Deutscher
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Rat

No. DAT-P-114/01-01

TEST REPORT

No. FCC-2006005

Test name	FCC Test
Product	GSM/GPRS Mobile Phone with Bluetooth Function
Model	CTS900
Client	CEC Wireless R&D Ltd

Telecommunication Metrology Center

of Ministry of Information Industry

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Address: No. 52, Huayuanbei Road, Beijing, P. R. China
Post code: 100083 Cable: 04282
Telephone: +86 10 62302041 Fax: +86 10 62304793

Product	GSM/GPRS Mobile Phone with Bluetooth Function	**Model**	CTS900
		Trade mark	
Client	CEC Wireless R&D Ltd		
Manufacturer	CEC Wireless R&D Ltd	**Arrival Date of sample**	Apr,13, 2006
Place of sampling	(Blank)	**Carrier of the samples**	Xinglan Yu
Quantity of the samples	1	**Date of product**	/
Base of the samples	(Blank)	**Items of test**	11
Series number	008S900N04		
Standard(s)	FCC Part 24, Part 15		
Conclusion	**Final Judgement: Pass** (Stamp) **Date of issue:** June,24, 2006		
Comment	The test result relates only to the tested sample.		

Approved by_____ **Reviewed by**_____ **Tested by**_____

(Lu Bingsong) (Wang Hongbo) (Song Chongwen)

(Lu Bingsong- **Deputy Director of the laboratory**)

TABLE OF CONTENT

1 COMPETENCE AND WARRANTIES

Telecommunication Metrology Center of Ministry of Information Industry is a test laboratory accredited by DAR (DATech) – Deutschen Akkreditierungs Rat (Deutsche Akkreditierungsstelle Technik), for the tests indicated in the Certificate No. **DAT-P-114/01-01**.

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Telecommunication Metrology Center of Ministry of Information Industry has been accepted by the CETECOM Competent Body for the EMC test reports since April 2000.

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Telecommunication Metrology Center of Ministry of Information Industry guarantees the reliability of the data presented in this report, which is the result of measurements and tests performed to the item under test on the date and under the conditions stated on the report and is based on the knowledge and technical facilities available at **Telecommunication Metrology Center of Ministry of Information Industry** at the time of execution of the test.

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2.4 This report cannot be used partially or in full for publicity and/or promotional purposes without previous written approval of Telecommunication Metrology Center of Ministry of Information Industry and the Accreditation Bodies, if it applies.

3 ABOUT EUT

3.1 Addressing Information Related to EUT

Table 1: Applicant's details (The Client)

Name or Company	CEC Wireless R&D Ltd
Address/Post	P.O.Box 707-27 West M5 Building ,No.1 East Road Jiuxianqiao ChaoYang District,Beijing,China
City	Beijing
Postal Code	100016
Country	China
Telephone	+86-10-58270277
Fax	+86-10-84568718

Table 2: Manufacturer's details

Name or Company	CEC Wireless R&D Ltd
Address/Post	P.O.Box 707-27 West M5 Building ,No.1 East Road Jiuxianqiao ChaoYang District,Beijing,China
City	Beijing
Postal Code	100016
Country	China
Telephone	+86-10-58270277
Fax	+86-10-84568718

3.2 Equipment under test (EUT)

Model	CTS900
Description	GSM/GPRS Mobile Phone with Bluetooth Function
IMEI or SN	EUT1: 008S900N04;
Hardware status	PiR
Software status	S900-PR3-DV15.1.5-T075
Frequency	1850.2MHz – 1909.8MHz for PCS 1900; 2400.0MHz – 2483.5MHz for Bluetooth
Type of modulation	GMSK for PCS 1900 FHSS for Bluetooth
Number of channels	299 for PCS 1900 79 for Bluetooth
Antenna	Internal
Power supply	Battery or Charger (AC Adaptor)
Output power	29.42dBm(0.87W) maximum EIRP measured for PCS 1900
Extreme vol. Limits	3.5VDC to 4.2VDC (nominal: 3.7 VDC)
Extreme temp. Tolerance	-30°C to +50°C

3.3 Photographs of Equipment under test

Photographs of MS Hand Telephone Set and Charger are respectively shown in ANNEX B of this test report.

4 LABORATORY ENVIRONMENT

Semi-anechoic chamber (23 meters×17meters×10meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ℃, Max. = 30 ℃
Relative humidity	Min. = 30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω
Normalised site attenuation (NSA)	< ±3.2 dB, 10 m distance, from 30 to 1000 MHz
Uniformity of field strength	Between 0 and 6 dB, from 26 to 1000 MHz

Control room did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ℃, Max. = 35 ℃
Relative humidity	Min. =30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω

Conducted chamber did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ℃, Max. = 30 ℃
Relative humidity	Min. = 30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω

Fully-anechoic chamber (6.8 meters×3.08 meters×3.53 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ℃, Max. = 30 ℃
Relative humidity	Min. = 30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω
Uniformity of field strength	Between 0 and 6 dB, from 26 to 1000 MHz

5 SUMMARY OF TEST RESULTS

Abbreviations used in this clause:	
P	Pass
NA	Not applicable
F	Fail

Clause	List	Clause in FCC rules	Verdict
1	POWER OUTPUT	24.232(b) 15.247(b)	P
2	FREQUENCY STABILITY	2.1055/24.235	P
3	OCCUPIED BANDWIDTH	2.1049(h)(i) 15.247(a)	P
4	EMISSION BANDWIDTH	24.238(b)	P
5	EMISSION LIMIT	24.238	P
6	BAND EDGE COMPLIANCE	24.238(b) 15.247(d)	P
7	CONDUCTED SPURIOUS EMISSIONS	2.1057/24.238 15.247(d)	P
8	CONDUCTED EMISSIONS	15.107/207	P
9	TIME OF OCCUPANCY(DWELL TIME)	15.247(a)	P
10	NUMBER OF HOPPING FREQUENCIES	15.247(a)	P
11	CARRIER FREQUENCY SEPARATION	15.247(a)	P

6 MAIN TEST INSTRUMENTS

NO.	NAME	TYPE	SERIES NUMBER	PRODUCER
1	Test Receiver	ESS	847151/015	R&S
2	Test Receiver	ESI40	831564/002	R&S
3	BiLog Antenna	3142B	9908-1403	EMCO
4	BiLog Antenna	3142B	9908-1405	EMCO
5	Signal Generator	SMT06	831285/005	R&S
6	Signal Generator	SMP04	100070	R&S
7	LISN	ESH2-Z5	829991/012	R&S
8	Spectrum Analyzer	E4440A	MY41000262	Agilent
9	Universal Radio Communication Tester	CMU200	100680	R&S
10	Dual-Ridge Waveguide Horn Antenna	3115	9906-5827	EMCO
11	Dual-Ridge Waveguide Horn Antenna	3116	2663	EMCO
12	Dual-Ridge Waveguide Horn Antenna	3116	2661	EMCO
13	Climatic chamber	PL-2G	343074	ESPEC
14	Spectrum Analyzer	FSU26	20030	R&S

7 TEST PERIOD

The performed test started on Apr, 13, 2006 and finished on June 24, 2006.

8 TEST LOCATION

Safety & EMC laboratory of Telecommunication Metrology Center of Ministry of Information Industry.

ANNEX A MEASUREMENT RESULTS

A.1 OUTPUT POWER-PCS1900 (§24.232(b))

A.1.1 Summary

During the process of testing, the EUT was controlled via Rhode & Schwarz Digital Radio Communication tester (CMU-200) to ensure max power transmission and proper modulation.
This result contains peak output power and EIRP measurements for the EUT.
In all cases, output power is within the specified limits.

A.1.2 Conducted

A.1.2.1 Method of Measurements

The EUT was set up for the max output power with pseudo random data modulation.
The power was measured with Agilent Spectrum Analyzer E4440A (peak)
These measurements were done at 3 frequencies, 1850.2 MHz, 1880.0 MHz and 1909.8 MHz for PCS1900 band (bottom, middle and top of operational frequency range).

PCS1900

Limit

Power step	Nominal Peak output power (dBm)	Tolerance (dB)
0	30dBm(1W)*	± 2

*GSM Specification – ETSI EN 300 910 V8.5.1 (2000-11) Section 4.1

Measurement result

EUT1

Frequency(MHz)	Power Step	Peak output power(dBm)
1850.2	0	28.60
1880.0	0	28.44
1909.8	0	28.50

A.1.3 Radiated

A.1.3.1 Description

This is the test for the maximum radiated power from the EUT.
Rule Part 24.232(b) specifies, "Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power" and 24.232(c) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage."

A.1.3.2 Method of Measurement

1. In an anechoic antenna test chamber, a half-wave dipole antenna for the frequency band of interest is placed at the reference centre of the chamber. An RF Signal source for the frequency band of interest is connected to the dipole with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A known (measured) power (Pin) is applied to the input of the dipole, and the power received (Pr) at the chamber's probe antenna is recorded.

2. A "reference path loss" is established as Pin + 2.15 - Pr.
3. The EUT is substituted for the dipole at the reference centre of the chamber and a scan is performed to obtain the radiation pattern.
4. From the radiation pattern, the co-ordinates where the maximum antenna gain occurs are identified.
5. The EUT is then put into pulse mode at its maximum power level (Power Step 0 for PCS1900).
6. "Gated mode" power measurements are performed with the receiving antenna placed at the coordinates determined in Step 3 to determine the output power as defined in Rule 24.232 (b) and (c). The "reference path loss" from Step1 is added to this result.
7. This value is EIRP since the measurement is calibrated using a half-wave dipole antenna of known gain (2.15 dBi) and known input power (Pin).
8. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.15dBi.

PCS1900-EIRP 24.232(b)

Limits

Power Step	Burst Peak EIRP (dBm)
0	≤33dBm (2W)

Measurement result

Frequency(MHz)	Power Step	Peak EIRP(dBm)
1850.2	0	28.08
1880.0	0	29.06
1909.8	0	29.42

ANALYZER SETTINGS: RBW = VBW = 3MHz

A.2 OUTPUT POWER –Bluetooth (§15.247(b))

A.2.1 conducted

A.2.1.1 Method of measurement

This measurement applies to equipment with an integral antenna and to equipment with an antenna connector and equipped with an antenna as declared by the applicant.
The power was measured with modulation (declared by the applicant).

Limits

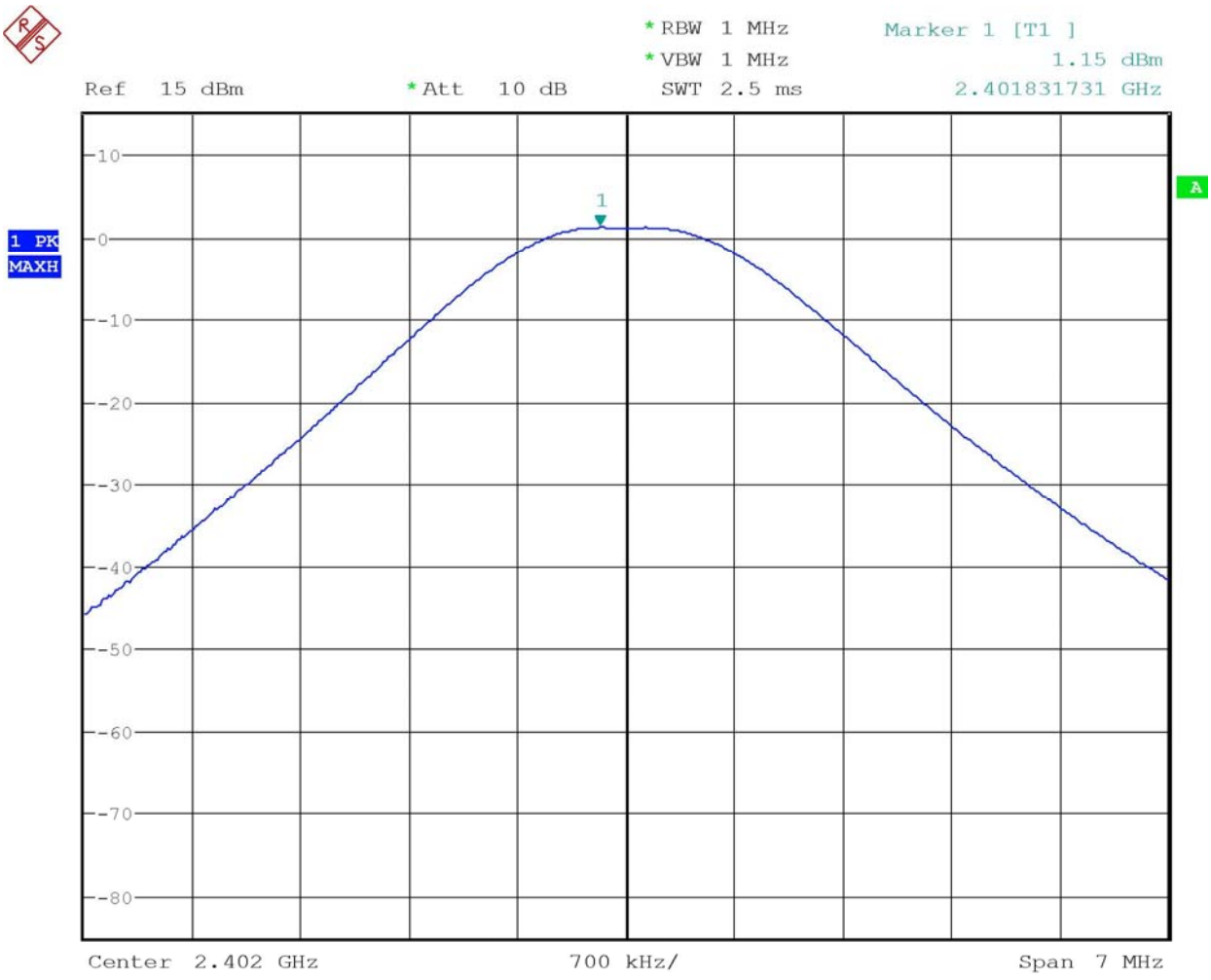
Frequency band	FCC
5725-5850MHz	1 Watt(30 dBm)for systems with>75 hopping channels
2400-2483.5MHz	1 Watt(30 dBm)for systems with>75 non-overlapping hopping channels 0.125 Watt(21 dBm)for all other hopping systems, but at least 15 hopping channels
902-928MHz	1 Watt(30 dBm)for systems with>50 hopping channels 0.25 Watt(24 dBm)for all other hopping systems, but at least 25 hopping channels

A.2.1.2 Measurement result

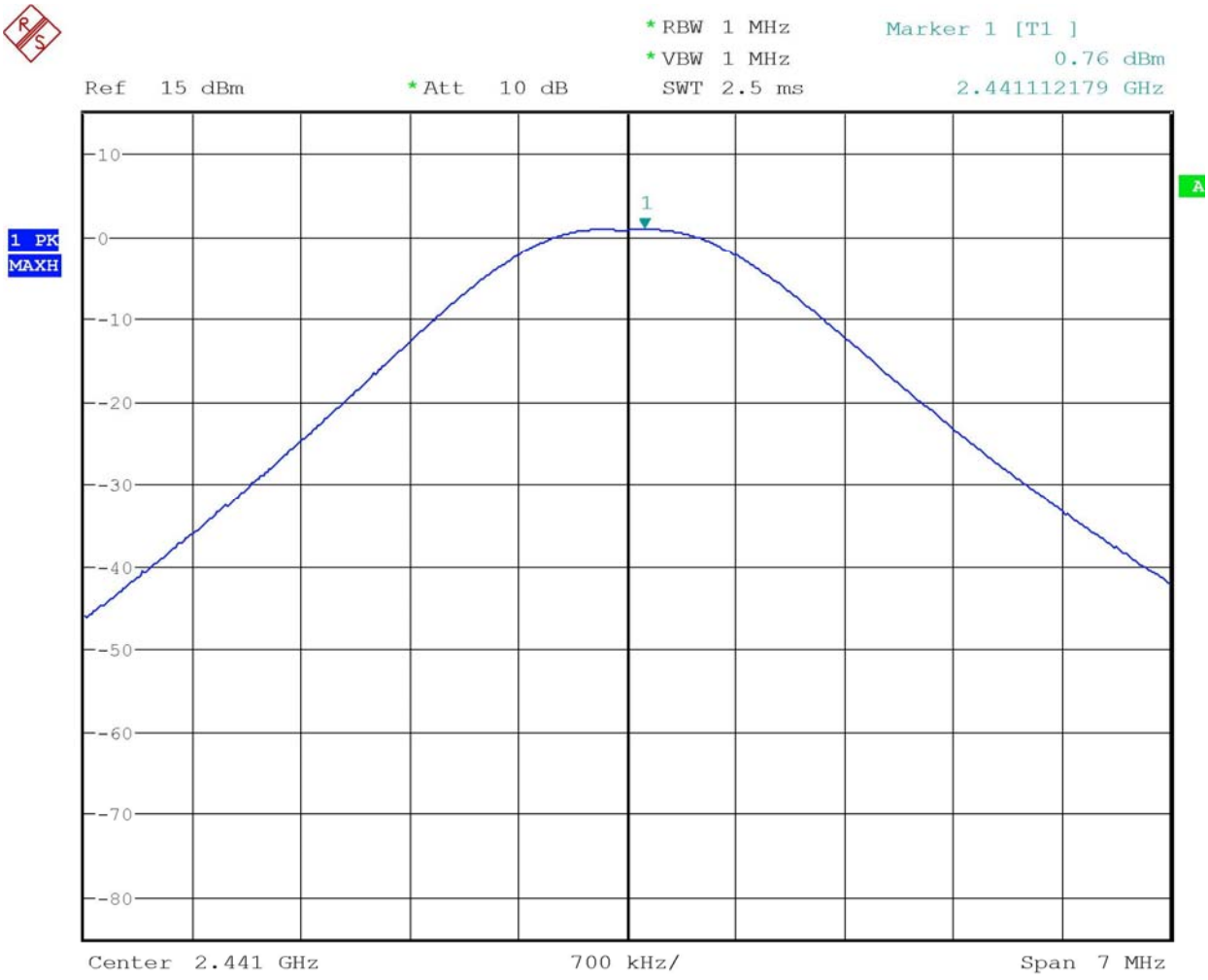
Test conditions	Channel 0	Channel 39	Channel 78
	[dBm]	[dBm]	[dBm]
T nom=25℃ V nom=3.7V	1.15	0.76	1.77

See attached diagrams

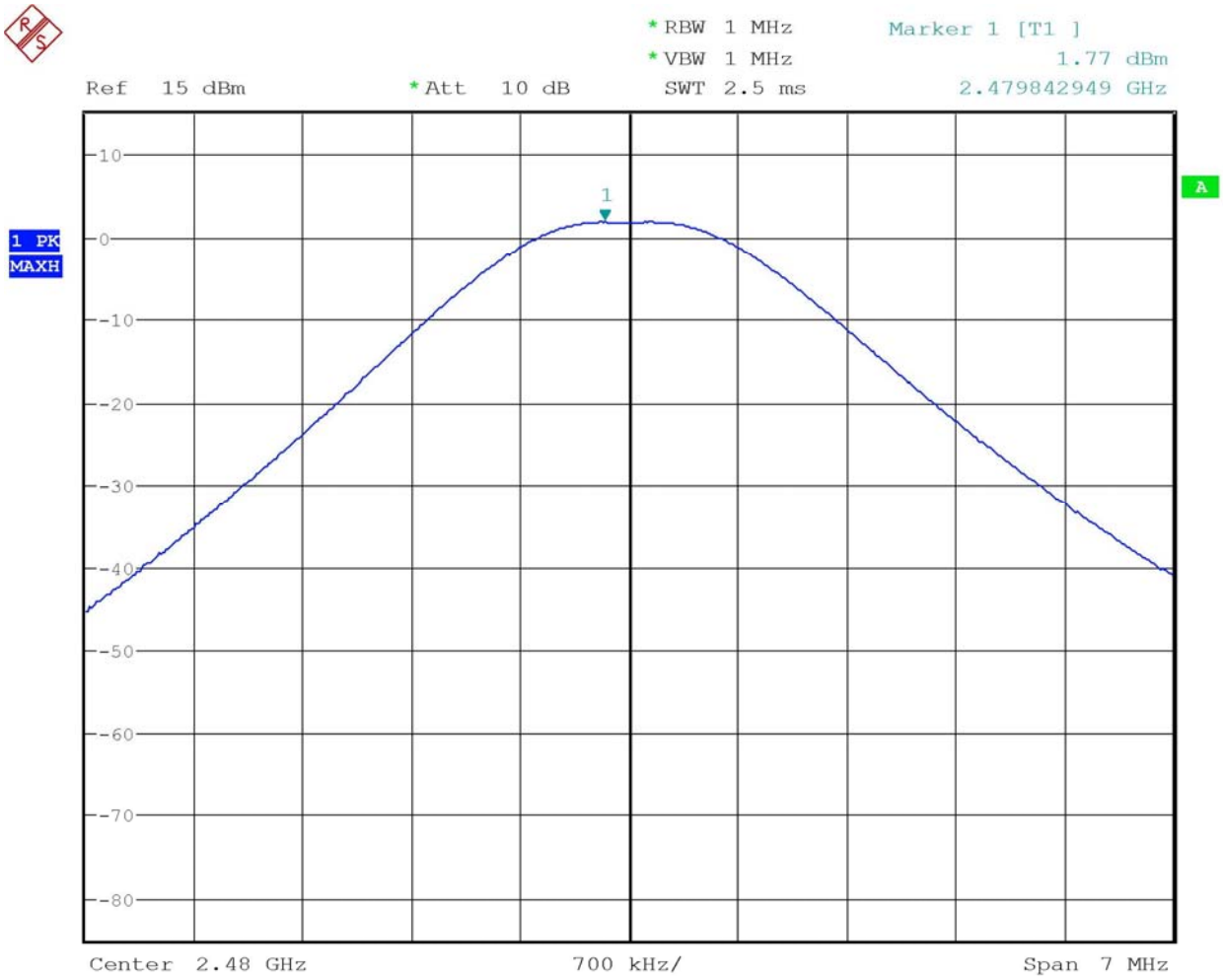
Channel 0, 2402.00MHz



Channel 39, 2441 MHz



Channel 78, 2480 MHz



A.3 FREQUENCY STABILITY (§2.1055/§24.235)

A.3.1 Method of Measurement

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a “call mode”. This is accomplished with the use of R&S CMU200 DIGITAL RADIO COMMUNICATION TESTER.

1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -30℃.
3. With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on channel 661 (centre channel), measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
4. Repeat the above measurements at 10℃ increments from -30℃ to +50℃. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.
5. Remeasure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments remeasuring carrier frequency at each voltage. Pause at nominal voltage for 1 1/2 hours unpowered, to allow any self-heating to stabilize, before continuing.
6. Subject the EUT to overnight soak at +50℃.

7. With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on channel 661 (centre channel), measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
8. Repeat the above measurements at 10 C increments from +50℃ to -30℃. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.
9. At all temperature levels hold the temperature to +/- 0.5℃ during the measurement procedure.

A.3.2 Measurement Limit

A.3.2.1 For Hand carried battery powered equipment

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. As this transceiver is considered "Hand carried, battery powered equipment" Section 2.1055(d)(2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of between 3.5VDC and 4.2VDC, with a nominal voltage of 3.7VDC. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress. These voltages represent a tolerance of -10 % and +12.5 %. For the purposes of measuring frequency stability these voltage limits are to be used.

A.3.2.2 For equipment powered by primary supply voltage

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. For this EUT section 2.1055(d)(1) applies. This requires varying primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

A.3.3 Measurement results

PCS 1900

Frequency Error vs Voltage

Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.5	17	0.009
3.7	16	0.009
4.2	18	0.010

Frequency Error vs Temperature

temperature(℃)	Frequency error(Hz)	Frequency error(ppm)
-30	30	0.016
-20	28	0.015
-10	25	0.013
0	26	0.014
10	28	0.015
20	19	0.010
30	20	0.011
40	22	0.012
50	26	0.014

A.4 OCCUPIED BANDWIDTH-PCS1900 (§2.1049(h)(i))

A.4.1 Occupied Bandwidth Results

Similar to conducted emissions; occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of the USPCS frequency band. The table below lists the measured -20dBc BW (99%). Spectrum analyzer plots are included on the following pages.

PCS 1900(-20dBc)

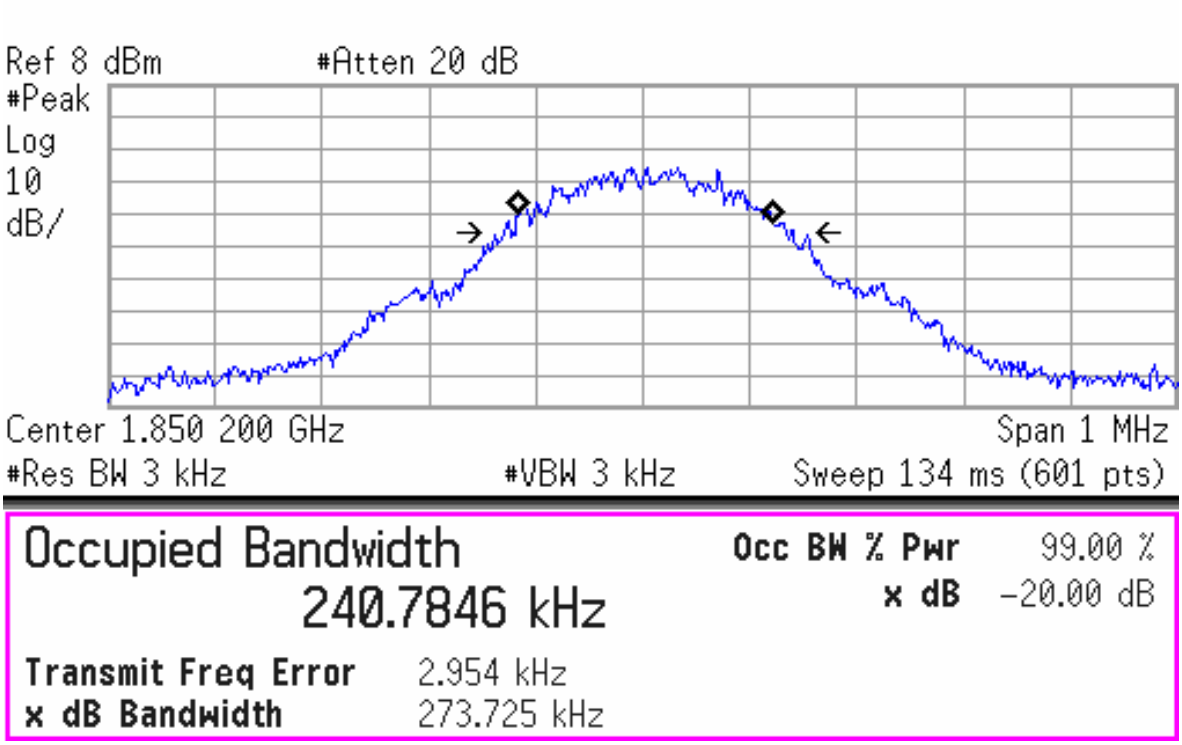
EUT1

Frequency(MHz)	Occupied Bandwidth (–20dBc BW)(kHz)
1850.2	273.725
1880.0	262.795
1909.8	272.401

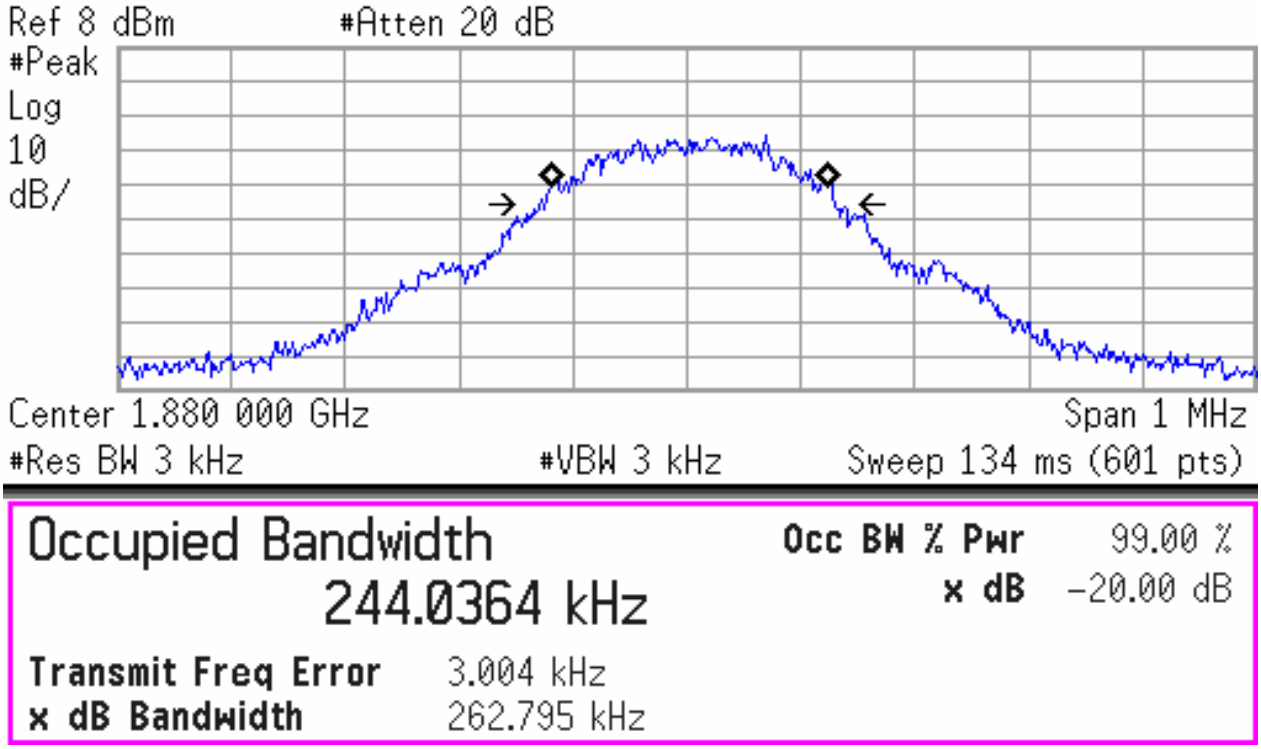
ANALYZER SETTINGS: RBW=VBW=3kHz

PCS 1900

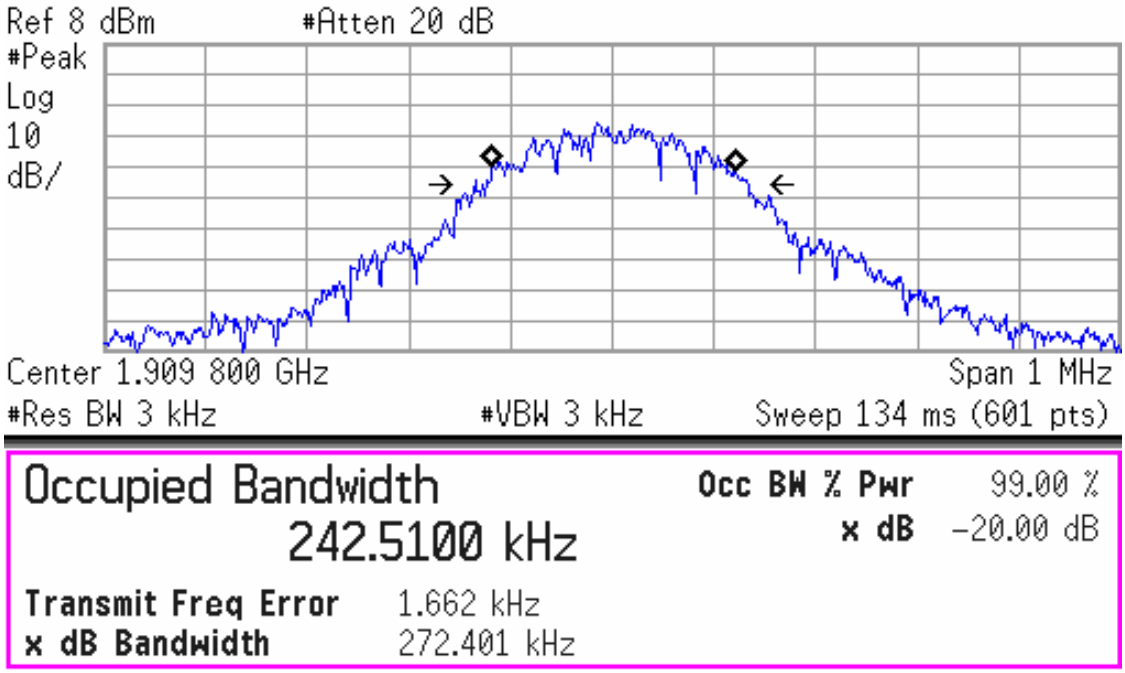
Channel 512-Occupied Bandwidth (-20dBc BW)



Channel 661-Occupied Bandwidth (-20dBc BW)



Channel 810-Occupied Bandwidth (-20dBc BW)



A.5 20dB bandwidth-Bluetooth (§15.247(a))

A.5.1 Method of measurement

The 20dB bandwidth is measured on the lowest, middle and highest hopping channel.

