



FCC PART 27

TEST AND MEASUREMENT REPORT

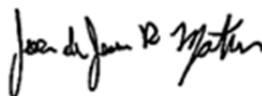
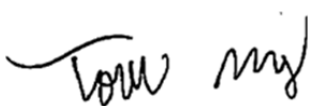
For

Intelibs, Inc.

1500 Stony Brook Road,

Stony Brook, NY 11794, USA

FCC ID: Z69D01T4JX6

Report Type: Original Report	Product Type: Medium power Remote Unit (MRU)
Prepared By: Jose Martinez Test Engineer	
Report Number: R1608092-27	
Report Date: 2016-12-19	
Reviewed By: Todd Moy RF Lead	
Bay Area Compliance Laboratories Corp. 1274 Anvilwood Avenue, Sunnyvale, CA 94089, USA Tel: (408) 732-9162 Fax: (408) 732 9164	

Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. This report **must not** be used by the customer to claim product certification, approval, or endorsement by A2LA* or any agency of the Federal Government.

* This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk

TABLE OF CONTENTS

1	GENERAL INFORMATION	5
1.1	PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	5
1.2	MECHANICAL DESCRIPTION	5
1.3	OBJECTIVE	5
1.4	RELATED SUBMITTAL(S)/GRANT(S).....	5
1.5	TEST METHODOLOGY	5
1.6	MEASUREMENT UNCERTAINTY.....	5
1.7	TEST FACILITY REGISTRATIONS	6
1.8	TEST FACILITY ACCREDITATIONS.....	6
2	SYSTEM TEST CONFIGURATION	9
2.1	JUSTIFICATION.....	9
2.2	EUT EXERCISE SOFTWARE.....	9
2.3	EQUIPMENT MODIFICATIONS	9
2.4	EUT INTERNAL CONFIGURATION	9
2.5	LOCAL SUPPORT EQUIPMENT LIST AND DETAILS	9
2.6	POWER SUPPLY AND LINE FILTERS.....	9
2.7	INTERFACE PORTS AND CABLING	10
3	SUMMARY OF TEST RESULTS.....	11
4	FCC §1.1307(B)(1) & §2.1091 - RF EXPOSURE	12
4.1	APPLICABLE STANDARDS	12
4.2	MPE PREDICTION	12
4.3	TEST RESULTS	13
5	FCC §2.1046 & §27.50 - RF OUTPUT POWER	14
5.1	APPLICABLE STANDARDS	14
5.2	TEST PROCEDURE	14
5.3	TEST EQUIPMENT LIST AND DETAILS	15
5.4	TEST ENVIRONMENTAL CONDITIONS.....	15
5.5	TEST RESULTS	16
6	FCC §2.1049 – OCCUPIED BANDWIDTH.....	17
6.1	APPLICABLE STANDARDS	17
6.2	TEST PROCEDURE	17
6.3	TEST EQUIPMENT LIST AND DETAILS	17
6.4	TEST ENVIRONMENTAL CONDITIONS.....	18
6.5	TEST RESULTS	18
7	FCC §2.1053 & §27.53 - SPURIOUS RADIATED EMISSIONS.....	31
7.1	APPLICABLE STANDARDS	31
7.2	TEST PROCEDURE	31
7.3	TEST EQUIPMENT LIST AND DETAILS	32
7.4	TEST SETUP BLOCK DIAGRAM.....	33
7.5	TEST ENVIRONMENTAL CONDITIONS.....	33
7.6	TEST RESULTS	34
8	FCC §2.1051 & §27.53 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS.....	36
8.1	APPLICABLE STANDARDS	36
8.2	TEST PROCEDURE	36
8.3	TEST EQUIPMENT LIST AND DETAILS	37
8.4	TEST ENVIRONMENTAL CONDITIONS.....	37

8.5	TEST RESULTS	37
9	FCC §27.53 - BAND EDGE & INTERMODULATION.....	74
9.1	APPLICABLE STANDARDS	74
9.2	TEST PROCEDURE	74
9.3	TEST EQUIPMENT LIST AND DETAILS	75
9.4	TEST ENVIRONMENTAL CONDITIONS.....	75
9.5	TEST RESULTS	75
10	FCC §20.21 - OUT OF BAND REJECTION.....	100
10.1	APPLICABLE STANDARD	100
10.2	TEST PROCEDURE	100
10.3	TEST EQUIPMENT LIST AND DETAILS	100
10.4	TEST ENVIRONMENTAL CONDITIONS.....	100
10.5	TEST RESULTS	101
11	ANNEX A (NORMATIVE) - FCC ID LABELING REQUIREMENTS	102
11.1	FCC ID LABEL REQUIREMENTS.....	102
11.2	FCC ID LABEL CONTENTS AND LOCATION	102
12	ANNEX B (NORMATIVE) - EUT SETUP PHOTOGRAPHS.....	104
12.1	RADIATED EMISSION BELOW 1 GHz FRONT VIEW.....	104
12.2	RADIATED EMISSION BELOW 1 GHz REAR VIEW.....	104
12.3	RADIATED EMISSION ABOVE 1 GHz FRONT VIEW	105
12.4	RADIATED EMISSION ABOVE 1 GHz REAR VIEW	105
13	ANNEX C (NORMATIVE) – EUT PHOTOGRAPHS.....	106
13.1	EUT – FRONT VIEW.....	106
13.2	EUT – REAR VIEW	106
13.3	EUT – LEFT VIEW	107
13.4	EUT – RIGHT VIEW	107
13.5	EUT – TOP VIEW	108
13.6	EUT – BOTTOM VIEW	108
13.7	EUT – MRU RF/OPTIC MODULE TOP VIEW.....	109
13.9	EUT – MRU RF/OPTIC MODULE INTERNAL TOP VIEW.....	110
13.10	EUT – MRU RF/OPTIC MODULE INTERNAL TOP VIEW.....	110
13.11	EUT – MRU DC/DC CONVERTER ASSEMBLY TOP VIEW.....	111
13.13	EUT – MRU-HPA FOR LOW BAND TOP VIEW	112
13.14	EUT – MRU-HPA FOR LOW BAND SIDE VIEW	112
13.15	EUT – MRU-HPA FOR LOW BAND INTERNAL TOP VIEW	113
13.16	EUT – MRU-HPA FOR HIGH BAND TOP VIEW	113
13.17	EUT – MRU-HPA FOR HIGH BAND SIDE VIEW	114
13.18	EUT – MRU-HPA FOR HIGH BAND INTERNAL TOP VIEW	114
13.19	EUT – MRU- MULTIPLEXER TOP VIEW	115
13.20	EUT – MRU- MULTIPLEXER BOTTOM VIEW	115
13.21	EUT – MRU- MULTIPLEXER INSIDE TOP VIEW.....	116
13.22	EUT – MRU – MULTIPLEXER INSIDE BOTTOM VIEW	116
13.23	EUT POWER ADAPTER	117
13.24	SUPPORT EQUIPMENT – FRONT VIEW	117
13.25	SUPPORT EQUIPMENT – FRONT VIEW	118
13.26	SUPPORT EQUIPMENT – LEFT VIEW	118
13.27	SUPPORT EQUIPMENT – RIGHT VIEW	119
13.28	SUPPORT EQUIPMENT – TOP VIEW.....	119
13.29	SUPPORT EQUIPMENT – BOTTOM VIEW	120

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1608092-27	Original	2016-12-19

1 General Information

1.1 Product Description for Equipment under Test (EUT)

This test and measurement report was prepared on behalf of *Intelibs Inc.* and their product model: MRU, FCC ID: Z69D01T4JX6, which will henceforth be referred to as the EUT (Equipment under Test). The EUT is a Medium power Remote Unit (MRU). The EUT operated in the downlink of the ESMR, cellular, broadband PCS, 700 MHz, and AWS-1 frequency bands.

1.2 Mechanical Description

The EUT measured approximately 36.5 cm (L) x 28 cm (W) x 12.3 cm (H) and weighs 14 kg.

The test data gathered are from typical production sample, serial number: R1608092-1, assigned by BACL.

1.3 Objective

This type approval report was prepared on behalf of *Intelibs, Inc.* in accordance with Part 2, Subpart J, Part 20.21, and Part 27 of the Federal Communication Commission's rules.

The objective is to determine compliance with FCC rules for RF output power, occupied bandwidth, spurious emissions at antenna terminal, field strength of spurious radiation and band edge.

1.4 Related Submittal(s)/Grant(s)

FCC Part 22, Subpart H, Equipment B2I with FCC ID: Z69D01T4JX6

FCC Part 24, Subpart E, Equipment B2I with FCC ID: Z69D01T4JX6

FCC Part 90, Subpart S, Equipment B2I with FCC ID: Z69D01T4JX6

1.5 Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-part J as well as the following parts:

Part 20.21 – Signal Boosters

Part 27 - Miscellaneous Wireless Communication Services

Applicable Standards: TIA/EIA603-D, FCC KDB 935210.

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.

1.6 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.

Parameter	Measurement uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.57 dB
Unwanted Emissions, conducted	±1.57dB
All emissions, radiated	±4.0 dB
Temperature	±2 ° C
Humidity	±5 %
DC and low frequency voltages	±1.0 %
Time	±2 %
Duty Cycle	±3 %

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 3297.02), 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 Accreditation Certificate Number 3297.03) to certify

- 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 (Industry 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 (Info-Communications Development Authority (IDA)):
 - 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 3297.01) 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: (Industry Canada - IC) 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/EC US-EU EMC & Telecom MRA CAB
 - o Radio & Teleterminal Equipment (R&TTE) Directive 1995/5/EC
US -EU EMC & Telecom MRA CAB
- 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 Development Authority - IDA) 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;
- Vietnam: APEC Tel MRA -Phase I;

2 System Test Configuration

2.1 Justification

The EUT was configured for testing according to TIA/EIA-603-D.
The final qualification test was performed with the EUT operating at normal mode.

2.2 EUT Exercise Software

There was no exercise software with the EUT; signal was sent through EUT using a signal generator.

2.3 Equipment Modifications

No modifications were made to the EUT.

2.4 EUT Internal Configuration

Manufacturer	Description	Model	Serial Number
Intelibs	DC/DC Converter	-	-
Intelibs	Low Band High Power Amplifier	-	-
Intelibs	High Band High Power Amplifier	-	-
Intelibs	RF/Optic Module	-	-
Intelibs	Quad Band Multiplexer	-	-

2.5 Local Support Equipment List and Details

NA

2.6 Power Supply and Line Filters

Manufacturers	Descriptions	Models	Serial Numbers
XP Power	AC/DC Power Adapter w/ PoE Cable	AFE220PS48	102236

2.7 Interface Ports and Cabling

Cable Description	Length (m)	From	To
RF cable	< 1	Signal Generator	Support Equipment
RF cable	< 1	EUT Output	Spectrum Analyzer
Fiber Optic Cable	1	Support Equipment	EUT Input

3 Summary of Test Results

FCC Rules	Description of Tests	Results
§2.1091	RF Exposure	Compliant
§2.1046, §27.50	RF Output Power	Compliant
§2.1049	26 dB Occupied Bandwidth	Compliant
§2.1053, §27.53	Spurious Radiated Emissions	Compliant
§2.1053, §27.53	Spurious Emissions at Antenna Terminals	Compliant
§2.1053, §27.53	Band Edge & Intermodulation	Compliant
§2.1055, §27.54	Frequency Stability	N/A ¹
§20.21	Out of Band Rejection	Compliant

¹ The EUT was a signal booster.

4 FCC §1.1307(b)(1) & §2.1091 - RF Exposure

4.1 Applicable Standards

FCC §2.1091, (a) Requirements of this section are a consequence of Commission responsibilities under the National Environmental Policy Act to evaluate the environmental significance of its actions. See subpart I of part 1 of this chapter, in particular §1.1307(b).

According to §1.1310 and §2.1091 RF exposure is calculated.

Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

Note: f = frequency in MHz

* = Plane-wave equivalent power density

4.2 MPE Prediction

Predication of MPE limit at a given distance, Equation from OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S = power density

P = power input to antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

4.3 Test Results

728–746 MHz

<u>Maximum peak output power at antenna input terminal (dBm):</u>	<u>33.36</u>
<u>Maximum peak output power at antenna input terminal (mW):</u>	<u>2167.70</u>
<u>Prediction distance (cm):</u>	<u>110</u>
<u>Prediction frequency (MHz):</u>	<u>737</u>
<u>Antenna Gain, typical (dBi):</u>	<u>15</u>
<u>Maximum Antenna Gain (numeric):</u>	<u>31.62</u>
<u>Power density at predication frequency and distance (mW/cm²):</u>	<u>0.4508</u>
<u>MPE limit for uncontrolled exposure at predication frequency (mW/cm²):</u>	<u>0.49</u>

746-757 MHz

<u>Maximum peak output power at antenna input terminal (dBm):</u>	<u>33.09</u>
<u>Maximum peak output power at antenna input terminal (mW):</u>	<u>2037.04</u>
<u>Prediction distance (cm):</u>	<u>110</u>
<u>Prediction frequency (MHz):</u>	<u>751.5</u>
<u>Antenna Gain, typical (dBi):</u>	<u>15</u>
<u>Maximum Antenna Gain (numeric):</u>	<u>31.62</u>
<u>Power density at predication frequency and distance (mW/cm²):</u>	<u>0.4236</u>
<u>MPE limit for uncontrolled exposure at predication frequency (mW/cm²):</u>	<u>0.501</u>

2110-2155 MHz

<u>Maximum peak output power at antenna input terminal (dBm):</u>	<u>33.38</u>
<u>Maximum peak output power at antenna input terminal (mW):</u>	<u>2177.71</u>
<u>Prediction distance (cm):</u>	<u>110</u>
<u>Prediction frequency (MHz):</u>	<u>2132.5</u>
<u>Antenna Gain, typical (dBi):</u>	<u>15</u>
<u>Maximum Antenna Gain (numeric):</u>	<u>31.62</u>
<u>Power density at predication frequency and distance (mW/cm²):</u>	<u>0.4529</u>
<u>MPE limit for uncontrolled exposure at predication frequency (mW/cm²):</u>	<u>1.0</u>

Results

The highest power density levels at 110 cm are below the MPE uncontrolled exposure limits with a 15 dBi antenna gain for each of the frequency bands.

5 FCC §2.1046 & §27.50 - RF Output Power

5.1 Applicable Standards

According to FCC §27.50 (b) (2), fixed and base stations transmitting a signal in the 746-757 MHz and 776-787 MHz bands with an emission bandwidth of 1 MHz or less must not exceed an ERP of 1000 watts and an antenna height of 305 m HAAT, except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 1000 watts ERP in accordance with Table 1 of this section.

According to FCC §27.50 (b) (4), fixed and base stations transmitting a signal in the 746-757 MHz and 776-787 MHz bands with an emission bandwidth greater than 1 MHz must not exceed an ERP of 1000 watts/MHz and an antenna height of 305 m HAAT, except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 1000 watts/MHz ERP in accordance with Table 3 of this section.

According to FCC §27.50 (c) (1), for transmitters in the 698-746 MHz band, fixed and base stations transmitting a signal with an emission bandwidth of 1 MHz or less must not exceed an effective radiated power (ERP) of 1000 watts and an antenna height of 305 m height above average terrain (HAAT), except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 1000 watts ERP in accordance with Table 1 of this section.

According to FCC §27.50 (c) (3), for transmitters in the 698-746 MHz band, fixed and base stations transmitting a signal with an emission bandwidth greater than 1 MHz must not exceed an ERP of 1000 watts/MHz and an antenna height of 305 m HAAT, except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 1000 watts/MHz ERP in accordance with Table 3 of this section.

According to FCC §27.50 (d) (2), the power of each fixed or base station transmitting in the 1995-2000 MHz, the 2110-2155 MHz 2155-2180 MHz band, or 2180-2200 MHz band and situated in any geographic location other than that described in paragraph (d)(1) of this section is limited to:

- (i) An equivalent isotropically radiated power (EIRP) of 1640 watts when transmitting with an emission bandwidth of 1 MHz or less.
- (ii) An EIRP of 1640 watts/MHz when transmitting with an emission bandwidth greater than 1 MHz.

5.2 Test Procedure

Conducted:

The signal generator was connected to the support equipment and the support equipment was connected to the EUT through a fiber cable. The output of the EUT was connected to a spectrum analyzer through appropriate attenuation.



5.3 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates	Calibration Interval
Agilent	Analyzer, Spectrum	E4440A	US 42221851	2016-06-10	1 year
Rohde & Schwarz	Generator, Signal	SMIQ03	849192/0085	2016-07-29	2 year
Keysight Technologies	Vector Signal Generator	N5182B	MY51350070	2015-11-18	1 year
-	20 dB attenuator	-	-	Each Time ¹	Each Time ¹
-	20 dB attenuator	-	-	Each Time ¹	Each Time ¹
-	SMA cable	-	C0003	Each Time ¹	Each Time ¹
-	SMA cable	-	C0006	Each Time ¹	Each Time ¹

¹Note: This equipment was calibrated for each test.

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 9 June 2016) “A2LA Policy on Metrological Traceability”.

5.4 Test Environmental Conditions

Temperature:	23° C
Relative Humidity:	32 %
ATM Pressure:	101.4-102 kPa

The testing was performed by Jose Martinez 2016-09-28 in the RF Site.

5.5 Test Results

728-746 MHz

Signal Type	AGC	Input Power (dBm)	Output Power (dBm)	Gain (dB)	ERP (dBm)
Broadband	Off	-53.93	28.35	82.28	41.20
	On	-50.40	32.41	82.81	45.26
Narrowband	Off	-51.00	31.94	82.94	44.79
	On	-47.65	33.36	81.01	46.21

746-757 MHz

Signal Type	AGC	Input Power (dBm)	Output Power (dBm)	Gain (dB)	ERP (dBm)
Broadband	Off	-54.98	28.13	83.11	40.98
	On	-51.48	31.70	83.18	44.55
Narrowband	Off	-52.84	30.58	83.42	43.43
	On	-49.77	33.09	82.86	45.94

2110-2155 MHz

Signal Type	AGC	Input Power (dBm)	Output Power (dBm)	Gain (dB)	EIRP (dBm)
Broadband	Off	-51.26	29.84	81.1	44.84
	On	-47.72	33.38	81.1	48.38
Narrowband	Off	-51.42	32.60	84.02	47.60
	On	-48.12	31.85	79.97	46.85

Note: ERP=Conducted Output Power (dBm) + Antenna Gain (dBi) -2.15 dB, gain of the antenna that applies to this device is 15 dBi.

EIRP=Conducted Output Power (dBm) + Antenna Gain (dBi), gain of the antenna that applies to this device is 15 dBi.

Note: Calculation results of the amplifier gain listed in the table above contains two parts: gain of MRU (the EUT) and gain of RHU. The typical gain of the EUT was 45 dB, while the typical gain of RHU was 40 dB. Please refer to FCC ID: Z69D01T4JX5 for the RHU.

6 FCC §2.1049 – Occupied Bandwidth

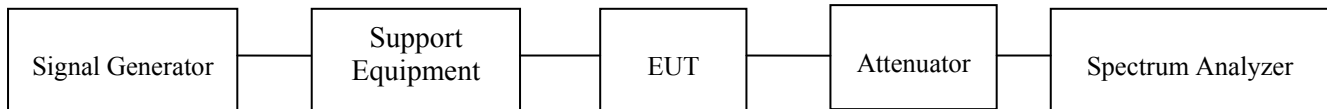
6.1 Applicable Standards

Requirements: FCC §2.1049

6.2 Test Procedure

The signal generator was connected to the support equipment and the support equipment was connected to the EUT through a fiber cable. The output of the EUT was connected to a spectrum analyzer through appropriate attenuation.

The resolution bandwidth of the spectrum analyzer was set to at least 1 to 5% of the anticipated OBW and the 26 dB & 99% bandwidth was recorded.



6.3 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates	Calibration Interval
Agilent	Analyzer, Spectrum	E4440A	US 42221851	2016-06-10	1 year
Rohde & Schwarz	Generator, Signal	SMIQ03	849192/0085	2016-07-29	2 years
Keysight Technologies	Vector Signal Generator	N5182B	MY51350070	2015-11-18	1 year
-	20 dB attenuator	-	-	Each Time ¹	Each Time ¹
-	20 dB attenuator	-	-	Each Time ¹	Each Time ¹
-	SMA cable	-	C0003	Each Time ¹	Each Time ¹
-	SMA cable	-	C0006	Each Time ¹	Each Time ¹

¹Note: This equipment was calibrated for each test.

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 9 June 2016) “A2LA Policy on Metrological Traceability”.

6.4 Test Environmental Conditions

Temperature:	23° C
Relative Humidity:	32 %
ATM Pressure:	101.4-102 kPa

The testing was performed by Jose Martinez 2016-08-26 in the RF Site.

6.5 Test Results

Please refer to the following table and plots.

728–746 MHz

Signal Type	AGC	Input	Output
		99 % OBW (kHz)	99 % OBW (kHz)
Broadband	off	4127.1	4120.2
	on	4127.1	4109.6
Narrowband	off	242.77	240.93
	on	242.77	243.63

746–757 MHz

Signal Type	AGC	Input	Output
		99 % OBW (kHz)	99 % OBW (kHz)
Broadband	off	4129.2	4129.5
	on	4129.2	4132.7
Narrowband	off	241.68	241.90
	on	241.68	243.47

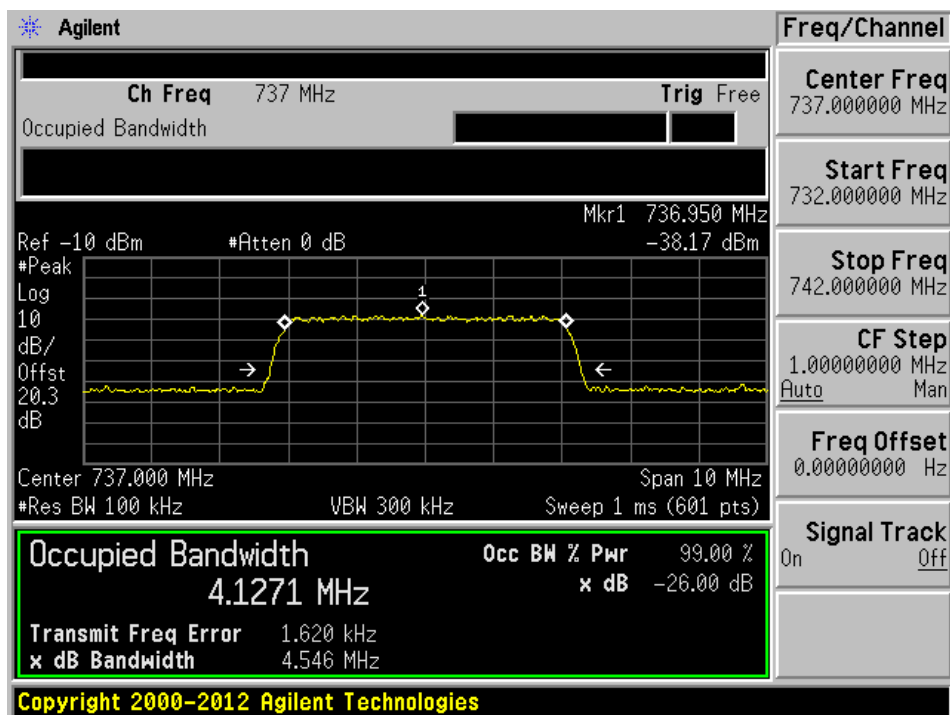
2110–2155 MHz

Signal Type	AGC	Input	Output
		99 % OBW (kHz)	99 % OBW (kHz)
Broadband	off	4112.7	4112.4
	on	4112.7	4119.9
Narrowband	off	242.52	241.83
	on	242.52	242.66

