MET Laboratories, Inc. *Safety Certification - EMI - Telecom Environmental Simulation*
914 WEST PATAPSCO AVENUE • BALTIMORE, MARYLAND 21230-3432 • PHONE (410) 354-3300 • FAX (410) 354-3313
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13501 MCCALLEN PASS • AUSTIN, TEXAS 78753 • PHONE (512) 287-2500 • FAX (512) 287-2513

December 5, 2018

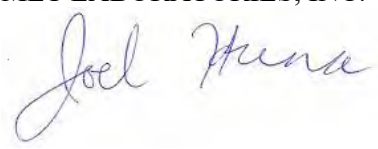
Commscope
Via Mengolina, 20
Faenza –RA- , ITALY

Dear Giuliano Pompignoli,

Enclosed is the EMC Wireless test report for compliance testing of the Commscope, CAP M 7E/80-85/17E/19-F-DC 7820478-0001 and 7820478-0002 as tested to the requirements of the FCC Certification rules under Title 47 of the CFR Part 27 Subpart L for Broadband Radio Service (BRS) Devices.

Thank you for using the services of MET Laboratories, Inc. If you have any questions regarding these results or if MET can be of further service to you, please contact me.

Sincerely yours,
MET LABORATORIES, INC.



Joel Huna
Documentation Department

Reference: (\Commscope\EMC100116-FCC27 REV. 3)

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Electromagnetic Compatibility Criteria
Test Report

for the

Commscope
Model CAP M 7E/80-85/17E/19-F-DC 7820478-0001 and 7820478-0002

Tested under
FCC Certification Rules
Title 47 of the CFR, Part 27 Subpart L

MET Report: EMC100116-FCC27 REV. 3

December 5, 2018

Prepared For:

Commscope
Via Mengolina, 20
Faenza –RA-, ITALY

Prepared By:
MET Laboratories, Inc.
914 West Patapsco Avenue,
Baltimore, MD 21230

Electromagnetic Compatibility Criteria
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Tested Under

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Title 47 of the CFR, Part 27 Subpart L

Bradley Jones, Project Engineer
Electromagnetic Compatibility Lab

Joel Huna
Documentation Department

Engineering Statement: The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of Part 27 L of the FCC Rules under normal use and maintenance.

John Mason,
Director, Electromagnetic Compatibility Lab

Report Status Sheet

Revision	Report Date	Reason for Revision
∅	October 30, 2018	Initial Issue.
1	November 13, 2018	Engineer corrections.
2	November 15, 2018	TCB Corrections.
3	December 5, 2018	TCB Corrections.

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List of Terms and Abbreviations

AC	**A**lternating **C**urrent
ACF	**A**ntenna **C**orrection **F**actor
Cal	**Cal**ibration
d	**M**easurement **D**istance
dB	**D**eci**b**els
dBµA	**D**eci**b**els above one **micro**amp
dBµV	**D**eci**b**els above one **micro**volt
dBµA/m	**D**eci**b**els above one **micro**amp **per m**eter
dBµV/m	**D**eci**b**els above one **micro**volt **per m**eter
DC	**D**irect **C**urrent
E	**E**lectric Field
DSL	**D**igital **S**ubscriber **L**ine
ESD	**E**lectro**s**tatic **D**ischarge
EUT	**E**quipment **U**nder **T**est
f	**F**requency
FCC	**F**ederal **C**ommunications **C**ommission
GRP	**G**round **R**eference **P**lane
H	Magnetic Field
HCP	**H**orizontal **C**oupling **P**lane
Hz	**H**ertz
IEC	**I**nternational **E**lectrotechnical **C**ommission
kHz	**k**ilo**h**ertz
kPa	**k**ilo**pa**scal
kV	**k**ilovolt
LISN	**L**ine **I**mpedance **S**tabilization **N**etwork
MHz	**M**ega**h**ertz
µH	**microh**enry
µ	**microf**arad
µs	**micros**econds
NEBS	**N**etwork **E**quipment-**B**uilding **S**ystem
PRF	**P**ulse **R**epetition **F**requency
RF	**R**adio **F**requency
RMS	**R**oot-**M**ean-**S**quare
TWT	**T**raveling **W**ave **T**ube
V/m	**V**olts **per m**eter
VCP	**V**ertical **C**oupling **P**lane

I. Executive Summary

A. Purpose of Test

An EMC evaluation was performed to determine compliance of the Commscope CAP M 7E/80-85/17E/19-F-DC 7820478-0001 and 7820478-0002, with the requirements of Part 27. All references are to the most current version of Title 47 of the Code of Federal Regulations in effect. In accordance with §2.1033, the following data is presented in support of the Certification of the CAP M 7E/80-85/17E/19-F-DC 7820478-0001 and 7820478-0002. Commscope should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the CAP M 7E/80-85/17E/19-F-DC 7820478-0001 and 7820478-0002, has been **permanently** discontinued.

B. Executive Summary

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 27, in accordance with Commscope, purchase order number 8002554399.

Reference	Description	Compliance
§2.1046; §27.50(h)	RF Power Output	Compliant
§2.1047	Modulation Characteristics	Not Applicable
§2.1049	Occupied Bandwidth	Compliant
§2.1051; §27.53(m)	Spurious Emissions at Antenna Terminals	Compliant
§2.1053	Radiated Spurious Emissions	Compliant
§2.1055	Frequency Stability	Compliant
Section 3.62 FCC KDB 935210 and section 7.2.2.5.2 ANSI C63.26	Intermodulation Products	Compliant
Section 3.3 FCC KDB 935210 and section 7.2.2.2 ANSI C63.26	Filter Response	Compliant
N/A	RF Exposure	Not Applicable

Table 1. Executive Summary of EMC Compliance Testing

II. Equipment Configuration

A. Overview

MET Laboratories, Inc. was contracted by Commscope to perform testing on the CAP M 7E/80-85/17E/19-F-DC 7820478-0001 and 7820478-0002, under Commscope's purchase order number 8002554399.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Commscope, CAP M 7E/80-85/17E/19-F-DC 7820478-0001 and 7820478-0002.

The results obtained relate only to the item(s) tested.

Model(s) Tested	CAP M 7E/80-85/17E/19-F-DC 7820478-0001 and 7820478-0002	
Model(s) Covered:	CAP M 7E/80-85/17E/19-F-DC 7820478-0001 and 7820478-0002	
EUT Specifications:	Primary Power: 110VAC for EUT1 and 48VDC for EUT2	
	FCC ID: XS5-CAPM7E817E19	
	Equipment Code:	B2I
	RF Output Power: Watts	Band 5 – 29.86 dBm Conducted Band 12 – 29.53 dBm Conducted Band 13 – 29.95 dBm Conducted Band 25 – 33.05 dBm Conducted Band 66 – 33.59 dBm Conducted
	EUT Frequency Range:	729 –746 MHz; 746 – 756 MHz; 869-894 MHz; 2110-2180 MHz & 1930-1995 MHz
Analysis:	The results obtained relate only to the item(s) tested.	
Environmental Test Conditions:	Temperature: 15-35º C	
	Relative Humidity: 30-60%	
	Barometric Pressure: 860-1060 mbar	
Evaluated by:	Bradley Jones	
Date(s):	December 5, 2018	

Table 2. EUT Summary Table

B. References

CFR 47, Part 27	Federal Communication Commission, Code of Federal Regulations, Title 47, Part 27: Rules and Regulations for Advanced Wireless Services
ANSI C63.4:2014	Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical And Electronic Equipment in the Range of 9 kHz to 40 GHz
ISO/IEC 17025:2005	General Requirements for the Competence of Testing and Calibration Laboratories
EIA/TIA-603-A-2001	Land Mobile FM or PM Communication Equipment Measurement and Performance Standards
ANSI C63.26: 2015	Compliance Testing of Transmitters Used in Licensed Radio Services
KDB 971168 v02r02	MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS

Table 3. Standard References

C. Test Site

All testing was performed at MET Laboratories, Inc., 914 West Patapsco Avenue, Baltimore, MD 21230. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology.

Radiated Emissions measurements were performed in a 3 meter semi-anechoic chamber (equivalent to an Open Area Test Site).

D. Measurement Uncertainty

Test Method	Typical Expanded Uncertainty	K	Confidence Level
RF Frequencies	±4.52 Hz	2	95%
RF Power Conducted Emissions	±2.32 dB	2	95%
RF Power Conducted Spurious Emissions	±2.25 dB	2	95%
RF Power Radiated Emissions	±3.01 dB	2	95%

Table 4. Uncertainty Calculations Summary

E. Description of Test Sample

The Commscope CAP M 7E/80-85/17E/19-F-DC 7820478-0001 and 7820478-0002, Equipment Under Test (EUT), is a DAS (Distributed Antenna System) Remote. It does not operate in a stand-alone mode.

1.1.1 CAP M Base Unit Overview

The CAP M serves as a remote unit in an ION-E DAS. The CAP M interfaces with the CAN/TEN via an optical link. The CAP M also can be cascaded to a second unit using the same transport mechanism, and/or an auxiliary PoE (Class 3) Ethernet device such as a wireless access point. On the DL, the CAP M converts some or all the data arriving at the CAP M to analog signals and sends them to the antenna ports. On the UL, received signals are digitized and serialized into data streams which are sent back to the CAN. Each unit contains up to four transceiver paths for RF coverage. Each path is dedicated to a fixed band (set at the factory).
Physically, the *CAP M* base unit consists of 3 major PCBAs, the Main board and 2 separate RF boards for optimization of the dissipation. A cavity Duplexer and Power supply module.

1.1.2 Main Board

The Main Board contains the FPGA, reference clocks, and power supplies for the unit. Main Board provides the interface to the ERA head end (CAN or TEN) by optical connection. The Main Board also provides the interfaces for a cascaded CAP M and/or auxiliary Ethernet port.
Additional connections to the "outside world" from the Main Board include status & alarm indicator bi-color LED, and the fan kit connector (optional). Internally, the board contains the A/D and D/A converters as well as the IF and frequency-translating components for the RF transceivers. For the initial release, the main board transceiver paths are frequency-agnostic, so that only the RF board must be changed to cover a different set of frequency bands.

1.1.3 RF Boards

The RF boards contain the PAs, LNAs, filters, and combiners for each coverage band. These bands are combined in the cavity Duplexer, 1 ANT port for SISO version and 2 ANT ports for MIMO version. The RF Boards is where all of the frequency-specific devices reside, so generally the bands supported by a CAP M unit are determined by which RF Board variant and different cavity DPX.

1.2 *PowerSupply*

CAP M EU version is powered via the AC connection only. AC power comes from local AC supply. For US version DC power is available, DC can come from a local DC supply or via hybrid fiber (and a hybrid fiber junction box) from the CAN/TEN.

1.3 *Optical Interface*

The CAP M Optical unit interface with the CAN/TEN via optical fiber, and the conversion of signals from optical to electrical takes place in the SFP+ module(s) in the OCTIS connector(s). The appropriate SFP+ units must be specified: these vary depending upon the length of fiber used and the type of fiber used (single mode, multimode). These SFP+ options can be changed in the field. Optical transport is over single mode (SM) or multimode (MM) fiber. The appropriate SFP+ is chosen by the customer during the ordering process and is installed in the OCTIS SFP connector. See ERA system for further requirements / limitations.

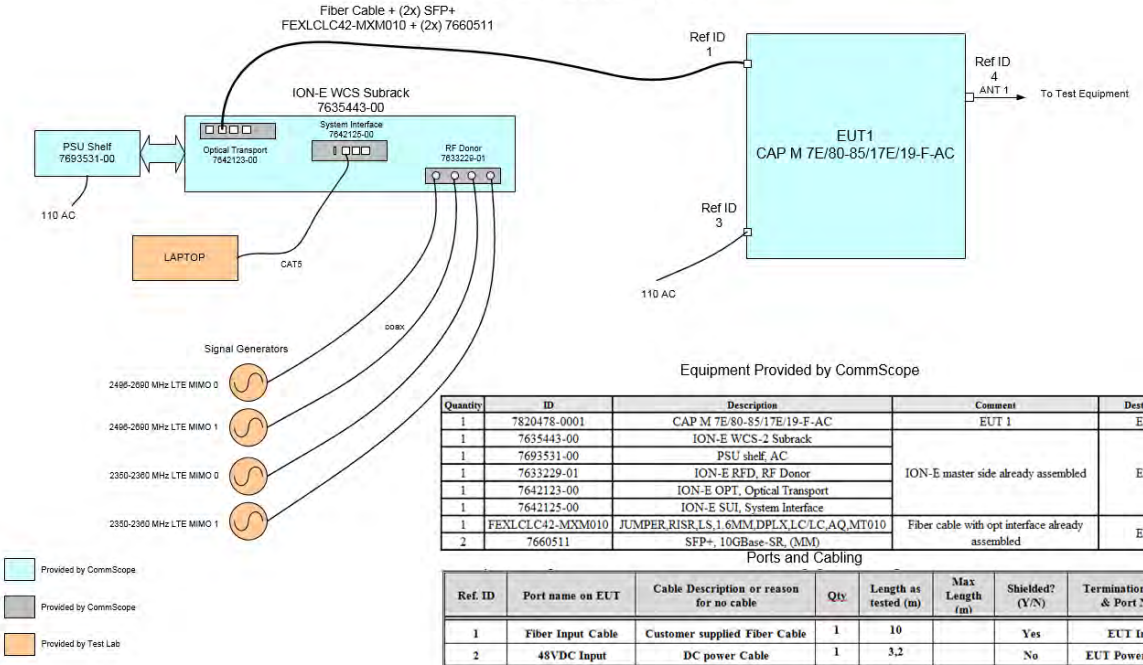
1.4 ***List Operation bands***

BAND	DL (MHz)	UL (MHz)	Standard
12	729-746	699-716	LTE
13	746-756	777-787	LTE
5	869-894	824-849	LTE, UMTS, CDMA, GSM
66	2110-2180	1710-7180	LTE, UMTS, CDMA
25	1930-1995	1850-1915	LTE, UMTS, CDMA, GSM

1.5 ***Description of power down function for CAP-M remote unit***

a) Over temperature:
Internal temperatures of the major components (PAs, FPGA, and PHY) are continuously monitored by the system controller. Over-temperature alarms are raised if any of these temperatures exceed 80°C (75° for the FPGA). If nothing is done to remedy the situation when the alarm is raised and temperatures continue to rise; the unit will shut down when any one of the temperature measurements reach 85°C (or 80°C for the FPGA).
b) Over power:
If the input power of the PA exceeds continuously the limit that will result in the maximum output power, an input power limiter (ALC = Automatic Level Control) will be active. It will actively limit the input power to a value that will result in the maximum specified output power.
c) Over power:
Output power overdrive due to fast input power peaks will trigger a gain reduction algorithm so that the output power level is restricted to the intended maximum
d) Over current:
An electronic device turns OFF the PA when its current exceeds defined current threshold which roughly corresponds to about 4/5dB the nominal output power.

Config. 1-Setup
Cap M 7E/80-85/17E/19-F-AC



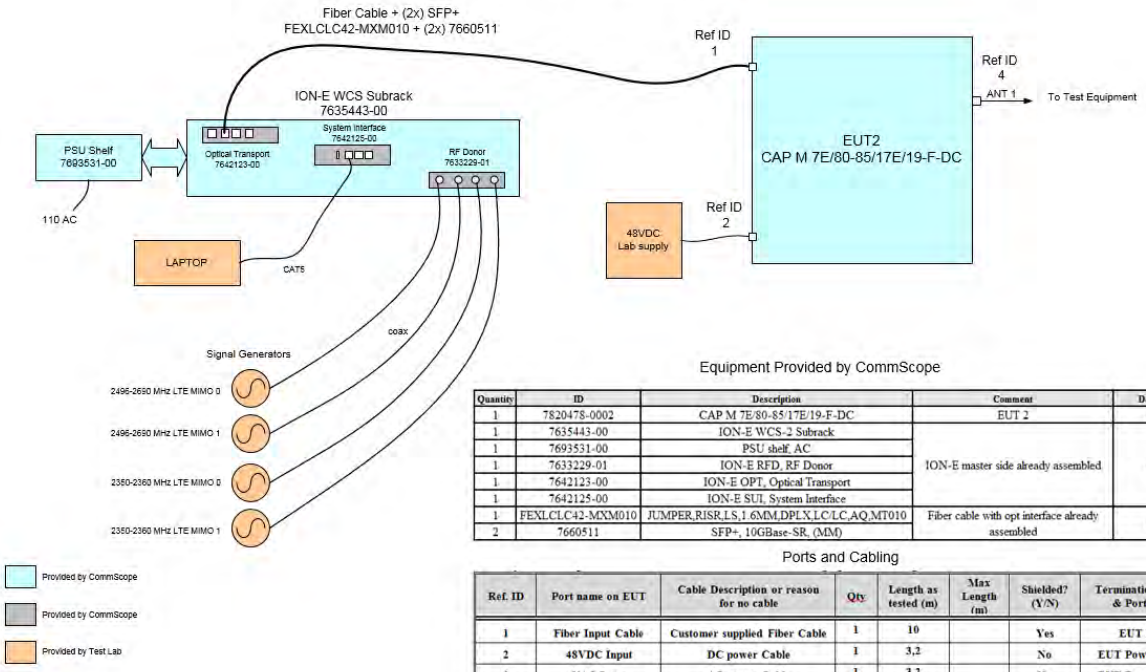
Equipment Provided by CommScope

Quantity	ID	Description	Comment	Destination
1	7820478-0001	CAP M 7E/80-85/17E/19-F-AC	EUT 1	EMC
1	7635443-00	ION-E WCS-2 Subrack	ION-E master side already assembled	EMC
1	7693531-00	PSU shelf, AC		
1	7633229-01	ION-E RFD, RF Donor		
1	7642123-00	ION-E OPT, Optical Transport		
1	7642125-00	ION-E SUI, System Interface		
1	FEXLCLC42-MXM010	JUMPER,RISR,LS,1.6MM,DPLX,LC/LC,AQ,MT010	Fiber cable with opt interface already assembled	EMC
2	7660511	SFP+, 10GBase-SR, (MM)		

Ports and Cabling

Ref. ID	Port name on EUT	Cable Description or reason for no cable	Qty	Length as tested (m)	Max Length (m)	Shielded? (Y/N)	Termination Box ID & Port Name
1	Fiber Input Cable	Customer supplied Fiber Cable	1	10		Yes	EUT Input
2	48VDC Input	DC power Cable	1	3,2		No	EUT Power Supply
3	VAC Input	AC power Cable	1	3,2		No	EUT Power Supply
4	ANT 1	Test Equipment	1	2		No	Antenna Port

Config. 2 - Setup
Cap M 7E/80-85/17E/19-F-DC



Equipment Provided by CommScope

Quantity	ID	Description	Comment	Destination
1	7820478-0002	CAP M 7E/80-85/17E/19-F-DC	EUT 2	EMC
1	7635443-00	ION-E WCS-2 Subrack	ION-E master side already assembled	EMC
1	7693531-00	PSU shelf, AC		
1	7633229-01	ION-E RFD, RF Donor		
1	7642123-00	ION-E OPT, Optical Transport		
1	7642125-00	ION-E SUI, System Interface		
1	FEXLCLC42-MXM010	JUMPER,RISR,LS,1.6MM,DPLX,LC/LC,AQ,MT010	Fiber cable with opt interface already assembled	EMC
2	7660511	SFP+, 10GBase-SR, (MM)		

Ports and Cabling

Ref. ID	Port name on EUT	Cable Description or reason for no cable	Qty	Length as tested (m)	Max Length (m)	Shielded? (Y/N)	Termination Box ID & Port Name
1	Fiber Input Cable	Customer supplied Fiber Cable	1	10		Yes	EUT Input
2	48VDC Input	DC power Cable	1	3,2		No	EUT Power Supply
3	VAC Input	AC power Cable	1	3,2		No	EUT Power Supply
4	ANT 1	Test Equipment	1	2		No	Antenna Port

F. Equipment Configuration

Ref. ID	Slot #	Name / Description	Model Number	Part Number	Serial Number	Rev. #
EUT1		CAP M 7E/80-85/17E/19-F-AC	7820478-0001			
EUT2		CAP M 23/23/25/25-F-DC	7820478-0002			

Table 5. Equipment Configuration

G. Support Equipment

Ref. ID	Name / Description	Manufacturer	Model Number	*Customer Supplied Calibration Data
	Laptop	Not Available		N/A
	Qty 4 - Cat 5 Cable	Not Available		N/A
	Qty 1 - Signal Generators (729-798 MHz)	Not Available		Not Available
	Qty 1 - Signal Generators (858,5-894 MHz)	Not Available		Not Available
	Qty 1 - Signal Generators (2110-2180 MHz)	Not Available		
	Qty 1 - Signal Generators (1930-1995 MHz)	Not Available		
	48VDC Power Supply	Not Available		N/A
	ION-E WCS-2 Subrack	Commscope	7635443-00	N/A
	PSU shelf, AC	Commscope	7693531-00	N/A
	ION-E RFD, RF Donor	Commscope	7633229-01	N/A
	ION-E OPT, Optical Transport	Commscope	7642123-00	N/A
	ION-E SUI, System Interface	Commscope	7642125-00	N/A
	JUMPER, RISR, LS, 1.6MM, DPLX, LC/LC, AQ, MT010	Commscope	FEXLCLC42-MXM010	N/A
	SFP+, 10GBase-SR, (MM)		7660511	N/A
The 'Customer Supplied Calibration Data' column will be marked as either not applicable, not available, or will contain the calibration date supplied by the customer.				

Table 6. Support Equipment

H. Ports and Cabling Information

Ref. ID	Port name on EUT	Cable Description or reason for no cable	Qty	Length as tested (m)	Max Length (m)	Shielded? (Y/N)	Termination Box ID & Port Name
1	Fiber Input Cable	Customer supplied Fiber Cable	1	10		Yes	EUT Input
2	48VDC Input	DC power Cable	1	3,2		No	EUT Power Supply
3	VAC Input	AC power Cable	1	3,2		No	EUT Power Supply
4	ANT 1	Test Equipment	1	2		No	Antenna Port

Table 7. Ports and Cabling Information

I. Mode of Operation

The EUT will operate in a continuous emission mode. The unit will be tested to address FCC Part 15 B (Class B) – Unintentional Radiator Conducted and Radiated Emissions.

The EUT will also be operated in a continuous emission mode on the downlink side only addressing FCC Part 27 & RSS-131, RSS-139 Intentional Radiator mode for Frequency:
LTE Band 2 or 25 UL (1850-1915 MHz) / DL (1930-1995 MHz) (Bandwidths 5, 10, 20 MHz)
LTE Band 3 or 66 UL(1710-1780 MHz) / DL (2110 – 2180 MHz)(Bandwidths 5, 10, 20 MHz)
LTE Band 5 UL(824-849 MHz) / DL (869 – 894 MHz)(Bandwidths 5, 10 MHz)
LTE Band 12UL (699-716 MHz) / DL (729 – 746 MHz) (Bandwidths 5, 10 MHz)
LTE Band 13UL (777-787 MHz) / DL (746 – 756 MHz) (Bandwidths 5, 10 MHz)

J. Method of Monitoring EUT Operation

The LED on the unit will be solid green if the unit is powered on and operational. If the unit is powered on and the LED on the unit is a solid red, the unit is not operational. It will be identified as a major hardware issue and an alarm will be raised on the GUI.

K. Modifications

a) Modifications to EUT

No modifications were made to the EUT.

b) Modifications to Test Standard

No modifications were made to the test standard.

L. Disposition of EUT

The test sample including all support equipment submitted to the Electro-Magnetic Compatibility Lab for testing was returned to Commscope upon completion of testing.

III. Electromagnetic Compatibility Criteria for Intentional Radiators

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 2.1046 RF Power Output

Test Requirement(s): §27.50 (h) --- Mobile and other user stations. Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

Test Procedures: The EUT was tested according to the average power integration procedures of ANSI C63.26 5.2.4.4.1. The power measurement function of spectrum analyzer was used and configured in the following manner.

(a) Frequency = channel cf
(b) Span = 2-3 x the OBW
(c) RBW = 1-5 % of the OBW
(d) VBW 1-3 x the RBW
(e) Sweep Time = Auto
(f) Detector = Average

Test Results: The EUT was found compliant with the requirements of this section.

Test Engineer(s): Bradley Jones

Test Date(s): September 18, 2018

Band 5		frequency	Input Power	Output Power	Gain
5 MHz	Low	871.5	-5.17	29.86	35.03
	Middle	881.5	-5.08	29.21	34.29
	High	891.5	-4.95	28.22	33.17
10 MHz	Low	874	-5.49	29.11	34.6
	Middle	881.5	-5.32	29.2	34.52
	High	889	-5.77	28.69	34.46

Table 8. RF Output Power, Band 5, Test Results

Band 12		frequency	Input Power	Output Power	Gain
5 MHz	Low	731.5	-5.47	29.53	35
	Middle	737.5	-5.28	29.27	34.55
	High	743.5	-5.2	29.18	34.38
10 MHz	Low	734	-5.27	28.75	34.02
	Middle	737.5	-5.46	28.52	33.98
	High	741	-5.14	29.2	34.34

Table 9. RF Output Power, Band 12, Test Results

Band 13		frequency	Input Power	Output Power	Gain
5 MHz	Low	748.5	-5.13	28.95	34.08
	Middle	751	-5.01	29.27	34.28
	High	753.5	-5.06	29.38	34.44
10 MHz	Middle	751	-5.49	28.11	33.6

Table 10. RF Output Power, Band 13, Test Results

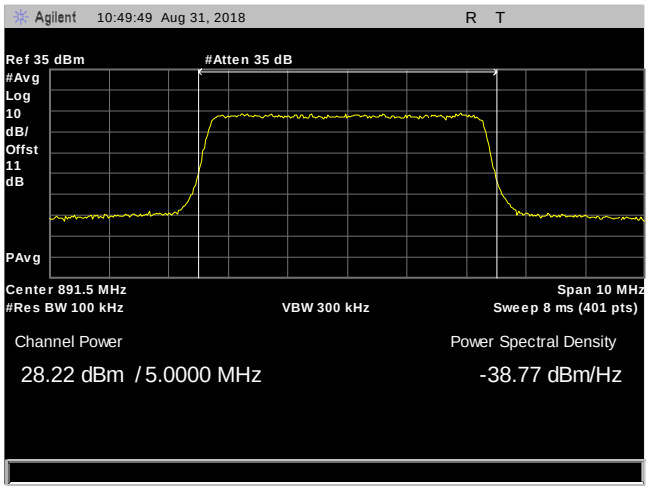
Band 25		frequency	Input Power	Output Power	Gain
5 MHz	Low	1932.5	-5.52	32.89	38.41
	Middle	1960	-5.45	33.05	38.5
	High	1992	-5.57	33.05	38.62
10 MHz	Low	1935	-5.66	31.72	37.38
	Middle	1960	-5.9	32.29	38.19
	High	1990	-6.13	32.81	38.94
20 MHz	Low	1940	-5.25	32.14	37.39
	Middle	1960	-5.96	32.65	38.61
	High	1985	-5.35	32.81	38.16

Table 11. RF Output Power, Band 25, Test Results

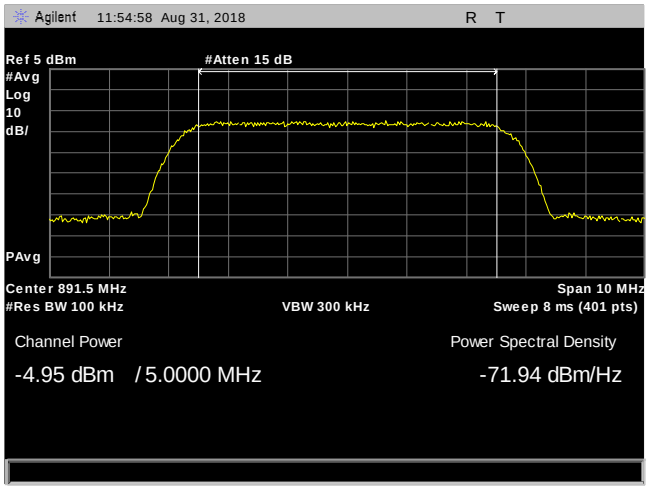
Band 66		frequency	Input Power	Output Power	Gain
5 MHz	Low	2112	-5.25	33.04	38.29
	Middle	2145	-5.18	33.59	38.77
	High	2178	-5.42	33.11	38.53
10 MHz	Low	2115	-5.52	33.25	38.77
	Middle	2145	-5.4	32.95	38.35
	High	2175	-5.24	33.17	38.41
20 MHz	Low	2120	-5.77	32.46	38.23
	Middle	2145	-5.88	32.41	38.29
	High	2170	-5.98	32.56	38.54

Table 12. RF Output Power, Band 66, Test Results

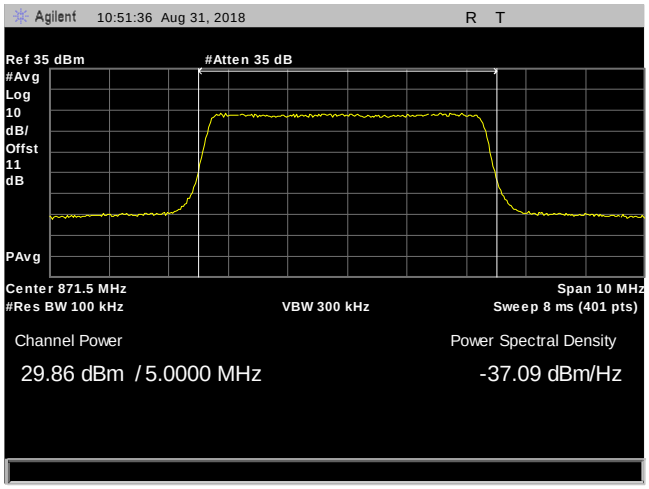
RF Output Power, Band 5, 869 – 894 MHz



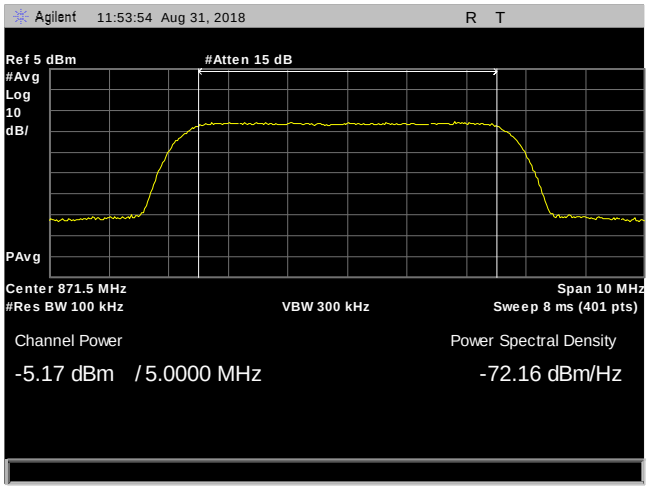
Plot 1. RF Power Output, 5M, CEL850, High, 869 – 894 MHz



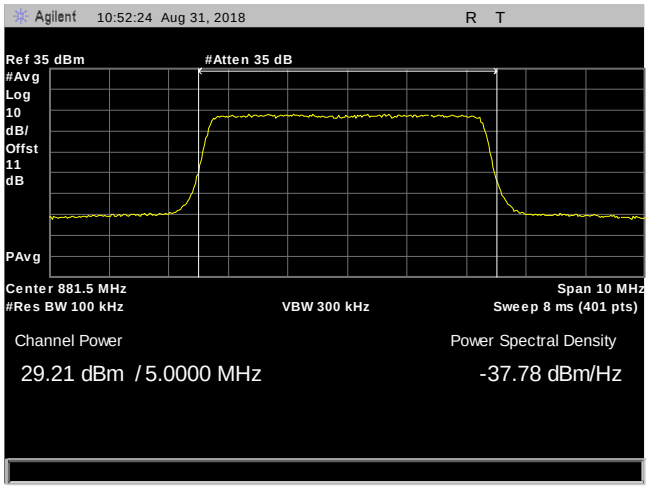
Plot 2. RF Power Output, 5M, CEL850, High, 869 – 894 MHz, AGC



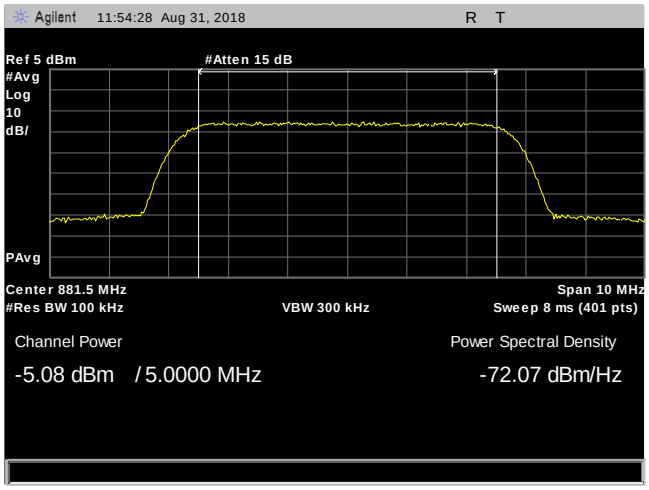
Plot 3. RF Power Output, 5M, CEL850, Low, 869 – 894 MHz



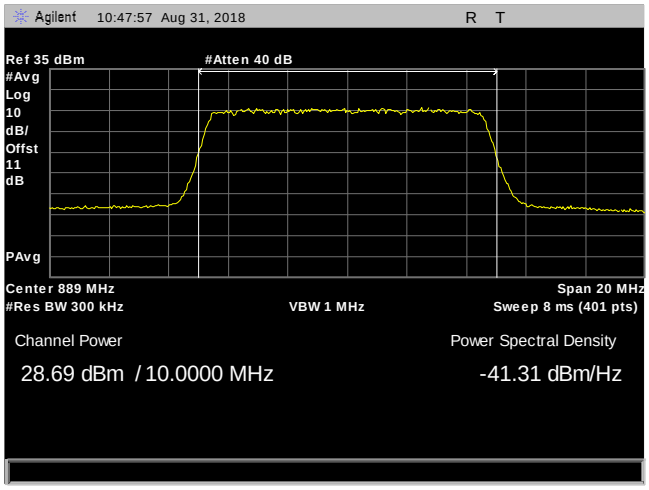
Plot 4. RF Power Output, 5M, CEL850, Low, 869 – 894 MHz, AGC



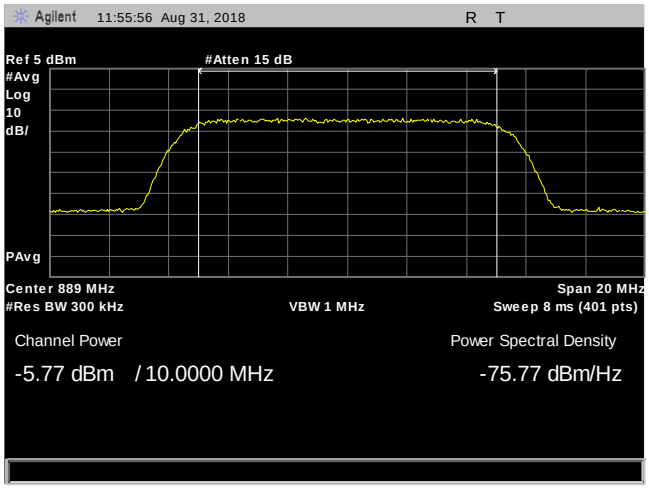
Plot 5. RF Power Output, 5M, CEL850, Mid, 869 – 894 MHz



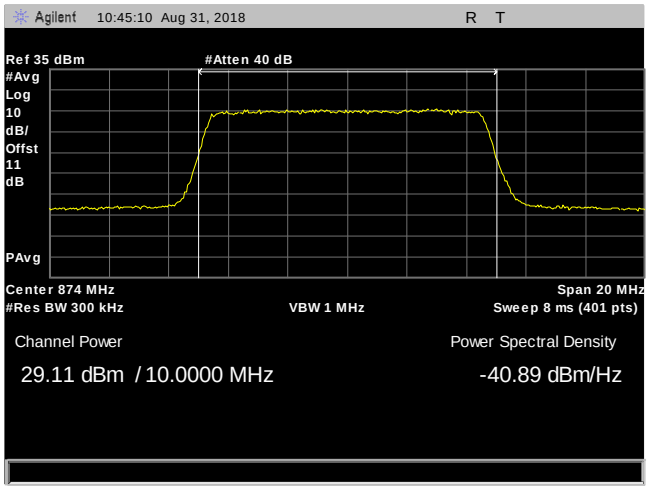
Plot 6. RF Power Output, 5M, CEL850, Mid, 869 – 894 MHz, AGC



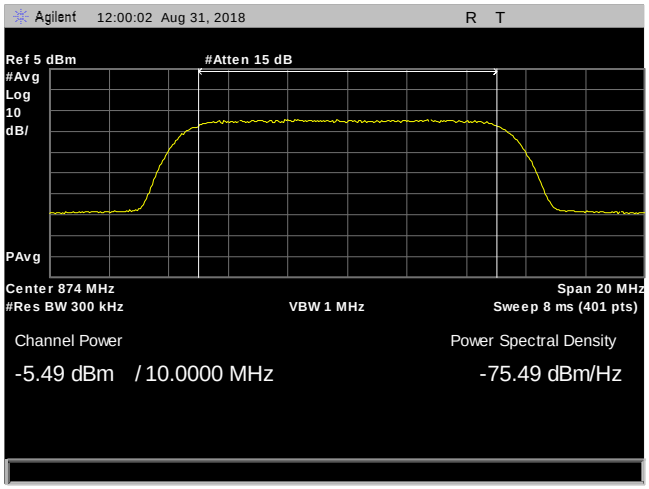
Plot 7. RF Power Output, 10M, CEL850, High, 869 – 894 MHz



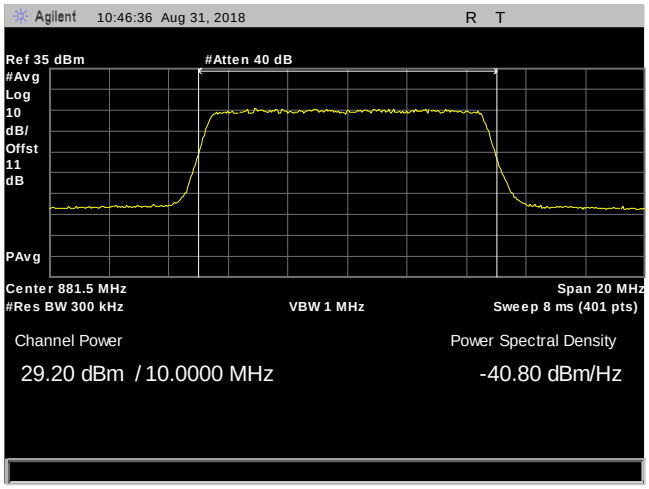
Plot 8. RF Power Output, 10M, CEL850, High, 869 – 894 MHz, AGC



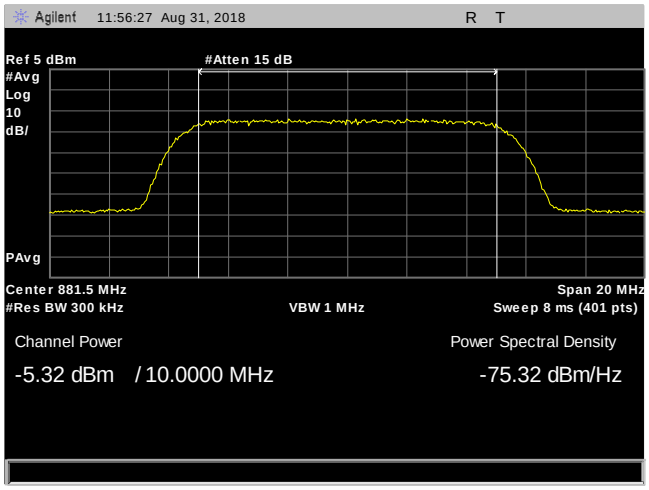
Plot 9. RF Power Output, 10M, CEL850, Low, 869 – 894 MHz



Plot 10. RF Power Output, 10M, CEL850, Low, 869 – 894 MHz, AGC

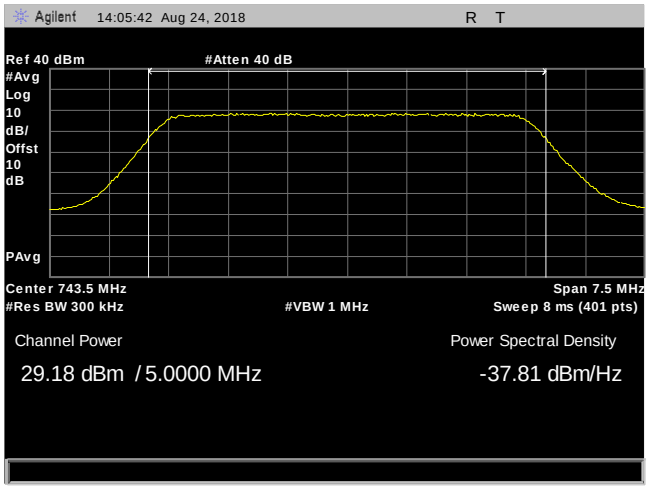


Plot 11. RF Power Output, 10M, CEL850, Mid, 869 – 894 MHz

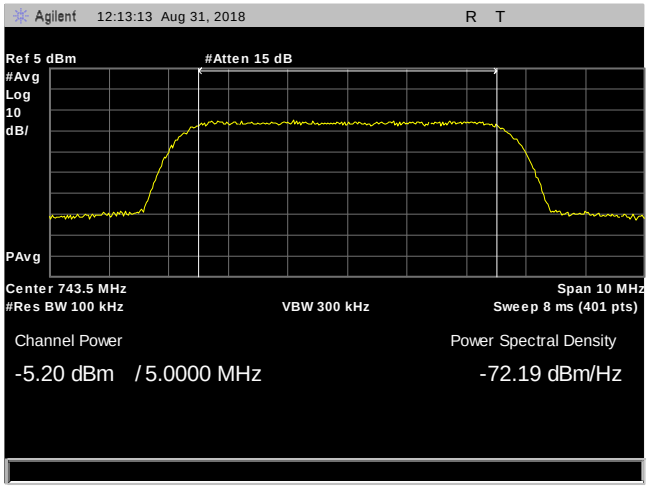


Plot 12. RF Power Output, 10M, CEL850, Mid, 869 – 894 MHz, AGC

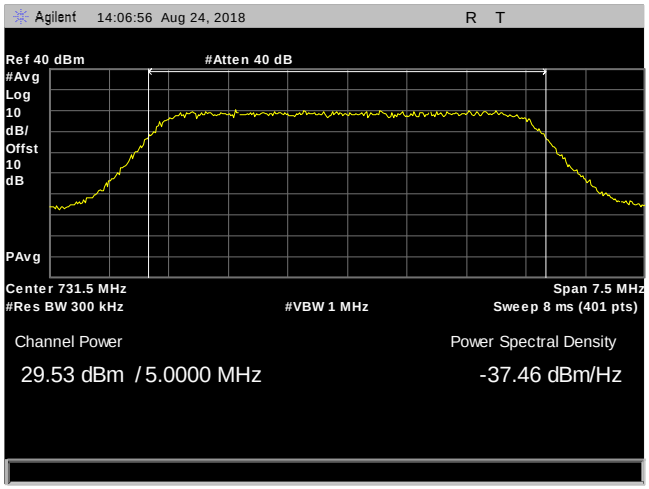
RF Output Power, Band 12, 729 – 746 MHz



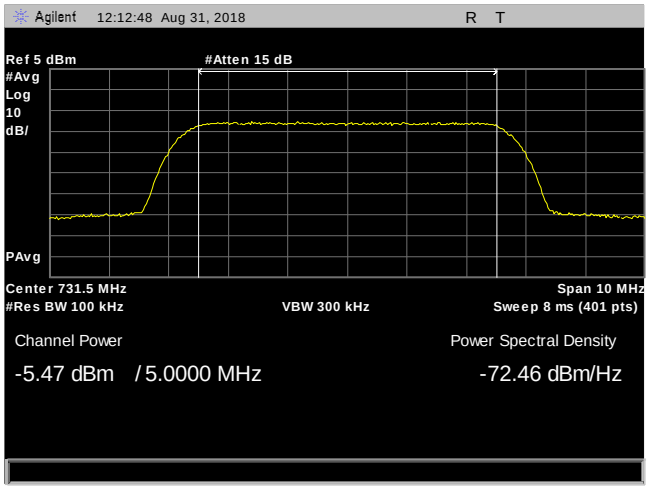
Plot 13. RF Power Output, LTE700ABC, 5 MHz, High, 729 – 746 MHz



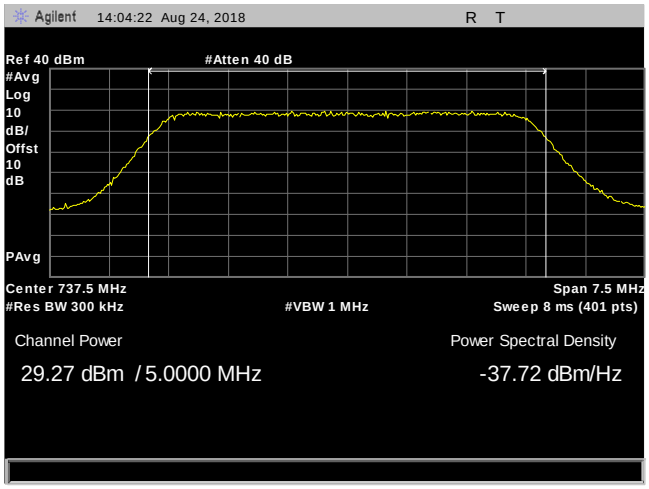
Plot 14. RF Power Output, LTE700ABC, 5 MHz, High, 729 – 746 MHz, AGC



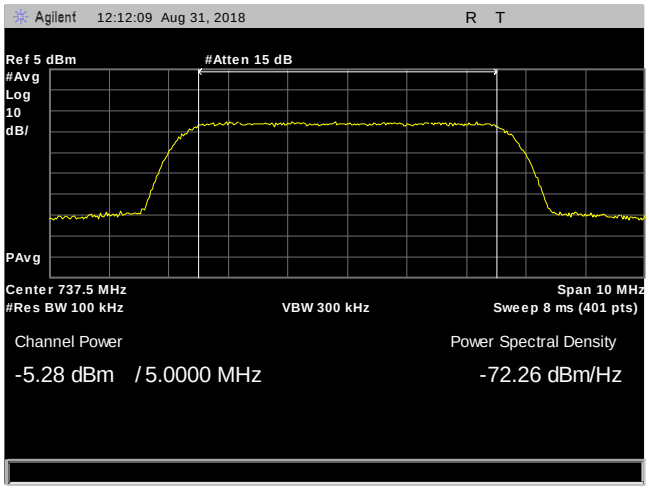
Plot 15. RF Power Output, LTE700ABC, 5 MHz, Low, 729 – 746 MHz



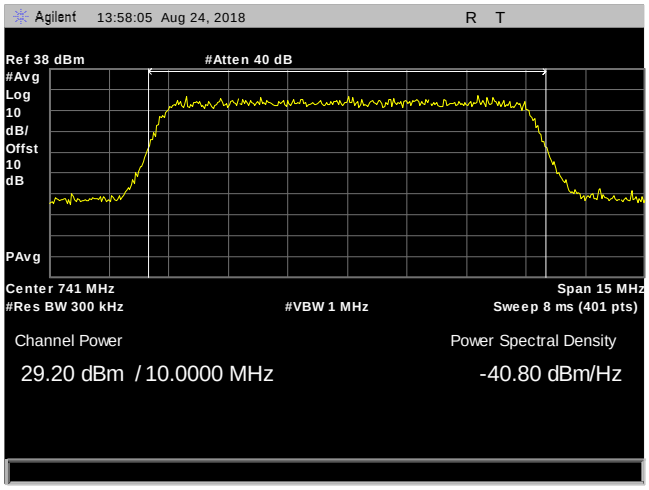
Plot 16. RF Power Output, LTE700ABC, 5 MHz, Low, 729 – 746 MHz, AGC



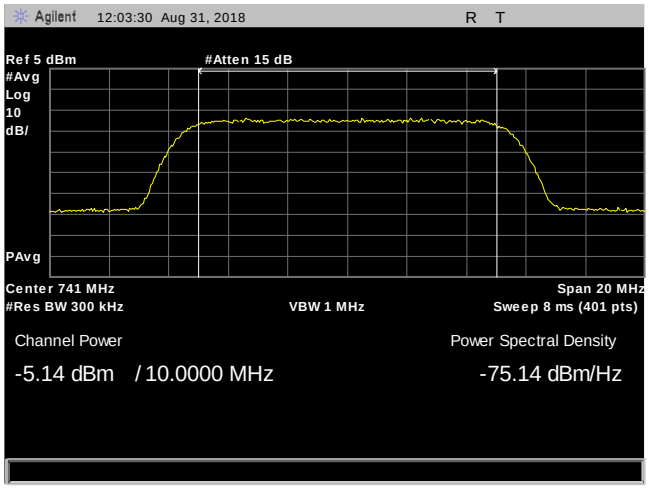
Plot 17. RF Power Output, LTE700ABC, 5 MHz, Mid, 729 – 746 MHz



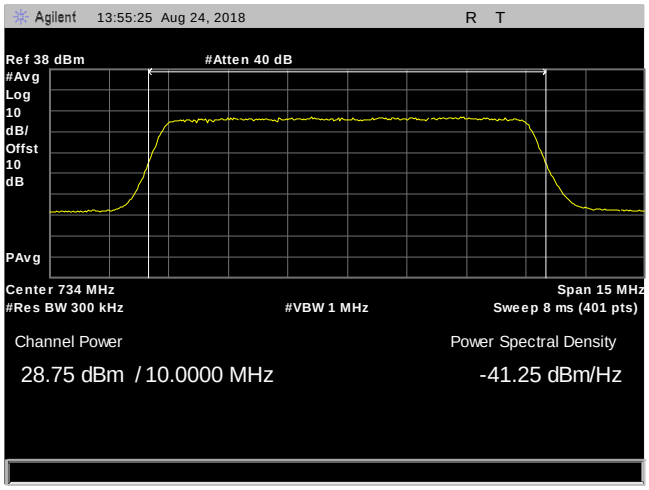
Plot 18. RF Power Output, LTE700ABC, 5 MHz, Mid, 729 – 746 MHz, AGC



