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Test Report

Report Number: F100984E2

Applicant:

Hirschmann Automation and Control GmbH

Manufacturer:

Hirschmann Automation and Control GmbH

Equipment under Test (EUT):

EMP-7601

Laboratory (CAB) accredited by
Deutsche Gesellschaft für Akkreditierung mbH
in compliance with DIN EN ISO/IEC 17025
under the Reg. No. DGA-PL-105/99-22,
FCC Test site registration number 90877 and
Industry Canada Test site registration IC3469A-1

REFERENCES

- [1] **ANSI C63.4-2009** American National Standard for Methods of Measuring of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
- [2] **FCC CFR 47 Part 15 (October 2009)** Radio Frequency Devices
- [3] **FCC Public Notice DA 00-705 (March 2000)**
- [4] **RSS-210 Issue 7 (June 2007)** Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment
- [5] **RSS-Gen Issue 2 (June 2007)** General Requirements and Information for the Certification of Radiocommunication Equipment
- [6] **Publication Number 913591 (March 2007)** Measurement of radiated emissions at the edge of the band for a Part 15 RF Device

TEST RESULT

The requirements of the tests performed as shown in the overview (clause 4) were fulfilled by the equipment under test.

The complete test results are presented in the following.

Test
engineer:

Thomas KÜHN

Name



Signature

02 September 2010

Date

Authorized
reviewer:

Bernd STEINER

Name



Signature

02 September 2010

Date

RESERVATION

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1 IDENTIFICATION

1.1 APPLICANT

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Applicant represented during the test by the following person:	-

1.2 MANUFACTURER

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Applicant represented during the test by the following person:	-

1.3 TEST LABORATORY

The tests were carried out at: **PHOENIX TESTLAB GmbH**
Königswinkel 10
32825 Blomberg
Germany

accredited by DGA Deutsche Gesellschaft für Akkreditierung mbH in compliance with
DIN EN ISO/IEC 17025 under Reg. No. DGA-PL-105/99-22, FCC Test site registration number
90877 and Industry Canada Test site registration IC3469A-1.

1.4 EUT (EQUIPMENT UNDER TEST)

Test object:	802.11 a/b/g/n miniPCI module
Type:	EMP-7601
FCC ID:	U99BAT300
IC:	4019A-BAT300
Serial number:	093310106
PCB identifier:	NMP-7601.1.20 LPF
Hardware version:	1.20
Software version:	Hilcos

1.5 TECHNICAL DATA OF EQUIPMENT

Antenna type:	Refer table below
Antenna gain:	Refer table below
Type of modulation:	DSSS (CCK / DQPSK, DBPSK) or OFDM (64QAM, 16QAM, QPSK, BPSK) depends on data-rate and the 802.11-mode)
Operating frequency range:	2.412 to 2.462 GHz 5.18 to 5.24 GHz 5.725 to 5.85 GHz
Number of channel	2.4 GHz: 11 for b-, g- and n-mode (20 MHz), 7 for n-mode (40 MHz) 5 GHz: 9 for a- and n-mode (20 MHz), 4 for n-mode (40 MHz)

The following external I/O cables were used:

Identification	Connector		Length *
	EUT	Ancillary	
Ethernet 1 / Ethernet 2	RJ 45 plug	RJ 45 plug	3 m (ETH 2)
DC in 12 V	5.5 mm jack plug	-	Not used
DC in 24 V	4 pole terminal block	-	2 m
Antenna 1 to 3	RPSMA	N female via pigtail	1 m

*: Length during the test if no other specified.

Used antennas:

Antenna name	Frequency range	Cable length / connector	Gain [dBi]
BAT-ANT-N-9A-DS-IP65	5.15 GHz to 5.925 GHz	2 x N-female	6.4 *
BAT-ANT-N-MiMoDB-5N-IP65	5.15 GHz to 5.875 GHz	3 x 1 m / N female	5.5 (5 GHz)
BAT-ANT-N-MiMo5-9N-IP65	5.15 GHz to 5.875 GHz	3 x 1 m / N female	6.4 *

*: As declared by the applicant the antennas will be used in combination with a cable which has an attenuation of at least 2.6 dB. This attenuation is respected by reducing the declared antenna gain by this value.

1.6 DATES

Date of receipt of test sample:	18 May 2010
Start of test:	09 August 2010
End of test:	23 August 2010

2 OPERATIONAL STATES

The EUT is a WLAN module, which is intended to be used in two host applications. During the tests the module was installed inside a BAT300-Rail FCC and a BAT300-F FCC.

As pre-tests has show the emissions caused by the EUT mounted inside the BAT300-Rail FCC were higher than the emissions with the EUT mounted inside the BAT300-F FCC. Therefore all measurements were carried out with the EUT mounted inside the BAT300-Rail FCC.

During all tests the EUT was powered with 24.0 V DC because there was no measurable difference to powering with 12 V DC or 48 V DC. The operation mode was adjusted with the help of a configuration-software on a laptop computer, which was permanently connected to the Ethernet-port of the host (BAT300-Rail FCC) via a Ethernet to fibre optic converter.

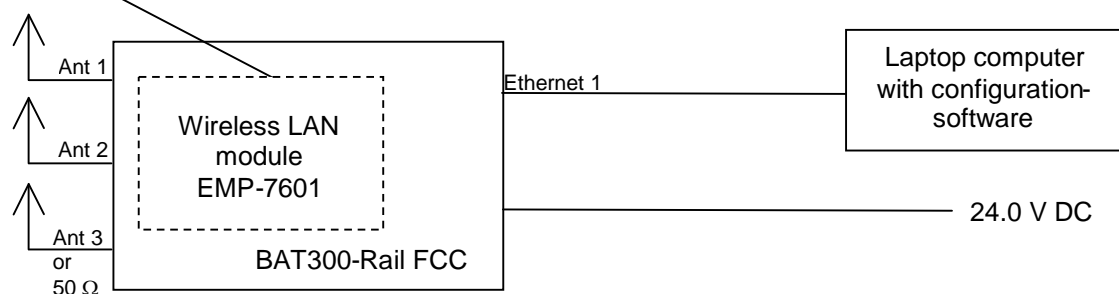
The EUT contains also a 2.4 GHz b-, g- and n-mode WLAN and a 5.8 GHz a- and n-mode WLAN. Object of this test report is the only the 5.2 GHz a- and n-mode WLAN. The results of the measurements of the 2.4 GHz b-, g- and n-mode WLAN and the 5.8 GHz a- and n-mode WLAN will be documented in a separate test report.

During the tests, the EUT was not labelled with a correct FCC/IC-label.

The following operation modes were used during the tests:

Operation mode	Description of the operation mode
1	Continuous transmitting on 5180 MHz, a or n-mode (20 MHz), with all applicable data rates
2	Continuous transmitting on 5200 MHz, a or n-mode (20 MHz), with all applicable data rates
3	Continuous transmitting on 5240 MHz, a or n-mode (20 MHz), with all applicable data rates
4	Continuous transmitting on 5190 MHz, n-mode (40 MHz), with all applicable data rates
5	Continuous transmitting on 5230 MHz, n-mode (40 MHz), with all applicable data rates
6	Continuous receiving on 5200 MHz

Physical boundary of the EUT



Preliminary tests were performed in different data rates to find worst-case configuration. The data rate shown in the table below shows the found worst-case rate with respect to specific test item. The following table shows a list of the test modes used for the results, documented in this report.

The conducted emissions on the power supply line were not depending on the used antenna. They were measured with the EUT supplied by an AC / DC adaptor type SMP-120W/V365 from profitec.

The following test modes were adjusted during the tests:

Test items	Operation mode
Maximum peak output power	1 – 5 with 6 Mbps, 7.2 Mbps and 15 Mbps
Band edge compliance (radiated)	1 – 5 with 6 Mbps, 7.2 Mbps and 15 Mbps
Radiated emissions (transmitter)	1 – 5 with 6 Mbps, 7.2 Mbps and 15 Mbps
Conducted emissions on supply line	2 with 6 Mbps
Radiated emissions (receiver)	6

3 ADDITIONAL INFORMATION

The EMP-7601 is already tested and certified under FCC ID U99BAT300 /IC 4019A-BAT300. The reasons for this test report were new antennas used with this the host application should be listed with a class 2 permissive change. Due to this fact all measurements were carried out with the WLAN module all radiated measurements and the conducted output power measurement were repeated and documented. For details of the conducted measurements refer the original filing.

4 OVERVIEW

Application	Frequency range [MHz]	FCC 47 CFR Part 15 section	RSS 210, Issue 7 [3] or RSS-Gen, Issue 2 [4]	Status	Refer page
26 dB spectrum bandwidth	5150 – 5250	15.407 (a)	A9.2 (1) [3]	Passed	Refer original filing
Maximum peak output power	5150 – 5250	15.407 (a)	A9.2 (1) [3]	Passed	20 et seq.
Power spectral density	5150 – 5250	15.407 (a)	A9.2 (1) [3]	Passed	Refer original filing
Peak excursion	5150 – 5250	15.407 (a)	-	Passed	Refer original filing
Bandedge compliance	5150 – 5250	15.407 (b)	-	Passed	21 et seq.
Frequency stability	5150 – 5250	15.407 (g)	A9.5 (5) [3]	Passed	Refer original filing
Radiated emissions (transmitter)	30 – 40,000	15.209 (a) 15.407 (b)	A9.3 (1) [3], 4.7 [4]	Passed	33 et seq.
Conducted emissions on supply line	0.15 – 30	15.207 (a)	7.2.2 [4]	Passed	89 et seq.
Radiated emissions (receiver)	30 – 30,000	-	2.6 [3], 7.2.3 [4]	Passed	Annex D

5 METHODS OF MEASUREMENT

5.1 MAXIMUM CONDUCTED OUTPUT POWER

The calibration of the spectrum analyser has to be checked with the help of a known signal from a signal generator. The EUT has to be connected to the spectrum analyser via a low loss cable. If the EUT is not equipped with an antenna connector, a temporary antenna connector has to be installed. The EUT has to be switched on, the transmitter shall work with its maximum data rate.

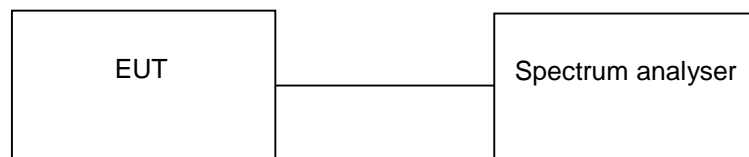
The following spectrum analyser settings shall be used:

- Span: Wide enough to encompass the entire emissions bandwidth (EBW) of the signal, centered on the actual channel.
- Resolution bandwidth: 1 MHz.
- Video bandwidth: 3 MHz.
- Sweep: Auto.
- Detector function: Sample
- Trace mode: Max hold.

Test will be performed in accordance with FCC Public Notice DA 02-2138, method 1. After trace stabilisation the marker shall be set on the signal peak. In case of multiple antennas, the measurement has to be repeated on each antenna port and the results have to be assumed.

The measurement will be performed on all channels.

Test set-up:



5.2 BAND-EDGE COMPLIANCE

The calibration of the spectrum analyser has to be checked with the help of a known signal from a signal generator. The EUT has to be connected to the antenna, which causes the highest field strength on the wanted frequency.

The following spectrum analyser settings shall be used:

- Span: Wide enough to capture the peak level of the emission on the channel closest to the band-edge, as well as any modulation products, which fall outside the assigned frequency band.
- Resolution bandwidth: 1 MHz.
- Video bandwidth: \geq the resolution bandwidth.
- Sweep: Auto.
- Detector function: Peak.
- Trace mode: Max hold.

The same test set-up as used for the final radiated emission measurement shall be used (refer also subclause 5.3 of this test report).

After trace stabilisation the marker shall be set on the signal peak. The first display line has to be set on this value. The second display line has to be set 20 dB below the first line (or the peak marker). The frequency line shall be set on the edge of the assigned frequency band. Set the second marker on the emission at the band-edge, or on the highest modulation product outside of the band, if this level is higher than that at the band-edge. This frequency shall be measured with the EMI receiver as described in subclause 5.3 of this test report.

The measurement will be performed at the upper end of the assigned frequency band.

The plots at the appropriate pages are showing radiated band-edge compliance with the worst-case operation mode. The display line 1 (D1) in these plots represents the highest level within the assigned frequency band. The display line 2 (D2) represents the 20 dB offset. The frequency line 1 (F1) shows the edge of the assigned frequency. The following tables are showing the results for the radiated band edge compliance for all applicable operation modes with the worst-case data rate, causing the highest emissions at the band edges.

5.3 RADIATED EMISSIONS

The radiated emission measurement is subdivided into five stages.

- A preliminary measurement carried out in a fully anechoic chamber with a fixed antenna height in the frequency range 9 kHz to 1 GHz.
- A final measurement carried out on an outdoor test side without reflecting ground plane and a fixed antenna height in the frequency range 9 kHz to 30 MHz.
- A final measurement carried out on an open area test side with reflecting ground plane and various antenna height in the frequency range 30 MHz to 1 GHz.
- A preliminary measurement carried out in a fully anechoic chamber with a variable antenna distance and height in the frequency range 1 GHz to 40 GHz.
- A final measurement carried out in a fully anechoic chamber with a fixed antenna height in the frequency range 1 GHz to 25 / 40 GHz.

All measurements will be carried out with the EUT working on the middle and upper and lower edge of the assigned frequency band. For this reason the hopping function of the EUT has to be disabled.

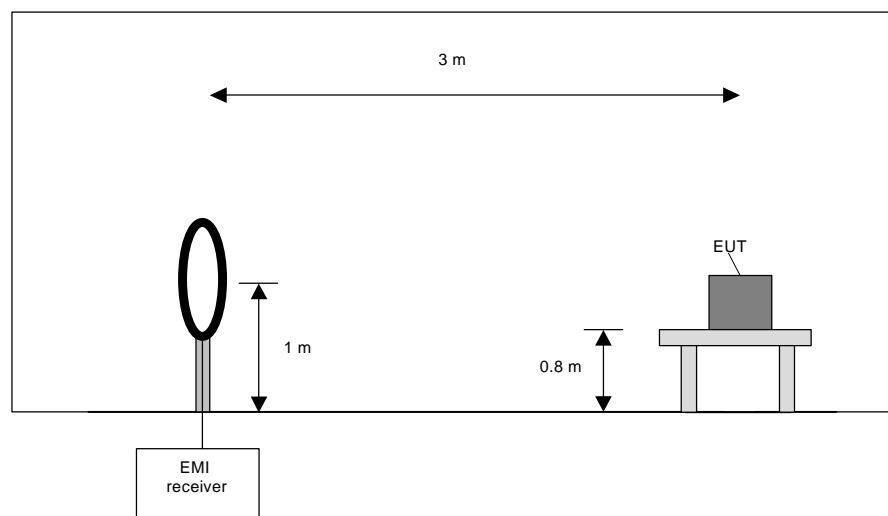
Preliminary measurement (9 kHz to 30 MHz):

In the first stage a preliminary measurement will be performed in a shielded room with a measuring distance of 3 meters. Tabletop devices will set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm. Floor-standing devices will be placed directly on the turntable/ground plane. The set up of the Equipment under test will be in accordance to ANSI C63.4-2009 [1].

The frequency range 9 kHz to 30 MHz will be monitored with a spectrum analyser while the system and its cables will be manipulated to find out the configuration with the maximum emission levels if applicable. The EMI Receiver will be set to MAX Hold mode. The EUT and the measuring antenna will be rotated around their vertical axis to found the maximum emissions.

The resolution bandwidth of the spectrum analyser will be set to the following values:

Frequency range	Resolution bandwidth
9 kHz to 150 kHz	200 Hz
150 kHz to 30 MHz	10 kHz



Preliminary measurement procedure:

Prescans were performed in the frequency range 9 kHz to 150 kHz and 150 kHz to 30 MHz.

The following procedure will be used:

- 1) Monitor the frequency range at horizontal polarisation and a EUT azimuth of 0 °.
- 2) Manipulate the system cables within the range to produce the maximum level of emission.
- 3) Rotate the EUT by 360 ° to maximize the detected signals.
- 4) Make a hardcopy of the spectrum.
- 5) Measure the frequencies of highest detected emission with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.
- 6) Repeat steps 1) to 5) with the other orthogonal axes of the EUT (because of EUT is a module and might be used in a handheld equipment application).
- 7) Rotate the measuring antenna and repeat steps 1) to 5).

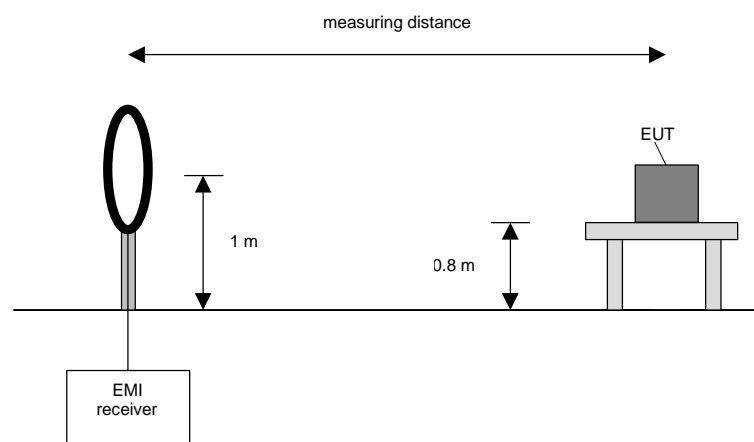
Final measurement (9 kHz to 30 MHz):

In the second stage a final measurement will be performed on an open area test site with no conducting ground plane in a measuring distances of 3 m, 10 m and 30 m. In the case where larger measuring distances are required the results will be extrapolated based on the values measured on the closer distances according to Section 15.31 (f) (2) [2]. The final measurement will be performed with a EMI Receiver set to Quasi Peak detector except for the frequency bands 9 kHz to 90 kHz and 110 kHz to 490 kHz where an average detector will be used according Section 15.209 (d) [2].

On the during the preliminary measurement detected frequencies the final measurement will be performed while rotating the EUT and the measuring antenna in the range of 0 ° to 360 ° around their vertical axis until the maximum value is found.

The resolution bandwidth of the EMI Receiver will be set to the following values:

Frequency range	Resolution bandwidth
9 kHz to 150 kHz	200 Hz
150 kHz to 30 MHz	9 kHz



Final measurement procedure:

The following procedure will be used:

- 1) Monitor the frequency range with the measuring antenna at vertical orientation parallel to the EUT at an azimuth of 0 °.
- 2) Rotate the EUT by 360 ° to maximize the detected signals and note the azimuth and orientation.
- 3) Rotate the measuring antenna to find the maximum and note the value.
- 4) Rotate the measuring antenna and repeat steps 1) to 3) until the maximum value is found.
- 5) Repeat steps 1) to 4) with the other orthogonal axes of the EUT (because of EUT is a module and might be used in a handheld equipment application).

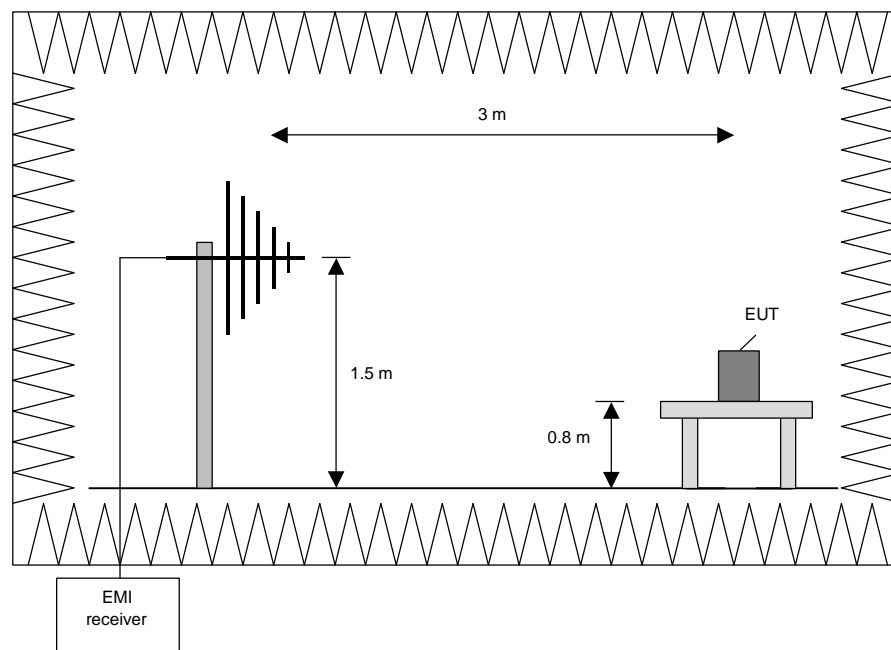
Preliminary measurement (30 MHz to 1 GHz)

In the first stage a preliminary measurement will be performed in a fully anechoic chamber with a measuring distance of 3 meter. Tabletop devices will set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm. Floor-standing devices will be placed directly on the turntable/ground plane. The set up of the Equipment under test will be in accordance to ANSI C63.4-2009 [1].

The frequency range 30 MHz to 1 GHz will be measured with an EMI Receiver set to MAX Hold mode and a resolution bandwidth of 100 kHz. The measurement will be performed in horizontal and vertical polarisation of the measuring antenna and while rotating the EUT in its vertical axis in the range of 0 ° to 360 °.

The resolution bandwidth of the EMI Receiver will be set to the following values:

Frequency range	Resolution bandwidth
30 MHz to 230 MHz	100 kHz
230 MHz to 1 GHz	100 kHz



Procedure preliminary measurement:

Prescans were performed in the frequency range 30 MHz to 230 MHz and 230 MHz to 1 GHz.

The following procedure will be used:

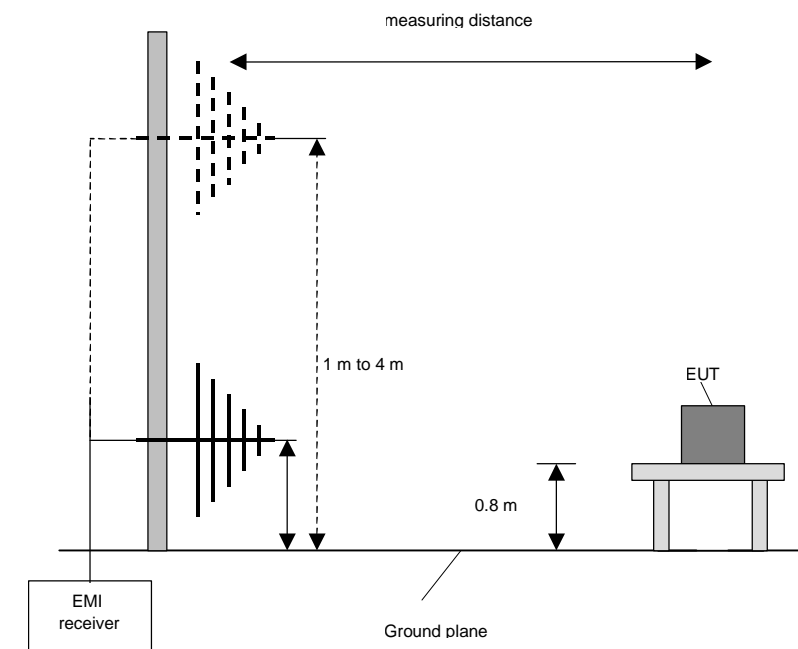
1. Monitor the frequency range at horizontal polarisation and a EUT azimuth of 0 °.
2. Manipulate the system cables within the range to produce the maximum level of emission.
3. Rotate the EUT by 360 ° to maximize the detected signals.
4. Make a hardcopy of the spectrum.
5. Measure the frequency of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.
6. Repeat 1) to 4) with the other orthogonal axes of the EUT (because of EUT is a module and might be used in a handheld equipment application).
7. Repeat 1) to 5) with the vertical polarisation of the measuring antenna.

