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Test Report

Report Number: F122097E1

Applicant:

Bury GmbH & Co. KG

Manufacturer:

Bury GmbH & Co. KG

Equipment under Test (EUT):

Bentley - BY621 BT handset and cradle

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

REFERENCES

[1] **ANSI C63.4-2009** American National Standard for Methods of Measuring of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

[2] **FCC CFR 47 Part 15 (August 2011)** Radio Frequency Devices

[3] **FCC Public Notice DA 00-705 (March 2000)**

[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 Radio Apparatus

[6] **Publication Number 913591 (March 2007)** Measurement of radiated emissions at the edge of the band for a Part 15 RF Device

TEST RESULT

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

Test engineer:	Paul NEUFELD		10 July 2012
	Name	Signature	Date
Authorized reviewer:	Thomas KÜHN		10 July 2012
	Name	Signature	Date

RESERVATION

This test report is only valid in its original form.

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1 IDENTIFICATION

1.1 Applicant

Name:	Bury GmbH & Co. KG
Address:	Robert-Koch-Str. 1 - 7
	32584 Löhne
Country:	Germany
Name for contact purposes:	Mr. Damian SZUDY
Phone:	+49 (0) 5732-9706-266
Fax:	+49 (0) 5732-9706-298
Mail address:	szudy@bury.com

1.2 Manufacturer

Name:	Bury GmbH & Co. KG
Address:	Robert-Koch-Str. 1 - 7
	32584 Löhne
Country:	Germany
Name for contact purposes:	Mr. Damian SZUDY
Phone:	+49 (0) 5732-9706-266
Fax:	+49 (0) 5732-9706-298
Mail address:	szudy@bury.com

1.3 Test laboratory

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

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

1.4 EUT (Equipment Under Test)

Equipment under test: *	Handset + Cradle
Model name: *	Bentley - BY621 BT handset and cradle
Article number: *	M0855_02
FCC ID:	QZ9-BTHANDSET
IC:	n.a.
Serial number:	412001941850 (radiated) and 412001940973 (conducted)
PCB identifier: *	BL6375
Hardware version:	HW0008
Software version:	SW372

1.5 Technical data of equipment

Channel 0	RX:	2402 MHz	TX:	2402 MHz
Channel 39	RX:	2441 MHz	TX:	2441 MHz
Channel 78	RX:	2480 MHz	TX:	2480 MHz

Fulfills Bluetooth specification: *	V. 2.1 with EDR					
Antenna type: *	Mica – SMD antenna					
Antenna model number	30 30 A5645 – 01					
Antenna manufacturer	Giga Ant					
Antenna gain: *	2 dBi					
Rated output power: *	4 dBm					
Antenna connector: *	None (SMA connector temporary installed for conducted tests)					
Power supply: *	U_{nom}=	12.0 V DC	U_{min}=	9.0 V_{DC}	U_{max}=	16.0 V_{DC}
Type of modulation: *	FHSS (GFSK, π/4-DQPSK, 8DPSK)					
Operating frequency range:*	2402 MHz to 2480 MHz					
Number of channels: *	79					
Temperature range: *	-20 °C to +75 °C					
Lowest / highest Internal clock frequency: *	32.768 kHz / 32.000 MHz					

*: declared by the applicant

The following external I/O cables were used:

none

Dates

Date of receipt of test sample:	31 May 2012
Start of test:	25 June 2012
End of test:	03 July 2012

2 OPERATIONAL STATES

The EUT is a telephone handset with a charging cradle designed for car installation. The handset establishes a Bluetooth connection to the head unit inside the car, where the SIM card reader and the mobile phone parts are located. The cradle is only used for charging the handset and is powered with 12 V from the vehicular battery.
The tests were carried out on two EUTs, one with an internal antenna, used for radiated tests (spurious emissions and band edge compliance) and one with a temporary antenna connector, used for conducted tests (all other tests).

During the tests, the EUTs were powered with 12 V from an external power supply. The operation modes were changed via connection with a temporary UART interface to a COM port on a PC. While the tests were running, the UART connection was removed and the device continued operating according to the last set operation mode.

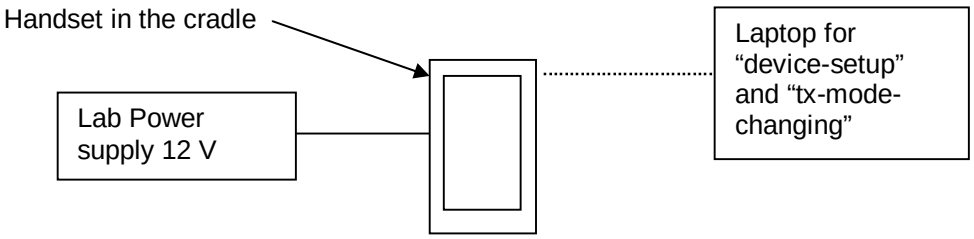
For the setup, the device was programmed with a script delivered by the applicant. With the “btcli”-program, contained in the BlueTest software suite, the device role and the Bluetooth test mode were set. After starting the BlueTest3 software the operation modes, as they are listed in the table below, were changed according to the specific test case.

The default values for the Bluetooth hopping mode GFSK – 1Mbps were: type = 4 and size = 27. For π/4-DQPSK modulation and 2 Mbps, it was type = 27 and size = 552 and for 8DPSK modulation and 3 Mbps it was type = 31 and size = 1021.

The Settings for Power (Ext, Int) were set to default. Therefore the internal amplifier had a value of 50 and the external amplifier a value of 255. The following test report is only valid with the afore mentioned settings.

The following operation modes were used during the tests:

Operation mode	Description of the operation mode	Modulation	Data rate / Mbps
1 1a 1b	Continuous transmitting on 2402 MHz	GFSK π/4-DQPSK 8DPSK	1 2 3
2 2a 2b	Continuous transmitting on 2441 MHz	GFSK π/4-DQPSK 8DPSK	1 2 3
3 3a 3b	Continuous transmitting on 2480 MHz	GFSK π/4-DQPSK 8DPSK	1 2 3
4 4a 4b	Transmitter hopping on all channels	GFSK π/4-DQPSK 8DPSK	1 2 3



Preliminary tests were performed in different data rates and different orthogonal directions, to find worst-case configuration and position. The data rate shown in the table below shows the found worst-case rate with respect to specific test item. In test cases where no difference was found between varying data rates, 1 Mbps data rate was adjusted. The following table shows a list of the test modes used for the results, documented in this report. The radiated emission measurement was carried out in the orthogonal direction that emits the highest spurious emission levels.

The three orthogonal axes were defined as Pos. 1 – device lying flat, Pos. 2 - device lying on the side and Pos. 3 – device standing vertical.

The following test modes were adjusted during the tests:

Test items	Operation mode
20 dB bandwidth	1b, 2b, 3b (3 Mbps)
Carrier frequency separation	1, 2, 3 (1 Mbps)
Number of hopping channels	4
Dwell time	2, 2a, 2b (1-, 2- and 3 Mbps)
Maximum peak output power	1, 1a, 1b, 2, 2a, 2b, 3, 3a and 3b (1-, 2- and 3 Mbps)
Band edge compliance (radiated)	1, 3, 4 (1 Mbps)
Radiated emissions (transmitter)	1, 2, 3 (1 Mbps)

3 ADDITIONAL INFORMATION

none

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
20 dB bandwitdh	General	15.247 (a) (1)	A8.1 (a) [4]	Passed	9 et seq.
Carrier frequency separation	General	15.247 (a) (1)	A8.1 (b) [4]	Passed	15 et seq.
Number of hopping channels	2400.0 - 2483.5	15.247 (a) (1) (iii)	A8.1 (c) [4]	Passed	18 et seq.
Dwell time	2400.0 - 2483.5	15.247 (a) (1) (iii)	A8.1 (d) [4]	Passed	20 et seq.
Maximum peak output power	2400.0 - 2483.5	15.247 (b) (1)	A8.4 (2) [4]	Passed	24 et seq.
Band edge compliance	2400.0 - 2483.5	15.247 (d)	A8.5 [4]	Passed	30 et seq.
Radiated emissions (transmitter)	0.009 - 25,000	15.205 (a) 15.209 (a)	A8.5 [4] 2.5 [4]	Passed	35 et seq.
Conducted emissions on supply line	0.15 - 30	15.207 (a)	7.2.2 [5]	Not applicable *	

*: Not applicable because of vehicular environment.

5 TEST RESULTS

5.1 20 dB bandwidth

5.1.1 Method of measurement (20 dB bandwidth)

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

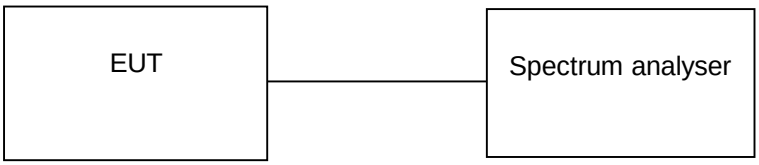
The following spectrum analyser settings shall be used:

- Span: App. 2 to 3 times the 20 dB bandwidth, centred on the actual hopping channel.
- Resolution bandwidth: ≥ 1 % of the 20 dB bandwidth.
- Video bandwidth: ≥ the resolution bandwidth.
- Sweep: Auto.
- Detector function: peak.
- Trace mode: Max hold.

After trace stabilisation the marker shall be set on the signal peak. The first display line has to be set on this value. The second display line has to be set 20 dB below the first line (or the peak marker). The frequency lines shall be set on the intersection points between the second display line and the measured curve.

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

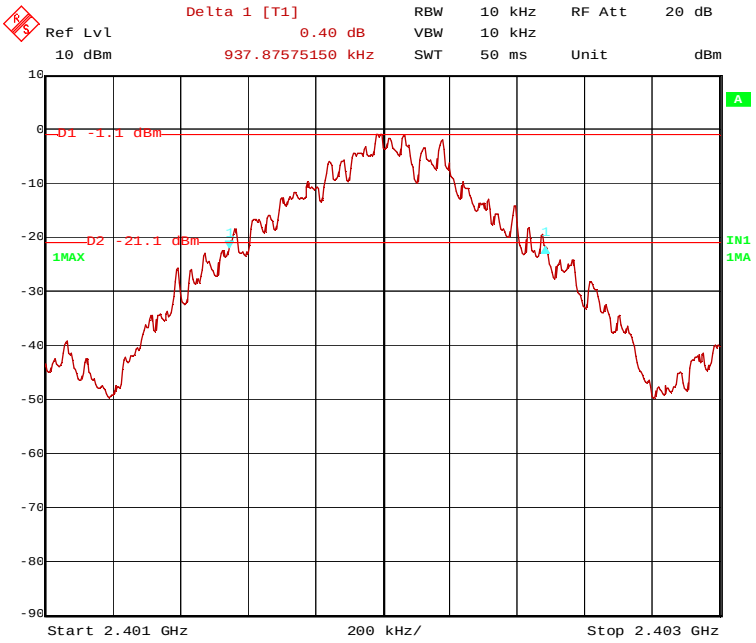
Test set-up:



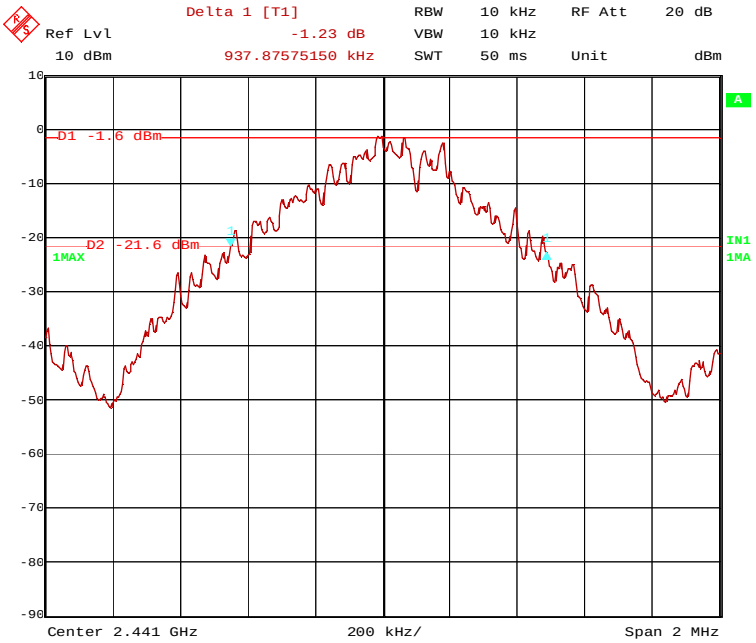
5.1.2 Test results (20 dB bandwidth)

Ambient temperature	22 °C		Relative humidity	54 %

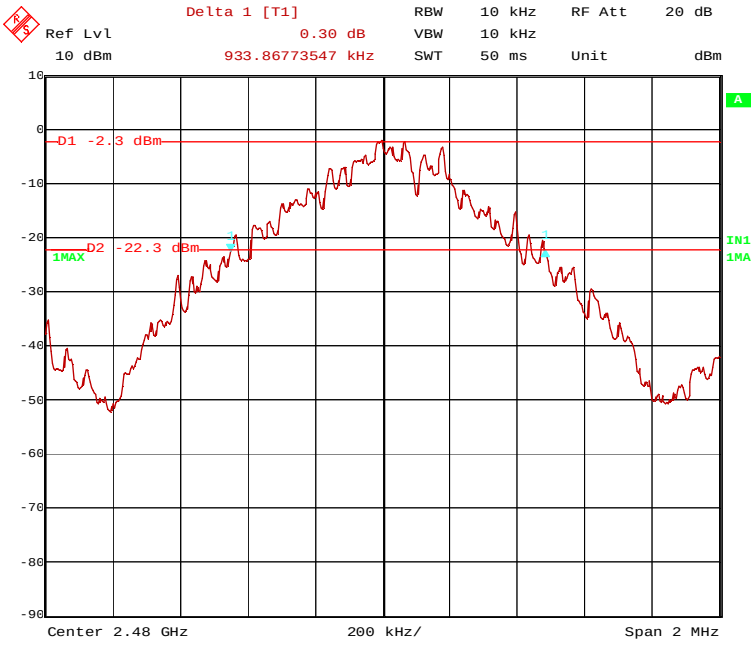
122097_48.wmf: 20 dB bandwidth at the lower end of the assigned frequency band (mode 1):



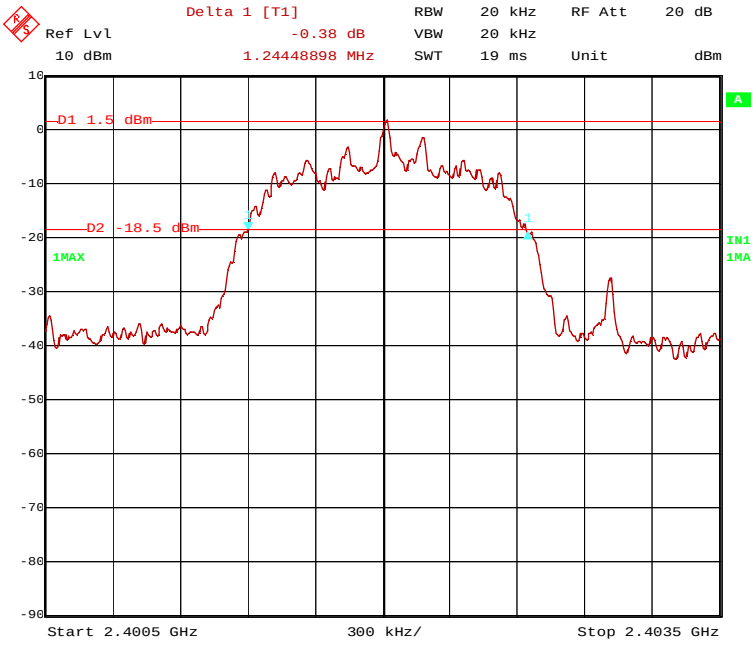
122097_49.wmf: 20 dB bandwidth at the middle of the assigned frequency band (mode 2):



