FCC PART 15.231

IC RSS-210, ISSUE 8, DECEMBER 2010

TEST AND MEASUREMENT REPORT

For

AnyDATA Corporation

5 Oldfield, Irvine, CA 92618, USA

FCC ID: P4M-ACT231
IC: 4594A-ACT231

Report Type:	**Product Type:**
Original Report	CDMA Vehicle Tracker with Bluetooth and RKE Function

Prepared By:	Wei Sun
Report Number:	R1207094-231-A
Report Date:	2012-09-20
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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1207094-231	Original Report	2012-08-24
1	R1207094-231A	Updated report with additional channel 309.5075 MHz	2012-09-20

1 General Description

1.1 Product Description for Equipment Under Test (EUT)

This test and measurement report was prepared on behalf of *AnyDATA Corporation*, and their product FCC ID: P4M-ACT231, IC: 4594A-ACT231, model: *ACT231* which will henceforth be referred to as the EUT (Equipment under Test). The EUT is a vehicle tracker with Bluetooth and RKE function.

1.2 Mechanical Description of EUT

The "EUT" measures approximately *80 mm (L) x 45mm (W) x 22mm (H)*, and weighs approximately *66.5*g.

The test data gathered are from typical production sample, serial number: 201206224815710 (6C4C727D) provided by the manufacturer.

1.3 Objective

This report is prepared on behalf of *AnyDATA Corporation* in accordance with Part 2, Subpart J, and Part 15, Subparts B and C of the Federal Communication Commissions rules and IC RSS-210 Issue 8, December 2010.

1.4 Related Submittal(s)/Grant(s)

FCC Part 22H/24E and RSS-132/133 report No.: R1207094-2224
FCC Part 15.247 and RSS-210 report No.: R1207094-247

1.5 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.4-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

1.6 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on CISPR16-4-2:2003, The Treatment of Uncertainty in EMC Measurements, the values ranging from $\pm$2.0 dB for Conducted Emissions tests and $\pm$4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL Corp.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

1.7 Test Facility

The test site used by BACL Corp. to collect radiated and conducted emissions measurement data is located at its facility in Sunnyvale, California, USA.

The test site at BACL Corp. has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997, and Article 8 of the VCCI regulations on December 25, 1997. The test site also complies with the test methods and procedures set forth in CISPR 22:2008 §10.4 for measurements below 1 GHz and §10.6 for measurements above 1 GHz as well as ANSI C63.4-2003, ANSI C63.4-2009, TIA/EIA-603 & CISPR 24:2010.

The Federal Communications Commission and Voluntary Control Council for Interference have the reports on file and they are listed under FCC registration number: 90464 and VCCI Registration No.: A-0027. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL Corp. is an American Association for Laboratory Accreditation (A2LA) accredited laboratory (Lab Code 3297-02). The current scope of accreditations can be found at

http://www.a2la.org/scopepdf/3297-02.pdf?CFID=1132286&CFTOKEN=e42a3240dac3f6ba-6DE17DCB-1851-9E57-477422F667031258&jsessionid=8430d44f1f47cf2996124343c704b367816b

2 System Test Configuration

2.1 Justification

The EUT was configured for testing according to ANSI C63.4-2009.

The EUT was tested in a testing mode to represent worst-case results during the final qualification test.

Modulation	Frequency (MHz)			
	300	309.5075	319	433.92
ASK	Mode 1	Mode 3	Mode 5	Mode 7
FSK	Mode 2	Mode 4	Mode 6	Mode 8

2.2 EUT Exercise Software

The test utility used was AC23VZO5 was provided by AnyDATA Corporation and was verified by Wei Sun to comply with the standard requirements being tested against.

2.3 Special Equipment

There were no special accessories were required, included, or intended for use with EUT during these tests.

2.4 Equipment Modifications

No modifications were made to the EUT.

2.5 Local Support Equipment

Manufacturer	Description	Model No.	Serial No.
Dell	Laptop	PP11L	CN-0D4571-48643-57F-7162

2.6 EUT Internal Configuration Details

Manufacturers	Descriptions	Models	Serial Numbers
AnyDATA Corporation	RKE Board	ACT231 TRANS V1.0	E170968
AnyDATA Corporation	STN Board	ACT231 STN V0.3	0.194V-0
AnyDATA Corporation	CDMA Board	ACT231 MAIN V0.3	5234V-0

2.7 Interface Ports and Cabling

Cable Description	Length (m)	From	To
Power Cable	<3	EUT	DC/AC
USB Cable	<3	EUT	Laptop
RF Cable	1	EUT	PSA

2.8 Power Supply List and Details

Manufacturer	Description	Model	Serial Number
HON-KWANG	AC/DC Adapter	HK-Q106-A12	-

3 Summary of Test Results

Results reported relate only to the product tested.

FCC & IC Rules	Description of Test	Result
FCC §15.203, IC RSS-Gen §7.1.2	Antenna Requirement	Compliant
FCC §15.207(a) IC RSS-Gen §7.2.4	AC Line Conducted Emissions	Compliant
§15.231 (a); IC RSS-210 A1.1.1	5 second deactivation	Compliant
FCC §15.231 (b); §15.205, §15.209 IC RSS-210 A1.1.2 & 2.2 IC RSS-Gen	Radiated Spurious Emissions	Compliant
FCC §15.231 (c); IC RSS-210 A1.1.3	Emission Bandwidth	Compliant
FCC §15.231 (d) IC RSS-210 A1.1.4	40.66–40.70 MHz; Frequency and Voltage Tolerance	N/A
FCC §15.231 (e) IC RSS-210 A1.1.2	Relaxed restrictions with reduced F/S limits	N/A
FCC §15.109 IC RSS-Gen §4.10, §6	Receiver Spurious Emission	N/A

Note: NA EUT compliance with Momentarily Operated Devices and does not operate in 40.66-40.70 MHz range. And RKE part of the EUT is transmitter only unit, therefore receiver spurious emission is not required.

4 FCC §15.203 & IC RSS-Gen §7.1.2 – Antenna Requirement

4.1 Applicable Standard

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

And according to FCC §15.247 (b) (4), if transmitting antennas of directional gain greater than 6 dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

As per IC RSS-Gen §7.1.2: Transmitter Antenna, a transmitter can only be sold or operated with antennas with which it was certified. A transmitter may be certified with multiple antenna types. An antenna type comprises antennas having similar in-band and out-of-band radiation patterns. Testing shall be performed using the highest-gain antenna of each combination of transmitter and antenna type for which certification is being sought, with the transmitter output power set at the maximum level. Any antenna of the same type and having equal or lesser gain as an antenna that had been successfully tested for certification with the transmitter, will also be considered certified with the transmitter, and may be used and marketed with the transmitter. The manufacturer shall include with the application for certification a list of acceptable antenna types to be used with the transmitter.

4.2 Result

The EUT has maximum gain of -7 dBi antenna, which in accordance to sections FCC Part 15.203 and IC RSS-Gen §7.1.2, is considered sufficient to comply with the provisions of these sections.

5 FCC §15.207 (a) & IC RSS-Gen §7.2.4 – AC Line Conducted Emissions

5.1 Applicable Standard

As per FCC §15.207 & IC RSS-Gen §7.2.4 Conducted limits:

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 frequencies ranges.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 Note 1	56 to 46 Note 1
0.5-5	56	46
5-30	60	50

Note 1: Decreases with the logarithm of the frequency.

5.2 Test Setup

The measurement was performed at shield room, using the setup per ANSI C63.4-2009 measurement procedure. The specification used was FCC Part15.207 limits and IC RSS-Gen §7.2.4 limits.

External I/O cables were draped along the edge of the test table and bundle when necessary.

The AC/DC power adapter of the Supporting Laptop which connects the EUT was connected with LISN-1 which provided 120 V / 60 Hz AC power.

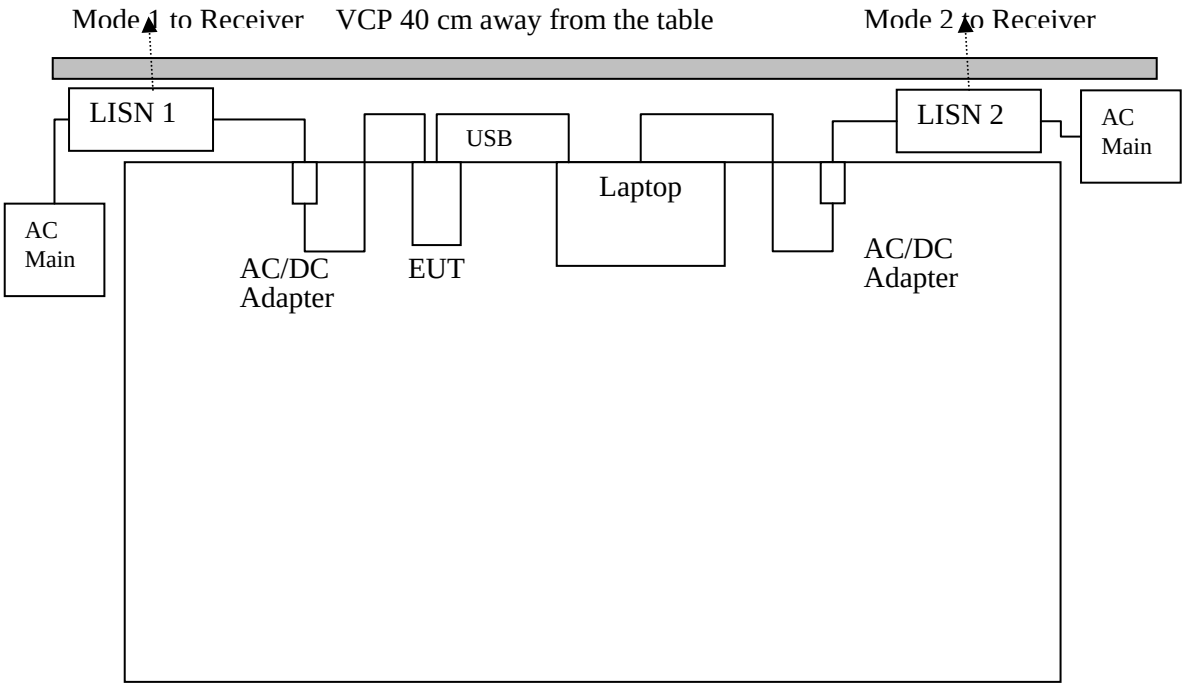
5.3 Test Procedure

During the conducted emissions test, the power cord of the EUT host system was connected to the mains outlet of the LISN-2.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the peak detection mode, quasi-peak and average. Quasi-Peak readings are distinguished with a “QP.” Average readings are distinguished with an “Ave”.

5.4 Test Setup Block Diagram



5.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Cable Loss (CL) plus the High Pass Filter/Attenuator value (HA) and subtracting the Amplifier Gain (Ga) to the indicated Amplitude (Ai) reading. The basic equation is as follows:

CA = Ai + CL + HA – Ga

For example, a corrected amplitude (CA) of 36 dBuV = Indicated Amplitude reading (Ai) of 50.0 dBuV + Cable Loss (CL) 1.0 dB + High Pass Filter/Attenuator (IA) 5 dB - Amplifier Gain (Ga) 20 dB

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit. The equation for margin calculation is as follows:

Margin (dB) = Corrected Amplitude (dBuV) - Limit (dBuV)

5.6 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Solar Electronics	LISN	9252-50-R-24-N	511205	2012-06-25	1 year
Solar Electronics	LISN	9252-50-R-24-N	511213	2012-06-25	1 year
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100338	2011-09-24	1 year

Statement of Traceability: BACL Corp. attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.

5.7 Test Environmental Conditions

Temperature:	25°C
Relative Humidity:	49%
ATM Pressure:	101.9kPa

The testing was performed by Wei Sun on 2012-07-23 at 5 meter chamber #2.

