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DATE: 16 February 2016

I.T.L. (PRODUCT TESTING) LTD.

FCC Radio Test Report

for

Corning Optical Communication Wireless

Equipment under test:

ONE- Optical Network Evolution DAS

RAU-5x Remote Antenna Unit PN:
RAU5xUS/RAU5xUS-A

ESMR-CELL-PCS-LTE-AWS
(ESMR-CELL-PCS Section)

Tested by: _____
M. Zohar

Approved by: _____
D. Shidlowsky

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This report relates only to items tested.

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Measurement/Technical Report for
Corning Optical Communication Wireless

ONE- Optical Network Evolution DAS

FCC ID: OJF1RAU5X

This report concerns:	Original Grant: X Class II change: Class I change:
Equipment type:	PCS Licensed Transmitter
Limits used:	47CFR Parts 2, 22, 24, 27, 90

Measurement procedure used is ANSI C63.4-2014, KDB 971168 D01 and KDB 935210.

Substitution Method used as in ANSI/TIA-603-C: 2004

Application for Certification
prepared by:
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1. General Information

1.1 Administrative Information

Manufacturer:	Corning Optical Communication Wireless
Manufacturer's Address:	13221 Woodland Park Rd., Suite #400 Herndon, VA. 20171, U.S.A. Tel: +1-541-758-2880 Fax: +1-703-848-0260
Manufacturer's Representative:	Habib Riazi
Equipment Under Test (E.U.T):	ONE- Optical Network Evolution DAS
Equipment Model No.:	RAU-5x Remote Antenna Unit PN: RAU5xUS/RAU5xUS-A
Equipment Serial No.:	Not Designated
Date of Receipt of E.U.T:	29 November 2015
Start of Test:	29 November 2015
End of Test:	10 December 2015
Test Laboratory Location:	I.T.L (Product Testing) Ltd. 1 Batsheva St, Lod, Israel 7116002
Test Specifications:	FCC Parts 22, 24, 27, 90

1.2 List of Accreditations

The EMC laboratory of I.T.L. is accredited by/registered with the following bodies:

1. The American Association for Laboratory Accreditation (A2LA) (U.S.A.), Certificate No. 1152.01.
2. The Federal Communications Commission (FCC) (U.S.A.), FCC Designation Number IL1005.
3. The Israel Ministry of the Environment (Israel), Registration No. 1104/01.
4. The Voluntary Control Council for Interference by Information Technology Equipment (VCCI) (Japan), Registration Numbers: C-3006, R-2729, T-1877, G-245.
5. Industry Canada (Canada), IC File No.: 46405-4025; Site Nos. IC 4025A-1, IC 4025A-2.

I.T.L. Product Testing Ltd. is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this test report have been determined in accordance with I.T.L.'s terms of accreditation unless stated otherwise in the report.

1.3 Product Description

The Optical Network Platform (ONE™) by Corning provides a flexible in-building RF and network digital coverage solution based on a fiber optic transport backbone.

The fiber-optics infrastructure is easily deployable via a wide range of pre-terminated composite cables and advanced end-to-end equipment. Easy to design, Plug and Play™ connectors, significantly reduce installation cost and deployment time.

The ONE™ solution is an ideal fit for large, high-rise or campus-style deployments. It generates significant CAPEX savings and OPEX savings through the use of user configurable sectorization and an infrastructure that is simple to deploy and efficient in usage.

Dynamic sectorization management allows precise service distribution control to meet changing density needs, and provides further savings by enabling sharing of equipment at various levels for service providers.

Radio source agnostic, remote units can be used as network extenders. Ethernet capability with dedicated fiber link for Wi-Fi offload brings a higher level of granularity and support for devices and applications with very high speed requirements.

Model name	RAU5x ONE wireless platform
Working voltage	48VDC
Mode of operation	DAS Remote Unit
Modulations	**ESMR/CELL/PCS/AWS bands:** GSM,WCDMA,LTE **LTE700 band:** QPSK,16QAM,64QAM
Frequency Range	**ESMR:** 862M-869M **CELL:** 869M-894M **PCS:** 1930M-1995M **LTE :**728M-758M **AWS:** 2110M-2180M
Transmit power	**ESMR/CELL/LTE:** ~15dBm **PCS/AWS:** ~20dBm
Antenna Gain	12.5dBi
DATA rate	N/A
Modulation BW	**GSM:** 500KHz **WCDMA:** 5MHz **LTE:** 10MHz/5MHz(for ESMR band)
Temperature (°C)/ Humidity (%RH)	26°C / 35%

1.4 Test Methodology

Both conducted and radiated testing were performed according to the procedures in KDB 971168 D01, KDB 935210 and ANSI C63.4: 2014. Radiated testing was performed at an antenna to EUT distance of 3 meters.

1.5 Test Facility

Both conducted and radiated emissions tests were performed at I.T.L.'s testing facility in Lod, Israel. I.T.L.'s EMC Laboratory is accredited by A2LA, certificate No. 1152.01 and its FCC Designation Number is IL1005.

1.6 Measurement Uncertainty

Radiated Emission (CISPR 11, EN 55011, CISPR 22, EN 55022, ANSI C63.4) for open site 30-1000MHz:
Expanded Uncertainty (95% Confidence, K=2):
± 4.98 dB

2. System Test Configuration

2.1 Justification

The test setup was configured to closely resemble the standard installation.
The EUT consists of the HEU, the OIU and the RAU5x.
All source signals are represented in the setup by appropriate signal generators.
An "Exercise" SW on the computer was used to enable / disable transmission of the RAU5x, while the EUT output was connected to the spectrum analyzer.
All channels transmitted during the testing.
There is neither an intermediate amplified nor donor antenna in the uplink.
All components included in the UL path are connected by cables.

2.2 EUT Exercise Software

HCM_2.0 Build2 RC1
ACM_2a00_18_01.bin
RMM_5a00_18_01.bin
OIM_7a03_18_01.bin
RAU5_9a64_18_03.bin

2.3 Special Accessories

No special accessories were needed in order to achieve compliance.

2.4 Equipment Modifications

No modifications were needed in order to achieve compliance.

