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Test Report

Report Number: F133448E3

Applicant:

Hirschmann Automation and Control GmbH

Manufacturer:

Hirschmann Automation and Control GmbH

Equipment under Test (EUT):

EWLAN1

Laboratory accredited by
Deutsche Akkreditierungsstelle GmbH (DAkkS)
in compliance with DIN EN ISO/IEC 17025
under the Reg. No. D-PL-17186-01-02,
FCC Test site registration number 90877 and
Industry Canada Test site registration IC3469A-1

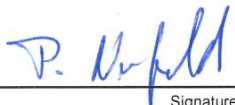

REFERENCES

- [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 (September 2013)** Radio Frequency Devices
- [3] **Publication Number 789033 (April 2013)** UNII Meas Guidelines v01r03
- [4] **RSS-210 Issue 8 (December 2010)** Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment
- [5] **RSS-Gen Issue 3 (December 2010)** General Requirements and Information for the Certification of Radiocommunication Equipment
- [6] **Publication Number 662911 (May 2013)** Emission Testing of Transmitters with Multiple Outputs in the Same Band v02

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:	<u>Paul NEUFELD</u>	<u></u>	<u>17 September 2013</u>
	Name	Signature	Date
Authorized reviewer:	<u>Bernd STEINER</u>	<u></u>	<u>17 September 2013</u>
	Name	Signature	Date

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1 IDENTIFICATION

1.1 Applicant

Name:	Hirschmann Automation and Control GmbH
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Applicant represented during the test by the following person:	-

1.2 Manufacturer

Name:	Hirschmann Automation and Control GmbH
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Country:	Germany
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Phone:	+49 7127 14 1750
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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 Deutsche Akkreditierungsstelle GmbH (DAkkS) in compliance with DIN EN ISO/IEC 17025 under the Reg. No. D-PL-17186-01-02, FCC Test site registration number 90877 and Industry Canada Test site registration IC3469A-1.

1.4 EUT (Equipment Under Test)

Test object: *	Wireless LAN Module
Type: *	EWLAN1
FCC ID: *	U99EWLAN1
IC: *	4019A-EWLAN1
Serial number: *	837599005030501094
PCB identifier: *	742386001 G03
Hardware version: *	Z03S06
Software version: *	HiLCOS 8.60.024

Channel 01	RX:	2412 MHz	TX:	2412 MHz
Channel 02	RX:	2417 MHz	TX:	2417 MHz
Channel 03	RX:	2422 MHz	TX:	2422 MHz
Channel 04	RX:	2427 MHz	TX:	2427 MHz
Channel 05	RX:	2432 MHz	TX:	2432 MHz
Channel 06	RX:	2437 MHz	TX:	2437 MHz
Channel 07	RX:	2442 MHz	TX:	2442 MHz
Channel 08	RX:	2447 MHz	TX:	2447 MHz
Channel 09	RX:	2452 MHz	TX:	2452 MHz
Channel 10	RX:	2457 MHz	TX:	2457 MHz
Channel 11	RX:	2462 MHz	TX:	2462 MHz
3	RX:	2422 MHz	TX:	2422 MHz
4	RX:	2427 MHz	TX:	2427 MHz
5	RX:	2432 MHz	TX:	2432 MHz
6	RX:	2437 MHz	TX:	2437 MHz
7	RX:	2442 MHz	TX:	2442 MHz
8	RX:	2447 MHz	TX:	2447 MHz
9	RX:	2452 MHz	TX:	2452 MHz

Channel 36	RX:	5180 MHz	TX:	5180 MHz
Channel 40	RX:	5200 MHz	TX:	5200 MHz
Channel 44	RX:	5220 MHz	TX:	5220 MHz
Channel 48	RX:	5240 MHz	TX:	5240 MHz
Channel 38	RX:	5190 MHz	TX:	5190 MHz
Channel 46	RX:	5230 MHz	TX:	5230 MHz

Channel 149	RX:	5745 MHz	TX:	5745 MHz
Channel 153	RX:	5765 MHz	TX:	5765 MHz
Channel 157	RX:	5785 MHz	TX:	5785 MHz
Channel 161	RX:	5805 MHz	TX:	5805 MHz
Channel 165	RX:	5825 MHz	TX:	5825 MHz
Channel 151	RX:	5755 MHz	TX:	5755 MHz
Channel 159	RX:	5795 MHz	TX:	5795 MHz

Fulfills WLAN specification: *	IEEE, 802.11b, 802.11g, 802.11n, 802.11a					
Antenna type: *	See Table 1					
Antenna gain: *	See Table 1					
Antenna connector: *	See Table 1					
Power supply - EUT	3.3 V & 1.18 V					
Power supply Host (type W)	U _{nom} =	24 V DC	U _{min} =	18 V DC	U _{max} =	36 V DC
Power supply Host (type C)	U _{nom} =	24 - 48 V DC	U _{min} =	18 V DC	U _{max} =	60 V DC
Power supply Host (type K)	U _{nom} =	60 - 250 V DC	U _{min} =	48 V DC	U _{max} =	320 V DC
	U _{nom} =	110 - 230 V AC 50 – 60 Hz	U _{min} =	88 V AC 47 – 63 Hz	U _{max} =	265 V AC 47 – 63 Hz
Type of modulation: *	802.11a: OFDM 802.11b: CCK, DQPSK, DBPSK 802.11g: OFDM 802.11n: OFDM					
Operating frequency range: *	2412 MHz to 2462 MHz, 5180 MHz to 5240 MHz, 5745 to 5825 MHz					
Number of channels: *	6					
Temperature range: *	0 °C to +40 °C					
Lowest / highest Internal clock frequency: *	40 MHz / 5825 GHz					

* declared by the applicant.

Table 1 Antenna specifications

Antenna name	Manufacturer	Type	Comment	Gain [dBi]
BAT-ANT-N-3AGN-IP67	Joymax Electronics Co., Ltd.	Monopole	Connector: N male	2 @ 2,4 GHz 2 @ 5 GHz
BAT-ANT-RSMA-2AGN-R	Joymax Europe GbmH	Monopole	Connector: SMA Reverse male ,	3 @ 2,4 GHz 5 @ 5 GHz
BAT-ANT-N-MiMoDB-5N-IP65	Huber+Suhner	Patch Array	Connector: N male,	3.5 @ 2,4 GHz 5.5 @ 5 GHz
BAT-ANT-N-MiMo5-9N-IP65	Huber+Suhner	Patch	Connector: N male,	9 @ 5 GHz

The following external I/O cables were used:

Identification	Connector		Length
	EUT	Ancillary	
AC/DC Adapter	DC plug	-	2 m *
Ethernet cable	Ethernet plug	-	-
PCI Express cable	PCI Express plug	PCI Express plug	30 cm ^{*2}

*: Length during the test if no other specified.

*2 Cable connects EUT and host device.

1.5 Dates

Date of receipt of test sample:	08 July 2013
Start of test:	08 July 2013
End of test:	31 July 2013

2 OPERATIONAL STATES

The equipment under test (EUT) is a WLAN module with a PCI express interface and 3 antenna ports. To set this module into operation it was connected to a Hirschmann Belden BAT-R Access Point via ribbon cable with a length of 30 cm.

The tests were carried out with an unmodified sample of the EUT. Parts of the tests were carried out conducted at the antenna ports. If these tests did not pass, the measurements were repeated as radiated tests, with the dedicated antennas attached.

Additionally a radiated measurement of the housing emission was performed while the antenna ports are terminated symmetrically by 50 Ω resistors.


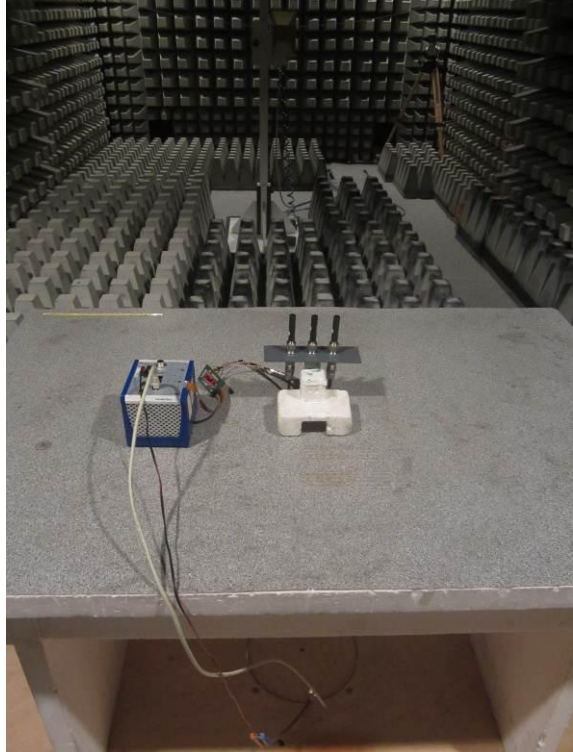


The BAT-R Access Point was connected via an Ethernet connection to a laptop computer. With a testsoftware running on the laptop the operation mode as seen in the table below could be choosen.

During the tests, the test samples were powered with 3.3 V and 1.28 V via PCI Express interface from the BAT-R Accesspoint. This Accesspoint was powered with 24 VDC from a laboratory power supply.

The following operation modes were identified as worst case condition and used during the tests:

Operation mode	Description of the operation mode	WLAN mode	WLAN channel	Modulation	Data rate / Mbps
1	Continuous transmitting on 5180 MHz	a	36	OFDM	6 MBit/s
2	Continuous transmitting on 5200 MHz	a	40	OFDM	6 MBit/s
3	Continuous transmitting on 5240 MHz	a	48	OFDM	6 MBit/s
4	Continuous transmitting on 5180 MHz	n 20 MHz	36	OFDM	6.5 MBit/s
5	Continuous transmitting on 5200 MHz	n 20 MHz	40	OFDM	6.5 MBit/s
6	Continuous transmitting on 5240 MHz	n 20 MHz	48	OFDM	6.5 MBit/s
7	Continuous transmitting on 5190 MHz	n 40 MHz	38	OFDM	13.5 MBit/s
8	Continuous transmitting on 5230 MHz	n 40 MHz	46	OFDM	13.5 MBit/s

Table 2 Worst case test setup

<p>Pos. 1: Worst case Position for housing emission</p> 	<p>Pos. 2: Worst case Position for Antenna BAT-ANT-N-3AGN-F</p> 
<p>Pos. 3: Worst case Position for BAT-ANT-RSMA-2AGN-R</p> 	<p>Pos. 4: Worst case Position for BAT-ANT-N-MiMoDB-5N-IP65</p> 

Pos. 5: Worst case Position for
BAT-ANT-N-9A-DS-IP65

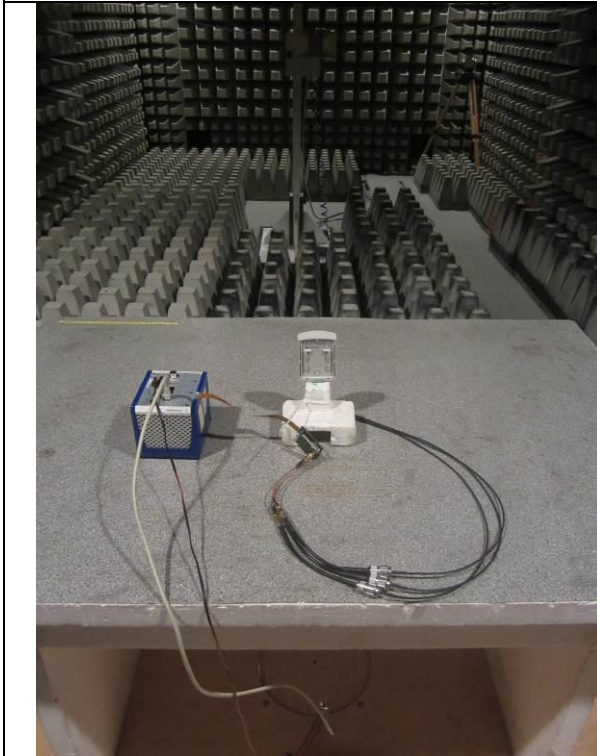
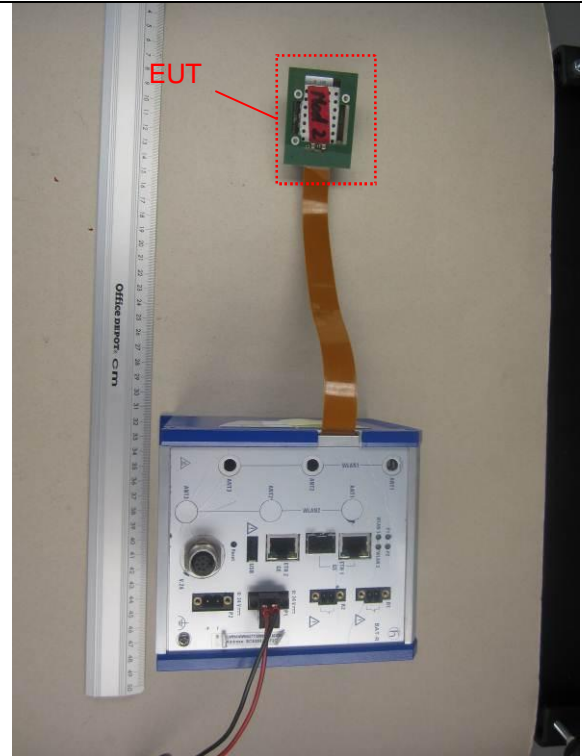


Figure 1: Identification of the EUT



Preliminary tests were performed to find worst-case configuration and position. The radiated emission measurements were carried out in the orthogonal direction that emits the highest spurious emission levels.

The worst case configurations are shown in Table 2.

The following test modes were adjusted during the tests:

Test items	Operation mode
Maximum Peak Output Power	1 - 8
UNII Bandwidth	1 - 8
Peak Power Spectral Density	1 - 8
Peak Excursion	1 - 8
Frequency Stability	1
Band Edge Compliance	1, 3, 4, 6, 7, 8
Maximum Unwanted Emissions	1 - 8

3 ADDITIONAL INFORMATION

The country profile, used for the measurement, was "FCC-United-States". The power reduction was set to 0 during all tests.

The setting for antenna gain was set to 0 in all tests.

4 OVERVIEW

Application	Frequency range [MHz]	FCC 47 CFR Part 15 section [2]	RSS 210, Issue 8 [4] or RSS-Gen, Issue 3 [5]	Status	Refer page
Maximum Peak Output Power	5150 - 5250	15.407 (a)	A9.2 [4]	Passed	12 et seq
UNII Bandwidth	5150 - 5250	15.403 (i)	A9.2 [4]	Passed	14 et seq
Peak Power Spectral Density	5150 - 5250	15.407 (a)(5)	A9.2 [4]	Passed	18 et seq
Peak Excursion	5150 – 5250	15.407 (b)	A9.3 [4]	Passed	22 et seq
Frequency Stability	5150 – 5250	15.407 (g)	A9.5 [4]	Passed	25 et seq
Band edge compliance	5150 - 5250	15.407 (b)	A8.5 [4]	Passed	27 et seq.
Radiated emissions (transmitter)	0.009 - 40,000	15.407 (b) 15.205 (a) 15.209 (a)	7.2.2 [5], 2.5 [4]	Passed	38 et seq.
Conducted emissions on supply line	0.15 - 30	15.207 (a)	7.2.4 [5]	Passed	113 et seq.

5 TEST RESULTS

5.1 Maximum conducted output power

5.1.1 Method of measurement

The measurement procedures described herein are based on the use of an antenna-port conducted test configuration.

“Measurement using a power meter (PM)” was used for this test. The procedure is described in chapter E)3)a) of document [3].

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

Test set-up:



5.1.2 Test results

Ambient temperature	22 °C	Relative humidity	62 %
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The highest array gain is given for the BAT-ANT-N-MiMoDB-5N-IP65 antenna, which has a gain of 5.5. dBi, which results in an array gain of 10.3 dBi Therefore the Peak power limit is reduced by 4.3 dB.

Operation Mode	Antenna gain combined [dBi]	Maximum average output power – port1 [dBm]	Maximum average output power – port2 [dBm]	Maximum average output power – port3 [dBm]	Maximum average output power – sum (all ports) [dBm]	Margin [dB]	Peak power limit [dBm]
1	10.3	7.4	6.3	7.0	11.7	1	12.7
2	10.3	8.1	6.9	6.2	11.9	0.8	12.7
3	10.3	8.2	6.4	6.4	11.9	0.8	12.7
4	10.3	7.6	6.2	6.3	11.5	1.2	12.7
5	10.3	8.0	6.8	6.2	11.8	0.9	12.7
6	10.3	8.0	6.8	6.3	11.9	0.8	12.7
7	10.3	7.9	6.1	6.5	11.7	1	12.7
8	10.3	8.1	6.4	5.9	11.7	1	12.7
Measurement uncertainty			+0.66 dB / -0.72 dB				

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

60, 61

5.2 UNII Bandwidth

5.2.1 Method of measurement

The relating measurements were carried out in a conducting manner. Therefore, the antenna connector was directly connected to a spectrum analyser. The measurement procedure refers to part C) of document [3].

- Set RBW = approximately 1% of the emission bandwidth.
- Set the VBW > RBW.
- Detector = Peak.
- Trace mode = max hold.
- Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

The measurements were carried out at each antenna port separately.

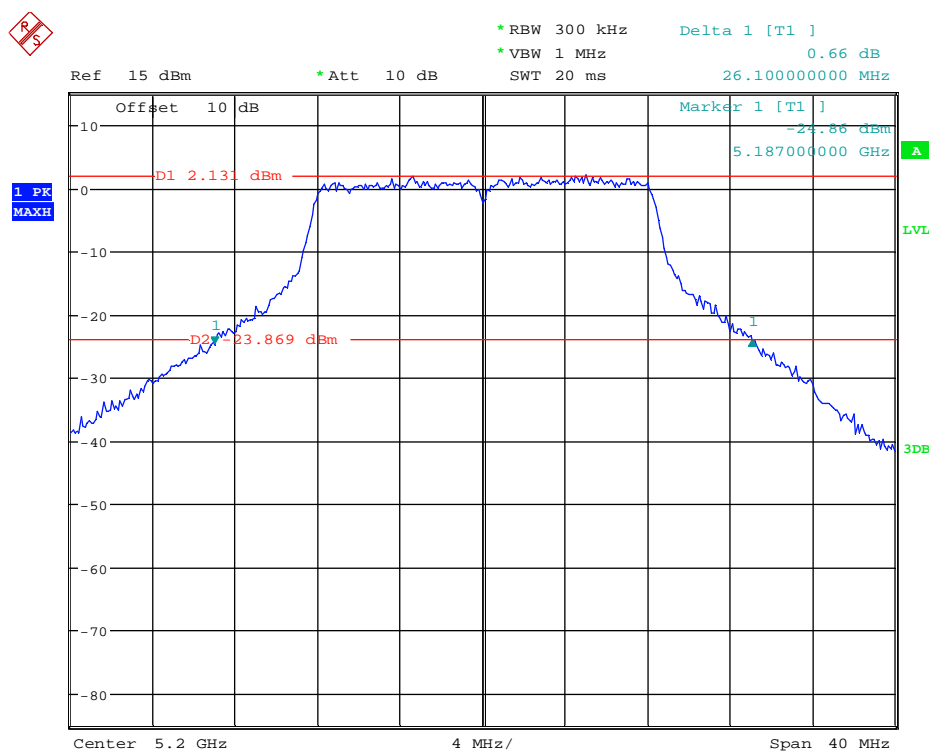
5.2.2 Test result

5.2.2.1 Antenna Port 1

Ambient temperature	22 °C	Relative humidity	60 %
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The following results were measured at antenna port 1 of the EUT. The plot shows an exemplary measurement result for the worst documented case. The other results are listed in the following table.

130254_26dB-BW_a_40.wmf: UNII-Bandwidth (operation mode 2):



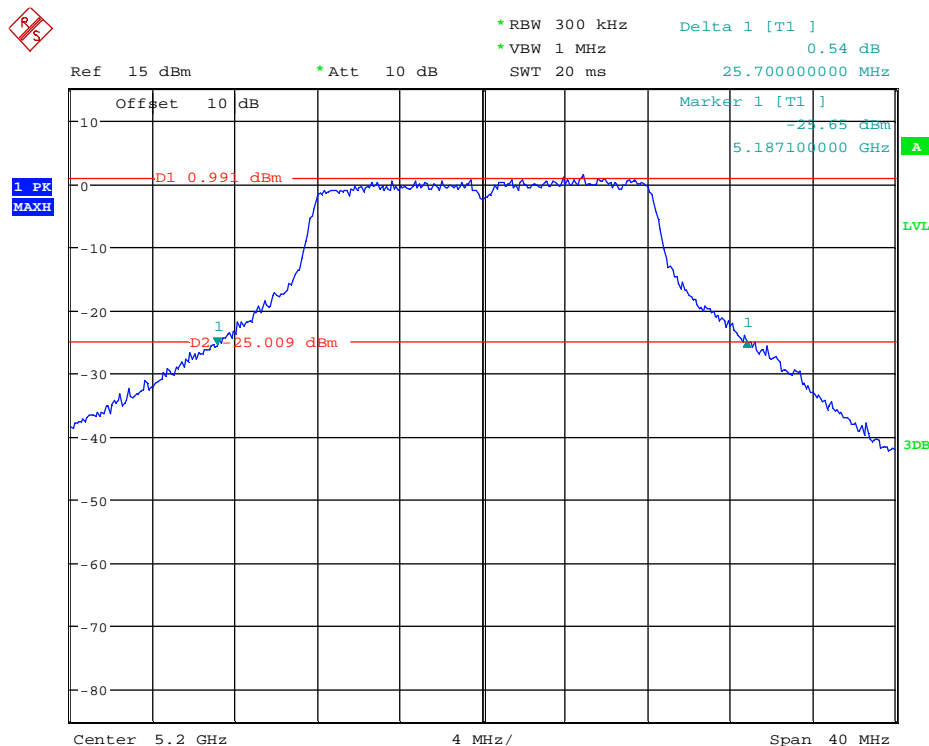
Operation Mode	Center Frequency [MHz]	Minimum 26-dB Bandwidth Limit [MHz]	26 dB Bandwidth [MHz]	Result
1	5180	0.5	26.400	Passed
2	5200	0.5	26.100	Passed
3	5240	0.5	25.800	Passed
4	5180	0.5	28.800	Passed
5	5200	0.5	27.800	Passed
6	5240	0.5	27.800	Passed
7	5190	0.5	51.750	Passed
8	5230	0.5	52.000	Passed
Measurement uncertainty		+0.66 dB / -0.72 dB		

5.2.2.2 Antenna Port 2

Ambient temperature	22 °C	Relative humidity	60 %
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The following results were measured at antenna port 2 of the EUT. The plot shows an exemplary measurement result for the worst documented case. The other results are listed in the following table.

130254 26dB-BW a 40.wmf: UNII-Bandwidth (operation mode 2):



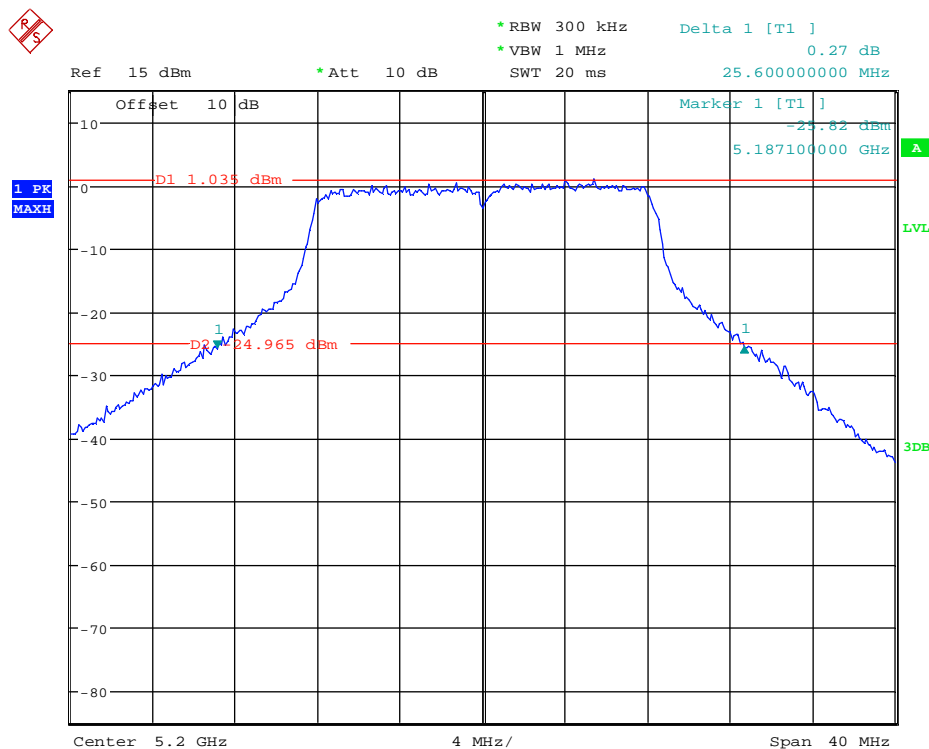
Operation Mode	Center Frequency [MHz]	Minimum 26-dB Bandwidth Limit [MHz]	26 dB Bandwidth [MHz]	Result
1	5180	0.5	26.700	Passed
2	5200	0.5	25.700	Passed
3	5240	0.5	26.600	Passed
4	5180	0.5	28.500	Passed
5	5200	0.5	29.000	Passed
6	5240	0.5	28.200	Passed
7	5190	0.5	51.500	Passed
8	5230	0.5	52.000	Passed
Measurement uncertainty		+0.66 dB / -0.72 dB		

5.2.2.3 Antenna Port 3

Ambient temperature	22 °C	Relative humidity	60 %
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The following results were measured at antenna port 3 of the EUT. The plot shows an exemplary measurement result for the worst documented case. The other results are listed in the following table.

130254 26dB-BW a 40.wmf:UNII-Bandwidth (operation mode 2):



Operation Mode	Center Frequency [MHz]	Minimum 26-dB Bandwidth Limit [MHz]	26 dB Bandwidth [MHz]	Result
1	5180	0.5	25.900	Passed
2	5200	0.5	25.600	Passed
3	5240	0.5	27.200	Passed
4	5180	0.5	29.100	Passed
5	5200	0.5	27.900	Passed
6	5240	0.5	29.100	Passed
7	5190	0.5	52.500	Passed
8	5230	0.5	51.250	Passed
Measurement uncertainty			+0.66 dB / -0.72 dB	

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

30

5.3 Peak Power Spectral Density

5.3.1 Method of measurement

The relating measurements were carried out in a conducting manner. Therefore, the antenna connector was directly connected to a spectrum analyser. The measurement procedure refers to part F) of document [3].

Method SA-1 was used for this measurement.

- Set span to encompass the entire 26-dB emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal.
- Set RBW = 1 MHz.
- Set VBW \geq 3 MHz.
- Number of points in sweep \geq 2 Span / RBW. (This ensures that bin-to-bin spacing is \leq RBW/2, so that narrowband signals are not lost between frequency bins.)
- Sweep time = auto.
- Detector = RMS (i.e., power averaging).
- Trace average at least 100 traces in power averaging (i.e., RMS) mode.
- The result is the PPSP.
- Set Marker to the peak of the spectrum.
- If duty cycle < 100 % add $10 \log(1/x)$, where x is the duty cycle, to the peak of the spectrum.

The measurements were carried out at each antenna port separately.

