

Test Report

Customer:

Hottinger Baldwin Messtechnik GmbH

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RF test report

140206-AU01+W02



Industry
Canada

Industrie
Canada

Hottinger Baldwin Messtechnik GmbH

Torque meter T40B

BG2 (S2) - 100Nm/200Nm

BG3 (S3) - 500Nm/1kNm

BG4 (S4) - 2kNm/3kNm

BG5 (S5) - 5kNm

BG6 (S6) - 10kNm



The test result refers exclusively
to the tested model.
This test report may not be copied or
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authorization
of the accreditation agency and/or
EMV **TESTHAUS** GmbH
Revision: 1.0



Deutsche
Akkreditierungsstelle
D-PL-12155-01-01

EMV **TESTHAUS** GmbH

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Accreditation:



FCC facility registration number: 221458
Test Firm Type "2.948 listed": Valid until 2017-04-22
Test Firm Type "accredited": Valid until 2015-06-11
MRA US-EU, FCC designation number: DE0010
BnetzA-CAB-02/21-02/04 Valid until 2018-11-27

Industry Canada test site number: 3472A-1
Registration expiry date: 2015-10-02

Test Laboratory:

EMV **TESTHAUS** GmbH
Gustav-Hertz-Straße 35
94315 Straubing
Germany

The technical accuracy is guaranteed through the quality management of the
EMV **TESTHAUS** GmbH



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Torque meter T40B
BG2, BG3, BG4, BG5, BG6

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1 Test regulations

47 CFR Part 2: 10-2013	Code of Federal Regulations Part 2 (Frequency allocation and radio treaty matters; General rules and regulations) of the Federal Communication Commission (FCC)
47 CFR Part 15: 10-2013	Code of Federal Regulations Part 15 (Radio Frequency Devices) of the Federal Communication Commission (FCC)
ANSI C63.4: September 2009	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
ICES-003 Issue 5, August 2012	Spectrum Management and Telecommunications Interference-Causing Equipment Standard Information Technology Equipment (ITE) – Limits and methods of measurement
RSS-Gen Issue 3, December 2010	Spectrum Management and Telecommunications Radio Standards Specification General Requirements and Information for the Certification of Radiocommunication Equipment
RSS-102 Issue 4, March 2010, updated December 2010	Spectrum Management and Telecommunications Radio Standards Specification Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)
RSS-210 Issue 8, December 2010	Spectrum Management and Telecommunications Radio Standards Specification Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment

1.1 Summary of test results

Standard	Test result
47 CFR Part 15, sections 15.207 and 15.209	Passed
RSS-210 Issue 8 clause 2 (with appropriate references to RSS-Gen Issue 3)	Passed



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2 Equipment under Test (EUT)

Product type: Torque meter T40B

Model Name: BG2 (S2) - 100Nm/200Nm
BG3 (S3) - 500Nm/1kNm
BG4 (S4) - 2kNm/3kNm
BG5 (S5) - 5kNm
BG6 (S6) - 10kNm

Manufacturer: Hottinger Baldwin Messtechnik GmbH

Serial number: BG2: 1312B0020
BG3: 1311B0015
BG4: 1410B0017
BG5: 162112021
BG6: 1402B0001

FCC ID: 2ADAT-T40S2TOS6

IC certification number: 12438A-T40S2TOS6

Application frequency band: Not applicable (general requirements apply)

Frequency range: 522.85 kHz -> wireless power supply
1.22 MHz -> wireless data transfer

Operating frequency: 522.85 kHz -> wireless power supply
1.22 MHz -> wireless data transfer

Number of RF-channels: 2

Modulation: ASK -> wireless power supply
PSK -> wireless data transfer

Antenna types: loop antenna
☐ detachable ☒ not detachable

Power supply: External power source
nominal: 24.0 VDC

Temperature range: -20°C to +50°C

Remark:

The tests were performed with 120V AC / 60Hz at mains input of DC power supply.



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2.1 Photo documentation

For photos of the EUT, see annex B.
For photos taken during testing, see annex A.

2.2 Short description of the EUT

The EUT is a torque meter with wireless measurement data transfer and wireless power supply. The measurement data transfer goes from rotor to stator. The wireless power supply goes the other way round. In the field EUT is part of an engine test bench.

2.3 Operation mode

The EUT is configured to start wireless power supply, measurement and data transfer as soon as supplied by external power.

The position in which the EUT was tested is documented in annex A.



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2.4 Configuration

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

Device	Model:	Serial or inventory number
Torque meter T40B	BG2 (S2) - 100Nm/200Nm	1312B0020
Torque meter T40B	BG3 (S3) - 500Nm/1kNm	1311B0015
Torque meter T40B	BG4 (S4) - 2kNm/3kNm	1410B0017
Torque meter T40B	BG5 (S5) - 5kNm	162112021
Torque meter T40B	BG6 (S6) - 10kNm	1402B0001
DC power supply	TRIO-PS/1AC/24DC/5 120 VAC / 60 Hz -> 24 VDC	3013539322
Data cable termination box	hbm test device (for radiated measurements)	n/a
AC power source	CHROMA 61602	616020002099

2.5 Used cables

Numbers:	Description: (type / lengths / remarks)	Serial No
1	7-pin shielded cable with 2 screw connectors, 3 m (for radiated measurements)	n/a
1	7-pin shielded cable with 1 screw connector and DC plug, 3 m (for AC power line conducted emissions)	n/a



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3 AC power line conducted emissions

according to 47 CFR Part 15, section 15.207, and
RSS-210, section 2.1 with RSS-Gen, section 7.2.4

3.1 Test location

Description	Manufacturer	Inventory No.
Shielded room	Siemens - Matsushita	E00107

3.2 Test instruments

	Description	Manufacturer	Inventory No.
☒	ESCS 30	Rohde & Schwarz	E00003
☐	ESU 26	Rohde & Schwarz	W00002
☐	ESCI	Rohde & Schwarz	E00001
☐	ESH3-Z2	Rohde & Schwarz	E00028
☒	ESH2-Z5	Rohde & Schwarz	E00004
☐	ESH2-Z5	Rohde & Schwarz	E00005

3.3 Limits

Frequency [MHz]	Quasi-peak [dB μ V]	Avarage [dB μ V]
0.15 – 0.5	66 – 56	56 – 46
0.5 – 5.0	56	46
5 – 30	60	50



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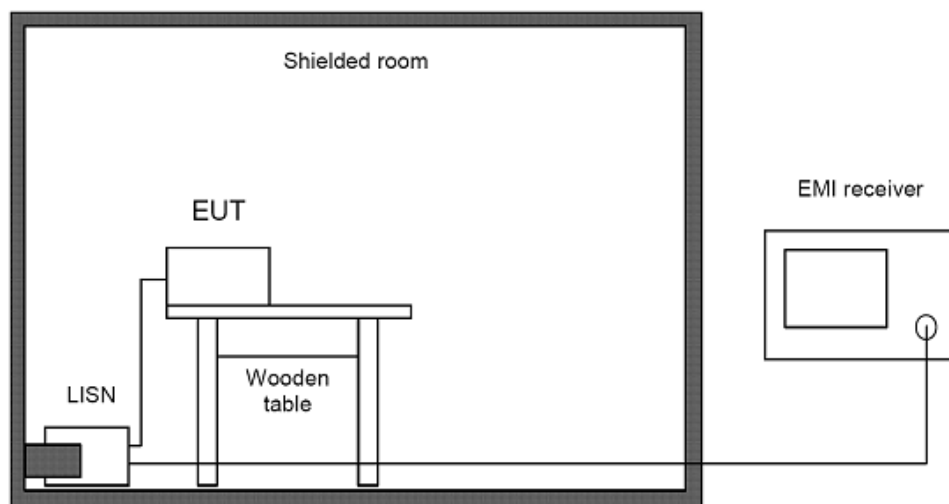
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3.4 Test procedure

1. The tests of conducted emission were carried out in a shielded room using a line impedance stabilization network (LISN) 50 μ H/50 Ohms and an EMI test receiver.
2. The EMI test receiver was connected to the LISN and set to a measurement bandwidth of 9 kHz in the frequency range from 0.15 MHz to 30 MHz.
3. The EUT was placed on a wooden table and connected to the LISN.
4. To accelerate the measurement the detector of the EMI test receiver was set to peak and the whole frequency range from 0.15 MHz to 30 MHz was scanned.
5. After that all peaks values with less margin than 10 dB to quasi-peak limit or exceeding the limit were marked and re-measured with quasi-peak detector.
6. If after that all values are under the average limit no addition measurement is necessary. In case there are still values between quasi-peak and average limit then these values were re-measured with average detector.
7. These measurements were done on all power lines.

According to ANSI C63.4, section 13.3.1 testing of intentional radiators with detachable antennas shall be done with a dummy load otherwise the tests should be done with connected antenna and if adjustable fully extended.

3.5 Test setup

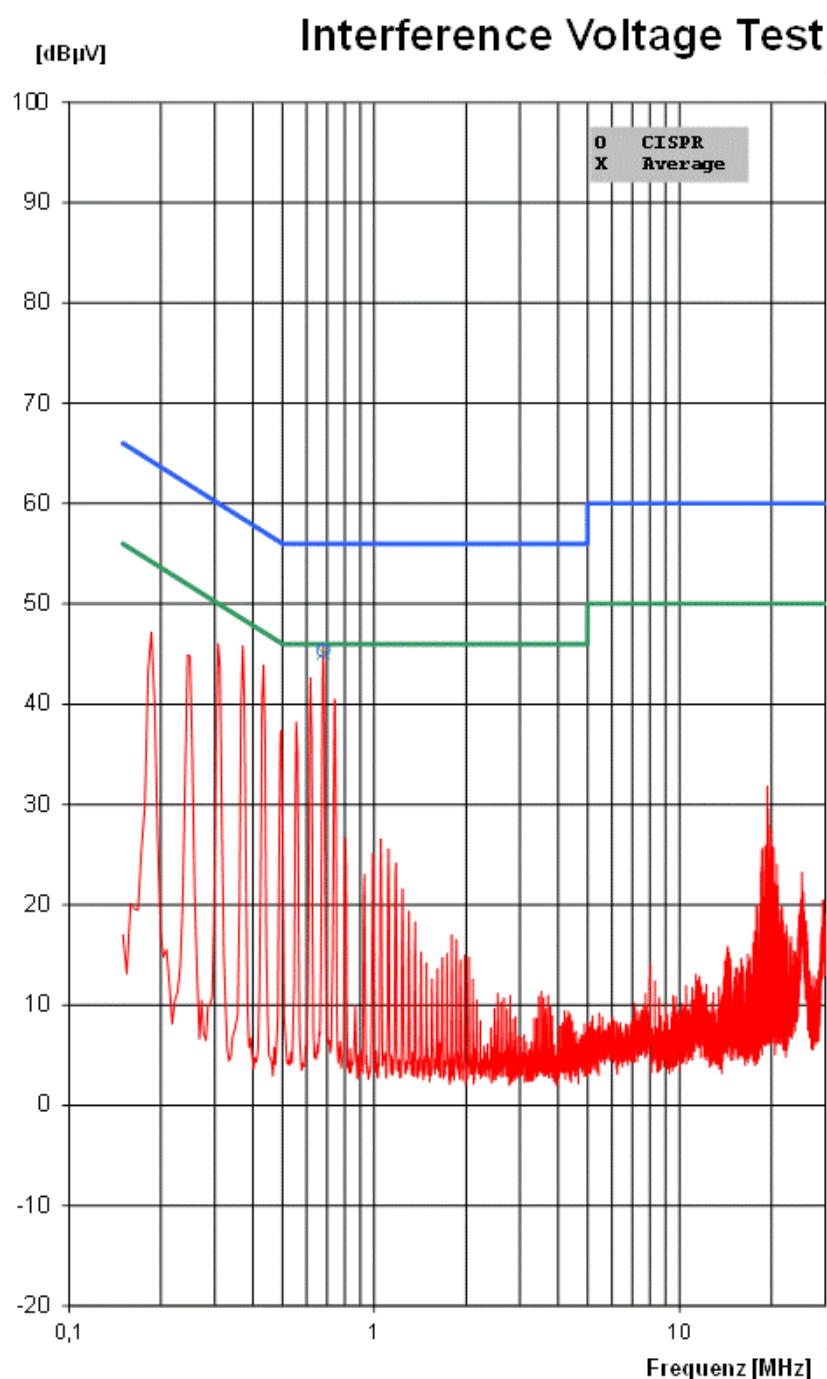


Picture 1: Outline of conducted emission test setup

Comments: All peripheral devices were additionally decoupled by means of a line stabilization network.

3.6 Test results - BG2 (S2)

Temperature:	20°C	Humidity:	44%
Tested by:	Martin Müller	Test date:	2014-11-03



REGULATIONS:
47 CFR, 15.207
PEAK / CISPR / AV

TEST EQUIPMENT:
R&S ESCS30 (E00003)
R&S ESH2-Z5 (E00004)

ORDER NO.:
140671-AU05+W02

EUT:
Hottinger Baldwin Messtechnik
GmbH
Torquemeter T40B
BG2 - 100/200Nm
1312B0020

OPERATION MODE:
continuous measurement
and data transfer

Mains 120V AC /60Hz
Phase

TEST FACILITY:
EMV TESTHAUS GmbH
Gustav-Hertz-Straße 35
94315 Straubing

DATE / TIME:
2014-11-03 11:50:49
20°C 44% 97kPa

TEST ENGINEER:
Martin Müller

StoSp_11.E10

Picture 2: BG2 - Graphic - Conducted emission on mains, phase 1 (without termination)

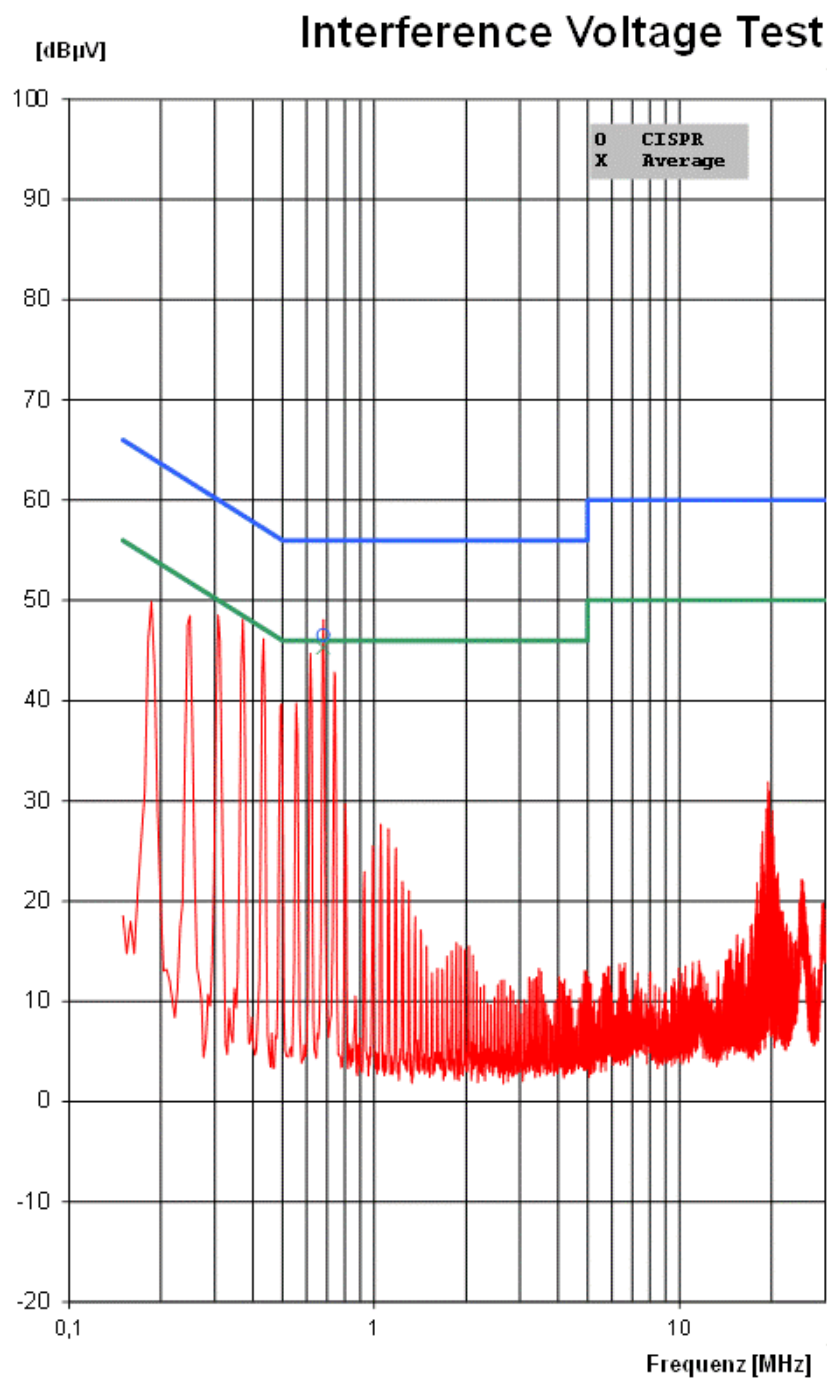


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BG2, BG3, BG4, BG5, BG6

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REGULATIONS:
 47 CFR, 15.207
 PEAK / CISPR / AV

TEST EQUIPMENT:
 R&S ESCS30 (E00003)
 R&S ESH2-Z5 (E00004)

ORDER NO.:
 140671-AU05+W02

EUT:
 Hottinger Baldwin Messtechnik GmbH
 Torquemeter T40B
 BG2 - 100/200Nm
 1312B0020

OPERATION MODE:
 continuous measurement
 and data transfer

Mains 120V AC /60Hz
 Neutral

TEST FACILITY:
 EMV TESTHAUS GmbH
 Gustav-Hertz-Straße 35
 94315 Straubing

DATE / TIME:
 2014-11-03 11:51:18
 20°C 44% 97kPa

TEST ENGINEER:
 Martin Müller

StoSp_N.E10

Picture 3: BG2 - Graphic - Conducted emission on mains, neutral (without termination)

Interference Voltage Test

Freq. [MHz]	U_CISPR [dBµV]	Limit [dBµV]	delta_U [dB]	U_AV [dBµV]	Limit [dBµV]	delta_U [dB]	Corr. [dB]	Remark
0,68	46,5	56,0	9,5	45,3	46,0	0,7	0,0	StöSe N.F.10

Picture 4: BG2 - Table - Conducted emission on mains, neutral (without termination)



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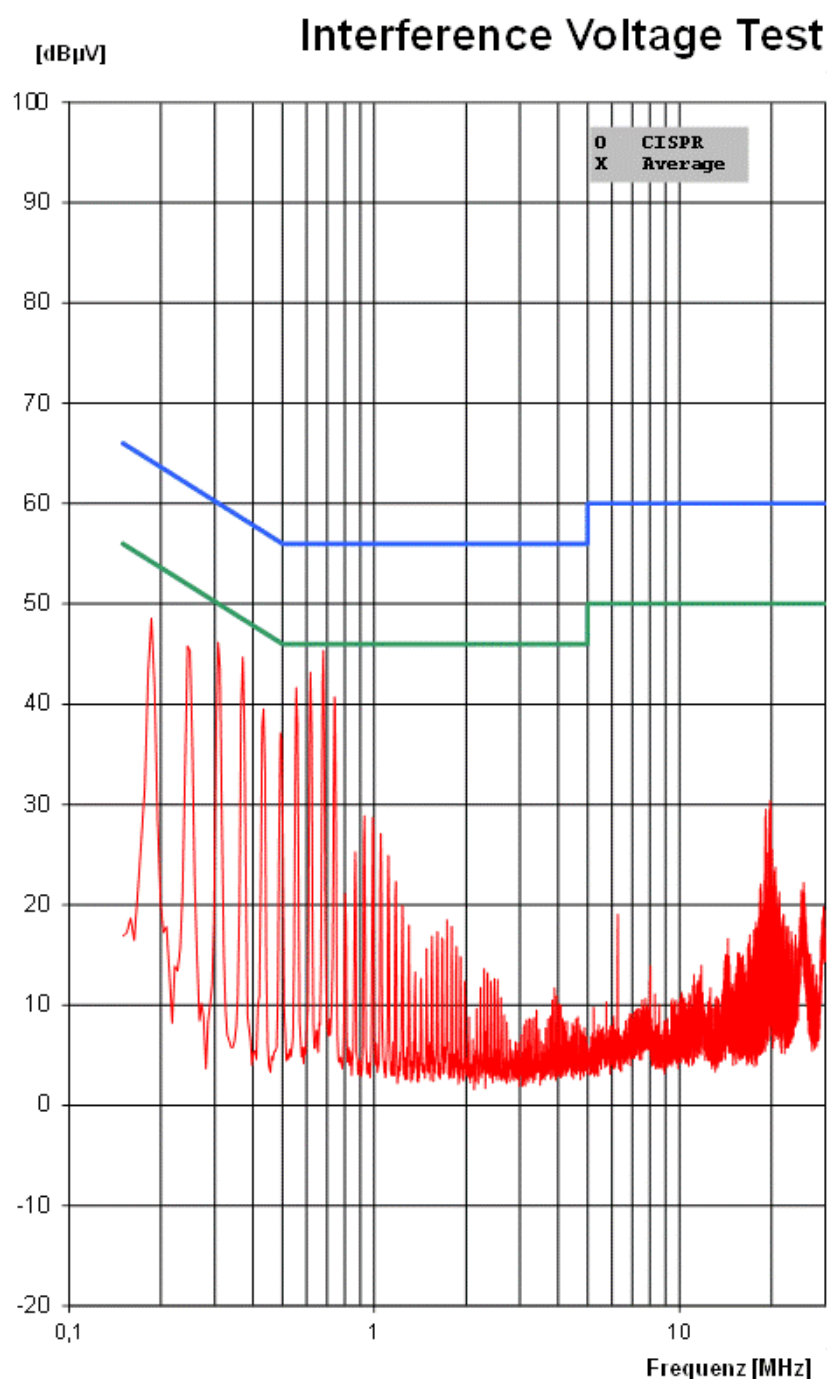
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Torque meter T40B
BG2, BG3, BG4, BG5, BG6

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3.7 Test results - BG3 (S3)

Temperature:	20°C	Humidity:	44%
Tested by:	Martin Müller	Test date:	2014-11-03



REGULATIONS:
47 CFR, 15.207
PEAK / CISPR / AV

TEST EQUIPMENT:
R&S ESCS30 (E00003)
R&S ESH2-Z5 (E00004)

ORDER NO.:
140671-AU04+W02

EUT:
Hottinger Baldwin Messtechnik
GmbH
Torquemeter T40B
BG3 - 500Nm/1kNm
1311B0015

OPERATION MODE:
continuous measurement
and data transfer

Mains 120V AC /60Hz
Phase

TEST FACILITY:
EMV TESTHAUS GmbH
Gustav-Hertz-Straße 35
94315 Straubing

DATE / TIME:
2014-11-03 11:35:44
20°C 44% 97kPa

TEST ENGINEER:
Martin Müller

StoSp_11.E10

Picture 5: BG3 - Graphic - Conducted emission on mains, phase 1 (without termination)

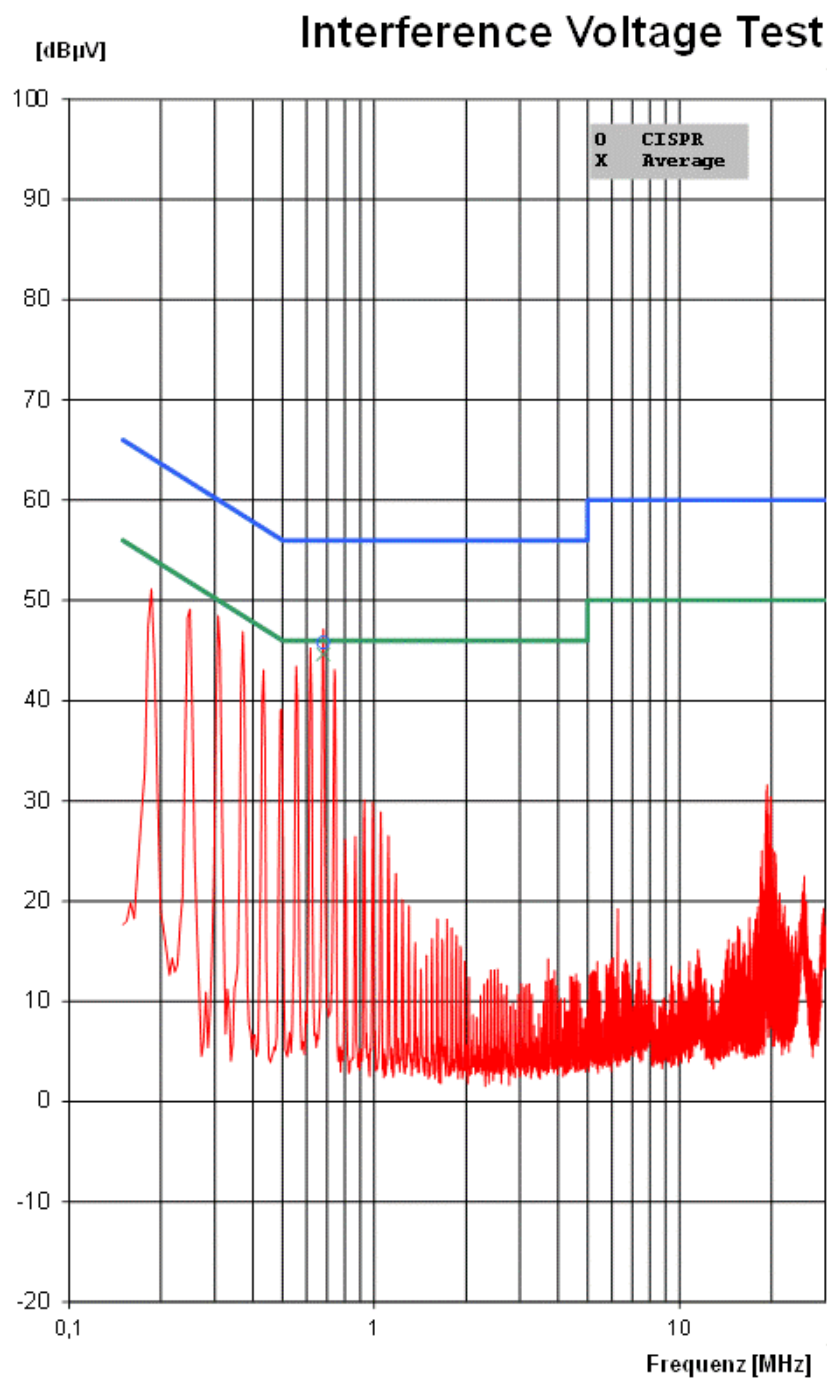


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REGULATIONS:
47 CFR, 15.207
PEAK / CISPR / AV

TEST EQUIPMENT:
R&S ESCS30 (E00003)
R&S ESH2-Z5 (E00004)

ORDER NO.:
140671-AU04+W02

EUT:
Hottinger Baldwin Messtechnik
GmbH
Torquemeter T40B
BG3 - 500Nm/1kNm
1311B0015

OPERATION MODE:
continous measurement
and data transfer

Mains 120V AC /60Hz
Neutral

TEST FACILITY:
EMV TESTHAUS GmbH
Gustav-Hertz-Straße 35
94315 Straubing

DATE / TIME:
2014-11-03 11:36:32
20°C 44% 97kPa

TEST ENGINEER:
Martin Müller

StoSp_N.E10

Picture 6: BG3 - Graphic - Conducted emission on mains, neutral (without termination)

Interference Voltage Test

Freq. [MHz]	U_CISPR [dBµV]	Limit [dBµV]	delta_U [dB]	U_AV [dBµV]	Limit [dBµV]	delta_U [dB]	Corr. [dB]	Remark
0,68	45,8	56,0	10,2	44,6	46,0	1,4	0,0	StöSe N.F.10

Picture 7: BG3 - Table - Conducted emission on mains, neutral (without termination)



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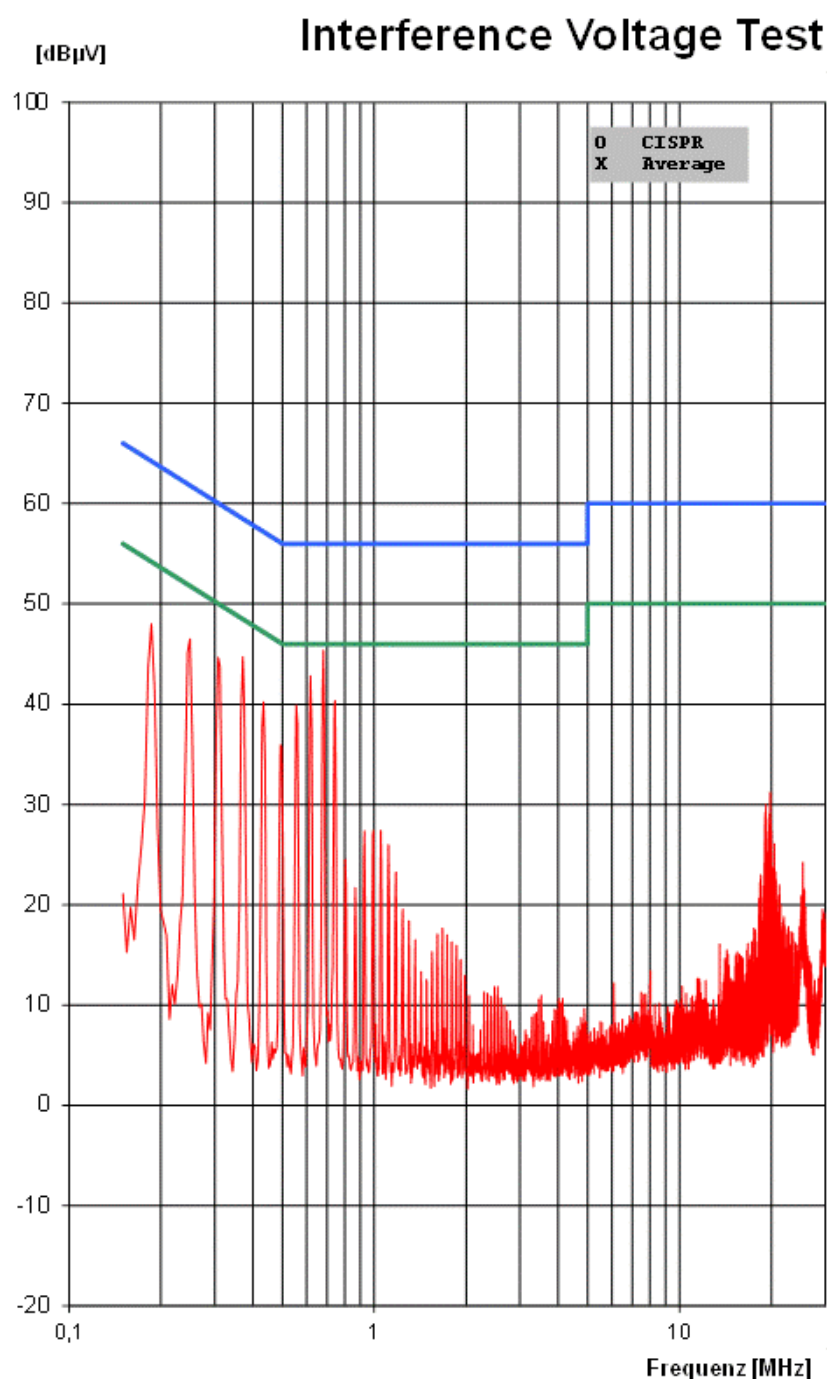
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BG2, BG3, BG4, BG5, BG6

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3.8 Test results - BG4 (S4)

Temperature:	20°C	Humidity:	44%
Tested by:	Martin Müller	Test date:	2014-11-03



REGULATIONS:
47 CFR, 15.207
PEAK / CISPR / AV

TEST EQUIPMENT:
R&S ESCS30 (E00003)
R&S ESH2-Z5 (E00004)