2.5 Configuration of Tested System

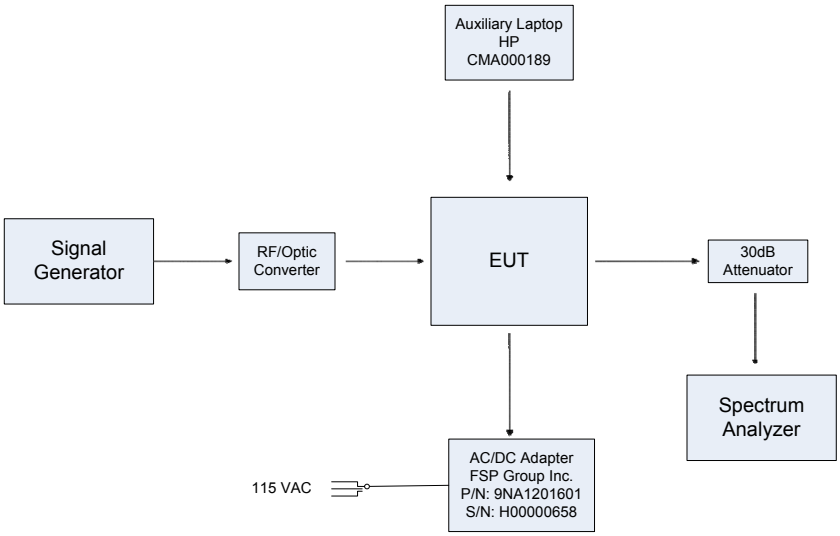

Figure 1. Test Set-Up Conducted

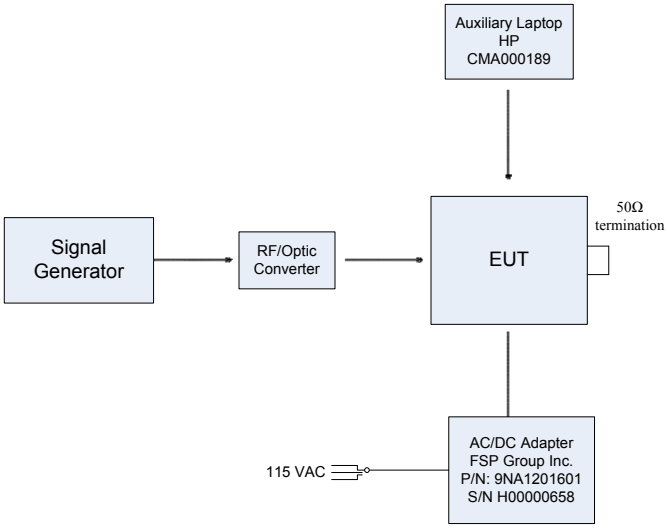

Figure 2. Test Set-Up Radiated

3. Test Set-Up Photos

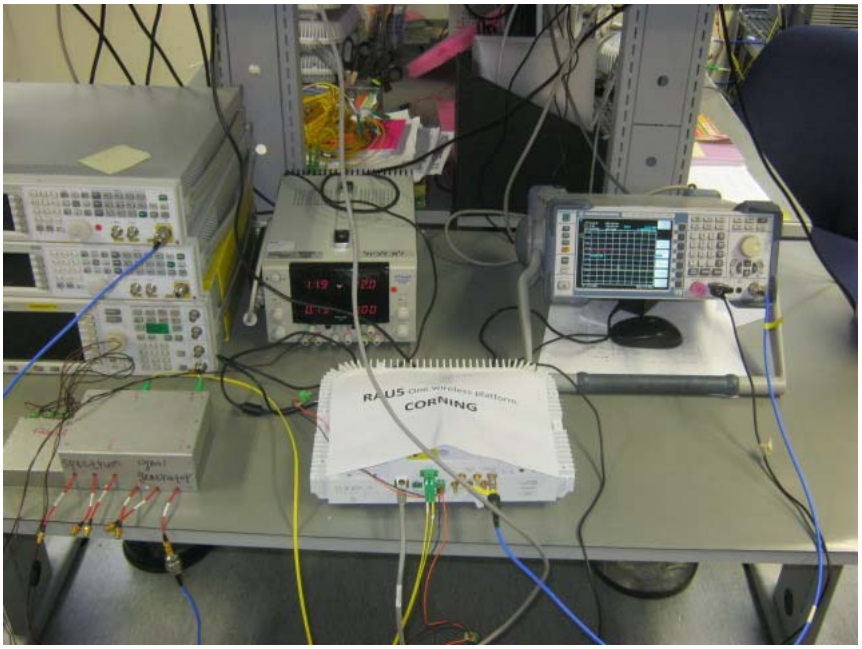

Figure 3. Conducted Emission From Antenna Port Tests

Figure 4. Radiated Emission Test

Figure 5. Radiated Emission Test

Figure 6. Radiated Emission Test

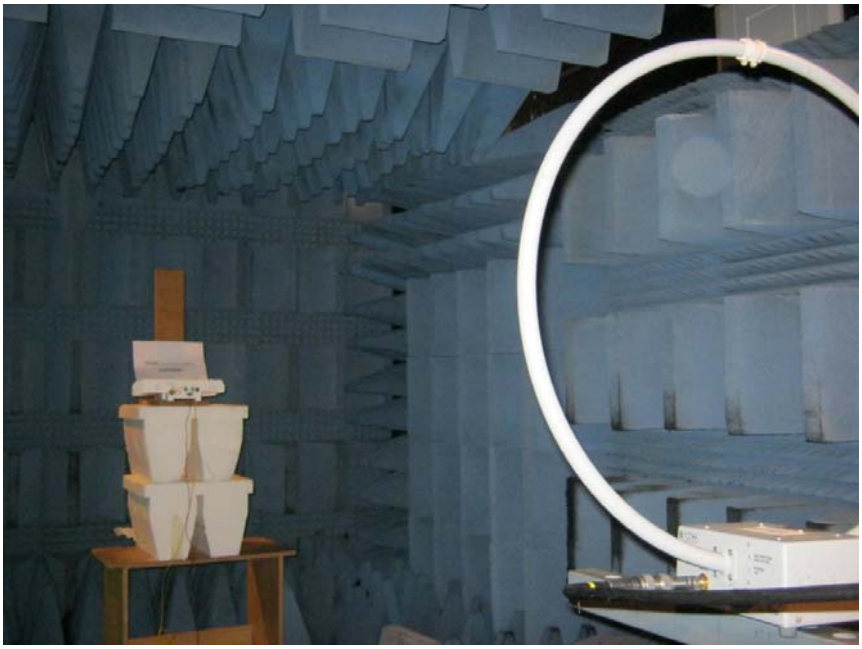

Figure 7. Radiated Emission Test

4. Peak Output Power (CELL)

4.1 Test Specification

FCC Part 22.913(a)

4.2 Test Procedure

Peak Power Output must not exceed 500 Watts (57dBm).

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator and an appropriate coaxial cable (loss=30.5 dB). The E.U.T. RF output was modulated. RBW was set to 1%-5% from the OBW. Special attention was taken to prevent Spectrum Analyzer RF input overload. The E.U.T was evaluated at the low, mid and high channels (874.0, 8881.0 and 889.0) of the 3 modulations: LTE 64QAM, GSM, WCDMA.

4.3 Test Results

Modulation	Operation Frequency (MHz)	Reading (dBm)	Specification (dBm)	Margin (dB)
LTE 64QAM	874.0	16.1	57.00	-40.9
	881.0	16.7	57.00	-40.3
	889.0	16.7	57.00	-40.3
GSM	870.2	16.4	57.00	-40.6
	881.0	15.3	57.00	-41.7
	892.8	16.5	57.00	-40.5
WCDMA	871.5	16.1	57.00	-40.9
	881.0	16.5	57.00	-40.5
	891.5	16.8	57.00	-40.2

Figure 8 Peak Output Power CELL

See additional information in *Figure 9* to *Figure 17.*

JUDGEMENT: Passed by 40.2 dB

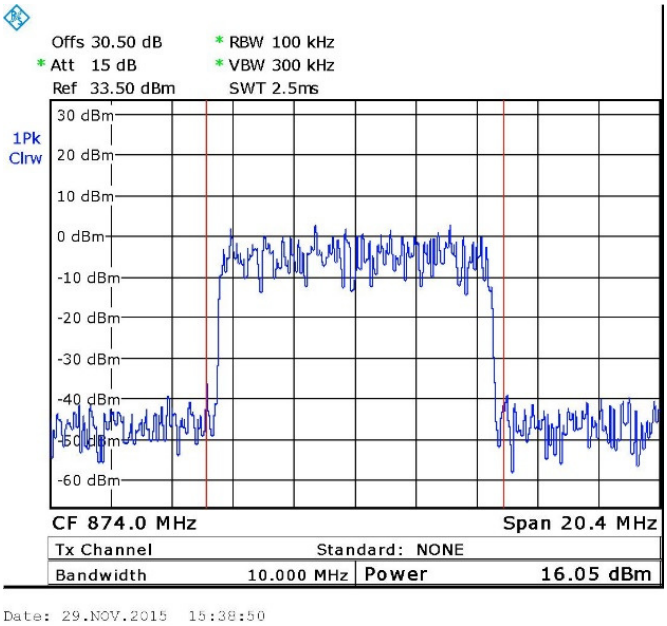

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Figure 9. LTE 64QAM - 874.00 MHz

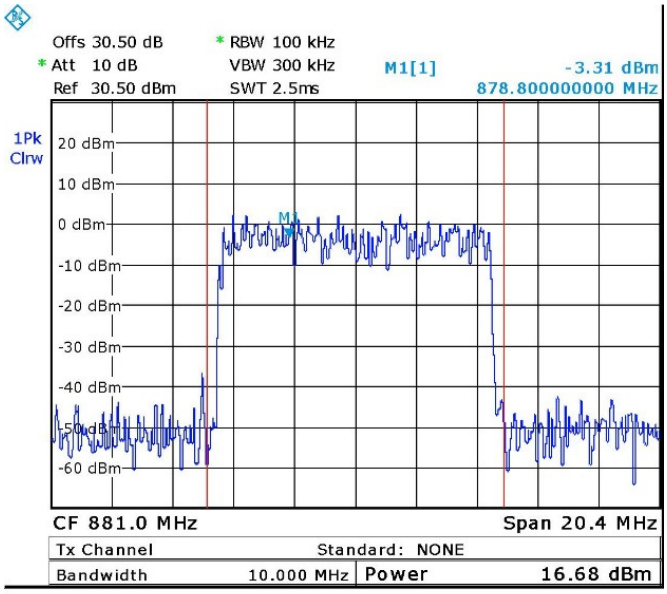

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Figure 10. LTE 64QAM - 881.00 MHz

