

FCC TEST REPORT

according to

FCC Rules and Regulations

Part 15 Subpart C

Applicant	: ACA Digital Corporation
Address	: 17F, No.866-7, ZhongZhen Rd. Zhonghe City, Taipei County, Taiwan, R.O.C
Equipment	: HT1100 Handy Terminal
Model No.	: HT1100
FCC ID	: UVZHT1100
Trade Name	: ACA Digital

Laboratory Accreditation



1332

- The test result refers exclusively to the test presented test model / sample.,
- Without written approval of **Exclusive Certification Corp.** the test report shall not be reproduced except in full.
- The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

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CERTIFICATE OF COMPLIANCE

according to

FCC Rules and Regulations

Part 15 Subpart C

Applicant	: ACA Digital Corporation
Address	: 17F, No.866-7, ZhongZhen Rd. Zhonghe City, Taipei County, Taiwan, R.O.C
Equipment	: HT1100 Handy Terminal
Model No.	: HT1100
FCC ID	: UVZHT1100

I HEREBY CERTIFY THAT :

The measurements shown in this test report were made in accordance with the procedures given in **ANSI C63.4** The equipment was **passed** the test performed according to **FCC Rules and Regulations Part 15 Subpart C (2003)**.

The test was carried out on Apr. 11, 2007 at **Exclusive Certification Corp.**

Signature

Anson Chou / Manager

1. Report of Measurements and Examinations

1.1 List of Measurements and Examinations

FCC Rule	Description of Test	Result
15.203	. Antenna Requirement	Pass
15.207	. Conducted Emission	Pass
15.209	. Radiated Emission	Pass
15.247(a)(1)	. Channel Carrier Frequencies Separation	Pass
15.247(a)(1)	. 20dB Bandwidth Measurement	Pass
15.247(a)(1)	. Dwell Time	Pass
15.247(b)	. Number of Hopping Channels	Pass
15.247(b)	. Peak Output Power Measurement Data	Pass
15.247(d)	. Band Edges Measurement Data	Pass
15.247(e)	. Power Spectral Density Measurement Data	Pass

2. Test Configuration of Equipment under Test

2.1 Feature of Equipment under Test

Powerful system

- Microsoft Windows CE 5.0 operating system
- Intel Bulverde PXA270 processor with speed up to 624 MHz

System memory

- 128MB SDRAM on board
- 128 MB Flash ROM

Display

- 3.5-inch transfective QVGA LCD with touchscreen
- 240 x 320 resolution

Barcode scanner

- Built-in Bar Code Scan Engine

Communication

- USB Host & Client
- 802.11b/g
- Bluetooth version 1.2
- GPS (optional)
- GPRS (optional)
- RFID (optional)

Audio

- Built-in microphone
- Built-in speaker (optional)
- External microphone connector
- External headset connector

Expansion slot

- SD
- PCMCIA

Battery life

- Normal usage: 4 hours continuous use
- Charging time: 90 minutes

User-friendly interface

- User configurable function keys
- Trigger keys for barcode scanning

2.2 RF Specifications

Spreading: GFSK for FHSS
Frequency Range 2402 ~ 2.480GHz
Number of Channels: 79 Channels
Data Rate GFSK: 1Mbps
Modulation: GFSK
Antenna E-Plane antenna Peak gain: 5.5dBi
Transmit Power: 1dBm

2.3 Test Mode & Test Software

- a. During testing, the interface cables and equipment positions were varied according to ANSI C63.4
- b. The complete test system included remote workstation, USB2.0 HDD, USB Flash memory, Modem, Earphone and EUT for EMI test. The remote workstation means Dell Notebook.
- c. An executive program, EMITEST.exe under WIN XP, which generates a complete line of continuously repeating "H" pattern was used as the test software.

The program was executed as follows:

1. Turn on the power of all equipment.
 2. The EUT reads the test program from the hard disk drive and runs it.
 3. The EUT sends "H" messages to the monitor, and the monitor displays "H" patterns on the screen.
 4. The PC sends "H" messages to the modem.
 5. The PC sends "H" messages to the internal Hard Disk, and the Hard Disk reads and writes the message.
 6. Repeat the steps from 2 to 5.
- d. An executive program, DutApiCf8385P.exe under WIN XP, which generates a continuous signal by the following frequency to test.
 - 802.11b (CH 00: 2402MHz) • 802.11b (CH 06: 2441MHz) • 802.11b (CH 11: 2480MHz)
 - 802.11g (CH 00: 2402MHz) • 802.11g (CH 06: 2441MHz) • 802.11g (CH 11: 2480MHz)

Note: All the transmitter rates had been pre-tested, and the test data is worst case.

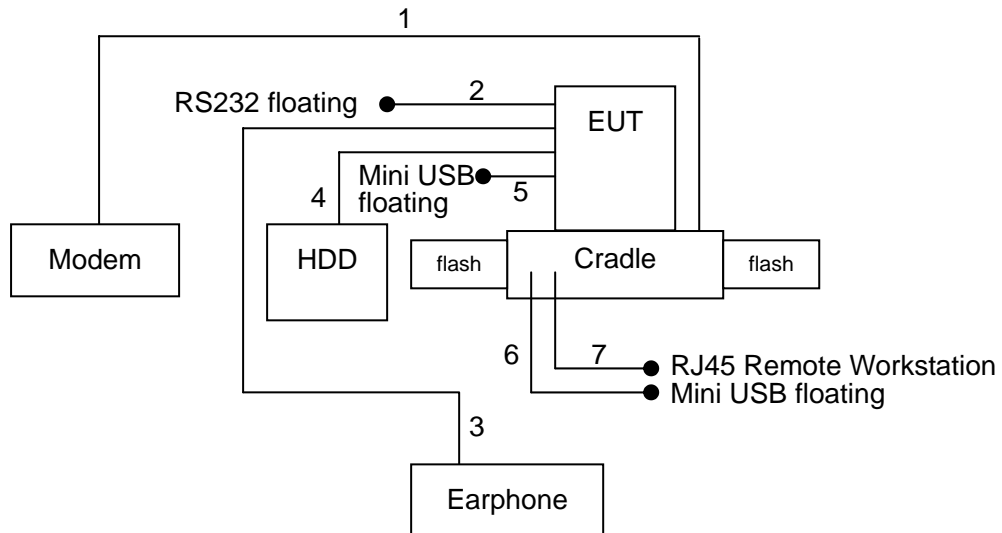
2.4 Description of Test System

Device	Manufacturer	Model No.	Description
Usb2.0HDD	Terasys	F-12UF	Power Cable, Adapter Unshielding 1.8 m Data Cable, USB Shielding 1.6 m
Modem	ACEXX	DM-1414	Power Cable, Adapter Unshielding 1.8 m Data Cable, RS232 Shielding 1.35 m
Flash memory*2	TranSend	JF150 512MB	N/A
Earphone	MIC	MIC-4	Data Cable, Audio Shielding 1.6 m
Notebook (Remote Workstation)	Dell	PP10L	Power Cable, Adapter Unshielding 1.8 m

Use Cable:

Cable	Quantity	Description
RJ45	1	Unshielding, 5.0m
Mini USB	2	Shielding, 0.9m
RS232	1	Shielding, 1.35m

2.5 Connection Diagram of Test System



1. The RS232 cable is connected form Cradle to the Modem.
2. The RS232 cable is floating.
3. The Audio cable is connected form EUT to the Earphone.
4. The USB cable is connected form EUT to the HDD.
5. The Mini USB cable is floating.
6. The Mini USB cable is floating.
7. The RJ45 cable is remote workstation.

2.6 General Information of Test

Test Site :	Exclusive Certification Corp. 4F-2, No. 28, Lane 78, Xing-Ai Rd. Nei-hu, Taipei City 114 Taiwan R.O.C.
Test Site Location (OATS1-SD):	No.68-1, Shihbachongsi, shihding Township, Taipei City 223, Taiwan, R.O.C. Registration Number: 632249.
FCC Registration Number :	632249
IC Registration Number :	6597A-1
VCCI Registration Number :	T-182 for Telecommunication Test C-2188 for Conducted emission test R-1902 for Radiated emission test
Test Voltage:	AC 120V/ 60Hz
Test in Compliance with:	ANSI C63.4-2003 FCC Part 15 Subpart C
Frequency Range Investigated:	Conducted: from 150kHz to 30 MHz Radiation: from 30 MHz to 24620MHz
Test Distance:	The test distance of radiated emission from antenna to EUT is 3 M.

2.7 Measurement Uncertainty

Measurement Item	Measurement Frequency	Polarization	Uncertainty
Conducted Emission	9 kHz ~ 30 MHz	LINE/NEUTRAL	2.71 dB
Radiated Emission	30 MHz ~ 1GHz	Vertical	4.11 dB
		Horizontal	4.10 dB
6 dB Bandwidth	---	---	7500 Hz
Maximum Peak Output Power	---	---	1.4 dB
100kHz Bandwidth of Frequency Band Edges	---	---	2.2 dB
Power Spectral Density	---	---	2.2 dB

2.8 History of this test report

■ ORIGINAL.

☐ Additional attachment as following record:

[illegible]

3. Antenna Requirements

3.1 Standard Applicable

For intentional device, according to FCC 47 CFR Section 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.

And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

3.2 Antenna Construction and Directional Gain

Antenna type: H-Plane

Antenna Gain: 5.5 dBi.

4. Test of Conducted Emission

4.1 Test Limit

Conducted Emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 KHz on the 120 VAC power and return leads of the EUT according to the methods defined in ANSI C63.4-2003 Section 3.1. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane as shown in section 2.2. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position produced maximum conducted emissions.

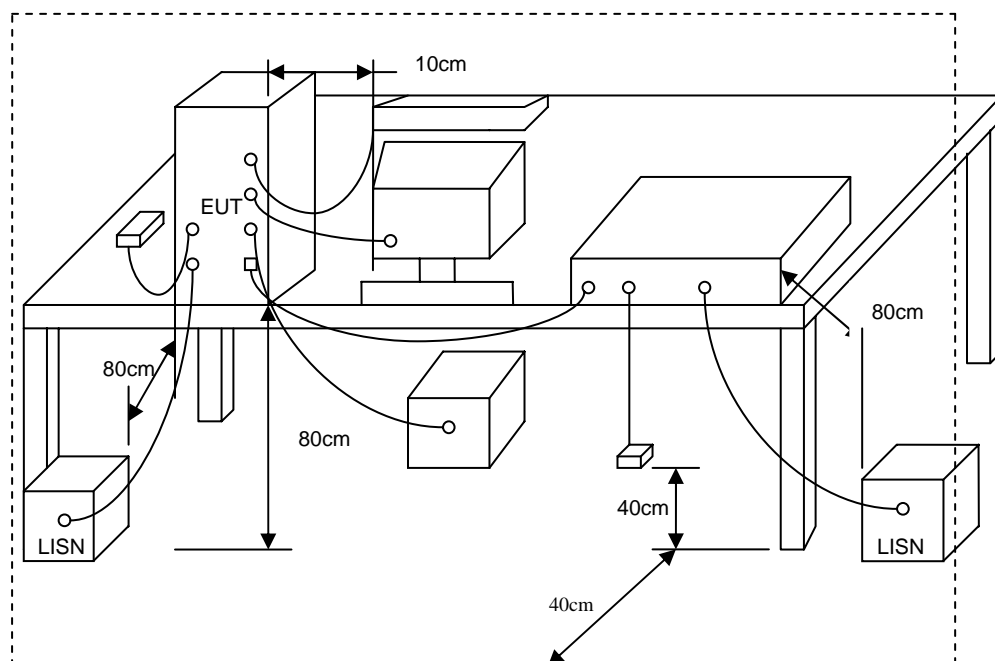
Frequency (MHz)	Quasi Peak (dB μ V)	Average (dB μ V)
0.15 – 0.5	66-56*	56-46*
0.5 – 5.0	56	46
5.0 – 30.0	60	50

*Decreases with the logarithm of the frequency.

4.2 Test Procedures

- The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
- Connect EUT to the power mains through a line impedance stabilization network (LISN).
- All the support units are connecting to the other LISN.
- The LISN provides 50 ohm coupling impedance for the measuring instrument.
- The FCC states that a 50 ohm, 50 micro-Henry LISN should be used.
- Both sides of AC line were checked for maximum conducted interference.
- The frequency range from 150 kHz to 30 MHz was searched.
- Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

4.3 Typical Test Setup

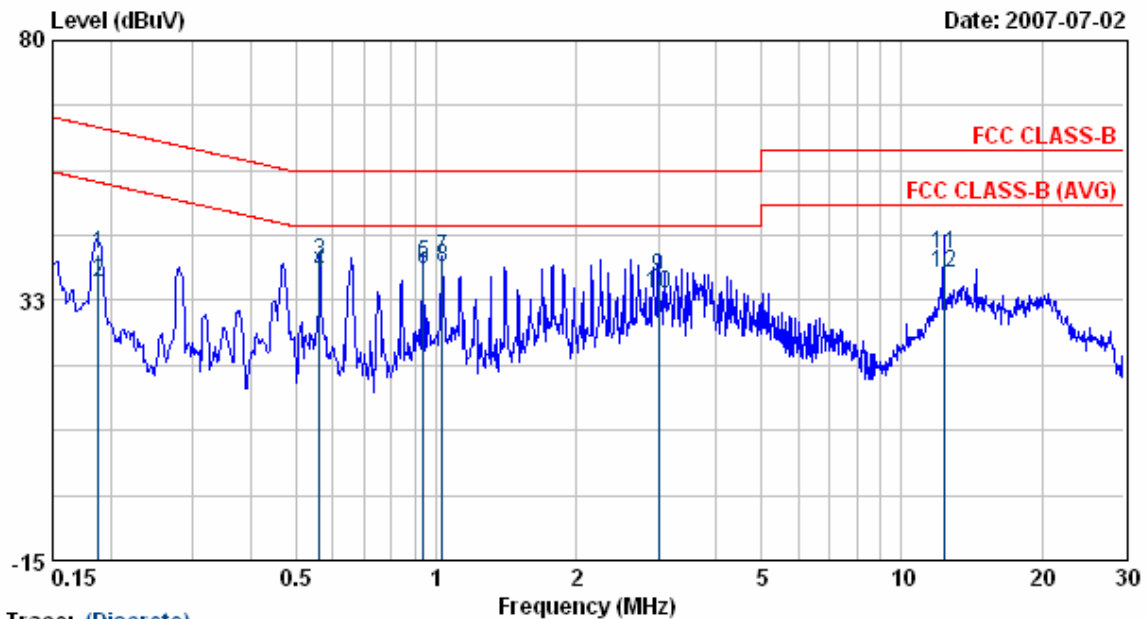


4.4 Measurement equipment

Instrument/Ancillary	Model No.	Manufacturer	Serial No.	Calibration Date	Valid Date.
Receiver	R&S	ESCI	100443	2006/09/20	2007/09/19
LISN	NNB-2/16Z	MESS TEC	02/10191	2007/04/19	2008/04/18
LISN	NNB-2/16Z	ROLF HEINE	03/10058	2006/04/27	2007/04/26

4.5 Test Result and Data

Power	: DC 5V	Pol/Phase	: LINE
Test Mode	: GFSK CH0	Temperature	: 25 °C
Memo	:	Humidity	: 57 %