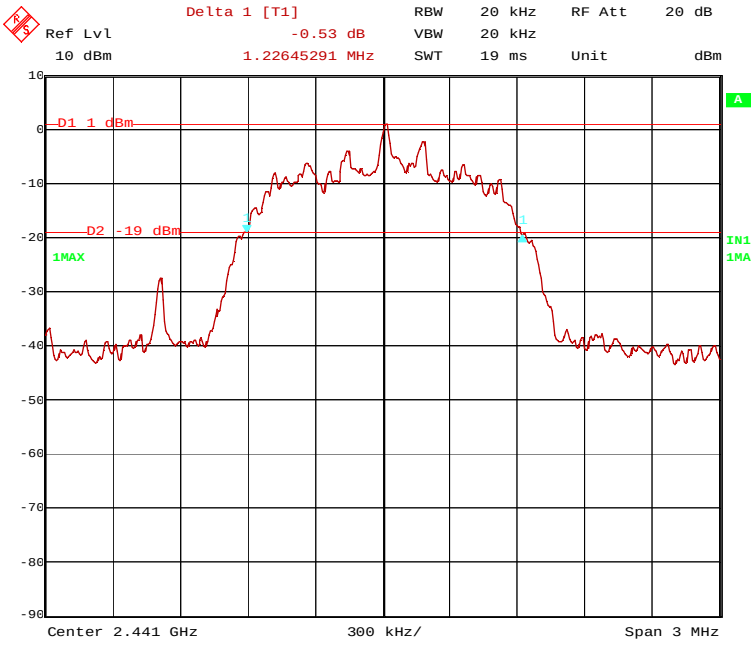
122097_49.wmf: 20 dB bandwidth at the upper end of the assigned frequency band (mode 3):



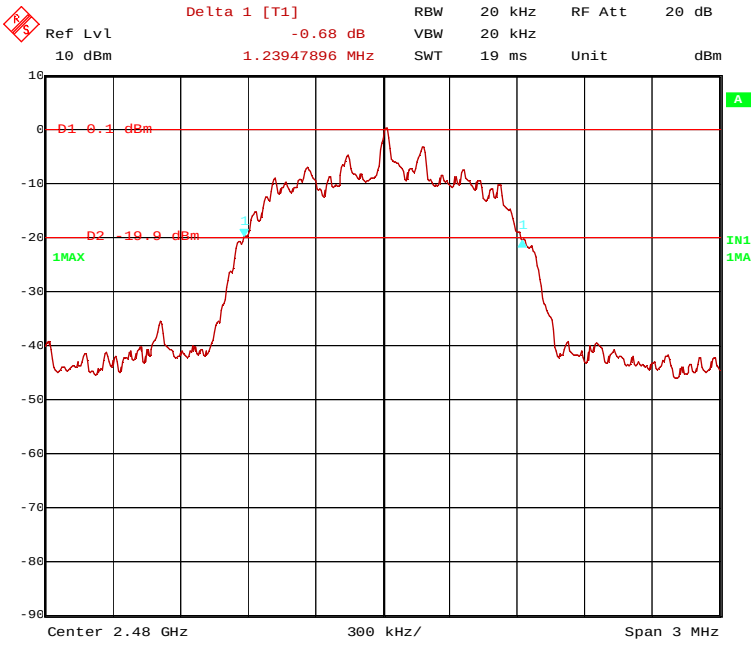
122097_53.wmf: 20 dB bandwidth at the lower end of the assigned frequency band (mode 1a):



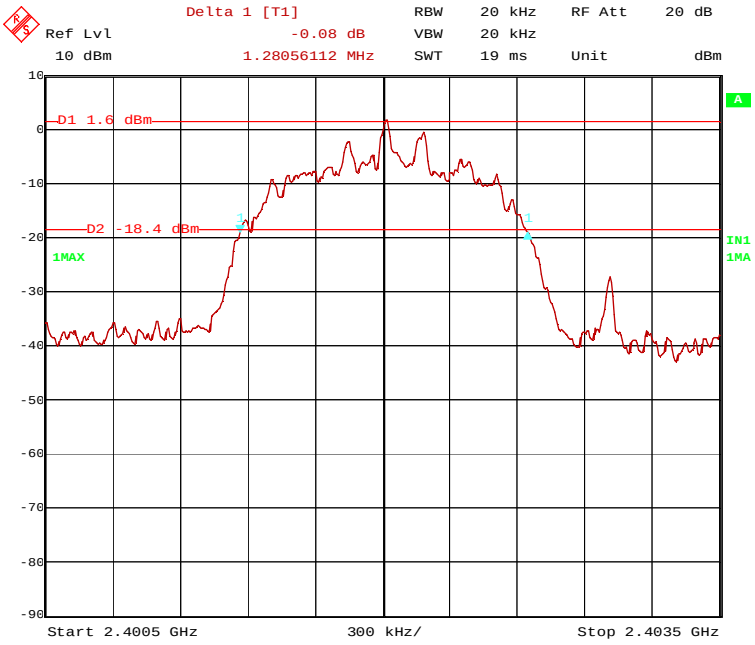
122097_52.wmf: 20 dB bandwidth at the middle of the assigned frequency band (mode 2a):



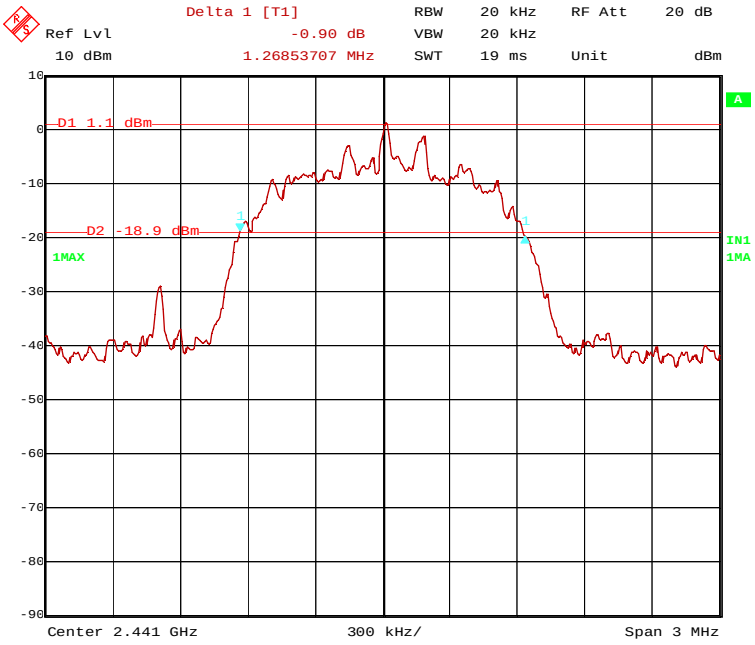
122097_51.wmf: 20 dB bandwidth at the upper end of the assigned frequency band (mode 3a):



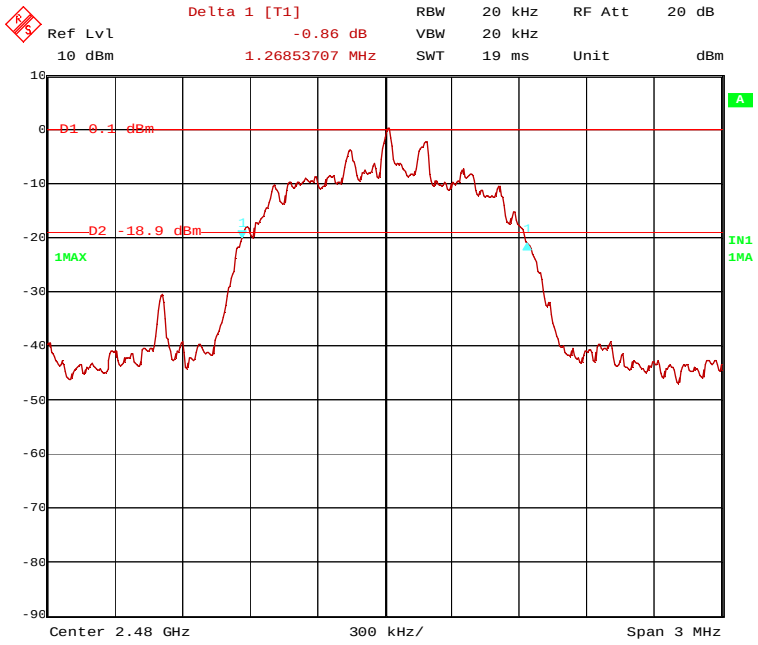
122097_54.wmf: 20 dB bandwidth at the lower end of the assigned frequency band (mode 1b):



122097_55.wmf: 20 dB bandwidth at the middle of the assigned frequency band (mode 2b):



122097_56.wmf: 20 dB bandwidth at the upper end of the assigned frequency band (mode 3b):



Operation Mode	Channel number	Channel frequency [MHz]	20 dB bandwidth [kHz]
1	0	2402	937.876
2	39	2441	937.876
3	78	2480	933.868
1a	0	2402	1244.489
2a	39	2441	1226.453
3a	78	2480	1239.479
1b	0	2402	1280.561
2b	39	2441	1268.537
3b	78	2480	1268.537
	#Measurement uncertainty		+0.66 dB / -0.72 dB

TEST EQUIPMENT USED FOR THE TEST:

31

5.2 Carrier frequency separation

5.2.1 Method of measurement (carrier frequency separation)

The calibration of the spectrum analyser has to be checked with the help of a known signal from a signal generator. The EUT has to be connected to the spectrum analyser via a low loss cable. If the EUT is not equipped with an antenna connector, a temporary antenna connector has to be installed. The EUT has to be switched on and the hopping function has to be enabled.

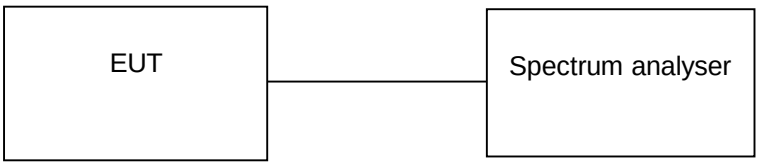
The following spectrum analyser settings shall be used:

- Span: Wide enough to capture the peaks of two adjacent channels.
- Resolution bandwidth: ≥ 1 % of the span.
- Video bandwidth: ≥ the resolution bandwidth.
- Sweep: Auto.
- Detector function: peak.
- Trace mode: Max hold

After trace stabilisation the marker and the delta marker function will be used to determine the separation between the peaks of two adjacent channel signals.

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

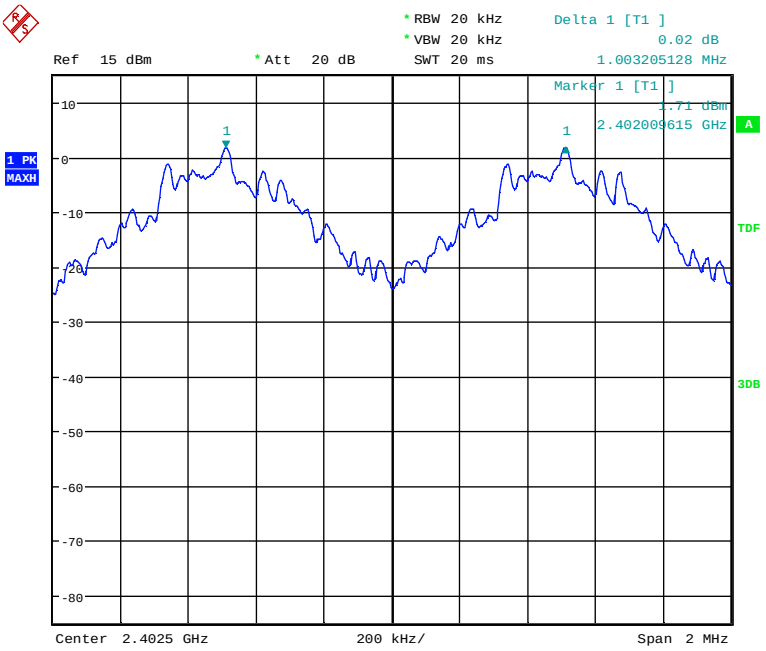
Test set-up:



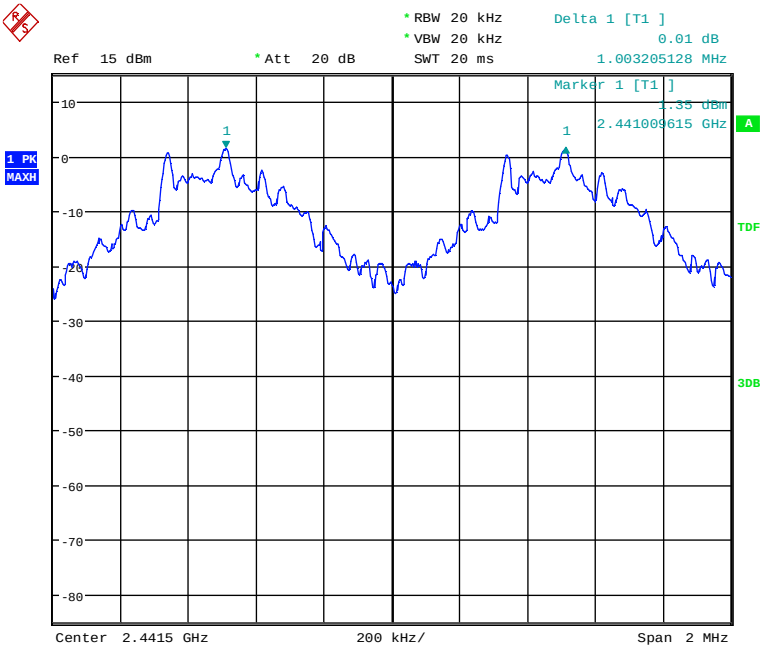
5.2.2 Test results (carrier frequency separation)