ORDER NO.:
140671-AU03+W02

EUT:
Hottinger Baldwin Messtechnik
GmbH
Torquemeter T40B
BG4 - 2/3kNm
1410B0017

OPERATION MODE:
continuous measurement
and data transfer

Mains 120V AC /60Hz
Phase

TEST FACILITY:
EMV TESTHAUS GmbH
Gustav-Hertz-Straße 35
94315 Straubing

DATE / TIME:
2014-11-03 11:23:07
20°C 44% 97kPa

TEST ENGINEER:
Martin Müller

StoSp_11.E10

Picture 8: BG4 - Graphic - Conducted emission on mains, phase 1 (without termination)

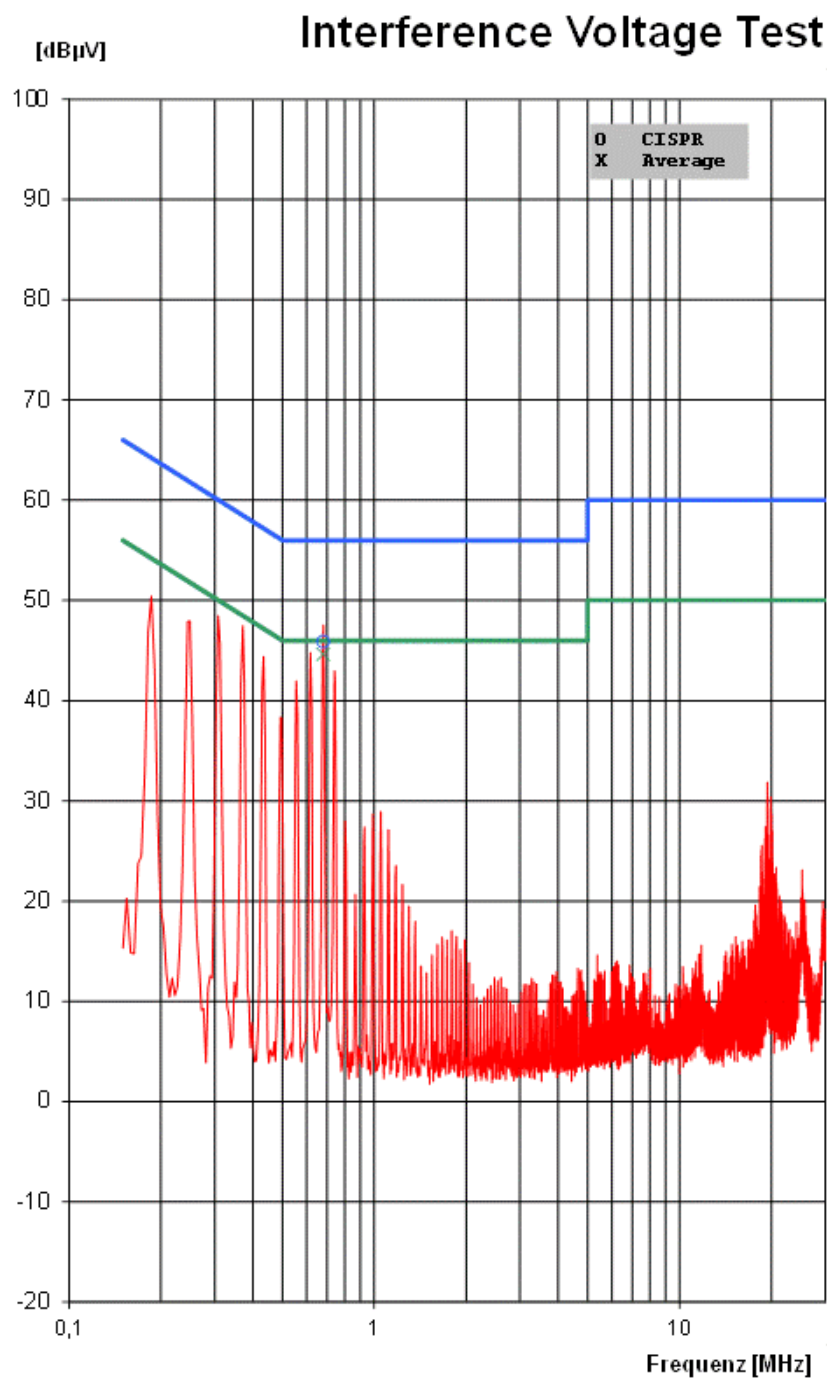


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REGULATIONS:
 47 CFR, 15.207
 PEAK / CISPR / AV

TEST EQUIPMENT:
 R&S ESCS30 (E00003)
 R&S ESH2-Z5 (E00004)

ORDER NO.:
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EUT:
 Hottinger Baldwin Messtechnik GmbH
 Torquemeter T40B
 BG4 - 2/3kNm
 1410B0017

OPERATION MODE:
 continuous measurement
 and data transfer

Mains 120V AC /60Hz
 Neutral

TEST FACILITY:
 EMV TESTHAUS GmbH
 Gustav-Hertz-Straße 35
 94315 Straubing

DATE / TIME:
 2014-11-03 11:23:51
 20°C 44% 97kPa

TEST ENGINEER:
 Martin Müller

StoSp_N.E10

Picture 9: BG4 - Graphic - Conducted emission on mains, neutral (without termination)

Interference Voltage Test

Freq. [MHz]	U_CISPR [dBµV]	Limit [dBµV]	delta_U [dB]	U_AV [dBµV]	Limit [dBµV]	delta_U [dB]	Corr. [dB]	Remark
0,68	45,9	56,0	10,1	44,6	46,0	1,4	0,0	StöSe N.F.10

Picture 10: BG4 - Table - Conducted emission on mains, neutral (without termination)



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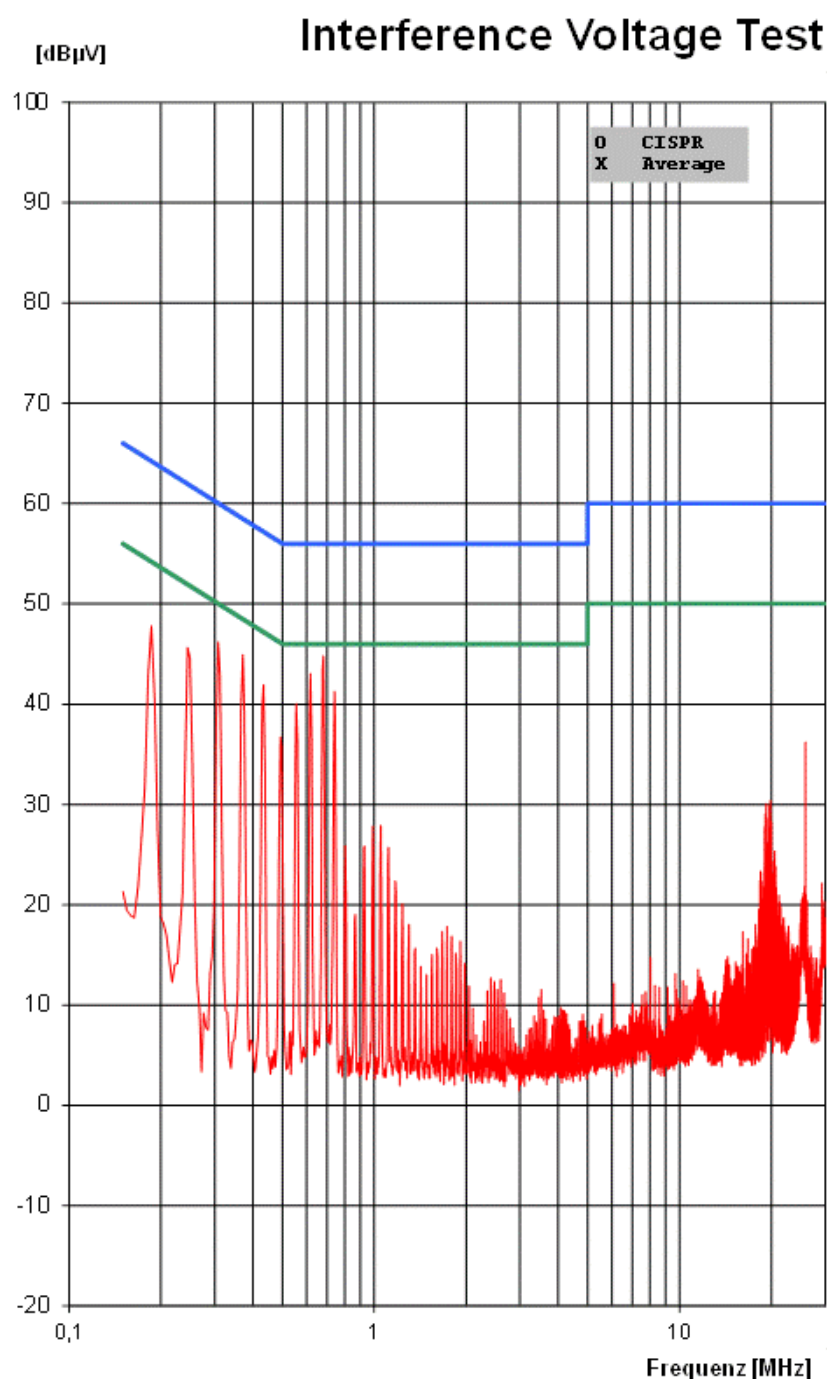
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Torque meter T40B
BG2, BG3, BG4, BG5, BG6

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3.9 Test results - BG5 (S5)

Temperature:	20°C	Humidity:	44%
Tested by:	Martin Müller	Test date:	2014-11-03



REGULATIONS:
47 CFR, 15.207
PEAK / CISPR / AV

TEST EQUIPMENT:
R&S ESCS30 (E00003)
R&S ESH2-Z5 (E00004)

ORDER NO.:
140671-AU02+W02

EUT:
Hottinger Baldwin Messtechnik
GmbH
Torquemeter T40B
BG5 - 5kNm
162112021

OPERATION MODE:
continuous measurement
and data transfer

Mains 120V AC /60Hz
Phase

TEST FACILITY:
EMV TESTHAUS GmbH
Gustav-Hertz-Straße 35
94315 Straubing

DATE / TIME:
2014-11-03 10:49:41
20°C 44% 97kPa

TEST ENGINEER:
Martin Müller

StoSp_11.E10

Picture 11: BG5 - Graphic - Conducted emission on mains, phase 1 (without termination)

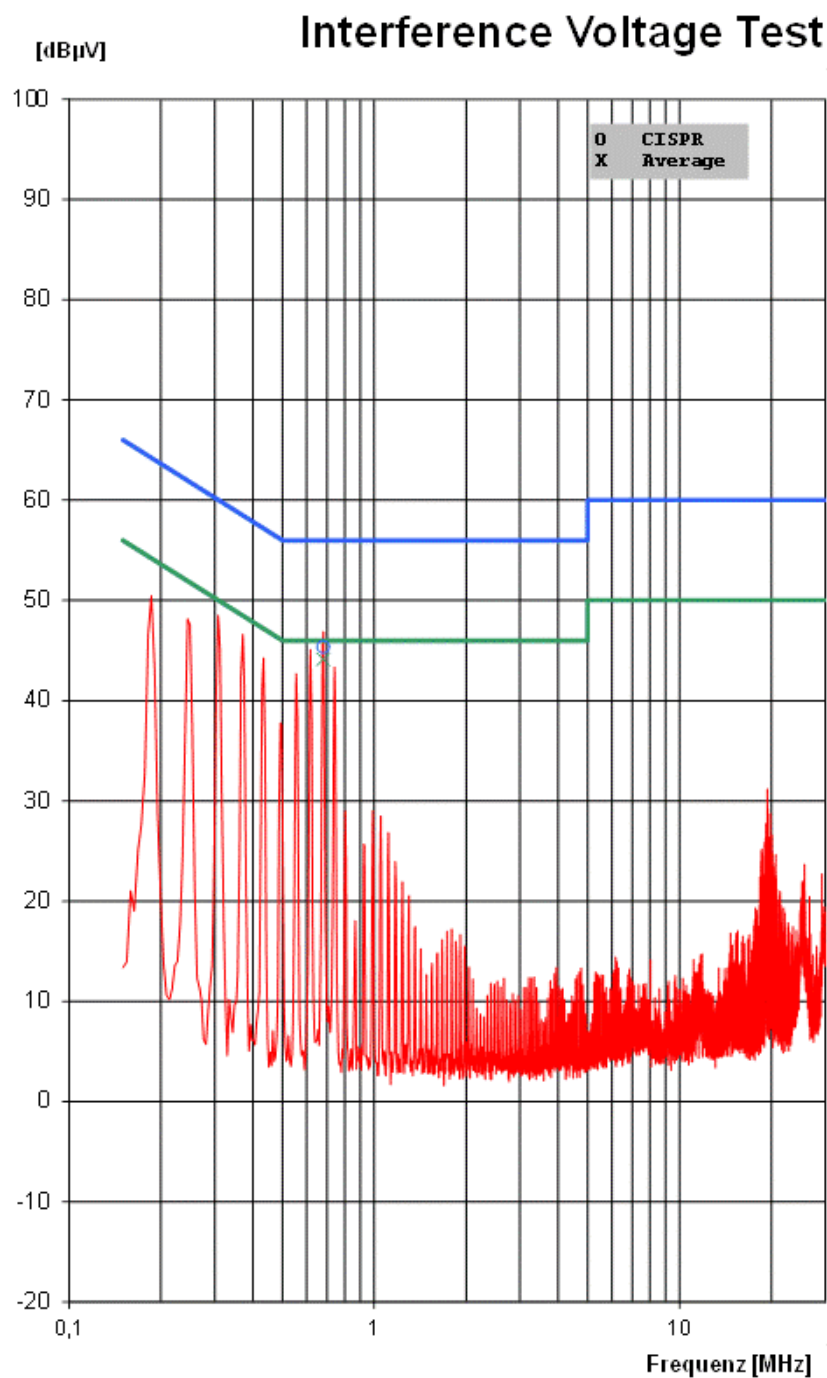


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REGULATIONS:
 47 CFR, 15.207
 PEAK / CISPR / AV

TEST EQUIPMENT:
 R&S ESCS30 (E00003)
 R&S ESH2-Z5 (E00004)

ORDER NO.:
 140671-AU02+W02

EUT:
 Hottinger Baldwin Messtechnik GmbH
 Torquemeter T40B
 BG5 - 5kNm
 162112021

OPERATION MODE:
 continuous measurement
 and data transfer

Mains 120V AC /60Hz
 Neutral

TEST FACILITY:
 EMV TESTHAUS GmbH
 Gustav-Hertz-Straße 35
 94315 Straubing

DATE / TIME:
 2014-11-03 10:50:17
 20°C 44% 97kPa

TEST ENGINEER:
 Martin Müller

StöSp_N.E10

Picture 12: BG5 - Graphic - Conducted emission on mains, neutral (without termination)

Interference Voltage Test

Freq. [MHz]	U_CISPR [dBµV]	Limit [dBµV]	delta_U [dB]	U_AV [dBµV]	Limit [dBµV]	delta_U [dB]	Corr. [dB]	Remark
0,68	45,4	56,0	10,7	44,1	46,0	1,9	0,0	StöSe N.F.10

Picture 13: BG5 - Table - Conducted emission on mains, neutral (without termination)



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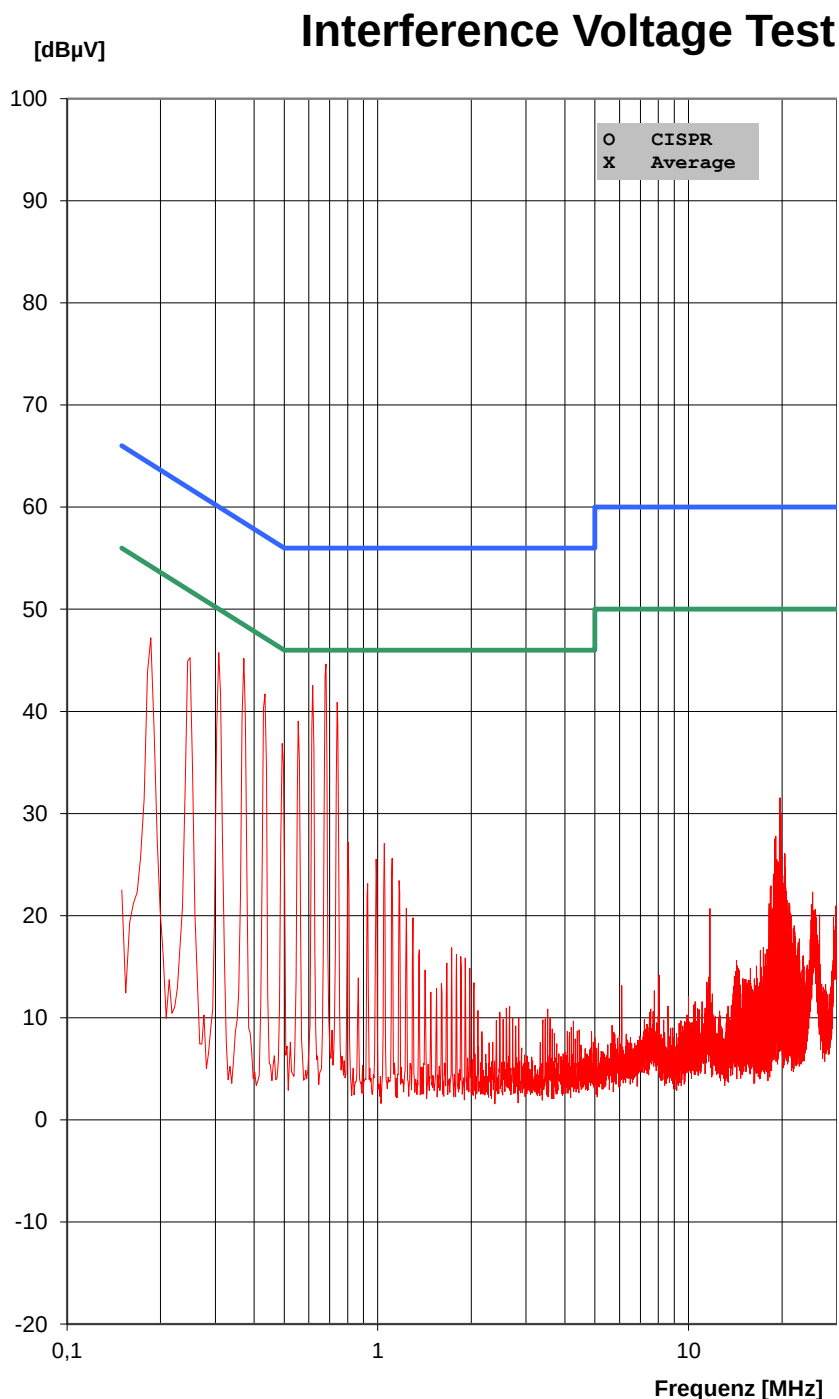
Hottinger Baldwin Messtechnik GmbH
Torque meter T40B
BG2, BG3, BG4, BG5, BG6

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3.10 Test results - BG6 (S6)

Temperature:	20°C	Humidity:	44%
Tested by:	Martin Müller	Test date:	2014-11-03



REGULATIONS:
47 CFR, 15.207
PEAK / CISPR / AV

TEST EQUIPMENT:
R&S ESCS30 (E00003)
R&S ESH2-Z5 (E00004)

ORDER NO.:
140671-AU01+W02

EUT:
Hottinger Baldwin Messtechnik
GmbH
Torquemeter T40B
BG6 - 10kNm
1402B0001

OPERATION MODE:
continous measurement
and data transfer

Mains 120V AC /60Hz
Phase

TEST FACILITY:
EMV TESTHAUS GmbH
Gustav-Hertz-Straße 35
94315 Straubing

DATE / TIME:
2014-11-03 10:21:20
20°C 44% 97kPa

TEST ENGINEER:
Martin Müller

StöSp_L1.E10

Picture 14: BG6 - Graphic - Conducted emission on mains, phase 1 (without termination)

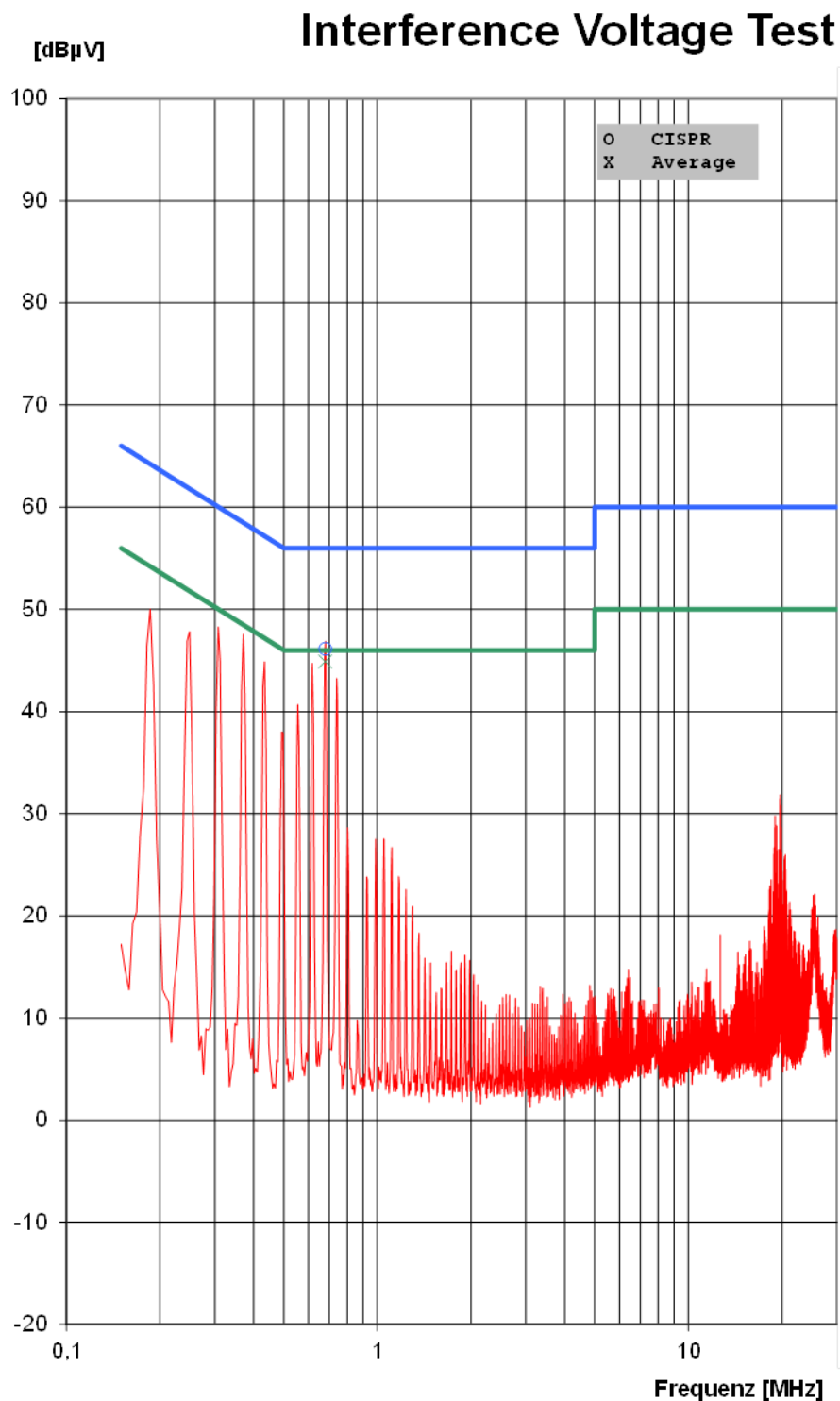


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REGULATIONS:
 47 CFR, 15.207
 PEAK / CISPR / AV

TEST EQUIPMENT:
 R&S ESCS30 (E00003)
 R&S ESH2-Z5 (E00004)

ORDER NO.:
 140671-AU01+W02

EUT:
 Hottinger Baldwin Messtechnik
 GmbH
 Torquemeter T40B
 BG6 - 10kNm
 1402B0001

OPERATION MODE:
 continous measurement
 and data transfer

Mains 120V AC /60Hz
 Neutral

TEST FACILITY:
 EMV TESTHAUS GmbH
 Gustav-Hertz-Straße 35
 94315 Straubing

DATE / TIME:
 2014-11-03 10:24:08
 20°C 44% 97kPa

TEST ENGINEER:
 Martin Müller

StöSp_N.E10

Picture 15: BG6 - Graphic - Conducted emission on mains, neutral (without termination)



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Interference Voltage Test

Freq. [MHz]	U_CISPR [dBµV]	Limit [dBµV]	delta_U [dB]	U_AV [dBµV]	Limit [dBµV]	delta_U [dB]	Corr. [dB]	Remark
0,68	46,1	56,0	9,9	44,9	46,0	1,1	0,0	StöSp_N F10

Picture 16: BG6 - Table - Conducted emission on mains, neutral (without termination)

4 Radiated emission measurement (<1 GHz)

according to 47 CFR Part 15, section 15.205(a), 15.209(a),
RSS-210, section 2.5 with RSS-Gen, sections 7.2.2 and 7.2.5

4.1 Test Location

- ☒ Scan with peak detector in 3 m CDC.
- ☒ Final CISPR measurement with quasi peak detector on 3 m open area test site.

Description	Manufacturer	Inventory No.
CDC	Albatross Projects	E00026
Open area test site (OATS)	EMV TESTHAUS GmbH	E00354

4.2 Test instruments

	Description	Manufacturer	Inventory No.
☒	ESCS 30 (FF)	Rohde & Schwarz	E00551
☐	ESU 26	Rohde & Schwarz	W00002
☒	ESCI (CDC)	Rohde & Schwarz	E00001
☒	VULB 9163 (FF)	Schwarzbeck	E00013
☒	VULB 9160 (CDC)	Schwarzbeck	E00011
☒	HFH2-Z2	Rohde & Schwarz	E00060
☒	Feedline OATS	Huber & Suhner	200024



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4.3 Limits

The field strength of any emissions including spurious emissions falling into restricted bands as specified in 15.205(a) shall not exceed the general radiated emission limits as specified in 15.209.

Frequency [MHz]	Field strength Fs [μ V/m]	Field strength [dB μ V/m]	Measurement distance d [m]
0.009 – 0.490	266.6 – 4.9	48.5 – 13.8	300
0.490 – 1.705	48.98 – 14.08	33.8 – 22.97	30
1.705 – 30.0	30	29.54	30
30 – 88	100	40	3
88 – 216	150	43.5	3
216 - 960	200	46	3
Above 960	500	54	3



4.4 Test procedure

1. EUT was configured according to ANSI C63.4. It was placed on the top of the turntable 0.8 meter above ground. The receiving antenna was placed 3 meters from the turntable. The test setup was placed inside a compact diagnostic chamber.
2. EUT and all peripherals were powered on.
3. The broadband antenna was set to vertical polarization.
4. The EMI receiver performed a scan from 30 MHz to 1000 MHz with peak detector peak and measurement bandwidth set to 120 kHz.
5. The turn table was rotated to 6 different positions ($360^\circ / 6$) and the antenna polarization was changed to horizontal.
6. Test procedure at step 4 and 5 was repeated.
7. The test setup was then placed in an OATS at 3 m distance and all peak values over or with less margin to the limit than 6dB were marked and re-measured with a quasi-peak detector.
8. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
9. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emission field strength of both horizontal and vertical polarization. The highest value was recorded.
10. For emissions below 30 MHz measurements were done using a loop antenna. Prescans were performed with peak detector and final measurements with quasi-peak except for the frequency bands 9 to 90 kHz and 110 to 490 kHz where average detector applies. Antenna height was not changed during this test. Appropriate CISPR bandwidths of 200 Hz for frequencies up to 150 kHz and 9 or 10 kHz for frequencies above were used.



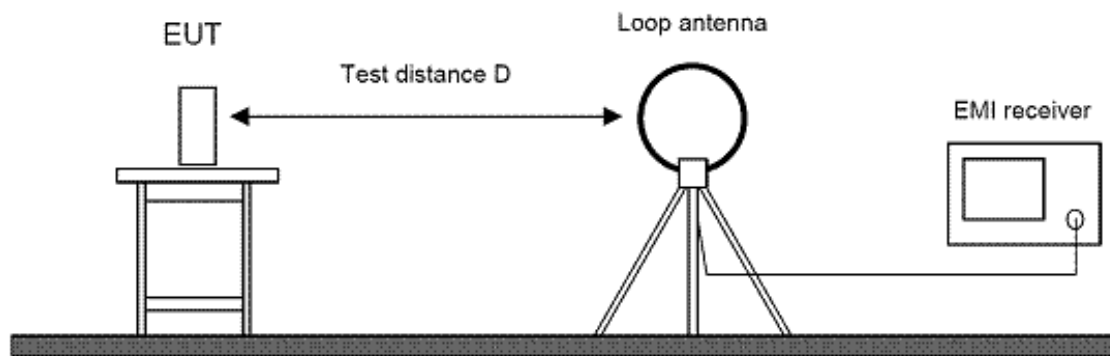
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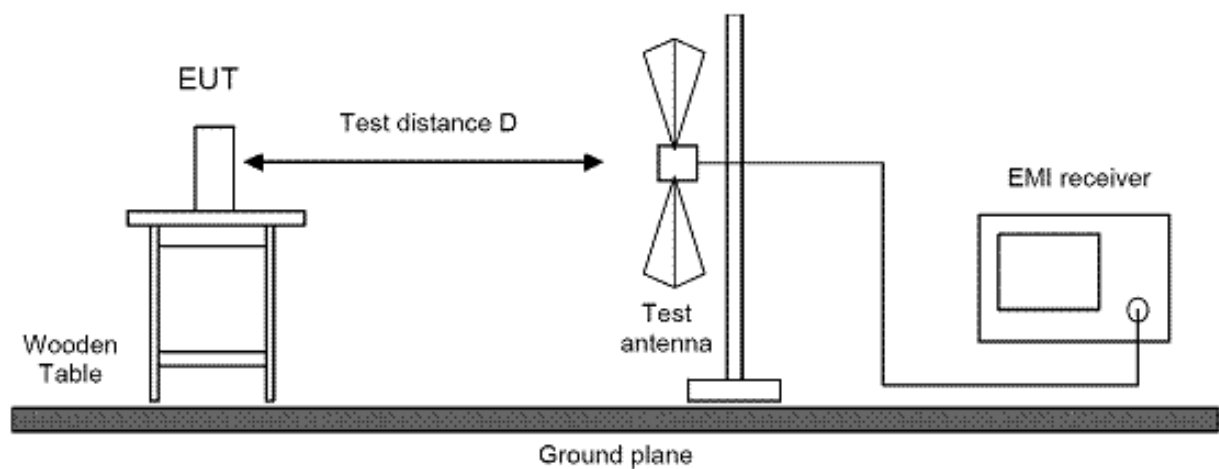
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4.5 Test setup



Picture 17: Test setup for radiated emission measurement (< 30 MHz)



Picture 18: Test setup for radiated emission measurement (< 1 GHz)

4.6 Test deviation

There is no deviation from the standards referred to.

4.7 Test results - BG2 (S2)

Temperature:	20°C	Humidity:	41%
Tested by:	Martin Müller	Test date:	2014-10-22

Radiated Emission Measurement 9 kHz - 30 MHz

Test procedure

The EUT was placed in a full anechoic chamber and the spurious emission testing was performed in accordance with ANSI C63.4, and 47 CFR Part 15, Subpart C. The measurement distance was 3 m.