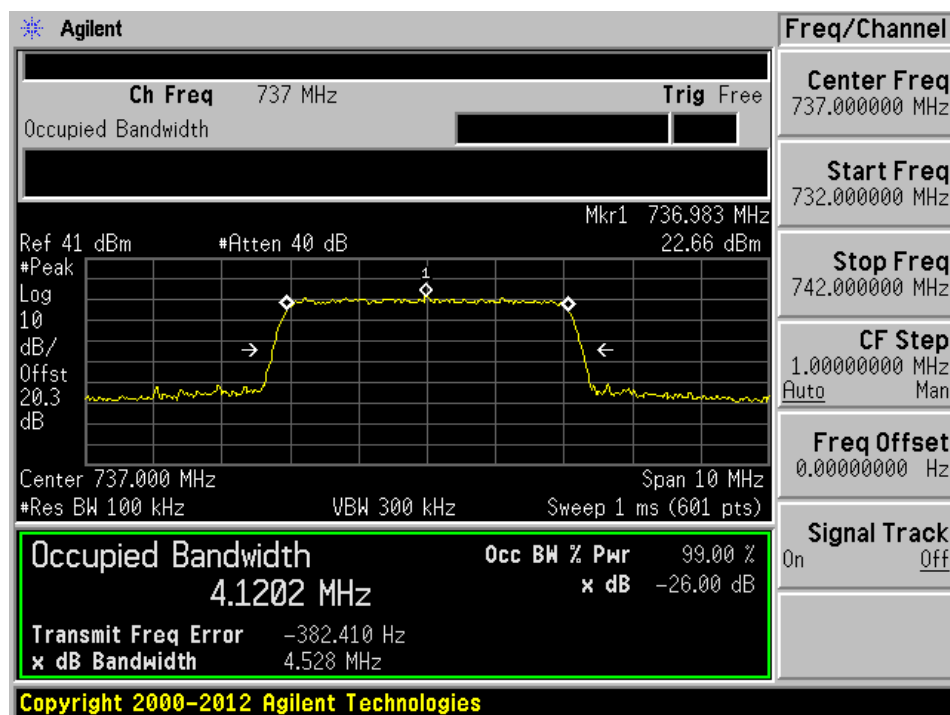
728–746 MHz, Broadband Signal

AGC off

Input

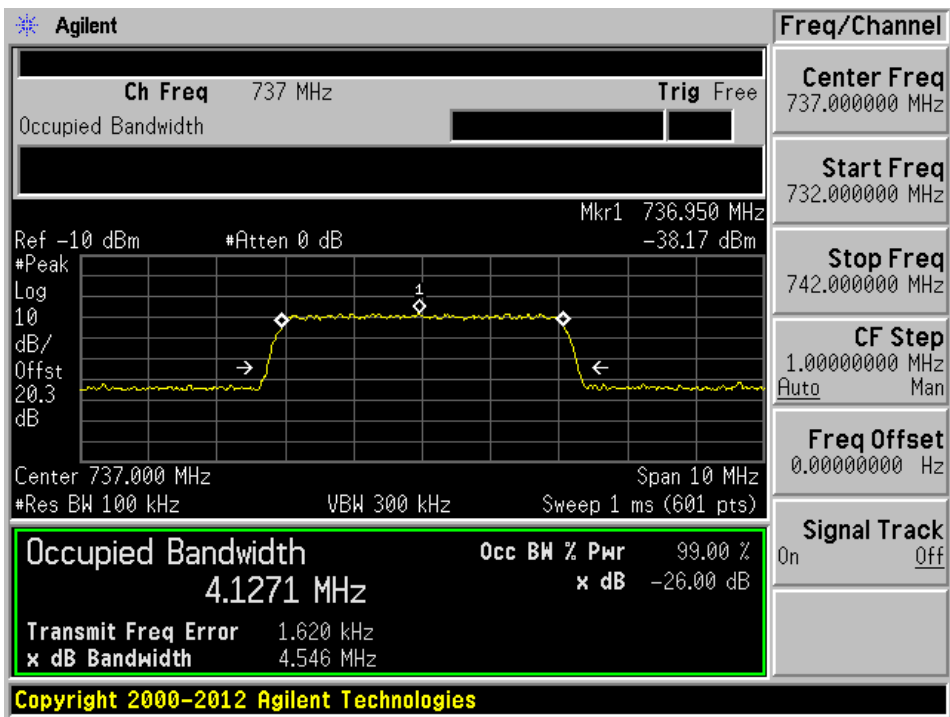


Output

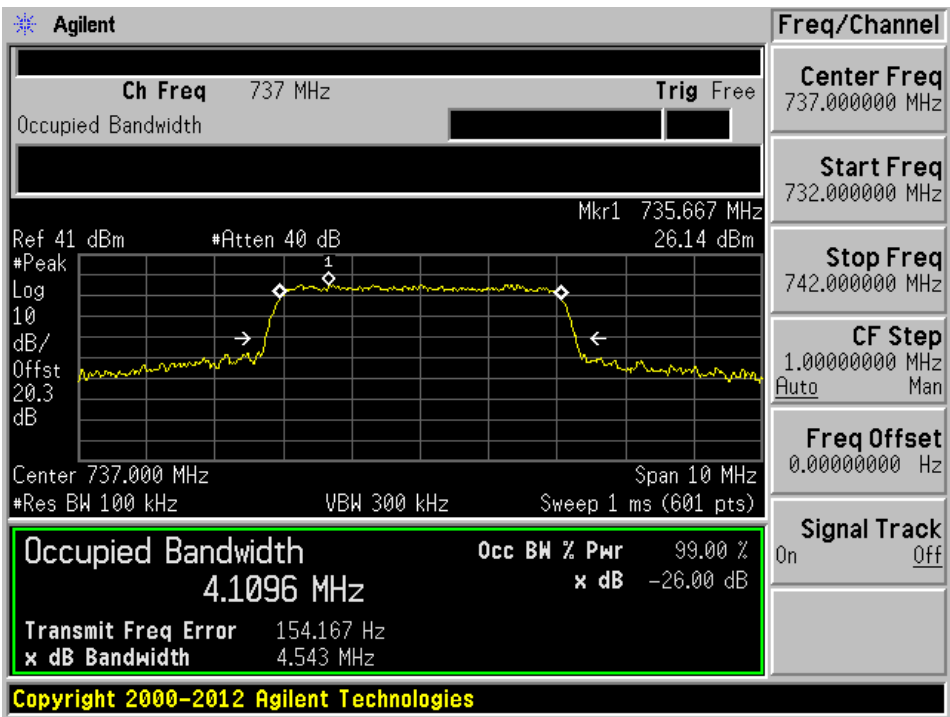


AGC on

Input



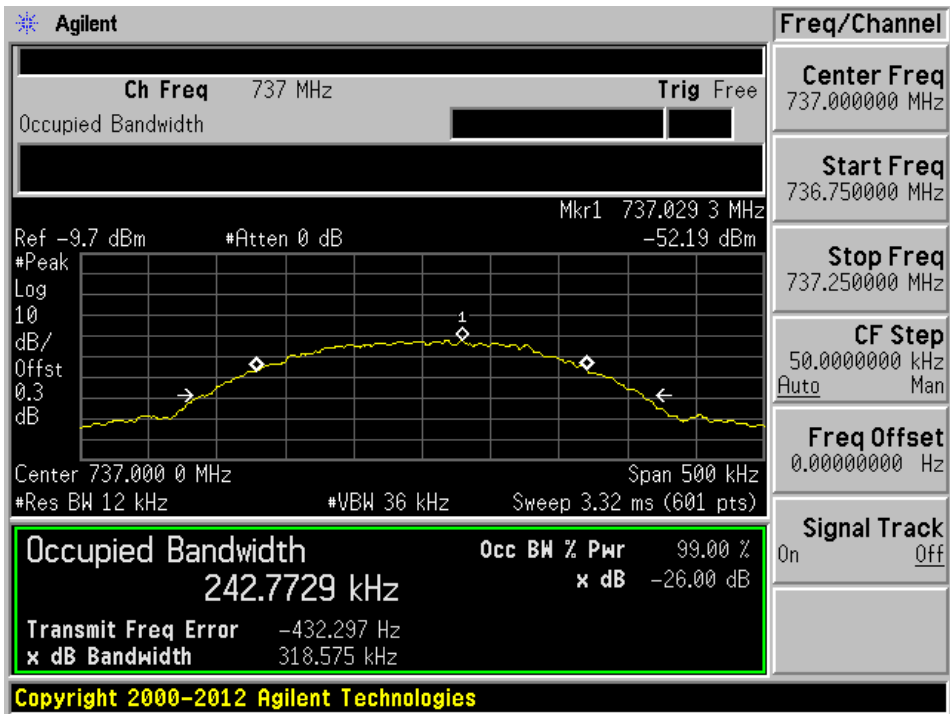
Output



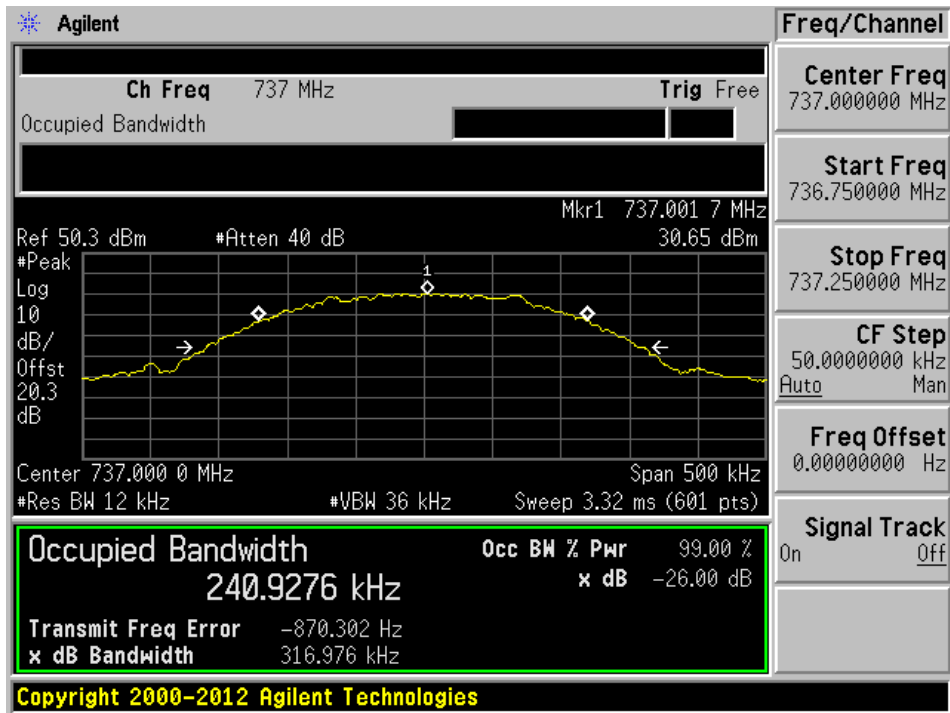
728–746 MHz, Narrowband Signal

AGC off

Input

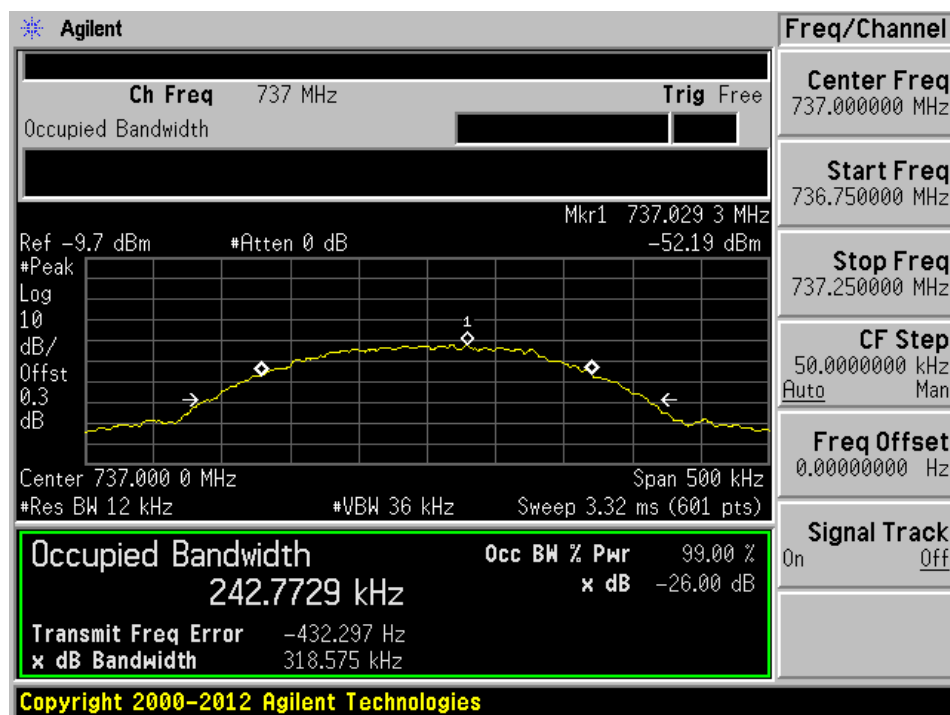


Output

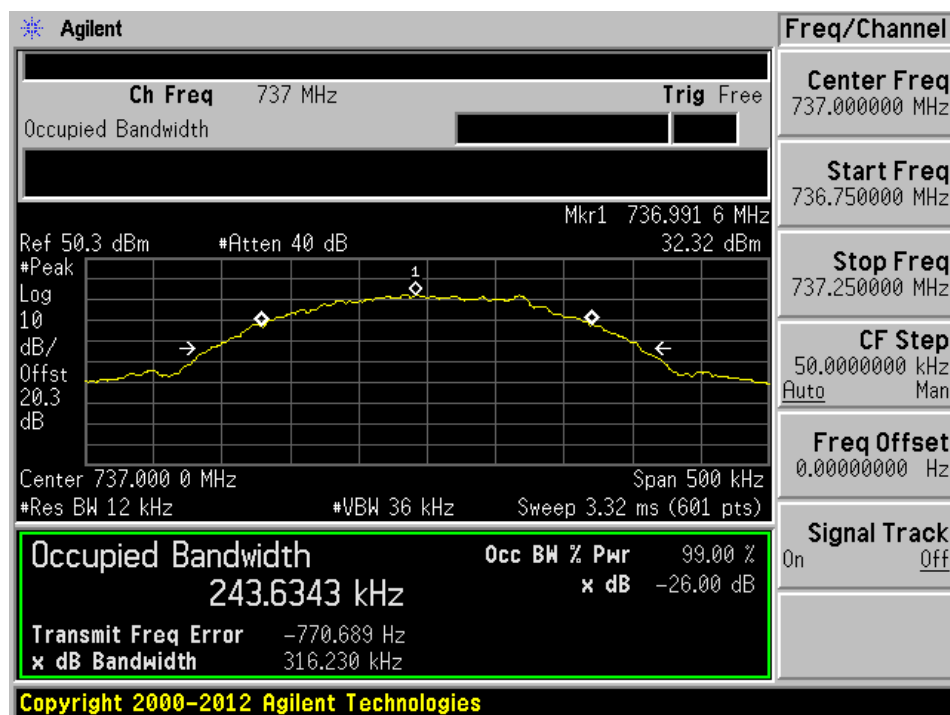


AGC on

Input



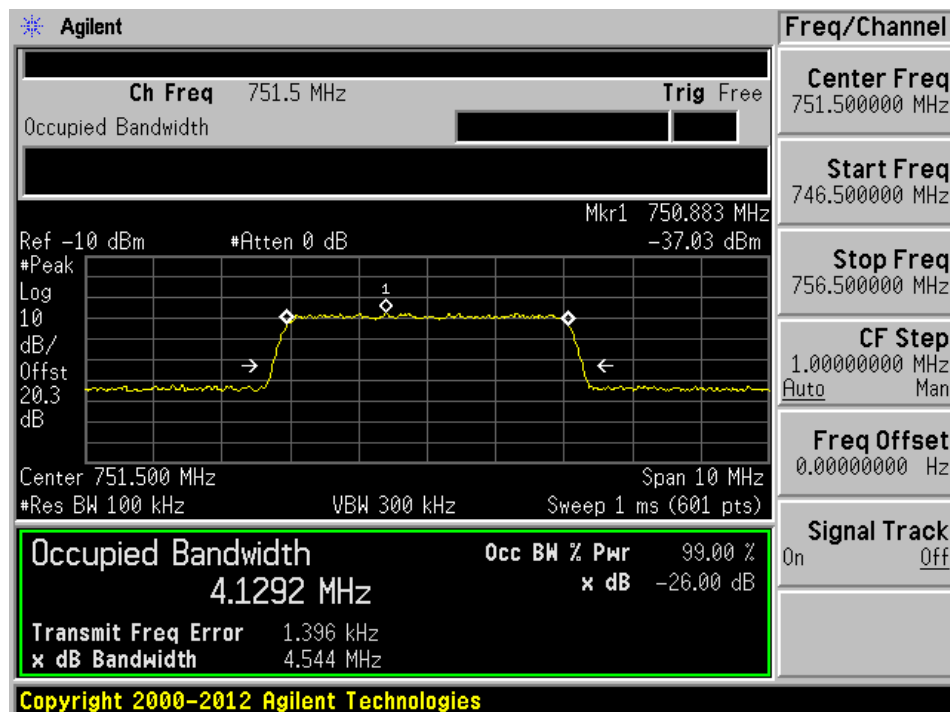
Output



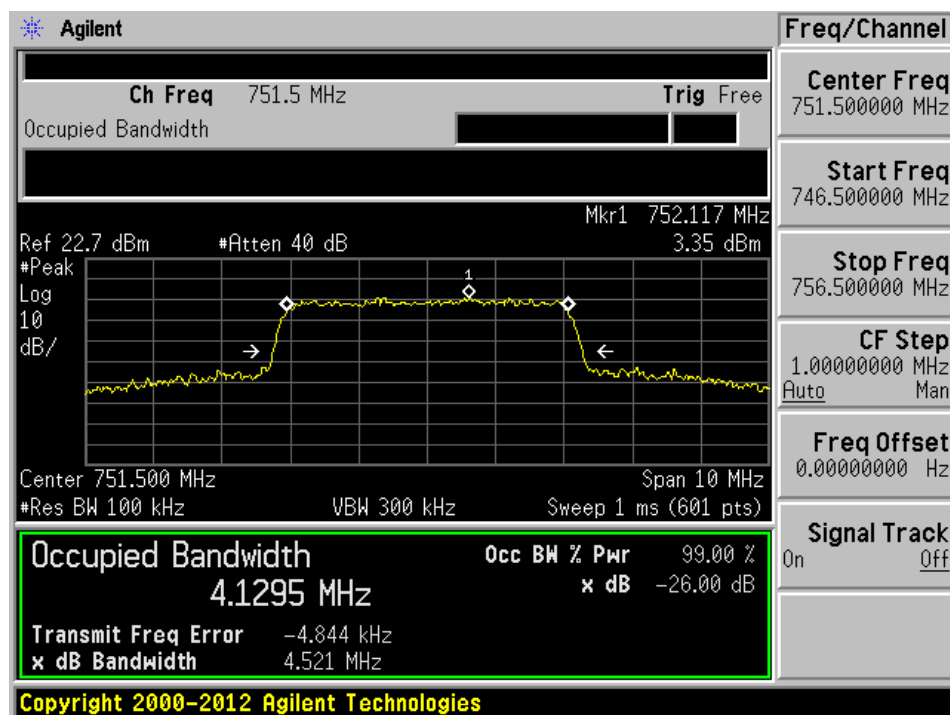
746–757 MHz, Broadband Signal

AGC off

Input

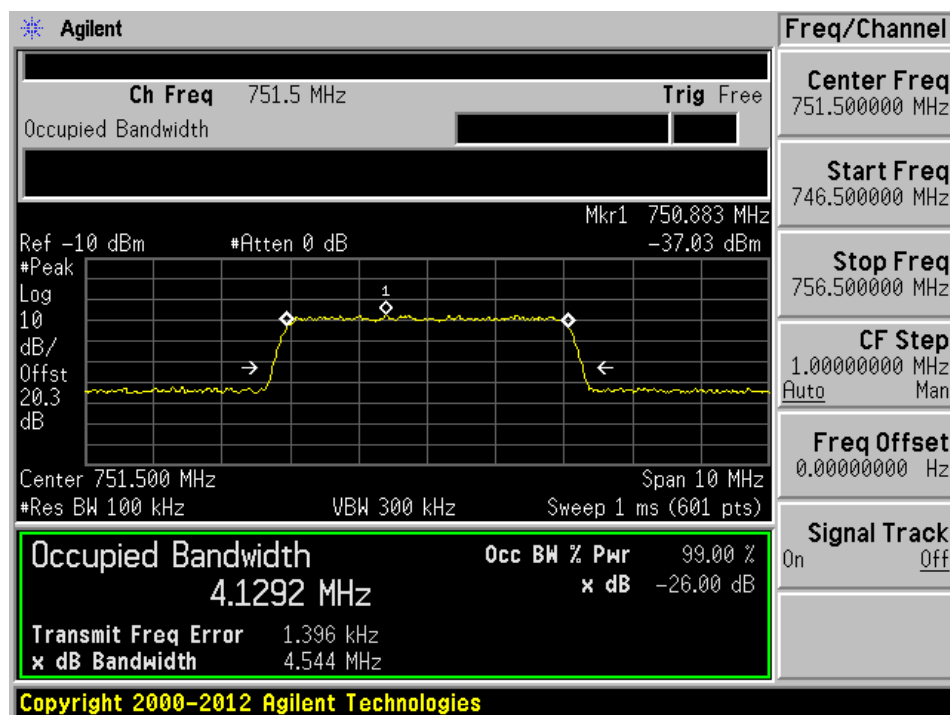


Output

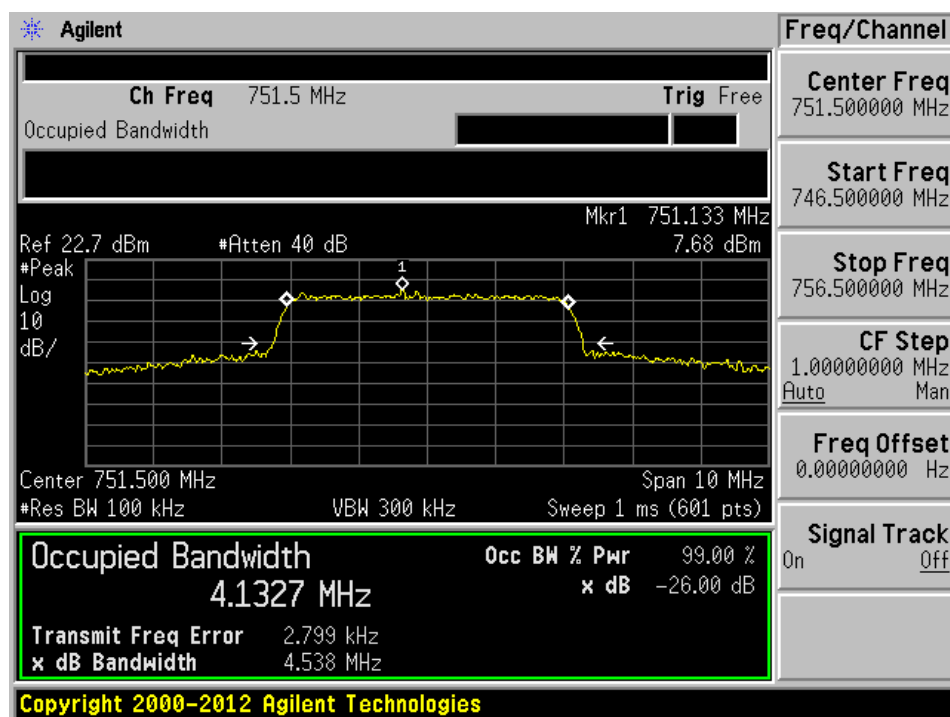


AGC on

Input



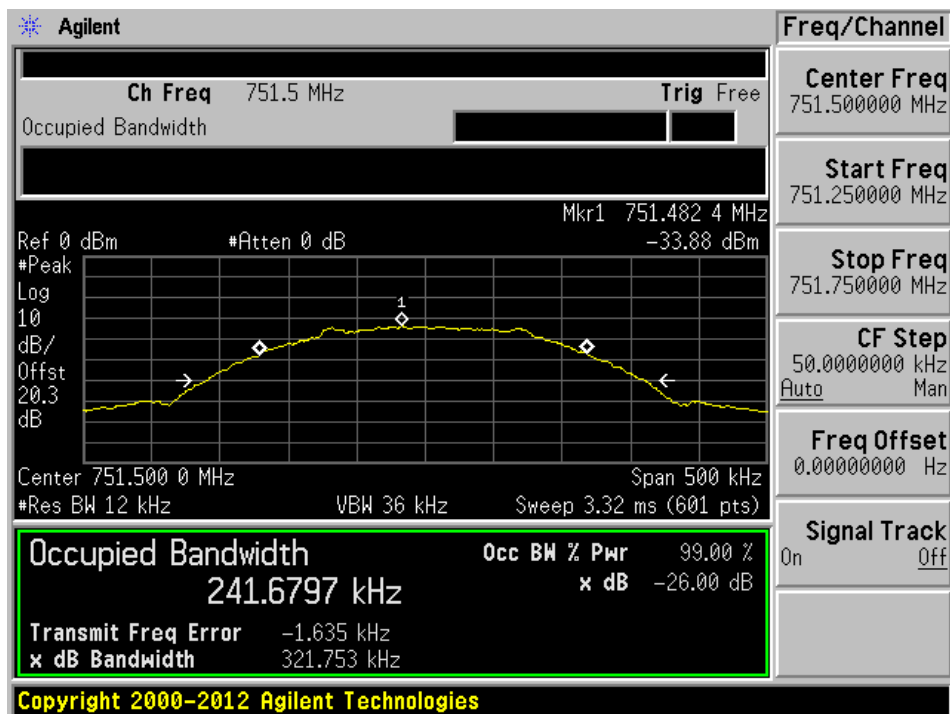
Output



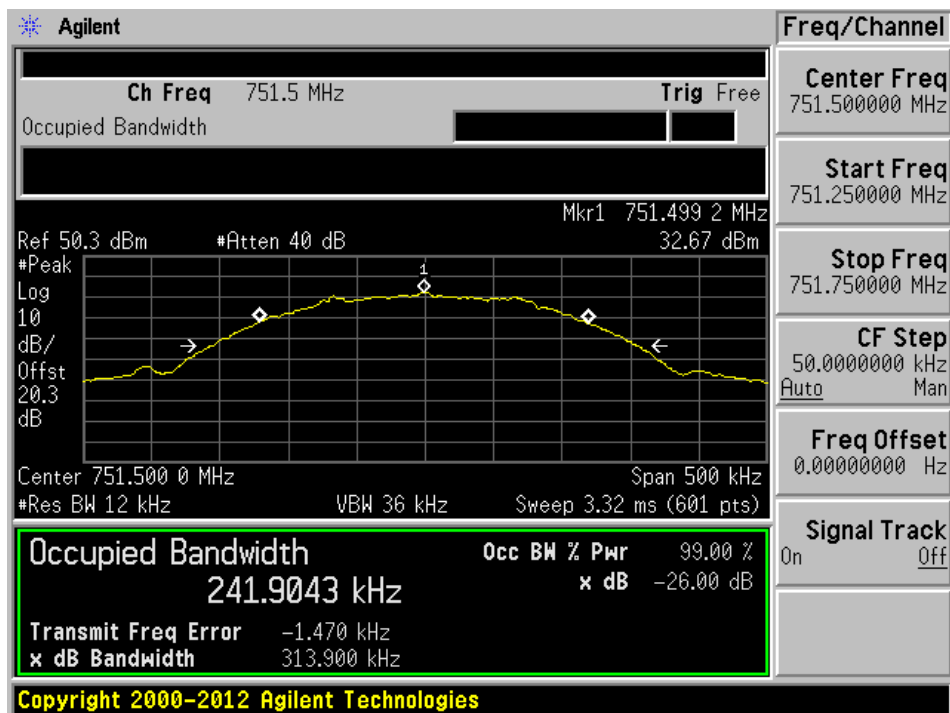
746–757 MHz, Narrowband Signal

AGC off

Input

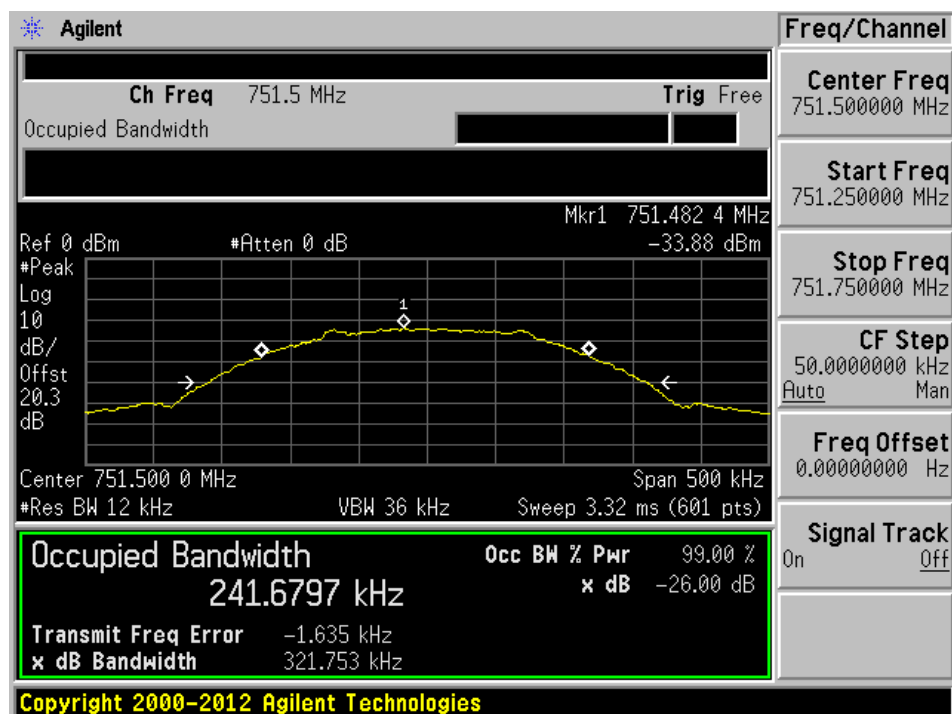


Output

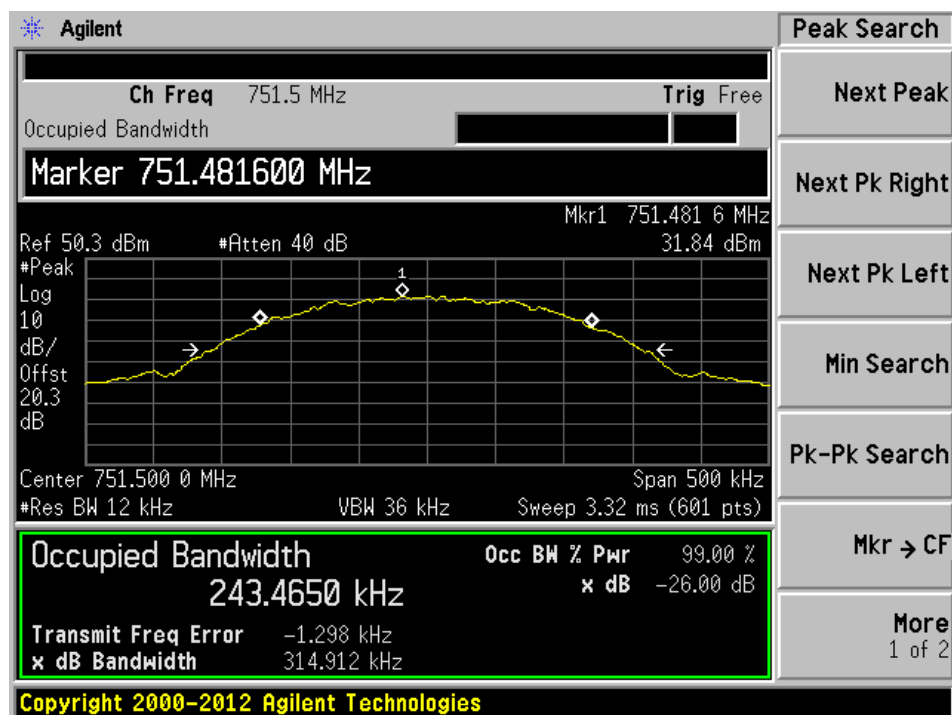


AGC on

Input



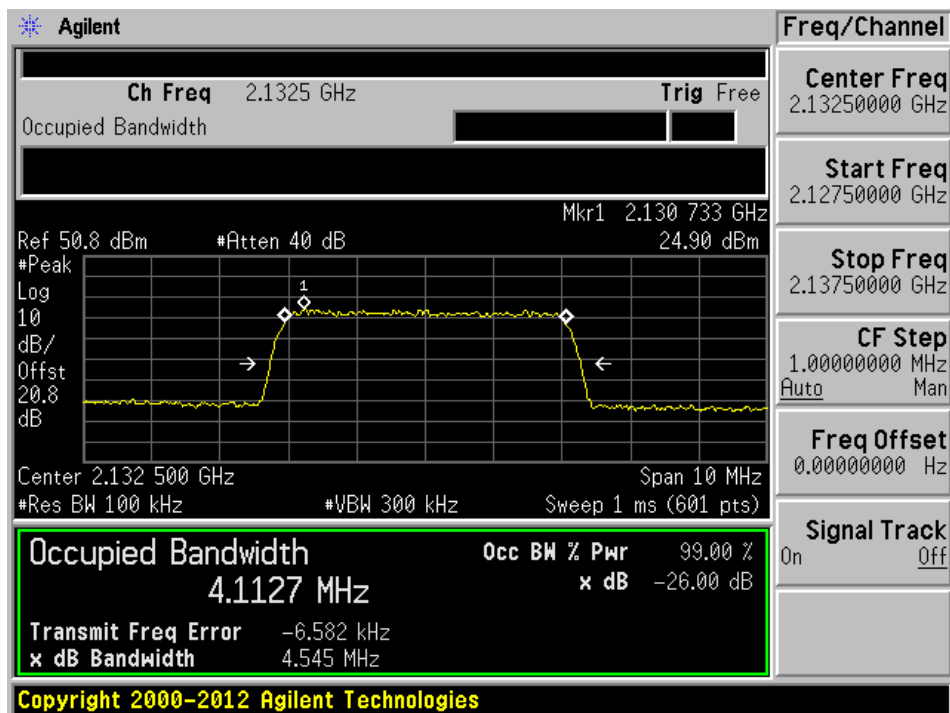
Output



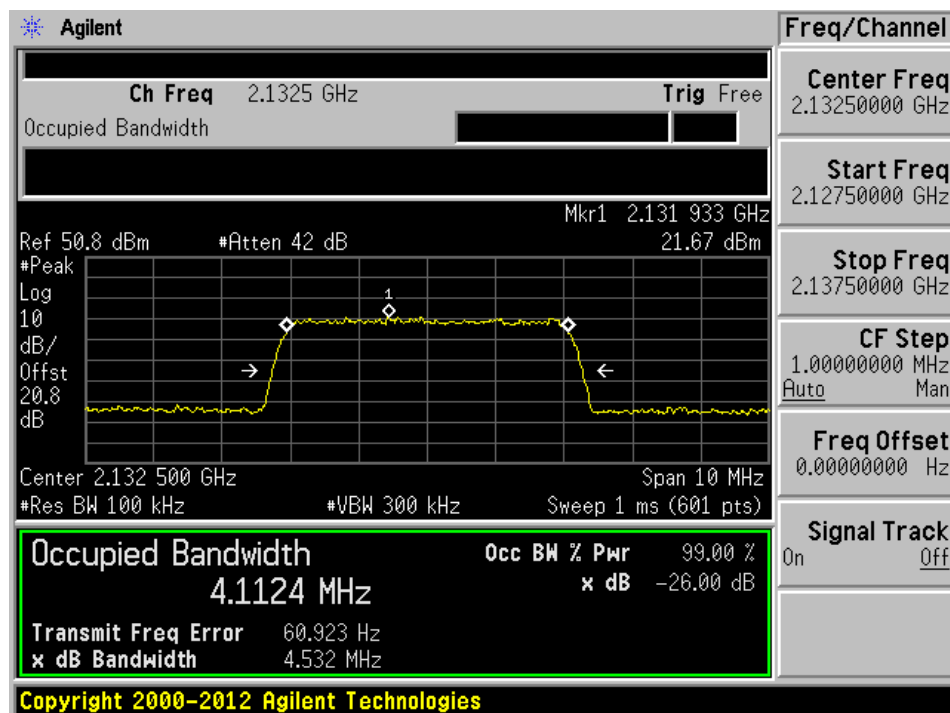
2110–2155 MHz, Broadband Signal

AGC off

Input

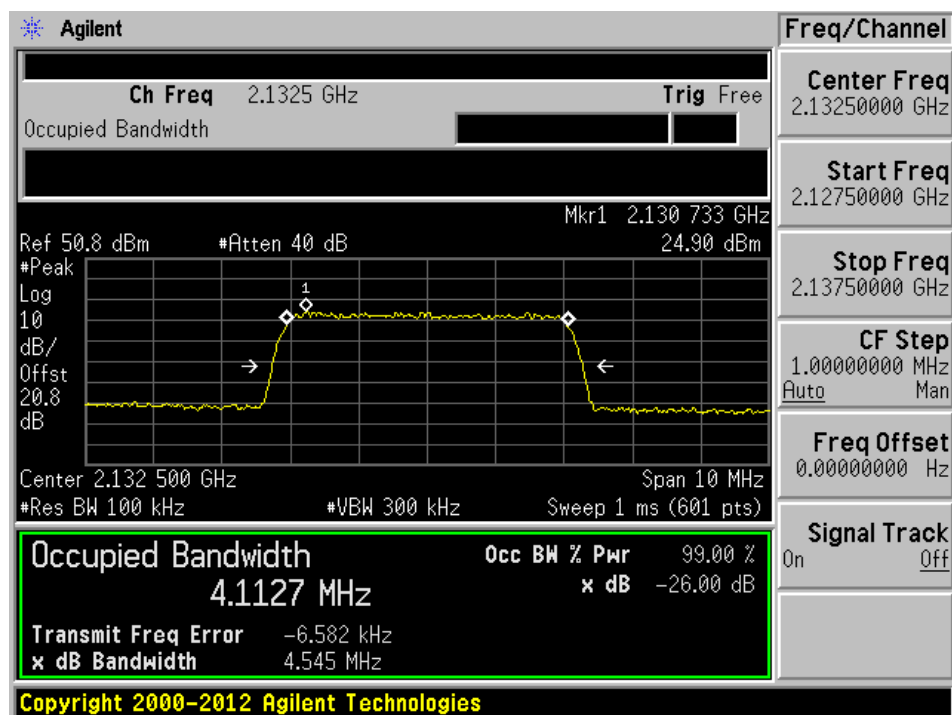


Output

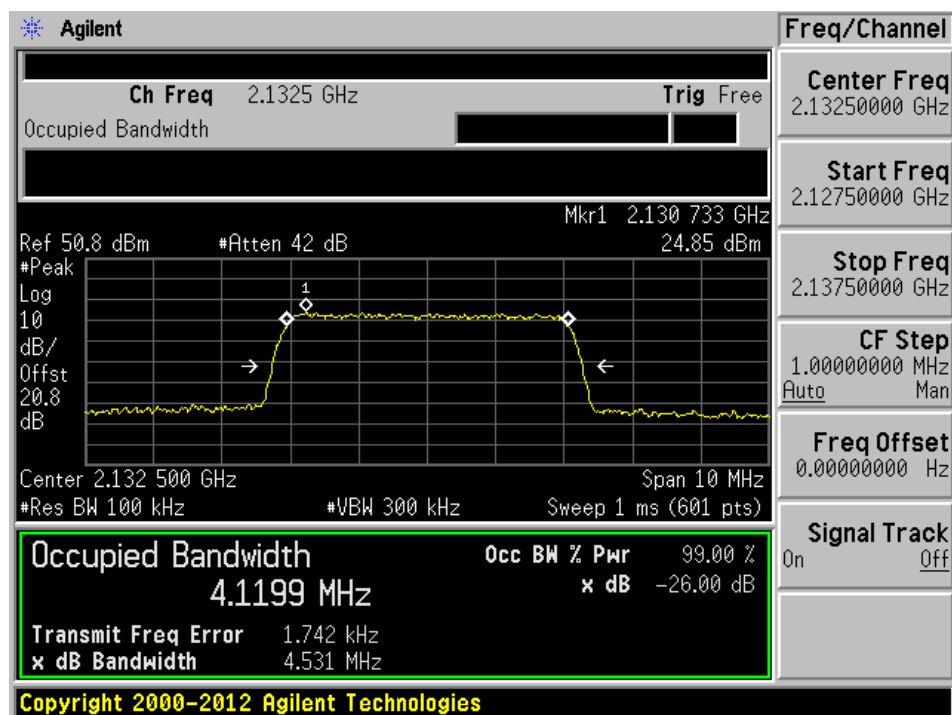


AGC on

Input



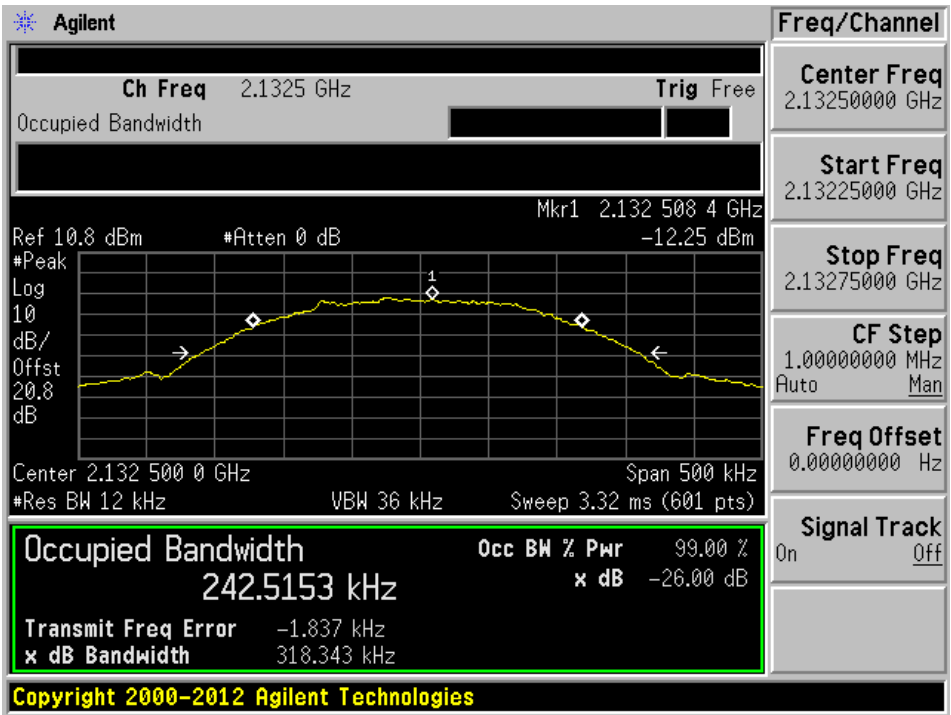
Output



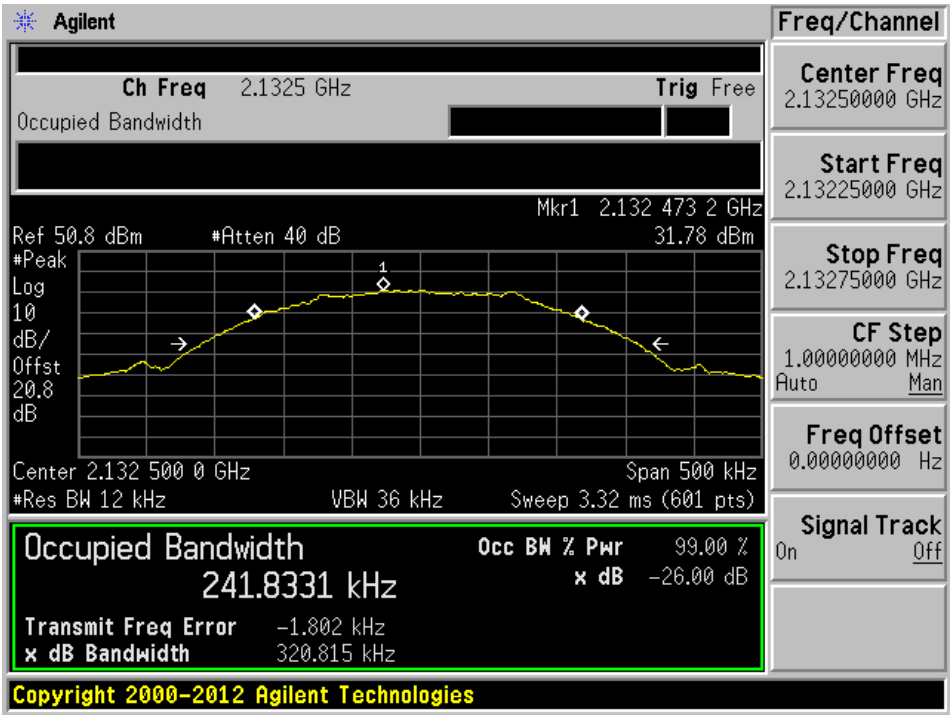
2110–2155 MHz, Narrowband Signal

AGC off

Input

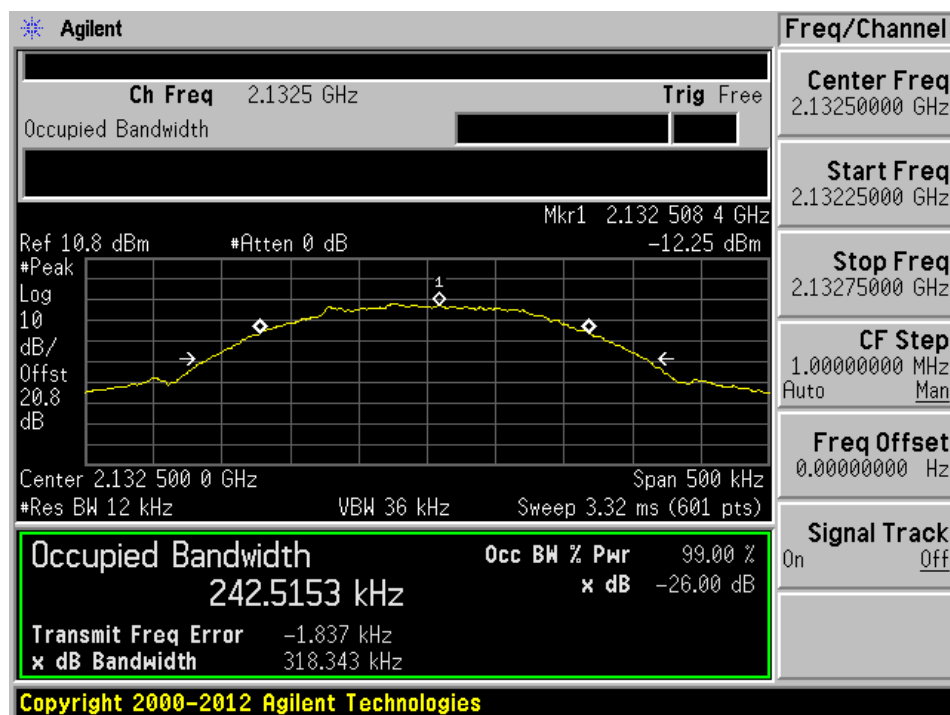


Output

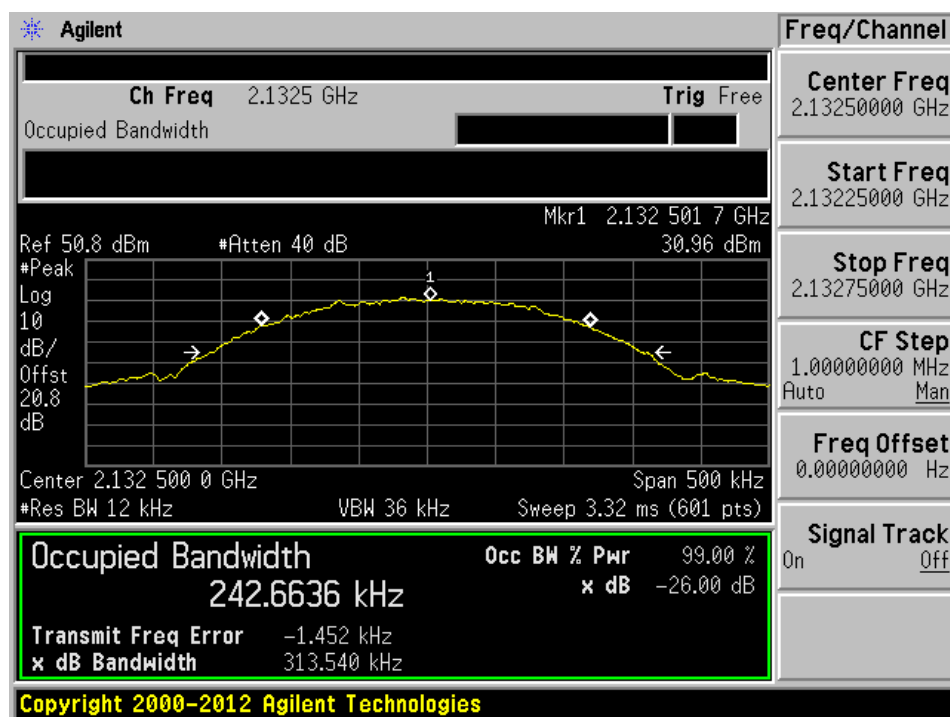


AGC on

Input



Output



7 FCC §2.1053 & §27.53 - Spurious Radiated Emissions

7.1 Applicable Standards

According to FCC §27.53(c)(1), on any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB.

According to FCC §27.53 (g), for operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log (P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

According to FCC §27.53 (h)(1), for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log (P)$ dB.

7.2 Test Procedure

The transmitter was placed onto a Styrofoam block. The unit was normally transmitting with a 50 ohm terminator connected to the antenna terminal.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT.

Emissions were investigated up to the tenth harmonic of the fundamental frequency.