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5MHz band may have hopping channel carrier frequencies that are separated by 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125mW.Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Limits

Frequency band	FCC and IC
5725-5850MHz	≤1MHz
2400-2483.5MHz	≤carrier frequencies separation for hopping systems with max cond. power of 1 Watt ≤1.5 of the carrier frequencies separation for hopping systems with max cond. power of 0.125 Watt
902-928MHz	<250kHz for systems with≥50 hopping channels 250kHz≤500kHz for all other hopping systems

A.5.2 Test results

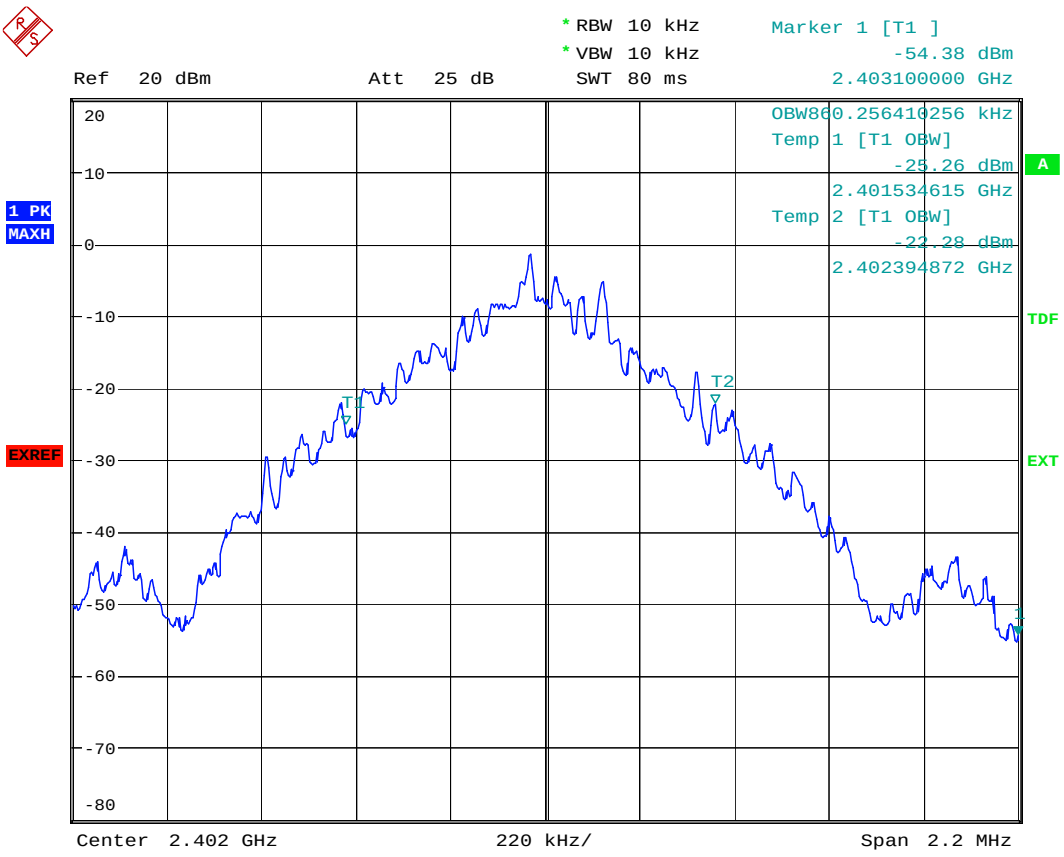
Test conditions	Channel 0	Channel 39	Channel 78
	kHz	kHz	kHz
T nom=25℃ V nom=3.7V	860.256	863.782	860.256

System receiver input bandwidth:

The manufacturer declares that the receiver input bandwidth matches to the bandwidth of the transmitter signal.

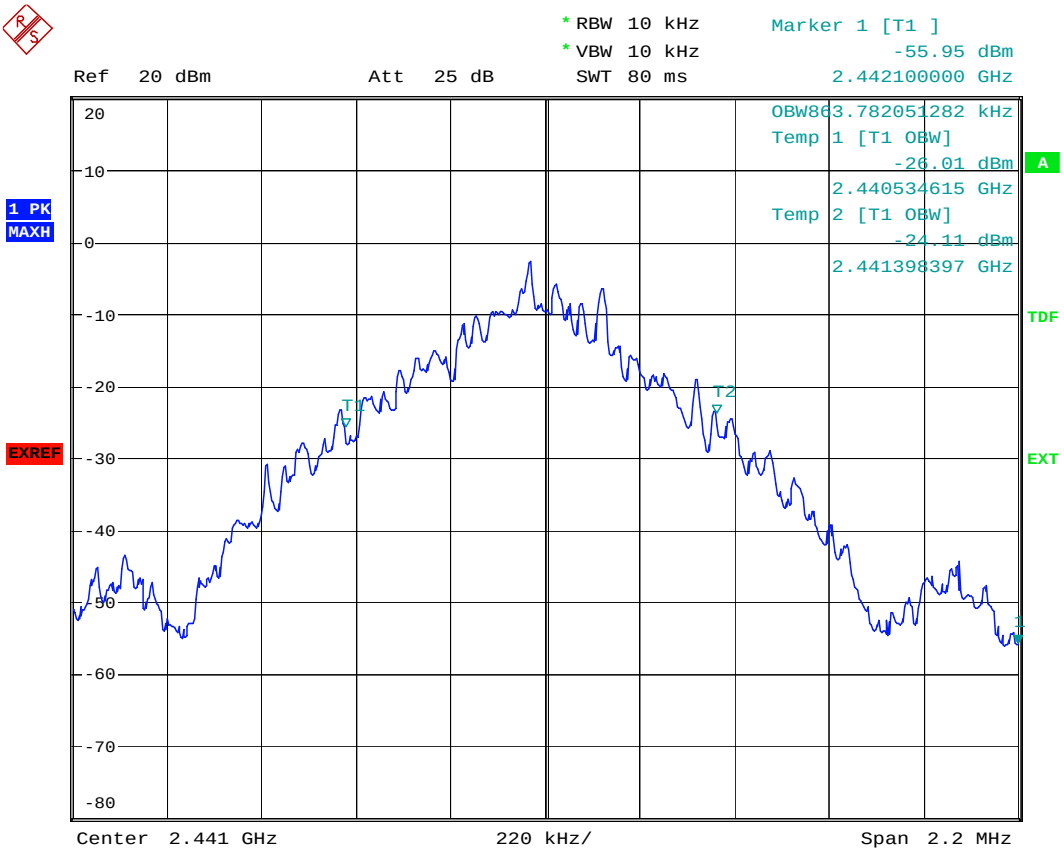
See attached diagrams

Channel 0, 2402MHz-Occupied Bandwidth (-20dBc BW)



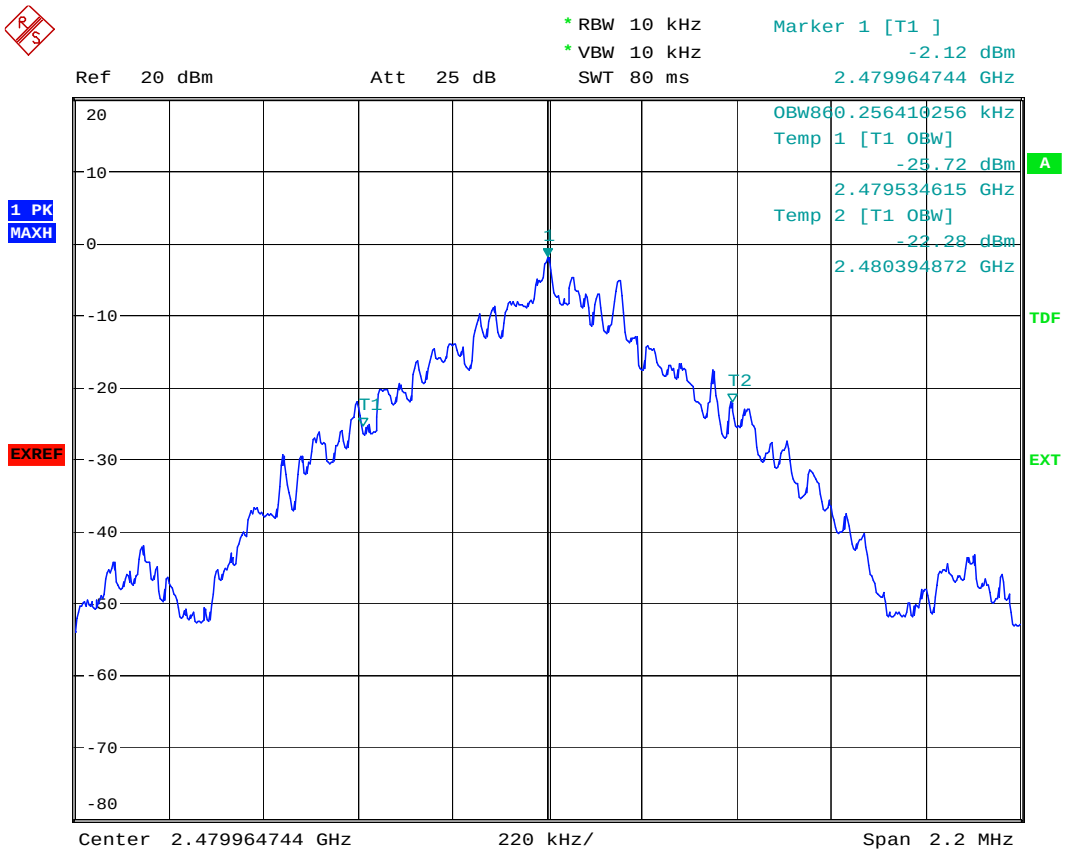
Date: 23.JUN.2006 06:47:01

Channel 39, 2441MHz-Occupied Bandwidth (-20dBc BW)



Date: 23.JUN.2006 06:45:54

Channel 78, 2480MHz-Occupied Bandwidth (-20dBc BW)



A.5 EMISSION BANDWIDTH (§24.238(b))

A.5.1Emission Bandwidth Results

Similar to conducted emissions; Emission bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of the PCS1900 band . Table below lists the measured -26dBc BW. Spectrum analyzer plots are included on the following pages.

PCS 1900(-26dBc)

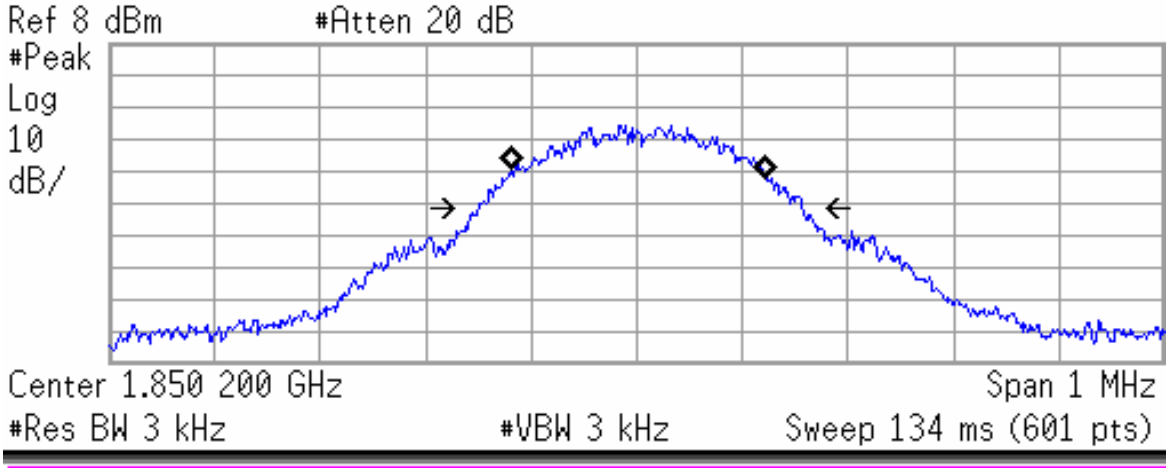
EUT1: SN.not available

Frequency(MHz)	Occupied Bandwidth (–26dBc BW)(kHz)
1850.2	312.339
1880.0	314.043
1909.8	318.973

ANALYZER SETTINGS: RBW=VBW=3kHz;

PCS 1900

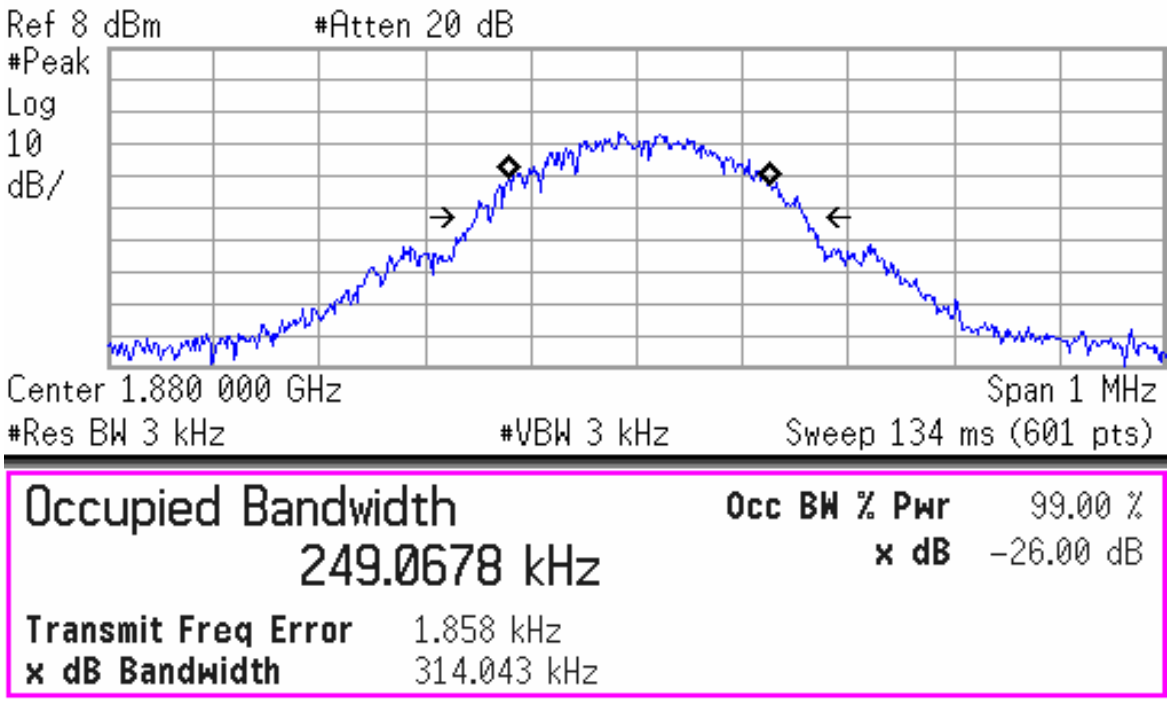
Channel 512-Occupied Bandwidth (-26dBc BW)



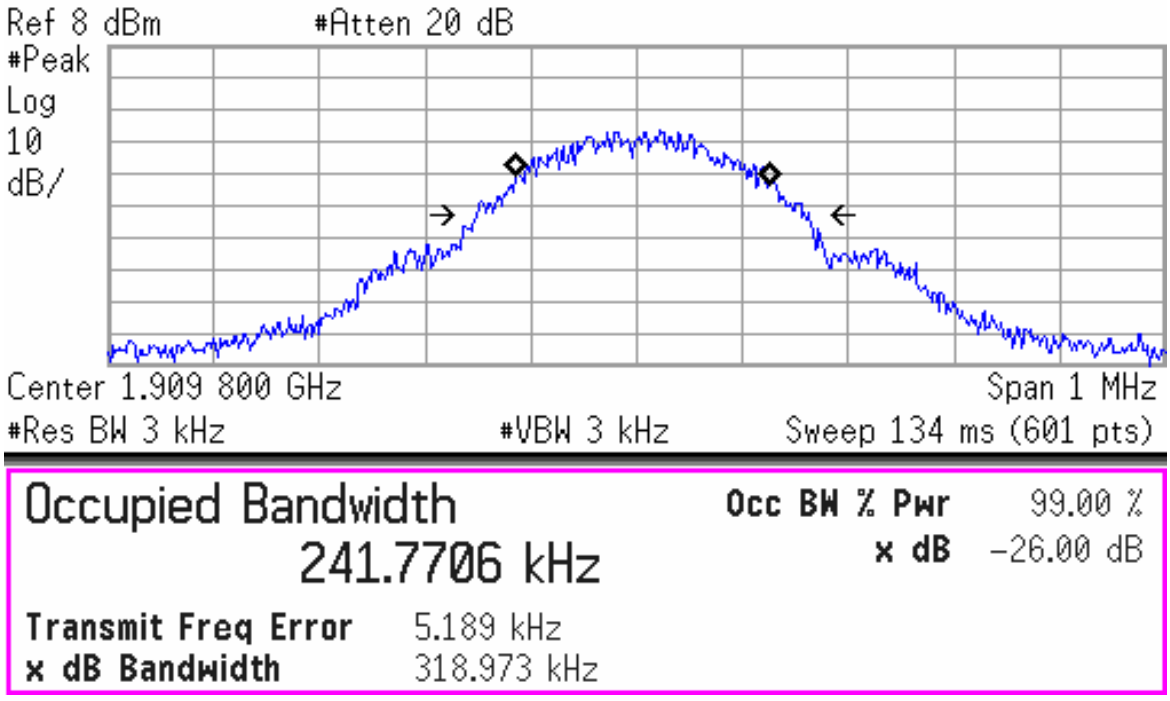
Occupied Bandwidth
245.3252 kHz

Occ BW % Pwr	99.00 %
x dB	-26.00 dB
Transmit Freq Error	1.100 kHz
x dB Bandwidth	312.339 kHz

Channel 661-Occupied Bandwidth (-26dBc BW)



Channel 810-Occupied Bandwidth (-26dBc BW)



A.6 EMISSION LIMIT (§24.238)

A.6.1 Measurement Method

The site is constructed in accordance with ANSI C63.4 – 1992 requirements and is recognized by the FCC. The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 1910 MHz. The resolution bandwidth is set 1MHz as outlined in Part 24.238. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the PCS1900.

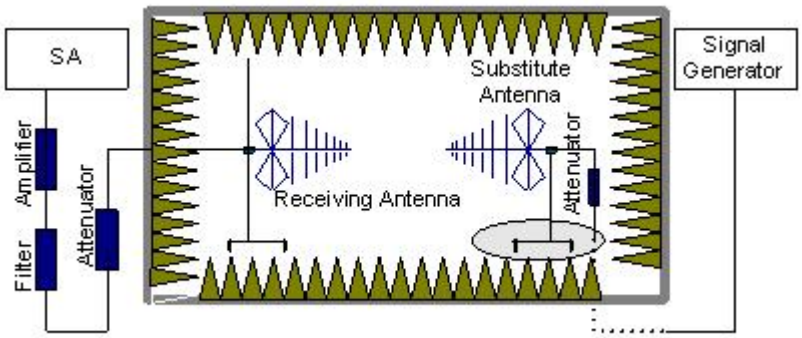
The procedure of radiated spurious emissions is as follows:

a) Pre-calibration

With pre-calibration method, the Radiated Spurious Emissions(RSE) is calculated as,

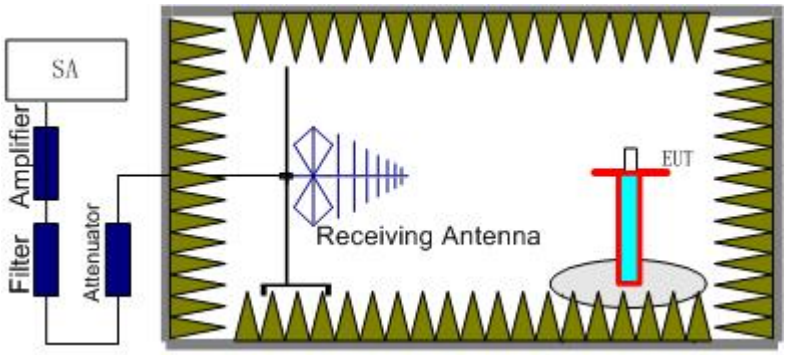
RSE=Rx（dBuV）+CL（dB）+SA（dB）+Gain（dBi）-107（dBuV to dBm）

The SA is calibrated using following setup.



b) EUT test

EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the test item for emission measurements. The height of receiving antenna is 1.5m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the test item and adjusting the receiving antenna polarization. The radiated emission measurements of all non-harmonic and harmonics of the transmit frequency through the 10th harmonic were measured with peak detector and 1MHz bandwidth.



A.6.2 Measurement Limit

Sec. 24.238 Emission Limits.
(a) On any frequency outside a licensee's frequency block (e.g. A, D, B, etc.) within the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least 43+10Log(P) dB. The specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

A.6.3 Measurement Results

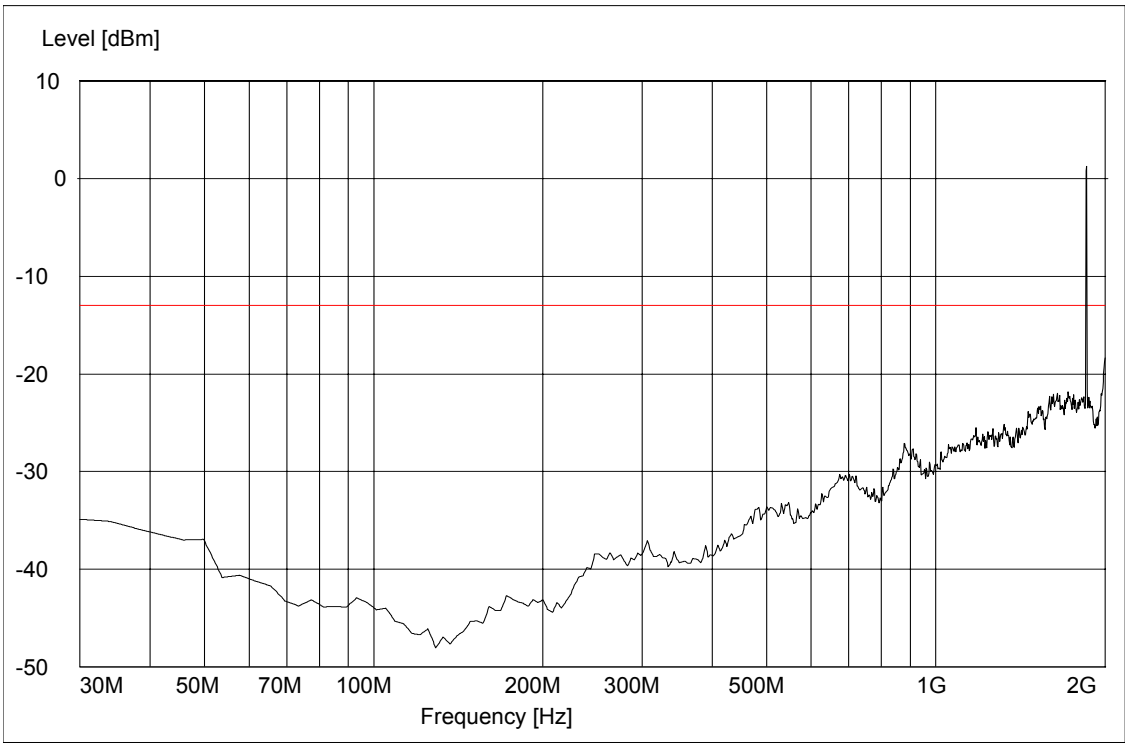
Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the PCS band (1850.2 MHz, 1880 MHz and 1909.8 MHz). It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of the PCS1900 into any of the other blocks. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this.

NOTE: The spurious emissions were done with different settings, using the relevant pre-amplifiers for the relevant frequency ranges. This is the reason that the graphs show different noise levels.

