





FCC PART 90.217
TEST AND MEASUREMENT REPORT

For

Sierra Innotek, Inc.

4391 Cameron Road,
Cameron Park, CA 95682, USA

FCC ID: 2AIQA-CMVAD100

Report Type: Original Report	Product Type: Law Enforcement Body Wire Transmitter
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Report Number: R1810113-217	
Report Date: 2018-11-06	
Reviewed By: Frank Wang RF Lead	
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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1810113-217	Original Report	2018-11-06

1 General Description

1.1 Product Description for Equipment Under Test (EUT)

This test and measurement report has been compiled on behalf of *Sierra Innotek, Inc.* and their product model: *C-CAT Mini*, FCC ID: 2AIQA-CMVAD100, which henceforth is referred to as the EUT (Equipment Under Test). The EUT is a Law Enforcement Body Wire Transmitter. The EUT operates in the frequency range: 136-173.39 MHz.

1.2 Mechanical Description of EUT

The C-CAT Mini (EUT) measures approximately 4 cm (L) x 2.3 cm (W) x 0.8 cm (H) and weighs approximately 0.012 kg.

1.3 Objective

The following type approved report is prepared on behalf of *Sierra Innotek, Inc.* in accordance with Part 90.217, Subparts I of the Federal Communications Commission rules.

The objective is to determine compliance with Part 90.217 of the FCC Rules, limits for RF output power, frequency stability, channel bandwidth, emission mask, and conducted and radiated transmitter unwanted emissions.

1.4 Related Submittal(s)/Grant(s)

FCC Part 15C, equipment class DTS with FCC ID: 2AIQA-CMVAD100.

1.5 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI/TIA-603-E-2016 and FCC KDB 971168 D01 Power Meas License Digital Systems v03r01.

All tests were performed at Bay Area Compliance Laboratories Corp.

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 CISPR16-4-2:2011, The Treatment of Uncertainty in EMC Measurements, the values ranging from ± 2.0 dB for Conducted Emissions tests and ± 4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL Corp.

1.7 Test Facility Registrations

BACLs test facilities that are used to perform Radiated and Conducted Emissions tests are currently recognized by the Federal Communications Commission as Accredited with NIST Designation Number US1129.

BACL's test facilities that are used to perform Radiated and Conducted Emissions tests are currently registered with Industry Canada under Registration Numbers: 3062A-1, 3062A-2, and 3062A-3.

BACL is a Chinese Taipei Bureau of Standards Metrology and Inspection (BSMI) validated Conformity Assessment Body (CAB), under Appendix B, Phase I Procedures of the APEC Mutual Recognition Arrangement (MRA). BACL's BSMI Lab Code Number is: SL2-IN-E-1002R

BACL's test facilities that are used to perform AC Line Conducted Emissions, Telecommunications Line Conducted Emissions, Radiated Emissions from 30 MHz to 1 GHz, and Radiated Emissions from 1 GHz to 6 GHz are currently recognized as Accredited in accordance with the Voluntary Control Council for Interference [VCCI] Article 15 procedures under Registration Number A-0027.

1.8 Test Facility Accreditations

Bay Area Compliance Laboratories Corp. (BACL) is:

A- An independent, 3rd-Party, Commercial Test Laboratory accredited to ISO/IEC 17025:2005 by A2LA (Test Laboratory Accreditation Certificate Number 3279.02), in the fields of: Electromagnetic Compatibility and Telecommunications. Unless noted by an Asterisk (*) in the Compliance Matrix (See Section 3 of this Test Report), BACL's ISO/IEC 17025:2005 Scope of Accreditation includes all of the Test Method Standards and/or the Product Family Standards detailed in this Test Report..

BACL's ISO/IEC 17025:2005 Scope of Accreditation includes a comprehensive suite of EMC Emissions, EMC Immunity, Radio, RF Exposure, Safety and wireline Telecommunications test methods applicable to a wide range of product categories. These product categories include Central Office Telecommunications Equipment [including NEBS - Network Equipment Building Systems], Unlicensed and Licensed Wireless and RF devices, Information Technology Equipment (ITE); Telecommunications Terminal Equipment (TTE); Medical Electrical Equipment; Industrial, Scientific and Medical Test Equipment; Professional Audio and Video Equipment; Industrial and Scientific Instruments and Laboratory Apparatus; Cable Distribution Systems, and Energy Efficient Lighting.

B- A Product Certification Body accredited to ISO/IEC 17065:2012 by A2LA (Product Certification Body

- - For the USA (Federal Communications Commission):

- 1- All Unlicensed radio frequency devices within FCC Scopes A1, A2, A3, and A4;
- 2- All Licensed radio frequency devices within FCC Scopes B1, B2, B3, and B4;
- 3- All Telephone Terminal Equipment within FCC Scope C.

- For the Canada (Innovation, Science and Economic Development Canada):

- 1- All Scope 1-Licence-Exempt Radio Frequency Devices;
- 2- All Scope 2-Licensed Personal Mobile Radio Services;
- 3- All Scope 3-Licensed General Mobile & Fixed Radio Services;
- 4- All Scope 4-Licensed Maritime & Aviation Radio Services;
- 5- All Scope 5-Licensed Fixed Microwave Radio Services
- 6- All Broadcasting Technical Standards (BETS) in the Category I Equipment Standards List.

For Singapore (Infocomm Media Development Authority (IMDA)):

- 1 All Line Terminal Equipment: All Technical Specifications for Line Terminal Equipment – Table 1 of IDA MRA Recognition Scheme: 2011, Annex 2
2. All Radio-Communication Equipment: All Technical Specifications for Radio-Communication Equipment – Table 2 of IDA MRA Recognition Scheme: 2011, Annex 2

- For the Hong Kong Special Administrative Region:

- 1 All Radio Equipment, per KHCA 10XX-series Specifications;
- 2 All GMDSS Marine Radio Equipment, per HKCA 12XX-series Specifications;
- 3 All Fixed Network Equipment, per HKCA 20XX-series Specifications.

- For Japan:

- 1 MIC Telecommunication Business Law (Terminal Equipment):
 - All Scope A1 - Terminal Equipment for the Purpose of Calls;
 - All Scope A2 - Other Terminal Equipment
- 2 Radio Law (Radio Equipment):
 - All Scope B1 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 1 of the Radio Law
 - All Scope B2 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 2 of the Radio Law
 - All Scope B3 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 3 of the Radio Law

C- A Product Certification Body accredited to ISO/IEC 17065:2012 by A2LA (Product Certification Body Accreditation Certificate Number 3279.01) to certify Products to USA's Environmental Protection Agency (EPA) ENERGY STAR Product Specifications for:

- 1 Electronics and Office Equipment:
 - for Telephony (ver. 3.0)
 - for Audio/Video (ver. 3.0)
 - for Battery Charging Systems (ver. 1.1)
 - for Set-top Boxes & Cable Boxes (ver. 4.1)
 - for Televisions (ver. 6.1)
 - for Computers (ver. 6.0)
 - for Displays (ver. 6.0)
 - for Imaging Equipment (ver. 2.0)
 - for Computer Servers (ver. 2.0)
- 2 Commercial Food Service Equipment
 - for Commercial Dishwashers (ver. 2.0)
 - for Commercial Ice Machines (ver. 2.0)
 - for Commercial Ovens (ver. 2.1)
 - for Commercial Refrigerators and Freezers
- 3 Lighting Products
 - For Decorative Light Strings (ver. 1.5)
 - For Luminaires (including sub-components) and Lamps (ver. 1.2)
 - For Compact Fluorescent Lamps (CFLs) (ver. 4.3)
 - For Integral LED Lamps (ver. 1.4)
- 4 Heating, Ventilation, and AC Products
 - for Residential Ceiling Fans (ver. 3.0)
 - for Residential Ventilating Fans (ver. 3.2)
- 5 Other
 - For Water Coolers (ver. 3.0)

D. A NIST Designated Phase-I and Phase-II Conformity Assessment Body (CAB) for the following economies and regulatory authorities under the terms of the stated MRAs/Treaties:

- Australia: ACMA (Australian Communication and Media Authority) – APEC Tel MRA -Phase I;
- Canada: (Innovation, Science and Economic Development Canada - ISED) Foreign Certification Body – FCB – APEC Tel MRA -Phase I & Phase II;
- Chinese Taipei (Republic of China – Taiwan):
 - o BSMI (Bureau of Standards, Metrology and Inspection) APEC Tel MRA -Phase I;
 - o NCC (National Communications Commission) APEC Tel MRA -Phase I;

- European Union:
 - o EMC Directive 2014/30/EU US-EU EMC & Telecom MRA CAB (NB)
 - o Radio Equipment (RE) Directive 2014/53/EU US-EU EMC & Telecom MRA CAB (NB)
 - o Low Voltage Directive (LVD) 2014/35/EU
- Hong Kong Special Administrative Region: (Office of the Telecommunications Authority – OFTA) APEC Tel MRA -Phase I & Phase II
- Israel – US-Israel MRA Phase I
- Republic of Korea (Ministry of Communications - Radio Research Laboratory) APEC Tel MRA -Phase I
- Singapore: (Infocomm Media Development Authority - IMDA) APEC Tel MRA -Phase I & Phase II;
- Japan: VCCI - Voluntary Control Council for Interference US-Japan Telecom Treaty VCCI Side Letter
- USA:
 - o ENERGY STAR Recognized Test Laboratory – US EPA
 - o Telecommunications Certification Body (TCB) – US FCC;
 - o Nationally Recognized Test Laboratory (NRTL) – US OSHA
- Vietnam: APEC Tel MRA -Phase I;

2 EUT Test Configuration

2.1 Justification

The EUT was configured for testing according to ANSI/TIA-603-E-2016 and KDB 971168 D01 v03r01.

2.2 EUT Exercise Software

Custom iOS application for setting VHF transmitter parameters (frequency, power).

2.3 Equipment Modifications

No equipment modifications were made to the EUT.

2.4 Local Support Equipment

Manufacturer	Description	Model
Dell	Laptop	Latitude E6410

2.5 Support Equipment

N/A

2.6 Interface Ports and Cabling

Cable Description	Length (m)	To	From
USB power	0.3	EUT	USB Type A power

3 Summary of Test Results

FCC Rules	Descriptions of Test	Result (s)
§2.1093	RF Exposure	Compliant ¹
§2.1046, §90.217	RF output power	Compliant
§2.1055, §90.217	Frequency Stability	Compliant
§90.217(a) & (b)	Emission Bandwidth	Compliant
§90.217(a) & (b)	Transmitter Unwanted Emissions (Emission Mask)	Compliant
§90.217(a) & (b)	Transmitter Unwanted Emissions (Conducted)	Compliant
§90.217(a) & (b)	Transmitter Unwanted Emissions (Radiated)	Compliant

Note 1: Please refer to R1810113-SAR report.

4 FCC §2.1046 & §90.217 - RF Output Power

4.1 Applicable Standards

According to FCC §90.217:

Transmitters used at stations licensed below 800 MHz on any frequency listed in subparts B and C of this part or licensed on a business category channel above 800 MHz which have an output power not exceeding 120 milliwatts are exempt from the technical requirements set out in this subpart.

4.2 Test Procedure

Refer to ANSI/TIA-603-E-2016 Section 2.2.1 and KDB 971168 D01 v03r01 Section 5

4.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4446A	MY48250238	2018-05-08	1 year
-	RF cable	-	-	Each time ¹	N/A
-	10dB attenuator	-	-	Each time ¹	N/A

Note¹: attenuator included in the test set-up will be checked each time before testing.

Statement of Traceability: *BACL Corp.* attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with A2LA Policy P102 (dated 09 June 2016) "A2LA Policy on Metrological Traceability".

4.4 Test Environmental Conditions

Temperature:	22 °C
Relative Humidity:	45 %
ATM Pressure:	101.2 kPa

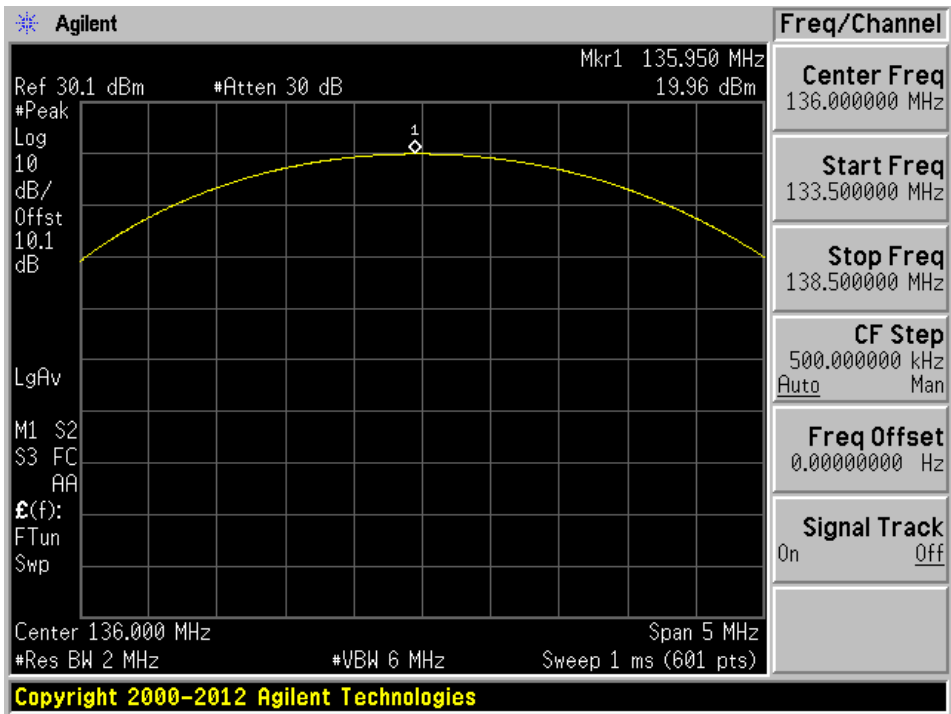
The testing was performed by Chin Ming Lui on 2018-10-15 at RF site.

