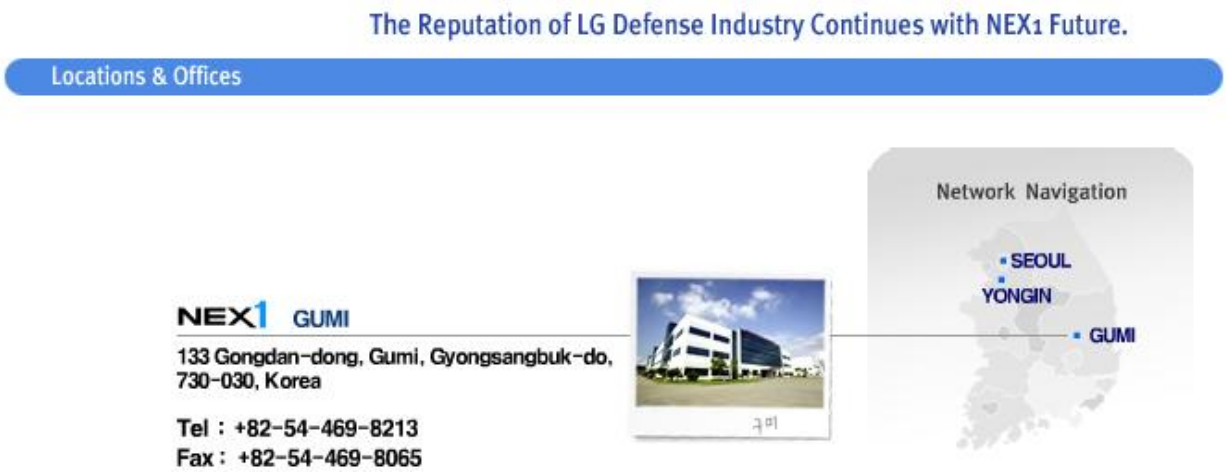
NEX1 Future Co., Ltd.

FCC TEST REPORT



December 14, 2005

NEX 1 Future Co., Ltd.

TEST REPORT CERTIFICATION

Applicant	**: Enustech Inc.**
Adderss	**: JnJ Bldg,5th Yeoksam 2-dong,785-12, Gangnam_gu, Seoul, Republic of Korea**
EUT Name	**: Bluetooth HandsFree**
Model No.	**: BHF-100**
Serial No.	**: Engineering Sample**
FCCID	**: TT2EBHF100N0005**
Testing location	**: LG-Nortel Co. Ltd. 299, Gongdan-Dong, Gumi-City , Gyeongsangbuk-Do, 730-030, R.O.K**
Applied specification	**: FCC Part 15**
Test result	**: The above mentioned test item passed.**

Test Date	**December 14, 2005**	**Review Date**	**December 14, 2005**
Tested by	**Hyo-Jeung, Cho**	**Reviewed by**	**Jeong-Hi, Jin**
Title	**Engineer**	**Title**	**EMC Manager**
Signature		**Signature**	

I HEREBY CERTIFY THAT the data shown in this report were made in accordance with the procedures given in the applied specification and I assume full responsibility for accuracy and completeness of these data.

Note : This test report relates to the a. m. test item. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark on this or similar products.

Contents

1. General Information

1.1 Product Description

Product Name	: Bluetooth HandsFree
Product ID	: BHF-100
Serial No.	: Prototype
FCC ID	: TT2EBHF100N0005

1.2 Project data

Receipt of EUT	: December 9, 2005
Date of Test	: December 14, 2005
Data of report	: December 14, 2005

1.3 Applicant

Company Name	: Enustech,.Inc
Address	: JnJ Bldg,5th Yeoksam 2-dong,785-12,Gangnam_gu,Seoul, Republic of Korea
Contact Person	: Mr. Hyo-Tae, Kim

1.4 Manufacturer

Company Name	: Enustech,.Inc
Address	: JnJ Bldg,5th Yeoksam 2-dong,785-12,Gangnam_gu,Seoul, Republic of Korea
Contact Person	: Mr. Hyo-Tae, Kim

2. EUT Information

2.1 General EUT Information

Type	Transmitter	Receiver
FCC Classification	FHSS Sequence Spread Spectrum (FHSS)	FHSS Sequence Spread Spectrum (FHSS)
Operating frequency range	2402 – 2480 MHz	2402 – 2480 MHz
Bands of operation	2.400 – 2.4835 GHz	2.400 – 2.4835 GHz
Number of Channels	79	79
Channel Separation	1MHz	1MHz
Type of Antenna	PCB Pattern Antenna	PCB Pattern Antenna
Power Supply	DC 3.7 V Lithium Ion	DC 3.7 V Lithium Ion

2.2 Center Frequency of Tested Channel

Frequency	Tx (MHz)	Rx (MHz)
Lowest	2402	2402
Middle	2441	2441
Highest	2480	2480

2.3 Test Environment

Temperature	25ºC
Relative Humidity	30 ~ 60%
Voltage	DC 3.7V

2.4 Accessories and Ancillary Equipment

Equipment	Model No.	Serial Number	Maker
Laptop PC	PS428L-OE142	30014068J	Toshiba

3. Testing Facilities

LG-Nortel Co. Ltd.
299, Gongdan-Dong, Gumi-City , Gyeongsangbuk-Do, 730-030, R.O.K

4. EUT Description and Operational Description

BHF-100 is designed for safety and comfort. It is a solution whereby the Bluetooth Hands-free Car kit recognizes the mobile phone and connects it without a cable or phone holder, enabling the user to control calls without touching the phone and keeping hands free for driving. Noise and acoustic echo are suppressed by the dedicated digital signal processor BHF-100 isn't need to wearing and so very comfortable and easier than other wearing headset. There are two microphone, two LED and loud speaker and then it can use without difficult to wear, dangerous to wear while driving, pain on ear area because of being worn for a long time.
Noise and acoustic echo are canceling with two microphone from loud speaker, loud speaker and two LED indicate several state in BHF-100, i.e. Making a call, Incoming a call, Ending a call, Low Battery, etc.,
BHF-100 use rechargeable Li-ion Battery, gives you up to 10hours of continuous talk time and 300hours of stand-by time with full charge.

1. Bluetooth spec: class2, Max +4dBm Tx output Power
2. Full Duplex DSP
3. Noise Suppression & Echo cancellation
4. Charging Current : 500 mA
5. Li-ion 1150mAh
6. Voltage: DC 3.3V regulated
7. Charging Time : 2 ~ 2.5 Hour
8. StandBy: 300 hours
9. Talking Time: 10 hours
10. Sensitivity (RF/MIC): -80 dBm / -42dB
11. Output Power: Max 2mW
12. Operating Range: Max.10M (30 feet)
13. Weight: 100g
14. Volume Control: 10 Steps
15. Power saving in Stand-by Mode
16. Bluetooth v1.2 or higher compliant

5. Test Set-up

5.1 Principle of configuration

Conducted : The equipment under test (EUT) was configured with a temporary SMA Connector and EUT transmits the related packet type with PRBS 9 as payload.

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes and test settings were adapted accordingly in reference to the instructions for use.

For details, please refer to the Operation mode in chapter 7.

5.2 Operational Modes

Page Scan,
Inquiry Scan
Hopping Mode
Fixed mode (2402Mhz, 2441Mhz and 2480Mhz)

5.3 Applied Specification

FCC Part 15

6. Test Report Summary

Related Clause	Test Cases	FCC Part Sections	Result (Note1)
7.1	Antenna Connector Requirements	15.203 15.204	C
7.2	AC Connected Emission	15.207	N/A
7.3	Carrier Frequency Separation	15.247	Pass
7.4	Time of Occupancy(Dwell time)	15.247	Pass
7.5	20dB Bandwidth	15.247	Pass
7.6	Number of Hopping Frequencies Requirements	15.247	C
7.7	Pseudorandom Frequency Hopping Sequence and Equal Hopping Frequency use Requirements	15.247	C
7.8	Receiver Input Bandwidth Requirements	15.247	C
7.9	Peak Output Power	15.247	Pass
7.10	Band-edge Compliance	15.247	Pass
7.11	Spurious Conducted emissions	15.247	Pass
7.12	Spurious Radiated emissions	15.247	Pass

* Note1: C: Complies, Pass: Passed, Fail : Failed and NA : Not Applicable

7. Test Results

7.1 Antenna Connector Requirements

Requirements **Subclause 15.203 and 15.204(c)**

According to the Part 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section.
The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.
And according to the Part 15.204(c), only the antenna with which an intentional radiator is authorized may be used with the intentional radiator.

Test results

RESULT: **Complies**

The antenna is permanently attached on the PCB.
The EUT has a PCB Pattern Antenna printed onthe circuit board.
For more information on the antenna:

Antenna gain	: 0 dBi
Manufacturer	: N/A
Model No.	: N/A
Type	: PCB Pattern Antenna

7.2 AC Connected Emission

Test Mode and conditions

The power is supplied by a DC 3.7 V Lithium Ion and it does not operate during the charging.

Requirements **Subclause15.207(a)**

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN).

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66-56*	56-46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

Test results

N/A.

7.3 Carrier Frequency Separation

Test Mode and conditions

Mode of operation : Tx mode (hopping on), DH1 packet with PRBS9 payload
Measurement Method : Conducted
Detector : PK
Trace : Max hold
RBW/VBW : 100kHz/300kHz

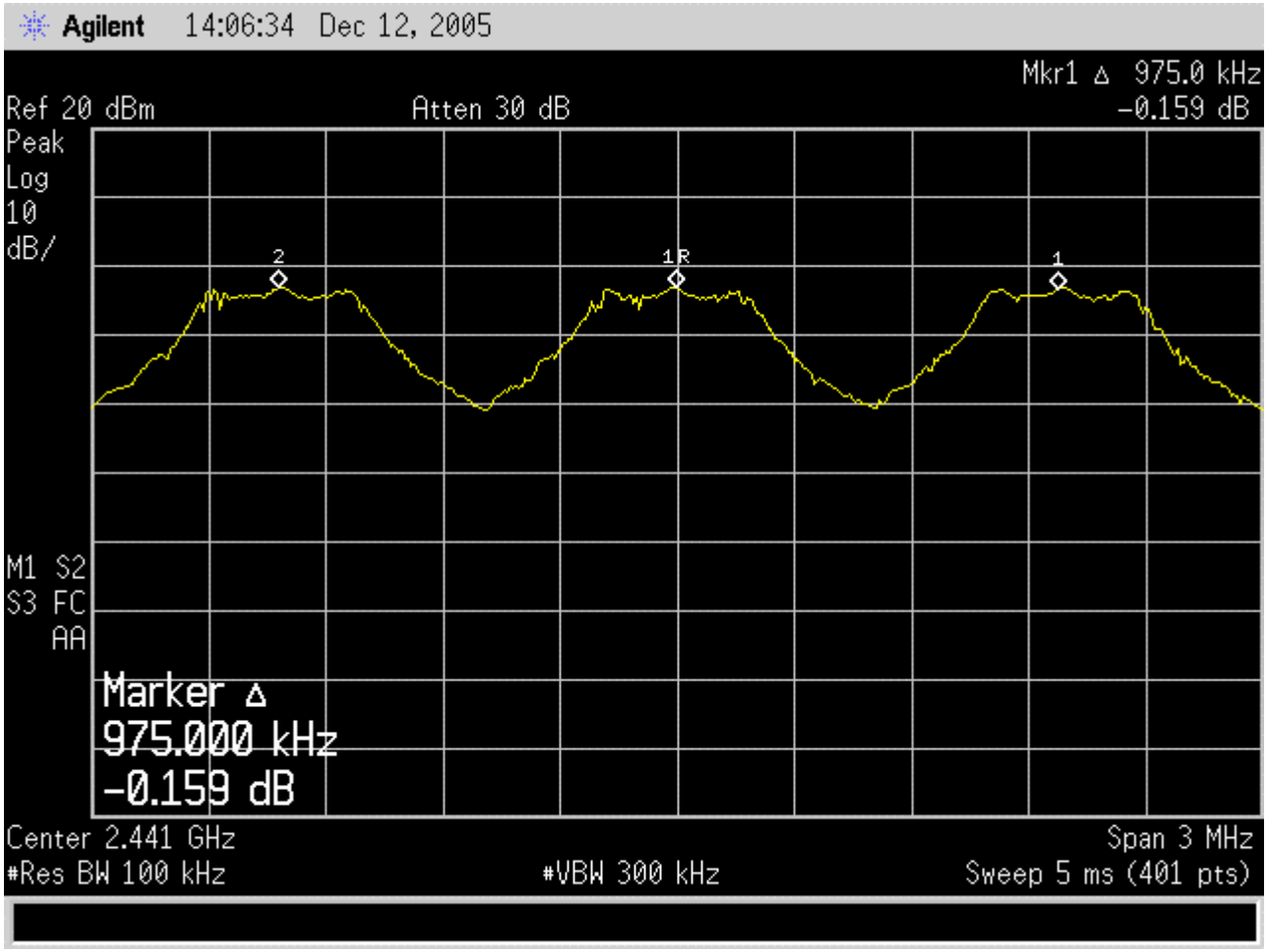
Requirements **Subclause 15.247(a)(1)**

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.