5.8 Summary of Test Results

According to the recorded data in following table, the EUT complied with the FCC & IC standard's conducted emissions limits, with the margin reading of:

RKE:

Worst Case: ASK at 300 MHz (Mode 1)

Mode #1: Powered by AC/DC Adapter

Connection: AC/DC adapter connected to 120 V/60 Hz, AC			
Margin (dB)	**Frequency (MHz)**	**Conductor (Line/Neutral)**	**Range (MHz)**
-11.12	0.290669	Line	0.15-30

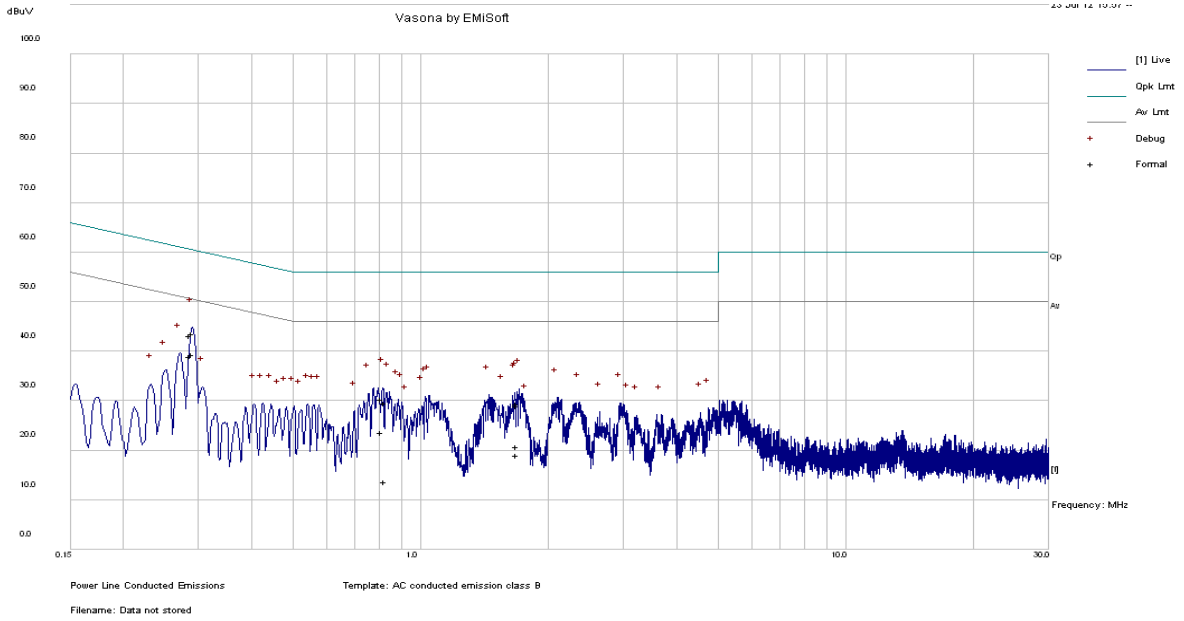
Mode #2: Using USB Connect to Laptop

Connection: AC/DC adapter connected to 120 V/60 Hz, AC			
Margin (dB)	**Frequency (MHz)**	**Conductor (Line/Neutral)**	**Range (MHz)**
-2.37	0.291072	Line	0.15-30

5.9 Conducted Emissions Test Plots and Data

Mode 1: With AC/DC Adapter

120 V, 60 Hz – Line



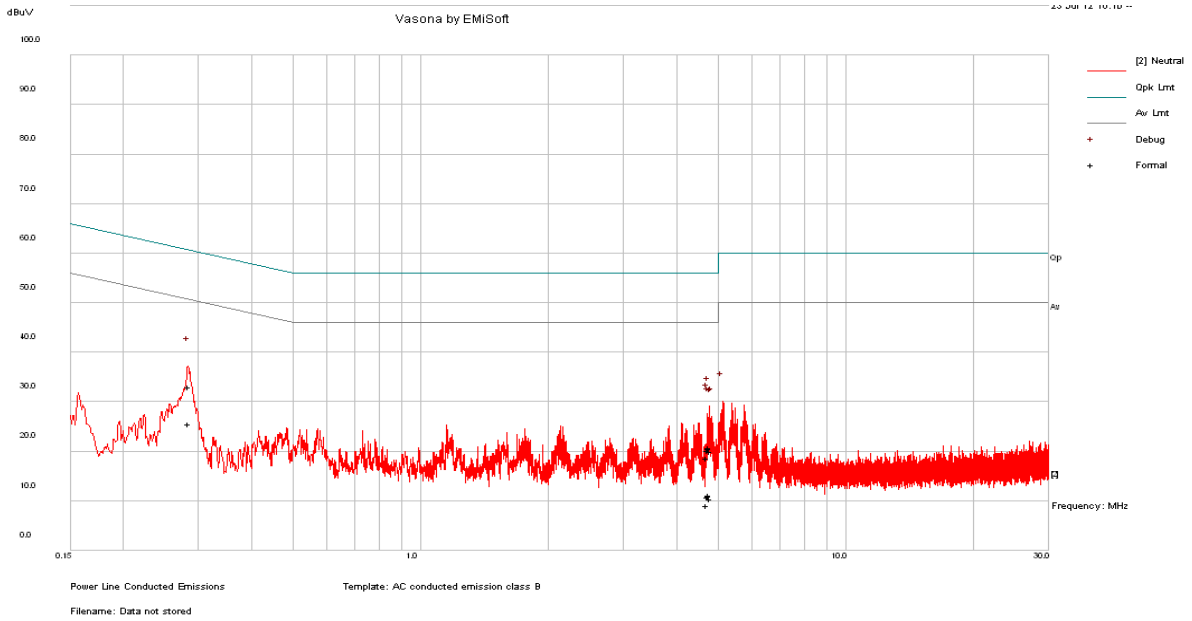
Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
0.290669	43.68	Line	60.51	-16.82
0.287638	43.19	Line	60.59	-17.40
0.812354	30.3	Line	56	-25.70
0.827179	29.67	Line	56	-26.33
1.688889	29.35	Line	56	-26.65
1.684624	29.1	Line	56	-26.90

Average Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
0.290669	39.38	Line	50.51	-11.12
0.287638	39.04	Line	50.59	-11.55
0.812354	23.66	Line	46	-22.34
1.684624	20.8	Line	46	-25.20
1.688889	19.11	Line	46	-26.89
0.827179	13.61	Line	46	-32.39

120 V, 60 Hz – Neutral



Quasi-Peak Measurements

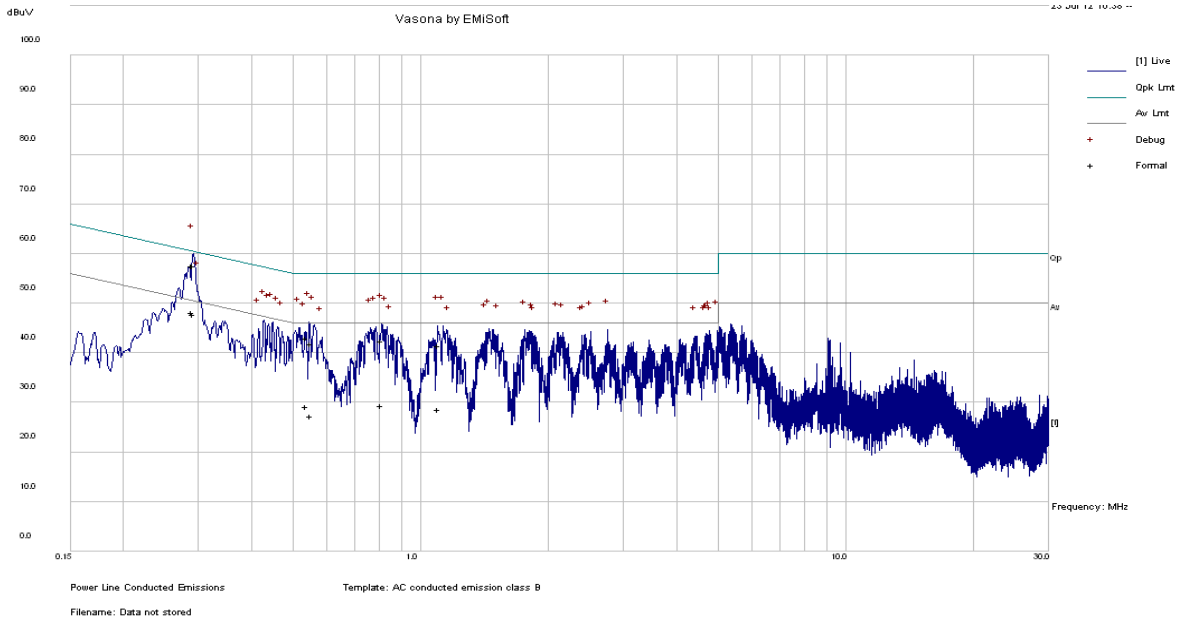
Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
0.286011	33.04	Neutral	60.64	-27.60
4.784147	20.75	Neutral	56	-35.25
4.792778	20.56	Neutral	56	-35.44
4.765673	20.25	Neutral	56	-35.75
4.825853	20.02	Neutral	56	-35.98
4.729862	18.64	Neutral	56	-37.36

Average Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
0.286011	25.58	Neutral	50.64	-25.06
4.784147	11.25	Neutral	46	-34.75
4.792778	11.07	Neutral	46	-34.93
4.765673	10.8	Neutral	46	-35.20
4.825853	10.39	Neutral	46	-35.61
4.729862	9.1	Neutral	46	-36.90

Mode 2: With Laptop

120 V, 60 Hz – Line



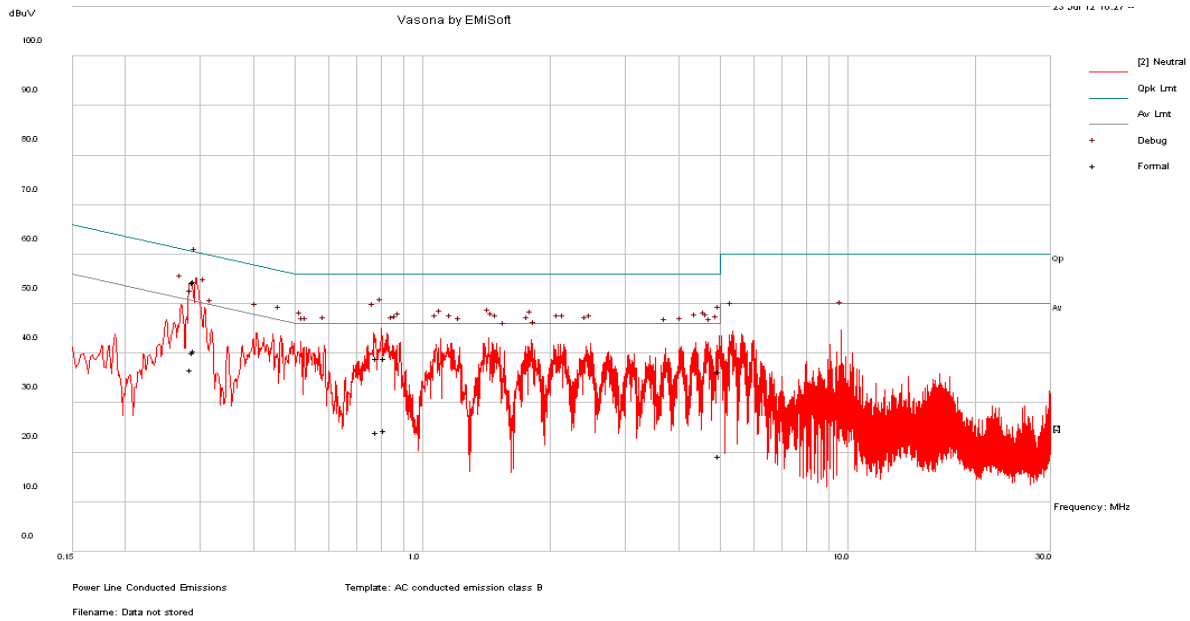
Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
0.291072	57.67	Line	60.49	-2.83
0.293004	57.53	Line	60.44	-2.91
0.540801	42.94	Line	56	-13.06
0.809235	42.51	Line	56	-13.49
0.553101	41.95	Line	56	-14.05
1.10658	41.44	Line	56	-14.56

Average Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
0.291072	48.13	Line	50.49	-2.37
0.293004	47.72	Line	50.44	-2.72
0.809235	29.5	Line	46	-16.50
0.540801	29.19	Line	46	-16.81
1.10658	28.69	Line	46	-17.31
0.553101	27.26	Line	46	-18.74

120 V, 60 Hz – Neutral



Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
0.290517	54.42	Neutral	60.51	-6.09
0.289662	54.3	Neutral	60.53	-6.23
0.286287	52.71	Neutral	60.63	-7.93
0.817368	39.02	Neutral	56	-16.98
0.782424	39	Neutral	56	-17.00
4.992419	36.37	Neutral	56	-19.63

Average Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
0.290517	40.62	Neutral	50.51	-9.89
0.289662	40.06	Neutral	50.53	-10.47
0.286287	36.75	Neutral	50.63	-13.88
0.817368	24.37	Neutral	46	-21.63
0.782424	24.11	Neutral	46	-21.89
4.992419	19.17	Neutral	46	-26.83

6 FCC §15.231 (b), §15.205, §15.209 & IC RSS-210 §A1.1.2, RSS-Gen – Radiated Spurious Emissions

6.1 Applicable Standard

As per FCC §15.35(d): Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz.

As per FCC §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 (micro volts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
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.

As Per FCC §15.205(a) except as show 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	960 – 1240	4. 5 – 5. 15
0.495 – 0.505	16.69475 – 16.69525	1300 – 1427	5. 35 – 5. 46
2.1735 – 2.1905	25.5 – 25.67	1435 – 1626.5	7.25 – 7.75
4.125 – 4.128	37.5 – 38.25	1645.5 – 1646.5	8.025 – 8.5
4.17725 – 4.17775	73 – 74.6	1660 – 1710	9.0 – 9.2
4.20725 – 4.20775	74.8 – 75.2	1718.8 – 1722.2	9.3 – 9.5
6.215 – 6.218	108 – 121.94	2200 – 2300	10.6 – 12.7
6.26775 – 6.26825	123 – 138	2310 – 2390	13.25 – 13.4
6.31175 – 6.31225	149.9 – 150.05	2483.5 – 2500	14.47 – 14.5
8.291 – 8.294	156.52475 – 156.52525	2690 – 2900	15.35 – 16.2
8.362 – 8.366	156.7 – 156.9	3260 – 3267	17.7 – 21.4
8.37625 – 8.38675	162.0125 –167.17	3.332 – 3.339	22.01 – 23.12
8.41425 – 8.41475	167.72 – 173.2	3 3458 – 3 358	23.6 – 24.0
12.29 – 12.293	240 – 285	3.600 – 4.400	31.2 – 31.8
12.51975 – 12.52025	322 – 335.4		36.43 – 36.5
12.57675 – 12.57725	399.9 – 410		Above 38.6
13.36 – 13.41	608 – 614		

(b) Except as provided in 15.205 paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in 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.