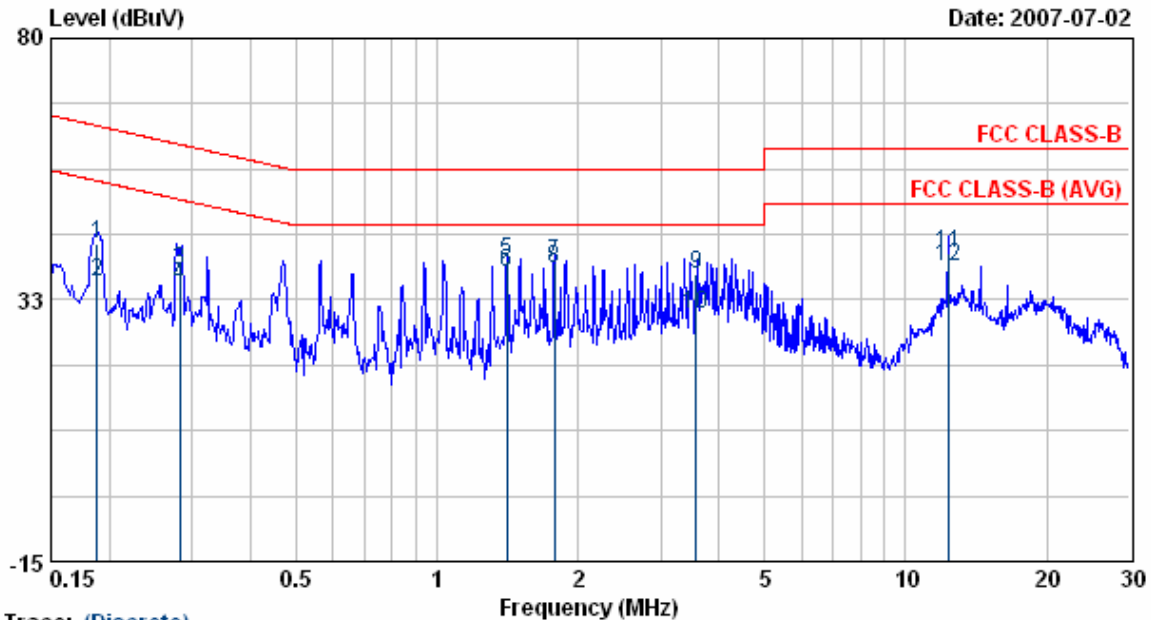


Trace: (Discrete)

Item	Freq	Read Value	Factor	Result	Limit	Margin	Remark
	MHz	dBuV	dB	dBuV	dBuV	dBuV	
1	0.19	40.75	0.10	40.85	64.11	-23.25	QP
2	0.19	35.66	0.10	35.76	54.11	-18.34	AVERAGE
3	0.56	39.51	0.13	39.64	56.00	-16.36	QP
4	0.56	37.28	0.13	37.41	46.00	-8.59	AVERAGE
5	0.94	39.19	0.15	39.34	56.00	-16.66	QP
6	0.94	37.90	0.15	38.05	46.00	-7.95	AVERAGE
7	1.03	40.08	0.15	40.23	56.00	-15.77	QP
8	1.03	38.34	0.15	38.49	46.00	-7.51	AVERAGE
9	3.00	36.48	0.22	36.70	56.00	-19.30	QP
10	3.00	33.57	0.22	33.79	46.00	-12.21	AVERAGE
11	12.31	40.62	0.35	40.97	60.00	-19.03	QP
12	12.31	37.13	0.35	37.48	50.00	-12.52	AVERAGE

- Remarks:
1. Level = Read Level + Factor
 2. Factor = LISN(ISN) Factor + Cable Loss
 3. According to technical experiences, all spurious emission of FM mode at channel 0,39,78 are almost the same below 1GHz, so that the channel 0 was chosen as representative in final test.
 4. The data is worst case.

Power	: DC 5V	Pol/Phase	: NEUTRAL
Test Mode	: GFSK CH0	Temperature	: 25 °C
Memo	:	Humidity	: 57 %



Trace: (Discrete)

Item	Freq	Read Value	Factor	Result	Limit	Margin	Remark
	MHz	dBuV	dB	dBuV	dBuV	dBuV	
1	0.19	42.61	0.09	42.70	64.13	-21.43	QP
2	0.19	35.54	0.09	35.63	54.13	-18.50	AVERAGE
3	0.28	37.89	0.10	37.99	60.75	-22.76	QP
4	0.28	35.02	0.10	35.12	50.75	-15.63	AVERAGE
5	1.41	39.37	0.17	39.54	56.00	-16.46	QP
6	1.41	37.44	0.17	37.61	46.00	-8.39	AVERAGE
7	1.78	39.13	0.19	39.32	56.00	-16.68	QP
8	1.78	37.91	0.19	38.10	46.00	-7.90	AVERAGE
9	3.57	37.02	0.24	37.26	56.00	-18.74	QP
10	3.57	29.78	0.24	30.02	46.00	-15.98	AVERAGE
11	12.31	40.46	0.40	40.86	60.00	-19.14	QP
12	12.31	38.15	0.40	38.55	50.00	-11.45	AVERAGE

- Remarks:
1. Level = Read Level + Factor
 2. Factor = LISN(ISN) Factor + Cable Loss
 3. According to technical experiences, all spurious emission of FM mode at channel 0,39,78 are almost the same below 1GHz, so that the channel 0 was chosen as representative in final test.
 4. The data is worst case.

Test engineer:

Ben

4.6 Test Photographs

Front View



Rear View



5. Test of Radiated Emission

5.1 Test Limit

Radiated emissions from 30 MHz to 25 GHz were measured according to the methods defines in ANSI C63.4-2003. The EUT was placed, 0.8 meter above the ground plane, as shown in section 5.6.3. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions. For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency (MHz)	Distance Meters	Radiated (μ V / M)	Radiated (dB μ V/ M)
30-88	3	100	40.0
88-216	3	150	43.5
216-960	3	200	46.0
Above 960	3	500	54.0

For unintentional device, according to CISPR PUB.22, for Class B digital devices, the general requirement of field strength of radiated emissions from intentional radiators at a distance of 10 meters shall not exceed the above table.

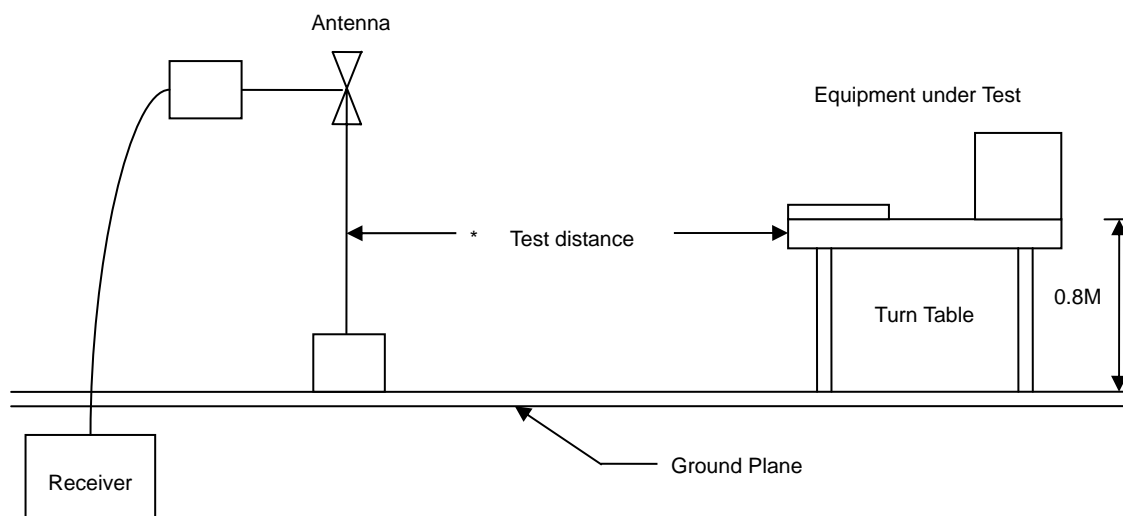
Frequency (MHz)	Distance Meters	Radiated (dB μ V/ M)
30-230	10	30
230-1000	10	37

5.2 Test Procedures

1. The EUT was placed on a rotatable table top 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna is a broadband antenna and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
5. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
6. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function and specified bandwidth with Maximum Hold Mode.
7. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.
8. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

9.

5.3 Typical Test Setup

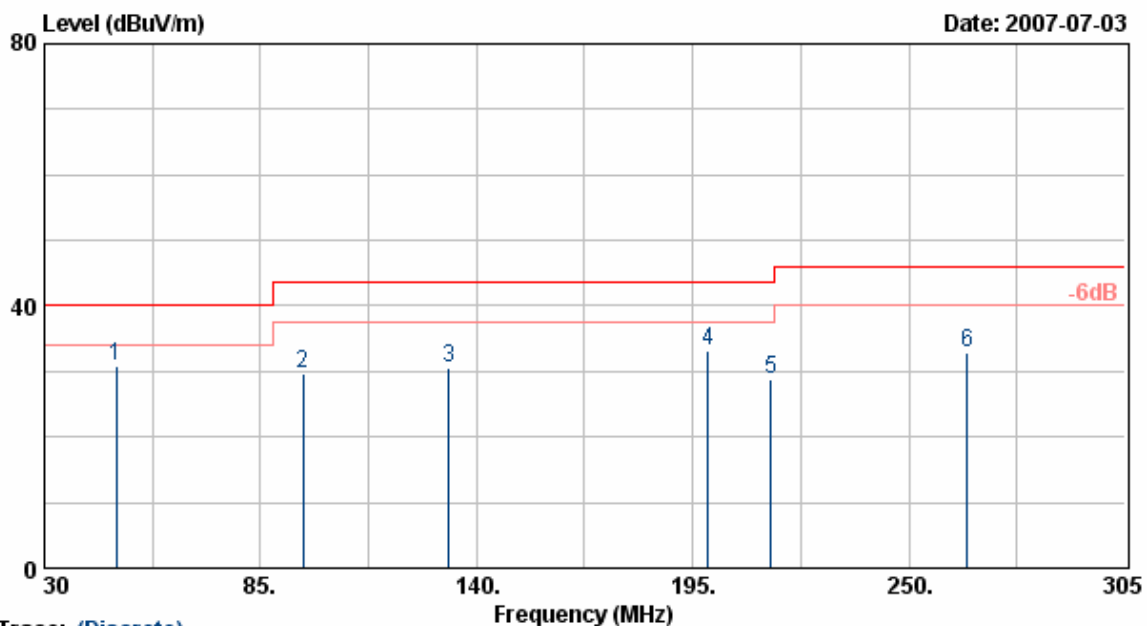


5.4 Measurement equipment

Instrument/Ancillary	Model No.	Manufacturer	Serial No.	Calibration Date	Valid Date
EMI Receiver	85460A	HP	3807A00454	2007/06/05	2008/06/04
Spectrum Analyzer	FSP40	R&S	10047	2007/01/23	2008/01/22
Horn Antenna	3115	EMCO	31589	2007/03/05	2008/03/04
Horn Antenna	3116	EMCO	31970	2007/03/06	2008/03/05
Bilog Antenna	CBL6112B	Schaffner	2840	2007/04/26	2008/04/25
Amplifier	8449B	Agilent	3008A01954	2007/01/12	2008/01/11
Amplifier	8447D	Agilent	2944A10531	2007/09/26	2008/09/25

5.5 Test Result and Data

Power	: DC 5V	Pol/Phase	: VERTICAL
Test Mode	: Transmit / Receive	Temperature	: 25 °C
Operation Channel	: 0	Humidity	: 65 %
Modulation Type	: GFSK	Atmospheric Pressure	: 1010 hPa
Memo	:	Rate	: 1 Mbps

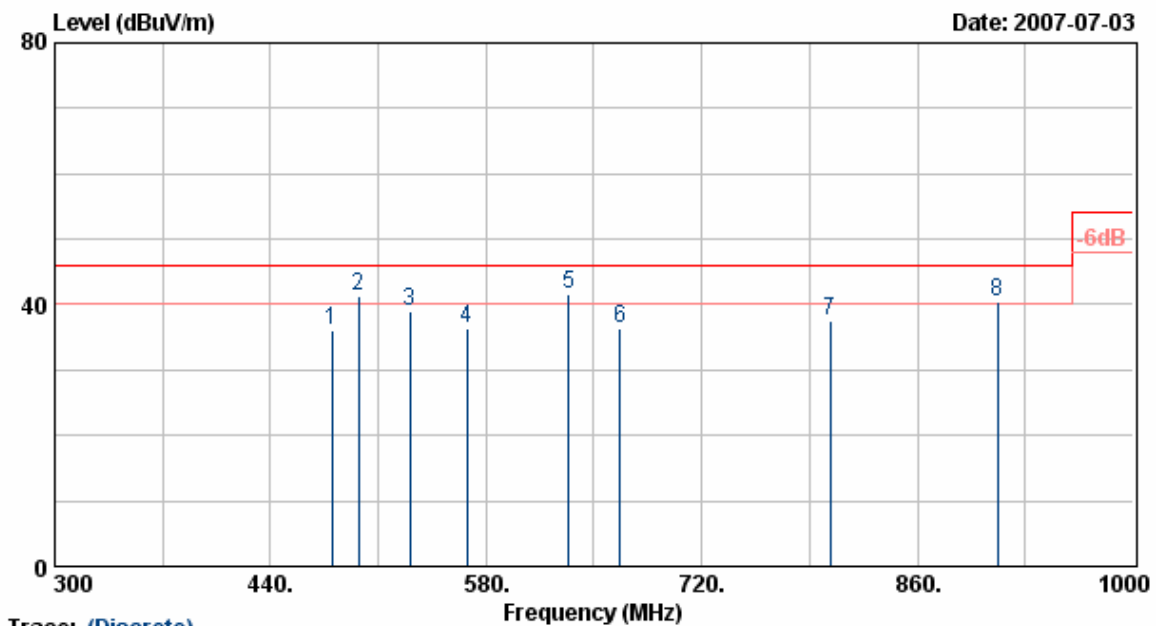


Trace: (Discrete)

Item	Freq	Read Value	Factor	Result	Limit	Margin	Remark	Ant Pos	Tab Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB		cm	Deg
1	48.43	46.55	-15.70	30.84	40.00	-9.16	Peak	100	26
2	95.73	46.51	-16.71	29.81	43.50	-13.69	Peak	100	0
3	132.85	43.70	-13.20	30.51	43.50	-12.99	Peak	100	222
4	198.85	46.64	-13.34	33.30	43.50	-10.20	Peak	100	48
5	214.80	41.48	-12.57	28.91	43.50	-14.59	Peak	100	0
6	264.85	45.82	-12.86	32.97	46.00	-13.03	Peak	100	167

- Remarks:
1. Result = Read Value + Factor
 2. Factor = Antenna Factor + Cable Loss - Amplifier
 3. According to technical experiences, all spurious emission of FM mode at channel 0,39,78 are almost the same below 1GHz, so that the channel 0 was chosen as representative in final test.
 4. The data is worst case.