PCS 1900

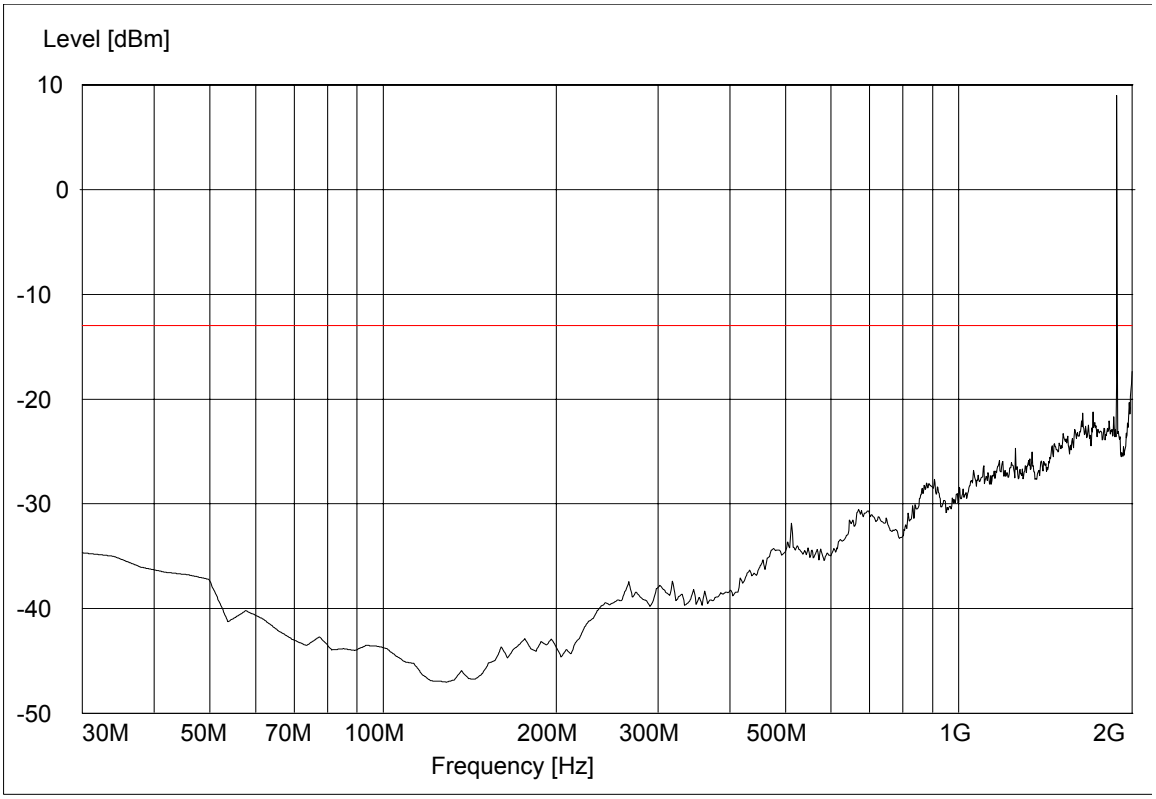
A.6.3.1 RADIATED SPURIOUS EMISSIONS-Channel 512: 30MHz – 2GHz

NOTE: peak above the limit line is the Carrier frequency @ ch-512



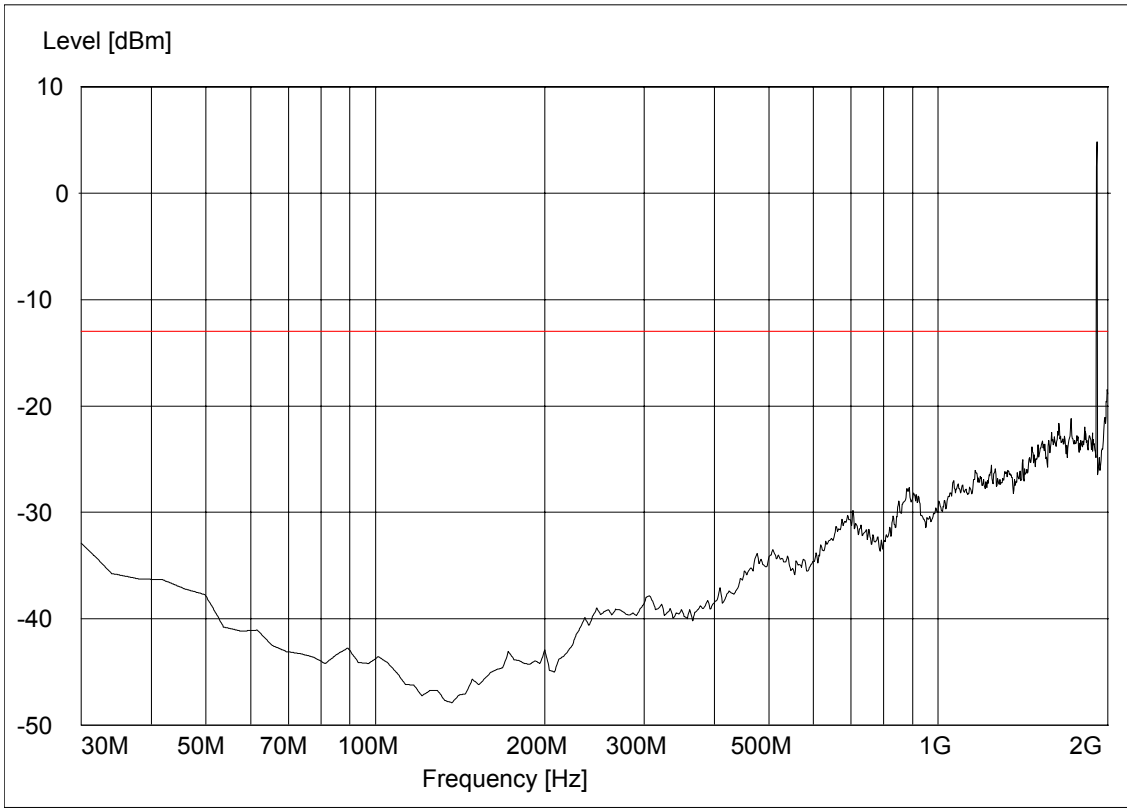
A.6.3.2 RADIATED SPURIOUS EMISSIONS-Channel 661: 30MHz – 2GHz

NOTE: peak above the limit line is the Carrier frequency @ ch-661

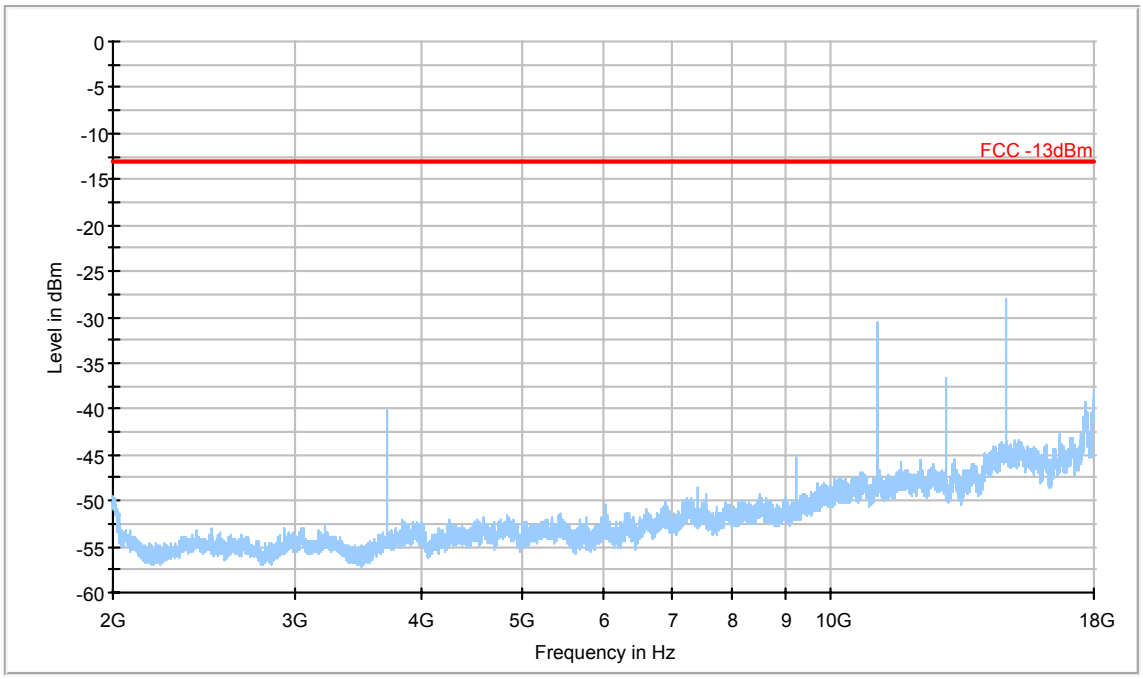


A.6.3.3 RADIATED SPURIOUS EMISSIONS-Channel 810: 30MHz – 2GHz

NOTE: peak above the limit line is the Carrier frequency @ ch-810

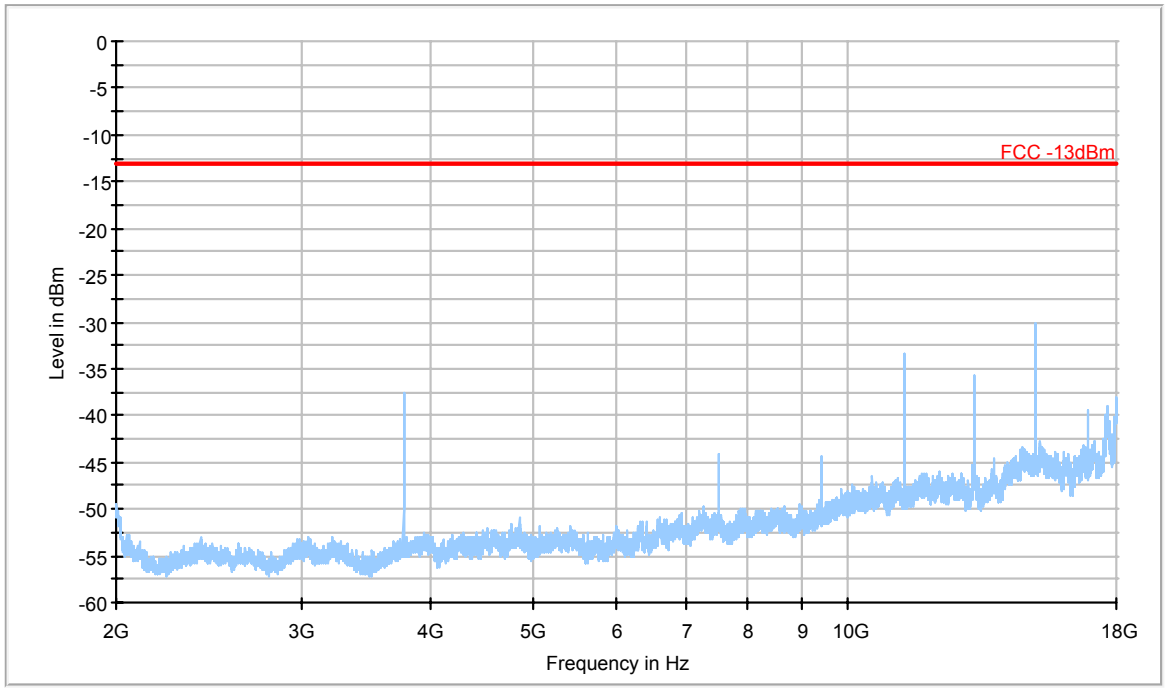


A.6.3.4 RADIATED SPURIOUS EMISSIONS-Channel 512: 2GHz – 18GHz



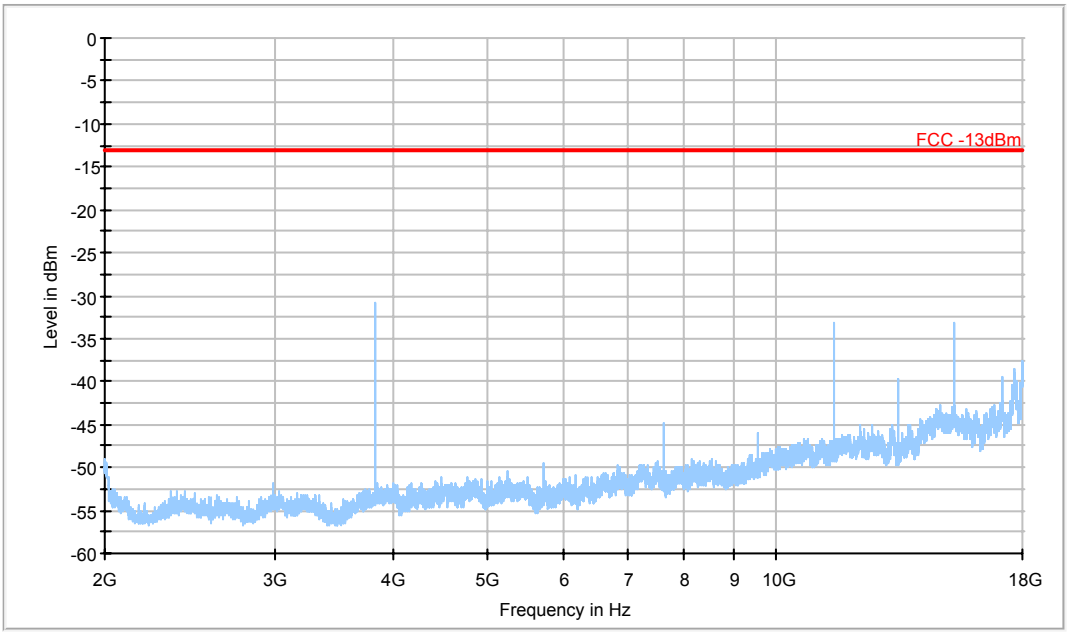
FCC -13dBm Preview Measurement Detector 1

A.6.3.5 RADIATED SPURIOUS EMISSIONS-Channel 661: 2GHz – 18GHz



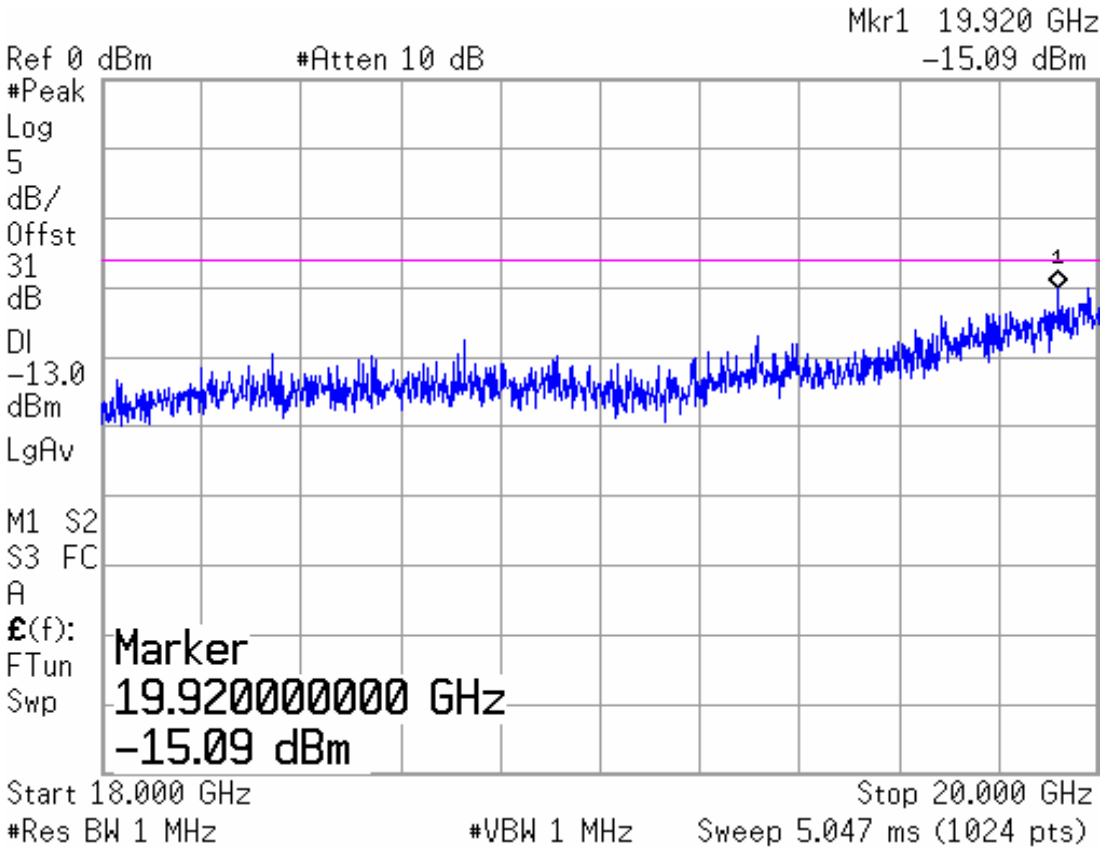
FCC -13dBm Preview Measurement Detector 1

A.6.3.6 RADIATED SPURIOUS EMISSIONS-Channel 810: 2GHz – 18GHz

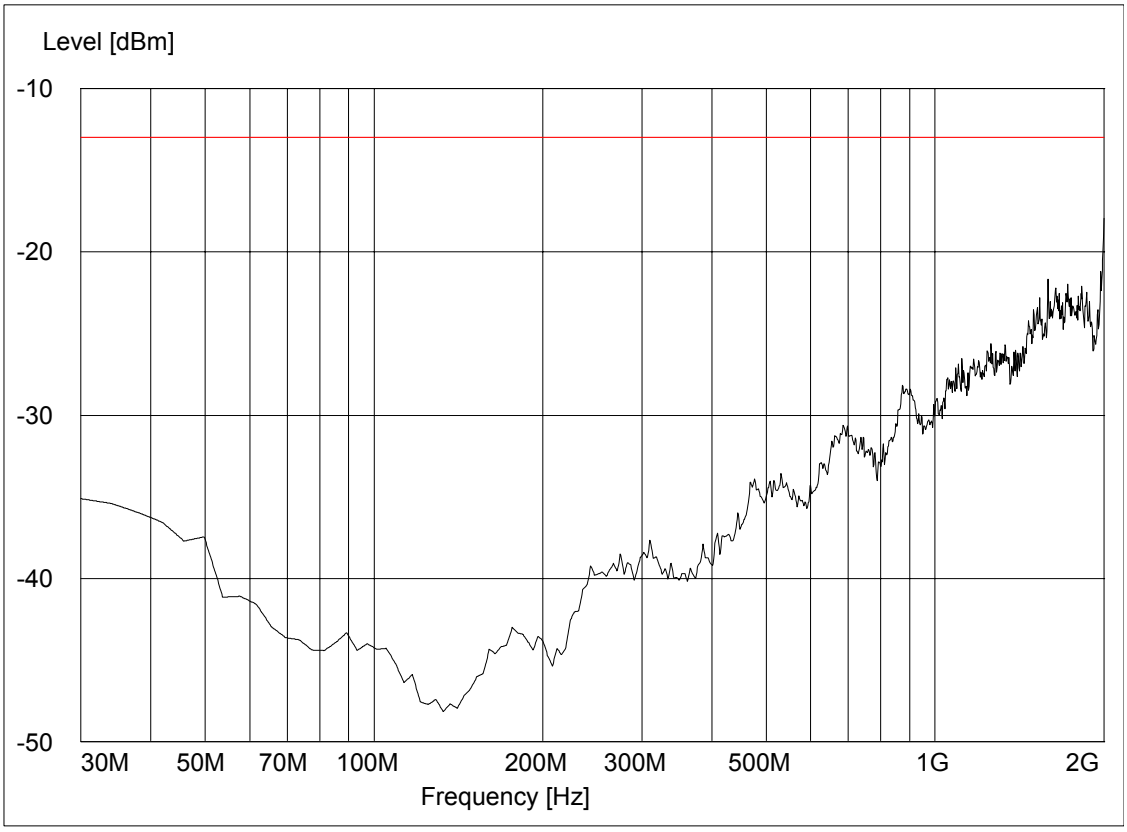


A.6.3.7 Radiated spurious emission (18GHz-20GHz)

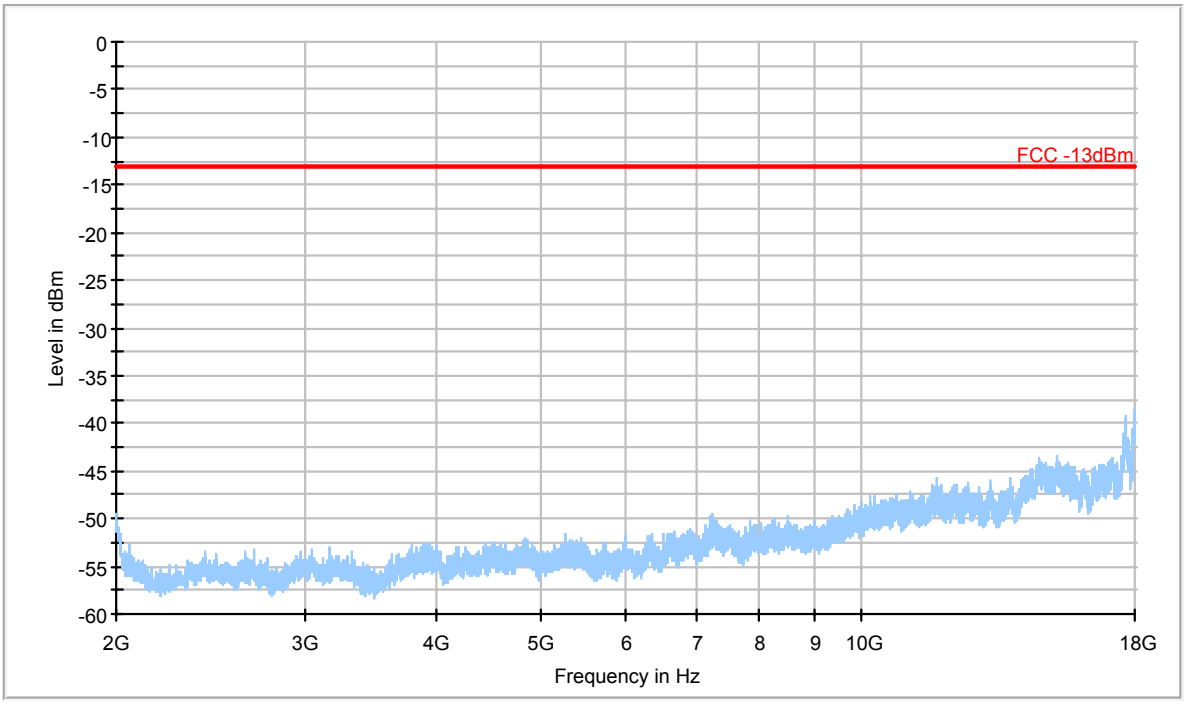
Note: This plot is valid for low, mid & high channels (worst-case plot). It is same as the floor noise.



A.6.3.8 RADIATED SPURIOUS EMISSIONS-EUT in Idle Mode: 30MHz – 2GHz



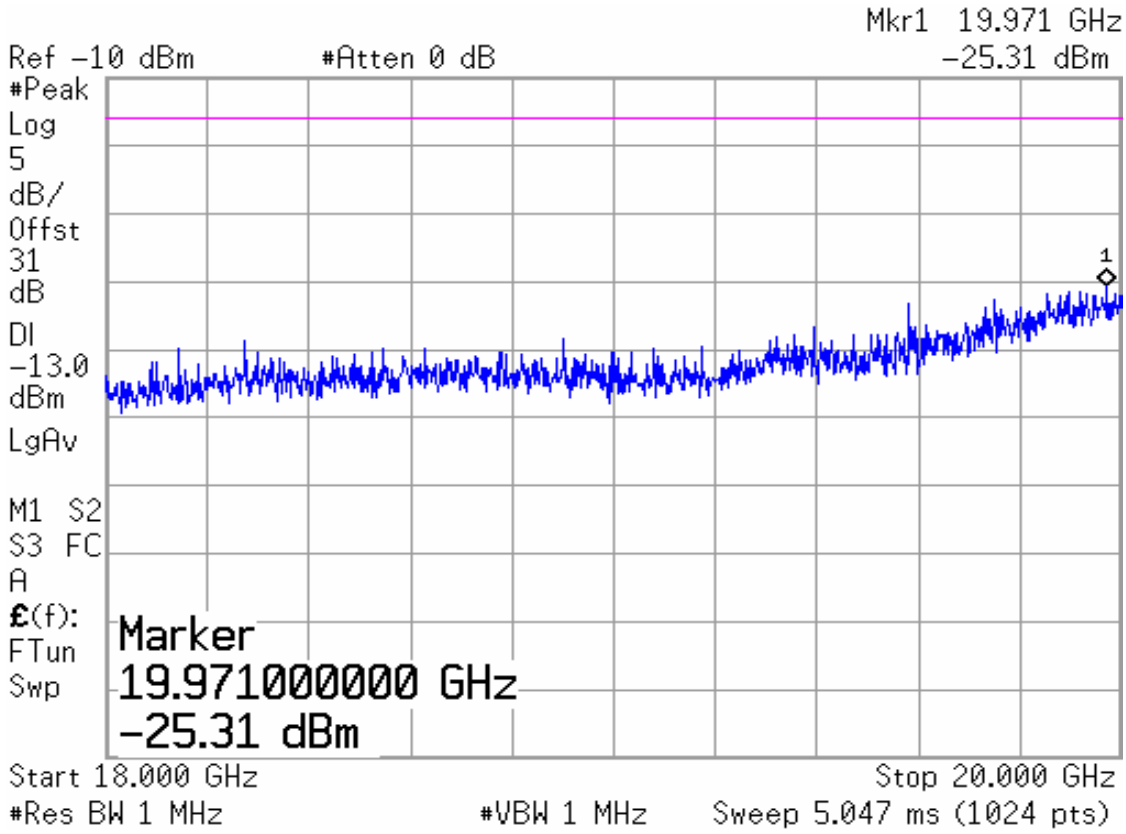
A.6.3.9 RADIATED SPURIOUS EMISSIONS-EUT in Idle Mode: 2GHz – 18GHz



FCC -13dBm Preview Measurement Detector 1

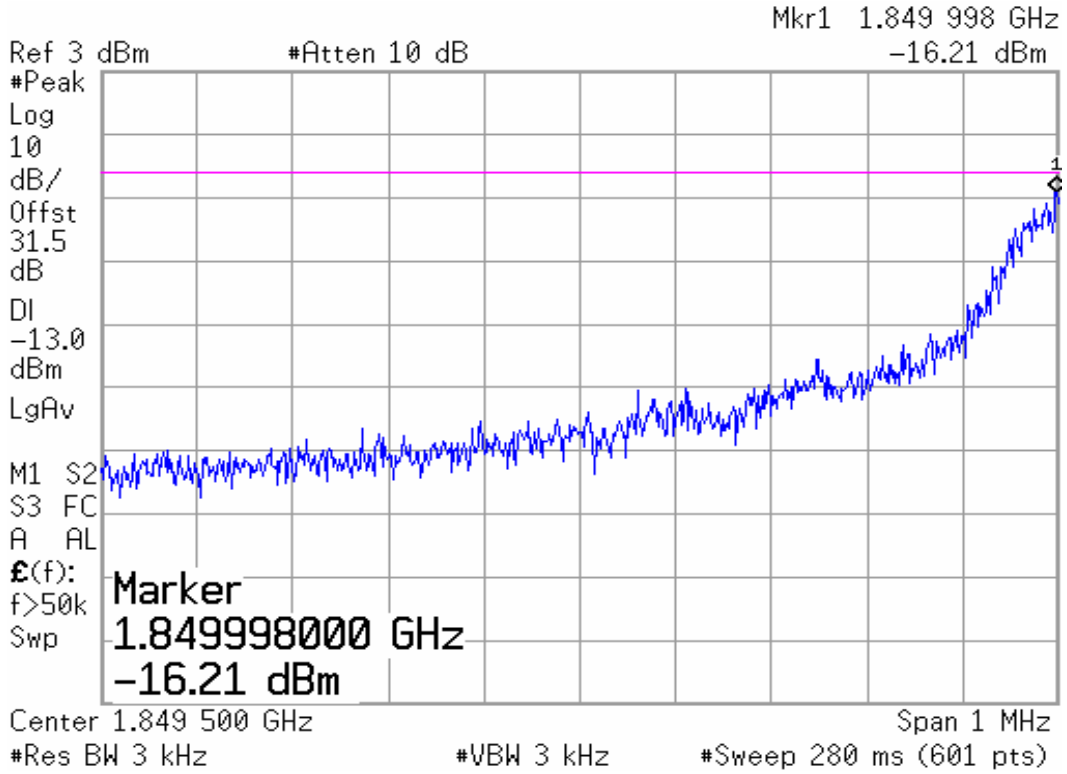
A.6.3.10 RADIATED SPURIOUS EMISSIONS-EUT in Idle Mode: 18GHz – 20GHz

Note: It is same as the floor noise.