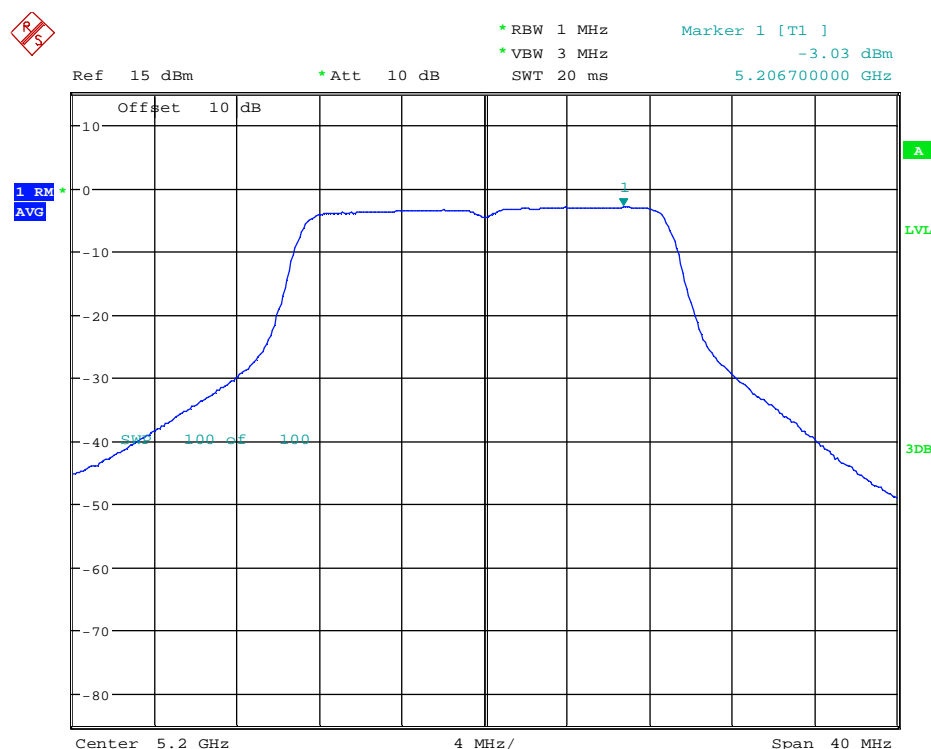
5.3.2 Test result

5.3.2.1 Antenna Port 1

Ambient temperature	22 °C	Relative humidity	60 %
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The following results were measured at antenna port 1 of the EUT. The plot shows an exemplary measurement result for the worst documented case. The other results are listed in the following table. The array sum for 3 antenna ports is an addition of 4.8 dB.

130254 PeakPwrSpecDens n20 40.wmf: power-spectral-density (operation mode 5):



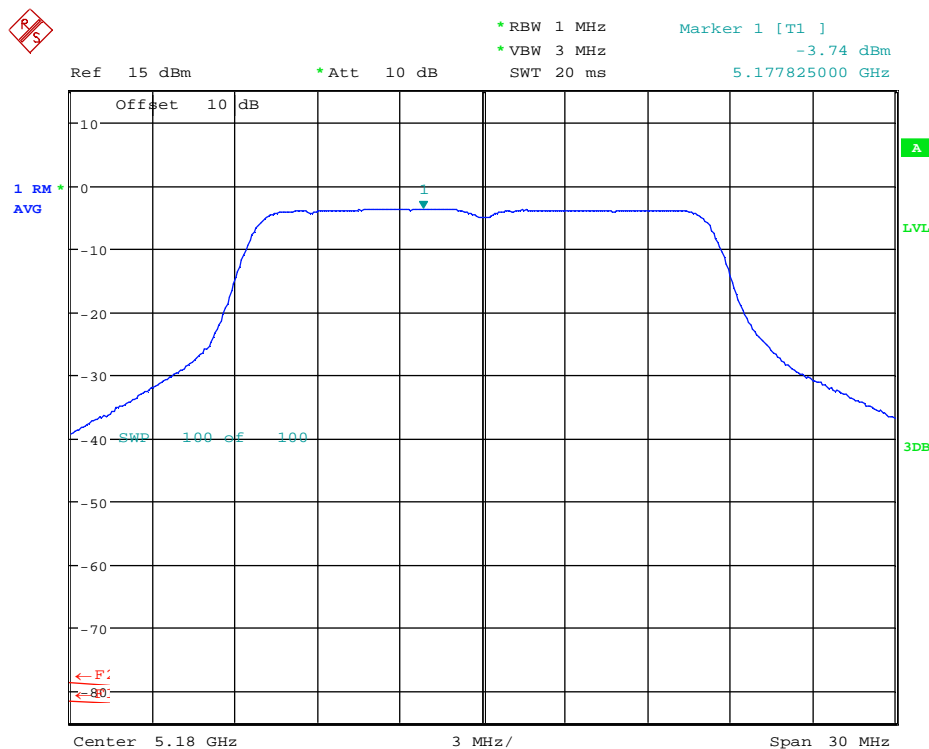
Operation Mode	Peak Frequency [MHz]	Peak Power Spectral Density Limit [dBm]	Peak Power Spectral Density Reading [dBm]	Array Gain [dB]	Peak Power Spectral Density Level [dBm]	Margin [dB]	Result
1	5181.575	4	-5.3	4.8	-0.5	4.5	Passed
2	5206.675	4	-3.0	4.8	1.8	2.2	Passed
3	5243.675	4	-3.6	4.8	1.2	2.8	Passed
4	5182.000	4	-3.5	4.8	1.3	2.7	Passed
5	5206.700	4	-3.0	4.8	1.8	2.2	Passed
6	5243.100	4	-3.5	4.8	1.3	2.7	Passed
7	5203.350	4	-5.2	4.8	-0.4	4.4	Passed
8	5243.500	4	-6.7	4.8	-2.1	6.0	Passed
Measurement uncertainty			+0.66 dB / -0.72 dB				

5.3.2.2 Antenna Port 2

Ambient temperature	22 °C	Relative humidity	60 %
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The following results were measured at antenna port 2 of the EUT. The plot shows an exemplary measurement result for the worst documented case. The other results are listed in the following table. The array sum for 3 antenna ports is an addition of 4.8 dB.

130254_PeakPwrSpecDens_a_36.wmf: power-spectral-density (operation mode 1):



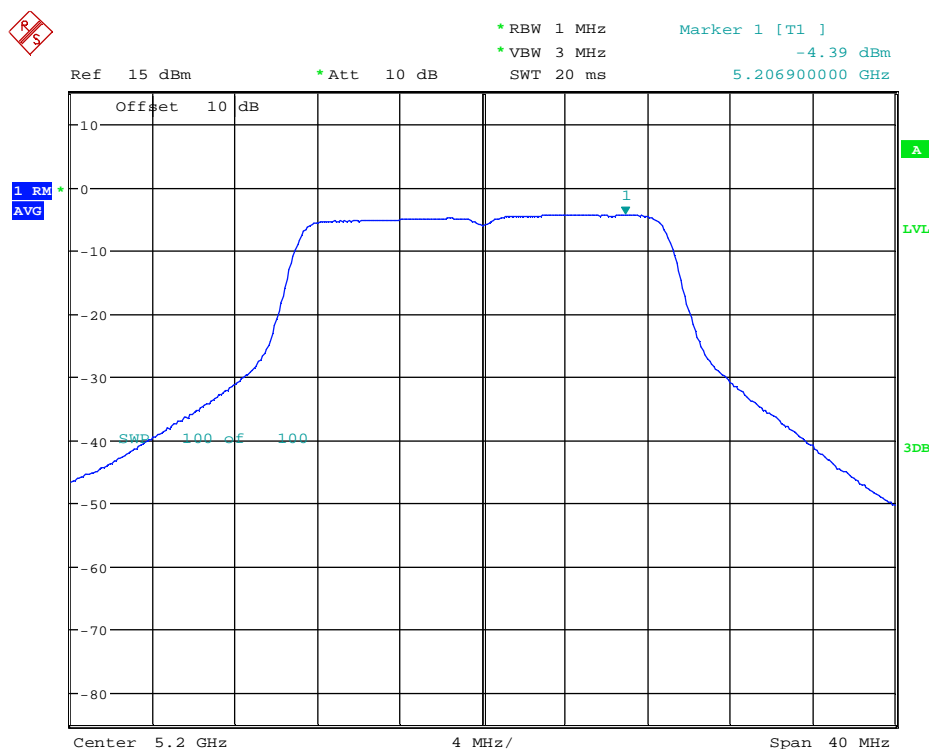
Operation Mode	Peak Frequency [MHz]	Peak Power Spectral Density Limit [dBm]	Peak Power Spectral Density Reading [dBm]	Array Gain [dB]	Peak Power Spectral Density Level [dBm]	Margin [dB]	Result
1	5177.825	4	-3.7	4.8	1.1	2.9	Passed
2	5206.600	4	-4.1	4.8	0.7	3.3	Passed
3	5242.925	4	-4.6	4.8	0.2	3.8	Passed
4	5178.300	4	-5.5	4.8	-0.7	4.7	Passed
5	5206.800	4	-4.1	4.8	0.7	3.3	Passed
6	5246.800	4	-4.4	4.8	0.4	3.6	Passed
7	5206.950	4	-6.9	4.8	-2.1	6.1	Passed
8	5243.500	4	-7.1	4.8	-2.3	6.3	Passed
Measurement uncertainty			+0.66 dB / -0.72 dB				

5.3.2.3 Antenna Port 3

Ambient temperature	22 °C	Relative humidity	40 %
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The following results were measured at antenna port 3 of the EUT. The plot shows an exemplary measurement result for the worst documented case. The other results are listed in the following table. The array sum for 3 antenna ports is an addition of 4.8 dB.

130254_PeakPwrSpecDens_n20_40.wmf: power-spectral-density (operation mode 5):



Operation Mode	Peak Frequency [MHz]	Peak Power Spectral Density Limit [dBm]	Peak Power Spectral Density Reading [dBm]	Array Gain [dB]	Peak Power Spectral Density Level [dBm]	Margin [dB]	Result
1	5178.200	4	-6.3	4.8	-1.5	5.5	Passed
2	5203.825	4	-4.4	4.8	0.4	3.6	Passed
3	5244.050	4	-6.2	4.8	-1.4	5.4	Passed
4	5178.200	4	-4.7	4.8	0.1	3.9	Passed
5	5206.900	4	-4.4	4.8	0.4	3.6	Passed
6	5244.000	4	-5.3	4.8	-0.5	4.5	Passed
7	5206.950	4	-6.5	4.8	-1.7	5.7	Passed
8	5244.250	4	-8.7	4.8	-3.9	7.9	Passed
Measurement uncertainty			+0.66 dB / -0.72 dB				

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

30

5.4 Peak Excursion

5.4.1 Method of measurement

The relating measurements were carried out in a conducting manner. Therefore, the antenna connector was directly connected to a spectrum analyser. The measurement procedure refers to part G) of document [3].

Testing each modulation mode on a single channel in a single operating band is sufficient to demonstrate compliance with the peak excursion requirement. (If all modulation modes are not available on a single channel in a single band, then testing must be extended to other channels and bands as needed to ensure that all modulation modes are tested.)

Tests must include all variations in signal structure, such as:

- (i) All signal types (e.g., direct sequence spread spectrum (DSSS) and OFDM);
- (ii) All modulation types (e.g., BPSK, QPSK, 16-QAM, 64-QAM, and 256-QAM);
- (iii) All bandwidth modes;
- (iv) All variations in signal parameters (e.g., changes in subcarrier spacing or number of subcarriers).

For a given signal structure, testing of multiple error-correction coding rates is not required (e.g., 1/2, 2/3, and 3/4 rate codes).

For MIMO devices, testing of a single output port is sufficient to demonstrate compliance with the peak excursion requirement. If a given signal structure can be exercised with various combinations of spatial multiplexing (such as different numbers of spatial streams), beamforming, and cyclic delay diversity, peak excursion tests are not required to include those variations.

Set the spectrum analyser or EMI receiver span to view the entire emission bandwidth.

Find the maximum of the peak-max-hold spectrum.

Set RBW = 1 MHz.

VBW \geq 3 MHz.

Detector = peak.

Trace mode = max-hold.

Allow the sweeps to continue until the trace stabilizes.

Use the peak search function to find the peak of the spectrum.

Use the procedure found under 5.3.1 to measure the PPSD. For this measurement the procedure SA-1 was used

Compute the ratio of the maximum of the peak-max-hold spectrum to the PPSD.

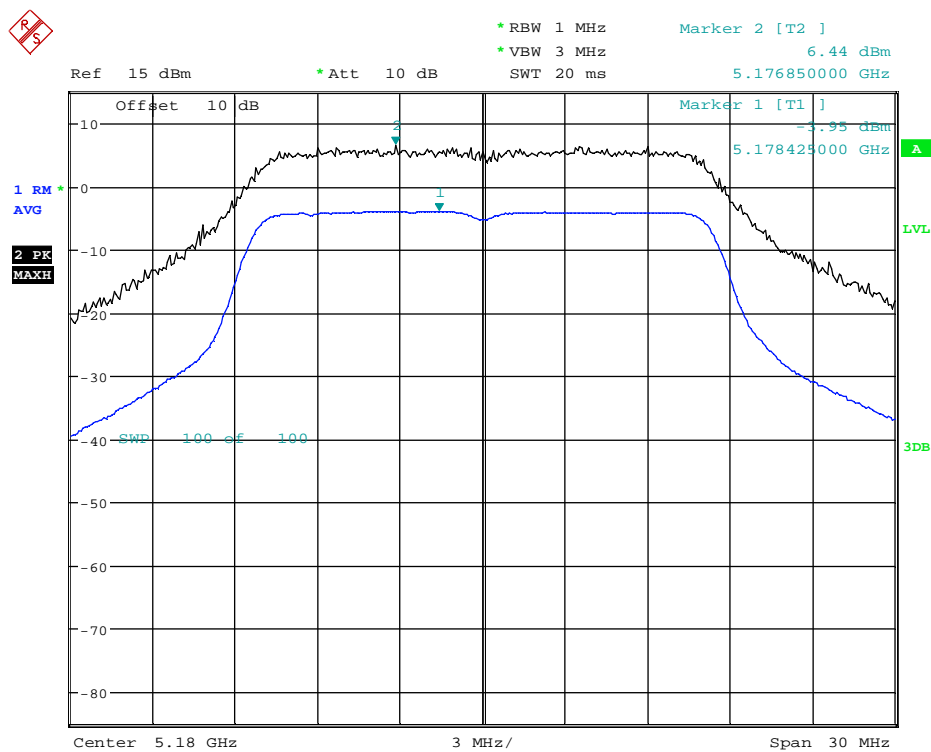
5.4.2 Test result

5.4.2.1 Antenna Port 1

Ambient temperature	22 °C	Relative humidity	60 %
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The following results were measured at antenna port 1 of the EUT. The plot shows an exemplary measurement result for the worst documented case. The other results are listed in the following table.

130254 PeakExc a-64QAM 36.wmf: peak excursion (operation mode 1)



WLAN channel	Signal type	Modulation	Peak Excursion [dB]	Limit [dB]	Margin [dB]	Result
36	a-mode	BPSK	10.8	13	2.2	Passed
36	a-mode	QPSK	10.1	13	2.9	Passed
36	a-mode	16-QAM	10.2	13	2.8	Passed
36	a-mode	64-QAM	10.4	13	2.6	Passed
36	n20	BPSK	10.1	13	2.9	Passed
36	n20	QPSK	10.1	13	2.9	Passed
36	n20	16-QAM	10.4	13	2.6	Passed
36	n20	64-QAM	10.3	13	2.7	Passed
36	n40	BPSK	9.7	13	3.3	Passed
36	n40	QPSK	9.9	13	3.1	Passed
36	n40	16-QAM	10.4	13	2.6	Passed
36	n40	64-QAM	10.3	13	2.7	Passed
Measurement uncertainty			+0.66 dB / -0.72 dB			

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

30

5.5 Frequency Stability

5.5.1 Method of measurement

The EUT is placed in a climatic chamber, which is able to adjust the temperature over the desired temperature range.

After reaching the desired temperature and an after an appropriate acclimatisation time, the EUT is turned on.

The nominal channel frequency is the measurement result with nominal supply power at 20 °C.

Spectrum analyzer settings:

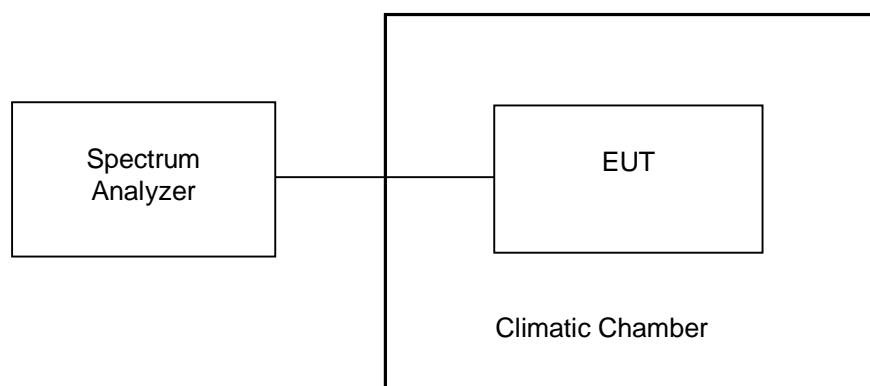
- Attenuation: Auto
- Center Frequency: channel frequency
- Span: 2 MHz
- RWB=VBW: 10 kHz
- Sweep Time: Auto

The frequency stability is testet at the minimum and maximum voltage, which is permitted by the manufacturer.

The frequency stability is testet at the minimum and maximum temperature, which is permitted by the manufacturer. But at least a temperature span from -30 °C – + 50 °C shall be covered.

The temperature is measured in 10 °C steps.

Test set-up:



5.5.2 Test result

The EUT was set to transmit continuously in operation mode 4. The frequency was derived by observing a characteristic dip in the centre of the OFDM signal.

Voltage [V]	Measurement Frequency [MHz]	Frequency Deviation [d] [ppm]	Limit [ppm]	Result
18 V	5180.0465	4.48	20	Passed
24 V	5180.0224	Reference	20	-
32 V	5180.0417	3.73	20	Passed
Measurement uncertainty		+0.66 dB / -0.72 dB		

Temperature [°C]	Measurement Frequency [MHz]	Frequency Deviation [ppm]	Limit [ppm]	Result
-40 °C	5180.0545	6.20	20	Passed
-30 °C	5180.0513	5.58	20	Passed
-20 °C	5180.0882	12.70	20	Passed
-10 °C	5180.0785	10.83	20	Passed
0 °C	5180.0705	9.29	20	Passed
10 °C	5180.0561	6.51	20	Passed
20 °C	5180.0224	Reference	-	-
30 °C	5180.0192	-0.62	20	Passed
40 °C	5180.0112	-2.16	20	Passed
50 °C	5180.0112	-2.16	20	Passed
60 °C	5180.0801	11.14	20	Passed
70 °C	5180.0256	0.62	20	Passed
80 °C	5180.0785	10.8	20	Passed
Measurement uncertainty		+0.66 dB / -0.72 dB		

TEST EQUIPMENT USED FOR THE TEST:

30

5.6 Band-edge compliance

5.6.1 Method of measurement (band edges next to restricted bands (conducted))

The same test set-up as used for the final conducted emission measurement shall be used (refer also subclause 5.7.1 of this test report).

After trace stabilisation the marker shall be set on the signal peak. The frequency line shall be set on the edge of the assigned frequency band. Now 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. The level of the measured field strength shall be compared to the the general limits specified in § 15.205.

The measurement was performed at the lower end of the 5.15 – 5.25 GHz band.

If an emission fails the conducted test, the measurement will be repeated in a radiated manner.

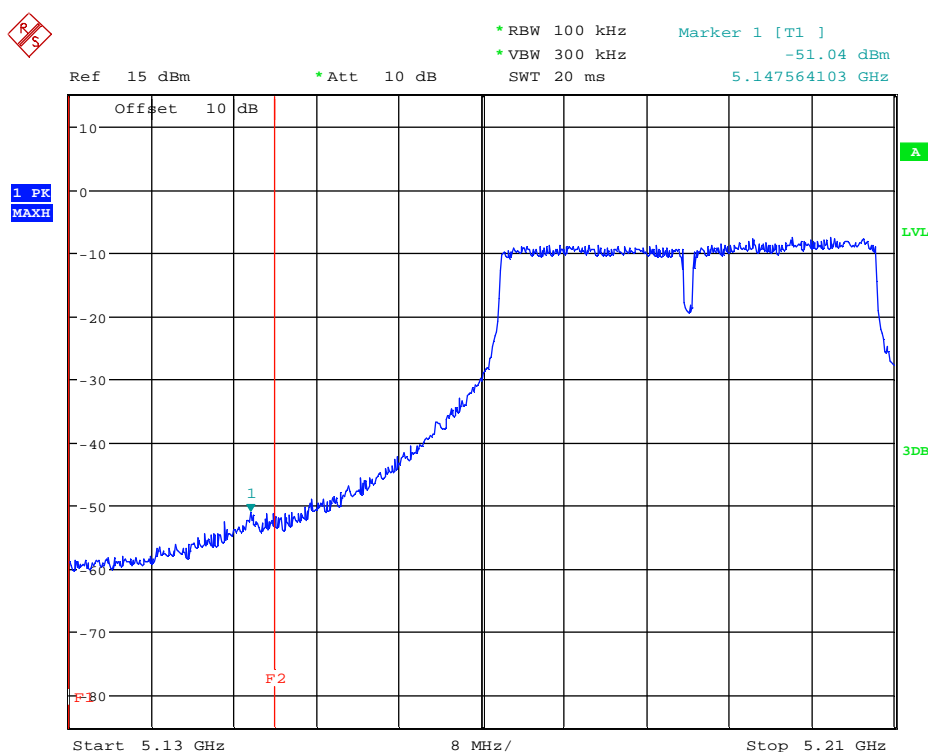
5.6.2 Test result (band edges next to restricted bands (conducted))

5.6.2.1 Antenna port 1

Ambient temperature	22 °C	Relative humidity	60 %
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The plot shows an exemplary measurement result for the worst documented case. The other results are listed in the following table.

130254_BandEdgeRestr_n40_36.wmf: conducted band-edge compliance (operation mode 7):



Band Edge Compliance, a-mode, channel 36 (Operation mode 1)						
Frequency [MHz]	Meas. Result [dBμV/m]	Max Peak Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
5149.802	61.9	74.0	12.1	-48.3	15.0	Passed
Average Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Average Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
5149.877	50.7	54.0	3.3	-59.6	15.0	Passed

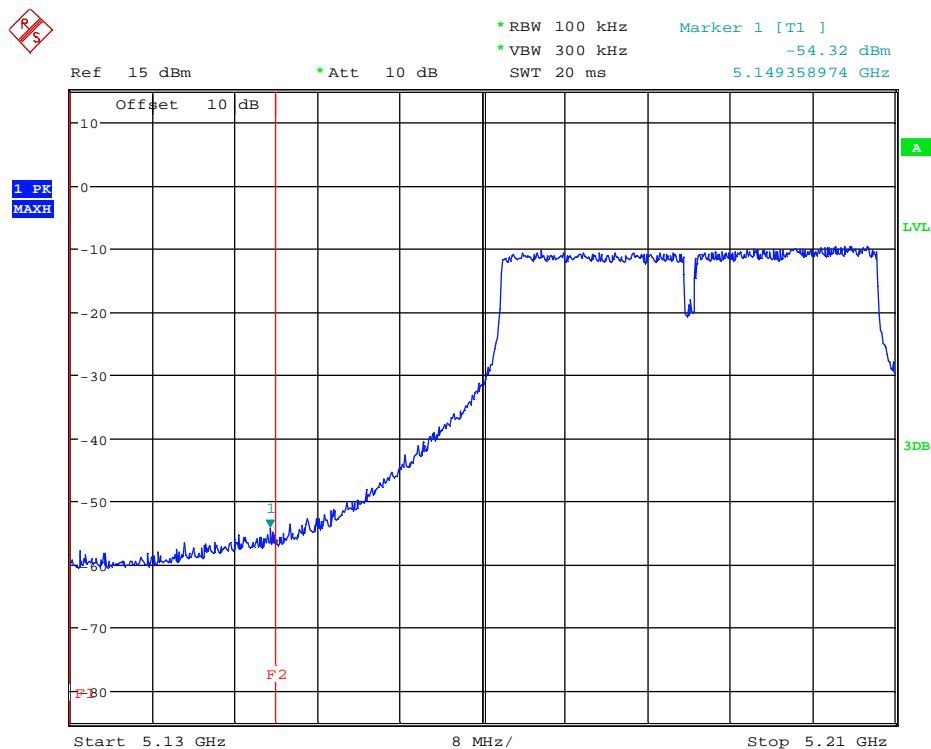
Band Edge Compliance, n20-mode, channel 36 (Operation mode 4)						
Frequency [MHz]	Meas. Result [dBμV/m]	Max Peak Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
5149.767	64.0	74.0	10.0	-46.2	15.0	Passed
Average Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Average Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
5149.917	51.3	54.0	2.7	-58.9	15.0	Passed

5.6.2.1 Antenna port 2

Ambient temperature	22 °C	Relative humidity	60 %
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The plot shows an exemplary measurement result for the worst documented case. The other results are listed in the following table.

130254_BandEdgeRestr_n40_36.wmf: conducted band-edge compliance (operation mode 7):



Band Edge Compliance, a-mode, channel 36 (Operation mode 1)						
Frequency [MHz]	Meas. Result [dB μ V/m]	Max Peak Limit [dB μ V/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
5149.065	62.4	74.0	11.6	-47.9	15.0	Passed
Average Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dB μ V/m]	Average Limit [dB μ V/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
5149.965	49.9	54.0	4.1	-60.3	15.0	Passed

Band Edge Compliance, n20-mode, channel 36 (Operation mode 4)						
Frequency [MHz]	Meas. Result [dB μ V/m]	Max Peak Limit [dB μ V/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
5141.756	61.7	74.0	12.3	-48.6	15.0	Passed
Average Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dB μ V/m]	Average Limit [dB μ V/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
5149.931	50.0	54.0	4.0	-60.2	15.0	Passed

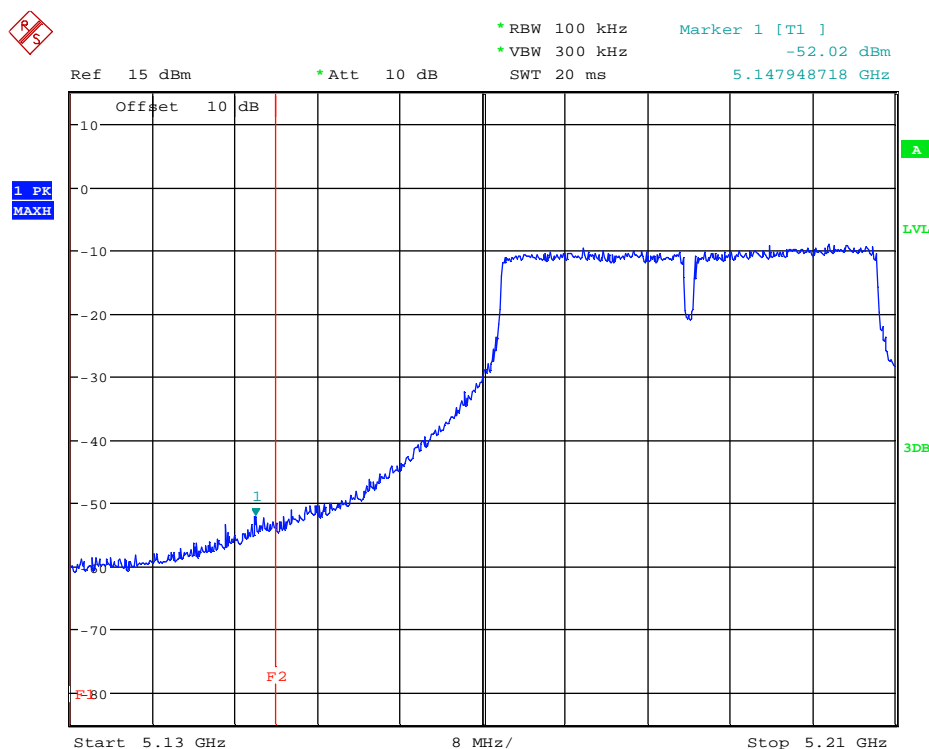
Band Edge Compliance, n40-mode, channel 36 (Operation mode 7)						
Frequency [MHz]	Meas. Result [dB μ V/m]	Max Peak Limit [dB μ V/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
5144.859	70.9	74.0	3.1	-39.4	15.0	Passed
Average Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dB μ V/m]	Average Limit [dB μ V/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
5149.959	54.0	54.0	0.0	-56.3	15.0	Passed

5.6.2.1 Antenna port 3

Ambient temperature	22 °C	Relative humidity	60 %
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The plot shows an exemplary measurement result for the worst documented case. The other results are listed in the following table.