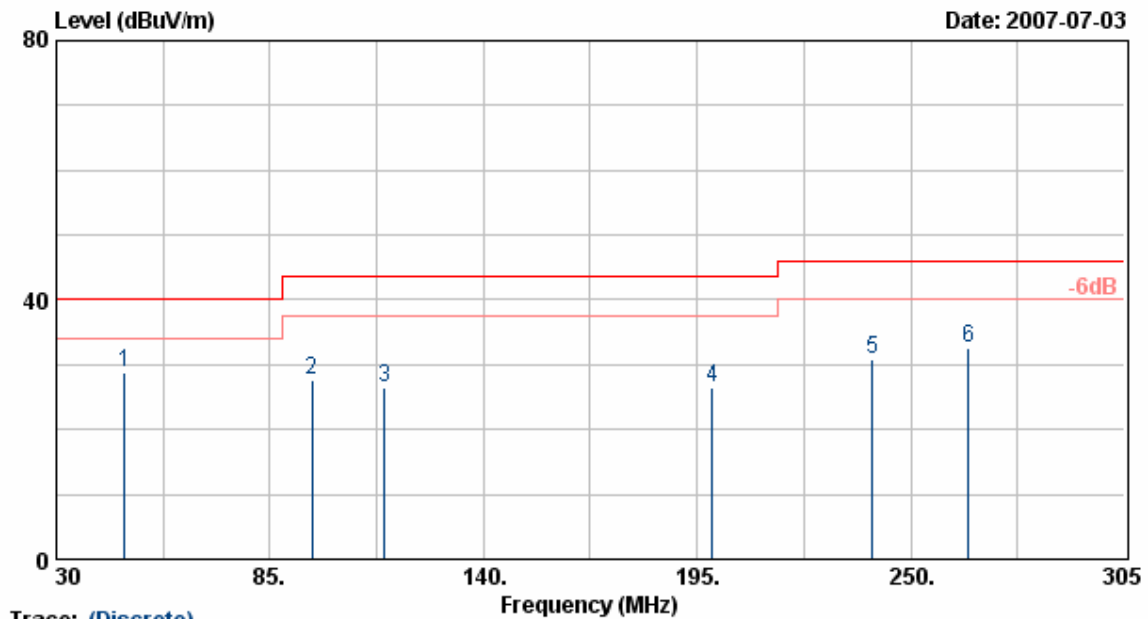
Power	: DC 5V	Pol/Phase	: VERTICAL
Test Mode	: Transmit / Receive	Temperature	: 25 °C
Operation Channel	: 0	Humidity	: 65 %
Modulation Type	: GFSK	Atmospheric Pressure	: 1010 hPa
Memo	:	Rate	: 1 Mbps



Remarks:

1. Result = Read Value + Factor
2. Factor = Antenna Factor + Cable Loss - Amplifier
3. According to technical experiences, all spurious emission of FM mode at channel 0,39,78 are almost the same below 1GHz, so that the channel 0 was chosen as representative in final test.
4. The data is worst case.

Power	: DC 5V	Pol/Phase	: HORIZONTAL
Test Mode	: Transmit / Receive	Temperature	: 25 °C
Operation Channel	: 0	Humidity	: 65 %
Modulation Type	: GFSK	Atmospheric Pressure	: 1010 hPa
Memo	:	Rate	: 1 Mbps

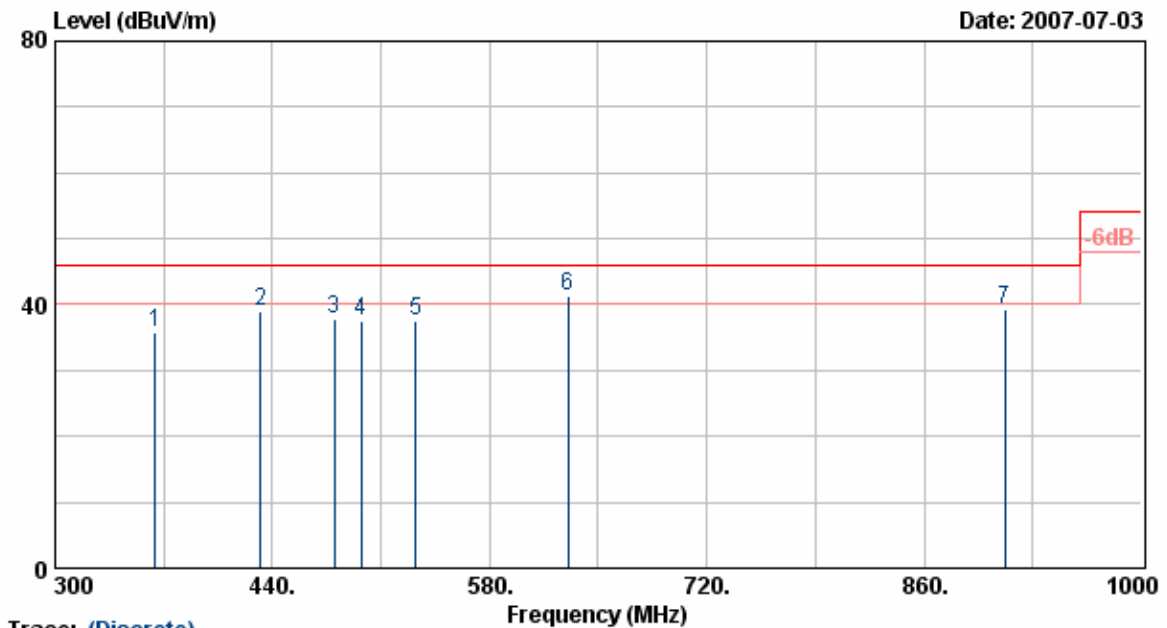


Trace: (Discrete)

Item	Freq	Read Value	Factor	Result	Limit	Margin	Remark	Ant Pos	Tab Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB		cm	Deg
1	47.60	43.09	-14.37	28.72	40.00	-11.28	Peak	100	360
2	95.73	50.16	-22.54	27.62	43.50	-15.88	Peak	100	360
3	114.43	48.83	-22.24	26.59	43.50	-16.91	Peak	100	122
4	198.85	46.30	-19.71	26.59	43.50	-16.91	Peak	100	241
5	240.10	50.21	-19.29	30.92	46.00	-15.08	Peak	100	360
6	264.85	47.80	-15.19	32.61	46.00	-13.39	Peak	100	0

- Remarks:
1. Result = Read Value + Factor
 2. Factor = Antenna Factor + Cable Loss - Amplifier
 3. According to technical experiences, all spurious emission of FM mode at channel 0,39,78 are almost the same below 1GHz, so that the channel 0 was chosen as representative in final test.
 4. The data is worst case.

Power	: DC 5V	Pol/Phase	: HORIZONTAL
Test Mode	: Transmit / Receive	Temperature	: 25 °C
Operation Channel	: 0	Humidity	: 65 %
Modulation Type	: GFSK	Atmospheric Pressure	: 1010 hPa
Memo	:	Rate	: 1 Mbps

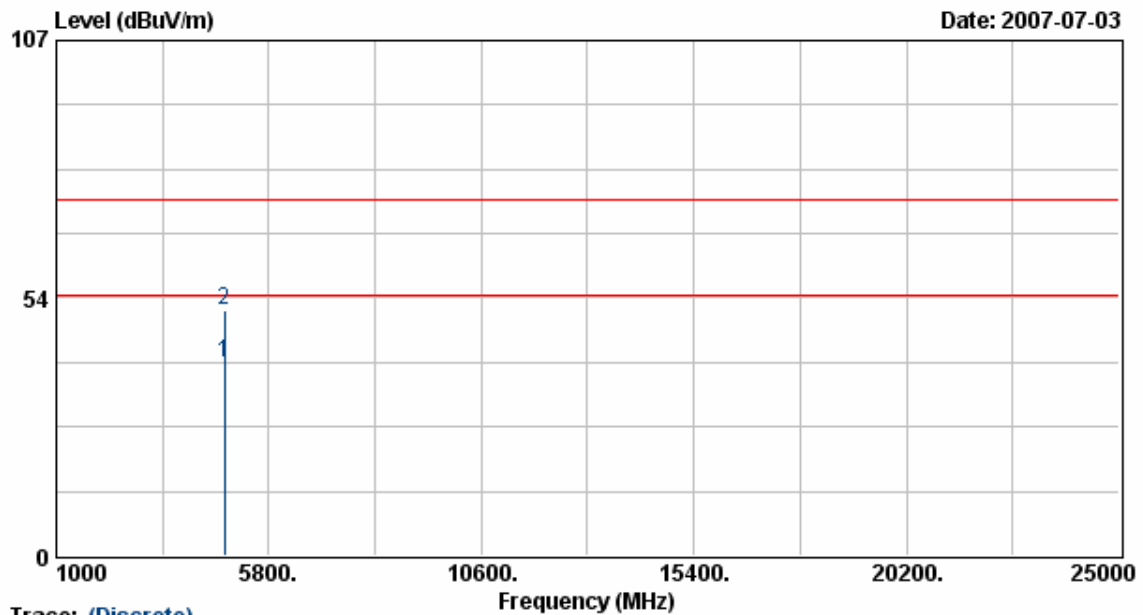


Trace: (Discrete)

Item	Freq	Read Value	Factor	Result	Limit	Margin	Remark	Ant Pos	Tab Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB		cm	Deg
1	364.40	47.40	-11.49	35.91	46.00	-10.09	Peak	100	47
2	432.30	47.35	-8.26	39.09	46.00	-6.91	Peak	100	157
3	479.90	47.18	-9.29	37.89	46.00	-8.11	Peak	100	57
4	497.40	44.78	-7.13	37.64	46.00	-8.36	Peak	100	275
5	532.40	44.50	-6.99	37.51	46.00	-8.49	Peak	100	360
6	630.40	45.28	-3.99	41.29	46.00	-4.71	QP	100	113
7	911.80	36.36	2.96	39.32	46.00	-6.68	Peak	100	360

Remarks: 1. Result = Read Value + Factor
 2. Factor = Antenna Factor + Cable Loss - Amplifier
 3. According to technical experiences, all spurious emission of FM mode at channel 0,39,78 are almost the same below 1GHz, so that the channel 0 was chosen as representative in final test.
 4. The data is worst case.

Power	: DC 5V	Pol/Phase	: VERTICAL
Test Mode	: Transmit / Receive	Temperature	: 25 °C
Operation Channel	: 0	Humidity	: 65 %
Modulation Type	: GFSK	Atmospheric Pressure	: 1010 hPa
Memo	:	Rate	: 1 Mbps

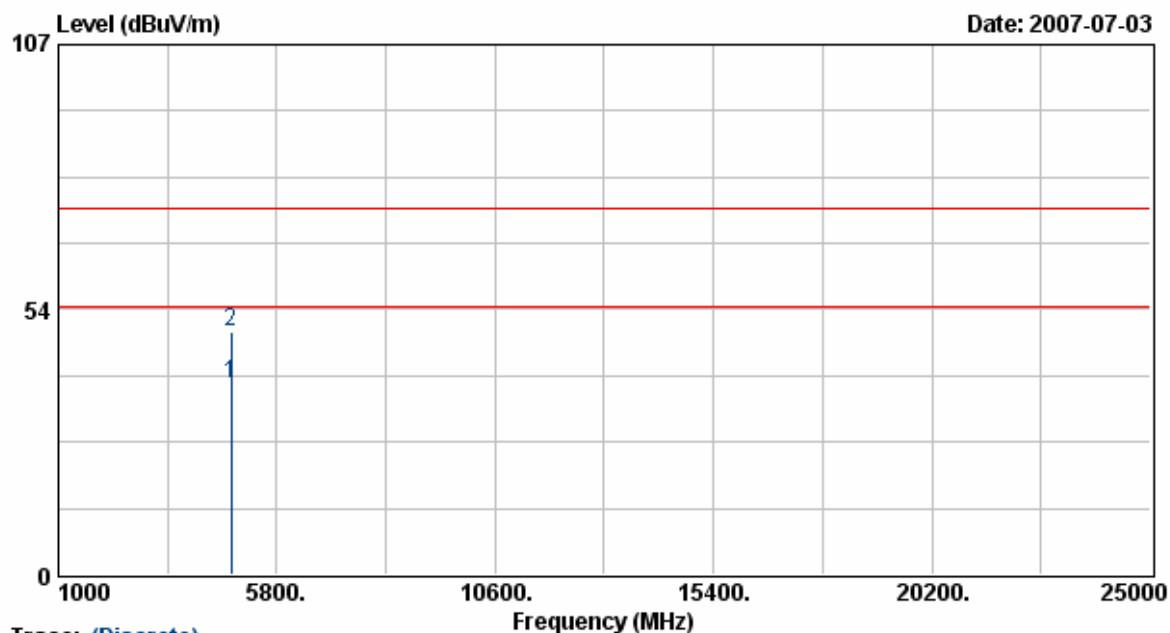


Item	Freq	Read Value	Factor	Result	Limit	Margin	Remark	Ant Pos	Tab Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB		cm	Deg
1	4804.00	31.32	8.58	39.91	54.00	-14.09	Average	100	194
2	4804.00	42.50	8.58	51.08	74.00	-22.92	Peak	100	194

Notes:

1. Result = Read Value + Factor
2. Factor = Antenna Factor + Cable Loss - Amplifier
3. The resolution bandwidth of test receiver/spectrum analyzer is 120KHz and video bandwidth is 300kHz for Peak detection and Quasi-peak detection at frequency below 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
5. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average detection at frequency above 1GHz.
6. The other emissions is too low to be measured.