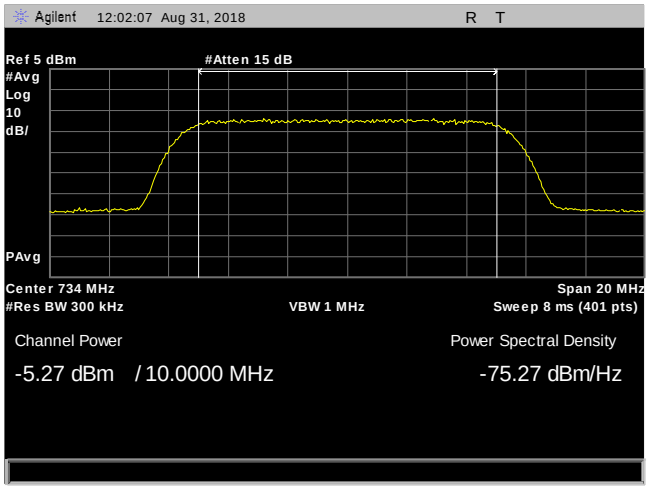
Plot 19. RF Power Output, LTE700ABC, 10 MHz, High, 729 – 746 MHz



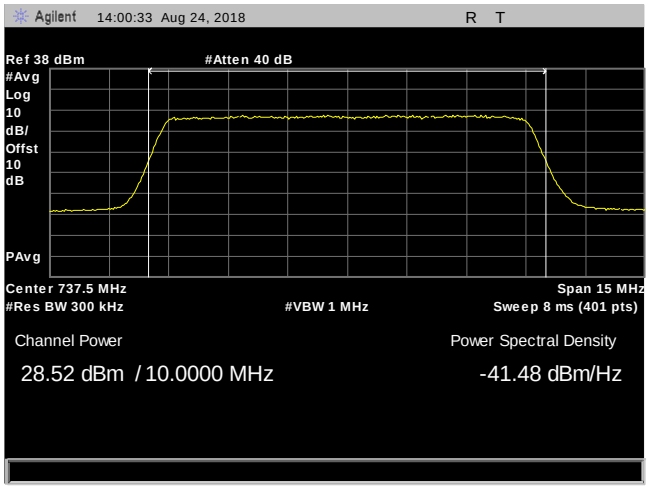
Plot 20. RF Power Output, LTE700ABC, 10 MHz, High, 729 – 746 MHz, AGC



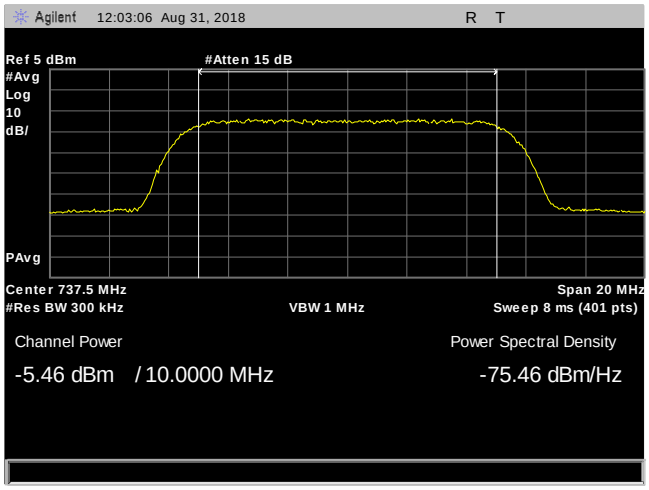
Plot 21. RF Power Output, LTE700ABC, 10 MHz, Low, 729 – 746 MHz



Plot 22. RF Power Output, LTE700ABC, 10 MHz, Low, 729 – 746 MHz, AGC

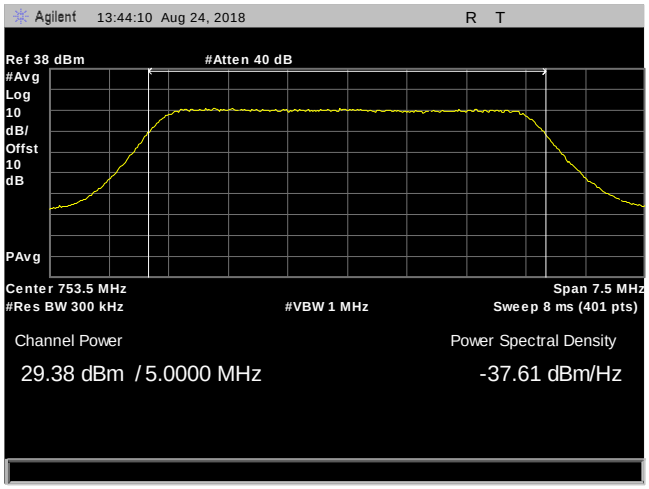


Plot 23. RF Power Output, LTE700ABC, 10 MHz, Mid, 729 – 746 MHz

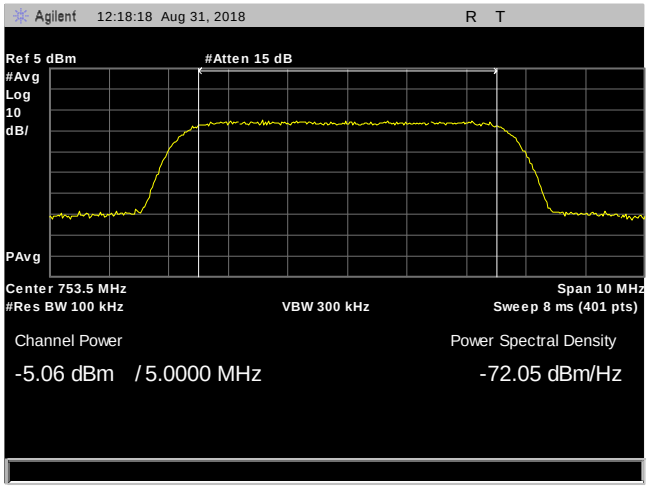


Plot 24. RF Power Output, LTE700ABC, 10 MHz, Mid, 729 – 746 MHz

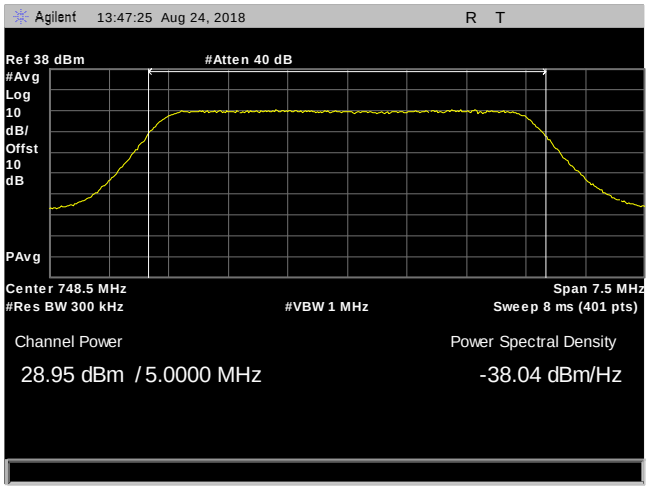
RF Output Power, Band 13, 746 – 756 MHz



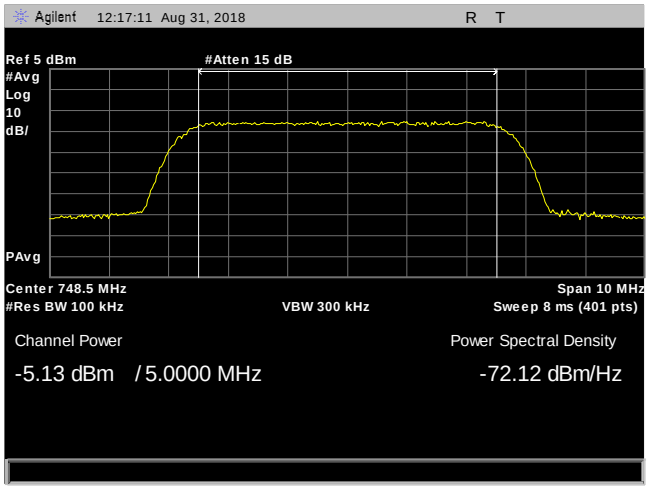
Plot 25. RF Power Output, LTEUpperC, 5 MHz, High, 746 – 756 MHz



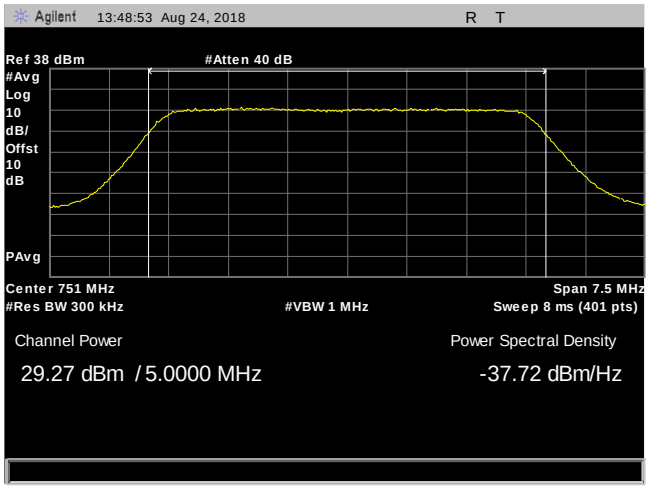
Plot 26. RF Power Output, LTEUpperC, 5 MHz, High, 746 – 756 MHz, AGC



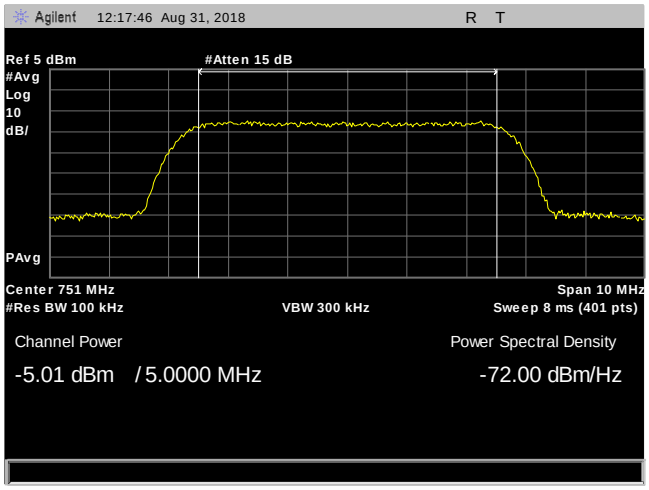
Plot 27. RF Power Output, LTEUpperC, 5 MHz, Low, 746 – 756 MHz



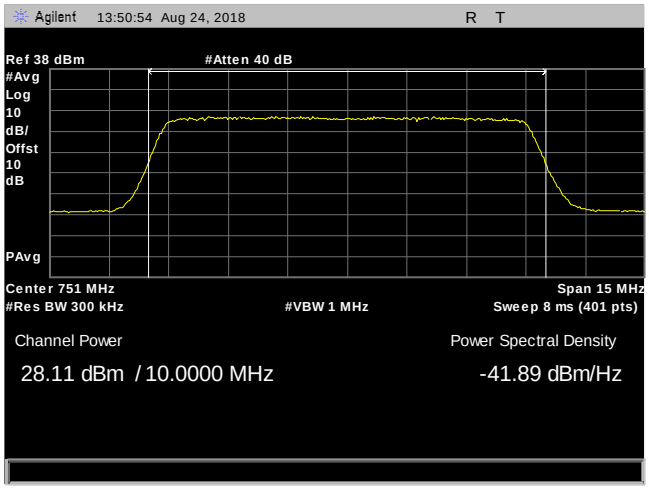
Plot 28. RF Power Output, LTEUpperC, 5 MHz, Low, 746 – 756 MHz, AGC



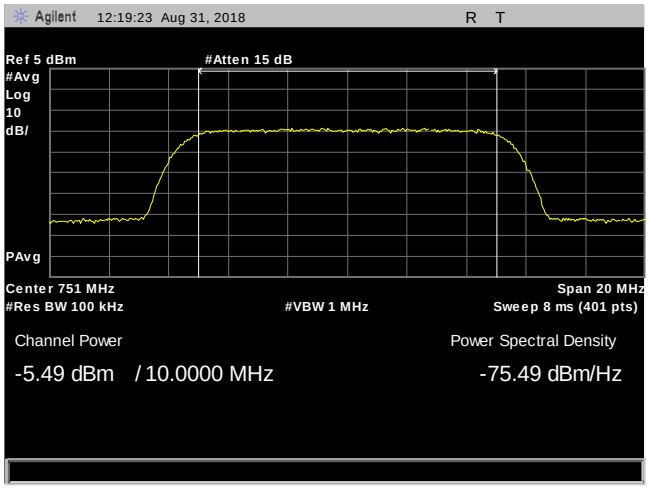
Plot 29. RF Power Output, LTEUpperC, 5 MHz, Mid, 746 – 756 MHz



Plot 30. RF Power Output, LTEUpperC, 5 MHz, Mid, 746 – 756 MHz

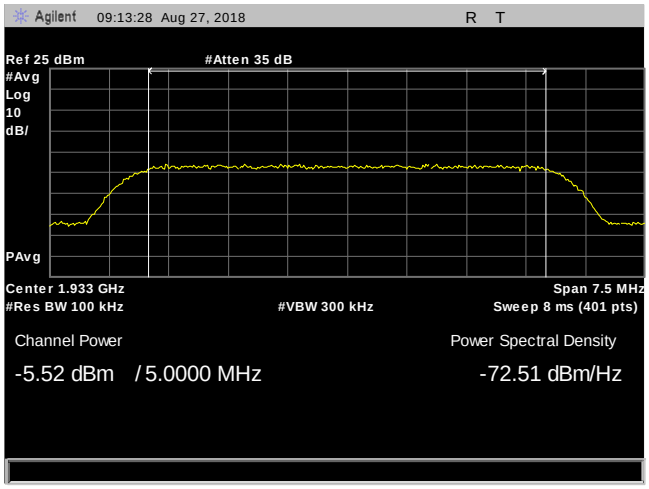


Plot 31. RF Power Output, LTEUpperC, 10 MHz, Mid, 746 – 756 MHz

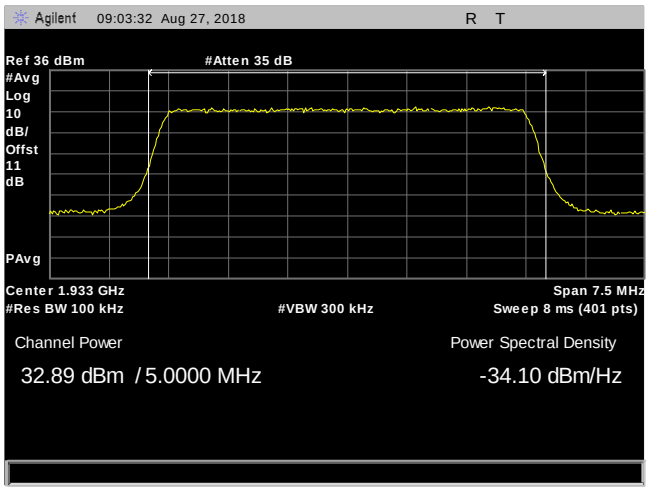


Plot 32. RF Power Output, LTEUpperC, 10 MHz, Mid, 746 – 756 MHz, AGC

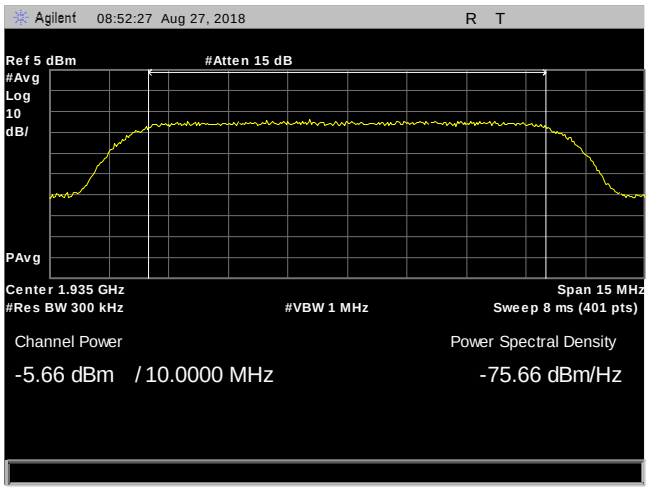
RF Output Power, Band 25, 1930 – 1995 MHz, Average Power



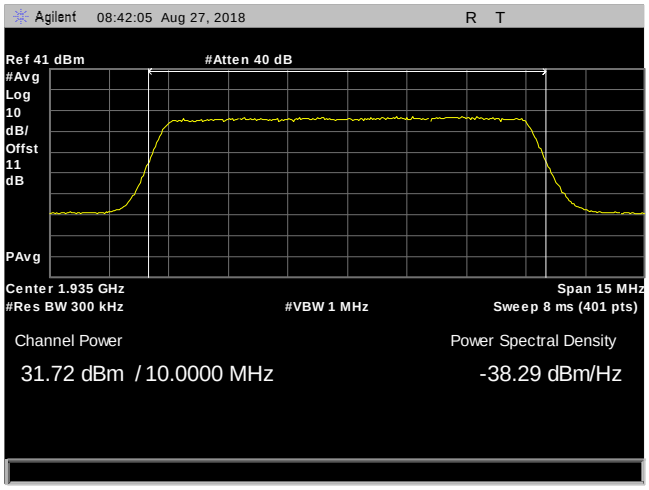
Plot 33. RF Power Output, PCS 1900, 5 MHz BW, Low, 1932.5 MHz, AGC



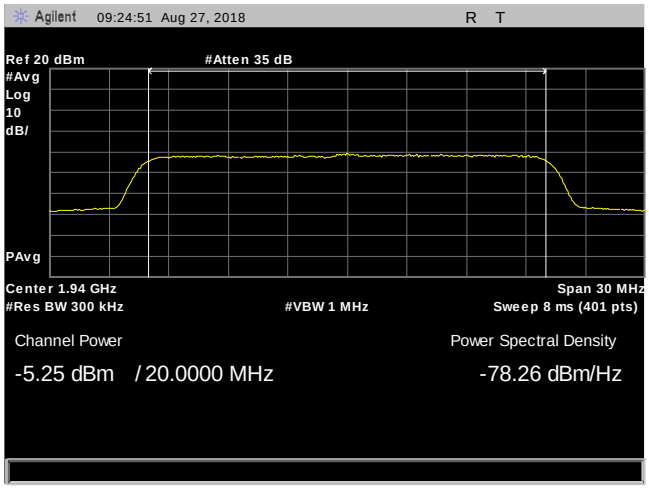
Plot 34. RF Power Output, PCS 1900, 5 MHz, Low, 1932.5 MHz



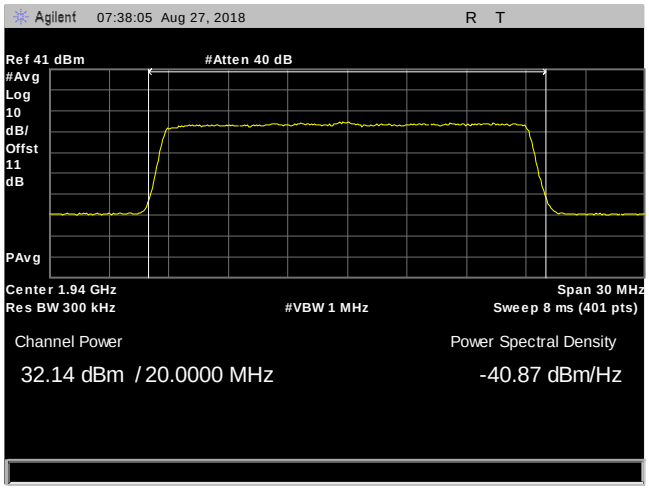
Plot 35. RF Power Output, PCS 1900, 10 MHz, Low, 1935 MHz, AGC



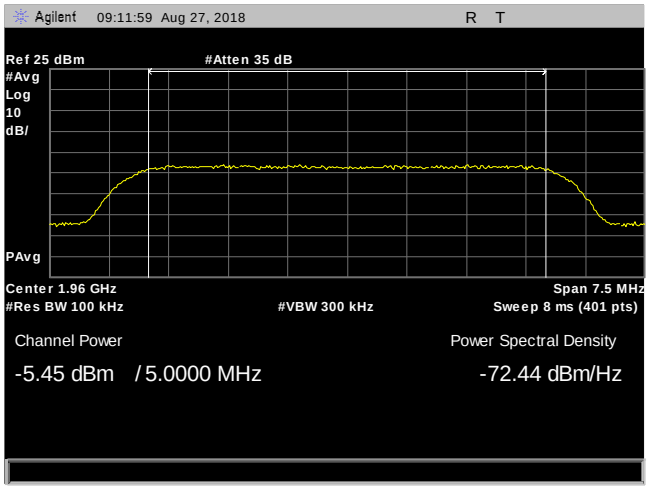
Plot 36. RF Power Output, PCS 1900, 10 MHz, Low, 1935 MHz



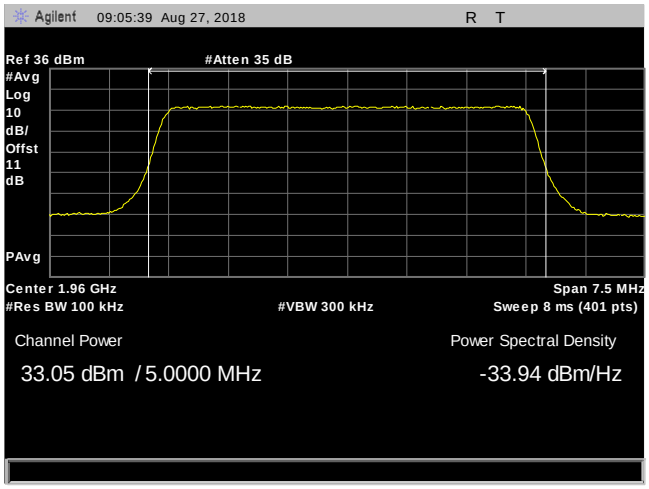
Plot 37. RF Power Output, PCS 1900, 20 MHz, Low, 1940 MHz, AGC



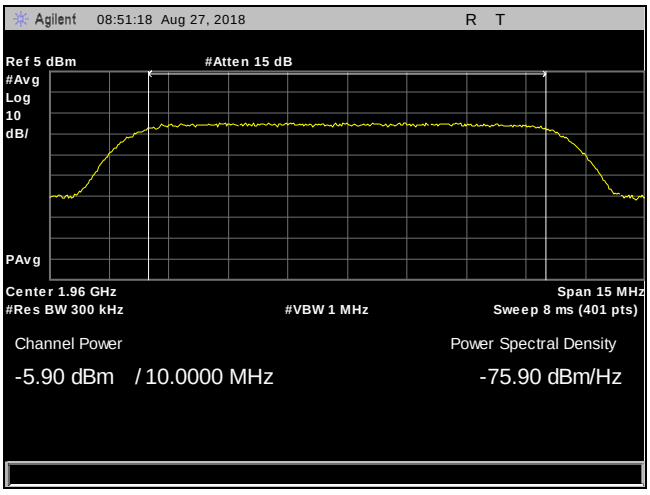
Plot 38. RF Power Output, PCS 1900, 20 MHz, Low, 1940 MHz



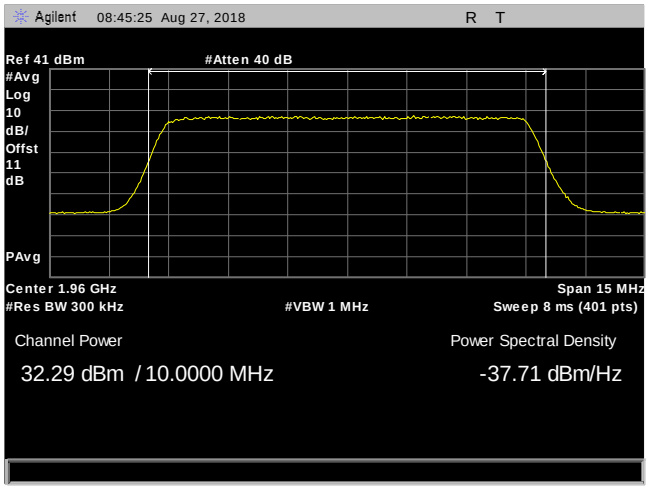
Plot 39. RF Power Output, PCS 1900, 5 MHz, Mid, 1960 MHz, AGC



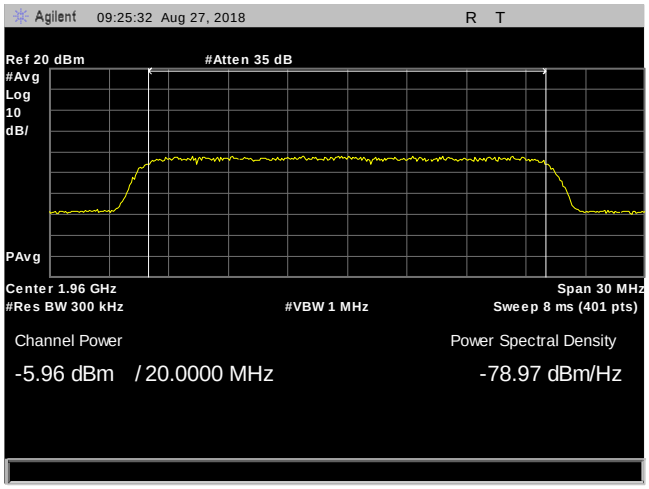
Plot 40. RF Power Output, PCS 1900, 5 MHz, Mid, 1960 MHz



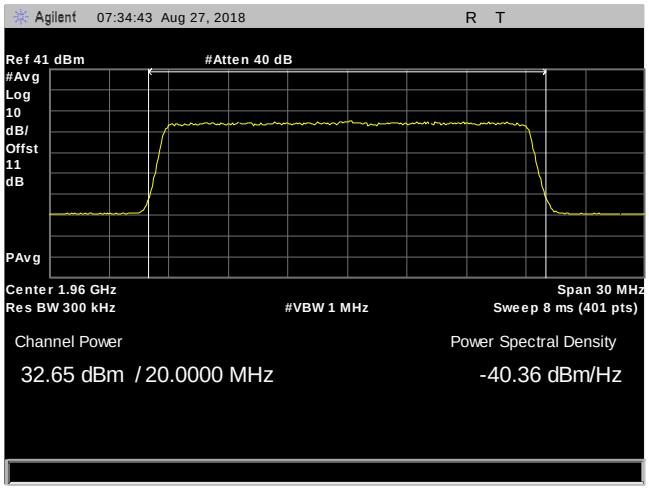
Plot 41. RF Power Output, PCS 1900, 10 MHz, Mid, 1960 MHz, AGC



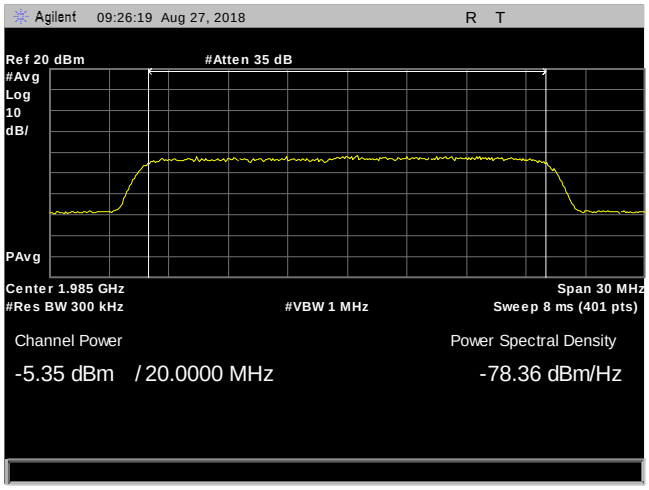
Plot 42. RF Power Output, PCS 1900, 10 MHz, Mid, 1960 MHz



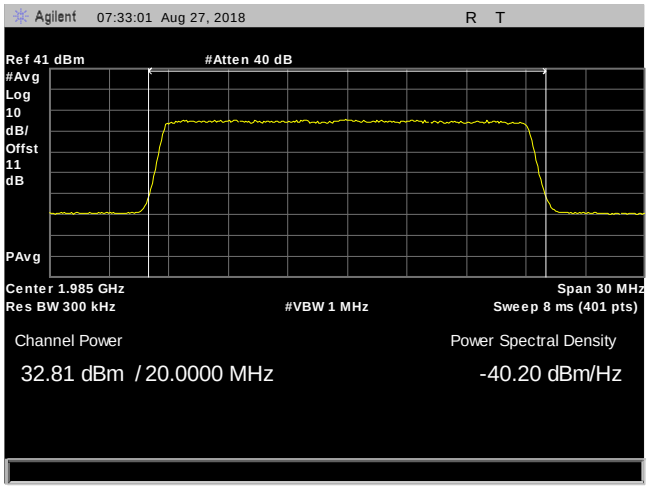
Plot 43. RF Power Output, PCS 1900, 20 MHz, Mid, 1960 MHz, AGC



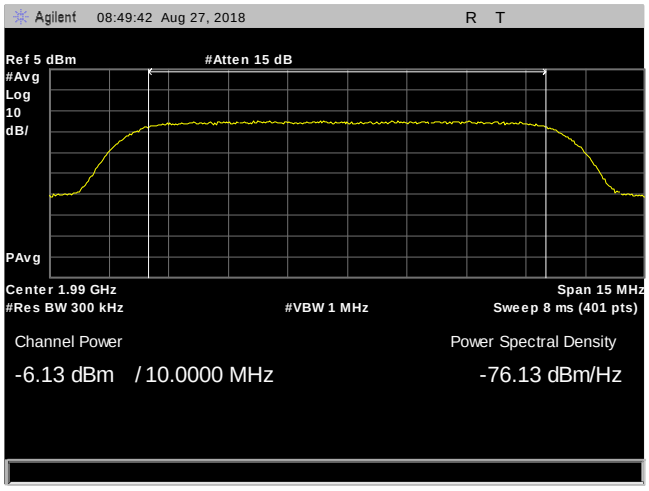
Plot 44. RF Power Output, PSC 1900, 20 MHz, Mid, 1960 MHz



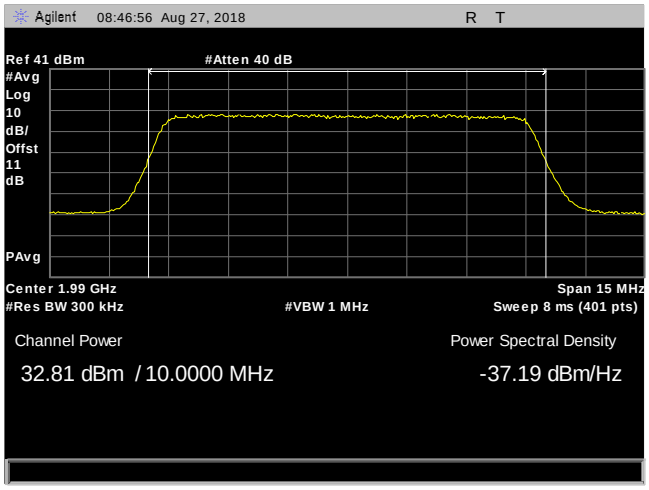
Plot 45. RF Power Output, PSC 1900, 20 MHz, High, 1985 MHz, AGC



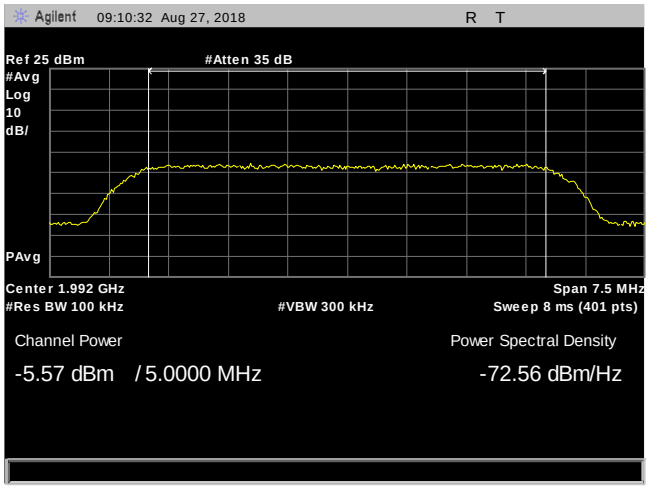
Plot 46. RF Power Output, PSC 1900, 20 MHz, High, 1985 MHz



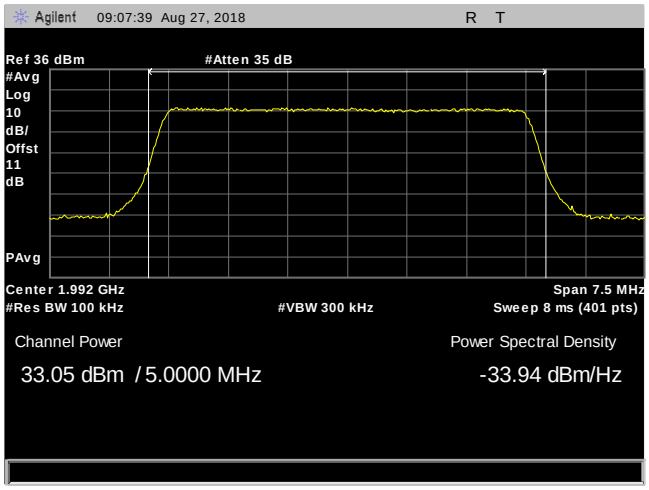
Plot 47. RF Power Output, PSC 1900, 10 MHz, High, 1990 MHz, AGC



Plot 48. RF Power Output, PSC 1900, 10 MHz, High, 1990 MHz

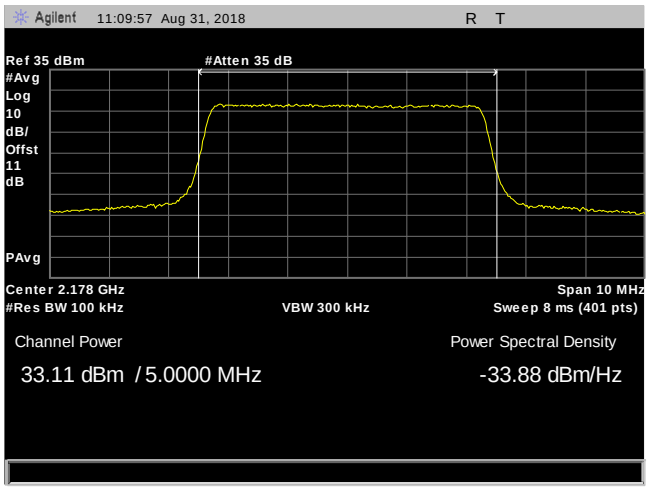


Plot 49. RF Power Output, PCS 1900, 5 MHz, High, 1992.5 MHz, AGC

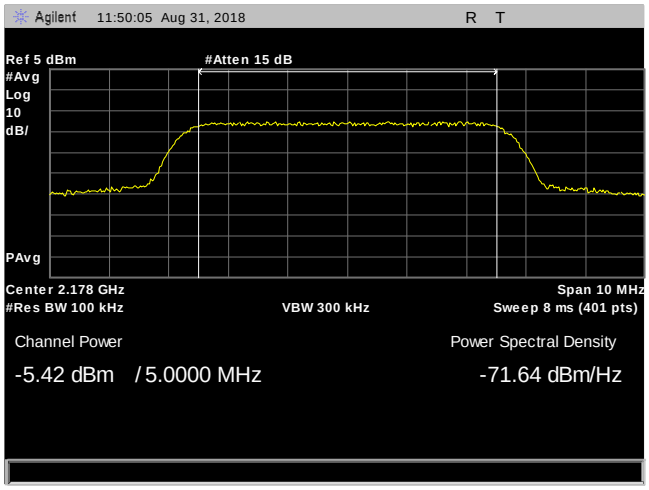


Plot 50. RF Power Output, PCS 1900, 5 MHz, High, 1992.5 MHz

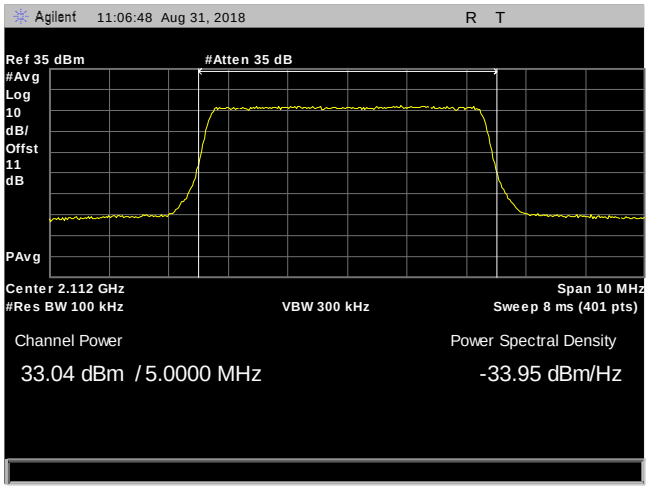
RF Output Power, Band 66, 2110 – 2180 MHz



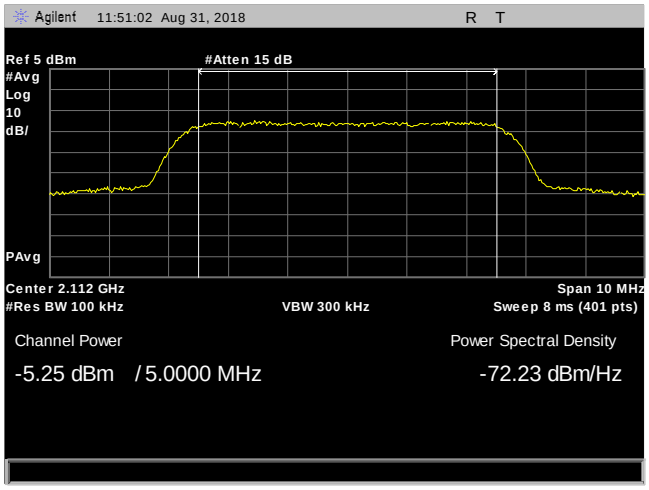
Plot 51. RF Power Output, AWS2100, 5 MHz, High, 2110 – 2180 MHz



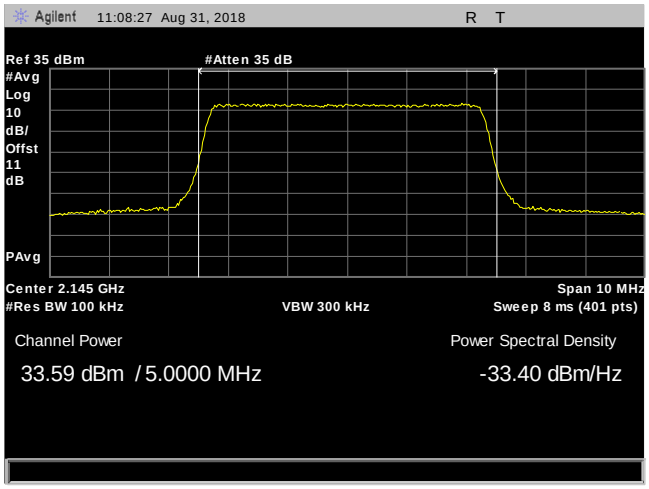
Plot 52. RF Power Output, AWS2100, 5 MHz, High, 2110 – 2180 MHz, AGC



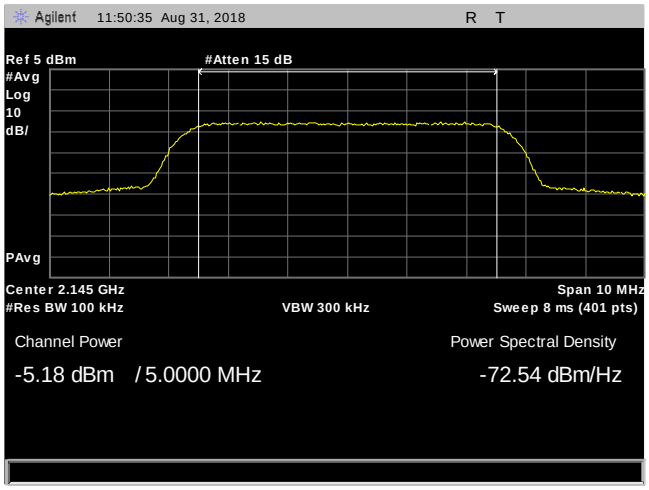
Plot 53. RF Power Output, AWS2100, 5 MHz, Low, 2110 – 2180 MHz



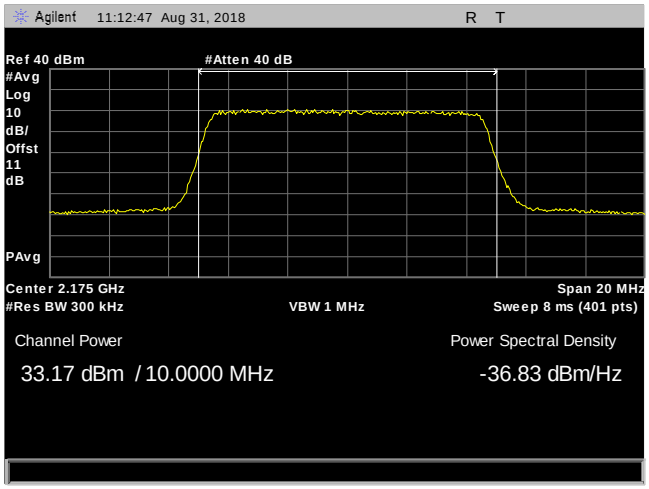
Plot 54. RF Power Output, AWS2100, 5 MHz, Low, 2110 – 2180 MHz, AGC



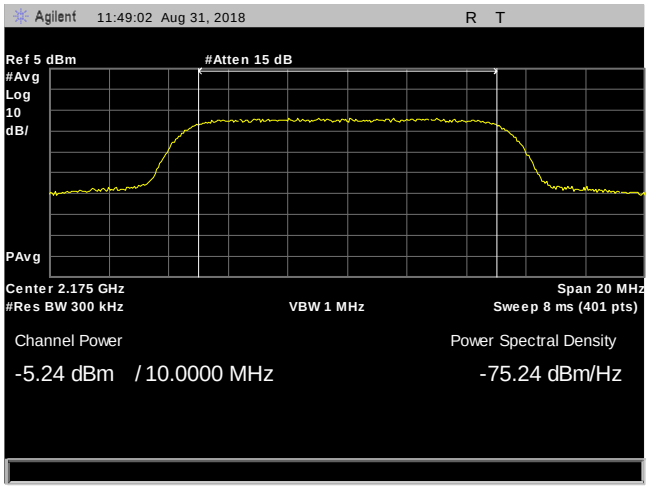
Plot 55. RF Power Output, AWS2100, 5 MHz, Mid, 2110 – 2180 MHz



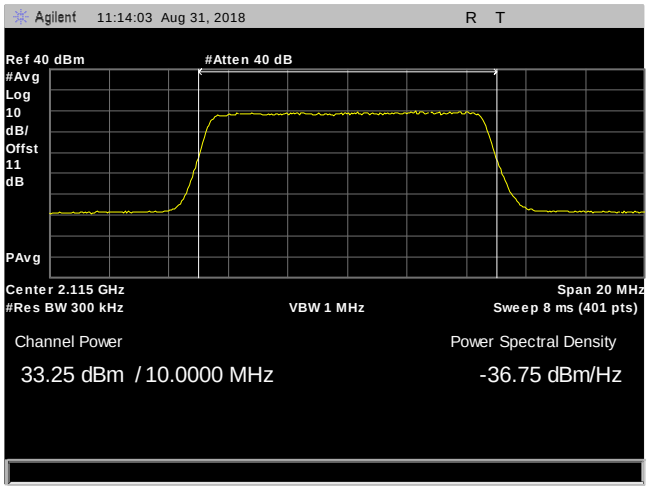
Plot 56. RF Power Output, AWS2100, 5 MHz, Mid, 2110 – 2180 MHz, AGC



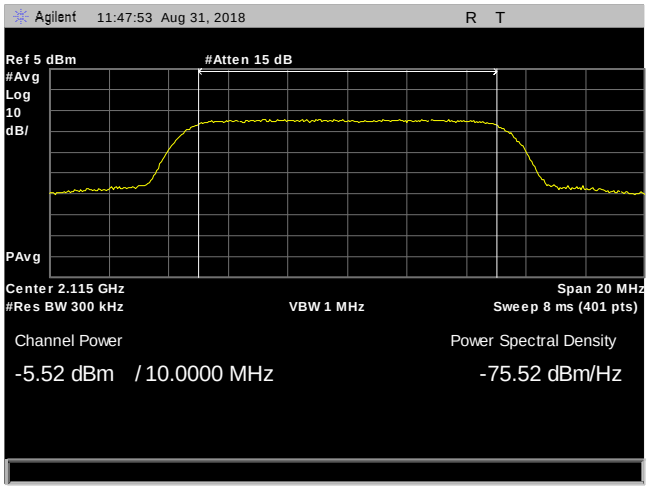
Plot 57. RF Power Output, AWS2100, 10 MHz, High, 2110 – 2180 MHz



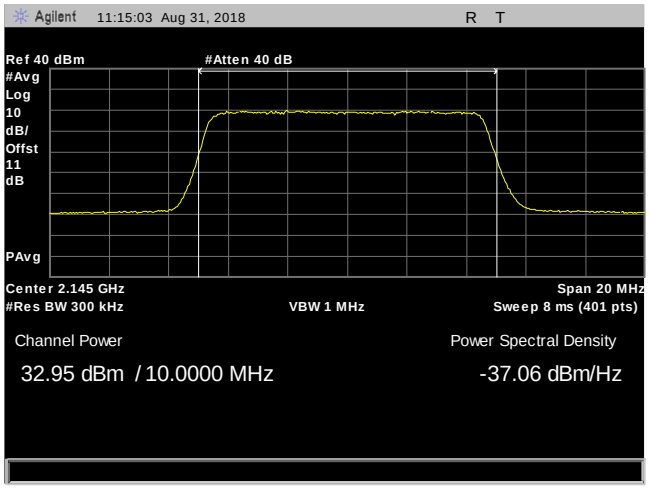
Plot 58. RF Power Output, AWS2100, 10 MHz, High, 2110 – 2180 MHz, AGC



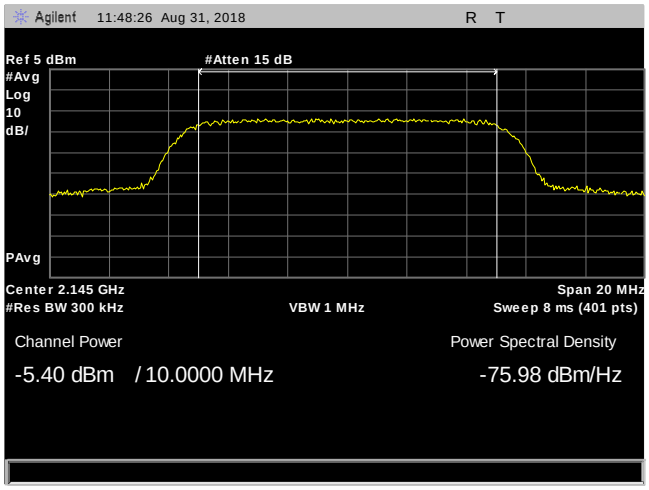
Plot 59. RF Power Output, AWS2100, 10 MHz, Low, 2110 – 2180 MHz



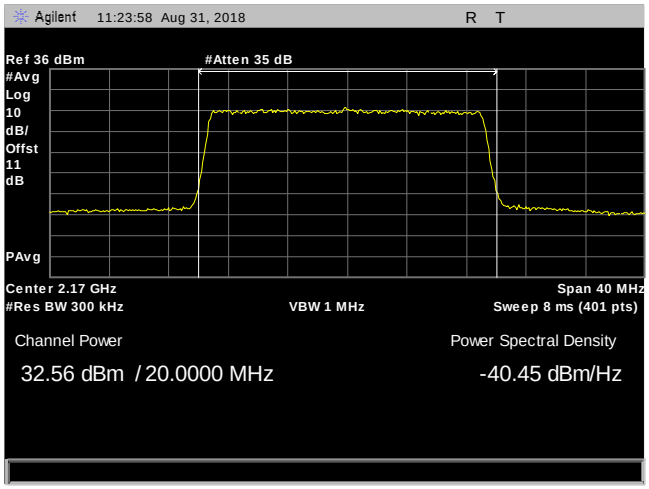
Plot 60. RF Power Output, AWS2100, 10 MHz, Low, 2110 – 2180 MHz, AGC



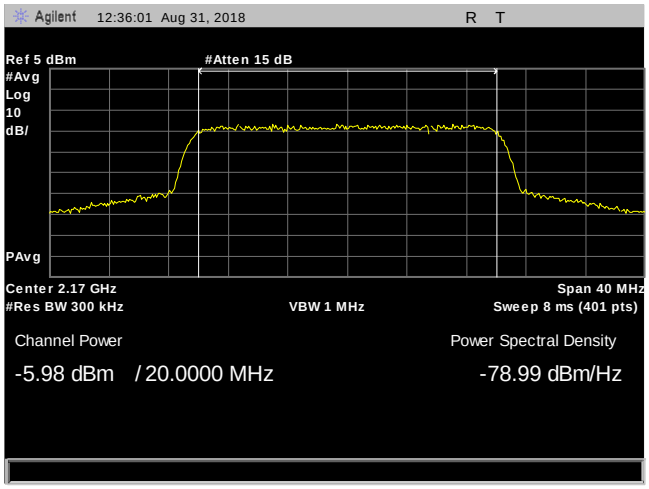
Plot 61. RF Power Output, AWS2100, 10 MHz, Mid, 2110 – 2180 MHz



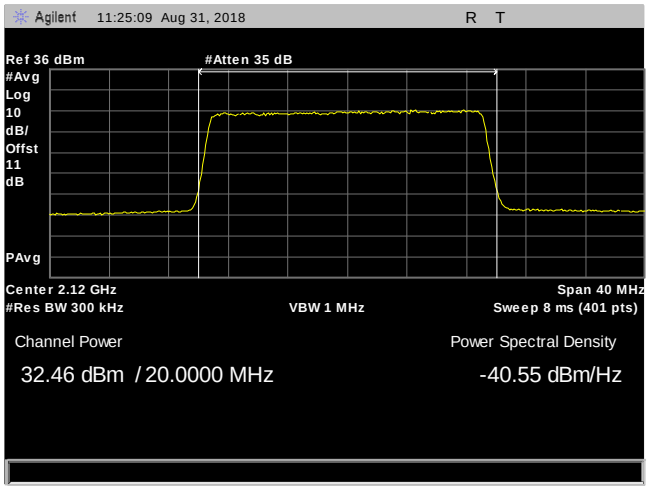
Plot 62. RF Power Output, AWS2100, 10 MHz, Mid, 2110 – 2180 MHz, AGC



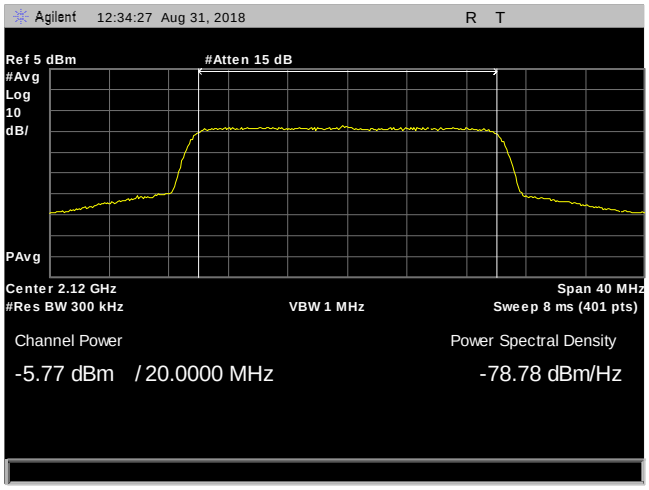
Plot 63. RF Power Output, AWS2100, 20 MHz, High, 2110 – 2180 MHz



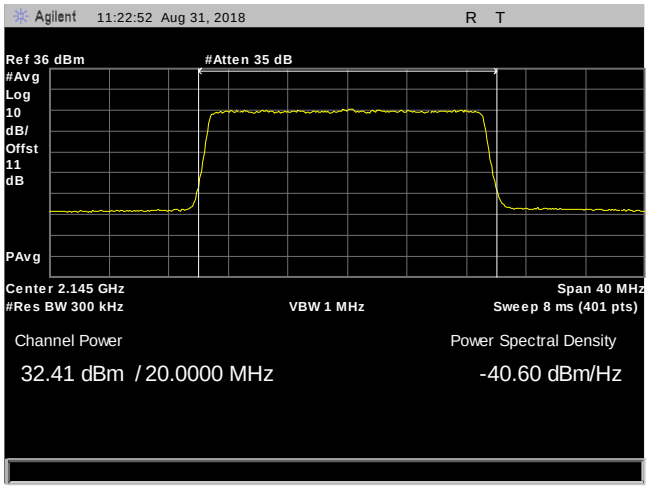
Plot 64. RF Power Output, AWS2100, 20 MHz, High, 2110 – 2180 MHz, AGC



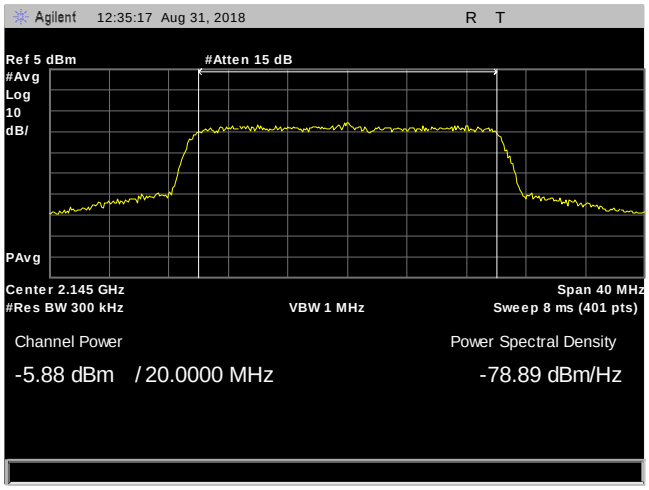
Plot 65. RF Power Output, AWS2100, 20 MHz, Low, 2110 – 2180 MHz



Plot 66. RF Power Output, AWS2100, 20 MHz, Low, 2110 – 2180 MHz, AGC



Plot 67. RF Power Output, AWS2100, 20 MHz, Mid, 2110 – 2180 MHz



Plot 68. RF Power Output, AWS2100, 20 MHz, Mid, 2110 – 2180 MHz, AGC

§ 2.1049 Occupied Bandwidth

Test Requirement(s): **§ 2.1049 Measurements required: Occupied bandwidth:** The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the specified conditions of § 2.1049 (a) through (i) as applicable.