Final measurement (30 MHz to 1 GHz)

A final measurement on an open area test site will be performed on selected frequencies found in the preliminary measurement. During this test the EUT will be rotated in the range of 0 ° to 360 °, the measuring antenna will be set to horizontal and vertical polarisation and raised and lowered in the range from 1 m to 4 m to find the maximum level of emissions.

The resolution bandwidth of the EMI Receiver will be set to the following values:

Frequency range	Resolution bandwidth
30 MHz to 1 GHz	120 kHz



Procedure final measurement:

The following procedure will be used:

- 1) Measure on the selected frequencies at an antenna height of 1 m and a EUT azimuth of 23 °.
- 2) Move the antenna from 1 m to 4 m and note the maximum value at each frequency.
- 3) Rotate the EUT by 45 ° and repeat 2) until an azimuth of 337 ° is reached.
- 4) Repeat 1) to 3) for the other orthogonal antenna polarization.
- 5) Move the antenna and the turntable to the position where the maximum value is detected.
- 6) Measure while moving the antenna slowly +/- 1 m.
- 7) Set the antenna to the position where the maximum value is found.
- 8) Measure while moving the turntable +/- 45 °.
- 9) Set the turntable to the azimuth where the maximum value is found.
- 10) Measure with Final detector (QP and AV) and note the value.
- 11) Repeat 5) to 10) for each frequency.
- 12) Repeat 1) to 11) for each orthogonal axes of the EUT (because of EUT is a module and might be used in a handheld equipment application).

Preliminary and final measurement (1 GHz to 40 GHz)

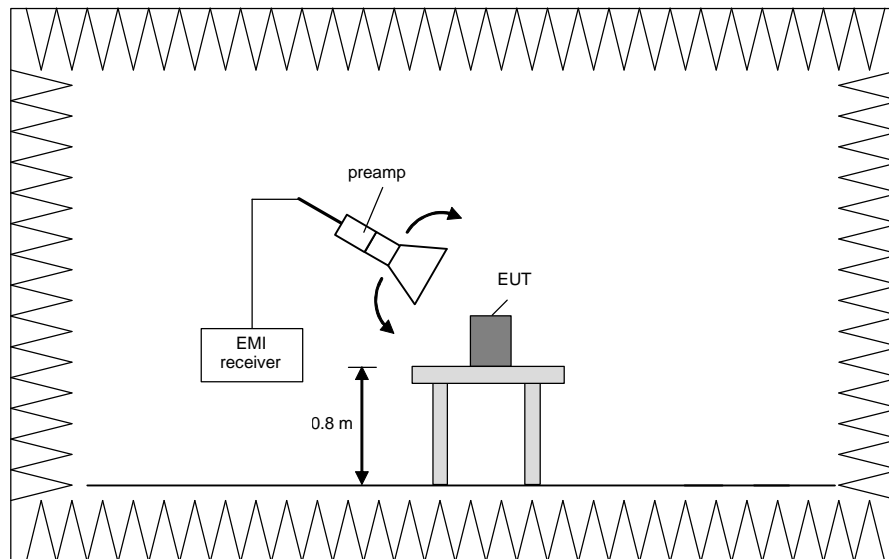
This measurement will be performed in a fully anechoic chamber. Tabletop devices will set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm. Floor-standing devices will be placed directly on the turntable/ground plane. The set up of the Equipment under test will be in accordance to ANSI C63.4-2009 [1].

Preliminary measurement (1 GHz to 40 GHz)

The frequency range will be divided into different sub ranges depending of the frequency range of the used horn antenna. The spectrum analyser set to MAX Hold mode and a resolution bandwidth of 100 kHz. The measurement will be performed in horizontal and vertical polarisation of the measuring antenna, the antenna close to the EUT and while moving the antenna over all sides of the EUT. With the spectrum analyser in CLEAR / WRITE mode the cone of the emission should be found and than the measuring distance will be set to 3 m with the receiving antenna moving in this cone of emission. At this position the final measurement will be carried out.

The resolution bandwidth of the EMI Receiver will be set to the following values:

Frequency range	Resolution bandwidth
1 GHz to 4 GHz	100 kHz
4 GHz to 12 GHz	100 kHz
12 GHz to 18 GHz	100 kHz
18 GHz to 26.5 GHz	100 kHz
26.5 GHz to 40 GHz	100 kHz

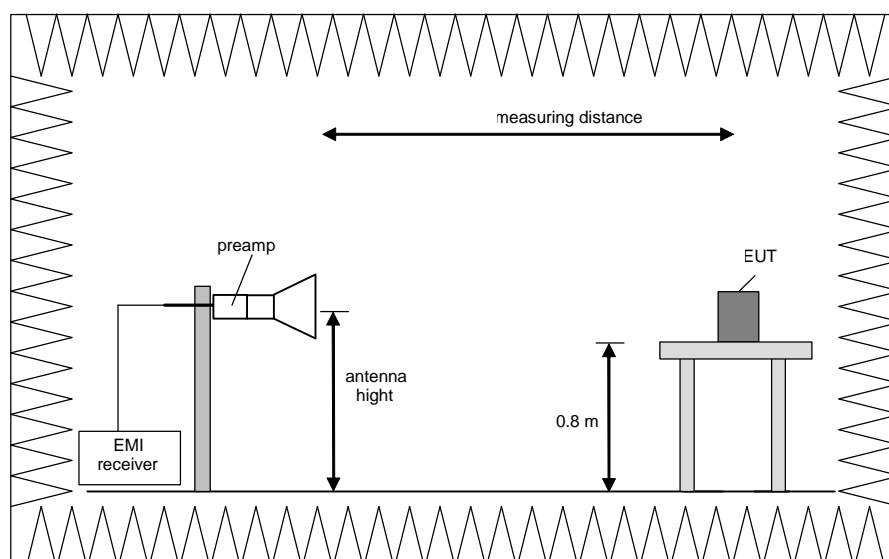


Final measurement (1 GHz to 40 GHz)

The frequency range will be divided into different sub ranges depending of the frequency range of the used horn antenna. The EMI Receiver set to peak and average mode and a resolution bandwidth of 1 MHz. The measurement will be performed in horizontal and vertical polarisation of the measuring antenna and while rotating the EUT in its vertical axis in the range of 0 ° to 360 ° in order to have the antenna inside the cone of radiation.

The resolution bandwidth of the EMI Receiver will be set to the following values:

Frequency range	Resolution bandwidth
1 GHz to 4 GHz	1 MHz
4 GHz to 12 GHz	1 MHz
12 GHz to 18 GHz	1 MHz
18 GHz to 26.5 GHz	1 MHz
26.5 GHz to 40 GHz	1 MHz



Procedure of measurement:

The measurements were performed in the frequency ranges 1 GHz to 4 GHz, 4 GHz to 12 GHz, 12 GHz to 18 GHz, 18 GHz to 25 /26.5 GHz and 26.5 GHz to 40 GHz.

The following procedure will be used:

- 1) Monitor the frequency range at horizontal polarisation and move the antenna over all sides of the EUT (if necessary move the EUT to another orthogonal axis).
- 2) Change the antenna polarisation and repeat 1) with vertical polarisation.
- 3) Make a hardcopy of the spectrum.
- 4) Measure the frequency of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.
- 5) Change the analyser mode to Clear / Write and found the cone of emission.
- 6) Rotate and move the EUT, so that the measuring distance can be enlarged to 3 m and the antenna will be still inside the cone of emission.
- 7) Measure the level of the detected frequency with the correct resolution bandwidth, with the antenna polarisation and azimuth and the peak and average detector, which causes the maximum emission.
- 8) Repeat steps 1) to 7) for the next antenna spot if the EUT is larger than the antenna beamwidth.

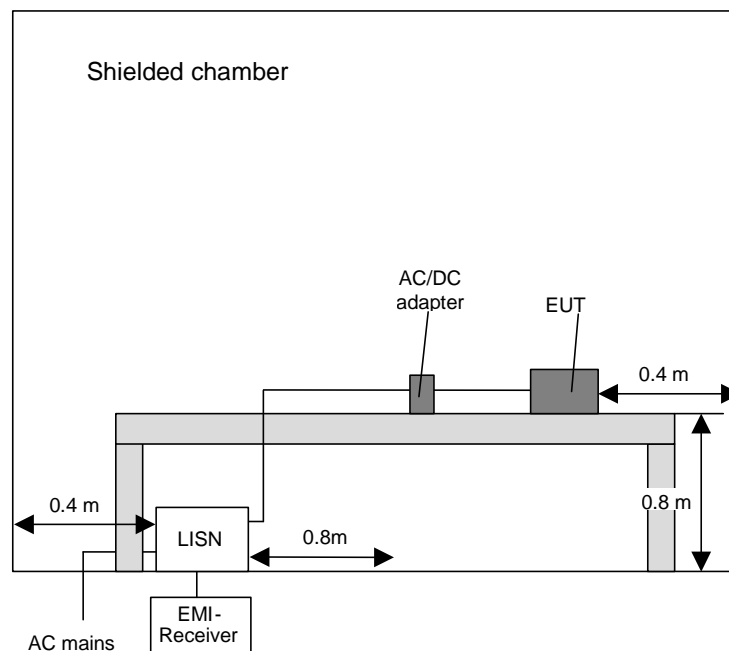
Step 1) to 6) are defined as preliminary measurement.

5.4 CONDUCTED EMISSIONS ON POWER SUPPLY LINES (150 kHz to 30 MHz)

This test will be carried out in a shielded chamber. Tabletop devices will set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm above the ground plane. Floor-standing devices will be placed directly on the ground plane. The set up of the Equipment under test will be in accordance to ANSI C63.4-2009 [1].

The frequency range 150 kHz to 30 MHz will be measured with an EMI Receiver set to MAX Hold mode with peak and average detector and a resolution bandwidth of 9 kHz. A scan will be carried out on the phase (or plus pole in case of DC powered devices) of the AC mains network. If levels detected 10 dB below the appropriate limit, this emission will be measured with the average and quasi-peak detector on all lines.

Frequency range	Resolution bandwidth
150 kHz to 30 MHz	9 kHz



6 TEST RESULTS

6.1 MAXIMUM PEAK OUTPUT POWER

Ambient temperature	20 °C
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Relative humidity	57 %
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Measured with method 1

T_{xon} = continuous transmission without duty cycle.

Because the maximum antenna gain (cable loss expected) exceed the 6.0 dBi, the limit is reduced by the amount of the exceedance.

Operation mode 7 to 9 a-mode with 6 Mbps data rate (worst-case)							
Channel number	Channel frequency [MHz]	Maximum peak output power [dBm]				Antenna gain [dBi]	Peak power limit [dBm]
36	5180	15.5				6.4	16.6
40	5200	15.4				6.4	16.6
48	5240	15.3				6.4	16.6
Operation mode 7 to 9 n-mode (20 MHz) with 7.2 Mbps data rate (worst-case)							
Channel number	Channel frequency [MHz]	Maximum peak output power [dBm]				Antenna gain [dBi]	Peak power limit [dBm]
		Chain 1	Chain 2	Chain 3	Total		
36	5180	9.5	8.8	11.2	14.7	6.4	16.6
40	5200	9.8	8.6	11.0	14.7	6.4	16.6
48	5240	9.5	8.3	10.7	14.4	6.4	16.6
Operation mode 10 to 11 n-mode (40 MHz) with 15 Mbps data rate (worst-case)							
Channel number	Channel frequency [MHz]	Maximum peak output power [dBm]				Antenna gain [dBi]	Peak power limit [dBm]
		Chain 1	Chain 2	Chain 3	Total		
38	5190	9.8	9.8	12.3	15.6	6.4	16.6
46	5230	11.7	9.7	12.7	16.3	6.4	16.6
Measurement uncertainty						+0.66 dB / -0.72 dB	

Test: Passed

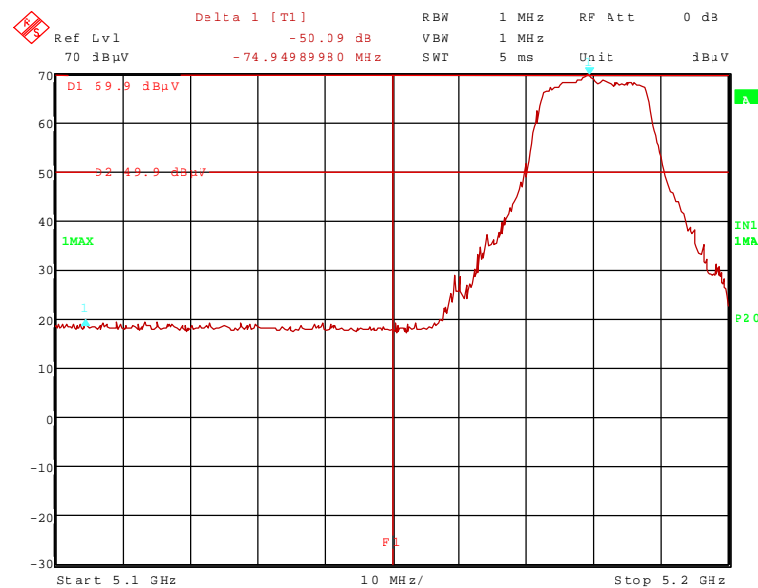
TEST EQUIPMENT USED FOR THE TEST:
30

6.2 BAND-EDGE COMPLIANCE

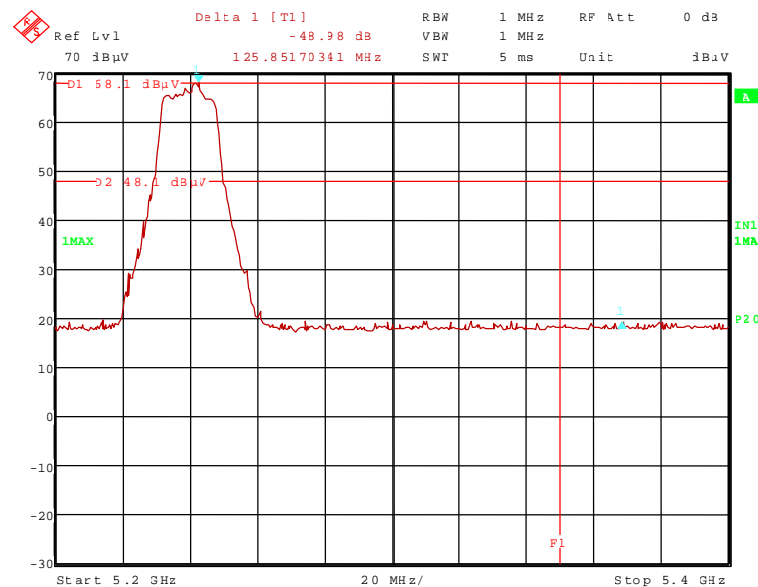
6.2.1 TEST RESULTS (BAND-EDGE COMPLIANCE) WITH BAT-ANT-N-MiMoDB-5N-IP65

Ambient temperature	20 °C	Relative humidity	62 %
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100984_444.wmf: Band-edge compliance at lower band edge (operation mode 1, a-mode 6, Mbps):



100984_443.wmf: Band edge compliance at upper band edge (operation mode 3, a-mode 6, Mbps):



6.2.1.1 TEST RESULT (BAND-EDGE COMPLIANCE) a-mode

Band-edge compliance (lower band edge, a-mode, 6 Mbps (worst-case))										
Result measured with the peak detector:										
Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.180	106.1	-	-	66.7	33.7	0.0	5.7	150	Vert.	
5.1044	57.6	74.0	16.4	18.5	33.5	0.0	5.6	150	Vert.	Yes
Result measured with the average detector:										
Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5180	96.5	-	-	57.1	33.7	0.0	5.7	150	Vert.	-
5.1044	44.3	54.0	9.7	5.2	33.5	0.0	5.6	150	Vert.	Yes
Measurement uncertainty							+2.2 dB / -3.6 dB			

Band-edge compliance (upper band edge, a-mode, 6 Mbps (worst-case))										
Result measured with the peak detector:										
Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.240	106.1	-	-	66.6	33.7	0.0	5.8	150	Vert.	-
5.3683	58.2	74.0	15.8	18.7	33.7	0.0	5.8	150	Vert.	Yes
Result measured with the average detector:										
Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.240	96.0	-	-	56.5	33.7	0.0	5.8	150	Vert.	-
5.3683	44.8	54.0	9.2	5.3	33.7	0.0	5.8	150	Vert.	Yes
Measurement uncertainty							+2.2 dB / -3.6 dB			

Test: Passed

6.2.1.2 TEST RESULT (BAND-EDGE COMPLIANCE) n-mode (20 MHz)

Band-edge compliance (lower band edge, n-mode (20 MHz), 7.2 Mbps (worst-case))										
Result measured with the peak detector:										
Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.180	108.5	-	-	69.1	33.7	0.0	5.7	150	Vert.	-
5.108	57.2	74.0	16.8	18.1	33.5	0.0	5.6	150	Vert.	Yes
Result measured with the average detector:										
Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.180	98.5	-	-	59.1	33.7	0.0	5.7	150	Vert.	
5.108	43.7	54.0	10.3	4.6	33.5	0.0	5.6	150	Vert.	Yes
Measurement uncertainty							+2.2 dB / -3.6 dB			

Band-edge compliance (upper band edge, n-mode (20 MHz), 7.2 Mbps (worst-case))										
Result measured with the peak detector:										
Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.240	105.7	-	-	66.2	33.7	0.0	5.8	150	Vert.	-
5.3831	58.1	74.0	15.9	18.5	33.8	0.0	5.8	150	Vert.	Yes
Result measured with the average detector:										
Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.240	95.8	-	-	56.3	33.7	0.0	5.8	150	Vert.	-
5.3831	44.8	54.0	9.4	5.2	33.8	0.0	5.8	150	Vert.	Yes
Measurement uncertainty							+2.2 dB / -3.6 dB			

Test: Passed

6.2.1.3 TEST RESULT (BAND-EDGE COMPLIANCE) n-mode (40 MHz)

Band-edge compliance (lower band edge, n-mode (40 MHz), 15 Mbps (worst-case))										
Result measured with the peak detector:										
Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.190	104.1	-	-	64.6	33.7	0.0	5.8	150	Vert.	-
5.1416	57.4	74.0	16.6	18.2	33.6	0.0	5.6	150	Vert.	Yes
Result measured with the average detector:										
Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.190	93.2	-	-	53.7	33.7	0.0	5.8	150	Vert.	-
5.1416	44.1	54.0	9.9	4.9	33.6	0.0	5.6	150	Vert.	Yes
Measurement uncertainty							+2.2 dB / -3.6 dB			

Band-edge compliance (upper band edge, n-mode (40 MHz), 15 Mbps (worst-case))										
Result measured with the peak detector:										
Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.230	104.9	-	-	65.4	33.7	0.0	5.8	150	Vert.	-
5.3518	57.6	74.0	16.4	18.1	33.7	0.0	5.8	150	Vert.	Yes
Result measured with the average detector:										
Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.230	93.9	-	-	54.4	33.7	0.0	5.8	150	Vert.	-
5.3518	44.2	54.0	9.8	4.7	33.7	0.0	5.8	150	Vert.	Yes
Measurement uncertainty							+2.2 dB / -3.6 dB			

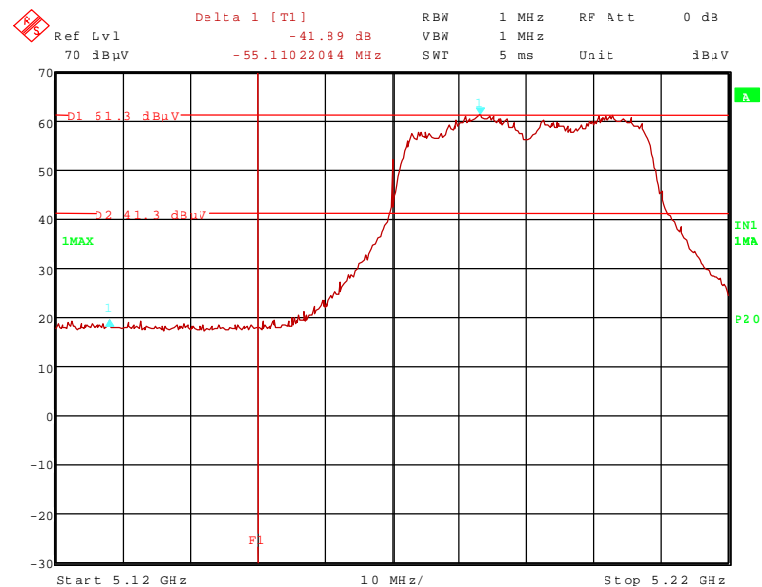
Test: Passed

TEST EQUIPMENT USED FOR THE TEST:
29, 31 – 34, 36, 44

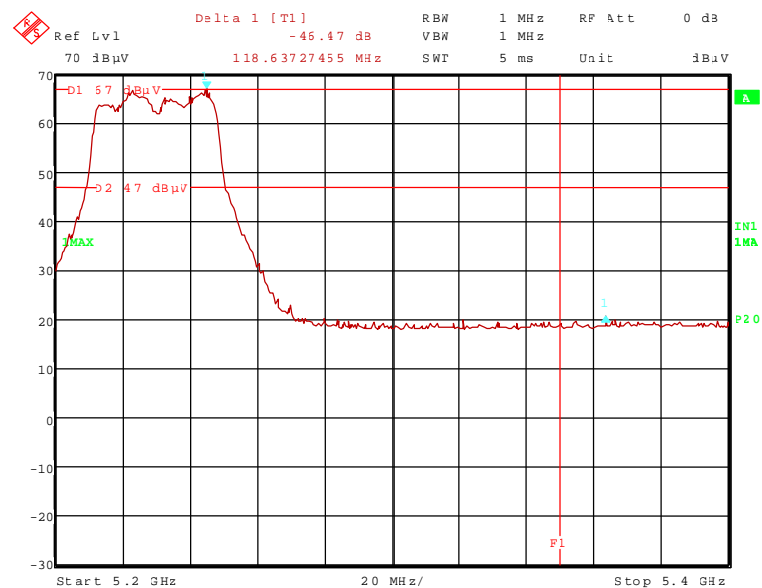
6.2.2 TEST RESULTS (BAND-EDGE COMPLIANCE) WITH BAT-ANT-N-9A-DS-IP65

Ambient temperature	20 °C	Relative humidity	62 %
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100984 401.wmf: Band-edge compliance at lower band edge (operation mode 4, n-mode, 15 Mbps):



100984 402.wmf: Band-edge compliance at lower band edge (operation mode 5, n-mode, 15 Mbps):



6.2.2.1 TEST RESULT (BAND-EDGE COMPLIANCE) a-mode

Band-edge compliance (lower band edge, a-mode, 6 Mbps (worst-case))										
Result measured with the peak detector:										
Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.180	103.7	-	-	64.3	33.7	0.0	5.7	150	Hor.	-
5.1482	56.8	74.0	17.2	17.6	33.6	0.0	5.6	150	Hor.	Yes
Result measured with the average detector:										
Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.180	94.2	-	-	54.8	33.7	0.0	5.7	150	Hor.	-
5.1482	43.4	54.0	10.6	4.2	33.6	0.0	5.6	150	Hor.	Yes
Measurement uncertainty							+2.2 dB / -3.6 dB			

Band-edge compliance (upper band edge, a-mode, 6 Mbps (worst-case))										
Result measured with the peak detector:										
Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.240	106.0	-	-	66.5	33.7	0.0	5.8	150	Hor.	-
5.3992	57.5	74.0	16.5	17.9	33.8	0.0	5.8	150	Hor.	Yes
Result measured with the average detector:										
Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.240	96.7	-	-	57.2	33.7	0.0	5.8	150	Hor.	-
5.3992	44.5	54.0	9.5	4.9	33.8	0.0	5.8	150	Hor.	Yes
Measurement uncertainty							+2.2 dB / -3.6 dB			

