Accredited testing-laboratory

DAR registration number: DAT-P-176/94-D1

Federal Motor Transport Authority (KBA)
DAR registration number: KBA-P 00070-97

Recognized by the Federal Communications Commission
Anechoic chamber registration no.: 90462 (FCC)
Anechoic chamber registration no.: 3463A-1 (IC)
Certification ID: DE 0001
Accreditation ID: DE 0002

Accredited Bluetooth® Test Facility (BQTF)

Test report no.	**:**	**4-2380-13-07/07**
Type identification	**:**	**MC2007S1**
Applicant	**:**	**SAGEM Communication**
FCC ID	**:**	**M9HMC07S1**
IC Reg. No.	**:**	**-**
Test standards	**:**	**47 CFR Part 15**

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1 General information

1.1 Notes

The test results of this test report relate exclusively to the test item specified in 1.5. The CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalisations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the CETECOM ICT Services GmbH.

Test laboratory manager:

2007-05-08	**Stefan Bös**	
Date	Name	Signature

Technical responsibility for area of testing:

2007-05-08	**Michael Berg**	
Date	Name	Signature

1.2 Testing laboratory

CETECOM ICT Services GmbH

Untertürkheimer Straße 6 - 10
66117 Saarbrücken
Germany
Phone: + 49 681 5 98 - 0
Fax: + 49 681 5 98 - 9075
e-mail: info@ICT.cetecom.de
Internet: http://www.cetecom-ict.de

State of accreditation: **The test laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025**
DAR registration number: DAT-P-176/94-D1

Accredited by: **Federal Motor Transport Authority (KBA)**
DAR registration number: KBA-P 00070-97

Testing location, if different from CETECOM ICT Services GmbH:

Name :
Street :
Town :
Country :
Phone :
Fax :

1.3 Details of applicant

Name:	**SAGEM Communication** **FR 0448018158**
Street:	**2 rue du Petit Albi**
Town:	**95800 Cergy Pontoise**
Country:	**France**
Telephone:	**+33-1-5811 90 90**
Fax:	**+33-1-5811 14 11**
Contact:	**Jean Marquet**
E-mail:	**jean.marquet@sagem.com**
Telephone:	**+33-1-5811 91 72**

1.4 Application details

Date of receipt of order:	**2007-03-21**
Date of receipt of test item:	**2007-05-01**
Date of start test:	**2007-05-07**
Date of end test	**2007-05-08**

Persons(s) who have been present during the test:

2 Test standard/s:

47 CFR Part 15	**2006-08**	**Title 47 of the Code of Federal Regulations; Chapter I-Federal Communications Commission subchapter A - general, Part 15-Radio frequency devices**

3 Technical tests

3.1 Details of manufacturer

Name:	**SAGEM Communication FR 0448018158**
Street:	**2 rue du Petit Albi**
Town:	**95800 Cergy Pontoise**
Country:	**France**

3.1.1 Test item

Kind of test item	:	**Mobile phone**
Type identification	:	**MC2007S1**
S/N serial number	:	**Radiated: IMEI 354437010000228** **Conducted: IMEI 354437010002695**
HW hardware status	:	**V0x**
SW software status	:	**E_E1,C; E_E1,D**
Frequency Band [MHz]	:	**ISM 2400 – 2483.5**
Type of Modulation	:	**FHSS**
Number of channels	:	**79**
Antenna	:	**Integrated antenna**
Power Supply	:	**3.90 V DC**
Temperature Range	:	**-20 °C to 55 °C**

Max. power radiated: -3.14 dBm
Max. power conducted: 1.96 dBm

FCC ID: **M9HMC07S1**
IC: **-**

3.1.2 Description of the test

3.1.3 EUT operating modes

EUT operating mode no.*)	Description of operating modes	Additional information
Op. 0	Normal mode	Normal temperature and power source conditions
Op. 1		low temperature, low power source conditions
Op. 2		low temperature, high power source conditions
Op. 3		high temperature, low power source conditions
Op. 4		high temperature, high power source conditions

*) EUT operating mode no. is used to simplify the test plan

3.1.4 Extreme conditions testing values

Description	Shortcut	Unit	Value
Nominal Temperature	T_{nom}	°C	**20**
Nominal Humidity	H_{nom}	%	**43**
Nominal Power Source	V_{nom}	V	**3.90**

Type of power source: **DC**

Deviations from these values are reported in chapter 2

4 Summary of Measurement Results and list of all performed test cases

☒ **No deviations from the technical specifications were ascertained**

☐ There were deviations from the technical specifications ascertained

TC identifier	Description	verdict	date	Remark
RF-Testing	FCC Part 15 §15.247	PASS	2004-10-27	

Test Specification Clause	Test Case	Modulation	Pass	Fail	N/A	Not performed
None	Antenna Gain	GFSK	Yes			
§15.247(a1)	Carrier frequency separation	GFSK	Yes			
§15.247(a1)	Number of hopping channels	GFSK	Yes			
§15.247(a)(1)(iii)	Time of occupancy (dwell time)	--	Yes			
§15.247(e)	Power Spectral density (Hybrid system in Inquiry mode/Page scan)	--			Yes	
§15.247(a)(1)	Spectrum Bandwidth of a FHSS System / 20dB Bandwith	GFSK Pi/4 DQPSK 8 DPSK	Yes Yes Yes			
§ 15.247 (b)(1)	Maximum output power (conducted)	GFSK Pi/4 DQPSK 8 DPSK	Yes Yes Yes			
§ 15.247 (b)(1)	Max. peak output power (radiated)	GFSK	Yes			
§ 15.247 (d)	Band-edge compliance of conducted emissions	Widest modulation	Yes			
§ 15.205	Band-edge compliance of radiated emissions	Widest modulation	Yes			
§ 15.247 (d)	Spurious Emission - conducted (Transmitter)	GFSK	Yes			
§ 15.247 (d)	Spurious Emission - radiated (Transmitter) >30 MHz	GFSK	Yes			
§ 15.109	Spurious Emissions - radiated (Receiver)	GFSK	Yes			
§ 15.209	Spurious Emissions - radiated (Transmitter) <30 MHz	GFSK	Yes			
§ 15.107/207	Conducted Emissions <30 MHz	GFSK	Yes			

5 RF measurement testing

5.1 Description of test set-up

5.1.1 Radiated measurements

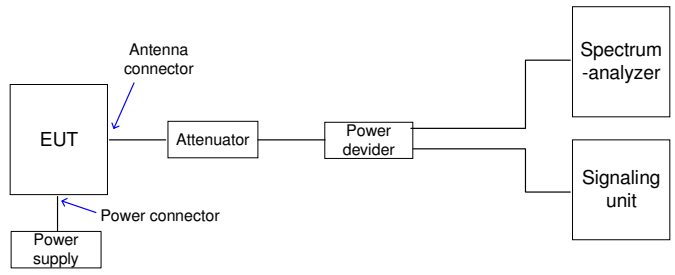
The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 25 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas are confirmed with specifications ANSI C63.2-1996 clause 15 and ANSI C63.4-2003 clause 4.1.5. These antennas can be moved over the height range between 1.0 m and 4.0 m in order to search for maximum field strength emitted from EUT. The measurement distances between EUT and receiving antennas are indicated in the test setups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received. The wanted and unwanted emissions are received by spectrum analysers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63-4-2003 clause 4.2.
Antennas are confirmed with ANSI C63.2-1996 item 15.

9 kHz - 150 kHz: Quasi Peak measurement, 200 Hz Bandwidth, passive loop antenna.
150 kHz - 30 MHz: Quasi Peak measurement, 9 kHz Bandwidth, passive loop antenna.
30 MHz - 200 MHz: Quasi Peak measurement, 120 kHz Bandwidth, biconical antenna
200MHz - 1GHz: Quasi Peak measurement, 120 kHz Bandwidth, log periodic antenna
>1GHz: Average, RBW 1MHz, VBW 10 Hz, waveguide horn

All measurements are done in accordance with the Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems DA 00-705 and Appendix A “BLUETOOTH APPROVALS”
The EUT is powered by an external power supply with nominal voltage. The signalling is performed from outside the chamber with a signalling unit (CMU200 or other) by air link using signalling antenna.

5.1.2 Conducted measurements

The EUT´s RF signal is coupled out by the antenna connector which is supplied by the manufacturer. The signal is first 10dB attenuated before it is power divided (~6dB loss per branch). One of the signal path is connected to the communication base Station (CMU200 or other), the other one is connected to the spectrum analyzer. The specific losses for both signal paths are first checked within a calibration. The measurement readings on the signalling unit/spectrum analyzer are corrected by the specific test set-up loss. The attenuator, power divider, signalling unit and the spectrum analyzer are impedance matched on 50 Ohm.



5.2 Referenced documents

None

5.3 Additional comments

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5.4 Antenna gain

The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module.

	low channel	mid channel	high channel
Conducted power [dBm] *GFSK*	1.66	1.96	1.81
Radiated power [dBm] *GFSK*	-3.14	-3.15	-3.19
Gain [dBi]	-4.80	-5.11	-5.00

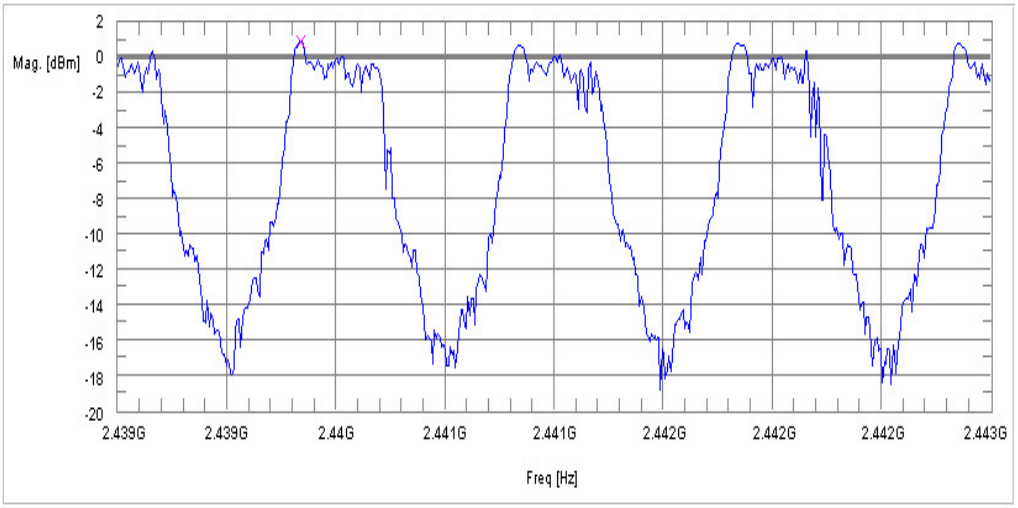
5.5 Carrier frequency separation §15.247(a)(1)

Modulation: GFSK

Plot 1 of 1:

Ref. Level Offset [dB]	Detector	Sweeptime [s]
11.3	POS	2.5m

Video BW [Hz]	RBW [Hz]
100k	100000



Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.439G	2.443G	MAXH	0.8947	2.44G

Result: Channel separation is: ~ 1 MHz

Limits:

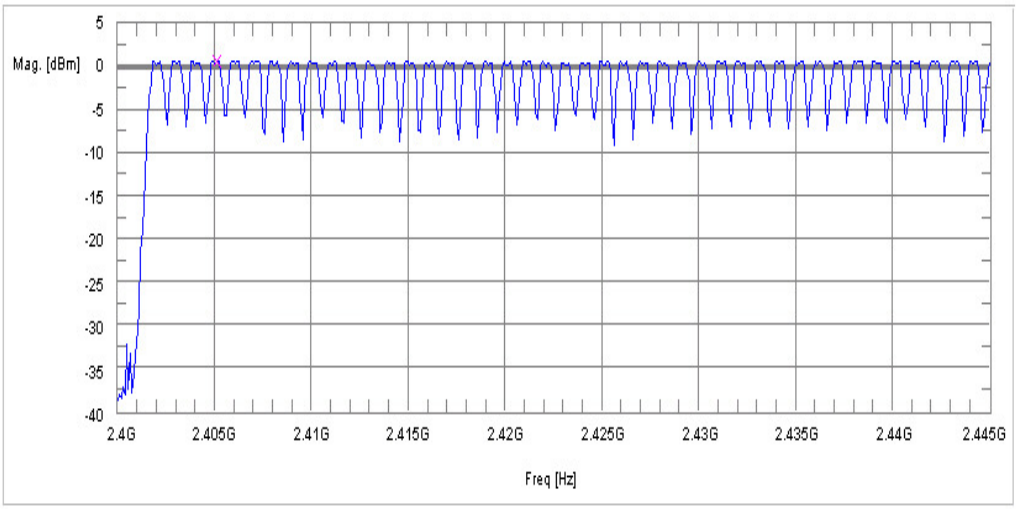
Under normal test conditions only	Minimum 25 kHz or 20 dB Bandwidth of the hopping system

5.6 Number of hopping channels §15.247(a)(1)

Modulation: GFSK

Plot 1 of 2:

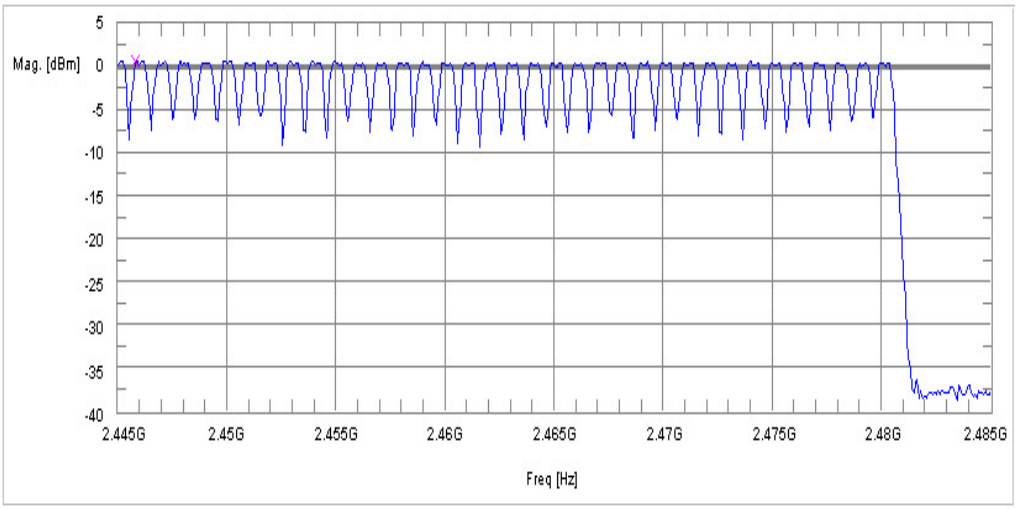
Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
11.3	POS	2.5m	300k	300000



Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.4G	2.445G	MAXH	0.7547	2.405G

Plot 2 of 2:

Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
11.3	POS	2.5m	300k	300000



Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.445G	2.485G	MAXH	0.6789	2.446G

Result : The number of hopping channels is: 79

Limits :

Under normal test conditions only	at least 15 non-overlapping channels

5.7 Time of occupancy (dwell time) §15.247(a)(1)(iii)

For Bluetooth devices:

The dwell time of 0.4 s within a 31.6 second period in data mode is independent from the packet type (packet length).
The calculation for a 31.6 second period is a follows:

Dwell time = time slot length * hop rate / number of hopping channels *31.6 s

Example for a DH1 packet (with a maximum length of one time slot)
Dwell time = 625 µs * 1600 1/s / 79 * 31.6 s = 0.4 s (in a 31.6 s period)

For multi-slot packet the hopping is reduced according to the length of the packet.
Example for a DH5 packet (with a maximum length of five time slots)
Dwell time = 5 * 625 µs * 1600 * 1/5 *1/s / 79 * 31.6 s = 0.4 s (in a 31.6 s period)

This is according the Bluetooth Core Specification V 1.1 & V 1.2 & V2.0 (+ critical errata) for all Bluetooth devices.
Therefore, all Bluetooth devices comply with the FCC dwell time requirement in the data mode.
This was checked during the Bluetooth Qualification tests.
The Dwell time in hybrid mode is approximately 2.6 ms (in a 12.8s period)

5.8 Power Spectral density (Hybrid system in Inquiry mode/Page scan) §15.247(e)

Plot 1 of 1:

Not applicable

Result: Power density: - dBm/Hz = - dBm / 3 kHz
Correction factor from dBm/Hz to dBm / 3 kHz is +34.8 dB

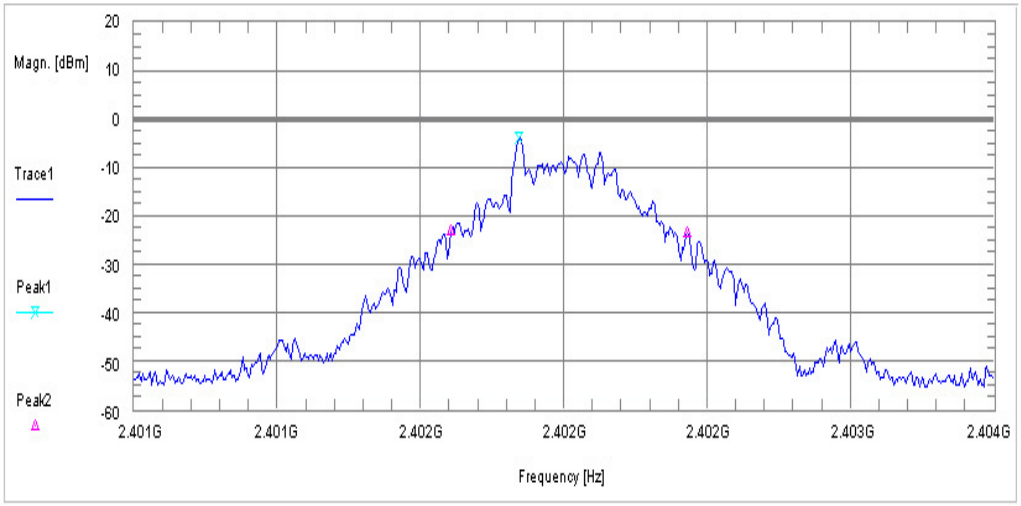
Limits :

Under normal test conditions only	For digitally modulated systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission

5.9 Spectrum Bandwidth of a FHSS System / 20dB Bandwidth §15.247(a)(1)

Plot 1: GFSK

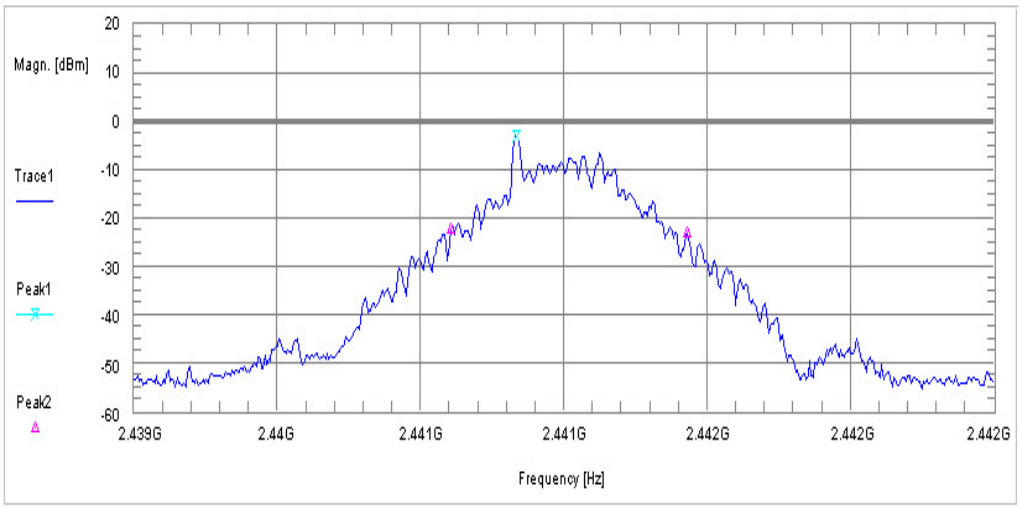
Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
11.1	POS	2	10k	10000



Found Peak [dBm]	Found Peak [Hz]	Tracemode	20 dB Bandwidth [kHz]
-3.791	2.402G	MAXH	824

Plot 2: GFSK

Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
11.3	POS	2	10k	10000

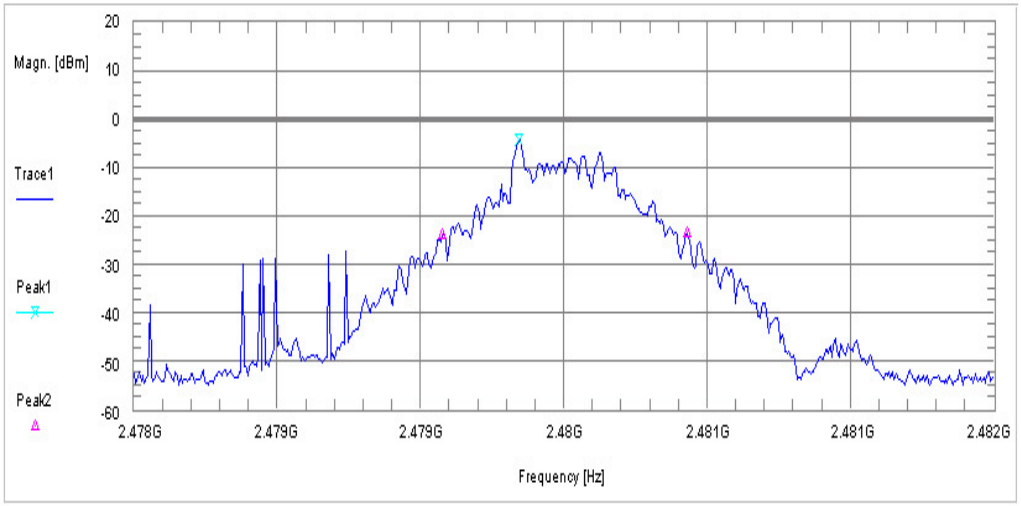


Found Peak [dBm]	Found Peak [Hz]	Tracemode	20 dB Bandwidth [kHz]
-3.111	2.441G	MAXH	824

Plot 3: GFSK

Ref. Level Offset [dB]	Detector	Sweeptime [s]
11.4	POS	2

Video BW [Hz]	RBW [Hz]
10k	10000



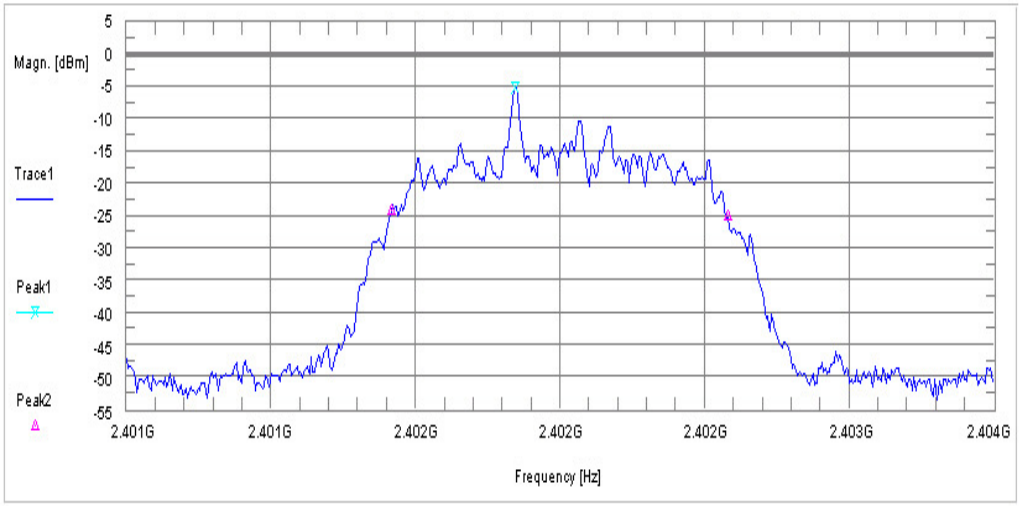
Found Peak [dBm]	Found Peak [Hz]	Tracemode
-4.266	2.48G	MAXH

20 dB Bandwidth [kHz]
854

Plot 4: Pi/4 DQPSK

Ref. Level Offset [dB]	Detector	Sweeptime [s]
11.1	POS	2

Video BW [Hz]	RBW [Hz]
10k	10000



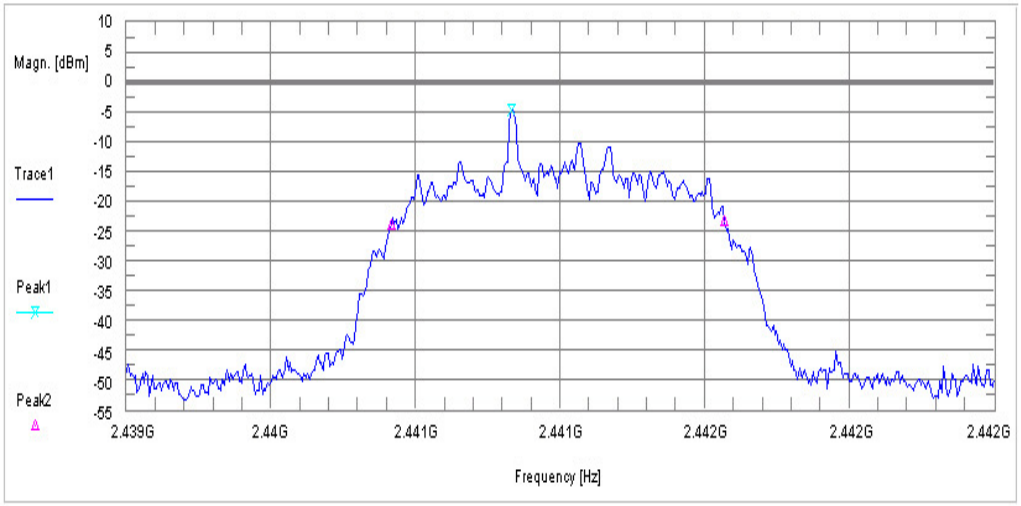
Found Peak [dBm]	Found Peak [Hz]	Tracemode
-5.204	2.402G	MAXH

20 dB Bandwidth [kHz]
1166

Plot 5: Pi/4 DQPSK

Ref. Level Offset [dB]	Detector	Sweeptime [s]
11.3	POS	2

Video BW [Hz]	RBW [Hz]
10k	10000



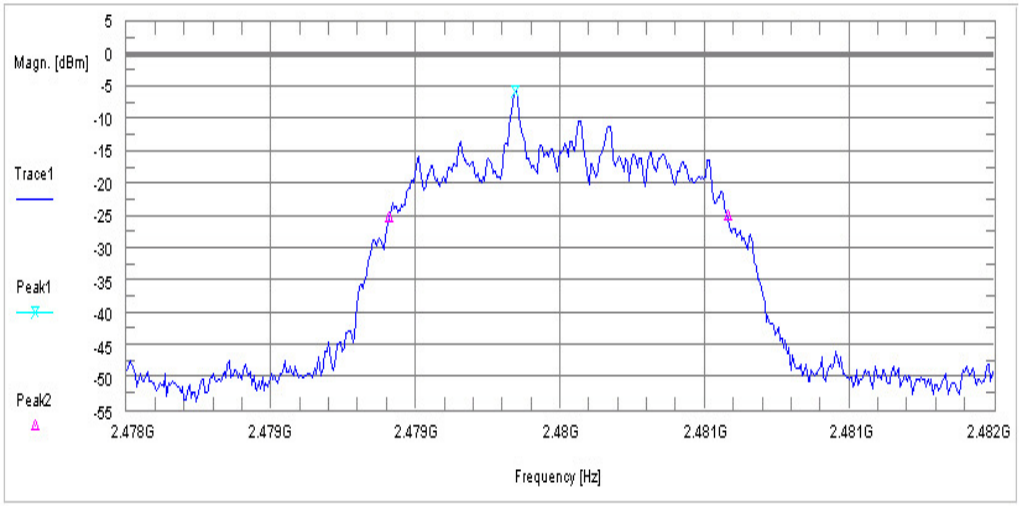
Found Peak [dBm]	Found Peak [Hz]	Tracemode
-4.643	2.441G	MAXH