4.5 Test Results

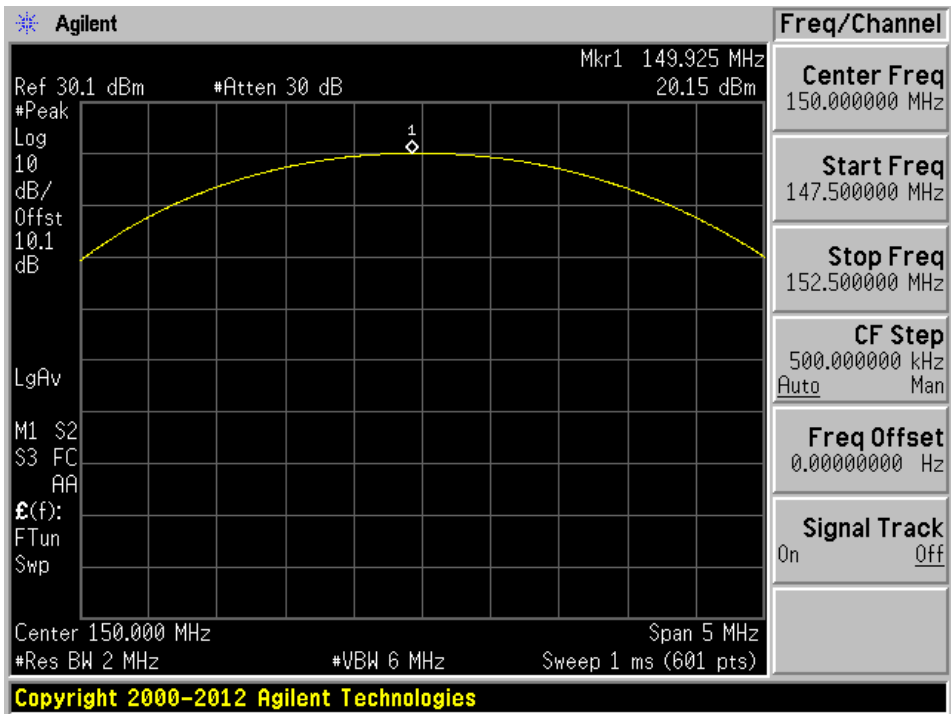
Channel	Frequency (MHz)	Conducted Output Power (dBm)	Conducted Output Power (mW)	Limit (mW)	Rated Power (mW)
Low	136	19.96	99.08	120	100
Middle	150	20.15	103.5	120	100
Middle	162	20.03	100.7	120	100
High	173.39	19.84	96.38	120	100

Please refer to the following plots for detailed test results

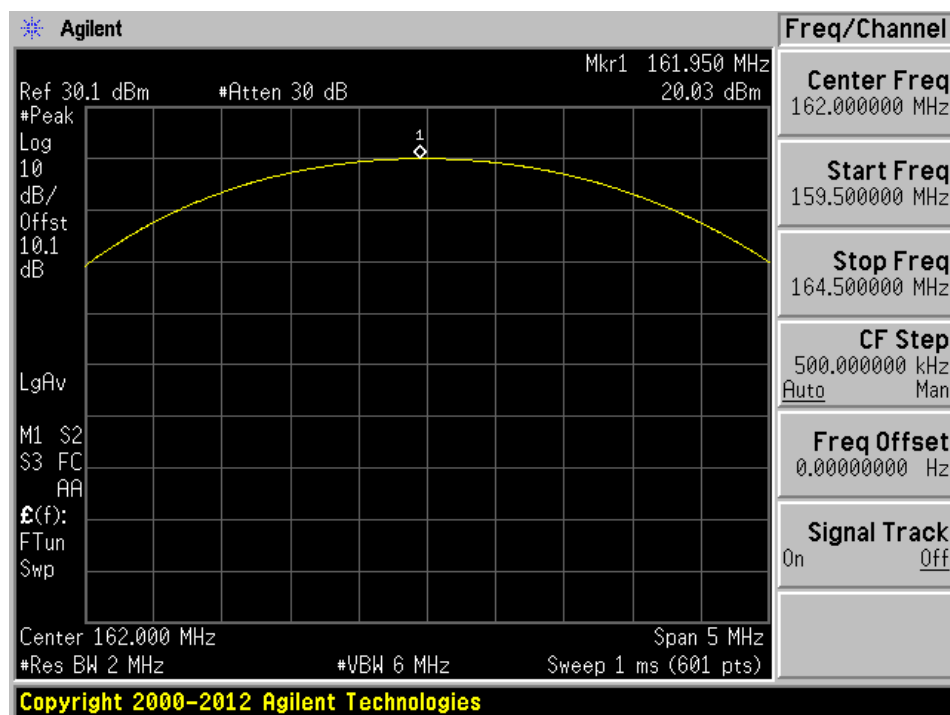
Low Channel 136 MHz



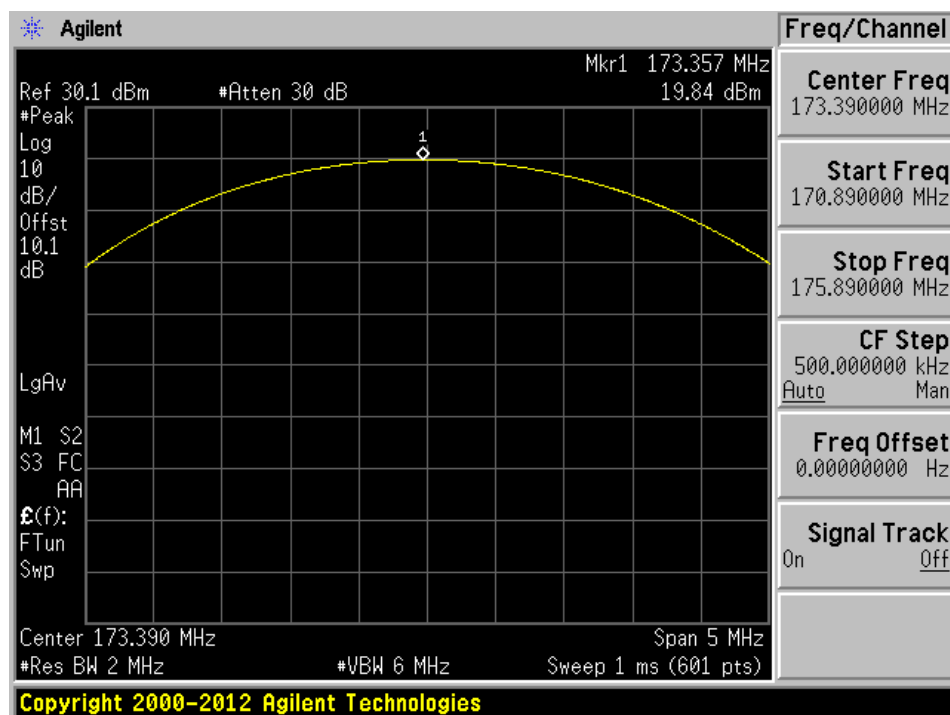
Middle Channel 150 MHz



Middle Channel 162 MHz



High Channel 173.39 MHz



5 FCC §2.1055 & §90.217 - Frequency Stability

5.1 Applicable Standards

According to FCC §90.217:

Transmitters used at stations licensed below 800 MHz on any frequency listed in subparts B and C of this part or licensed on a business category channel above 800 MHz which have an output power not exceeding 120 milliwatts are exempt from the technical requirements set out in this subpart.

5.2 Test Procedure

According to FCC 2.1055:

(a) The frequency stability shall be measured with variation of ambient temperature as follows:

(1) From -30° to $+50^{\circ}$ centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.

(2) From -20° to $+50^{\circ}$ centigrade for equipment to be licensed for use in the Maritime Services under part 80 of this chapter, except for Class A, B, and S Emergency Position Indicating Radiobeacons (EPIRBS), and equipment to be licensed for use above 952 MHz at operational fixed stations in all services, stations in the Local Television Transmission Service and Point-to-Point Microwave Radio Service under part 21 of this chapter, equipment licensed for use aboard aircraft in the Aviation Services under part 87 of this chapter, and equipment authorized for use in the Family Radio Service under part 95 of this chapter.

(3) From 0° to $+50^{\circ}$ centigrade for equipment to be licensed for use in the Radio Broadcast Services under part 73 of this chapter.

(b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10° centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.

(d) The frequency stability shall be measured with variation of primary supply voltage as follows:

(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.

5.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4446A	MY48250238	2018-05-08	1 year
ESL-4CA	Chamber, Humidity	ESL-4CA	18010	2018-02-23	1 year
HP	DC Power Supply	E3630A	-	Cal. Not Required	N/A
-	10 dB Attenuator	-	-	Each time ¹	N/A
-	RF Cable	-	-	Each time ¹	N/A

Note¹: cable and attenuator included in the test set-up will be checked each time before testing.

Statement of Traceability: *BACL Corp.* attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with A2LA Policy P102 (dated 09 June 2016) "A2LA Policy on Metrological Traceability".

5.4 Test Environmental Conditions

Temperature:	23 °C
Relative Humidity:	43 %
ATM Pressure:	101.1 kPa

The testing was performed by Chin Ming Lui on 2018-10-18 at RF site.

5.5 Test Results

162 MHz:

Varying temperature:

Temperature (°C)	Measured Frequency (MHz)	Channel Frequency (MHz)	Frequency Tolerance (ppm)
-30	161.999989	162	-0.0679
-20	161.999998	162	-0.0123
-10	162.000005	162	0.0309
0	162.000011	162	0.0679
10	162.000023	162	0.0142
20	162.000014	162	0.0864
30	162.000008	162	0.0494
40	161.999995	162	-0.0309
50	161.999989	162	-0.0679

Varying supply voltage:

Voltage	Measured Frequency (MHz)	Channel Frequency (MHz)	Frequency Tolerance (ppm)
4 V	162.000000	162	0
12 V	161.999998	162	-0.0123

6 FCC §90.217(a) & (b) - Emission Bandwidth

6.1 Applicable Standards

According to FCC §90.217(a)&(b):

(a) For equipment designed to operate with a 25 kHz channel bandwidth, the sum of the bandwidth occupied by the emitted signal plus the bandwidth required for frequency stability shall be adjusted so that any emission appearing on a frequency 40 kHz or more removed from the assigned frequency is attenuated at least 30 dB below the unmodulated carrier.

(b) For equipment designed to operate with a 12.5 kHz channel bandwidth, the sum of the bandwidth occupied by the emitted signal plus the bandwidth required for frequency stability shall be adjusted so that any emission appearing on a frequency 25 kHz or more removed from the assigned frequency is attenuated at least 30 dB below the unmodulated carrier.

6.2 Test Procedure

Refer to ANSI/TIA-603-E-2016 Section 2.2.11 and KDB 971168 D01 v03r01 Section 4

6.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4446A	MY48250238	2018-05-08	1 year
HP	RF Communications Test Set	8920A	3438A05338	2018-01-09	2 years
HP	Modulation Analyzer	8901A	2026A00847	2018-01-06	2 years
Krohn-Hite	Active Dual Channel Filter	3940	3212	2018-10-08	1 year
Agilent	Function Generator	33220A	MY43004878	2018-01-09	1 year
HP	TIMS	4934A	3737U15141	2018-01-09	1 year
-	RF cable	-	-	Each time ¹	N/A
-	10 dB Attenuator	-	-	Each time ¹	N/A

Note¹: attenuator included in the test set-up will be checked each time before testing.

Statement of Traceability: BACL Corp. attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with A2LA Policy P102 (dated 09 June 2016) "A2LA Policy on Metrological Traceability".

6.4 Test Environmental Conditions

Temperature:	22 °C
Relative Humidity:	45 %
ATM Pressure:	101.2 kPa

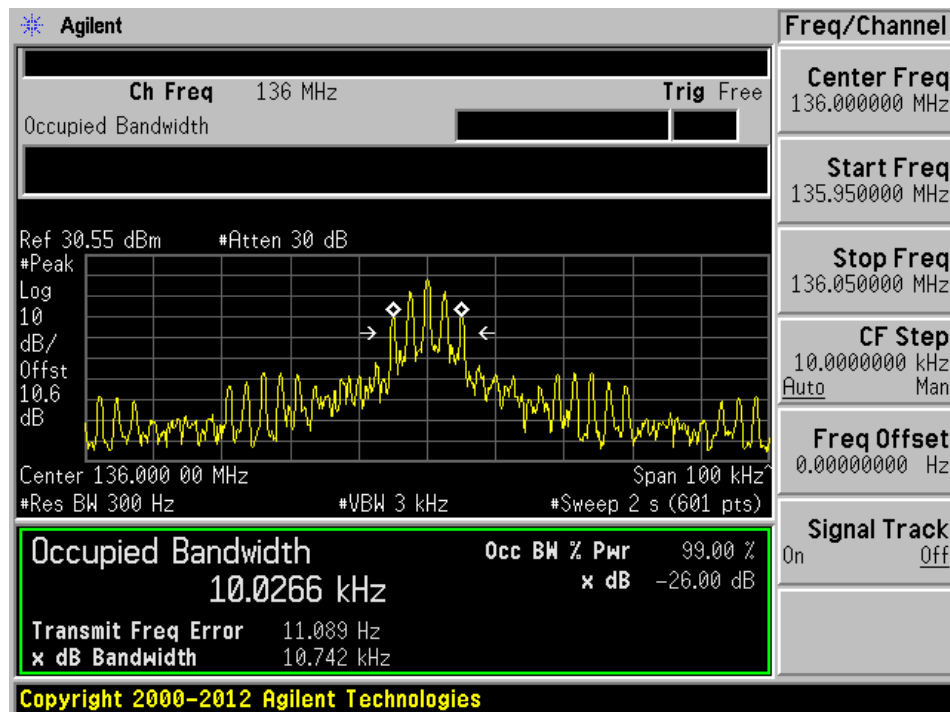
The testing was performed by Chin Ming Lui on 2018-10-15 and 2018-10-16 at RF site.

