

Radio Test Report: 99626831

Applicant: Taiyo Yuden Co. Ltd.
5607-2 Nakamuroda Harunamachi
370-3347
Gunma-Gun Gunma, Japan

Equipment Under Test: EYSFDCSXX

FCC ID: RYYEYXFDC

In Accordance With: **FCC Part 15, Subpart C, 15.247 (10-1-03 edition)**
Frequency Hopping Transmitters

Tested By: Telefication bv
Edisonstraat 12a
6902 PK Zevenaar
The Netherlands
FCC designation number: BE0003

Tested by:



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Reviewed by:



ing P. A. Suringa, Senior test engineer Radio/EMC

Authorized by:



J.P. van de Poll, Co-ordinator Test Group

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Section 1. Summary of Test Results

Manufacturer: Taiyo Yuden Co. Ltd.
5607-2 Nakamuroda Harunamachi
Gunma-Gun Gunma
Japan

Model No.: EYSFDCSXX

Serial No.: 00037a002e55

Date Received In Laboratory: 17 March 2005

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, Subpart C, Paragraph 15.247 for Frequency Hopping Spread Spectrum devices. Tests were conducted in accordance with Public Notice DA 00-705, issued in March 2000.

☒	New Submission	☒	Production Unit
☐	Class II Permissive Change	☐	Pre-Production Unit
☐	Family Listing		

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE.

See " Summary of Test Data".



Telefication complies with the accreditation criteria for test laboratories as laid down in ISO/IEC 17025:1999. The accreditation covers the quality system of the laboratory as well as the specific activities as described in the authorized annex bearing the accreditation number L021 and is granted on 30 November 1990 by the Dutch Council For Accreditation (RvA: Raad voor Accreditatie).

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Summary Of Test Data

NAME OF TEST	PARA. NO.	SPEC.	MEAS.	RESULT
Channel Separation	15.247(a)(1)	Greater than 25 kHz or 20 dB bandwidth	1 MHz	PASS
Pseudorandom Hopping Algorithm	15.247(a)(1)	Bluetooth	--	PASS
Time of Occupancy	15.247(a)(1)(ii)	≤ 0.4 sec in 30 sec	303 msec	PASS
20 dB Occupied Bandwidth	15.247(a)(1)	N.A.	GFSK: 0.933 MHz	N.A.
			$\pi/4$ -DPSK: 1.217 MHz	N.A.
			8-DPSK: 1.263 MHz	N.A.
Peak Power Output	15.247(b)	1 Watt	GFSK: 1.1 mW	PASS
			$\pi/4$ -DPSK: 0.83 mW	PASS
			8-DPSK: 0.86 mW	PASS
Spurious Emissions (Antenna Conducted)	15.247(c)	≤ -20 dBc	≤ -48.17 dBc	PASS
Spurious emissions (Radiated)	15.209	Table 15.209(a)	≤ 39.0 dB μ V/m	PASS
Spurious Emissions in restricted bands as defined in 15.205(a) (Radiated)	15.247(c)	Table 15.209(a)	45.2 dB μ V/m (Av) 63.9 dB μ V/m (Pk)	PASS

Test Conditions:

Indoor Temperature: 24 °C
Humidity: 44 %

Test locations:

- Telefication bv, Zevenaar

Note:

To configure the EUT during testing, Bluetest 1.20 was used. With this tools the transmit power and modulation was set. The following settings were used:

Mode	Modulation	Power setting	Packet type	Packet size
1 Mbit/s	GFSK	54	15	339
2 Mbit/s	$\pi/4$ -DPSK	95	30	679
3 Mbit/s	8-DPSK	95	31	1021

Section 2. Equipment Under Test (E.U.T.)

General Equipment Information

Frequency Band: 2400 – 2483.5 MHz

Rated power: +2 dBm (conducted)

Number of Channels: 79

Channel Spacing: 1 MHz

Emissions Designator:

GFSK	946KF1D
$\pi/4$-DPSK	1M24G1D
8-DPSK	1M27G1D

Description of Modification for Modification Filing

Not applicable

Family List Rational

Not applicable

Description of EUT

The EYSFDCSXX is a spread spectrum frequency hopping transceiver and is designated for operation in the frequency band of 2400-2483.5 MHz.

The equipment is a Bluetooth transceiver module, which supports enhanced data rates (EDR)

These enhanced data rates use a different type of modulation than normal Bluetooth.

For the 2 Mbit/s mode it uses $\pi/4$ -DPSK. For the 3 Mbit/s it uses 8-DPSK.

For testing purposes, an EUT with antenna connector was supplied. Normally, an integral antenna is used. The maximum gain of this antenna is 2 dBi.

Section 3. Channel Separation

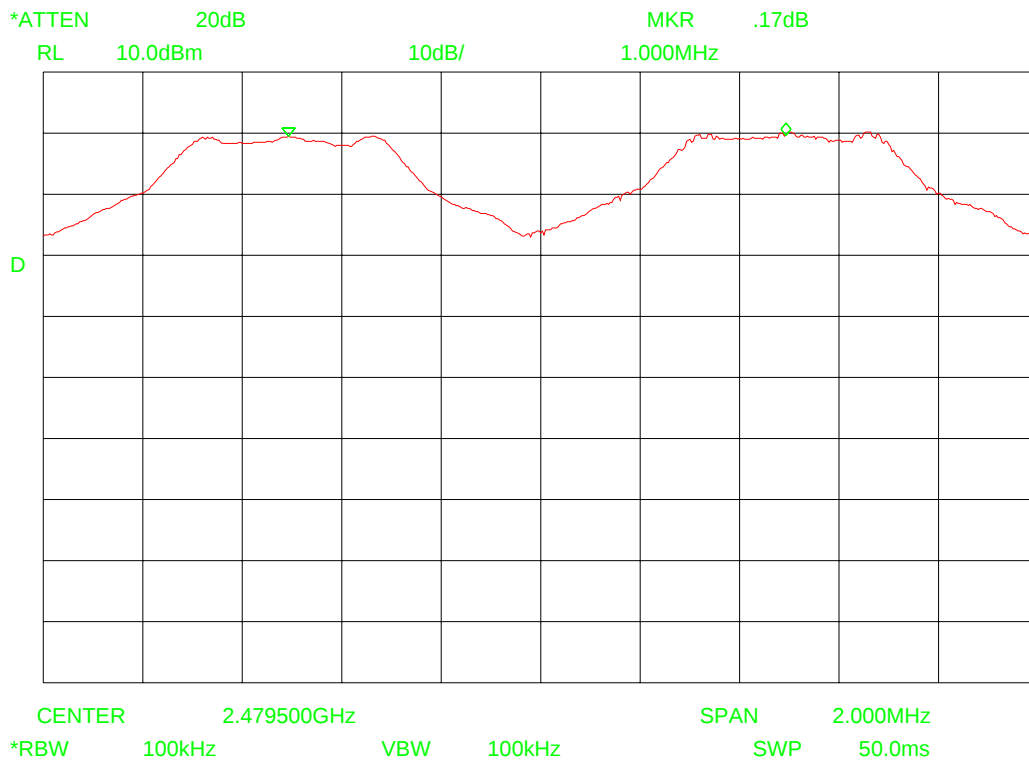
Section 3.1 GFSK

NAME OF TEST: Channel Separation

PARA. NO.: 15.247(a)(1)

Test Result: Complies.

Measurement Data: See attached plots
 See also 20 dB BW plots
 Measured 20 dB bandwidth: 0.933 MHz
 Channel separation: 1 MHz



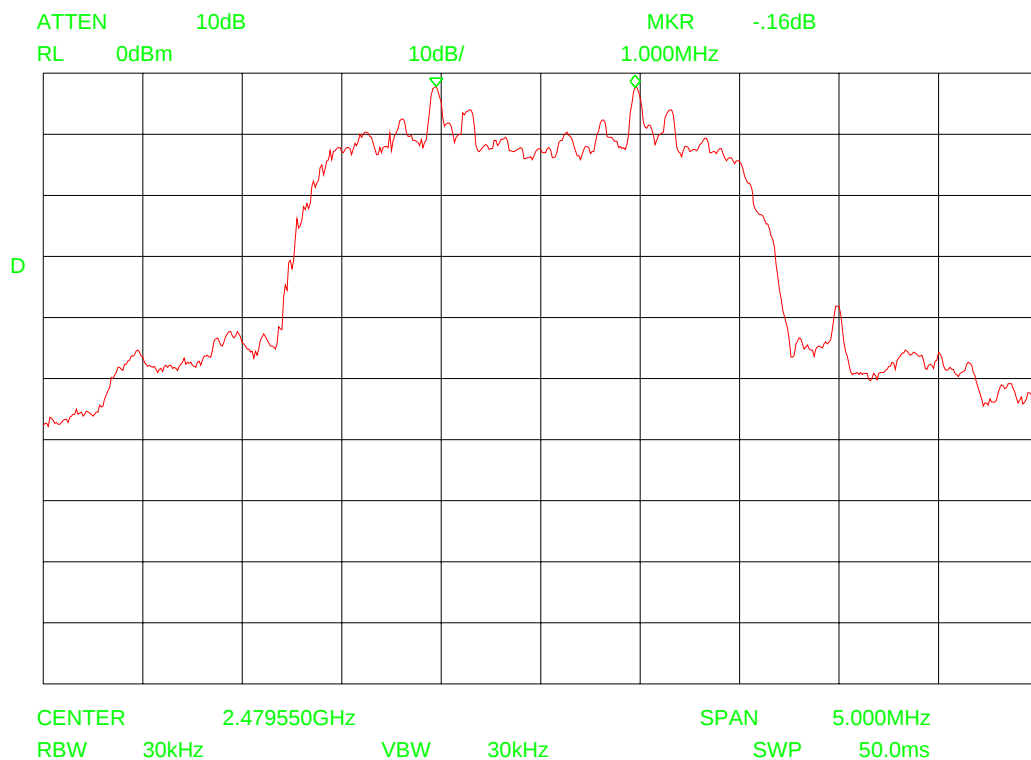
Section 3.2. Channel Separation $\pi/4$ -DPSK

NAME OF TEST: Channel Separation

PARA. NO.: 15.247(a)(1)

Test Result: Complies.

Measurement Data: See attached plots
See also 20 dB BW plots
Measured 20 dB bandwidth: 1.217 MHz
Channel separation: 1 MHz



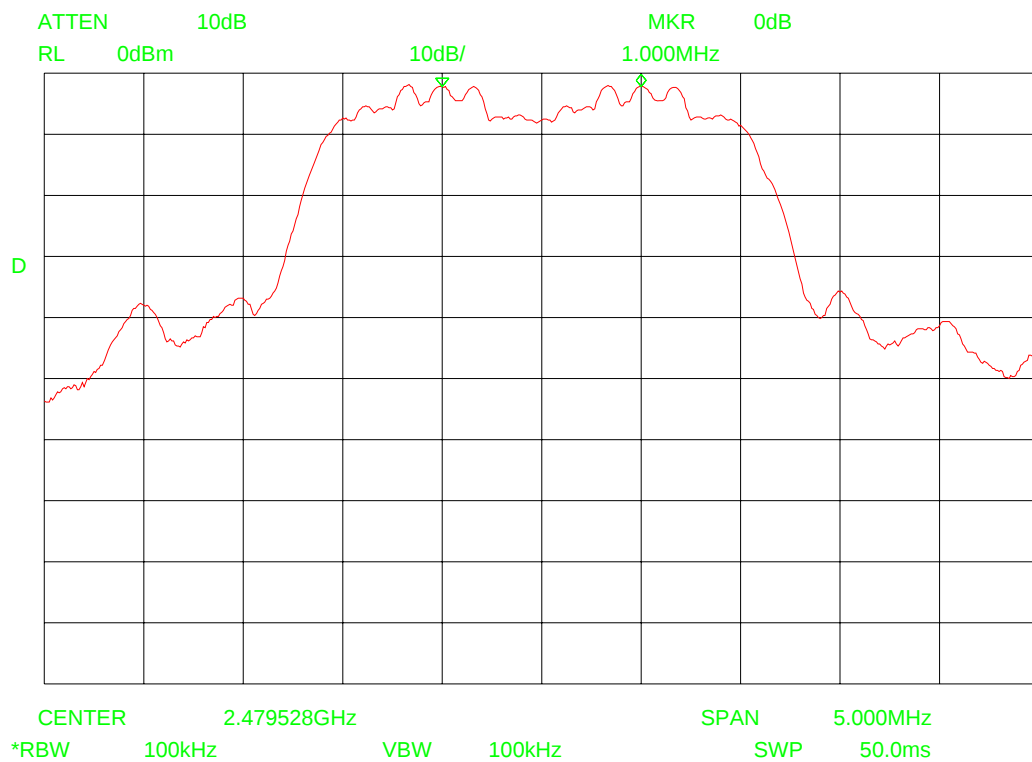
Section 3.3. Channel Separation 8-DPSK

NAME OF TEST: Channel Separation

PARA. NO.: 15.247(a)(1)

Test Result: Complies.

Measurement Data: See attached plots
See also 20 dB BW plots
Measured 20 dB bandwidth: 1.2635 MHz
Channel separation: 1 MHz



Section 4. Pseudorandom Hopping Algorithm

NAME OF TEST: Pseudorandom Hopping Algorithm	PARA. NO.: 15.247(a)(1)
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Test Result: N.A.

Measurement Data: Hopping sequence: according to Bluetooth spec
Number of Hopping Frequencies: 79
Number of Hopping Patterns: according to Bluetooth spec

Section 5. Time of Occupancy

NAME OF TEST: Time of Occupancy

PARA. NO.: 15.247(a)(1)

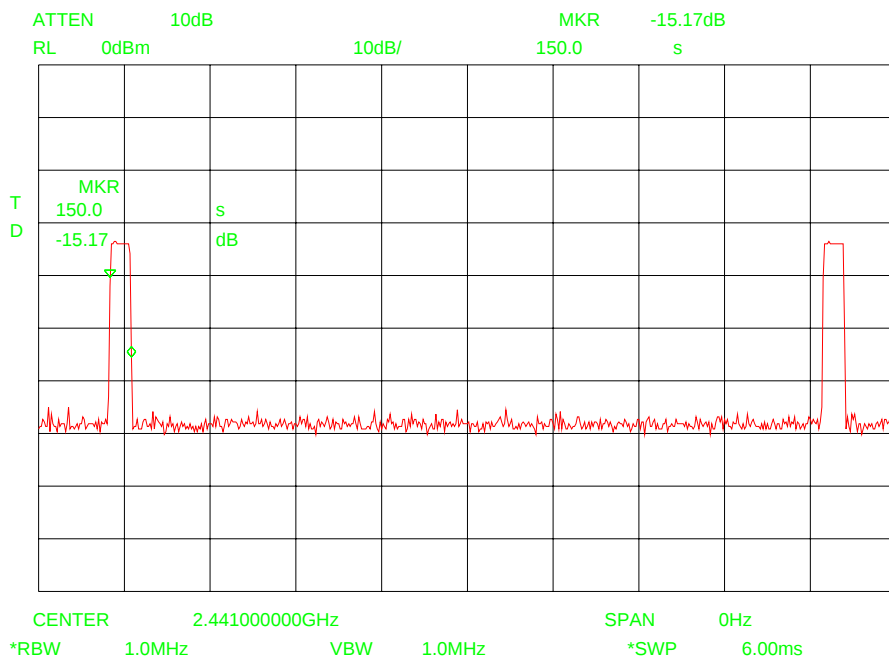
Test Result: Complies.

Data:

Hops per second (Bluetooth) 1600
Hops per second (DM5/DH5 packet size) 320 (5 time slots for Tx)

Measurement Data:

Time of occupancy on any channel: 3 msec.
Number of transmissions per second / per channel: 3.37
Time of occupancy in one measurement period: 30 x 4 x 150 μ sec 303 msec.

Limit: Average time of occupancy: ≤ 0.4 sec in 30 sec.


Section 6. Occupied Bandwidth

Section 6.1 GFSK

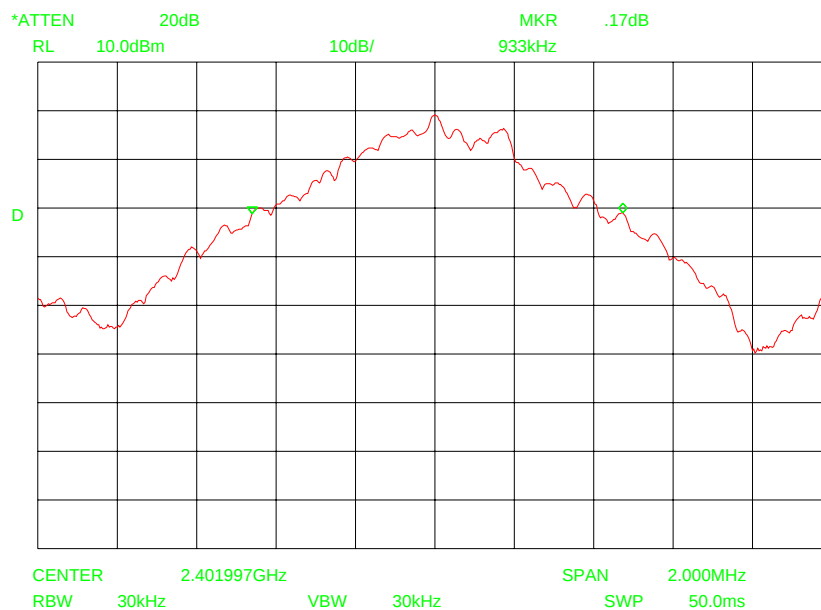
NAME OF TEST: Occupied Bandwidth

PARA. NO.: 15.247(a)(1)

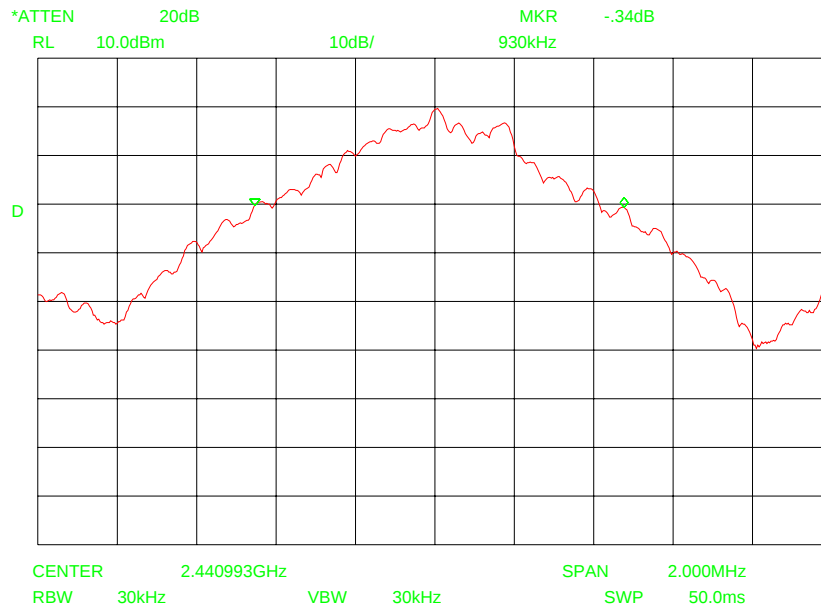
Test Result: Complies

Measurement Data: See attached plots.
Measured 20 dB BW: 0.933 MHz (max)