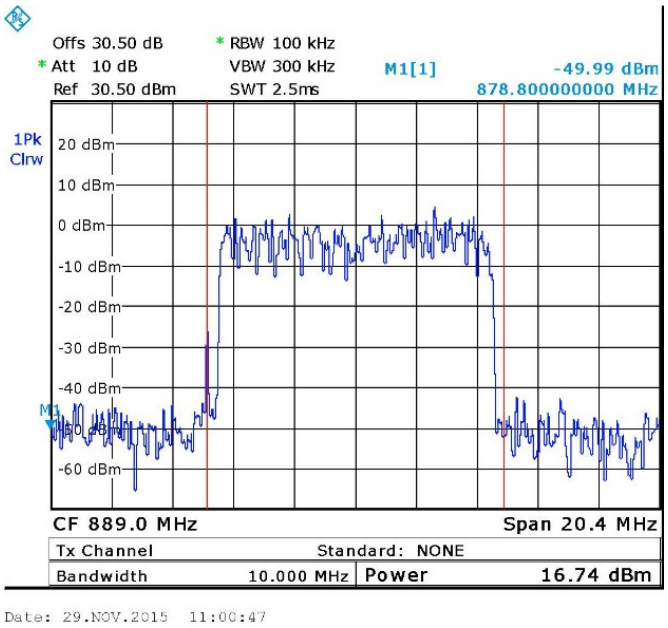

Figure 11. LTE 64QAM - 889.0 MHz

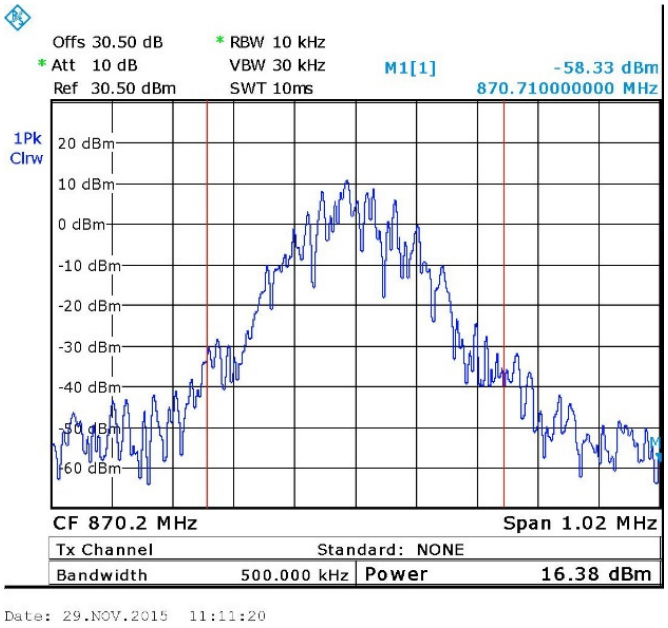

Figure 12. GSM - 870.2 MHz

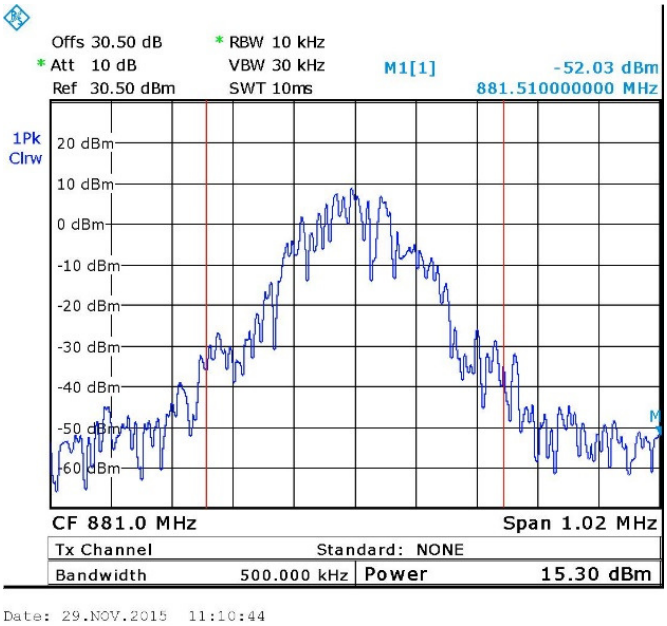

Figure 13. GSM - 881.0 MHz

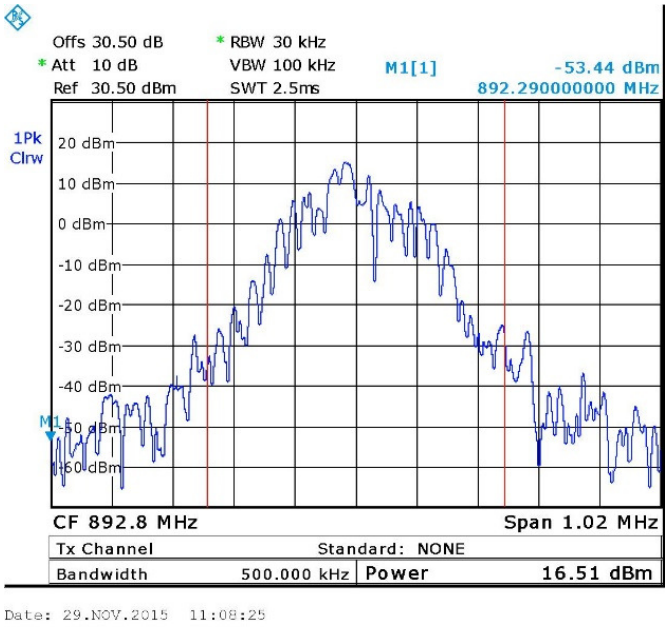

Figure 14. GSM - 892.8 MHz

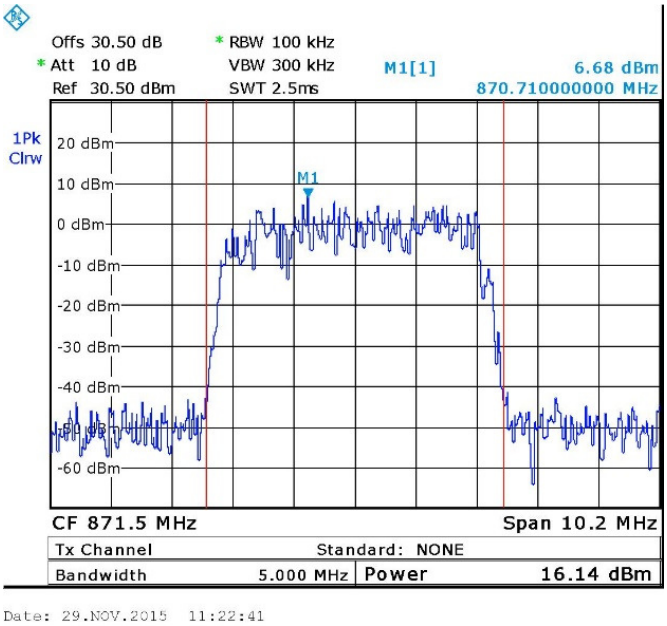

Figure 15. W-CDMA - 871.5 MHz

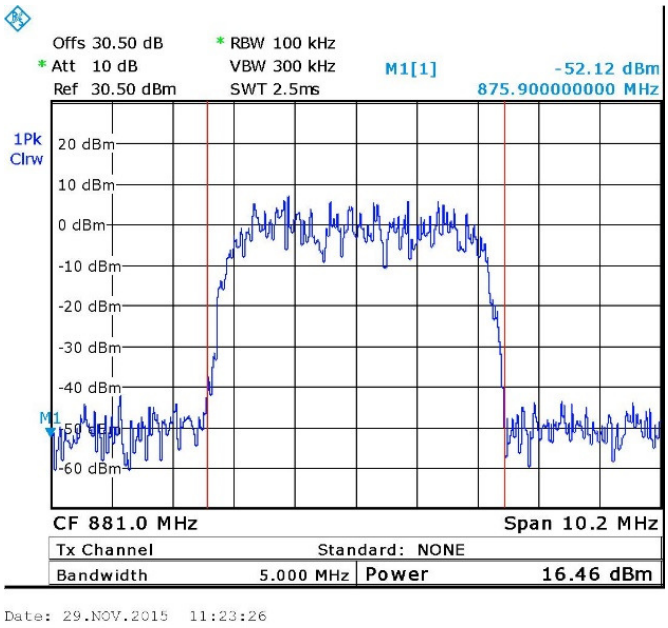

Figure 16. W-CDMA - 881.0 MHz

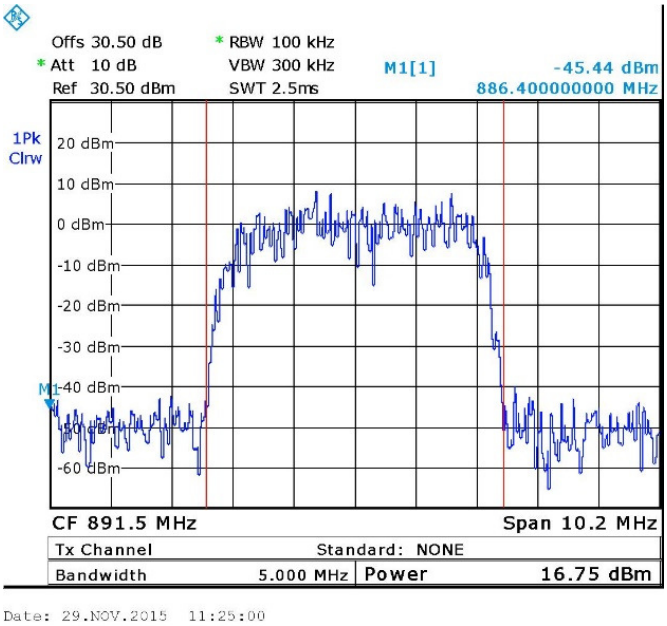

Figure 17. W-CDMA - 891.5 MHz

4.4 Test Equipment Used; Peak Output Power (CELL)

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	R&S	FSL6	100194	January 1, 2015	1 year
Vector Signal Generator	Agilent	N5182A	MY48180244	July 16, 2015	1 year
30 dB Attenuator	Weinschel Engineering	49-30-34	PD426	January 14, 2015	1 year

Figure 18 Test Equipment Used

5. Occupied Bandwidth (CELL)

5.1 Test Specification

FCC Part 2, Section 1049

5.2 Test Procedure

The E.U.T. was set to the applicable test frequency with modulation. The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (at the output port test) and an appropriate coaxial cable. RBW was set to 1%-5% from OBW.
The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limit, the mean powers radiated are each equal to 0.5% of the total mean power radiated by a given emission.
The function 99% power bandwidth was used for this evaluation
Occupied bandwidth measured was repeated in the input terminal of the E.U.T.
The E.U.T was evaluated at the low, mid and high channels of the 3 modulations: LTE 64QAM, GSM and WCDMA.

