



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

Report number: **156523-2TRFWL**

Apparatus: TRU8A19AWWL/AC-WS
(+ Master Unit composed of:
SUB-TRX+TPSU/AC+TPSU/48+TSPV-R+TTRC4W-S)

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

FCC ID: XM2-LOWPOWER

Test specification:

Title 47 – Telecommunication
Chapter I – Federal Communications Commission
Subchapter A – General
Part 24 – Personal Communication Services
Subpart E – Broadband PCS

Reviewed by:  2010/10/05
Signature Date
P. Barbieri, Wireless/EMC Specialist

Reviewed by:  2010/10/05
Signature Date
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 24 Subpart E, Broadband PCS

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 Canada's ISO/IEC 17025 accreditation.

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Section 2: Equipment under test

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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:	Optical System
Product marketing name:	Teko Telecom S.p.A.
Model number:	TRU8A19AWWL/AC-WS
Serial number:	090569002
Nemko sample number:	-----
FCC ID:	XM2-LOWPOWER
Date of receipt:	2010-09-13

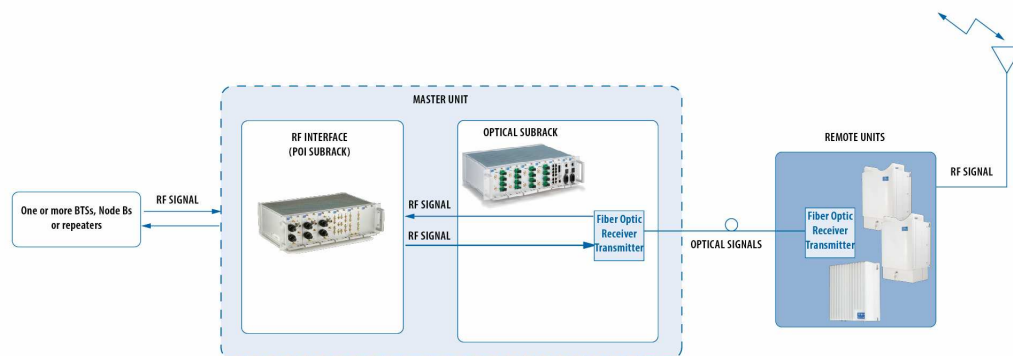
2.2 Accessories and support equipment

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 1930-1995 MHz; Up Link 1850-1915 MHz	
Operating frequencies:	Wideband	
Modulation type:	TDMA; LTE (QAM and QPSK)	
Occupied bandwidth:	30 kHz; 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz	
Channel spacing:	Standard	
Emission designator:	30K0DXW; D7W	
RF Output	Down Link: 29dBm (0,8W) Up Link: 4dBm typical (0,0025W typical)	
Gain	Down Link: 34dB 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		100-240 VAC external

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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.

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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 °C 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 $\pm 5\%$, for which the equipment was designed.

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Section 3: Test conditions, continued

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.

3.4 Test equipment

<i>Identification number</i>	<i>Description</i>	<i>Manufacturer model</i>	<i>s/n</i>	<i>Cal. Due</i>
1	Vector Signal Generator	Agilent H.P. N5182A MXG	MY48180714	April 2011
2	Spectrum Analyzer	Agilent H.P. E4440A	US40420470	Jun 2011
3	Network Analyzer	Agilent H.P. E5062A	MY44101829	November 2012
4	2xcables+directional coupler+dummyload	Teko Telecom	T003	No Cal. required

Client's property



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Section 4: Result summary

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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 24 Subpart E, Broadband PCS

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 method	Test description	Required	Result
§24.232	2.1046	RF Power Output	Y	Pass
—	2.1047	Modulation characteristics	N	--
—	2.1049	Occupied bandwidth	Y	Pass
§24.238(a)	2.1051	Spurious emissions at the antenna terminal	Y	Pass
§24.238(a)	2.1053	Field strength of spurious radiation	N/T	Pass*
§24.235	2.1055	Frequency stability	N	**
§2-11-04/EAB/RF	--	Filter Frequency Response	N/T	Pass***

Notes:

* See previous test report 131640-2TRFEMC

** Modulation & frequency conversion circuitry not in use

*** See previous test report 131640-2TRFEMC

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Appendix A: Test results

Clause 24.232 RF Power output

Base stations are limited to 1640 watts peak E.I.R.P. with an antenna height up to 300 meters HAAT. In no case may the peak output power of a base station transmitter exceed 100 watts.

In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13dB.

Test date: 2010-09-22
Test results: Pass

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



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Appendix B: Block diagrams

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Test data

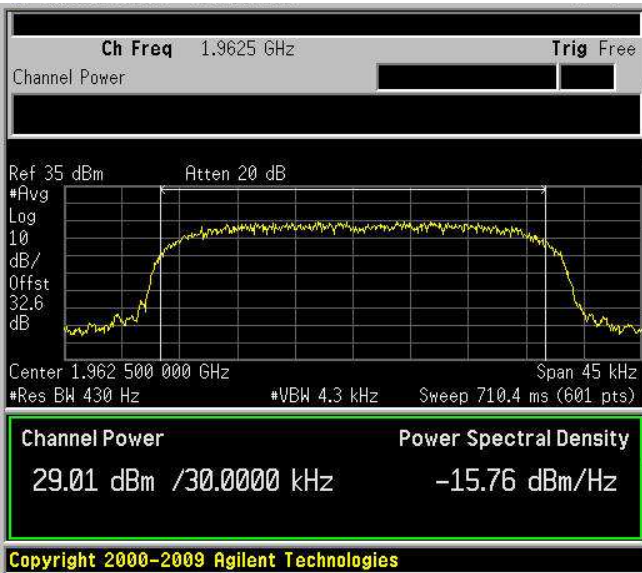
Conducted measurement

Test data

Direction	Modulation	Frequency (MHz)	RF output channel Power (dBm)	RF output channel Power (W)	PAR (dB)
Down-link	TDMA (30 kHz)	1962.5	29.01	0.796	3.22
Down-link	LTE (QAM, 1,4MHz)	1962.5	28.95	0.785	9.93
Down-link	LTE (QPSK, 1,4MHz)	1962.5	28.95	0.785	10.20
Down-link	LTE (QAM, 3MHz)	1962.5	28.97	0.789	10.45
Down-link	LTE (QPSK, 3MHz)	1962.5	29.01	0.796	10.45
Down-link	LTE (QAM, 5MHz)	1962.5	28.95	0.785	10.70
Down-link	LTE (QPSK, 5MHz)	1962.5	28.96	0.787	10.77
Down-link	LTE (QAM, 10MHz)	1962.5	29.02	0.798	10.99
Down-link	LTE (QPSK, 10MHz)	1962.5	29.06	0.805	11.11
Down-link	LTE (QAM, 15MHz)	1962.5	29.06	0.805	10.87
Down-link	LTE (QPSK, 15MHz)	1962.5	29.02	0.798	10.66
Down-link	LTE (QAM, 20MHz)	1962.5	29.06	0.805	11.58
Down-link	LTE (QPSK, 20MHz)	1962.5	29.02	0.798	11.66
Up-link	TDMA (30 kHz)	1882.5	4.05	2.541×10^{-3}	3.39
Up-link	LTE (QAM, 1,4MHz)	1882.5	4.07	2.553×10^{-3}	10.20
Up-link	LTE (QPSK, 1,4MHz)	1882.5	4.02	2.523×10^{-3}	10.48
Up-link	LTE (QAM, 3MHz)	1882.5	4.03	2.529×10^{-3}	10.84
Up-link	LTE (QPSK, 3MHz)	1882.5	4.03	2.529×10^{-3}	10.73
Up-link	LTE (QAM, 5MHz)	1882.5	4.03	2.529×10^{-3}	11.46
Up-link	LTE (QPSK, 5MHz)	1882.5	4.04	2.535×10^{-3}	11.23
Up-link	LTE (QAM, 10MHz)	1882.5	4.09	2.564×10^{-3}	11.14
Up-link	LTE (QPSK, 10MHz)	1882.5	4.07	2.553×10^{-3}	11.60
Up-link	LTE (QAM, 15MHz)	1882.5	4.09	2.564×10^{-3}	11.13
Up-link	LTE (QPSK, 15MHz)	1882.5	4.05	2.541×10^{-3}	11.70
Up-link	LTE (QAM, 20MHz)	1882.5	4.04	2.535×10^{-3}	11.01
Up-link	LTE (QPSK, 20MHz)	1882.5	4.06	2.547×10^{-3}	11.00