Test Procedures: The EUT was tested according to relative measurement procedure of ANSI C63.26 5.4.3. The OBW measurement function of the spectrum analyzer was used and configured in the following manner.

(a) Frequency = channel cf
(b) Span = 2-5 x the OBW
(c) RBW = 1-5 % of the OBW
(d) VBW 1-3 x the RBW
(e) Sweep Time = Auto
(f) Detector = peak
(g) –X dB = 26

Test Results: Equipment was found compliant with Section 2.1049. The following pages show measurements of 99% and -26 dB Occupied Bandwidth plots.

Test Engineer(s): Bradley Jones

Test Date(s): September 18, 2018

Band 5		frequency	Input BW	Output BW	% diff
5 MHz	Low	871.5	6.323	4.897	-29.1
	Middle	881.5	6.335	4.895	-29.4
	High	891.5	6.347	4.933	-28.7
10 MHz	Low	874	12.769	10.093	-26.5
	Middle	881.5	12.762	10.137	-25.9
	High	889	12.793	10.092	-26.8

Table 13. Occupied Bandwidth, Band 5, Test Results

Band 12		frequency	Input BW	Output BW	% diff
5 MHz	Low	731.5	6.354	4.928	-28.9
	Middle	737.5	6.312	4.915	-28.4
	High	743.5	6.319	4.939	-27.9
10 MHz	Low	734	12.615	10.117	-24.7
	Middle	737.5	12.717	10.127	-25.6
	High	741	12.693	10.117	-25.5

Table 14. Occupied Bandwidth, Band 12, Test Results

Band 13		frequency	Input BW	Output BW	% diff
5 MHz	Low	748.5	6.313	4.908	-28.63
	Middle	751	6.324	4.938	-28.07
	High	753.5	6.309	4.933	-27.89
10 MHz	Middle	751	10.646	10.077	-5.647

Table 15. Occupied Bandwidth, Band 13, Test Results

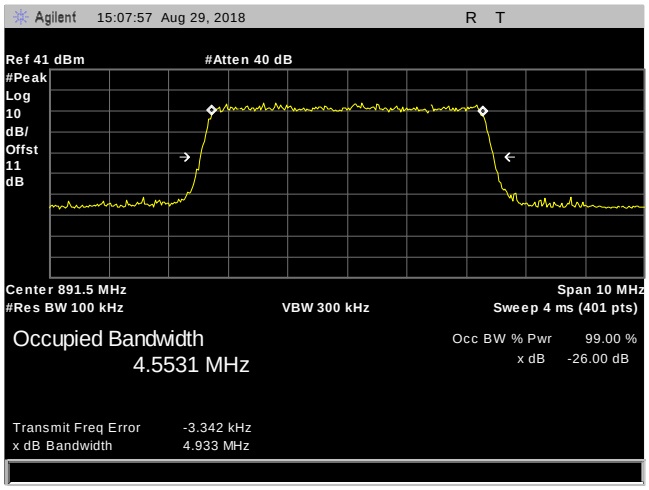
Band 25		frequency	Input BW	Output BW	% diff
5 MHz	Low	1932.5	6.313	5.296	-19.2
	Middle	1960	6.347	4.922	-29
	High	1992	6.321	4.906	-28.8
10 MHz	Low	1935	10.031	10.09	0.585
	Middle	1960	12.719	10.018	-27
	High	1990	12.638	10.036	-25.9
20 MHz	Low	1940	22.769	19.376	-17.5
	Middle	1960	22.7	19.359	-17.3
	High	1985	22.686	19.334	-17.3

Table 16. Occupied Bandwidth, Band 25, Test Results

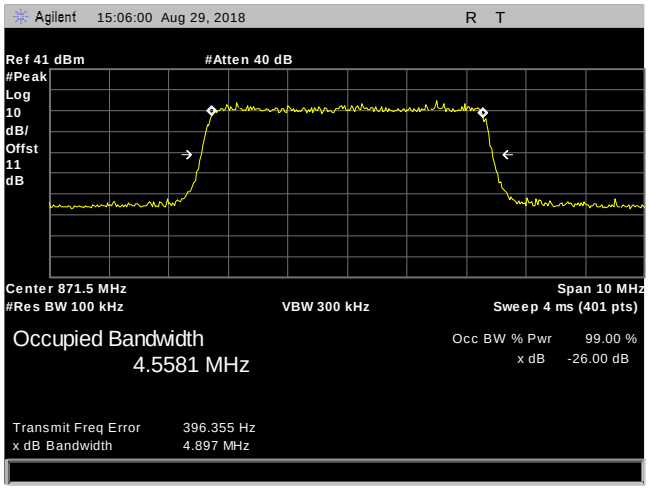
Band 66		frequency	Input BW	Output BW	% diff
5 MHz	Low	2112	6.39	4.927	-29.69
	Middle	2145	6.347	4.927	-28.82
	High	2178	6.394	4.924	-29.85
10 MHz	Low	2115	12.918	10.142	-27.37
	Middle	2145	12.886	10.176	-26.63
	High	2175	12.765	10.162	-25.62
20 MHz	Low	2120	22.85	19.399	-17.79
	Middle	2145	22.723	19.422	-17
	High	2170	22.868	19.349	-18.19

Table 17. Occupied Bandwidth, Band 66, Test Results

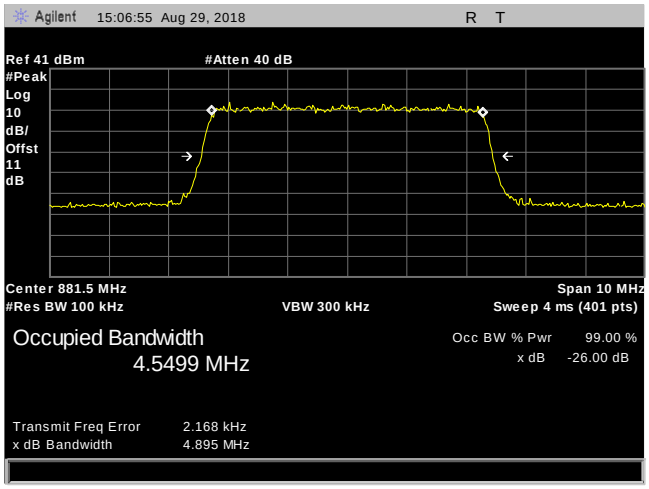
Occupied Bandwidth, Band 5, 869 – 894 MHz



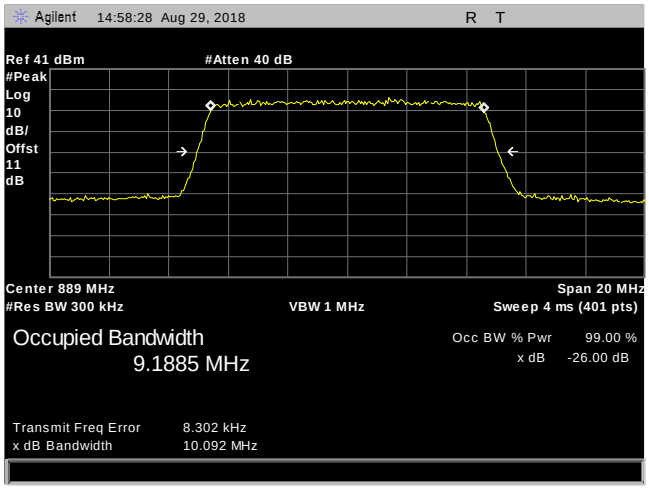
Plot 69. Occupied Bandwidth, CEL850, 5 MHz, High, 869 - 894 MHz



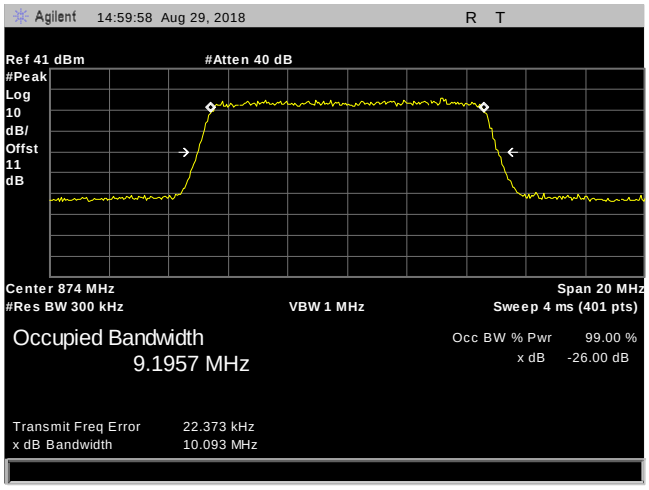
Plot 70. Occupied Bandwidth, CEL850, 5 MHz, Low, 869 – 894 MHz



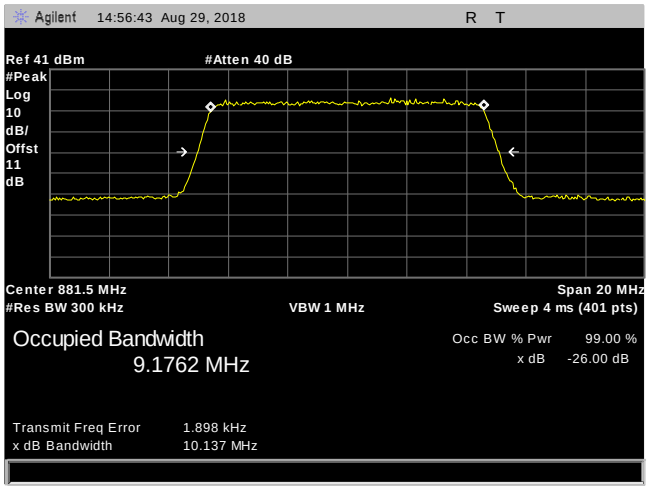
Plot 71. Occupied Bandwidth, CEL850, 5 MHz, Mid, 869 – 894 MHz



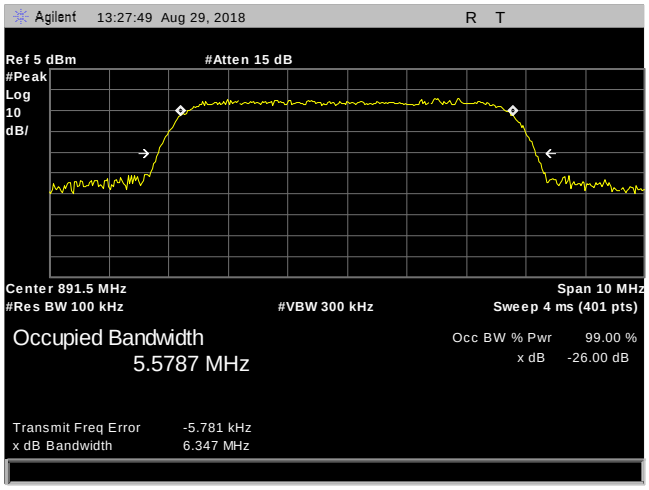
Plot 72. Occupied Bandwidth, CEL850, 10 MHz, High, 869 – 894 MHz



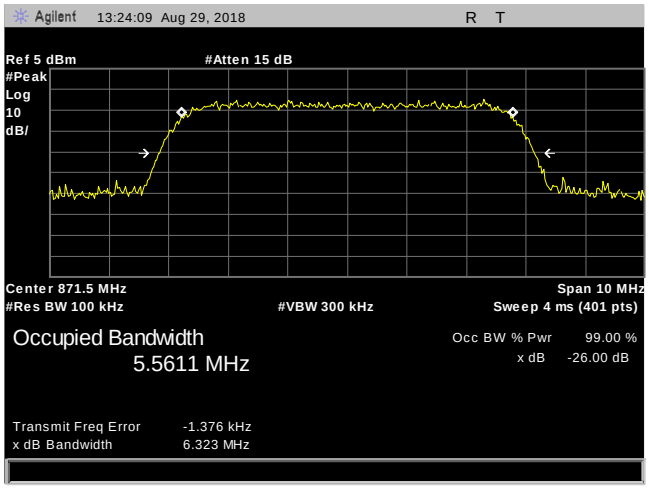
Plot 73. Occupied Bandwidth, CEL850, 10 MHz, Low, 869 – 894 MHz



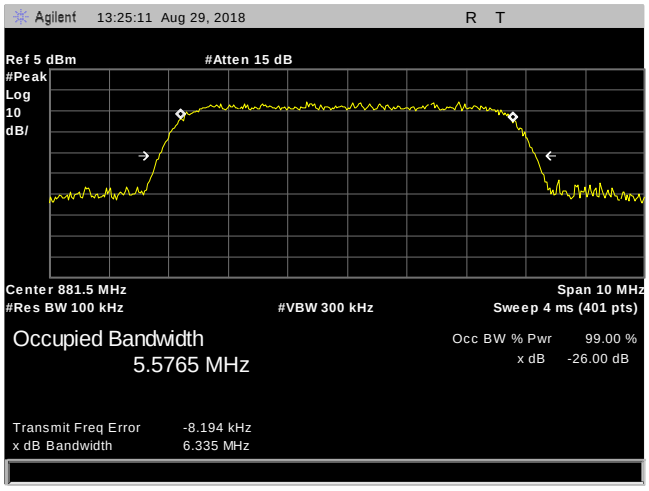
Plot 74. Occupied Bandwidth, CEL850, 10 MHz, Mid, 869 – 894 MHz



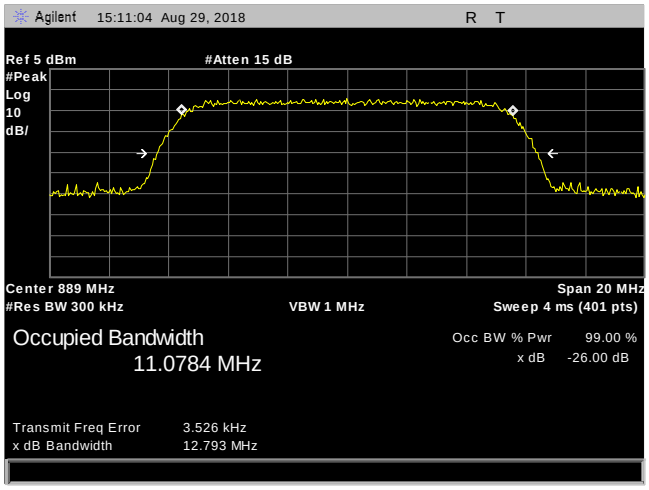
Plot 75. Occupied Bandwidth, CEL850, SG, 5 MHz, High, 869 – 894 MHz



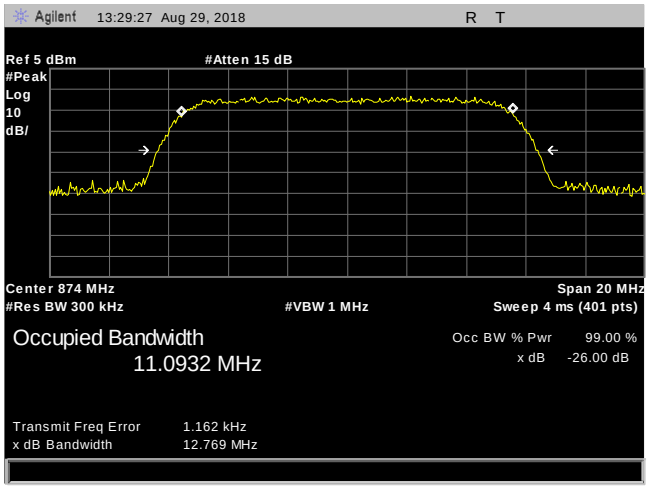
Plot 76. Occupied Bandwidth, CEL850, SG, 5 MHz, Low, 869 – 894 MHz



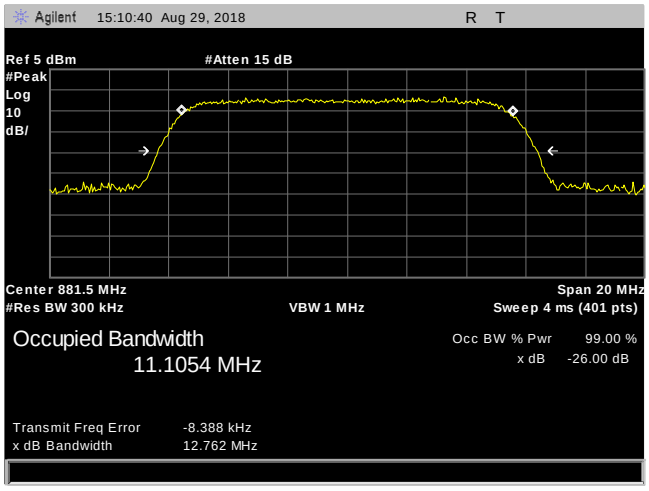
Plot 77. Occupied Bandwidth, CEL850, SG, 5 MHz, Mid, 869 – 894 MHz



Plot 78. Occupied Bandwidth, CEL850, SG, 10 MHz, High, 869 – 894 MHz

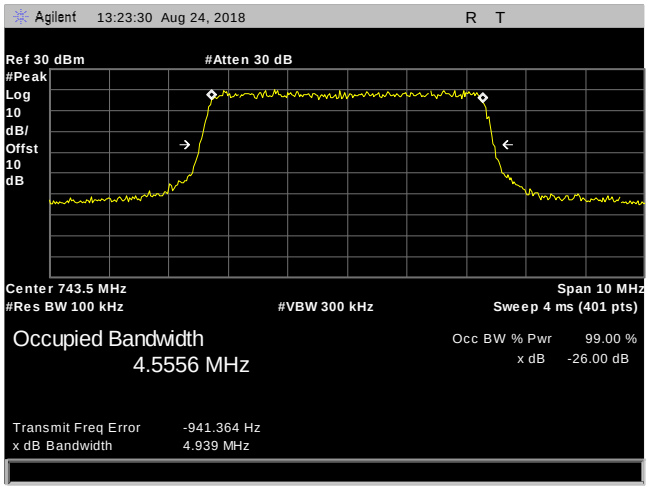


Plot 79. Occupied Bandwidth, CEL850, SG, 10 MHz, Low, 869 – 894 MHz

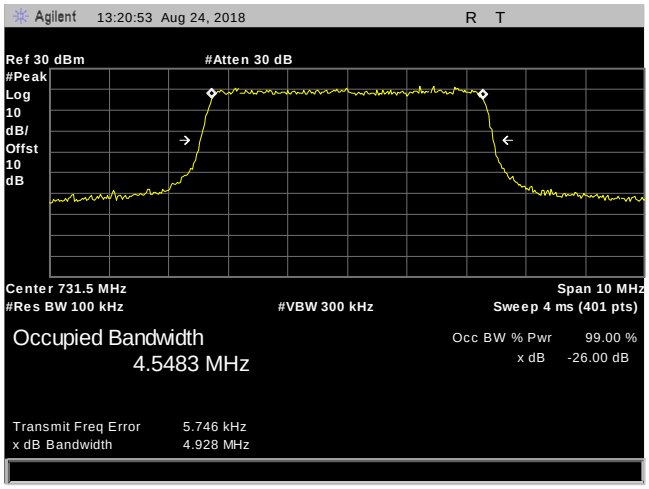


Plot 80. Occupied Bandwidth, CEL850, SG, 10 MHz, Mid, 869 – 894 MHz

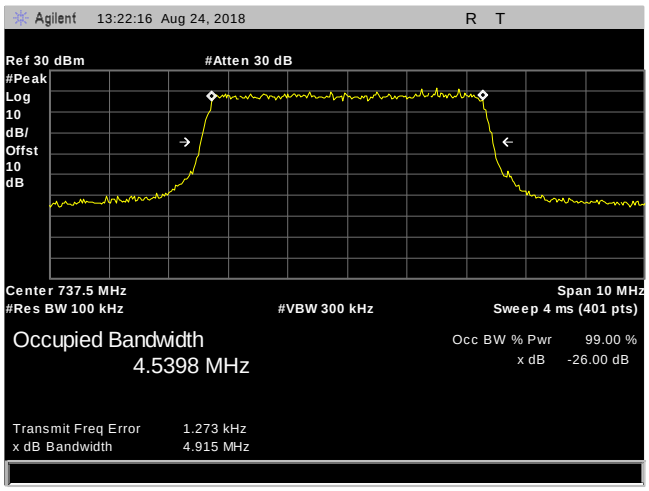
Occupied Bandwidth, Band 12, 729 – 746 MHz



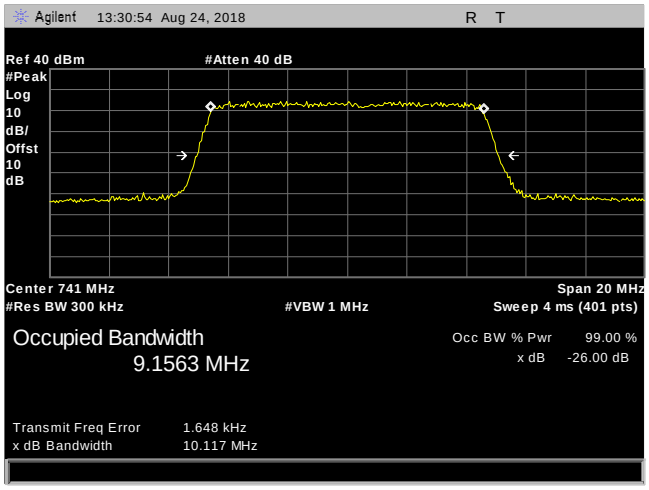
Plot 81. Occupied Bandwidth, LTE700ABC, 5 MHz, High, 729 – 746 MHz



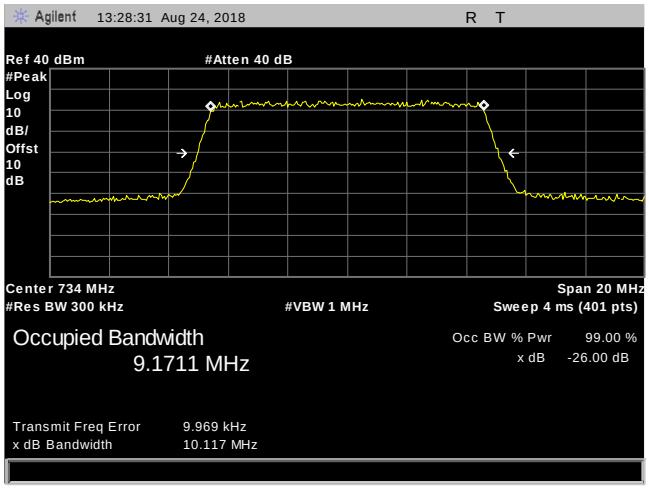
Plot 82. Occupied Bandwidth, LTE700ABC, 5 MHz, Low, 729 – 746 MHz



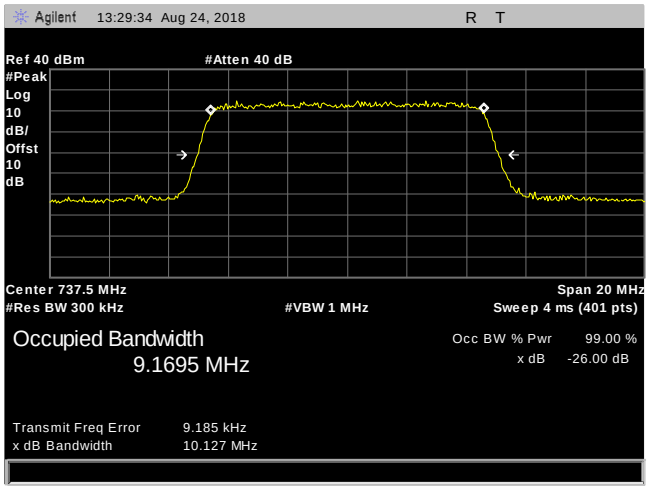
Plot 83. Occupied Bandwidth, LTE700ABC, 5 MHz, Mid, 729 – 746 MHz



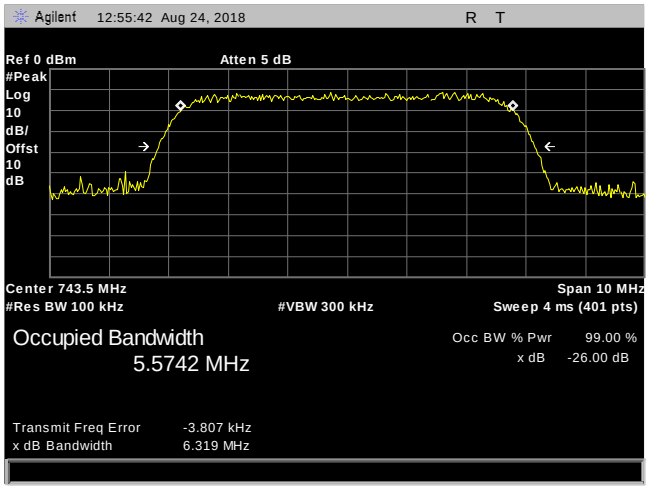
Plot 84. Occupied Bandwidth, LTE700ABC, 10 MHz, High, 729 – 746 MHz



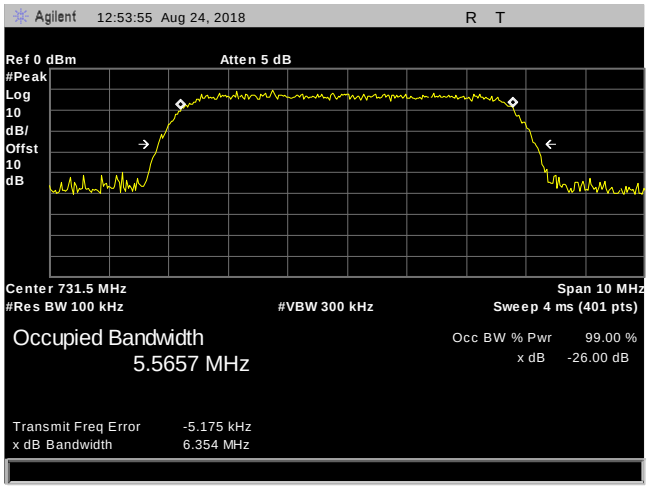
Plot 85. Occupied Bandwidth, LTE700ABC, 10 MHz, Low, 729 – 746 MHz



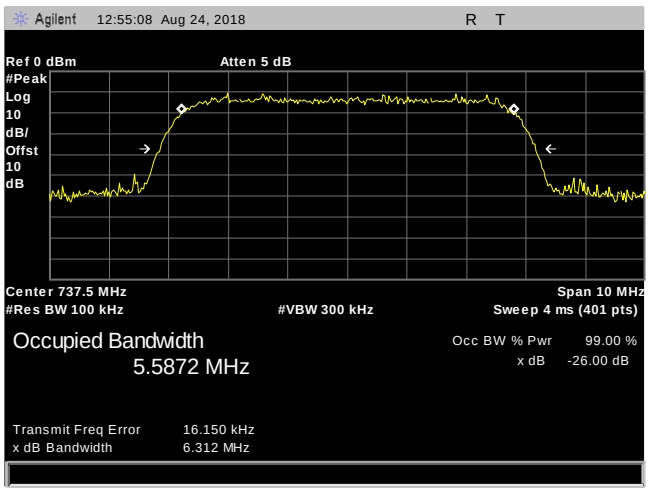
Plot 86. Occupied Bandwidth, LTE700ABC, 10 MHz, Mid, 729 – 746 MHz



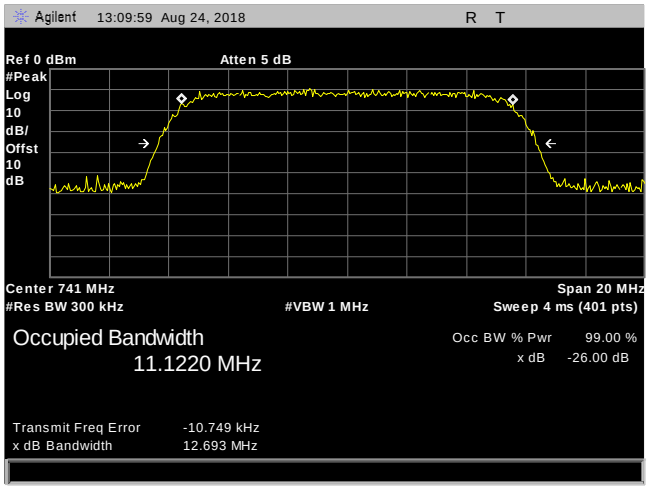
Plot 87. Occupied Bandwidth, LTE700ABC, SG, 5 MHz, High, 729 – 746 MHz



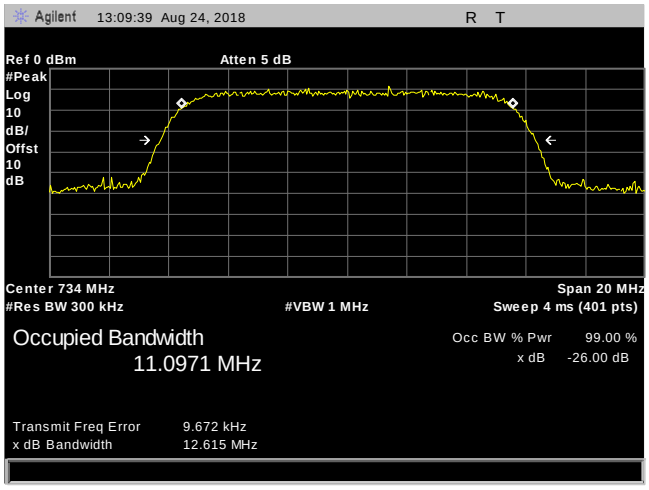
Plot 88. Occupied Bandwidth, LTE700ABC, SG, 5 MHz, Low, 729 – 746 MHz



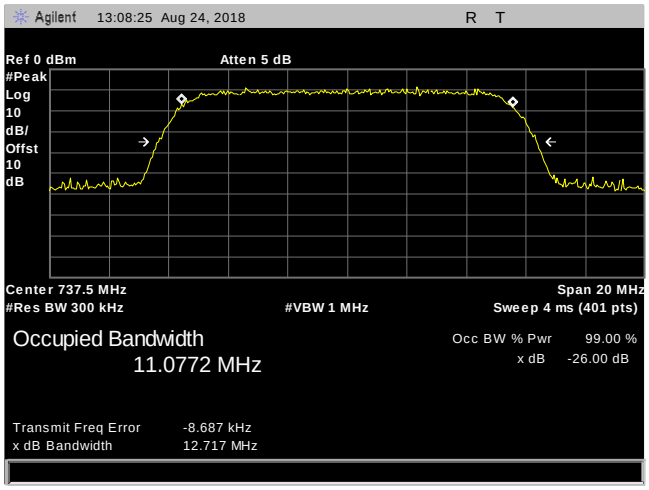
Plot 89. Occupied Bandwidth, LTE700ABC, SG, 5 MHz, Mid, 729 – 746 MHz



Plot 90. Occupied Bandwidth, LTE700ABC, SG, 10 MHz, High, 729 – 746 MHz

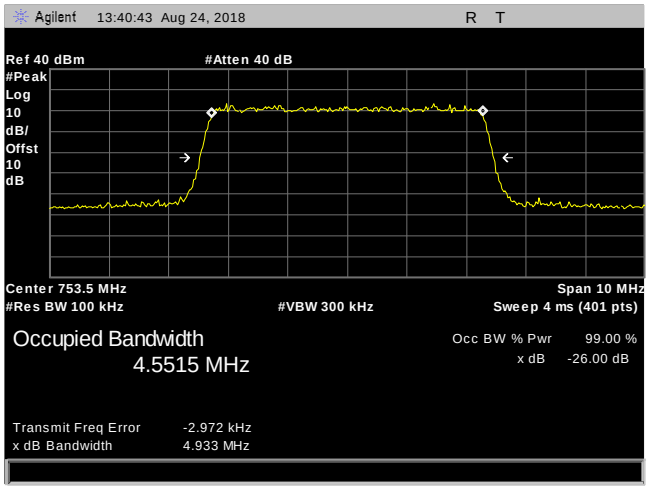


Plot 91. Occupied Bandwidth, LTE700ABC, SG, 10 MHz, Low, 729 – 746 MHz

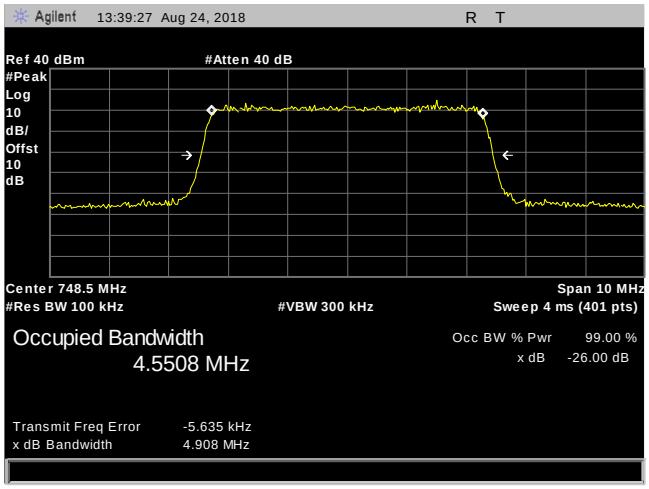


Plot 92. Occupied Bandwidth, LTE700ABC, SG, 10 MHz, Mid, 729 – 746 MHz

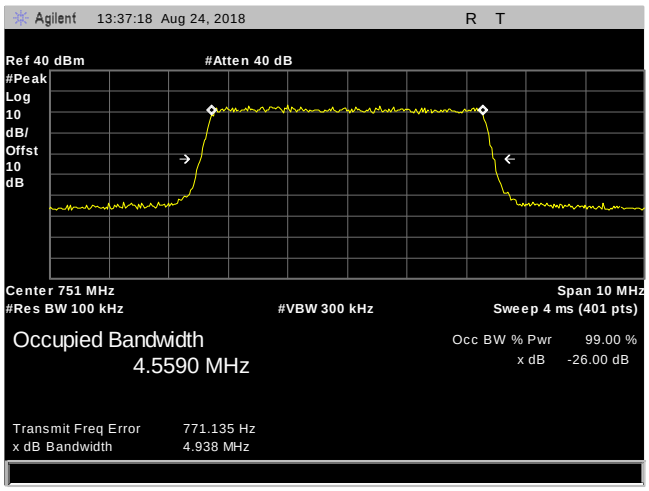
Occupied Bandwidth, Band 13, 746 – 756 MHz



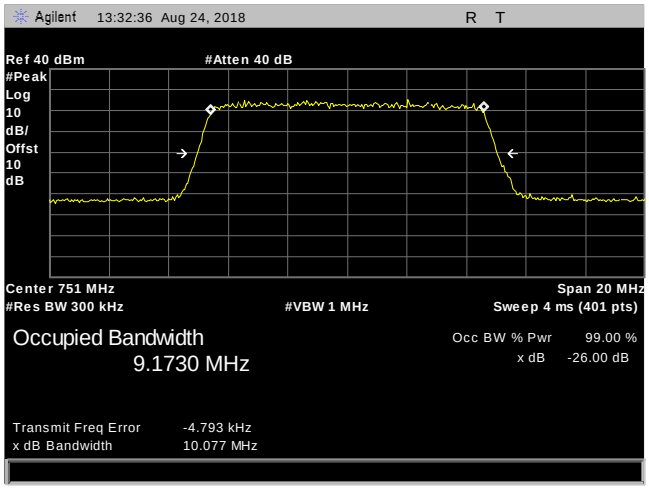
Plot 93. Occupied Bandwidth, LTEUpperC, 5 MHz, High, 746 – 756 MHz



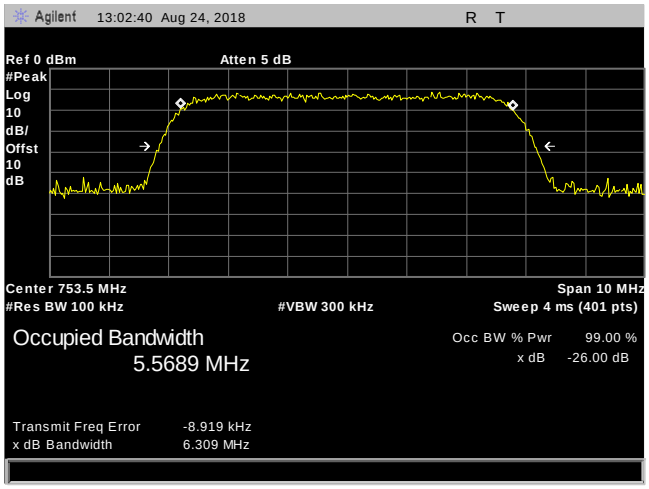
Plot 94. Occupied Bandwidth, LTEUpperC, 5 MHz, Low, 746 – 756 MHz



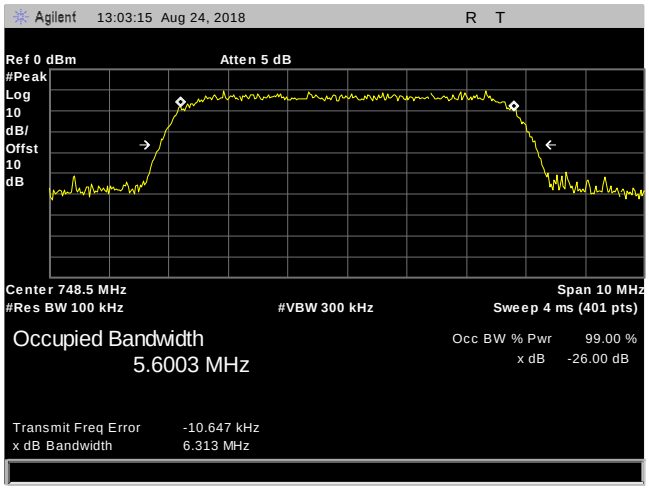
Plot 95. Occupied Bandwidth, LTEUpperC, 5 MHz, Mid, 746 – 756 MHz



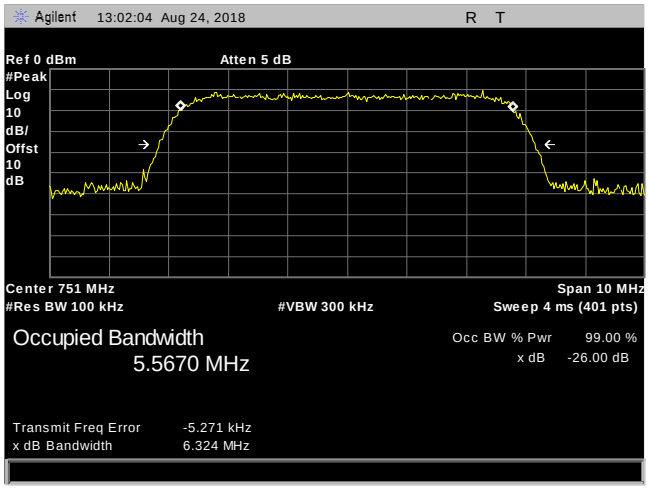
Plot 96. Occupied Bandwidth, LTEUpperC, 10 MHz, Mid, 746 – 756 MHz



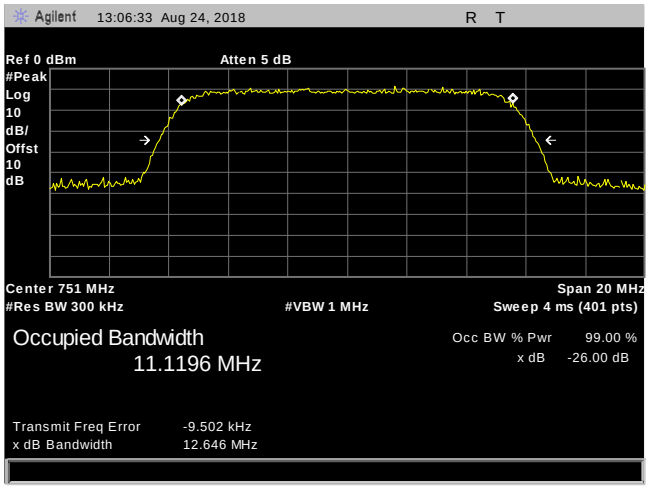
Plot 97. Occupied Bandwidth, LTEUpperC, SG, 5 MHz, High, 746 – 756 MHz



Plot 98. Occupied Bandwidth, LTEUpperC, SG, 5 MHz, Low, 746 – 756 MHz

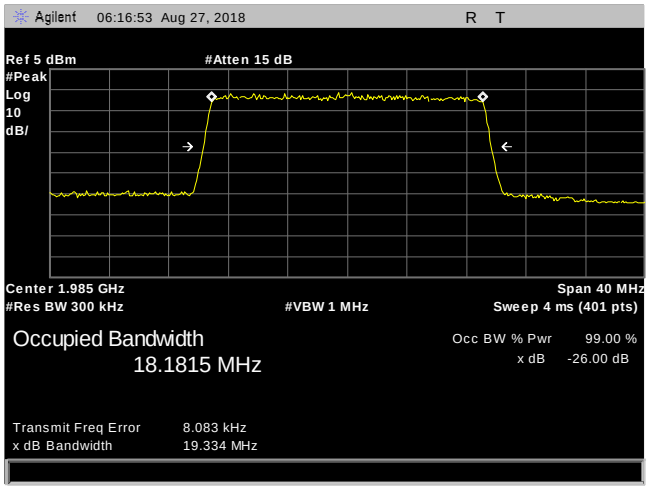


Plot 99. Occupied Bandwidth, LTEUpperC, SG, 5 MHz, Mid, 746 – 756 MHz

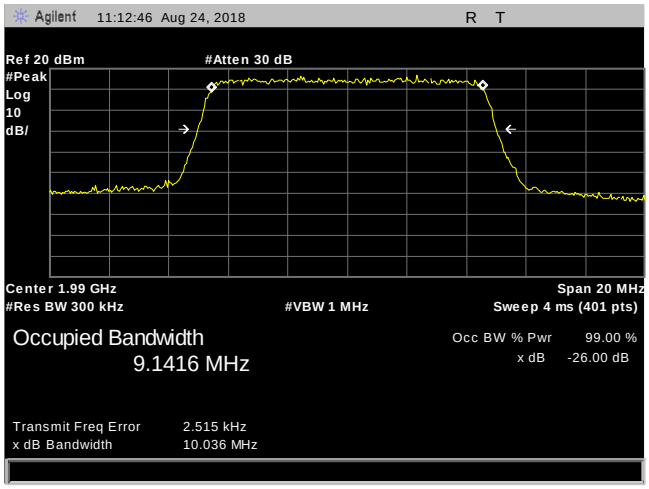


Plot 100. Occupied Bandwidth, LTEUpperC, SG, 10 MHz, Mid, 746 – 756 MHz

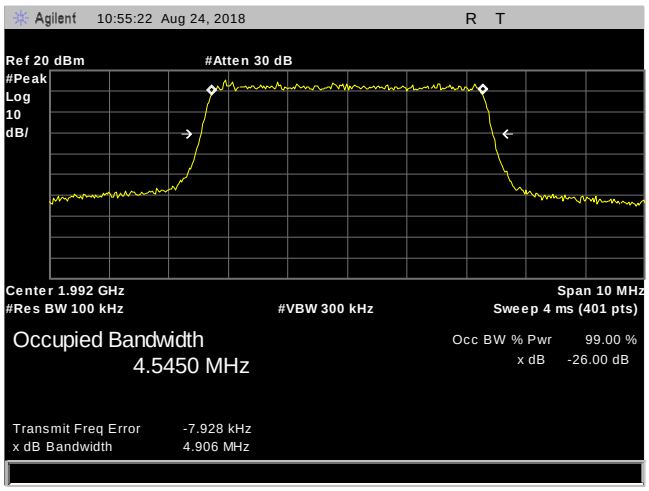
Occupied Bandwidth, Band 25, 1930 – 1995 MHz



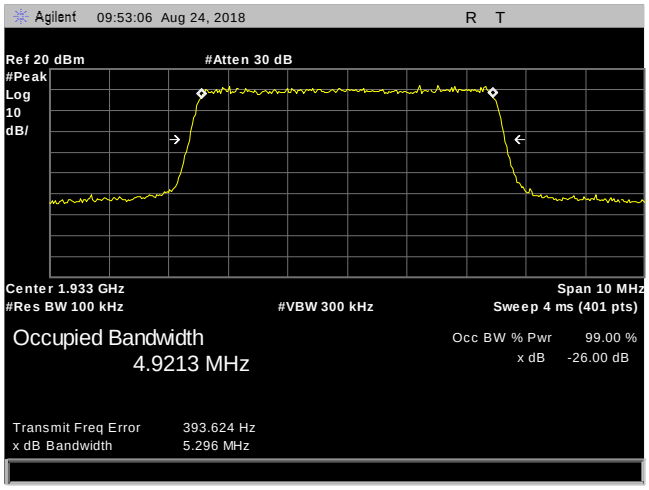
Plot 101. 26 dB Occupied Bandwidth, DL, 20 MHz, High, 1985 MHz



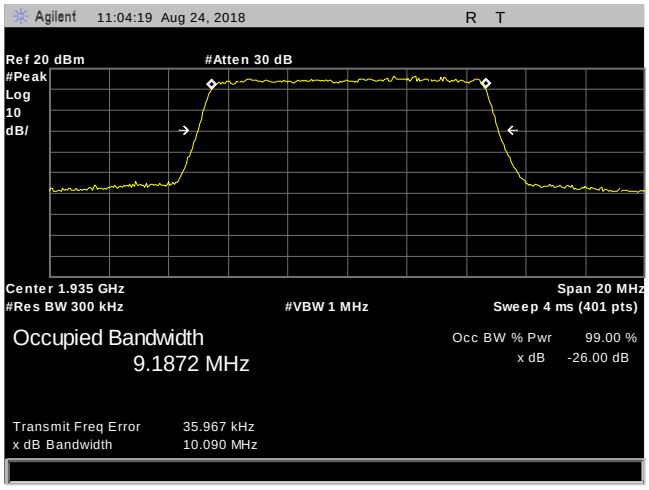
Plot 102. 26 dB Occupied Bandwidth, DL, 10 MHz, High, 1990 MHz