Test: Passed

6.2.2.2 TEST RESULT (BAND-EDGE COMPLIANCE) n-mode (20 MHz)

Band-edge compliance (lower band edge, n-mode (20 MHz), 7.2 Mbps (worst-case))										
Result measured with the peak detector:										
Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.180	104.6	-	-	65.2	33.7	0.0	5.7	150	Vert.	-
5.1426	56.9	74.0	17.1	17.7	33.6	0.0	5.6	150	Vert.	Yes
Result measured with the average detector:										
Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.180	94.0	-	-	54.6	33.7	0.0	5.7	150	Vert.	-
5.1426	43.5	54.0	10.5	4.3	33.6	0.0	5.6	150	Vert.	Yes
Measurement uncertainty							+2.2 dB / -3.6 dB			

Band-edge compliance (upper band edge, n-mode (20 MHz), 7.2 Mbps (worst-case))										
Result measured with the peak detector:										
Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.240	101.0	-	-	61.5	33.7	0.0	5.8	150	Vert.	-
5.3710	58.5	74.0	15.5	19.0	33.7	0.0	5.8	150	Hor.	Yes
Result measured with the average detector:										
Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.240	90.8	-	-	51.3	33.7	0.0	5.8	150	Vert.	-
5.3710	44.6	54.0	9.4	5.1	33.7	0.0	5.8	150	Hor.	Yes
Measurement uncertainty							+2.2 dB / -3.6 dB			

Test: Passed

6.2.2.3 TEST RESULT (BAND-EDGE COMPLIANCE) n-mode (40 MHz)

Band-edge compliance (lower band edge, n-mode (40 MHz), 15 Mbps (worst-case))										
Result measured with the peak detector:										
Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.190	99.8	-	-	60.3	33.7	0.0	5.8	150	Hor.	-
5.128	56.9	74.0	17.1	17.7	33.6	0.0	5.6	150	Hor.	Yes
Result measured with the average detector:										
Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.190	88.6	-	-	49.1	33.7	0.0	5.8	150	Hor.	-
5.1280	43.9	54.0	10.1	4.7	33.6	0.0	5.6	150	Hor.	Yes
Measurement uncertainty							+2.2 dB / -3.6 dB			

Band-edge compliance (upper band edge, n-mode (40 MHz), 15 Mbps (worst-case))										
Result measured with the peak detector:										
Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.230	105.2	-	-	65.7	33.7	0.0	5.8	150	Hor.	-
5.3634	58.0	74.0	16.0	18.5	33.7	0.0	5.8	150	Hor.	Yes
Result measured with the average detector:										
Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.230	93.8	-	-	54.3	33.7	0.0	5.8	150	Hor.	-
5.3634	44.8	54.0	9.2	5.3	33.7	0.0	5.8	150	Hor.	Yes
Measurement uncertainty							+2.2 dB / -3.6 dB			

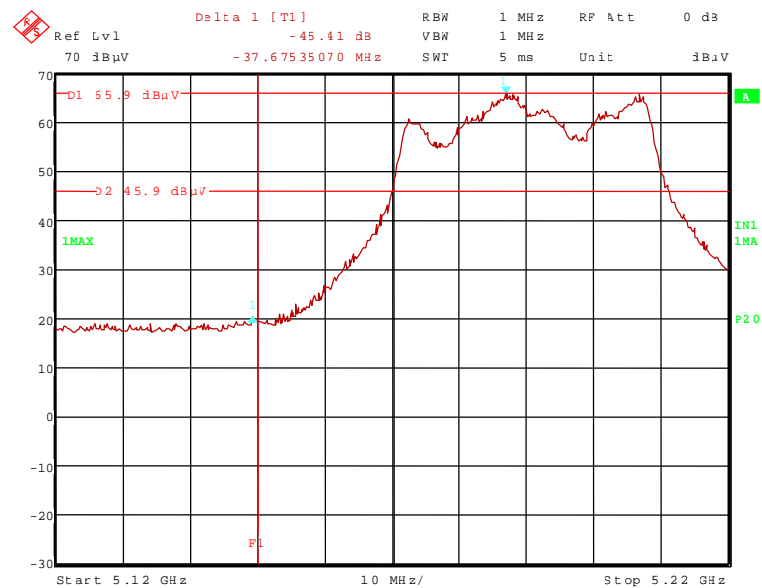
Test: Passed

TEST EQUIPMENT USED FOR THE TEST:
29, 31 – 34, 36, 44

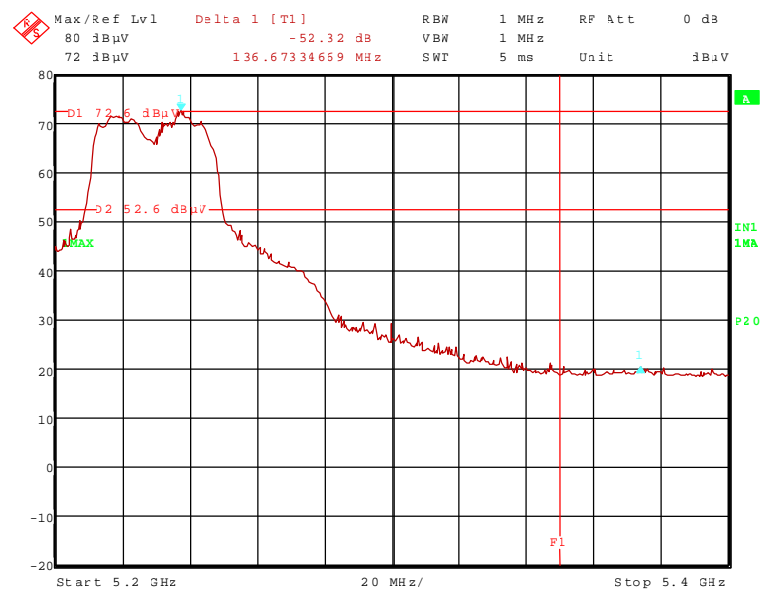
6.2.3 TEST RESULTS (BAND-EDGE COMPLIANCE) WITH BAT-ANT-N-MiMo5-9N-IP65

Ambient temperature	20 °C	Relative humidity	61 %
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100984_561.wmf: Band-edge compliance at lower band edge (operation mode 4, n-mode, 15 Mbps):



100984_564.wmf: Band edge compliance at upper band edge (operation mode 5, n-mode, 15 Mbps):



6.2.3.1 TEST RESULT (BAND-EDGE COMPLIANCE) a-mode

Band-edge compliance (lower band edge, a-mode, 6 Mbps (worst-case))										
Result measured with the peak detector:										
Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.180	104.8	-	-	65.4	33.7	0.0	5.7	150	Vert.	-
5.1184	57.5	74.0	16.5	18.4	33.5	0.0	5.6	150	Vert.	Yes
Result measured with the average detector:										
Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.180	94.2	-	-	54.8	33.7	0.0	5.7	150	Vert.	-
5.1184	44.2	54.0	9.8	5.1	33.5	0.0	5.6	150	Vert.	Yes
Measurement uncertainty							+2.2 dB / -3.6 dB			

Band-edge compliance (upper band edge, a-mode, 6 Mbps (worst-case))										
Result measured with the peak detector:										
Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.240	103.9	-	-	64.4	33.7	0.0	5.8	150	Vert.	-
5.3803	58.7	74.0	15.3	19.1	33.8	0.0	5.8	150	Vert.	Yes
Result measured with the average detector:										
Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.240	94.5	-	-	55.0	33.7	0.0	5.8	150	Vert.	-
5.380	45.0	54.0	9.0	5.4	33.8	0.0	5.8	150	Vert.	Yes
Measurement uncertainty							+2.2 dB / -3.6 dB			

Test: Passed

6.2.3.2 TEST RESULT (BAND-EDGE COMPLIANCE) n-mode (20 MHz)

Band-edge compliance (lower band edge, n-mode (20 MHz), 7.2 Mbps (worst-case))										
Result measured with the peak detector:										
Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.180	107.5	-	-	68.1	33.7	0.0	5.7	150	Vert.	-
5.1498	58.4	74.0	15.6	19.2	33.6	0.0	5.6	150	Vert.	Yes
Result measured with the average detector:										
Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.180	97.4	-	-	58.0	33.7	0.0	5.7	150	Vert.	-
5.1498	44.9	54.0	9.1	5.7	33.6	0.0	5.6	150	Vert.	Yes
Measurement uncertainty							+2.2 dB / -3.6 dB			

Band-edge compliance (upper band edge, n-mode (20 MHz), 7.2 Mbps (worst-case))										
Result measured with the peak detector:										
Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.240	106.0	-	-	66.5	33.7	0.0	5.8	150	Hor.	-
5.3687	58.7	74.0	15.3	19.2	33.7	0.0	5.8	150	Vert.	Yes
Result measured with the average detector:										
Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.240	96.3	-	-	56.8	33.7	0.0	5.8	150	Hor.	-
5.3687	44.9	54.0	9.1	5.4	33.7	0.0	5.8	150	Vert.	Yes
Measurement uncertainty							+2.2 dB / -3.6 dB			

Test: Passed

6.2.3.3 TEST RESULT (BAND-EDGE COMPLIANCE) n-mode (40 MHz)

Band-edge compliance (lower band edge, n-mode (40 MHz), 15 Mbps (worst-case))										
Result measured with the peak detector:										
Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.190	104.4	-	-	64.9	33.7	0.0	5.8	150	Vert.	-
5.1493	60.0	74.0	14.0	20.8	33.6	0.0	5.6	150	Vert.	Yes
Result measured with the average detector:										
Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.190	92.8	-	-	53.3	33.7	0.0	5.8	150	Vert.	-
5.1493	45.0	54.0	9.0	5.8	33.6	0.0	5.6	150	Vert.	Yes
Measurement uncertainty							+2.2 dB / -3.6 dB			

Band-edge compliance (upper band edge, n-mode (40 MHz), 15 Mbps (worst-case))										
Result measured with the peak detector:										
Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.230	111.7	-	-	72.2	33.7	0.0	5.8	150	Vert.	-
5.374	58.9	74.0	15.1	19.3	33.8	0.0	5.8	150	Vert.	Yes
Result measured with the average detector:										
Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.230	99.8	-	-	60.3	33.7	0.0	5.8	150	Vert.	-
5.374	45.4	54.0	8.6	5.8	33.8	0.0	5.8	150	Vert.	Yes
Measurement uncertainty							+2.2 dB / -3.6 dB			

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

29, 31 – 34, 36, 44, 49

6.3 RADIATED EMISSIONS

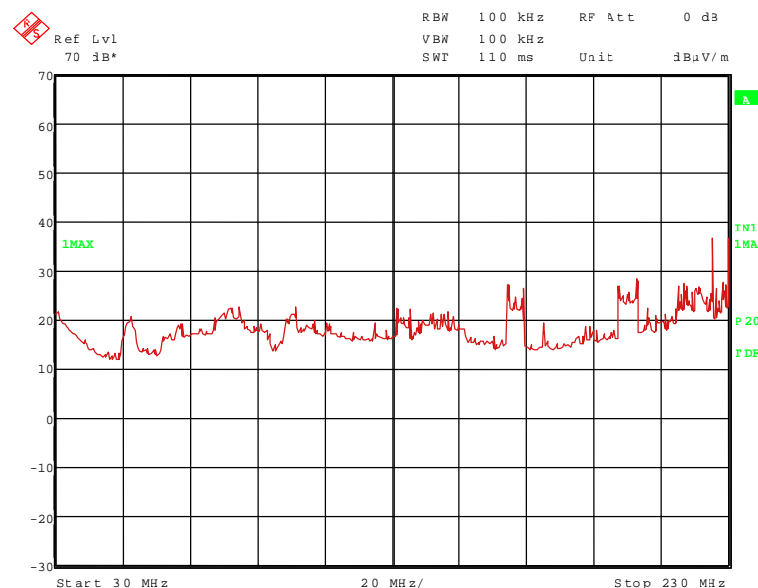
6.3.1 TEST RESULTS (RADIATED EMISSIONS) WITH BAT-ANT-N-MiMoDB-5N-IP65

6.3.1.1 PRELIMINARY MEASUREMENT (30 MHz to 1 GHz)

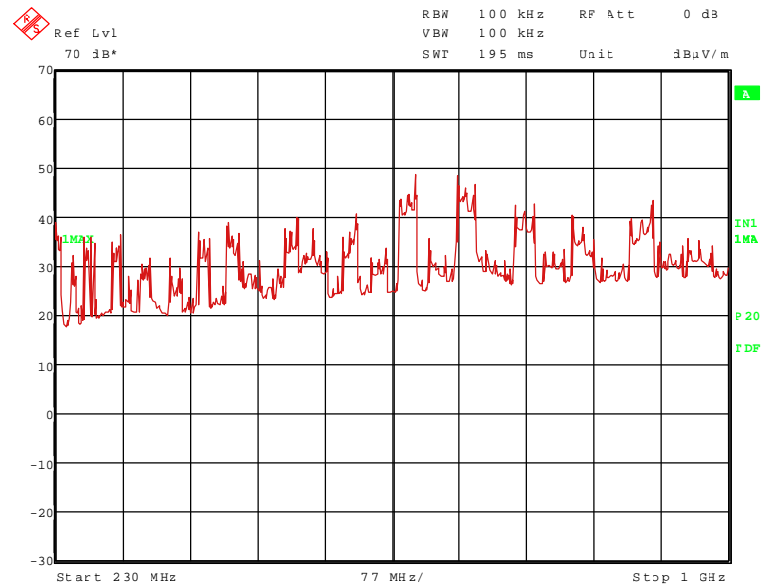
Ambient temperature	20 °C	Relative humidity	59 %
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Position of EUT:	The EUT was set-up on a non-conducting table of a height of 0.8 m. The distance between EUT and antenna was 3 m.
Cable guide:	The cables of the EUT were fixed on the non-conducting table. For further information of the cable guide refer to the pictures in annex A of this test report.
Test record:	All results are shown in the following.
Supply voltage:	During all measurements the EUT was supplied with 24.0 V DC.
Remark:	As pre-tests have shown, the emissions in the frequency range 30 MHz to 1 GHz are not depending on the transmitter operation mode or frequency. Therefore, the emissions in this frequency range were measured only in operation mode 2 (n-mode (20 MHz) with 7.2 Mbps).

100984_572.wmf: Spurious emissions from 30 MHz to 230 GHz:



100984_573.wmf: Spurious emissions from 230 MHz to 1 GHz:



The following frequency was found inside the restricted bands during the preliminary radiated emission test:

- 164.472 MHz.

The following frequencies were found outside the restricted bands during the preliminary radiated emission test:

- 81.207 MHz, 202.821 MHz, 225.000 MHz, 230.186 MHz, 427.315 MHz, 506.170 MHz, 642.496 MHz, 689.980 MHz, 777.940 MHz and 913.240 MHz.

These frequencies have to be measured in a final measurement on an open area test-site. The results were presented in the following.

TEST EQUIPMENT USED FOR THE TEST:

29, 31 – 35, 43

6.3.1.2 PRELIMINARY MEASUREMENT (1 GHz to 40 GHz)

Ambient temperature	20 °C	Relative humidity	57 %
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Position of EUT: The EUT was set-up on a non-conducting table of a height of 0.8 m. The distance between EUT and antenna was 3 m.

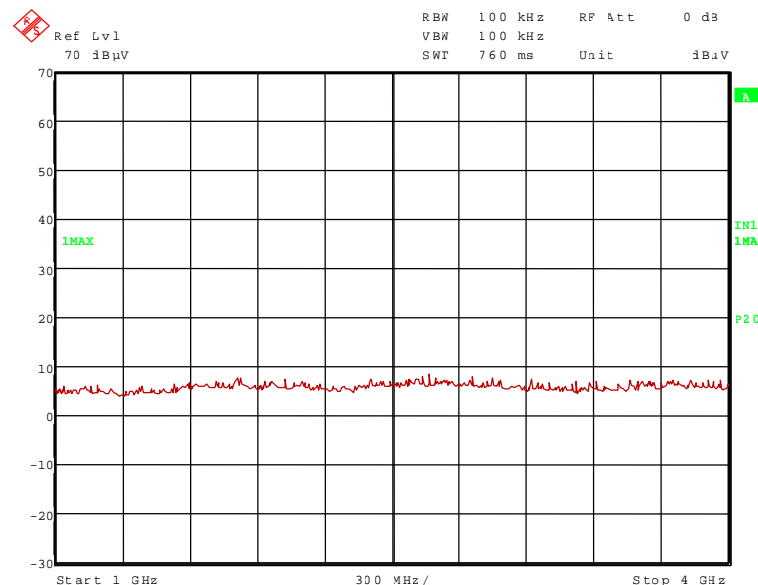
Cable guide: The cables of the EUT were fixed on the non-conducting table. For further information of the cable guide refer to the pictures in annex A of this test report.

Test record: In order to reduce the documents size, only the worst-case emissions were shown for the preliminary measurement. The tables of the final measurements in the next clauses are showing the results for the radiated spurious emissions for all applicable operation modes with the worst-case data rate, causing the highest emissions at the band edges

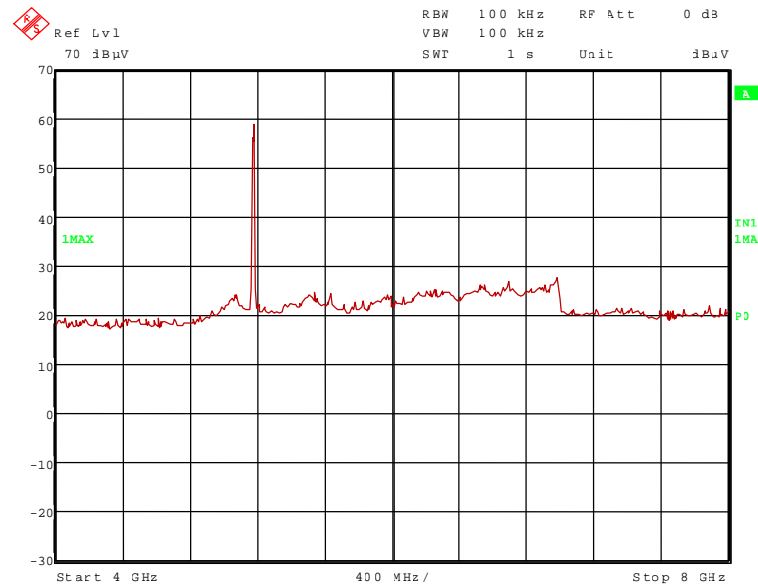
Supply voltage: During all measurements the EUT was supplied with 24.0 V DC.

Transmitter operates at the lower end of the assigned frequency band (operation mode 1)

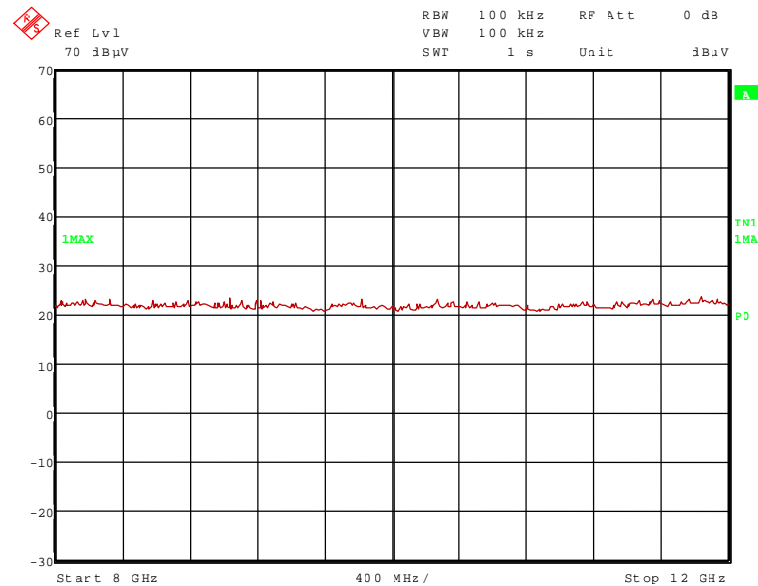
100984_438.wmf: Spurious emissions from 1 GHz to 4 GHz (n-mode, 7.2 Mbps):



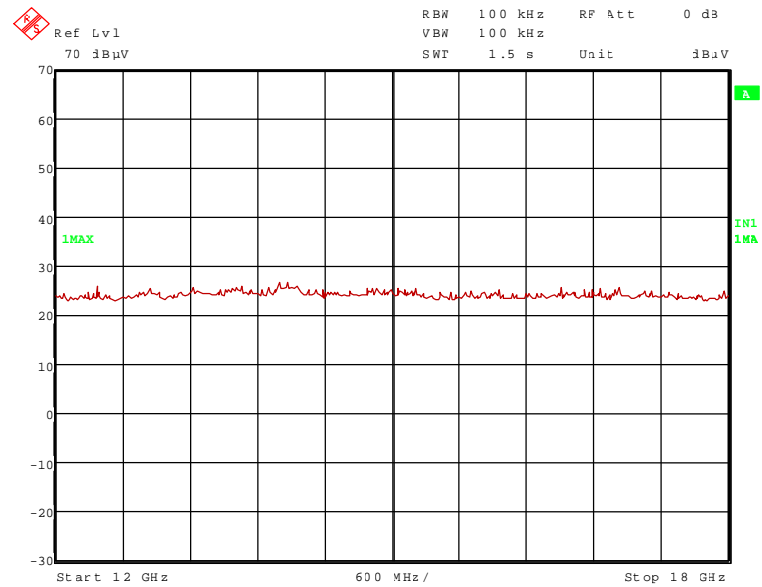
100984_439.wmf: Spurious emissions from 4 GHz to 8 GHz (n-mode, 7.2 Mbps):



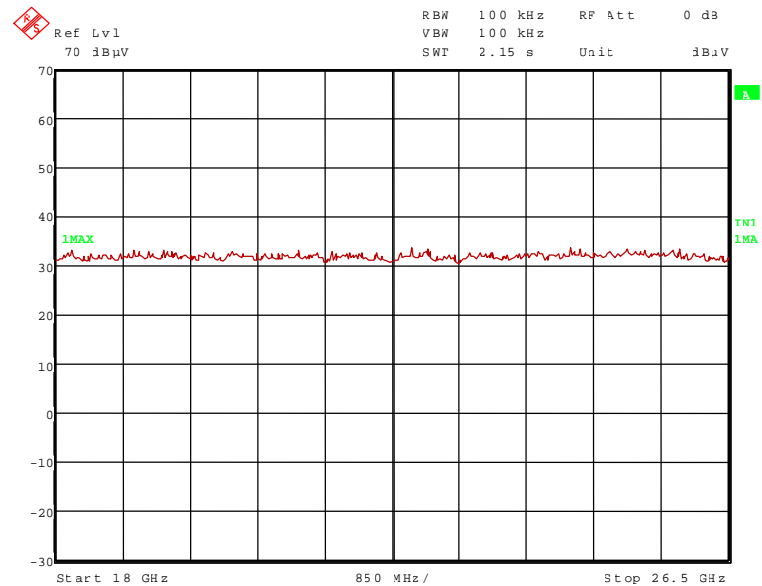
100984_440.wmf: Spurious emissions from 8 GHz to 12 GHz (n-mode, 7.2 Mbps):



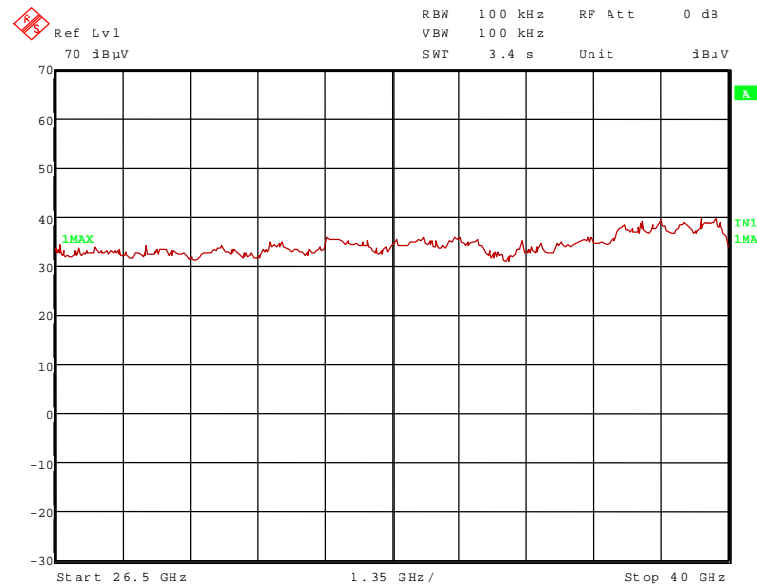
100984_462.wmf: Spurious emissions from 12 GHz to 18 GHz (n-mode, 7.2 Mbps):



100984_467.wmf: Spurious emissions from 18 GHz to 26.5 GHz (n-mode, 7.2 Mbps):



100984_468.wmf: Spurious emissions from 26.5 GHz to 40 GHz (n-mode, 7.2 Mbps):



No frequencies were found inside the restricted bands during the preliminary radiated emission test.

