Nemko Italy S.p.A., Via del Carroccio 4, 20046, Biassono, Italy.

Report number: **210165-3TRFWL**

Apparatus: VHPA0001AMPS

Applicant: TEKO Telecom S.p.A.
Via Meucci, 24/a
I-40024 Castel S. Pietro Terme (BO)

FCC ID: XM2- VHPA

Test specification:

Title 47-Telecommunication
Chapter I – Federal Communications Commission
Subchapter A – General
Part 22 – Public Mobile Services
Subpart H – Cellular Radiotelephone Service

Reviewed by: _____ 2012/06/11
Signature Date
P. Barbieri, Wireless/EMC Specialist

Reviewed by: _____ 2012/06/11
Signature
G. Curioni, Wireless/EMC Specialist

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Section 1: Report summary

This report contains an assessment of apparatus against specifications based upon tests carried out on samples submitted at Nemko Italy SpA.

Test specification:
FCC Part 22 Subpart H, Cellular Radiotelephone Service

Compliance status:	Complies
Exclusions:	None
Non-compliances:	None
Report release history:	Original release
Test location:	Nemko Italy S.p.A. Via del Carroccio 4, 20046, Biassono, Italy.
Registration number:	481407 (10 m Semi anechoic chamber)

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko Italy's ISO/IEC 17025 accreditation.

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Section 2: Equipment under test

2.1 Identification of equipment under test (EUT)

The following information identifies the EUT under test:

Type of equipment:	Very High Power Module
Product marketing name:	Teko Telecom S.p.A.
Model number:	VHPA0001AMPS
Serial number:	na
Nemko sample number:	-----
FCC ID:	XM2-VHPA
Date of receipt:	2012-06-01

2.2 Accessories and support equipment

The following information identifies accessories used to exercise the EUT during testing:

Only setup See 3.4 test equipment and photo

Section 2: Equipment under test, continued

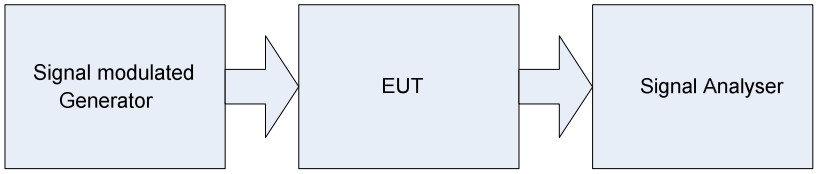
2.3 EUT description

2.4 Technical specifications of the EUT

Operating band:	Down Link 869-894 MHz; Up Link 824-849 MHz
Operating frequencies:	Wideband
Modulation type:	GSM, EDGE, TDMA, CDMA, WCDMA, LTE (QAM and QPSK)
Occupied bandwidth:	GSM and EDGE: 200 kHz; TDMA: 30 kHz CDMA: 1,25 MHz, WCDMA: 5 MHz LTE: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz
Channel spacing:	Standard
Emission designator:	GSM and EDGE: GXW; TDMA: DXW CDMA, WCDMA: F9W, LTE: D7W
RF Output	Down Link: 43dBm (20W) Up Link: 4dBm typical (0,0025W typical)
Gain	Down Link: 48dB Up Link: 47dB
Antenna data:	No antenna provided
Antenna type:	No antenna provided
	External Antenna (Equipment that has an external 50 Ω RF connector)
Power source	28-30 Vdc

Section 2: Equipment under test, continued

2.5 EUT setup diagram



2.6 Operation of the EUT during testing

Normal working at max gain with max RF power output (down-link and up-link)

2.7 Modifications incorporated in the EUT

None/Comments (Performed by: Client or Nemko)
There were no modifications performed to the EUT during this assessment.

Section 3: Test conditions

3.1 Deviations from laboratory tests procedures

No deviations were made from laboratory test procedures.

3.2 Test conditions, power source and ambient temperatures

Normal temperature, humidity and air pressure test conditions	Temperature: 15–30 ℃ Relative humidity: 20–75 % Air pressure: 860–1060 hPa When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.
Power supply range:	The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages ±5 %, for which the equipment was designed.

3.3 Measurement uncertainty

Nemko S.p.A. measurement uncertainty has been calculated using the standard CISPR 16-4-2 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainties, statistics and limit modeling – Uncertainty in EMC measurements“. All calculations have been performed to provide a confidence level of 95 % and can be found in Nemko S.p.A. document WML1002.

Section 3: Test conditions, continued

3.4 Test equipment

Identification number	*Description*	*Manufacturer model*	*s/n*	*Cal. Due*
1a	Vector Signal Generator	Agilent N5182A MXG	MY48180714	May 2013
1b	Vector Signal Generator	Agilent E4438C ESG	MY45094485	Ago 2013
2	Spectrum Analyzer	Agilent E4440A	US40420470	Jul 2012
3	Network Analyzer	Agilent E5071B	MY42301133	Jan 2013
4	Climatic chamber	Angelantoni Hygros 600	7237	Nov 2014

Client's property

Identification number	*Equipment*	*Manufacturer*	*Model*	*Serial N°*	*Cal. due*
1	Trilog Broadband Antenna	Schwarzbeck	VULB 9163	VULB 9163-286	04/2013
2	Bilog antenna	Schwarzbeck	STLP 9148-123	123	09/2012
3	Double ridge waveguide horn	Spin	DRH40	061106A40	09/2013
4	Broadband preamplifier	Schwarzbeck	BBV 9718	9718-137	05/2013
5	Broadband preamplifier	Miteq	JS44	1648665	05/2013
6	Spectrum Analyzer 9kHz-40GHz	R&S	FSEK	848255/005	09/2012
7	Controller	EMCO	2090	9511-1099	NSC
8	Antenna Tower	EMCO	2071-2	9601-1940	NSC
9	Turning table Controller	EMCO	1061-1.521	9012-1508	NSC
10	Semi-anechoic chamber	Nemko	3m semi-anechoic chamber	70	04/2013
11	Control room	Siemens	3m control room	3	NSC

Property of Nemko Italy

Section 4: Result summary

4.1 Test results

The apparatus was assessed against the following specifications:

FCC Part 2 Subpart J, Equipment Authorization Procedures
FCC Part 22 Subpart H Cellular Radiotelephone Service

The column headed 'Required' indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

N	No : not applicable / not relevant.
Y	Yes : Mandatory i.e. the apparatus shall conform to these tests.
N/T	Not Tested, mandatory but not assessed. (See report summary)

Part	Test description	Required	Result
§22.913(a)	Effective radiated power limits (500 W erp)	Y	Pass
§2.1047	Modulation characteristics	N/A	a)
§2.1049	Occupied bandwidth (Input/Output)	Y	Pass
§22.917	Out of band emissions (antenna terminals)	Y	Pass
§22.917	Field Strength of Spurious Emissions	Y	Pass
§22.355	Frequency tolerance	N/A	a)
----	Filter Frequency Response	Y	Pass

Notes:

a) Modulation & frequency conversion circuitry not in use

Appendix A: Test results

Clause 22.913(a) Effective radiated power limits

The effective radiated power (ERP) of transmitters in the Cellular Radiotelephone Service must not exceed the limits in this section.

(a) Maximum ERP. In general, the effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts (57 dBm). However, for those systems operating in areas more than 72 km (45 miles) from international borders that:

(1) Are located in counties with population densities of 100 persons or fewer per square mile, based upon the most recently available population statistics from the Bureau of the Census; or,

(2) Extend coverage on a secondary basis into cellular unserved areas, as those areas are defined in §22.949, the ERP of base transmitters and cellular repeaters of such systems must not exceed 1000 Watts (60 dBm). The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts (38.45 dBm).

Test date: 2011-06-04

Test results: Pass

Special notes

Conducted measurement were performed:

- The power was measured using spectrum analyzer with RMS detector / average power meter.

Only conducted measurement at antenna connector was possible, no antenna provided by manufacturer

Clause 22.913(a) RF power output, continued

Test data

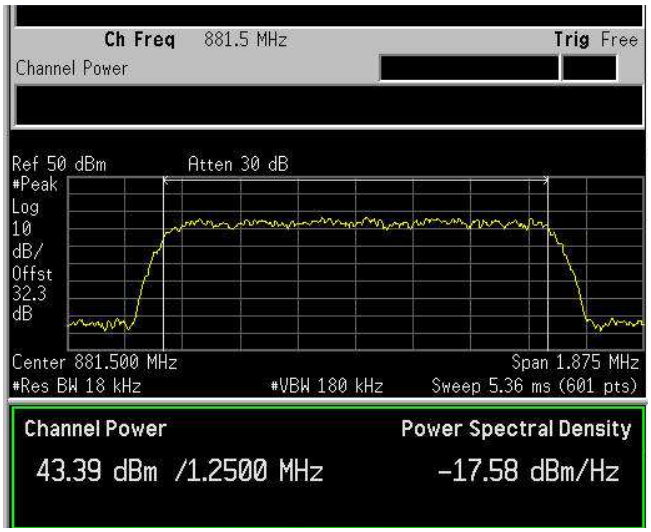
Conducted measurement

Test data

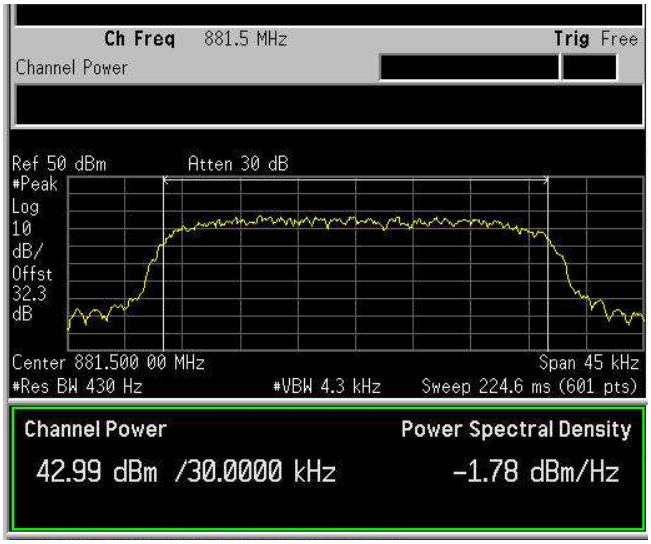
Direction	Modulation	Frequency (MHz)	RF output channel Power (dBm)	RF output channel Power (W)
Down-link	GSM (200 kHz)	881.5	43.39	21.83
Down-link	EDGE (200 kHz)	881.5	42.99	19.93
Down-link	TDMA (30 kHz)	881.5	43.45	22.13
Down-link	CDMA (1,25MHz)	881.5	43.38	21.80
Down-link	WCDMA (5MHz)	881.5	43.21	20.94
Down-link	LTE (QAM, 1,4MHz)	881.5	43.00	19.95
Down-link	LTE (QPSK, 1,4MHz)	881.5	43.06	20.23
Down-link	LTE (QAM, 3MHz)	881.5	43.05	20.18
Down-link	LTE (QPSK, 3MHz)	881.5	43.05	20.18
Down-link	LTE (QAM, 5MHz)	881.5	43.05	20.18
Down-link	LTE (QPSK, 5MHz)	881.5	43.01	20
Down-link	LTE (QAM, 10MHz)	881.5	43.01	20
Down-link	LTE (QPSK, 10MHz)	881.5	43.00	19.93
Up-link	GSM (200 kHz)	836.5	4.27	$2.67x10^{-3}$
Up-link	EDGE (200 kHz)	836.5	4.36	$2.73x10^{-3}$
Up-link	TDMA (30 kHz)	836.5	4.10	$2.57x10^{-3}$
Up-link	CDMA (1,25MHz)	836.5	4.49	$2.81x10^{-3}$
Up-link	WCDMA (5MHz)	836.5	4.15	$2.60x10^{-3}$
Up-link	LTE (QAM, 1,4MHz)	836.5	4.06	$2.55x10^{-3}$
Up-link	LTE (QPSK, 1,4MHz)	836.5	4.05	$2.54x10^{-3}$
Up-link	LTE (QAM, 3MHz)	836.5	4.02	$2.52x10^{-3}$
Up-link	LTE (QPSK, 3MHz)	836.5	4.01	$2.52x10^{-3}$
Up-link	LTE (QAM, 5MHz)	836.5	4.06	$2.55x10^{-3}$
Up-link	LTE (QPSK, 5MHz)	836.5	4.03	$2.53x10^{-3}$
Up-link	LTE (QAM, 10MHz)	836.5	4.01	$2.52x10^{-3}$
Up-link	LTE (QPSK, 10MHz)	836.5	4.02	$2.52x10^{-3}$

