FCC 47 CFR PART 15 SUBPART C AND ANSI C63.4 : 2003

TEST REPORT

For

Jawbone

Model : JBG

Trade Name : Jawbone

Issued for

Aliph com

99 Rhode Island, Floor 3, San Francisco, CA94103, U.S.A.

Issued by

Compliance Certification Services Inc.
Tainan Laboratory
No. 8, Jiu Cheng Ling, Jiaokeng Village, Sinhua Township, Tainan Hsien 712, Taiwan R.O.C.
TEL: 886-6-580-2201
FAX: 886-6-580-2202

Testing Laboratory
1109

Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	10/08/2009	Initial Issue	All Page 73	Jeter Wu

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1. TEST REPORT CERTIFICATION

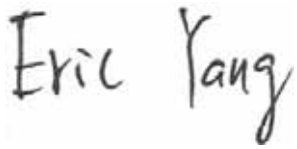
Applicant	：Aliph com
Address	：99 Rhode Island, Floor 3, San Francisco, CA94103, U.S.A.
Equipment Under Test	：Jawbone
Model	：JBG
Trade Name	：Jawbone
Tested Date	：September 04 ~ October 07, 2009

APPLICABLE STANDARD	
STANDARD	**TEST RESULT**
FCC Part 15 Subpart C AND ANSI C63.4 : 2003	PASS

Approved by:

Jeter Wu
Section Manager

Reviewed by:



Eric Yang
Senior Engineer

WE HEREBY CERTIFY THAT: The measurements shown in the attachment were made in accordance with the procedures indicated, and the energy emitted by the equipment was found to be within the limits applicable. We assume full responsibility for the accuracy and completeness of these measurements and vouch for the qualifications of all persons taking them.

2. EUT DESCRIPTION

2.1 DESCRIPTION OF EUT & POWER

Product Name	Jawbone
Model Number	JBG
Frequency Range	2402MHz to 2480MHz f = 2402 + nMHz, n = 0, …..78
Transmit Power	2.31dBm
Channel Spacing	1MHz
Channel Number	79 Channels
Air Data Rate	GFSK (1Mbps), π/4-DQPSK(2Mbps), 8-DPSK(3Mbps)
Type of Modulation	Frequency Hopping Spread Spectrum
Frequency Selection	by software / firmware
Transmitter Classification	portable device
Antenna Type	Monopole Antenna, Antenna Gain : 1.45dBi
Power Source	Normal Mode: 3.7VDC(Battery Powered) Charging Mode: 5.0VDC (From Notebook PC, Powered From Host Device & power adapter)
RF Exposure Evaluation	Since the EUT is classed portable device, and the maximum peak power is 2.31dBm (<13.6dBm), the MPE evaluation is not required and no SAR consideration applied.
I/O Port	Mini USB Port × 1

Power Adapter :

No.	Manufacturer	Model No.	Power Input	Power Output
1	JBWBONE	SPA-K901	100-240V , 0.1A , 50/60Hz	5.0V, 550mA

Remark:

1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.
2. This submittal(s) (test report) is intended for FCC ID: V3J-JBG filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.
3. For more details, please refer to the User's manual of the EUT.
4. The EUT has six types for sales except color of appearance. The detail please refer to photographs. (Grey Color, Black Color, Pearl White Color, Gold Color, Smoke Black Color and Smoke Red Color)

3. DESCRIPTION OF TEST MODES

The EUT had been tested under operating condition.

There are three channels have been tested as following :

Channel	Frequency (MHz)
Low	2402
Middle	2441
High	2480

Radiated Emission Test (Below 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

Charge Linking

Radiated Emission Test (Above 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

Tested Channel	Modulation Technology	Modulation Type	Packet Type
Low, Mid, High	FHSS	GFSK	DH5
Low, Mid, High	FHSS	8-DPSK	3-DH5

Bandedge Measurement :

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

Tested Channel	Modulation Technology	Modulation Type	Packet Type
Low, High	FHSS	GFSK	DH5
Low, High	FHSS	8-DPSK	3-DH5

Antenna Port Conducted Measurement :

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

Tested Channel	Modulation Technology	Modulation Type	Packet Type
Low, Mid, High	FHSS	GFSK	DH5
Low, Mid, High	FHSS	8-DPSK	3-DH5

Note：The field strength of spurious emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in stand-up position(Z axis) and the worst case was recorded.

4. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4 : 2003 and FCC CFR 47 15.207, 15.209 and 15.247.

5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

No. 8, Jiu Cheng Ling, Jiaokeng Village,Sinhua Township, Tainan Hsien 712, Taiwan R.O.C.

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 : 2003 and CISPR Publication 22.

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with preselectors and quasi-peak detectors are used to perform radiated measurements.
Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.
Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.
All receiving equipment conforms to CISPR Publication 16-1, “Radio Interference Measuring Apparatus and Measurement Methods.”

5.3 LABORATORY ACCREDITATIONS LISTINGS

The test facilities used to perform radiated and conducted emissions tests are accredited by Taiwan Accreditation Foundation for the specific scope of accreditation under Lab Code: 1109 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. In addition, the test facilities are listed with Industry Canada, Certification and Engineering Bureau, IC 2324H-1 for OATS -6.

5.4 TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3/10 meter Open Area Test Sites to perform FCC Part 15/18 measurements	455173 TW-1037
Japan	VCCI	3/10 meter Open Area Test Sites to perform conducted/radiated measurements	C-2882 R-2635
Taiwan	TAF	CISPR 11, FCC METHOD-47 CFR Part 18, EN 55011, EN 60601-1-2, CISPR 22, CNS 13438, EN 55022, EN 55024, AS/NZS CISPR 22 CISPR 14, EN 55014-1, EN 55014-2, CNS 13783-1, CISPR 22, CNS 13439, EN 55013, FCC Method-47 CFR Part 15 Subpart B, IC ICES-003, VCCI V-3 & V-4 FCC Method-47 CFR Part 15 Subpart C and ANSI C63.4, LP 0002 EN / IEC 61000-4-2 / -3 / -4 / -5 / -6 / -8 / -11 EN 61000-3-2, EN 61000-3-3 EN 61000-6-3, EN 61000-6-1, AS/NZS 4251.1, EN 61000-6-4, EN 61000-6-2, AS/NZS 4251.2, EN 61204-3, EN 50130-4, EN 62040-2, EN 50371, EN 50385, AS/NZS 4268, ETSI EN 300 386 ETSI EN 300 328, ETSI EN 301 489-1/-3/-9/-17 ETSI EN 301 893, ETSI EN 300 220-2/-1 ETSI EN 300 440-2/-1 ETSI EN 301 357-2/-1 RSS-310, RSS-210 Issue 7, RSS-Gen Issue 2	Testing Laboratory 1109
Taiwan	BSMI	CNS 13438, CNS 13783-1, CNS13439	SL2-IN-E-0039 SL2-R1/R2-0039 SL2-A1-E-0039
Canada	Industry Canada	RSS210, Issue 7	IC 2324H-1

** No part of this report may be used to claim or imply product endorsement by TAF or any agency of the US Government.*

6. CALIBRATION AND UNCERTAINTY

6.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

6.2 MEASUREMENT UNCERTAINTY

The following table is for the measurement uncertainty, which is calculated as per the document CISPR 16-4.

PARAMETER	UNCERTAINTY
Radiated Emission, 30 to 1000 MHz	+/- 3.2 dB
Radiated Emission, 1 to 26.5GHz	+/- 3.2 dB
Power Line Conducted Emission	+/- 2.1 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

7. SETUP OF EQUIPMENT UNDER TEST

SUPPORT EQUIPMENT

No.	Product	Manufacturer	Model No.	Serial No.	FCC ID
1	Notebook PC	Lenovo ideaPad	S10e_4068-RZ1	L3CEV2D	HFS-FL
2	Notebook PC	HP	nx6130	CNU543274R	CNTWM3B2200BGA
3	Modem	ZyXEL	Omni 56K	S1Z4107727	1880MN156K
4	Printer	HP	Deskjet 948c	CN19T6S011	DoC
5	Mouse	KINYO	KM-770	0804	DoC

SETUP DIAGRAM FOR TESTS

EUT & peripherals setup diagram is shown in appendix setup photos.

EUT OPERATING CONDITION

RF :

Push down the volume key, join USB Cable JBG will enter DFU test mode, carry out CSR and test the software.

1. Setup all computers like the setup diagram.
2. Run CSR Blue Test software.
3. Select the following settings,

   Transport type: USB

   USB Device:csr0
4. TX mode(GFSK)

   TXDATA1

   LO Freq: 2402, 2441, 2480

   Power (EXT, Int): 255, 44

   CFG PKT, Packet Type: 15

   Packet Size: 339

   TX mode (8-DPSK)

   TXDATA1

   LO Freq: 2402, 2441, 2480

   Power (EXT, Int): 255, 44

   CFG PKT, Packet Type: 31

   Packet Size: 1021

5. RX mode(GFSK)
   RXSTART1
   LO Freq: 2402, 2441, 2480
   hi-side:fales
   RX Attenuation :0
   CFG PKT, Packet Type: 15
   Packet Size: 339
   RX mode (8-DPSK)
   RXSTART1
   LO Freq: 2402, 2441, 2480
   hi-side:fales
   RX Attenuation :0
   CFG PKT, Packet Type: 31
   Packet Size: 1021
6. All of the functions are under run.
7. Start test.

For Normal operating :

1. Setup all computers like the setup diagram.
2. (1) Build up a connection between EUT and Notebook PC (play music).
   (2) Charge mode.
3. All of the functions are under run.
4. Start test.

8. APPLICABLE LIMITS AND TEST RESULTS

8.1 20dB BANDWIDTH FOR HOPPING

LIMIT

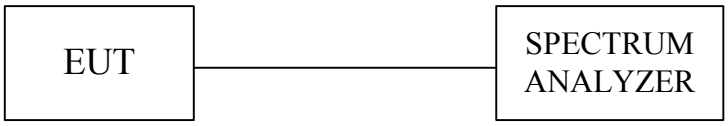
Limit : N/A

TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
SPECTRUM ANALYZER	AGILENT	E4446A	MY43360132	06/09/2010
SPECTRUM ANALYZER	AGILENT	E4446A	MY46180323	05/26/2010

Remark: *Each piece of equipment is scheduled for calibration once a year.*

TEST SETUP



TEST PROCEDURE

The 20dB band width was measured with a spectrum analyzer connected to RF antenna connector (conducted measurement) while EUT was operating in transmit mode at the appropriate center frequency. The analyzer center frequency was set to the EUT carrier frequency, using the analyzer. Display Line and Marker Delta functions, the 20dB band width of the emission was determined.

TEST RESULTS

Modulation Type: GFSK, CFG PKT Packet Type: 15 Packet Size: 339 (DH5)

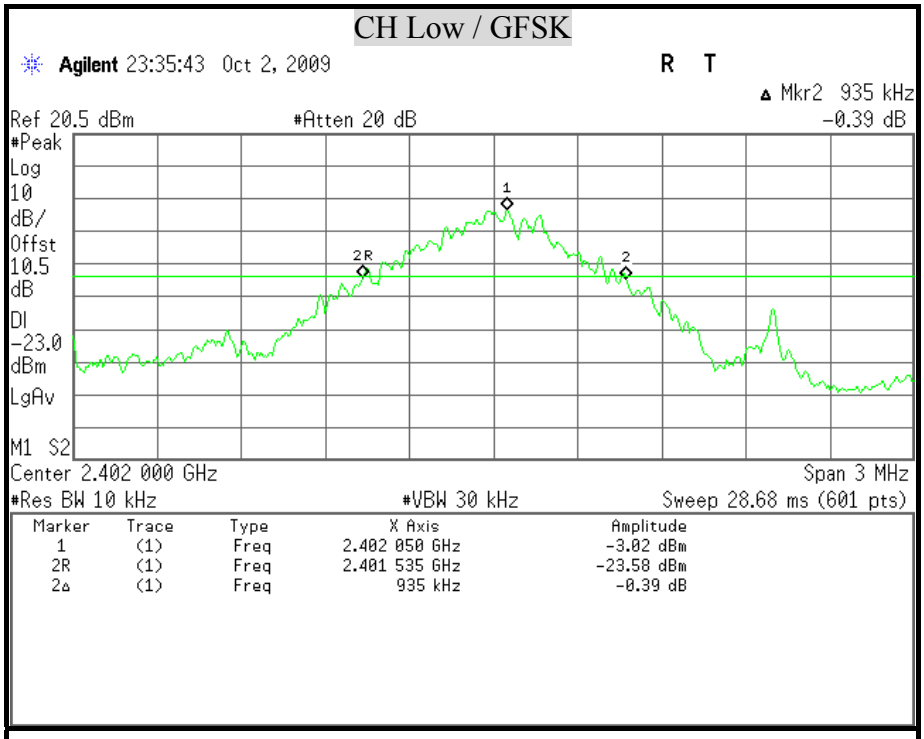
Channel	Channel Frequency (MHz)	20dB Bandwidth (MHz)	Pass / Fail
Low	2402	0.935	N/A
Middle	2441	0.925	N/A
High	2480	0.915	N/A

Modulation Type: 8-DPSK, CFG PKT Packet Type: 31 Packet Size: 1021 (3-DH5)

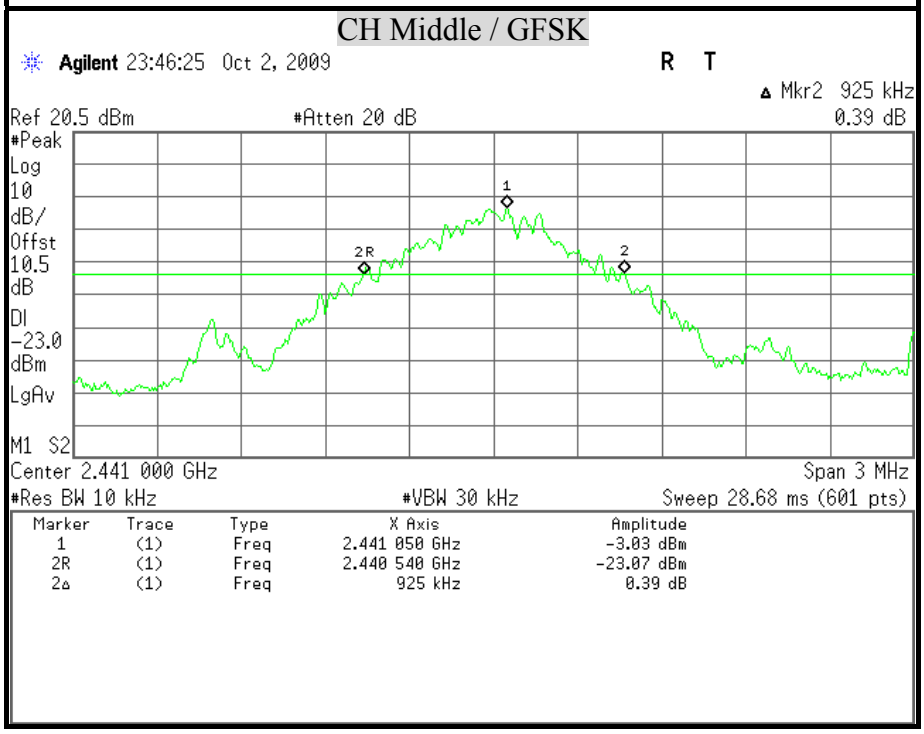
Channel	Channel Frequency (MHz)	20dB Bandwidth (MHz)	Pass / Fail
Low	2402	1.265	N/A
Middle	2441	1.280	N/A
High	2480	1.280	N/A

20dB BANDWIDTH

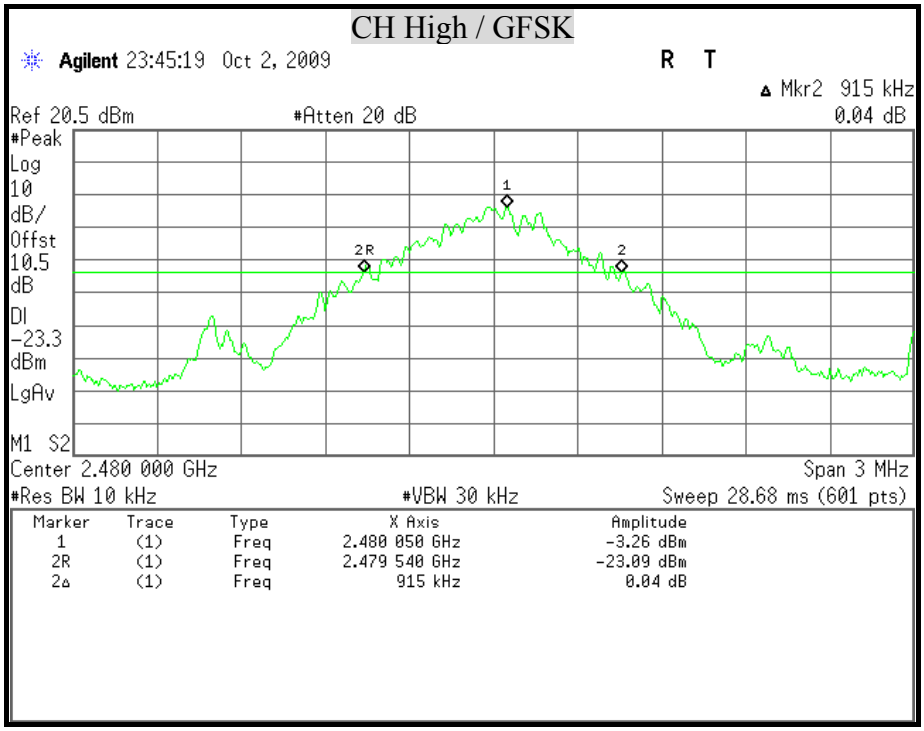
CH Low / GFSK



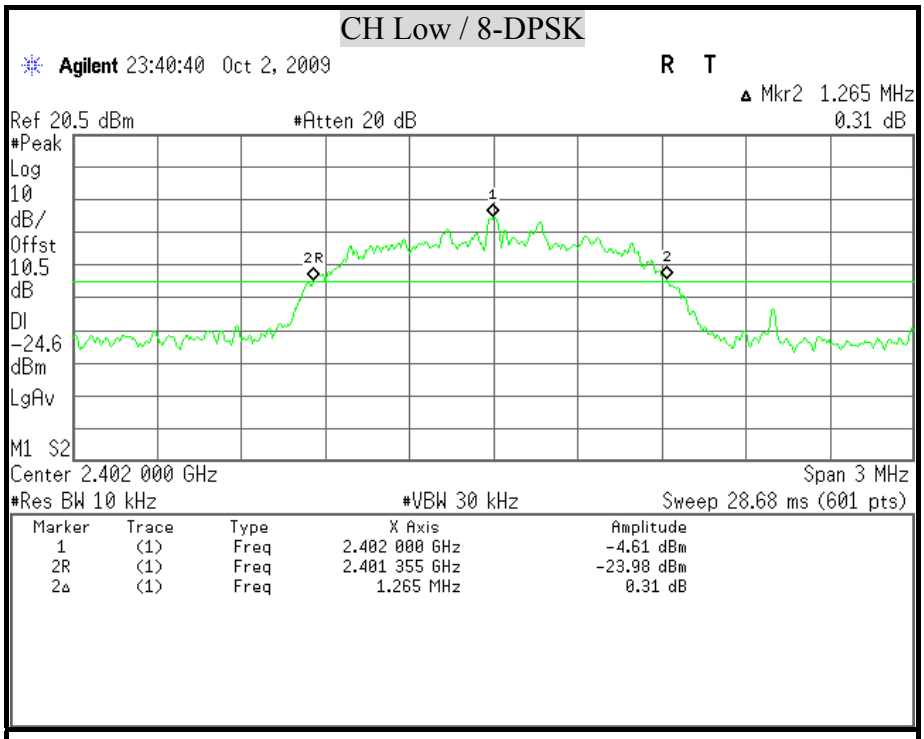
CH Middle / GFSK



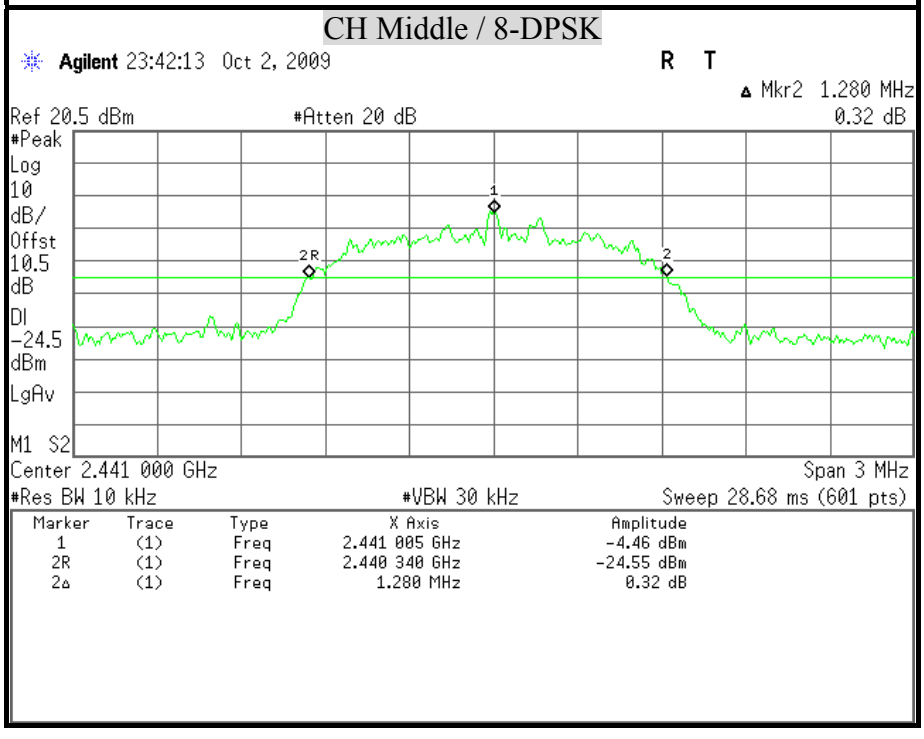
CH High / GFSK


Agilent 23:45:19 Oct 2, 2009
R T
Mkr2 915 kHz
Ref 20.5 dBm
#Atten 20 dB
0.04 dB
#Peak
Log
10
dB/
Offst
10.5
dB
Dl
-23.3
dBm
LgAv
M1 S2
1
2R
2
Center 2.480 000 GHz
Span 3 MHz
#Res BW 10 kHz
#VBW 30 kHz
Sweep 28.68 ms (601 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 2.480 050 GHz -3.26 dBm
2R (1) Freq 2.479 540 GHz -23.09 dBm
2Δ (1) Freq 915 kHz 0.04 dB