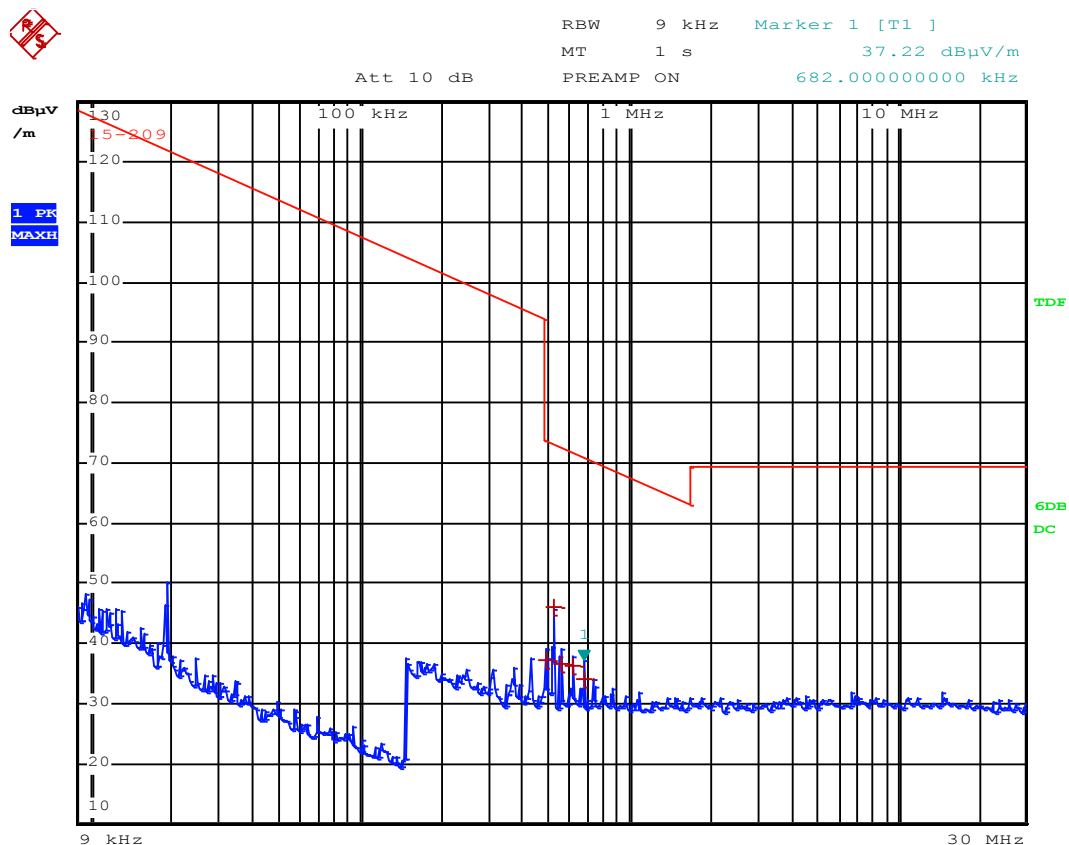


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EDIT PEAK LIST (Final Measurement Results)			
Trace1:	15-209		
Trace2:	---		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBμV/m	DELTA LIMIT dB
1 Quasi Peak	494 kHz	37.26	-36.46
1 Quasi Peak	522 kHz	46.04	-27.20
1 Quasi Peak	558 kHz	36.53	-36.14
1 Quasi Peak	618 kHz	36.14	-35.64
1 Quasi Peak	682 kHz	34.10	-36.83

Picture 19: BG2 - Radiated emission 9 kHz – 30 MHz @ 3m distance

Frequency (kHz)	Measured value (dBµV/m)	Detector	Recalculation factor (dB/decade)	Field strength (dBµV/m)	Limit (dBµV/m)	Margin	Result
494	37.26	QP	40	-2.74	33.73	36.47	PASS
¹⁾ 522	46.04	QP	40	6.04	33.25	27.21	PASS
558	36.53	QP	40	-3.47	32.67	36.14	PASS
618	36.14	QP	40	-3.86	31.78	35.64	PASS
682	34.10	QP	40	-5.90	30.93	36.83	PASS

¹⁾ Note:

Measured value = 46.04 dBµV/m @ 3 m

Recalculation factor = 40 dB / decade

Recalculated value = 46.04 dBµV/m @ 3 m - 40 dB = **6.04 dBµV/m @ 30 m**



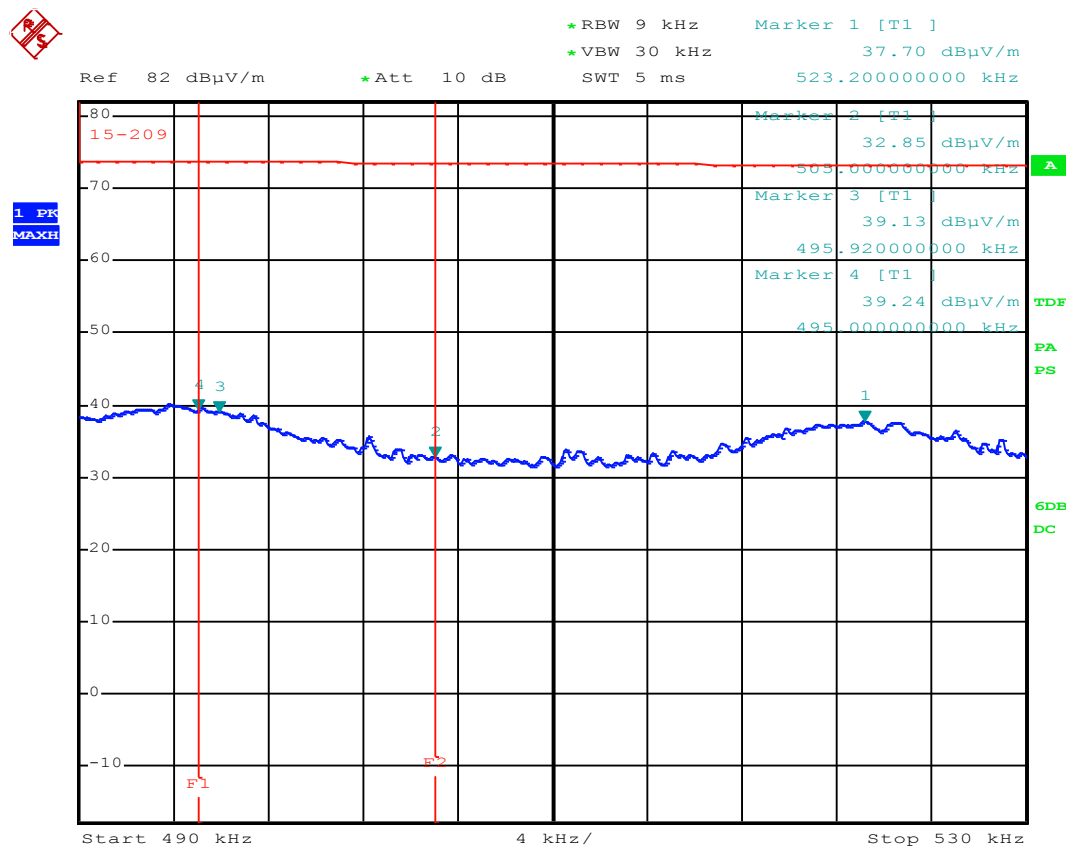
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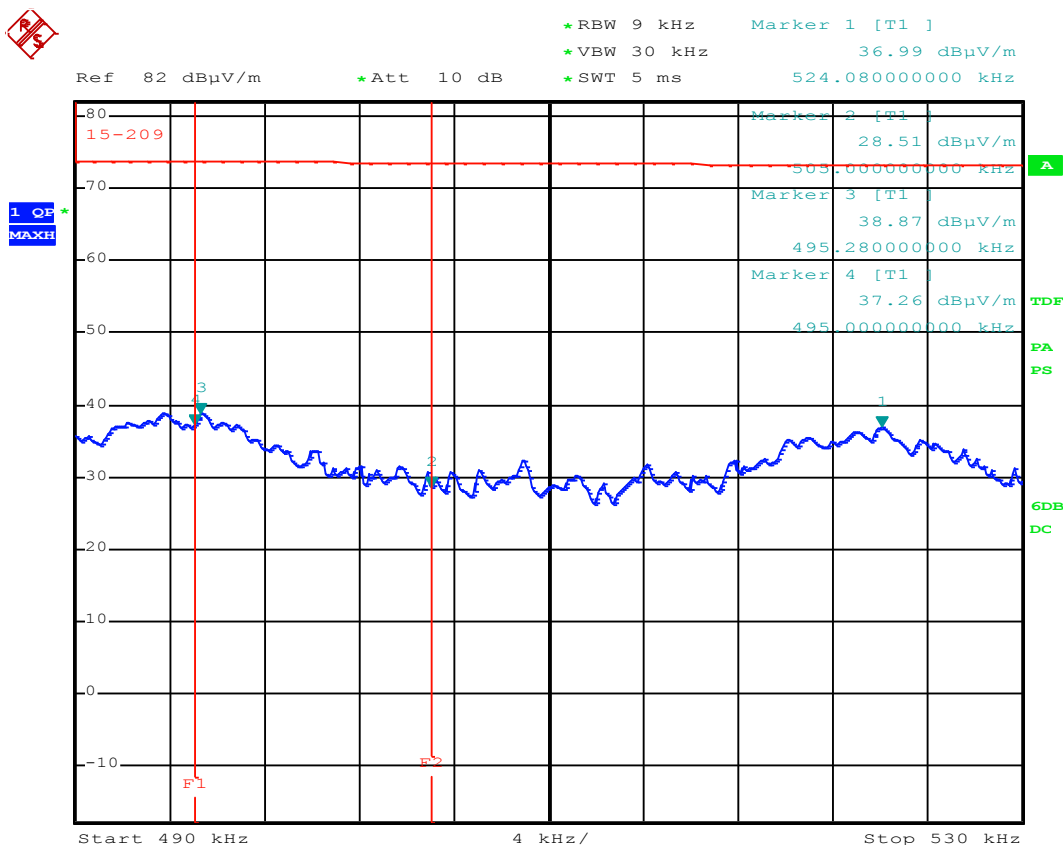
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Restricted Band (495 kHz - 505 kHz)



Picture 20: BG2 - Restricted Band - PK @ 3m distance



Picture 21: BG2 - Restricted Band - QP @ 3m distance

Frequency (kHz)	Measured value (dBµV/m)	Detector	Recalculation factor (dB/decade)	Field strength (dBµV/m)	Limit (dBµV/m)	Margin	Result
495.00	39.24	PK	40	-0.76	----	----	PASS
495.00	37.26	QP	40	-2.74	33.71	36.45	PASS
495.92	39.13	PK	40	-0.87	----	----	PASS
495.28	38.87	QP	40	-1.13	33.70	34.83	PASS
505.00	32.85	PK	40	-7.15	----	----	PASS
505.00	28.51	QP	40	-11.49	33.54	45.03	PASS
523.20	37.70	PK	40	-2.30	----	----	PASS
¹⁾ 524.08	36.99	QP	40	-3.01	33.21	36.22	PASS

¹⁾ Note:

Measured value = 36.99 dBµV/m @ 3 m

Recalculation factor = 40 dB / decade

Recalculated value = 36.99 dBµV/m @ 3 m - 40 dB = **-3.01 dBµV/m @ 30 m**

Additional note:

Emissions in restricted band are spurious emissions not caused by carrier or modulation.



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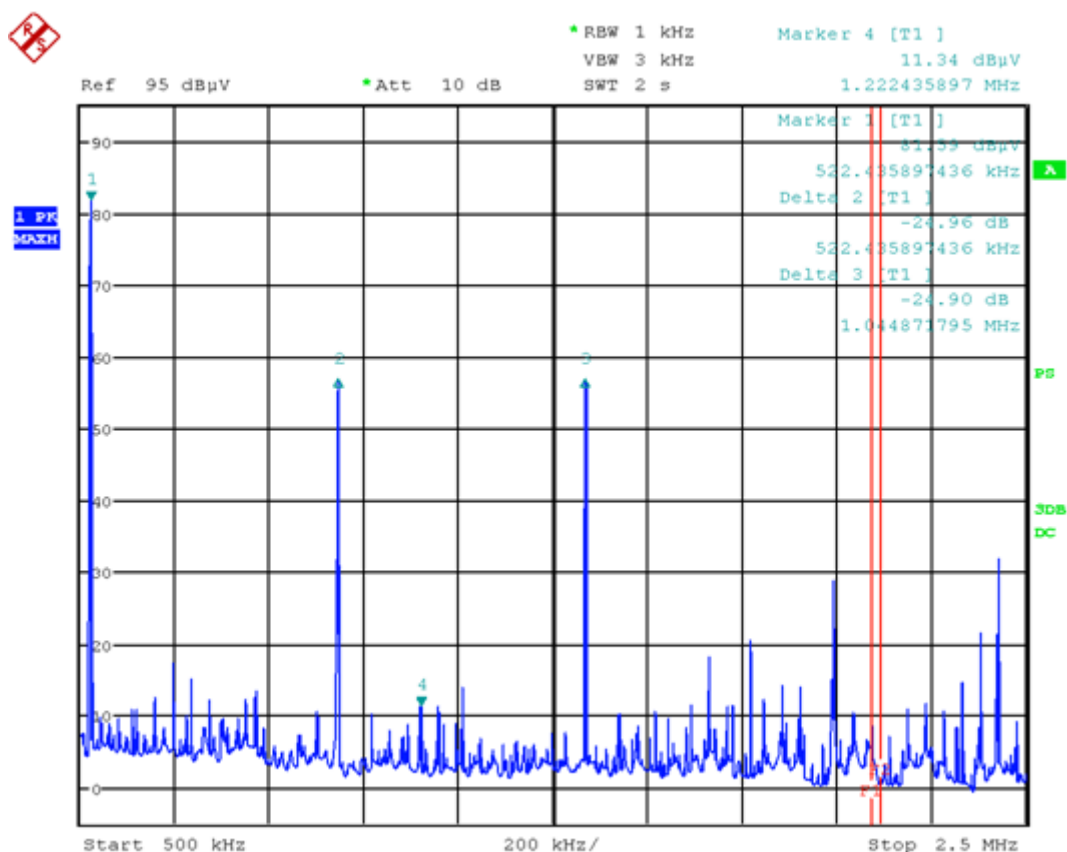
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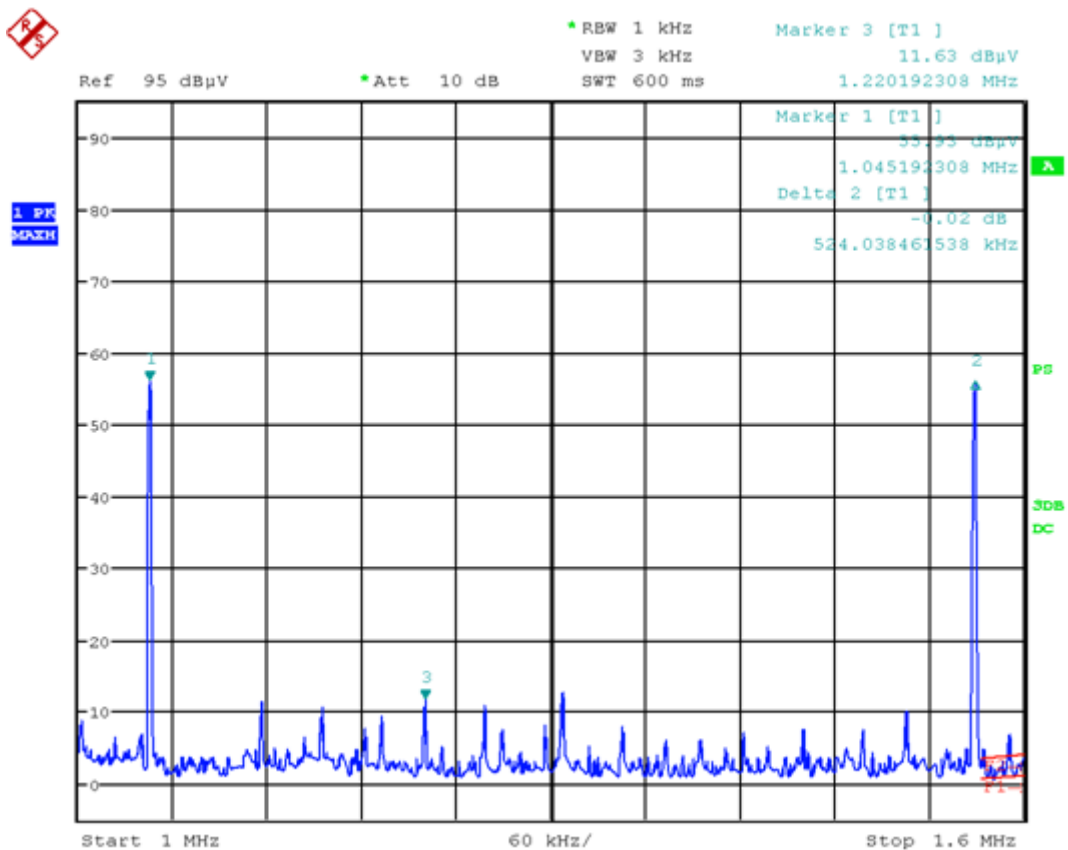
Restricted Band (2.1735 MHz - 2.1905 MHz)

Remark: This measurement was performed using magnetic field probe RF-R 400-1 to show that there are no emissions caused by carrier or modulation. During the “radiated emission 9kHz - 30MHz”-measurement no carrier at 1.22 MHz was detected because of its low amplitude. The setup is documented in Annex A.



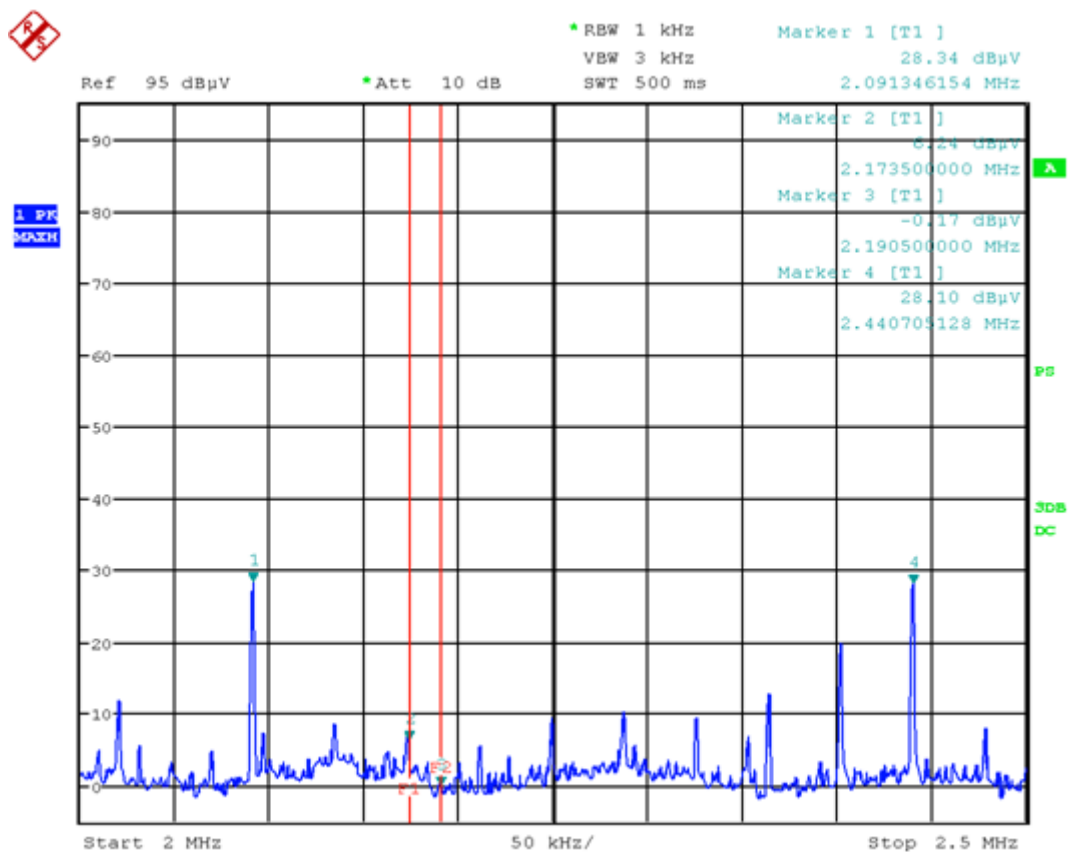
f [MHz]	E _{meas} [dBμV]	Detector	Remark
0.5224	81.59	PK	carrier power supply
1.0449	56.63	PK	2 nd harmonic power supply
1.2200	11.34	PK	carrier data transfer
1.5673	56.69	PK	3 rd harmonic power supply

Picture 22: BG2 - carrier (1.22 MHz) and restricted band



f [MHz]	E _{meas} [dBμV]	Detector	Remark
1.0452	55.93	PK	2 nd harmonic power supply
1.2200	13.88	PK	carrier data transfer
1.5692	55.91	PK	3 rd harmonic power supply

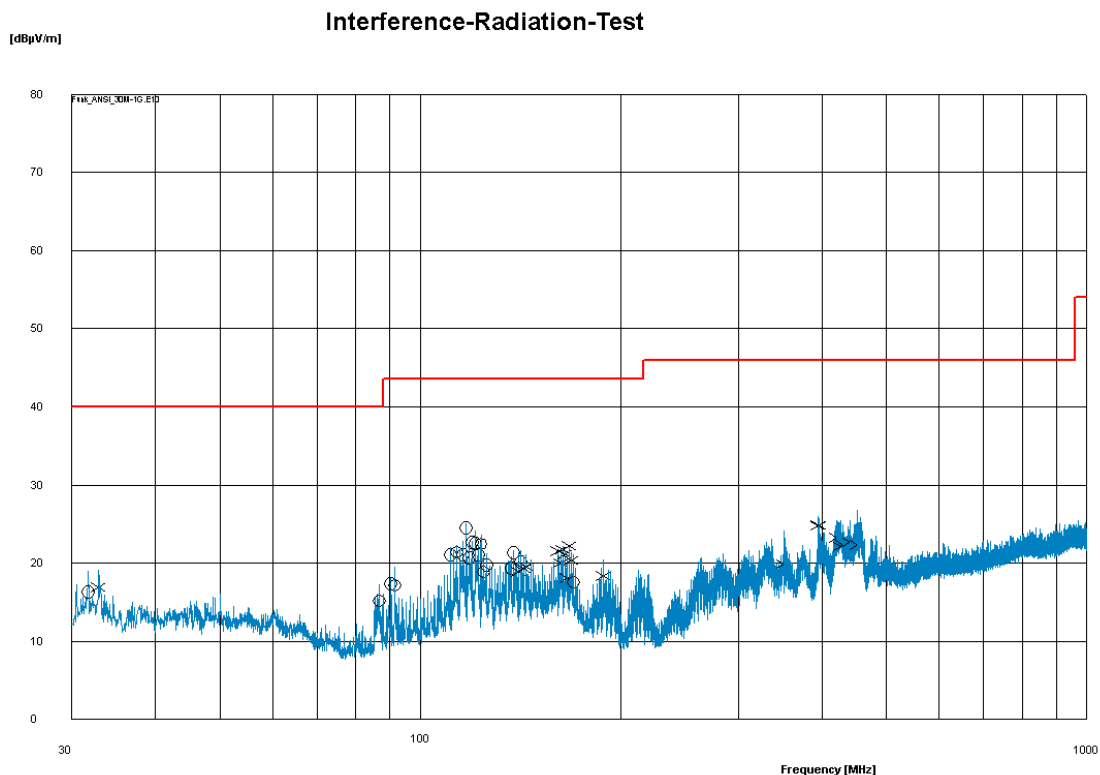
Picture 23: BG2 - zoomed to carrier (1.22 MHz)



f [MHz]	E _{meas} [dBμV]	Detector	Remark
2.0913	28.34	PK	4 th harmonic power supply
2.1735	6.24	PK	lower edge restricted band
2.1905	-0.17	PK	upper edge restricted band
2.4407	18.10	PK	- - - -

Picture 24: BG2 - zoomed to restricted band

Radiated Emission Measurement 30 MHz - 1000 MHz



M.	Freq [M...]	VMaxC...	Corr...	Limit	dLimit	Pol	Ant	TT	Date	Remarks	VScal...	Corr...
✓	31.74	16.3	12.1	40.0	- 23.7	H	100	151	2014-10-22 17:19...		19.0	0.0
✓	32.88	16.9	12.1	40.0	- 23.1	V	100	232	2014-10-22 17:01...		19.1	0.0
✓	86.64	15.2	9.5	40.0	- 24.8	H	100	331	2014-10-22 17:20...		17.3	0.0
✓	90.3	17.3	9.8	43.5	- 26.2	H	100	191	2014-10-22 17:21...		18.1	0.0
✓	91.5	17.2	9.9	43.5	- 26.4	H	100	183	2014-10-22 17:22...		19.5	0.0
✓	111	21.0	11.6	43.5	- 22.5	H	100	191	2014-10-22 17:23...		22.0	0.0
✓	113.46	21.4	11.8	43.5	- 22.1	H	100	195	2014-10-22 17:24...		22.3	0.0
✓	115.92	21.1	12.1	43.5	- 22.4	H	100	206	2014-10-22 17:25...		22.7	0.0
✓	117.12	24.5	12.2	43.5	- 19.0	H	100	195	2014-10-22 17:26...		25.0	0.0
✓	118.38	20.6	12.3	43.5	- 22.9	H	100	206	2014-10-22 17:27...		22.6	0.0
✓	119.58	22.6	12.5	43.5	- 20.9	H	100	208	2014-10-22 17:28...		22.8	0.0
✓	120.84	22.5	12.6	43.5	- 21.0	H	100	206	2014-10-22 17:29...		24.1	0.0
✓	122.04	21.0	12.6	43.5	- 22.5	H	100	195	2014-10-22 17:30...		22.3	0.0
✓	123.24	22.5	12.6	43.5	- 21.1	H	100	207	2014-10-22 17:31...		23.5	0.0
✓	124.44	18.9	12.6	43.5	- 24.6	H	100	195	2014-10-22 17:32...		20.9	0.0
✓	125.7	19.7	12.6	43.5	- 23.8	H	100	207	2014-10-22 17:33...		21.2	0.0
✓	136.68	19.3	13.1	43.5	- 24.2	H	100	208	2014-10-22 17:34...		20.8	0.0
✓	137.88	21.4	13.2	43.5	- 22.2	H	100	206	2014-10-22 17:34...		21.6	0.0
✓	140.34	18.9	13.3	43.5	- 24.7	V	100	169	2014-10-22 17:02...		21.3	0.0
✓	141.54	20.1	13.4	43.5	- 23.4	H	100	208	2014-10-22 17:35...		21.6	0.0
✓	142.74	19.3	13.4	43.5	- 24.2	V	100	178	2014-10-22 17:02...		20.9	0.0
✓	144	19.5	13.5	43.5	- 24.0	V	100	169	2014-10-22 17:03...		21.0	0.0
✓	161.04	21.6	14.1	43.5	- 21.9	V	100	274	2014-10-22 17:04...		21.3	0.0
✓	162.3	20.0	14.0	43.5	- 23.5	V	100	261	2014-10-22 17:05...		21.1	0.0
✓	163.5	21.7	13.9	43.5	- 21.8	V	100	273	2014-10-22 17:06...		22.1	0.0
✓	164.7	21.1	13.8	43.5	- 22.4	V	100	261	2014-10-22 17:07...		21.6	0.0
✓	166.02	18.1	13.7	43.5	- 25.5	V	100	273	2014-10-22 17:08...		21.1	0.0
✓	167.16	22.2	13.6	43.5	- 21.3	V	100	261	2014-10-22 17:09...		21.9	0.0
✓	168.36	20.4	13.5	43.5	- 23.2	V	100	274	2014-10-22 17:10...		21.3	0.0
✓	169.62	17.6	13.3	43.5	- 26.0	H	100	315	2014-10-22 17:36...		21.1	0.0
✓	187.86	18.4	10.9	43.5	- 25.1	V	100	8	2014-10-22 17:11...		20.4	0.0
✓	351.36	19.9	13.7	46.0	- 26.1	V	100	-1	2014-10-22 17:12...		24.1	0.0
✓	394.86	24.8	14.6	46.0	- 21.2	V	100	343	2014-10-22 17:13...		25.9	0.0
✓	395.82	24.8	14.6	46.0	- 21.2	V	100	352	2014-10-22 17:14...		25.7	0.0
✓	421.62	23.2	15.2	46.0	- 22.8	V	100	343	2014-10-22 17:15...		25.4	0.0
✓	426.66	22.1	15.3	46.0	- 23.9	V	100	29	2014-10-22 17:16...		25.5	0.0
✓	430.2	22.3	15.4	46.0	- 23.7	V	100	331	2014-10-22 17:17...		24.9	0.0
✓	441.12	22.7	15.6	46.0	- 23.3	V	100	286	2014-10-22 17:17...		25.5	0.0
✓	451.98	22.3	15.8	46.0	- 23.7	V	100	62	2014-10-22 17:18...		26.7	0.0

Picture 25: BG2 - Radiated emission 30 MHz - 1000MHz @ 3m distance



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4.8 Test results - BG3 (S3)

Temperature:	20°C	Humidity:	41%
Tested by:	Martin Müller	Test date:	2014-10-22

Radiated Emission Measurement 9 kHz - 30 MHz

Test procedure

The EUT was placed in a full anechoic chamber and the spurious emission testing was performed in accordance with ANSI C63.4, and 47 CFR Part 15, Subpart C. The measurement distance was 3 m.