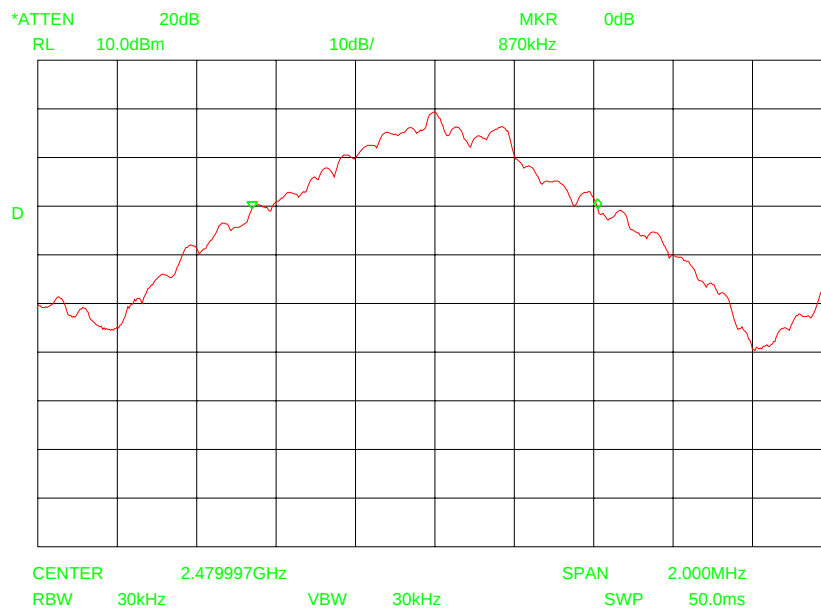
Channel 1



Channel 40



Channel 79



Section 6.2 $\pi/4$ -DPSK

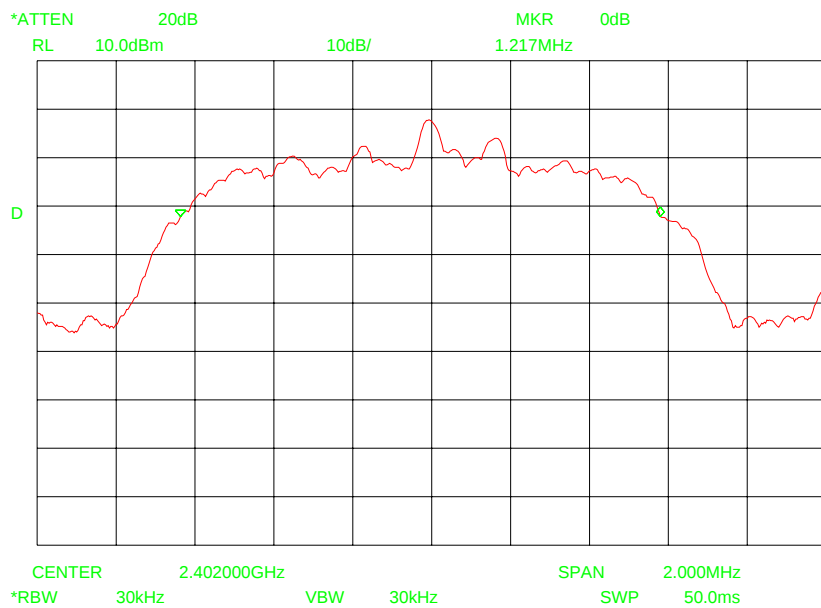
NAME OF TEST: Occupied Bandwidth

PARA. NO.: 15.247(a)(1)

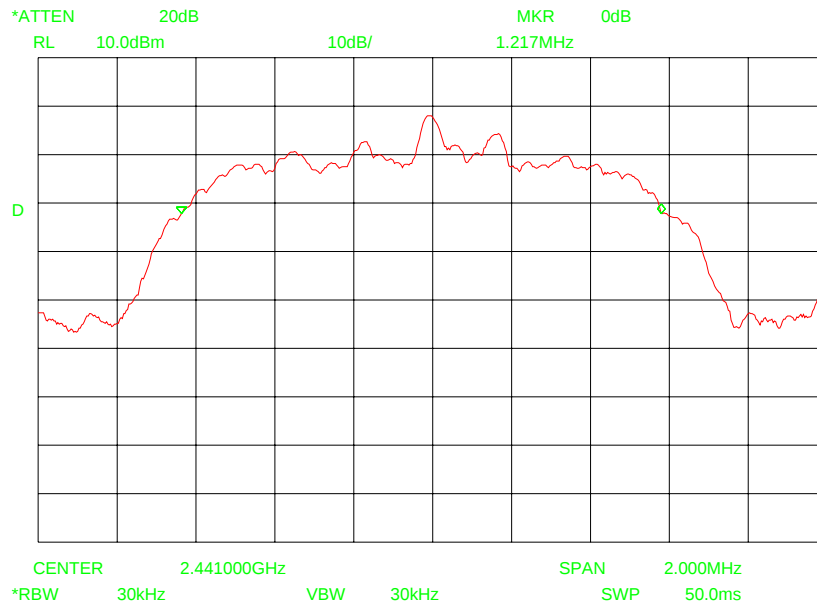
Test Result: Complies

Measurement Data: See attached plots.
Measured 20 dB BW: 1.217 MHz (max)

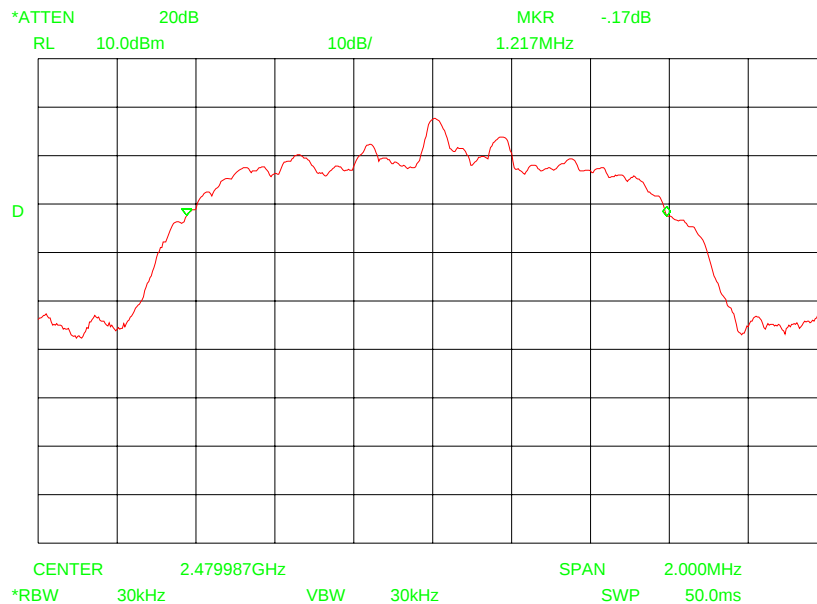
Channel 1



Channel 40



Channel 79



Section 6.3 8-DPSK

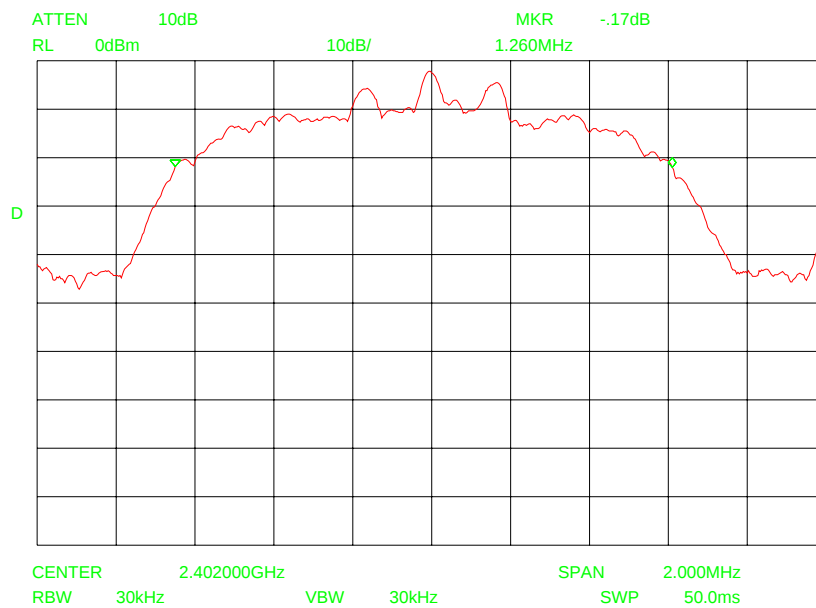
NAME OF TEST: Occupied Bandwidth

PARA. NO.: 15.247(a)(1)

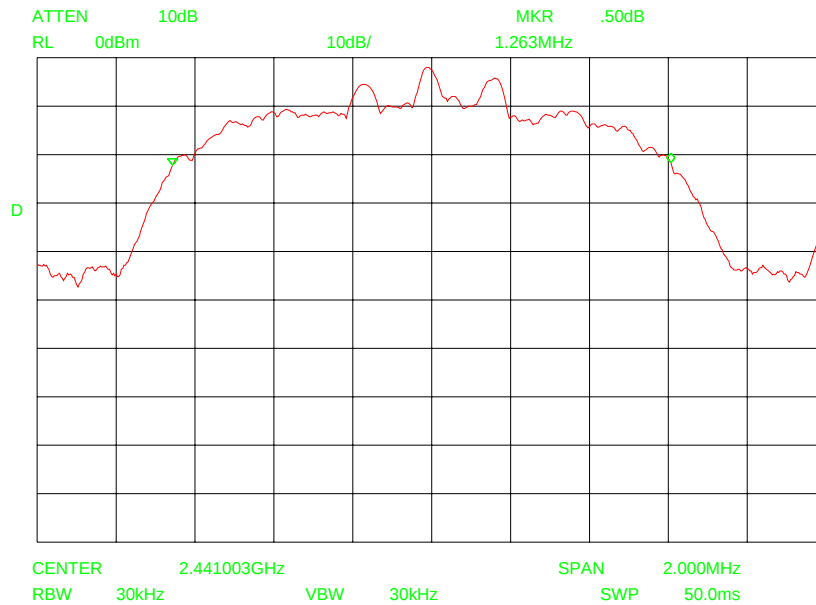
Test Result: Complies

Measurement Data: See attached plots.
Measured 20 dB BW: 1.263 MHz (max)

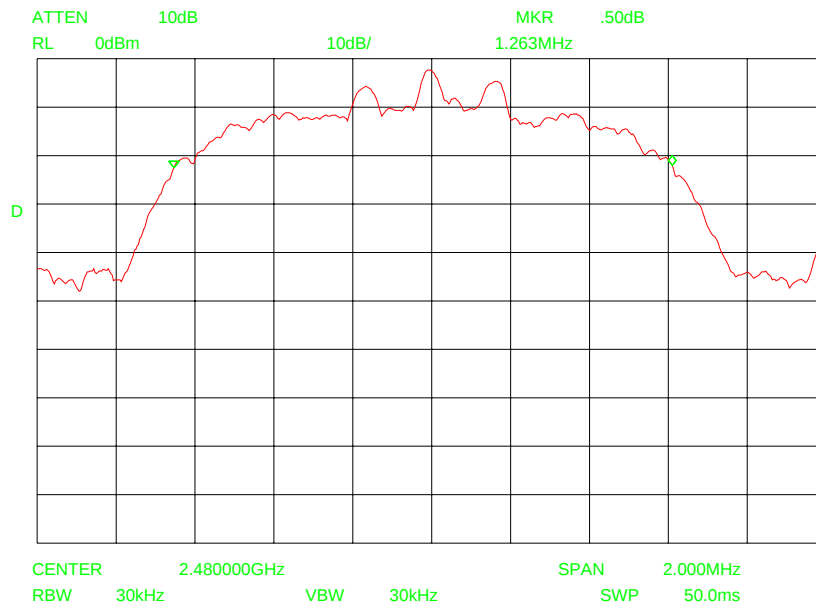
Channel 1



Channel 40



Channel 79



Section 7. Peak Power Output

NAME OF TEST: Peak Power Output

PARA. NO.: 15.247 (b)

Test Result: Complies.

Measurement data:

Channel	EIRP (dBm)		
	GFSK	$\pi/4$ -DPSK	8-DPSK
1 (2402 MHz)	+0.33	-0.83	-0.67
40 (2441 MHz)	-1.17	-2.67	-2.67
79 (2480 MHz)	-3.0	-4.83	-4.67

Antenna:

Model	Type	Manufacturer	Gain (dBi)
integral	AH083F245001-T	Taiyo Yuden	+2 (peak)

Field Strength GFSK: 95.5 dB μ V/m @ 3m or 59.7 mV/m @ 3m.
 Field Strength $\pi/4$ -DPSK: 94.4 dB μ V/m @ 3m or 52.5 mV/m @ 3m.
 Field Strength 8-DPSK: 94.5 dB μ V/m @ 3m or 53.3 mV/m @ 3m.

Section 8. Spurious Emissions (Antenna conducted)

NAME OF TEST: Spurious Emissions (Antenna conducted)	PARA. NO.: 15.247(c)
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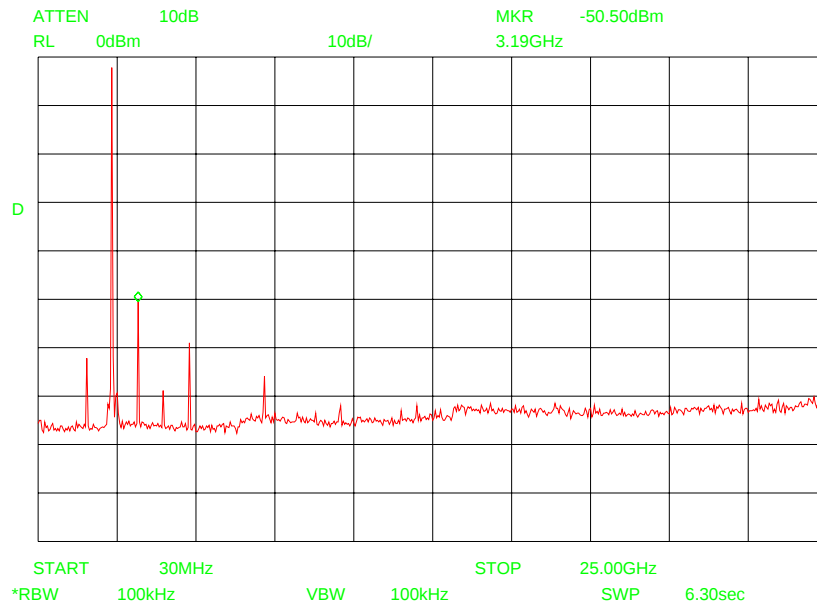
Test Result: Complies

Measurement Data: See attached graphs.

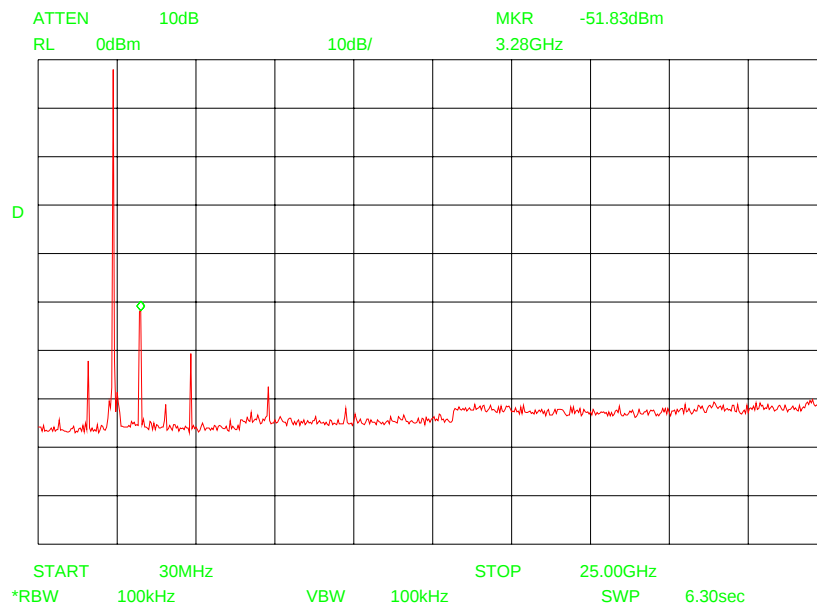
Requirement: In any 100 kHz bandwidth outside the operating frequency band, the RF power produced shall be at least 20 dB below that in the 100 kHz bandwidth that contains the highest level of intended RF power.
Spurious signals in the restricted bands shall comply with §15.205.

Test Data - Conducted Emissions (Peak)