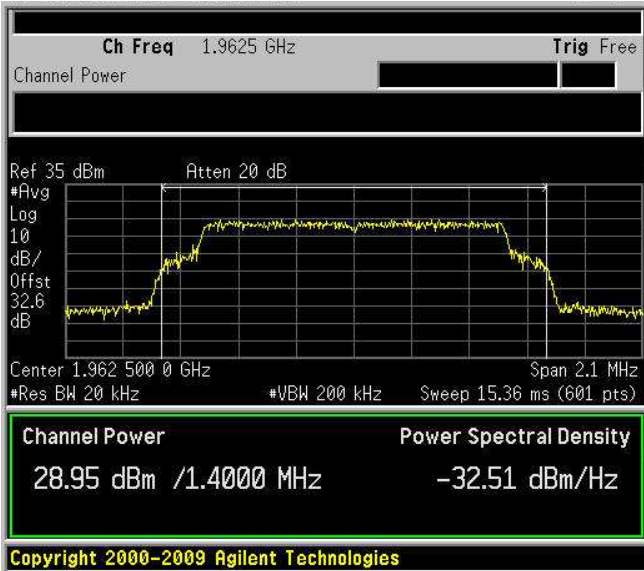
Test data

RF Power Output D.L. mod. 30 kHz TDMA

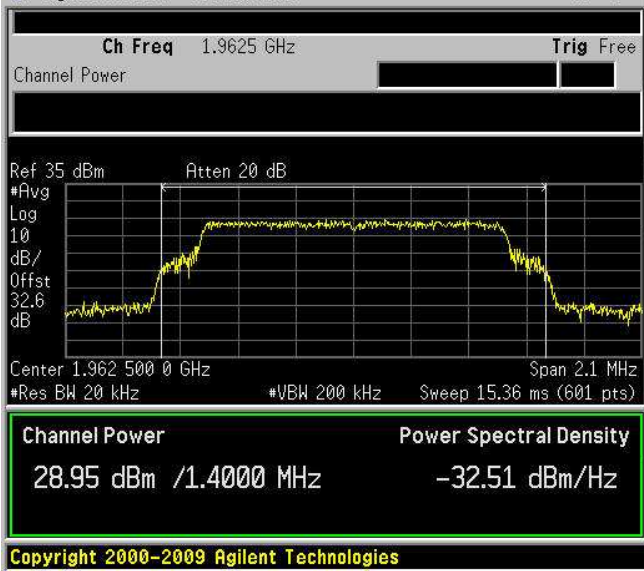


Test data

RF Power Output D.L. mod. 1.4 QAM

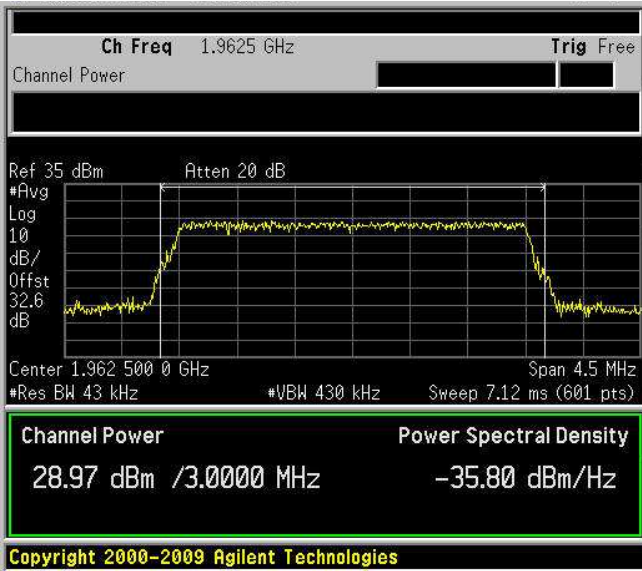


RF Power Output D.L. mod. 1.4 QPSK

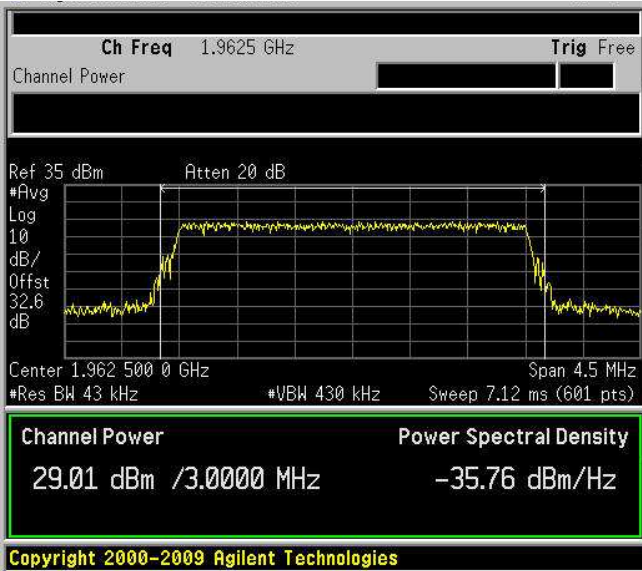


Test data

RF Power Output D.L. mod. 3 QAM

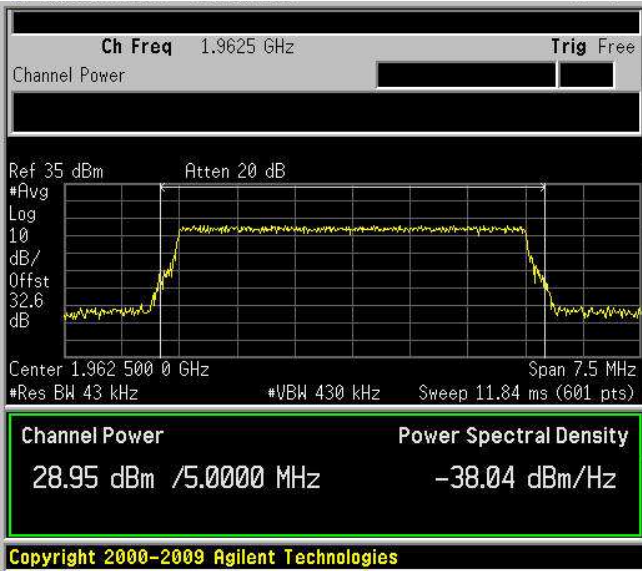


RF Power Output D.L. mod. 3 QPSK

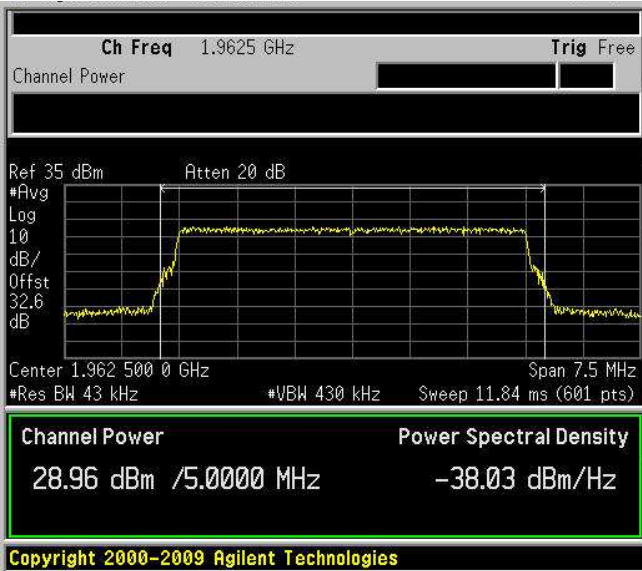


Test data

RF Power Output D.L. mod. 5 QAM

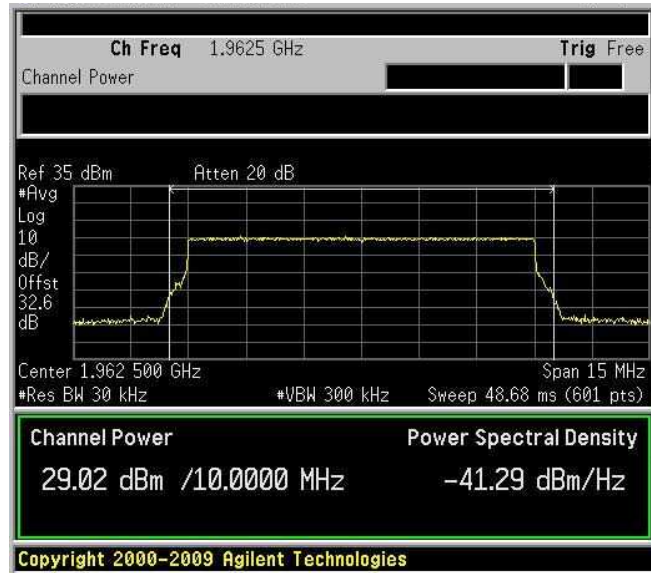


RF Power Output D.L. mod. 5 QPSK

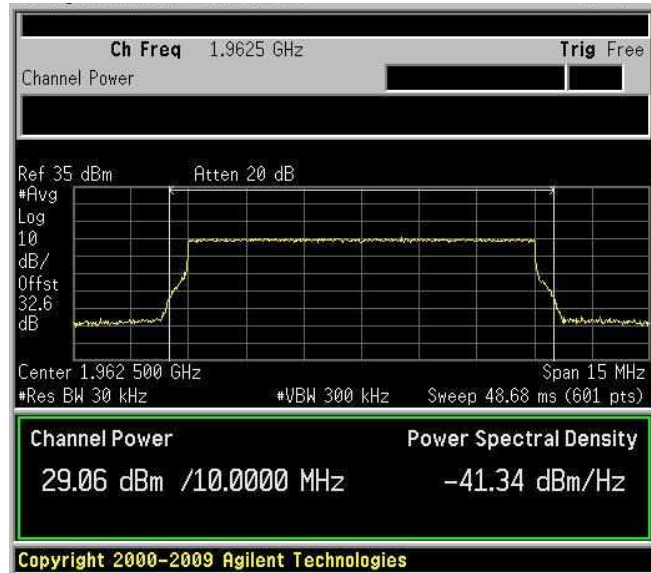


Test data

RF Power Output D.L. mod. 10 QAM

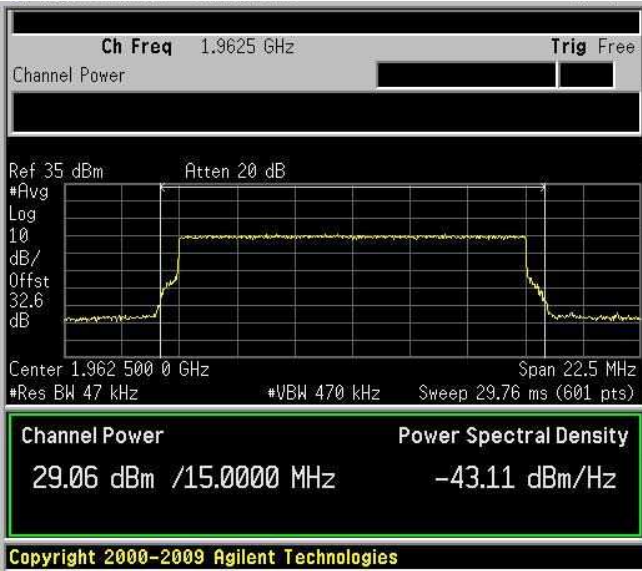


RF Power Output D.L. mod. 10 QPSK

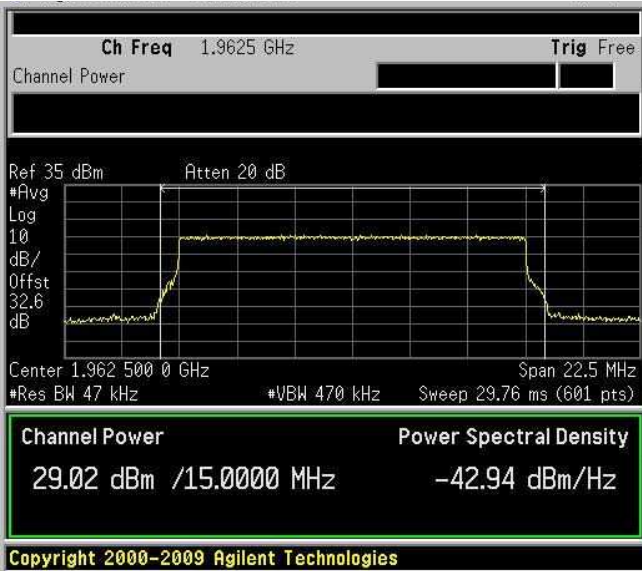


Test data

RF Power Output D.L. mod. 15 QAM

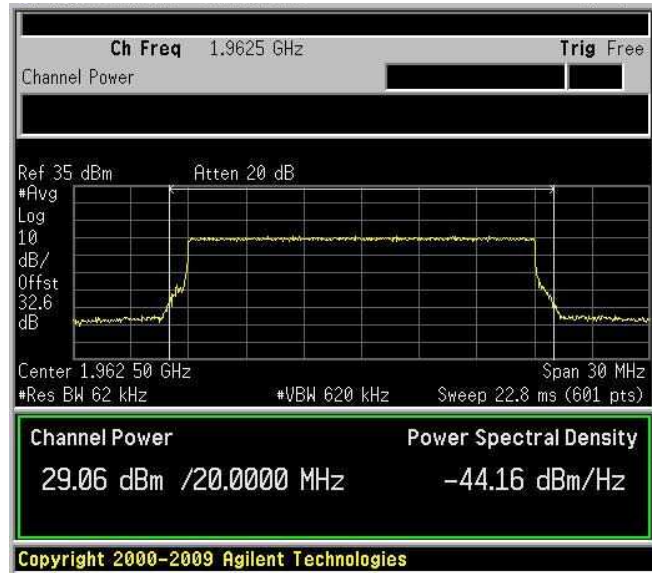


RF Power Output D.L. mod. 15 QPSK

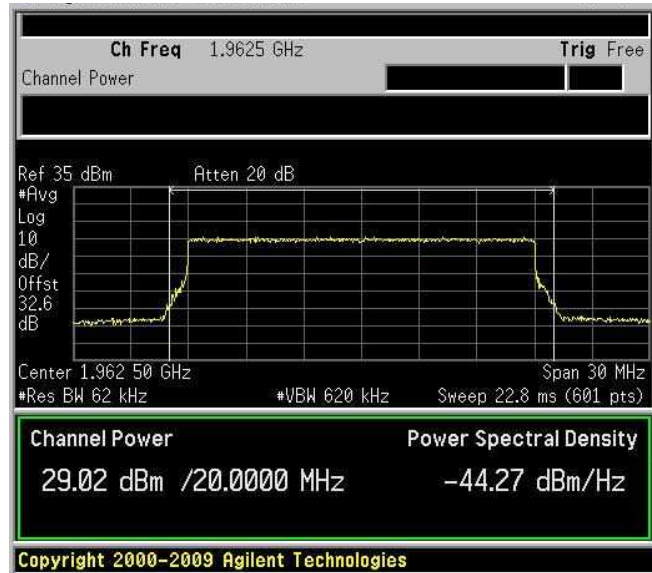


Test data

RF Power Output D.L. mod. 20 QAM

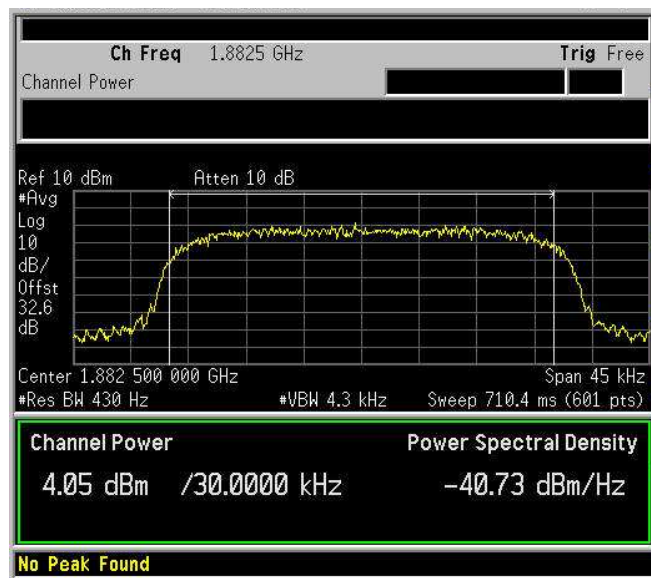


RF Power Output D.L. mod. 20 QPSK



Test data

RF Power Output U.L. mod. 30 kHz TDMA





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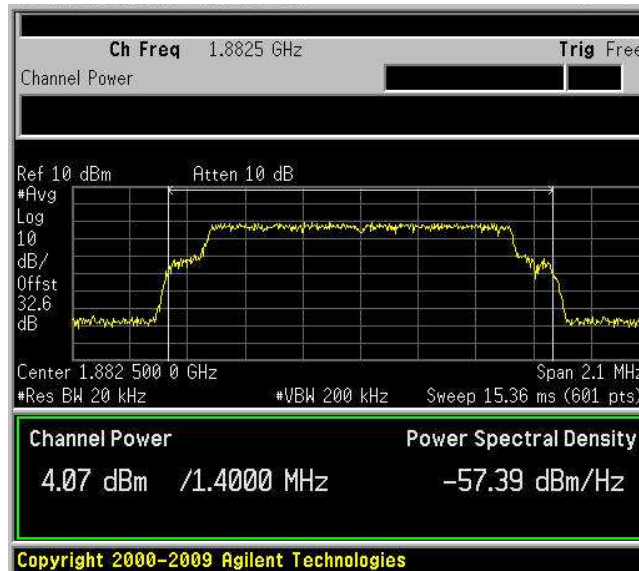
Appendix B: Block diagrams

