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Report: 07CA20581-FCC
Date: June 07, 2007
Model: SKSN-I30-CO

Electromagnetic Compatibility Test Report

FCC Certification 47 CFR Part 90 Subpart I

For

SK Telesys Co.,Ltd.

**12F, Chorim Bldg. 6-3, Sunae-Dong,
Buandang-Gu, Seongnam, Gyeonggi-Do,
463-825, Korea**

UL Korea Ltd.

33rd Fl. Star Tower, 737 Yeoksam-Dong, Kangnam-Gu, Seoul, 135-984, Korea
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Report Directory

1.	GENERAL - Product Description	5
1.1	Equipment Description	5
1.2	Equipment	6
1.3	Equipment Marking Plate	6
2.	Test Conditions	7
2.1	Equipment Used During Test	7
2.2	Input/Output Ports	7
2.3	Test Equipments used	8
2.4	Power Interface	8
2.5	EUT Internal Operating Frequencies	8
2.6	EUT Operation Modes	9
2.7	EUT Operating Frequencies	9
2.8	Test Signal Source	9
2.9	EUT Configurations	10
2.10	Test Lab Environmental Condition	11
2.11	Test Specifications	12
2.12	Test Laboratory Details	12
3.	Test Results	13
3.1	Test Conditions and Results – Conducted emissions at mains terminal	13
3.2	Test Conditions and Results – Radiated Emissions	18
3.3	Test Conditions and Results – RF Power Output	22
3.4	Test Conditions and Results – Occupied Bandwidth	34
3.5	Test Conditions and Results – Emission Mask	54
3.6	Test Conditions and Results – Spurious Emission at Antenna Terminal	65
3.7	Test Conditions and Results – Radiated Spurious Emission	95
3.8	Test Conditions and Results – Frequency Stability	99

Test Report Details :

Tests Performed By:	UL Korea Ltd. 33 rd FL. Star Tower 737 Yeoksam-dong, Kangnam-ku, Seoul, 135-984, Korea
Test Site:	BWS Tech Inc. 683-3, Yubang-Dong, Yongin-Si, Kyunggi-Do, Korea, 449-080 FCC Registration No. : 553281
Tests Performed For:	SK Telesys Co.,Ltd. 12F, Chorim Bldg. 6-3, Sunae-Dong, Buandang-Gu, Seongnam, Gyeonggi-Do, 463-825, Korea
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Test Report Number:	07CA20581-FCC
Test Report Date:	Apr. 30, 2007
Equipment Class:	TNB - Licensed Non-Broadcast Station Transmitter
Product Type:	iDEN RF Repeater
Model Number:	SKSN-I30-CO
FCC ID:	VAWSKSN-I30-CO
Test standards	47 CFR Part 90 Subpart I & Part 15 Subpart B
Sample Serial Number:	07C000010742
Sample Receive Date:	2007-04-11
Testing Start Date:	2007-04-11
Date Testing Complete:	2007-04-12
Overall Results:	Pass

UL Korea as an affiliate of Underwriters Laboratories Inc. EMC report apply only to the specific test samples and test results submitted for UL's review. All samples tested were in good operating condition throughout the entire test program. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. UL Korea Ltd. shall have no liability for any deductions, inferences or generalizations drawn by the client or others from UL Korea Ltd. issued reports. This report shall not be used to claim, constitute or imply product certification, approval, or any agency of the National Authorities. This report may contain test results that are not covered by the NVLAP or KOLAS accreditation.

Summary of Testing:

The following tests were performed on a sample submitted for evaluation of compliance with 47 CFR Part 90 Subpart I and Part 15 Subpart B.

Test #	Test Name Test Requirement/Specification	Compliant	Not Compliant	See Remark
1	Part 15, Subpart B Section 15.109(a)/ CISPR 22:1997 Class A Radiated Emissions - 30 to 1000 MHz Electric Field	X	-	2
2	Part 15, Subpart B Section 15.107(a) / CISPR 22:1997 Class A Conducted Emissions	X	-	2
3	Section 2.1046 & 90.205 RF Power Output	X		
4	Section 2.1047 & 90.212 Audio Frequency Response	-	-	1
5	Section 2.1047 Modulation Limiting	-	-	1
6	Section 2.1047 & 90.209 Occupied Bandwidth	X		
7	Section 2.1051 & 90.210, 90.669 Spurious Emission at antenna terminal	X		
8	Section 2.1053 & 90.210 Radiated Spurious Emission	X		
9	Section 2.1055 & 90.213 Frequency Stability	X		
10	Out of band Rejection	X		
11	RF Exposure			3

Remarks:

- 1) Not applicable to this EUT.
- 2) Emissions Data can also be considered applicable to FCC Part 15 Subpart A.
- 3) RF Exposure will be addressed at the time of licensing.
- 4) Modifications to EUT required for compliance: NONE.

Conclusion:

The tests listed in the Summary of Testing section of this report have been performed and the results recorded by UL Korea Ltd. in accordance with the procedures stated in each test requirement and specification. The test list was determined by the Applicant as being applicable to the Equipment Under Test. As a result, the subject product has been verified to comply or not comply as noted in the Summary of Testing with each test specification. The test results relate only to the items tested.

Tested By:

Reviewed By:



Kyung Yong, Kim
EMC Engineer
UL Korea Ltd.



Jea Woon, Choi
EMC Engineer
UL Korea Ltd.

1. G E N E R A L - Product Description

1.1 Equipment Description

The SK telesys SKSN-I30-CO is an dual band bi-directional RF signal amplifier system for the wireless SMR 800 MHz and 900 MHz iDEN spectrum bands. The iDEN (Integrated Digital Enhanced Network) RF repeater is a RF repeater for indoor use using a frequency band of iDEN networks. This dual band RF repeater is designed to be elastically applicable to frequency of iDEN band, is excellent in frequency selection levels of frequency bandwidth to service of down links and up links through an up/down converter module, and minimizes interference in other signals.

- Basic model tested : SKSN-I30-CO
- Model covered : SKSN-I30-CM , SKSN-I30-NO

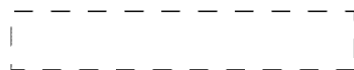
Items		Standards
Frequency Range	800MHz band	Downlink : 851~869MHz , Uplink : 806~824MHz Downlink : 862~869MHz , Uplink : 817~824MHz
	900MHz band	Downlink : 935~940MHz , Uplink : 896~901MHz
Output Power per channel / Amplifier Gain		30dBm / 80dB
Modulation		QAM
Emission Designator		GXW(iDEN)
Input Level		-20 ~ -50dBm / Total
Gain Control Range		30 dB(1dB/Step±0.5dB or less
Out of band paging carrier rejection		929~932MHz(3MHz), 940~941MHz(1MHz)
Input/output connector		50Ω N-Type (Female)
Cabinet		Indoor type
Size (H*W*D)		390*326*240 mm
Working temperature/ working humidity		-10℃ ~ 50℃ / 5 % ~ 95%
Power		108 ~ 127 VAC, 60Hz

1.2 Equipment



1.3 Equipment Marking Plate

PRODUCT NAME : iDEN Repeater
MODEL : SKSN-I30-CO



S/N : TSKAABBB1234

PRODUCTION DATE : 2007. 5

MANUFACTURER : **SK** telesys

MADE IN KOREA

Customer Service : Call 1-888-758-7002, or

Send e-mail to service@sktelesys.com



E312829

I.T.E.

3LBK

INPUT : 120V~, 60Hz, 2.8A

FCC ID : VAWSKSN-I30-CO

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions : (1) This device may not cause harmful interference and (2) This device must accept any interference received, including interference that may cause undesired operation.

2. Test Conditions

2.1 Equipment Used During Test

Use*	Product Type	Manufacturer	Model	Comments
EUT	iDEN Repeater	SK Telesys	SKCN-I30-CO	Indoor metal enclosure
AE	RF Load	Bird	8173	Coaxial Load S/N : 2501
AE	RF Attenuator	Bird	8325	Coaxial Attenuator S/N : 4572
SIM	Notebook PC	DELL	PP17L	For Frequency tune up
Note: * EUT - Equipment Under Test, AE - Auxiliary/Associated Equipment, or SIM - Simulator (Not Subjected to Test)				

2.2 Input/Output Ports

Port #	Name	Type*	Cable Max. >3m (Y/N)	Cable Shielded (Y/N)	Comments
0	Enclosure	N/E	—	—	Metal cabinet type (indoor purpose)
1	Mains (AC input)	AC	< 3m	N	Cable length (1m)
2	Antenna port (Donor)	RF	N	Y	Connected to RF Load
3	Antenna port (Service)	RF	N	Y	Connected to RF Load
4	Coupling Port	RF	-	-	No use : Maintenance purpose only
5	Coupling Port	RF	-	-	No use : Maintenance purpose only
Note: *AC = AC Power Port DC = DC Power Port N/E = Non-Electrical I/O = Signal Input or Output Port (Not Involved in Process Control) TP = Telecommunication Ports					

2.3 Test Equipments used

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Signal Generator	Aeroflex	IFR3413	341006/212	2006-05-12	2007-05-12
Signal Generator	Aeroflex	IFR3413	341006/012	2006-09-26	2007-09-36
Spectrum Analyzer	Agilent	E4440A	MY44022474	2006-11-06	2007-11-06
Spectrum Analyzer	Agilent	E4440A	MY43362280	2005-10-06	2007-11-06
Fixed Attenuator	H.P	8498A	3318A10568	-	-
Fixed Attenuator	Microwave device	MA-530	2309	-	-

Note : E4440A : 3Hz~26.5GHz, IFR3413: 250kHz ~3GHz, Attn : 30dB

2.4 Power Interface

Mode #	Voltage (V)	Frequency (DC/AC-Hz)	Phases (#)	Comments
Rated	120Vac	60Hz	Single Phase	Nominal voltage
1	120Vac	60Hz	Single Phase	
2	108Vac	60Hz	Single Phase	Voltage variation (Nominal-15%)
3	138Vac	60Hz	Single Phase	Voltage variation (Nominal+15%)

2.5 EUT Internal Operating Frequencies

Frequency (MHz)	Description	Frequency (MHz)	Description

Note : The data has not been provided from the applicant.

2.6 EUT Operation Modes

Mode #	Description
1	Transmission mode : RF signal from the iDEN signal generator injected to the service port of the repeater and the amplified RF output signal from the Doner port of the repeater was connected to the RF Load.
2	Uplink mode : RF signal from the iDEN signal generator injected to the service port of the repeater and the amplified RF output signal from the Doner port of the repeater was connected to the Spectrum analyzer.
3	Downlink mode : RF signal from the iDEN signal generator injected to the Doner port of the repeater and the amplified RF output signal from the Service port of the repeater was connected to the Spectrum analyzer.

2.7 EUT Operating Frequencies

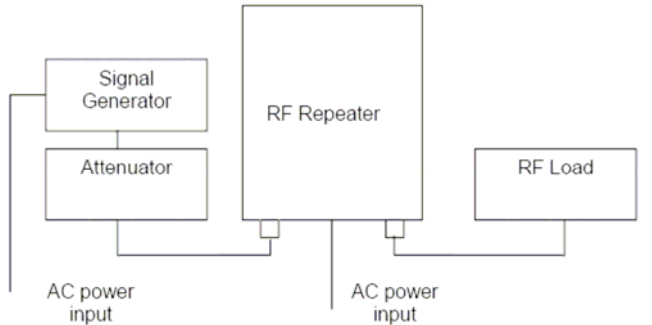
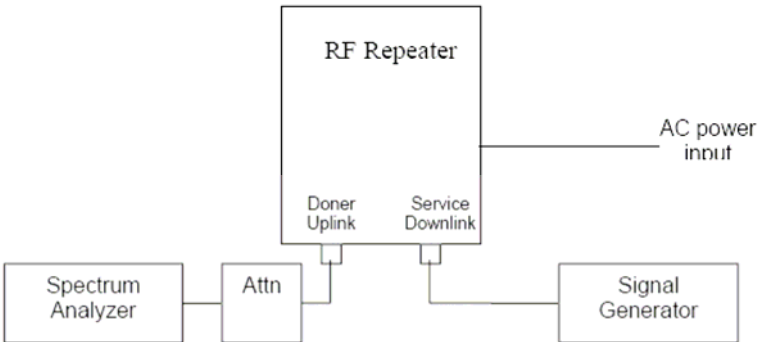
Mode #	Description
1	Uplink mode : 3 frequencies (Bottom, Mid, Top channel) for each frequency band -. 18 MHz band : 806 MHz, 815 MHz, 824 MHz -. 7 MHz band : 817 MHz, 820.5 MHz, 824 MHz -. 5 MHz band : 896 MHz, 898.5 MHz, 901 MHz
2	Downlink mode : 3 frequencies (Bottom, Mid, Top channel) for each frequency band -. 18 MHz band : 851 MHz, 860 MHz, 869 MHz -. 7 MHz band : 862 MHz, 865.5 MHz, 869 MHz -. 5 MHz band : 935 MHz, 937.5 MHz, 940 MHz