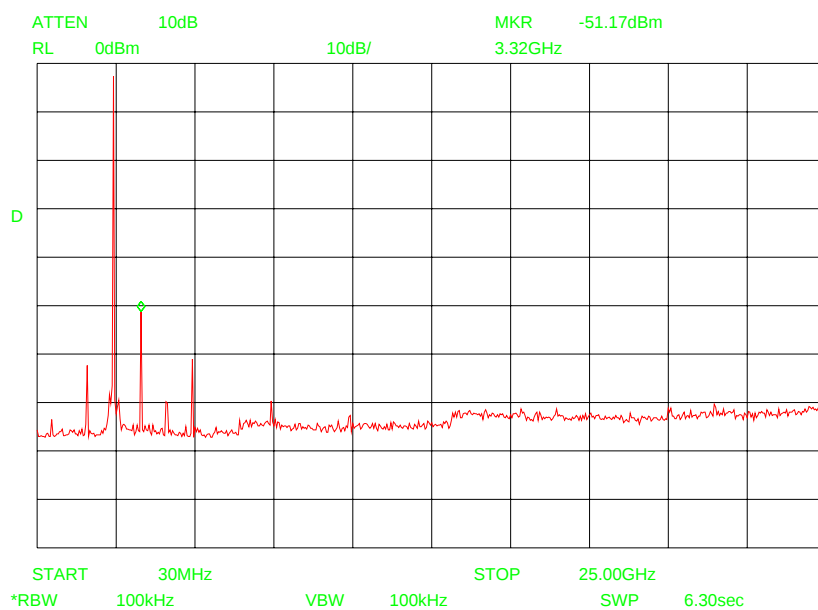
Channel 1 - GFSK modulation



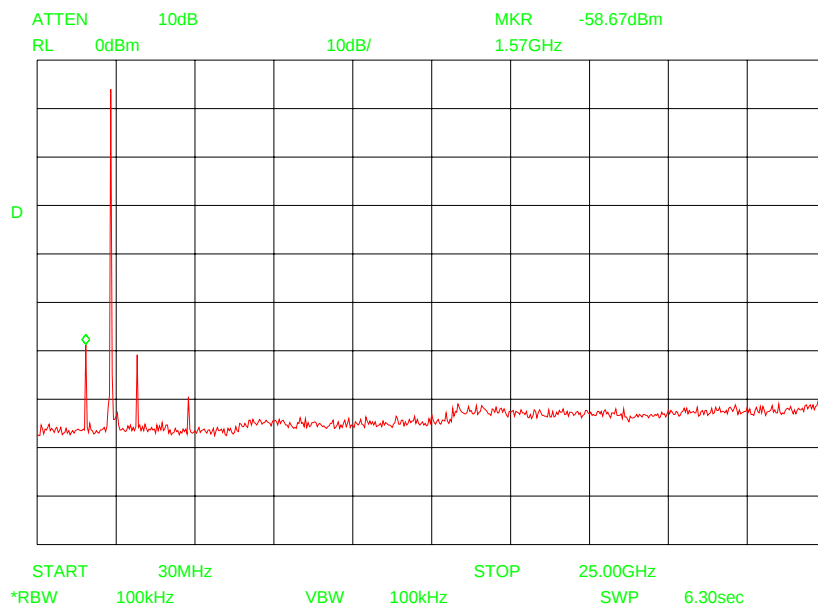
Channel 40 - GFSK modulation



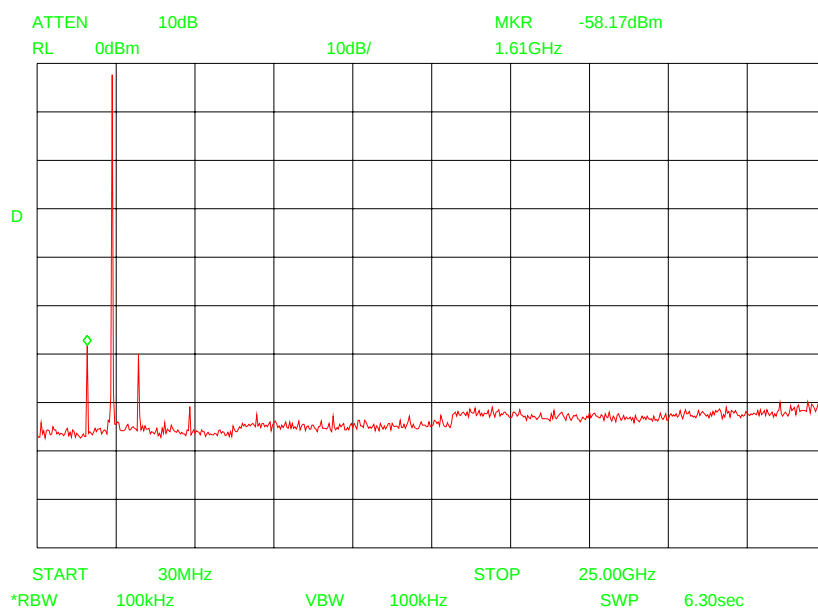
Channel 79 - GFSK modulation



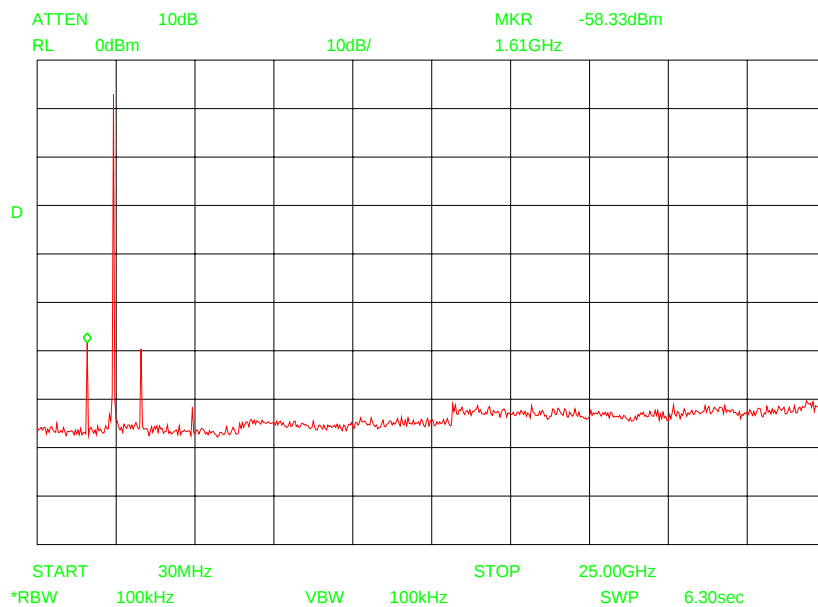
Channel 1 - $\pi/4$ -DPSK modulation



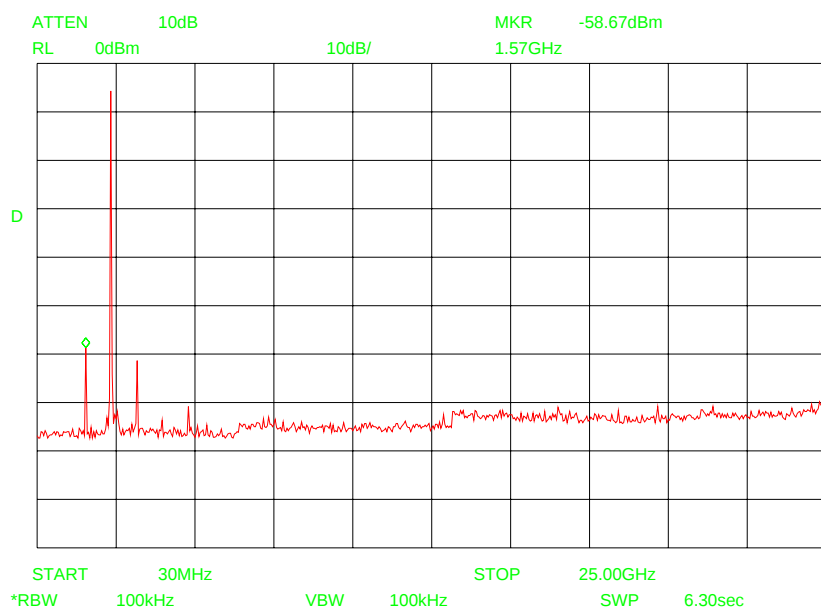
Channel 40 - $\pi/4$ -DPSK modulation



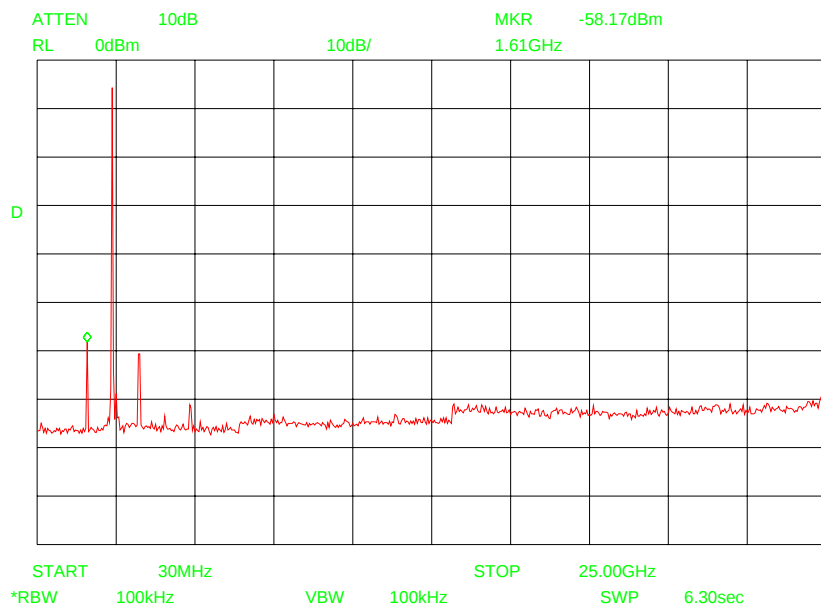
Channel 79 - $\pi/4$ -DPSK K modulation



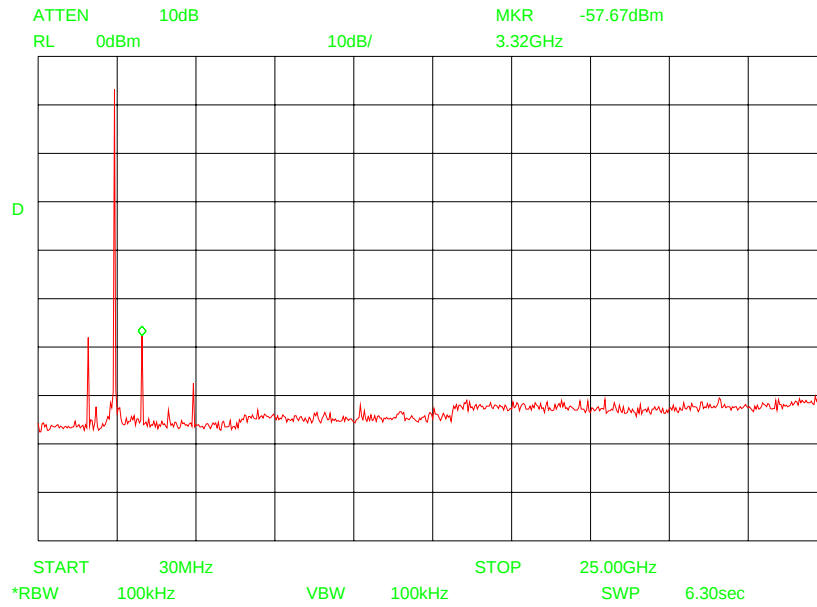
Channel 1 - 8-DPSK modulation



Channel 40 - 8-DPSK modulation



Channel 79 - 8-DPSK modulation



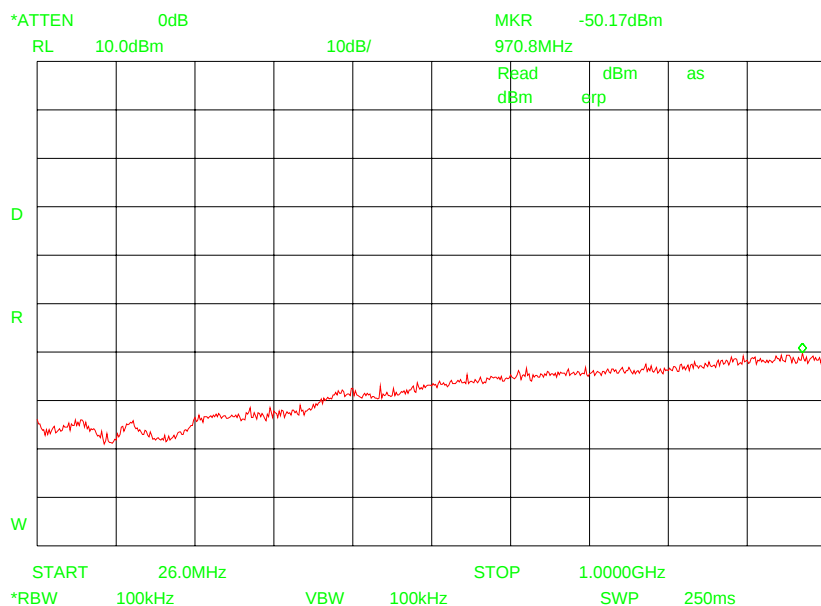
Section 9. Spurious Emissions (Radiated, exploratory)

NAME OF TEST: Spurious Emissions (Radiated, exploratory) PARA. NO.: 15.209

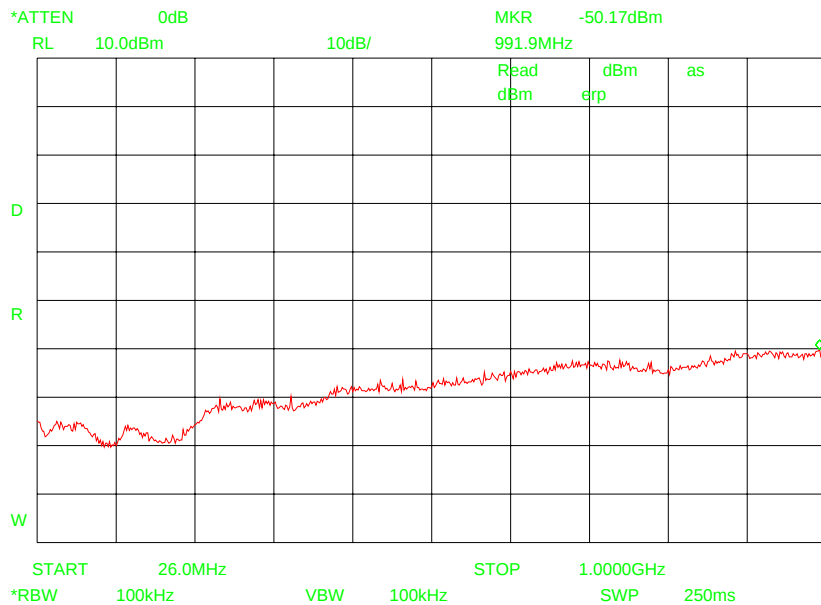
Test Result: N.A.

Measurement data: See plots

Horizontal polarization GFSK modulation

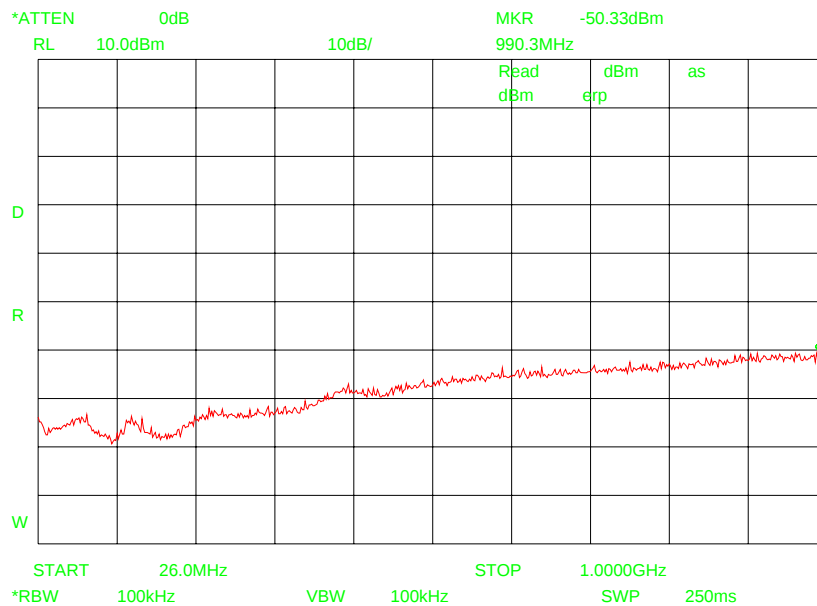


Vertical polarization GFSK modulation

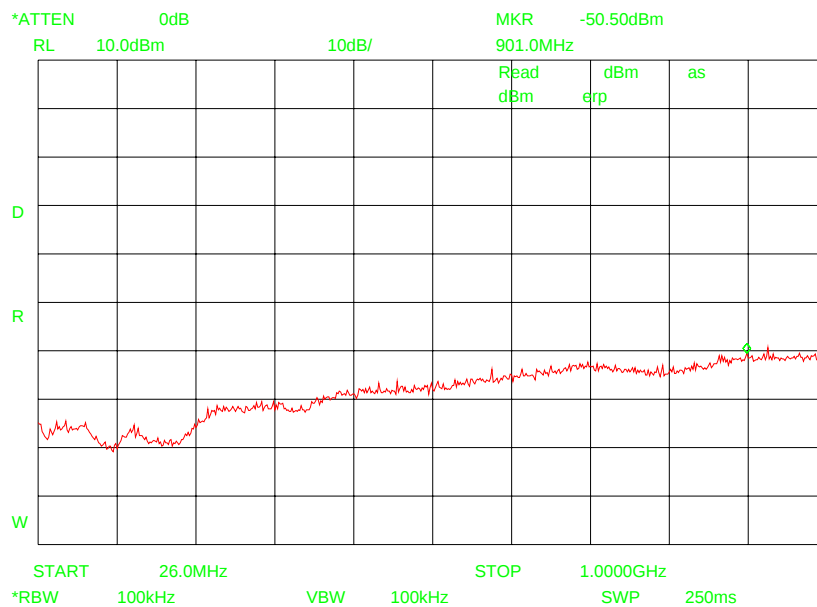


Note: The plot is calibrated in units of dBm E.R.P.

Horizontal polarization $\pi/4$ -DPSK modulation

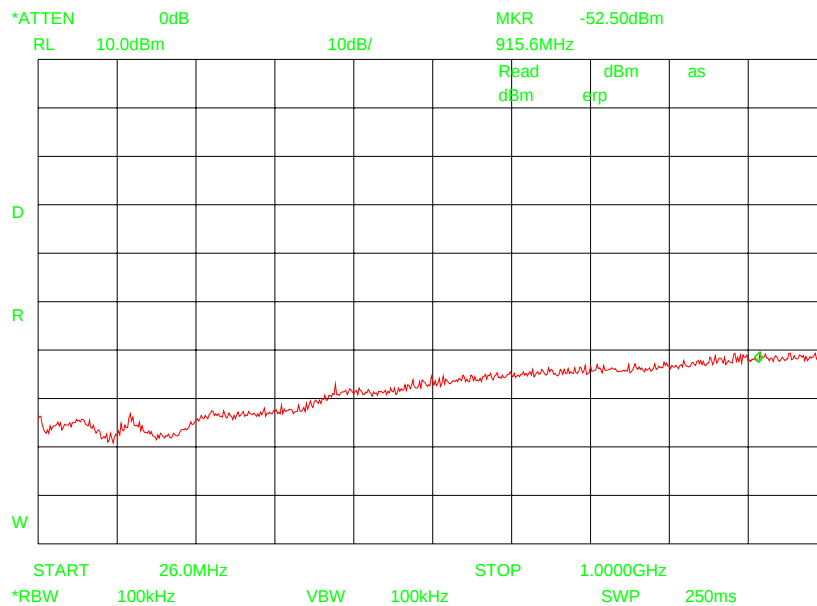


Vertical polarization $\pi/4$ -DPSK modulation

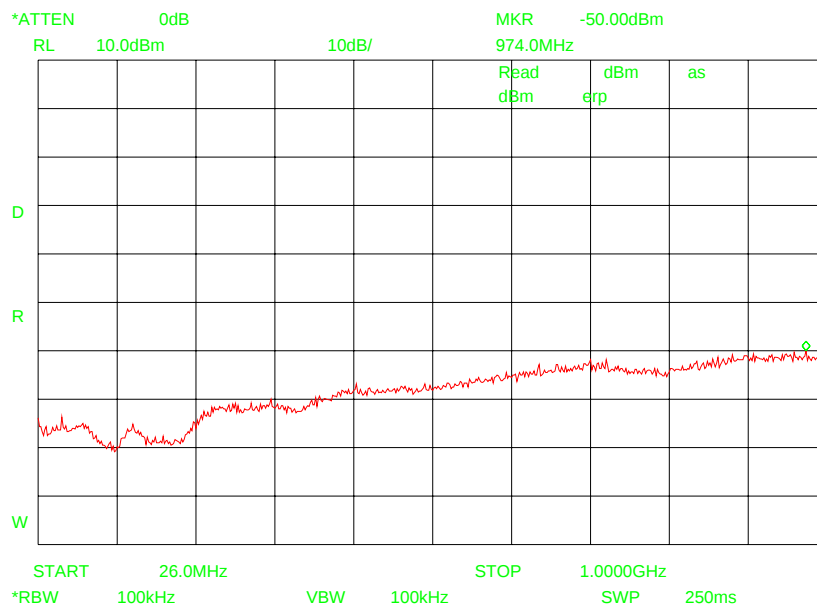


Note: The plot is calibrated in units of dBm E.R.P.

Horizontal polarization 8-DPSK modulation



Vertical polarization 8-DPSK modulation



Note: The plot is calibrated in units of dBm E.R.P.

Section 10. Spurious Emissions (Radiated, compliance)

Section 10.1 Spurious emissions GFSK modulation

NAME OF TEST: Spurious Emissions (Radiated, compliance) PARA. NO.: 15.209

Test Result: Complies

Measurement data:

Frequency (MHz)	Polarization (H/V)	Fieldstrength in dB μ V/m	Peak/Average
1628	H	38.37	Peak
1628	H	32.53	Average
1654	H	38.87	Peak
1654	H	32.87	Average
3204	V	46.37	Peak
3204	V	36.03	Average
3256	V	45.70	Peak
3256	V	34.20	Average
3308	V	46.03	Peak
3308	V	34.03	Average

Limit: 54 dB μ V/m (average)
74 dB μ V/m (peak)

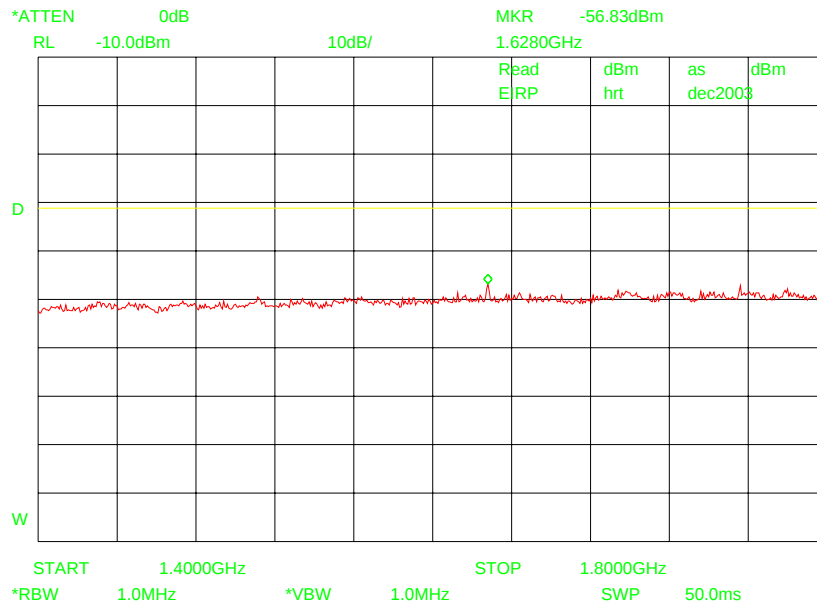
Since no spurious signals below 1 GHz were found in the exploratory measurements, no compliance measurements were deemed necessary.