6.5 Test Results

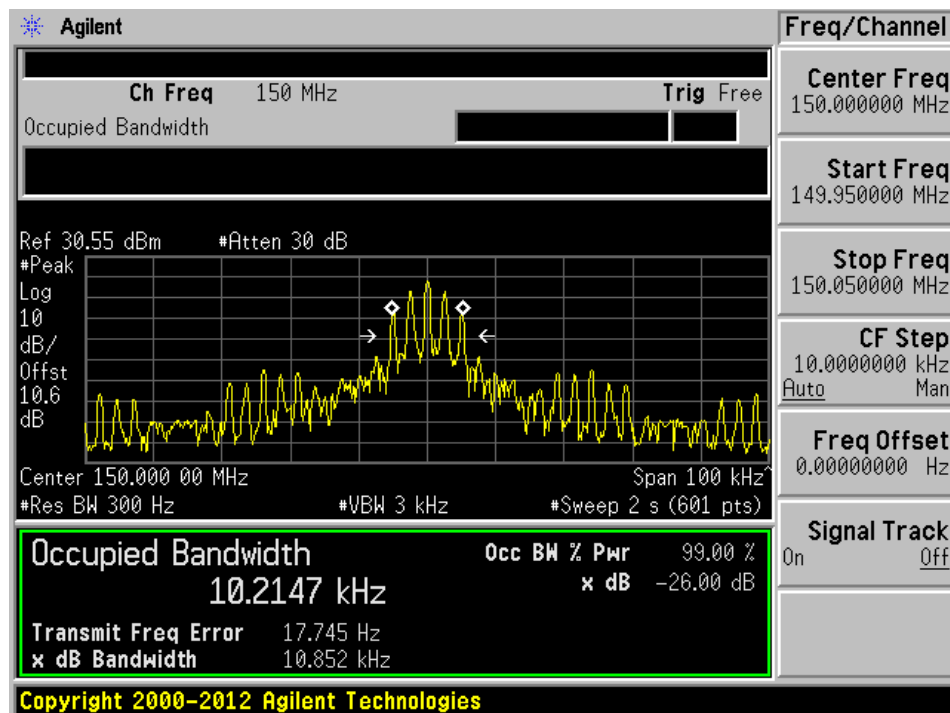
Modulation	Center Frequency (MHz)	99% Bandwidth (kHz)	Rated Power (mW)
FM 11K2F3E	136	10.0266	100
	150	10.2147	100
	162	10.2111	100
	173.39	10.2138	100
FSK Data 20K0F1D	136	19.8699	100
	150	20.0782	100
	162	20.0175	100
	173.39	20.0141	100
FSK Data 1K03F1D	136	1.2846	100
	150	1.2871	100
	162	1.3003	100
	173.39	1.3006	100