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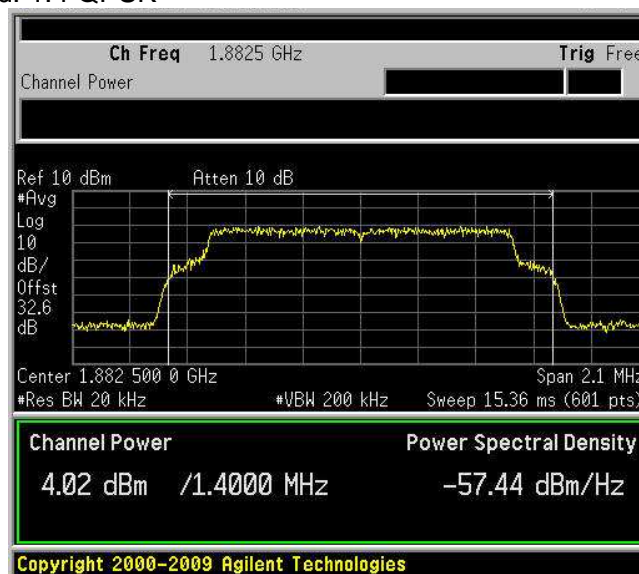
Specification: FCC 24 Subpart E

Test data

RF Power Output U.L. mod. 1.4 QAM



RF Power Output U.L. mod. 1.4 QPSK





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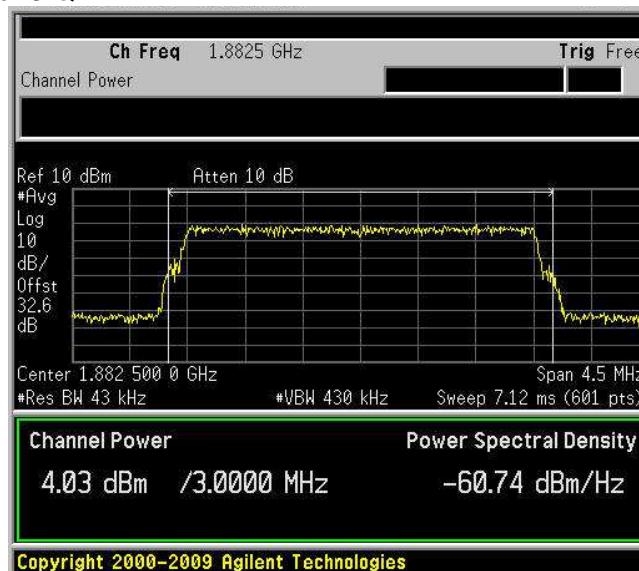
Appendix B: Block diagrams

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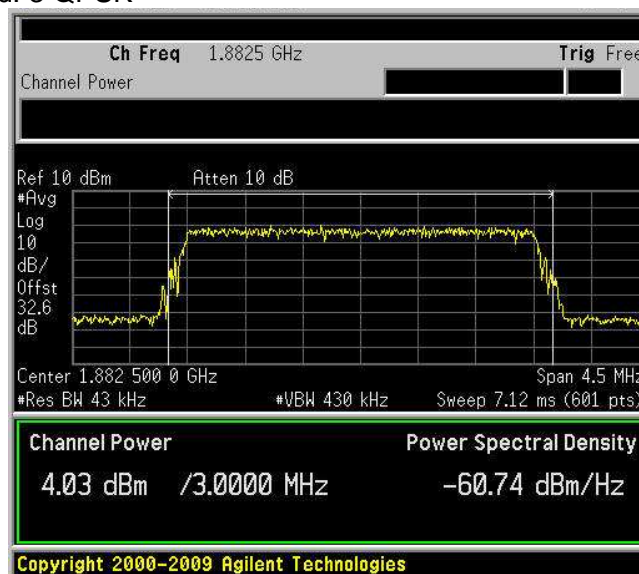
Specification: FCC 24 Subpart E

Test data

RF Power Output U.L. mod. 3 QAM

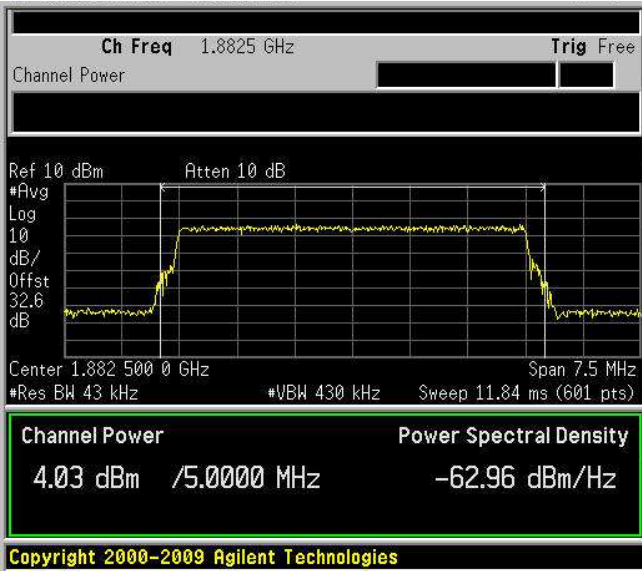


RF Power Output U.L. mod. 3 QPSK

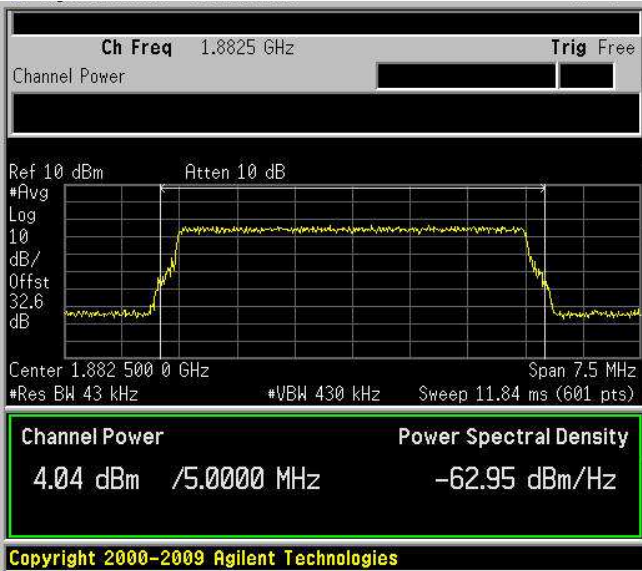


Test data

RF Power Output U.L. mod. 5 QAM



RF Power Output U.L. mod. 5 QPSK





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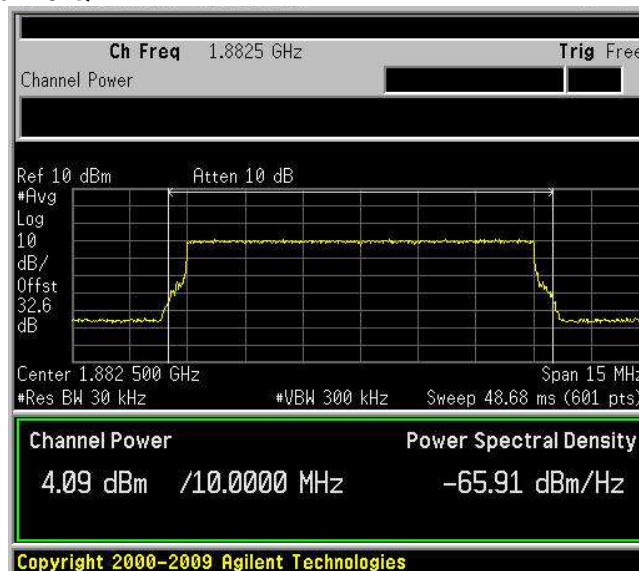
Appendix B: Block diagrams

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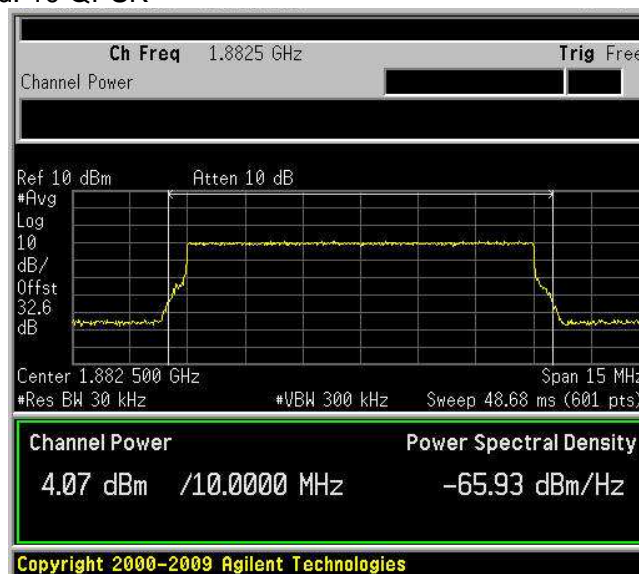
Specification: FCC 24 Subpart E

Test data

RF Power Output U.L. mod. 10 QAM

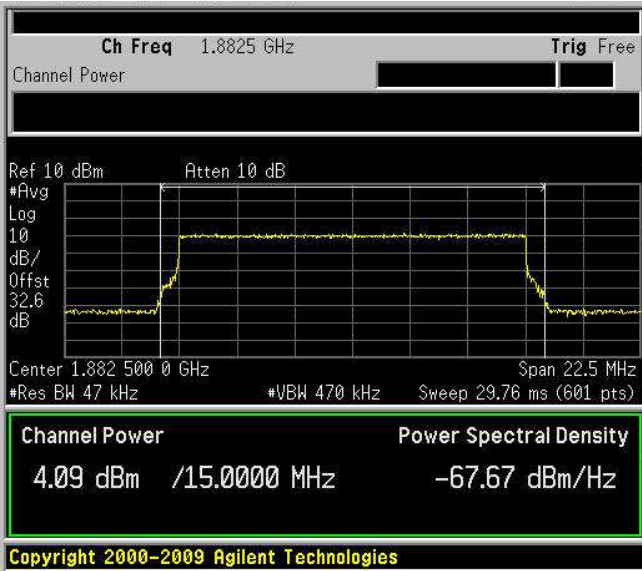


RF Power Output U.L. mod. 10 QPSK

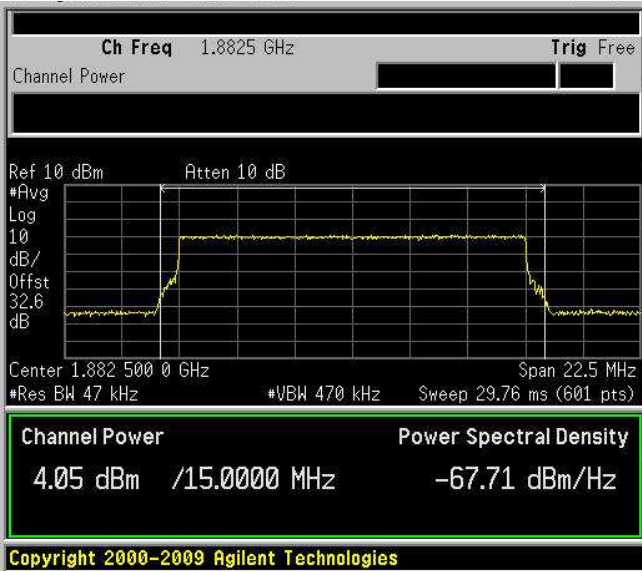


Test data

RF Power Output U.L. mod. 15 QAM

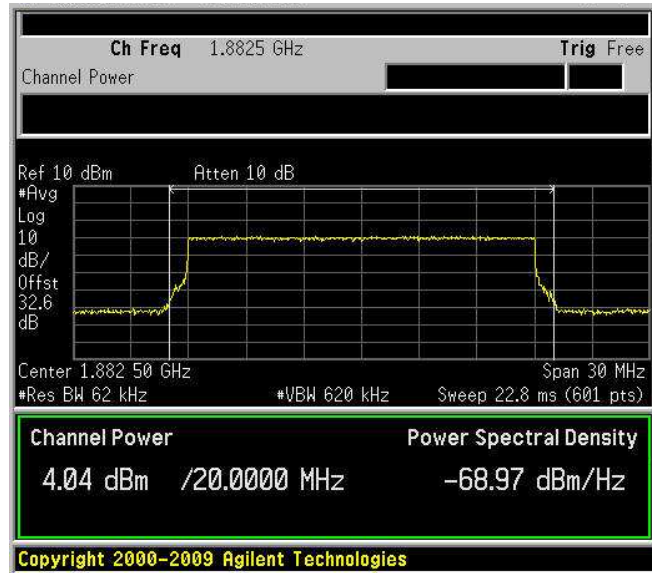


RF Power Output U.L. mod. 15 QPSK

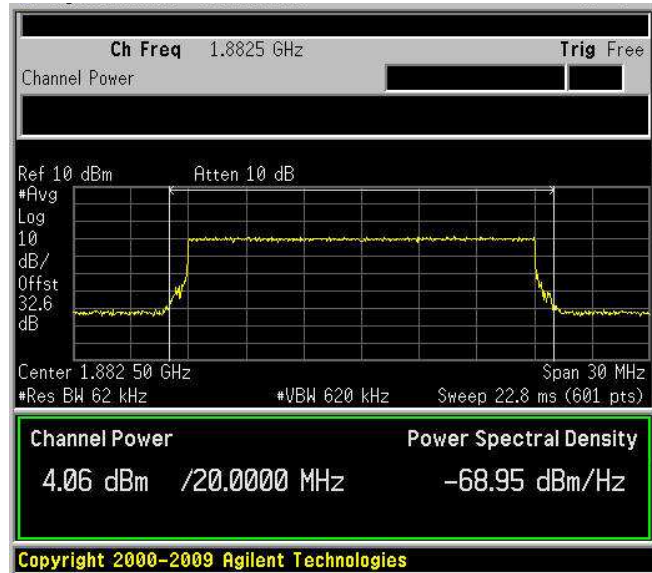


Test data

RF Power Output U.L. mod. 20 QAM



RF Power Output U.L. mod. 20 QPSK



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Clause 2.1049 Occupied bandwidth