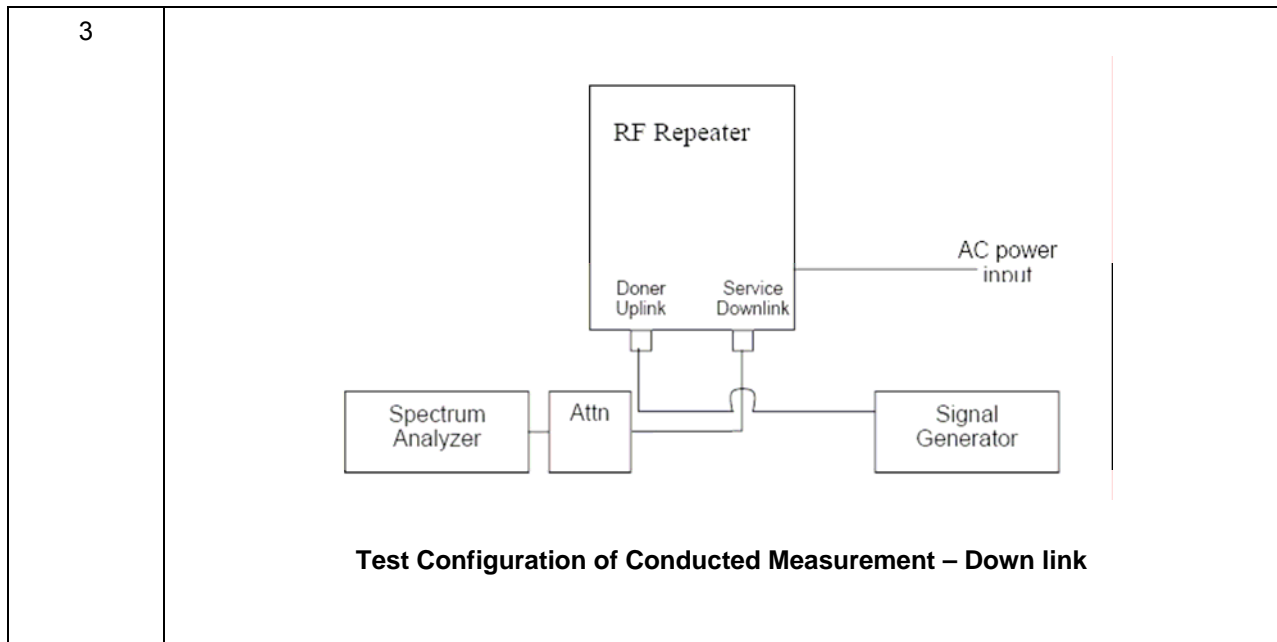
2.8 Test Signal Source

The carrier from the signal generator applied to the repeater was a Quadrature Amplitude Modulation(QAM)

- Baseband Modulation type : 16-QAM, 64 kbps Random Data Per Channel
- Baseband Channelization : 25 kHz
- Signal source sample rate : 640ks/sec
- No. of samples : 960,000
- RMS Value : 2907
- Crest factor : 9.475dB

2.9 EUT Configurations

Mode #	Description
1	 <p>Test Configuration of EMI Measurement</p> <p>-. Device on tabletop connected to AC power.</p>
2	 <p>Test Configuration of Conducted Measurement – Up link</p>



2.10 Test Lab Environmental Condition

Parameters required prior to the test	Laboratory Ambient Temperature	10 to 40 °C
	Relative Humidity	10 to 90 %
Parameters recorded during the test	Laboratory Ambient Temperature	25 °C
	Relative Humidity	40 %

2.11 Test Specifications

Standard Number	Standard Name	Standard Date
CFR 47 Part 90 Subpart I	General Technical Standards	2006
CFR 47 Part 15 Subpart B	General Technical requirements	2006
ANSI C63.4-2003	Methods of Measurements of Radio-Noise Emission from Low voltage and electrical equipment in the range of 9kHz~40GHz	2003
EIA/TIA-603 Edition C 2004	Land Mobile FM or PM communication equipment measurement and performance standards	2004
FCC 2-11-04	EAB/RF Amplifier, Booster, and Repeater reminder	2004

2.12 Test Laboratory Details

All the testing has been performed by UL Korea engineer at both test laboratories described below. The radiated spurious emission measurements were performed in a 10 meter open site which has been filed to the commission in accordance with section 2.948 at BWS Tech Inc.

Conducted RF Measurement Test Laboratory : SK Telesys Test Lab (Manufacturer's Test Lab)
Location : 12F, Chorim Bldg. 6-3, Sunae-Dong, Buandang-Gu, Seongnam, Gyeonggi-Do, 463-825, Korea.

Persons who have been presented during the test : Si Hwan, Sung (Research engineer / SK Telesys) Dae Kwang, Kim (Manager of R&D office/ SK Telesys), Jae Hyung, Kim (Manager of R&D office/ SK Telesys)

Radiated Emission Measurement Test Laboratory : BWS Tech Inc.
10 m Open Field Test Site (FCC Registration No. : 553281)
611-1, Maesan-ri, Mohyeon-myeon, Cheoin-gu, Yongin-si, Gyeonggi-do 449-853, Korea
Persons who have been presented during the test : Min sup, Shim (Senior test engineer)

3. Test Results

3.1 Test Conditions and Results – Conducted emissions at mains terminal

Test Description	Measurements were made on a ground plane. All power was connected to the system through Artificial Mains Network (AMN). Conducted voltage measurements on mains lines were made at the output of the AMN.	
Basic Standard	ANSI C63.4-2003, 47 CFR § 15.107	
Parameters required prior to the test	Laboratory Ambient Temperature	10 to 40 °C
	Relative Humidity	10 to 90 %
Parameters recorded during the test	Laboratory Ambient Temperature	25 °C
	Relative Humidity	40 %
	Frequency range on each side of line	Measurement Point
Fully configured sample scanned over the following frequency range	150kHz to 30MHz	Mains
Limits - Class A		
Frequency (MHz)	Limit (dBμV)	
	Quasi-Peak	Average
0.15 to 0.50	79	66
0.50 to 30	73	60
Limits - Class B		
Frequency (MHz)	Limit (dBμV)	
	Quasi-Peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Supplementary information: None		

Conducted Emissions EUT Configuration Settings

Power Interface Mode # (See Section 2.4)	EUT Configurations Mode # (See Section 2.9)	EUT Operation Mode # (See 2.6)
1	1	1

Supplementary information:
The EUT operation modes specified in Section 2.4 have been investigated and final measurement reported was performed with Uplink mode 18 MHz band Mid frequency(815MHz) as a worst case emission.

Conducted Emissions Test Equipment

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Signal Generator	Aeroflex	IFR3413	341006/012	2006-09-26	2007-09-26
LISN	COM-POWER	L1-115	241017	2006-11-13	2007-11-13
Signal Analyzer	PMM	PMM9000	3100570602	2006-09-22	2007-09-22

Figure 1 Test Setup for Conducted Emissions



Figure 2 Conducted Emissions Graph

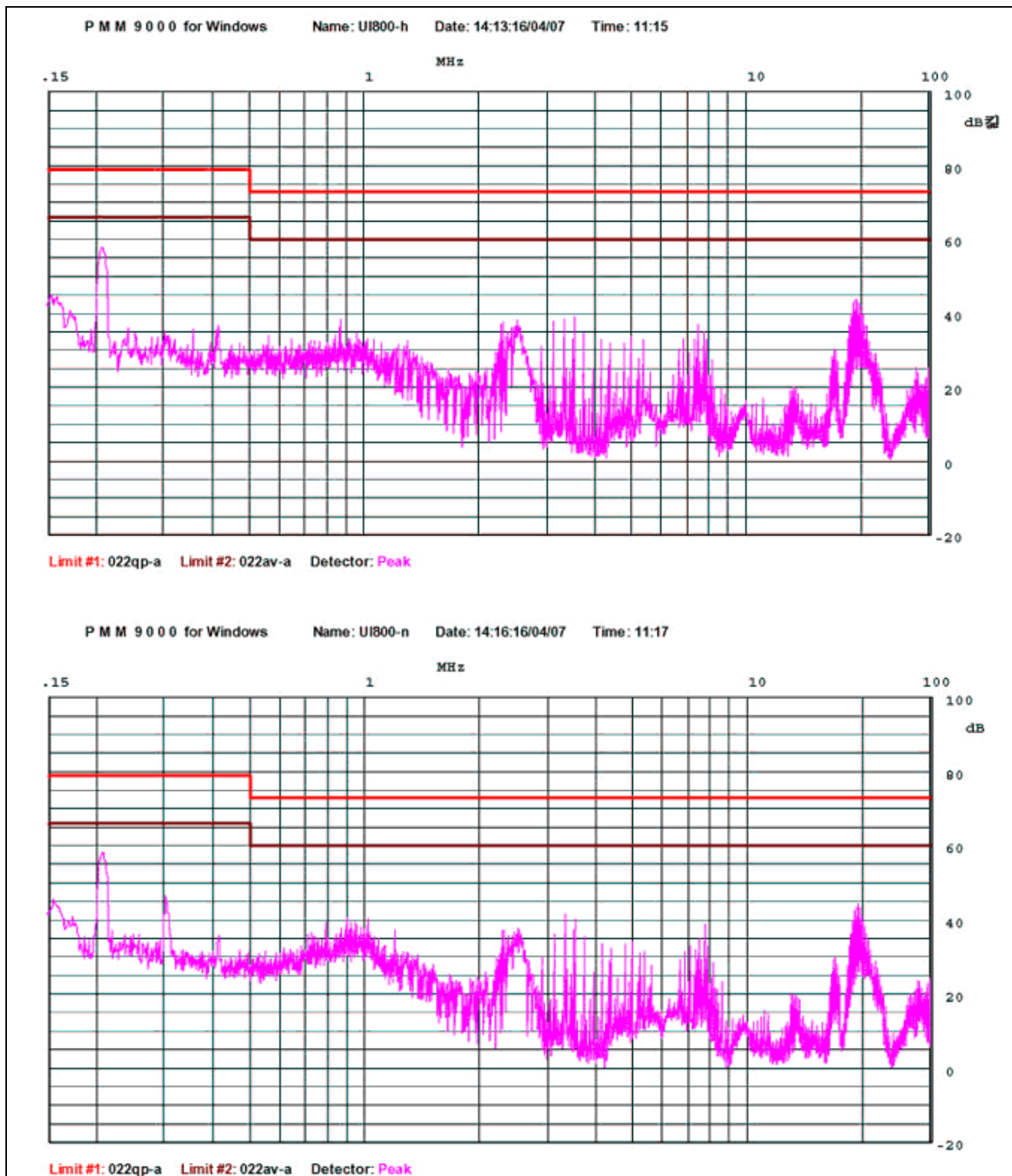


Table 1 Conducted Emissions Data Points

Test Frequency (MHz)	Meter Reading (dBuV)	Detector (Pk/QP/Av)	Gain/Loss Factor (dB)	Transducer Factor(dB)	Level (dBuV)	QP Limit (dBuV)	Ave Limit (dBuV)	Margin (dB)
0.159	47.2	QP	0.03	0.06	47.3	79.0	66.0	31.8
0.206	58.3	QP	0.10	0.07	58.5	79.0	66.0	20.7
0.238	39.3	QP	0.22	0.08	39.6	79.0	66.0	39.7
0.414	39.4	QP	0.26	0.08	39.7	79.0	66.0	39.6
0.929	35.4	QP	0.33	0.06	35.8	73.0	60.0	37.6
2.283	32.2	QP	0.57	0.03	32.8	73.0	60.0	40.8
8.020	32.6	QP	0.99	0.05	33.6	73.0	60.0	40.4
19.540	35.7	QP	1.35	0.06	37.11	73.0	60.0	37.3
Supplementary information: -. Line polarity : HOT -. Margin = QP Limit - Level								

Test Frequency (MHz)	Meter Reading (dBuV)	Detector (Pk/QP/Av)	Gain/Loss Factor (dB)	Transducer Factor(dB)	Level (dBuV)	QP Limit (dBuV)	Ave Limit (dBuV)	Margin (dB)
0.154	42.8	QP	0.03	0.06	42.9	79.0	66.0	36.2
0.206	57.9	QP	0.10	0.07	58.1	79.0	66.0	21.1
0.236	37.5	QP	0.22	0.08	37.8	79.0	66.0	41.5
0.410	37.9	QP	0.26	0.08	38.2	79.0	66.0	41.1
0.919	35.0	QP	0.33	0.06	35.4	73.0	60.0	38.0
2.468	31.5	QP	0.57	0.03	32.1	73.0	60.0	41.5
8.030	29.6	QP	0.99	0.05	30.6	73.0	60.0	43.4
19.930	37.2	QP	1.35	0.06	38.6	73.0	60.0	35.8
Supplementary information: -. Line polarity : Neutral -. Margin = Class A QP Limit - Level								

3.2 Test Conditions and Results – Radiated Emissions

Test Description	Measurements were made in a 10-meter open field test site that complies to CISPR 16/ANSI C63.4. Preliminary (peak) measurements were performed at semi anechoic chamber with antenna to EUT separation distance of 3 meter. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in both horizontal and vertical polarities. Final measurements (quasi-peak or average as noted) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4-meters. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.	
Basic Standard	ANSI C63.4-2003, 47 CFR § 15.107 Class A	
Parameters required prior to the test	Laboratory Ambient Temperature	10 to 40 °C
	Relative Humidity	10 to 90 %
Parameters recorded during the test	Laboratory Ambient Temperature	27 °C
	Relative Humidity	47 %
	Frequency range	Measurement Point
Fully configured sample scanned over the following frequency range	30MHz – 1GHz	(10 meter measurement distance)
Limits - Class A		
Frequency (MHz)	Limit (dBµV/m)	
	Quasi-Peak	Average
30 to 230	40	NA
230 to 1000	47	NA
Limits - Class B		
Frequency (MHz)	Limit (dBµV/m)	
	Quasi-Peak	Average
30 to 230	30	NA
230 to 1000	37	NA
Supplementary information:		

Radiated Emissions EUT Configuration Settings

Power Interface Mode # (See Section 2.4)	EUT Configurations Mode # (See Section 2.9)	EUT Operation Mode # (See Section 2.6)
Rated	1	1
Supplementary information: The EUT operation modes specified in Section 2.4 have been investigated and final measurement reported was performed with Uplink mode 18 MHz band Mid frequency(815MHz) as a worst case emission.		