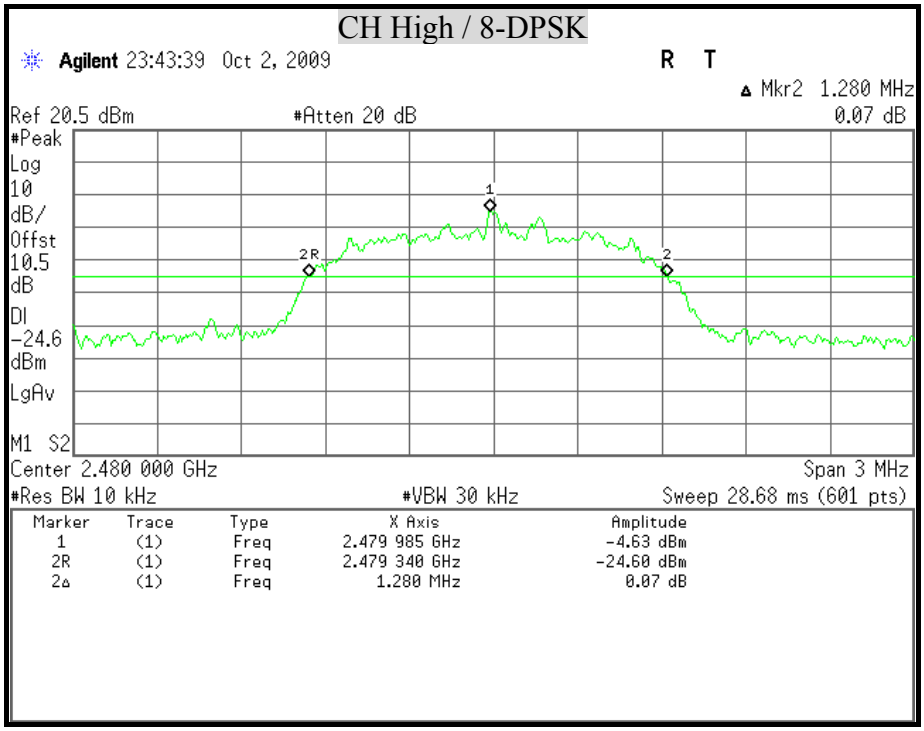
CH Low / 8-DPSK



CH Middle / 8-DPSK



CH High / 8-DPSK



8.2 MAXIMUM PEAK OUTPUT POWER

LIMIT

§15.247(b)(1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
SPECTRUM ANALYZER	AGILENT	E4446A	MY43360132	06/09/2010
SPECTRUM ANALYZER	AGILENT	E4446A	MY46180323	05/26/2010

Remark: *Each piece of equipment is scheduled for calibration once a year.*

TEST SETUP

TEST PROCEDURE

The RF power output was measured with a power meter connected to the RF Antenna connector (conducted measurement) while EUT was operating in transmit mode at the appropriate center frequency, A power meter was used to record the shape of the transmit signal.

TEST RESULTS

Modulation Type: GFSK, CFG PKT Packet Type: 15 Packet Size: 339 (DH5)

Channel	Channel Frequency (MHz)	Peak Power Output (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	2402	2.31	20.97	PASS
Middle	2441	2.29	20.97	PASS
High	2480	2.25	20.97	PASS

Remark: *The cable assembly insertion loss of 10.5dB (including 10dB pad and 0.5dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.*

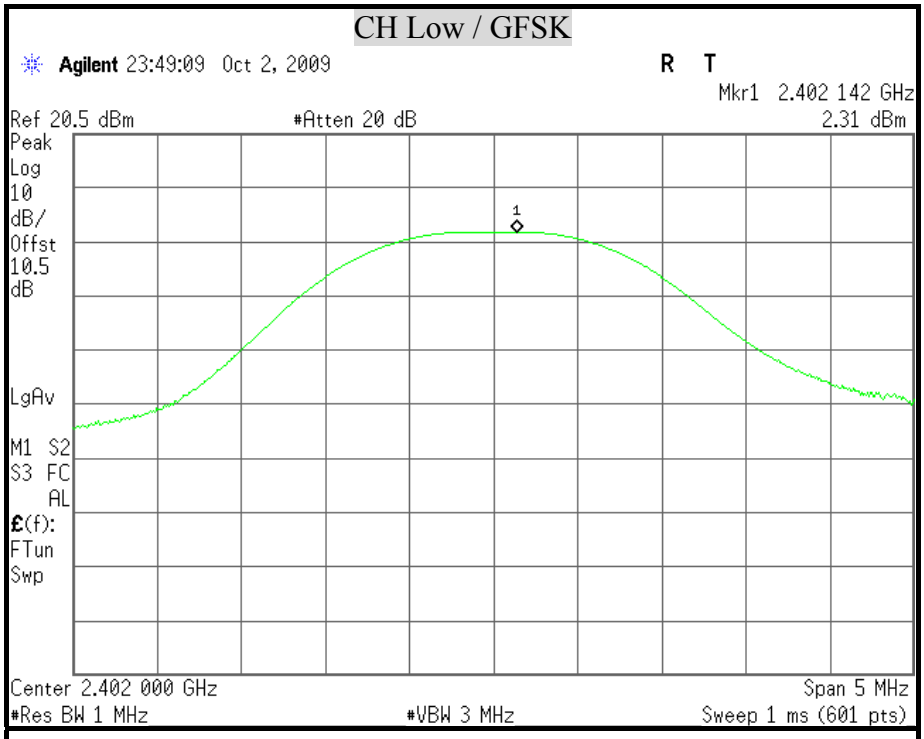
Modulation Type: 8-DPSK, CFG PKT Packet Type: 31 Packet Size: 1021 (3-DH5)

Channel	Channel Frequency (MHz)	Peak Power Output (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	2402	1.73	20.97	PASS
Middle	2441	1.72	20.97	PASS
High	2480	1.56	20.97	PASS

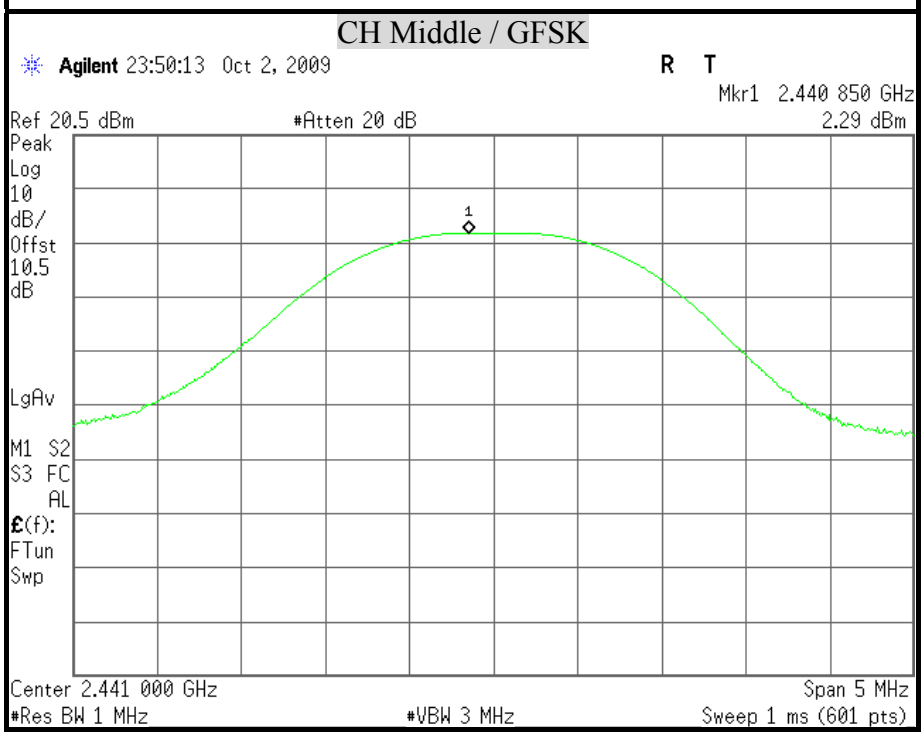
Remark: *The cable assembly insertion loss of 10.5dB (including 10dB pad and 0.5dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.*

MAXIMUM PEAK OUTPUT POWER

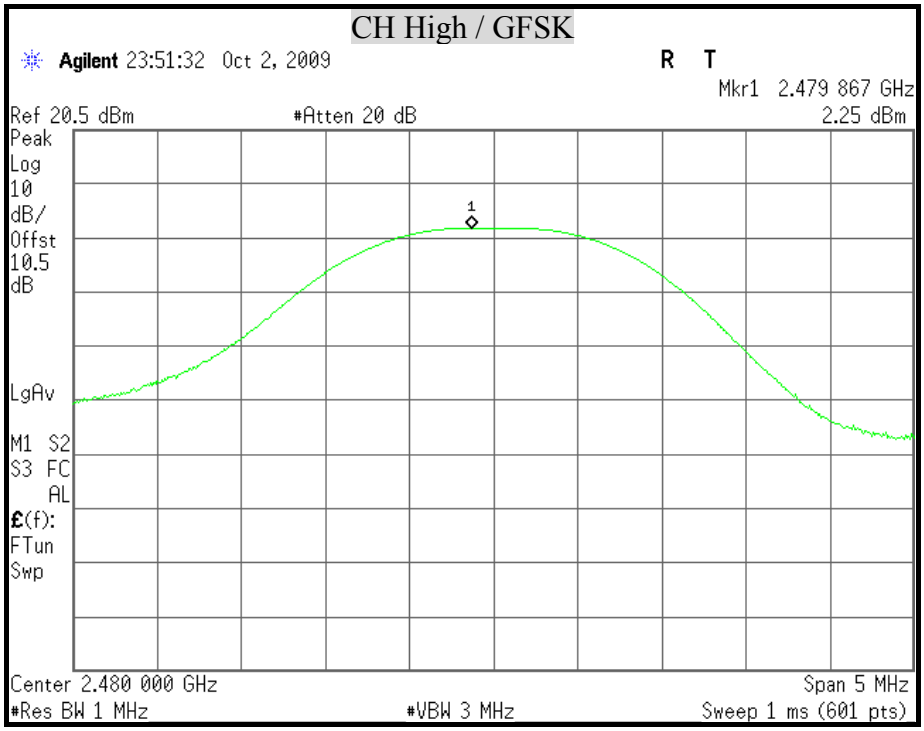
CH Low / GFSK



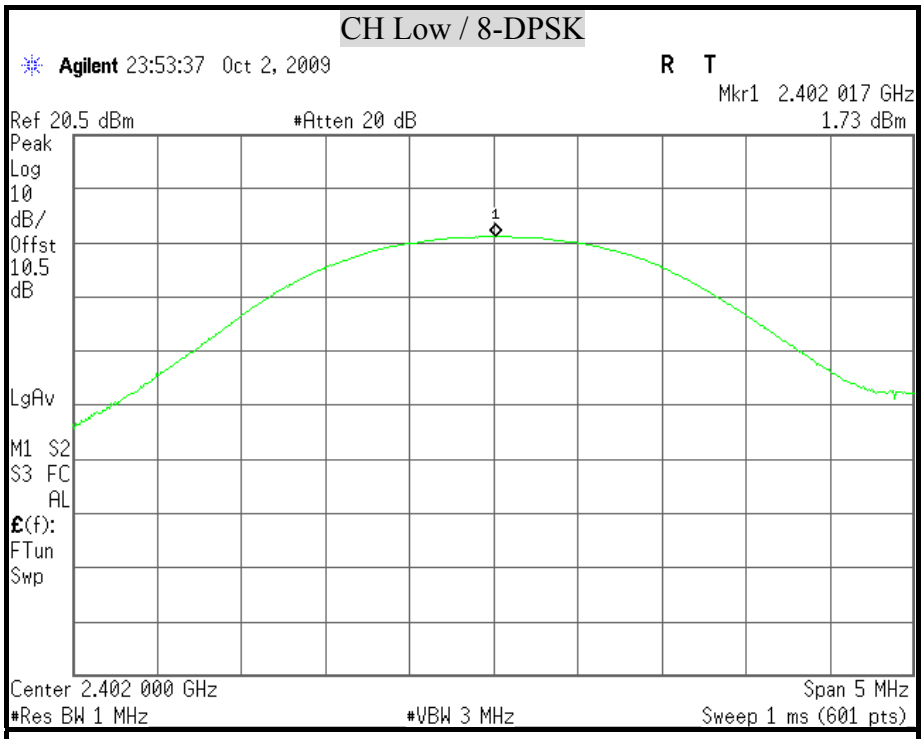
CH Middle / GFSK



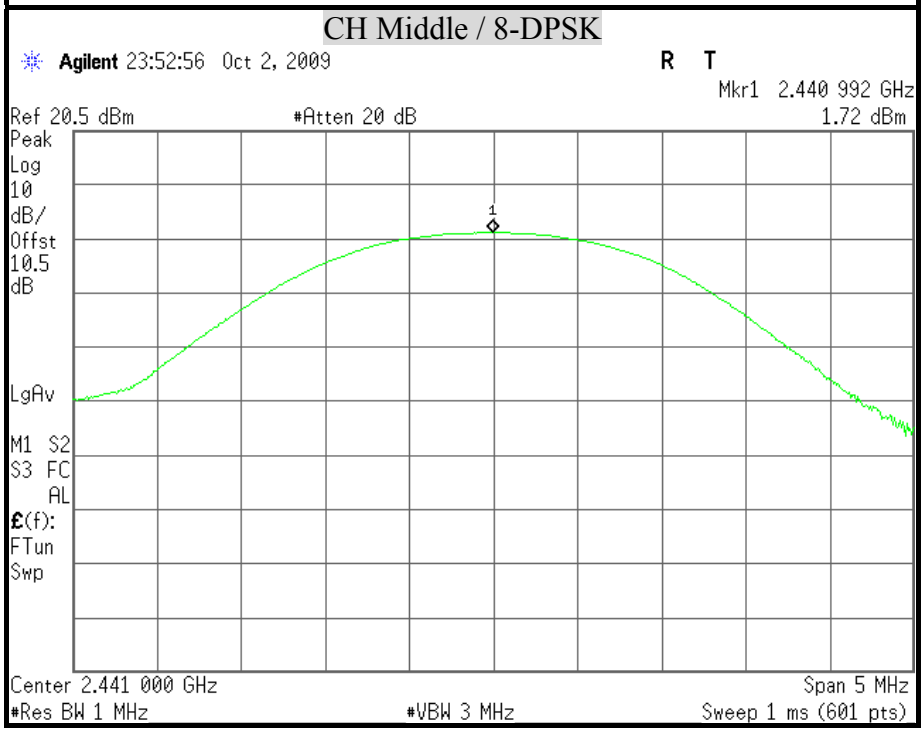
CH High / GFSK


Agilent 23:51:32 Oct 2, 2009
R T
Mkr1 2.479 867 GHz
Ref 20.5 dBm
#Atten 20 dB
2.25 dBm
Peak
Log
10
dB/
Offst
10.5
dB
LgAv
M1 S2
S3 FC
AL
£(f):
FTun
Swp
Center 2.480 000 GHz
Span 5 MHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 1 ms (601 pts)

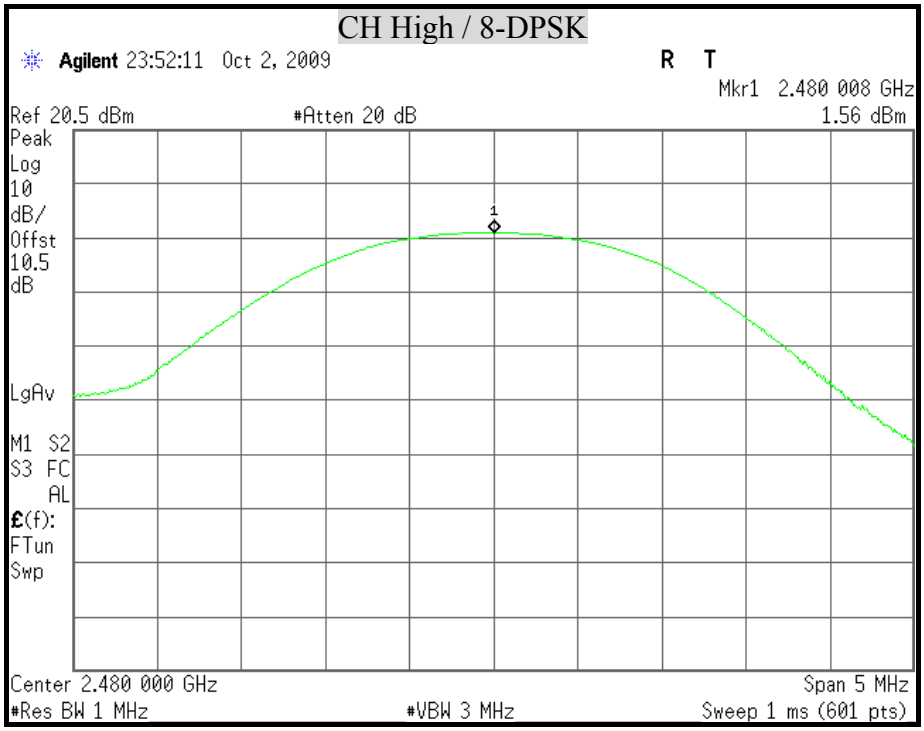
CH Low / 8-DPSK



CH Middle / 8-DPSK



CH High / 8-DPSK



8.3 HOPPING CHANNEL SEPARATION

LIMIT

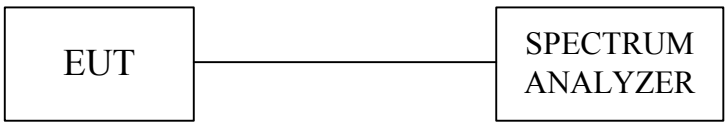
§15.247(a)(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier 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. 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. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
SPECTRUM ANALYZER	AGILENT	E4446A	MY43360132	06/09/2010
SPECTRUM ANALYZER	AGILENT	E4446A	MY46180323	05/26/2010

Remark: *Each piece of equipment is scheduled for calibration once a year.*

TEST SETUP



TEST PROCEDURE

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in test setup without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
3. By using the MaxHold function record the separation of adjacent channels.
4. Measure the frequency difference of these two adjacent channels by spectrum analyzer MARK function. And then plot the result on spectrum analyzer screen.
5. Repeat above procedures until all frequencies measured were complete.

TEST RESULTS

Refer to section 8.1, 20dB bandwidth measurement, the measured channel separation should be greater than two-third of 20dB bandwidth or Minimum bandwidth.