All found spurious except at the ones mentioned above are within restricted bands and can be found in section 11.

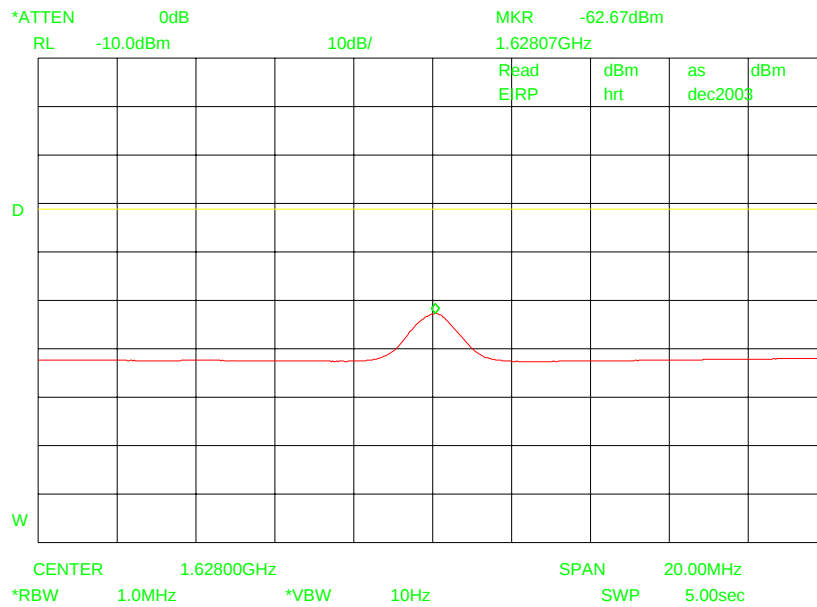
Only the above-mentioned frequencies are measured in this section.

The values in the table are calculated using the relation between fieldstrength at 3 meters and the EIRP. See annex A.

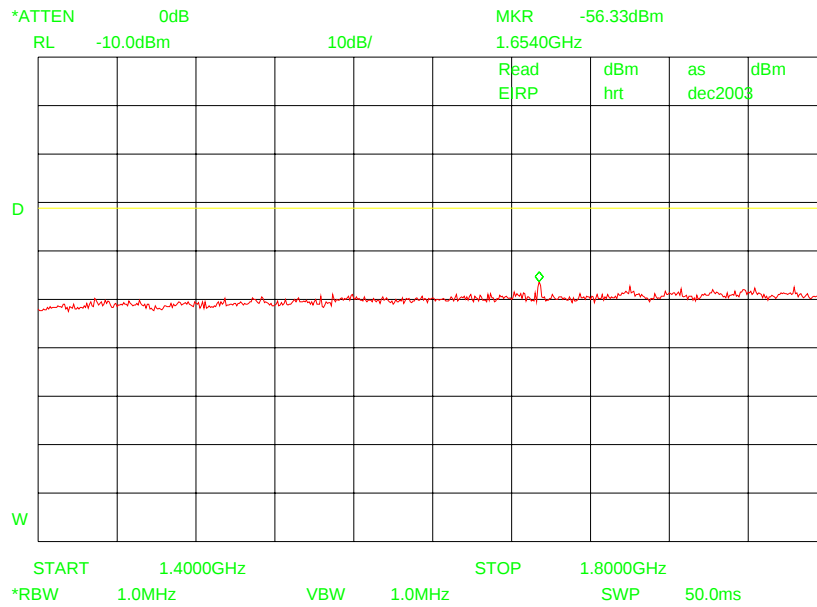
1628 MHz spurious emission (peak measurement) channel 40



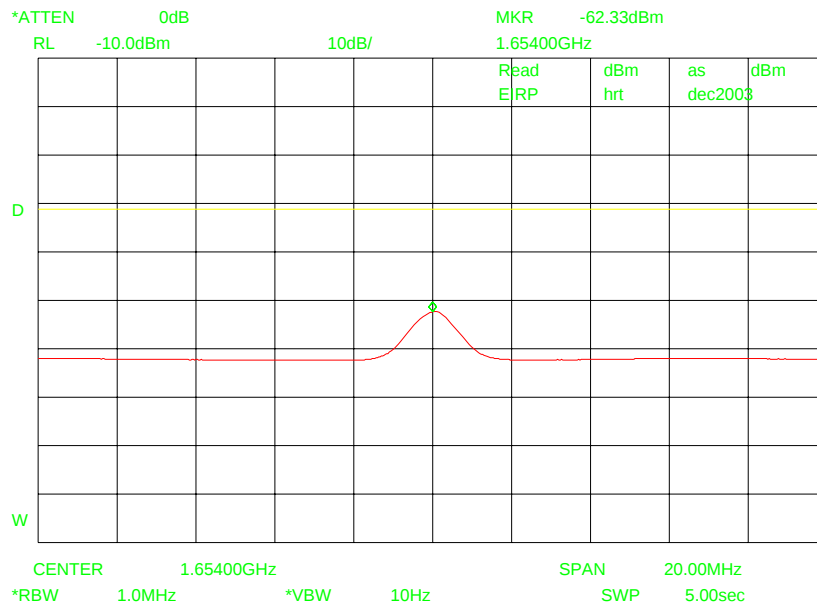
1628 MHz spurious emission (average measurement) channel 40



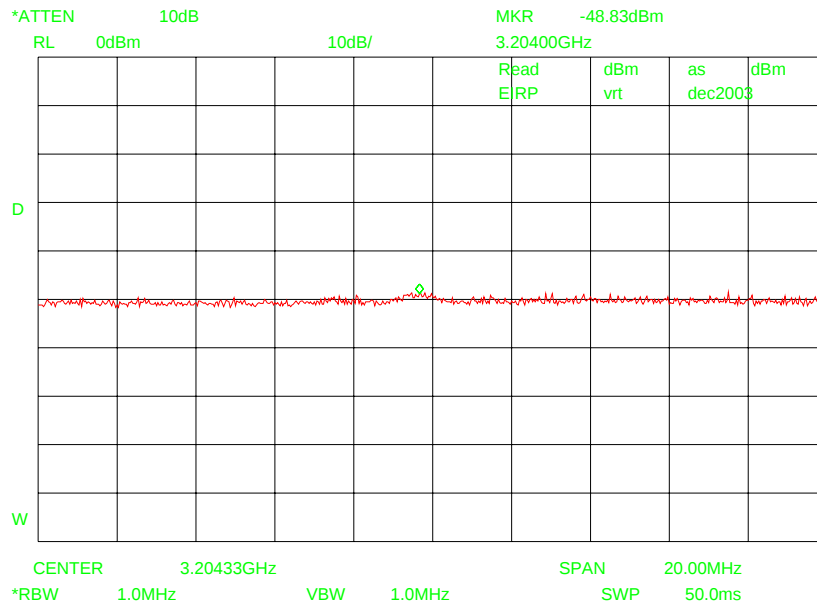
1654 MHz spurious emission (peak measurement) channel 79



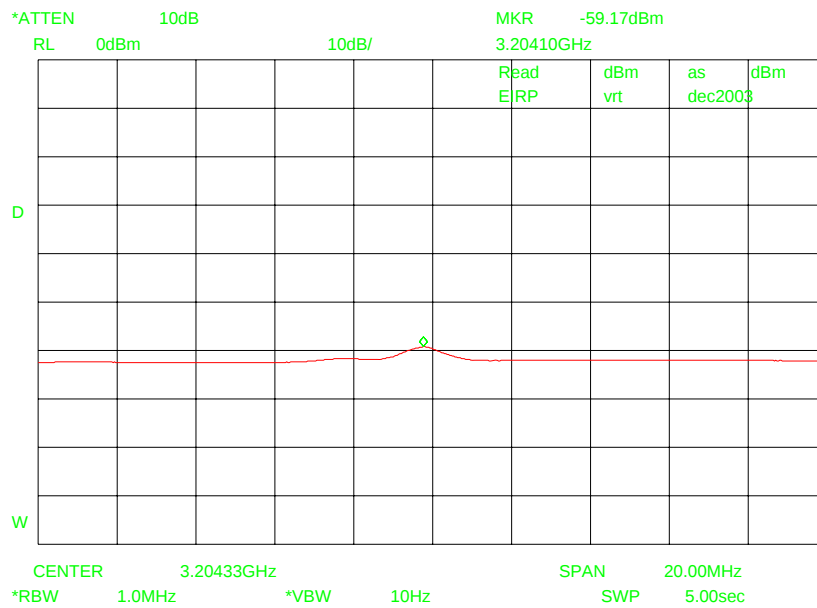
1654 MHz spurious emission (average measurement) channel 79



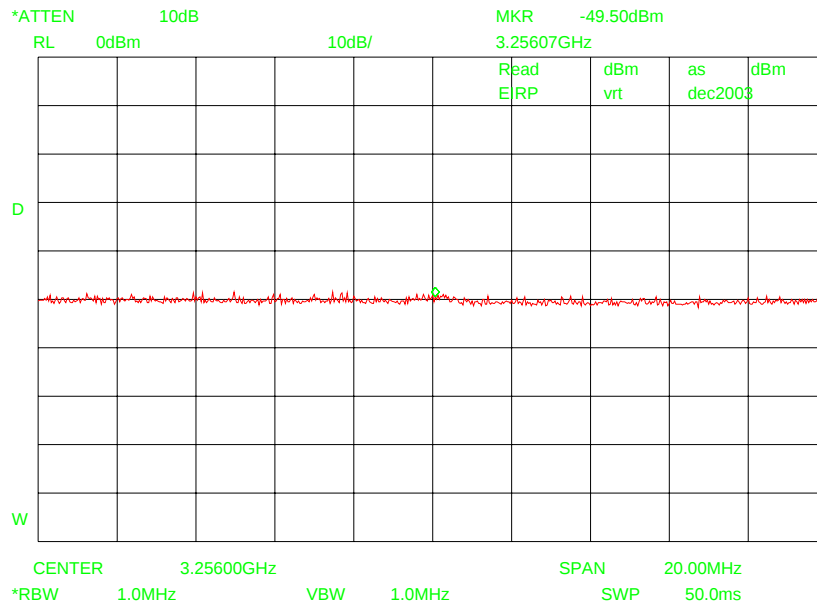
3.2 GHz spurious (peak measurement) channel 1



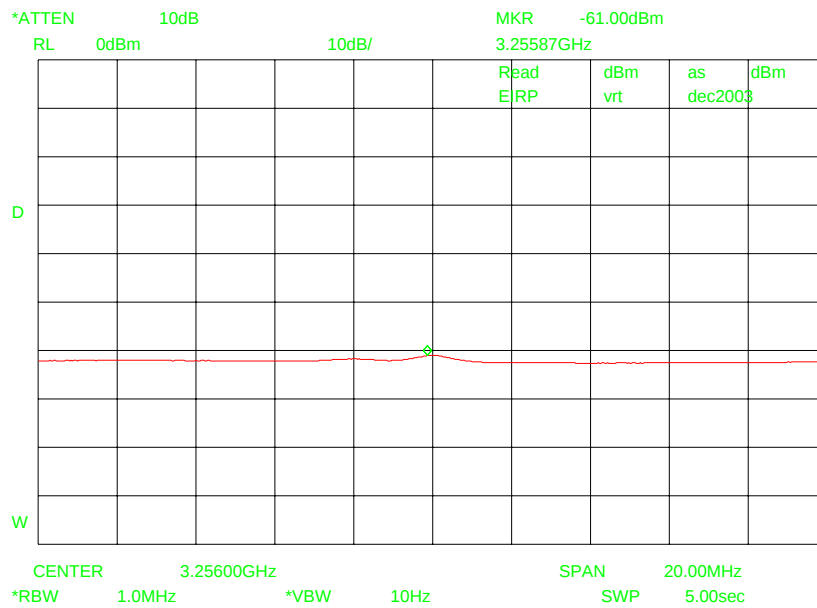
3.2 GHz spurious (average measurement) channel 1



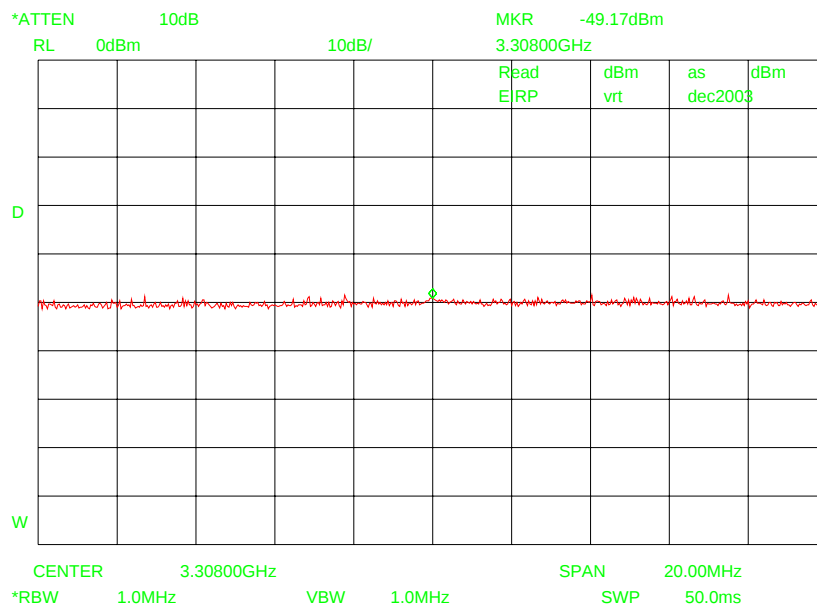
3.2 GHz spurious (peak measurement) channel 40



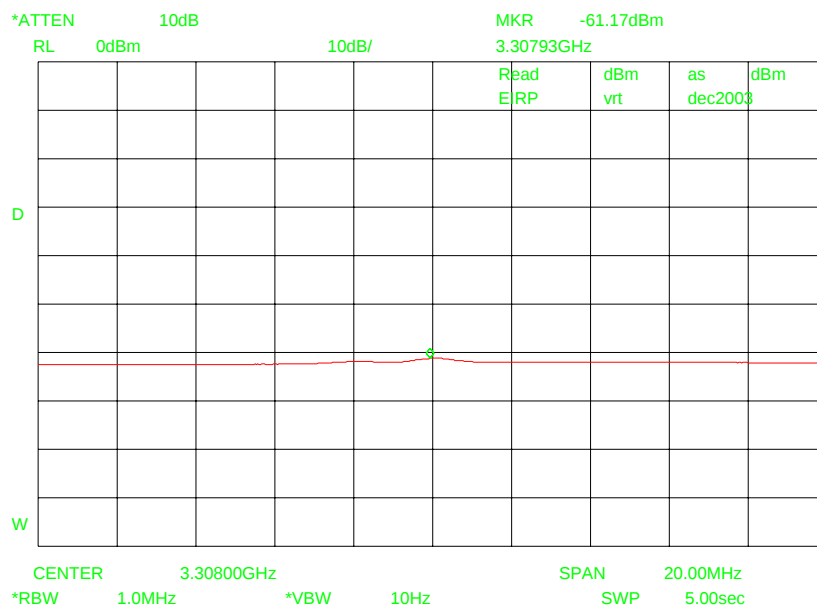
3.2 GHz spurious (average measurement) channel 40



3.2 GHz spurious (peak measurement) channel 79



3.2 GHz spurious (average measurement) channel 79



Section 10.2 Spurious emissions $\pi/4$ -DPSK modulation

NAME OF TEST: Spurious Emissions (Radiated, compliance) PARA. NO.: 15.209

Test Result: Complies

Measurement data:

Frequency (MHz)	Polarization (H/V)	Fieldstrength in dB μ V/m	Peak/Average
1628	H	38.87	Peak
1628	H	32.53	Average
1654	H	39.53	Peak
1654	H	33.37	Average

Limit: 54 dB μ V/m (average)
74 dB μ V/m (peak)

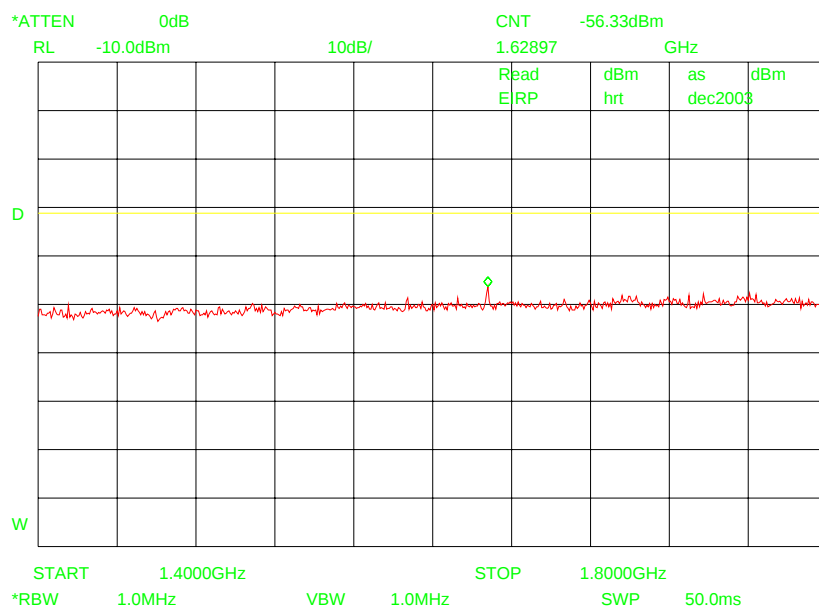
Since no spurious signals below 1 GHz were found in the exploratory measurements, no compliance measurements were deemed necessary.

All found spurious except at the ones mentioned above are within restricted bands and can be found in section 11.

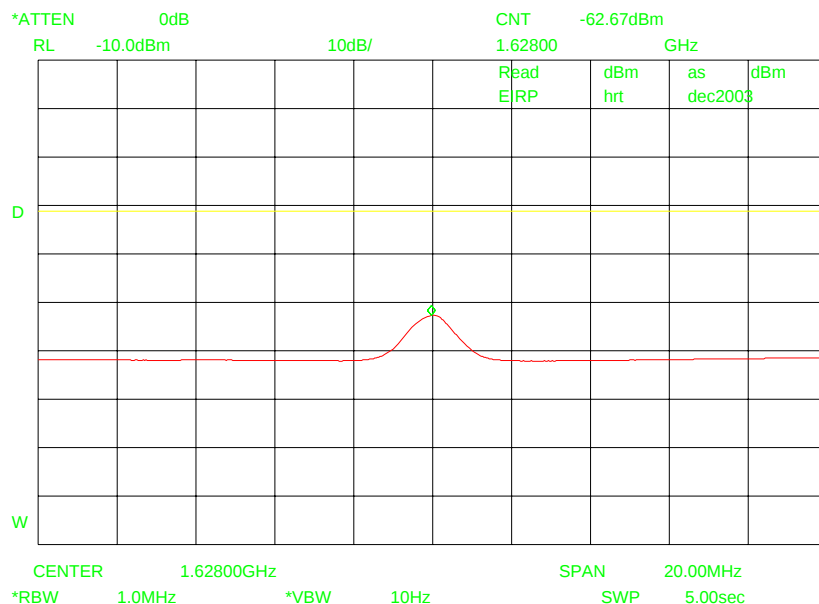
Only the above-mentioned frequencies are measured in this section.

The values in the table are calculated using the relation between field strength at 3 meters and the EIRP. See annex A.