Radiated Emissions Test Equipment

Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Bilog Antenna	Schwarzbwck	VULB9160	9160-3122	2006-12-29	2007-12-29
Test Receiver	Rohde & Schwarz	ESVN30	832854/010	2005-06-22	2006-06-22
Signal Generator	Aeroflex	IFR3413	341006/012	2006-09-26	2007-09-26
Horn Antenna	Schwarzbeck	BBHA 9120D	234	2007-02-08	2008-02-08
Test Receiver	Rohde & Schwarz	ESPI	100063	2006-11-09	2007-11-09

Figure 3 Test setup for Radiated Emissions

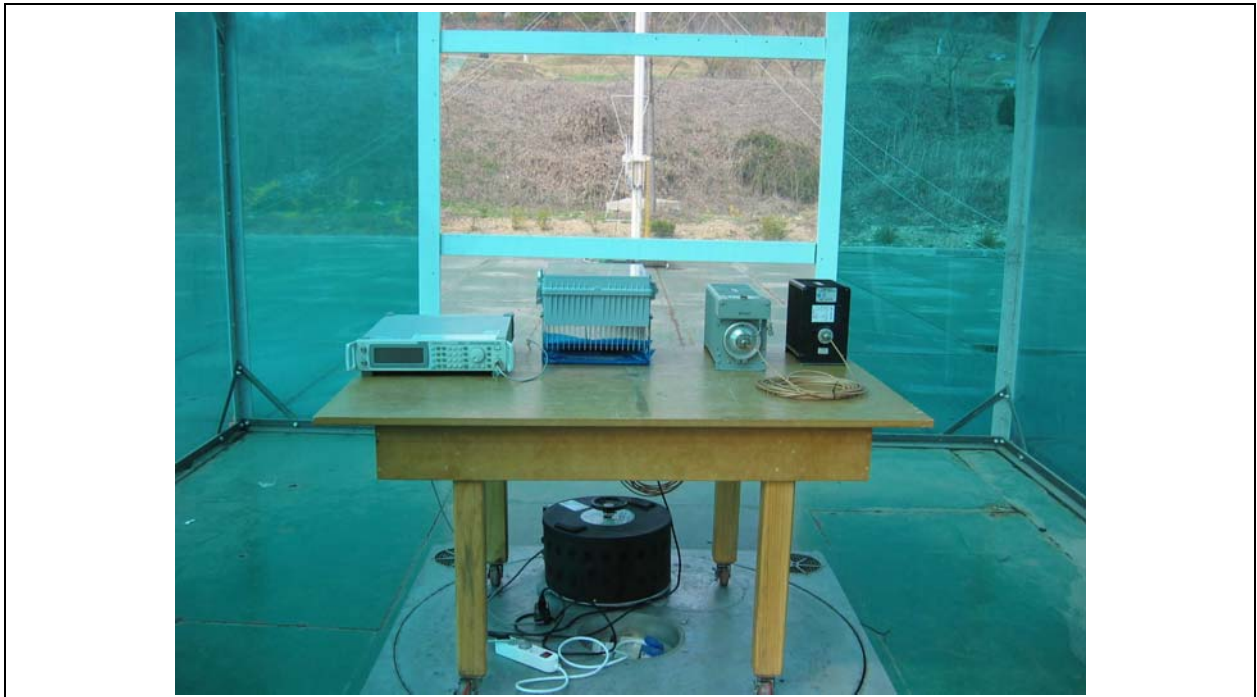
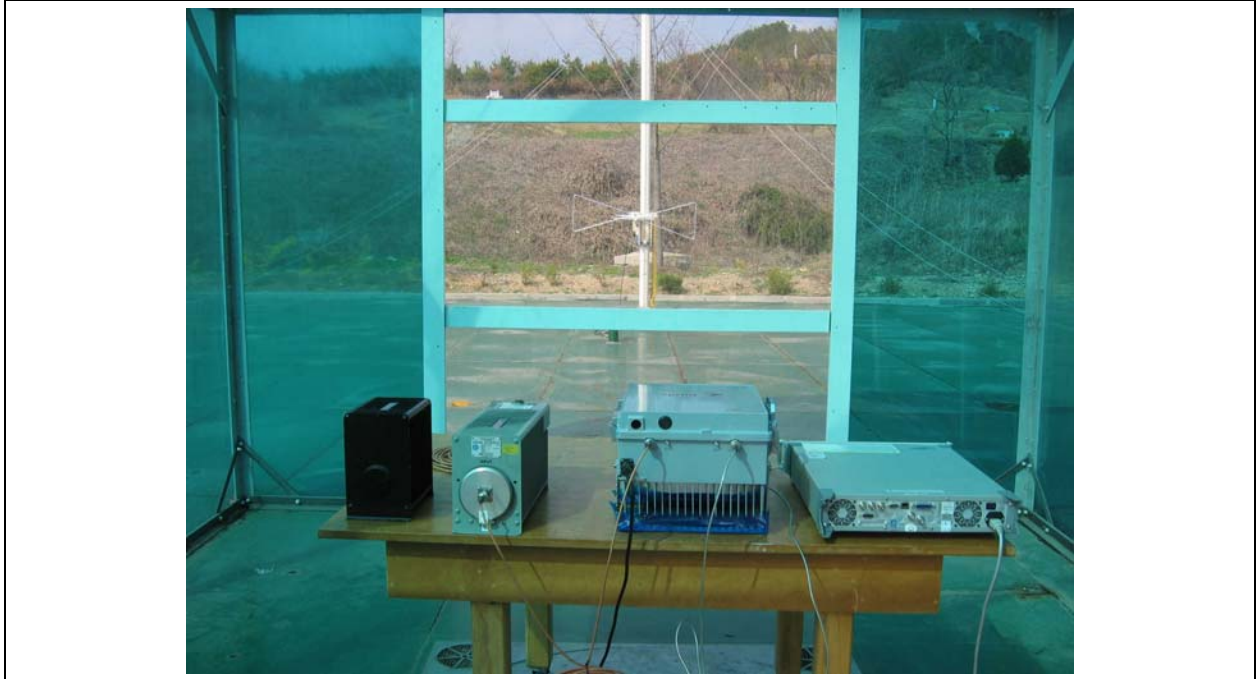


Table 2 Radiated Emissions Data Points

Test Frequency (MHz)	Meter Reading (dBuV)	Detector (Pk/QP)	Polarity (V/H)	Azimuth (Degrees)	Antenna Height (cm)	Gain/Loss Factor (dB)	Transducer Factor (dB/m)	Level dBuV/m	Class A Limit dBuV/m	Margin (dB)
162.14	8.05	QP	H	270	200	2.83	13.32	24.20	40.0	15.80
746.31	10.02	QP	H	180	100	6.47	22.11	38.60	47.0	8.40
968.35	2.30	QP	H	180	100	7.52	24.38	34.20	47.0	12.80
Supplementary information: -. Margin = Class A QP Limit - Level										

3.3 Test Conditions and Results – RF Power Output

Test Description	Measurements were made in the laboratory environment. For RF power measurements, all calculations and methods used by the applicant for determining carrier power or peak envelope power, as appropriate, on the basis of measured power in the radio frequency load attached to the transmitter output terminals shall be shown. The EUT was adjusted to produce maximum power rating of the product specification. The measurements were made at the EUT input and output ports in downlink and uplink transmit modes of operation at B,M,T channels.	
Basic Standard		47 CFR § 2.1046, § 90.205, § 90.219
Occupied Bandwidth Limits		
The Effective radiated power of base station and cellular repeater must not exceed 500 watts.		
Parameters required prior to the test	Laboratory Ambient Temperature	10 to 40 °C
	Relative Humidity	10 to 90 %
Parameters recorded during the test	Laboratory Ambient Temperature	23 °C
	Relative Humidity	40 %

RF output power Configuration Settings

Power Interface Mode # (See Section 2.4)	EUT Configurations Mode # (See Section 2.9)	EUT Operation Mode # (See 2.6)
1	2,3	2,3
Supplementary information: None		

Table 3 RF output power measured data

Table 3-A Down Link

Carrier Band	Frequency (MHz)	Loss offset (dB)	Measured Power (dBm)	Limit (dBm)	Margin (dB)
iDEN 18 MHz	851	31	29.90	37	-7.10
	860	31	29.87	37	-7.13
	869	31	29.82	37	-7.18
iDEN 7 MHz	862	31	29.70	37	-7.30
	865.5	31	29.96	37	-7.04
	869	31	29.31	37	-7.69
iDEN 5 MHz	935	31	29.27	37	-7.73
	937.5	31	29.54	37	-7.46
	940	31	29.17	37	-7.83
Supplementary information: -. Modulation signal 16-QAM, Power measurement : Channel power w/ mean value -. Before the measurement, the system calibration for compensation of cable loss and attenuator has been made and included in the test result.					

Table 3-B Up Link

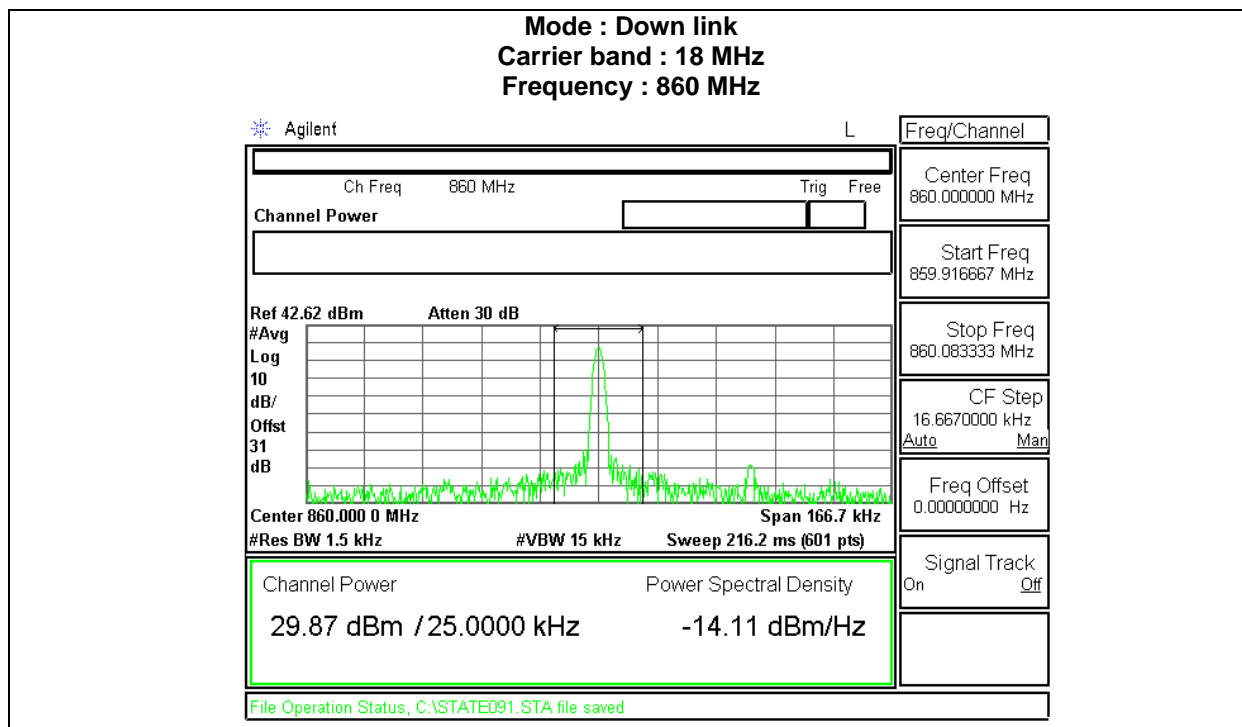
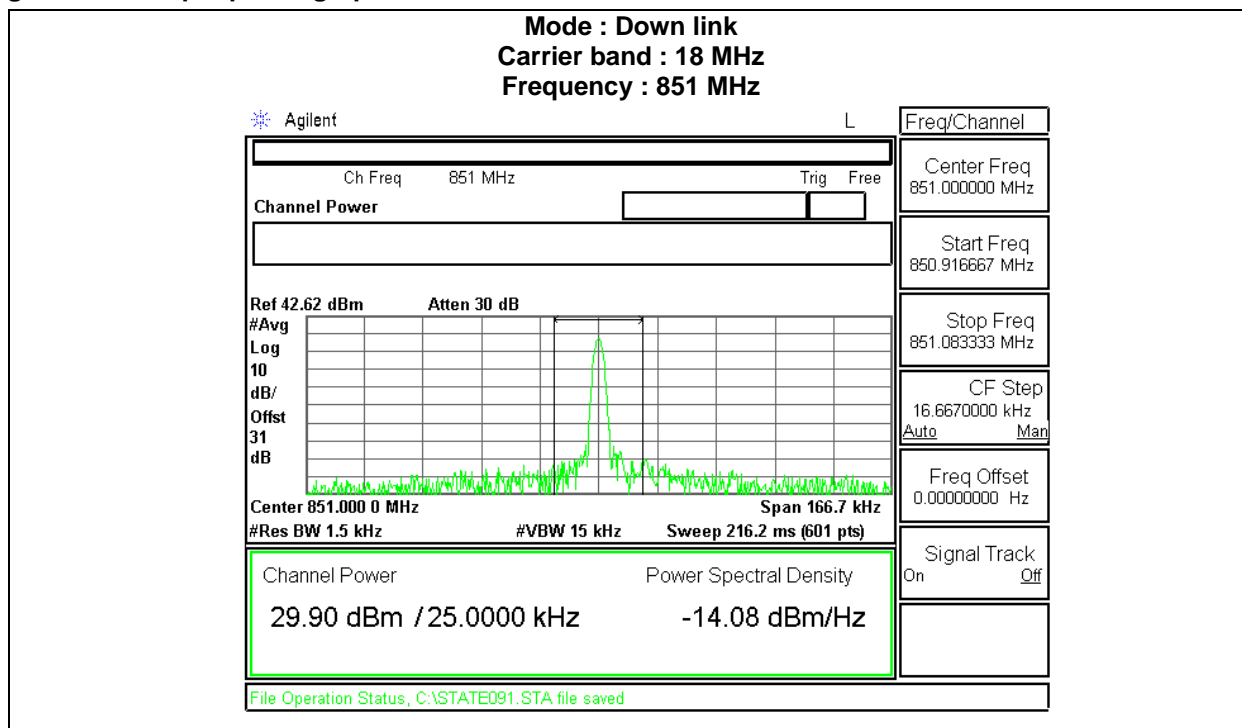
Carrier Band	Frequency (MHz)	Loss offset (dB)	Measured Power (dBm)	Limit (dBm)	Margin (dB)
iDEN 18 MHz	806	31	29.89	37	-7.11
	815	31	29.97	37	-7.03
	824	31	28.96	37	-8.04
iDEN 7 MHz	817	31	29.76	37	-7.24
	820.5	31	30.09	37	-6.91
	824	31	29.17	37	-7.83
iDEN 5 MHz	896	31	29.68	37	-7.32
	898.5	31	30.05	37	-6.95
	901	31	29.23	37	-7.77
Supplementary information: -. Modulation signal 16-QAM, Power measurement : Channel power w/ mean value -. Before the measurement, the system calibration for compensation of cable loss and attenuator has been made and included in the test result.					