The following frequency was found outside the restricted bands during the preliminary radiated emission test:

- 5.180 GHz.

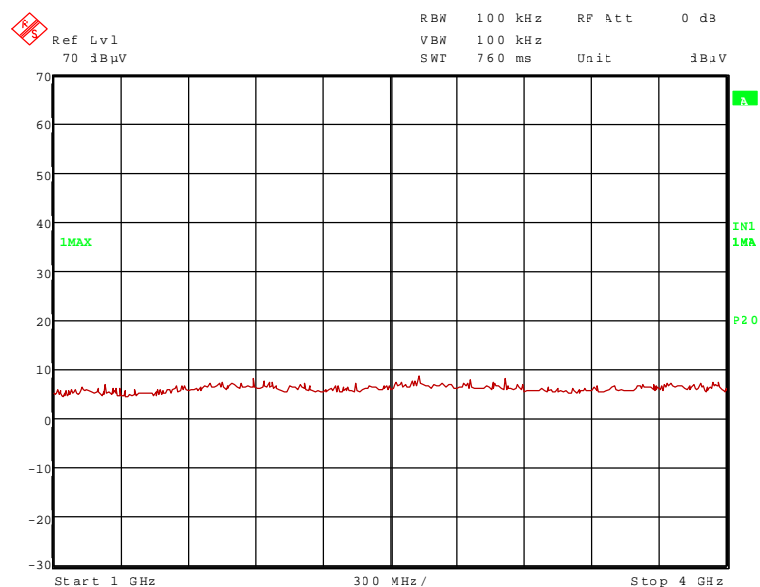
This frequency has to be measured in a final measurement. The results were presented in the following.

TEST EQUIPMENT USED FOR THE TEST:

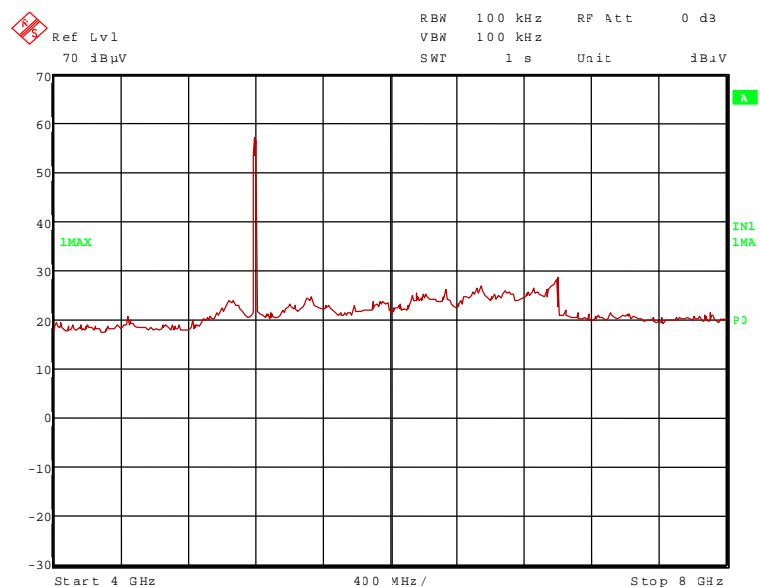
29, 31 – 34, 36, 37, 39, 41, 44, 46, 49 – 52, 73

Transmitter operates at the middle of the assigned frequency band (operation mode 2)

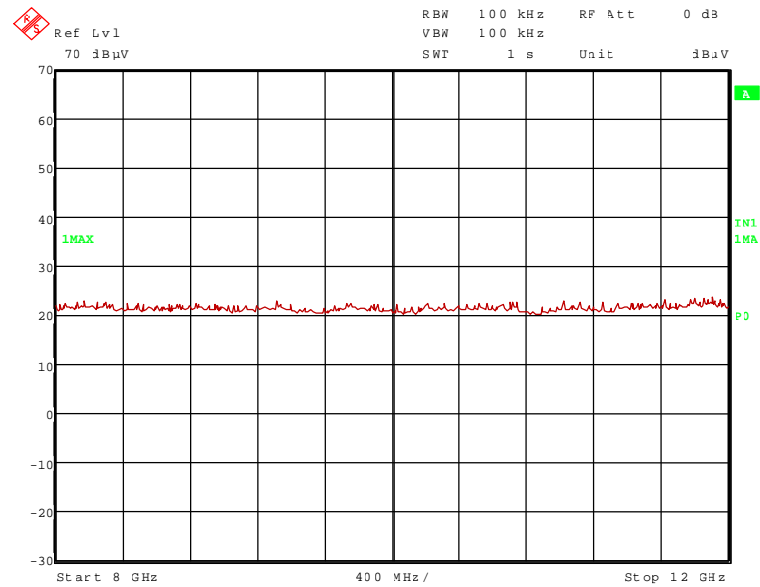
100984 437.wmf: Spurious emissions from 1 GHz to 4 GHz (n-mode, 7.2 Mbps):



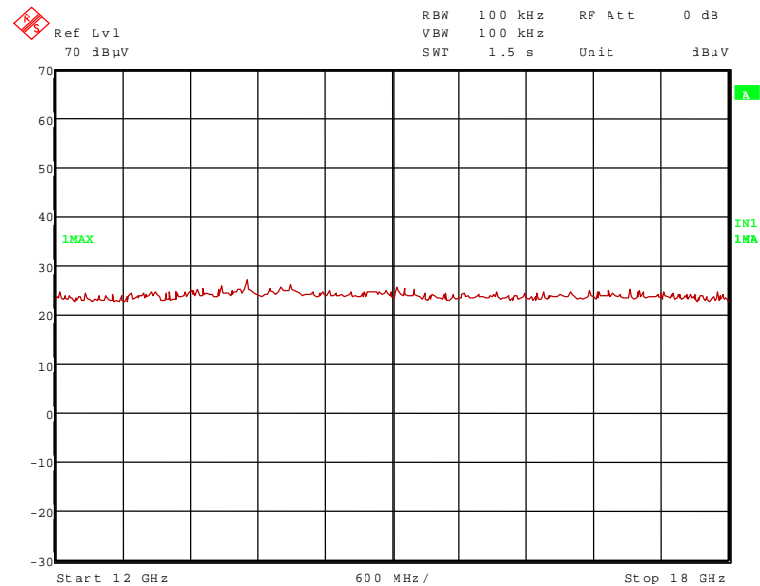
100984 436.wmf: Spurious emissions from 4 GHz to 8 GHz (n-mode, 7.2 Mbps):



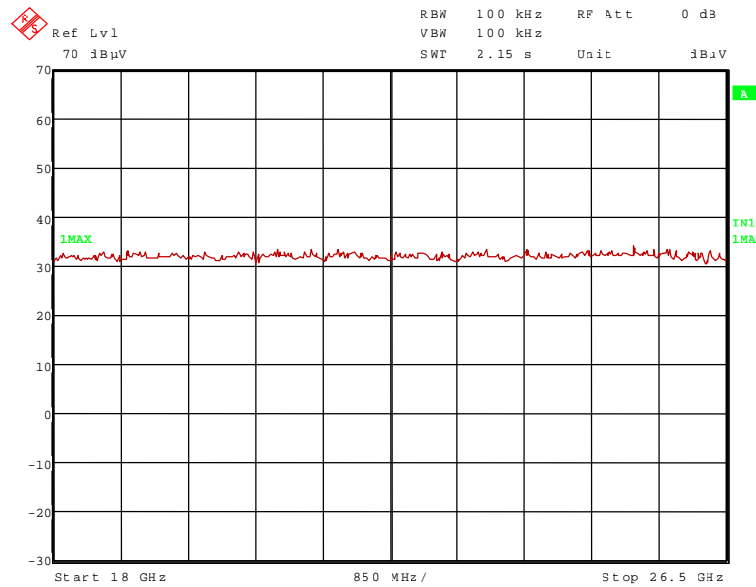
100984_441.wmf: Spurious emissions from 8 GHz to 12 GHz (n-mode, 7.2 Mbps):



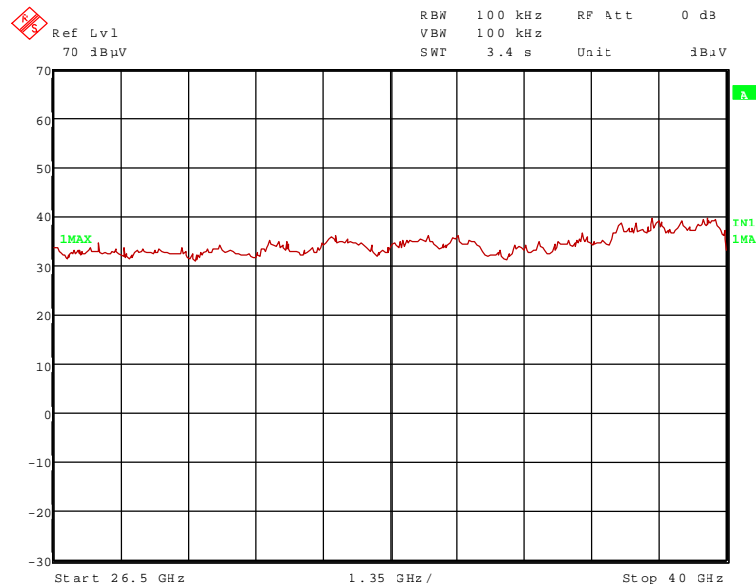
100984_463.wmf: Spurious emissions from 12 GHz to 18 GHz (n-mode, 7.2 Mbps):



100984_466.wmf: Spurious emissions from 18 GHz to 26.5 GHz (n-mode, 7.2 Mbps):



100984_469.wmf: Spurious emissions from 26.5 GHz to 40 GHz (n-mode, 7.2 Mbps):



No frequencies were found inside the restricted bands during the preliminary radiated emission test.

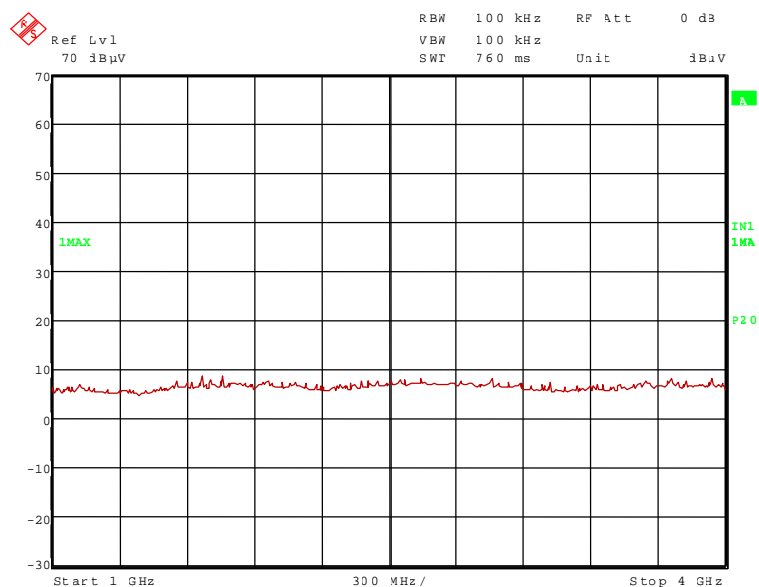
The following frequency was found outside the restricted bands during the preliminary radiated emission test:

- 5.200 GHz.

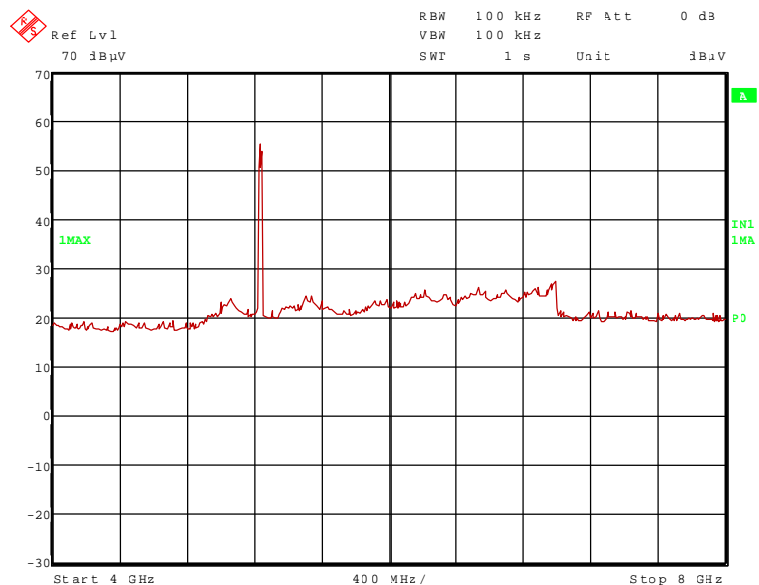
This frequency has to be measured in a final measurement. The results were presented in the following.

Transmitter operates at the upper end of the assigned frequency band (operation mode 3)

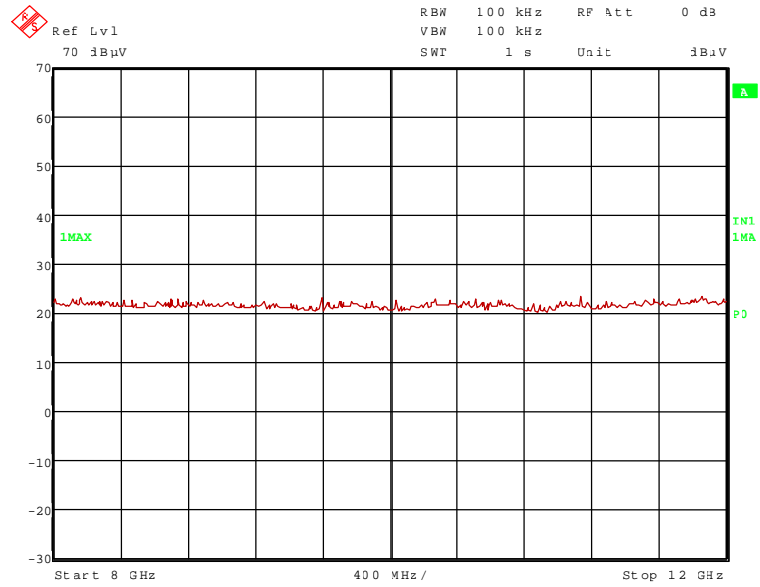
100984 434.wmf: Spurious emissions from 1 GHz to 4 GHz (n-mode, 7.2 Mbps):



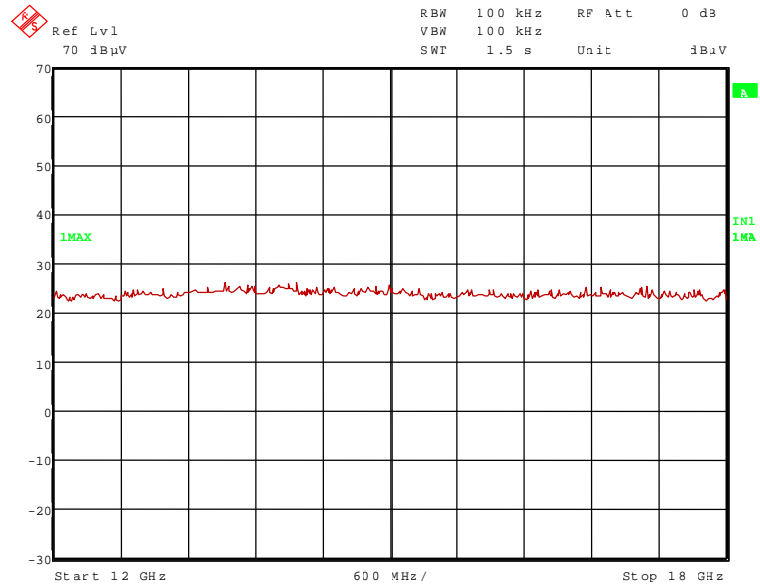
100984 435.wmf: Spurious emissions from 4 GHz to 8 GHz (n-mode, 7.2 Mbps):



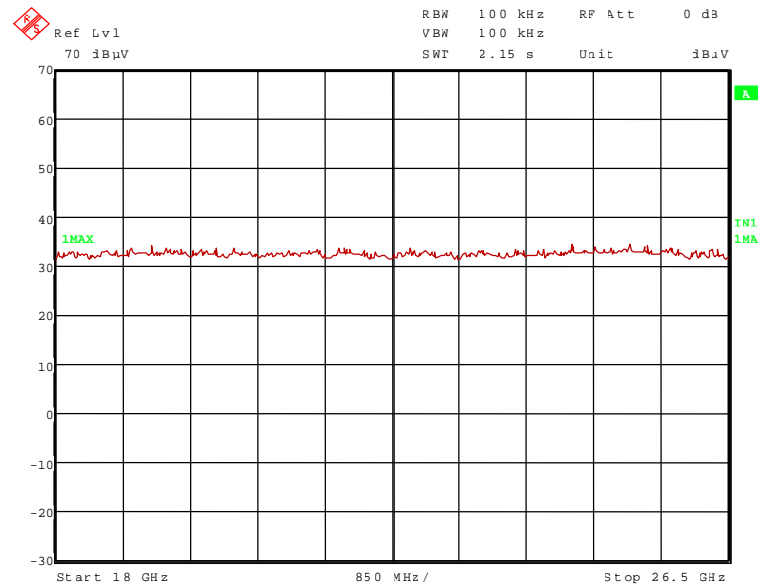
100984_442.wmf: Spurious emissions from 8 GHz to 12 GHz (n-mode, 7.2 Mbps):



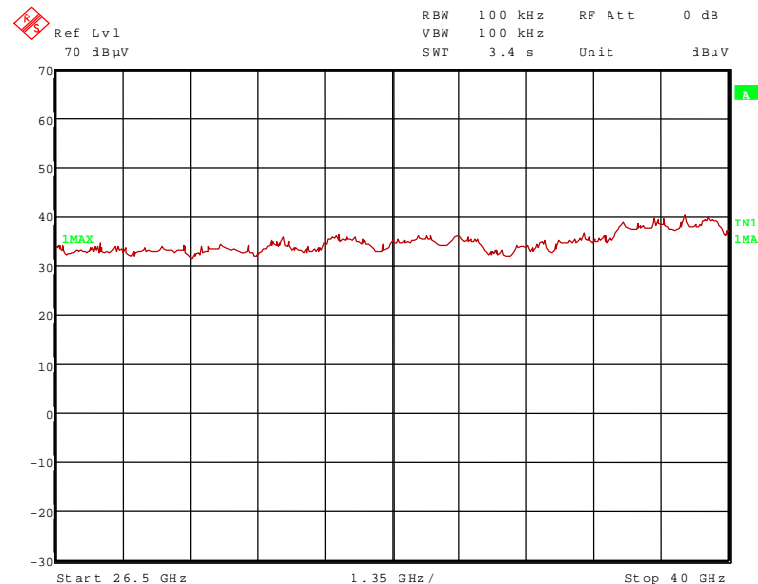
100984_464.wmf: Spurious emissions from 12 GHz to 18 GHz (n-mode, 7.2 Mbps):



100984_465.wmf: Spurious emissions from 18 GHz to 26.5 GHz (n-mode, 7.2 Mbps):



100984_470.wmf: Spurious emissions from 26.5 GHz to 40 GHz (n-mode, 7.2 Mbps):



No frequencies were found inside the restricted bands during the preliminary radiated emission test.

The following frequency was found outside the restricted bands during the preliminary radiated emission test:

- 5.240 GHz.

This frequency has to be measured in a final measurement. The results were presented in the following.

6.3.1.3 FINAL MEASUREMENT (30 MHz to 1 GHz)

Ambient temperature	20 °C	Relative humidity	65 %
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Position of EUT: The EUT was set-up on a non-conducting table of a height of 0.8 m. The distance between EUT and antenna was 3 m.

Cable guide: For detail information of test set-up and the cable guide refer to the pictures in annex A of this test report.

Supply voltage: During all measurements the EUT was supplied with 24.0 DC.

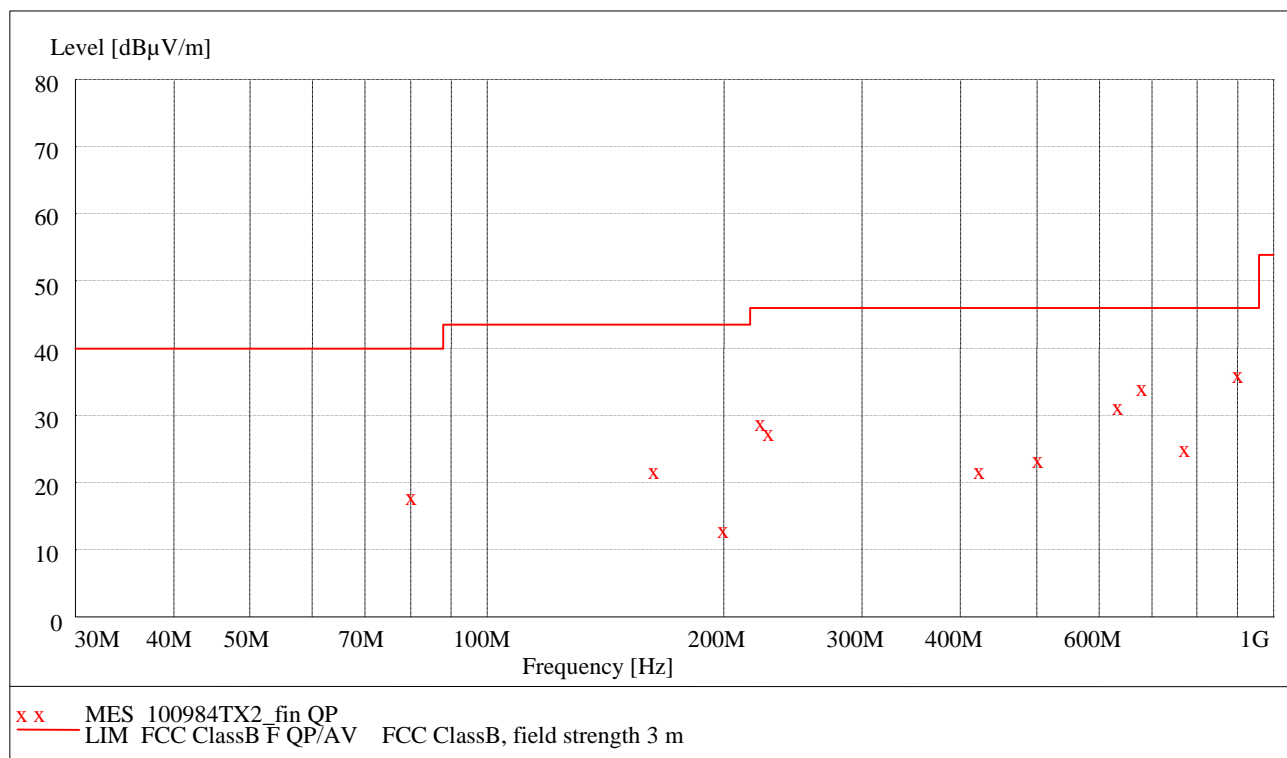
Test record: The test was carried out in operation mode 2 (n-mode with 7.2 Mbps) of the EUT, because there was no difference to the other test modes.