After the emissions were found, the EUT was removed and replaced by a substituting antenna. A signal generator was connected to the substituting antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB = $10 \lg (\text{TXpwr in Watts}/0.001)$ – the absolute level
Spurious attenuation limit in dB = $43 + 10 \log_{10} (\text{power out in Watts})$

7.3 Test Equipment List and Details

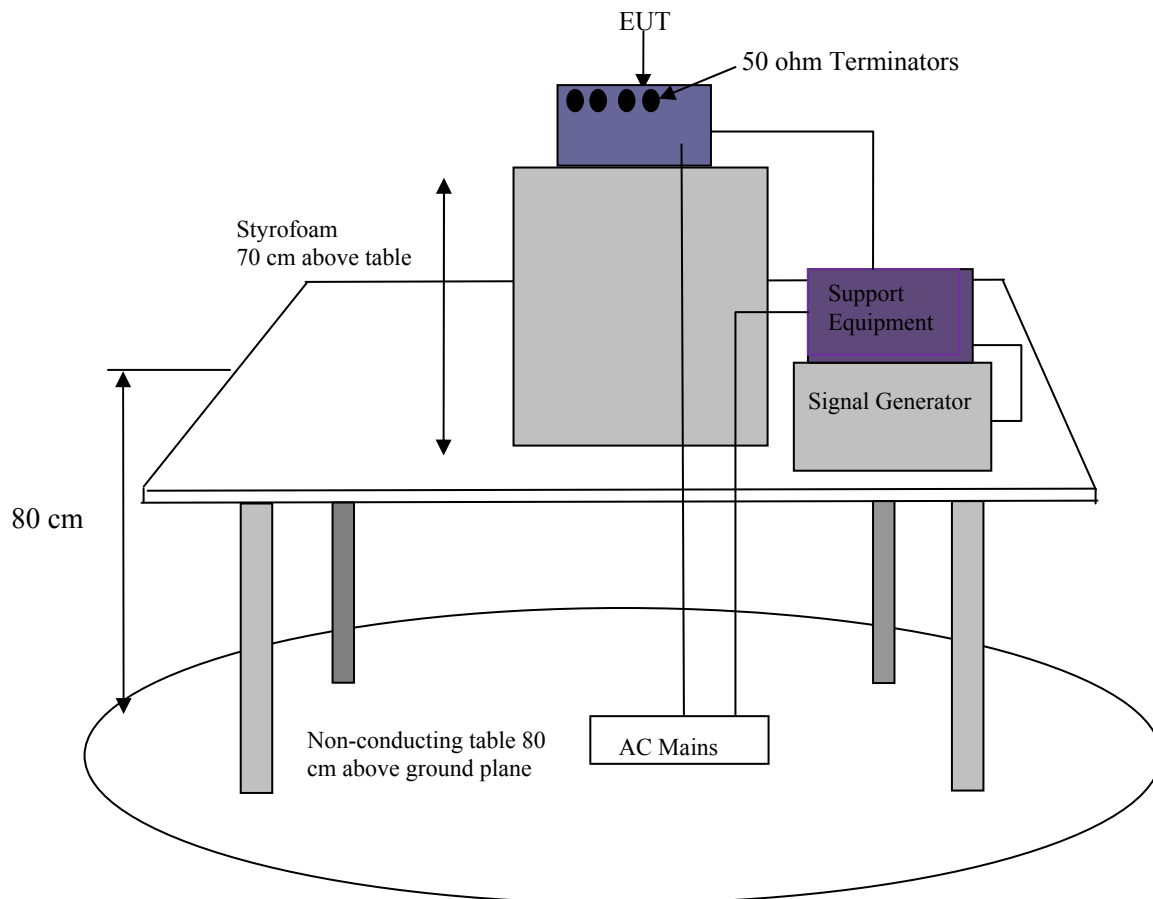
Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4440A	US 42221851	2016-06-10	1 year
Sunol Science Corp	System Controller	SC99V	122303-1	N/R	N/R
Sunol Sciences	Antenna, Biconi-Log	JB3	A020106-2	2015-07-11	2 years
Agilent	Amplifier, Pre	8447D	2944A10187	2016-03-23	1 year
HP/ Agilent	Pre Amplifier	8449B OPT HO2	3008A0113	2016-05-23	1 year
EMCO	Antenna, Horn	3115	9511-4627	2016-01-28	2 years
A.R.A.	Antenna, Horn	DRG-118/A	1132	2015-09-21	2 year
Keysight Technologies	Vector Signal Generator	N5182B	MY51350070	2015-11-18	1 year
COM-POWER	Antenna, Dipole	AD-100	721033DB1/2/3 /4	2014-11-03	2 year
-	SMA cable	-	C0003	Each Time ¹	Each Time ¹
-	SMA cable	-	C0006	Each Time ¹	Each Time ¹

¹Note: This equipment was calibrated for each test.

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 9 June 2016) “A2LA Policy on Metrological Traceability”.

7.4 Test Setup Block Diagram

Radiated Emissions Testing



7.5 Test Environmental Conditions

Temperature:	20-21°C
Relative Humidity:	47-49 %
ATM Pressure:	101.4-101.6 kPa

The testing was performed by Jose Martinez on 2016- 10-04 in 5 Meter Chamber 3.

7.6 Test Results

Carrier Wave Signal

728-746 MHz

Middle Channel

Indicated		Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	S.A. Amp. (dBuV)		Height (cm)	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Ant. Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)		
60.7	61.05	282	278	H	60.7	-28.79	0.000	0.33	-29.12	-13	-16.12
60.7	67.79	84	301	V	60.7	-17.88	0.000	0.33	-18.21	-13	-5.21
80	63.28	115	210	H	80	-26.56	0.000	0.38	-26.94	-13	-13.94
80	60.14	71	301	V	80	-25.53	0.000	0.38	-25.91	-13	-12.91
1474	32.85	0	100	H	1474	-41.94	8.323	0.48	-34.097	-13	-21.10
1474	32.13	0	100	V	1474	-42.36	8.241	0.48	-34.599	-13	-21.60
2211	33.33	0	100	H	2211	-38.53	8.816	0.58	-30.294	-13	-17.29
2211	33.11	0	100	V	2211	-38.61	8.781	0.58	-30.409	-13	-17.41

746-757 MHz

Middle Channel

Indicated		Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	S.A. Amp. (dBuV)		Height (cm)	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Ant. Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)		
60	58.06	0	233	H	60	-31.78	0.000	0.38	-32.16	-13	-19.16
60	65.23	270	150	V	60	-20.44	0.000	0.38	-20.82	-13	-7.82
77.42	66.45	0	240	H	77.42	-23.39	0.000	0.31	-23.7	-13	-10.70
77.42	66.71	270	100	V	77.42	-18.96	0.000	0.31	-19.27	-13	-6.27
1503	32.86	0	100	H	1503	-41.86	8.323	0.48	-34.017	-13	-21.02
1503	32.29	0	100	V	1503	-42.36	8.241	0.48	-34.599	-13	-21.60
2254.4	33.89	0	100	H	2254.4	-37.56	9.309	0.58	-28.831	-13	-15.83
2254.5	33.69	0	100	V	2254.5	-37.63	9.217	0.58	-28.993	-13	-15.99

2110-2155 MHz

Middle Channel

Indicated		Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	S.A. Amp. (dBuV)		Height (cm)	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Ant. Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)		
45	48.84	0	300	H	45	-41.00	0.000	0.38	-41.38	-13	-28.38
45	60.74	270	100	V	45	-24.93	0.000	0.38	-25.31	-13	-12.31
80	64.19	0	220	H	80	-25.65	0.000	0.33	-25.98	-13	-12.98
80	63.72	270	100	V	80	-21.95	0.000	0.33	-22.28	-13	-9.28
4265	32.87	0	100	H	4265	-33.38	10.45	0.91	-23.84	-13	-10.84
4265	33.12	0	100	V	4265	-33.04	10.413	0.91	-23.537	-13	-10.54
6397.5	35.31	0	100	H	6397.5	-27.6	10.264	1.63	-18.966	-13	-5.97
6397.5	34.08	0	100	V	6397.5	-28.62	10.253	1.63	-19.997	-13	-7.00

8 FCC §2.1051 & §27.53 - Spurious Emissions at Antenna Terminals

8.1 Applicable Standards

According to FCC §27.53(c)(1), on any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log(P)$ dB.

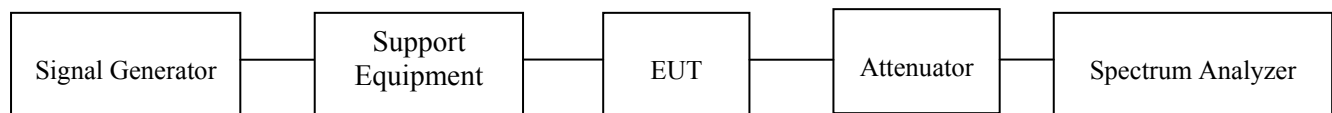
According to FCC §27.53 (g), for operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log(P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

According to FCC §27.53 (h)(1), for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB.

8.2 Test Procedure

The signal generator was connected to the support equipment and the support equipment was connected to the EUT through a fiber cable. The output of the EUT was connected to a spectrum analyzer through appropriate attenuation.

The resolution bandwidth of the spectrum analyzer was set 100 KHz or greater for 700 MHz frequency band and for 2100 MHz band. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.



8.3 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates	Calibration Interval
Agilent	Analyzer, Spectrum	E4440A	US 42221851	2016-06-10	1 year
Rohde & Schwarz	Generator, Signal	SMIQ03	849192/0085	2016-07-29	2 year
Keysight Technologies	Vector Signal Generator	N5182B	MY51350070	2015-11-18	1 year
-	20 dB attenuator	-	-	Each Time ¹	Each Time ¹
-	20 dB attenuator	-	-	Each Time ¹	Each Time ¹
-	SMA cable	-	C0003	Each Time ¹	Each Time ¹
-	SMA cable	-	C0006	Each Time ¹	Each Time ¹

¹Note: This equipment was calibrated for each test.

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 9 June 2016) “A2LA Policy on Metrological Traceability”.

8.4 Test Environmental Conditions

Temperature:	23° C
Relative Humidity:	32 %
ATM Pressure:	101.4-102 kPa

The testing was performed by Jose Martinez 2016-09-13 in the RF Site.

8.5 Test Results

Please refer to the following plots.

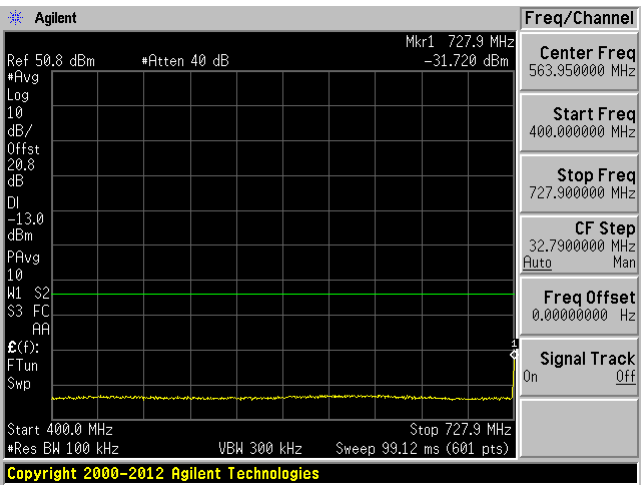
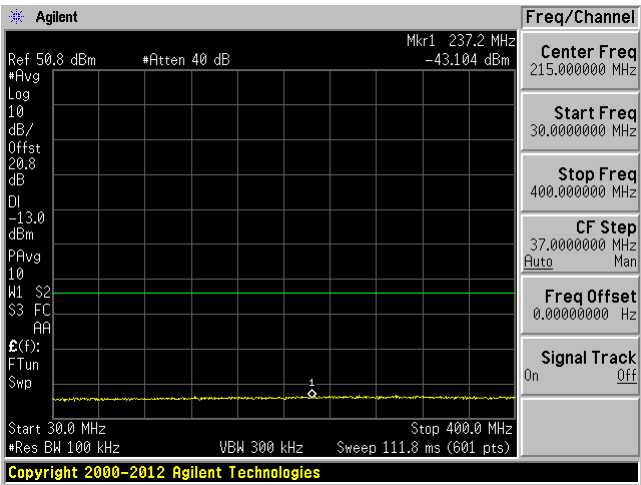
Broadband Signal 728-746 MHz