20 dB Bandwidth [kHz]
1154

Plot 6: Pi/4 DQPSK

Ref. Level Offset [dB]	Detector	Sweeptime [s]
11.4	POS	2

Video BW [Hz]	RBW [Hz]
10k	10000



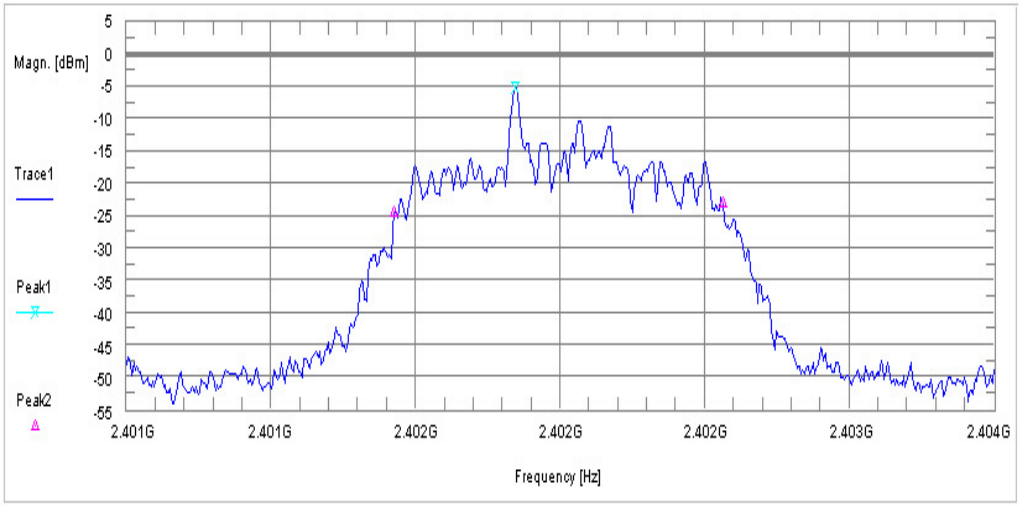
Found Peak [dBm]	Found Peak [Hz]	Tracemode
-5.784	2.48G	MAXH

20 dB Bandwidth [kHz]
1172

Plot 7: 8DPSK

Ref. Level Offset [dB]	Detector	Sweeptime [s]
11.1	POS	2

Video BW [Hz]	RBW [Hz]
10k	10000



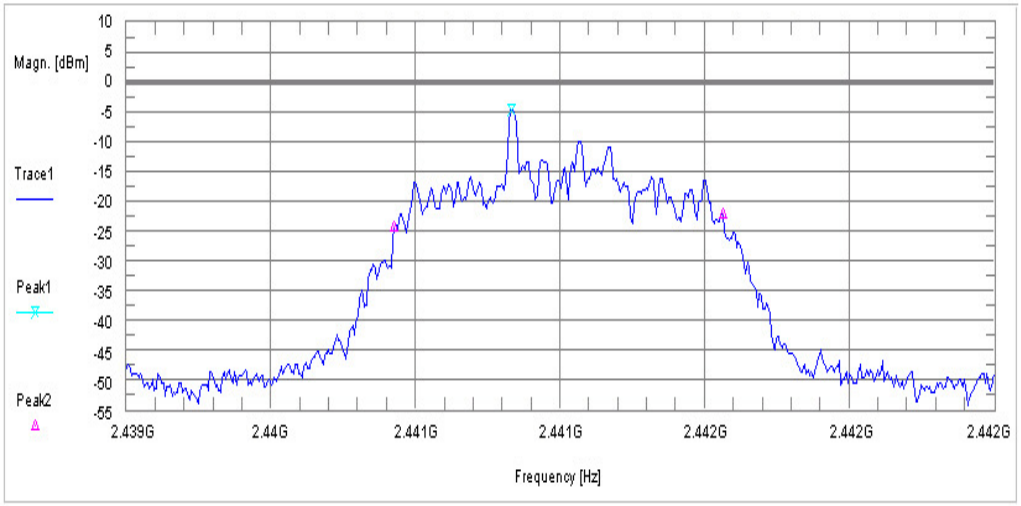
Found Peak [dBm]	Found Peak [Hz]	Tracemode
-5.174	2.402G	MAXH

20 dB Bandwidth [kHz]
1136

Plot 8: 8DPSK

Ref. Level Offset [dB]	Detector	Sweeptime [s]
11.3	POS	2

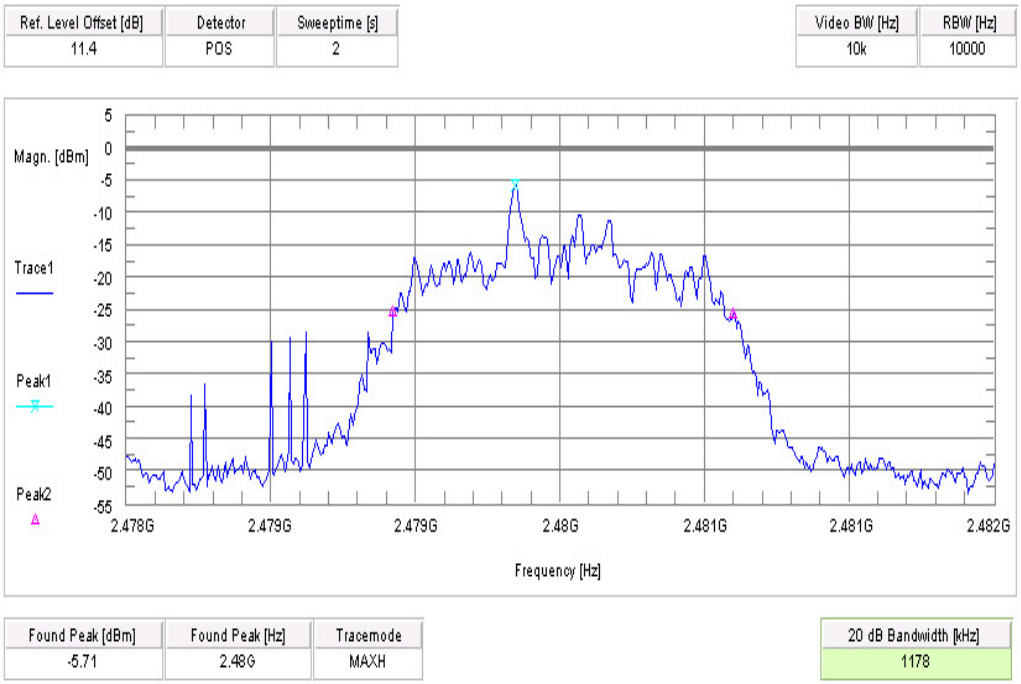
Video BW [Hz]	RBW [Hz]
10k	10000



Found Peak [dBm]	Found Peak [Hz]	Tracemode
-4.59	2.441G	MAXH

20 dB Bandwidth [kHz]
1136

Plot 9: 8DPSK



RESULTS:

Modulation	**20 dB BANDWIDTH [kHz]**		
Frequency [MHz]	2402	2441	2480
GFSK	824	824	854
Pi/4 DQPSK	1166	1154	1172
8DPSK	1136	1136	1178
Measurement uncertainty	±10kHz		

RBW / VBW as provided in the „Measurement Guidelines“ (DA 00-705, March 30, 2000)
RBW: 10 kHz / VBW 10 kHz

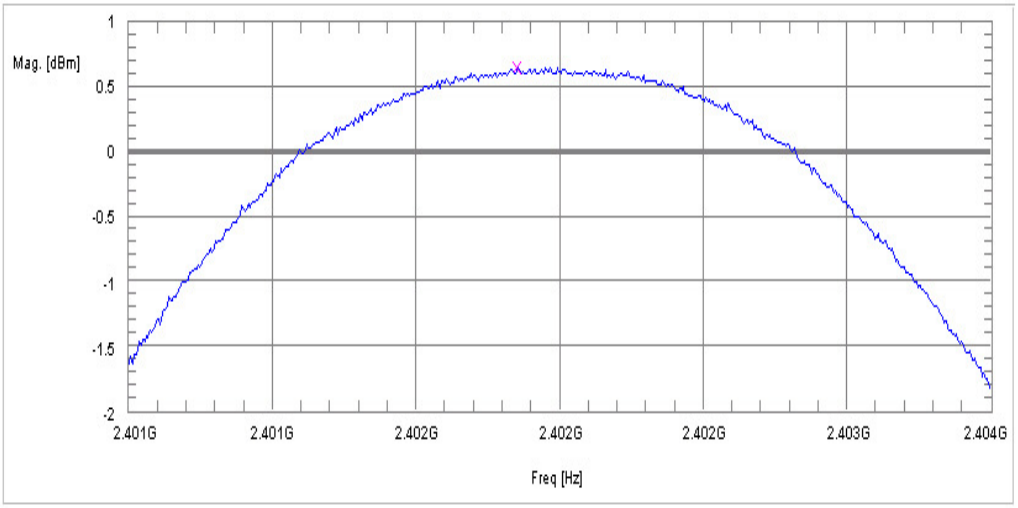
Limits:

Under normal test conditions only	GFSK < 1000 kHz Pi/4 DQPSK < 1500 kHz 8DPSK < 1500 kHz

5.10 Maximum output power (conducted) § 15.247 (b)(1)

Plot 1: GFSK

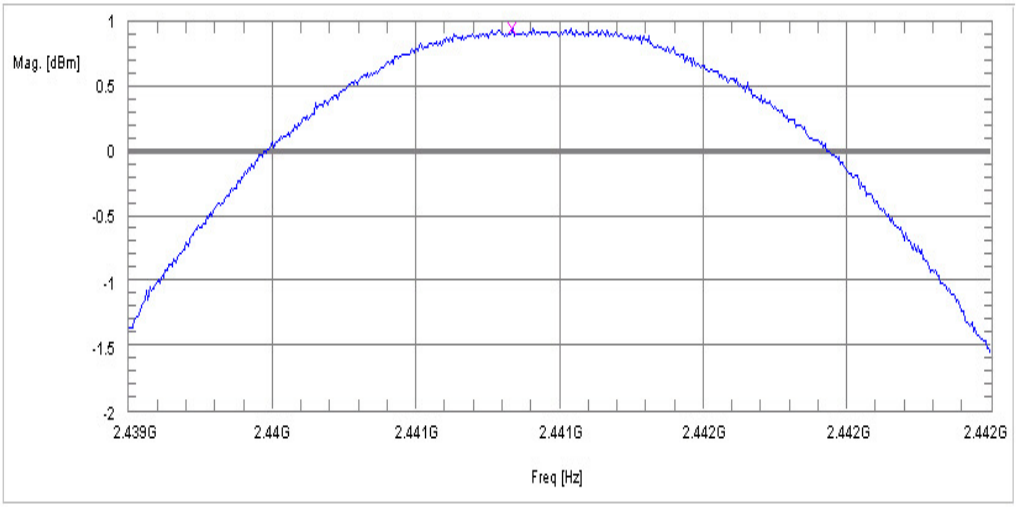
Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
11.1	POS	2.5m	3M	3000000



Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.401G	2.404G	MAXH	0.6562	2.402G

Plot 2: GFSK

Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
11.3	POS	2.5m	3M	3000000

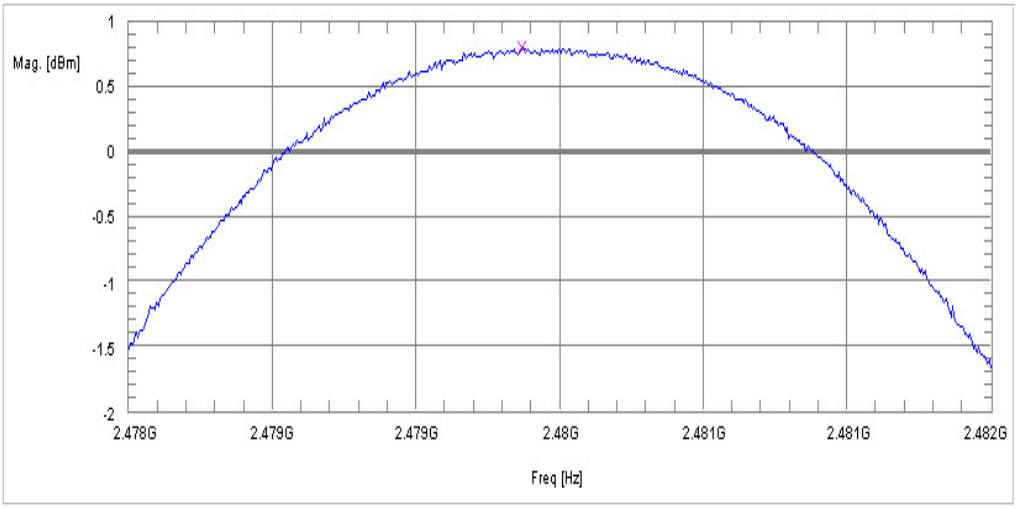


Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.439G	2.442G	MAXH	0.9589	2.441G

Plot 3: GFSK

Ref. Level Offset [dB]	Detector	Sweeptime [s]
11.4	POS	2.5m

Video BW [Hz]	RBW [Hz]
3M	3000000

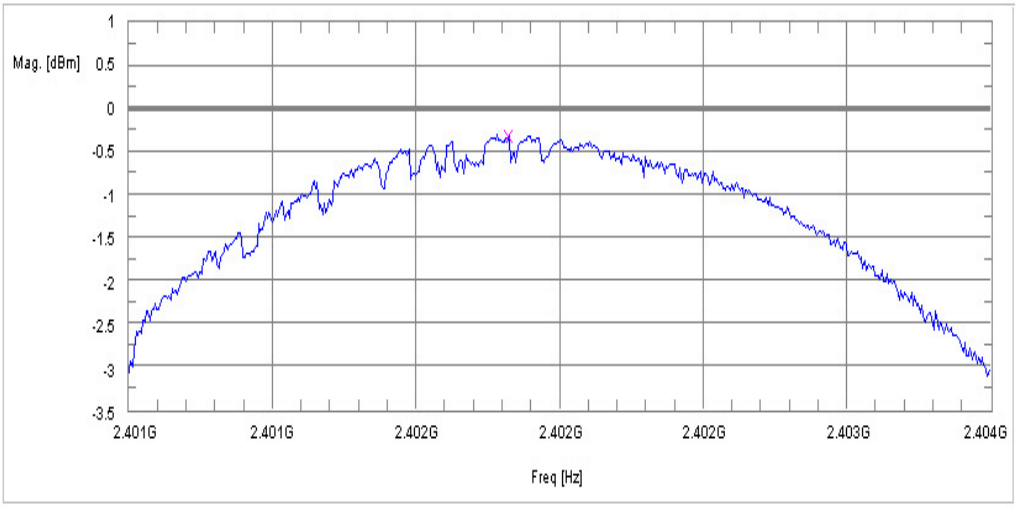


Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.478G	2.482G	MAXH	0.8101	2.48G

