheral devices and interface cables

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

- <u>Mains Adapter</u>	Model : <u>ZD12D060100</u>
- <u>Handset unit</u>	Model : <u>B6R-H9TV4PBD</u>
- <u>V Module</u>	Model : <u>G6R-BUMV3</u>
- <u>WiFi Box 2</u>	Model : <u>B6R-W2ME-2-T</u>
- <u>Relay with cable</u>	Model : <u>GV-S60C/12</u>
- <u>Wall switch</u>	Model : <u>G6R-SPKS1000</u>
- <u>LED Strips</u>	Model : <u>WS2812B/ 5VDC/ 5050 RGB</u>
- <u>AUX cable</u>	Model : <u>GV- S60</u>
- <u>Temperature sensor</u>	Model : <u>G60-ZCT</u>
- <u>Valve</u>	Model : <u>GV60M1-B5C3GL-0015</u>
- <u>Pilot burne</u>	Model : <u>G30-ZP2M</u>

2.8 Determination of worst case conditions for final measurement

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. For the further measurement the EUT is set in horizontal position.

2.9 Test jig

No Test jig was used.

2.10 Test software

No test software was used.

3 TEST RESULT SUMMARY

Operating in the 902 MHz – 928 MHz band:

FCC Rule Part	RSS Rule Part	Description	Result
15.207(a)	RSS Gen, 8.8	AC power line conducted emissions	passed
15.249(a)	RSS-210, B10(a)	Field strength of fundamental	passed
15.35(c)	RSS-Gen, 8.2	Pulsed operation	passed
15.249(d)	RSS-210, B10(b)	Out-of-band emission, radiated	passed
15.215(c)	-	Emission bandwidth	passed
-	RSS-Gen, 6.7 RSS-210, A.1.3	Occupied bandwidth	passed
15.215(c)	RSS-Gen, 6.11	Transmitter frequency stability	passed

3.1 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 : 21 November 2018

Testing concluded on : 12 December 2018

Checked by:

Tested by:

Klaus Gegenfurtner
Teamleader Radio

Josef Knab
Radio Team

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. It is noted that the expanded measurement uncertainty corresponds to the measurement results from the standard measurement uncertainty multiplied by the coverage factor $k = 2$. The true value is located in the corresponding interval with a probability of 95 % 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. 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 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.

Measurement Type	Range	Confidence Level	Calculated Uncertainty
AC power line conducted emissions	0.15 MHz to 30 MHz	95%	± 3.29 dB
EBW and OBW	2400 MHz to 3000 MHz	95%	± 2.5 x 10 ⁻⁷
Maximum peak conducted output power	2400 MHz to 3000 MHz	95%	± 0.62 dB
Power spectral density	2400 MHz to 3000 MHz	95%	± 0.62 dB
Conducted Spurious Emissions	9 kHz to 10000 MHz	95%	± 2.15 dB
Conducted Spurious Emissions	10000 MHz to 40000 MHz	95%	± 3.47 dB
Radiated Spurious Emissions	9 kHz to 30 MHz	95%	± 3.53 dB
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	± 3.71 dB
Radiated Spurious Emissions	1000 MHz to 10000 MHz	95%	± 2.34 dB
Field strength of the fundamental	100 kHz to 100 MHz	95%	± 3.53 dB

4.4 Measurement protocol for FCC and ISED

4.4.1 Test methodology

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

IC 3009A-1

The Anechoic chamber is a listed test site under the Canadian Test-Sites File-No:

IC 3009A-2

In compliance with RSS 210 testing for RSS compliance may be achieved by following the procedures set out in ANSI C63.10.

4.4.2 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.

4.4.3 General Standard information

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 C63.10 and applying the CISPR 22 limits.

4.4.3.1.1 Radiated emission (electrical field 30 MHz - 1 GHz)

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 polarised 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 m non-conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. The setup of the equipment under test is established in accordance with ANSI C63.10. The interface cables that are closer than 40 centimetres to the ground plane are bundled in the center in a serpentine fashion so that 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 screened room located outside the test area. The antenna is positioned 3, 10 or 30 metres horizontally from the EUT and is repeated vertically. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 metres and the EUT is rotated 360 degrees.

The final level in dB μ V/m is calculated by taking the reading from the EMI receiver (Level dB μ V) and adding the correction factors and cable loss factor (dB). The FCC or CISPR limit is subtracted from this result in order to provide the limit margin listed in the measurement protocol.

The resolution bandwidth setting:

30 MHz – 1000 MHz: RBW: 120 kHz

Example:

Frequency Delta (MHz)	Level (dB μ V)	+	Factor (dB)	=	Level (dB μ V/m)	-	CISPR Limit (dB μ V/m)	=	(dB)
719.0	75.0	+	32.6	=	107.6	-	110.0	=	-2.4

4.4.3.1.2 Radiated emission (electrical field 1 GHz - 40 GHz)

Description of measurement:

Radiated emissions from the EUT are measured in the frequency range 1 GHz up to the maximum frequency as specified in 47 CFR Part 15, Subpart A, Section 15.33, using a spectrum analyser and appropriate linearly polarized antennas. Table top equipment is placed on a 1.0 X 1.5 metre non-conducting table, 1.5 metre above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. The setup of the equipment under test is following set out in ANSI C63.10. 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 screened room located outside the test area. Measurements are made in both the horizontal and vertical polarization planes in a fully anechoic room using a spectrum analyzer set to max peak detector function and a resolution 1 MHz and video bandwidth 3 MHz for peak measurement. The conditions determined as worst case will then be used for the final measurements. When the EUT is larger than the beam width of the measuring antenna it will be moved over the surface for the four sides of the equipment. Where appropriate, the test distance may be reduced in order to detect emissions under better uncertainty and are calculated at the specified test distance.

5 TEST CONDITIONS AND RESULTS

5.1 AC power line 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

For test setup photos see T40604-03-00KJ ATTACHMENT A

5.1.3 Applicable standard

FCC Part 15, Section 15.207 and RSS-Gen 8.8:

5.1.4 Description of Measurement

The measurements are performed following the procedures set out in ANSI C63.10.

EMI test receiver settings:

150 kHz – 30 MHz: RBW: 9 kHz

5.1.5 Test result

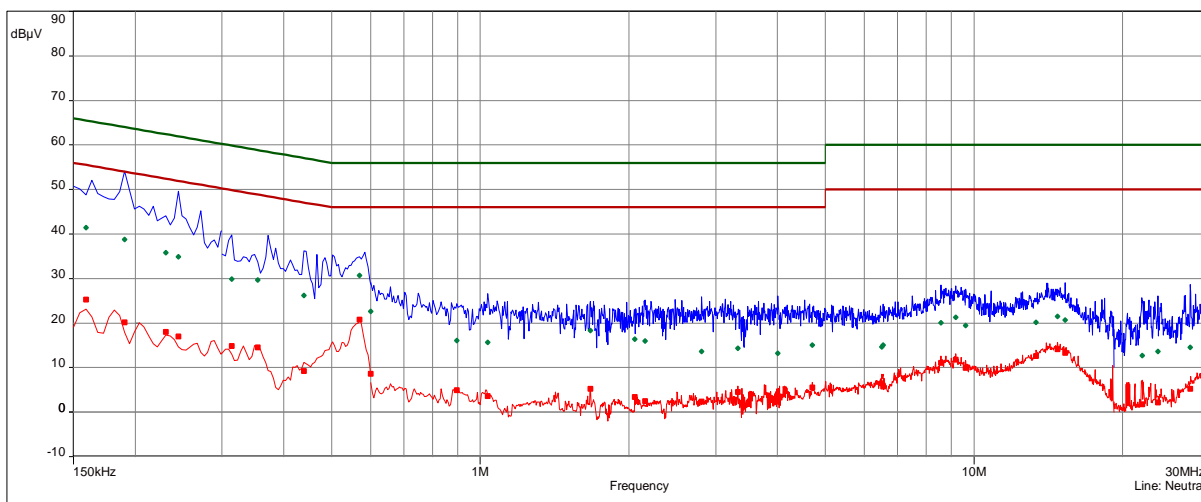
The requirements are **FULFILLED**.