Test results

Reference frequency (MHz)	Channel Separation (kHz)	Limit	Results
2441.000	975	Minimum of 25kHz or the 20dB bandwidth	Pass

Carrier Frequency Separation Plot



7.4 Time of Occupancy(Dwell time)

Test Mode and conditions

Mode of operation : Hopping on , DH5 packet with PRBS9 payload
Measurement Method : Conducted
Detector : PK
Trace : Max hold
RBW/VBW : 1MHz/300kHz

Requirements **Subclause 15.247(a)(1)(iii)**

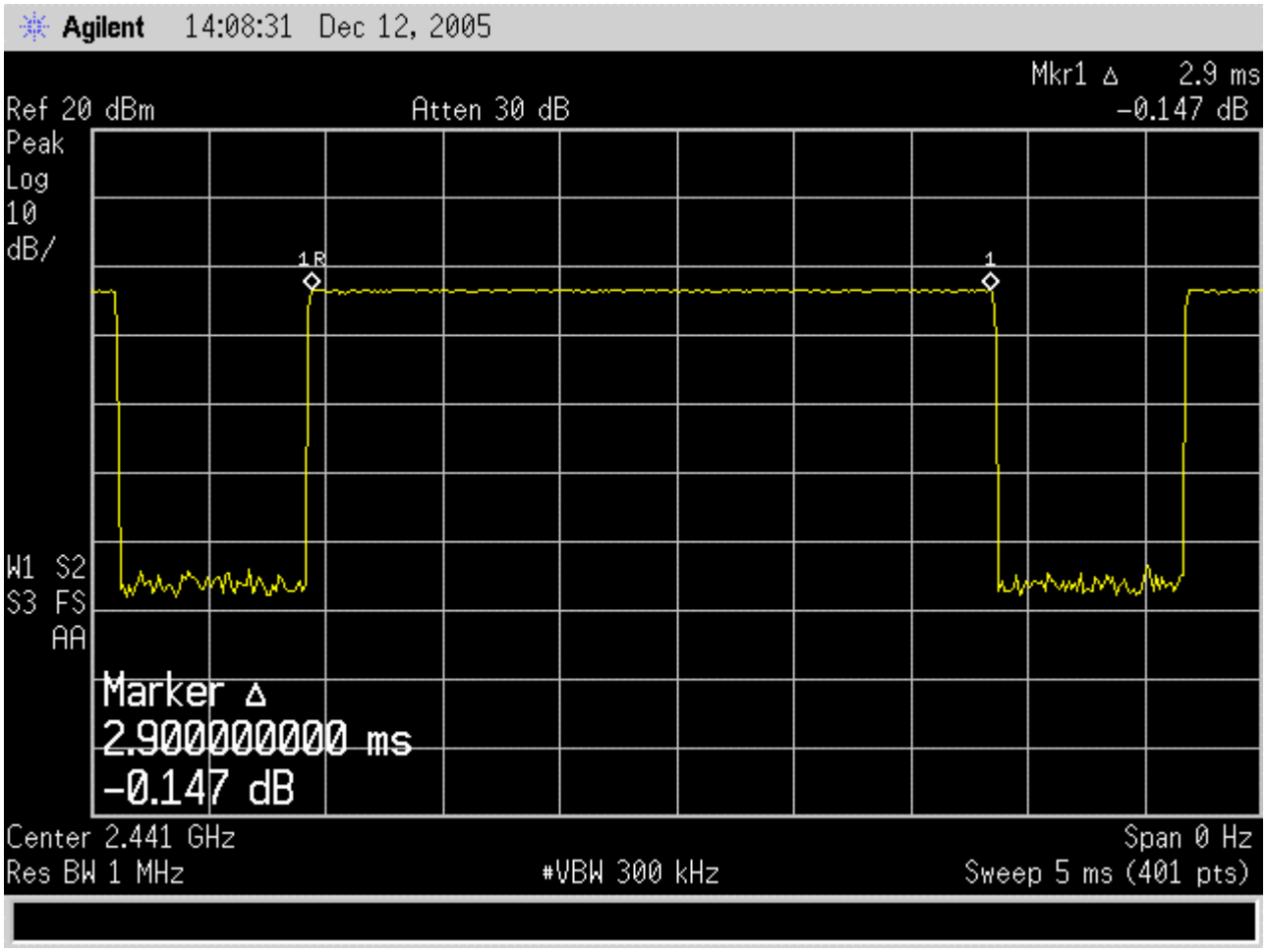
Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 75 hopping frequencies. The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period.

Test results

The system makes 1600 hops per second or has a length of 625us.
Let take DH5 packet in worst case. A DH5 packet has 5 slots for transmitting and 1 slot for receiving. It means it can have maximum 266.67 (=1600/6)hops per second.
Therefore it has 3.38 hops(=266.67/79) per second for each channel.
And it has 106.81hops appearance for 31.6 seconds (= 0.4x79channels).

Length per slot(L)	Number slots (N)	Dwell Time (=L*N)	Limit	Results
2.900 ms	106.81	309.749ms	0.4 seconds	Pass

Time of Occupancy Plot



7.5 20dB Bandwidth

Test Mode and conditions

Mode of operation : Tx mode (2402MHz, 2441MHz, 2480MHz), DH5 packet with PRBS9 payload
Measurement Method : Conducted
Detector : PK
Trace : Max hold
RBW/VBW : 30kHz/100kHz

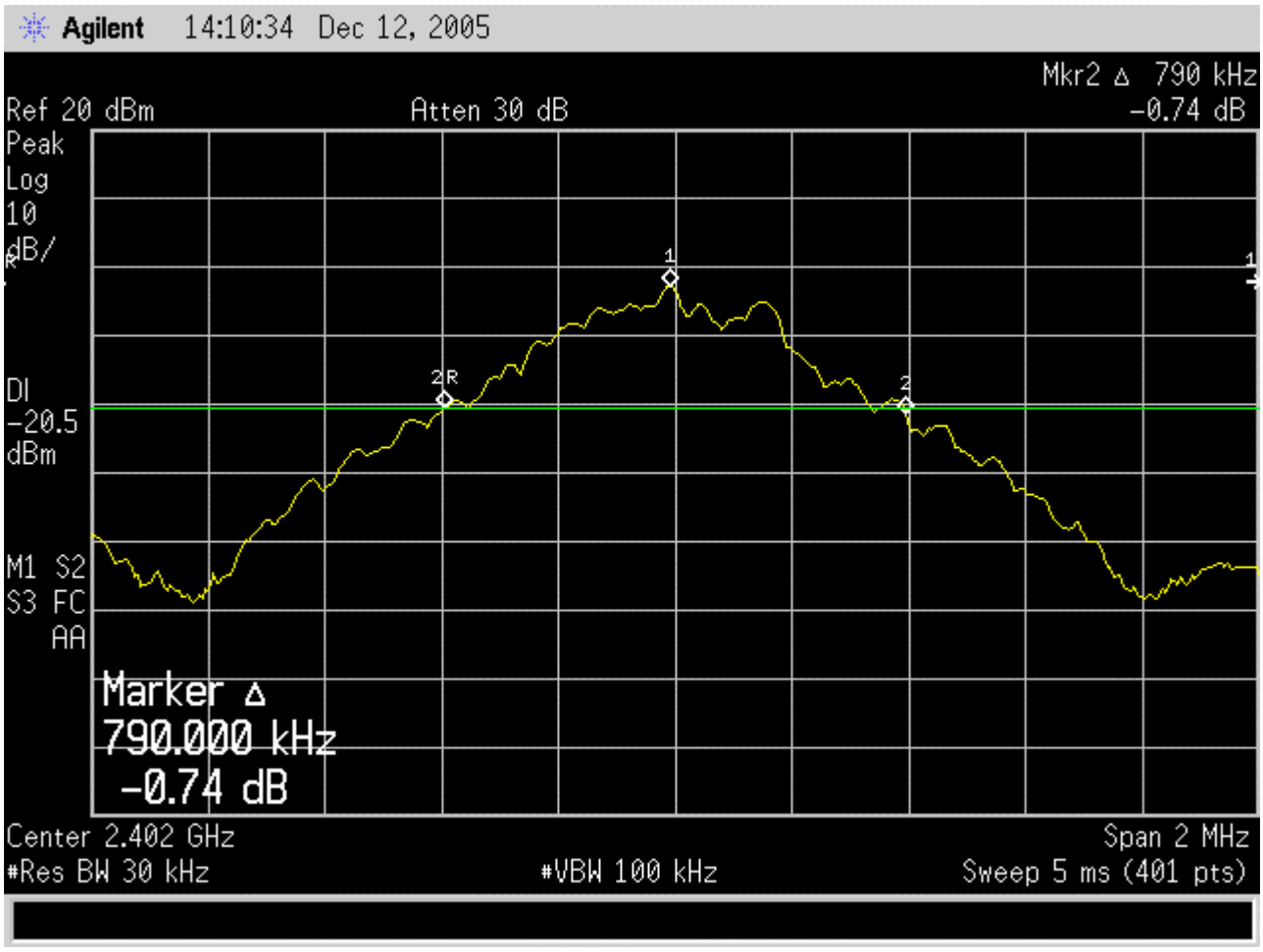
Requirements **Subclause 15.247(a)(1)**

It is mentioned implicitly as the maximum 20dB bandwidth of the hopping channel is 1Mhz.

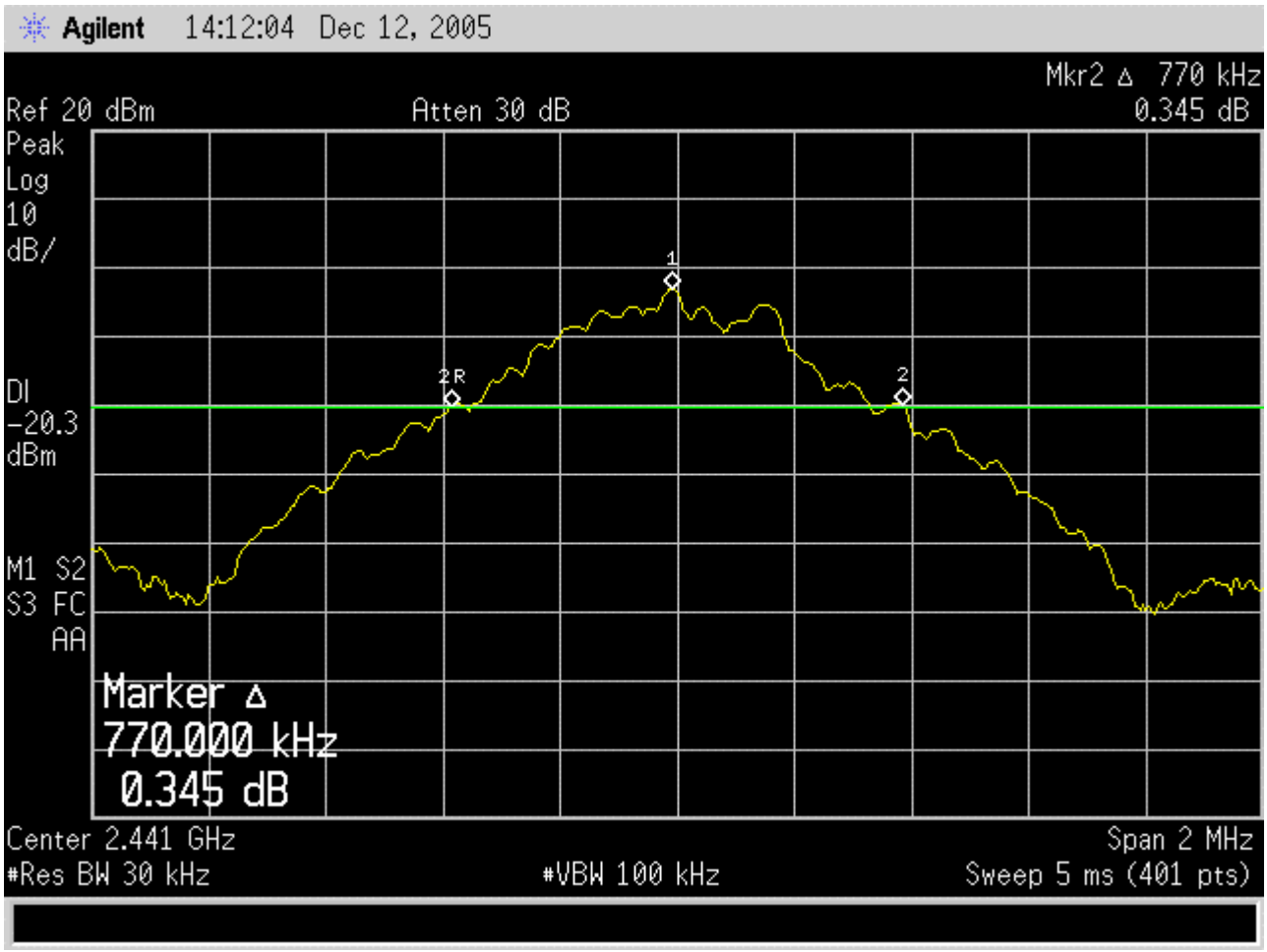
Test results

Operating frequency (MHz)	20dB Bandwidth (MHz)	Limit	Results
2402	0.790	< 1 Mhz	Pass
2441	0.770	< 1 Mhz	Pass
2480	0.910	< 1 Mhz	Pass