Resolution bandwidth: For all measurements a resolution bandwidth of 120 kHz was used.

Test results: The test results were calculated with the following formula:

$$\text{Result [dB}\mu\text{V/m]} = \text{reading [dB}\mu\text{V]} + \text{cable loss [dB]} + \text{antenna factor [dB/m]}$$

The measured points and the limit line in the following diagram refer to the standard measurement of the emitted interference in compliance with the above mentioned standard. The measured points marked with an x are the measured results of the standard subsequent measurement on the open area test site.



Data record name: 100984TX2

The results of the standard subsequent measurement on the open area test site are indicated in the table below. The limits as well as the measured results (levels) refer to the above mentioned standard while taking account of the specified requirements for a 3 m measuring distance.

The measurement time with the quasi-peak measuring detector is 1 second.

Result measured with the quasipeak detector:
(These values are marked in the diagram by an x)

Spurious emissions outside restricted bands									
Frequency	Result	Limit	Margin	Readings	Antenna factor	Cable loss	Height	Azimuth	Pol.
MHz	dBµV/m	dBµV/m	dB	dBµV	dB/m	dB	cm	deg	
81.207	18.6	40.0	21.4	9.4	8.2	1.0	150	68	Vert.
202.821	13.3	43.5	30.2	2.7	9.1	1.5	300	68	Vert.
225.000	29.9	46.0	16.1	18.2	10.1	1.6	150	247	Hor.
230.186	27.7	46.0	18.3	15.8	10.3	1.6	150	247	Hor.
427.315	22.4	46.0	23.6	3.9	16.2	2.3	100	112	Hor.
506.170	24.1	46.0	21.9	4.1	17.5	2.5	150	202	Hor.
642.496	31.9	46.0	14.1	9.3	19.7	2.9	300	293	Vert.
689.980	34.6	46.0	11.4	11.7	19.9	3.0	100	247	Hor.
777.940	25.8	46.0	20.2	1.1	21.5	3.2	100	157	Hor.
913.240	36.4	46.0	9.6	10.2	22.8	3.4	100	112	Hor.
Spurious emissions in restricted bands									
Frequency	Result	Limit	Margin	Readings	Antenna factor	Cable loss	Height	Azimuth	Pol.
MHz	dBµV/m	dBµV/m	dB	dBµV	dB/m	dB	cm	deg	
164.472	22.5	43.5	21.0	10.3	10.8	1.4	150	67	Vert.
Measurement uncertainty				+2.2 dB / -3.6 dB					

The test results were calculated with the following formula:

$$\text{Result [dBµV/m]} = \text{reading [dBµV]} + \text{cable loss [dB]} + \text{antenna factor [dB/m]}$$

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

14 – 20

6.3.1.4 FINAL MEASUREMENT (1 GHz to 40 GHz) a-mode

Ambient temperature	20 °C	Relative humidity	57 %
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Position of EUT: The EUT was set-up on a non-conducting table of a height of 0.8 m. The distance between EUT and antenna was 3 m.

Cable guide: The cables of the EUT were fixed on the non-conducting table. For further information of the cable guide refer to the pictures in annex A of this test report.

Supply voltage: During all measurements the EUT was supplied with 24.0 V DC.

Resolution bandwidth: For all measurements a resolution bandwidth of 1 MHz was used.

Remark: The worst-case data rate for this measurement was 6 Mbps.

Transmitter operates at the lower end of the assigned frequency band (operation mode 1)

Result measured with the peak detector:

Frequency GHz	Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamplifier dB	Cable loss dB	Height cm	Pol.	Restr. Band
5.180	106.1	-	-	66.7	33.7	0.0	5.7	150	Vert.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Result measured with the average detector:

Frequency GHz	Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamplifier dB	Cable loss dB	Height cm	Pol.	Restr. Band
5.180	96.5	-	-	57.1	33.7	0.0	5.7	150	Vert.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Transmitter operates at the middle of the assigned frequency band (operation mode 2)

Result measured with the peak detector:

Frequency GHz	Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamplifier dB	Cable loss dB	Height cm	Pol.	Restr. Band
5.200	107.1	-	-	67.5	33.8	0.0	5.8	150	Vert.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Result measured with the average detector:

Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamp	Cable loss	Height	Pol.	Restr. Band
GHz	dB μ V/m	dB μ V/m	dB	dB μ V	1/m	dB	dB	cm		
5.200	97.6	-	-	58.0	33.8	0.0	5.8	150	Vert.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Transmitter operates at the upper end of the assigned frequency band (operation mode 3)

Result measured with the peak detector:

Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamp	Cable loss	Height	Pol.	Restr. Band
GHz	dB μ V/m	dB μ V/m	dB	dB μ V	1/m	dB	dB	cm		
5.240	106.1	-	-	66.6	33.7	0.0	5.8	150	Vert.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Result measured with the average detector:

Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamp	Cable loss	Height	Pol.	Restr. Band
GHz	dB μ V/m	dB μ V/m	dB	dB μ V	1/m	dB	dB	cm		
5.240	96.0	-	-	56.5	33.7	0.0	5.8	150	Vert.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

29, 31 – 34, 36, 44, 49

6.3.1.5 FINAL MEASUREMENT (1 GHz to 40 GHz) n-mode (20 MHz)

Ambient temperature	20 °C	Relative humidity	57 %
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Position of EUT: The EUT was set-up on a non-conducting table of a height of 0.8 m. The distance between EUT and antenna was 3 m.

Cable guide: The cables of the EUT were fixed on the non-conducting table. For further information of the cable guide refer to the pictures in annex A of this test report.

Supply voltage: During all measurements the EUT was supplied with 24.0 V DC.

Resolution bandwidth: For all measurements a resolution bandwidth of 1 MHz was used.

Remark: The worst-case data rate for this measurement was 7.2 Mbps.

Transmitter operates at the lower end of the assigned frequency band (operation mode 1)

Result measured with the peak detector:

Frequency GHz	Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
5.180	108.5	-	-	69.1	33.7	0.0	5.7	150	Vert.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Result measured with the average detector:

Frequency GHz	Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
5.180	98.5	-	-	59.1	33.7	0.0	5.7	150	Vert.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Transmitter operates at the middle of the assigned frequency band (operation mode 2)

Result measured with the peak detector:

Frequency GHz	Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
5.200	108.4	-	-	68.8	33.8	0.0	5.8	150	Vert.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Result measured with the average detector:

Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamp	Cable loss	Height	Pol.	Restr. Band
GHz	dB μ V/m	dB μ V/m	dB	dB μ V	1/m	dB	dB	cm		
5.200	99.0	-	-	59.4	33.8	0.0	5.8	150	Vert.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Transmitter operates at the upper end of the assigned frequency band (operation mode 3)

Result measured with the peak detector:

Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamp	Cable loss	Height	Pol.	Restr. Band
GHz	dB μ V/m	dB μ V/m	dB	dB μ V	1/m	dB	dB	cm		
5.240	105.7	-	-	66.2	33.7	0.0	5.8	150	Vert.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Result measured with the average detector:

Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamp	Cable loss	Height	Pol.	Restr. Band
GHz	dB μ V/m	dB μ V/m	dB	dB μ V	1/m	dB	dB	cm		
5.240	95.8	-	-	56.3	33.7	0.0	5.8	150	Vert.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

29, 31 – 34, 36, 44, 49

6.3.1.6 FINAL MEASUREMENT (1 GHz to 40 GHz) n-mode (40 MHz)

Ambient temperature	20 °C	Relative humidity	57 %
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Position of EUT: The EUT was set-up on a non-conducting table of a height of 0.8 m. The distance between EUT and antenna was 3 m.

Cable guide: The cables of the EUT were fixed on the non-conducting table. For further information of the cable guide refer to the pictures in annex A of this test report.

Supply voltage: During all measurements the EUT was supplied with 5.0 V DC.

Resolution bandwidth: For all measurements a resolution bandwidth of 1 MHz was used.

Remark: The worst-case data rate for this measurement was 15 Mbps.

Transmitter operates at the lower end of the assigned frequency band (operation mode 4)

Result measured with the peak detector:

Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.190	104.1	-	-	64.6	33.7	0.0	5.8	150	Vert.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Result measured with the average detector:

Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.190	93.2	-	-	53.7	33.7	0.0	5.8	150	Vert.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Transmitter operates at the upper end of the assigned frequency band (operation mode 5)

Result measured with the peak detector:

Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamp	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.230	104.9	-	-	65.4	33.7	0.0	5.8	150	Vert.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Result measured with the average detector:

Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamp	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.230	93.9	-	-	54.4	33.7	0.0	5.8	150	Vert.	
Measurement uncertainty						+2.2 dB / -3.6 dB				

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

29, 31 – 34, 36, 44, 49

6.3.1.7 FINAL MEASUREMENT (1 GHz to 40 GHz) n-mode (20 MHz)

Ambient temperature	20 °C	Relative humidity	62 %
---------------------	-------	-------------------	------

Position of EUT: The EUT was set-up on a non-conducting table of a height of 0.8 m. The distance between EUT and antenna was 3 m.

Cable guide: The cables of the EUT were fixed on the non-conducting table. For further information of the cable guide refer to the pictures in annex A of this test report.

Supply voltage: During all measurements the EUT was supplied with 24.0 V DC.

Resolution bandwidth: For all measurements a resolution bandwidth of 1 MHz was used.

Remark: The worst-case data rate for this measurement was 7.2 Mbps.

Transmitter operates at the lower end of the assigned frequency band (operation mode 1)

Result measured with the peak detector:

Frequency GHz	Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
5.180	111.1	-	-	71.7	33.7	0.0	5.7	150	Hor.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Result measured with the average detector:

Frequency GHz	Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
5.180	99.9	-	-	60.5	33.7	0.0	5.7	150	Hor.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Transmitter operates at the middle of the assigned frequency band (operation mode 2)

Result measured with the peak detector:

Frequency GHz	Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
5.200	106.2	-	-	66.6	33.8	0.0	5.8	150	Hor.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Result measured with the average detector:

Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamp	Cable loss	Height	Pol.	Restr. Band
GHz	dB μ V/m	dB μ V/m	dB	dB μ V	1/m	dB	dB	cm		
5.200	94.7	-	-	55.1	33.8	0.0	5.8	150	Hor.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Transmitter operates at the upper end of the assigned frequency band (operation mode 3)

Result measured with the peak detector:

Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamp	Cable loss	Height	Pol.	Restr. Band
GHz	dB μ V/m	dB μ V/m	dB	dB μ V	1/m	dB	dB	cm		
5.240	111.0	-	-	71.5	33.7	0.0	5.8	150	Hor.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Result measured with the average detector:

Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamp	Cable loss	Height	Pol.	Restr. Band
GHz	dB μ V/m	dB μ V/m	dB	dB μ V	1/m	dB	dB	cm		
5.240	99.6	-	-	60.1	33.7	0.0	5.8	150	Hor.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

29, 31 – 34, 36, 44, 49

6.3.1.8 FINAL MEASUREMENT (1 GHz to 40 GHz) n-mode (40 MHz)

Ambient temperature	20 °C	Relative humidity	62 %
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Position of EUT: The EUT was set-up on a non-conducting table of a height of 0.8 m. The distance between EUT and antenna was 3 m.

Cable guide: The cables of the EUT were fixed on the non-conducting table. For further information of the cable guide refer to the pictures in annex A of this test report.

Supply voltage: During all measurements the EUT was supplied with 5.0 V DC.

Resolution bandwidth: For all measurements a resolution bandwidth of 1 MHz was used.

Remark: The worst-case data rate for this measurement was 15 Mbps.

Transmitter operates at the lower end of the assigned frequency band (operation mode 10)

Result measured with the peak detector:

Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.190	104.7	-	-	65.2	33.7	0.0	5.8	150	Hor.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Result measured with the average detector:

Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.190	93.3	-	-	53.8	33.7	0.0	5.8	150	Hor.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Transmitter operates at the upper end of the assigned frequency band (operation mode 11)

Result measured with the peak detector:

Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.230	110.3	-	-	70.8	33.7	0.0	5.8	150	Hor.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Result measured with the average detector:

Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.230	98.6	-	-	59.1	33.7	0.0	5.8	150	Hor.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

29, 31 – 34, 36, 44, 49

6.3.2 TEST RESULTS (RADIATED EMISSIONS) WITH BAT-ANT-N-9A-DS-IP65

6.3.2.1 PRELIMINARY MEASUREMENT (1 GHz to 40 GHz)

Ambient temperature	20 °C	Relative humidity	62 %
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Position of EUT: The EUT was set-up on a non-conducting table of a height of 0.8 m. The distance between EUT and antenna was 3 m.

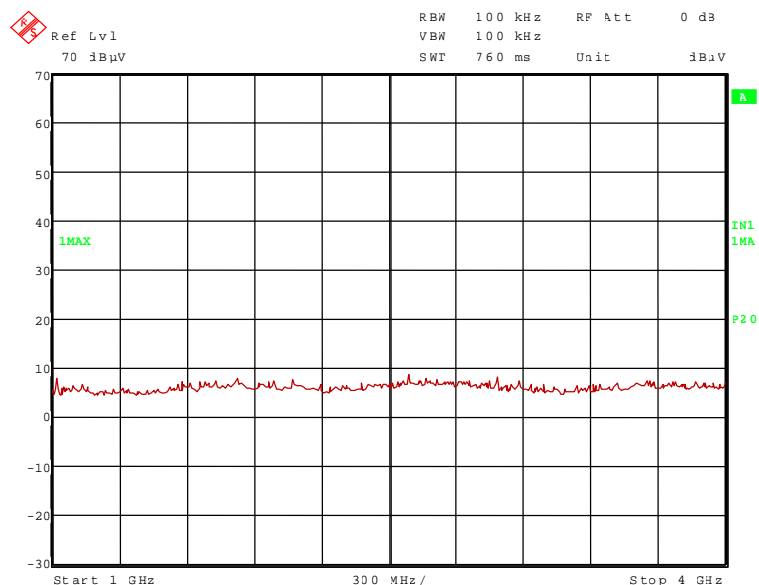
Cable guide: The cables of the EUT were fixed on the non-conducting table. For further information of the cable guide refer to the pictures in annex A of this test report.

Test record: In order to reduce the documents size, only the worst-case emissions were shown for the preliminary measurement. The tables of the final measurements in the next clauses are showing the results for the radiated spurious emissions for all applicable operation modes with the worst-case data rate, causing the highest emissions at the band edges

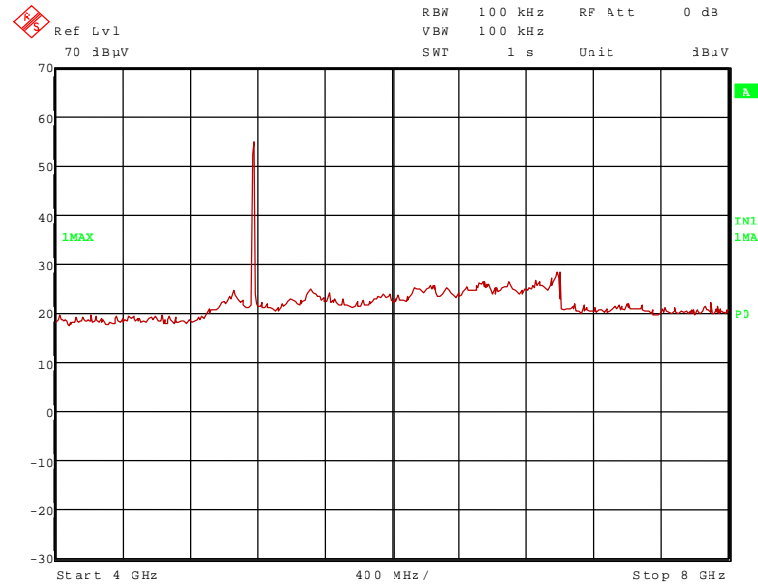
Supply voltage: During all measurements the EUT was supplied with 24.0 V DC.

Transmitter operates at the lower end of the assigned frequency band (operation mode 1)

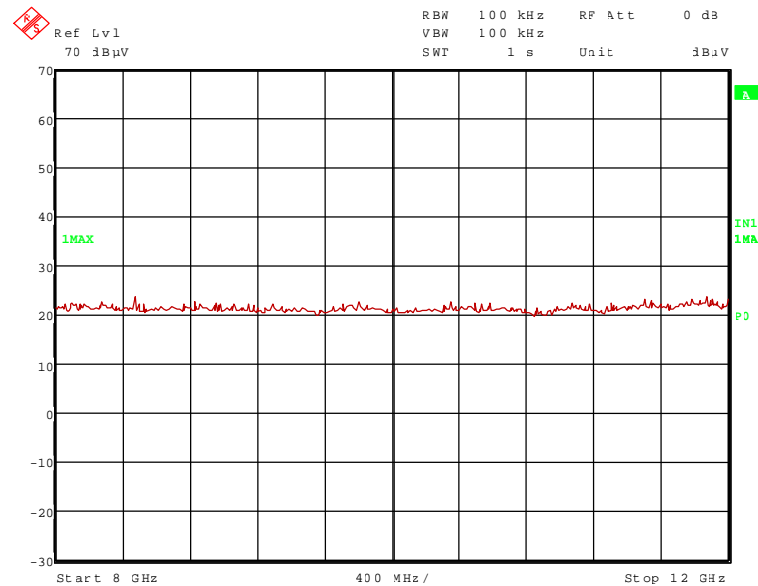
100984_375.wmf: Spurious emissions from 1 GHz to 4 GHz (a-mode, 6 Mbps):



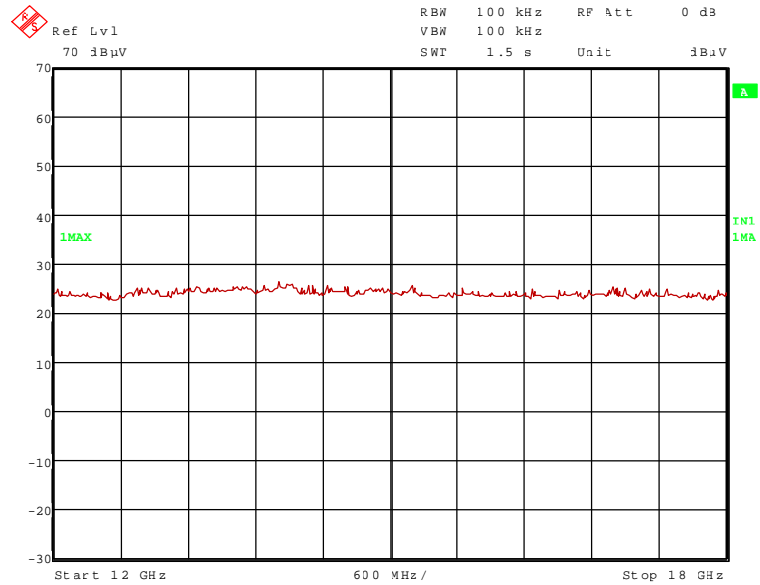
100984_376.wmf: Spurious emissions from 4 GHz to 8 GHz (a-mode, 6 Mbps):



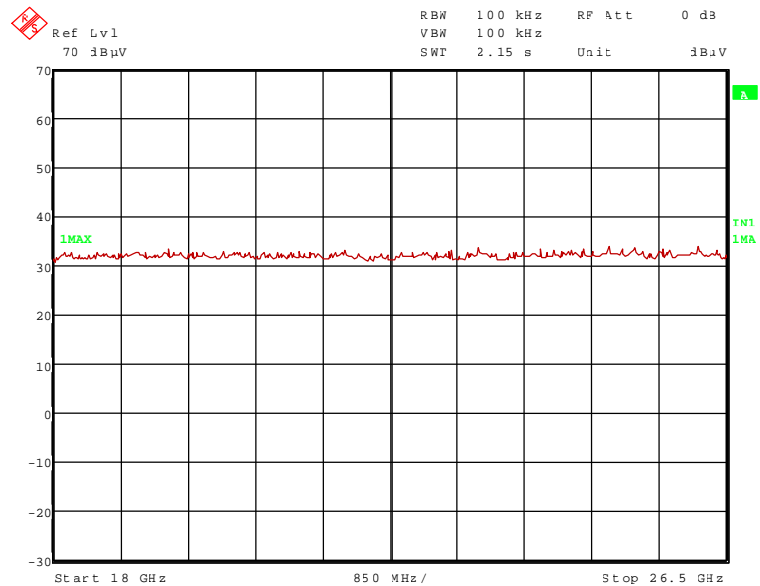
100984_383.wmf: Spurious emissions from 8 GHz to 12 GHz (a-mode, 6 Mbps):



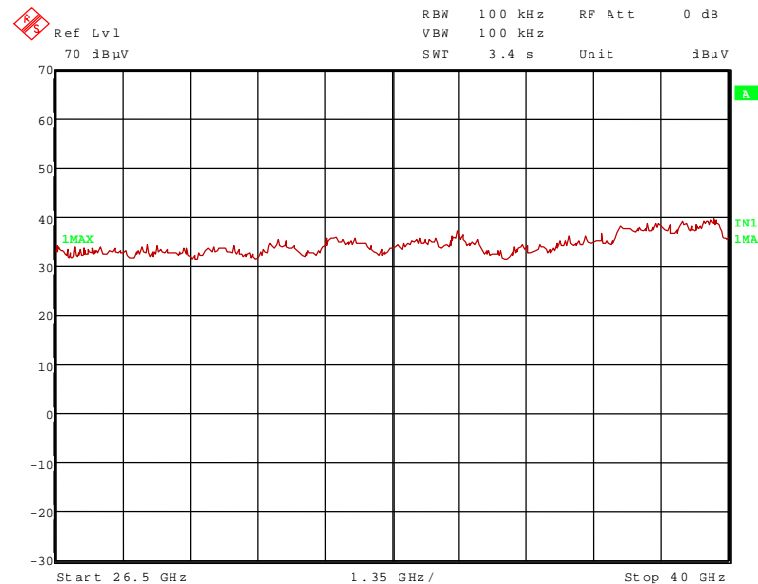
100984_407.wmf: Spurious emissions from 12 GHz to 18 GHz (a-mode, 6 Mbps):



100984_412.wmf: Spurious emissions from 18 GHz to 26.5 GHz (a-mode, 6 Mbps):



100984_413.wmf: Spurious emissions from 26.5 GHz to 40 GHz (a-mode, 6 Mbps):



No frequencies were found inside the restricted bands during the preliminary radiated emission test.

The following frequency was found outside the restricted bands during the preliminary radiated emission test:

- 5.180 GHz.