Test data

RF Power Output D.L. mod. CDMA

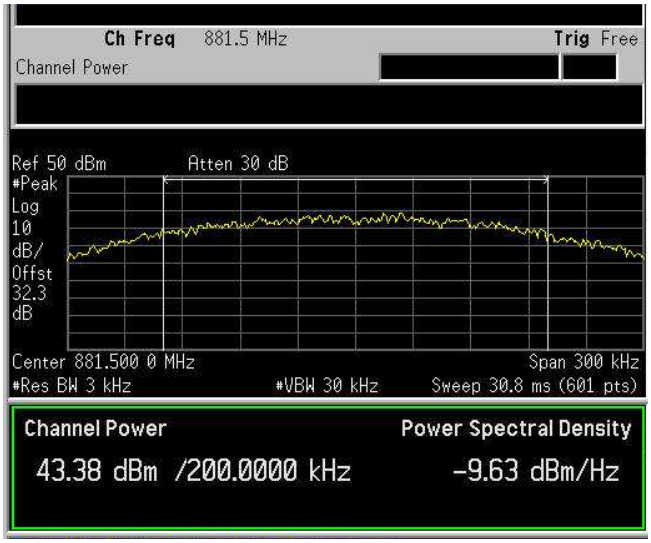


RF Power Output D.L. mod. TDMA

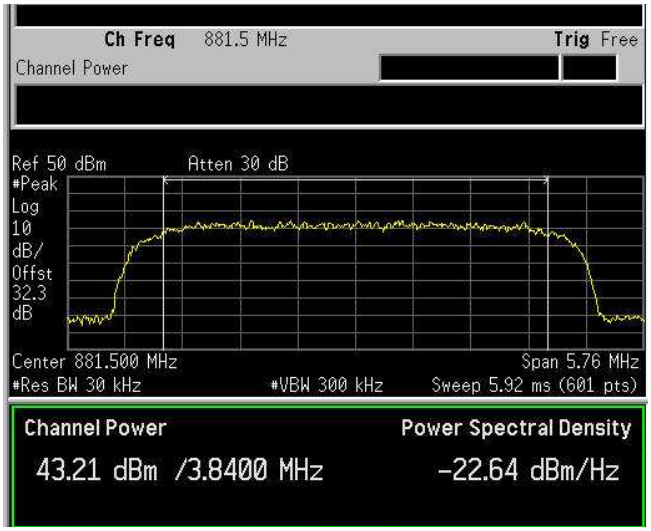


RF Power Output D.L. mod. EDGE

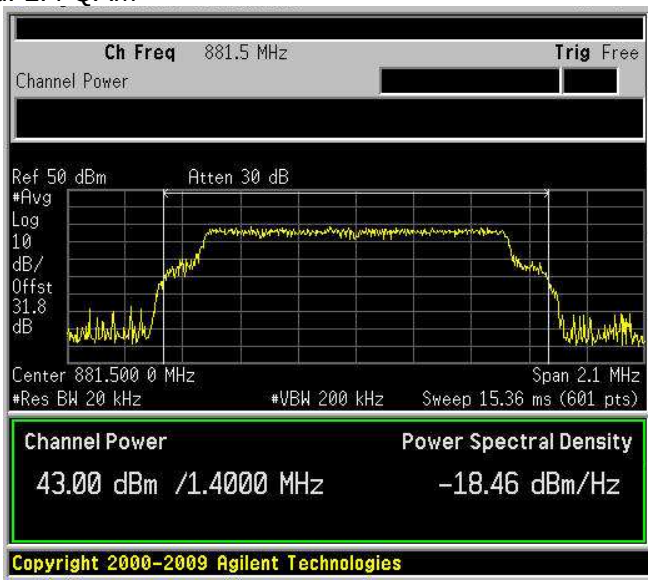
RF Power Output D.L. mod. GSM



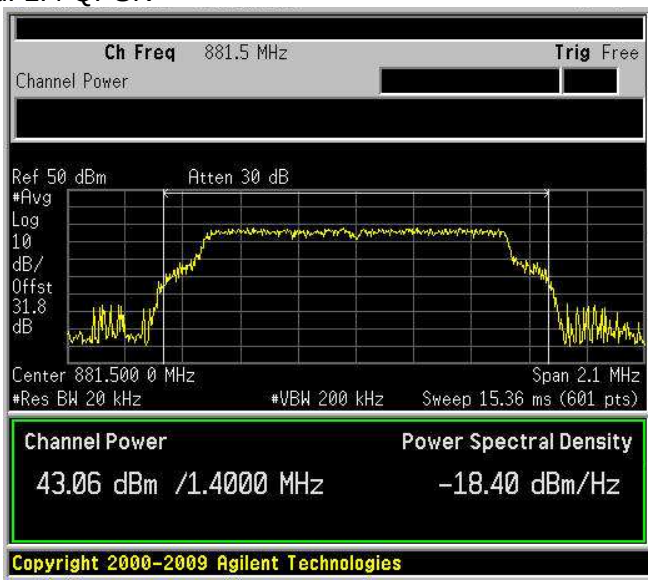
RF Power Output D.L. mod. WCDMA



RF Power Output D.L. mod. 1.4 QAM

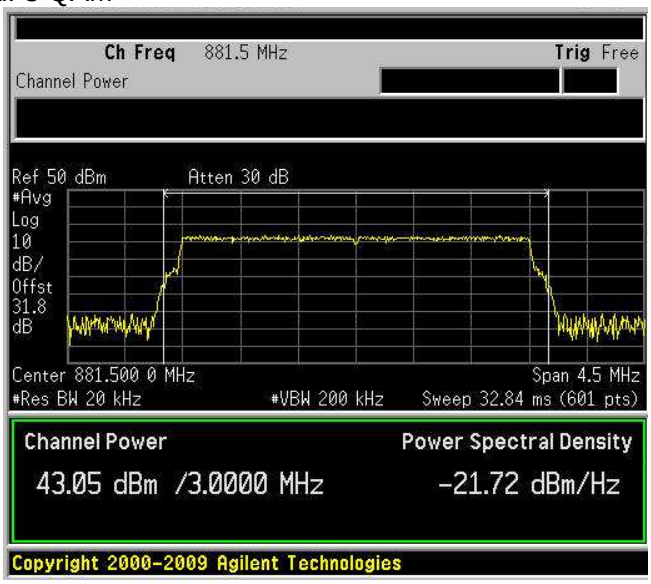


