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DATE: 24 January 2013

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

FCC Radio Test Report

for

Corning Mobile Access

Equipment under test:

QX Remote Unit

QX CELL-PCS-LTE AC

Written by: _____
D. Shidlowsky, Documentation

Approved by: _____
I. Siboni, Test Engineer

Approved by: _____
I. Raz, EMC Laboratory Manager

Measurement/Technical Report for

Corning Mobile Access

QX Remote Unit

FCC ID: OJFQXC85P19L70

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

Measurement procedure used is ANSI C63.4-2003.
Substitution Method used as in ANSI/TIA-603-C: 2004

Application for Certification prepared by:

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Lod 71100
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Applicant for this device:
(different from "prepared by")

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Fax: +1-703-848-0260
e-mail: sblum@mobileaccess.com

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1. General Information

1.1 Administrative Information

Manufacturer:	Corning Mobile Access
Manufacturer's Address:	8391 Old Courthouse Rd. Suite #300 Vienna, VA 22182 U.S.A. Tel: +1-541-758-2880 Fax: +1-703-848-0260
Manufacturer's Representative:	Steve Blum
Equipment Under Test (E.U.T):	QX Remote Unit
Equipment Model No.:	QX CELL-PCS-LTE AC
Equipment Serial No.:	Not Designated
Date of Receipt of E.U.T:	02.12.12
Start of Test:	02.12.12
End of Test:	15.01.13
Test Laboratory Location:	I.T.L (Product Testing) Ltd. 1 Batsheva St, Lod, Israel 71100
Test Specifications:	FCC Parts 22, 24, 27

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.), Registration No. 861911.
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 No. IC 4025A-1.
6. TUV Product Services, England, ASLLAS No. 97201.

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

MobileAccess2000 QX (QX) is a member of the MobileAccess2000 family. It is a compact, modular, cellular indoor coverage remote unit supporting up to four services (currently, CELL/PCS, LTE and AWS).
All services are received from the head-end, over a single optic fiber and reconverted to RF for convergence and distribution over a common DAS antenna infrastructure.
Service support can be quickly added as needed by inserting card like modules into the chassis without any downtime or additional cabling. In addition, two QX units can be cascaded to provide various combinations of SISO and MIMO services distributed over the same antenna infrastructure.
MA2000 QX is managed by opening a Web session to the SC-450 Controller.
MA2000 QX operates along with an SCU-F unit, which converges the services from one or more MA2000 QX units and provides the interface to the DAS infrastructure.
The following benefits are achieved with the QX platform:

Multi-Service Platform - Supports up to four services. Currently supported: CELL, PCS, AWS, 700 MHz LTE

Multi-Operator Optimized Platform - Services from a number of operators can be supported by the same chassis or by different units and distributed over a common DAS antenna infrastructure.

Optic Fiber savings - All services routed to a QX unit are routed over a single optic fiber

Modular Design - Seamless service upgrades – simply add a card in the QX (and the parallel service conditioning module at the head end)

Scalable MIMO Upgrades - Upgrade any or all services from SISO to MIMO by cascading another QX unit

Small Footprint - 3 U height rack

Simple maintenance - All connections and monitoring LEDs located on front panel, Modular, hot-swap, field replaceable service modules, including fan modules

Web Management - Web management via the SC-450 controller

System Architecture

The QX and SCU-F are located at the floor level remote end. QX receives RF over optic service signals from the head end, reconverts the signals to RF over copper, adjusts them to the required level and outputs each service to dedicated interfaces. The signals are combined by the SCU-F (along with services from other QX units) and distributed over a common DAS (Distributed Antenna System) infrastructure.
In the uplink, cellular service signals received at the DAS are separated by the SCU-F and routed to their dedicated QX ports. The signals are then converted to optic and forwarded to the head-end for reconversion to RF and distribution to the relevant BTS or BDA system

Headend:

At the headend CMA elements provide interface to the wireless service provider’s network, condition the signals and convert them to optical signals for transportation over fiber optics towards the remote ends.

Radio Interface Unit (RIU) - the RIU conditions and custom tunes the RF Downlink (DL) signals from an operator's signal source (BTS or BDA) to ensure a constant RF level. In the Uplink (UL), the signal (at the required level) is routed back to the operator's signal source.
RF to Optic converter unit – this can either be a **Base Unit (BU)** or an **Optical Control Head End Unit (OCH)**, where the OCH is QX model specific. These are wideband units that convert the RF Downlink (DL) signals from the RIU into optical signals for routing over single or multi-mode fiber optic cabling (SMF/MMF) to/from the QX units located at the remote locations up to 2Km away.
System Controller (SC-450) - the system controller enables centralized remote management and control of MobileAccess elements. This unit connects directly to the RIU and BU and/or OCH and allows management of these as well as their hosted elements (e.g. QX) via a controller Web session.

Remote End:

At the remote end, the optical signal is reconverted to RF, filtered, amplified to the appropriate level, combined with other signals and distributed over the broadband antenna infrastructure.
The QX unit is installed, along with the Four Port Service Combiner Unit (SCU-F). The QX system remote end consists of the following elements:

QX - each QX unit provides coverage for four RF services (e.g. CELL, PCS, 700LTE and AWS) via two types of service dedicated internal modules (RHU and AO). Each of these modules is monitored via the Controller as an independent unit.
Service Combiner Unit (SCU-F): a passive module that combines and distributes the UL and DL signals from one or more QX units to (up to) four broadband antennas.

1.4 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4: 2003. 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. This site is a FCC listed test laboratory (FCC Registration No. 861911, date of listing June 30, 2010).
I.T.L.'s EMC Laboratory is also accredited by A2LA, certificate No. 1152.01.

1.6 Measurement Uncertainty

Conducted Emission (CISPR 11, EN 55011, CISPR 22, EN 55022, ANSI C63.4)
0.15 – 30 MHz:
Expanded Uncertainty (95% Confidence, K=2):
± 3.44 dB
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 BU (Base Unit) and the QX (Remote Unit).

The RF source is injected into the BU, converted onto optical signal, transmitted over fiber cable to the QX, converted back to RF and transmitted to antenna ports.

The RF 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 RHU, while the EUT output was connected to the spectrum analyzer.

The E.U.T. is available in both AC and DC versions.

To select the worst case version to be fully tested, an exploratory radiated emission test was performed inside the shielded room.

The units were placed on a 0.8 meter high wooden table, 1meter from the tests antenna, which was 1 m high.

The results of the exploratory radiated emission tests are shown in the table below.

Frequency (MHz)	AC Configuration (dBµV/m)	DC Configuration (dBµV/m)
129.7	46.1	45.5
345.0	42.6	41.6
414.0	43.9	42.7
483.0	41.2	41.3

Based on the above exploratory radiated emission test, the AC powered configuration was selected as the “worst case” host.

2.2 EUT Exercise Software

The NMS ver. 5.3 build 00 used for commands delivery.
These commands are used to enable / disable of QX transmission.
QX Embedded SW version 4.7 build 00 (for AddOn)
and 7.6 build 00 (for RHU).
BU Embedded SW version 5.2 build 00

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

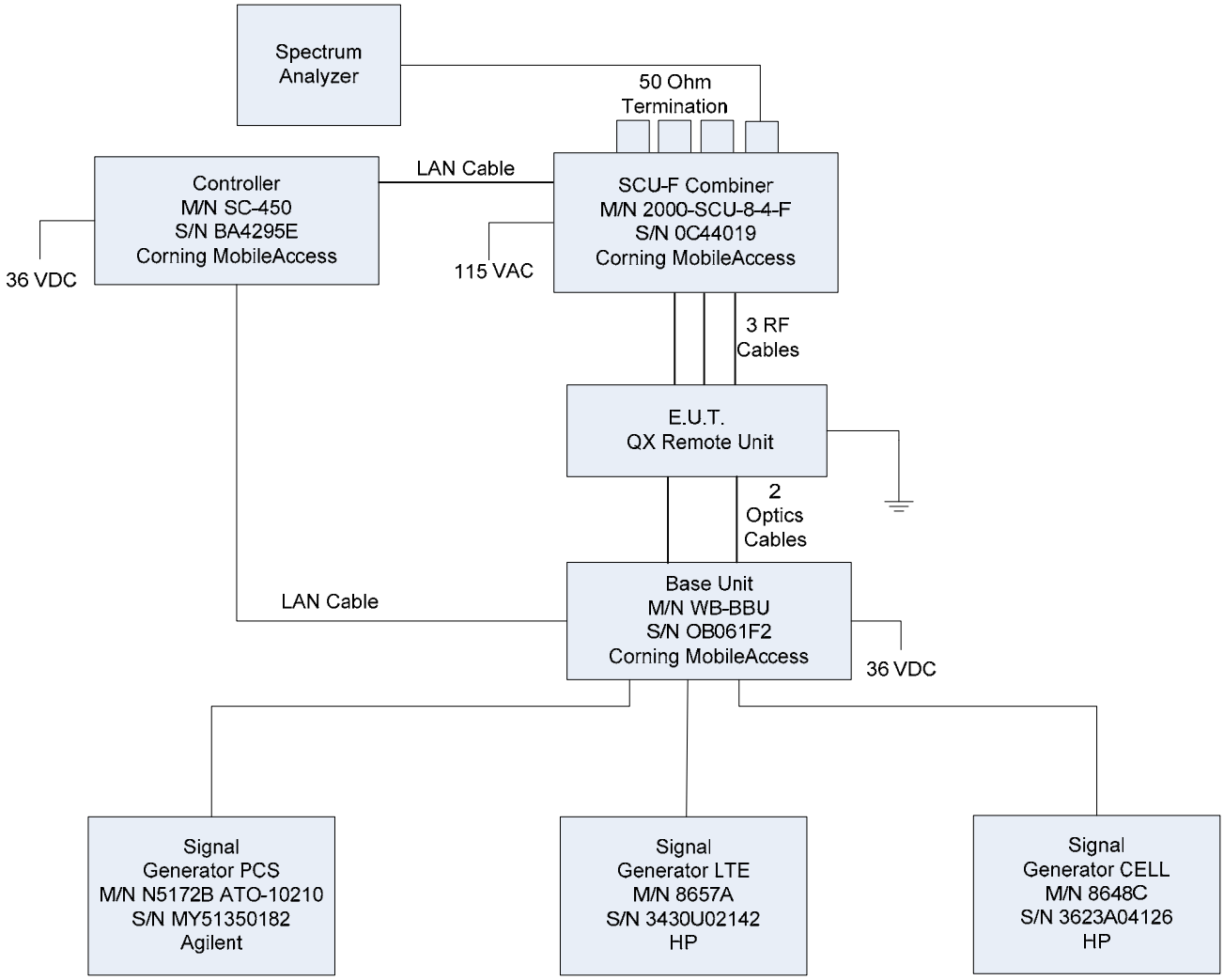

Figure 1. Tests Set-up

Notes:

1. For peak Output Power, Occupied Bandwidth, and Band Edge Spectrum tests, spectrum analyzer, M/N FSL6, S/N 100194, manufactured by Rohde & Schwarz was used.
2. For Out of Band Emission at Antenna Ports test, spectrum analyzer M.N 8564E, S/N 3442A00275,manufactured by HP was used.
3. Three signal generators were used for the intermodulation tests. For all other tests only signal generator M/N N5172B ATO-10210, S/N MY51350182, manufactured by Agilent, was used to provide all modulations.

3. Conducted and Radiated Measurement Test Set-ups Photo

Figure 2. Conducted Emission From Antenna Ports Tests

Figure 3. Radiated Emission Test

4. Peak Output Power CELL

4.1 Test Specification

FCC Part 22.913

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=31.35 dB). The E.U.T. RF output was modulated. Special attention was taken to prevent Spectrum Analyzer RF input overload. The Spectrum Analyzer was set to 100 kHz RBW. The output power level was measured at the low, mid and high channels of each modulation.

4.3 Test Results

Modulation	Operation Frequency (MHz)	Reading (dBm)	Specification (dBm)	Margin (dB)
LTE QPSK	874.0	23.26	57.00	-33.74
	881.5	23.72	57.00	-33.28
	889.0	23.22	57.00	-33.78
LTE 16QAM	874.0	23.40	57.00	-33.60
	881.5	23.91	57.00	-33.09
	889.0	23.28	57.00	-33.72
LTE 64QAM	874.0	24.42	57.00	-32.58
	881.5	24.17	57.00	-32.83
	889.0	23.88	57.00	-33.12
GSM	870.2	23.38	57.00	-33.62
	881.0	24.07	57.00	-32.93
	892.8	21.53	57.00	-35.47
W-CDMA	871.5	24.20	57.00	-32.80
	881.0	24.86	57.00	-32.14
	891.5	23.69	57.00	-33.31

Figure 4 Peak Output Power CELL

See additional information in Figure 11 to Figure 19.

JUDGEMENT: Passed by 32.14 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 20.01.13

Typed/Printed Name: A. Sharabi

LTE QPSK :

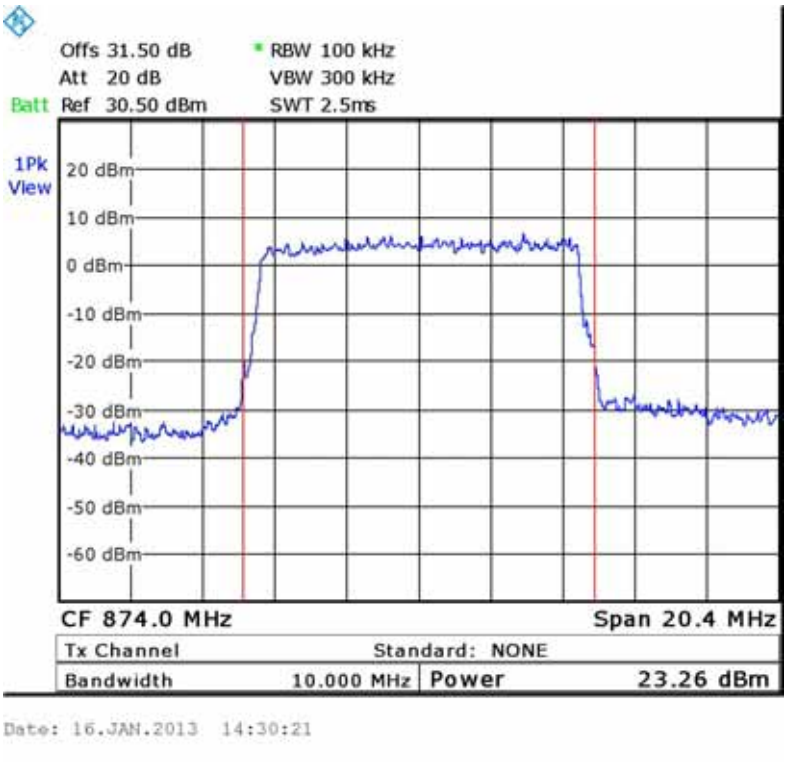

Figure 5.— 874.00 MHz

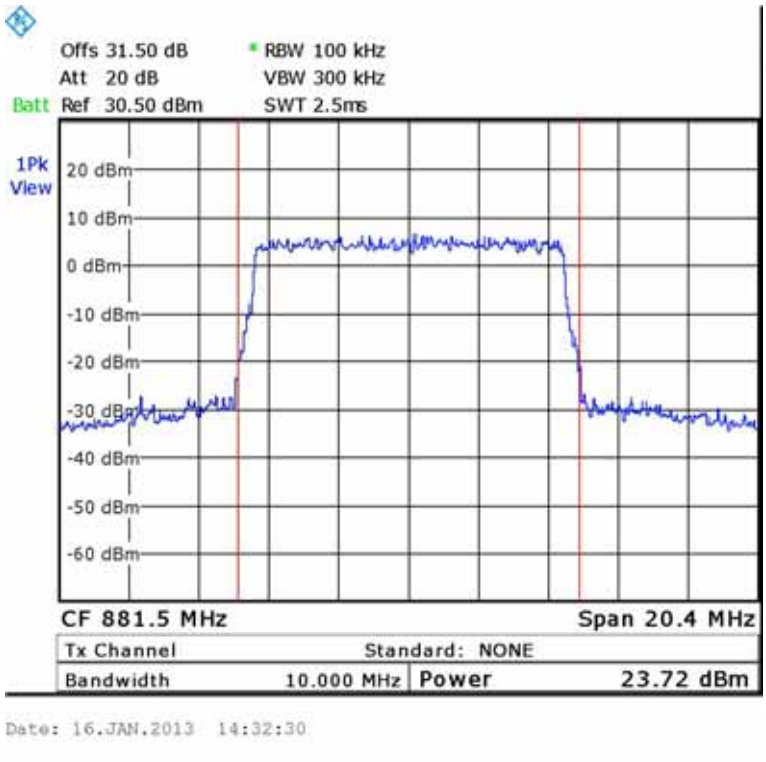

Figure 6.— 881.50 MHz

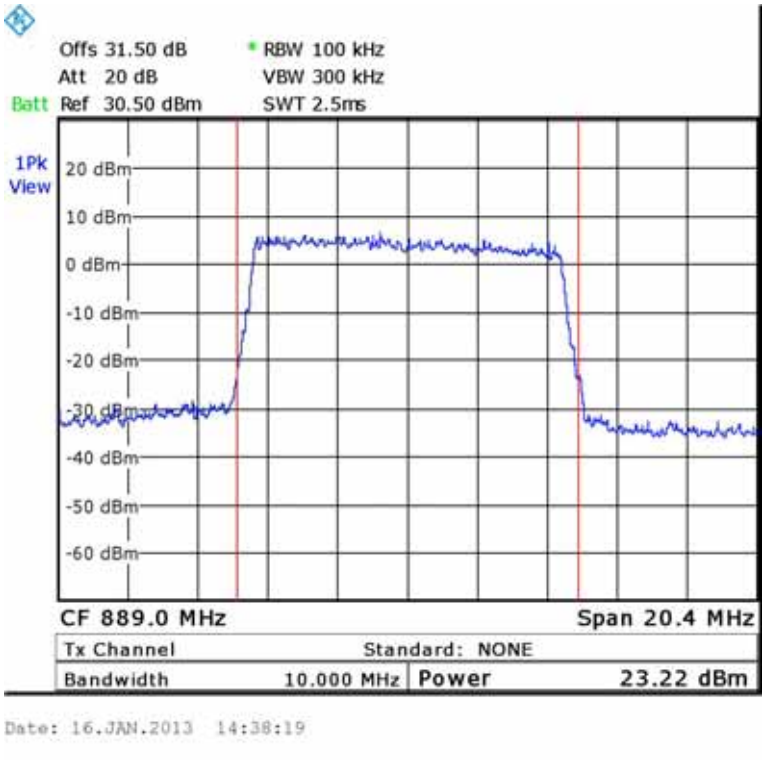

Figure 7.— 889.00 MHz

LTE 16QAM:

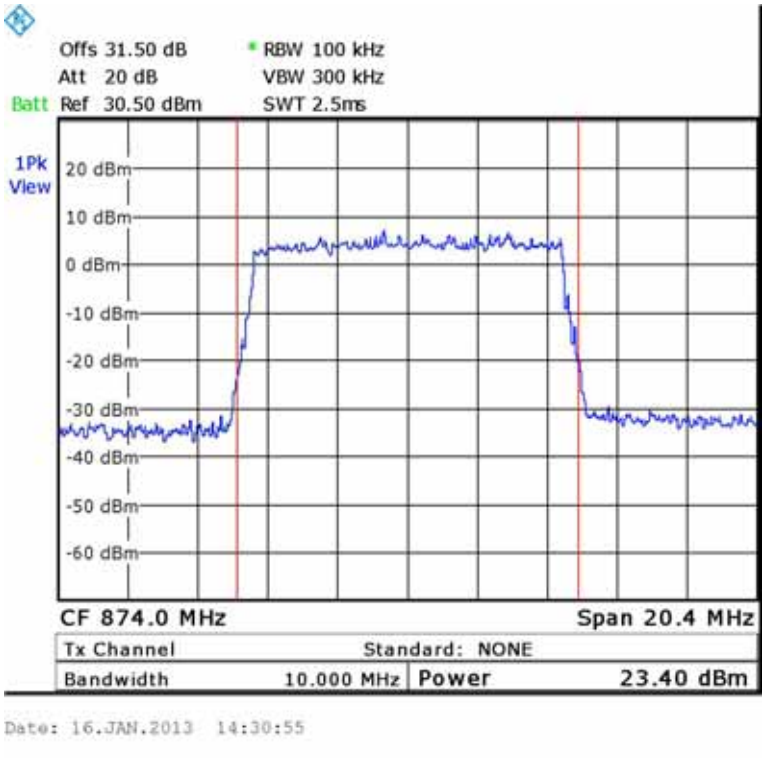

Figure 8.— 874.00 MHz

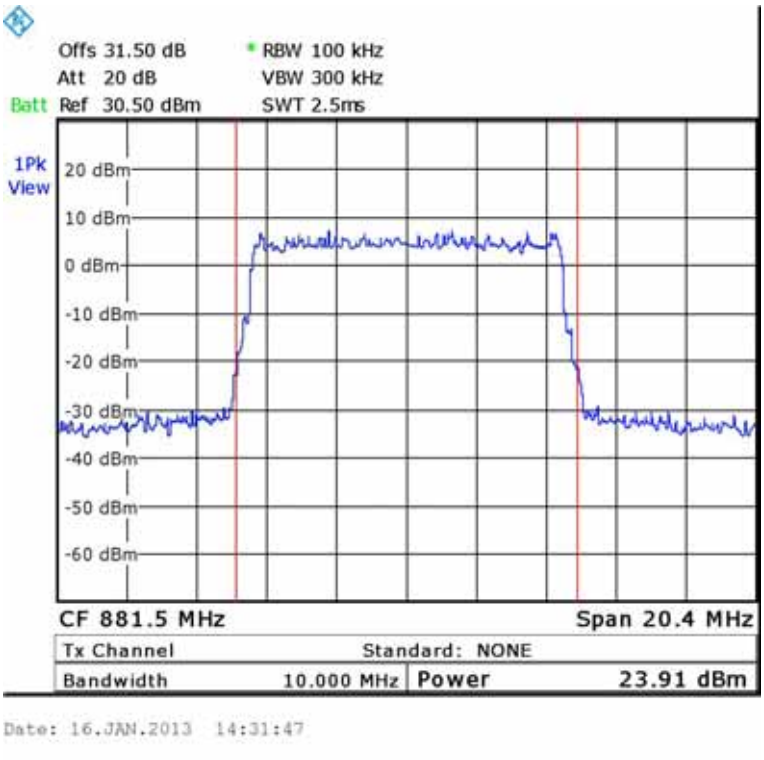

Figure 9.— 881.5 MHz

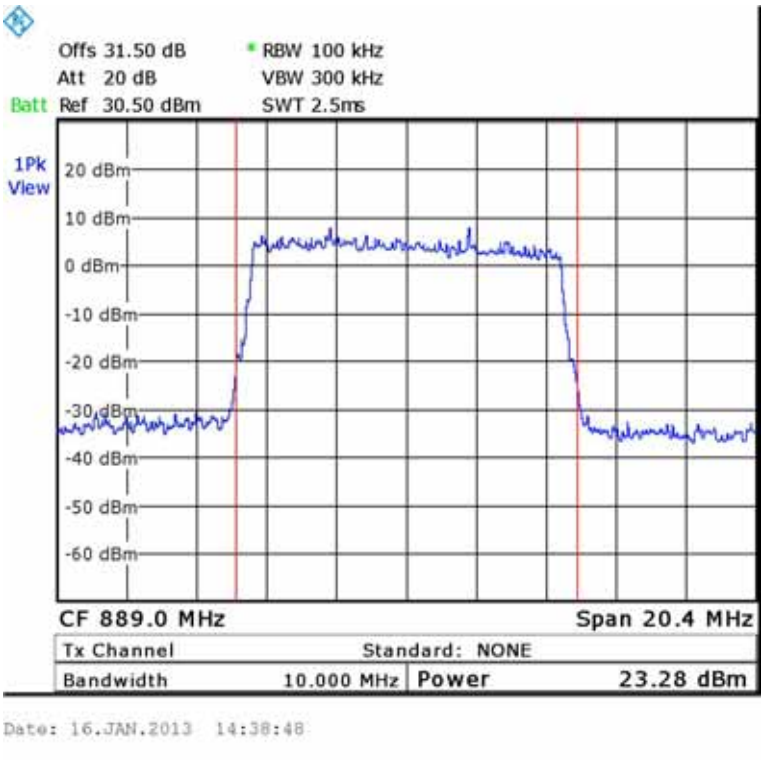

Figure 10.— 889.00 MHz

LTE 64QAM:

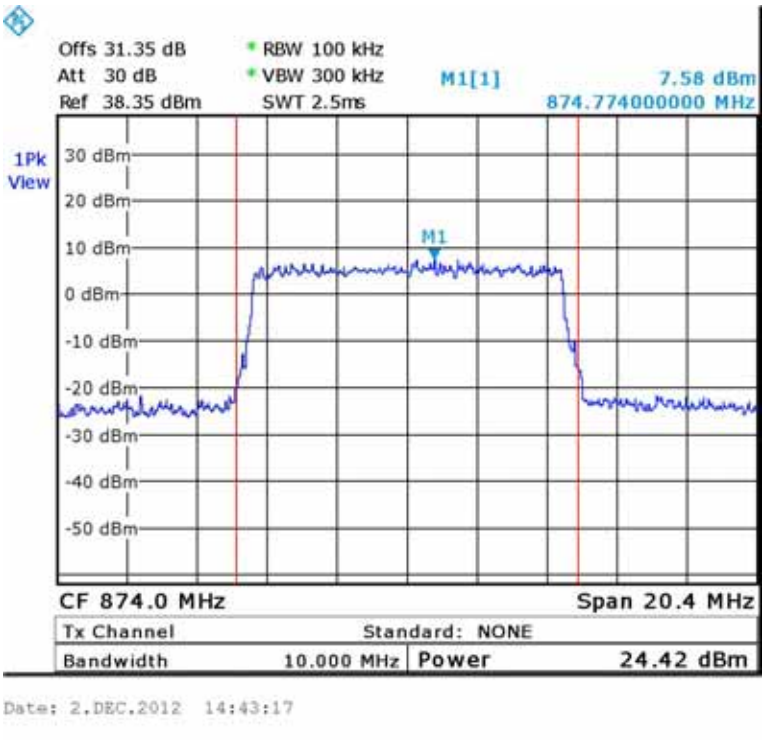

Figure 11.— 874.00 MHz

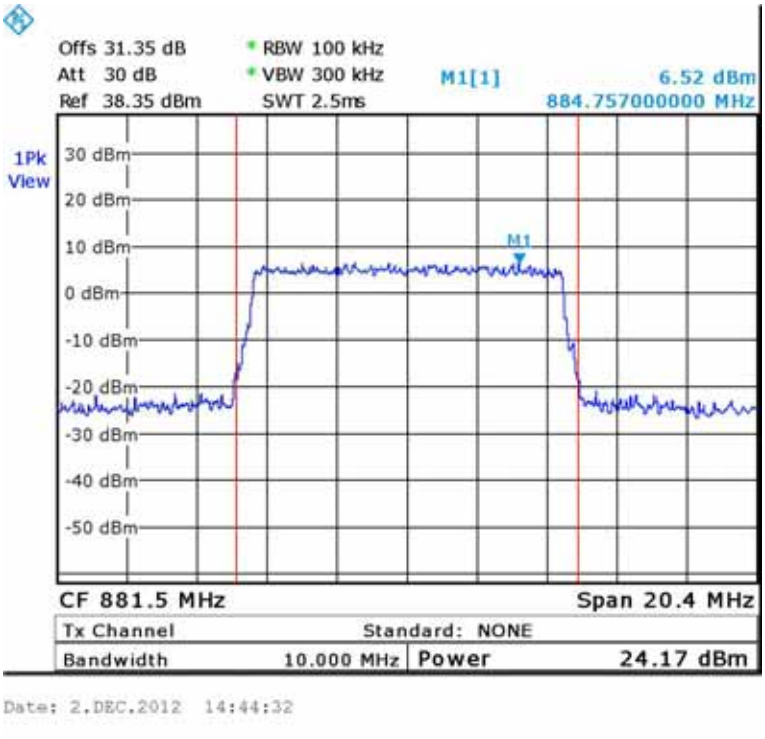

Figure 12.— 881.50 MHz

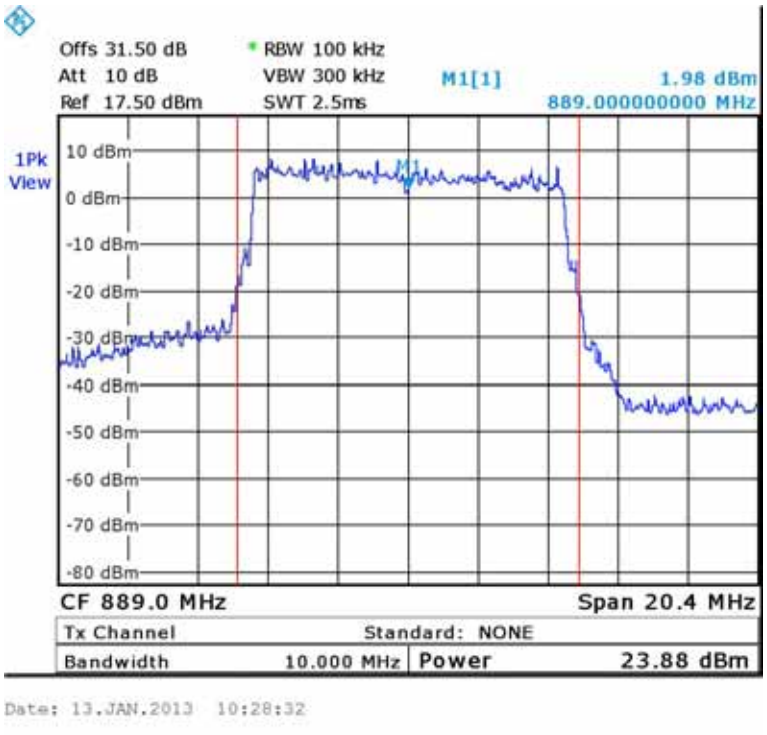

Figure 13.— 889.0 MHz

GSM:

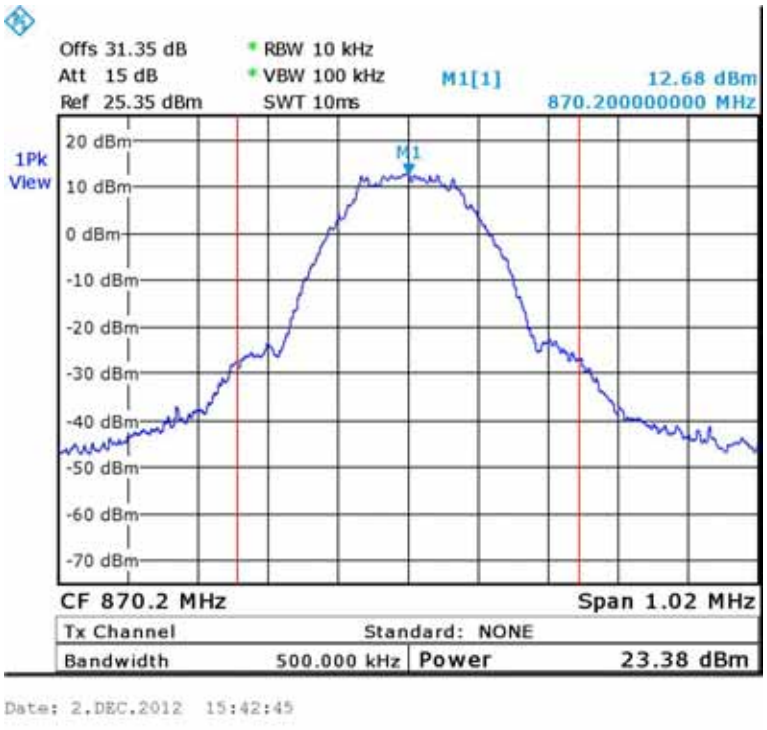

Figure 14.— 870.20 MHz

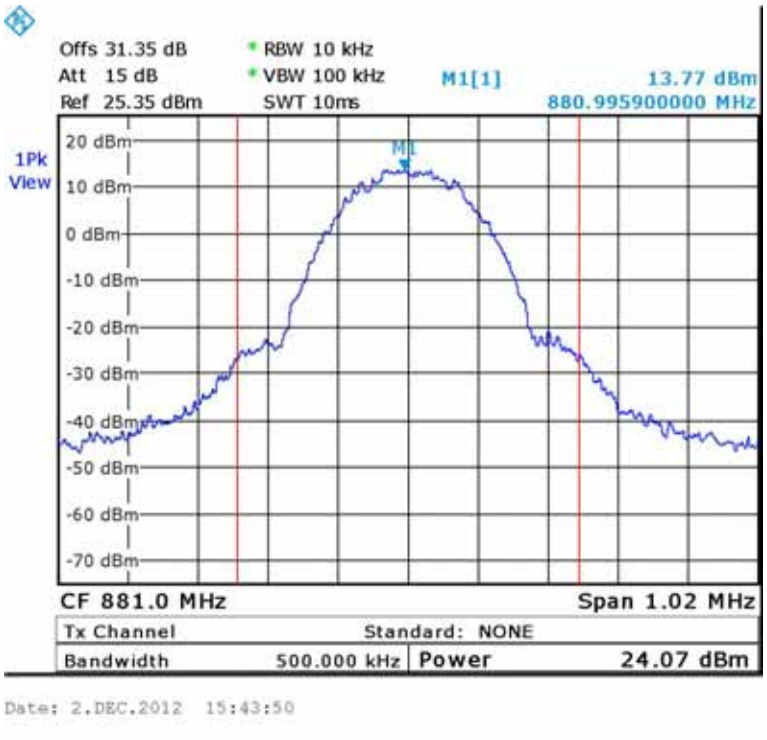

Figure 15.— 881.00 MHz

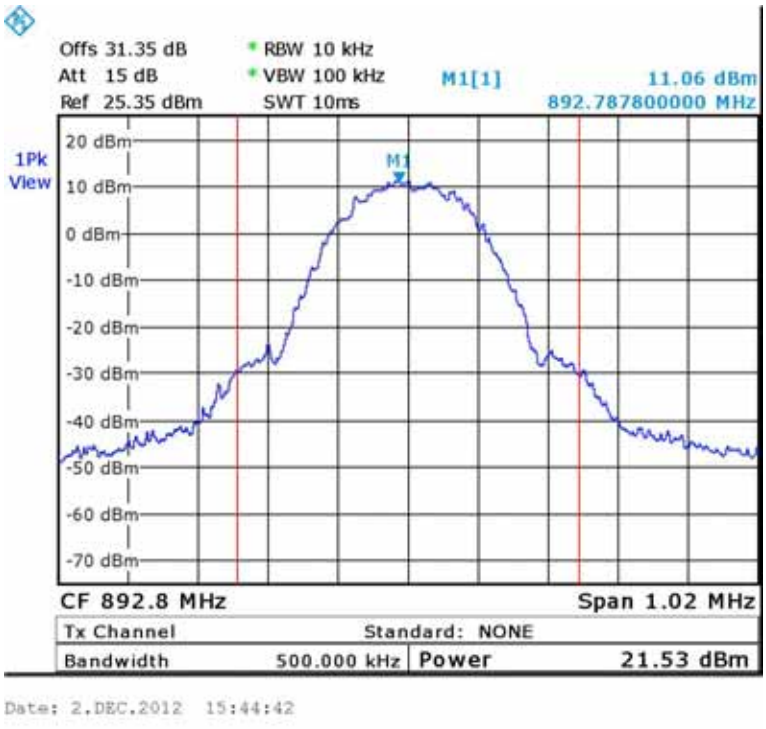

Figure 16.— 892.80 MHz

W-CDMA:

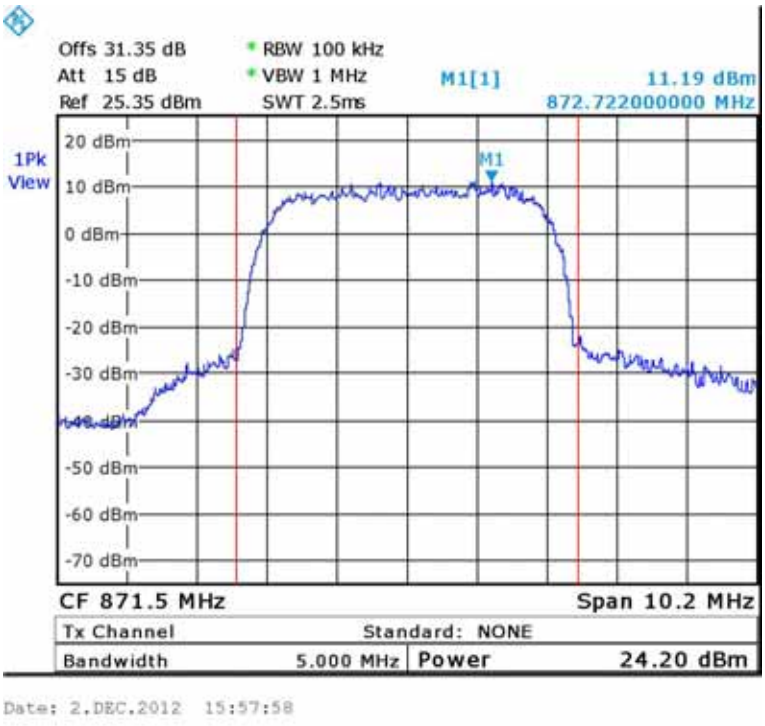

Figure 17.— 871.50 MHz

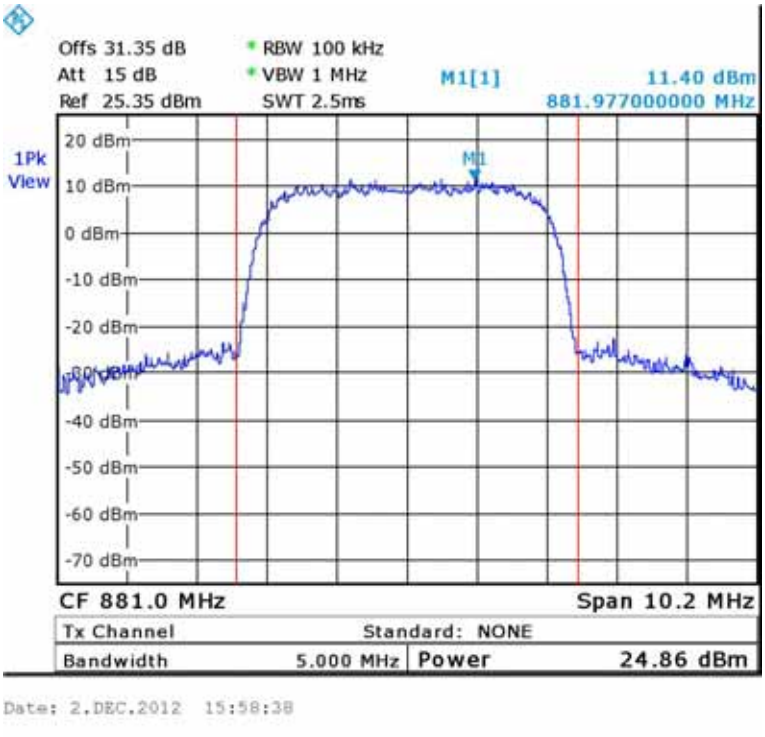

Figure 18.— 881.00 MHz

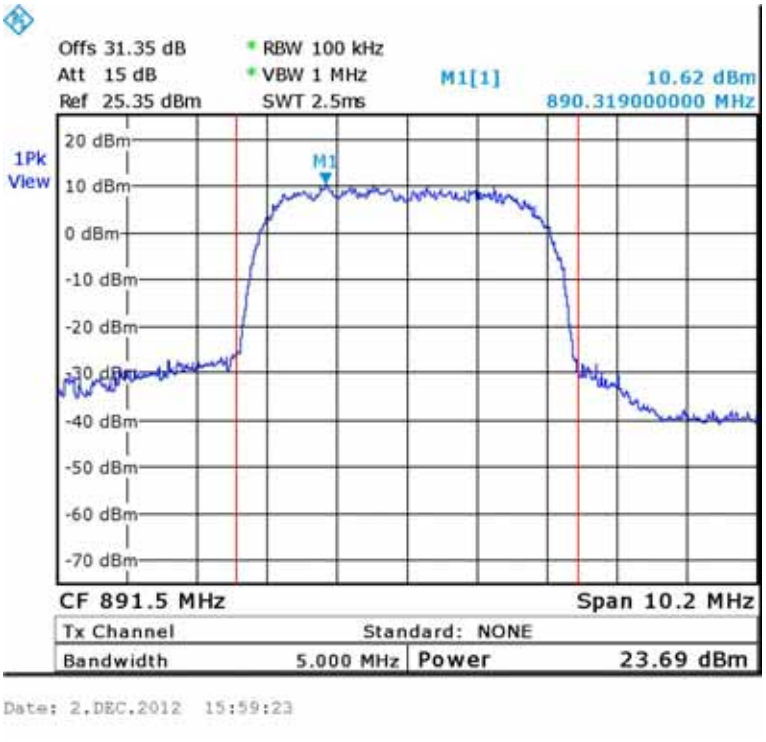

Figure 19.— 891.50 MHz

4.4 Test Equipment Used

Peak Output Power CELL

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	Rohde & Schwarz	FSL6	100194	November 1, 2012	1 year
Signal Generator	Agilent	N5172B ATO 10210	MY51350182	May 31, 2012	2 years
Attenuator	Bird	8304-N20DB	-	August 14, 2012	1 year
Cable	Avnet MTS	P-3636-603-5236	-	August 28, 2012	1 year
DC Block	MIDWEST MICROWAVE	DCDB-3624-10-NNN-02	-	N/A	N/A

Figure 20 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 test) and an appropriate coaxial cable. The spectrum analyzer was set to 100 kHz resolution B.W.
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 occupied bandwidth of the E.U.T. at the points of 20 dB below maximum peak power was measured and recorded.
Occupied bandwidth measured was repeated in the input terminal of the E.U.T.

5.3 Test Results

Modulation		Operating Frequency (MHz)	Reading (MHz)
LTE 64QAM	Input	874.0	9.760
LTE 64QAM	Output	874.0	9.521
LTE 64QAM	Input	881.0	9.677
LTE 64QAM	Output	881.0	9.587
LTE 64QAM	Input	889.0	9.325
LTE 64QAM	Output	889.0	9.365
LTE 16QAM	Input	874.0	9.301
LTE 16QAM	Output	874.0	9.391
LTE 16QAM	Input	881.0	9.421
LTE 16QAM	Output	881.0	9.581
LTE 16QAM	Input	889.0	9.421
LTE 16QAM	Output	889.0	9.381
LTE QPSK	Input	874.0	9.261
LTE QPSK	Output	874.0	9.391
LTE QPSK	Input	881.0	9.461
LTE QPSK	Output	881.0	9.261
LTE QPSK	Input	889.0	9.510
LTE QPSK	Output	889.0	9.301
GSM	Input	870.2	0.299
GSM	Output	870.2	0.293
GSM	Input	881.0	0.293
GSM	Output	881.0	0.295
GSM	Input	890.0	0.293
GSM	Output	890.0	0.295
W-CDMA	Input	871.5	4.601
W-CDMA	Output	871.5	4.581
W-CDMA	Input	881.0	4.601
W-CDMA	Output	881.0	4.581
W-CDMA	Input	891.5	4.642
W-CDMA	Output	891.5	4.560

Figure 21 Occupied Bandwidth CELL

See additional information in Figure 22 to Figure 51.

TEST PERSONNEL:

Tester Signature: _____ Date: 20.01.13

Typed/Printed Name: A. Sharabi

LTE:

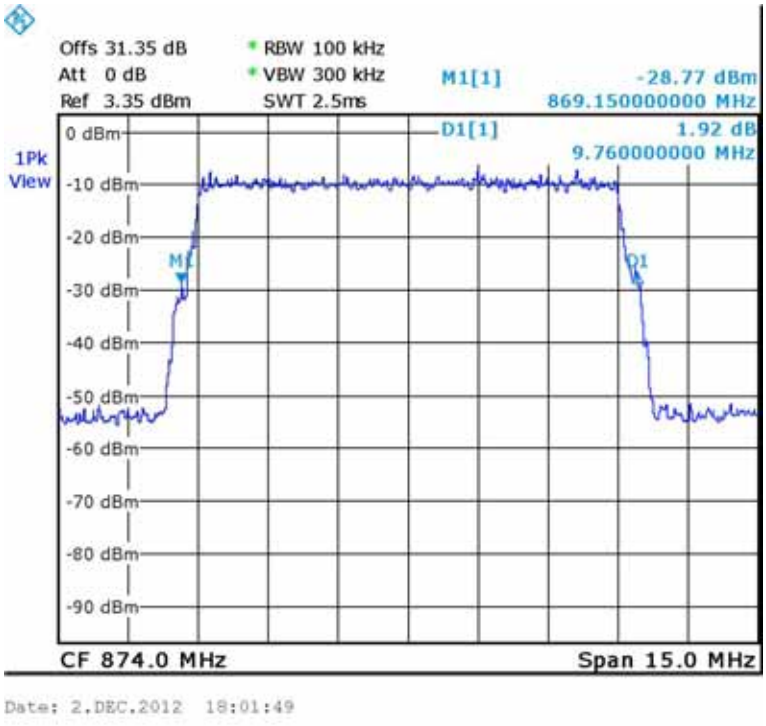

Figure 22.— 64QAM Input 874.00

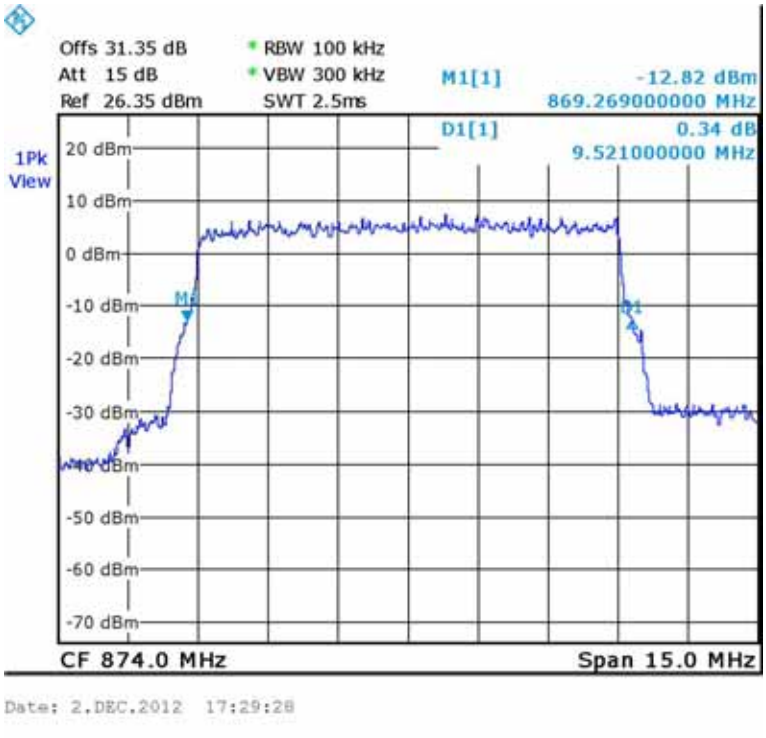

Figure 23.— 64QAM Output 874.00

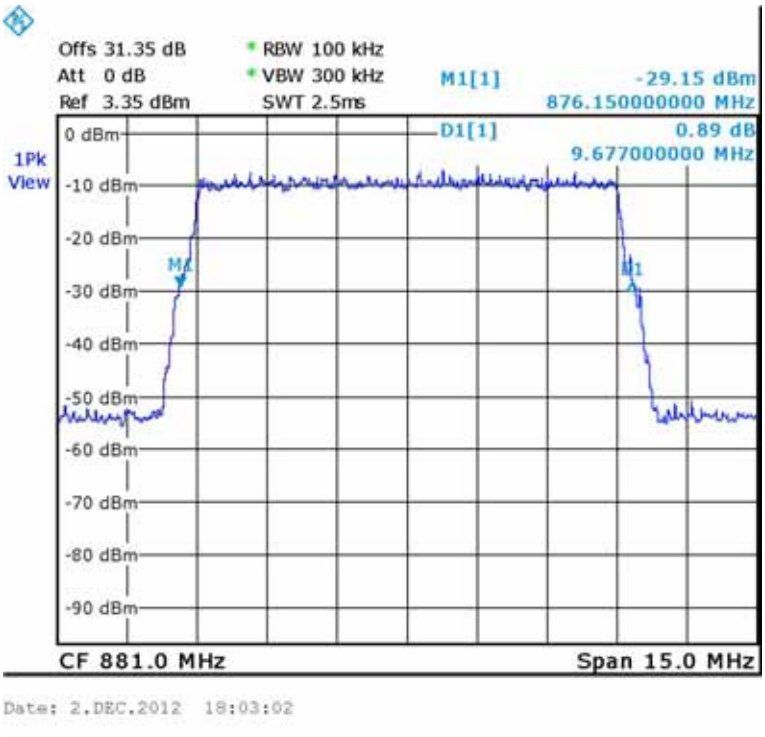

Figure 24.— 64QAM Input 881.0 MHz.

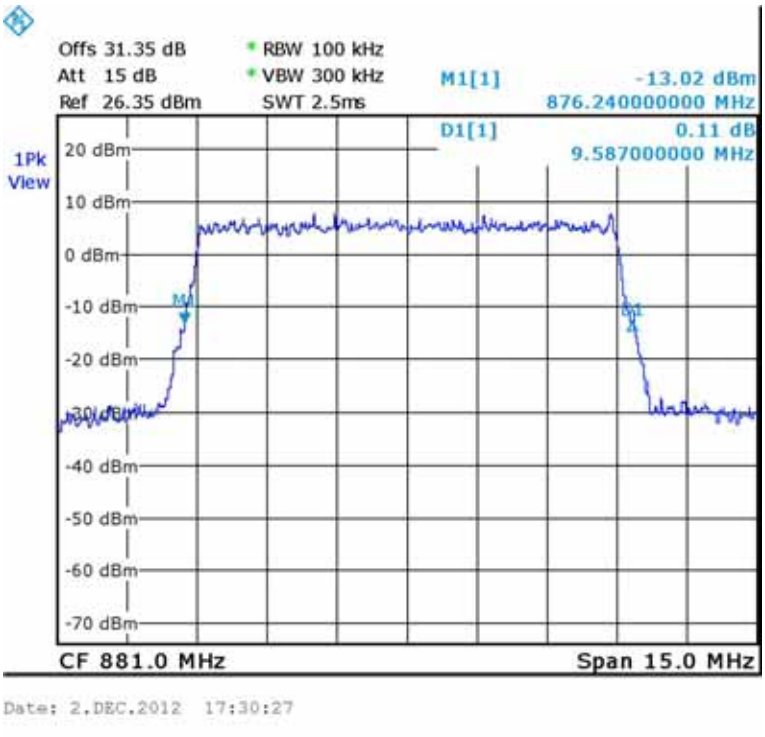

Figure 25.— 64QAM Output 881.0Hz.