Power	: DC 5V	Pol/Phase	: HORIZONTAL
Test Mode	: Transmit / Receive	Temperature	: 25 °C
Operation Channel	: 0	Humidity	: 65 %
Modulation Type	: GFSK	Atmospheric Pressure	: 1010 hPa
Memo	:	Rate	: 1 Mbps



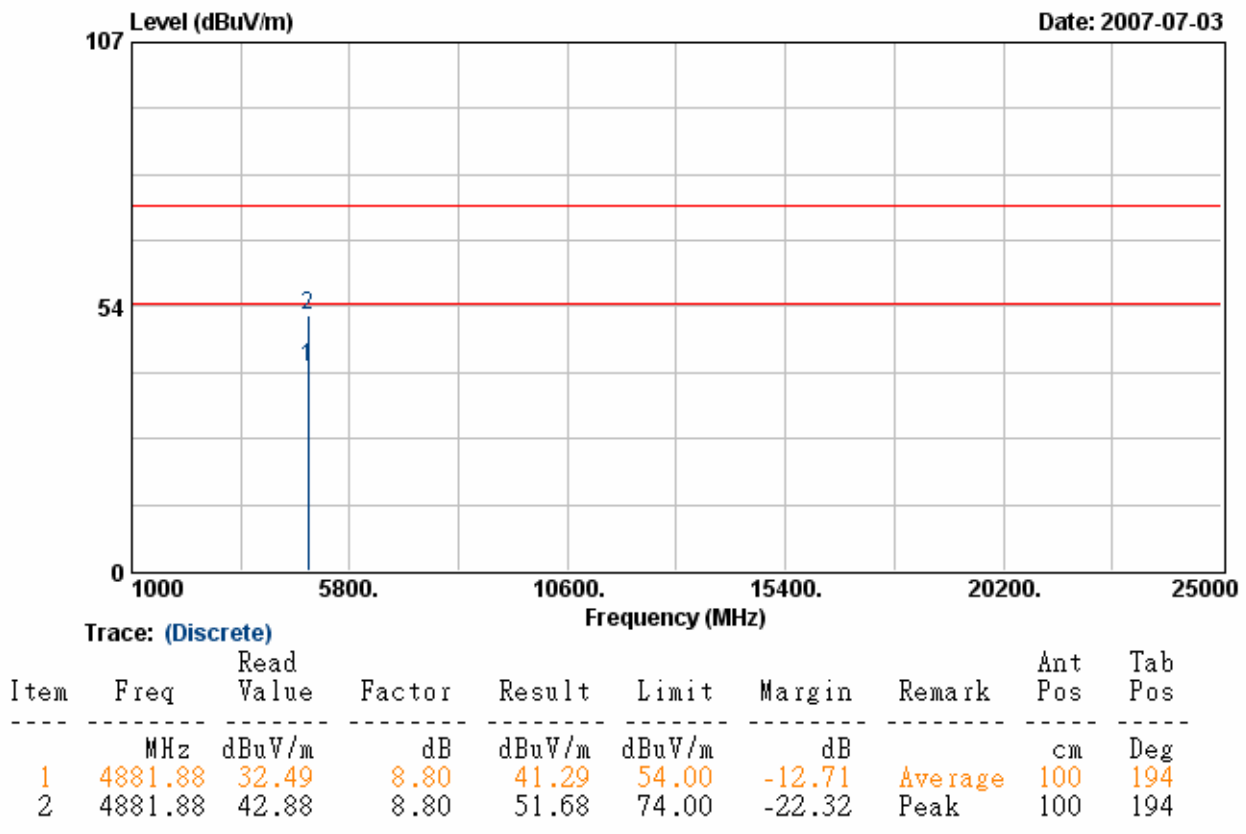
Trace: (Discrete)

Item	Freq	Read Value	Factor	Result	Limit	Margin	Remark	Ant Pos	Tab Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB		cm	Deg
1	4804.00	30.12	8.58	38.70	54.00	-15.30	Average	100	238
2	4804.00	40.42	8.58	49.00	74.00	-25.00	Peak	100	238

Notes:

1. Result = Read Value + Factor
2. Factor = Antenna Factor + Cable Loss - Amplifier
3. The resolution bandwidth of test receiver/spectrum analyzer is 120KHz and video bandwidth is 300kHz for Peak detection and Quasi-peak detection at frequency below 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
5. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average detection at frequency above 1GHz.
6. The other emissions is too low to be measured.

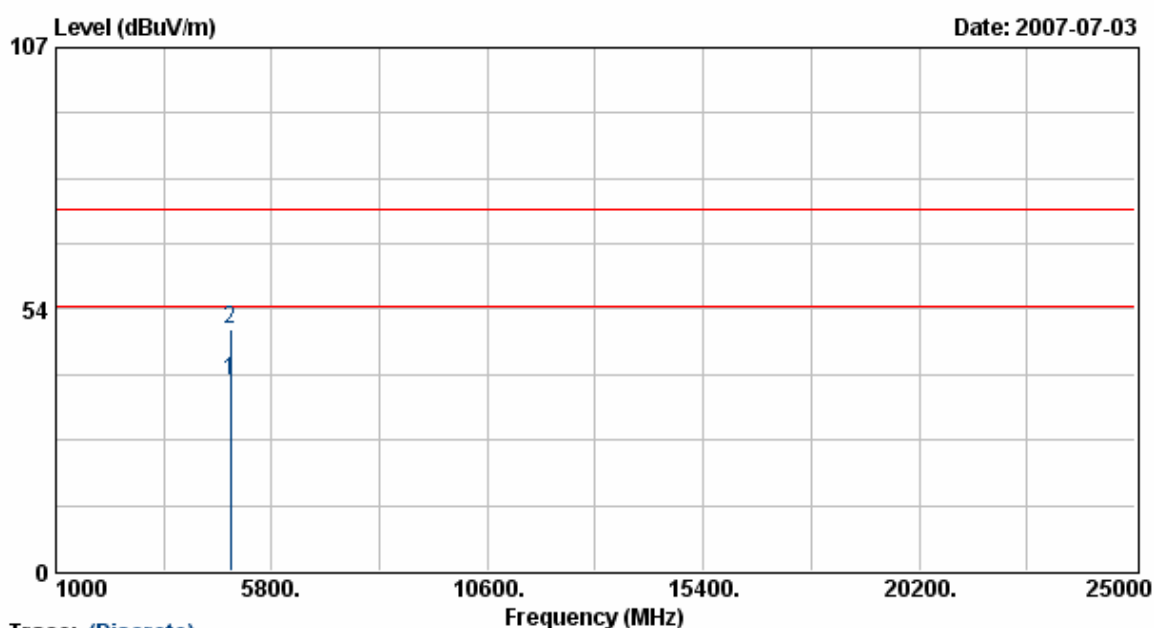
Power	: DC 5V	Pol/Phase	: VERTICAL
Test Mode	: Transmit / Receive	Temperature	: 25 °C
Operation Channel	: 39	Humidity	: 65 %
Modulation Type	: GFSK	Atmospheric Pressure	: 1010 hPa
Memo	:	Rate	: 1 Mbps



Notes:

1. Result = Read Value + Factor
2. Factor = Antenna Factor + Cable Loss - Amplifier
3. The resolution bandwidth of test receiver/spectrum analyzer is 120KHz and video bandwidth is 300kHz for Peak detection and Quasi-peak detection at frequency below 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
5. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average detection at frequency above 1GHz.
6. The other emissions is too low to be measured.

Power	: DC 5V	Pol/Phase	: HORIZONTAL
Test Mode	: Transmit / Receive	Temperature	: 25 °C
Operation Channel	: 39	Humidity	: 65 %
Modulation Type	: GFSK	Atmospheric Pressure	: 1010 hPa
Memo	:	Rate	: 1 Mbps



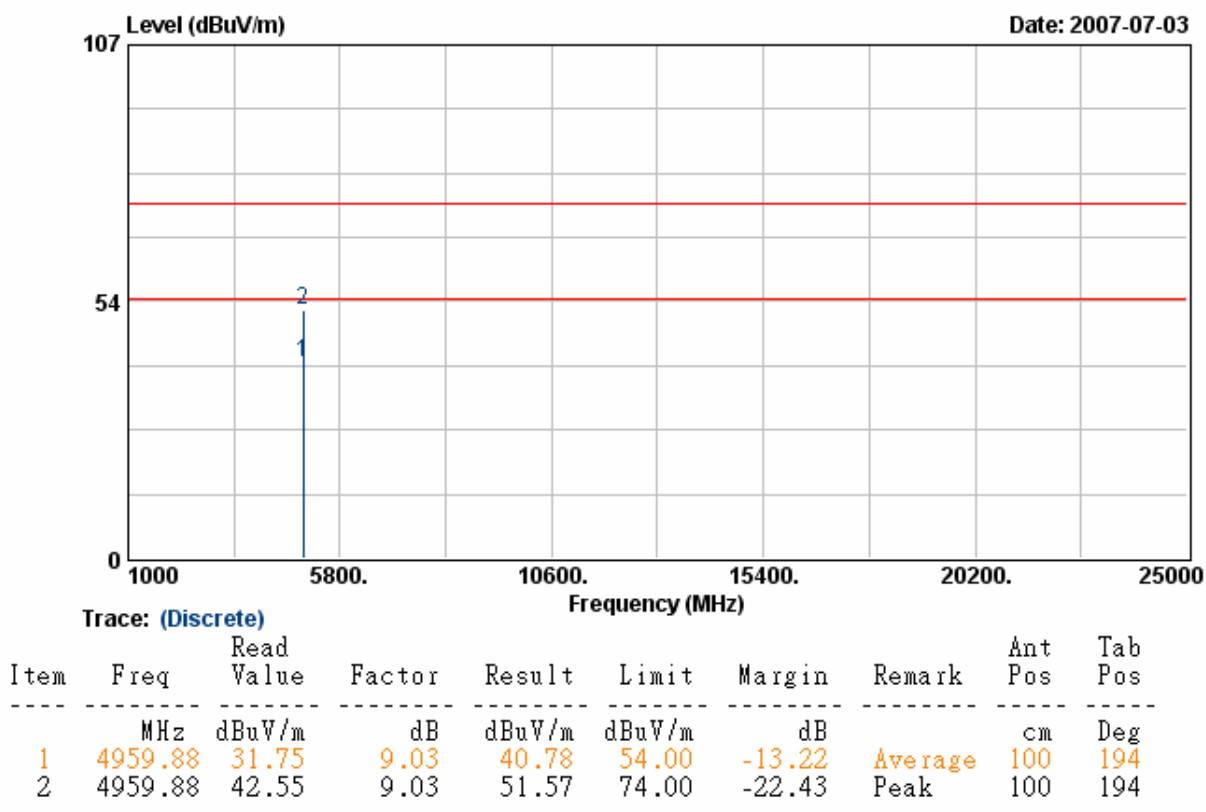
Trace: (Discrete)

Item	Freq	Read Value	Factor	Result	Limit	Margin	Remark	Ant Pos	Tab Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB		cm	Deg
1	4882.00	30.26	8.80	39.06	54.00	-14.94	Average	100	238
2	4882.00	40.58	8.80	49.38	74.00	-24.62	Peak	100	238

Notes:

1. Result = Read Value + Factor
2. Factor = Antenna Factor + Cable Loss - Amplifier
3. The resolution bandwidth of test receiver/spectrum analyzer is 120KHz and video bandwidth is 300kHz for Peak detection and Quasi-peak detection at frequency below 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
5. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average detection at frequency above 1GHz.
6. The other emissions is too low to be measured.

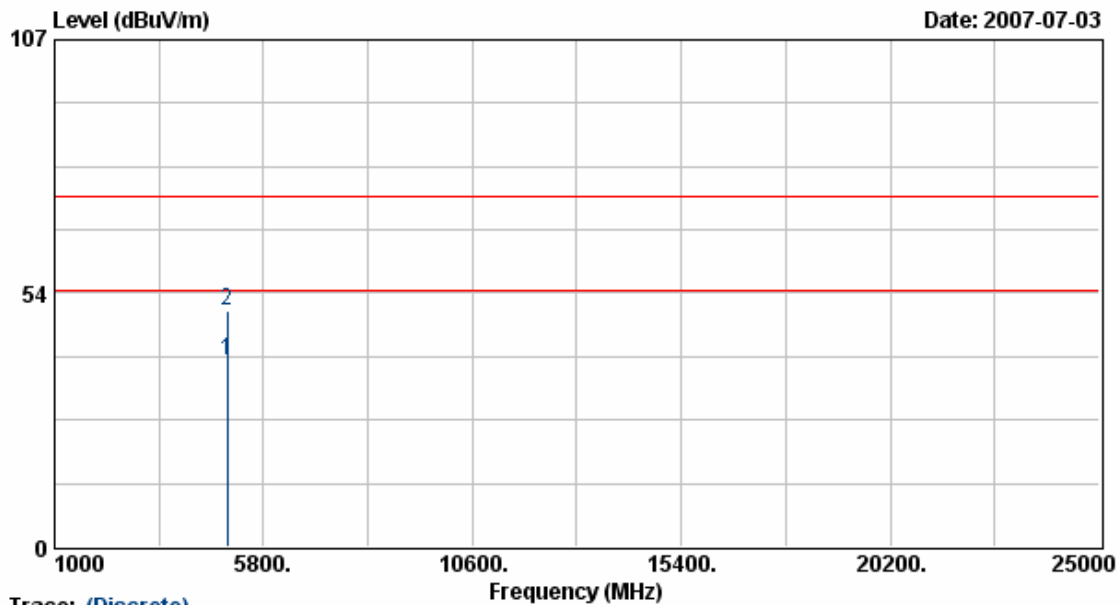
Power	: DC 5V	Pol/Phase	: VERTICAL
Test Mode	: Transmit / Receive	Temperature	: 25 °C
Operation Channel	: 78	Humidity	: 65 %
Modulation Type	: GFSK	Atmospheric Pressure	: 1010 hPa
Memo	:	Rate	: 1 Mbps



Notes:

1. Result = Read Value + Factor
2. Factor = Antenna Factor + Cable Loss - Amplifier
3. The resolution bandwidth of test receiver/spectrum analyzer is 120KHz and video bandwidth is 300kHz for Peak detection and Quasi-peak detection at frequency below 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
5. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average detection at frequency above 1GHz.
6. The other emissions is too low to be measured.

Power	: DC 5V	Pol/Phase	: HORIZONTAL
Test Mode	: Transmit / Receive	Temperature	: 25 °C
Operation Channel	: 78	Humidity	: 65 %
Modulation Type	: GFSK	Atmospheric Pressure	: 1010 hPa
Memo	:	Rate	: 1 Mbps



Item	Freq	Read Value	Factor	Result	Limit	Margin	Remark	Ant Pos	Tab Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB		cm	Deg
1	4960.13	30.26	9.03	39.29	54.00	-14.71	Average	100	238
2	4960.13	40.59	9.03	49.61	74.00	-24.39	Peak	100	238

Notes:

1. Result = Read Value + Factor
2. Factor = Antenna Factor + Cable Loss - Amplifier
3. The resolution bandwidth of test receiver/spectrum analyzer is 120KHz and video bandwidth is 300kHz for Peak detection and Quasi-peak detection at frequency below 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
5. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average detection at frequency above 1GHz.
6. The other emissions is too low to be measured.