Plot 4: Pi/4 DQPSK

Ref. Level Offset [dB]	Detector	Sweeptime [s]
11.1	POS	2.5m

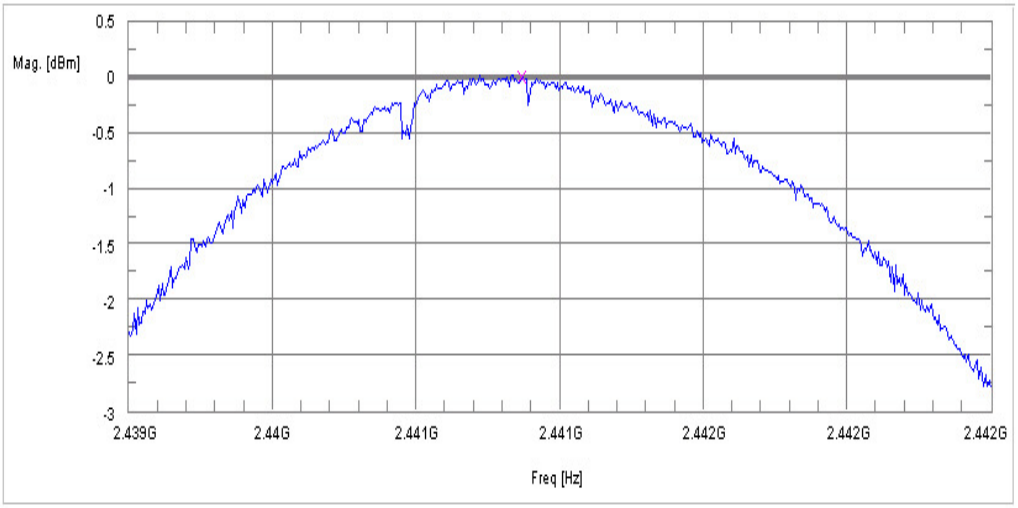
Video BW [Hz]	RBW [Hz]
3M	3000000



Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.401G	2.404G	MAXH	-0.3304	2.402G

Plot 5: Pi/4 DQPSK

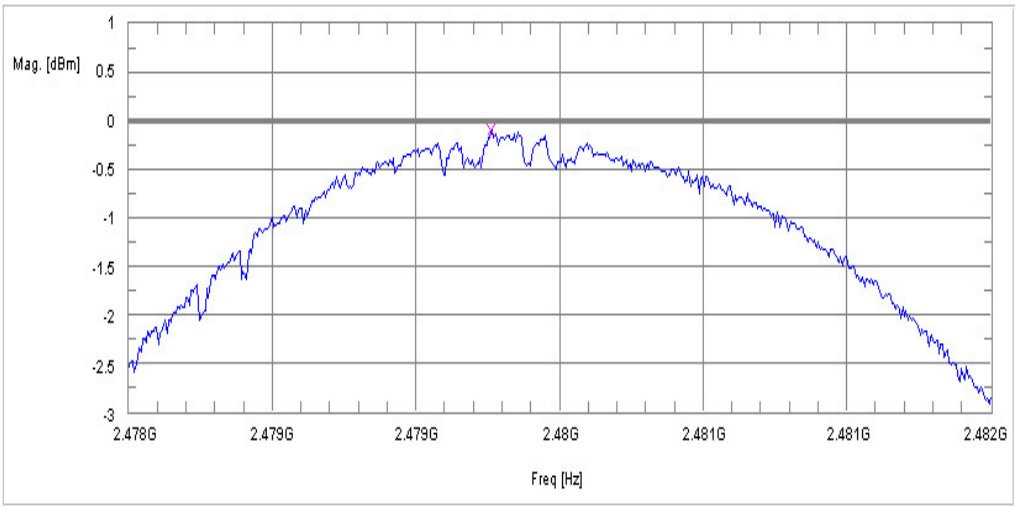
Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
11.3	POS	2.5m	3M	3000000



Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.439G	2.442G	MAXH	14.78m	2.441G

Plot 6: Pi/4 DQPSK

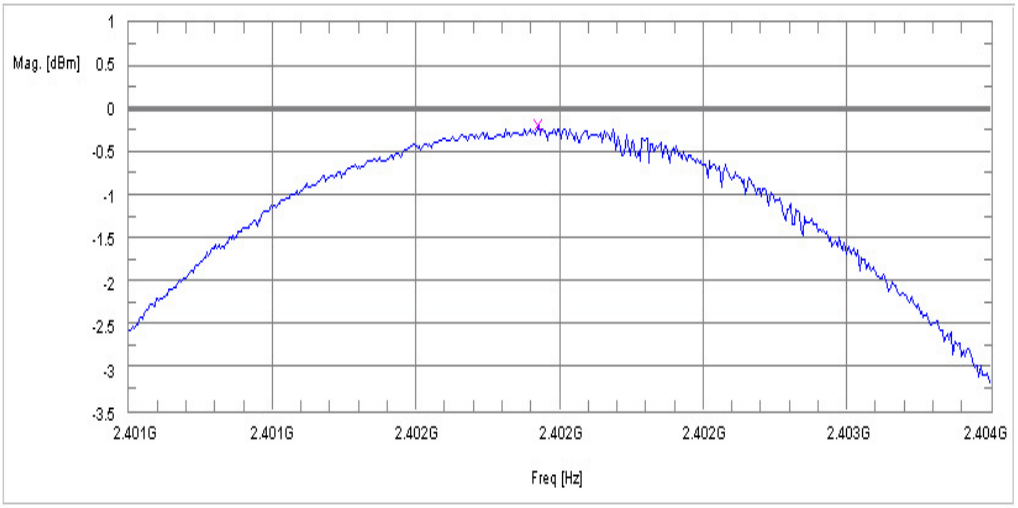
Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
11.4	POS	2.5m	3M	3000000



Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.478G	2.482G	MAXH	-98.4m	2.48G

Plot 7: 8DPSK

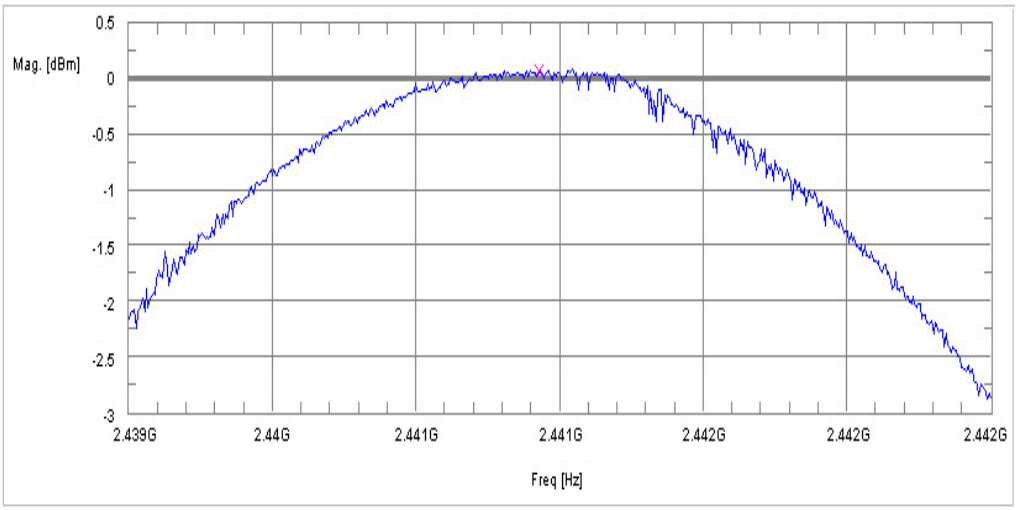
Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
11.1	POS	2.5m	3M	3000000



Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.401G	2.404G	MAXH	-0.1883	2.402G

Plot 8: 8DPSK

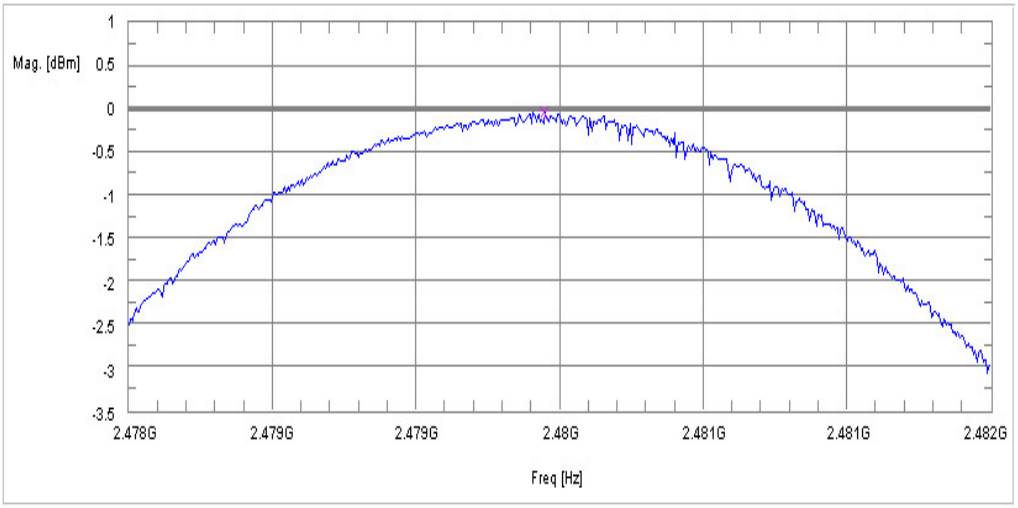
Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
11.3	POS	2.5m	3M	3000000



Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.439G	2.442G	MAXH	74.6m	2.441G

Plot 9: 8DPSK

Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
11.4	POS	2.5m	3M	3000000



Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.478G	2.482G	MAXH	-31.05m	2.48G

Results:
Measurements corrected with cable loss: 1,0 dB

Modulation	**Max. peak output power [dBm]**		
Frequency [MHz]	2402	2441	2480
GFSK	1.66	1.96	1.81
Pi/4 DQPSK	0.67	1.01	0.90
8DPSK	0.81	1.07	0.97
Measurement uncertainty	±2dB		

RBW / VBW: 3 MHz

Limits:

Under normal test conditions only, for frequency range 2400-2483.5 MHz	Max. 1.0 Watt

5.11 Max. peak output power (radiated) § 15.247 (b)(1)

Modulation: GFSK

Test conditions		Max. peak output power EIRP [dBm]		
Frequency [MHz]		2402	2442	2480
T_{nom}	V_{nom}	-3.14	-3.15	-3.19
Measurement uncertainty		±3dB		

RBW / VBW: 3 MHz
Measured at a distance of 3m

Limits:

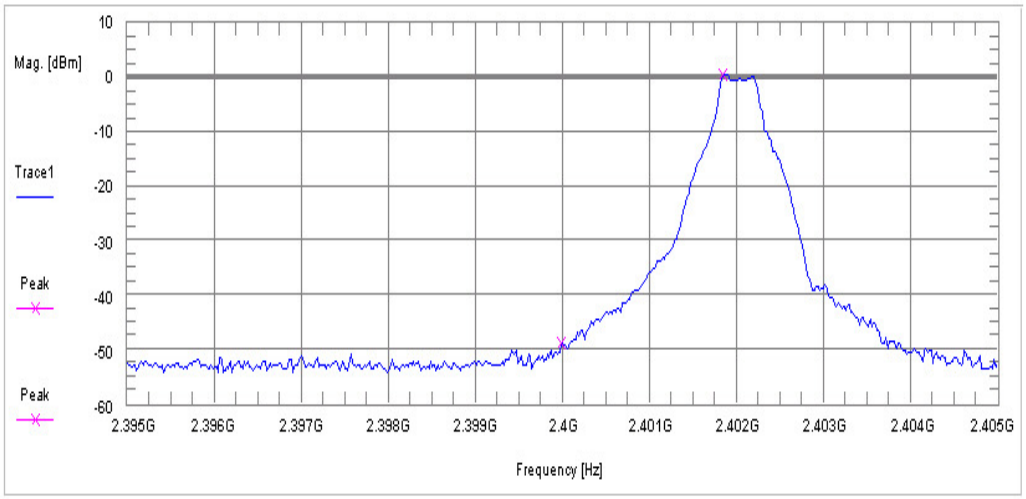
Under normal test conditions only, for frequency range 2400-2483.5 MHz	Max. 1.0 Watt

5.12 Band-edge compliance of conducted emissions §15.247 (d)

Modulation: widest

Plot 1 of 4 (hopping off, lowest frequency):

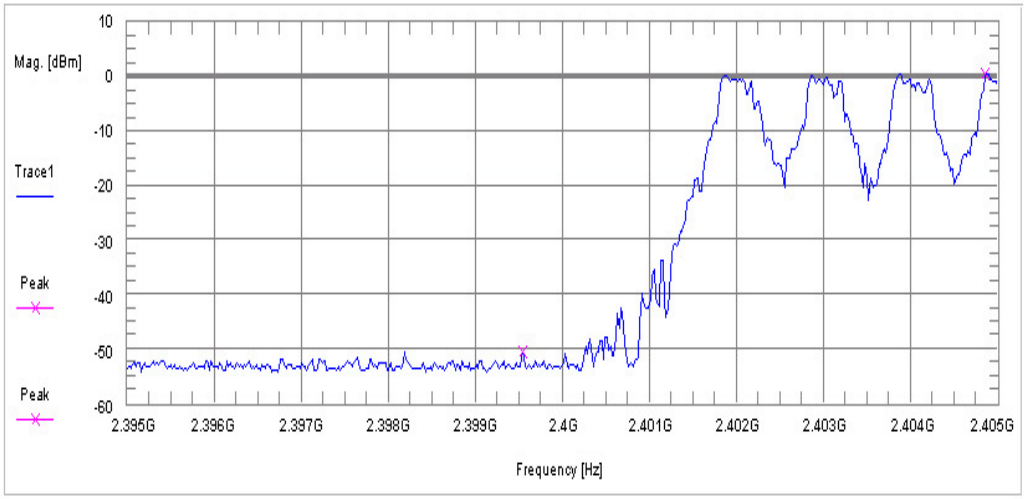
Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
11.1	POS	2.5m	100k	100000