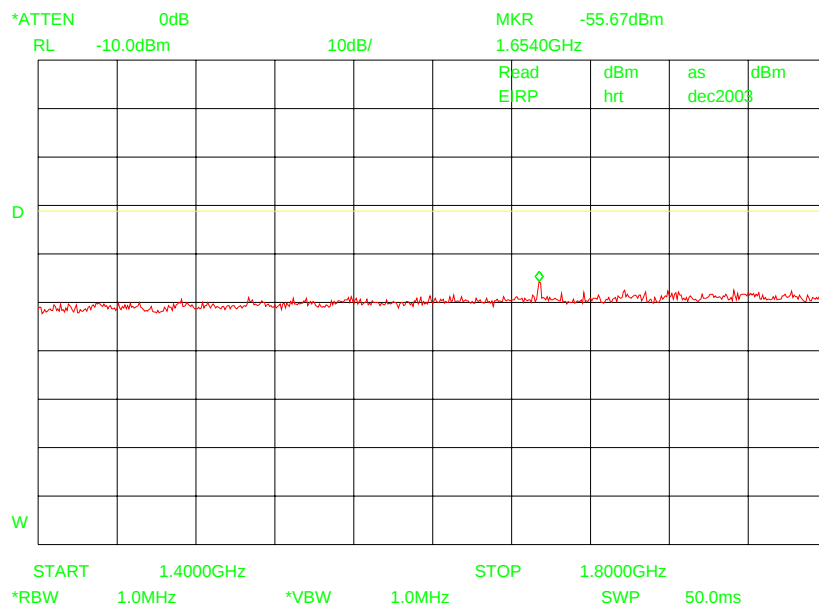
1628 MHz spurious emission (peak measurement) channel 40



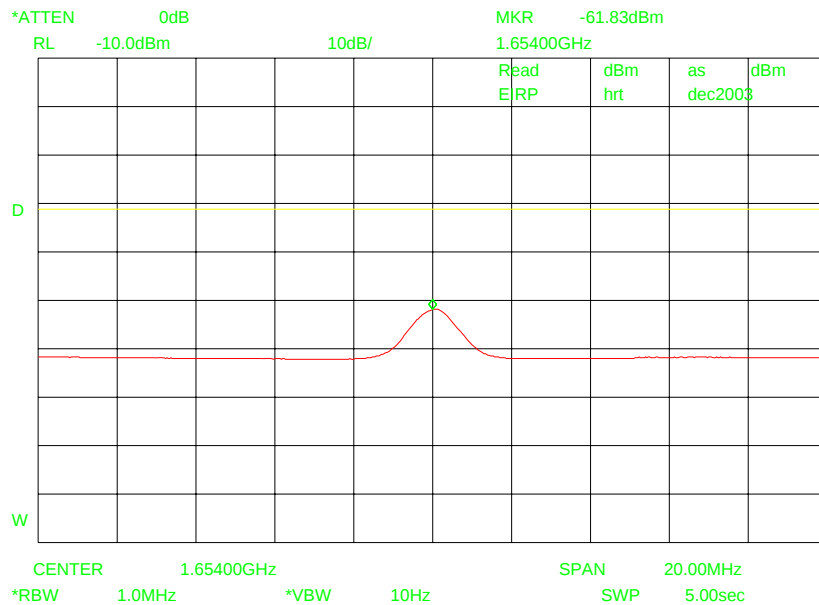
1628 MHz spurious emission (average measurement) channel 40



1654 MHz spurious emission (peak measurement) channel 79



1654 MHz spurious emission (average measurement) channel 79



Section 10.3 Spurious emissions 8-DPSK modulation

NAME OF TEST: Spurious Emissions (Radiated, compliance) PARA. NO.: 15.209

Test Result: Complies

Measurement data:

Frequency (MHz)	Polarization (H/V)	Fieldstrength in dB μ V/m	Peak/Average
1628	H	39.70	Peak
1628	H	33.53	Average
1654	H	39.03	Peak
1654	H	33.2	Average

Limit: 54 dB μ V/m (average)
74 dB μ V/m (peak)

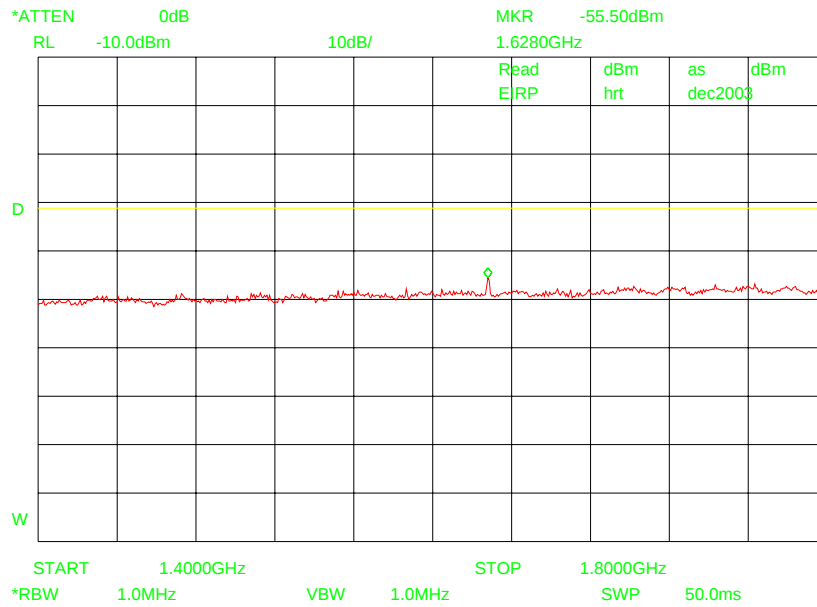
Since no spurious signals below 1 GHz were found in the exploratory measurements, no compliance measurements were deemed necessary.

All found spurious except at the ones mentioned above are within restricted bands and can be found in section 11.

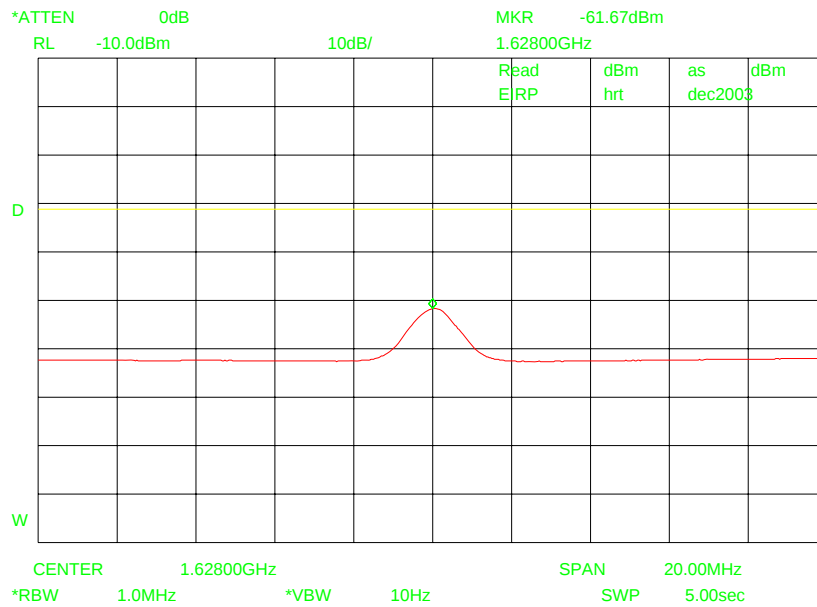
Only the above-mentioned frequencies are measured in this section.

The values in the table are calculated using the relation between field strength at 3 meters and the EIRP. See annex A.

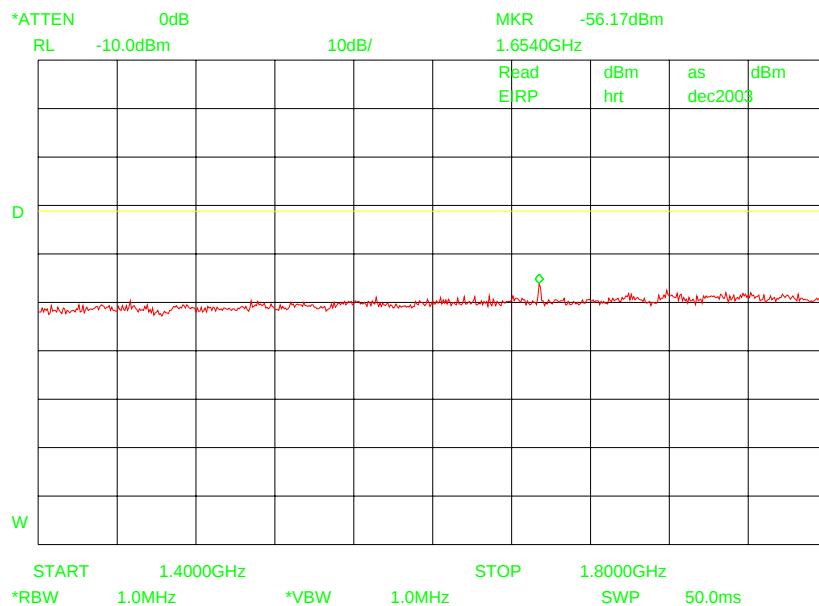
1628 MHz spurious emission (peak measurement) channel 40



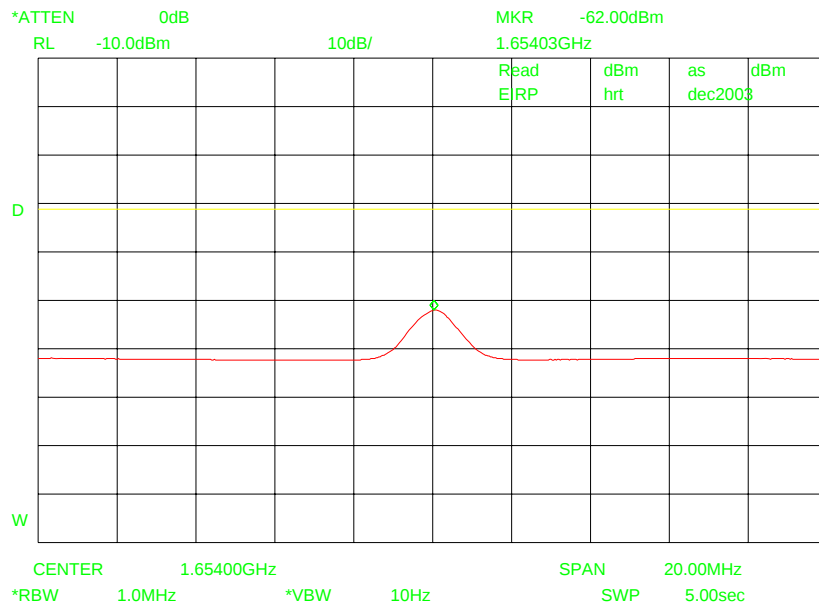
1628 MHz spurious emission (average measurement) channel 40



1654 MHz spurious emission (peak measurement) channel 79



1654 MHz spurious emission (average measurement) channel 79



Section 11. Spurious Emissions (Restricted bands Radiated)

Section 11.1. Spurious emissions GFSK modulation (restricted bands)

NAME OF TEST: Spurious Emissions (Radiated)

PARA. NO.: 15.247(c)

Test Result: Complies

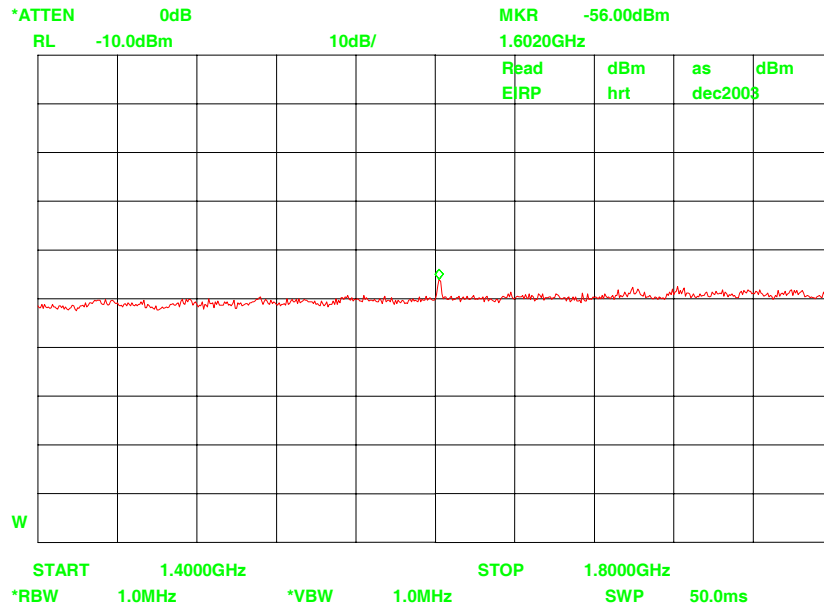
Measurement data: See plots

Frequency (MHz)	Polarization (H/V)	Fieldstrength in dB μ V/m	Peak/Average
1602	H	39.20	Peak
1602	H	34.03	Average
2386	V	43.53	Peak
2386	V	31.03	Average
2483	V	51.03	Peak
2483	V	40.03	Average
4805	V	47.37	Peak
4805	V	38.53	Average
4882	V	46.37	Peak
4882	V	36.53	Average
4959	V	44.7	Peak
4959	V	33.53	Average

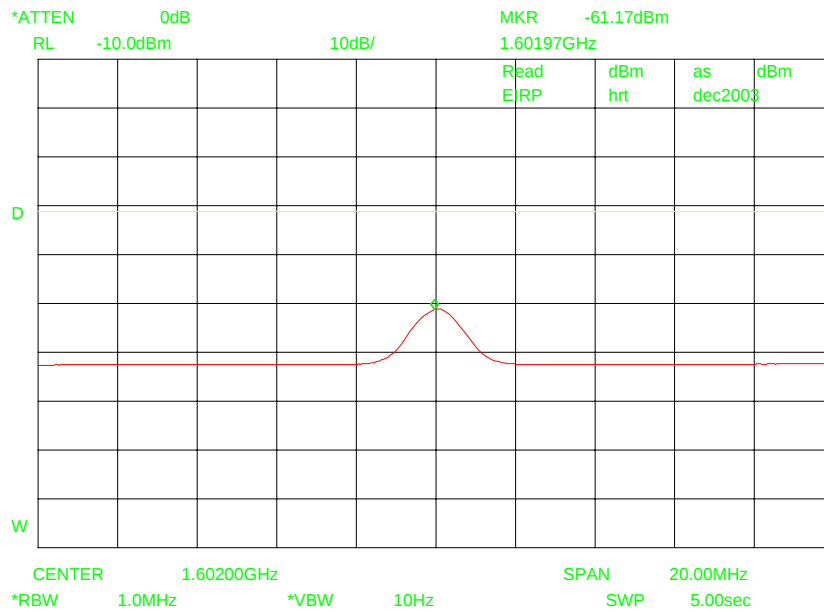
Limit: 54 dB μ V/m (average)
74 dB μ V/m (peak)

The values in the table are calculated using the relation between field strength at 3 meters and the EIRP. See annex A.

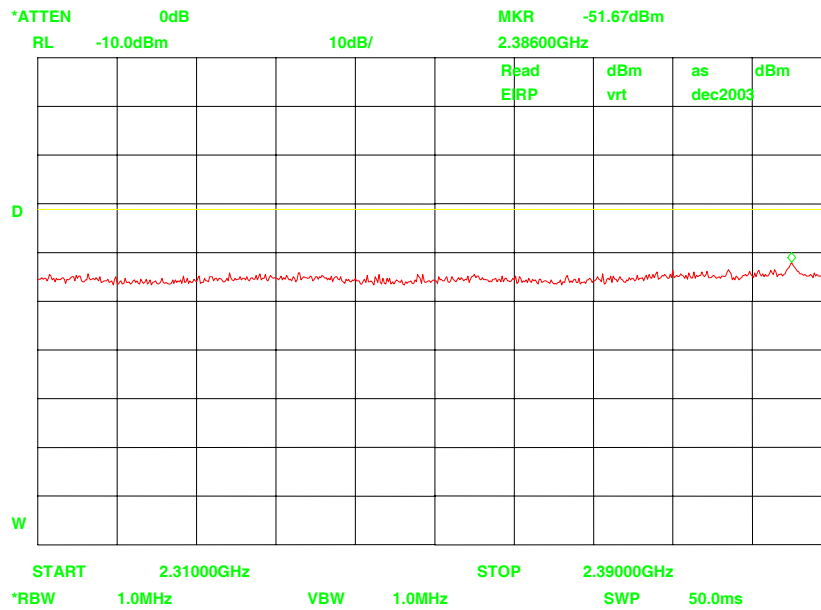
1435 – 1626.5 MHz restricted band (peak measurement) channel 1



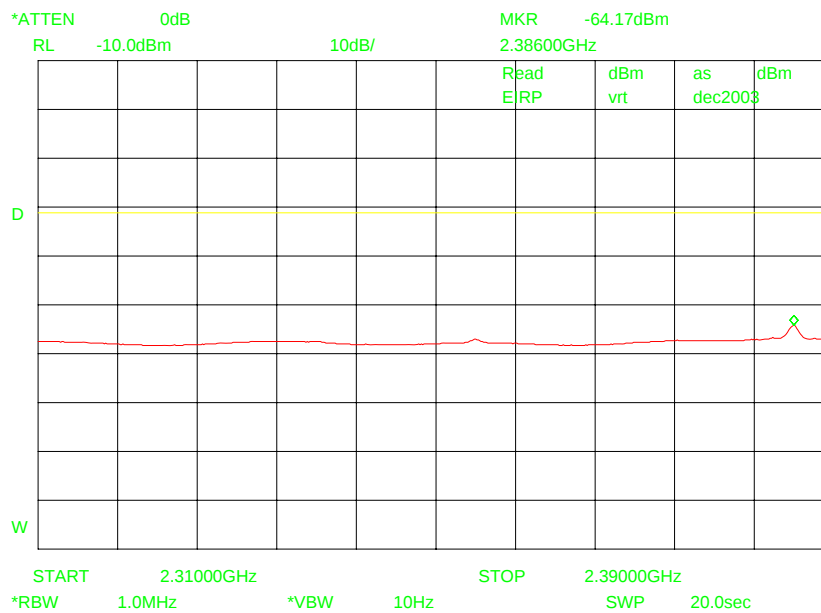
1435 – 1626.5 MHz restricted band (average measurement) channel 1



Lower adjacent restricted band (peak measurement)

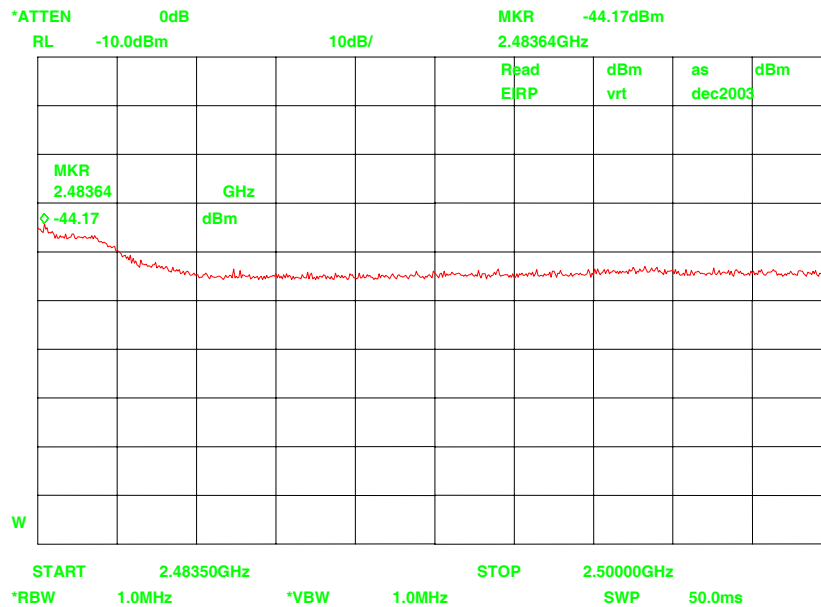


Lower adjacent restricted band (average measurement)

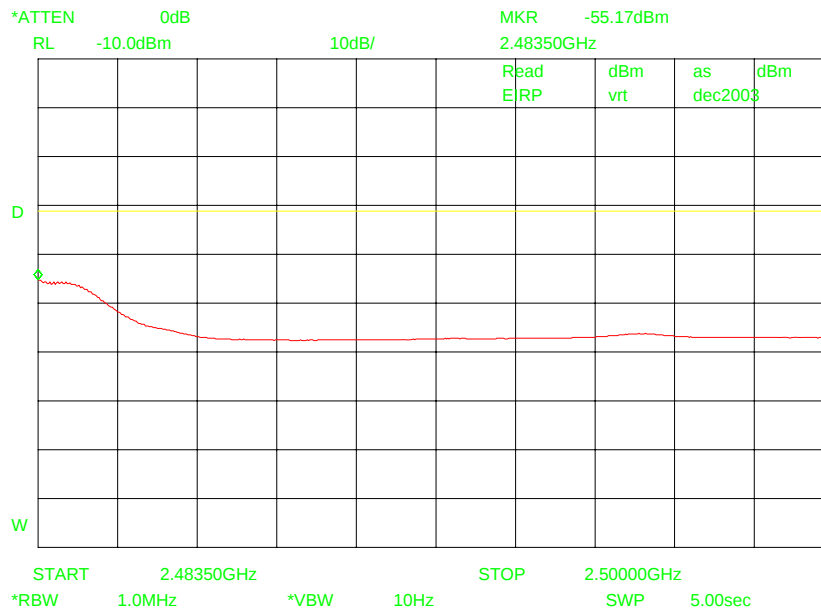


Note: The plot is calibrated in units of dBm E.I.R.P.