Modulation Type: GFSK, CFG PKT Packet Type: 15 Packet Size: 339 (DH5)

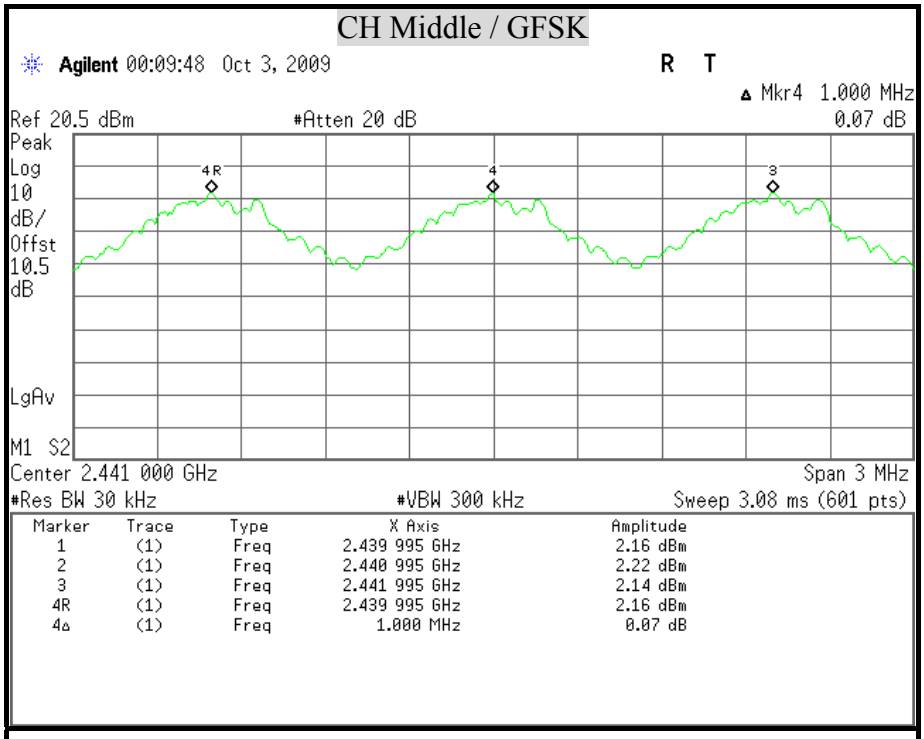
Channel	Adjacent Hopping Channel Separation (kHz)	Two –third of 20dB bandwidth (kHz)	Minimum Bandwidth (kHz)	Result
2441MHz (Mid)	1000	616.67	25	PASS

Modulation Type: 8-DPSK, CFG PKT Packet Type: 31 Packet Size: 1021 (3-DH5)

Channel	Adjacent Hopping Channel Separation (kHz)	Two –third of 20dB bandwidth (kHz)	Minimum Bandwidth (kHz)	Result
2441MHz (Mid)	1000	853.33	25	PASS

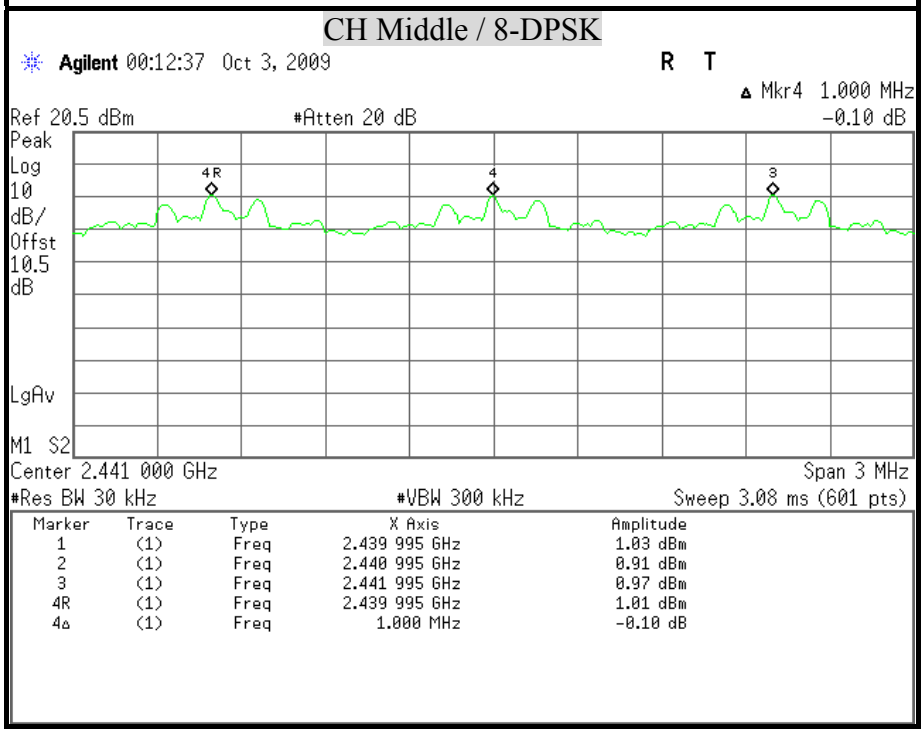
HOPPING CHANNEL SEPARATION

CH Middle / GFSK



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.439 995 GHz	2.16 dBm
2	(1)	Freq	2.440 995 GHz	2.22 dBm
3	(1)	Freq	2.441 995 GHz	2.14 dBm
4R	(1)	Freq	2.439 995 GHz	2.16 dBm
4Δ	(1)	Freq	1.000 MHz	0.07 dB

CH Middle / 8-DPSK



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.439 995 GHz	1.03 dBm
2	(1)	Freq	2.440 995 GHz	0.91 dBm
3	(1)	Freq	2.441 995 GHz	0.97 dBm
4R	(1)	Freq	2.439 995 GHz	1.01 dBm
4Δ	(1)	Freq	1.000 MHz	-0.10 dB

8.4 NUMBER OF HOPPING FREQUENCY USED

LIMIT

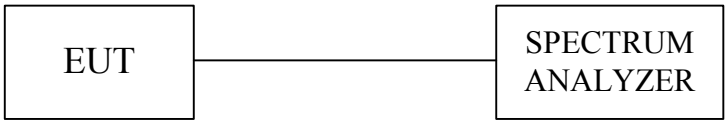
§15.247(a)(1)(iii) For frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
SPECTRUM ANALYZER	AGILENT	E4446A	MY43360132	06/09/2010
SPECTRUM ANALYZER	AGILENT	E4446A	MY46180323	05/26/2010

Remark: *Each piece of equipment is scheduled for calibration once a year.*

TEST SETUP



TEST PROCEDURE

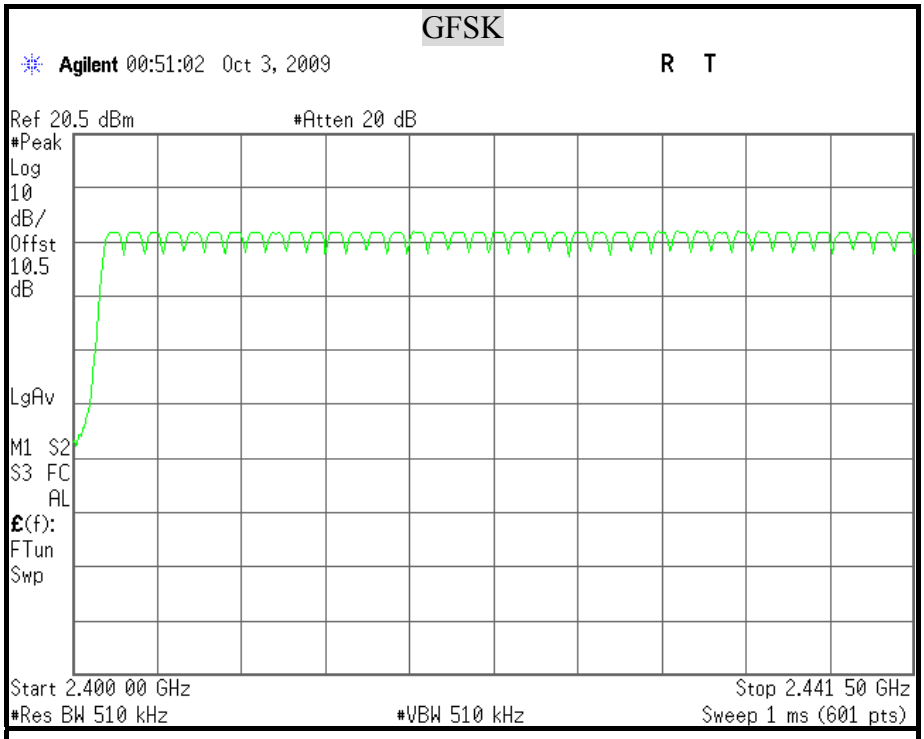
1 Check the calibration of the measuring instrument (spectrum analyzer) using either an internal calibrator or a known signal from an external generator.
2 Position the EUT as shown in test setup without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3 Set the spectrum analyzer on MaxHold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
4 Set the spectrum analyzer on View mode and then plot the result on spectrum analyzer screen.
5 Repeat above procedures until all frequencies measured were complete.

TEST RESULTS

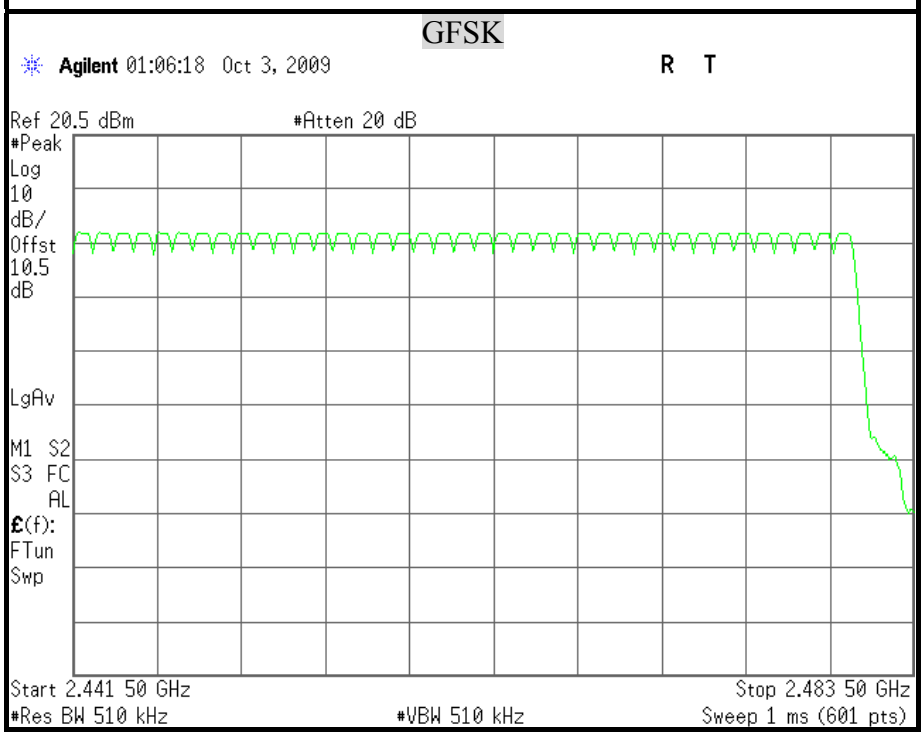
Refer to the attached plot.
There are 79 hopping frequencies in a hopping sequence.

NUMBER OF HOPPING FREQUENCY USED

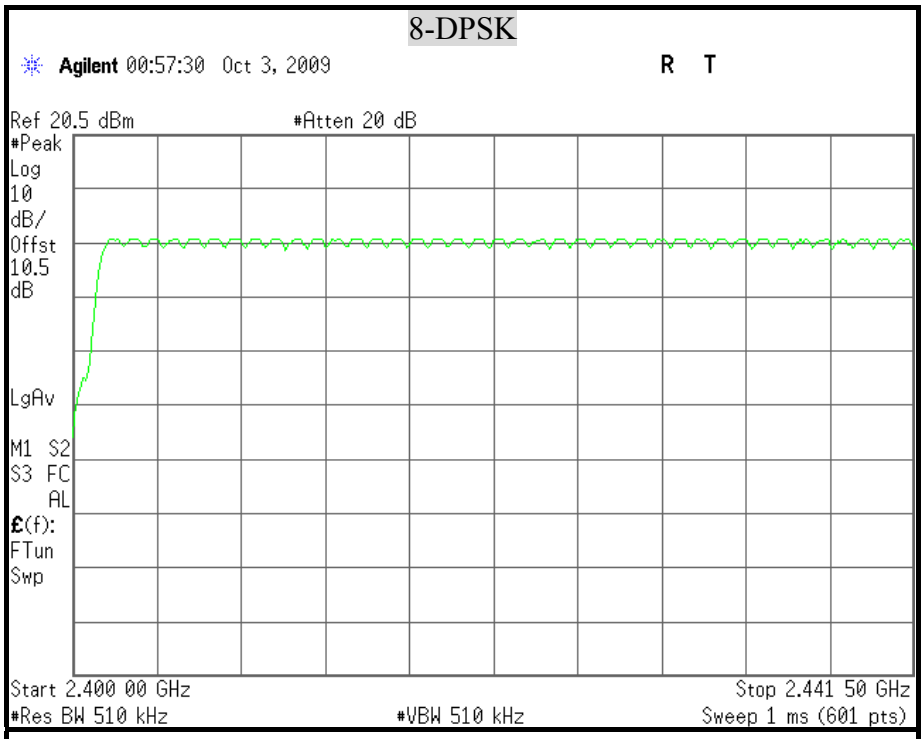
GFSK



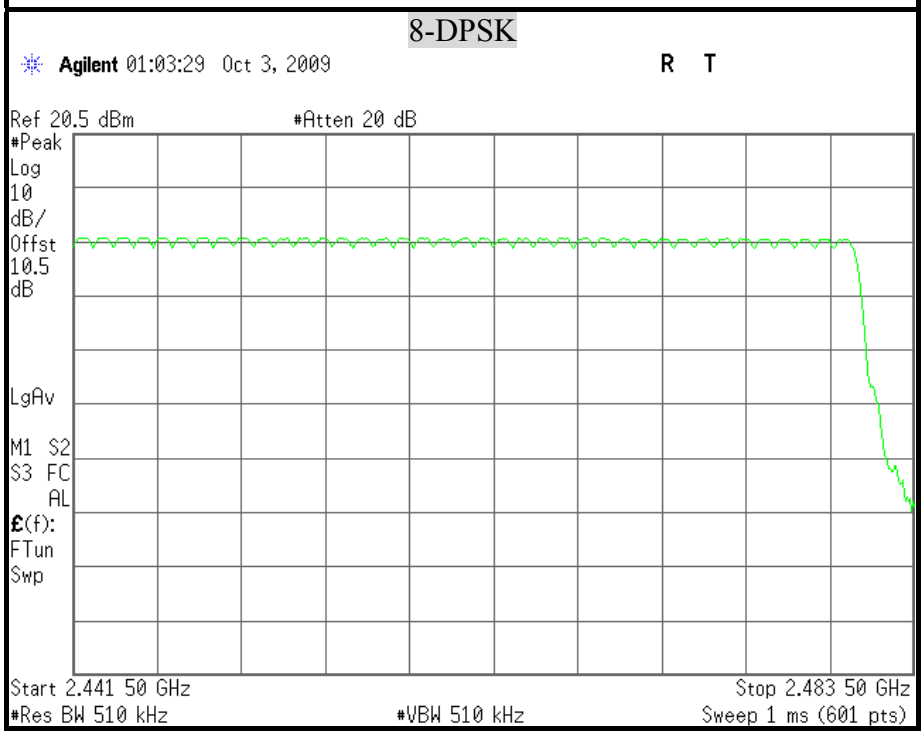
GFSK



8-DPSK


Agilent 00:57:30 Oct 3, 2009
R T
Ref 20.5 dBm
#Atten 20 dB
#Peak
Log
10
dB/
Offst
10.5
dB
LgAv
M1 S2
S3 FC
AL
£(f):
FTun
Swp
Start 2.400 00 GHz
#Res BW 510 kHz
#VBW 510 kHz
Stop 2.441 50 GHz
Sweep 1 ms (601 pts)

8-DPSK


Agilent 01:03:29 Oct 3, 2009
R T
Ref 20.5 dBm
#Atten 20 dB
#Peak
Log
10
dB/
Offst
10.5
dB
LgAv
M1 S2
S3 FC
AL
£(f):
FTun
Swp
Start 2.441 50 GHz
#Res BW 510 kHz
#VBW 510 kHz
Stop 2.483 50 GHz
Sweep 1 ms (601 pts)

8.5 DWELL TIME ON EACH CHANNEL

LIMIT

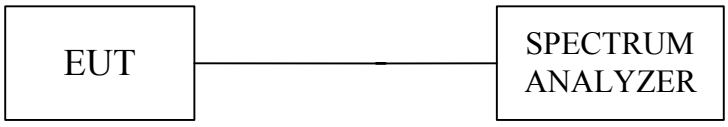
§15.247(a)(1)(iii) For frequency hopping system operating in the 2400-2483.5MHz band, the average time of occupancy on any frequency shall not be greater than 0.4 second within a 31.6 second period.

TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
SPECTRUM ANALYZER	AGILENT	E4446A	MY43360132	06/09/2010
SPECTRUM ANALYZER	AGILENT	E4446A	MY46180323	05/26/2010

Remark: *Each piece of equipment is scheduled for calibration once a year.*

TEST SETUP



TEST PROCEDURE

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in test setup without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Adjust the center frequency of spectrum analyzer on any frequency be measured and set spectrum analyzer to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
4. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
5. Repeat above procedures until all frequencies measured were complete.
6. The Universal Bluetooth Headset has 3 type of payload, DH1, DH3, DH5. The hopping rate is 1600 per second.

   The longer the payload is, the slower the hopping rate is.

TEST RESULTS

Time of occupancy on the TX channel in 31.6sec = time domain slot length × hop rate ÷ number of hop per channel × 31.6

Refer to the attached graph.

The hopping rates of Bluetooth devices change with different types of payload. The longer the payload is, the slower the hopping rate. The hopping rate scenario is defined in Bluetooth core specification.

Modulation Type: GFSK, CFG PKT Packet Type: 15 Packet Size: 339 (DH5)

Transmitting Frequency	Packet type	Dwell time (ms)	Time of occupancy on the TX channel in 31.6sec (ms)	Limit for Time of occupancy on the TX channel in 31.6sec (ms)	Results
2441MHz	DH1	0.40	128.00	400	PASS
2441MHz	DH3	1.65	264.00	400	PASS
2441MHz	DH5	2.90	309.33	400	PASS

DH1 Dwell time = 0.40 ms × (1600÷2) ÷ 79 × 31.6 = 128.00 (ms)
DH3 Dwell time = 1.65 ms × (1600÷4) ÷ 79 × 31.6 = 264.00 (ms)
DH5 Dwell time = 2.90 ms × (1600÷6) ÷ 79 × 31.6 = 309.33 (ms)

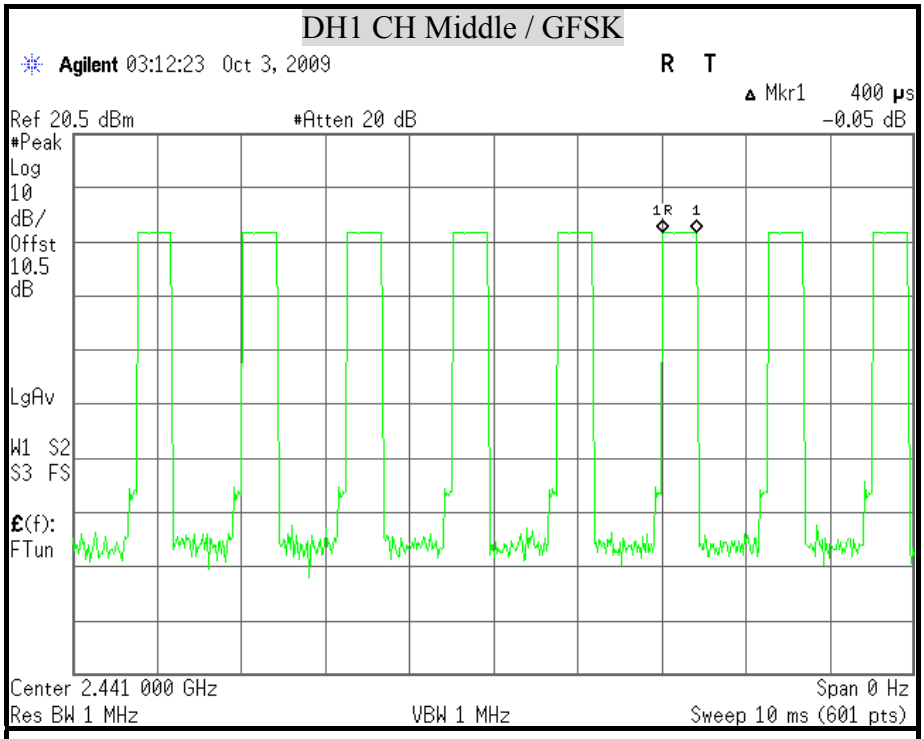
Modulation Type: 8-DPSK, CFG PKT Packet Type: 31 Packet Size: 1021 (3-DH5)

Transmitting Frequency	Packet type	Dwell time (ms)	Time of occupancy on the TX channel in 31.6sec (ms)	Limit for Time of occupancy on the TX channel in 31.6sec (ms)	Results
2441MHz	DH1	0.400	128.00	400	PASS
2441MHz	DH3	1.667	266.72	400	PASS
2441MHz	DH5	2.900	309.33	400	PASS