130254 BandEdgeRestr n40 36.wmf: conducted band-edge compliance (operation mode 7):



Band Edge Compliance, a-mode, channel 36 (Operation mode 1)						
Frequency [MHz]	Meas. Result [dBμV/m]	Max Peak Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
5149.519	61.4	74.0	12.6	-48.9	15.0	Passed
Average Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Average Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
5147.494	49.5	54.0	4.5	-60.7	15.0	Passed

Band Edge Compliance, n20-mode, channel 36 (Operation mode 4)						
Frequency [MHz]	Meas. Result [dBμV/m]	Max Peak Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
5149.850	62.8	74.0	11.2	-47.5	15.0	Passed
Average Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Average Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
5147.825	50.3	54.0	3.7	-60.0	15.0	Passed

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

30

5.6.3 Method of measurement (band edges next to unrestricted bands (radiated))

The same test set-up as used for the final radiated emission measurement shall be used (refer also subclause 5.7.4 of this test report).

The preliminary measurements are performed using the following settings:

- 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 authorized band of operation.
- Resolution bandwidth: = 100 kHz
- Video bandwidth: = 100 kHz
- Sweep: Auto.
- Detector function: Peak.
- Trace mode: Max hold.

After trace stabilisation the marker shall be set on the signal peak. The frequency line shall be set on the edge of the assigned frequency band. Now 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 5.7.4 of this test report. The level of the measured field strength shall be compared to the the general limits specified in § 15.205.

The measurement was performed at the lower end of the 5.15 – 5.25 GHz band.

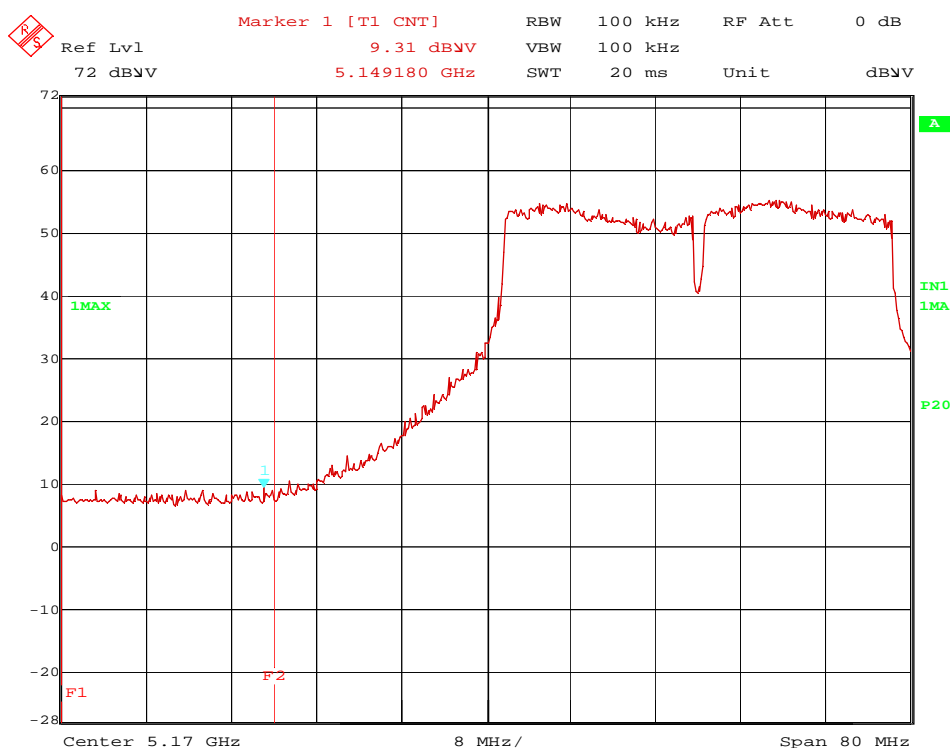
If an emission fails the conducted test, the measurement will be repeated in a radiated manner.

5.6.4 Test result (band edges next to restricted bands (radiated))

5.6.4.1 BAT-ANT-RSMA-2AGNR

Ambient temperature	22 °C	Relative humidity	54 %
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130254_Ant1_BandEdge_ch36_n40-mode.wmf: Radiated band-edge compliance (operation mode 8):



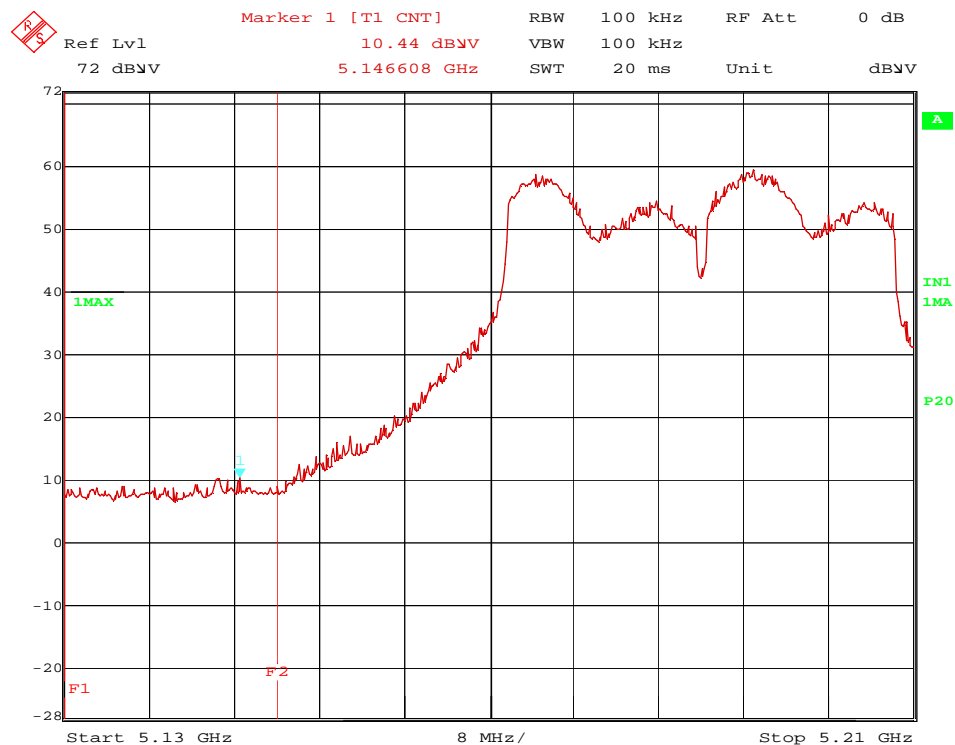
Band-edge compliance (lower band edge. Mode 8)											
Result measured with the peak detector:											
Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Reading dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turnt. Angle	Pos.
5149.2	58.27	74.00	15.73	19.18	33.49	0.00	5.60	150	Vert.	90.00	1
Result measured with the average detector:											
Frequency GHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Reading dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turnt. Angle	Pos.
5149.2	44.59	54.00	9.41	5.50	33.49	0.00	5.60	150	Vert.	337.00	1
Measurement uncertainty							+2.2 dB / -3.6 dB				

5.6.4.2 BAT-ANT-N-MiMoDB-5N-IP65

Ambient temperature	21 °C	Relative humidity	67 %
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The plot shows an exemplary measurement result for the worst documented case. The other results are listed in the following table.

130254 Ant3 BandEdge ch36 n40-mode.wmf: Radiated band-edge compliance (operation mode 8):



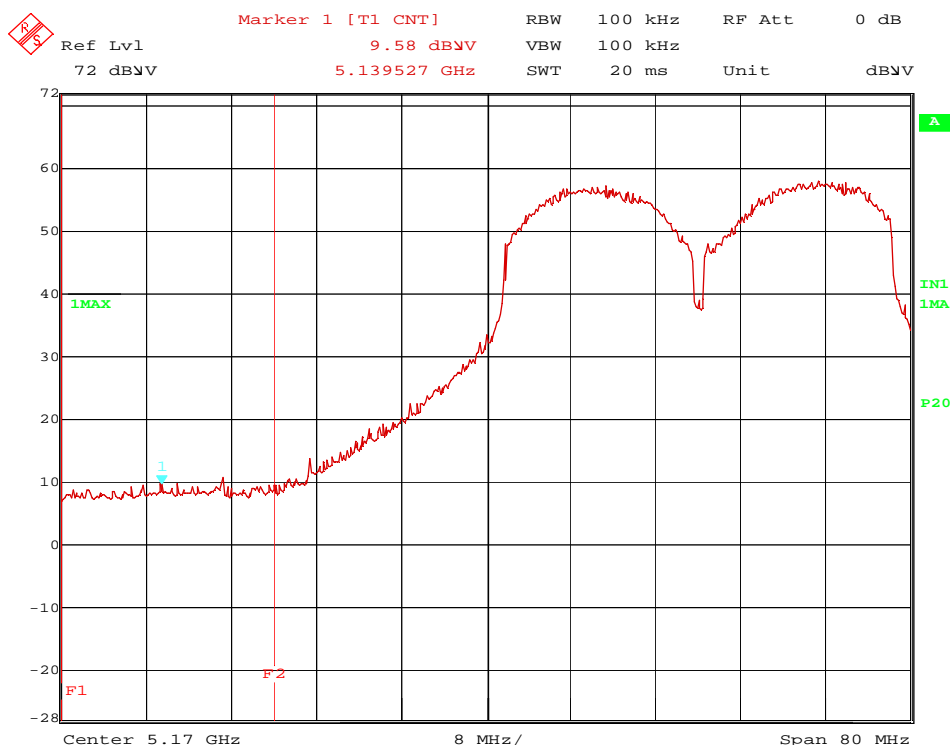
Band-edge compliance (lower band edge. Mode 8)											
Result measured with the peak detector:											
Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Reading dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turnt. Angle	Pos.
5146.6	60.06	74.00	13.94	20.97	33.49	0.00	5.60	150	Hor.	58	1
Result measured with the average detector:											
Frequency GHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Reading dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turnt. Angle	Pos.
5146.6	46.07	54.00	7.93	6.98	33.49	0.00	5.60	150	Hor.	49	1
Measurement uncertainty							+2.2 dB / -3.6 dB				

5.6.4.3 BAT-ANT-N-9A-DS-IP65

Ambient temperature	21 °C	Relative humidity	67 %
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The plot shows an exemplary measurement result for the worst documented case. The other results are listed in the following table.

130254 Ant4 BandEdge ch36 n40-mode.wmf: Radiated band-edge compliance (operation mode 8):



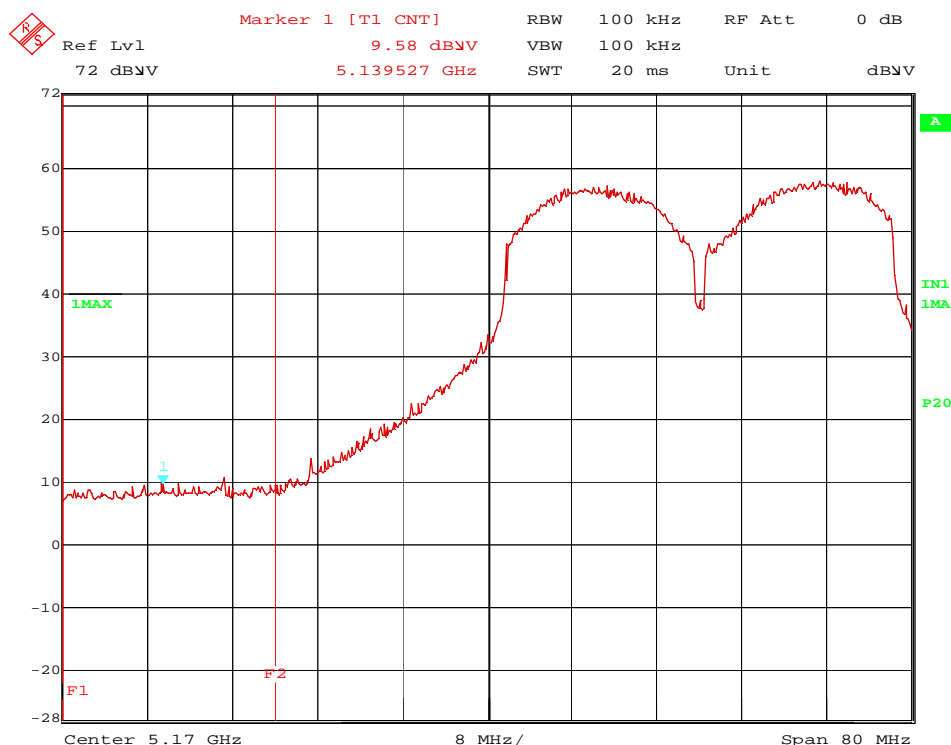
Band-edge compliance (lower band edge. Mode 8)											
Result measured with the peak detector:											
Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Reading dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turnt. Angle	Pos.
5139.50	59.59	74.00	14.41	20.50	33.49	0.00	5.60	150	Vert.	337	1
Result measured with the average detector:											
Frequency GHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Reading dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turnt. Angle	Pos.
5139.50	45.00	54.00	9.00	5.91	33.49	0.00	5.60	150	Vert.	356	1
Measurement uncertainty							+2.2 dB / -3.6 dB				

5.6.4.4 BAT-ANT-N-3AGN-F

Ambient temperature	21 °C	Relative humidity	67 %
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The plot shows an exemplary measurement result for the worst documented case. The other results are listed in the following table.

130254 Ant4 BandEdge ch36 n40-mode.wmf: Radiated band-edge compliance (operation mode 8):



Band-edge compliance (lower band edge. Mode 8)											
Result measured with the peak detector:											
Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Reading dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turnt. Angle	Pos.
5148.5	58.72	74.00	15.28	19.63	33.49	0.00	5.60	150	Vert.	348	1
Result measured with the average detector:											
Frequency GHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Reading dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turnt. Angle	Pos.
5148.5	44.20	54.00	9.80	5.11	33.49	0.00	5.60	150	Vert.	325	1
Measurement uncertainty							+2.2 dB / -3.6 dB				

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:
29, 31 – 37, 39 - 44, 46, 49 – 51, 55, 72, 73

5.7 Maximum unwanted emissions

5.7.1 Method of measurement (conducted emissions in the restricted bands)

The relating measurements were carried out in a conducting manner. Therefore, the antenna connector was directly mounted to a spectrum analyser. The measurement procedure refers to part H in [3].

If emissions were detected during the preliminary measurements, they were measured using the following measurement procedures:

Procedure for average measurement: H)6) – Trace averaging with continuous EUT transmission at full power:

The following method is valid if the EUT transmits continuously (duty cycle $\geq 98\%$)

- Set the RBW = 1 MHz.
- Set the VBW $\geq 3 \times$ RBW.
- Detector = power average (RMS).
- Ensure that the number of measurement points in the sweep to $\geq 2 \times$ (span/RBW).
- Averaging type = power (i.e., RMS)
- Sweep time = auto
- Perform a trace average of at least 100 traces

Peak measurement procedure: H5

- Set the analyzer span to encompass the entire unwanted emission bandwidth.
- Set the RBW = specified in Table 3.
- Set the VBW \geq RBW.
- Set sweep time = auto.
- Detector = peak.
- Trace mode = max hold.
- Allow the trace to stabilize.
- Use the peak marker function to determine the peak power over the emission bandwidth.

Table 3 RBW as a function of frequency

Frequency	RBW
9-150 kHz	200-300 Hz
0.15-30 MHz	9-10 kHz
30-1000 MHz	100-120 kHz
> 1000 MHz	1 MHz

The measurements were carried out at each antenna port.

If an emission fails the conducted test, the measurement will be repeated in a radiated manner.

5.7.1.1 Limit calculations

The following general procedure is described in chapter H)1)d) of [3].

- Measure the conducted output power (in dBm) using the procedures described in 5.7.1.
- Add the maximum transmit antenna gain (in dBi) to the measured output power level to determine the EIRP level
- Add the appropriate maximum ground reflections factor to the EIRP level (6 dB for frequencies \leq , 30 MHz, 4.7 for frequencies between 30 MHz and 1000 MHz, inclusive and 0 dB for frequencies $>$ 1000 MHz)
- For devices with multiple antenna ports, measure the power of each individual chain and sum the EIRP of all chains in linear terms (e.g., Watts, mW)
- Convert the resultant level to an equivalent electric field strength using the following relationships:

$$E. = EIRP - 20 \log(d) + 104.8 \quad (1)$$

Where:

E. = electric field strength, in dB μ V/m

EIRP = equivalent isotropic radiated power, in dBm

d = specified measurement distance, in meters

- Compare the resultant electric field strength to the applicable limit

Document [6] state, that for transmitters with multiple outputs in the same band, summing of emissions and accounting for array gain have to be considered.

For combining emissions from multiple outputs, the spurious emissions at each output have to be measured and $10 \log(N)$ has to be added to the resulting value, whereby N refers to the number of outputs.

To account for directional gain which might occur in case of N transmit antennas, the directional gain has to be calculated as

$$G_{Dir} = G_{Ant} + 10 \log(N) dBi ,$$

whereby N is the number of antennas.

For the actual EUT the highest combination of antenna gain and used number of ports results in an additional value, added to the conducted spurious emission level, of 15 dB. Whereby the antenna has a gain of 5.5 dBi and the number of used ports is 3.

5.7.2 Method of measurement (conducted emissions in the unrestricted bands)

The measurement was performed as described in H)2) in document [3].

5.7.2.1 Emission level measurement

- a) Set the center frequency and span to encompass frequency range to be measured.
- b) RBW = 1 MHz.
- c) VBW \geq 3 MHz.
- d) Detector = Peak.
- e) Sweep time = auto.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use the peak marker function to determine the maximum amplitude level.

The limit of -27 dBm/MHz was specified in 15.407 (b) (1)

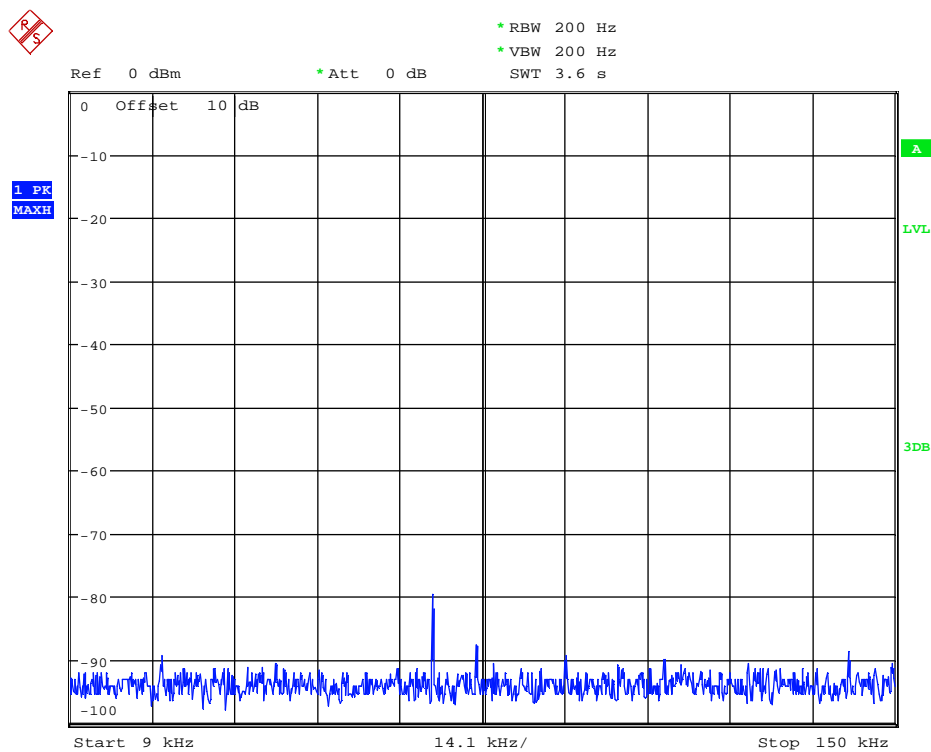
5.7.3 Test results (conducted emissions)

5.7.3.1 Emissions below 1 GHz

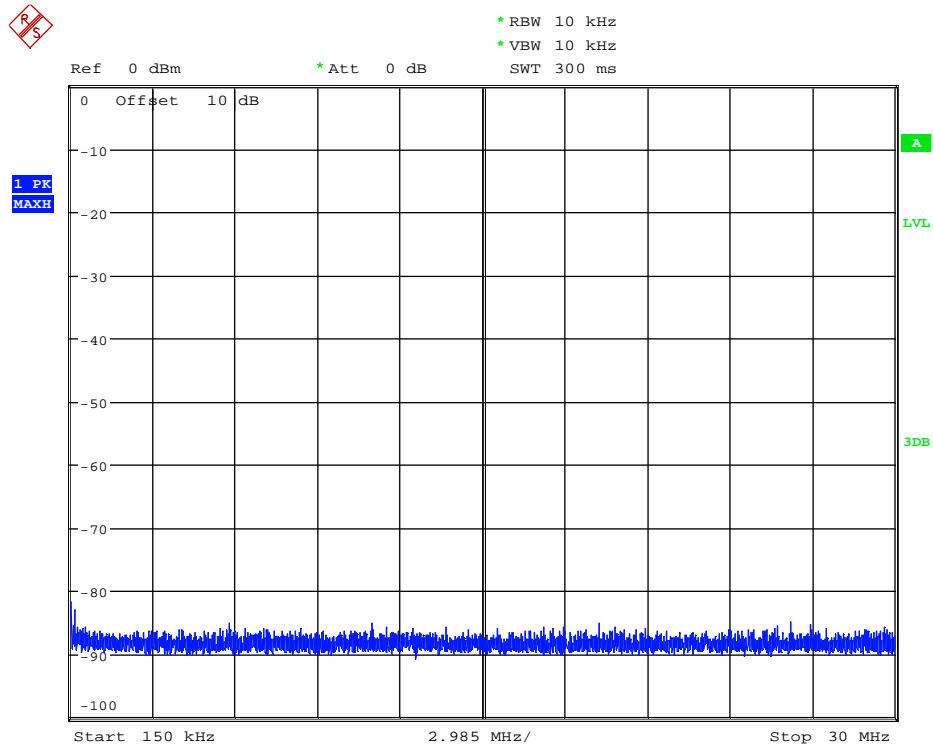
Ambient temperature	22 °C	Relative humidity	59 %
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The Emissions below 1 GHz were equal for all antenna ports, modulations and data rates. Therefore only the results of an exemplary test case are submitted below.

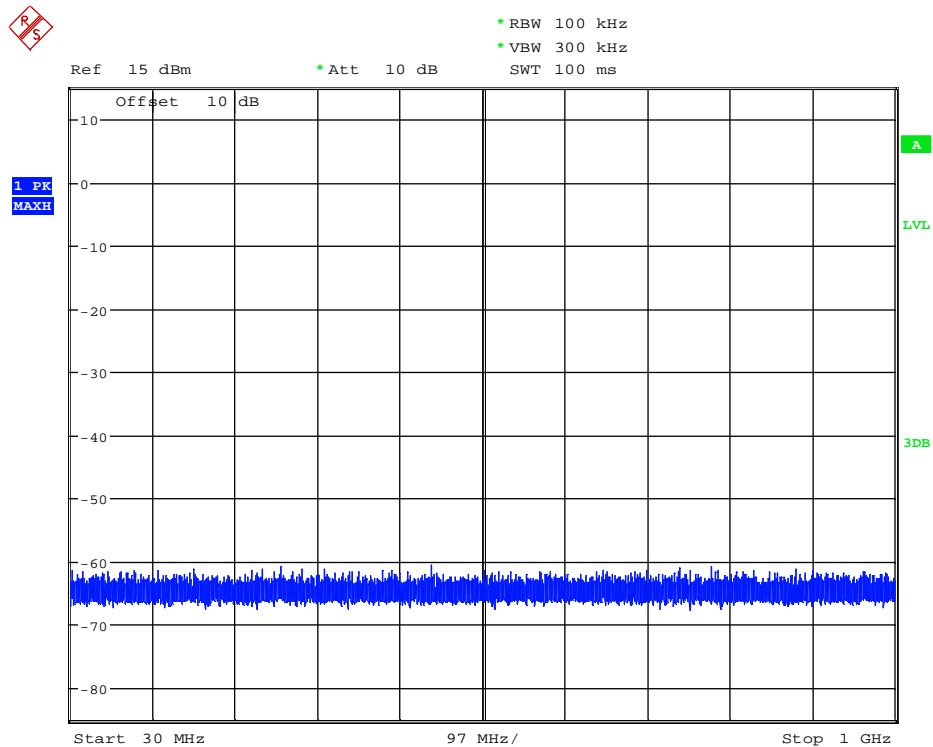
130254_SpurEmiss9-150k_b_1.wmf: conducted spurious emissions (operation mode 1):



130254_SpurEmiss150k-30M_b_1.wmf: conducted spurious emissions (operation mode 1):



130254_SpurEmiss0.03-1G_b_1.wmf: conducted spurious emissions (operation mode 1):



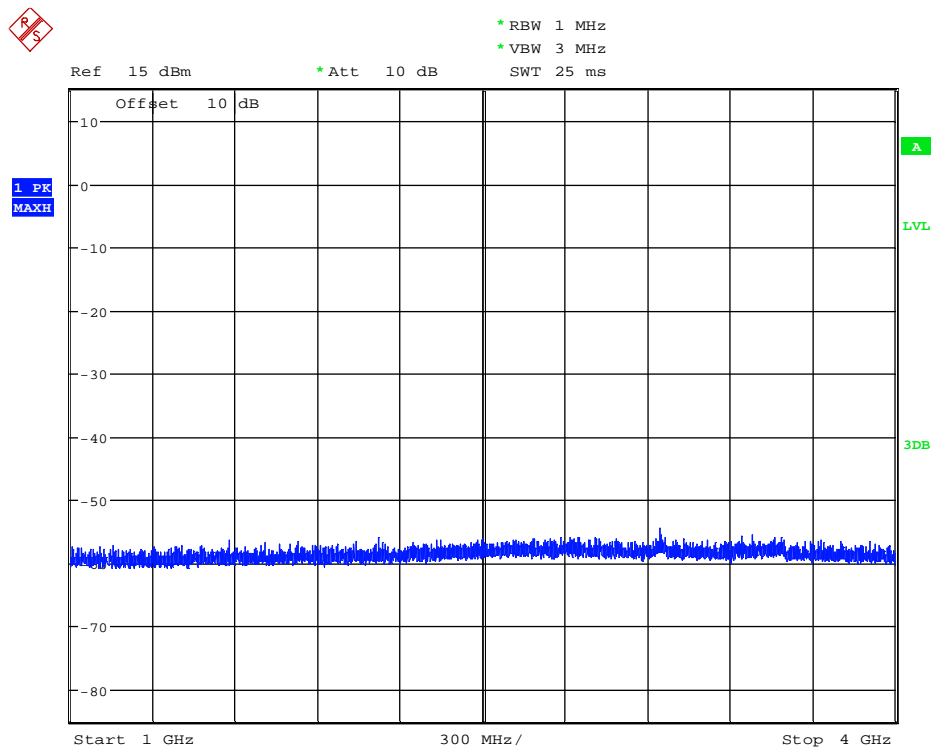
Spurious Emissions f < 1 GHz						
Peak Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Max Peak Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
0.071	6.52	30.59	24.07	-69.74	15.0	Passed
0.078	0.44	29.72	29.28	-75.82	15.0	Passed
0.142	-0.87	24.56	25.43	-77.13	15.0	Passed

5.7.3.2 Antenna port 1

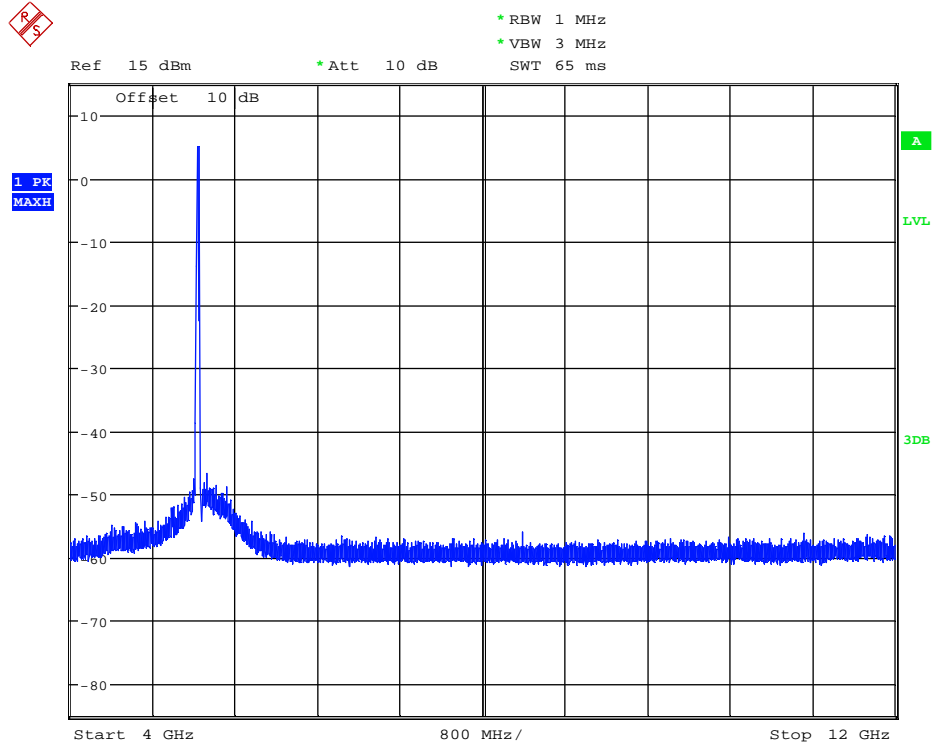
Ambient temperature	22 °C	Relative humidity	60 %
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The following results were measured at antenna port 1 of the EUT. The plots shows exemplary measurement results for the worst documented case. The other results are listed in the following table.