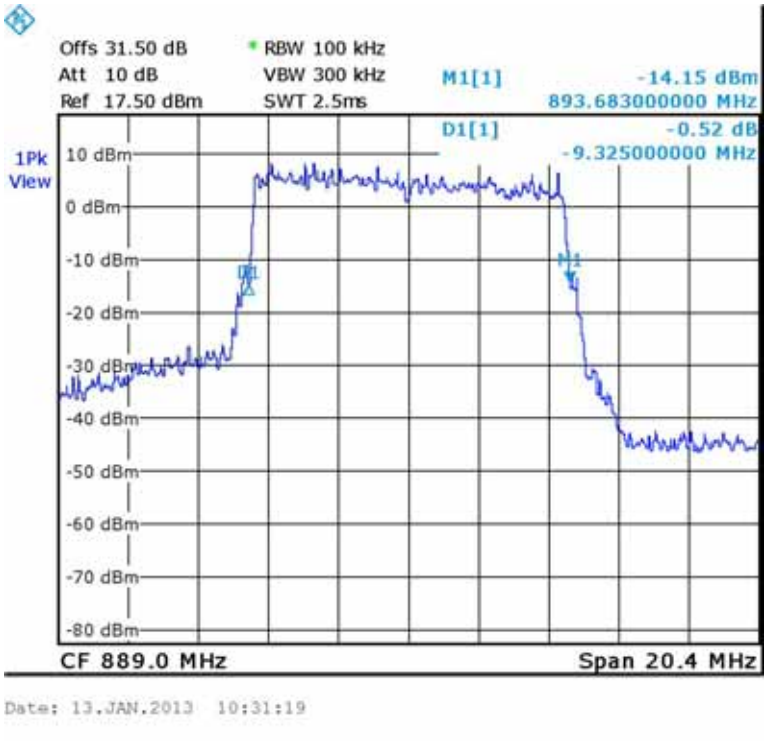

Figure 26.— 64QAM Input 889.00 MHz.

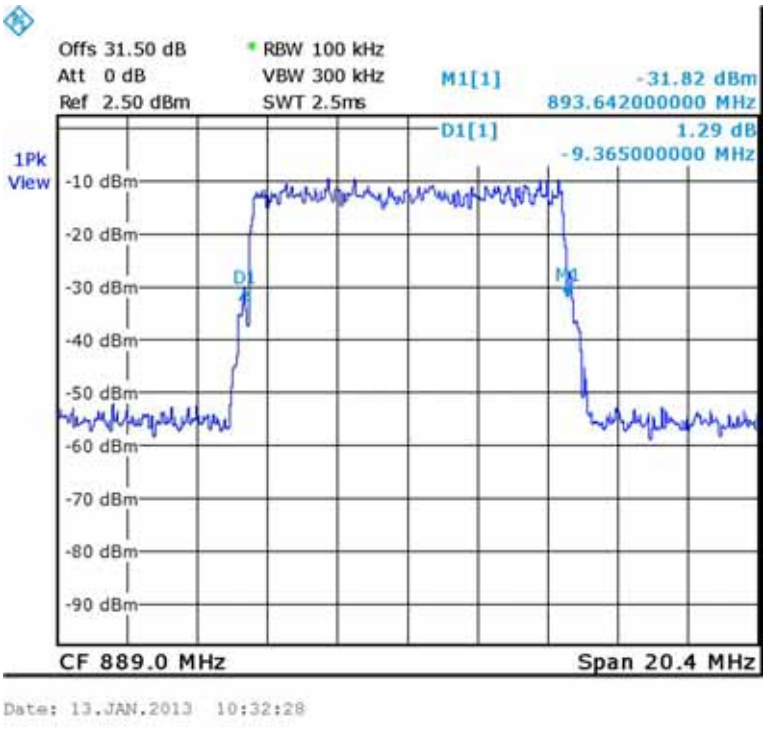

Figure 27.— 64QAM Output 889.00 MHz.

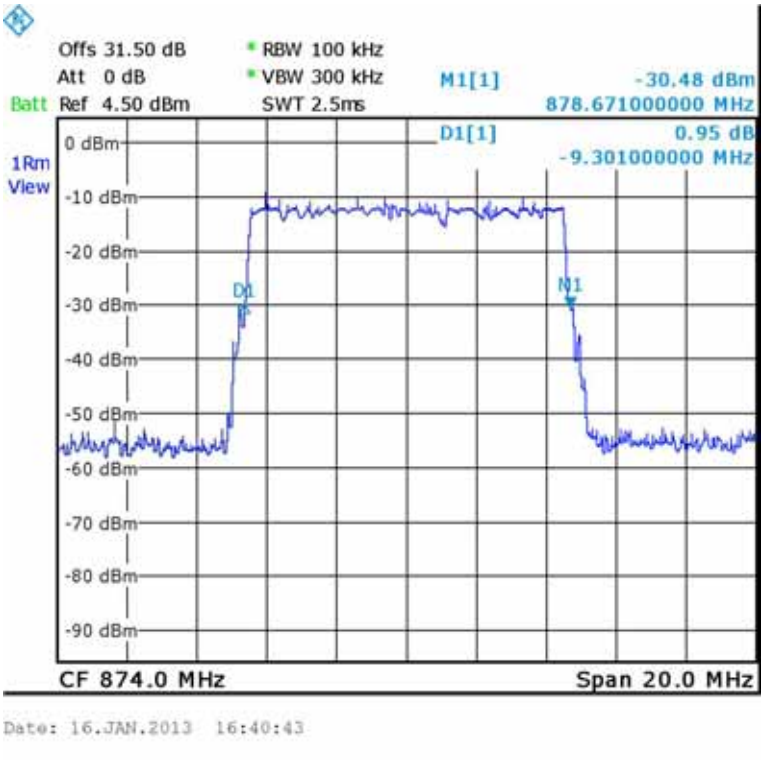

Figure 28.— 16QAM Input 874.00 MHz.

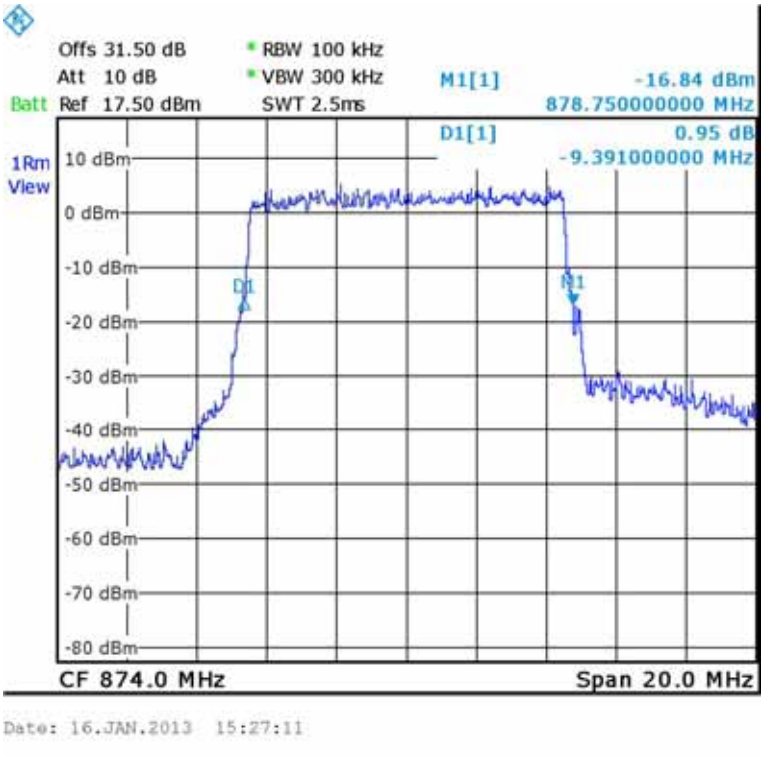

Figure 29.— 16QAM Output 874.00 MHz.

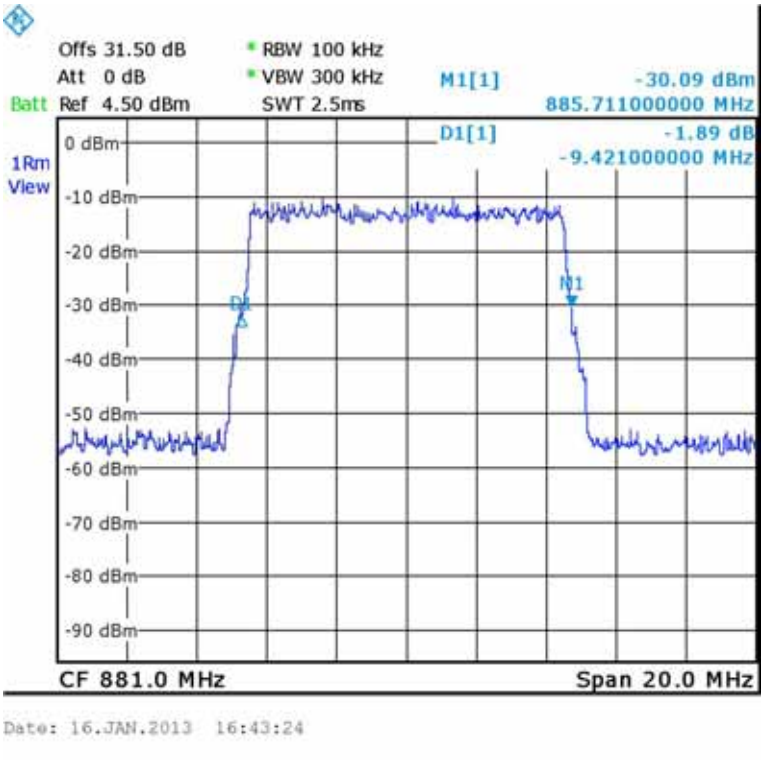

Figure 30.— 16QAM Input 881.00 MHz.

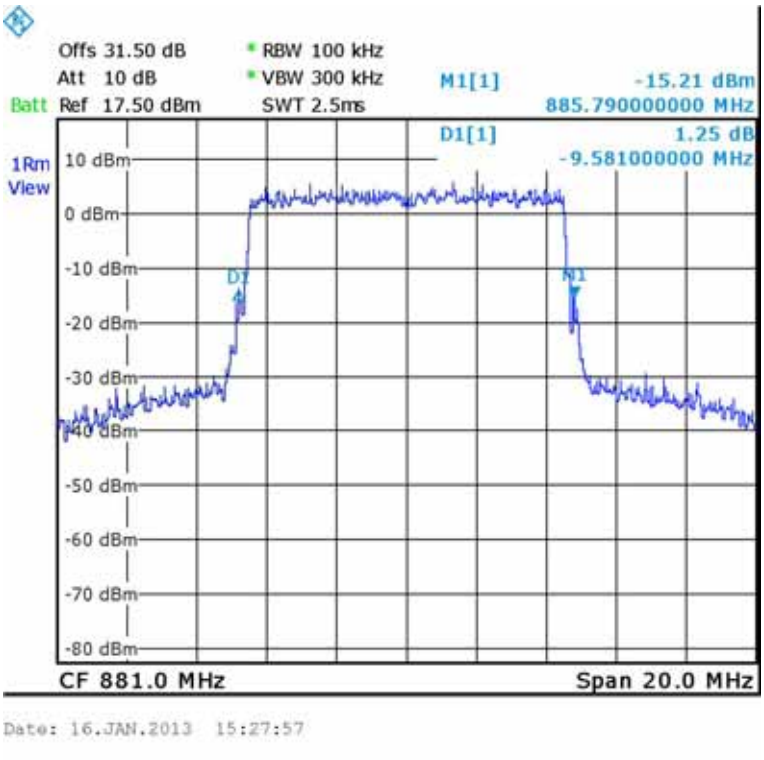

Figure 31.— 16QAM Output 881.00 MHz.

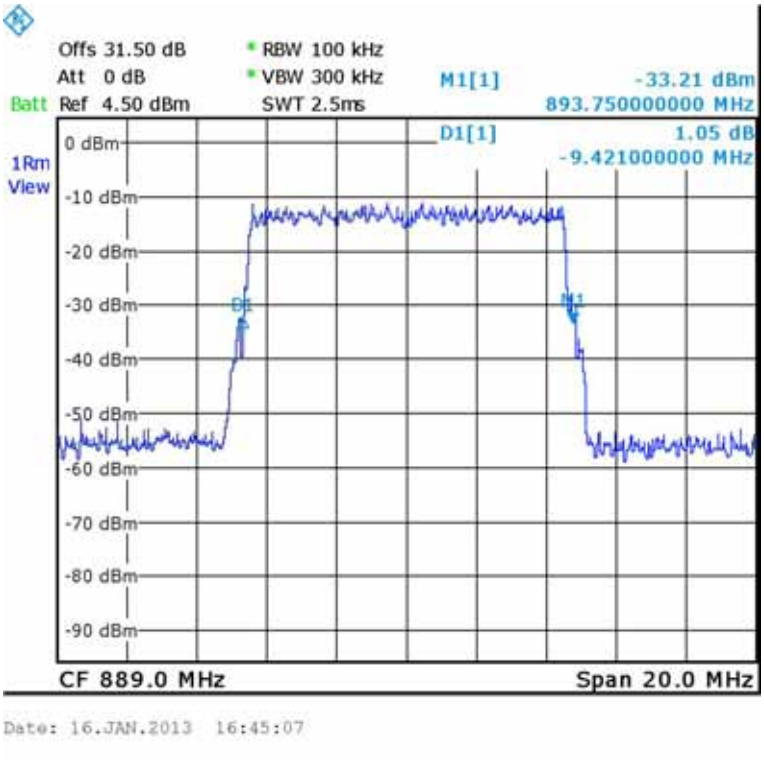

Figure 32.— 16QAM Input 889.00 MHz.

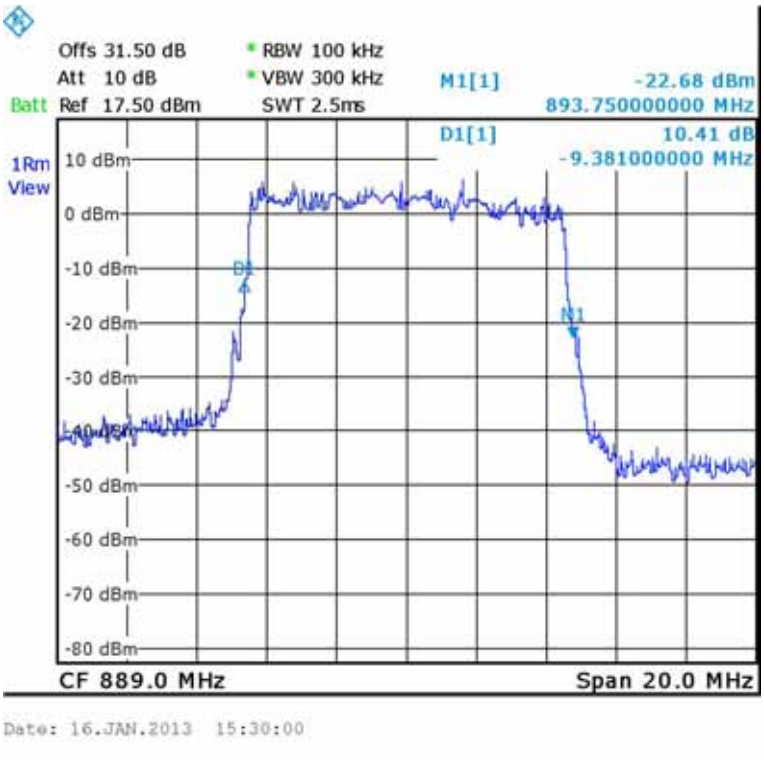

Figure 33.— 16QAM Output 889.00 MHz.

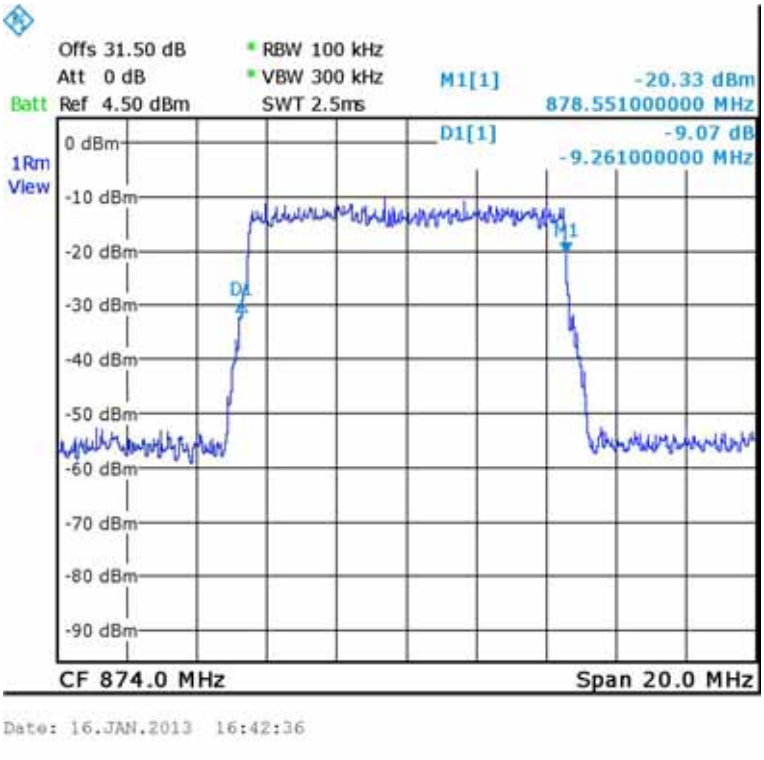

Figure 34.— QPSK Input 874.00 MHz.

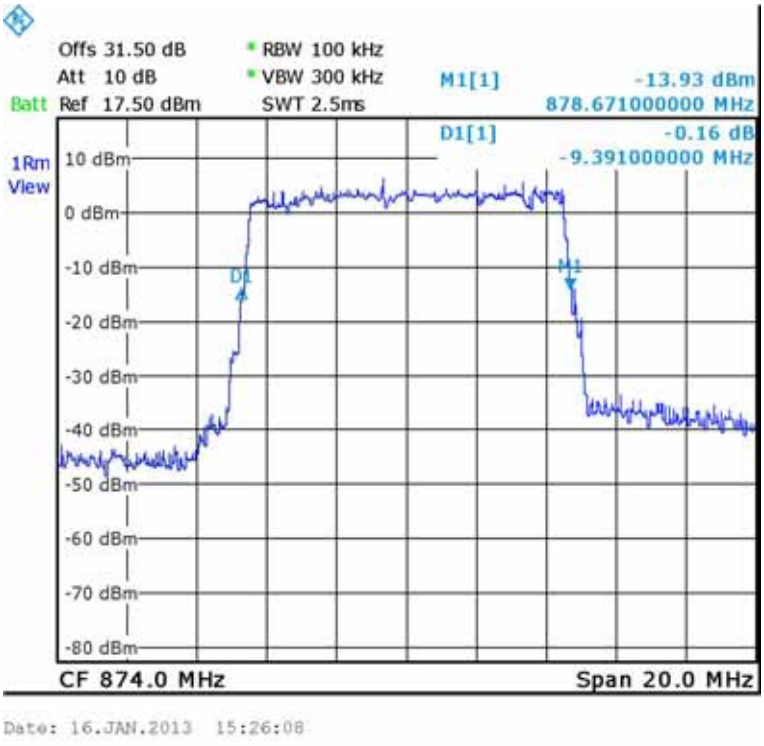

Figure 35.— QPSK Output 874.00 MHz.

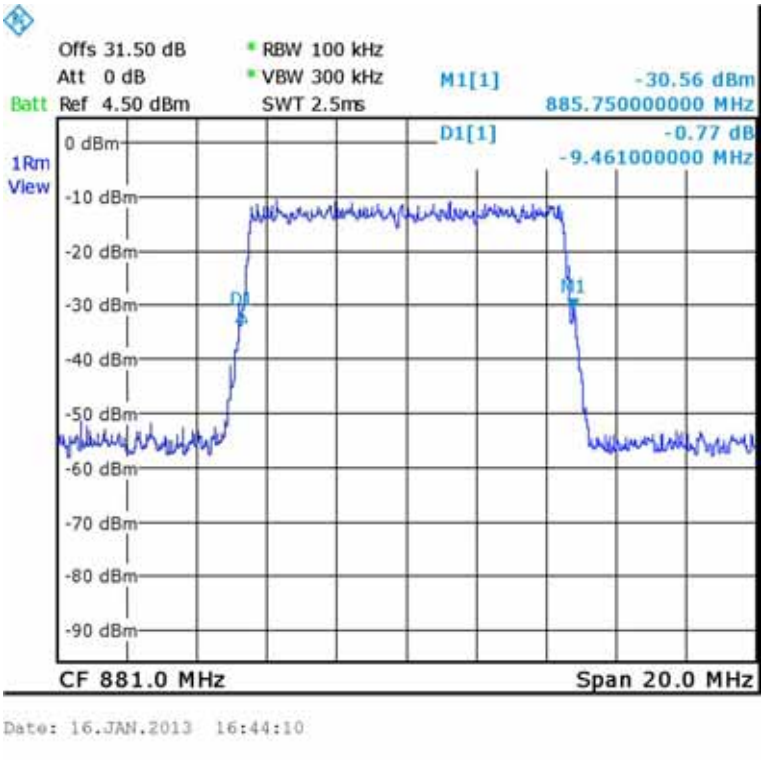

Figure 36.— QPSK Input 881.00 MHz.

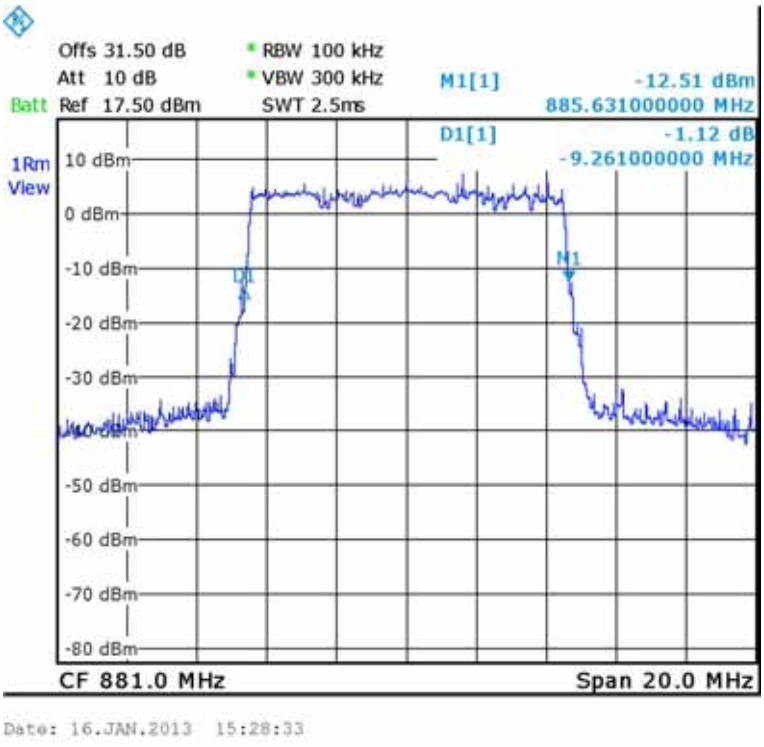

Figure 37.— QPSK Output 881.00 MHz.

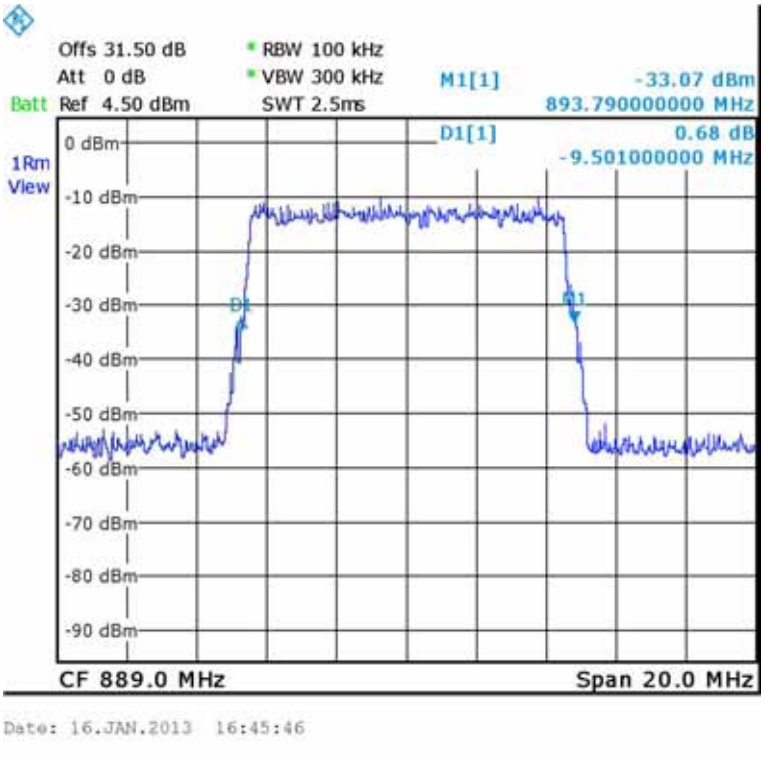

Figure 38.— QPSK Input 889.00 MHz.

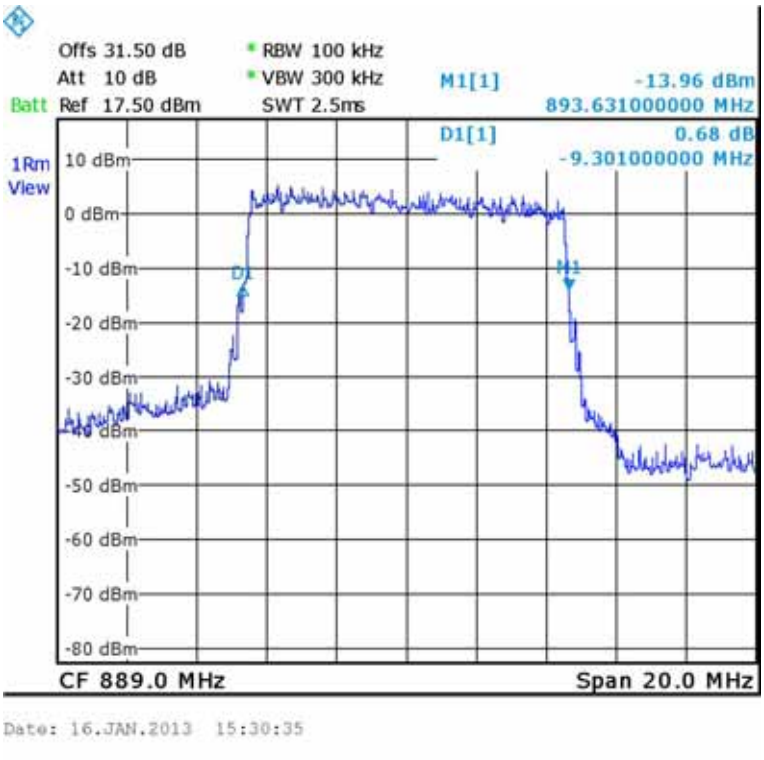

Figure 39.— QPSK Output 889.00 MHz.

GSM:

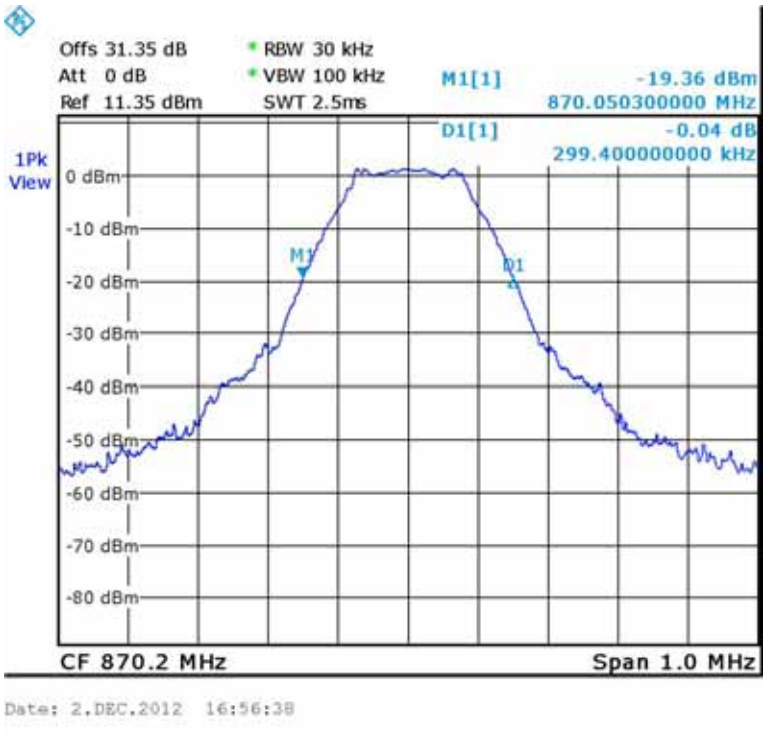

Figure 40.— Input 870.20

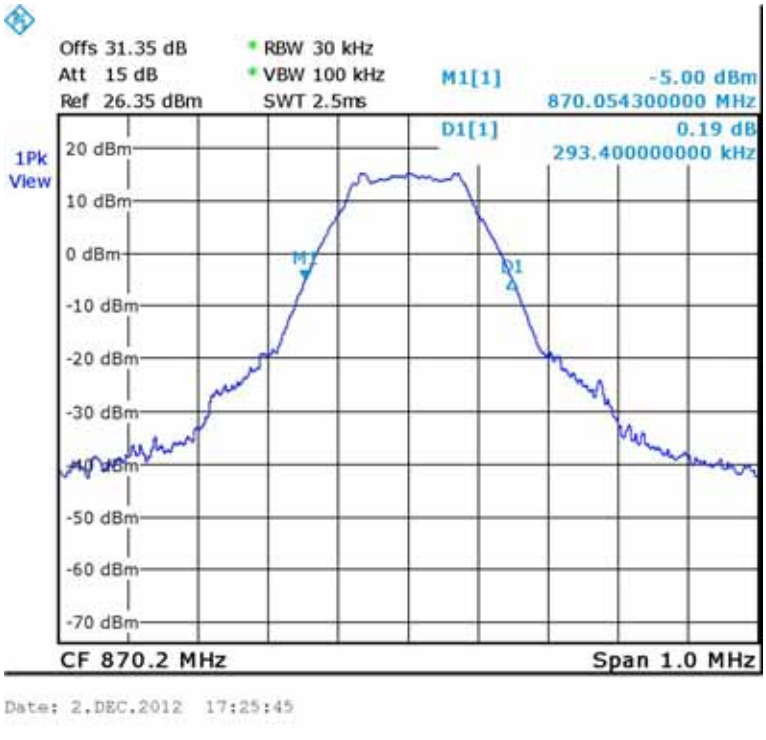

Figure 41.— Output 870.20

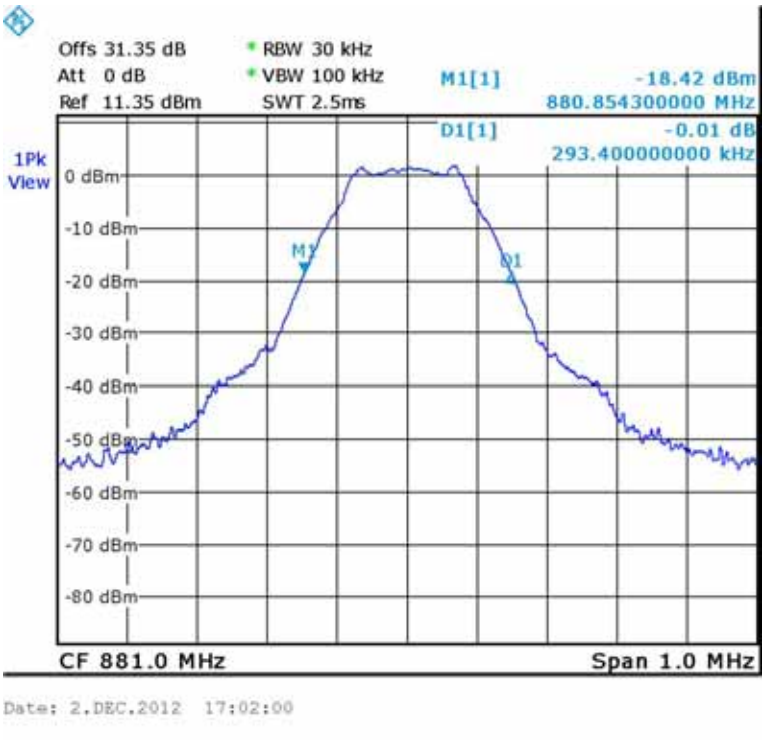

Figure 42.— Input 881.0 MHz.

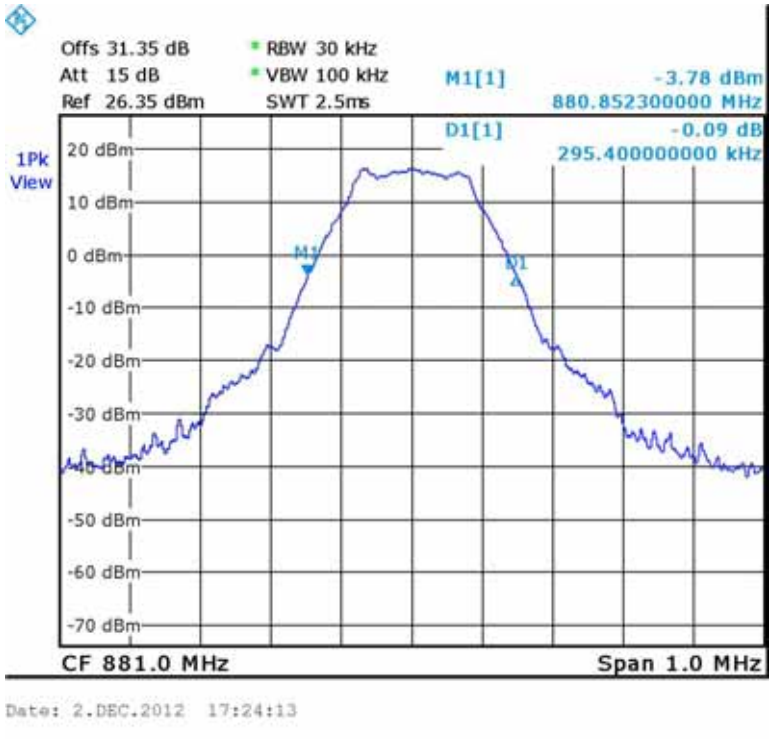

Figure 43.—Output 881.0Hz.

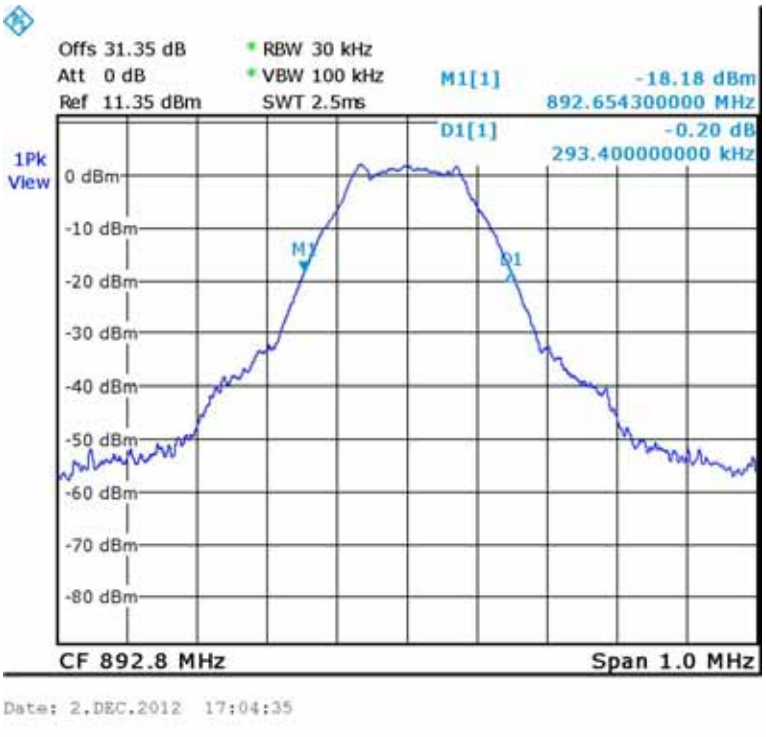

Figure 44.— Input 892.8 MHz.

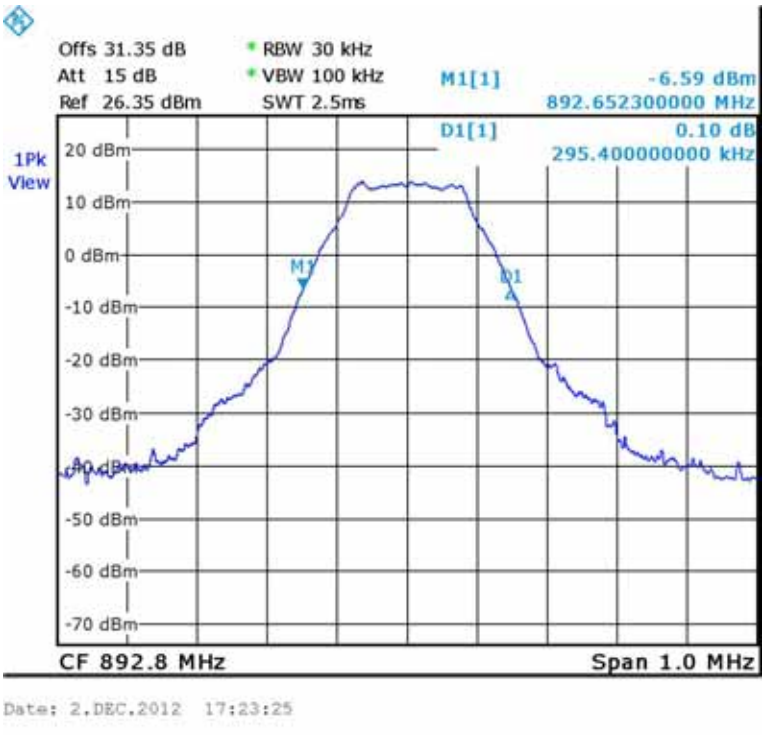

Figure 45.— Output 892.8 MHz.

W-CDMA:

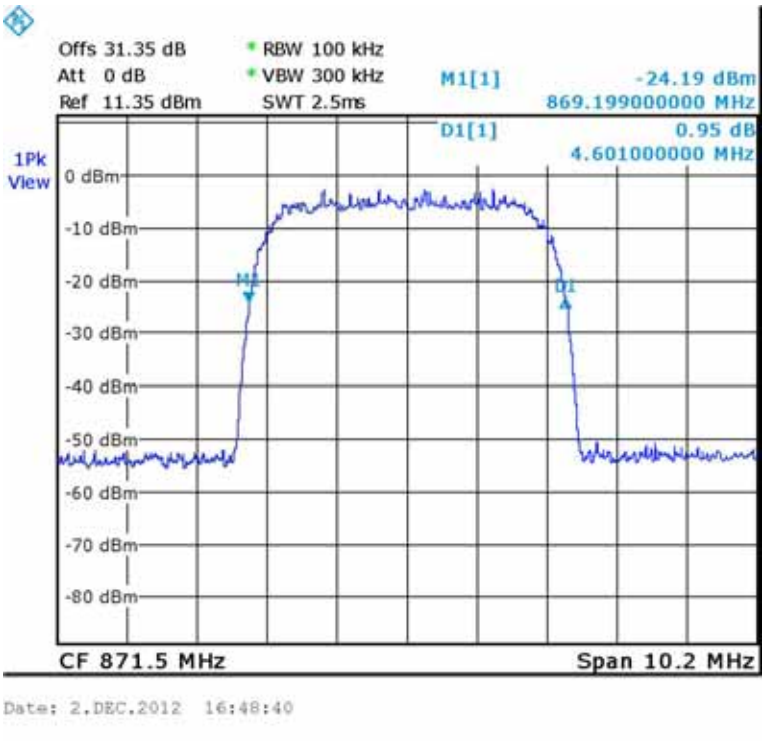

Figure 46.— Input 871.50

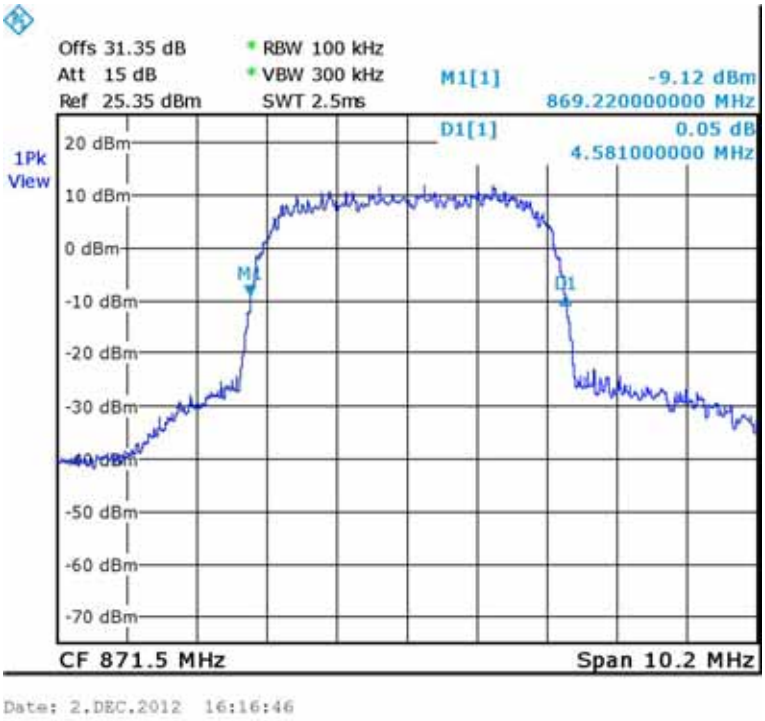

Figure 47.— Output 871.50

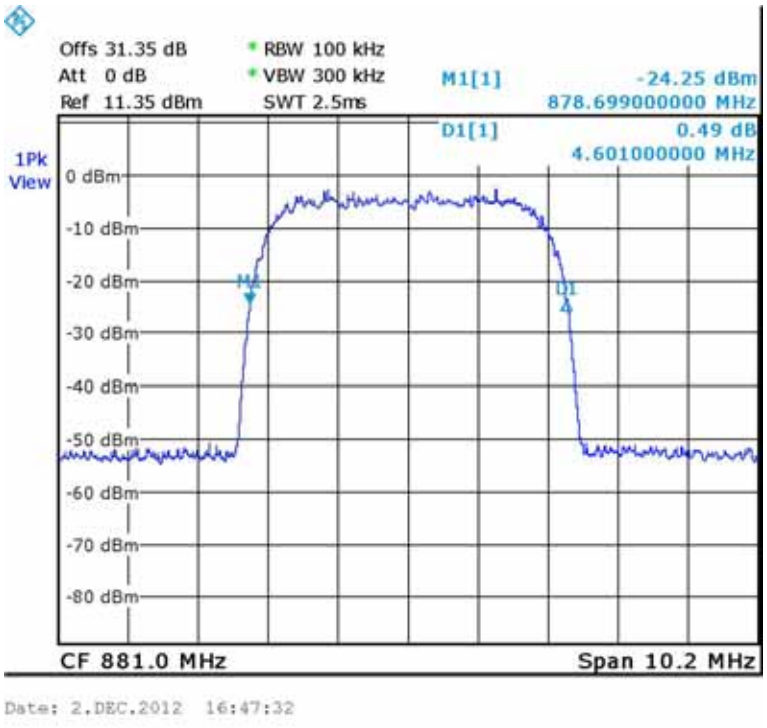

Figure 48.— Input 881.0 MHz.

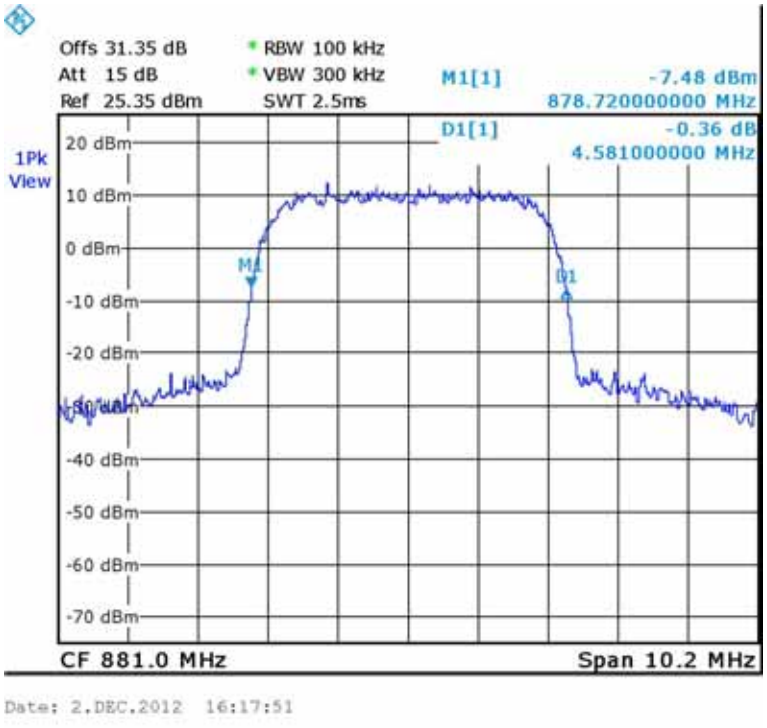

Figure 49.—Output 881.0Hz.

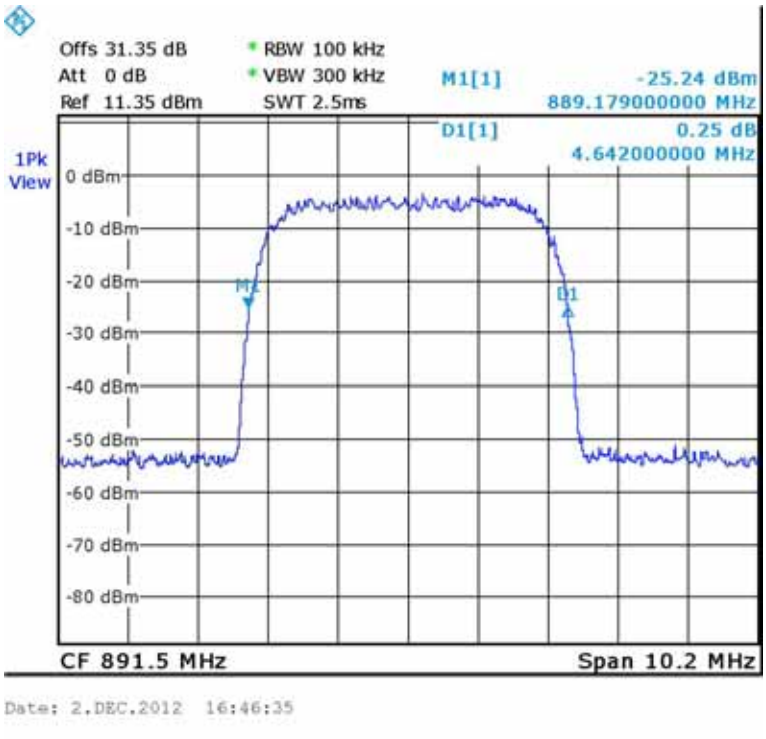

Figure 50.— Input 891.50 MHz.

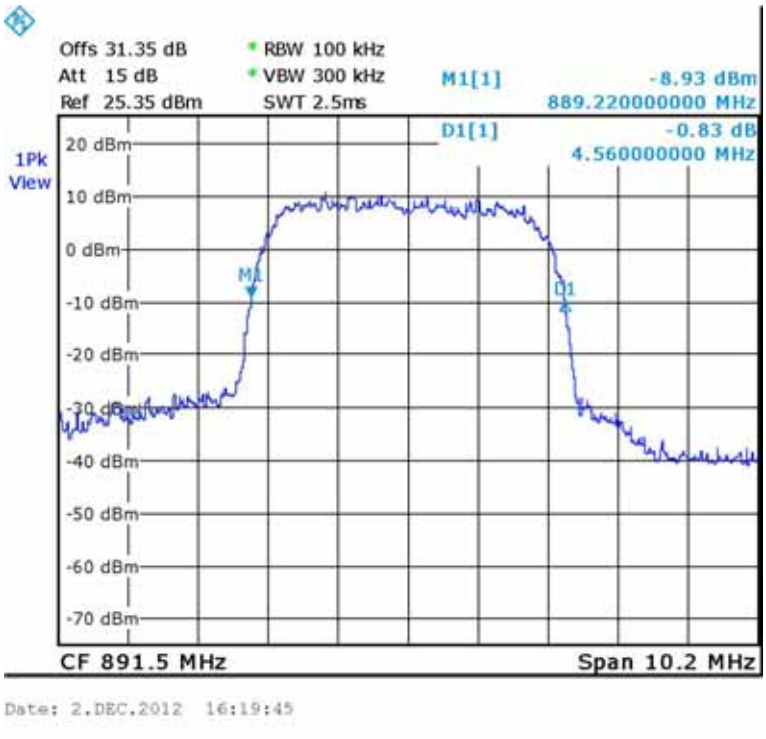

Figure 51.— Output 891.50 MHz.

5.4 Test Equipment Used

Occupied Bandwidth CELL

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	Rohde & Schwarz	FSL6	100194	November 1, 2012	1 year
Signal Generator	Agilent	N5172B ATO 10210	MY51350182	May 31, 2012	2 years
Attenuator	Bird	8304-N20DB	-	August 14, 2012	1 year
Cable	Avnet MTS	P-3636-603-5236	-	August 28, 2012	1 year
DC Block	MIDWEST MICROWAVE	DCDB-3624-10-NNN-02	-	N/A	N/A

Figure 52 Test Equipment Used

6. Out of Band Emissions at Antenna Terminals CELL

6.1 Test Specification

FCC Part 22, Section 917; FCC Part 2.1051

6.2 Test procedure

The power of any emission outside of the authorized operating frequency ranges (869 - 894 MHz) 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 (41 dB).
The spectrum analyzer was set to 100 kHz R.B.W.

6.3 Test Results

Modulation	Operation Frequency (MHz)	Reading (dBm)	Specification (dBm)	Margin (dB)
LTE	874.00	-21.65	-13.0	-8.65
	881.00	-17.32	-13.0	-4.32
	890.00	-17.82	-13.0	-4.82
GSM	870.20	-21.32	-13.0	-8.32
	881.00	-19.98	-13.0	-6.98
	892.80	-17.98	-13.0	-4.98
W-CDMA	871.50	-18.32	-13.0	-5.32
	881.00	-20.15	-13.0	-7.15
	891.50	-20.65	-13.0	-7.65

Figure 53 Out of Band Emission Results CELL

See additional information in Figure 54 to Figure 107.