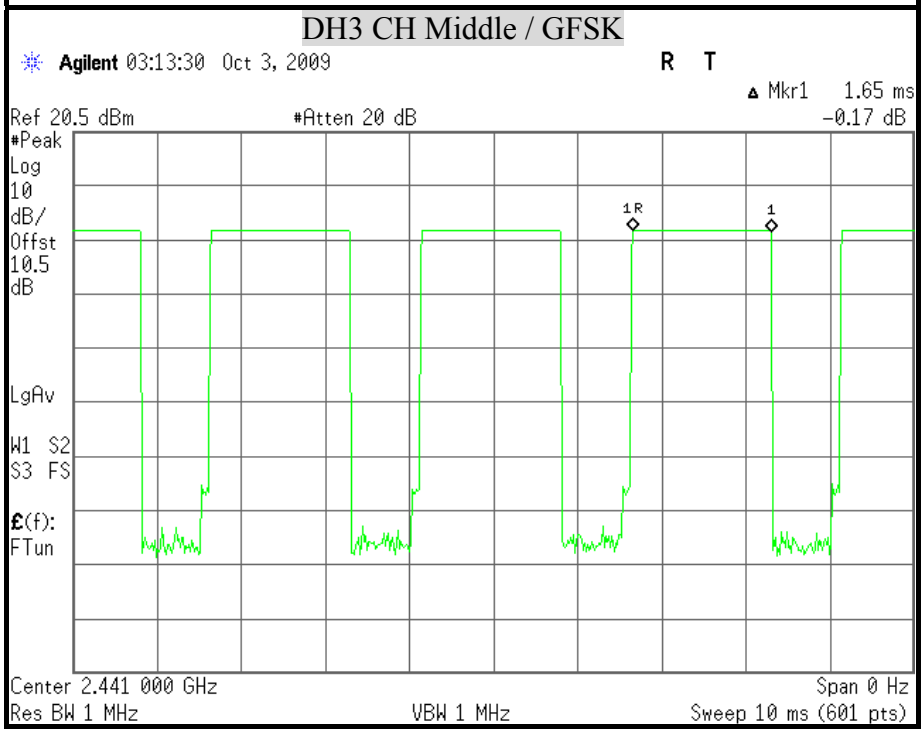
DH1 Dwell time = 0.400ms × (1600÷2) ÷ 79 × 31.6 = 128.00 (ms)
DH3 Dwell time = 1.667ms × (1600÷4) ÷ 79 × 31.6 = 266.72 (ms)
DH5 Dwell time = 2.900ms × (1600÷6) ÷ 79 × 31.6 = 309.33 (ms)

DWELL TIME ON EACH PAYLOAD

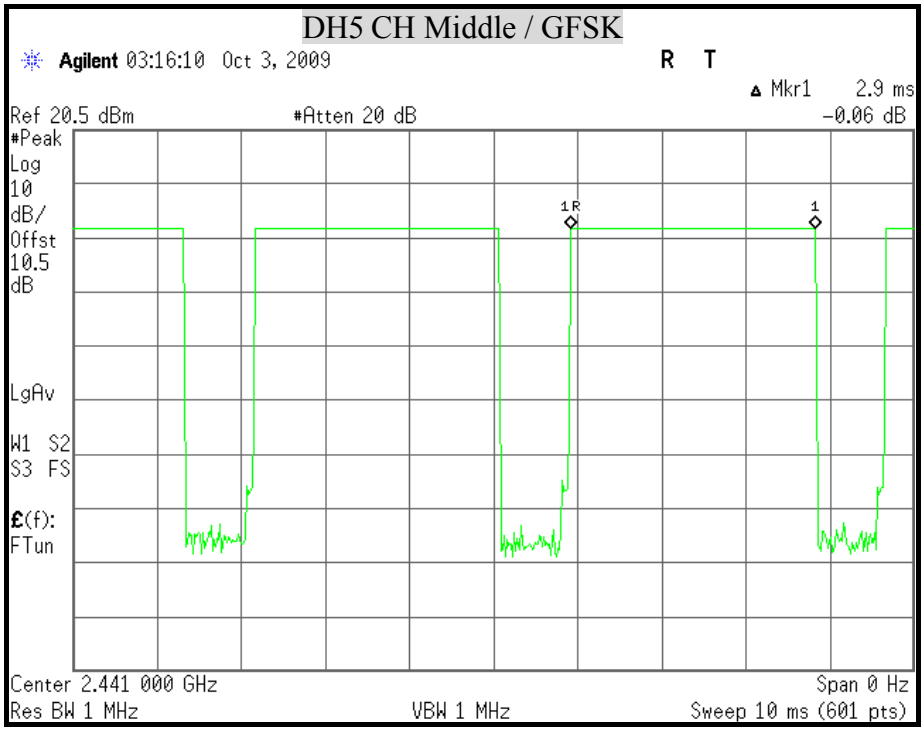
DH1 CH Middle / GFSK



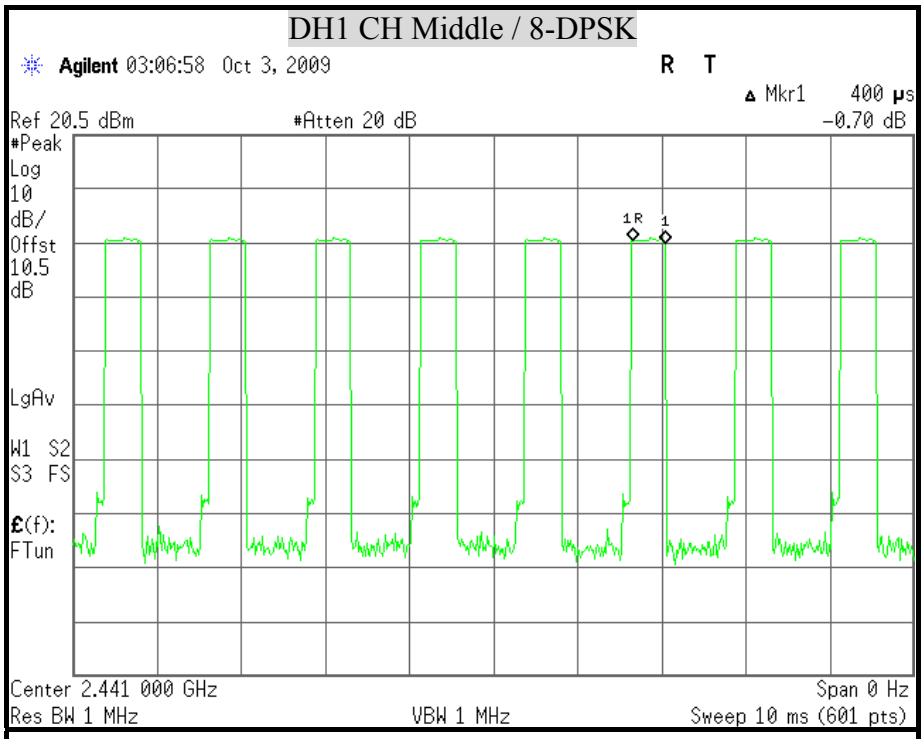
DH3 CH Middle / GFSK



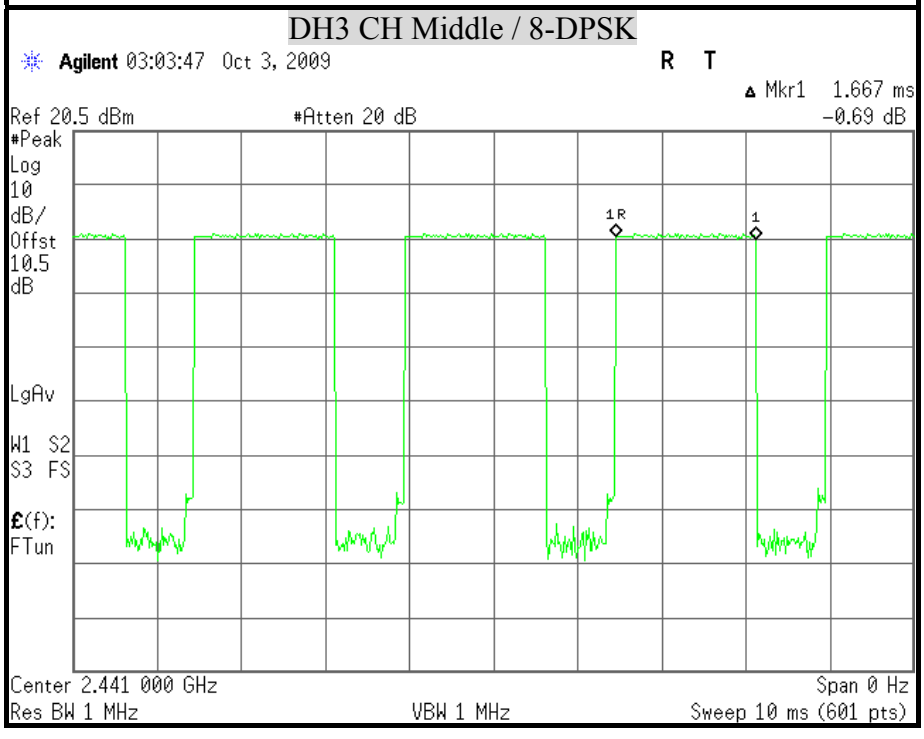
DH5 CH Middle / GFSK



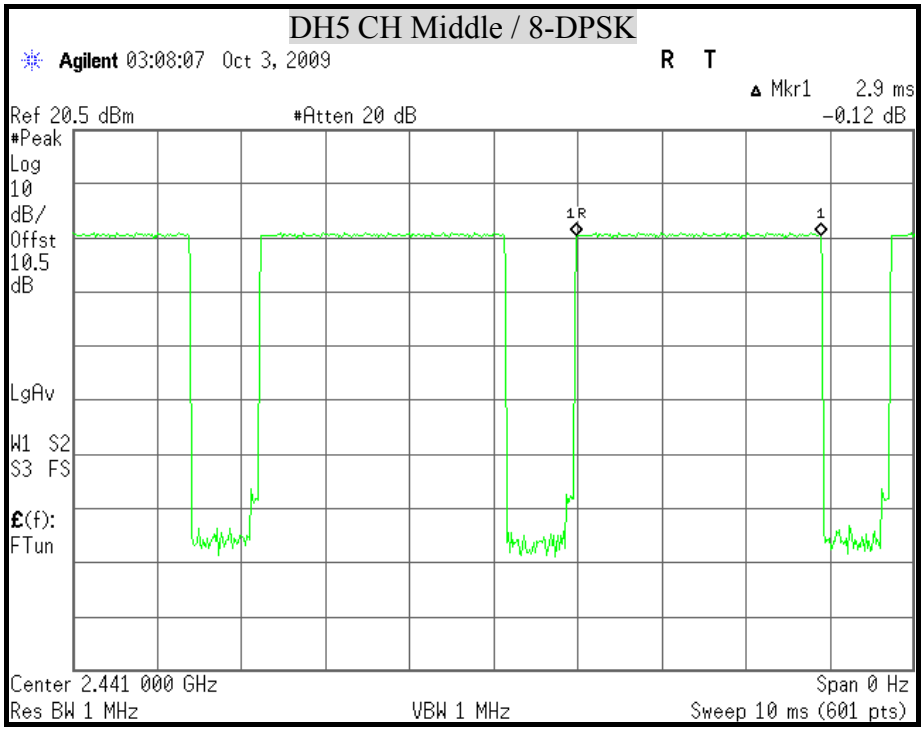
DH1 CH Middle / 8-DPSK



DH3 CH Middle / 8-DPSK



DH5 CH Middle / 8-DPSK



8.6 CONDUCTED SPURIOUS EMISSION

LIMITS

§ 15.247(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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 and 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)).

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 100 kHz.

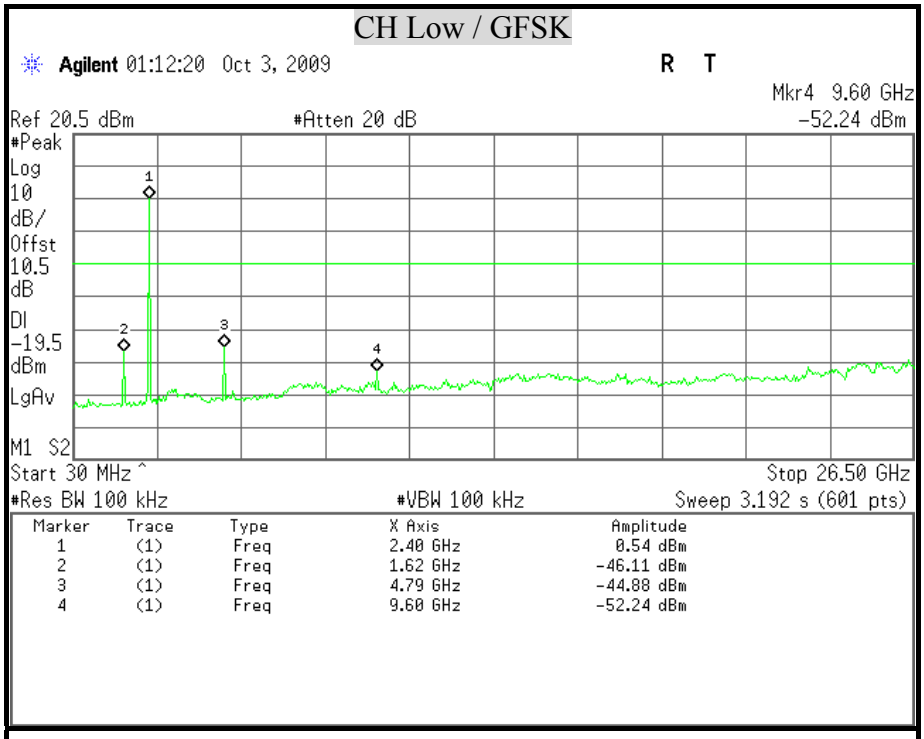
The spectrum from 30 MHz to 26.5 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

TEST RESULTS

BAND EDGE COMPLIANCE OF RF CONDUCTED EMISSIONS

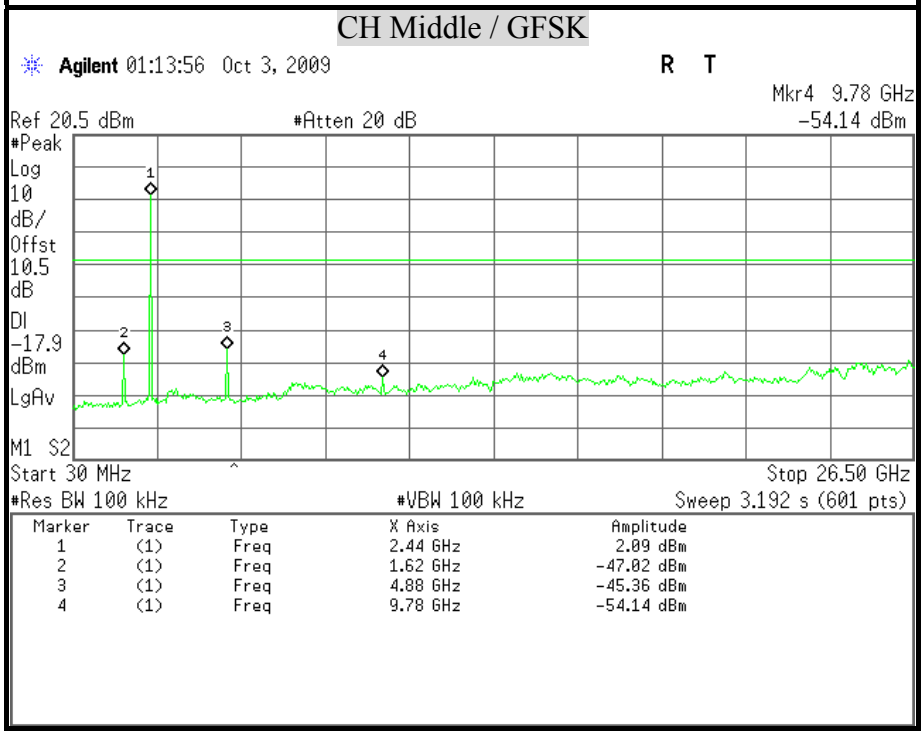
OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

CH Low / GFSK



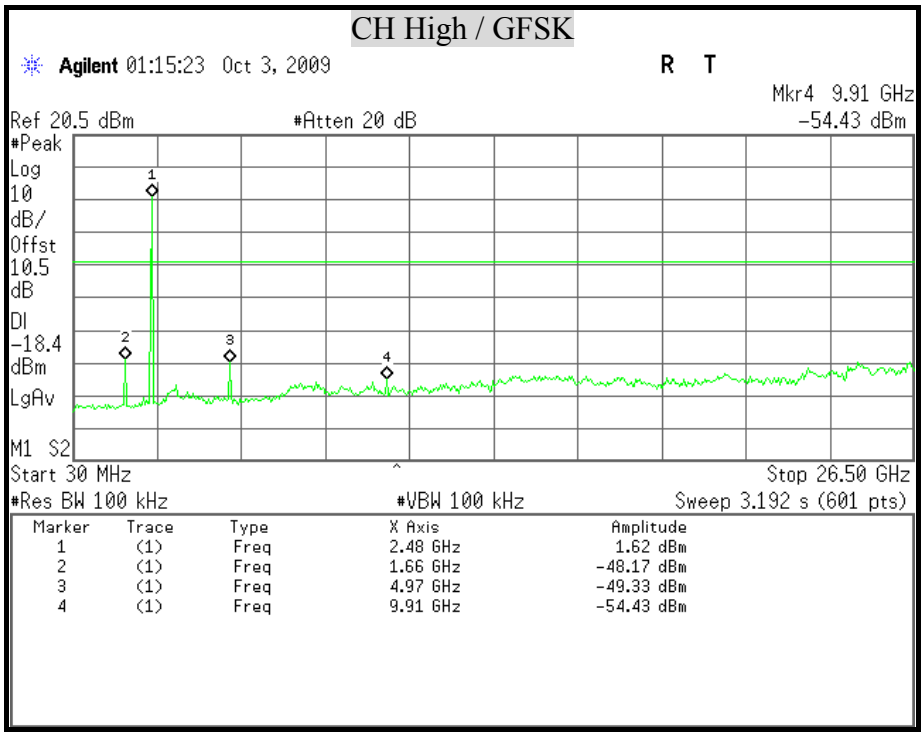
Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.40 GHz	0.54 dBm
2	(1)	Freq	1.62 GHz	-46.11 dBm
3	(1)	Freq	4.79 GHz	-44.88 dBm
4	(1)	Freq	9.60 GHz	-52.24 dBm

CH Middle / GFSK

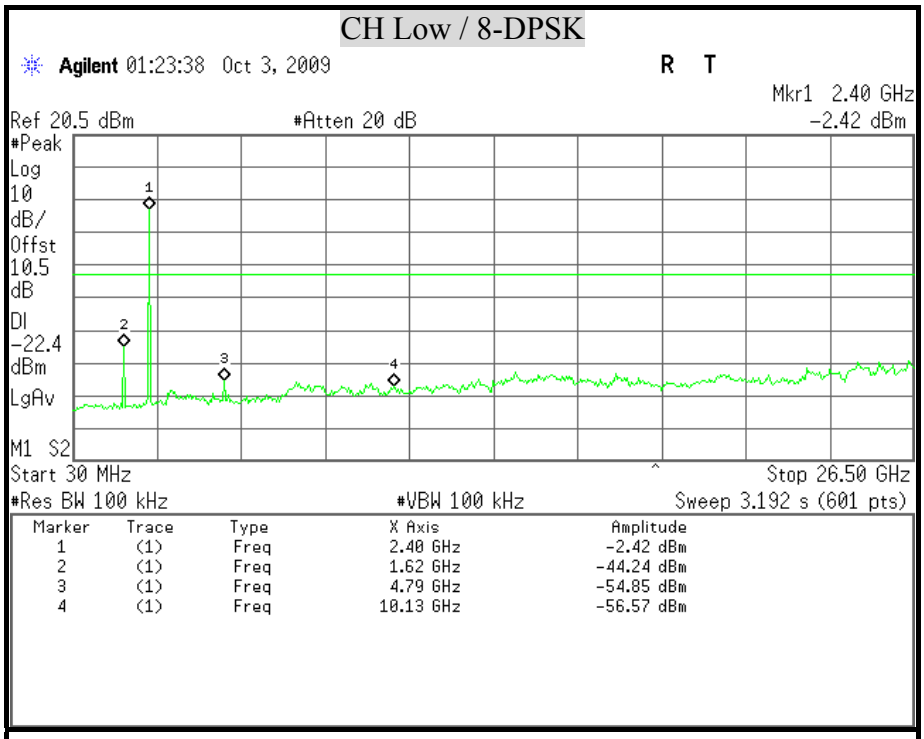


Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.44 GHz	2.09 dBm
2	(1)	Freq	1.62 GHz	-47.02 dBm
3	(1)	Freq	4.88 GHz	-45.36 dBm
4	(1)	Freq	9.78 GHz	-54.14 dBm