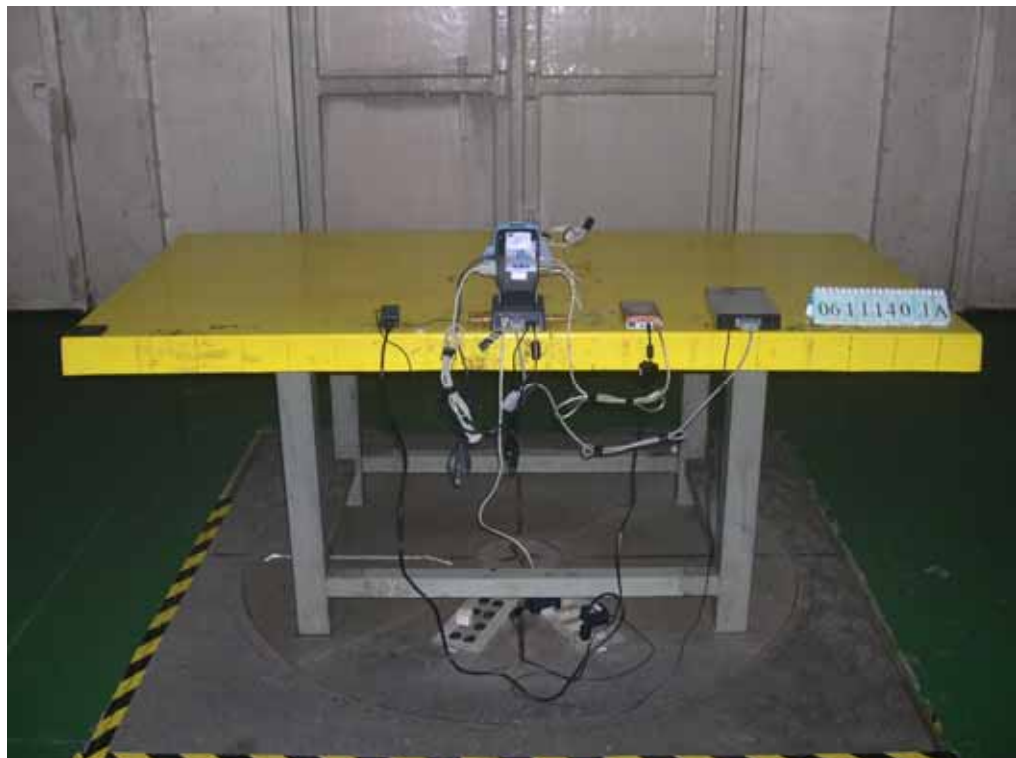
Test engineer: Ben

5.6 Test Photographs

Front View



Rear View



6. 20dB Bandwidth Measurement Data

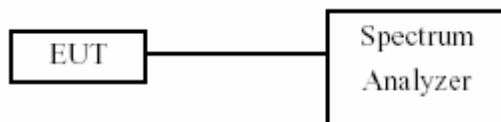
6.1 Test Limit

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. Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

6.2 Test Procedures

1. The transmitter output was connected to the spectrum analyzer.
2. Set RBW of spectrum analyzer to 30 KHz and VBW to 100 KHz.
3. The 20 dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20 dB.

6.3 Test Setup Layout



6.4 Measurement equipment

Instrument/Ancillary	Model No.	Manufacturer	Serial No.	Calibration Date	Valid Date
Spectrum Analyzer	FSP40	R&S	100047	2007/01/23	2008/01/22

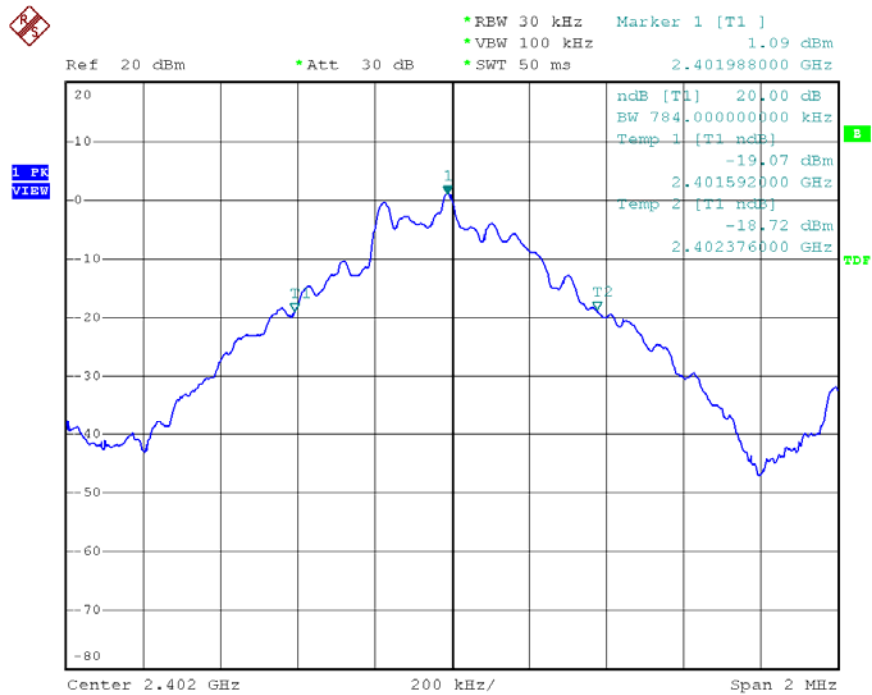
6.5 Test Result and Data

Modulation Standard: GFSK (1Mbps)

Test Date: Jul. 05, 2007 Temperature: 25 Humidity: 68% Atmospheric pressure: 1010 hPa

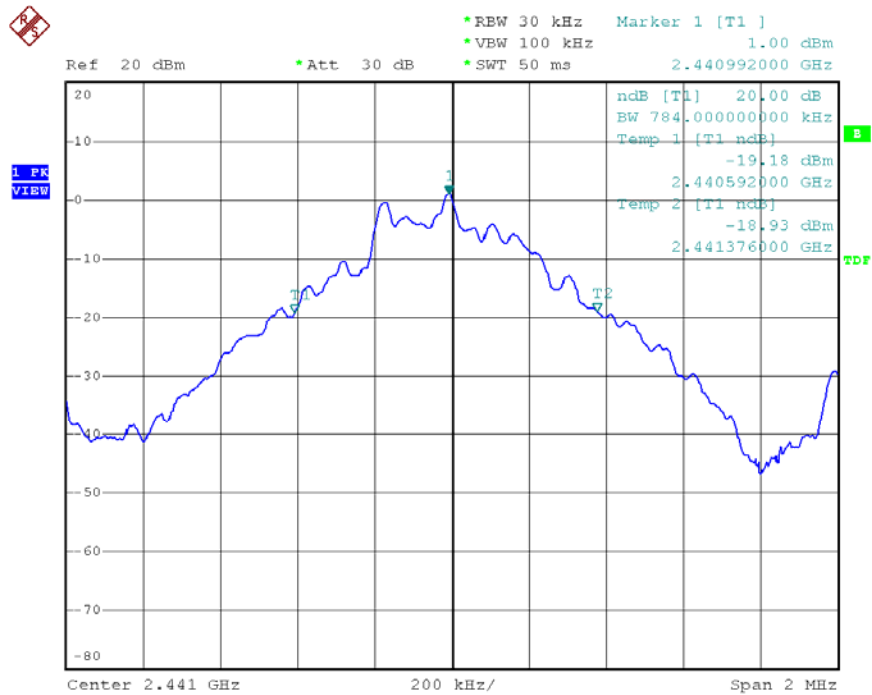
Channel	Frequency (MHz)	20dB Bandwidth (KHz)
00	2402	784
39	2441	784
78	2480	784

Modulation Standard: GFSK (1Mbps)
Channel: 00



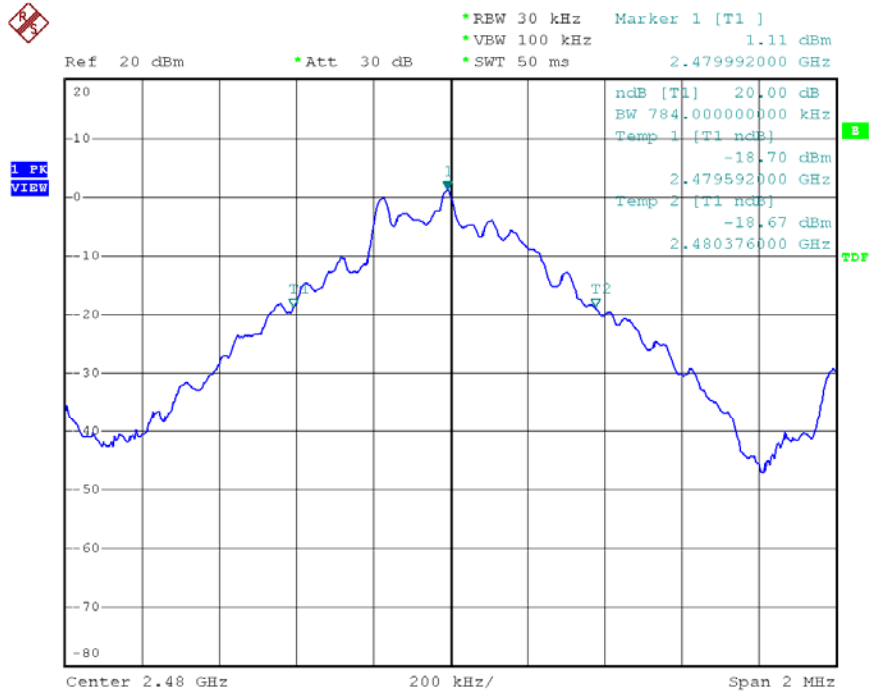
Date: 5.JUL.2007 17:20:11

Modulation Standard: GFSK (1Mbps)
Channel: 39



Date: 5.JUL.2007 17:21:02

Modulation Standard: GFSK (1Mbps)
Channel: 78



Date: 5.JUL.2007 17:22:20

7. Frequencies Separation

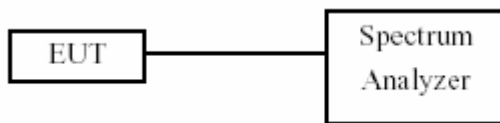
7.1 Test Limit

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.

7.2 Test Procedures

1. The transmitter output was connected to the spectrum analyzer.
2. Set RBW of spectrum analyzer to 100 KHz and VBW to 100 KHz.
3. By using the MaxHold function record the separation of two adjacent channels.
4. Measure the frequency difference of these two adjacent channels.

7.3 Test Setup Layout



7.4 Measurement equipment

Instrument/Ancillary	Model No.	Manufacturer	Serial No.	Calibration Date	Valid Date
Spectrum Analyzer	FSP40	R&S	100047	2007/01/23	2008/01/22

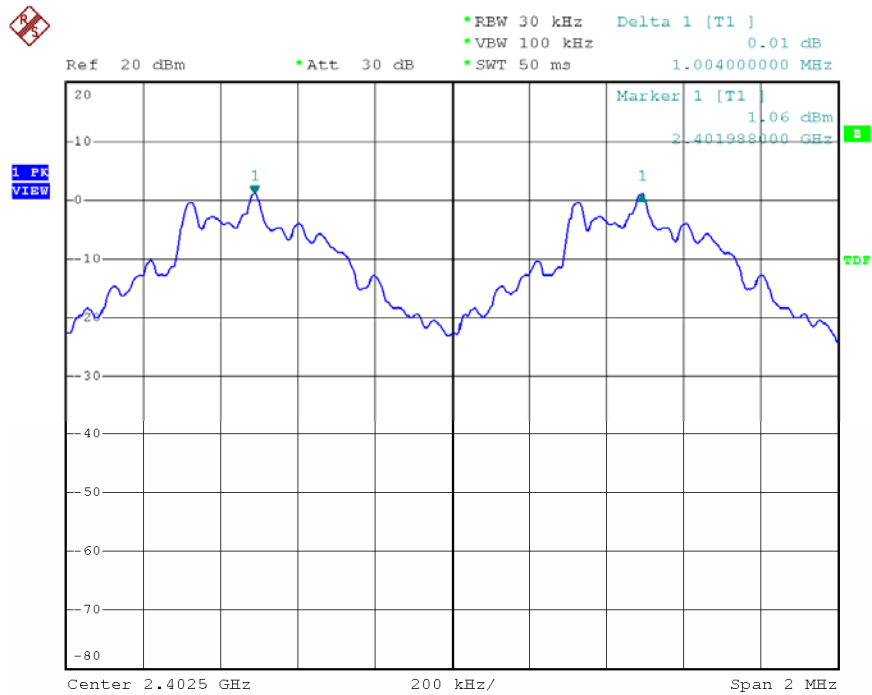
7.5 Test Result and Data

Modulation Standard: GFSK (1Mbps)

Test Date: Jul. 05, 2007 Temperature: 25 Humidity: 68% Atmospheric pressure: 1010 hPa

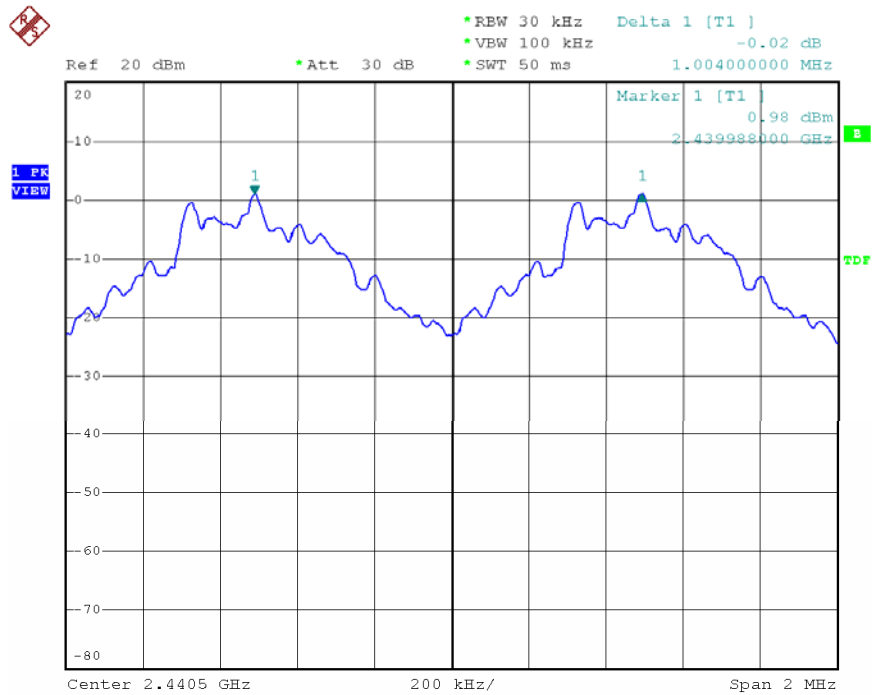
Channel	Frequency (MHz)	Channel Separation (MHz)	Minimum Limit (MHz)
00	2402	1.004	0.784
39	2441	1.004	0.784
78	2480	1.000	0.784

Modulation Standard: GFSK (1Mbps)
Channel: 00



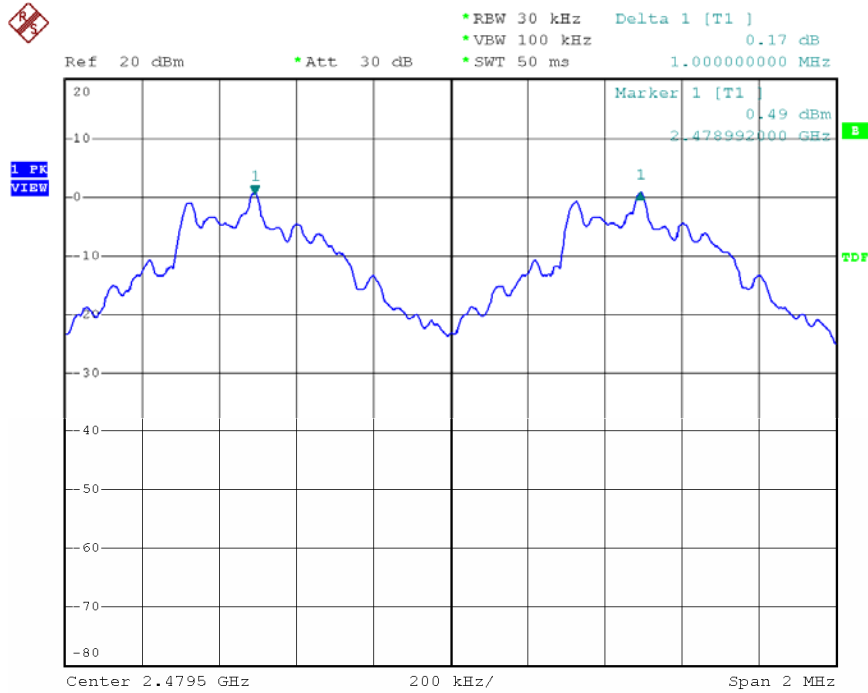
Date: 5.JUL.2007 17:27:49

Modulation Standard: GFSK (1Mbps)
Channel: 39



Date: 5.JUL.2007 17:29:00

Modulation Standard: GFSK (1Mbps)
Channel: 78



Date: 5.JUL.2007 17:30:13

8. Dwell Time on each channel

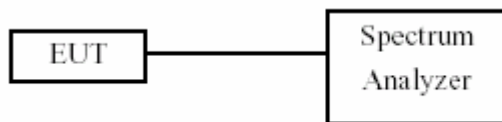
8.1 Test Limit

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

8.2 Test Procedures

1. The transmitter output was connected to the spectrum analyzer.
2. Adjust the center frequency to measure frequency, then set zero span mode.
2. Set RBW of spectrum analyzer to 100 KHz and VBW to 100 KHz.
4. Measure the time duration of one transmission on the measured frequency.