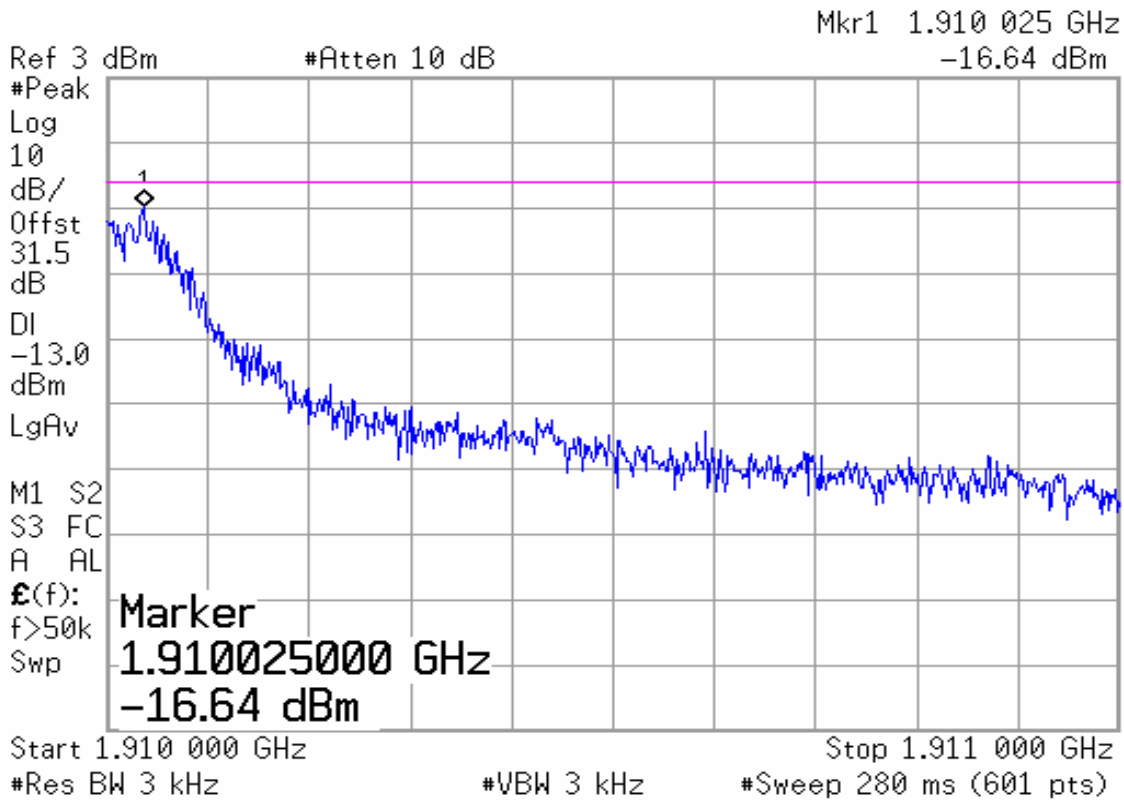


A.7 BAND EDGE COMPLIANCE-PCS1900 (§24.238(b))

PCS 1900- LOW BAND EDGE BLOCK-A (PCS 1900)-Channel 512

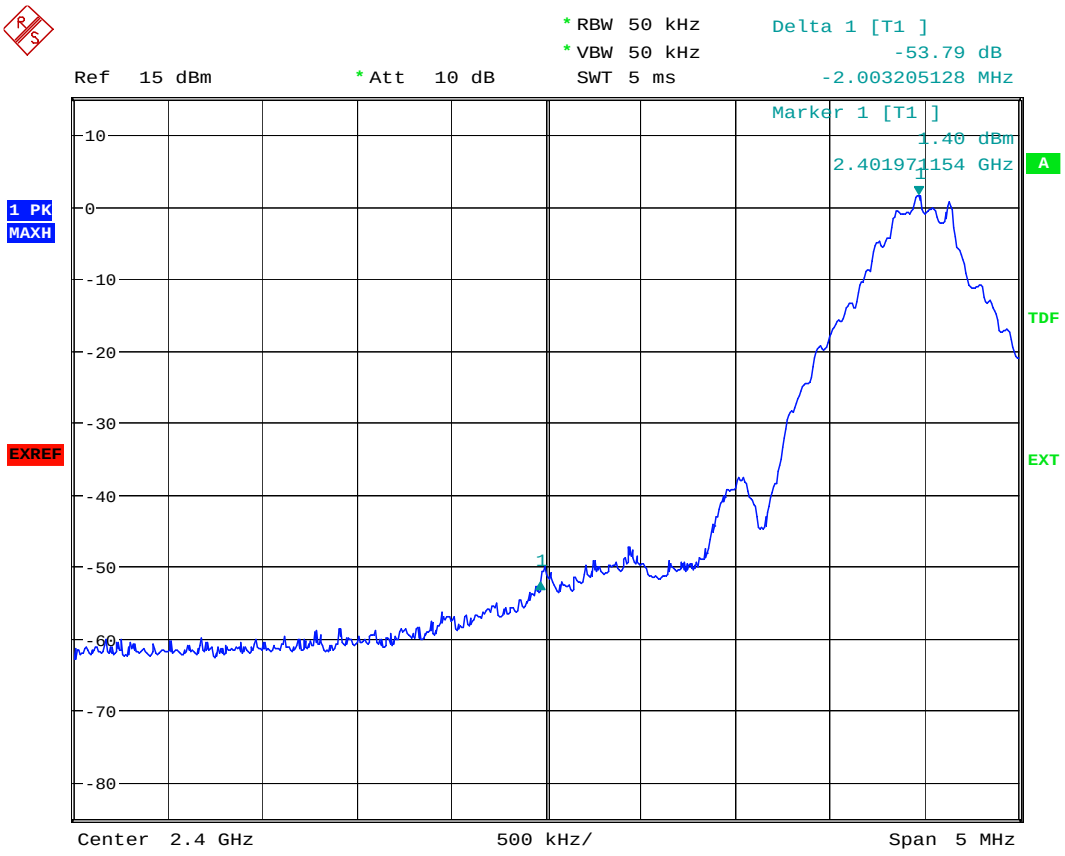


HIGH BAND EDGE BLOCK-C (PCS-1900) –Channel 810



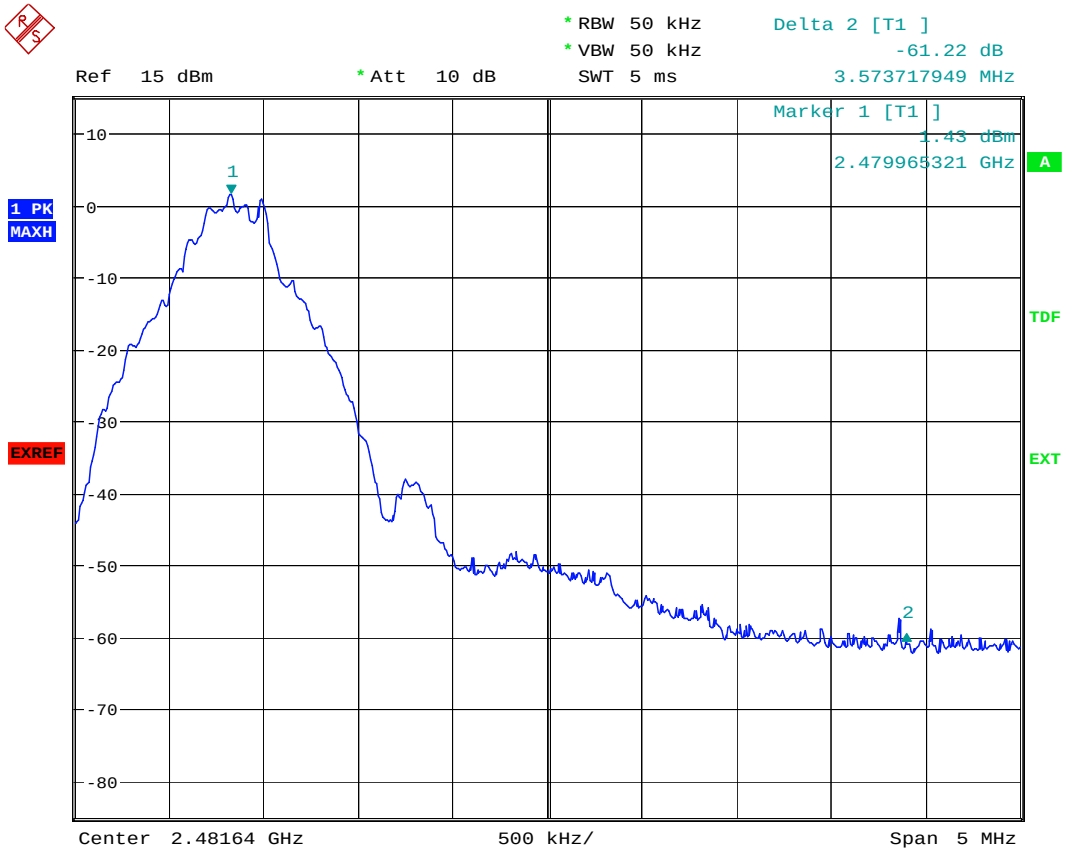
A.8 BAND EDGE COMPLIANCE-Bluetooth (§15.247(c))

A.8.1 Channel 0 / 2402MHz Single frequency mode



Date: 23.JUN.2006 07:15:04

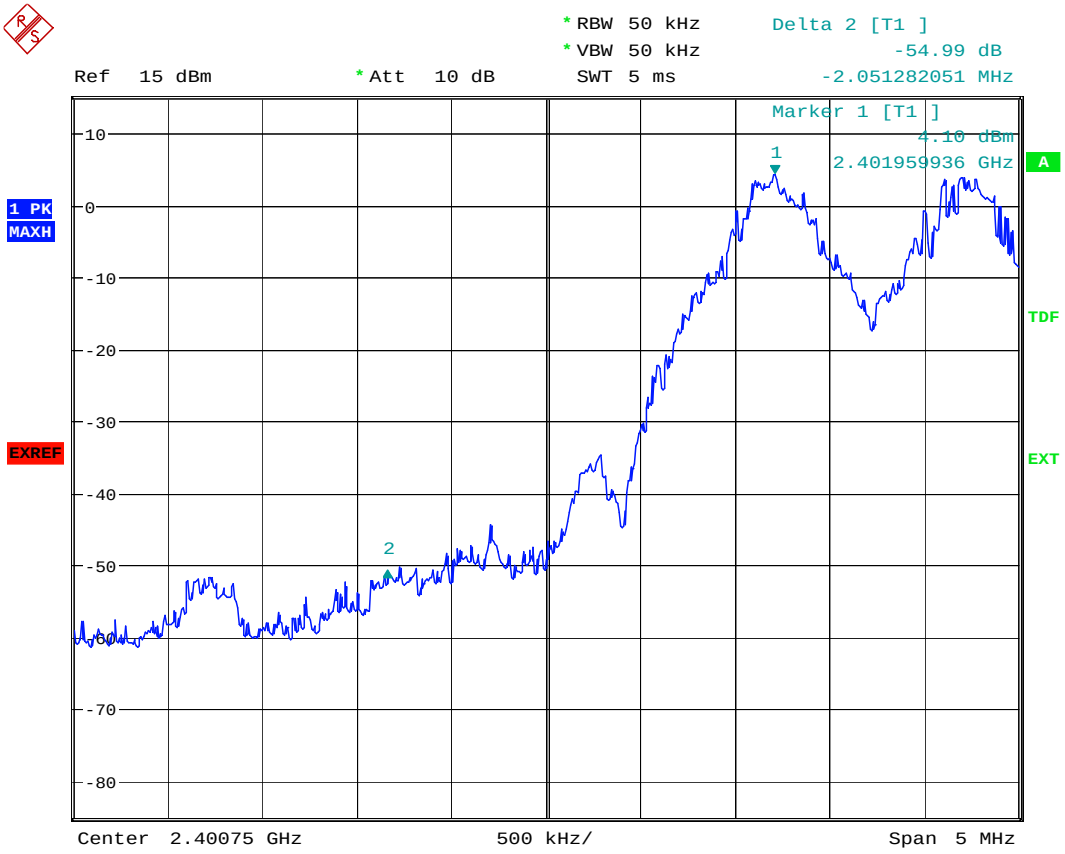
A.8.2 Channel 78 / 2480MHz Single frequency mode



Date: 23.JUN.2006 08:03:41

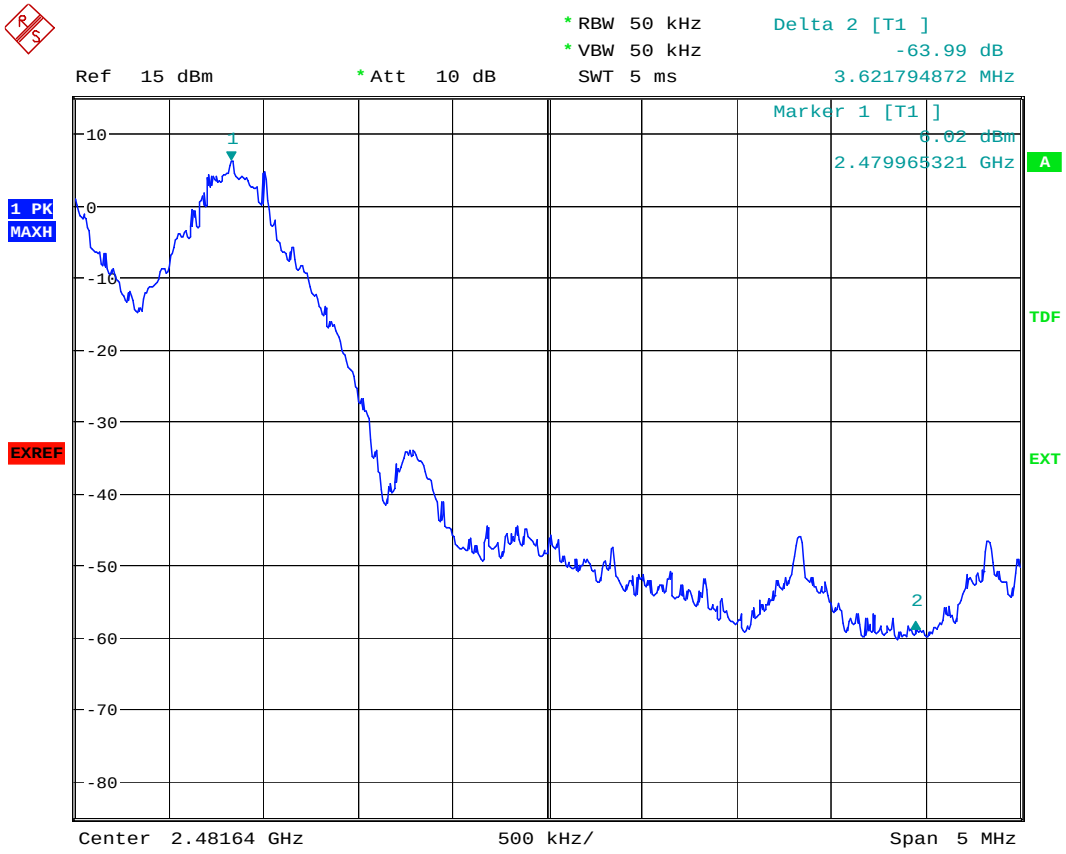
A.8.3 Band-edge compliance of RF conducted emissions

Channel 0 /2402MHz Hopping mode



Date: 23.JUN.2006 08:43:44

A.8.4 Band-edge compliance of RF conducted emissions- Channel 78/2480MHz Hopping mode



A.9 CONDUCTED SPURIOUS EMISSION (§2.1057/§24.238)

A.9.1 Measurement Method

The following steps outline the procedure used to measure the conducted emissions from the EUT.

1. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the equipment of PCS1900 band, this equates to a frequency range of 30 MHz to 19.1 GHz, data taken from 30 MHz to 20 GHz.
2. Determine EUT transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

PCS1900 Transmitter

Channel	Frequency (MHz)
512	1850.2
661	1880.0
810	1909.8

A.9.2 Measurement Limit

Sec. 24.238 Emission Limits.

(a) On any frequency outside frequency band of the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least 43+10Log(P) dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

A.9.3 Measurement result

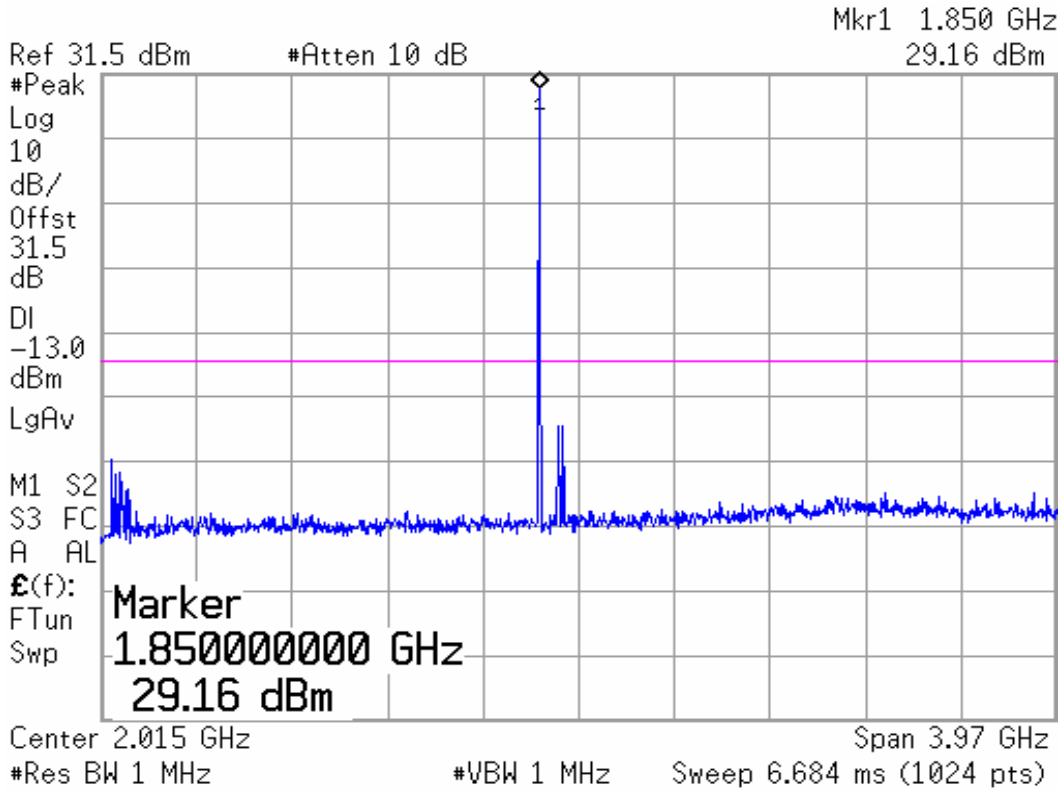
PCS1900

Harmonic	Tx ch. 512 Freq. (MHz)	Level (dBm)	Tx ch. 661 Freq. (MHz)	Level (dBm)	Tx ch. 810 Freq. (MHz)	Level (dBm)
2	3700.4	nf	3760	nf	3819.6	nf
3	5550.6	nf	5640	nf	5729.4	nf
4	7400.8	nf	7520	nf	7639.2	nf
5	9251.0	nf	9400	nf	9549.0	nf
6	11101.2	nf	11280	nf	11458.8	nf
7	12951.4	nf	13160	nf	13368.6	nf
8	14801.6	nf	15040	nf	15278.4	nf
9	16651.8	nf	16920	nf	17188.2	nf
10	18502.0	nf	18800	nf	19098.0	nf
nf: Noise floor						

A.9.3.1 Channel 512: 30MHz – 4GHz

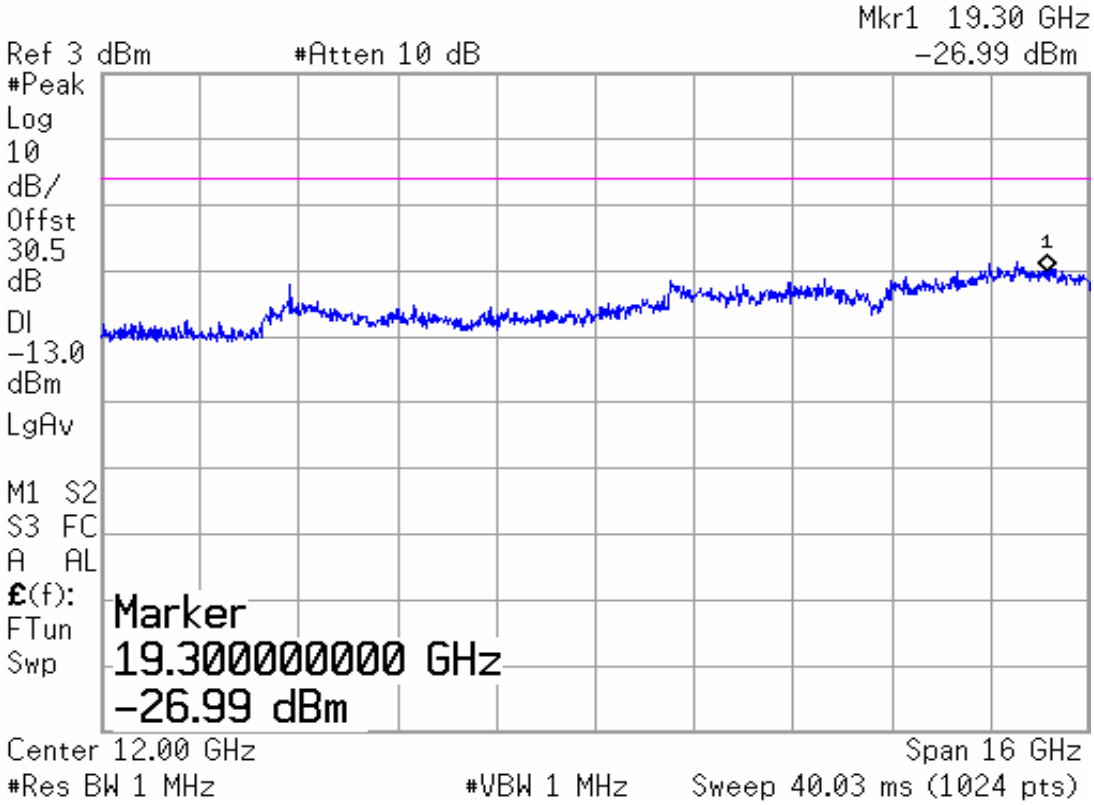
Spurious emission limit –13dBm.

NOTE: peak above the limit line is the carrier frequency.



A.9.3.2 Channel 512: 4GHz – 20GHz

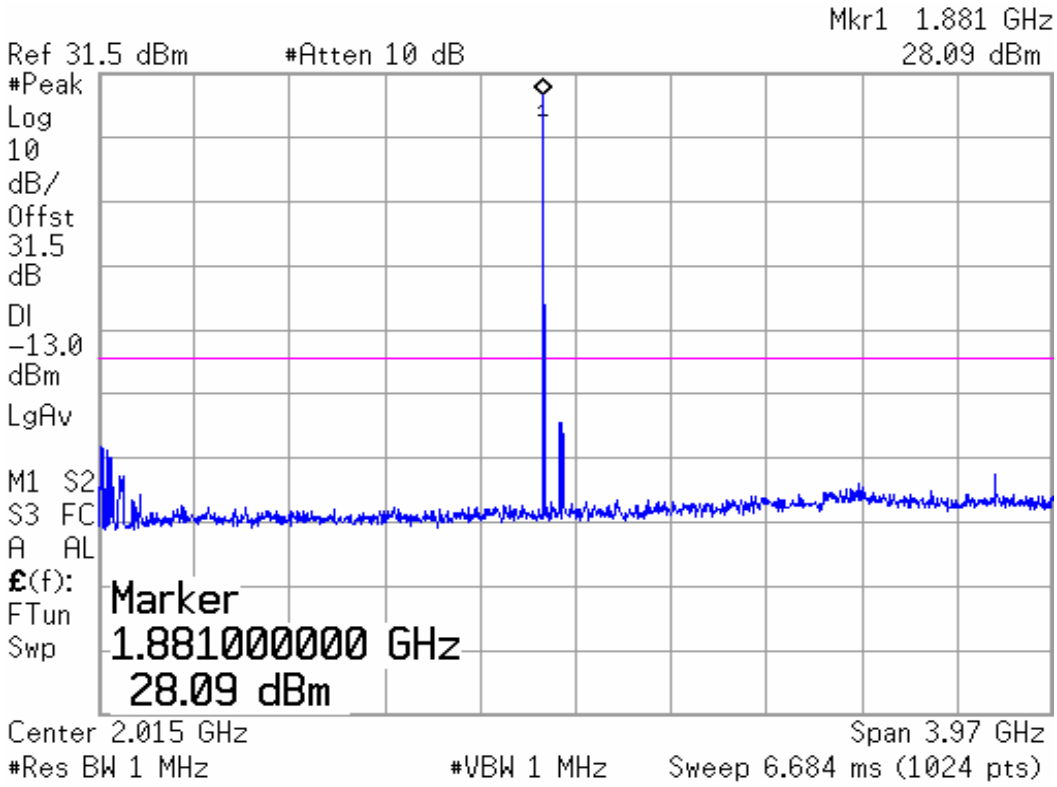
Spurious emission limit –13dBm.



A.9.3.3 Channel 661: 30MHz – 4GHz

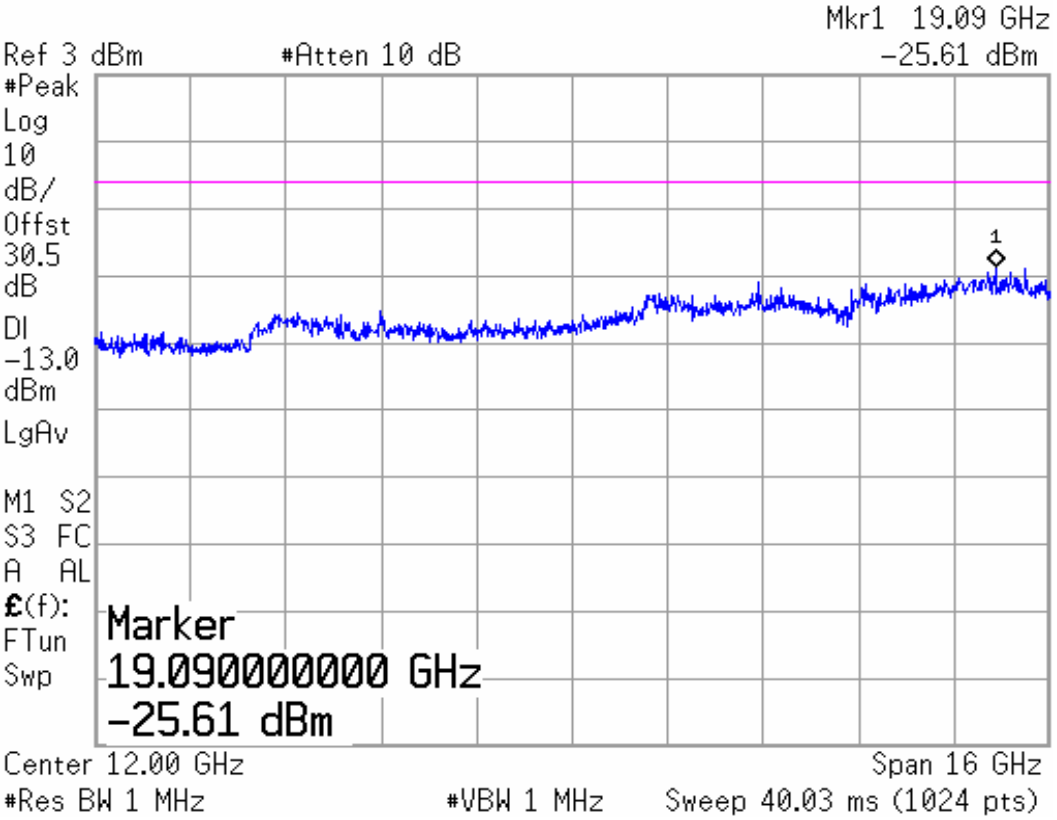
Spurious emission limit –13dBm

NOTE: peak above the limit line is the carrier frequency.



A.9.3.4 Channel 661: 4GHz –20GHz

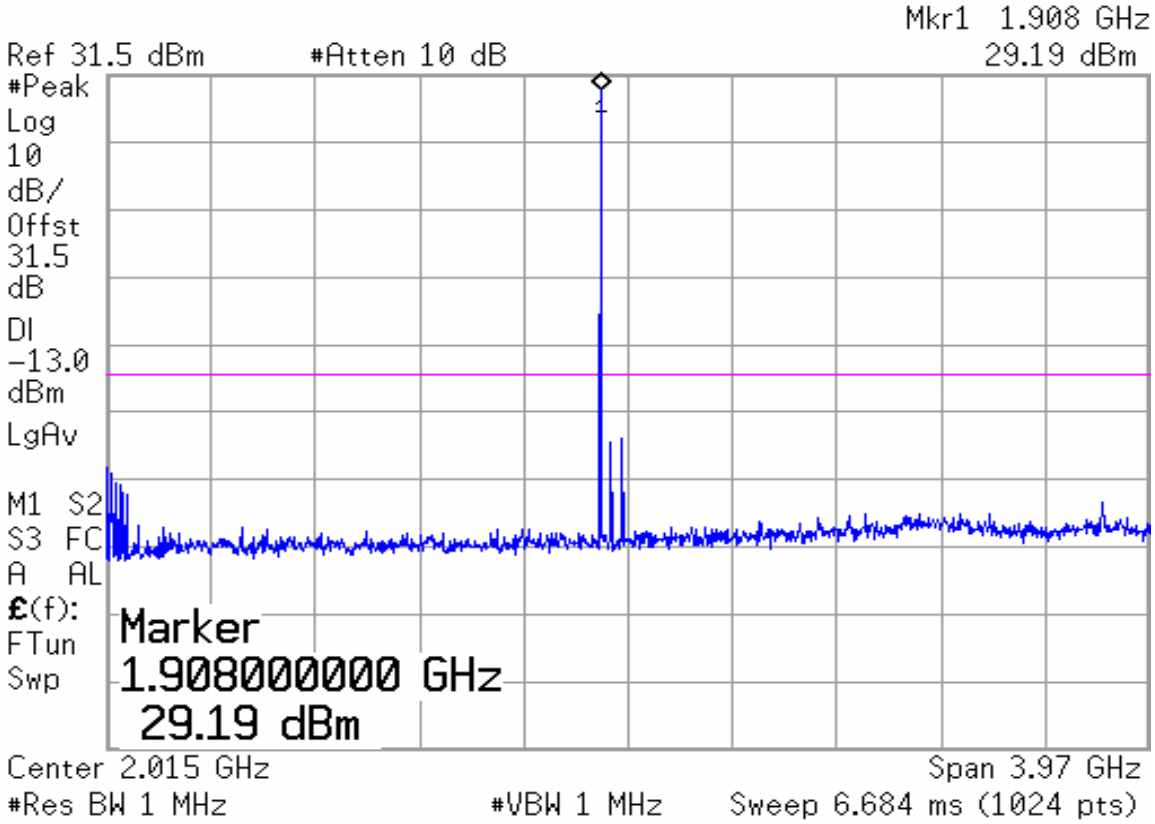
Spurious emission limit –13dBm



A.9.3.5 Channel 810: 30MHz – 4GHz

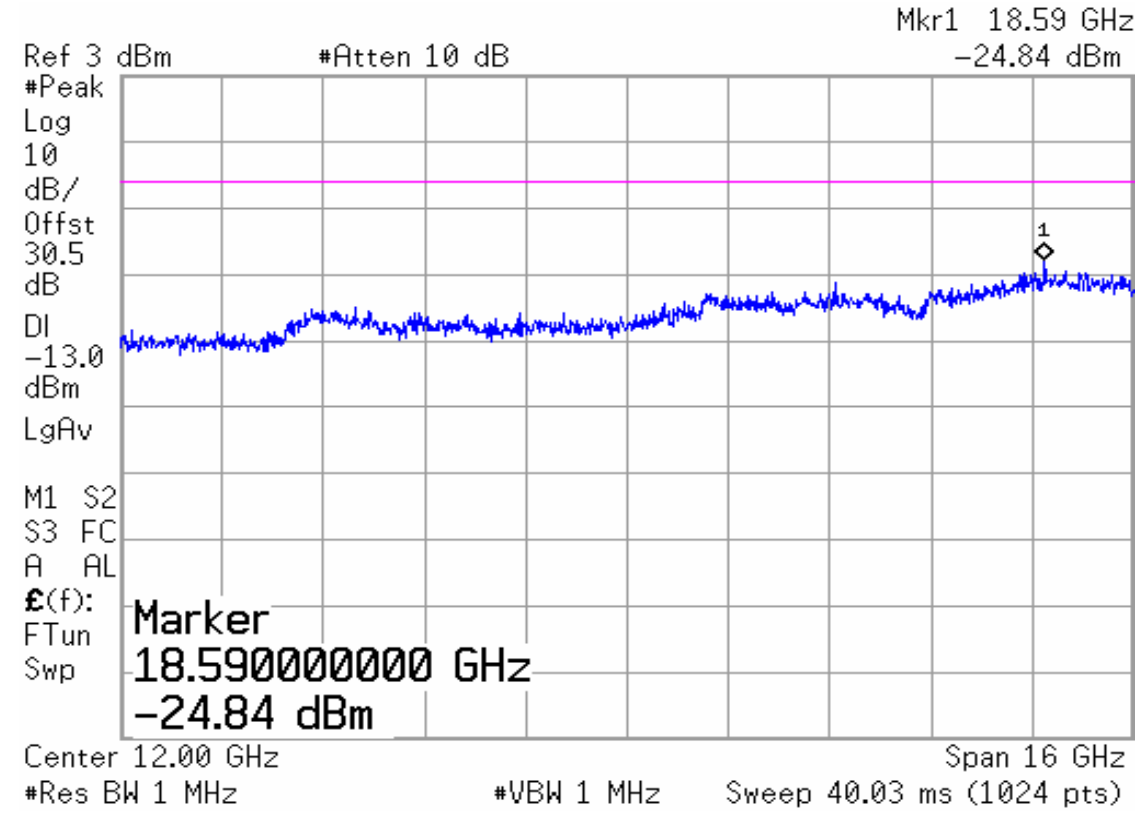
Spurious emission limit –13dBm.