(c) Except as provided in paragraphs (d) and (e), regardless of the field strength limits specified elsewhere in this Subpart, the provisions of this Section apply to emissions from any intentional radiator.

As Per FCC 15.231 (b)

(b): In addition to the provisions of §15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	1,250 to 3,750**	125 to 375**
174-260	3,750	375
260-470	3,750 to 12,500**	375 to 1,250**
Above 470	12,500	1,250

According to RSS-210:

Category I licence-exempt equipment is required to comply with the provisions in RSS-Gen with respect to emissions falling within restricted frequency bands. These restricted frequency bands are listed in RSS-Gen.

RSS-210 §2.5 General Field Strength Limits

RSS-Gen includes the general field strength limits of unwanted emissions, where applicable, for transmitters and receivers operating in accordance with the provisions specified in this standard.

Unwanted emissions of transmitters and receivers are permitted to fall within the restricted bands listed in RSS-Gen, and including the TV bands, but fundamental emissions are prohibited in the restricted bands bands.

As Per IC RSS-210 A1.1

The frequency bands and field strength limits in tables A and B of this annex are only for the transmission of a control signal, such as that used with alarm systems, door openers, remote switches, etc. Radio control of toys or model aircraft, and continuous transmissions, such as voice or video, are not permitted except as provided in Section A1.1.5 below. Data may be sent with a control signal.

Table A: Permissible Field Strength Limits for Momentarily Operated Devices

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66-40.70	Dee Section A2.7	
70-130	1,250	125
130-174	1,250 to 3,750**	125 to 375**
174-260	3,750	375
260-470	3,750 to 12,500**	375 to 1,250**
Above 470	12,500	1,250

Note 1: Limits on the field strength of emissions, as shown in this table, are based on the average value of the measured emissions. As an alternative, compliance with the limits in this table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector.

Linear interpolation with frequency F in MHz:

For 130-174 MHz: FS (microvolts/m) = (56.82 x F)-6136
For 260-470 MHz: FS (microvolts/m) = (41.67 x F)-7083

Note 2: The frequency band 225-399.9 MHz is allocated for Government of Canada usage. There are different types of operations in different parts of this band of frequencies, including communications with aircraft and operations using high-power transmitters. Besides avoiding the restricted frequency bands listed in RSS-Gen, it is recommended that the entire 225-399.9 MHz band be avoided.

6.2 Test Setup

The radiated emissions tests were performed in the 5-meter Chamber, using the setup in accordance with ANSI C63.4-2009. The specification used was the FCC 15C and IC RSS-210 limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle when necessary.

6.3 Test Procedure

For the radiated emissions test, the EUT host, and all support equipment power cords was connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 meter, and the EUT is placed on a turntable, which is 0.8 meter above ground plane, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

The spectrum analyzer or receiver is set as:

Below 1000 MHz:

RBW = 100 kHz / VBW = 300 kHz / Sweep = Auto

Above 1000 MHz:

(1) Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto
(2) Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

6.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Antenna Factor (AF), the Cable Loss (CL), the Attenuator Factor (Atten) and subtracting the Amplifier Gain (Ga) to the indicated Amplitude (Ai) reading. The basic equation is as follows:

CA = Ai + AF + CL + Atten – Ga

For example, the Corrected Amplitude (CA) of 40.3 dBuV/m = indicated Amplitude reading (Ai) 32.5 dBuV + Antenna Factor (AF) 23.5dB + Cable Loss (CL) 3.7 dB + Attenuator (Atten) 10 dB - Amplifier Gain (Ga) 29.4 dB

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit. The equation for margin calculation is as follows:

Margin (dB) = Corrected Amplitude (dBuV/m) - Limit (dBuV/m)

6.5 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	MY44303352	2012-05-10	1 year
Sunol Science Corp	System Controller	SC99V	122303-1	N/R	-
Sunol Science Corp	Combination Antenna	JB3	A020106-2	2012-08-15	1 year
Hewlett Packard	Pre-amplifier	8447D	2944A10187	2012-03-08	1 year
A.H. Systems	Horn antenna	SAS-200/571	261	2012-01-18	1 year
Mini-Circuits	Pre Amplifier	ZVA-183-S	667400960	2012-05-08	1 year
Wisewave	Horn antenna	ARH-4223-02	10555-02	2010-06-14 [1]	3 years

Statement of Traceability: BACL attests that all calibrations have been performed per the A2LA requirements, traceable to NIST.

6.6 Test Environmental Conditions

Temperature:	24 °C
Relative Humidity:	45%
ATM Pressure:	101.77kPa

The testing was performed by Wei Sun on 2012-08-07 at 5 meter chamber 2.

Additional Channel 309.5075 MHz

Temperature:	24.3 °C
Relative Humidity:	43%
ATM Pressure:	101.7kPa

The testing was performed by Wei Sun on 2012-09-17 at 5 meter chamber 2.

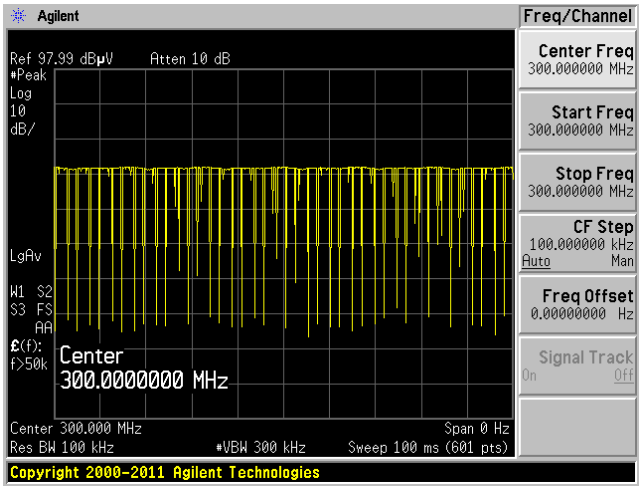
6.7 Radiated Emissions Test Result Data

Mode1: 300 MHz ASK

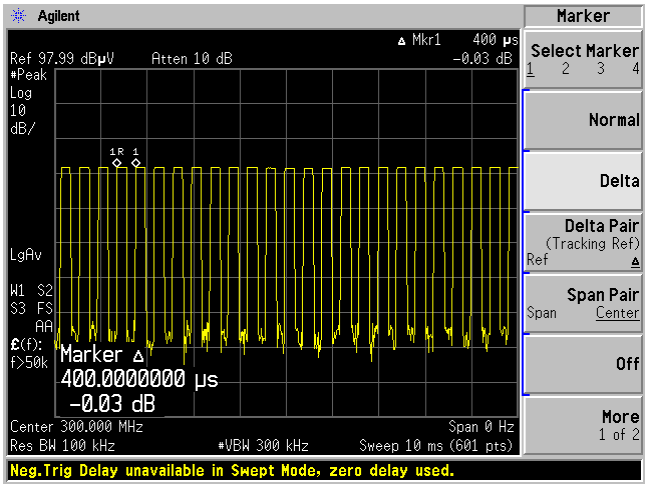
Freq. (MHz)	S.A. Reading (dBuV)	Detector (PK/AV) Note	Turntable Azimuth (Degree)	Ant. Height (cm)	Ant. Polar (V/H)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp. Gain (dB)	Duty Cycle Factor (dB)	Cord. Reading (dBuV/m)	FCC/IC	
											Limit (dBuV/m)	Margin (dB)
300	85.42	Peak/Fund	237	100	H	14.1	0.99	27.75	0	72.76	94.67	-21.91
300	85.42	Ave/Fund	237	100	H	14.1	0.99	27.75	5.67	67.09	74.67	-7.58
300	83.64	Peak/Fund	246	155	V	14.1	0.99	27.75	0	70.98	94.67	-23.69
300	83.64	Ave/Fund	246	155	V	14.1	0.99	27.75	5.67	65.31	74.67	-9.36
600	44.71	Peak/Harm	332	128	H	19.3	1.62	28.91	0	36.72	74.67	-37.95
600	44.71	Ave/Harm	332	128	H	19.3	1.62	28.91	5.67	31.05	54.67	-23.62
600	45.09	Peak/Harm	270	100	V	19.3	1.62	28.91	0	37.1	74.67	-37.57
600	45.09	Ave/Harm	270	100	V	19.3	1.62	28.91	5.67	31.43	54.67	-23.24
900	45.82	Peak/Harm	309	100	H	22.8	2.11	28.2	0	42.53	74.67	-32.14
900	45.82	Ave/Harm	309	100	H	22.8	2.11	28.2	5.67	36.86	54.67	-17.81
900	43.81	Peak/Harm	9	167	V	22.8	2.11	28.2	0	40.52	74.67	-34.15
900	43.81	Ave/Harm	9	167	V	22.8	2.11	28.2	5.67	34.85	54.67	-19.82
1594.46	52.92	Peak/Spur	0	100	V	25.22	2.46	27.61	0	52.99	74	-21.01
1594.46	51.13	Peak/Spur	192	100	H	25.22	2.46	27.61	0	51.2	74	-22.8
1594.46	30.79	Ave/Spur	0	100	V	25.22	2.46	27.61	0	30.86	54	-23.14
1594.46	29.42	Ave/Spur	192	100	H	25.22	2.46	27.61	0	29.49	54	-24.51
245	40.18	QP/Spur	71	100	V	12.4	11.33	25.2	0	38.71	46	-7.29
245	31.27	QP/Spur	297	100	H	12.4	11.33	25.2	0	29.8	46	-16.2
1330	50.61	Peak/Spur	330	100	V	25.56	2.23	27.36	0	51.04	74	-22.96
1330	49.22	Peak/Spur	49	100	H	25.56	2.23	27.36	0	49.65	74	-24.35
1330	28.35	Ave/Spur	330	100	V	25.56	2.23	27.36	0	28.78	54	-25.22
1330	28.67	Ave/Spur	49	100	H	25.56	2.23	27.36	0	29.1	54	-24.9

Duty Cycle factor was calculated by the following function and plots:

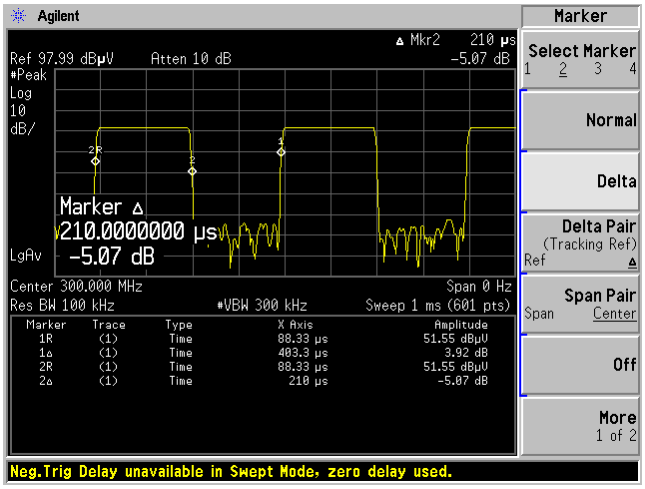
Duty Cycle factor = 20 * log (Ton/Tp) = 20 * log (210us/403.3us) = -5.67 dB



100 ms plots



10 ms Plots shows the Cycle time.



1ms plot shows detail Ton and Tp time.