Please refer to the following plots for detailed test results

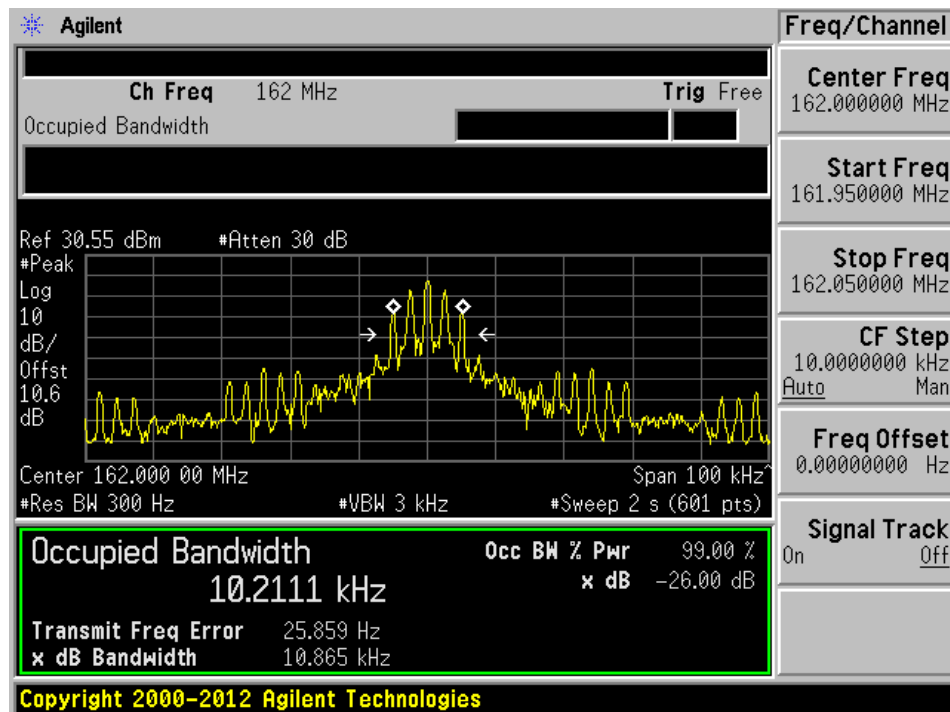
FM 136 MHz



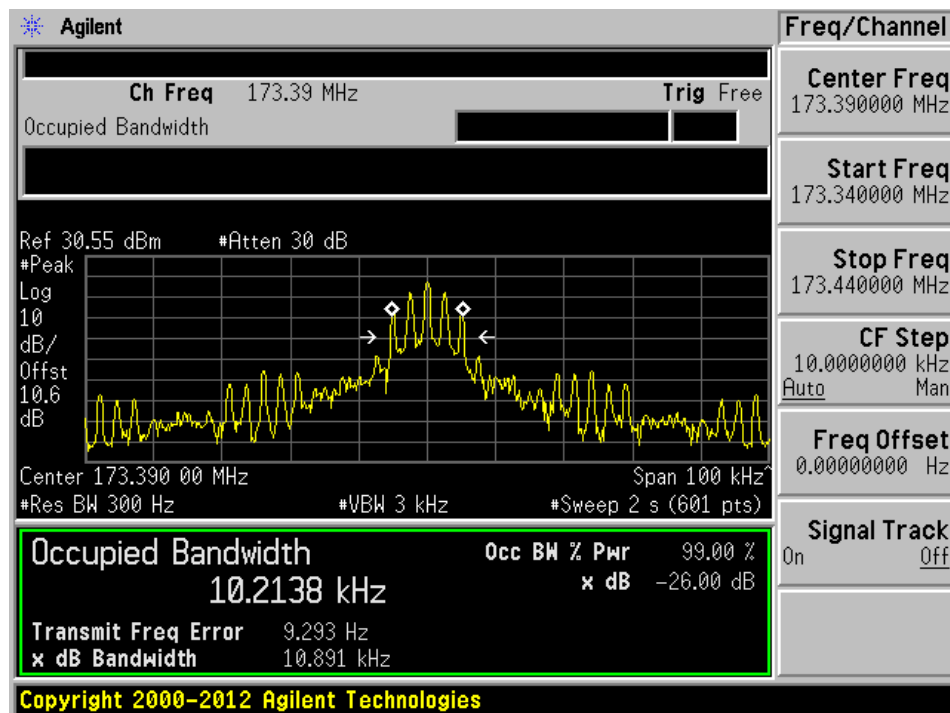
FM 150 MHz



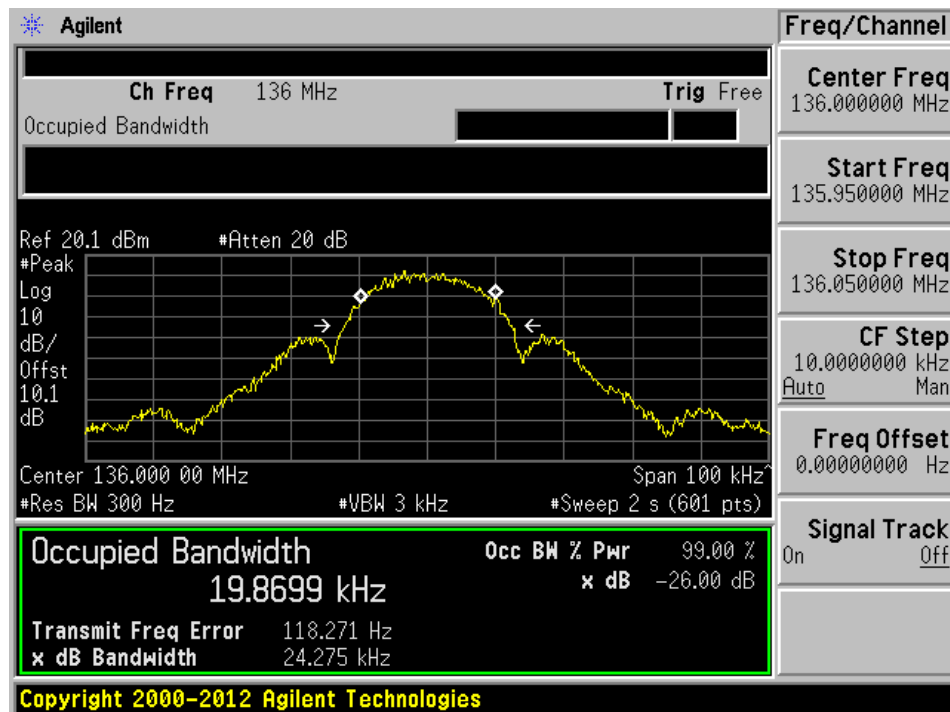
FM 162 MHz



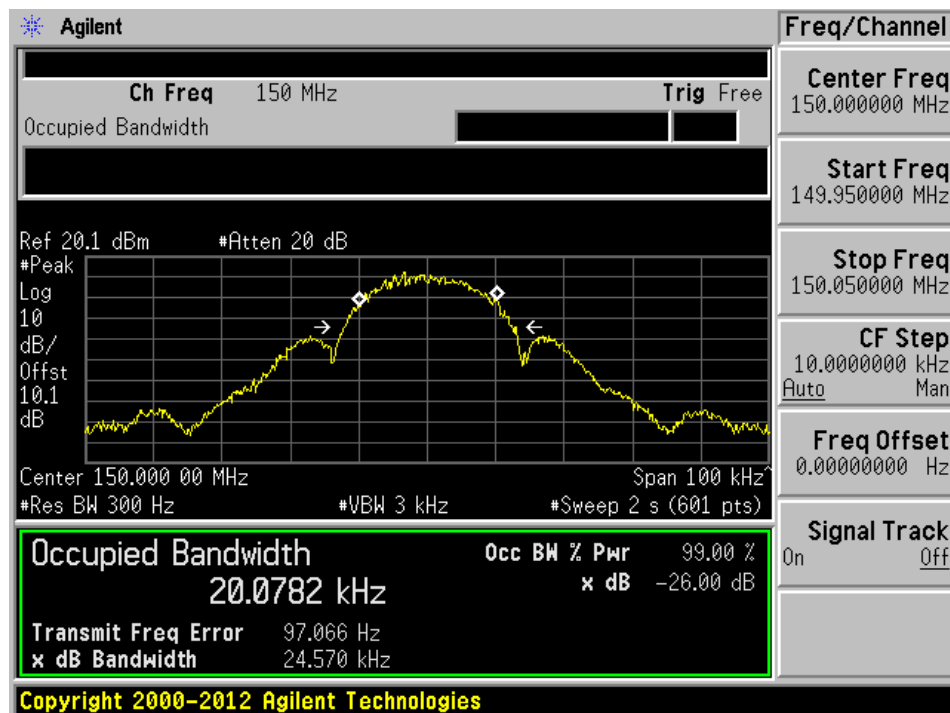
FM 173.39 MHz



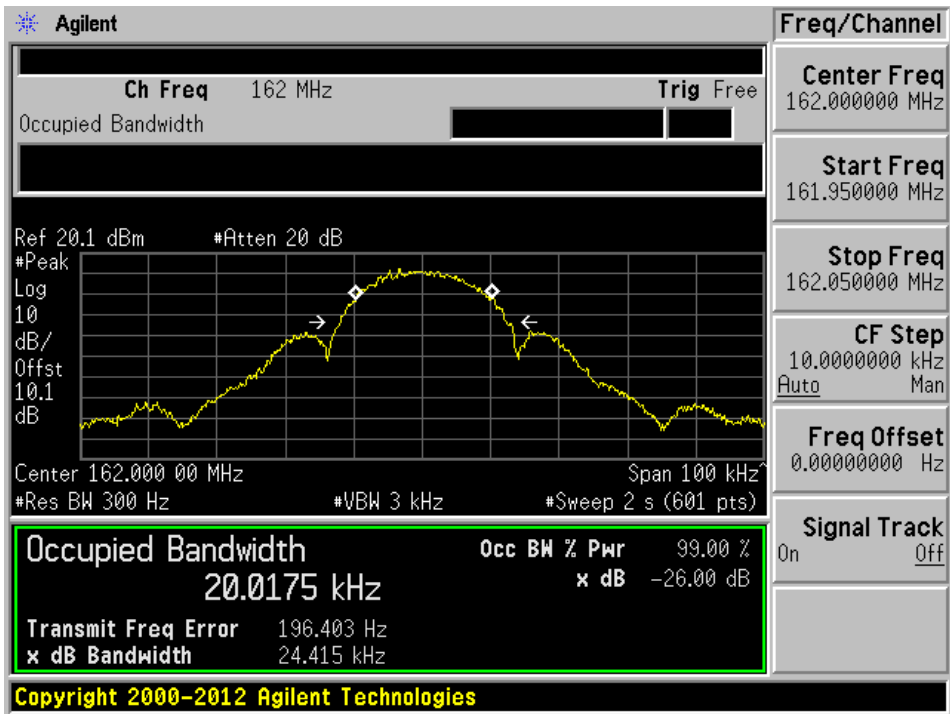
FSK High Data Rate 136 MHz



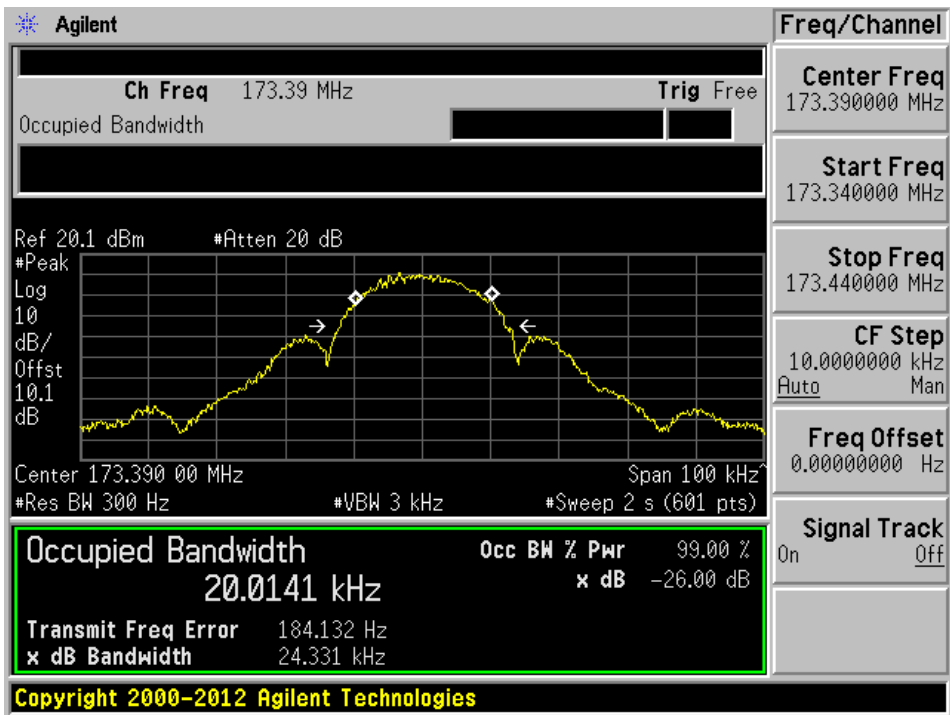
FSK High Data Rate 150 MHz



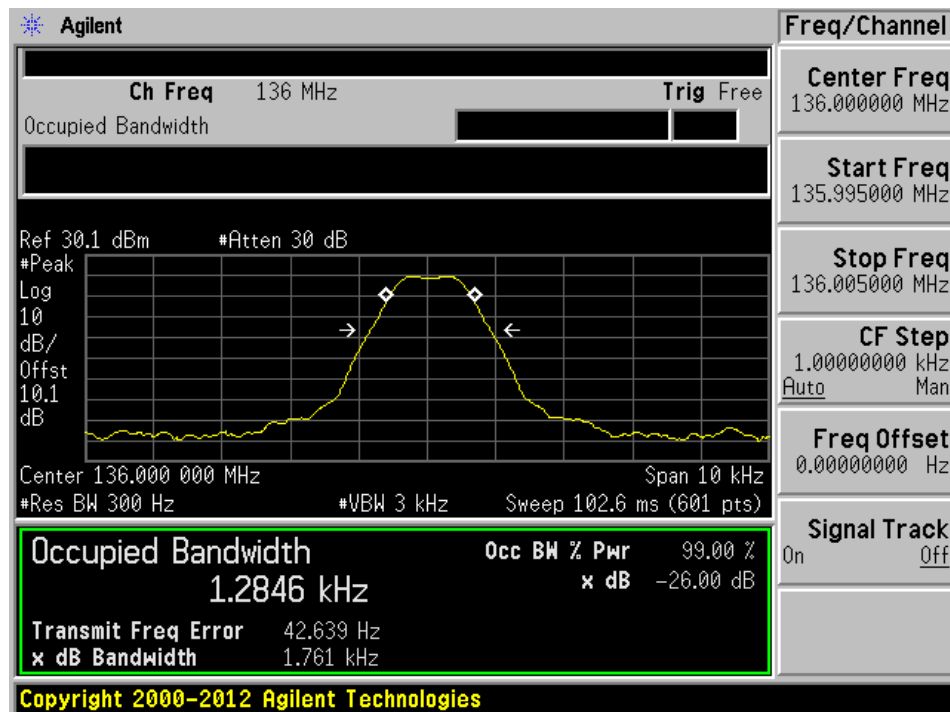
FSK High Data Rate 162 MHz



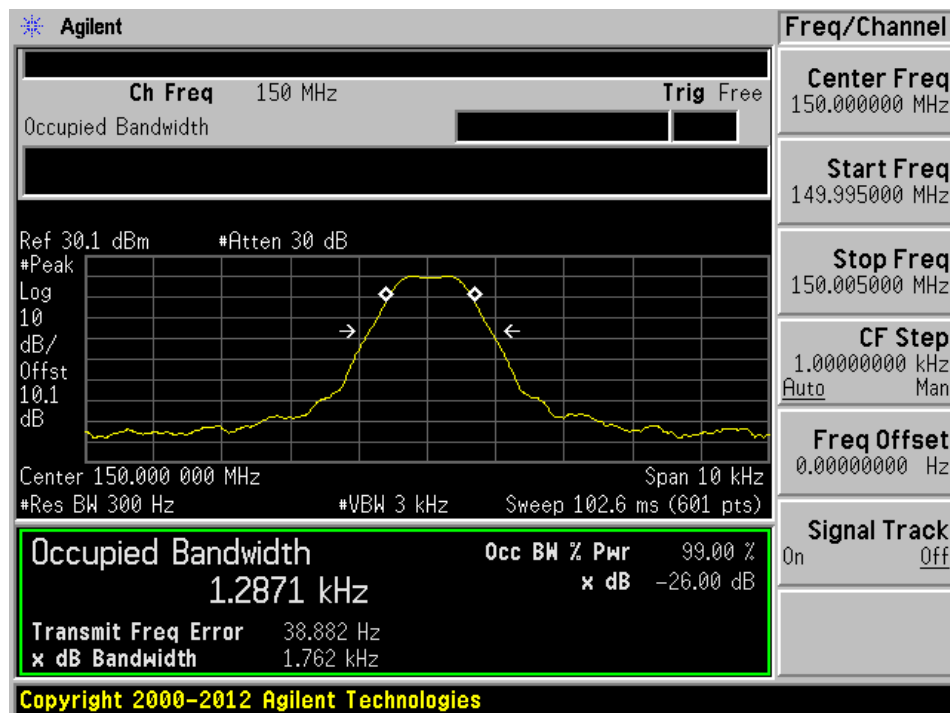
FSK High Data Rate 173.39 MHz



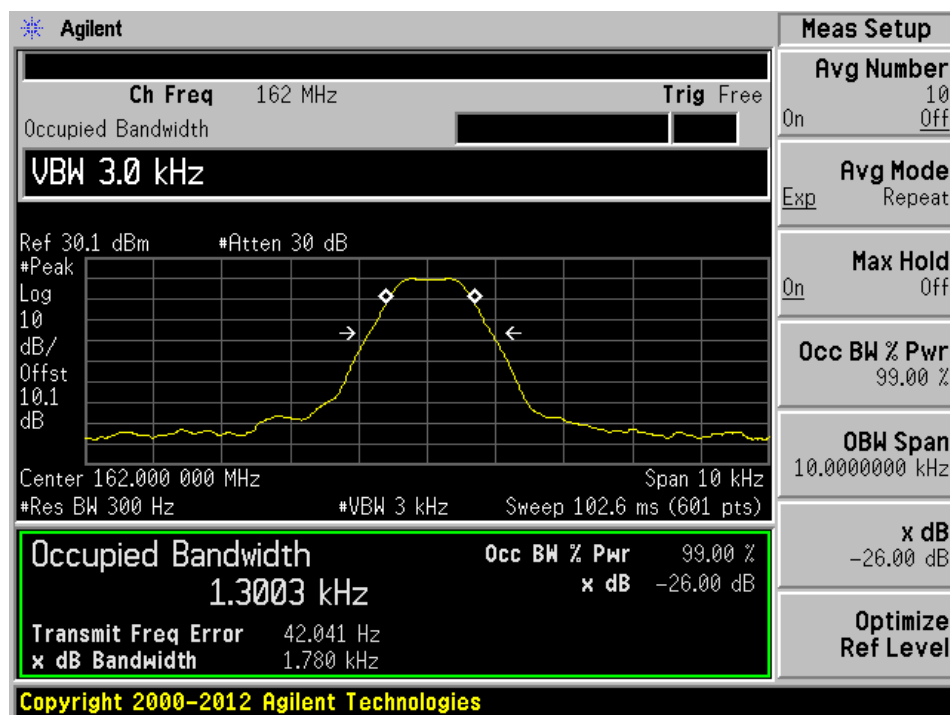
FSK Low Data Rate 136 MHz



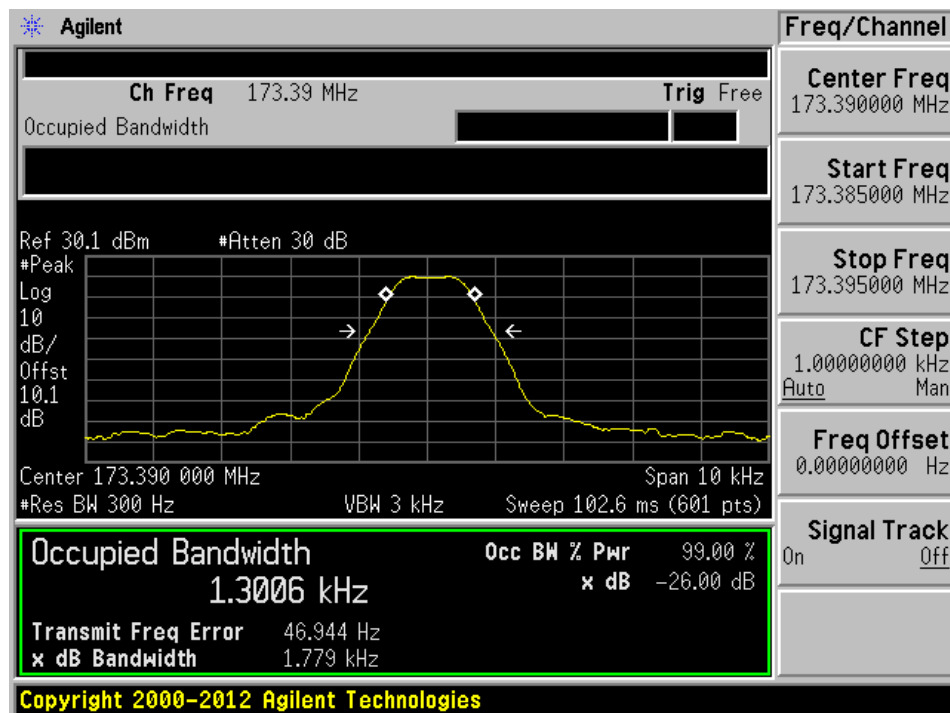
FSK Low Data Rate 150 MHz



FSK Low Data Rate 162 MHz



FSK Low Data Rate 173.39 MHz



7 FCC §90.217(a) & (b) -Transmitter Unwanted Emissions (Emission Mask)

7.1 Applicable Standards

According to FCC §90.217(a)&(b):

- (a) For equipment designed to operate with a 25 kHz channel bandwidth, the sum of the bandwidth occupied by the emitted signal plus the bandwidth required for frequency stability shall be adjusted so that any emission appearing on a frequency 40 kHz or more removed from the assigned frequency is attenuated at least 30 dB below the unmodulated carrier.
- (b) For equipment designed to operate with a 12.5 kHz channel bandwidth, the sum of the bandwidth occupied by the emitted signal plus the bandwidth required for frequency stability shall be adjusted so that any emission appearing on a frequency 25 kHz or more removed from the assigned frequency is attenuated at least 30 dB below the unmodulated carrier.