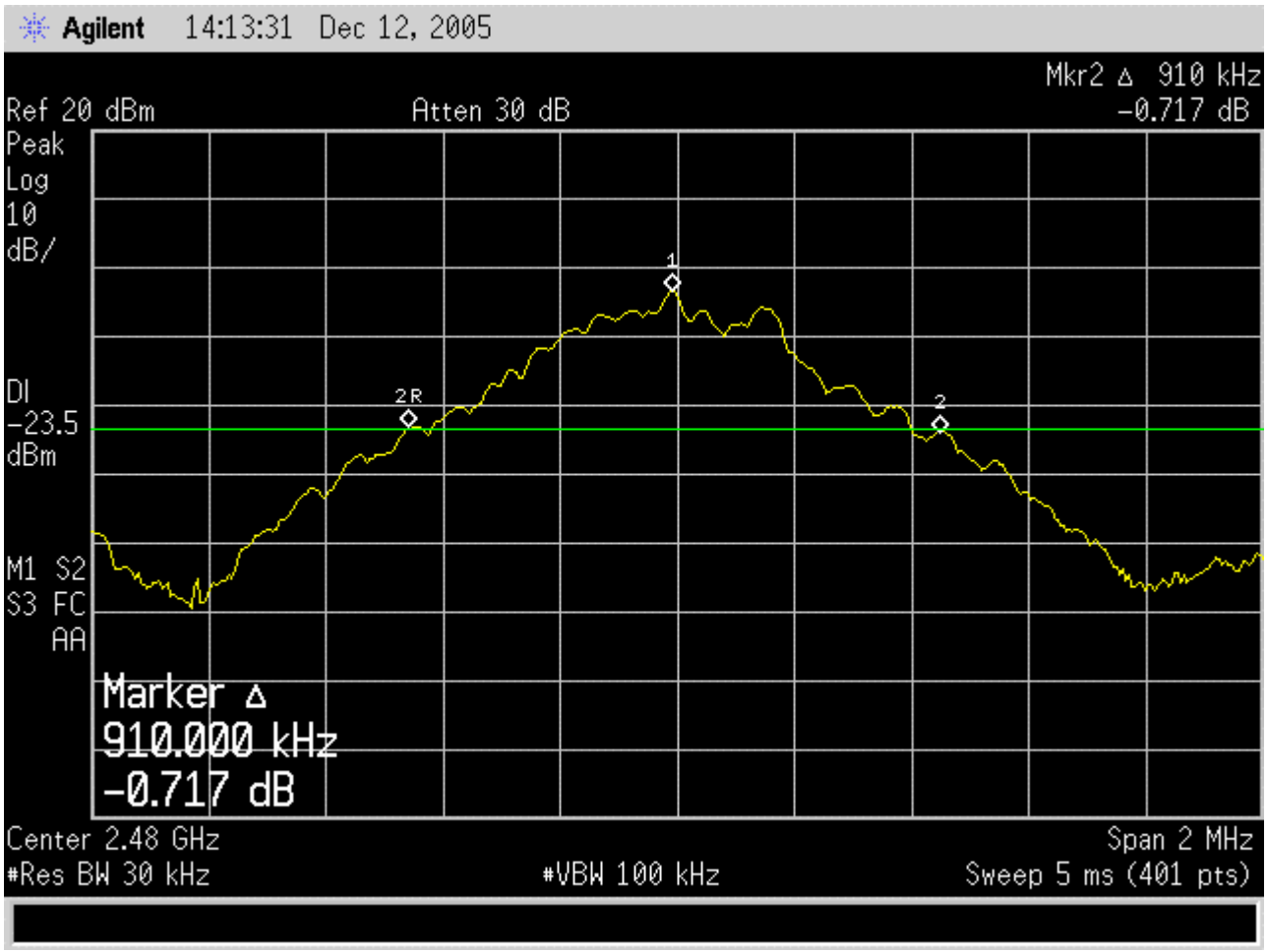
20dB Bandwidth Plot – 2402Mhz



20dB Bandwidth Plot – 2441Mhz



20dB Bandwidth Plot – 2480Mhz



7.6 Number of Hopping Frequencies Requirements

Test Mode and conditions

Mode of operation : Hopping, DH1 with PRBS9 payload
Measurement Method : Conducted
Detector : PK
Trace : Max hold
RBW/VBW : 100kHz/100kHz

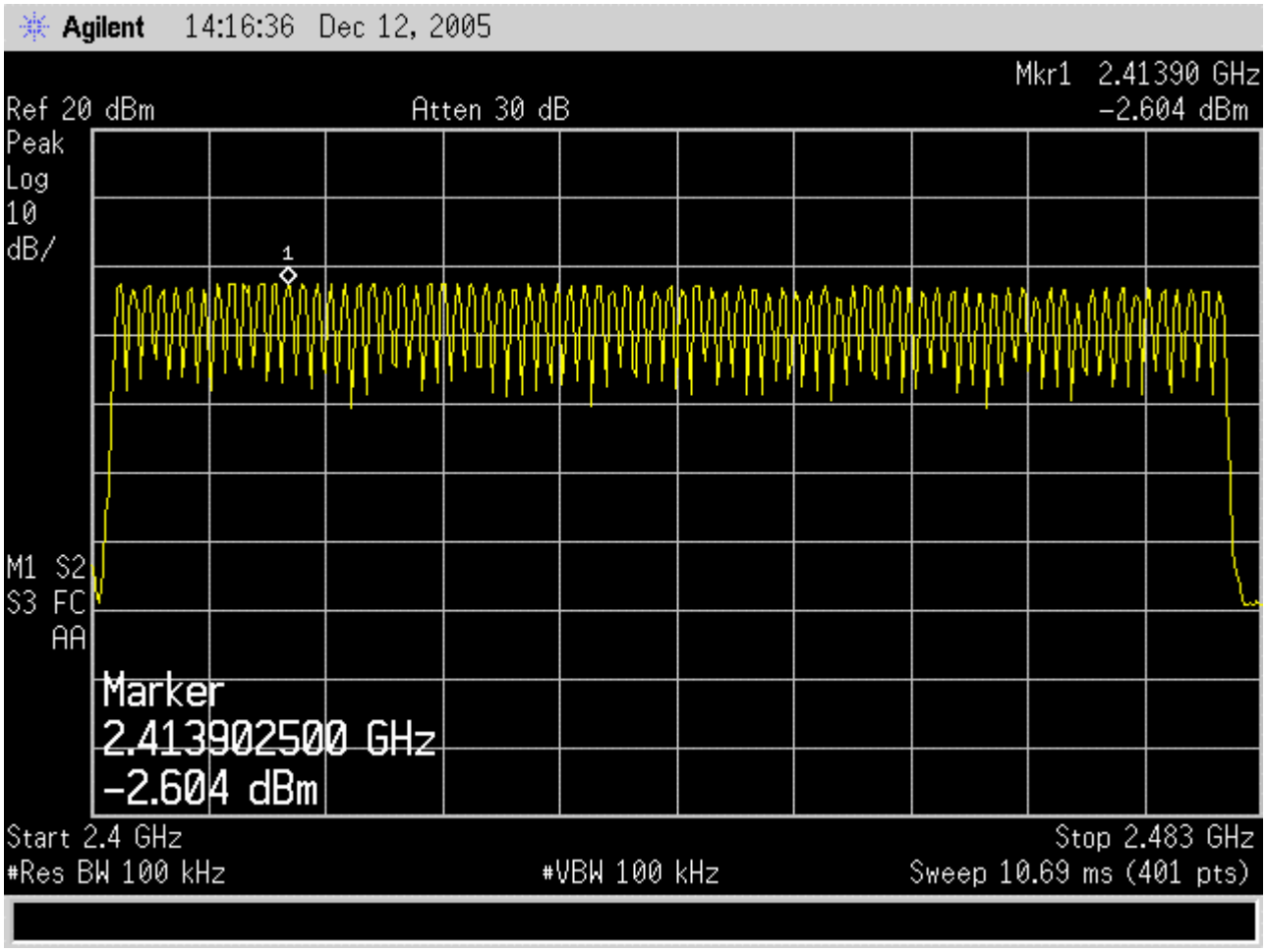
Requirements **15.247(a)(1)(iii)**

Frequency hopping systems in the 2400-2483.5 Mhz band shall use at least 15 non-overlapping Channels.

Test results

Operating frequency (MHz)	Number of Hopping	Limit	Results
2402~2480	79	≥ 15	Pass

Number of Hopping Frequencies Plot



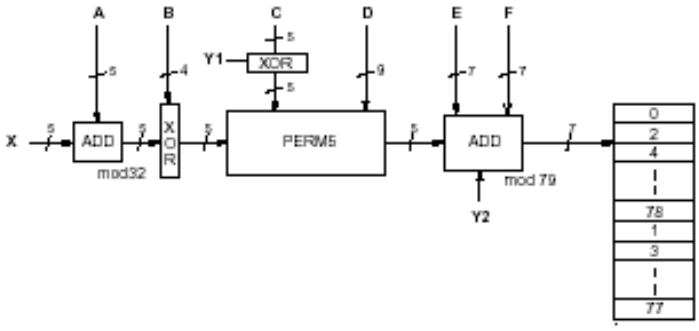
7.7 Pseudorandom FHS and Equal Hopping Frequency use Requirements

Requirements **Subclause 15.247 (a)(1)**

The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudorandomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter.

RESULT **Complies**

The channel is represented by a pseudo-random hopping sequence hopping throug h the 79 RF channels. The hopping sequence is unique for the piconet and is determined by the Bluetooth device address of the master. For details, refer to the figure 1. The X input determines the phase in the 32-hop segment, whereas Y1 and Y2 selects between master-to-slave and slave-to-master transmission. The inputs A to D determine the ordering within the segment, the inputs E and F determine the mapping onto thehop frequencies.
The algorism in the Bluetooth specifications shows the each of its hoping channels
Is used equally on average also.



< Figure 1 : Block diagram of hop selection kernel for 79 hop system >

7.8 Receiver Input Bandwidth Requirements

Requirements **Subclause 15.247 (a)(1)**

The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in the synchronization with the transmitted signals.

RESULT **Complies**

The receiver bandwidth is equal to the receiver bandwidth in the 79 hopping channel mode, which is 1 MHz. The receiver bandwidth is indirectly verified during Bluetooth RF conformance testing.

7.9 Peak Output Power

Test Mode and conditions

Mode of operation : Tx mode (2402MHz, 2441MHz, 2480MHz), DH1 packet with PRBS 9 payload
Measurement Method : Conducted
Detector : PK
Trace : Max hold
RBW/VBW : 1MHz/3MHz