JUDGEMENT: Passed by 4.32 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 20.01.13

Typed/Printed Name: I. Siboni

LTE:

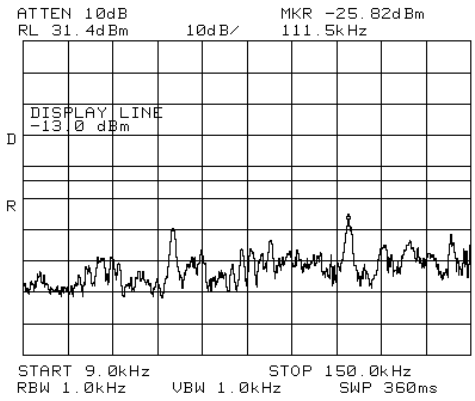

Figure 54.— 874.00 MHz

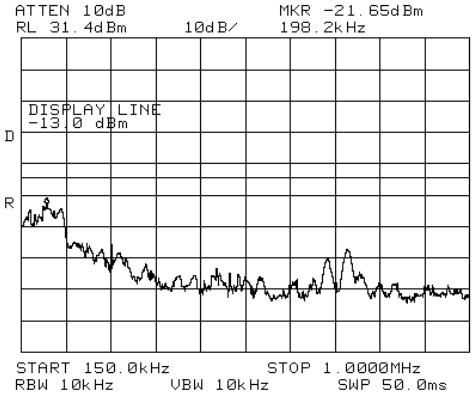

Figure 55.— 874.00 MHz

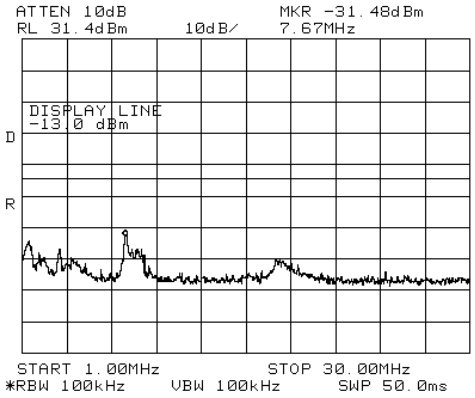

Figure 56.— 874.00 MHz

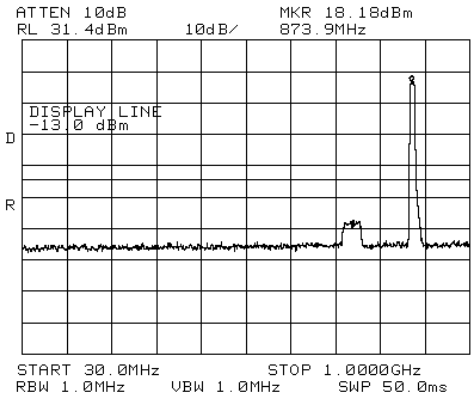

Figure 57.— 874.00 MHz

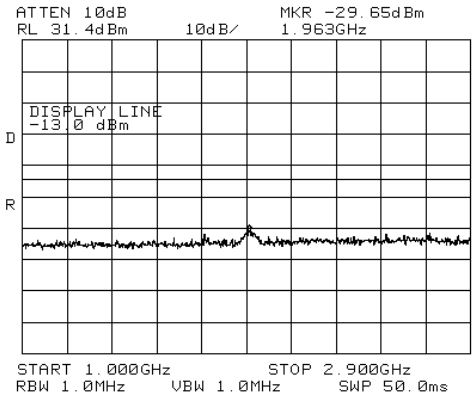

Figure 58.— 874.00 MHz

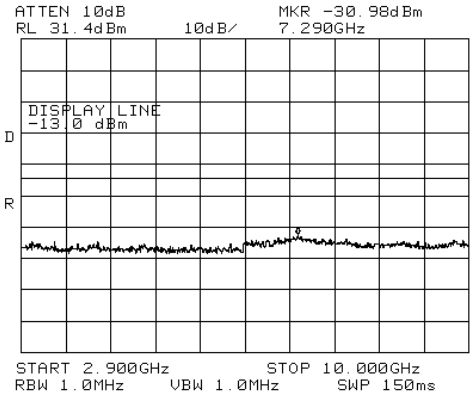

Figure 59.— 874.00 MHz

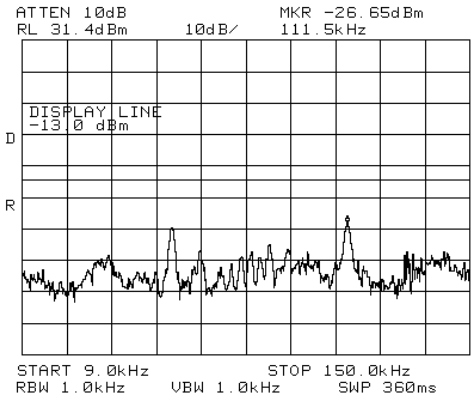

Figure 60.— 881.00 MHz

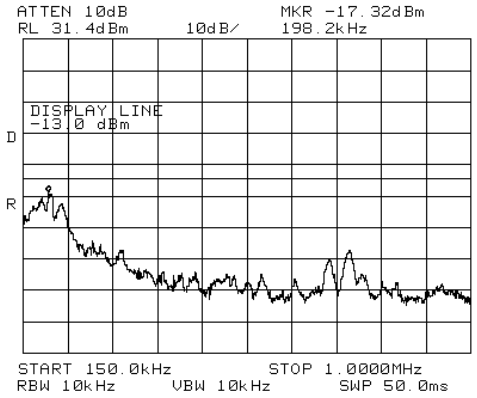

Figure 61.— 881.00 MHz

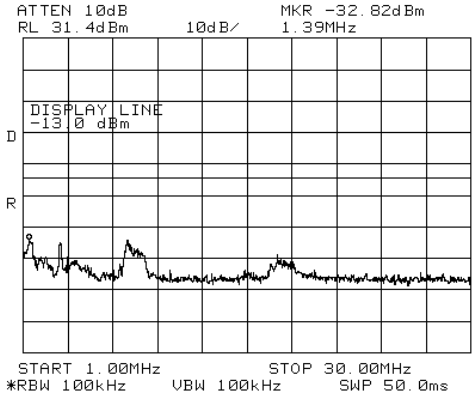

Figure 62.— 881.00 MHz

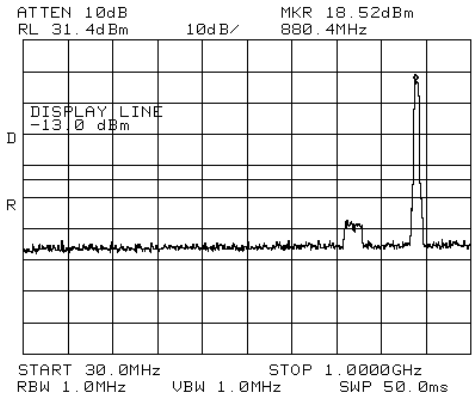

Figure 63.— 881.00 MHz

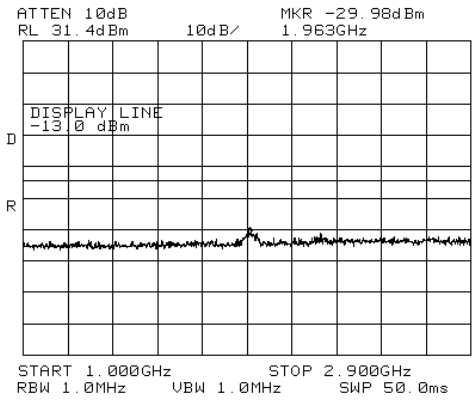

Figure 64.— 881.00 MHz

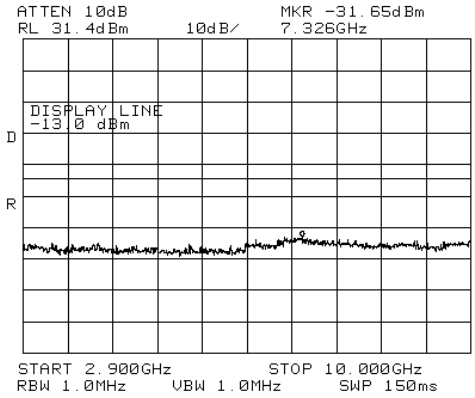

Figure 65.— 881.00 MHz

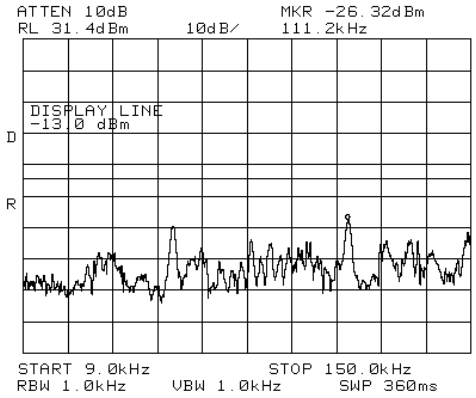

Figure 66.— 890.00 MHz

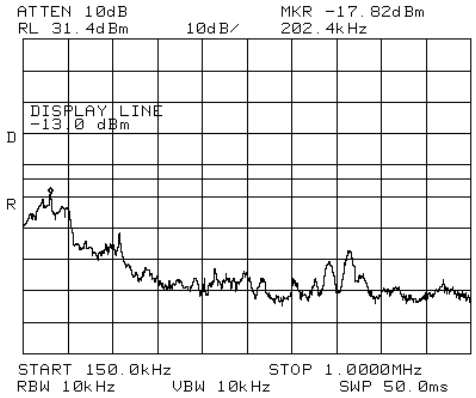

Figure 67.— 890.00 MHz

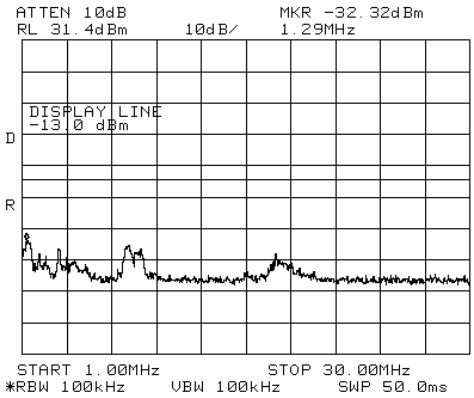

Figure 68.— 890.00 MHz

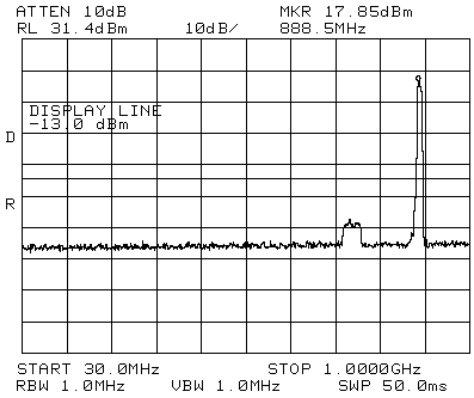

Figure 69.— 890.00 MHz

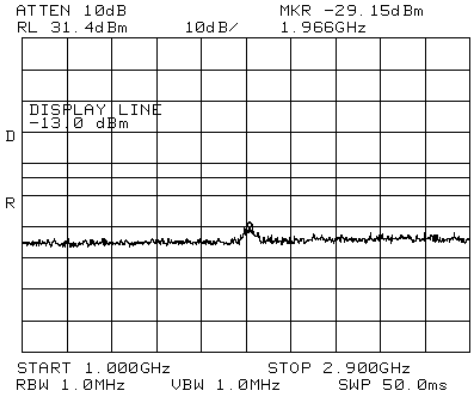

Figure 70.— 890.00 MHz

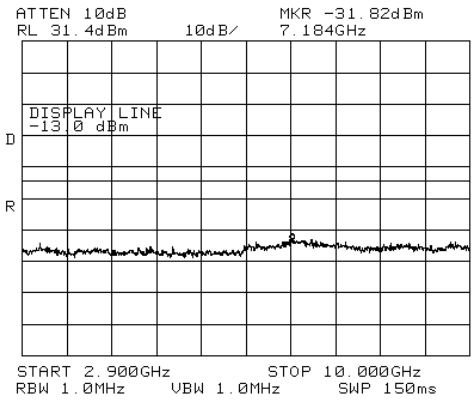

Figure 71.— 890.00 MHz

GSM:

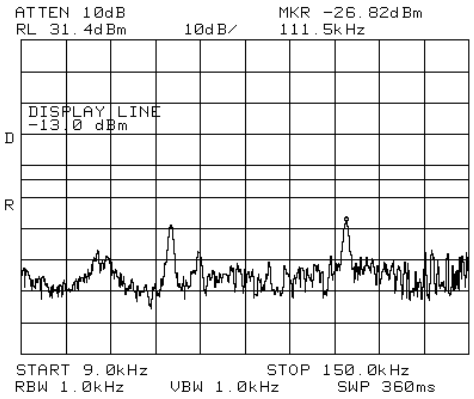

Figure 72.— 870.20 MHz

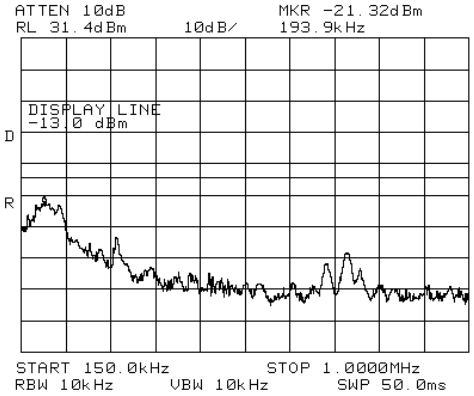

Figure 73.— 870.20 MHz

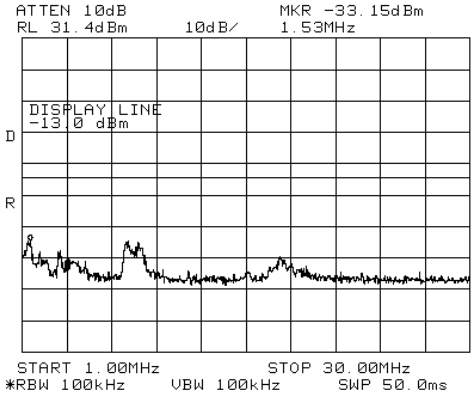

Figure 74.— 870.20 MHz

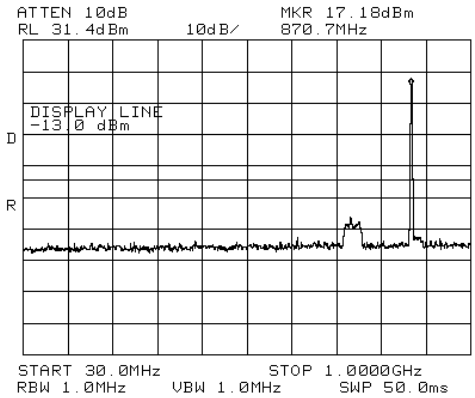

Figure 75.— 870.20 MHz

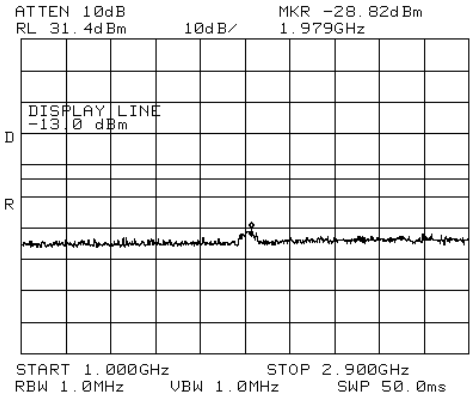

Figure 76.— 870.20 MHz

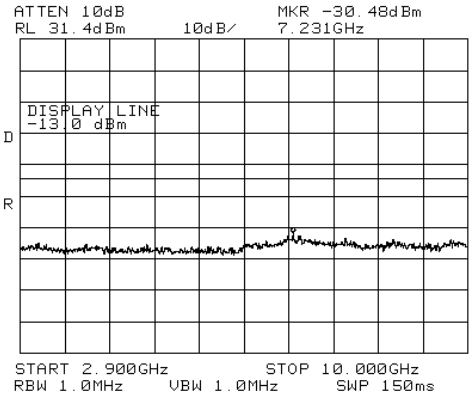

Figure 77.— 870.20 MHz

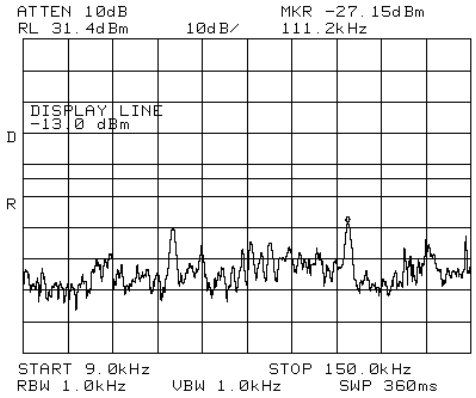

Figure 78.— 881.00 MHz

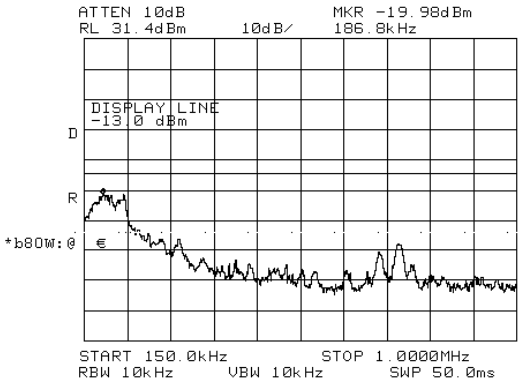

Figure 79.— 881.00 MHz

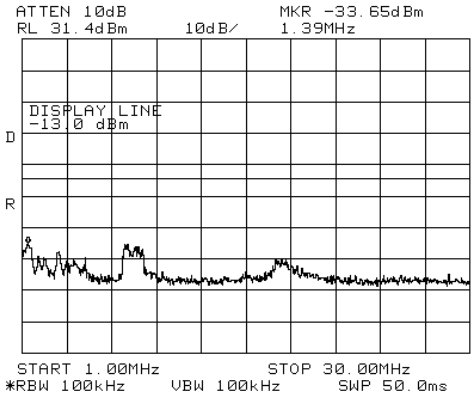

Figure 80.— 881.00 MHz

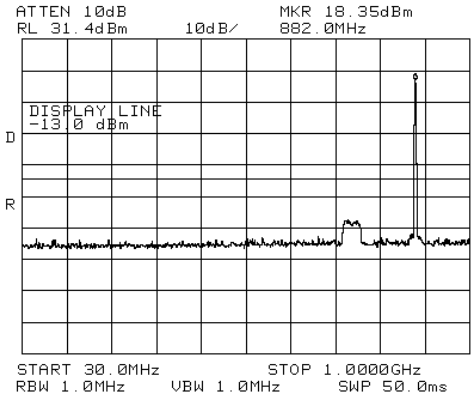

Figure 81.— 881.00 MHz

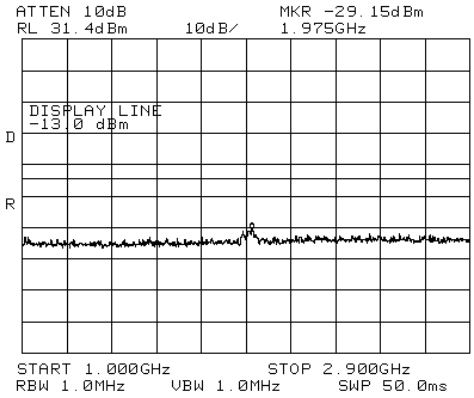

Figure 82.— 881.00 MHz

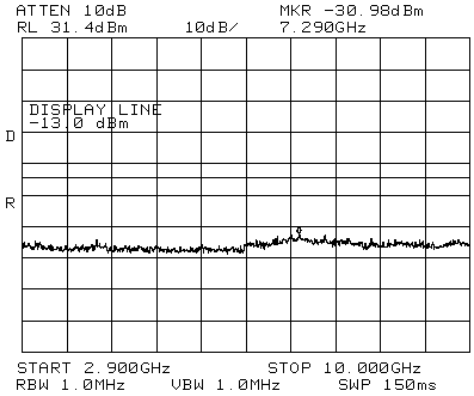

Figure 83.— 881.00 MHz

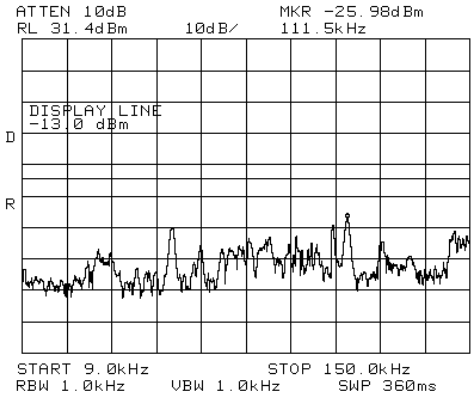

Figure 84.— 892.80 MHz

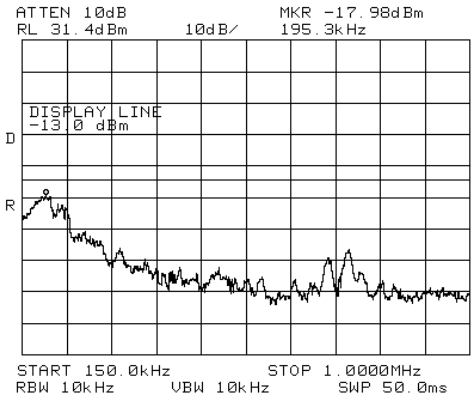

Figure 85.— 892.80 MHz

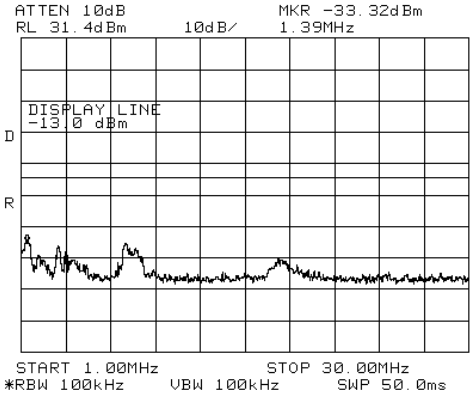

Figure 86.— 892.80 MHz

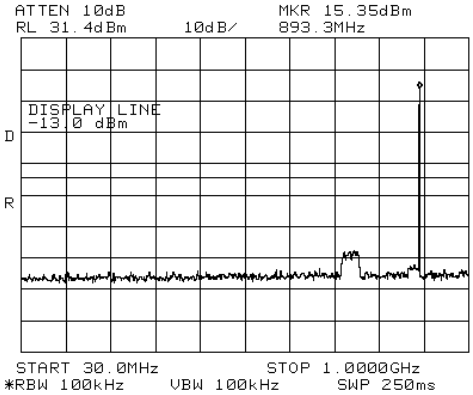

Figure 87.— 892.80 MHz

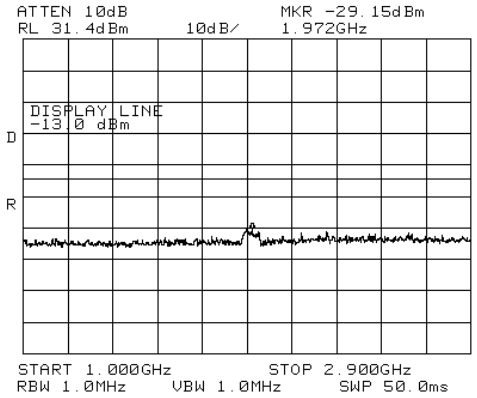

Figure 88.— 892.80 MHz

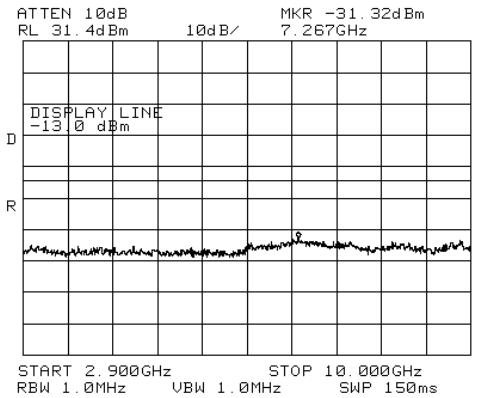

Figure 89.— 892.80 MHz

W-CDMA:

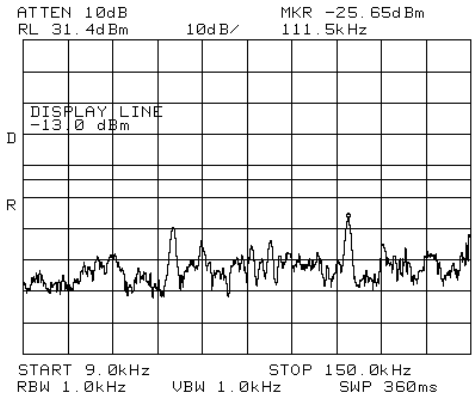

Figure 90.— 871.50 MHz

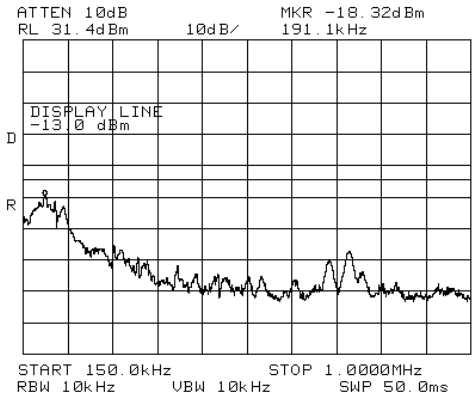

Figure 91.— 871.50 MHz

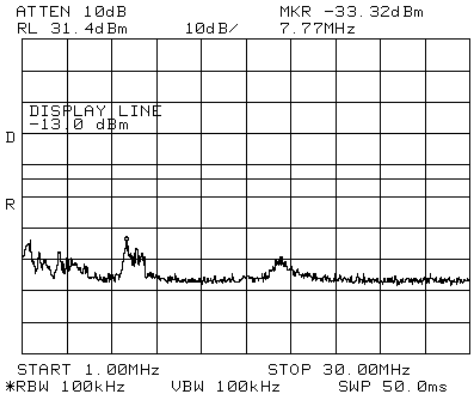

Figure 92.— 871.50 MHz

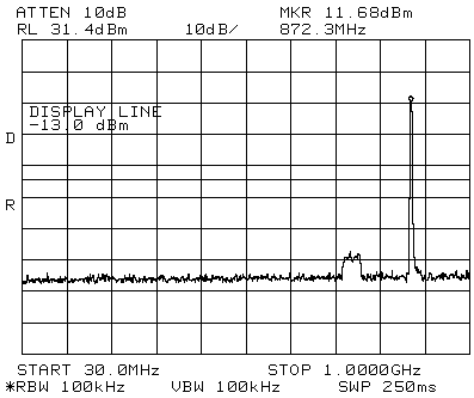

Figure 93.— 871.50 MHz

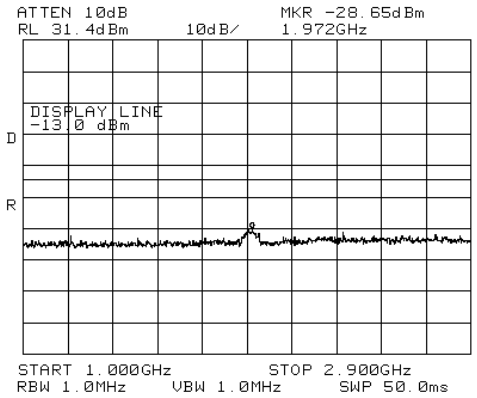

Figure 94.— 871.50 MHz

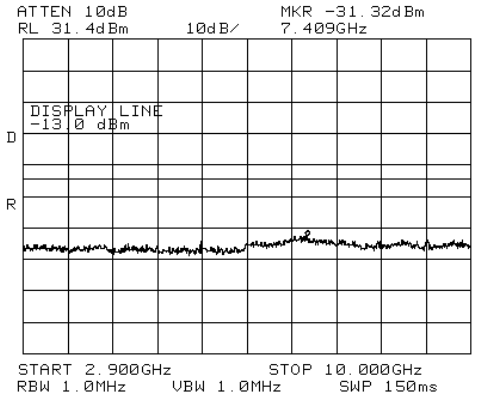

Figure 95.— 871.50 MHz

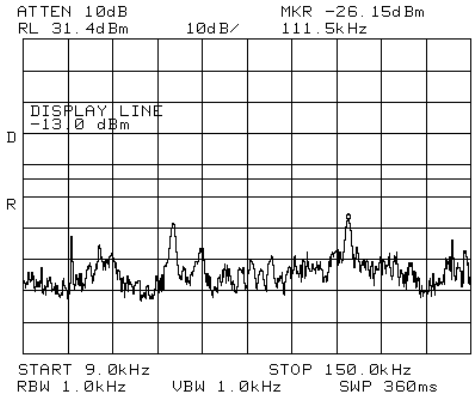

Figure 96.— 881.00 MHz

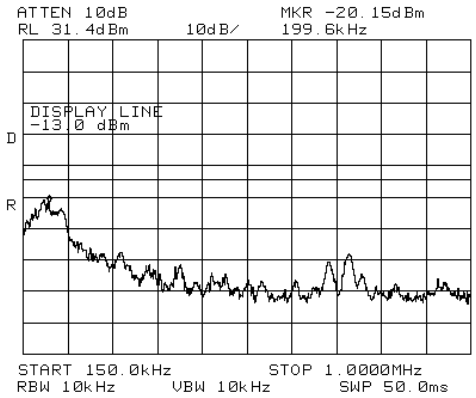

Figure 97.— 881.00 MHz

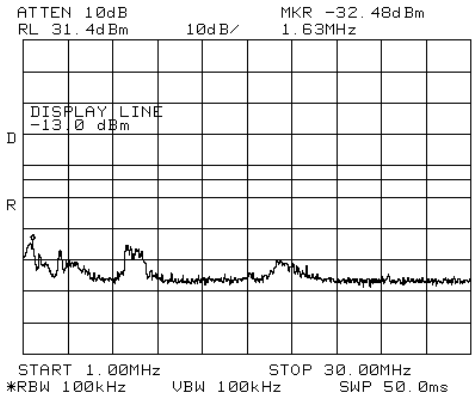

Figure 98.— 881.00 MHz

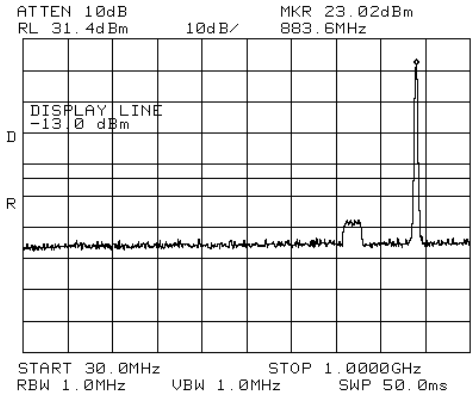

Figure 99.— 881.00 MHz

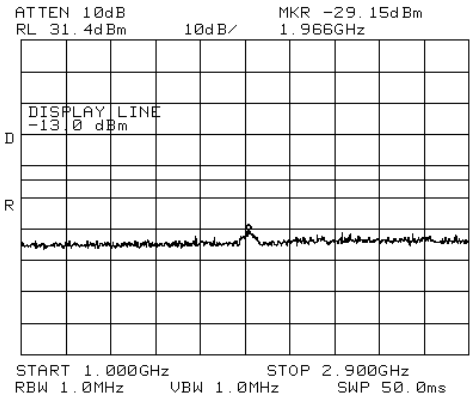

Figure 100.— 881.00 MHz

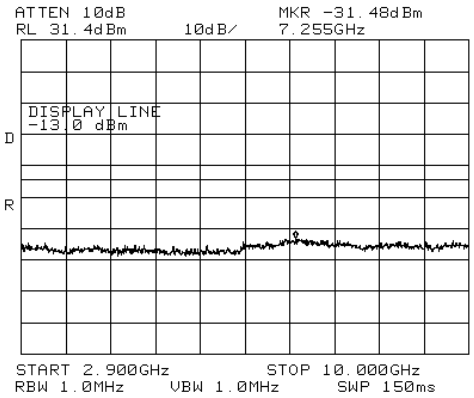

Figure 101.— 881.00 MHz

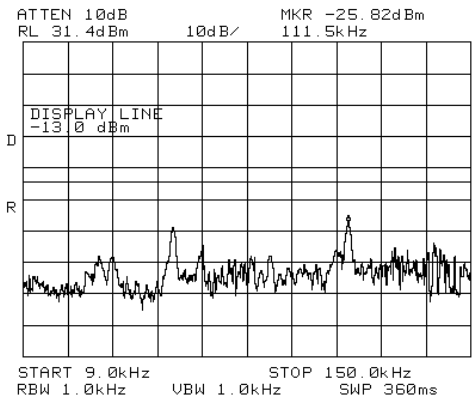

Figure 102.— 891.50 MHz

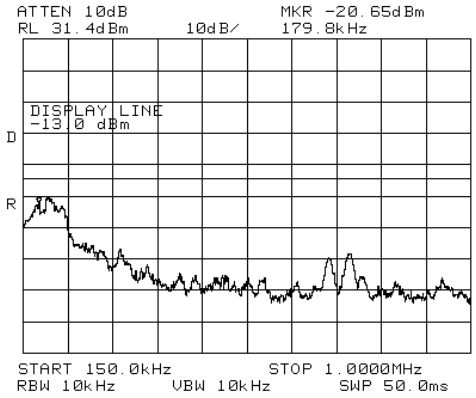

Figure 103.— 891.50 MHz

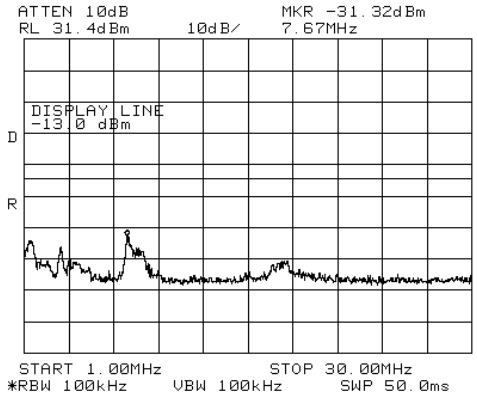

Figure 104.— 891.50 MHz

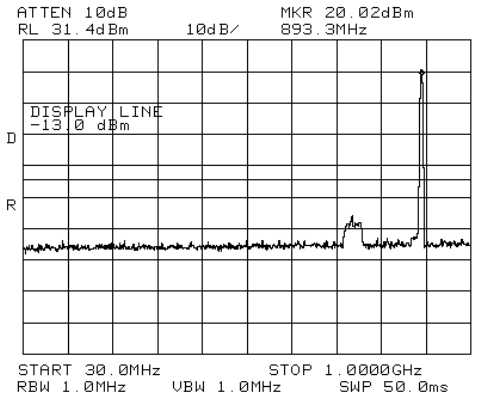

Figure 105.— 891.50 MHz

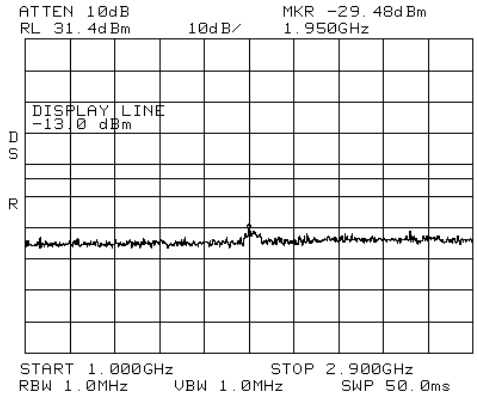

Figure 106.— 891.50 MHz

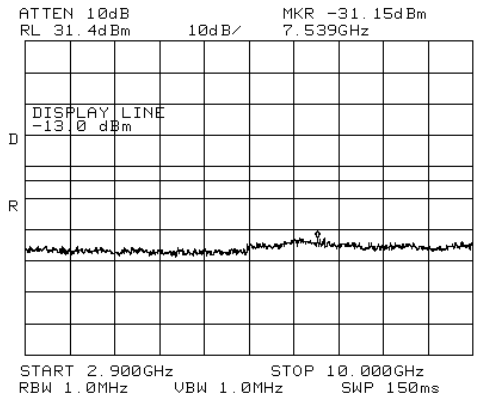

Figure 107.— 891.50 MHz

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	8564E	3442a00275	January 19, 2012	1 year
Signal Generator	Agilent	N5172B EXG	MY51350182	May 31, 2012	2 years
Attenuator	Bird	8304-N20DB	-	August 14, 2012	1 year
Cable	Avnet MTS	P-3636-603-5236	-	August 28, 2012	1 year
DC Block	MIDWEST MICROWAVE	DCDB-3624-10-NNN-02	-	N/A	N/A

Figure 108 Test Equipment Used

7. Band Edge Spectrum CELL

7.1 Test Specification

FCC Part 22, FCC Part 2.1051

7.2 Test procedure

For LTE and GSM:
Enclosed are spectrum analyzer plots for the lowest operation frequency (870.20 MHz) and the highest operation frequency (892.8 MHz) in which the E.U.T. is planned to be used.
For W-CDMA:
Enclosed are spectrum analyzer plots for the lowest operation frequency (871.50 MHz) and the highest operation frequency (891.5 MHz) in which the E.U.T. is planned to be used.

The power of any emission outside of the authorized operating frequency ranges (869 - 894 MHz) 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 (21 dB).
The spectrum analyzer was set to 100 kHz R.B.W.

7.3 Test Results

Modulation	Operation Frequency (MHz)	Band Edge Frequency (MHz)	Reading (dBm)	Specification (dBm)	Margin (dB)
LTE 64QAM	874.00	869.00	-29.31	-13.0	-16.31
	889.00	894.00	-32.28	-13.0	-19.28
LTE 16QAM	874.00	869.00	-32.34	-13.0	-19.34
	889.00	894.00	-35.99	-13.0	-22.99
LTE QPSK	874.00	869.00	-34.92	-13.0	-21.92
	889.00	894.00	-35.42	-13.0	-22.42
GSM	870.20	894.00	-27.57	-13.0	-14.57
	892.80	869.00	-29.13	-13.0	-16.13
W-CDMA	871.50	869.00	-31.17	-13.0	-18.17
	891.50	894.00	-33.13	-13.0	-20.13

Figure 109 Band Edge Spectrum Results CELL

See additional information in Figure 110 to Figure 119.

JUDGEMENT: Passed by 14.57 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 20.01.13

Typed/Printed Name: A. Sharabi

LTE:

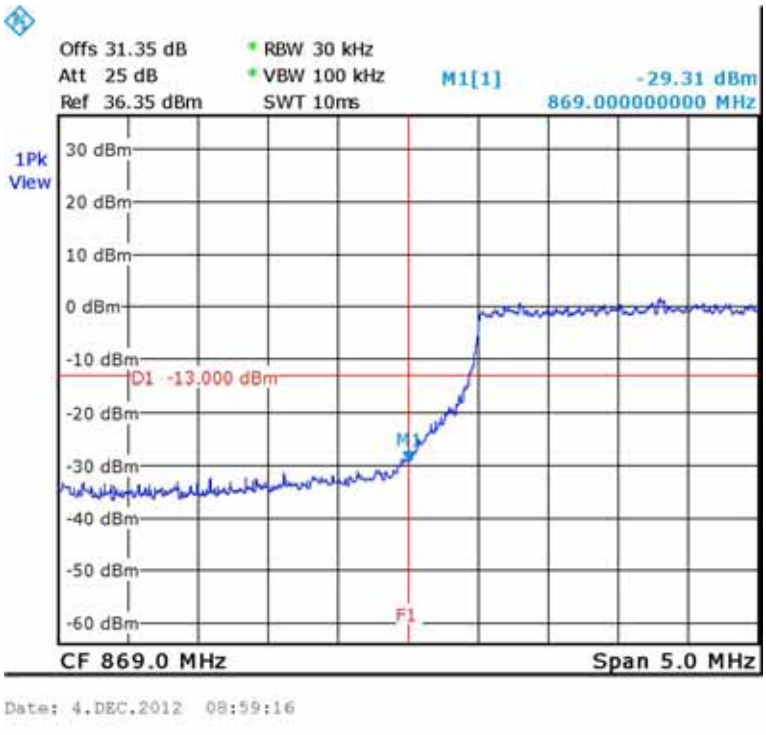

Figure 110.— 64QAM 874.00 MHz

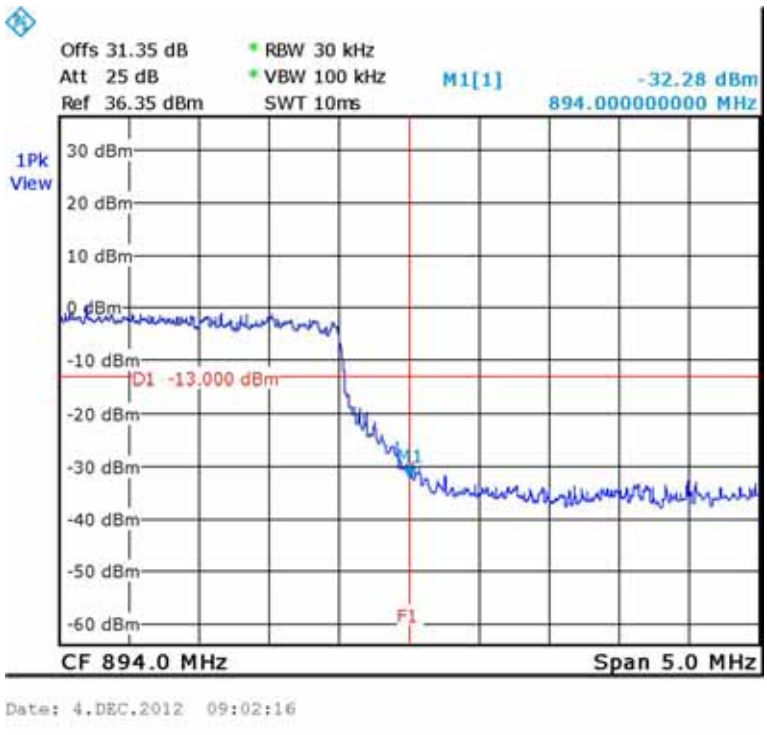

Figure 111.— 64QAM 889.00 MHz

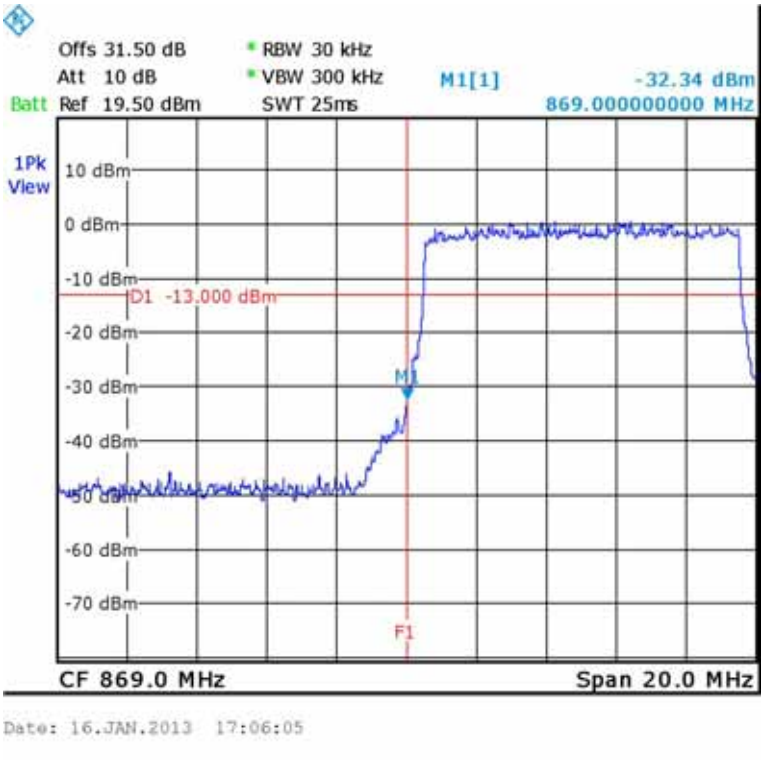

Figure 112.— 16QAM 874.00 MHz

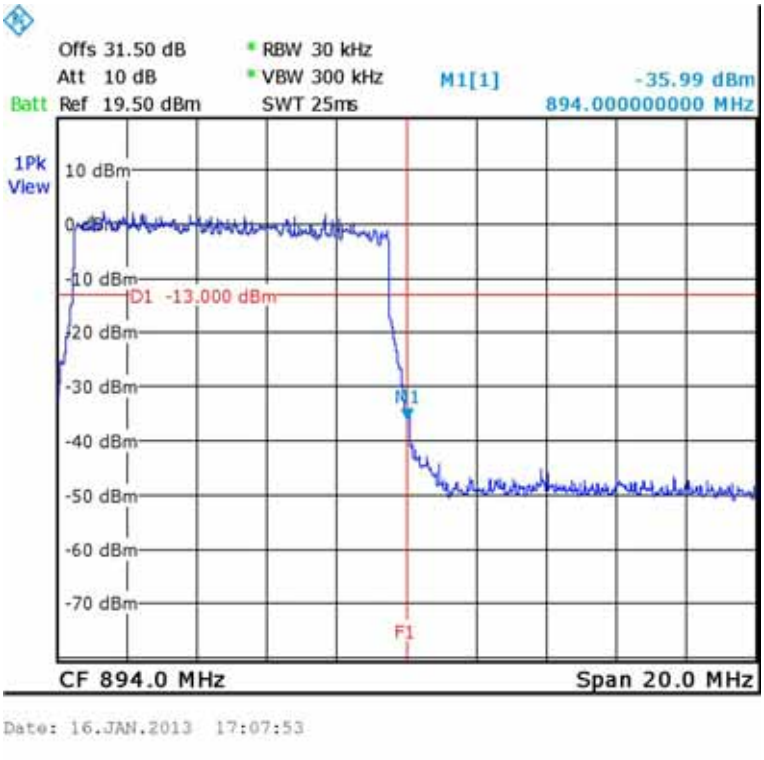

Figure 113.— 16QAM 889.00 MHz

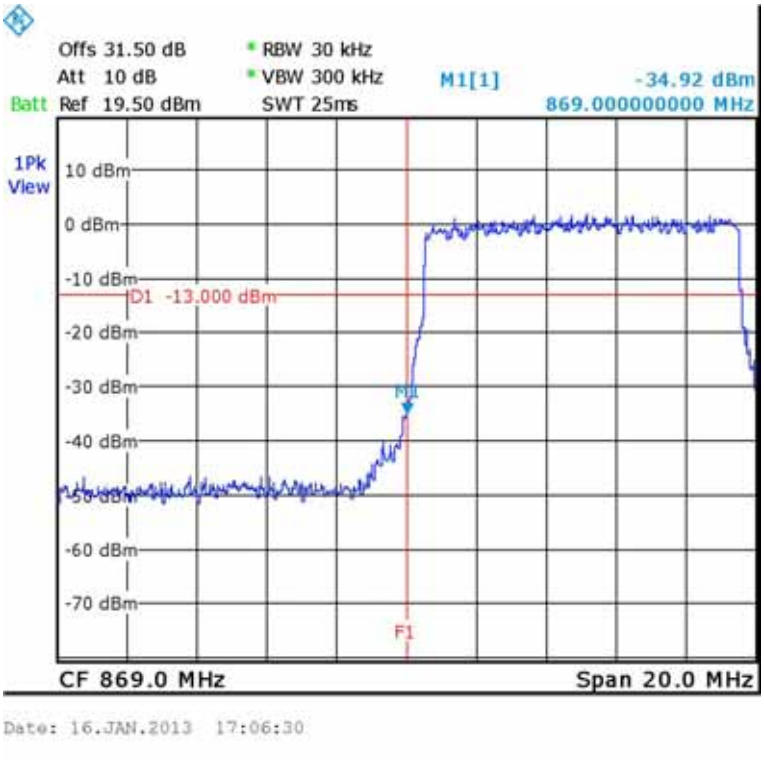

Figure 114.— QPSK 874.00 MHz

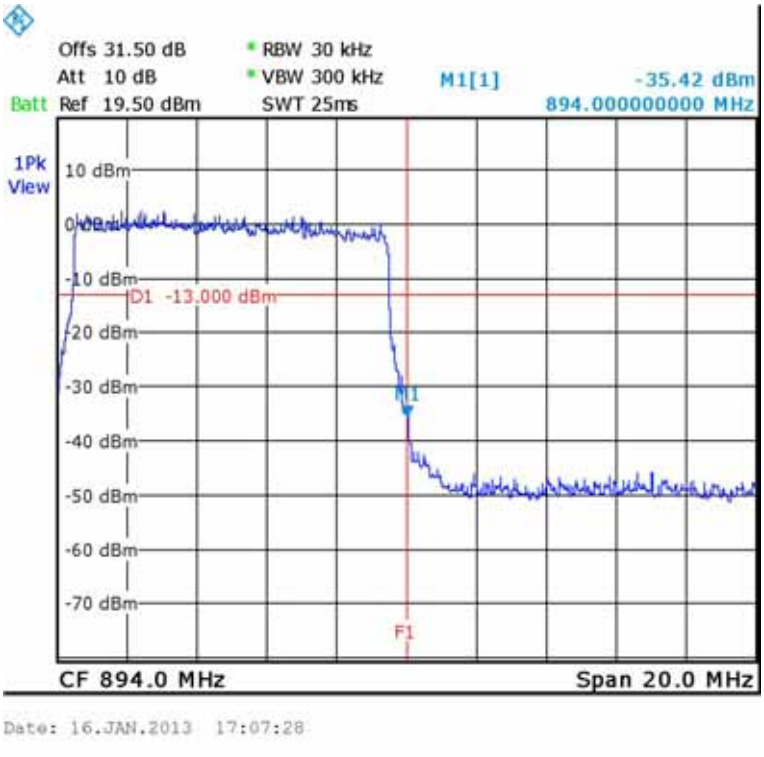

Figure 115.— QPSK 889.00 MHz

GSM:

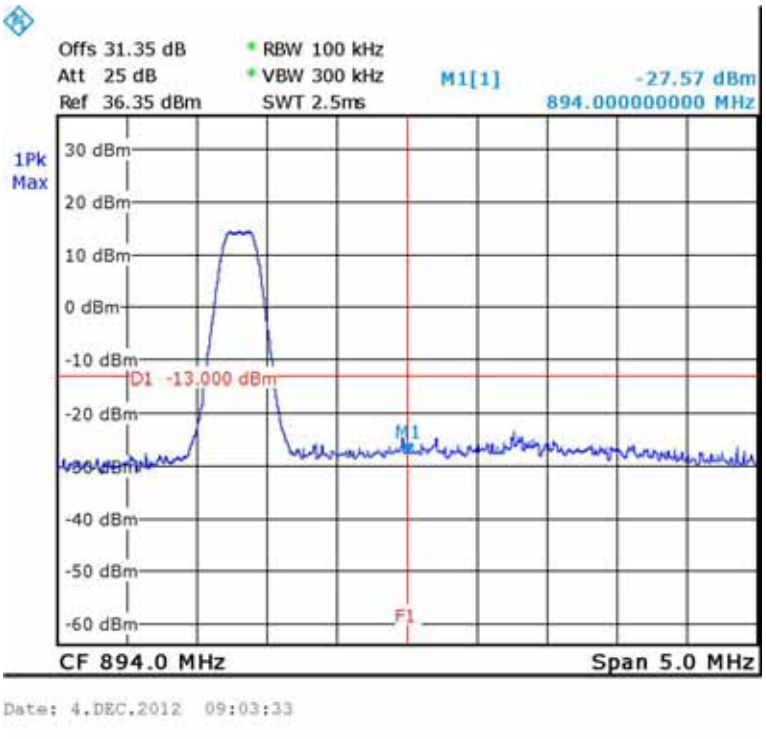

Figure 116.— 870.20 MHz

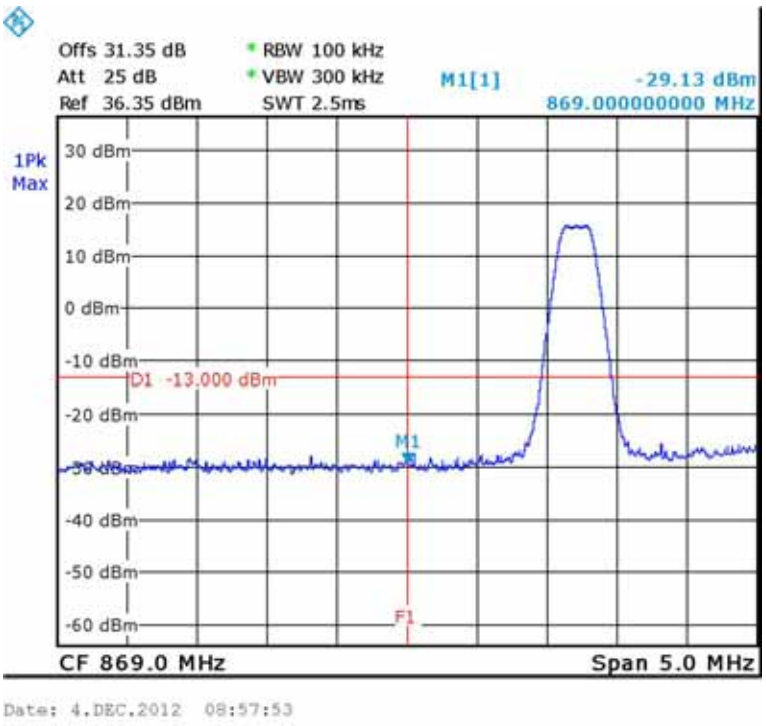

Figure 117.— 892.80 MHz

W-CDMA:

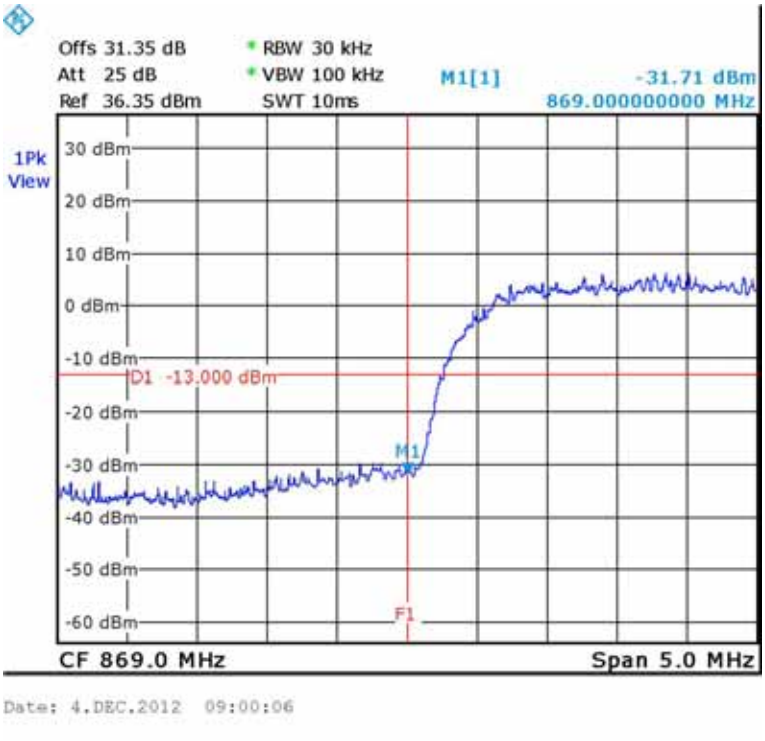

Figure 118.— 871.50 MHz

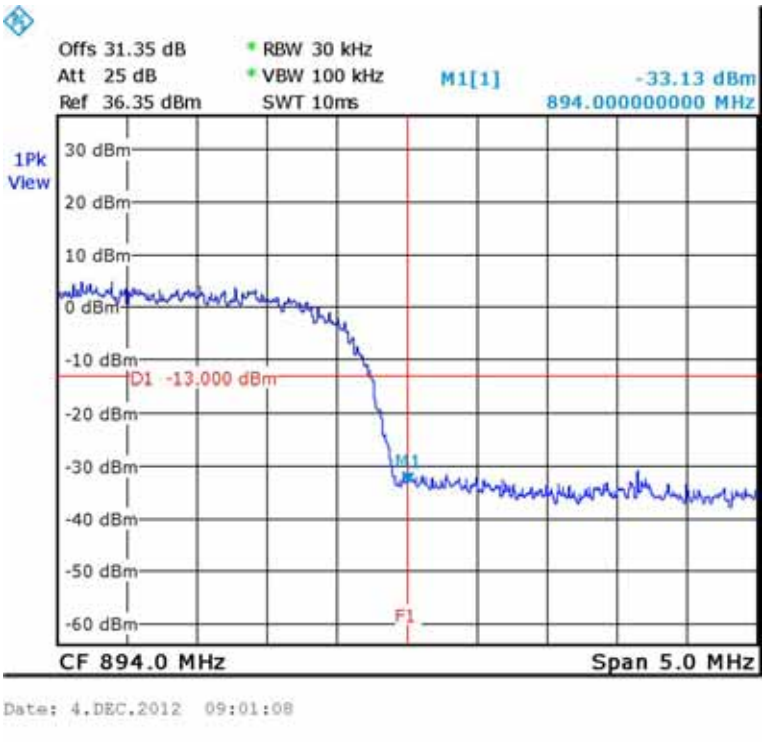

Figure 119.— 891.50 MHz

7.4 Test Equipment Used

Band Edge Spectrum CELL

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	Rohde & Schwarz	FSL6	100194	November 1, 2012	1 year
Signal Generator	Agilent	N5172B ATO 10210	MY51350182	May 31, 2012	2 years
Attenuator	Bird	8304-N20DB	-	August 14, 2012	1 year
Cable	Avnet MTS	P-3636-603-5236	-	August 28, 2012	1 year
DC Block	MIDWEST MICROWAVE	DCDB-3624-10-NNN-02	-	N/A	N/A

Figure 120 Test Equipment Used

8. Out of Band Emissions (Radiated) CELL

8.1 Test Specification

FCC Part 22, Section 917; FCC Part 2.1053

8.2 Test Procedure

The test method was based on ANSI/TIA-603-C: 2004, Section 2.2.12 Unwanted Emissions: Radiated Spurious.
The power of any emission outside of the authorized operating frequency ranges (869 - 894 MHz) must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB, yielding –13dBm.