RF Power Output D.L. mod. 1.4 QPSK

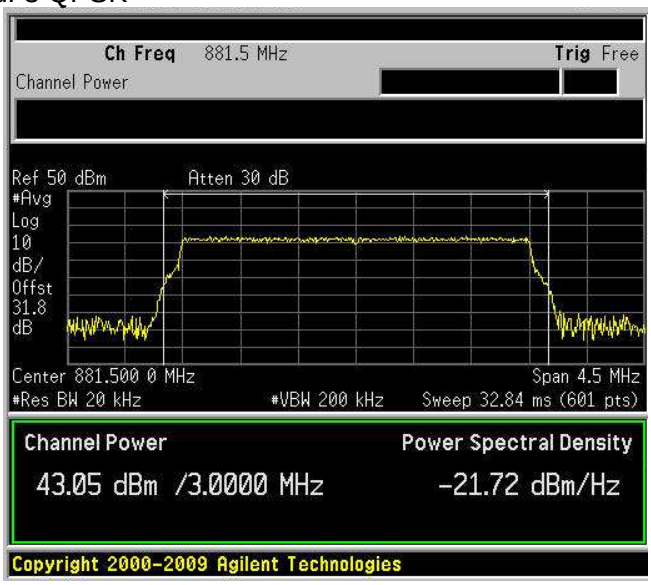


Test data

RF Power Output D.L. mod. 3 QAM

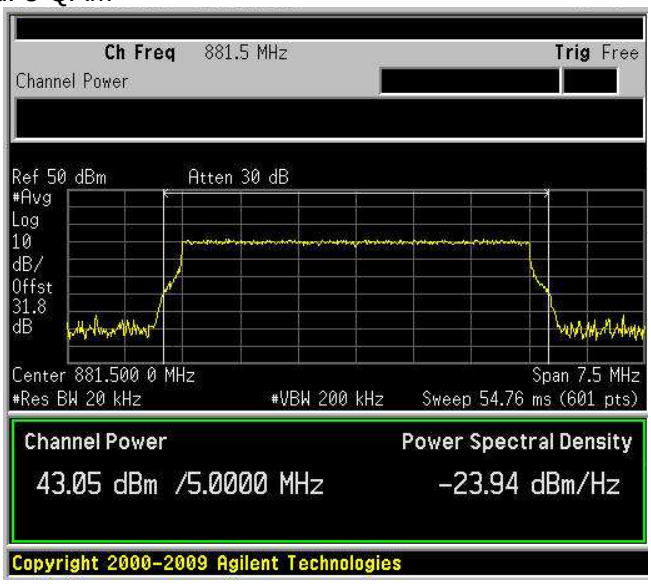


RF Power Output D.L. mod. 3 QPSK

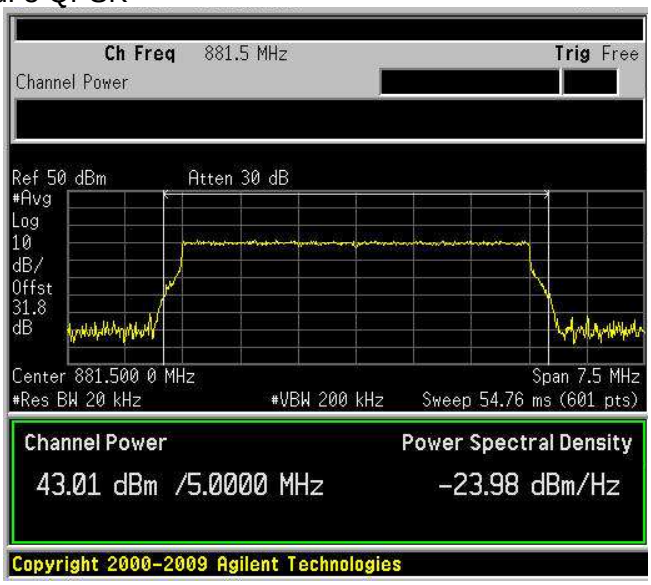


Test data

RF Power Output D.L. mod. 5 QAM

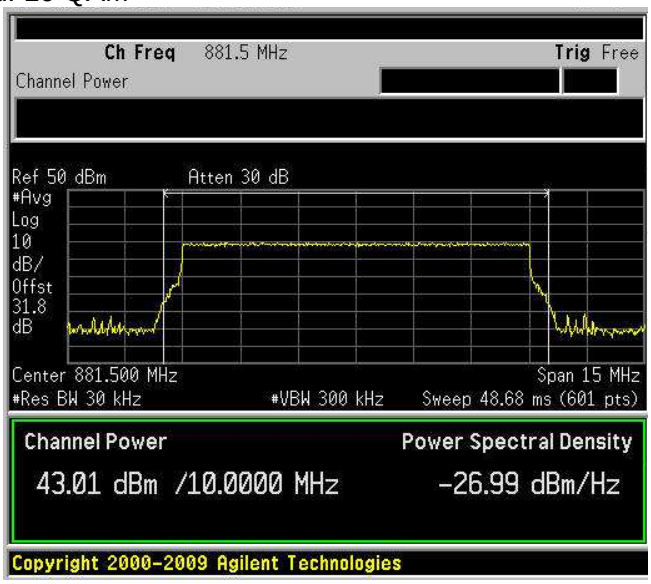


RF Power Output D.L. mod. 5 QPSK

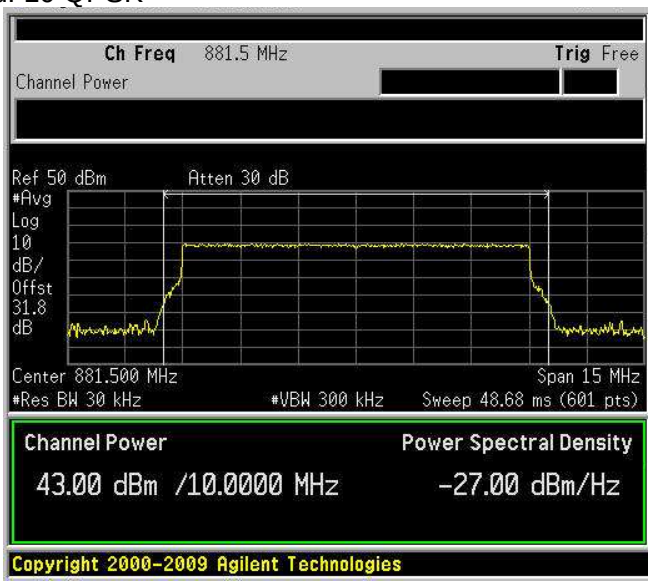


Test data