NOTE: peak above the limit line is the carrier frequency.



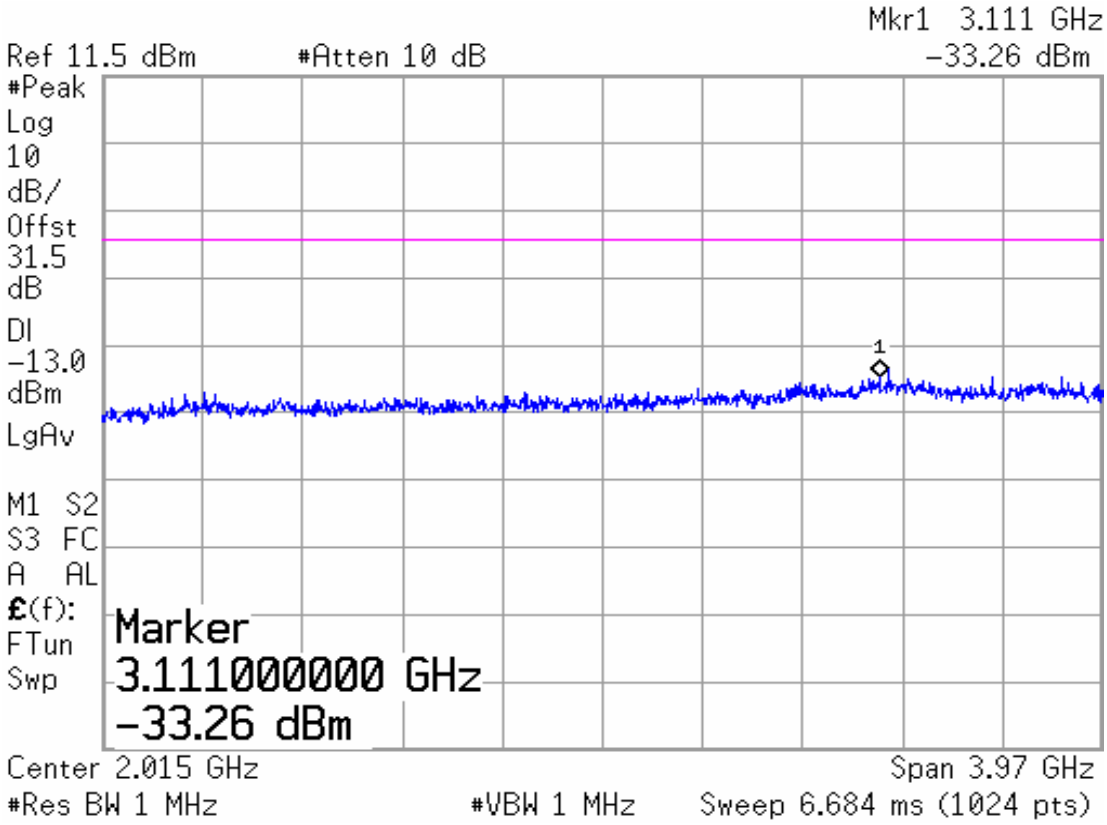
A.9.3.6 Channel 810: 4GHz – 20GHz

Spurious emission limit –13dBm.



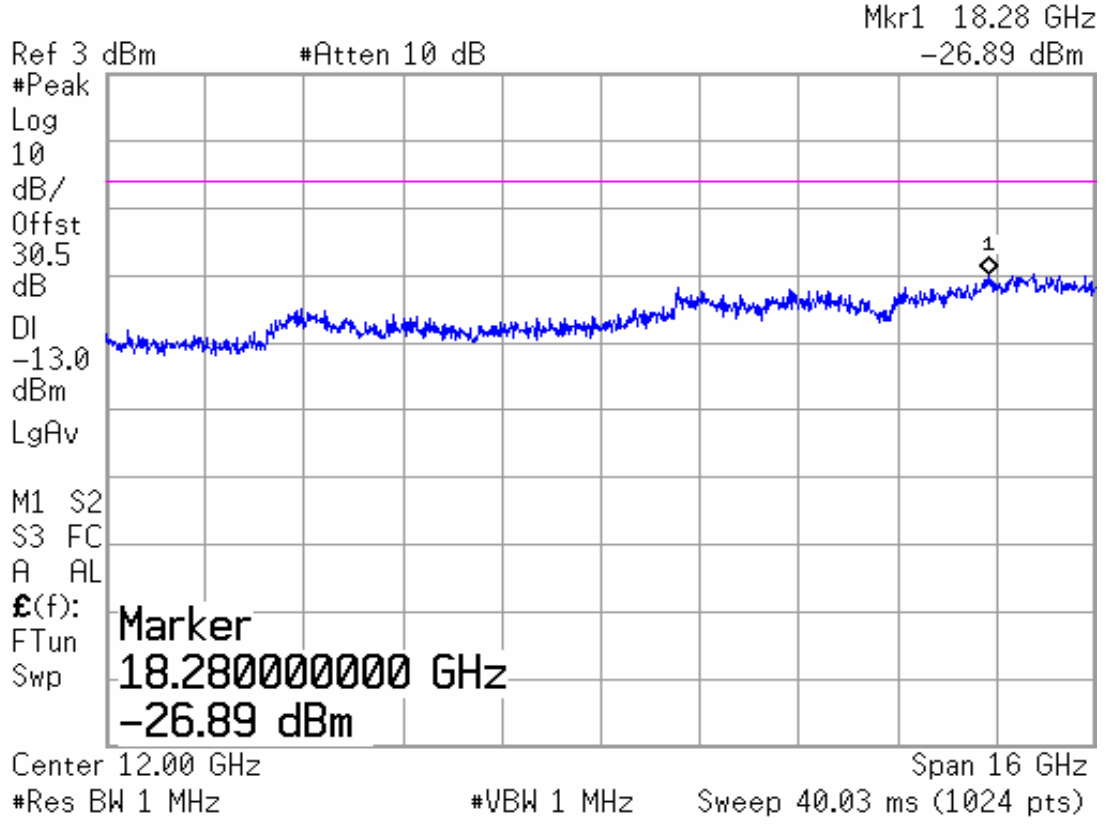
A.9.3.7 Idle mode: 30MHz – 4GHz

Spurious emission limit –13dBm.



A.9.3.8 Idle mode: 4GHz – 20GHz

Spurious emission limit –13dBm.



A.10 CONDUCTED SPURIOUS EMISSION-Bluetooth (§15.247(d))

A.10.1 Method of measurement

The EUT is connected to the spectrum analyzer via a low loss cable. If the EUT is not equipped with and antenna connector, a temporary antenna connector has to be installed. The EUT is switched on, the hopping function is disabled.

The analyzer setting was as following:

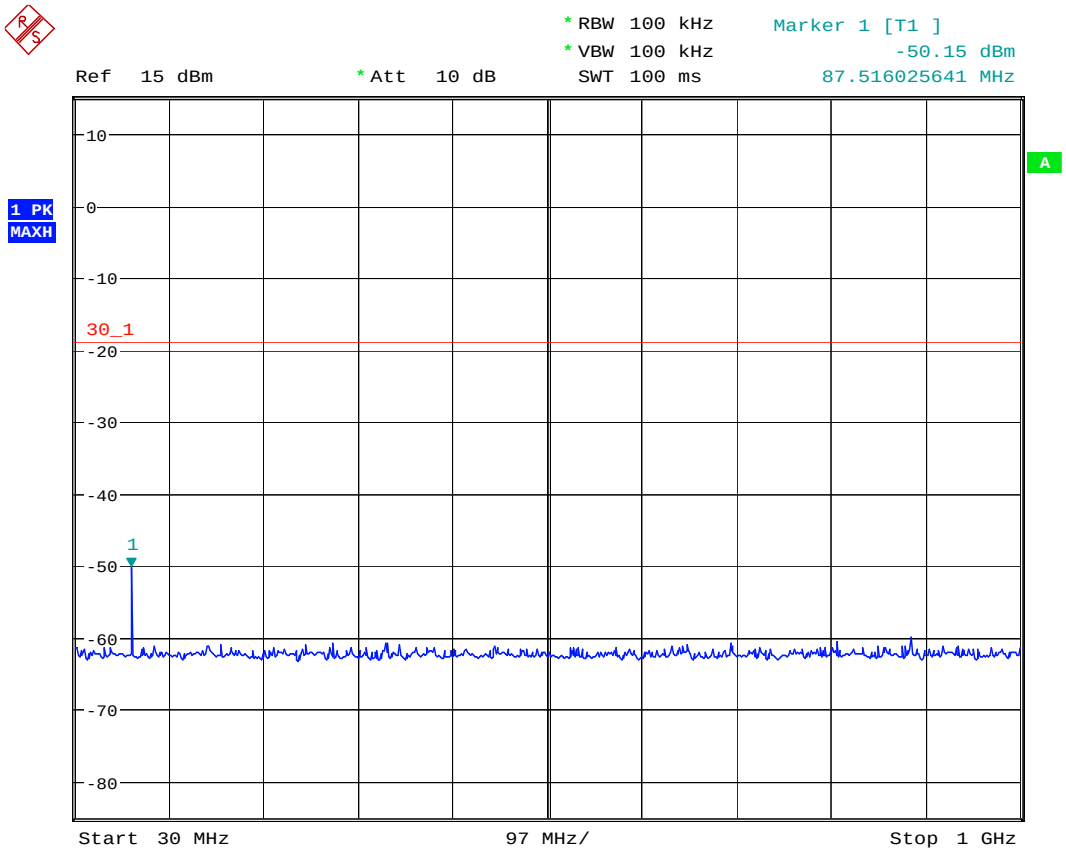
Frequency range	RES bandwidth		Video bandwidth	
	Pk	Avg	Pk	Avg
f<1GHz	100kHz	100kHz	100kHz	100kHz
f>1GHz	1MHz	1MHz	1MHz	1MHz