Ambient temperature	22 °C	Relative humidity	56 %

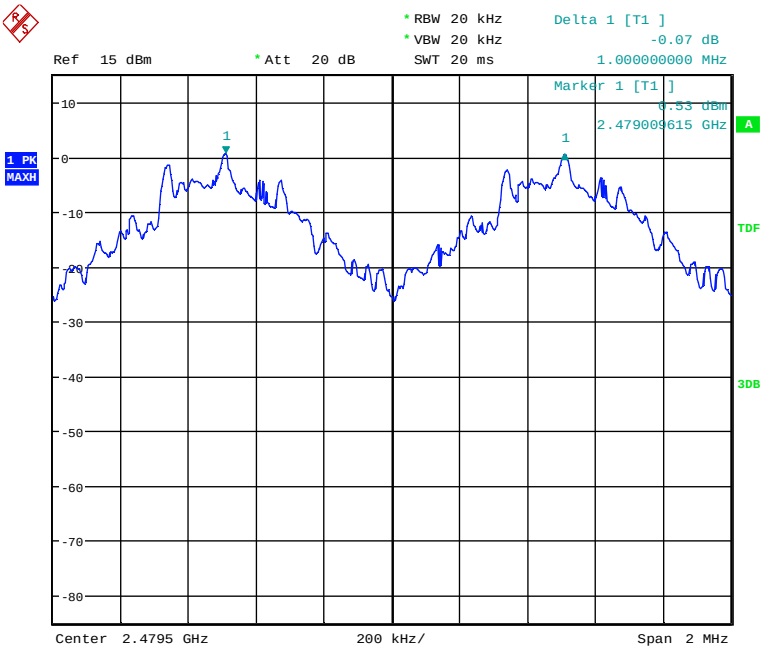
122097_25.wmf: Channel separation at the lower end of the assigned frequency band (mode 1):



122097_26.wmf: Channel separation at the middle of the assigned frequency band (mode 2):



122097_27.wmf: Channel separation at the upper end of the assigned frequency band (mode 3):



Channel number	Channel frequency [MHz]	Channel separation [kHz]	Minimum limit [kHz]
Operation mode 4			
0	2402	1003.205	850.427 ($^2/_3$ of the 20 dB bandwidth)
39	2441	1003.205	848.291 ($^2/_3$ of the 20 dB bandwidth)
78	2480	1000.000	846.154 ($^2/_3$ of the 20 dB bandwidth)
Measurement uncertainty			$<10^{-7}$

Test result: Passed

TEST EQUIPMENT USED FOR THE TEST:

30, 45

5.3 Number of hopping frequencies

5.3.1 Method of measurement (number of hopping frequencies)

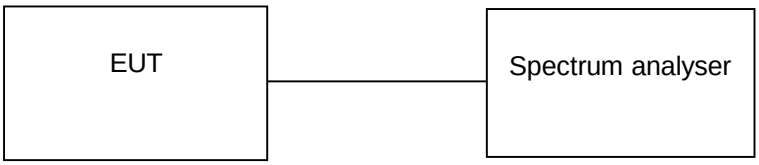
The calibration of the spectrum analyser has to be checked with the help of a known signal from a signal generator. The EUT has to be connected to the spectrum analyser via a low loss cable. If the EUT is not equipped with an antenna connector, a temporary antenna connector has to be installed. The EUT has to be switched on and the hopping function has to be enabled.

The following spectrum analyser settings shall be used:

- Span: the frequency band of operation.
- Resolution bandwidth: ≥ 1 % of the span.
- Video bandwidth: ≥ the resolution bandwidth.
- Sweep: Auto.
- Detector function: Peak.
- Trace mode: Max hold.

After trace stabilisation the number of hopping channels could be counted. It might be possible to divide the span into some sub ranges in order to clearly show all hopping frequencies.

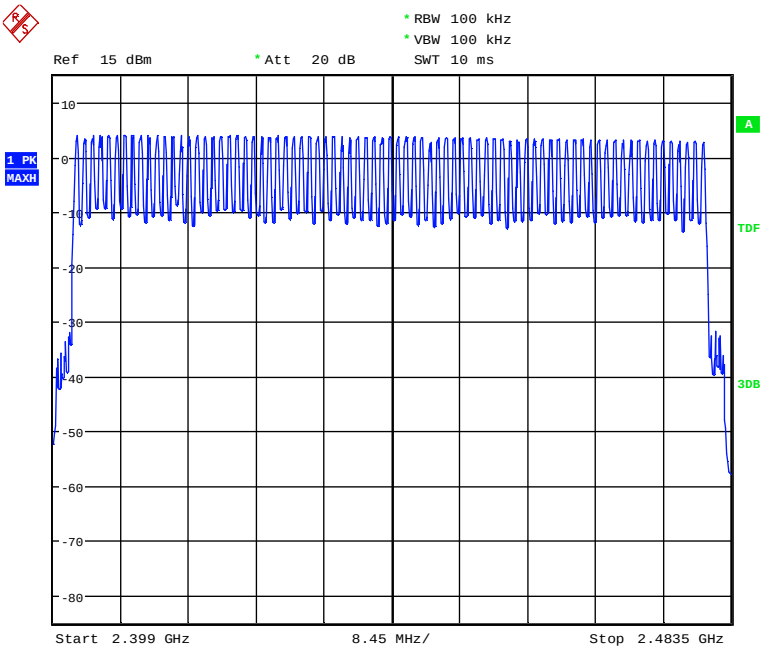
Test set-up:



5.3.2 Test results (number of hopping frequencies)

Ambient temperature	22 °C	Relative humidity	56 %

122097_28.wmf: Number of hopping channels (mode 4):



Number of hopping channels	Limit
79	At least 15

Test result: Passed

TEST EQUIPMENT USED FOR THE TEST:

30, 45

5.4 Dwell time

5.4.1 Method of measurement (dwell time)

The calibration of the spectrum analyser has to be checked with the help of a known signal from a signal generator. The EUT has to be connected to the spectrum analyser via a low loss cable. If the EUT is not equipped with an antenna connector, a temporary antenna connector has to be installed. The EUT has to be switched on and the hopping function has to be enabled.

The following spectrum analyser settings shall be used:

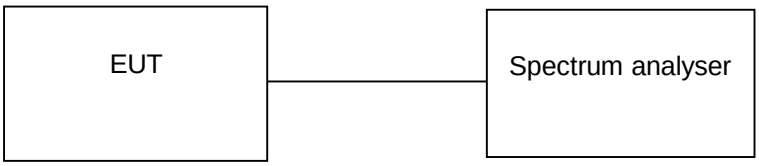
- Span: Zero, centred on a hopping channel.
- Resolution bandwidth: 1 MHz.
- Video bandwidth: ≥ the resolution bandwidth.
- Sweep: As necessary to capture the entire dwell time per hopping channel.
- Detector function: peak.
- Trace mode: Max hold.

The marker and delta marker function of the spectrum analyser will be used to determine the dwell time.

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

If the EUT is possible to operate with different mode of operation (data rates, modulation formats etc.) the test will be repeated with every different operation mode of the EUT.

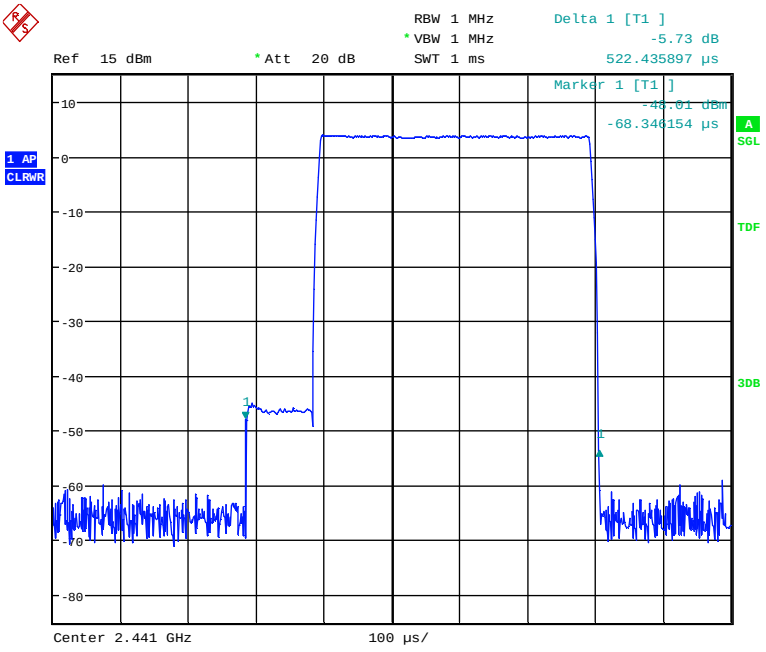
Test set-up:



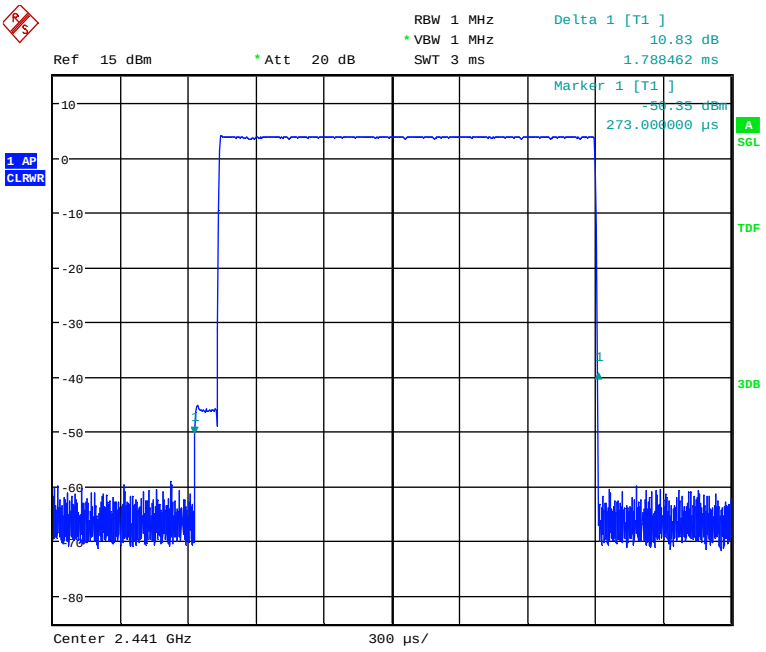
5.4.2 Test results (dwell time)

Ambient temperature	22 °C	Relative humidity	56 %

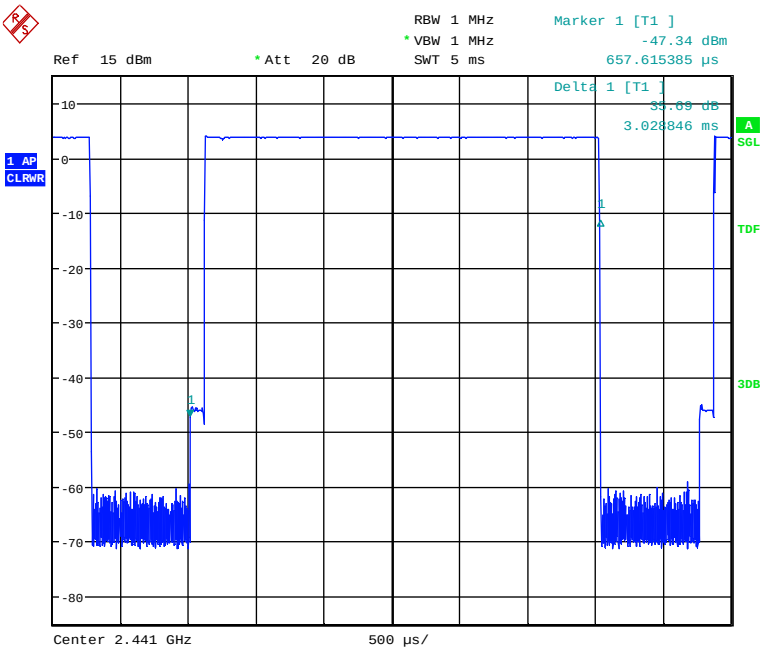
122097_32.wmf: Dwell time at the middle of the assigned frequency band (operation mode 2):



122097_30.wmf: Dwell time at the middle of the assigned frequency band (operation mode 2a):



122097_55.wmf: Dwell time at the middle of the assigned frequency band (operation mode 2b):



The dwell time is calculated with the following formula:

Dwell time = t_{pulse} x n_{hops} / number of hopping channels x 31.6 (equal to 0.4 s x number of hopping channels)

Where:

t_{pulse} is the measured pulse time (pls. refer the plots of the spectrum analyser above) [s],
n_{hops} is the number of hops per second in the actual operating mode of the transmitter [1/s].

The hopping rate of the system is 1600 hops per second and the system uses 79 channels. For this reason one time slot has a length of 625 µs.

With the used hopping mode (2 - 1 Mbps) a packet need 1 timeslot for transmitting and the next timeslot for receiving. So the system makes in worst case 800 hops per second in transmit mode (n_{hops} = 800 1/s).

With the used hopping mode (2a - 2 Mbps) a packet need 3 timeslots for transmitting and the next timeslot for receiving. So the system makes in worst case 400 hops per second in transmit mode (n_{hops} = 400 1/s).

With the used hopping mode (2b - 3 Mbps) a packet need 5 timeslots for transmitting and the next timeslot for receiving. So the system makes in worst case 267 hops per second in transmit mode (n_{hops} = 267 1/s).

Operation mode 2				
Channel number	Channel frequency [MHz]	t_{pulse} [µs]	Dwell time [ms]	Limit [ms]
39	2441	522.436	167.180	400
Operation mode 2a				
Channel number	Channel frequency [MHz]	t_{pulse} [µs]	Dwell time [ms]	Limit [ms]
39	2441	1.788	286.080	400
Operation mode 2b				
Channel number	Channel frequency [MHz]	t_{pulse} [µs]	Dwell time [ms]	Limit [ms]
39	2441	3.029	323.497	400
Measurement uncertainty			$<10^{-7}$	

Test result: Passed

TEST EQUIPMENT USED FOR THE TEST:

30, 45

5.5 Maximum peak output power

5.5.1 Method of measurement (maximum peak output power)

The calibration of the spectrum analyser has to be checked with the help of a known signal from a signal generator. The EUT has to be connected to the spectrum analyser via a low loss cable. If the EUT is not equipped with an antenna connector, a temporary antenna connector has to be installed. The EUT has to be switched on and the hopping function has to be disenabled.

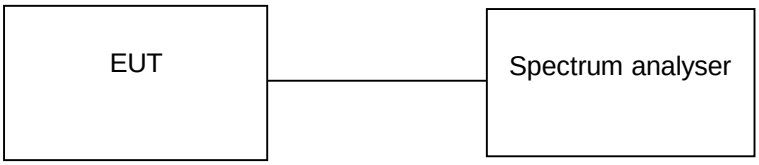
The following spectrum analyser settings shall be used:

- Span: Approx. 5 times the 20 dB bandwidth, centred on a hopping channel.
- Resolution bandwidth: > the 20 dB bandwidth of the emission being measured.
- Video bandwidth: ≥ the resolution bandwidth.
- Sweep: Auto.
- Detector function: peak.
- Trace mode: Max hold.

After trace stabilisation the marker shall be set on the signal peak. The indicated level is the peak output power, which has to be corrected with the value of the cable loss and an external attenuation (if necessary).