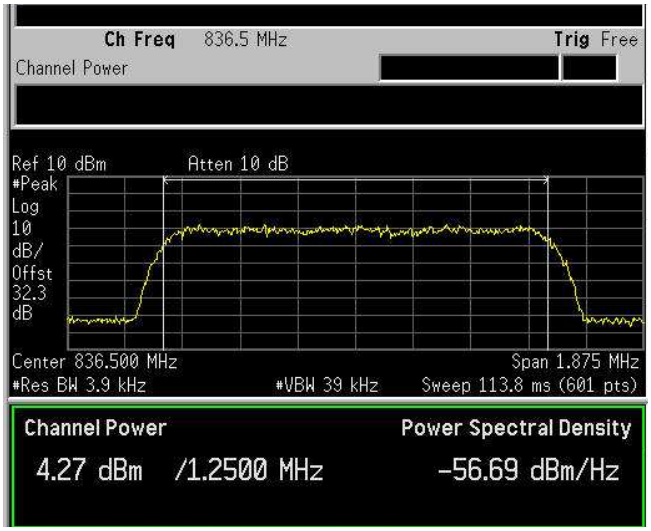
RF Power Output D.L. mod. 10 QAM



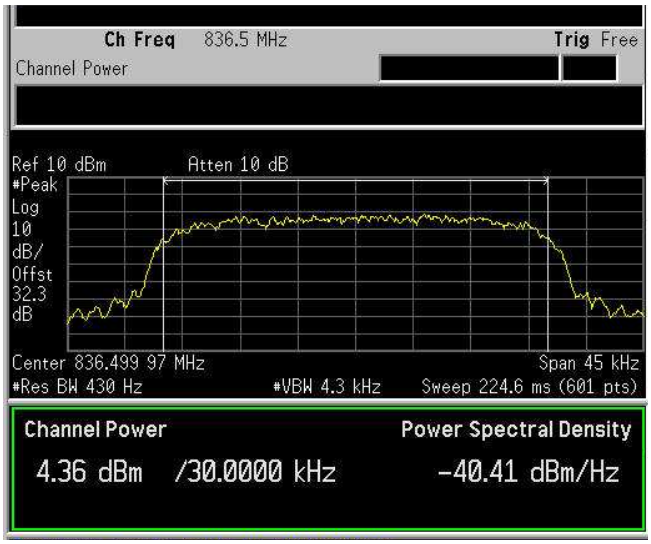
RF Power Output D.L. mod. 10 QPSK



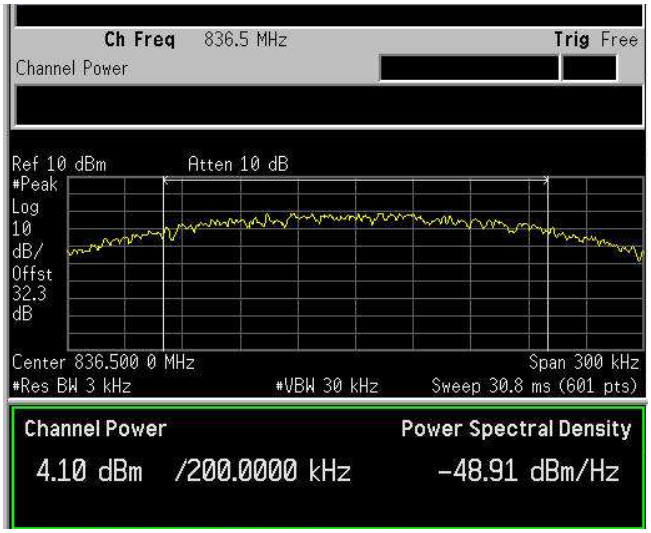
RF Power Output U.L. mod. CDMA



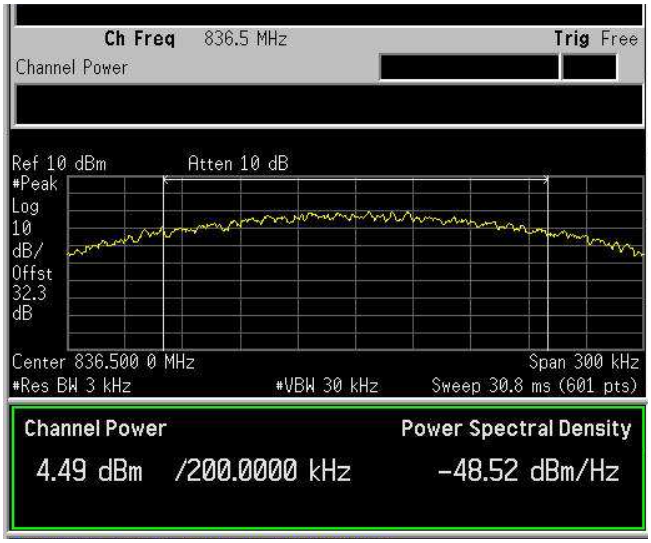
RF Power Output U.L. mod. TDMA



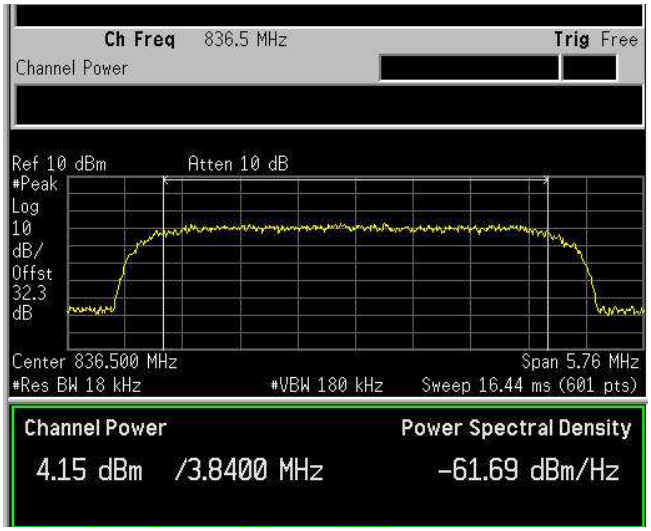
RF Power Output U.L. mod. EDGE



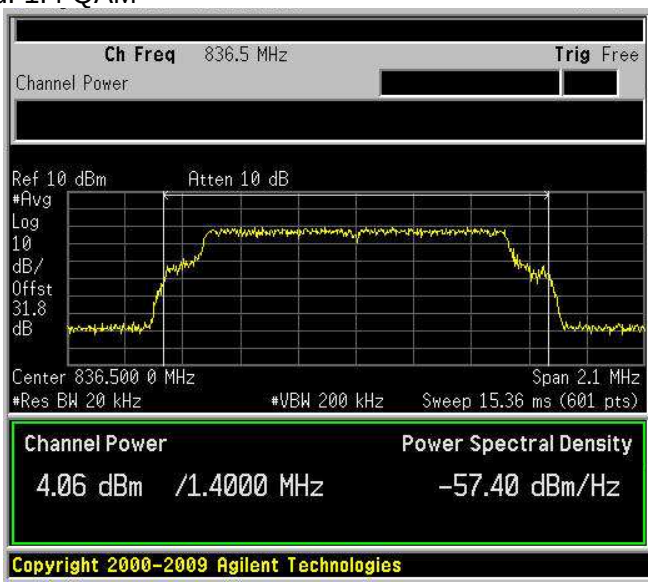