A.10.2 Limits

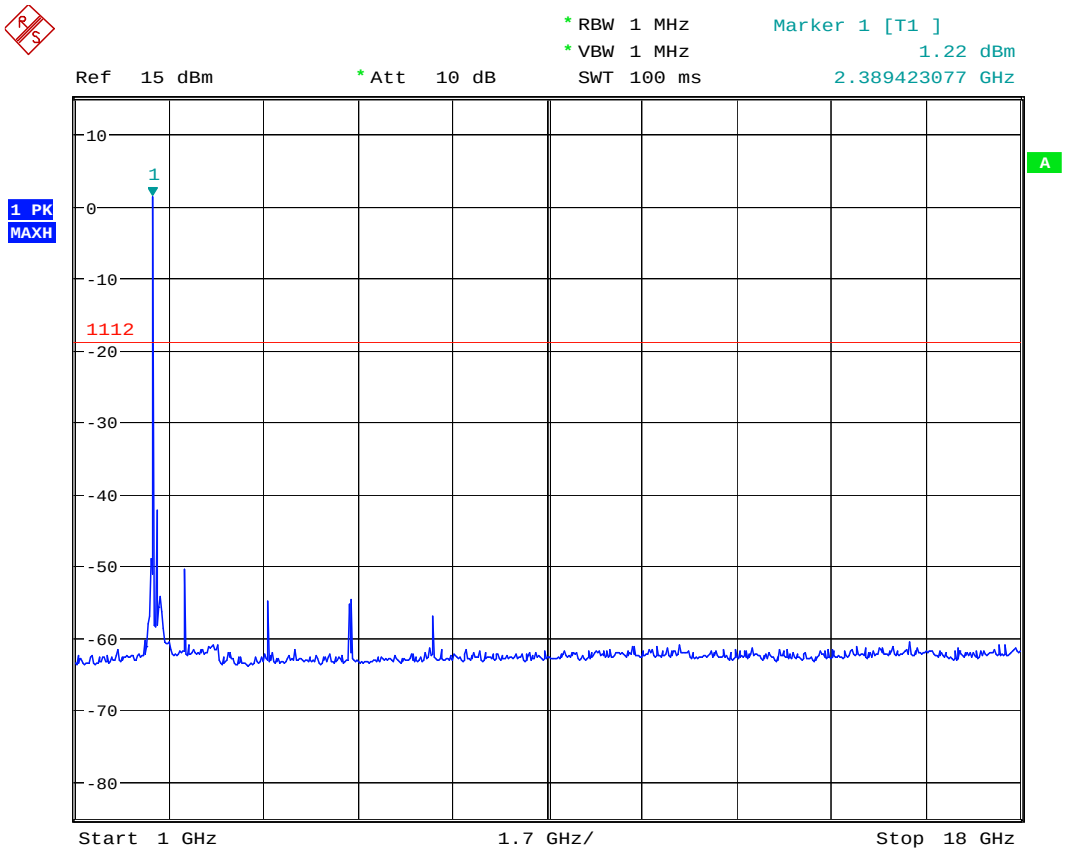
FCC	20dB below peak output power

A.10.3 Measurement result

A.10.3.1 Channel 0/2402MHz: 30MHz - 1GHz

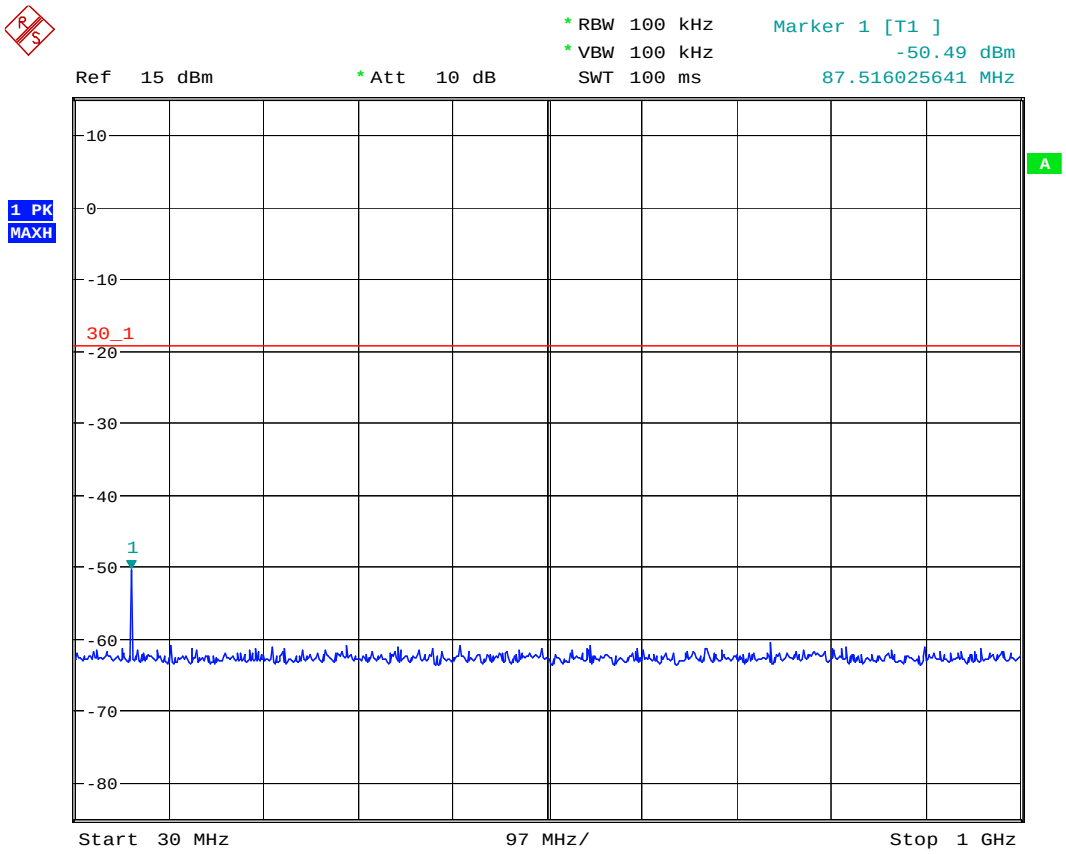


A.10.3.2 Channel 0/2402MHz: 1GHz – 18GHz



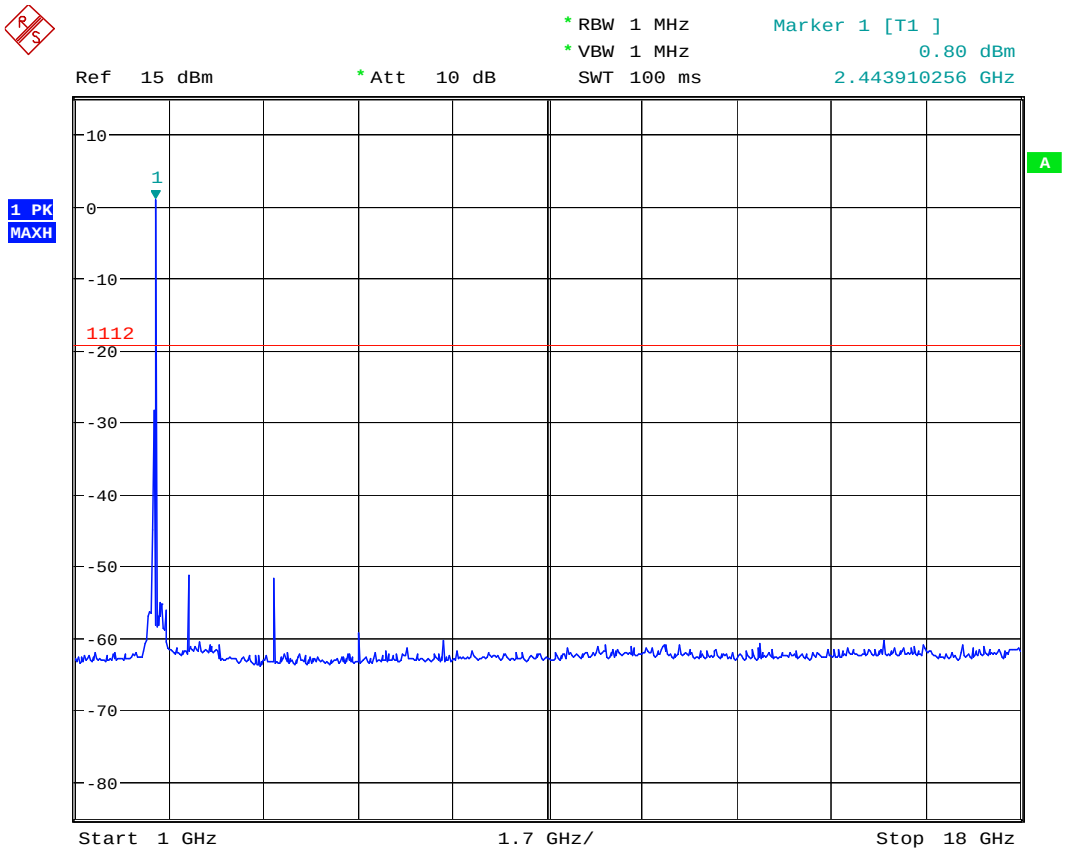
Date: 24.JUN.2006 03:17:25

A.10.3.3 Channel 39/2441MHz: 30MHz - 1GHz



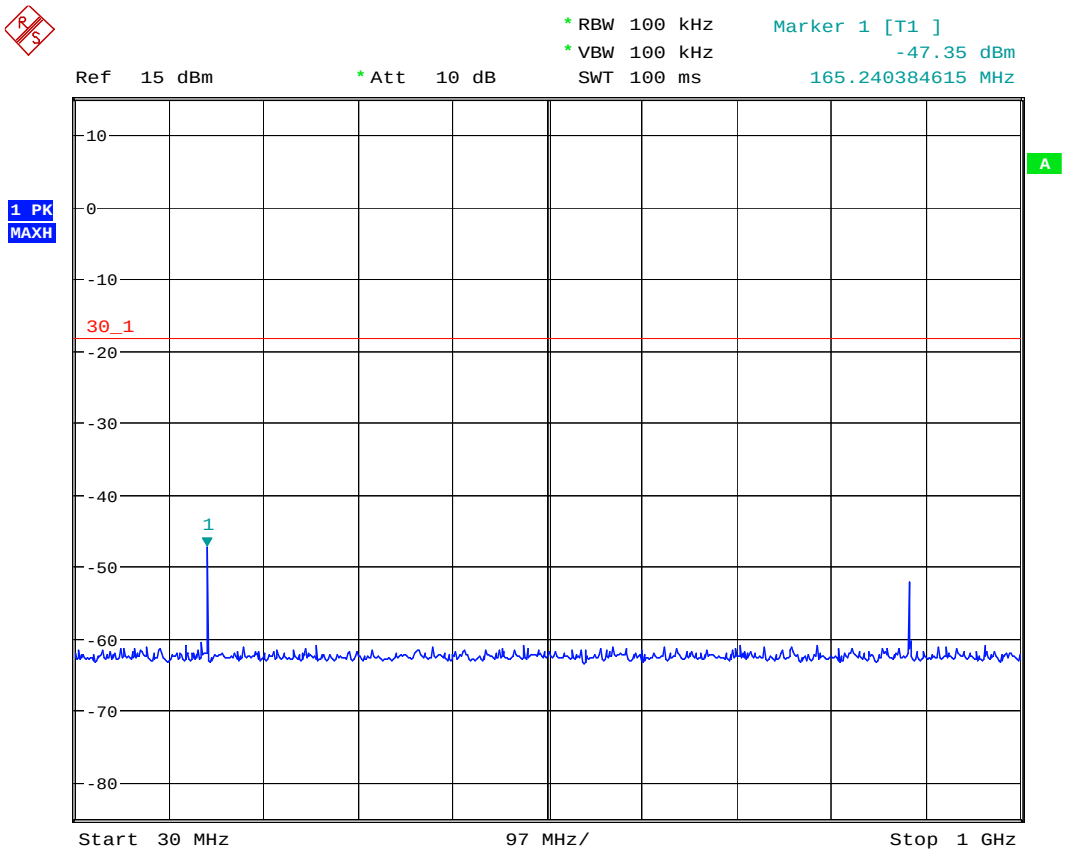
Date: 24.JUN.2006 04:19:16

A.10.3.4 Channel 39/2441MHz: 1GHz - 18GHz



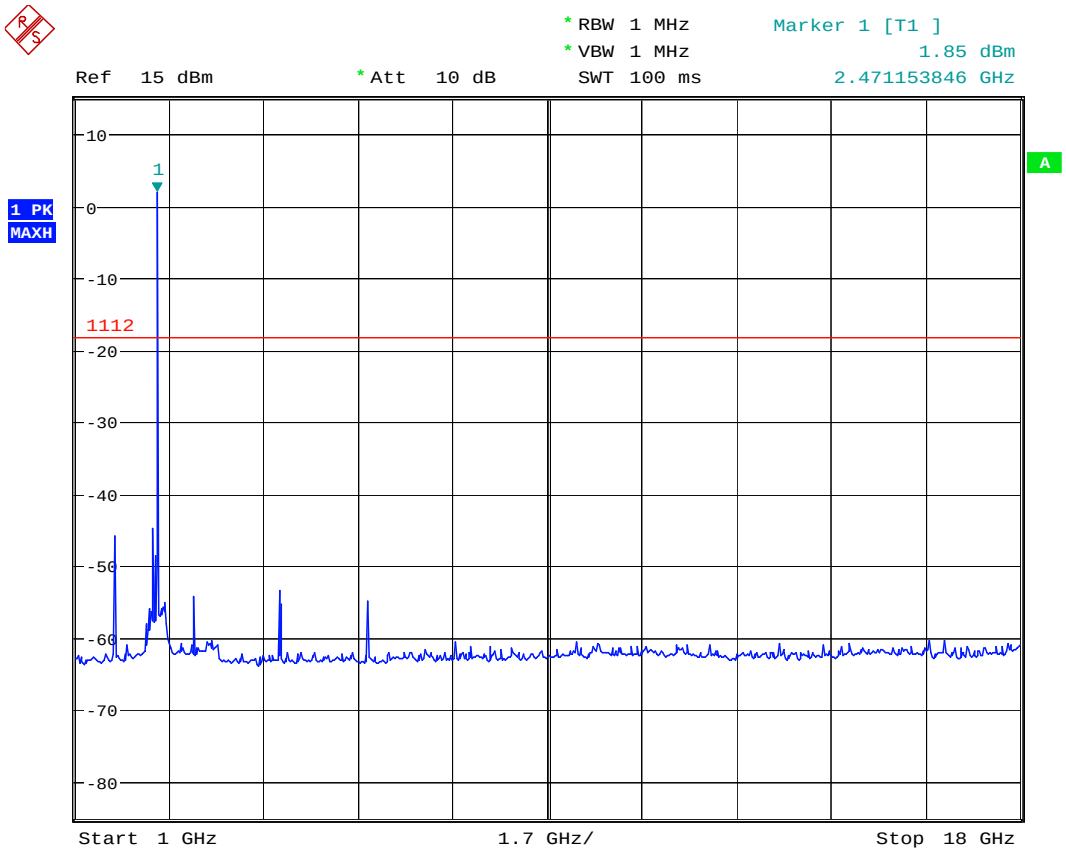
Date: 24.JUN.2006 03:15:26

A.10.3.5 Channel 78/2480MHz: 30MHz - 1GHz



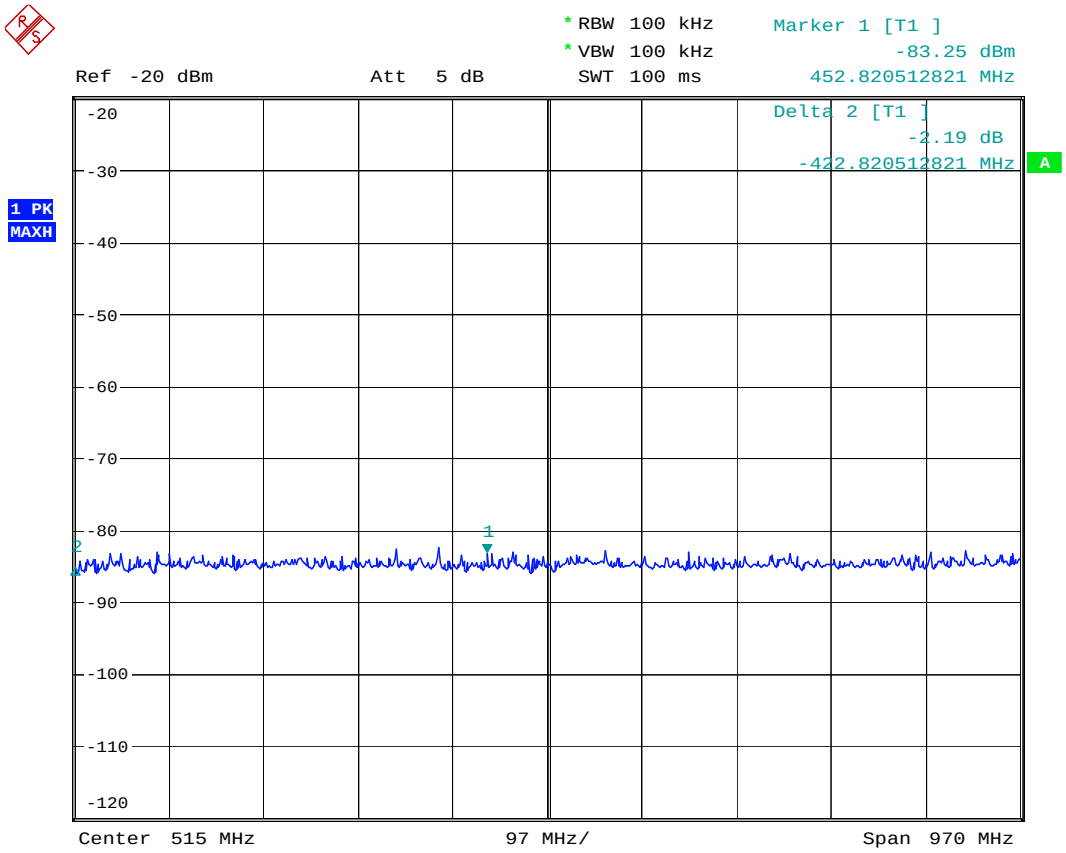
Date: 24.JUN.2006 03:09:50

A.10.3.6 Channel 78/2480MHz: 1GHz - 18GHz



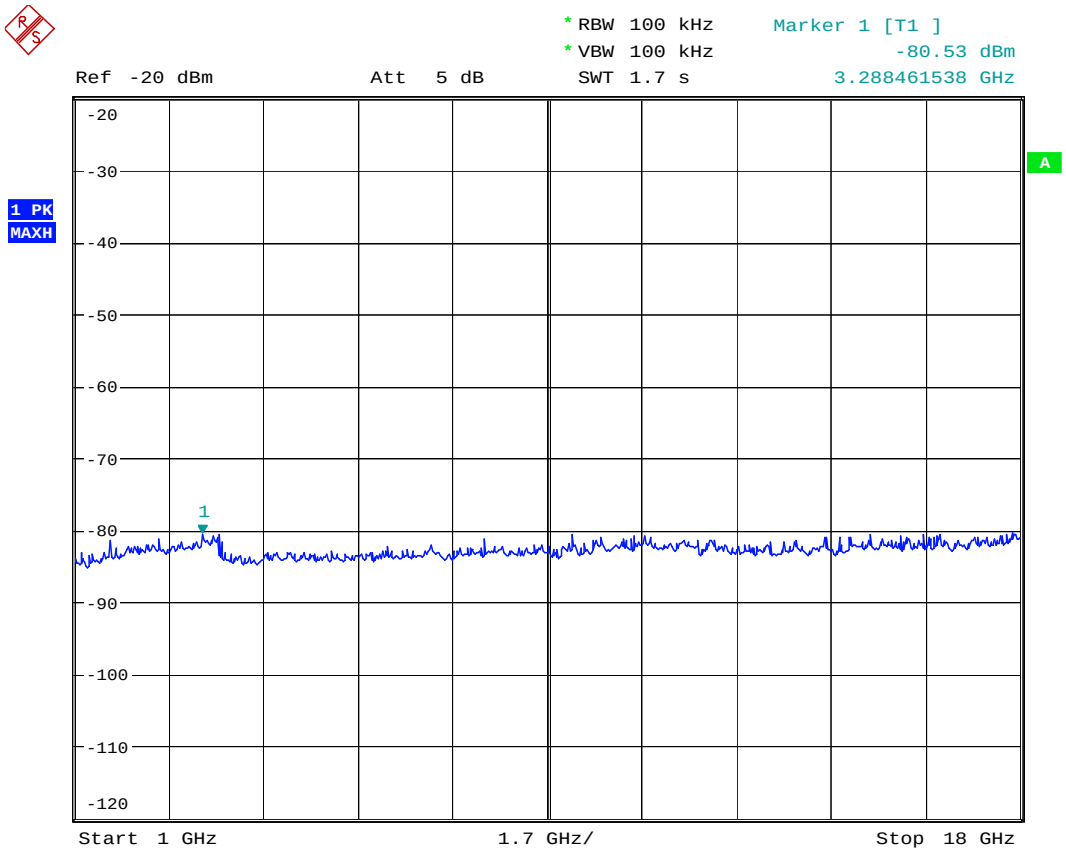
Date: 24.JUN.2006 03:13:19

A.10.3.7 Idle mode: 30MHz - 1GHz



Date: 23.JUN.2006 12:55:44

A.10.3.8 Idle mode: 1GHz - 18GHz



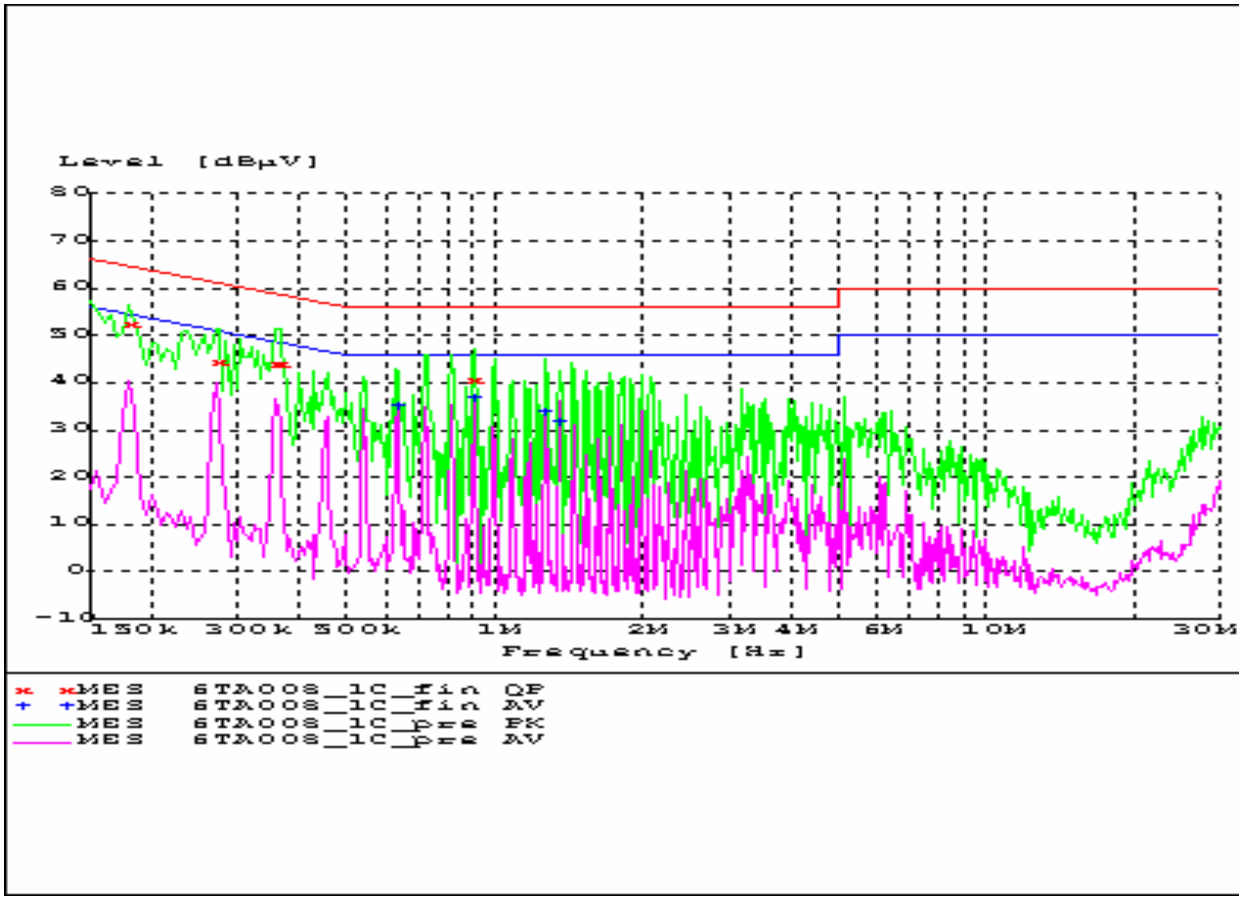
Date: 23.JUN.2006 12:56:56

A.11 CONDUCTED EMISSION (§15.107/§207)

A.11.1 Limit

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	Quasi -Peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30	60	50
* Decreases with logarithm of the frequency		

A.11.2 Measurement result



MEASUREMENT RESULT: "6TA008_1C_fin QP"

5/15/2006 10:46

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.180000	52.00	10.1	65	12.5	L1	GND
0.275000	44.00	10.1	61	17.0	L1	FLO
0.360000	43.40	10.1	59	15.3	N	GND
0.365000	43.50	10.1	59	15.1	L1	GND
0.905000	40.40	10.1	56	15.6	N	GND

MEASUREMENT RESULT: "6TA008_1C_fin AV"

5/15/2006 10:46

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.635000	34.90	10.1	46	11.1	L1	GND
0.905000	36.30	10.1	46	9.7	L1	GND
1.265000	33.50	10.1	46	12.5	L1	GND
1.355000	31.40	10.1	46	14.7	L1	FLO

A.12 Time of occupancy (dwell time) (§15.247(a))

A12.1 Method of measurement

The EUT has its hopping function enabled.

Spectrum analyzer settings:

Span: zero span, centered on hopping channel

RBW: 1MHz

VBW: >RBW

Sweep: as necessary to capture the entire dwell time per hopping channel

Detector: peak

Trace: max hold

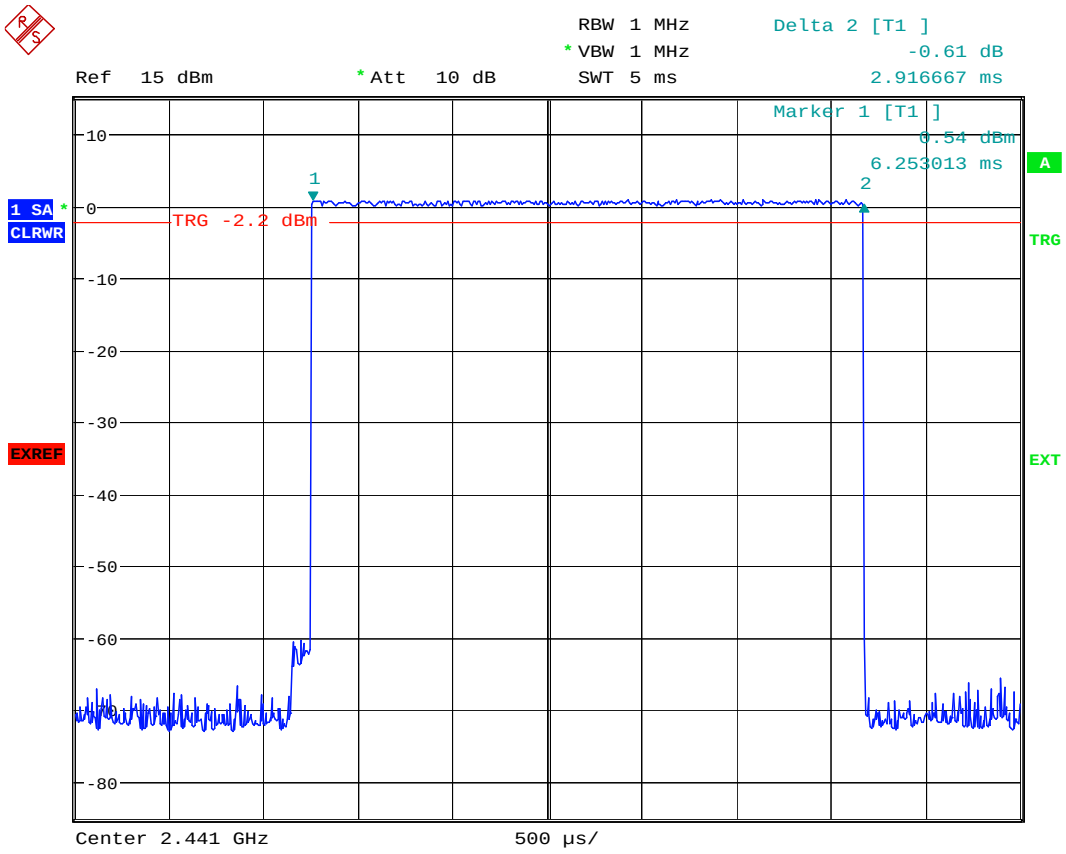
Limits

Frequency band	FCC
5725-5850MHz	≤0.4s at measurement period of 30 seconds
2400-2483.5MHz	≤0.4s multiplied by the number of hopping channels employed
902-928MHz	≤0.4s at measurement period of 20 seconds for max 250kMz 20dB BW allowed ≤0.4s at measurement period of 10 seconds for max 500kMz 20dB BW allowed

A.12.2 Test results

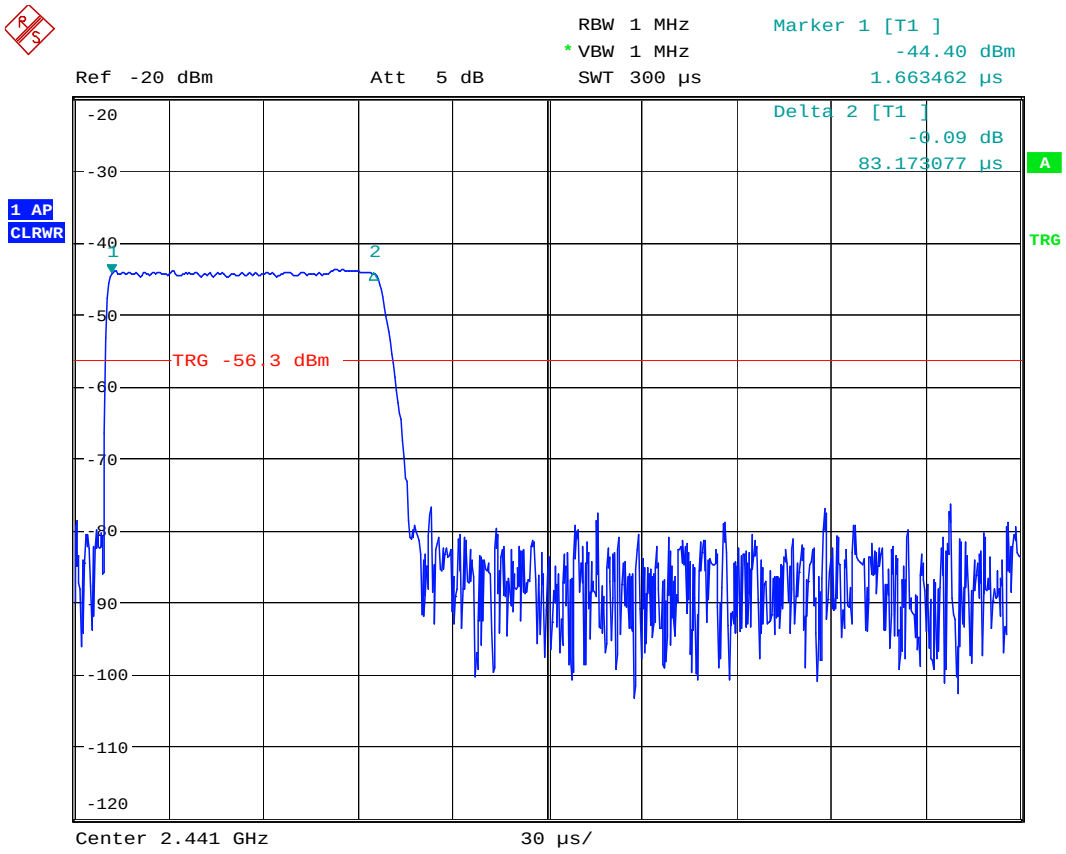
Test conditions	Operating mode	Measurement period	Time of occupancy
		[s]	[ms]
T nom=25℃ V nom=3.7V	normal transmitting	31.9	183.77
	inquiry mode	13.2	28.28

A.12.2.1 Time of occupancy (dwell time)



Date: 23.JUN.2006 11:59:15

A.12.2.2 Time of occupancy inquiry



Date: 23.JUN.2006 12:51:51

A.13 Number of hopping channels (§15.247(a))

A.13.1 Method of measurement

According to FCC rules part 15 subpart C 15.247 frequency hopping systems operating in the 2400-2483.5MHz and 5725-5850MHz bands shall use at least 75 hopping frequencies.

According to FCC 00-312 appendix B systems in the 2400-2483.5MHz band may utilize hopping channels whose 20dB bandwidth is greater than 1MHz provide the systems use at least 15 non-overlapping channels.

A.13.2 Limits

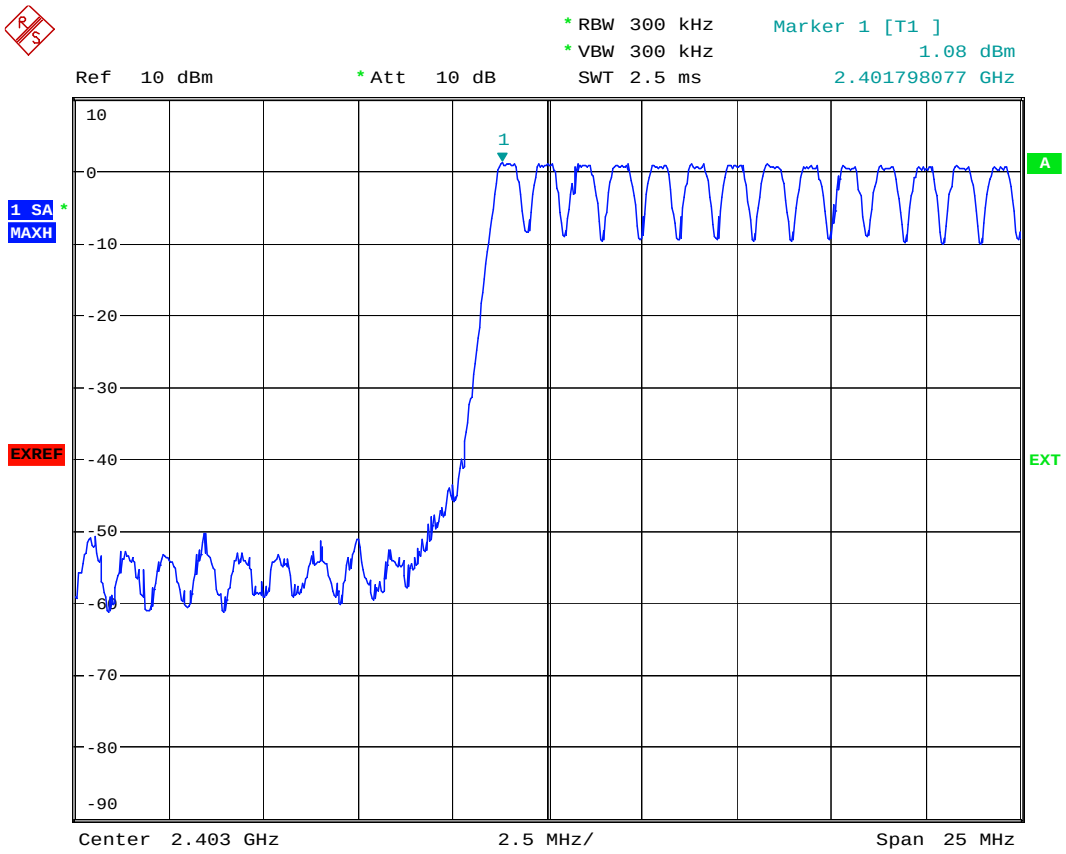
Frequency band	FCC
5725-5850MHz	≥75 hopping channels
2400-2483.5MHz	≥75 hopping channels for>0.125 Watt ≥15 hopping channels for≤0.125 Watt
902-928MHz	≥50 hopping channels for>0.25 Watt ≥25 hopping channels for≤0.25 Watt

A.13.3 Test results

Test conditions	Operating mode	Number of channel
T nom=25℃	Normal transmitting	79
V nom=3.7V	Inquiry mode	32

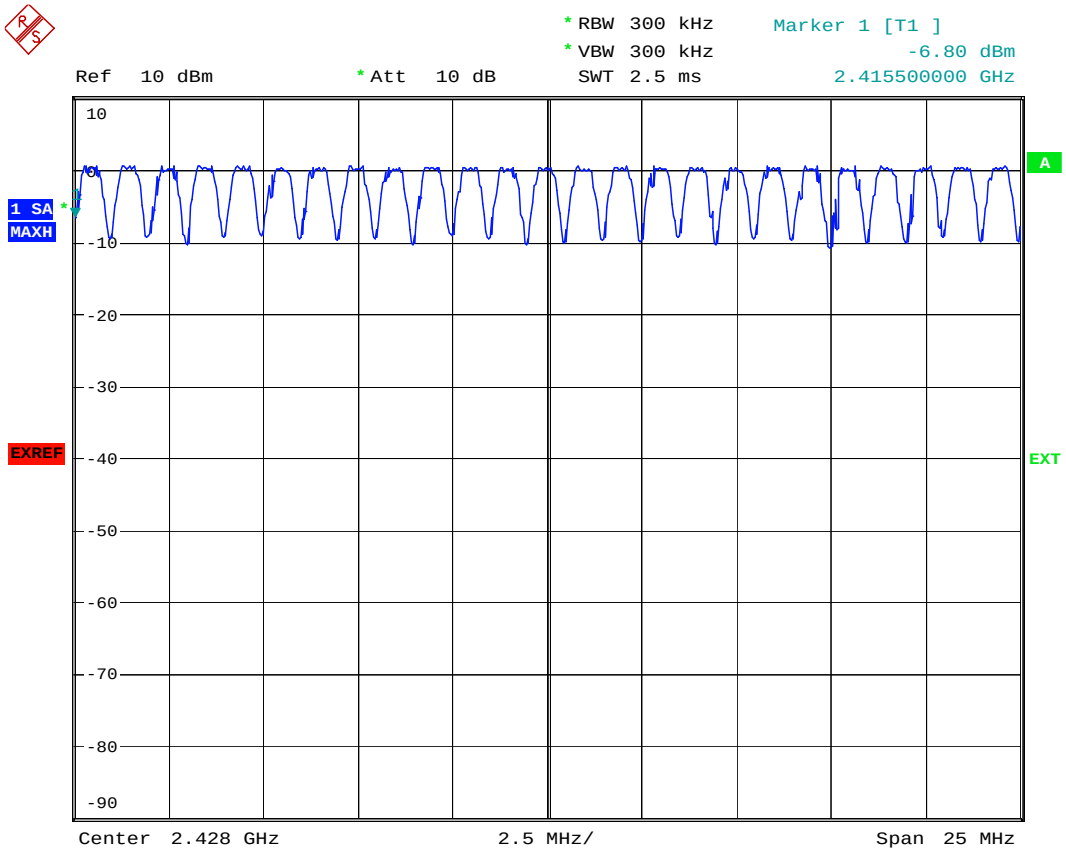
See attached diagrams

A.13.3.1 Number of hopping frequencies- Channel:0-13



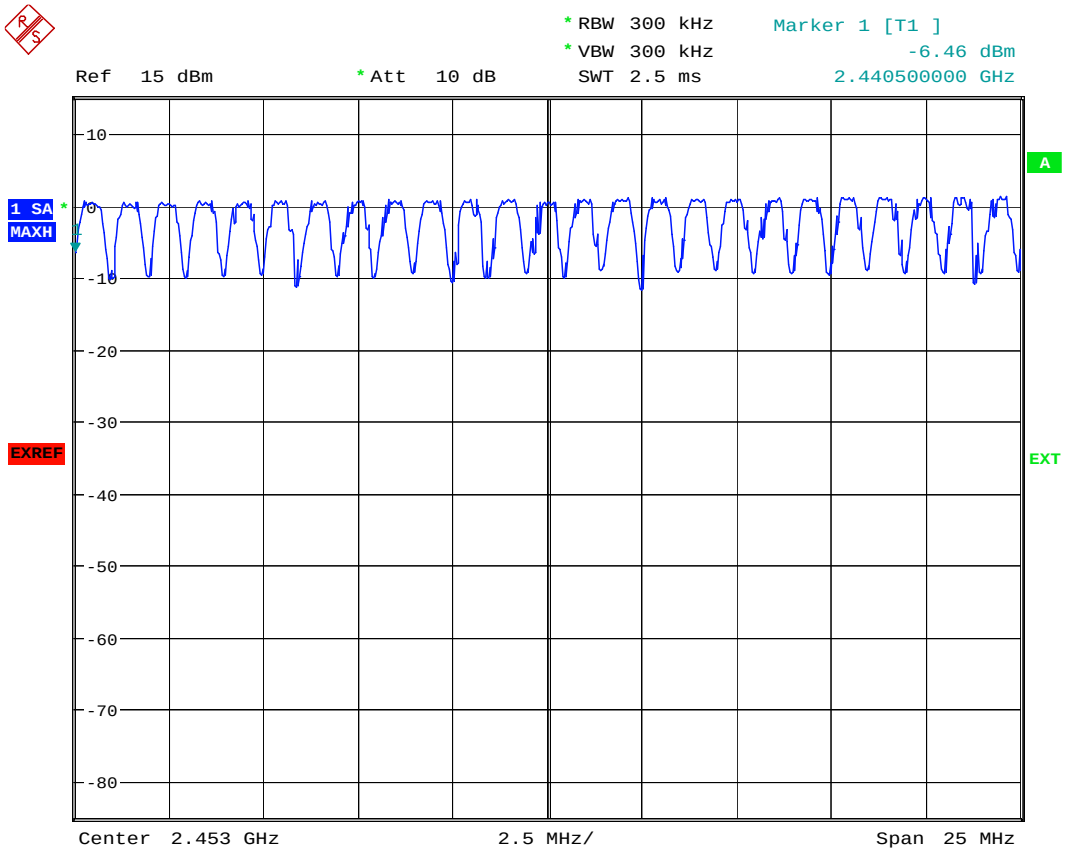
Date: 23.JUN.2006 09:20:22

A.13.3.2 Number of hopping frequencies-Channel:14-38



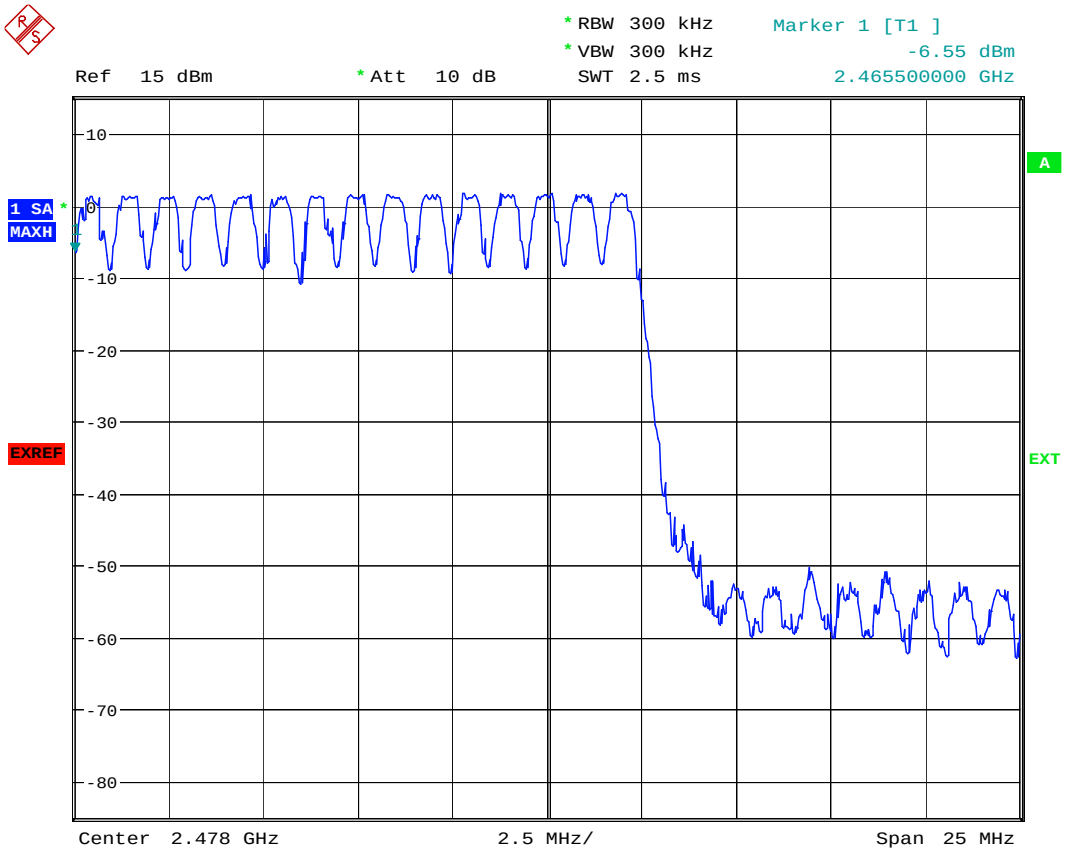
Date: 23.JUN.2006 09:23:23

A.13.3.3 Number of hopping frequencies- Channel: 39-63



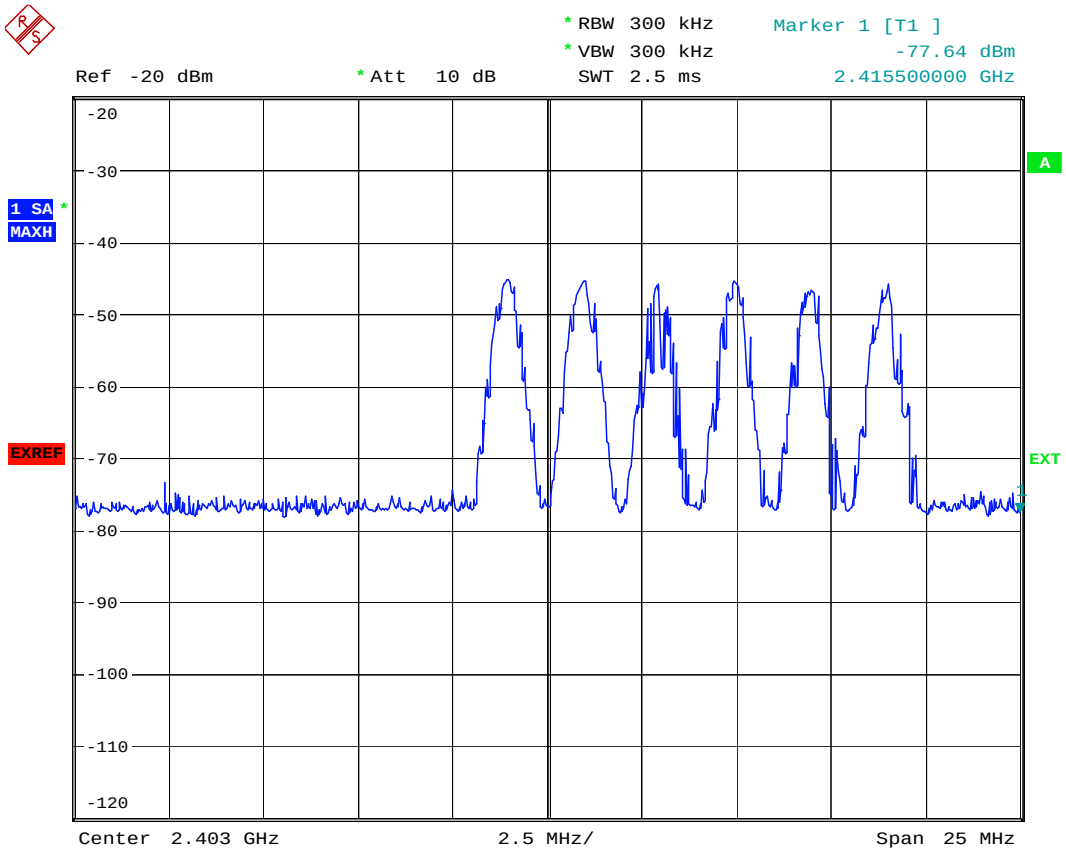
Date: 23.JUN.2006 09:25:10

A.13.3.4 Number of hopping frequencies-Channel:64-78



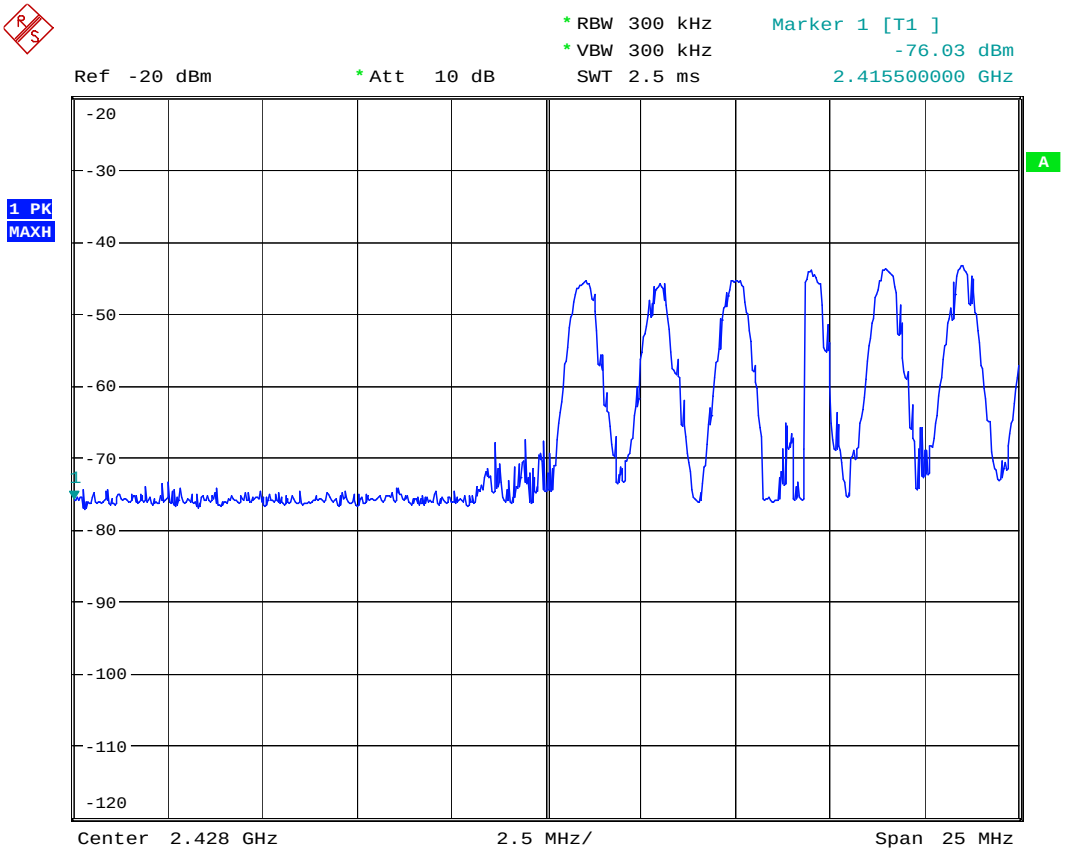
Date: 23.JUN.2006 09:26:12

A.13.3.5 Number of hopping frequencies (master inquiry mode)