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

5.1.6 Test protocols

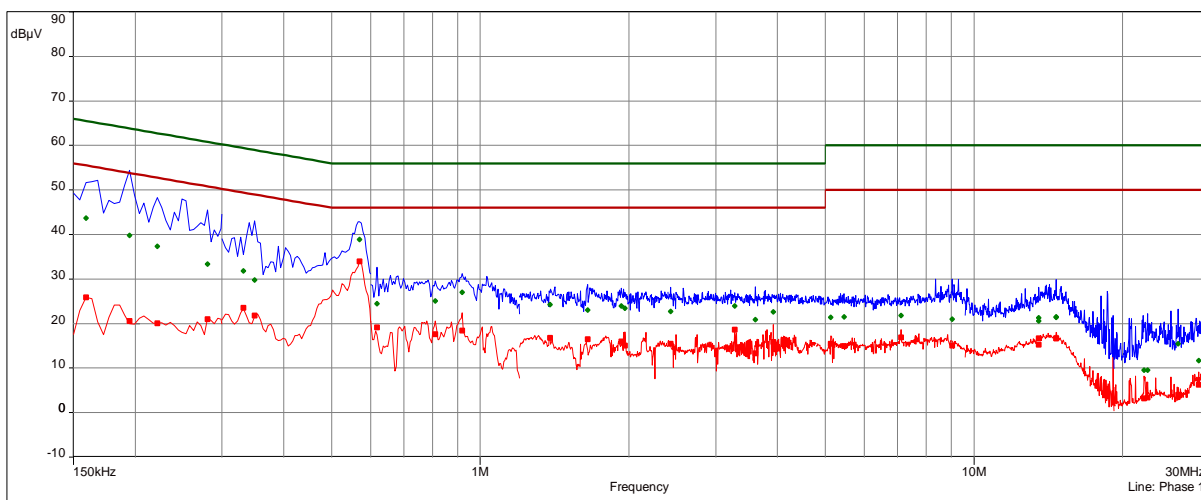
File No.:	T40604-03-00KJ	Result	passed
Operation mode:	Cont. TX modulated at 918.0 MHz (the valve always moves up and down)		
Tested by:	Josef Knab		
Location:	S2	Date:	27.11.2018
Remarks:	None		

- FCC/FCC Part 15B (15.109) B - Average/
- FCC/FCC Part 15B (15.109) B - QPeak/
- Meas.Peak (Neutral)
- Mes. CISPR AVG (Neutral)
- QuasiPeak (Finals) (Neutral)
- CISPR AV (Finals) (Neutral)



FCC/FCC Part 15B (15.109)B

- FCC/FCC Part 15B (15.109) B - Average/
- FCC/FCC Part 15B (15.109) B - QPeak/
- Meas.Peak (Phase 1)
- Mes. CISPR AVG (Phase 1)
- QuasiPeak (Finals) (Phase 1)
- CISPR AV (Finals) (Phase 1)