AGC Off

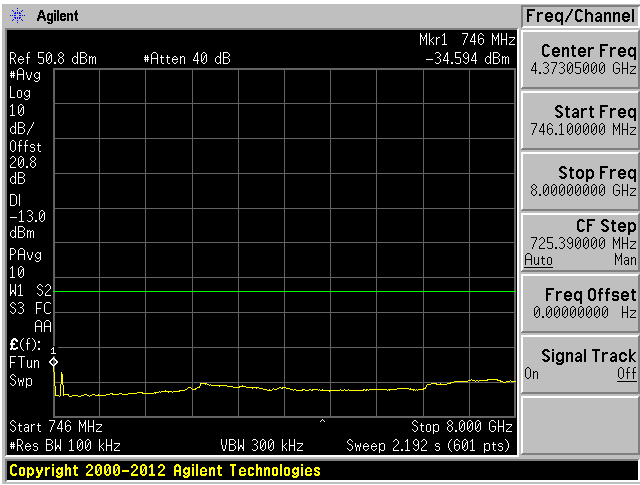
Low Channel

Low Channel: 30 MHz-400 MHz

Low Channel: 400 MHz-727.9 GHz

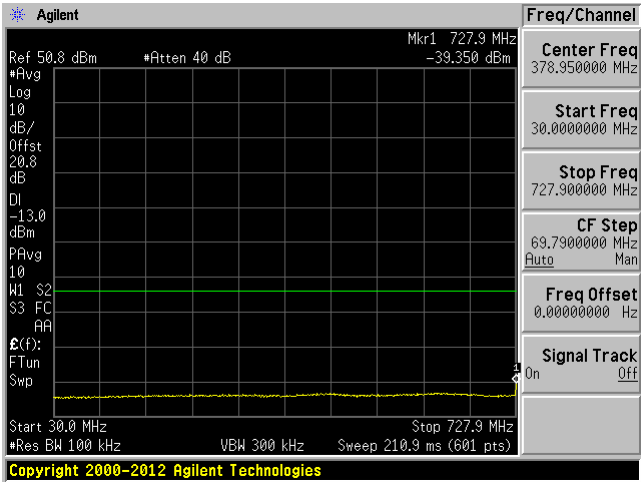


Low Channel: 746.1 MHz- 8 GHz

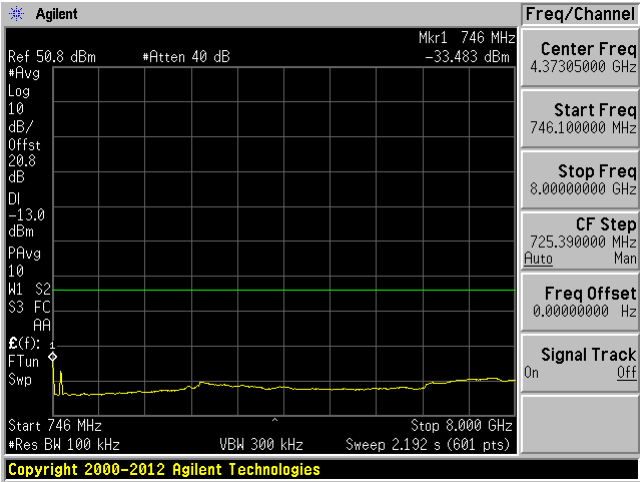


Middle Channel

Middle Channel: 30 MHz-727.9 MHz

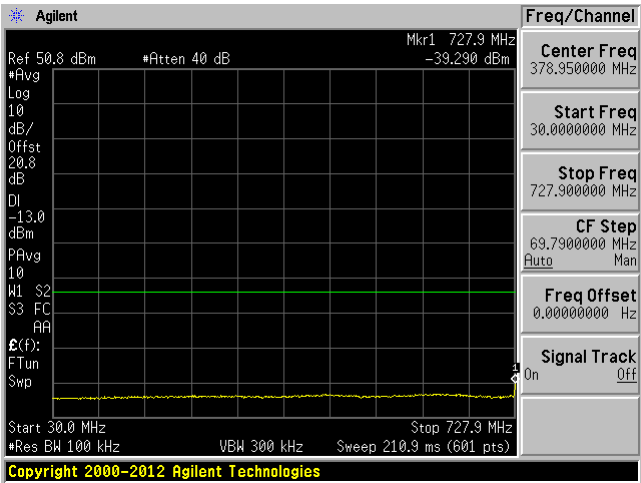


Middle Channel: 746.1 MHz-8 GHz

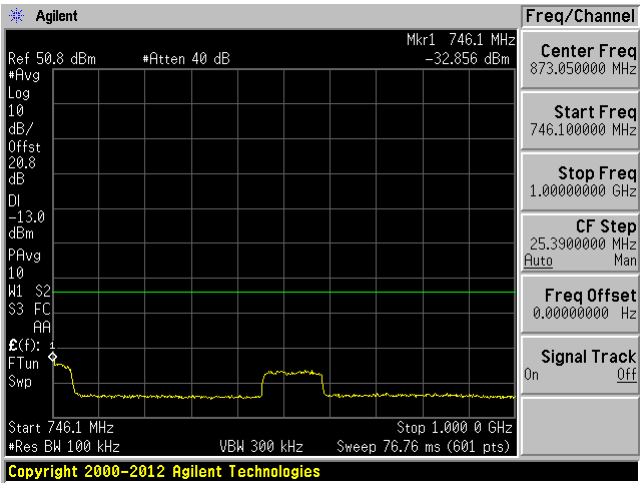


High Channel

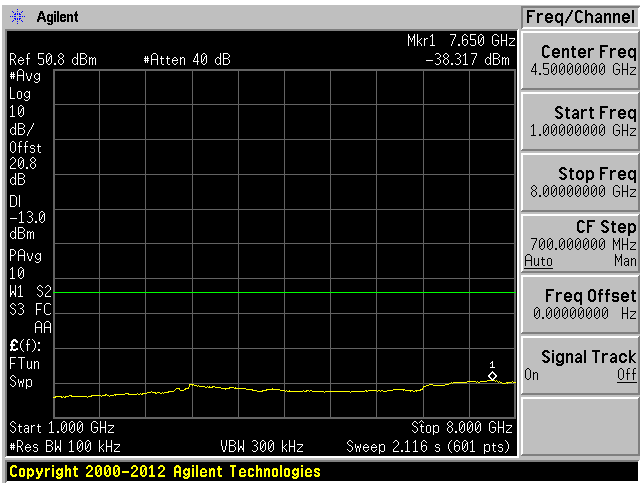
High Channel: 30 MHz-727.9 MHz



High Channel: 746.1 MHz-1 GHz



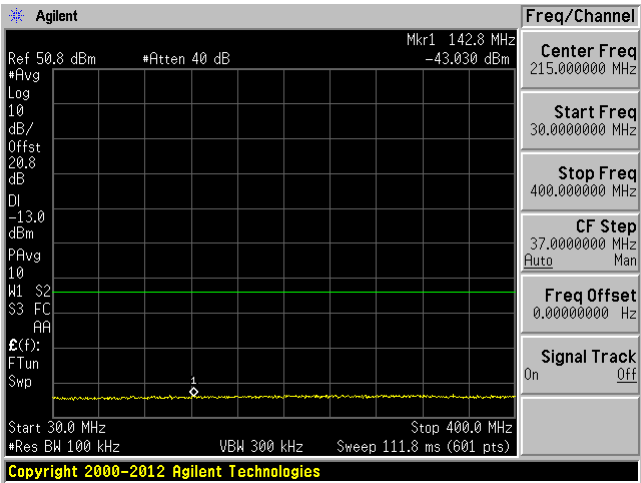
High Channel: 1 GHz- 8 GHz



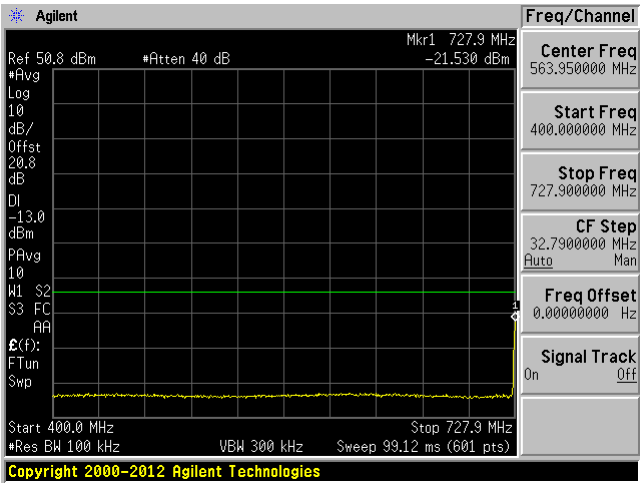
AGC On

Low Channel

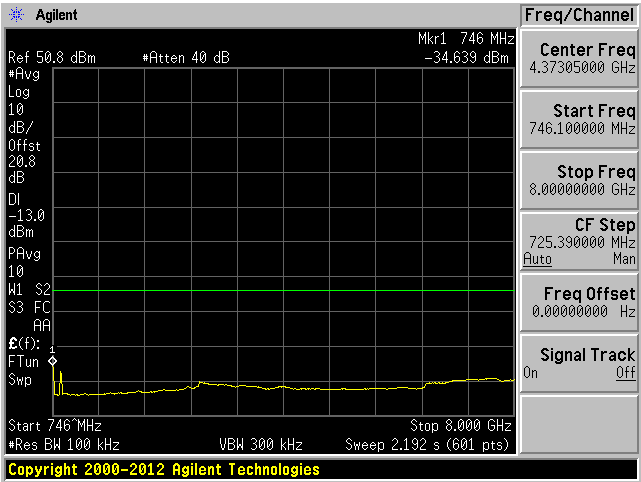
Low Channel: 30 MHz-400 MHz



Low Channel: 400 MHz-727.9 MHz

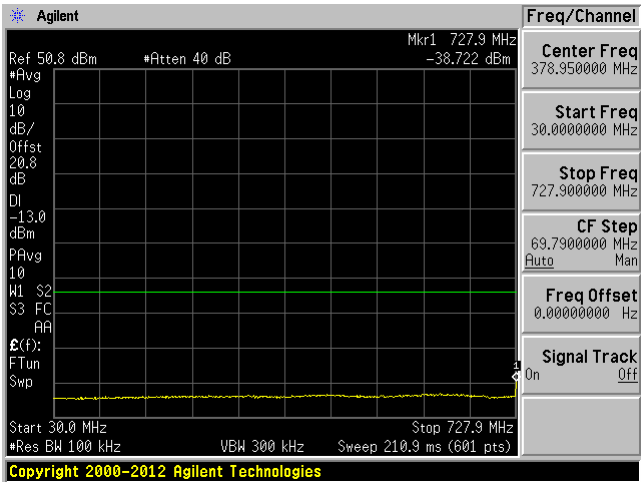


Low Channel: 746.1 MHz- 8 GHz

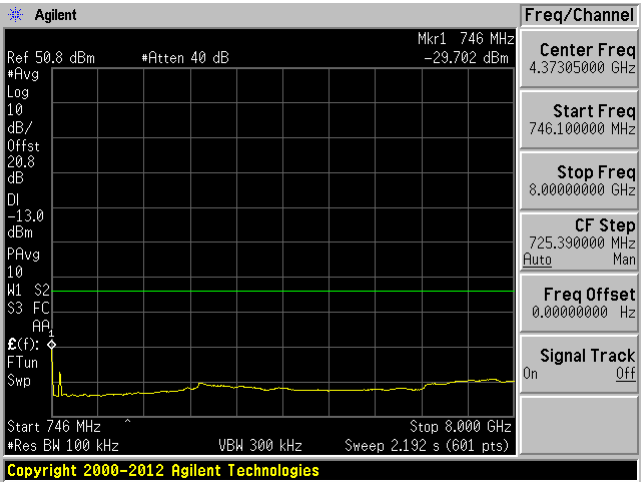


Middle Channel

Middle Channel: 30 MHz-727.9 MHz

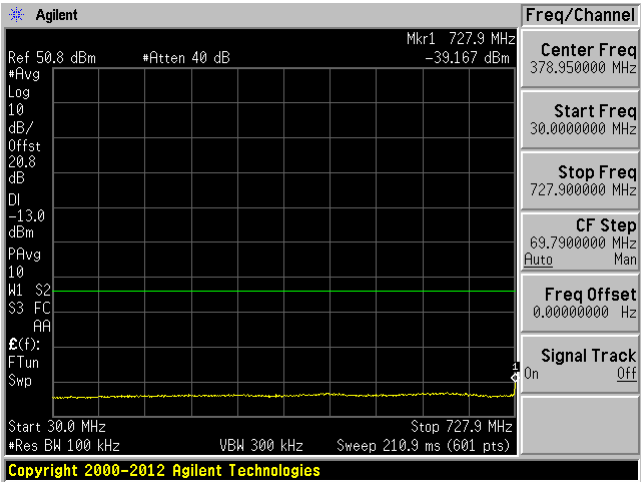


Middle Channel: 746.1 MHz-8 GHz

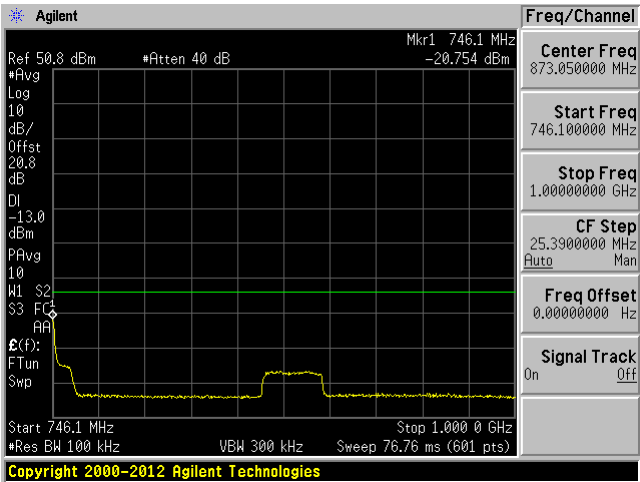


High Channel

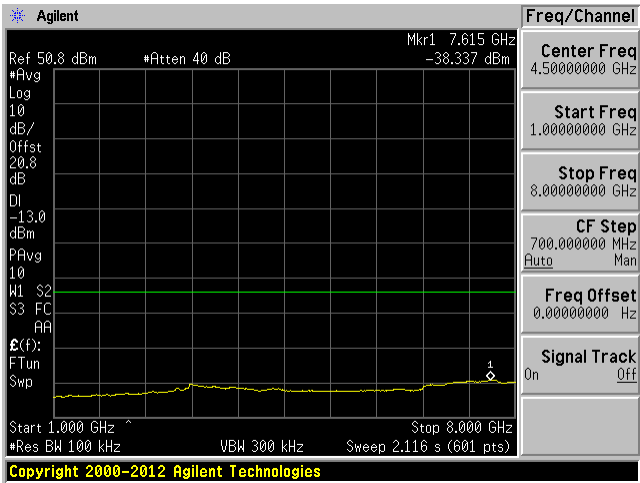
High Channel: 30 MHz-727.9 MHz



High Channel: 746.1 MHz-1 GHz



High Channel: 1 GHz- 8 GHz

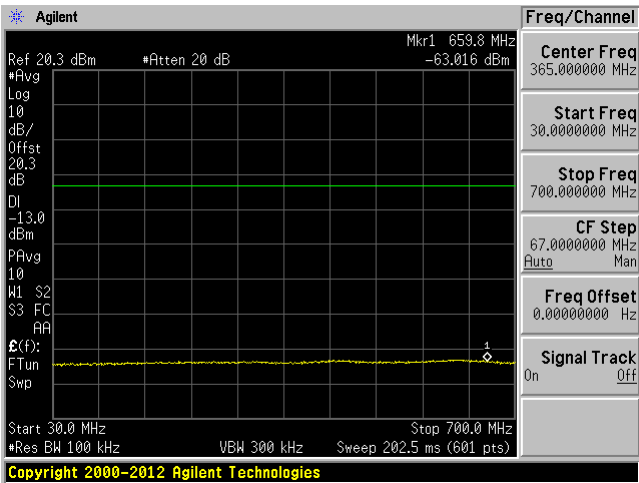


Narrowband signal 728-746 MHz

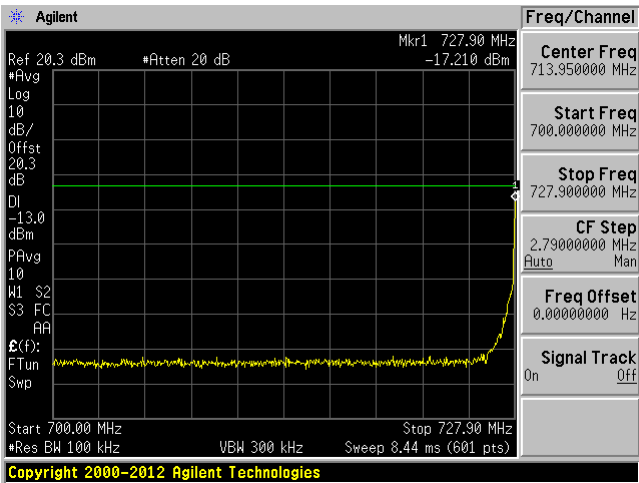
AGC Off

Low Channel

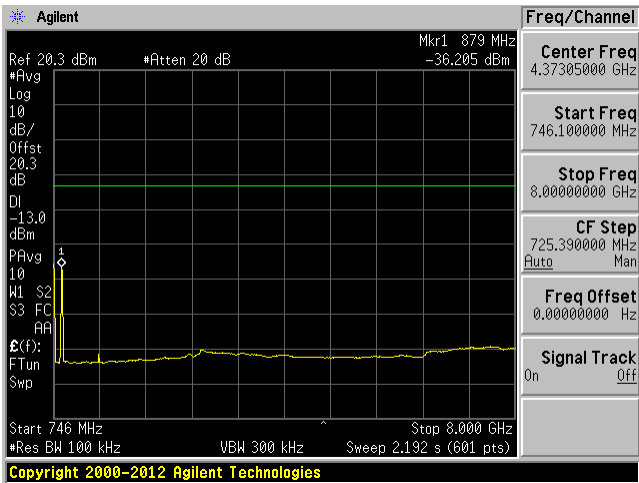
Low Channel: 30 MHz-700 MHz



Low Channel: 700 MHz-727.9 MHz

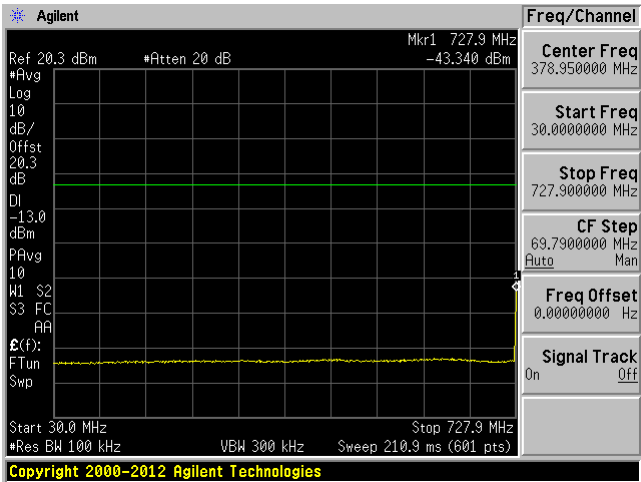


Low Channel: 746.1 MHz- 8 GHz

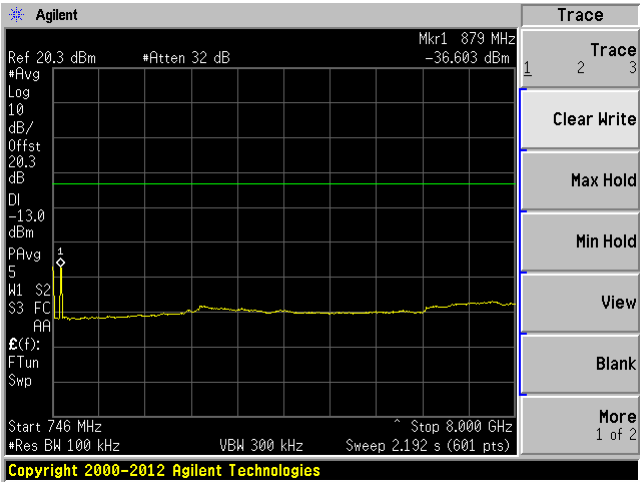


Middle Channel

Middle Channel: 30 MHz-727.9 MHz

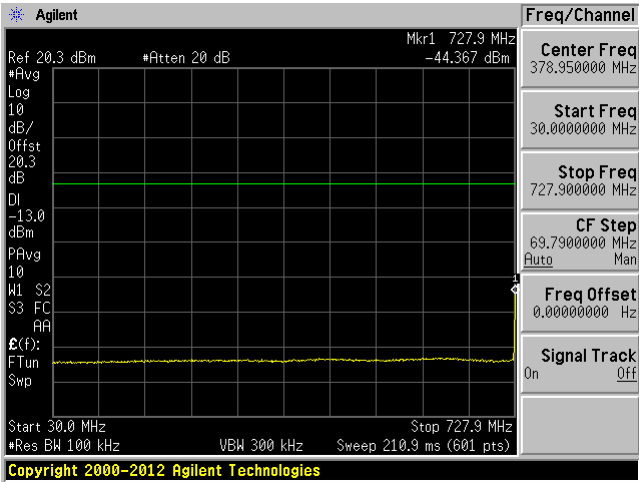


Middle Channel: 746.1 MHz-8 GHz

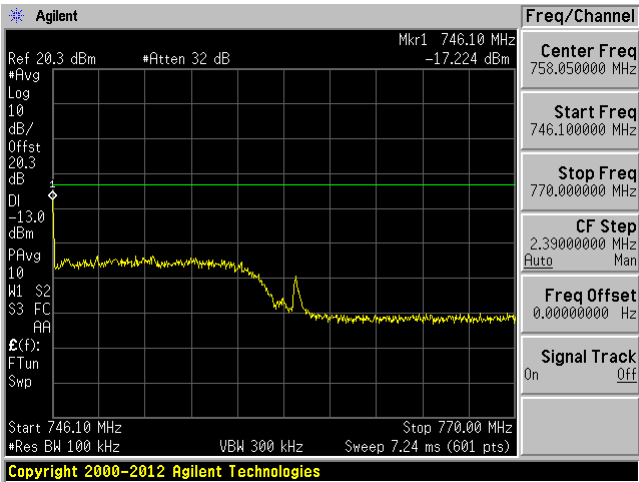


High Channel

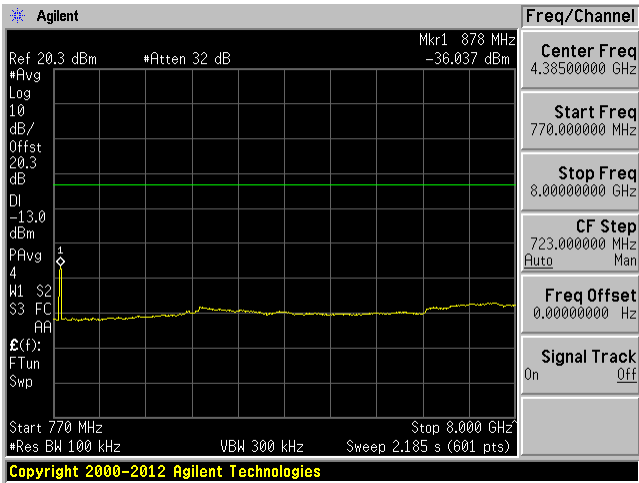
High Channel: 30 MHz-727.9 MHz



High Channel: 746.1 MHz-770 MHz



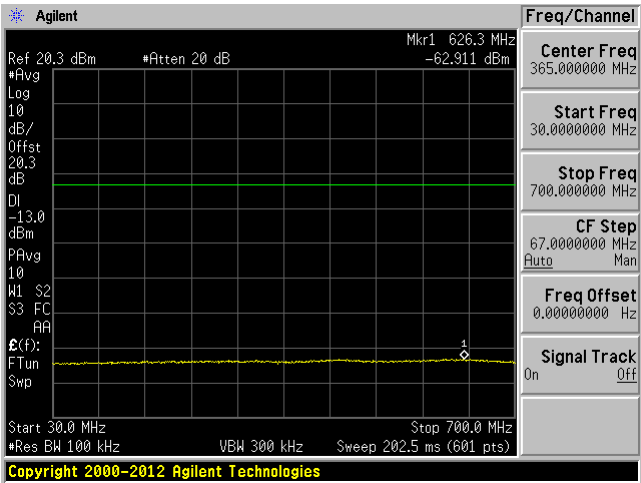
High Channel: 770 MHz- 8 GHz



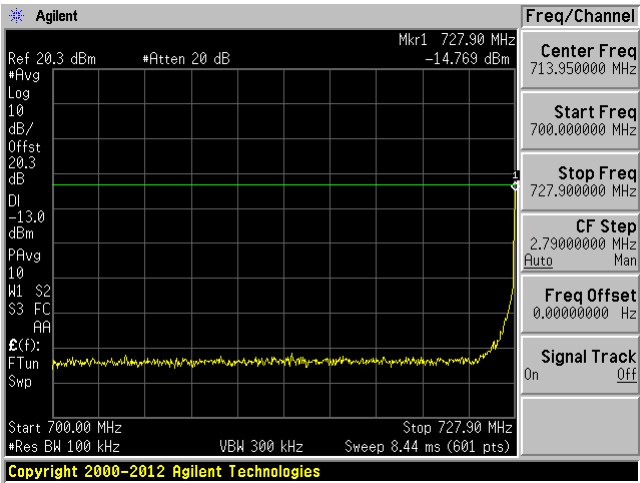
AGC On

Low Channel

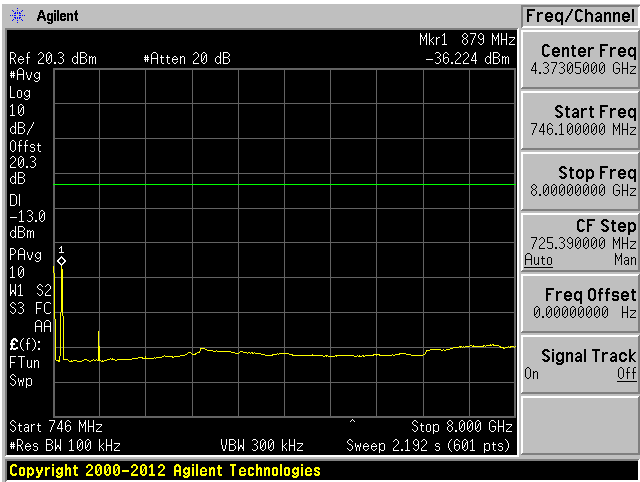
Low Channel: 30 MHz-700 MHz



Low Channel: 700 MHz-727.9 MHz

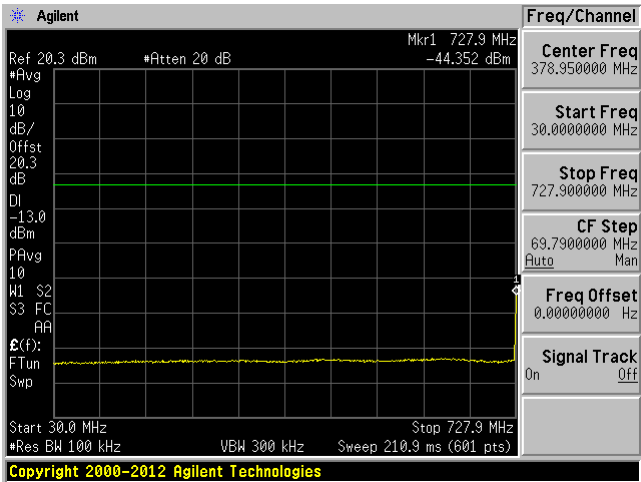


Low Channel: 746.1 MHz- 8 GHz

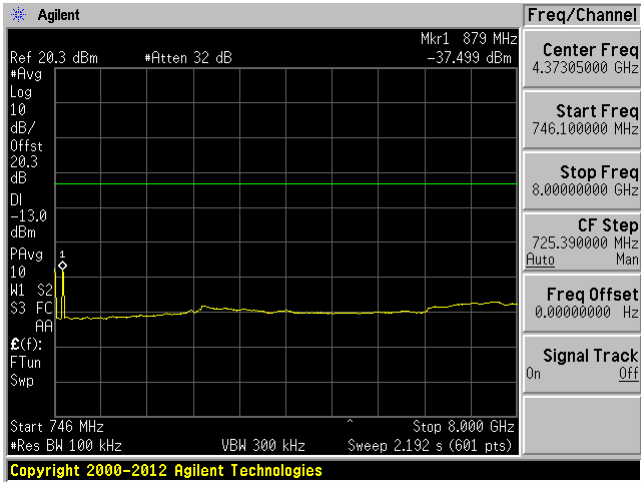


Middle Channel

Middle Channel: 30 MHz-727.9 MHz

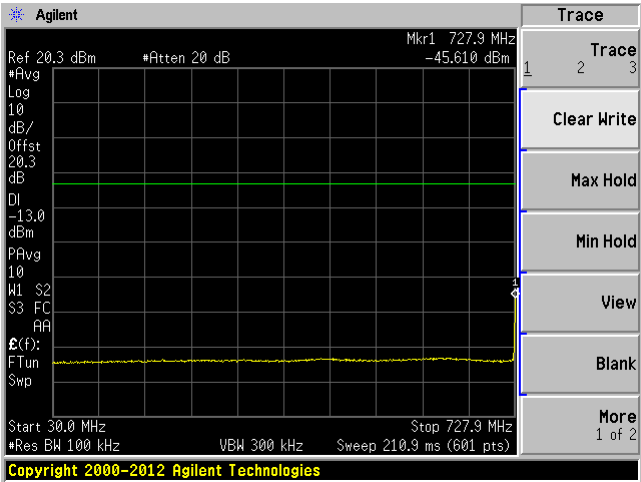


Middle Channel: 746.1 MHz-8 GHz

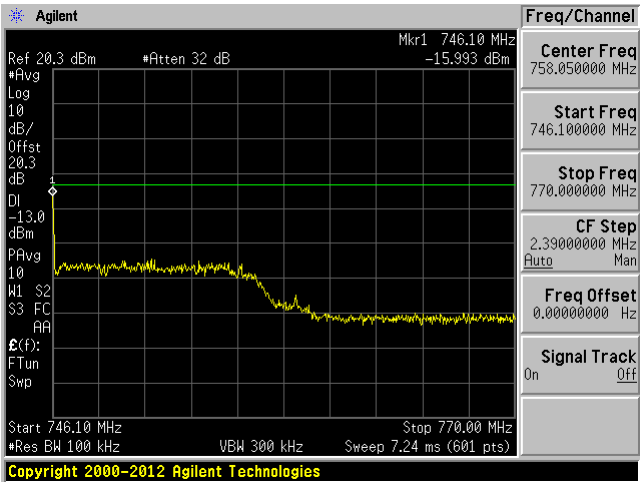


High Channel

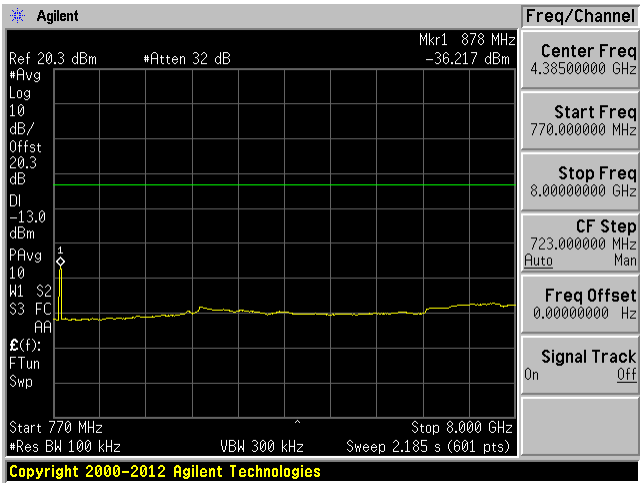
High Channel: 30 MHz-727.9 MHz



High Channel: 746.1 MHz-770 MHz



High Channel: 770 MHz- 8 GHz



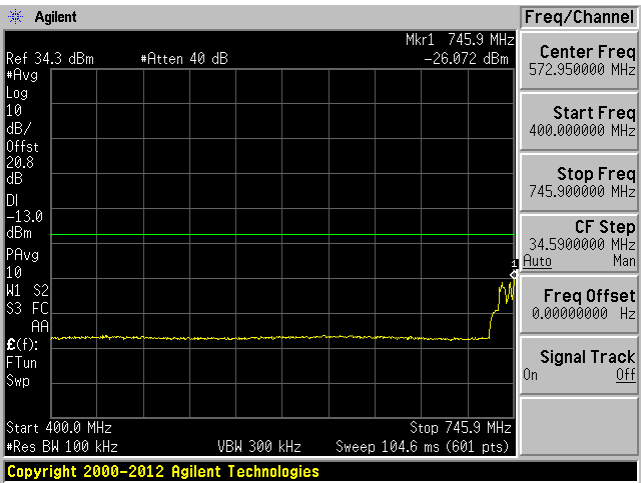
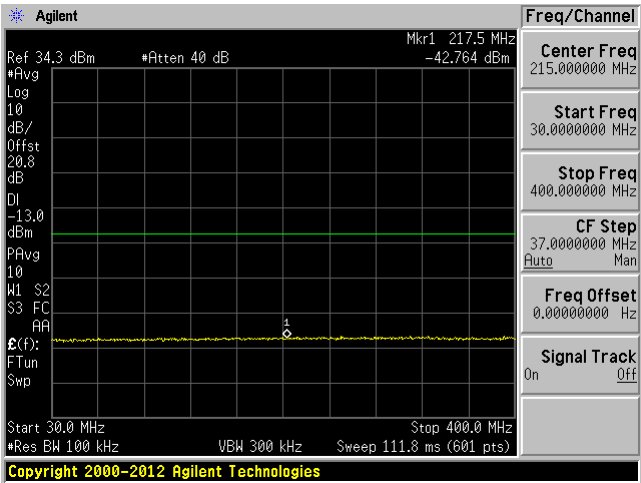
Broadband Signal 746-757 MHz