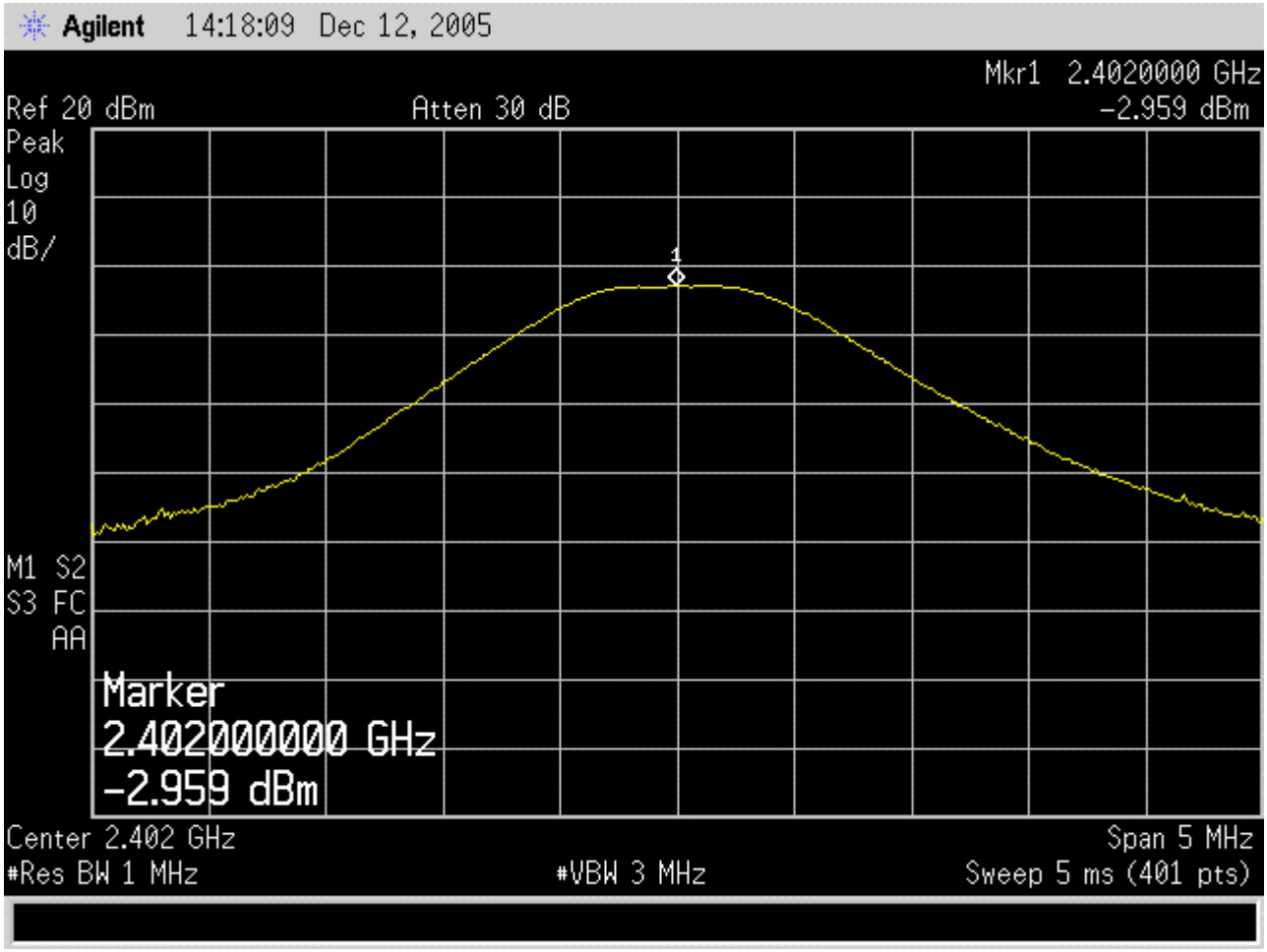
Requirements **Subclause 15.247(b)(1)**

For frequency hopping systems operating in the 2400~2483.5 Mhz band employing at least 75hopping channels, the maximum output power of the intentional radiator shall not exceeded 1 watt.

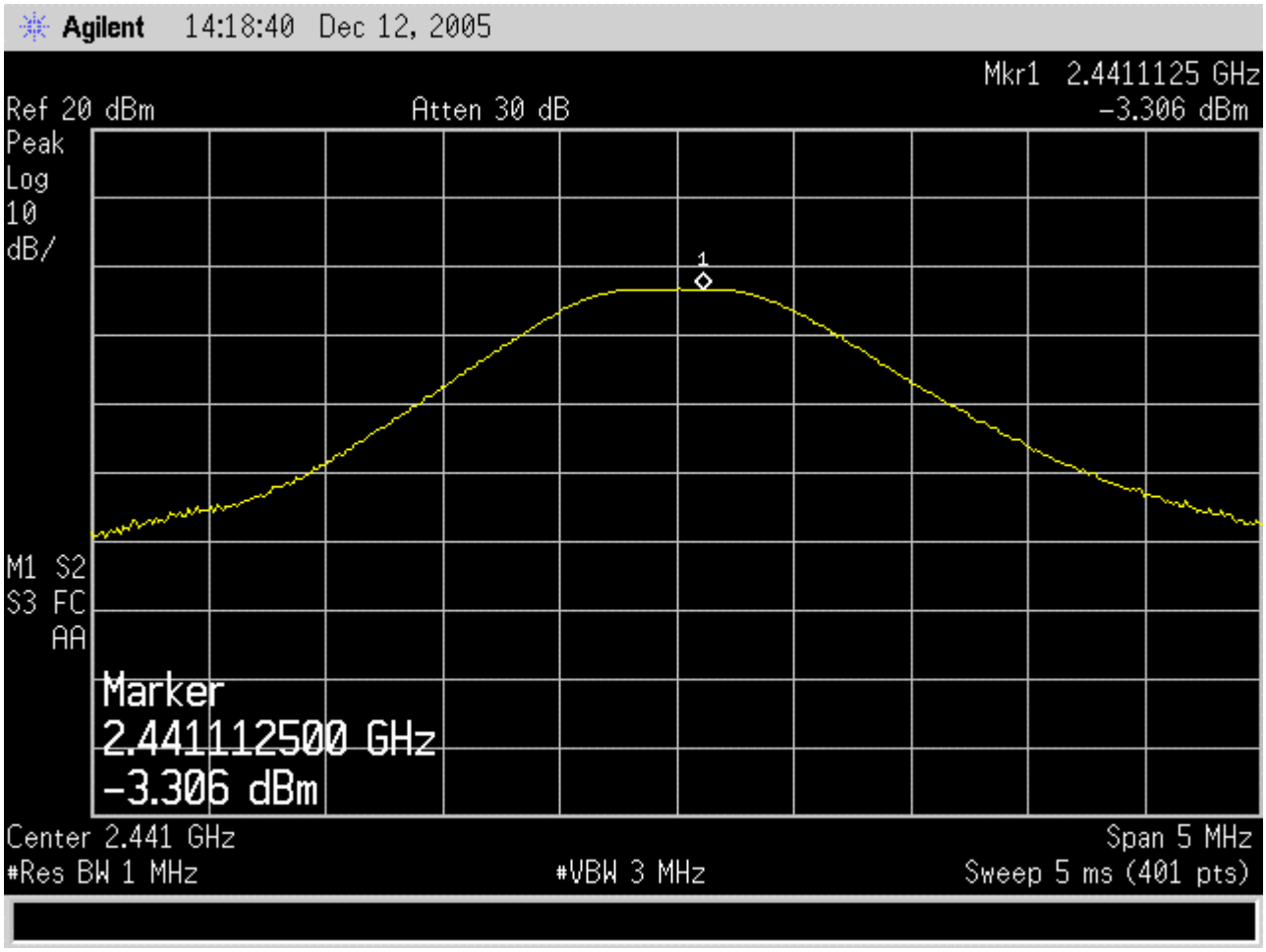
Test results

Operating Frequency (MHz)	Reading (dBm)	Cable attenuation (dB)	Actual Value (W)	Limit (W)	Results
2402	-2.959	1.80	0.000765773	<1.0	Pass
2441	-3.306	1.83	0.000711900	<1.0	Pass
2480	-3.735	1.85	0.000647888	<1.0	Pass

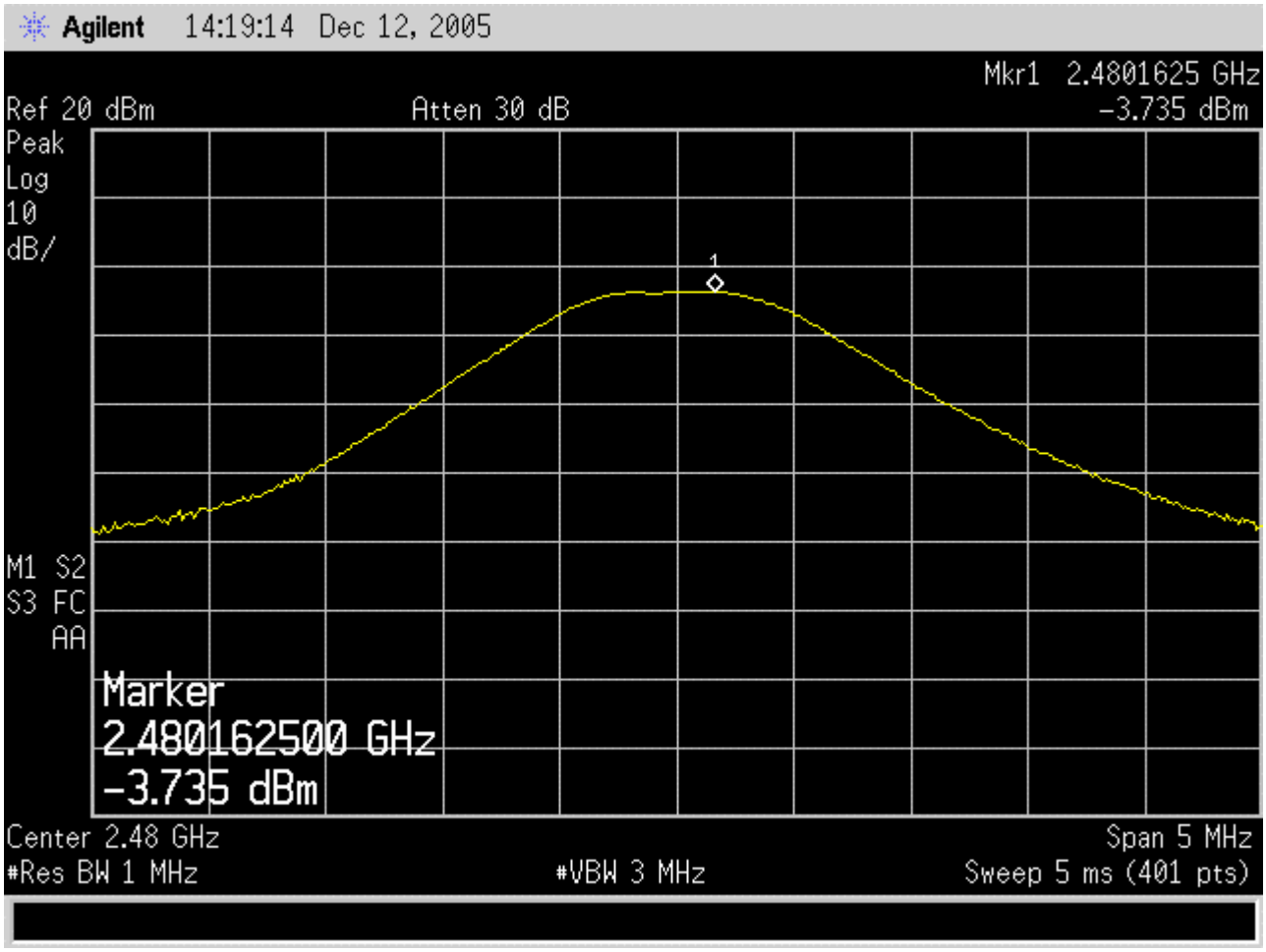
Peak Output Power Plot - 2402



Peak Output Power Plot – 2441



Peak Output Power Plot – 2480



7.10 Band-edge Compliance

Test Mode and conditions

Mode of operation : Tx mode (2402MHz, 2441MHz, 2480MHz), DH1 packet
Measurement Method : Conducted
Detector : PK
Trace : Max hold
RBW/VBW : 300kHz/1.0MHz

Requirements **Subclause 15.247(c)**

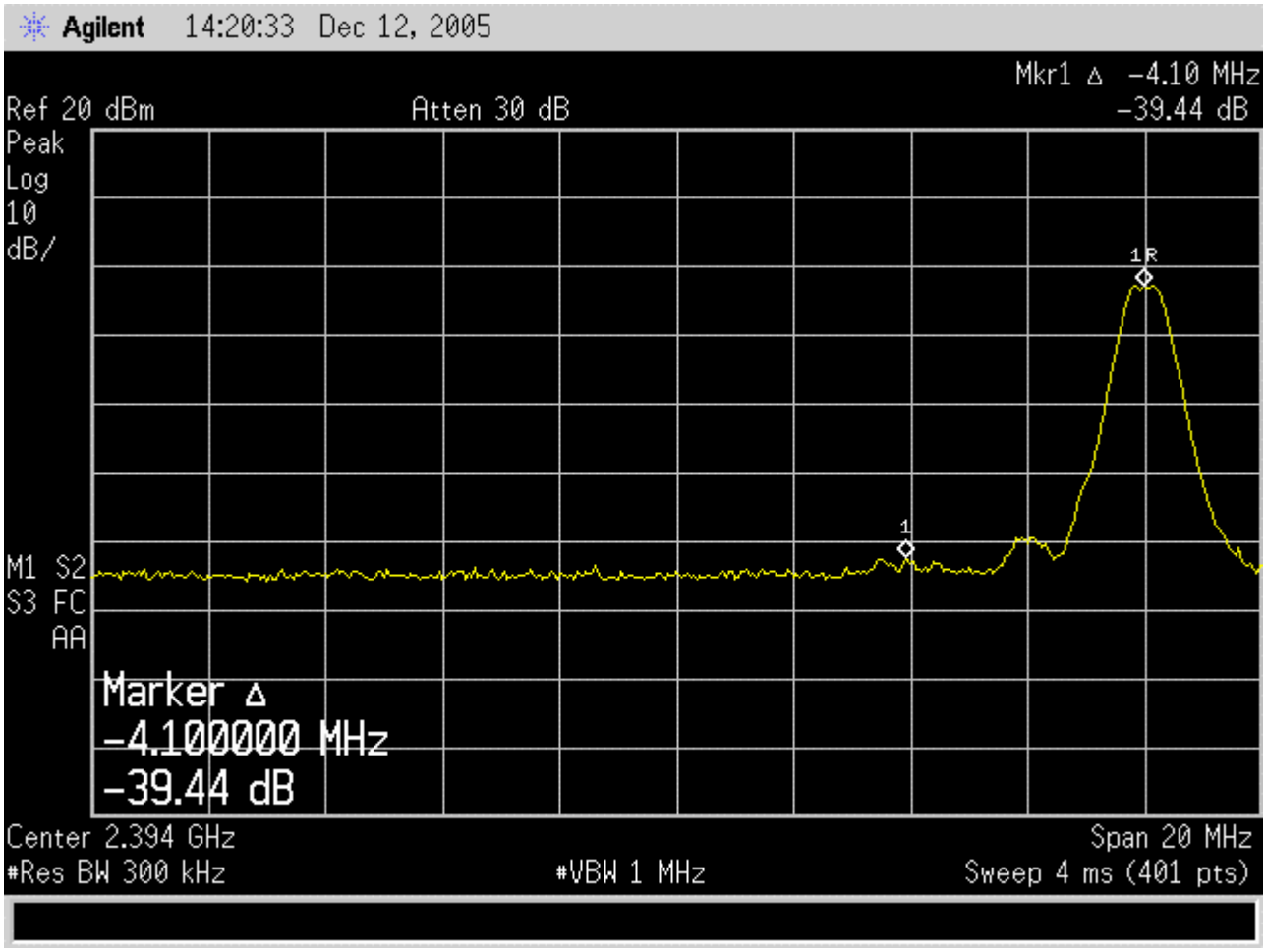
In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100k Hz bandwidth within the band that contains the highest level of the desired power, b ased on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required.