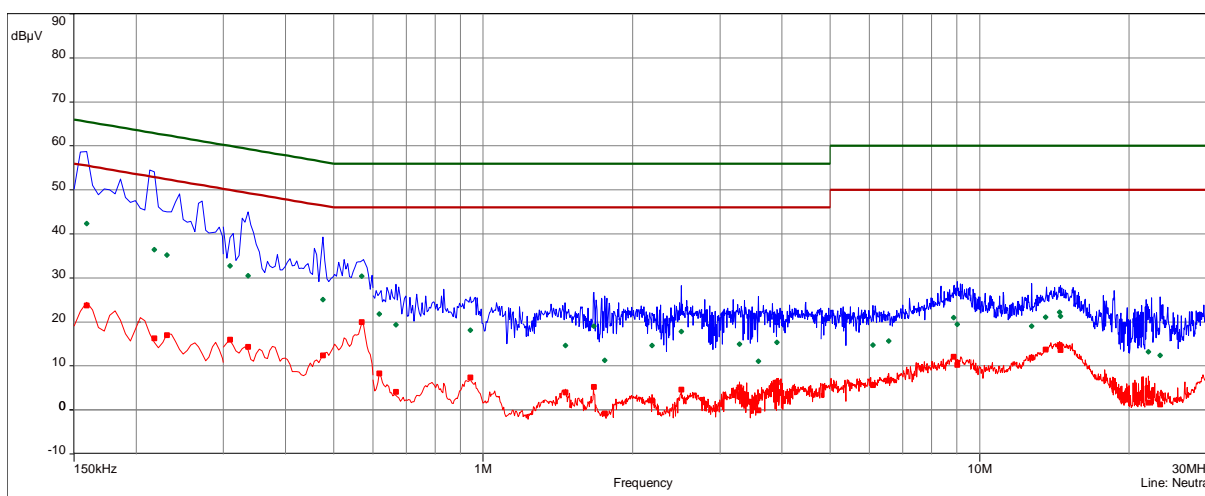


FCC/FCC Part 15B (15.109)B

freq MHz	SR	QP dB(μV)	margin dB	limit dB	AV dB(μV)	margin dB	limit dB	line	corr dB
0.159	1	43.67	21.84	65.52	25.92	29.60	55.52	Phase 1	10.08
0.195	1	39.82	24.00	63.82	20.59	33.24	53.82	Phase 1	10.09
0.222	1	37.30	25.45	62.74	20.07	32.67	52.74	Phase 1	10.09
0.2805	1	33.39	27.41	60.80	20.95	29.85	50.80	Phase 1	10.11
0.3315	2	31.83	27.58	59.41	23.50	25.92	49.41	Phase 1	10.13
0.3495	2	29.80	29.18	58.97	21.86	27.12	48.97	Phase 1	10.13
0.57	2	38.83	17.17	56.00	33.96	12.04	46.00	Phase 1	10.15
0.618	3	24.51	31.49	56.00	19.15	26.85	46.00	Phase 1	10.16
0.8115	3	25.03	30.97	56.00	17.61	28.39	46.00	Phase 1	10.19
0.9195	3	26.99	29.01	56.00	18.43	27.57	46.00	Phase 1	10.19
1.3845	4	24.28	31.72	56.00	16.82	29.18	46.00	Phase 1	10.24
1.65	4	23.06	32.94	56.00	16.47	29.53	46.00	Phase 1	10.26
1.929	4	23.93	32.07	56.00	15.94	30.06	46.00	Phase 1	10.26
1.965	4	23.49	32.51	56.00	15.10	30.90	46.00	Phase 1	10.26
2.4315	5	22.76	33.24	56.00	15.45	30.55	46.00	Phase 1	10.31
3.2775	5	23.92	32.08	56.00	18.60	27.40	46.00	Phase 1	10.35
3.606	5	20.90	35.10	56.00	13.36	32.64	46.00	Phase 1	10.36
3.9255	5	22.65	33.35	56.00	15.85	30.15	46.00	Phase 1	10.38
5.124	6	21.44	38.56	60.00	15.50	34.50	50.00	Phase 1	10.45
5.4615	6	21.50	38.50	60.00	14.91	35.09	50.00	Phase 1	10.48
7.113	6	21.81	38.19	60.00	16.88	33.12	50.00	Phase 1	10.60
9.0345	6	20.96	39.04	60.00	15.06	34.94	50.00	Phase 1	10.68
13.5195	7	21.33	38.67	60.00	16.75	33.25	50.00	Phase 1	10.98
13.5285	7	20.61	39.39	60.00	15.27	34.73	50.00	Phase 1	10.99
14.676	7	21.50	38.50	60.00	16.65	33.35	50.00	Phase 1	11.06
14.6805	7	21.43	38.57	60.00	16.66	33.34	50.00	Phase 1	11.06
22.089	8	9.57	50.43	60.00	3.22	46.78	50.00	Phase 1	11.40
22.458	8	9.54	50.46	60.00	3.39	46.61	50.00	Phase 1	11.41
25.8915	8	15.43	44.57	60.00	4.03	45.97	50.00	Phase 1	11.46
28.5465	8	11.73	48.27	60.00	6.24	43.76	50.00	Phase 1	11.40
0.159	9	41.44	24.08	65.52	25.26	30.25	55.52	Neutral	10.09
0.1905	9	38.75	25.26	64.01	20.15	33.87	54.01	Neutral	10.09
0.231	9	35.80	26.62	62.41	18.06	34.35	52.41	Neutral	10.11
0.2445	9	34.95	27.00	61.94	17.01	34.93	51.94	Neutral	10.11
0.3135	10	29.92	29.96	59.88	14.89	34.99	49.88	Neutral	10.13
0.354	10	29.67	29.20	58.87	14.59	34.28	48.87	Neutral	10.14
0.4395	10	26.22	30.86	57.07	9.22	37.85	47.07	Neutral	10.15
0.57	10	30.75	25.25	56.00	20.80	25.20	46.00	Neutral	10.16
0.6	11	22.64	33.36	56.00	8.65	37.35	46.00	Neutral	10.16
0.897	11	16.07	39.93	56.00	4.92	41.08	46.00	Neutral	10.19
1.0365	11	15.72	40.28	56.00	3.61	42.39	46.00	Neutral	10.20
1.6725	12	18.37	37.63	56.00	5.24	40.76	46.00	Neutral	10.27
2.055	12	16.39	39.61	56.00	3.42	42.58	46.00	Neutral	10.28
2.1585	12	15.99	40.01	56.00	2.45	43.55	46.00	Neutral	10.29
2.8095	13	13.59	42.41	56.00	2.43	43.57	46.00	Neutral	10.34
3.3225	13	14.37	41.63	56.00	4.56	41.44	46.00	Neutral	10.36
4.0065	13	13.18	42.82	56.00	2.77	43.23	46.00	Neutral	10.40
4.704	13	15.04	40.96	56.00	5.52	40.48	46.00	Neutral	10.44
6.51	14	14.66	45.34	60.00	6.52	43.48	50.00	Neutral	10.56
6.546	14	15.04	44.96	60.00	5.80	44.20	50.00	Neutral	10.57
8.5755	14	20.06	39.94	60.00	11.10	38.90	50.00	Neutral	10.66
9.183	14	21.25	38.75	60.00	11.79	38.21	50.00	Neutral	10.68
9.6135	15	19.46	40.54	60.00	9.93	40.07	50.00	Neutral	10.69
13.344	15	20.13	39.87	60.00	12.57	37.43	50.00	Neutral	10.94
14.757	15	21.55	38.45	60.00	14.10	35.90	50.00	Neutral	11.03
15.288	15	20.70	39.30	60.00	13.31	36.69	50.00	Neutral	11.07
21.918	16	12.72	47.28	60.00	1.77	48.23	50.00	Neutral	11.37
23.601	16	13.66	46.34	60.00	2.14	47.86	50.00	Neutral	11.38
27.399	16	14.54	45.46	60.00	5.25	44.75	50.00	Neutral	11.29
29.496	16	14.30	45.70	60.00	7.58	42.42	50.00	Neutral	11.21

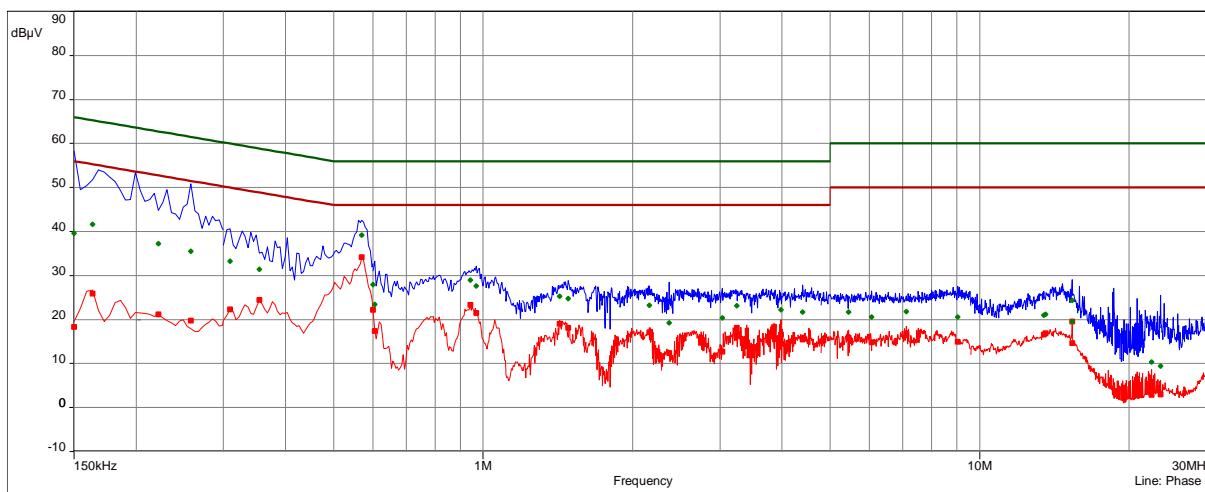
File No.:	T40604-03-00KJ	Result	passed
Operation mode:	Receive mode / standby		
Tested by:	Josef Knab		
Location:	S2	Date:	27.11.2018
Remarks:	None		

- FCC/FCC Part 15B (15.109) B - Average/
- FCC/FCC Part 15B (15.109) B - QPeak/
- Meas.Peak (Neutral)
- Mes. CISPR AVG (Neutral)
- QuasiPeak (Finals) (Neutral)
- CISPR AV (Finals) (Neutral)



FCC/FCC Part 15B (15.109)B

- FCC/FCC Part 15B (15.109) B - Average/
- FCC/FCC Part 15B (15.109) B - QPeak/
- Meas.Peak (Phase 1)
- Mes. CISPR AVG (Phase 1)
- QuasiPeak (Finals) (Phase 1)
- CISPR AV (Finals) (Phase 1)