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: [2010-09-22](#)

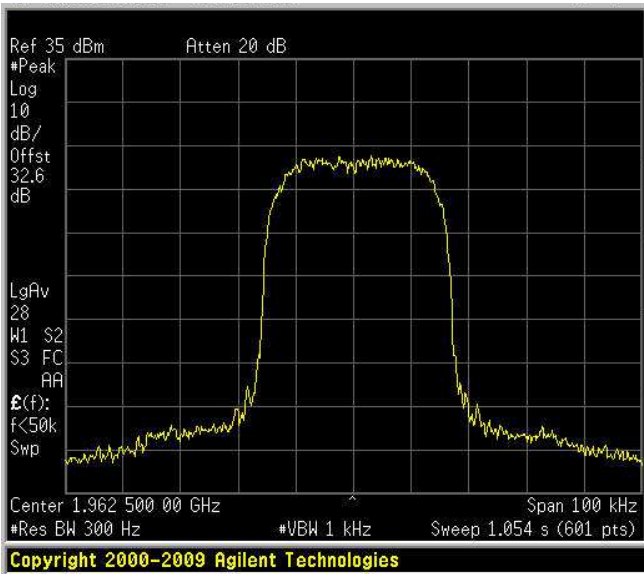
Test results: [Pass](#)

Special notes

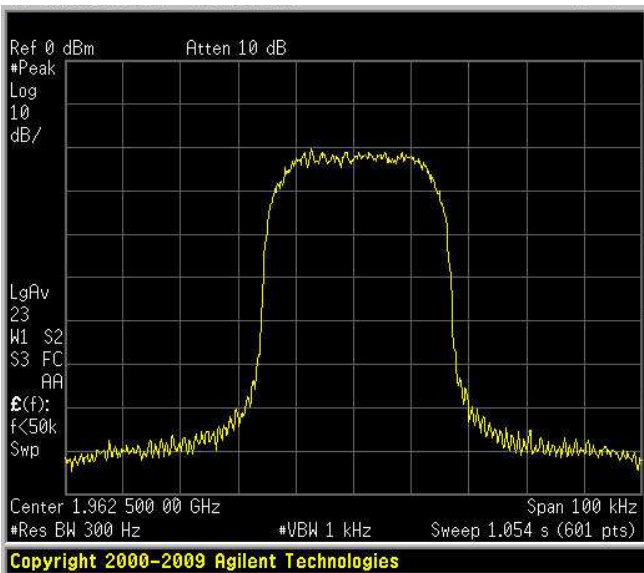
Resolution bandwidth was set wider or equal than occupied bandwidth. Reference peak power was measured.

Clause 24.238(b) Occupied bandwidth, continued

Occupied Bandwidth
Downlink – 30 kHz TDMA
OUTPUT



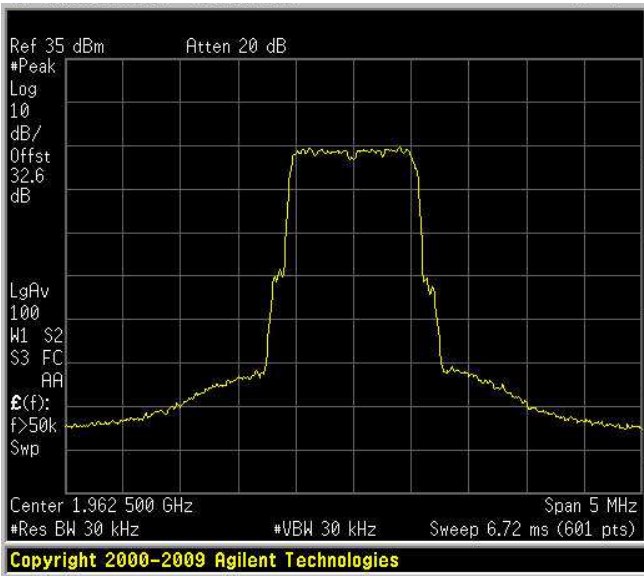
Occupied Bandwidth
Downlink – 30 kHz TDMA
INPUT