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

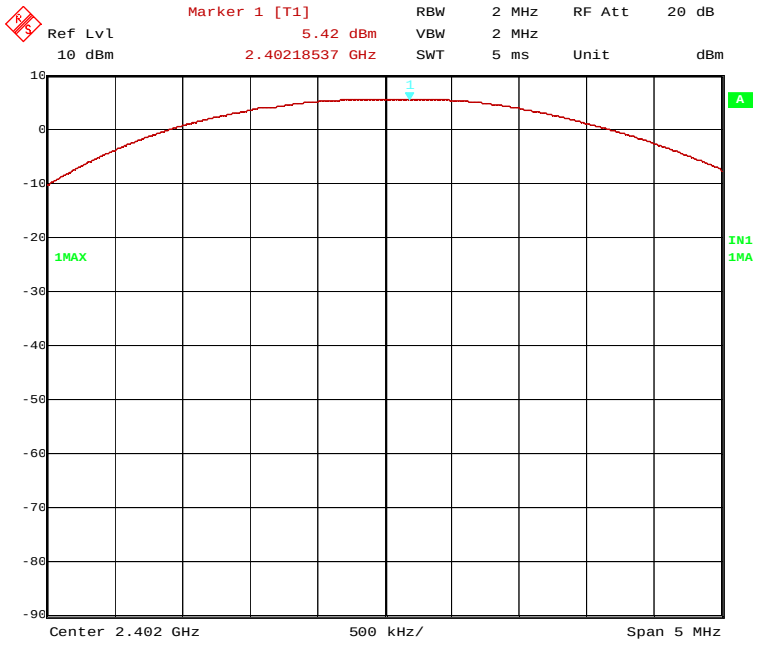
Test set-up:



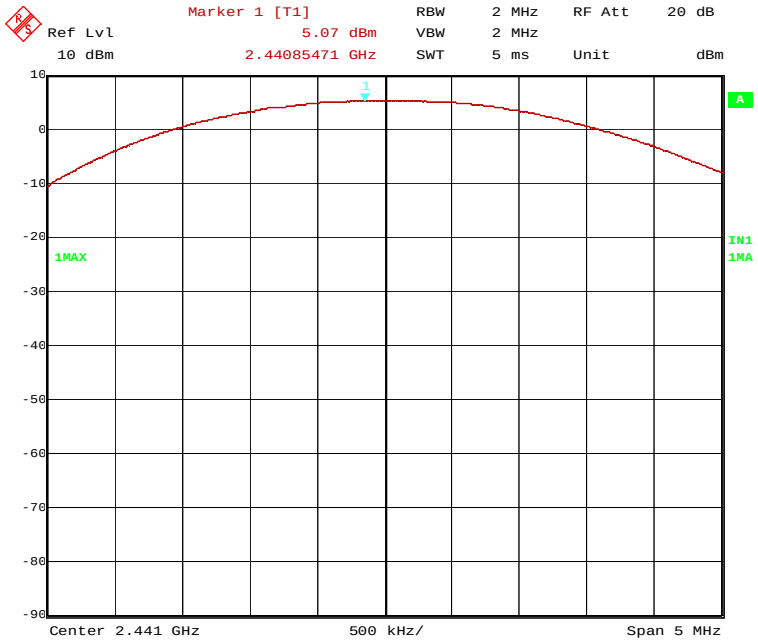
5.5.2 Test results (maximum peak output power)

Ambient temperature	22 °C	Relative humidity	56 %

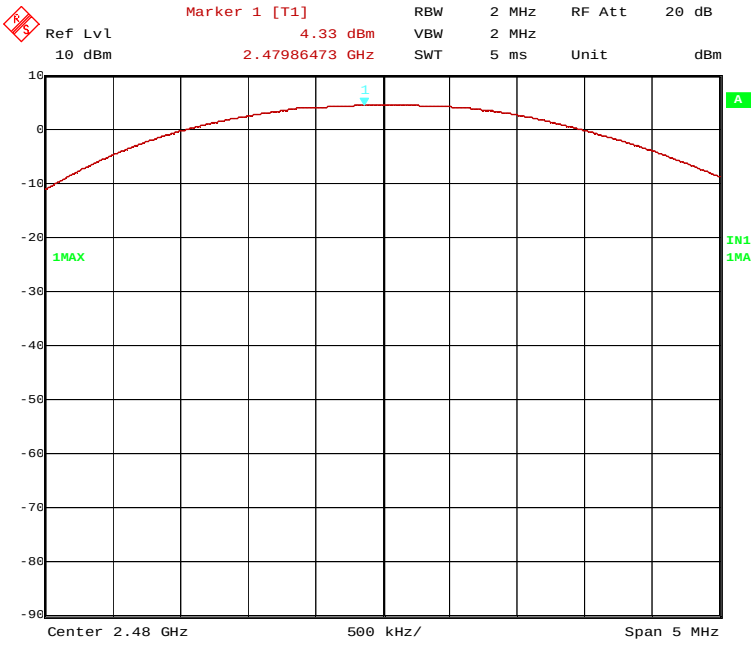
122097_60.wmf: Maximum peak output power at the lower end of the assigned frequency band (mode 1):



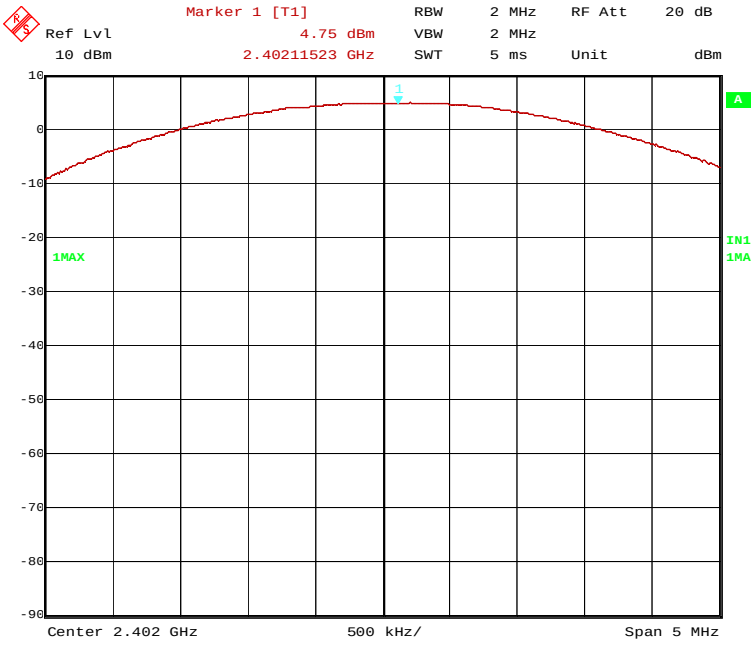
122097_61.wmf: Maximum peak output power at the middle of the assigned frequency band (mode 2):



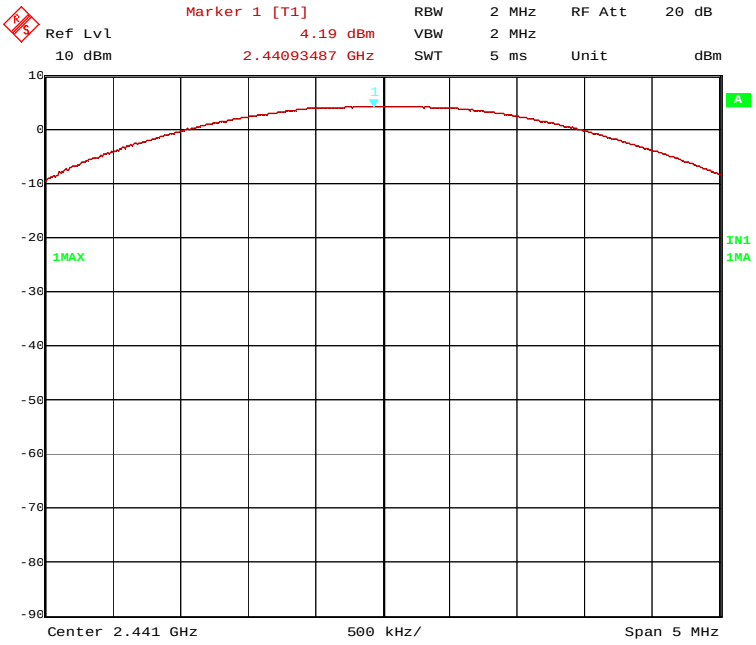
122097_62.wmf: Maximum peak output power at the upper end of the assigned frequency band (mode 3):



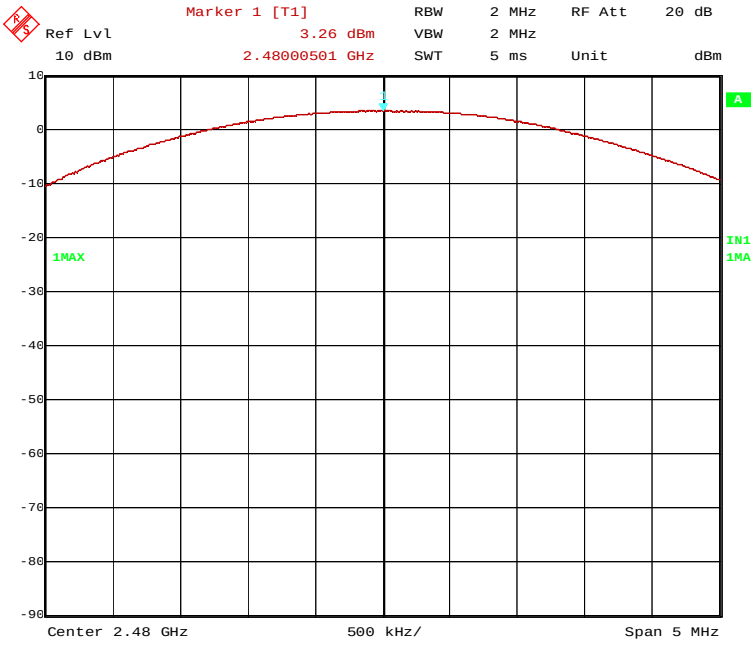
122097_59.wmf:Maximum peak output power at the lower end of the assigned frequency band (mode 1a):



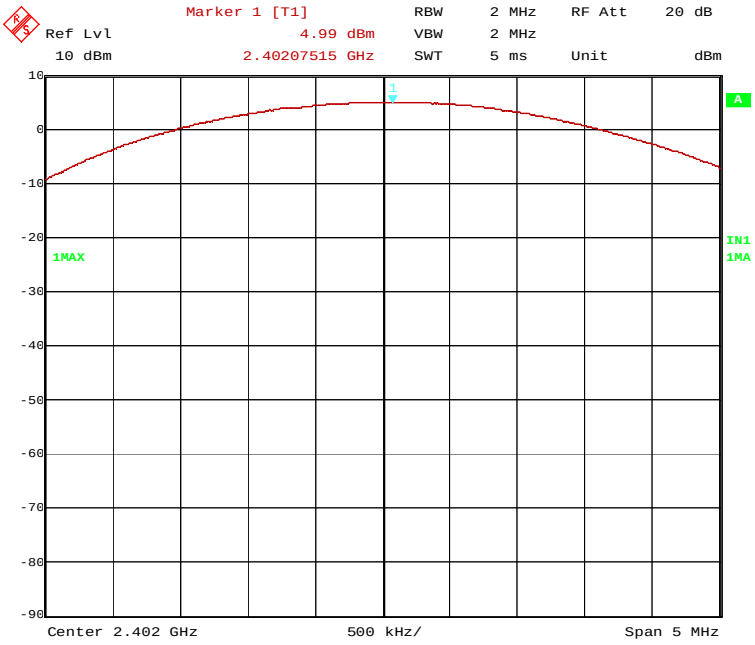
122097_58.wmf:Maximum peak output power at the middle of the assigned frequency band (mode 2a):



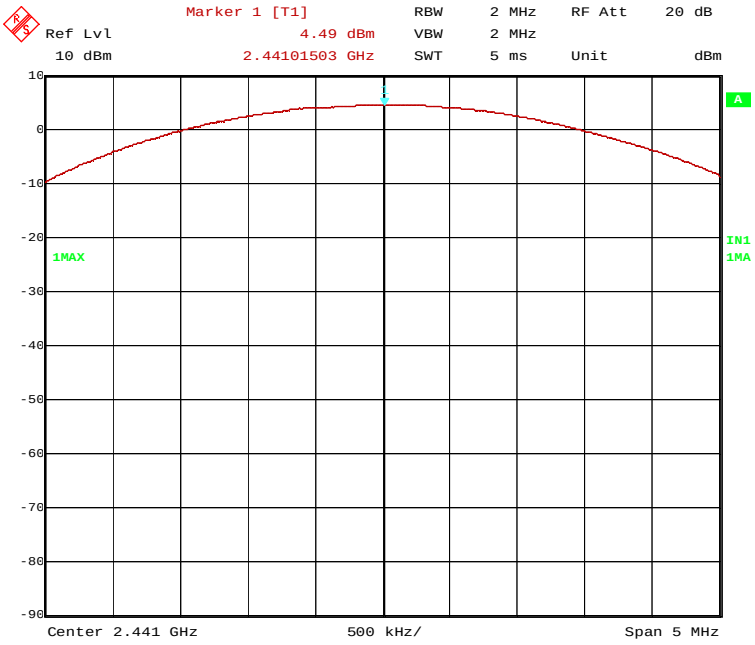
122097_57.wmf:Maximum peak output power at the upper end of the assigned frequency band (mode 3a):



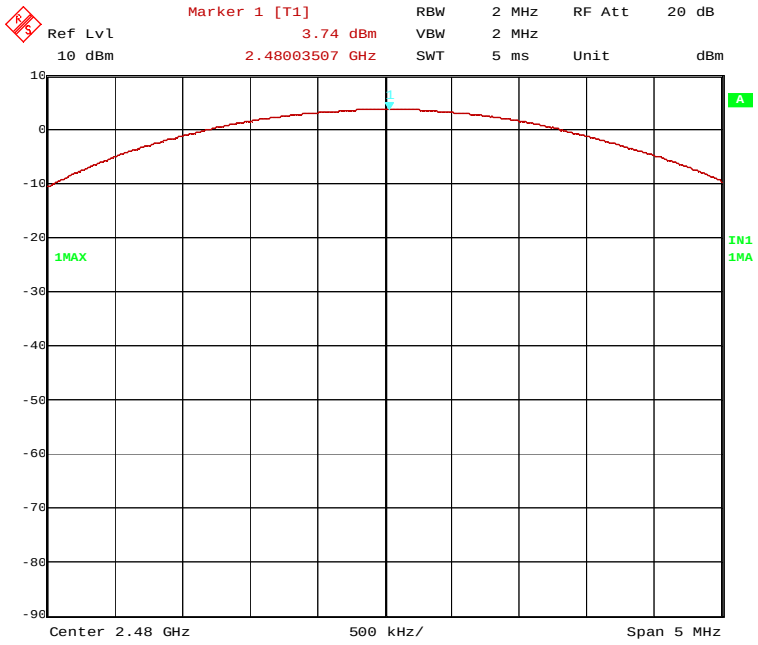
122097_63.wmf:Maximum peak output power at the lower end of the assigned frequency band (mode 1b):



122097_64.wmf:Maximum peak output power at the middle of the assigned frequency band (mode 2b):



122097_65.wmf:Maximum peak output power at the upper end of the assigned frequency band (mode 3b):



Operation mode	Channel number	Channel frequency [MHz]	Maximum peak output power [dBm]	Antenna gain [dBi]	Peak power limit [dBm]
1	0	2402	5.42	2.0	30.0
2	39	2441	5.07	2.0	30.0
3	78	2480	4.33	2.0	30.0
1a	0	2402	4.75	2.0	30.0
2a	39	2441	4.19	2.0	30.0
3a	78	2480	3.26	2.0	30.0
1b	0	2402	4.99	2.0	30.0
2b	39	2441	4.49	2.0	30.0
3b	78	2480	3.74	2.0	30.0
Measurement uncertainty				+0.66 dB / -0.72 dB	

Test result: Passed

TEST EQUIPMENT USED FOR THE TEST:

31

5.6 Band-edge compliance

5.6.1 Method of measurement (band-edge compliance (radiated))

The same test set-up as used for the final radiated emission measurement shall be used (refer also subclause 5.2.1 of this test report). The measurements shall be carried out with using a resolution bandwidth of 100 kHz.