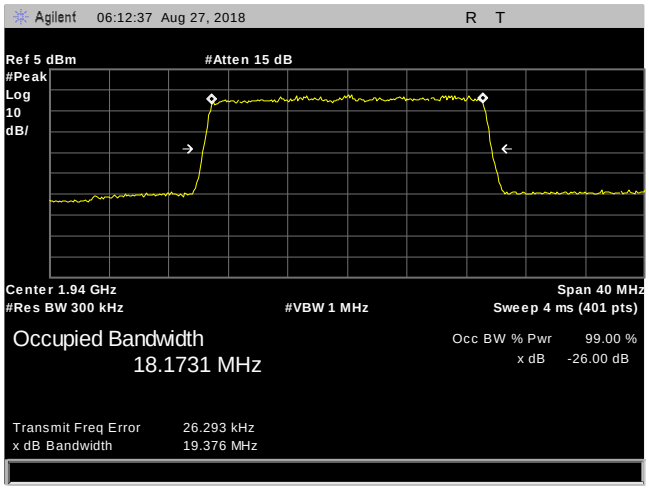
Plot 103. 26 dB Occupied Bandwidth, DL, 5 MHz, High, 1992.5 MHz



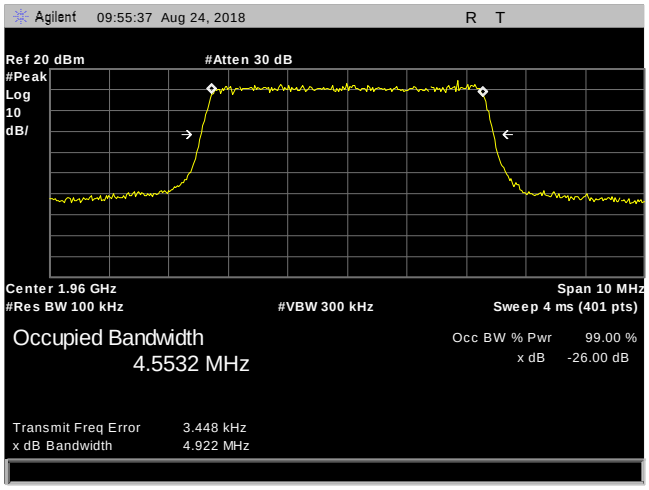
Plot 104. 26 dB Occupied Bandwidth, DL, 5 MHz, Low, 1932.5 MHz



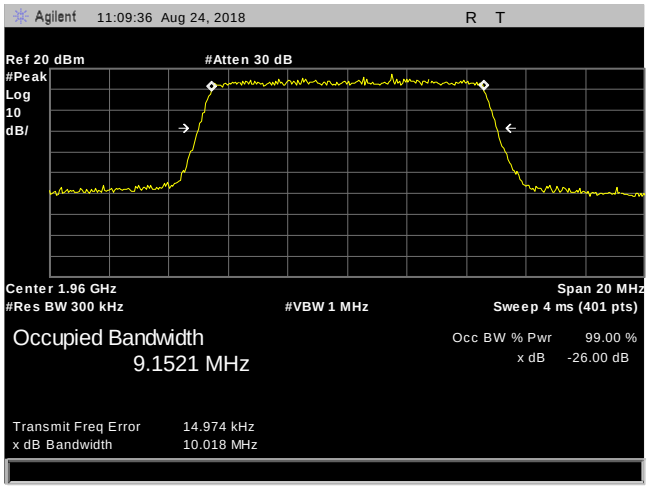
Plot 105. 26 dB Occupied Bandwidth, DL, 10 MHz, Low, 1935 MHz



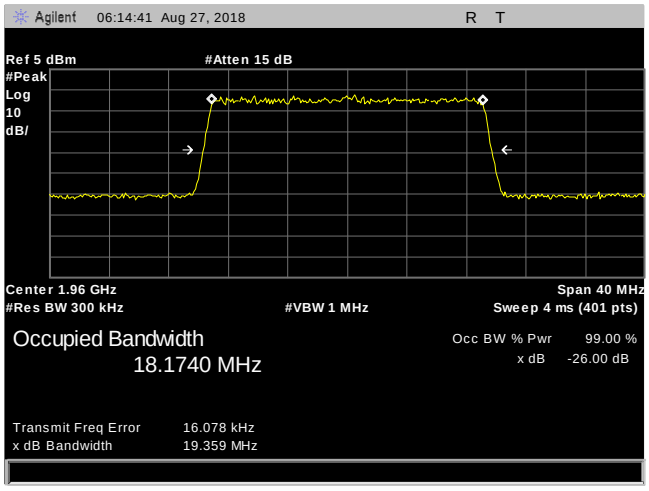
Plot 106. 26 dB Occupied Bandwidth, DL, 20 MHz, Low, 1940 MHz



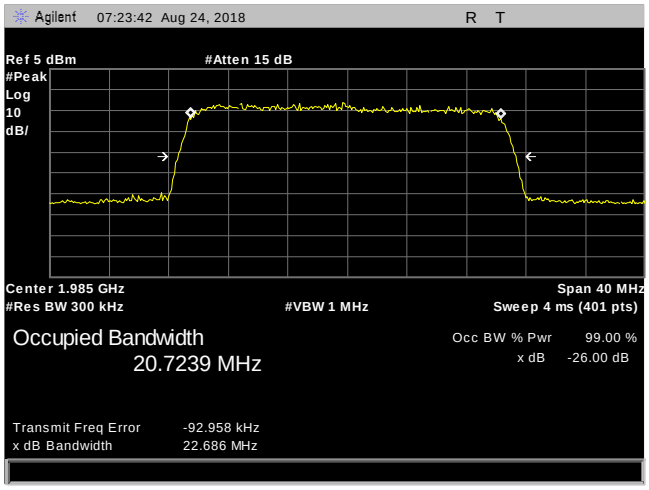
Plot 107. 26 dB Occupied Bandwidth, DL, 5 MHz, Mid, 1960 MHz



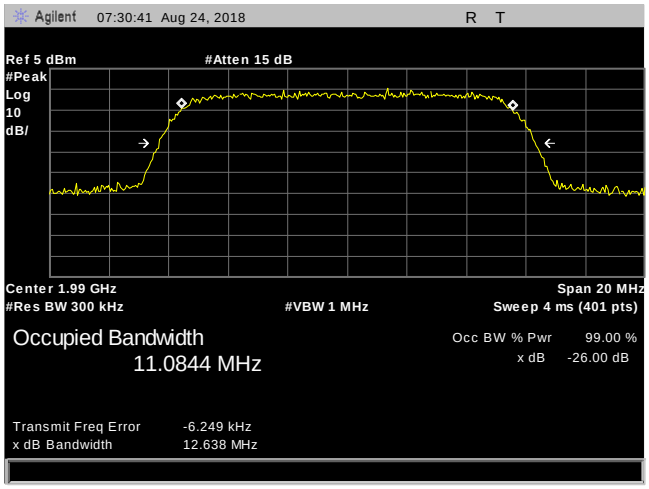
Plot 108. 26 dB Occupied Bandwidth, DL, 10 MHz, Mid, 1960 MHz



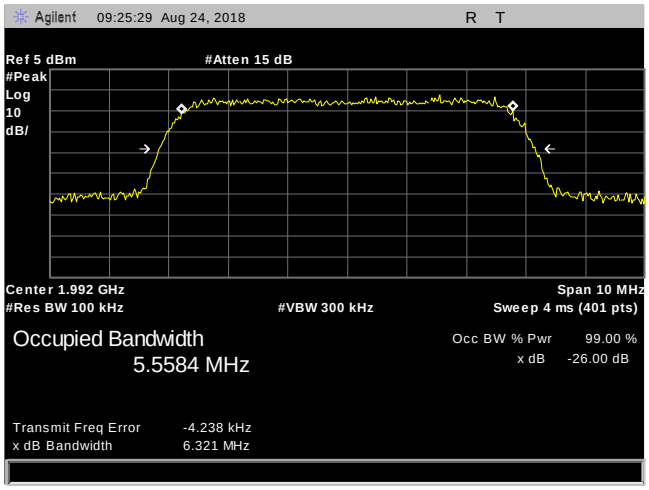
Plot 109. 26 dB Occupied Bandwidth, DL, 20 MHz, Mid, 1960 MHz



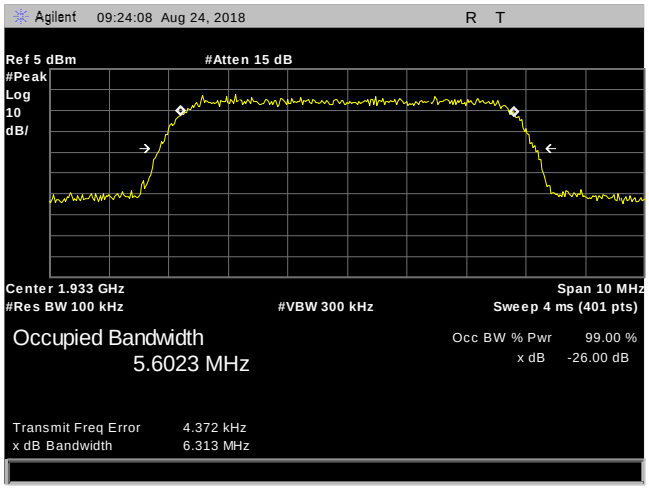
Plot 110. 26 dB Occupied Bandwidth, Input Signal DL, 20 MHz, High, 1985 MHz



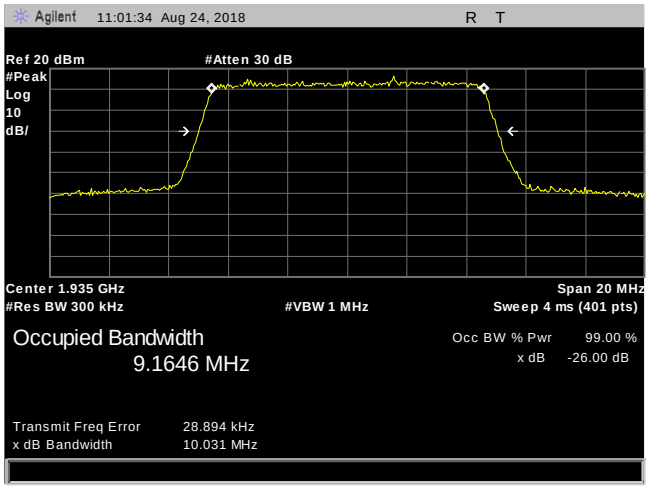
Plot 111. 26 dB Occupied Bandwidth, Input Signal DL, 10 MHz, High, 1990 MHz



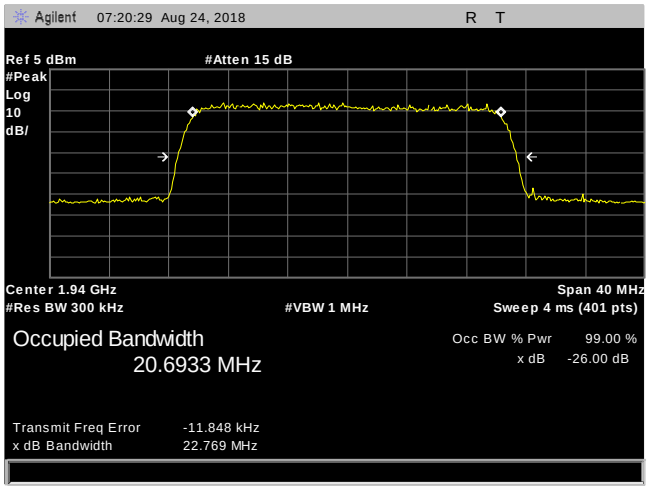
Plot 112. 26 dB Occupied Bandwidth, Input Signal DL, 5 MHz, High, 1992.5 MHz



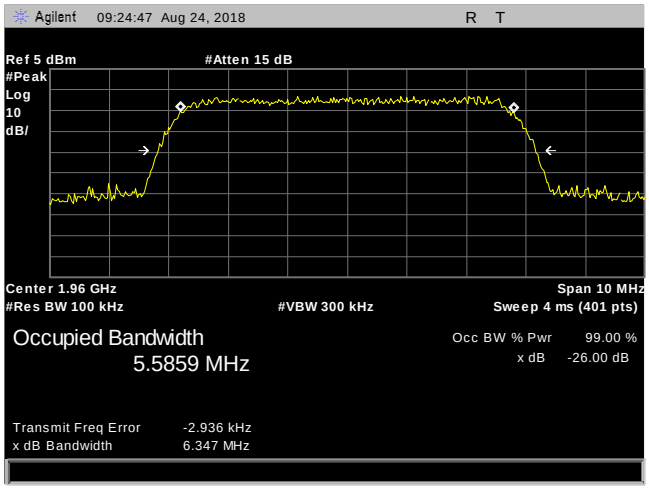
Plot 113. 26 dB Occupied Bandwidth, Input Signal DL, 5 MHz, Low, 1932.5 MHz



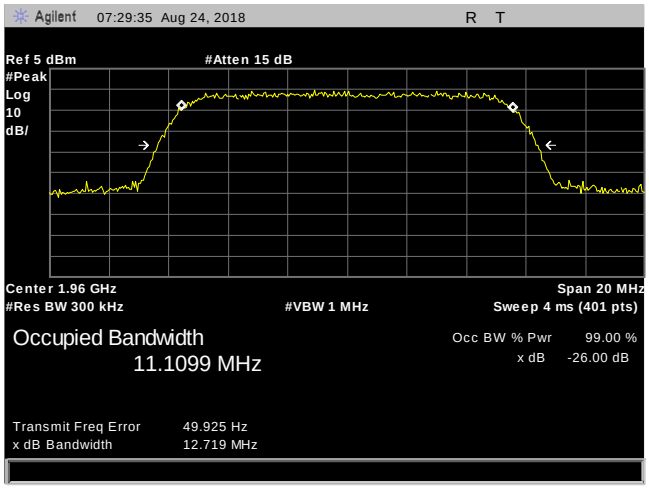
Plot 114. 26 dB Occupied Bandwidth, Input Signal DL, 10 MHz, Low, 1935 MHz



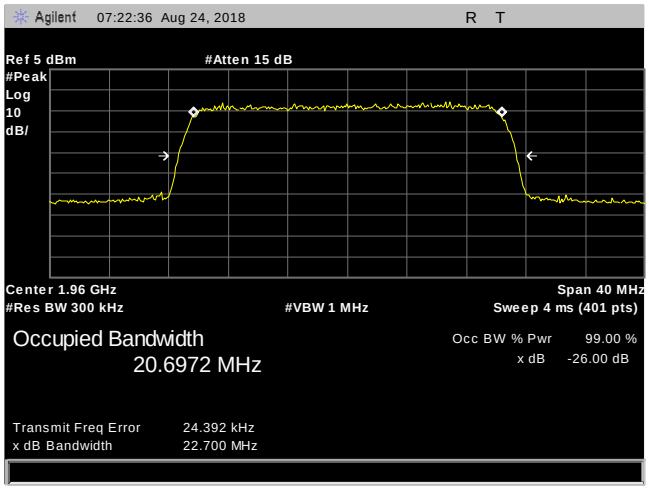
Plot 115. 26 dB Occupied Bandwidth, Input Signal DL, 20 MHz, Low, 1940 MHz



Plot 116. 26 dB Occupied Bandwidth, Input Signal DL, 5 MHz, Mid, 1960 MHz

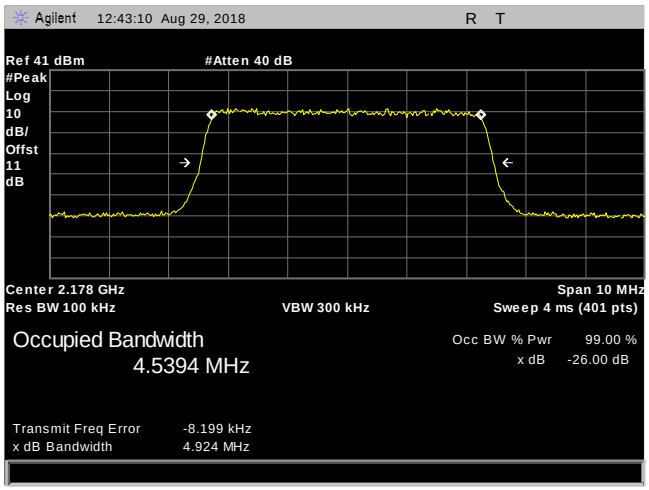


Plot 117. 26 dB Occupied Bandwidth, Input Signal DL, 10 MHz, Mid, 1960 MHz

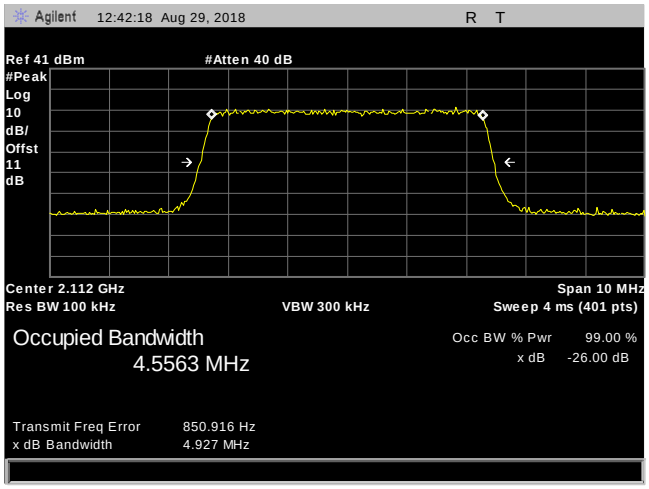


Plot 118. 26 dB Occupied Bandwidth, Input Signal DL, 20 MHz, Mid, 1960 MHz

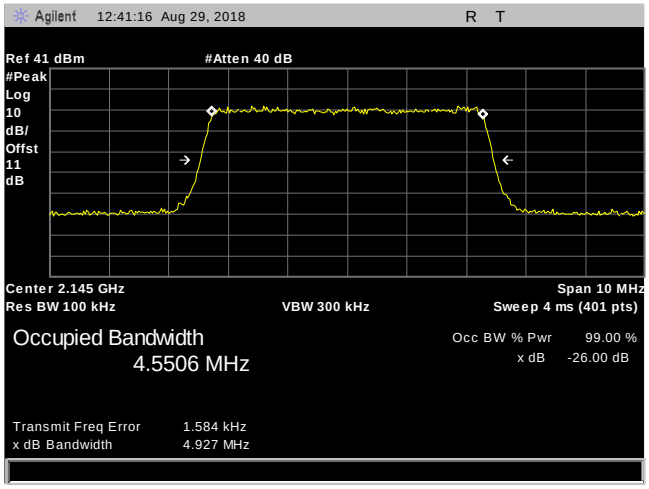
Occupied Bandwidth, Band 66, 2110 – 2180 MHz



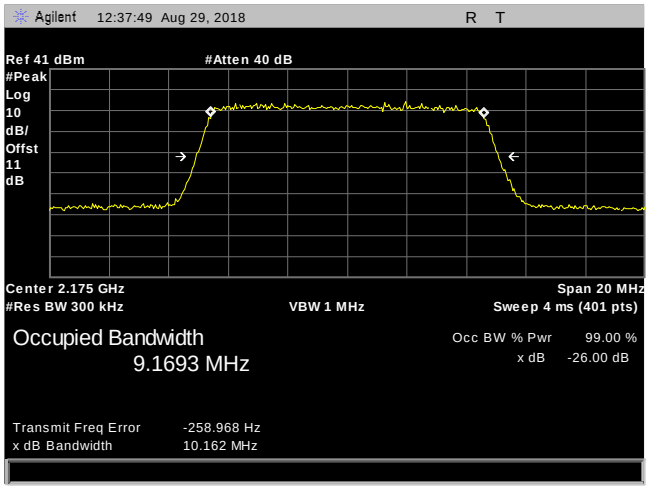
Plot 119. Occupied Bandwidth, AWS1700, 5 MHz, High, 2110 – 2180 MHz



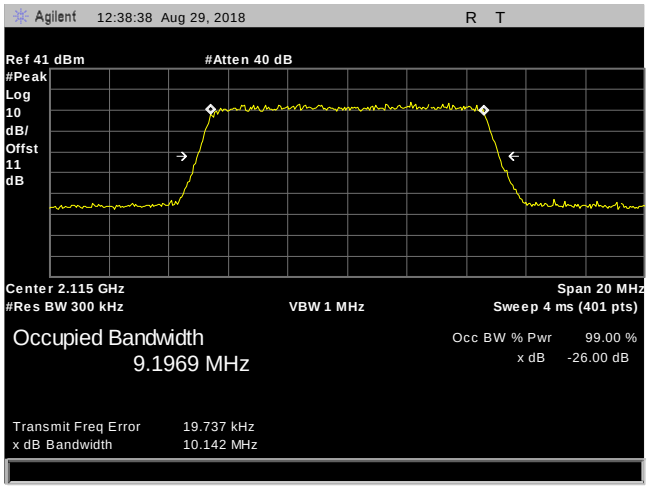
Plot 120. Occupied Bandwidth, AWS1700, 5 MHz, Low, 2110 – 2180 MHz



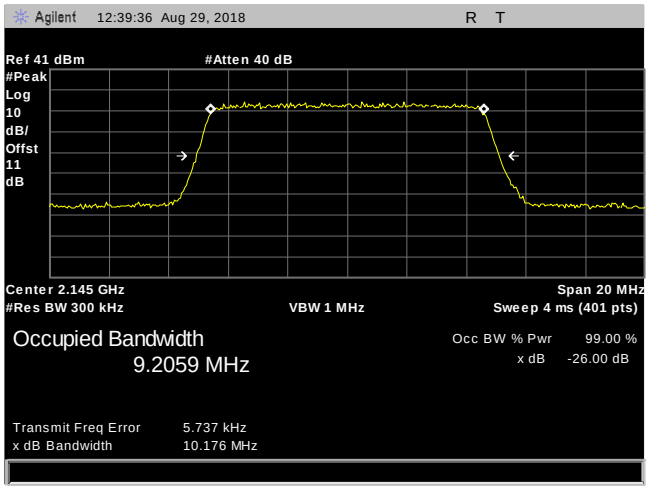
Plot 121. Occupied Bandwidth, AWS1700, 5 MHz, Mid, 2110 – 2180 MHz



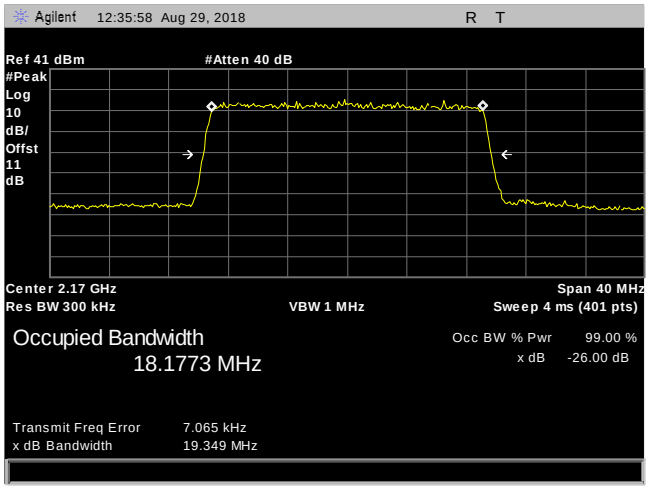
Plot 122. Occupied Bandwidth, AWS1700, 10 MHz, High, 2110 – 2180 MHz



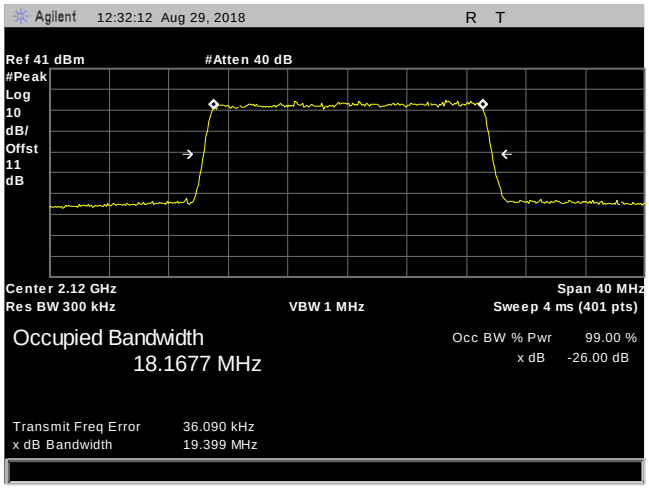
Plot 123. Occupied Bandwidth, AWS1700, 10 MHz, Low, 2110 – 2180 MHz



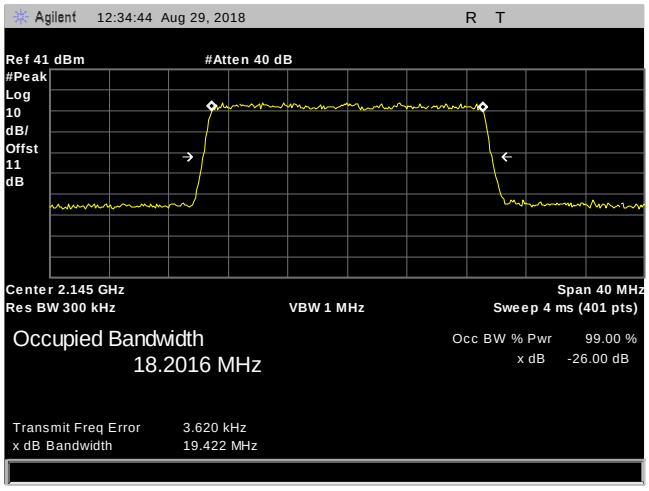
Plot 124. Occupied Bandwidth, AWS1700, 10 MHz, Mid, 2110 – 2180 MHz



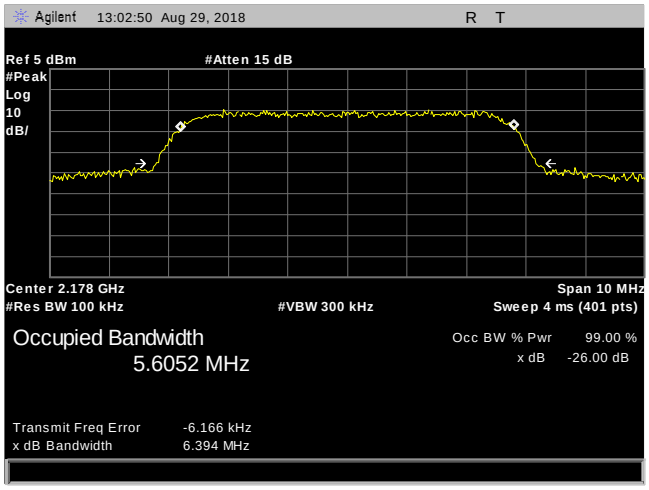
Plot 125. Occupied Bandwidth, AWS1700, 20 MHz, High, 2110 – 2180 MHz



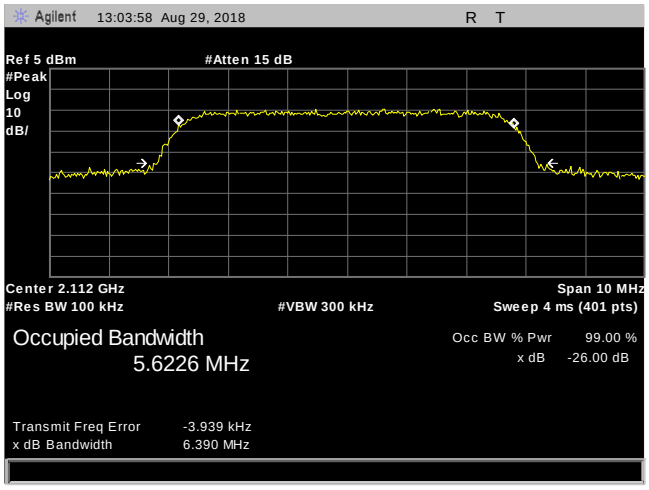
Plot 126. Occupied Bandwidth, AWS1700, 20 MHz, Low, 2110 – 2180 MHz



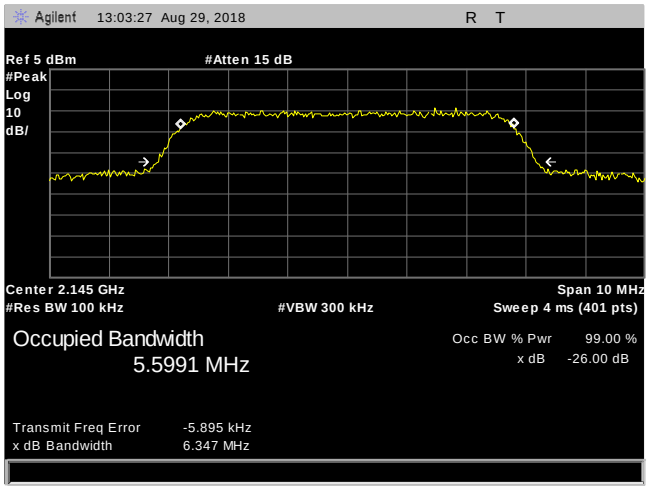
Plot 127. Occupied Bandwidth, AWS1700, 20 MHz, Mid 2110 – 2180 MHz



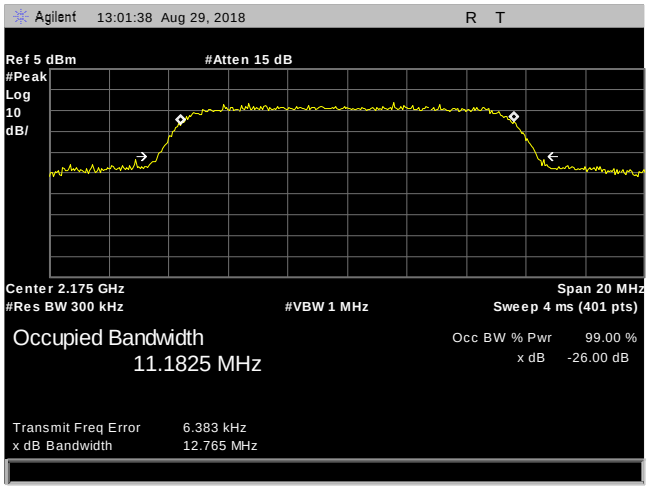
Plot 128. Occupied Bandwidth, AWS1700, SG, 5 MHz, High, 2110 – 2180 MHz



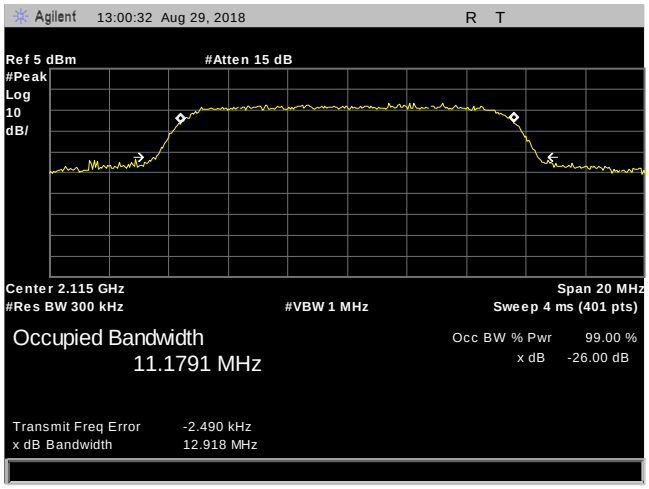
Plot 129. Occupied Bandwidth, AWS1700, SG, 5 MHz, Low, 2110 – 2180 MHz



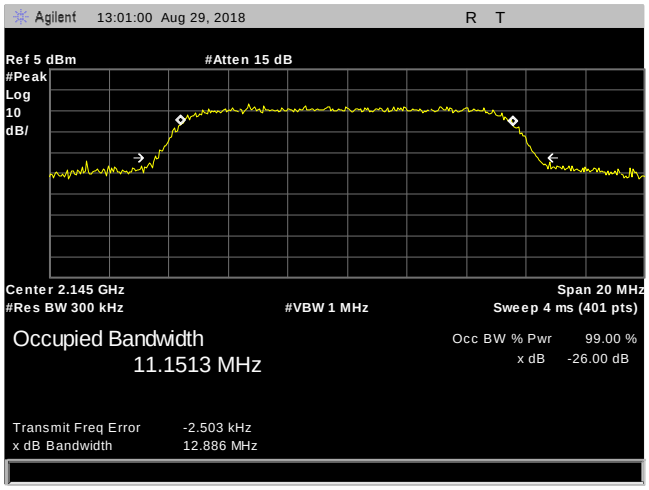
Plot 130. Occupied Bandwidth, AWS1700, SG, 5 MHz, Mid, 2110 – 2180 MHz



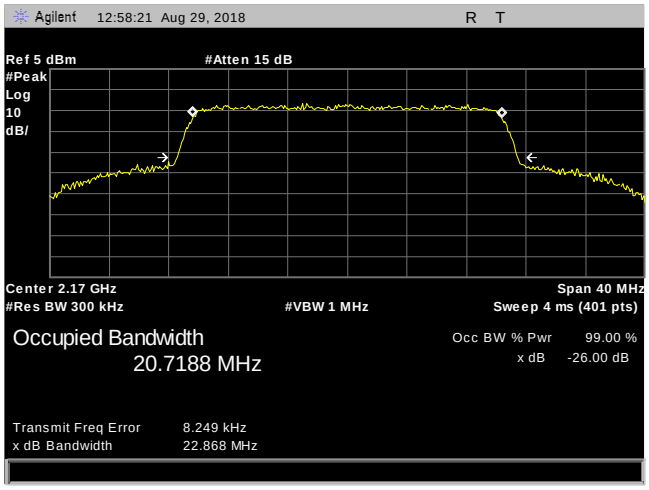
Plot 131. Occupied Bandwidth, AWS1700, SG, 10 MHz, High, 2110 – 2180 MHz



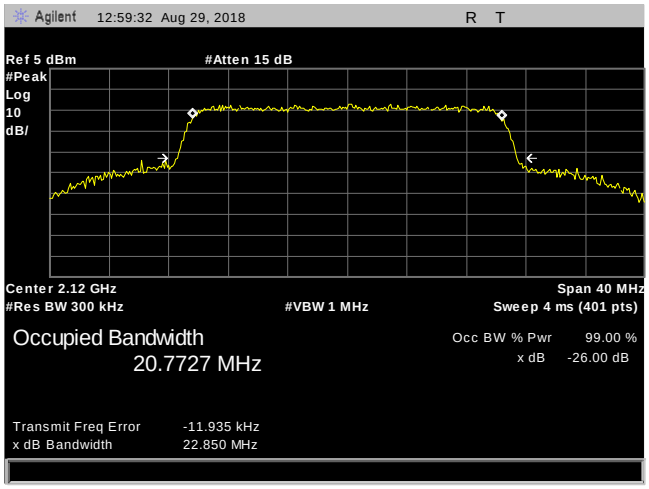
Plot 132. Occupied Bandwidth, AWS1700, SG, 10 MHz, Low, 2110 – 2180 MHz



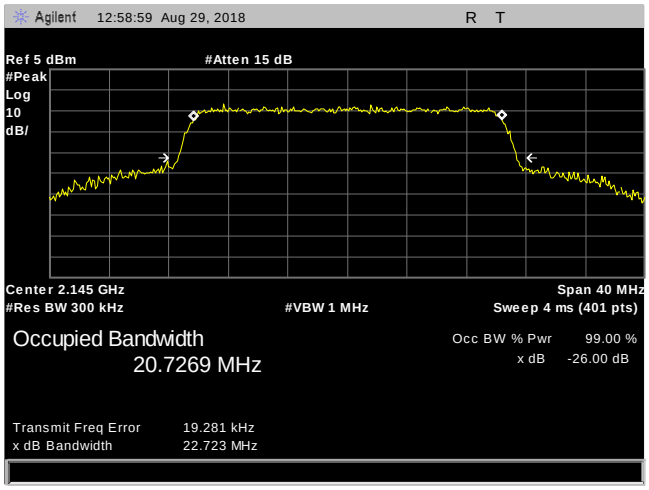
Plot 133. Occupied Bandwidth, AWS1700, SG, 10 MHz, Mid, 2110 – 2180 MHz



Plot 134. Occupied Bandwidth, AWS1700, SG, 20 MHz, High, 2110 – 2180 MHz



Plot 135. Occupied Bandwidth, AWS1700, SG, 20 MHz, Low, 2110 – 2180 MHz



Plot 136. Occupied Bandwidth, AWS1700, SG, 20 MHz, Mid, 2110 – 2180 MHz

Electromagnetic Compatibility Criteria for Intentional Radiators

Intermodulation

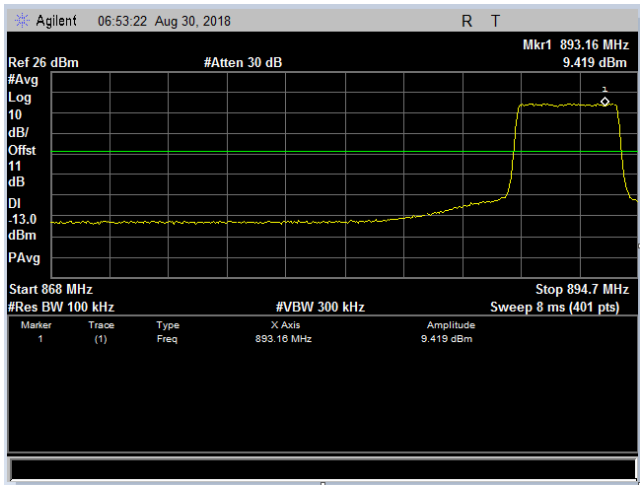
Test Requirement(s): Spurious emissions shall be measured using a single test signal sequentially tuned to the low, middle, and high channels or frequencies within each authorized frequency band of operation. Out-of-band/out-of-block emissions (including intermodulation products) shall be measured under each of the following two stimulus conditions: a) two adjacent test signals sequentially tuned to the lower and upper frequency band/block edges; b) a single test signal, sequentially tuned to the lowest and highest frequencies or channels within the frequency band/block under examination.

Test Procedures: Test was performed using the procedure specified in Section 3.6.2 of the KDB 935210 D05 v01r02.

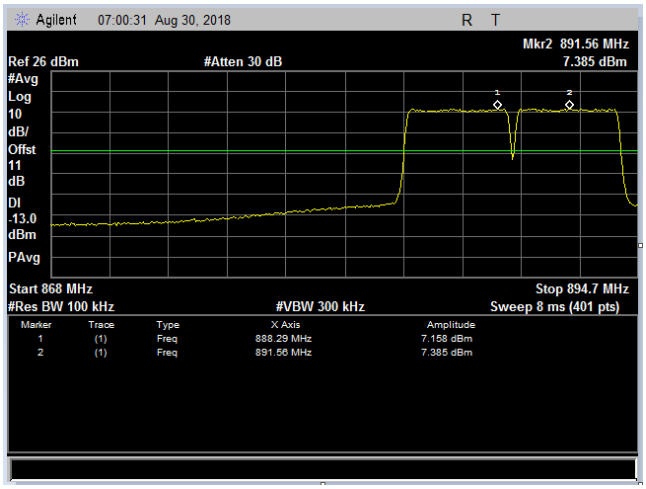
Test Results: Equipment was found compliant with these requirements.

Test Engineer(s): Deepak Giri

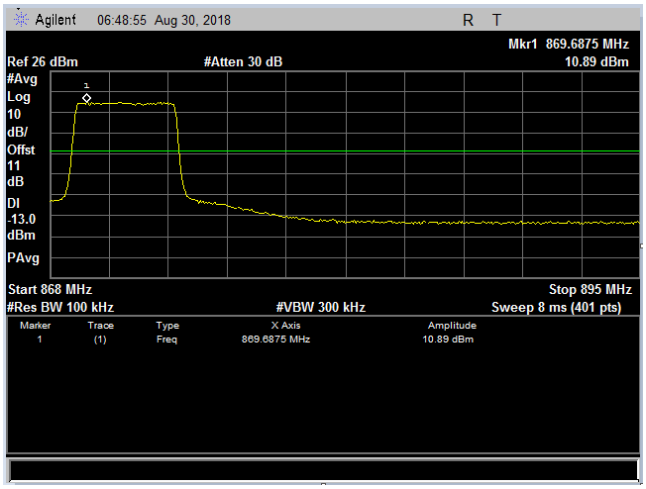
Test Date(s): September 21, 2018



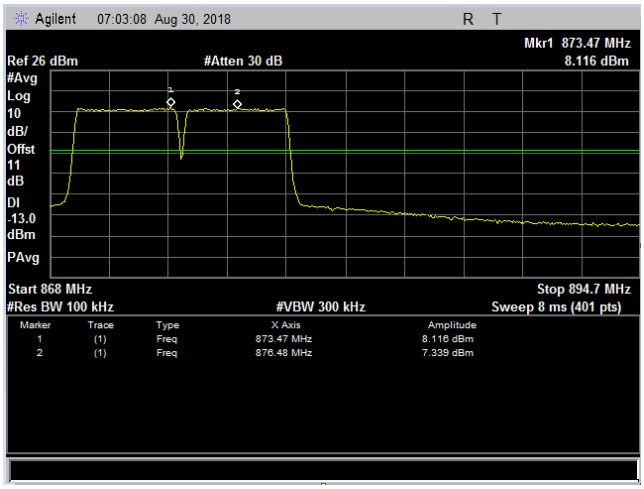
Plot 137. Intermodulation, 5 MHz, High Channel, One Signal, CELL850, Band 5



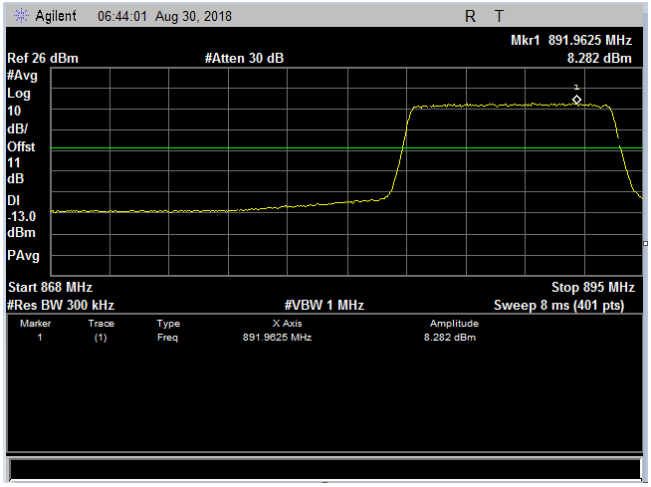
Plot 138. Intermodulation, 5 MHz, High Channel, Two Signal, CELL850, Band 5



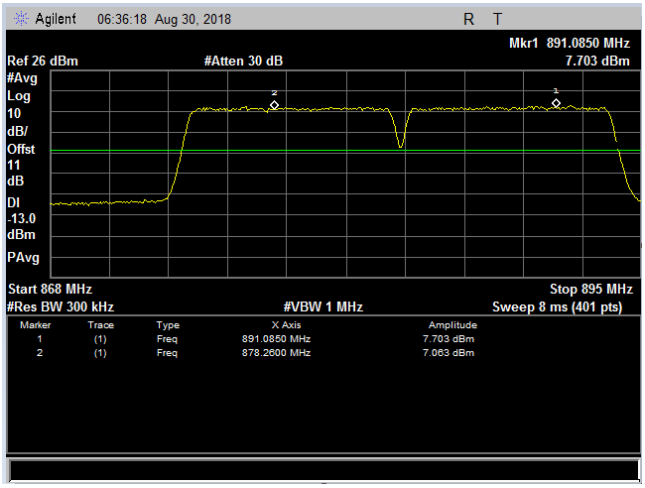
Plot 139. Intermodulation, 5 MHz, Low Channel, One Signal n, CELL850, Band 5



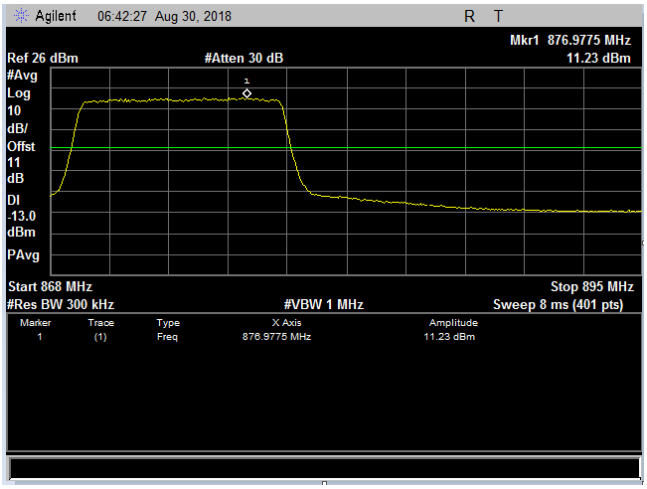
Plot 140. Intermodulation, 5 MHz, Low Channel, Two Signal, CELL850, Band 5



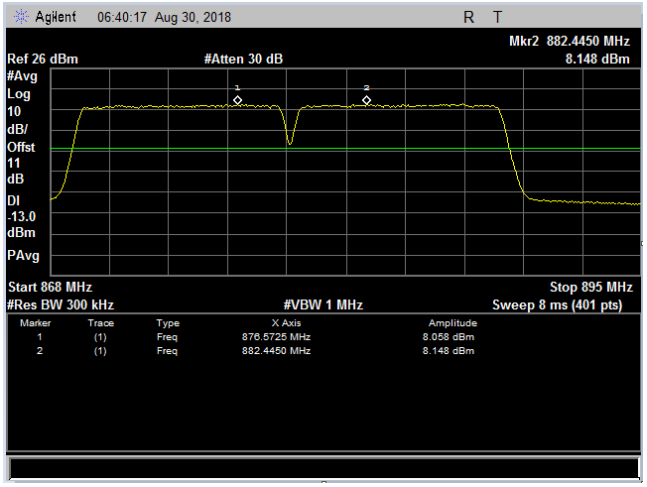
Plot 141. Intermodulation, 10 MHz, High Channel, One Signal n, CELL850, Band 5



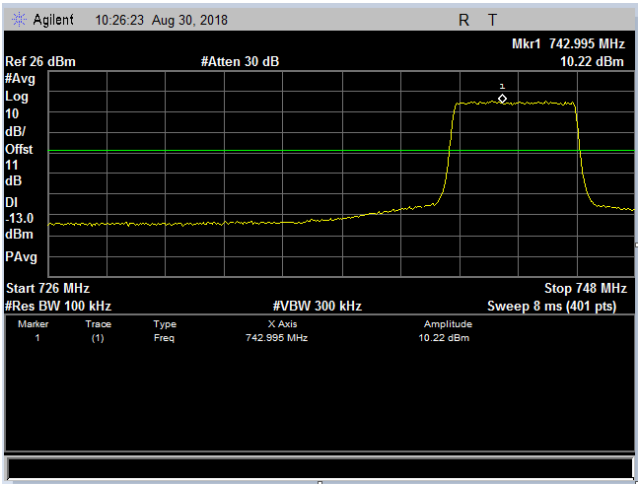
Plot 142. Intermodulation, 10 MHz, High Channel, Two Signal, CELL850, Band 5



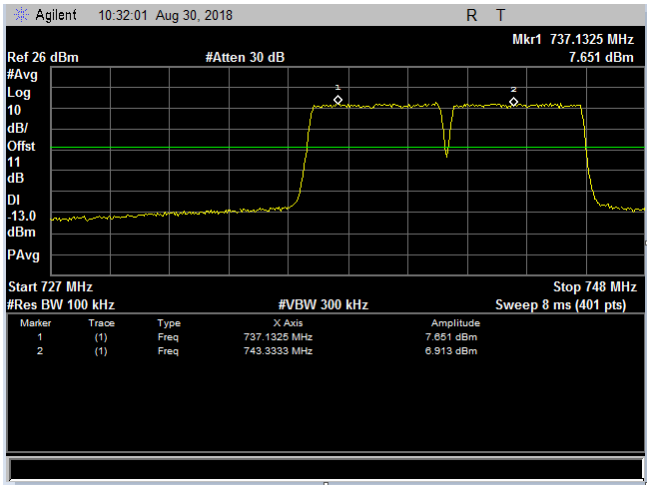
Plot 143. Intermodulation s, 10 MHz, Low Channel, One Signal, CELL850, Band 5



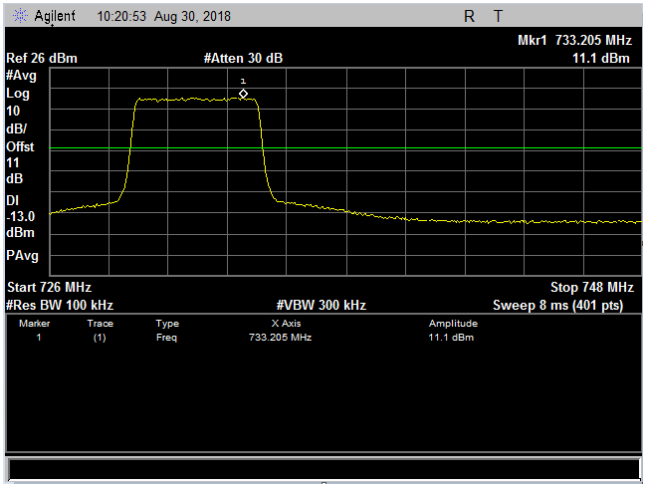
Plot 144. Intermodulation s, 10 MHz, Low Channel, Two Signal, CELL850, Band 5



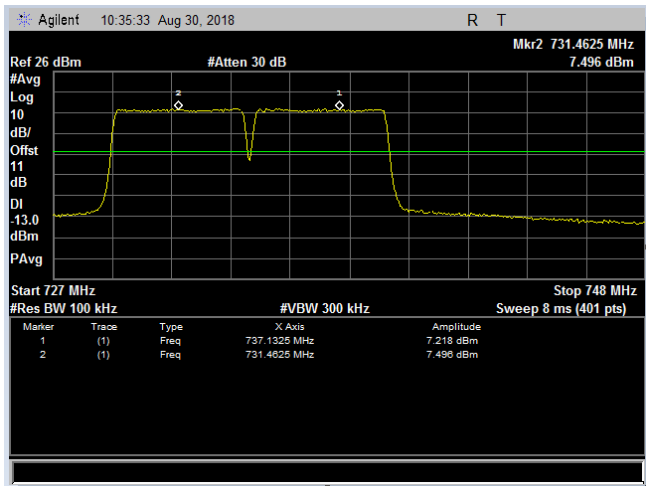
Plot 145. Intermodulation, 5 MHz, High Channel, One Signal, USA700_LTE700, Band 12