AGC Off

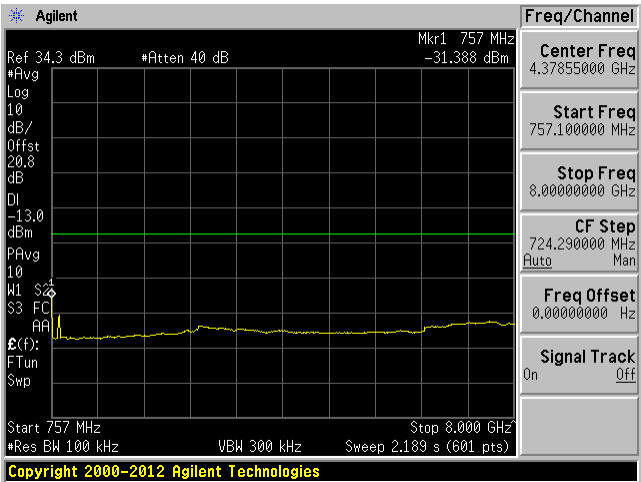
Low Channel

Low Channel: 30 MHz-400 MHz

Low Channel: 400 MHz-745.9 MHz

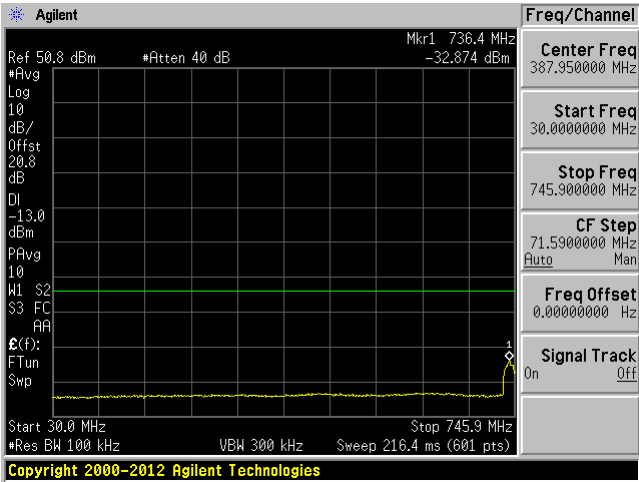


Low Channel: 757.1 MHz- 8 GHz

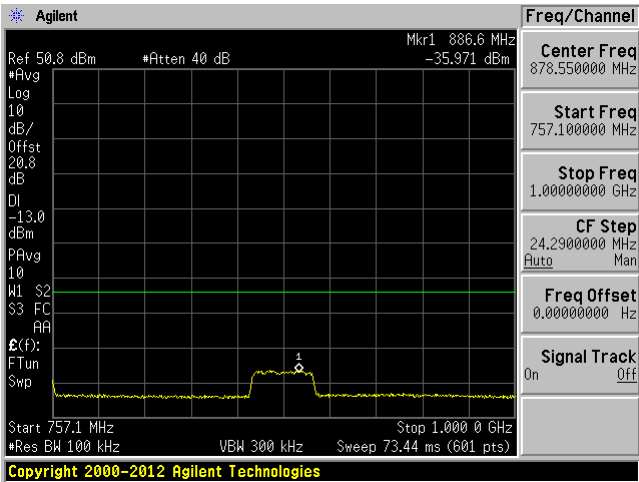


Middle Channel

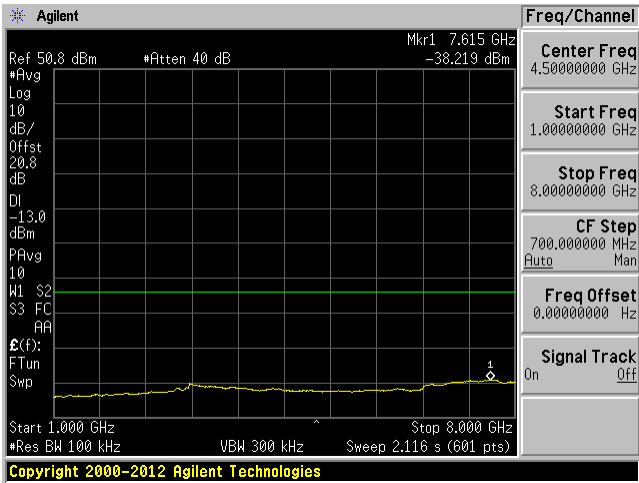
Middle Channel: 30 MHz-745.9 MHz



Middle Channel: 757.1 MHz-1 GHz

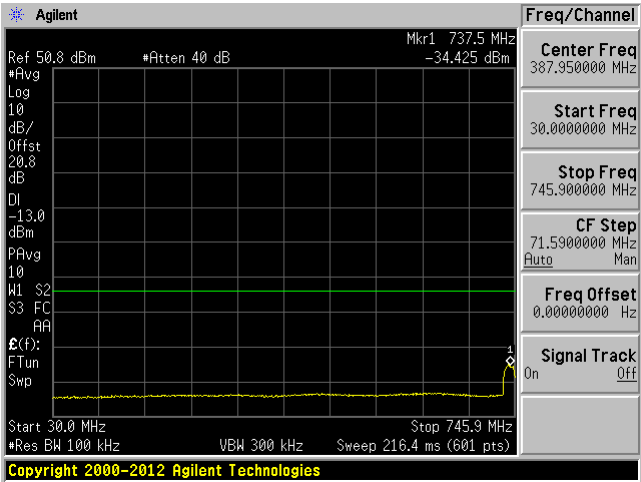


Middle Channel: 1 GHz- 8 GHz

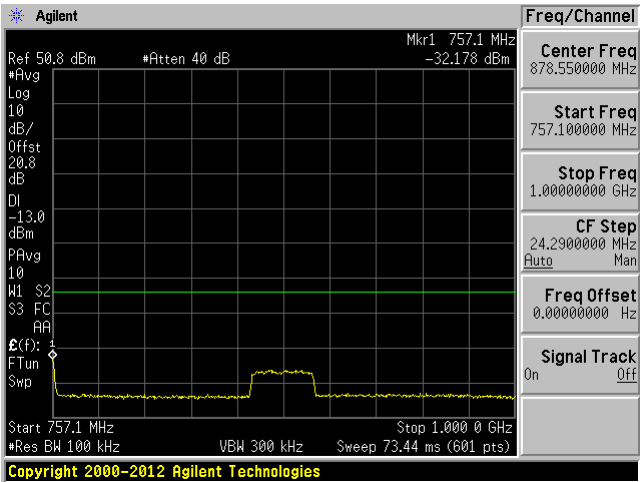


High Channel

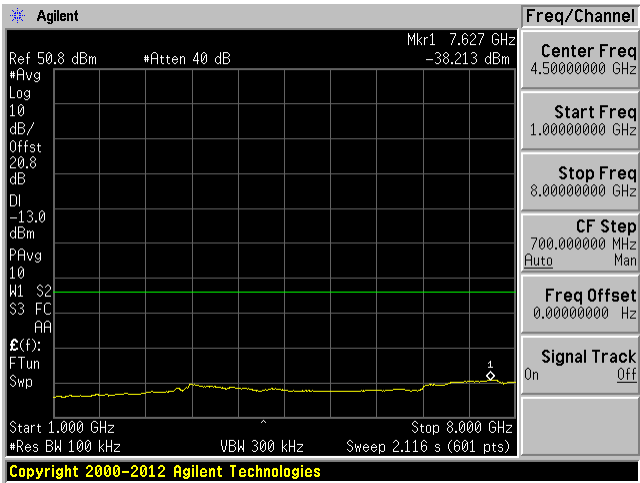
High Channel: 30 MHz-745.9 MHz



High Channel: 757.1 MHz-1 GHz



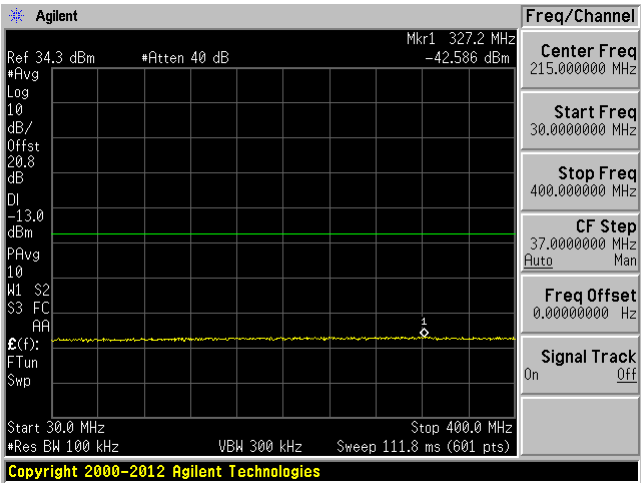
High Channel: 1 GHz- 8 GHz



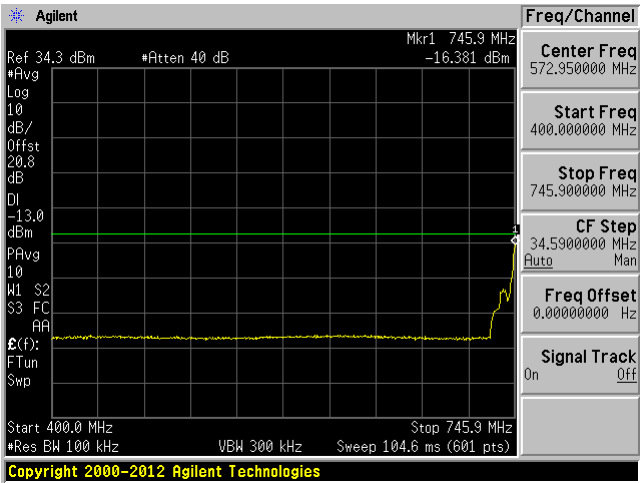
AGC On

Low Channel

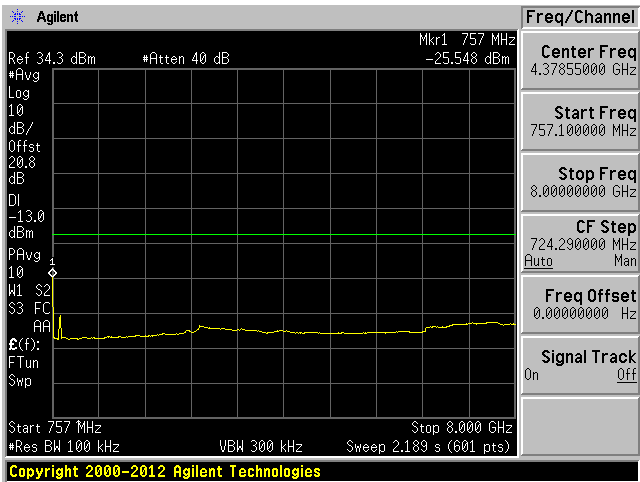
Low Channel: 30 MHz-400 MHz



Low Channel: 400 MHz-745.9 MHz

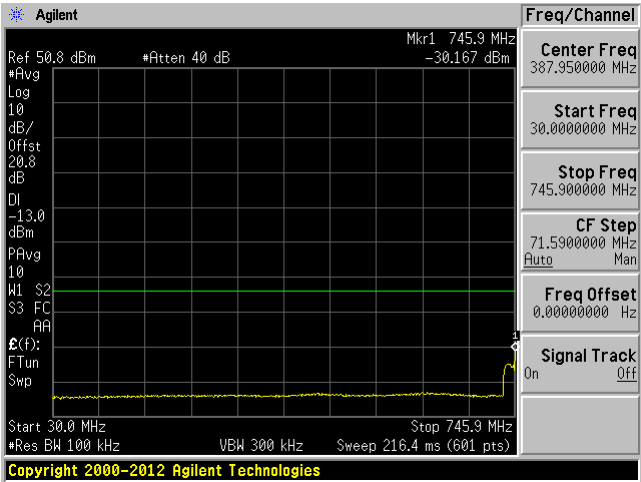


Low Channel: 757.1 MHz- 8 GHz

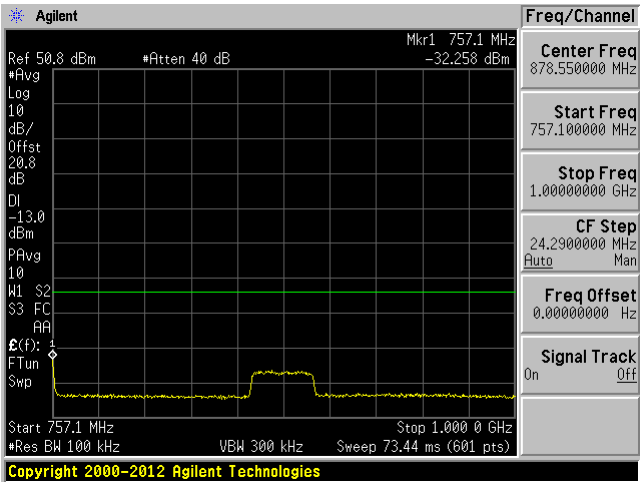


Middle Channel

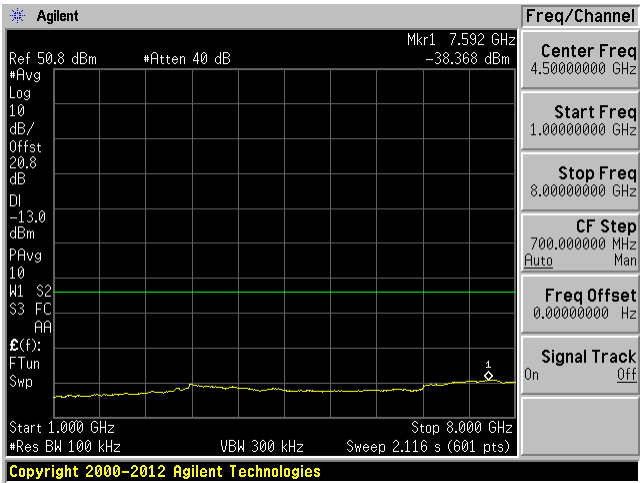
Middle Channel: 30 MHz-745.9 MHz



Middle Channel: 757.1 MHz-1 GHz

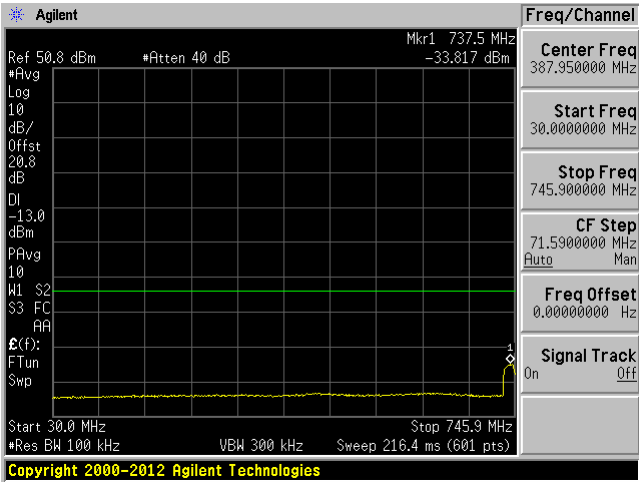


Middle Channel: 1 GHz- 8 GHz

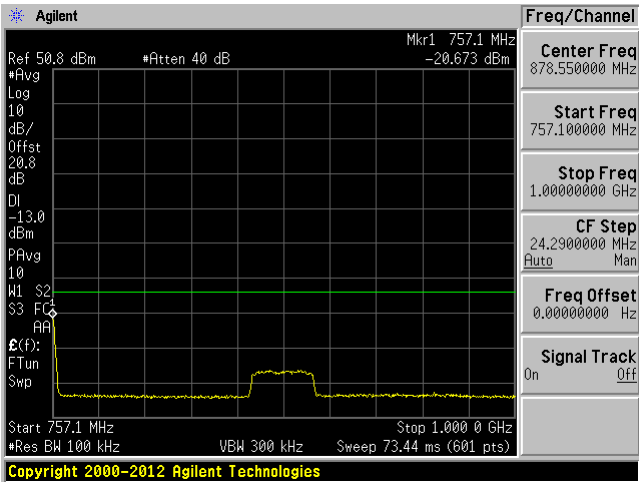


High Channel

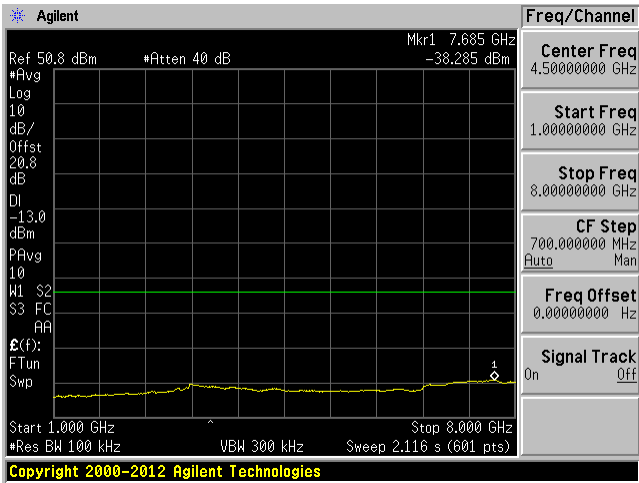
High Channel: 30 MHz-745.9 MHz



High Channel: 757.1 MHz-1 GHz



High Channel: 1 GHz- 8 GHz

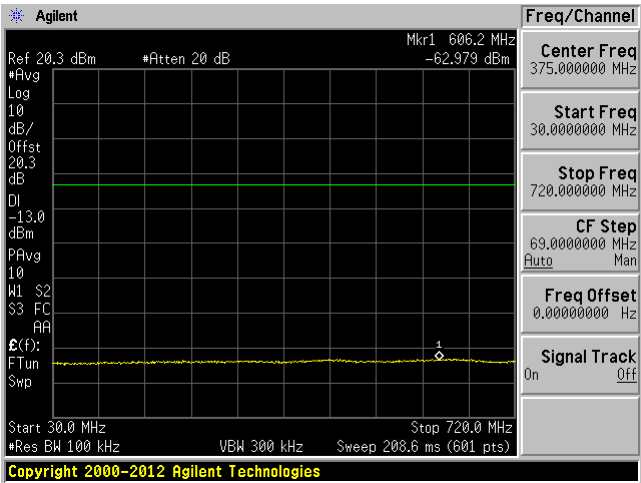


Narrowband Signal 746-757 MHz

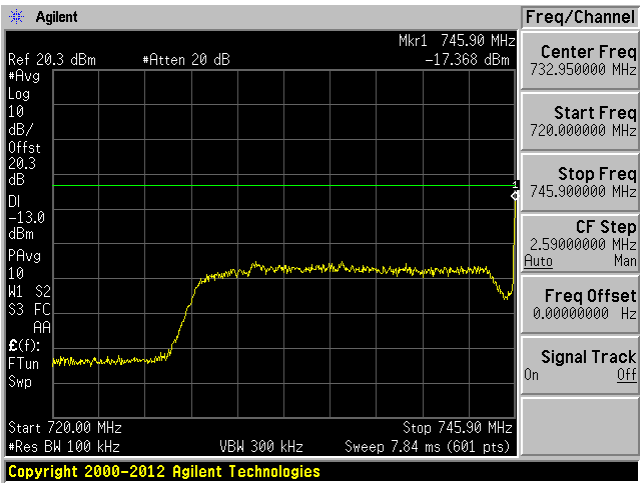
AGC Off

Low Channel

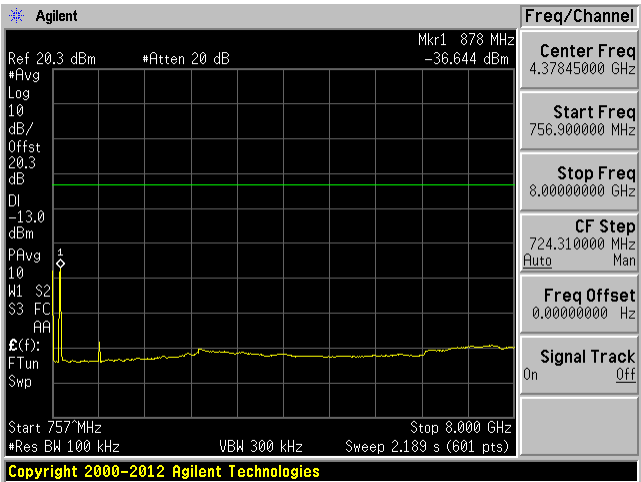
Low Channel: 30 MHz-720 MHz



Low Channel: 720 MHz-745.9 MHz

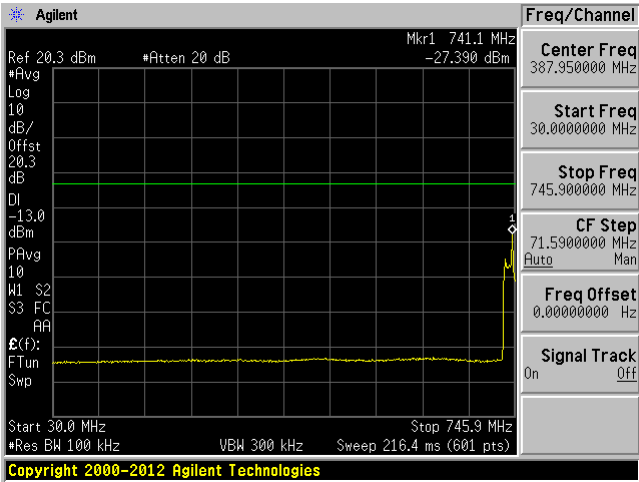


Low Channel: 756.9 MHz- 8 GHz

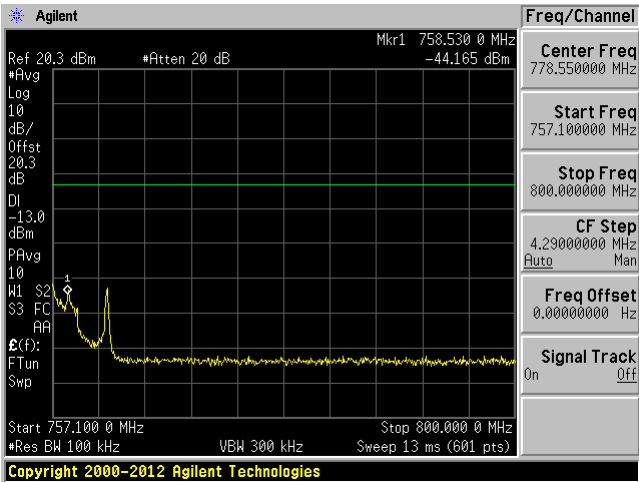


Middle Channel

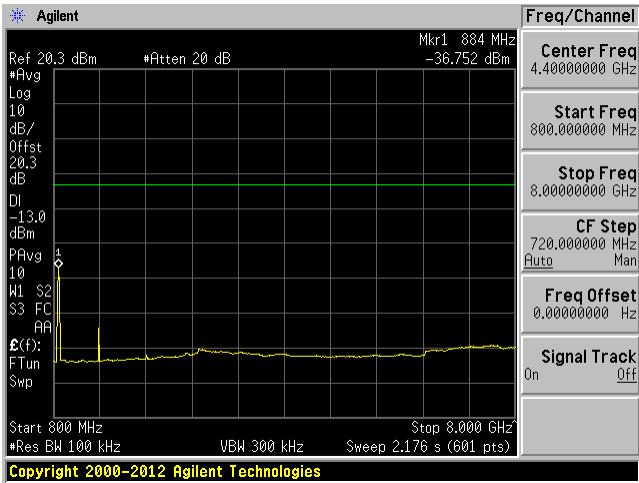
Middle Channel: 30 MHz-745.9 MHz



Middle Channel: 757.1 MHz-800 MHz

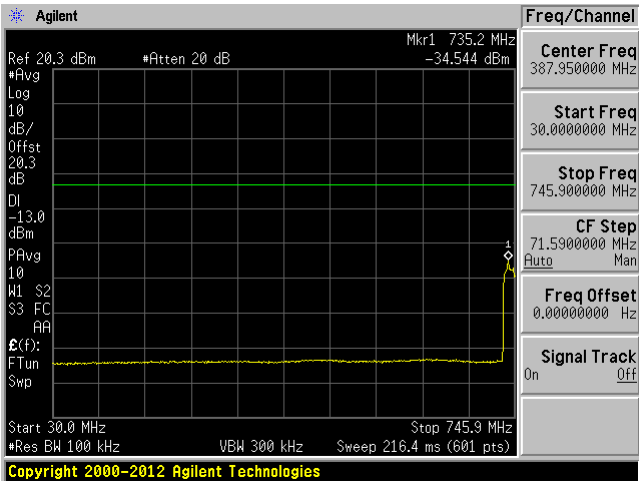


Middle Channel: 800 MHz- 8 GHz

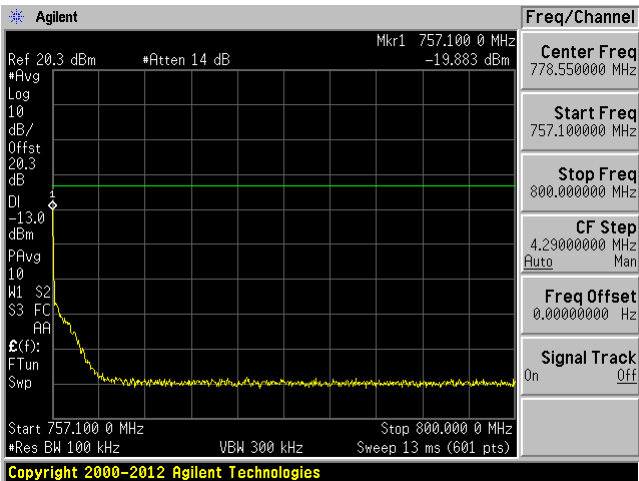


High Channel

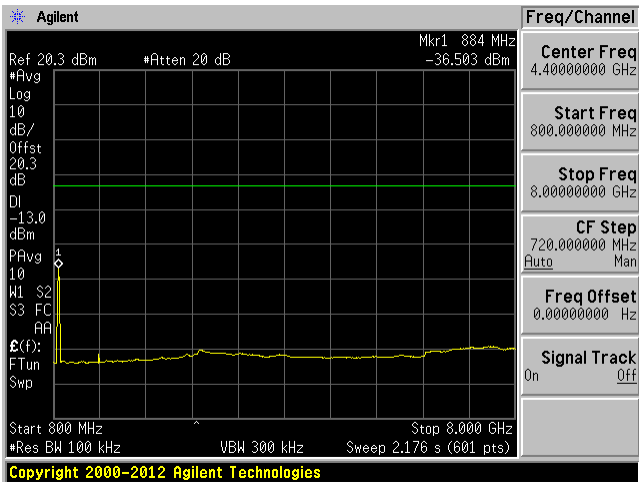
High Channel: 30 MHz-745.9 MHz



High Channel: 757.1 MHz-800 MHz



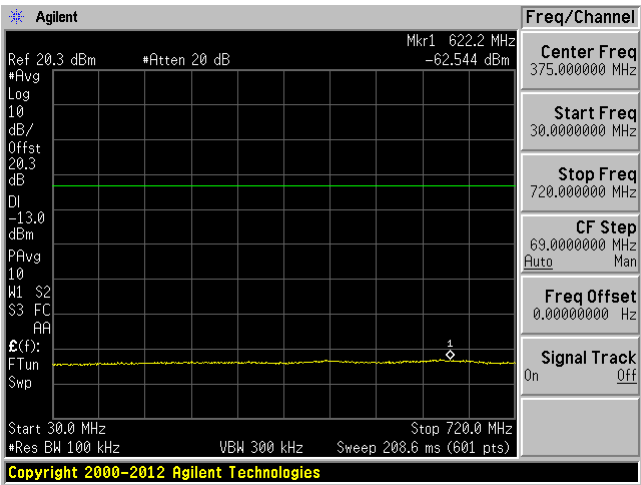
High Channel: 800 MHz- 8 GHz



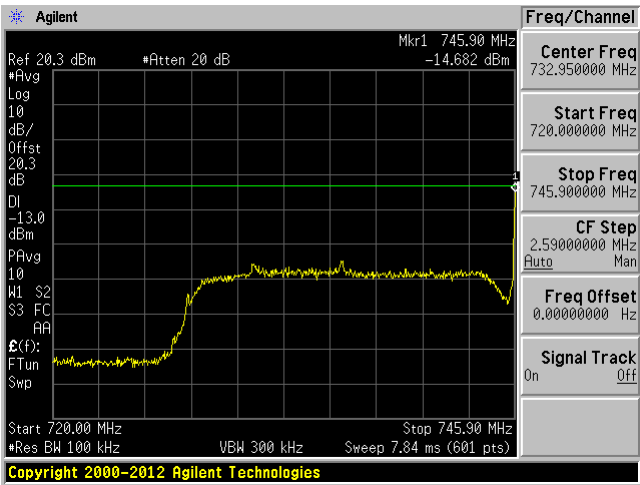
AGC On

Low Channel

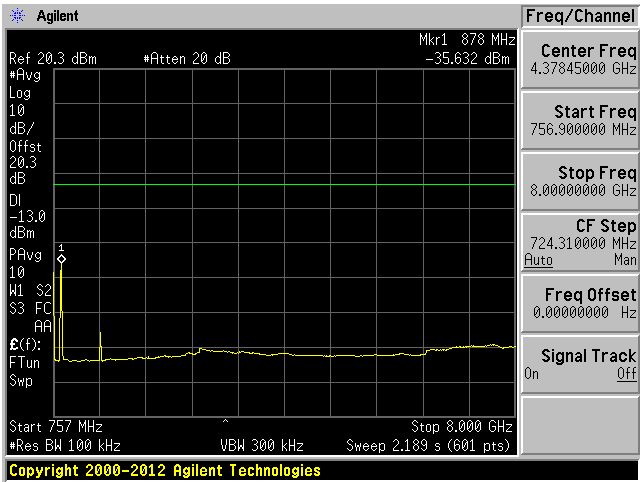
Low Channel: 30 MHz-720 MHz



Low Channel: 720 MHz-754.9 MHz

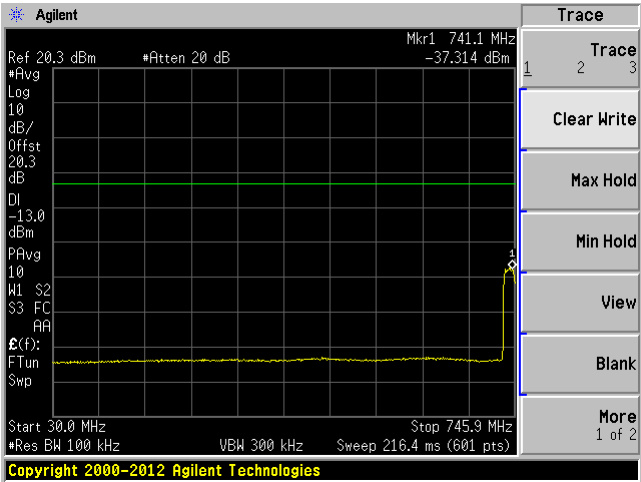


Low Channel: 756.9 MHz- 8 GHz

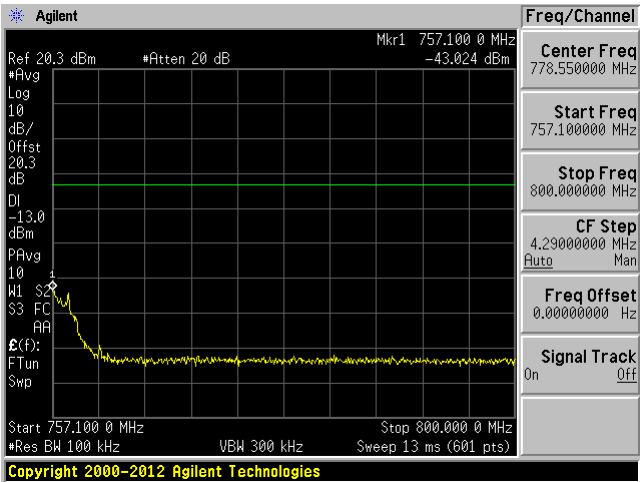


Middle Channel

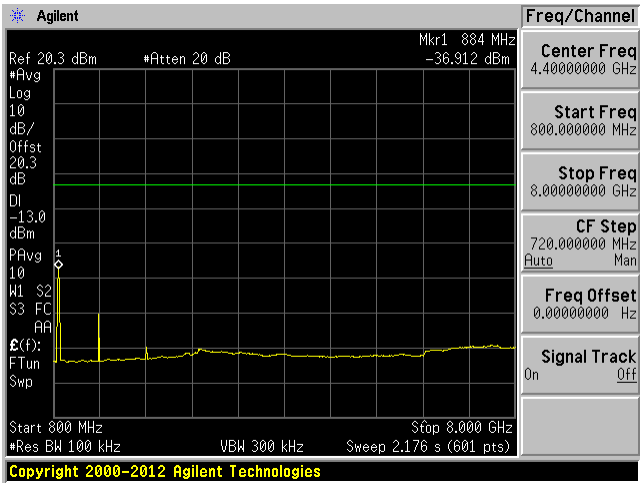
Middle Channel: 30 MHz-745.9 MHz



Middle Channel: 757.1 MHz-800 MHz

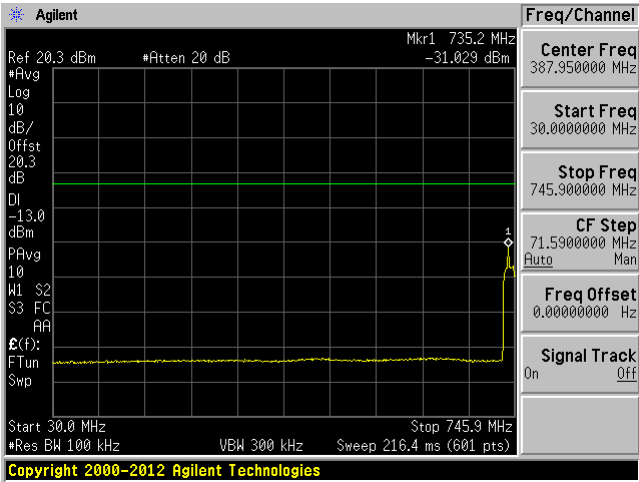


Middle Channel: 800 MHz- 8 GHz

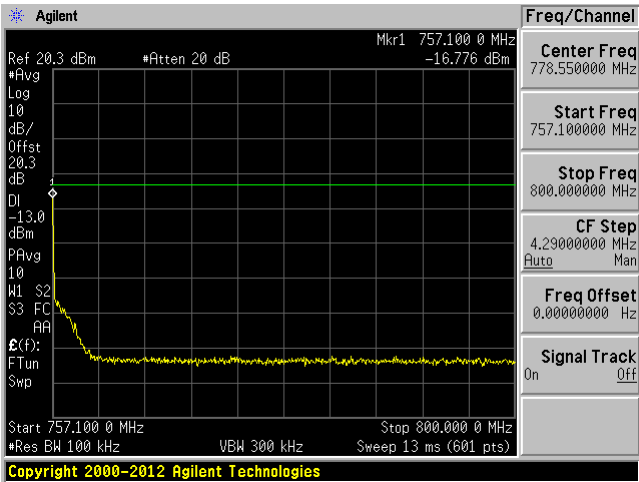


High Channel

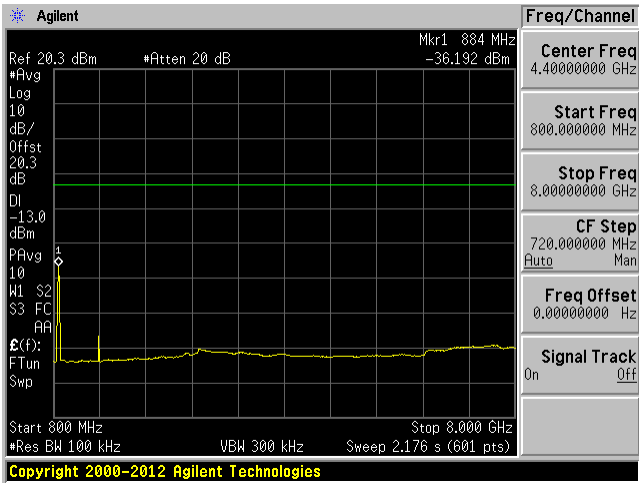
High Channel: 30 MHz-745.9 MHz



High Channel: 757.1 MHz-800 MHz



High Channel: 800 MHz- 8 GHz

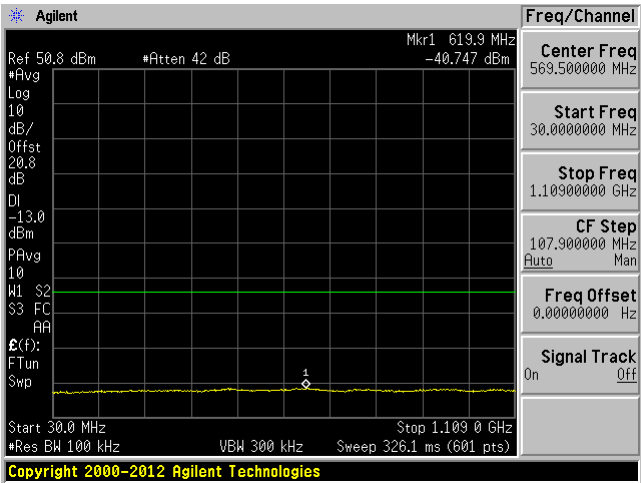


Broadband signal 2110-2155 MHz

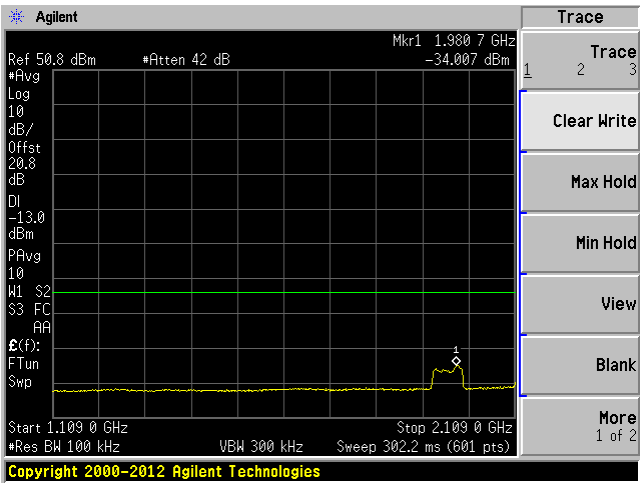
AGC Off

Low Channel

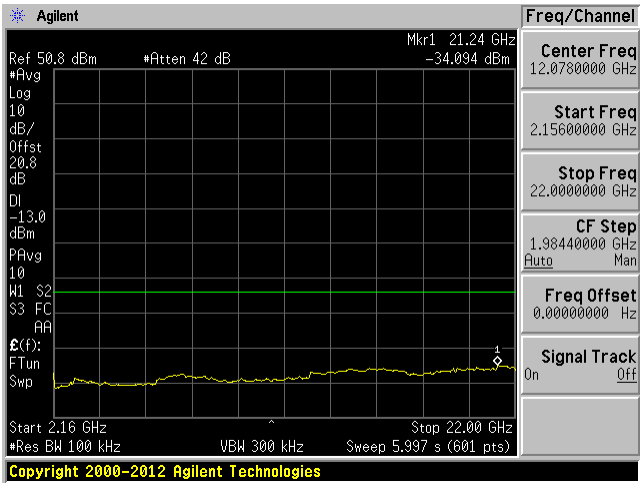
Low Channel: 30 MHz-1.109 GHz



Low Channel: 1.109 GHz-2.109 GHz

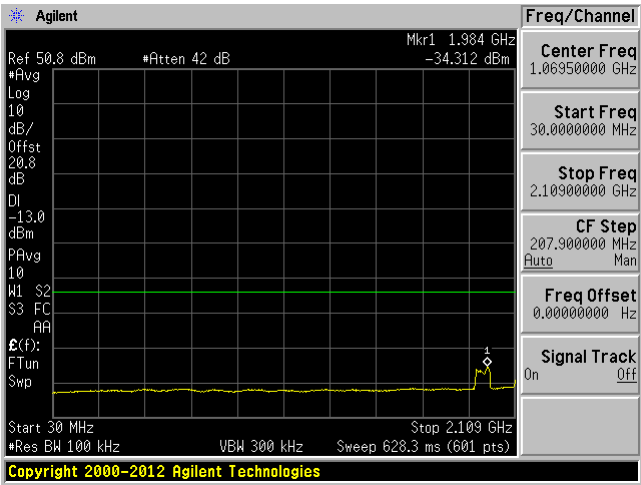


Low Channel: 2.156 GHz- 22 GHz

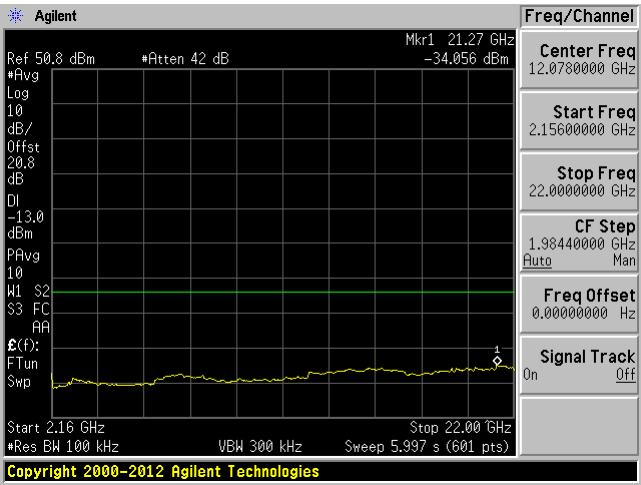


Middle Channel

Middle Channel: 30 MHz-2.109 GHz

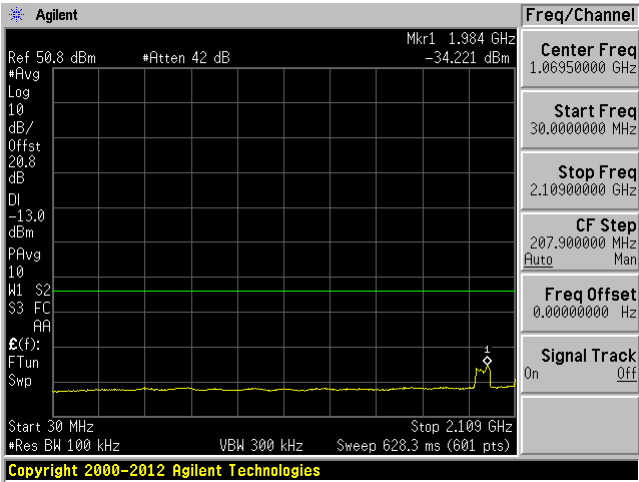


Middle Channel: 2.156 GHz-22 GHz

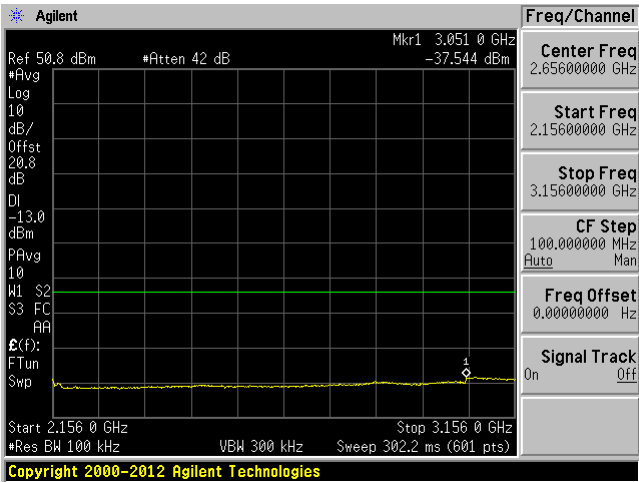


High Channel

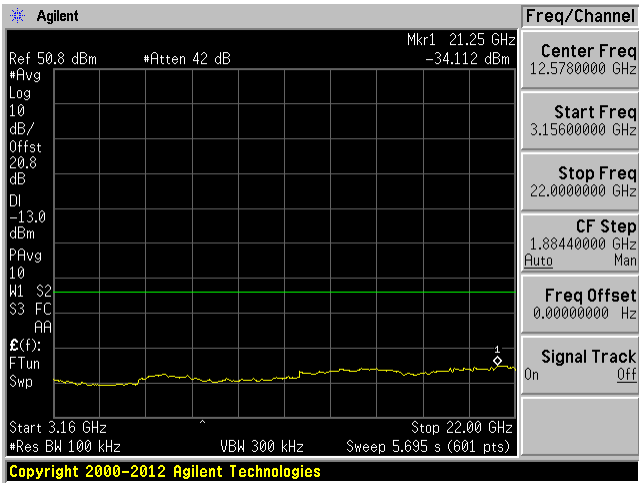
High Channel: 30 MHz-2.109 MHz



High Channel: 2.156 GHz-3.156 GHz



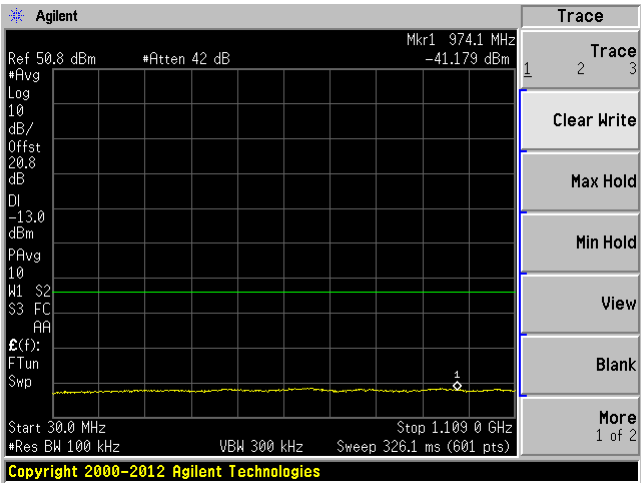
High Channel: 3.156 GHz- 22 GHz



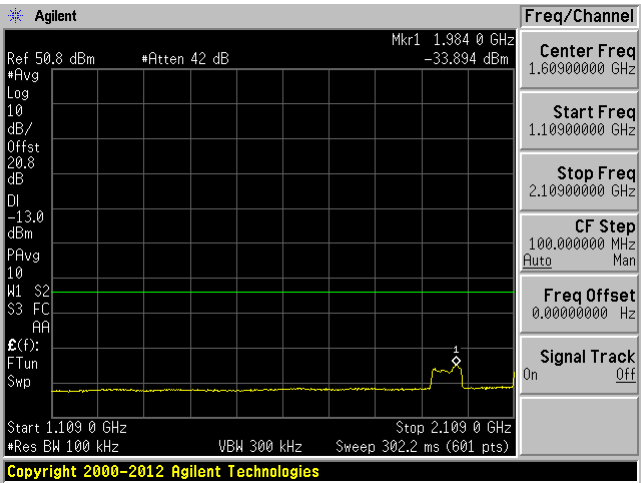
AGC On

Low Channel

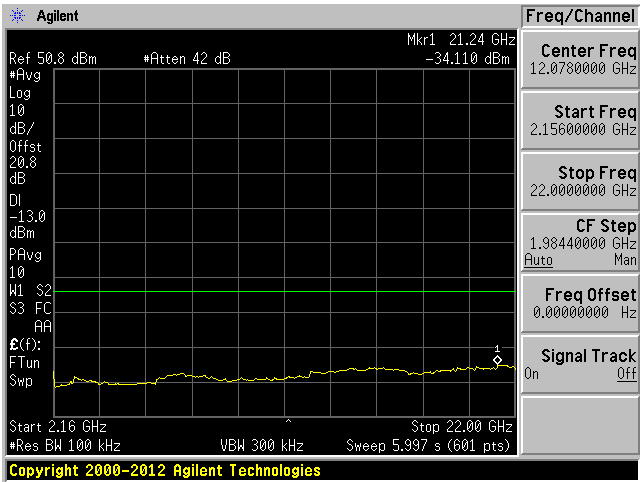
Low Channel: 30 MHz-1.109 GHz



Low Channel: 1.109 GHz-2.109 GHz

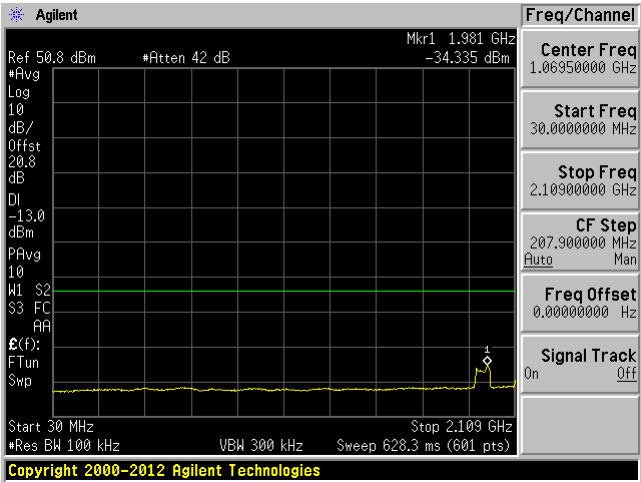


Low Channel: 2.156 GHz- 22 GHz

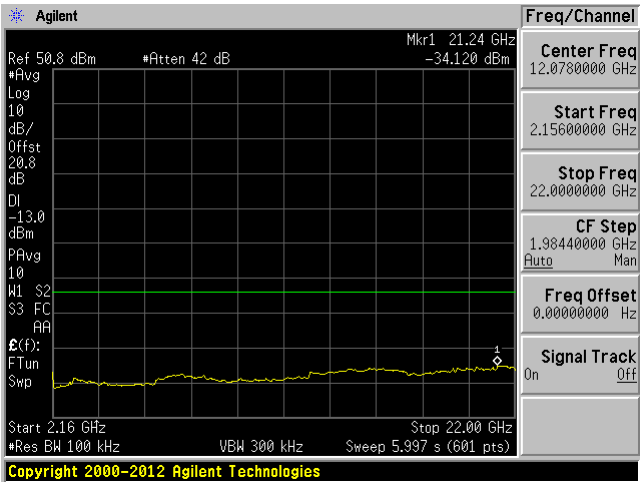


Middle Channel

Middle Channel: 30 MHz-2.109 GHz

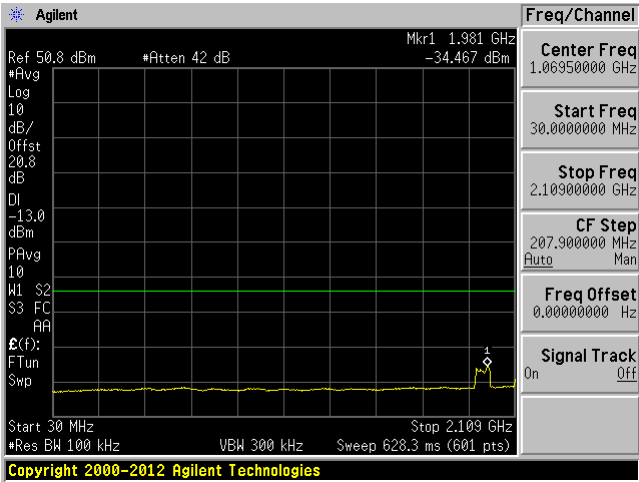


Middle Channel: 2.156 GHz-22 GHz

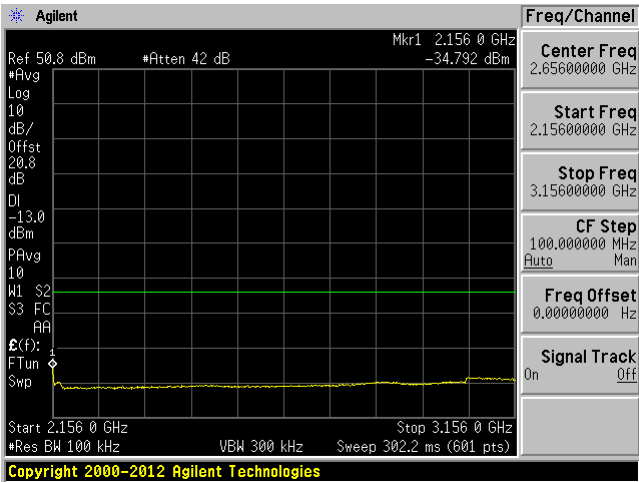


High Channel

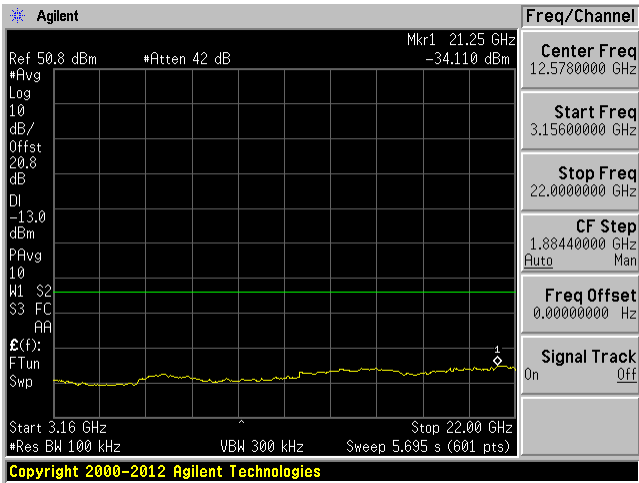
High Channel: 30 MHz-2.109 GHz



High Channel: 2.156 GHz-3.156 GHz



High Channel: 3.156 GHz- 22 GHz

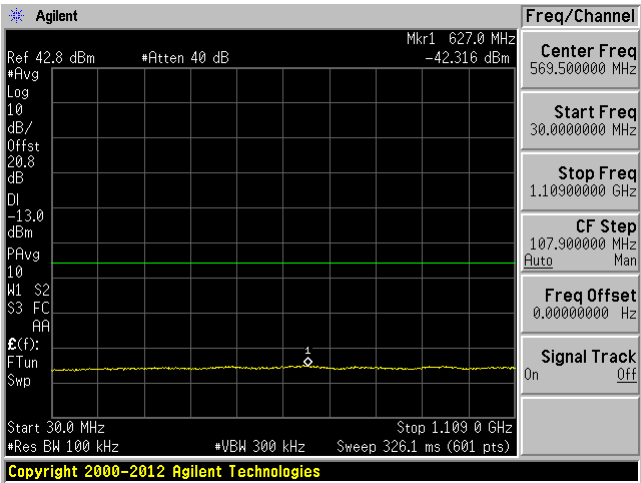


Narrowband Signal 2110-2155 MHz

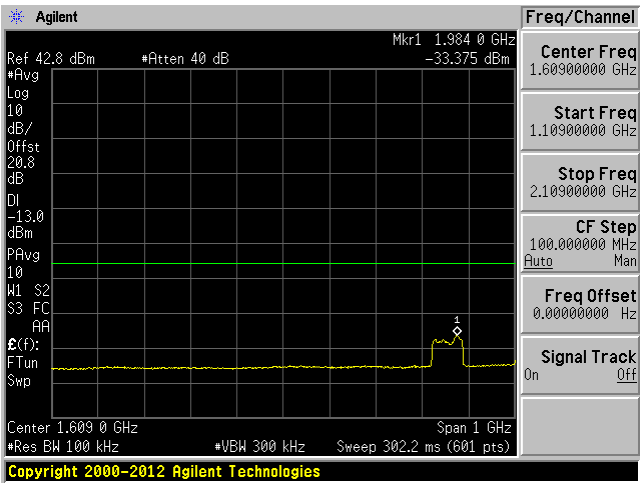
AGC Off

Low Channel

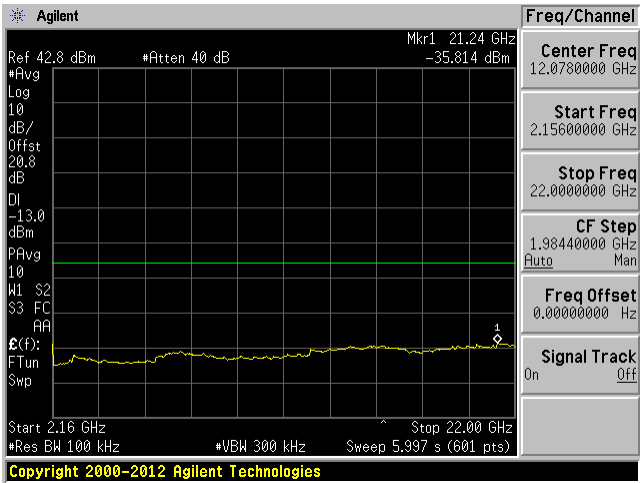
Low Channel: 30 MHz-1.109 GHz



Low Channel: 1.109 GHz-2.109 GHz

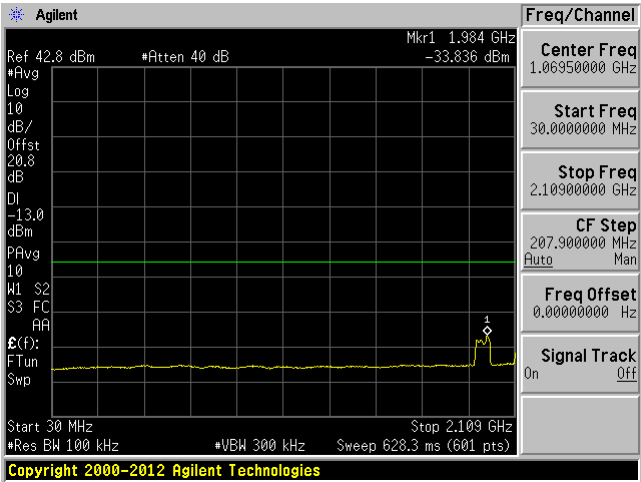


Low Channel: 2.156 GHz- 22 GHz

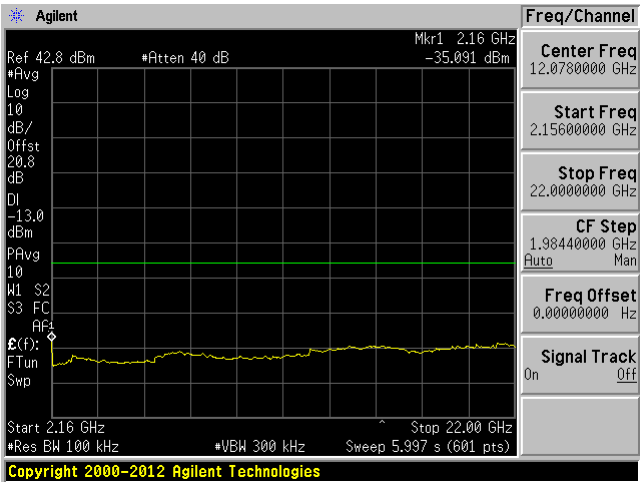


Middle Channel

Middle Channel: 30 MHz-2.109 GHz

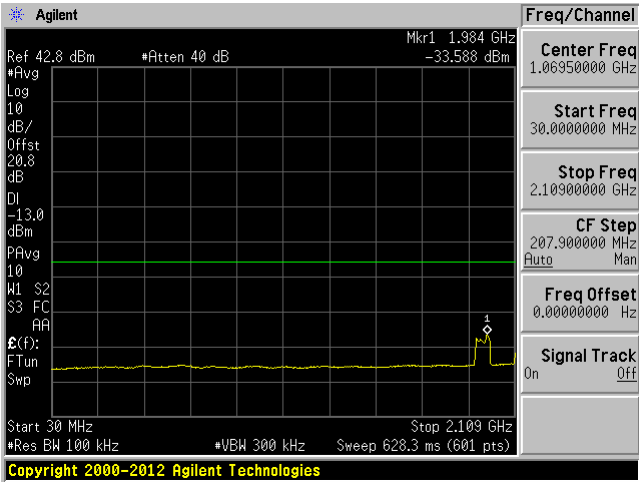


Middle Channel: 2.156 GHz-22 GHz

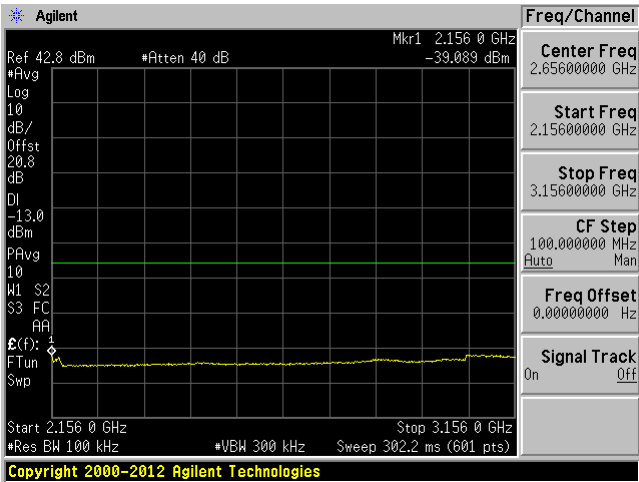


High Channel

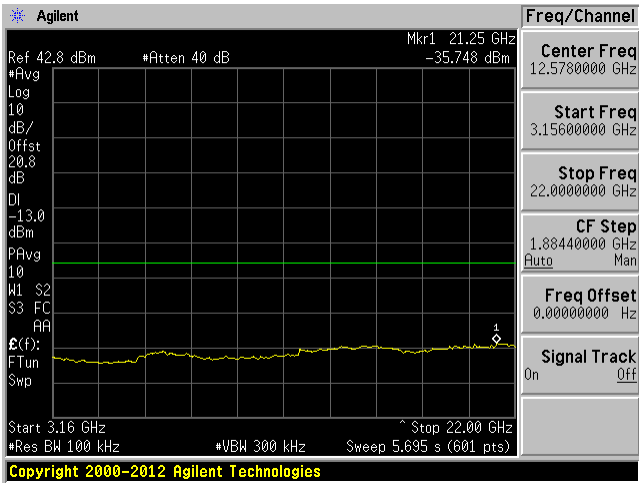
High Channel: 30 MHz-2.109 GHz



High Channel: 2.156 GHz-3.156 GHz



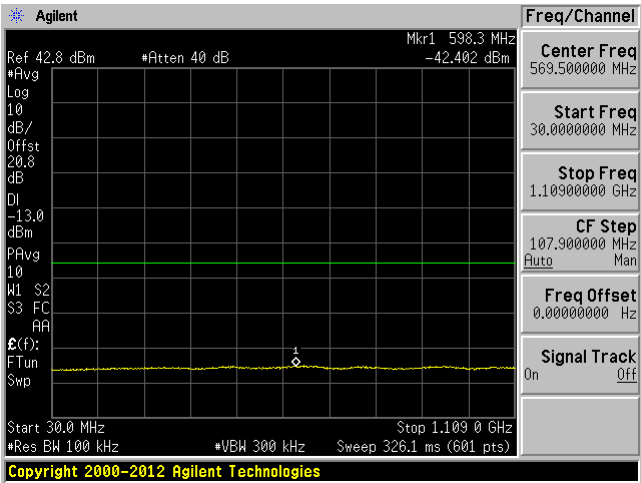
High Channel: 3.156 GHz- 22 GHz



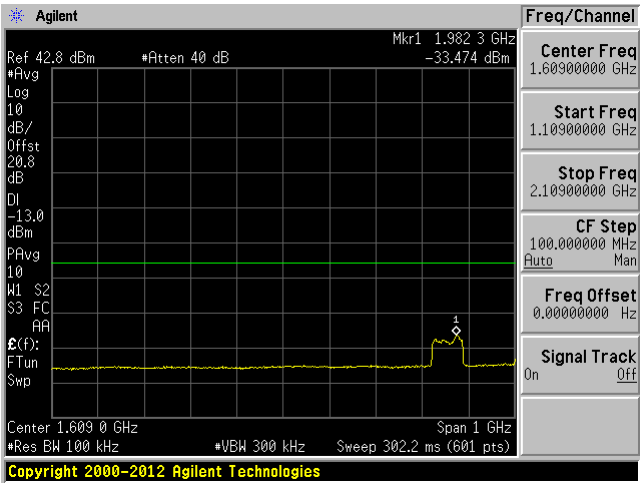
AGC On

Low Channel

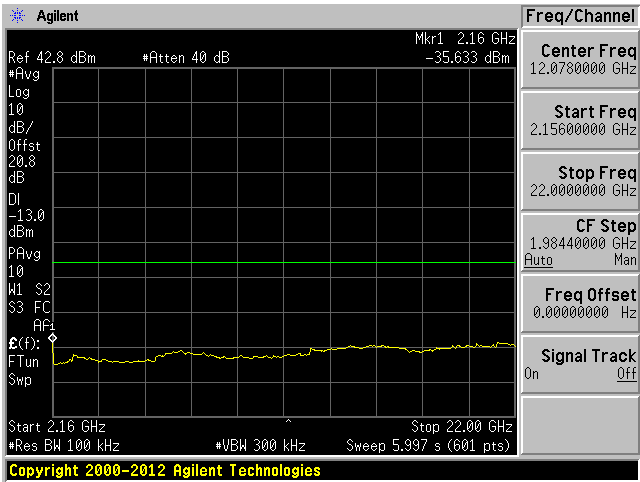
Low Channel: 30 MHz-1.109 GHz



Low Channel: 1.109 GHz-2.109 GHz

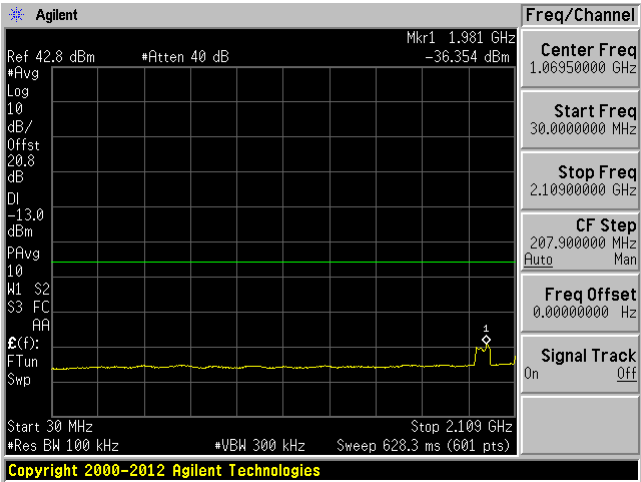


Low Channel: 2.156 GHz- 22 GHz

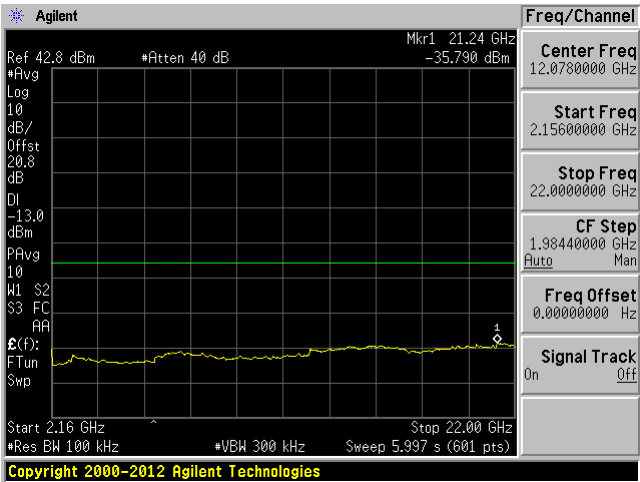


Middle Channel

Middle Channel: 30 MHz-2.109 GHz

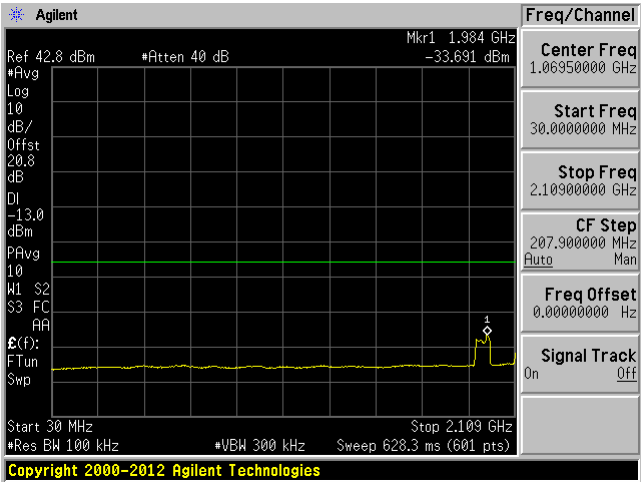


Middle Channel: 2.156 GHz-22 GHz

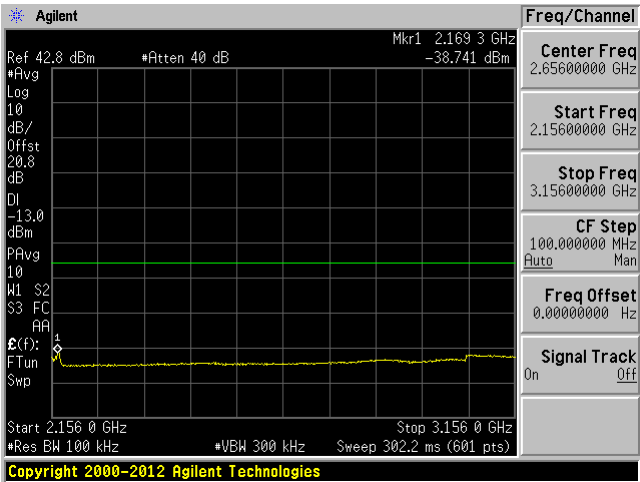


High Channel

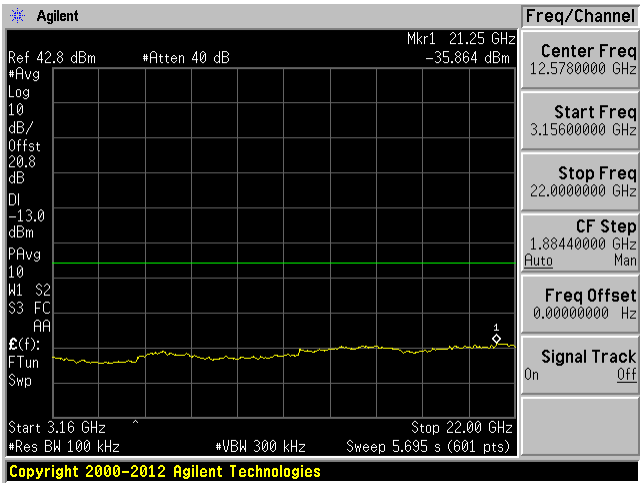
High Channel: 30 MHz-2.109 GHz



High Channel: 2.156 GHz-3.156 GHz



High Channel: 3.156 GHz- 22 GHz



Note: For the AWS-1 band, a 1 MHz RBW was supposed to be used, but compliance was ensured with the 100 kHz RBW.