FCC/FCC Part 15B (15.109)B

freq MHz	SR	QP dB(μV)	margin dB	limit dB	AV dB(μV)	margin dB	limit dB	line	corr dB
0.15	1	39.65	26.35	66.00	18.30	37.70	56.00	Phase 1	10.07
0.1635	1	41.65	23.63	65.28	25.85	29.44	55.28	Phase 1	10.08
0.222	1	37.24	25.50	62.74	21.22	31.53	52.74	Phase 1	10.09
0.258	1	35.46	26.04	61.50	19.79	31.70	51.50	Phase 1	10.11
0.309	2	33.29	26.71	60.00	22.36	27.64	50.00	Phase 1	10.12
0.354	2	31.41	27.46	58.87	24.46	24.41	48.87	Phase 1	10.13
0.57	2	39.16	16.84	56.00	34.22	11.78	46.00	Phase 1	10.15
0.6	3	27.89	28.11	56.00	22.21	23.79	46.00	Phase 1	10.15
0.6045	3	23.40	32.60	56.00	17.40	28.60	46.00	Phase 1	10.16
0.942	3	28.93	27.07	56.00	23.30	22.70	46.00	Phase 1	10.18
0.969	3	27.68	28.32	56.00	21.54	24.46	46.00	Phase 1	10.19
1.425	4	25.30	30.70	56.00	19.04	26.96	46.00	Phase 1	10.25
1.4835	4	24.76	31.24	56.00	18.17	27.83	46.00	Phase 1	10.25
2.163	4	23.27	32.73	56.00	17.14	28.86	46.00	Phase 1	10.28
2.37	4	19.27	36.73	56.00	12.36	33.64	46.00	Phase 1	10.30
3.0345	5	20.41	35.59	56.00	12.66	33.34	46.00	Phase 1	10.34
3.2415	5	23.10	32.90	56.00	18.11	27.89	46.00	Phase 1	10.35
3.984	5	22.24	33.76	56.00	16.58	29.42	46.00	Phase 1	10.39
4.398	5	21.65	34.35	56.00	15.46	30.54	46.00	Phase 1	10.42
5.448	6	21.73	38.27	60.00	15.90	34.10	50.00	Phase 1	10.48
6.06	6	20.59	39.41	60.00	14.87	35.13	50.00	Phase 1	10.53
7.1265	6	21.81	38.19	60.00	16.91	33.09	50.00	Phase 1	10.60
9.039	6	20.57	39.43	60.00	14.99	35.01	50.00	Phase 1	10.68
13.4745	7	21.01	38.99	60.00	16.64	33.36	50.00	Phase 1	10.98
13.569	7	21.21	38.79	60.00	16.93	33.07	50.00	Phase 1	10.99
15.351	7	24.37	35.63	60.00	19.54	30.46	50.00	Phase 1	11.11
15.3555	7	19.51	40.49	60.00	14.63	35.37	50.00	Phase 1	11.11
23.16	8	9.40	50.60	60.00	3.01	46.99	50.00	Phase 1	11.44
29.244	8	12.39	47.61	60.00	7.40	42.60	50.00	Phase 1	11.38
29.775	8	12.75	47.25	60.00	7.94	42.06	50.00	Phase 1	11.37
0.159	9	42.32	23.20	65.52	23.73	31.78	55.52	Neutral	10.09
0.2175	9	36.46	26.46	62.91	16.27	36.65	52.91	Neutral	10.10
0.231	9	35.22	27.20	62.41	17.01	35.40	52.41	Neutral	10.11
0.309	10	32.75	27.24	60.00	15.94	34.05	50.00	Neutral	10.13
0.336	10	30.45	28.85	59.30	14.34	34.97	49.30	Neutral	10.14
0.4755	10	25.10	31.31	56.42	12.45	33.97	46.42	Neutral	10.15
0.57	10	30.42	25.58	56.00	20.01	25.99	46.00	Neutral	10.16
0.618	11	21.86	34.14	56.00	8.36	37.64	46.00	Neutral	10.17
0.6675	11	19.35	36.65	56.00	4.16	41.84	46.00	Neutral	10.18
0.942	11	18.12	37.88	56.00	7.40	38.60	46.00	Neutral	10.19
1.4655	12	14.61	41.39	56.00	3.99	42.01	46.00	Neutral	10.26
1.6725	12	19.01	36.99	56.00	5.24	40.76	46.00	Neutral	10.27
1.758	12	11.28	44.72	56.00	-0.81	46.81	46.00	Neutral	10.28
2.19	12	14.69	41.31	56.00	2.19	43.81	46.00	Neutral	10.29
2.508	13	17.78	38.22	56.00	4.67	41.33	46.00	Neutral	10.32
3.282	13	14.96	41.04	56.00	5.10	40.90	46.00	Neutral	10.36
3.5835	13	11.05	44.95	56.00	-0.04	46.04	46.00	Neutral	10.36
3.9075	13	15.38	40.62	56.00	6.23	39.77	46.00	Neutral	10.39
6.096	14	14.71	45.29	60.00	5.64	44.36	50.00	Neutral	10.54
6.564	14	15.72	44.28	60.00	6.71	43.29	50.00	Neutral	10.57
8.859	14	21.02	38.98	60.00	12.07	37.93	50.00	Neutral	10.66
9.0165	14	19.46	40.54	60.00	10.28	39.72	50.00	Neutral	10.67
12.723	15	19.05	40.95	60.00	11.86	38.14	50.00	Neutral	10.90
13.578	15	21.07	38.93	60.00	13.75	36.25	50.00	Neutral	10.96
14.487	15	22.23	37.77	60.00	14.72	35.28	50.00	Neutral	11.01
14.5455	15	21.33	38.67	60.00	13.64	36.36	50.00	Neutral	11.02
21.8775	16	13.20	46.80	60.00	1.61	48.39	50.00	Neutral	11.37
23.097	16	12.37	47.63	60.00	1.24	48.76	50.00	Neutral	11.38
28.8075	16	15.51	44.49	60.00	6.96	43.04	50.00	Neutral	11.23
29.6085	16	15.09	44.91	60.00	7.56	42.44	50.00	Neutral	11.20

5.2 Field strength of fundamental

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

For test setup photos see T40604-03-00KJ ATTACHMENT A

5.2.3 Applicable standard

FCC Part 15, Section 15.249(a), RSS-210 B10(a):

5.2.4 Description of Measurement

The measurements are performed following the procedures set out in ANSI C63.10.

EMI test receiver settings:

30 MHz – 1000 MHz: RBW: 120 kHz

5.2.5 Test result

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)
918.0	60	120	29.2	89.2	94	-4.8

Note: The correction factor includes cable loss and antenna factor.

Limit according to FCC Part 15, Section 15.249(a), RSS-210 B10(a):

Frequency (MHz)	Field strength of fundamental	
	(mV/m)	dB(μ V/m)
902 - 928	50	94

The requirements are **FULFILLED**.

Remarks:

5.3 Correction for pulsed operation (duty cycle)

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

5.3.1 Description of the test location

Test location: Shielded Room S4

5.3.2 Photo documentation of the test set-up

For test setup photos see T40604-03-00KJ ATTACHMENT A

5.3.3 Applicable standard

FCC Part 15, Section 15.35(c), RSS-GEN 8.2:

5.3.4 Description of Measurement

The measurements are performed following the procedures set out in ANSI C63.10.