Test results

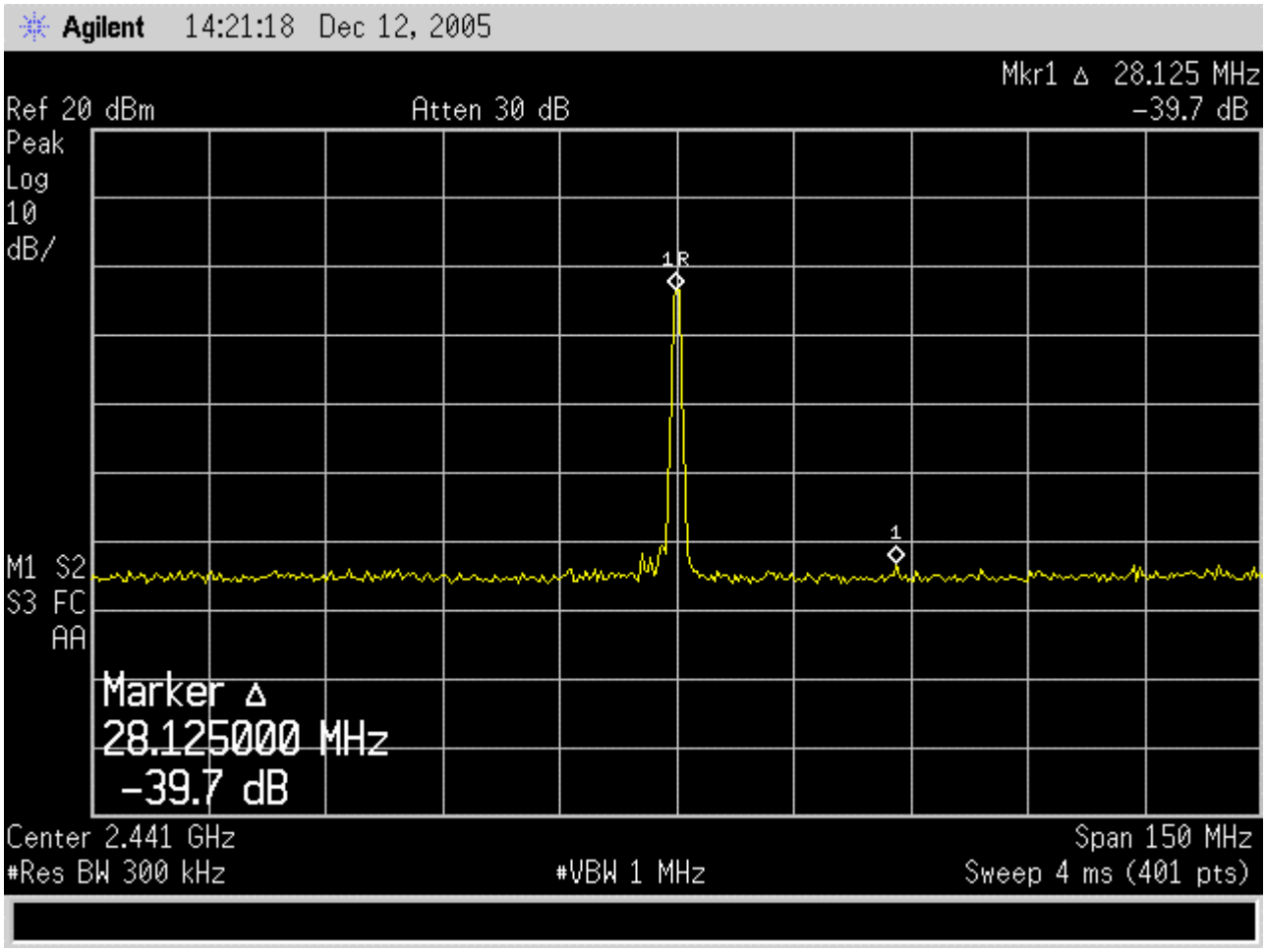
There is no peak found outside any 100kHz bandwidth of the operating frequency band in the three transmit frequency.

Tx Frequency (MHz)	RF power outside 100kHz BW (MHz)	Limit	Results
2402	No peak above 20dB	20dB below	Pass
2441	No peak above 20dB	20dB below	Pass
2480	No peak above 20dB	20dB below	Pass

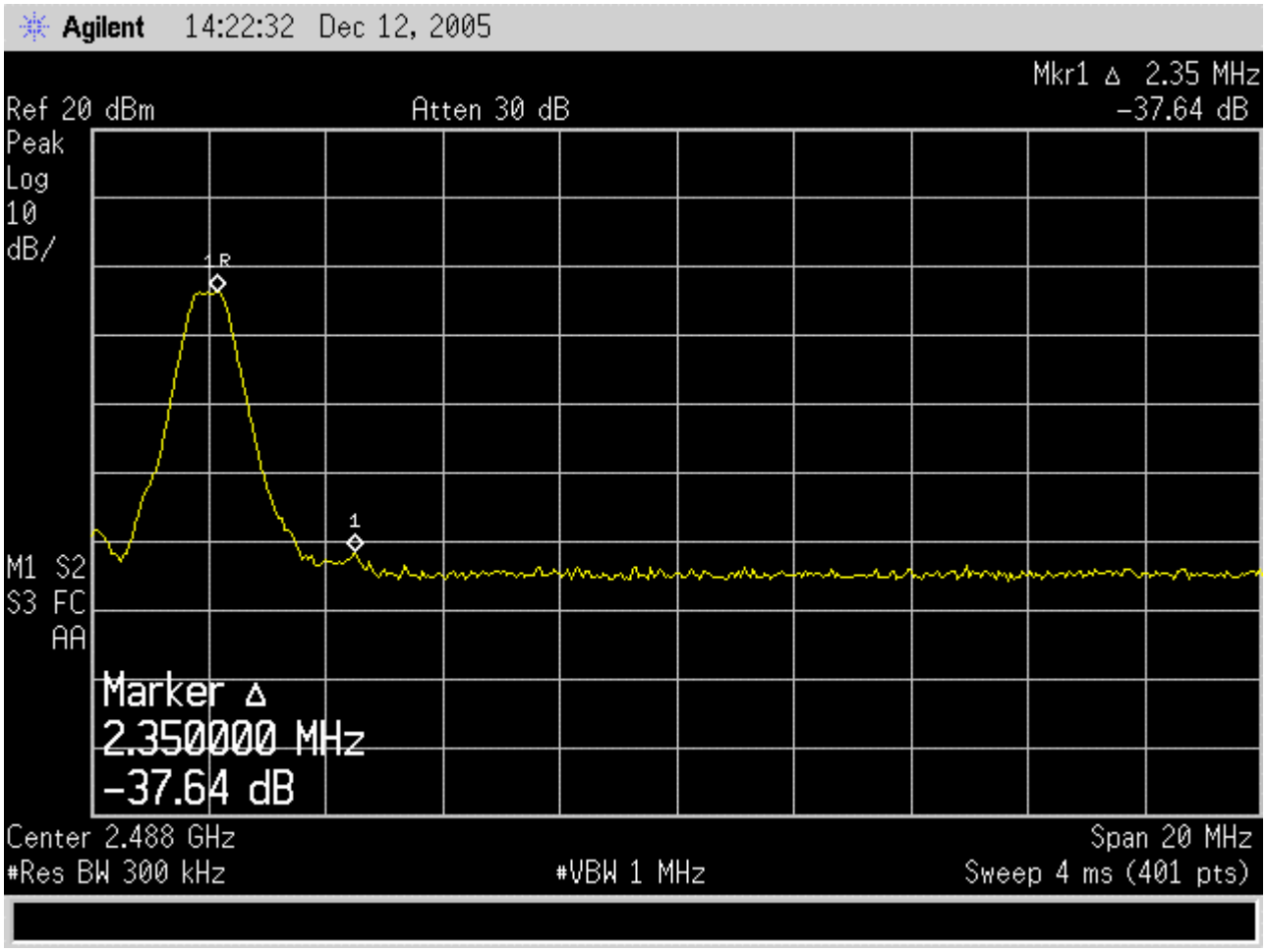
Band-edge Compliance Plot - 2402



Band-edge Compliance Plot – 2441



Band-edge Compliance Plot – 2480



7.11 Spurious Conducted emissions

Test Mode and conditions

Mode of operation	:	Tx mode (2402MHz, 2441MHz, 2480MHz), DH1 packet
Measurement Method	:	Conducted
Detector	:	PK
Trace	:	Max hold
RBW/VBW	:	100kHz/300kHz

Requirements **Subclause 15.247(c)**

In any 100kHz 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 20dB below that in the 100k Hz 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.

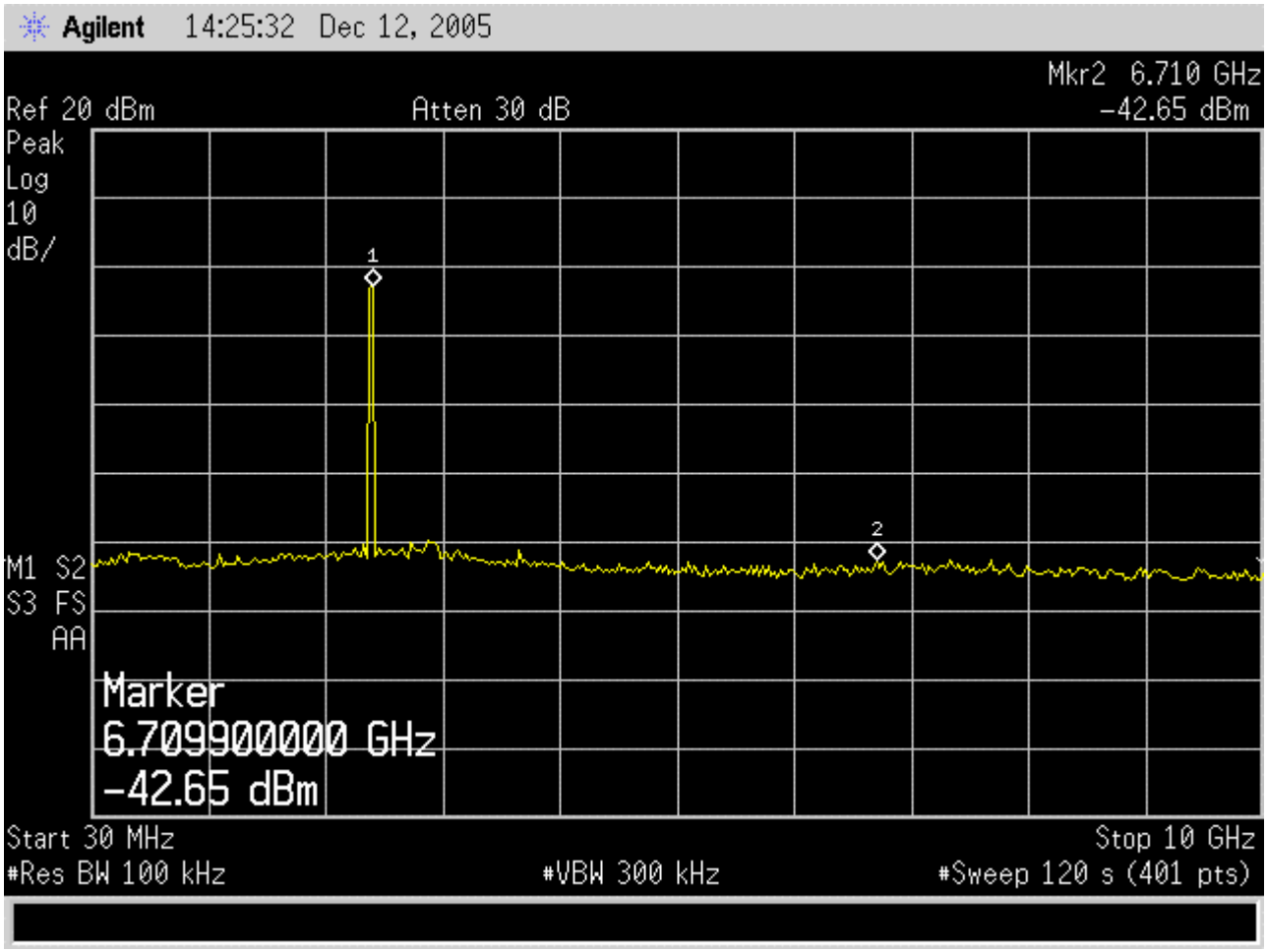
Test results

Frequency (MHz)	Reading Value (dBm)	Correction Factor (dB)	Results (dBm)	Reference Value (dBm)	Delta to Reference (dB)
Operating frequency : 2402MHz					
6710	-42.65	3.4	-39.25	-22.959	16.291
13475	-43.62	6.0	-37.62	-22.959	14.661
24637.5	-42.33	6.7	-35.63	-22.959	12.671