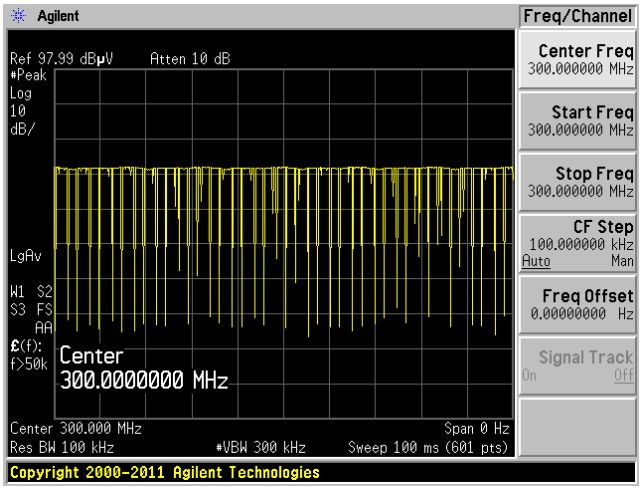
Ton = 210us
Tp = 403.3us

Mode2: 300 MHz FSK

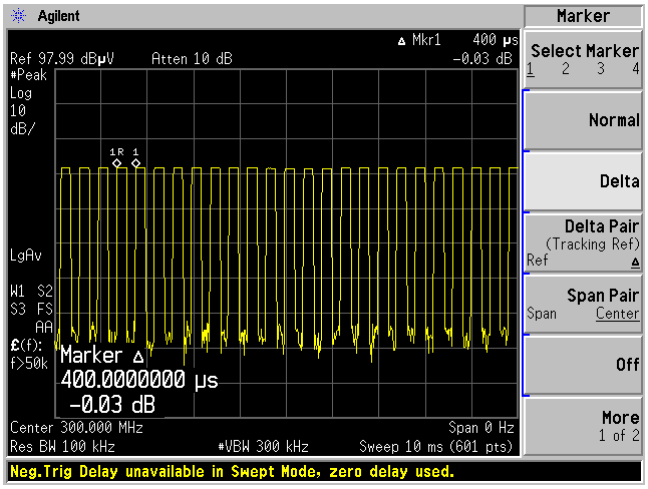
Freq. (MHz)	S.A. Reading (dBuV)	Detector (PK/AV) Note	Turntable Azimuth (Degree)	Ant. Height (cm)	Ant. Polar (V/H)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp. Gain (dB)	Duty Cycle Factor (dB)	Cord. Reading (dBuV/m)	FCC/IC	
											Limit (dBuV/m)	Margin (dB)
300	85.42	Peak/Fund	237	100	H	14.1	0.99	27.75	0	72.76	94.67	-21.91
300	85.42	Ave/Fund	237	100	H	14.1	0.99	27.75	5.67	67.09	74.67	-7.58
300	83.64	Peak/Fund	246	155	V	14.1	0.99	27.75	0	70.98	94.67	-23.69
300	83.64	Ave/Fund	246	155	V	14.1	0.99	27.75	5.67	65.31	74.67	-9.36
600	41.85	Peak/Harm	302	120	H	19.3	1.62	28.91	0	33.86	74.67	-40.81
600	41.85	Ave/Harm	302	120	H	19.3	1.62	28.91	5.67	28.19	54.67	-26.48
600	43.26	Peak/Harm	267	100	V	19.3	1.62	28.91	0	35.27	74.67	-39.4
600	43.26	Ave/Harm	267	100	V	19.3	1.62	28.91	5.67	29.6	54.67	-25.07
900	43.55	Peak/Harm	138	100	H	22.8	2.11	28.2	0	40.26	74.67	-34.41
900	43.55	Ave/Harm	138	100	H	22.8	2.11	28.2	5.67	34.59	54.67	-20.08
900	42.08	Peak/Harm	105	140	V	22.8	2.11	28.2	0	38.79	74.67	-35.88
900	42.08	Ave/Harm	105	140	V	22.8	2.11	28.2	5.67	33.12	54.67	-21.55
1594.46	52.45	Peak/Spur	0	100	V	25.22	2.46	27.61	0	52.52	74	-21.48
1594.46	50.59	Peak/Spur	195	100	H	25.22	2.46	27.61	0	50.66	74	-23.34
1594.46	30.82	Ave/Spur	0	100	V	25.22	2.46	27.61	0	30.89	54	-23.11
1594.46	29.16	Ave/Spur	195	100	H	25.22	2.46	27.61	0	29.23	54	-24.77
245	40.25	QP/Spur	71	100	V	12.4	11.33	25.2	0	38.78	46	-7.22
245	31.4	QP/Spur	297	100	H	12.4	11.33	25.2	0	29.93	46	-16.07
1330	50.85	Peak/Spur	337	100	V	25.56	2.23	27.36	0	51.28	74	-22.72
1330	49.22	Peak/Spur	55	100	H	25.56	2.23	27.36	0	49.65	74	-24.35
1330	28.38	Ave/Spur	337	100	V	25.56	2.23	27.36	0	28.81	54	-25.19
1330	28.94	Ave/Spur	55	100	H	25.56	2.23	27.36	0	29.37	54	-24.63

Duty Cycle factor was calculated by the following function and plots:

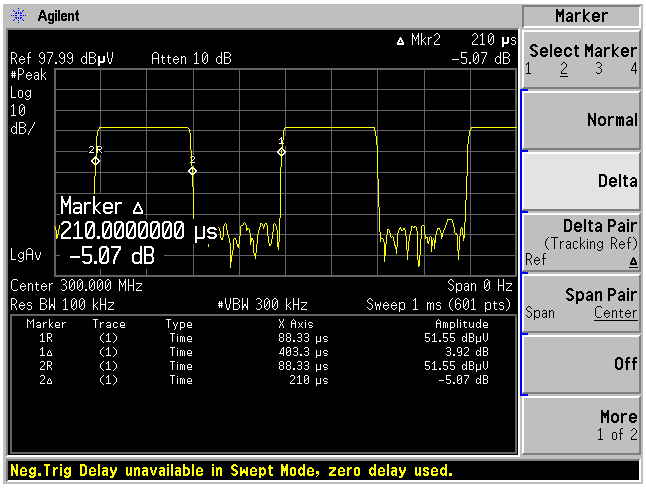
Duty Cycle factor = 20 * log (Ton/Tp) = 20 * log (210us/403.3us) = -5.67 dB



100 ms plots



10 ms Plots shows the Cycle time.



1ms plot shows detail Ton and Tp time.

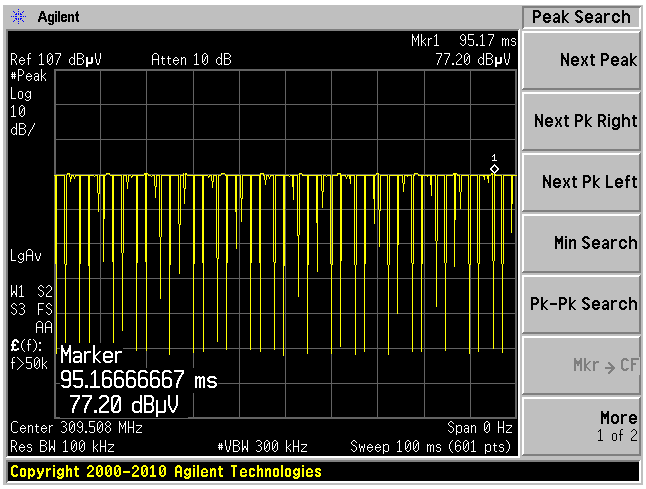
Ton = 210us
Tp = 403.3us

Mode 3: 309.5075 MHz ASK

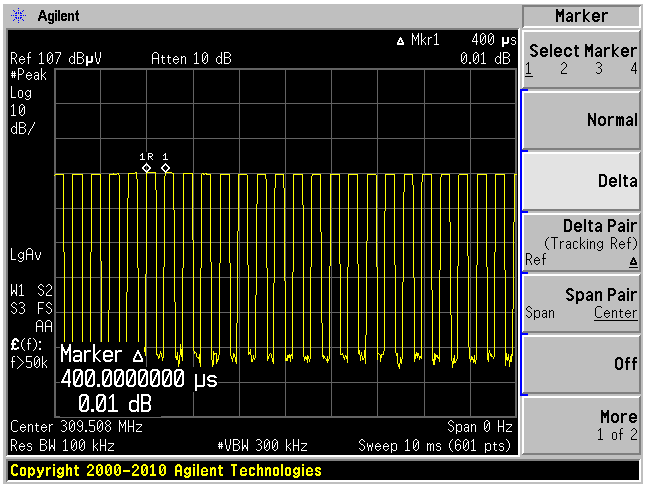
Freq. (MHz)	S.A. Reading (dBuV)	Detector (PK/AV) Note	Turntable Azimuth (Degree)	Ant. Height (cm)	Ant. Polar (V/H)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp. Gain (dB)	Duty Cycle Factor (dB)	Cord. Reading (dBuV/m)	FCC/IC	
											Limit (dBuV/m)	Margin (dB)
309.5075	86.41	Peak/Fund	91	100	H	14.3	1	27.78	0	73.93	96.5	22.57
309.5075	86.41	Ave/Fund	91	100	H	14.3	1	27.78	5.73	68.2	76.5	8.3
309.5075	82.44	Peak/Fund	246	155	V	14.3	1	27.78	0	69.96	96.5	26.54
309.5075	82.44	Ave/Fund	246	155	V	14.3	1	27.78	5.73	64.23	76.5	12.27
619.015	34.15	Peak/Harm	0	100	H	19.7	1.63	28.91	0	26.57	76.5	49.93
619.015	34.15	Ave/Harm	0	100	H	19.7	1.63	28.91	5.73	20.84	56.5	35.66
619.015	32.78	Peak/Harm	0	100	V	19.7	1.63	28.91	0	25.2	76.5	51.3
619.015	32.78	Ave/Harm	0	100	V	19.7	1.63	28.91	5.73	19.47	56.5	37.03
928.5225	39.74	Peak/Harm	240	100	H	23.1	2.09	28.2	0	36.73	76.5	39.77
928.5225	39.74	Ave/Harm	240	100	H	23.1	2.09	28.2	5.73	31	56.5	25.5
928.5225	36.58	Peak/Harm	0	100	V	23.1	2.09	28.2	0	33.57	76.5	42.93
928.5225	36.58	Ave/Harm	0	100	V	23.1	2.09	28.2	5.73	27.84	56.5	28.66
1594.46	51.19	Peak/Spur	0	100	V	25.22	2.46	27.61	0	51.26	74	22.74
1594.46	50.47	Peak/Spur	191	100	H	25.22	2.46	27.61	0	50.54	74	23.46
1594.46	31.21	Ave/Spur	0	100	V	25.22	2.46	27.61	0	31.28	54	22.72
1594.46	30	Ave/Spur	191	100	H	25.22	2.46	27.61	0	30.07	54	23.93
245	41.08	QP/Spur	75	100	V	12.4	11.33	25.2	0	39.61	46	6.39
245	32.1	QP/Spur	301	100	H	12.4	11.33	25.2	0	30.63	46	15.37
1330	49.27	Peak/Spur	0	100	V	25.56	2.23	27.36	0	49.7	74	24.3
1330	48.52	Peak/Spur	50	100	H	25.56	2.23	27.36	0	48.95	74	25.05
1330	27.94	Ave/Spur	0	100	V	25.56	2.23	27.36	0	28.37	54	25.63
1330	28.13	Ave/Spur	50	100	H	25.56	2.23	27.36	0	28.56	54	25.44

Duty Cycle factor was calculated by the following function and plots:

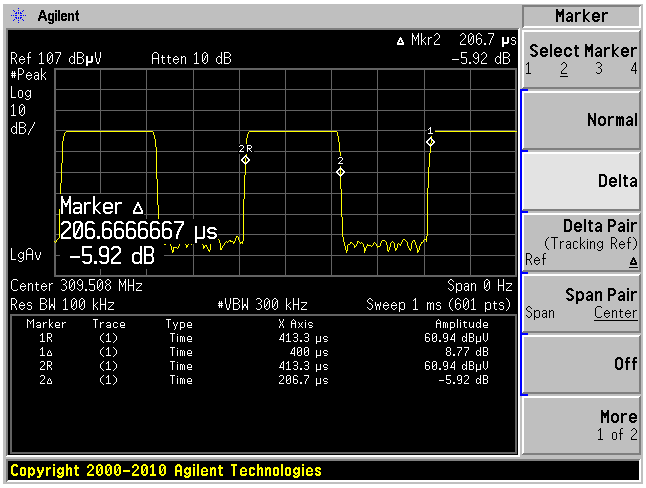
Duty Cycle factor = 20 * log (Ton/Tp) = 20 * log (206.7us/400us) = -5.73 dB



100 ms plots



10 ms Plots shows the Cycle time.



1ms plot shows detail Ton and Tp time.