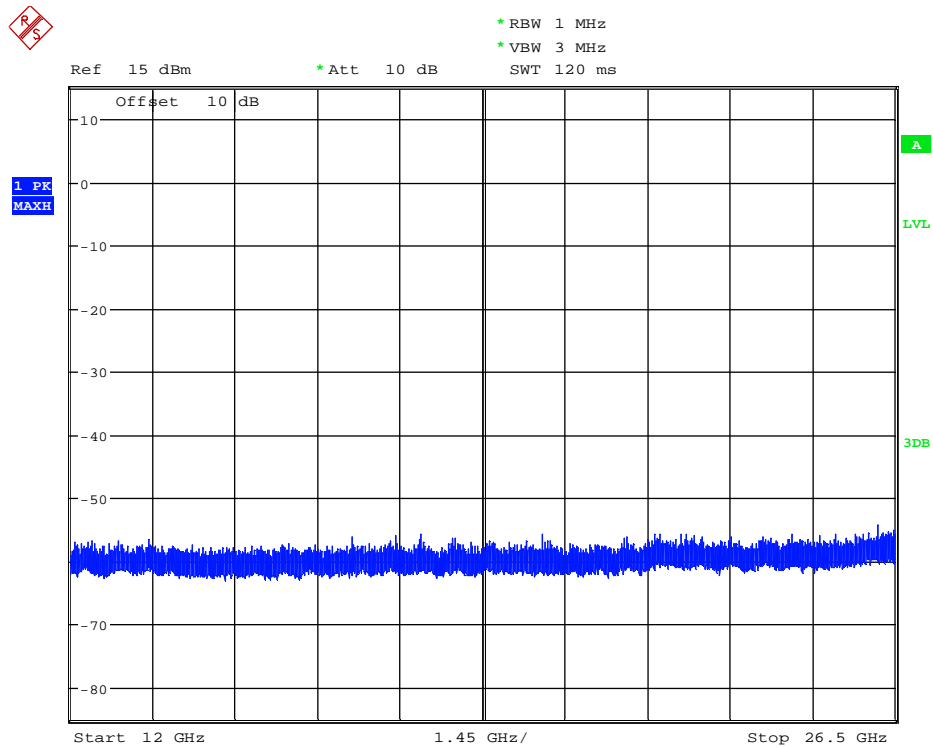
130254 SpurEmiss1-4G a 48.wmf: conducted spurious emissions (operation mode 3):



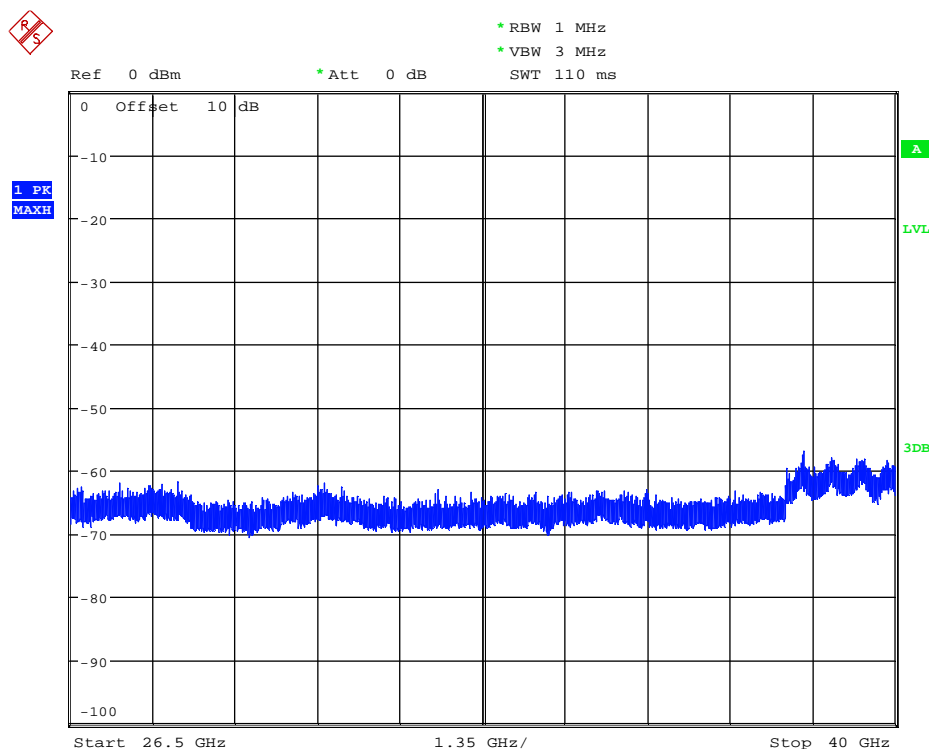
130254_SpurEmiss4-12G_a_48.wmf: conducted spurious emissions (operation mode 3):



130254_SpurEmiss12-26,5G_a_48.wmf: conducted spurious emissions (operation mode 3):



130254 SpurEmiss26.5-40G a 48.wmf: conducted spurious emissions (operation mode 3):



Spurious Emissions, a-mode, channel 36 (Operation mode 1)						
Peak Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Max Peak Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4720.000	57.8	74.0	16.2	-52.5	15.0	Passed
4959.775	58.8	74.0	15.2	-51.4	15.0	Passed
4987.025	60.0	74.0	14.0	-50.3	15.0	Passed
5040.300	59.6	74.0	14.4	-50.6	15.0	Passed
5080.125	61.6	74.0	12.4	-48.7	15.0	Passed
Average Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Average Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4719.950	48.6	54.0	5.4	-61.6	15.0	Passed
4960.025	49.4	54.0	4.6	-60.8	15.0	Passed
4994.650	46.9	54.0	7.1	-63.4	15.0	Passed
5039.975	50.2	54.0	3.8	-60.0	15.0	Passed
5079.950	52.0	54.0	2.0	-58.3	15.0	Passed
Emissions in the non-restricted Bands						
Frequency [MHz]	Meas. Result [dBm/MHz]	Limit [dBm/MHz]	Margin [dB]	Result		
5480.050	-53.4	-27.0	26.4	Passed		
5520.000	-54.3	-27.0	27.3	Passed		
5560.025	-55.8	-27.0	28.8	Passed		

Spurious Emissions, a-mode, channel 40 (Operation mode 2)						
Peak Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Max Peak Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
3989.675	54.4	74.0	19.6	-55.9	15.0	Passed
4077.800	54.7	74.0	19.3	-55.5	15.0	Passed
4719.700	58.1	74.0	15.9	-52.2	15.0	Passed
4960.400	59.0	74.0	15.0	-51.3	15.0	Passed
4999.950	61.2	74.0	12.8	-49.1	15.0	Passed
5068.750	60.0	74.0	14.0	-50.3	15.0	Passed
5080.075	61.6	74.0	12.4	-48.7	15.0	Passed
5360.325	64.0	74.0	10.0	-46.3	15.0	Passed
Average Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Average Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
3989.050	43.3	54.0	10.7	-67.0	15.0	Passed
4079.850	44.0	54.0	10.0	-66.2	15.0	Passed
4720.025	48.8	54.0	5.2	-61.5	15.0	Passed
4960.000	49.0	54.0	5.0	-61.2	15.0	Passed
5000.025	49.8	54.0	4.2	-60.5	15.0	Passed
5071.825	48.1	54.0	5.9	-62.2	15.0	Passed
5080.025	52.5	54.0	1.5	-57.8	15.0	Passed
5359.975	53.1	54.0	0.9	-57.2	15.0	Passed
Emissions in the non-restricted Bands						
Frequency [MHz]	Meas. Result [dBm/MHz]	Limit [dBm/MHz]	Margin [dB]	Result		
4400.000	-57.5	-27.0	30.5	Passed		
5480.000	-54.1	-27.0	27.1	Passed		
5520.025	-53.7	-27.0	26.7	Passed		
5640.000	-58.4	-27.0	31.4	Passed		

Spurious Emissions, a-mode, channel 48 (Operation mode 3)						
Peak Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Max Peak Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4400.000	56.4	74.0	17.6	-53.9	15.0	Passed
4640.100	57.3	74.0	16.7	-52.9	15.0	Passed
4720.100	58.4	74.0	15.6	-51.8	15.0	Passed
4799.925	58.0	74.0	16.0	-52.2	15.0	Passed
4960.000	59.2	74.0	14.8	-51.0	15.0	Passed
4999.675	60.4	74.0	13.6	-49.9	15.0	Passed
5079.975	61.8	74.0	12.2	-48.5	15.0	Passed
5120.875	61.3	74.0	12.7	-48.9	15.0	Passed
5360.350	64.1	74.0	9.9	-46.2	15.0	Passed
Average Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Average Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4399.925	47.1	54.0	6.9	-63.2	15.0	Passed
4640.025	47.9	54.0	6.1	-62.4	15.0	Passed
4720.000	48.6	54.0	5.4	-61.7	15.0	Passed
4800.025	46.8	54.0	7.2	-63.5	15.0	Passed
4959.950	48.9	54.0	5.1	-61.4	15.0	Passed
4999.975	49.5	54.0	4.5	-60.7	15.0	Passed
5080.000	52.3	54.0	1.7	-58.0	15.0	Passed
5119.925	49.9	54.0	4.1	-60.4	15.0	Passed
5359.975	53.4	54.0	0.6	-56.9	15.0	Passed
Emissions in the non-restricted Bands						
Frequency [MHz]	Meas. Result [dBm/MHz]	Limit [dBm/MHz]	Margin [dB]	Result		
3593.600	-60.4	-27.0	33.4	Passed		
4480.025	-58.0	-27.0	31.0	Passed		
5480.050	-54.2	-27.0	27.2	Passed		
5520.025	-52.3	-27.0	25.3	Passed		
5560.025	-56.8	-27.0	29.8	Passed		

Spurious Emissions, n20-mode, channel 36 (Operation mode 4)						
Peak Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Max Peak Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4719.650	58.2	74.0	15.8	-52.0	15.0	Passed
4909.975	57.2	74.0	16.8	-53.0	15.0	Passed
4959.875	58.8	74.0	15.2	-51.5	15.0	Passed
5000.200	60.4	74.0	13.6	-49.9	15.0	Passed
5080.450	61.3	74.0	12.7	-49.0	15.0	Passed
5360.600	64.0	74.0	10.0	-46.3	15.0	Passed
5440.025	62.6	74.0	11.4	-47.6	15.0	Passed
Average Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Average Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4720.000	48.7	54.0	5.3	-61.5	15.0	Passed
4907.150	45.7	54.0	8.3	-64.6	15.0	Passed
4959.925	48.8	54.0	5.2	-61.5	15.0	Passed
4999.900	49.6	54.0	4.4	-60.6	15.0	Passed
5080.025	52.2	54.0	1.8	-58.1	15.0	Passed
5359.925	52.9	54.0	1.1	-57.4	15.0	Passed
5440.025	51.8	54.0	2.2	-58.5	15.0	Passed
Emissions in the non-restricted Bands						
Frequency [MHz]	Meas. Result [dBm/MHz]	Limit [dBm/MHz]	Margin [dB]	Result		
5480.000	-55.1	-27.0	28.1	Passed		
5520.000	-54.1	-27.0	27.1	Passed		
5560.000	-57.2	-27.0	30.2	Passed		
5600.050	-57.9	-27.0	30.9	Passed		

Spurious Emissions, n20-mode, channel 40 (Operation mode 5)						
Peak Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Max Peak Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4287.925	55.5	74.0	18.5	-54.7	15.0	Passed
4720.375	58.3	74.0	15.7	-51.9	15.0	Passed
4999.725	60.2	74.0	13.8	-50.1	15.0	Passed
5040.225	59.7	74.0	14.3	-50.6	15.0	Passed
5073.300	60.3	74.0	13.7	-50.0	15.0	Passed
5080.150	61.8	74.0	12.2	-48.5	15.0	Passed
5360.350	64.0	74.0	10.0	-46.3	15.0	Passed
Average Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Average Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4294.675	43.8	54.0	10.2	-66.5	15.0	Passed
4720.000	48.7	54.0	5.3	-61.6	15.0	Passed
4999.975	50.0	54.0	4.0	-60.3	15.0	Passed
5039.975	48.5	54.0	5.5	-61.7	15.0	Passed
5073.750	48.3	54.0	5.7	-62.0	15.0	Passed
5080.025	52.4	54.0	1.6	-57.9	15.0	Passed
5360.000	53.3	54.0	0.7	-57.0	15.0	Passed
Emissions in the non-restricted Bands						
Frequency [MHz]	Meas. Result [dBm/MHz]	Limit [dBm/MHz]	Margin [dB]	Result		
4400.000	-58.5	-27.0	31.5	Passed		
4480.025	-57.5	-27.0	30.5	Passed		
5480.000	-54.8	-27.0	27.8	Passed		
5520.025	-53.0	-27.0	26.0	Passed		
5600.000	-56.7	-27.0	29.7	Passed		

Spurious Emissions, n20-mode, channel 48 (Operation mode 6)						
Peak Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Max Peak Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4399.950	56.4	74.0	17.6	-53.8	15.0	Passed
4639.675	57.9	74.0	16.1	-52.3	15.0	Passed
4719.925	57.7	74.0	16.3	-52.5	15.0	Passed
4960.075	58.6	74.0	15.4	-51.6	15.0	Passed
4999.875	60.1	74.0	13.9	-50.1	15.0	Passed
5079.650	61.3	74.0	12.7	-49.0	15.0	Passed
5360.075	63.4	74.0	10.6	-46.8	15.0	Passed
Average Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Average Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4399.950	47.1	54.0	6.9	-63.2	15.0	Passed
4639.975	47.9	54.0	6.1	-62.3	15.0	Passed
4720.000	48.6	54.0	5.4	-61.7	15.0	Passed
4959.975	48.8	54.0	5.2	-61.4	15.0	Passed
4999.925	49.8	54.0	4.2	-60.5	15.0	Passed
5080.000	52.3	54.0	1.7	-57.9	15.0	Passed
5360.025	53.4	54.0	0.6	-56.9	15.0	Passed
Emissions in the non-restricted Bands						
Frequency [MHz]	Meas. Result [dBm/MHz]	Limit [dBm/MHz]	Margin [dB]	Result		
5479.975	-54.3	-27.0	27.3	Passed		
5520.000	-52.6	-27.0	25.6	Passed		

Spurious Emissions, n40-mode, channel 36 (Operation mode 7)						
Peak Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Max Peak Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4640.350	57.7	74.0	16.3	-52.5	15.0	Passed
4720.000	58.6	74.0	15.4	-51.7	15.0	Passed
4959.900	58.5	74.0	15.5	-51.7	15.0	Passed
5000.075	61.1	74.0	12.9	-49.2	15.0	Passed
5080.100	61.7	74.0	12.3	-48.6	15.0	Passed
5359.875	63.8	74.0	10.2	-46.5	15.0	Passed
Average Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Average Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4639.925	47.8	54.0	6.2	-62.4	15.0	Passed
4720.000	48.7	54.0	5.3	-61.5	15.0	Passed
4960.000	48.7	54.0	5.3	-61.5	15.0	Passed
4999.975	50.0	54.0	4.0	-60.3	15.0	Passed
5080.000	52.4	54.0	1.6	-57.9	15.0	Passed
5359.950	53.3	54.0	0.7	-56.9	15.0	Passed
Emissions in the non-restricted Bands						
Frequency [MHz]	Meas. Result [dBm/MHz]	Limit [dBm/MHz]	Margin [dB]	Result		
4400.000	-57.6	-27.0	30.6	Passed		
4480.025	-57.6	-27.0	30.6	Passed		
5480.000	-55.2	-27.0	28.2	Passed		
5520.000	-53.4	-27.0	26.4	Passed		

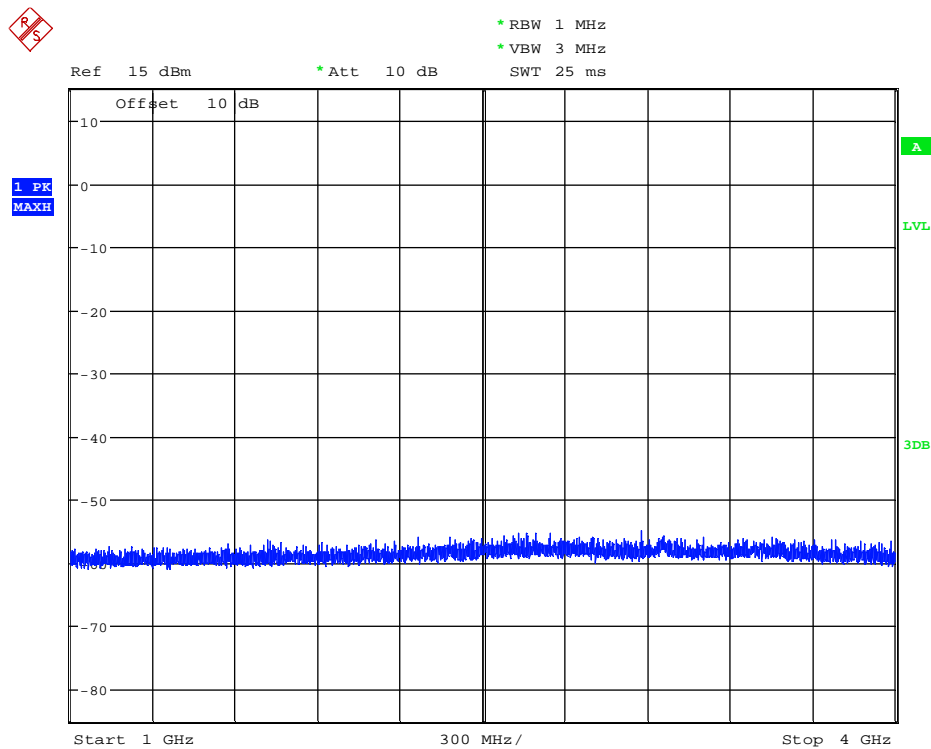
Spurious Emissions, n40-mode, channel 48 (Operation mode 8)						
Peak Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Max Peak Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4400.000	56.8	74.0	17.2	-53.5	15.0	Passed
4720.025	58.1	74.0	15.9	-52.1	15.0	Passed
4999.800	61.0	74.0	13.0	-49.2	15.0	Passed
5040.050	59.0	74.0	15.0	-51.3	15.0	Passed
5080.250	61.6	74.0	12.4	-48.7	15.0	Passed
5360.000	63.9	74.0	10.1	-46.3	15.0	Passed
Average Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Average Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4399.925	47.4	54.0	6.6	-62.8	15.0	Passed
4719.950	48.6	54.0	5.4	-61.7	15.0	Passed
4999.975	49.7	54.0	4.3	-60.5	15.0	Passed
5040.025	48.5	54.0	5.5	-61.8	15.0	Passed
5080.000	52.3	54.0	1.7	-58.0	15.0	Passed
5359.975	53.6	54.0	0.4	-56.6	15.0	Passed
Emissions in the non-restricted Bands						
Frequency [MHz]	Meas. Result [dBm/MHz]	Limit [dBm/MHz]	Margin [dB]	Result		
3049.600	-60.1	-27.0	33.1	Passed		
5480.000	-54.2	-27.0	27.2	Passed		
5520.000	-52.6	-27.0	25.6	Passed		
5600.025	-56.4	-27.0	29.4	Passed		

5.7.3.3 Antenna port 2

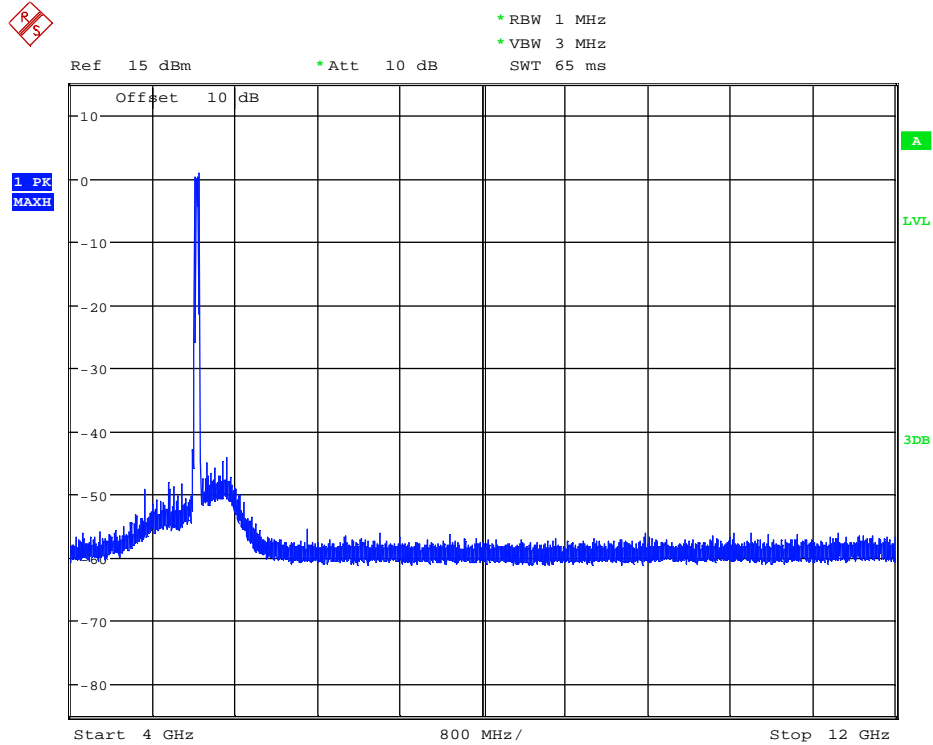
Ambient temperature	22 °C	Relative humidity	60 %
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The following results were measured at antenna port 2 of the EUT. The plots shows exemplary measurement results for the worst documented case. The other results are listed in the following table.

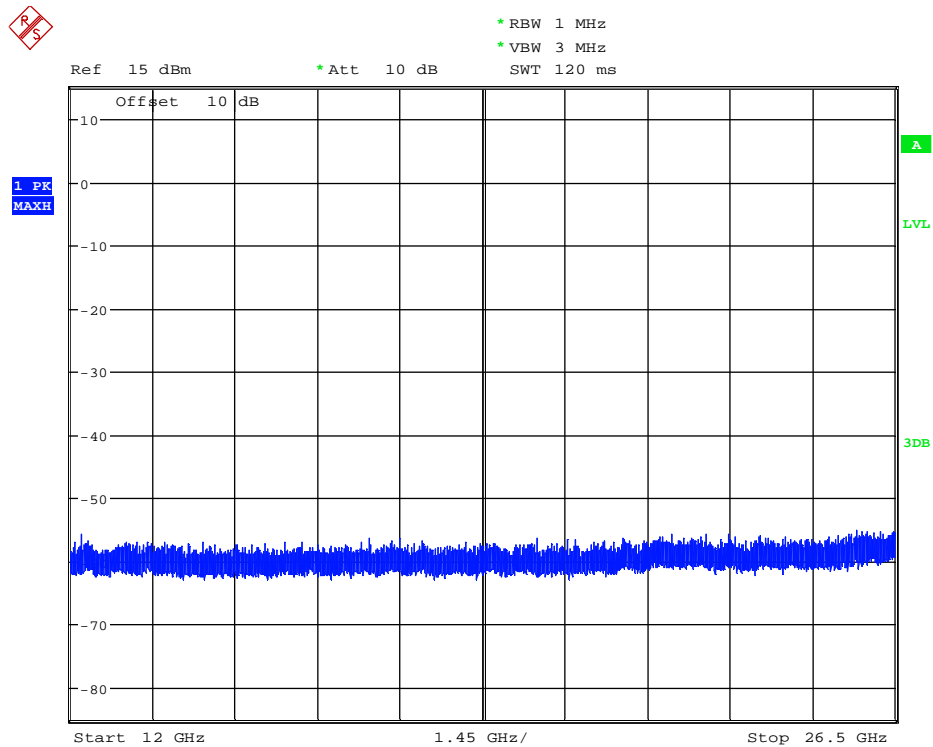
130254 SpurEmiss1-4G n40 48.wmf: conducted spurious emissions (operation mode 8):



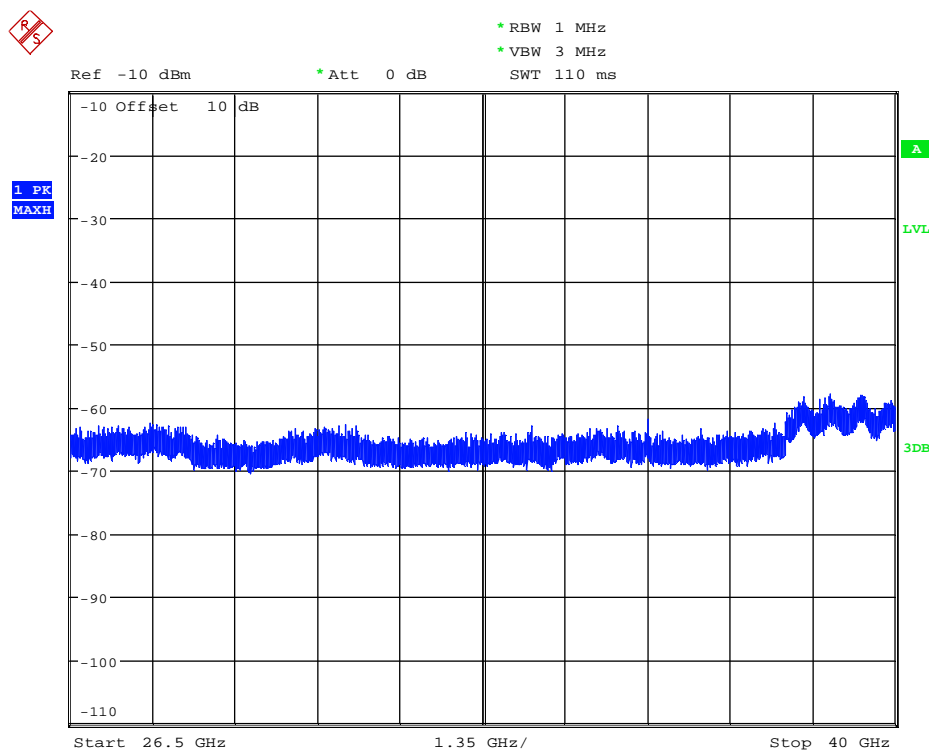
130254_SpurEmiss4-12G_n40_48.wmf: conducted spurious emissions (operation mode 8):