5.3 Test Results

Modulation	port	Operating Frequency (MHz)	Reading (MHz)
LTE 64QAM	Input	874.0	8.98
LTE 64QAM	Output	874.0	8.99
LTE 64QAM	Input	881.0	8.98
LTE 64QAM	Output	881.0	8.94
LTE 64QAM	Input	889.0	8.98
LTE 64QAM	Output	889.0	8.99
GSM	Input	870.2	0.24
GSM	Output	870.2	0.24
GSM	Input	881.0	0.24
GSM	Output	881.0	0.24
GSM	Input	892.8	0.24
GSM	Output	892.8	0.24
WCDMA	Input	871.5	4.17
WCDMA	Output	871.5	4.19
WCDMA	Input	881.0	4.17
WCDMA	Output	881.0	4.19
WCDMA	Input	891.5	4.17
WCDMA	Output	891.5	4.17

Figure 19 Occupied Bandwidth CELL

See additional information in *Figure 20* to *Figure 37.*

JUDGEMENT: Passed

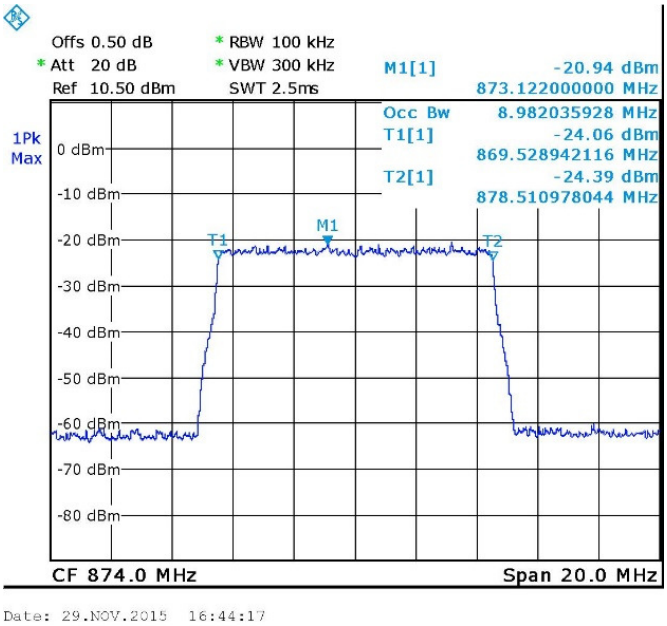

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Figure 20. LTE 64QAM - 874.0MHz Input

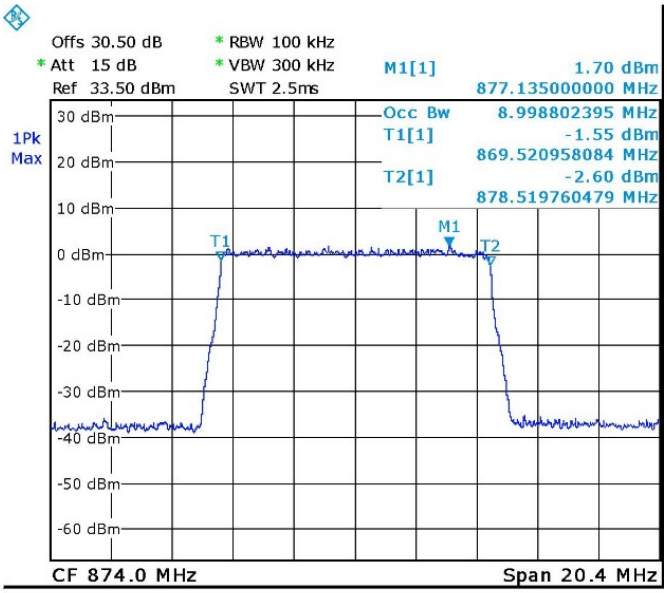

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Figure 21. LTE 64QAM - 874.0MHz Output

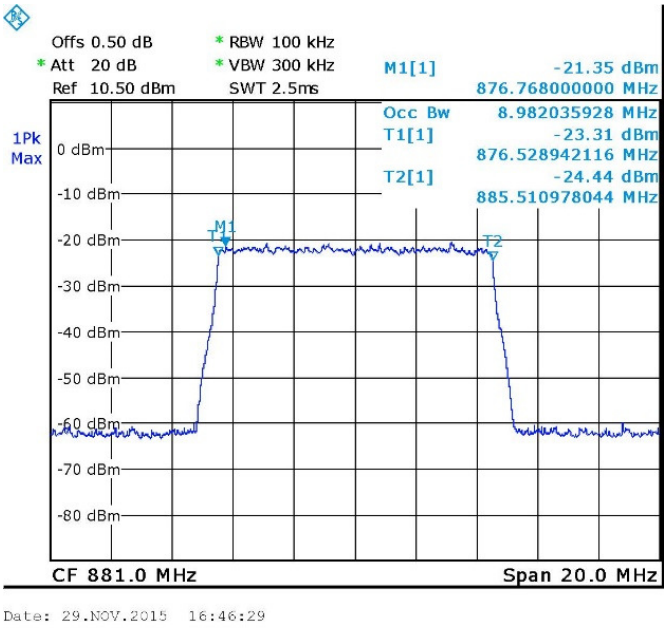

Figure 22. LTE 64QAM - 881.0 MHz Input

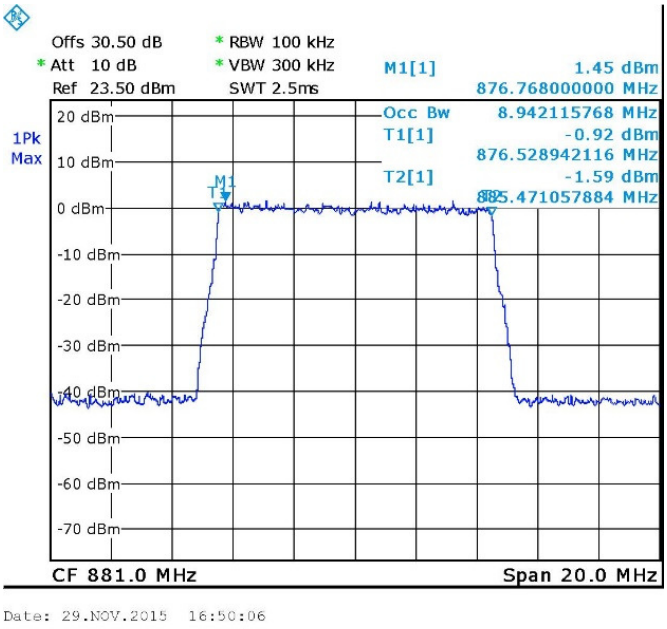

Figure 23. LTE 64QAM - 881.0MHz Output

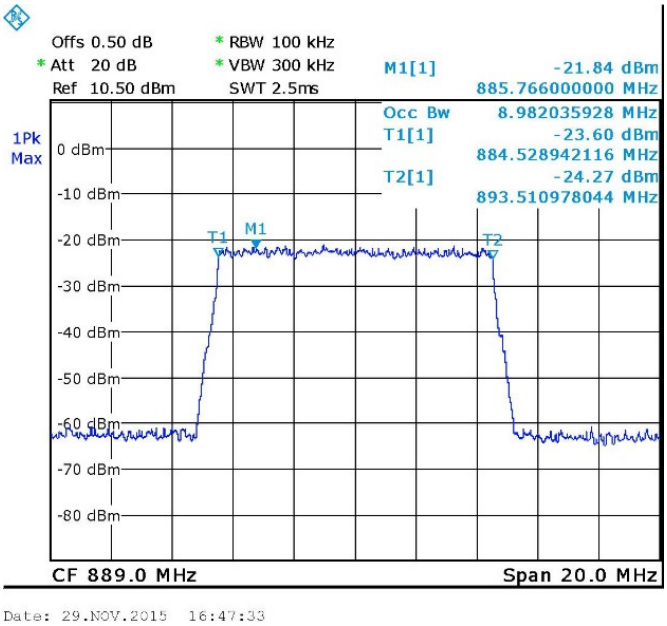

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Figure 24. LTE 64QAM - 889.0 MHz Input

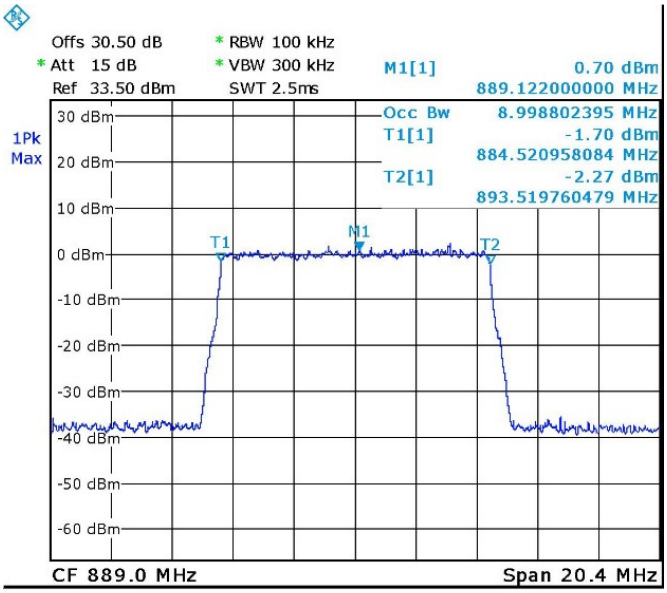

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Figure 25. LTE 64QAM - 889.0 MHz Output