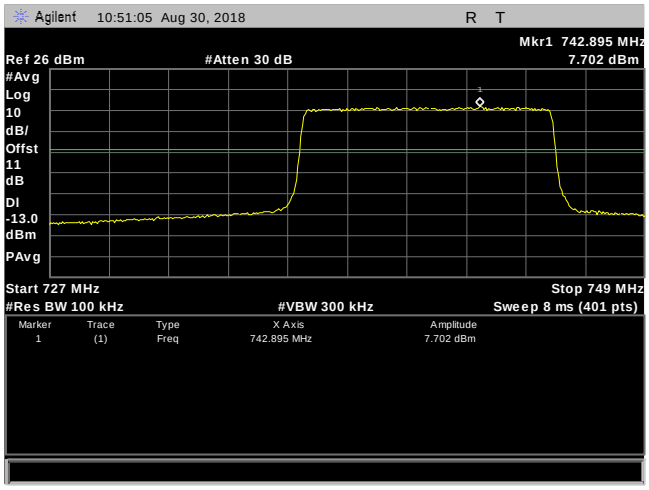
Plot 146. Intermodulation, 5 MHz, High Channel, Two Signal, USA700, Band 12



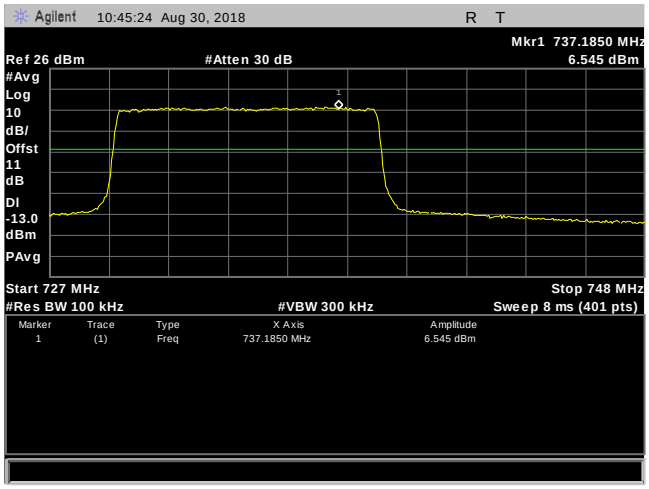
Plot 147. Intermodulation, 5 MHz, Low Channel, One Signal, USA700_LTE700, Band 12



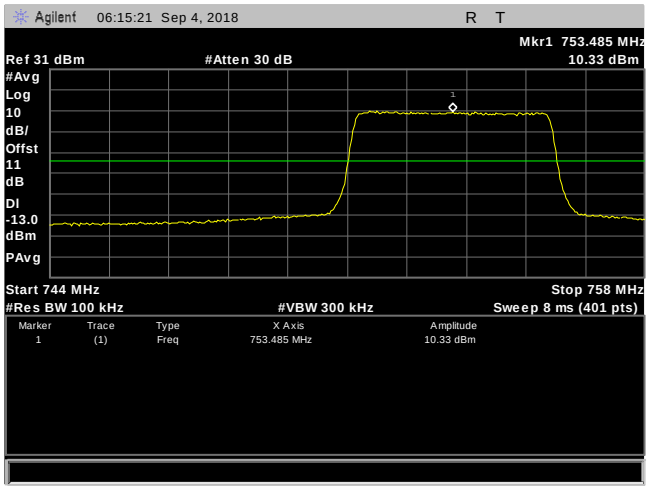
Plot 148. Intermodulation, 5 MHz, Low Channel, Two Signal, USA700_LTE700, Band 12



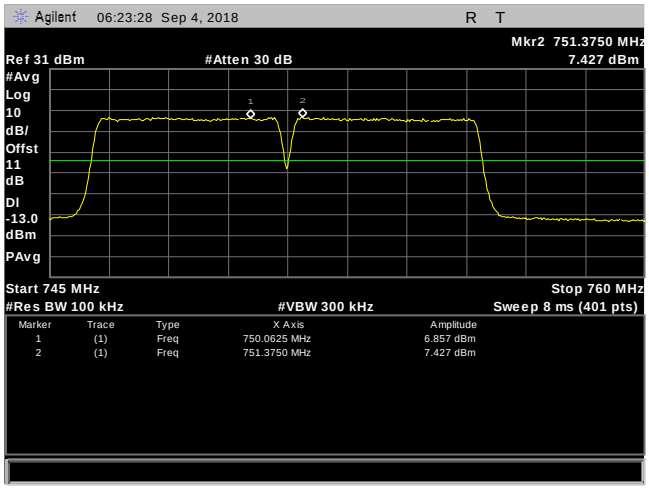
Plot 149. Intermodulation, 10 MHz, High Channel, One Signal, USA700_LTE700, Band 12



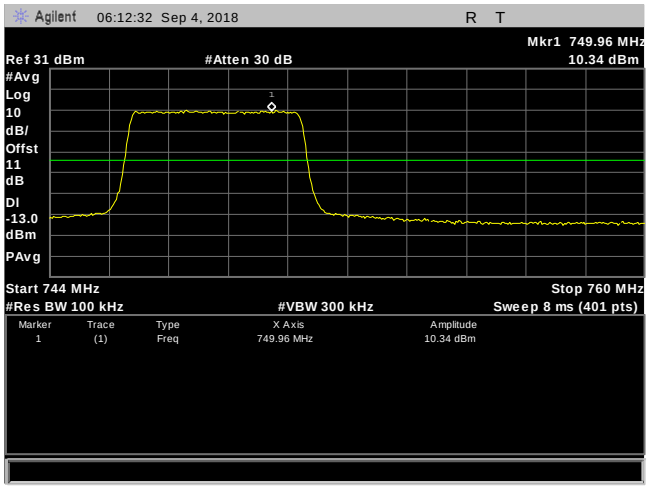
Plot 150. Intermodulation, 10 MHz, High Channel, one Signal, USA700_LTE700, Band 12



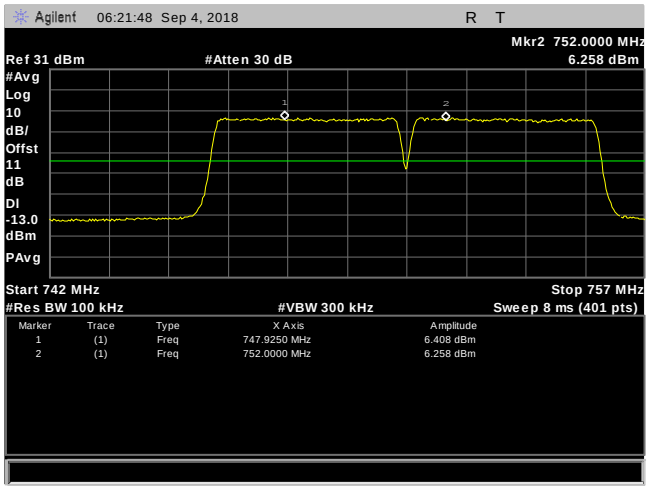
Plot 151. Intermodulation, 5 MHz, High Channel, One Signal, USA 700-Upper 700C, Band 13



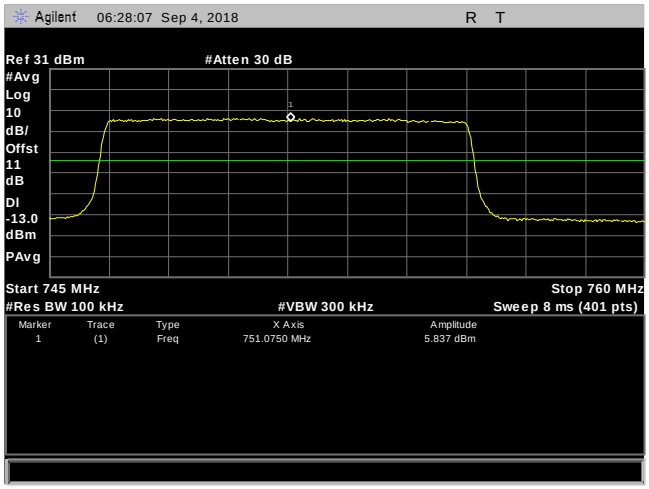
Plot 152. Intermodulation, 5 MHz, High Channel, Two Signal, USA 700 – Upper 700 C, Band 13



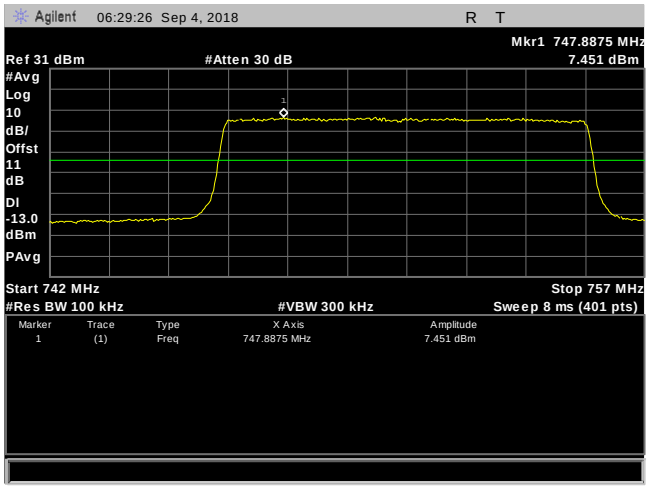
Plot 153. Intermodulation, 5 MHz, Low Channel, One Signal, USA700 – Upper 700 C, band 13



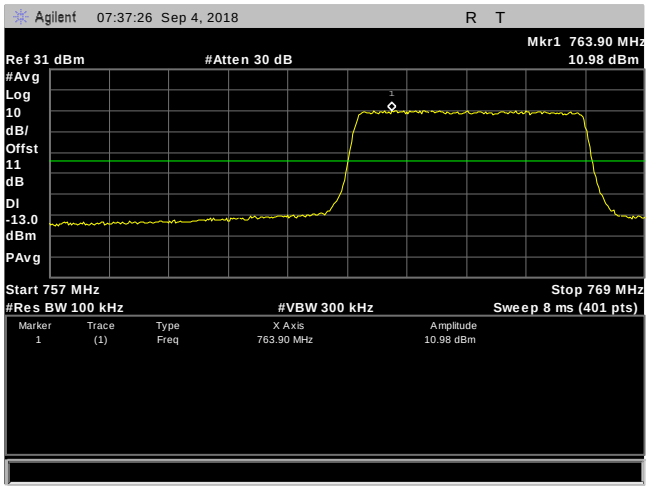
Plot 154. Intermodulation, 5 MHz, Low Channel, Two Signal, USA 700 – Upper C, Band 13



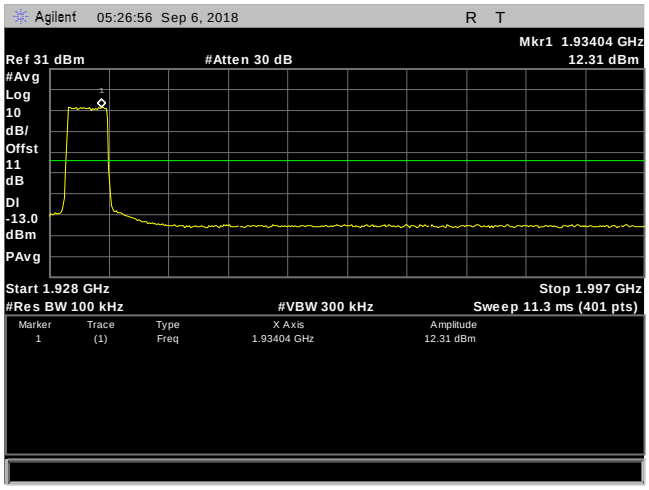
Plot 155. Intermodulation, 10 MHz, High Channel, One Signal, USA 700 – Upper 700 C, Band 13



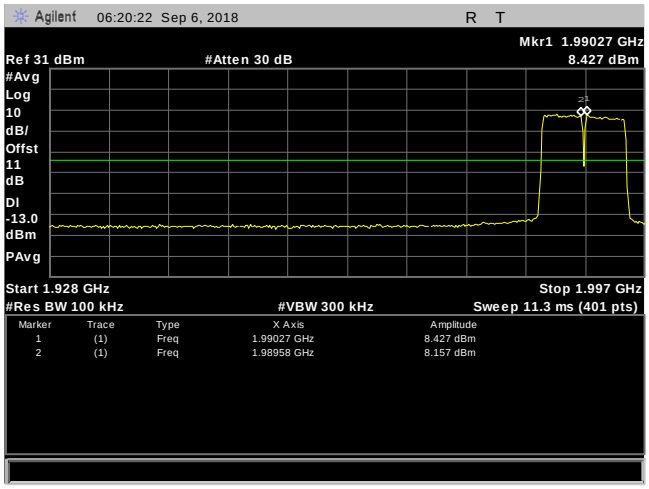
Plot 156. Intermodulation, 10 MHz, High Channel, One Signal, USA 700 – Upper 700 C, Band 13



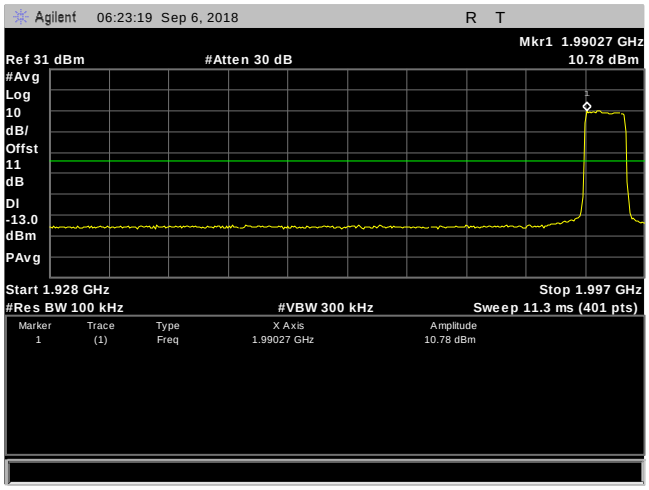
Plot 157. Intermodulation, 10 MHz, Low Channel, One Signal, USA 700 – Upper 700 C, Band 13



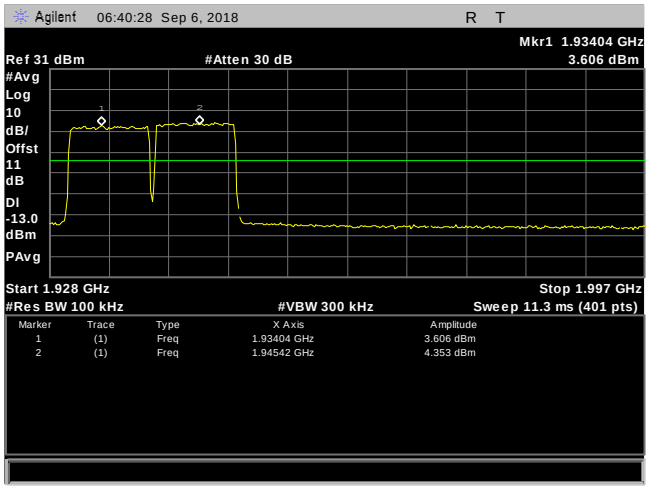
Plot 158. Intermodulation, 5 MHz Channel, Lower Edge one signal, PCS 1900



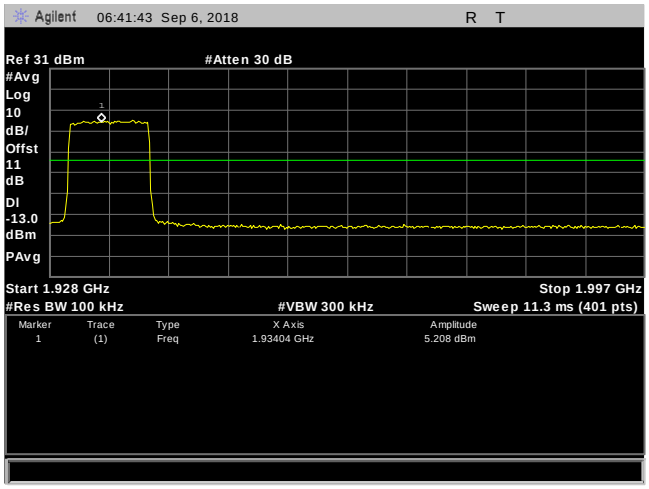
Plot 159. Intermodulation, 5 MHz, Channel Lower Edge, two signal, PCS 1900



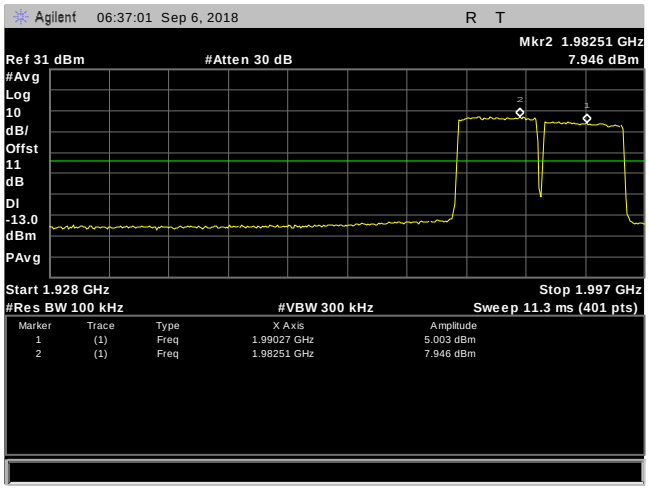
Plot 160. Intermodulation, 5 MHz, Channel Upper Edge one signal, PCS 1900



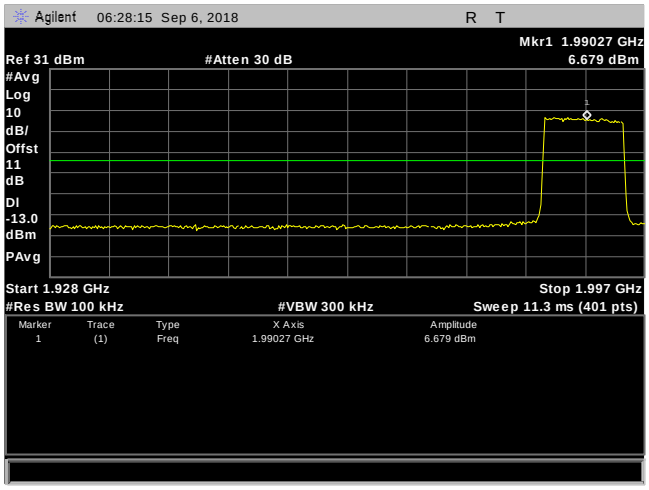
Plot 161. Intermodulation, 10 MHz, Channel Lower Edge, two signal, PCS 1900



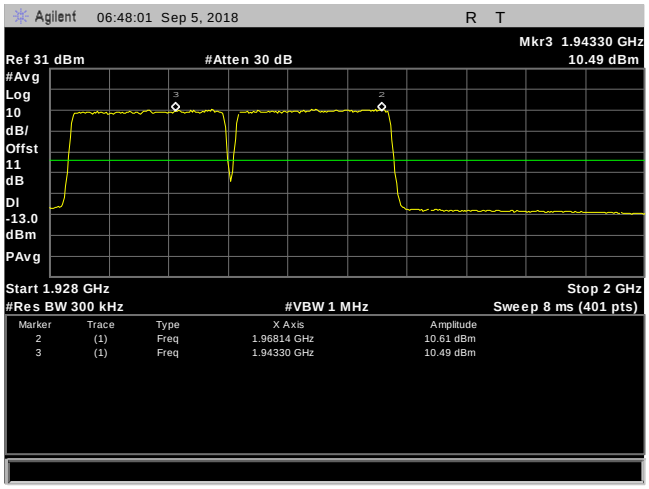
Plot 162. Intermodulation, 10 MHz, Channel Lower Edge, one, PCS 1900



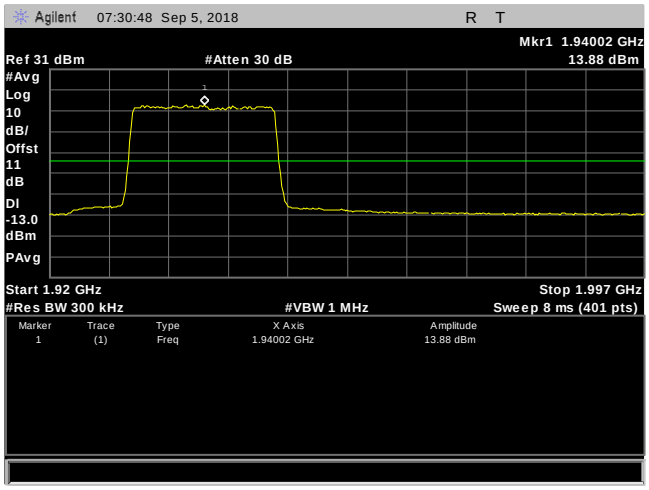
Plot 163. Intermodulation, 10 MHz, Channel Upper Edge, two signal, PCS 1900



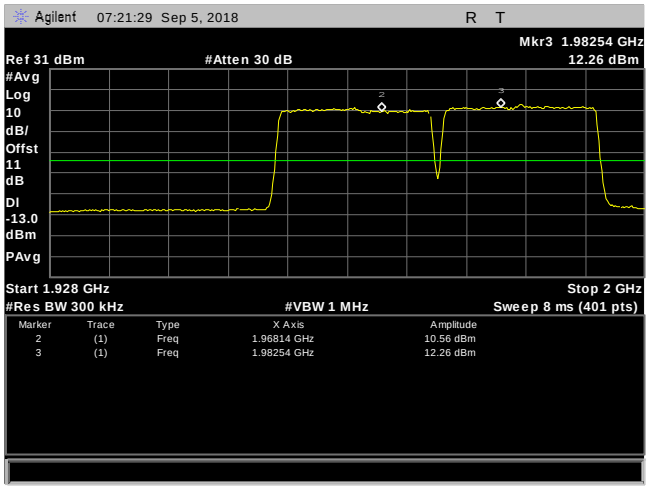
Plot 164. Intermodulation 10 MHz, Channel Upper Edge, one signaln, PCS 1900



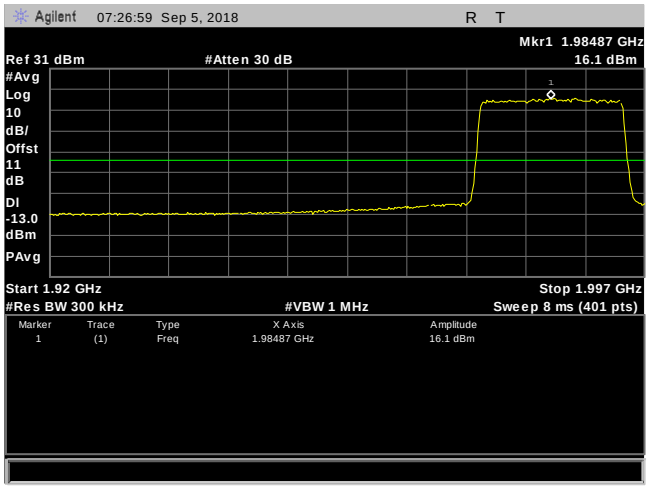
Plot 165. Intermodulation, 20 MHz, Channel Lower Edge, two signal, PCS 1900



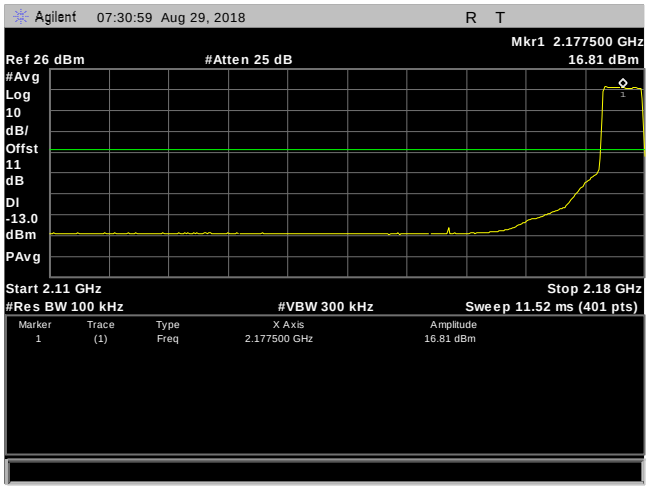
Plot 166. Intermodulation, 20 MHz, Channel Lower Edge, one signal PCS 1900



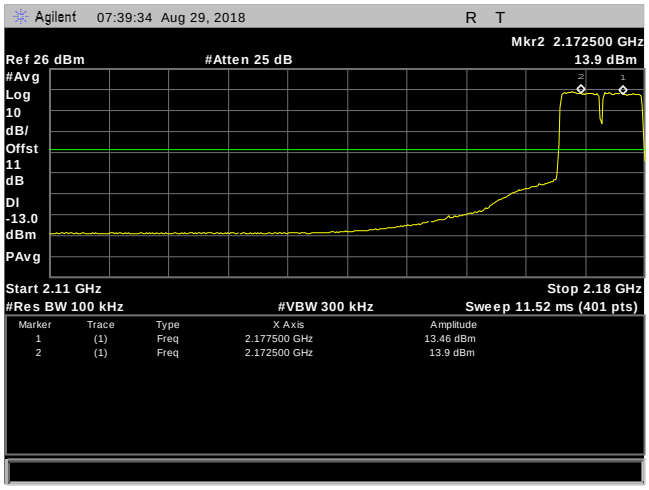
Plot 167. Intermodulation, 20 MHz, Channel Upper Edge, two signal, PCS 1900



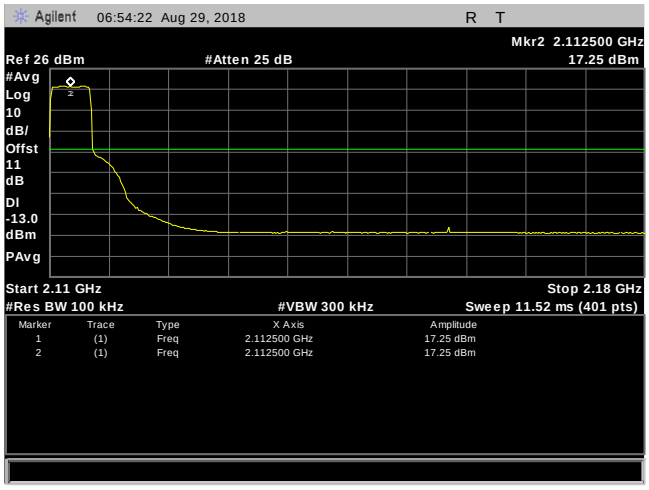
Plot 168. Intermodulation, 20 MHz, Channel Upper Edge, one signal PCS 1900



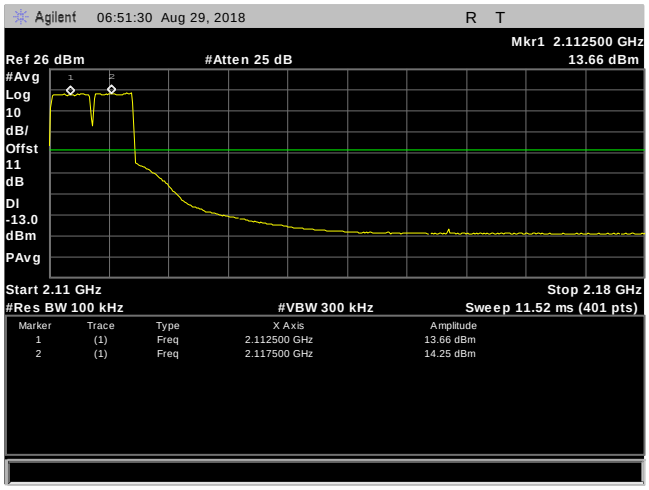
Plot 169. Intermodulation, 5 MHz, High Channel, One Signal AWS



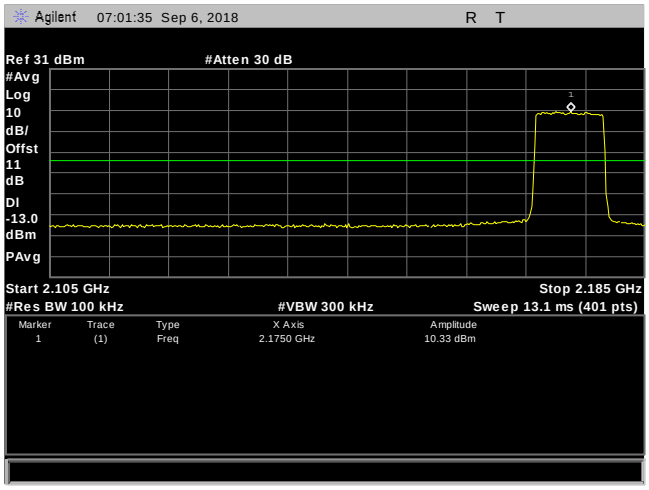
Plot 170. Intermodulation, 5 MHz, High Channel, Two Signal AWS



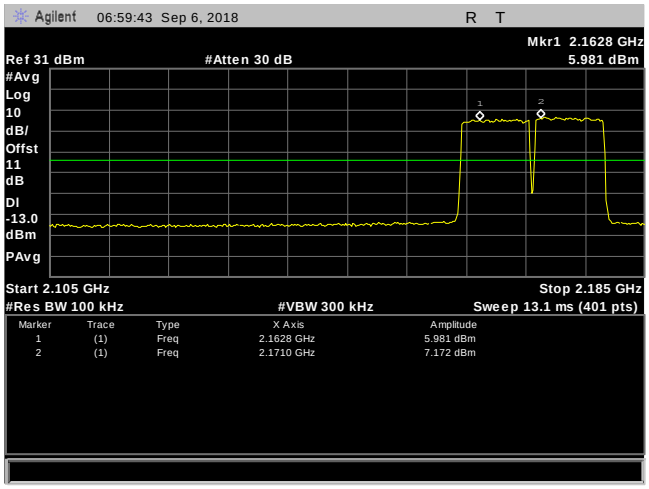
Plot 171. Intermodulation, 5 MHz, Low Channel, One Signal AWS



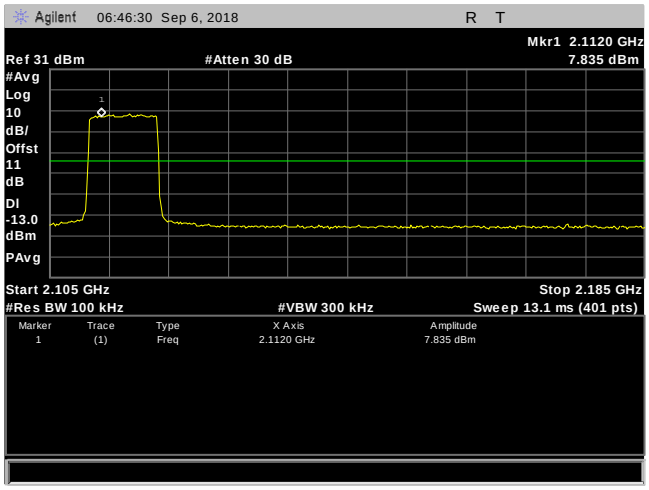
Plot 172. Intermodulation, 5 MHz, Low Channel, Two Signal AWS



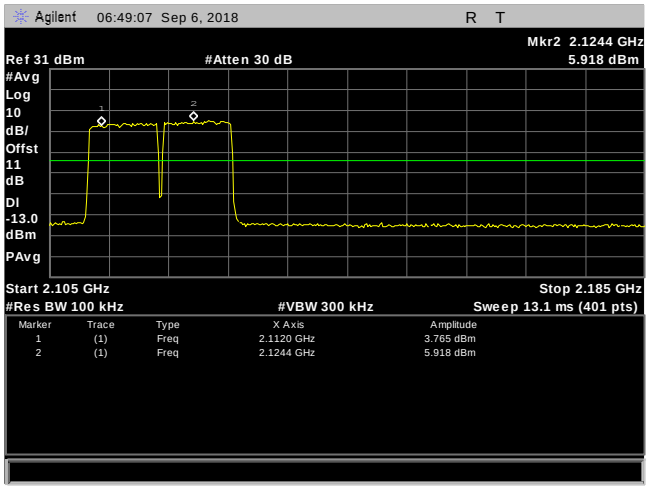
Plot 173. Intermodulation, 10 MHz, High Channel, One Signal AWS



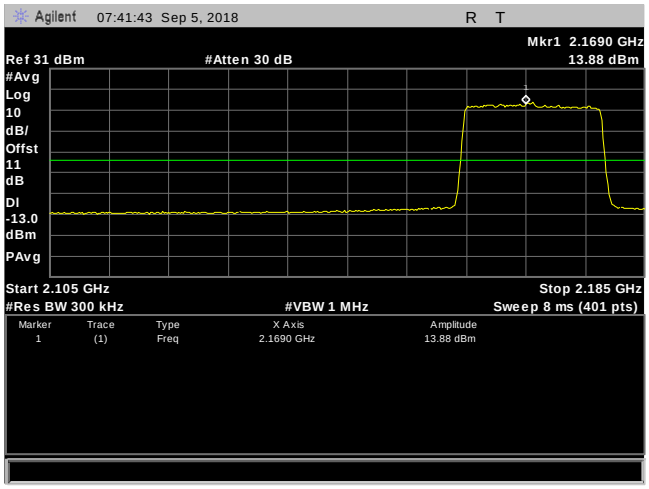
Plot 174. Intermodulation, 10 MHz, High Channel, Two Signal AWS



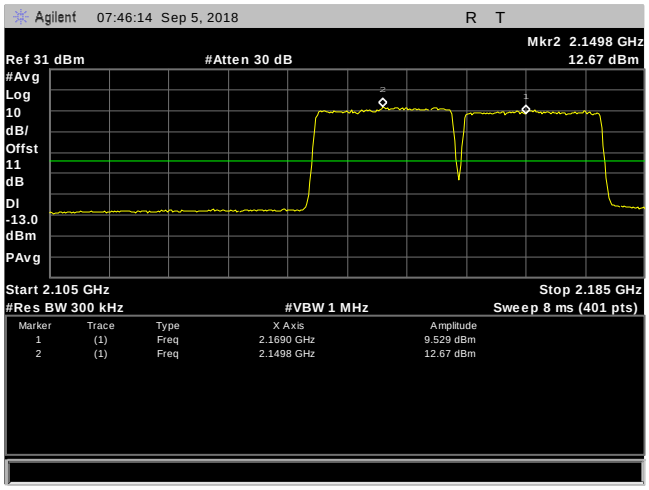
Plot 175. Intermodulation, 10 MHz, Low Channel, One Signal AWS



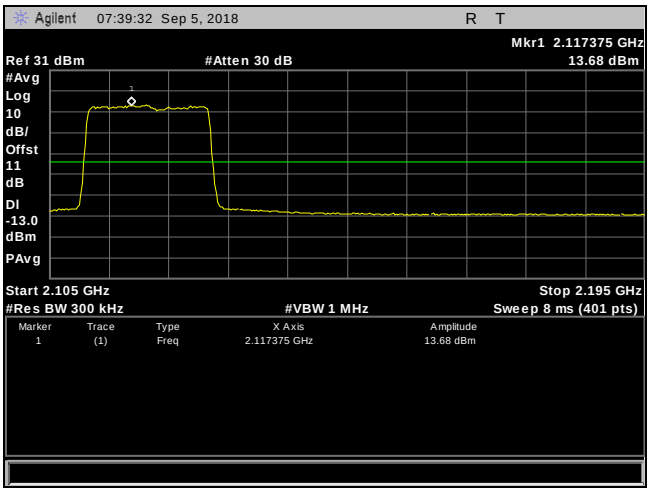
Plot 176. Intermodulation, 10 MHz, Low Channel, Two Signal, AWS



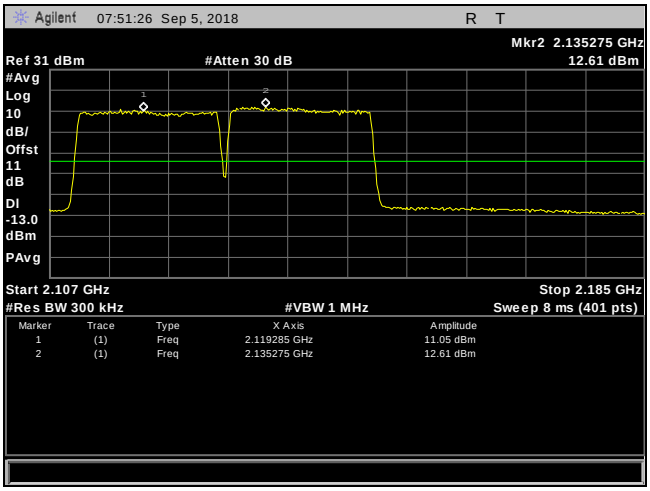
Plot 177. Intermodulation, 20 MHz, High Channel, One Signal AWS



Plot 178. Intermodulation, 20 MHz, High Channel, Two Signal AWS



Plot 179. Intermodulation, 20 MHz, Low Channel, One Signal AWS



Plot 180. Intermodulation, 20 MHz, Low Channel, Two Signal AWS

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 2.1053 Radiated Spurious Emissions

Test Requirement(s): **§ 2.1053 Measurements required: Field strength of spurious radiation.**

§ 2.1053 (a) Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of § 2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from half-wave dipole antennas.

§ 2.1053 (b): The measurements specified in paragraph (a) of this section shall be made for the following equipment:

(1) Those in which the spurious emissions are required to be 60 dB or more below the mean power of the transmitter.

(2) All equipment operating on frequencies higher than 25 MHz.

(3) All equipment where the antenna is an integral part of, and attached directly to the transmitter.

(4) Other types of equipment as required, when deemed necessary by the Commission.

Test Procedures: The EUT was tested according to field strength method of ANSI C63.26 5.5.4. The spectrum analyzer was used and configured in the following manner:

(a) Frequency Range = Lowest Generated – 10th Harmonic
(b) RBW = 1MHz
(c) VBW 1-3 x the RBW
(d) Detector = Average

Radiated emission measurements were performed inside a 3 meter chamber that satisfies the site requirements of ANSI C63.4-2014. The EUT was place on an rf transparent 80 cm table for measurements below 1GHz and an rf transparent 1.5 meter table for measurements above 1GHz. The EUT's RF ports were terminated to 50ohm load. The EUT was tested using all modulations and at the low, mid, and high channels. The EUT was rotated about 360^0 and the receiving antenna scanned from 1-4m in order to capture the maximum emission. The plots are corrected for cable loss, antenna correction factor, and distance correction. The field strength was mathematically corrected to an E.I.R.P.

Emissions below 30MHz and above 18GHz were more than 20dB below the limit. The worse-case configurations are reported.

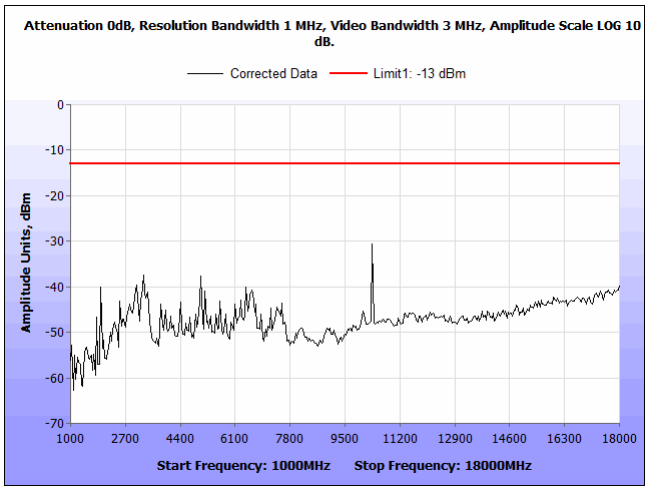
Test Results: The EUT was found compliant with the requirements of this section.

Measurements were made in each configuration. Data is presented for the worse case configuration.

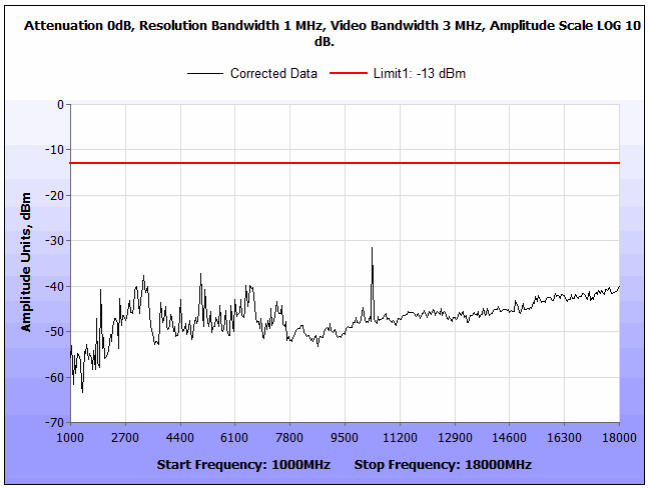
Test Engineer: Bradley Jones

Test Date(s): September 26, 2018

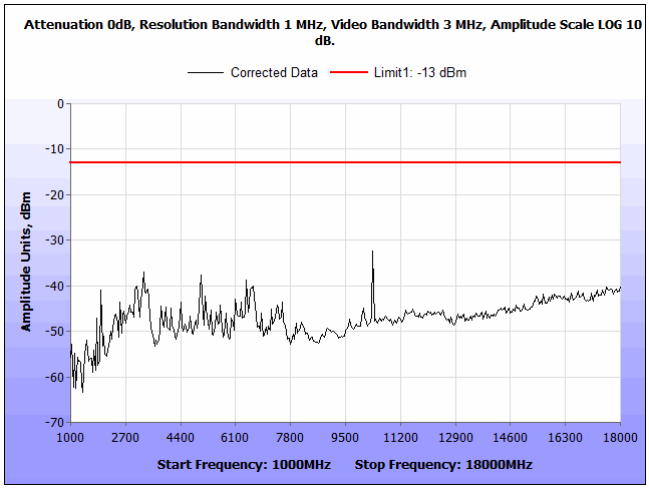
Radiated Spurious Emissions, Band 5, 869 – 894 MHz



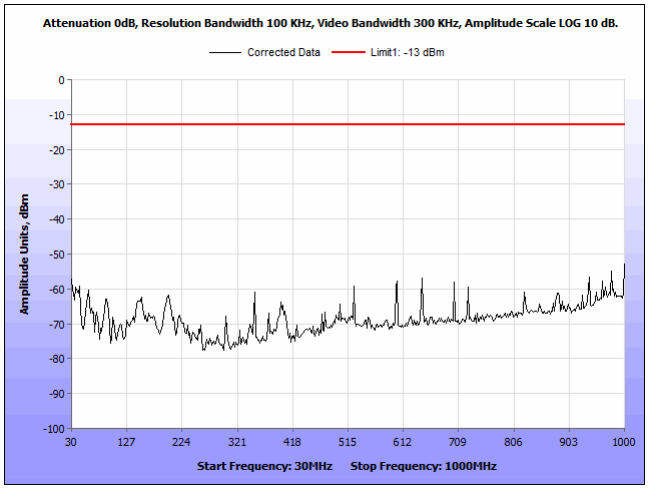
Plot 181. Radiated Spurious Emissions, CEL850, 5 MHz, 1 – 18 GHz, High



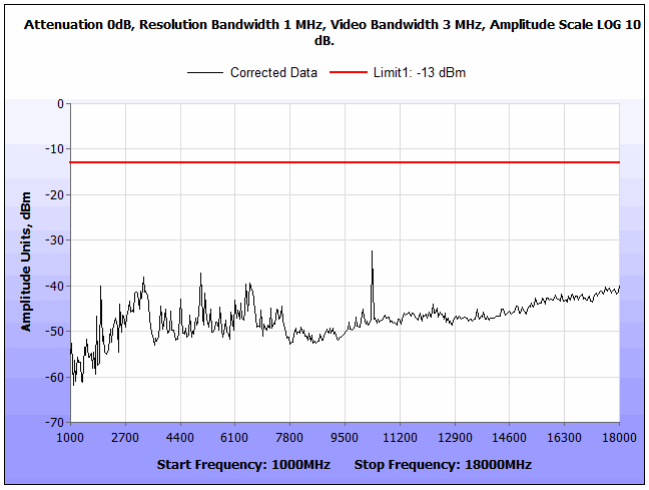
Plot 182. Radiated Spurious Emissions, CEL850, 5 MHz, 1 – 18 GHz, Low



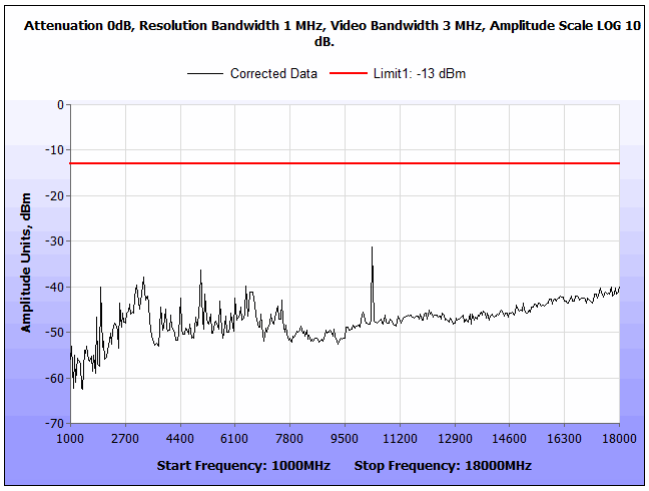
Plot 183. Radiated Spurious Emissions, CEL850, 5 MHz, 1 – 18 GHz, Mid



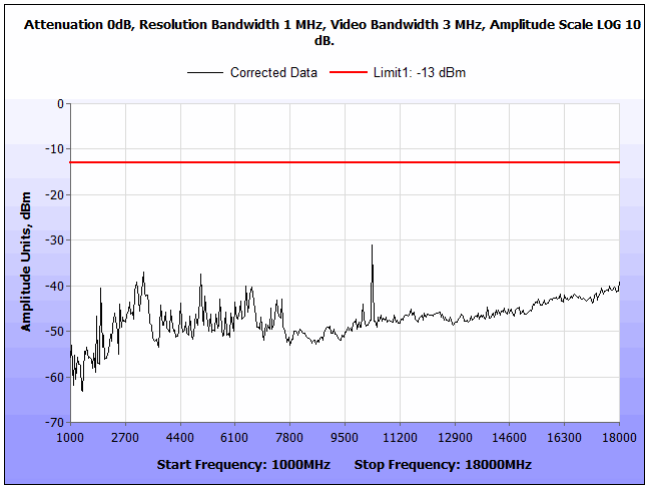
Plot 184. Radiated Spurious Emissions, CEL850, 5 MHz, 30 MHz – 1 GHz



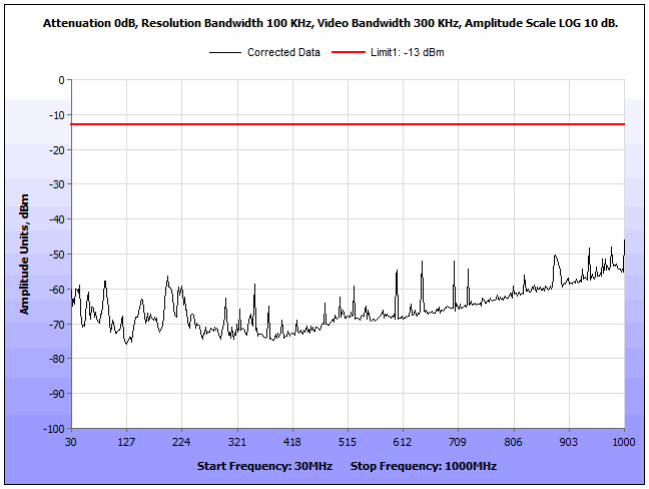
Plot 185. Radiated Spurious Emissions, CEL850, 10 MHz, 1 – 18 GHz, High



Plot 186. Radiated Spurious Emissions, CEL850, 10 MHz, 1 – 18 GHz, Low

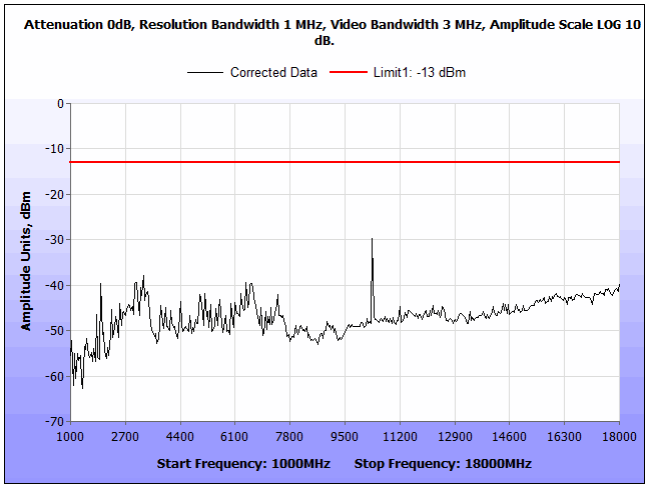


Plot 187. Radiated Spurious Emissions, CEL850, 10 MHz, 1 – 18 GHz, Mid

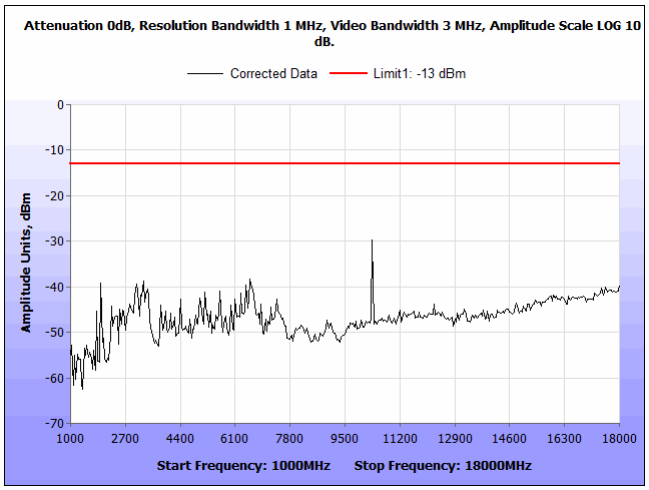


Plot 188. Radiated Spurious Emissions, CEL850, 10 MHz, 30 MHz – 1 GHz

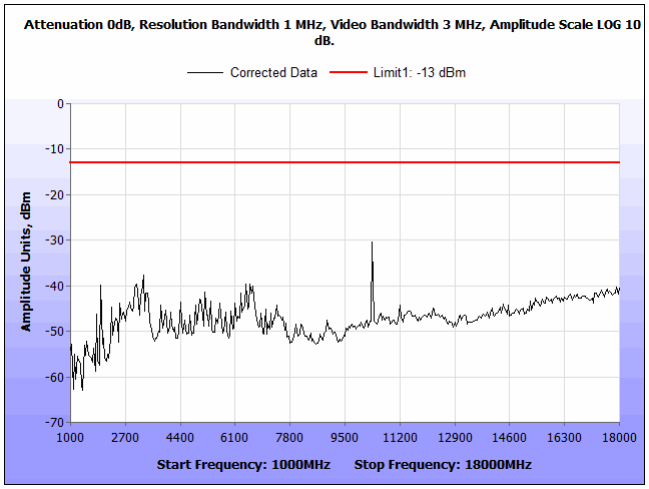
Radiated Spurious Emissions, Band 12, 729 – 746 MHz