8.3 Test Setup Layout



8.4 Measurement equipment

Instrument/Ancillary	Model No.	Manufacturer	Serial No.	Calibration Date	Valid Date
Spectrum Analyzer	FSP40	R&S	100047	2007/01/23	2008/01/22

8.5 Test Result and Data

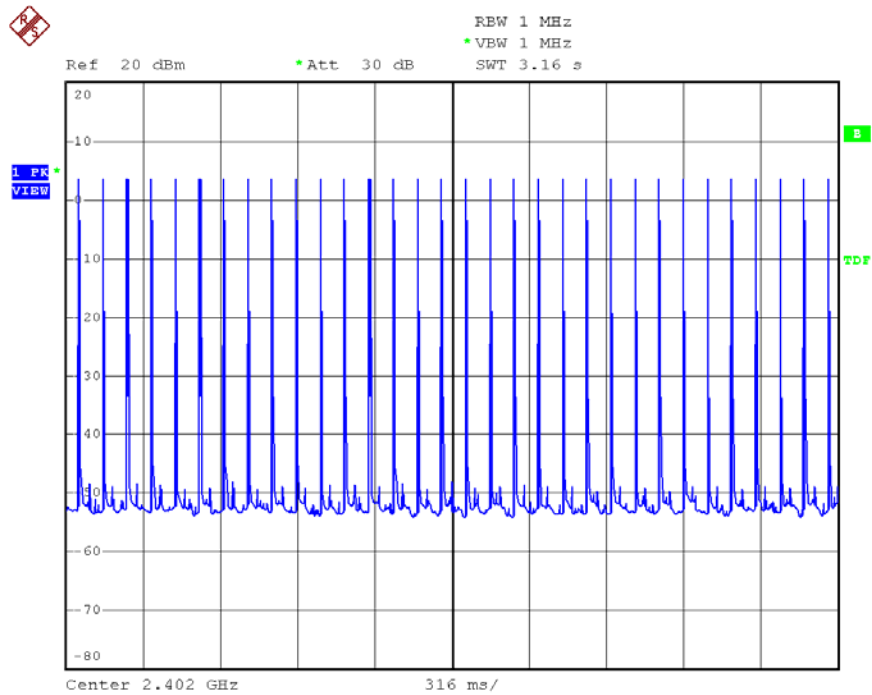
Modulation Standard: GFSK (1Mbps)

Test Date: Jul. 05, 2007 Temperature: 25 Humidity: 68% Atmospheric pressure: 1010 hPa

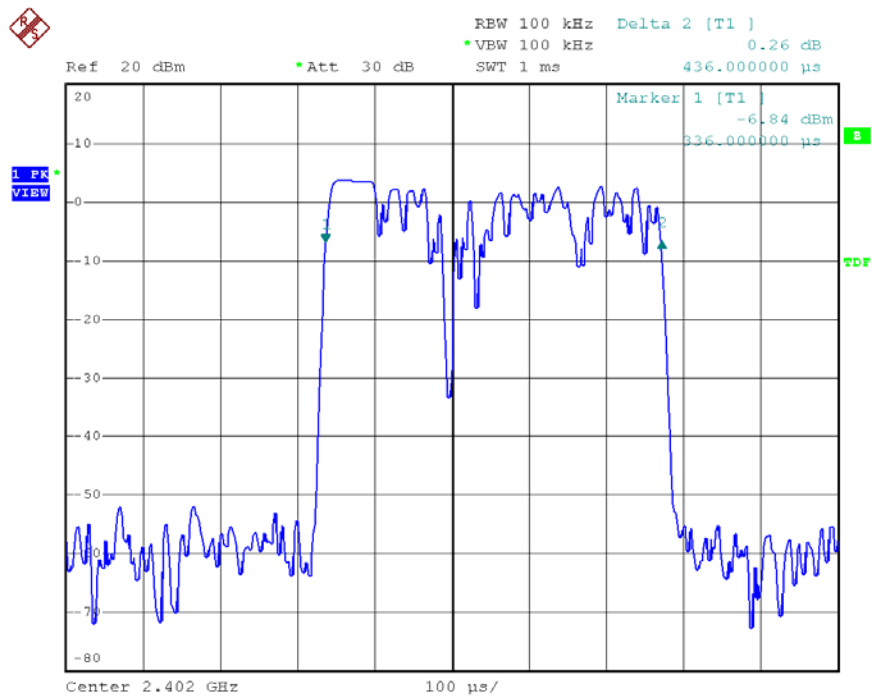
Test Period = 0.4 (second/ channel) x 79 Channel = 31.6 sec

a) 2402 MHz Dwell Time is	=	0.436ms	x	31.6	x	32	=	139.52ms
				3.16				
b) 2441 MHz Dwell Time is	=	0.436ms	x	31.6	x	32	=	139.52ms
				3.16				
c) 2480 MHz Dwell Time is	=	0.434ms	x	31.6	x	32	=	138.88ms
				3.16				

Modulation Standard: GFSK (1Mbps)
Channel: 00

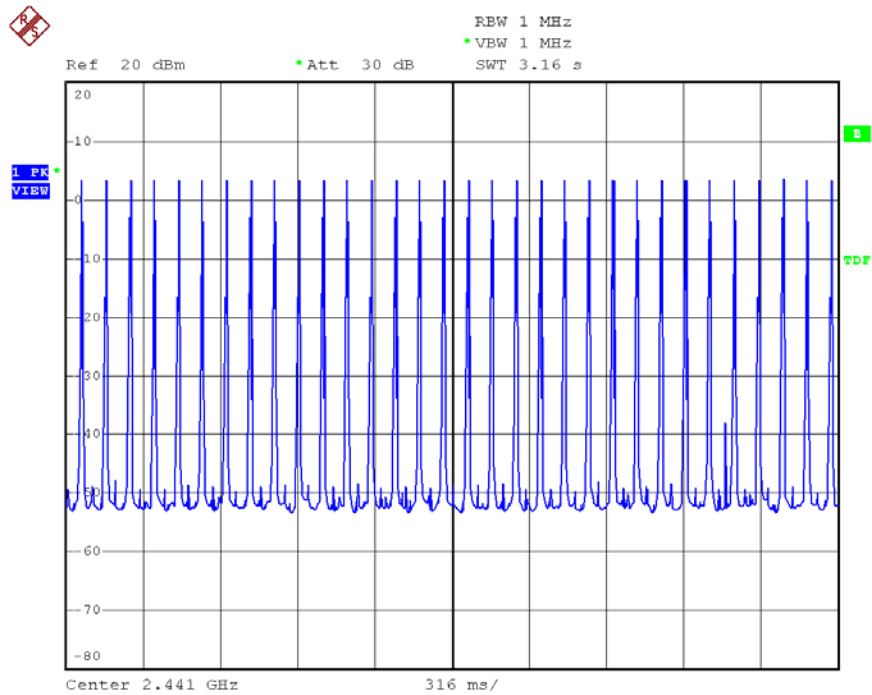


Date: 5.JUL.2007 17:38:09

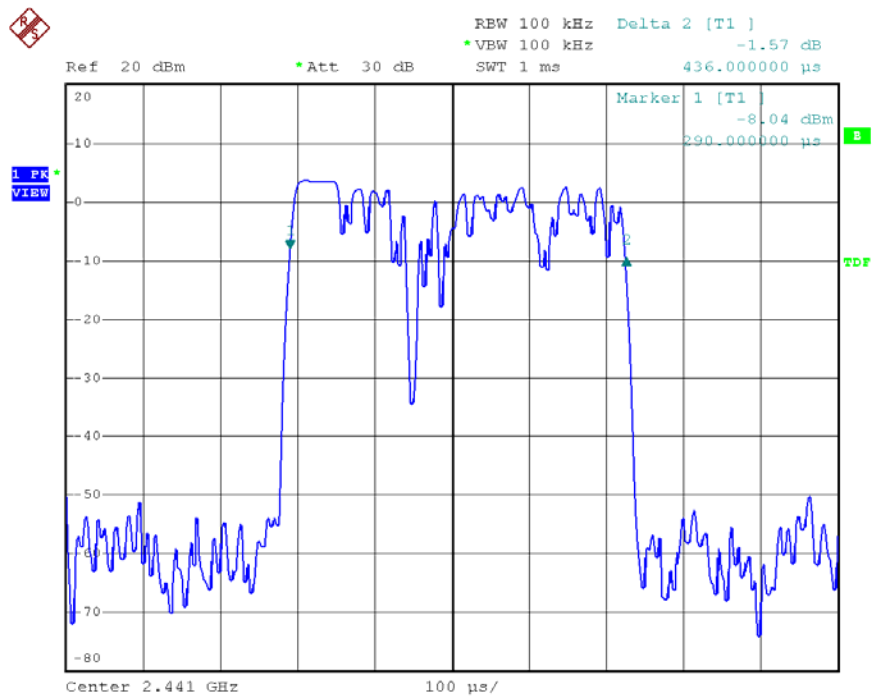


Date: 5.JUL.2007 17:24:13

Modulation Standard: GFSK (1Mbps)
Channel: 39

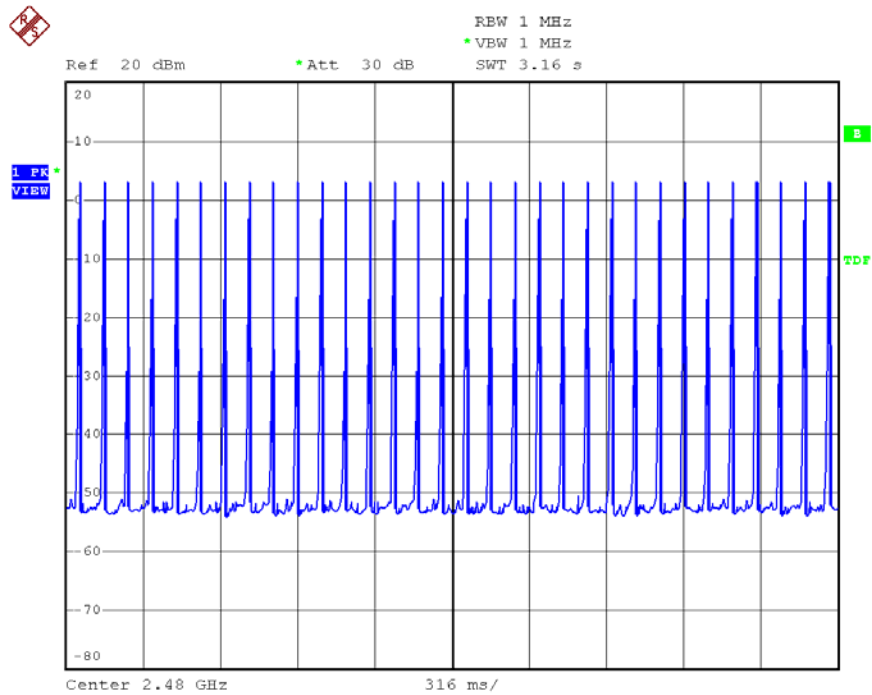


Date: 5.JUL.2007 17:38:46

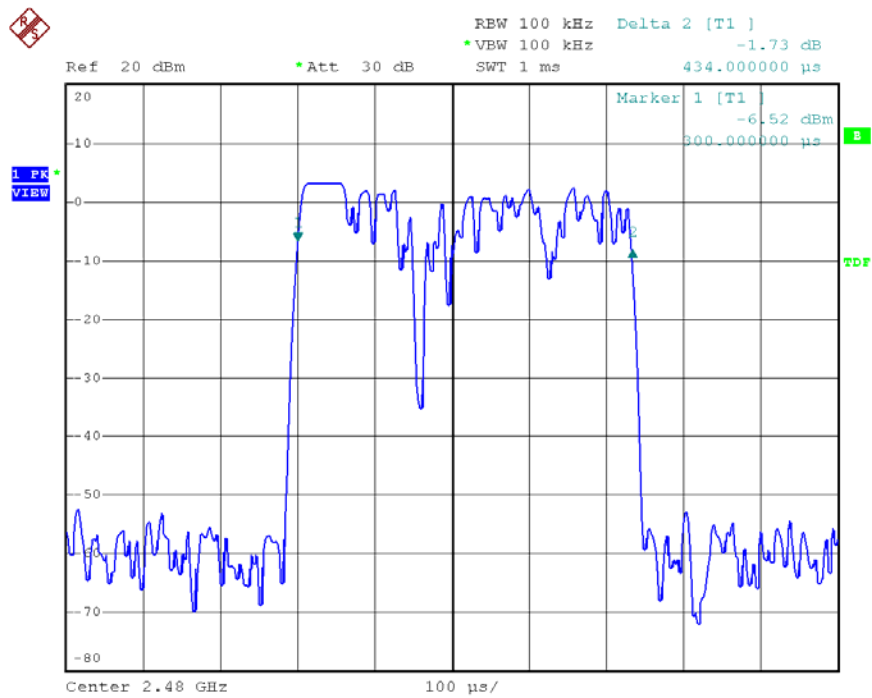


Date: 5.JUL.2007 17:25:19

Modulation Standard: GFSK (1Mbps)
Channel: 78



Date: 5.JUL.2007 17:39:27



Date: 5.JUL.2007 17:26:57

9. Number of Hopping Channels

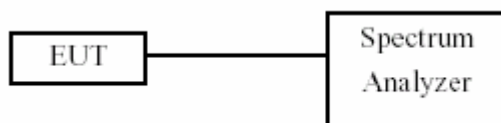
9.1 Test Limit

Frequency hopping systems in the 2400 ~ 2483.5 MHz band shall use at least 15 channels.

9.2 Test Procedures

1. The transmitter output was connected to the spectrum analyzer.
2. Set RBW of spectrum analyzer to 100 KHz and VBW to 100 KHz.
3. Set the MaxHold function, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been record.