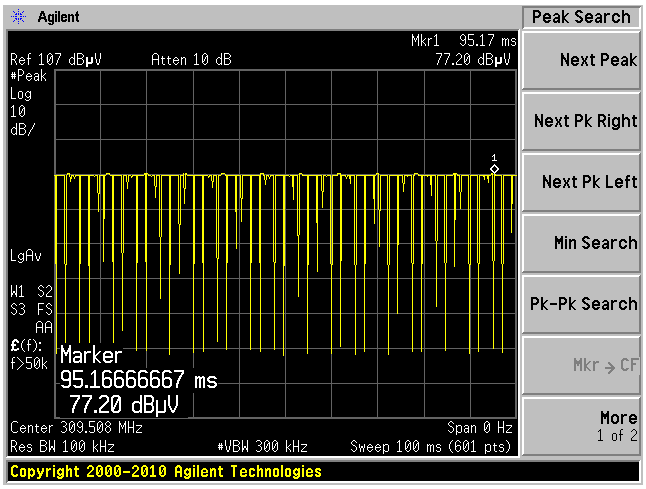
Ton = 206.7us
Tp = 400us

Mode 4: 309.5075 MHz FSK

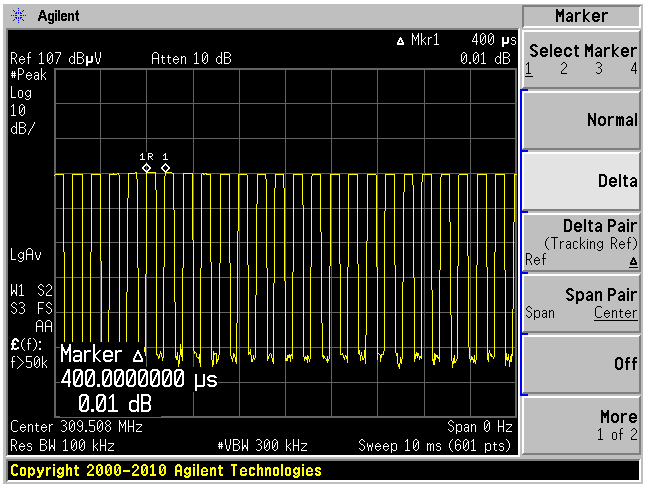
Freq. (MHz)	S.A. Reading (dBuV)	Detector (PK/AV) Note	Turntable Azimuth (Degree)	Ant. Height (cm)	Ant. Polar (V/H)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp. Gain (dB)	Duty Cycle Factor (dB)	Cord. Reading (dBuV/m)	FCC/IC	
											Limit (dBuV/m)	Margin (dB)
309.5075	85.23	Peak/Fund	95	100	H	14.3	1	27.78	0	72.75	96.5	23.75
309.5075	85.23	Ave/Fund	95	100	H	14.3	1	27.78	5.73	67.02	76.5	9.48
309.5075	82.21	Peak/Fund	246	155	V	14.3	1	27.78	0	69.73	96.5	26.77
309.5075	82.21	Ave/Fund	246	155	V	14.3	1	27.78	5.73	64	76.5	12.5
619.015	34.07	Peak/Harm	0	100	H	19.7	1.63	28.91	0	26.49	76.5	50.01
619.015	34.07	Ave/Harm	0	100	H	19.7	1.63	28.91	5.73	20.76	56.5	35.74
619.015	32.19	Peak/Harm	0	100	V	19.7	1.63	28.91	0	24.61	76.5	51.89
619.015	32.19	Ave/Harm	0	100	V	19.7	1.63	28.91	5.73	18.88	56.5	37.62
928.5225	40.13	Peak/Harm	245	100	H	23.1	2.09	28.2	0	37.12	76.5	39.38
928.5225	40.13	Ave/Harm	245	100	H	23.1	2.09	28.2	5.73	31.39	56.5	25.11
928.5225	36.12	Peak/Harm	0	100	V	23.1	2.09	28.2	0	33.11	76.5	43.39
928.5225	36.12	Ave/Harm	0	100	V	23.1	2.09	28.2	5.73	27.38	56.5	29.12
1595	50.27	Peak/Spur	0	100	V	25.22	2.46	27.61	0	50.34	74	23.66
1595	51.23	Peak/Spur	180	100	H	25.22	2.46	27.61	0	51.3	74	22.7
1595	30.59	Ave/Spur	0	100	V	25.22	2.46	27.61	0	30.66	54	23.34
1595	31.27	Ave/Spur	180	100	H	25.22	2.46	27.61	0	31.34	54	22.66
245	42.07	QP/Spur	75	100	V	12.4	11.33	25.2	0	40.6	46	5.4
245	34.13	QP/Spur	301	100	H	12.4	11.33	25.2	0	32.66	46	13.34
1330	48.16	Peak/Spur	0	100	V	25.56	2.23	27.36	0	48.59	74	25.41
1330	48.13	Peak/Spur	0	100	H	25.56	2.23	27.36	0	48.56	74	25.44
1330	27.65	Ave/Spur	0	100	V	25.56	2.23	27.36	0	28.08	54	25.92
1330	27.09	Ave/Spur	0	100	H	25.56	2.23	27.36	0	27.52	54	26.48

Duty Cycle factor was calculated by the following function and plots:

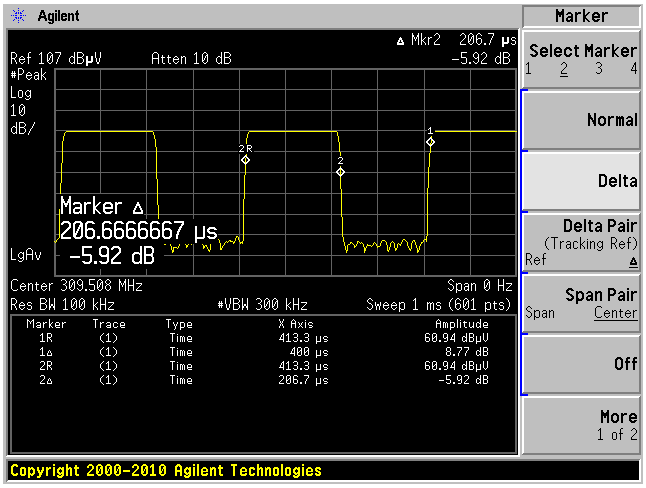
Duty Cycle factor = 20 * log (Ton/Tp) = 20 * log (206.7us/400us) = -5.73 dB



100 ms plots



10 ms Plots shows the Cycle time.



1ms plot shows detail Ton and Tp time.

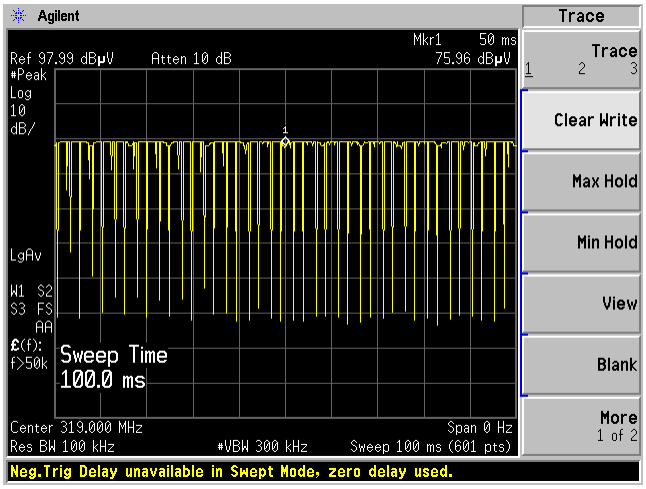
Ton = 206.7us
Tp = 400us

Mode 5: 319 MHz ASK

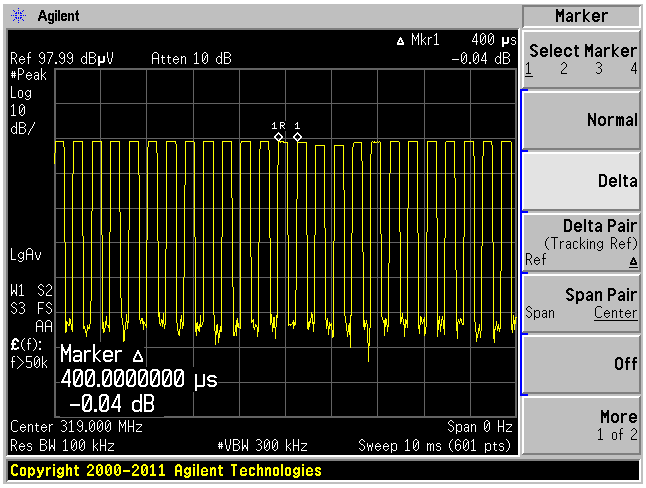
Freq. (MHz)	S.A. Reading (dBuV)	Detector (PK/AV) Note	Turntable Azimuth (Degree)	Ant. Height (cm)	Ant. Polar (V/H)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp. Gain (dB)	Duty Cycle Factor (dB)	Cord. Reading (dBuV/m)	FCC/IC	
											Limit (dBuV/m)	Margin (dB)
319	93.37	Peak/Fund	239	100	H	14.5	1.02	27.8	0	81.09	95.86	-14.77
319	93.37	Ave/Fund	239	100	H	14.5	1.02	27.8	5.67	75.42	75.86	-0.44
319	86.52	Peak/Fund	242	134	V	14.5	1.02	27.8	0	74.24	95.86	-21.62
319	86.52	Ave/Fund	242	134	V	14.5	1.02	27.8	5.67	68.57	75.86	-7.29
638	41.38	Peak/Harm	236	100	H	20.1	1.64	28.95	0	34.17	75.86	-41.69
638	41.38	Ave/Harm	236	100	H	20.1	1.64	28.95	5.67	28.5	55.86	-27.36
638	25.2	Peak/Harm	0	100	V	20.1	1.64	28.95	0	17.99	75.86	-57.87
638	25.2	Ave/Harm	0	100	V	20.1	1.64	28.95	5.67	12.32	55.86	-43.54
957	31.29	Peak/Harm	344	100	H	23.4	2.18	28.04	0	28.83	75.86	-47.03
957	31.29	Ave/Harm	344	100	H	23.4	2.18	28.04	5.67	23.16	55.86	-32.7
957	30.94	Peak/Harm	0	100	V	23.4	2.18	28.04	0	28.48	75.86	-47.38
957	30.94	Ave/Harm	0	100	V	23.4	2.18	28.04	5.67	22.81	55.86	-33.05
1594.46	52.23	Peak/Spur	0	100	V	25.22	2.46	27.61	0	52.3	74	-21.7
1594.46	51.82	Peak/Spur	193	100	H	25.22	2.46	27.61	0	51.89	74	-22.11
1594.46	30.66	Ave/Spur	0	100	V	25.22	2.46	27.61	0	30.73	54	-23.27
1594.46	30.03	Ave/Spur	193	100	H	25.22	2.46	27.61	0	30.1	54	-23.9
245	40.35	QP/Spur	71	100	V	12.4	11.33	25.2	0	38.88	40	-1.12
245	31.49	QP/Spur	297	100	H	12.4	11.33	25.2	0	30.02	40	-9.98
1330	50.61	Peak/Spur	334	100	V	25.56	2.23	27.36	0	51.04	74	-22.96
1330	48.91	Peak/Spur	50	100	H	25.56	2.23	27.36	0	49.34	74	-24.66
1330	28.1	Ave/Spur	334	100	V	25.56	2.23	27.36	0	28.53	54	-25.47
1330	28.16	Ave/Spur	50	100	H	25.56	2.23	27.36	0	28.59	54	-25.41

Duty Cycle factor was calculated by the following function and plots:

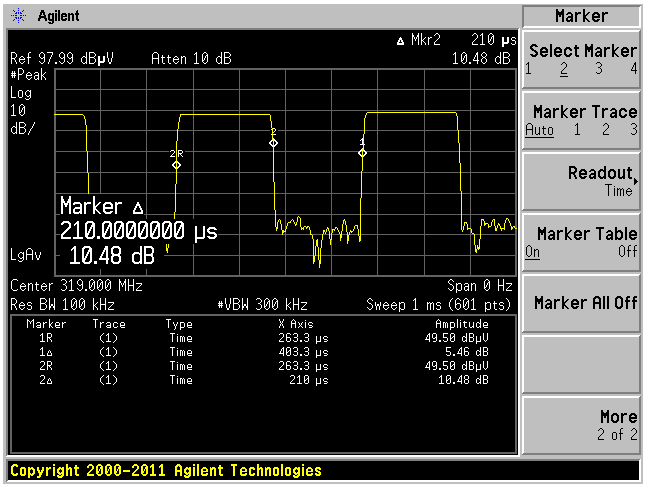
Duty Cycle factor = 20 * log (Ton/Tp) = 20 * log (210us/403.3us) = -5.67 dB



100 ms plots



10 ms Plots shows the Cycle time.



1ms plot shows detail Ton and Tp time.