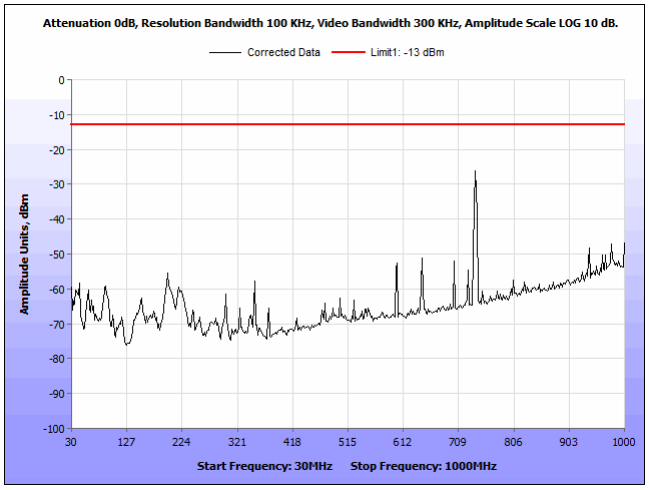
Plot 189. Radiated Spurious Emissions, LTE700ABC, 5 MHz, 1 – 18 GHz, High



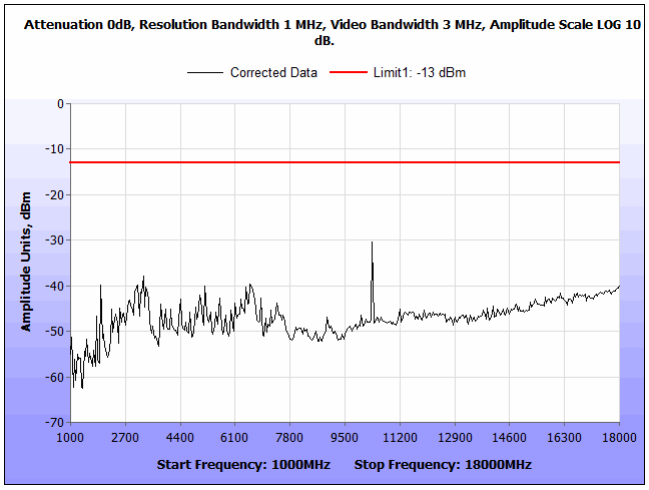
Plot 190. Radiated Spurious Emissions, LTE700ABC, 5 MHz, 1 – 18 GHz, Low



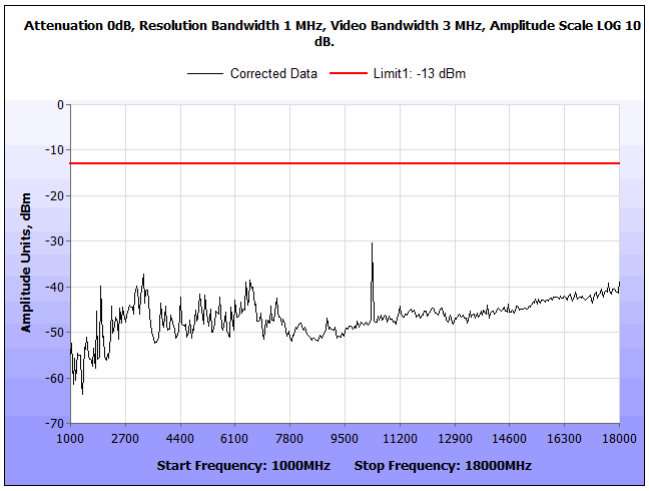
Plot 191. Radiated Spurious Emissions, LTE700ABC, 5 MHz, 1 – 18 GHz, Mid



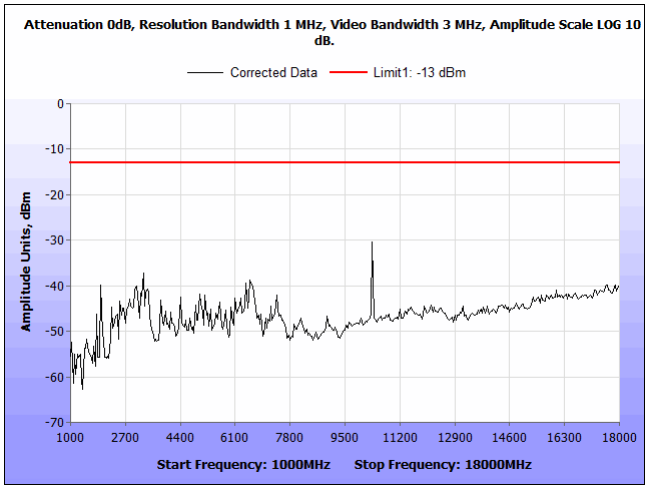
Plot 192. Radiated Spurious Emissions, LTE700ABC, 5 MHz, 30 MHz – 1 GHz



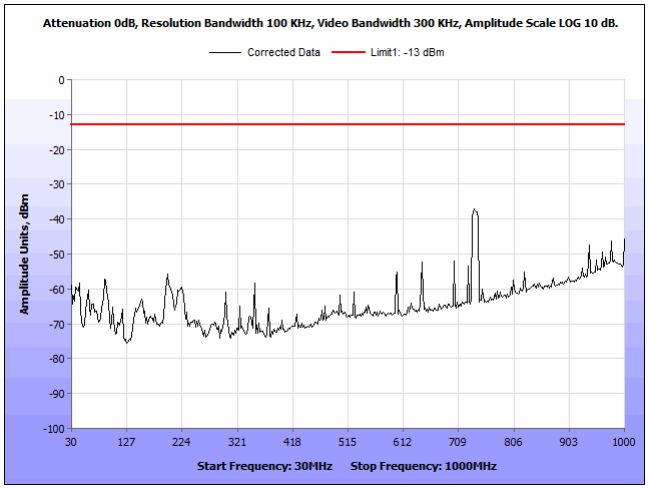
Plot 193. Radiated Spurious Emissions, LTE700ABC, 10 MHz, 1 – 18 GHz, High



Plot 194. Radiated Spurious Emissions, LTE700ABC, 10 MHz, 1 – 18 GHz, Low

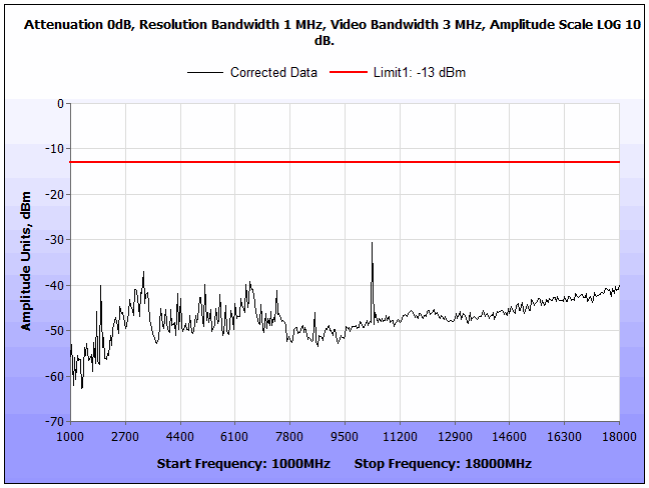


Plot 195. Radiated Spurious Emissions, LTE700ABC, 10 MHz, 1 – 18 GHz, Mid

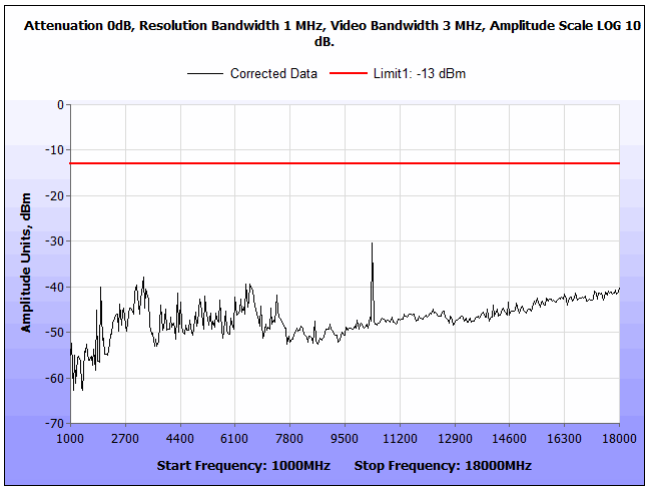


Plot 196. Radiated Spurious Emissions, LTE700ABC, 10 MHz, 30 MHz – 1 GHz

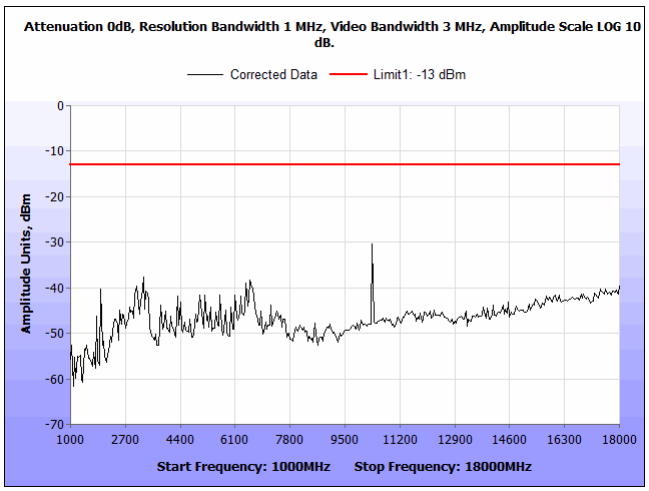
Radiated Spurious Emissions, Band 13, 746 – 756 MHz



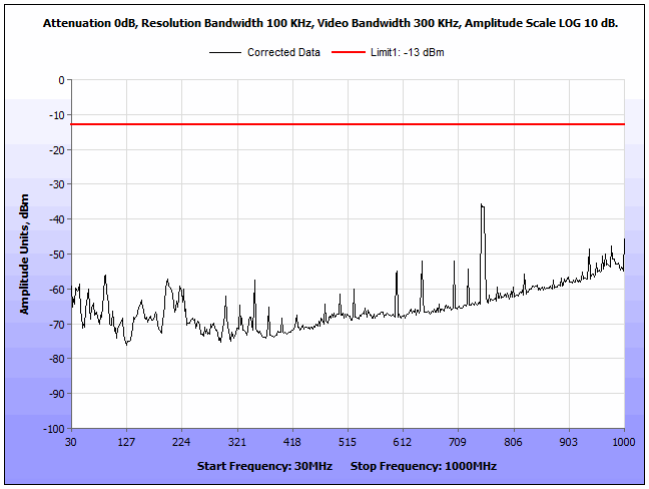
Plot 197. Radiated Spurious Emissions, LTEUpperC, 5 MHz, 1 – 18 GHz, High



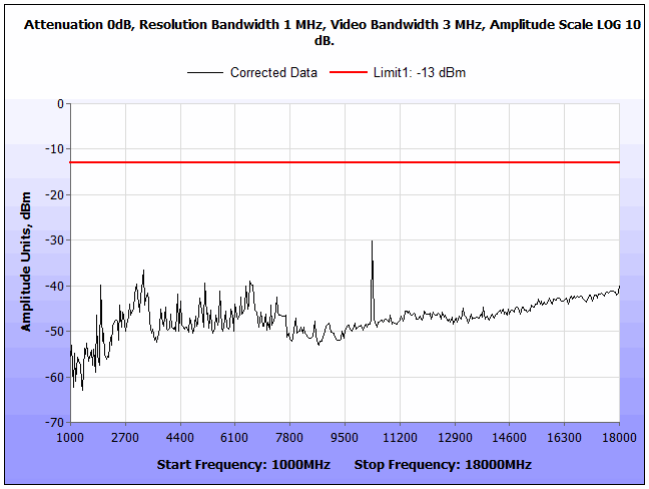
Plot 198. Radiated Spurious Emissions, LTEUpperC, 5 MHz, 1 – 18 GHz, Low



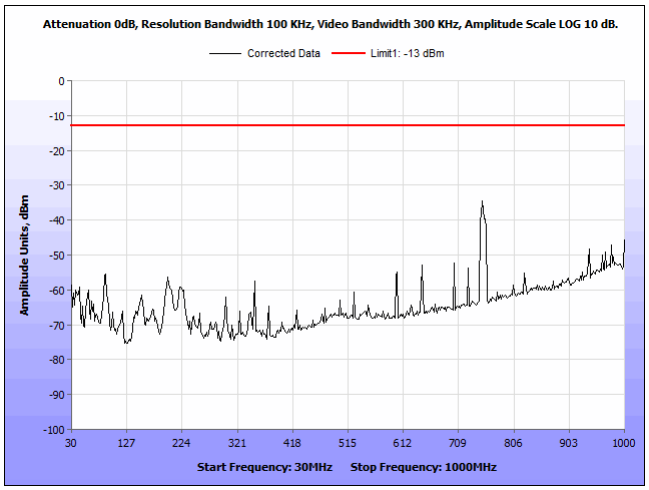
Plot 199. Radiated Spurious Emissions, LTEUpperC, 5 MHz, 1 – 18 GHz, Mid



Plot 200. Radiated Spurious Emissions, LTEUpperC, 5 MHz, 30 MHz – 1 GHz

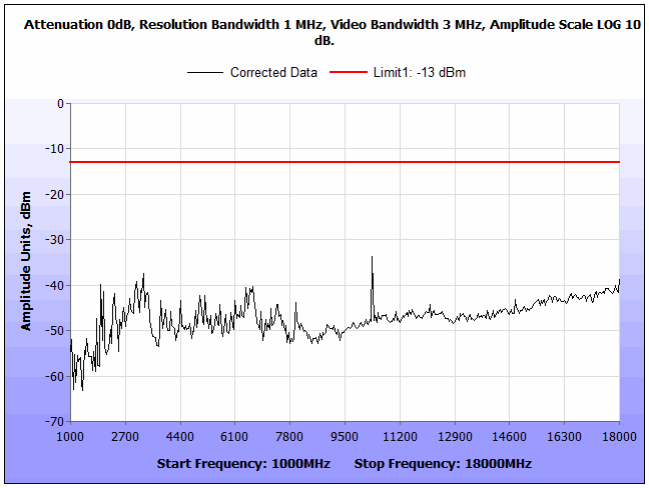


Plot 201. Radiated Spurious Emissions, LTEUpperC, 10 MHz, 1 – 18 GHz, Mid

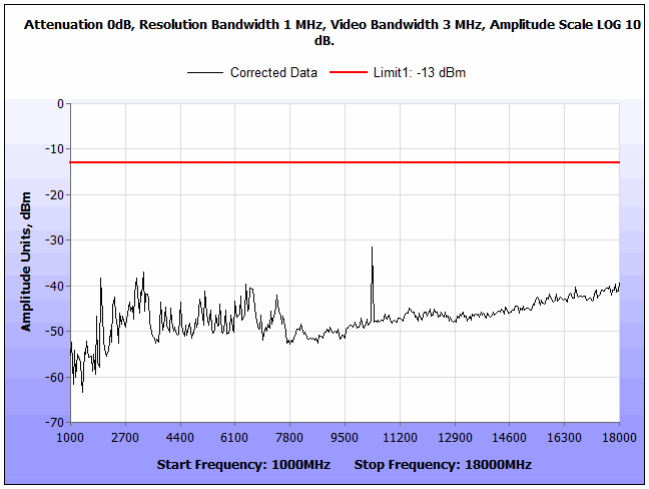


Plot 202. Radiated Spurious Emissions, LTEUpperC, 10 MHz, 30 MHz – 1 GHz

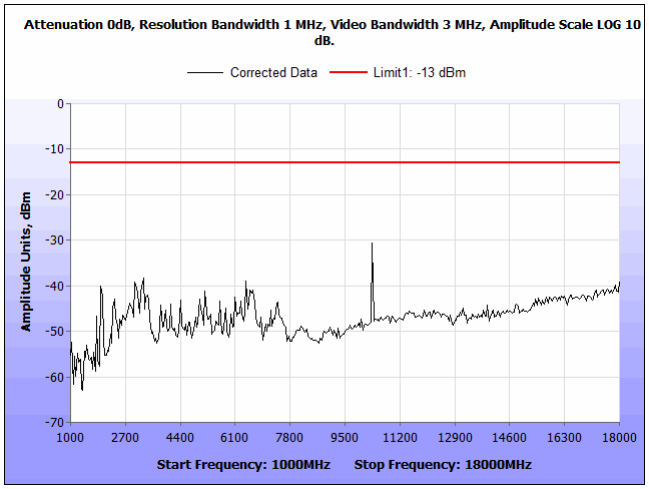
Radiated Spurious Emissions, Band 25, 1930 – 1995 MHz



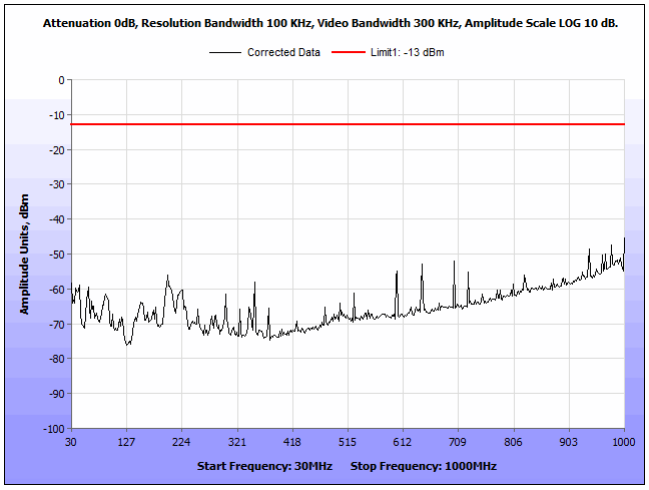
Plot 203. Radiated Spurious Emissions, PCS1900, 5 MHz, 1 – 18 GHz, High



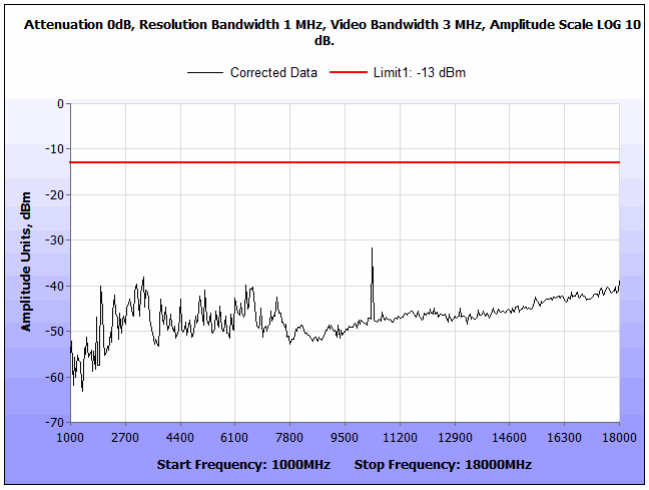
Plot 204. Radiated Spurious Emissions, PCS1900, 5 MHz, 1 – 18 GHz, Low



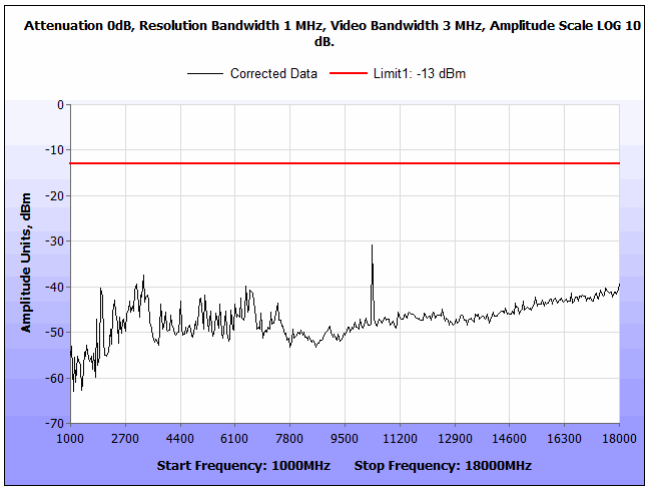
Plot 205. Radiated Spurious Emissions, PCS1900, 5 MHz, 1 – 18 GHz, Mid



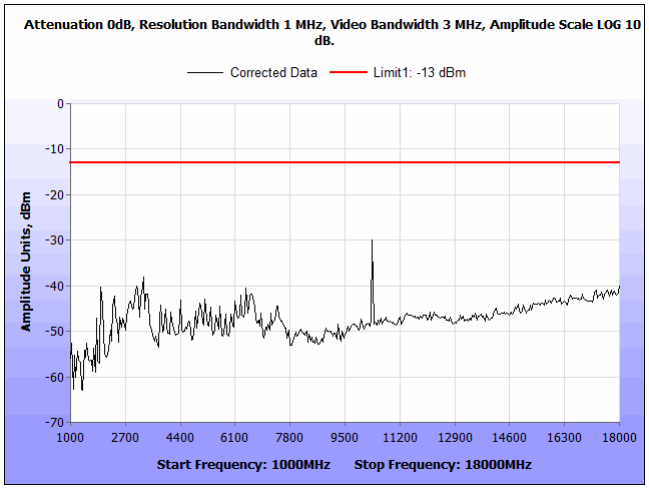
Plot 206. Radiated Spurious Emissions, PCS1900, 5 MHz, 30 MHz – 1 GHz



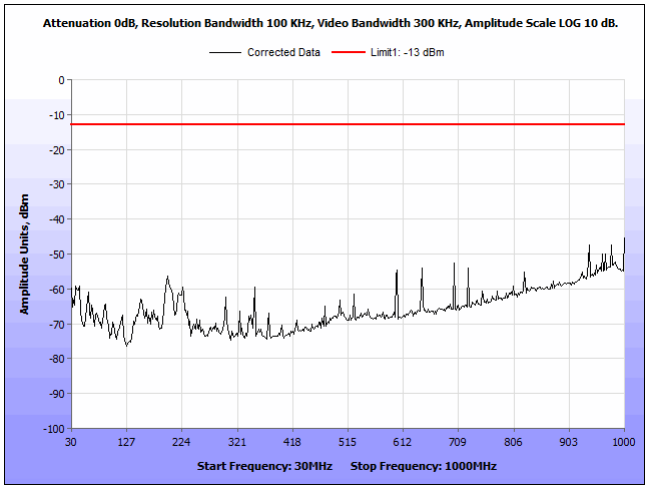
Plot 207. Radiated Spurious Emissions, PCS1900, 10 MHz, 1 – 18 GHz, High



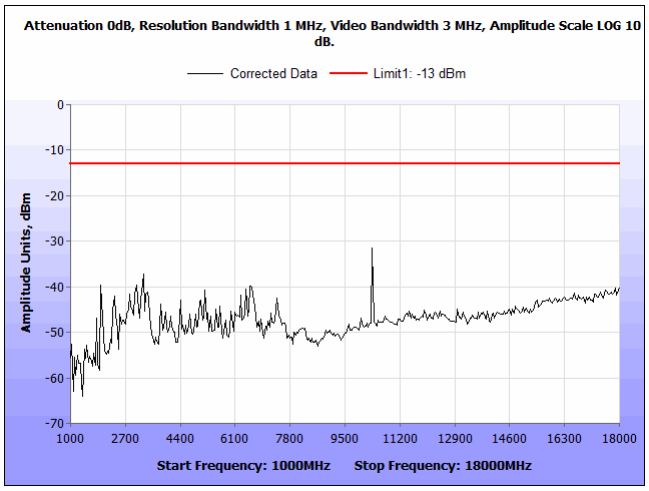
Plot 208. Radiated Spurious Emissions, PCS1900, 10 MHz, 1 – 18 GHz, Low



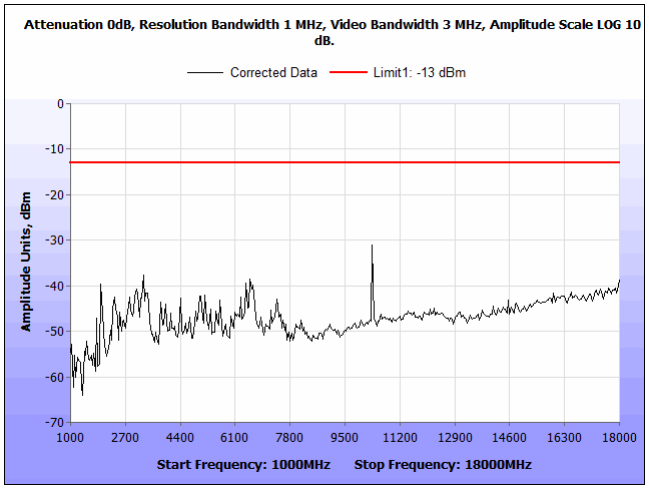
Plot 209. Radiated Spurious Emissions, PCS1900, 10 MHz, 1 – 18 GHz, Mid



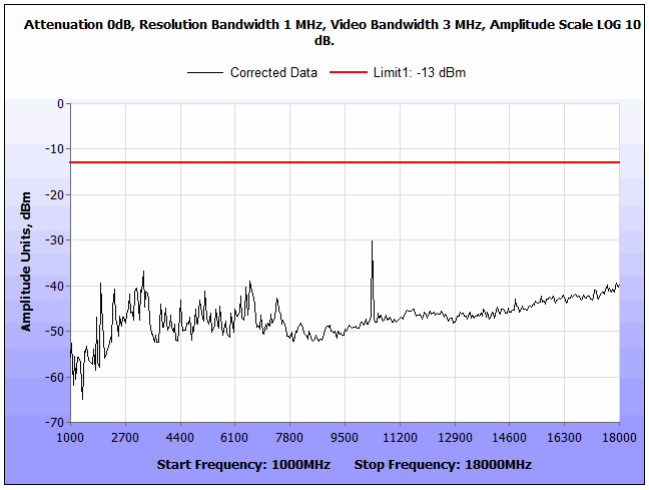
Plot 210. Radiated Spurious Emissions, PCS1900, 10 MHz, 30 MHz – 1 GHz



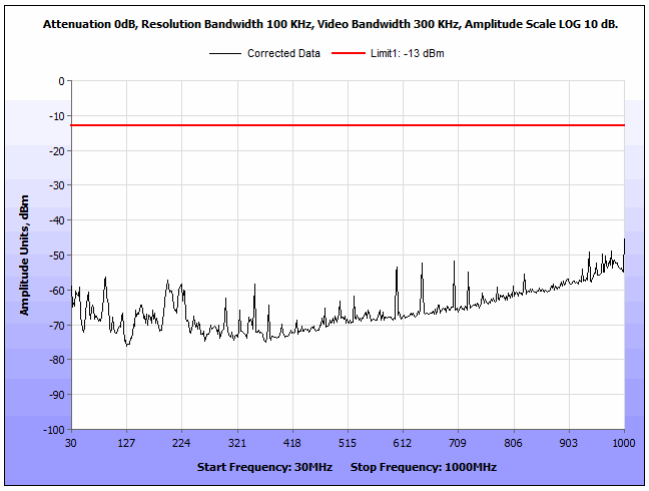
Plot 211. Radiated Spurious Emissions, PCS1900, 20 MHz, 1 – 18 GHz, High



Plot 212. Radiated Spurious Emissions, PCS1900, 20 MHz, 1 – 18 GHz, Low

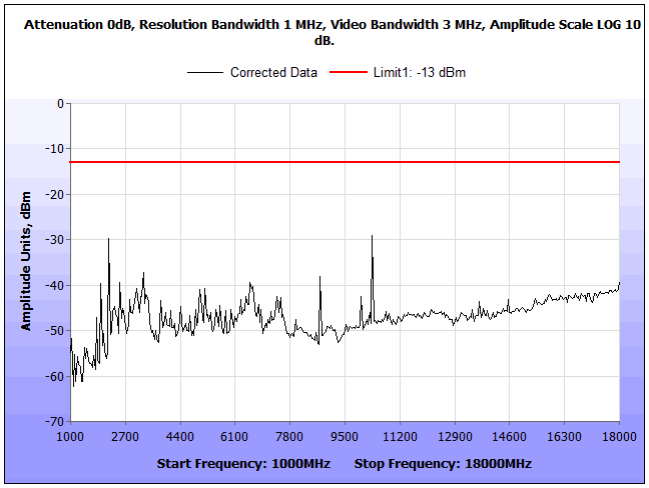


Plot 213. Radiated Spurious Emissions, PCS1900, 20 MHz, 1 – 18 GHz, Mid

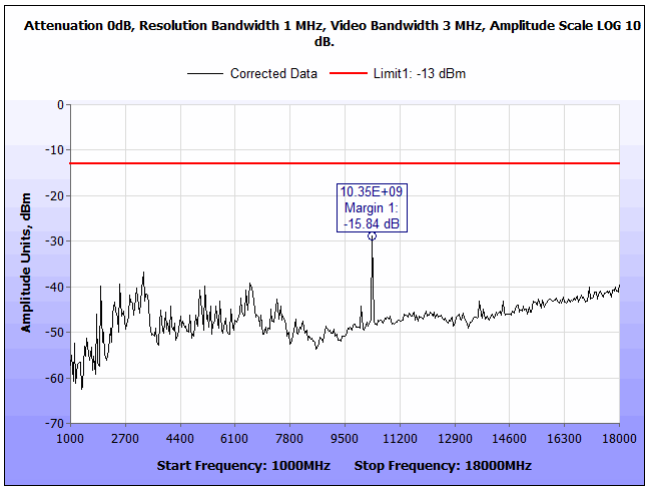


Plot 214. Radiated Spurious Emissions, PCS1900, 20 MHz, 30 MHz – 1 GHz

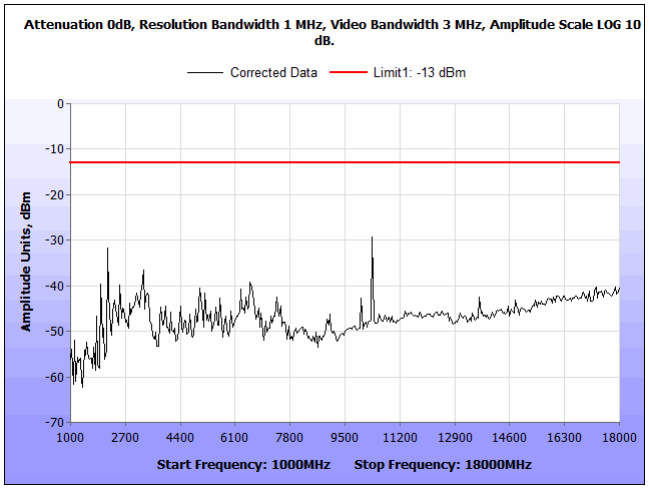
Radiated Spurious Emissions, Band 66, 2110 – 2180 MHz



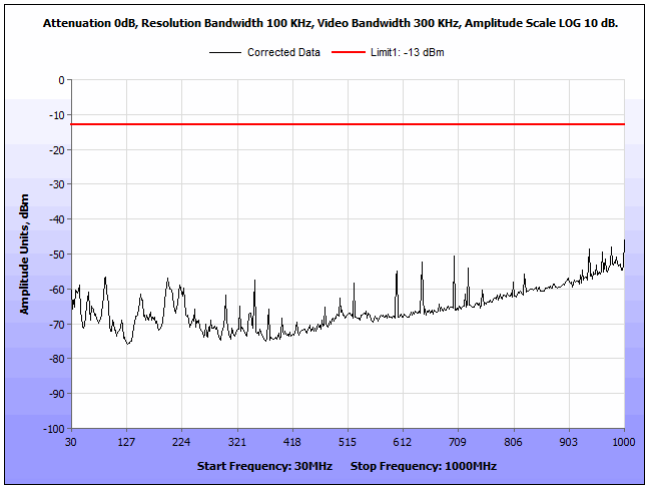
Plot 215. Radiated Spurious Emissions, AWS2100, 5 MHz, 1 – 18 GHz, High



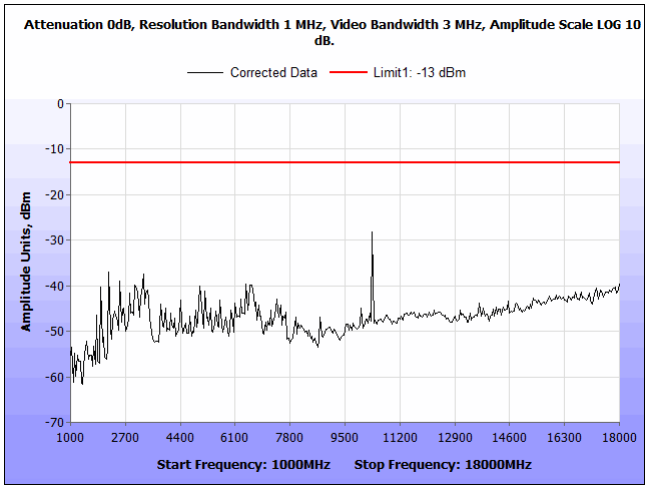
Plot 216. Radiated Spurious Emissions, AWS2100, 5 MHz, 1 – 18 GHz, Low



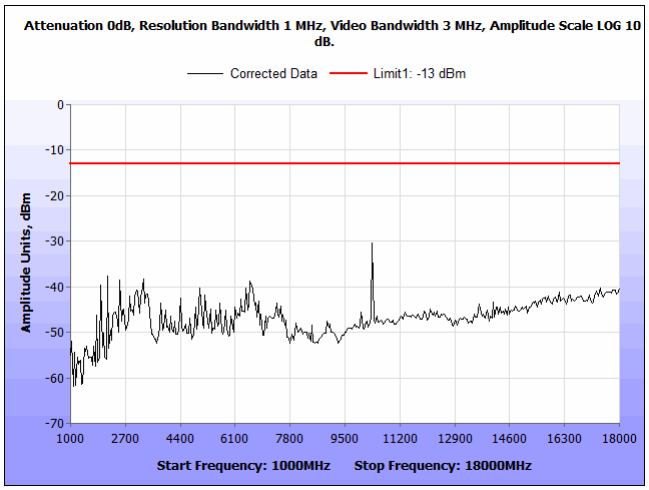
Plot 217. Radiated Spurious Emissions, AWS2100, 5 MHz, 1 – 18 GHz, Mid



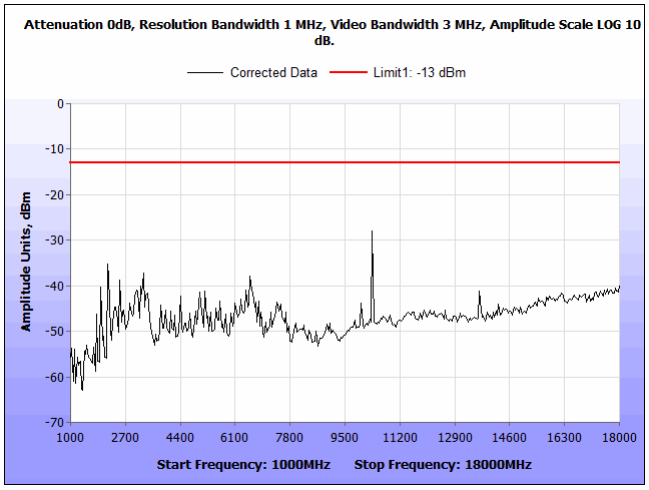
Plot 218. Radiated Spurious Emissions, AWS2100, 5 MHz, 30 MHz – 1 GHz



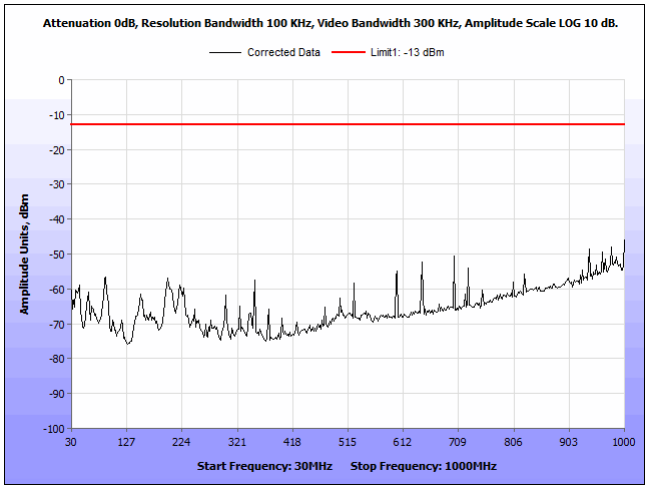
Plot 219. Radiated Spurious Emissions, AWS2100, 10 MHz, 1 – 18 GHz, High



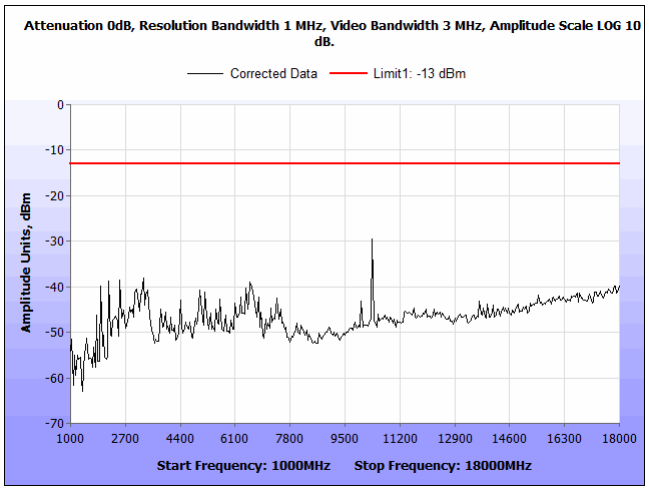
Plot 220. Radiated Spurious Emissions, AWS2100, 10 MHz, 1 – 18 GHz, Low



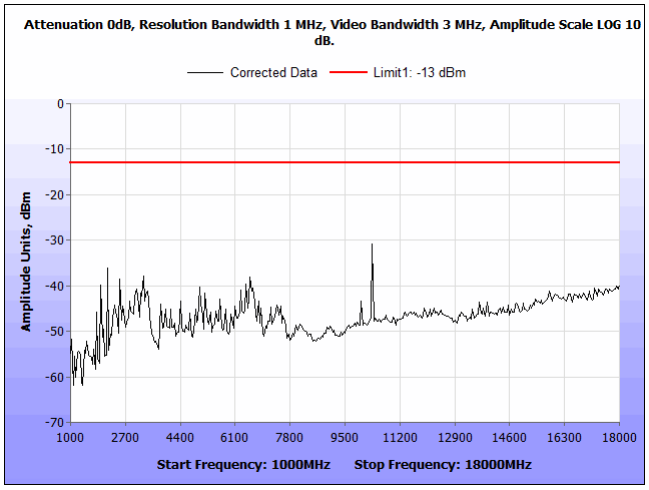
Plot 221. Radiated Spurious Emissions, AWS2100, 10 MHz, 1 – 18 GHz, Mid



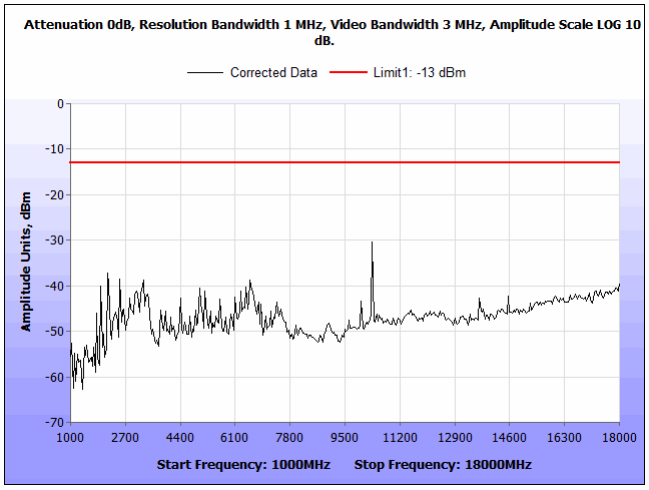
Plot 222. Radiated Spurious Emissions, AWS2100, 10 MHz, 30 MHz – 1 GHz



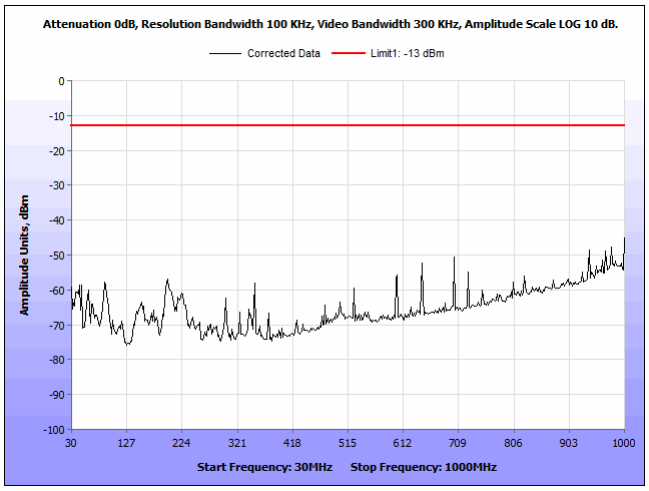
Plot 223. Radiated Spurious Emissions, AWS2100, 20 MHz, 1 – 18 GHz, High



Plot 224. Radiated Spurious Emissions, AWS2100, 20 MHz, 1 – 18 GHz, Low



Plot 225. Radiated Spurious Emissions, AWS2100, 20 MHz, 1 – 18 GHz, Mid



Plot 226. Radiated Spurious Emissions, AWS2100, 20 MHz, 30 MHz – 1 GHz

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 2.1051 Spurious Emissions at Antenna Terminals

Test Requirement(s): **§ 2.1051 and 27.53(m) Measurements required: Spurious emissions at antenna terminals:** The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in § 2.1049 as appropriate.

Test Procedures: The EUT was tested according to the unwanted emissions procedures of ANSI C63.26 5.7.3.The spectrum analyzer was used and configured in the following manner:

(a) Frequency Range = 30MHz – 10th Harmonic
(b) RBW = 1% of the OBW, or greater
(c) VBW 1-3 x the RBW
(d) Detector = Peak
(e) Sweet Time = Auto

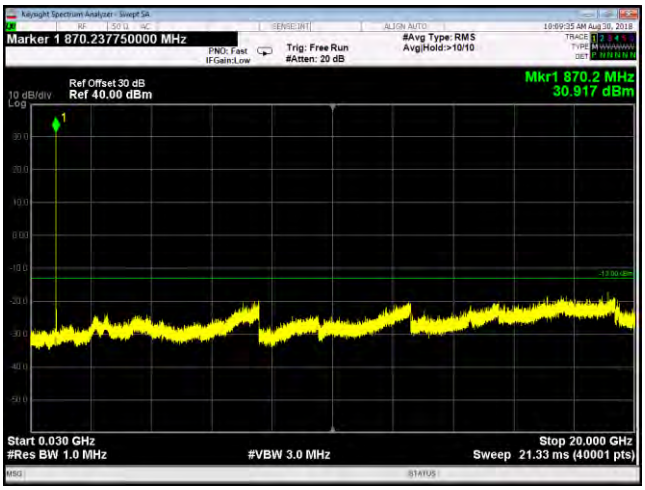
Test Results: The equipment was found compliant with the requirements of this section.