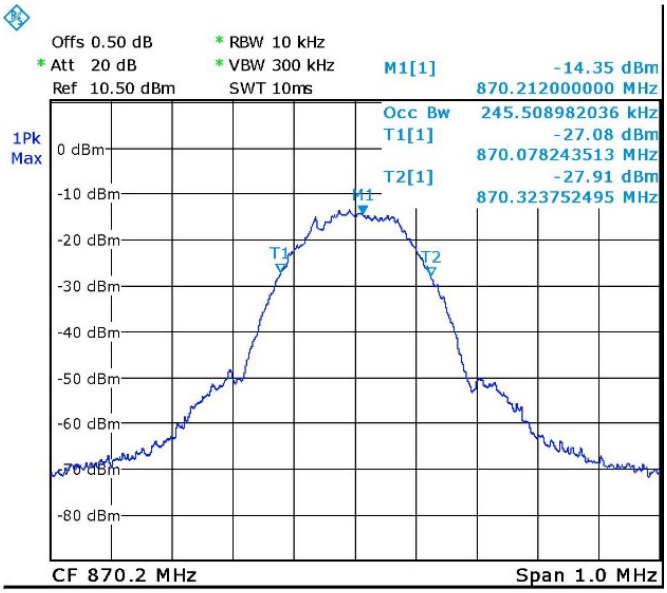

Figure 26. GSM - 870.2MHz Input

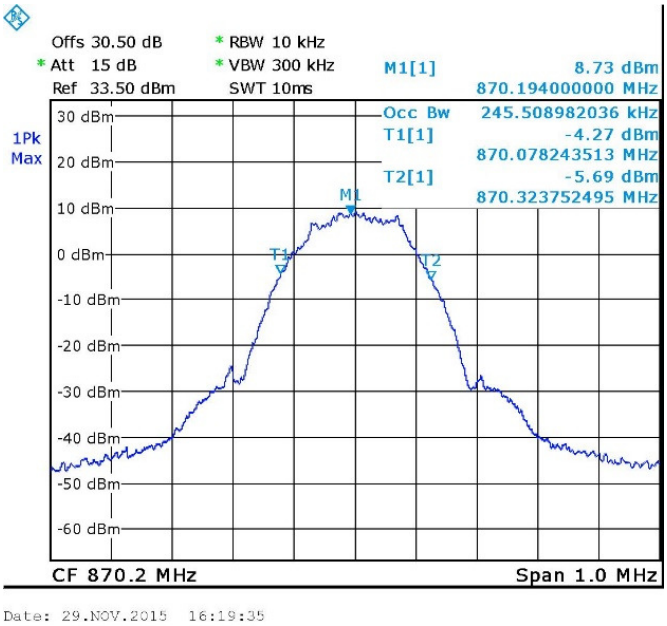

Figure 27. GSM - 870.2MHz Output

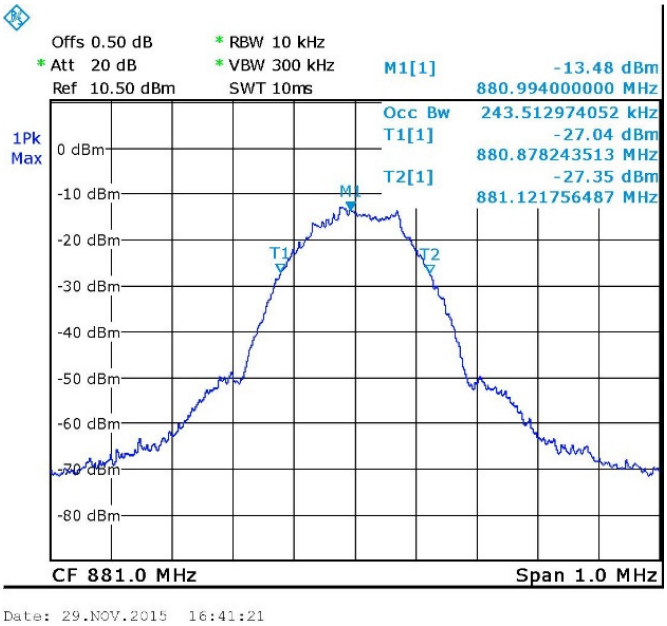

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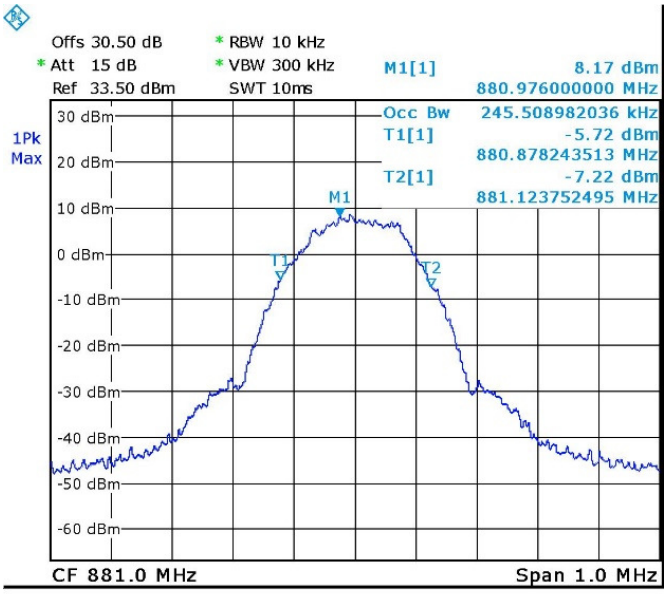
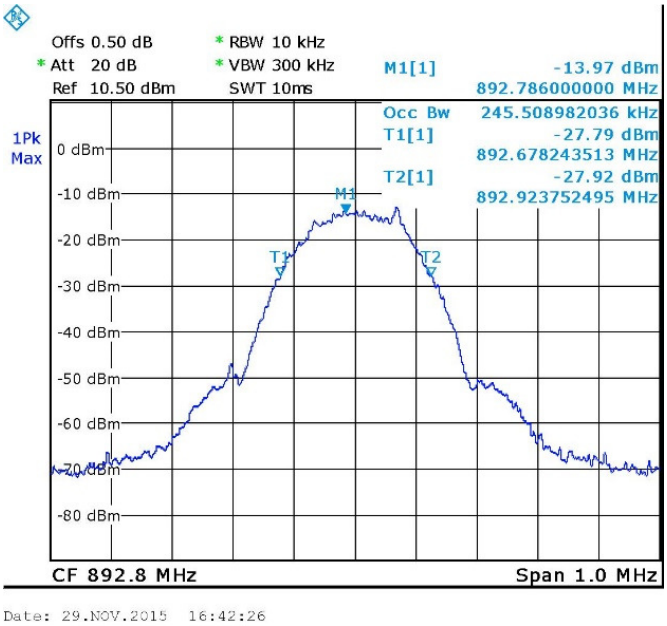
Figure 28. GSM - 881.0 MHz Input