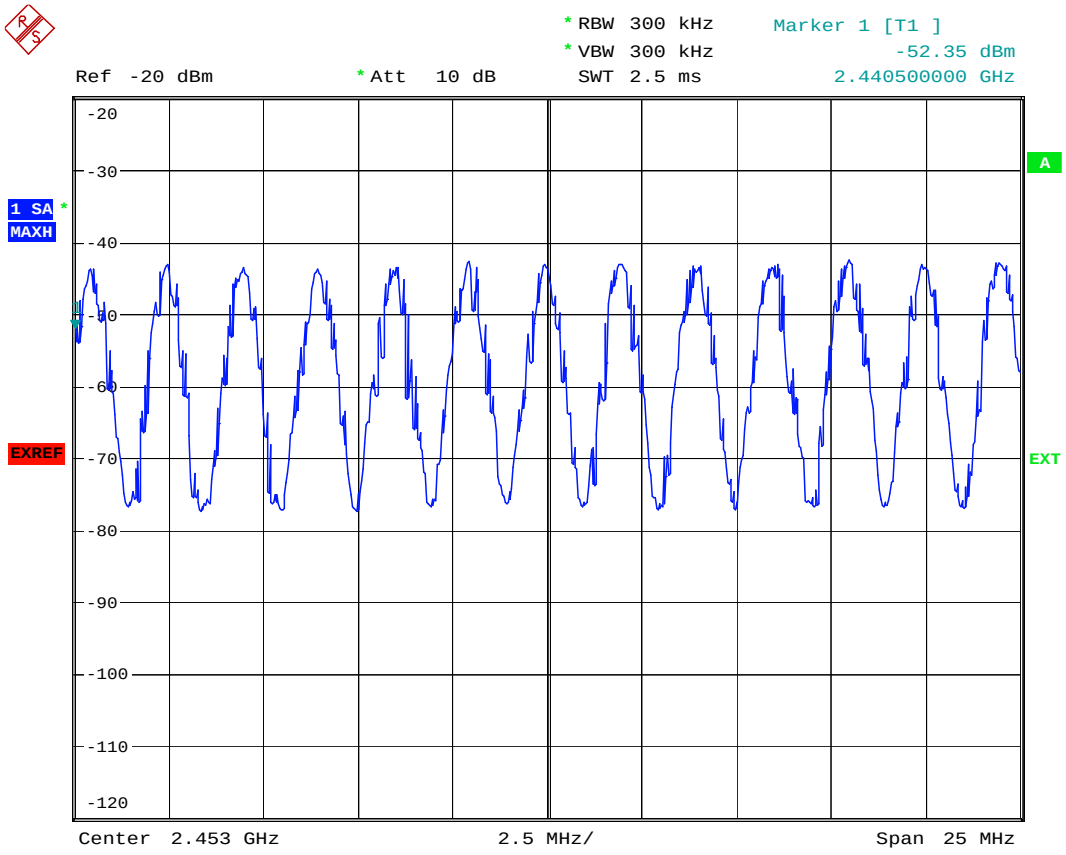
Date: 23.JUN.2006 09:31:35

A.13.3.6 Number of hopping frequencies(master inquiry mode)



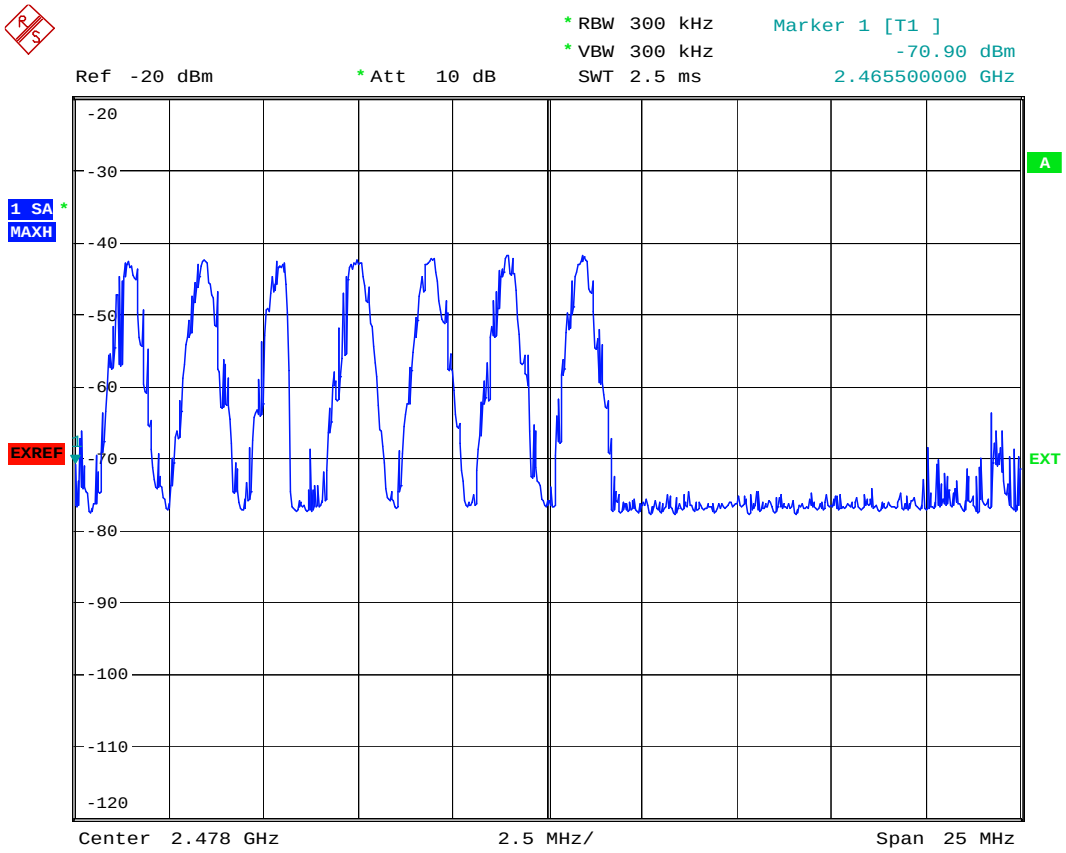
Date: 24.JUN.2006 03:49:40

A.13.3.7 Number of hopping frequencies (master inquiry mode)



Date: 23.JUN.2006 09:32:57

A.13.38 Number of hopping frequencies (master inquiry mode)



A.14 Carrier frequency separation (§15.247(a))

A.14.1 Method of measurement

Carrier frequency separation was measured with modulation (declared by manufacturer)

A.14.2 Limits

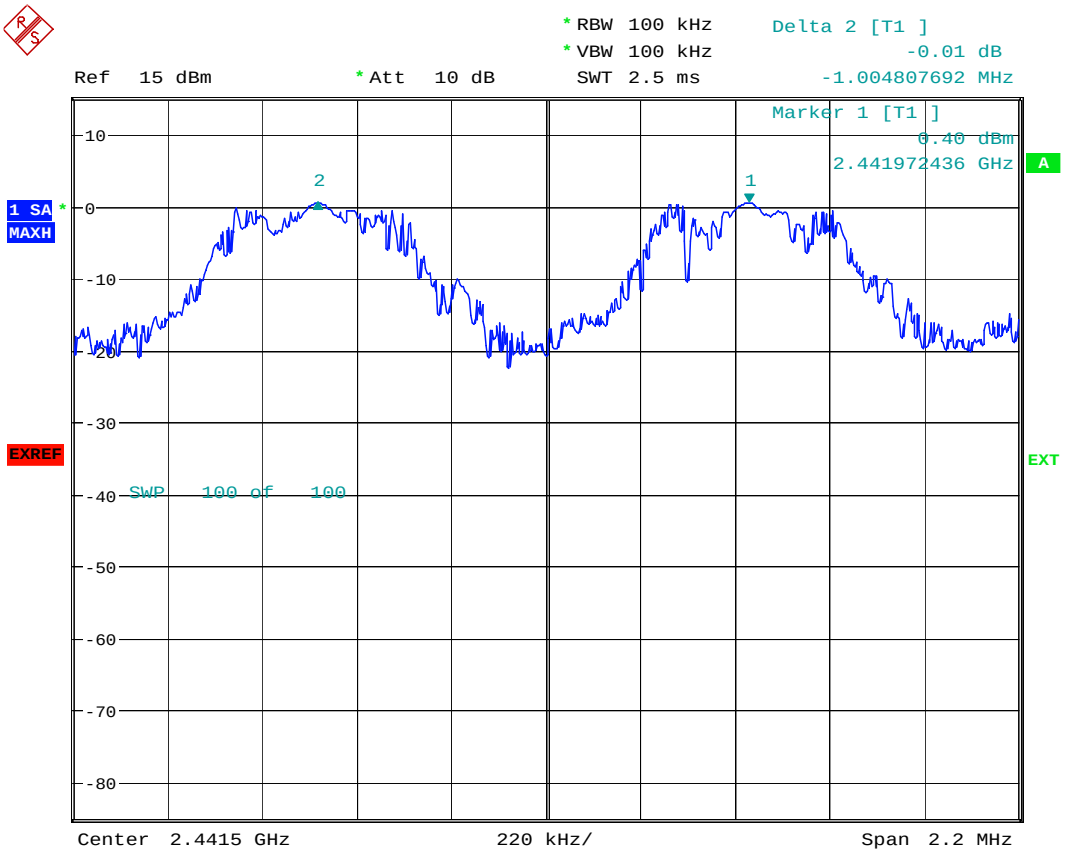
Frequency band	FCC
5725-5850MHz	Minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater, but≤1MHz
2400-2483.5MHz	Minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater Minimum of 25kHz or 2/3 of the 20dB bandwidth of the hopping channel, whichever is greater, for Pout≤0.125W
902-928MHz	Minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater

A.14.3 Test results

Test conditions	Channel 39	Channel Separation
	[GHz]	[kHz]
T nom=25℃ V nom=3.7V	2.441	1005

See attached diagrams

A.14.3.1 Carrier frequency separation -Channel.:39/40/2441/2442MHz



Date: 23.JUN.2006 09:44:11

A.15 Radiated Spurious Emission-Bluetooth (&15.247,&15.205,&15.209,&15.35)

A.15.1 method of measurement

The radiated spurious emission in Bluetooth operating mode was measured using peak detector with modulation (declared by the applicant).

A.15.2 limit

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 § 15.209(a) is not required.

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)).

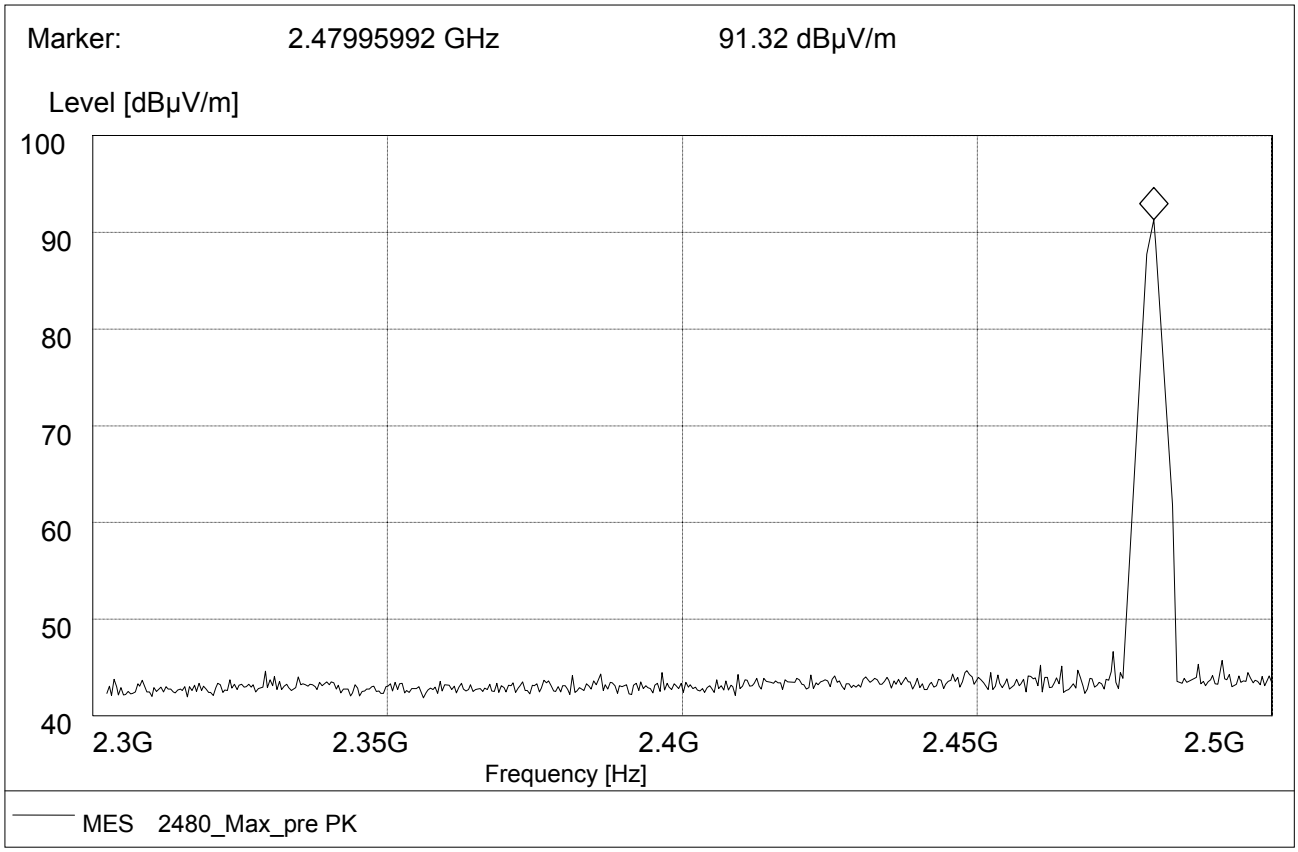
Limit in restricted band

Frequency of emission (MHz)	Field strength(uV/m)	Field strength(dBuV/m)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

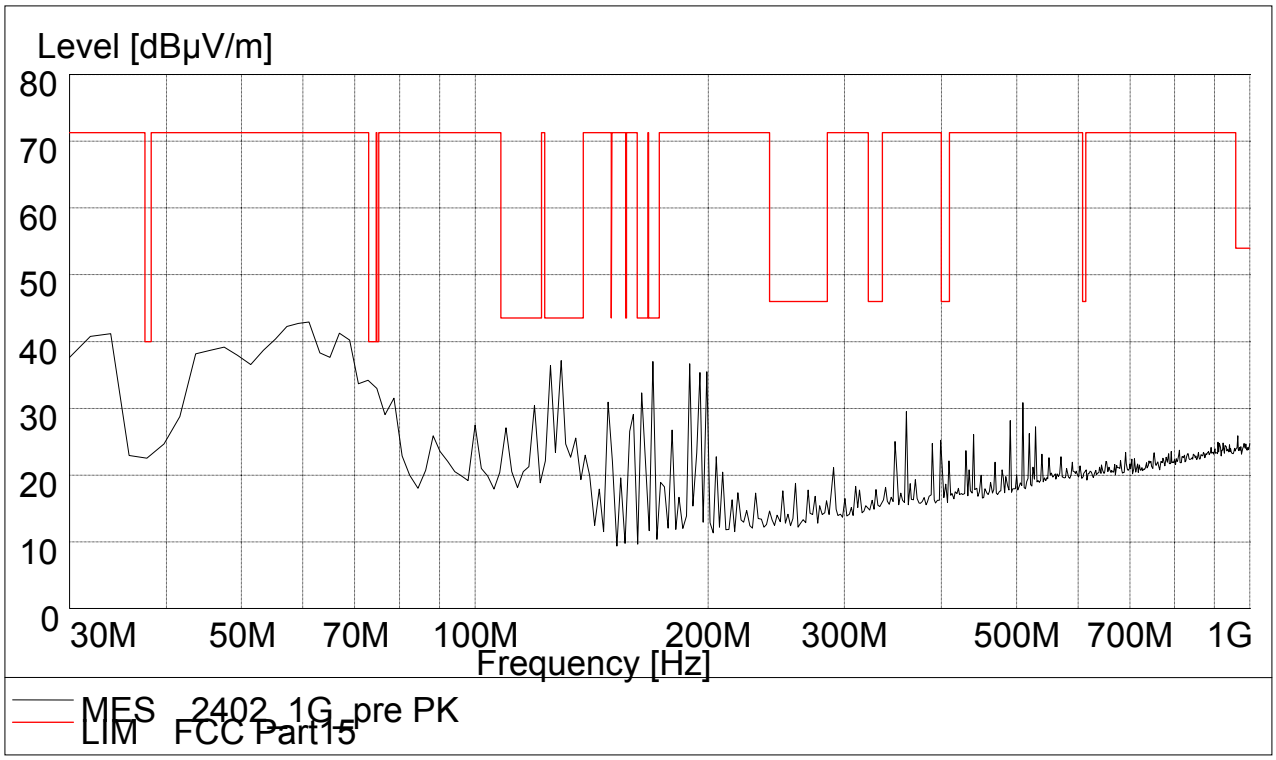
Calculation of limit
Limit=91.3dBuV/m-20dB=71.32dBuV/m.

A.15.3 Measurement result

A.15.3.1 carrier power

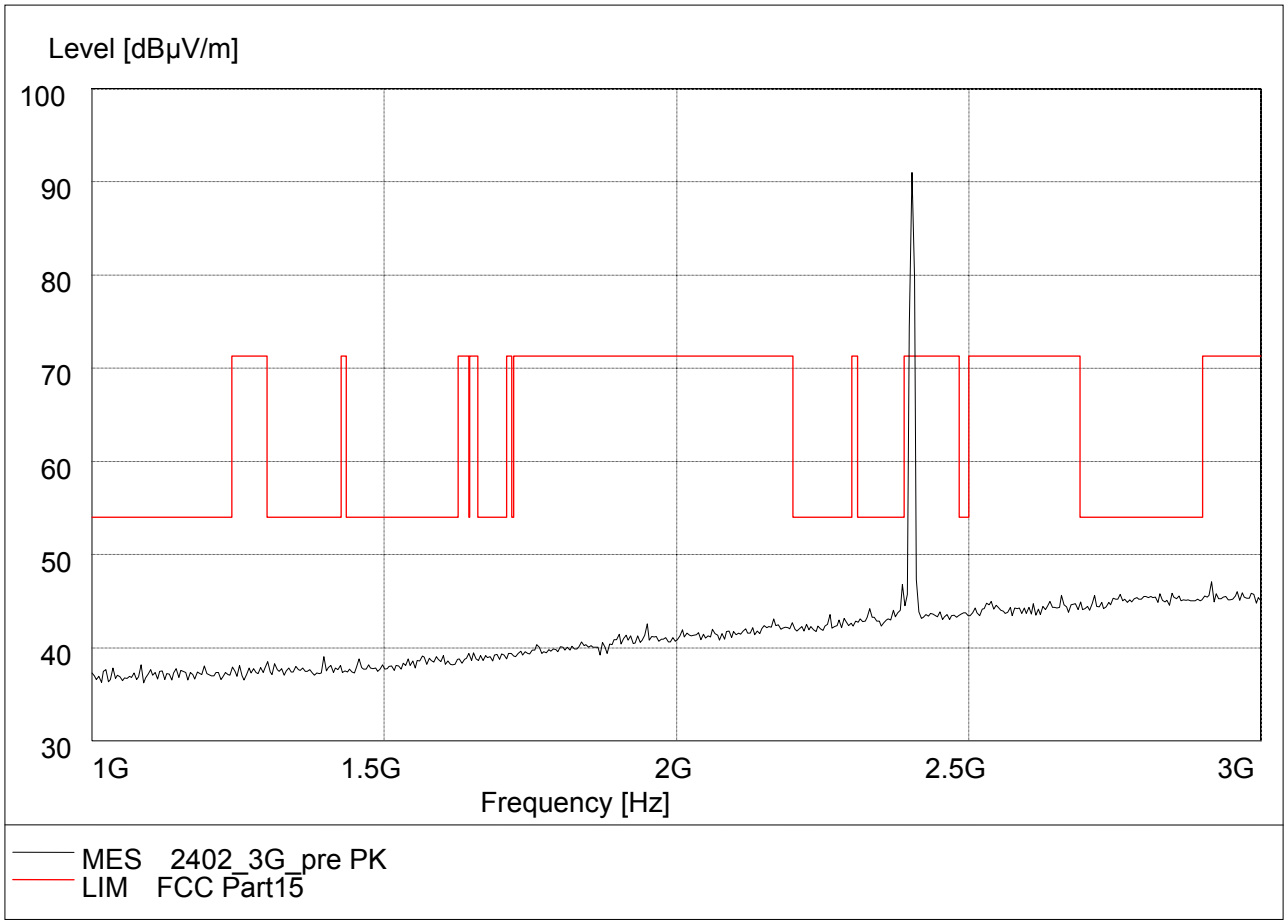


A.15.3.2 30MHz-1GHz - Channel 2402MHz

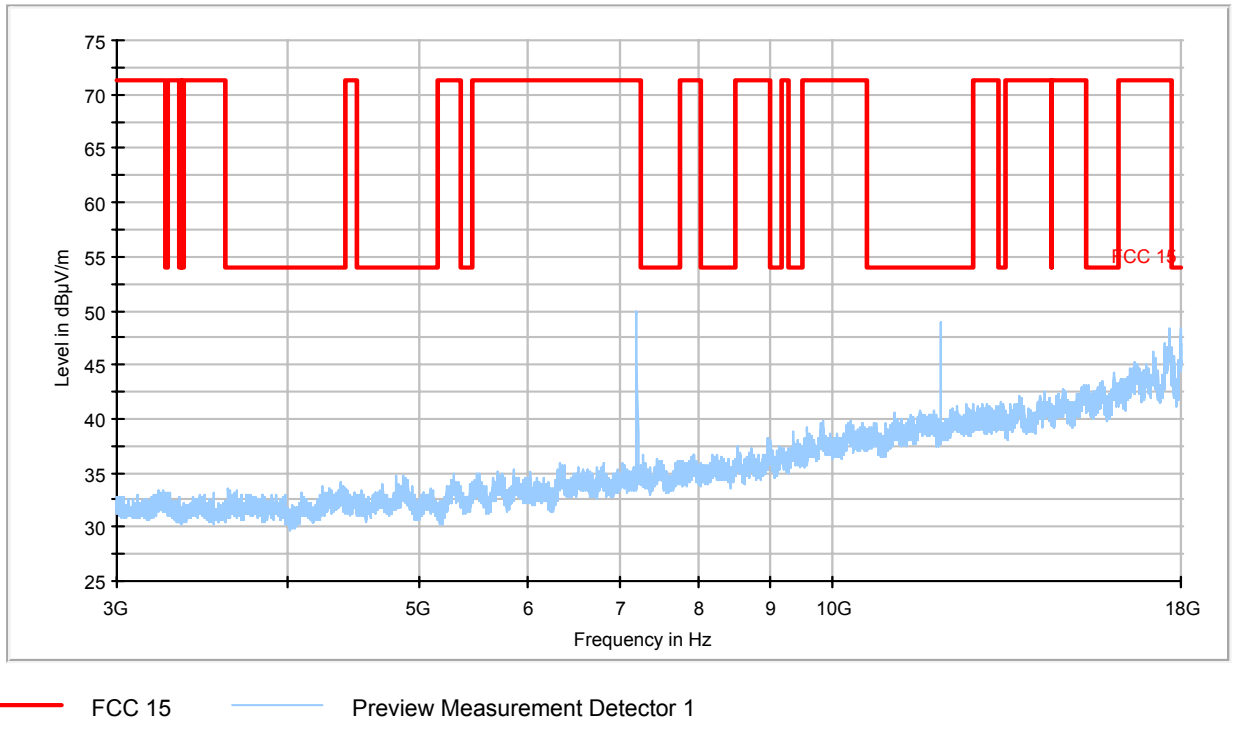


A.15.3.3 1GHz-3GHz - Channel 2402MHz

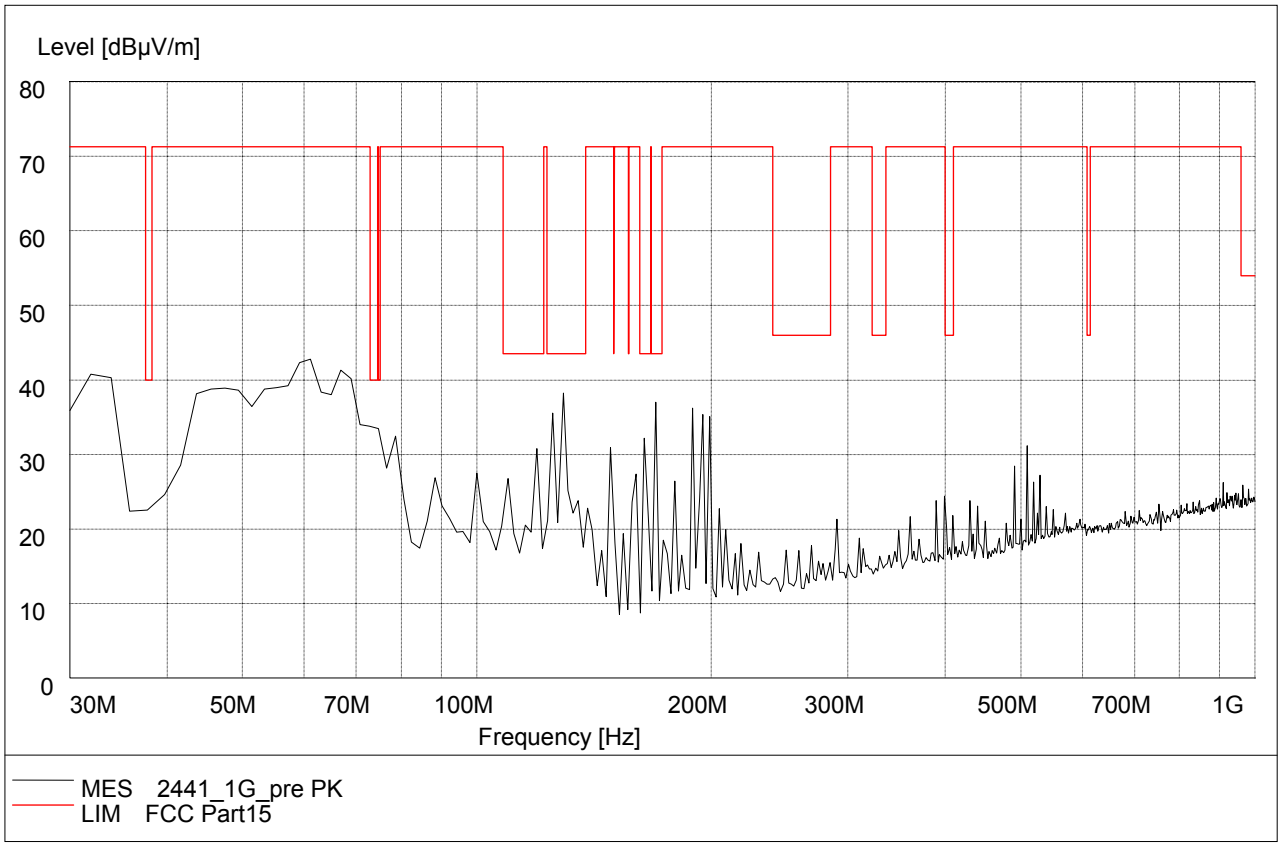
Note: the peak above the limit is carrier power.