Upper adjacent restricted band (peak measurement)

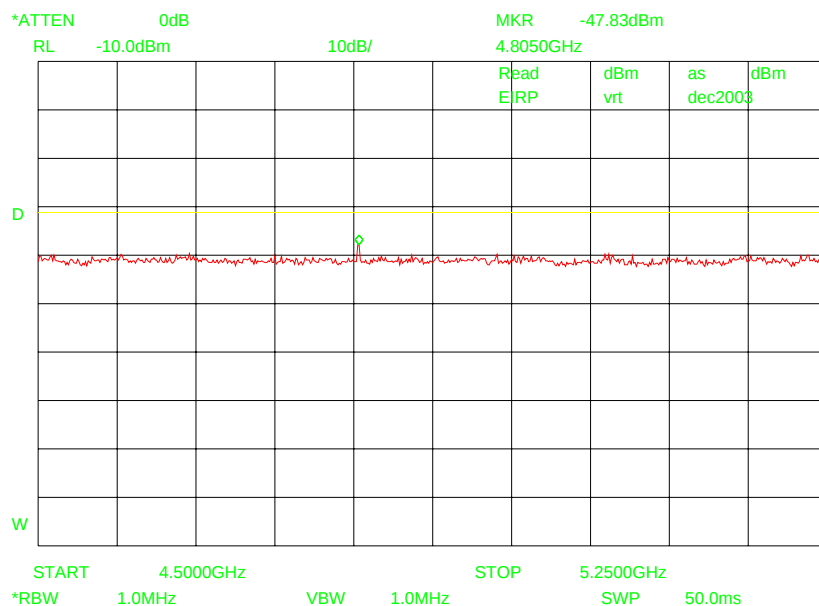


Upper adjacent restricted band (average measurement)

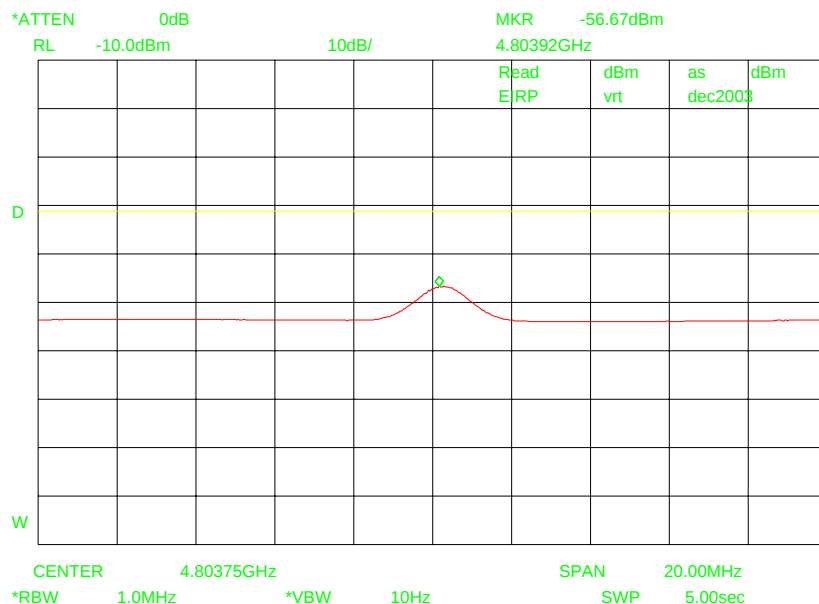


Note: The plot is calibrated in units of dBm E.I.R.P.

Channel 1 harmonic in restricted band (peak measurement)

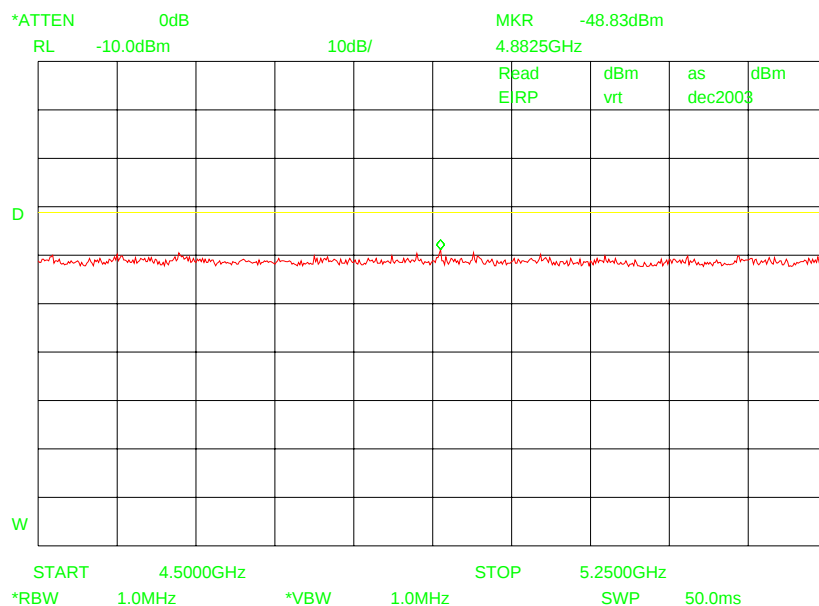


Channel 1 harmonic in restricted band (average measurement)

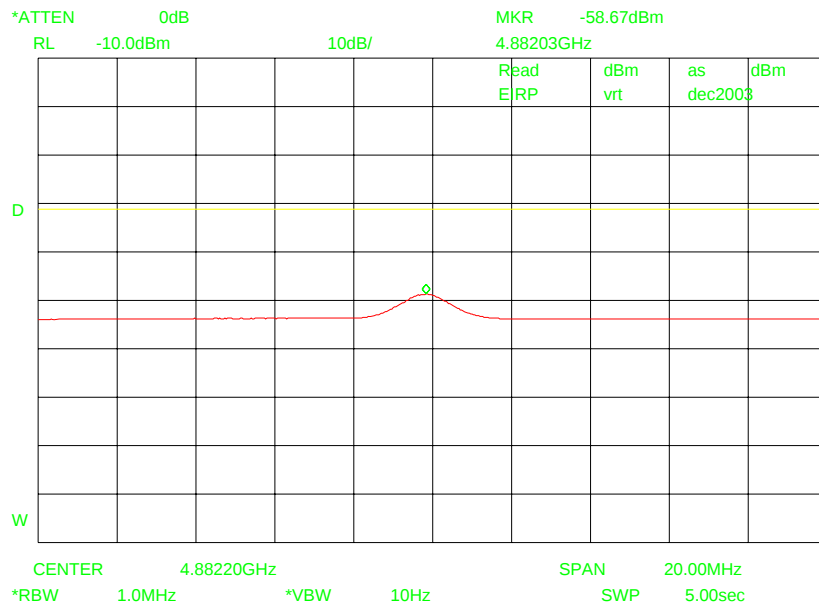


Note: The plot is calibrated in units of dBm E.I.R.P.

Channel 40 harmonic in restricted band (peak measurement)

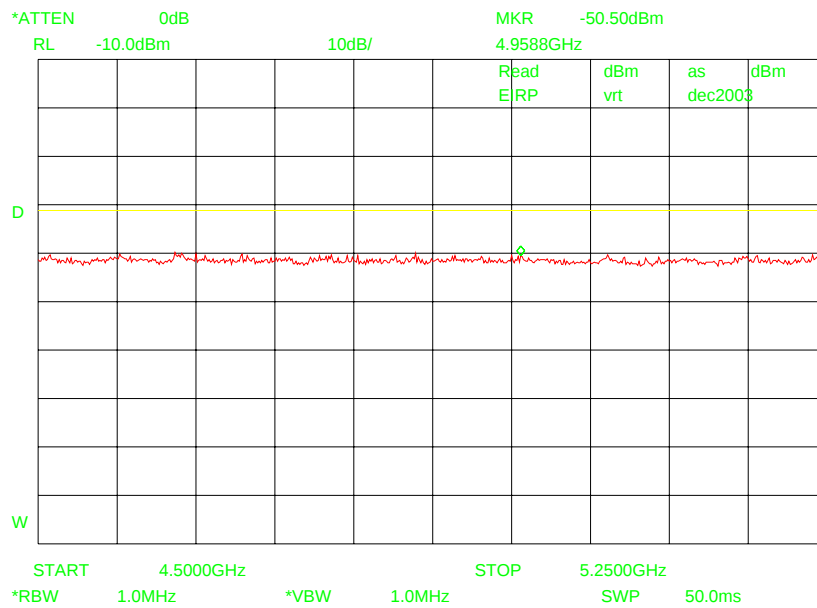


Channel 40 harmonic in restricted band (average measurement)

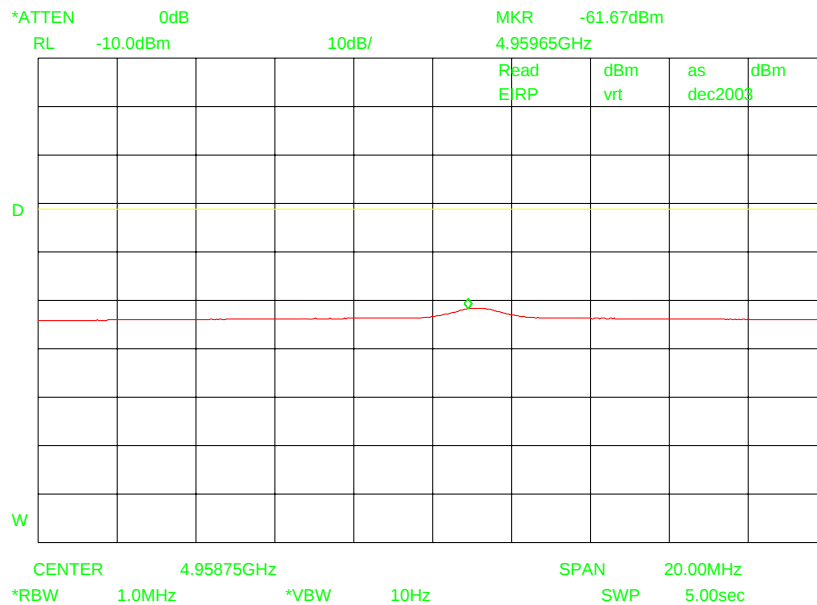


Note: The plot is calibrated in units of dBm E.I.R.P.

Channel 79 harmonic in restricted band (peak measurement)



Channel 79 harmonic in restricted band (average measurement)



Note: The plot is calibrated in units of dBm E.I.R.P.

Section 11.2. Spurious emissions $\pi/4$ -DPSK modulation (restricted bands)

NAME OF TEST: Spurious Emissions (Radiated)

PARA. NO.: 15.247(c)

Test Result: Complies

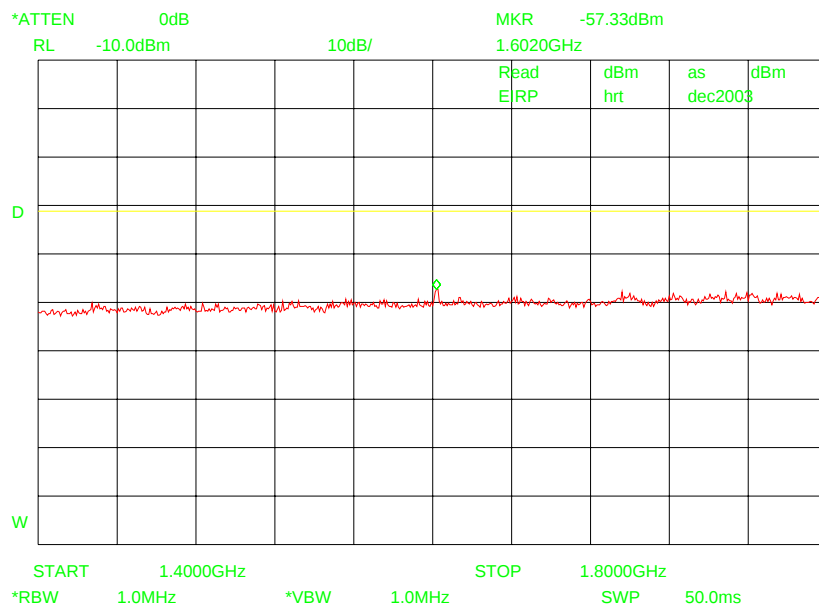
Measurement data: See plots

Frequency (MHz)	Polarization (H/V)	Fieldstrength in dB μ V/m	Peak/Average
1602	H	37.87	Peak
1602	H	34.37	Average
2386	V	41.20	Peak
2386	V	30.53	Average
2483	V	54.87	Peak
2483	V	41.20	Average
4805	V	45.37	Peak
4805	V	32.37	Average
4882	V	46.37	Peak
4882	V	36.53	Average
4959	V	44.70	Peak
4959	V	33.53	Average

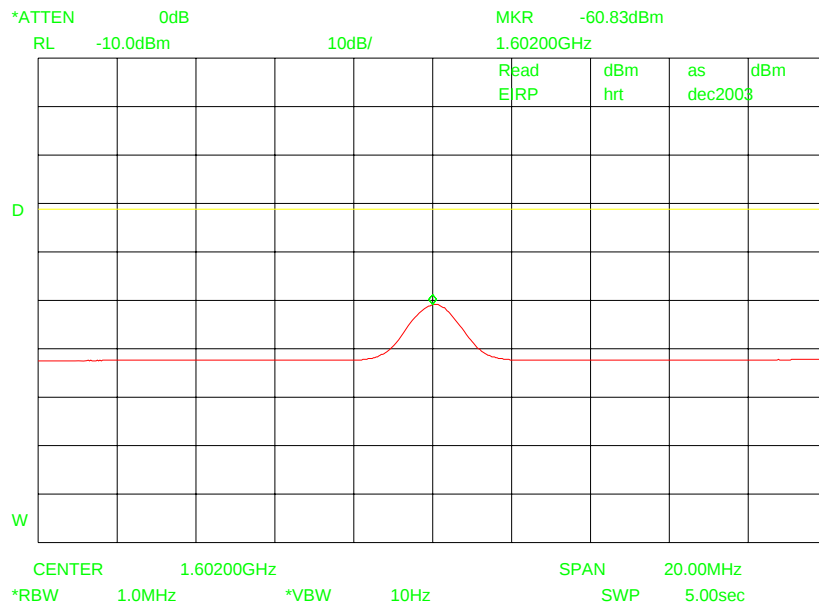
Limit: 54 dB μ V/m (average)
74 dB μ V/m (peak)

The values in the table are calculated using the relation between field strength at 3 meters and the EIRP. See annex A.

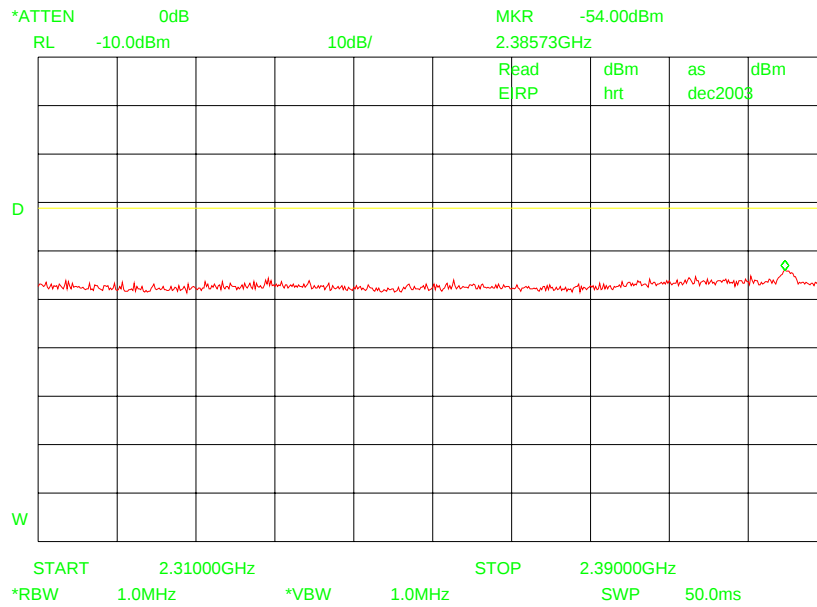
1435 – 1626.5 MHz restricted band (peak measurement) channel 1



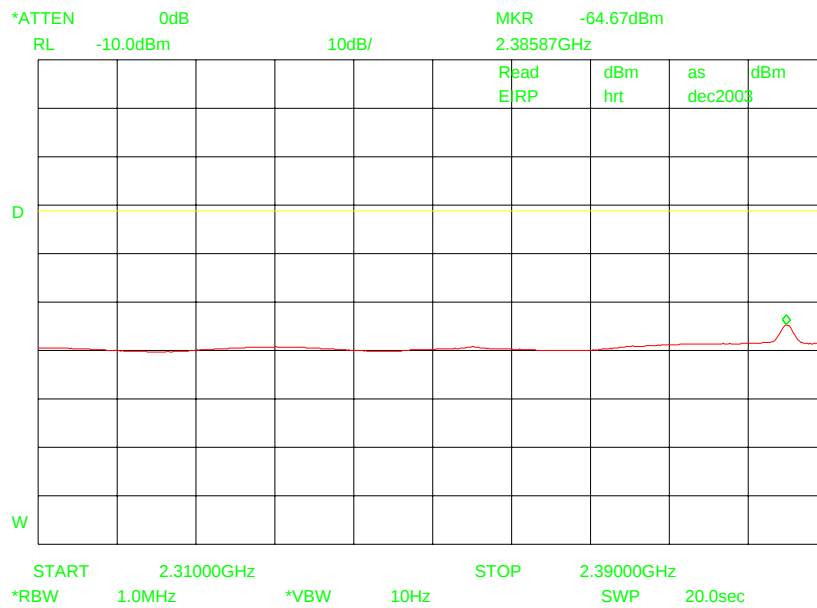
1435 – 1626.5 MHz restricted band (average measurement) channel 1



Lower adjacent restricted band (peak measurement) channel 1

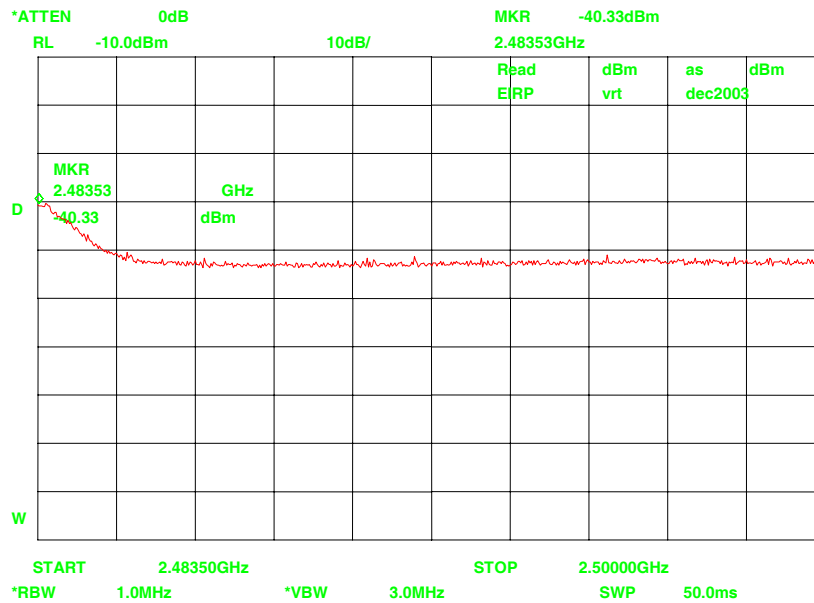


Lower adjacent restricted band (average measurement) channel 1

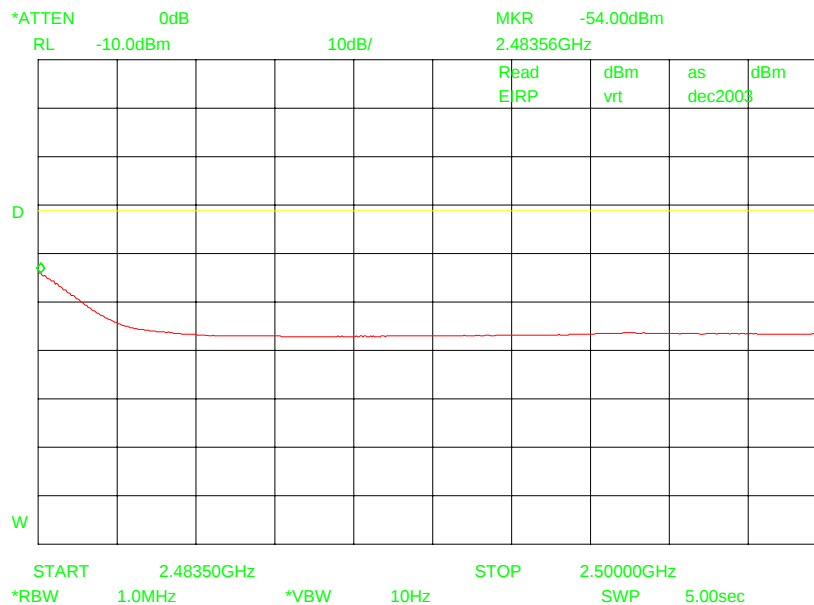


Note: The plot is calibrated in units of dBm E.I.R.P.