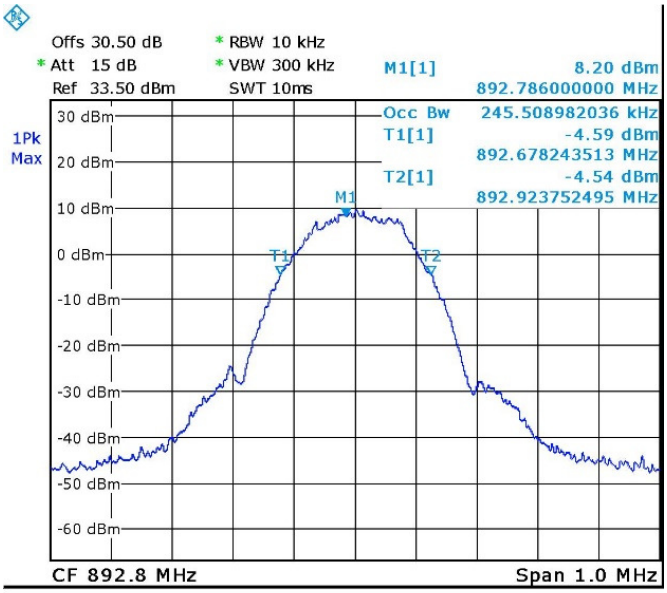
Date: 29.NOV.2015 16:20:23

Figure 29. GSM - 881.0MHz Output



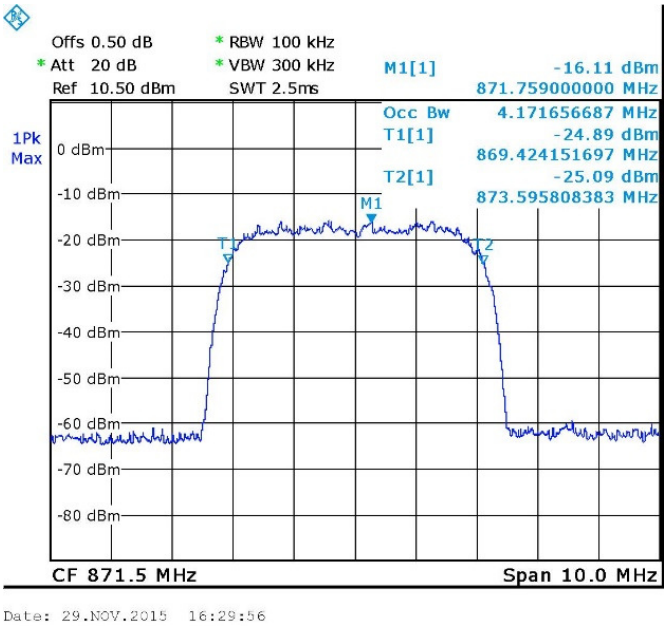
Date: 29.NOV.2015 16:42:26

Figure 30. GSM - 892.8 MHz Input



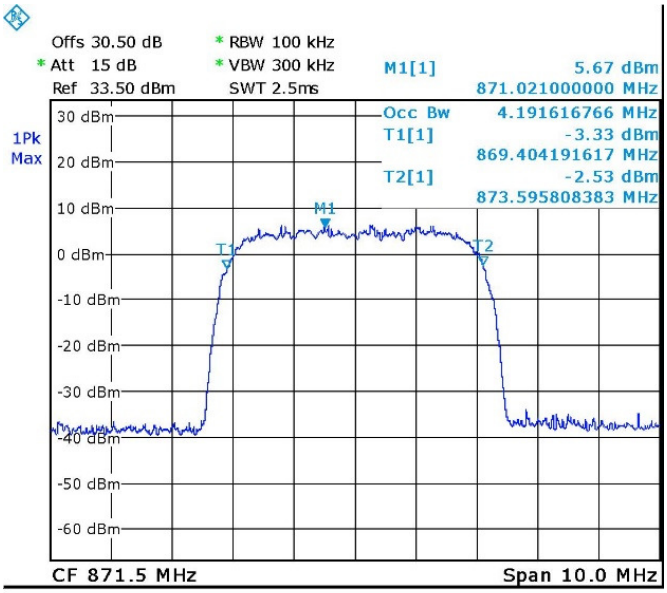
Date: 29.NOV.2015 16:21:15

Figure 31. GSM -892.8 MHz Output



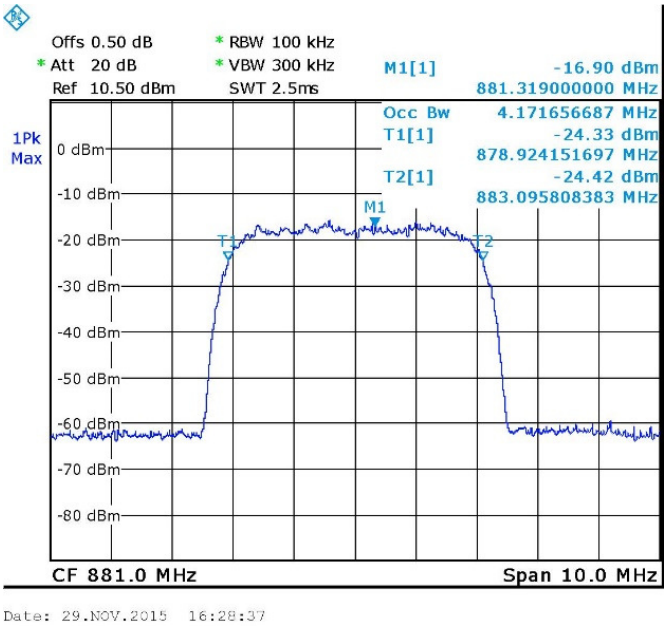
Date: 29.NOV.2015 16:29:56

Figure 32.WCDMA - 871.5MHz Input



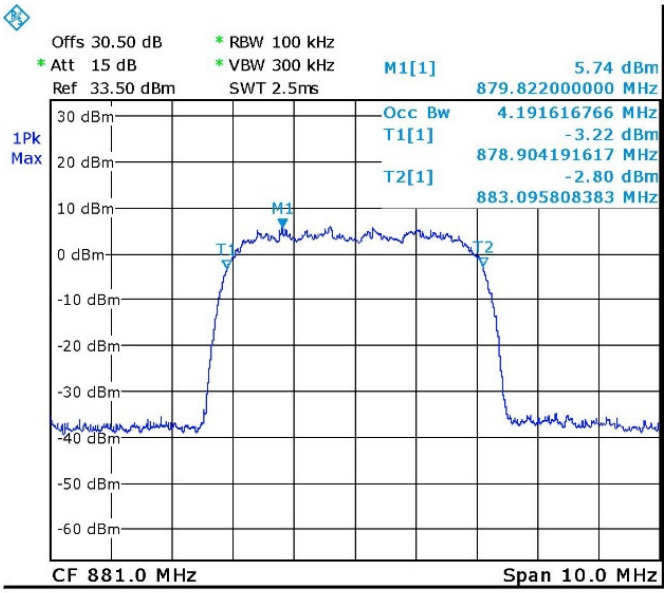
Date: 29.NOV.2015 16:23:41

Figure 33. WCDMA - 871.5MHz Output



Date: 29.NOV.2015 16:28:37

Figure 34. WCDMA - 881.0 MHz Input



Date: 29.NOV.2015 16:24:24

Figure 35. WCDMA - 881.0MHz Output

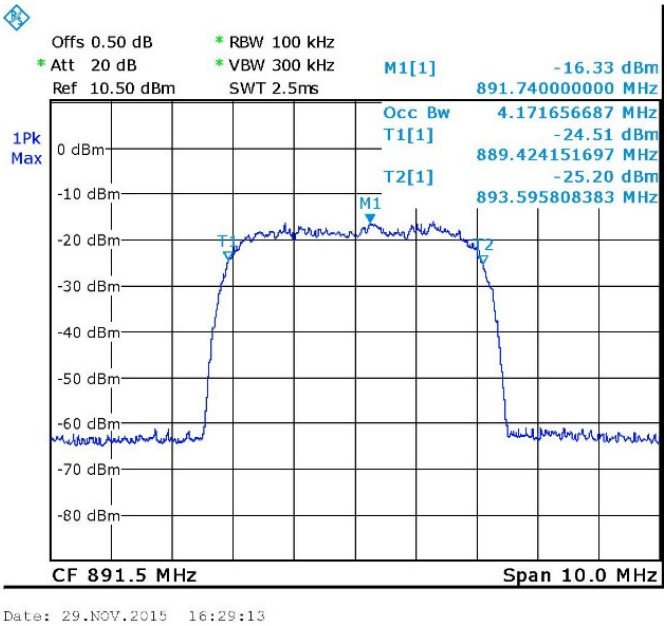


Figure 36. WCDMA - 891.5 MHz Input

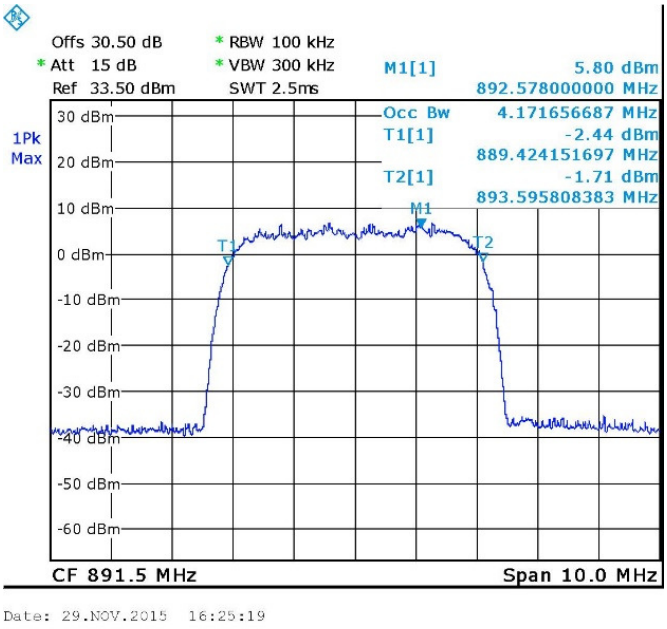


Figure 37. WCDMA - 891.5 MHz Output

5.4 Test Equipment Used; Occupied Bandwidth CELL

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	R&S	FSL6	100194	January 1, 2015	1 year
Vector Signal Generator	Agilent	N5182A	MY48180244	July 16, 2015	1 year
30 dB Attenuator	Weinschel Engineering	49-30-34	PD426	January 14, 2015	1 year

Figure 38 Test Equipment Used

6. Out of Band Emissions at Antenna Terminals (CELL)

6.1 Test Specification

FCC Part 22, Section 917(a); FCC Part 2.1051

6.2 Test Procedure

The power of any emission outside of the authorized bandwidth must be attenuated below the transmitting power (P) by a factor of at least

43 + log (P) dB, yielding –13dBm.

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator and an appropriate coaxial cable (max total Loss= 33.0 dB).

The resolution bandwidth was set to 1.0 kHz for the frequency range 9 kHz – 1 MHz, 100 kHz for the frequency range 1 MHz to 1 GHz, and 1 MHz in the frequency range 1 – 22 GHz.

The E.U.T was evaluated at the low, mid and high channels of each of the 3 modulations: LTE 64QAM, GSM, WCDMA.