Test Engineer(s): Bradley Jones and Deepak Giri

Test Date(s): September 18, 2018

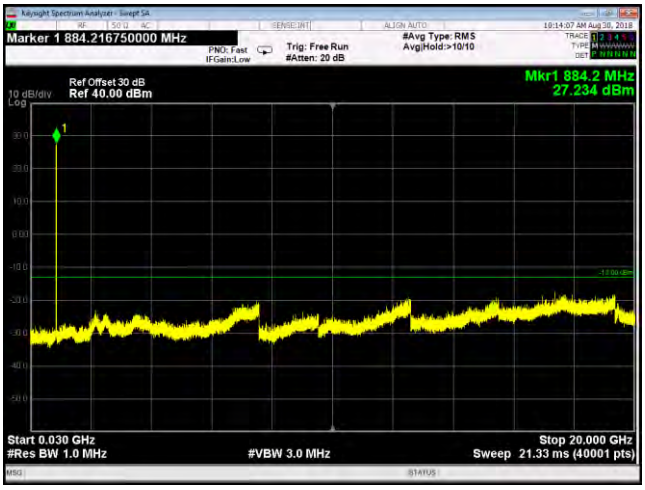
Conducted Spurious Emissions, Band 5, 869 – 894 MHz

Plot 227. Spurious Emissions at Antenna Terminals, CEL850, 5 MHz, High, 869 – 894 MHz

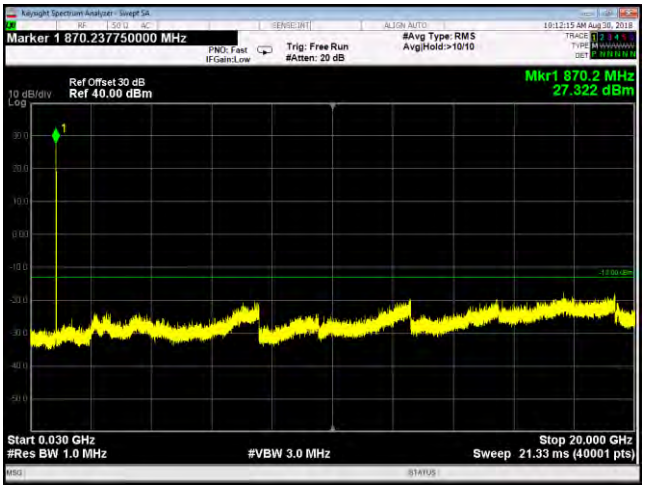


Plot 228. Spurious Emissions at Antenna Terminals, CEL850, 5 MHz, Low, 869 – 894 MHz

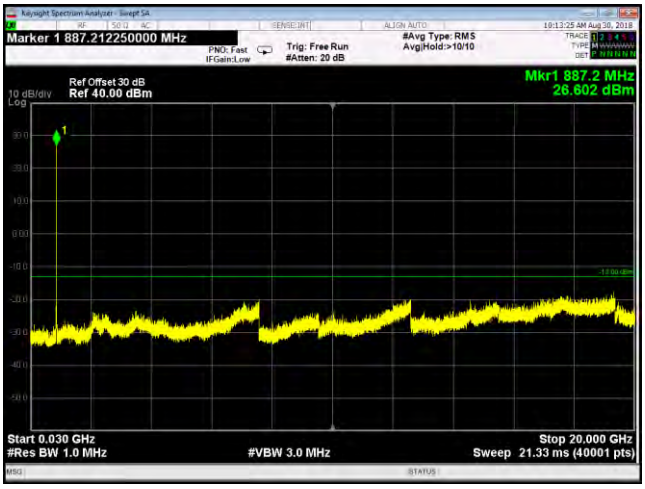
Plot 229. Spurious Emissions at Antenna Terminals, CEL850, 5 MHz, Mid, 869 – 894 MHz



Plot 230. Spurious Emissions at Antenna Terminals, CEL850, 10 MHz, High, 869 – 849 MHz

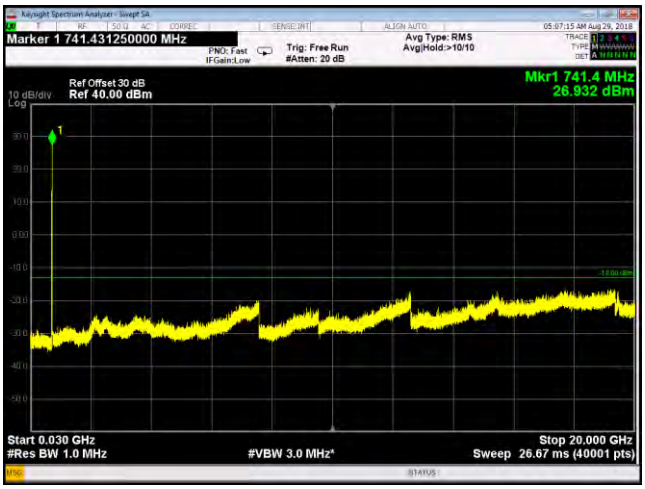


Plot 231. Spurious Emissions at Antenna Terminals, CEL850, 10 MHz, Low, Med, 869 – 849 MHz



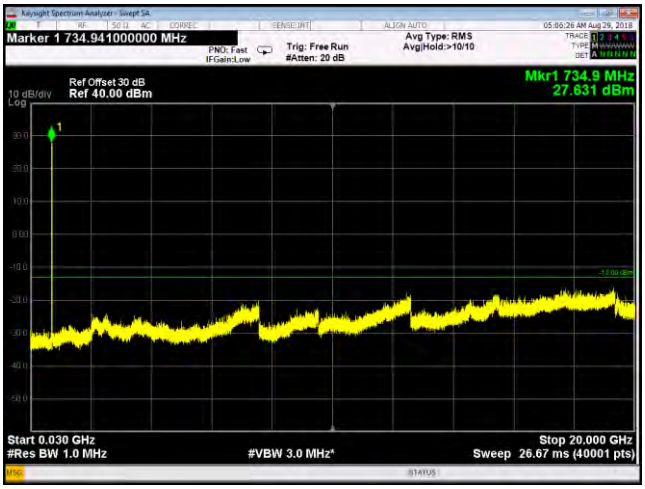
Plot 232. Spurious Emissions at Antenna Terminals, CEL850, 10 MHz, Mid, 869 – 849 MHz

Conducted Spurious Emissions, Brand 12, 729 – 746 MHz



Plot 233. Spurious Emissions at Antenna Terminals, LTE700ABC, 5 MHz, High

Plot 234. Spurious Emissions at Antenna Terminals, LTE700ABC, 5 MHz, Low



Plot 235. Spurious Emissions at Antenna Terminals, LTE700ABC, 5 MHz, Mid

Plot 236. Spurious Emissions at Antenna Terminals, LTE700ABC, 5 MHz, High

Plot 237. Spurious Emissions at Antenna Terminals, LTE700ABC, 5 MHz, Low

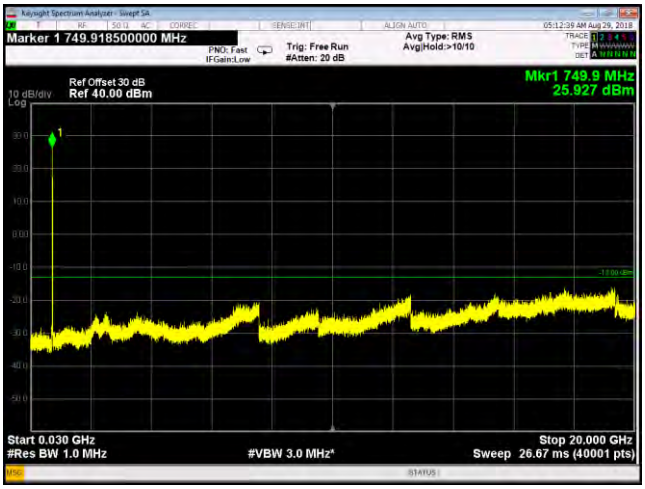
Plot 238. Spurious Emissions at Antenna Terminals, LTE700ABC, 5 MHz, Mid

Conducted Spurious Emissions, Band 13, 746 – 756 MHz

Plot 239. Spurious Emissions at Antenna Terminals, LTEUpperC, 5 MHz, High

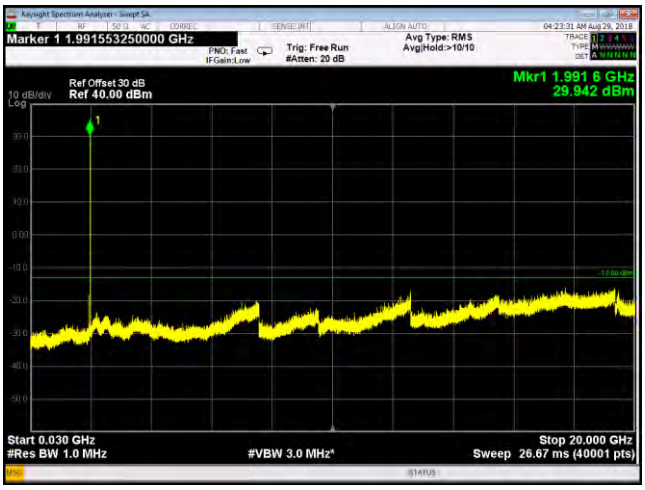
Plot 240. Spurious Emissions at Antenna Terminals, LTEUpperC, 5 MHz, Low

Plot 241. Spurious Emissions at Antenna Terminals, LTEUpperC, 5 MHz, Mid

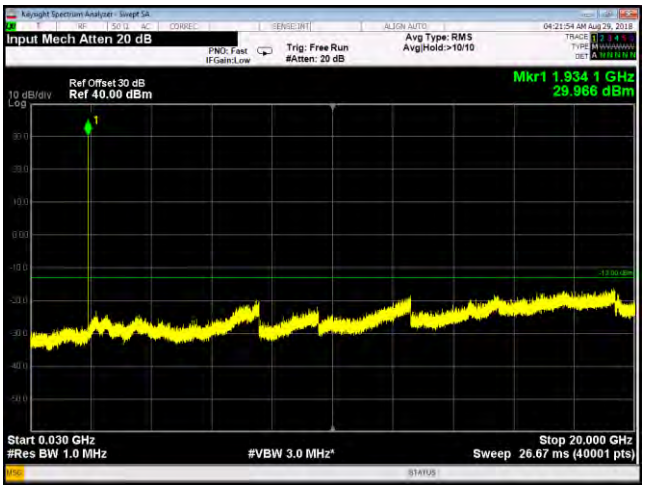


Plot 242. Spurious Emissions at Antenna Terminals, LTEUpperC, 10 MHz, Mid

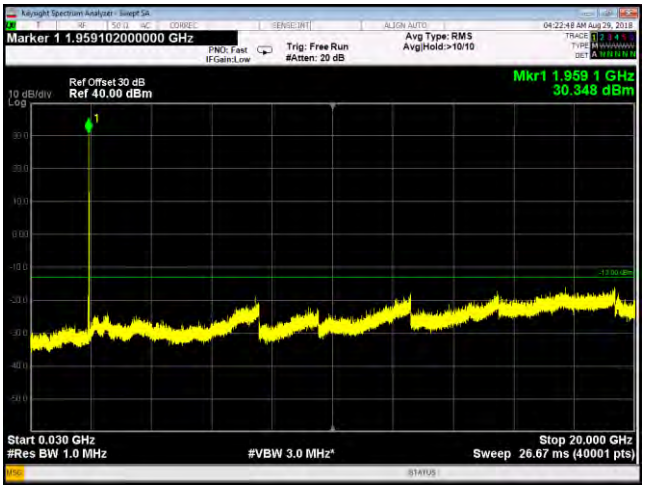
Conducted Spurious Emissions, Band 25, 1930 – 1995 MHz



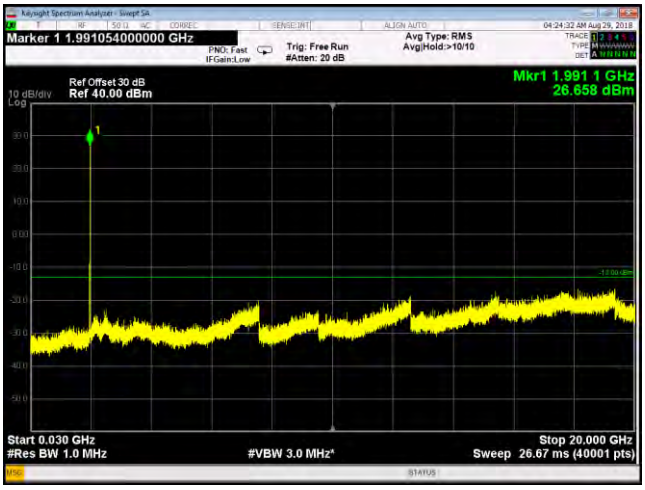
Plot 243. Spurious Emissions at Antenna Terminals, PCS 1900, 5 MHz, High



Plot 244. Spurious Emissions at Antenna Terminals, PCS 1900, 5 MHz, Low

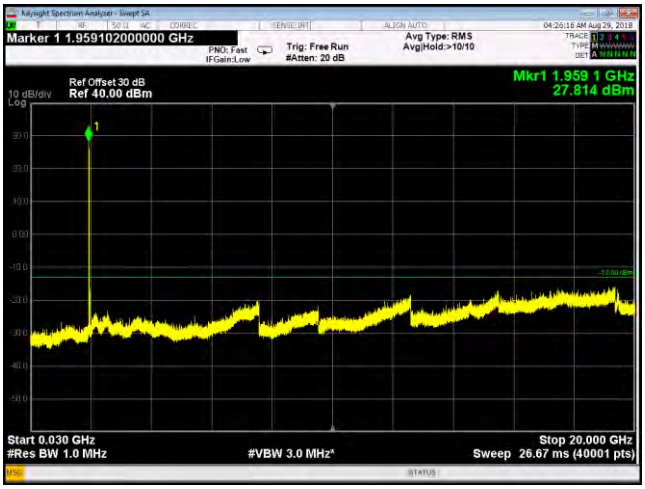


Plot 245. Spurious Emissions at Antenna Terminals, PCS 1900, 5 MHz, Mid

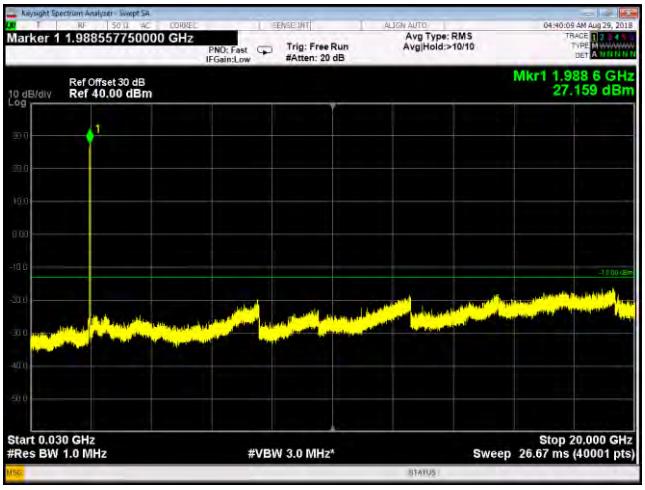


Plot 246. Spurious Emissions at Antenna Terminals, PCS 1900, 10 MHz, High

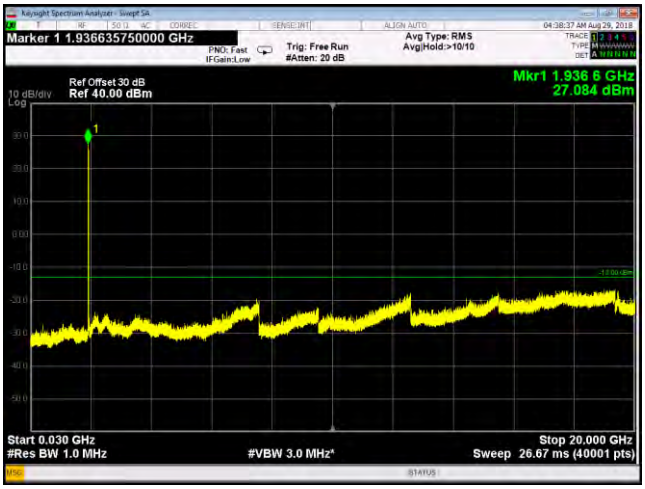
Plot 247. Spurious Emissions at Antenna Terminals, PCS 1900, 10 MHz, Low



Plot 248. Spurious Emissions at Antenna Terminals, PCS 1900, 10 MHz, Mid



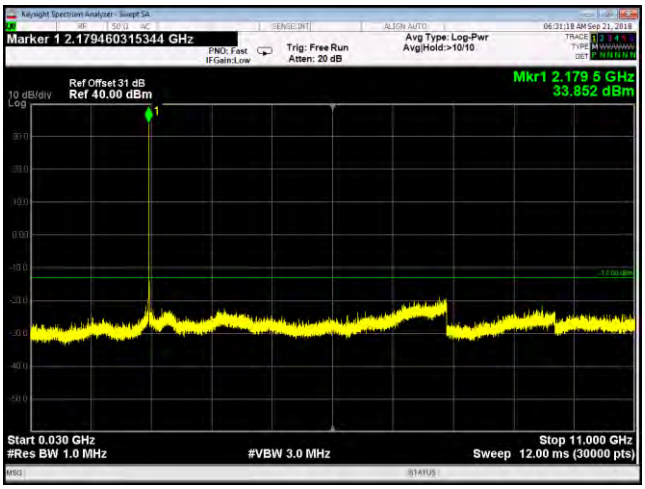
Plot 249. Spurious Emissions at Antenna Terminals, PCS 1900, 20 MHz, High



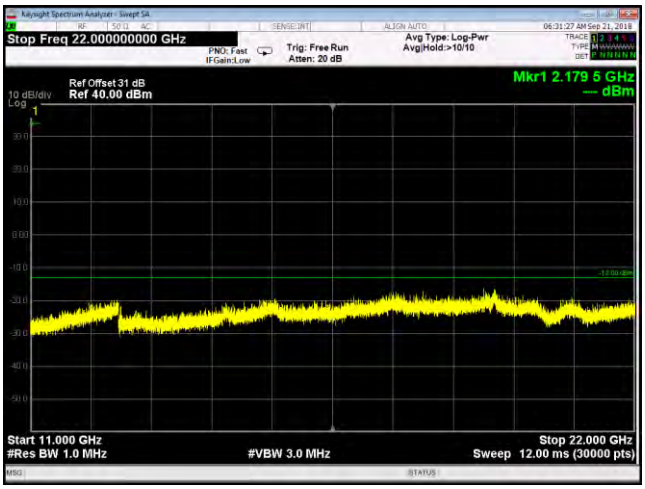
Plot 250. Spurious Emissions at Antenna Terminals, PCS 1900, 20 MHz, Low

Plot 251. Spurious Emissions at Antenna Terminals, PCS 1900, 20 MHz, Mid

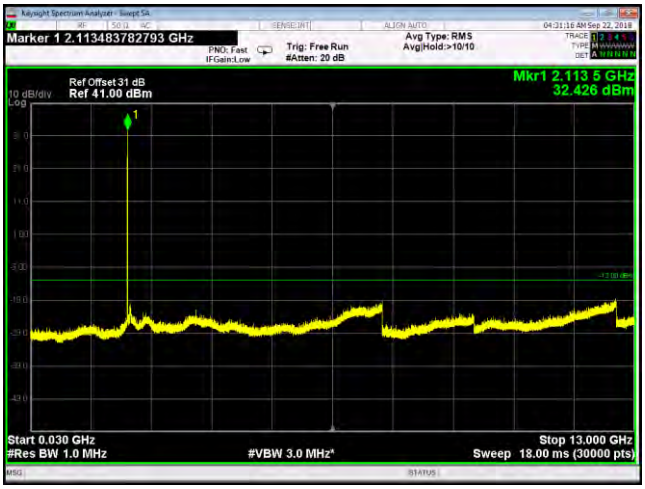
Conducted Spurious Emissions, Band 66, 2110 – 2180 MHz



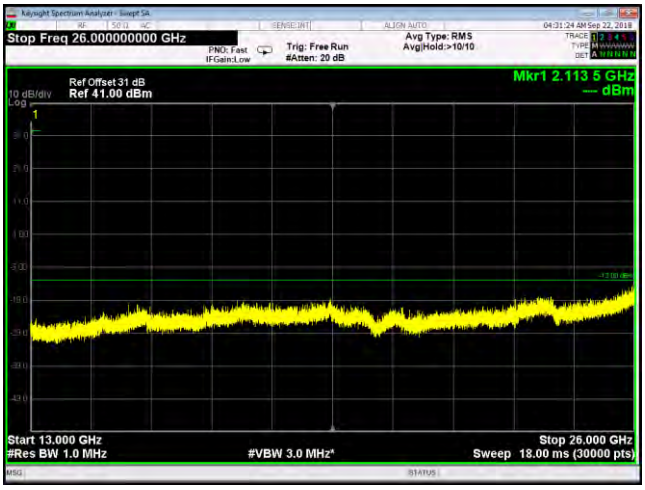
Plot 252. Spurious Emissions at Antenna Terminals, AWS7100, 5 MHz, .03 – 11 GHz, High



Plot 253. Spurious Emissions at Antenna Terminals, AWS7100, 5 MHz, 11 – 22 GHz, High

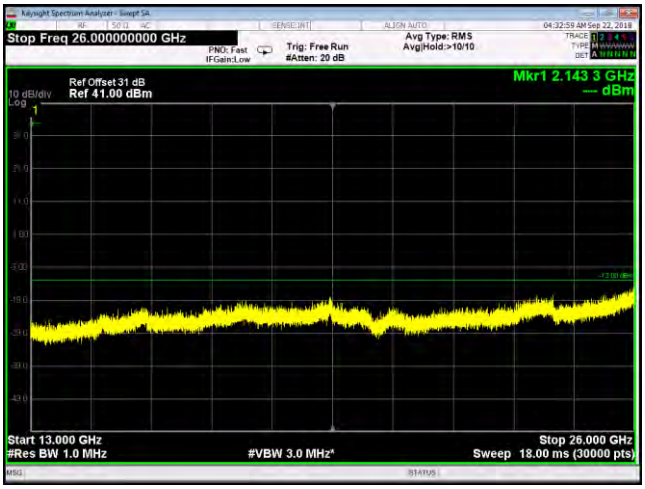


Plot 254. Spurious Emissions at Antenna Terminals, AWS7100, 5 MHz, .30 – 13 GHz, Low



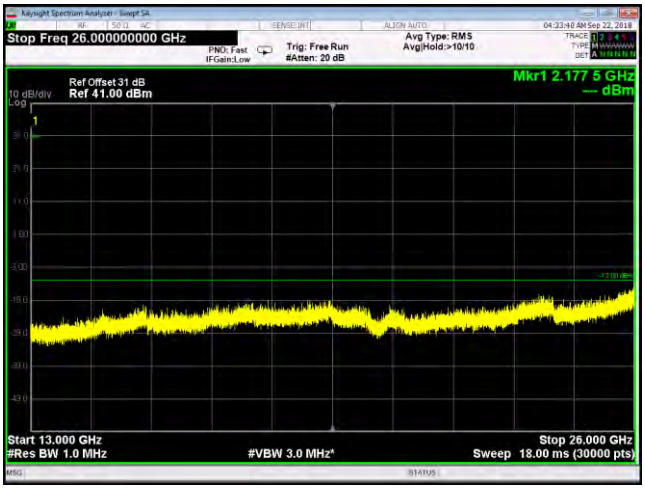
Plot 255. Spurious Emissions at Antenna Terminals, AWS7100, 5 MHz, 13 – 26 GHz, Low

Plot 256. Spurious Emissions at Antenna Terminals, AWS7100, 5 MHz, .30 – 13 GHz, Mid

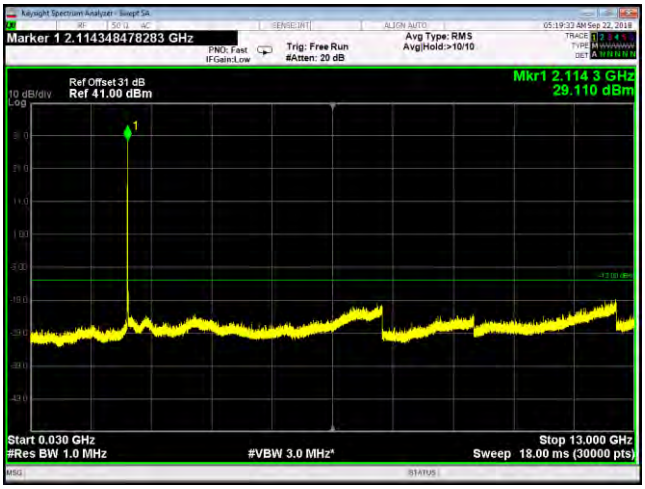


Plot 257. Spurious Emissions at Antenna Terminals, AWS7100, 5 MHz, 13 – 26 GHz, Mid

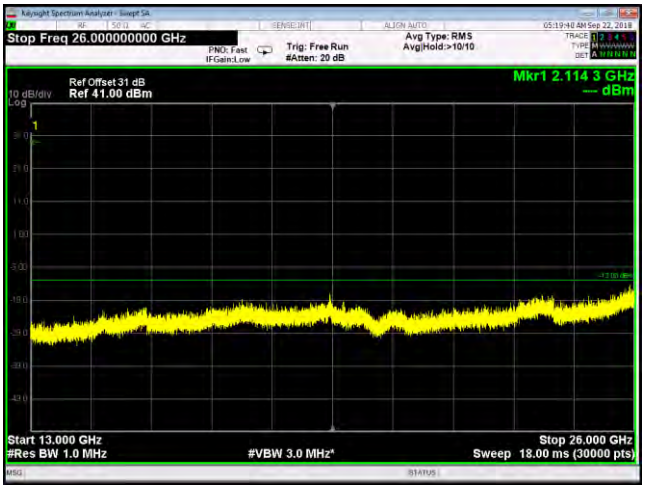
Plot 258. Spurious Emissions at Antenna Terminals, AWS7100, 10 MHz, .30 – 13 GHz, High



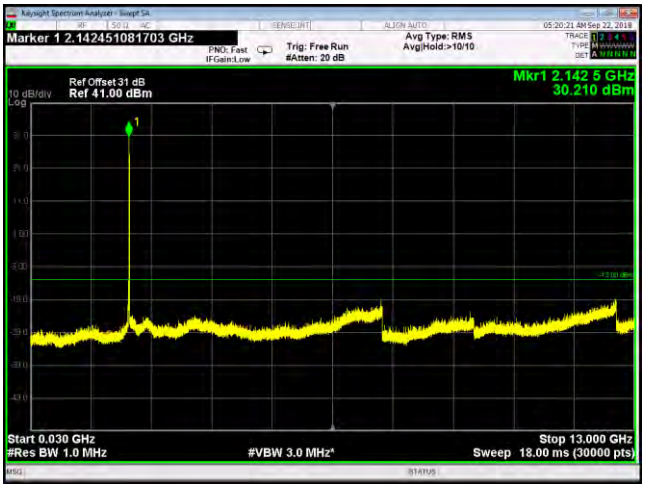
Plot 259. Spurious Emissions at Antenna Terminals, AWS7100, 10 MHz, 13 – 26 GHz, High



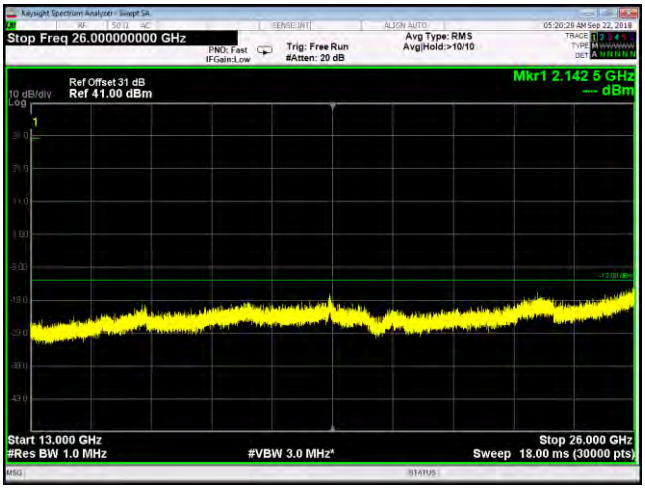
Plot 260. Spurious Emissions at Antenna Terminals, AWS7100, 10 MHz, .30 – 13 GHz, Low



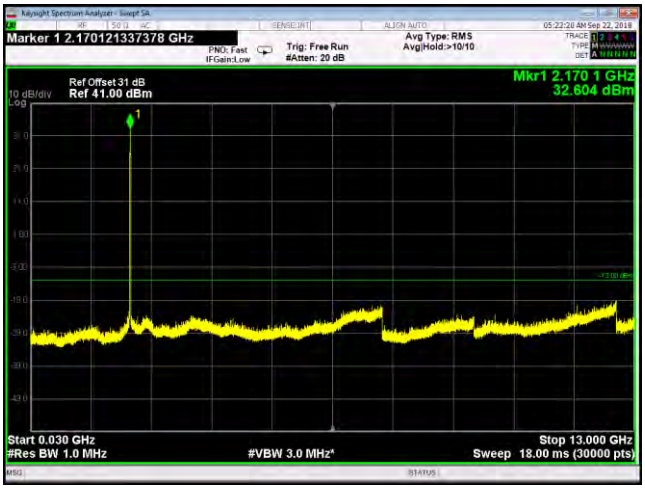
Plot 261. Spurious Emissions at Antenna Terminals, AWS7100, 10 MHz, 13 – 26 GHz, Low



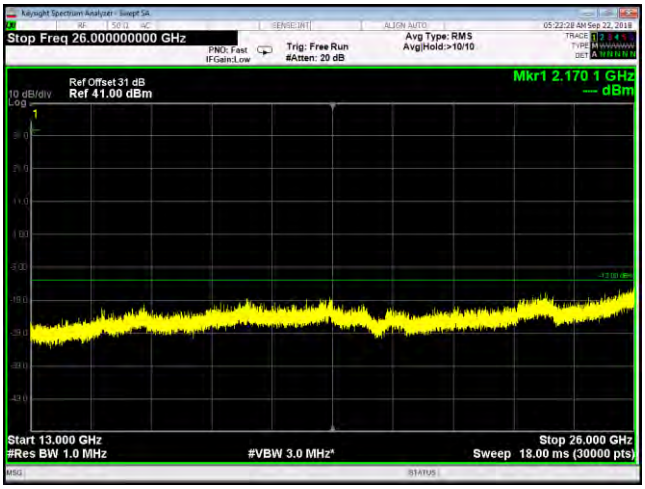
Plot 262. Spurious Emissions at Antenna Terminals, AWS7100, 10 MHz, .30 – 13 GHz, Mid



Plot 263. Spurious Emissions at Antenna Terminals, AWS7100, 10 MHz, 13- 26 GHz, Mid

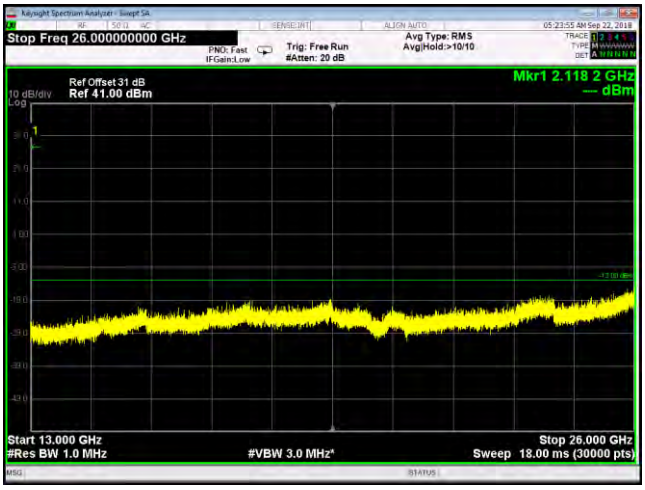


Plot 264. Spurious Emissions at Antenna Terminals, AWS7100, 20 MHz, .30 – 13 GHz, High

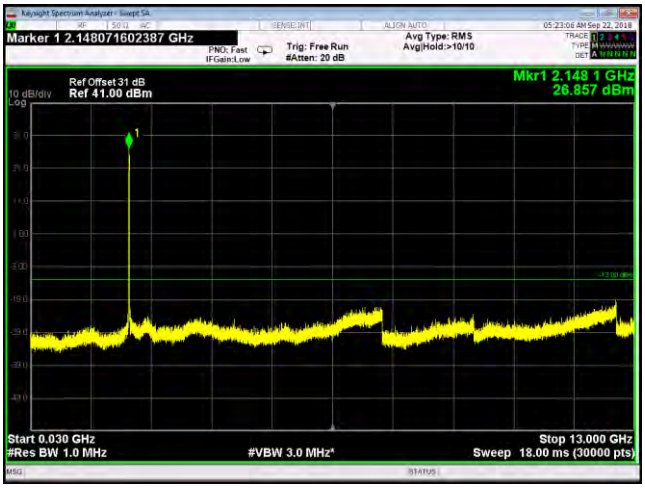


Plot 265. Spurious Emissions at Antenna Terminals, AWS7100, 20 MHz, 13 – 26 GHz, High

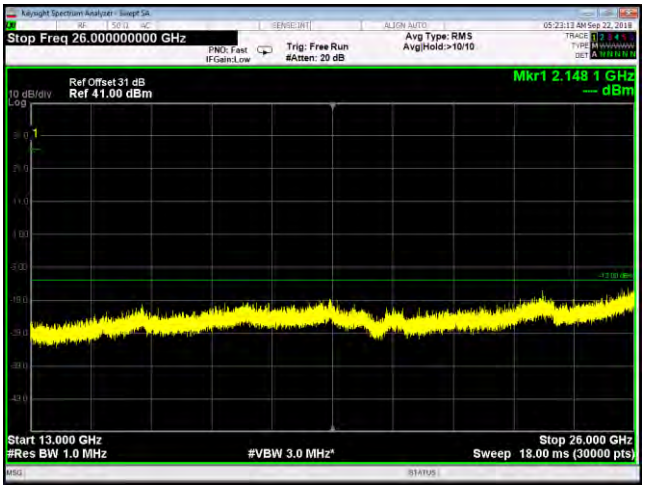
Plot 266. Spurious Emissions at Antenna Terminals, AWS7100, 20 MHz, .30 – 13 GHz, Low



Plot 267. Spurious Emissions at Antenna Terminals, AWS7100, 20 MHz, 13 – 26 GHz, Low

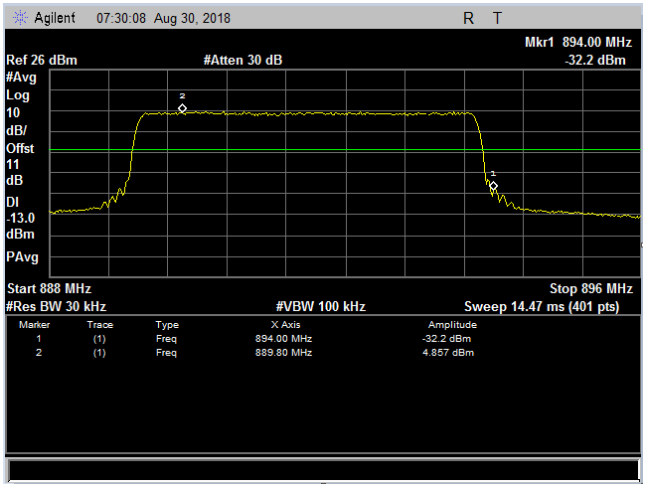


Plot 268. Spurious Emissions at Antenna Terminals, AWS7100, 20 MHz, .30 – 13 GHz, Mid

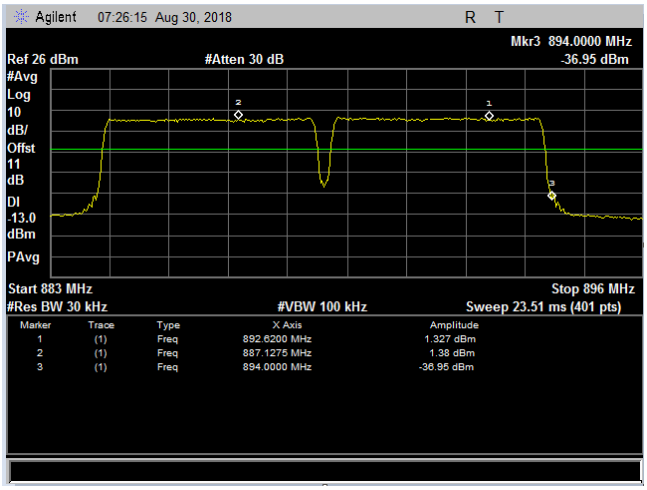


Plot 269. Spurious Emissions at Antenna Terminals, AWS7100, 20 MHz, 13 – 26 GHz, Mid

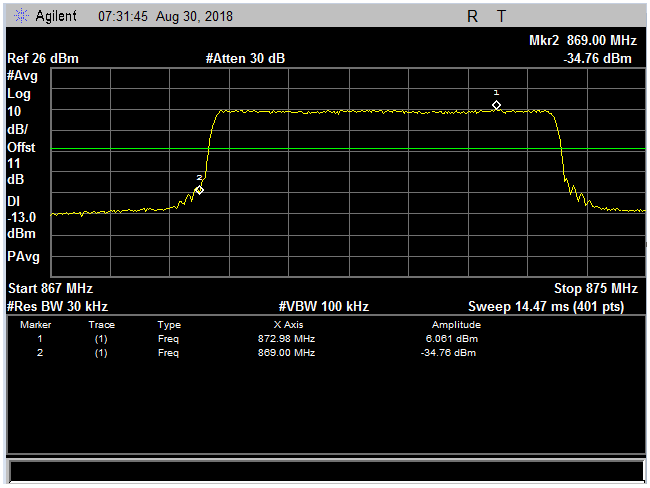
Band Edge



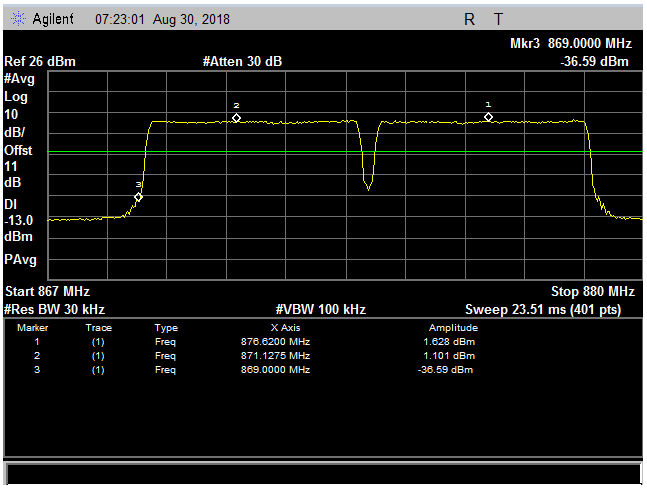
Plot 270. 5 MHz, High Channel, One Signal Band Edge, Cell 850 Band 5



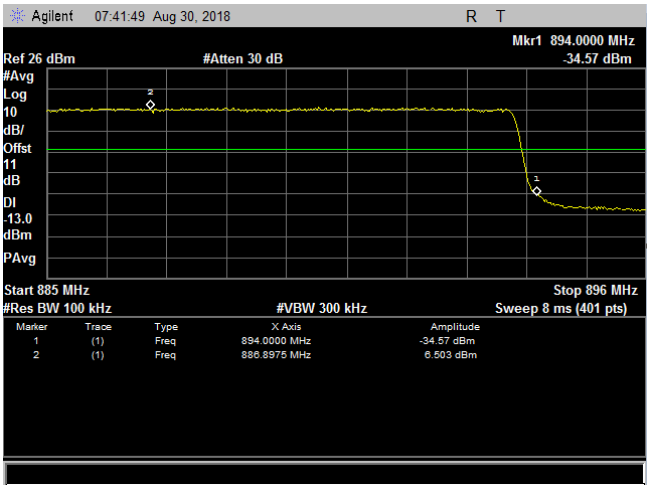
Plot 271. 5 MHz, High Channel, Two Signal Band Edge, Cell 850 Band 5



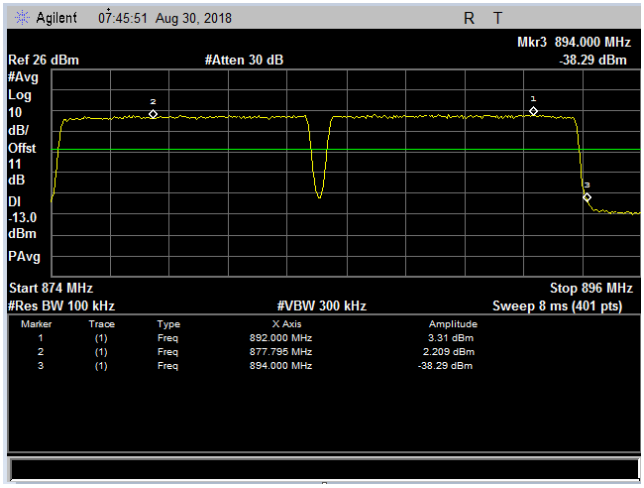
Plot 272. 5 MHz, Low Channel, One Signal Band Edge, Cell 850, Band 5



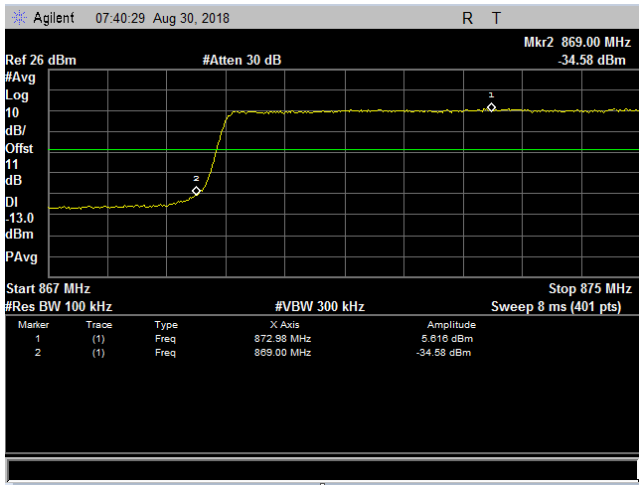
Plot 273. 5 MHz, Low Channel, Two Signal Band Edge, Cell 850, Band 5



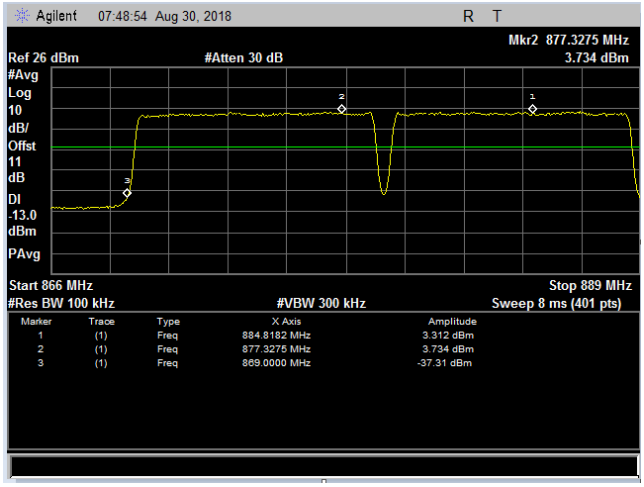
Plot 274. 10 MHz, High Channel, One Signal Band Edge, Cell 850, Band 5



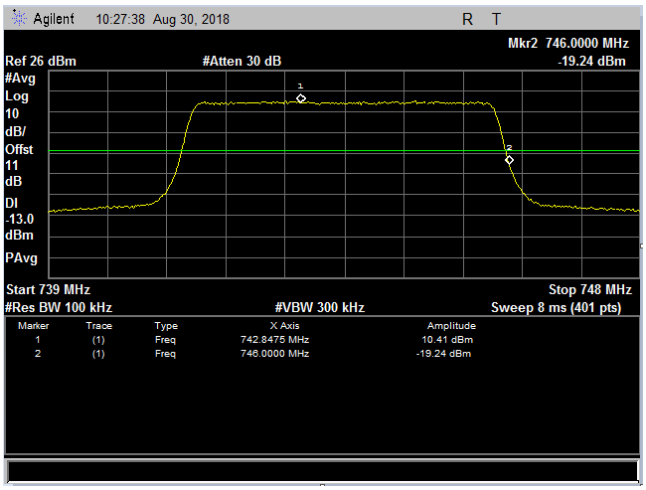
Plot 275. 10 MHz, High Channel, Two Signal Band Edge, Cell 850, Band 5



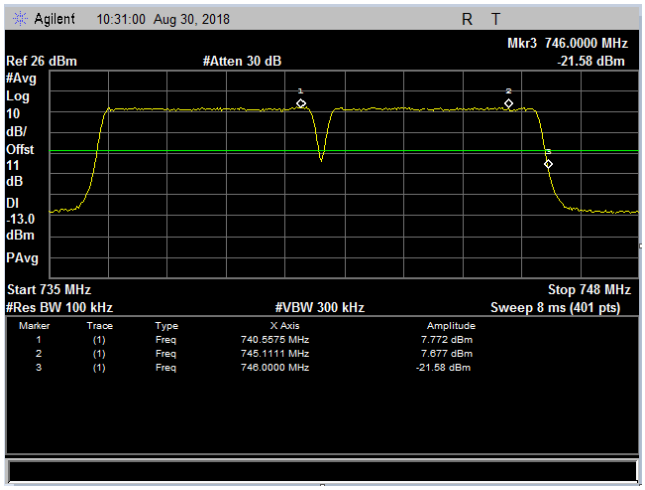
Plot 276. 10 MHz, Low Channel, One Signal Band Edge, Cell 850, Band 5



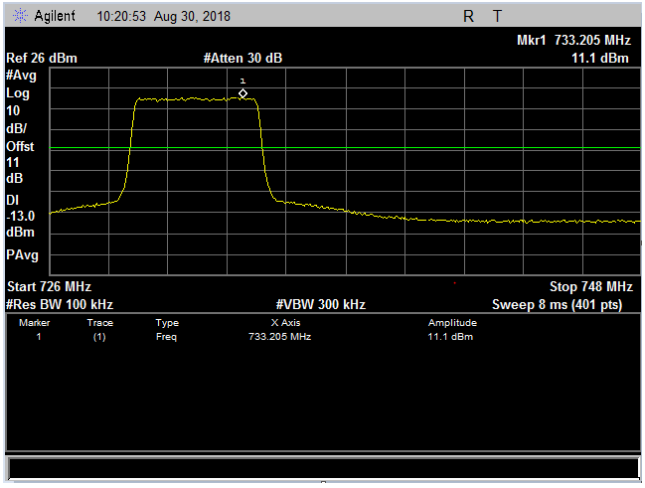
Plot 277. 10 MHz, Low Channel, Two Signal Band Edge, Cell 850, Band 5



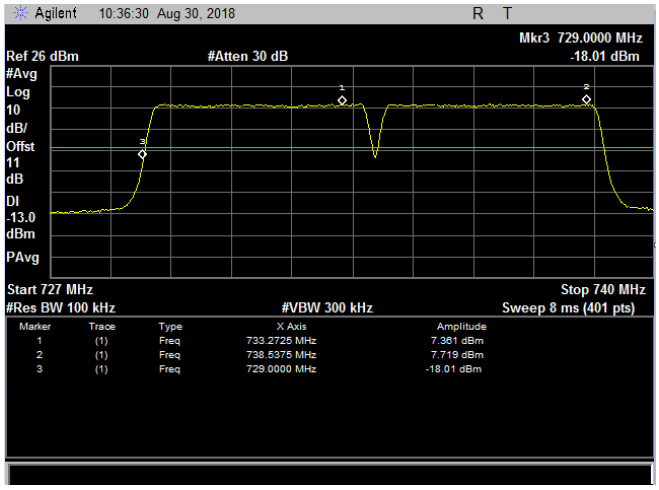
Plot 278. 5 MHz, High Channel, Band Edge, One signal, USA700_LTE700, Band 12



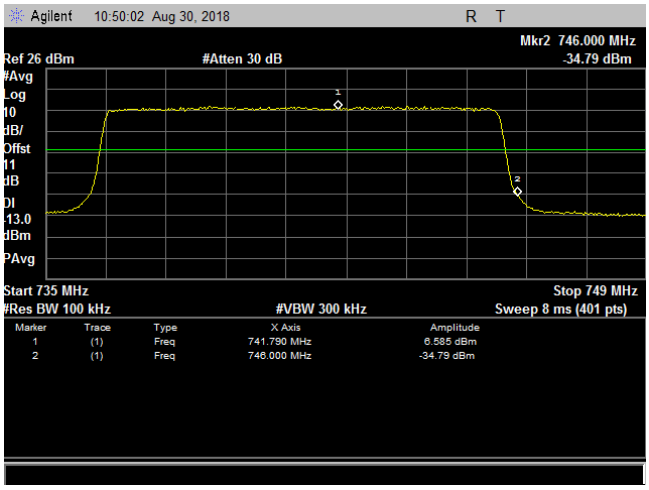
Plot 279. 5 MHz, High Channel Band Edge, Two signal, USA700_LTE700, Band 12



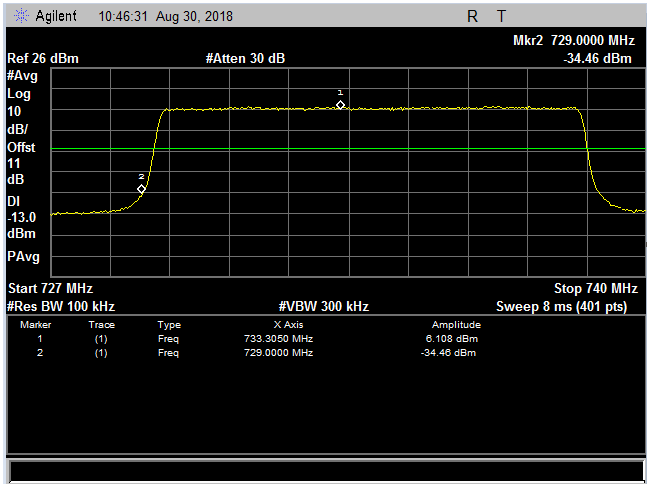
Plot 280. 5 MHz, Low Channel Band Edge, One signal, USA700_LTE700, Band 12



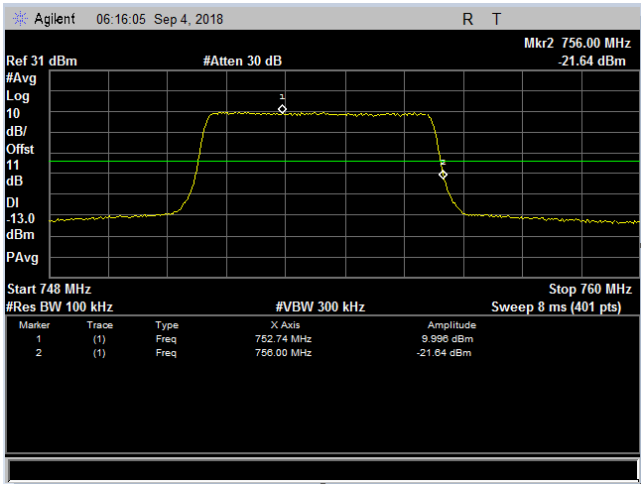
Plot 281. 5 MHz Low Channel Band Edge, Two signal, USA700_LTE700, Band 12



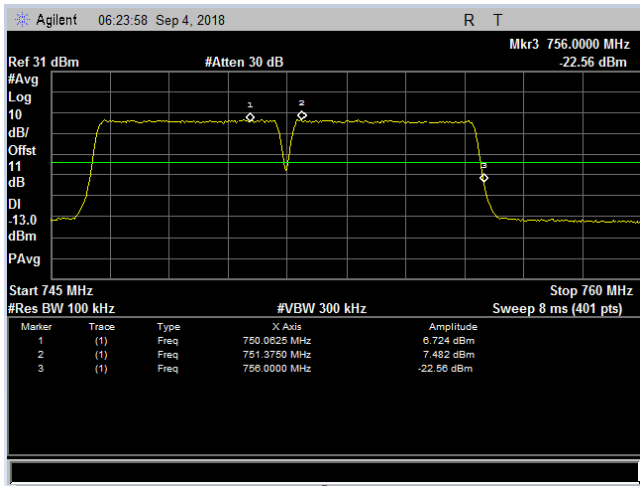
Plot 282. 10 MHz, High Channel Band Edge, One signal, USA700_LTE700, Band 12



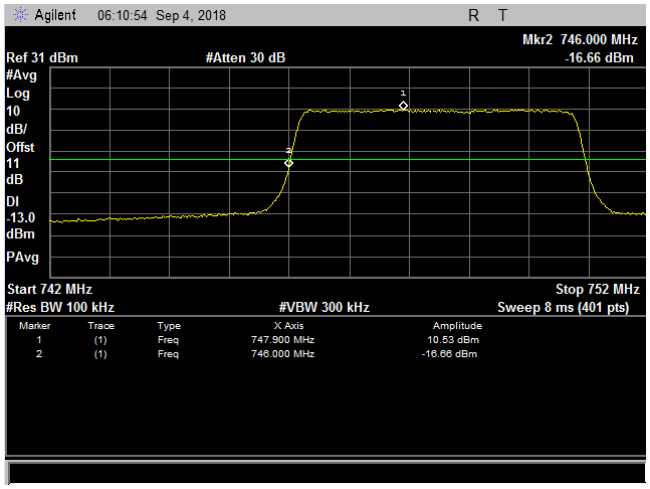
Plot 283. 10 MHz, Low Channel Band Edge, One signal, USA700_LTE700, Band 12



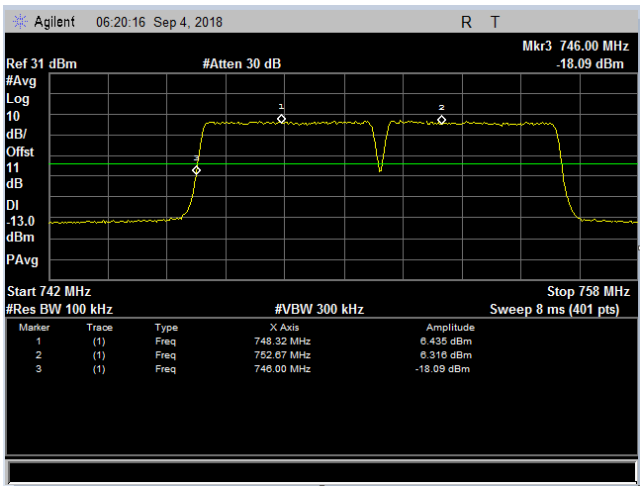
Plot 284. 5 MHz, High Channel, Band Edge, One Signal, LTE700 Upper 700C, Band 13



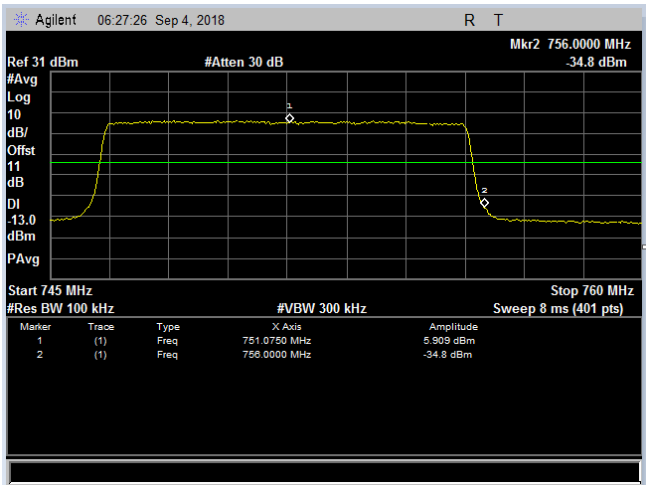
Plot 285. 5 MHz, High Channel Band Edge, Two Signal, LTE 700 Upper 700C, Band 13



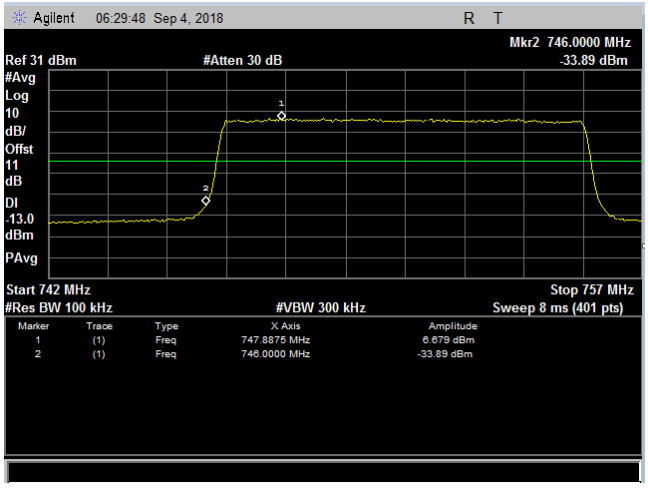
Plot 286. 5 MHz, Low Channel Band Edge, One Signal, LTE 700 Upper 700C, Band 13