Upper adjacent restricted band (peak measurement) channel 79

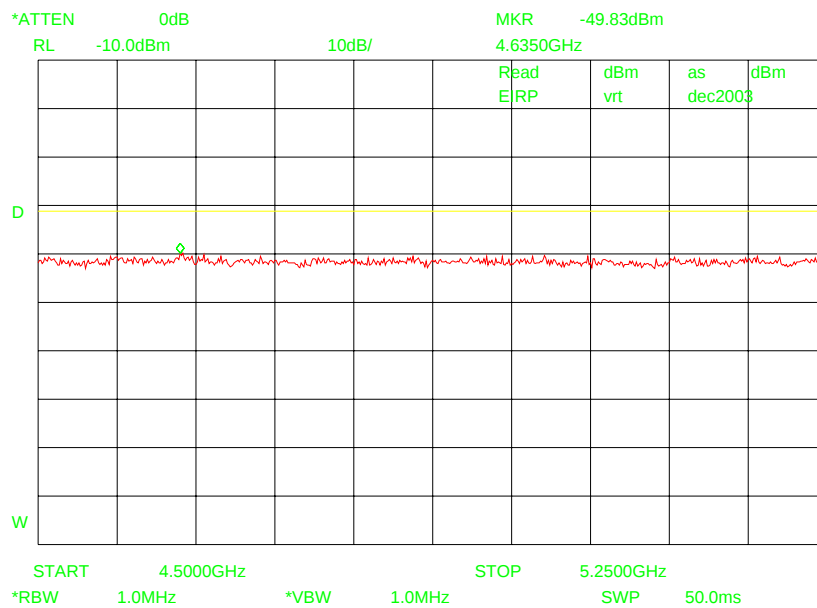


Upper adjacent restricted band (average measurement) channel 79

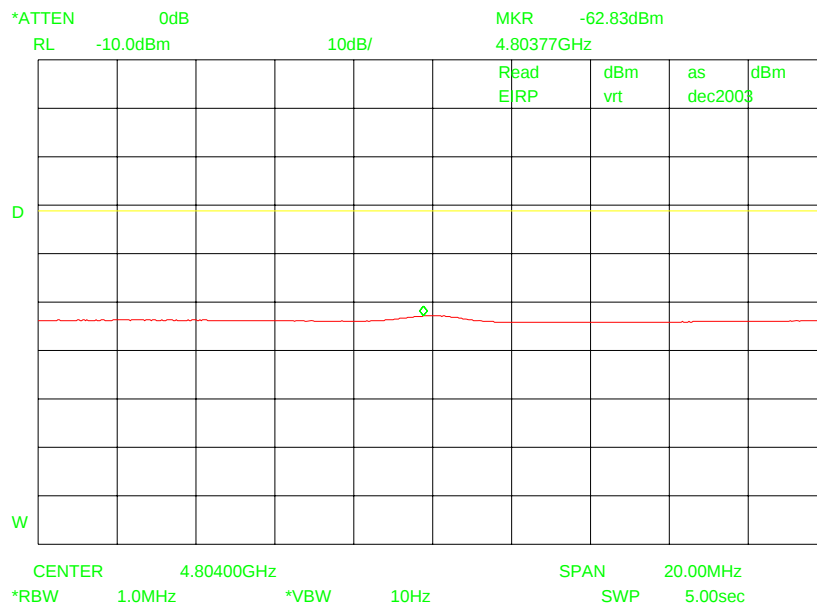


Note: The plot is calibrated in units of dBm E.I.R.P.

Channel 1 harmonic in restricted band (peak measurement)

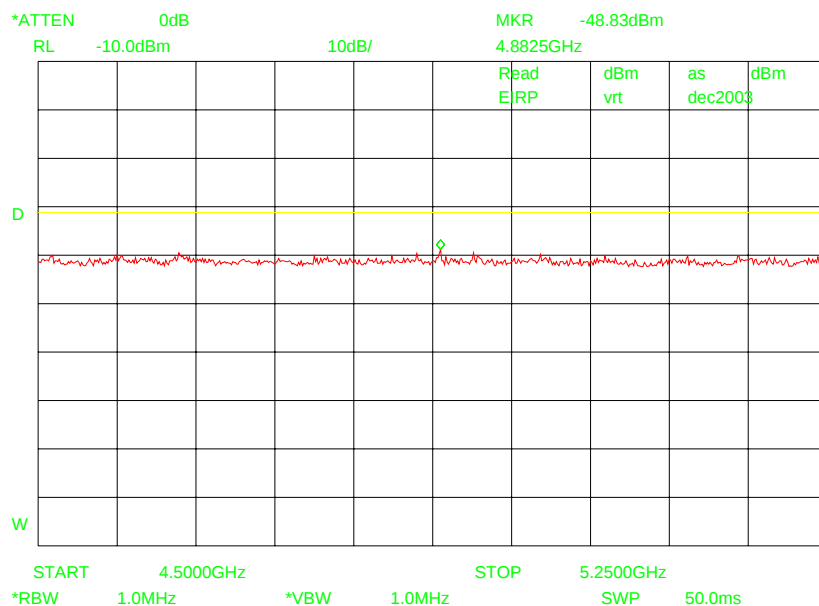


Channel 1 harmonic in restricted band (average measurement)

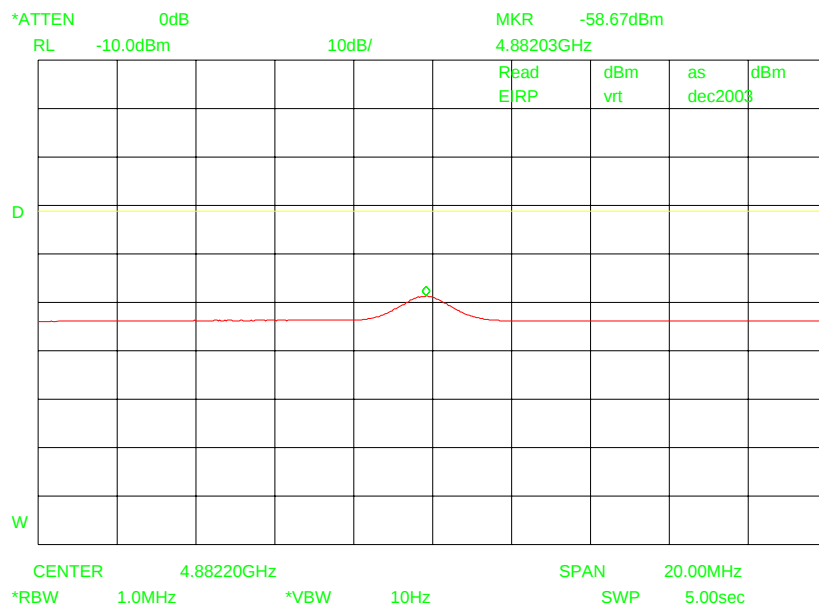


Note: The plot is calibrated in units of dBm E.I.R.P.

Channel 40 harmonic in restricted band (peak measurement)

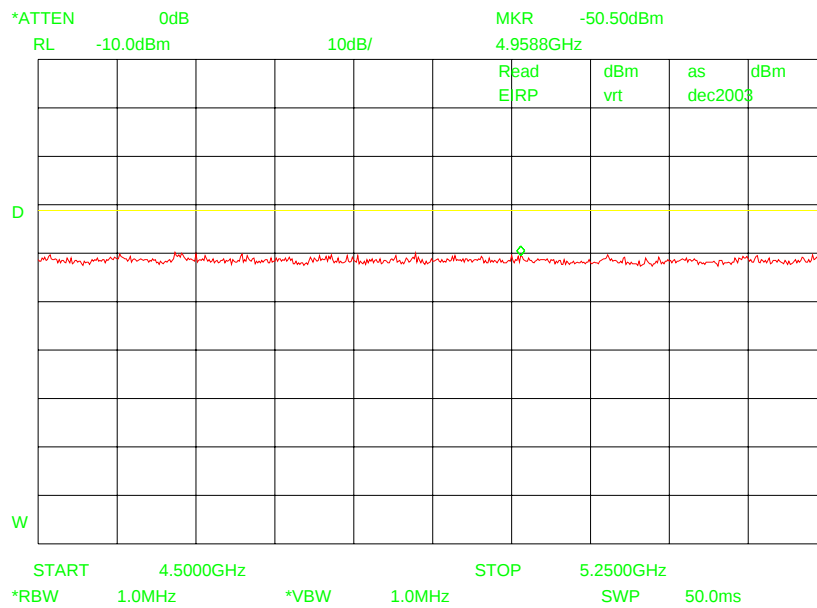


Channel 40 harmonic in restricted band (average measurement)

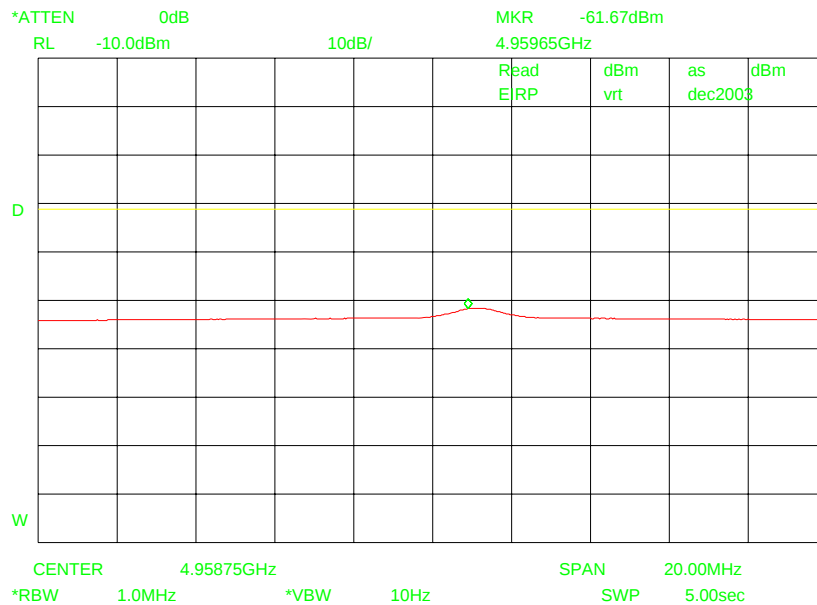


Note: The plot is calibrated in units of dBm E.I.R.P.

Channel 79 harmonic in restricted band (peak measurement)



Channel 79 harmonic in restricted band (average measurement)



Note: The plot is calibrated in units of dBm E.I.R.P.

Section 11.3. Spurious emissions 8-DPSK modulation (restricted bands)

NAME OF TEST: Spurious Emissions (Radiated)

PARA. NO.: 15.247(c)

Test Result: Complies

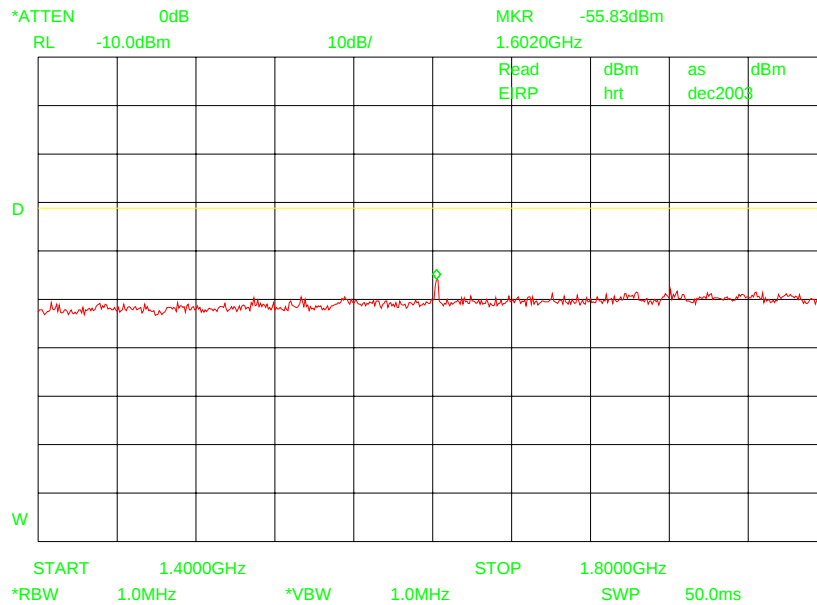
Measurement data: See plots

Frequency (MHz)	Polarization (H/V)	Fieldstrength in dB μ V/m	Peak/Average
1602	H	39.37	Peak
1602	H	34.53	Average
2386	V	43.37	Peak
2386	V	30.53	Average
2483	V	54.37	Peak
2483	V	40.37	Average
4805	V	45.20	Peak
4805	V	36.03	Average
4882	V	45.70	Peak
4882	V	32.03	Average
4959	V	45.37	Peak
4959	V	32.03	Average

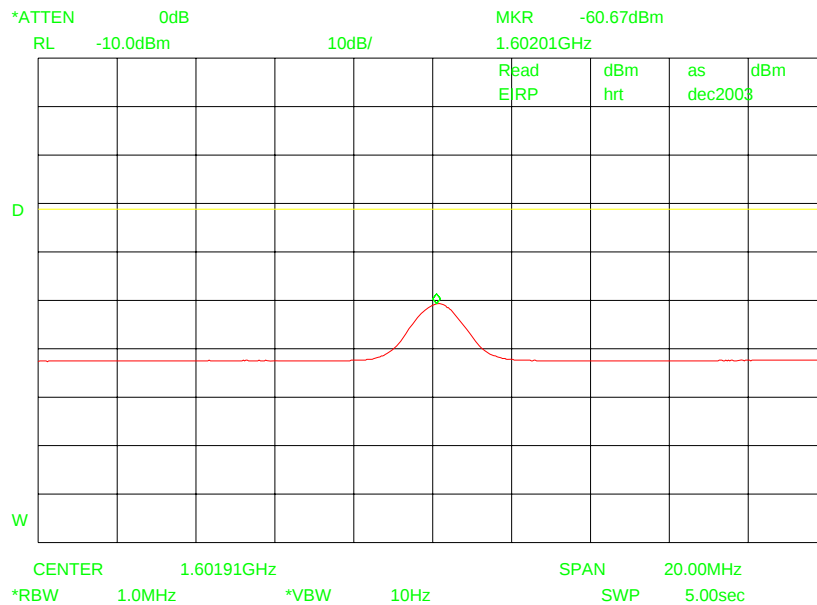
Limit: 54 dB μ V/m (average)
74 dB μ V/m (peak)

The values in the table are calculated using the relation between field strength at 3 meters and the EIRP. See annex A.

1435 – 1626.5 MHz restricted band (peak measurement) channel 1

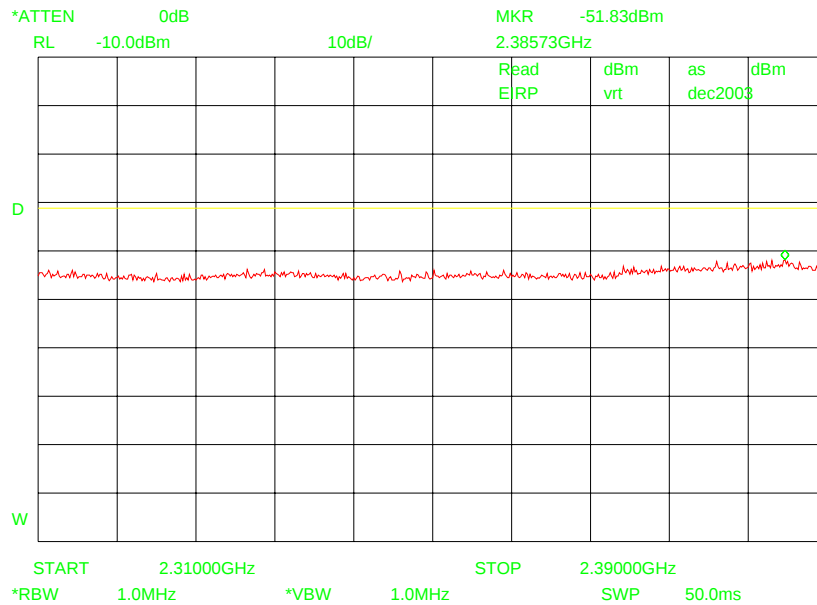


1435 – 1626.5 MHz restricted band (average measurement) channel 1

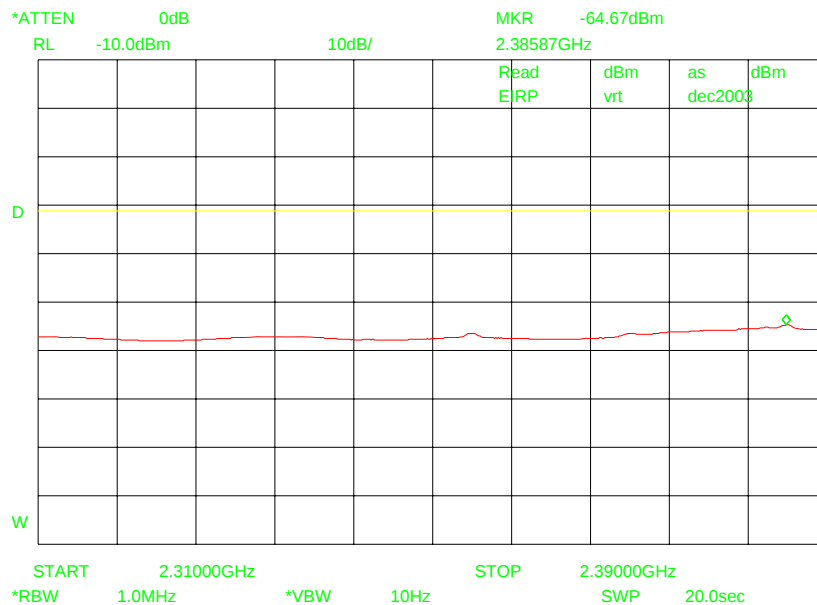


Note: The plot is calibrated in units of dBm E.I.R.P.