7.2 Test Procedure

Refer to ANSI/TIA-603-E-2016 Section 2.2.11

7.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4446A	MY48250238	2018-05-08	1 year
-	RF cable	-	-	Each time ¹	N/A
-	10 dB Attenuator	-	-	Each time ¹	N/A

Note¹: attenuator included in the test set-up will be checked each time before testing.

Statement of Traceability: BACL Corp. attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with A2LA Policy P102 (dated 09 June 2016) "A2LA Policy on Metrological Traceability".

7.4 Test Environmental Conditions

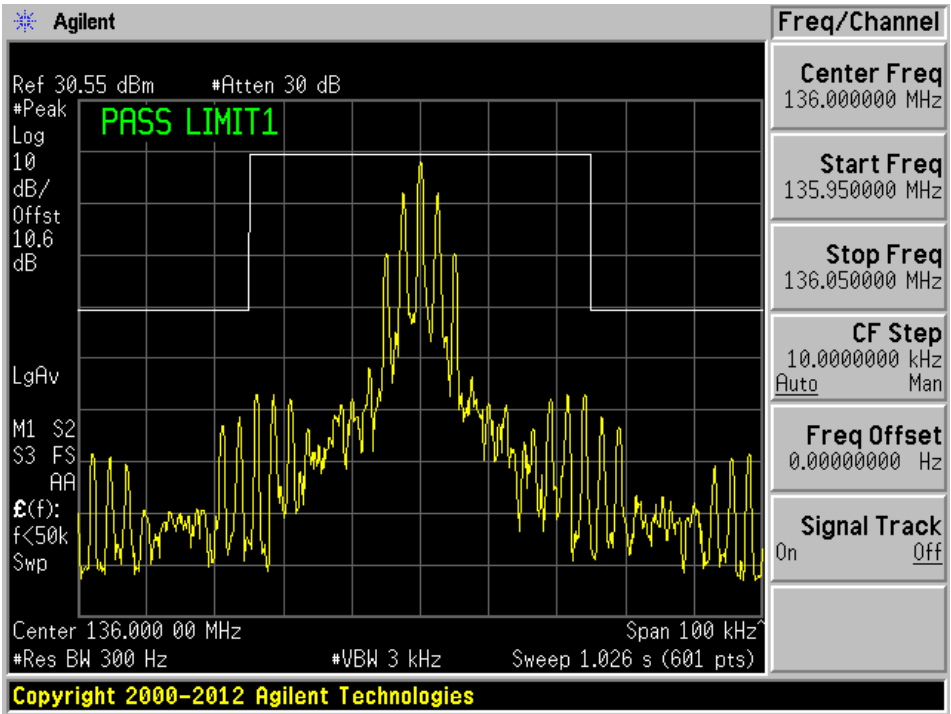
Temperature:	22 °C
Relative Humidity:	45 %
ATM Pressure:	101.2 kPa

The testing was performed by Chin Ming Lui on 2018-10-15 and 2018-10-16 at RF site.

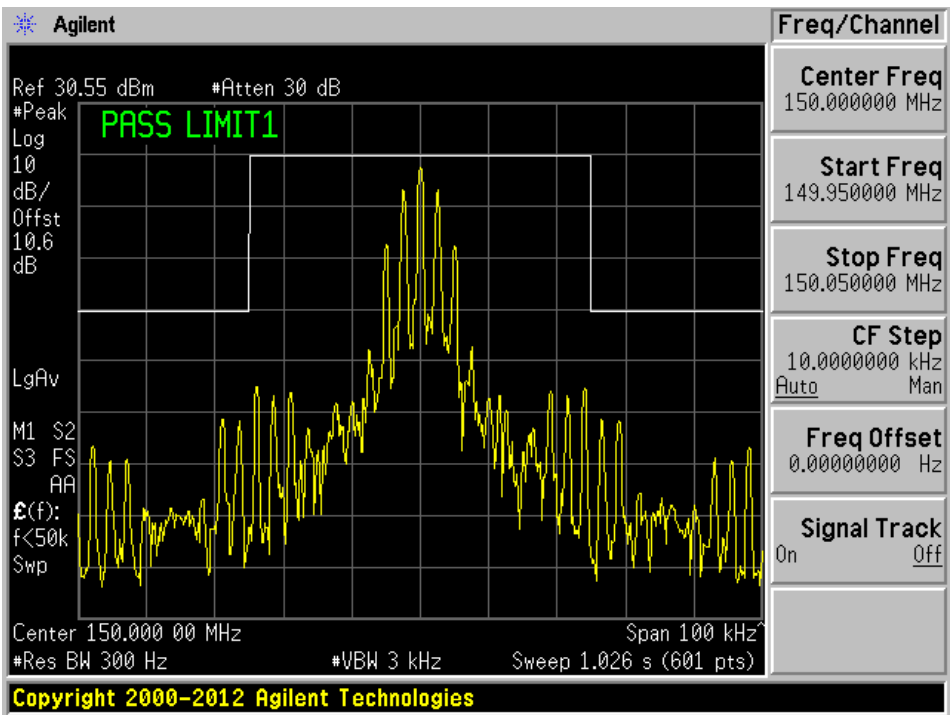
7.5 Test Results

Please refer to the following table plots for detailed test results:

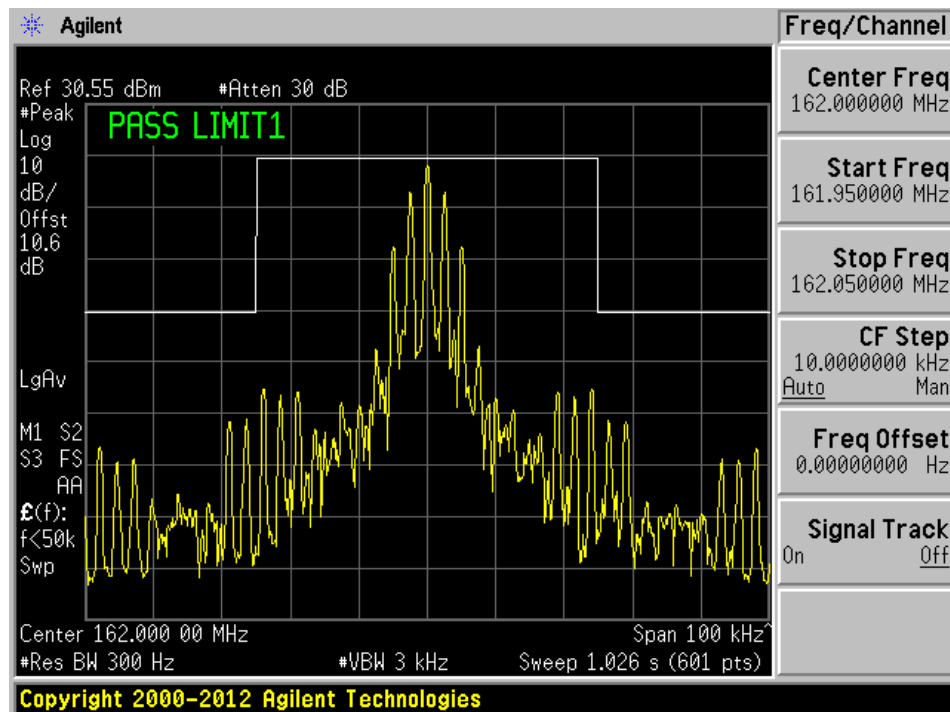
FM 136 MHz



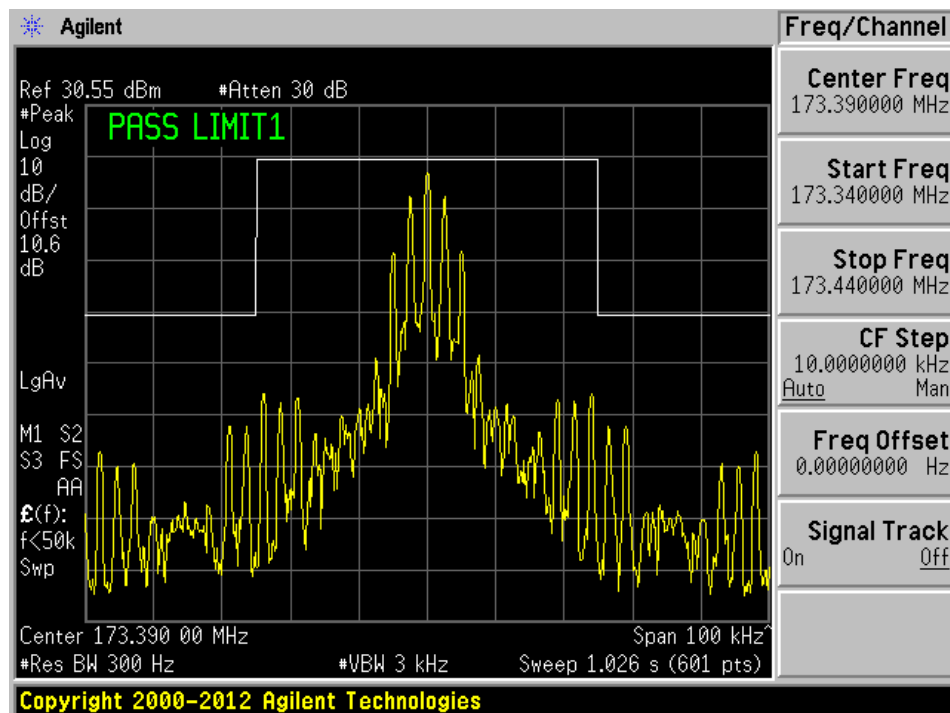
FM 150 MHz



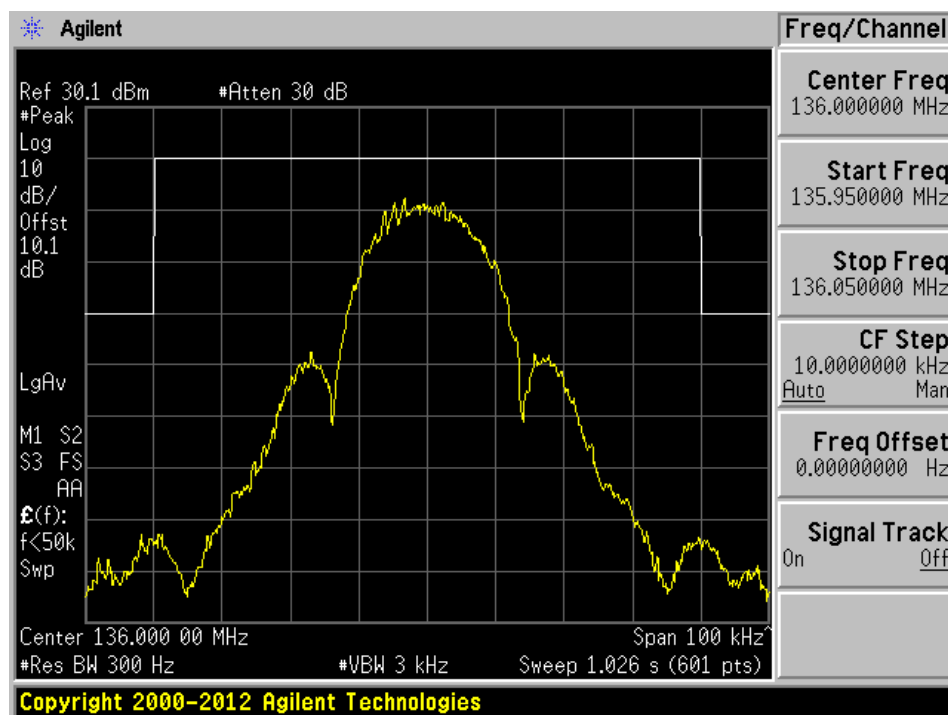
FM 162 MHz



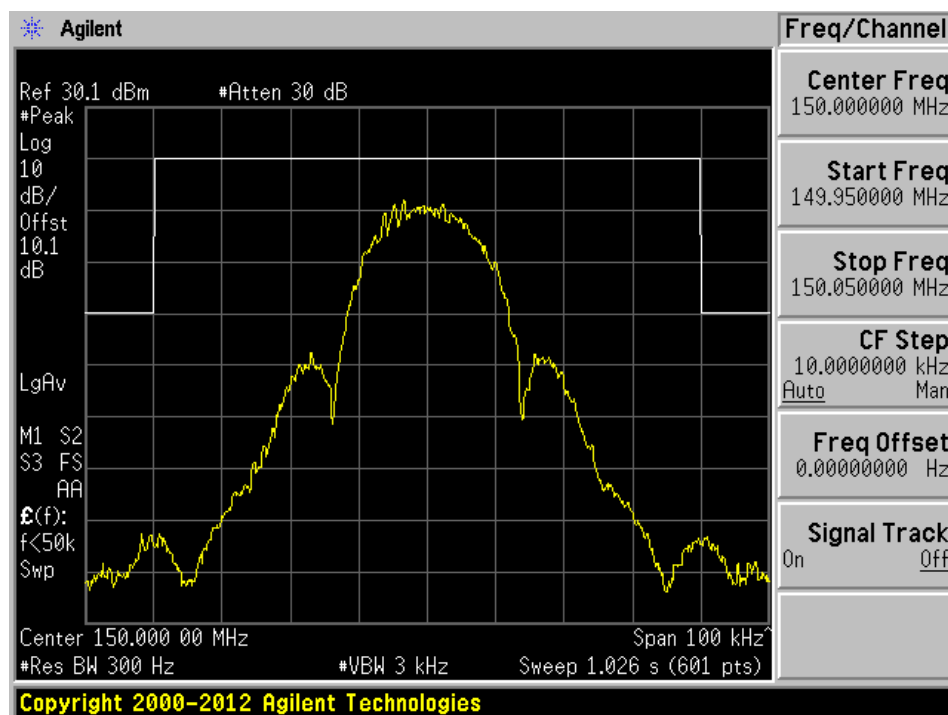
FM 173.39 MHz



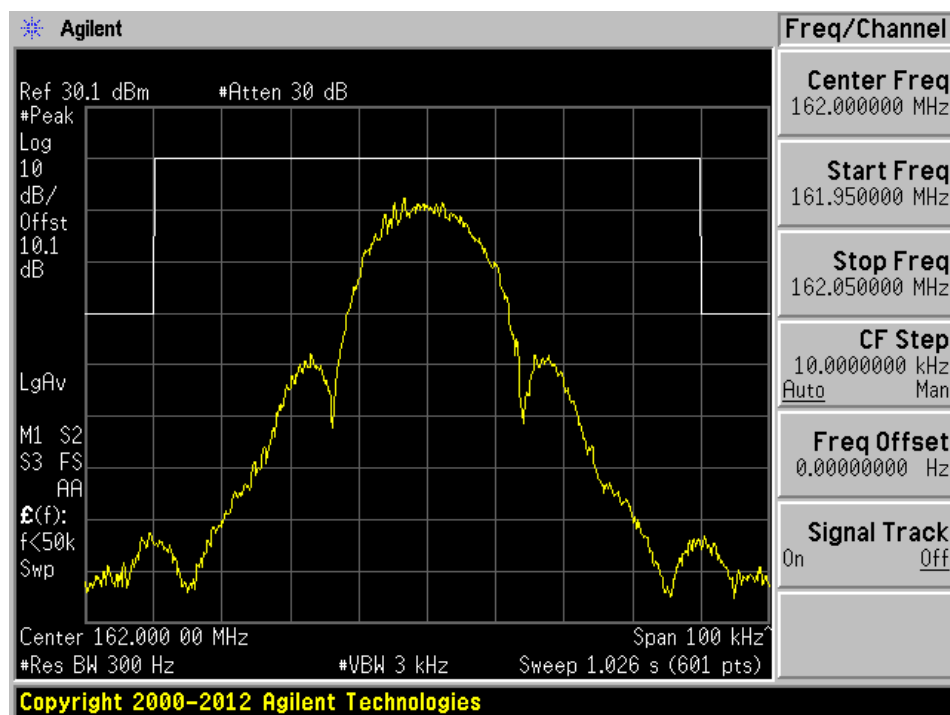
FSK High Data Rate 136 MHz



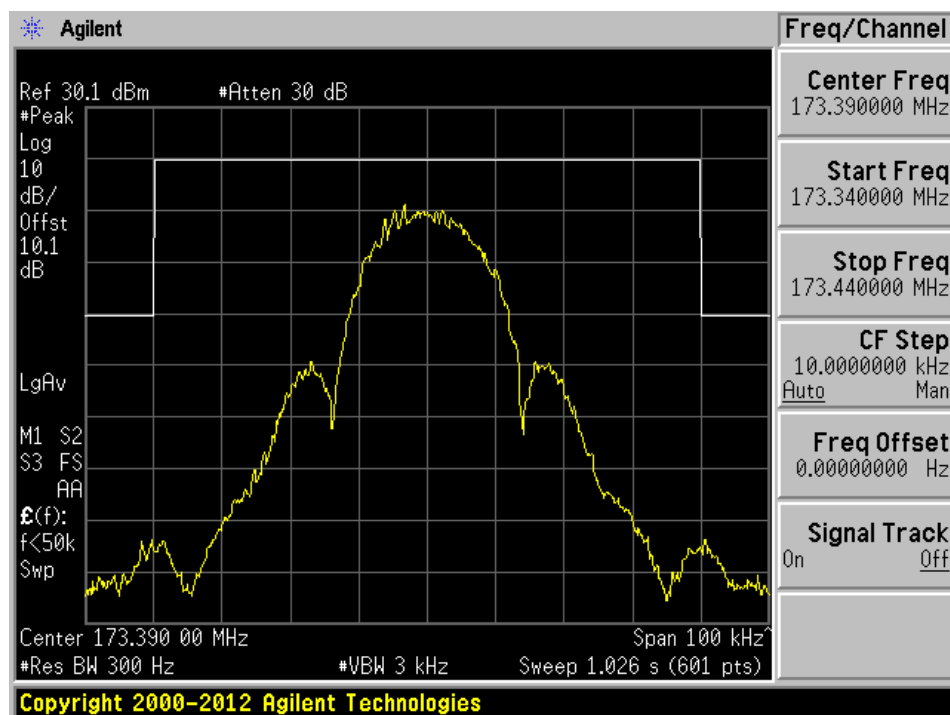
FSK High Data Rate 150 MHz



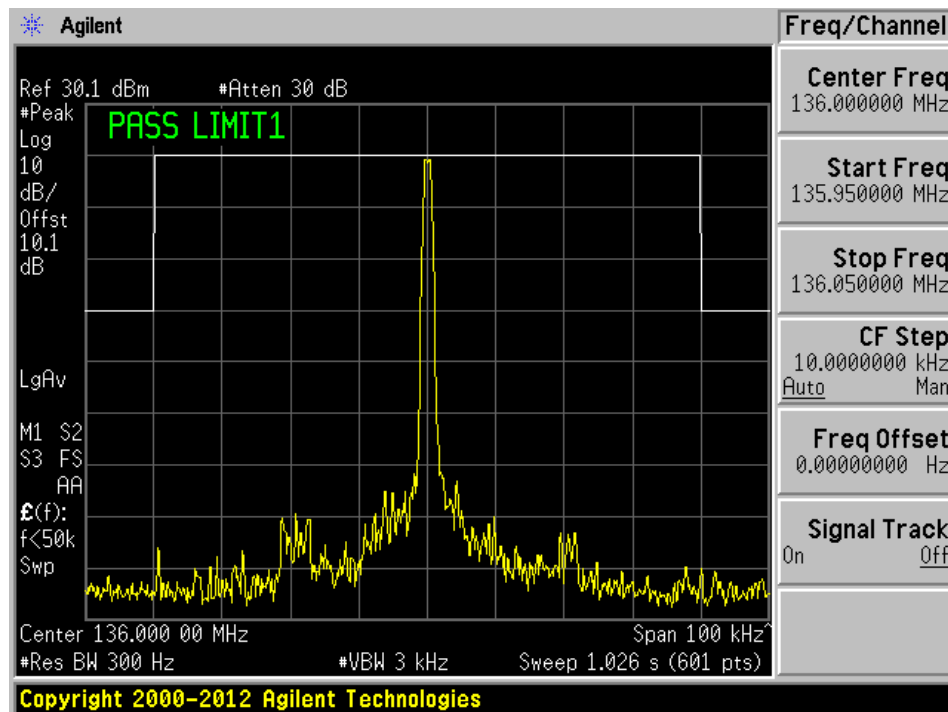
FSK High Data Rate 162 MHz



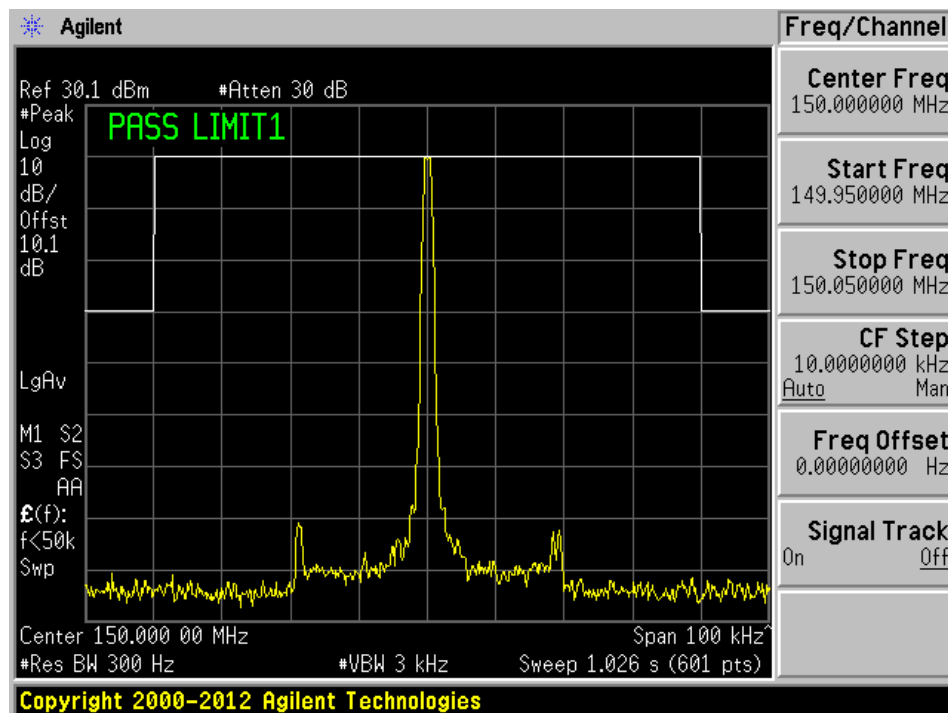
FSK High Data Rate 173.39 MHz



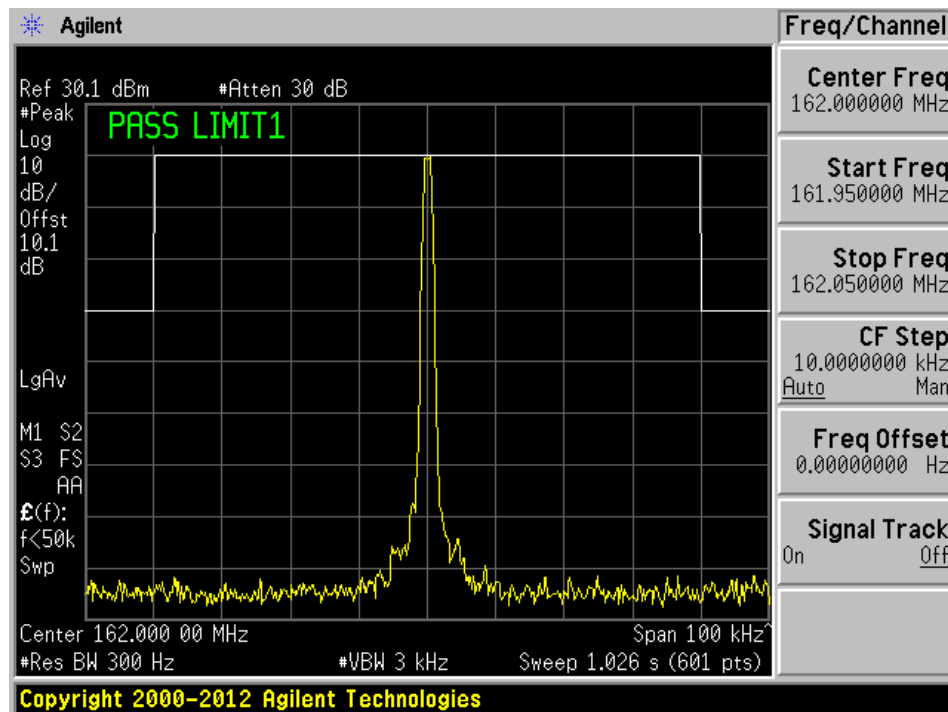
FSK Low Data Rate 136 MHz



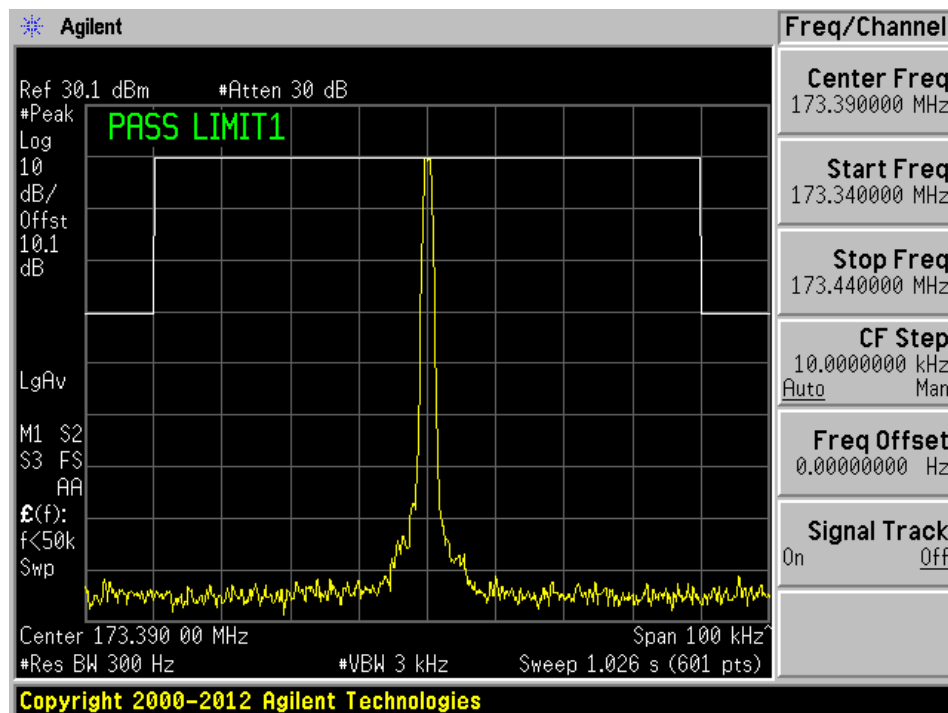
FSK Low Data Rate 150 MHz



FSK Low Data Rate 162 MHz



FSK Low Data Rate 173.39 MHz



8 FCC §90.217(a) & (b) - Transmitter Unwanted Emissions (Conducted)

8.1 Applicable Standards

According to FCC §90.217(a)&(b):

- (c) For equipment designed to operate with a 25 kHz channel bandwidth, the sum of the bandwidth occupied by the emitted signal plus the bandwidth required for frequency stability shall be adjusted so that any emission appearing on a frequency 40 kHz or more removed from the assigned frequency is attenuated at least 30 dB below the unmodulated carrier.
- (d) For equipment designed to operate with a 12.5 kHz channel bandwidth, the sum of the bandwidth occupied by the emitted signal plus the bandwidth required for frequency stability shall be adjusted so that any emission appearing on a frequency 25 kHz or more removed from the assigned frequency is attenuated at least 30 dB below the unmodulated carrier.