9 FCC §27.53 - Band Edge & Intermodulation

9.1 Applicable Standards

According to FCC §27.53(c)(1), on any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB.

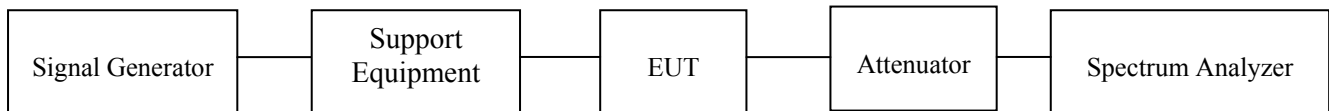
According to FCC §27.53 (g), for operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log (P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

According to FCC §27.53 (h)(1), for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10} (P)$ dB.

9.2 Test Procedure

The signal generator was connected to the support equipment and the support equipment was connected to the EUT through a fiber cable. The output of the EUT was connected to a spectrum analyzer through appropriate attenuation.

The center frequency of the spectrum analyzer was set according to center frequency of the EUT to be transmitted.



9.3 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates	Calibration Interval
Agilent	Analyzer, Spectrum	E4440A	US 42221851	2016-06-10	1 year
Rohde & Schwarz	Generator, Signal	SMIQ03	849192/0085	2016-07-29	2 year
Keysight Technologies	Vector Signal Generator	N5182B	MY51350070	2015-11-18	1 year
-	20 dB attenuator	-	-	Each Time ¹	Each Time ¹
-	20 dB attenuator	-	-	Each Time ¹	Each Time ¹
-	SMA cable	-	C0003	Each Time ¹	Each Time ¹
-	SMA cable	-	C0006	Each Time ¹	Each Time ¹

¹Note: This equipment was calibrated for each test.

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 9 June 2016) “A2LA Policy on Metrological Traceability”.

9.4 Test Environmental Conditions

Temperature:	23° C
Relative Humidity:	32 %
ATM Pressure:	101.4-102 kPa

The testing was performed by Jose Martinez 2016-10-07 in the RF Site.

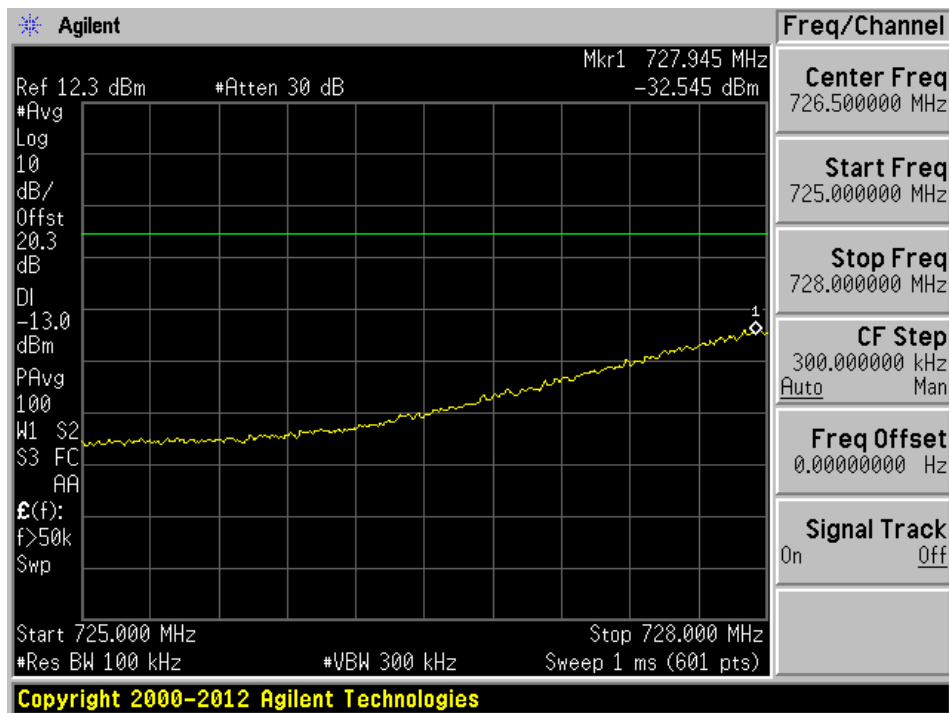
9.5 Test Results

Please refer to the following plots.