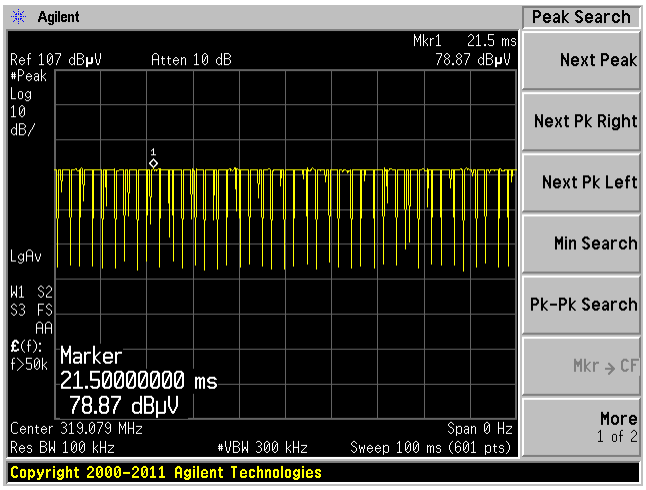
Ton = 210us
Tp = 403.3us

Mode 6: 319 MHz FSK

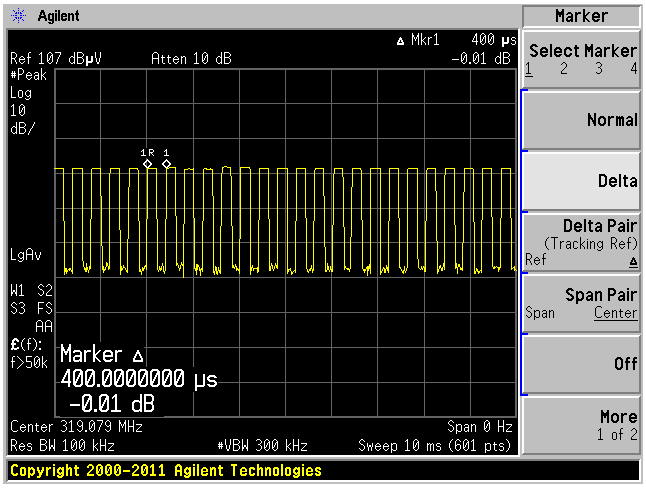
Freq. (MHz)	S.A. Reading (dBuV)	Detector (PK/AV) Note	Turntable Azimuth (Degree)	Ant. Height (cm)	Ant. Polar (V/H)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp. Gain (dB)	Duty Cycle Factor (dB)	Cord. Reading (dBuV/m)	FCC/IC	
											Limit (dBuV/m)	Margin (dB)
319	93.15	Peak/Fund	223	100	H	14.5	1.02	27.8	0	80.87	95.86	-14.99
319	93.15	Ave/Fund	223	100	H	14.5	1.02	27.8	5.67	75.2	75.86	-0.66
319	86.63	Peak/Fund	225	129	V	14.5	1.02	27.8	0	74.35	95.86	-21.51
319	86.63	Ave/Fund	225	129	V	14.5	1.02	27.8	5.67	68.68	75.86	-7.18
638	38.83	Peak/Harm	232	100	H	20.1	1.64	28.95	0	31.62	75.86	-44.24
638	38.83	Ave/Harm	232	100	H	20.1	1.64	28.95	5.67	25.95	55.86	-29.91
638	24.8	Peak/Harm	0	100	V	20.1	1.64	28.95	0	17.59	75.86	-58.27
638	24.8	Ave/Harm	0	100	V	20.1	1.64	28.95	5.67	11.92	55.86	-43.94
957	31.56	Peak/Harm	338	100	H	23.4	2.18	28.04	0	29.1	75.86	-46.76
957	31.56	Ave/Harm	338	100	H	23.4	2.18	28.04	5.67	23.43	55.86	-32.43
957	30.02	Peak/Harm	0	100	V	23.4	2.18	28.04	0	27.56	75.86	-48.3
957	30.02	Ave/Harm	0	100	V	23.4	2.18	28.04	5.67	21.89	55.86	-33.97
1594.46	52.36	Peak/Spur	0	100	V	25.22	2.46	27.61	0	52.43	74	-21.57
1594.46	51.05	Peak/Spur	198	100	H	25.22	2.46	27.61	0	51.12	74	-22.88
1594.46	31.08	Ave/Spur	0	100	V	25.22	2.46	27.61	0	31.15	54	-22.85
1594.46	30.24	Ave/Spur	198	100	H	25.22	2.46	27.61	0	30.31	54	-23.69
245	40.03	QP/Spur	71	100	V	12.4	11.33	25.2	0	38.56	46	-7.44
245	31.23	QP/Spur	297	100	H	12.4	11.33	25.2	0	29.76	46	-16.24
1330	50.74	Peak/Spur	333	100	V	25.56	2.23	27.36	0	51.17	74	-22.83
1330	49.25	Peak/Spur	51	100	H	25.56	2.23	27.36	0	49.68	74	-24.32
1330	28.38	Ave/Spur	333	100	V	25.56	2.23	27.36	0	28.81	54	-25.19
1330	28.5	Ave/Spur	51	100	H	25.56	2.23	27.36	0	28.93	54	-25.07

Duty Cycle factor was calculated by the following function and plots:

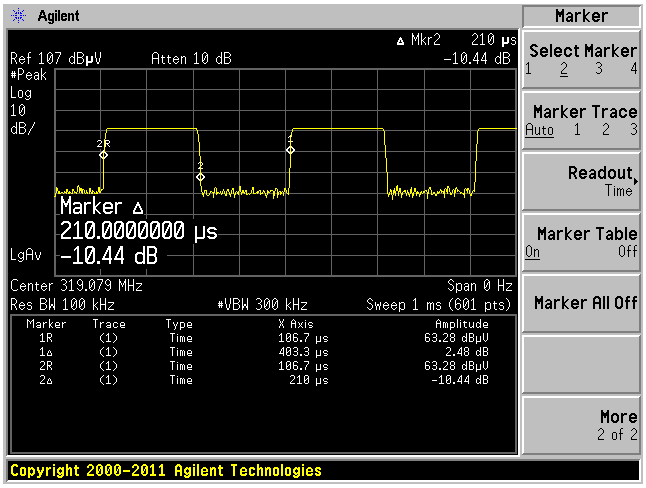
Duty Cycle factor = 20 * log (Ton/Tp) = 20 * log (210us/403.3us) = -5.67 dB



100 ms plots



10 ms Plots shows the Cycle time.



1ms plot shows detail Ton and Tp time.

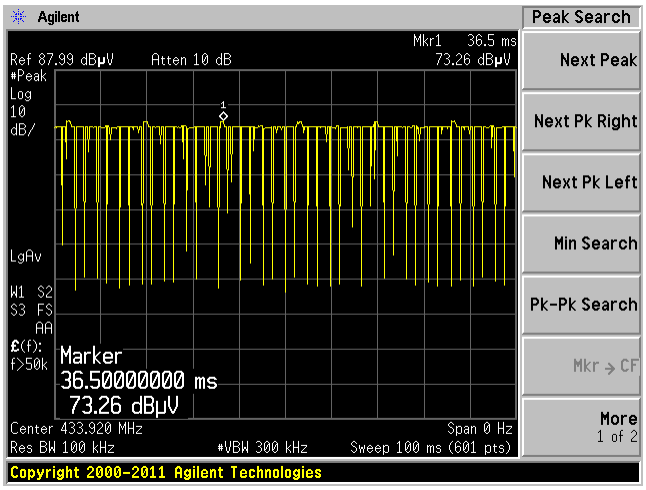
Ton = 210us
Tp = 403.3us

Mode 7: 433.92 MHz ASK

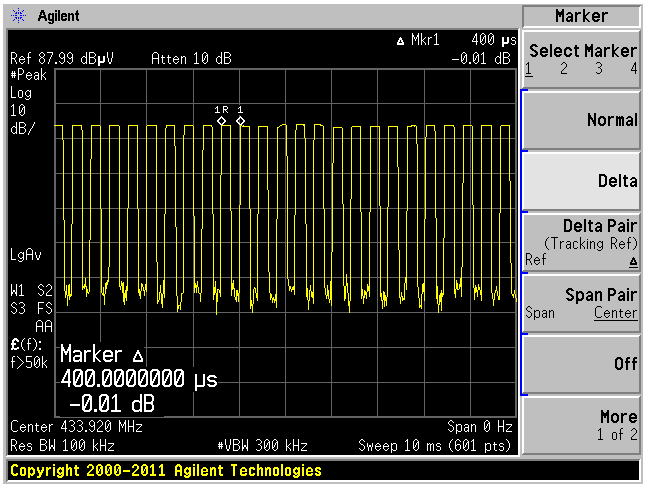
Freq. (MHz)	S.A. Reading (dBuV)	Detector (PK/AV) Note	Turntable Azimuth (Degree)	Ant. Height (cm)	Ant. Polar (V/H)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp. Gain (dB)	Duty Cycle Factor (dB)	Cord. Reading (dBuV/m)	FCC/IC	
											Limit (dBuV/m)	Margin (dB)
433.92	69.96	Peak/Fund	214	100	H	17.1	1.28	28.38	0	59.96	100.83	-40.87
433.92	69.96	Ave/Fund	214	100	H	17.1	1.28	28.38	5.67	54.29	80.83	-26.54
433.92	65.7	Peak/Fund	267	124	V	17.1	1.28	28.38	0	55.7	100.83	-45.13
433.92	65.7	Ave/Fund	267	124	V	17.1	1.28	28.38	5.67	50.03	80.83	-30.8
867.84	41.5	Peak/Harm	209	100	H	22.8	2.11	28.2	0	38.21	80.83	-42.62
867.84	41.5	Ave/Harm	209	100	H	22.8	2.11	28.2	5.67	32.54	60.83	-28.29
867.84	40.81	Peak/Harm	317	112	V	22.8	2.11	28.2	0	37.52	80.83	-43.31
867.84	40.81	Ave/Harm	317	112	V	22.8	2.11	28.2	5.67	31.85	60.83	-28.98
1301.76	28.61	Peak/Harm	0	100	H	25.56	2.23	27.39	0	29.01	74	-44.99
1301.76	28.61	Ave/Harm	0	100	H	25.56	2.23	27.39	5.67	23.34	54	-30.66
1301.76	28.51	Peak/Harm	0	100	V	25.56	2.23	27.39	0	28.91	74	-45.09
1301.76	28.51	Ave/Harm	0	100	V	25.56	2.23	27.39	5.67	23.24	54	-30.76
1594.46	52.3	Peak/Spur	0	100	V	25.22	2.46	27.61	0	52.37	74	-21.63
1594.46	52.26	Peak/Spur	194	100	H	25.22	2.46	27.61	0	52.33	74	-21.67
1594.46	30.95	Ave/Spur	0	100	V	25.22	2.46	27.61	0	31.02	54	-22.98
1594.46	30.49	Ave/Spur	194	100	H	25.22	2.46	27.61	0	30.56	54	-23.44
245	40.31	QP/Spur	71	100	V	12.4	11.33	25.2	0	38.84	46	-7.16
245	31.46	QP/Spur	297	100	H	12.4	11.33	25.2	0	29.99	46	-16.01
1330	50.7	Peak/Spur	334	100	V	25.56	2.23	27.36	0	51.13	74	-22.87
1330	49.05	Peak/Spur	52	100	H	25.56	2.23	27.36	0	49.48	74	-24.52
1330	28.23	Ave/Spur	334	100	V	25.56	2.23	27.36	0	28.66	54	-25.34
1330	28.79	Ave/Spur	52	100	H	25.56	2.23	27.36	0	29.22	54	-24.78

Duty Cycle factor was calculated by the following function and plots:

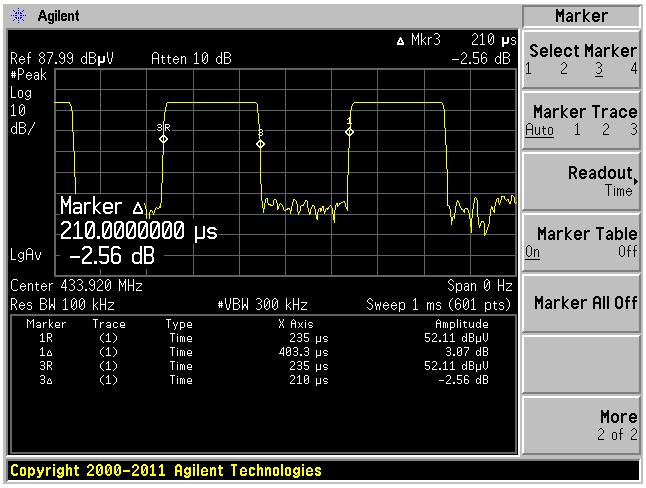
Duty Cycle factor = 20 * log (Ton/Tp) = 20 * log (210us/403.3us) = -5.67 dB



100 ms plots



10 ms Plots shows the Cycle time.



1ms plot shows detail Ton and Tp time.