9.3 Test Setup Layout



9.4 Measurement equipment

Instrument/Ancillary	Model No.	Manufacturer	Serial No.	Calibration Date	Valid Date
Spectrum Analyzer	FSP40	R&S	100047	2007/01/23	2008/01/22

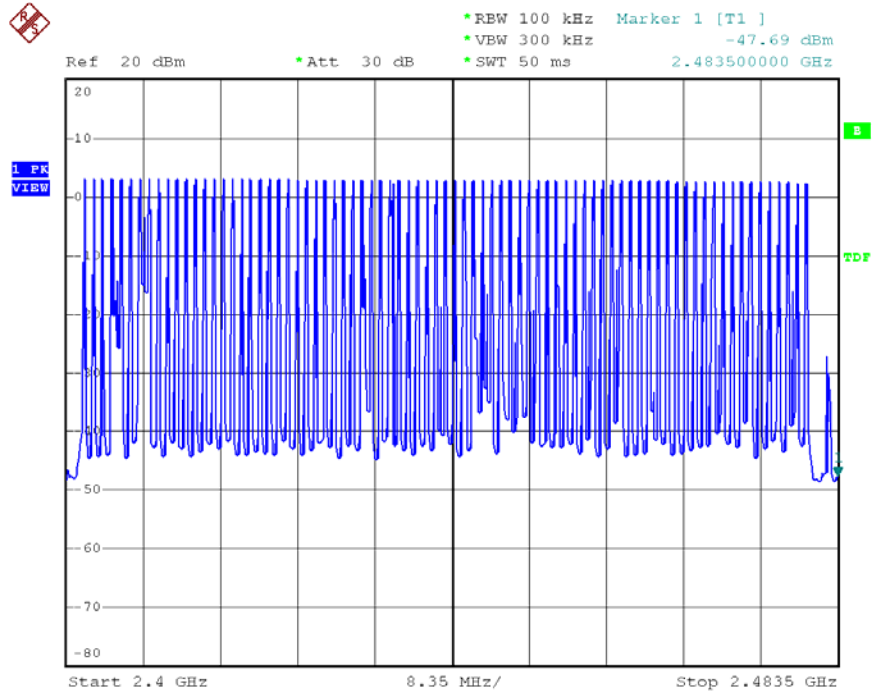
9.5 Test Result and Data

Modulation Standard: GFSK (1Mbps)

Test Date: Jul. 05, 2007 Temperature: 25 Humidity: 68% Atmospheric pressure: 1010 hPa

Number of hopping channels: 79 Channels

Modulation Standard: GFSK (1Mbps)



Date: 5.JUL.2007 15:57:19

10. Maximum Peak Output Power

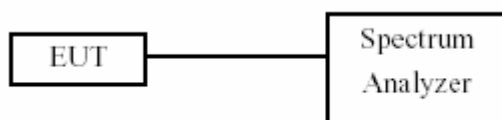
10.1 Test Limit

The Maximum Peak Output Power Measurement is 30dBm.

10.2 Test Procedures

The antenna port(RF output)of the EUT was connected to the input(RF input)of a power meter. Power was read directly from the meter and cable loss connection was added to the reading to obtain power at the EUT antenna terminal. The EUT Output Power was set to maximum to produce the worse case test result.

10.3 Test Setup Layout



10.4 Measurement equipment

Instrument/Ancillary	Model No.	Manufacturer	Serial No.	Calibration Date	Valid Date
Spectrum Analyzer	FSP40	R&S	100047	2007/01/23	2008/01/22

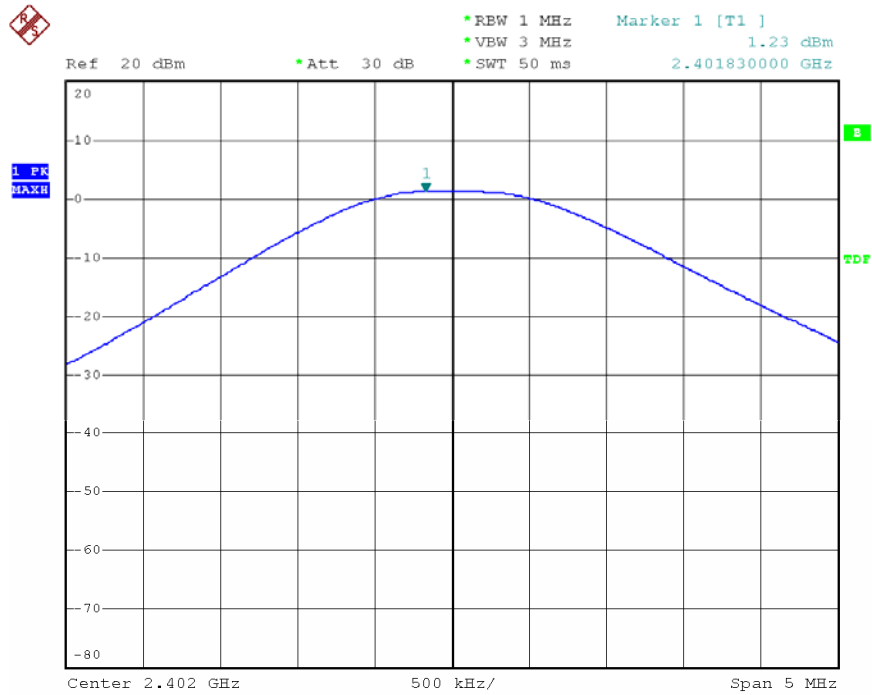
10.5 Test Result and Data

Modulation Standard: GFSK (1Mbps)

Test Date: Jul. 05, 2007 Temperature: 25 Humidity: 68% Atmospheric pressure: 1010 hPa

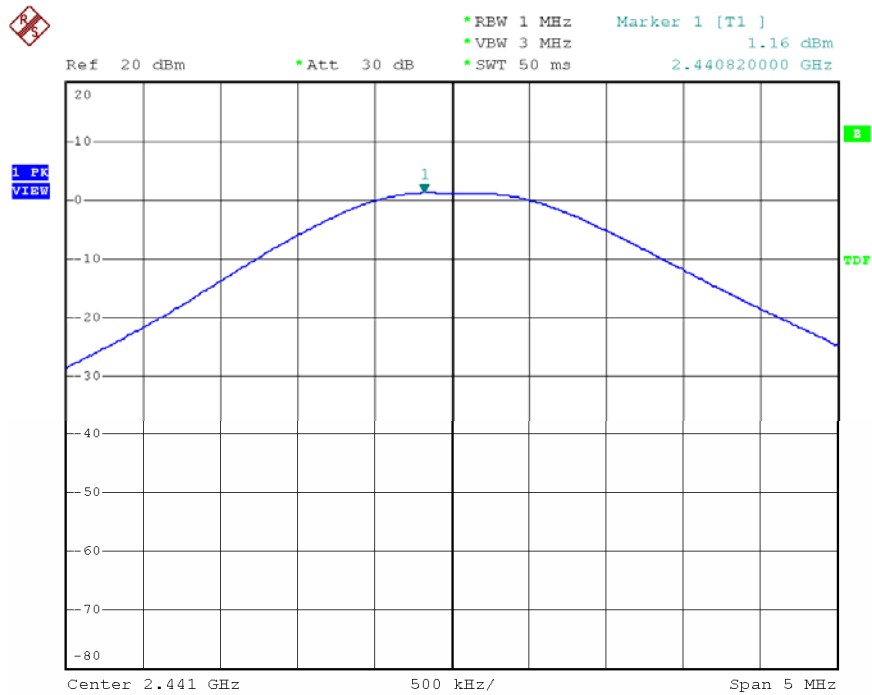
Channel	Frequency (MHz)	Peak Power Output (dBm)	Peak Power Output (mW)
00	2402	1.23	1.3
39	2441	1.16	1.3
78	2478	0.87	1.2

Modulation Standard: GFSK (1Mbps)
Channel: 00



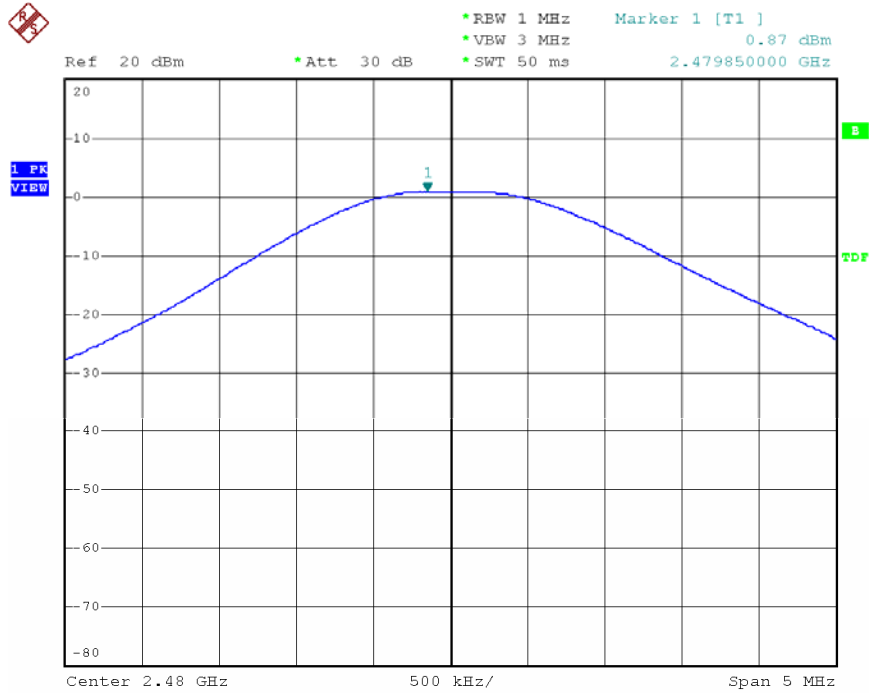
Date: 5.JUL.2007 17:33:45

Modulation Standard: GFSK (1Mbps)
Channel: 39



Date: 5.JUL.2007 17:34:18

Modulation Standard: GFSK (1Mbps)
Channel: 78



Date: 5.JUL.2007 17:35:04

11. Band Edges Measurement

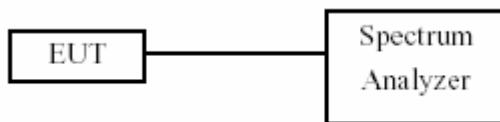
11.1 Test Limit

Below -20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

11.2 Test Procedure :

1. The transmitter output was connected to the spectrum analyzer via a low lose cable.
2. Set both RBW and VBW of spectrum analyzer to 100 KHz with convenient frequency span including 100 KHz bandwidth from band edge.
3. The band edges was measured and recorded.

11.3 Test Setup Layout



11.4 List of Measuring Equipment Used

Instrument/Ancillary	Model No.	Manufacturer	Serial No.	Calibration Date	Valid Date
Spectrum Analyzer	FSP40	R&S	100047	2007/01/23	2008/01/22

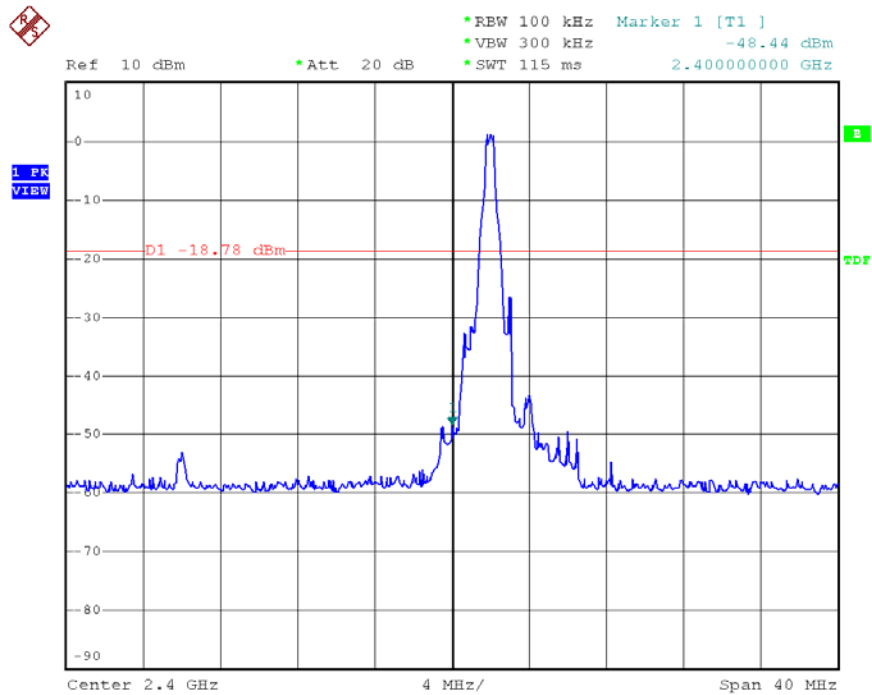
11.5 Test Result and Data

Modulation Standard: GFSK (1Mbps)

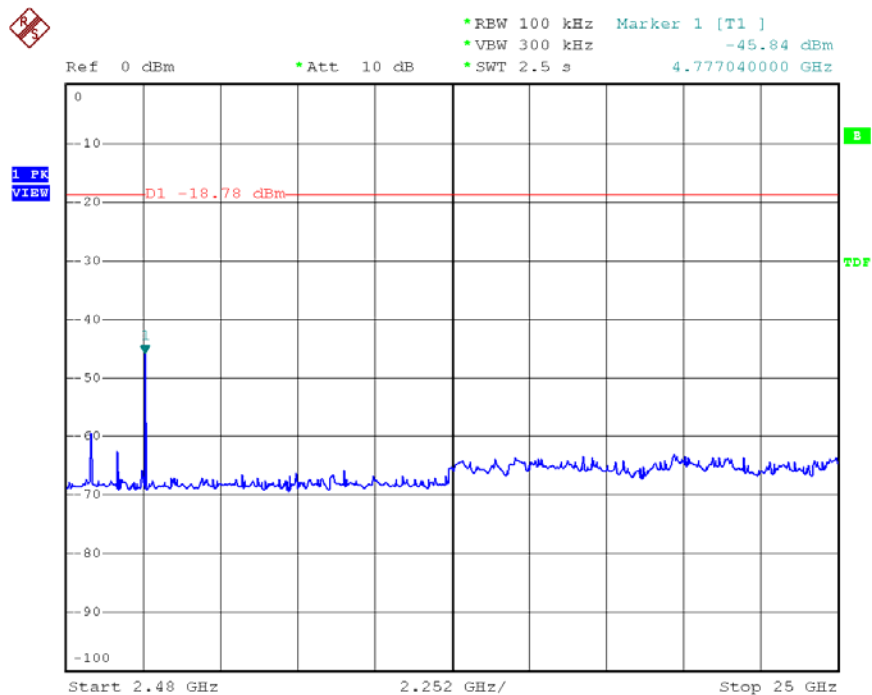
Test Date: Jul. 05, 2007 Temperature: 25 Humidity: 68% Atmospheric pressure: 1010 hPa

Channel	Frequency	maximum value in frequency (MHz)	maximum value is (dBm)
01	2412	4777.04	-45.84
11	2462	4957.20	-46.58