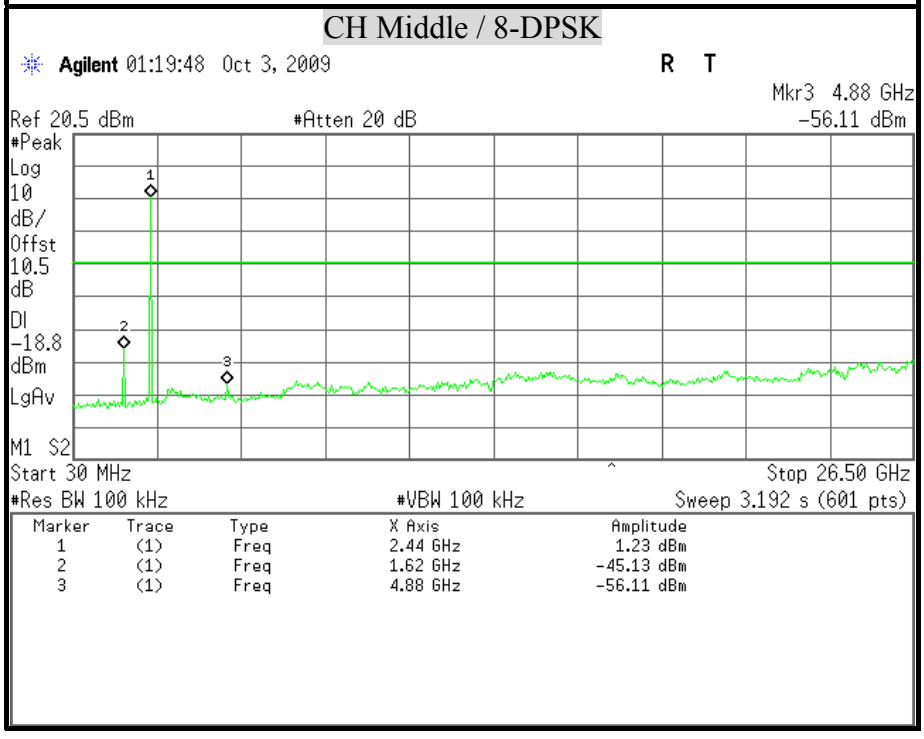
CH High / GFSK


Agilent 01:15:23 Oct 3, 2009
R T
Mkr4 9.91 GHz
Ref 20.5 dBm
#Atten 20 dB
-54.43 dBm
#Peak
Log
10
dB/
Offst
10.5
dB
Dl
-18.4
dBm
LgAv
M1 S2
Start 30 MHz
Stop 26.50 GHz
#Res BW 100 kHz
#VBW 100 kHz
Sweep 3.192 s (601 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 2.48 GHz 1.62 dBm
2 (1) Freq 1.66 GHz -48.17 dBm
3 (1) Freq 4.97 GHz -49.33 dBm
4 (1) Freq 9.91 GHz -54.43 dBm

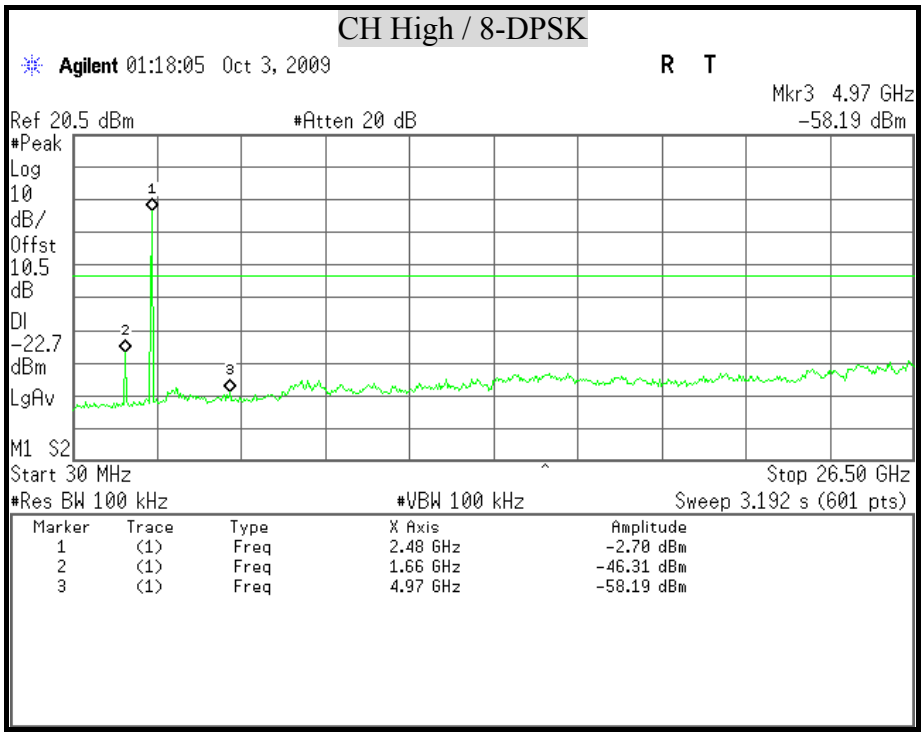
CH Low / 8-DPSK



CH Middle / 8-DPSK



CH High / 8-DPSK



8.7 RADIATED EMISSIONS

8.7.1 TRANSMITTER RADIATED SUPURIOUS EMSSIONS

LIMITS

§ 15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 -1710	10.6 -12.7
6.26775 - 6.26825	108 -121.94	1718.8 - 1722.2	13.25 -13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 – 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 -16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3338	36.43 - 36.5
12.57675 - 12.57725	322 -335.4	3600 - 4400	([2])
13.36 - 13.41			

[1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

[2] Above 38.6

§ 15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown is Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

§ 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)	Measurement Distance (meters)
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

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

§ 15.209 (b) In the emission table above, the tighter limit applies at the band edges.

TEST EQUIPMENT

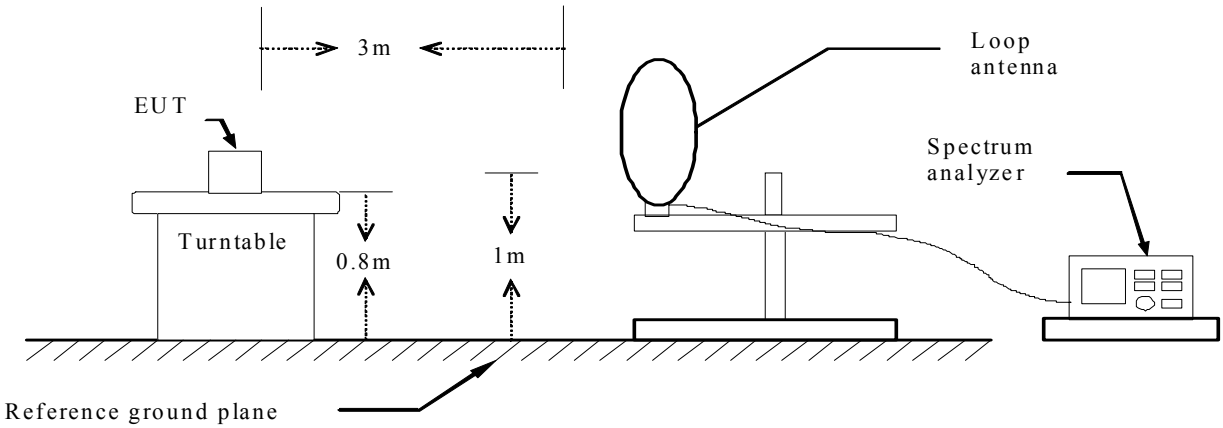
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
SPECTRUM ANALYZER	AGILENT	E4446A	MY43360132	06/09/2010
SPECTRUM ANALYZER	AGILENT	E4446A	MY46180323	05/26/2010
EMI TEST RECEIVER	R & S	ESCI	100221	05/17/2010
BILOG ANTENNA	SCHWARZBECK	VULB9168	9168_249	09/17/2010
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00078732	06/30/2010
PRE-AMPLIFIER	Agilent	8449B	3008A01471	08/02/2010
PRE-AMPLIFIER	HP	8447F	2944A03748	09/24/2010
Notch Filters Band Reject	Micro-Tronics	BRM50702-01	009	N.C.R.
RF COAXIAL CABLE	HUBERSUHNER	SUCOFLEX 104PEA	SN31350	07/21/2010
LOOP ANTENNA	EMCO	6502	2356	05/28/2010

Remark: *1. Each piece of equipment is scheduled for calibration once a year.*
2. N.C.R = No Calibration Request.

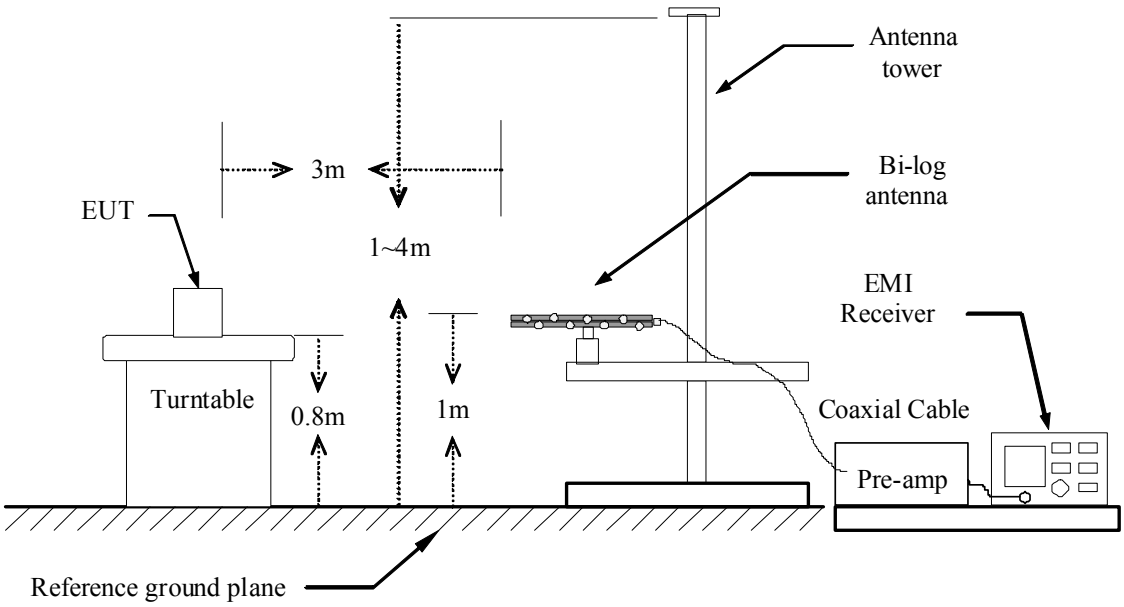
TEST SETUP

The diagram below shows the test setup that is utilized to make the measurements for emission from below 1GHz.

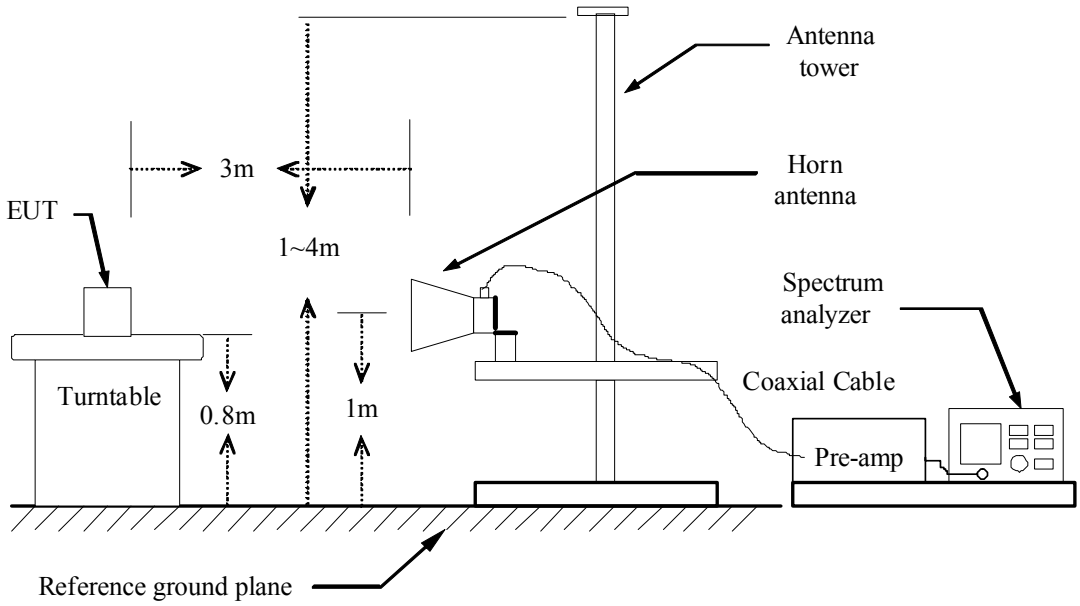
9kHz ~ 30MHz



30MHz ~ 1GHz



The diagram below shows the test setup that is utilized to make the measurements for emission above 1GHz.



TEST PROCEDURE

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
b. White measuring the radiated emission below 1GHz, the EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. White measuring the radiated emission above 1GHz, the EUT was set 3 meters away from the interference-receiving antenna
c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarization of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Note：
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection and frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1GHz.

8.7.2 WORST-CASE RADIATED EMISSION BELOW 1 GHz

BELOW 1 GHz (9kHz ~ 30MHz)

No emission found between lowest internal used/generated frequency to 30MHz.

BELOW 1 GHz (30MHz ~ 1GHz)

Product Name	Jawbone	**Test Date**	2009/09/29
Model Name	JBG	**Test By**	Rick Lin
Test Mode	Charge mode / worst case	**TEMP & Humidity**	26.2°C, 67%

Horizontal						
Frequency (MHz)	Reading (dBμV)	Correction Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Remark
200.72	47.36	-12.56	34.80	43.50	-8.70	Peak
300.63	49.24	-8.83	40.41	46.00	-5.59	Peak
366.59	42.94	-6.92	36.02	46.00	-9.98	Peak
386.96	45.02	-6.29	38.73	46.00	-7.27	Peak
420.91	41.78	-5.32	36.46	46.00	-9.54	Peak
758.47	35.16	1.44	36.60	46.00	-9.40	Peak
801.15	34.68	1.96	36.64	46.00	-9.36	Peak
921.43	34.12	4.17	38.30	46.00	-7.70	Peak

Vertical						
Frequency (MHz)	Reading (dBμV)	Correction Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Remark
300.63	44.29	-8.83	35.47	46.00	-10.53	Peak
386.96	41.09	-6.29	34.80	46.00	-11.20	Peak
415.09	40.14	-5.48	34.66	46.00	-11.34	Peak
444.19	37.83	-4.70	33.13	46.00	-12.87	Peak
527.61	37.38	-3.14	34.24	46.00	-11.76	Peak
744.89	34.57	1.21	35.79	46.00	-10.21	Peak
758.47	33.88	1.44	35.32	46.00	-10.68	Peak
921.43	36.58	4.17	40.76	46.00	-5.24	Peak

Remark:

1. *Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit.*
2. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
3. *Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB) – PreAmp.Gain (dB)*
4. *Result (dBuV/m) = Reading (dBuV) + Correction Factor (dB/m)*
5. *Margin (dB) = Remark result (dBuV/m) - Quasi-peak limit (dBuV/m).*

8.7.3 TRANSMITTER RADIATED EMISSION ABOVE 1 GHz

Product Name	Jawbone	**Test Date**	2009/10/05
Model Name	JBG	**Test By**	Rueyyan Lin
Test Mode	CH Low TX / GFSK	**TEMP & Humidity**	25.6°C, 63%

Horizontal

Frequency (MHz)	Reading-PK (dBμV)	Reading-AV (dBμV)	Correction Factor (dB/m)	Result-PK (dBμV/m)	Result-AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-AV (dBμV/m)	Margin (dB)	Remark
1598.00	63.49	---	-13.25	50.25	---	74.00	54.00	-3.75	Peak
2402.00	101.59	---	-8.87	92.72	---	---	---	---	Carrier
2496.00	66.46	51.16	-8.74	57.72	42.42	74.00	54.00	-11.58	AVG
3270.00	42.48	---	3.86	46.34	---	74.00	54.00	-7.66	Peak
4800.00	48.23	41.49	7.07	55.30	48.56	74.00	54.00	-5.44	AVG
6127.50	40.65	---	9.37	50.02	---	74.00	54.00	-3.98	Peak

Vertical

Frequency (MHz)	Reading-PK (dBμV)	Reading-AV (dBμV)	Correction Factor (dB/m)	Result-PK (dBμV/m)	Result-AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-AV (dBμV/m)	Margin (dB)	Remark
1596.00	67.39	59.47	-13.27	54.12	46.20	74.00	54.00	-7.80	AVG
2402.00	105.13	---	-8.87	96.26	---	---	---	---	Carrier
2488.00	67.52	51.47	-8.75	58.77	42.72	74.00	54.00	-11.28	AVG
3247.50	42.97	---	3.82	46.79	---	74.00	54.00	-7.21	Peak
4807.50	47.52	40.63	7.08	54.60	47.71	74.00	54.00	-6.29	AVG
6030.00	40.45	---	9.28	49.72	---	74.00	54.00	-4.28	Peak

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
3. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
4. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
5. *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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.*
6. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(AV)
   Remark AVG = Result(AV) – Limit(AV)

Product Name	Jawbone	Test Date	2009/10/05
Model Name	JBG	Test By	Rick Lin
Test Mode	CH Middle TX / GFSK	TEMP & Humidity	25.6°C, 63%

Horizontal

Frequency (MHz)	Reading-PK (dBμV)	Reading-AV (dBμV)	Correction Factor (dB/m)	Result-PK (dBμV/m)	Result-AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-AV (dBμV/m)	Margin (dB)	Remark
1592.00	63.49	---	-13.31	50.18	---	74.00	54.00	-3.82	Peak
2442.00	100.93	90.87	-8.81	92.12	82.06	---	---	---	Carrier
2498.00	66.54	51.45	-8.74	57.80	42.71	74.00	54.00	-11.29	AVG
3412.50	41.60	---	4.12	45.72	---	74.00	54.00	-8.28	Peak
4882.50	49.41	42.08	7.12	56.53	49.20	74.00	54.00	-4.80	AVG
5932.50	40.63	---	9.13	49.76	---	74.00	54.00	-4.24	Peak

Vertical

Frequency (MHz)	Reading-PK (dBμV)	Reading-AV (dBμV)	Correction Factor (dB/m)	Result-PK (dBμV/m)	Result-AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-AV (dBμV/m)	Margin (dB)	Remark
1598.00	67.52	54.35	-13.25	54.27	41.10	74.00	54.00	-12.90	AVG
2440.00	102.42	91.02	-8.82	93.60	82.20	---	---	---	Carrier
2490.00	68.16	51.61	-8.75	59.41	42.86	74.00	54.00	-11.14	AVG
3247.50	42.52	---	3.82	46.34	---	74.00	54.00	-7.66	Peak
4882.50	48.60	41.24	7.12	55.72	48.36	74.00	54.00	-5.64	AVG
5767.50	40.97	---	8.84	49.82	---	74.00	54.00	-4.18	Peak

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
3. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
4. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
5. *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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.*
6. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(AV)
   Remark AVG = Result(AV) – Limit(AV)

Product Name	Jawbone	Test Date	2009/10/05
Model Name	JBG	Test By	Rick Lin
Test Mode	CH High TX / GFSK	TEMP & Humidity	25.6°C, 63%

Horizontal

Frequency (MHz)	Reading-PK (dBμV)	Reading-AV (dBμV)	Correction Factor (dB/m)	Result-PK (dBμV/m)	Result-AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-AV (dBμV/m)	Margin (dB)	Remark
1596.00	64.65	---	-13.27	51.38	---	74.00	54.00	-2.62	Peak
2480.00	102.26	---	-8.76	93.50	---	---	---	---	Carrier
2494.00	66.27	50.85	-8.74	57.53	42.11	74.00	54.00	-11.89	AVG
4005.00	41.66	---	5.14	46.79	---	74.00	54.00	-7.21	Peak
4957.50	49.03	41.89	7.16	56.19	49.05	74.00	54.00	-4.95	AVG
6225.00	40.90	---	9.45	50.35	---	74.00	54.00	-3.65	Peak

Vertical

Frequency (MHz)	Reading-PK (dBμV)	Reading-AV (dBμV)	Correction Factor (dB/m)	Result-PK (dBμV/m)	Result-AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-AV (dBμV/m)	Margin (dB)	Remark
1594.00	67.63	54.13	-13.29	54.34	40.84	74.00	54.00	-13.16	AVG
2480.00	103.82	---	-8.76	95.06	---	---	---	---	Carrier
2496.00	68.74	51.55	-8.74	60.00	42.81	74.00	54.00	-11.19	AVG
3457.50	42.37	---	4.21	46.58	---	74.00	54.00	-7.42	Peak
4957.50	49.23	41.74	7.16	56.39	48.90	74.00	54.00	-5.10	AVG
6172.50	39.89	---	9.41	49.29	---	74.00	54.00	-4.71	Peak

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
3. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
4. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
5. *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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.*
6. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(AV)
   Remark AVG = Result(AV) – Limit(AV)

Product Name	Jawbone	Test Date	2009/10/05
Model Name	JBG	Test By	Rick Lin
Test Mode	CH Low TX / 8-DPSK	TEMP & Humidity	25.6°C, 63%

Horizontal

Frequency (MHz)	Reading-PK (dBμV)	Reading-AV (dBμV)	Correction Factor (dB/m)	Result-PK (dBμV/m)	Result-AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-AV (dBμV/m)	Margin (dB)	Remark
1592.00	64.89	---	-13.31	51.59	---	74.00	54.00	-2.41	Peak
2402.00	100.85	---	-8.87	91.98	---	---	---	---	Carrier
2488.00	66.67	51.33	-8.75	57.92	42.58	74.00	54.00	-11.42	AVG
3360.00	42.51	---	4.03	46.54	---	74.00	54.00	-7.46	Peak
4725.00	41.05	---	7.03	48.08	---	74.00	54.00	-5.92	Peak
6007.50	40.54	---	9.26	49.80	---	74.00	54.00	-4.20	Peak