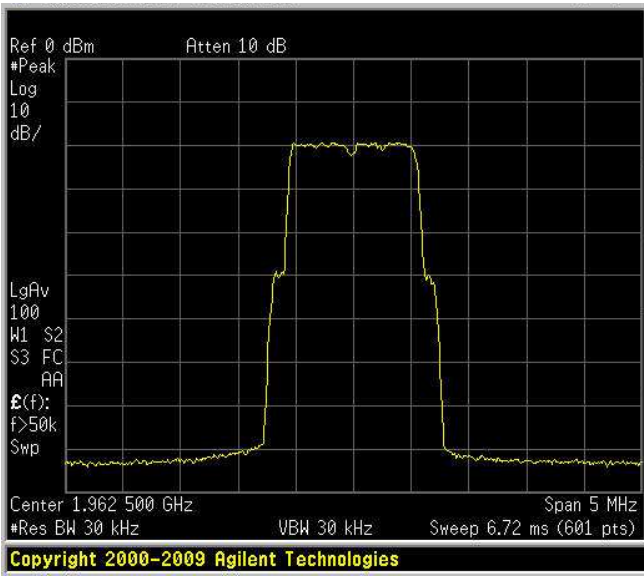
Clause

Occupied bandwidth (input/output), continued

Occupied Bandwidth
Downlink – 1.4 QAM
OUTPUT

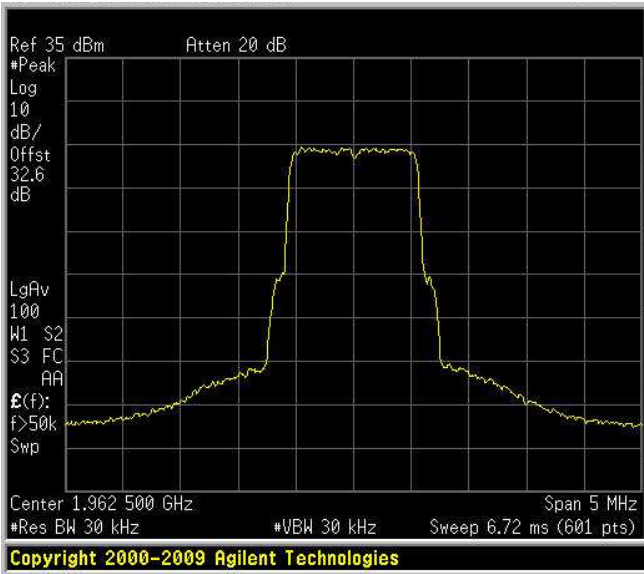


Occupied Bandwidth
Downlink – 1.4 QAM
INPUT

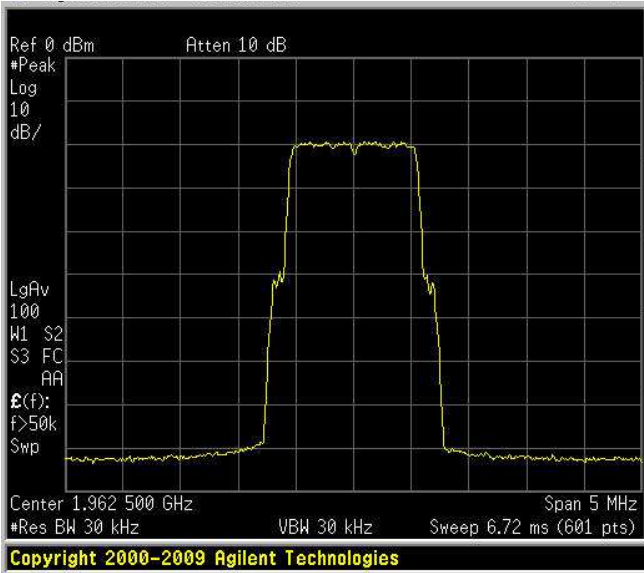


Test data, continued

Occupied Bandwidth
Downlink – 1.4 QPSK
OUTPUT

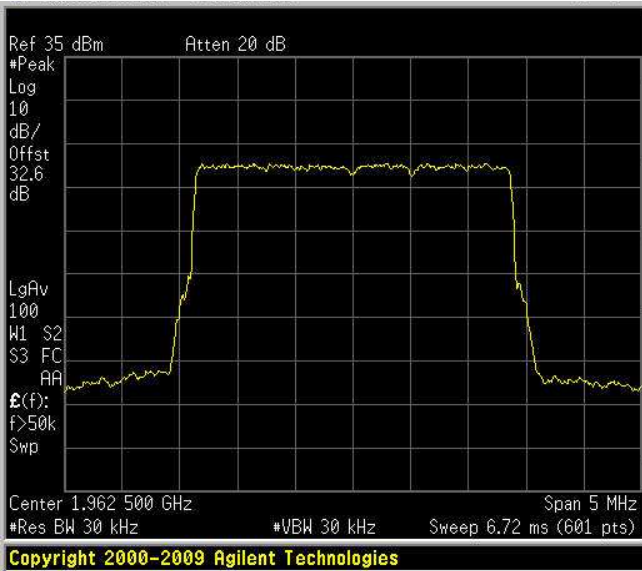


Occupied Bandwidth
Downlink – 1.4 QPSK
INPUT

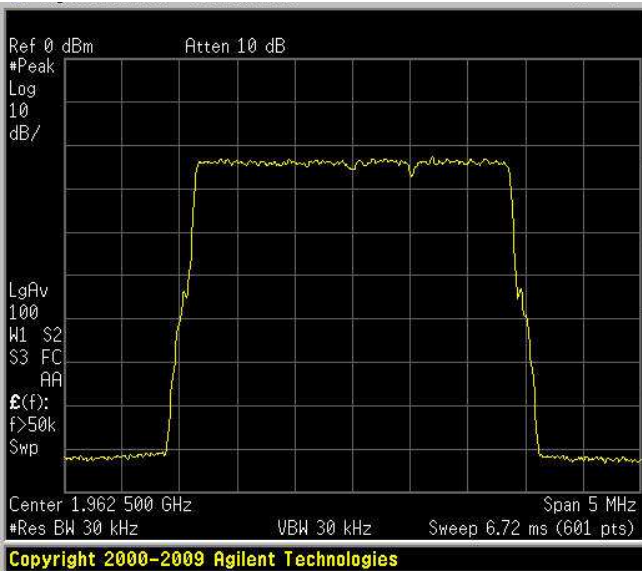


Test data

Occupied Bandwidth
Downlink – 3 QAM
OUTPUT

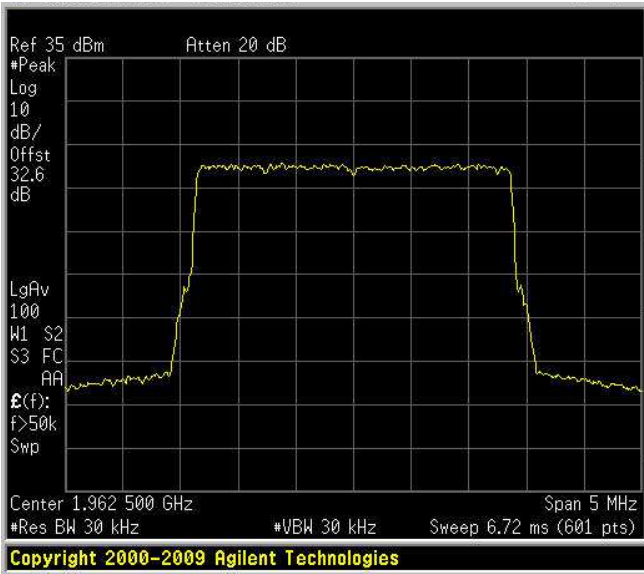


Occupied Bandwidth
Downlink – 3 QAM
INPUT

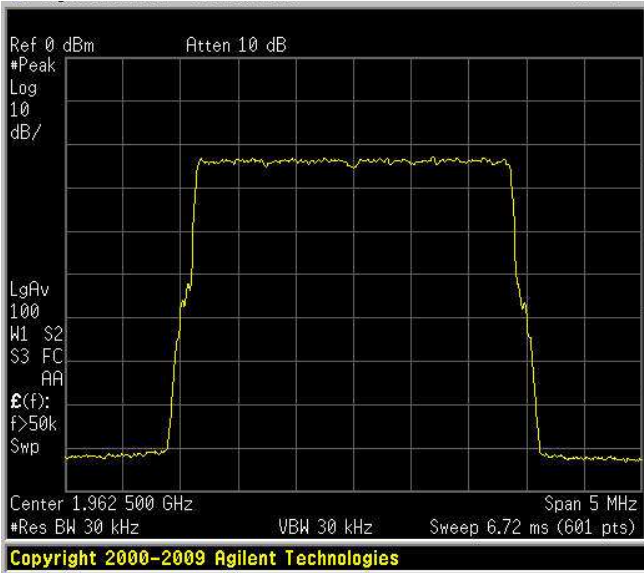


Test data

Occupied Bandwidth
Downlink – 3 QPSK
OUTPUT

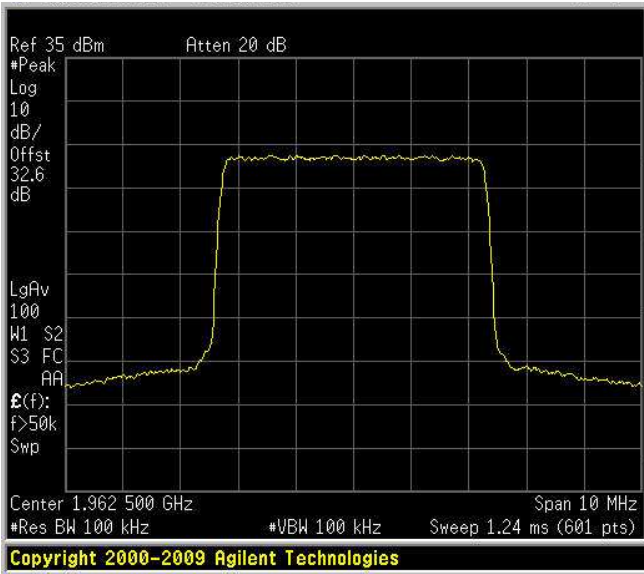


Occupied Bandwidth
Downlink – 3 QPSK
INPUT

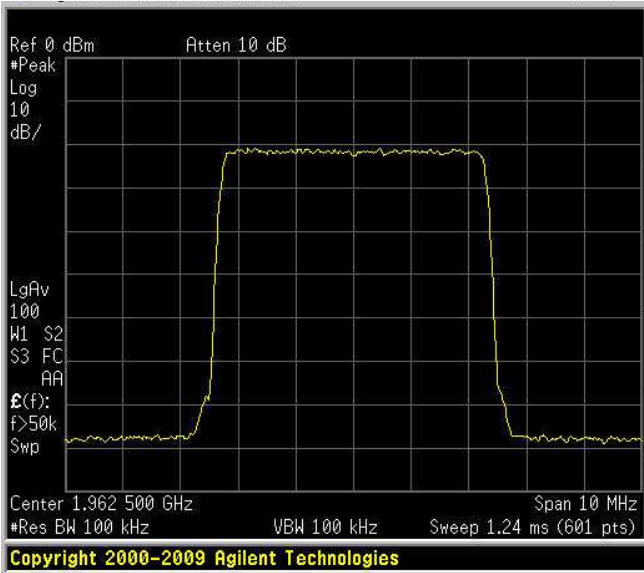


Test data

Occupied Bandwidth
Downlink – 5 QAM
OUTPUT

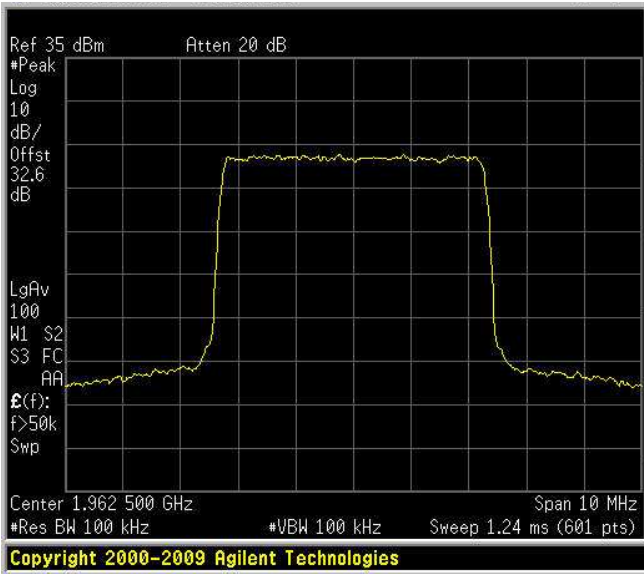


Occupied Bandwidth
Downlink – 5 QAM
INPUT

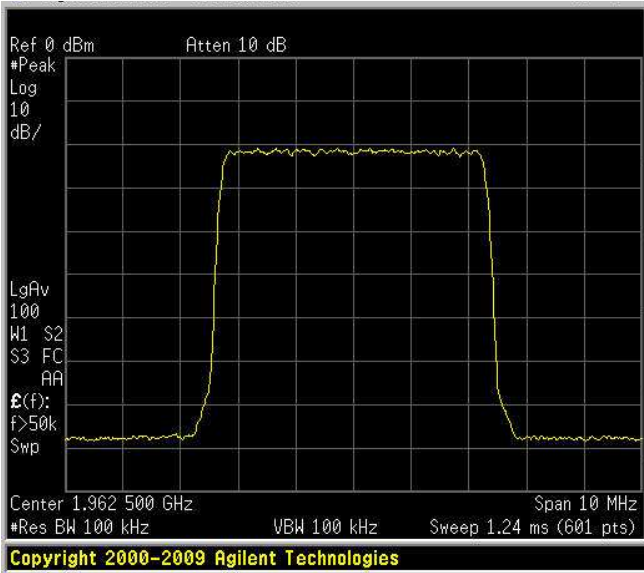


Test data

Occupied Bandwidth
Downlink – 5 QPSK
OUTPUT

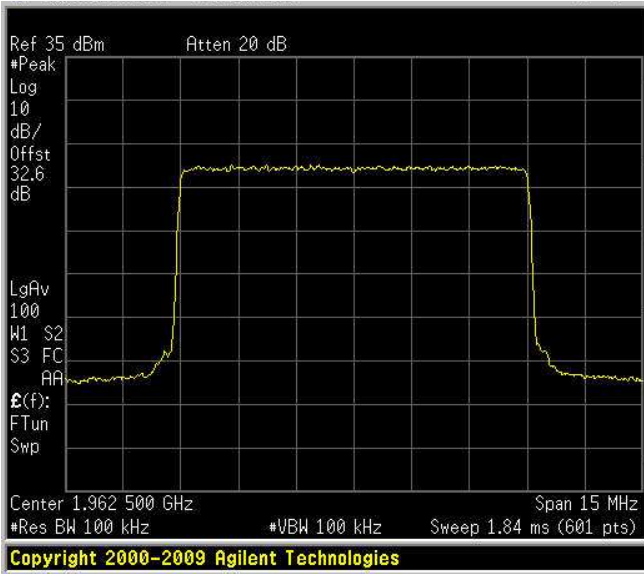


Occupied Bandwidth
Downlink – 5 QPSK
INPUT

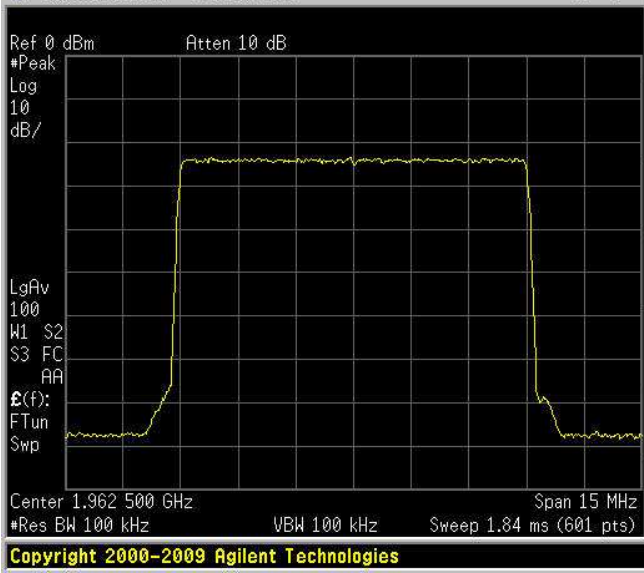


Test data

Occupied Bandwidth
Downlink – 10 QAM