The following spectrum analyser settings shall be used:

- Span: Wide enough to capture the peak level of the emission on the channel closest to the band-edge, as well as any modulation products, which fall outside the assigned frequency band.
- Resolution bandwidth: 100 kHz.
- Video bandwidth: ≥ the resolution bandwidth.
- Sweep: Auto.
- Detector function: Peak.
- Trace mode: Max hold.

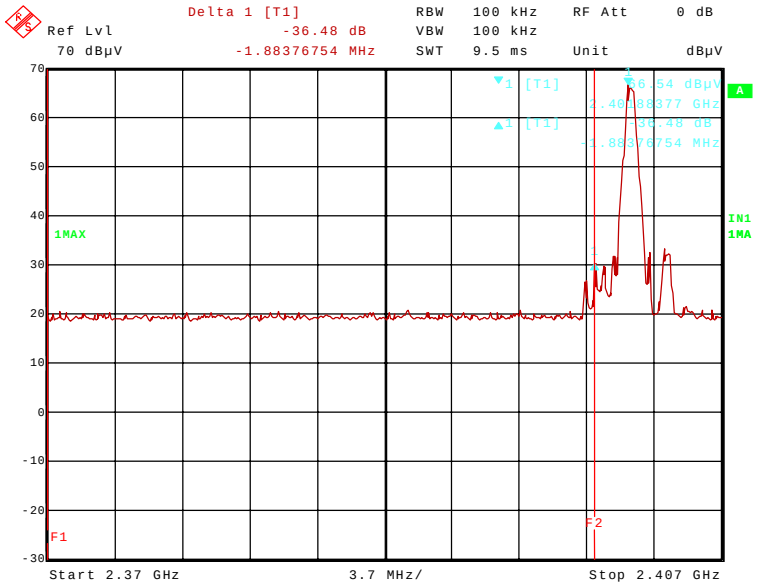
After trace stabilisation the marker shall be set on the signal peak. The first display line has to be set on this value. The second display line has to be set 20 dB below the first line (or the peak marker). The frequency line shall be set on the edge of the assigned frequency band. Set the second marker on the emission at the band-edge, or on the highest modulation product outside of the band, if this level is higher than that at the band-edge. This frequency shall be measured with the EMI receiver as described in subclause 5.2.1 of this test report, but 100 kHz resolution bandwidth shall be used.

The measurement will be performed at the upper end of the assigned frequency band and with hopping on and off.

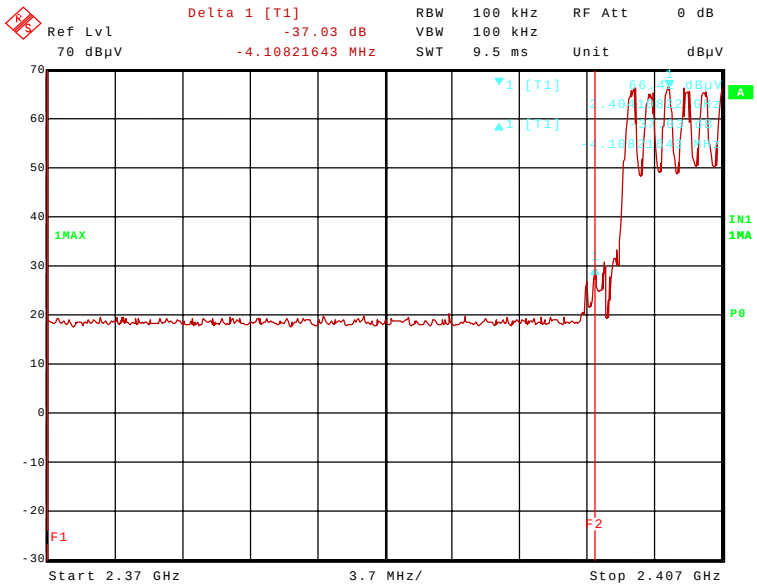
5.6.2 Test results (band-edge compliance (radiated))

Ambient temperature	20 °C	Relative humidity	43 %

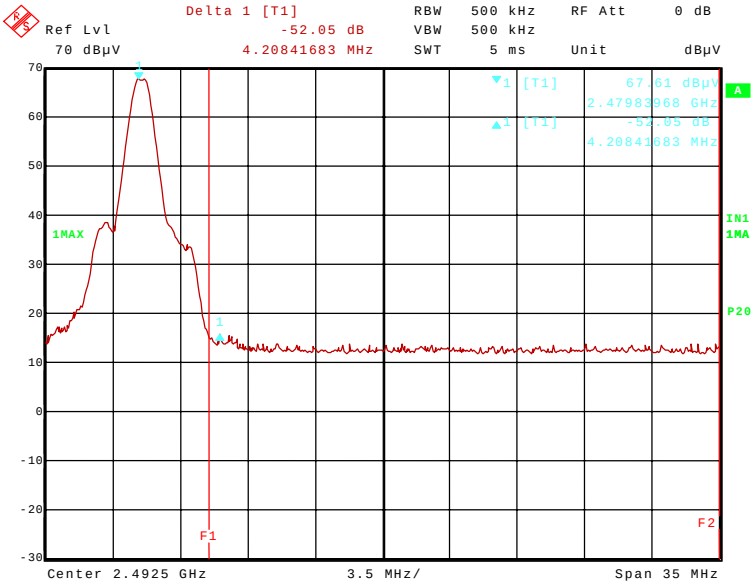
122097_02.wmf: Radiated band-edge compliance, lower band edge, hopping off (mode 1):



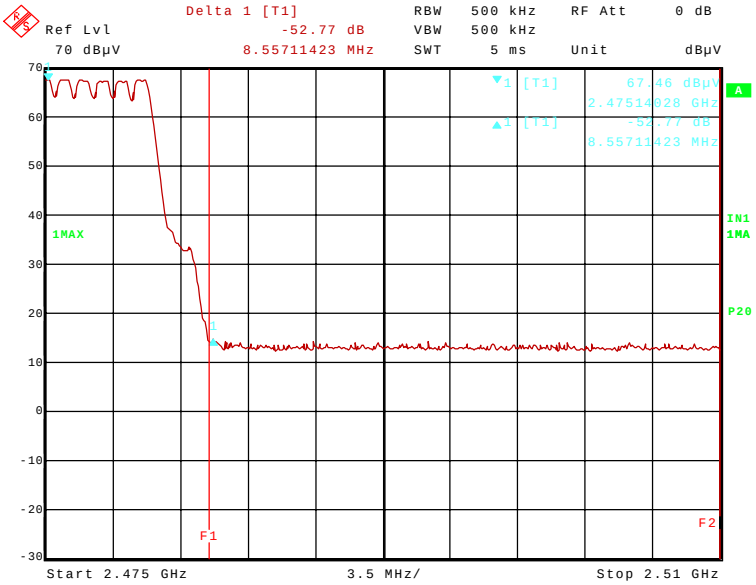
122097_09.wmf: Radiated band-edge compliance, lower band edge, hopping on (mode 4):



122097_07.wmf: Radiated band-edge compliance, upper band edge, hopping off (mode 3):



122097_10.wmf: Radiated band-edge compliance, upper band edge, hopping on (mode 4):



The plots on the page before are showing the radiated band-edge compliance for the upper band-edge, with and without hopping. The frequency lines 1 (F1) and 2 (F2) show the edges of the assigned frequency band.

Band-edge compliance (lower band edge. hopping disenabled)										
Result measured with the peak detector:										
Frequency GHz	Corr. value dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
2402	99.3	-	-	67.3	28.3	0.0	3.7	150	Vert.	-
2400	62.8	79.3	16.5	30.8	28.3	0.0	3.7	150	Vert.	No
Result measured with the average detector:										
Frequency GHz	Corr. value dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
2402	88.8	-	-	56.8	28.3	0.0	3.7	150	Vert.	-
2400	52.3	68.8	16.5	20.3	28.3	0.0	3.7	150	Vert.	No
Measurement uncertainty							+2.2 dB / -3.6 dB			

Band-edge compliance (lower band edge. hopping enabled)										
Result measured with the peak detector:										
Frequency GHz	Corr. value dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
2402	99.3			67.3	28.3	0.0	3.7	150	Vert.	-
2400	62.3	79.3	17.0	30.3	28.3	0.0	3.7	150	Vert.	No
Result measured with the average detector:										
Frequency GHz	Corr. value dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
2402	88.8	-	-	56.8	28.3	0.0	3.7	150	Vert.	-
2400	51.8	68.8	17.0	19.8	28.3	0.0	3.7	150	Vert.	No
Measurement uncertainty							+2.2 dB / -3.6 dB			

Band-edge compliance (upper band edge. hopping disenabled)										
Result measured with the peak detector:										
Frequency GHz	Corr. value dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
2480	99.9	-	-	67.6	28.5	0.0	3.8	150	Vert.	-
2484	47.8	74.0	26.2	15.5	28.5	0.0	3.8	150	Vert.	Yes
Result measured with the average detector:										
Frequency GHz	Corr. value dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
2480	89.4	-	-	57.1	28.5	0.0	3.8	150	Vert.	-
2484	37.3	54.0	16.7	5.0	28.5	0.0	3.8	150	Vert.	Yes
Measurement uncertainty							+2.2 dB / -3.6 dB			

Band-edge compliance (upper band edge. hopping enabled)										
Result measured with the peak detector:										
Frequency GHz	Corr. value dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
2480	99.9			67.6	28.5	0.0	3.8	150	Vert.	-
2484	47.1	74.0	26.9	14.8	28.5	0.0	3.8	150	Vert.	Yes
Result measured with the average detector:										
Frequency GHz	Corr. value dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
2480	89.4			57.1	28.5	0.0	3.8	150	Vert.	-
2484	36.6	54.0	17.4	4.3	28.5	0.0	3.8	150	Vert.	Yes
Measurement uncertainty							+2.2 dB / -3.6 dB			

Test result: Passed

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

5.7 Radiated emissions

5.7.1 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 side with reflecting ground plane and various antenna height in the frequency range 30 MHz to 1 GHz.
- A preliminary measurement carried out in a fully anechoic chamber with a variable antenna distance and height in the frequency range 1 GHz to 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.

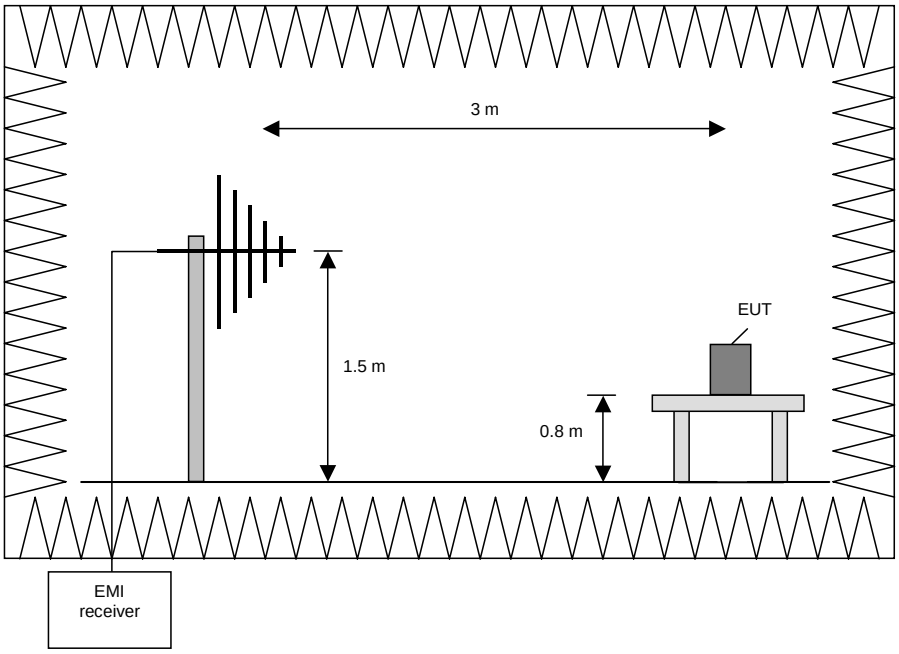
Preliminary measurement (30 MHz to 1 GHz)

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

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

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

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



Procedure preliminary measurement:

Prescans were performed in the frequency range 30 MHz to 230 MHz and 230 MHz to 1 GHz.
The following procedure will be used:

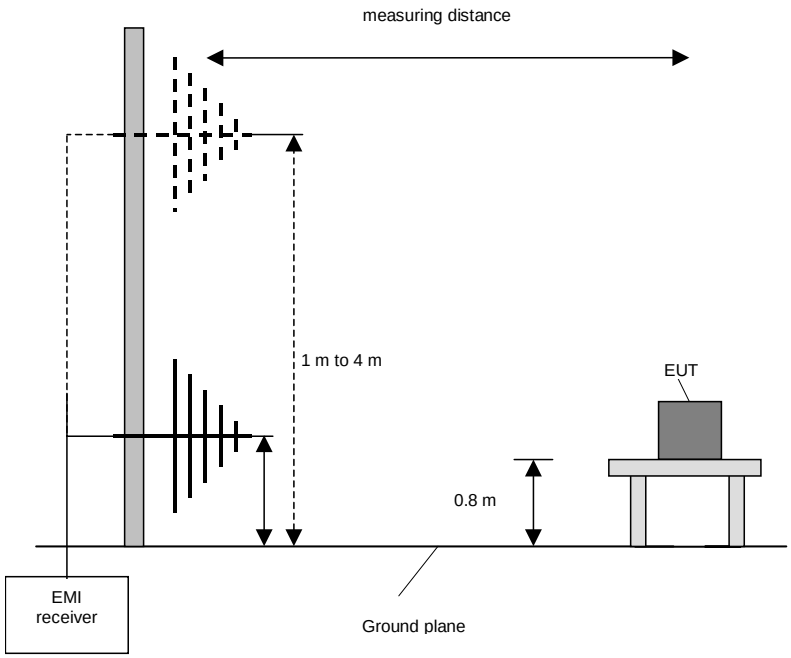
1. Monitor the frequency range at horizontal polarisation and a EUT azimuth of 0 °.
2. Manipulate the system cables within the range to produce the maximum level of emission.
3. Rotate the EUT by 360 ° to maximize the detected signals.
4. Make a hardcopy of the spectrum.
5. Measure the frequency of the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

Final measurement (30 MHz to 1 GHz)

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

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

Frequency range	Resolution bandwidth
30 MHz to 1 GHz	120 kHz



Procedure final measurement:

The following procedure will be used:

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

Preliminary and final measurement (1 GHz to 110 GHz)

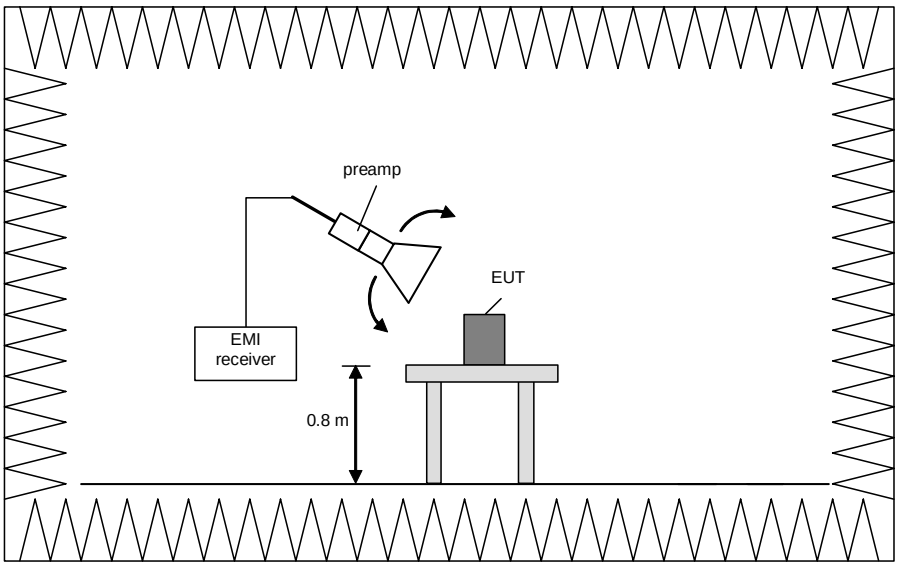
This measurement will be performed in a fully anechoic chamber. Tabletop devices will set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm. Floor-standing devices will be placed directly on the turntable/ground plane. The set up of the Equipment under test will be in accordance 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 than the measuring distance will be set to 3 m with the receiving antenna moving in this cone of emission. At this position the final measurement will be carried out.