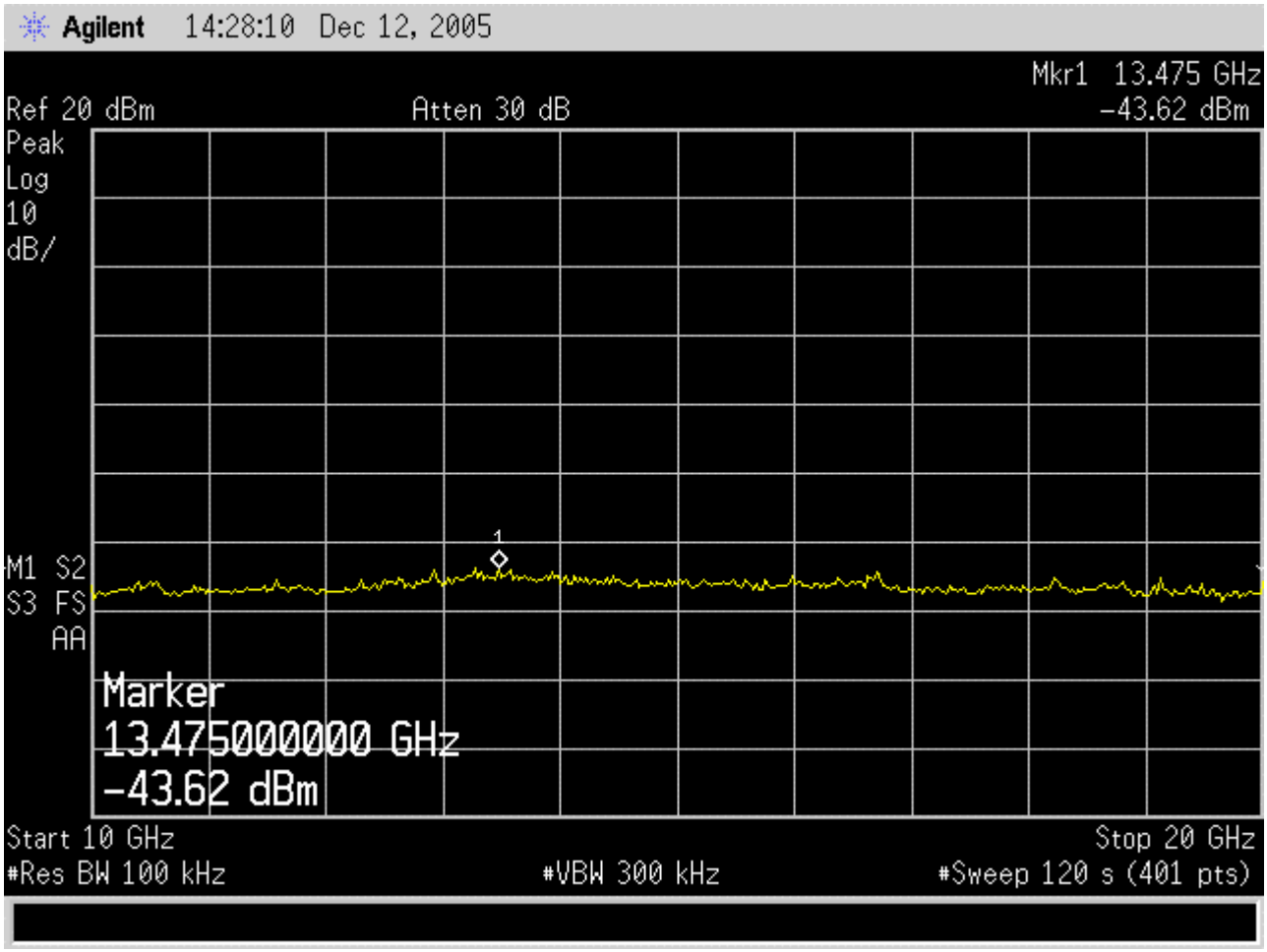
Frequency (MHz)	Reading Value (dBm)	Correction Factor (dB)	Results (dBm)	Reference Value (dBm)	Delta to Reference (dB)
Operating frequency : 2441MHz					
6934	-45.03	3.4	-41.63	-23.306	18.32
14125	-44.34	6.0	-38.34	-23.306	15.034
24650	-43.56	6.7	-36.86	-23.306	13.554

Frequency (MHz)	Reading Value (dBm)	Correction Factor (dB)	Results (dBm)	Reference Value (dBm)	Delta to Reference (dB)
Operating frequency : 2480MHz					
6959	-46.92	3.4	-43.52	-23.735	19.785
11650	-43.54	6.0	-37.54	-23.735	13.805
24637.5	-43.47	6.7	-36.77	-23.735	13.035

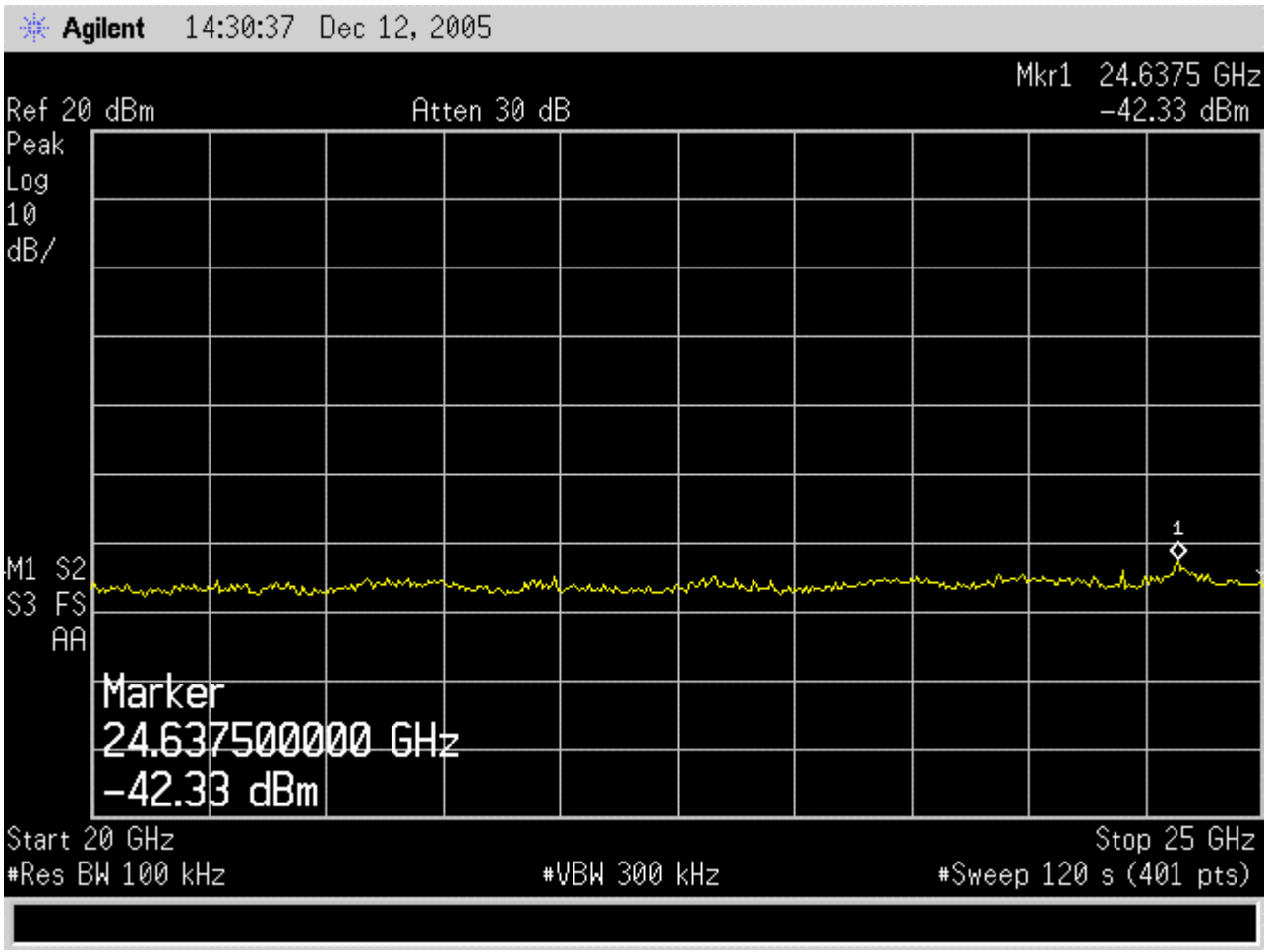
Spurious Conducted emissions plot- 2402 (30MHz~10GHz)



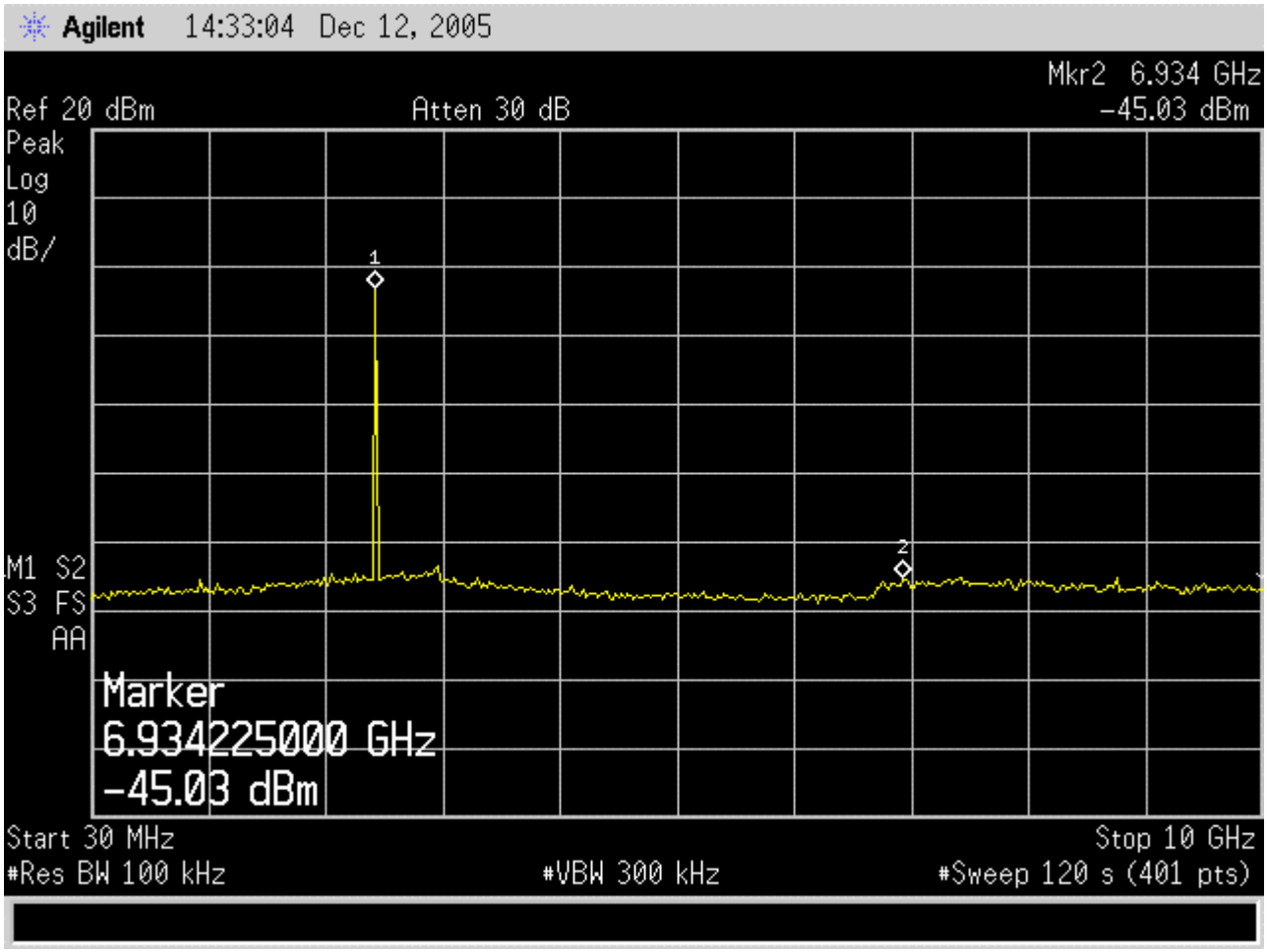
Spurious Conducted emissions plot- 2402 (10GHz~20GHz)