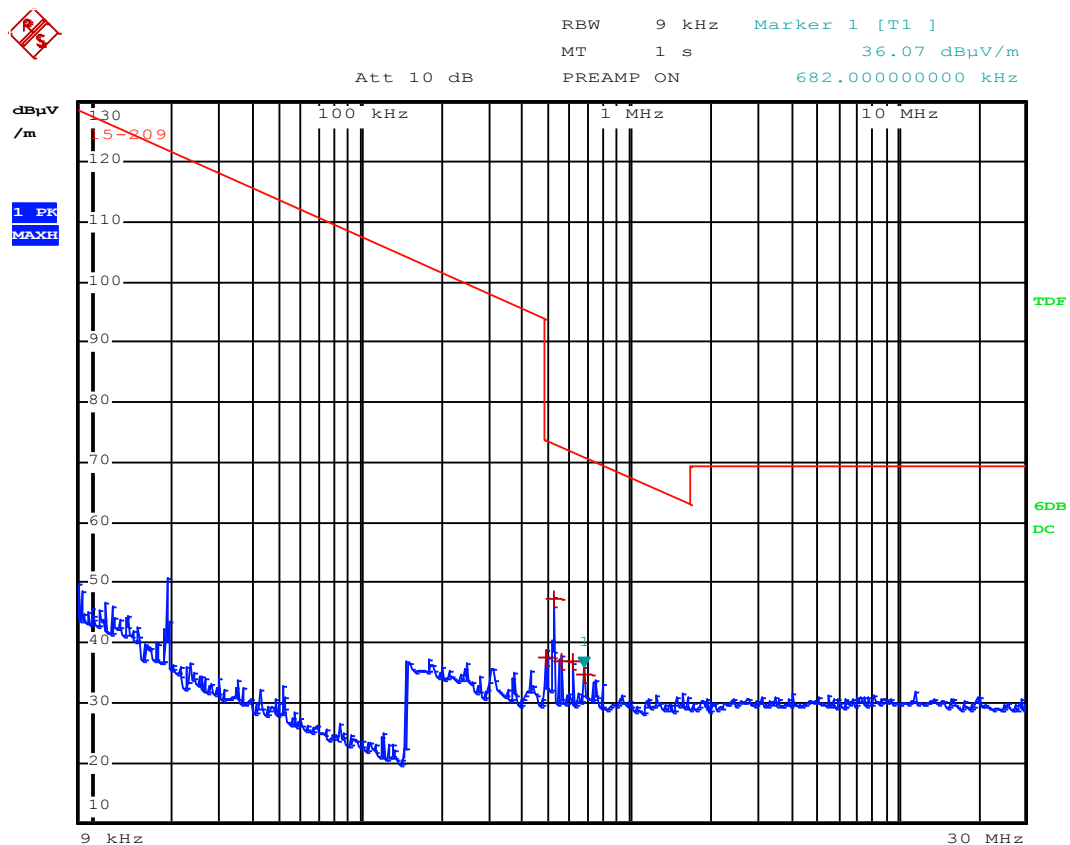


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EDIT PEAK LIST (Final Measurement Results)			
Trace1:	15-209		
Trace2:	---		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBμV/m	DELTA LIMIT dB
1 Quasi Peak	494 kHz	37.44	-36.29
1 Quasi Peak	522 kHz	47.20	-26.04
1 Quasi Peak	558 kHz	36.99	-35.67
1 Quasi Peak	618 kHz	36.98	-34.80
1 Quasi Peak	682 kHz	34.66	-36.27

Picture 26: BG3 - Radiated emission 9 kHz – 30 MHz @ 3m distance

Frequency (kHz)	Measured value (dBµV/m)	Detector	Recalculation factor (dB/decade)	Field strength (dBµV/m)	Limit (dBµV/m)	Margin	Result
494	37.44	QP	40	-2.56	33.73	36.29	PASS
¹⁾ 522	47.20	QP	40	7.20	33.25	26.05	PASS
558	36.99	QP	40	-3.01	32.67	35.68	PASS
618	36.98	QP	40	-3.02	31.78	34.80	PASS
682	34.66	QP	40	-5.34	30.93	36.27	PASS

¹⁾ Note:

Measured value = 47.20 dBµV/m @ 3 m

Recalculation factor = 40 dB / decade

Recalculated value = 47.20 dBµV/m @ 3 m - 40 dB = **7.20 dBµV/m @ 30 m**



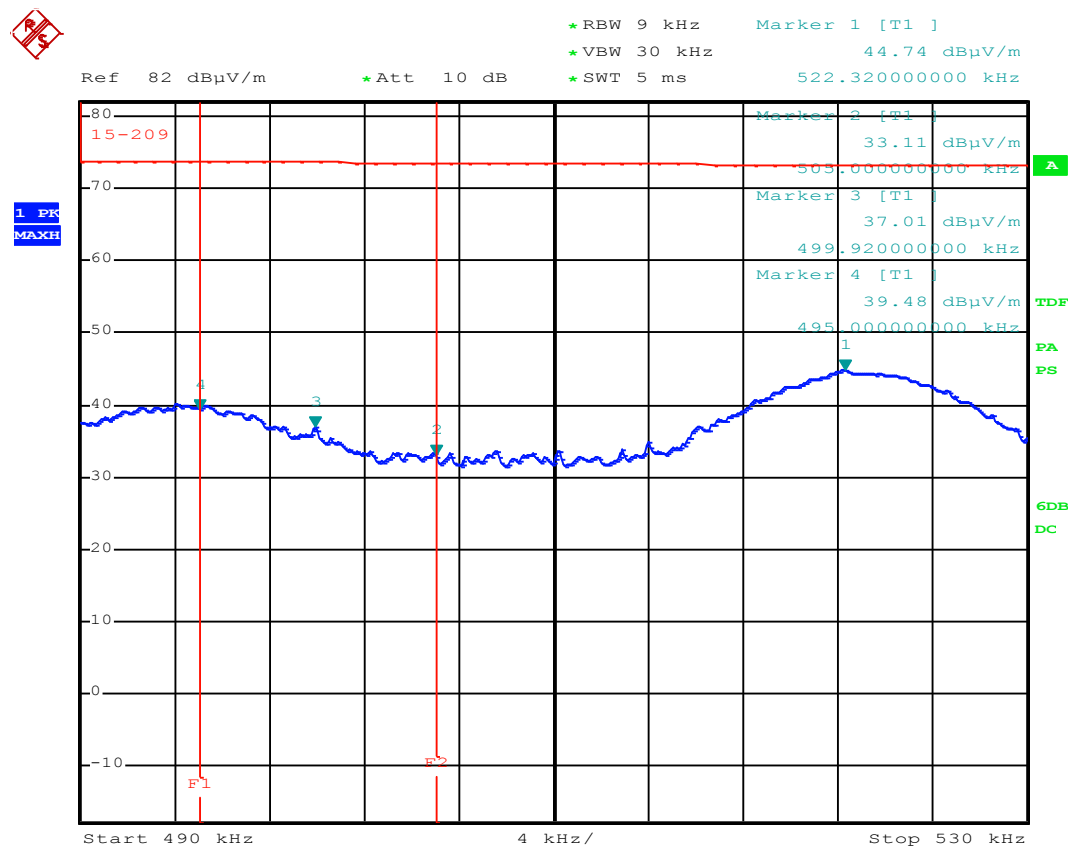
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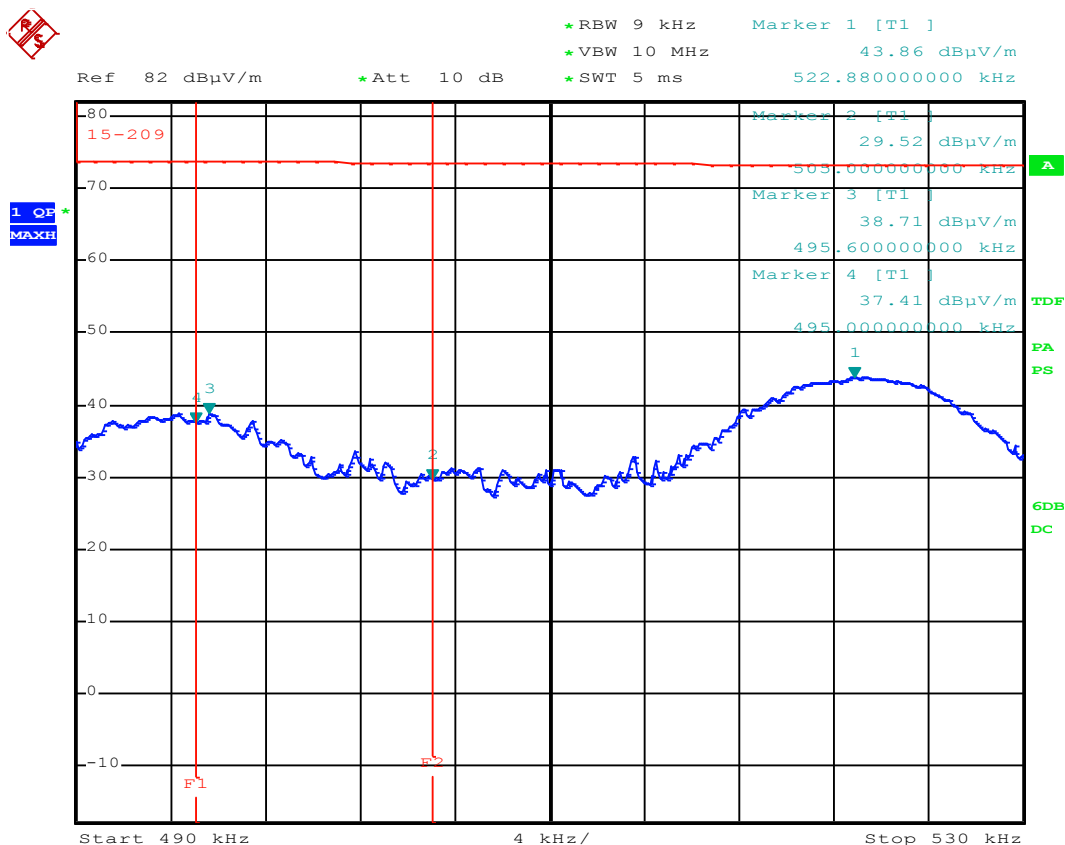
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Restricted Band (495 kHz - 505 kHz)



Picture 27: BG3 - Restricted Band - PK @ 3m distance



Picture 28: BG3 - Restricted Band - QP @ 3m distance

Frequency (kHz)	Measured value (dBμV/m)	Detector	Recalculation factor (dB/decade)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin	Result
495.00	39.48	PK	40	-0.52	----	----	PASS
495.00	37.41	QP	40	-2.59	33.71	36.30	PASS
499.92	37.01	PK	40	-2.99	----	----	PASS
495.60	38.71	QP	40	-1.29	33.70	34.99	PASS
505.00	33.11	PK	40	-6.89	----	----	PASS
505.00	29.52	QP	40	-10.48	33.54	44.02	PASS
522.32	44.74	PK	40	4.74	----	----	PASS
¹⁾ 522.88	43.86	QP	40	3.86	33.24	29.38	PASS

¹⁾ Note:

Measured value = 43.86 dBμV/m @ 3 m

Recalculation factor = 40 dB / decade

Recalculated value = 43.86 dBμV/m @ 3 m - 40 dB = **3.86 dBμV/m @ 30 m**

Additional note:

Emissions in restricted band are spurious emissions not caused by carrier or modulation.



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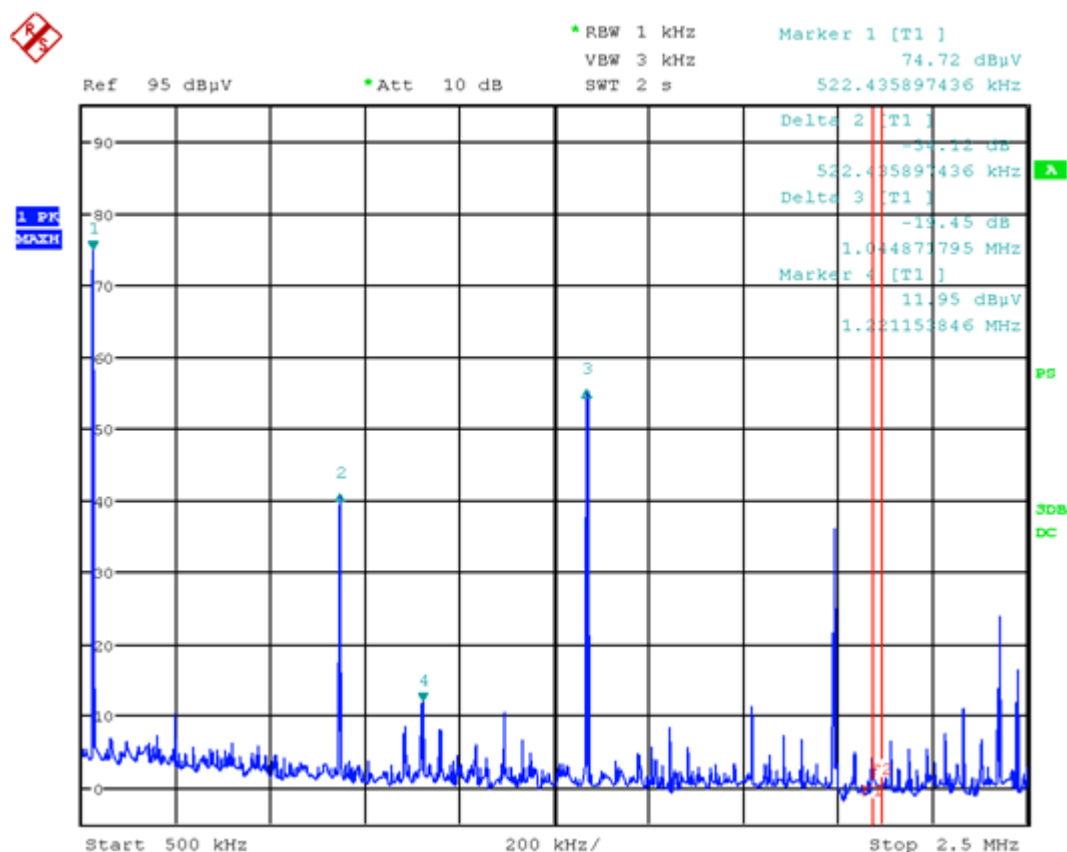
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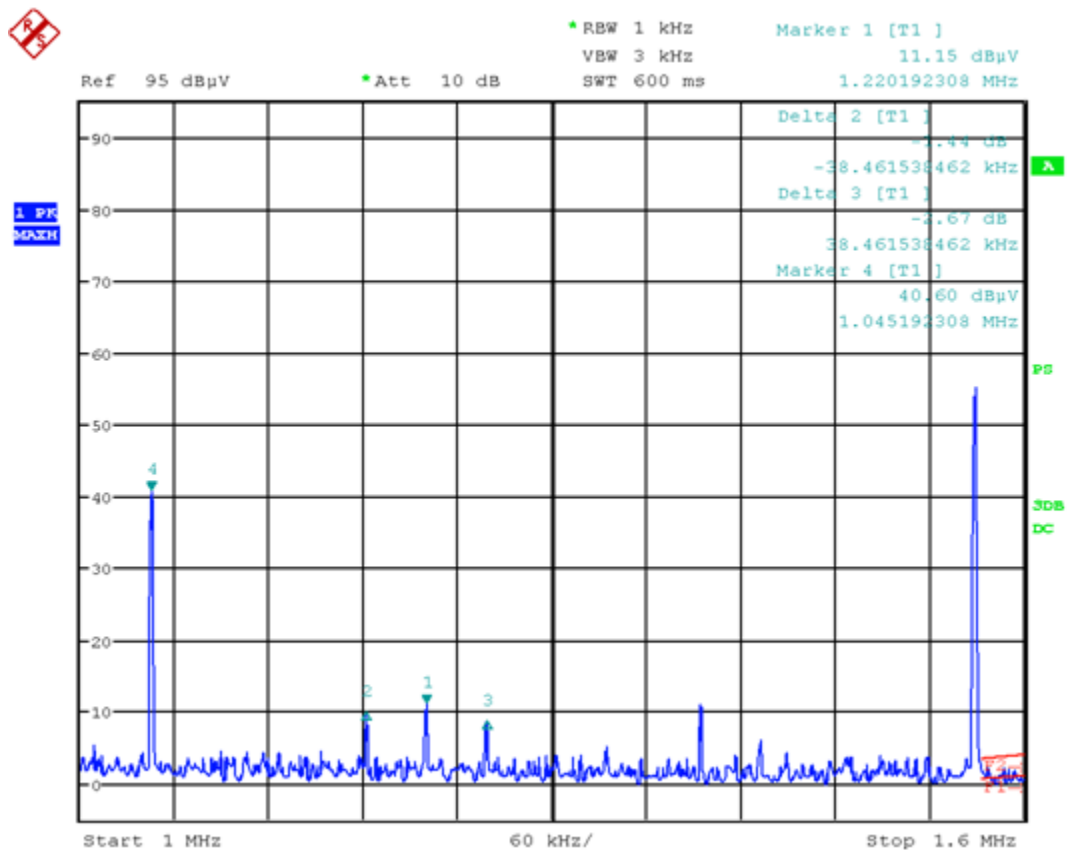
Restricted Band (2.1735 MHz - 2.1905 MHz)

Remark: This measurement was performed using magnetic field probe RF-R 400-1 to show that there are no emissions caused by carrier or modulation. During the “radiated emission 9kHz - 30MHz”-measurement no carrier at 1.22 MHz was detected because of its low amplitude. The setup is documented in Annex A.



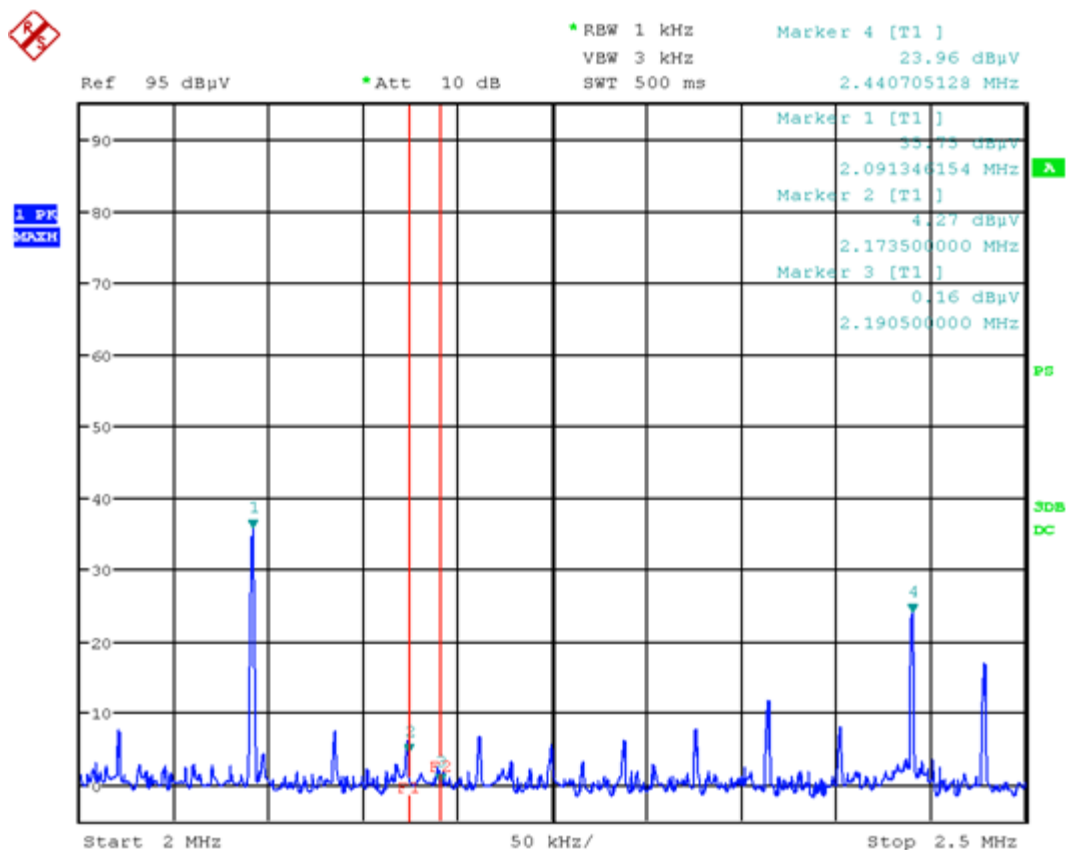
f [MHz]	E _{meas} [dBμV]	Detector	Remark
0.5224	74.72	PK	carrier power supply
1.0449	40.06	PK	2 nd harmonic power supply
1.2200	11.95	PK	carrier data transfer
1.5673	55.27	PK	3 rd harmonic power supply

Picture 29: BG3 - carrier (1.22 MHz) and restricted band



f [MHz]	E _{meas} [dBμV]	Detector	Remark
1.0452	40.60	PK	2 nd harmonic power supply
1.1817	9.71	PK	lower sideband data transfer
1.2202	11.15	PK	carrier data transfer
1.2587	8.48	PK	upper sideband data transfer

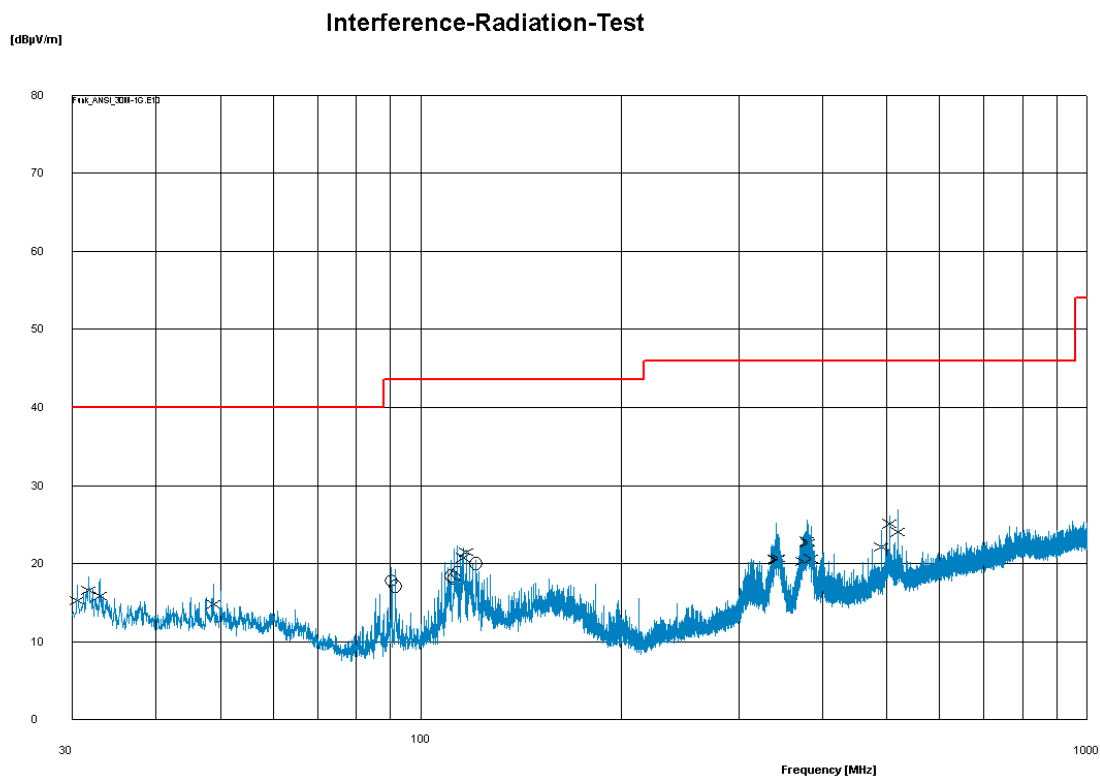
Picture 30: BG3 - zoomed to carrier (1.22 MHz)



f [MHz]	E _{meas} [dBμV]	Detector	Remark
2.0913	35.75	PK	4 th harmonic power supply
2.1735	4.27	PK	lower edge restricted band
2.1905	0.16	PK	upper edge restricted band
2.4407	23.96	PK	- - - -

Picture 31: BG3 - zoomed to restricted band

Radiated Emission Measurement 30 MHz - 1000 MHz



M.	Freq [M...]	VMaxC...	Corr...	Limit	dLimit	Pol	Ant	TT	Date	Remarks	VScal...	Corr ...
✓	30.48	15.3	12.2	40.0	- 24.7	V	100	237	2014-10-22 16:19...		17.3	0.0
✓	31.74	16.6	12.1	40.0	- 23.4	V	100	224	2014-10-22 16:19...		18.2	0.0
✓	32.94	15.9	12.1	40.0	- 24.1	V	100	206	2014-10-22 16:20...		18.0	0.0
✓	48.78	14.8	12.7	40.0	- 25.2	V	100	262	2014-10-22 16:21...		17.3	0.0
✓	90.3	17.8	9.8	43.5	- 25.7	H	100	342	2014-10-22 16:34...		19.5	0.0
✓	91.5	17.1	9.9	43.5	- 26.5	H	100	343	2014-10-22 16:35...		19.2	0.0
✓	111	18.4	11.6	43.5	- 25.1	H	100	340	2014-10-22 16:36...		20.5	0.0
✓	112.26	18.2	11.7	43.5	- 25.4	H	100	331	2014-10-22 16:36...		21.9	0.0
✓	113.46	18.8	11.8	43.5	- 24.7	H	100	340	2014-10-22 16:37...		22.2	0.0
✓	115.92	20.7	12.1	43.5	- 22.8	V	100	111	2014-10-22 16:22...		22.0	0.0
✓	117.12	21.5	12.2	43.5	- 22.1	V	100	127	2014-10-22 16:23...		21.7	0.0
✓	120.78	20.0	12.5	43.5	- 23.5	H	100	195	2014-10-22 16:38...		20.3	0.0
✓	339.84	20.5	13.5	46.0	- 25.5	V	100	261	2014-10-22 16:24...		23.1	0.0
✓	341.82	20.5	13.6	46.0	- 25.5	V	100	261	2014-10-22 16:25...		25.1	0.0
✓	343.38	20.7	13.6	46.0	- 25.4	V	100	273	2014-10-22 16:26...		23.7	0.0
✓	375.06	20.3	14.2	46.0	- 25.8	V	100	7	2014-10-22 16:27...		23.5	0.0
✓	380.16	22.8	14.3	46.0	- 23.2	V	100	-1	2014-10-22 16:28...		25.5	0.0
✓	381.72	22.7	14.3	46.0	- 23.4	V	100	361	2014-10-22 16:29...		25.1	0.0
✓	385.74	20.6	14.4	46.0	- 25.4	V	100	6	2014-10-22 16:30...		24.7	0.0
✓	490.5	22.1	16.4	46.0	- 23.9	V	100	5	2014-10-22 16:31...		24.3	0.0
✓	505.08	25.1	16.6	46.0	- 20.9	V	100	6	2014-10-22 16:32...		26.1	0.0
✓	519.78	24.1	16.8	46.0	- 22.0	V	100	8	2014-10-22 16:33...		26.9	0.0

Picture 32: BG3 - Radiated emission 30 MHz - 1000MHz @ 3m distance



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4.9 Test results - BG4 (S4)

Temperature:	20°C	Humidity:	41%
Tested by:	Martin Müller	Test date:	2014-10-22

Radiated Emission Measurement 9 kHz - 30 MHz

Test procedure

The EUT was placed in a full anechoic chamber and the spurious emission testing was performed in accordance with ANSI C63.4, and 47 CFR Part 15, Subpart C. The measurement distance was 3 m.

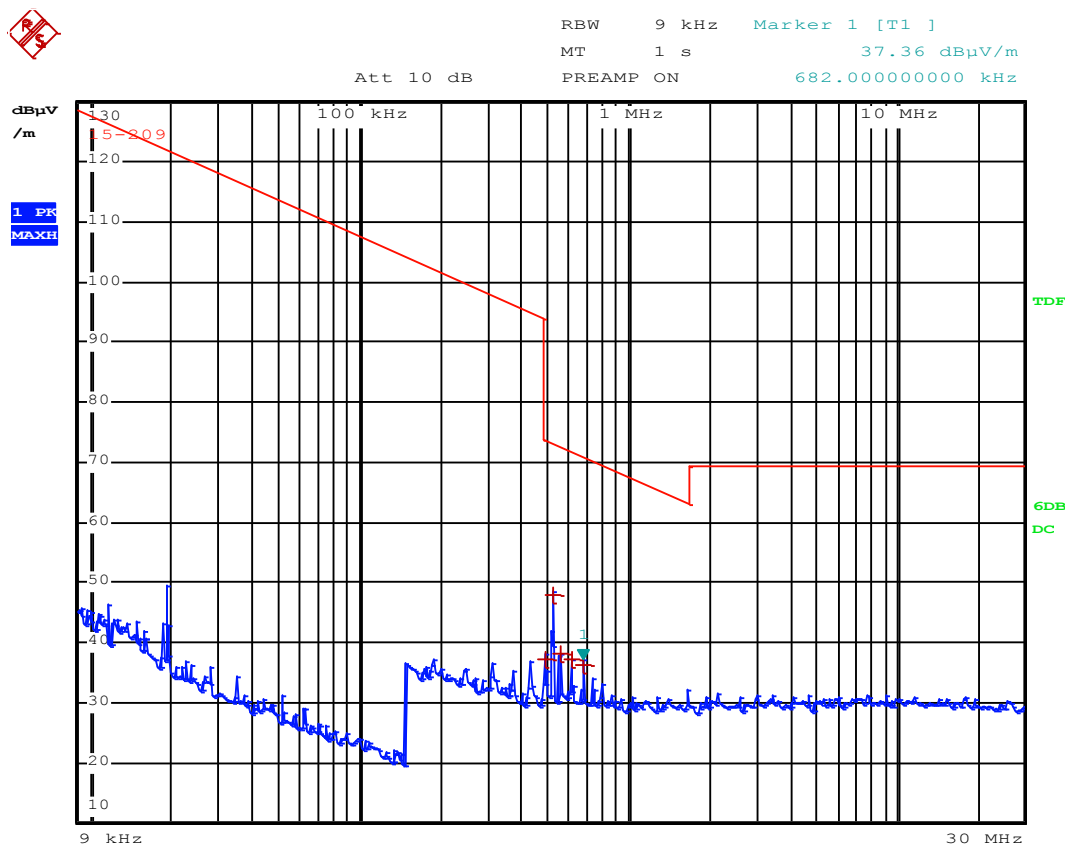


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EDIT PEAK LIST (Final Measurement Results)			
Trace1:	15-209		
Trace2:	---		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBµV/m	DELTA LIMIT dB
1 Quasi Peak	494 kHz	37.15	-36.57
1 Quasi Peak	522 kHz	47.98	-25.27
1 Quasi Peak	558 kHz	38.10	-34.57
1 Quasi Peak	618 kHz	37.32	-34.46
1 Quasi Peak	682 kHz	36.20	-34.73

Picture 33: BG4 - Radiated emission 9 kHz – 30 MHz @ 3m distance

Frequency (kHz)	Measured value (dBµV/m)	Detector	Recalculation factor (dB/decade)	Field strength (dBµV/m)	Limit (dBµV/m)	Margin	Result
494	37.15	QP	40	-2.85	33.73	36.58	PASS
¹⁾ 522	47.98	QP	40	7.98	33.25	25.27	PASS
558	38.10	QP	40	-1.90	32.67	34.57	PASS
618	37.32	QP	40	-2.68	31.78	34.46	PASS
682	36.20	QP	40	-3.80	30.93	34.73	PASS

¹⁾ Note:

Measured value = 47.98 dBµV/m @ 3 m

Recalculation factor = 40 dB / decade

Recalculated value = 47.98 dBµV/m @ 3 m - 40 dB = **7.98 dBµV/m @ 30 m**



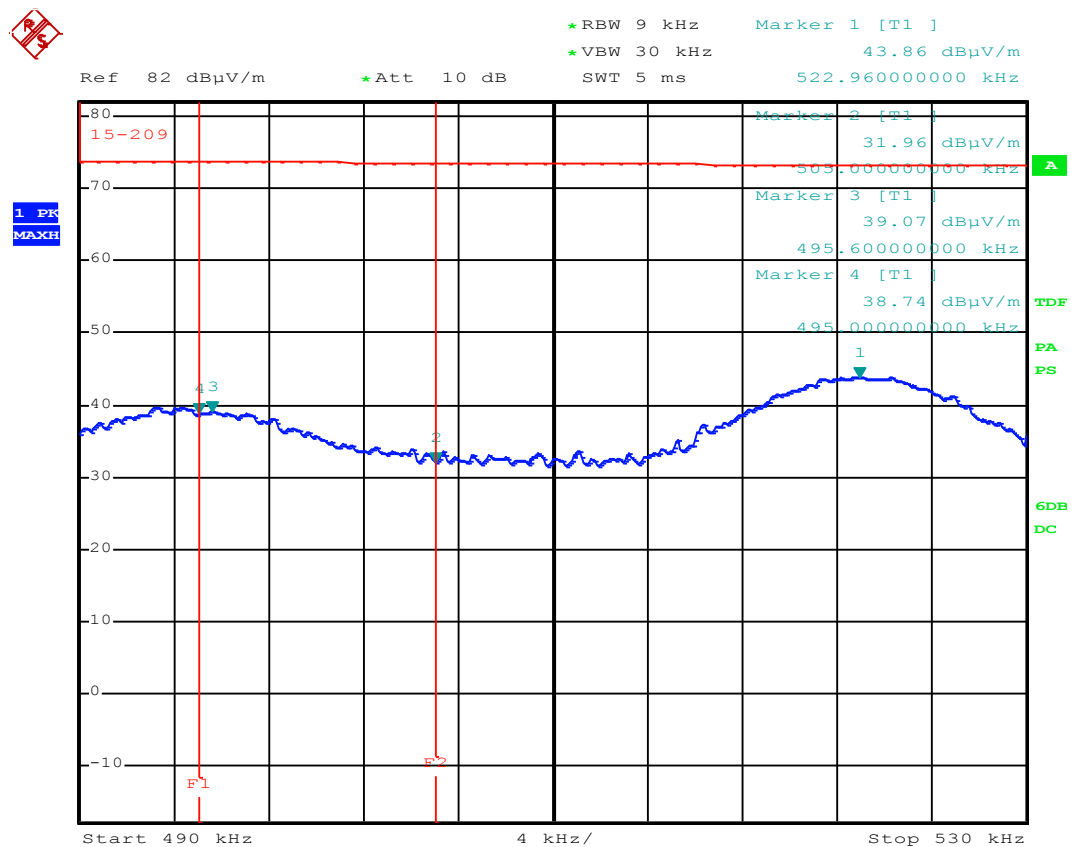
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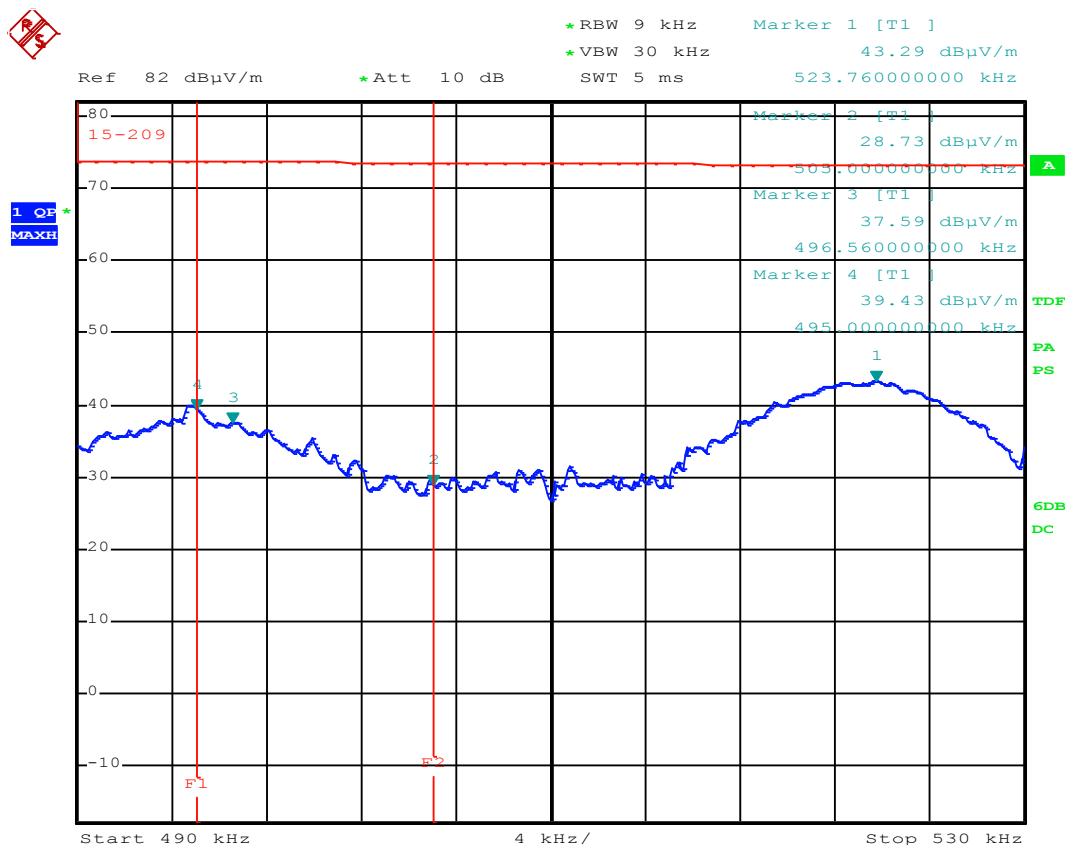
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Restricted Band (495 kHz - 505 kHz)



Picture 34: BG4 - Restricted Band - PK @ 3m distance



Picture 35: BG4 - Restricted Band - QP @ 3m distance

Frequency (kHz)	Measured value (dBμV/m)	Detector	Recalculation factor (dB/decade)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin	Result
495.00	38.74	PK	40	-1.26	----	----	PASS
495.00	39.43	QP	40	-0.57	33.71	34.28	PASS
495.60	39.07	PK	40	-0.93	----	----	PASS
496.56	37.59	QP	40	-2.41	33.68	36.09	PASS
505.00	31.96	PK	40	-8.04	----	----	PASS
505.00	28.73	QP	40	-11.27	33.54	44.81	PASS
522.96	43.86	PK	40	3.86	----	----	PASS
¹⁾ 523.76	43.29	QP	40	3.29	33.22	29.93	PASS

¹⁾ Note:

Measured value = 43.29 dBμV/m @ 3 m

Recalculation factor = 40 dB / decade

Recalculated value = 43.29 dBμV/m @ 3 m - 40 dB = **3.29 dBμV/m @ 30 m**

Additional note:

Emissions in restricted band are spurious emissions not caused by carrier or modulation.