6.3 Test Results

See additional information in *Figure 39* to *Figure 47.*

JUDGEMENT: Passed

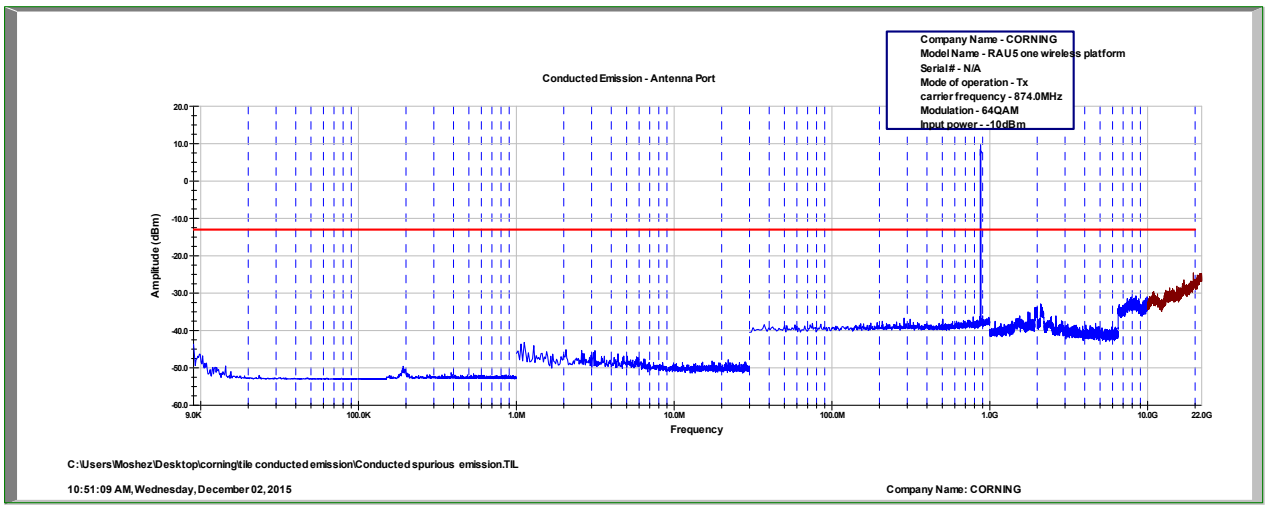


Figure 39 LTE 64QAM — 874.0 MHz

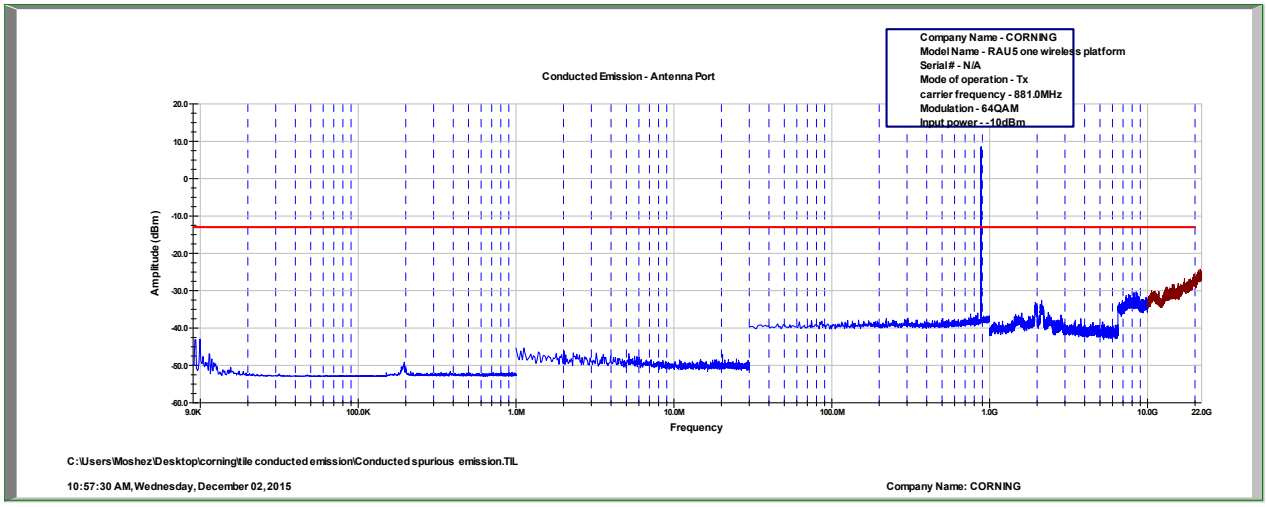


Figure 40 LTE 64QAM — 881.0 MHz

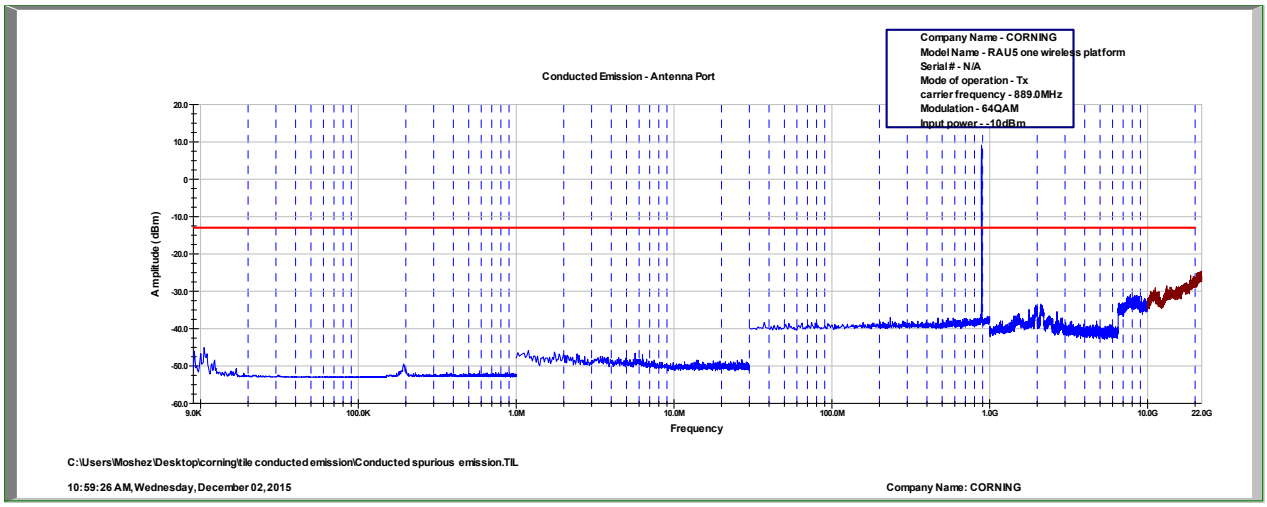


Figure 41 LTE 64QAM — 889.0 MHz

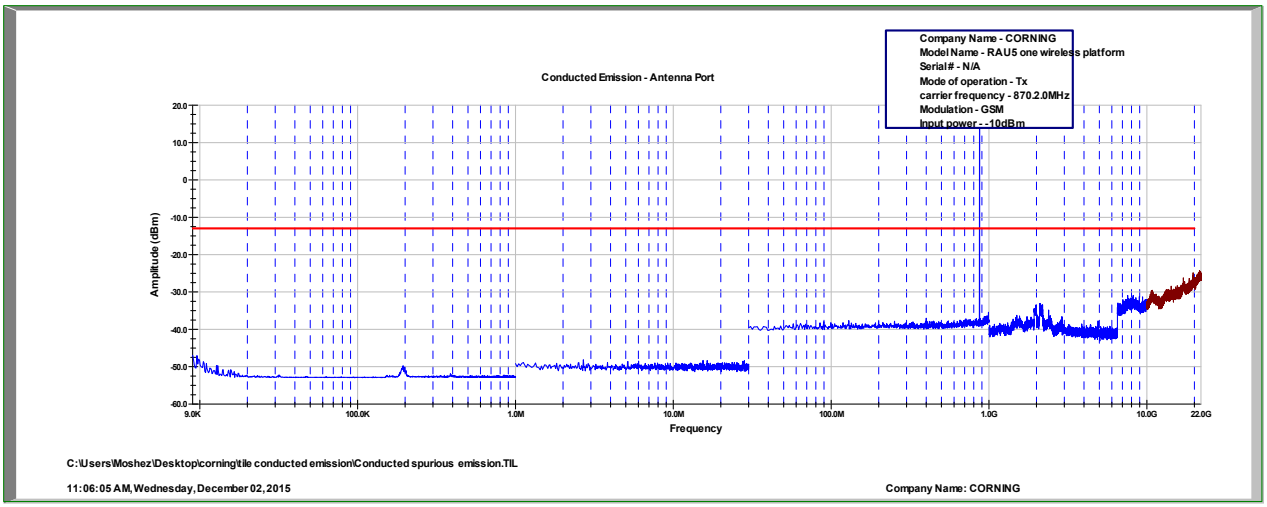


Figure 42. GSM — 870.2 MHz

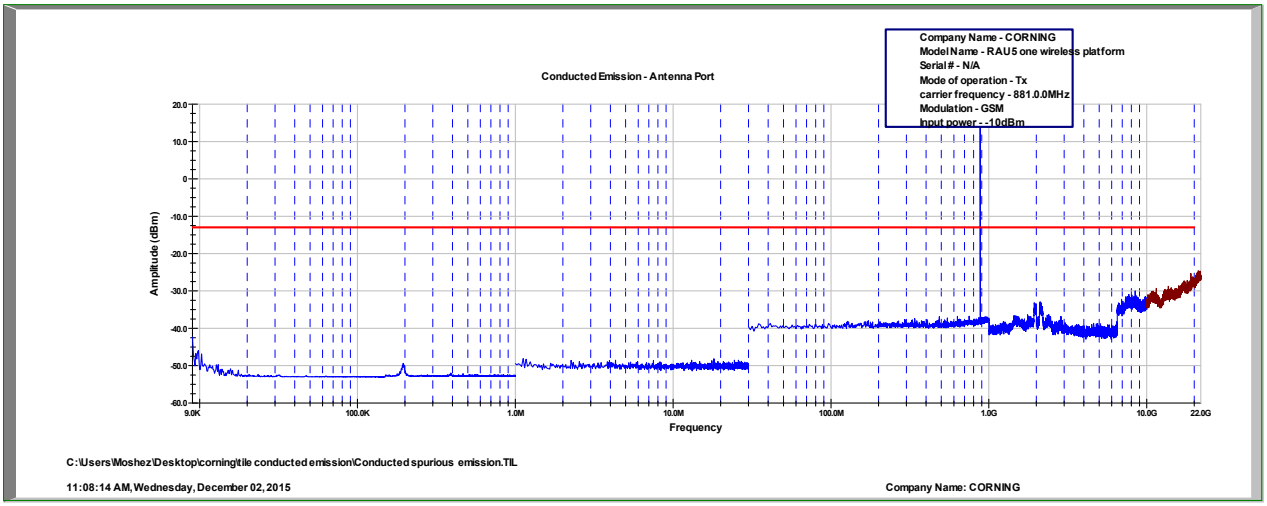


Figure 43. GSM — 881.0 MHz

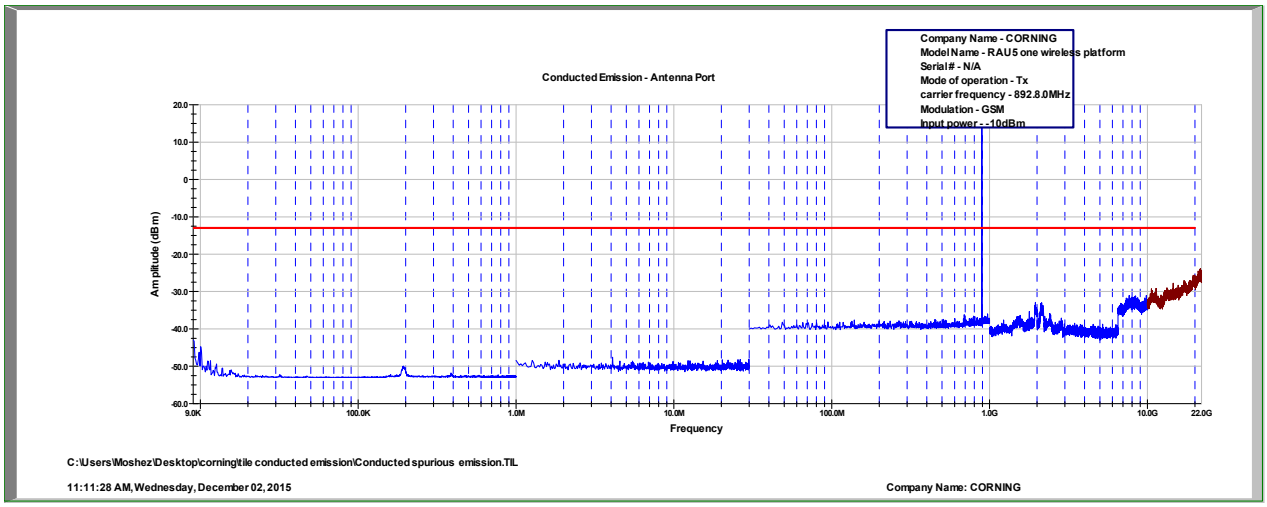


Figure 44. GSM — 892.8 MHz