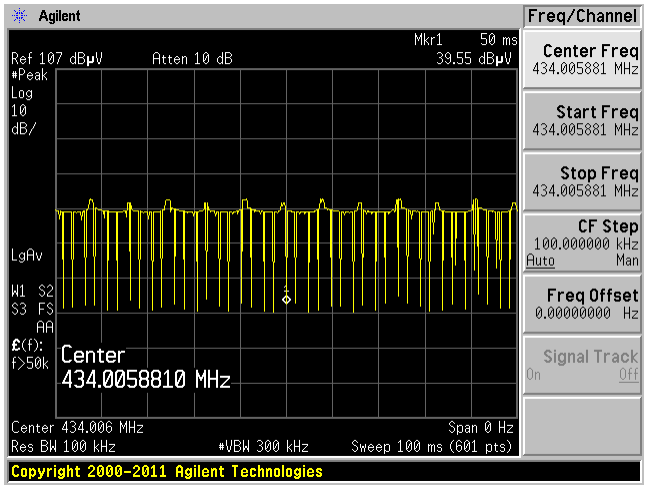
Ton = 210us
Tp = 403.3us

Mode 8: 433.92 MHz FSK

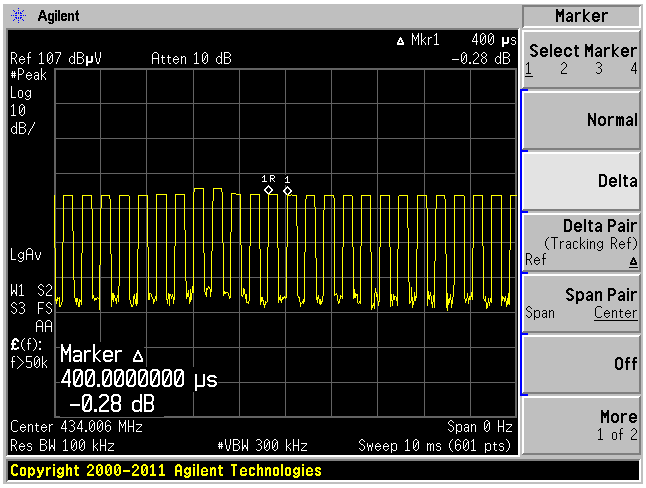
Freq. (MHz)	S.A. Reading (dBuV)	Detector (PK/AV) Note	Turntable Azimuth (Degree)	Ant. Height (cm)	Ant. Polar (V/H)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp. Gain (dB)	Duty Cycle Factor (dB)	Cord. Reading (dBuV/m)	FCC/IC	
											Limit (dBuV/m)	Margin (dB)
433.92	70.25	Peak/Fund	236	100	H	17.1	1.28	28.38	0	60.25	100.83	-40.58
433.92	70.25	Ave/Fund	236	100	H	17.1	1.28	28.38	5.67	54.58	80.83	-26.25
433.92	65.69	Peak/Fund	254	123	V	17.1	1.28	28.38	0	55.69	100.83	-45.14
433.92	65.69	Ave/Fund	254	123	V	17.1	1.28	28.38	5.67	50.02	80.83	-30.81
867.84	40.21	Peak/Harm	100	100	H	22.8	2.11	28.2	0	36.92	80.83	-43.91
867.84	40.21	Ave/Harm	100	100	H	22.8	2.11	28.2	5.67	31.25	60.83	-29.58
867.84	39.81	Peak/Harm	313	112	V	22.8	2.11	28.2	0	36.52	80.83	-44.31
867.84	39.81	Ave/Harm	313	112	V	22.8	2.11	28.2	5.67	30.85	60.83	-29.98
1301.76	28.17	Peak/Harm	0	100	H	25.56	2.23	27.39	0	28.57	74	-45.43
1301.76	28.17	Ave/Harm	0	100	H	25.56	2.23	27.39	5.67	22.9	54	-31.1
1301.76	28.21	Peak/Harm	0	100	V	25.56	2.23	27.39	0	28.61	74	-45.39
1301.76	28.21	Ave/Harm	0	100	V	25.56	2.23	27.39	5.67	22.94	54	-31.06
1594.46	52.57	Peak/Spur	358	100	V	25.22	2.46	27.61	0	52.64	74	-21.36
1594.46	52.38	Peak/Spur	194	100	H	25.22	2.46	27.61	0	52.45	74	-21.55
1594.46	31.15	Ave/Spur	358	100	V	25.22	2.46	27.61	0	31.22	54	-22.78
1594.46	30.54	Ave/Spur	194	100	H	25.22	2.46	27.61	0	30.61	54	-23.39
245	40.15	QP/Spur	71	100	V	12.4	11.33	25.2	0	38.68	46	-7.32
245	31.09	QP/Spur	297	100	H	12.4	11.33	25.2	0	29.62	46	-16.38
1330	50.85	Peak/Spur	337	100	V	25.56	2.23	27.36	0	51.28	74	-22.72
1330	49.36	Peak/Spur	51	100	H	25.56	2.23	27.36	0	49.79	74	-24.21
1330	28.5	Ave/Spur	337	100	V	25.56	2.23	27.36	0	28.93	54	-25.07
1330	28.61	Ave/Spur	51	100	H	25.56	2.23	27.36	0	29.04	54	-24.96

Duty Cycle factor was calculated by the following function and plots:

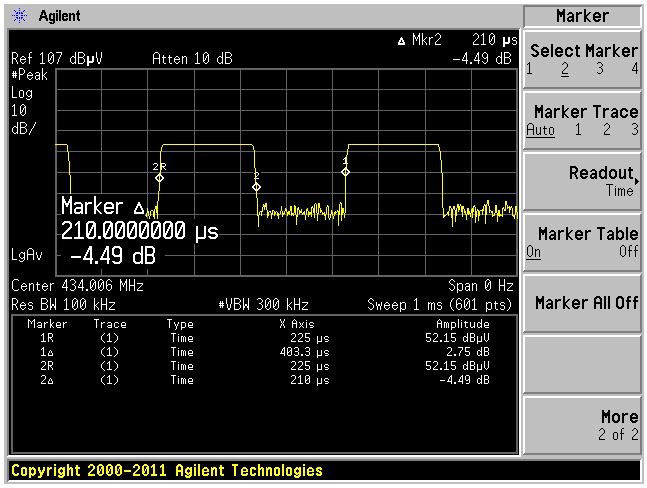
Duty Cycle factor = 20 * log (Ton/Tp) = 20 * log (210us/403.3us) = -5.67 dB



100 ms plots



10 ms Plots shows the Cycle time.



1ms plot shows detail Ton and Tp time.

Ton = 210us
Tp = 403.3us

7 FCC §15.231(a) & IC RSS-210 §A1.1.1 – Deactivate Time

7.1 Applicable Standard Requirement

FCC Part 15.231

(a) The provisions of this section are restricted to periodic operation within the band 40.66–40.70 MHz and above 70 MHz. Except as shown in paragraph (e) of this section, the intentional radiator is restricted to the transmission of a control signal such as those used with alarm systems, door openers, remote switches, etc. Continuous transmissions, voice, video and the radio control of toys are not permitted. Data is permitted to be sent with a control signal. The following conditions shall be met to comply with the provisions for this periodic operation:

(1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.
(2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.
(3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.
(4) Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition
(5) Transmission of set-up information for security systems may exceed the transmission duration limits in paragraphs (a)(1) and (a)(2) of this section, provided such transmissions are under the control of a professional installer and do not exceed ten seconds after a manually operated switch is released or a transmitter is activated automatically. Such set-up information may include data.

RSS-210 A1.1.1 Types of Momentary Signals

The following conditions shall be met to comply with the provisions for momentary operation:

1. A manually operated transmitter shall be equipped with a push-to-operate switch and be under manual control at all transmission times. When released, the transmitter shall cease transmission (holdover time of up to 5 seconds is permitted).
2. A transmitter activated automatically shall cease transmission within 5 seconds after activation (i.e. maximum 5 seconds of operation).
3. Periodic transmissions at regular predetermined intervals are not permitted, except as provided in Section A.1.1.5. However, polling or supervision transmissions to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmission does not exceed 2 seconds per hour for each transmitter.
4. Intentional radiators employed for radio control purposes during emergencies involving fire, security of goods (e.g. burglar alarms), and safety-of-life, when activated to signal an alarm, may operate during the interval of the alarm condition.

7.2 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	MY44303352	2012-05-10	1 year
Com-Power	Dipole Antenna	AD-100	2229	2012-07-23	1 year

Statement of Traceability: BACL attests that all calibrations have been performed per the A2LA requirements, traceable to NIST.

7.3 Test Environmental Conditions

Temperature:	24 °C
Relative Humidity:	47%
ATM Pressure:	101.94kPa

The testing was performed by Wei Sun on 2012-08-10 at RF Site.

Additional Channel 309.5075MHz

Temperature:	24.3 °C
Relative Humidity:	43%
ATM Pressure:	101.7kPa

The testing was performed by Wei Sun on 2012-09-17 at RF Site.

7.4 Test Results

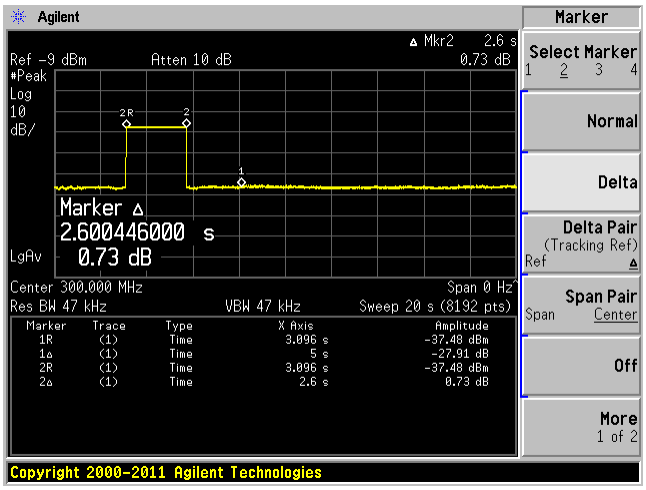
Pass; please refer to the following table and plot:

Periodic Operation Time

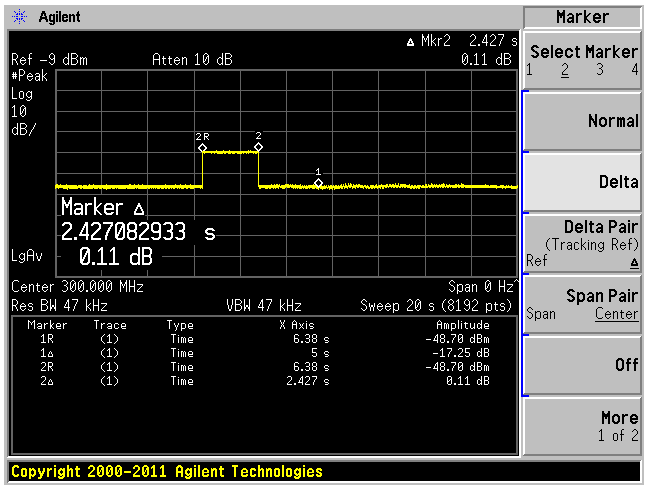
Frequency (MHz)	Modulation Mode	FCC/IC Result		
		Transition Time (s)	Limit (s)	Result
300	ASK Mode 1	< 5	5	Compliance
300	FSK Mode 2	< 5	5	Compliance
309.5075	ASK Mode 3	< 5	5	Compliance
309.5075	FSK Mode 4	< 5	5	Compliance
319	ASK Mode 5	< 5	5	Compliance
319	FSK Mode 6	< 5	5	Compliance
433.92	ASK Mode 7	< 5	5	Compliance
433.92	FSK Mode 8	< 5	5	Compliance

EUT is a manually operate transmitter which fully compliance with section a (1)