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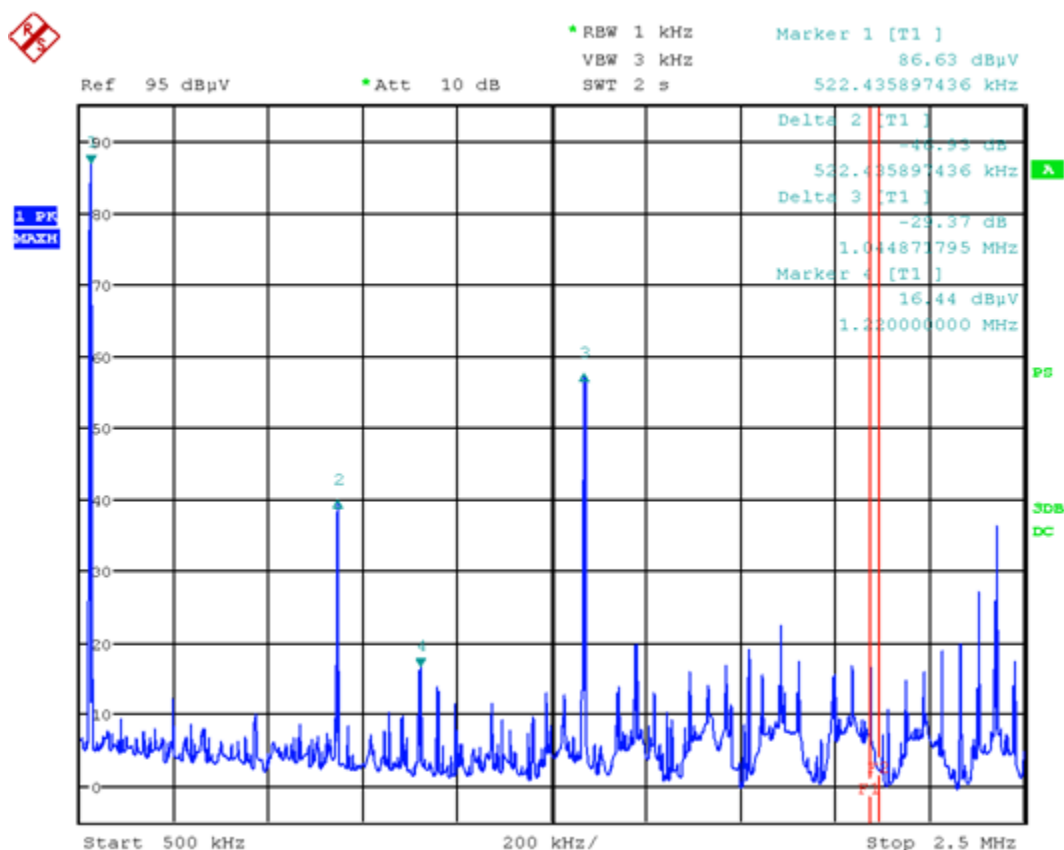
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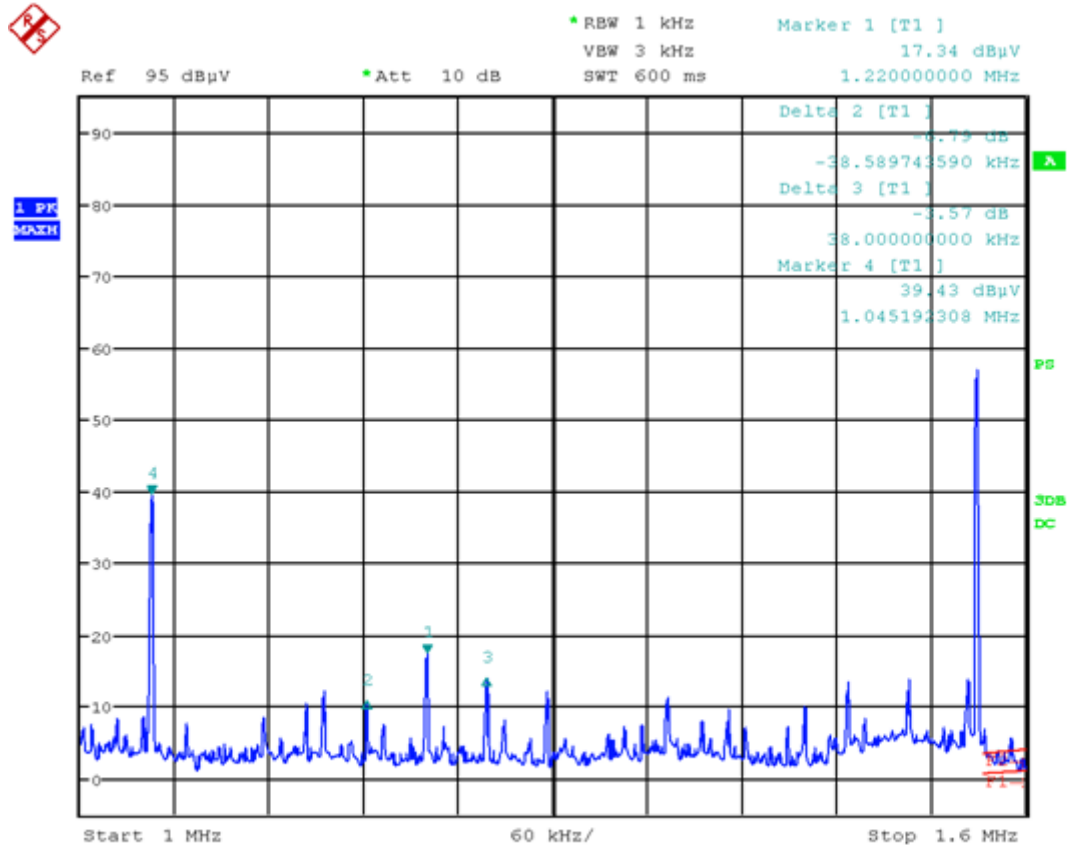
Restricted Band (2.1735 MHz - 2.1905 MHz)

Remark: This measurement was performed using magnetic field probe RF-R 400-1 to show that there are no emissions caused by carrier or modulation. During the “radiated emission 9kHz - 30MHz”-measurement no carrier at 1.22 MHz was detected because of its low amplitude. The setup is documented in Annex A.



f [MHz]	E _{meas} [dBμV]	Detector	Remark
0.5224	86.63	PK	carrier power supply
1.0449	39.70	PK	2 nd harmonic power supply
1.2200	16.44	PK	carrier data transfer
1.5673	57.26	PK	3 rd harmonic power supply

Picture 36: BG4 - carrier (1.22 MHz) and restricted band

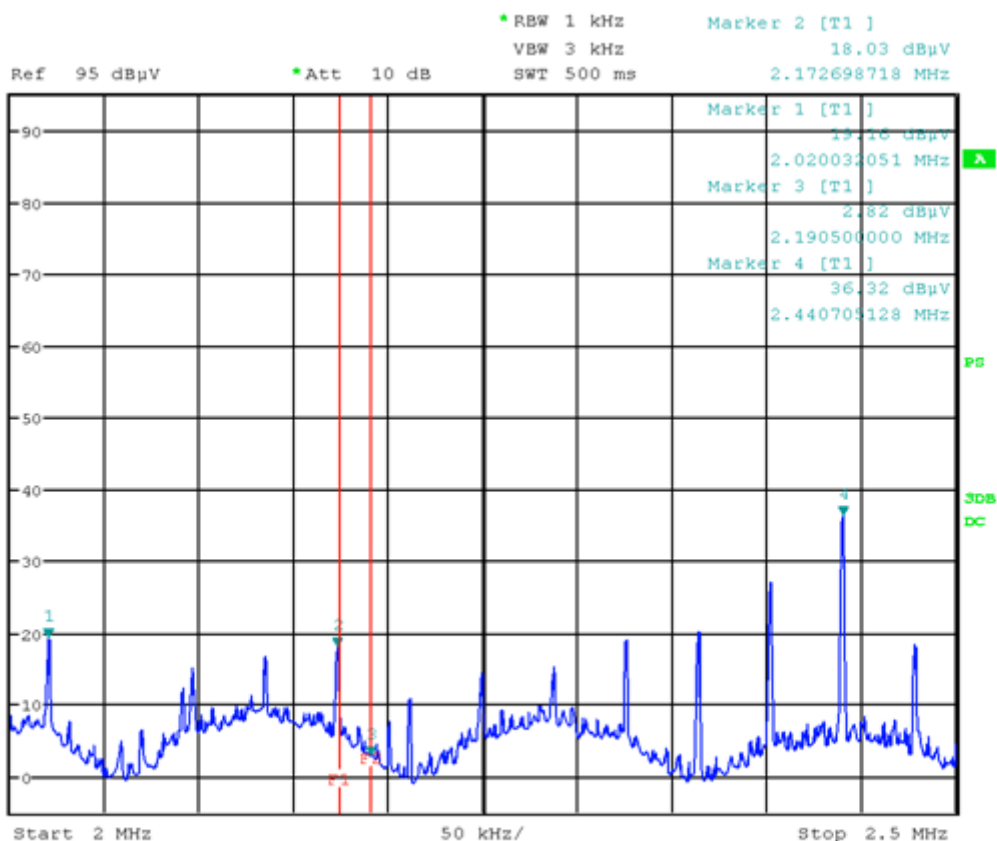


f [MHz]	E _{meas} [dBμV]	Detector	Remark
1.0452	39.43	PK	2 nd harmonic power supply
1.1814	10.55	PK	lower sideband data transfer
1.2200	17.34	PK	carrier data transfer
1.2580	13.77	PK	upper sideband data transfer

Picture 37: BG4 - zoomed to carrier (1.22 MHz)



1 PK
MAX



f [MHz]	E _{meas} [dBμV]	Detector	Remark
2.0200	19.16	PK	4 th harmonic power supply
2.1727	18.03	PK	lower edge restricted band
2.1905	2.82	PK	upper edge restricted band
2.4407	36.32	PK	- - - -

Picture 38: BG4 - zoomed to restricted band



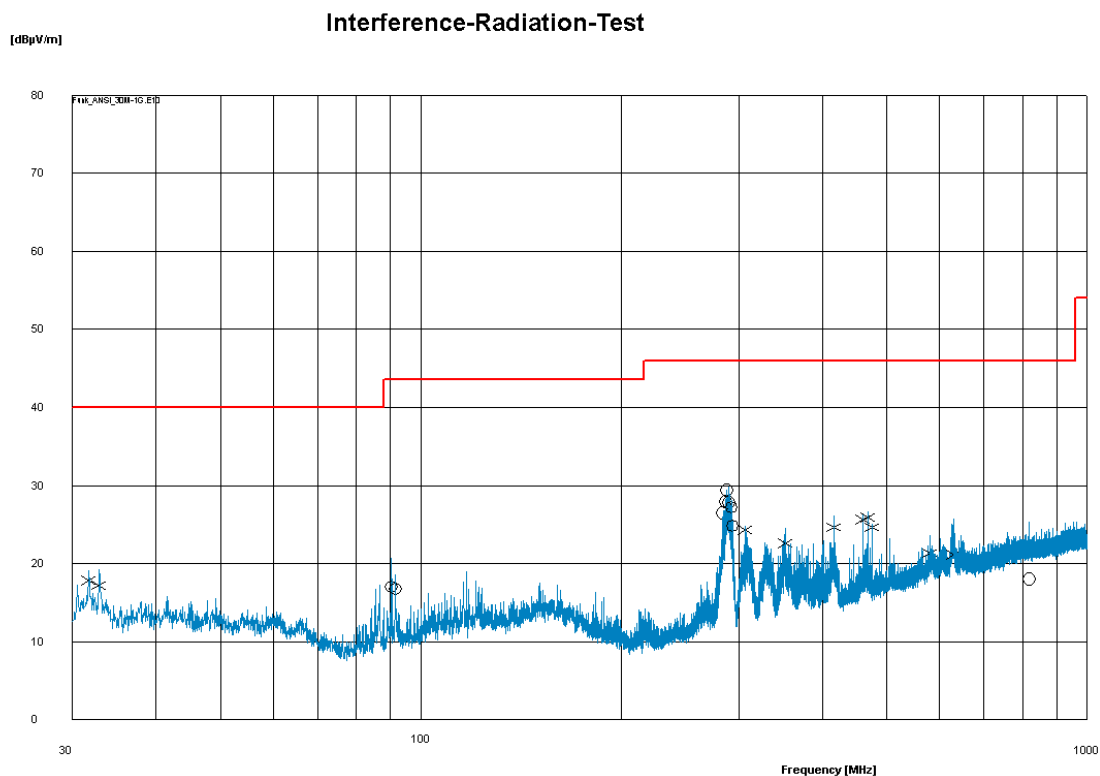
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Radiated Emission Measurement 30 MHz - 1000 MHz



M	Freq [M...]	VMaxC...	Corr...	Limit	dLimit	Pol	Ant	TT	Date	Remarks	VScal...	Corr ...
✓	31.74	17.9	12.1	40.0	- 22.1	V	100	251	2014-10-22 15:37...		19.1	0.0
✓	32.88	17.2	12.1	40.0	- 22.8	V	100	236	2014-10-22 15:38...		19.2	0.0
✓	90.3	17.0	9.8	43.5	- 26.5	H	100	0	2014-10-22 15:46...		20.6	0.0
✓	91.5	16.8	9.9	43.5	- 26.8	H	100	343	2014-10-22 15:47...		18.6	0.0
✓	283.74	26.5	12.4	46.0	- 19.5	H	100	232	2014-10-22 15:48...		26.0	0.0
✓	286.2	28.0	12.5	46.0	- 18.1	H	100	236	2014-10-22 15:49...		28.3	0.0
✓	287.22	29.4	12.5	46.0	- 16.6	H	100	232	2014-10-22 15:50...		29.5	0.0
✓	289.32	27.8	12.5	46.0	- 18.2	H	100	8	2014-10-22 15:51...		29.9	0.0
✓	292.26	27.2	12.6	46.0	- 18.8	H	100	17	2014-10-22 15:52...		28.1	0.0
✓	293.34	24.8	12.6	46.0	- 21.2	H	100	8	2014-10-22 15:53...		25.5	0.0
✓	306.9	24.3	12.9	46.0	- 21.7	V	100	29	2014-10-22 15:39...		24.8	0.0
✓	351.9	22.6	13.7	46.0	- 23.5	V	100	354	2014-10-22 15:40...		24.5	0.0
✓	417.24	24.7	15.1	46.0	- 21.4	V	100	340	2014-10-22 15:40...		26.1	0.0
✓	461.16	25.6	16.0	46.0	- 20.4	V	100	361	2014-10-22 15:41...		26.2	0.0
✓	468.48	25.9	16.1	46.0	- 20.2	V	100	355	2014-10-22 15:42...		26.6	0.0
✓	475.8	24.6	16.2	46.0	- 21.4	V	100	354	2014-10-22 15:43...		25.0	0.0
✓	581.1	21.3	18.0	46.0	- 24.7	V	100	276	2014-10-22 15:44...		23.6	0.0
✓	630.06	21.2	18.8	46.0	- 24.8	V	100	343	2014-10-22 15:45...		25.7	0.0
✓	817.86	18.1	21.1	46.0	- 28.0	H	100	152	2014-10-22 15:54...		25.3	0.0

Picture 39: BG4 - Radiated emission 30 MHz - 1000MHz @ 3m distance



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4.10 Test results - BG5 (S5)

Temperature:	20°C	Humidity:	41%
Tested by:	Martin Müller	Test date:	2014-10-22

Radiated Emission Measurement 9 kHz - 30 MHz

Test procedure

The EUT was placed in a full anechoic chamber and the spurious emission testing was performed in accordance with ANSI C63.4, and 47 CFR Part 15, Subpart C. The measurement distance was 3 m.

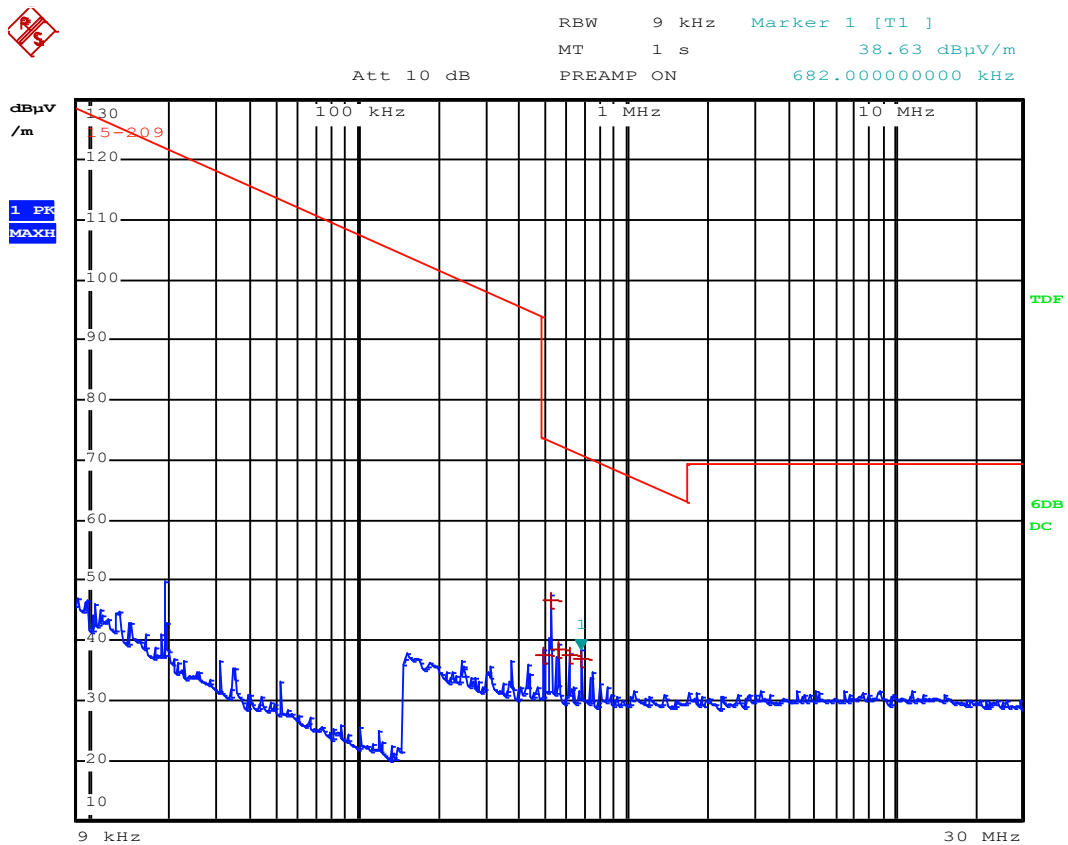


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EDIT PEAK LIST (Final Measurement Results)			
Trace1:	15-209		
Trace2:	---		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBµV/m	DELTA LIMIT dB
1 Quasi Peak	494 kHz	37.41	-36.31
1 Quasi Peak	522 kHz	46.74	-26.51
1 Quasi Peak	558 kHz	38.35	-34.32
1 Quasi Peak	618 kHz	37.44	-34.34
1 Quasi Peak	682 kHz	36.93	-34.00

Picture 40: BG5 - Radiated emission 9 kHz – 30 MHz @ 3m distance

Frequency (kHz)	Measured value (dBµV/m)	Detector	Recalculation factor (dB/decade)	Field strength (dBµV/m)	Limit (dBµV/m)	Margin	Result
494	37.41	QP	40	-2.59	33.73	36.32	PASS
¹⁾ 522	46.74	QP	40	6.74	33.25	26.51	PASS
558	38.35	QP	40	-1.65	32.67	34.32	PASS
618	37.44	QP	40	-2.56	31.78	34.34	PASS
682	36.93	QP	40	-3.07	30.93	34.00	PASS

¹⁾ Note:

Measured value = 46.74 dBµV/m @ 3 m

Recalculation factor = 40 dB / decade

Recalculated value = 46.74 dBµV/m @ 3 m - 40 dB = **6.74 dBµV/m @ 30 m**



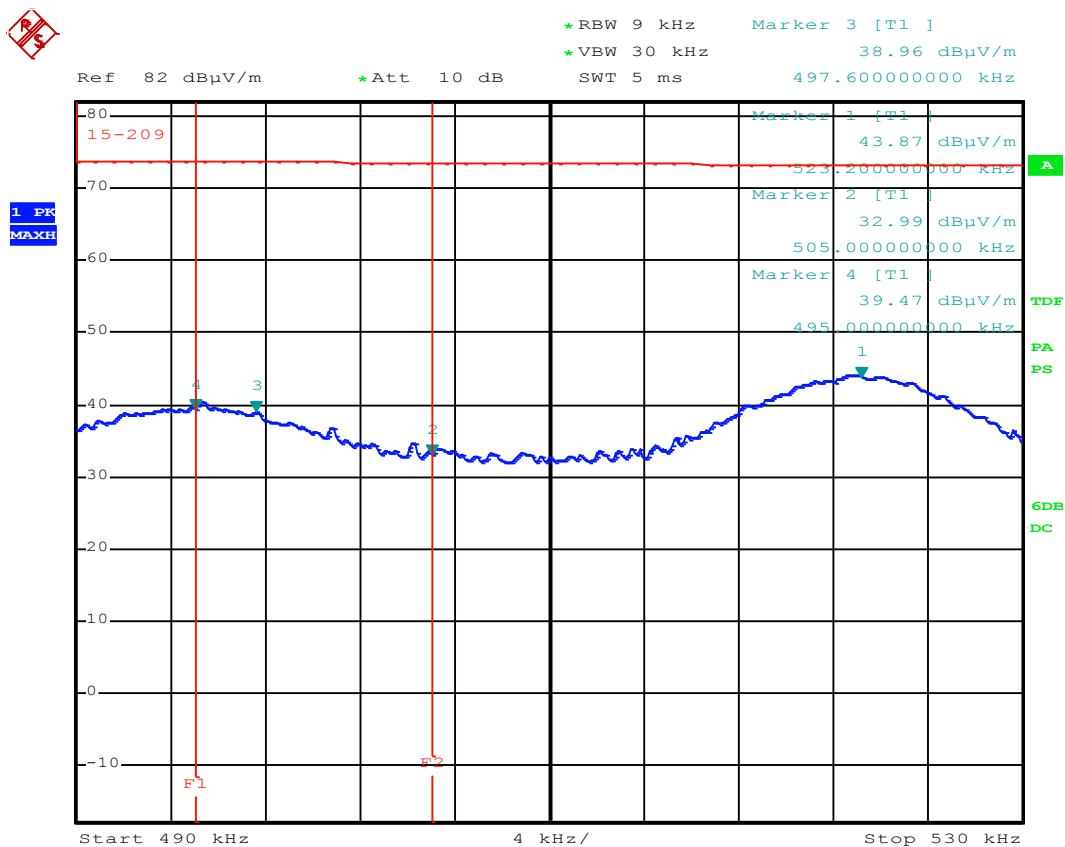
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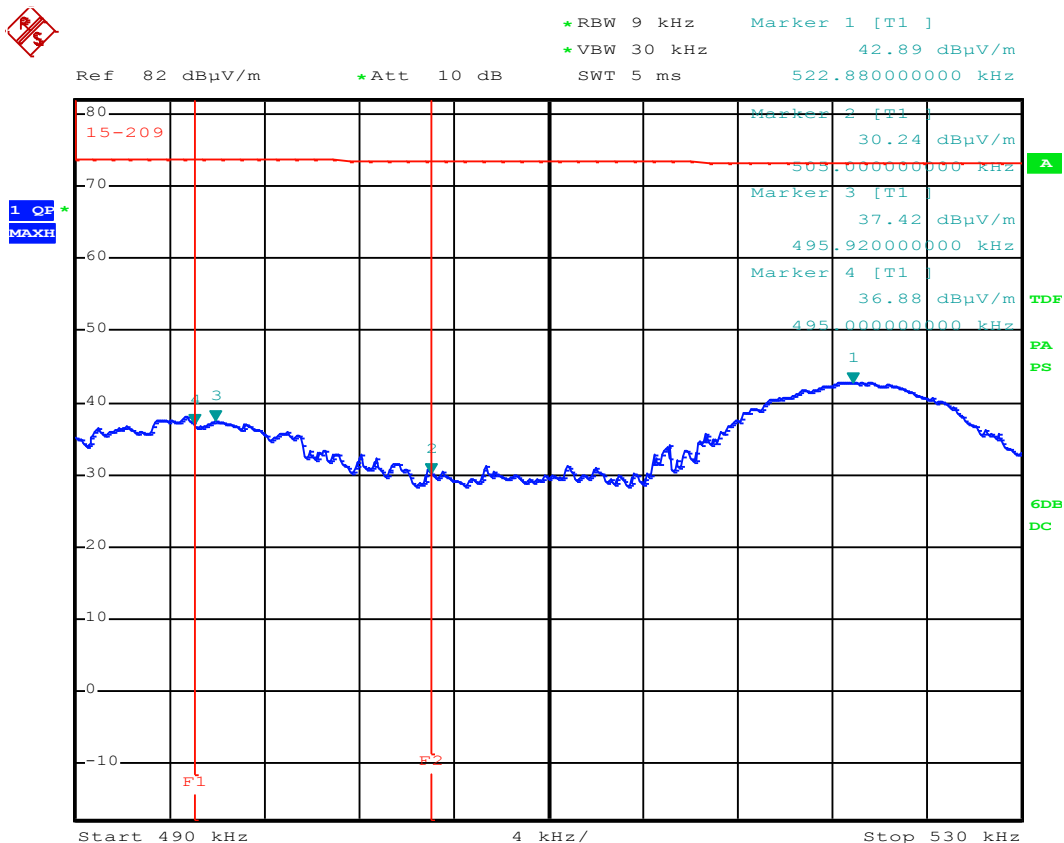
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Restricted Band (495 kHz - 505 kHz)



Picture 41: BG5 - Restricted Band - PK @ 3m distance



Picture 42: BG5 - Restricted Band - QP @ 3m distance

Frequency (kHz)	Measured value (dBμV/m)	Detector	Recalculation factor (dB/decade)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin	Result
495.00	39.47	PK	40	-0.53	----	----	PASS
495.00	36.88	QP	40	-3.12	33.71	36.83	PASS
497.60	38.96	PK	40	-1.04	----	----	PASS
495.92	37.42	QP	40	-2.58	33.70	36.28	PASS
505.00	32.99	PK	40	-7.01	----	----	PASS
505.00	30.24	QP	40	-9.76	33.54	43.30	PASS
523.20	43.87	PK	40	3.87	----	----	PASS
¹⁾ 522.88	42.89	QP	40	2.89	33.24	30.35	PASS

¹⁾ Note:

Measured value = 42.89 dBμV/m @ 3 m

Recalculation factor = 40 dB / decade

Recalculated value = 42.89 dBμV/m @ 3 m - 40 dB = **2.89 dBμV/m @ 30 m**

Additional note:

Emissions in restricted band are spurious emissions not caused by carrier or modulation.