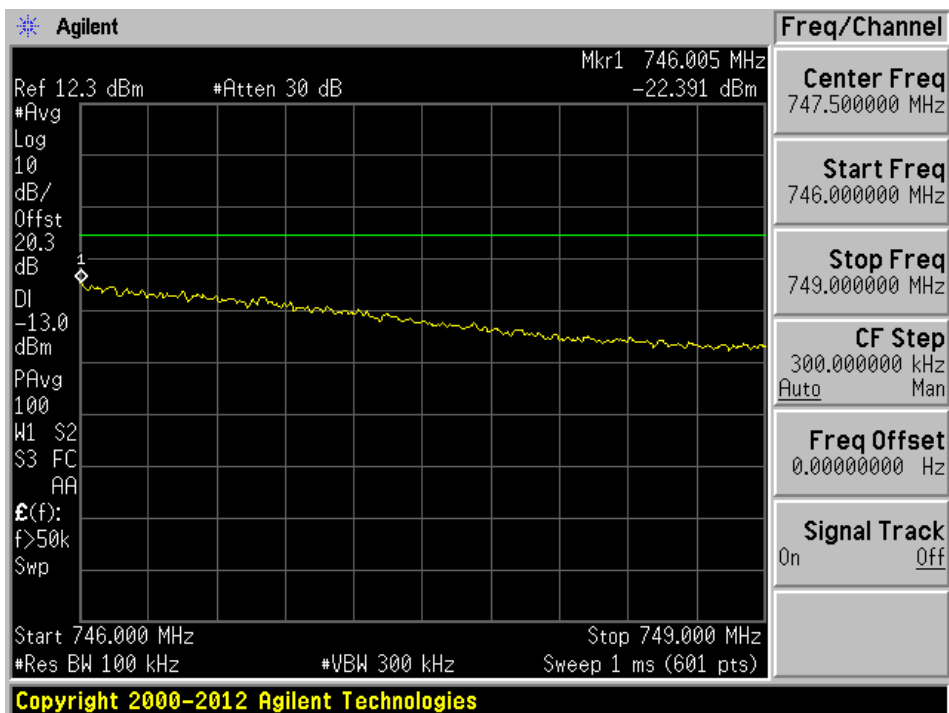
Broadband Signal 728-746 MHz

AGC Off

Lower Band Edge

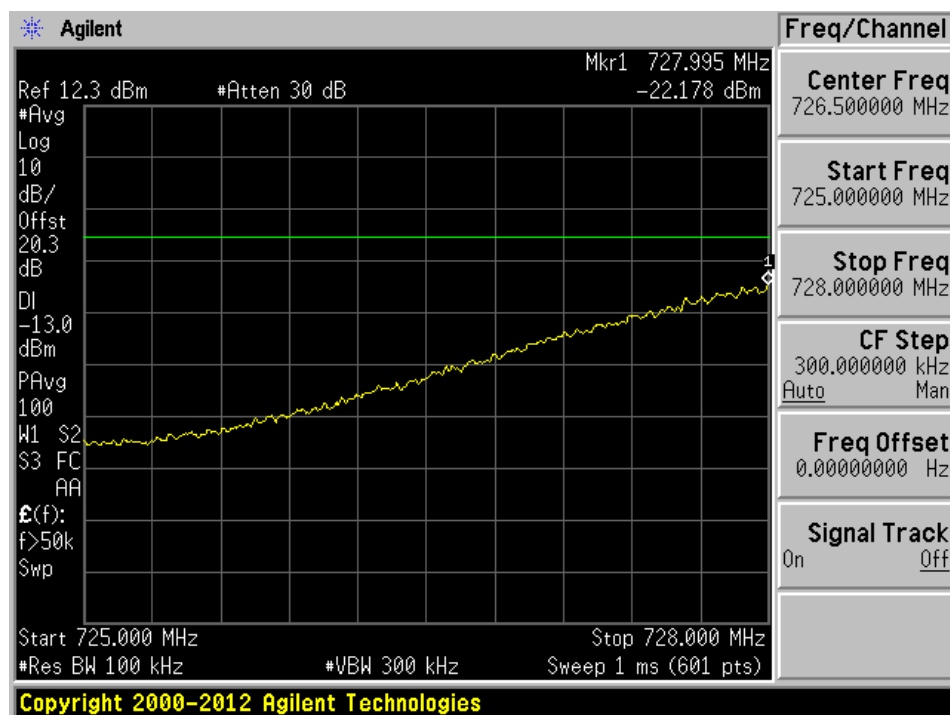


Upper Band Edge

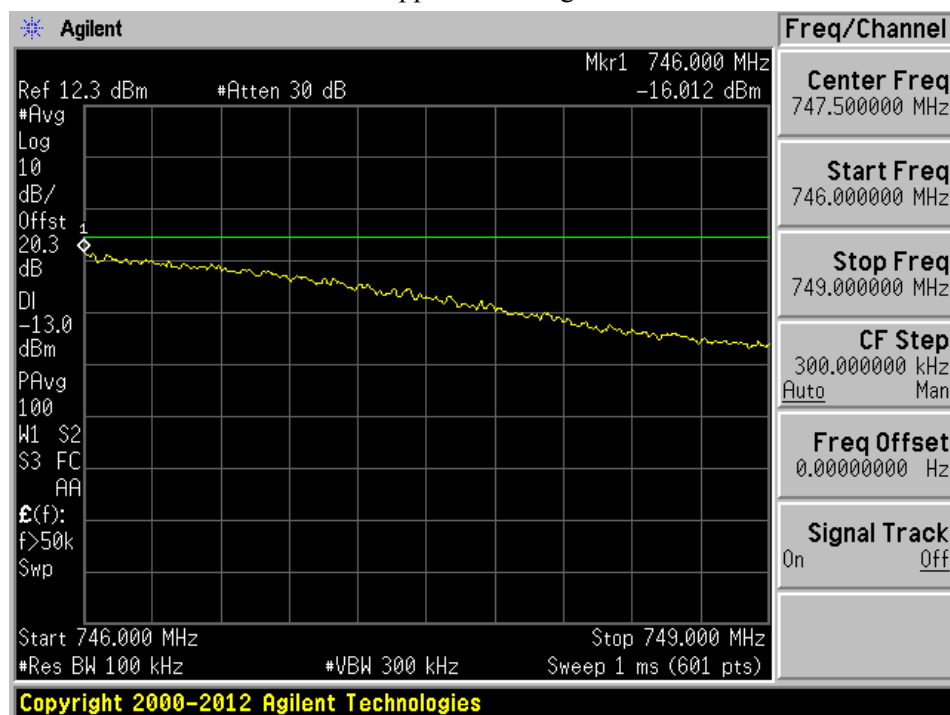


AGC On

Lower Band Edge



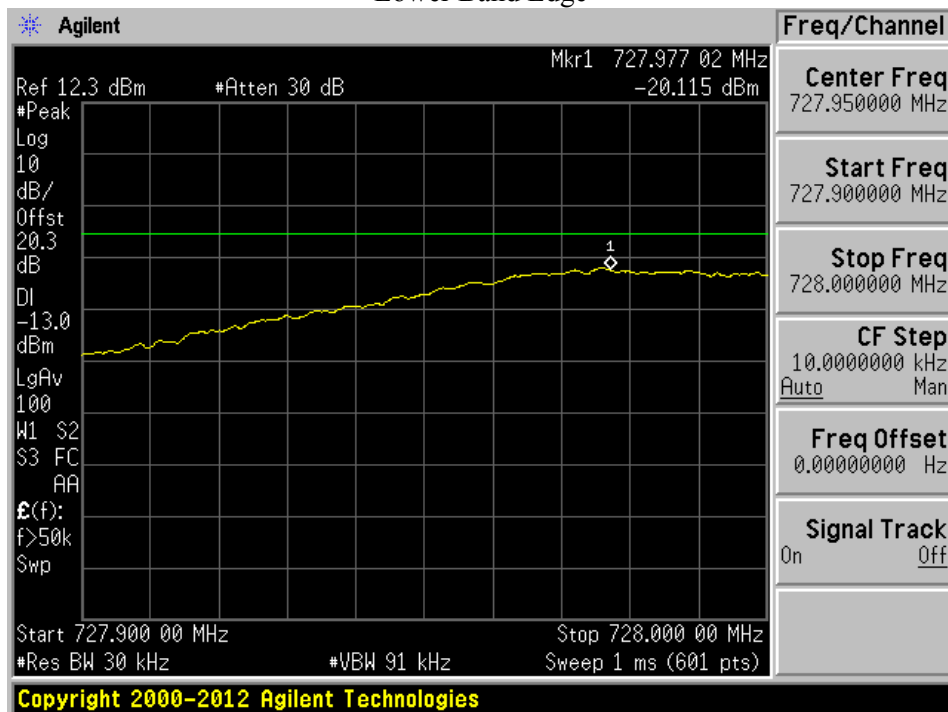
Upper Band Edge



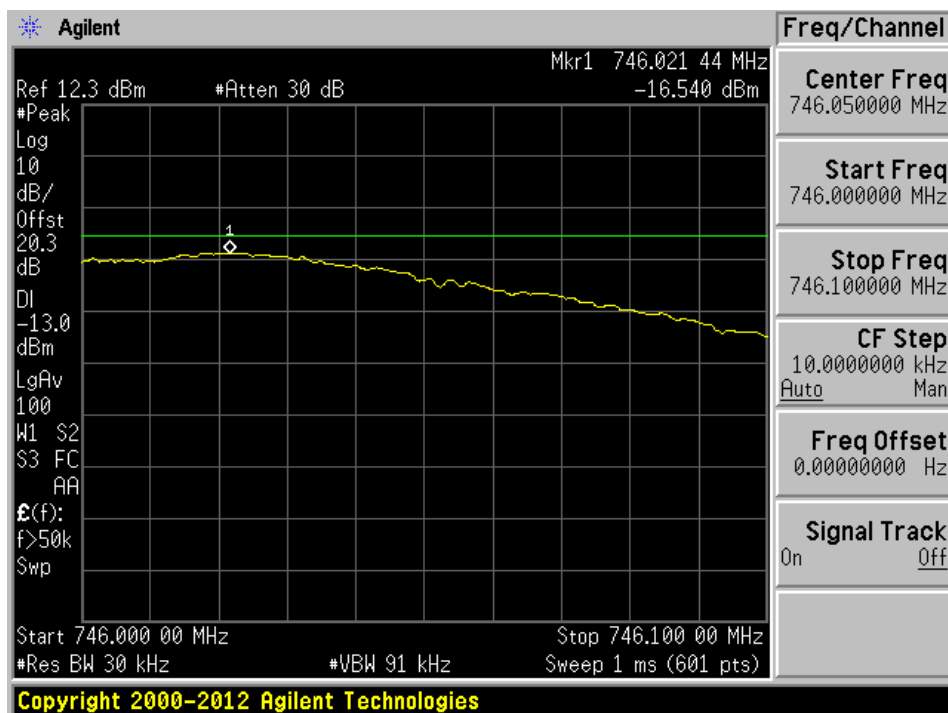
Narrowband Signal 728-746 MHz

AGC Off

Lower Band Edge

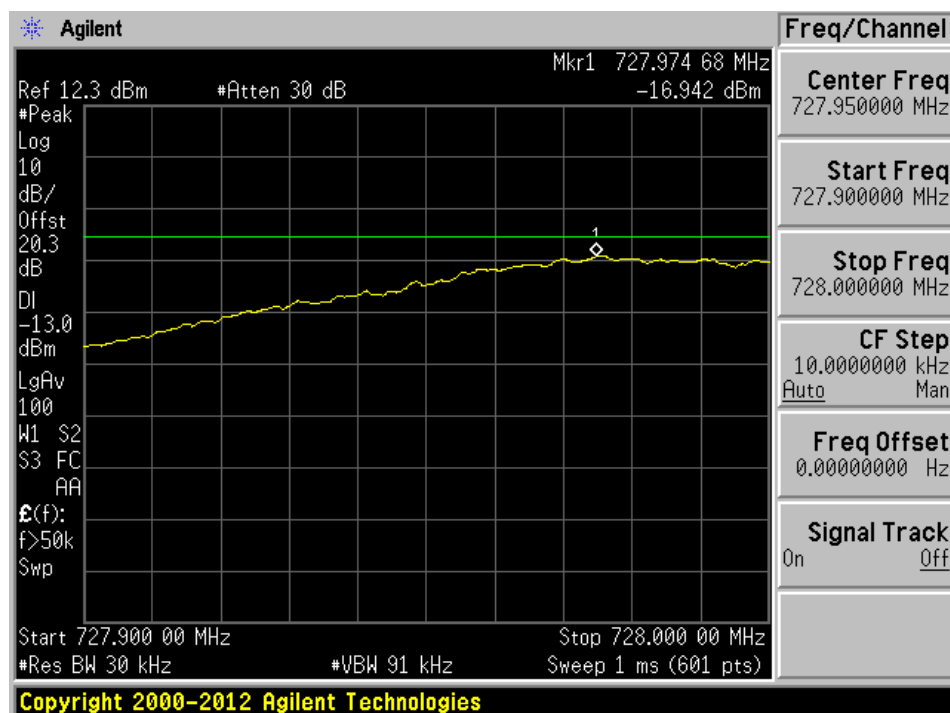


Upper Band Edge

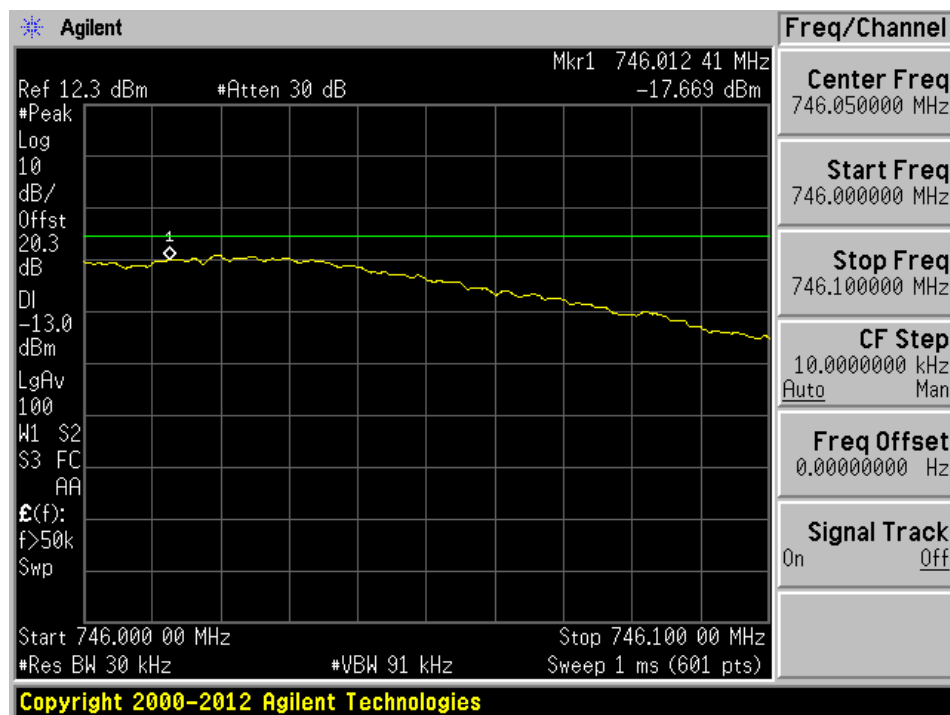


AGC On

Lower Band Edge



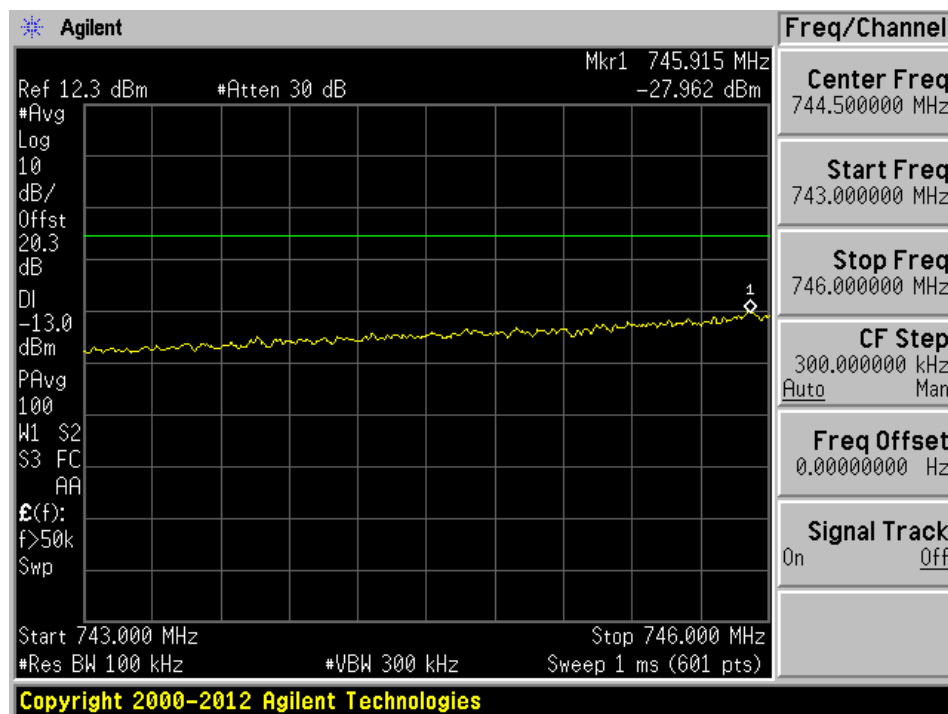
Upper Band Edge



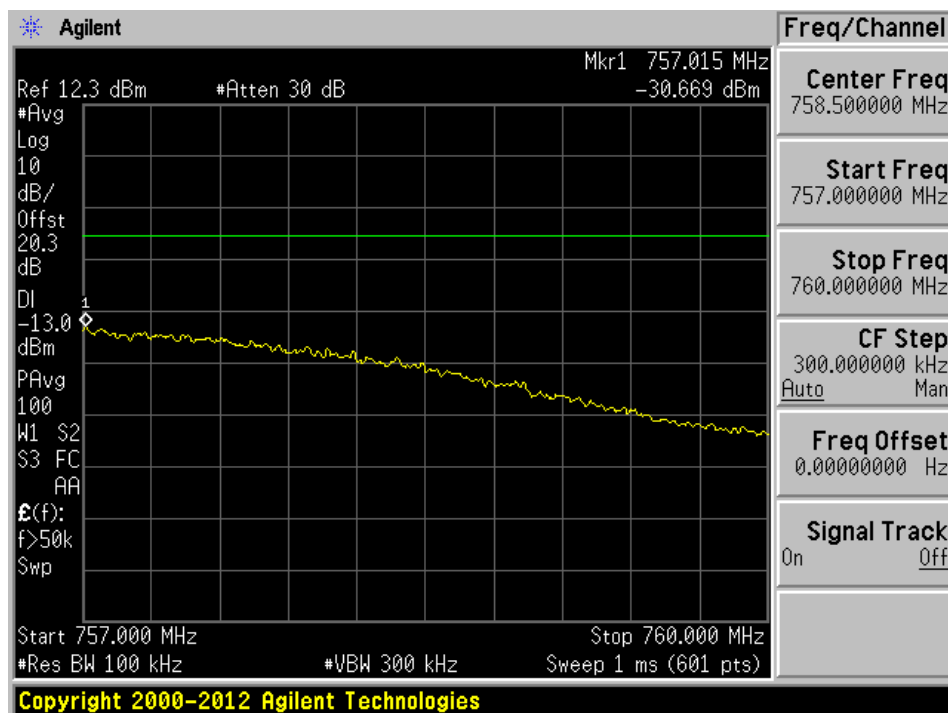
Broadband Signal 746-757 MHz

AGC Off

Lower Band Edge

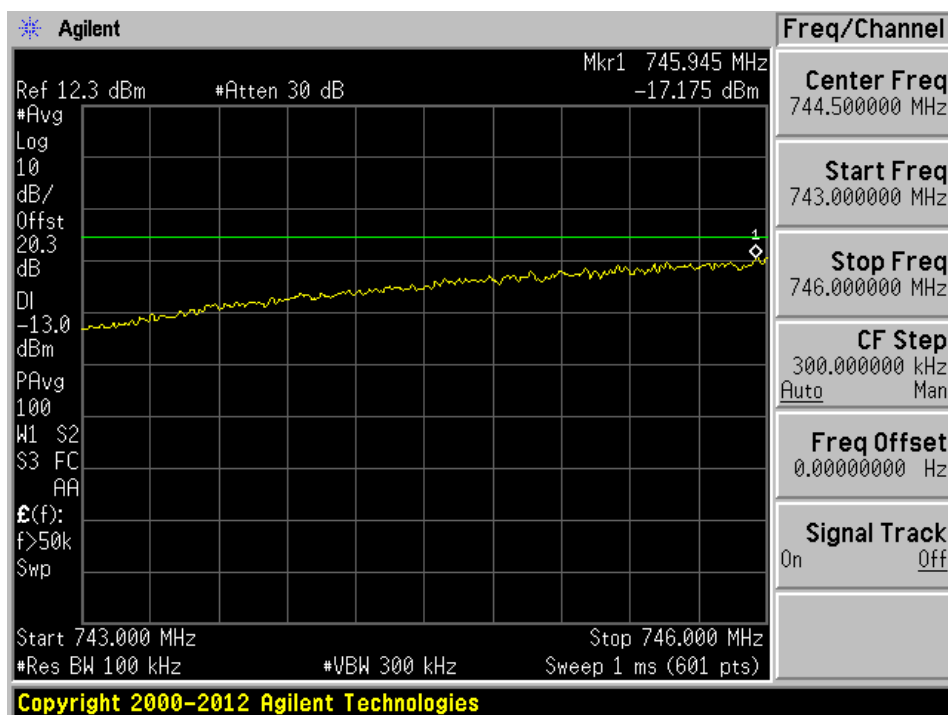


Upper Band Edge

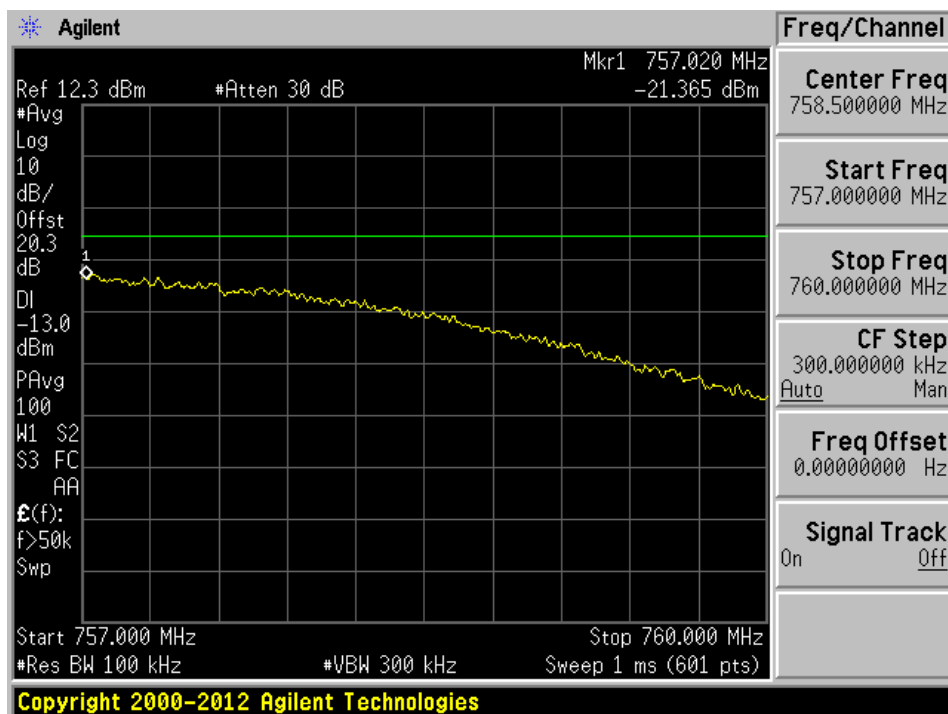


AGC On

Lower Band Edge



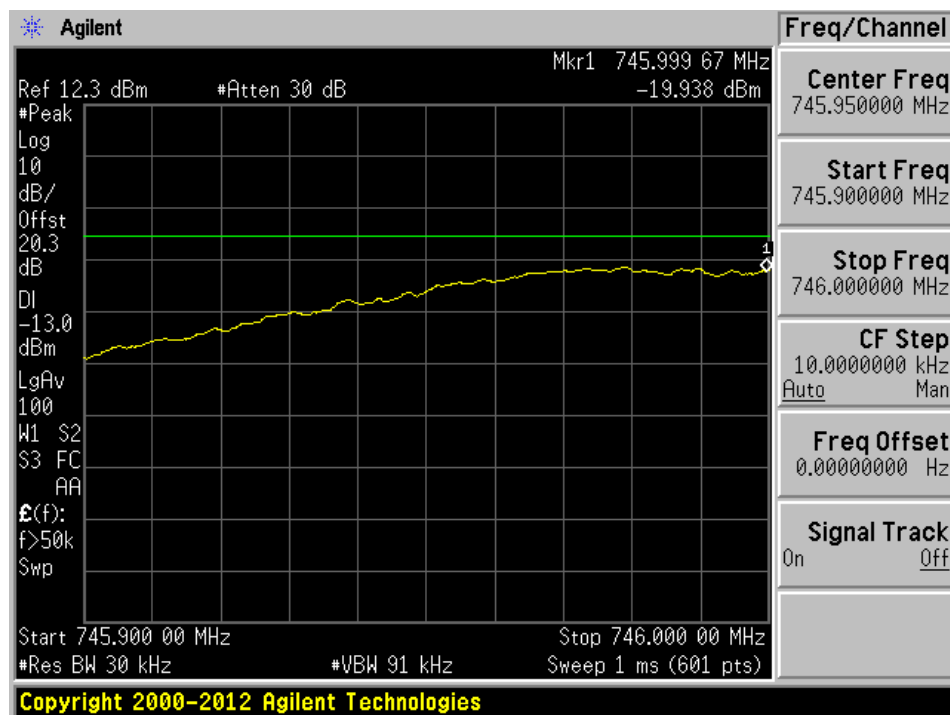
Upper Band Edge



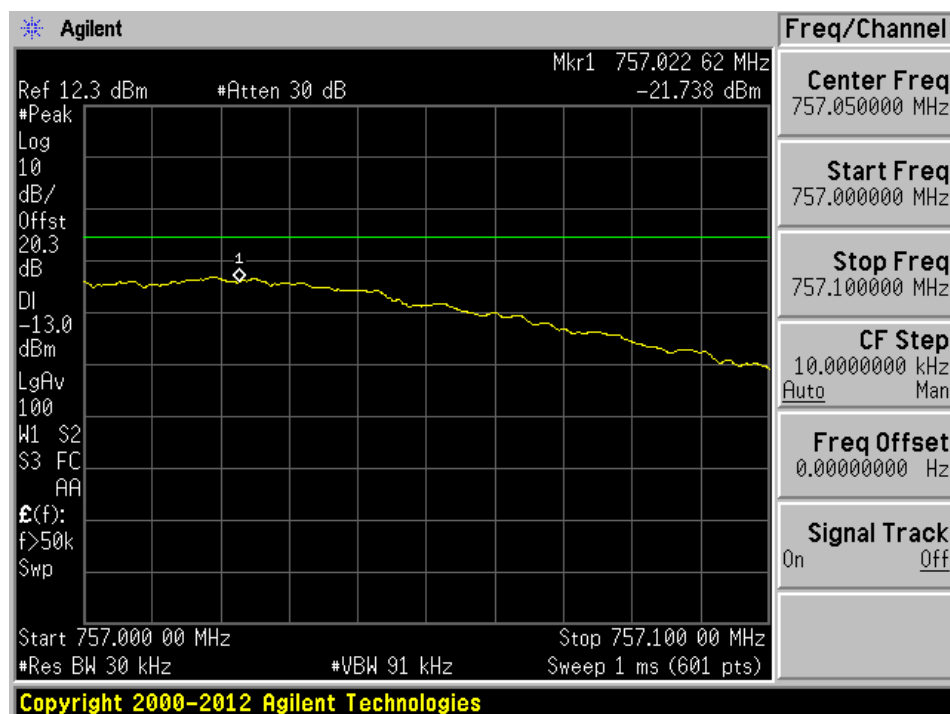
Narrowband signal 746-757 MHz

AGC Off

Lower Band Edge

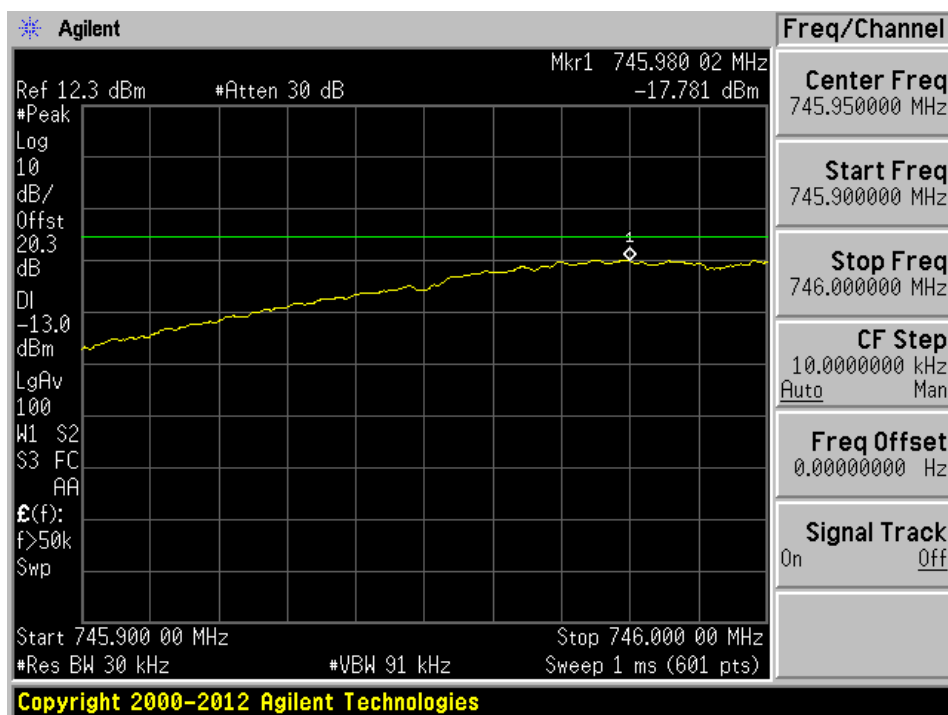


Upper Band Edge

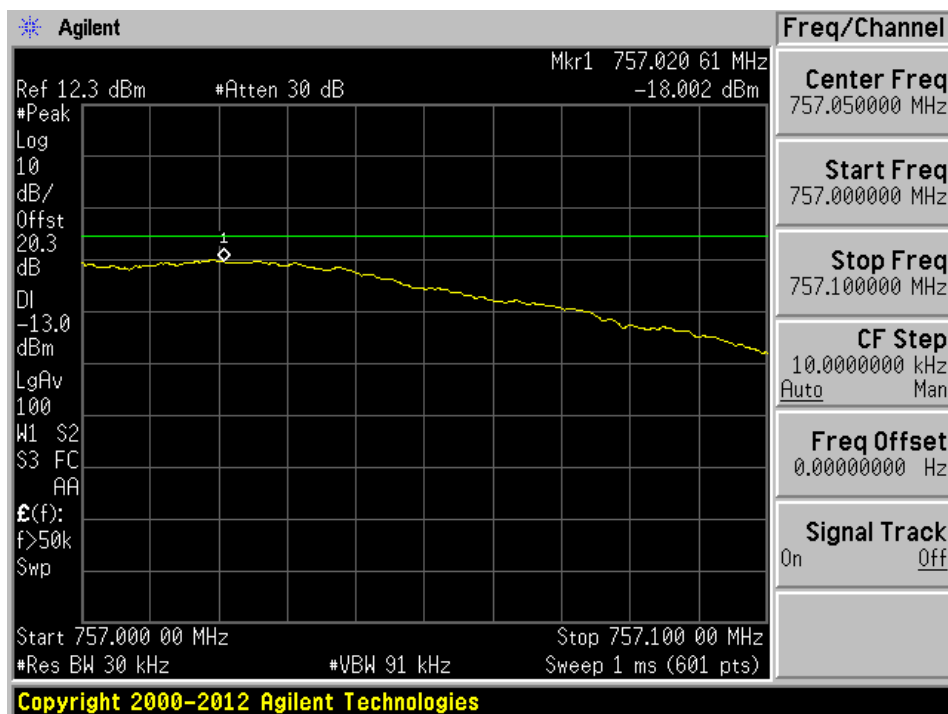


AGC On

Lower Band Edge



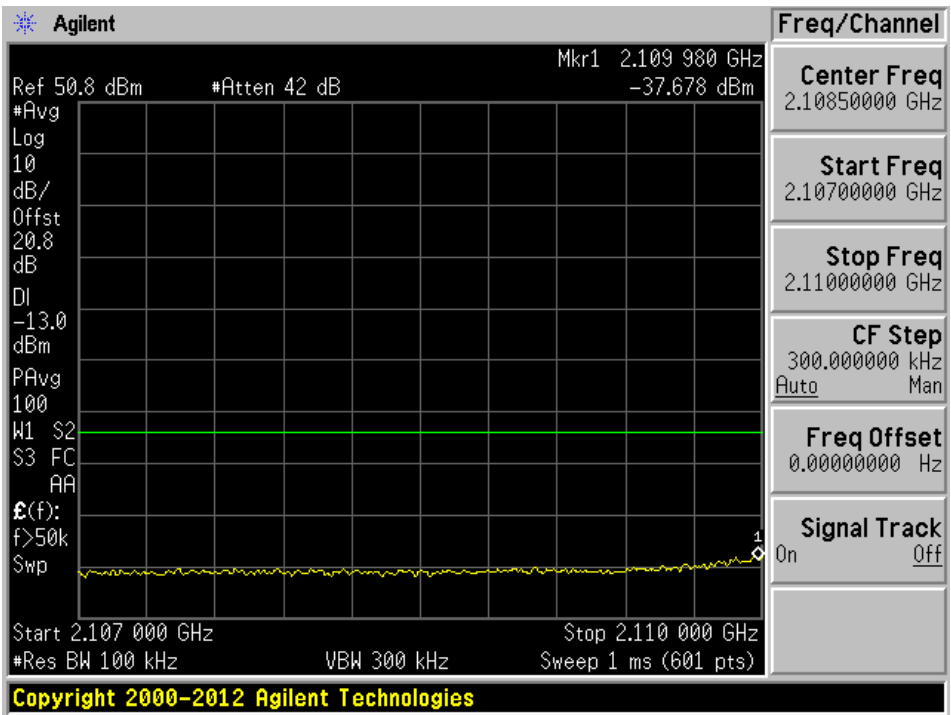
Upper Band Edge



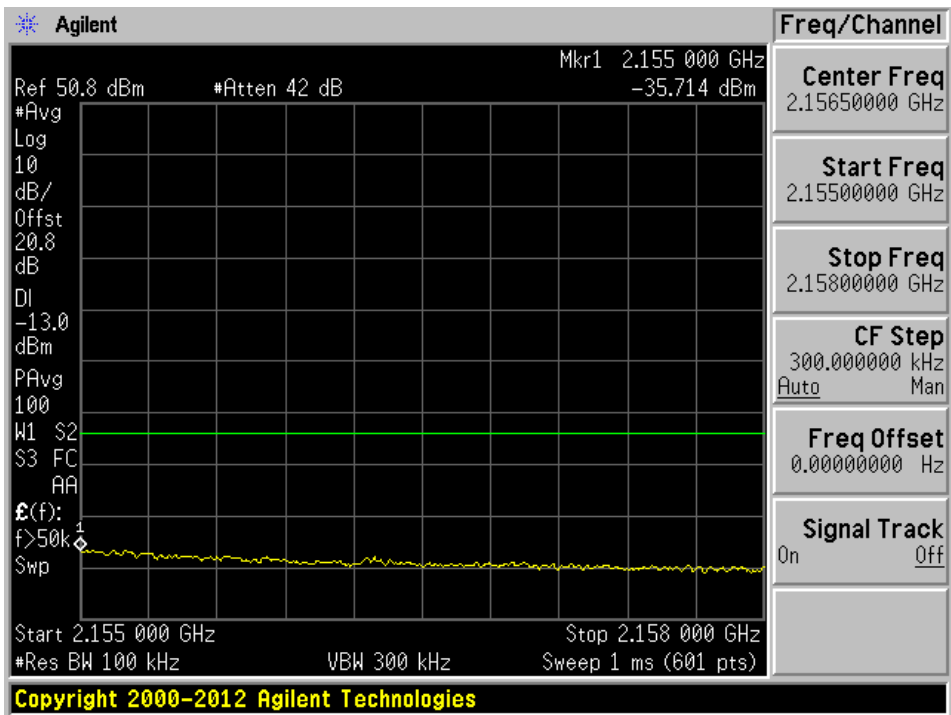
Broadband Signal 2110-2155 MHz

AGC Off

Lower Band Edge

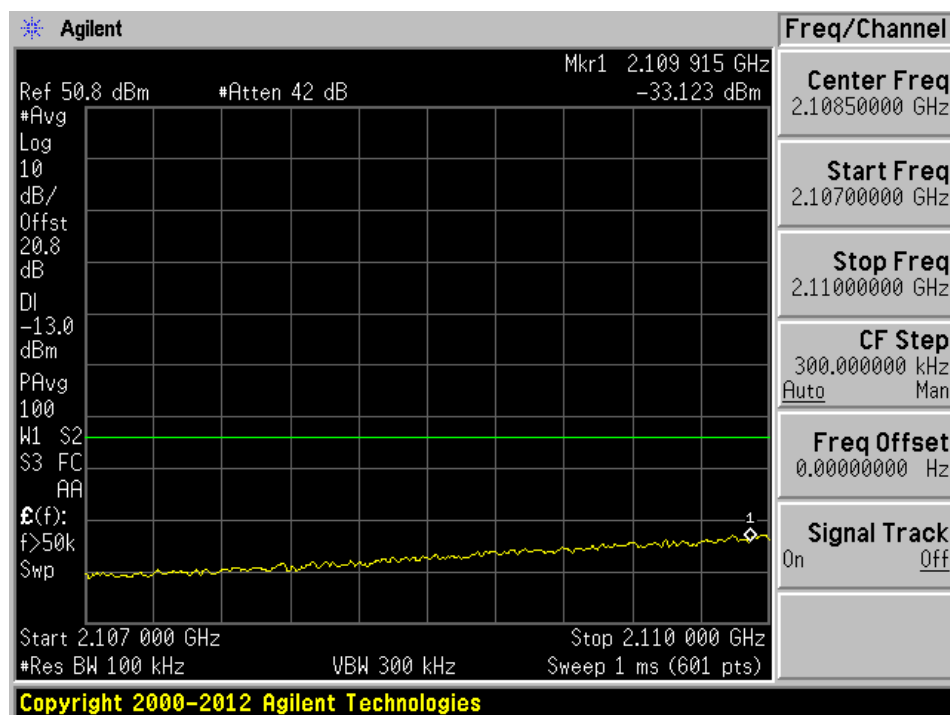


Upper Band Edge

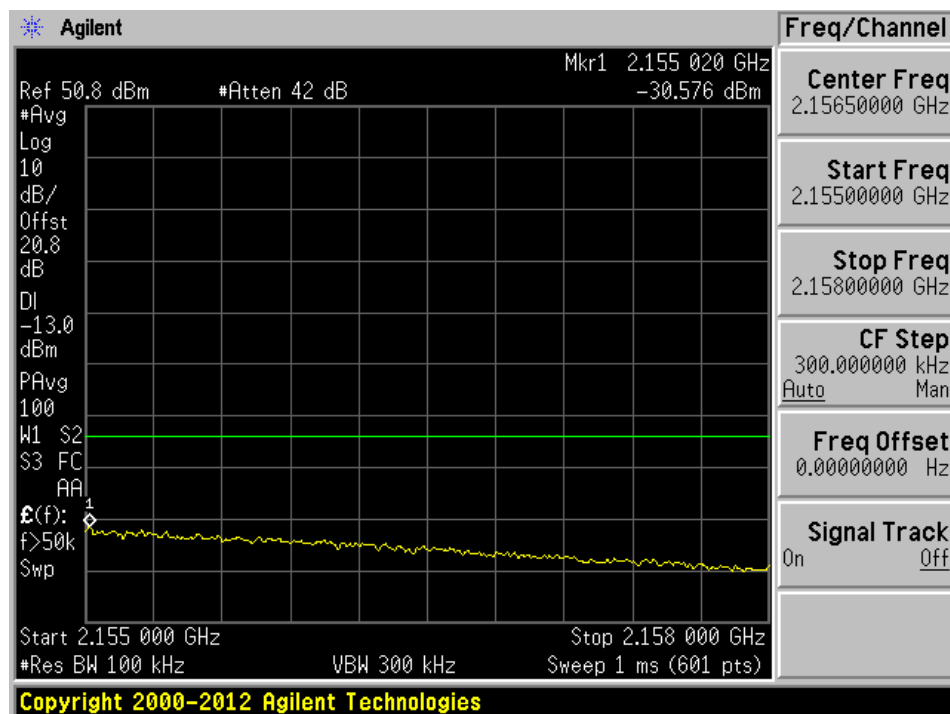


AGC On

Lower Band Edge



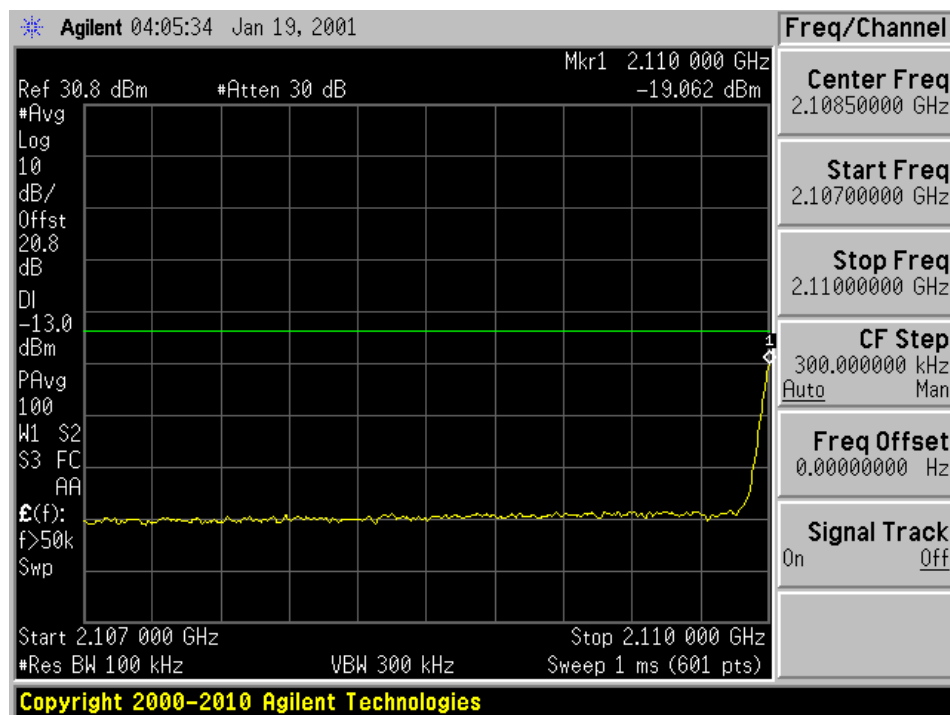
Upper Band Edge



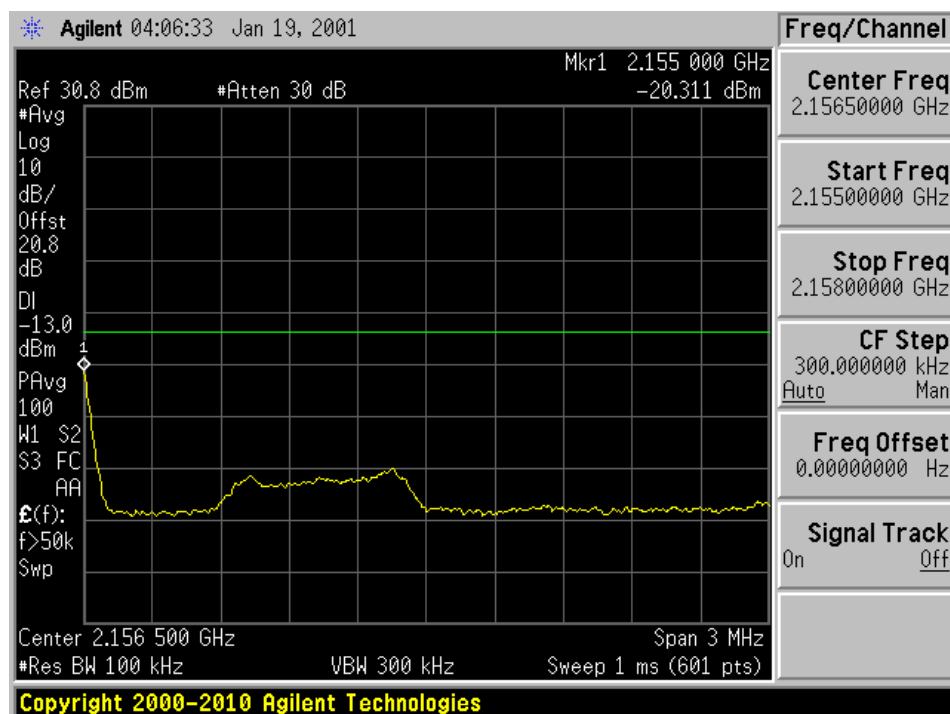
Narrowband signal 2110-2155 MHz

AGC Off

Lower Band Edge

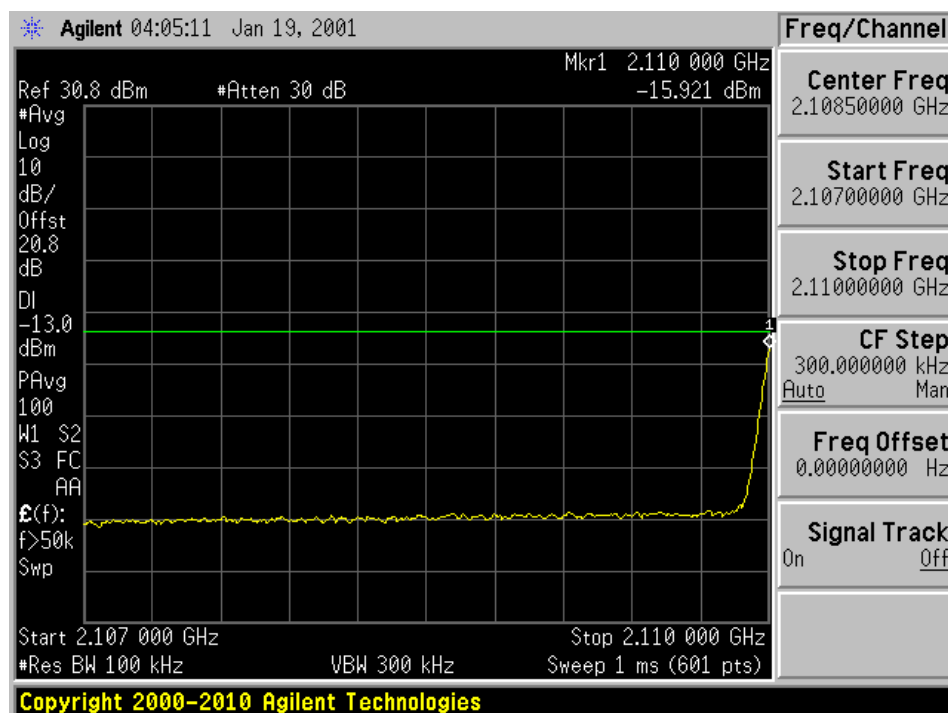


Upper Band Edge

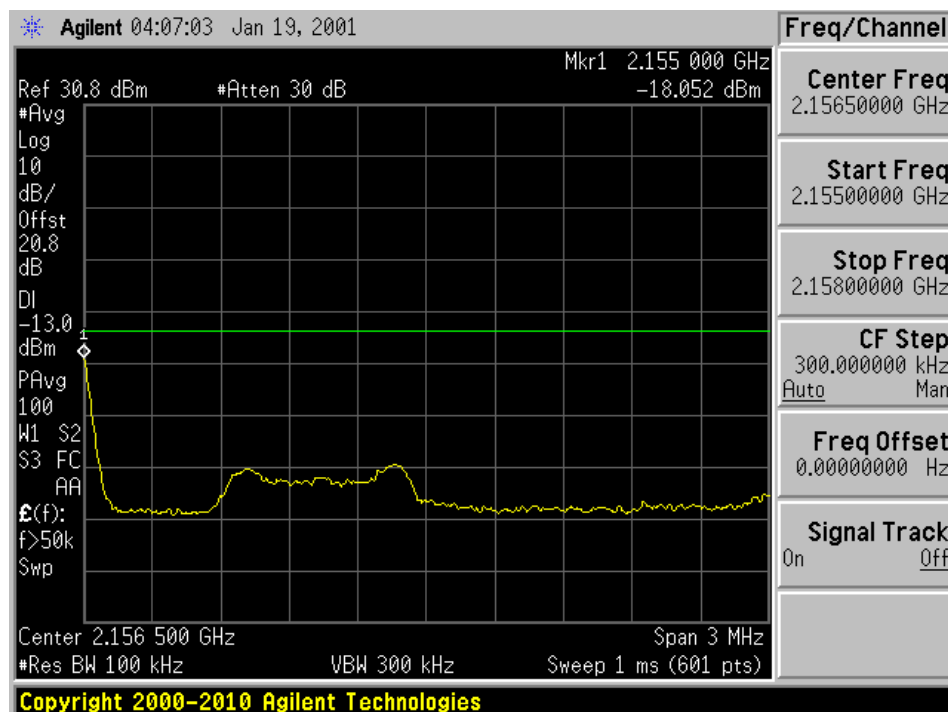


AGC On

Lower Band Edge



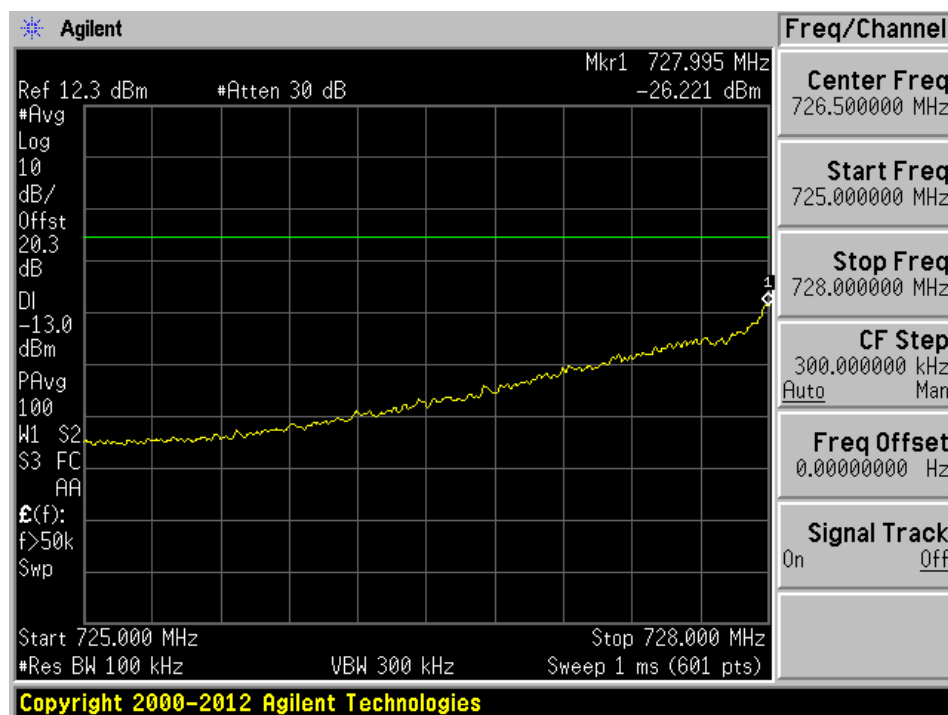
Upper Band Edge



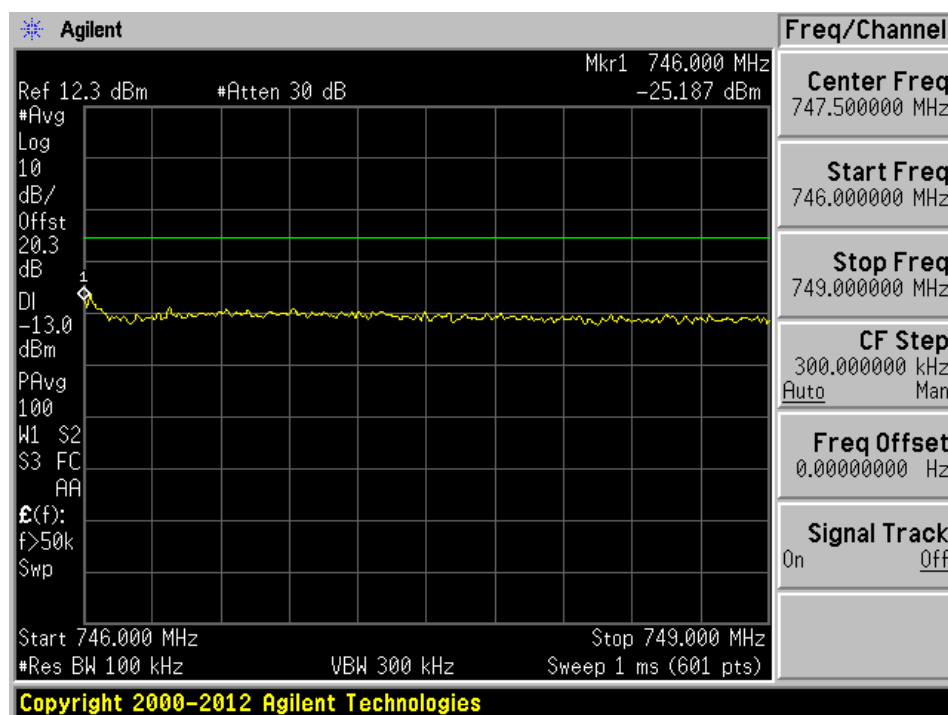
Intermodulation:**Broadband signal 728-746 MHz**