Vertical

Frequency (MHz)	Reading-PK (dBμV)	Reading-AV (dBμV)	Correction Factor (dB/m)	Result-PK (dBμV/m)	Result-AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-AV (dBμV/m)	Margin (dB)	Remark
1600.00	67.89	59.11	-13.23	54.66	45.88	74.00	54.00	-8.12	AVG
2402.00	102.77	---	-8.87	93.90	---	---	---	---	Carrier
2490.00	67.17	51.55	-8.75	58.42	42.80	74.00	54.00	-11.20	AVG
3352.50	42.78	---	4.01	46.79	---	74.00	54.00	-7.21	Peak
4807.50	41.08	---	7.08	48.16	---	74.00	54.00	-5.84	Peak
5737.50	41.02	---	8.79	49.81	---	74.00	54.00	-4.19	Peak

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
3. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
4. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
5. *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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.*
6. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(AV)
   Remark AVG = Result(AV) – Limit(AV)

Product Name	Jawbone	Test Date	2009/10/05
Model Name	JBG	Test By	Rick Lin
Test Mode	CH Middle TX / 8-DPSK	TEMP & Humidity	25.6°C, 63%

Horizontal

Frequency (MHz)	Reading-PK (dBμV)	Reading-AV (dBμV)	Correction Factor (dB/m)	Result-PK (dBμV/m)	Result-AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-AV (dBμV/m)	Margin (dB)	Remark
1592.00	65.07	---	-13.31	51.77	---	74.00	54.00	-2.23	Peak
2442.00	99.89	87.31	-8.81	91.08	78.50	---	---	---	Carrier
2490.00	66.43	51.29	-8.75	57.68	42.54	74.00	54.00	-11.46	AVG
3285.00	42.47	---	3.89	46.36	---	74.00	54.00	-7.64	Peak
4822.50	42.00	---	7.08	49.08	---	74.00	54.00	-4.92	Peak
6105.00	40.76	---	9.35	50.10	---	74.00	54.00	-3.90	Peak

Vertical

Frequency (MHz)	Reading-PK (dBμV)	Reading-AV (dBμV)	Correction Factor (dB/m)	Result-PK (dBμV/m)	Result-AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-AV (dBμV/m)	Margin (dB)	Remark
1594.00	67.39	57.12	-13.29	54.10	43.83	74.00	54.00	-10.17	AVG
2440.00	101.28	88.39	-8.82	92.46	79.57	---	---	---	Carrier
2494.00	66.21	51.10	-8.74	57.47	42.36	74.00	54.00	-11.64	AVG
3660.00	42.17	---	4.55	46.72	---	74.00	54.00	-7.28	Peak
5025.00	41.11	---	7.24	48.34	---	74.00	54.00	-5.66	Peak
5970.00	41.07	---	9.20	50.27	---	74.00	54.00	-3.73	Peak

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
3. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
4. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
5. *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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.*
6. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(AV)
   Remark AVG = Result(AV) – Limit(AV)

Product Name	Jawbone	Test Date	2009/10/05
Model Name	JBG	Test By	Rick Lin
Test Mode	CH High TX / 8-DPSK	TEMP & Humidity	25.6°C, 63%

Horizontal

Frequency (MHz)	Reading-PK (dBμV)	Reading-AV (dBμV)	Correction Factor (dB/m)	Result-PK (dBμV/m)	Result-AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-AV (dBμV/m)	Margin (dB)	Remark
1596.00	63.79	---	-13.27	50.52	---	74.00	54.00	-3.48	Peak
2480.00	100.78	---	-8.76	92.02	---	---	---	---	Carrier
2490.00	65.88	50.96	-8.75	57.13	42.21	74.00	54.00	-11.79	AVG
3330.00	42.05	---	3.97	46.02	---	74.00	54.00	-7.98	Peak
4935.00	41.45	---	7.14	48.60	---	74.00	54.00	-5.40	Peak
6105.00	40.69	---	9.35	50.04	---	74.00	54.00	-3.96	Peak

Vertical

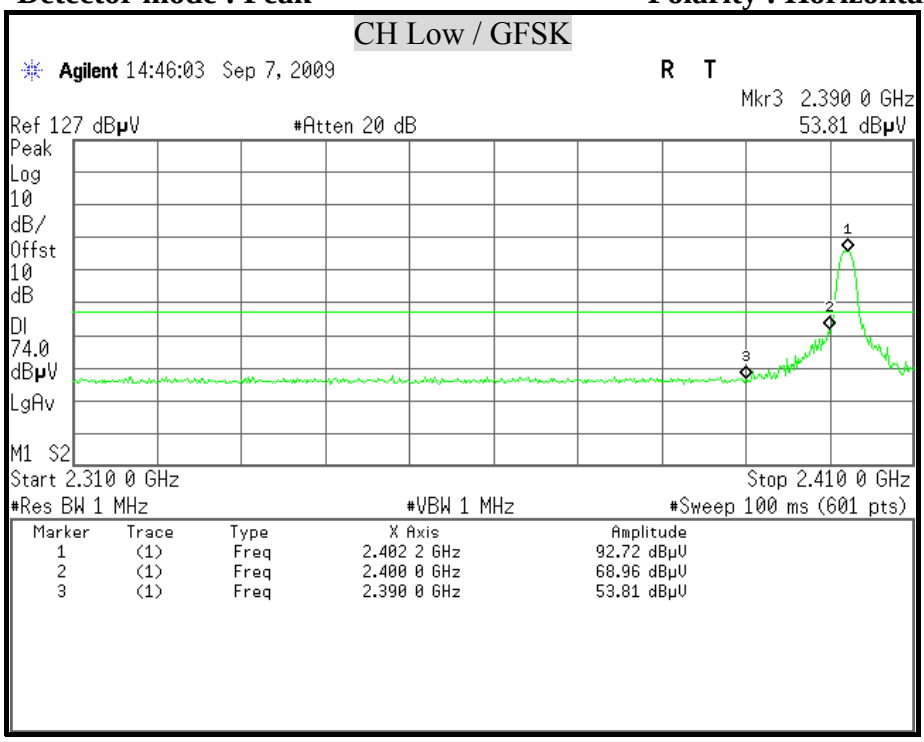
Frequency (MHz)	Reading-PK (dBμV)	Reading-AV (dBμV)	Correction Factor (dB/m)	Result-PK (dBμV/m)	Result-AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-AV (dBμV/m)	Margin (dB)	Remark
1598.00	67.88	54.70	-13.25	54.63	41.45	74.00	54.00	-12.55	AVG
2480.00	102.45	---	-8.76	93.69	---	---	---	---	Carrier
2496.00	66.37	51.38	-8.74	57.63	42.64	74.00	54.00	-11.36	AVG
3345.00	42.03	---	4.00	46.03	---	74.00	54.00	-7.97	Peak
4905.00	41.61	---	7.13	48.74	---	74.00	54.00	-5.26	Peak
5872.50	40.49	---	9.03	49.52	---	74.00	54.00	-4.48	Peak

Remark:

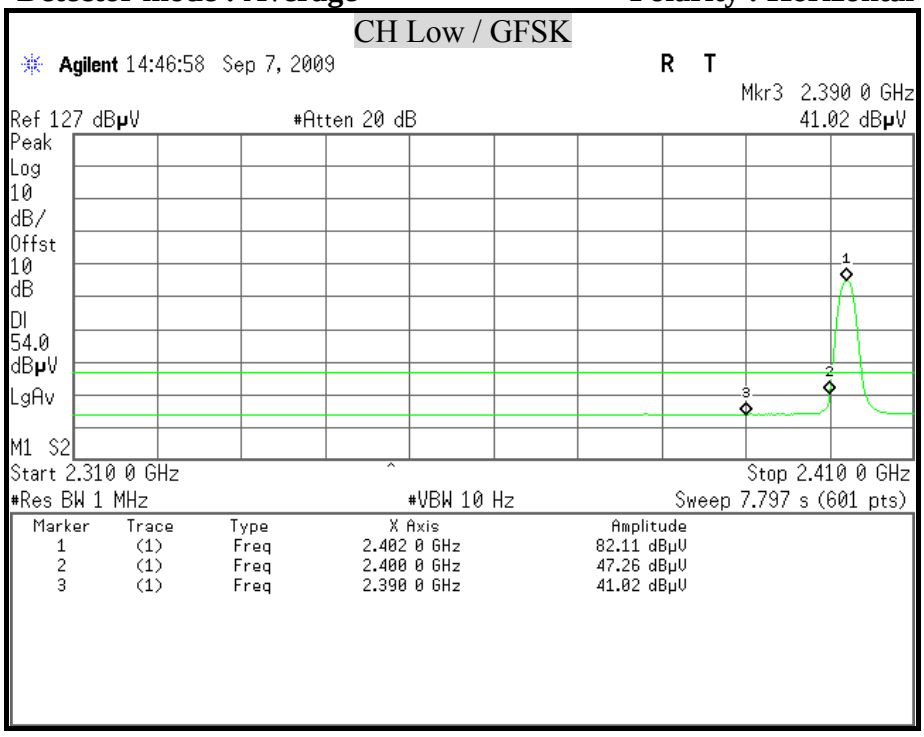
1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
3. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
4. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
5. *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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.*
6. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(AV)
   Remark AVG = Result(AV) – Limit(AV)

8.7.4 RESTRICTED BAND EDGES

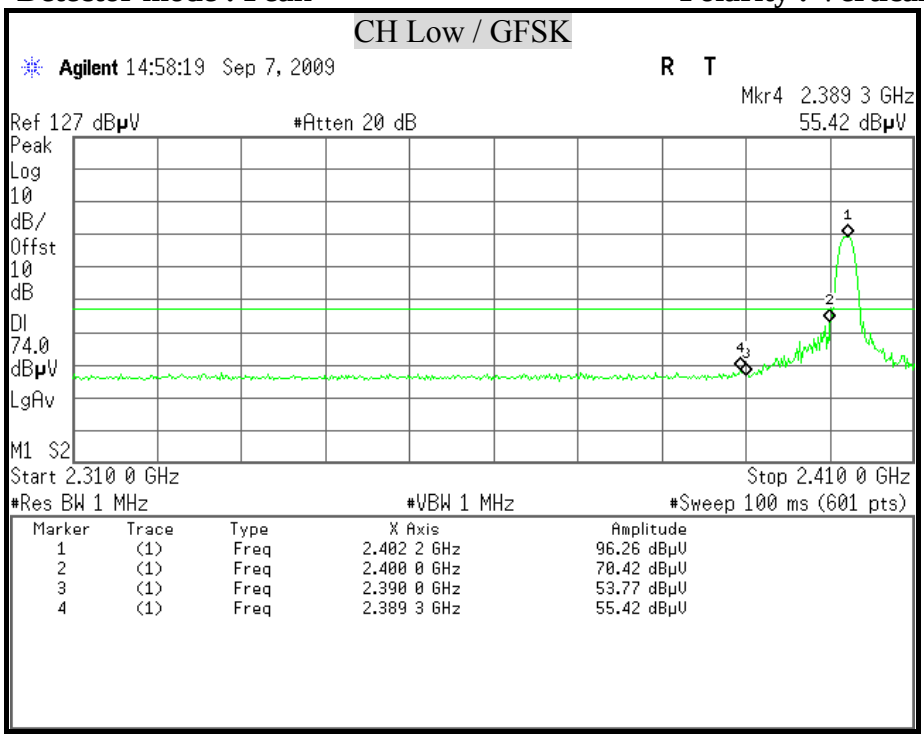
Detector mode : Peak **Polarity : Horizontal**



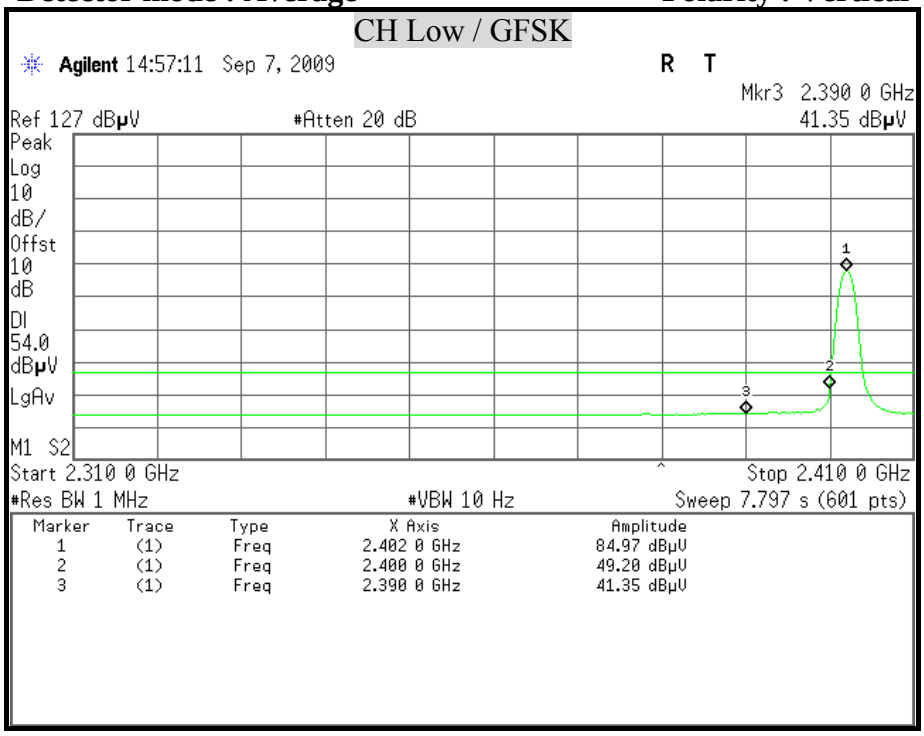
Detector mode : Average **Polarity : Horizontal**



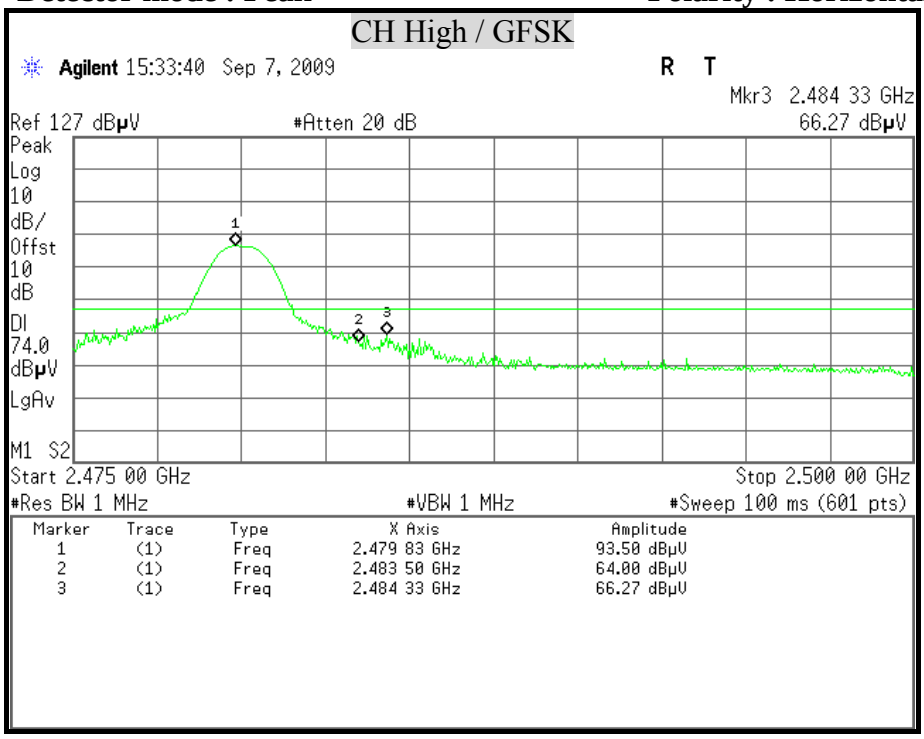
Detector mode : Peak **Polarity : Vertical**



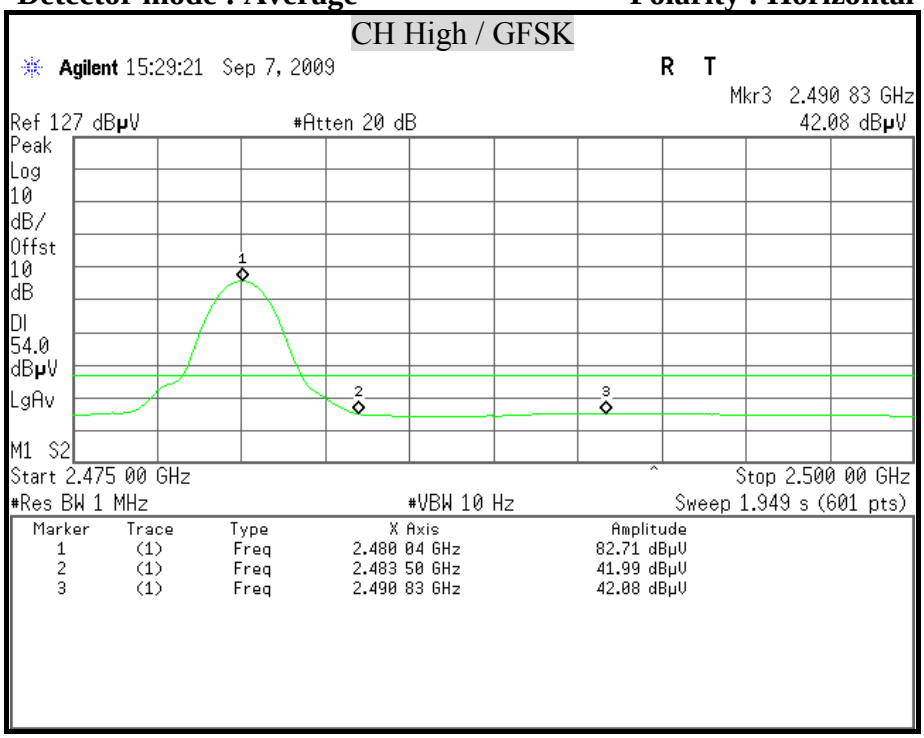
Detector mode : Average **Polarity : Vertical**



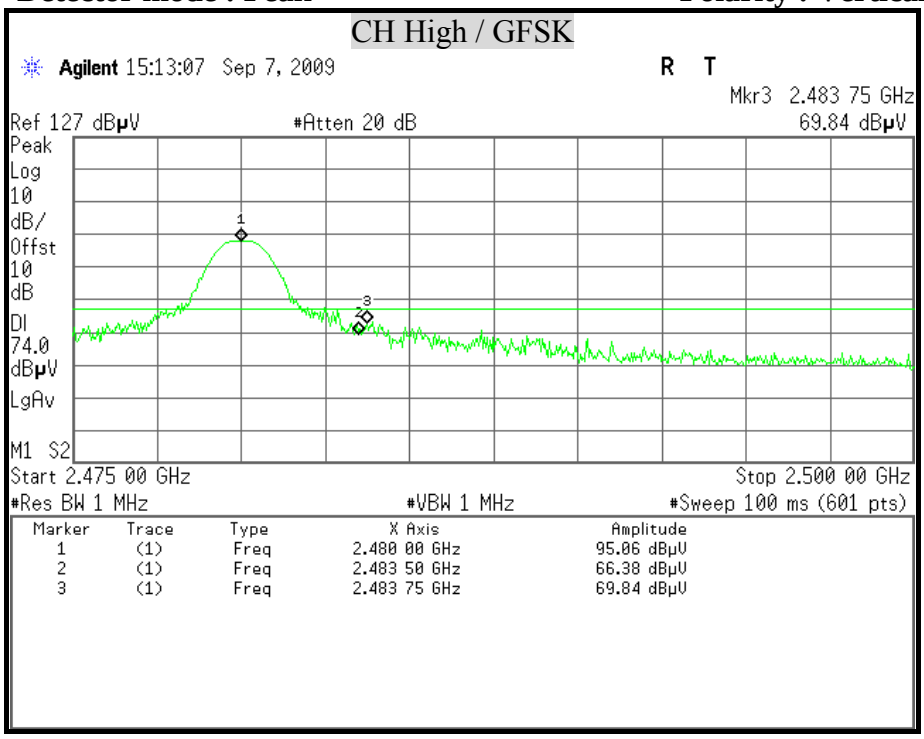
Detector mode : Peak **Polarity : Horizontal**