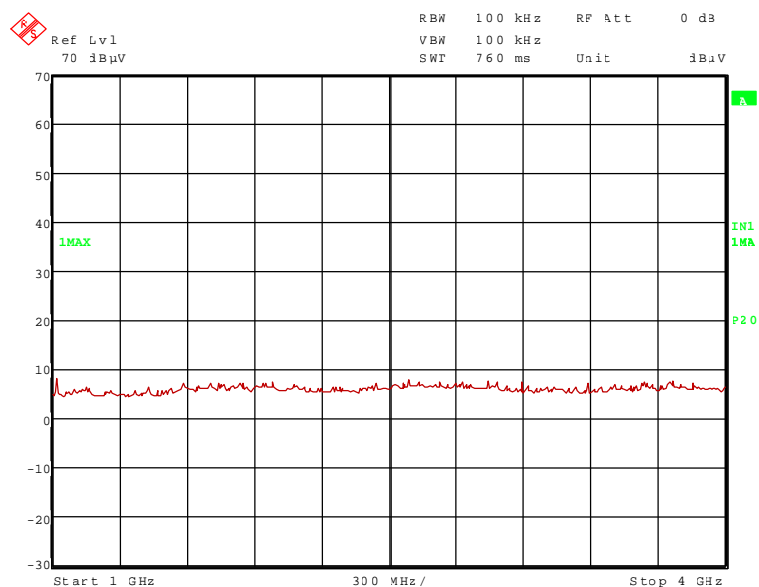
This frequency has to be measured in a final measurement. The results were presented in the following.

TEST EQUIPMENT USED FOR THE TEST:

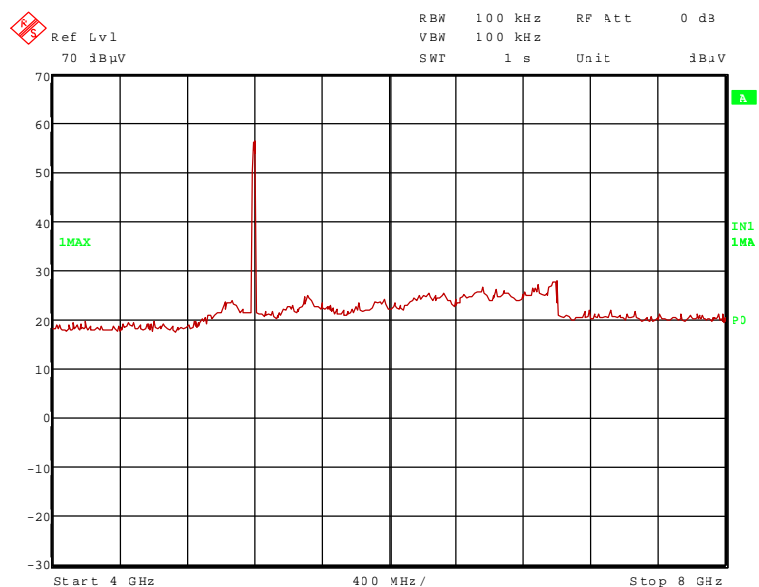
29, 31 – 34, 36, 37, 39, 44, 46, 49 – 52, 73

Transmitter operates at the middle of the assigned frequency band (operation mode 2)

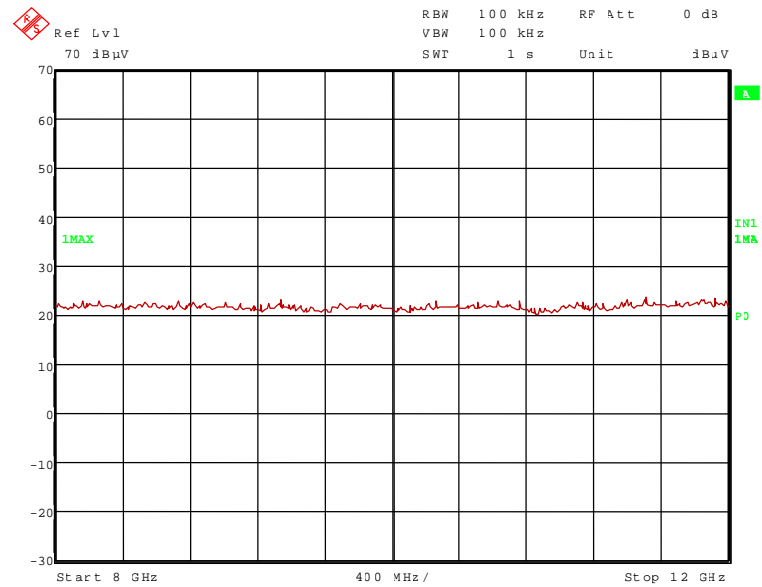
100984 377.wmf: Spurious emissions from 1 GHz to 4 GHz (a-mode, 6 Mbps):



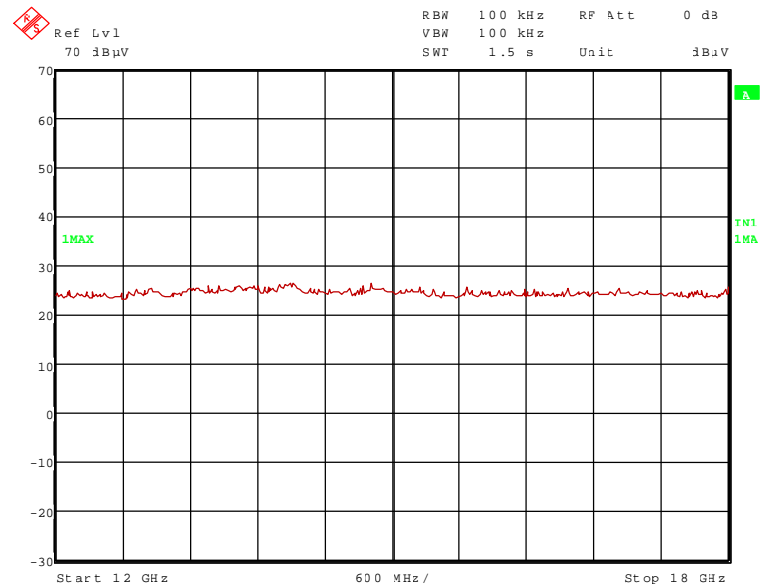
100984 378.wmf: Spurious emissions from 4 GHz to 8 GHz (a-mode, 6 Mbps):



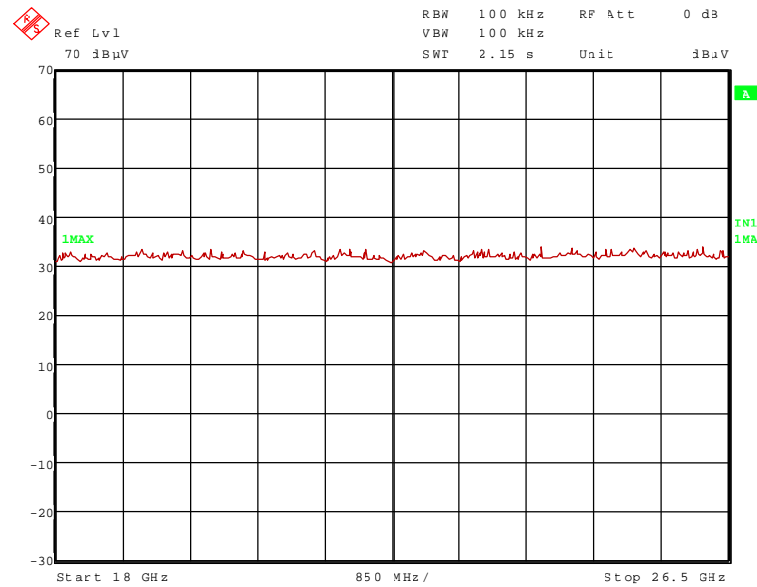
100984_382.wmf: Spurious emissions from 8 GHz to 12 GHz (a-mode, 6 Mbps):



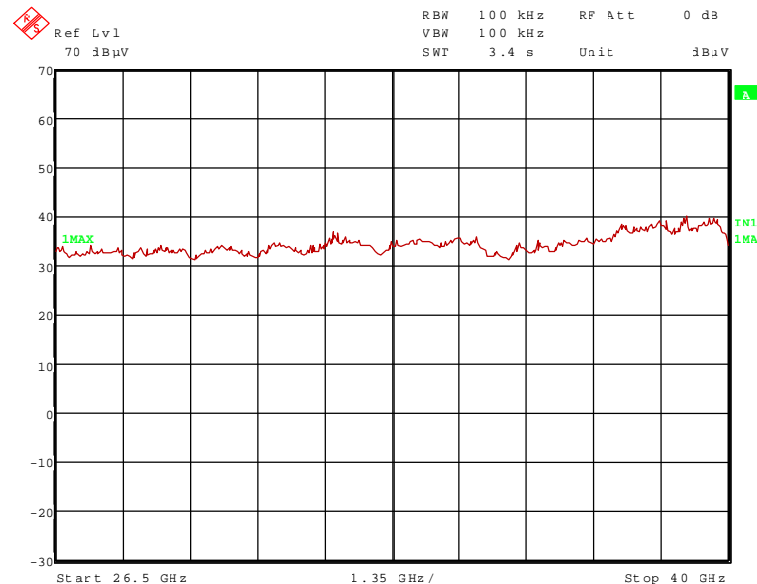
100984_408.wmf: Spurious emissions from 12 GHz to 18 GHz (a-mode, 6 Mbps):



100984_411.wmf: Spurious emissions from 18 GHz to 26.5 GHz (a-mode, 6 Mbps):



100984_414.wmf: Spurious emissions from 26.5 GHz to 40 GHz (a-mode, 6 Mbps):



The following frequency was found inside the restricted bands during the preliminary radiated emission test:

- 1.018 GHz.

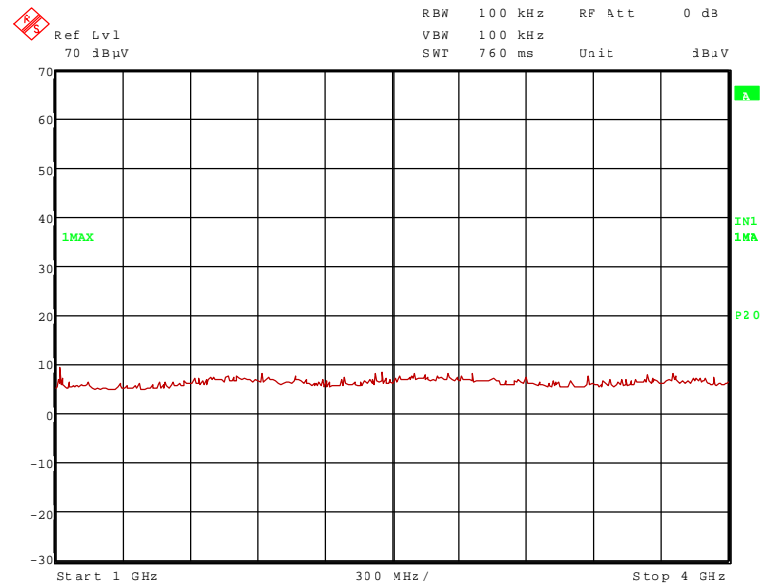
The following frequency was found outside the restricted bands during the preliminary radiated emission test:

- 5.200 GHz.

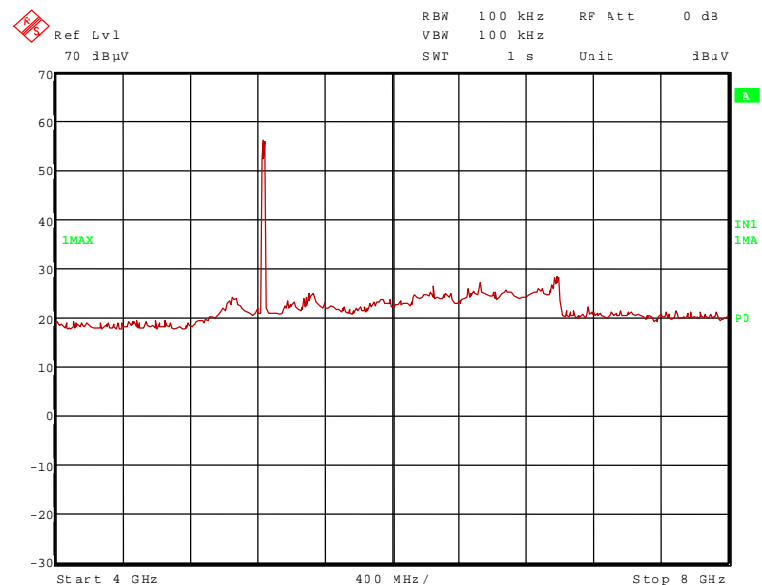
These frequencies have to be measured in a final measurement. The results were presented in the following.

Transmitter operates at the upper end of the assigned frequency band (operation mode 3)

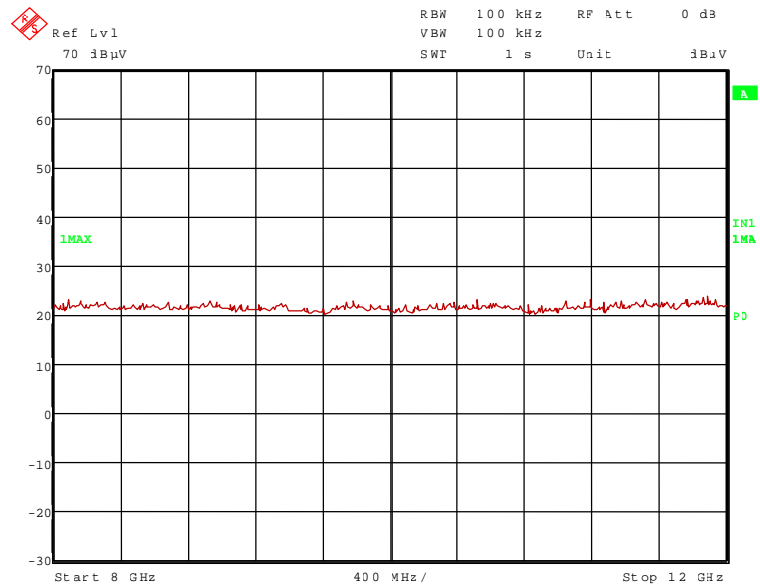
100984 379.wmf: Spurious emissions from 1 GHz to 4 GHz (a-mode, 6 Mbps):



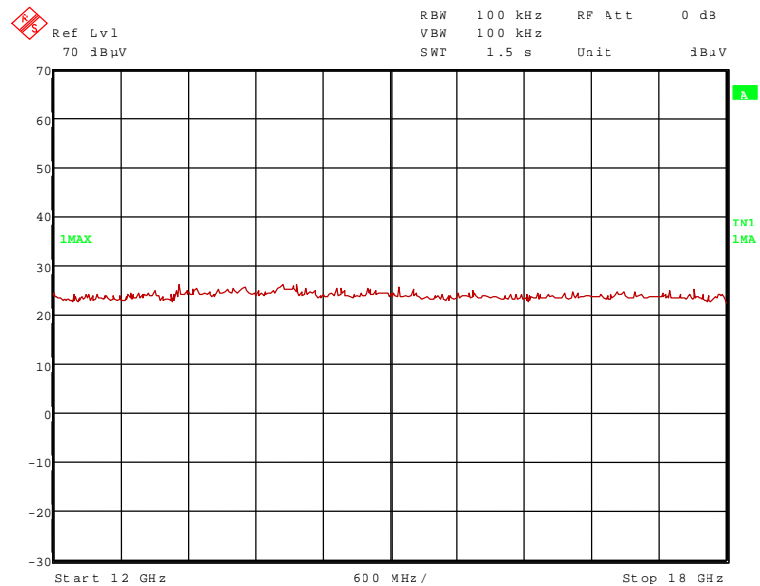
100984 380.wmf: Spurious emissions from 4 GHz to 8 GHz (a-mode, 6 Mbps):



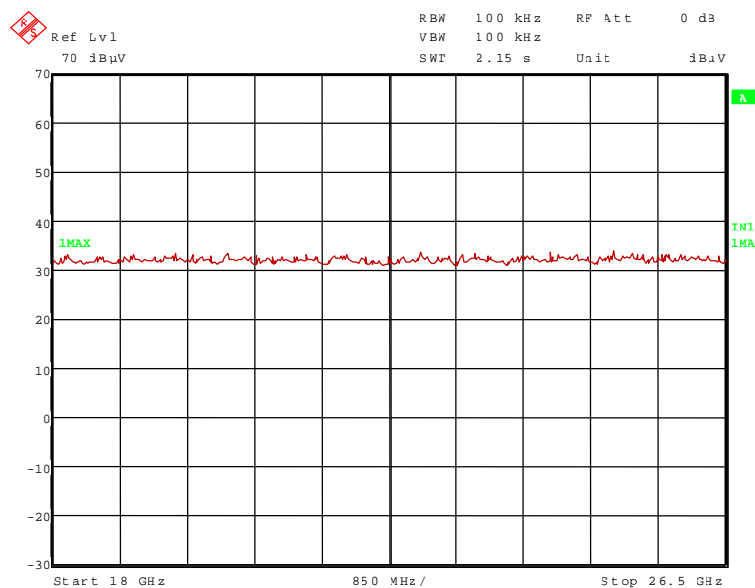
100984_381.wmf: Spurious emissions from 8 GHz to 12 GHz (a-mode, 6 Mbps):



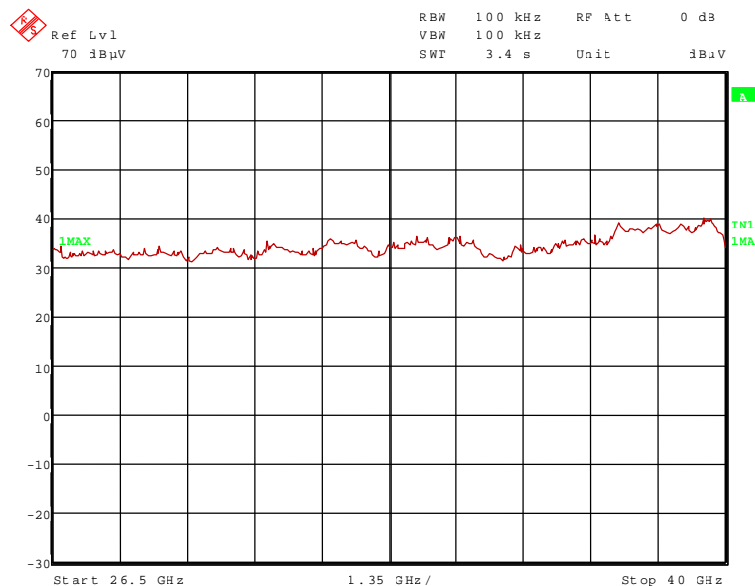
100984_409.wmf: Spurious emissions from 12 GHz to 18 GHz (a-mode, 6 Mbps):



100984_410.wmf: Spurious emissions from 18 GHz to 26.5 GHz (a-mode, 6 Mbps):



100984_415.wmf: Spurious emissions from 26.5 GHz to 40 GHz (a-mode, 6 Mbps):



The following frequency was found inside the restricted bands during the preliminary radiated emission test:

- 1.018 GHz.

The following frequency was found outside the restricted bands during the preliminary radiated emission test:

- 5.240 GHz.

These frequencies have to be measured in a final measurement. The results were presented in the following.

6.3.2.2 FINAL MEASUREMENT (1 GHz to 40 GHz) a-mode

Ambient temperature	20 °C	Relative humidity	62 %
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Position of EUT: The EUT was set-up on a non-conducting table of a height of 0.8 m. The distance between EUT and antenna was 3 m.

Cable guide: The cables of the EUT were fixed on the non-conducting table. For further information of the cable guide refer to the pictures in annex A of this test report.

Supply voltage: During all measurements the EUT was supplied with 24.0 V DC.

Resolution bandwidth: For all measurements a resolution bandwidth of 1 MHz was used.

Remark: The worst-case data rate for this measurement was 6 Mbps.

Transmitter operates at the lower end of the assigned frequency band (operation mode 1)

Result measured with the peak detector:

Frequency GHz	Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamplifier dB	Cable loss dB	Height cm	Pol.	Restr. Band
5.180	103.7	-	-	64.3	33.7	0.0	5.7	150	Hor.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Result measured with the average detector:

Frequency GHz	Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamplifier dB	Cable loss dB	Height cm	Pol.	Restr. Band
5.180	94.2	-	-	54.8	33.7	0.0	5.7	150	Hor.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Transmitter operates at the middle of the assigned frequency band (operation mode 2)

Result measured with the peak detector:

Frequency GHz	Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamplifier dB	Cable loss dB	Height cm	Pol.	Restr. Band
1.018	46.6	74.0	27.4	20.1	24.1	0.0	2.4	150	Hor.	Yes
5.200	106.3	-	-	66.7	33.8	0.0	5.8	150	Hor.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Result measured with the average detector:

Frequency GHz	Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
1.018	29.5	54.0	24.5	3.0	24.1	0.0	2.4	150	Hor.	Yes
5.200	96.6	-	-	57.0	33.8	0.0	5.8	150	Hor.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Transmitter operates at the upper end of the assigned frequency band (operation mode 3)

Result measured with the peak detector:

Frequency GHz	Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
1.018	46.8	74.0	27.2	20.3	24.1	0.0	2.4	150	Hor.	Yes
5.240	106.0	-	-	66.5	33.7	0.0	5.8	150	Hor.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Result measured with the average detector:

Frequency GHz	Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
1.018	29.5	54.0	24.5	3.0	24.1	0.0	2.4	150	Hor.	Yes
5.240	96.7	-	-	57.2	33.7	0.0	5.8	150	Hor.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

29, 31 – 34, 36, 44, 49

6.3.2.3 FINAL MEASUREMENT (1 GHz to 40 GHz) n-mode (20 MHz)

Ambient temperature	20 °C	Relative humidity	62 %
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Position of EUT: The EUT was set-up on a non-conducting table of a height of 0.8 m. The distance between EUT and antenna was 3 m.

Cable guide: The cables of the EUT were fixed on the non-conducting table. For further information of the cable guide refer to the pictures in annex A of this test report.

Supply voltage: During all measurements the EUT was supplied with 24.0 V DC.

Resolution bandwidth: For all measurements a resolution bandwidth of 1 MHz was used.

Remark: The worst-case data rate for this measurement was 7.2 Mbps.

Transmitter operates at the lower end of the assigned frequency band (operation mode 1)

Result measured with the peak detector:

Frequency GHz	Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
5.180	104.6	-	-	65.2	33.7	0.0	5.7	150	Vert.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Result measured with the average detector:

Frequency GHz	Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
5.180	94.0	-	-	54.6	33.7	0.0	5.7	150	Vert.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Transmitter operates at the middle of the assigned frequency band (operation mode 2)

Result measured with the peak detector:

Frequency GHz	Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
5.200	102.7	-	-	63.1	33.8	0.0	5.8	150	Hor.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Result measured with the average detector:

Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.200	92.8	-	-	53.2	33.8	0.0	5.8	150	Hor.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Transmitter operates at the upper end of the assigned frequency band (operation mode 3)

Result measured with the peak detector:

Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.240	101.0	-	-	61.5	33.7	0.0	5.8	150	Vert.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Result measured with the average detector:

Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.240	90.8	-	-	51.3	33.7	0.0	5.8	150	Vert.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

29, 31 – 34, 36, 44, 49

6.3.2.4 FINAL MEASUREMENT (1 GHz to 40 GHz) n-mode (40 MHz)

Ambient temperature	20 °C	Relative humidity	62 %
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Position of EUT: The EUT was set-up on a non-conducting table of a height of 0.8 m. The distance between EUT and antenna was 3 m.

Cable guide: The cables of the EUT were fixed on the non-conducting table. For further information of the cable guide refer to the pictures in annex A of this test report.

Supply voltage: During all measurements the EUT was supplied with 5.0 V DC.

Resolution bandwidth: For all measurements a resolution bandwidth of 1 MHz was used.

Remark: The worst-case data rate for this measurement was 15 Mbps.