RF Power Output U.L. mod. GSM



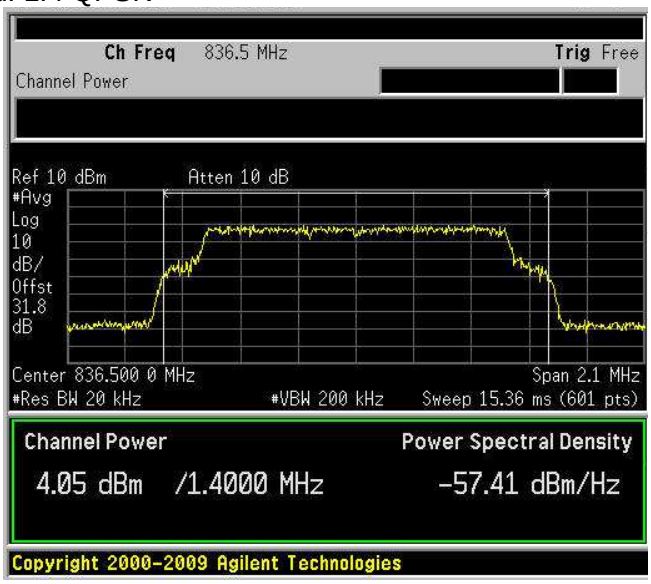
RF Power Output U.L. mod. WCDMA



RF Power Output U.L. mod. 1.4 QAM

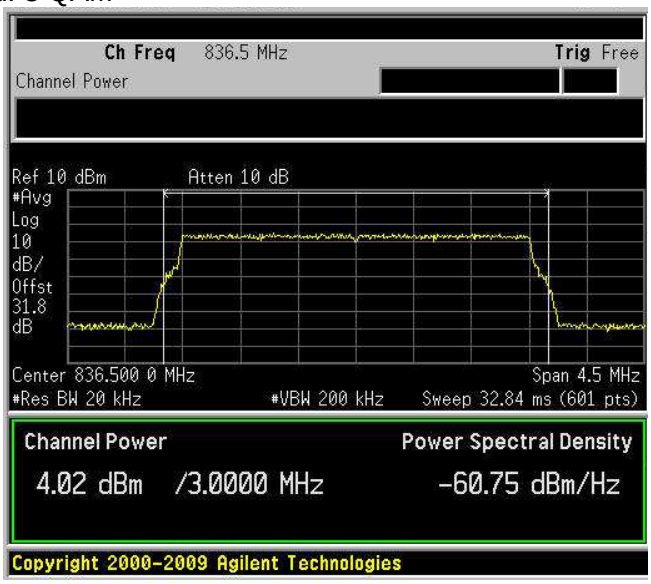


RF Power Output U.L. mod. 1.4 QPSK

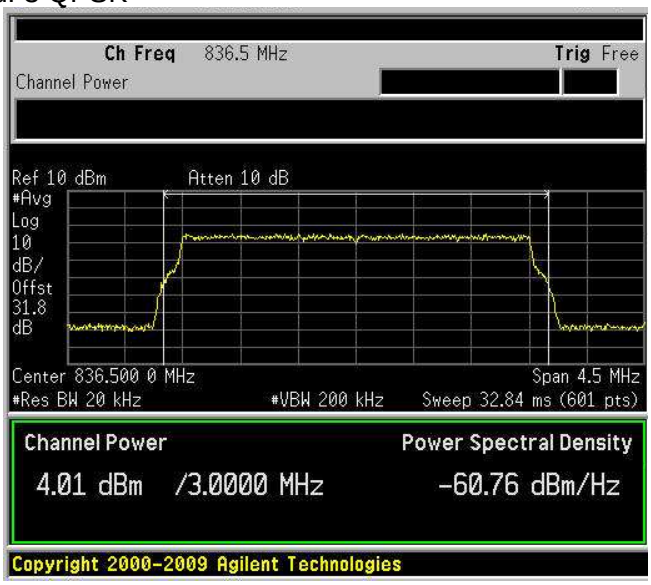


Test data

RF Power Output U.L. mod. 3 QAM

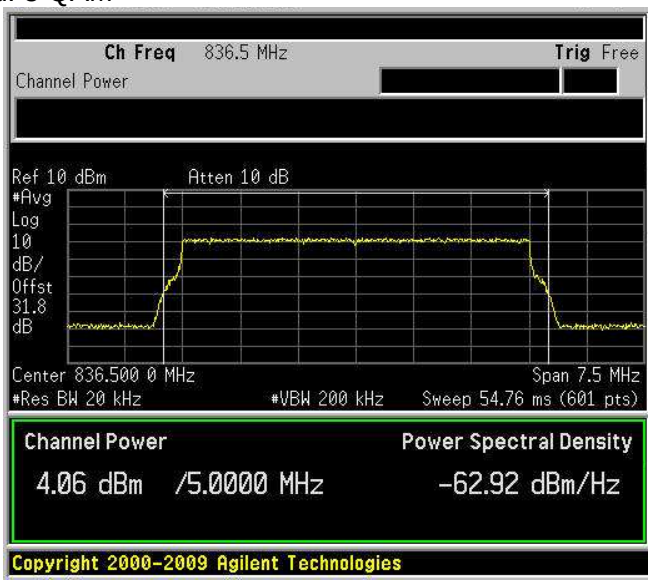


RF Power Output U.L. mod. 3 QPSK

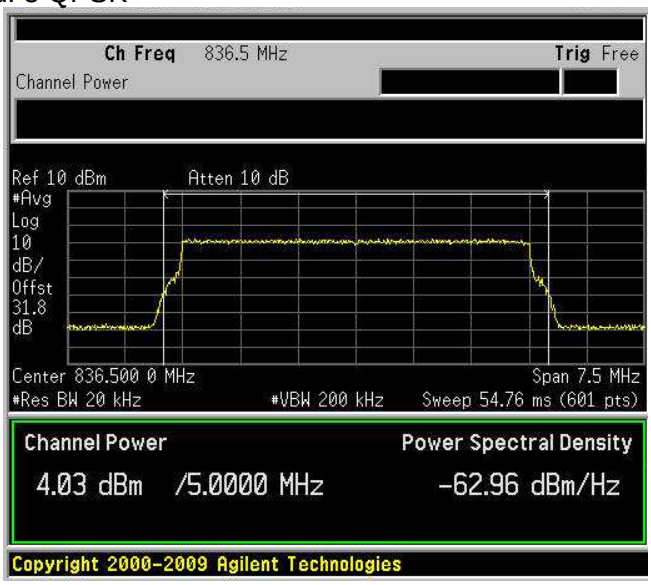


Test data