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

Frequency range	Resolution bandwidth
1 GHz to 4 GHz	100 kHz
4 GHz to 12 GHz	100 kHz
12 GHz to 18 GHz	100 kHz
18 GHz to 26.5 GHz	100 kHz
26.5 GHz to 40 GHz	100 kHz
40 GHz to 60 GHz	100 kHz
50 GHz to 75 GHz	100 kHz
75 GHz to 110 GHz	100 kHz

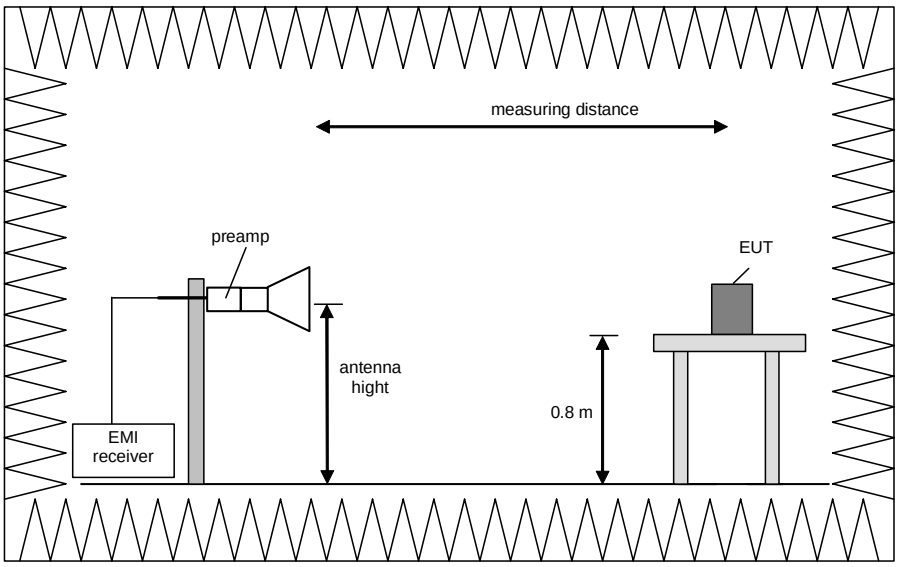


Final measurement (1 GHz to 110 GHz)

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.

5.7.2 Test results (radiated emissions)

5.7.2.1 Preliminary radiated emission measurement (9 kHz to 1 GHz)

Ambient temperature	20 °C	Relative humidity	43 %

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

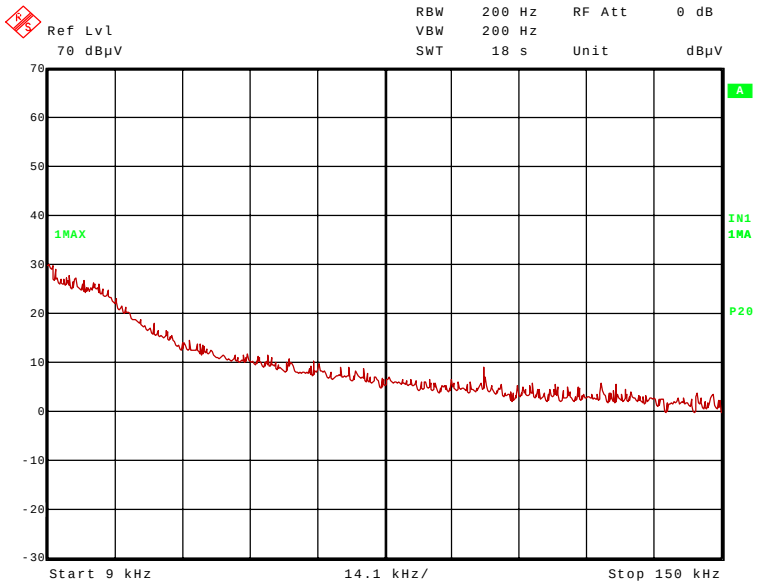
Cable guide: The cable of the EUT is running vertically to the false floor. For detail information of test set-up and the cable guide refer to the pictures in annex A of this test report.

Test record: All results are shown in the following.

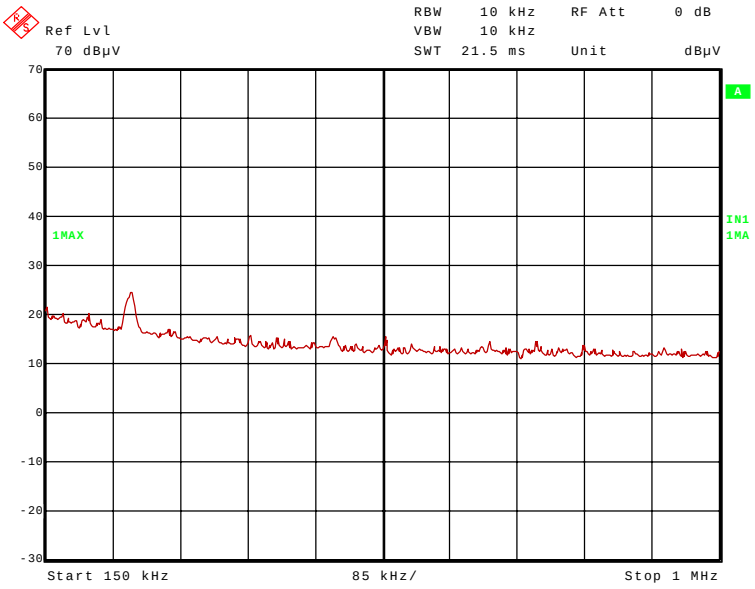
Supply voltage: During all measurements the EUT was supplied with 12.0 V DC.

Remark: Pretests have shown that there is no measurable difference of the emissions between the different operation frequencies in the frequency range 9 kHz to 1 GHz. Therefore the emissions in this frequency range were documented only with the transmitter operating in mode 2.

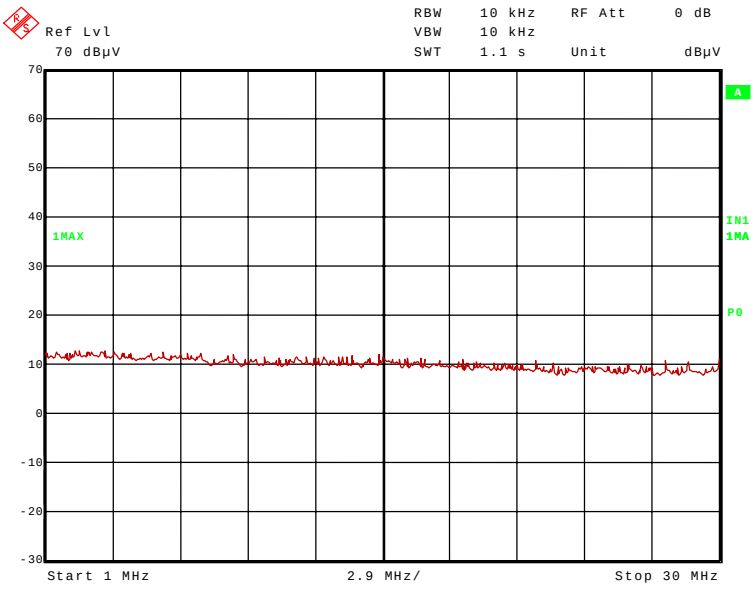
122097_12.wmf: Spurious emissions from 9 kHz to 150 kHz (mode 2):



122097_13.wmf: Spurious emissions from 150 kHz to 1 MHz (mode 2):



122097_18.wmf: Spurious emissions from 1 MHz to 30 MHz (mode 2):



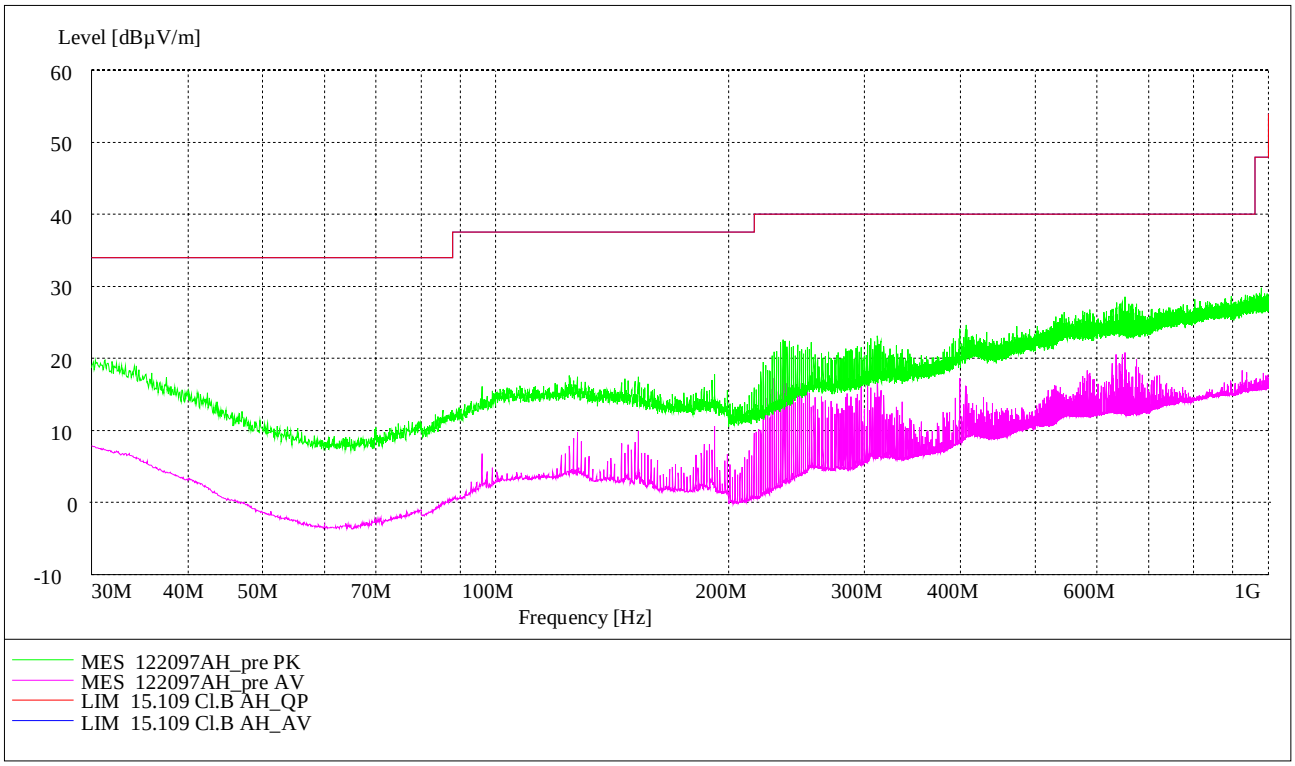
The following frequencies were found during the preliminary radiated emission test: 255 kHz

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

100.26 kHz

These frequencies have to be measured on the open area test site. The results are presented in the following chapter.

Title:	Emissionmeasurement EMI Test receiver ESI Rohde & Schwarz
EUT:	Handset + Cradle
Manufacturer:	Bury
Operating Condition:	Continous transmission on channel 41 (mode 2)
Test site:	fully anechoic chamber M20; PHOENIX TEST LAB GmbH
Operator:	P. Neufeld



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

96.000 MHz, 192.000 MHz, 235,500 MHz, 312.000 MHz, 652.000 MHz

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

406.000 MHz.

These frequencies have to be measured on the open area test site. The result is presented in the following.

TEST EQUIPMENT USED FOR THE TEST:
20, 29, 31 – 35, 42, 55

5.7.2.2 Final radiated emission test (9 kHz to 30 MHz)

Ambient temperature	18 °C	Relative humidity	76 %

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 and 10 m.

Cable guide: The cable of the EUT is running vertically to the floor. 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.
0

Supply voltage: During all measurements the EUT was supplied with 12.0 V DC.

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

Result [dBµV/m] = reading [dBµV] + antenna factor [dB/m]

Results with measuring distance of 3 m								
Frequency kHz	Result dBµV/m	Limit ** dBµV/m	Margin dB	Detector	Readings dBµV	Pol.	Pos.	Antenna factor / dB/m
100.260	29.6	107.6	78	QP	9.6	Face	1	20.0
255.000	45.2	99.5	54.3	AV	25.2	face	1	20.0
Results with measuring distance of 10 m								
Frequency kHz	Result dBµV/m	Limit ** dBµV/m	Margin dB	Detector	Readings dBµV	Pol.	Pos.	Antenna factor / dB/m
100.260	Signal was below the noise floor of the system							
255.000	Signal was below the noise floor of the system							
Measurement uncertainty					+2.2 dB / -3.6 dB			

*: Cable loss included
**: Limit caculated with 40 dB/Decade

Test result: Passed

TEST EQUIPMENT USED FOR THE TEST:
12, 13, 55

5.7.2.3 Final radiated emission test (30 MHz to 1 GHz)

Ambient temperature	13 °C	Relative humidity	72 %

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

Cable guide: The cable of the EUT is running vertically to the false floor. For detail information of test set-up and the cable guide refer to the pictures in annex A of this test report.