Transmitter operates at the lower end of the assigned frequency band (operation mode 4)

Result measured with the peak detector:

Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.190	99.8	-	-	60.3	33.7	0.0	5.8	150	Hor.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Result measured with the average detector:

Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.190	88.6	-	-	49.1	33.7	0.0	5.8	150	Hor.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Transmitter operates at the upper end of the assigned frequency band (operation mode 5)

Result measured with the peak detector:

Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.230	105.2	-	-	65.7	33.7	0.0	5.8	150	Hor.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Result measured with the average detector:

Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.230	93.8	-	-	54.3	33.7	0.0	5.8	150	Hor.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

29, 31 – 34, 36, 44, 49

6.3.3 TEST RESULTS (RADIATED EMISSIONS) WITH BAT-ANT-N-MiMo5-9N-IP65

6.3.3.1 PRELIMINARY MEASUREMENT (1 GHz to 40 GHz)

Ambient temperature	20 °C	Relative humidity	62 %
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Position of EUT: The EUT was set-up on a non-conducting table of a height of 0.8 m. The distance between EUT and antenna was 3 m.

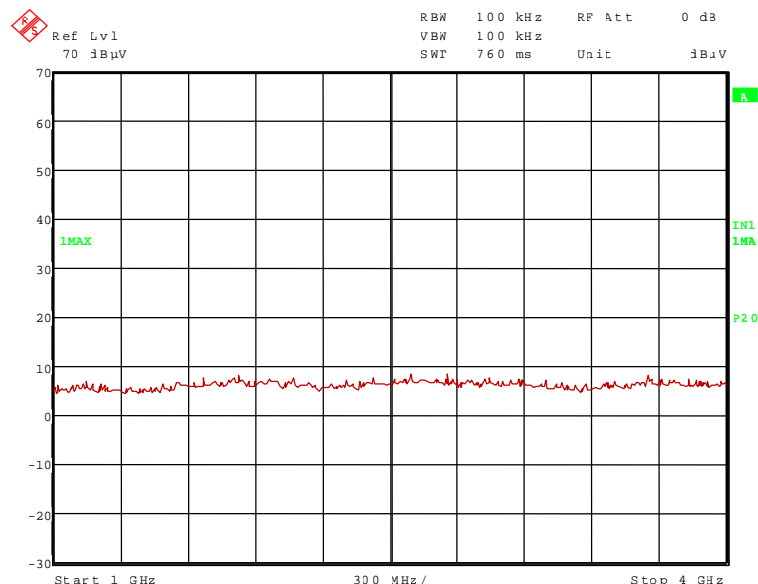
Cable guide: The cables of the EUT were fixed on the non-conducting table. For further information of the cable guide refer to the pictures in annex A of this test report.

Test record: In order to reduce the documents size, only the worst-case emissions were shown for the preliminary measurement. The tables of the final measurements in the next clauses are showing the results for the radiated spurious emissions for all applicable operation modes with the worst-case data rate, causing the highest emissions at the band edges

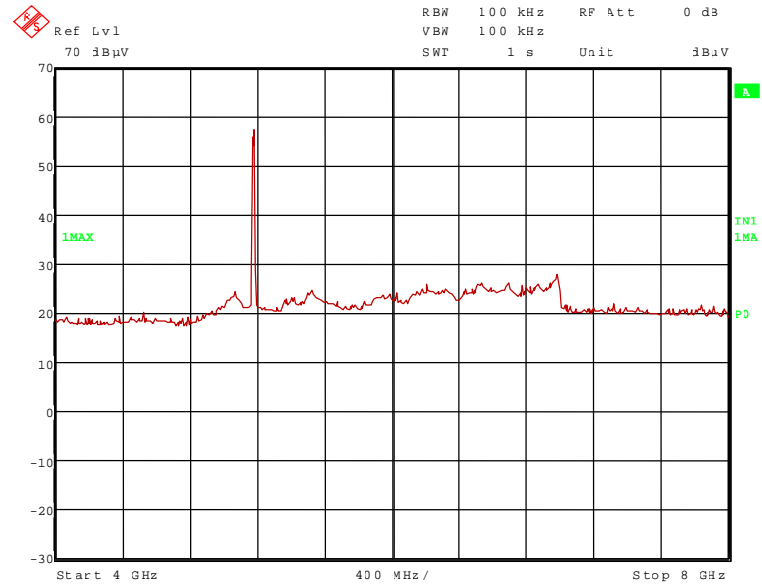
Supply voltage: During all measurements the EUT was supplied with 24.0 V DC.

Transmitter operates at the lower end of the assigned frequency band (operation mode 1)

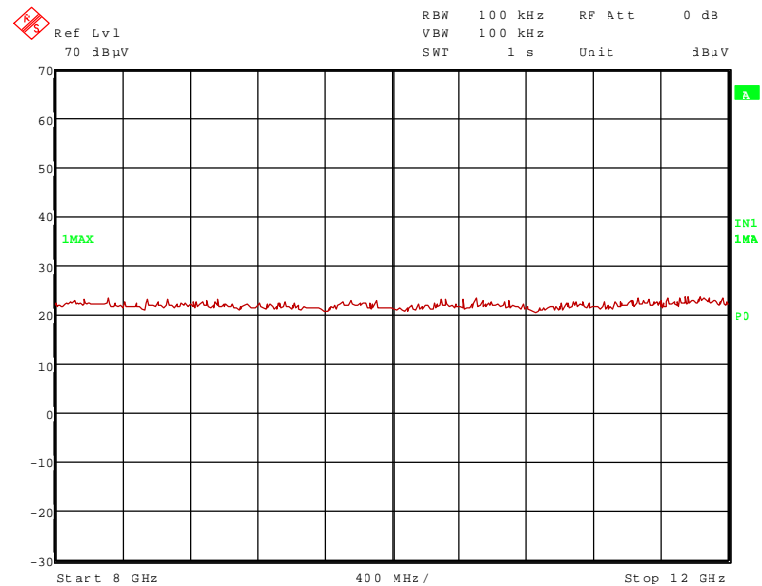
100984_578.wmf: Spurious emissions from 1 GHz to 4 GHz (n-mode, 7.2 Mbps):



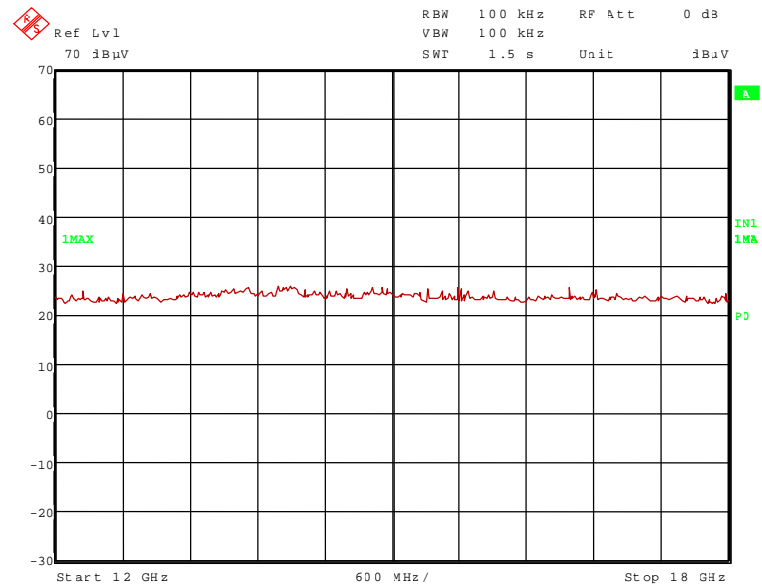
100984_579.wmf: Spurious emissions from 4 GHz to 8 GHz (n-mode, 7.2 Mbps):



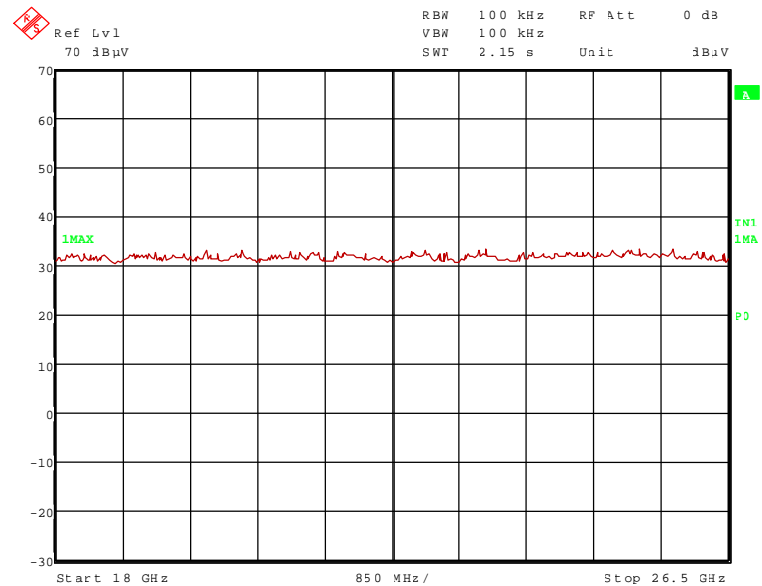
100984_588.wmf: Spurious emissions from 8 GHz to 12 GHz (n-mode, 7.2 Mbps):



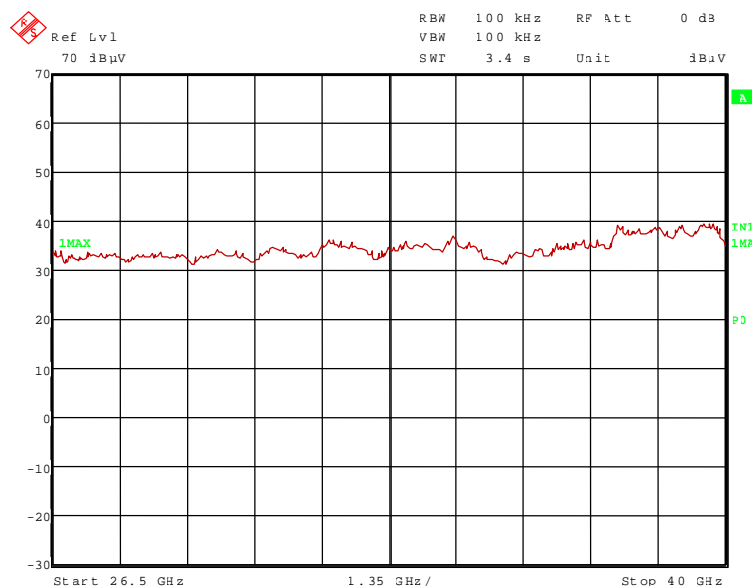
100984_602.wmf: Spurious emissions from 12 GHz to 8 GHz (n-mode, 7.2 Mbps):



100984_603.wmf: Spurious emissions from 18 GHz to 26.5 GHz (n-mode, 7.2 Mbps):



100984_608.wmf: Spurious emissions from 26.5 GHz to 40 GHz (n-mode, 7.2 Mbps):



No frequencies were found inside the restricted bands during the preliminary radiated emission test.

The following frequency was found outside the restricted bands during the preliminary radiated emission test:

- 5.180 GHz.

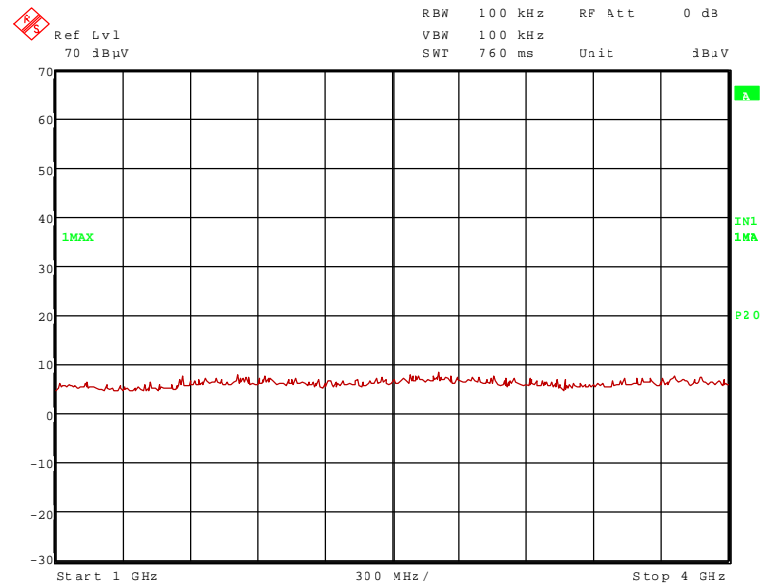
This frequency has to be measured in a final measurement. The results were presented in the following.

TEST EQUIPMENT USED FOR THE TEST:

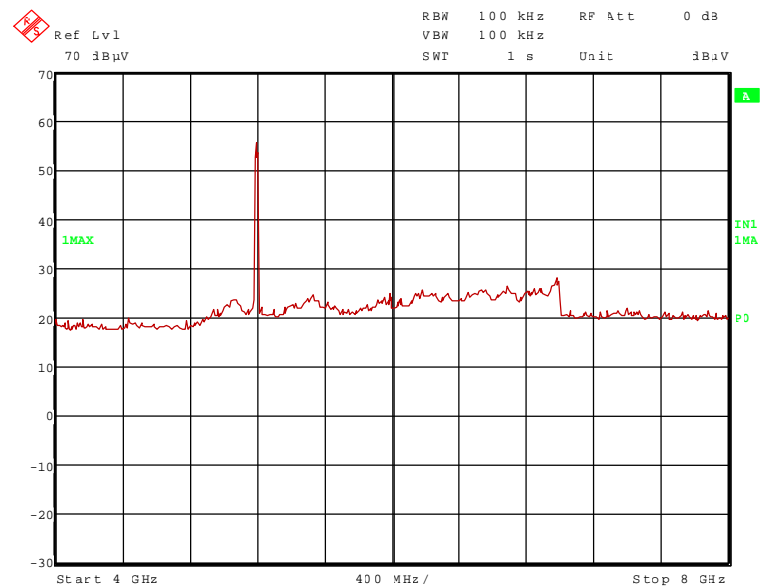
29, 31 – 34, 36, 37, 39, 41, 44, 46, 49 – 52, 73

Transmitter operates at the middle of the assigned frequency band (operation mode 2)

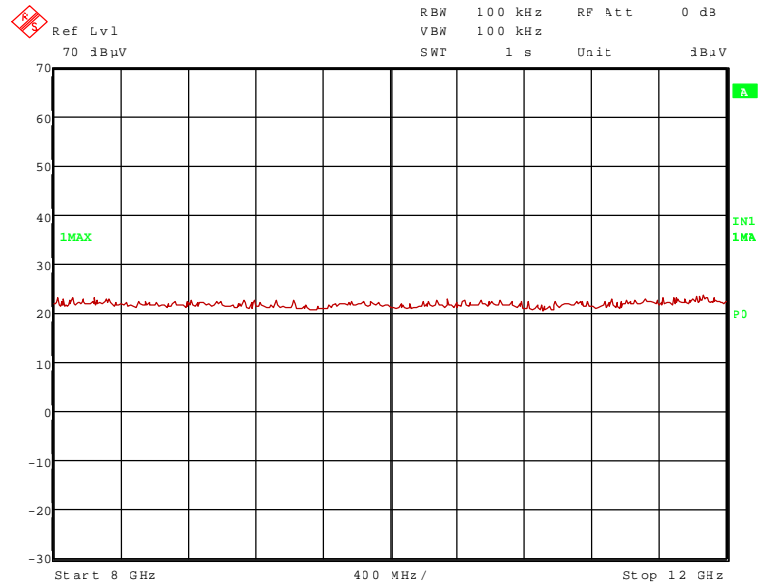
100984 481.wmf: Spurious emissions from 1 GHz to 4 GHz (n-mode, 7.2 Mbps):



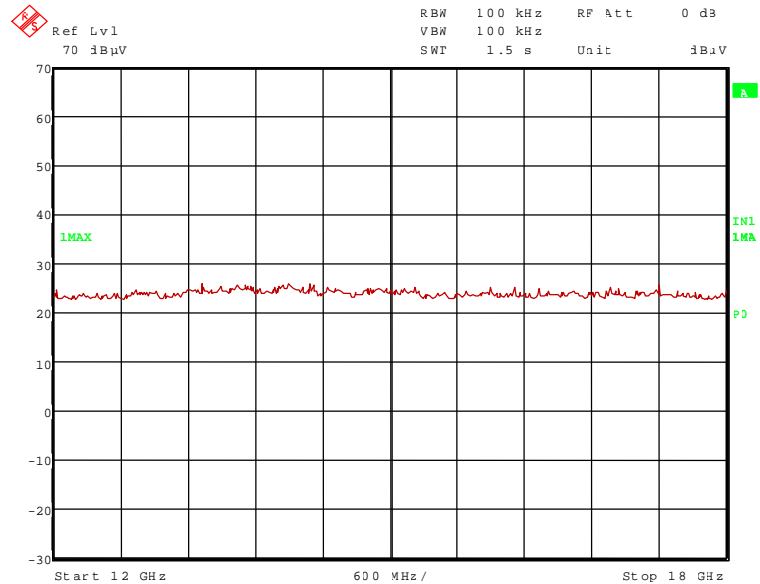
100984 482.wmf: Spurious emissions from 4 GHz to 8 GHz (n-mode, 7.2 Mbps):



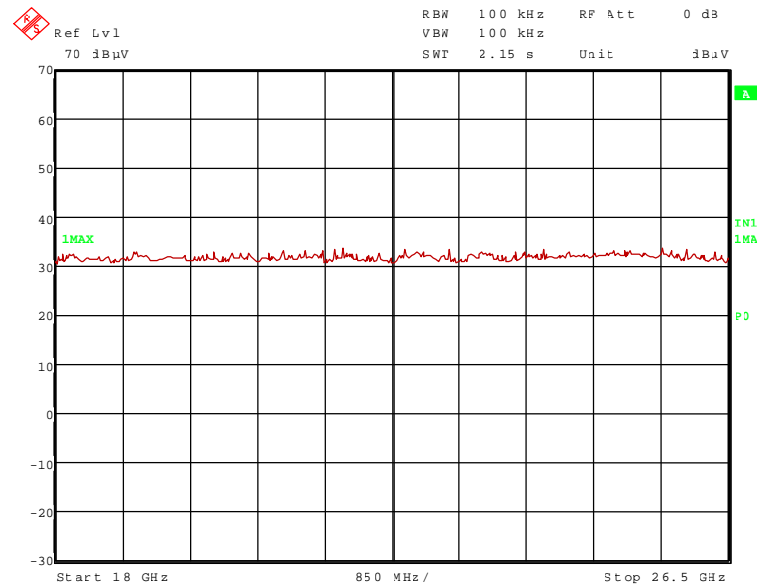
100984_587.wmf: Spurious emissions from 8 GHz to 12 GHz (n-mode, 7.2 Mbps):



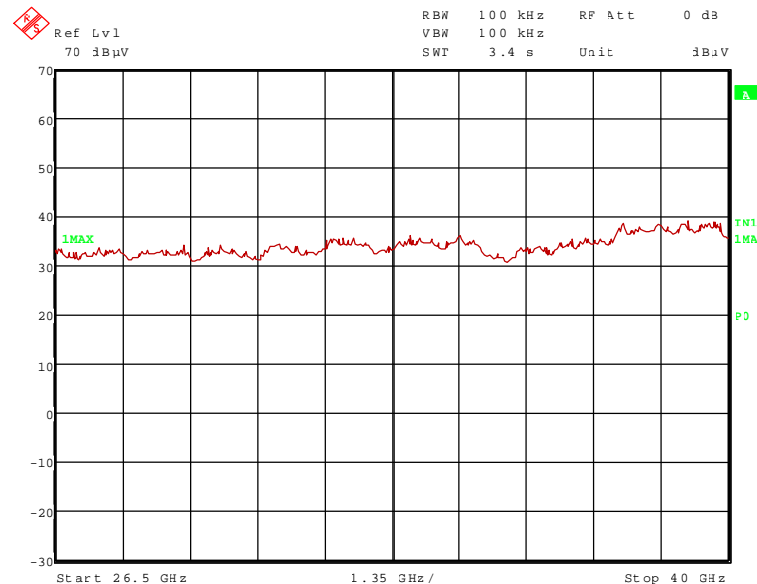
100984_601.wmf: Spurious emissions from 12 GHz to 18GHz (n-mode, 7.2 Mbps):



100984_604.wmf: Spurious emissions from 18 GHz to 26.5 GHz (n-mode, 7.2 Mbps):



100984_607.wmf: Spurious emissions from 26.5 GHz to 40 GHz (n-mode, 7.2 Mbps):



No frequencies were found inside the restricted bands during the preliminary radiated emission test.

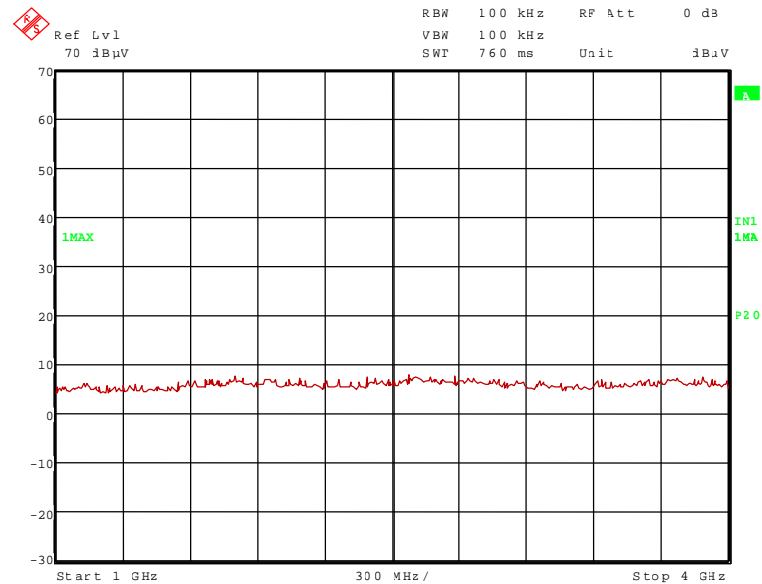
The following frequency was found outside the restricted bands during the preliminary radiated emission test:

- 5.200 GHz.

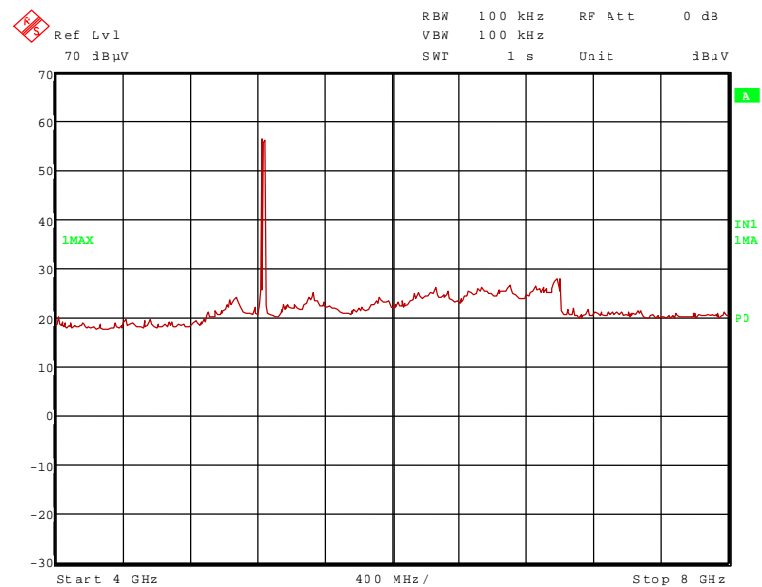
This frequency has to be measured in a final measurement. The results were presented in the following.