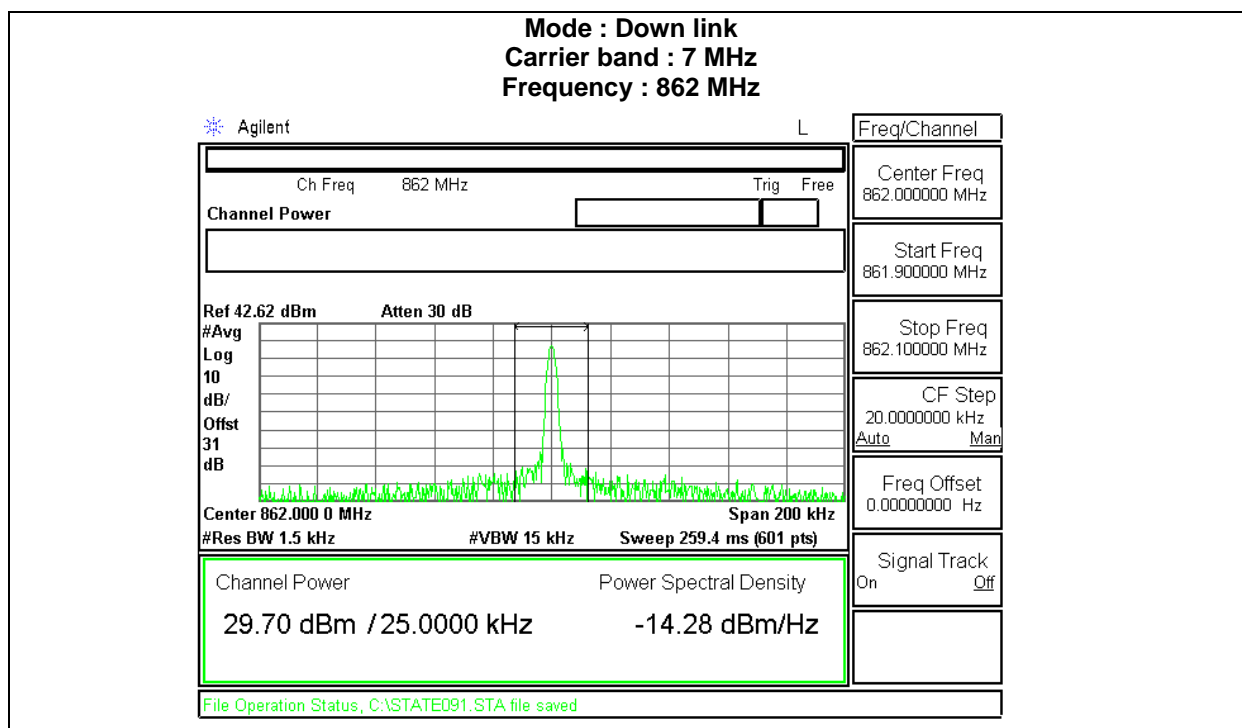
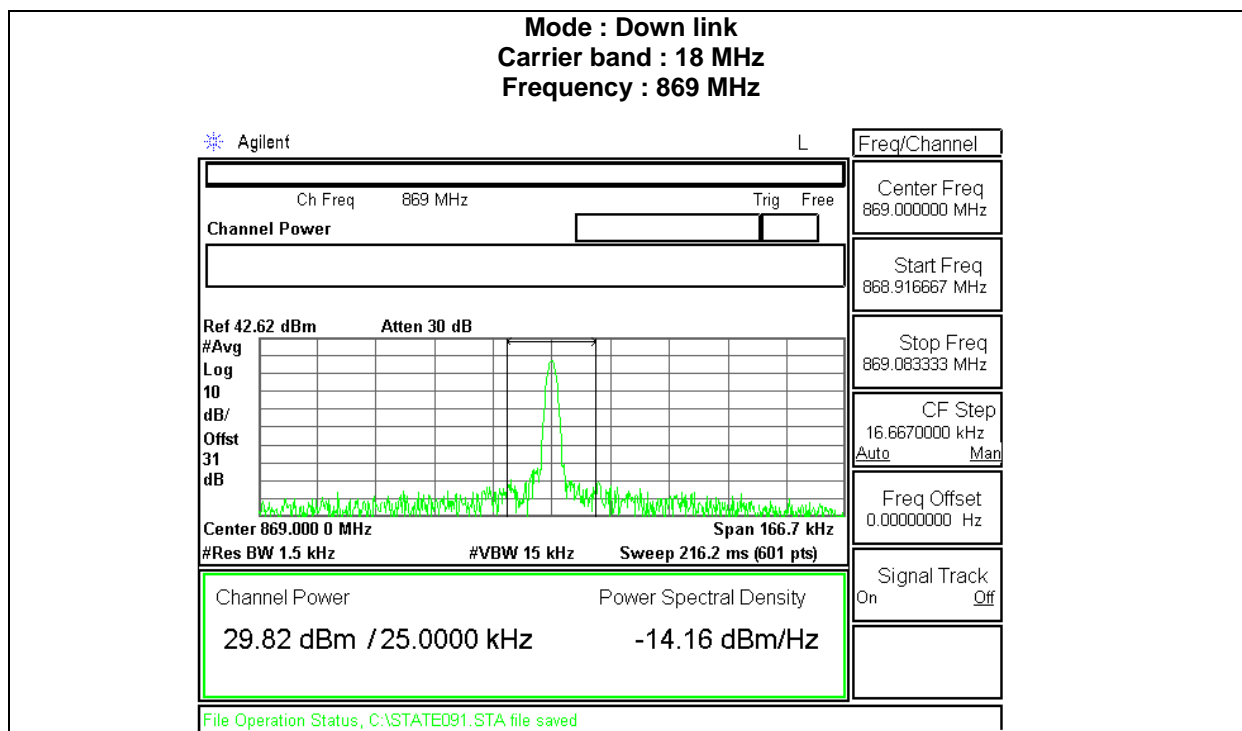
Test Equipment

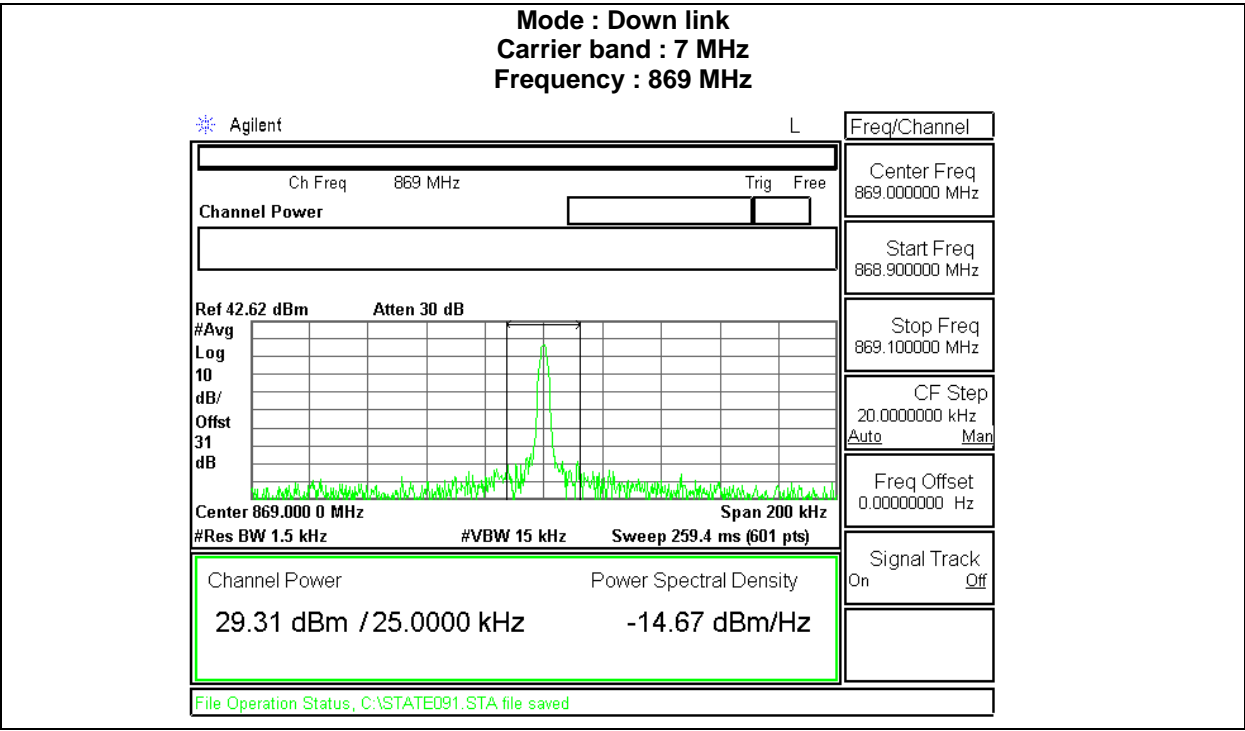
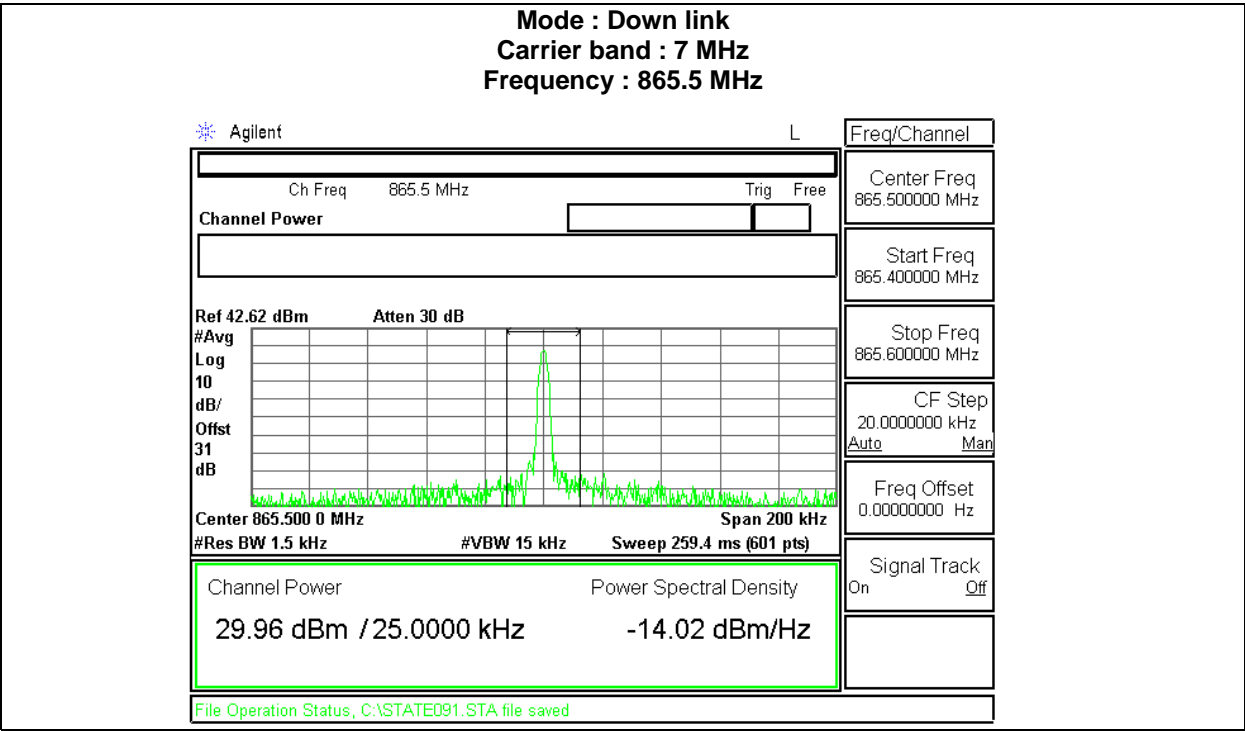
Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Signal Generator	Aeroflex	IFR3413	341006/212	2006-05-12	2007-05-12
Spectrum Analyzer	Agilent	E4440A	MY44022474	2006-11-06	2007-11-06
Fixed Attenuator	H.P	8498A	3318A10568		