RF Power Output U.L. mod. 5 QAM

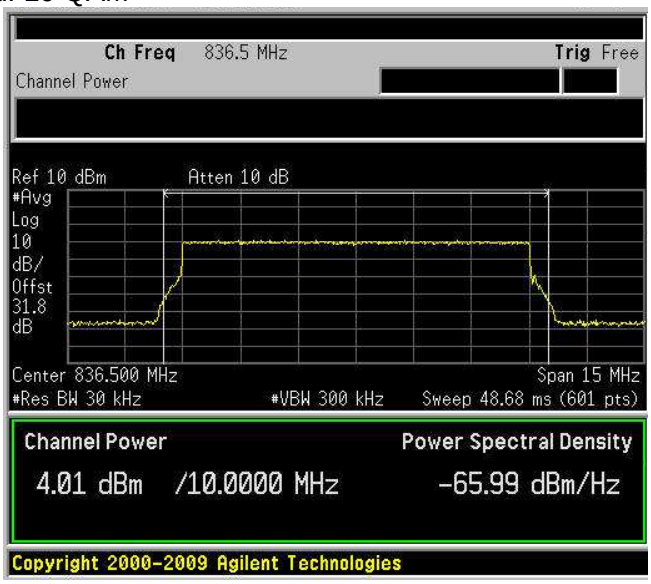


RF Power Output U.L. mod. 5 QPSK

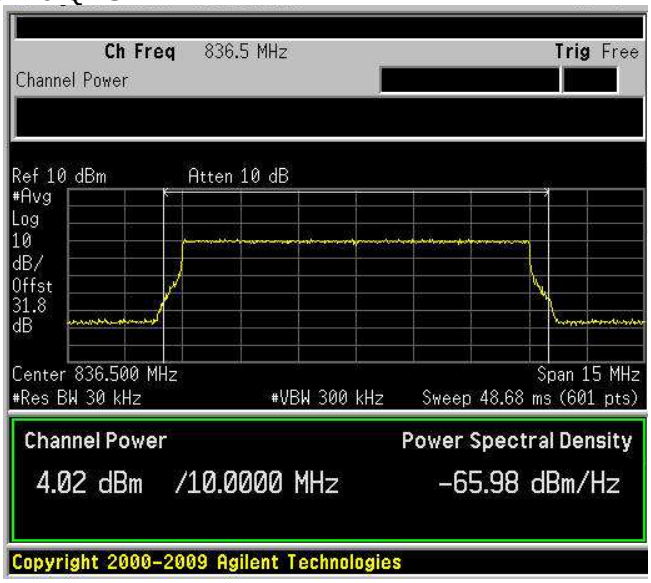


Test data

RF Power Output U.L. mod. 10 QAM



RF Power Output U.L. mod. 10 QPSK



Clause 2.1047 Modulation characteristics

Unless specified elsewhere in this part, stations will be authorized emissions as provided for in paragraphs (b) through (n) of this section.