130254_SpurEmiss12-26,5G_n40_48.wmf: conducted spurious emissions (operation mode 8):



130254 SpurEmiss26.5-40G n40 48.wmf: conducted spurious emissions (operation mode 8):



Spurious Emissions, a-mode, channel 36 (Operation mode 1)						
Peak Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Max Peak Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4839.925	61.2	74.0	12.8	-49.0	15.0	Passed
4879.775	60.6	74.0	13.4	-49.6	15.0	Passed
Average Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Average Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4839.925	53.2	54.0	0.8	-57.0	15.0	Passed
4880.000	51.6	54.0	2.4	-58.7	15.0	Passed
Emissions in the non-restricted Bands						
Frequency [MHz]	Meas. Result [dBm/MHz]	Limit [dBm/MHz]	Margin [dB]	Result		
5480.050	-46.0	-27.0	19.0	Passed		
5520.000	-48.6	-27.0	21.6	Passed		
5560.000	-50.1	-27.0	23.1	Passed		
5600.000	-53.6	-27.0	26.6	Passed		
5640.050	-53.9	-27.0	26.9	Passed		

Spurious Emissions, a-mode, channel 40 (Operation mode 2)						
Peak Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Max Peak Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4640.275	59.7	74.0	14.3	-50.5	15.0	Passed
4839.775	61.8	74.0	12.2	-48.4	15.0	Passed
5039.825	61.7	74.0	12.3	-48.5	15.0	Passed
Average Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Average Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4639.950	51.9	54.0	2.1	-58.3	15.0	Passed
4840.000	53.3	54.0	0.7	-56.9	15.0	Passed
5040.000	53.9	54.0	0.1	-56.3	15.0	Passed
Emissions in the non-restricted Bands						
Frequency [MHz]	Meas. Result [dBm/MHz]	Limit [dBm/MHz]	Margin [dB]	Result		
5480.025	-46.9	-27.0	19.9	Passed		
5520.000	-47.8	-27.0	20.8	Passed		
5560.000	-50.3	-27.0	23.3	Passed		
5600.025	-53.3	-27.0	26.3	Passed		
5640.000	-53.2	-27.0	26.2	Passed		

Spurious Emissions, a-mode, channel 48 (Operation mode 3)						
Peak Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Max Peak Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4023.600	54.2	74.0	19.8	-56.0	15.0	Passed
4169.375	54.5	74.0	19.5	-55.7	15.0	Passed
4680.025	60.8	74.0	13.2	-49.5	15.0	Passed
4720.250	59.0	74.0	15.0	-51.2	15.0	Passed
4797.600	58.5	74.0	15.5	-51.7	15.0	Passed
4875.650	59.3	74.0	14.7	-51.0	15.0	Passed
4959.900	60.7	74.0	13.3	-49.6	15.0	Passed
5119.400	60.6	74.0	13.4	-49.6	15.0	Passed
5360.850	63.4	74.0	10.6	-46.8	15.0	Passed
Average Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Average Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4016.600	43.4	54.0	10.6	-66.8	15.0	Passed
4177.400	43.7	54.0	10.3	-66.6	15.0	Passed
4679.950	53.8	54.0	0.2	-56.4	15.0	Passed
4720.000	49.3	54.0	4.7	-60.9	15.0	Passed
4799.975	47.3	54.0	6.7	-62.9	15.0	Passed
4880.025	47.9	54.0	6.1	-62.3	15.0	Passed
4959.900	52.3	54.0	1.7	-57.9	15.0	Passed
5119.975	49.7	54.0	4.3	-60.5	15.0	Passed
5359.950	52.6	54.0	1.4	-57.6	15.0	Passed
Emissions in the non-restricted Bands						
Frequency [MHz]	Meas. Result [dBm/MHz]	Limit [dBm/MHz]	Margin [dB]	Result		
4480.025	-58.8	-27.0	31.8	Passed		
5520.025	-47.2	-27.0	20.2	Passed		
5560.000	-56.0	-27.0	29.0	Passed		
5600.000	-53.1	-27.0	26.1	Passed		

Spurious Emissions, n20-mode, channel 36 (Operation mode 4)						
Peak Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Max Peak Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4330.175	55.2	74.0	18.8	-55.1	15.0	Passed
4640.000	59.6	74.0	14.4	-50.6	15.0	Passed
4839.825	61.7	74.0	12.3	-48.5	15.0	Passed
4880.125	60.9	74.0	13.1	-49.3	15.0	Passed
5119.875	61.7	74.0	12.3	-48.5	15.0	Passed
Average Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Average Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4330.175	43.9	54.0	10.1	-66.4	15.0	Passed
4639.975	52.1	54.0	1.9	-58.1	15.0	Passed
4840.000	53.4	54.0	0.6	-56.9	15.0	Passed
4880.000	51.4	54.0	2.6	-58.8	15.0	Passed
5119.975	52.2	54.0	1.8	-58.1	15.0	Passed
Emissions in the non-restricted Bands						
Frequency [MHz]	Meas. Result [dBm/MHz]	Limit [dBm/MHz]	Margin [dB]	Result		
5480.000	-47.1	-27.0	20.1	Passed		
5520.025	-47.8	-27.0	20.8	Passed		
5560.000	-50.1	-27.0	23.1	Passed		
5600.000	-53.2	-27.0	26.2	Passed		

Spurious Emissions, n20-mode, channel 40 (Operation mode 5)						
Peak Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Max Peak Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4839.475	61.7	74.0	12.3	-48.5	15.0	Passed
4879.775	61.0	74.0	13.0	-49.2	15.0	Passed
5119.975	62.7	74.0	11.3	-47.6	15.0	Passed
Average Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Average Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4840.025	53.3	54.0	0.7	-57.0	15.0	Passed
4879.950	51.7	54.0	2.3	-58.6	15.0	Passed
5120.050	53.0	54.0	1.0	-57.3	15.0	Passed
Emissions in the non-restricted Bands						
Frequency [MHz]	Meas. Result [dBm/MHz]	Limit [dBm/MHz]	Margin [dB]	Result		
5480.025	-47.1	-27.0	20.1	Passed		
5520.025	-47.6	-27.0	20.6	Passed		
5560.000	-50.4	-27.0	23.4	Passed		
5600.025	-53.2	-27.0	26.2	Passed		

Spurious Emissions, n20-mode, channel 48 (Operation mode 6)						
Peak Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Max Peak Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4840.200	61.5	74.0	12.5	-48.8	15.0	Passed
4880.250	61.0	74.0	13.0	-49.3	15.0	Passed
Average Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Average Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4840.025	52.9	54.0	1.1	-57.3	15.0	Passed
4880.000	51.6	54.0	2.4	-58.6	15.0	Passed
Emissions in the non-restricted Bands						
Frequency [MHz]	Meas. Result [dBm/MHz]	Limit [dBm/MHz]	Margin [dB]	Result		
5480.025	-47.1	-27.0	20.1	Passed		
5520.025	-47.2	-27.0	20.2	Passed		
5560.025	-50.4	-27.0	23.4	Passed		

Spurious Emissions, n40-mode, channel 36 (Operation mode 7)						
Peak Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Max Peak Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4840.000	61.9	74.0	12.1	-48.4	15.0	Passed
5039.775	61.6	74.0	12.4	-48.7	15.0	Passed
5120.100	63.8	74.0	10.2	-46.5	15.0	Passed
Average Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Average Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4840.000	53.5	54.0	0.5	-56.8	15.0	Passed
5039.950	53.2	54.0	0.8	-57.1	15.0	Passed
5119.975	53.7	54.0	0.3	-56.6	15.0	Passed
Emissions in the non-restricted Bands						
Frequency [MHz]	Meas. Result [dBm/MHz]	Limit [dBm/MHz]	Margin [dB]	Result		
5480.025	-47.8	-27.0	20.8	Passed		
5520.000	-47.1	-27.0	20.1	Passed		
5560.050	-51.4	-27.0	24.4	Passed		
5600.050	-53.0	-27.0	26.0	Passed		
5640.000	-53.9	-27.0	26.9	Passed		

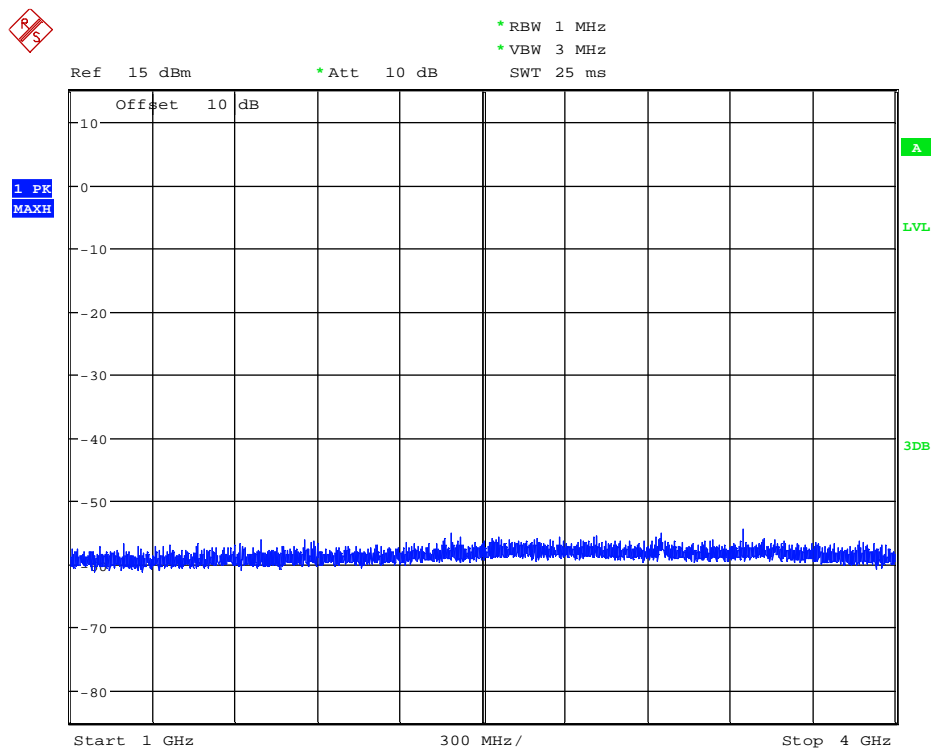
Spurious Emissions, n40-mode, channel 48 (Operation mode 8)						
Peak Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Max Peak Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4639.750	59.6	74.0	14.4	-50.6	15.0	Passed
4840.425	61.4	74.0	12.6	-48.8	15.0	Passed
5040.225	61.8	74.0	12.2	-48.4	15.0	Passed
5120.300	62.5	74.0	11.5	-47.7	15.0	Passed
Average Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Average Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4639.975	51.9	54.0	2.1	-58.4	15.0	Passed
4839.975	53.3	54.0	0.7	-57.0	15.0	Passed
5039.950	54.0	54.0	0.0	-56.3	15.0	Passed
5119.925	53.0	54.0	1.0	-57.3	15.0	Passed
Emissions in the non-restricted Bands						
Frequency [MHz]	Meas. Result [dBm/MHz]	Limit [dBm/MHz]	Margin [dB]	Result		
5480.000	-48.3	-27.0	21.3	Passed		
5520.025	-47.1	-27.0	20.1	Passed		
5560.000	-51.1	-27.0	24.1	Passed		
5600.000	-53.4	-27.0	26.4	Passed		
5680.000	-55.1	-27.0	28.1	Passed		

5.7.3.4 Antenna port 3

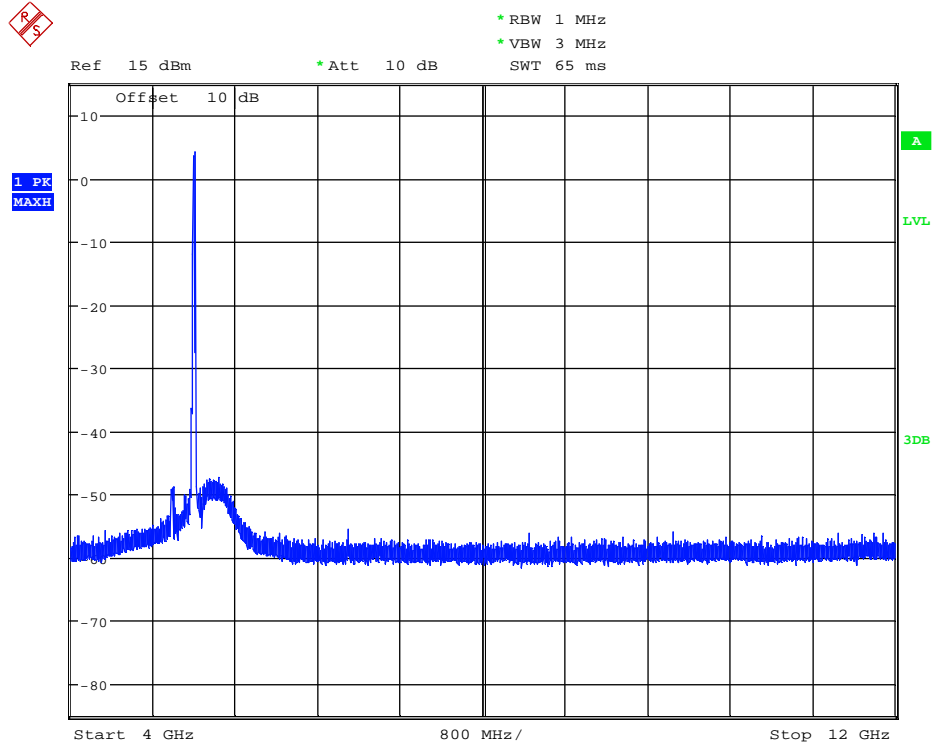
Ambient temperature	22 °C	Relative humidity	60 %
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The following results were measured at antenna port 3 of the EUT. The plots shows exemplary measurement results for the worst documented case. The other results are listed in the following table.

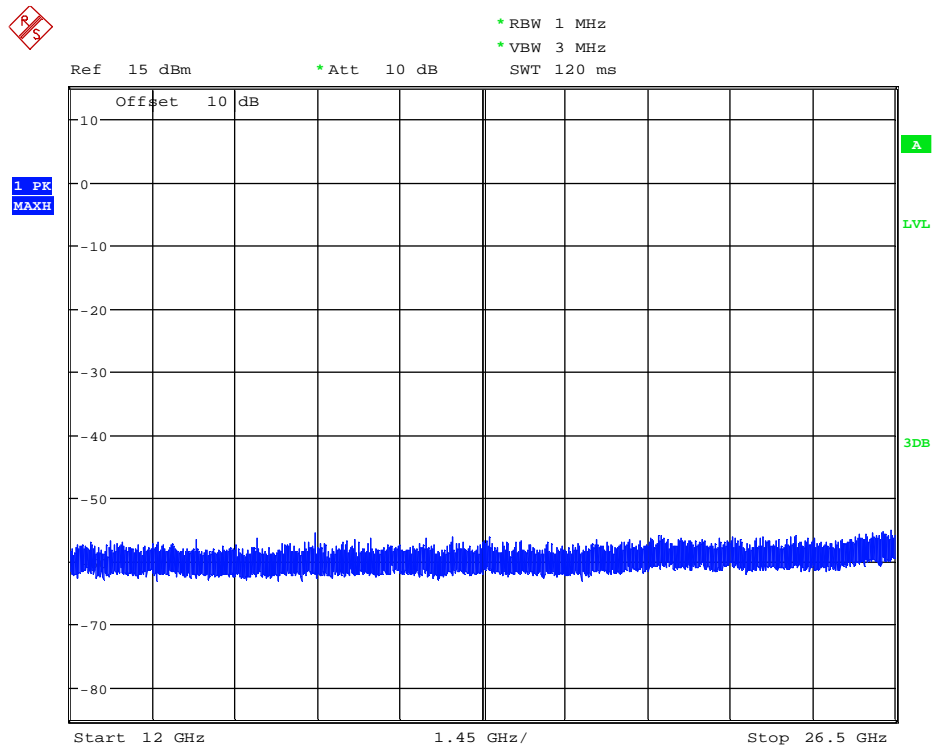
130254 SpurEmiss1-4G a 40.wmf: conducted spurious emissions (operation mode 2):



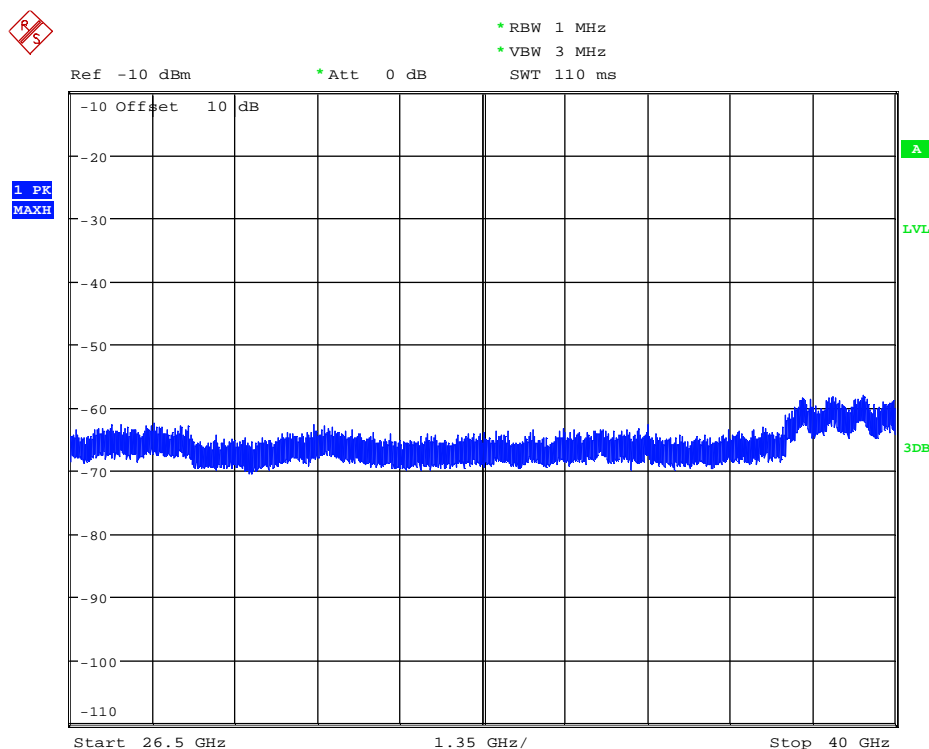
130254_SpurEmiss4-12G_a_40.wmf: conducted spurious emissions (operation mode 2):



130254_SpurEmiss12-26,5G_a_40.wmf: conducted spurious emissions (operation mode 2):



130254 SpurEmiss26,5-40G a 40.wmf: conducted spurious emissions (operation mode 2):



Spurious Emissions, a-mode, channel 36 (Operation mode 1)						
Peak Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Max Peak Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4829.425	57.9	74.0	16.1	-52.4	15.0	Passed
4996.250	62.8	74.0	11.2	-47.4	15.0	Passed
5141.525	61.8	74.0	12.2	-48.4	15.0	Passed
5360.025	63.9	74.0	10.1	-46.3	15.0	Passed
Average Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Average Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4835.500	45.4	54.0	8.6	-64.8	15.0	Passed
4997.825	49.0	54.0	5.0	-61.3	15.0	Passed
5143.625	49.3	54.0	4.7	-61.0	15.0	Passed
5360.100	51.9	54.0	2.1	-58.4	15.0	Passed
Emissions in the non-restricted Bands						
Frequency [MHz]	Meas. Result [dBm/MHz]	Limit [dBm/MHz]	Margin [dB]	Result		
4447.000	-59.9	-27.0	32.9	Passed		
5473.100	-55.9	-27.0	28.9	Passed		

Spurious Emissions, a-mode, channel 40 (Operation mode 2)						
Peak Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Max Peak Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4993.650	63.1	74.0	10.9	-47.1	15.0	Passed
5080.050	60.2	74.0	13.8	-50.1	15.0	Passed
5116.825	62.1	74.0	11.9	-48.2	15.0	Passed
5361.125	65.0	74.0	9.0	-45.3	15.0	Passed
Average Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Average Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4997.575	48.9	54.0	5.1	-61.4	15.0	Passed
5080.000	47.9	54.0	6.1	-62.4	15.0	Passed
5115.850	49.2	54.0	4.8	-61.0	15.0	Passed
5360.125	52.4	54.0	1.6	-57.9	15.0	Passed
Emissions in the non-restricted Bands						
Frequency [MHz]	Meas. Result [dBm/MHz]	Limit [dBm/MHz]	Margin [dB]	Result		
3289.350	-59.9	-27.0	32.9	Passed		
5476.875	-55.5	-27.0	28.5	Passed		

Spurious Emissions, a-mode, channel 48 (Operation mode 3)						
Peak Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Max Peak Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
5087.850	58.0	74.0	16.0	-52.2	15.0	Passed
5386.325	61.6	74.0	12.4	-48.7	15.0	Passed
5394.750	61.4	74.0	12.6	-48.8	15.0	Passed
Average Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Average Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
5088.375	46.0	54.0	8.0	-64.2	15.0	Passed
5386.000	49.3	54.0	4.7	-61.0	15.0	Passed
5399.925	49.3	54.0	4.7	-60.9	15.0	Passed
Emissions in the non-restricted Bands						
Frequency [MHz]	Meas. Result [dBm/MHz]	Limit [dBm/MHz]	Margin [dB]	Result		
3224.775	-60.0	-27.0	33.0	Passed		
5496.175	-58.7	-27.0	31.7	Passed		

Spurious Emissions, n20-mode, channel 36 (Operation mode 4)						
Peak Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Max Peak Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4866.275	57.7	74.0	16.3	-52.6	15.0	Passed
4989.225	62.6	74.0	11.4	-47.7	15.0	Passed
5360.375	64.7	74.0	9.3	-45.5	15.0	Passed
Average Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Average Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4867.200	45.8	54.0	8.2	-64.5	15.0	Passed
4994.375	48.9	54.0	5.1	-61.4	15.0	Passed
5360.050	52.2	54.0	1.8	-58.0	15.0	Passed
Emissions in the non-restricted Bands						
Frequency [MHz]	Meas. Result [dBm/MHz]	Limit [dBm/MHz]	Margin [dB]	Result		
3296.100	-60.4	-27.0	33.4	Passed		
5498.725	-56.5	-27.0	29.5	Passed		

Spurious Emissions, n20-mode, channel 40 (Operation mode 5)						
Peak Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Max Peak Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
3618.475	55.5	74.0	18.5	-54.7	15.0	Passed
4995.925	62.6	74.0	11.4	-47.7	15.0	Passed
5438.950	64.8	74.0	9.2	-45.5	15.0	Passed
Average Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Average Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
3616.800	43.6	54.0	10.4	-66.6	15.0	Passed
4995.525	48.9	54.0	5.1	-61.3	15.0	Passed
5437.550	52.2	54.0	1.8	-58.1	15.0	Passed
Emissions in the non-restricted Bands						
Frequency [MHz]	Meas. Result [dBm/MHz]	Limit [dBm/MHz]	Margin [dB]	Result		
5477.150	-55.7	-27.0	28.7	Passed		

Spurious Emissions, n20-mode, channel 48 (Operation mode 6)						
Peak Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Max Peak Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4534.050	55.9	74.0	18.1	-54.4	15.0	Passed
4838.850	57.0	74.0	17.0	-53.2	15.0	Passed
4999.125	62.6	74.0	11.4	-47.6	15.0	Passed
5366.875	64.1	74.0	9.9	-46.2	15.0	Passed
Average Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Average Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4534.525	44.6	54.0	9.4	-65.7	15.0	Passed
4840.150	45.4	54.0	8.6	-64.9	15.0	Passed
4993.075	48.8	54.0	5.2	-61.5	15.0	Passed
5368.400	51.6	54.0	2.4	-58.6	15.0	Passed
Emissions in the non-restricted Bands						
Frequency [MHz]	Meas. Result [dBm/MHz]	Limit [dBm/MHz]	Margin [dB]	Result		
3552.050	-60.6	-27.0	33.6	Passed		
5526.700	-57.2	-27.0	30.2	Passed		

Spurious Emissions, n40-mode, channel 36 (Operation mode 7)						
Peak Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Max Peak Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4263.250	54.6	74.0	19.4	-55.7	15.0	Passed
4800.125	57.2	74.0	16.8	-53.1	15.0	Passed
4999.350	63.2	74.0	10.8	-47.0	15.0	Passed
5390.850	64.3	74.0	9.7	-45.9	15.0	Passed
Average Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Average Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4261.125	43.5	54.0	10.5	-66.7	15.0	Passed
4800.325	45.4	54.0	8.6	-64.9	15.0	Passed
4997.800	48.9	54.0	5.1	-61.4	15.0	Passed
5382.600	52.1	54.0	1.9	-58.1	15.0	Passed
Emissions in the non-restricted Bands						
Frequency [MHz]	Meas. Result [dBm/MHz]	Limit [dBm/MHz]	Margin [dB]	Result		
3132.750	-59.7	-27.0	32.7	Passed		
5472.700	-55.7	-27.0	28.7	Passed		
5951.950	-59.8	-27.0	32.8	Passed		

Spurious Emissions, n40-mode, channel 48 (Operation mode 8)						
Peak Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Max Peak Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4560.950	55.7	74.0	18.3	-54.5	15.0	Passed
4979.050	62.2	74.0	11.8	-48.0	15.0	Passed
5380.400	64.3	74.0	9.7	-45.9	15.0	Passed
Average Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBμV/m]	Average Limit [dBμV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
4564.450	44.7	54.0	9.3	-65.6	15.0	Passed
4980.800	48.4	54.0	5.6	-61.8	15.0	Passed
5378.400	51.6	54.0	2.4	-58.7	15.0	Passed
Emissions in the non-restricted Bands						
Frequency [MHz]	Meas. Result [dBm/MHz]	Limit [dBm/MHz]	Margin [dB]	Result		
3083.950	-60.3	-27.0	33.3	Passed		
3465.050	-60.3	-27.0	33.3	Passed		
5466.575	-56.3	-27.0	29.3	Passed		

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

30, 80

5.7.4 Method of measurement (radiated emissions)

The radiated emission measurement is subdivided into four stages.

- A preliminary measurement carried out in a fully anechoic chamber with a fixed antenna height in the frequency range 30 MHz to 1 GHz.
- A final measurement carried out on an open area test site 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 110 GHz.
- A final measurement carried out in a fully anechoic chamber with a fixed antenna height in the frequency range 1 GHz to 110 GHz.

All measurements will be carried out with the EUT working on the middle of the assigned frequency band.