AGC Off

Low Channel

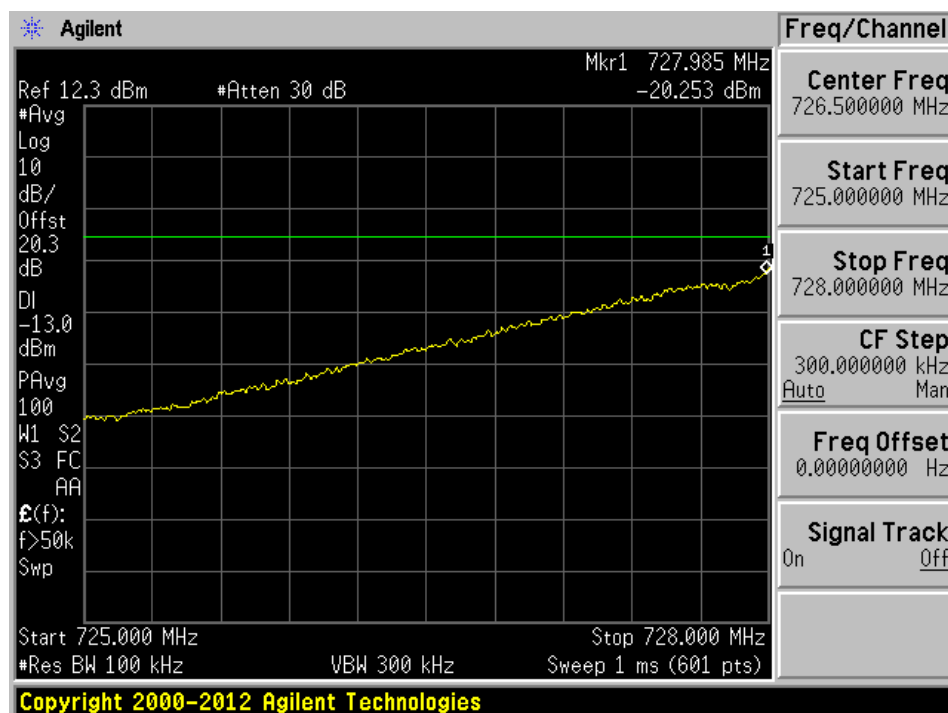


High Channel

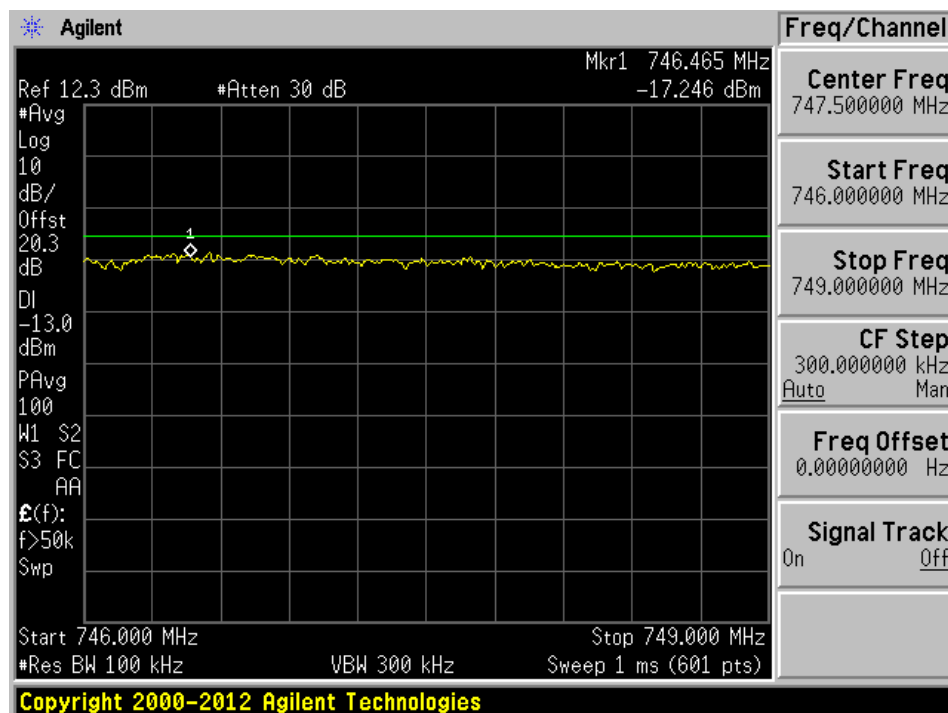


AGC On

Low Channel



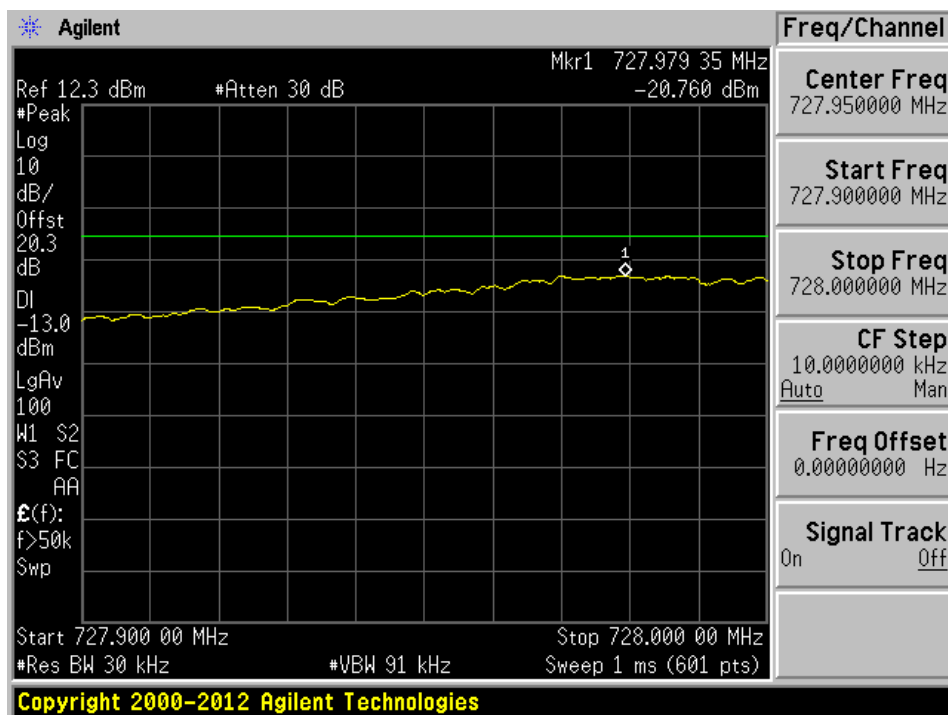
High Channel



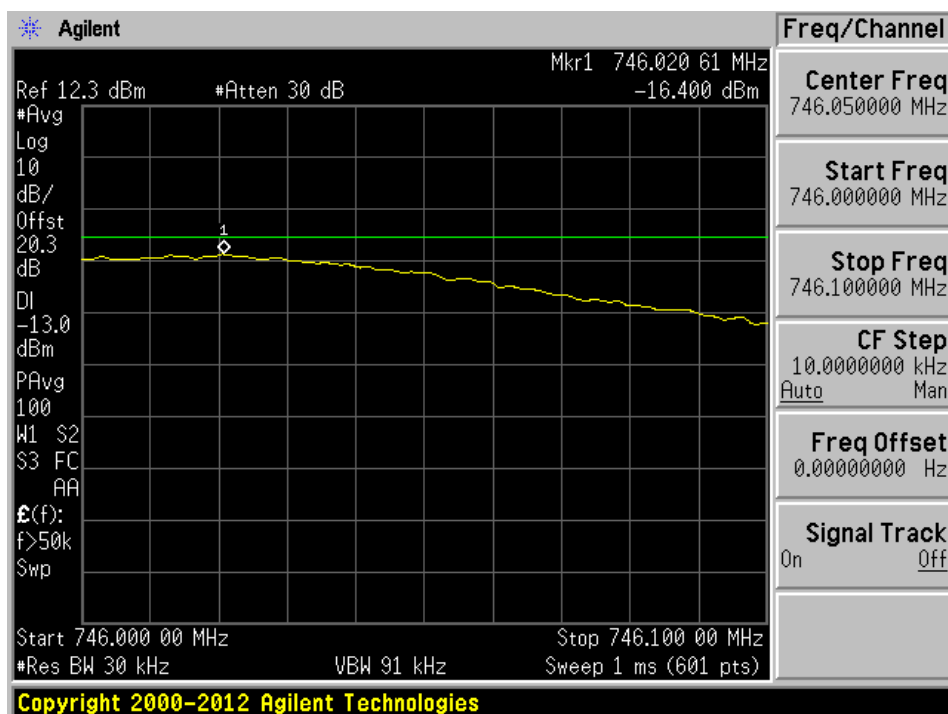
Narrowband Signal 728-746 MHz

AGC Off

Low Channel

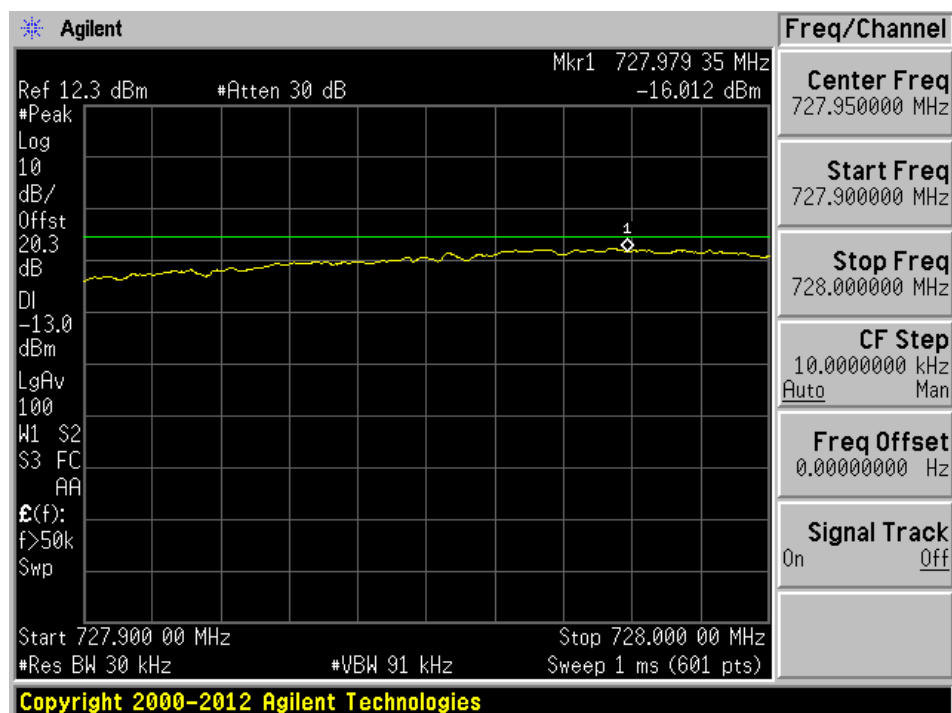


High Channel

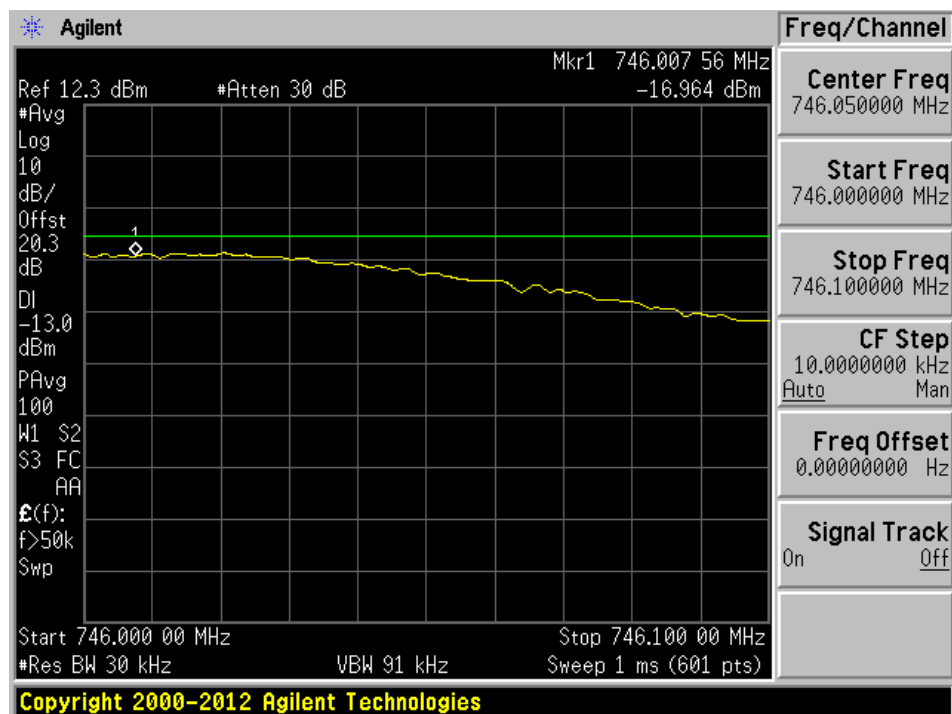


AGC On

Low Channel



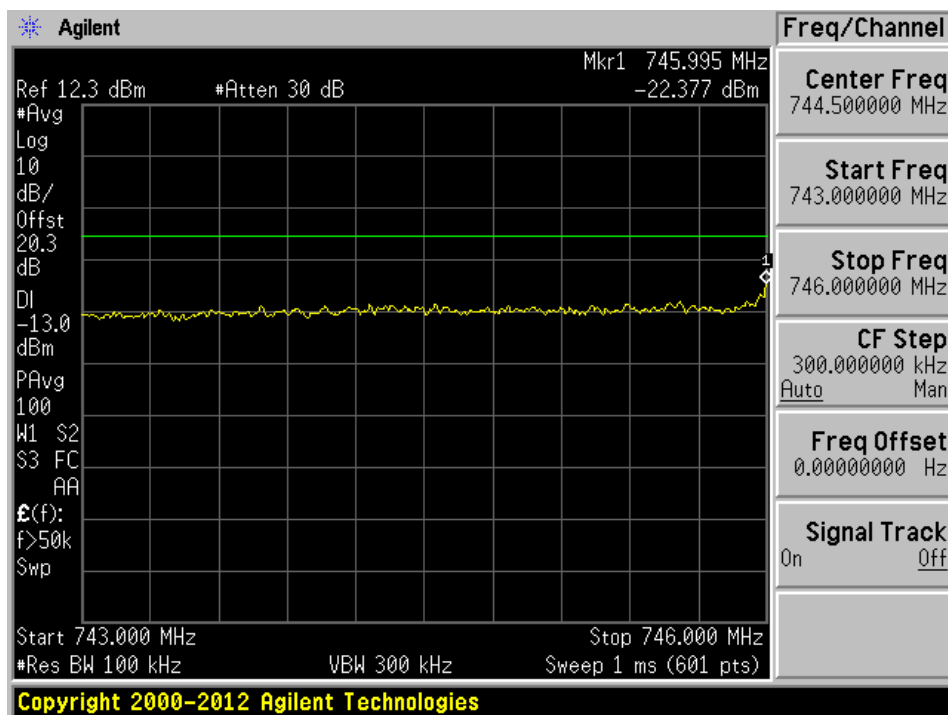
High Channel



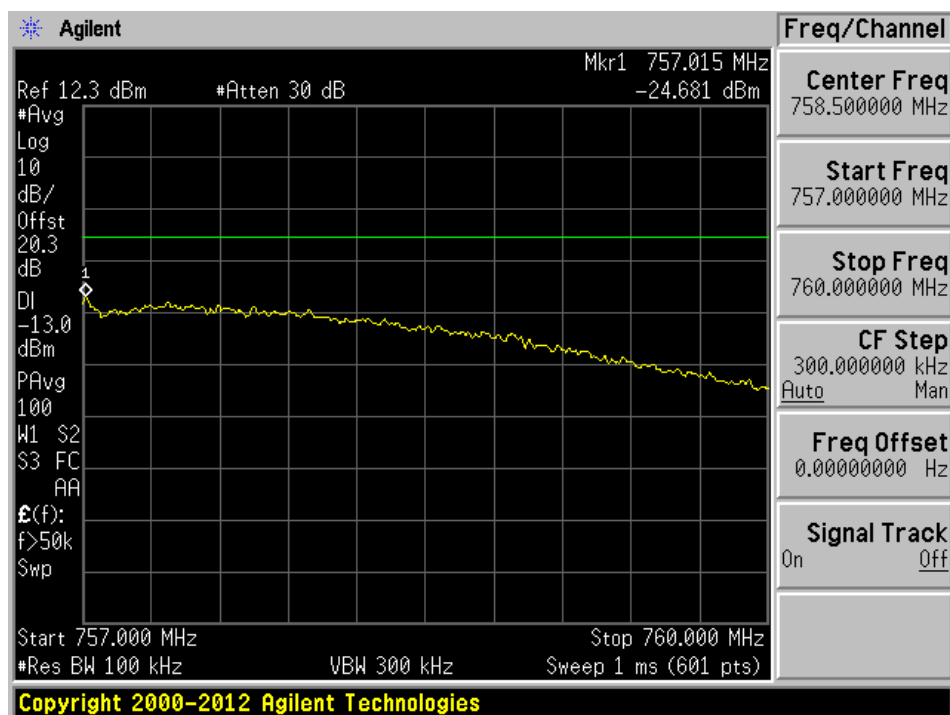
Broadband Signal 746-757 MHz

AGC Off

Low Channel

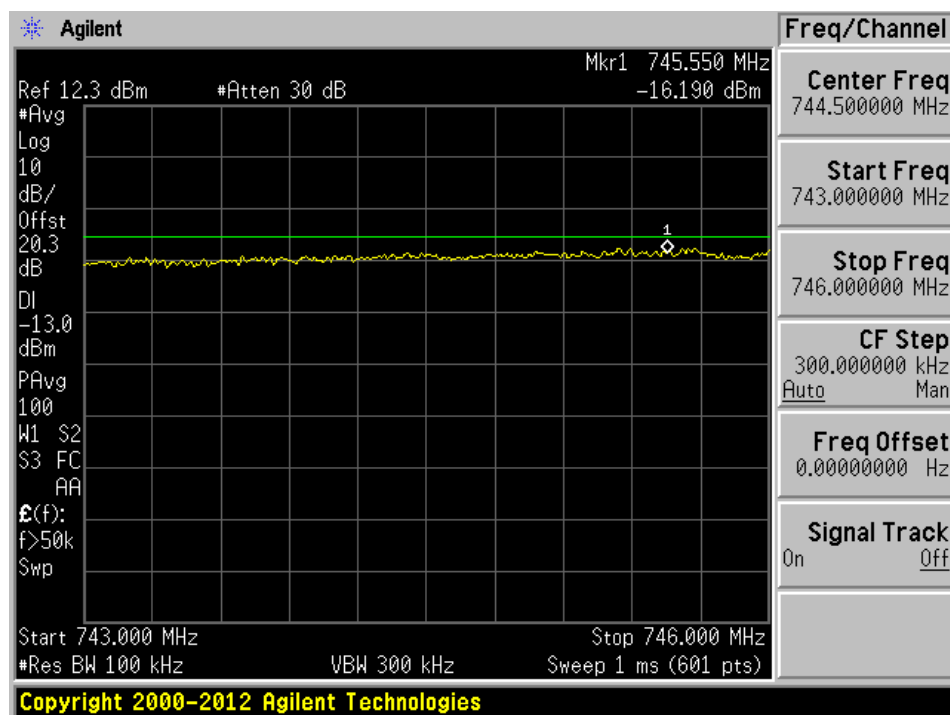


High Channel

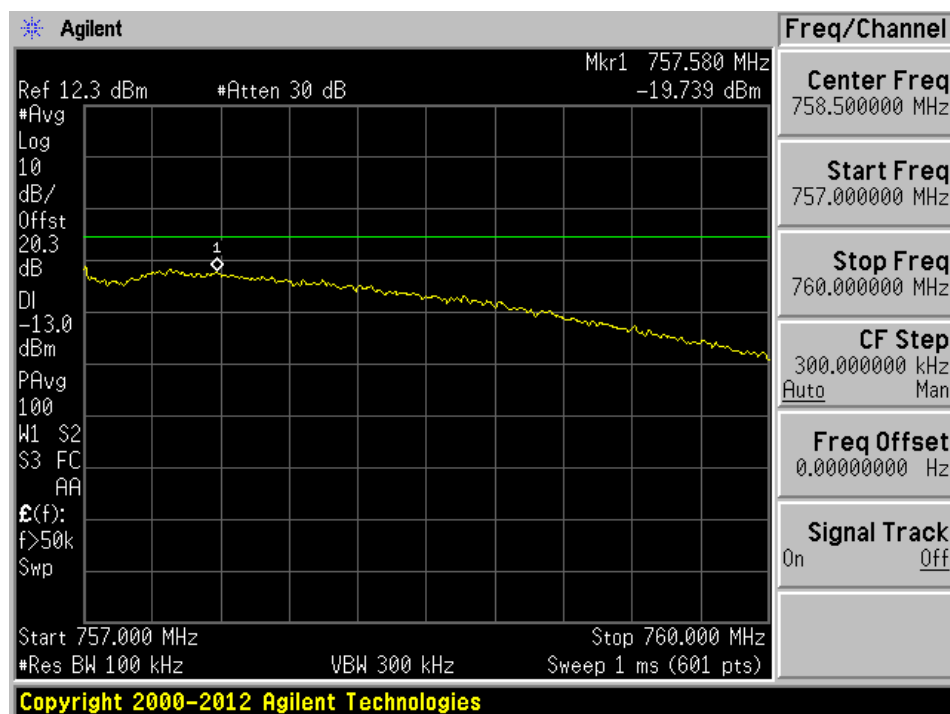


AGC On

Low Channel



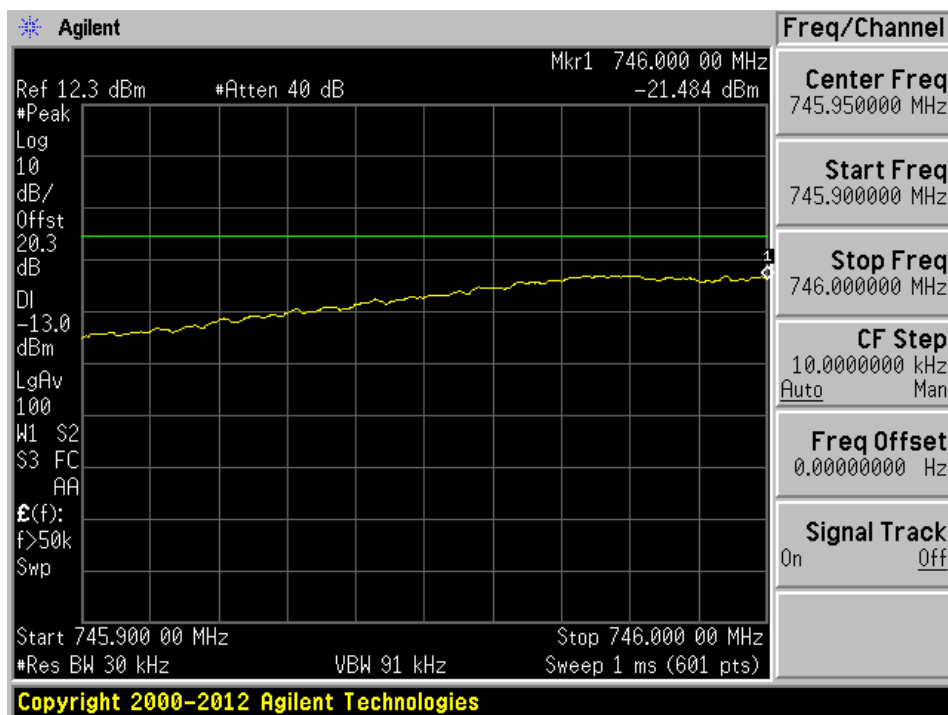
High Channel



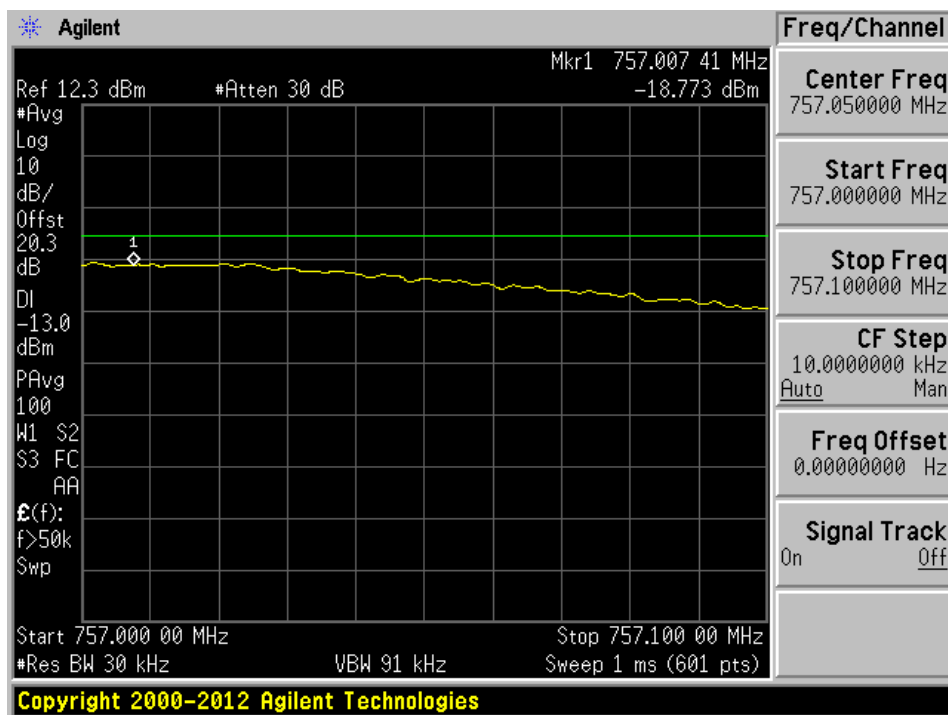
Narrowband Signal 746-757 MHz

AGC Off

Low Channel

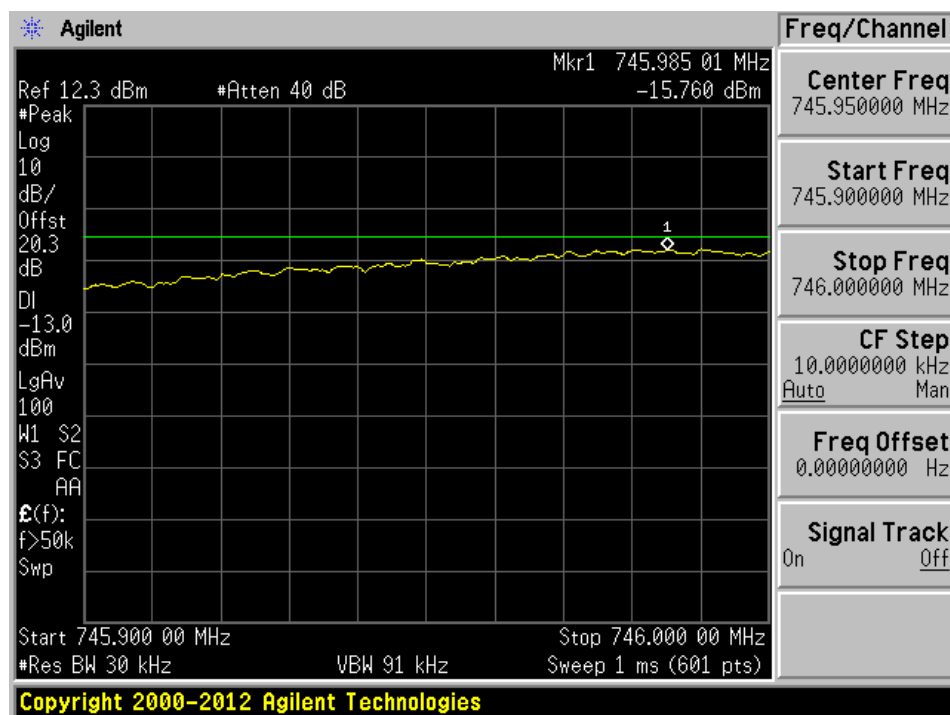


High Channel

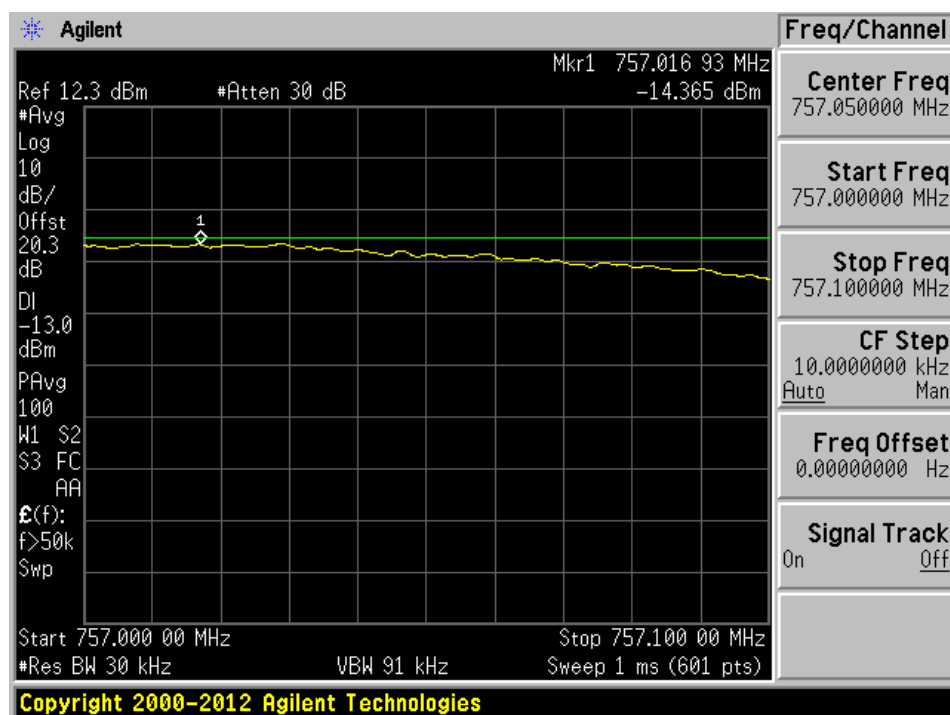


AGC On

Low Channel



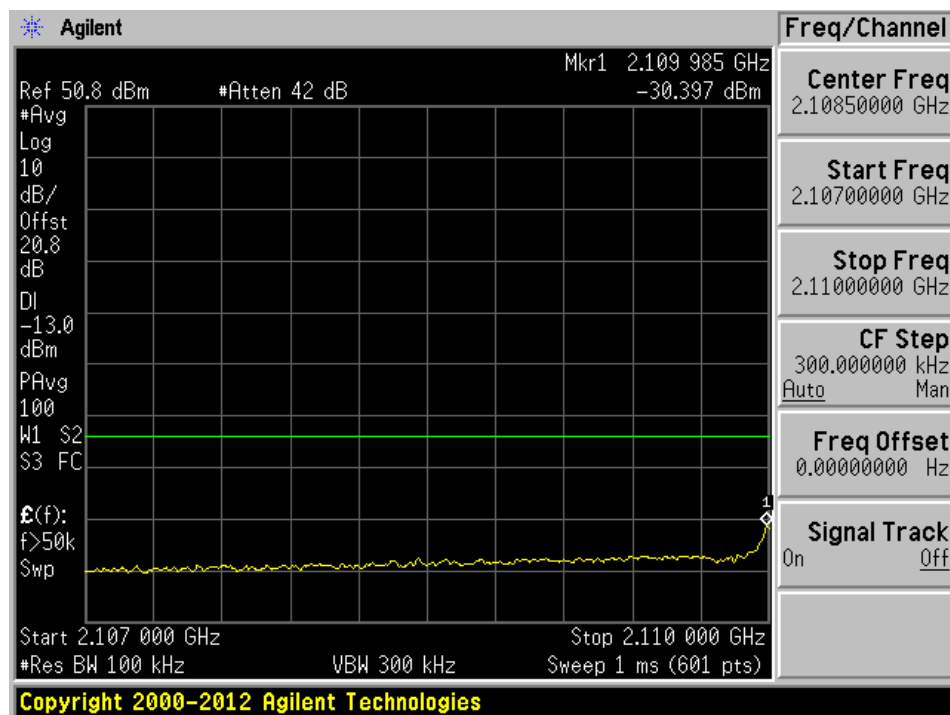
High Channel



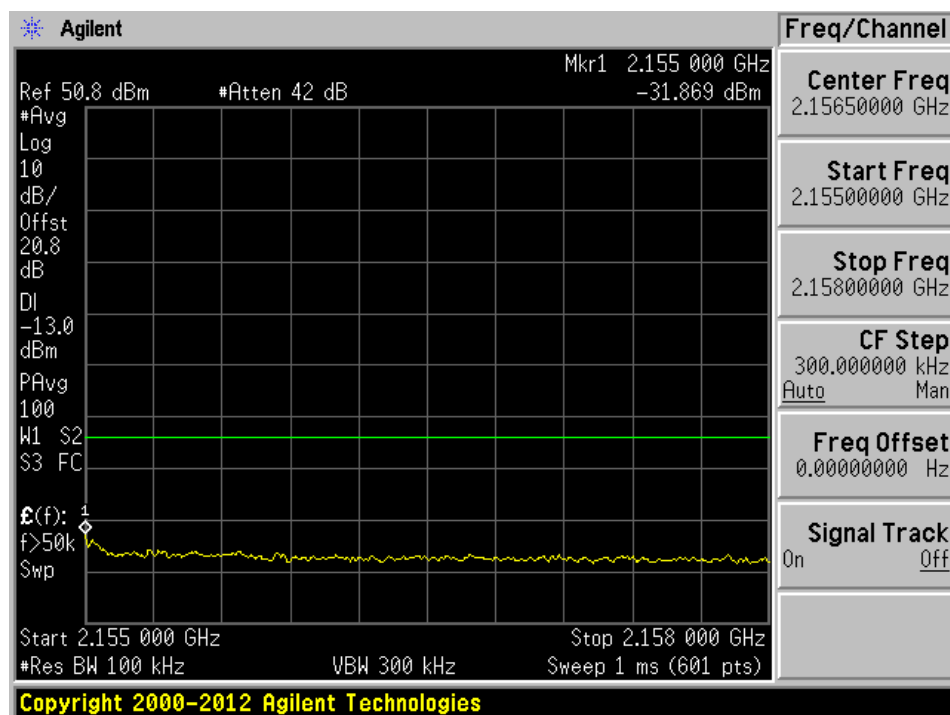
Broadband signal 2110-2155 MHz

AGC Off

Lower Band Edge

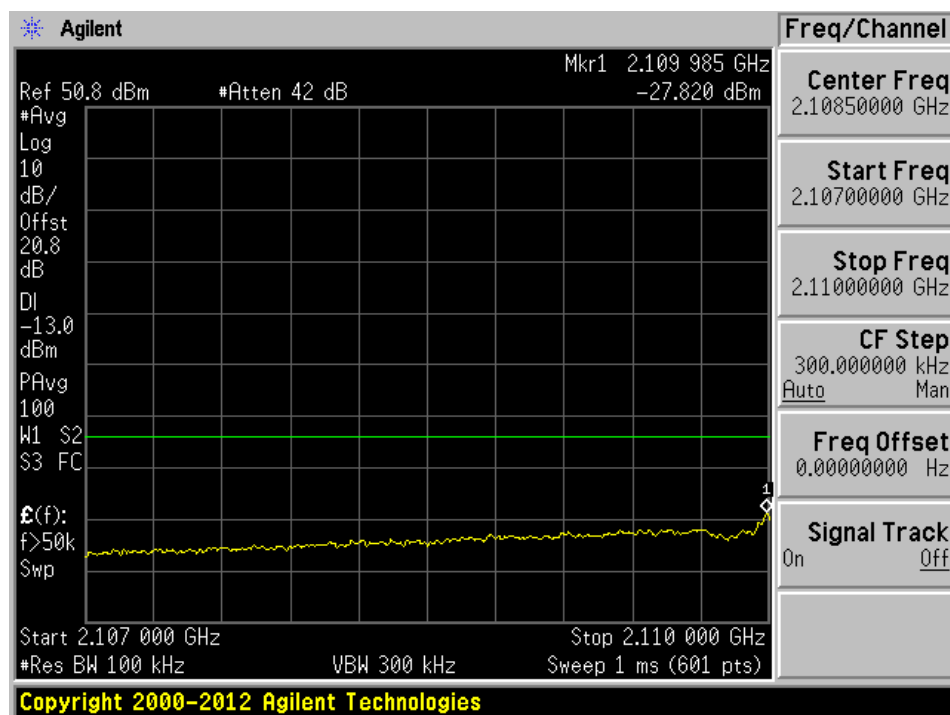


Upper Band Edge

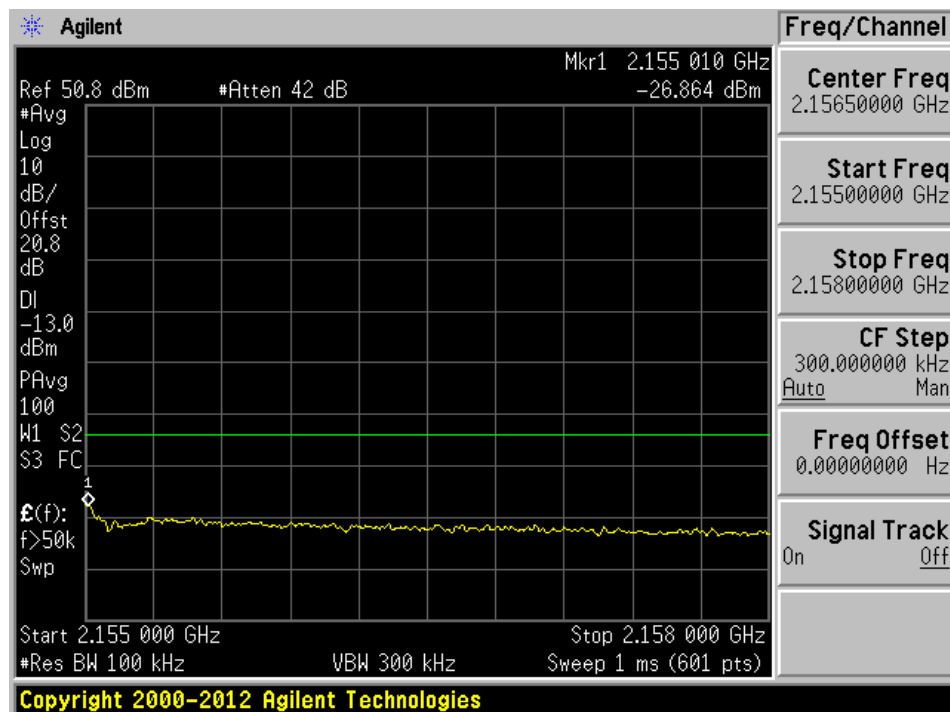


AGC On

Lower Band Edge



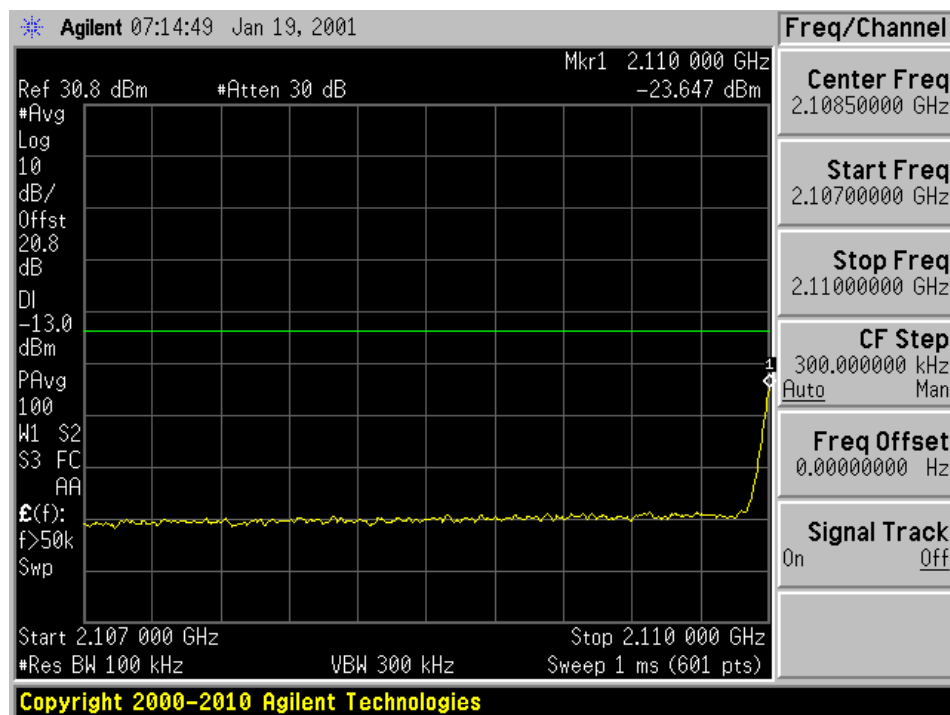
Upper Band Edge



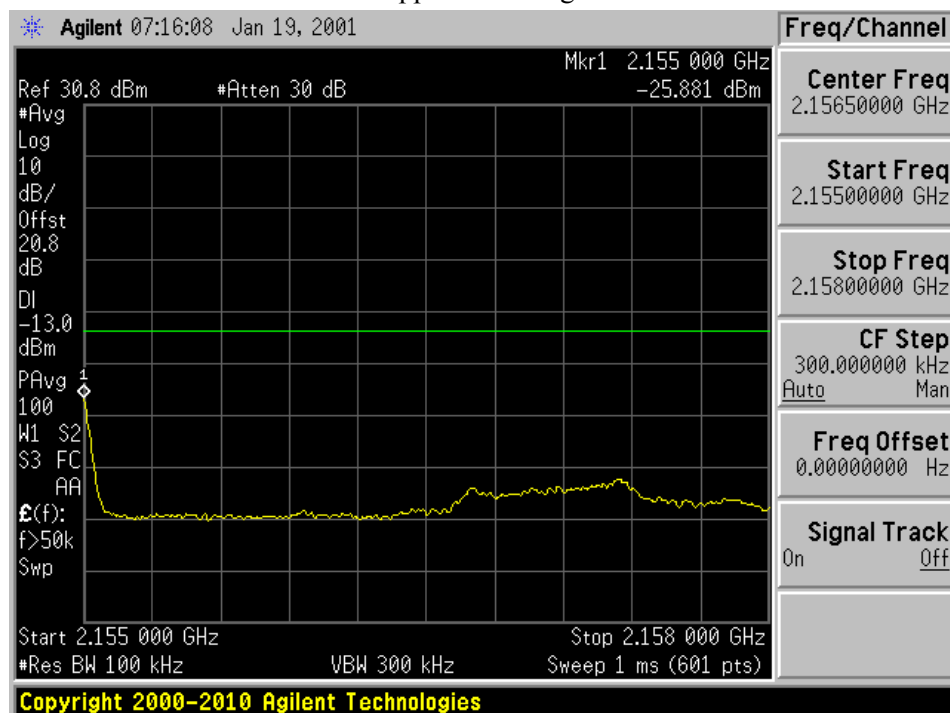
Narrowband Signal 2110-2155 MHz

AGC Off

Lower Band Edge

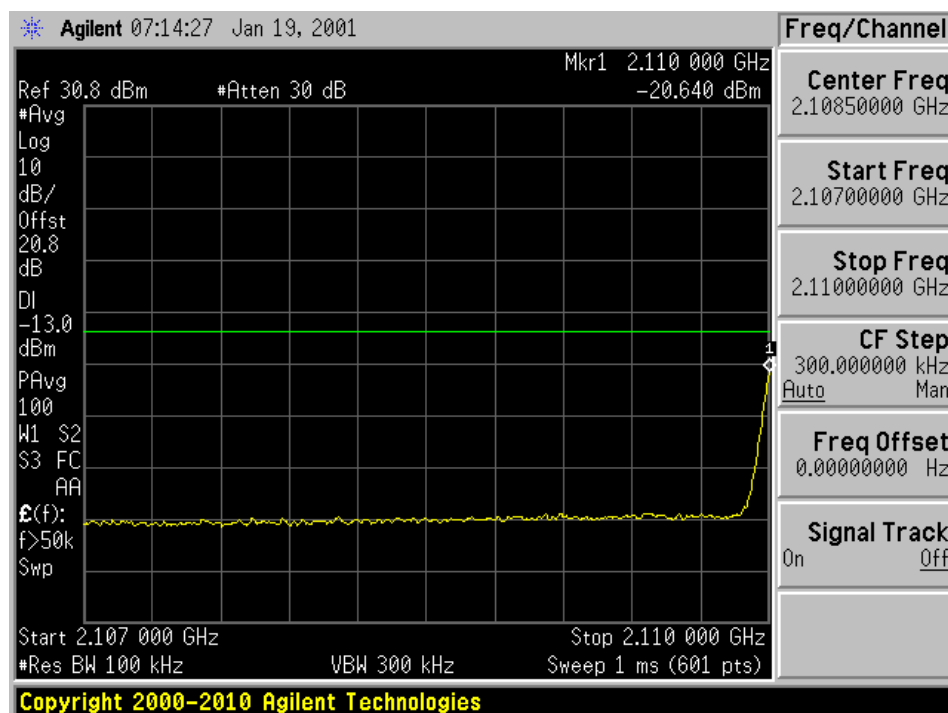


Upper Band Edge

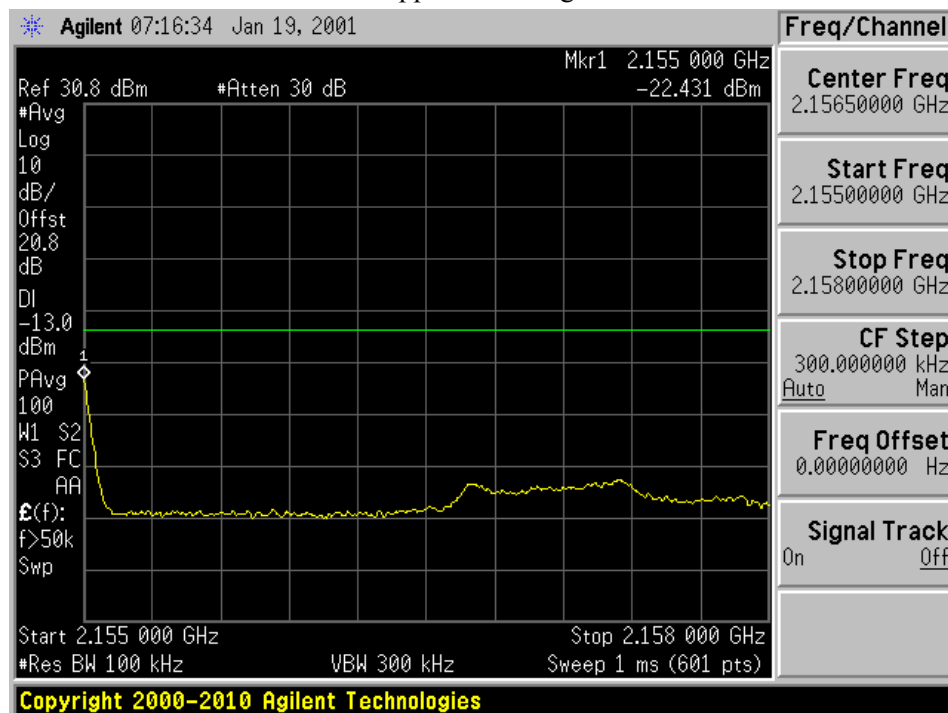


AGC On

Lower Band Edge



Upper Band Edge



10 FCC §20.21 - Out of Band Rejection

10.1 Applicable Standard

According to FCC Part 20.21, a frequency selective booster shall have –20 dB at the band edge referenced to the gain in the center of the pass band of the booster, where band edge is the end of the licensee's allocated spectrum.

10.2 Test Procedure

KDB 935210 D05, Section 3.3.

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The span of the spectrum analyzer was set to be wide enough in order to capture the spectrum of entire operating band.

10.3 Test Equipment List and Details

Manufacturer	Descriptions	Models	Serial Numbers	Calibration Dates	Calibration Interval
Agilent	Analyzer, Spectrum	E4440A	US 42221851	2016-06-10	1 year
Rohde & Schwarz	Generator, Signal	SMIQ03	849192/0085	2016-07-29	2 year
Keysight Technologies	Vector Signal Generator	N5182B	MY51350070	2015-11-18	1 year
-	20 dB attenuator	-	-	Each Time ¹	Each Time ¹
-	20 dB attenuator	-	-	Each Time ¹	Each Time ¹
-	SMA cable	-	C0003	Each Time ¹	Each Time ¹
-	SMA cable	-	C0006	Each Time ¹	Each Time ¹

¹Note: This equipment was calibrated for each test.

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 9 June 2016) “A2LA Policy on Metrological Traceability”.

10.4 Test Environmental Conditions

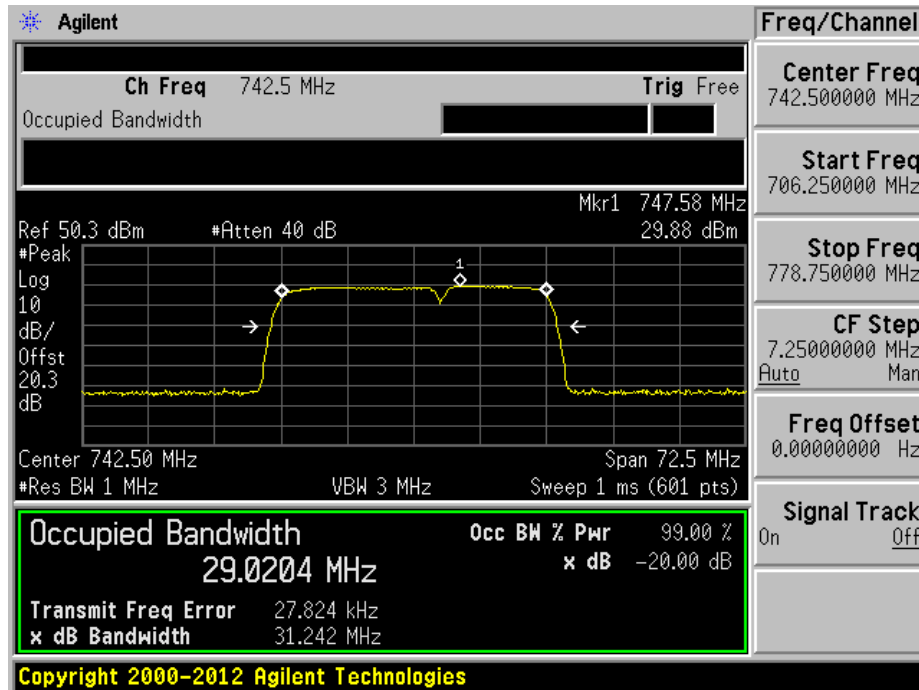
Temperature:	23° C
Relative Humidity:	32 %
ATM Pressure:	101.4-102 kPa

The testing was performed by Jose Martinez on 2016-09-08 in the RF Site.

10.5 Test Results

Please refer to the following plots.

728-746 MHz & 746-757 MHz



Note: A single filter was used for the lower and upper 700 MHz bands.

2110-2155 MHz