§ 2.1047 Measurements required: Modulation characteristics.
(a) Voice modulated communication equipment. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted. For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter, or of all circuitry installed between the modulation limiter and the modulated stage shall be submitted.
(b) Equipment which employs modulation limiting. A curve or family of curves showing the percentage of modulation versus the modulation input voltage shall be supplied. The information submitted shall be sufficient to show modulation limiting capability throughout the range of modulating frequencies and input modulating signal levels employed.
(c) Single sideband and independent sideband radiotelephone transmitters which employ a device or circuit to limit peak envelope power. A curve showing the peak envelope power output versus the modulation input voltage shall be supplied. The modulating signals shall be the same in frequency as specified in paragraph (c) of §2.1049 for the occupied bandwidth tests.
(d) Other types of equipment. A curve or equivalent data which shows that the equipment will meet the modulation requirements of the rules under which the equipment is to be licensed.

Test date:

Test results:

Test data

None

NOT APPLICABICABLE; E.U.T. does not contain modulation circuitry

Clause 2.1049 Occupied bandwidth (input/output)

The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

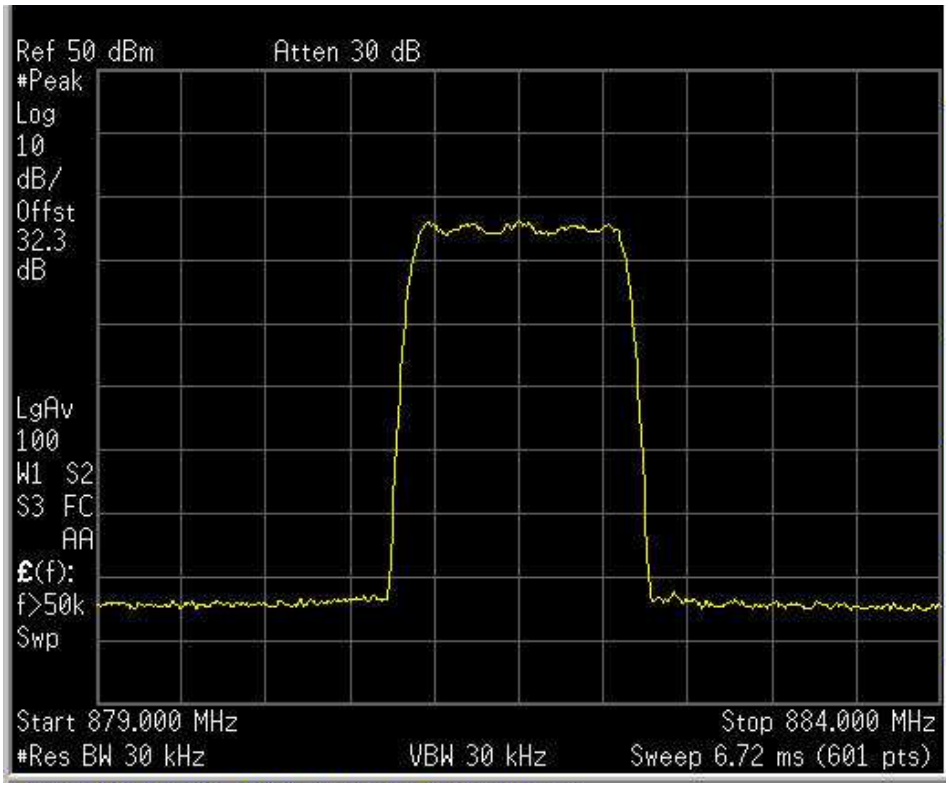
Test date: 2012-06-04

Test results: Pass

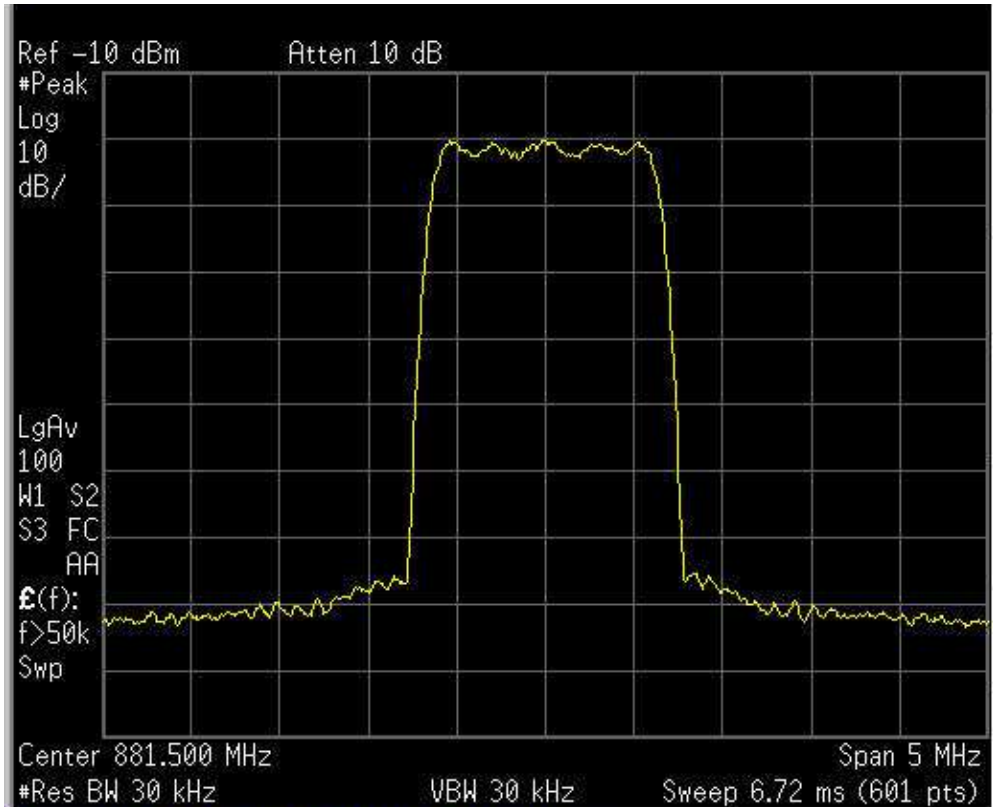
Special notes

Resolution bandwidth was set wider or equal than occupied bandwidth. Reference peak power was measured.

CDMA - Output
Downlink



CDMA - Input
Downlink



CDMA - Output
Uplink