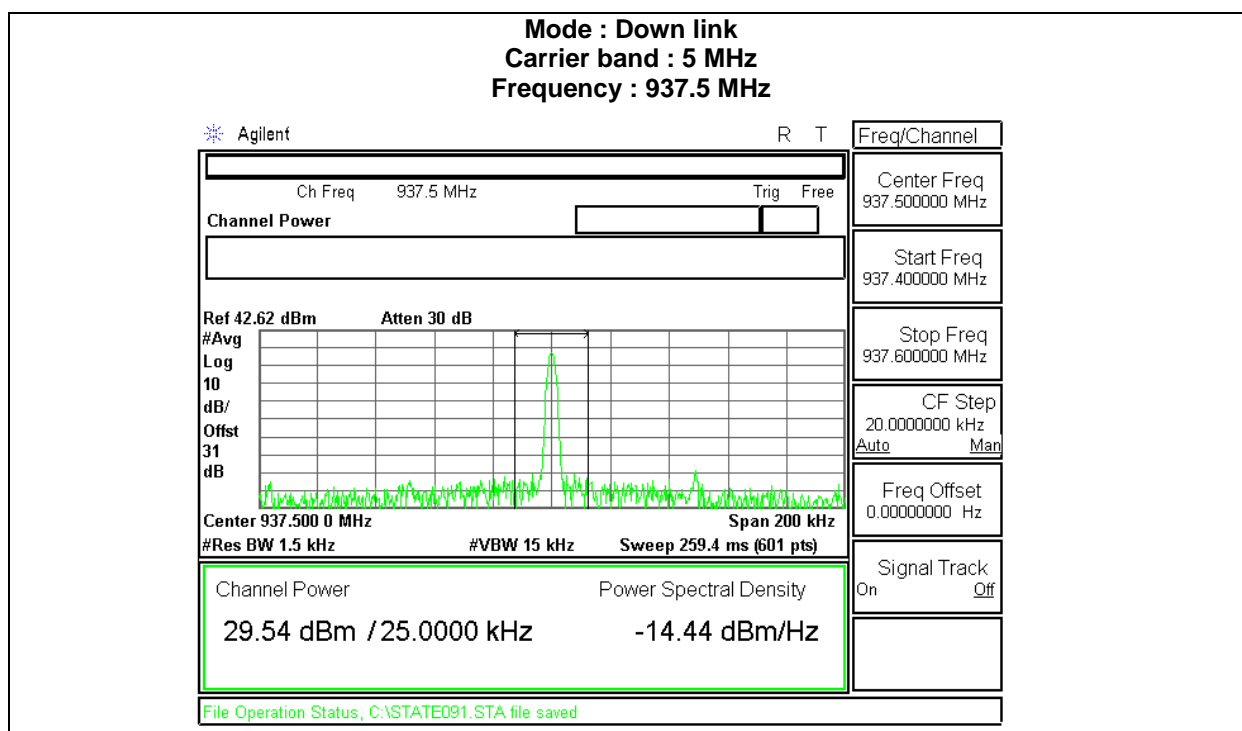
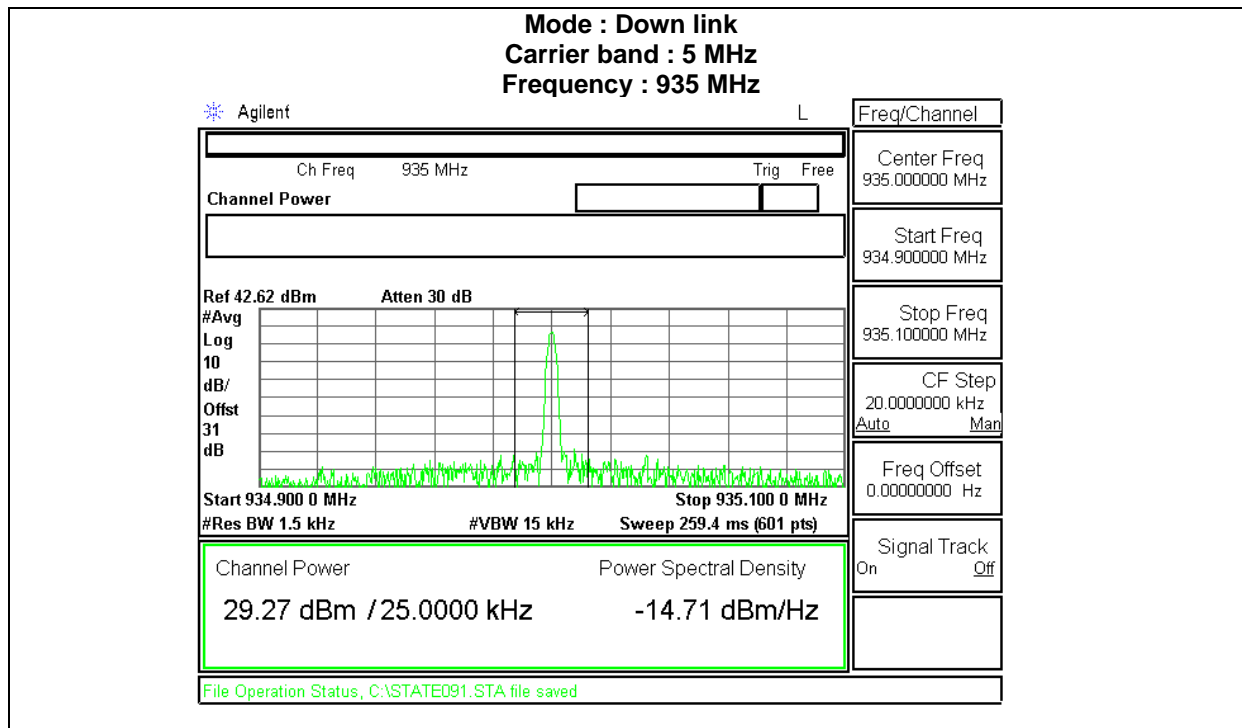
Note : E4440A : 3Hz~26.5GHz, IFR3413: 250kHz ~3GHz, Attn : 30dB

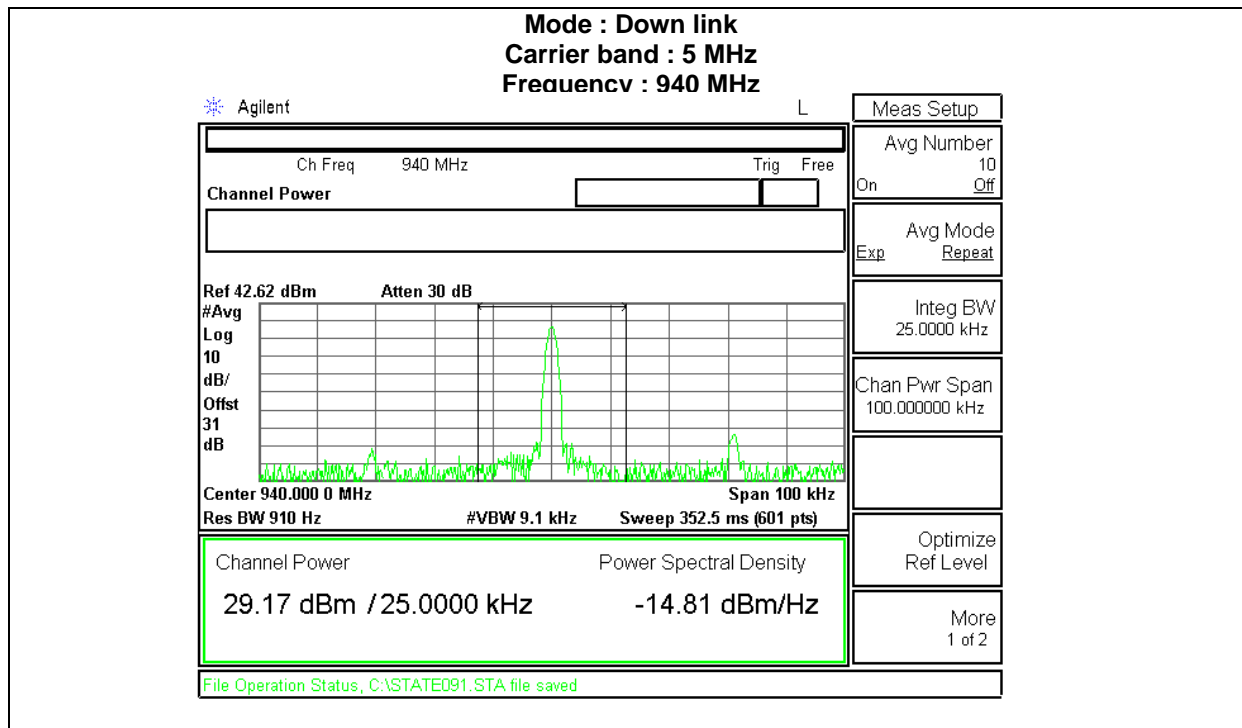
Figure 4 RF output power graphical data

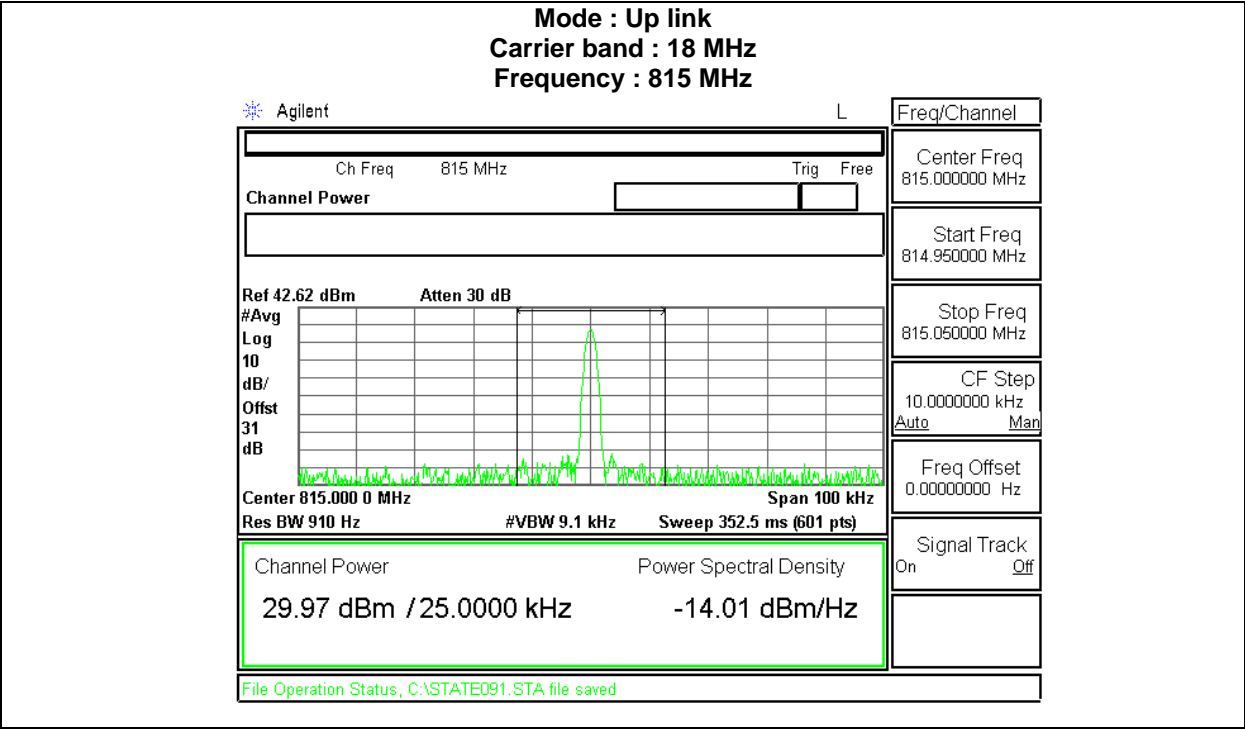
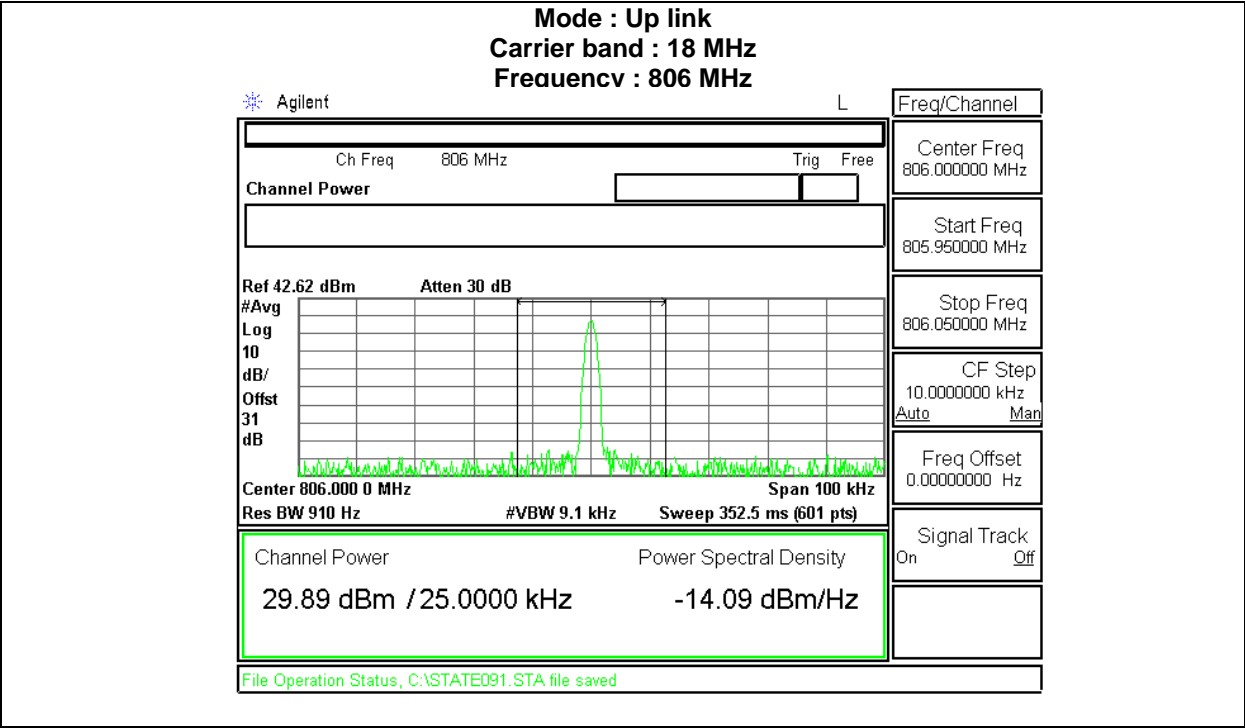