Preliminary and final measurement (1 GHz to 110 GHz)

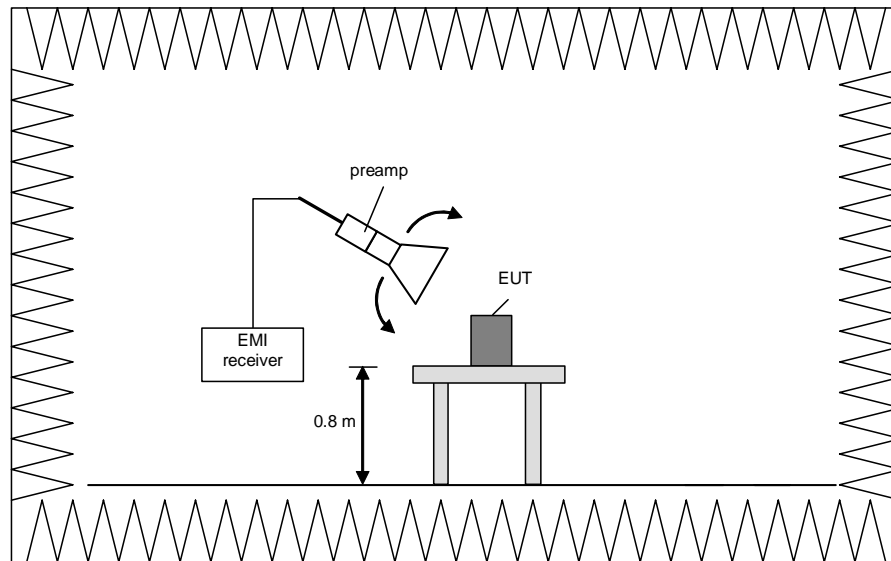
This measurement will be performed in a fully anechoic chamber. Tabletop devices will set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm. Floor-standing devices will be placed directly on the turntable/ground plane. The set up of the Equipment under test will be in accordance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

Preliminary measurement (1 GHz to 110 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 then 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
40 GHz to 60 GHz	100 kHz
50 GHz to 75 GHz	100 kHz
75 GHz to 110 GHz	100 kHz

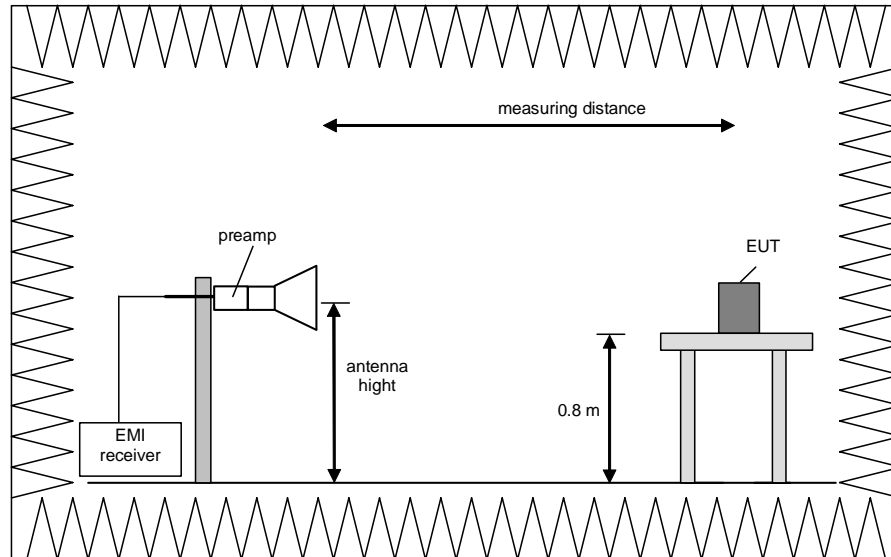


Final measurement (1 GHz to 110 GHz)

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
40 GHz to 60 GHz	1 MHz
50 GHz to 75 GHz	1 MHz
75 GHz to 110 GHz	1 MHz



Procedure of measurement:

The measurements were performed in the frequency range 1 GHz to 4 GHz, 4 GHz to 12 GHz, 12 GHz to 18 GHz, 18 GHz to 26.5 GHz, 26.5 GHz to 40 GHz, 40 GHz to 60 GHz, 60 GHz to 75 GHz and 75 GHz to 110 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.

5.7.5 Test results (radiated emissions) – Antenna Emissions

5.7.5.1 Preliminary radiated emission measurement

The preliminary measurements were already performed during the conducted measurements, therefore only the failed measurements were repeated at the given frequencies.

5.7.5.2 Final radiated emission measurement (1 GHz to 40 GHz)

Ambient temperature	23 °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: For detail information of test set-up and the cable guide refer to the pictures in Table 2.

Test record: All results are shown in the following.

Supply voltage: During all measurements the host of the EUT was powered with 24 V via an AC/DC Adapter.

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

Remark: Only the frequencies that failed the conducted spurious emissions tests are repeated in the following radiated antenna measurements.

5.7.5.2.1 BAT-ANT-RSMA-2AGNR

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

Result measured with the peak detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	56.89	74.00	17.11	18.70	32.89	0.00	5.30	150	Hor.	359	1
5040.0	58.38	74.00	15.62	19.87	33.11	0.00	5.40	150	Vert.	357	1
5080.0	58.27	74.00	15.73	19.18	33.49	0.00	5.60	150	Hor.	120	1
5360.0	58.90	74.00	15.10	19.40	33.80	0.00	5.70	150	Vert.	166	1
5400.0	58.55	74.00	15.45	19.05	33.80	0.00	5.70	150	Vert.	26	1
5720.0	58.86	74.00	15.14	19.18	33.78	0.00	5.90	150	Vert.	356	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	44.92	54.00	9.08	6.73	32.89	0.00	5.30	150	Vert.	0	1
5040.0	47.46	54.00	6.54	8.95	33.11	0.00	5.40	150	Vert.	357	1
5080.0	45.73	54.00	8.27	6.64	33.49	0.00	5.60	150	Vert.	358	1
5360.0	45.70	54.00	8.30	6.20	33.80	0.00	5.70	150	Vert.	356	1
5400.0	45.62	54.00	8.38	6.12	33.80	0.00	5.70	150	Vert.	293	1
5720.0	45.42	54.00	8.58	5.74	33.78	0.00	5.90	150	Vert.	260	1
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 MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	58.42	74.00	15.58	20.23	32.89	0.00	5.30	150	Vert.	360	1
5000.0	57.93	74.00	16.07	19.52	33.11	0.00	5.30	150	Vert.	360	1
5080.0	59.32	74.00	14.68	20.23	33.49	0.00	5.60	150	Vert.	355	1
5360.0	59.60	74.00	14.40	20.10	33.80	0.00	5.70	150	Vert.	292	1
5400.0	59.25	74.00	14.75	19.75	33.80	0.00	5.70	150	Vert.	351	1
5440.0	59.68	74.00	14.32	19.98	33.80	0.00	5.90	150	Vert.	356	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	48.55	54.00	5.45	10.36	32.89	0.00	5.30	150	Vert.	3	1
5000.0	45.81	54.00	8.19	7.40	33.11	0.00	5.30	150	Vert.	4	1
5080.0	47.49	54.00	6.51	8.40	33.49	0.00	5.60	150	Vert.	0	1
5360.0	46.49	54.00	7.51	6.99	33.80	0.00	5.70	150	Vert.	354	1
5400.0	45.99	54.00	8.01	6.49	33.80	0.00	5.70	150	Vert.	300	1
5440.0	46.22	54.00	7.78	6.52	33.80	0.00	5.90	150	Vert.	355	1
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 MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4760.0	55.64	74.00	18.36	17.75	32.59	0.00	5.30	150	Vert.	3	1
4920.0	56.46	74.00	17.54	18.34	32.82	0.00	5.30	150	Vert.	357	1
5000.0	57.81	74.00	16.19	19.40	33.11	0.00	5.30	150	Vert.	16	1
5400.0	59.02	74.00	14.98	19.52	33.80	0.00	5.70	150	Vert.	0	1
5440.0	59.33	74.00	14.67	19.63	33.80	0.00	5.90	150	Vert.	304	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4760.0	41.75	54.00	12.25	3.86	32.59	0.00	5.30	150	Vert.	308	1
4920.0	43.42	54.00	10.58	5.30	32.82	0.00	5.30	150	Vert.	355	1
5000.0	45.44	54.00	8.56	7.03	33.11	0.00	5.30	150	Vert.	4	1
5400.0	45.85	54.00	8.15	6.35	33.80	0.00	5.70	150	Vert.	292	1
5440.0	46.17	54.00	7.83	6.47	33.80	0.00	5.90	150	Vert.	354	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

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

Result measured with the peak detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	58.42	74.00	15.58	20.23	32.89	0.00	5.30	150	Vert.	356	1
5000.0	57.70	74.00	16.30	19.29	33.11	0.00	5.30	150	Vert.	358	1
5080.0	59.19	74.00	14.81	20.10	33.49	0.00	5.60	150	Vert.	256	1
5360.0	59.02	74.00	14.98	19.52	33.80	0.00	5.70	150	Vert.	360	1
5400.0	58.90	74.00	15.10	19.40	33.80	0.00	5.70	150	Vert.	288	1
5440.0	59.45	74.00	14.55	19.75	33.80	0.00	5.90	150	Vert.	287	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	49.08	54.00	4.92	10.89	32.89	0.00	5.30	150	Vert.	1	1
5000.0	44.81	54.00	9.19	6.40	33.11	0.00	5.30	150	Vert.	0	1
5080.0	47.55	54.00	6.45	8.46	33.49	0.00	5.60	150	Vert.	0	1
5360.0	46.18	54.00	7.82	6.68	33.80	0.00	5.70	150	Vert.	354	1
5400.0	45.97	54.00	8.03	6.47	33.80	0.00	5.70	150	Vert.	304	1
5440.0	46.07	54.00	7.93	6.37	33.80	0.00	5.90	150	Vert.	355	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

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

Result measured with the peak detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	58.17	74.00	15.83	19.98	32.89	0.00	5.30	150	Vert.	359	1
5000.0	58.39	74.00	15.61	19.98	33.11	0.00	5.30	150	Vert.	336	1
5080.0	59.07	74.00	14.93	19.98	33.49	0.00	5.60	150	Vert.	292	1
5360.0	59.25	74.00	14.75	19.75	33.80	0.00	5.70	150	Vert.	3	1
5400.0	59.48	74.00	14.52	19.98	33.80	0.00	5.70	150	Vert.	304	1
5440.0	59.68	74.00	14.32	19.98	33.80	0.00	5.90	150	Vert.	360	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	48.20	54.00	5.80	10.01	32.89	0.00	5.30	150	Vert.	356	1
5000.0	45.81	54.00	8.19	7.40	33.11	0.00	5.30	150	Vert.	358	1
5080.0	47.41	54.00	6.59	8.32	33.49	0.00	5.60	150	Vert.	0	1
5360.0	46.29	54.00	7.71	6.79	33.80	0.00	5.70	150	Vert.	352	1
5400.0	45.92	54.00	8.08	6.42	33.80	0.00	5.70	150	Vert.	304	1
5440.0	46.34	54.00	7.66	6.64	33.80	0.00	5.90	150	Vert.	354	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Transmitter operates at the upper end of the assigned frequency band (operation mode 6)

Result measured with the peak detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	57.94	74.00	16.06	19.75	32.89	0.00	5.30	150	Vert.	345	1
5000.0	57.93	74.00	16.07	19.52	33.11	0.00	5.30	150	Vert.	359	1
5080.0	59.69	74.00	14.31	20.60	33.49	0.00	5.60	150	Vert.	3	1
5360.0	59.02	74.00	14.98	19.52	33.80	0.00	5.70	150	Vert.	8	1
5400.0	58.90	74.00	15.10	19.40	33.80	0.00	5.70	150	Vert.	343	1
5440.0	59.33	74.00	14.67	19.63	33.80	0.00	5.90	150	Vert.	288	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	47.97	54.00	6.03	9.78	32.89	0.00	5.30	150	Vert.	356	1
5000.0	46.57	54.00	7.43	8.16	33.11	0.00	5.30	150	Vert.	357	1
5080.0	47.63	54.00	6.37	8.54	33.49	0.00	5.60	150	Vert.	0	1
5360.0	46.50	54.00	7.50	7.00	33.80	0.00	5.70	150	Vert.	288	1
5400.0	45.94	54.00	8.06	6.44	33.80	0.00	5.70	150	Vert.	287	1
5440.0	46.42	54.00	7.58	6.72	33.80	0.00	5.90	150	Vert.	358	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Transmitter operates at the lower end of the assigned frequency band (operation mode 7)

Result measured with the peak detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	58.17	74.00	15.83	19.98	32.89	0.00	5.30	150	Vert.	1	1
5000.0	57.93	74.00	16.07	19.52	33.11	0.00	5.30	150	Vert.	27	1
5080.0	58.84	74.00	15.16	19.75	33.49	0.00	5.60	150	Vert.	257	1
5360.0	59.37	74.00	14.63	19.87	33.80	0.00	5.70	150	Vert.	223	1
5400.0	59.48	74.00	14.52	19.98	33.80	0.00	5.70	150	Vert.	273	1
5440.0	59.45	74.00	14.55	19.75	33.80	0.00	5.90	150	Vert.	359	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	48.24	54.00	5.76	10.05	32.89	0.00	5.30	150	Vert.	3	1
5000.0	46.05	54.00	7.95	7.64	33.11	0.00	5.30	150	Vert.	0	1
5080.0	47.58	54.00	6.42	8.49	33.49	0.00	5.60	150	Vert.	0	1
5360.0	46.49	54.00	7.51	6.99	33.80	0.00	5.70	150	Vert.	284	1
5400.0	45.98	54.00	8.02	6.48	33.80	0.00	5.70	150	Vert.	292	1
5440.0	46.43	54.00	7.57	6.73	33.80	0.00	5.90	150	Vert.	355	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Transmitter operates at the middle of the assigned frequency band (operation mode 8)

Result measured with the peak detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	58.17	74.00	15.83	19.98	32.89	0.00	5.30	150	Vert.	360	1
5000.0	58.64	74.00	15.36	20.23	33.11	0.00	5.30	150	Vert.	353	1
5080.0	59.19	74.00	14.81	20.10	33.49	0.00	5.60	150	Vert.	354	1
5360.0	59.25	74.00	14.75	19.75	33.80	0.00	5.70	150	Vert.	3	1
5400.0	58.79	74.00	15.21	19.29	33.80	0.00	5.70	150	Vert.	273	1
5440.0	59.22	74.00	14.78	19.52	33.80	0.00	5.90	150	Vert.	359	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	47.77	54.00	6.23	9.58	32.89	0.00	5.30	150	Vert.	355	1
5000.0	47.10	54.00	6.90	8.69	33.11	0.00	5.30	150	Vert.	358	1
5080.0	47.57	54.00	6.43	8.48	33.49	0.00	5.60	150	Vert.	359	1
5360.0	46.51	54.00	7.49	7.01	33.80	0.00	5.70	150	Vert.	354	1
5400.0	45.93	54.00	8.07	6.43	33.80	0.00	5.70	150	Vert.	290	1
5440.0	46.40	54.00	7.60	6.70	33.80	0.00	5.90	150	Vert.	358	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

5.7.5.2.2 BAT-ANT-N-MiMoDB-5N-IP65

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

Result measured with the peak detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	58.32	74.00	15.68	20.13	32.89	0.00	5.30	150	Hor.	308	1
5040.0	58.89	74.00	15.11	20.38	33.11	0.00	5.40	150	Hor.	305	1
5080.0	59.47	74.00	14.53	20.38	33.49	0.00	5.60	150	Hor.	294	1
5360.0	61.53	74.00	12.47	22.03	33.80	0.00	5.70	150	Hor.	320	1
5400.0	61.27	74.00	12.73	21.77	33.80	0.00	5.70	150	Hor.	309	1
5720.0	59.23	74.00	14.77	19.55	33.78	0.00	5.90	150	Hor.	321	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	48.49	54.00	5.51	10.30	32.89	0.00	5.30	150	Hor.	304	1
5040.0	49.87	54.00	4.13	11.36	33.11	0.00	5.40	150	Hor.	305	1
5080.0	47.39	54.00	6.61	8.30	33.49	0.00	5.60	150	Hor.	301	1
5360.0	47.75	54.00	6.25	8.25	33.80	0.00	5.70	150	Hor.	308	1
5400.0	47.76	54.00	6.24	8.26	33.80	0.00	5.70	150	Hor.	301	1
5720.0	47.40	54.00	6.60	7.72	33.78	0.00	5.90	150	Hor.	299	1
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 MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	58.95	74.00	15.05	20.76	32.89	0.00	5.30	150	Hor.	295	1
5000.0	58.91	74.00	15.09	20.50	33.11	0.00	5.30	150	Hor.	307	1
5080.0	59.22	74.00	14.78	20.13	33.49	0.00	5.60	150	Hor.	300	1
5360.0	60.51	74.00	13.49	21.01	33.80	0.00	5.70	150	Hor.	288	1
5400.0	60.51	74.00	13.49	21.01	33.80	0.00	5.70	150	Hor.	304	1
5440.0	62.24	74.00	11.76	22.54	33.80	0.00	5.90	150	Hor.	304	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	49.17	54.00	4.83	10.98	32.89	0.00	5.30	150	Hor.	299	1
5000.0	47.24	54.00	6.76	8.83	33.11	0.00	5.30	150	Hor.	300	1
5080.0	47.72	54.00	6.28	8.63	33.49	0.00	5.60	150	Hor.	304	1
5360.0	48.00	54.00	6.00	8.50	33.80	0.00	5.70	150	Hor.	316	1
5400.0	48.15	54.00	5.85	8.65	33.80	0.00	5.70	150	Hor.	297	1
5440.0	51.00	54.00	3.00	11.30	33.80	0.00	5.90	150	Hor.	304	1
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 MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4760.0	58.14	74.00	15.86	20.25	32.59	0.00	5.30	150	Hor.	293	1
4920.0	57.90	74.00	16.10	19.78	32.82	0.00	5.30	150	Hor.	308	1
5000.0	58.42	74.00	15.58	20.01	33.11	0.00	5.30	150	Hor.	297	1
5400.0	60.26	74.00	13.74	20.76	33.80	0.00	5.70	150	Hor.	298	1
5440.0	61.47	74.00	12.53	21.77	33.80	0.00	5.90	150	Hor.	308	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4760.0	48.20	54.00	5.80	10.31	32.59	0.00	5.30	150	Hor.	298	1
4920.0	48.53	54.00	5.47	10.41	32.82	0.00	5.30	150	Hor.	304	1
5000.0	48.62	54.00	5.38	10.21	33.11	0.00	5.30	150	Hor.	297	1
5400.0	47.20	54.00	6.80	7.70	33.80	0.00	5.70	150	Hor.	298	1
5440.0	50.97	54.00	3.03	11.27	33.80	0.00	5.90	150	Hor.	304	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

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

Result measured with the peak detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	58.32	74.00	15.68	20.13	32.89	0.00	5.30	150	Hor.	305	1
5000.0	59.42	74.00	14.58	21.01	33.11	0.00	5.30	150	Hor.	301	1
5080.0	59.22	74.00	14.78	20.13	33.49	0.00	5.60	150	Hor.	291	1
5360.0	61.01	74.00	12.99	21.51	33.80	0.00	5.70	150	Hor.	291	1
5400.0	61.53	74.00	12.47	22.03	33.80	0.00	5.70	150	Hor.	308	1
5440.0	61.85	74.00	12.15	22.15	33.80	0.00	5.90	150	Hor.	295	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	48.84	54.00	5.16	10.65	32.89	0.00	5.30	150	Hor.	305	1
5000.0	47.45	54.00	6.55	9.04	33.11	0.00	5.30	150	Hor.	305	1
5080.0	47.66	54.00	6.34	8.57	33.49	0.00	5.60	150	Hor.	303	1
5360.0	48.18	54.00	5.82	8.68	33.80	0.00	5.70	150	Hor.	310	1
5400.0	48.43	54.00	5.57	8.93	33.80	0.00	5.70	150	Hor.	304	1
5440.0	50.60	54.00	3.40	10.90	33.80	0.00	5.90	150	Hor.	300	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

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

Result measured with the peak detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	58.20	74.00	15.80	20.01	32.89	0.00	5.30	150	Hor.	296	1
5000.0	59.55	74.00	14.45	21.14	33.11	0.00	5.30	150	Hor.	316	1
5080.0	60.10	74.00	13.90	21.01	33.49	0.00	5.60	150	Hor.	308	1
5360.0	61.14	74.00	12.86	21.64	33.80	0.00	5.70	150	Hor.	300	1
5400.0	60.89	74.00	13.11	21.39	33.80	0.00	5.70	150	Hor.	293	1
5440.0	61.73	74.00	12.27	22.03	33.80	0.00	5.90	150	Hor.	308	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	48.70	54.00	5.30	10.51	32.89	0.00	5.30	150	Hor.	299	1
5000.0	46.86	54.00	7.14	8.45	33.11	0.00	5.30	150	Hor.	297	1
5080.0	47.87	54.00	6.13	8.78	33.49	0.00	5.60	150	Hor.	304	1
5360.0	48.13	54.00	5.87	8.63	33.80	0.00	5.70	150	Hor.	315	1
5400.0	48.44	54.00	5.56	8.94	33.80	0.00	5.70	150	Hor.	297	1
5440.0	50.38	54.00	3.62	10.68	33.80	0.00	5.90	150	Hor.	304	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Transmitter operates at the upper end of the assigned frequency band (operation mode 6)

Result measured with the peak detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	59.33	74.00	14.67	21.14	32.89	0.00	5.30	150	Hor.	305	1
5000.0	59.04	74.00	14.96	20.63	33.11	0.00	5.30	150	Hor.	312	1
5080.0	59.47	74.00	14.53	20.38	33.49	0.00	5.60	150	Hor.	289	1
5360.0	60.89	74.00	13.11	21.39	33.80	0.00	5.70	150	Hor.	302	1
5400.0	60.89	74.00	13.11	21.39	33.80	0.00	5.70	150	Hor.	311	1
5440.0	61.73	74.00	12.27	22.03	33.80	0.00	5.90	150	Hor.	291	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	49.91	54.00	4.09	11.72	32.89	0.00	5.30	150	Hor.	305	1
5000.0	46.93	54.00	7.07	8.52	33.11	0.00	5.30	150	Hor.	304	1
5080.0	47.98	54.00	6.02	8.89	33.49	0.00	5.60	150	Hor.	302	1
5360.0	48.28	54.00	5.72	8.78	33.80	0.00	5.70	150	Hor.	309	1
5400.0	48.11	54.00	5.89	8.61	33.80	0.00	5.70	150	Hor.	304	1
5440.0	50.28	54.00	3.72	10.58	33.80	0.00	5.90	150	Hor.	298	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Transmitter operates at the lower end of the assigned frequency band (operation mode 7)

Result measured with the peak detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	58.95	74.00	15.05	20.76	32.89	0.00	5.30	150	Hor.	308	1
5000.0	59.67	74.00	14.33	21.26	33.11	0.00	5.30	150	Hor.	316	1
5080.0	59.85	74.00	14.15	20.76	33.49	0.00	5.60	150	Hor.	300	1
5360.0	61.91	74.00	12.09	22.41	33.80	0.00	5.70	150	Hor.	308	1
5400.0	60.64	74.00	13.36	21.14	33.80	0.00	5.70	150	Hor.	308	1
5440.0	61.98	74.00	12.02	22.28	33.80	0.00	5.90	150	Hor.	305	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	49.42	54.00	4.58	11.23	32.89	0.00	5.30	150	Hor.	305	1
5000.0	47.56	54.00	6.44	9.15	33.11	0.00	5.30	150	Hor.	304	1
5080.0	47.90	54.00	6.10	8.81	33.49	0.00	5.60	150	Hor.	300	1
5360.0	48.14	54.00	5.86	8.64	33.80	0.00	5.70	150	Hor.	304	1
5400.0	48.54	54.00	5.46	9.04	33.80	0.00	5.70	150	Hor.	304	1
5440.0	50.22	54.00	3.78	10.52	33.80	0.00	5.90	150	Hor.	297	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Transmitter operates at the middle of the assigned frequency band (operation mode 8)

Result measured with the peak detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	59.20	74.00	14.80	21.01	32.89	0.00	5.30	150	Hor.	304	1
5000.0	59.55	74.00	14.45	21.14	33.11	0.00	5.30	150	Hor.	284	1
5080.0	59.59	74.00	14.41	20.50	33.49	0.00	5.60	150	Hor.	290	1
5360.0	61.14	74.00	12.86	21.64	33.80	0.00	5.70	150	Hor.	319	1
5400.0	60.64	74.00	13.36	21.14	33.80	0.00	5.70	150	Hor.	294	1
5440.0	61.21	74.00	12.79	21.51	33.80	0.00	5.90	150	Hor.	298	1

Result measured with the average detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	49.72	54.00	4.28	11.53	32.89	0.00	5.30	150	Hor.	304	1
5000.0	46.73	54.00	7.27	8.32	33.11	0.00	5.30	150	Hor.	304	1
5080.0	47.97	54.00	6.03	8.88	33.49	0.00	5.60	150	Hor.	298	1
5360.0	48.38	54.00	5.62	8.88	33.80	0.00	5.70	150	Hor.	304	1
5400.0	48.19	54.00	5.81	8.69	33.80	0.00	5.70	150	Hor.	298	1
5440.0	49.81	54.00	4.19	10.11	33.80	0.00	5.90	150	Hor.	298	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

5.7.5.2.3 BAT-ANT-N-9A-DS-IP65

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

Result measured with the peak detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	59.07	74.00	14.93	20.88	32.89	0.00	5.30	150	Vert.	0	1
5040.0	59.65	74.00	14.35	21.14	33.11	0.00	5.40	150	Vert.	5	1
5080.0	59.85	74.00	14.15	20.76	33.49	0.00	5.60	150	Vert.	0	1
5360.0	61.14	74.00	12.86	21.64	33.80	0.00	5.70	150	Vert.	22	1
5400.0	59.75	74.00	14.25	20.25	33.80	0.00	5.70	150	Vert.	0	1
5720.0	59.46	74.00	14.54	19.78	33.78	0.00	5.90	150	Vert.	57	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	49.54	54.00	4.46	11.35	32.89	0.00	5.30	150	Vert.	3	1
5040.0	49.87	54.00	4.13	11.36	33.11	0.00	5.40	150	Vert.	357	1
5080.0	46.43	54.00	7.57	7.34	33.49	0.00	5.60	150	Vert.	359	1
5360.0	50.70	54.00	3.30	11.20	33.80	0.00	5.70	150	Vert.	0	1
5400.0	46.51	54.00	7.49	7.01	33.80	0.00	5.70	150	Vert.	1	1
5720.0	47.55	54.00	6.45	7.87	33.78	0.00	5.90	150	Vert.	4	1
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 MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	58.32	74.00	15.68	20.13	32.89	0.00	5.30	150	Vert.	352	1
5000.0	58.54	74.00	15.46	20.13	33.11	0.00	5.30	150	Vert.	1	1
5080.0	59.34	74.00	14.66	20.25	33.49	0.00	5.60	150	Vert.	359	1
5360.0	61.53	74.00	12.47	22.03	33.80	0.00	5.70	150	Vert.	0	1
5400.0	60.89	74.00	13.11	21.39	33.80	0.00	5.70	150	Vert.	0	1
5440.0	62.24	74.00	11.76	22.54	33.80	0.00	5.90	150	Vert.	358	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	47.81	54.00	6.19	9.62	32.89	0.00	5.30	150	Vert.	4	1
5000.0	48.03	54.00	5.97	9.62	33.11	0.00	5.30	150	Vert.	358	1
5080.0	47.12	54.00	6.88	8.03	33.49	0.00	5.60	150	Vert.	358	1
5360.0	48.93	54.00	5.07	9.43	33.80	0.00	5.70	150	Vert.	359	1
5400.0	47.48	54.00	6.52	7.98	33.80	0.00	5.70	150	Vert.	0	1
5440.0	52.58	54.00	1.42	12.88	33.80	0.00	5.90	150	Vert.	356	1
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 MHz	Meas. Result dB μ V/m	Limit dB μ V/m	Margin dB	Readings dB μ V	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4760.0	55.64	74.00	18.36	17.75	32.59	0.00	5.30	150	Hor.	6	1
4920.0	57.52	74.00	16.48	19.40	32.82	0.00	5.30	150	Vert.	3	1
5000.0	58.16	74.00	15.84	19.75	33.11	0.00	5.30	150	Vert.	358	1
5400.0	59.13	74.00	14.87	19.63	33.80	0.00	5.70	150	Vert.	0	1
5440.0	60.67	74.00	13.33	20.97	33.80	0.00	5.90	150	Vert.	0	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency MHz	Meas. Result dB μ V/m	Limit dB μ V/m	Margin dB	Readings dB μ V	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4760.0	43.79	54.00	10.21	5.90	32.59	0.00	5.30	150	Hor.	13	1
4920.0	46.02	54.00	7.98	7.90	32.82	0.00	5.30	150	Vert.	7	1
5000.0	47.38	54.00	6.62	8.97	33.11	0.00	5.30	150	Vert.	10	1
5400.0	45.87	54.00	8.13	6.37	33.80	0.00	5.70	150	Vert.	355	1
5440.0	48.99	54.00	5.01	9.29	33.80	0.00	5.90	150	Vert.	0	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