8.2 Test Procedure

Refer to ANSI/TIA-603-E-2016 Section 2.2.13 and KDB 971168 D01 v03r01 Section 6

8.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4446A	MY48250238	2018-05-08	1 year
-	RF cable	-	-	Each time ¹	N/A
-	10 dB Attenuator	-	-	Each time ¹	N/A

Note¹: attenuator included in the test set-up will be checked each time before testing.

Statement of Traceability: BACL Corp. attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with A2LA Policy P102 (dated 09 June 2016) "A2LA Policy on Metrological Traceability".

8.4 Test Environmental Conditions

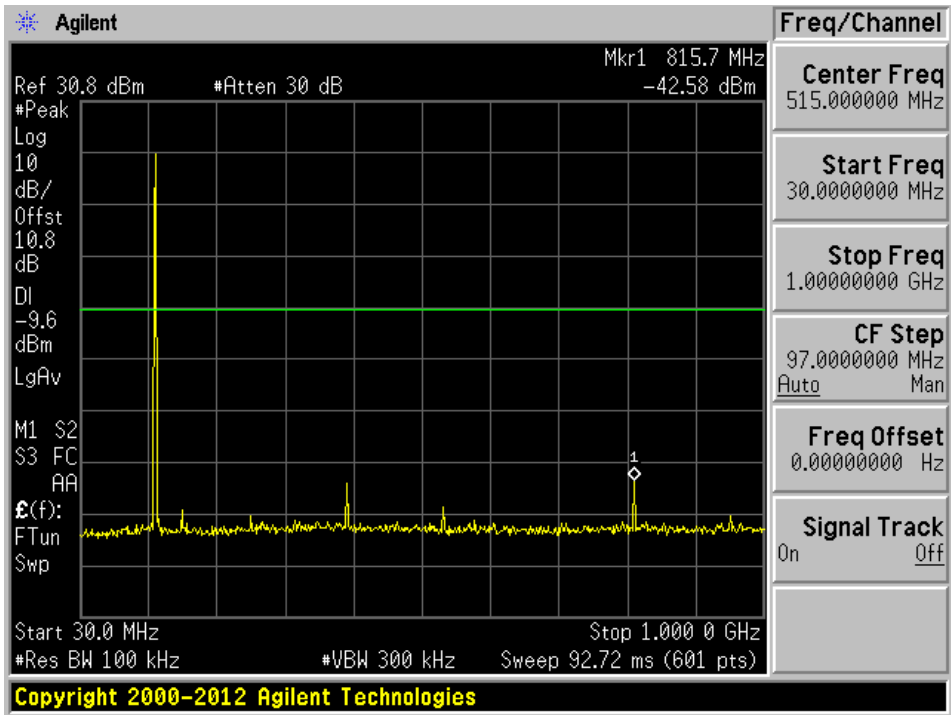
Temperature:	22 °C
Relative Humidity:	45 %
ATM Pressure:	101.2 kPa

The testing was performed by Chin Ming Lui on 2018-10-15 and 2018-10-16 at RF site.

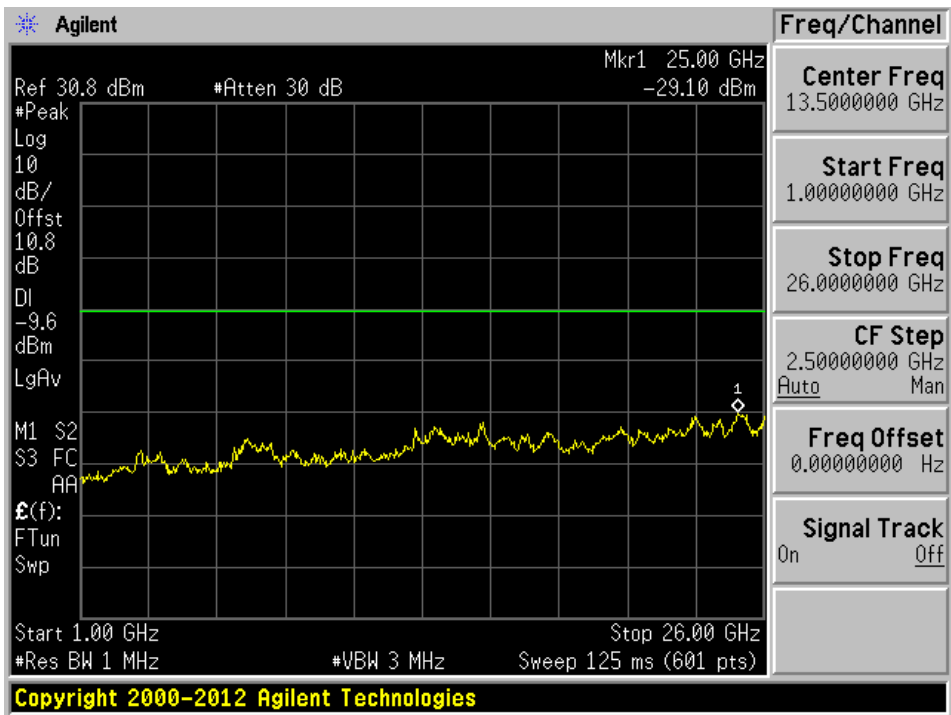
8.5 Test Results

Please refer to the following table plots for detailed test results:

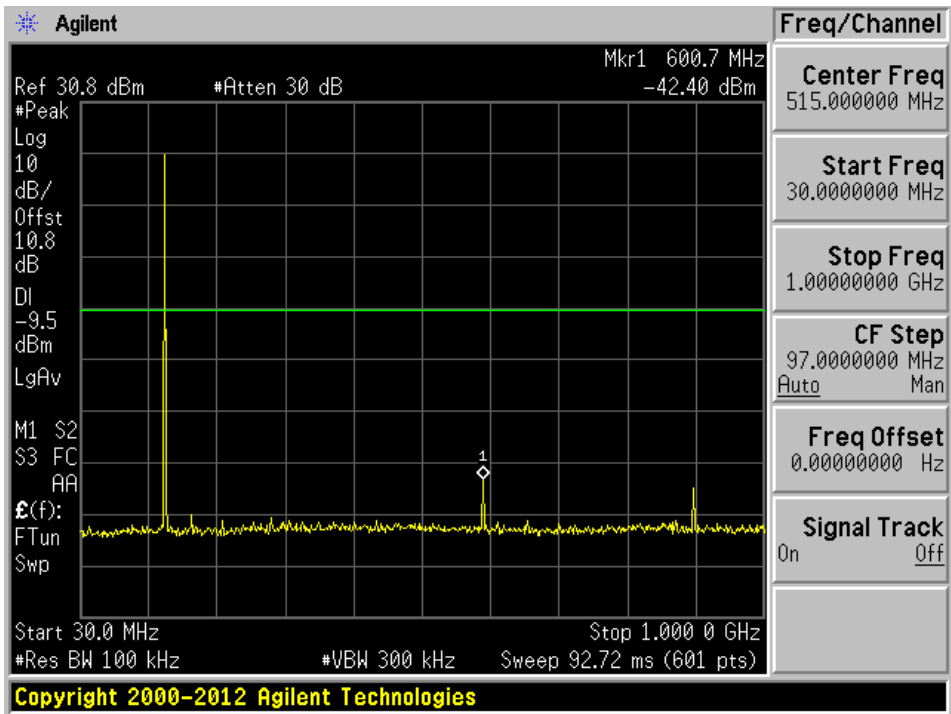
VHF 136 MHz 30 MHz – 1 GHz



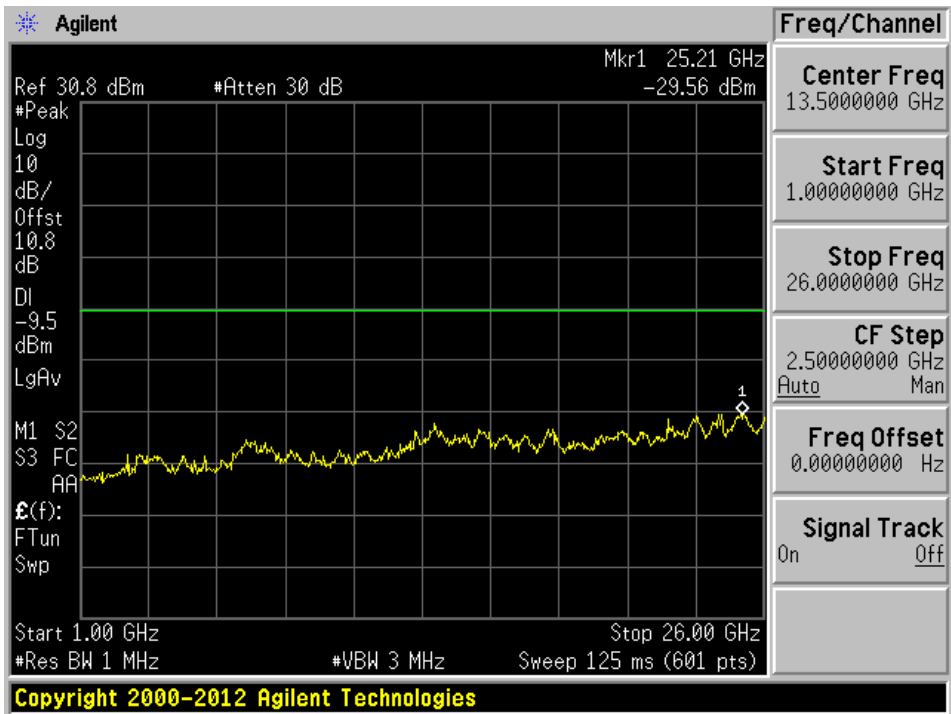
VHF 136 MHz 1 – 26 GHz



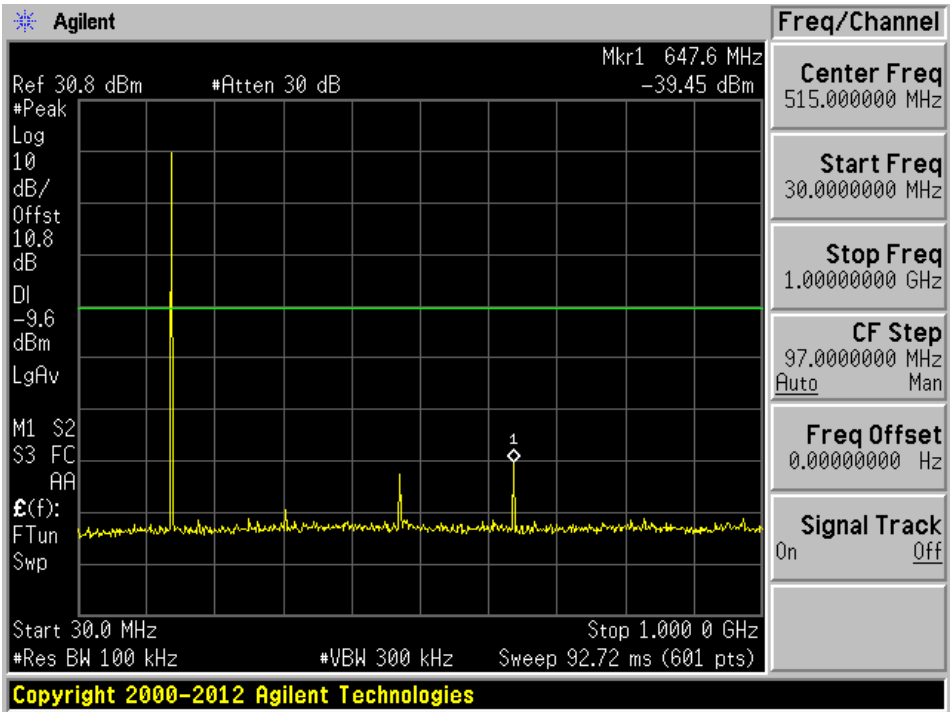
VHF 150 MHz 30 MHz – 1 GHz



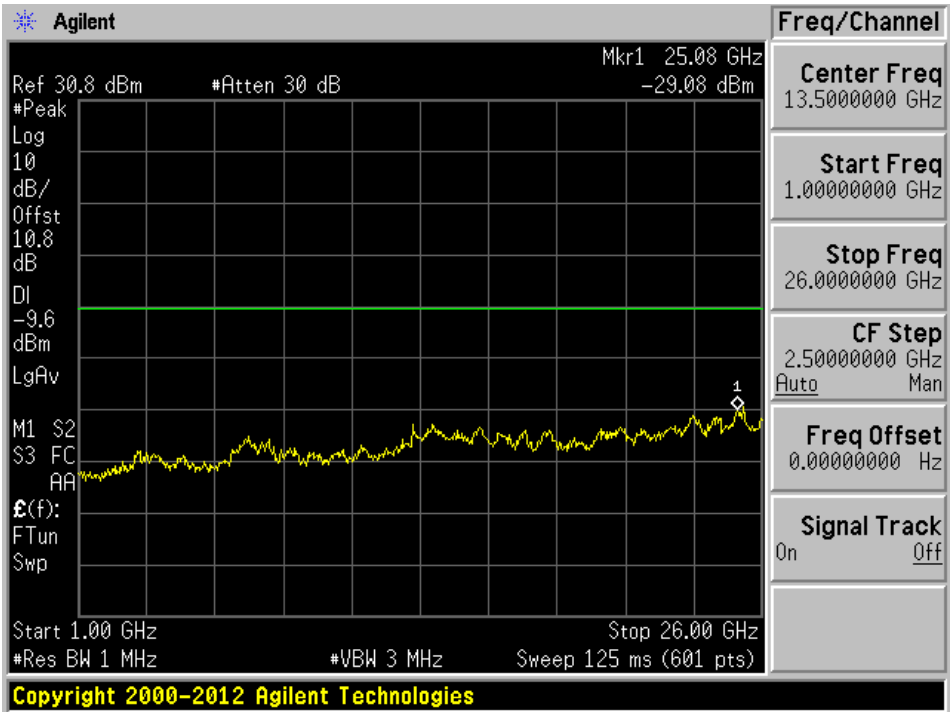
VHF 150 MHz 1 – 26 GHz



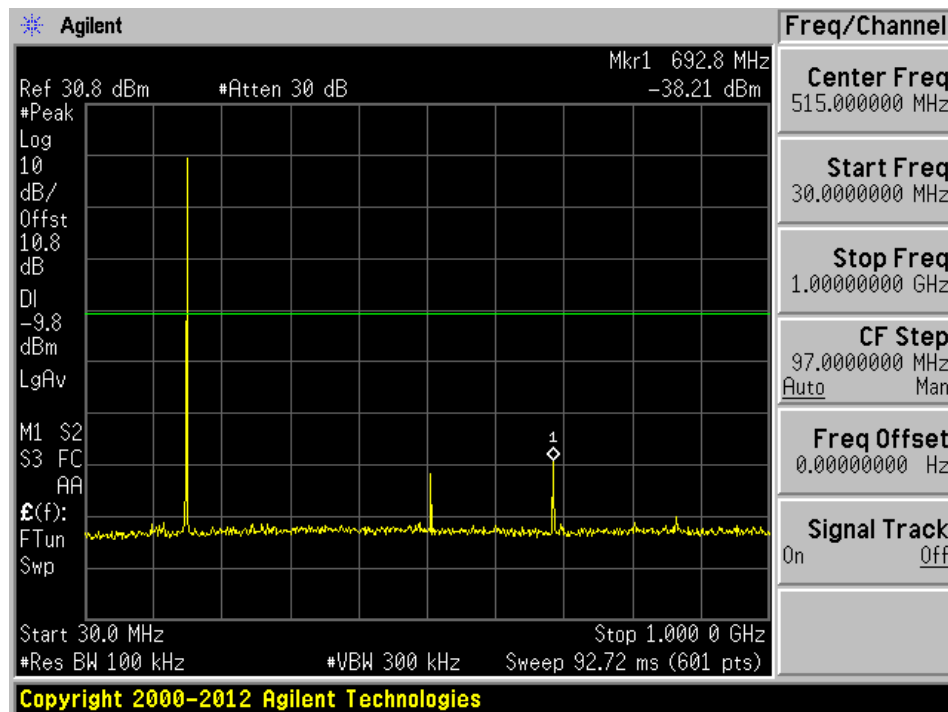
VHF 162 MHz 30 MHz – 1 GHz



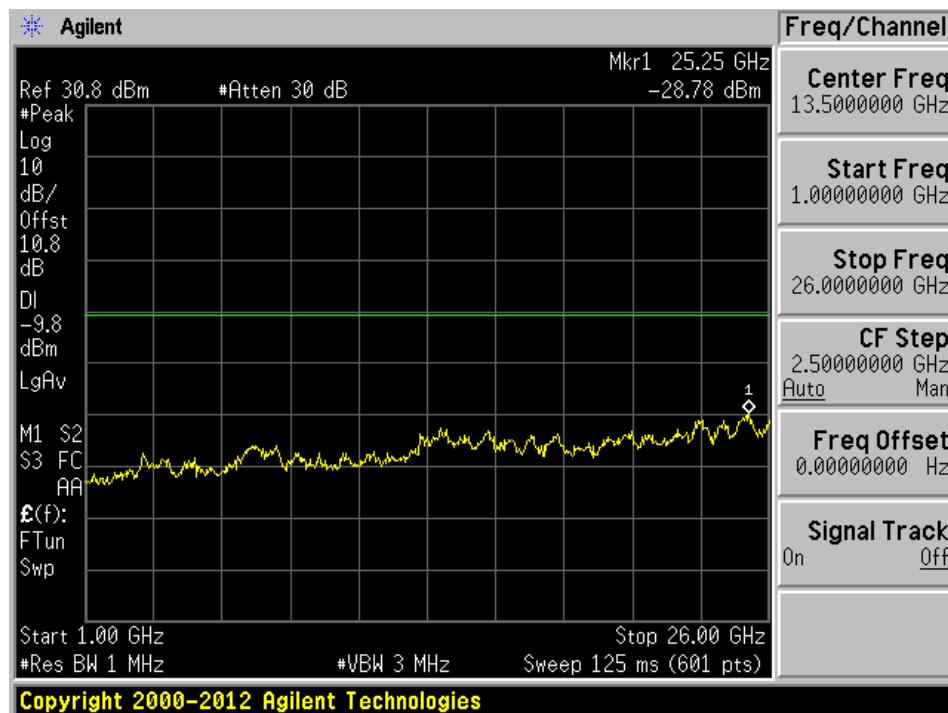
VHF 162 MHz 1 – 26 GHz



VHF 173.39 MHz 30 MHz – 1 GHz



VHF 173.39 MHz 1 – 26 GHz



9 FCC §90.217(a) & (b) - Transmitter Unwanted Emissions (Radiated)

9.1 Applicable Standards

According to FCC §90.217(a) & (b):

- (a) For equipment designed to operate with a 25 kHz channel bandwidth, the sum of the bandwidth occupied by the emitted signal plus the bandwidth required for frequency stability shall be adjusted so that any emission appearing on a frequency 40 kHz or more removed from the assigned frequency is attenuated at least 30 dB below the unmodulated carrier.
- (b) For equipment designed to operate with a 12.5 kHz channel bandwidth, the sum of the bandwidth occupied by the emitted signal plus the bandwidth required for frequency stability shall be adjusted so that any emission appearing on a frequency 25 kHz or more removed from the assigned frequency is attenuated at least 30 dB below the unmodulated carrier.

9.2 Test Procedure

Refer to ANSI/TIA-603-E-2016 Section 2.2.12 and KDB 971168 D01 v03r01 Section 7

9.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	US44300386	2018-06-01	1 year
Sunol Science Corp	System Controller	SC99V	011003-1	N/R	N/A
Sunol Sciences	Biconi-Log Antenna	JB1	A013105-3	2018-02-26	2 years
Agilent	Pre Amplifier	8447D	2944A10187	2018-04-02	1 year
HP	Pre-Amplifier	8449B	3147A00400	2018-02-02	1 year
A.R.A.	Horn Antenna	DRG-118/A	1132	2018-02-13	2 years
EMCO	Horn Antenna	3115	9511-4627	2018-03-28	2 years
HP	Signal Generator	83650B	3614A00276	2018-03-21	1 year
IW	AOBOR Hi frequency Co AX Cable	DC 1531	KPS-1501A3960K PS	2018-01-04	1 year
-	SMA cable	-	C00011	Each time ¹	N/A
COM-POWER	Dipole Antenna	AD-100	721033DB1, 2, 3, 4	2017-02-13	2 years

Note¹: cable included in the test set-up will be checked each time before testing.

Statement of Traceability: *BACL Corp.* attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with A2LA Policy P102 (dated 09 June 2016) "A2LA Policy on Metrological Traceability".

9.4 Test Environmental Conditions

Temperature:	22 °C
Relative Humidity:	40 %
ATM Pressure:	101.0 kPa

The testing was performed by Chin Ming Lui and Harry Zhao on 2018-10-17 at 5 meter chamber 3.

9.5 Test Results

EUT was configured to the highest power setting on worst case channel.

TX Mid CH (150 MHz) at the maximum output power:

Freq. (MHz)	S.A. Amp. (dBμV)	Table Azimuth (Degrees)	Test Antenna		Substitution				Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Freq. (MHz)	S.G. Level (dBm)	Antenna Gain (dB)	Cable Loss (dB)			
150 MHz CW Signal											
300	51.46	85	151	H	300	-53.38	0	0.227	-53.607	-7.7	-45.907
300	57.79	200	100	V	300	-44.54	0	0.227	-44.767	-7.7	-37.067
450	39.69	65	100	H	450	-66.89	0	0.227	-67.117	-7.7	-59.417
450	44.69	175	276	V	450	-59.37	0	0.227	-59.597	-7.7	-51.897
600	39.44	195	273	H	600	-63.9	0	0.227	-64.127	-7.7	-56.427
600	47.33	0	100	V	600	-54.8	0	0.227	-55.027	-7.7	-47.327
750	32.07	120	110	H	750	-69.3	0	0.335	-69.635	-7.7	-61.935
750	34.87	178	284	V	750	-64.15	0	0.335	-64.485	-7.7	-56.785
900	29.27	0	100	H	900	-70.27	0	0.335	-70.605	-7.7	-62.905
900	30.56	122	131	V	900	-65.45	0	0.335	-65.785	-7.7	-58.085
1050	52.81	0	135	H	1050	-58.68	6.559	0.335	-52.456	-7.7	-44.756
1050	53.08	0	124	V	1050	-58.65	6.559	0.335	-52.426	-7.7	-44.726
1200	50.38	0	100	H	1200	-62.03	7.458	0.335	-54.907	-7.7	-47.207
1200	50.86	0	100	V	1200	-61.45	7.458	0.335	-54.327	-7.7	-46.627
1350	51.64	0	100	H	1350	-59.95	7.766	0.335	-52.519	-7.7	-44.819
1350	51.88	193	230	V	1350	-59.79	7.766	0.335	-52.359	-7.7	-44.659

Note: E.i.r.p.= Conducted Output Power + Antenna Gain = 20.15+2.15=22.3 dBm, so the limit is 22.3-30=-7.7dBm.

10 Appendix A - FCC Equipment Labeling Requirements

10.1 FCC ID Label Requirements

As per FCC §2.925,

(a) Each equipment covered in an application for equipment authorization shall bear a nameplate or label listing the following:

(1) FCC Identifier consisting of the two elements in the exact order specified in §2.926. The FCC Identifier shall be preceded by the term FCC ID in capital letters on a single line, and shall be of a type size large enough to be legible without the aid of magnification.

Example: FCC ID: XXX123

Where: XXX—Grantee Code, 123—Equipment Product Code

As per FCC §15.19,

(a) In addition to the requirements in part 2 of this chapter, a device subject to certification, or verification shall be labeled as follows:

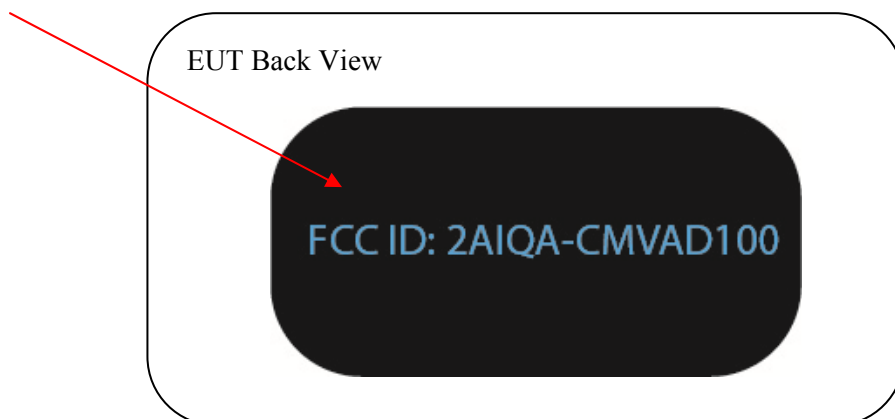
(3) All other devices shall bear the following statement in a conspicuous location on the device:

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

(4) Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified above is required to be affixed only to the main control unit. If the EUT is integrated within another device then a label affixed to the host shall also state, “Contains FCC ID: XXXXXX”

(5) When the device is so small or for such use that it is not practicable to place the statement specified under paragraph (a) of this section on it, the information required by this paragraph shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.

10.2 FCC ID Label Contents and Location



11 Appendix B - EUT Test Setup Photographs

Please refer to the attachment

12 Appendix C - EUT External Photographs

Please refer to the attachment

13 Appendix D - EUT Internal Photographs

Please refer to the attachment

14 Appendix E (Normative) - A2LA Electrical Testing Certificate



--- END OF REPORT ---