Spectrum analyser settings: refer to attached plots

The duty cycle factor is calculated from the sum of the individual ON times, per equation:

$$\delta(dB) = 20\log \left[\frac{\sum (t_1 + t_2 + \dots)}{T} \right]$$

δ is the duty cycle correction factor

t_1 is the duration of pulse 1

t_2 is the duration of pulse 2

T is the period of the pulse train, or 100 ms if the pulse train length is greater than 100 ms

5.3.5 Test result

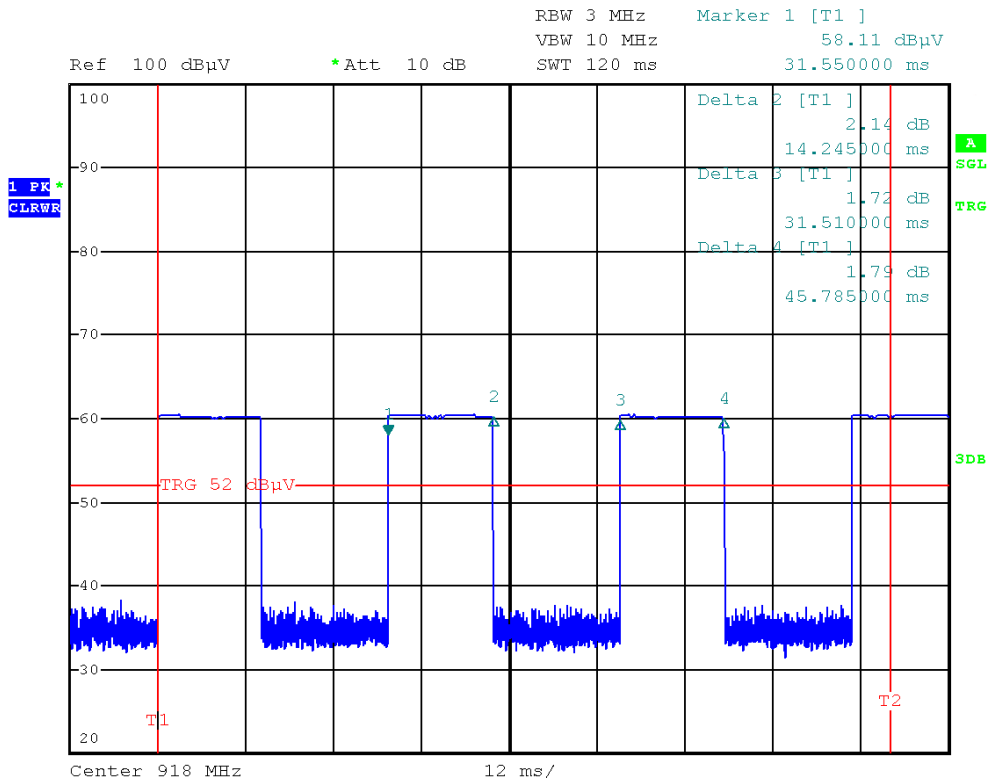
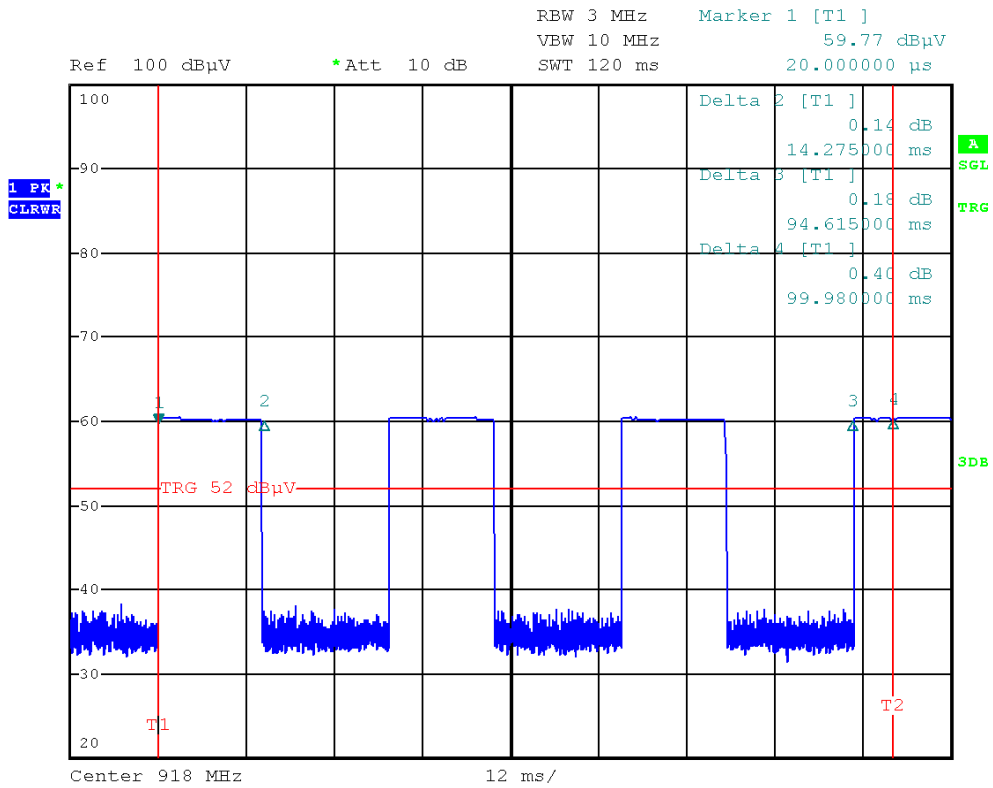
t_1 (ms)	t_2 (ms)	t_3 (ms)	t_4 (ms)	$\sum t$ (ms)	δ (dB)
14.28	14.25	14.28	5.37	48.18	-6.3

Remarks: The pulse train (T) exceeds 100 ms, therefore the duty cycle have been calculated by averaging
the sum of the pulse widths over the 100 ms with the highest average value.

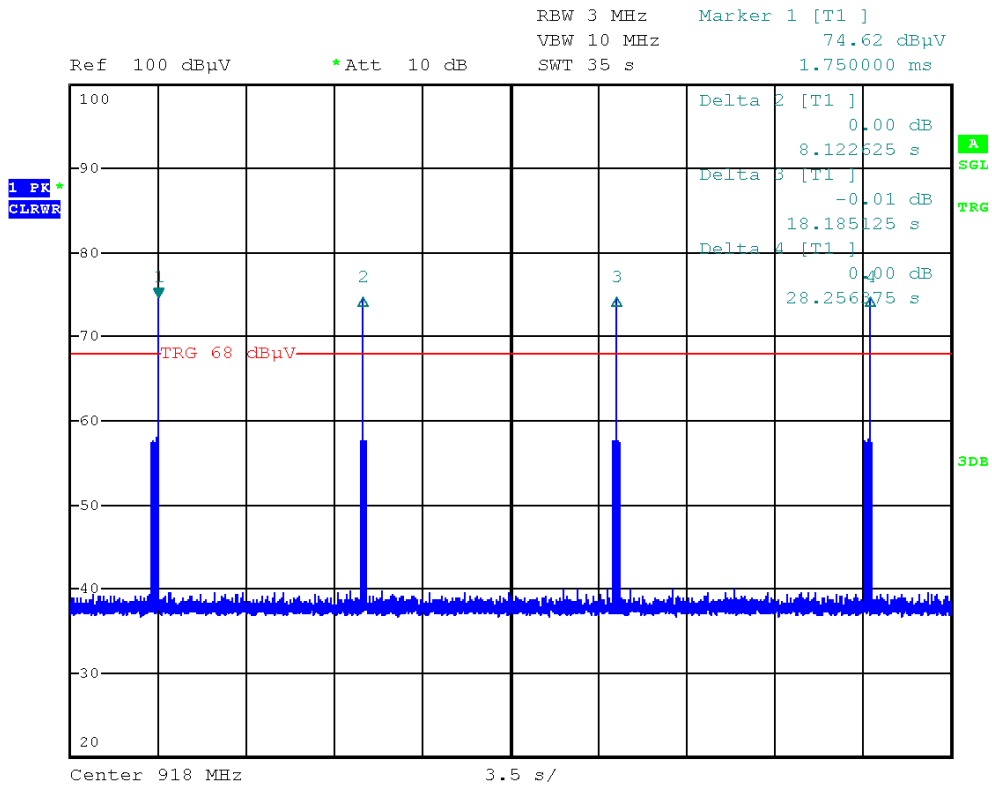
For detailed results, please see the test protocol below.