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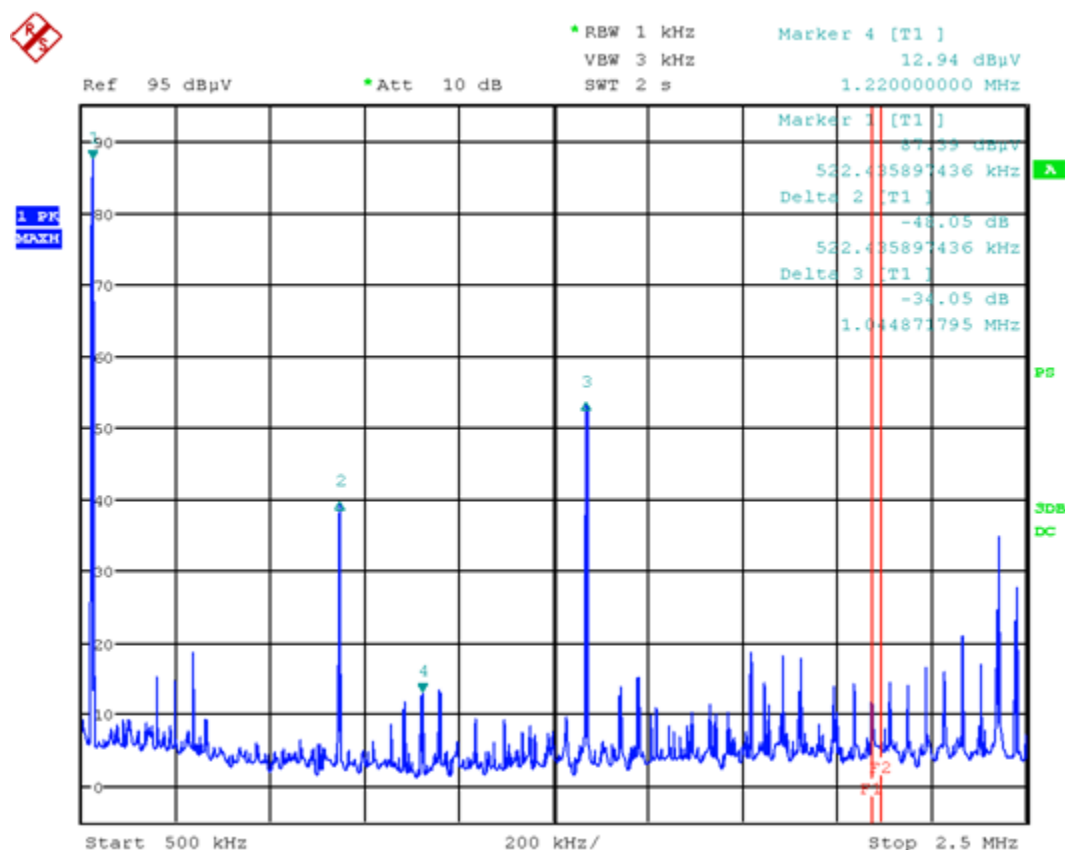
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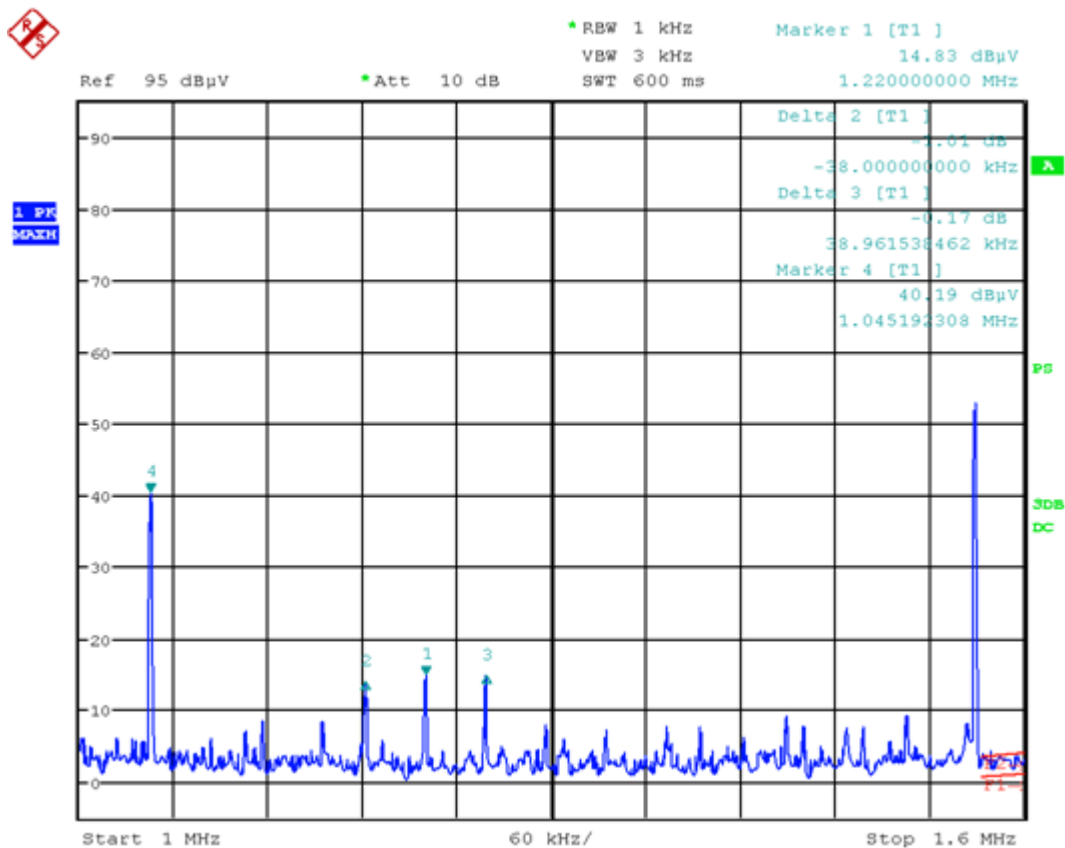
Restricted Band (2.1735 MHz - 2.1905 MHz)

Remark: This measurement was performed using magnetic field probe RF-R 400-1 to show that there are no emissions caused by carrier or modulation. During the “radiated emission 9kHz - 30MHz”-measurement no carrier at 1.22 MHz was detected because of its low amplitude. The setup is documented in Annex A.



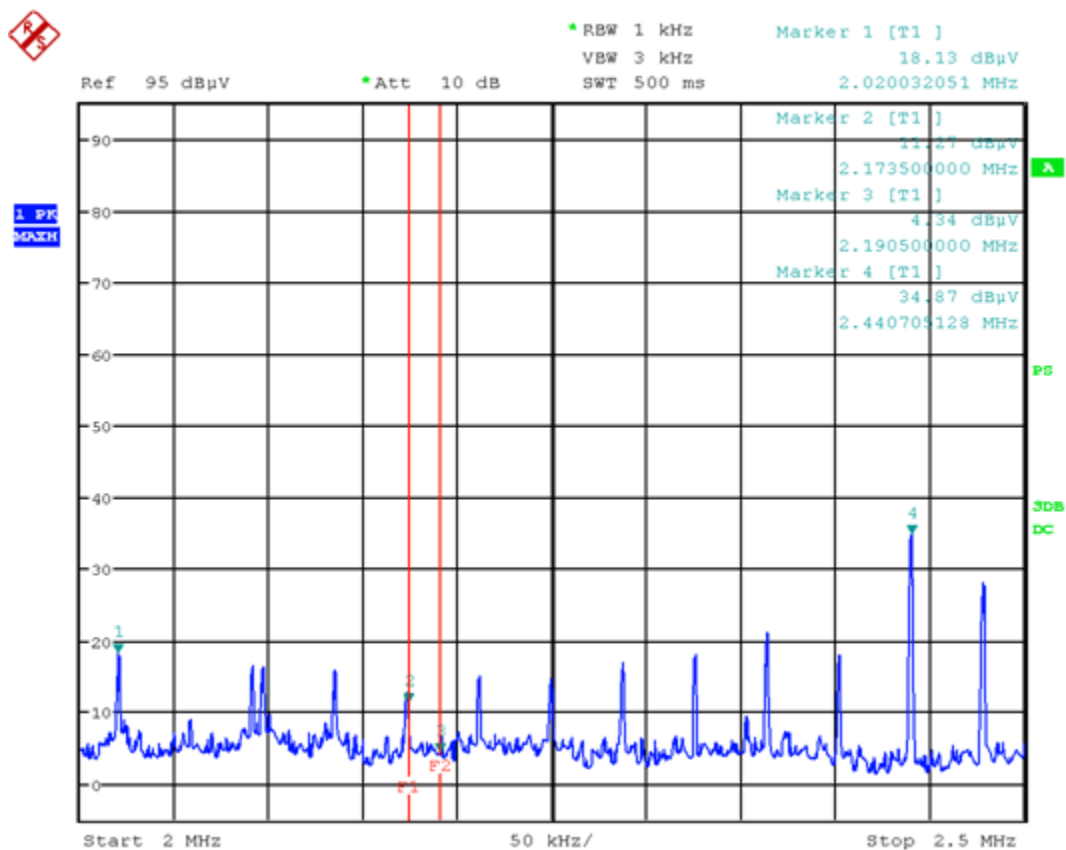
f [MHz]	E _{meas} [dBμV]	Detector	Remark
0.5224	87.39	PK	carrier power supply
1.0449	39.34	PK	2 nd harmonic power supply
1.2200	12.94	PK	carrier data transfer
1.5673	53.34	PK	3 rd harmonic power supply

Picture 43: BG5 - carrier (1.22 MHz) and restricted band



f [MHz]	E _{meas} [dBμV]	Detector	Remark
1.0452	40.19	PK	2 nd harmonic power supply
1.1820	13.82	PK	lower sideband data transfer
1.2200	14.83	PK	carrier data transfer
1.2590	14.66	PK	upper sideband data transfer

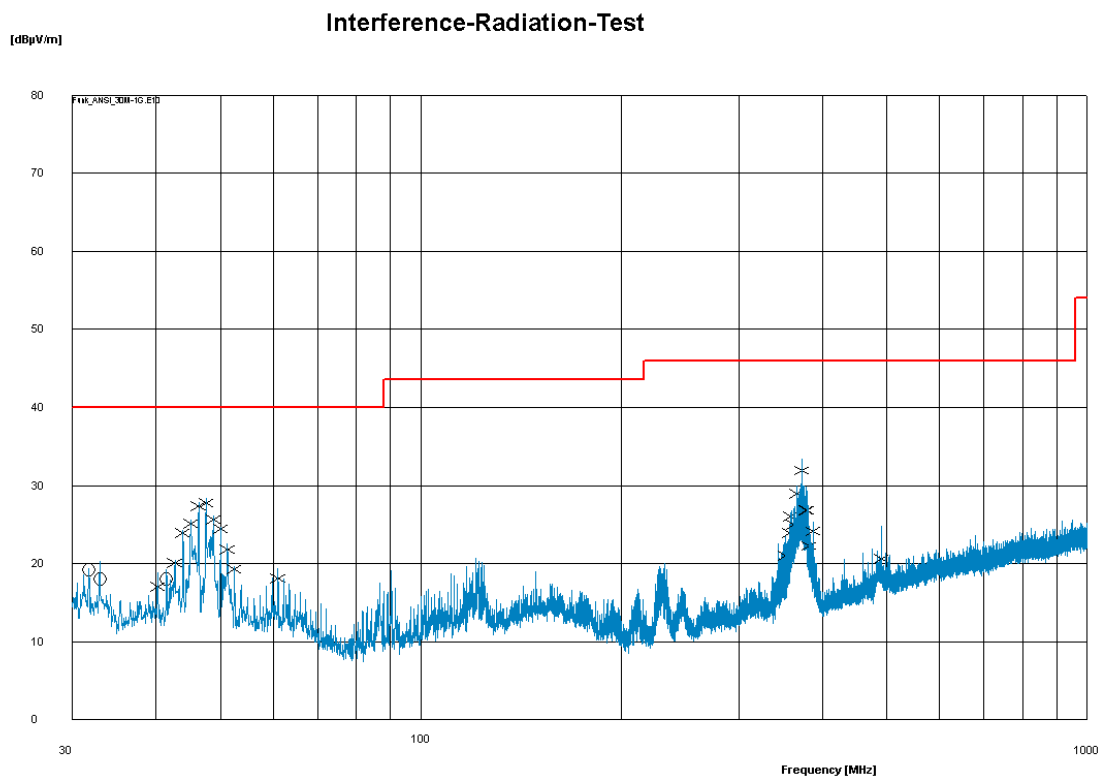
Picture 44: BG5 - zoomed to carrier (1.22 MHz)



f [MHz]	E _{meas} [dBμV]	Detector	Remark
2.0200	18.13	PK	4 th harmonic power supply
2.1735	11.27	PK	lower edge restricted band
2.1905	4.34	PK	upper edge restricted band
2.4407	34.87	PK	- - - -

Picture 45: BG5 - zoomed to restricted band

Radiated Emission Measurement 30 MHz - 1000 MHz



M	Freq [M...]	VMaxC...	Corr...	Limit	dLimit	Pol	Ant	TT	Date	Remarks	VScal...	Corr...
✓	31.74	19,3	12,1	40,0	- 20,7	H	100	330	2014-10-22 15:14...		19,4	0,0
✓	32,94	18,0	12,1	40,0	- 22,0	H	100	331	2014-10-22 15:15...		20,2	0,0
✓	40,26	17,1	13,0	40,0	- 22,9	V	100	248	2014-10-22 14:54...		18,8	0,0
✓	41,46	18,0	12,9	40,0	- 22,0	H	100	191	2014-10-22 15:16...		19,2	0,0
✓	42,72	20,0	12,8	40,0	- 20,0	V	100	249	2014-10-22 14:55...		20,5	0,0
✓	43,92	23,9	12,7	40,0	- 16,1	V	100	245	2014-10-22 14:56...		24,3	0,0
✓	45,12	25,1	12,7	40,0	- 14,9	V	100	249	2014-10-22 14:56...		25,6	0,0
✓	46,38	27,4	12,7	40,0	- 12,6	V	100	257	2014-10-22 14:57...		27,8	0,0
✓	47,58	27,8	12,7	40,0	- 12,2	V	100	249	2014-10-22 14:58...		28,3	0,0
✓	48,78	25,7	12,7	40,0	- 14,3	V	100	261	2014-10-22 14:59...		26,0	0,0
✓	50,04	24,4	12,7	40,0	- 15,6	V	100	261	2014-10-22 15:00...		24,6	0,0
✓	51,24	21,8	12,7	40,0	- 18,2	V	100	259	2014-10-22 15:01...		22,5	0,0
✓	52,44	19,3	12,6	40,0	- 20,7	V	100	261	2014-10-22 15:02...		19,7	0,0
✓	61,02	18,1	12,1	40,0	- 21,9	V	100	273	2014-10-22 15:03...		19,4	0,0
✓	352,92	21,0	13,7	46,0	- 25,0	V	100	354	2014-10-22 15:04...		23,5	0,0
✓	357,12	23,9	13,8	46,0	- 22,1	V	100	353	2014-10-22 15:05...		25,1	0,0
✓	358,68	26,1	13,9	46,0	- 20,0	V	100	354	2014-10-22 15:06...		26,3	0,0
✓	362,34	24,9	13,9	46,0	- 21,1	V	100	355	2014-10-22 15:07...		27,1	0,0
✓	366,54	28,9	14,0	46,0	- 17,1	V	100	354	2014-10-22 15:08...		29,9	0,0
✓	373,32	31,9	14,2	46,0	- 14,1	V	100	355	2014-10-22 15:09...		33,3	0,0
✓	378,06	26,8	14,3	46,0	- 19,2	V	100	343	2014-10-22 15:10...		29,8	0,0
✓	380,1	26,8	14,3	46,0	- 19,2	V	100	-1	2014-10-22 15:11...		29,2	0,0
✓	382,2	22,3	14,3	46,0	- 23,8	V	100	343	2014-10-22 15:11...		24,7	0,0
✓	387,96	24,1	14,4	46,0	- 21,9	V	100	-1	2014-10-22 15:12...		25,3	0,0
✓	490,44	20,6	16,4	46,0	- 25,4	V	100	361	2014-10-22 15:13...		24,8	0,0

Picture 46: BG5 - Radiated emission 30 MHz - 1000MHz @ 3m distance



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4.11 Test results - BG6 (S6)

Temperature:	20°C	Humidity:	41%
Tested by:	Martin Müller	Test date:	2014-10-22

Radiated Emission Measurement 9 kHz - 30 MHz

Test procedure

The EUT was placed in a full anechoic chamber and the spurious emission testing was performed in accordance with ANSI C63.4, and 47 CFR Part 15, Subpart C. The measurement distance was 3 m.

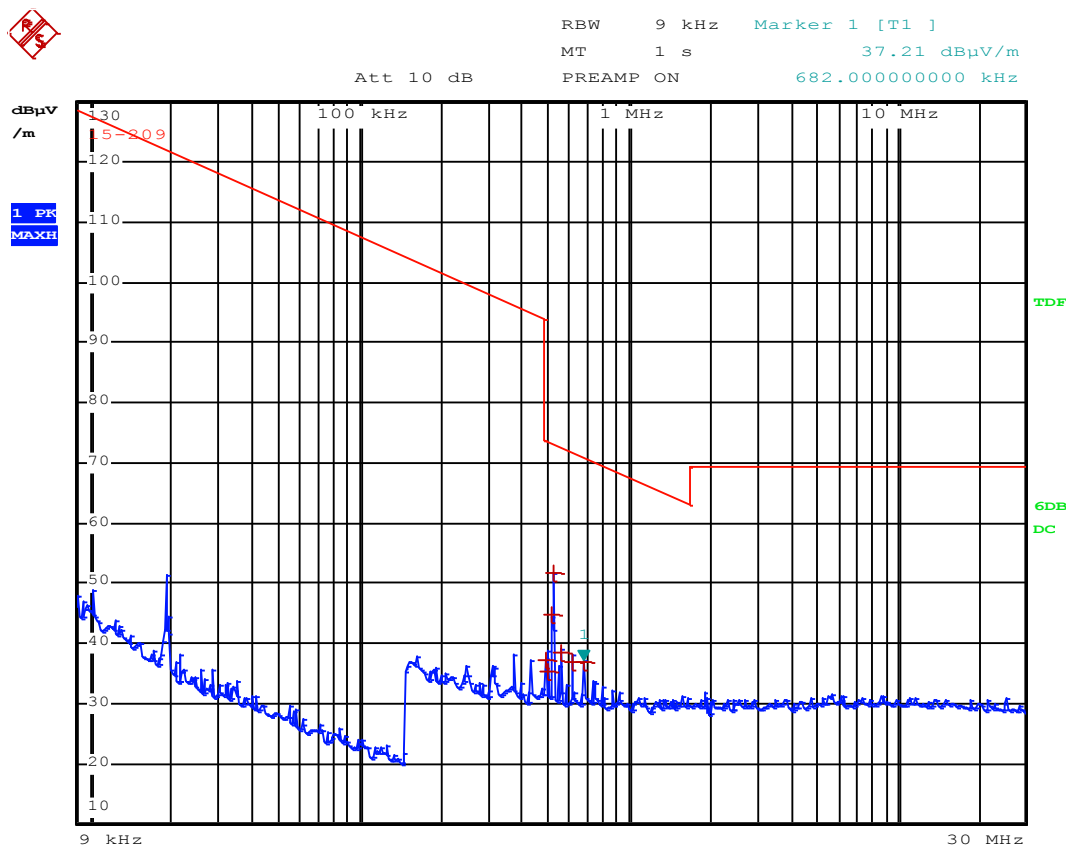


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EDIT PEAK LIST (Final Measurement Results)			
Trace1:	15-209		
Trace2:	---		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBμV/m	DELTA LIMIT dB
1 Quasi Peak	494 kHz	37.26	-36.46
1 Quasi Peak	498 kHz	35.51	-38.14
1 Quasi Peak	518 kHz	44.87	-28.44
1 Quasi Peak	522 kHz	51.67	-21.57
1 Quasi Peak	558 kHz	38.59	-34.07
1 Quasi Peak	618 kHz	37.04	-34.74
1 Quasi Peak	682 kHz	37.08	-33.85

Picture 47: BG6 - Radiated emission 9 kHz – 30 MHz @ 3m distance

Frequency (kHz)	Measured value (dBµV/m)	Detector	Recalculation factor (dB/decade)	Field strength (dBµV/m)	Limit (dBµV/m)	Margin	Result
494	37.26	QP	40	-2.74	33.73	36.47	PASS
498	35.51	QP	40	-4.49	33.66	38.15	PASS
518	44.87	QP	40	4.87	33.32	28.45	PASS
¹⁾ 522	51.67	QP	40	11.67	33.25	21.58	PASS
558	38.59	QP	40	-1.41	32.67	34.08	PASS
618	37.04	QP	40	-2.96	31.78	34.74	PASS
682	37.08	QP	40	-2.92	30.93	33.85	PASS

¹⁾ Note:

Measured value = 51.67 dBµV/m @ 3 m

Recalculation factor = 40 dB / decade

Recalculated value = 51.67 dBµV/m @ 3 m - 40 dB = **11.67 dBµV/m @ 30 m**



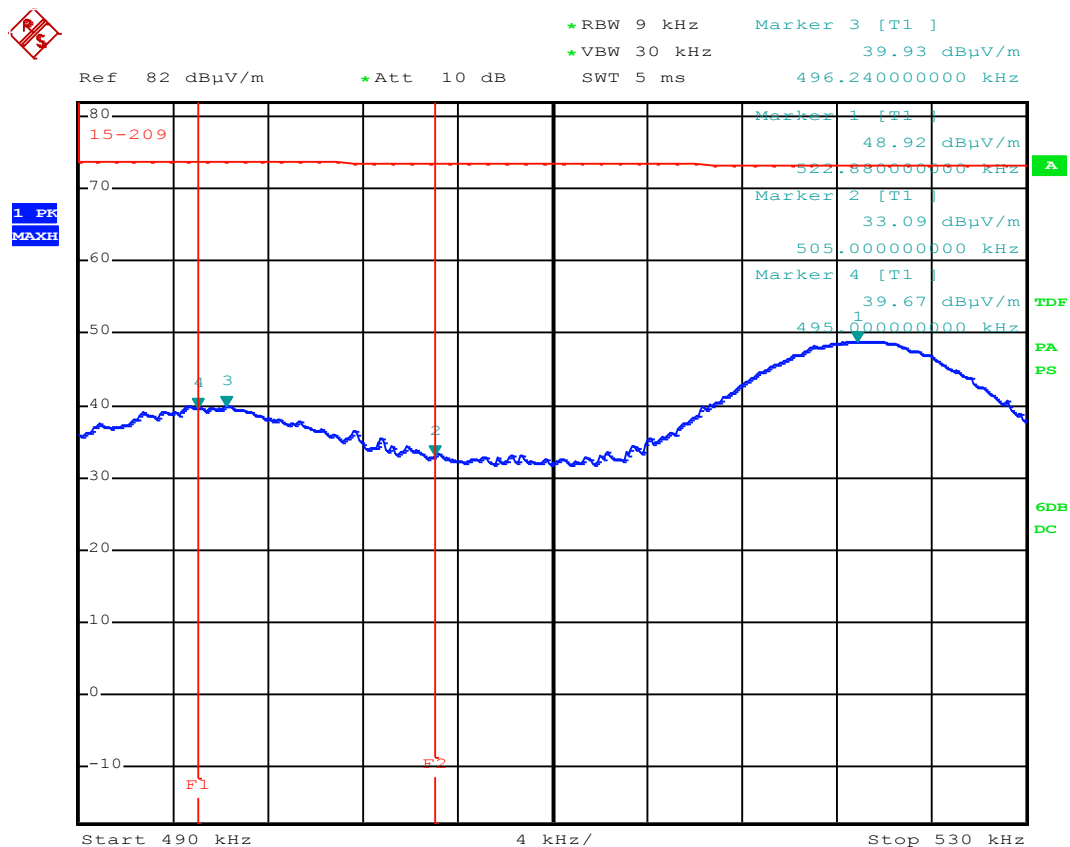
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Restricted Band (495 kHz - 505 kHz)

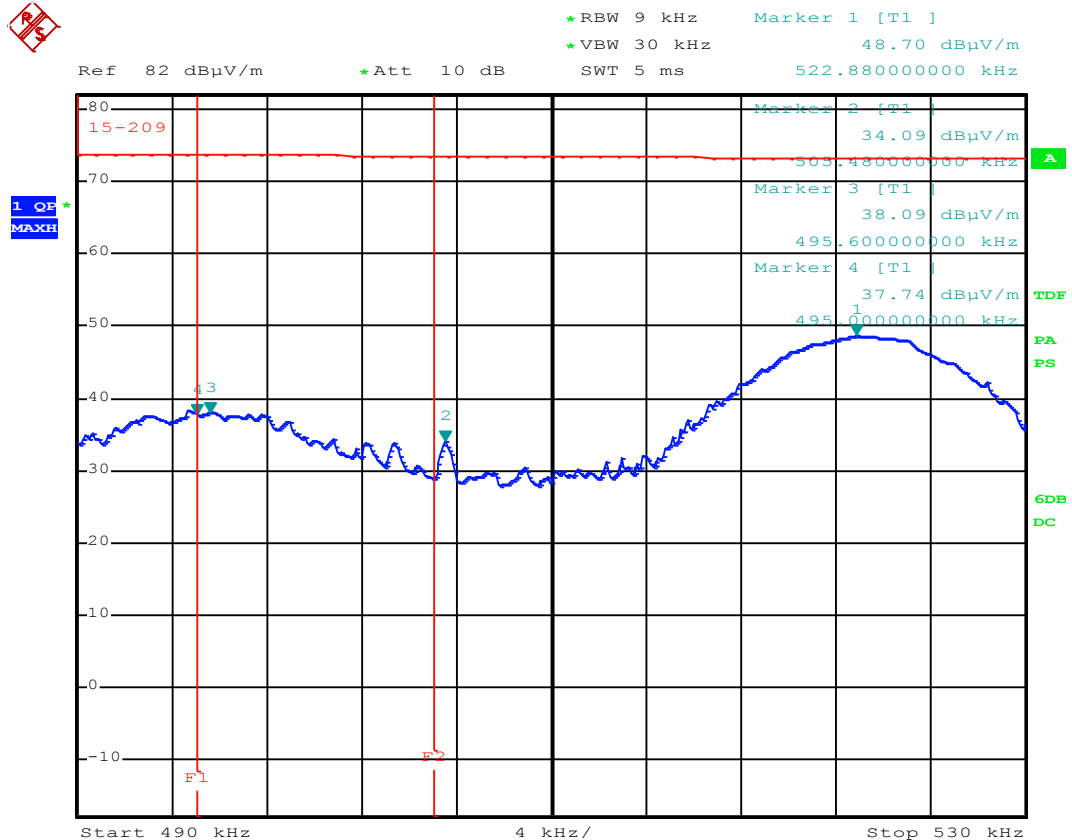


Picture 48: BG6 - Restricted Band - PK @ 3m distance



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Picture 49: BG6 - Restricted Band - QP @ 3m distance

Frequency (kHz)	Measured value (dBμV/m)	Detector	Recalculation factor (dB/decade)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin	Result
495.00	39.67	PK	40	-0.33	----	----	PASS
495.00	37.74	QP	40	-2.26	33.71	35.97	PASS
496.24	39.93	PK	40	-0.07	----	----	PASS
495.60	38.09	QP	40	-1.91	33.70	35.61	PASS
505.00	33.09	PK	40	-6.91	----	----	PASS
505.48	34.09	QP	40	-5.91	33.53	39.44	PASS
522.88	48.92	PK	40	8.92	----	----	PASS
¹⁾ 522.88	48.70	QP	40	8.70	33.24	24.54	PASS

¹⁾ Note:

Measured value = 48.70 dBμV/m @ 3 m

Recalculation factor = 40 dB / decade

Recalculated value = 48.70 dBμV/m @ 3 m - 40 dB = **8.70 dBμV/m @ 30 m**

Additional note:

Emissions in restricted band are spurious emissions not caused by carrier or modulation.



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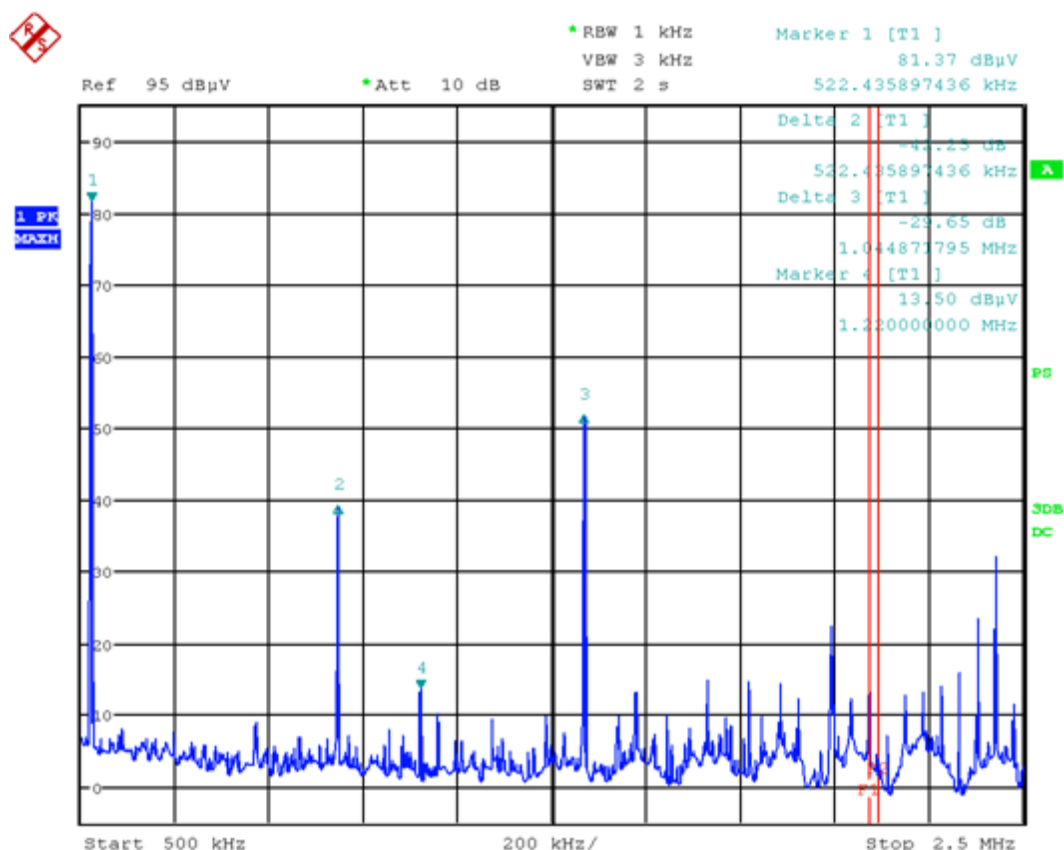
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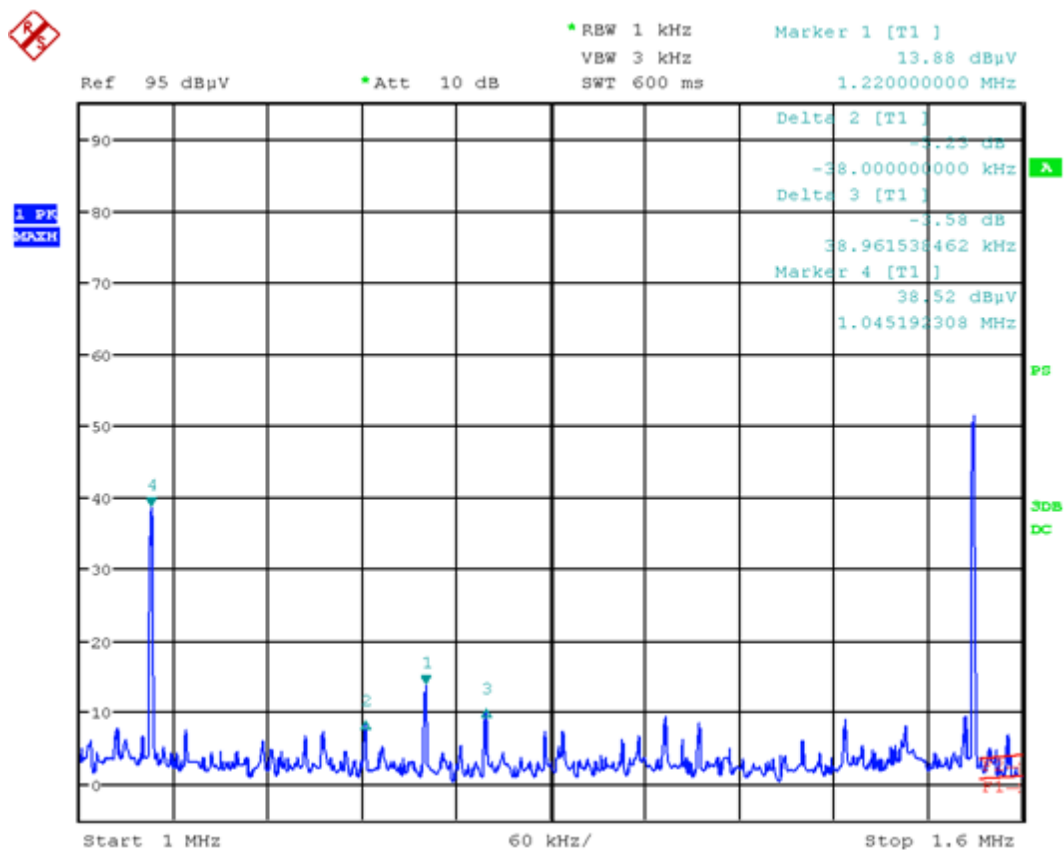
Restricted Band (2.1735 MHz - 2.1905 MHz)

Remark: This measurement was performed using magnetic field probe RF-R 400-1 to show that there are no emissions caused by carrier or modulation. During the "radiated emission 9kHz - 30MHz"-measurement no carrier at 1.22 MHz was detected because of its low amplitude. The setup is documented in Annex A.