OUTPUT

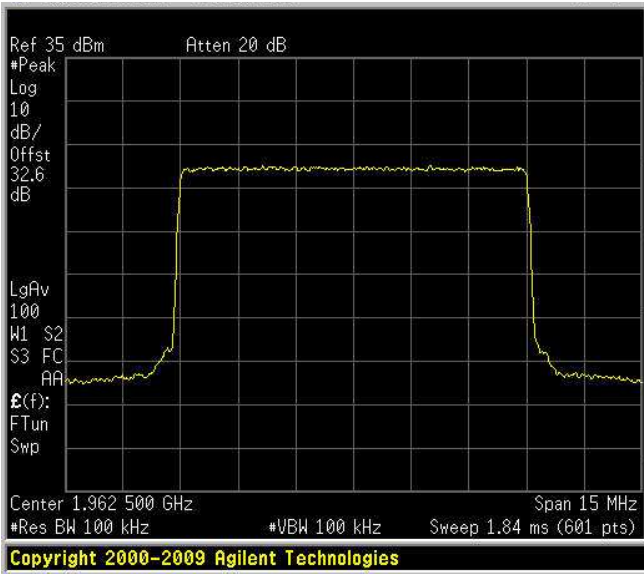


Occupied Bandwidth
Downlink – 10 QAM
INPUT

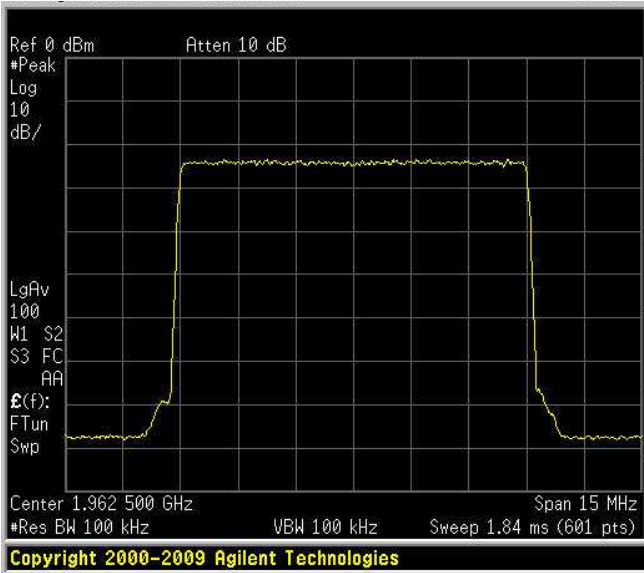


Test data

Occupied Bandwidth
Downlink – 10 QPSK
OUTPUT

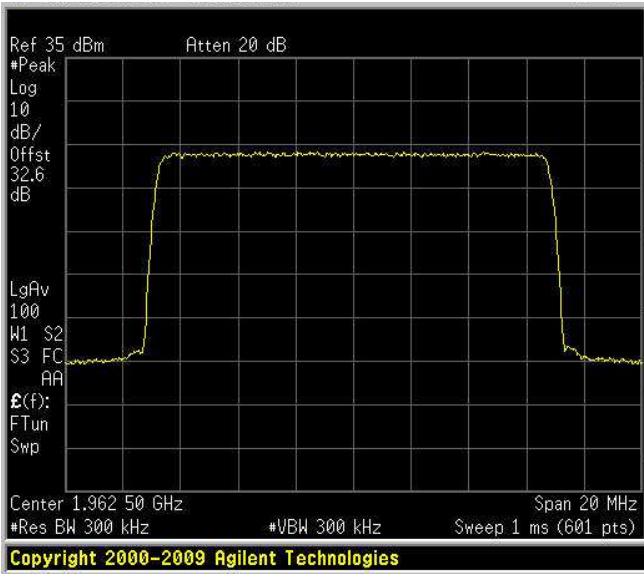


Occupied Bandwidth
Downlink – 10 QPSK
INPUT

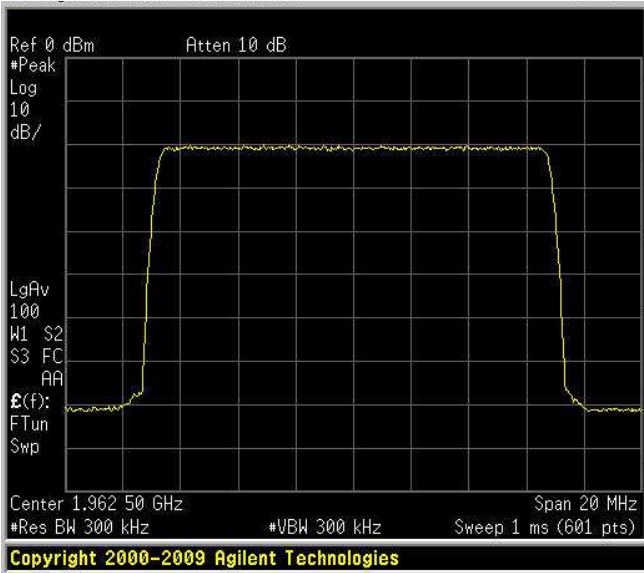


Test data

Occupied Bandwidth
Downlink – 15 QAM
OUTPUT

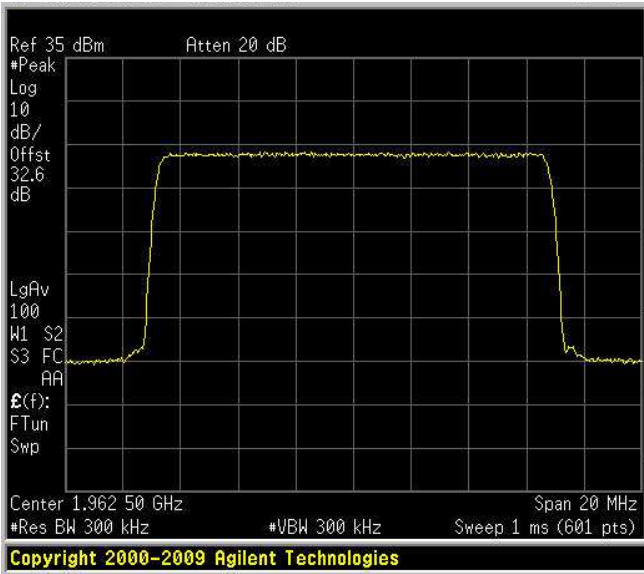


Occupied Bandwidth
Downlink – 15 QAM
INPUT

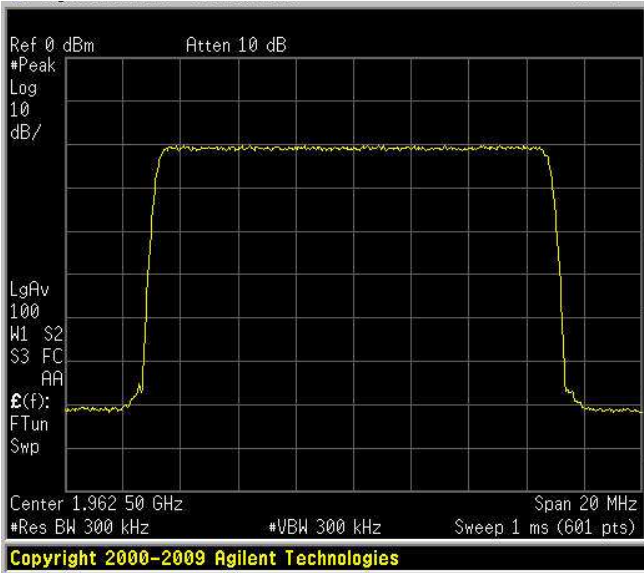


Test data

Occupied Bandwidth
Downlink – 15 QPSK
OUTPUT

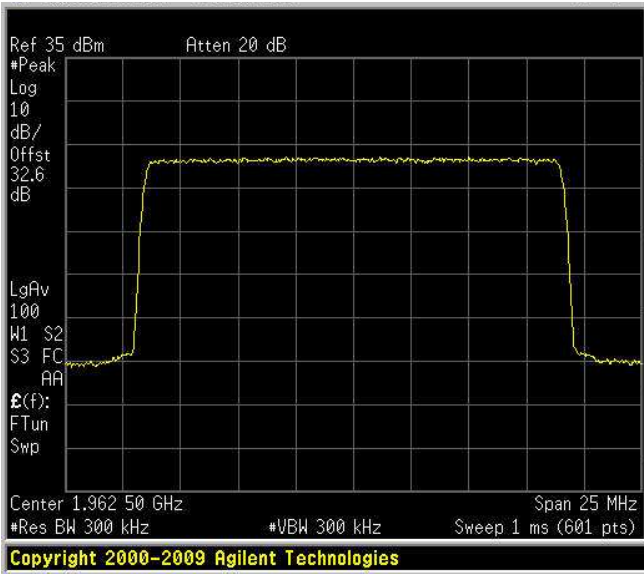


Occupied Bandwidth
Downlink – 15 QPSK
INPUT

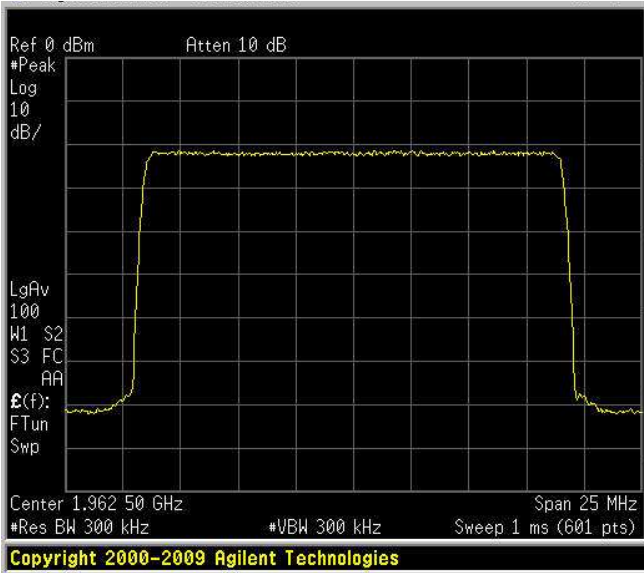


Test data

Occupied Bandwidth
Downlink – 20 QAM
OUTPUT

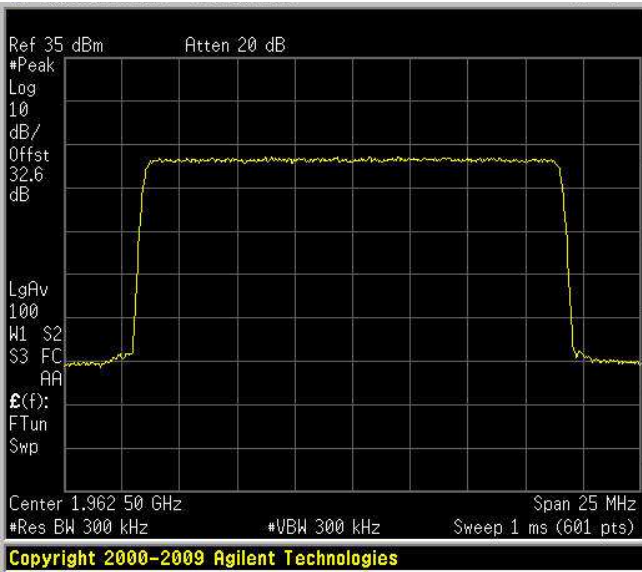


Occupied Bandwidth
Downlink – 20 QAM
INPUT

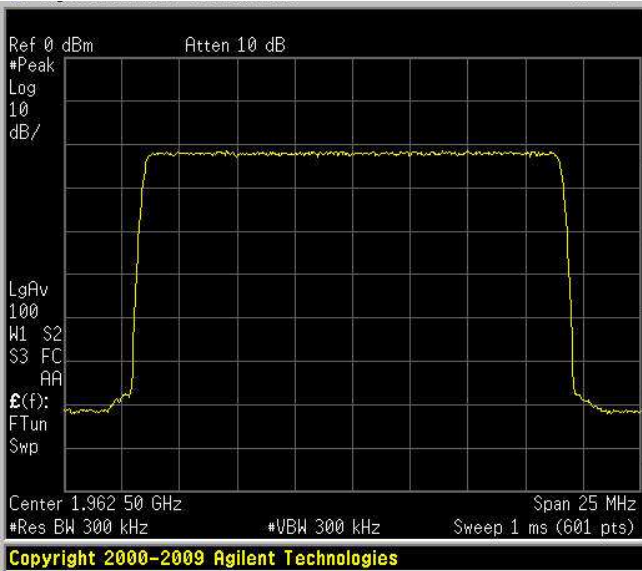


Test data

Occupied Bandwidth
Downlink – 20 QPSK
OUTPUT

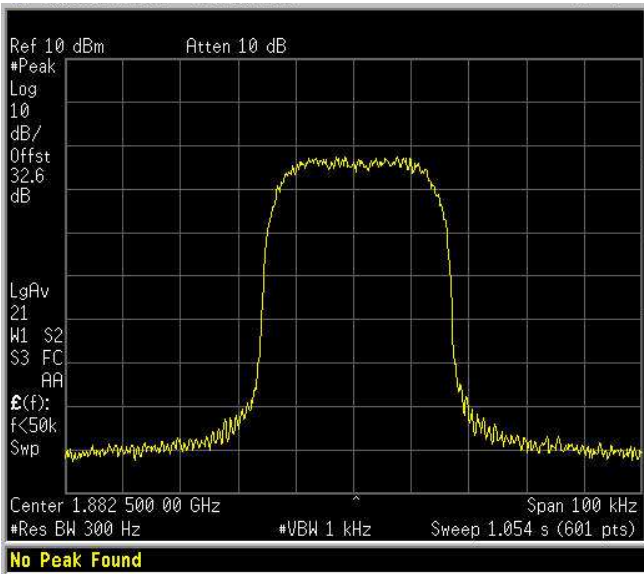


Occupied Bandwidth
Downlink – 20 QPSK
INPUT

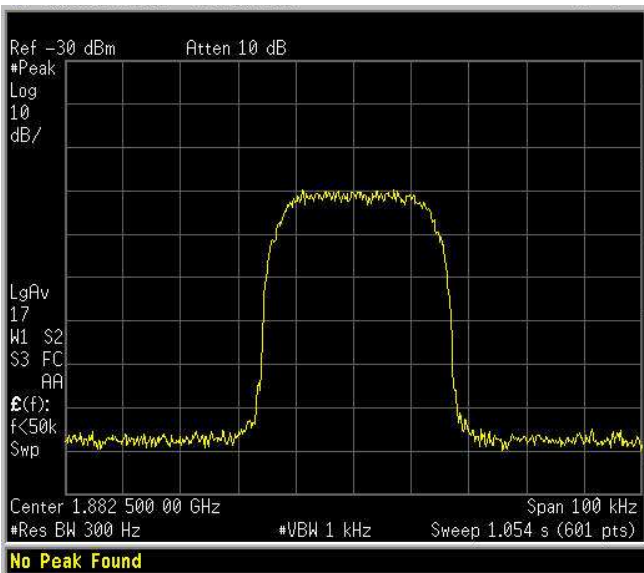


Clause 24.238(b) Occupied bandwidth, continued

Occupied Bandwidth
Uplink – 30 kHz TDMA
OUTPUT



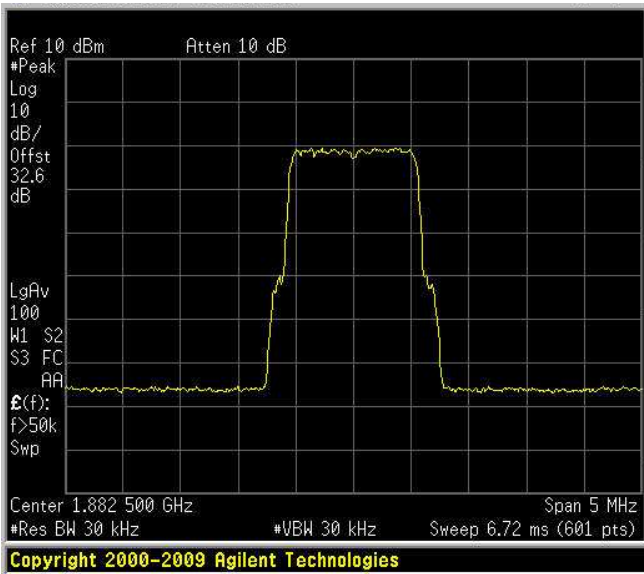
Occupied Bandwidth
Uplink – 30 kHz TDMA
INPUT