5.3.6 Test protocols

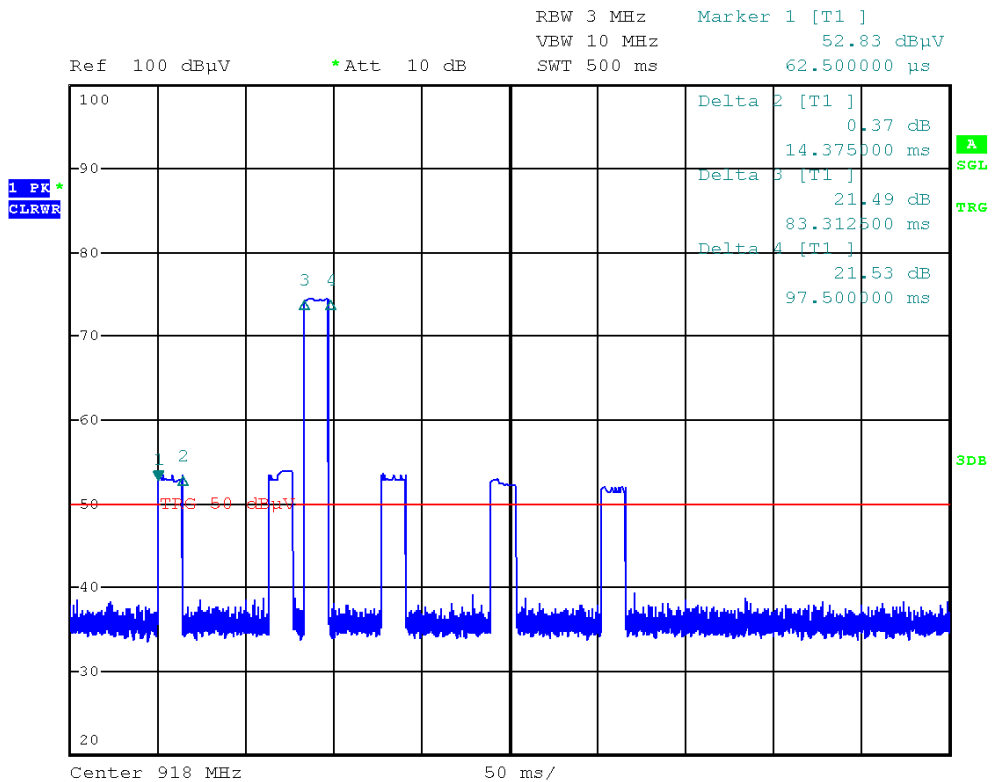
Pulse train >100 ms
Pulses within 100 ms (T1 = 0 ms & T2 = 100 ms)
(Modified test sample as permanent transmitter, used for out of band emission)



Normal operation
(The lower pulses are from the handset unit)



Normal operation – detailed view
(The lower pulses are from the handset unit)



5.4 Out-of-band emission, radiated

For test instruments and accessories used see section 6 Part **SER1**, **SER 2**, **SER 3**.

5.4.1 Description of the test location

Test location: OATS 1 / Anechoic chamber 1

Test distance: 3 m

5.4.2 Photo documentation of the test set-up

For test setup photos see T40604-03-00KJ ATTACHMENT A

5.4.3 Applicable standard

FCC Part 15, Section 15.249(d), RSS-210 B10(b):

5.4.4 Description of Measurement

The measurements are performed following the procedures set out in ANSI C63.10.

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

5.4.5 Test result 9 kHz to 30 MHz

FCC Part 15C, Section 15.209

Frequency (MHz)	Reading QP dB(μ V/m)	D factor (dB)	Level QP dB(μ V/m)	Limit QP dB(μ V/m)	Delta (dB)
0.1	35.0	-80	-45.0	27.6	-72.6
1	31.6	-40	-8.4	27.6	-36.0
15	22.4	-40	-17.6	29.5	-47.1
20	29.9	-40	-10.1	29.5	-39.6
25	31.3	-40	-8.7	29.5	-38.2

RSS-GEN 8.9

Frequency (MHz)	Reading QP dB(μ A/m)	D factor (dB)	Level QP dB(μ A/m)	Limit QP dB(μ A/m)	Delta (dB)
0.1	-16.5	-80	-96.5	-23.9	-72.6
1	-19.9	-40	-59.9	-23.9	-36.0
15	-29.1	-40	-69.1	-21.9	-47.2
20	-21.6	-40	-61.6	-21.9	-39.7
25	-20.2	-40	-60.2	-21.9	-38.3

Note: In the frequency range 9 kHz to 30 MHz no emission could be detected. The frequencies mention the noise level. The measurement results from distance 3 m are extrapolated (D factor) to the specified distance. The measured dB μ V/m readings, are reduced by 51.5 dB to be converted to dB μ A/m for RSS-GEN 8.9.

5.4.6 Test result 30 MHz to 1 GHz

Frequency (MHz)	Level QP (dB μ V)	Bandwidth (kHz)	Correct. Factor (dB)	Corrected level QP dB(μ V/m)	Limit QP dB(μ V/m)	Delta (dB)
32.4	9.4	120.0	12.9	22.3	40.0	-17.7
34.5	11.2	120.0	13.0	24.2	40.0	-15.8
143.5	7.1	120.0	12.8	19.9	43.5	-23.6
146.8	8	120.0	13.0	21.0	43.5	-22.5
150.85	5.6	120.0	14.0	19.6	43.5	-23.9
204.37	12.1	120.0	10.6	22.7	43.5	-20.8
205.45	11.5	120.0	11.3	22.8	43.5	-20.7
208.85	12.5	120.0	11.4	23.9	43.5	-19.6
214.25	12.4	120.0	11.6	24.0	43.5	-19.5

Note: The correction factor includes cable loss and antenna factor. The measurement results are from distance of 3 m.