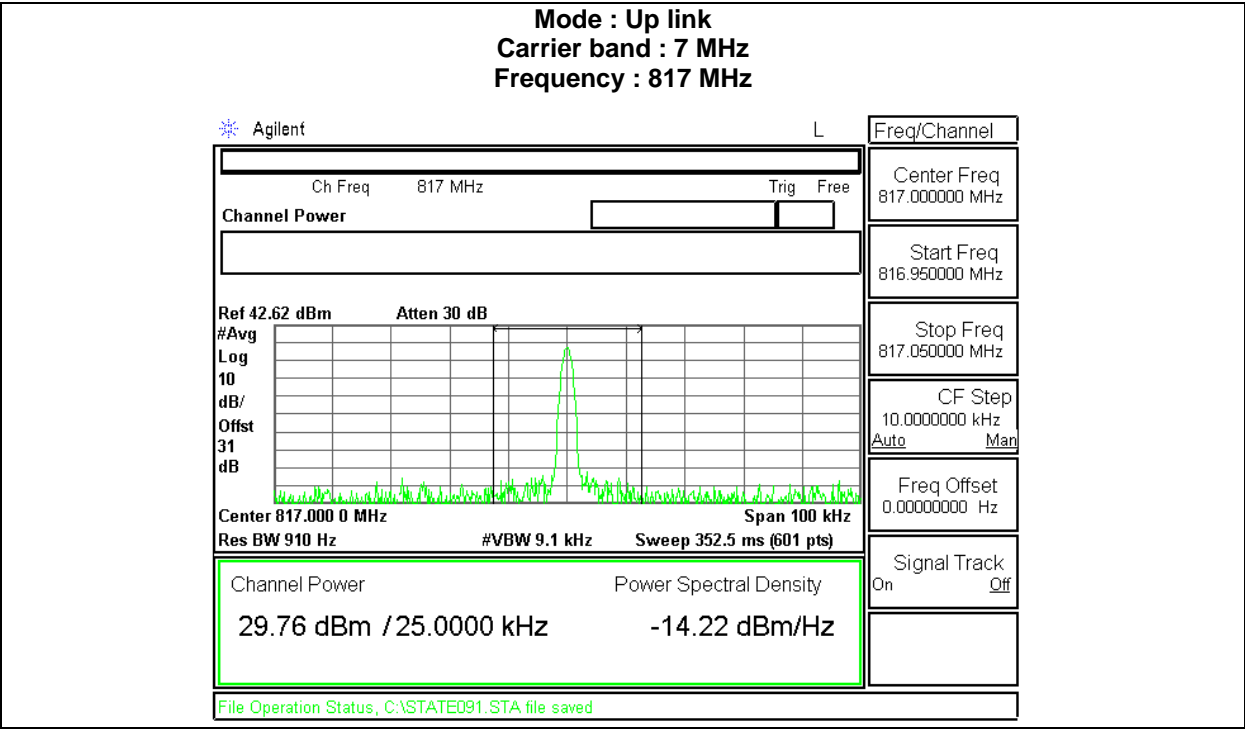
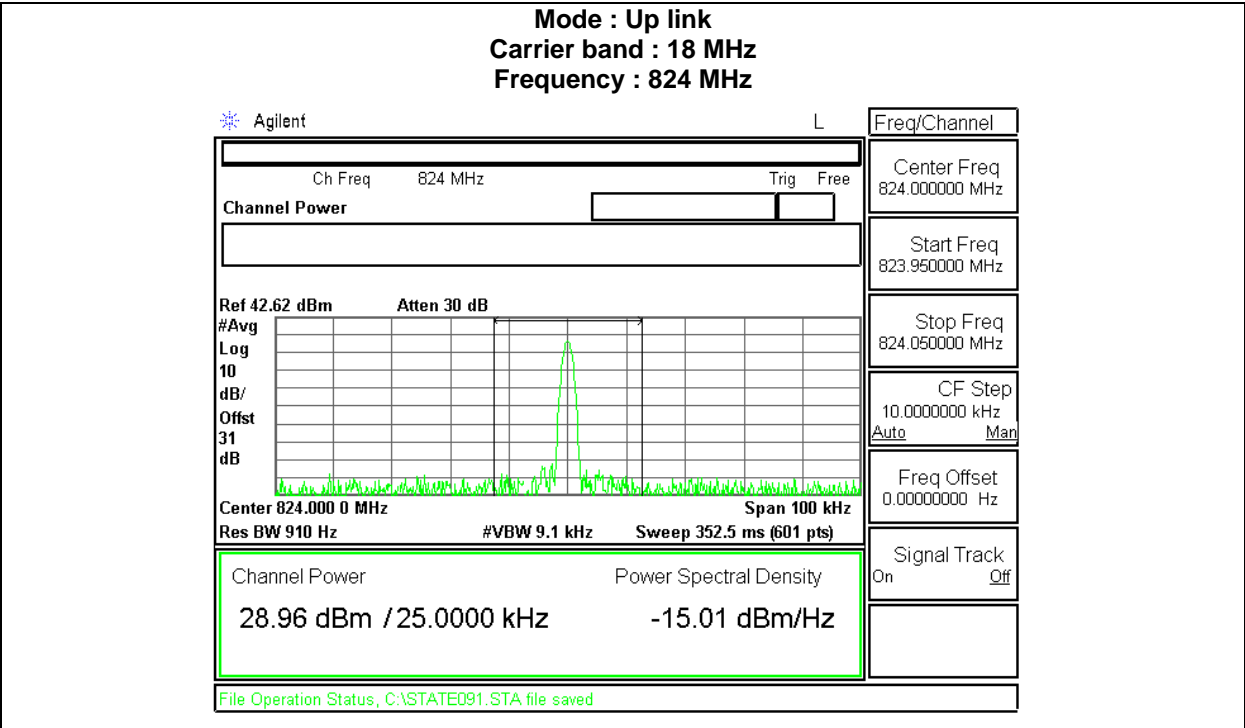


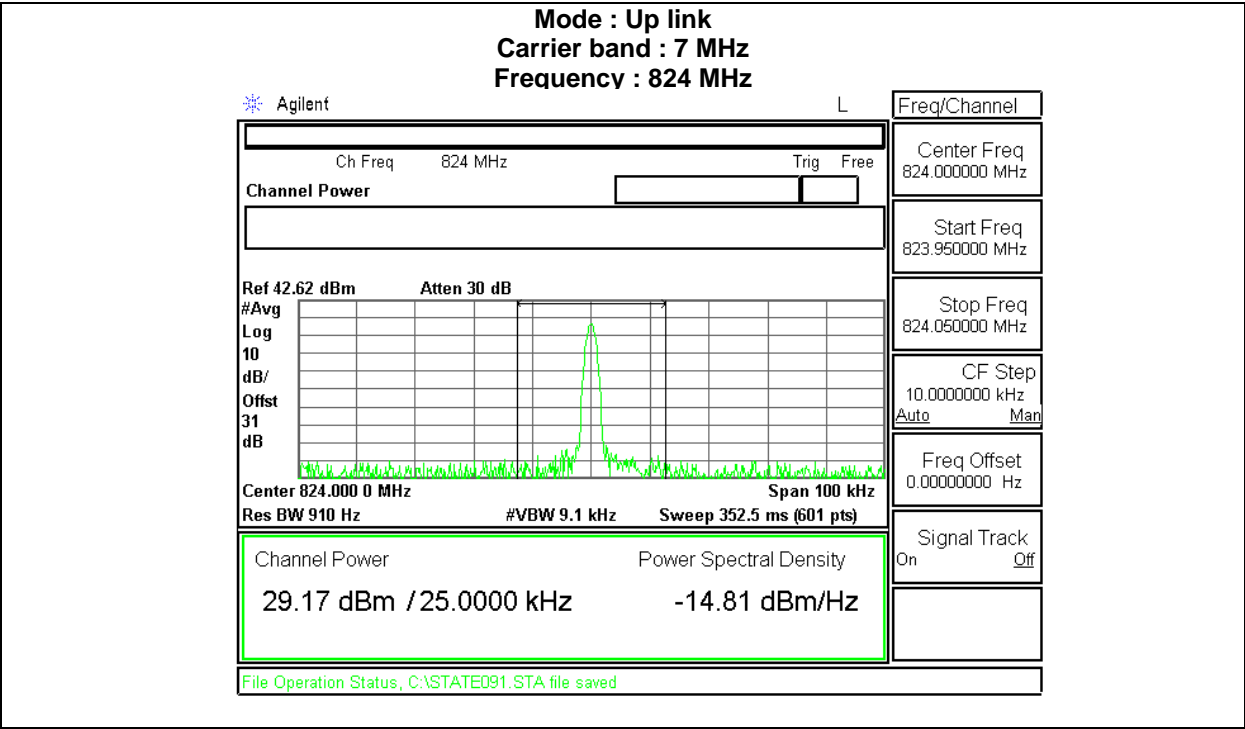
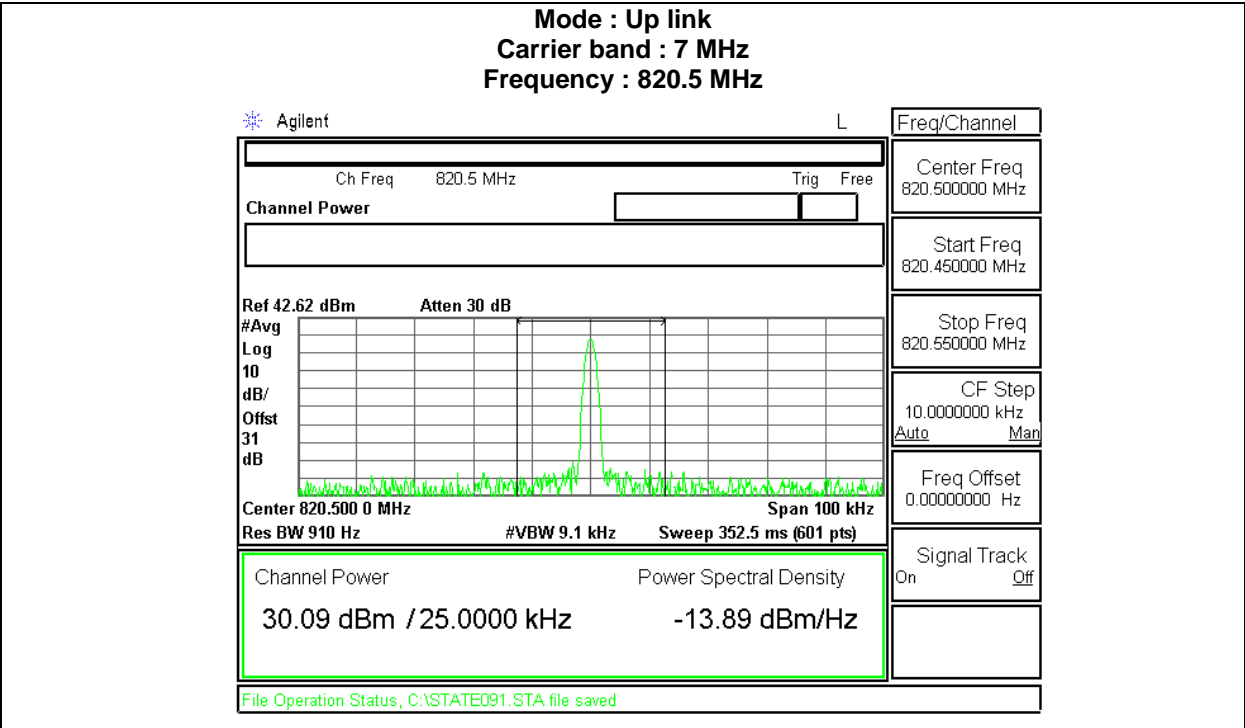