A.15.3.4 3GHz-18GHz - Channel 2402MHz

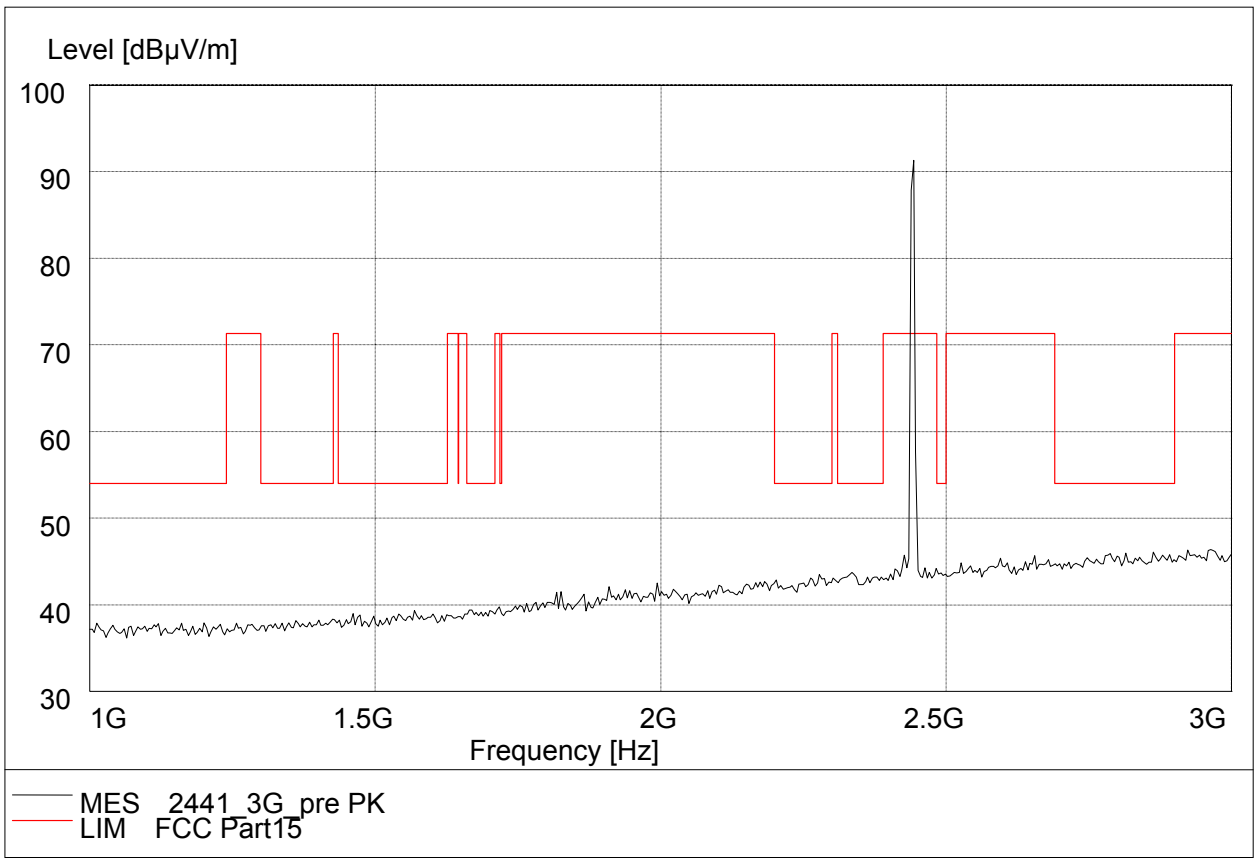


A.15.3.5 30MHz-1GHz - Channel 2441MHz

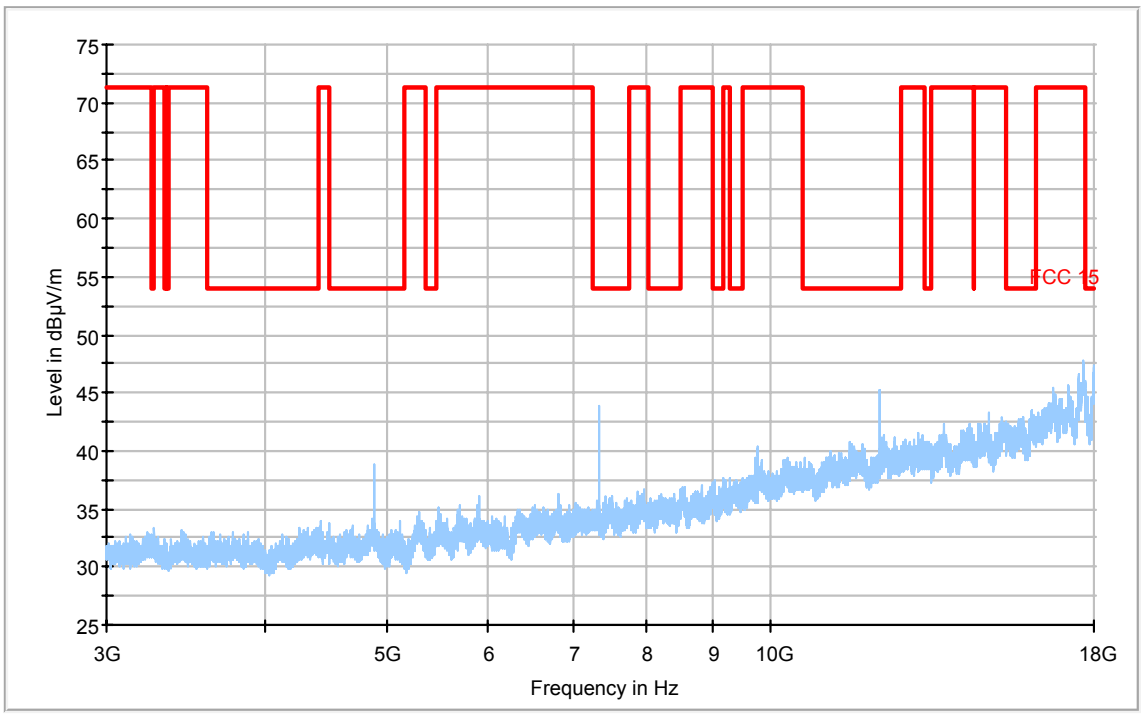


A.15.3.6 1GHz-3GHz - Channel 2441MHz

Note: the peak above the limit is carrier power

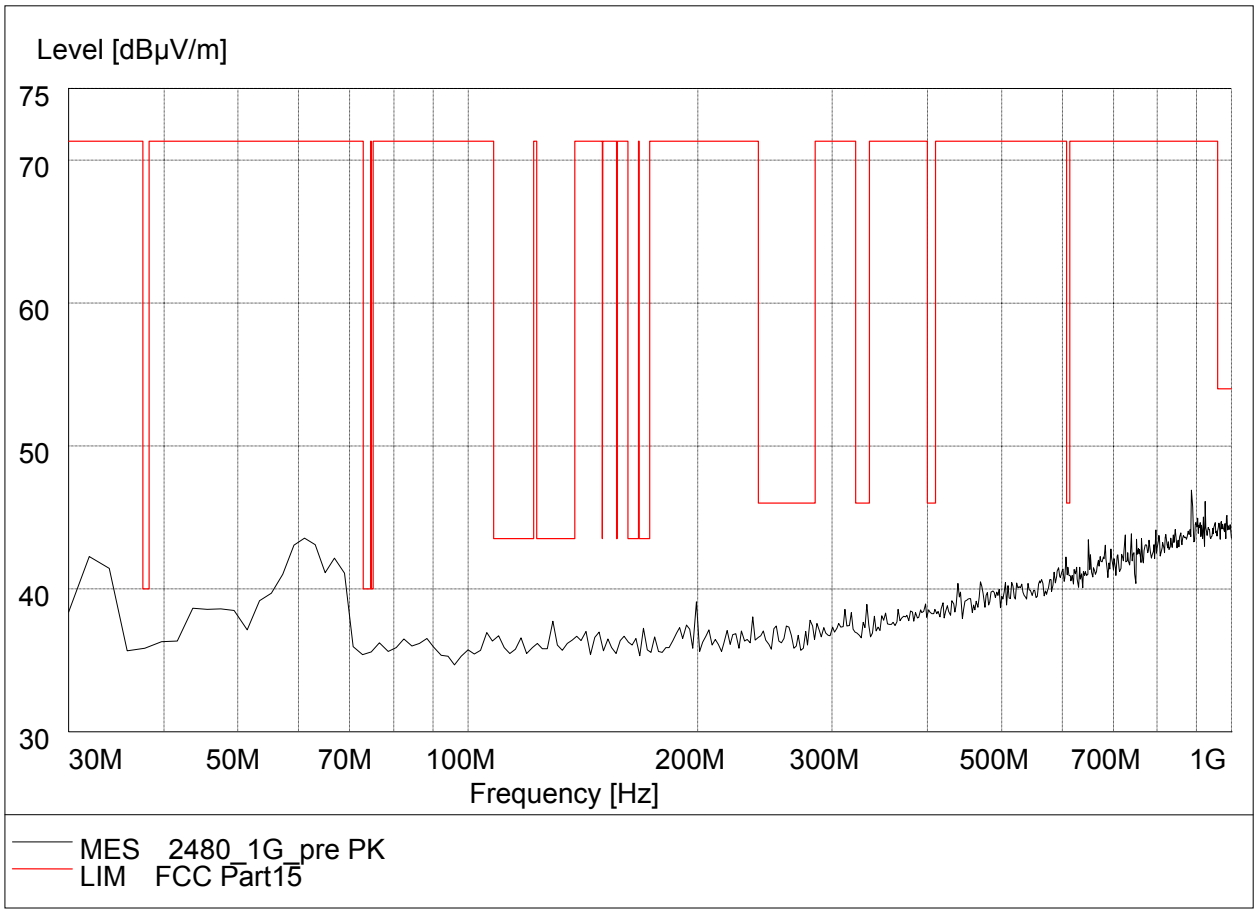


A.15.3.7 3GHz-18GHz - Channel 2441MHz



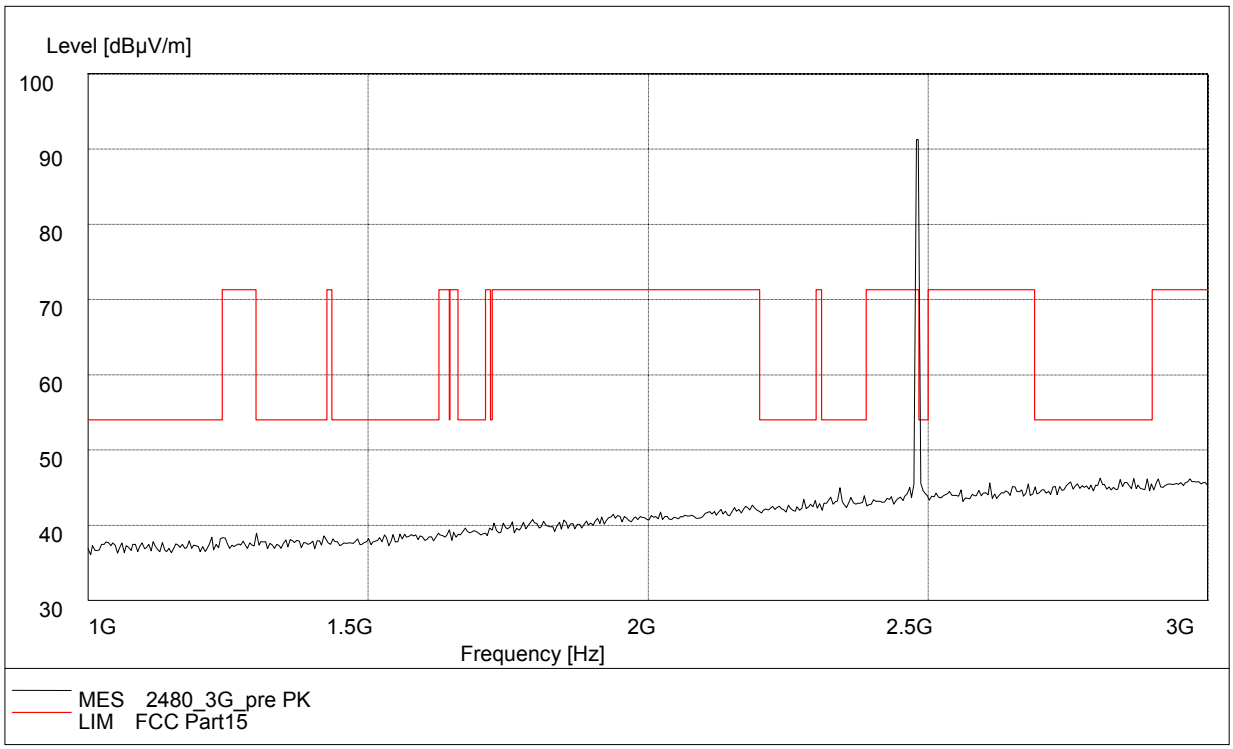
FCC 15 Preview Measurement Detector 1

A.15.3.8 30MHz-1GHz - Channel 2480MHz

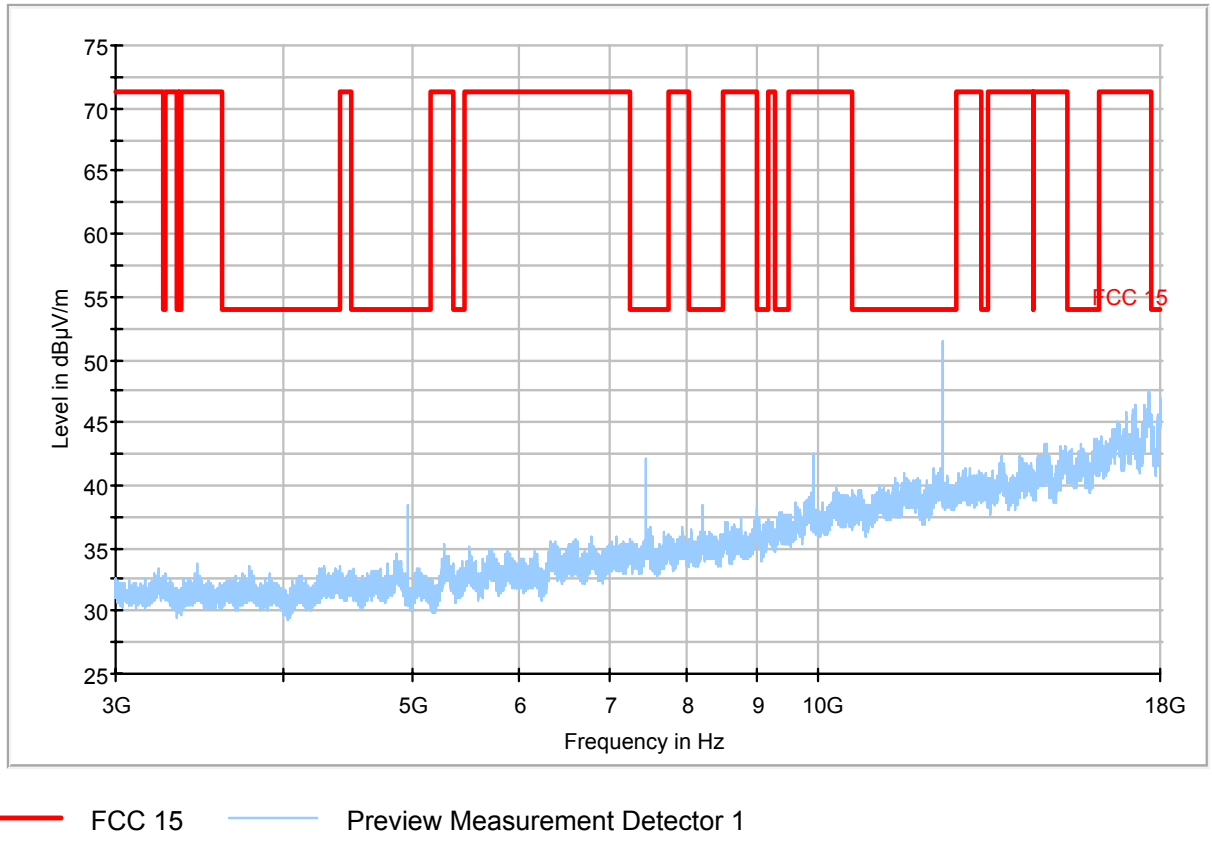


A.15.3.9 1GHz-3GHz - Channel 2480MHz

Note: the peak above the limit is carrier power

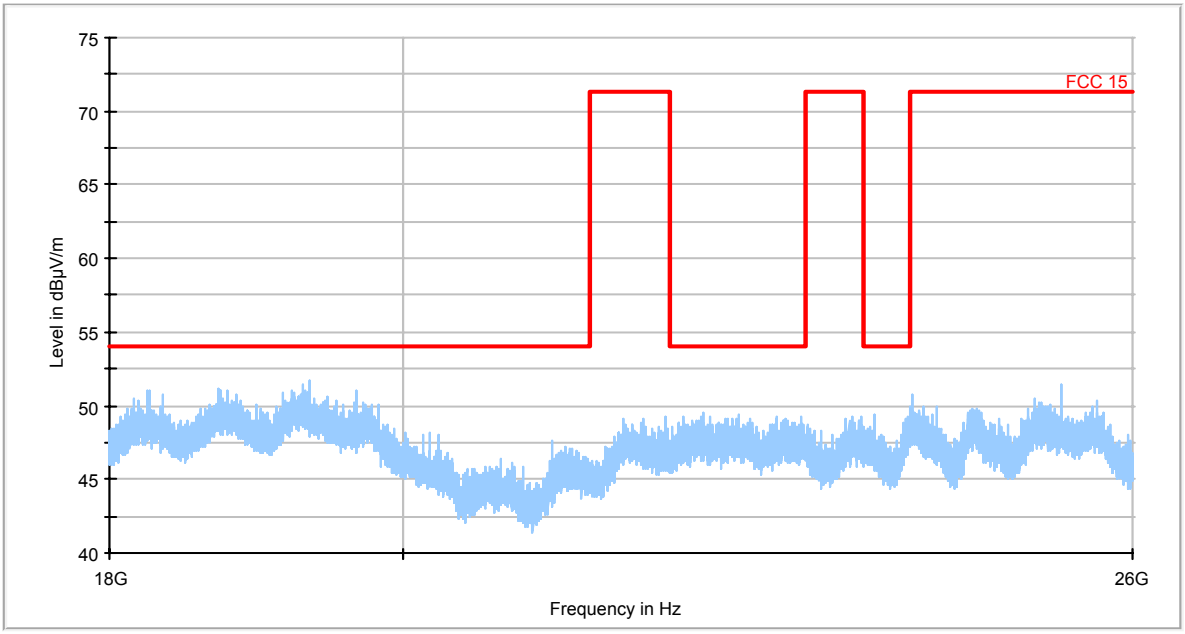


A.15.3.10 3GHz-18GHz - Channel 2480MHz



A.15.3.11 18GHz-26.5GHz

This plot is the worst case of Low, Middle, High channel. It is same as the noise floor.



FCC 15:Limit Preview Measurement Detector 1

ANNEX B PHOTOGRAPH OF EUT

External Photo

Mobile Phone

Mobile Phone

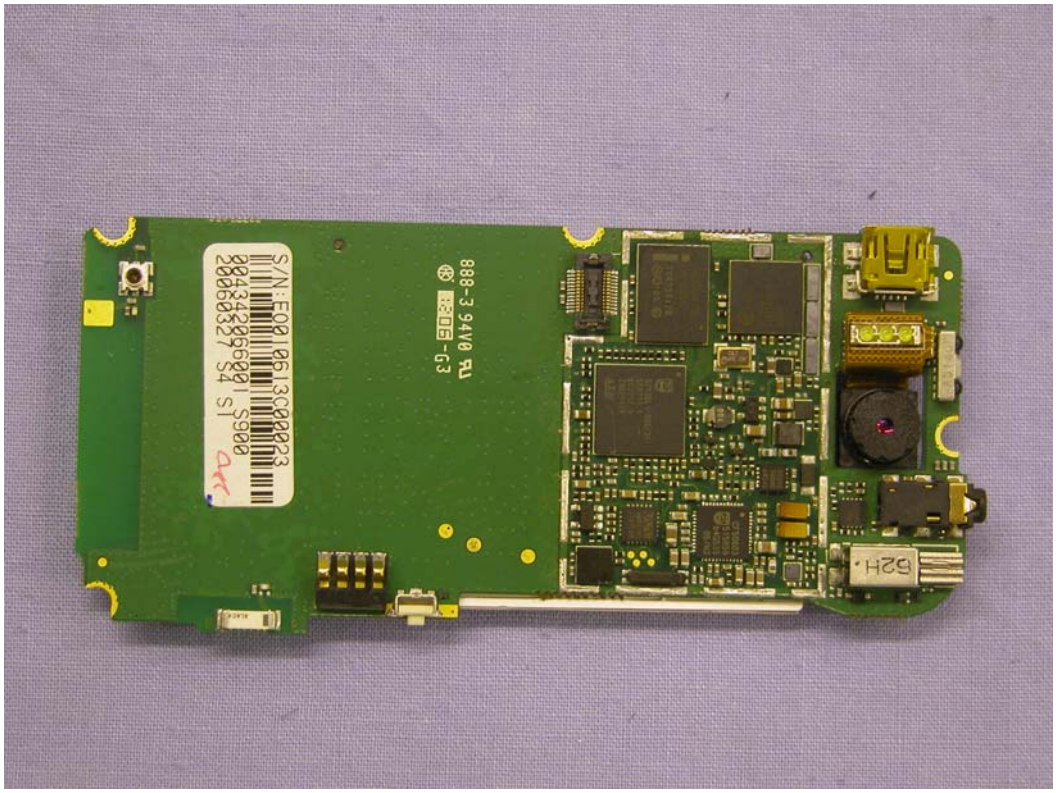
Mobile Phone

Mobile phone

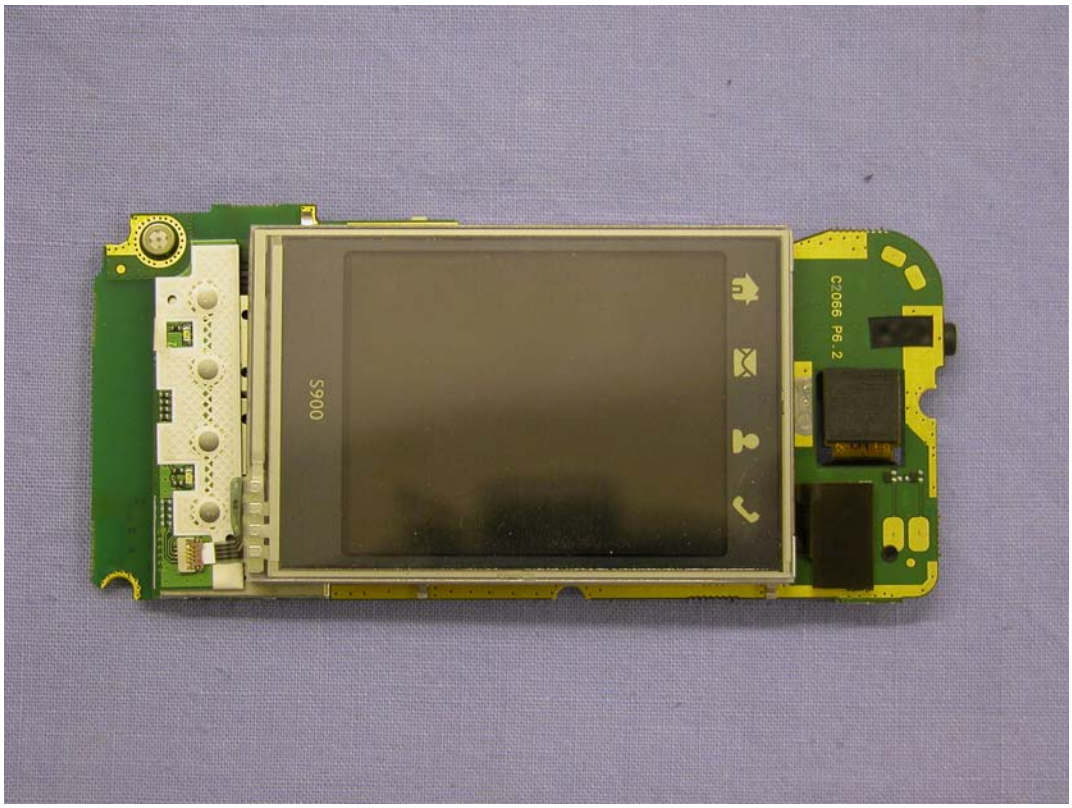
Charger (AC/DC Adapter)

Internal Photo

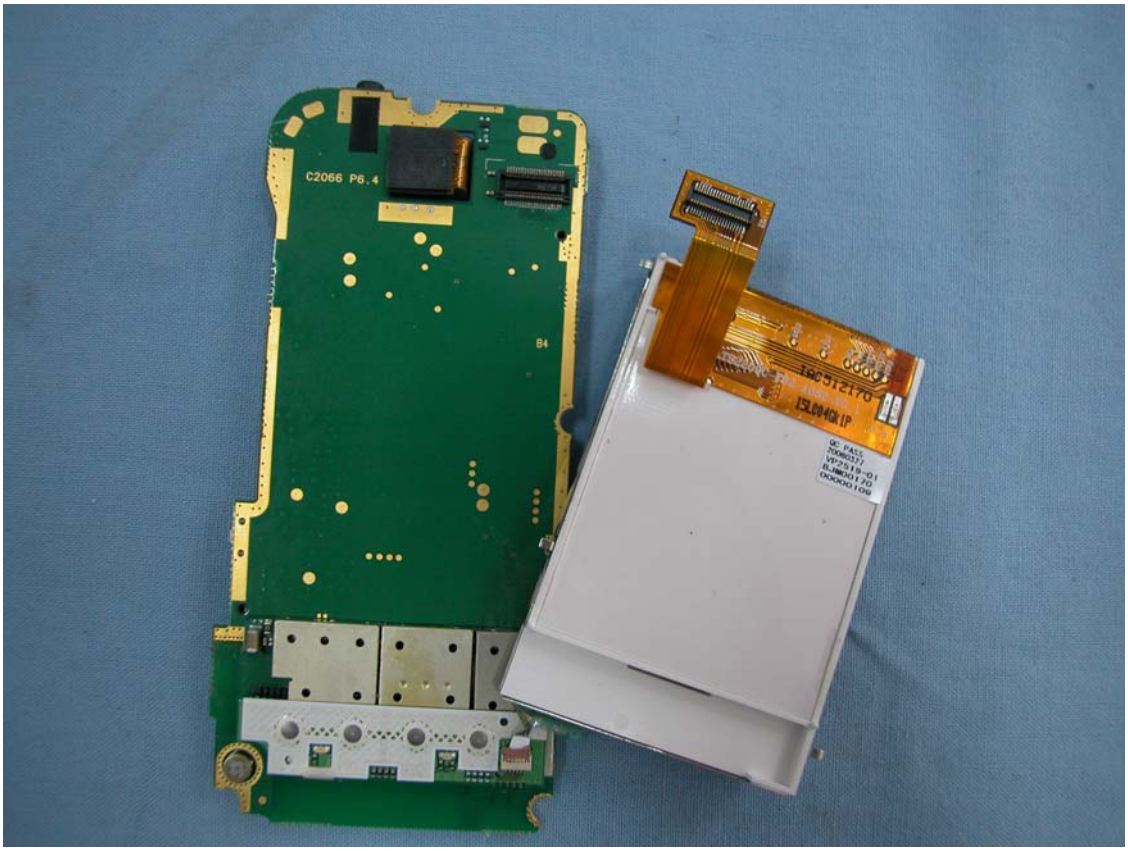
Mobile phone Disassembly



mobile phone PCB back view

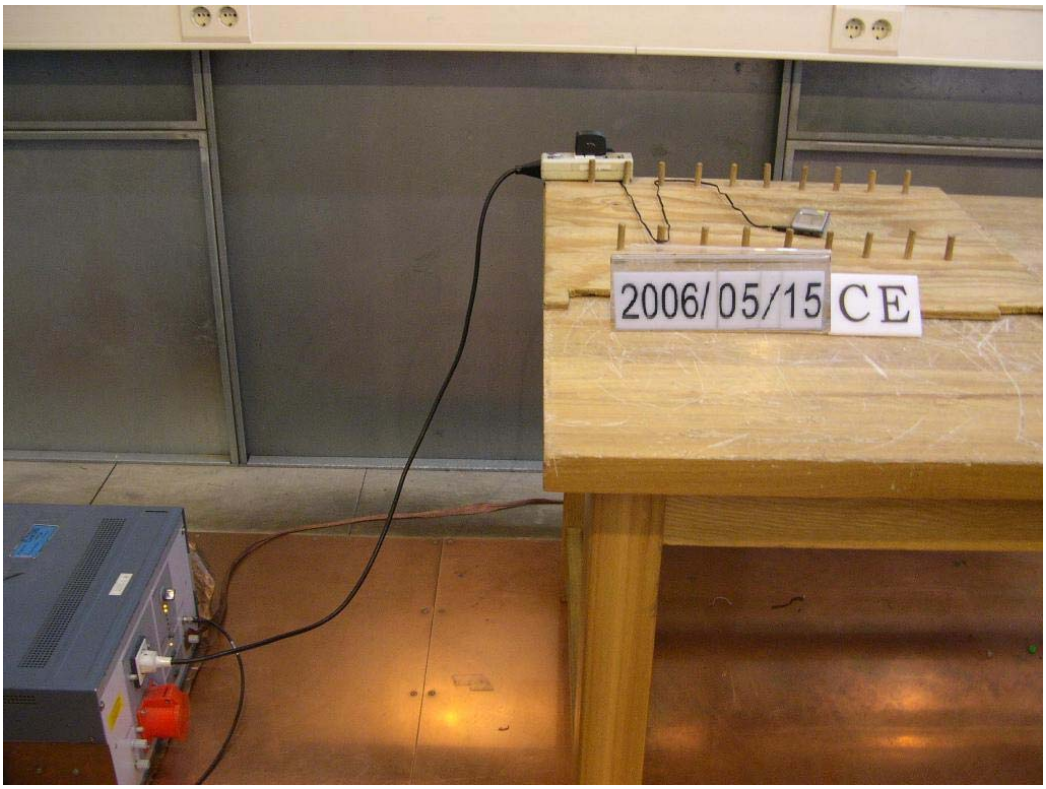


mobile phone PCB front view



mobile phone PCB front view

ANNEX C TEST LAYOUT



Pic C.1 Conducted Emission

Pic C.2 Radiated Spurious Emission for PCS1900

Pic C.3 Radiated Spurious Emission for Bluetooth

*****END OF REPORT BODY*****