5.4.7 Test result 1 GHz to 10 GHz

Frequency (MHz)	Level Pk (dB μ V)	Duty Cycle correction (dB)	Level AV (dB μ V)	Correct. factor (dB)	Corrected level PK (dB μ V/m)	Corrected level AV (dB μ V/m)	Limit PK (dB μ V/m)	Limit AV (dB μ V/m)	Delta (dB)
1836.0	65.8	-6.3	59.5	-8.4	57.4	51.1	74.0	54.0	-2.9
2754.0	62.3	-6.3	56.0	-6.6	55.8	49.5	74.0	54.0	-4.5
3672.0	60.1	-6.3	53.8	-6.6	53.6	47.3	74.0	54.0	-6.7
4590.0	55.5	-6.3	49.2	-4.8	50.7	44.4	74.0	54.0	-9.6
5508.0	60.0	-6.3	53.7	-3.9	56.1	49.8	74.0	54.0	-4.2
6426.0	59.7	-6.3	53.4	-2.1	57.6	51.3	74.0	54.0	-2.7
7344.0	55.2	-6.3	48.9	-1.6	53.6	47.3	74.0	54.0	-6.7
8262.0	54.1	-6.3	47.8	-0.9	53.2	46.9	74.0	54.0	-7.1
9180.0	50.8	-6.3	44.5	-0.1	50.7	44.4	74.0	54.0	-9.6

Note: The correction factor includes cable loss and antenna factor. In the frequency range 1 GHz to 10 GHz no emission above 4 GHz could be detected. The measurement results are from distance of 3 m. Average values were calculated from the subtraction of peak values minus correction duty cycle factor.

Limit according to FCC Part 15C, Section 15.209:

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

Limit according to RSS-GEN 8.9:

Table 5 – General field strength limits at frequencies above 30 MHz

Frequency (MHz)	Field strength ($\mu\text{V/m}$)	Measurement distance (m)
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

Table 6 – General field strength limits at frequencies below 30 MHz

Frequency (MHz)	Magnetic field strength ($\mu\text{A/m}$)	Measurement distance (m)
0.009 - -0.49	$6.37/F$ (F in kHz)	300
0.49 - 1.705	$63.7/F$ (F in kHz)	30
1.705 - 30.0	0.09	30

Average limit according to FCC Part 15, Section 15.249(d), RSS-210 B10(b):

Fundamental frequency (MHz)	Field strength of harmonics ($\mu\text{V/m}$)	dB($\mu\text{V/m}$)
902 - 928	500	54

The requirements are **FULFILLED**.

Remarks: The measurement was performed up to the 10th harmonic (10000 MHz).

5.5 EBW and OBW

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

5.5.1 Description of the test location

Test location: Shielded Room S4

5.5.2 Photo documentation of the test set-up

For test setup photos see T40604-03-00KJ ATTACHMENT A

5.5.3 Applicable standard

FCC Part 15, Section 15.215(c), RSS-GEN 6.7 and RSS-210 A.1.3:

5.5.4 Description of Measurement

The measurements are performed following the procedures set out in ANSI C63.10.

Spectrum analyser settings: refer to attached plots

5.5.5 Test result

FCC Part 15C, Section 15.215(c)

20dB bandwidth					
Operating frequency (MHz)	f_{low} (MHz)	f_{high} (MHz)	Bandwidth (kHz)	Frequencies between (MHz)	Result
918.0	917.96170	918.06990	108.20	902 - 928	PASS

RSS-GEN 6.7 and RSS-210 A.1.3

99% bandwidth					
Operating frequency (MHz)	f_{low} (MHz)	f_{high} (MHz)	Bandwidth (kHz)	limit (kHz)	Result
918.0	917.96340	918.06615	102.75	4590	PASS

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

Frequency band (MHz)	Emission bandwidth
902 to 928	Within the designated frequency band

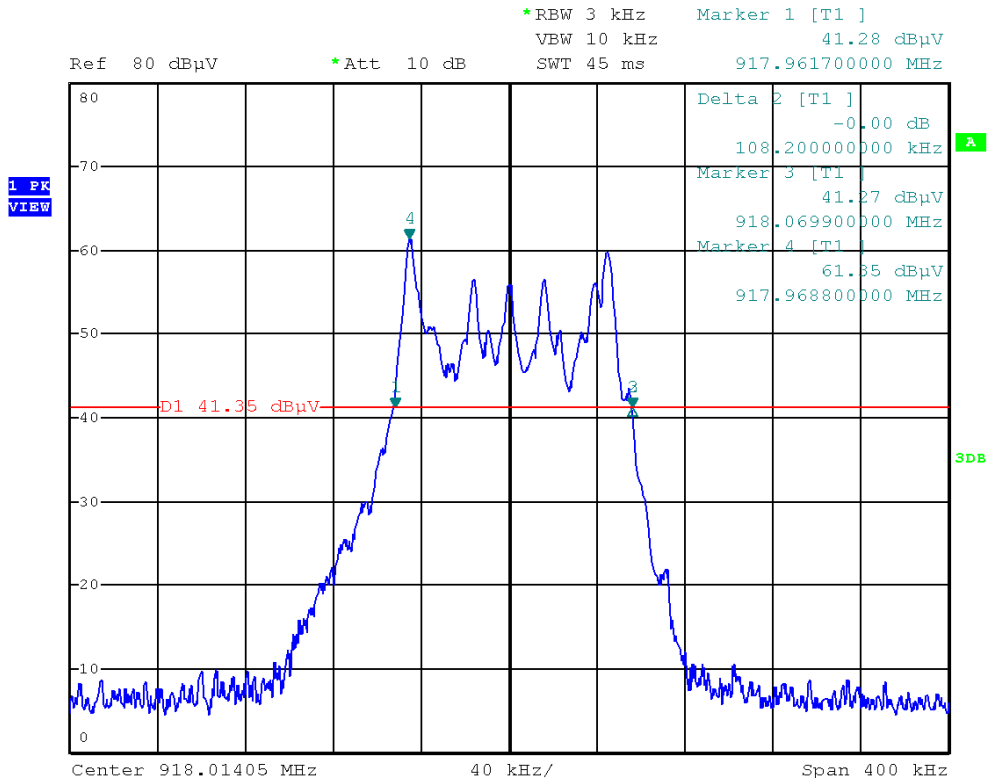
Limit according to RSS-210 A.1.3:

Operating frequency (MHz)	Bandwith of momentary signals (kHz)
> 900	≤ 0.5 % of the center frequency.

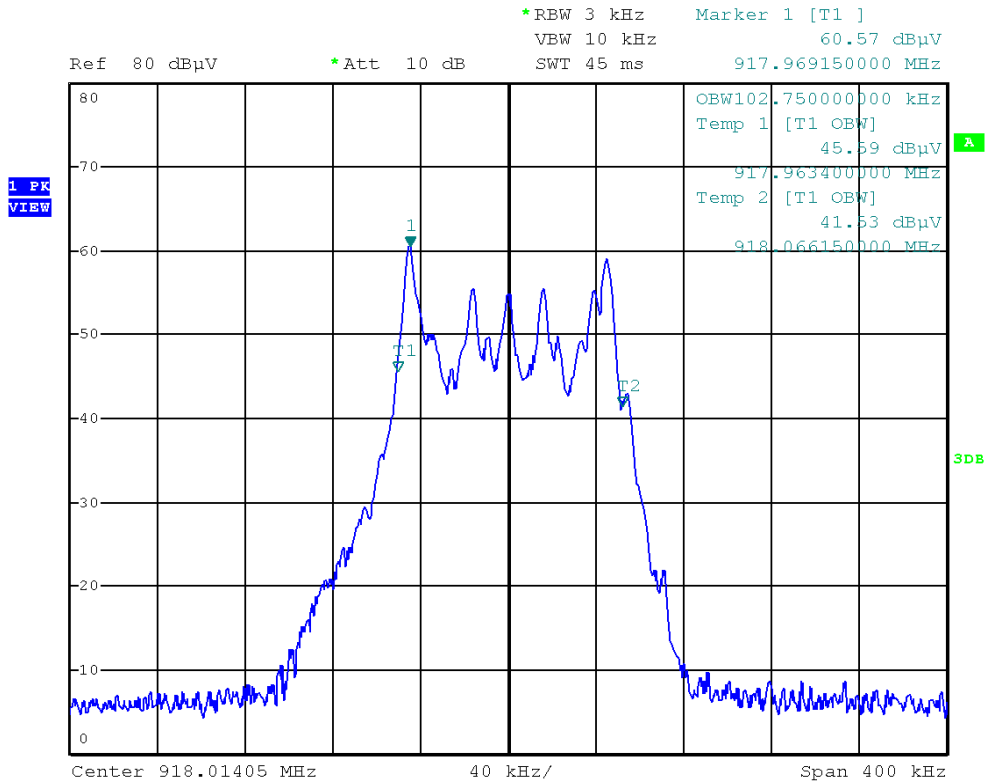
The requirements are **FULFILLED**.