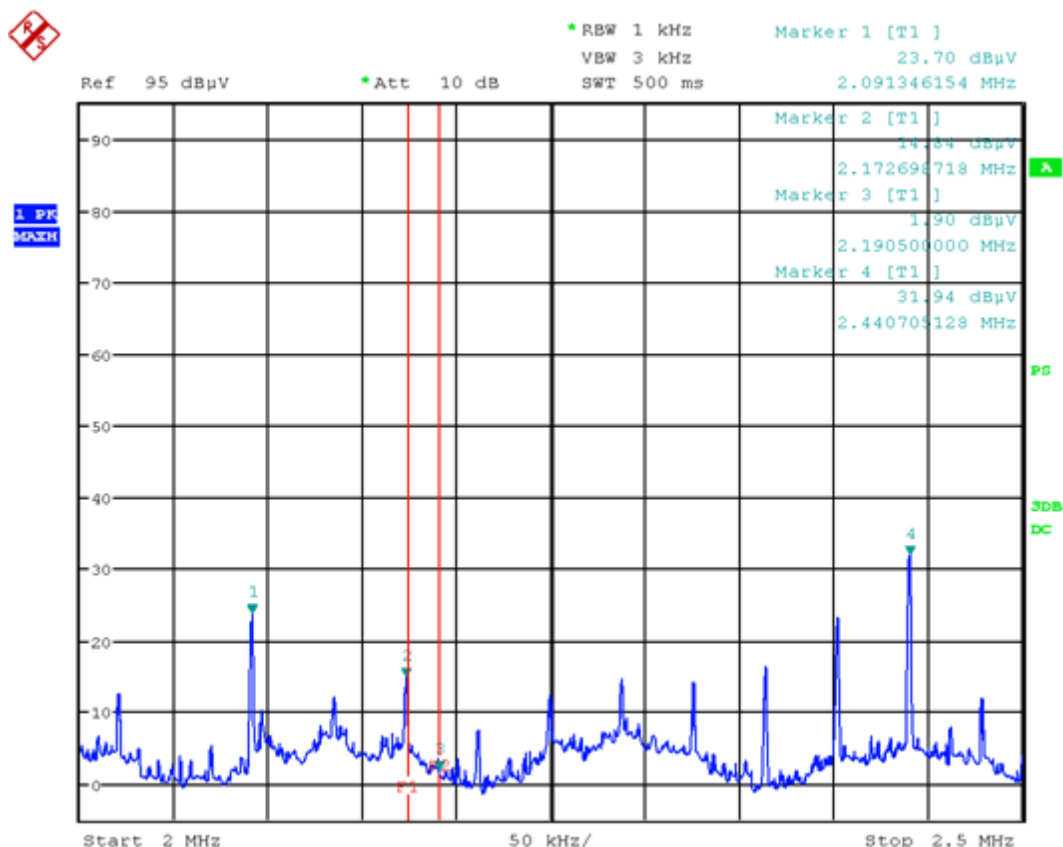
f [MHz]	E _{meas} [dBμV]	Detector	Remark
0.5224	81.37	PK	carrier power supply
1.0449	39.12	PK	2 nd harmonic power supply
1.2200	13.50	PK	carrier data transfer
1.5673	51.72	PK	3 rd harmonic power supply

Picture 50: BG6 - carrier (1.22 MHz) and restricted band



f [MHz]	E _{meas} [dBμV]	Detector	Remark
1.0452	38.52	PK	2 nd harmonic power supply
1.1820	8.65	PK	lower sideband data transfer
1.2200	13.88	PK	carrier data transfer
1.2590	10.03	PK	upper sideband data transfer

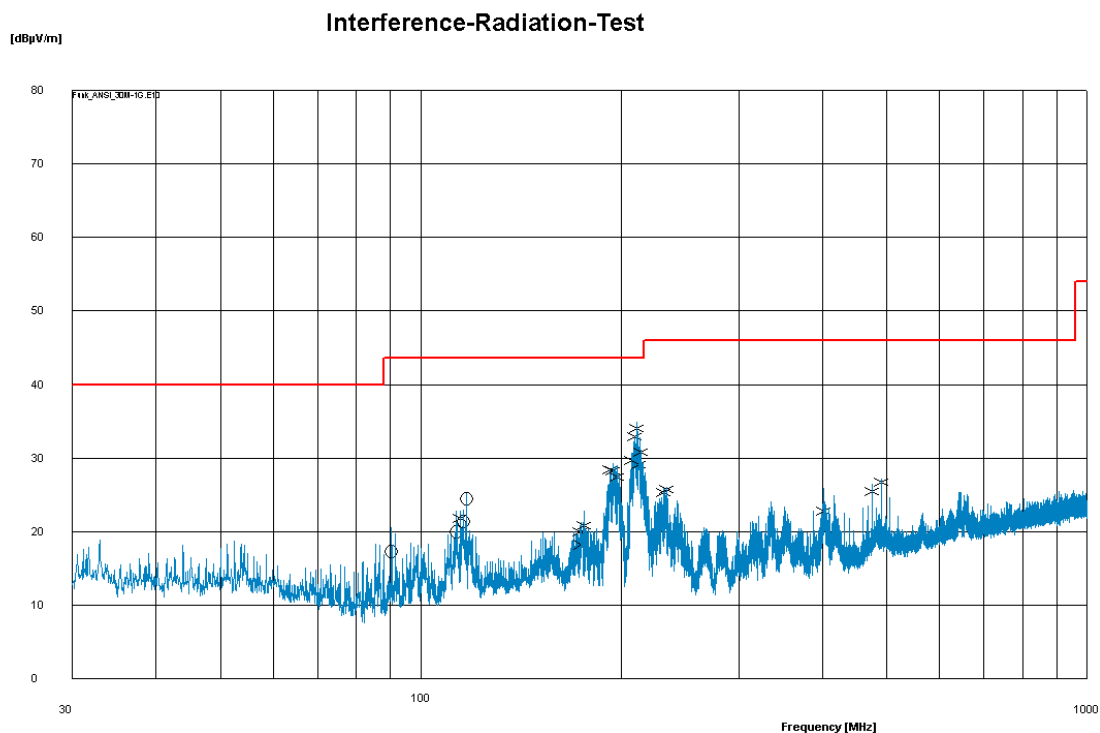
Picture 51: BG6 - zoomed to carrier (1.22 MHz)



f [MHz]	E _{meas} [dBμV]	Detector	Remark
2.0913	23.70	PK	4 th harmonic power supply
2.1727	14.84	PK	lower edge restricted band
2.1905	1.90	PK	upper edge restricted band
2.4407	31.94	PK	- - -

Picture 52: BG6 - zoomed to restricted band

Radiated Emission Measurement 30 MHz - 1000 MHz



M.	Freq [M...]	VMaxC...	Corr ...	Limit	dLimit	Pol	Ant	TT	Date	Remarks	VScal...	Corr ...
✓	90.3	17.4	9.8	43.5	- 26.2	H	100	343	2014-10-22 14:37:37		20.6	0.0
✓	112.86	20.0	11.8	43.5	- 23.6	H	100	179	2014-10-22 14:34:19		22.8	0.0
✓	114.66	21.8	12.0	43.5	- 21.7	V	100	99	2014-10-22 14:18:16		22.7	0.0
✓	115.92	21.4	12.1	43.5	- 22.1	H	100	191	2014-10-22 14:35:16		22.9	0.0
✓	117.12	24.4	12.2	43.5	- 19.1	H	100	182	2014-10-22 14:36:12		25.2	0.0
✓	173.22	20.0	12.8	43.5	- 23.6	V	100	261	2014-10-22 14:19:12		20.8	0.0
✓	173.82	18.2	12.7	43.5	- 25.3	V	100	273	2014-10-22 14:20:08		21.3	0.0
✓	175.68	20.8	12.4	43.5	- 22.7	V	100	261	2014-10-22 14:21:04		22.8	0.0
✓	192.24	28.4	10.5	43.5	- 15.2	V	100	340	2014-10-22 14:22:01		28.4	0.0
✓	194.52	28.3	10.4	43.5	- 15.2	V	100	315	2014-10-22 14:22:57		29.3	0.0
✓	196.98	27.4	10.3	43.5	- 16.1	V	100	299	2014-10-22 14:23:53		29.0	0.0
✓	206.88	29.7	10.0	43.5	- 13.9	V	100	7	2014-10-22 14:24:49		30.7	0.0
✓	209.16	33.0	10.0	43.5	- 10.6	V	100	6	2014-10-22 14:25:45		32.7	0.0
✓	210.54	34.0	10.0	43.5	- 9.5	V	100	361	2014-10-22 14:26:42		34.9	0.0
✓	212.46	29.1	10.0	43.5	- 14.5	V	100	6	2014-10-22 14:27:38		31.5	0.0
✓	214.02	30.8	10.1	43.5	- 12.8	V	100	361	2014-10-22 14:28:34		30.8	0.0
✓	231.3	25.3	10.8	46.0	- 20.7	V	100	353	2014-10-22 14:29:30		26.0	0.0
✓	233.7	25.7	10.9	46.0	- 20.3	V	100	343	2014-10-22 14:30:27		26.1	0.0
✓	402.6	22.8	14.7	46.0	- 23.2	V	100	57	2014-10-22 14:31:23		25.9	0.0
✓	475.8	25.4	16.2	46.0	- 20.6	V	100	343	2014-10-22 14:32:19		26.4	0.0
✓	490.44	26.7	16.4	46.0	- 19.3	V	100	353	2014-10-22 14:33:15		27.2	0.0

Picture 53: BG6 - Radiated emission 30 MHz - 1000MHz @ 3m distance



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5 Radiated emission measurement (>1 GHz)

according to 47 CFR Part 15, section 15.209(a),
RSS-210, section 2.5 with RSS-Gen, section 7.2.5

Remark:

This measurement needs not to be applied because

- the intentional radiator operates below 10 GHz and tenth harmonic of the highest fundamental frequency is lower than 1 GHz (see 47 CFR Part 15, section 15.33(a)(1), and RSS-Gen, section 4.9), and
- the digital part of the device does not generate or use internal frequencies higher than 108 MHz (see 47 CFR Part 15 section 15.33(b)(1), and RSS-Gen, section 7.1.4 with ICES-003, section 6.2).



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6 Bandwidths

according to CFR 47 Part 2, section 2.202(a), and RSS-Gen, section 4.6

6.1 Test Location

See clause 4.1 on page 29.

6.2 Test instruments

See clause 4.2 on page 29.

6.3 Limits

The bandwidths are recorded only. There are no limits specified in CFR 47 Part 15, section 15.209, and RSS-210, Annex 2.6

6.4 Test setup

See clause 4.5 on page 32.

6.5 Test deviation

There is no deviation from the standards referred to.



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6.6 Test results - BG2 (S2)

Temperature:	21°C	Humidity:	43%
Tested by:	Martin Müller	Test date:	2014-11-04

Occupied bandwidth (99 %)

Test procedure

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. The transmitter shall be operated at its maximum carrier power measured under normal test conditions.

The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used given that a peak or peak hold may produce a wider bandwidth than actual.

The trace data points are recovered and directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded. The span between the two recorded frequencies is the occupied bandwidth. For this purpose the appropriate measurement function of the spectrum analyzer is used.

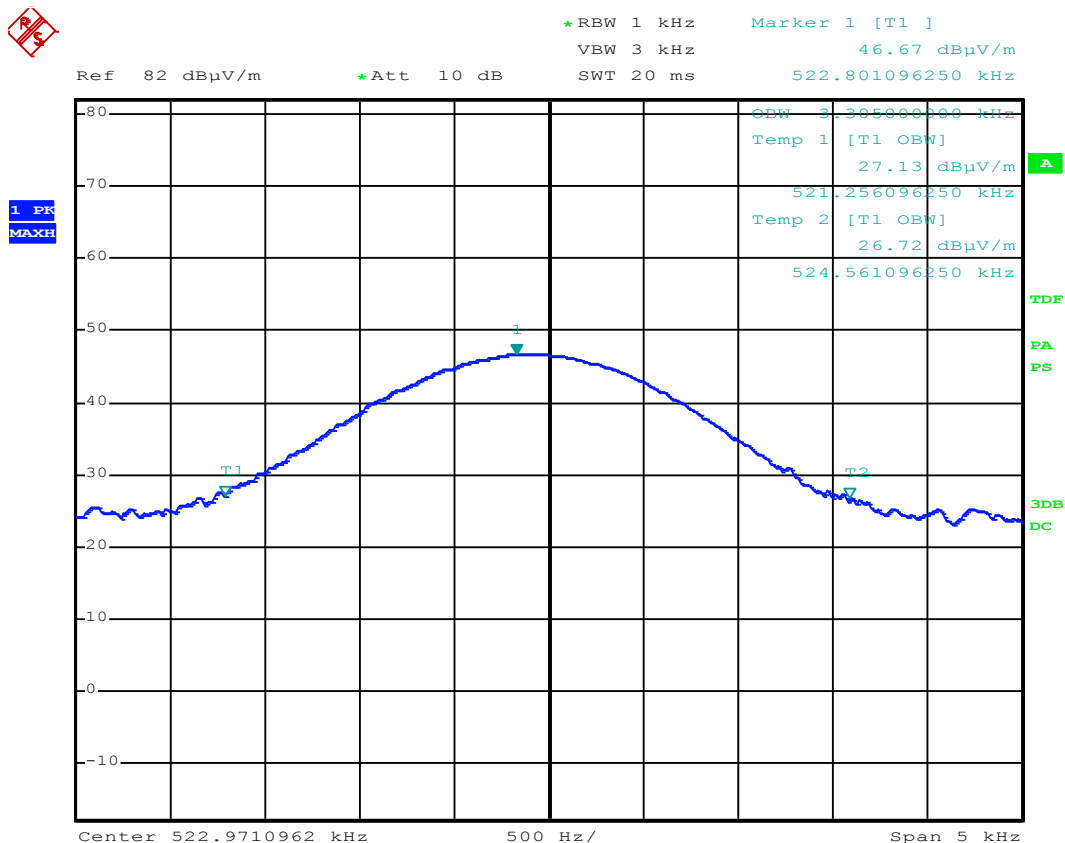


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Picture 54: BG2 - Occupied bandwidth (99 %) - 522 kHz

Measured occupied bandwidth (99 %) - 522 kHz: 3.3050 kHz



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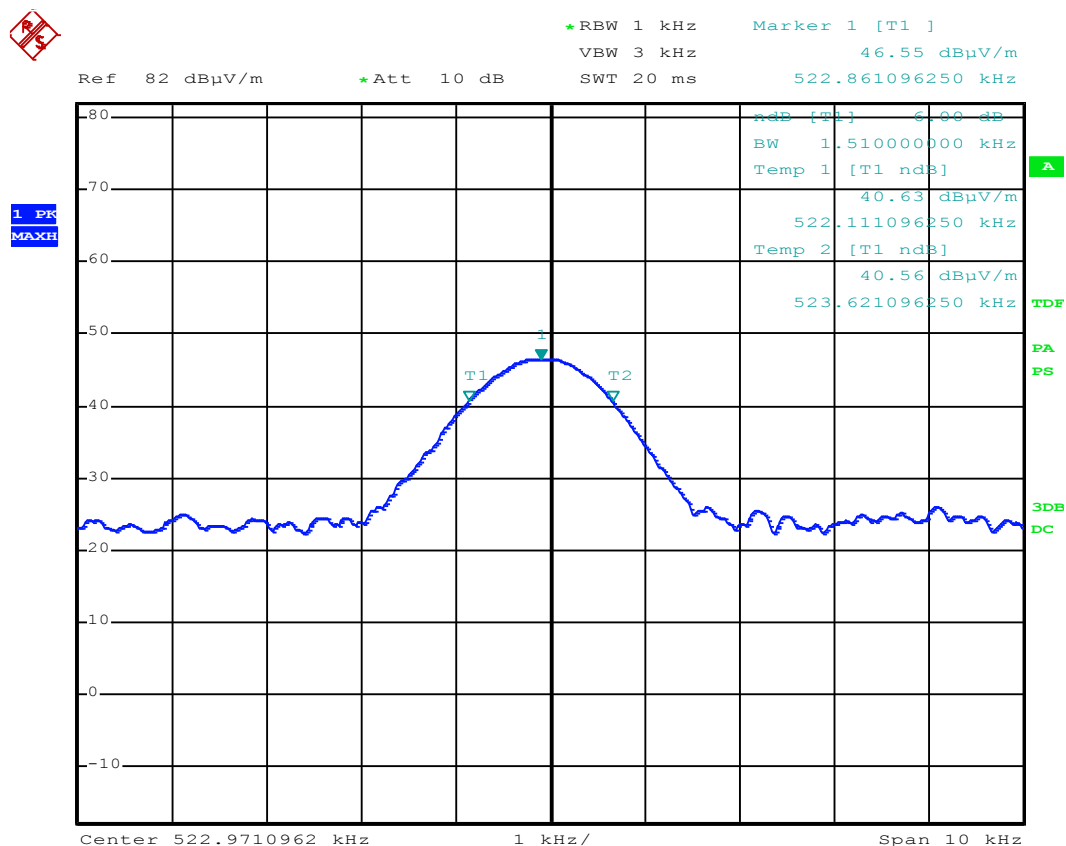
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-6 dB emission bandwidth

Test procedure

Where indicated, the -6 dB emission bandwidth is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated 6 dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth equal to approximately 1.0% of the emission bandwidth



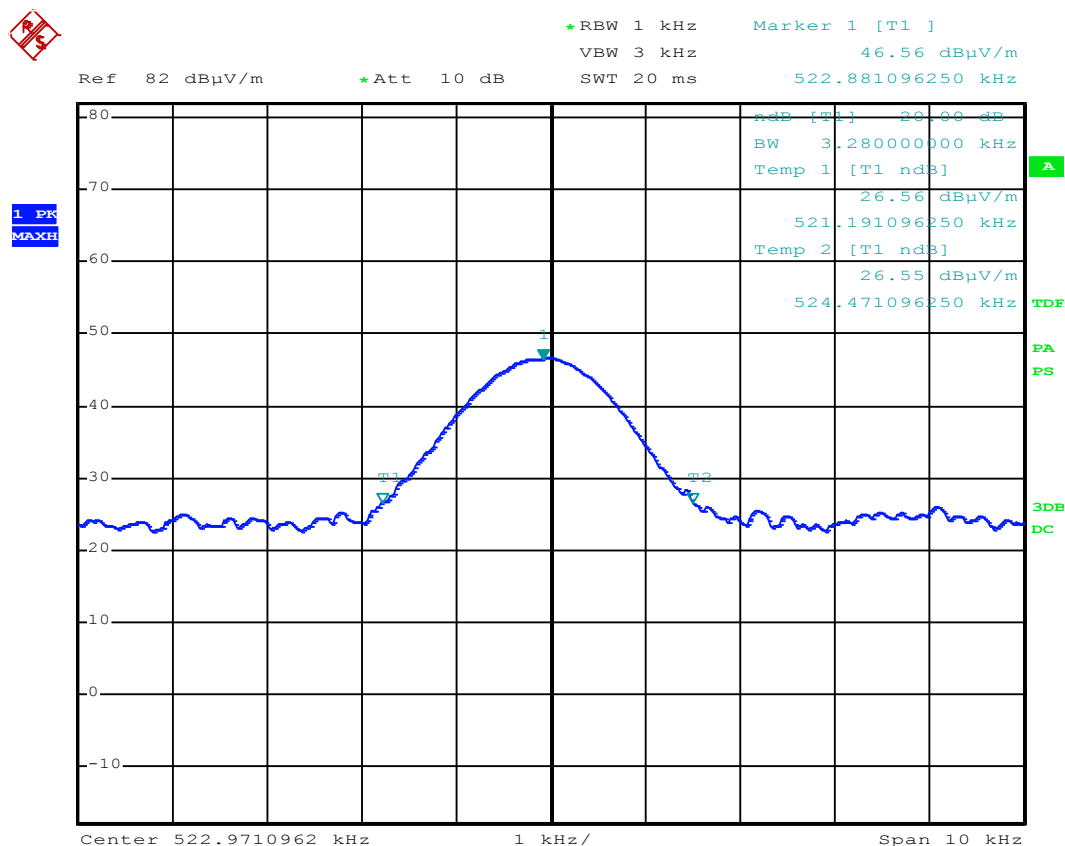
Picture 55: BG2 - -6 dB emission bandwidth - 522 kHz

Measured -6 dB emission bandwidth - 522 kHz: 1.5100 kHz

-20 dB emission bandwidth

Test procedure

Where indicated, the -20 dB emission bandwidth is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated 20 dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth equal to approximately 1.0% of the emission bandwidth.



Picture 56: BG2 - -20 dB emission bandwidth - 522 kHz

Measured -20 dB emission bandwidth - 522 kHz: 3.2800 kHz

6.7 Test results - BG3 (S3)

Temperature:	21°C	Humidity:	43%
Tested by:	Martin Müller	Test date:	2014-11-04

Occupied bandwidth (99 %)

Test procedure

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. The transmitter shall be operated at its maximum carrier power measured under normal test conditions.

The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used given that a peak or peak hold may produce a wider bandwidth than actual.

The trace data points are recovered and directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded. The span between the two recorded frequencies is the occupied bandwidth. For this purpose the appropriate measurement function of the spectrum analyzer is used.

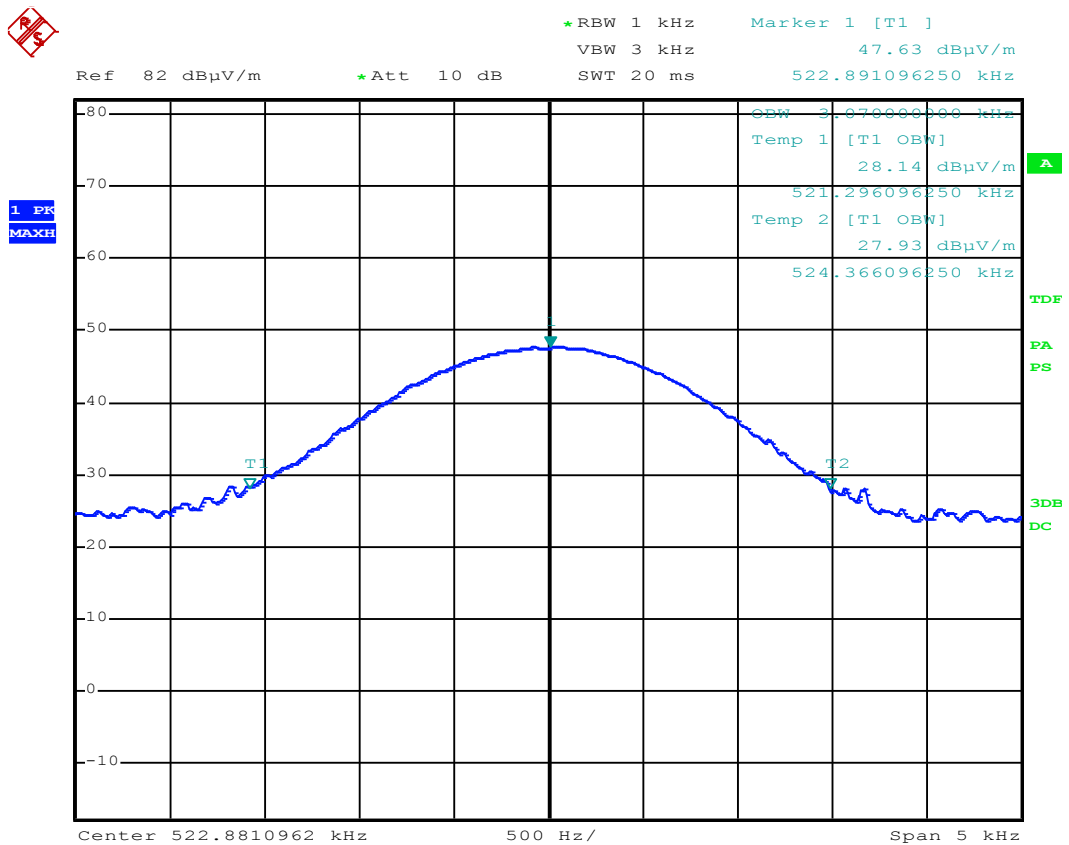


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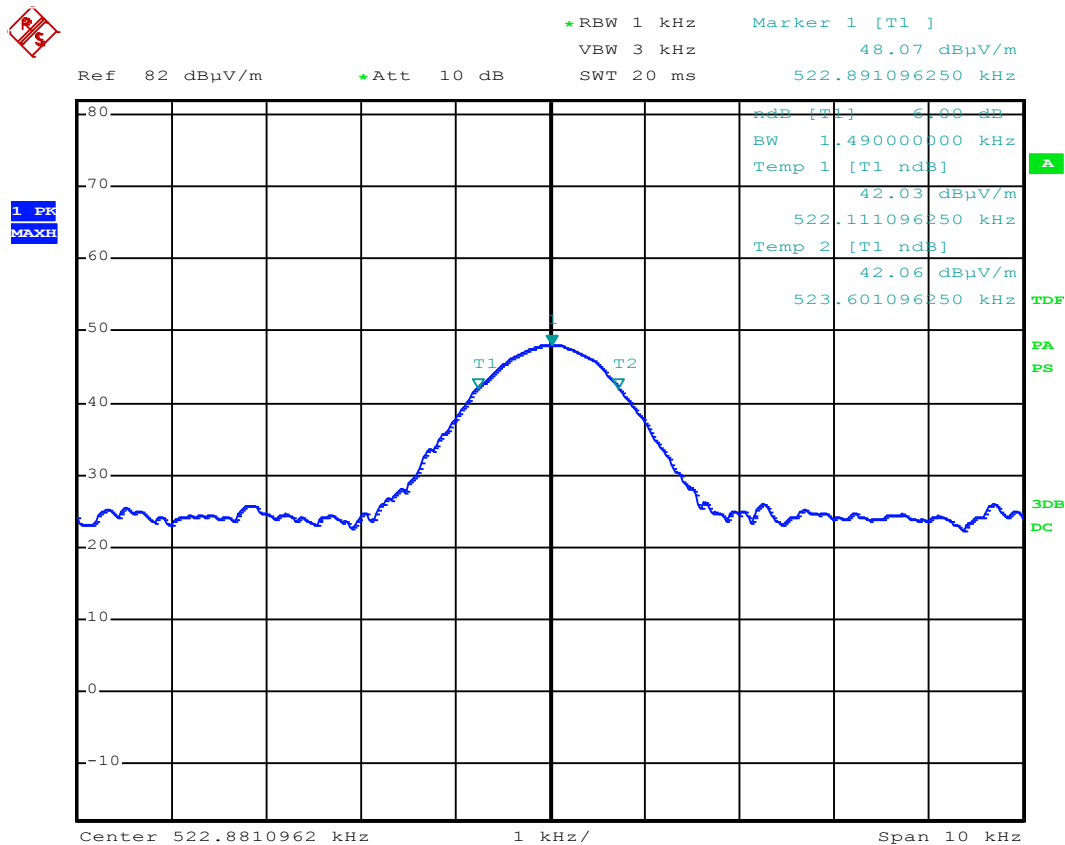
Picture 57: BG3 - Occupied bandwidth (99 %) - 522 kHz

Measured occupied bandwidth (99 %) - 522 kHz: 3.0700 kHz

-6 dB emission bandwidth

Test procedure

Where indicated, the -6 dB emission bandwidth is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated 6 dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth equal to approximately 1.0% of the emission bandwidth



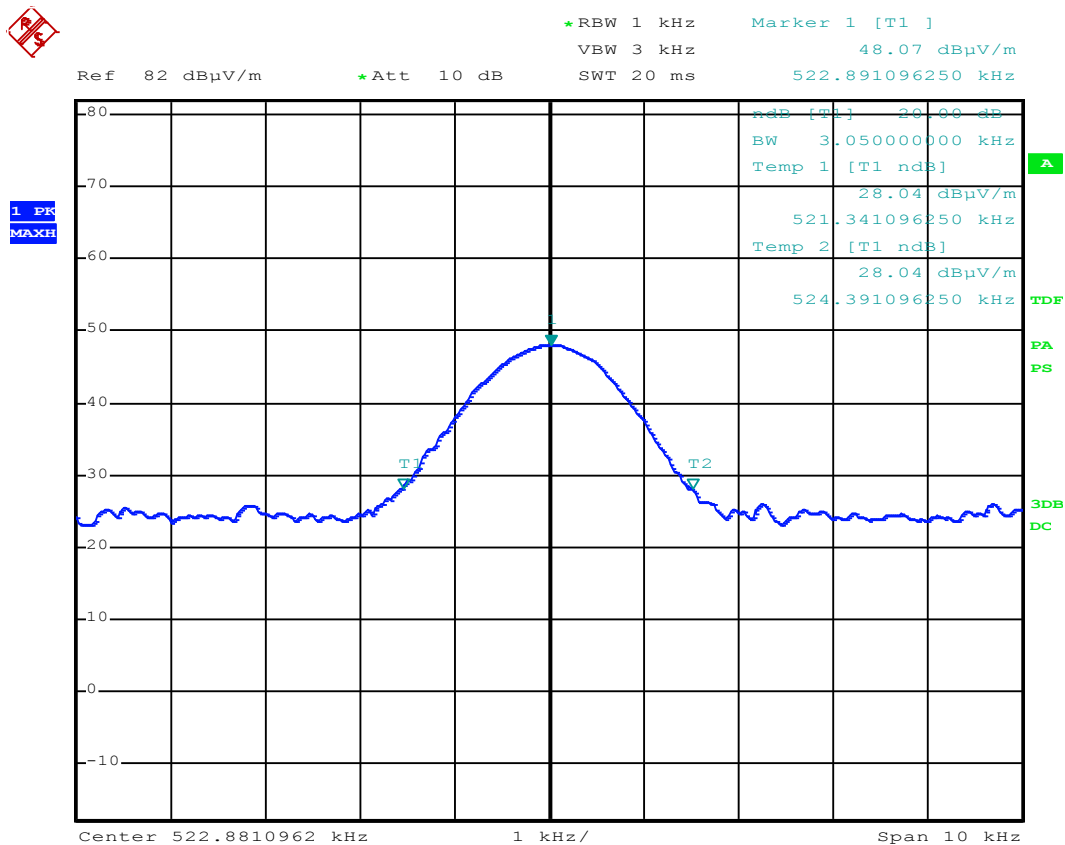
Picture 58: BG3 - -6 dB emission bandwidth - 522 kHz

Measured -6 dB emission bandwidth - 522 kHz: 1.4900 kHz

-20 dB emission bandwidth

Test procedure

Where indicated, the -20 dB emission bandwidth is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated 20 dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth equal to approximately 1.0% of the emission bandwidth.



Picture 59: BG3 - -20 dB emission bandwidth - 522 kHz

Measured -20 dB emission bandwidth - 522 kHz: 3.0500 kHz

6.8 Test results - BG4 (S4)

Temperature:	21°C	Humidity:	43%
Tested by:	Martin Müller	Test date:	2014-11-04

Occupied bandwidth (99 %)

Test procedure

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. The transmitter shall be operated at its maximum carrier power measured under normal test conditions.

The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used given that a peak or peak hold may produce a wider bandwidth than actual.

The trace data points are recovered and directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded. The span between the two recorded frequencies is the occupied bandwidth. For this purpose the appropriate measurement function of the spectrum analyzer is used.