(a) The E.U.T. operation mode and test set-up are as described in Section 3. A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 1.5 meters above the ground. The configuration tested is shown in Figure 3.1.
The frequency range 9 kHz-20 GHz was scanned, and the list of the highest emissions was verified and updated accordingly.
The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.
The emissions were measured at a distance of 3 meters.

(b) The E.U.T. was replaced by a substitution antenna (dipole 30MHz-1GHz, Horn Antenna above 1GHz) driven by a signal generator. The height was readjusted for maximum reading. The signal generator level was adjusted to obtain the same reading on the EMI receiver as in step (a).
The signals observed in step (a) were converted to radiated power using:
P_d(dBm) = P_g(dBm) – Cable Loss (dB) + Substitution Antenna Gain (dB)
P_d = Dipole equivalent power (result).
P_g = Signal generator output level.

8.3 Test Results

Carrier Channel (MHz)	Freq. (MHz)	Antenna Pol.	Maximum Peak Level (dBµV/m)	Signal Generator RF Output (dBm)	Cable Loss (dB)	Antenna Gain (dBi)	Effective Radiated Power Level (dBm)	Spec. (dBm)	Margin (dB)
870.20	1740.4	V	55.8	-43.5	6.7	7.6	-42.6	-13.0	-29.6
870.20	1740.4	H	56.6	-42.7	6.7	8.0	-41.4	-13.0	-28.4
881.00	1762.0	V	60.6	-36.8	6.7	7.6	-35.9	-13.0	-22.9
881.00	1762.0	H	60.9	-37.3	6.7	8.0	-36.0	-13.0	-23.0
892.80	1785.6	V	60.7	-36.7	6.7	7.6	-35.8	-13.0	-22.8
892.80	1785.6	H	61.1	-37.1	6.7	8.0	-35.8	-13.0	-22.8

The E.U.T met the requirements of the FCC Part 22, Section 917;
FCC Part 2.1053 specifications.

TEST PERSONNEL:

Tester Signature: _____ Date: 20.01.13

Typed/Printed Name: I. Siboni

8.4 Test Instrumentation Used, Radiated Measurements CELL

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	Rohde & Schwarz	1066.301	100120	November 1, 2012	1 year
Spectrum Analyzer	HP	8592L	3826A01204	March 5, 2012	1 year
Active Loop Antenna	Emco	6502	2950	October 19, 2012	1 year
Antenna Bioconilog	EMCO	3142B	1250	July 7, 2012	1 year
Horn	EMCO	3115	6142	March 14, 2012	2 year
Horn	ARA	SWH-28	1007	January 26, 2011	2 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	August 21, 2012	1 year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	August 28, 2012	1 year
Signal Generator	Agilent	N5172B ATO10210	MY51350182	May 31, 2012	2 years
Antenna Mast	ETS	2070-2	9608-1497	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Table Controller	ETS/EMCO	2090	9608-1456	N/A	N/A

9. Peak Output Power PCS

9.1 Test Specification

FCC Part 24, Subpart E

9.2 Test procedure

Peak Power Output must not exceed 100 Watts (50dBm).

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator and an appropriate coaxial cable (loss = 31.35 dB). The E.U.T. RF output was W-CDMA and GSM and LTE modulated. Special attention was taken to prevent Spectrum Analyzer RF input overload. The Spectrum Analyzer was set to 100 kHz RBW.

9.3 Test Results

Modulation	Operation Frequency (MHz)	Reading (dBm)	Specification (dBm)	Margin (dB)
LTE 64QAM	1935.0	24.52	50.0	-25.48
	1962.5	26.95	50.0	-23.05
	1990.0	26.44	50.0	-23.56
LTE 16QAM	1935.0	25.53	50.00	-24.47
	1962.5	26.36	50.00	-23.64
	1990.0	24.86	50.00	-25.14
LTE QPSK	1935.0	26.08	50.00	-23.92
	1962.5	26.57	50.00	-23.43
	1990.0	25.05	50.00	-24.95
GSM	1931.2	23.59	50.0	-26.41
	1960.0	26.84	50.0	-23.16
	1993.8	23.88	50.0	-26.12
W-CDMA	1932.5	24.67	50.0	-25.33
	1960.0	27.65	50.0	-22.35
	1992.5	24.84	50.0	-25.16

Figure 121 Peak Output Power PCS

See additional information in Figure 122 to Figure 136.

JUDGEMENT: Passed by 22.35 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 20.01.13

Typed/Printed Name: A. Sharabi

LTE

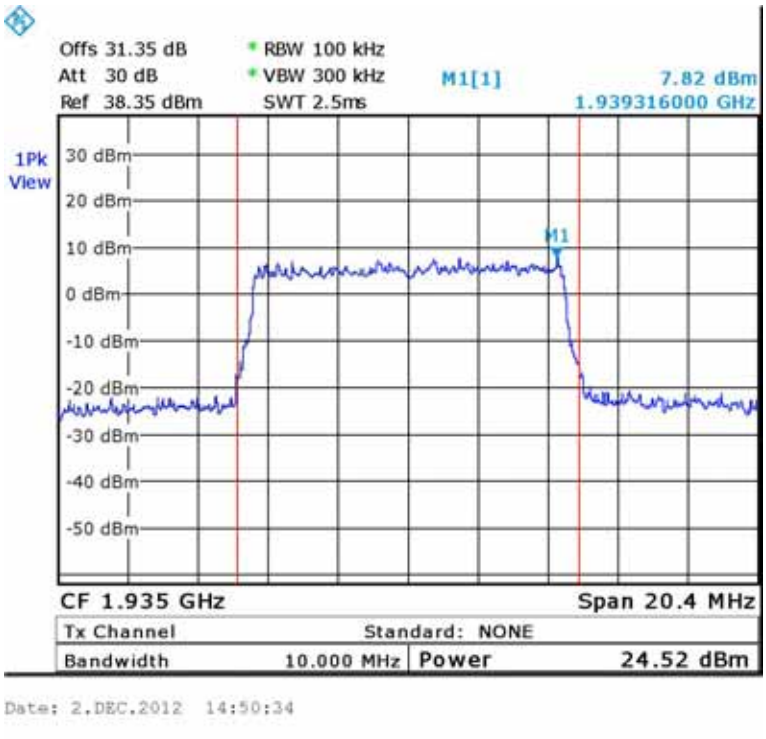

Figure 122.— 64QAM 1935.00 MHz

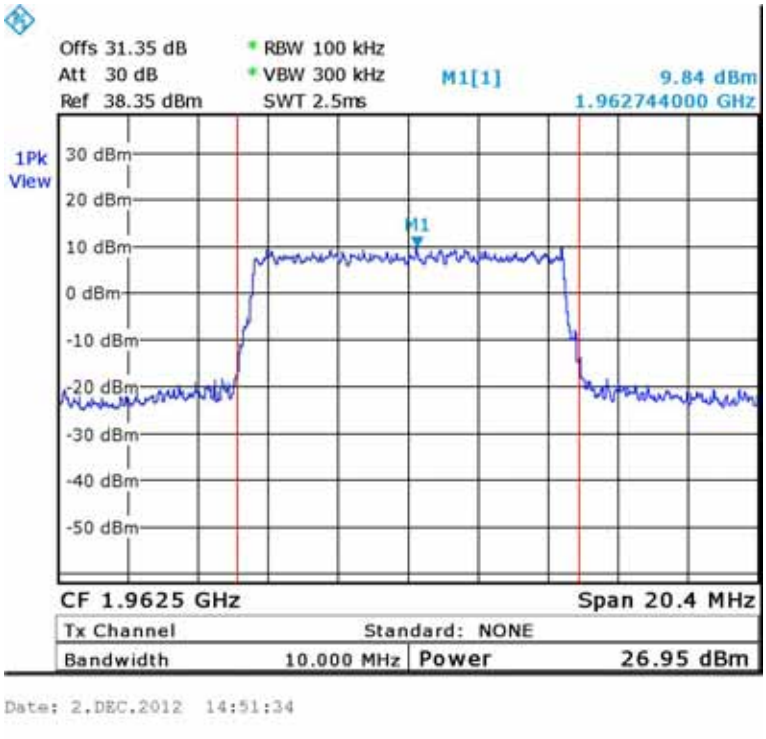

Figure 123.— 64QAM 1962.50 MHz

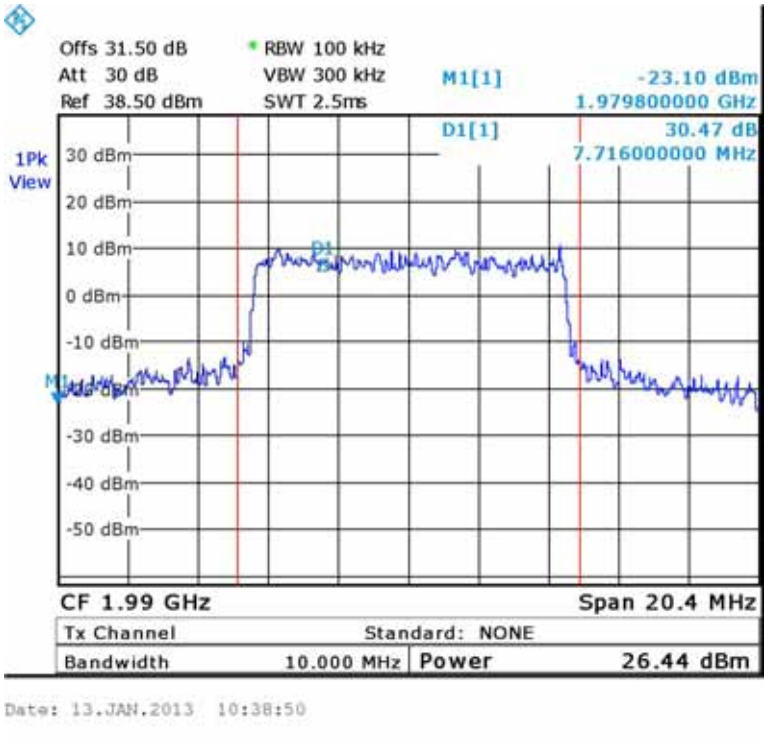

Figure 124.— 64QAM 1990.00 MHz

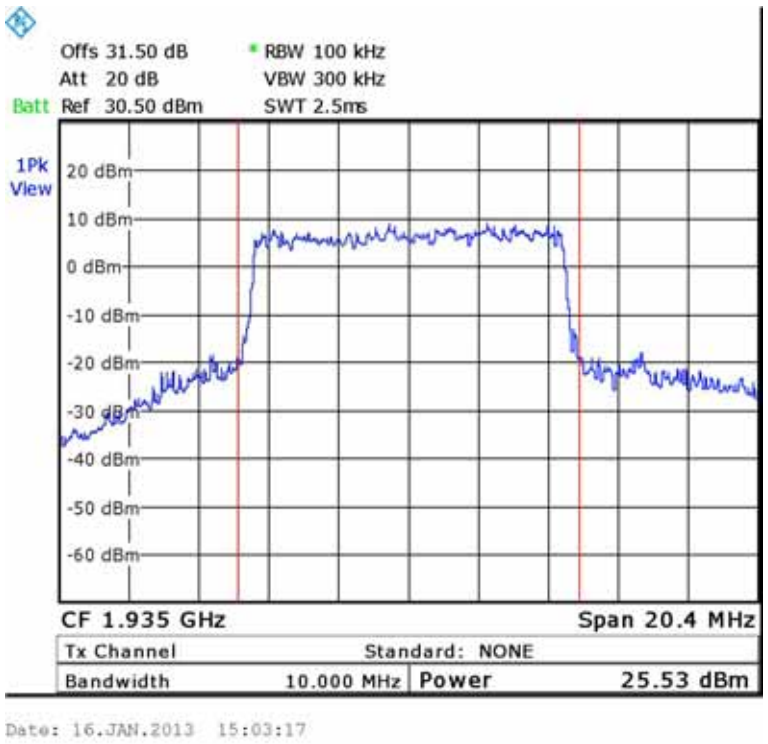

Figure 125.— 16QAM 1935.00 MHz

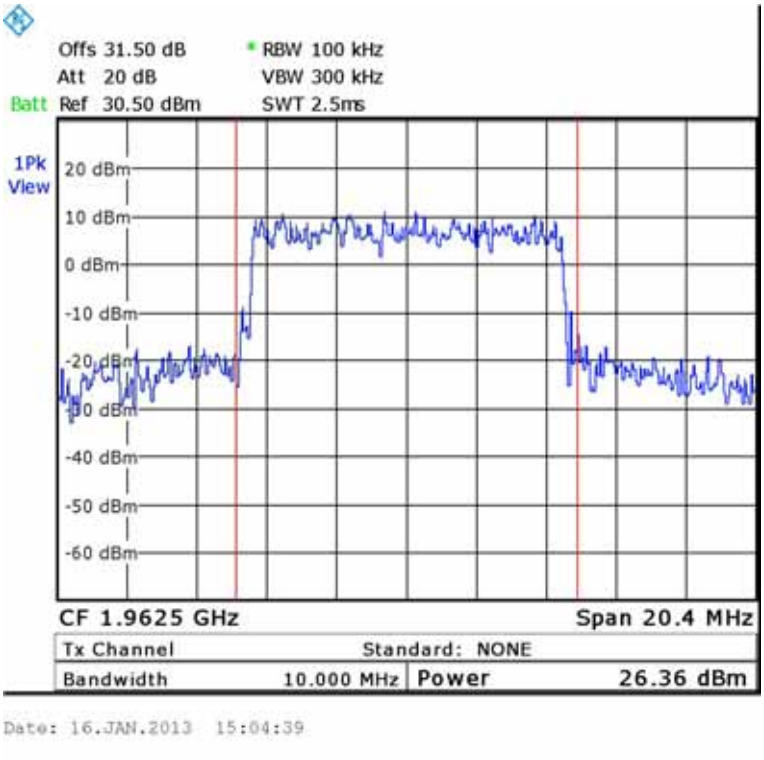

Figure 126.— 16QAM 1962.50 MHz

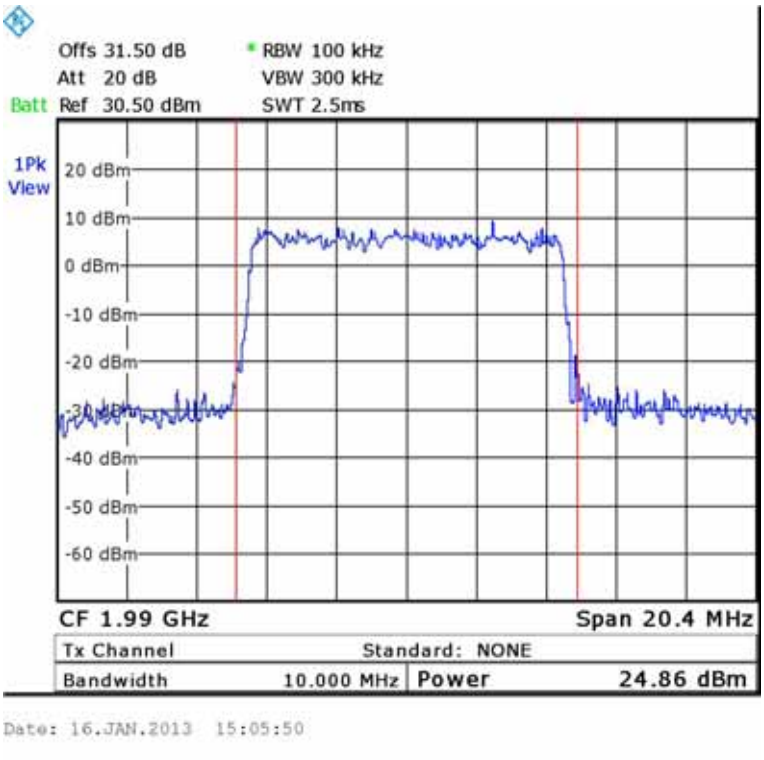

Figure 127.— 16QAM 1990.00 MHz

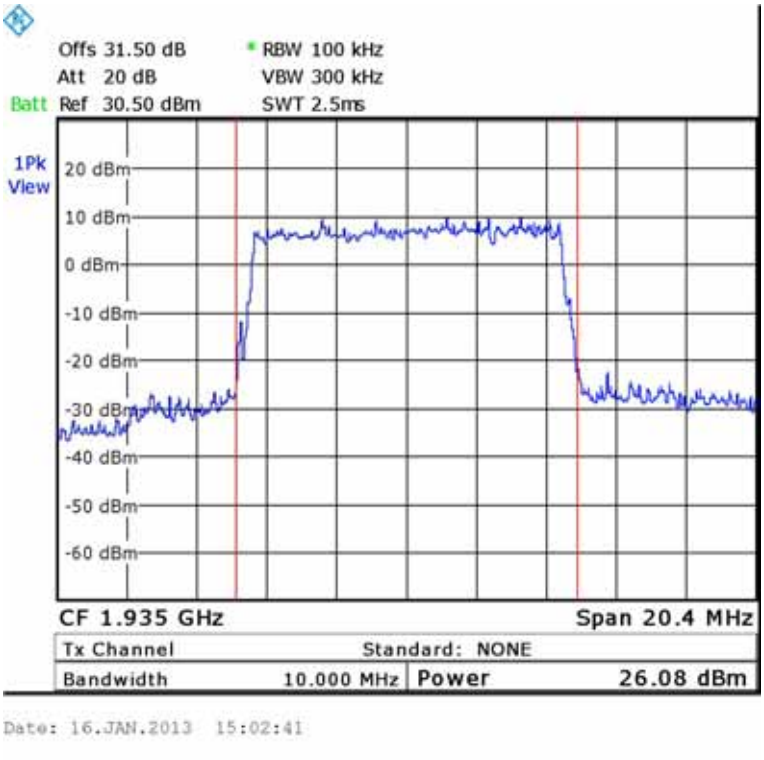

Figure 128.— QPSK 1935.00 MHz

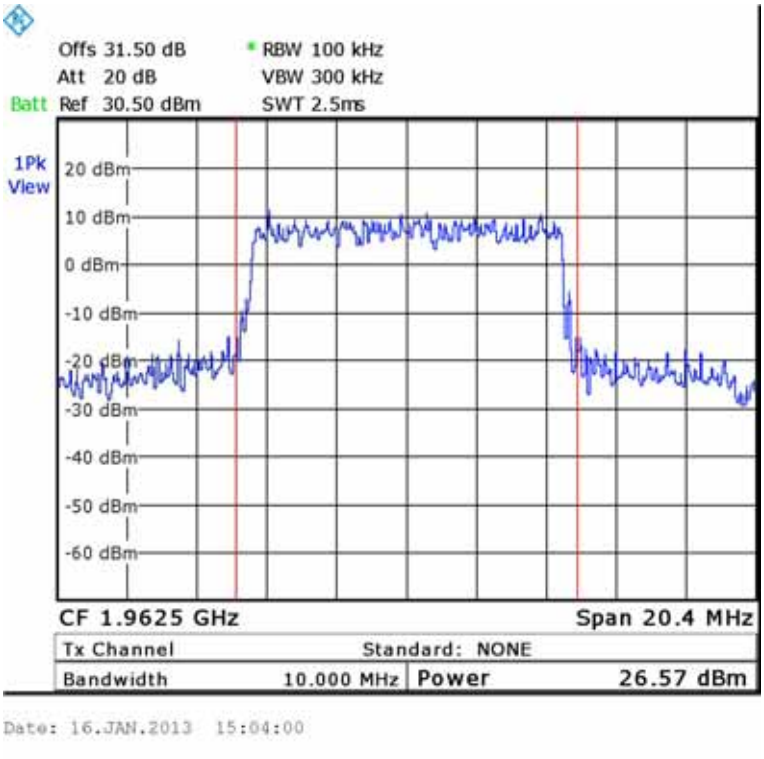

Figure 129.— QPSK 1962.50 MHz

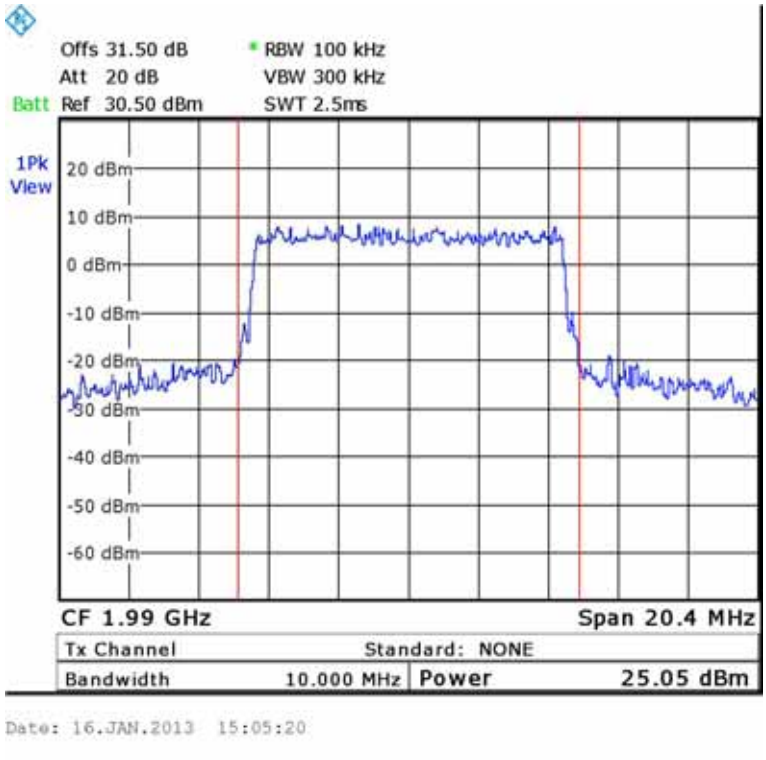

Figure 130.— QPSK 1990.00 MHz

GSM:

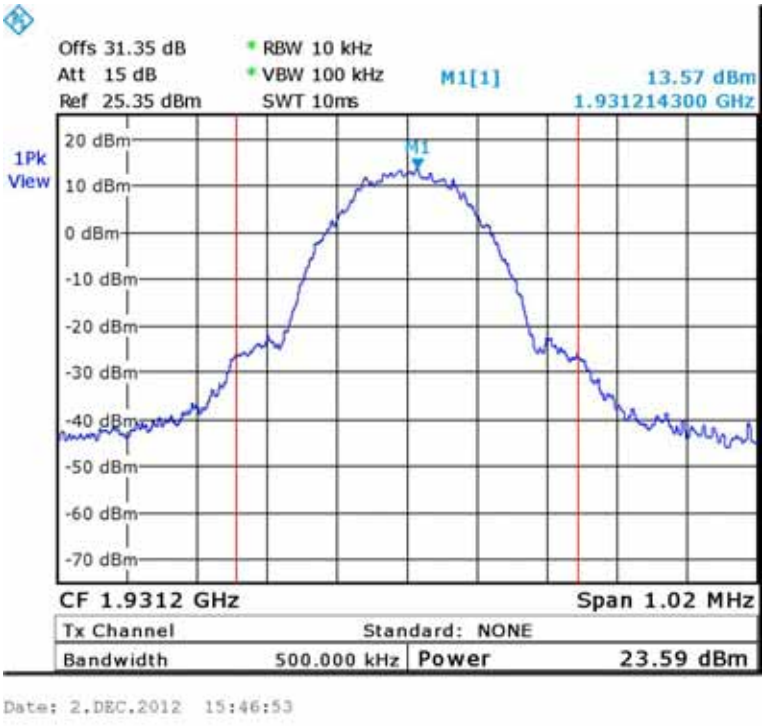

Figure 131.— 1931.20 MHz

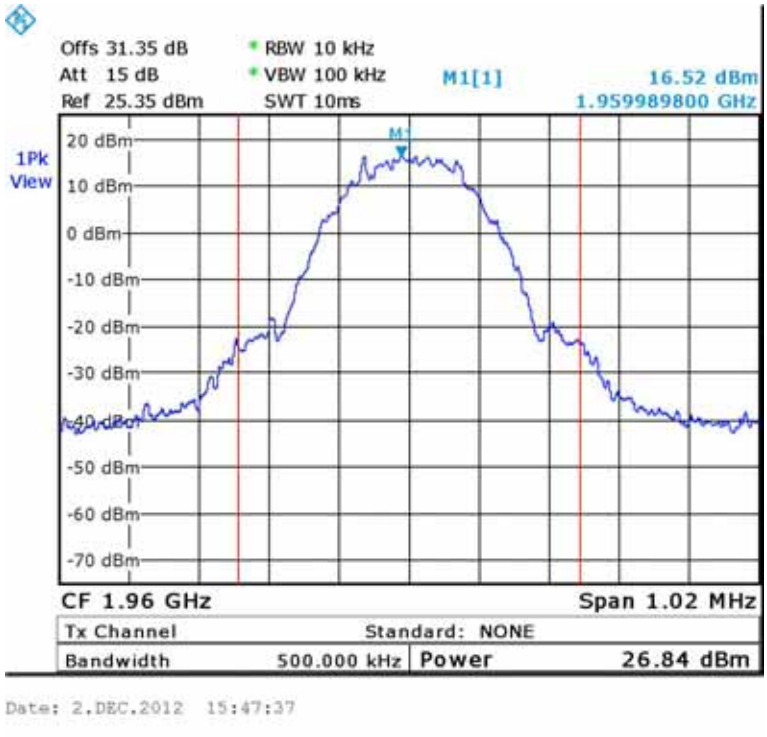

Figure 132.— 1960.00 MHz

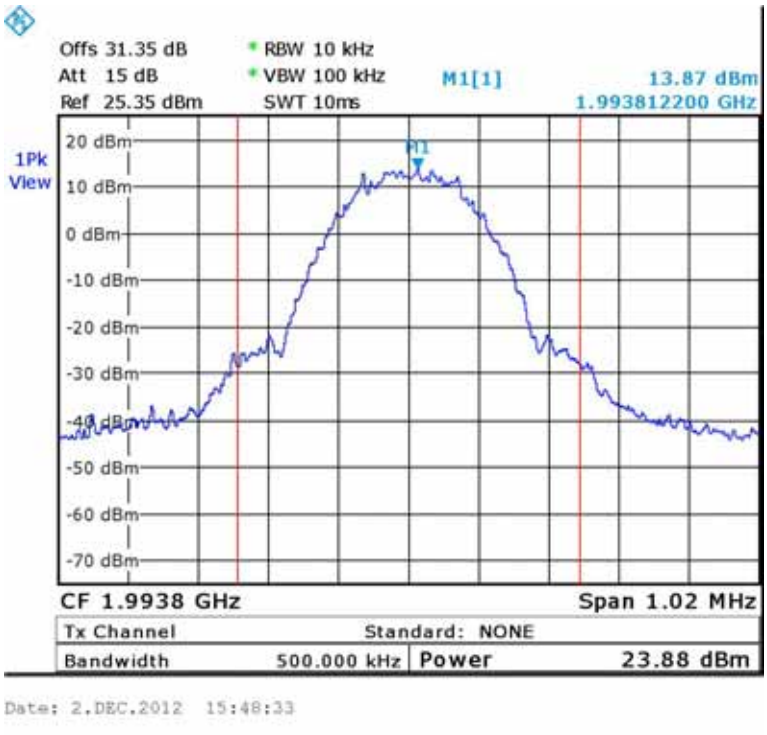

Figure 133.— 1993.80 MHz

W-CDMA:

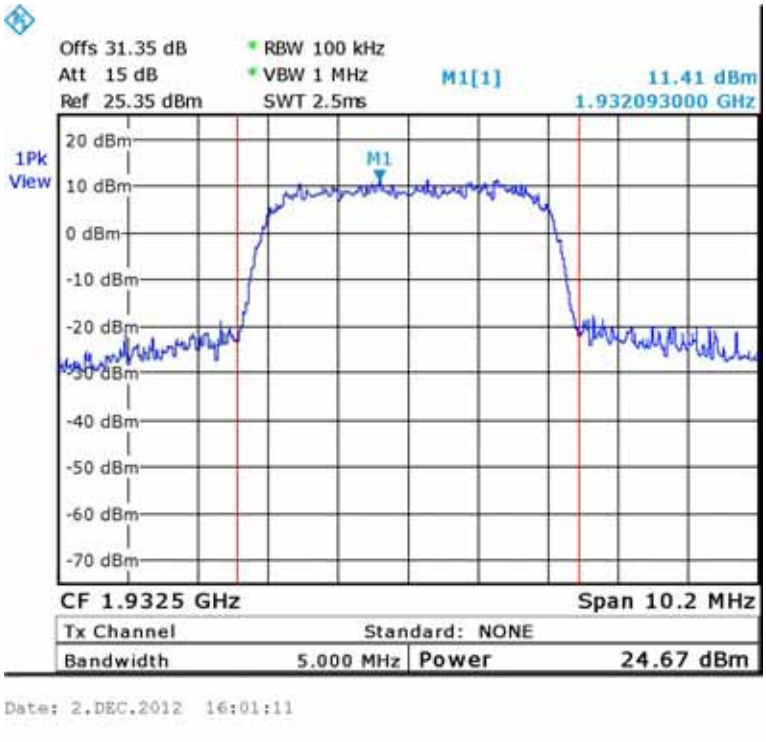

Figure 134.— 1932.50 MHz

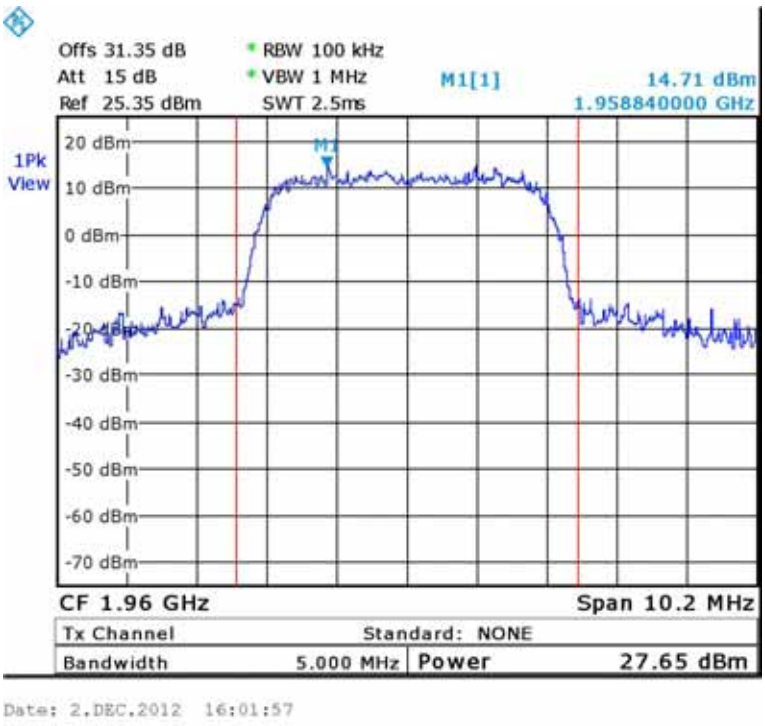

Figure 135.— 1960.00 MHz

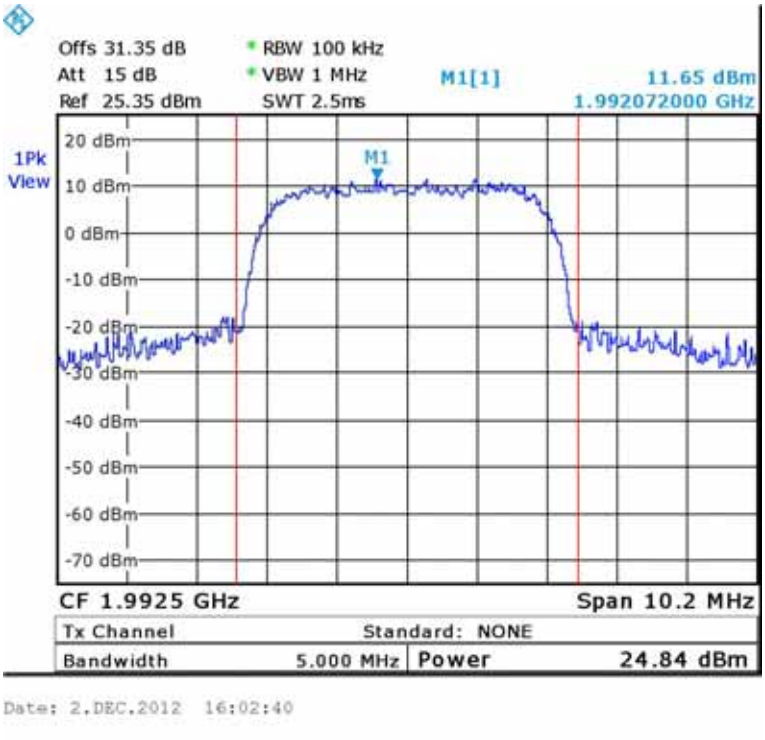

Figure 136.— 1992.50 MHz

9.4 Test Equipment Used

Peak Output Power PCS

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	Rohde & Schwarz	FSL6	100194	November 1, 2012	1 year
Signal Generator	Agilent	N5172B ATO 10210	MY51350182	May 31, 2012	2 years
Attenuator	Bird	8304-N20DB	-	August 14, 2012	1 year
Cable	Avnet MTS	P-3636-603-5236	-	August 28, 2012	1 year
DC Block	MIDWEST MICROWAVE	DCDB-3624-10-NNN-02	-	N/A	N/A

Figure 137 Test Equipment Used

10. Occupied Bandwidth PCS

10.1 Test Specification

FCC Part 2, Section 1049

10.2 Test Procedure

The E.U.T. was set to the applicable test frequency with CDMA, GSM and W-CDMA modulation. The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (at the output test) and an appropriate coaxial cable. The spectrum analyzer was set to 100 kHz resolution B.W.
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 occupied bandwidth of the E.U.T. at the points of 20 dB below maximum peak power was measured and recorded.
Occupied bandwidth measured was repeated in the input terminal of the E.U.T.

10.3 Test Results

Modulation		Operating Frequency (MHz)	Reading (MHz)
LTE 64QAM	Input	1935.00	9.581
	Output	1935.00	9.551
	Input	1962.50	9.611
	Output	1962.50	9.626
	Input	1990.00	9.406
	Output	1990.00	9.487
LTE 16QAM	Input	1935.00	9.381
	Output	1935.00	9.341
	Input	1962.50	9.421
	Output	1962.50	9.261
	Input	1990.00	9.341
	Output	1990.00	9.381
LTE QPSK	Input	1935.00	9.461
	Output	1935.00	9.381
	Input	1962.50	9.222
	Output	1962.50	9.461
	Input	1990.00	9.341
	Output	1990.00	9.501
GSM	Input	1931.20	0.295
	Output	1931.20	0.295
	Input	1960.00	0.295
	Output	1960.00	0.293
	Input	1993.80	0.291
	Output	1993.80	0.295
W-CDMA	Input	1932.50	4.540
	Output	1932.50	4.601
	Input	1960.00	4.581
	Output	1960.00	4.581
	Input	1992.50	4.560
	Output	1992.50	4.560

Figure 138 Occupied Bandwidth PCS

See additional information in Figure 139 to Figure 168.

TEST PERSONNEL:

Tester Signature: _____ Date: 20.01.13

Typed/Printed Name: A. Sharabi

LTE

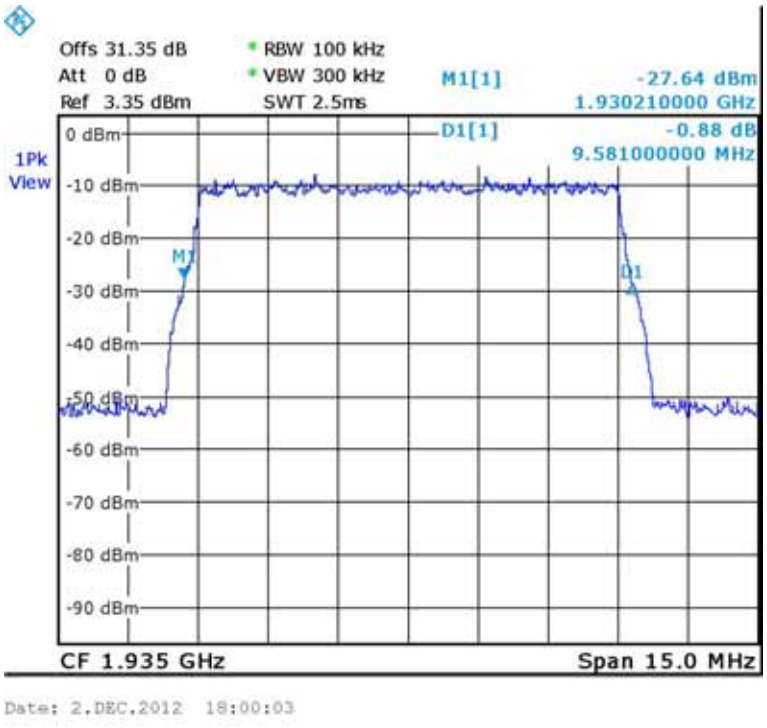

Figure 139.— 64QAM Input 1935.00 MHz

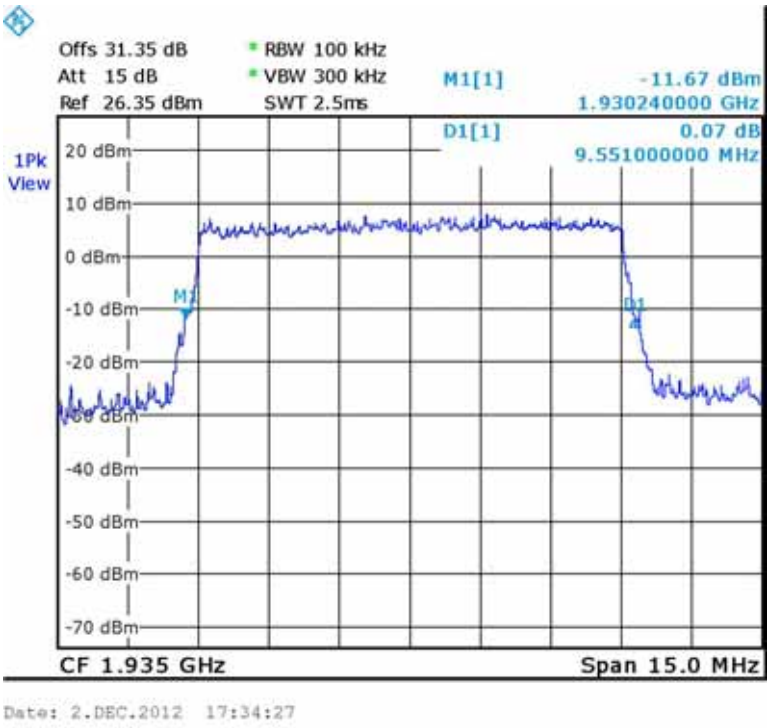

Figure 140.— 64QAM Output 1935.00 MHz

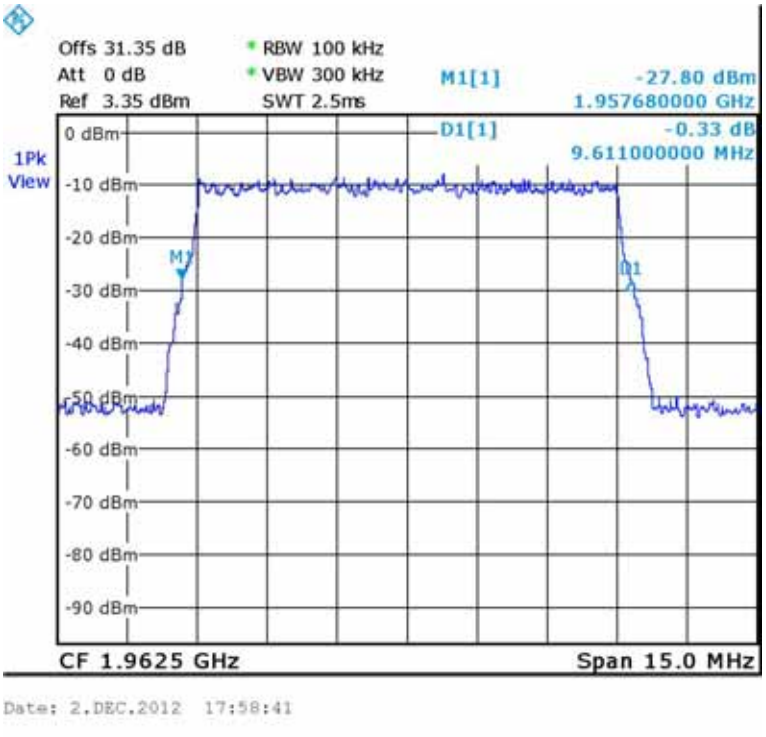

Figure 141.— 64QAM Input 1962.50 MHz

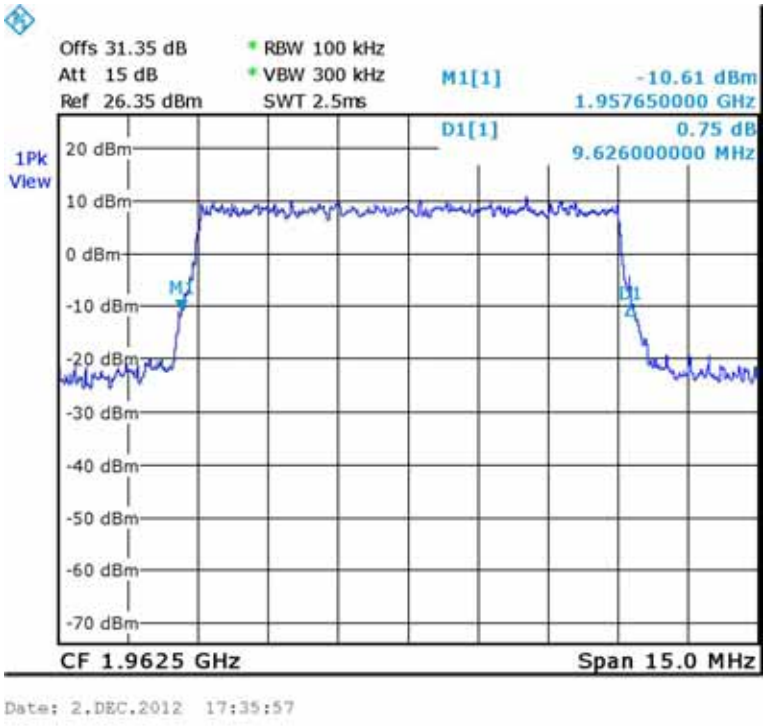

Figure 142.— 64QAM Output 1962.50 MHz

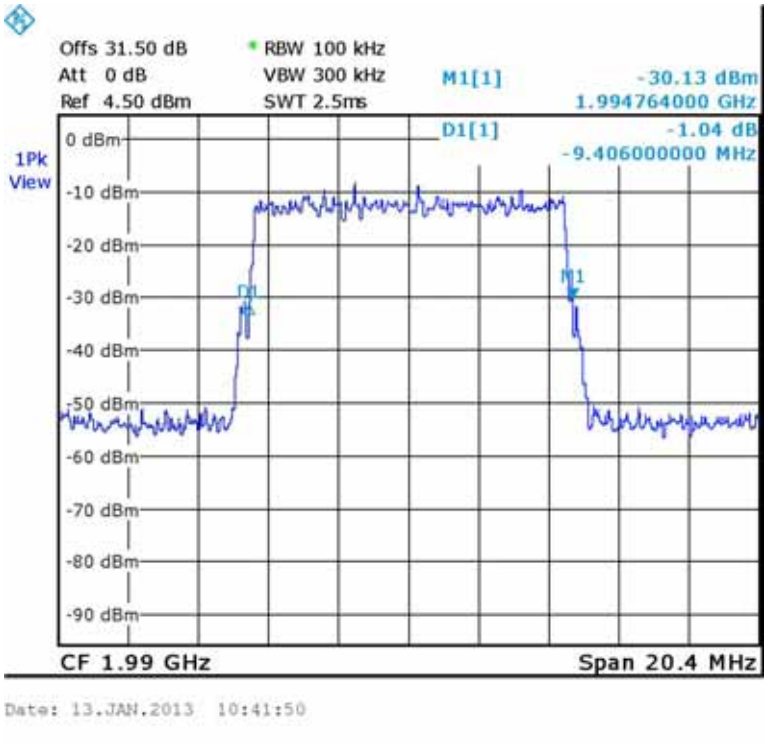

Figure 143.— 64QAM Input 1990.00 MHz

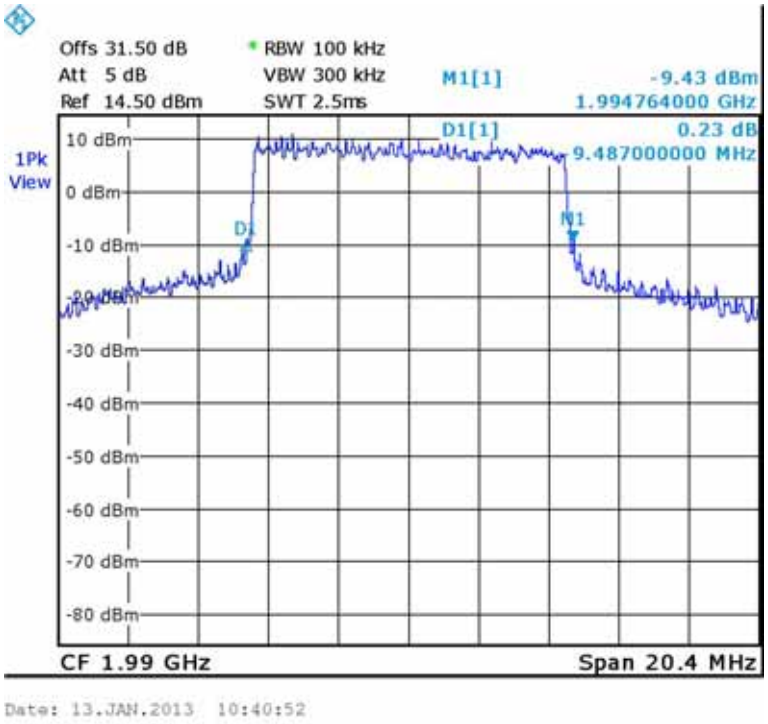

Figure 144.— 64QAM Output 1990.00 MHz

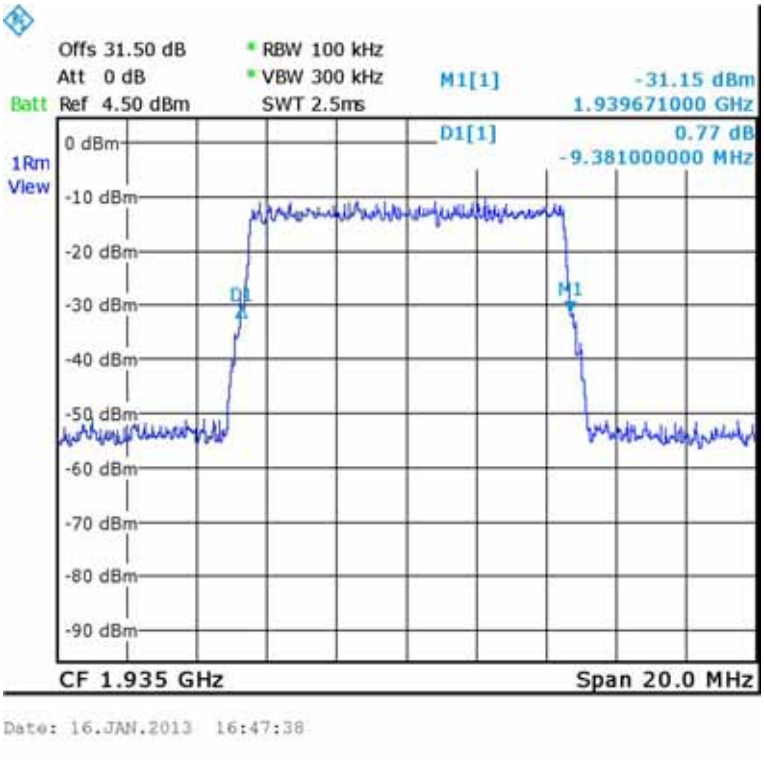

Figure 145.— 16QAM Input 1935.00 MHz

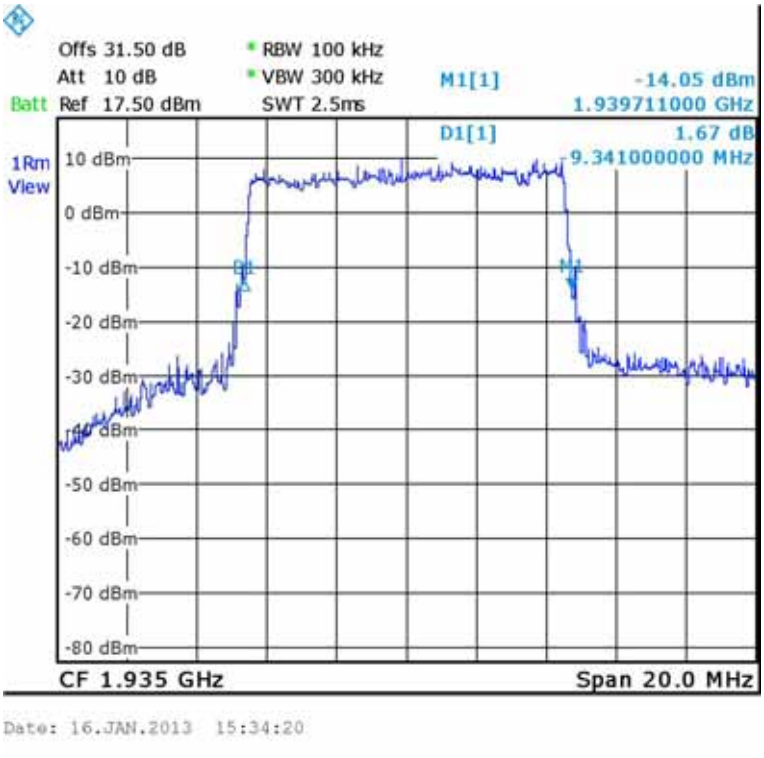

Figure 146.— 16QAM Output 1935.00 MHz

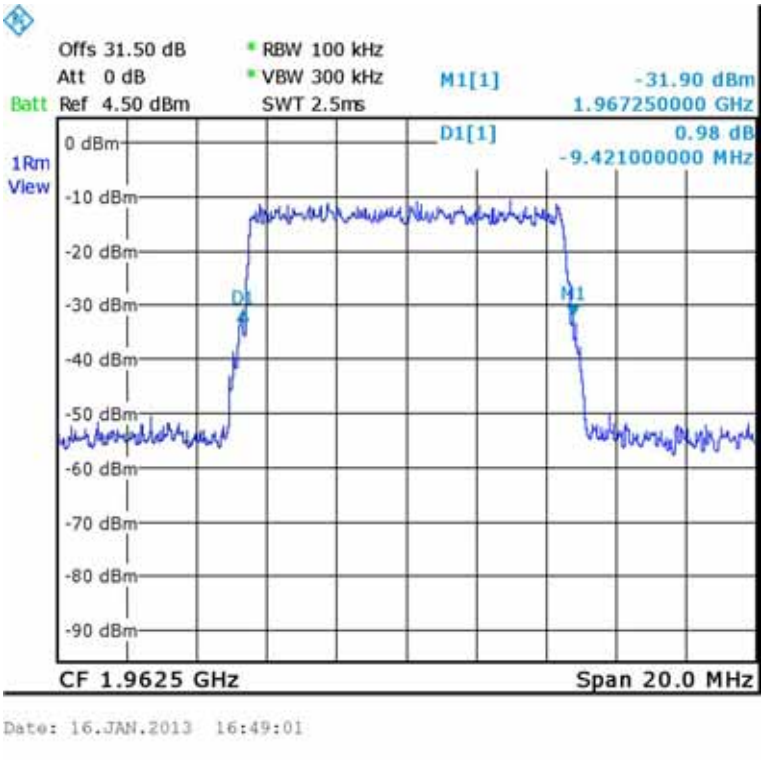

Figure 147.— 16QAM Input 1962.50 MHz

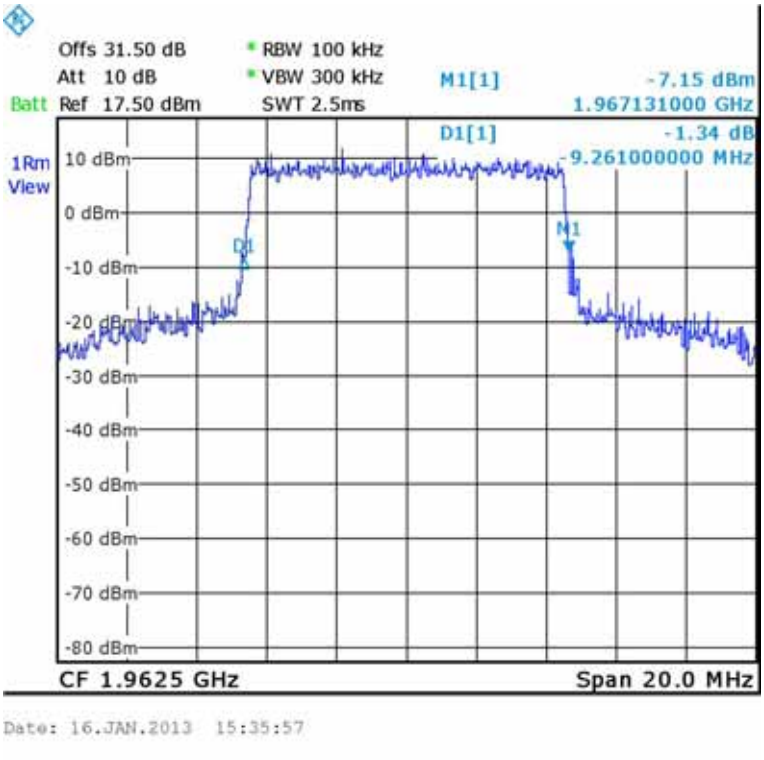

Figure 148.— 16QAM Output 1962.50 MHz

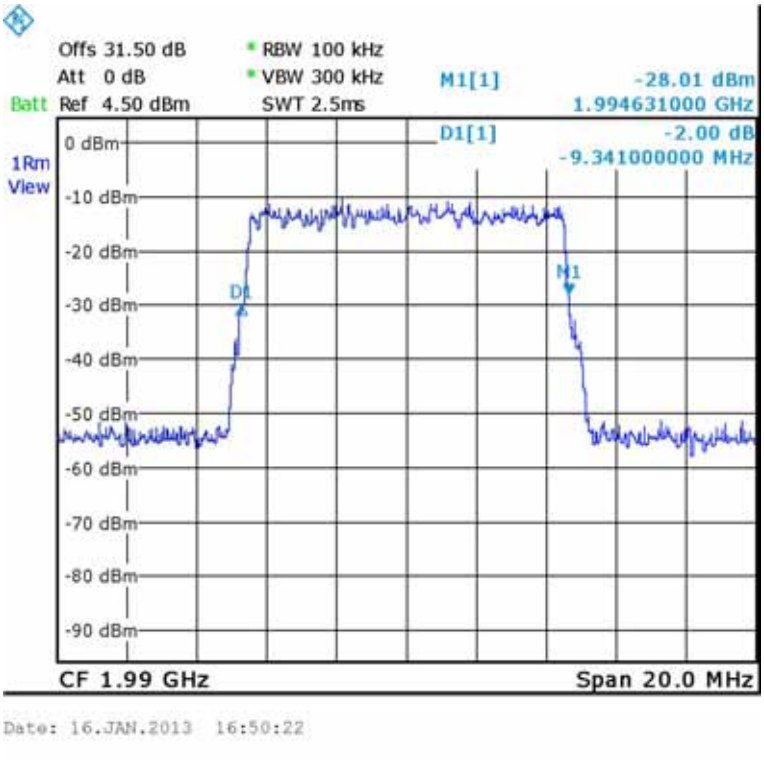

Figure 149.— 16QAM Input 1990.00 MHz

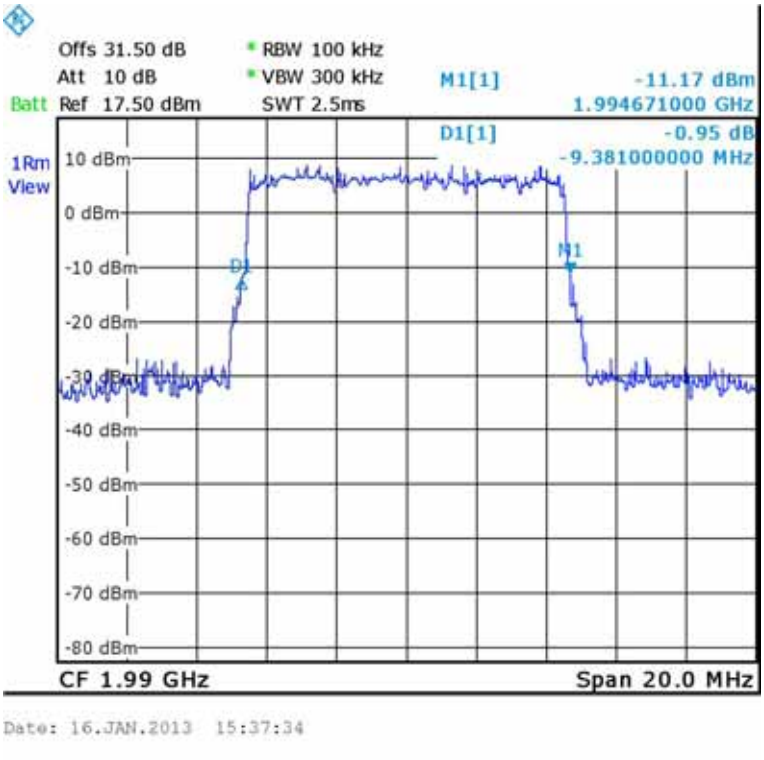

Figure 150.— 16QAM Output 1990.00 MHz

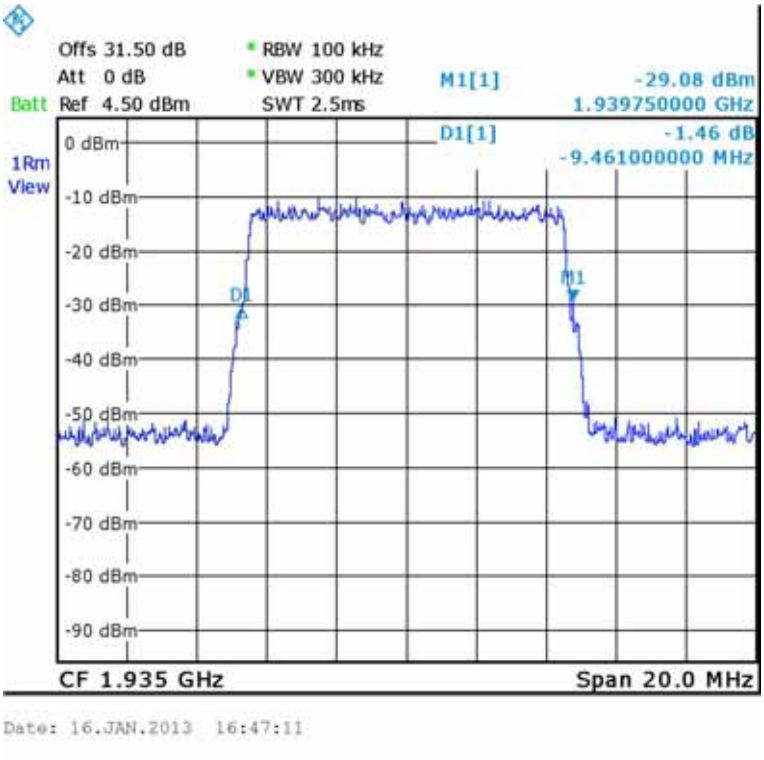

Figure 151.— QPSK Input 1935.00 MHz

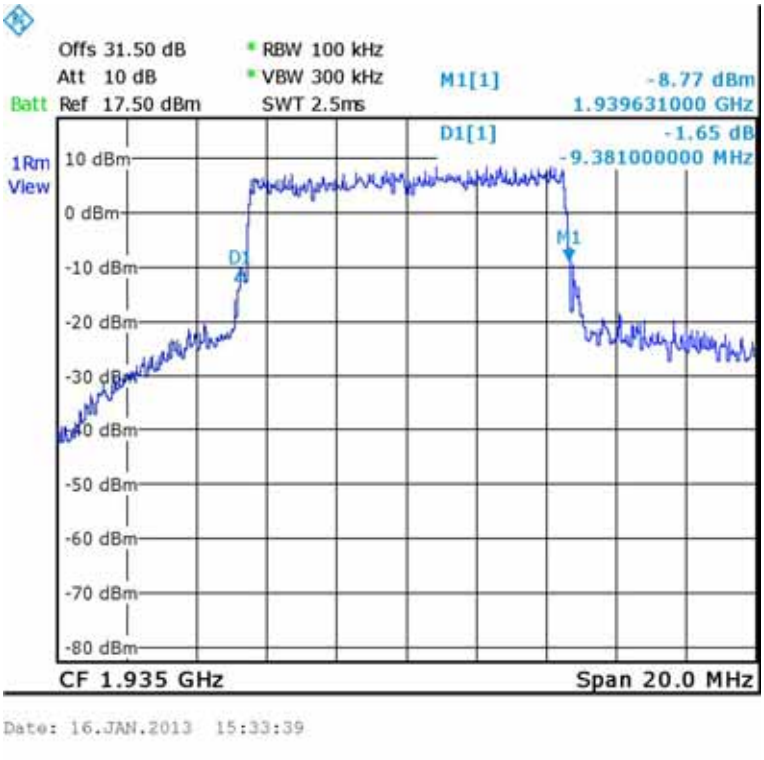

Figure 152.— QPSK Output 1935.00 MHz

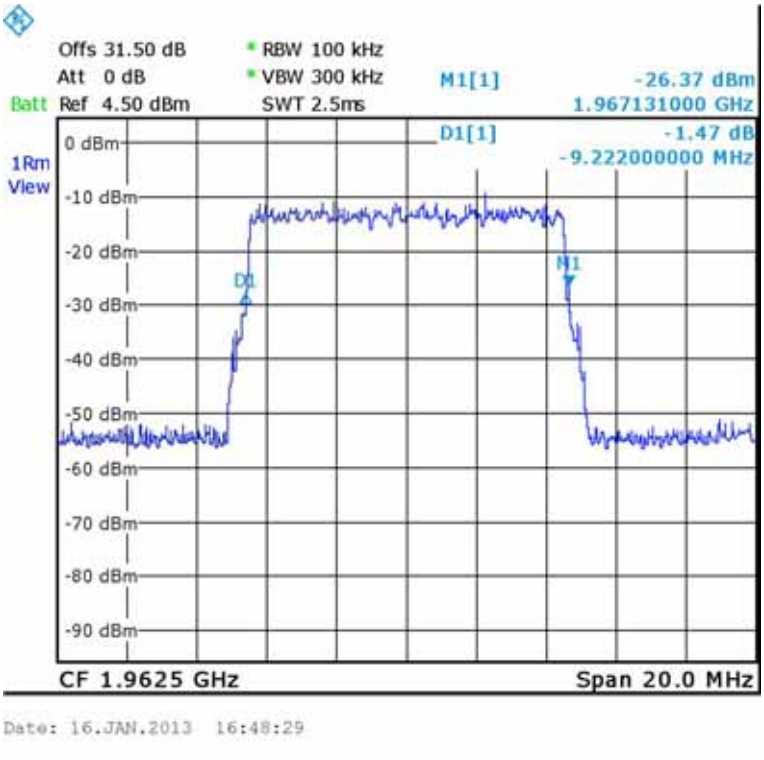

Figure 153.— QPSK Input 1962.50 MHz

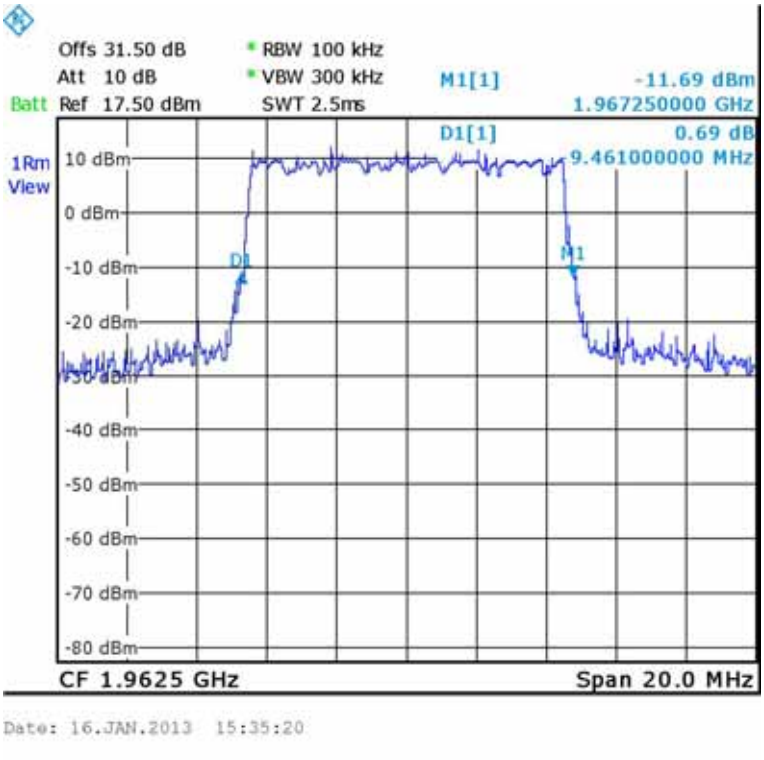

Figure 154.— QPSK Output 1962.50 MHz

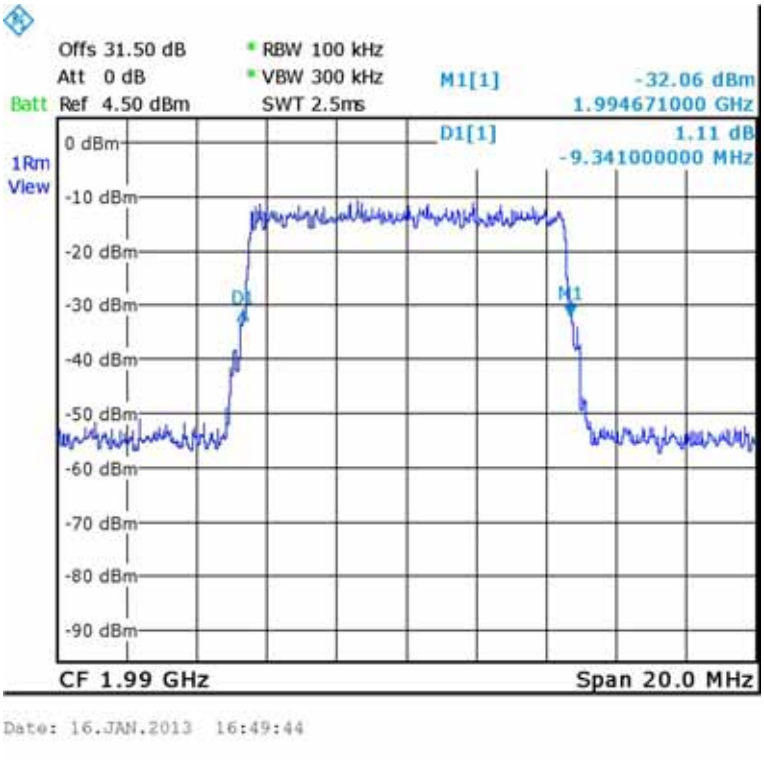

Figure 155.— QPSK Input 1990.00 MHz

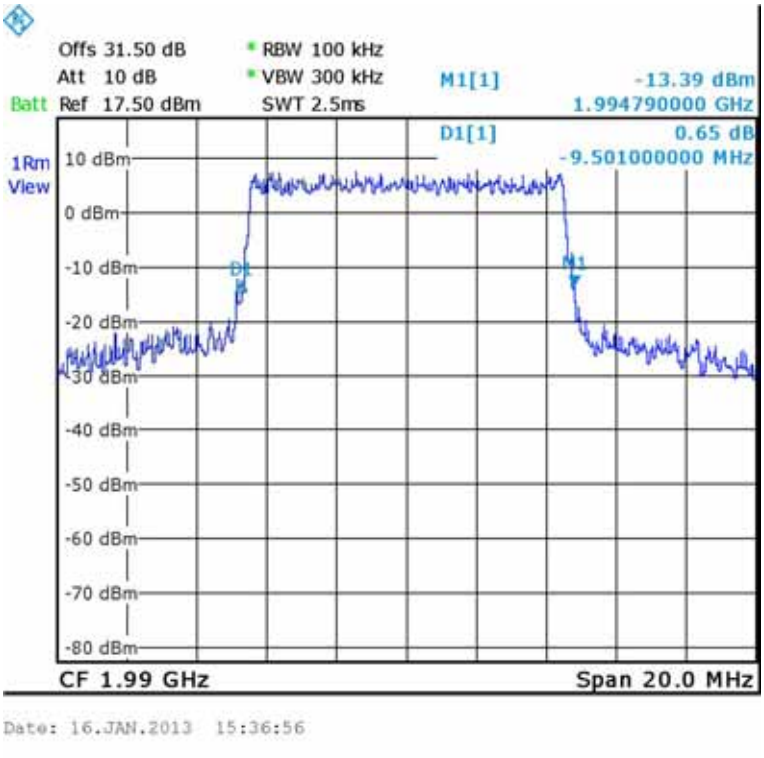

Figure 156.— QPSK Output 1990.00 MHz

GSM:

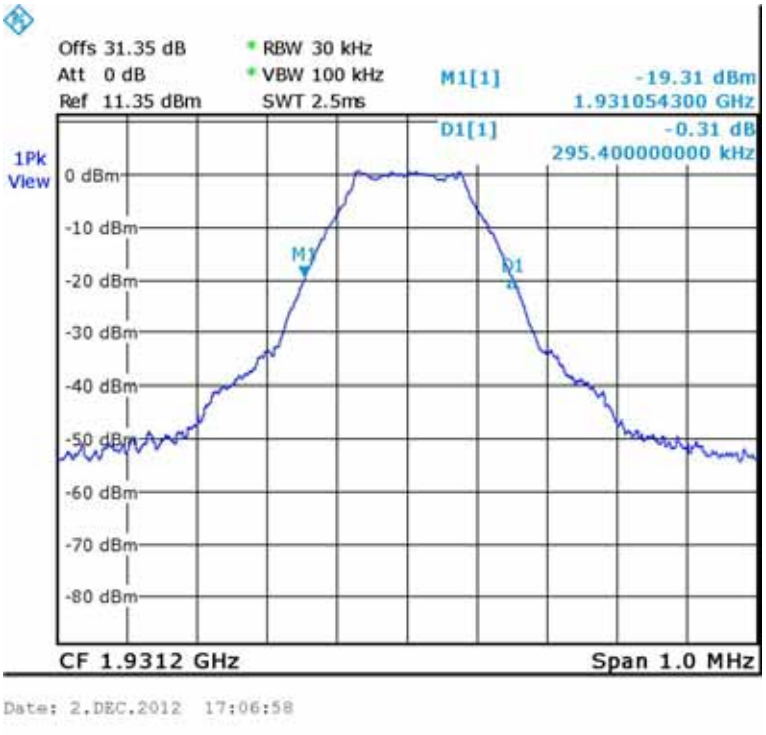

Figure 157.— Input 1931.20 MHz

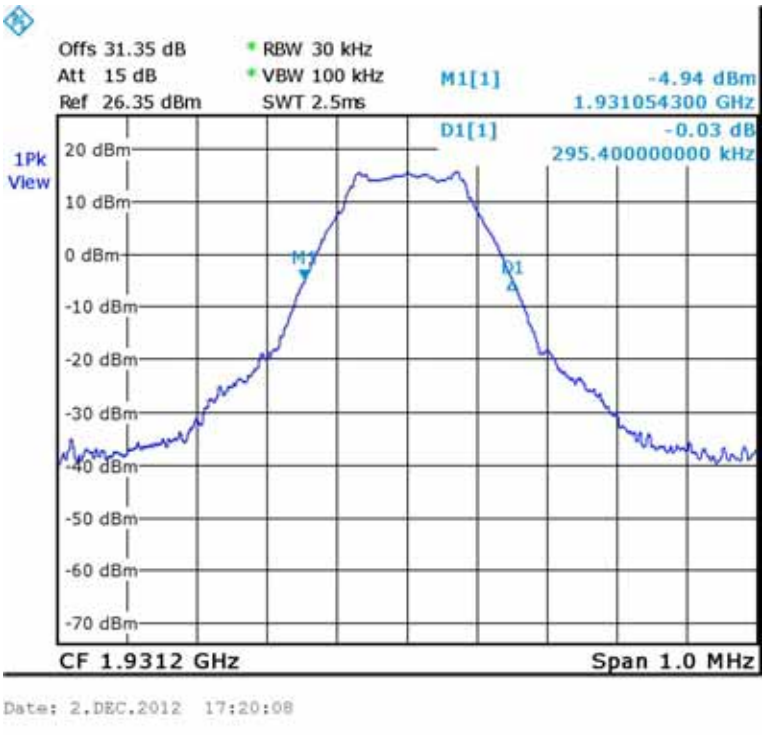

Figure 158.— Output 1931.20 MHz

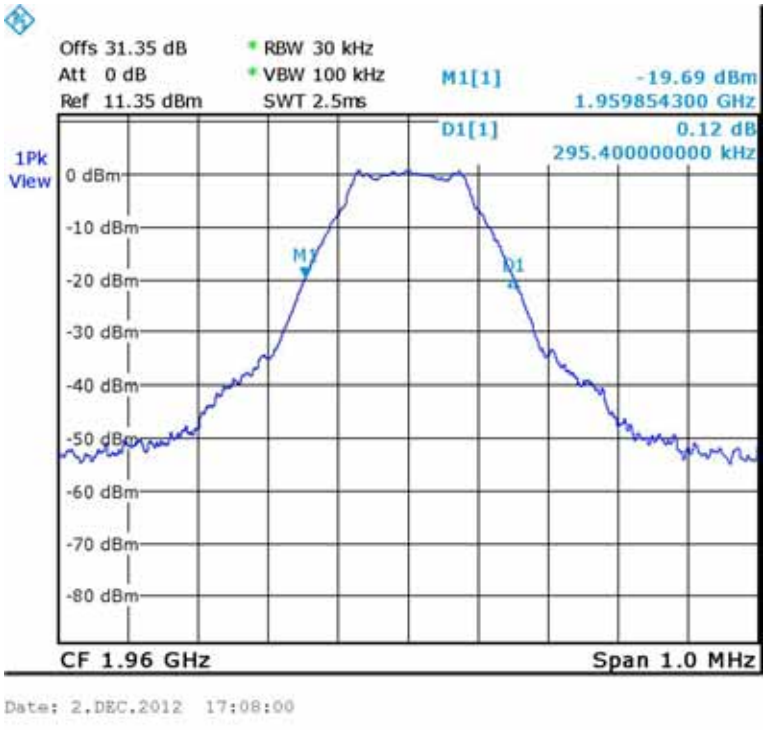

Figure 159.— Input 1960.00 MHz

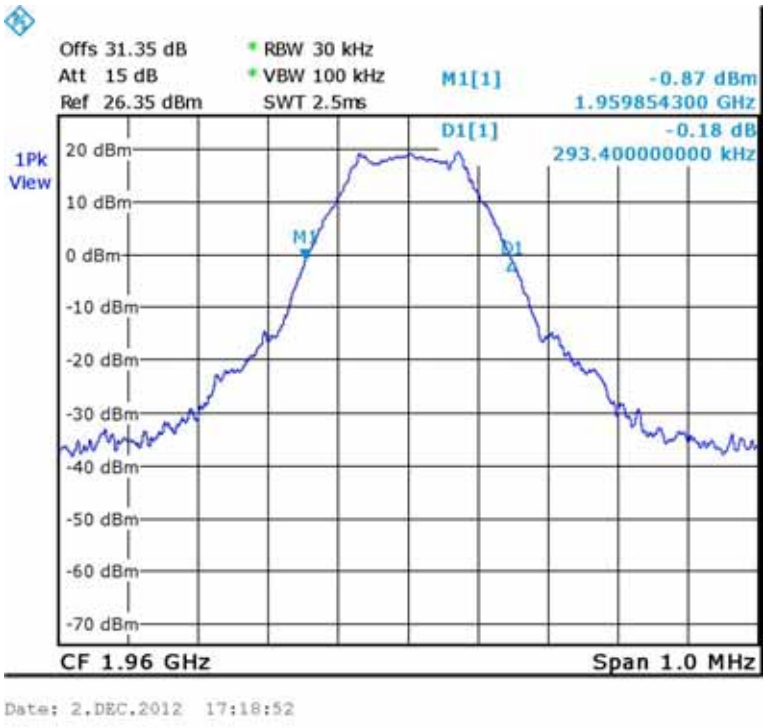

Figure 160.— Output 1960.00 MHz

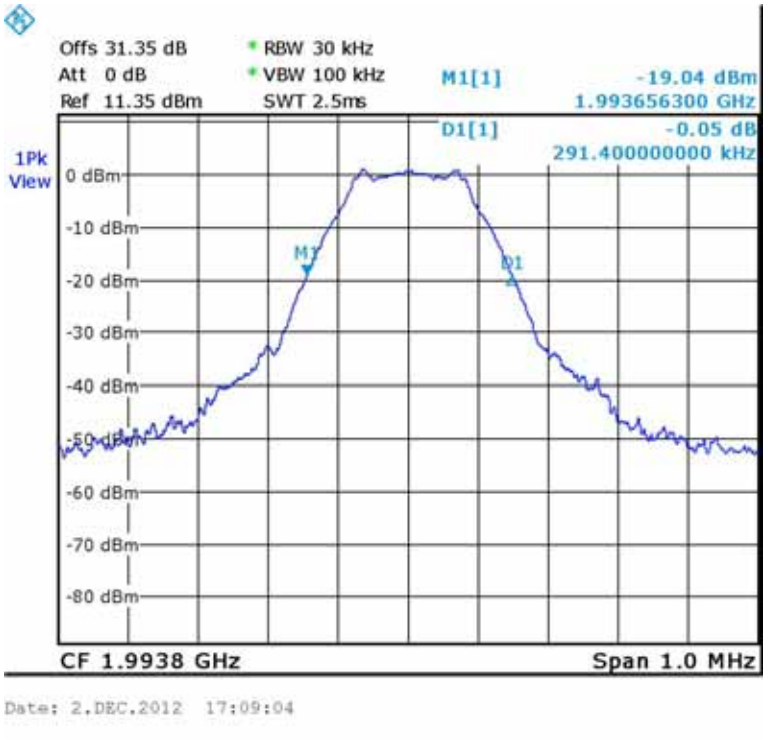

Figure 161.— Input 1993.80 MHz

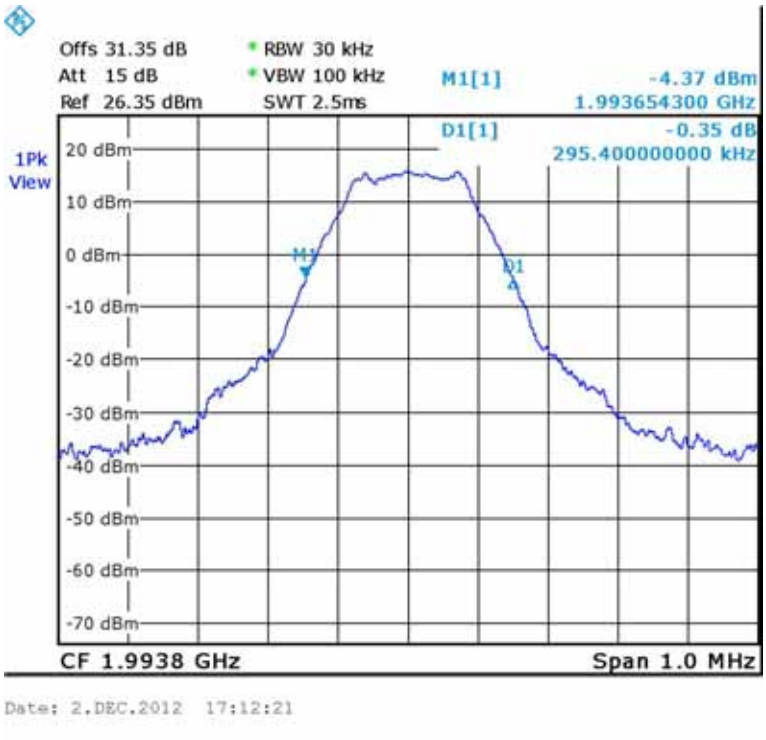

Figure 162.— Output 1993.80 MHz

W-CDMA:

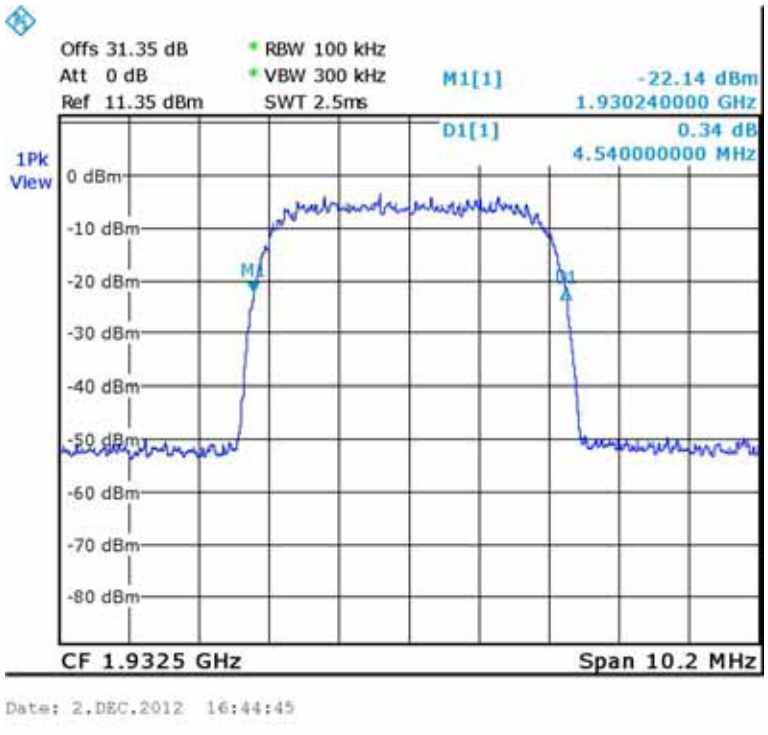

Figure 163.— Input 1932.50 MHz

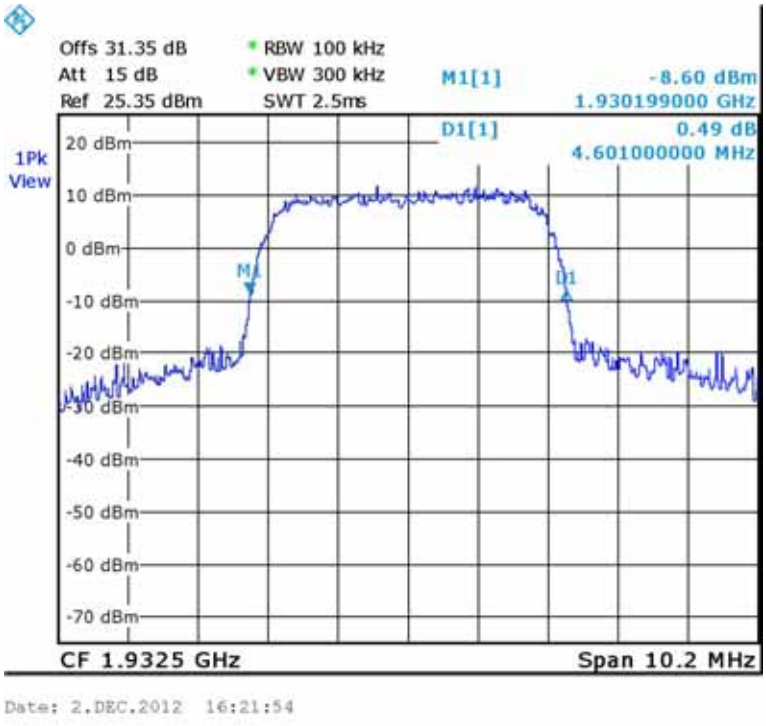

Figure 164.— Output 1932.50 MHz

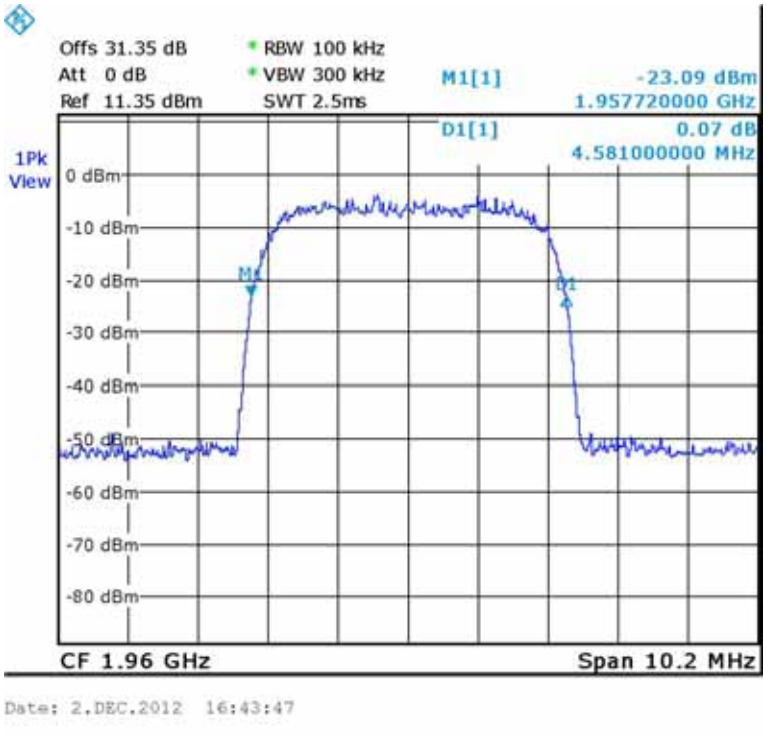

Figure 165.— Input 1960.00 MHz

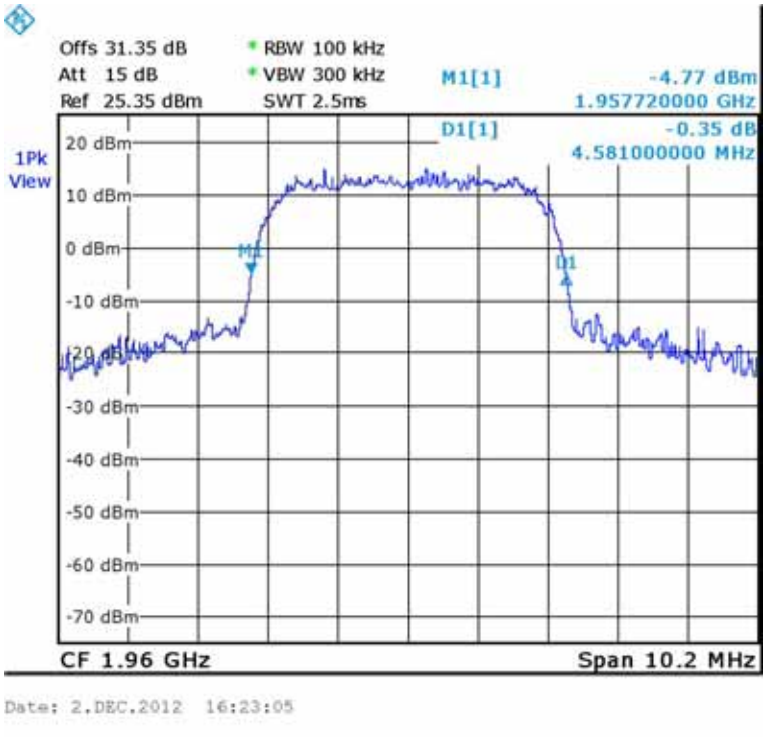

Figure 166.— Output 1960.00 MHz

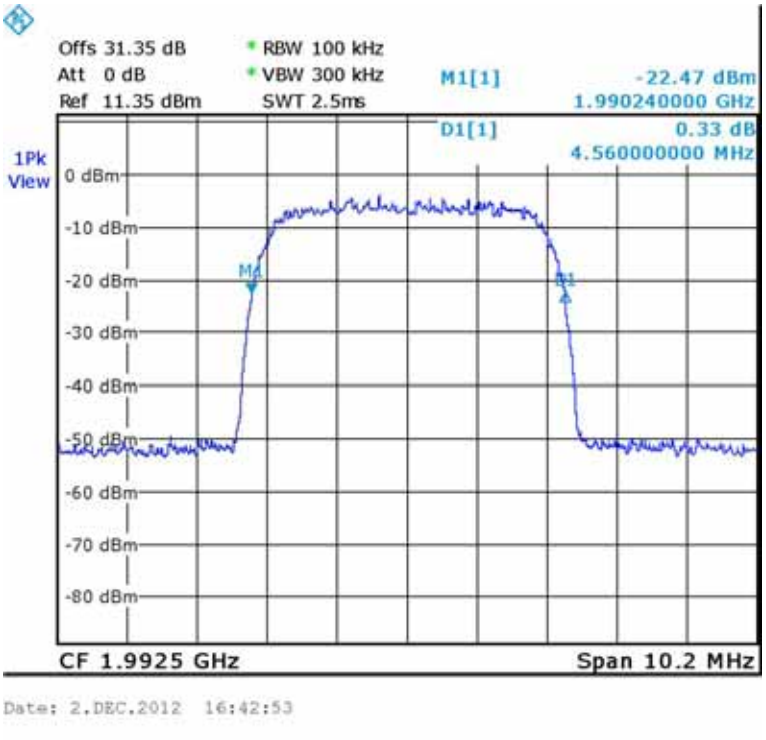

Figure 167.— Input 1992.50 MHz

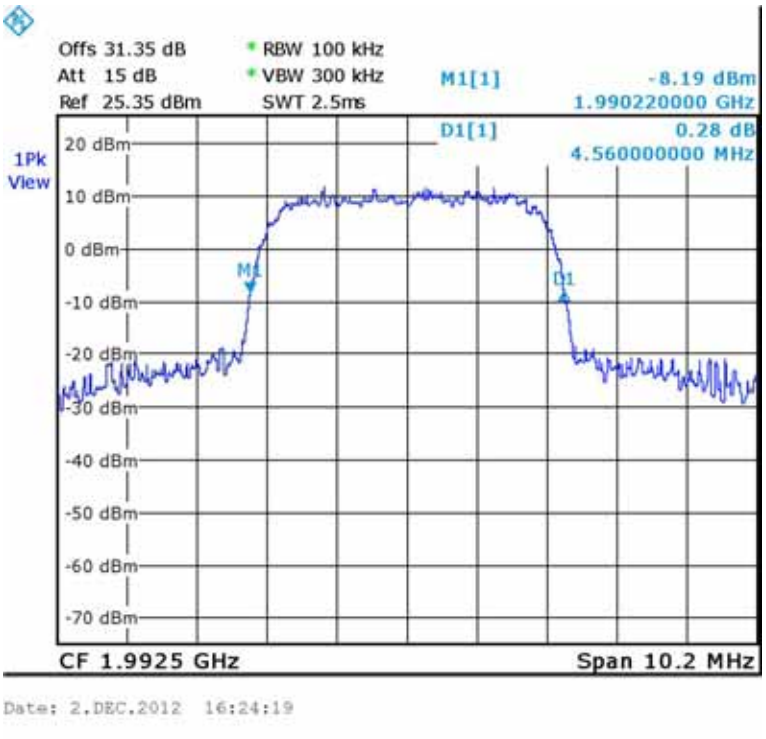

Figure 168.— Output 1992.50 MHz

10.4 Test Equipment Used

Occupied Bandwidth PCS

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	Rohde & Schwarz	FSL6	100194	November 1, 2012	1 year
Signal Generator	Agilent	N5172B ATO 10210	MY51350182	May 31, 2012	2 years
Attenuator	Bird	8304-N20DB	-	August 14, 2012	1 year
Cable	Avnet MTS	P-3636-603-5236	-	August 28, 2012	1 year
DC Block	MIDWEST MICROWAVE	DCDB-3624-10-NNN-02	-	N/A	N/A

Figure 169 Test Equipment Used

11. Out of Band Emissions at Antenna Terminals PCS

11.1 Test Specification

FCC Part 24, Subpart E, Section 238; FCC Part 2.1051

11.2 Test procedure

The power of any emission outside of the authorized operating frequency ranges (1930-1990 MHz) 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 (31.35 dB). The spectrum analyzer was set to 1 kHz resolution BW for the frequency range 9.0-150.0 kHz, 10 kHz for the frequency range 150 kHz–1.0 MHz, 100 kHz for the frequency range 1.0 MHz – 30 MHz, and 1MHz for the frequency range
30 MHz - 20.0 GHz. Signal power was +10 dBm to EUT.