Found Peak [dBm]	Found Peak [Hz]	Tracemode	Delta [dB]
0.5243	2.402G	MAXH	49.5

Plot 2 of 4 (hopping on, lowest frequency):

Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
11.1	POS	2.5m	100k	100000

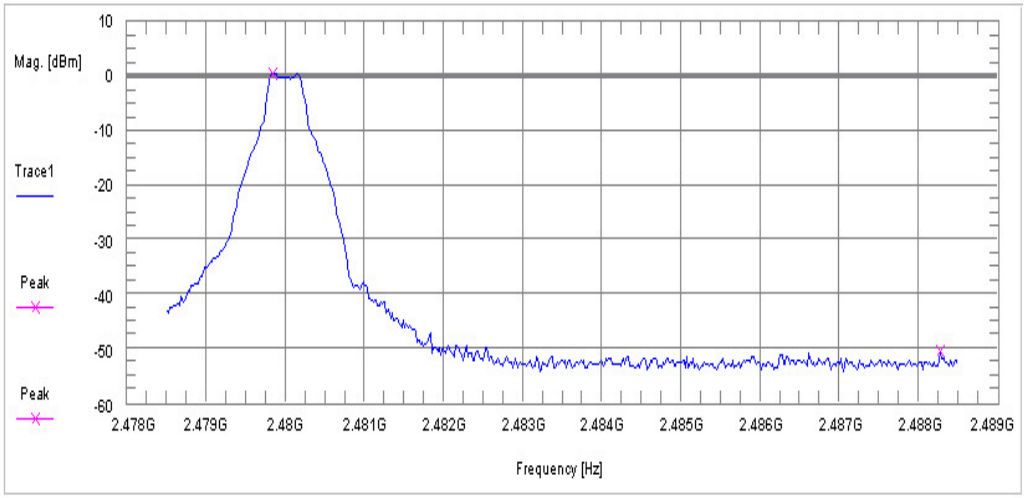


Found Peak [dBm]	Found Peak [Hz]	Tracemode	Delta [dB]
0.4418	2.405G	MAXH	51.18

Plot 3 of 4 (hopping off, highest frequency):

Ref. Level Offset [dB]	Detector	Sweeptime [s]
11.4	POS	2.5m

Video BW [Hz]	RBW [Hz]
100k	100000



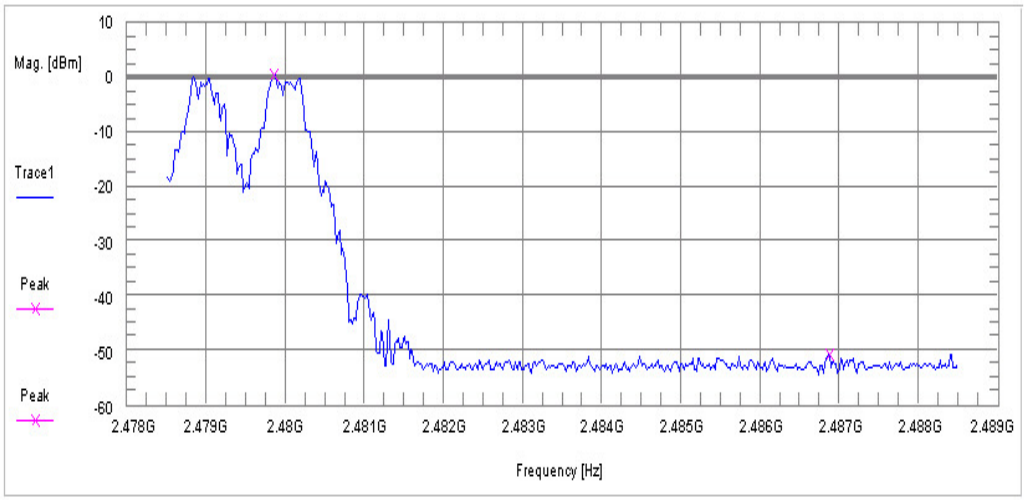
Found Peak [dBm]	Found Peak [Hz]	Tracemode
0.6948	2.48G	MAXH

Delta [dB]
51.27

Plot 4 of 4 (hopping on, highest frequency):

Ref. Level Offset [dB]	Detector	Sweeptime [s]
11.4	POS	2.5m

Video BW [Hz]	RBW [Hz]
100k	100000



Found Peak [dBm]	Found Peak [Hz]	Tracemode
0.4805	2.48G	MAXH

Delta [dB]
51.25

Results:

SZENARIO	DELTA VALUE [DB]
hopping off, lowest frequency	49.5
hopping on, lowest frequency	51.2
hopping off, highest frequency	51.3
hopping on, highest frequency	51.3
Measurement uncertainty	±1.5dB

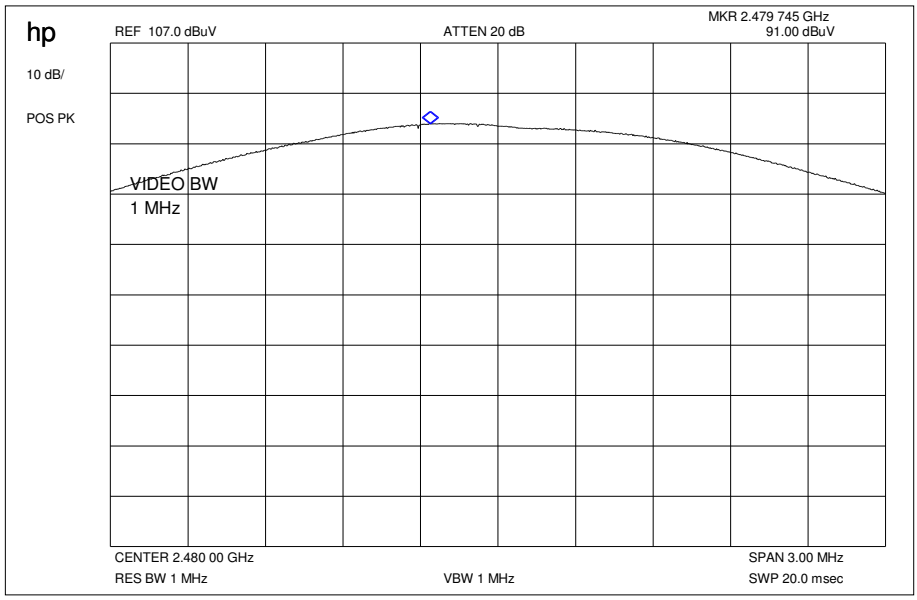
Limits:

Under normal test conditions only	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 5.205(c)).

5.13 Band-edge compliance of radiated emissions §15.205

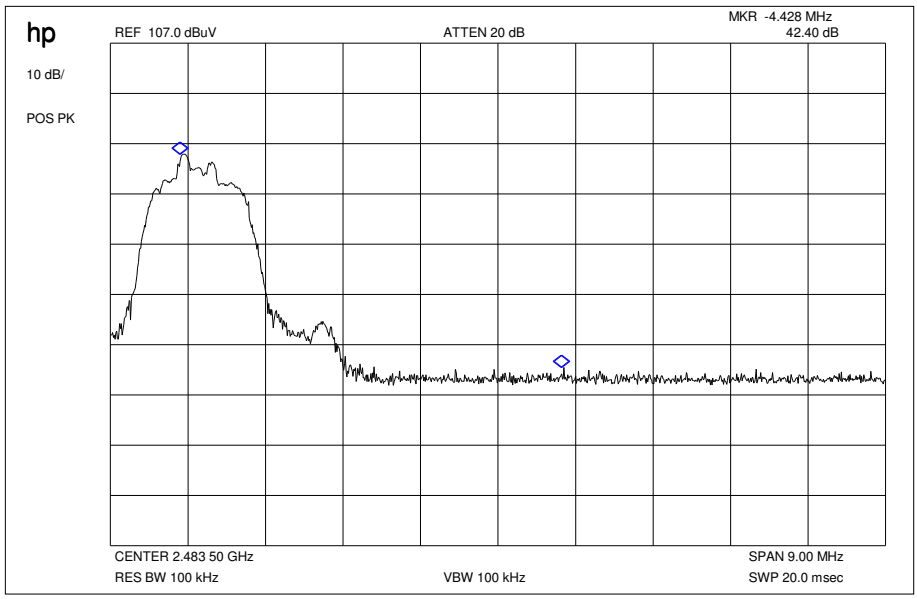
Modulation: widest

Plot 1: Max field strength in 3m distance (single frequency)



Result: 91.00 dBµV/m

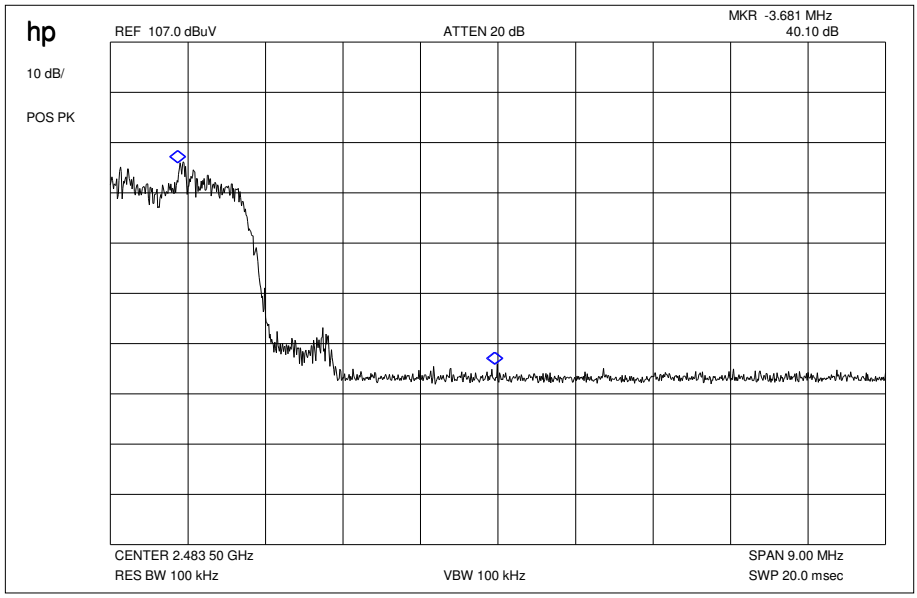
Plot 2: Marker-Delta Method (single carrier)



Result:

Marker-Delta-Value: 42.40 dB

This measurement was made to show that the behaviour of the system is conform to FCC 15.205 (restricted bands)
Plot 3: Marker-Delta Method (hopping)

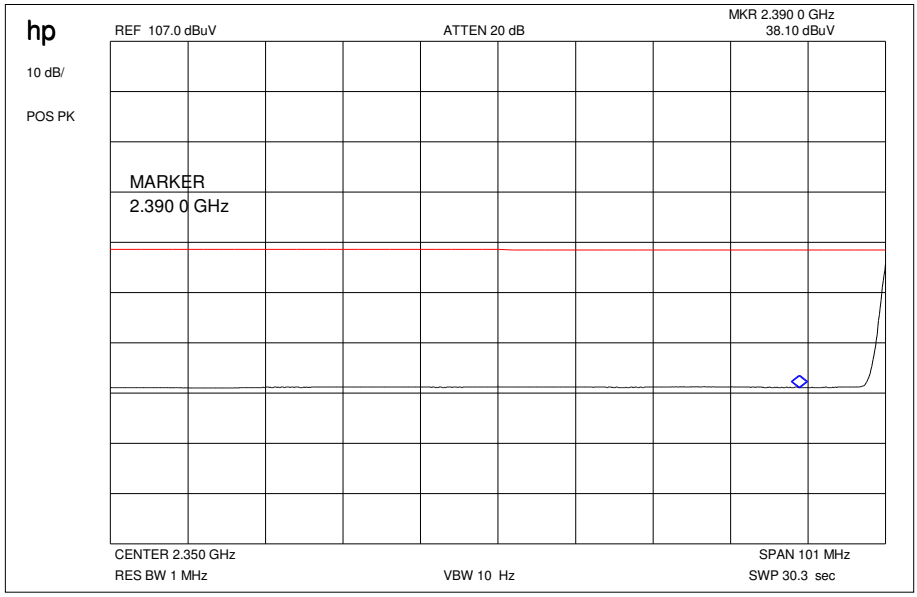


Result:

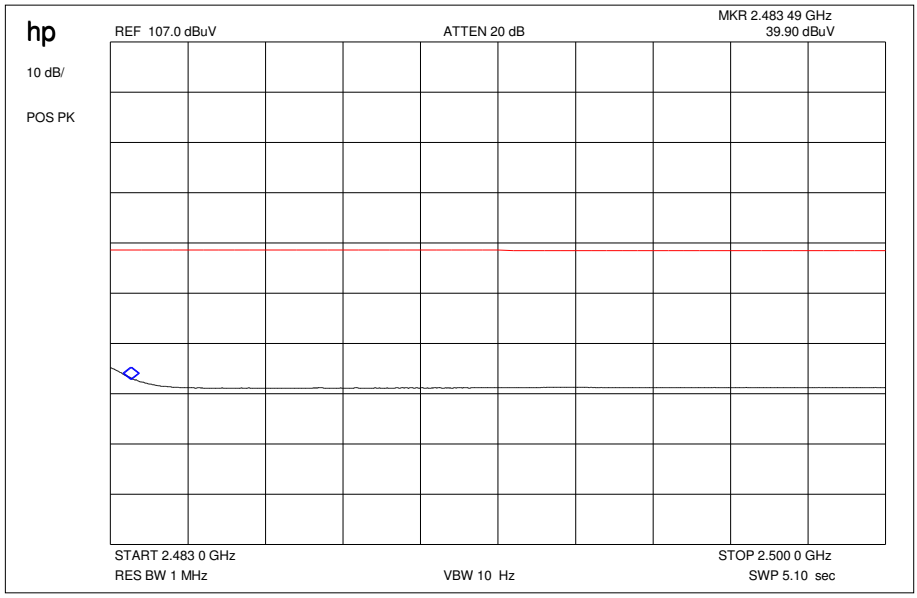
Marker-Delta-Value: 40.10dB

This measurement was made to show that the behaviour of the system is conform to FCC 15.205 (restricted bands)