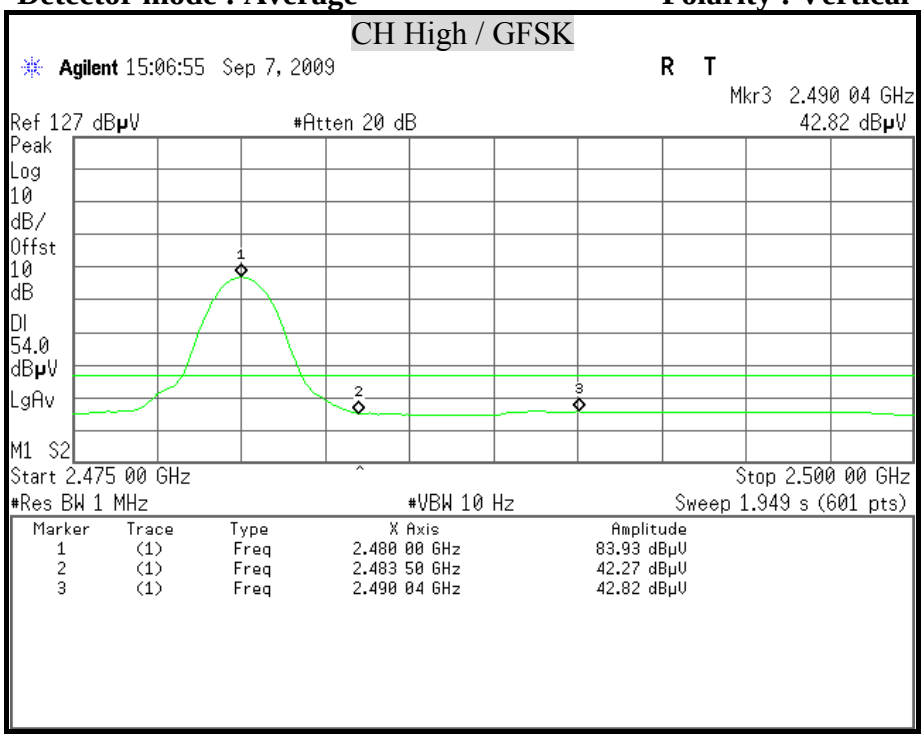
Detector mode : Average **Polarity : Horizontal**



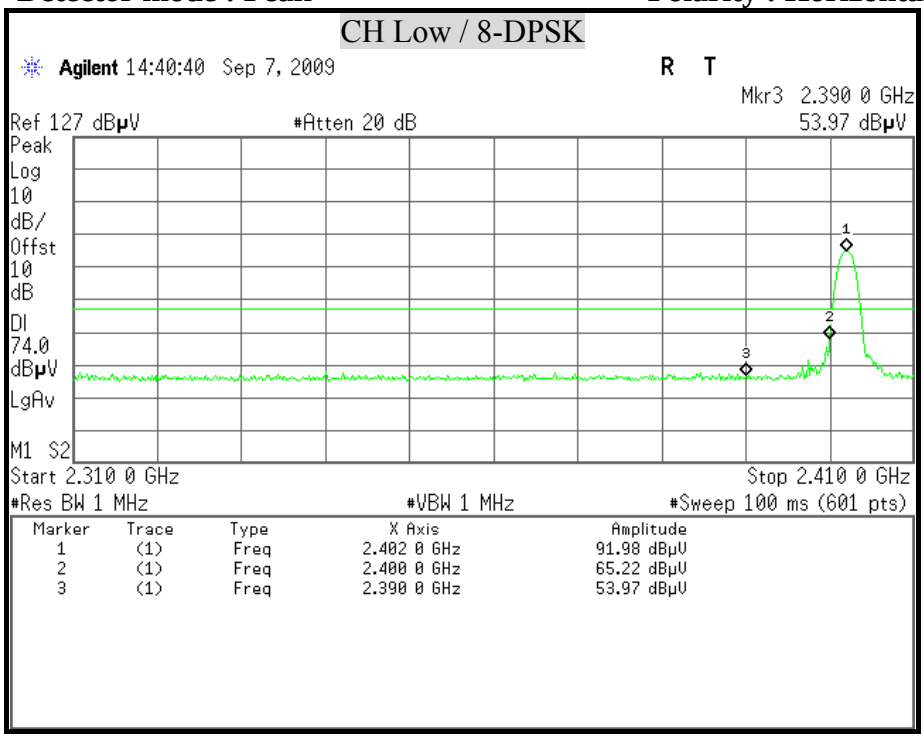
Detector mode : Peak **Polarity : Vertical**



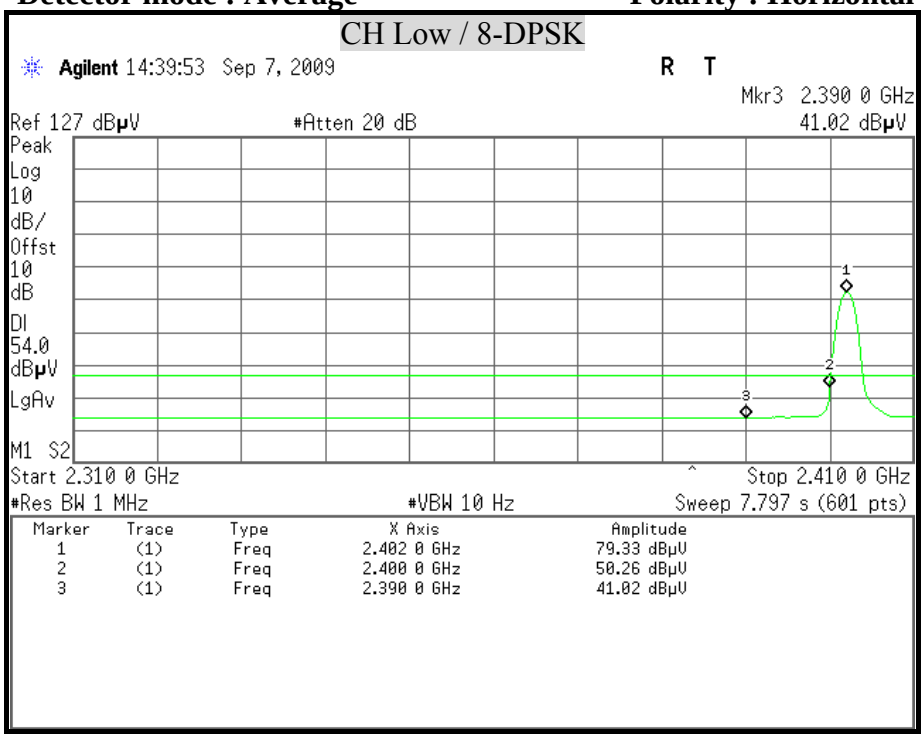
Detector mode : Average **Polarity : Vertical**



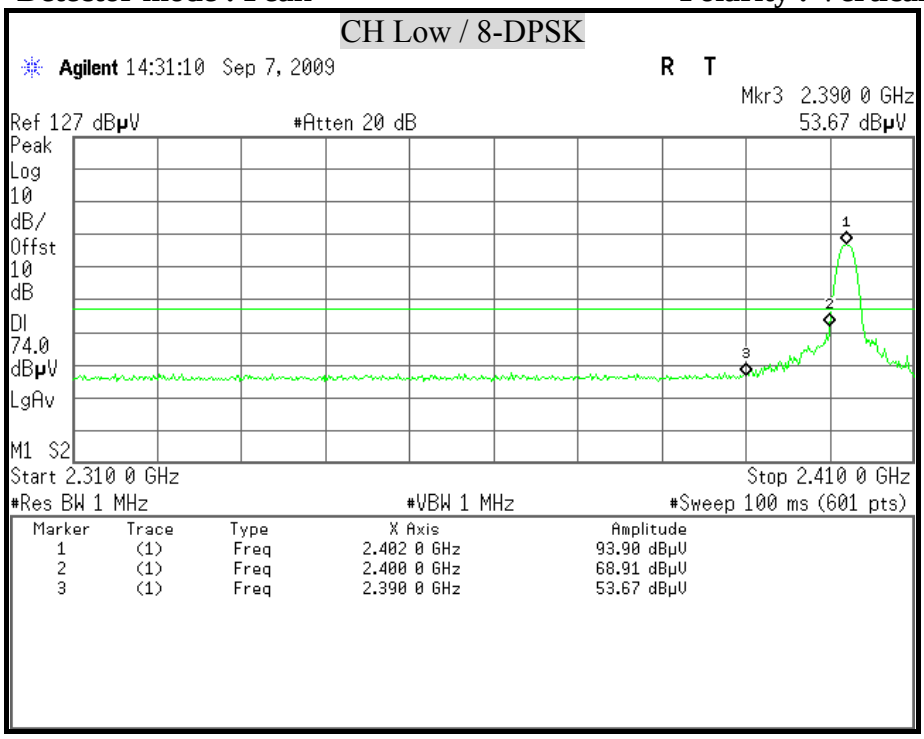
Detector mode : Peak **Polarity : Horizontal**



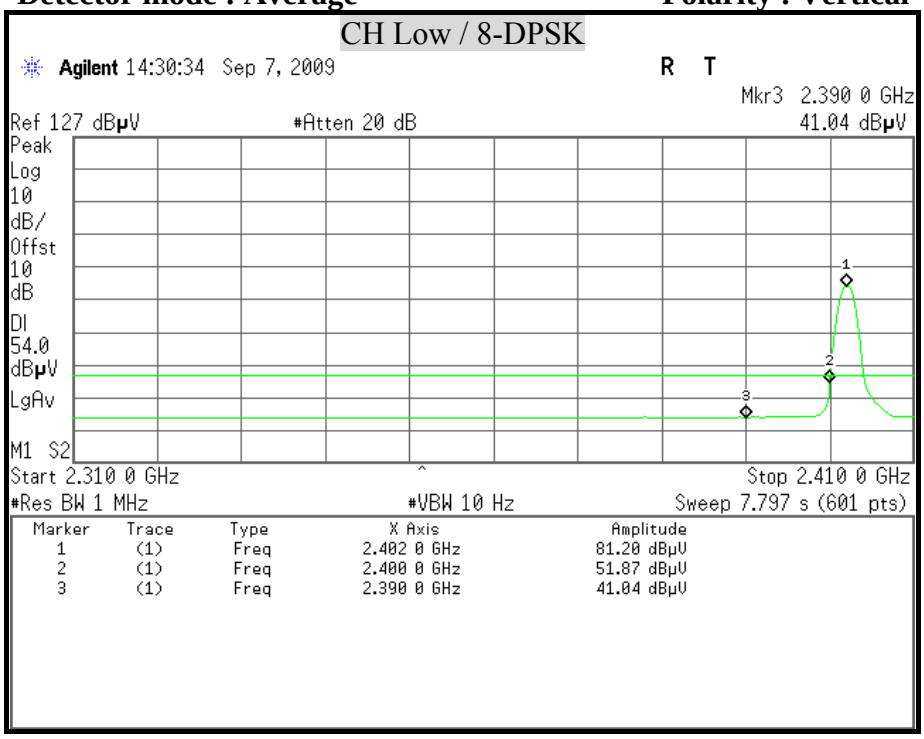
Detector mode : Average **Polarity : Horizontal**



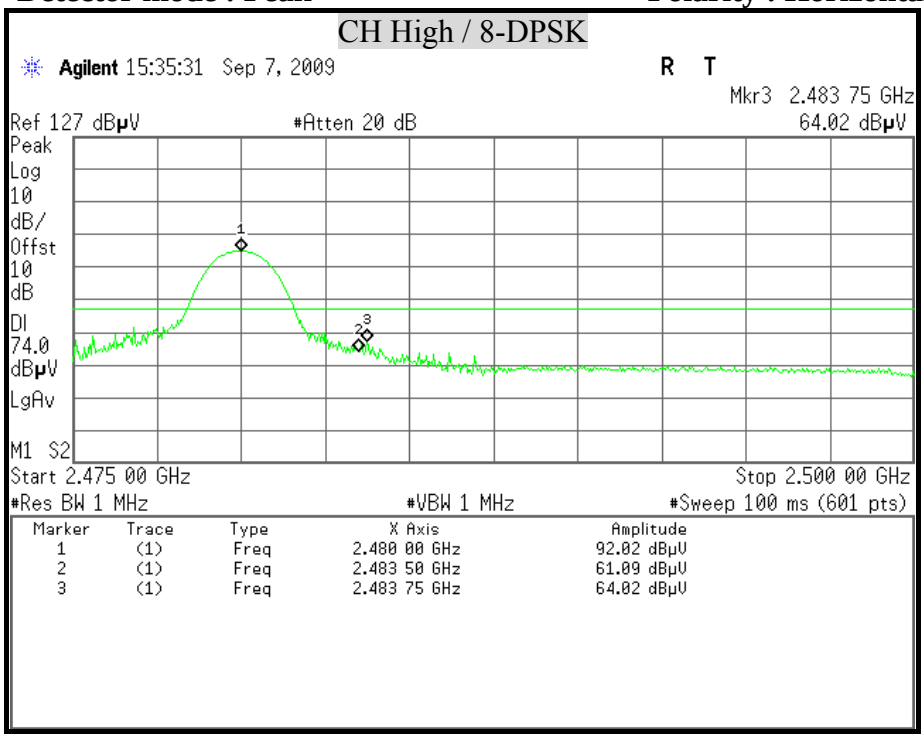
Detector mode : Peak **Polarity : Vertical**



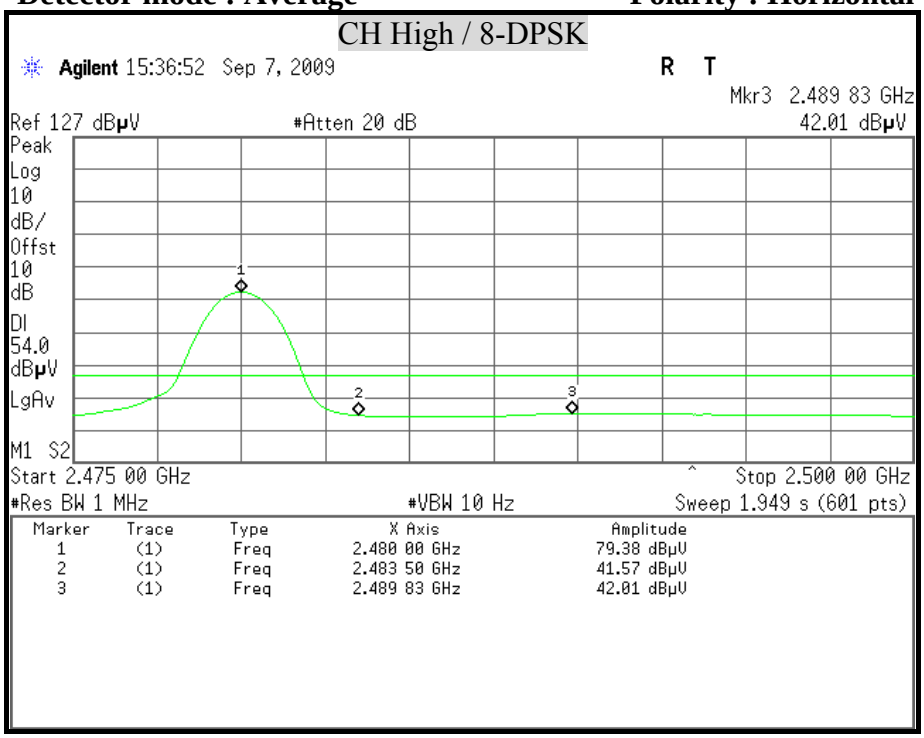
Detector mode : Average **Polarity : Vertical**



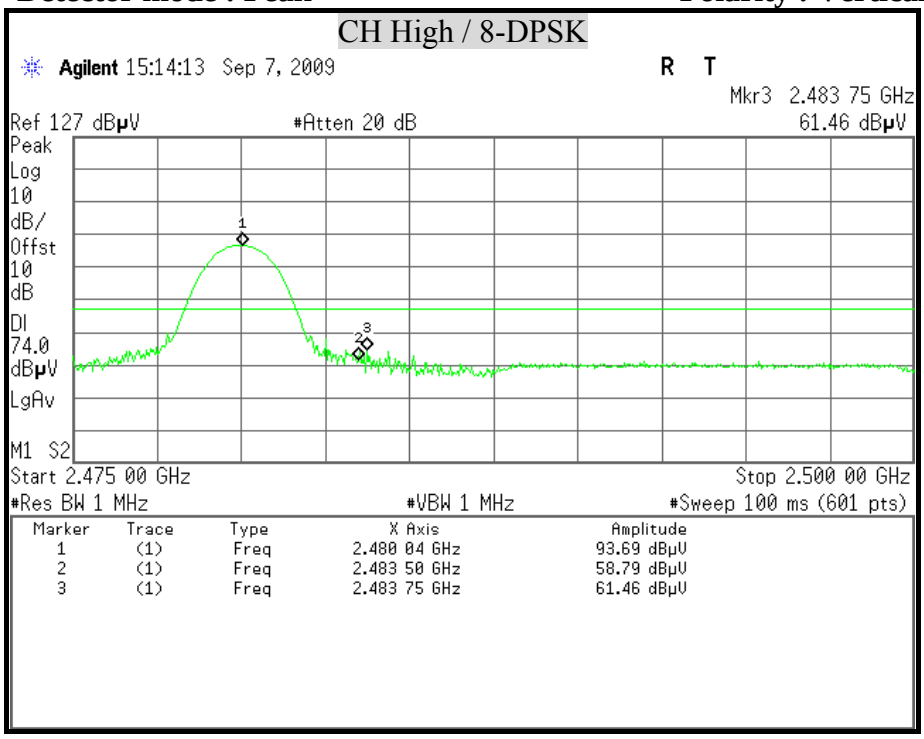
Detector mode : Peak **Polarity : Horizontal**



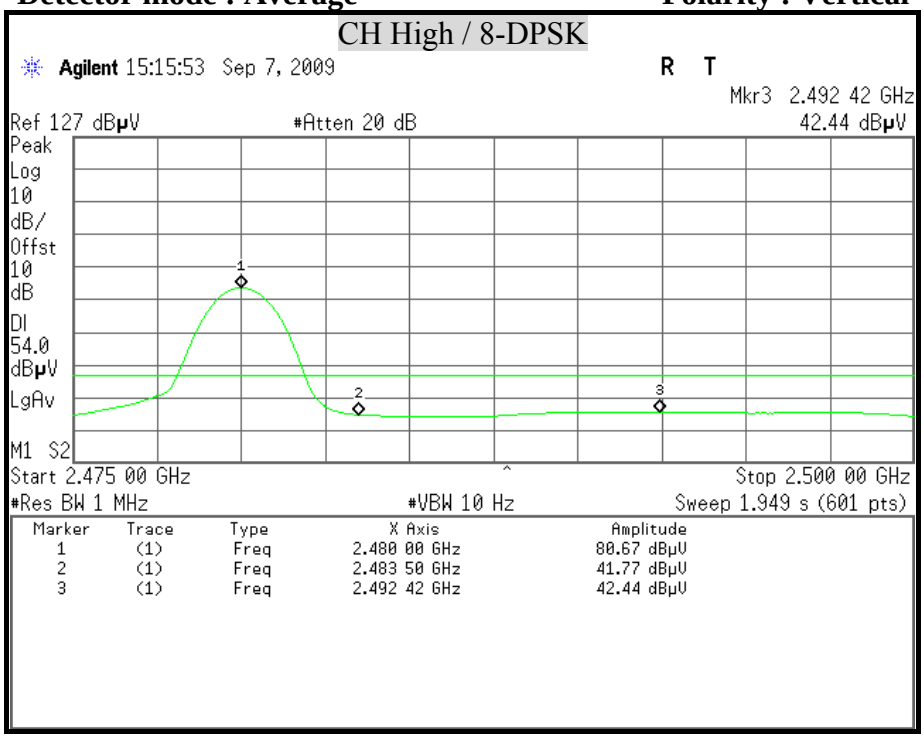
Detector mode : Average **Polarity : Horizontal**



Detector mode : Peak **Polarity : Vertical**



Detector mode : Average **Polarity : Vertical**



8.8 POWERLINE CONDUCTED EMISSIONS

LIMITS

§ 15.207 (a) Except as shown in paragraph (b) and (c) this section, 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). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal.

The lower limit applies at the boundary between the frequency ranges.