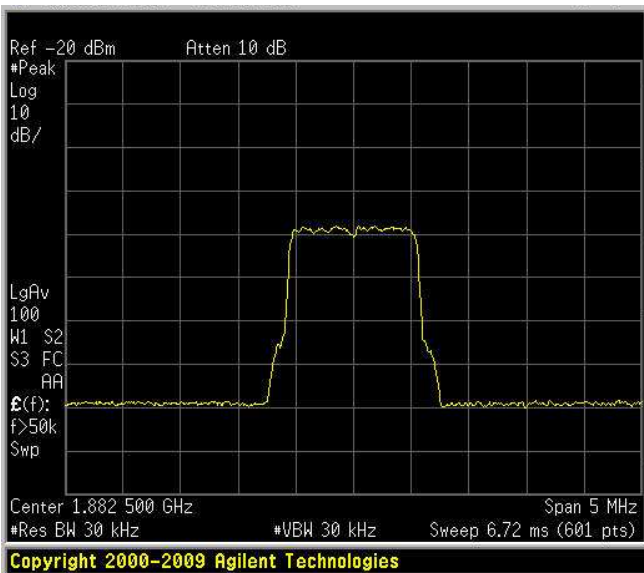
Clause

Occupied bandwidth (input/output), continued

Occupied Bandwidth
Uplink – 1.4 QAM
OUTPUT

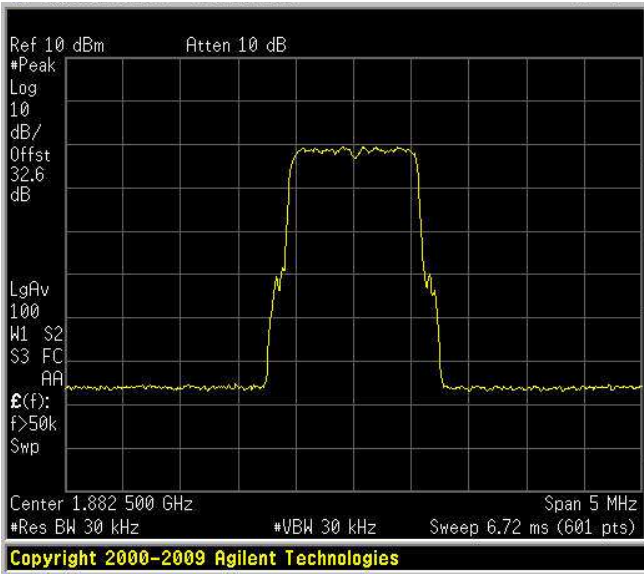


Occupied Bandwidth
Uplink – 1.4 QAM
INPUT

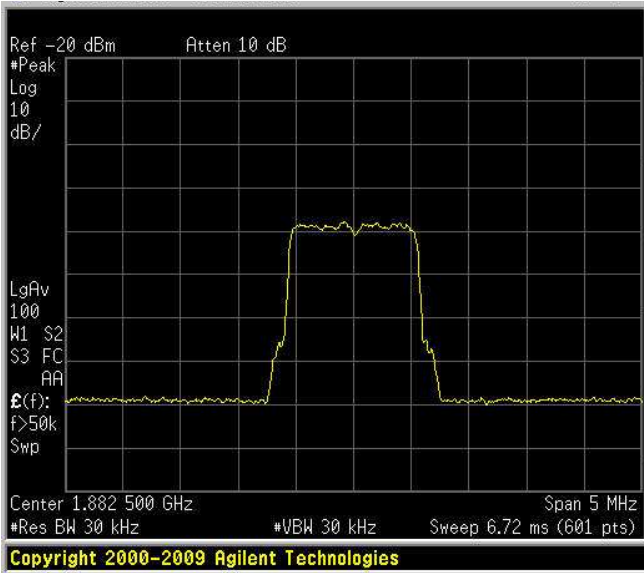


Test data, continued

Occupied Bandwidth
Uplink – 1.4 QPSK
OUTPUT

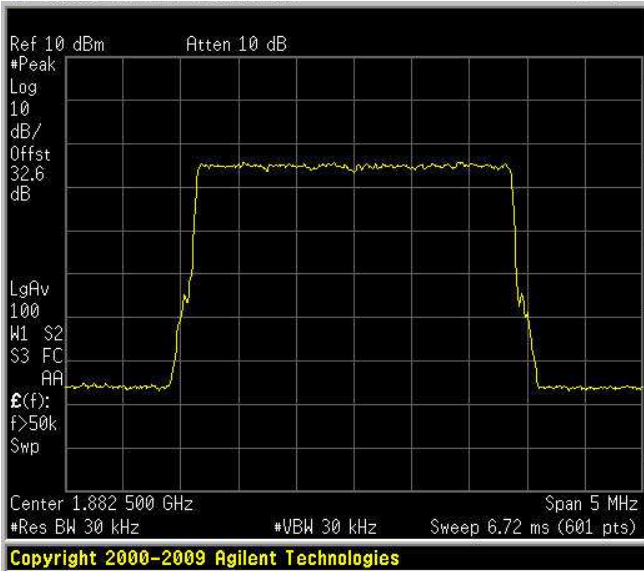


Occupied Bandwidth
Uplink – 1.4 QPSK
INPUT

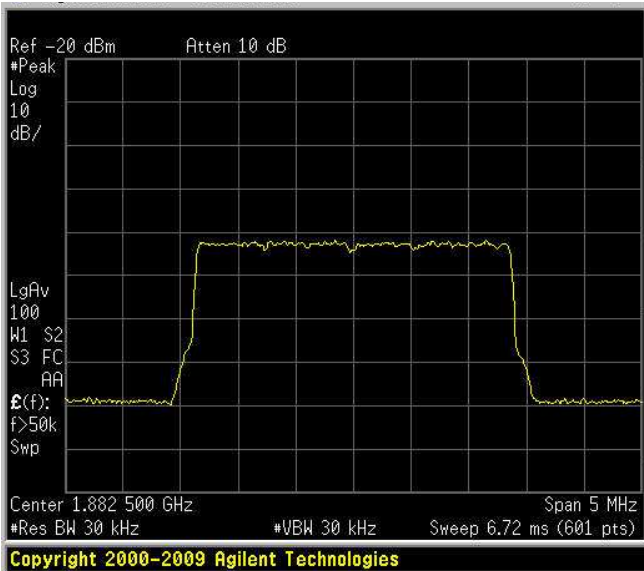


Test data

Occupied Bandwidth
Uplink – 3 QAM
OUTPUT

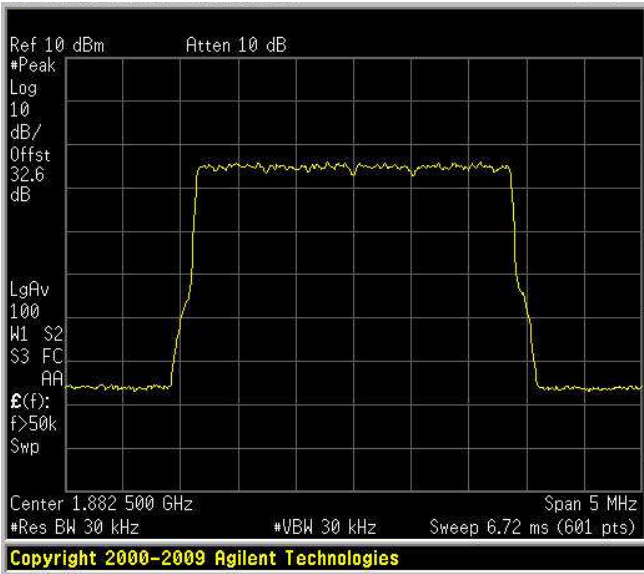


Occupied Bandwidth
Uplink – 3 QAM
INPUT

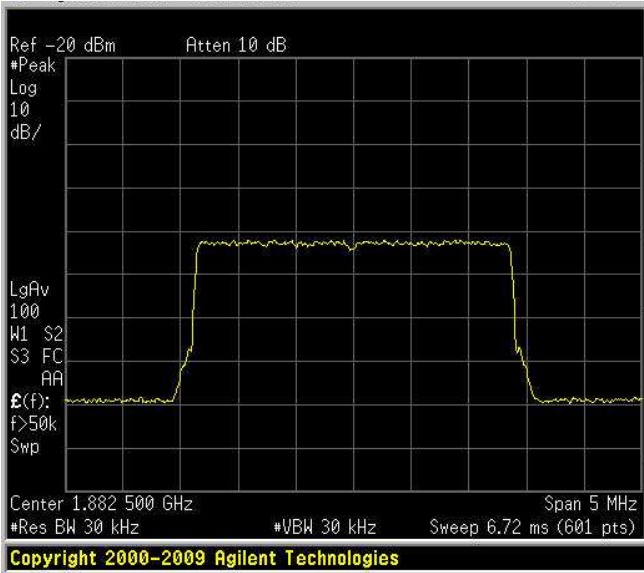


Test data

Occupied Bandwidth
Uplink – 3 QPSK
OUTPUT

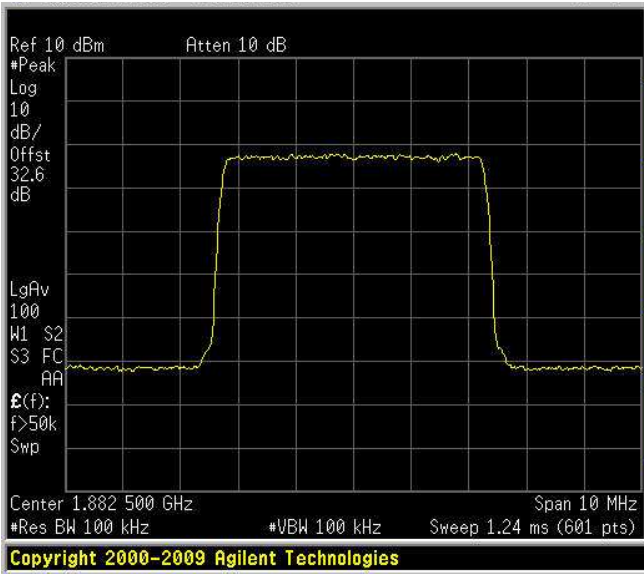


Occupied Bandwidth
Uplink – 3 QPSK
INPUT

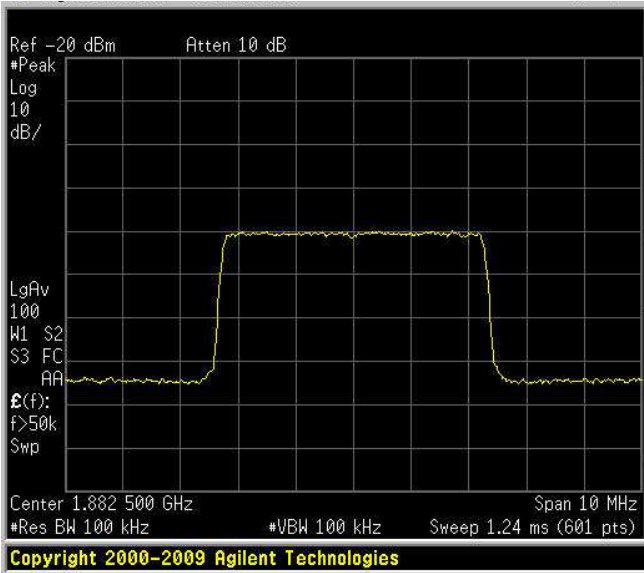


Test data

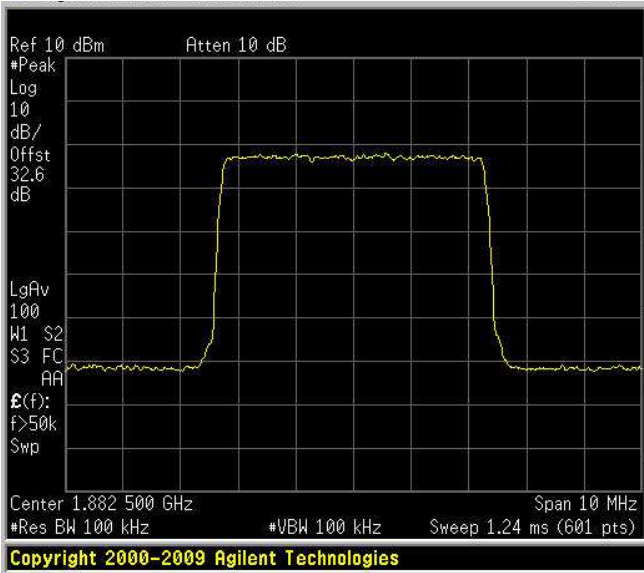
Occupied Bandwidth
Uplink – 5 QAM
OUTPUT