Plot 4: Restricted Bands low



Plot 5: Restricted Bands high



Results & Limits:

Radiated field strength

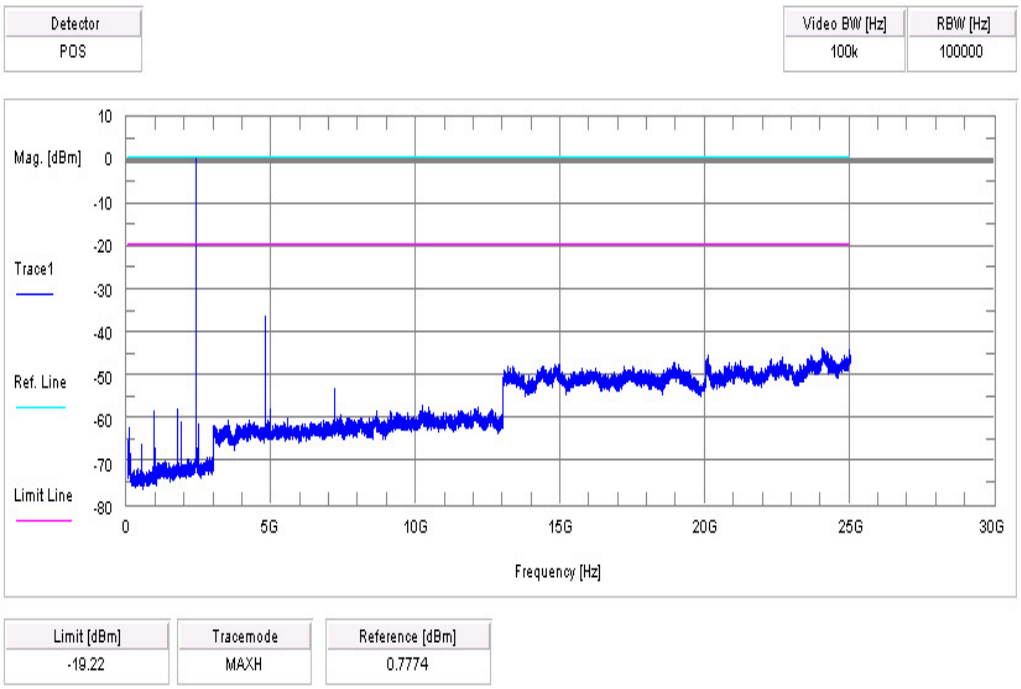
The field strength was measured with an EMI measuring receiver and 1 MHz RBW / VBW for peak and with 1MHz RBW / 10Hz VBW for average at a distance of 3m.

high channel	setup	measured value (3m)	correction factor (3m)	calculated value (3m)
Max. peak value	1 MHz RBW 1 MHz VBW	91.00dBµV/m	-3.20	87.80 dBµV/m
Max. average value	Calculated with duty cycle correction factor	87.80 dBµV/m peak	-1.07dB duty cycle correction factor (worst case DH5)	86.73 dBµV/m
Delta value	Peak 100 kHz RBW/VBW	42.40 dB (single carrier) 40.10 dB (hopping mode)	-	-
Value at band edge	limit 54 dBµV/m			44.33 dBµV/m (single carrier) 46.63 dBµV/m (hopping mode)
Statement:				Complies

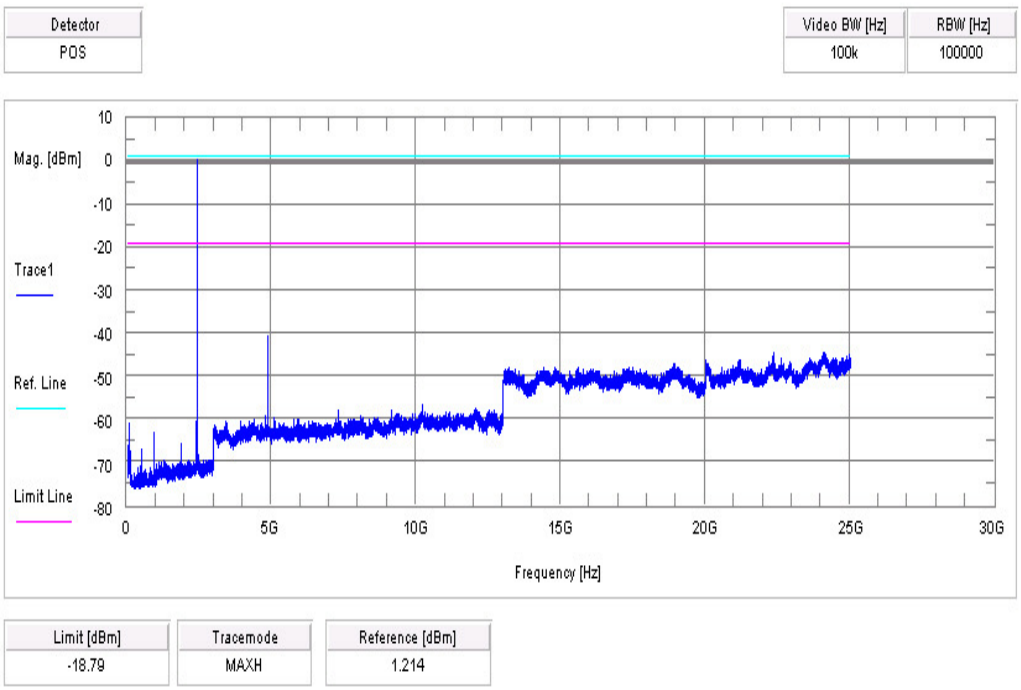
5.14 Spurious Emissions - conducted (Transmitter) § 15.247 (c)(1)

Modulation: GFSK

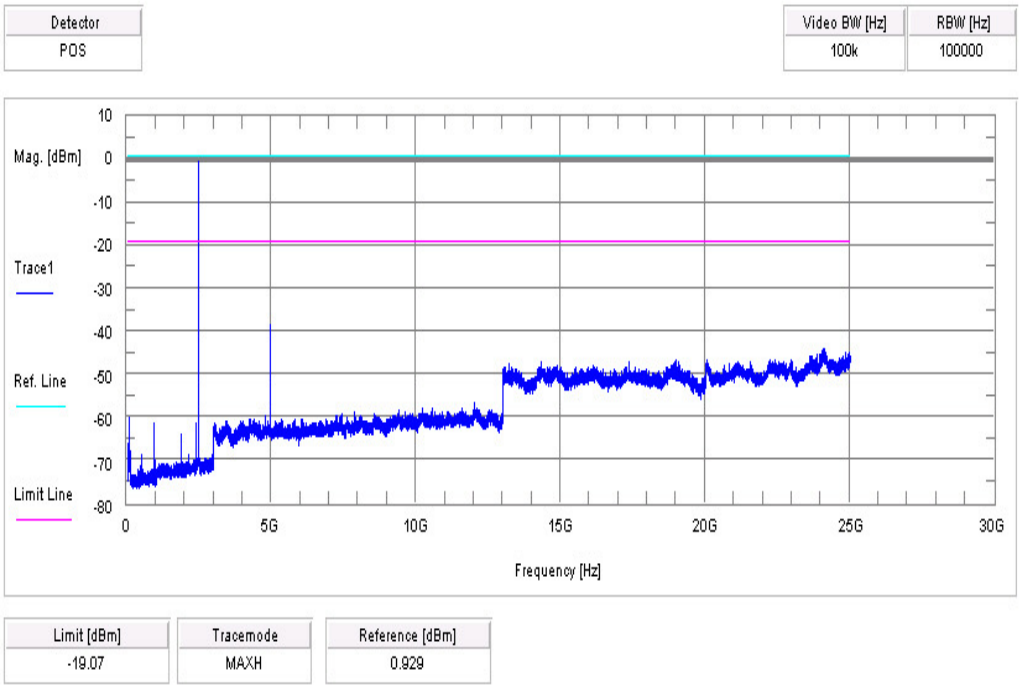
Plot 1 of 3: lowest channel



Plot 2 of 3: middle channel



Plot 3 of 3: highest channel



Result & Limits:

Emission Limitation					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emmision power	actual attenuation below frequency of operation [dB]	results
2402		0.78	30 dBm		Operating frequency
4804		-36.56	-20 dBc	-17.34	complies
					complies
2441		1.21	30 dBm		Operating frequency
4882		-40.21	-20 dBc	-21.42	complies
					complies
2480		0.93	30 dBm		Operating frequency
4960		-38.46	-20 dBc	-19.39	complies
					complies
Measurement uncertainty		± 3dB			

RBW: 100 kHz VBW: 100 MHz

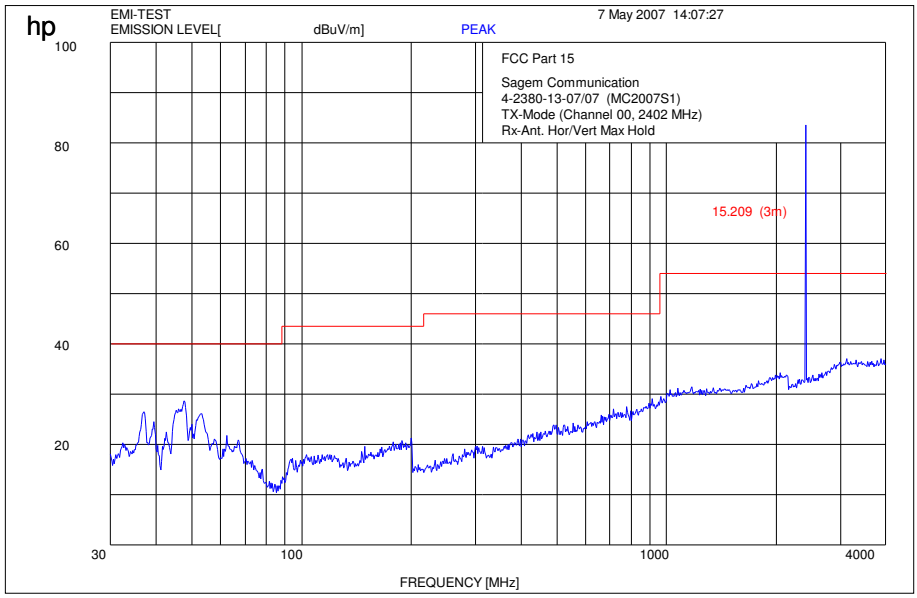
Under normal test conditions only	In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Note: For emissions that fall into restricted bands you find the radiated emissions later in the report.

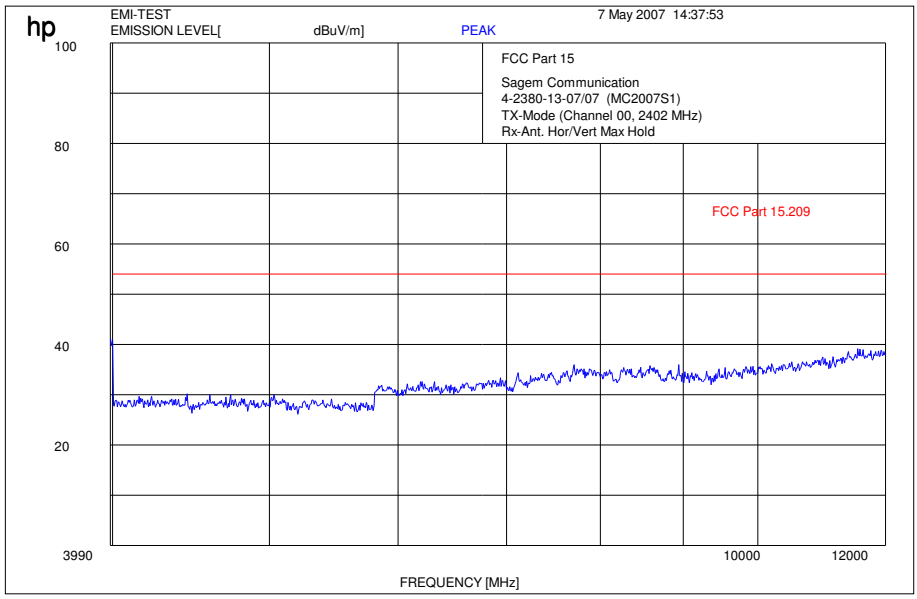
5.15 Spurious Emissions > 30 MHz- radiated (Transmitter) § 15.247 (c)(1)

Modulation: GFSK

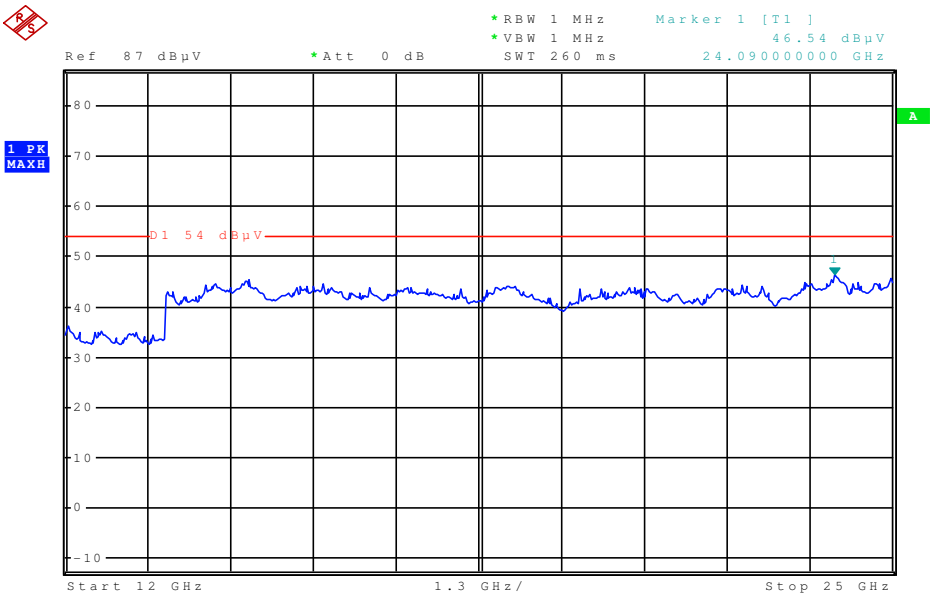
Plot: 0.03 - 4 GHz vertical/horizontal (lowest channel)