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*RBW 1 kHz Marker 1 [T1]
VBW 3 kHz 48.87 dBμV/m
*Att 10 dB
SWT 20 ms 522.926096250 kHz

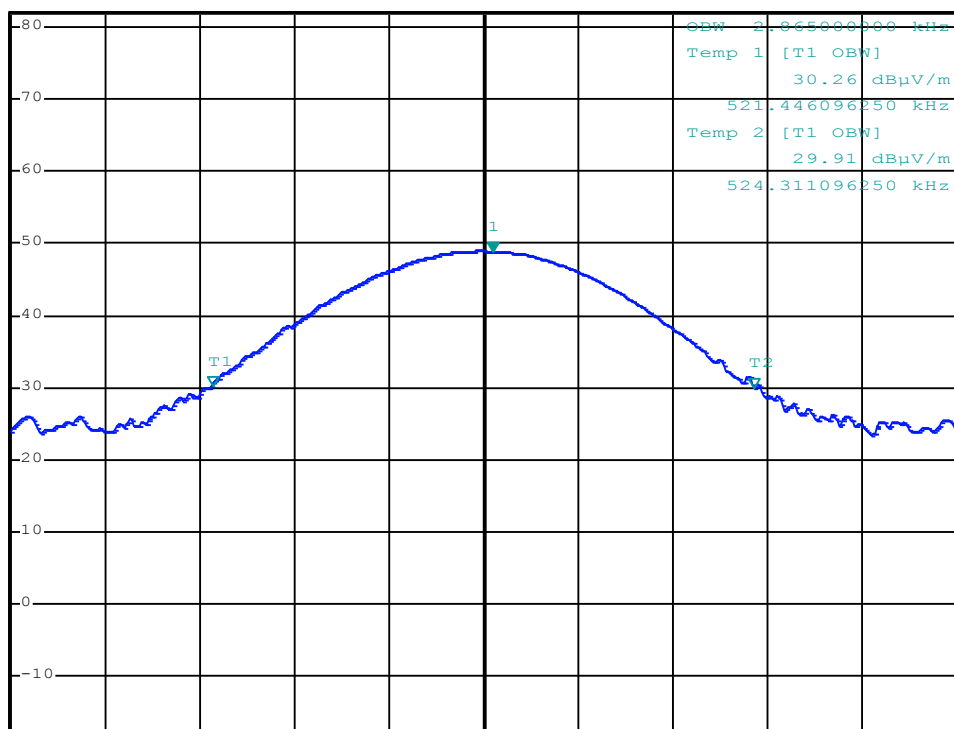
Ref 82 dBμV/m

*Att 10 dB

SWT 20 ms

522.926096250 kHz

1 PK
MAXH



Center 522.8810962 kHz 500 Hz/ Span 5 kHz

Picture 60: BG4 - Occupied bandwidth (99 %) - 522 kHz

Measured occupied bandwidth (99 %) - 522 kHz: 2.8650 kHz



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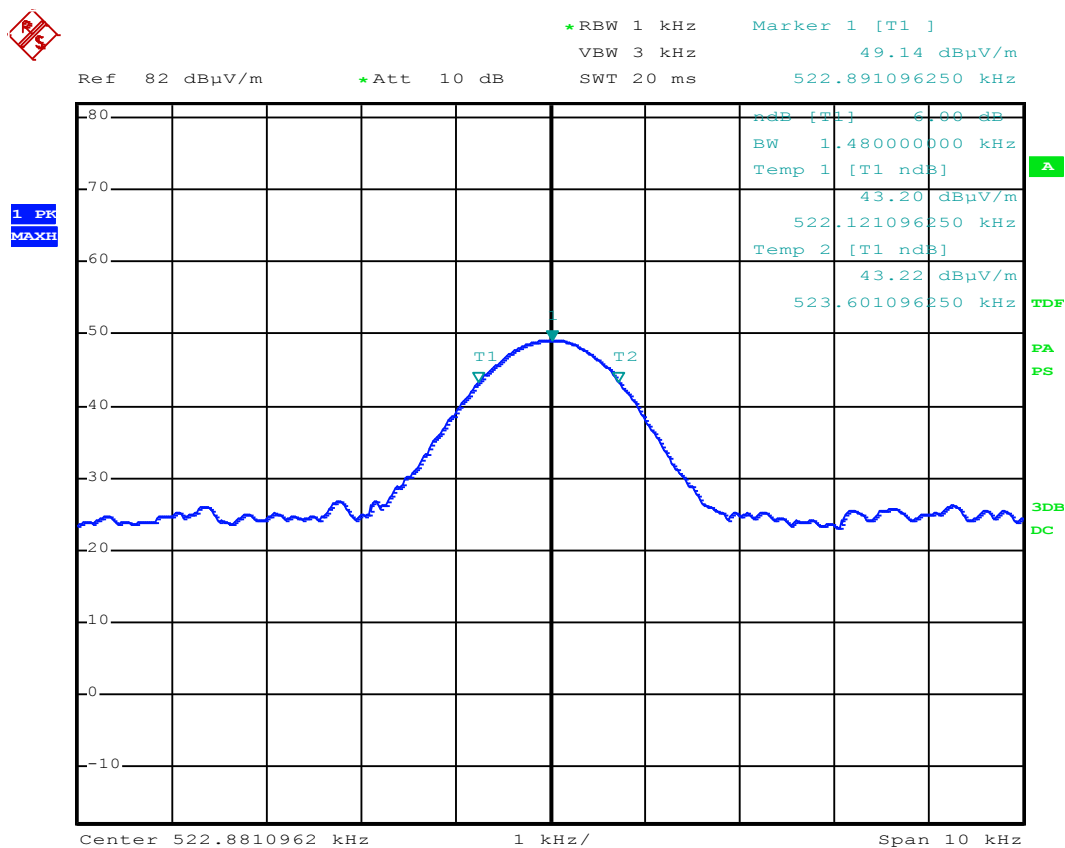
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-6 dB emission bandwidth

Test procedure

Where indicated, the -6 dB emission bandwidth is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated 6 dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth equal to approximately 1.0% of the emission bandwidth



Picture 61: BG4 - -6 dB emission bandwidth - 522 kHz

Measured -6 dB emission bandwidth - 522 kHz: 1.4800 kHz



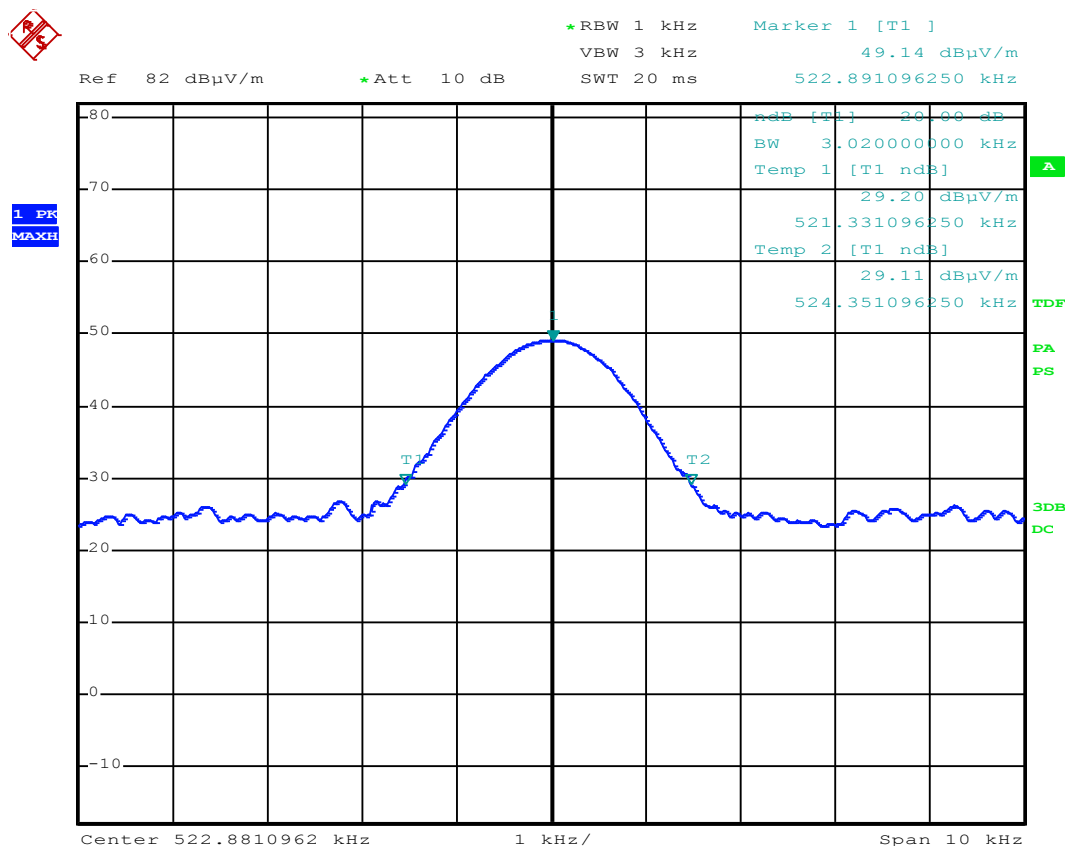
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-20 dB emission bandwidth

Test procedure

Where indicated, the -20 dB emission bandwidth is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated 20 dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth equal to approximately 1.0% of the emission bandwidth.



Picture 62: BG4 - -20 dB emission bandwidth - 522 kHz

Measured -20 dB emission bandwidth - 522 kHz: 3.0200 kHz

6.9 Test results - BG5 (S5)

Temperature:	21°C	Humidity:	43%
Tested by:	Martin Müller	Test date:	2014-11-04

Occupied bandwidth (99 %)

Test procedure

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. The transmitter shall be operated at its maximum carrier power measured under normal test conditions.

The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used given that a peak or peak hold may produce a wider bandwidth than actual.

The trace data points are recovered and directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded. The span between the two recorded frequencies is the occupied bandwidth. For this purpose the appropriate measurement function of the spectrum analyzer is used.



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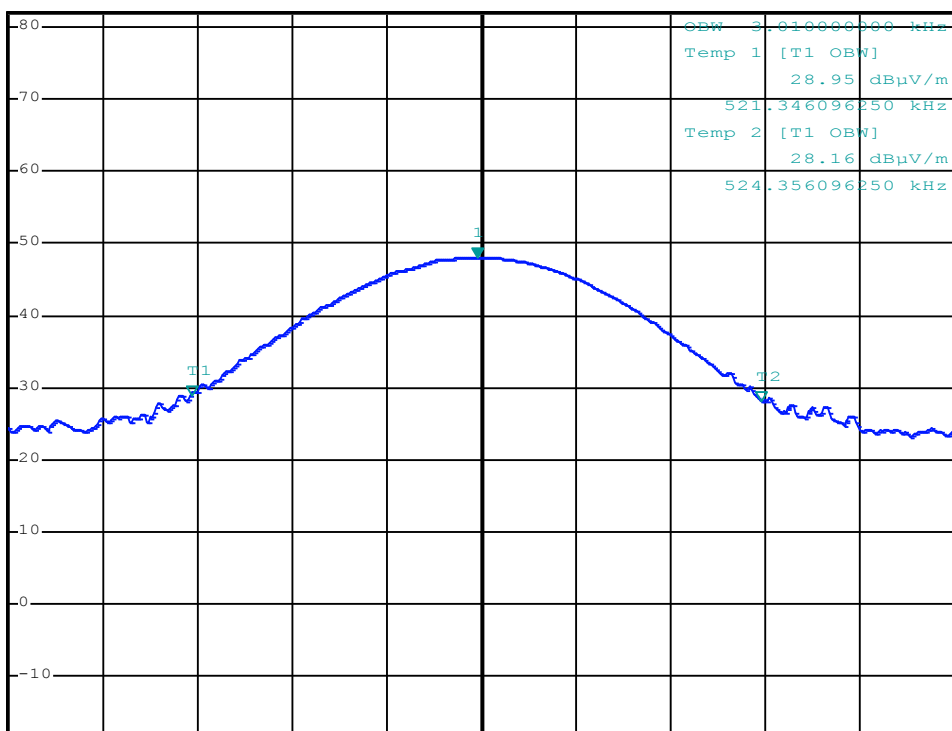
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*RBW 1 kHz Marker 1 [T1]
VBW 3 kHz 47.99 dBμV/m
*Att 10 dB 522.856096250 kHz
SWT 20 ms

Ref 82 dBμV/m

1 PK
MAXH



Center 522.8810962 kHz 500 Hz/ Span 5 kHz

Picture 63: BG5 - Occupied bandwidth (99 %) - 522 kHz

Measured occupied bandwidth (99 %) - 522 kHz: 3.0100 kHz



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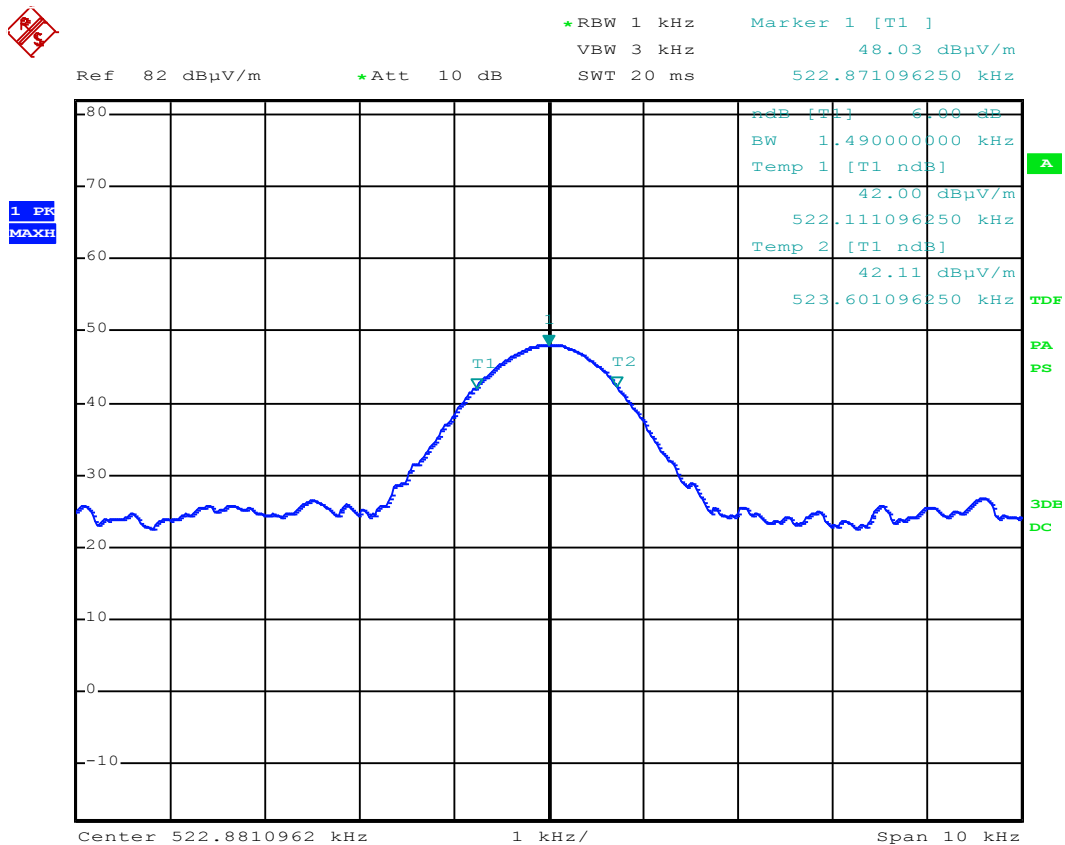
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-6 dB emission bandwidth

Test procedure

Where indicated, the -6 dB emission bandwidth is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated 6 dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth equal to approximately 1.0% of the emission bandwidth



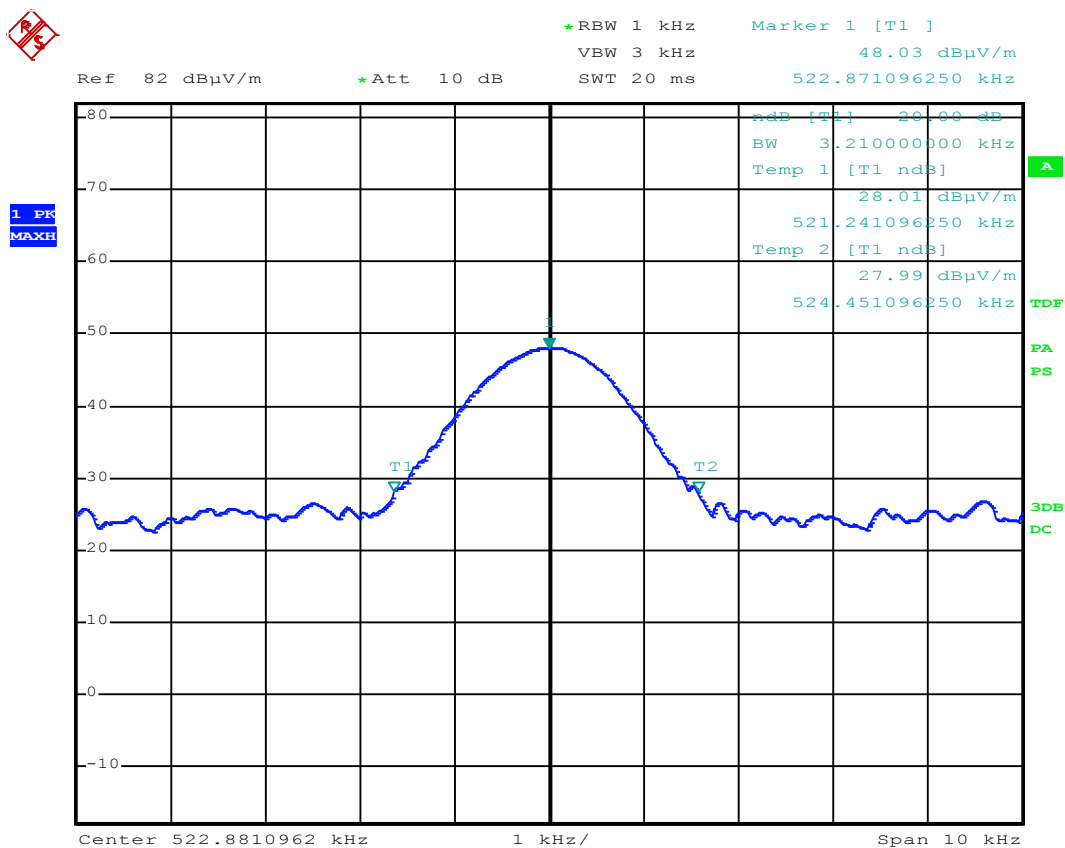
Picture 64: BG5 - -6 dB emission bandwidth - 522 kHz

Measured -6 dB emission bandwidth - 522 kHz: 1.4900 kHz

-20 dB emission bandwidth

Test procedure

Where indicated, the -20 dB emission bandwidth is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated 20 dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth equal to approximately 1.0% of the emission bandwidth.



Picture 65: BG5 - -20 dB emission bandwidth - 522 kHz

Measured -20 dB emission bandwidth - 522 kHz: 3.2100 kHz

6.10 Test results - BG6 (S6)

Temperature:	21°C	Humidity:	43%
Tested by:	Martin Müller	Test date:	2014-11-04

Occupied bandwidth (99 %)

Test procedure

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. The transmitter shall be operated at its maximum carrier power measured under normal test conditions.

The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used given that a peak or peak hold may produce a wider bandwidth than actual.

The trace data points are recovered and directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded. The span between the two recorded frequencies is the occupied bandwidth. For this purpose the appropriate measurement function of the spectrum analyzer is used.

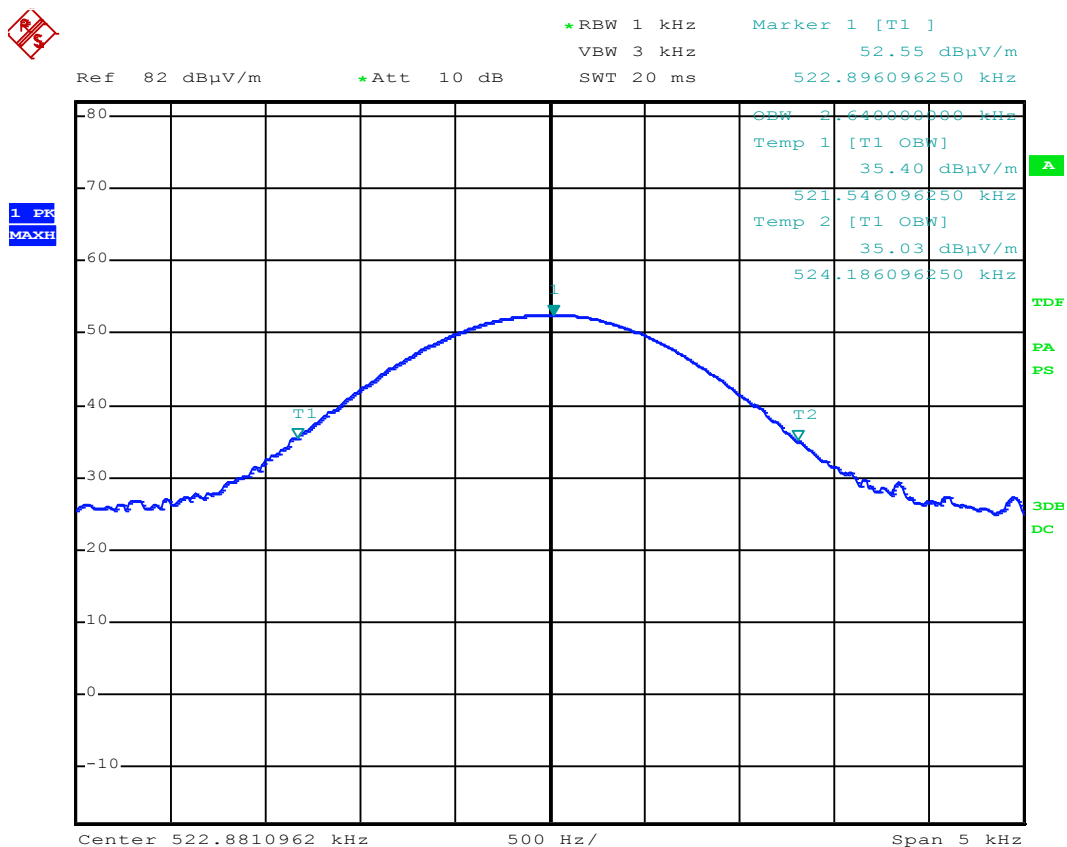


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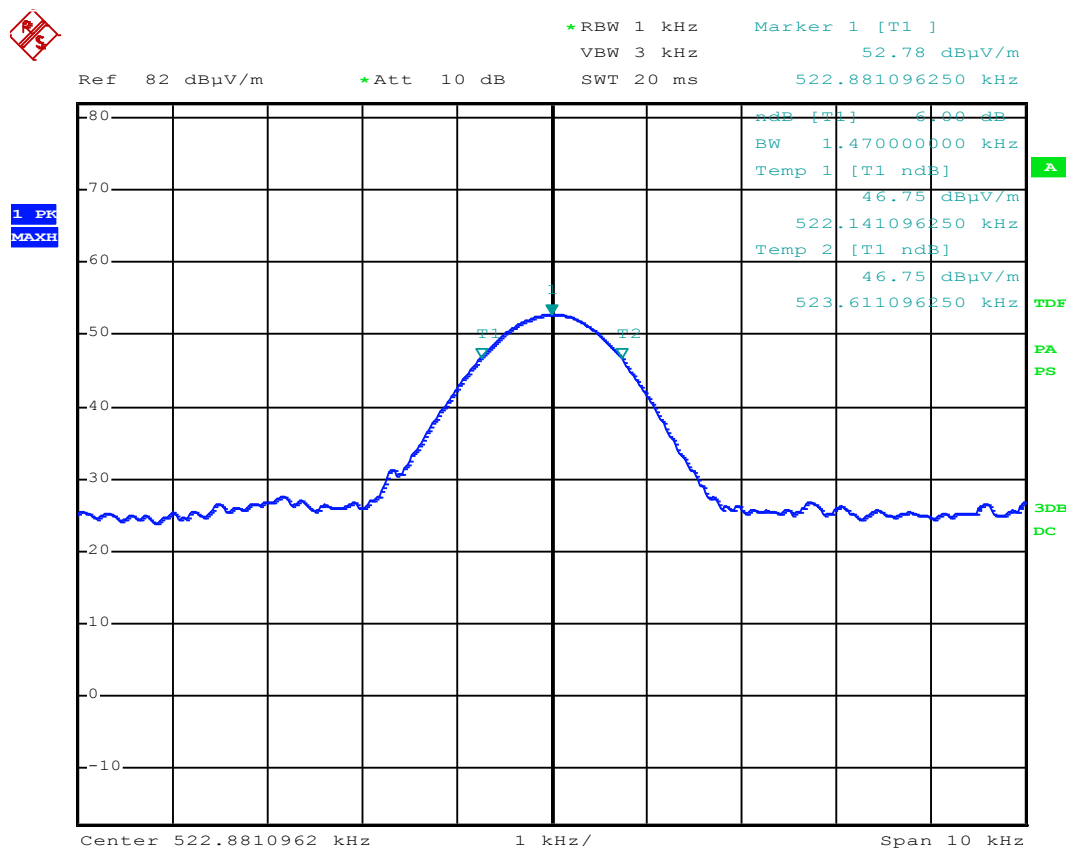
Picture 66: BG6 - Occupied bandwidth (99 %) - 522 kHz

Measured occupied bandwidth (99 %) - 522 kHz: 2.6400 kHz

-6 dB emission bandwidth

Test procedure

Where indicated, the -6 dB emission bandwidth is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated 6 dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth equal to approximately 1.0% of the emission bandwidth



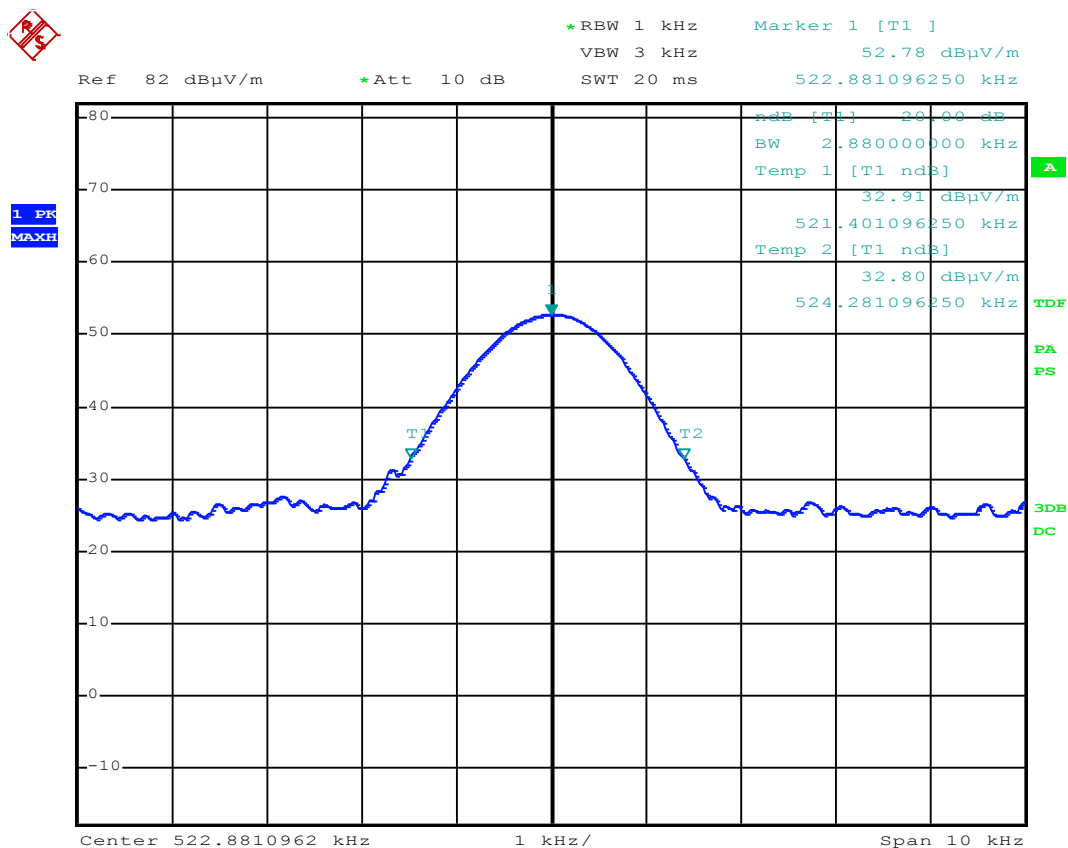
Picture 67: BG6 - -6 dB emission bandwidth - 522 kHz

Measured -6 dB emission bandwidth - 522 kHz: 1.4700 kHz

-20 dB emission bandwidth

Test procedure

Where indicated, the -20 dB emission bandwidth is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated 20 dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth equal to approximately 1.0% of the emission bandwidth.



Picture 68: BG6 - -20 dB emission bandwidth - 522 kHz

Measured -20 dB emission bandwidth - 522 kHz: 2.8800 kHz

Necessary bandwidth - data transfer carrier (1.22 MHz)

Test procedure

Calculated according to TRC-43, Issue 3, November 2012

Formula for PSK: $B_n = \frac{2 \times R \times K}{\log_2 S}$

$$R = 1.2 \text{ Mbps}^{1)}$$

$$K = 1$$

$$S = 3^{1)}$$

$$\underline{\underline{B_n = 1.5142 \text{ MHz}}}$$

Note¹⁾ : customer information

Remark: The calculation of the data transfer carrier is valid for all the models because the parameters are the same. Due to extremely low levels the bandwidth cannot be verified by measurements of e. g. occupied bandwidth..



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7 Equipment calibration status

Description	Modell number	Serial number	Inventory number	Last calibration	Next calibration
Test receiver	ESU 26	100026	W00002	2014-02	2016-02
Test receiver	ESCI 3	100013	E00001	2013-12	2015-12
Test receiver	ESCI 3	100328	E00552	2014-07	2016-07
Test receiver	ESCS 30	825442/0002	E00003	2014-02	2015-02
Test receiver	ESCS 30	845552/0008	E00551	2014-01	2015-01
LISN	ESH2-Z5	881362/037	E00004	2013-03	2015-03
LISN	ESH2-Z5	893406/009	E00005	2014-01	2016-01
Broadband antenna	VULB 9163	9163-114	E00013	2015-09	2015-09
Loop antenna	HFH2-Z2	871398/0050	E00004	2016-07	2016-07
Magnetic field probe	RF-R 400-1	02-1165	E00270	N/A (see note 1)	
Shielded room	P92007	B83117C1109T211	E00107	N/A	
Compact Diagnostic Chamber (CDC)	VK041.0174	D62128-A502-A69-2-0006	E00026	N/A	
Open area test site (OATS)	---	---	E00354	2014-10	2015-10
Climatic chamber 340 I	VC ³ 4034	58566123250010	C00015	2014-09	2016-09

Table 1: Equipment calibration status

Note 1: Used for relative measurements

Note 2: Expiration date of measurement facility registration (OATS) by
 - FCC (registration number 221458): 2017-04
 - Industry Canada (test site number 3472A-1): 2015-10



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8 Measurement uncertainty

Description	Max. deviation	k=
Conducted emission AMN (9kHz to 30 MHz)	± 3.8 dB	2
Radiated emission open field (3 m) (30 MHz to 300 MHz) (300MHz to 1 GHz)	± 5.4 dB ± 5.9 dB	2
Radiated emission absorber chamber (> 1000 MHz)	± 4.5 dB	2

Table 2: Measurement uncertainty

The uncertainty stated is the expanded uncertainty obtained by multiplying the standard uncertainty by the coverage factor k. For a confidence level of 95 % the coverage factor k is 2.



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9 Summary

The EMC Regulations according to the marked specifications are

☒ **KEPT**

The EUT does fulfill the general approval requirements mentioned.

☐ **NOT KEPT**

The EUT does not fulfill the general approval requirements mentioned.

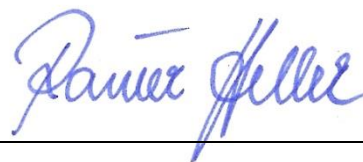
Place, Date: Straubing, November 12th, 2014



Martin Müller

Test engineer

EMV **TESTHAUS** GmbH



Rainer Heller

Head of EMC / radio department

EMV **TESTHAUS** GmbH



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10 Revision History

Date	Description	Person	Revision
2014-11-12	First edition	M. Müller	- - -

Template used: A_1.0_FCC 15.225_EN_PB.dotx



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