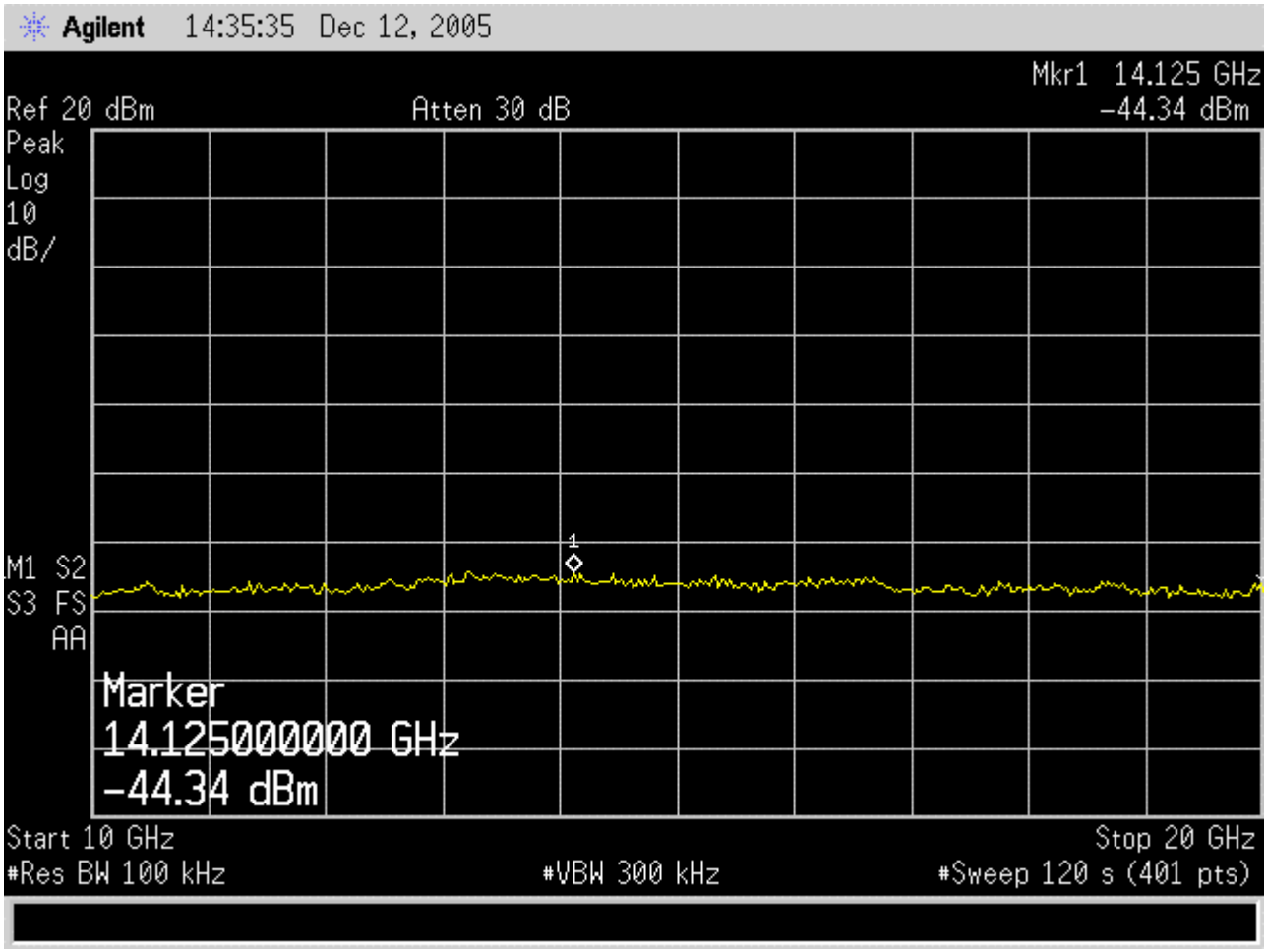
Spurious Conducted emissions plot- 2402 (20GHz~25GHz)



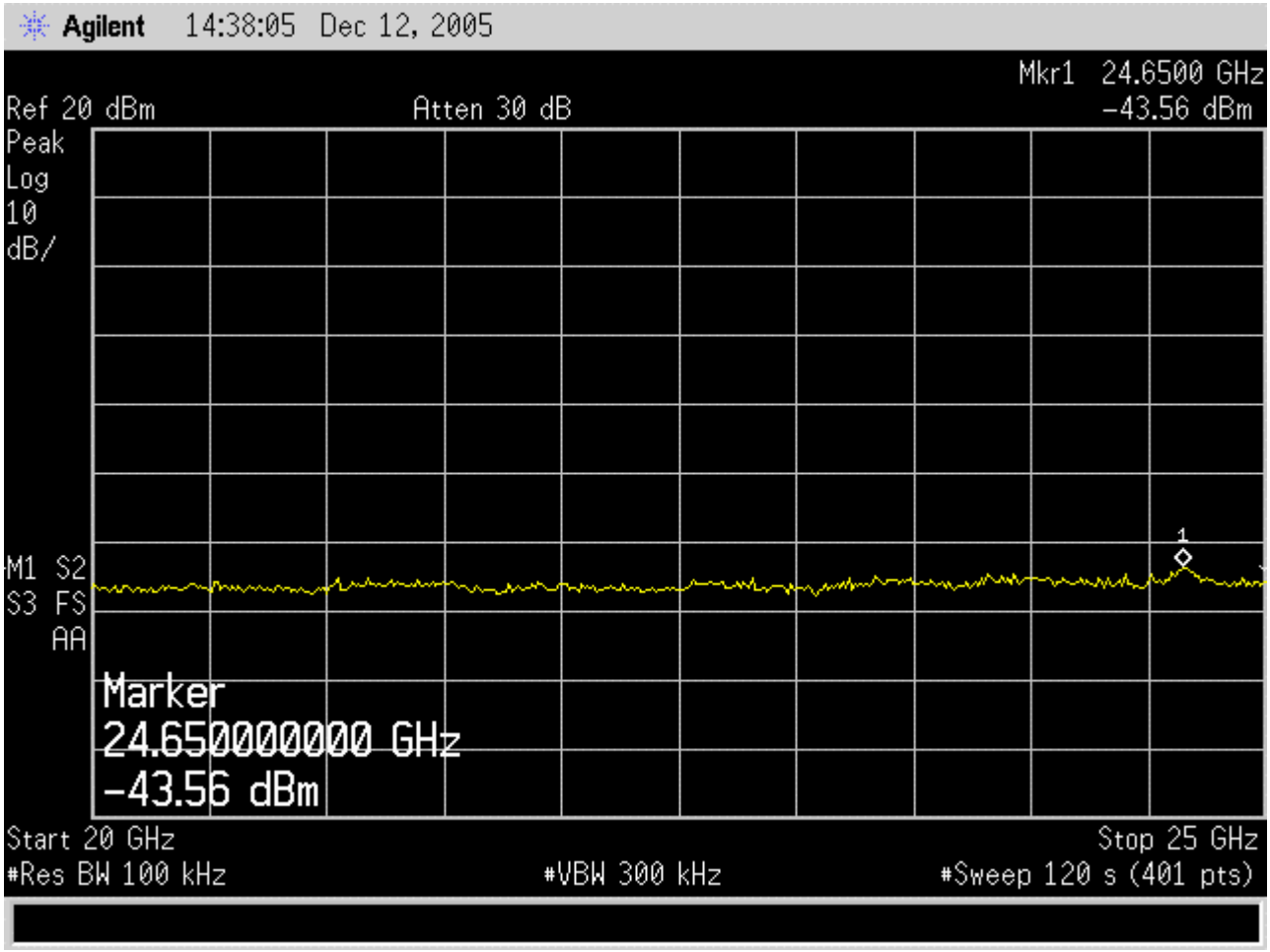
Spurious Conducted emissions plot- 2441 (30MHz~10GHz)



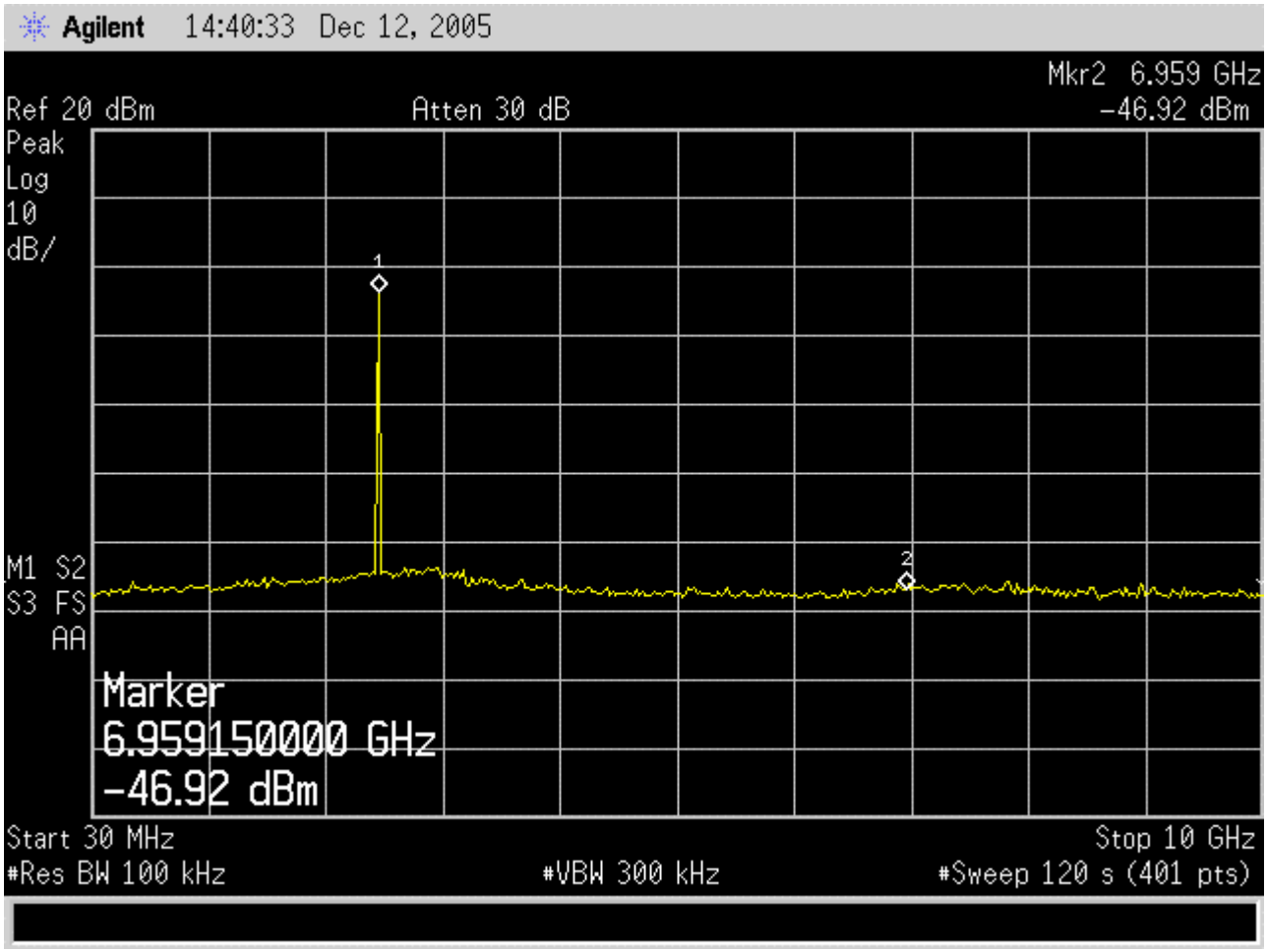
Spurious Conducted emissions plot- 2441 (10GHz~20GHz)