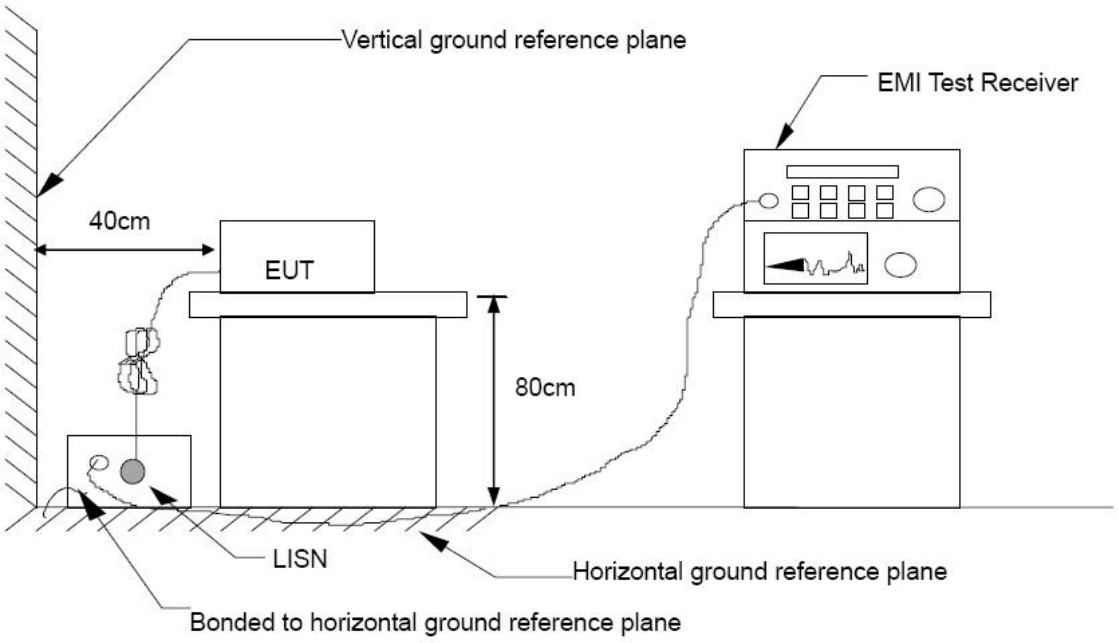
Frequency of Emission (MHz)	Conducted limit (dBμv)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56	56 to 46
0.5 - 5	56	46
5 - 30	60	50

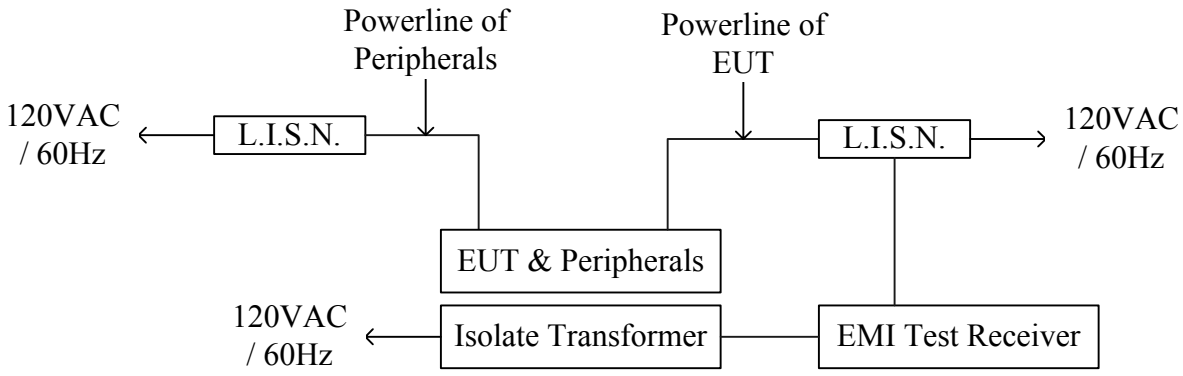
TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
L.I.S.N	SCHWARZBECK	NSLK 8127	8127-465	08/13/2010
L.I.S.N	SCHWARZBECK	NSLK 8127	8127-473	10/12/2009
TEST RECEIVER	R & S	ESHS30	838550/003	02/02/2010
TEST RECEIVER	R & S	ESCS 30	826547/004	08/05/2010
PULSE LIMIT	R & S	ESH3-Z2	100117	09/17/2010
N TYPE COAXIAL CABLE	BELDEN	8268 M17/164	003	07/09/2010

Remark: *Each piece of equipment is scheduled for calibration once a year.*

TEST SETUP





TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80cm above the horizontal ground plane. The EUT IS CONFIGURED IN ACCORDANCE WITH ANSI C63.4 : 2003.

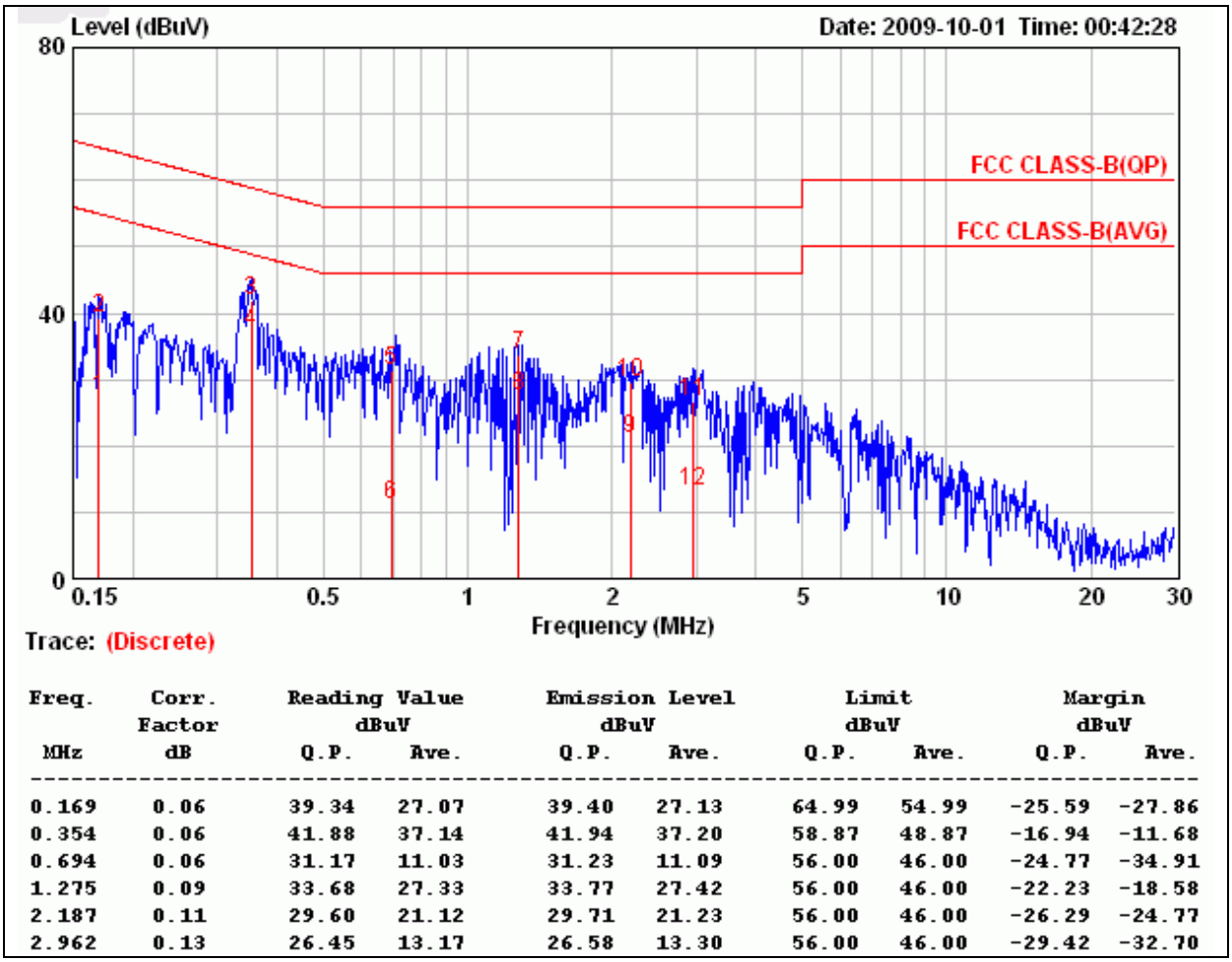
The resolution bandwidth is set to 9 kHz for both quasi-peak detection and average detection measurements.

Line conducted data is recorded for both NEUTRAL and LINE.

TEST RESULTS

Product Name	Jawbone	Test Date	2009/10/01
Model	JBG	Test By	Rick Lin
Test Mode	Power Adapter	TEMP & Humidity	22.5°C, 54%

LINE



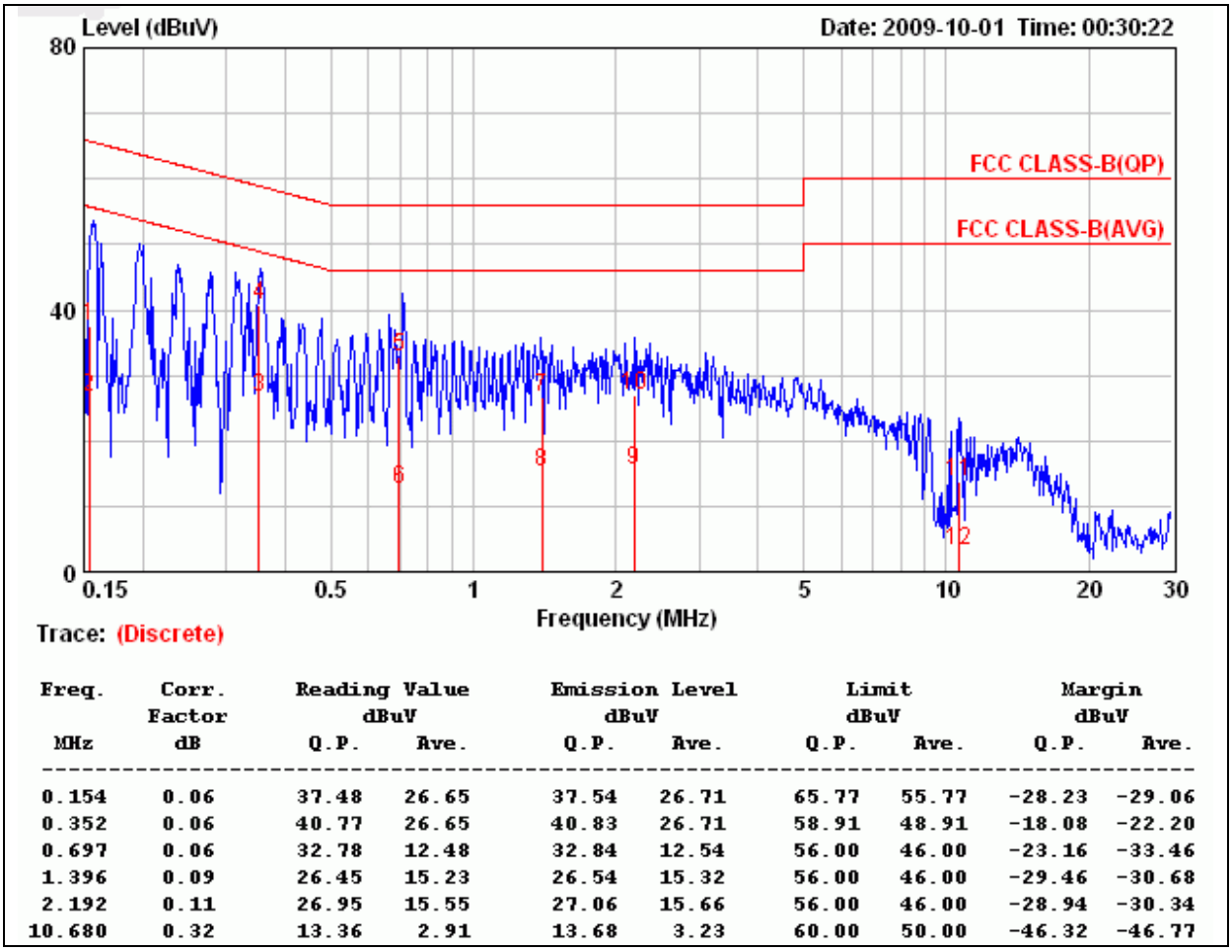
Freq. MHz	Corr. Factor dB	Reading Value dBuV Q.P.	Reading Value dBuV Ave.	Emission Level dBuV Q.P.	Emission Level dBuV Ave.	Limit dBuV Q.P.	Limit dBuV Ave.	Margin dBuV Q.P.	Margin dBuV Ave.
0.169	0.06	39.34	27.07	39.40	27.13	64.99	54.99	-25.59	-27.86
0.354	0.06	41.88	37.14	41.94	37.20	58.87	48.87	-16.94	-11.68
0.694	0.06	31.17	11.03	31.23	11.09	56.00	46.00	-24.77	-34.91
1.275	0.09	33.68	27.33	33.77	27.42	56.00	46.00	-22.23	-18.58
2.187	0.11	29.60	21.12	29.71	21.23	56.00	46.00	-26.29	-24.77
2.962	0.13	26.45	13.17	26.58	13.30	56.00	46.00	-29.42	-32.70

Remark:

1. Correction Factor = Insertion loss + cable loss
2. Margin value = Emission level – Limit value

Product Name	Jawbone	Test Date	2009/10/01
Model	JBG	Test By	Rick Lin
Test Mode	Power Adapter	TEMP & Humidity	22.5°C, 54%

NEUTRAL



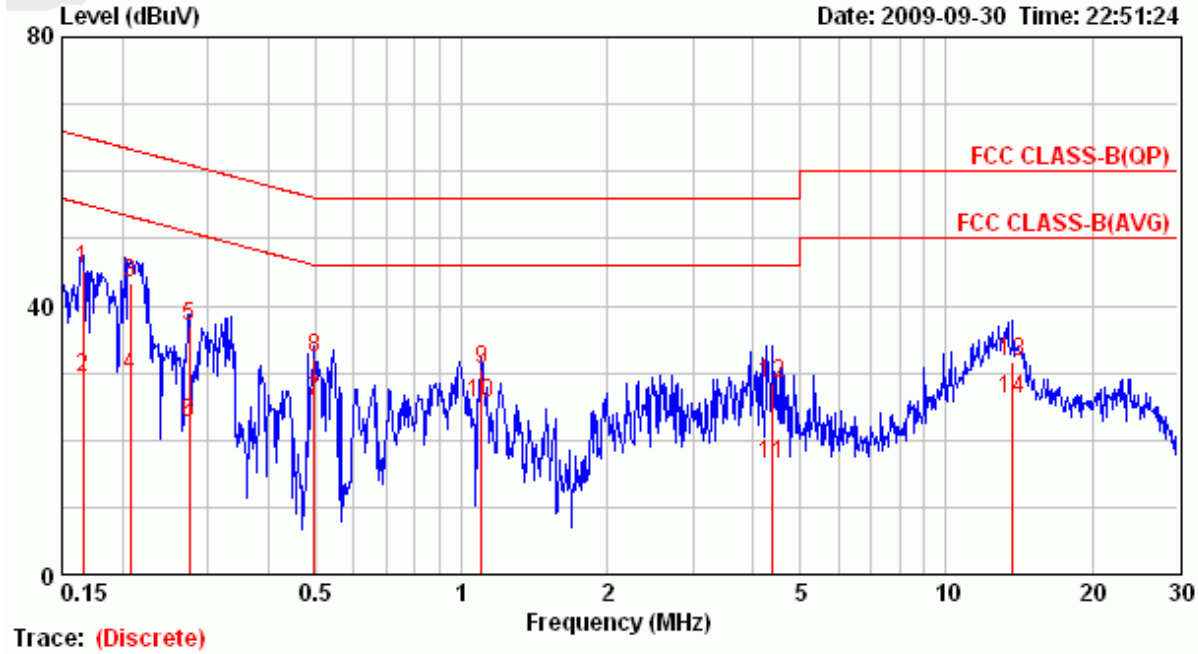
Freq. MHz	Corr. Factor dB	Reading Value dBuV Q.P.	Reading Value dBuV Ave.	Emission Level dBuV Q.P.	Emission Level dBuV Ave.	Limit dBuV Q.P.	Limit dBuV Ave.	Margin dBuV Q.P.	Margin dBuV Ave.
0.154	0.06	37.48	26.65	37.54	26.71	65.77	55.77	-28.23	-29.06
0.352	0.06	40.77	26.65	40.83	26.71	58.91	48.91	-18.08	-22.20
0.697	0.06	32.78	12.48	32.84	12.54	56.00	46.00	-23.16	-33.46
1.396	0.09	26.45	15.23	26.54	15.32	56.00	46.00	-29.46	-30.68
2.192	0.11	26.95	15.55	27.06	15.66	56.00	46.00	-28.94	-30.34
10.680	0.32	13.36	2.91	13.68	3.23	60.00	50.00	-46.32	-46.77

Remark:

1. Correction Factor = Insertion loss + cable loss
2. Margin value = Emission level – Limit value

Product Name	Jawbone	Test Date	2009/09/30
Model	JBG	Test By	Rick Lin
Test Mode	Charge mode	TEMP & Humidity	22.5°C, 54%

LINE



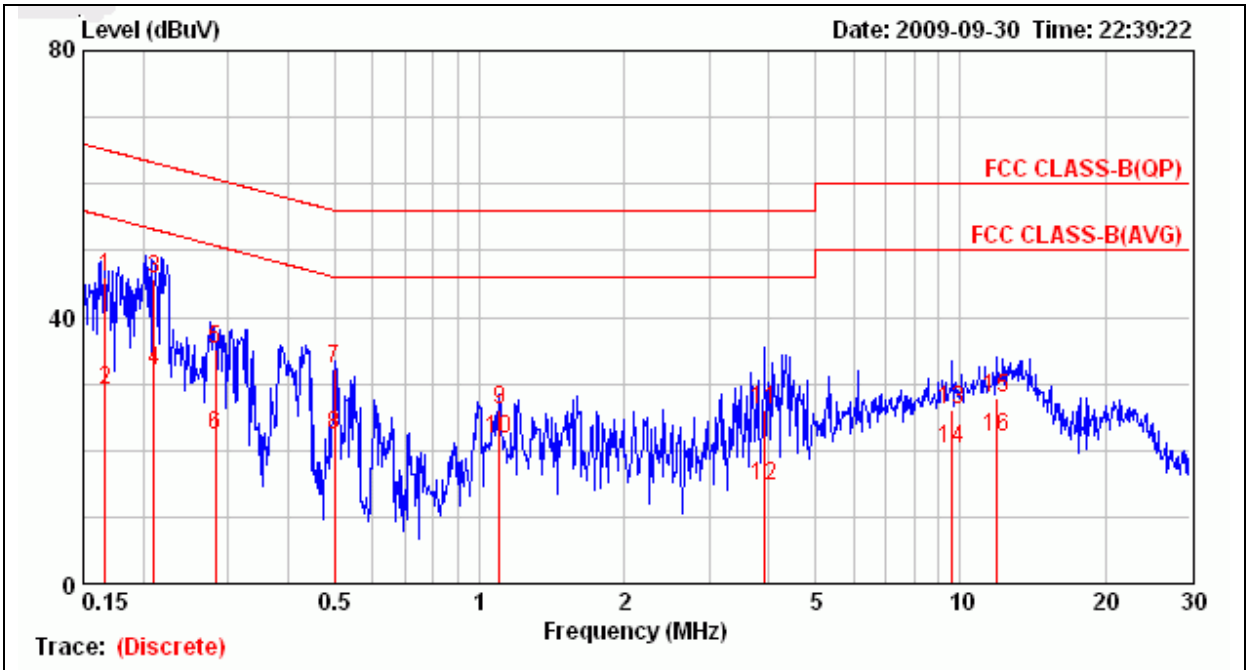
Freq.	Corr. Factor	Reading Value dBuV		Emission Level dBuV		Limit dBuV		Margin dBuV	
MHz	dB	Q.P.	Ave.	Q.P.	Ave.	Q.P.	Ave.	Q.P.	Ave.
0.165	0.06	45.26	29.28	45.32	29.34	65.18	55.18	-19.86	-25.84
0.207	0.06	43.37	29.51	43.43	29.57	63.32	53.32	-19.89	-23.75
0.274	0.06	36.74	22.51	36.80	22.57	60.98	50.98	-24.19	-28.42
0.497	0.05	32.19	25.79	32.24	25.84	56.05	46.05	-23.81	-20.21
1.099	0.08	30.31	25.49	30.39	25.57	56.00	46.00	-25.61	-20.43
4.394	0.16	28.17	16.29	28.33	16.45	56.00	46.00	-27.67	-29.55
13.695	0.36	31.34	25.65	31.70	26.01	60.00	50.00	-28.30	-23.99

Remark:

1. Correction Factor = Insertion loss + cable loss
2. Margin value = Emission level – Limit value

Product Name	Jawbone	Test Date	2009/09/30
Model	JBG	Test By	Rick Lin
Test Mode	Charge mode	TEMP & Humidity	22.5°C, 54%

NEUTRAL



Freq. MHz	Corr. Factor dB	Reading Value dBuV Q.P.	Reading Value dBuV Ave.	Emission Level dBuV Q.P.	Emission Level dBuV Ave.	Limit dBuV Q.P.	Limit dBuV Ave.	Margin dBuV Q.P.	Margin dBuV Ave.
0.167	0.06	46.05	29.03	46.11	29.09	65.12	55.12	-19.01	-26.03
0.210	0.06	45.62	31.86	45.68	31.92	63.20	53.20	-17.53	-21.29
0.283	0.06	35.02	22.12	35.08	22.18	60.73	50.73	-25.66	-28.56
0.499	0.05	32.09	22.25	32.14	22.30	56.02	46.02	-23.88	-23.72
1.100	0.08	26.08	21.47	26.16	21.55	56.00	46.00	-29.84	-24.45
3.922	0.15	25.81	14.60	25.96	14.75	56.00	46.00	-30.04	-31.25
9.603	0.30	25.85	19.92	26.15	20.22	60.00	50.00	-33.85	-29.78
11.870	0.34	27.59	21.77	27.93	22.11	60.00	50.00	-32.07	-27.89

Remark:

1. Correction Factor = Insertion loss + cable loss
2. Margin value = Emission level – Limit value