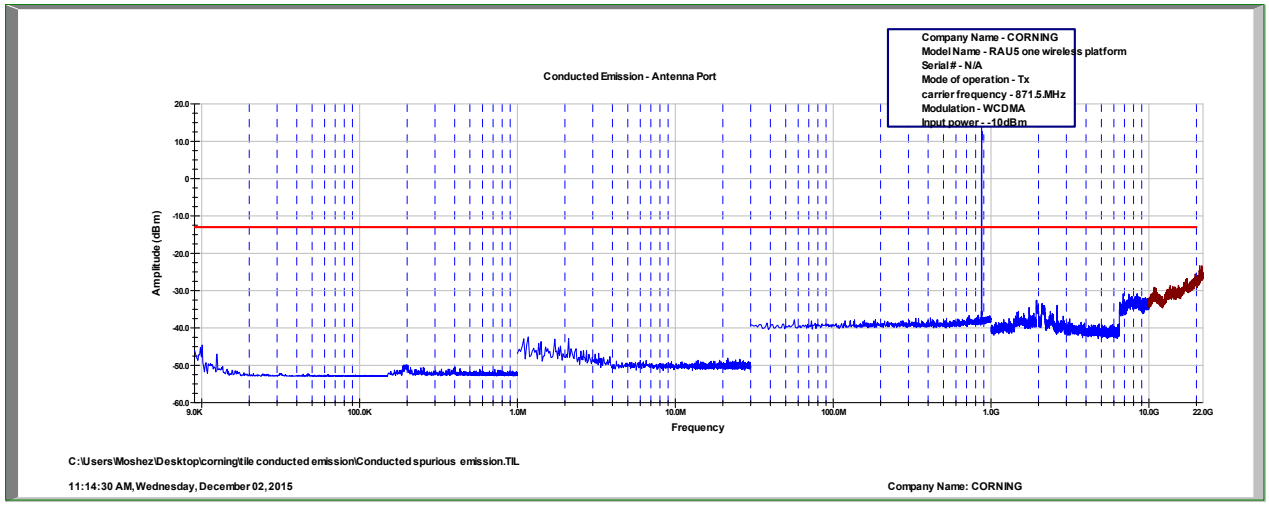


Figure 45. WCDMA — 871.5 MHz

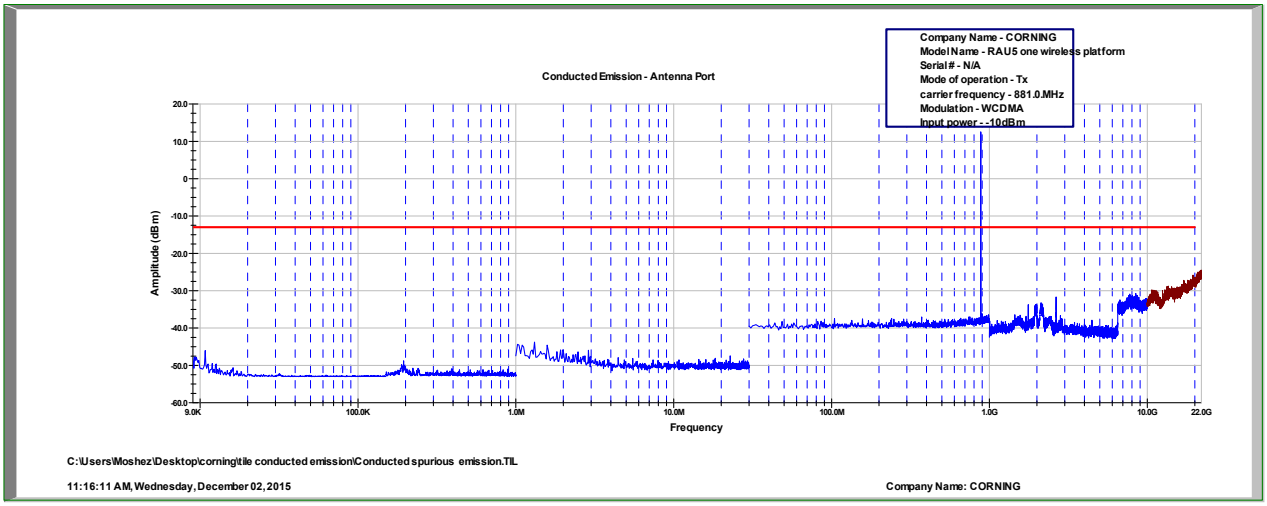


Figure 46. WCDMA — 881.0 MHz

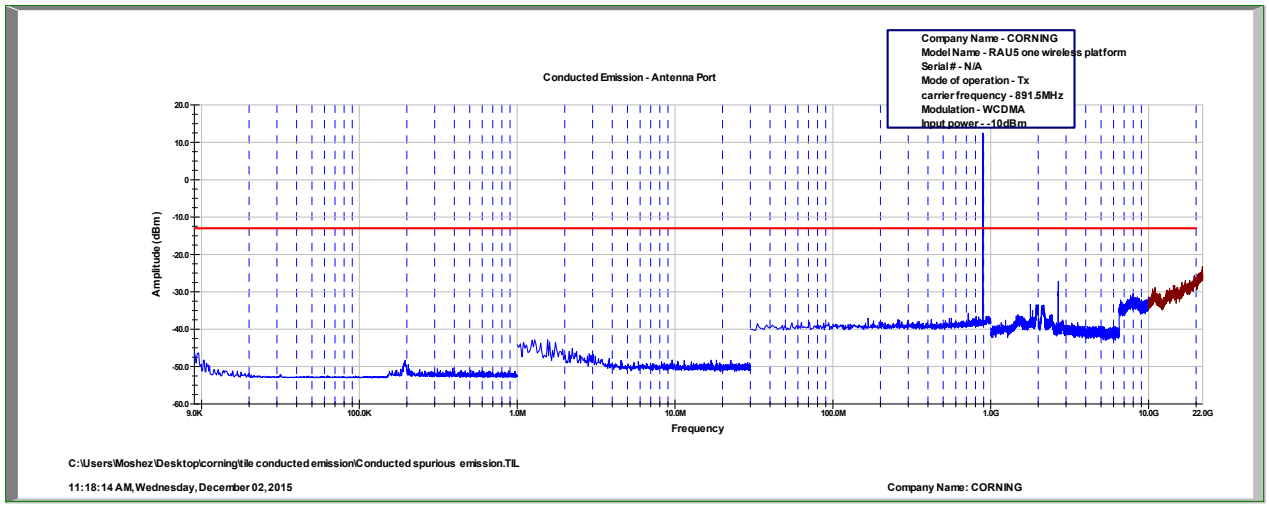


Figure 47. WCDMA — 891.5 MHz

6.4 Test Equipment Used; Out of Band Emission at Antenna Terminals CELL

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	HP	8592L	3826A01204	March 4, 2015	1 year
Vector Signal Generator	Agilent	N5182A	MY48180244	July 16, 2015	1 year
30 dB Attenuator	Weinschel Engineering	49-30-34	PD426	January 14, 2015	1 year

Figure 48 Test Equipment Used