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

5.5.6 Test protocols – 20 dB bandwidth



5.5.7 Test protocols – 99% bandwidth



5.6 Frequency stability

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

5.6.1 Description of the test location

Test location: AREA4

5.6.2 Photo documentation of the test set-up

For test setup photos see T40604-03-00KJ ATTACHMENT A

5.6.3 Applicable standard

FCC Part 15, Section 15.215(c), RSS-GEN 6.11:

5.6.4 Description of Measurement

The measurements are performed following the procedures set out in ANSI C63.10.

Spectrum analyser settings:

RBW	VBW	Span	Trace mode	Detector
100 Hz	300 Hz	3 kHz	max. hold	max. peak

5.6.5 Test result

DC powered:

Temperature (C°)	Voltage (V)	Measured frequency at startup (MHz)	Measured frequency at 2 minutes (MHz)	Measured frequency at 5 minutes (MHz)	Measured frequency at 10 minutes (MHz)	Limit between (MHz)	Result
50	6.0	918.009698	918.009710	918.009723	918.009739	904.6 - 925.4	PASS
40	6.0	918.010331	918.010331	918.010327	918.010319	904.6 - 925.4	PASS
30	6.0	918.012264	918.012264	918.012260	918.012264	904.6 - 925.4	PASS
20	5.1	918.014977	918.014956	918.014947	918.014947	904.6 - 925.4	PASS
20	6.0	918.014958	918.014941	918.014933	918.014933	904.6 - 925.4	PASS
20	6.9	918.014889	918.014877	918.014877	918.014872	904.6 - 925.4	PASS
10	6.0	918.017370	918.017365	918.017365	918.017353	904.6 - 925.4	PASS
0	6.0	918.019054	918.019050	918.019042	918.019021	904.6 - 925.4	PASS
-10	6.0	918.019565	918.019569	918.019569	918.019557	904.6 - 925.4	PASS
-20	6.0	918.018288	918.018309	918.018284	918.018264	904.6 - 925.4	PASS

AC powered:

Temperature (C°)	Voltage (V)	Measured frequency at startup (MHz)	Measured frequency at 2 minutes (MHz)	Measured frequency at 5 minutes (MHz)	Measured frequency at 10 minutes (MHz)	Limit between (MHz)	Result
50	110	918.009731	918.009765	918.009760	918.009773	904.6 - 925.4	PASS
40	110	918.010404	918.010409	918.010413	918.010409	904.6 - 925.4	PASS
30	110	918.012362	918.012354	918.012346	918.012346	904.6 - 925.4	PASS
20	93	918.014941	918.014928	918.014920	918.014920	904.6 - 925.4	PASS
20	110	918.014949	918.014937	918.014929	918.014924	904.6 - 925.4	PASS
20	127	918.014973	918.014943	918.014935	918.014935	904.6 - 925.4	PASS
10	110	918.017370	918.017353	918.017344	918.017340	904.6 - 925.4	PASS
0	110	918.019033	918.019033	918.019017	918.019012	904.6 - 925.4	PASS
-10	110	918.019521	918.019538	918.019533	918.019663	904.6 - 925.4	PASS
-20	110	918.018121	918.018217	918.018226	918.018209	904.6 - 925.4	PASS

Limit according to FCC Part 15, Section 15.215(c) and RSS-210 A.1.3:

Frequency band (MHz)	Frequency stability
902 to 928	Within 80% of the permitted frequency band

Remarks:

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.
A 4	BAT-EMC 3.18.0.17	01-02/68-13-001				
	ESCI	02-02/03-15-001	11/06/2019	11/06/2018		
	ESH 2 - Z 5	02-02/20-05-004	25/10/2019	25/10/2017	30/04/2019	31/10/2018
	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	18/11/2019	18/11/2016	06/05/2019	06/11/2018
CPR 2	ESVS 30	02-02/03-05-006	06/06/2019	06/06/2018		
	VULB 9168	02-02/24-05-005	18/04/2019	18/04/2018		
	NW-2000-NB	02-02/50-05-113				
	KK-EF393/U-16N-21N20 m	02-02/50-12-018				
	KK-SD_7/8-2X21N-33,0M	02-02/50-15-028				
DC	FSP 40	02-02/11-11-001	17/10/2019	17/10/2018		
	RF Antenna	02-02/24-05-032				
FS	FSP 40	02-02/11-11-001	17/10/2019	17/10/2018		
	RF Antenna	02-02/24-05-032				
	METRAHIT WORLD	02-02/32-15-001	13/12/2018	13/12/2017		
	WK-340/40	02-02/45-05-001	06/04/2019	06/04/2018		
	6543A	02-02/50-05-157				
	Type 5315.5	02-02/50-05-197				
MB	FSP 40	02-02/11-11-001	17/10/2019	17/10/2018		
	RF Antenna	02-02/24-05-032				
SER 1	ESCI	02-02/03-05-005	11/12/2019	11/12/2018		
	HFH 2 - Z 2	02-02/24-15-001	22/03/2019	22/03/2018		
	NW-2000-NB	02-02/50-05-113				
	KK-EF393/U-16N-21N20 m	02-02/50-12-018				
	KK-SD_7/8-2X21N-33,0M	02-02/50-15-028				
	ANT1010A	02-02/50-16-035				
SER 2	ESVS 30	02-02/03-05-006	06/06/2019	06/06/2018		
	VULB 9168	02-02/24-05-005	18/04/2019	18/04/2018		
	NW-2000-NB	02-02/50-05-113				
	KK-EF393/U-16N-21N20 m	02-02/50-12-018				
	KK-SD_7/8-2X21N-33,0M	02-02/50-15-028				
SER 3	ESW26	02-02/03-17-002	08/12/2018	08/12/2017		
	AMF-6D-01002000-22-10P	02-02/17-15-004				
	3117	02-02/24-05-009	08/05/2019	08/05/2018		
	WHJS 1000-10EE	02-02/50-05-070				
	18N-20	02-02/50-17-003				
	NMS111-GL200SC01-NMS11	02-02/50-17-012				
	BAM 4.5-P	02-02/50-17-024				
	NCD	02-02/50-17-025				
	KK-SF106-2X11N-6,5M	02-02/50-18-016				