11.3 Test Results

Modulation	Operation Frequency (MHz)	Reading (dBm)	Specification (dBm)	Margin (dB)
LTE	1935.00	-18.32	-13.0	-5.32
	1962.50	-21.82	-13.0	-8.82
	1990.00	-24.98	-13.0	-11.98
GSM	1931.20	-22.98	-13.0	-9.98
	1960.00	-22.48	-13.0	-9.48
	1993.80	-19.32	-13.0	-6.32
W-CDMA	1932.50	-24.15	-13.0	-11.15
	1960.00	-24.15	-13.0	-11.15
	1992.50	-25.65	-13.0	-12.65

Figure 170 Out of Band Emission Results PCS

See additional information in Figure 171 to Figure 233

JUDGEMENT: Passed by 5.32 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 20.01.13

Typed/Printed Name: I. Siboni

LTE:

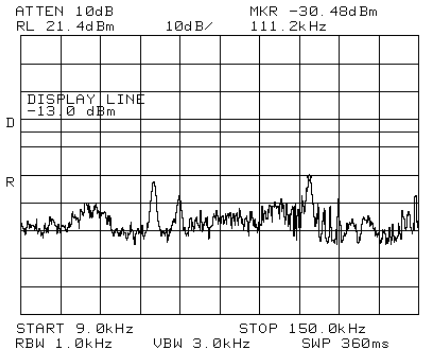

Figure 171.— 1935.00 MHz

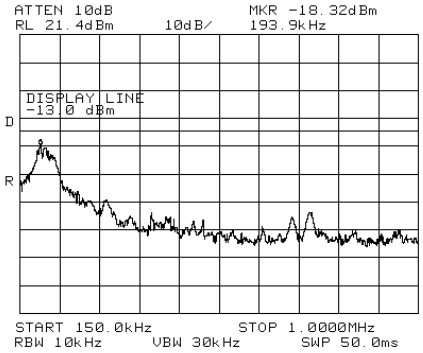

Figure 172.— 1935.00 MHz

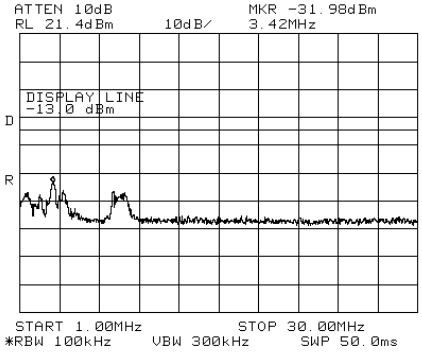

Figure 173.— 1935.00 MHz

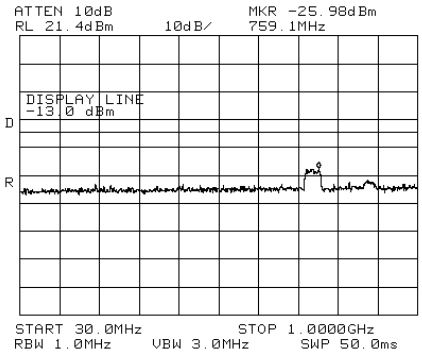

Figure 174.— 1935.00 MHz

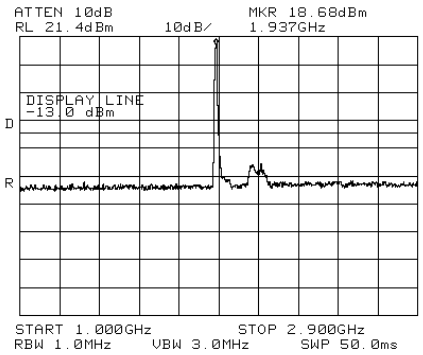

Figure 175.— 1935.00 MHz

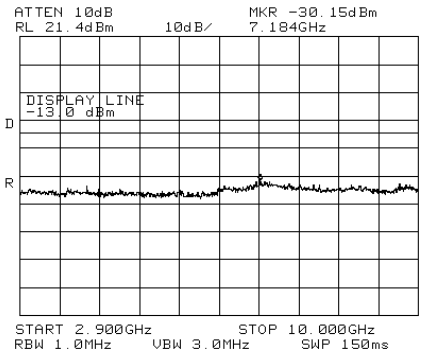

Figure 176.— 1935.00 MHz

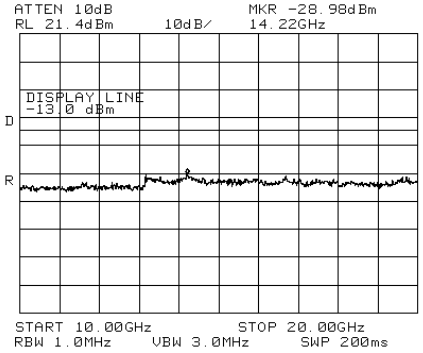

Figure 177.— 1935.00 MHz

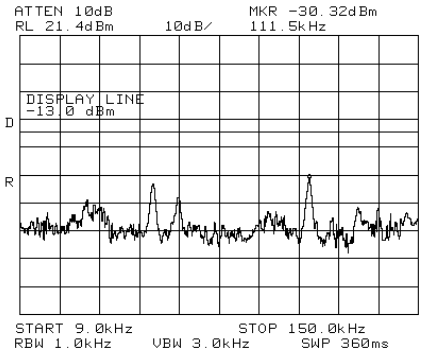

Figure 178.— 1962.50 MHz

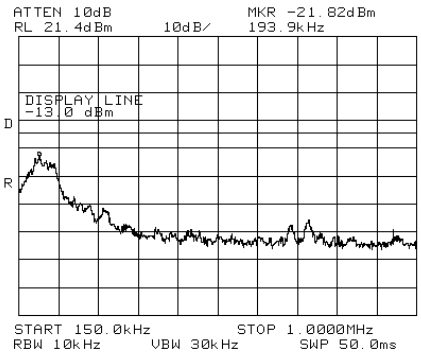

Figure 179.— 1962.50 MHz

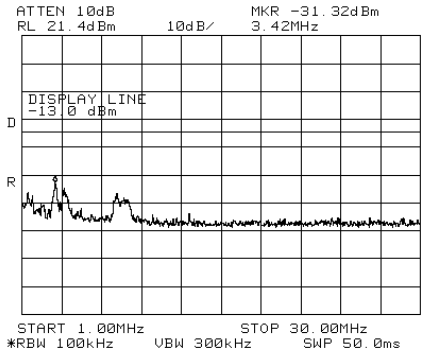

Figure 180.— 1962.50 MHz

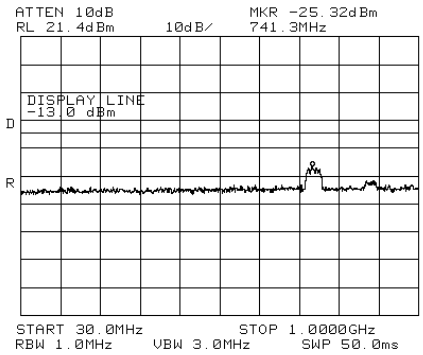

Figure 181.— 1962.50 MHz

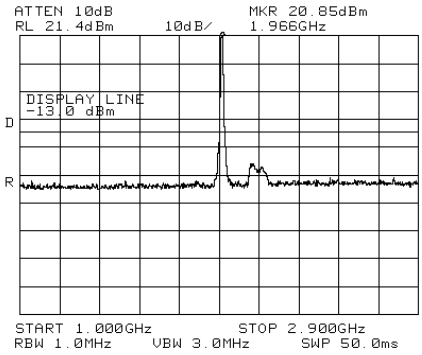

Figure 182.— 1962.50 MHz

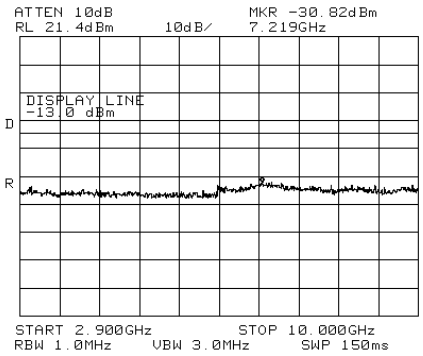

Figure 183.— 1962.50 MHz

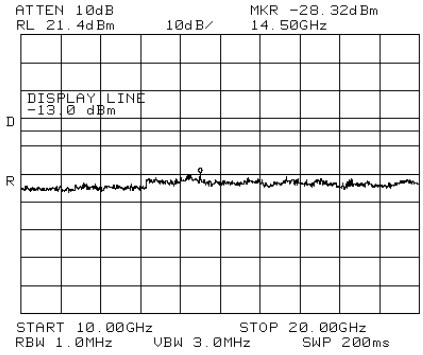

Figure 184.— 1962.50 MHz

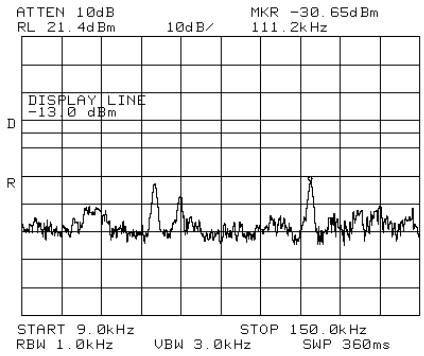

Figure 185.— 1990.00 MHz

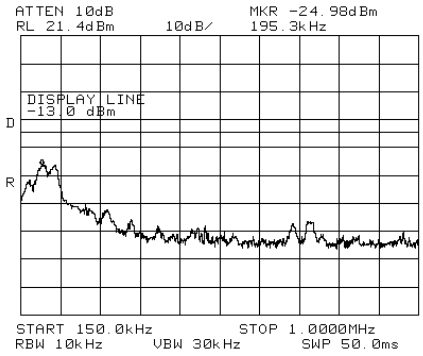

Figure 186.— 1990.00 MHz

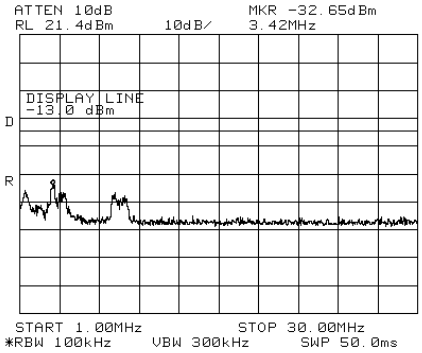

Figure 187.— 1990.00 MHz

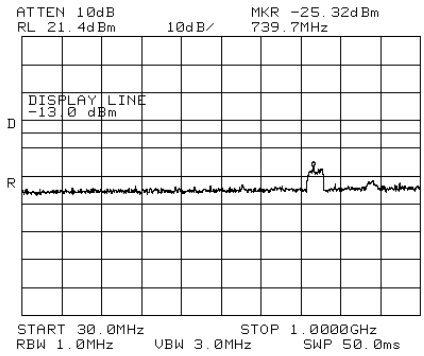

Figure 188.— 1990.00 MHz

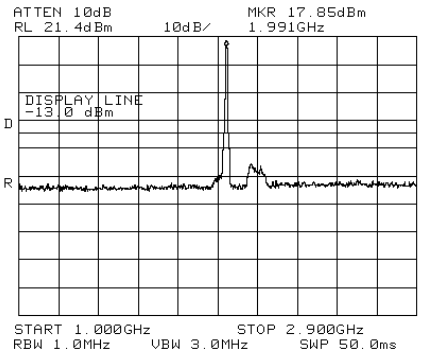

Figure 189.— 1990.00 MHz

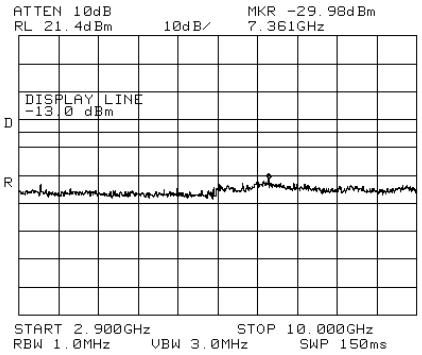

Figure 190.— 1990.00 MHz

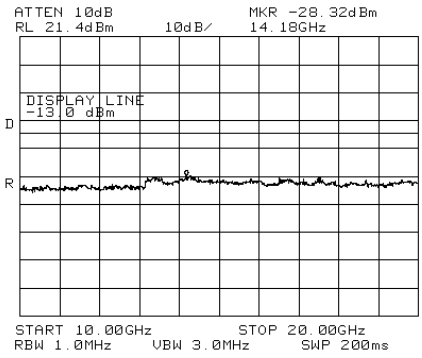

Figure 191.— 1990.00 MHz

GSM:

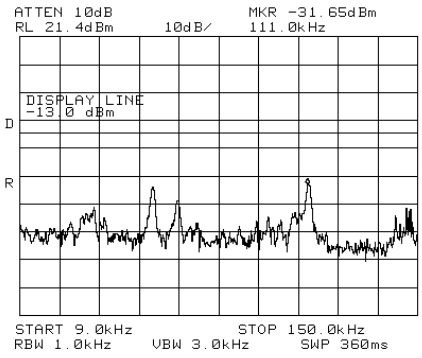

Figure 192.— 1931.20 MHz

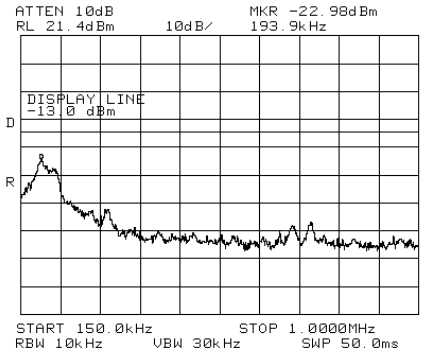

Figure 193.— 1931.20 MHz

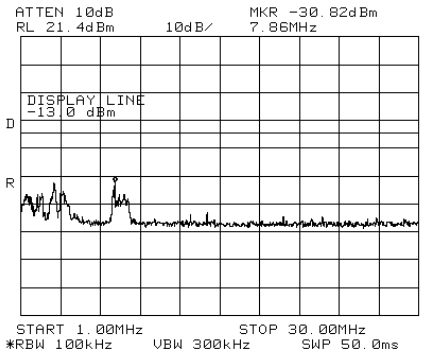

Figure 194.— 1931.20 MHz

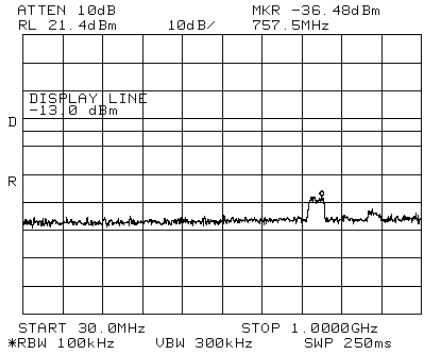

Figure 195.— 1931.20 MHz

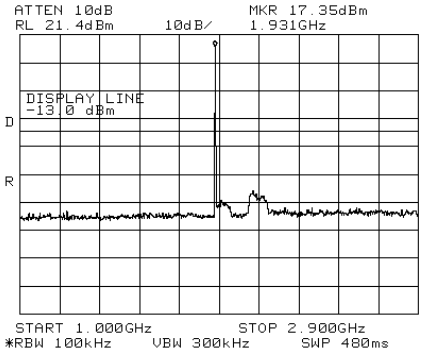

Figure 196.— 1931.20 MHz

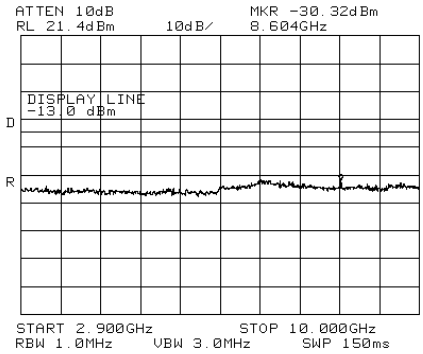

Figure 197.— 1931.20 MHz

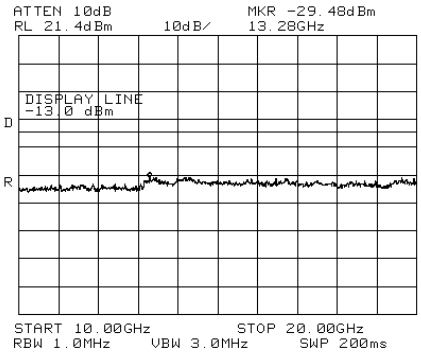

Figure 198.— 1931.20 MHz

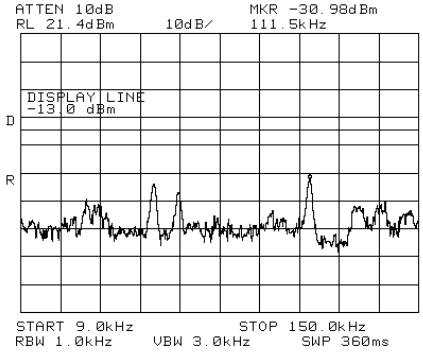

Figure 199.— 1960.00 MHz

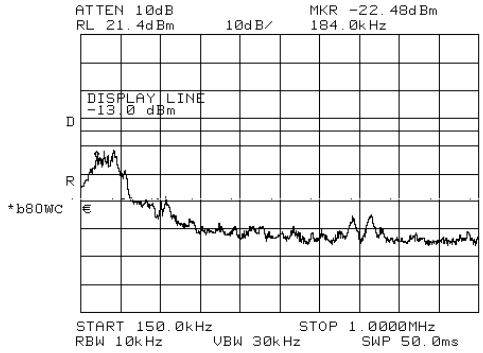

Figure 200.— 1960.00 MHz

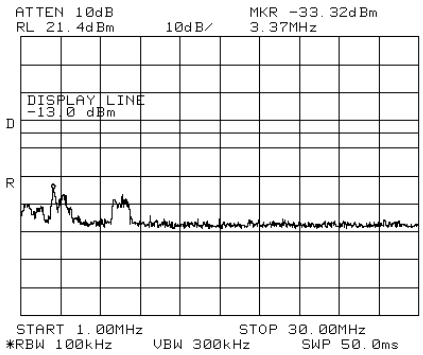

Figure 201.— 1960.00 MHz

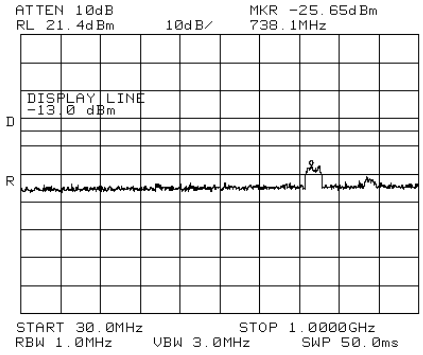

Figure 202.— 1960.00 MHz

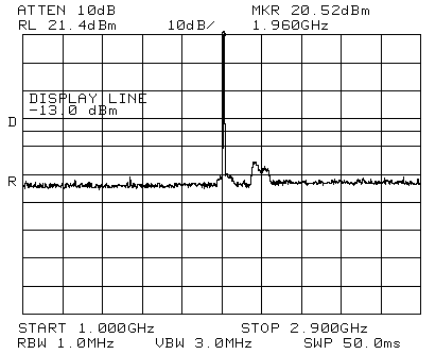

Figure 203.— 1960.00 MHz

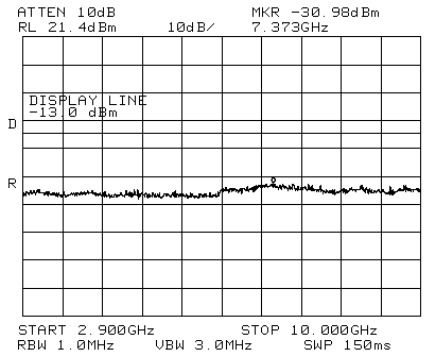

Figure 204.— 1960.00 MHz

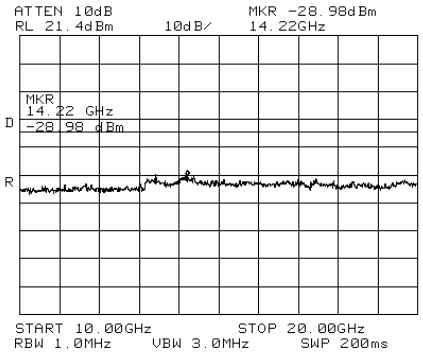

Figure 205.— 1960.00 MHz

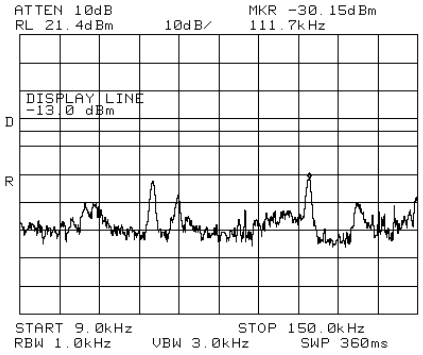

Figure 206.— 1993.80 MHz

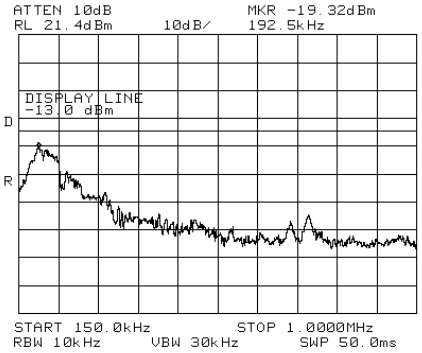

Figure 207.— 1993.80 MHz

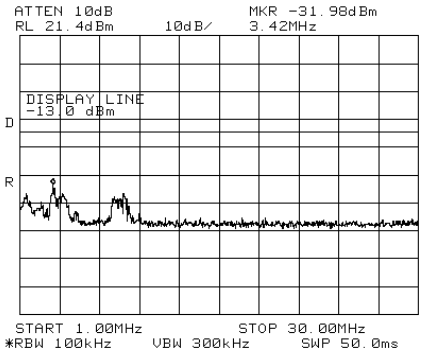

Figure 208.— 1993.80 MHz

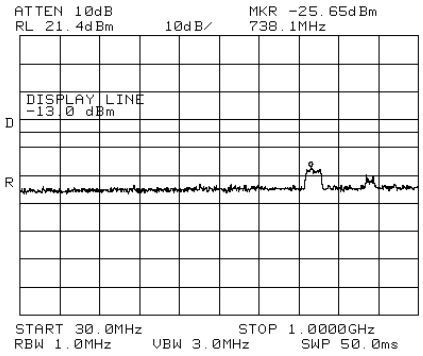

Figure 209.— 1993.80 MHz

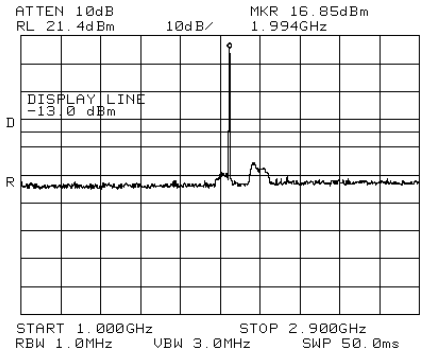

Figure 210.— 1993.80 MHz

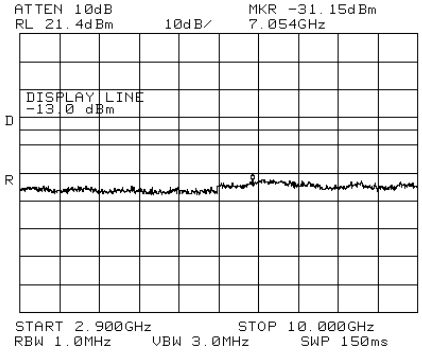

Figure 211.— 1993.80 MHz

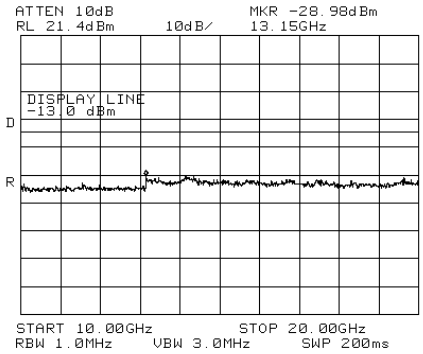

Figure 212.— 1993.80 MHz

W-CDMA:

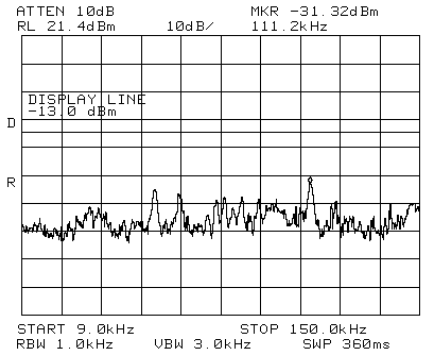

Figure 213.— 1932.50 MHz

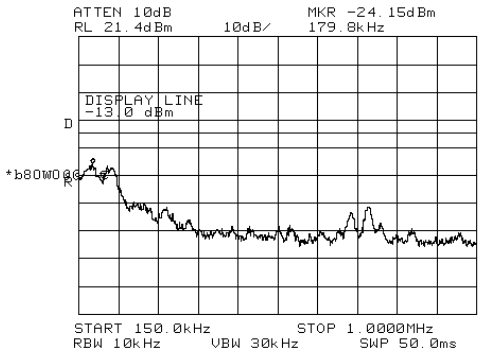

Figure 214.— 1932.50 MHz

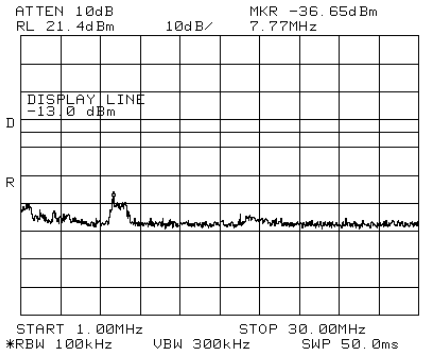

Figure 215.— 1932.50 MHz

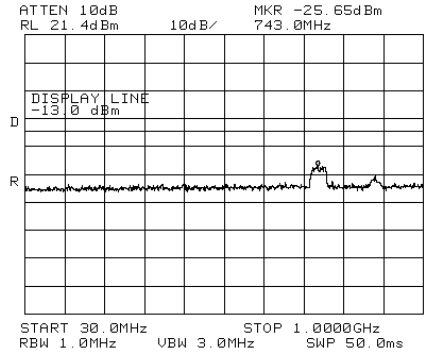

Figure 216.— 1932.50 MHz

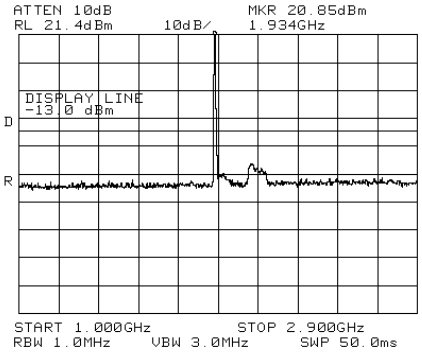

Figure 217.— 1932.50 MHz

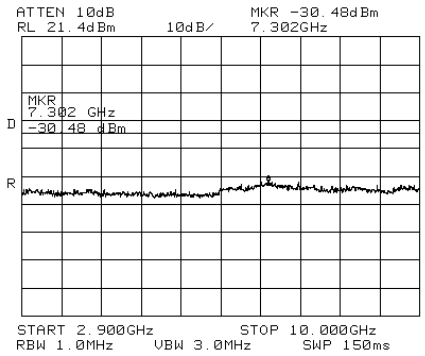

Figure 218.— 1932.50 MHz

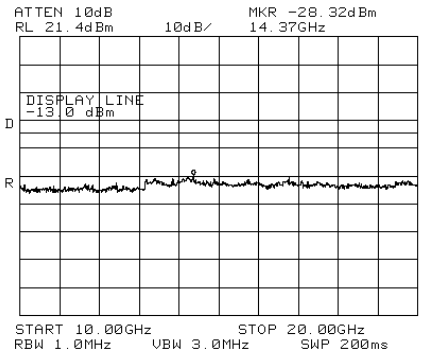

Figure 219.— 1932.50 MHz

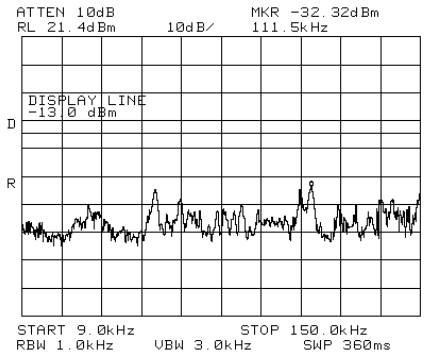

Figure 220.— 1960.00 MHz

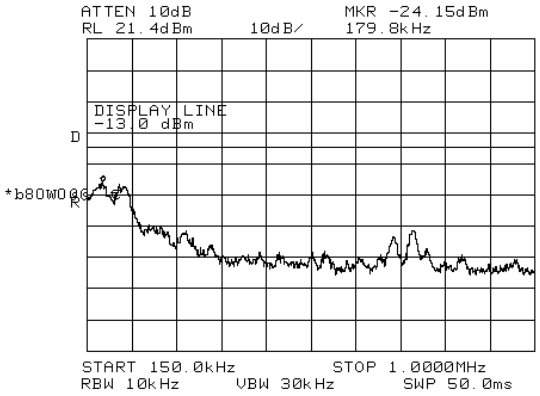

Figure 221.— 1960.00 MHz

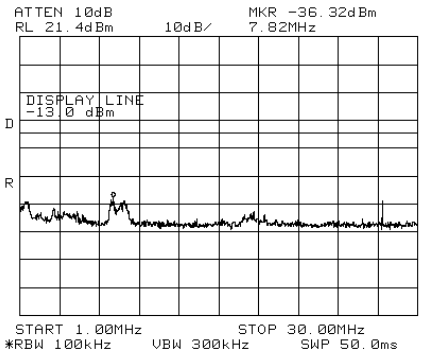

Figure 222.— 1960.00 MHz

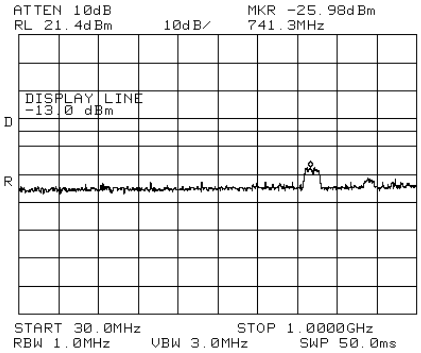

Figure 223.— 1960.00 MHz

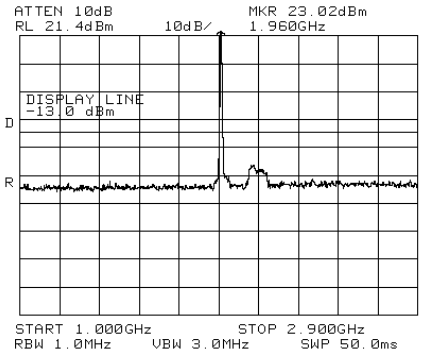

Figure 224.— 1960.00 MHz

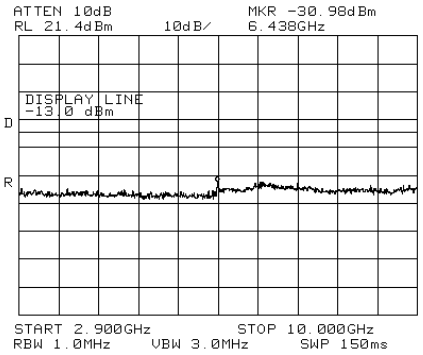

Figure 225.— 1960.00 MHz

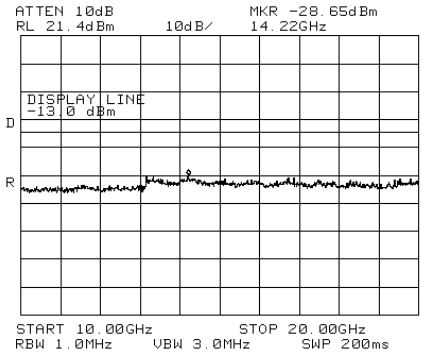

Figure 226.— 1960.00 MHz

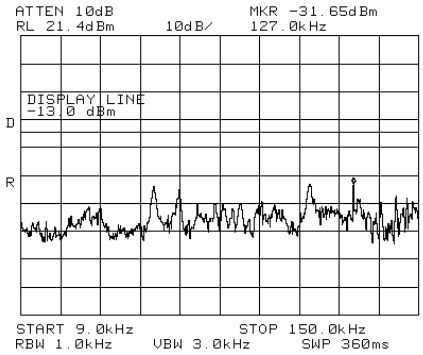

Figure 227.— 1992.50 MHz

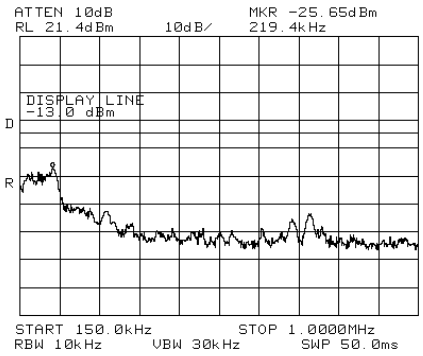

Figure 228.— 1992.50 MHz

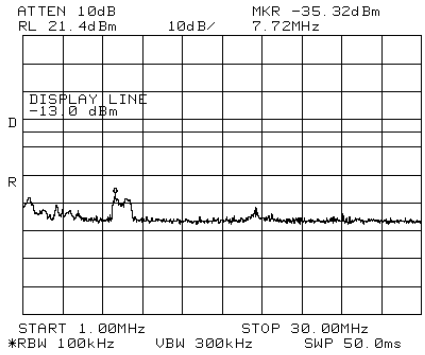

Figure 229.— 1992.50 MHz

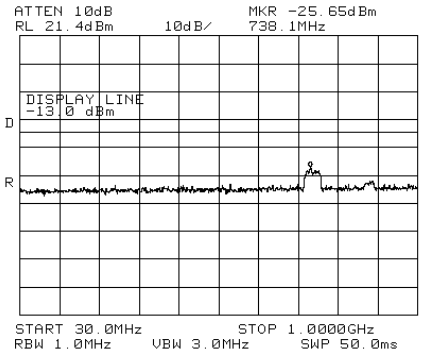

Figure 230.— 1992.50 MHz

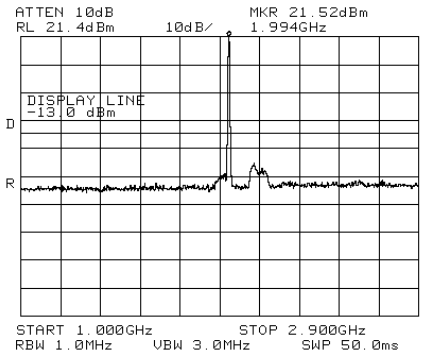

Figure 231.— 1992.50 MHz

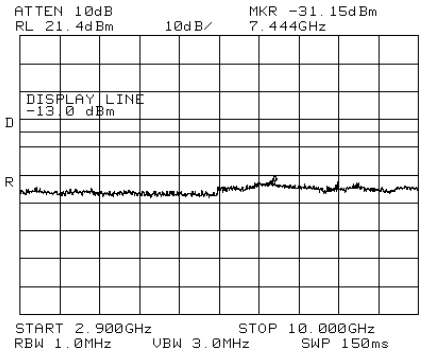

Figure 232.— 1992.50 MHz

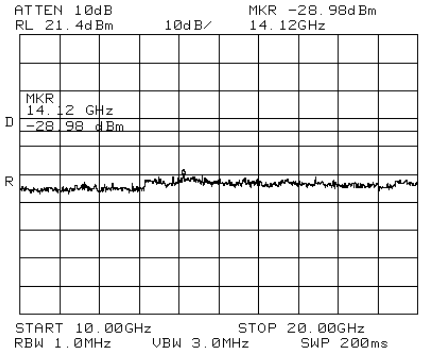

Figure 233.— 1992.50 MHz

11.4 Test Equipment Used.

Out of Band Emission at Antenna Terminals PCS

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	HP	8564E	3442A00275	January 19, 2012	1 year
Signal Generator	Agilent	N5172B ATO 10210	MY51350182	May 31, 2012	2 years
Attenuator	Bird	8304-N20DB	-	August 14, 2012	1 year
Cable	Avnet MTS	P-3636-603-5236	-	August 28, 2012	1 year
DC Block	MIDWEST MICROWAVE	DCDB-3624-10-NNN-02	-	N/A	N/A

Figure 234 Test Equipment Used

12. Band Edge Spectrum PCS

12.1 Test Specification

FCC Part 24, Subpart E, Section 238; FCC Part 2.1051

12.2 Test procedure

For LTE and GSM:

Enclosed are spectrum analyzer plots for the lowest operation frequency (1931.2 MHz) and the highest operation frequency (1993.8 MHz) in which the E.U.T. is planned to be used.

For WCDMA:

Enclosed are spectrum analyzer plots for the lowest operation frequency (1932.5 MHz) and the highest operation frequency (1992.5 MHz) in which the E.U.T. is planned to be used.

The power of any emission outside of the authorized operating frequency ranges (1930.00-1990.00 MHz) 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 (31.5 dB).
The spectrum analyzer was set to 100 kHz R.B.W.

12.3 Test Results

Modulation	Operation Frequency (MHz)	Band Edge Frequency (MHz)	Reading (dBm)	Specification (dBm)	Margin (dB)
LTE 64QAM	1935.00	1930.00	-18.76	-13.0	-5.73
	1990.00	1995.00	-19.83	-13.0	-6.83
LTE 16QAM	1935.00	1930.00	-20.29	-13.0	-7.29
	1990.00	1995.00	-18.50	-13.0	-5.50
LTE QPSK	1935.00	1930.00	-20.60	-13.0	-7.60
	1990.00	1995.00	-21.11	-13.0	-8.11
GSM	1931.20	1930.00	-29.70	-13.0	-16.70
	1993.80	1995.00	-26.38	-13.0	-13.38
W-CDMA	1932.50	1930.00	-23.10	-13.0	-10.10
	1992.50	1995.00	-22.57	-13.0	-9.57

Figure 235 Band Edge Spectrum Results PCS

See additional information in Figure 236 to Figure 245.

JUDGEMENT: Passed by 5.50 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 20.01.13

Typed/Printed Name: A. Sharabi

LTE:

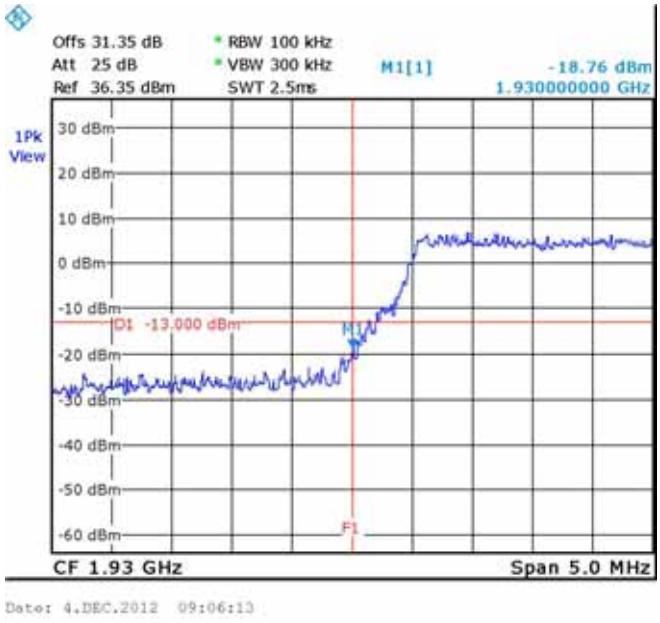

Figure 236.— 64QAM 1935.00 MHz

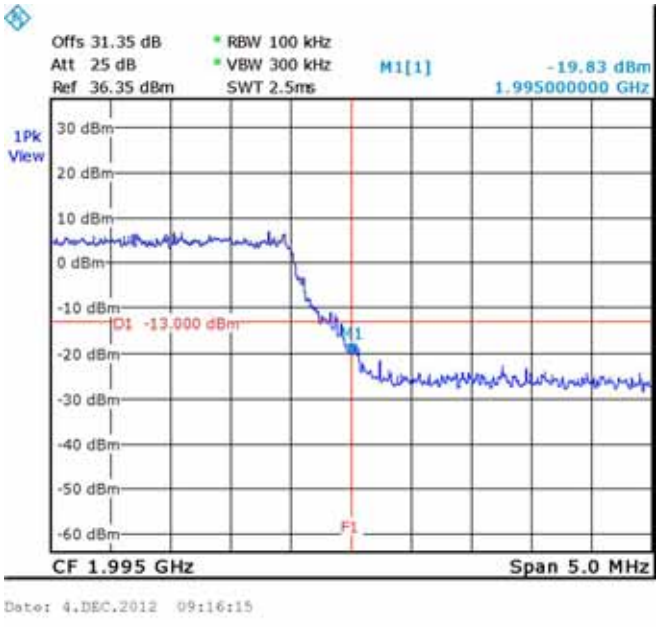

Figure 237.— 64QAM 1990.00 MHz

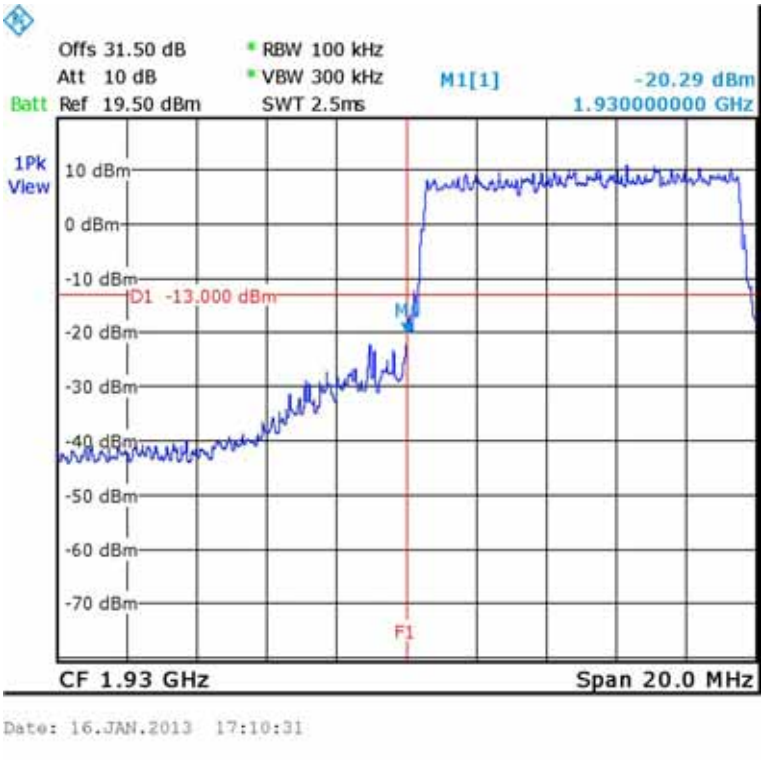

Figure 238.— 16QAM 1935.00 MHz

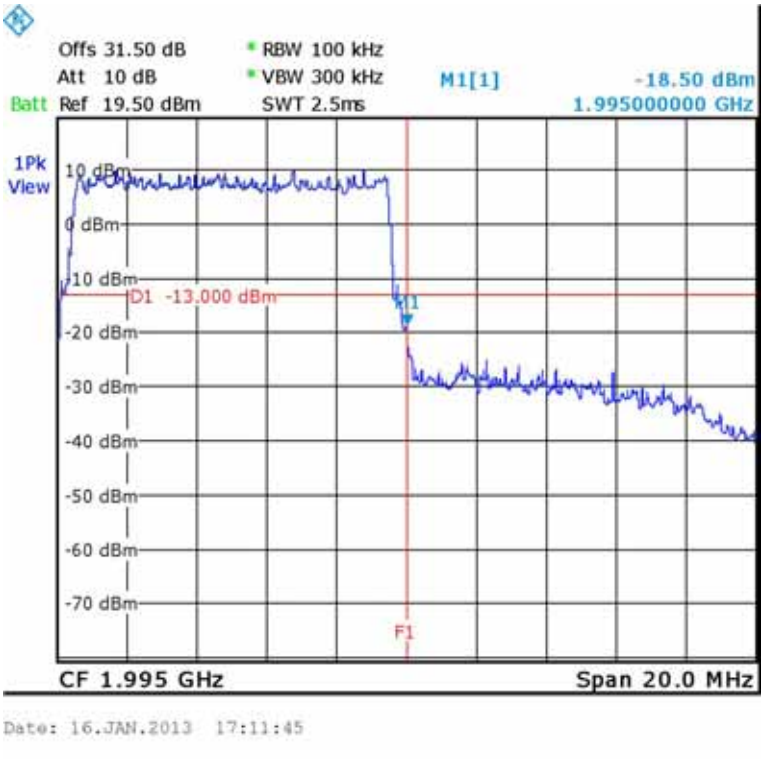

Figure 239.— 16QAM 1990.00 MHz

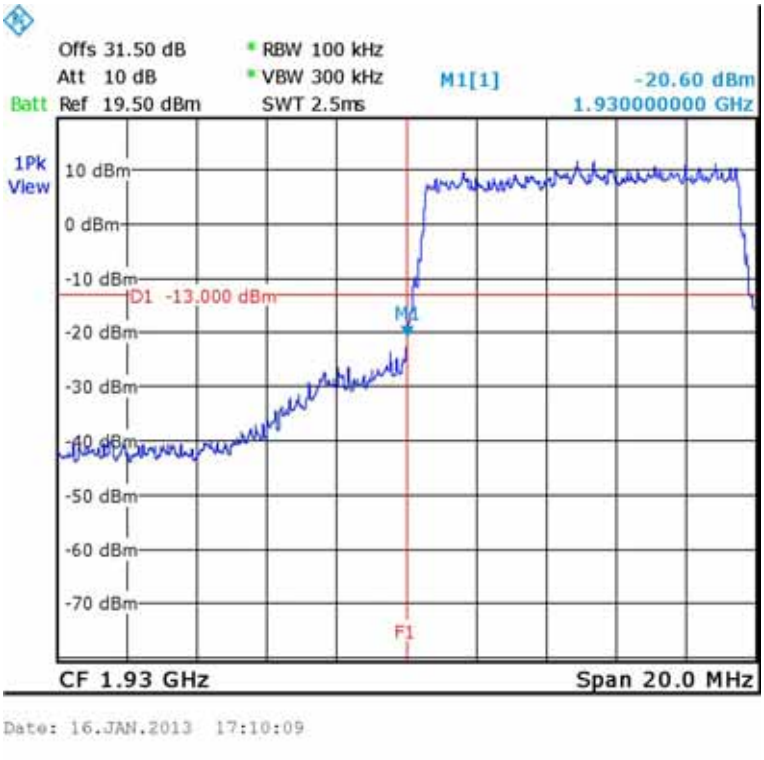

Figure 240.— QPSK 1935.00 MHz

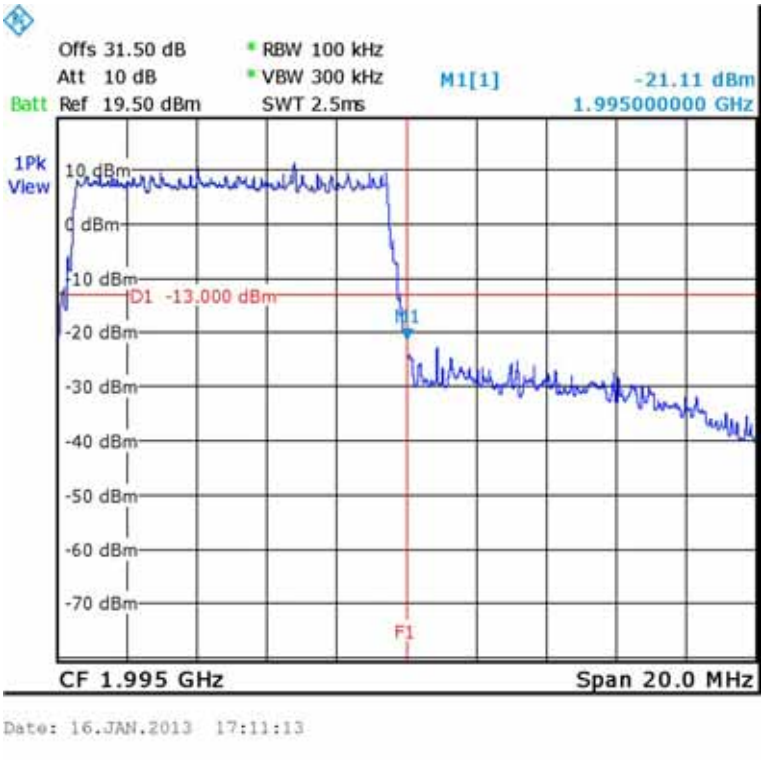

Figure 241.— QPSK 1990.00 MHz

GSM:

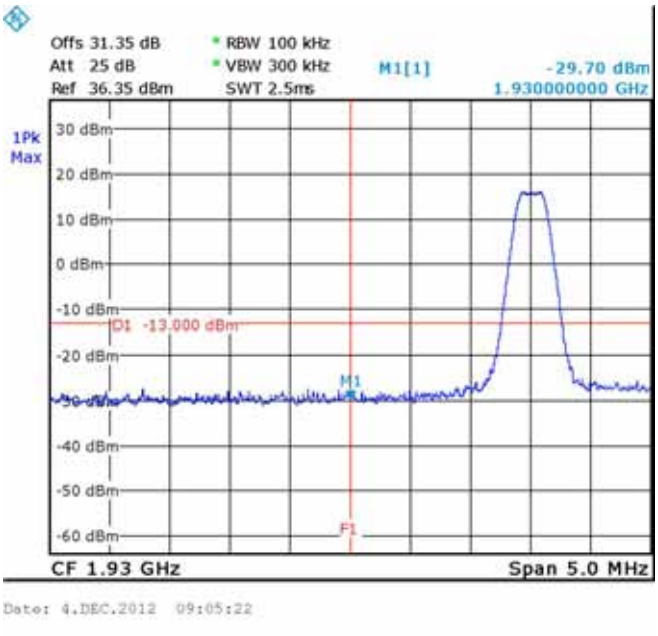

Figure 242.— 1931.20 MHz

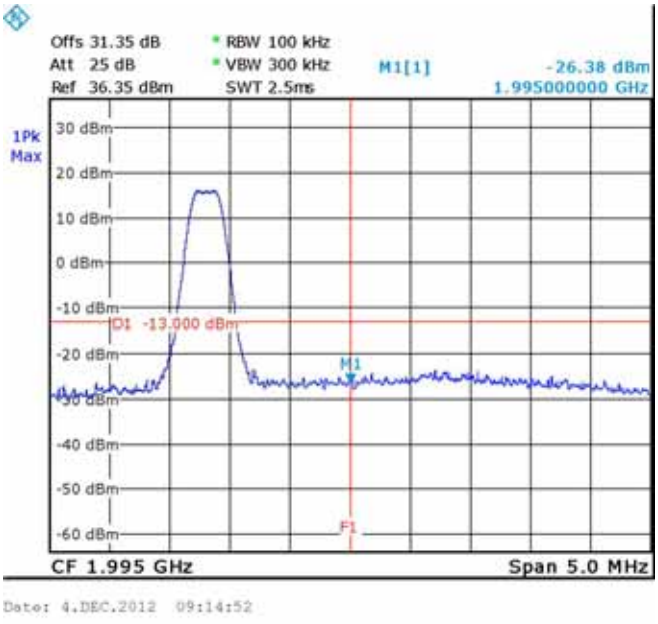

Figure 243.— 1993.80 MHz

W-CDMA:

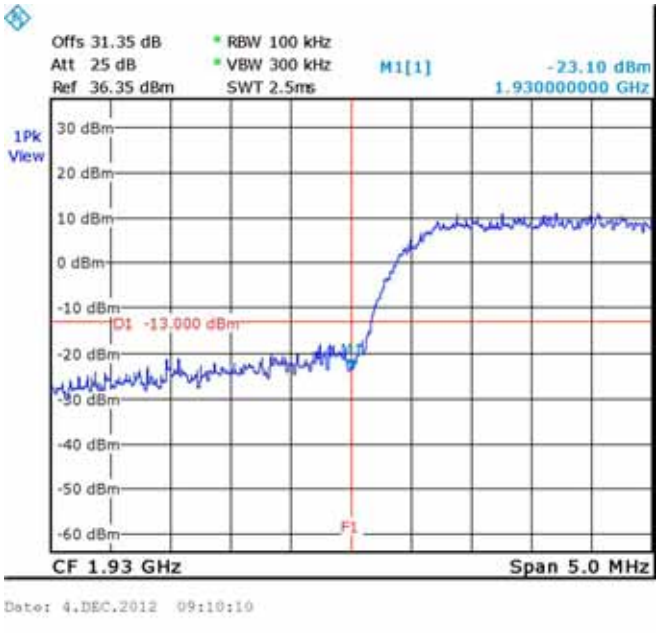

Figure 244.— 1932.50 MHz

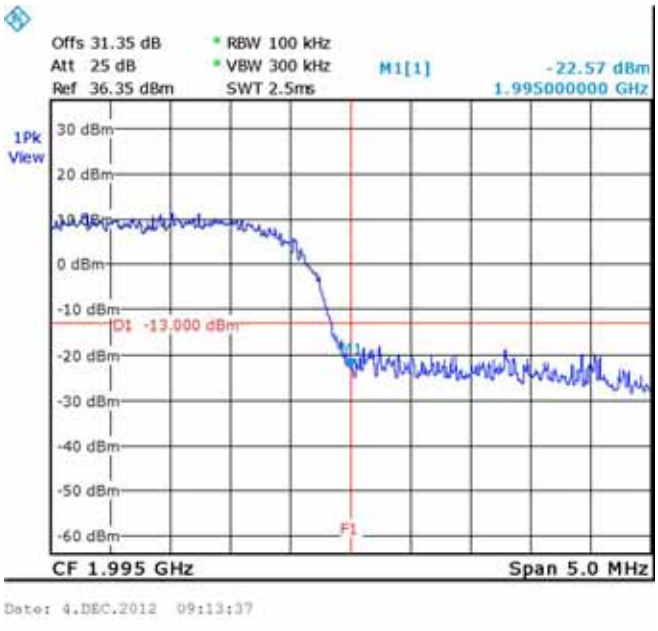

Figure 245.— 1992.50 MHz

12.4 Test Equipment Used.

Band Edge Spectrum PCS

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	Rohde & Schwarz	FSL6	100194	November 1, 2012	1 year
Signal Generator	Agilent	N5172B ATO 10210	MY51350182	May 31, 2012	2 years
Attenuator	Bird	8304-N20DB	-	August 14, 2012	1 year
Cable	Avnet MTS	P-3636-603-5236	-	August 28, 2012	1 year
DC Block	MIDWEST MICROWAVE	DCDB-3624-10-NNN-02	-	N/A	N/A

Figure 246 Test Equipment Used

13. Out of Band Emissions (Radiated) PCS

13.1 Test Specification

FCC, Part 24, Subpart E Section 238, FCC Part 2.1053

13.2 Test Procedure

The test method was based on ANSI/TIA-603-C: 2004, Section 2.2.12 Unwanted Emissions: Radiated Spurious.
The power of any emission outside of the authorized operating frequency ranges (1930-1990 MHz) must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB, yielding –13dBm.