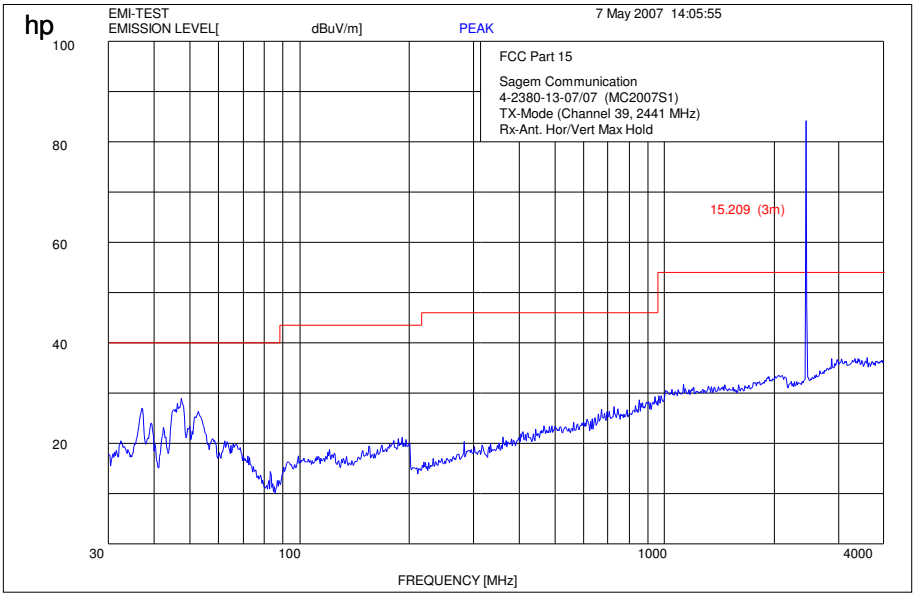
Plot: 4- 12 GHz vertical/horizontal (lowest channel)



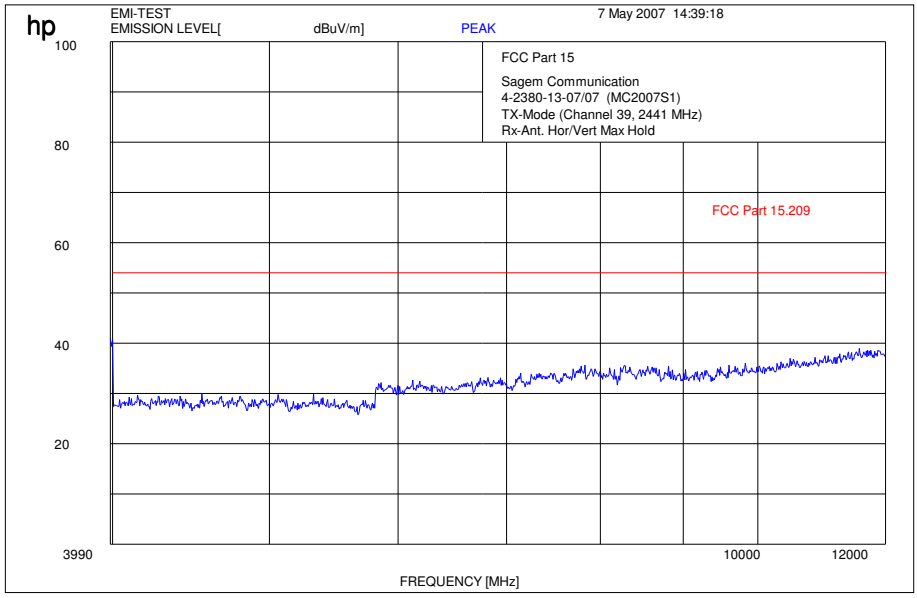
Plot: 12- 25 GHz vertical/horizontal (valid for all channels)



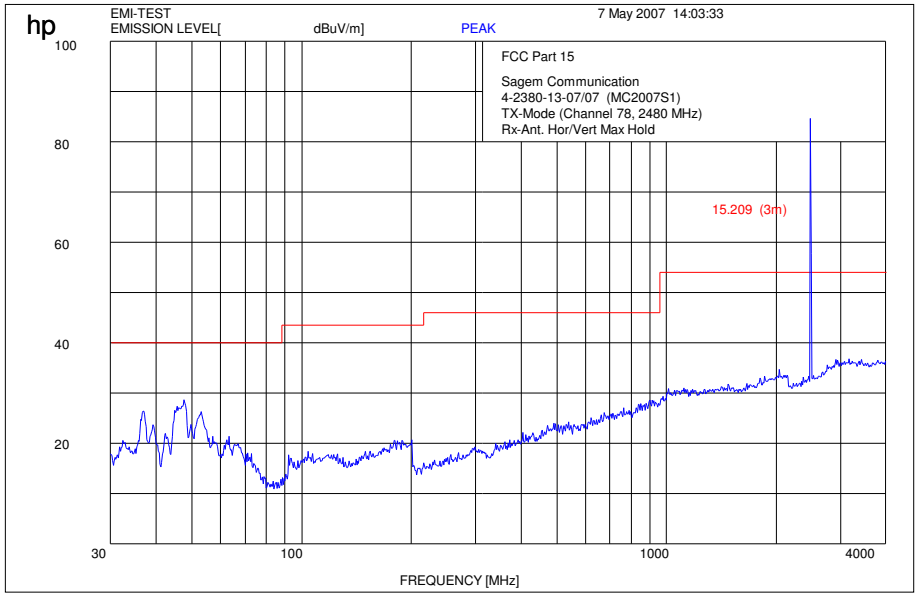
Plot: 0.03 - 4 GHz vertical/horizontal (middle channel)



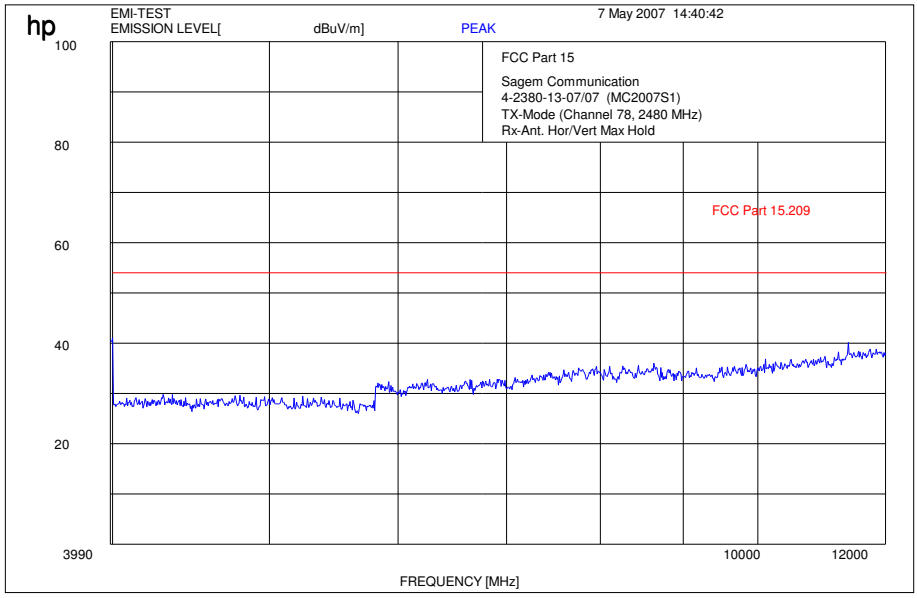
Plot: 4- 12 GHz vertical/horizontal (middle channel)



Plot: 0.03 - 4 GHz vertical/horizontal (highest channel)



Plot: 4- 12 GHz vertical/horizontal (highest channel)



Results:

SPURIOUS EMISSIONS LEVEL (dBµV/m)								
2402 MHz			2441 MHz			2480 MHz		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Level [dBµV/m]	Level [µV/m]
No critical peaks found			No critical peaks found			No critical peaks found		
Measurement uncertainty			±3 dB					

f < 1 GHz : RBW/VBW: 100 kHz f ≥ 1GHz : RBW/VBW: 1 MHz

Limits: § 15.247 (c)

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

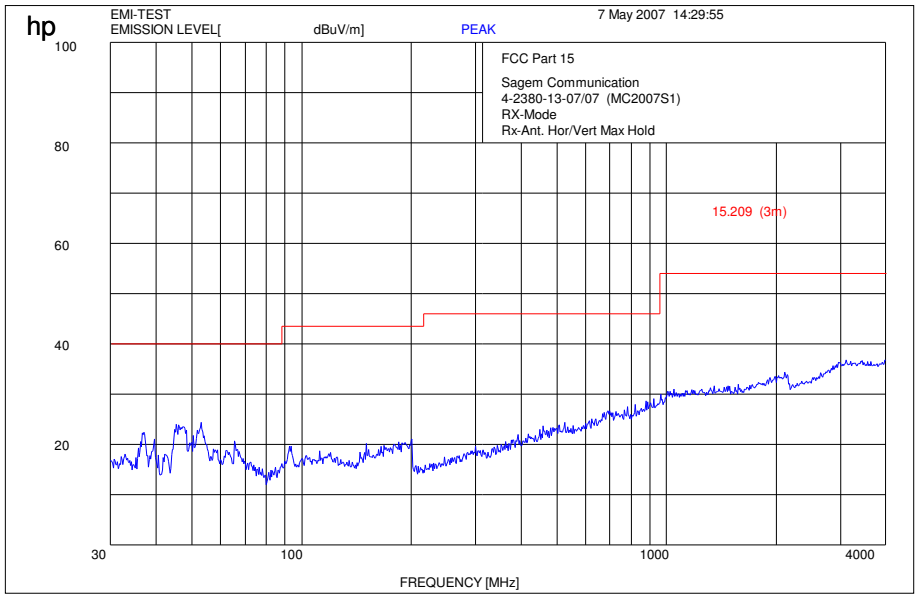
Limits: § 15.209

Frequency [MHz]	Field strength [µV/m]	Measurement distance (m)
30 - 88	100 (40 dBµV/m)	3
88 - 216	150 (43.5 dBµV/m)	3
216 - 960	200 (46 dBµV/m)	3
above 960	500 (54 dBµV/m)	3

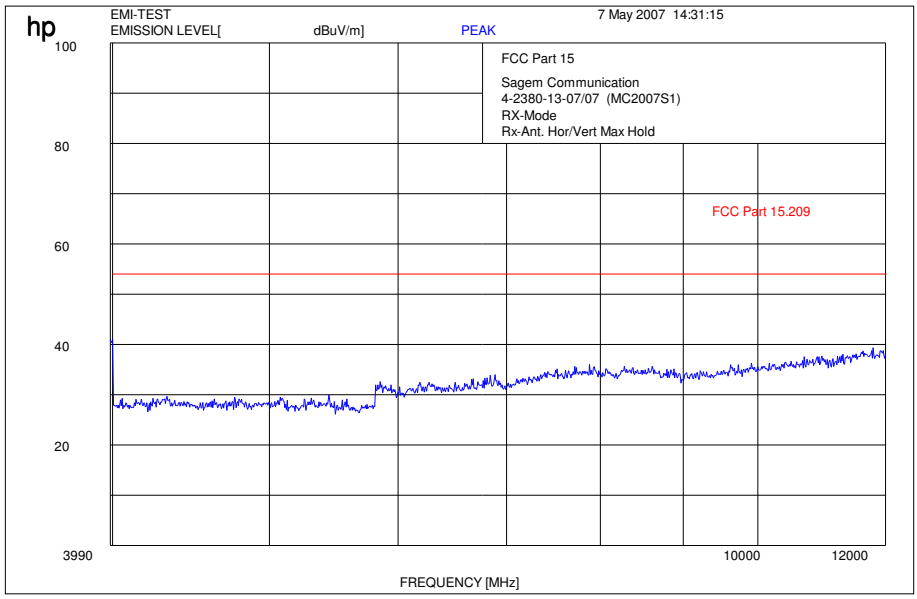
5.16 Spurious Emissions - radiated (Receiver) § 15.109

Modulation: GFSK

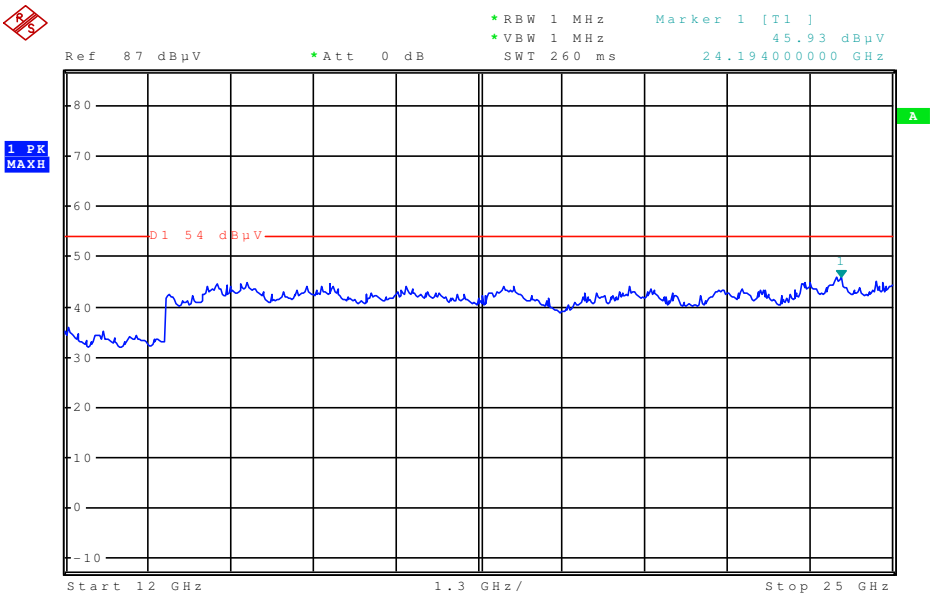
Plot: 0.03 - 4 GHz vertical/horizontal (receiver)