Transmitter operates at the upper end of the assigned frequency band (operation mode 3)

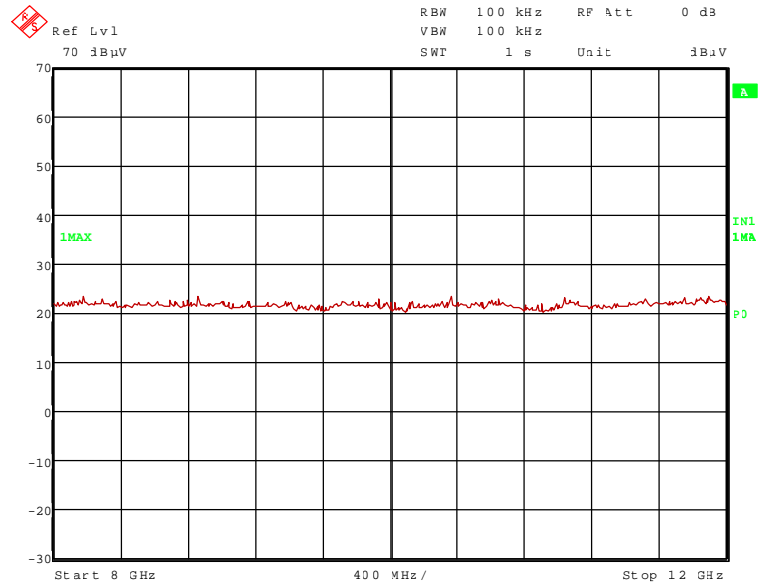
100984 483.wmf: Spurious emissions from 1 GHz to 4 GHz (n-mode, 7.2 Mbps):



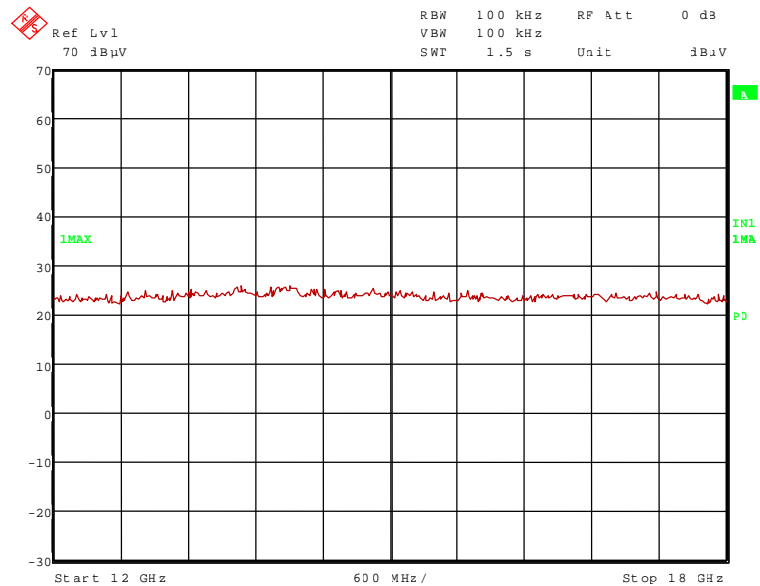
100984 484.wmf: Spurious emissions from 4 GHz to 8 GHz (n-mode, 7.2 Mbps):



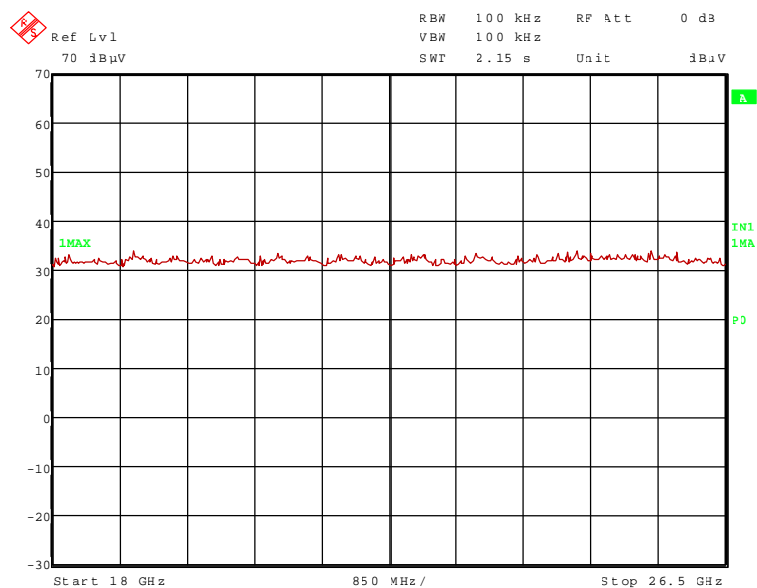
100984_586.wmf: Spurious emissions from 8 GHz to 12 GHz (n-mode, 7.2 Mbps):



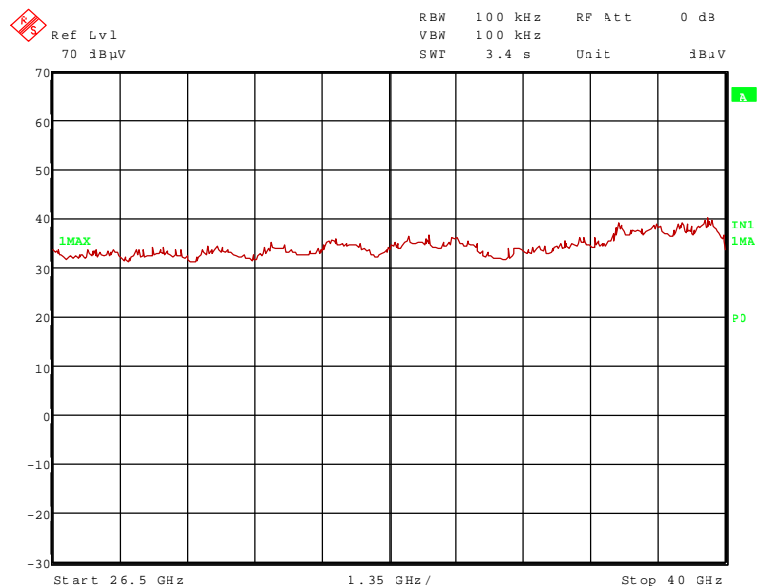
100984_600.wmf: Spurious emissions from 12 GHz to 18 GHz (n-mode, 7.2 Mbps):



100984_605.wmf: Spurious emissions from 18 GHz to 26.5 GHz (n-mode, 7.2 Mbps):



100984_606.wmf: Spurious emissions from 26.5 GHz to 40 GHz (n-mode, 7.2 Mbps):



No frequencies were found inside the restricted bands during the preliminary radiated emission test.

The following frequency was found outside the restricted bands during the preliminary radiated emission test:

- 5.240 GHz.

This frequency has to be measured in a final measurement. The results were presented in the following.

6.3.3.2 FINAL MEASUREMENT (1 GHz to 40 GHz) a-mode

Ambient temperature	20 °C	Relative humidity	62 %
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Position of EUT: The EUT was set-up on a non-conducting table of a height of 0.8 m. The distance between EUT and antenna was 3 m.

Cable guide: The cables of the EUT were fixed on the non-conducting table. For further information of the cable guide refer to the pictures in annex A of this test report.

Supply voltage: During all measurements the EUT was supplied with 24.0 V DC.

Resolution bandwidth: For all measurements a resolution bandwidth of 1 MHz was used.

Remark: The worst-case data rate for this measurement was 6 Mbps.

Transmitter operates at the lower end of the assigned frequency band (operation mode 1)

Result measured with the peak detector:

Frequency GHz	Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
5.180	104.8	-	-	65.4	33.7	0.0	5.7	150	Vert.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Result measured with the average detector:

Frequency GHz	Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
5.180	94.2	-	-	54.8	33.7	0.0	5.7	150	Vert.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Transmitter operates at the middle of the assigned frequency band (operation mode 2)

Result measured with the peak detector:

Frequency GHz	Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
5.200	107.6	-	-	68.0	33.8	0.0	5.8	150	Vert.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Result measured with the average detector:

Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.200	97.2	-	-	57.6	33.8	0.0	5.8	150	Vert.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Transmitter operates at the upper end of the assigned frequency band (operation mode 3)

Result measured with the peak detector:

Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.240	103.9	-	-	64.4	33.7	0.0	5.8	150	Vert.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Result measured with the average detector:

Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.240	94.5	-	-	55.0	33.7	0.0	5.8	150	Vert.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

29, 31 – 34, 36, 44, 49

6.3.3.3 FINAL MEASUREMENT (1 GHz to 40 GHz) n-mode (20 MHz)

Ambient temperature	20 °C	Relative humidity	62 %
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Position of EUT: The EUT was set-up on a non-conducting table of a height of 0.8 m. The distance between EUT and antenna was 3 m.

Cable guide: The cables of the EUT were fixed on the non-conducting table. For further information of the cable guide refer to the pictures in annex A of this test report.

Supply voltage: During all measurements the EUT was supplied with 24.0 V DC.

Resolution bandwidth: For all measurements a resolution bandwidth of 1 MHz was used.

Remark: The worst-case data rate for this measurement was 7.2 Mbps.

Transmitter operates at the lower end of the assigned frequency band (operation mode 1)

Result measured with the peak detector:

Frequency GHz	Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
5.180	107.5	-	-	68.1	33.7	0.0	5.7	150	Vert.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Result measured with the average detector:

Frequency GHz	Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
5.180	97.4	-	-	58.0	33.7	0.0	5.7	150	Vert.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Transmitter operates at the middle of the assigned frequency band (operation mode 2)

Result measured with the peak detector:

Frequency GHz	Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
5.200	105.4	-	-	65.8	33.8	0.0	5.8	150	Hor.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Result measured with the average detector:

Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamp	Cable loss	Height	Pol.	Restr. Band
GHz	dB μ V/m	dB μ V/m	dB	dB μ V	1/m	dB	dB	cm		
5.200	95.6	-	-	56.0	33.8	0.0	5.8	150	Hor.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Transmitter operates at the upper end of the assigned frequency band (operation mode 3)

Result measured with the peak detector:

Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamp	Cable loss	Height	Pol.	Restr. Band
GHz	dB μ V/m	dB μ V/m	dB	dB μ V	1/m	dB	dB	cm		
5.240	106.0	-	-	66.5	33.7	0.0	5.8	150	Hor.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Result measured with the average detector:

Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamp	Cable loss	Height	Pol.	Restr. Band
GHz	dB μ V/m	dB μ V/m	dB	dB μ V	1/m	dB	dB	cm		
5.240	96.3	-	-	56.8	33.7	0.0	5.8	150	Hor.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

29, 31 – 34, 36, 44, 49

6.3.3.4 FINAL MEASUREMENT (1 GHz to 40 GHz) n-mode (40 MHz)

Ambient temperature	20 °C	Relative humidity	62 %
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Position of EUT: The EUT was set-up on a non-conducting table of a height of 0.8 m. The distance between EUT and antenna was 3 m.

Cable guide: The cables of the EUT were fixed on the non-conducting table. For further information of the cable guide refer to the pictures in annex A of this test report.

Supply voltage: During all measurements the EUT was supplied with 24.0 V DC.

Resolution bandwidth: For all measurements a resolution bandwidth of 1 MHz was used.

Remark: The worst-case data rate for this measurement was 15 Mbps.

Transmitter operates at the lower end of the assigned frequency band (operation mode 4)

Result measured with the peak detector:

Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.190	104.4	-	-	64.9	33.7	0.0	5.8	150	Vert.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Result measured with the average detector:

Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.190	92.8	-	-	53.3	33.7	0.0	5.8	150	Vert.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Transmitter operates at the upper end of the assigned frequency band (operation mode 11)

Result measured with the peak detector:

Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.230	111.7	-	-	72.2	33.7	0.0	5.8	150	Vert.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Result measured with the average detector:

Frequency	Result	Limit	Margin	Readings	Antenna factor	Preamplifier	Cable loss	Height	Pol.	Restr. Band
GHz	dBμV/m	dBμV/m	dB	dBμV	1/m	dB	dB	cm		
5.230	99.8	-	-	60.3	33.7	0.0	5.8	150	Vert.	-
Measurement uncertainty						+2.2 dB / -3.6 dB				

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

29, 31 – 34, 36, 44, 49

6.4 CONDUCTED EMISSIONS ON POWER SUPPLY LINES (150 kHz to 30 MHz)

Ambient temperature	20 °C	Relative humidity	55 %
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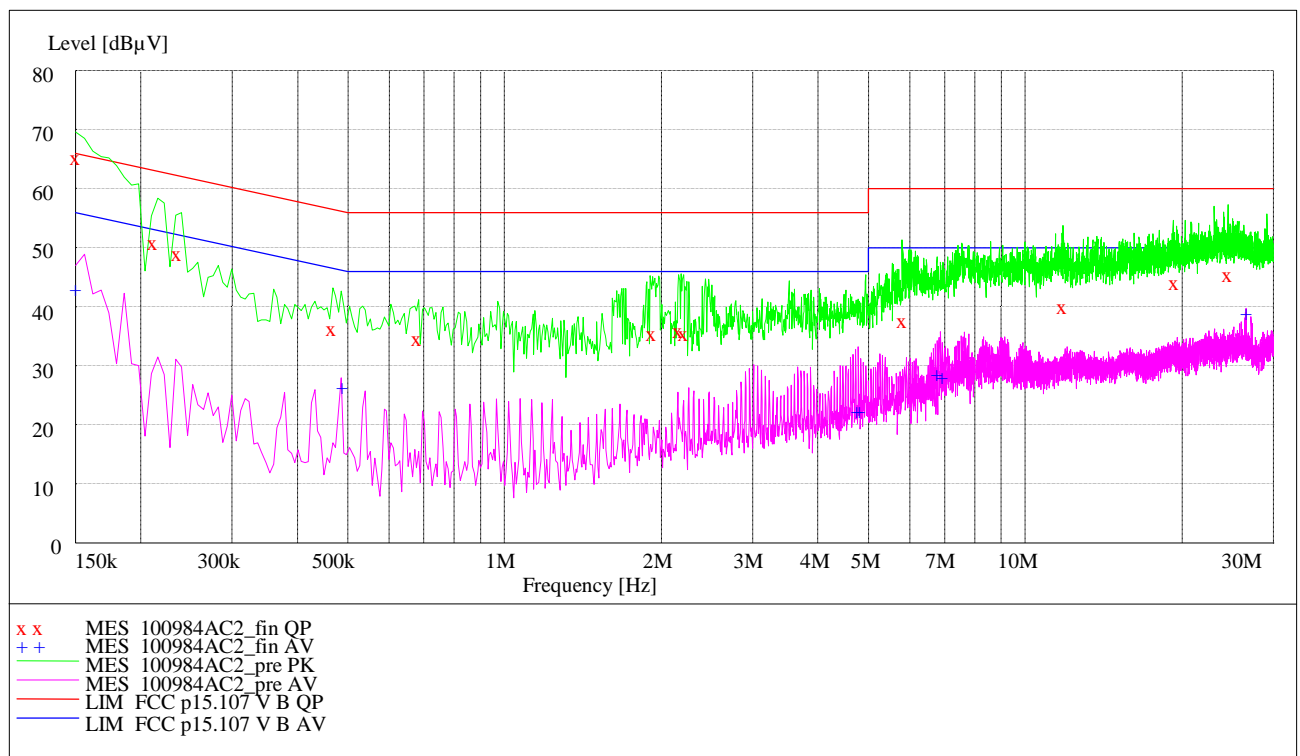
Position of EUT: The EUT was set-up on a non-conducting table of a height of 0.8 m.

Cable guide: The cables of the EUT were fixed on the non-conducting table. For further information of the cable guide refer to the pictures in annex A of this test report.

Test record: All results are shown in the following.

Supply voltage: During the measurement the EUT was supplied 24.0 V DC by an AC / DC adaptor type SMP-120W/V365 from profitec. The EUT transmits in a-mode with 6 Mbps, because there was no difference to the other test modes.

The curves in the diagram only represent for each frequency point the maximum measured value of all preliminary measurements which were made for each power supply line. The top measured curve represents the peak measurement and the bottom measured curve the average measurement. The quasi-peak measured points are marked by an x and the average measured points by an +.



Data record name: 100984AC2

Result measured with the peak detector:
(These values are marked in the diagram by an +)

Frequency MHz	Level dB μ V	Transducer dB	Limit dB μ V	Margin dB	Line	PE
0.1500	65.8	2.1	66.0	0.2	N	FLO
0.2103	51.7	1.0	63.2	11.5	N	GND
0.2337	49.4	1.0	62.3	12.9	N	GND
0.4650	36.8	0.9	56.6	19.8	N	FLO
0.6792	35.0	0.8	56.0	21.0	N	GND
1.9194	36.2	0.7	56.0	19.8	N	FLO
2.1588	36.5	0.8	56.0	19.5	N	GND
2.1894	36.0	0.8	56.0	20.0	L1	GND
5.8137	38.3	1.0	60.0	21.7	N	FLO
11.8221	40.7	1.6	60.0	19.3	N	FLO
19.2759	45.0	2.4	60.0	15.0	L1	GND
24.5634	46.4	2.8	60.0	13.6	L1	GND
Measurement uncertainty				+3.6 dB / -4.5 dB		

Data record name: 100984AC2_fin QP

Result measured with the average detector:
(These values are marked in the diagram by an +)

Frequency MHz	Level dB μ V	Transducer dB	Limit dB μ V	Margin dB	Line	PE
0.1518	43.6	2.0	55.9	12.3	L1	FLO
0.4848	27.0	0.8	46.3	19.2	N	GND
4.7409	23.3	0.9	46.0	22.7	N	GND
4.7949	23.0	0.9	46.0	23.0	N	GND
6.7929	29.2	1.1	50.0	20.8	L1	GND
6.9009	29.4	1.1	50.0	20.6	L1	GND
26.6091	39.9	3.0	50.0	10.1	L1	GND
Measurement uncertainty				+3.6 dB / -4.5 dB		

Data record name: 100984AC2_fin AV

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

1 – 4, 20

7 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

No.	Test equipment	Type	Manufacturer	Serial No.	PM. No.	Cal. Date	Cal. due
1	Shielded chamber M4	-	Siemens	B83117S1-X158	480088	Weekly verification (system cal.)	
2	EMI Receiver	ESIB 26	Rohde & Schwarz	1088.7490	481182	02/08/2010	02/2012
3	LISN	NSLK8128	Schwarzbeck	8128161	480138	05/07/2010	05/2012
4	High pass filter	HR 0.13-5ENN	FSY Microwave Inc.	DC 0109 SN 002	480340	Weekly verification (system cal.)	
14	Open area test site	-	Phoenix Test-Lab	-	480085	Weekly verification (system cal.)	
15	Measuring receiver	ESIB7	Rohde & Schwarz	100304	480521	03/15/2010	03/2012
16	Controller	HD100	Deisel	100/670	480139	-	-
17	Turntable	DS420HE	Deisel	420/620/80	480087	-	-
18	Antenna support	AS615P	Deisel	615/310	480086	-	-
19	Antenna	CBL6111 A	Chase	1643	480147	08/01/2007	08/2012
20	EMI Software	ES-K1	Rohde & Schwarz	-	480111	-	-
29	Fully anechoic chamber M20	-	Albatross Projects	B83107-E2439-T232	480303	Weekly verification (system cal.)	
30	Spectrum analyser	FSU	Rohde & Schwarz	200125	480956	04/15/2010	04/2010
31	Measuring receiver	ESI 40	Rohde & Schwarz	100064	480355	03/17/2010	03/2012
32	Controller	MCU	Maturo	MCU/043/971107	480832	-	-
33	Turntable	DS420HE	Deisel	420/620/80	480315	-	-
34	Antenna support	AS615P	Deisel	615/310	480187	-	-
35	Antenna	CBL6112 B	Chase	2688	480328	10/11/2005	10/2010
36	Antenna	3115 A	EMCO	9609-4918	480183	04/11/2008	11/2013
37	Standard Gain Horn 11.9 GHz – 18 GHz	18240-20	Flann Microwave	483	480294	Six month verification (system cal.)	
39	Standard Gain Horn 17.9 GHz – 26.7 GHz	20240-20	Flann Microwave	411	480297	Six month verification (system cal.)	
41	Standard Gain Horn 26.4 GHz – 40.1 GHz	22240-20	Flann Microwave	469	480299	Six month verification (system cal.)	
43	RF-cable No. 30	RTK 081	Rosenberger	-	410141	Weekly verification (system cal.)	
44	RF-cable No. 31	RTK 081	Rosenberger	-	410142	Weekly verification (system cal.)	
46	RF-cable 1 m	KPS-1533-400-KPS	Insulated Wire	-	480301	Six month verification (system cal.)	
49	Preamplifier	JS3-00101200-23-5A	Miteq	681851	480337	Six month verification (system cal.)	
50	Preamplifier	JS3-12001800-16-5A	Miteq	571667	480343	Six month verification (system cal.)	
51	Preamplifier	JS3-18002600-20-5A	Miteq	658697	480342	Six month verification (system cal.)	

No.	Test equipment	Type	Manufacturer	Serial No.	PM. No.	Cal. Date
52	Preamplifier	JS3-26004000-25-5A	Miteq	563593	480344	Preamplifier
73	8 GHz High Pass Filter	WHKX8.0/18 G-8SS	Wainwright Instruments	4	480586	Weekly verification (system cal.)

8 REPORT HISTORY

Report Number	Date	Comment
F100984E2	02 September 2010	Document created

9 LIST OF ANNEXES

ANNEX A TEST SETUP PHOTOS 9 pages

100984_2.jpg: BAT300 with BAT-ANT-N-MiMoDB-5N-IP65, test set-up fully anechoic chamber
 100984_7.jpg: BAT300 with BAT-ANT-N-9A-DS-IP65, test set-up fully anechoic chamber
 100984_12.jpg: BAT300 with BAT-ANT-N-23A-N-IP65, test set-up fully anechoic chamber
 100984_23.jpg: BAT300 with BAT-ANT-N-MiMo5-9N-IP65, test set-up fully anechoic chamber
 100984_18.jpg: BAT300 with BAT-ANT-N-23A-VH-IP65, test set-up fully anechoic chamber
 100984_1.jpg: BAT300 with BAT-ANT-N-MiMoDB-5N-IP65, test set-up fully anechoic chamber
 100984_24.jpg: BAT300 with BAT-ANT-N-9A-DS-IP65, test set-up fully anechoic chamber
 100984_29.jpg: BAT300 with BAT-ANT-N-MiMoDB-5N-IP65, open area test site
 100984_27.jpg: BAT300 with BAT-ANT-N-MiMoDB-5N-IP65, test set-up shielded chamber

ANNEX B INTERNAL PHOTOGRAPHS 8 pages

100984_e.jpg: EMP-7601 top view
 100984_f.jpg: EMP-7601 bottom view
 100984_d.jpg: BAT300-Rail FCC (Host), internal view
 100984_g.jpg: BAT300-Rail FCC (Host), PCB 1, top view
 100984_h.jpg: BAT300-Rail FCC (Host), PCB 1, bottom view
 100984_j.jpg: BAT300-Rail FCC (Host), PCB 2, top view
 100984_i.jpg: BAT300-Rail FCC (Host), PCB 2, bottom view
 100984_p.jpg: BAT300-F FCC (Host), internal view

Annex C EXTERNAL PHOTOGRAPHS 7 pages

100984_a.jpg: BAT300-Rail FCC (Host), 3-D view 1
 100984_b.jpg: BAT300-Rail FCC (Host), 3-D view 2
 100984_k.jpg: BAT300-Rail FCC (Host), type plate 1
 100984_l.jpg: BAT300-Rail FCC (Host), type plate 2
 100984_m.jpg: BAT300-F FCC (Host), 3-D view 1
 100984_n.jpg: BAT300-F FCC (Host), 3-D view 2
 100984_o.jpg: BAT300-F FCC (Host), type plate

ANNEX D ADDITIONAL RESULTS FOR INDUSTRY CANADA 20 PAGES