(a) The E.U.T. operation mode and test set-up are as described in Section 3. A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 1.5 meters above the ground. The configuration tested is shown in Figure 3.1.
The frequency range 9 kHz-20 GHz was scanned and the list of the highest emissions was verified and updated accordingly.
The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.
The emissions were measured at a distance of 3 meters.

(c) The E.U.T. was replaced by a substitution antenna (dipole 30MHz-1GHz, Horn Antenna above 1GHz) driven by a signal generator. The height was readjusted for maximum reading. The signal generator level was adjusted to obtain the same reading on the EMI receiver as in step (a).
The signals observed in step (a) were converted to radiated power using:
P_d(dBm) = P_g(dBm) – Cable Loss (dB) + Substitution Antenna Gain (dB)
P_d = Dipole equivalent power (result).
P_g = Signal generator output level.

13.3 Results Table

Carrier Channel (MHz)	Freq. (MHz)	Antenna Pol.	Maximum Peak Level (dBµV/m)	Signal Generator RF Output (dBm)	Cable Loss (dB)	Antenna Gain (dBi)	Effective Radiated Power Level (dBm)	Spec. (dBm)	Margin (dB)
1931.20	3862.4	V	66.4	-28.9	10.2	8.7	-30.4	-13.0	-17.4
1931.20	3862.4	H	66.1	-30.8	10.2	9.8	-31.2	-13.0	-18.2
1960.00	3920.0	V	68.3	-27.0	10.2	8.7	-28.5	-13.0	-15.5
1960.00	3920.0	H	70.2	-26.7	10.2	9.8	-27.1	-13.0	-14.1
1993.80	3987.6	V	70.0	-25.7	11.2	9.5	-27.4	-13.0	-14.4
1993.80	3987.6	H	70.7	-25.5	11.2	8.6	-28.1	-13.0	-15.1

The E.U.T met the requirements of the FCC, Part 24, Subpart E, Section 238; FCC Part 2.1053 specifications.

TEST PERSONNEL:

Tester Signature: _____ Date: 20.01.13

Typed/Printed Name: I. Siboni

13.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	Rohde & Schwarz	1066.301	100120	November 1, 2012	1 year
Spectrum Analyzer	HP	8592L	3826A01204	March 5, 2012	1 year
Active Loop Antenna	Emco	6502	2950	October 19, 2012	1 year
Antenna Bioconilog	EMCO	3142B	1250	July 7, 2012	1 year
Horn	EMCO	3115	6142	March 14, 2012	2 year
Horn	ARA	SWH-28	1007	January 26, 2011	2 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	August 21, 2012	1 year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	August 28, 2012	1 year
Signal Generator	Agilent	N5172B ATO10210	MY51350182	May 31, 2012	2 years
Antenna Mast	ETS	2070-2	9608-1497	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Table Controller	ETS/EMCO	2090	9608-1456	N/A	N/A

14. RF Power Output LTE

14.1 Test Specification

FCC Part 27, Subpart C (27.50)

14.2 Test procedure

Peak Power Output must not exceed 1000W. The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator (31.5 dB) and an appropriate coaxial cable. Special attention was taken to prevent Spectrum Analyzer RF input overload. The Spectrum Analyzer was set to 100 kHz RBW.

14.3 Test Results

	Operation Frequency (MHz)	Reading (dBm)
LTE 64QAM	733	29.99
LTE 64QAM	747	28.82
LTE 64QAM	753	29.41
LTE 16QAM	733	27.55
LTE 16QAM	747	28.74
LTE 16QAM	753	29.20
LTE QPSK	733	28.30
LTE QPSK	747	28.05
LTE QPSK	753	28.52

Figure 247 RF Power Output LTE

See additional information in Figure 248 to Figure 256.

TEST PERSONNEL:

Tester Signature: _____ Date: 20.01.13

Typed/Printed Name: A. Sharabi

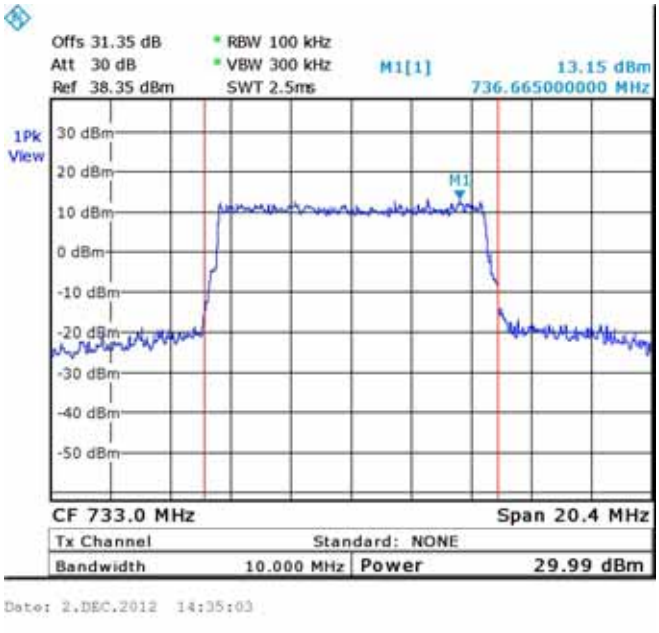

Figure 248.— 64QAM, 733 MHz

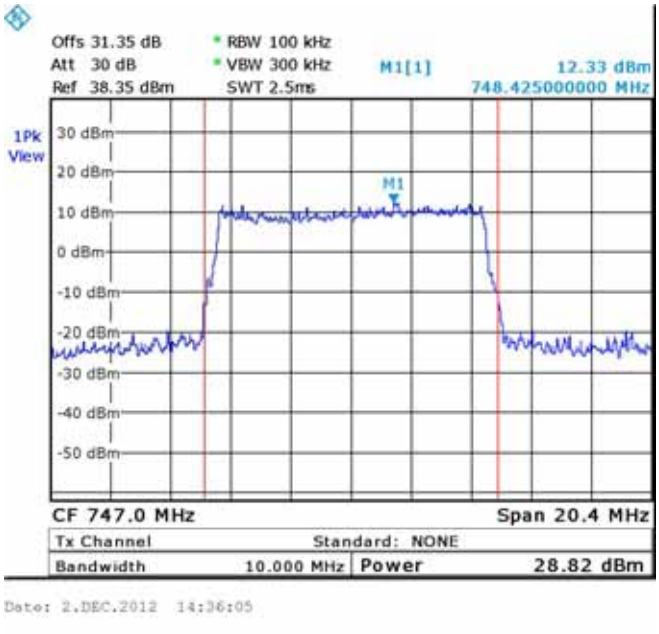

Figure 249.— 64QAM 747 MHz

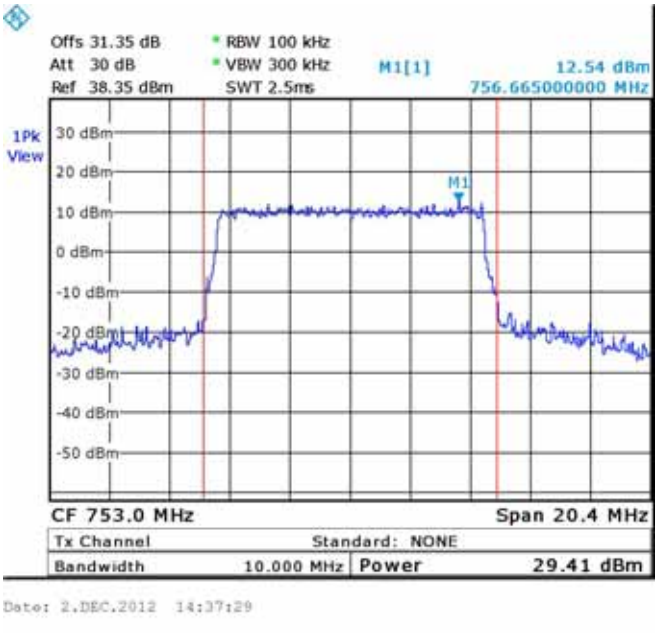

Figure 250.— 64QAM 753 MHz

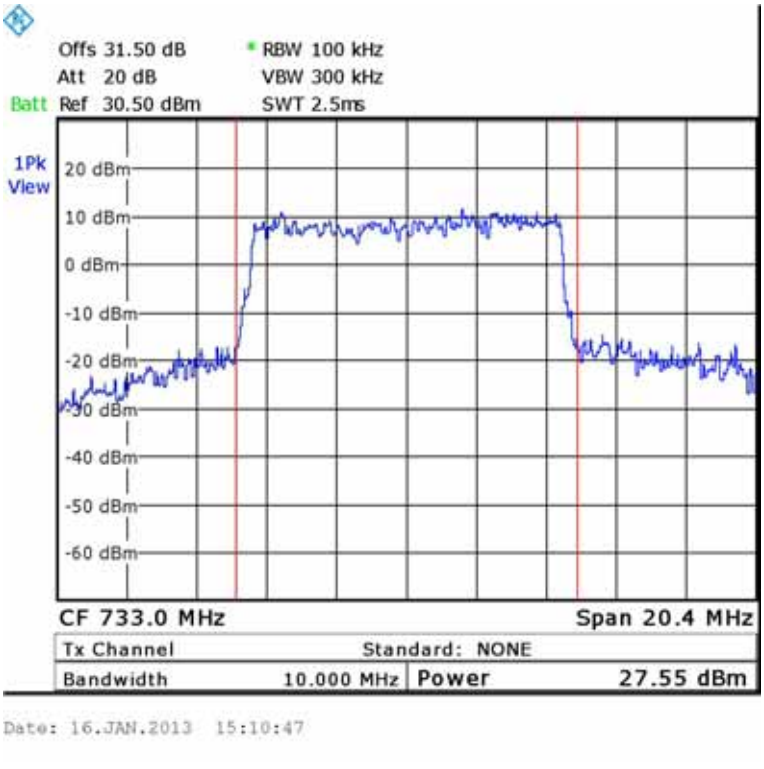

Figure 251.— 16QAM 733 MHz

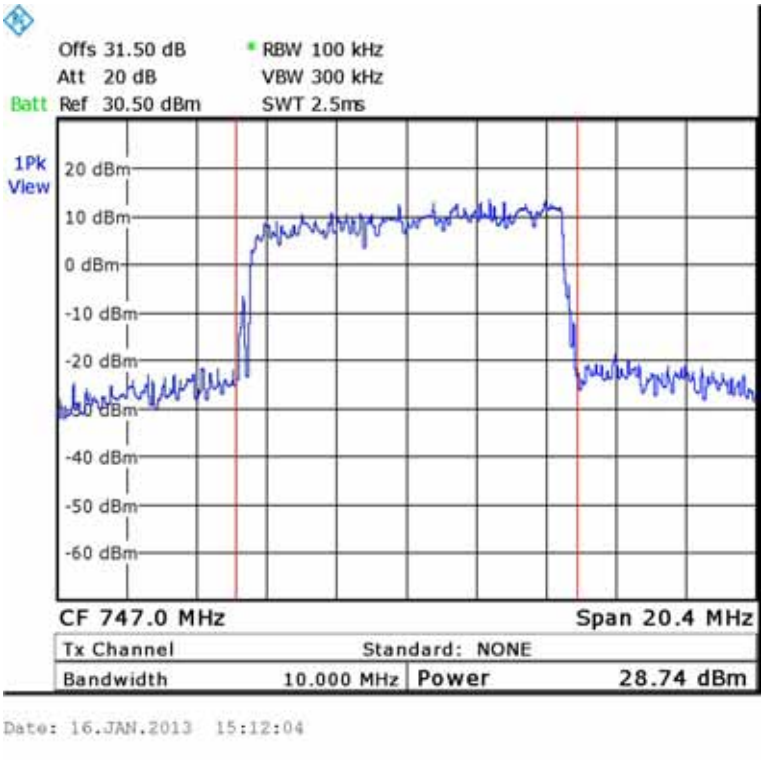

Figure 252.— 16QAM 747 MHz

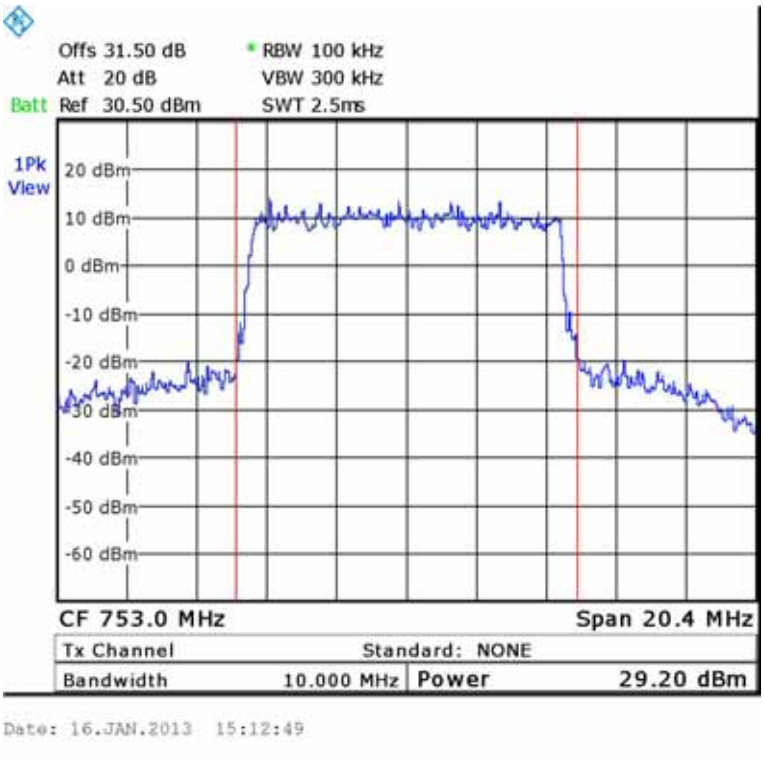

Figure 253.— 16QAM 753 MHz

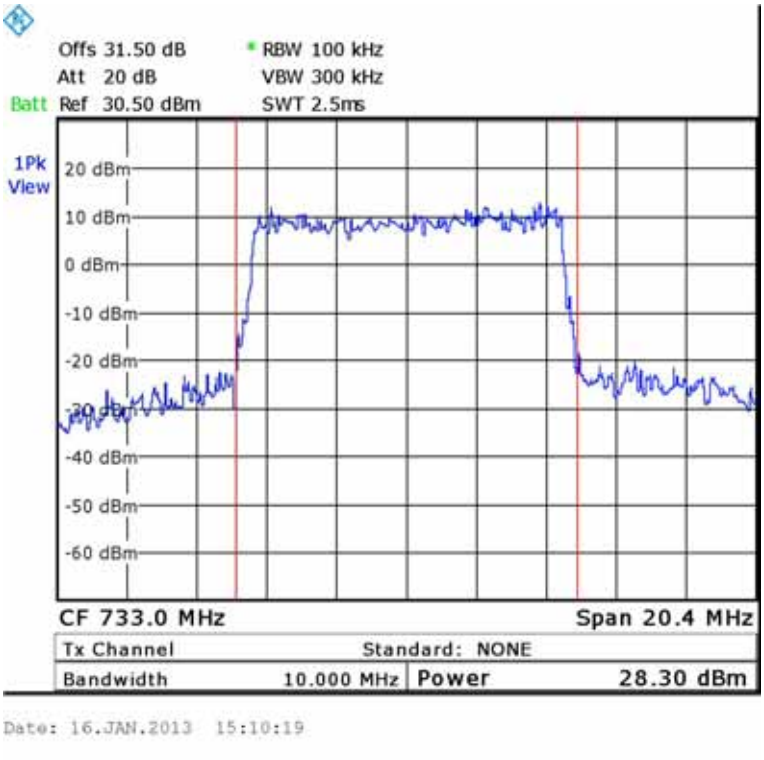

Figure 254.— QPSK 733 MHz

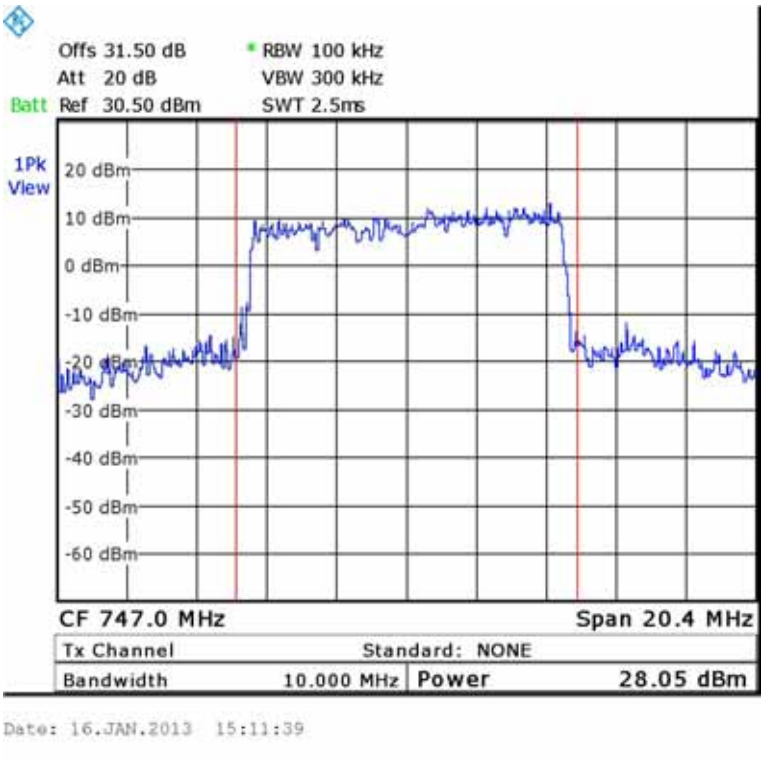

Figure 255.— QPSK 747 MHz

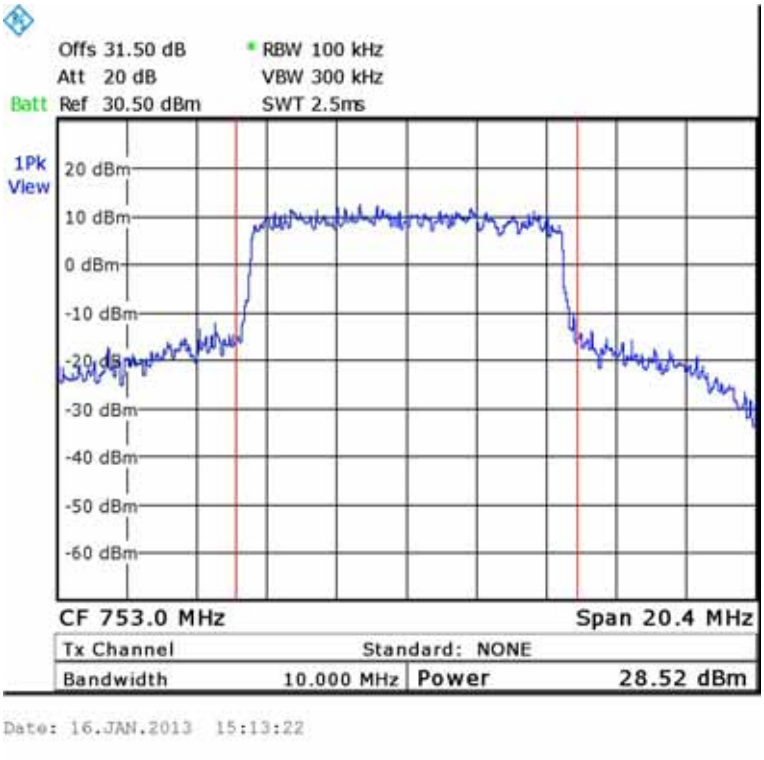

Figure 256.— QPSK 753 MHz

14.4 Test Equipment Used.

RF Power Output LTE

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	Rohde & Schwarz	FSL6	100194	November 1, 2012	1 year
Signal Generator	Agilent	N5172B ATO 10210	MY51350182	May 31, 2012	2 years
Attenuator	Bird	8304-N20DB	-	August 14, 2012	1 year
Cable	Avnet MTS	P-3636-603-5236	-	August 28, 2012	1 year
DC Block	MIDWEST MICROWAVE	DCDB-3624-10-NNN-02	-	N/A	N/A

Figure 257 Test Equipment Used

15. Occupied Bandwidth LTE

15.1 Test Specification

FCC Part 2, Section 1049

15.2 Test Procedure

The E.U.T. was set to the applicable test frequency in the 728-757 MHz band. The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (at the output test) and an appropriate coaxial cable (31.35 dB). The spectrum analyzer was set to proper resolution B.W.
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.
Occupied bandwidth measured was repeated in the input terminal of the E.U.T.

15.3 Test Results

		Operating Frequency (MHz)	Reading (MHz)
LTE 64QAM	Input	733	9.641
LTE 64QAM	Output	733	9.641
LTE 64QAM	Input	747	9.611
LTE 64QAM	Output	747	9.461
LTE 64QAM	Input	753	9.569
LTE 64QAM	Output	753	9.479
LTE 16QAM	Input	733	9.301
LTE 16QAM	Output	733	9.381
LTE 16QAM	Input	747	9.421
LTE 16QAM	Output	747	9.341
LTE 16QAM	Input	753	9.261
LTE 16QAM	Output	753	9.222
LTE QPSK	Input	733	9.461
LTE QPSK	Output	733	9.501
LTE QPSK	Input	747	9.381
LTE QPSK	Output	747	9.461
LTE QPSK	Input	753	9.301
LTE QPSK	Output	753	9.261

Figure 258 Occupied Bandwidth LTE

JUDGEMENT: Passed

See additional information in Figure 259 to Figure 276.

TEST PERSONNEL:

Tester Signature: _____ Date: 20.01.13

Typed/Printed Name: A. Sharabi

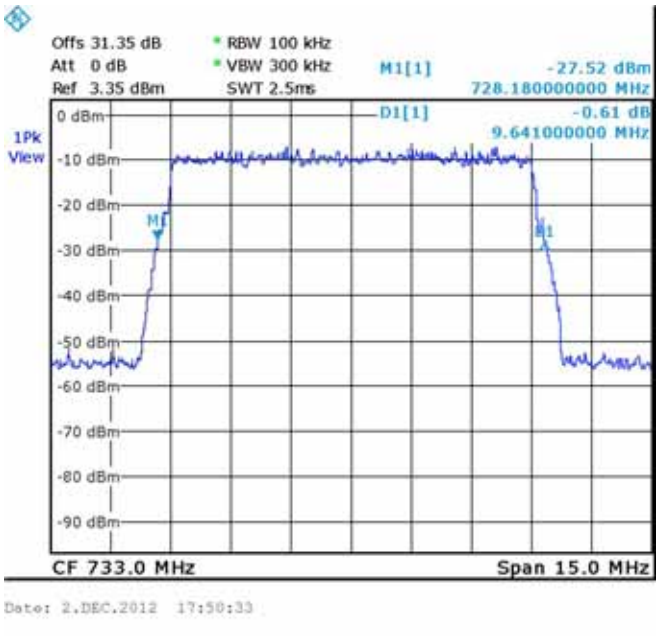

Figure 259.— 64QAM 733 MHz IN

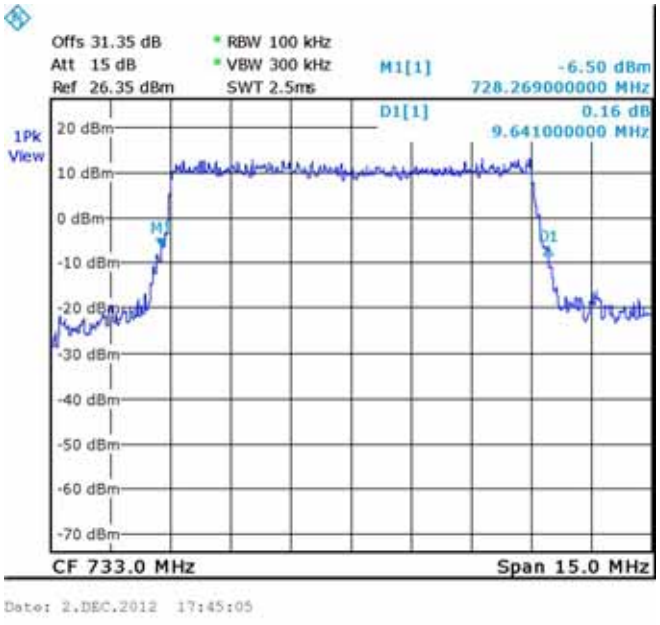

Figure 260.— 64QAM 733 MHz OUT

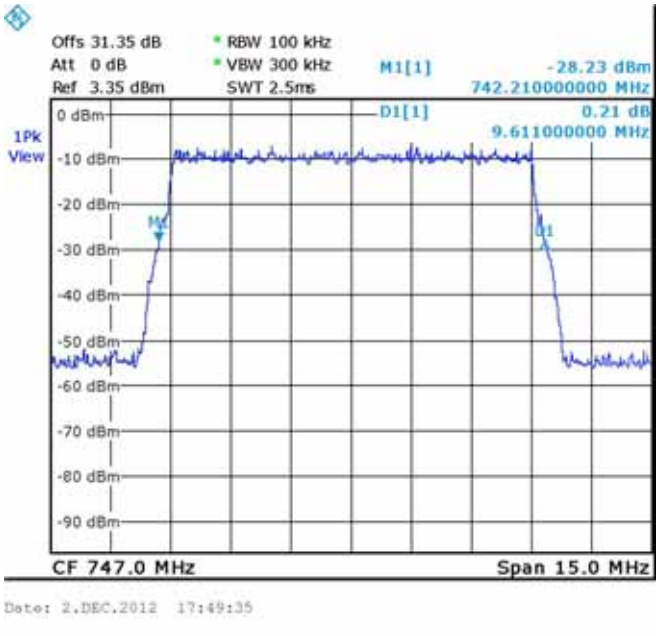

Figure 261.— 64QAM 747 MHz IN

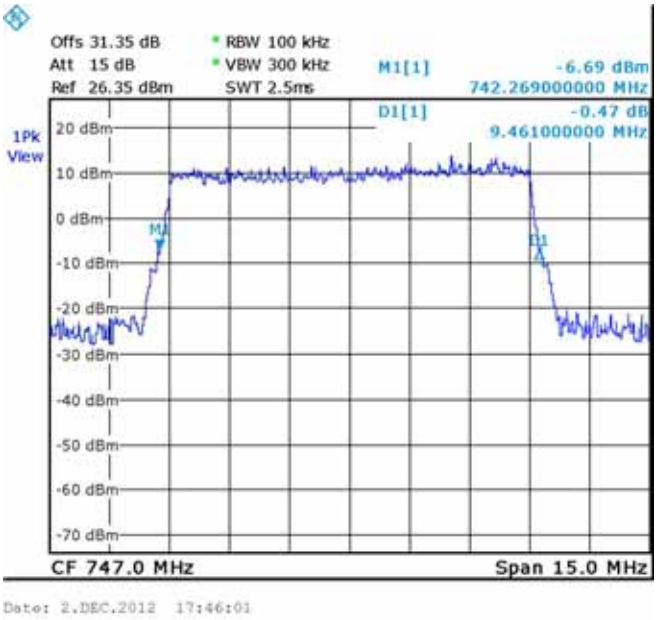

Figure 262.— 64QAM 747 MHz OUT

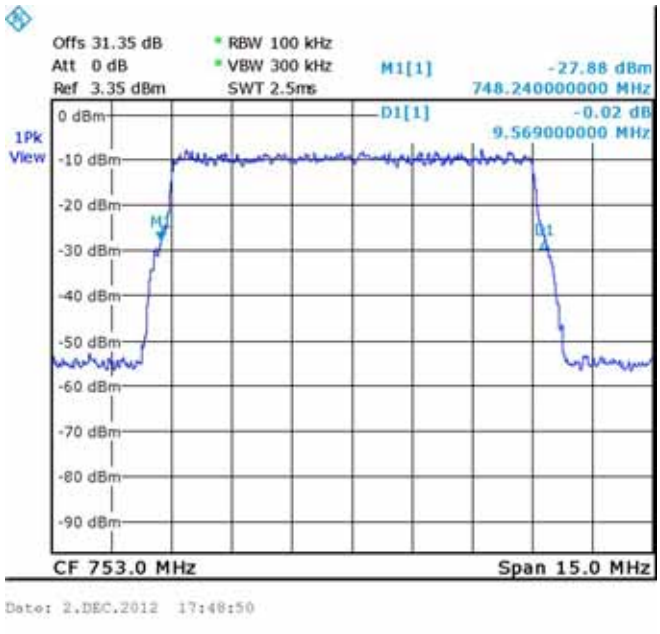

Figure 263.— 64QAM 753 MHz IN

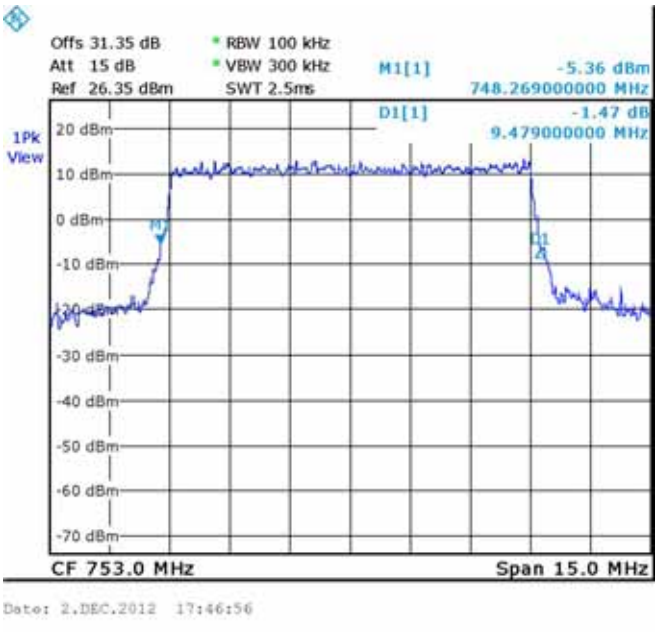

Figure 264.— 64QAM 753 MHz OUT

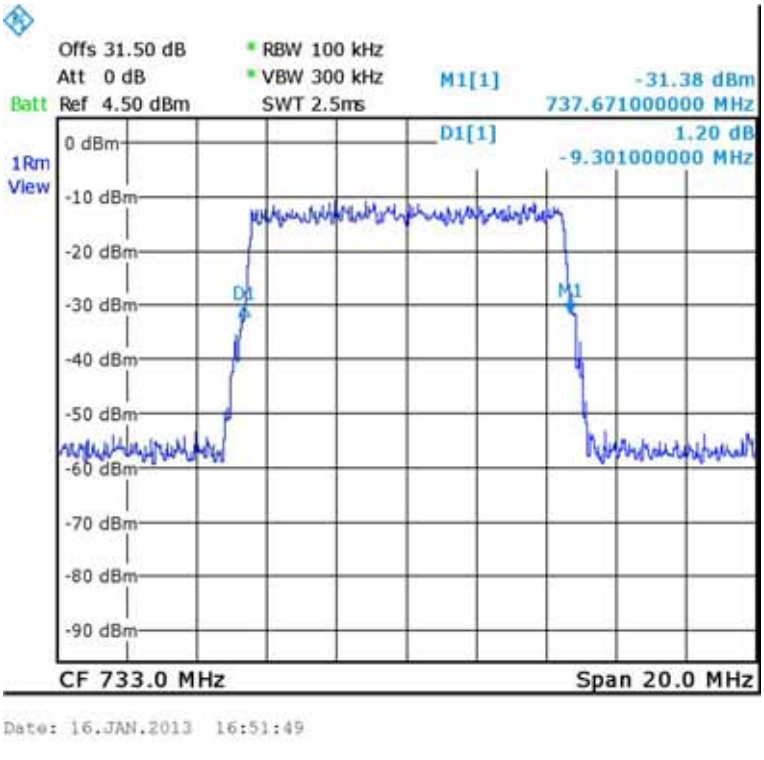

Figure 265.— 16QAM 733 MHz IN

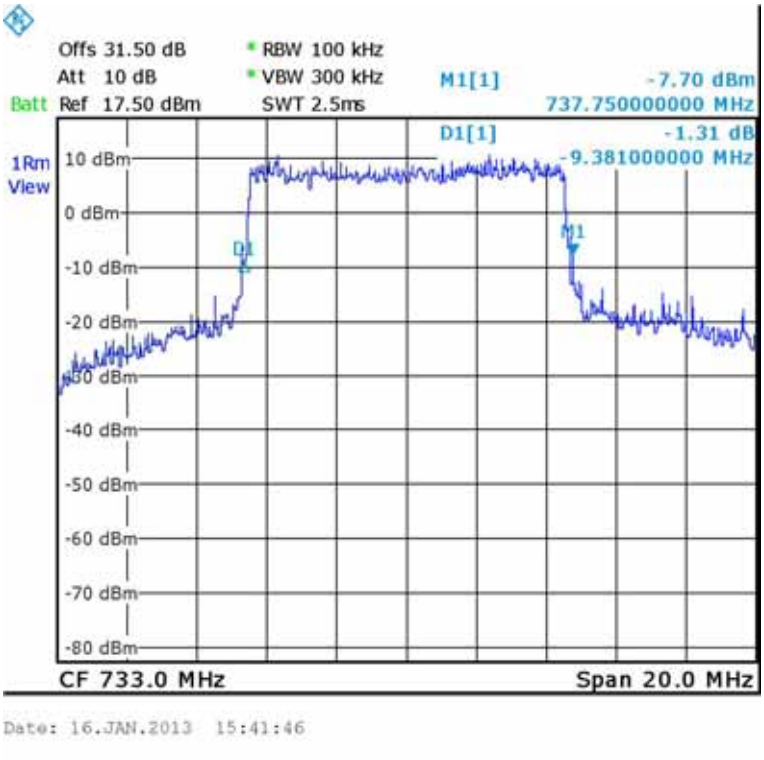

Figure 266.— 16QAM 733 MHz OUT

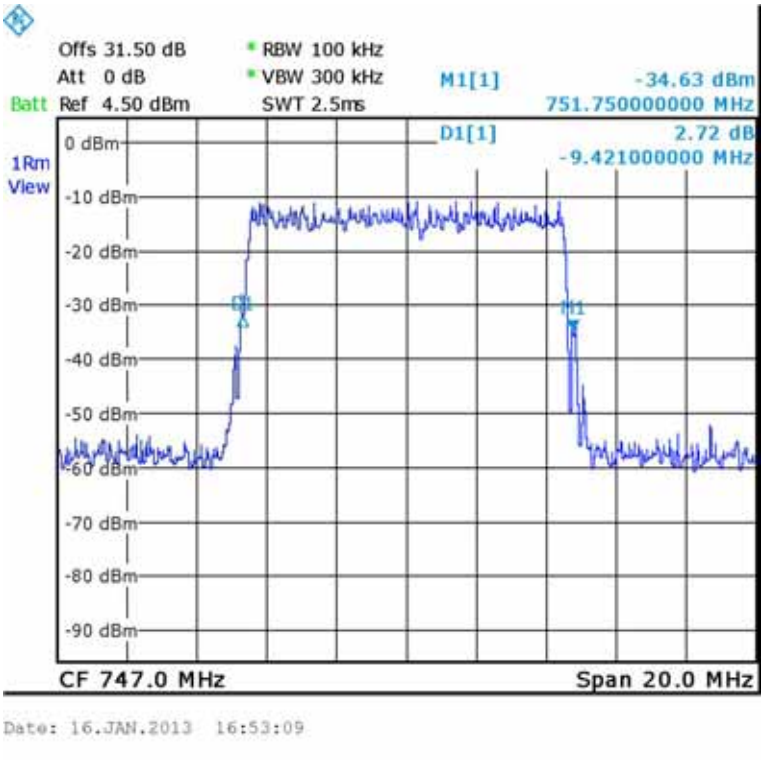

Figure 267.— 16QAM 747 MHz IN

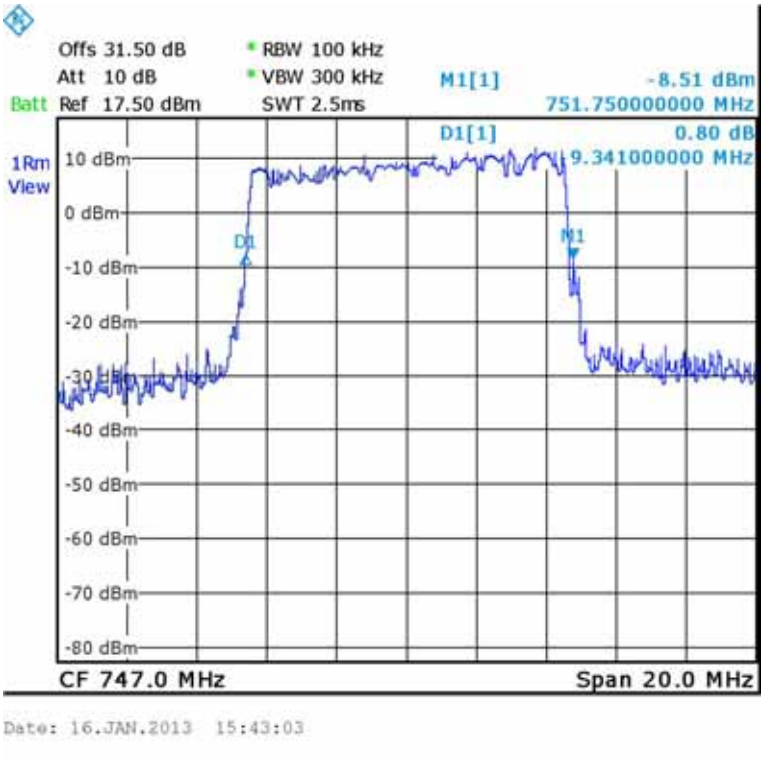

Figure 268.— 16QAM 747 MHz OUT

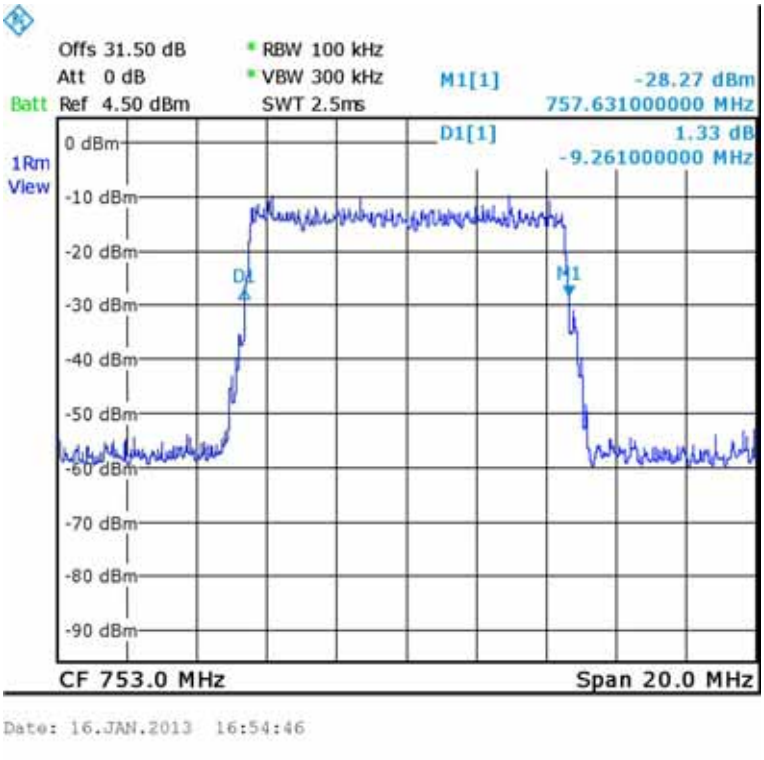

Figure 269.— 16QAM 753 MHz IN

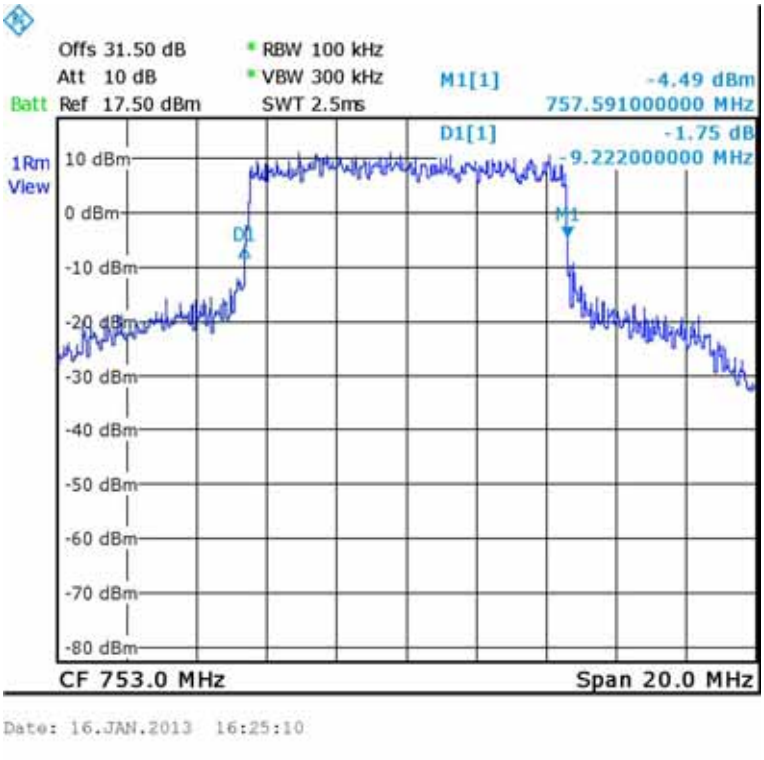

Figure 270.— 16QAM 753 MHz OUT

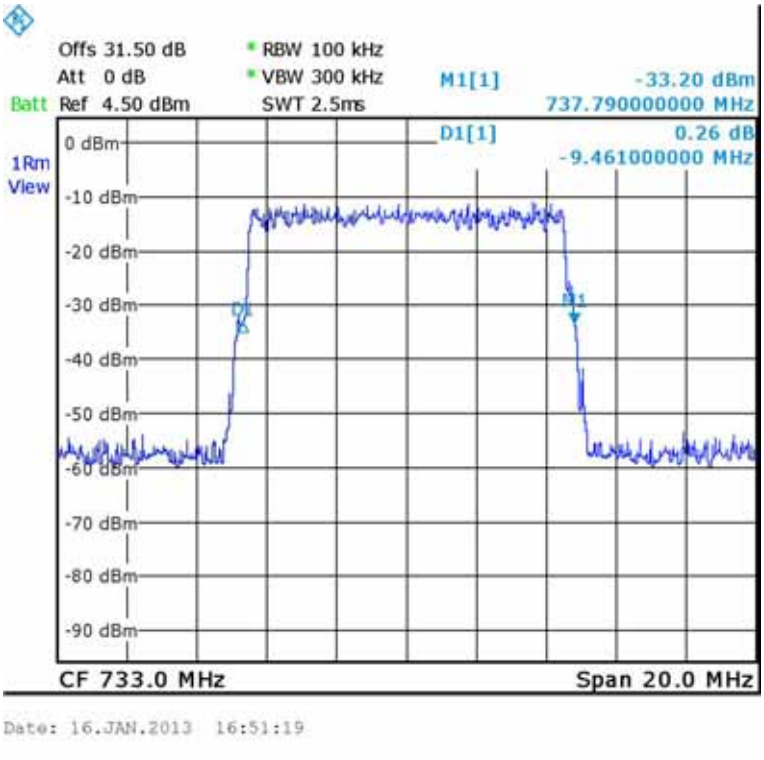

Figure 271.— QPSK 733 MHz IN

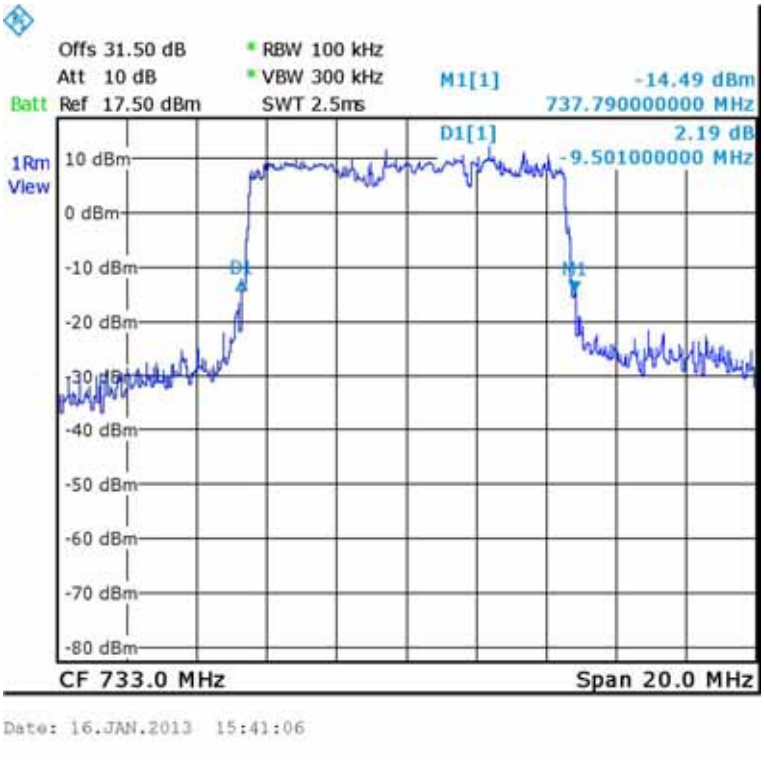

Figure 272.— QPSK 733 MHz OUT

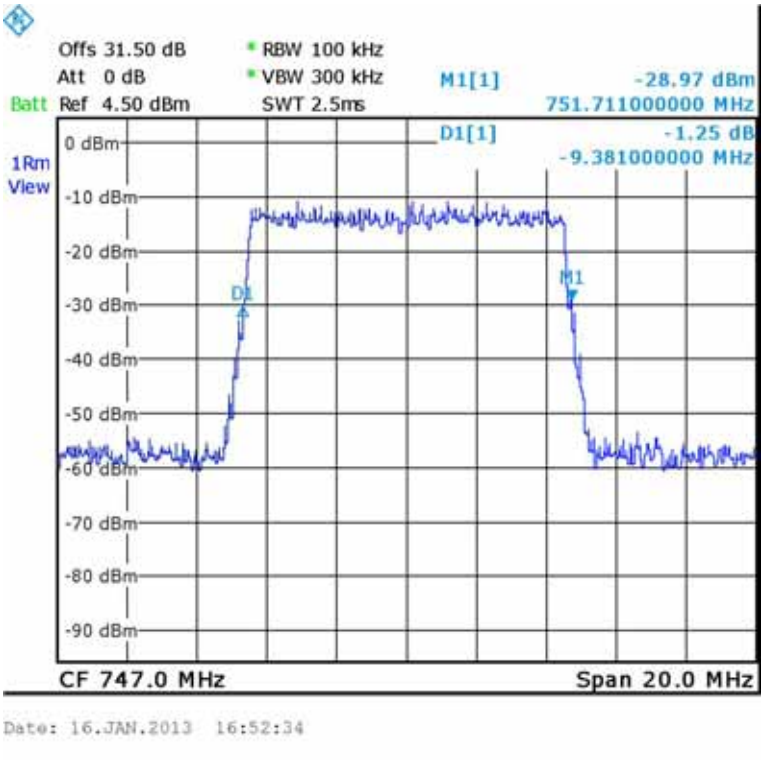

Figure 273.— QPSK 747 MHz IN

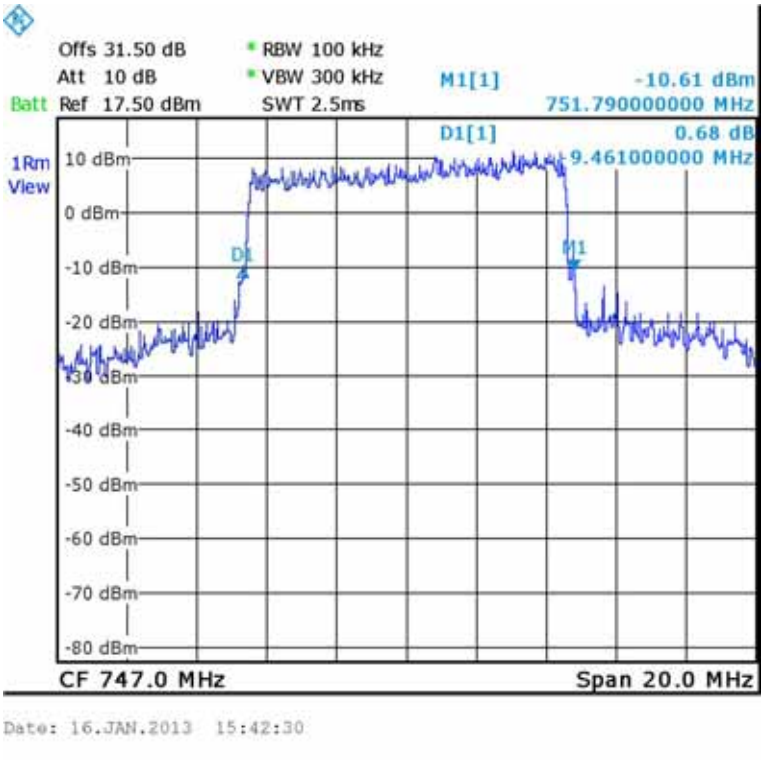

Figure 274.— QPSK 747 MHz OUT

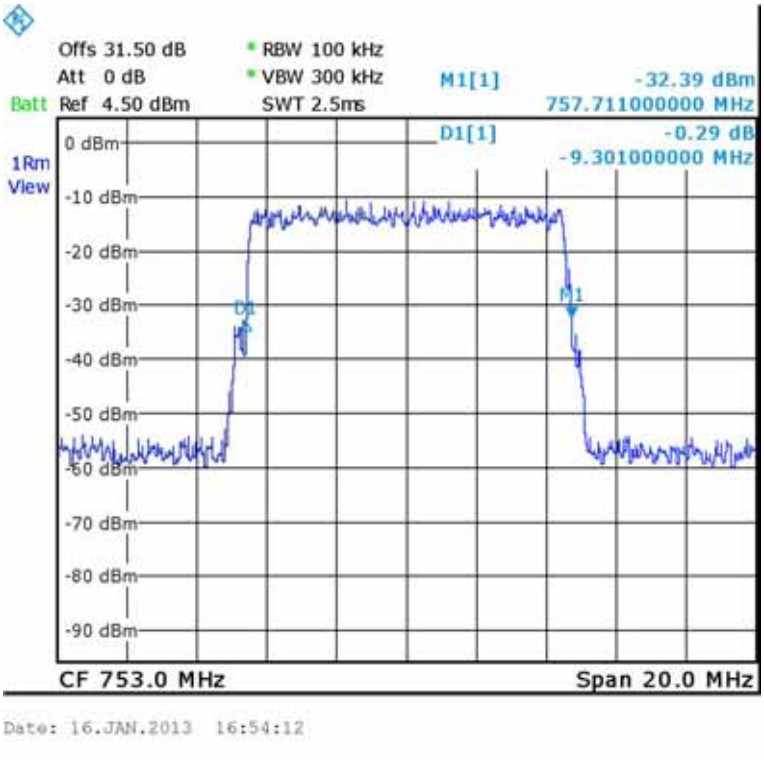

Figure 275.— QPSK 753 MHz IN

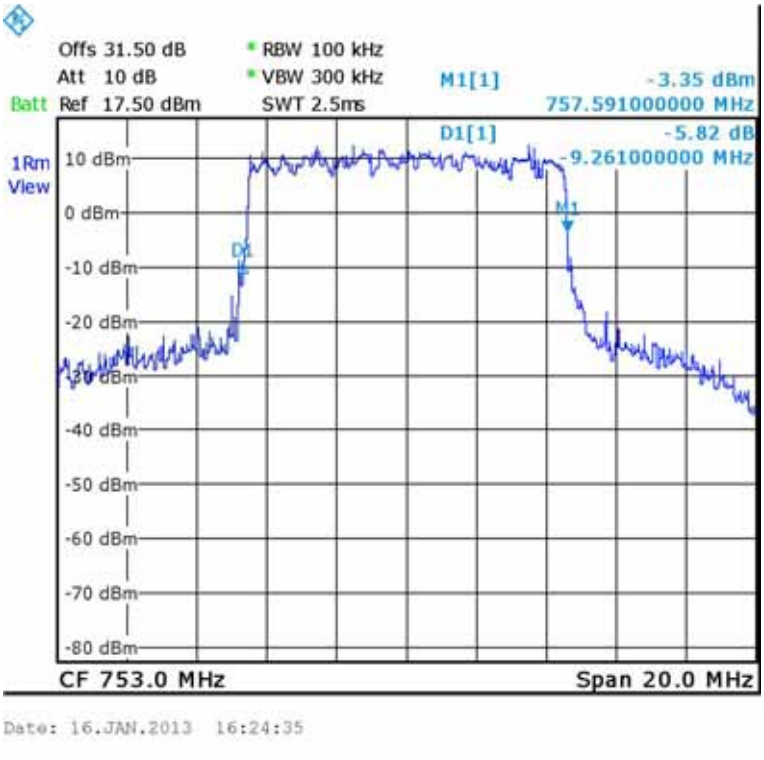

Figure 276.— QPSK 753 MHz OUT

15.4 Test Equipment Used.

Occupied Bandwidth LTE

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	Rohde & Schwarz	FSL6	100194	November 1, 2012	1 year
Signal Generator	Agilent	N5172B ATO 10210	MY51350182	May 31, 2012	2 years
Attenuator	Bird	8304-N20DB	-	August 14, 2012	1 year
Cable	Avnet MTS	P-3636-603-5236	-	August 28, 2012	1 year
DC Block	MIDWEST MICROWAVE	DCDB-3624-10-NNN-02	-	N/A	N/A

Figure 277 Test Equipment Used

16. Spurious Emissions at Antenna Terminals LTE

16.1 Test Specification

FCC Part 27, Subpart C, Sections 27.53(c)(1) (3) 27.53 (g)

16.2 Test procedure

The power of any emission outside of the authorized operating frequency ranges 728 MHz-758 MHz must be attenuated below the transmitting power (P) by a factor of 43+ 10 log (P) dB .