Plot: 4- 12 GHz vertical/horizontal (receiver)



Plot: 12- 25 GHz vertical/horizontal (receiver)



Spurious Emissisons level [dBµV/m]		
f[MHz]	Detector	Level [dBµV/m]
No critical peaks found		
Measurement uncertainty	±3 dB	

f < 1 GHz: RBW/VBW: 100 kHz f ≥ 1GHz: RBW/VBW: 1 MHz
See above plots

Measurement distance see table

Limits: § 15.109

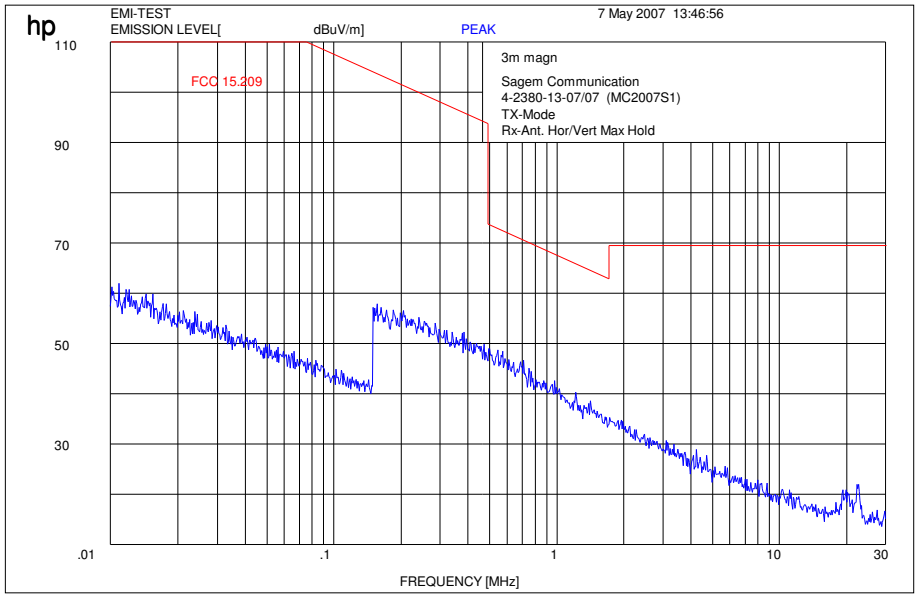
Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
30 - 88	100 (40 dBµV/m)	3
88 - 216	150 (43.5 dBµV/m)	3
216 - 960	200 (46 dBµV/m)	3
above 960	500 (54 dBµV/m)	3

5.17 Spurious Emissions < 30 MHz - Transmitter radiated § 15.209

Modulation: GFSK

Measured at 10 m distance.
Values recalculated with 40 dB/decade according to FCC rules.

Plot 1:



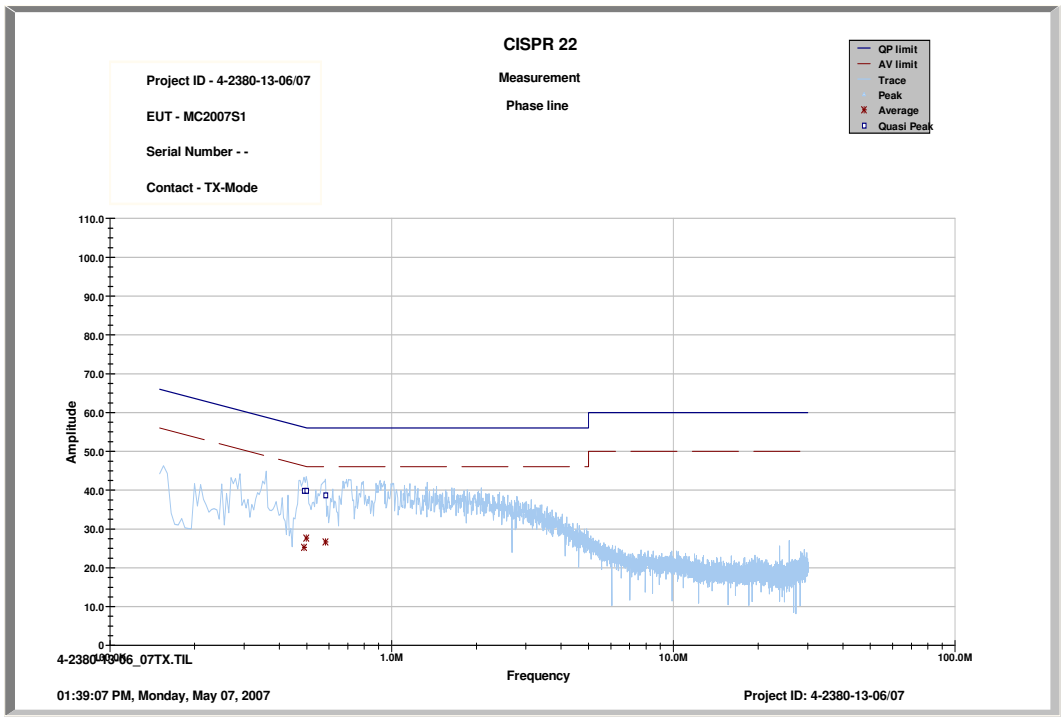
Limits:

Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30 / 29.5 dBµV/m	30

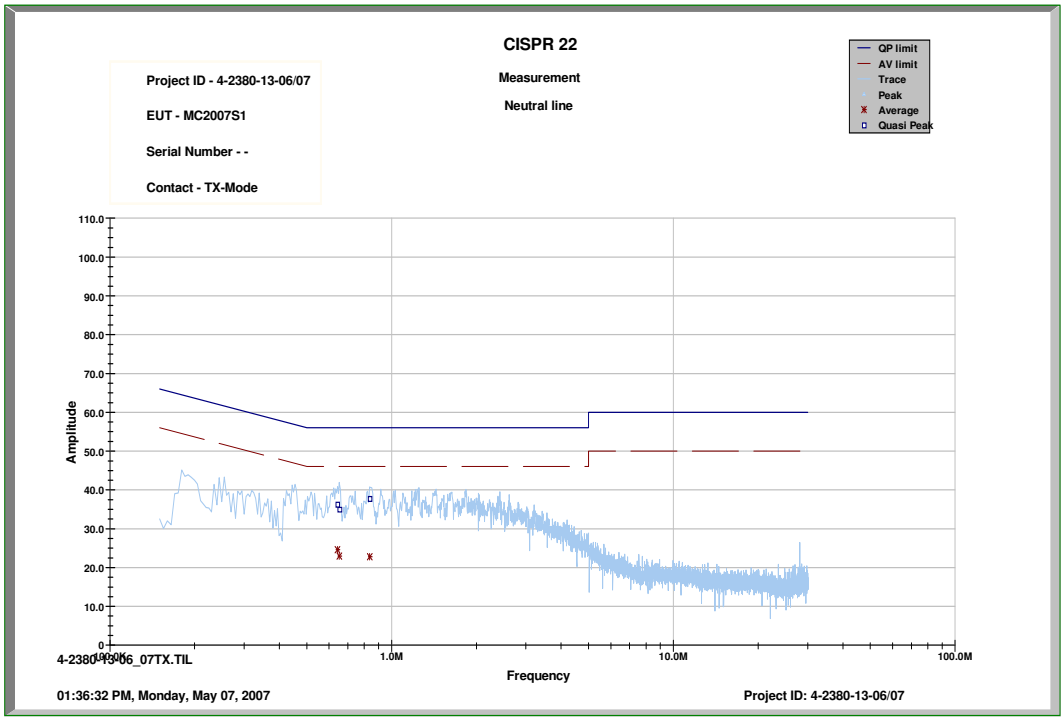
5.18 Conducted Emissions < 30 MHz § 15.107/207

Modulation: GFSK

Plot 1:



Plot 2:



Limits :

Under normal test conditions only	See plots

6 Test equipment and ancillaries used for tests

To simplify the identification on each page of the test equipment used, on each page of the test report, each item of test equipment and ancillaries such as cables are identified (numbered) by the Test Laboratory, below.

Anechoic chamber C:

No	Equipment/Type	Manufact.	Serial Nr.	Inv. No. Cetecom
1	Anechoic chamber	MWB	87400/02	300000996
2	System-Rack 85900	HP I.V.	*	300000222
3	Measurement System 1			
4	Spektrum Analyzer 8566B	HP	2747A05306	300001000
5	Spektrum Analyzer Display 85662A	HP	2816A16541	300002297
6	Quasi-Peak-Adapter 85650A	HP	2811A01131	300000999
7	RF-Preselector 85685A	HP	2837A00779	300000218
8	PC Vectra VL	HP		300001688
9	Software EMI	HP		300000983
10	Measurement System 2			
11	FSP 30	R&S	100623	ICT 300003464
12	PC	F+W		
13	TILE	TILE		
14	Biconical antenna	EMCO	S/N: 860 942/003	
15	Log. Period. Antenna 3146	EMCO	2130	300001603
16	Double Ridged Antenna HP 3115P	EMCO	3088	300001032
17	Active Loop Antenna 6502	EMCO	2210	300001015
18	Power Supply 6032A	HP	2818A03450	300001040
19	Busisolator	Kontron		300001056
20	Leitungsteiler 11850C	HP		300000997
21	Power attenuator 8325	Byrd	1530	300001595
22	Band reject filter WRCG1855/1910	Wainwright	7	300003350
23	Band reject filter WRCG2400/2483	Wainwright	11	300003351

Bluetooth Rack:

No	Equipment/Type	Manufact.	Serial Nr.	Inv. No. Cetecom
1	FSP 30	R&S		300003575
2	CBT	R&S	100313	300003516
3	Switch Matrix	HP		300000929
4	Power Supply	HP	3041A00544	300002270
5	Signal Generator	R&S	836206/0092	300002680

Signaling Units:

No	Equipment/Type	Manufact.	Serial Nr.	Inv. No. Cetecom
1	CBT	R&S	100313	300003516
2	CBT	R&S	100185	300003416
3	CMU-200	R&S	103992	300003231
4	CMU-200	R&S	106240	300003321

SRD Laboratory Room 002:

No	Equipment/Type	Manufact.	Serial Nr.	Inv. No. Cetecom
1	System Controller PSM 12	R&S	835259/007	3000002681
2	Memory Extension PSM-K10	R&S	To 1	3000002681
3	Operating Software PSM-B2	R&S	To 1	3000002681
4	19'' Monitor		22759020-ED	3000002681
5	Mouse		LZE 0095/6639	3000002681
6	Keyboard		G00013834L461	3000002681
7	Spectrum Analyser FSIQ 26	R&S	835540/018	3000002681
8	Tracking Generator FSIQ-B10	R&S	835107/015	3000002681
10	RF-Generator SMIQ03 (B1 Signal)	R&S	835541/056	3000002681
11	Modulation Coder SMIQ-B20	R&S	To 10	3000002681
12	Data Generator SMIQ-B11	R&S	To 10	3000002681
13	RF Rear Connection SMIQ-B19	R&S	To 10	3000002681
14	Fast CPU SM-B50	R&S	To 10	3000002681
15	FM Modulator SM-B5	R&S	835676/033	3000002681
16	RF-Generator SMIQ03 (B2 Signal)	R&S	835541/055	3000002681
17	Modulation Coder SMIQ-B20	R&S	To 16	3000002681
18	Data Generator SMIQ-B11	R&S	To 16	3000002681
19	RF Rear Connection SMIQ-B19	R&S	To 16	3000002681
20	Fast CPU SM-B50	R&S	To 16	3000002681
21	FM Modulator SM-B5	R&S	836061/022	3000002681
22	RF-Generator SMP03 (B3 Signal)	R&S	835133/011	3000002681
23	Attenuator SMP-B15	R&S	835136/014	3000002681
24	RF Rear Connection SMP-B19	R&S	834745/007	3000002681
25	Power Meter NRVD	R&S	835430/044	3000002681
26	Power Sensor NRVD-Z1	R&S	833894/012	3000002681
27	Power Sensor NRVD-Z1	R&S	833894/011	3000002681
28	Rubidium Standard RUB	R&S	6197	3000002681
29	Switching and Signal Conditioning Unit SSCU	R&S	338864/003	3000002681
30	Laser Printer HP Deskjet 2100	HP	N/A	3000002681
31	19'' Rack	R&S	11138363000004	3000002681
32	RF-cable set	R&S	N/A	3000002681
33	IEEE-cables	R&S	N/A	3000002681
34	Sampling System FSIQ-B70	R&S	835355/009	3000002681
35	RSP programmable attenuator	R&S	834500/010	3000002681
36	Signalling Unit	R&S	838312/011	3000002681
37	NGPE programmable Power Supply for EUT	R&S	192.033.41	3000002681
38	Climatic box VT 4002	Heraeus Vötsch	--	300003019
39	Signaling Unit CMU200	R&S	832221/0055	300002862
40	Power Splitter 6005-3	Inmet Corp.	none	300002841
41	SMA Cables SPS-1151-985-SPS	Insulated Wire	different	different
42	CBT32 with EDR Signaling Unit	R&S		
43	Coupling unit	Narda	N/A	--
44	2xSwitch Matrix PSU	R&S	872584/021	--
45	RF-cable set	R&S	N/A	different
46	IEEE-cables	R&S	N/A	--

SRD Laboratory Room 005:

No	Equipment/Type	Manufact.	Serial Nr.	Inv. No. Cetecom
1	Spektrum Analyzer 8566B	HP	2747A05275	300000219
2	Spektrum Analyzer Display 85662A	HP	2816A16497	300001690
3	Quasi-Peak-Adapter 85650A	HP	2811A01135	300000216
4	Power Supply	Heiden	003202	300001187
5	Power Supply	Heiden	1701	300001392