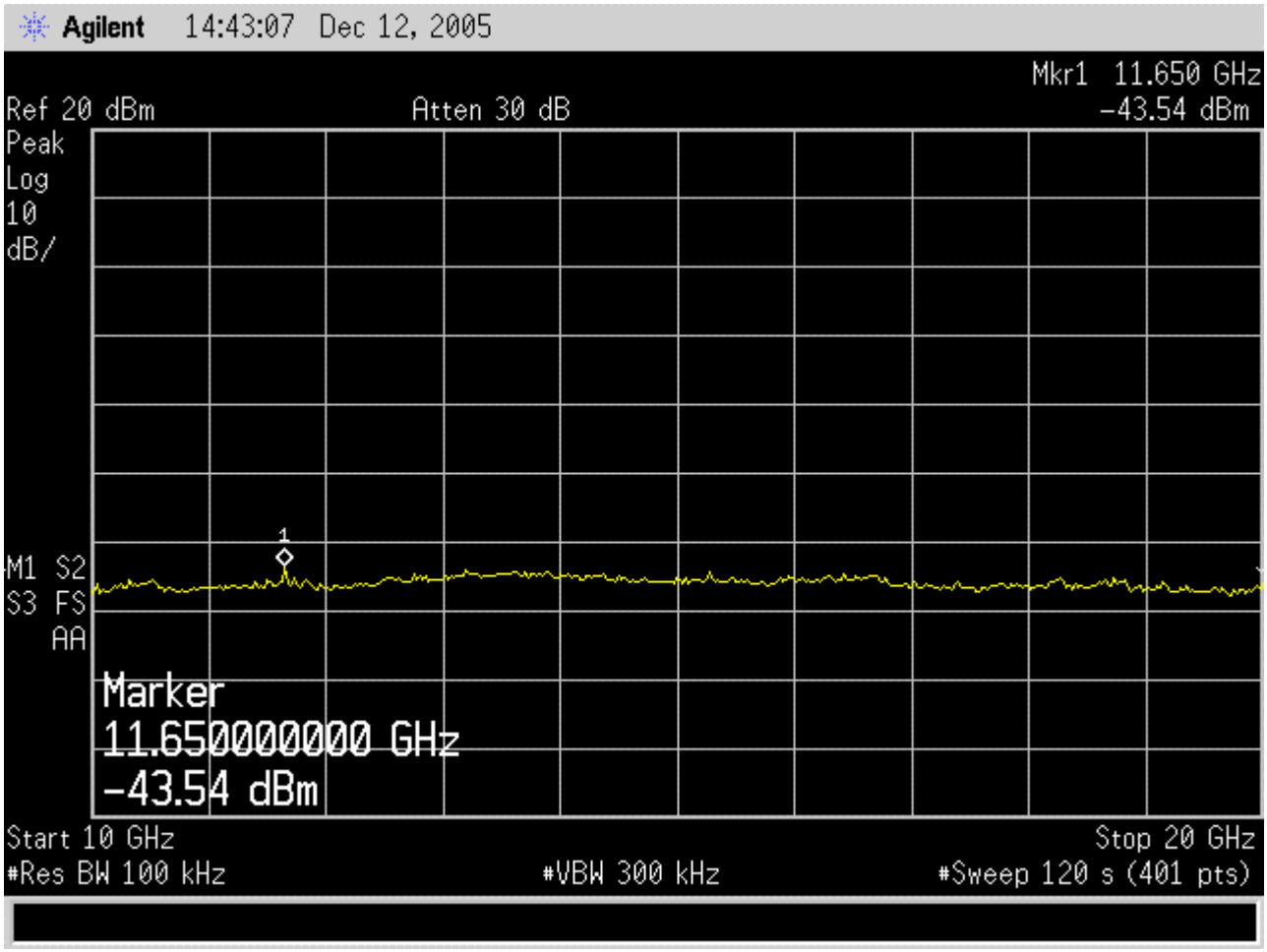
Spurious Conducted emissions plot- 2441 (20GHz~25GHz)



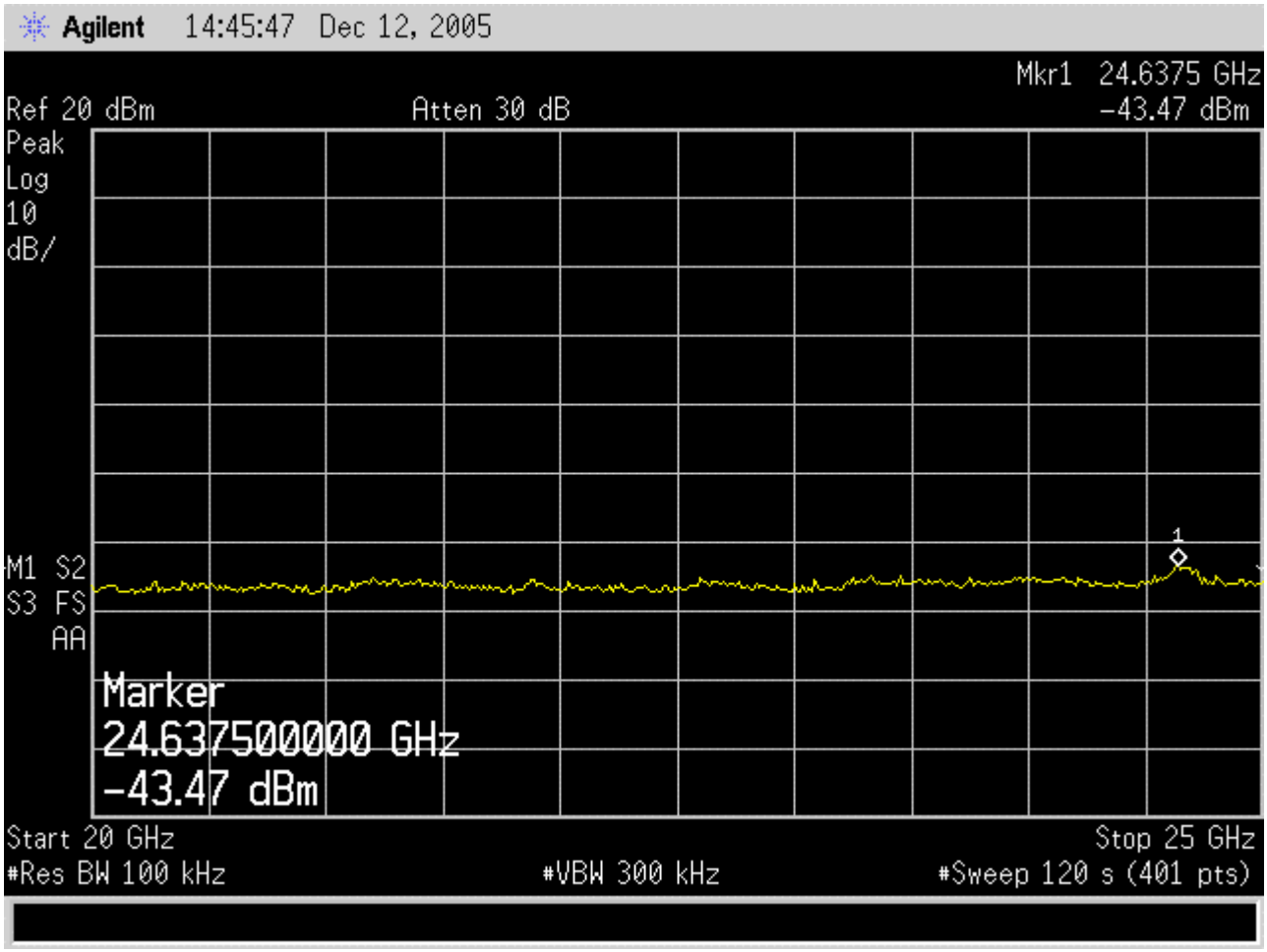
Spurious Conducted emissions plot- 2480 (30MHz~10GHz)



Spurious Conducted emissions plot- 2480 (10GHz~20GHz)



Spurious Conducted emissions plot- 2480 (20GHz~25GHz)



7.12 Spurious Radiated emissions

Test Mode and conditions

Mode of operation	:	Tx mode (2402MHz, 2441MHz, 2480MHz), DH1 packet
Detector	:	PK
Trace	:	Max hold
Measurement Method	:	Radiated- Enclosure
Measurement Distance	:	3m
Measurement BW	:	1 MHz for f ≥ 1 GHz, 100kHz for f < 1 GHz

Requirements **Subclause 15.247(c)**

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 15.205(c)).

According to Section 15.209(a) , except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field strength (microvolts/meter)	Field strength (dBμV/m)	Measurement distance (meters)
30-88	100**	20*log(100) = 40.0	3
88-216	150**	20*log(150) = 43.5	3
216-960	200	20*log(200) = 46.0	3
960-2500	500	20*log(500) = 54.0	3

** Except as provided in paragraph(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72Mhz, 76-88Mhz, 174-216Mhz or 470-806Mhz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

According to section 15.35(b), on any frequency or frequencies above 1000 MHz the radiated limits shown are based upon the use of measurement instrumentation employing an average detector function. When average radiated emission

measurements are specified in this part, including emission measurements below 1000 MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit for the frequency being investigated

Test results

Frequency (MHz)	Polarization (H/V)	Corr. Factor (dB)	Result (dBuV/m)		Limit (dBuV/m)		Margin (dB)		Table Angle (Deg.)	Ant. Height (m)
			A	P	A	P	A	P		
Operating frequency : 2402Mhz										
1313	V	-1.3	27.7	43.6	54	74	26.3	30.4	270	1.25
4800	V	10.8	34.0	46.0	54	74	20.0	28.0	270	1.25
4810	H	10.8	33.8	45.7	54	74	20.2	28.3	0	1.45

Frequency (MHz)	Polarization (H/V)	Corr. Factor (dB)	Result (dBuV/m)		Limit (dBuV/m)		Margin (dB)		Table Angle (Deg.)	Ant. Height (m)
			A	P	A	P	A	P		
Operating frequency : 2441Mhz										
4880	V	10.8	33.1	46.1	54	74	20.9	27.9	270	1.25

Frequ-ency (MHz)	Polariz-ation (H/V)	Corr. Factor (dB)	Result (dBuV/m)		Limit (dBuV/m)		Margin (dB)		Table Angle (Deg.)	Ant. Height (m)
			A	P	A	P	A	P		
Operating frequency : 2480Mhz										
1095	V	-1.8	25.0	40.0	54	74	29.0	34.0	270	1.25
4960	H	11.6	34.7	46.0	54	74	19.3	28.0	0	1.45

* Note :

1. Remark “*” means that the emission frequency is produced by local oscillator.
2. Remark”- - “ means that the emission level is too low to be measured.
3. The measurement uncertainty of the radiated emission test is ±3dB
4. “A” and “P” mean average and peak measurement respectively.
5. There are no spurious emissions found between the lowest internal oscillating frequency and 30 MHz.

8. List of Test and Measurement Instruments

	Kind of Equipment	Type	Manufacturer	S/N
☒	EMI Test Receiver	ESI26	R/S	8340.0010.02
☐	Spectrum Analyzer	FSP30	R/S	1093.4495.30
☐	Tracking Generator	ESMI-B1	R/S	1033.3240.52
☒	Spectrum Analyzer	8566B	HP	3638A0857E
☐	Spectrum Analyzer	E4407B	HP	MY41310181
☒	Wave Dipole Antenna	HZ-12	R/S	842006/0012
☒	Wave Dipole Antenna	HZ-12	R/S	846556/0004
☒	Biconical Antenna	3104C	EMCO	9408-4667
☐	Biconical Antenna	3109	EMCO	9405-2812
☒	Log-Periodic Antenna	3146A	EMCO	1064
☒	Biconilog Antenna	HLP2603	EMC Automaion	080100
☐	V-Network	ESH3-Z5	R/S	847265/030
☐	V-Network	ESH3-Z6	R/S	847250/016
☐	T-Network	E-Z10	R/S	84480/011
☒	LISN	3825/2	EMCO	9502-2334
☒	Turn Table	2081	EMCO	
☒	Antenna Tower	1072-5	EMCO	9202-1651
☒	Positioning Controller	1090	EMCO	
☐	Printer	C4569A	HP	SG78K1H1FS
☒	Absorbing Clamp	MDS 21	R/S	847905/005
☐	Signal Generator	2023	MARCONI	112246067
☐	Swept Signal Generator	83620B	HP	3722A00549
☐	10dB Attenuator	23-10-34	Weinschel co	BD4316
☐	10dB Attenuator	33-10-34	Weinschel co	BB9784
☒	Antenna	3142	EMCO	9710-1220
☒	Antenna	3115	EMCO	9202-3820
☒	Antenna	3160-08	EMCO	1168

☒	Antenna	3160-09	EMCO	1304
☒	Amplifier	HP8447F	HP	3113A06911
☒	Amplifier	HP83006	HP	3104A00611
☒	Amplifier	HP8449B	HP	3008A00859
☒	EMI test receiver	ESCS30	R&S	839809/003
☒	Artificial mains network	ESH2-Z5	R&S	829991/009
☒	Artificial hand	FCC-AH-1	Fischer custom communications Inc.	2008