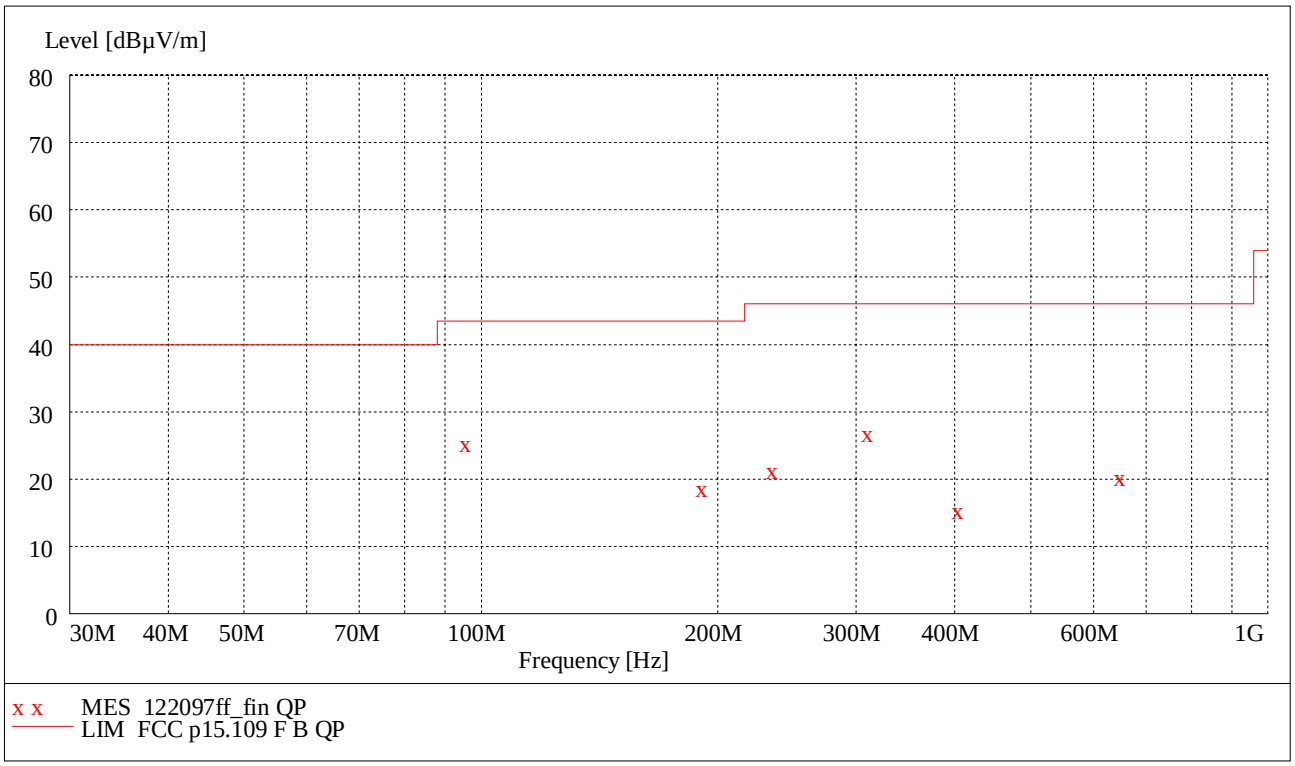
Test record: All results are shown in the following.

Supply voltage: During all measurements the EUT was supplied with 12.0 V DC.

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

Result [dBµV/m] = reading [dBµV] + cable loss [dB] + antenna factor [dB/m]

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



Data record name: 122097ff

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

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

Result measured with the quasipeak detector:

(This value is marked in the diagram by an x)

Spurious emissions outside restricted bands										
Frequency MHz	Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor dB/m	Cable loss dB	Height cm	Azimuth deg	Pol.	Pos.
96,000	25,6	43,5	17,9	13,9	10,6	1,1		181.00	Vert.	1
192,000	18,9	43,5	24,6	8,4	9,0	1,5	125.0	260.00	Hor.	1
235,500	21,6	46,0	24,4	9,2	10,7	1,7	114.0	238.00	Hor.	1
312,000	27,1	46,0	18,9	12,2	13,0	1,9	100.0	253.00	Hor.	1
652,000	20,6	46,0	25,4	-1,9	19,6	2,9	109.0	271.00	Hor.	1
Spurious emissions in restricted bands										
Frequency MHz	Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor dB/m	Cable loss dB	Height cm	Azimuth deg	Pol.	Pos.
406,000	15,7	46,0	30,3	-2,3	15,8	2,2	100.0	235.00	Hor.	1
Measurement uncertainty				+2.2 dB / -3.6 dB						

Test result: Passed

TEST EQUIPMENT USED FOR THE TEST:

14 – 20

5.7.2.4 Preliminary radiated emission measurement (1 GHz to 25 GHz)

Ambient temperature	21 °C	Relative humidity	47 %

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

Cable guide: The cable of the EUT is running vertically to the false floor. For detail information of test set-up and the cable guide refer to the pictures in annex A of this test report.

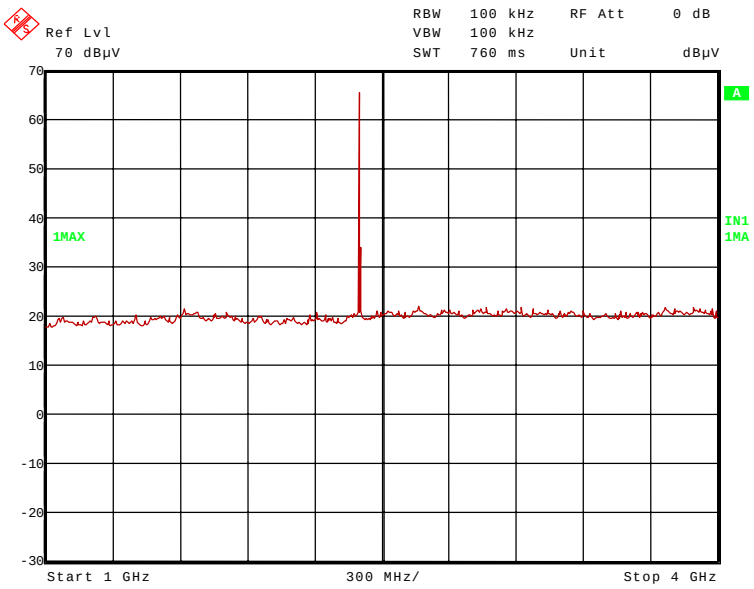
Test record: All results are shown in the following.

Supply voltage: During all measurements the EUT was supplied with 12.0 V DC.

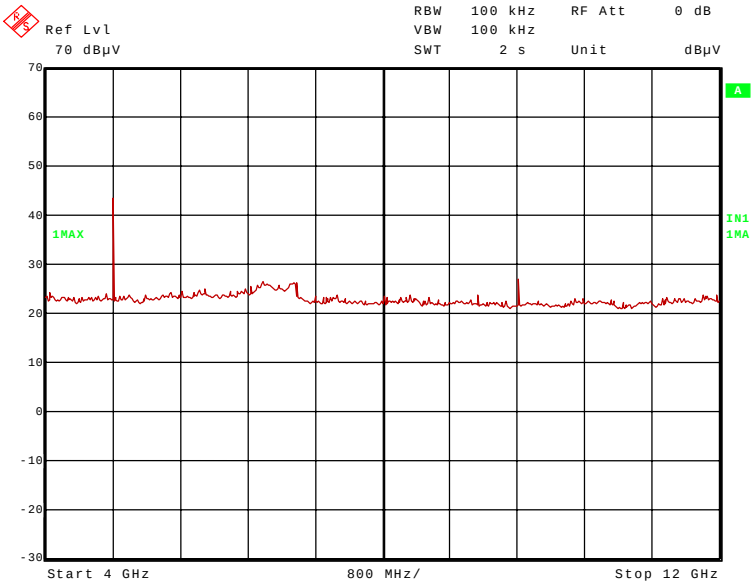
Pretests have shown that transmitting using GFSK modulation with 1 Mbps data rate is the worst case szenario.

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

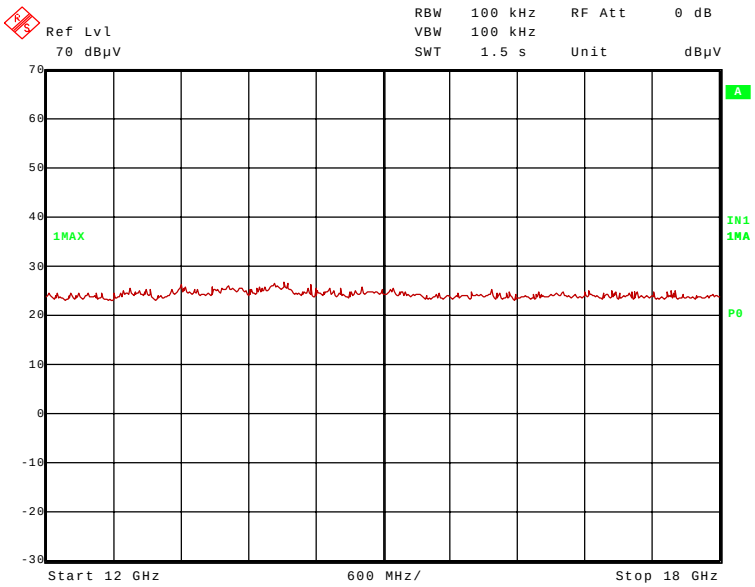
122097_01.wmf: Spurious emissions from 1 GHz to 4 GHz (operation mode 1):



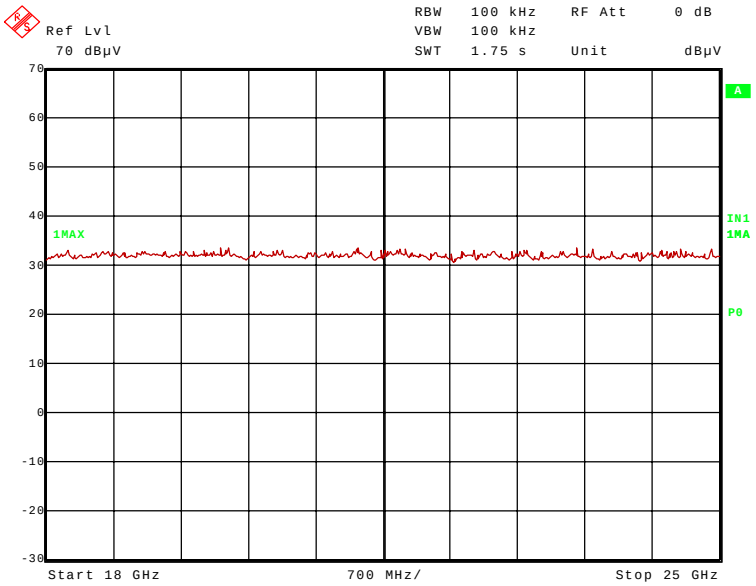
122097_03.wmf: Spurious emissions from 4 GHz to 12 GHz (operation mode 1):



122097_22.wmf: Spurious emissions from 12 GHz to 18 GHz (operation mode 1):



122097_21.wmf: Spurious emissions from 18 GHz to 25 GHz (operation mode 1):



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

- 4.804 GHz.

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

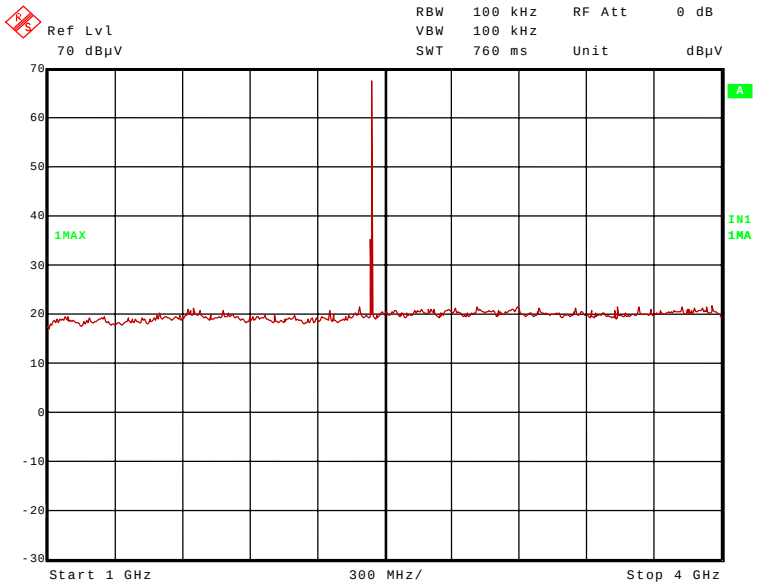
- 2.402 GHz and 9.608 GHz.

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

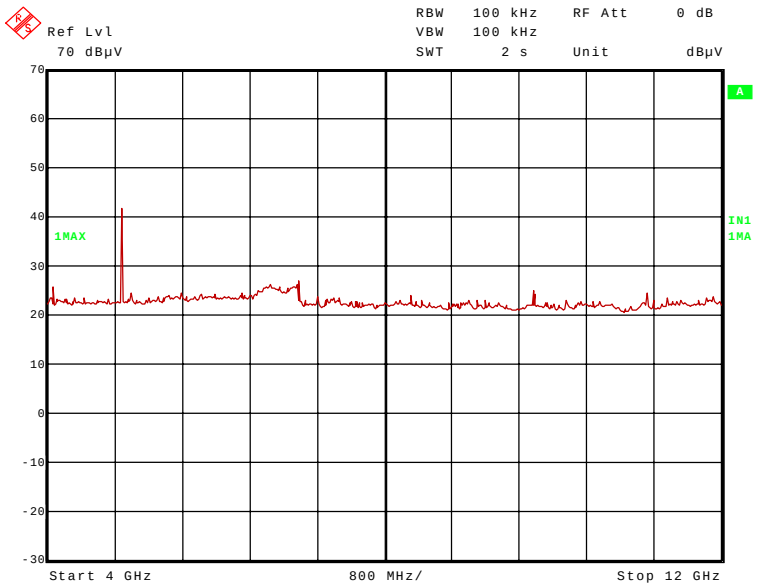
TEST EQUIPMENT USED FOR THE TEST:
29, 31 –34, 36, 37, 39, 43, 44, 46, 49 - 51, 72

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

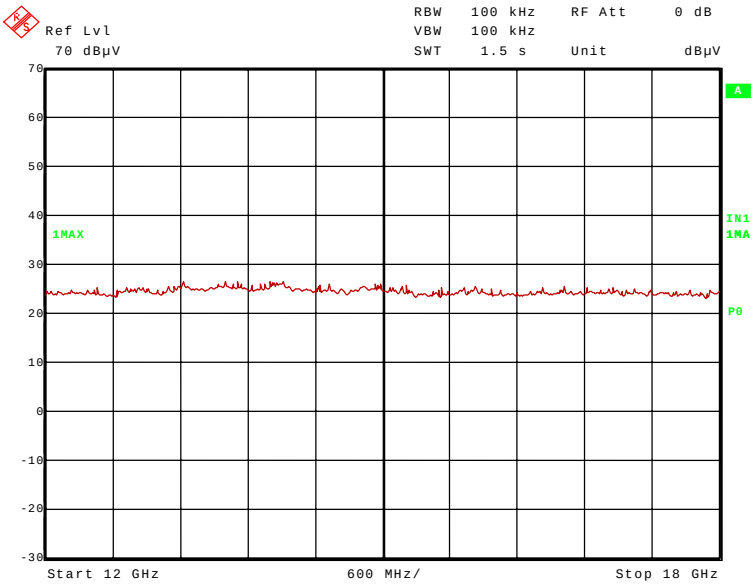
122097_05.wmf: Spurious emissions from 1 GHz to 4 GHz (operation mode 2):



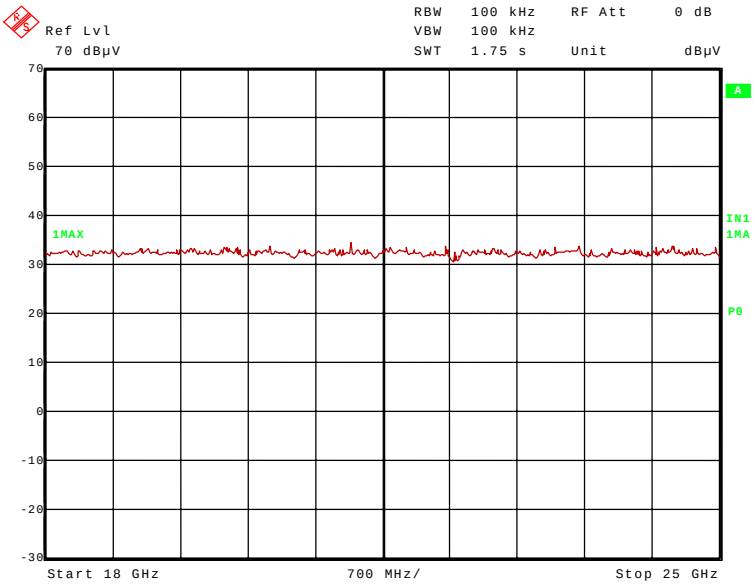
122097_04.wmf: Spurious emissions from 4 GHz to 12 GHz (operation mode 2):



122097_19.wmf: Spurious emissions from 12 GHz to 18 GHz (operation mode 2):



122097_20.wmf: Spurious emissions from 18 GHz to 25 GHz (operation mode 2):



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

- 4.882 GHz.