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator and an appropriate coaxial cable (41dB).
The signal generator was configured for 0dBm output power and 10MHz LTE signal, modulated with W-CDMA, QPSK, 16QAM, 64QAM and 64QAM.

16.3 Test Results

Operation Frequency (MHz)	Reading (dBm)	Specification (dBm)	Margin (dB)
733.00	-19.3	-13.0	-6.3
747.00	-19.7	-13.0	-6.7
753.00	-17.8	-13.0	-4.8

Figure 278 Spurious Emissions at Antenna Terminals Results LTE

See additional information in **Figure 279** to **Figure 296**.

JUDGEMENT: Passed by 4.8 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 20.01.13

Typed/Printed Name: I. Siboni

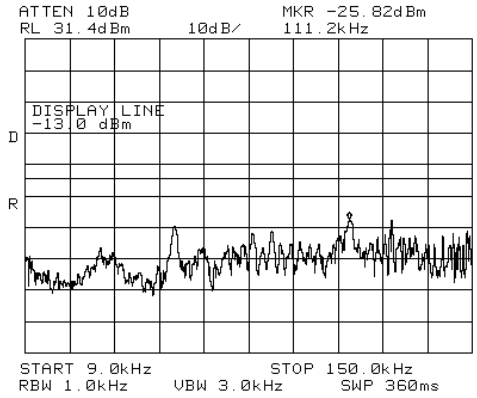

Figure 279.— 733 MHz

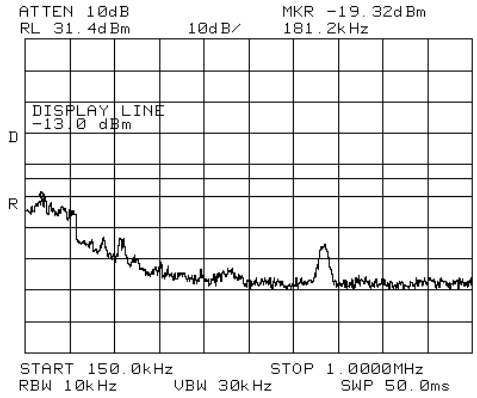

Figure 280.— 733 MHz

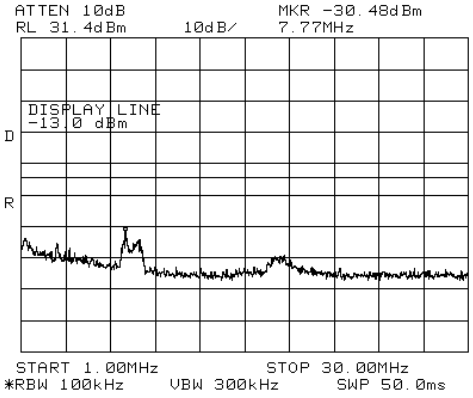

Figure 281.— 733 MHz

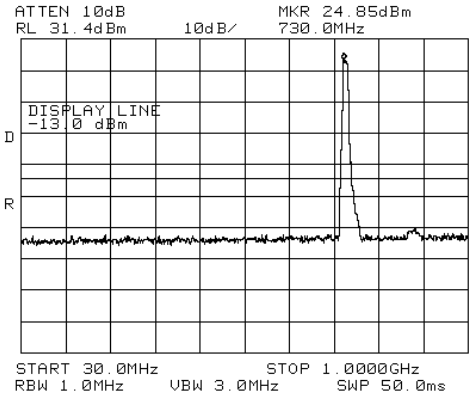

Figure 282.— 733 MHz

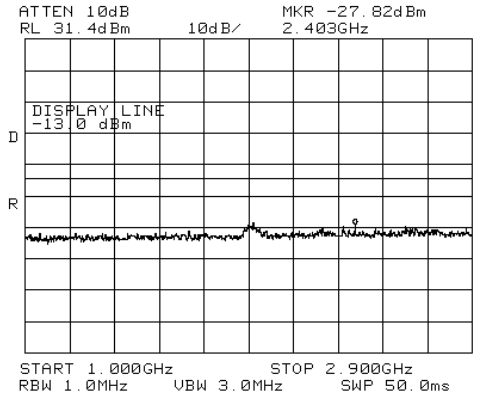

Figure 283.— 733 MHz

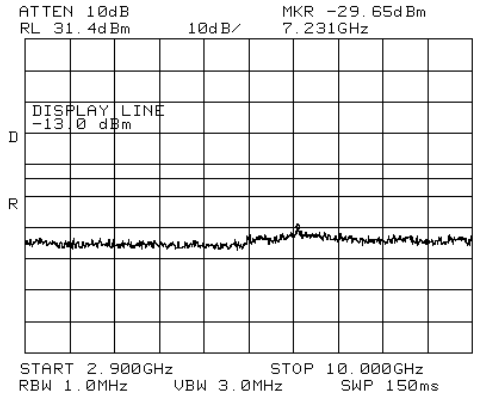

Figure 284.— 733 MHz

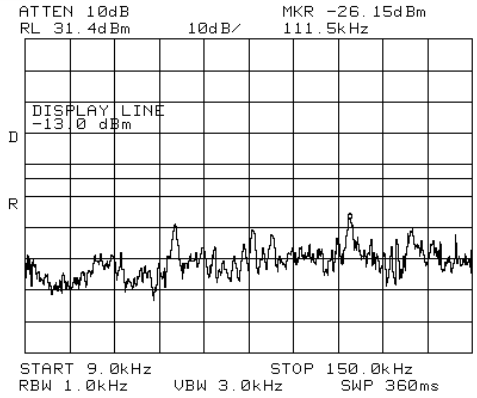

Figure 285.— 747 MHz

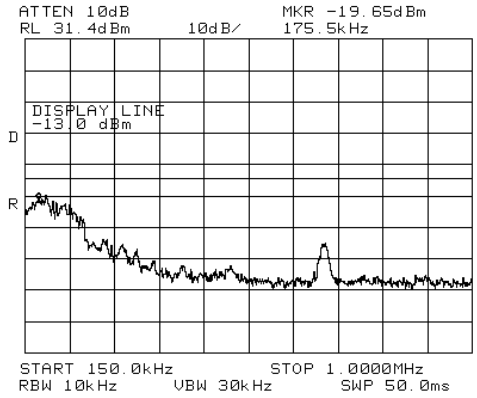

Figure 286.— 747 MHz

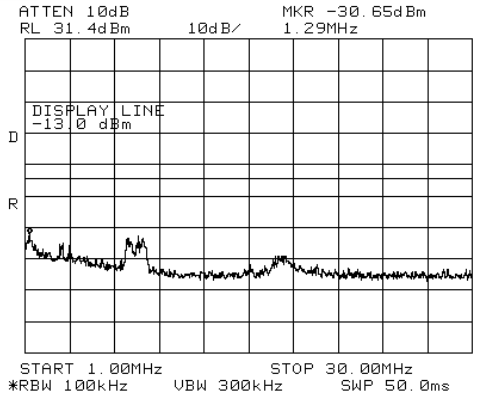

Figure 287.— 747 MHz

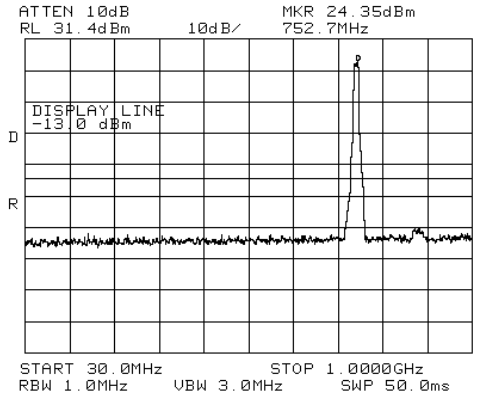

Figure 288.— 747 MHz

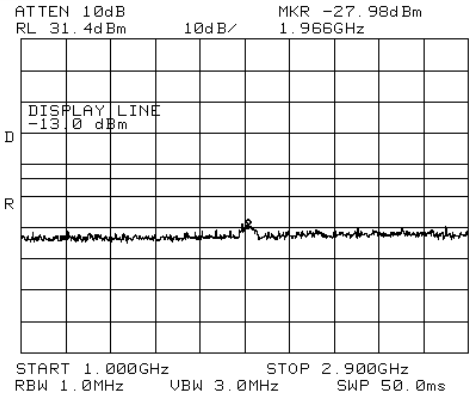

Figure 289.— 747 MHz

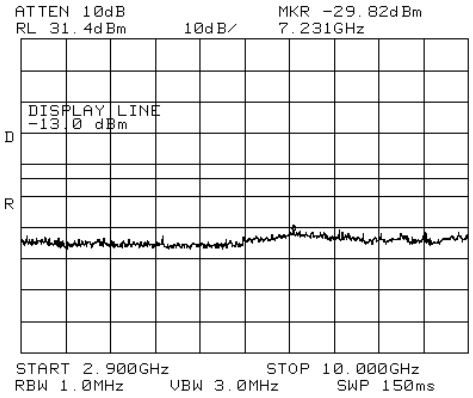

Figure 290.— 747 MHz

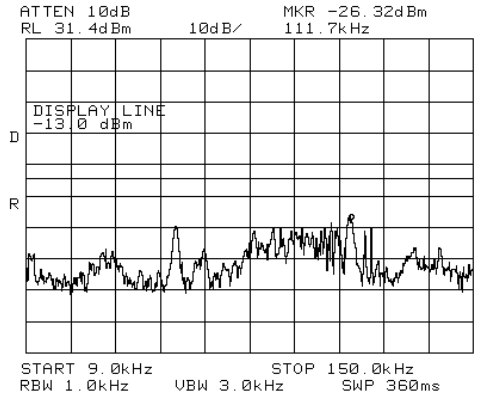

Figure 291.— 753 MHz

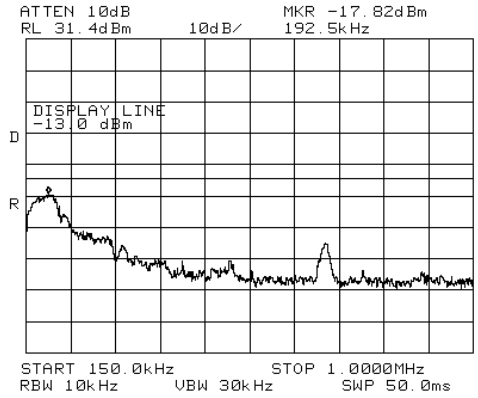

Figure 292.— 753 MHz

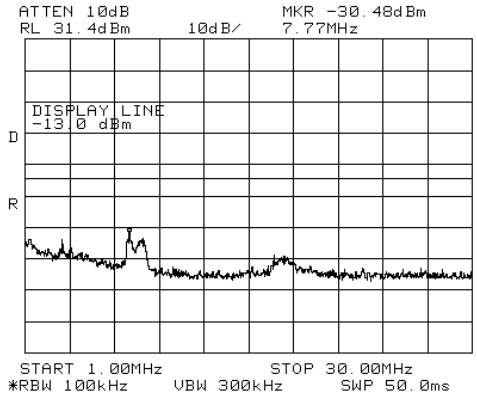

Figure 293.— 753 MHz

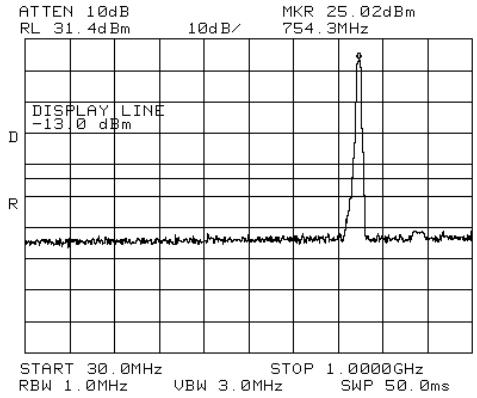

Figure 294.— 753 MHz

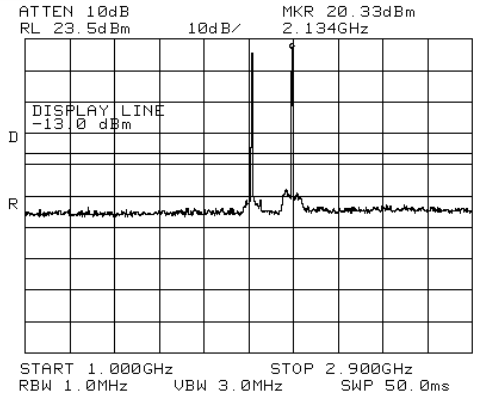

Figure 295.— 753 MHz

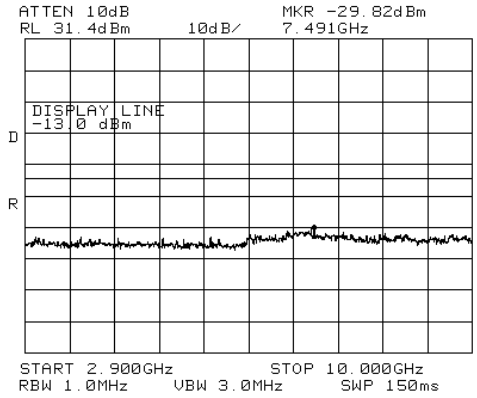

Figure 296.— 753 MHz

16.4 Test Equipment Used

Spurious Emissions at Antenna Terminals LTE

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	HP	8564E	3442A00275	January 19, 2012	1 year
Signal Generator	Agilent	N5172B ATO 10210	MY51350182	May 31, 2012	2 years
Attenuator	Bird	8304-N20DB	-	August 14, 2012	1 year
Cable	Avnet MTS	P-3636-603-5236	-	August 28, 2012	1 year
DC Block	MIDWEST MICROWAVE	DCDB-3624-10-NNN-02	-	N/A	N/A

Figure 297 Test Equipment Used

17. Band Edge Spectrum LTE

17.1 Test Specification

FCC Part 27, Subpart C, Section 27.53 (c)(1)

17.2 Test procedure

Enclosed are spectrum analyzer plots for the lowest operation frequency and the highest operation frequency in which the E.U.T. is planned to be used.

The power of any emission outside of the authorized operating frequency ranges 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 (31.5 dB).
The spectrum analyzer was set to 30kHz R.B.W.

17.3 Results

	Operation Frequency (MHz)	Band Edge Frequency (MHz)	Reading (dBm)	Specification (dBm)	Margin (dB)
LTE64QAM	733.00	728.00	-23.32	-13.0	-10.32
LTE64QAM	753.00	758.00	-22.20	-13.0	-9.20
LTE16QAM	733.00	728.00	-25.98	-13.0	-12.98
LTE16QAM	753.00	758.00	-25.20	-13.0	-12.20
LTEQPSK	733.00	728.00	-27.07	-13.0	-14.07
LTEQPSK	753.00	758.00	-24.27	-13.0	-11.27

Figure 298 Band Edge Spectrum Results LTE

JUDGEMENT: Passed by 9.2 dB

See additional information in Figure 299 to Figure 304.

TEST PERSONNEL:

Tester Signature: _____ Date: 20.01.13

Typed/Printed Name: A

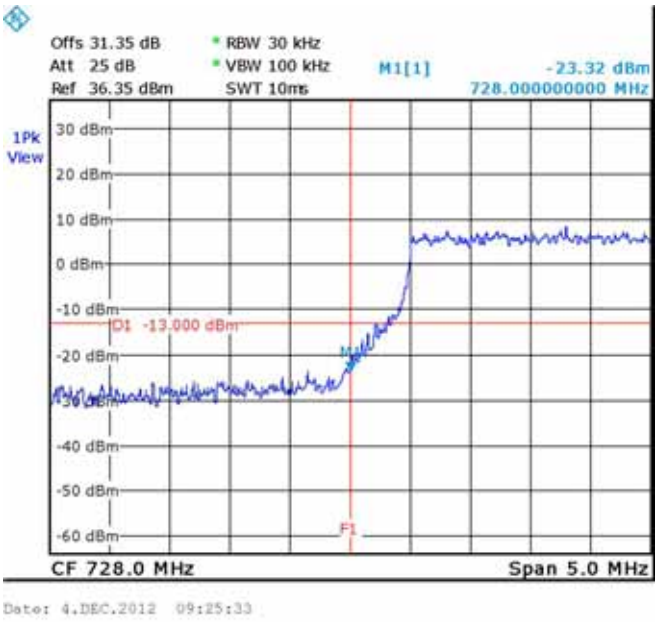

Figure 299.—64QAM 733.0 MHz

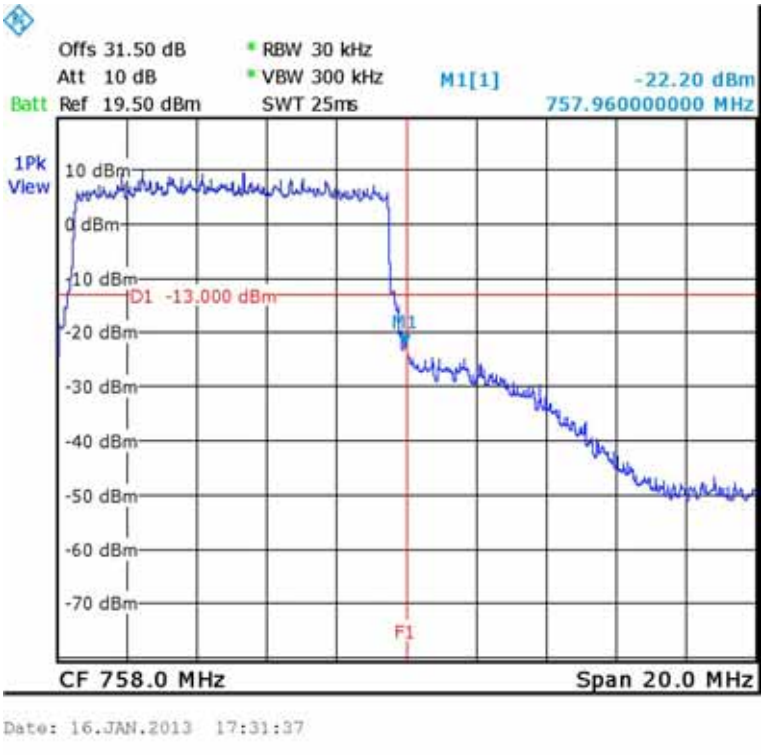

Figure 300.— 64QAM 753.0 MHz

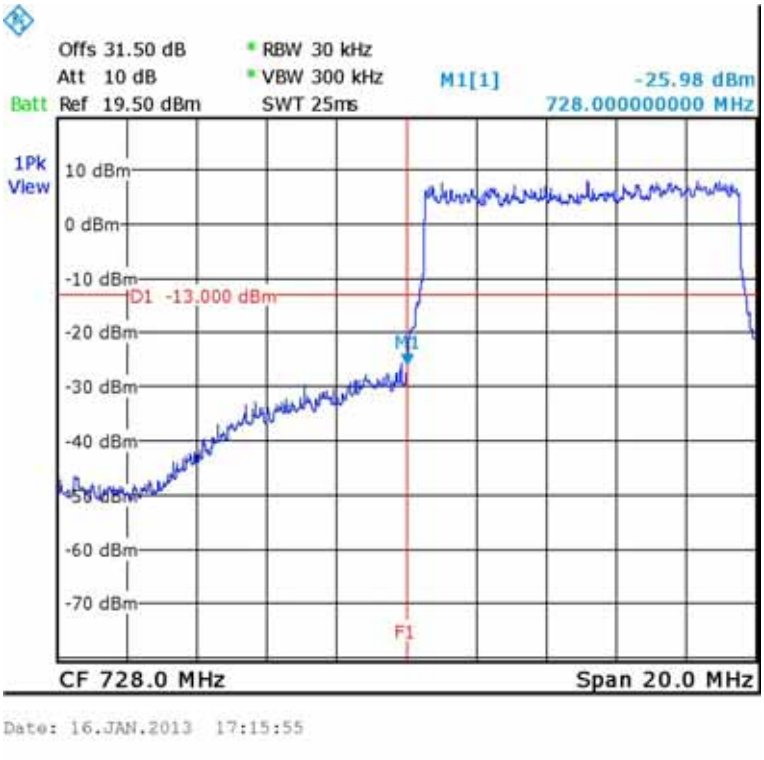

Figure 301.—16QAM 733.0 MHz

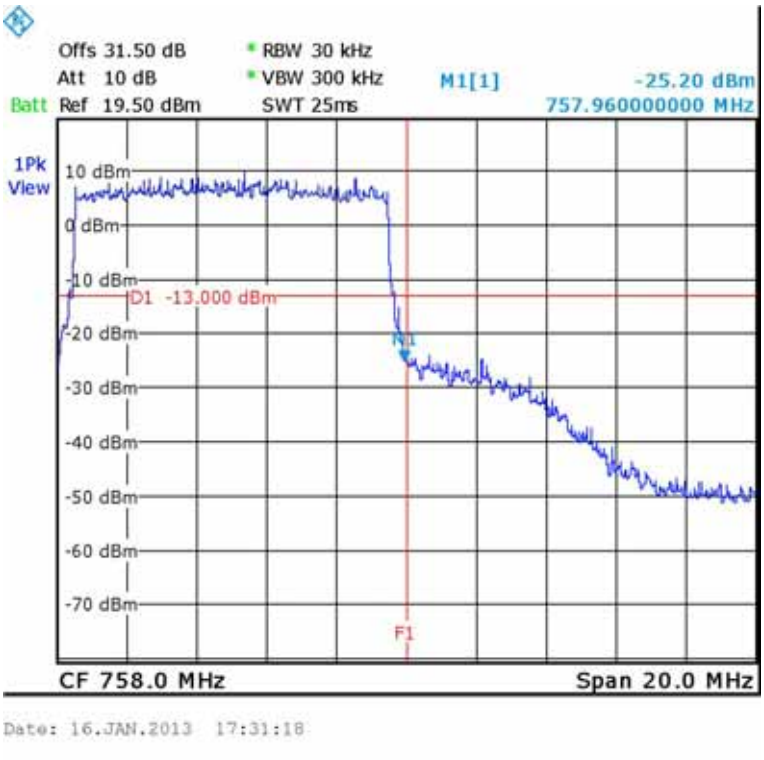

Figure 302.— 16QAM 753.0 MHz

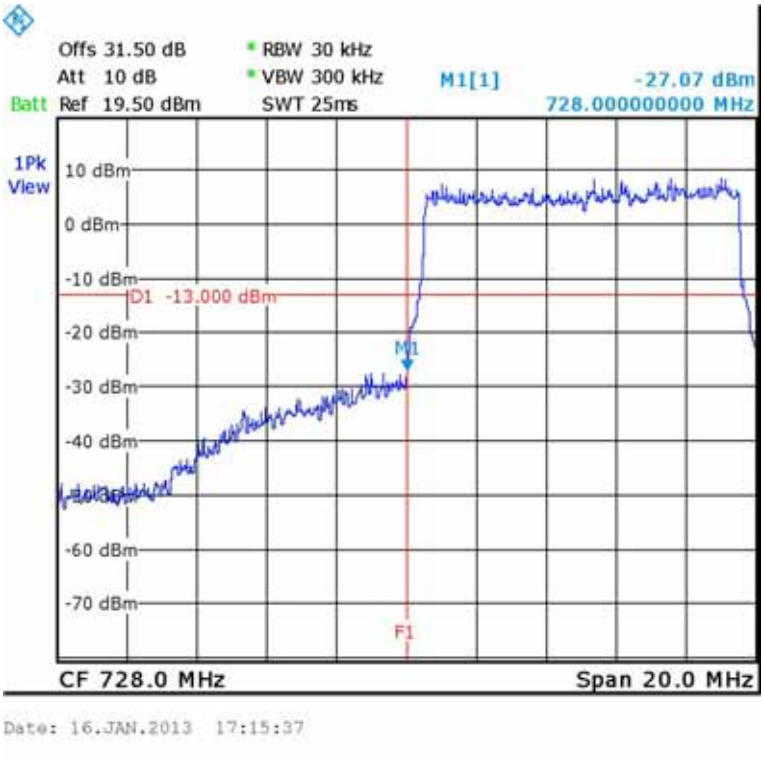

Figure 303.— QPSK 733.0 MHz

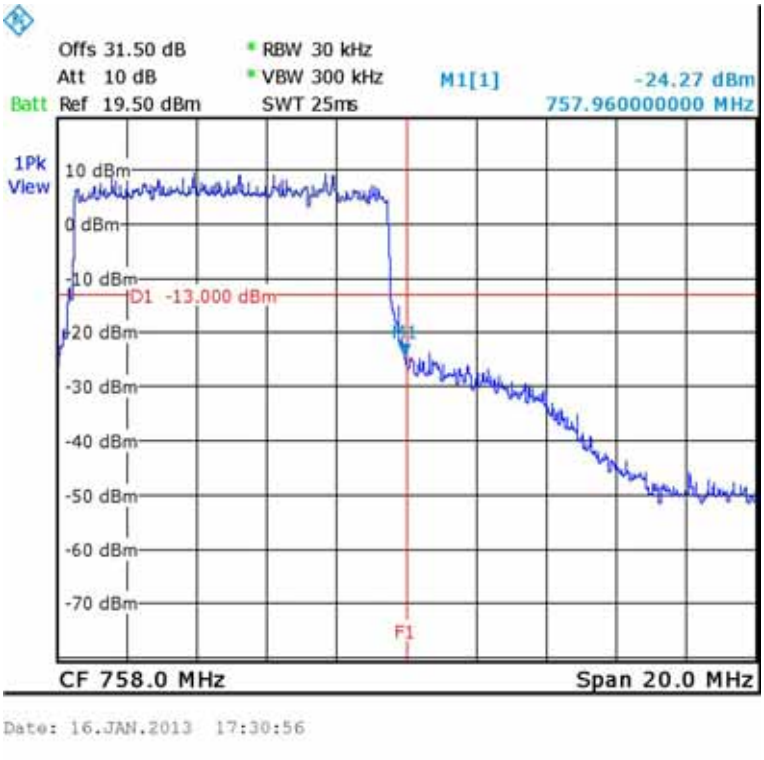

Figure 304.—QPSK 753.0 MHz

17.4 Test Equipment Used.

Band Edge Spectrum

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	Rohde & Schwarz	FSL6	100194	November 1, 2012	1 year
Signal Generator	Agilent	N5172B ATO 10210	MY51350182	May 31, 2012	2 years
Attenuator	Bird	8304-N20DB	-	August 14, 2012	1 year
Cable	Avnet MTS	P-3636-603-5236	-	August 28, 2012	1 year
DC Block	MIDWEST MICROWAVE	DCDB-3624-10-NNN-02	-	N/A	N/A

Figure 305 Test Equipment Used

18. Spurious Radiated Emission LTE

18.1 Test Specification

FCC, Part 27, Subpart C Section 27.53 (g)

18.2 Test Procedure

The test method was based on ANSI/TIA-603-C: 2004, Section 2.2.12 Unwanted Emissions: Radiated Spurious.
The power of any emission outside of the authorized operating frequency ranges (728-758 MHz) must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB, yielding –13dBm.

(a) The E.U.T. operation mode and test set-up are as described in Section 3. A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The configuration tested is shown in Figure 3
The frequency range 9 kHz-20 GHz was scanned, and the list of the highest emissions was verified and updated accordingly.
The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization. The emissions were measured at a distance of 3 meters.

(b) The E.U.T. was replaced by a substitution antenna (dipole 30MHz-1GHz, Horn Antenna above 1GHz) driven by a signal generator. The height was readjusted for maximum reading. The signal generator level was adjusted to obtain the same reading on the EMI receiver as in step (a).
The signals observed in step (a) were converted to radiated power using:
P_d(dBm) = P_g(dBm) – Cable Loss (dB) + Substitution Antenna Gain (dB)
P_d = Dipole equivalent power (result).
P_g = Signal generator output level.

18.3 Test Results

JUDGEMENT: Passed by 27.3 dB

The E.U.T met the requirements of the FCC, Part 27, Subpart C, Section 27.53 (g) specifications.

TEST PERSONNEL:

Tester Signature: _____ Date: 20.01.13

Typed/Printed Name: I. Siboni

Carrier Channel (MHz)	Freq. (MHz)	Antenna Pol.	Maximum Peak Level (dBµV/m)	Signal Generator RF Output (dBm)	Cable Loss (dB)	Antenna Gain (dBi)	Effective Radiated Power Level (dBm)	Spec. (dBm)	Margin (dB)
733.00	1466.00	V	57.1	-42.8	6.7	7.6	-41.9	-13.0	-28.9
733.00	1466.00	H	56.5	-43.0	6.7	8.0	-41.7	-13.0	-28.7
747.00	1494.00	V	57.4	-42.5	6.7	7.6	-41.6	-13.0	-28.6
747.00	1494.00	H	57.9	-41.6	6.7	8.0	-40.3	-13.0	-27.3
753.00	1506.00	V	55.9	-44.0	6.7	7.6	-43.1	-13.0	-30.1
753.00	1506.00	H	57.6	-41.9	6.7	8.0	-40.6	-13.0	-27.6

18.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	Rohde & Schwarz	1066.301	100120	November 1, 2012	1 year
Spectrum Analyzer	HP	8592L	3826A01204	March 5, 2012	1 year
Active Loop Antenna	Emco	6502	2950	October 19, 2012	1 year
Antenna Bioconilog	EMCO	3142B	1250	July 7, 2012	1 year
Horn	EMCO	3115	6142	March 14, 2012	2 year
Horn	ARA	SWH-28	1007	January 26, 2011	2 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	August 21, 2012	1 year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	August 28, 2012	1 year
Signal Generator	Agilent	N5172B ATO10210	MY51350182	May 31, 2012	2 years
Antenna Mast	ETS	2070-2	9608-1497	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Table Controller	ETS/EMCO	2090	9608-1456	N/A	N/A

19. Intermodulation Conducted

19.1 Test procedure

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator and an appropriate coaxial cable(loss = 31.35 dB). The spectrum analyzer was set to 1 kHz resolution BW for the frequency range 9.0-150.0 kHz, 10kHz for the frequency range
150kHz–1.0MHz, 100kHz for the frequency range 1.0MHz-30MHz, 1MHz for the frequency range 30MHz-22GHz, .

3 input signals were sent simultaneously to the E.U.T. as follows:

LTE 747 MHz QPSK 0 dBm

CELL 811 MHz GSM 0 dBm

PCS 1960 MHz CW 0 dBm

The frequency range of 9 kHz – 22.0GHz was scanned for unwanted signals.

19.2 Test Results

JUDGEMENT: Passed
TEST PERSONNEL:

Tester Signature: _____ Date: 20.01.13

Typed/Printed Name: I. Siboni

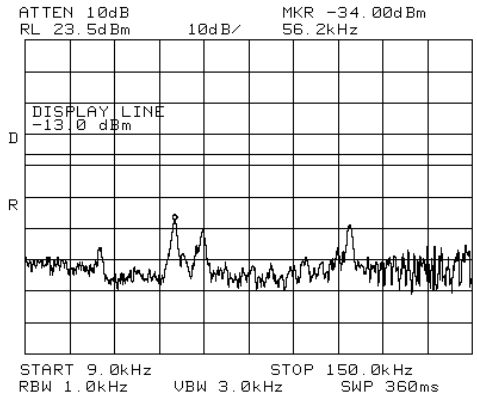

Figure 306 Intermodulation

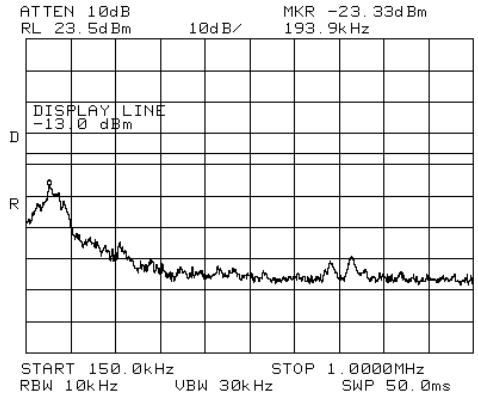

Figure 307 Intermodulation

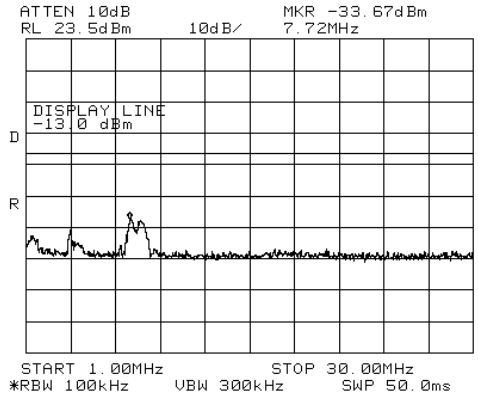

Figure 308 Intermodulation

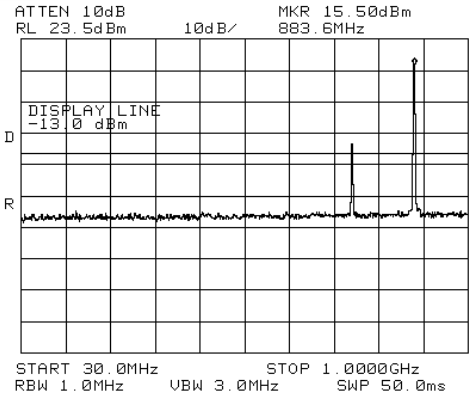

Figure 309 Intermodulation

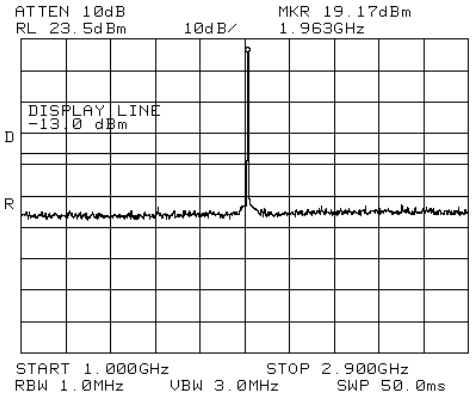

Figure 310 Intermodulation

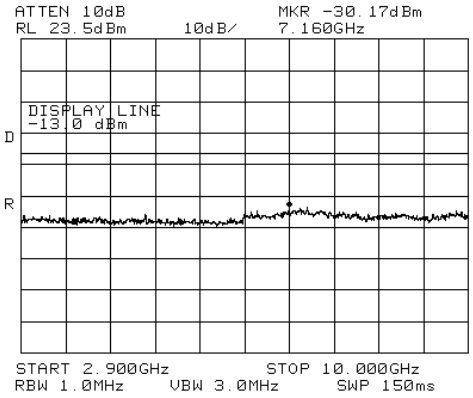

Figure 311 Intermodulation

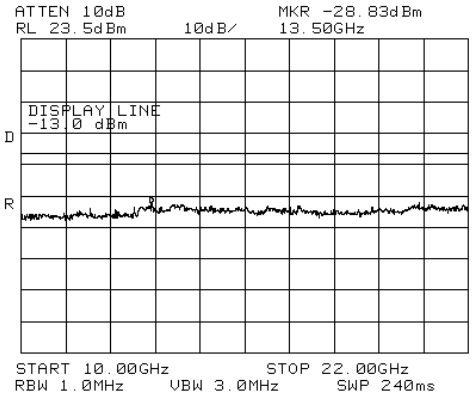

Figure 312 Intermodulation

19.3 Test Equipment Used.

Intermodulation Conducted

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	HP	8564E	3442A00275	January 19, 2012	1 year
Signal Generator	HP	8657A	3430U02142	February 20, 2011	2 years
Signal Generator	HP	8648C	3623A04126	February 28, 2012	1 year
Signal Generator	Agilent	N5172B ATO-10210	MY51350182	May 31, 2012	2 years
Attenuator	Bird	8304-N20DB	-	August 14, 2012	1 year
Cable	Avnet MTS	P-3636-603-5236	-	August 28, 2012	1 year
DC Block	MIDWEST MICROWAVE	DCDB-3624-10-NNN-02	-	N/A	N/A

Figure 313 Test Equipment Used

20. Intermodulation Radiated

20.1 Test procedure

The test method was based on ANSI/TIA-603-C: 2004, Section 2.2.12 Unwanted Emissions: Radiated Spurious.
The power of any emission outside of the authorized operating frequency ranges (728-758; 869-894; 1930-1990 MHz) must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB, yielding –13dBm.

(a) The E.U.T. operation mode and test set-up are as described in Section 2.
A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The configuration tested is shown in Figure 3.

The E.U.T. was operated in Downlink mode at 4 different channels at center frequency of each band at the same time, transmitting at CW signal.

(b) The frequency range 9 kHz-25 GHz was scanned, and the list of the highest emissions was verified and updated accordingly. The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.
The emissions were measured at a distance of 3 meters.

(c) The E.U.T. was replaced by a substitution antenna (dipole 30MHz-1GHz, Horn Antenna above 1GHz) driven by a signal generator. The height was readjusted for maximum reading. The signal generator level was adjusted to obtain the same reading on the EMI receiver as in step (a).
The signals observed in step (a) were converted to radiated power using:
$P_d(dBm) = P_g(dBm) – Cable\ Loss\ (dB) + Substitution\ Antenna\ Gain\ (dB)$
P_d = Dipole equivalent power (result).
P_g = Signal generator output level.

20.2 Test Results

JUDGEMENT: Passed
TEST PERSONNEL:
Tester Signature: _____ Date: 20.01.13
Typed/Printed Name: I. Siboni

Carrier Channel (MHz)	Freq. (MHz)	Antenna Pol.	Maximum Peak Level (dBµV/m)	Signal Generator RF Output (dBm)	Cable Loss (dB)	Antenna Gain (dBi)	Effective Radiated Power Level (dBm)	Spec. (dBm)	Margin (dB)
2*747-881	613.00	V	35.9	-59.67	4.2	1.57	-62.3	-13.0	-49.3
2*747-881	613.00	H	38.4	-58.92	4.2	1.57	-61.55	-13.0	-48.6
2*881-747	1015.00	V	53.1	-45.11	5.4	5.4	-45.11	-13.0	-32.1
2*881-747	1015.00	H	52.7	-45.88	5.4	5.8	-45.48	-13.0	-32.5
3*747-2*881	579.00	V	37.8	-57.77	4.2	1.57	-60.4	-13.0	-47.4
3*747-2*881	579.00	H	37.8	-59.52	4.2	1.57	-62.15	-13.0	-49.2
3*881-2*747	1149.00	V	55.2	-45.1	5.4	5.4	-45.1	-13.0	-32.1
3*881-2*747	1149.00	H	55.5	-43.2	5.4	5.8	-42.8	-13.0	-29.8
2*1960-2135	1785.00	V	60.7	-36.7	6.7	7.6	-35.8	-13.0	-22.8
2*1960-2135	1785.00	H	60.8	-37.4	6.7	8.0	-36.1	-13.0	-23.1

20.3 Test Instrumentation Used, Radiated Measurements Intermodulation

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	Rohde & Schwarz	1066.301	100120	November 1, 2012	1 year
Spectrum Analyzer	HP	8592L	3826A01204	March 5, 2012	1 year
Active Loop Antenna	Emco	6502	2950	October 19, 2012	1 year
Antenna Bioconilog	EMCO	3142B	1250	July 7, 2012	1 year
Horn	EMCO	3115	6142	March 14, 2012	2 year
Horn	ARA	SWH-28	1007	January 26, 2011	2 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	August 21, 2012	1 year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	August 28, 2012	1 year
Signal Generator	HP	8657A	3430U02142	February 20, 2011	2 years
Signal Generator	HP	8648C	3623A04126	February 28, 2012	1 year
Signal Generator	Agilent	N5172B ATO-10210	MY51350182	May 31, 2012	2 years
Antenna Mast	ETS	2070-2	9608-1497	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Table Controller	ETS/EMCO	2090	9608-1456	N/A	N/A

21. APPENDIX A - CORRECTION FACTORS

21.1 Correction factors for CABLE

from EMI receiver to test antenna at 3 meter range.

FRQ	S.G.	REF	A AMP	
10K	-30	-29.8	-30.2	0.4
15K	-30	-29.5	-29.7	0.2
20K	-30	-29.7	-29.9	0.2
30K	-30	-29.6	-29.9	0.3
50K	-30	-29.7	-30.0	0.3
75K	-30	-29.7	-30.0	0.3
100K	-30	-29.8	-30.0	0.2
150K	-30	-29.8	-30.0	0.2
200K	-30	-29.9	-30.2	0.3
500K	-30	-29.9	-30.3	0.4
1M	-30	-30.1	-30.5	0.4
1.5M	-30	-30.1	-30.6	0.5
2M	-30	-30.2	-30.7	0.5
5M	-30	-30.3	-30.9	0.6
10M	-30	-30.2	-31.0	0.8
15M	-30	-30.2	-31.1	0.9
20M	-30	-30.5	-31.3	0.8

FRQ	S.G.	REF	A	
			AMP	
50M	-30	-30.5	-31.7	1.2
100M	-30	-30.5	-32.2	0.7
150M	-30	-30.4	-32.5	2.1
200M	-30	-30.5	-32.8	2.3
300M	-30	-30.4	-33.3	2.9
500M	-30	-30.5	-34.3	3.8
750M	-30	-30.7	-35.3	4.8
1G	-30	-30.9	-36.3	5.4
1.5G	-15	-15.7	-22.4	6.7
2G	-15	-15.9	-24.9	9.0
2.5G	-15	-16.3	-25.7	9.4
3G	-15	-16.5	-26.4	9.9
3.5G	-15	-16.7	-26.9	10.2
4G	-15	-16.3	-27.5	11.2
4.5G	-15	-16.6	-28.7	12.1
5G	-15	-16.8	-29.9	13.1
5.5G	-15	-17.6	-31.1	13.5
6G	-15	-17.2	-31.7	14.5

NOTES:

1. The cable type is SPUMA400 RF-11N(X2)and 39m long

2. The cable is manufactured by Huber + Suhner

21.2 Correction factors for Bilog ANTENNA

Model: 3142
Antenna serial number: 1250
3 meter range

FREQUENCY (MHz)	AFE (dB/m)	FREQUENCY (MHz)	AFE (dB/m)
30	18.4	1100	25
40	13.7	1200	24.9
50	9.9	1300	26
60	8.1	1400	26.1
70	7.4	1500	27.1
80	7.2	1600	27.2
90	7.5	1700	28.3
100	8.5	1800	28.1
120	7.8	1900	28.5
140	8.5	2000	28.9
160	10.8		
180	10.4		
200	10.5		
250	12.7		
300	14.3		
400	17		
500	18.6		
600	19.6		
700	21.1		
800	21.4		
900	23.5		
1000	24.3		

21.3 Correction factors for Horn ANTENNA

Model: 3115
Antenna serial number: 6142
3 meter range

FREQUENCY (MHz)	Antenna Factor (dB/m)	FREQUENCY (MHz)	Antenna Factor (dB/m)
1000	23.9	10500	38.4
1500	25.4	11000	38.5
2000	27.3	11500	39.4
2500	28.5	12000	39.2
3000	30.4	12500	39.4
3500	31.6	13000	40.7
4000	33.0	14000	42.1
4500	32.7	15000	40.1
5000	34.1	16000	38.2
5500	34.5	17000	41.7
6000	34.9	17500	45.7
6500	35.1	18000	47.7
7000	35.9		
7500	37.5		
8000	37.6		
8500	38.3		
9000	38.5		
9500	38.1		
10000	38.6		

21.4 Correction factors for Horn ANTENNA

Model: SWH-28
Antenna serial number: 1007
1 meter range

FREQUENCY	Antenna Factor
(MHz)	(dB/m)
18000	33.0
18500	32.9
19000	33.1
19500	33.3
20000	33.6
20500	33.6
21000	33.4
21500	33.8
22000	33.7
22500	33.9
23000	34.8
23500	34.5
24000	34.2
24500	34.8
25000	34.4
25500	35.2
26000	35.9
26500	36.0

21.5 Correction factors for ACTIVE LOOP ANTENNA

Model 6502
S/N 9506-2950

FREQUENCY	Magnetic Antenna Factor	Electric Antenna Factor
(MHz)	(dB)	(dB)
.009	-35.1	16.4
.010	-35.7	15.8
.020	-38.5	13.0
.050	-39.6	11.9
.075	-39.8	11.8
.100	-40.0	11.6
.150	-40.0	11.5
.250	-40.0	11.6
.500	-40.0	11.5
.750	-40.1	11.5
1.000	-39.9	11.7
2.000	-39.5	12.0
3.000	-39.4	12.1
4.000	-39.7	11.9
5.000	-39.7	11.8
10.000	40.2	11.3
15.000	-40.7	10.8
20.000	-40.5	11.0
25.000	-41.3	10.2
30.000	42.3	9.2