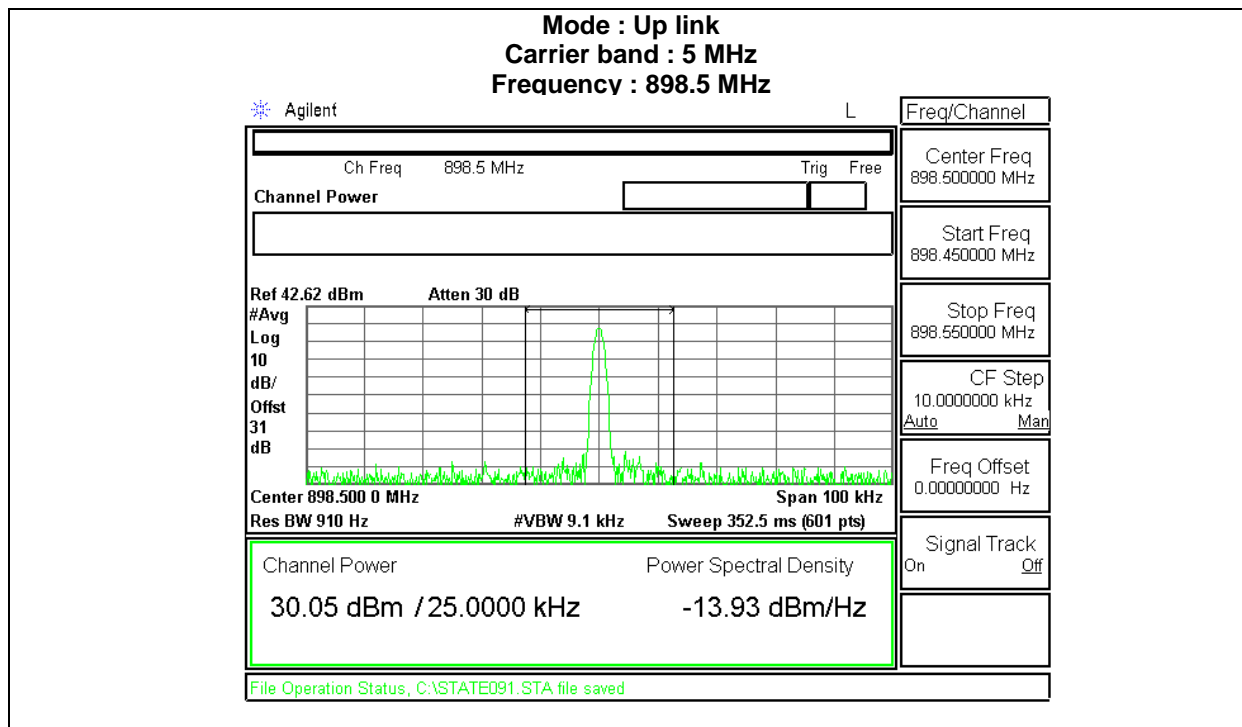
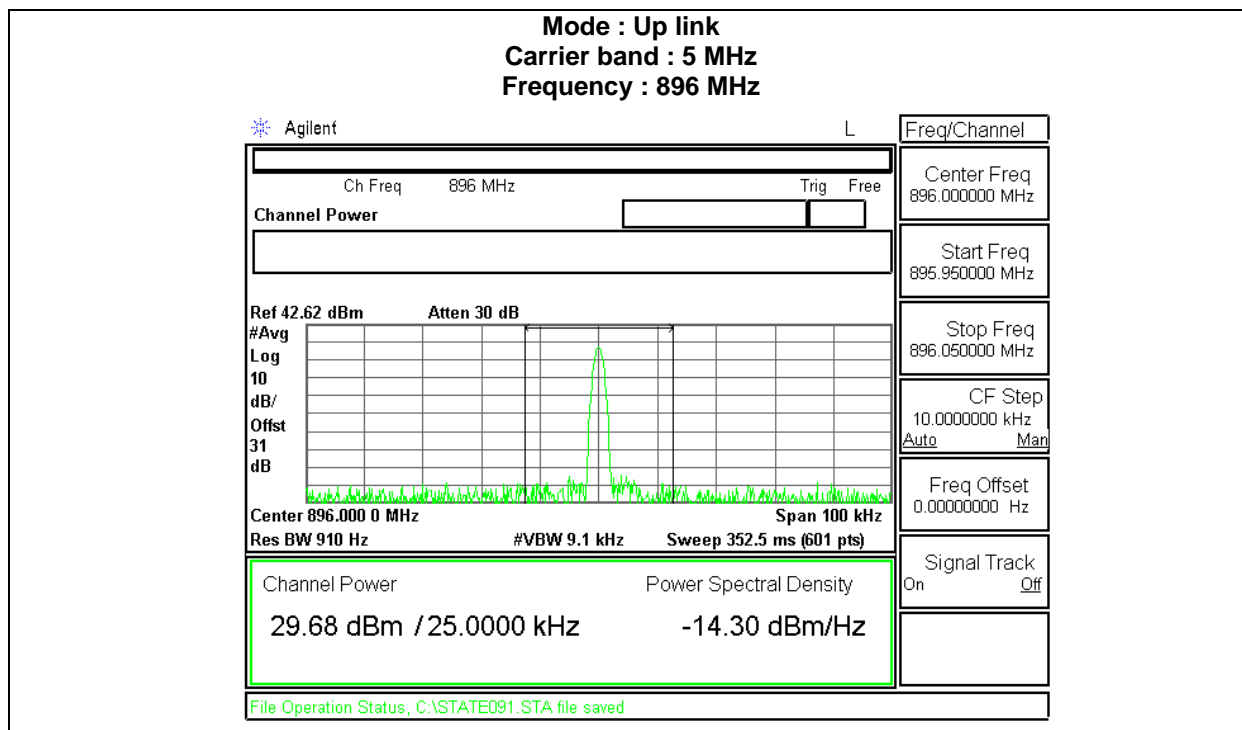


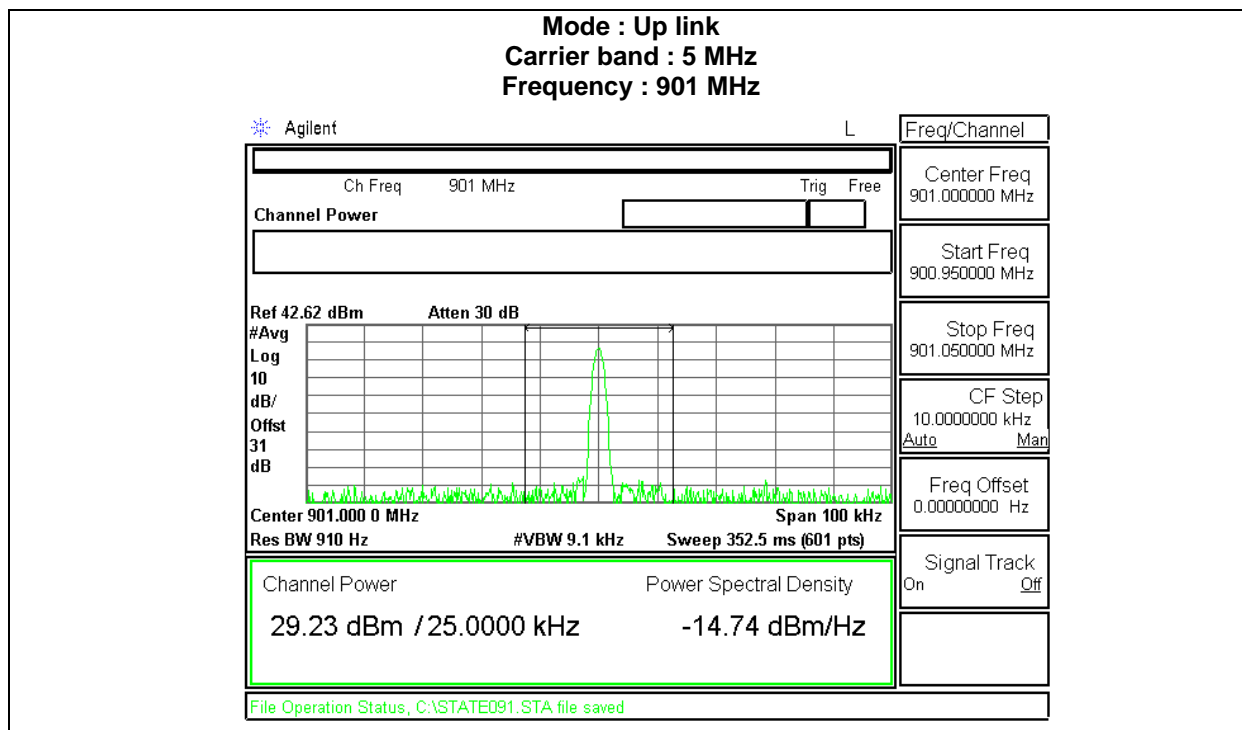












3.4 Test Conditions and Results – Occupied Bandwidth

Test Description	Measurements were made in the laboratory environment. The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. The modulated carrier signal with maximum RF level was applied to the down and up link input of the repeater and resulting output was compared against the original signal.	
Basic Standard	47 CFR § 2.1049,	
Occupied Bandwidth Limits		
According to the FCC 2-11-04/EAB/RF, Input and output signals were compared to verify that there was no any degradation to the signal due to amplification and conversion from the repeater using an RBW of 300 Hz or 1% of the emission bandwidth.		
Parameters required prior to the test	Laboratory Ambient Temperature	10 to 40 °C
	Relative Humidity	10 to 90 %
Parameters recorded during the test	Laboratory Ambient Temperature	23 °C
	Relative Humidity	40 %

Occupied Bandwidth Configuration Settings

Power Interface Mode # (See Section 2.4)	EUT Configurations Mode # (See Section 2.9)	EUT Operation Mode # (See 2.6)
1	2,3	2,3
Supplementary information: None		

Occupied Bandwidth Spectrum Analyzer Settings

Span (MHz)	Resolution Bandwidth (MHz)	Occupied Bandwidth Requirements	
		dBc	%
50 kHz	470 Hz	-26	99
Supplementary information: 99% bandwidth was applied.			

Table 4 Occupied Bandwidth measured results

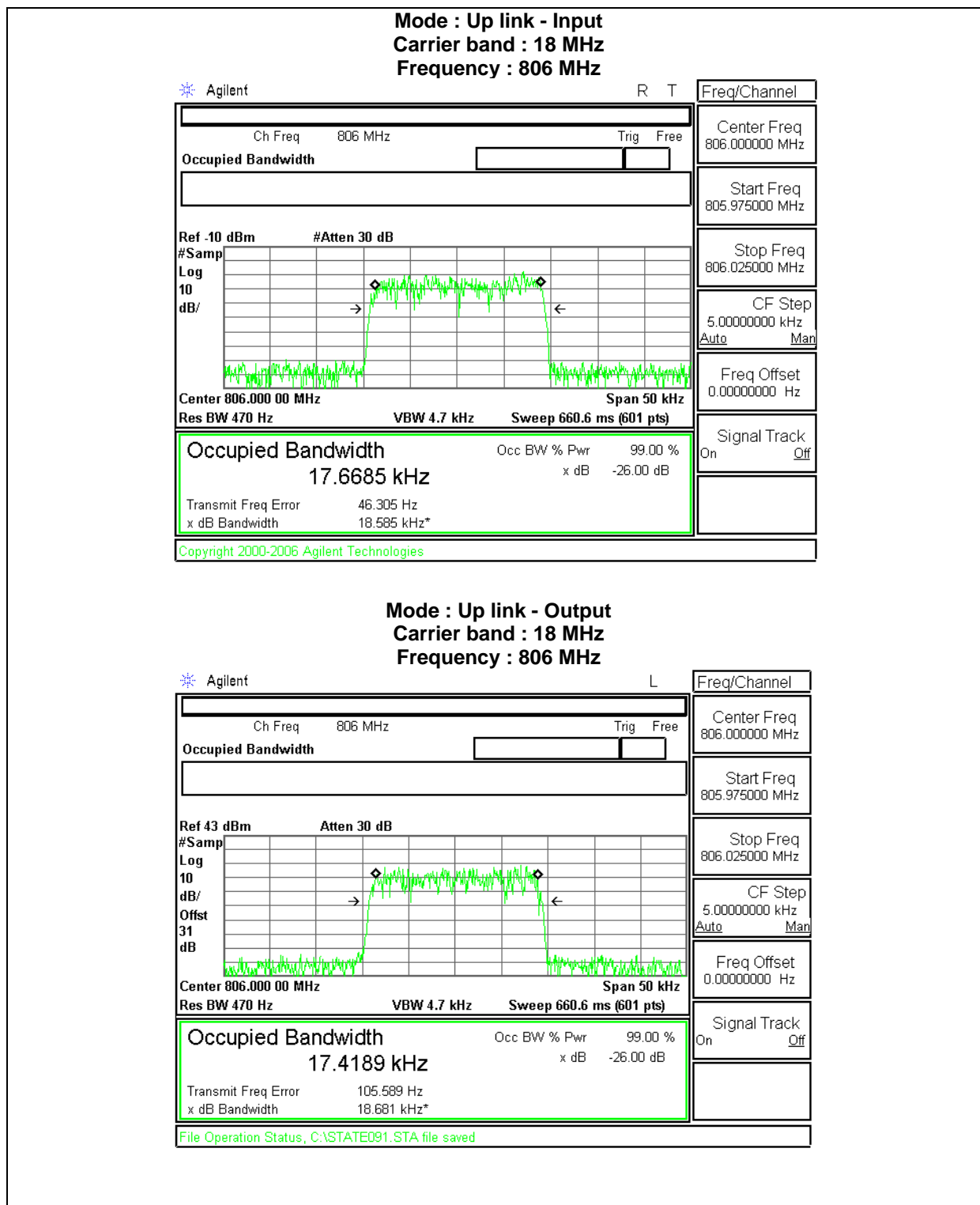
Carrier Band	UP LINK Bandwidth (kHz)		
	Frequency (MHz)	Input channel	Output channel
iDEN 18 MHz	806	17.67	17.42
	815	17.56	17.64
	824	17.74	17.53
iDEN 7 MHz	817	17.60	17.71
	820.5	17.32	17.44
	824	17.74	17.45
iDEN 5 MHz	896	17.62	17.53
	898.5	17.82	17.53
	901	17.63	17.29
Supplementary information: Modulation signal 16-QAM, 99% bandwidth			