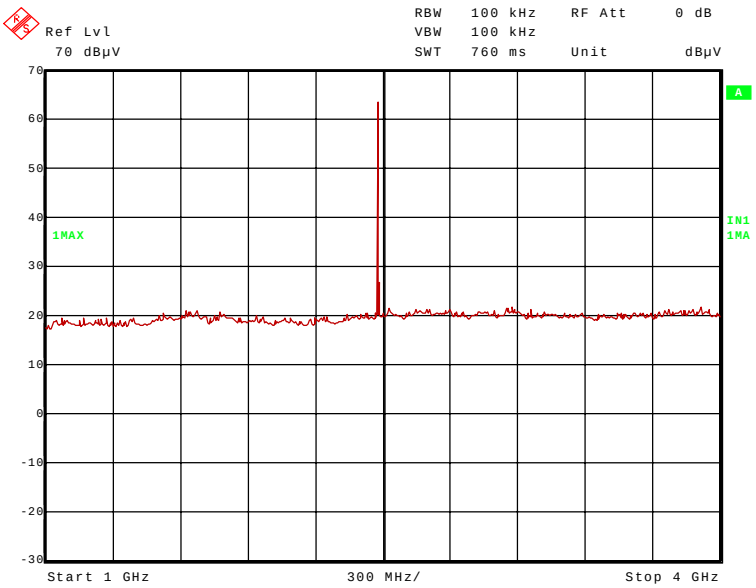
The following frequency was found outside the restricted bands during the preliminary radiated emission test:

- 2.441 GHz and 9.764 GHz.

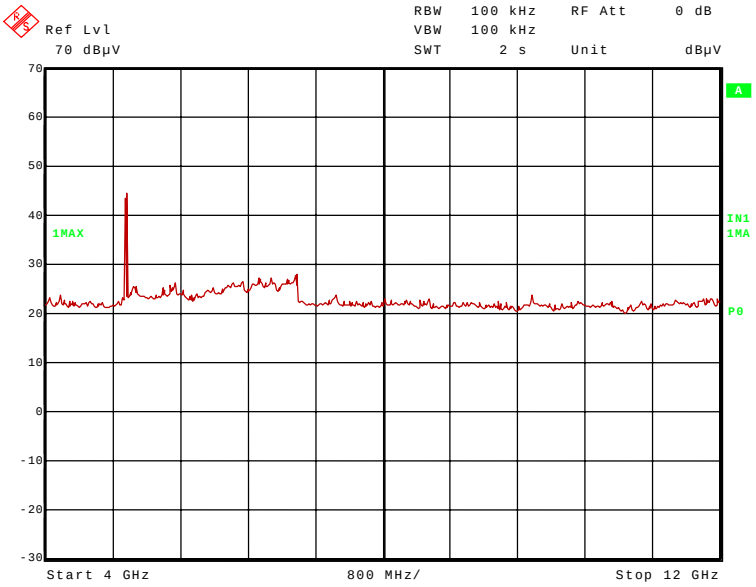
These frequencies have to be measured in a final measurement. The results were presented in the following.

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

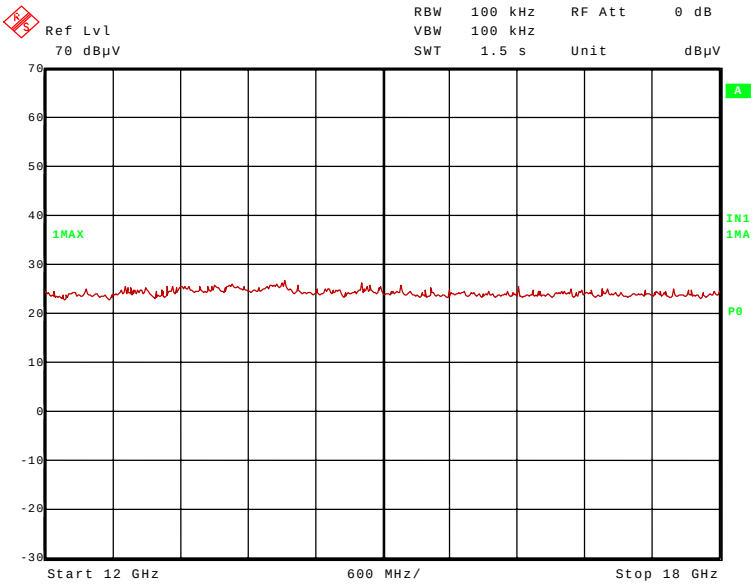
122097_41.wmf: Spurious emissions from 1 GHz to 4 GHz (operation mode 3):



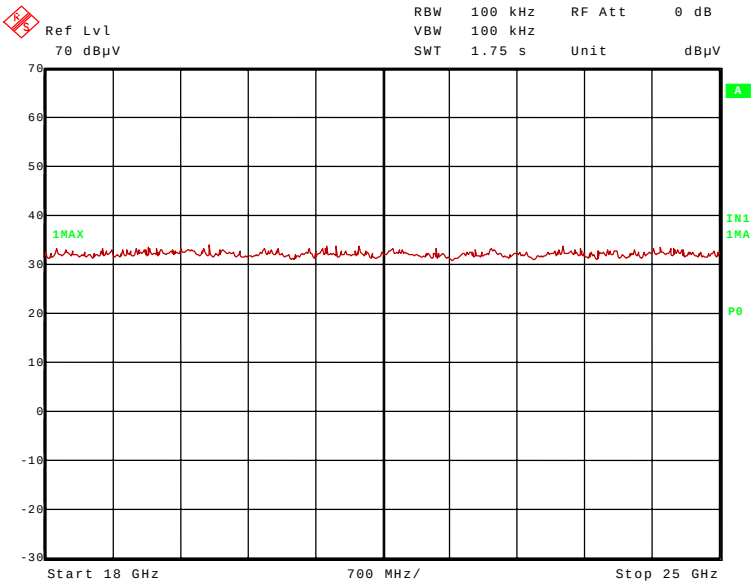
122097_08.wmf: Spurious emissions from 4 GHz to 12 GHz (operation mode 3):



122097_23.wmf: Spurious emissions from 12 GHz to 18 GHz (operation mode 3):



122097_24.wmf: Spurious emissions from 18 GHz to 25 GHz (operation mode 3):



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

- 4.960 GHz.

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

- 2.480 GHz.

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

5.7.2.5 Final radiated emission measurement (1 GHz to 25 GHz)

Ambient temperature	21 °C	Relative humidity	47 %

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

Cable guide: The cable of the EUT is running vertically to the false floor. 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 EUT was supplied with 12.0 V DC.

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

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

Result [dBµV/m] = reading [dBµV] + cable loss [dB] + antenna factor [dB/m] – preamp [dB]

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

Result measured with the peak detector:

Frequency GHz	Corr. value dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Pos.	Restr. Band
2.402	99.3	-	-	67.3	28.3	0.0	3.7	150	Vert.	1	carrier
4.804	60.7	74.0	13.3	48.5	32.6	25.7	5.3	150	Hor.	2	Yes
9.608	55.4	79.3	23.9	34.2	37.3	23.9	7.8	150	Vert.	2	No
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency GHz	Corr. value dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Pos.	Restr. Band
2.402	88.8	-	-	56.8	28.3	0.0	3.7	150	Vert.	1	carrier
4.804	47.8	54.0	6.2	35.6	32.6	25.7	5.3	150	Hor.	2	Yes
9.608	40.5	68.8	28.2	19.3	37.3	23.9	7.8	150	Vert.	2	No
Measurement uncertainty						+2.2 dB / -3.6 dB					

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

Result measured with the peak detector:

Frequency GHz	Corr. value dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height Cm	Pol.	Pos.	Restr. Band
2.441	101.0	-	-	68.9	28.4	0.0	3.7	150	Vert.	1	carrier
4.882	59.1	74.0	14.9	46.9	32.6	25.7	5.3	150	Hor.	2	Yes
9.764	55.6	81.0	25.4	34.3	37.3	23.9	7.9	150	Vert.	2	No
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency GHz	Corr. value dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Pos.	Restr. Band
2.441	90.5	-	-	58.4	28.4	0.0	3.7	150	Vert.	1	carrier
4.882	45.1	54.0	9.0	32.9	32.6	25.7	5.3	150	Hor.	2	Yes
9.764	41.0	70.5	29.5	19.7	37.3	23.9	7.9	150	Vert.	2	No
Measurement uncertainty						+2.2 dB / -3.6 dB					

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

Result measured with the peak detector:

Frequency GHz	Corr. value dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Pos.	Restr. Band
2.480	99.9	-	-	67.6	28.5	0.0	3.8	150	Vert.	1	carrier
4.960	61.2	74.0	12.8	48.6	32.9	25.6	5.3	150	Hor.	2	Yes
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency GHz	Corr. value dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Pos.	Restr. Band
2.480	89.4	-	-	57.1	28.5	0.0	3.8	150	Vert.	1	carrier
4.960	47.5	54.0	6.5	34.9	32.9	25.6	5.3	150	Hor.	2	Yes
Measurement uncertainty						+2.2 dB / -3.6 dB					

Test result: Passed

TEST EQUIPMENT USED FOR THE TEST:
29, 31 –34, 36, , 43, 44, 49, 72

6 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

No.	Test equipment	Type	Manufacturer	Serial No.	PM. No.	Cal. Date	Cal. due
12	Measuring Receiver	ESPC	Rohde & Schwarz	843756/006	480150	02/09/2012	02/2014
13	Outdoor test site	-	Phoenix Test-Lab	-	-	-	-
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	-	-
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	AS620P	Deisel	620/375	480325	-	-
35	Antenna	CBL6112 B	Chase	2917	480447	09/28/2010	09/2015
36	Antenna	3115 A	EMCO	9609-4918	480183	11/09/2012	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.)	
42	RF-cable-No 36	Sucoflex 106B	Huber&Suhner	0587/6B / Kabel 36	480865	Weekly verification (system cal.)	
43	RF-cable No. 3	Sucoflex 106B	Suhner	0563/6B	480670	Weekly verification (system cal.)	
44	RF-cable No. 40	Sucoflex 106B	Suhner	0708/6B	481330	Weekly verification (system cal.)	
45	RF-cable 1 m	KPS-1533-400-KPS	Insulated Wire		480300	Six month 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	Antenna	HFH2-Z2	Rohde & Schwarz	832609/014	480059	02/16/2012	02/2014
72	4 GHz High Pass Filter	WHKX4.0/18 G-8SS	Wainwright Instruments	1	480587	Weekly verification (system cal.)	

7 REPORT HISTORY

Report Number	Date	Comment
F122097E1	09 July 2012	Document created

8 LIST OF ANNEXES

ANNEX A TEST SETUP PHOTOGRAPHS 5 pages

122097_02: Test setup - Radiated emission – 9 kHz – 30 MHz (fully anechoic chamber)
122097_03: Test setup - Radiated emission – 30 MHz – 1 GHz (fully anechoic chamber)
122097_01: Test setup - Radiated emission – 1 GHz – 12 GHz (fully anechoic chamber)
122097_04: Test setup - Radiated emission – 30 MHz – 1 GHz (open area test site)
122097_06: Test setup - Radiated emission – 30 MHz – 1 GHz (outdoor test site)

ANNEX B EXTERNAL PHOTOGRAPHS 12 pages

122097_56.JPG: EUT – handset + cradle, 3D top view*[1]
122097_21.JPG: EUT – handset + cradle, ,3D bottom view*[1]
122097_53.JPG: EUT – handset, 3D top view*[1]
122097_54.JPG: EUT – handset, 3D bottom view*[1]
122097_57.JPG: EUT – cradle, 3D top view*[1]
122097_22.JPG: EUT – cradle, ,3D bottom view*[1]
122097_58.JPG: EUT – handset + cradle, with temporary antenna connector, 3D top view *[2]
122097_12.JPG: EUT – handset + cradle, with temporary antenna connector, 3D bottom view*[2]
122097_60.JPG: EUT – handset, with temporary antenna connector, 3D top view *[2]
122097_61.JPG: EUT – handset, with temporary antenna connector, 3D bottom view*[2]
122097_62.JPG: EUT – cradle, 3D top view
122097_16.JPG: EUT – cradle, 3D bottom view

ANNEX C INTERNAL PHOTOGRAPHS 13, pages

122097_23.JPG: EUT – handset, internal top view*[1]
122097_25.JPG: EUT – handset, internal bottom view*[1]
122097_32.JPG: EUT – handset, PCB top view *[1]
122097_31.JPG: EUT – handset, PCB bottom view *[1]
122097_33.JPG: EUT – handset, closeup to temporary UART connection *[1]
122097_41.JPG: EUT – handset, with temporary antenna connector, internal top view*[2]
122097_40.JPG: EUT – handset, with temporary antenna connector, internal bottom view*[2]
122097_47.JPG: EUT – handset, with temporary antenna connector, PCB top view*[2]
122097_46.JPG: EUT – handset, with temporary antenna connector, PCB bottom view*[2]
122097_48.JPG: EUT – handset, with temporary antenna connector, closeup to temporary UART connection*[2]
122097_50.JPG: EUT – handset, with temporary antenna connector, closeup to temporary antenna connector*[2]
122097_36.JPG: EUT – cradle, charging circuit, PCB top view
122097_39.JPG: EUT – cradle, charging circuit, PCB bottom view

The EUTs shown in the photographs marked by *[1] were modified with a temporary UART interface for test purposes.

The EUTs shown in the photographs marked by *[2] were modified with a temporary UART interface and antenna connector for test purposes.