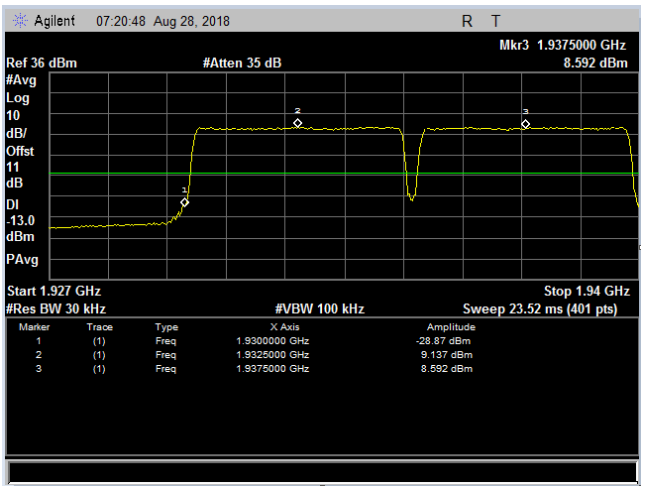
Plot 287. 5 MHz, Low Channel Band Edge, Two Signal, LTE 700 Upper 700C, Band 13



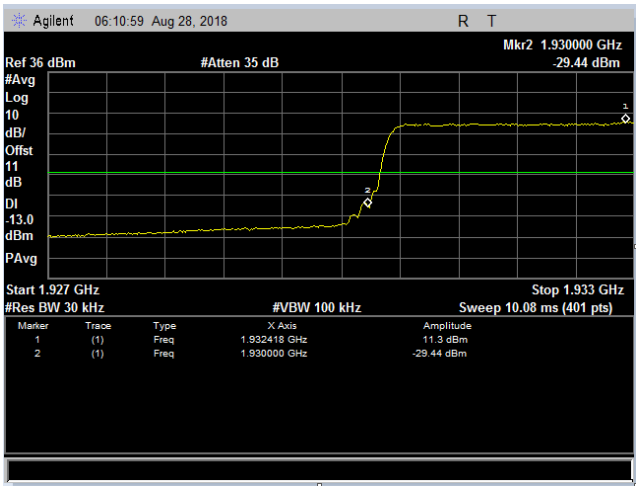
Plot 288. 10 MHz, High Channel Band Edge, One Signal, LTE 700 Upper 700C, Band 13



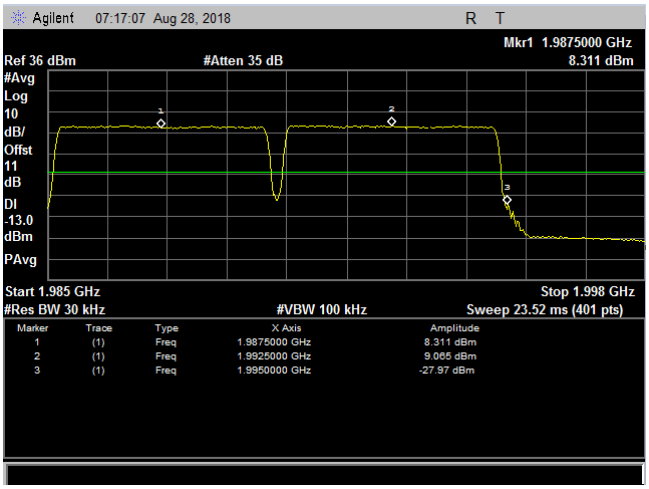
Plot 289. 10 MHz, Low Channel Band Edge, One Signal, LTE 700 Upper 700C, Band 13



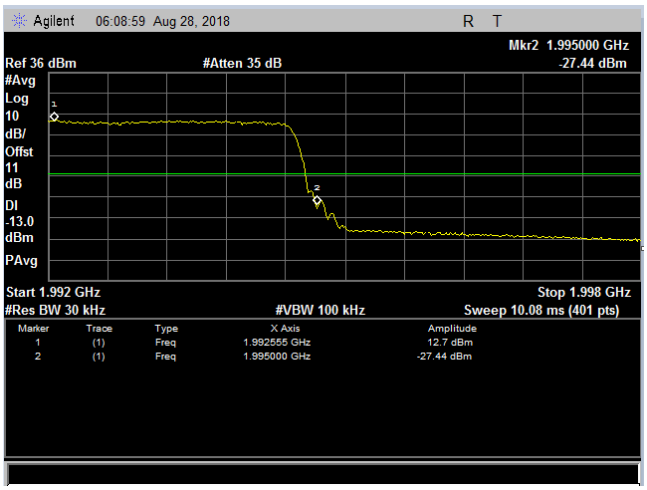
Plot 290. 5 MHz, Lower Channel band Edge two signal, PCS 1900



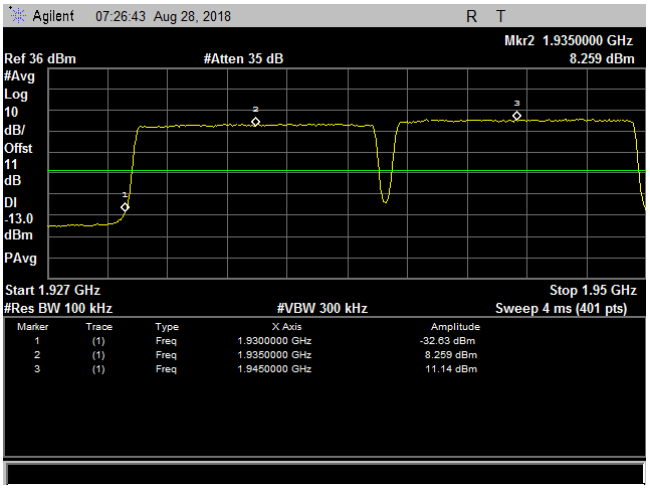
Plot 291. 5 MHz, Lower channel band Edge one signal PCS 1900



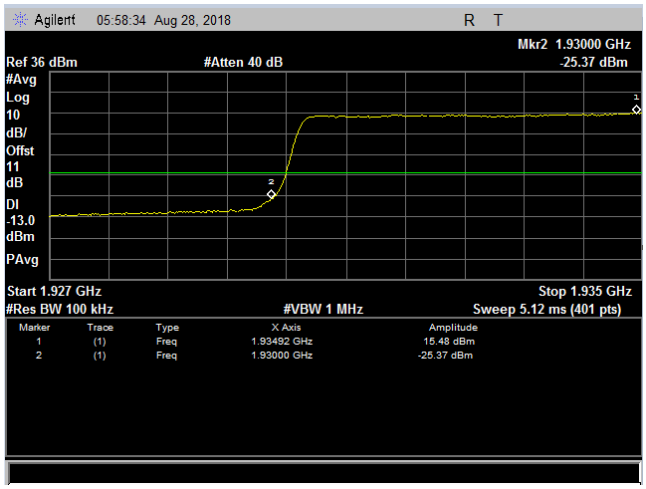
Plot 292. 5 MHz, Upper channel band Edge two signal, PCS 1900



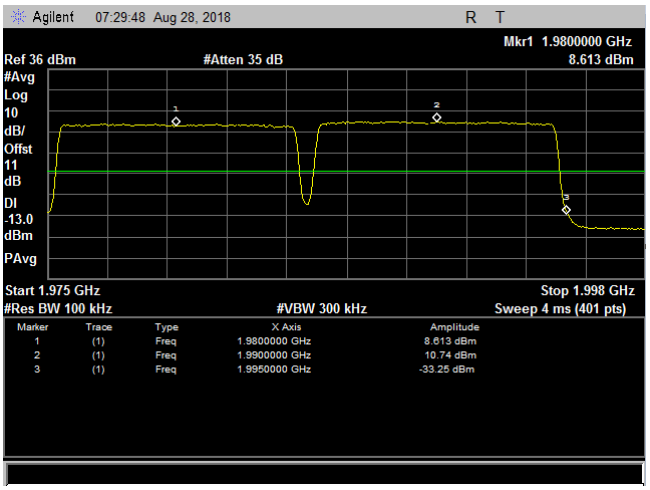
Plot 293. 5 MHz Upper channel band Edge one signal PCS 1900



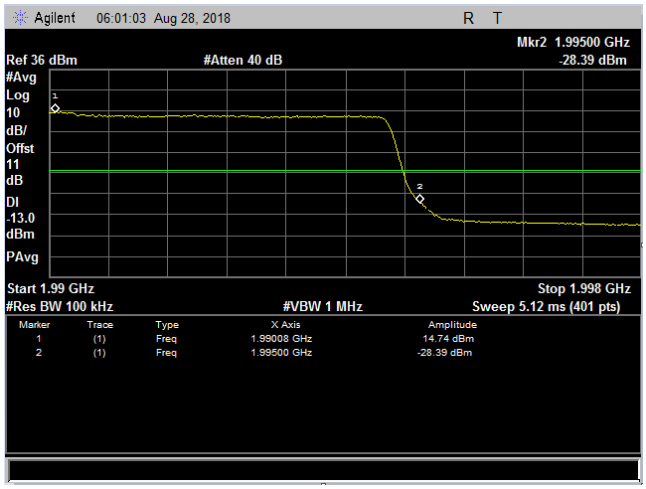
Plot 294. 10 MHz Lower channel band Edge two signal, PCS 1900



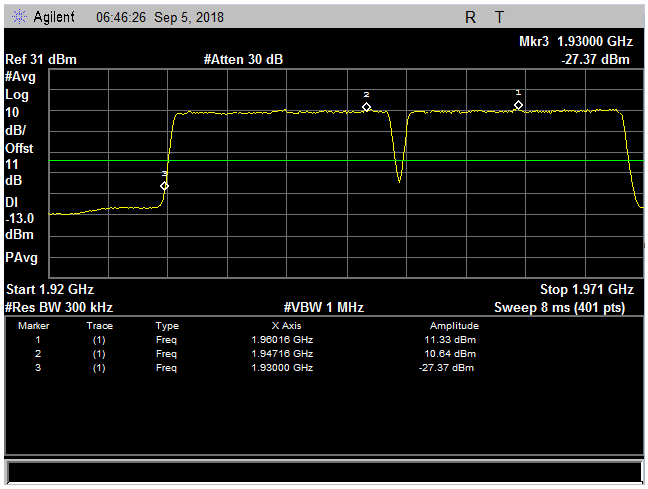
Plot 295. 10 MHz Lower channel band Edge one signal PCS 1900



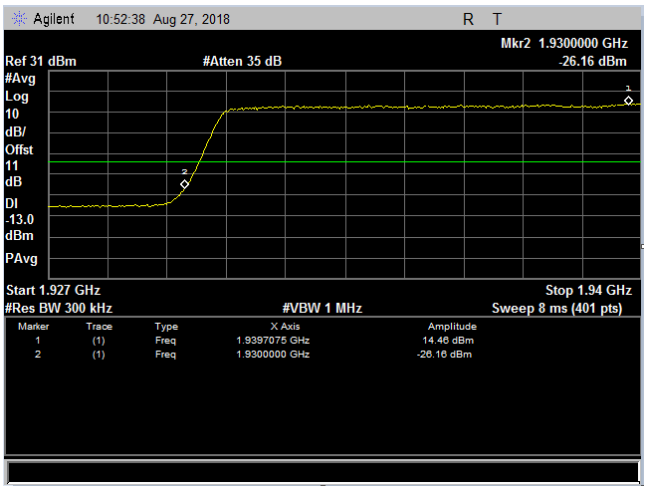
Plot 296. 10 MHz Upper channel band Edge two signal PCS 1900



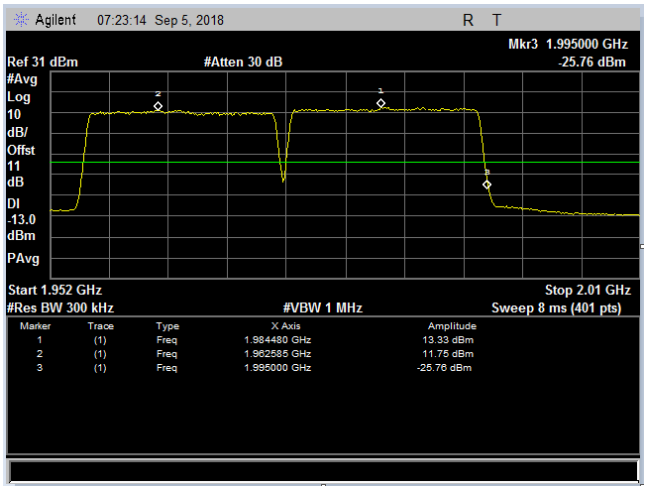
Plot 297. 10 MHz Upper channel band Edge one signal PCS 1900



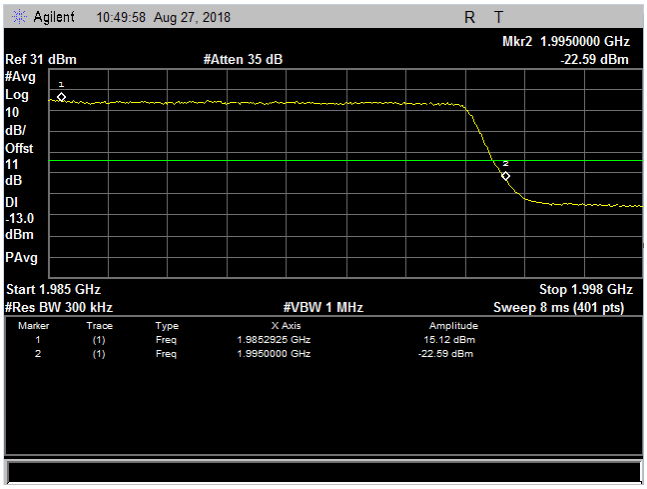
Plot 298. 20 MHz Lower channel band Edge two signal PCS 1900



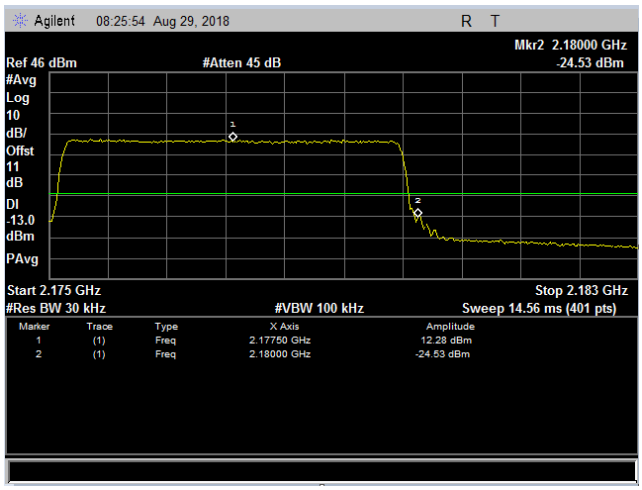
Plot 299. 20 MHz Lower channel band Edge one signal PCS 1900



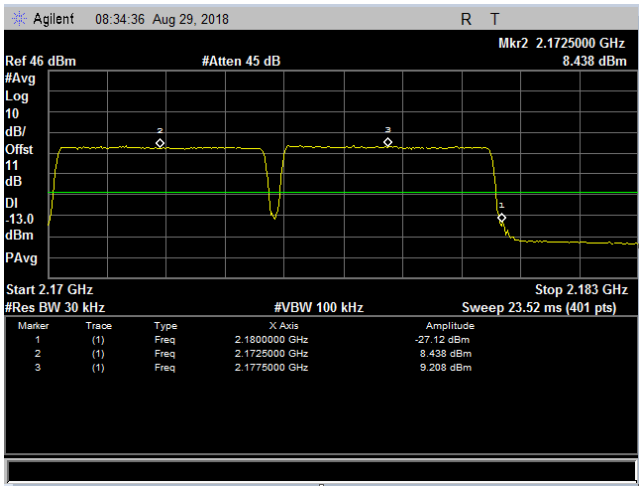
Plot 300. 20 MHz Upper channel band Edge two signal PCS 1900



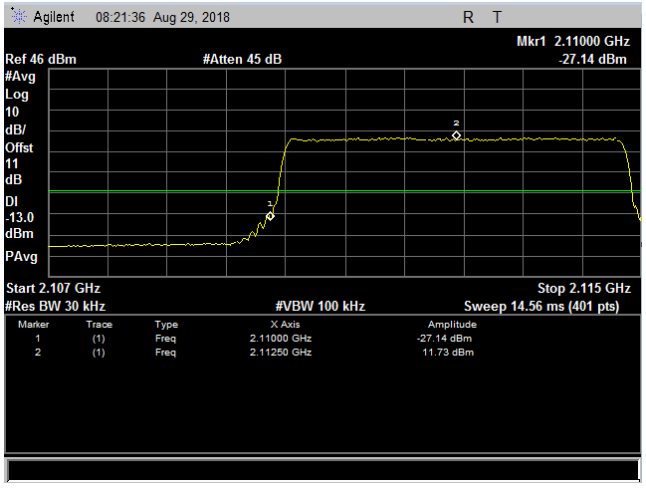
Plot 301. 20 MHz Upper channel band Edge one signal PCS 1900



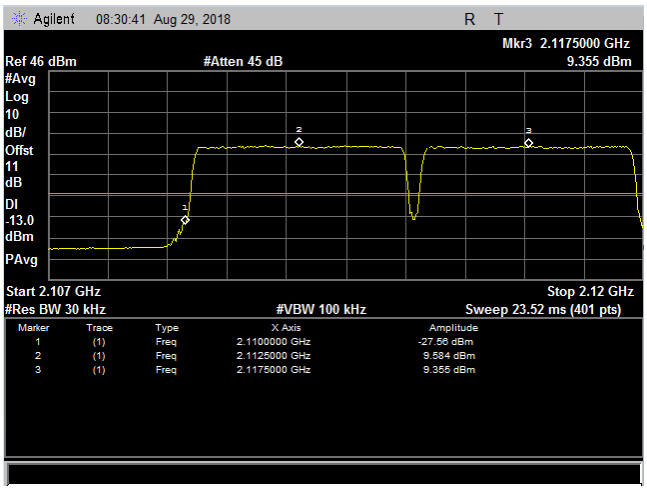
Plot 302. 5 MHz High Channel Band Edge, One Signal AWS



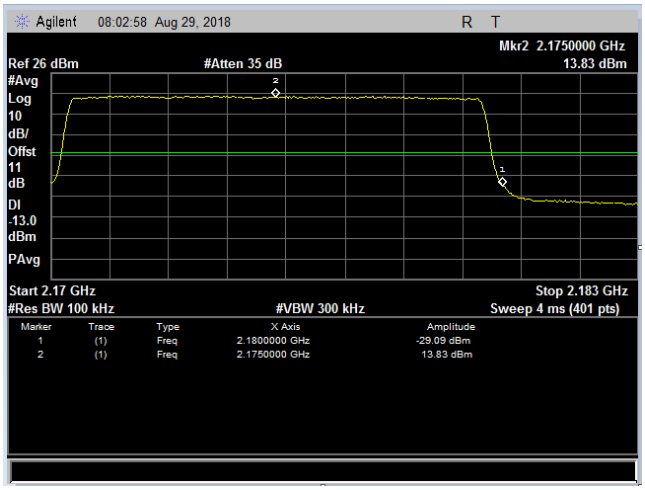
Plot 303. 5 MHz High Channel Band Edge, Two Signal AWS



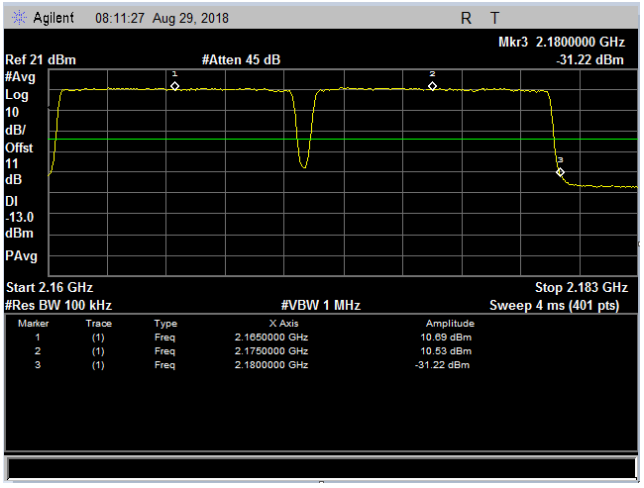
Plot 304. 5 MHz Low Channel Band Edge, One Signal AWS



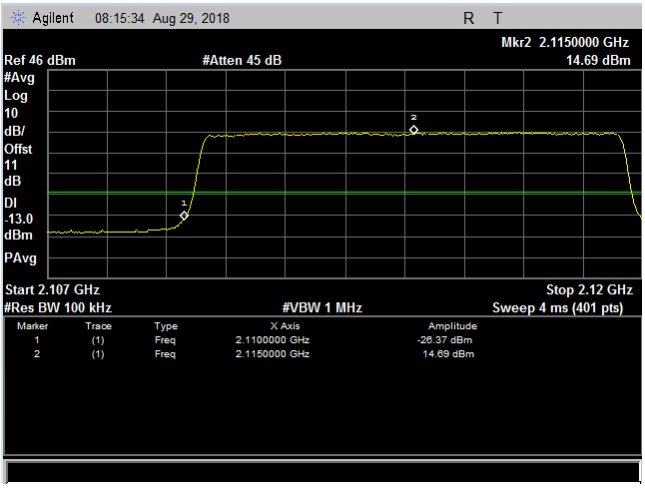
Plot 305. 5 MHz Low Channel Band Edge, Two Signal AWS



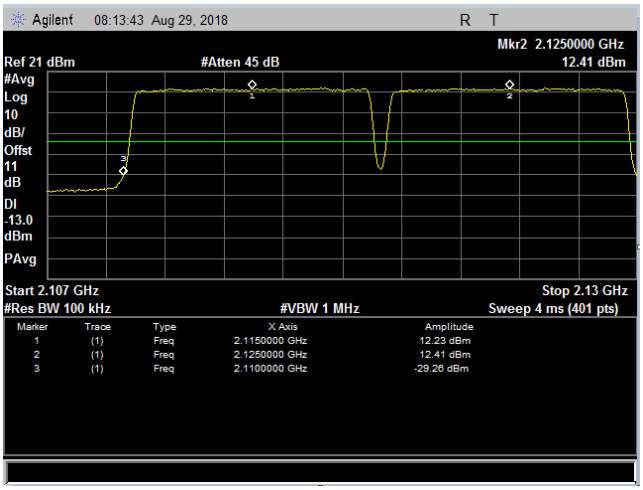
Plot 306. 10 MHz High Channel Band Edge, One Signal AWS



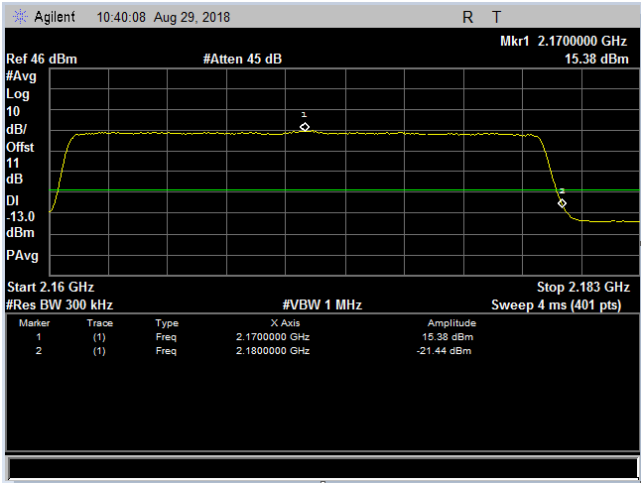
Plot 307. 10 MHz High Channel Band Edge, Two Signal AWS



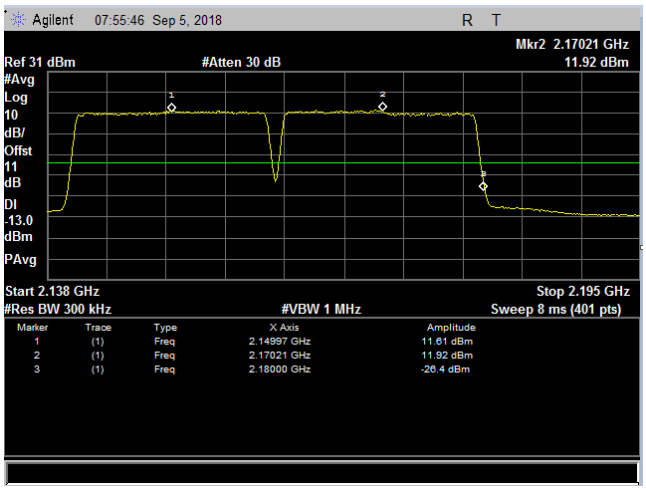
Plot 308. 10 MHz Low Channel Band Edge, One Signal AWS



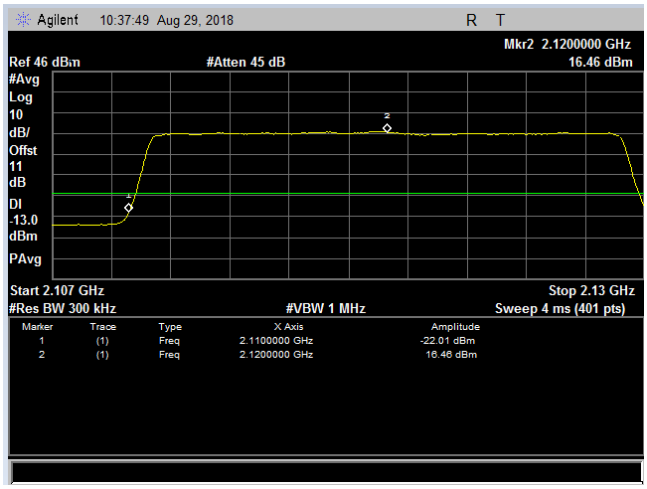
Plot 309. 10 MHz Low Channel Band Edge, Two Signal, AWS



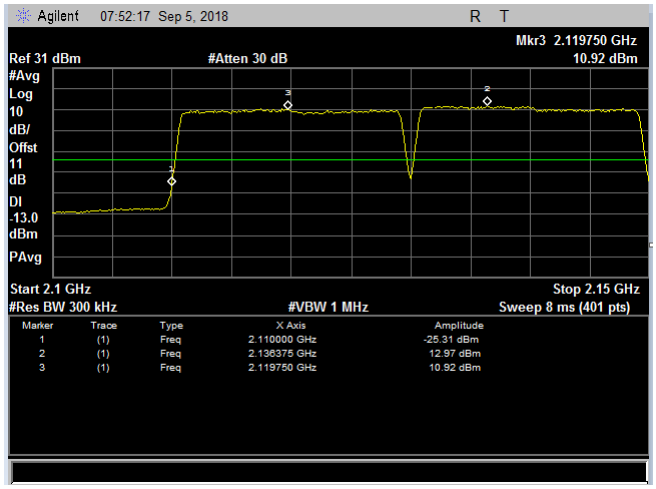
Plot 310. 20 MHz High Channel Band Edge, One Signal, AWS



Plot 311. 20 MHz High Channel Band Edge, Two Signal, AWS



Plot 312. 20 MHz Low Channel Band Edge, One Signal, AWS



Plot 313. 20 MHz Low Channel Band Edge, Two Signal, AWS

Electromagnetic Compatibility Criteria for Intentional Radiators

§2.1055 Frequency Stability

Test Requirement(s): **§2.1055 (a)** The frequency stability shall be measured with variation of ambient temperature. (d) The frequency stability shall be measured with variation of primary supply voltage.

§27.54 The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

Test Procedures: The EUT was placed inside a temperature chamber and Frequency measurements were made at the extremes of the specified temperature range and at intervals of 10° centigrade through the range. The operating voltage is varied to +/- 15 % of the nominal voltage at normal temperature.

Test Results: Equipment was found compliant with the requirements of this section.

Test Engineer(s): Bradley Jones

Test Date(s): November 29, 2018

Temp Degrees C	Voltage (AC)	Assigned Frequency (Hz)	Measured Frequency (Hz)	PPM	PPM Limit
-30	102		1,960,000,050	1.00	1.50
-30	120	1,960,000,050	1,960,000,050	0.00	1.50
-30	138		1,960,000,050	1.00	1.50
-20	102		1,960,000,054	1.00	1.50
-20	120	1,960,000,055	1,960,000,055	0.00	1.50
-20	138		1,960,000,054	1.00	1.50
-10	102		1,960,000,048	1.00	1.50
-10	120	1,960,000,048	1,960,000,048	0.00	1.50
-10	138		1,960,000,047	1.00	1.50
0	102		1,960,000,046	1.00	1.50
0	120	1,960,000,047	1,960,000,047	0.00	1.50
0	138		1,960,000,047	1.00	1.50
10	102		1,960,000,046	1.00	1.50
10	120	1,960,000,045	1,960,000,045	0.00	1.50
10	138		1,960,000,045	1.00	1.50
20	102		1,960,000,046	1.00	1.50
20	120	1,960,000,046	1,960,000,046	0.00	1.50
20	138		1,960,000,046	1.00	1.50
30	102		1,960,000,047	1.00	1.50
30	120	1,960,000,047	1,960,000,047	0.00	1.50
30	138		1,960,000,047	1.00	1.50
40	102		1,960,000,049	1.00	1.50
40	120	1,960,000,049	1,960,000,049	0.00	1.50
40	138		1,960,000,049	1.00	1.50
50	102		1,960,000,051	1.00	1.50
50	120	1,960,000,051	1,960,000,051	0.00	1.50
50	138		1,960,000,051	1.00	1.50

Table 18. Frequency Stability, 1930 - 1995 MHz, Test Results

Temp Degrees C	Voltage (AC)	Assigned Frequency (Hz)	Measured Frequency (Hz)	PPM	PPM Limit
-30	102		881,500,023	1.00	1.50
-30	120	881,500,024	881,500,024	0.00	1.50
-30	138		881,500,024	1.00	1.50
-20	102		881,500,024	1.00	1.50
-20	120	881,500,024	881,500,024	0.00	1.50
-20	138		881,500,024	1.00	1.50
-10	102		881,500,024	1.00	1.50
-10	120	881,500,024	881,500,024	0.00	1.50
-10	138		881,500,024	1.00	1.50
0	102		881,500,025	1.00	1.50
0	120	881,500,025	881,500,025	0.00	1.50
0	138		881,500,025	1.00	1.50
10	102		881,500,025	1.00	1.50
10	120	881,500,026	881,500,026	0.00	1.50
10	138		881,500,025	1.00	1.50
20	102		881,500,025	1.00	1.50
20	120	881,500,025	881,500,025	0.00	1.50
20	138		881,500,025	1.00	1.50
30	102		881,500,025	1.00	1.50
30	120	881,500,025	881,500,025	0.00	1.50
30	138		881,500,025	1.00	1.50
40	102		881,500,024	1.00	1.50
40	120	881,500,025	881,500,025	0.00	1.50
40	138		881,500,025	1.00	1.50
50	102		881,500,024	1.00	1.50
50	120	881,500,024	881,500,024	0.00	1.50
50	138		881,500,024	1.00	1.50

Table 19. Frequency Stability, 869 - 894 MHz, Test Results

Temp Degrees C	Voltage (AC)	Assigned Frequency (Hz)	Measured Frequency (Hz)	PPM	PPM Limit
-30	102		737,500,020	1.00	1.50
-30	120	737,500,020	737,500,020	0.00	1.50
-30	138		737,500,019	1.00	1.50
-20	102		737,500,019	1.00	1.50
-20	120	737,500,019	737,500,019	0.00	1.50
-20	138		737,500,020	1.00	1.50
-10	102		737,500,019	1.00	1.50
-10	120	737,500,019	737,500,019	0.00	1.50
-10	138		737,500,019	1.00	1.50
0	102		737,500,018	1.00	1.50
0	120	737,500,019	737,500,019	0.00	1.50
0	138		737,500,019	1.00	1.50
10	102		737,500,019	1.00	1.50
10	120	737,500,019	737,500,019	0.00	1.50
10	138		737,500,019	1.00	1.50
20	102		737,500,020	1.00	1.50
20	120	737,500,020	737,500,020	0.00	1.50
20	138		737,500,019	1.00	1.50
30	102		737,500,021	1.00	1.50
30	120	737,500,020	737,500,020	0.00	1.50
30	138		737,500,020	1.00	1.50
40	102		737,500,021	1.00	1.50
40	120	737,500,022	737,500,022	0.00	1.50
40	138		737,500,021	1.00	1.50
50	102		737,500,023	1.00	1.50
50	120	737,500,022	737,500,022	0.00	1.50
50	138		737,500,023	1.00	1.50

Table 20. Frequency Stability, 729 - 746 MHz, Test Results

Temp Degrees C	Voltage (AC)	Assigned Frequency (Hz)	Measured Frequency (Hz)	PPM	PPM Limit
-30	102		751,000,020	1.00	1.50
-30	120	751,000,020	751,000,020	0.00	1.50
-30	138		751,000,020	1.00	1.50
-20	102		751,000,021	1.00	1.50
-20	120	751,000,021	751,000,021	0.00	1.50
-20	138		751,000,021	1.00	1.50
-10	102		751,000,021	1.00	1.50
-10	120	751,000,022	751,000,022	0.00	1.50
-10	138		751,000,022	1.00	1.50
0	102		751,000,023	1.00	1.50
0	120	751,000,023	751,000,023	0.00	1.50
0	138		751,000,024	1.00	1.50
10	102		751,000,023	1.00	1.50
10	120	751,000,024	751,000,024	0.00	1.50
10	138		751,000,023	1.00	1.50
20	102		751,000,024	1.00	1.50
20	120	751,000,025	751,000,025	0.00	1.50
20	138		751,000,024	1.00	1.50
30	102		751,000,024	1.00	1.50
30	120	751,000,024	751,000,024	0.00	1.50
30	138		751,000,024	1.00	1.50
40	102		751,000,024	1.00	1.50
40	120	751,000,024	751,000,024	0.00	1.50
40	138		751,000,024	1.00	1.50
50	102		751,000,023	1.00	1.50
50	120	751,000,023	751,000,023	0.00	1.50
50	138		751,000,023	1.00	1.50

Table 21. Frequency Stability, 746 - 756 MHz, Test Results

Part 27 DL 2110-2180 MHz and UL 1710-1780 MHz					
Temp Degrees C	**Voltage (AC)**	**Assigned Frequency (Hz)**	**Measured Frequency (Hz)**	**PPM**	**PPM Limit**
-30	102		2,145,000,144	1.00	1.50
-30	120	2,145,000,158	2,145,000,158	0.00	1.50
-30	138		2,145,000,142	1.00	1.50
-20	102		2,145,000,137	1.00	1.50
-20	120	2,145,000,140	2,145,000,140	0.00	1.50
-20	138		2,145,000,137	1.00	1.50
-10	102		2,145,000,118	1.00	1.50
-10	120	2,145,000,118	2,145,000,118	0.00	1.50
-10	138		2,145,000,117	1.00	1.50
0	102		2,145,000,110	1.00	1.50
0	120	2,145,000,111	2,145,000,111	0.00	1.50
0	138		2,145,000,108	1.00	1.50
10	102		2,145,000,104	1.00	1.50
10	120	2,145,000,105	2,145,000,105	0.00	1.50
10	138		2,145,000,111	1.00	1.50
20	102		2,145,000,095	1.00	1.50
20	120	2,145,000,096	2,145,000,096	0.00	1.50
20	138		2,145,000,090	1.00	1.50
30	102		2,145,000,085	1.00	1.50
30	120	2,145,000,083	2,145,000,083	0.00	1.50
30	138		2,145,000,082	1.00	1.50
40	102		2,145,000,079	1.00	1.50
40	120	2,145,000,077	2,145,000,077	0.00	1.50
40	138		2,145,000,078	1.00	1.50
50	102		2,145,000,080	1.00	1.50
50	120	2,145,000,079	2,145,000,079	0.00	1.50
50	138		2,145,000,080	1.00	1.50

Table 22. Frequency Stability, 2110 - 2180 MHz, Test Results

Electromagnetic Compatibility Criteria for Intentional Radiators

Filter Response

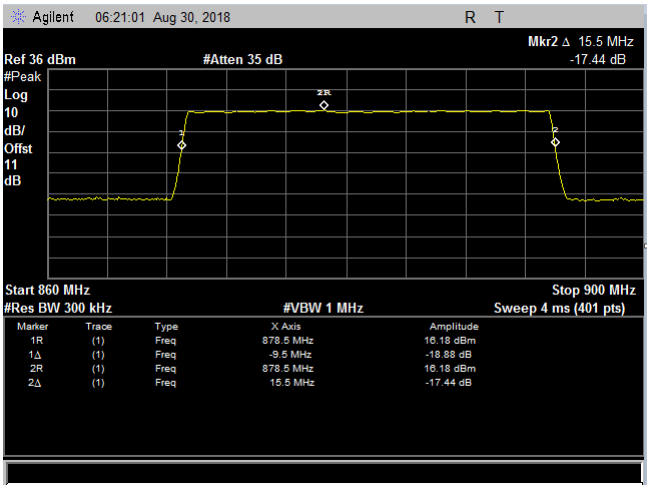
Test Procedures: Test was performed according to section 3.3 of the FCC KDB 935210 D05 v01r02.

Test Results: Equipment was found compliant with the requirements of this section.

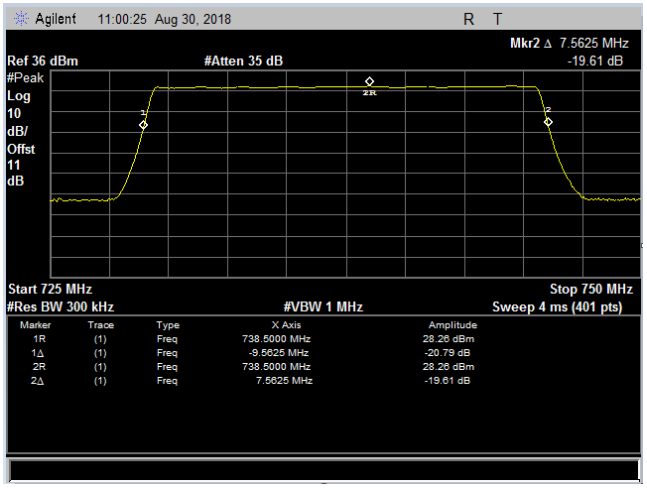
Test Engineer(s): Deepak Giri

Test Date(s): September 21, 2018

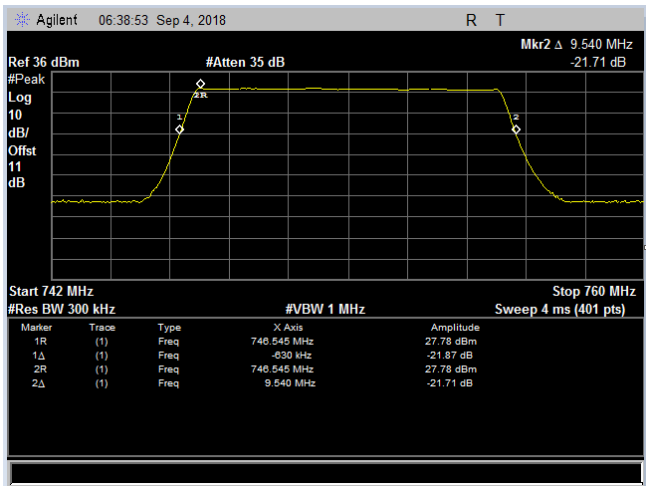
Filter Response



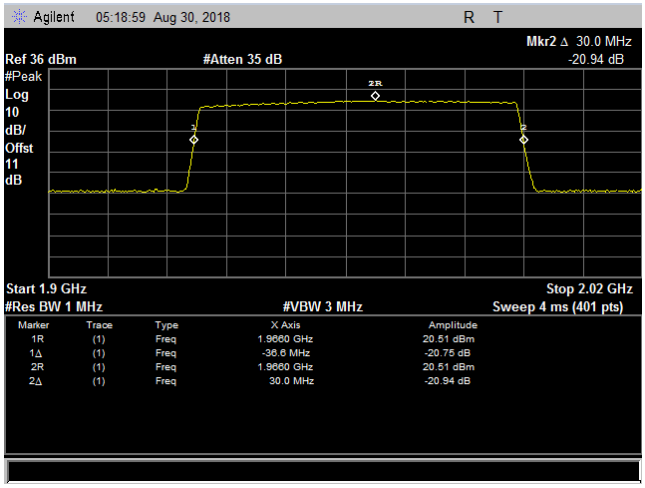
Plot 314. Filter Response, 869 – 894 MHz, Out of Band Rejection Cell 850



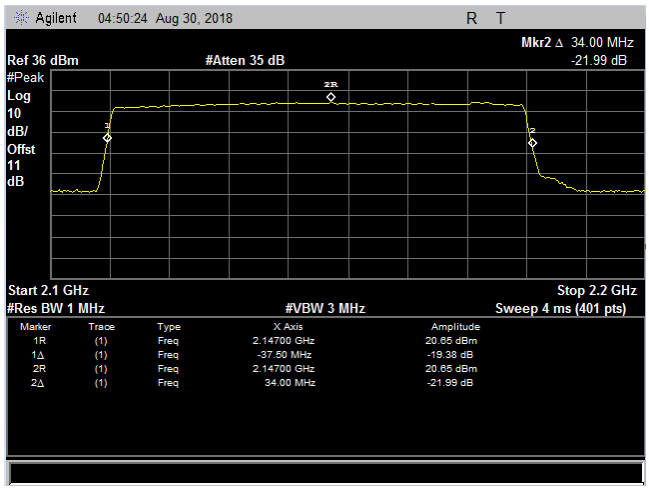
Plot 315. Filter Response, 729 – 746 MHz, Out of Band Rejection, USA700_LTE700, Band 12



Plot 316. Filter Response, 746 – 756 MHz, Out of Band Rejection, LTE 700 Band, Band 13



Plot 317. Filter Response, 1930 – 1995 MHz, Out of Band Rejection, PCS 1900



Plot 318. Filter Response, 2110 – 2180 MHz, Out of Band Rejection, AWS Band

IV. Test Equipment

Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2005.

MET Asset #	Equipment	Manufacturer	Model	Last Cal Date	Cal Due Date
1T4300A	SEMI-ANECHOIC CHAMBER # 1 (FCC)	EMC TEST SYSTEMS	NONE	01/31/2016	01/31/2019
1T4751	Antenna - Bilog	Sunol Sciences	JB6	07/30/2018	01/30/2020
1T4409	EMI Receiver	Rohde & Schwarz	ESIB7	12/07/2016	12/07/2018
1T4149	High-Frequency Anechoic Chamber	Ray Proof	81	08/23/2001	08/23/2002
1T4483	Antenna; Horn	ETS-Lindgren	3117	04/19/2017	10/19/2018
1T8831	Signal Analyzer (CXA)	Keysight Technologies	N9000A	01/29/2018	01/29/2019
1T4612	Spectrum Analyzer	Agilent Technologies	E4407B	05/15/2018	11/15/2019
1T4497	Signal Generator	Agilent Technologies	E4432B	04/22/2016	10/22/2017
1T4299	Signal Generator	HP	E4432B	12/12/2016	06/12/2018
1T8743	Preamplifier	A.H. Systems, Inc.	PAM-0118P	03/11/2015	03/11/2016
1T4483	Antenna; Horn	ETS-Lindgren	3117	04/19/2017	10/19/2018
1T8831	Signal Analyzer (CXA)	Keysight Technologies	N9000A	01/29/2018	01/29/2019

Table 23. Test Equipment List

Note: Functionally tested equipment is verified using calibrated instrumentation at the time of testing.

V. Certification & User's Manual Information

Certification & User's Manual Information

A. Certification Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 2, Subpart I — Marketing of Radio frequency devices:

§ 2.801 Radio-frequency device defined.

As used in this part, a radio-frequency device is any device which in its operation is capable of Emitting radio-frequency energy by radiation, conduction, or other means. Radio- frequency devices include, but are not limited to:

(a) The various types of radio communication transmitting devices described throughout this chapter.

(b) The incidental, unintentional and intentional radiators defined in Part 15 of this chapter.

(c) The industrial, scientific, and medical equipment described in Part 18 of this chapter.

(d) Any part or component thereof which in use emits radio-frequency energy by radiation, conduction, or other means.

§ 2.803 Marketing of radio frequency devices prior to equipment authorization.

(a) Except as provided elsewhere in this chapter, no person shall sell or lease, or offer for sale or lease (including advertising for sale or lease), or import, ship or distribute for the purpose of selling or leasing or offering for sale or lease, any radio frequency device unless:

(1) In the case of a device subject to certification, such device has been authorized by the Commission in accordance with the rules in this chapter and is properly identified and labeled as required by §2.925 and other relevant sections in this chapter; or

(2) In the case of a device that is not required to have a grant of equipment authorization issued by the Commission, but which must comply with the specified technical standards prior to use, such device also complies with all applicable administrative (including verification of the equipment or authorization under a Declaration of Conformity, where required), technical, labeling and identification requirements specified in this chapter.

(d) Notwithstanding the provisions of paragraph (a) of this section, the offer for sale solely to business, commercial, industrial, scientific or medical users (but not an offer for sale to other parties or to end users located in a residential environment) of a radio frequency device that is in the conceptual, developmental, design or pre-production stage is permitted prior to equipment authorization or, for devices not subject to the equipment authorization requirements, prior to a determination of compliance with the applicable technical requirements *provided* that the prospective buyer is advised in writing at the time of the offer for sale that the equipment is subject to the FCC rules and that the equipment will comply with the appropriate rules before delivery to the buyer or to centers of distribution.

(e)(1) Notwithstanding the provisions of paragraph (a) of this section, prior to equipment authorization or determination of compliance with the applicable technical requirements any radio frequency device may be operated, but not marketed, for the following purposes and under the following conditions:

(i) Compliance testing;

(ii) Demonstrations at a trade show provided the notice contained in paragraph (c) of this section is displayed in a conspicuous location on, or immediately adjacent to, the device;

(iii) Demonstrations at an exhibition conducted at a business, commercial, industrial, scientific or medical location, but excluding locations in a residential environment, provided the notice contained in paragraphs (c) or (d) of this section, as appropriate, is displayed in a conspicuous location on, or immediately adjacent to, the device;

(iv) Evaluation of product performance and determination of customer acceptability, provided such operation takes place at the manufacturer's facilities during developmental, design or pre-production states; or

(v) Evaluation of product performance and determination of customer acceptability where customer acceptability of a radio frequency device cannot be determined at the manufacturer's facilities because of size or unique capability of the device, provided the device is operated at a business, commercial, industrial, scientific or medical user's site, but not at a residential site, during the development, design or pre-production stages.

(e)(2) For the purpose of paragraphs (e)(1)(iv) and (e)(1)(v) of this section, the term *manufacturer's facilities* includes the facilities of the party responsible for compliance with the regulations and the manufacturer's premises, as well as the facilities of other entities working under the authorization of the responsible party in connection with the development and manufacture, but not the marketing, of the equipment.

(f) For radio frequency devices subject to verification and sold solely to business, commercial, industrial, scientific and medical users (excluding products sold to other parties or for operation in a residential environment), parties responsible for verification of the devices shall have the option of ensuring compliance with the applicable technical specifications of this chapter at each end user's location after installation, provided that the purchase or lease agreement includes a proviso that such a determination of compliance be made and is the responsibility of the party responsible for verification of the equipment.

Certification & User's Manual Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 2, Subpart J — Equipment Authorization Procedures:

§ 2.901 Basis and Purpose

(a) In order to carry out its responsibilities under the Communications Act and the various treaties and international regulations, and in order to promote efficient use of the radio spectrum, the Commission has developed technical standards for radio frequency equipment and parts or components thereof. The technical standards applicable to individual types of equipment are found in that part of the rules governing the service wherein the equipment is to be operated.[1] *In addition to the technical standards provided, the rules governing the service may require that such equipment be verified by the manufacturer or importer*, be authorized under a Declaration of Conformity, or receive an equipment authorization from the Commission by one of the following procedures: certification or registration.

(b) The following sections describe the verification procedure, the procedure for a Declaration of Conformity, and the procedures to be followed in obtaining certification from the Commission and the conditions attendant to such a grant.

§ 2.907 Certification.

(a) Certification is an equipment authorization issued by the Commission, based on representation and test data submitted by the applicant.

(b) Certification attaches to all units subsequently marketed by the grantee which are identical (see Section 2.908) to the sample tested except for permissive changes or other variations authorized by the Commission pursuant to Section 2.1043.

[1] In this case, the equipment is subject to the rules of Part 15. More specifically, the equipment falls under Subpart B (of Part 15), which deals with unintentional radiators.

Certification & User's Manual Information

§ 2.948 Description of measurement facilities.

(a) Each party making measurements of equipment that is subject to an equipment authorization under Part 15 or Part 18 of this chapter, regardless of whether the measurements are filed with the Commission or kept on file by the party responsible for compliance of equipment marketed within the U.S. or its possessions, shall compile a description of the measurement facilities employed.

(1) If the measured equipment is subject to the verification procedure, the description of the measurement facilities shall be retained by the party responsible for verification of the equipment.

(i) If the equipment is verified through measurements performed by an independent laboratory, it is acceptable for the party responsible for verification of the equipment to rely upon the description of the measurement facilities retained by or placed on file with the Commission by that laboratory. In this situation, the party responsible for the verification of the equipment is not required to retain a duplicate copy of the description of the measurement facilities.

(ii) If the equipment is verified based on measurements performed at the installation site of the equipment, no specific site calibration data is required. It is acceptable to retain the description of the measurement facilities at the site at which the measurements were performed.

(2) If the equipment is to be authorized by the Commission under the certification procedure, the description of the measurement facilities shall be filed with the Commission's Laboratory in Columbia, Maryland. The data describing the measurement facilities need only be filed once but must be updated as changes are made to the measurement facilities or as otherwise described in this section. At least every three years, the organization responsible for filing the data with the Commission shall certify that the data on file is current.

Certification & User's Manual Information

1. Label and User's Manual Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 15, Subpart A — General:

§ 15.19 Labeling requirements.

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

(1) Receivers associated with the operation of a licensed radio service, e.g., FM broadcast under Part 73 of this chapter, land mobile operation under Part 90, etc., 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 condition that this device does not cause harmful interference.

(2) A stand-alone cable input selector switch, shall bear the following statement in a conspicuous location on the device:

This device is verified to comply with Part 15 of the FCC Rules for use with cable television service.

(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 under paragraph (a) of this section is required to be affixed only to the main control unit.

(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.

§ 15.21 Information to user.

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Verification & User's Manual Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 15, Subpart B — Unintentional Radiators:

§ 15.105 Information to the user.

(a) For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

– Reorient or relocate the receiving antenna.

– Increase the separation between the equipment and receiver.

– Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

– Consult the dealer or an experienced radio/TV technician for help.

End of Report