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

Result measured with the peak detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	57.18	74.00	16.82	18.99	32.89	0.00	5.30	150	Vert.	343	1
5000.0	60.18	74.00	13.82	21.77	33.11	0.00	5.30	150	Vert.	0	1
5080.0	59.72	74.00	14.28	20.63	33.49	0.00	5.60	150	Vert.	360	1
5360.0	61.01	74.00	12.99	21.51	33.80	0.00	5.70	150	Vert.	0	1
5400.0	59.88	74.00	14.12	20.38	33.80	0.00	5.70	150	Vert.	348	1
5440.0	62.63	74.00	11.37	22.93	33.80	0.00	5.90	150	Vert.	359	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	44.28	54.00	9.72	6.09	32.89	0.00	5.30	150	Vert.	359	1
5000.0	52.33	54.00	1.67	13.92	33.11	0.00	5.30	150	Vert.	7	1
5080.0	47.97	54.00	6.03	8.88	33.49	0.00	5.60	150	Vert.	354	1
5360.0	49.66	54.00	4.34	10.16	33.80	0.00	5.70	150	Vert.	0	1
5400.0	46.42	54.00	7.58	6.92	33.80	0.00	5.70	150	Vert.	0	1
5440.0	53.47	54.00	0.53	13.77	33.80	0.00	5.90	150	Vert.	0	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

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

Result measured with the peak detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	58.29	74.00	15.71	20.10	32.89	0.00	5.30	150	Vert.	359	1
5000.0	57.70	74.00	16.30	19.29	33.11	0.00	5.30	150	Vert.	360	1
5080.0	59.81	74.00	14.19	20.72	33.49	0.00	5.60	150	Vert.	11	1
5360.0	59.48	74.00	14.52	19.98	33.80	0.00	5.70	150	Vert.	16	1
5400.0	59.02	74.00	14.98	19.52	33.80	0.00	5.70	150	Vert.	0	1
5440.0	60.18	74.00	13.82	20.48	33.80	0.00	5.90	150	Vert.	358	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	47.98	54.00	6.02	9.79	32.89	0.00	5.30	150	Vert.	10	1
5000.0	45.88	54.00	8.12	7.47	33.11	0.00	5.30	150	Vert.	12	1
5080.0	47.20	54.00	6.80	8.11	33.49	0.00	5.60	150	Vert.	4	1
5360.0	46.87	54.00	7.13	7.37	33.80	0.00	5.70	150	Vert.	356	1
5400.0	45.68	54.00	8.32	6.18	33.80	0.00	5.70	150	Vert.	0	1
5440.0	48.86	54.00	5.14	9.16	33.80	0.00	5.90	150	Vert.	0	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Transmitter operates at the upper end of the assigned frequency band (operation mode 6)

Result measured with the peak detector:

Frequency MHz	Meas. Result dB μ V/m	Limit dB μ V/m	Margin dB	Readings dB μ V	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	58.79	74.00	15.21	20.60	32.89	0.00	5.30	150	Hor.	352	1
5000.0	57.23	74.00	16.77	18.82	33.11	0.00	5.30	150	Vert.	53	1
5080.0	60.19	74.00	13.81	21.10	33.49	0.00	5.60	150	Vert.	360	1
5360.0	60.10	74.00	13.90	20.60	33.80	0.00	5.70	150	Vert.	360	1
5400.0	59.48	74.00	14.52	19.98	33.80	0.00	5.70	150	Vert.	1	1
5440.0	60.05	74.00	13.95	20.35	33.80	0.00	5.90	150	Vert.	358	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency MHz	Meas. Result dB μ V/m	Limit dB μ V/m	Margin dB	Readings dB μ V	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	49.53	54.00	4.47	11.34	32.89	0.00	5.30	150	Vert.	11	1
5000.0	45.08	54.00	8.92	6.67	33.11	0.00	5.30	150	Vert.	359	1
5080.0	49.24	54.00	4.76	10.15	33.49	0.00	5.60	150	Vert.	3	1
5360.0	47.25	54.00	6.75	7.75	33.80	0.00	5.70	150	Vert.	354	1
5400.0	46.60	54.00	7.40	7.10	33.80	0.00	5.70	150	Vert.	356	1
5440.0	47.57	54.00	6.43	7.87	33.80	0.00	5.90	150	Vert.	360	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Transmitter operates at the lower end of the assigned frequency band (operation mode 7)

Result measured with the peak detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	58.95	74.00	15.05	20.76	32.89	0.00	5.30	150	Vert.	0	1
5000.0	58.66	74.00	15.34	20.25	33.11	0.00	5.30	150	Vert.	0	1
5080.0	59.59	74.00	14.41	20.50	33.49	0.00	5.60	150	Vert.	0	1
5360.0	60.89	74.00	13.11	21.39	33.80	0.00	5.70	150	Vert.	5	1
5400.0	60.38	74.00	13.62	20.88	33.80	0.00	5.70	150	Vert.	13	1
5440.0	62.50	74.00	11.50	22.80	33.80	0.00	5.90	150	Vert.	360	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	48.59	54.00	5.41	10.40	32.89	0.00	5.30	150	Vert.	4	1
5000.0	47.38	54.00	6.62	8.97	33.11	0.00	5.30	150	Vert.	354	1
5080.0	47.20	54.00	6.80	8.11	33.49	0.00	5.60	150	Vert.	7	1
5360.0	48.60	54.00	5.40	9.10	33.80	0.00	5.70	150	Vert.	359	1
5400.0	48.05	54.00	5.95	8.55	33.80	0.00	5.70	150	Vert.	0	1
5440.0	51.51	54.00	2.49	11.81	33.80	0.00	5.90	150	Vert.	360	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Transmitter operates at the middle of the assigned frequency band (operation mode 8)

Result measured with the peak detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	58.54	74.00	15.46	20.35	32.89	0.00	5.30	150	Vert.	4	1
5000.0	57.11	74.00	16.89	18.70	33.11	0.00	5.30	150	Vert.	5	1
5080.0	59.94	74.00	14.06	20.85	33.49	0.00	5.60	150	Vert.	358	1
5360.0	60.47	74.00	13.53	20.97	33.80	0.00	5.70	150	Vert.	1	1
5400.0	59.37	74.00	14.63	19.87	33.80	0.00	5.70	150	Vert.	0	1
5440.0	60.05	74.00	13.95	20.35	33.80	0.00	5.90	150	Vert.	359	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	49.45	54.00	4.55	11.26	32.89	0.00	5.30	150	Vert.	11	1
5000.0	44.75	54.00	9.25	6.34	33.11	0.00	5.30	150	Vert.	4	1
5080.0	49.23	54.00	4.77	10.14	33.49	0.00	5.60	150	Vert.	360	1
5360.0	47.16	54.00	6.84	7.66	33.80	0.00	5.70	150	Vert.	1	1
5400.0	46.56	54.00	7.44	7.06	33.80	0.00	5.70	150	Vert.	355	1
5440.0	47.34	54.00	6.66	7.64	33.80	0.00	5.90	150	Vert.	5	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

5.7.5.2.4 BAT-ANT-N-3AGN-F

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

Result measured with the peak detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	56.30	74.00	17.70	18.11	32.89	0.00	5.30	150	Vert.	351	1
5040.0	57.56	74.00	16.44	19.05	33.11	0.00	5.40	150	Vert.	97	1
5080.0	58.49	74.00	15.51	19.40	33.49	0.00	5.60	150	Vert.	359	1
5360.0	59.02	74.00	14.98	19.52	33.80	0.00	5.70	150	Vert.	360	1
5400.0	58.55	74.00	15.45	19.05	33.80	0.00	5.70	150	Vert.	284	1
5720.0	58.73	74.00	15.27	19.05	33.78	0.00	5.90	150	Vert.	2	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	43.16	54.00	10.84	4.97	32.89	0.00	5.30	150	Vert.	356	1
5040.0	46.67	54.00	7.33	8.16	33.11	0.00	5.40	150	Vert.	356	1
5080.0	45.40	54.00	8.60	6.31	33.49	0.00	5.60	150	Vert.	0	1
5360.0	45.93	54.00	8.07	6.43	33.80	0.00	5.70	150	Vert.	349	1
5400.0	45.76	54.00	8.24	6.26	33.80	0.00	5.70	150	Vert.	343	1
5720.0	45.57	54.00	8.43	5.89	33.78	0.00	5.90	150	Vert.	356	1
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 MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	57.48	74.00	16.52	19.29	32.89	0.00	5.30	150	Vert.	287	1
5000.0	57.00	74.00	17.00	18.59	33.11	0.00	5.30	150	Vert.	0	1
5080.0	59.81	74.00	14.19	20.72	33.49	0.00	5.60	150	Vert.	0	1
5360.0	59.37	74.00	14.63	19.87	33.80	0.00	5.70	150	Vert.	360	1
5400.0	58.68	74.00	15.32	19.18	33.80	0.00	5.70	150	Vert.	95	1
5440.0	59.45	74.00	14.55	19.75	33.80	0.00	5.90	150	Vert.	0	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	46.30	54.00	7.70	8.11	32.89	0.00	5.30	150	Vert.	292	1
5000.0	44.73	54.00	9.27	6.32	33.11	0.00	5.30	150	Vert.	358	1
5080.0	48.03	54.00	5.97	8.94	33.49	0.00	5.60	150	Vert.	357	1
5360.0	47.78	54.00	6.22	8.28	33.80	0.00	5.70	150	Vert.	352	1
5400.0	46.44	54.00	7.56	6.94	33.80	0.00	5.70	150	Vert.	348	1
5440.0	46.88	54.00	7.12	7.18	33.80	0.00	5.90	150	Vert.	354	1
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 MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4760.0	54.91	74.00	19.09	17.02	32.59	0.00	5.30	150	Vert.	118	1
4920.0	55.75	74.00	18.25	17.63	32.82	0.00	5.30	150	Hor.	98	1
5000.0	56.88	74.00	17.12	18.47	33.11	0.00	5.30	150	Vert.	0	1
5400.0	59.02	74.00	14.98	19.52	33.80	0.00	5.70	150	Vert.	356	1
5440.0	59.93	74.00	14.07	20.23	33.80	0.00	5.90	150	Vert.	0	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4760.0	41.62	54.00	12.38	3.73	32.59	0.00	5.30	150	Vert.	282	1
4920.0	42.58	54.00	11.42	4.46	32.82	0.00	5.30	150	Vert.	277	1
5000.0	44.67	54.00	9.33	6.26	33.11	0.00	5.30	150	Vert.	357	1
5400.0	46.72	54.00	7.28	7.22	33.80	0.00	5.70	150	Vert.	348	1
5440.0	46.45	54.00	7.55	6.75	33.80	0.00	5.90	150	Vert.	0	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

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

Result measured with the peak detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	57.71	74.00	16.29	19.52	32.89	0.00	5.30	150	Vert.	81	1
5000.0	57.23	74.00	16.77	18.82	33.11	0.00	5.30	150	Vert.	360	1
5080.0	59.07	74.00	14.93	19.98	33.49	0.00	5.60	150	Vert.	353	1
5360.0	59.60	74.00	14.40	20.10	33.80	0.00	5.70	150	Vert.	359	1
5400.0	58.79	74.00	15.21	19.29	33.80	0.00	5.70	150	Vert.	83	1
5440.0	60.05	74.00	13.95	20.35	33.80	0.00	5.90	150	Vert.	359	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	45.91	54.00	8.09	7.72	32.89	0.00	5.30	150	Vert.	296	1
5000.0	45.30	54.00	8.70	6.89	33.11	0.00	5.30	150	Vert.	357	1
5080.0	48.31	54.00	5.69	9.22	33.49	0.00	5.60	150	Vert.	356	1
5360.0	47.77	54.00	6.23	8.27	33.80	0.00	5.70	150	Vert.	354	1
5400.0	46.78	54.00	7.22	7.28	33.80	0.00	5.70	150	Vert.	346	1
5440.0	47.33	54.00	6.67	7.63	33.80	0.00	5.90	150	Vert.	354	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

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

Result measured with the peak detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	57.37	74.00	16.63	19.18	32.89	0.00	5.30	150	Vert.	80	1
5000.0	58.51	74.00	15.49	20.10	33.11	0.00	5.30	150	Vert.	358	1
5080.0	59.44	74.00	14.56	20.35	33.49	0.00	5.60	150	Vert.	3	1
5360.0	59.73	74.00	14.27	20.23	33.80	0.00	5.70	150	Vert.	2	1
5400.0	58.68	74.00	15.32	19.18	33.80	0.00	5.70	150	Vert.	258	1
5440.0	59.33	74.00	14.67	19.63	33.80	0.00	5.90	150	Vert.	359	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	45.77	54.00	8.23	7.58	32.89	0.00	5.30	150	Vert.	288	1
5000.0	45.44	54.00	8.56	7.03	33.11	0.00	5.30	150	Vert.	358	1
5080.0	48.39	54.00	5.61	9.30	33.49	0.00	5.60	150	Vert.	359	1
5360.0	48.08	54.00	5.92	8.58	33.80	0.00	5.70	150	Vert.	356	1
5400.0	46.76	54.00	7.24	7.26	33.80	0.00	5.70	150	Vert.	348	1
5440.0	47.18	54.00	6.82	7.48	33.80	0.00	5.90	150	Vert.	354	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Transmitter operates at the upper end of the assigned frequency band (operation mode 6)

Result measured with the peak detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	57.48	74.00	16.52	19.29	32.89	0.00	5.30	150	Vert.	320	1
5000.0	57.59	74.00	16.41	19.18	33.11	0.00	5.30	150	Vert.	360	1
5080.0	59.19	74.00	14.81	20.10	33.49	0.00	5.60	150	Vert.	342	1
5360.0	59.85	74.00	14.15	20.35	33.80	0.00	5.70	150	Vert.	353	1
5400.0	58.79	74.00	15.21	19.29	33.80	0.00	5.70	150	Vert.	343	1
5440.0	59.22	74.00	14.78	19.52	33.80	0.00	5.90	150	Vert.	350	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	45.81	54.00	8.19	7.62	32.89	0.00	5.30	150	Vert.	356	1
5000.0	45.28	54.00	8.72	6.87	33.11	0.00	5.30	150	Vert.	0	1
5080.0	48.42	54.00	5.58	9.33	33.49	0.00	5.60	150	Vert.	357	1
5360.0	47.95	54.00	6.05	8.45	33.80	0.00	5.70	150	Vert.	348	1
5400.0	46.80	54.00	7.20	7.30	33.80	0.00	5.70	150	Vert.	352	1
5440.0	47.27	54.00	6.73	7.57	33.80	0.00	5.90	150	Vert.	350	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Transmitter operates at the lower end of the assigned frequency band (operation mode 7)

Result measured with the peak detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	57.01	74.00	16.99	18.82	32.89	0.00	5.30	150	Vert.	358	1
5000.0	57.46	74.00	16.54	19.05	33.11	0.00	5.30	150	Vert.	355	1
5080.0	59.07	74.00	14.93	19.98	33.49	0.00	5.60	150	Vert.	356	1
5360.0	59.60	74.00	14.40	20.10	33.80	0.00	5.70	150	Vert.	0	1
5400.0	59.48	74.00	14.52	19.98	33.80	0.00	5.70	150	Vert.	2	1
5440.0	60.42	74.00	13.58	20.72	33.80	0.00	5.90	150	Vert.	0	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	45.33	54.00	8.67	7.14	32.89	0.00	5.30	150	Vert.	299	1
5000.0	46.06	54.00	7.94	7.65	33.11	0.00	5.30	150	Vert.	357	1
5080.0	48.18	54.00	5.82	9.09	33.49	0.00	5.60	150	Vert.	358	1
5360.0	48.12	54.00	5.88	8.62	33.80	0.00	5.70	150	Vert.	352	1
5400.0	46.99	54.00	7.01	7.49	33.80	0.00	5.70	150	Vert.	347	1
5440.0	48.25	54.00	5.75	8.55	33.80	0.00	5.90	150	Vert.	354	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Transmitter operates at the middle of the assigned frequency band (operation mode 8)

Result measured with the peak detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	57.24	74.00	16.76	19.05	32.89	0.00	5.30	150	Vert.	360	1
5000.0	57.35	74.00	16.65	18.94	33.11	0.00	5.30	150	Vert.	3	1
5080.0	58.96	74.00	15.04	19.87	33.49	0.00	5.60	150	Vert.	358	1
5360.0	59.98	74.00	14.02	20.48	33.80	0.00	5.70	150	Vert.	356	1
5400.0	59.25	74.00	14.75	19.75	33.80	0.00	5.70	150	Vert.	355	1
5440.0	59.80	74.00	14.20	20.10	33.80	0.00	5.90	150	Vert.	359	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
4960.0	45.80	54.00	8.20	7.61	32.89	0.00	5.30	150	Vert.	356	1
5000.0	44.65	54.00	9.35	6.24	33.11	0.00	5.30	150	Vert.	0	1
5080.0	48.51	54.00	5.49	9.42	33.49	0.00	5.60	150	Vert.	356	1
5360.0	48.29	54.00	5.71	8.79	33.80	0.00	5.70	150	Vert.	352	1
5400.0	46.84	54.00	7.16	7.34	33.80	0.00	5.70	150	Vert.	348	1
5440.0	47.32	54.00	6.68	7.62	33.80	0.00	5.90	150	Vert.	351	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

5.7.6 Test results (radiated emissions) – cabinet emissions

5.7.6.1 Preliminary radiated emission measurement

Ambient temperature	22 °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: For detail information of test set-up and the cable guide refer to the pictures in Table 2.

Test record: All results are shown in the following.

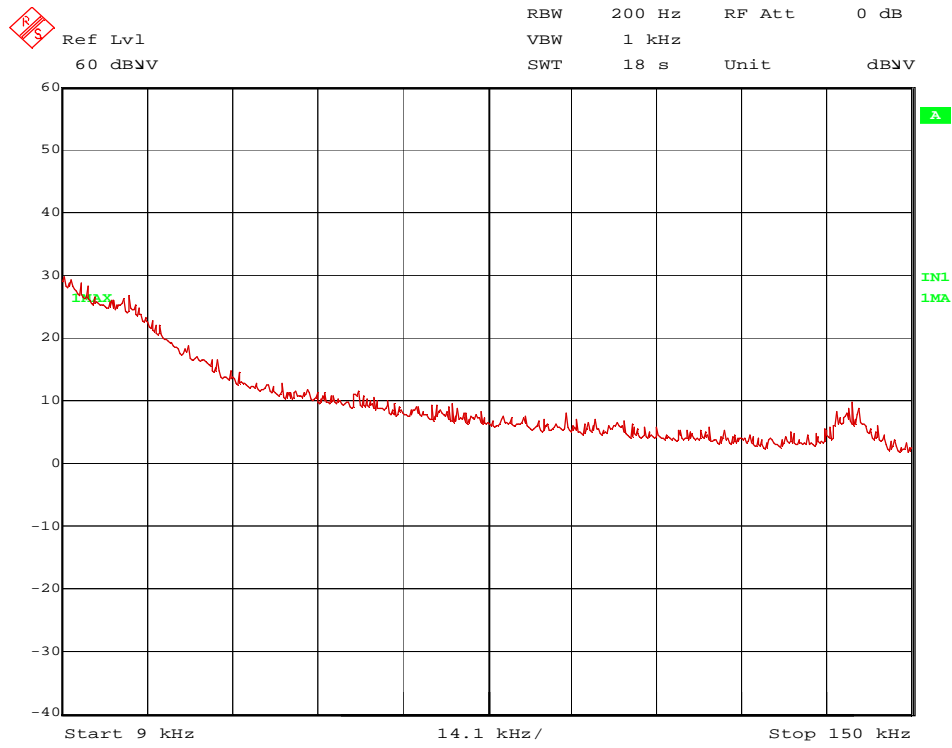
Supply voltage: During all measurements the host of the EUT was powered with 24 V via an AC/DC Adapter.

Remark: Document [3] states in 12.2.1, that in case of conducted measurements, additional radiated cabinet emission measurements must be performed. The measurements were performed at the worst case modulation, namely 802.11n20 mode with at channel 36, 40 and 48.

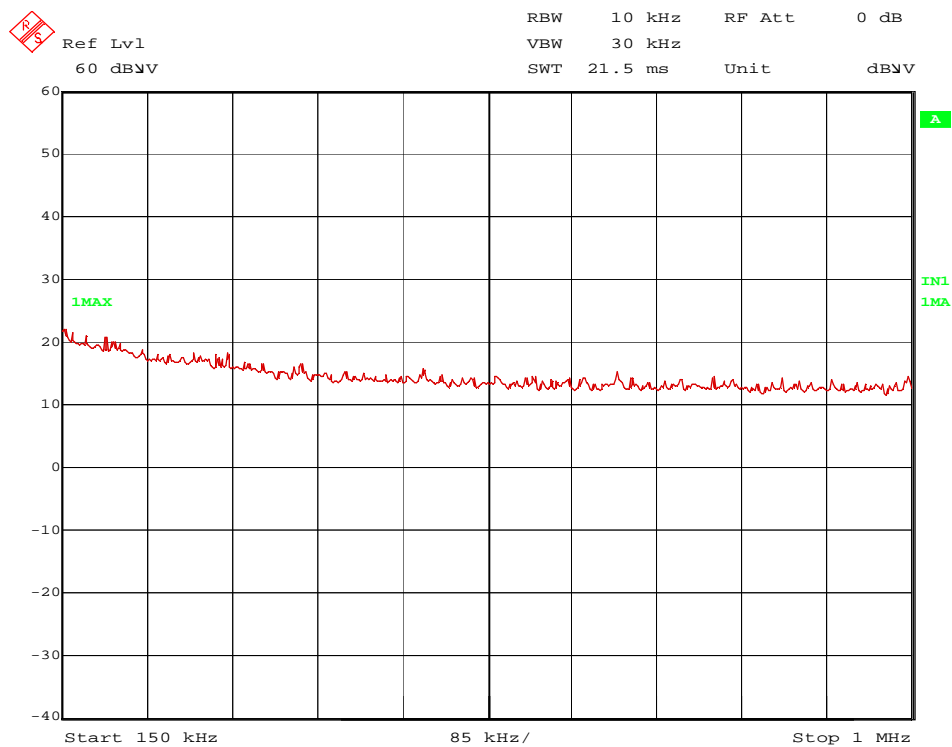
Only the plots of the worst case emissions are submitted for every frequency range above 1 GHz in the preliminary results.

The Emissions below 1 GHz were equal for all antenna ports, transmit frequencies, modulation schemes and data rates. Therefore only the results of an exemplary test case are submitted below.

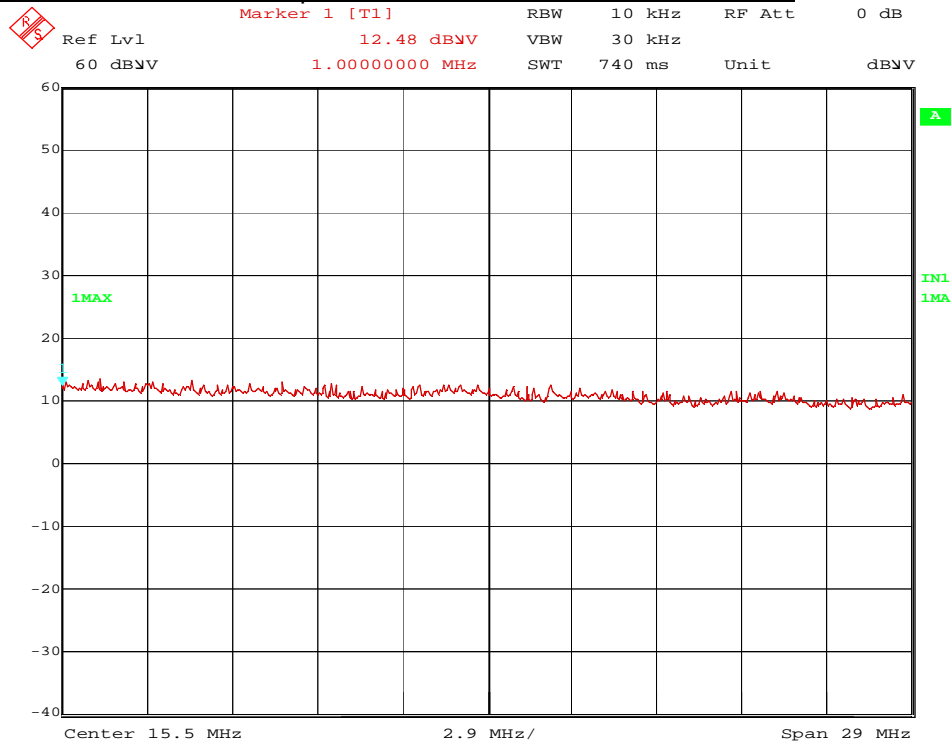
130254 9-150k bMode ch6.wmf: Spurious emissions from 9 kHz to 150 kHz:



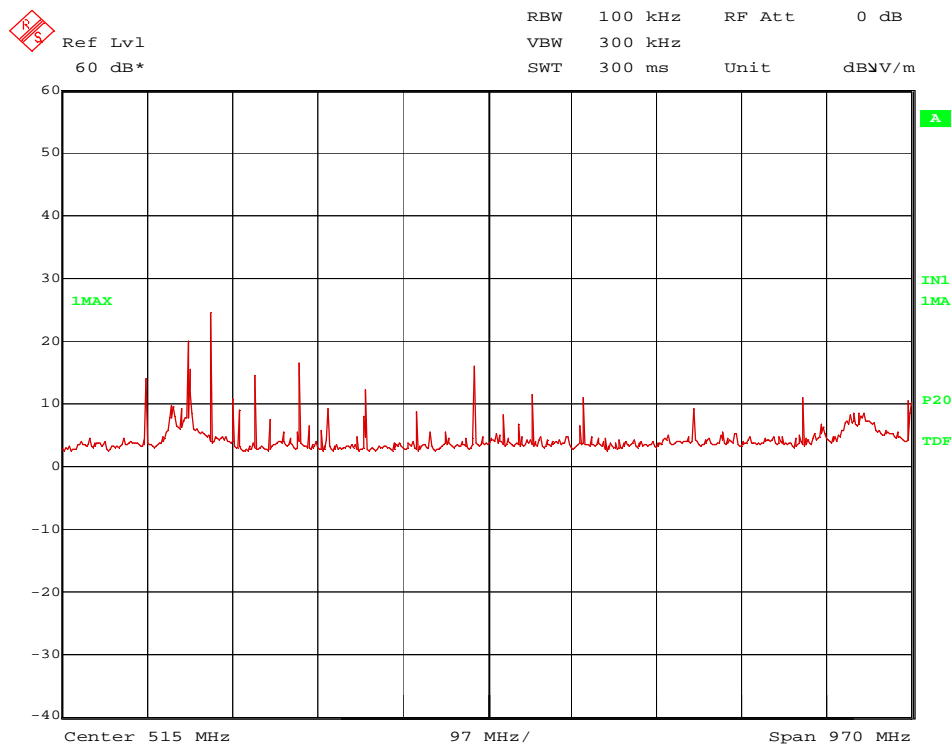
130254 150k-1M bMode ch6.wmf: Spurious emissions from 150 kHz to 1 MHz:



130254_1M-30M_bMode_ch6.wmf: Spurious emissions from 1 MHz to 30 MHz:

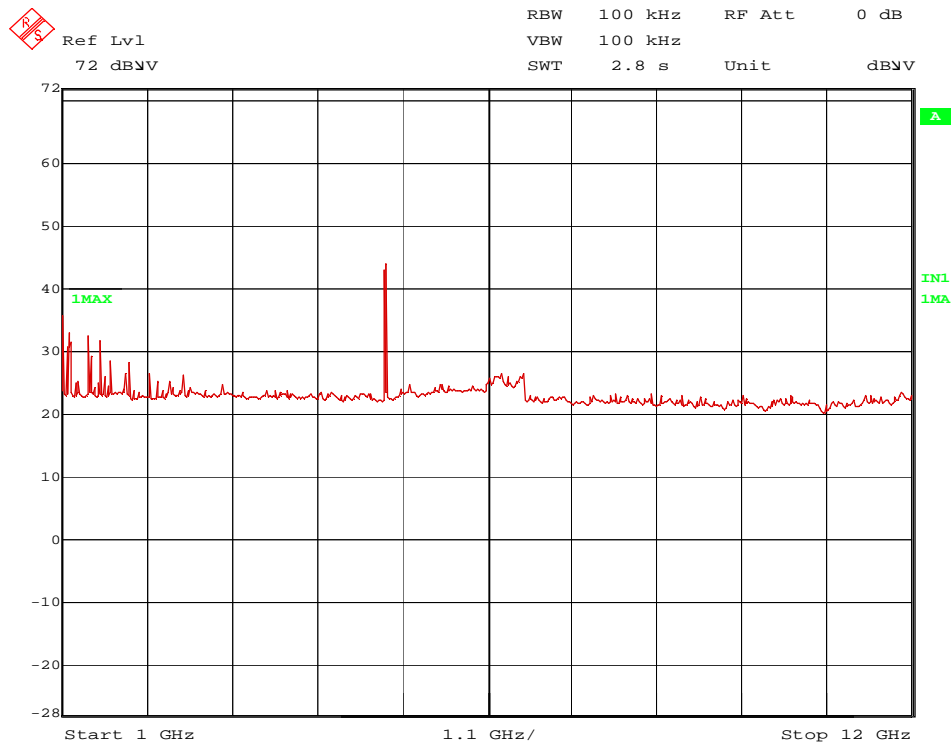


130254_30M-1G_bMode_ch6.wmf: Spurious emissions from 30 MHz to 1 GHz:

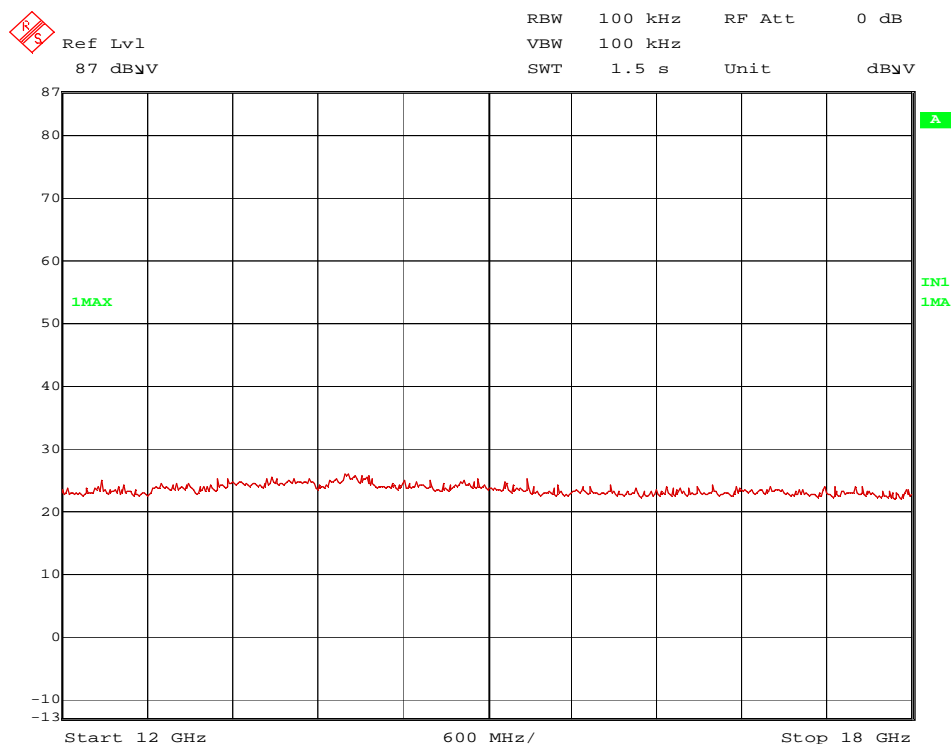


Transmitter operates at the upper end of the assigned frequency band (operation mode 4)

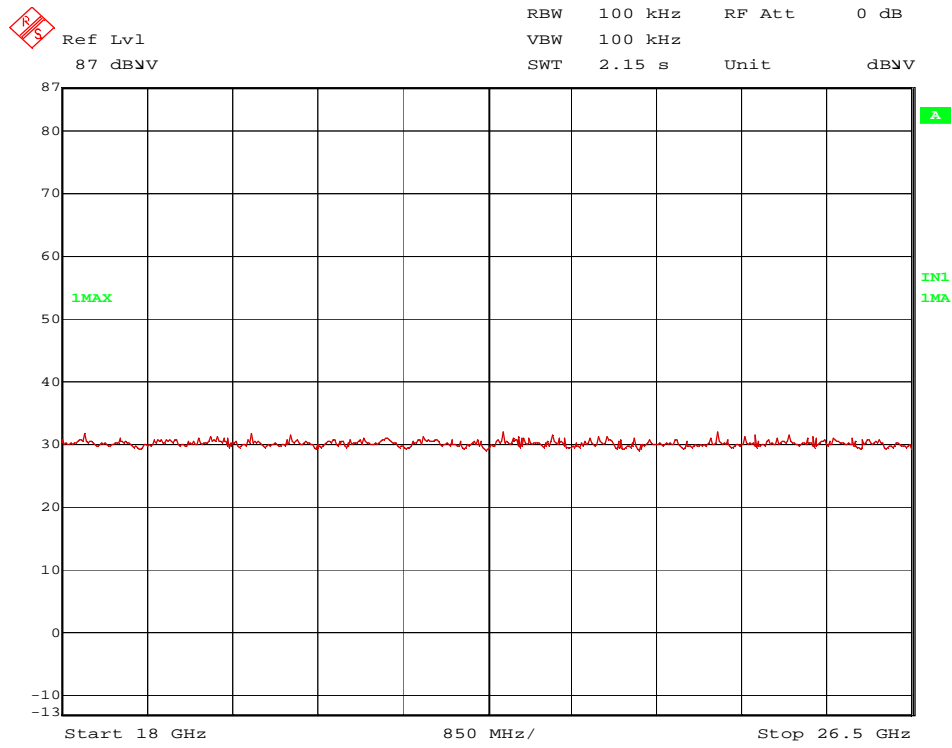
130254_SpurEmiss_1-12G_36_n20-mode.wmf: Spurious emissions from 1 GHz to 12 GHz (operation mode 4):



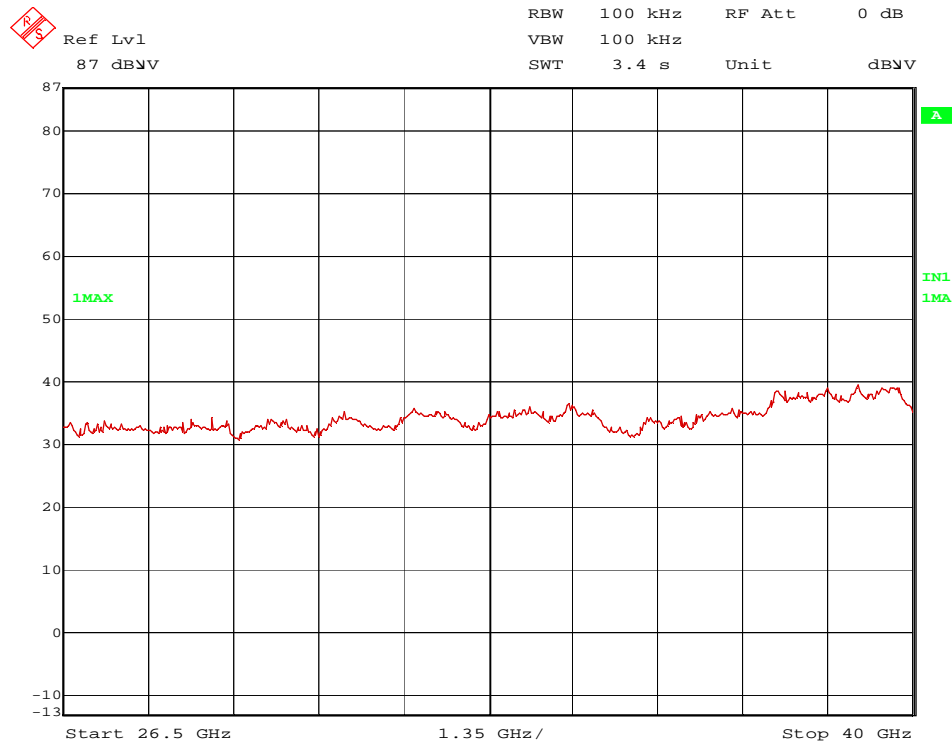
254_04.wmf: Spurious emissions from 12 GHz – 18 GHz (operation mode 4):



254_13.wmf: Spurious emissions from 18 GHz – 26.5 GHz (operation mode 4):



254 19.wmf: Spurious emissions from 26.5 GHz – 40 GHz (operation mode 4):



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

- 125 MHz, 250 MHz, 1000 MHz, 1066 MHz, 1099 MHz and 1333 MHz.

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

- 175 MHz, 200 MHz, 225 MHz, 233.33 MHz, 300 MHz, 375 MHz, 433 MHz, 500 MHz, 566 MHz and 5185.1 MHz.

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

TEST EQUIPMENT USED FOR THE TEST:
29, 31 – 37, 39 - 44, 46, 49 – 51, 55, 72, 73

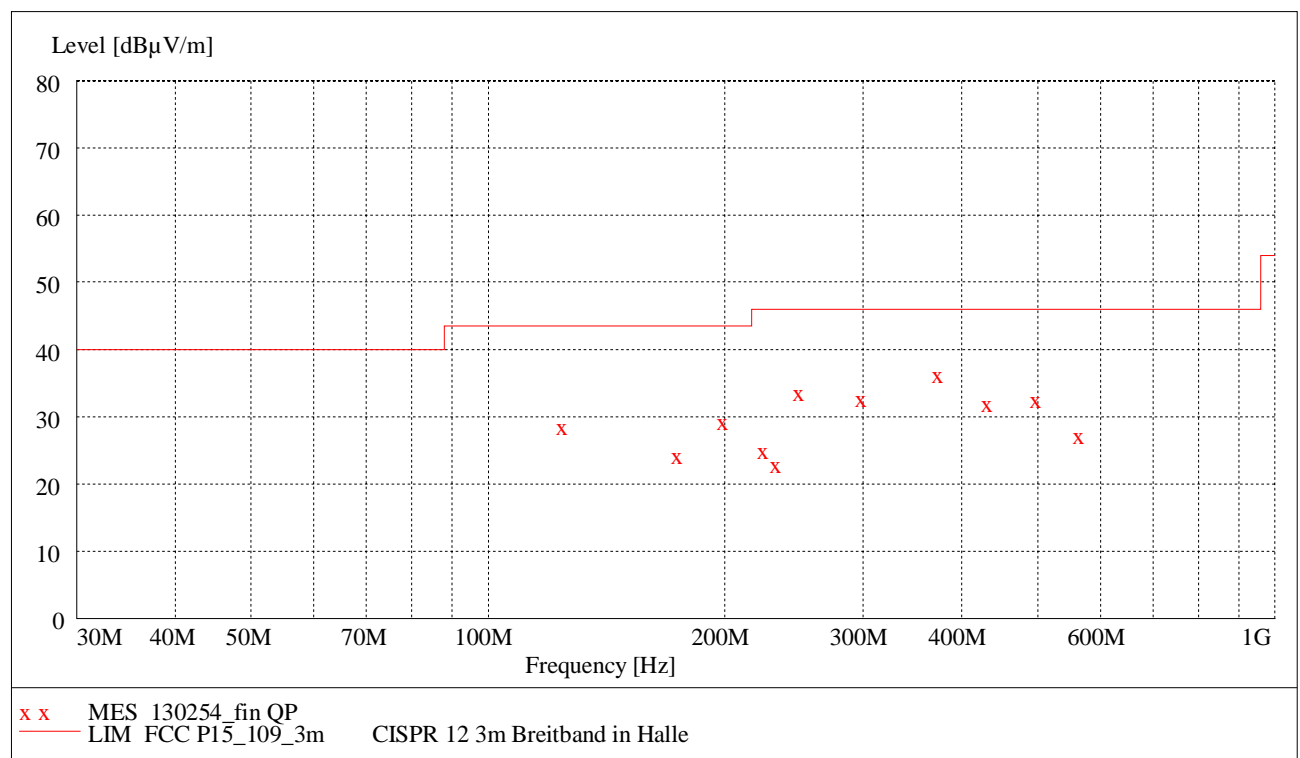
5.7.6.2 Final radiated emission measurement (9 kHz to 1 GHz)

Ambient temperature	22 °C	Relative humidity	55 %
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Title: final measurement on 3 m open area test site

EUT: EWLAN1
 Manufacturer: Hirschmann Automation and Control GmbH
 Operating Condition: Continuous Transmission
 Test site: PHOENIX TESTLAB GmbH, BLOMBERG; open area test site M6
 Operator: P. Neufeld
 Test Specification: Transmitting on channel 6, b-mode, 2dB Power Reduction
 Comment: Profile: Egalistan
 15.07.2013 / 15:42:57

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 "x" are the measured results of the standard subsequent measurement on the open area test site.



Data record name: 130254 of 15.07.2013

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 10 m measuring distance.

Result measured with the quasipeak detector (marked by an x):

Frequency MHz	Level dB μ V/m	Transducer dB	Limit dB μ V/m	Margin dB	Height cm	Azimuth deg	Polarisation
125.000000	28.90	14.1	43.5	14.6	125.0	25.00	VERTICAL
175.000000	24.60	12.4	43.5	18.9	100.0	91.00	VERTICAL
200.000000	29.70	11.7	43.5	13.8	101.0	206.00	HORIZONTAL
225.000000	25.30	12.9	46.0	20.7	113.0	204.00	HORIZONTAL
233.330000	23.30	13.5	46.0	22.7	118.0	201.00	HORIZONTAL
250.000000	34.00	15.1	46.0	12.0	100.0	340.00	HORIZONTAL
300.000000	33.10	16.4	46.0	12.9	100.0	213.00	HORIZONTAL
375.000000	36.70	18.5	46.0	9.3	100.0	200.00	HORIZONTAL
433.330000	32.40	20.4	46.0	13.6	198.0	189.00	HORIZONTAL
500.000000	32.90	21.9	46.0	13.1	154.0	328.00	HORIZONTAL
566.660000	28.50	24.1	46.0	17.5	375.0	232.00	VERTICAL

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

14 - 20

5.7.6.3 Final radiated emission measurement (1 GHz to 40 GHz)

Ambient temperature	23 °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: For detail information of test set-up and 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 host of the EUT was powered with 24 V via an AC/DC Adapter.

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

Comment: For simplification, all emissions were tested using the restricted band limits. Chapter 11.1 c) in document [3] states, that attenuation below 15.209 limits is not required.

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

Result measured with the peak detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
5185.1	71.90	-	-	57.93	33.77	25.60	5.80	150	Vert.	351	1
1000.0	47.48	74.00	26.52	47.54	24.04	26.50	2.40	150	Vert.	3	1
1066.0	33.22	74.00	40.78	33.22	24.20	26.50	2.30	150	Vert.	170	1
1100.0	39.29	74.00	34.71	38.82	24.47	26.50	2.50	150	Vert.	56	1
1125.0	37.85	74.00	36.15	37.38	24.47	26.50	2.50	150	Vert.	165	1
1333.0	37.57	74.00	36.43	36.28	24.99	26.50	2.80	150	Vert.	179	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
5185.1	62.47	-	-	48.50	33.77	25.60	5.80	150	Vert.	353	1
1000.0	33.88	54.00	20.12	33.94	24.04	26.50	2.40	150	Vert.	12	1
1066.0	21.53	54.00	32.47	21.53	24.20	26.50	2.30	150	Vert.	175	1
1100.0	32.49	54.00	21.51	32.02	24.47	26.50	2.50	150	Hor.	202	1
1125.0	29.71	54.00	24.29	29.24	24.47	26.50	2.50	150	Hor.	207	1
1333.0	31.39	54.00	22.61	30.10	24.99	26.50	2.80	150	Vert.	179	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

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

Result measured with the peak detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
5201.2	70.56	-	-	56.59	33.77	25.60	5.80	150	Hor.	165	1
1000.0	47.48	74.00	26.52	47.54	24.04	26.50	2.40	150	Vert.	4	1
1066.0	33.62	74.00	40.38	33.62	24.20	26.50	2.30	150	Vert.	90	1
1100.0	38.94	74.00	35.06	38.47	24.47	26.50	2.50	150	Vert.	159	1
1125.0	37.73	74.00	36.27	37.26	24.47	26.50	2.50	150	Hor.	199	1
1333.0	39.40	74.00	34.60	38.11	24.99	26.50	2.80	150	Vert.	282	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
5201.2	60.83	-	-	46.86	33.77	25.60	5.80	150	Hor.	165	1
1000.0	33.84	54.00	20.16	33.90	24.04	26.50	2.40	150	Vert.	16	1
1066.0	21.90	54.00	32.10	21.90	24.20	26.50	2.30	150	Vert.	165	1
1100.0	32.43	54.00	21.57	31.96	24.47	26.50	2.50	150	Hor.	199	1
1125.0	29.81	54.00	24.19	29.34	24.47	26.50	2.50	150	Hor.	199	1
1333.0	30.68	54.00	23.32	29.39	24.99	26.50	2.80	150	Vert.	176	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Transmitter operates at the upper end of the assigned frequency band (operation mode 6)

Result measured with the peak detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
5245.4	72.50	-	-	58.53	33.77	25.60	5.80	150	Vert.	273	1
1000.0	47.48	74.00	26.52	47.54	24.04	26.50	2.40	150	Vert.	7	1
1066.0	33.47	74.00	40.53	33.47	24.20	26.50	2.30	150	Vert.	335	1
1100.0	38.58	74.00	35.42	38.11	24.47	26.50	2.50	150	Vert.	163	1
1125.0	39.87	74.00	34.13	39.40	24.47	26.50	2.50	150	Vert.	267	1
1333.0	37.32	74.00	36.68	36.03	24.99	26.50	2.80	150	Hor.	300	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency MHz	Meas. Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Turntable Angle	Pos.
5245.4	62.99	-	-	49.02	33.77	25.60	5.80	150	Vert.	273	1
1000.0	33.83	54.00	20.17	33.89	24.04	26.50	2.40	150	Vert.	12	1
1066.0	21.66	54.00	32.34	21.66	24.20	26.50	2.30	150	Vert.	174	1
1100.0	32.29	54.00	21.71	31.82	24.47	26.50	2.50	150	Hor.	199	1
1125.0	29.85	54.00	24.15	29.38	24.47	26.50	2.50	150	Hor.	207	1
1333.0	31.03	54.00	22.97	29.74	24.99	26.50	2.80	150	Vert.	176	1
Measurement uncertainty						+2.2 dB / -3.6 dB					

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:
29, 31 – 37, 39 - 44, 46, 49 – 51, 55, 72, 73

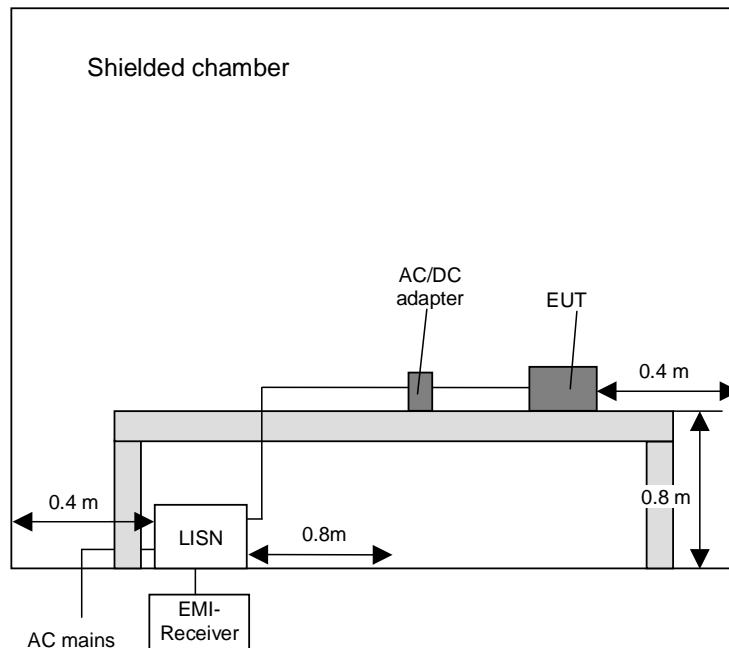
5.8 Conducted emissions on power supply lines (150 kHz to 30 MHz)

5.8.1 Method of measurement

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



5.8.2 Test results (conducted emissions on power supply lines)

Ambient temperature	20 °C	Relative humidity	27 %
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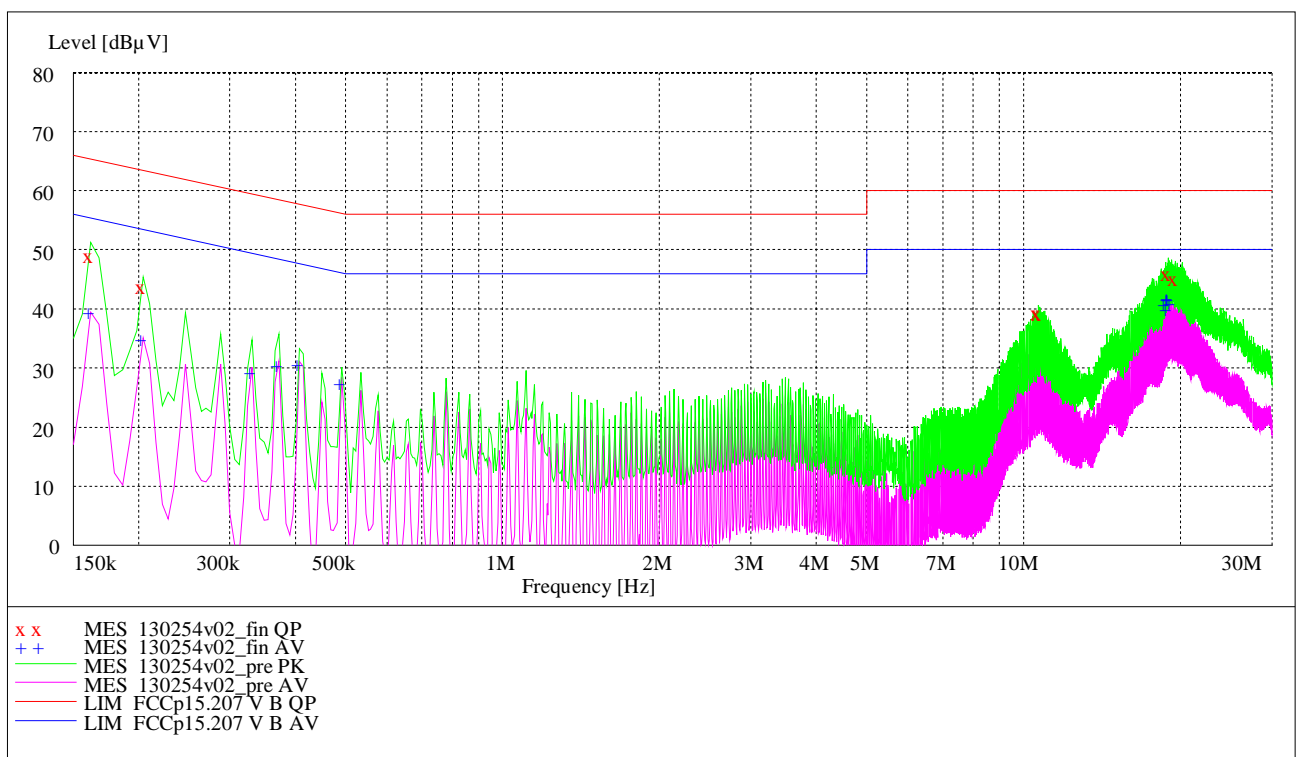
Position of EUT: For the test the EUT together with the basic unit were plugged into a laptop PC via an Ethernet cable. To emulate a real use case, a connection between the laptop PC connected by Ethernet and another laptop PC connected wirelessly to the Access Point was established. To emulate real traffic, an iperf stream was sent from one laptop PC to the other. The laptop PC with the inserted 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.

Test record: All results are shown in the following.

Supply voltage: During all measurements the host of the EUT was supplied by a 100 – 240 V AC to 24 V DC converter. Measurement performed with US 120V/60Hz. For the test a MINI-PS-100-240AC/24DC/1 from Phoenix Contact was used.

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: 130254v02

Result measured with the quasipeak detector (marked by an x):

Frequency MHz	Level dB μ V	Transducer dB	Limit dB μ V	Margin dB	Line	PE
0.162000	49.30	1.5	65.4	16.1	N	FLO
0.204000	44.00	1.0	63.4	19.4	L1	FLO
10.680000	39.80	1.4	60.0	20.2	N	GND
10.722000	39.60	1.4	60.0	20.4	N	GND
18.978000	46.30	2.3	60.0	13.7	L1	GND
19.554000	45.60	2.4	60.0	14.4	L1	FLO

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

1 – 4, 20

6 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

No.	Test equipment	Type	Manufacturer	Serial No.	PM. No.	Cal. Date	Cal. Due
1	Shielded chamber M47	-	Albatross Projects	B83117-C6439-T262 -	480662	Weekly verification (system cal.)	
2	EMI Receiver	ESIB 26	Rohde & Schwarz	1088.7490	481182	03/09/2012	03/2014
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	02/15/2012	02/2014
16	Controller	HD100	Deisel	100/670	480139	-	-
17	Turntable	DS420HE	Deisel	420/620/80	480087	-	-
18	Antenna support	MA240-0	Inn-Co GmbH	MA240- 0/030/6600603	480086	-	-
19	Antenna	CBL6111 D	Chase	25761	480894	09/28/2011	09/2014
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	02/15/2012	02/2014
31	Measuring receiver	ESI 40	Rohde & Schwarz	100064	480355	02/13/2012	02/2014
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	04/21/2011	04/2014
36	Antenna	3115 A	EMCO	9609-4918	480183	11/09/2011	11/2014
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.)	
40	Standard Gain Horn Antenne 26.4 – 40.1 GHz	22240-20	Flann Microwave	469	480229	Six month verification (system cal.)	
41	RF-cable No. 3	Sucoflex 106B	Huber&Suhner	0563/6B / Kabel 3	480670	Weekly verification (system cal.)	
42	RF-cable No. 40	Sucoflex 106B	Huber&Suhner	0708/6B / Kabel 40	481330	Weekly 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.)	
55	Loop antenna	HFH2-Z2	Rohde & Schwarz	832609/014	480059	02/16/2012	02/2014
60	Power Meter	NRVD	Rohde & Schwarz	833697/030	480589	02/15/2012	02/2014
61	Thermal Power Sensor	NRV-Z51	Rohde & Schwarz	825948/004	480247	07/15/2013	07/2014
72	4 GHz High Pass Filter	WHKX4.0/18 G-8SS	Wainwright Instruments	1	480587	Weekly verification (system cal.)	
73	Single Control Unit	SCU	Maturo GmbH	SCU/006/971107	480831	Calibration not necessary	
80	High-pass Filter	H26G40G1	Microwave Circuits, Inc.	33471	480593	Six month verification (system cal.)	

7 REPORT HISTORY

Report Number	Date	Comment
F122165E3	17 September 2013	Document created

8 LIST OF ANNEXES

ANNEX A TEST SET-UP PHOTOS 7 pages

- 133448_01: Test setup - Radiated emission, Antennas terminated (open area test site)
- 133448_02: Test setup - Radiated emission, Antennas terminated (fully anechoic chamber)
- 133448_03: Test setup - Radiated emission, Antenna BAT-ANT-N-3AGN-F (fully anechoic chamber)
- 133448_04: Test setup - Radiated emission, Antenna BAT-ANT-RSMA-2AGN-R (fully anechoic chamber)
- 133448_05: Test setup - Radiated emission, Antenna BAT-ANT-N-MiMoDB-5N-IP65 (fully anechoic chamber)
- 133448_06: Test setup - Radiated emission, Antenna BAT-ANT-N-9A-DS-IP65 (fully anechoic chamber)
- 133448_07: Test setup – conducted measurements at the antenna port
- 133448_18: Test setup – conducted emissions on power supply lines

ANNEX B EXTERNAL PHOTOGRAPHS 3 pages

- 133448_08.JPG: EUT + Ancillary Device, 3D view 1
- 133448_09.JPG: EUT + Ancillary Device, 3D view 1
- 133448_10.JPG: Adapter board for test purposes

ANNEX C INTERNAL PHOTOGRAPHS 3 pages

- 133448_13.JPG: EUT - top view, with shielding
- 133448_16.JPG: EUT - top view, shielding removed
- 133448_14.JPG: EUT – bottom view