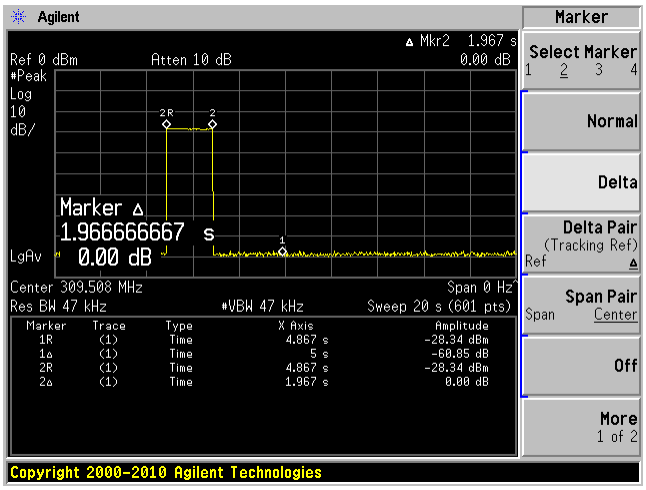
300 MHz Mode 1 ASK



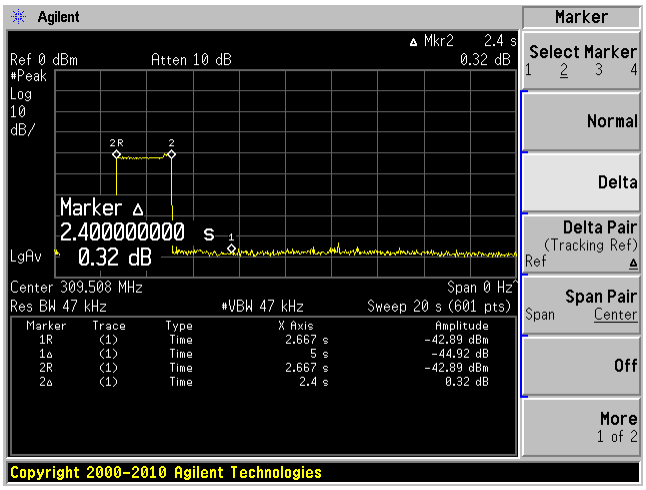
300 MHz Mode 2 FSK



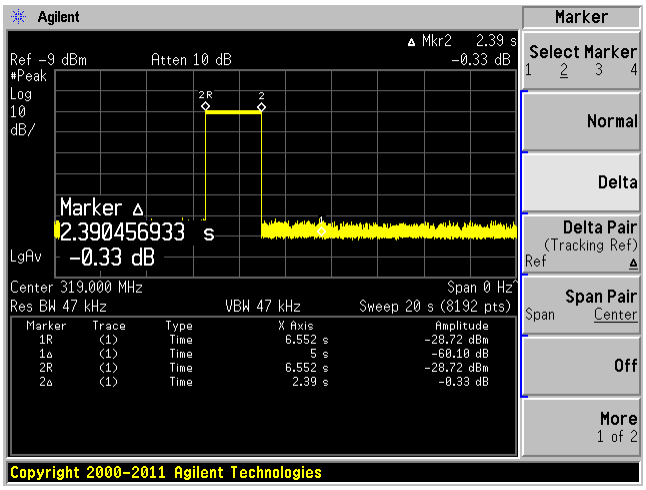
309.5075 MHz Mode 3 ASK



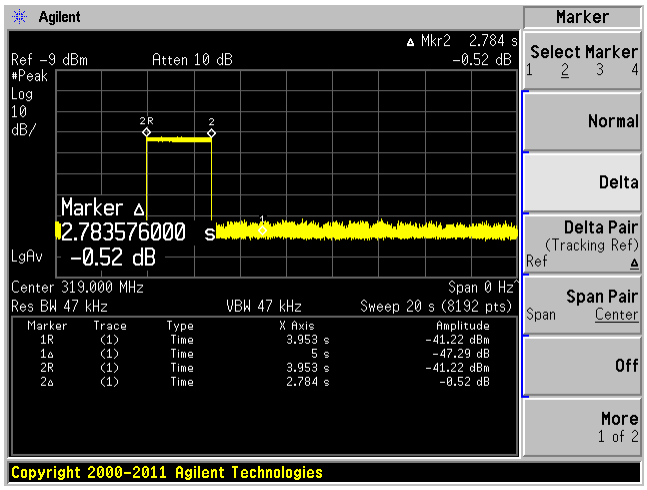
309.5075 MHz Mode 4 FSK



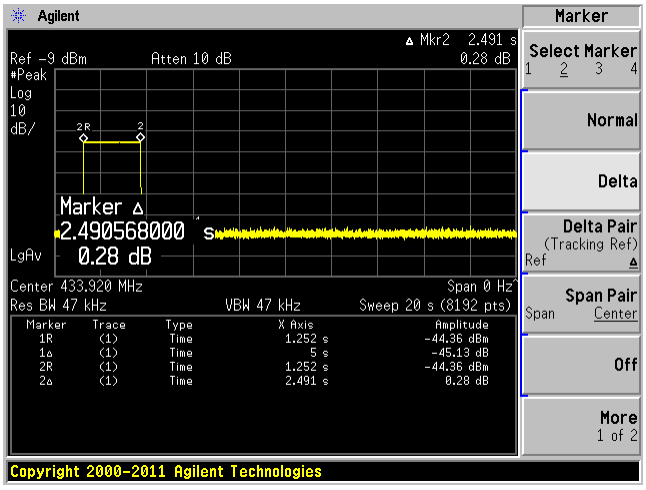
319 MHz Mode 5 ASK



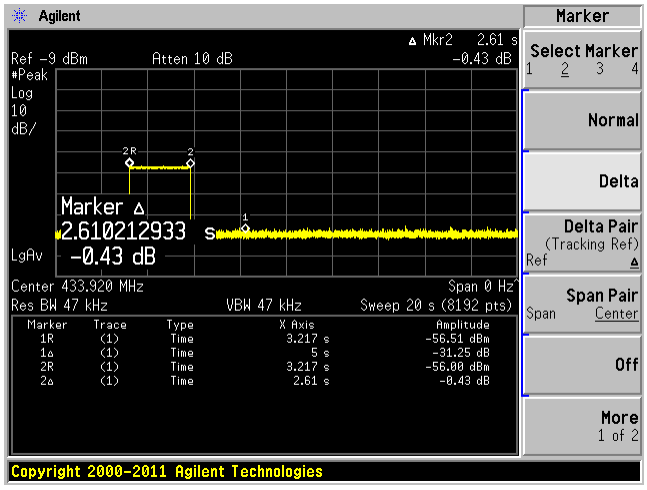
319 MHz Mode 6 FSK



433.92 MHz Mode 7 ASK



433.92 MHz Mode 8 FSK



8 FCC §15.231(c) & IC RSS-210 §A1.1.3 – Emissions Bandwidth

8.1 Applicable Standard Requirement

FCC §15.231(c)

(c) The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

RSS-210 A1.1.3

For the purpose of Section A1.1, the 99% bandwidth shall be no wider than 0.25% of the centre frequency for devices operating between 70 MHz and 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the centre frequency.

8.2 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	MY44303352	2012-05-10	1 year
Com-Power	Dipole Antenna	AD-100	2229	2012-07-23	1 year

Statement of Traceability: BACL attests that all calibrations have been performed per the A2LA requirements, traceable to NIST.

8.3 Test Environmental Conditions

Temperature:	24 °C
Relative Humidity:	47%
ATM Pressure:	101.94kPa

The testing was performed by Wei Sun on 2012-08-10 at RF Site.

Additional Channel 309.5075 MHz

Temperature:	24.3 °C
Relative Humidity:	43%
ATM Pressure:	101.7kPa

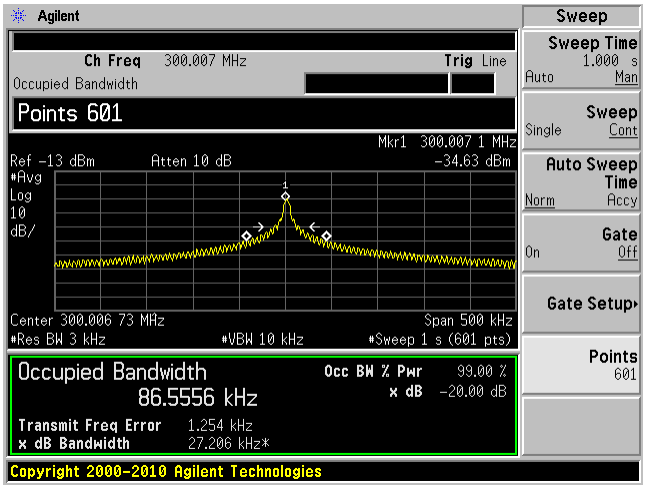
The testing was performed by Wei Sun on 2012-09-17 at RF Site.

8.4 Test Results

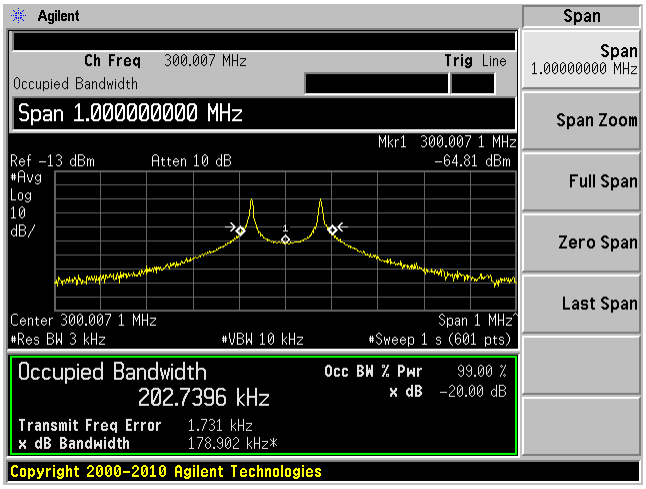
300 MHz FCC/IC Limit = Fundamental Frequency X 0.25% = 300 MHz ×0.25%= 750 kHz
309.5075 MHz FCC/IC Limit = Fundamental Frequency X 0.25% = 309.5075MHz ×0.25%= 774 kHz
319 MHz FCC/IC Limit = Fundamental Frequency X 0.25% = 319 MHz×0.25%= 797.5 kHz
433.92 MHz FCC/IC Limit = Fundamental Frequency X 0.25% = 433.92 MHz×0.25%= 1084.8 kHz

Frequency	Modulation Mode	FCC/IC Result		
		20 dB Bandwidth (kHz)	Limit (kHz)	Result
300	ASK Mode 1	27.206	750	Compliance
300	FSK Mode 2	178.902	750	Compliance
309.5075	ASK Mode 3	27.315	774	Compliance
309.5075	FSK Mode 4	179.606	774	Compliance
319	ASK Mode 5	27.512	797.5	Compliance
319	FSK Mode 6	179.507	797.5	Compliance
433.92	ASK Mode 7	27.383	1084.8	Compliance
433.92	FSK Mode 8	178.724	1084.8	Compliance

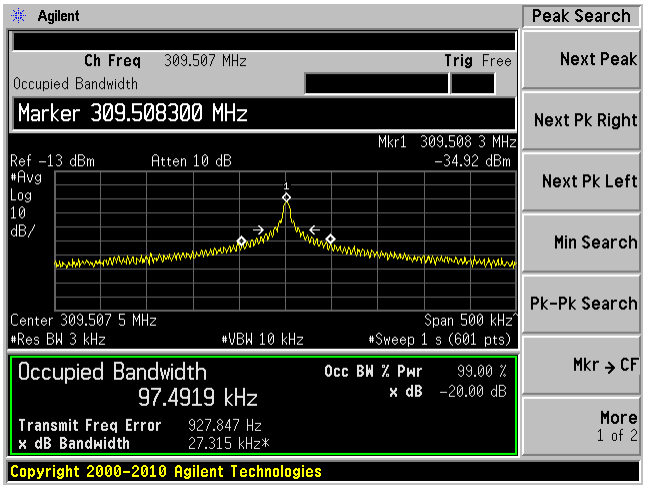
300 MHz Mode 1 ASK



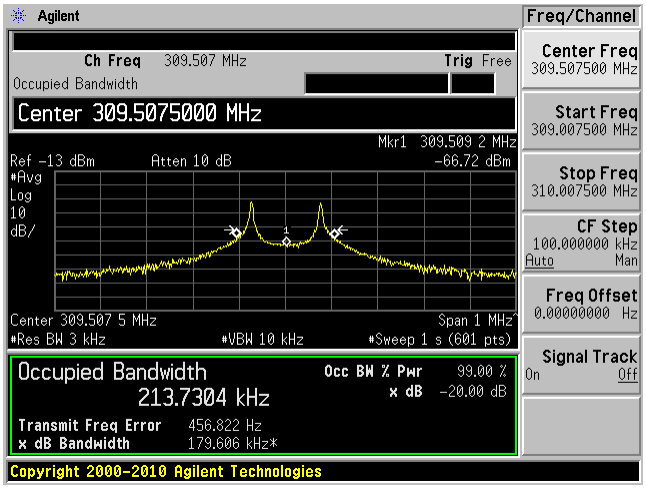
300 MHz Mode 2 FSK



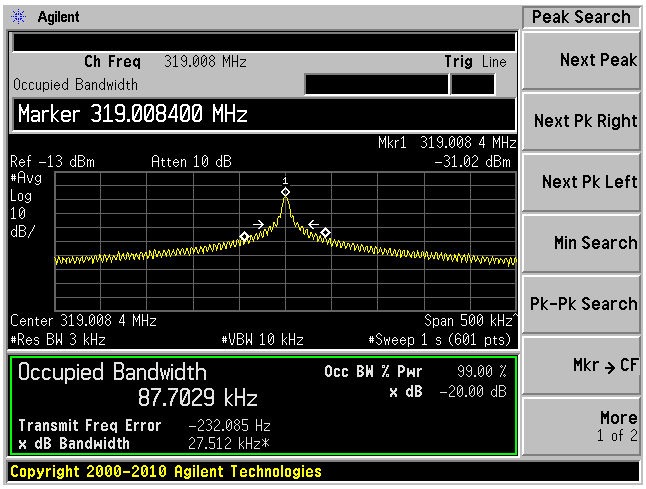
309.5075 MHz Mode 3 ASK



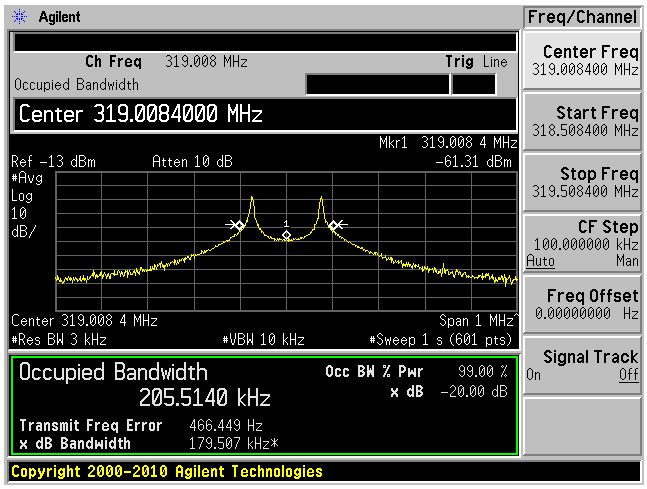
309.5075 MHz Mode 4 FSK



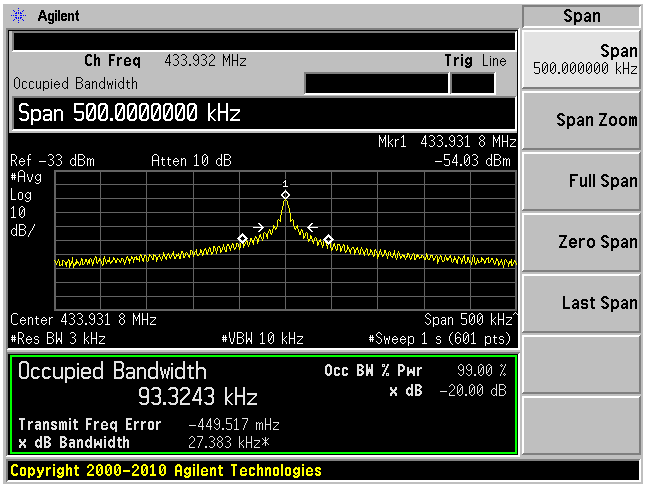
319 MHz Mode 5 ASK



319 MHz Mode 6 FSK



433.92 MHz Mode 7 ASK



433.92 MHz Mode 8 FSK