Lower adjacent restricted band (peak measurement) channel 1

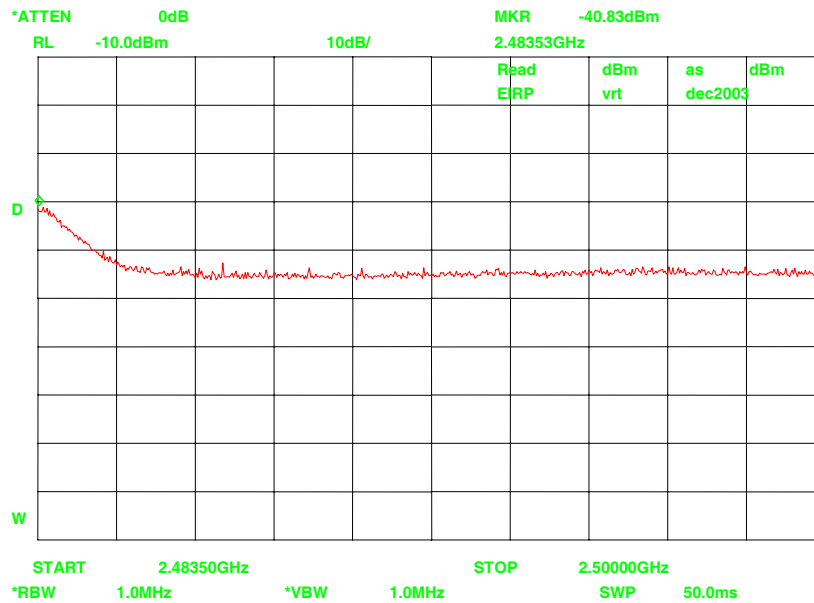


Lower adjacent restricted band (average measurement) channel 1

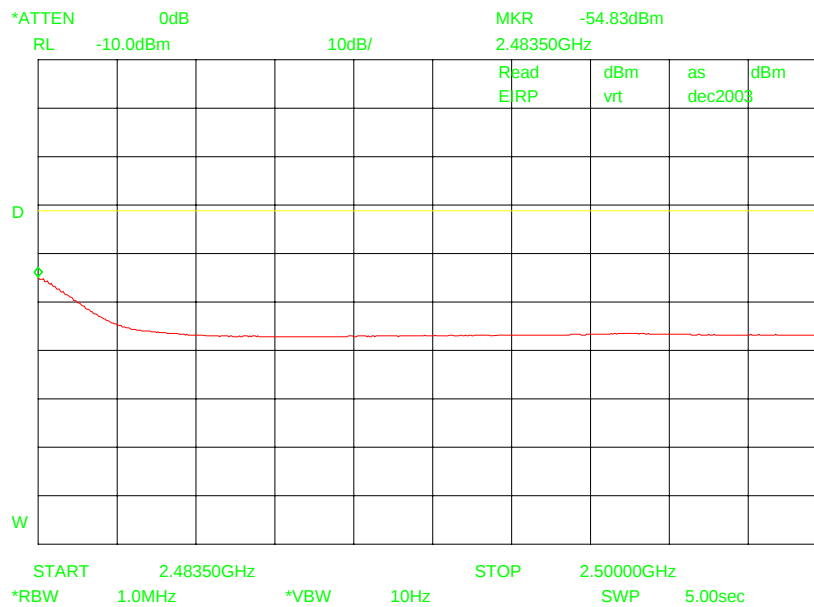


Note: The plot is calibrated in units of dBm E.I.R.P.

Upper adjacent restricted band (peak measurement) channel 79

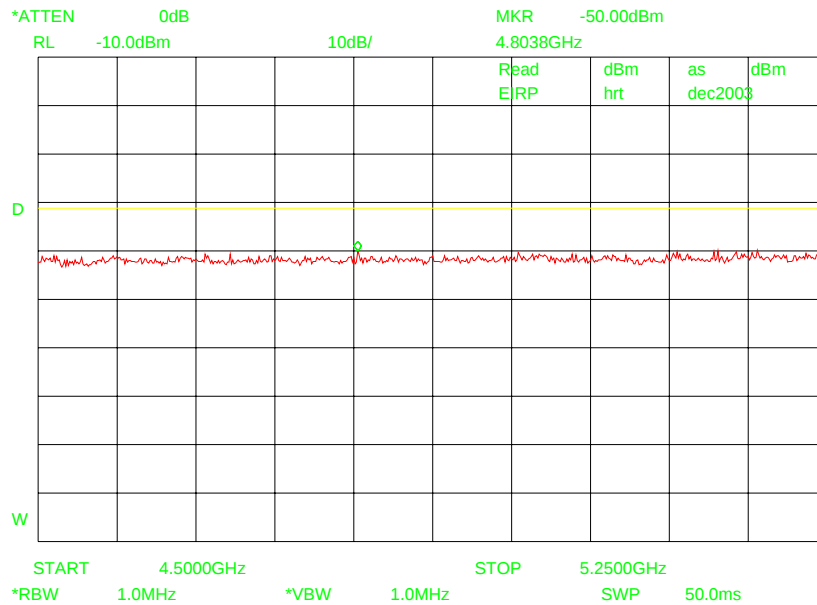


Upper adjacent restricted band (average measurement) channel 79

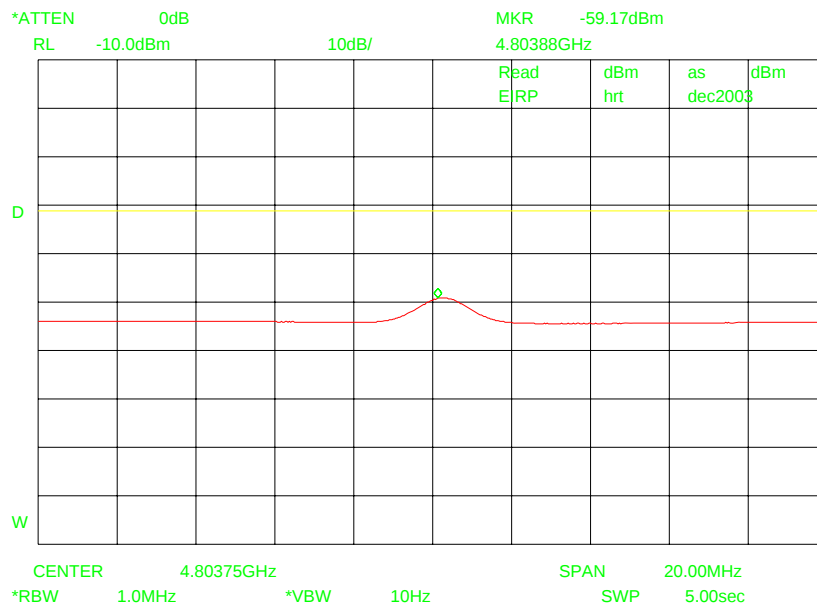


Note: The plot is calibrated in units of dBm E.I.R.P.

Channel 1 harmonic in restricted band (peak measurement)

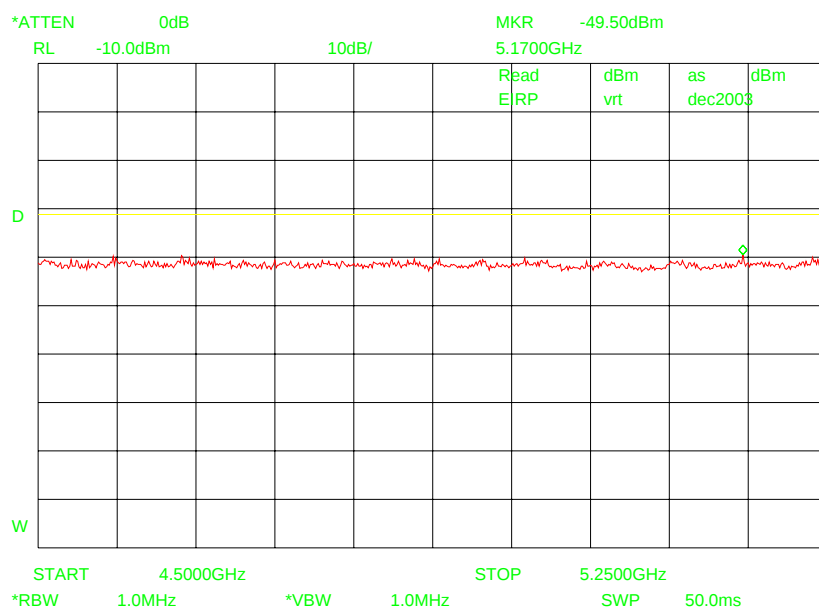


Channel 1 harmonic in restricted band (average measurement)

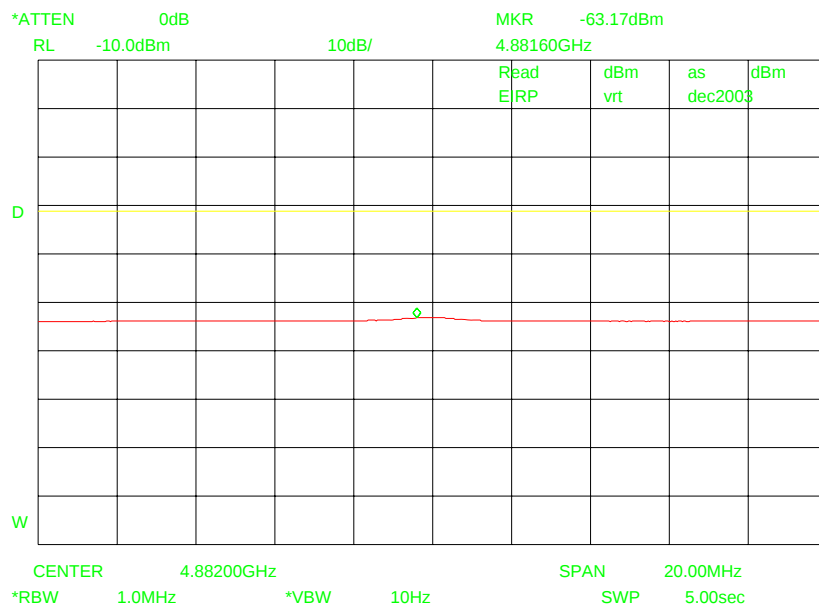


Note: The plot is calibrated in units of dBm E.I.R.P.

Channel 40 harmonic in restricted band (peak measurement)

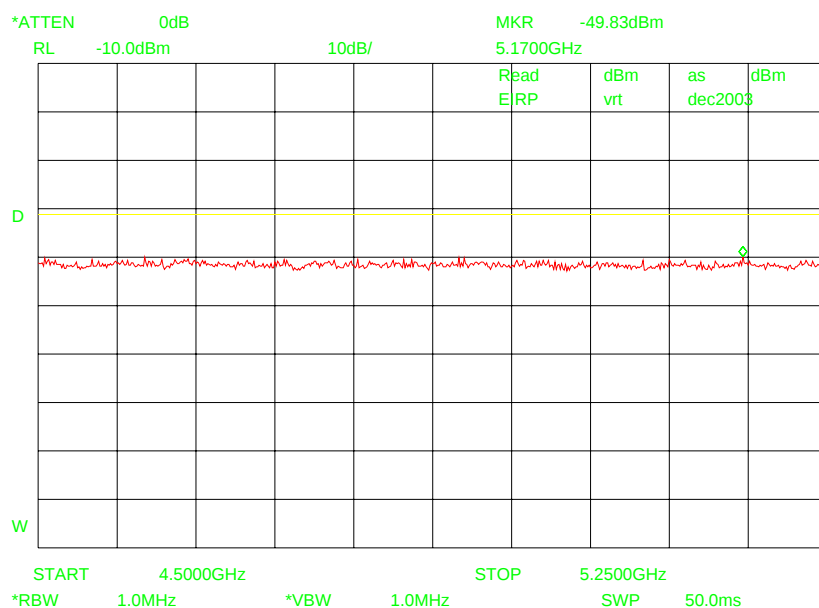


Channel 40 harmonic in restricted band (average measurement)

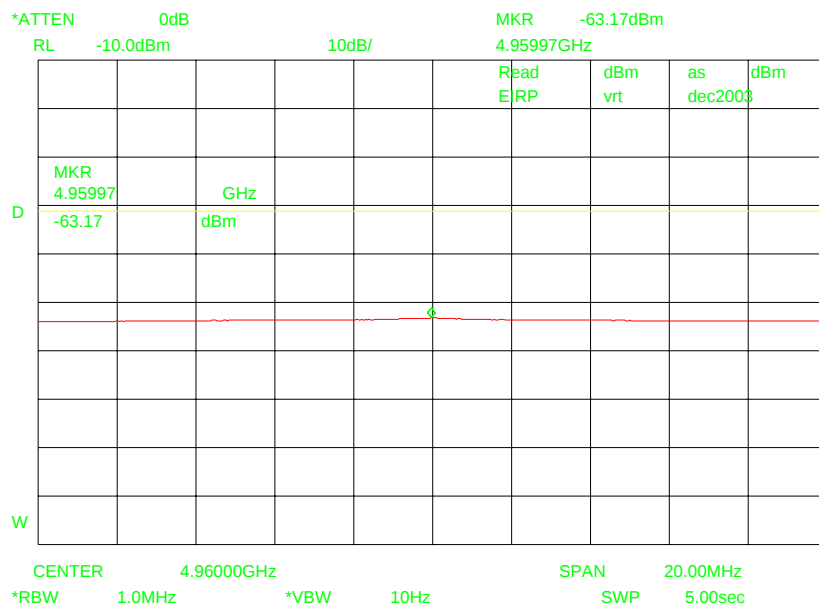


Note: The plot is calibrated in units of dBm E.I.R.P.

Channel 79 harmonic in restricted band (peak measurement)



Channel 79 harmonic in restricted band (average measurement)



Note: The plot is calibrated in units of dBm E.I.R.P.

Section 12. Test Equipment List

Description	Manufacturer	Model	Identification	Used at
Anechoic chamber	Euroshield	RFD-F-100	--	15.207(a);15.247(a)(2); (c); (d)
Spectrum analyzer	Hewlett Packard	8563E	TE 00481	15.207(a);15.247(a)(2); (c); (d)
Double ridged guide horn antenna	EMCO	3115	TE 00531	15.247(c)
Biconilog antenna	EMCO	3143	TE 00744	15.247(c)
Pre-amplifier	Hewlett Packard	8449B	TE 00092	15.247(c)
Pre-amplifier	Rohde & Schwarz	ESV-Z3	TE 00098	15.247(c)
Power meter	Hewlett Packard	437 B	TE 00489	15.247(b)(3)
Power sensor	Hewlett Packard	8481 A	TE 00355	15.247(b)(3)

Annex A Test details

NAME OF TEST: Channel Separation	PARA. NO.: 15.247(a)(1)
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Minimum Standard:

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

NAME OF TEST: Pseudorandom Hopping Algorithm

PARA. NO.: 15.247(a)(1)

Minimum Standard:

The system shall hop to channel frequencies that are selected from a pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their transmitters and shall shift frequencies in synchronization with the transmitted signals.

NAME OF TEST: Time of Occupancy

PARA. NO.: 15.247(a)(1)(ii)

Minimum Standard:

Frequency Band (MHz)	20 dB Bandwidth	No. of Hopping Channels	Average Time of Occupancy
902 - 928	<250 kHz	50	=<0.4 sec. in 20 sec.
902 - 928	=>250 kHz	25	=<0.4 sec. in 10 sec.
2400 - 2483.5	-----	75	=<0.4 sec. in 30 sec.
5725 - 5850	-----	75	=<0.4 sec. in 30 sec.

Method Of Measurement:

The spectrum analyzer is set as follows:

RBW: 1 MHz

VBW: = RBW

Span: 0 Hz

LOG dB/div.: 10 dB

Sweep: Sufficient to see one hop time sequence.

Trigger: Video

The occupancy time of one hop is measured as above. The average time of occupancy is calculated over the appropriate period of time from above table (10, 20, or 30 seconds).

Avg. time of occupancy = (period from table/duration of one hop)/no. of channels multiplied by the duration of one hop.

For instance:

If a 2.4 GHz system has a measured hop duration time of 1 msec. and uses 75 channels, then the average time of occupancy would be:

$(30 \text{ sec.} / .001 \text{ sec.}) / 75 \text{ chan.} = 400 \times 1 \text{ msec.} = 400 \text{ msec. or } 0.4 \text{ sec. in } 30 \text{ sec.}$

NAME OF TEST: Occupied Bandwidth

PARA. NO.: 15.247(a)(2)

Minimum Standard:

Frequency Band (MHz)	Maximum 20 dB Bandwidth
902 - 928	500 kHz
2400 – 2483.5	1 MHz
5725 – 5850	1 MHz

Method Of Measurement:

The spectrum analyzer is set as follows:

RBW: At least 1% of span/div.

VBW: >RBW

Span: Sufficient to display 20 dB bandwidth

LOG dB/div.: 10 dB

Sweep: Auto

Number of channels tested:

Tuning range	Number of channels tested	Channel location in band
1 MHz or less	1	middle
1 to 10 MHz	2	top and bottom
more than 10 MHz	3	top, middle, bottom

NAME OF TEST: Peak Power Output

PARA. NO.: 15.247(b)

Minimum Standard:

Frequency Band (MHz)	No. of Hopping Channels	Maximum Peak Power Output at Antenna Port
902 - 928	at least 50	1 Watt
902 – 928	25 - 49	0.25 Watts
2400 – 2483.5	75	1 Watt
5725 – 5850	75	1 Watt

If transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Systems operating in the 2400-2483.5 MHz band that are used exclusively for fixed, point to point operation may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceed 6 dBi.

Systems operating in the 5725 – 5850 MHz band that are used exclusively for fixed, point-to-point operation may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter peak output power.

Direct Measurement Method For Detachable Antennas:

If the antenna is detachable, a peak power meter is used to measure the power output with the transmitter operating into a 50 ohm load. The dBi gain of the antenna(s) employed shall be reported.

Calculation Of EIRP For Integral Antenna:

If the antenna is not detachable from the circuit then the Peak Power Output is derived from the peak radiated field strength of the fundamental emission by using the relationship for 3 m distance as follows:

$$\text{EIRP} = E - 95.2$$

where,

EIRP = the equivalent isotropic radiated power in dBm

E = the maximum measured field strength in dB μ V/m

The RBW of the spectrum analyzer shall be set to a value greater than the measured 20 dB occupied bandwidth of the E.U.T.

Number of channels tested:

Tuning range	Number of channels tested	Channel location in band
1 MHz or less	1	middle
1 to 10 MHz	2	top and bottom
more than 10 MHz	3	top, middle, bottom

NAME OF TEST: Radiated Spurious Emissions

PARA. NO.: 15.247(c)

Minimum Standard: In any 100 kHz bandwidth outside the frequency band in which the transmitter is operating, emissions shall be at least 20 dB below the fundamental emission and shall not exceed the following field strength limits when falling in the restricted bands.

Emissions falling in the restricted bands of 15.205 shall not exceed the following field strength limits:

Frequency (MHz)	Field Strength ($\mu\text{V/m}$ @ 3m)	Field Strength (dB @ 3m)
30 - 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

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15.205 Restricted Bands

MHz	MHz	MHz	GHz
0.09-0.11	16.42-16.423	399.9-410	4.5-5.25
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.125-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2655-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41	1718		

Number of channels tested:

Tuning range	Number of channels tested	Channel location in band
1 MHz or less	1	middle
1 to 10 MHz	2	top and bottom
more than 10 MHz	3	top, middle, bottom