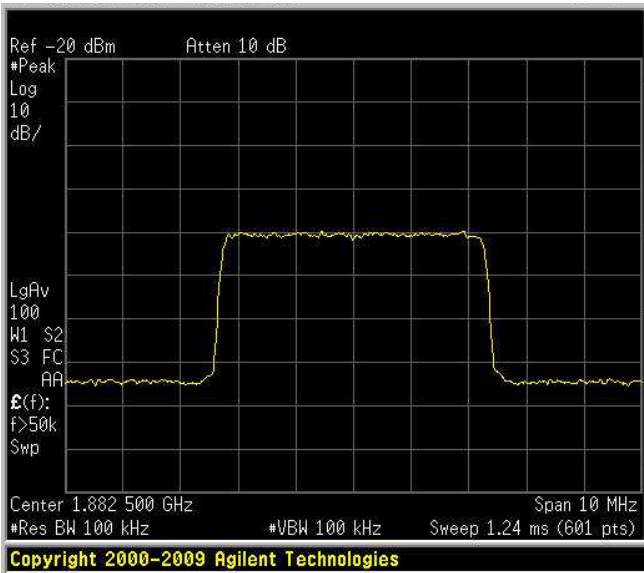
Occupied Bandwidth
Uplink – 5 QAM
INPUT



Occupied Bandwidth
Uplink – 5 QPSK
OUTPUT

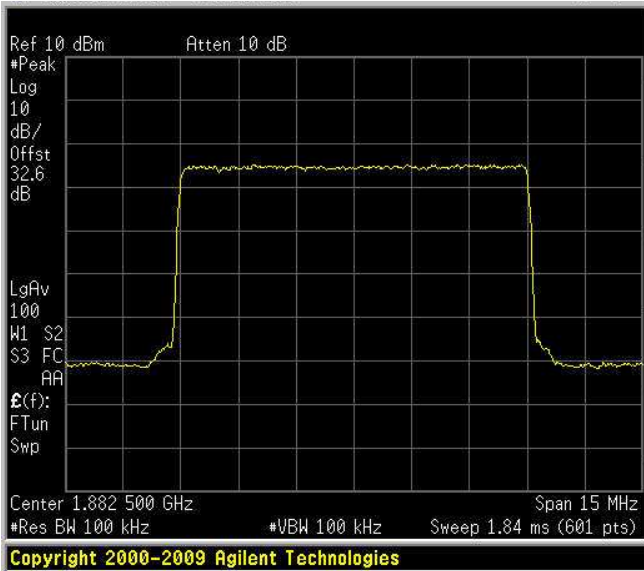


Occupied Bandwidth
Uplink – 5 QPSK
INPUT

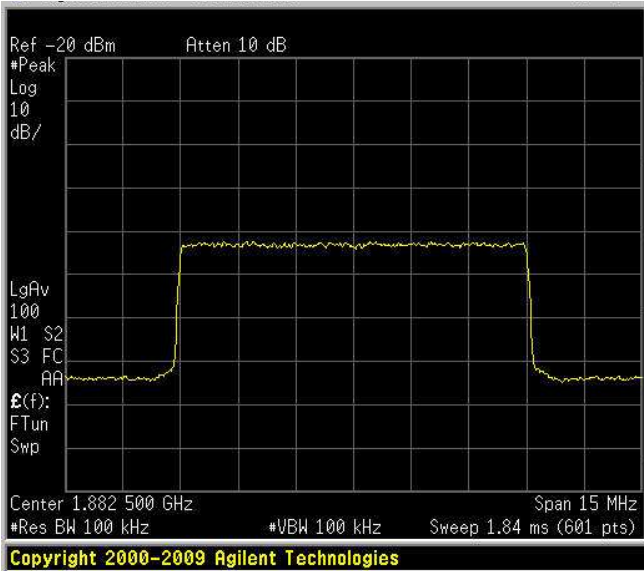


Test data

Occupied Bandwidth
Uplink – 10 QAM
OUTPUT

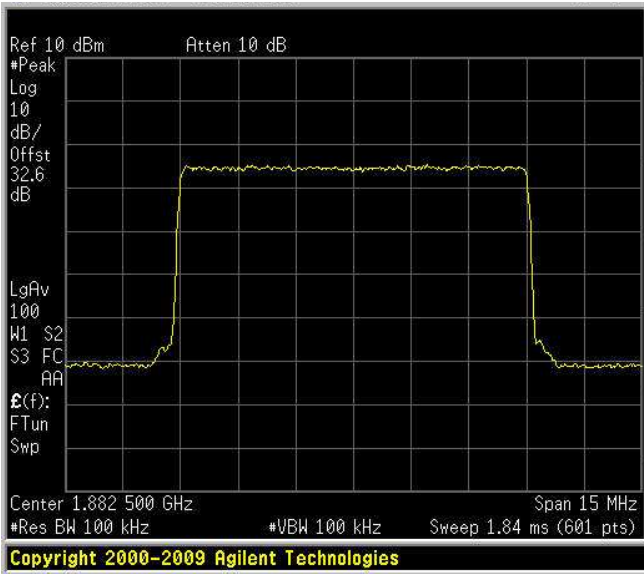


Occupied Bandwidth
Uplink – 10 QAM
INPUT

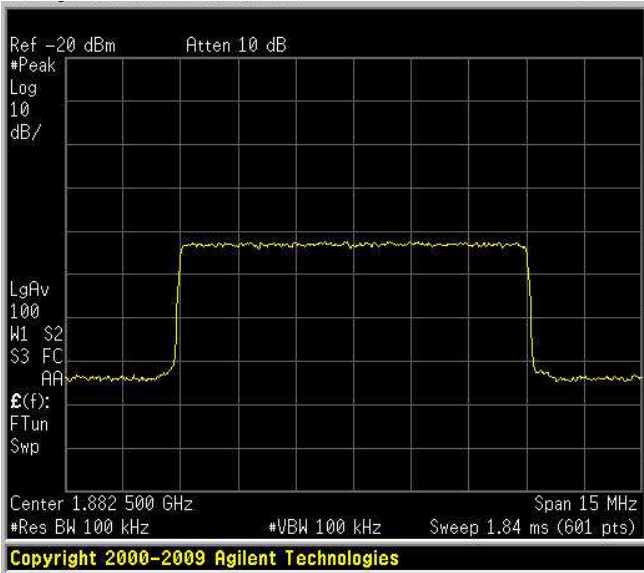


Test data

Occupied Bandwidth
Uplink – 10 QPSK
OUTPUT

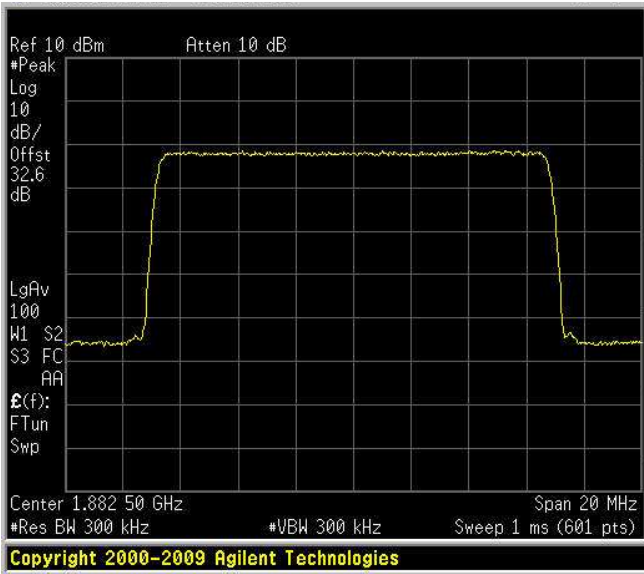


Occupied Bandwidth
Uplink – 10 QPSK
INPUT

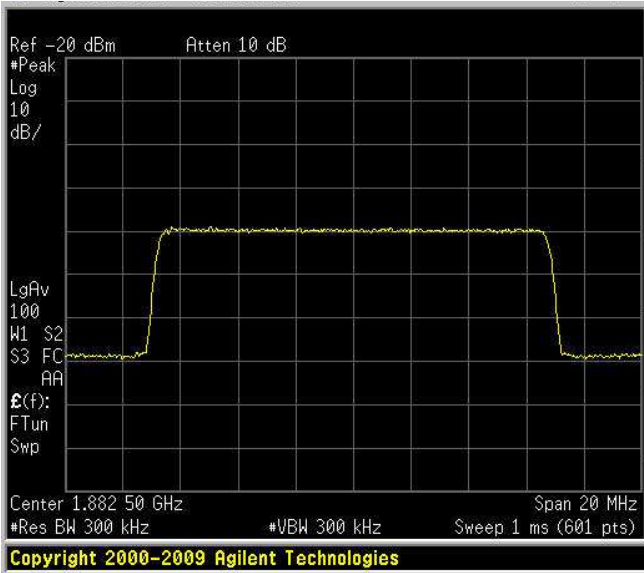


Test data

Occupied Bandwidth
Uplink – 15 QAM
OUTPUT

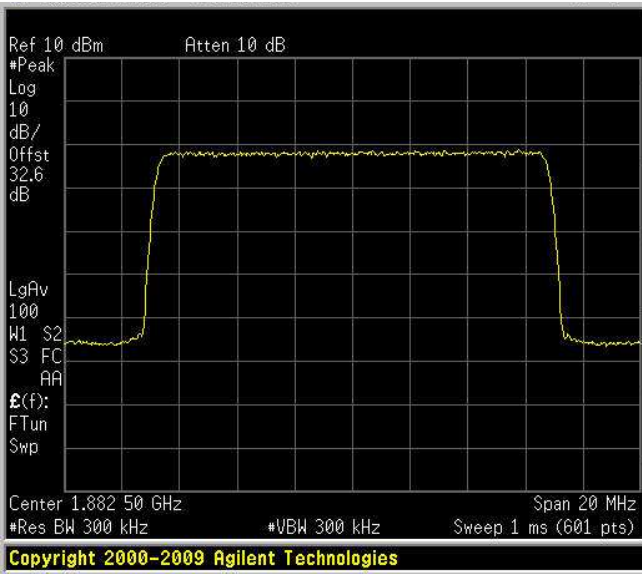


Occupied Bandwidth
Uplink – 15 QAM
INPUT

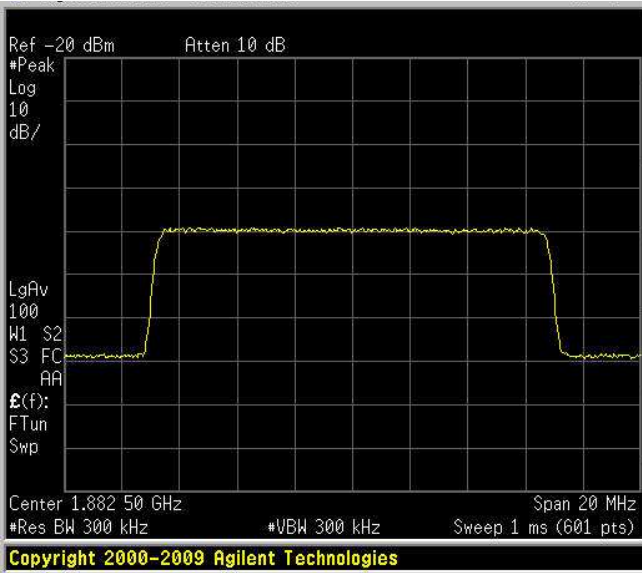


Test data

Occupied Bandwidth
Uplink – 15 QPSK
OUTPUT

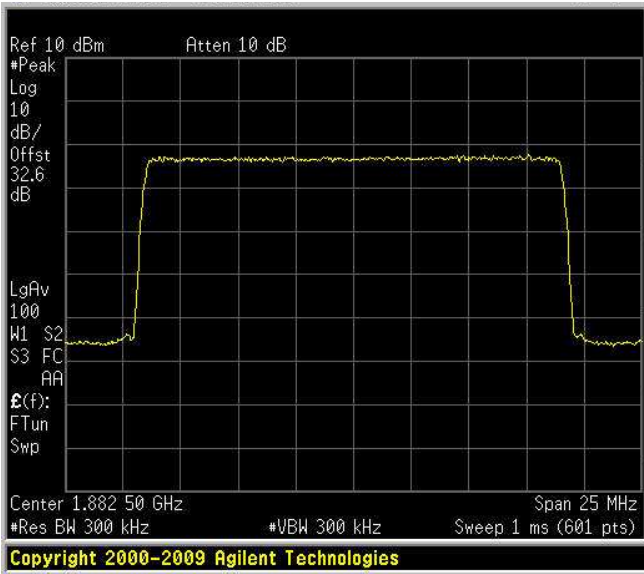


Occupied Bandwidth
Uplink – 15 QPSK
INPUT

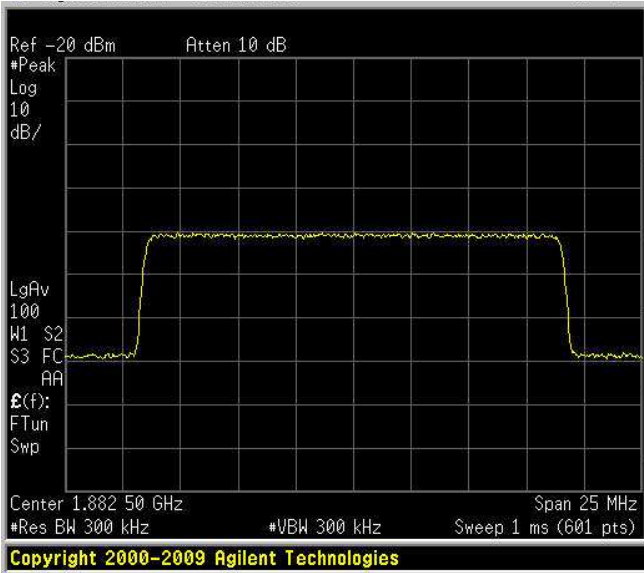


Test data

Occupied Bandwidth
Uplink – 20 QAM
OUTPUT

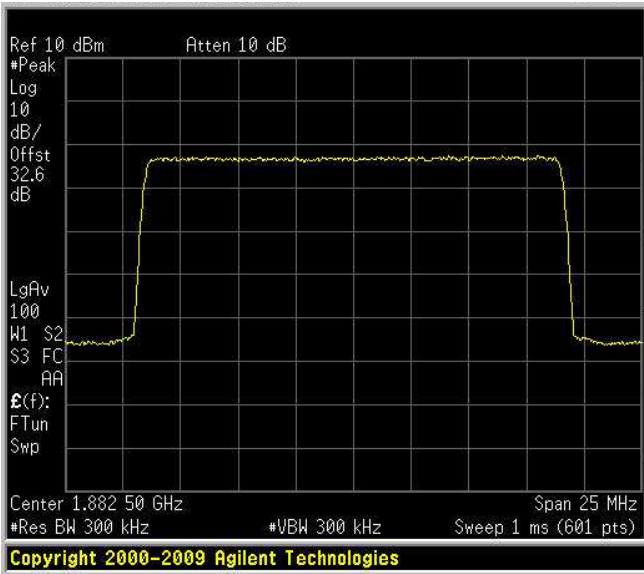


Occupied Bandwidth
Uplink – 20 QAM
INPUT

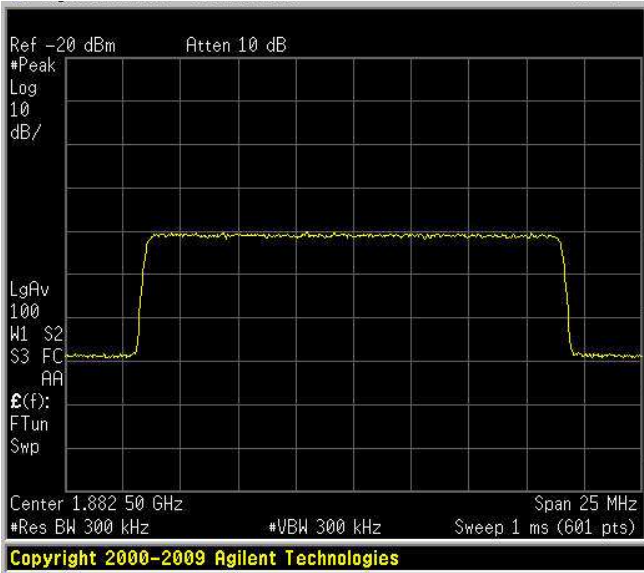


Test data

Occupied Bandwidth
Uplink – 20 QPSK
OUTPUT



Occupied Bandwidth
Uplink – 20 QPSK
INPUT



To be Continued