Modulation Standard: GFSK (1Mbps)
Channel: 00

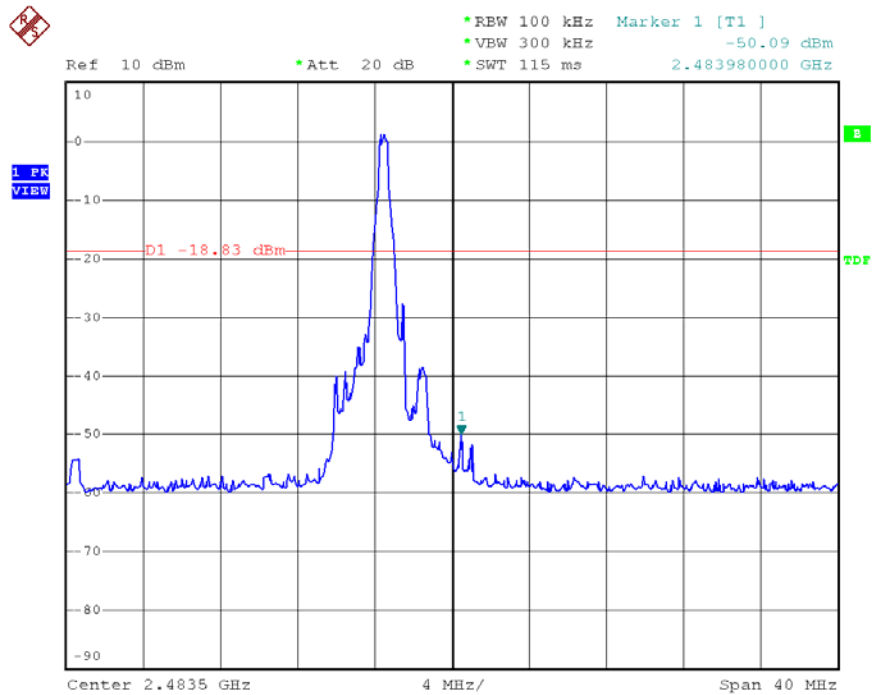


Date: 5.JUL.2007 10:22:32

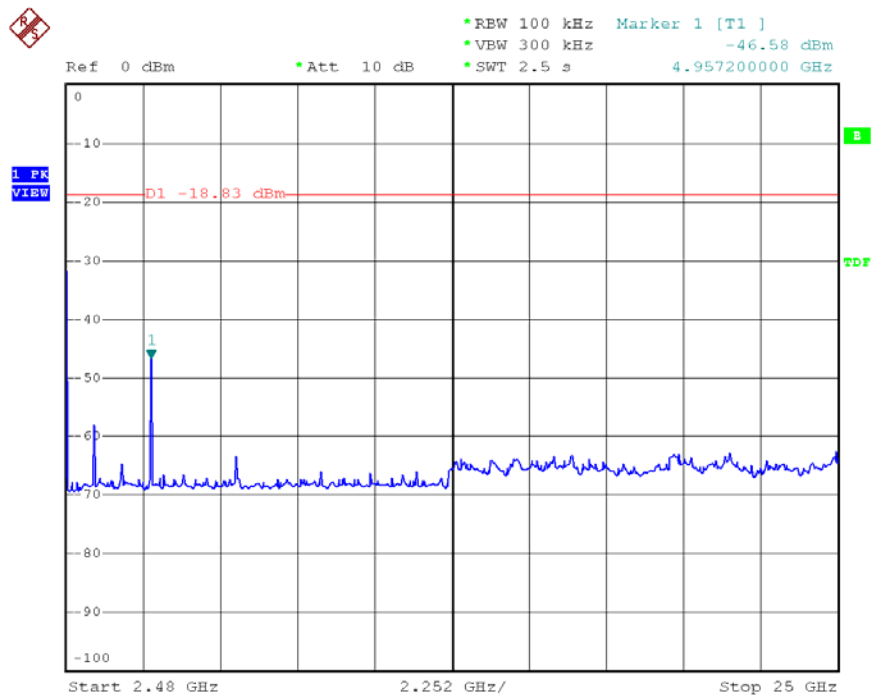


Date: 5.JUL.2007 10:23:49

Modulation Standard: GFSK (1Mbps)
Channel: 78



Date: 5.JUL.2007 17:44:56



Date: 5.JUL.2007 17:45:55

11.6 Restrict band emission Measurement Data

Modulation Standard: GFSK (1Mbps)

Test Date: Jul. 03, 2007 Temperature: 25 Humidity: 65% Atmospheric pressure: 1010 hPa

a) Channel 00

Frequency (MHz)	Ant-Pol H/V	Meter Reading	Corrected Factor	Result (dBuV/m)	Remark	Limit@3m (dBuV/m)		Margin (dB)	Table (Deg.)	Ant High (m)
						Peak	Ave.			
2340.80	H	43.33	-0.31	43.02	Peak	74	54	-30.98	238	1.1
2385.89	H	31.86	-0.17	31.69	Ave	74	54	-22.31	238	1.1
2379.26	V	45.11	-0.18	44.93	Peak	74	54	-29.07	194	1.0
2385.89	V	33.42	-0.14	33.28	Ave	74	54	-20.72	194	1.0

b) Channel 78

Frequency (MHz)	Ant-Pol H/V	Meter Reading	Corrected Factor	Result (dBuV/m)	Remark	Limit@3m (dBuV/m)		Margin (dB)	Table (Deg.)	Ant High (m)
						Peak	Ave.			
2486.64	H	46.12	0.25	46.12	Peak	74	54	-27.88	238	1.1
2483.50	H	34.28	0.24	34.28	Ave	74	54	-19.72	238	1.1
2488.04	V	49.36	0.29	49.36	Peak	74	54	-24.64	194	1.0
2483.50	V	38.85	0.23	38.85	Ave	74	54	-15.15	194	1.0

Notes:

1. Result = Meter Reading + Factor
2. Factor = Antenna Factor + Cable Loss – Amplifier
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3 MHz for Peak detection at frequency above 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average detection at frequency above 1GHz

12. Power Spectral Density

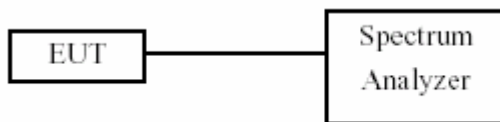
12.1 Test Limit

The Maximum of Power Spectral Density Measurement is 8dBm.

12.2 Test Procedures

- 1.The transmitter output was connected to spectrum analyzer.
- 2.The spectrum analyzer's resolution bandwidth were set at 3KHz RBW and 30KHz VBW as that of the fundamental frequency. Set the sweep time=span/3KHz.
- 3.The power spectral density was measured and recorded.
- 4.The Sweep time is allowed to be longer than span/3KHz for a full response of the mixer in the spectrum analyzer.

12.3 Test Setup Layout :



12.4 List of Measuring Equipment Used

Instrument/Ancillary	Model No.	Manufacturer	Serial No.	Calibration Date	Valid Date
Spectrum Analyzer	FSP40	R&S	100047	2007/01/23	2008/01/22

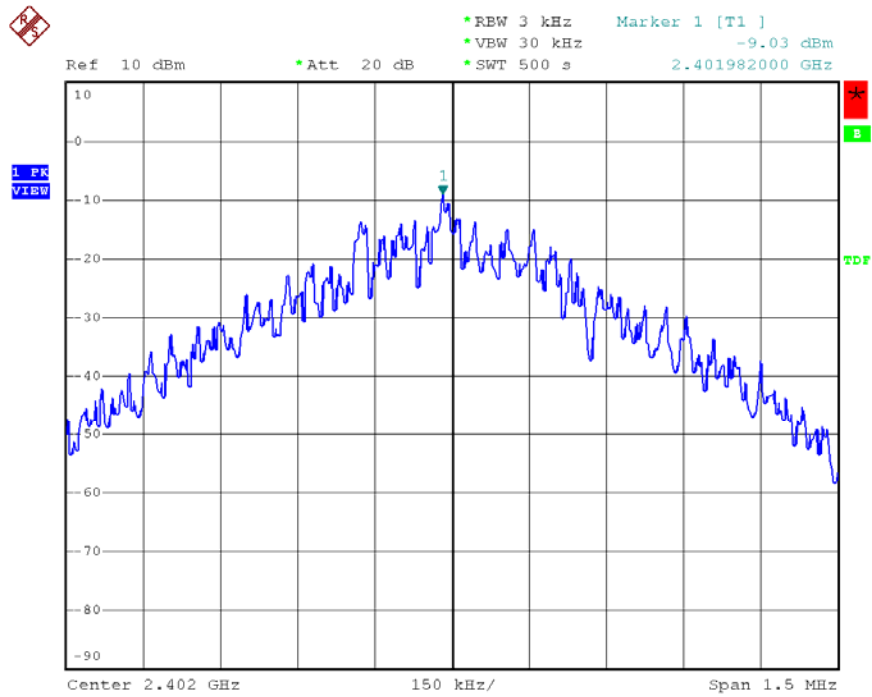
12.5 Test Result and Data

(1) Modulation Standard: GFSK (1Mbps)

Test Date: Jul. 05, 2007 Temperature: 25 Humidity: 68% Atmospheric pressure: 1010 hPa

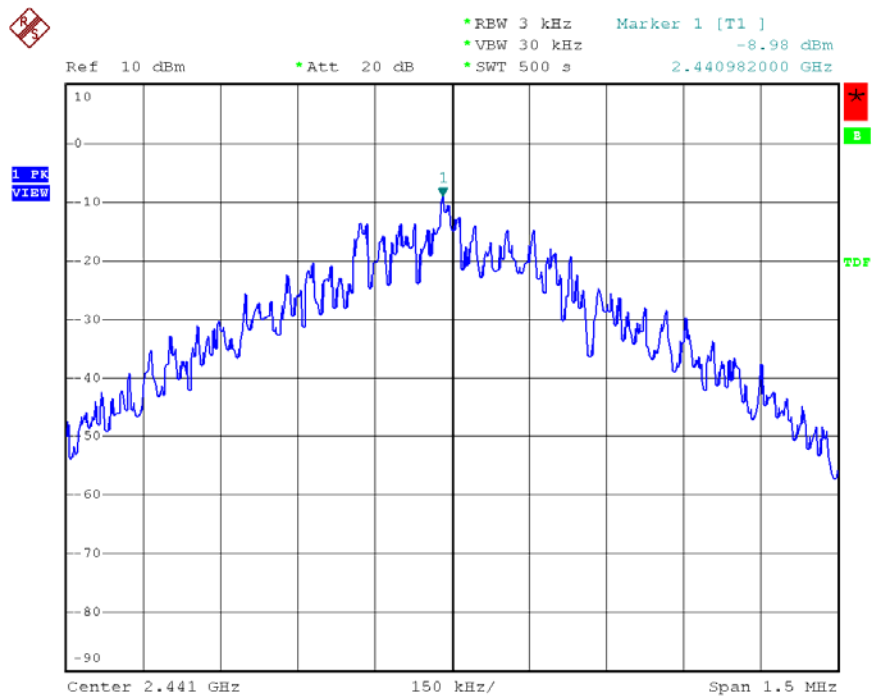
Channel	Frequency	Maximum Power Density of 3 kHz Bandwidth (dBm)
00	2402	-9.03
39	2441	-8.98
78	2480	-10.05

Modulation Standard: 802.11b (11Mbps)
Channel: 01



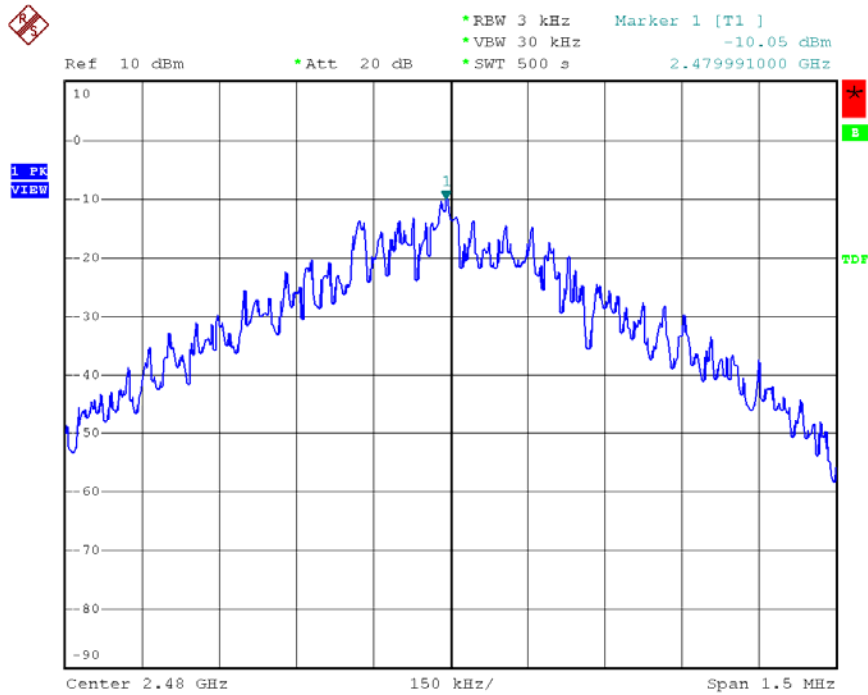
Date: 5.JUL.2007 17:37:11

Channel:06



Date: 5.JUL.2007 17:37:57

Channel: 11



Date: 5.JUL.2007 17:39:03

13. Restricted Bands of Operation

Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.09000 – 0.11000	16.42000 – 16.42300	399.9 – 410.0	4.500 – 5.250
0.49500 – 0.505**	16.69475 – 16.69525	608.0 – 614.0	5.350 – 5.460
2.17350 – 2.19050	16.80425 – 16.80475	960.0 – 1240.0	7.250 – 7.750
4.12500 – 4.12800	25.50000 – 25.67000	1300.0 – 1427.0	8.025 – 8.500
4.17725 – 4.17775	37.50000 – 38.25000	1435.0 – 1626.5	9.000 – 9.200
4.20725 – 4.20775	73.00000 – 74.60000	1645.5 – 1646.5	9.300 – 9.500
6.21500 – 6.21800	74.80000 – 75.20000	1660.0 – 1710.0	10.600 – 12.700
6.26775 – 6.26825	108.00000 – 121.94000	1718.8 – 1722.2	13.250 – 13.400
6.31175 – 6.31225	123.00000 – 138.00000	2200.0 – 2300.0	14.470 – 14.500
8.29100 – 8.29400	149.90000 – 150.05000	2310.0 – 2390.0	15.350 – 16.200
8.36200 – 8.36600	156.52475 – 156.52525	2483.5 – 2500.0	17.700 – 21.400
8.37625 – 8.38675	156.70000 – 156.90000	2655.0 – 2900.0	22.010 – 23.120
8.41425 – 8.41475	162.01250 – 167.17000	3260.0 – 3267.0	23.600 – 24.000
12.29000 – 12.29300	167.72000 – 173.20000	3332.0 – 3339.0	31.200 – 31.800
12.51975 – 12.52025	240.00000 – 285.00000	3345.8 – 3358.0	36.430 – 36.500
12.57675 – 12.57725	322.00000 – 335.40000	3600.0 – 4400.0	Above 38.6
13.36000 – 13.41000			

** : Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz

13.1 Labeling Requirement

The device shall bear the following statement in a conspicuous location on the device:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.