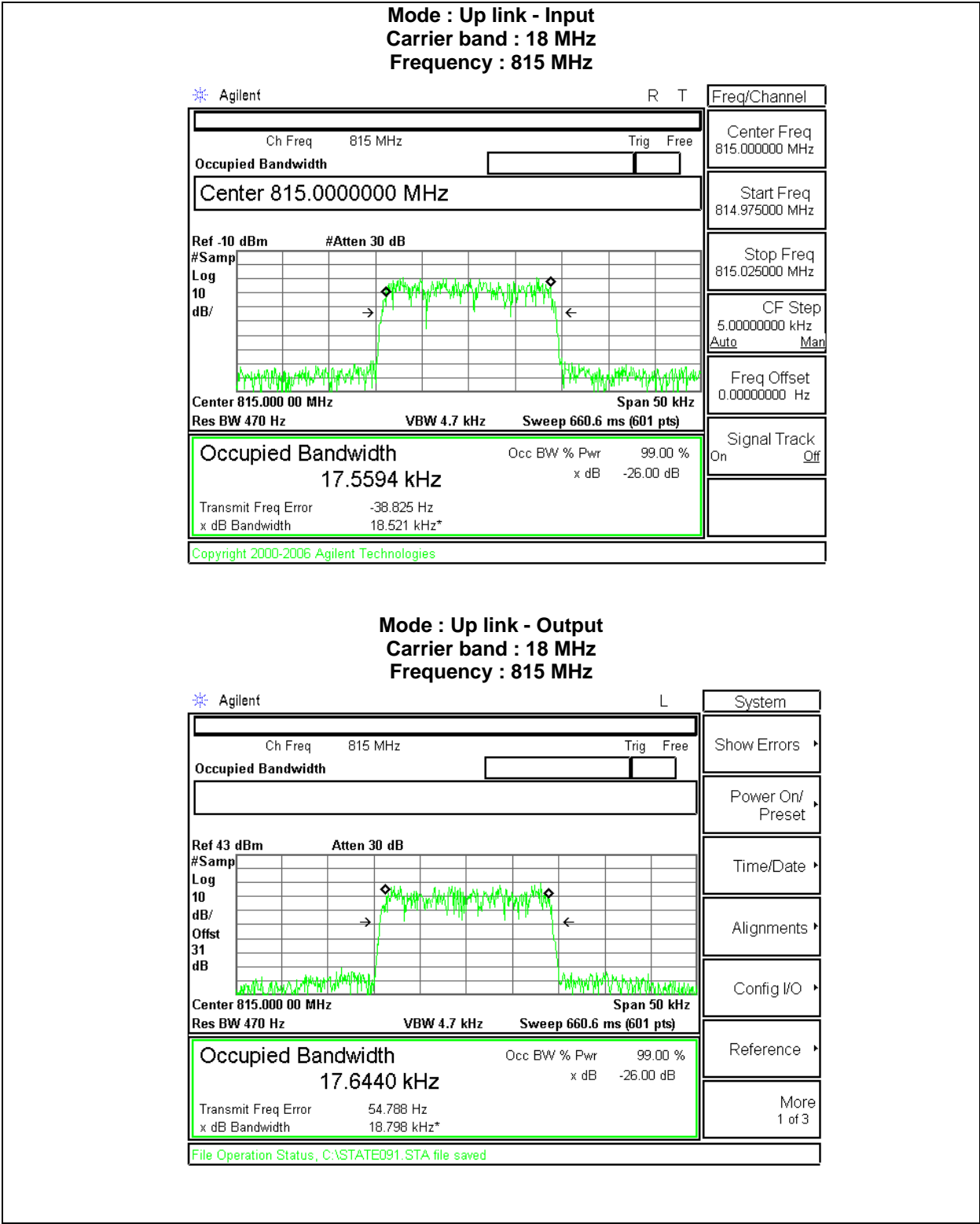
Carrier Band	DOWN LINK Bandwidth (kHz)		
	Frequency (MHz)	Input channel	Output channel
iDEN 18 MHz	851	17.81	17.52
	860	17.67	17.40
	869	17.54	17.90
iDEN 7 MHz	862	17.50	17.70
	865.5	17.87	17.73
	869	17.54	17.21
iDEN 5 MHz	935	17.31	17.45
	937.5	17.50	17.54
	940	17.72	17.65
Supplementary information: Modulation signal 16-QAM, 99% bandwidth			

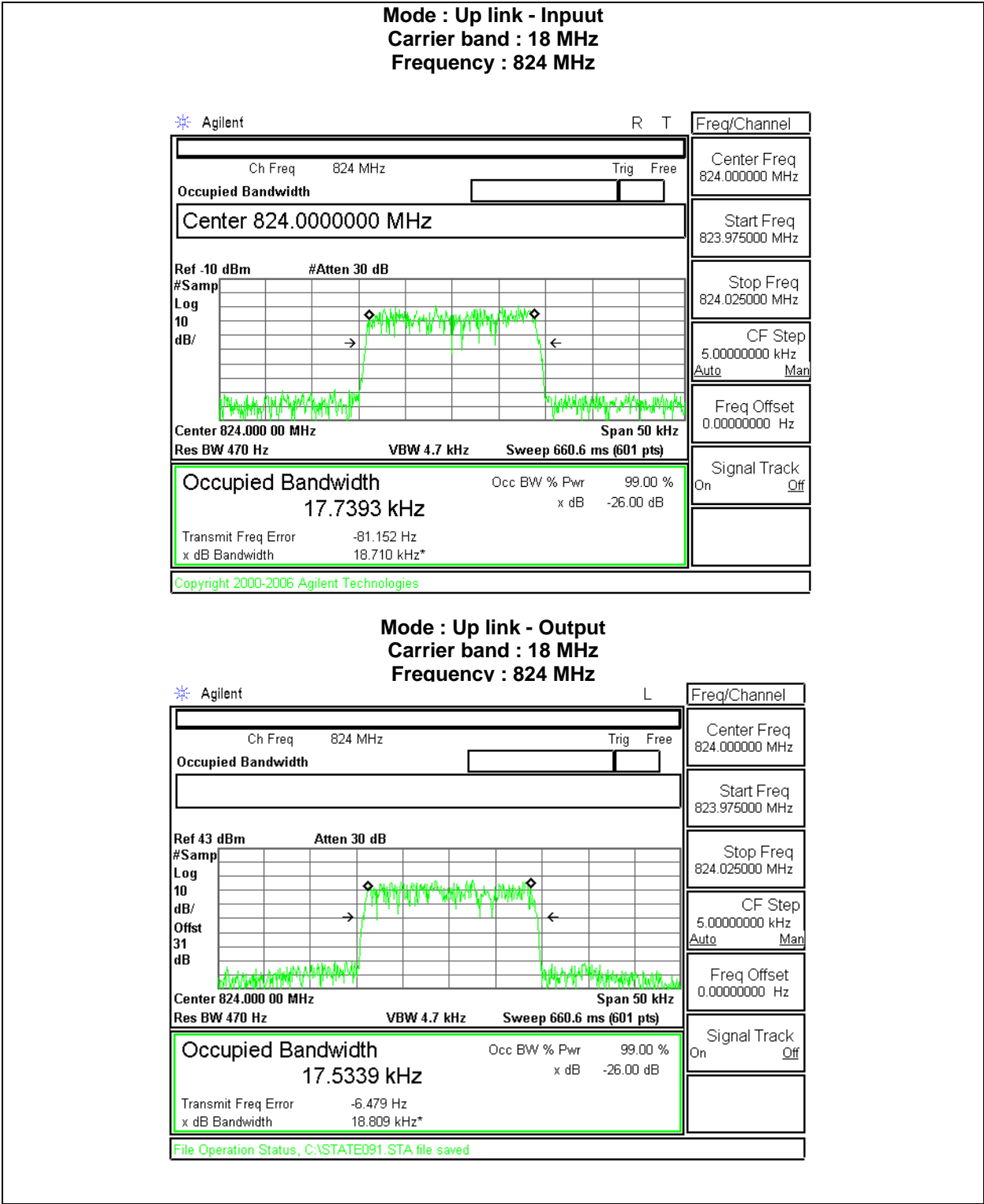
Occupied Bandwidth Test Equipment

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Signal Generator	Aeroflex	IFR3413	341006/212	2006-05-12	2007-05-12
Spectrum Analyzer	Agilent	E4440A	MY44022474	2006-11-06	2007-11-06
Fixed Attenuator	H.P	8498A	3318A10568		

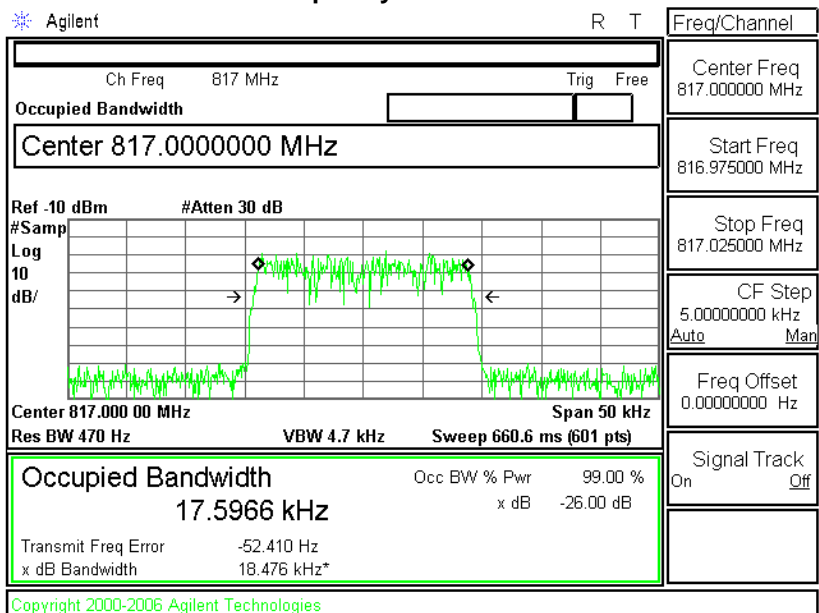
Figure 5 Occupied Bandwidth Graph



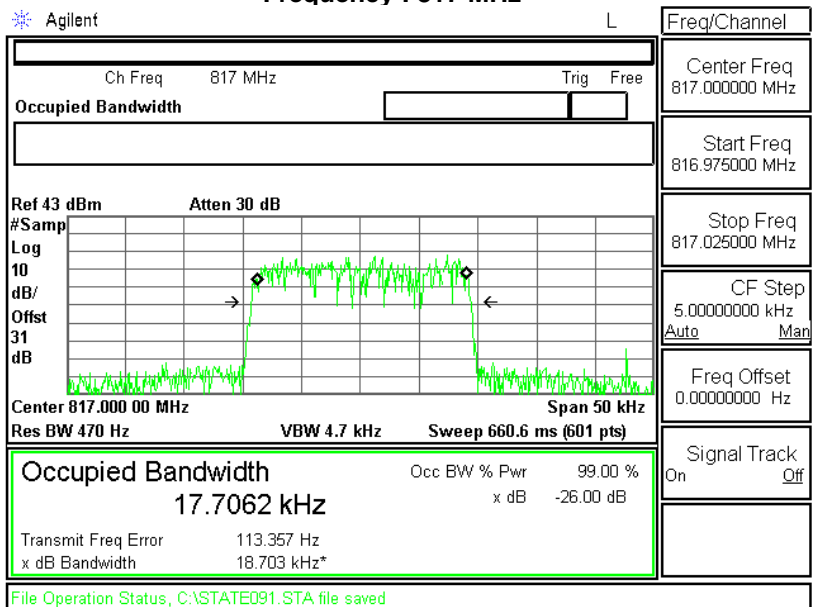


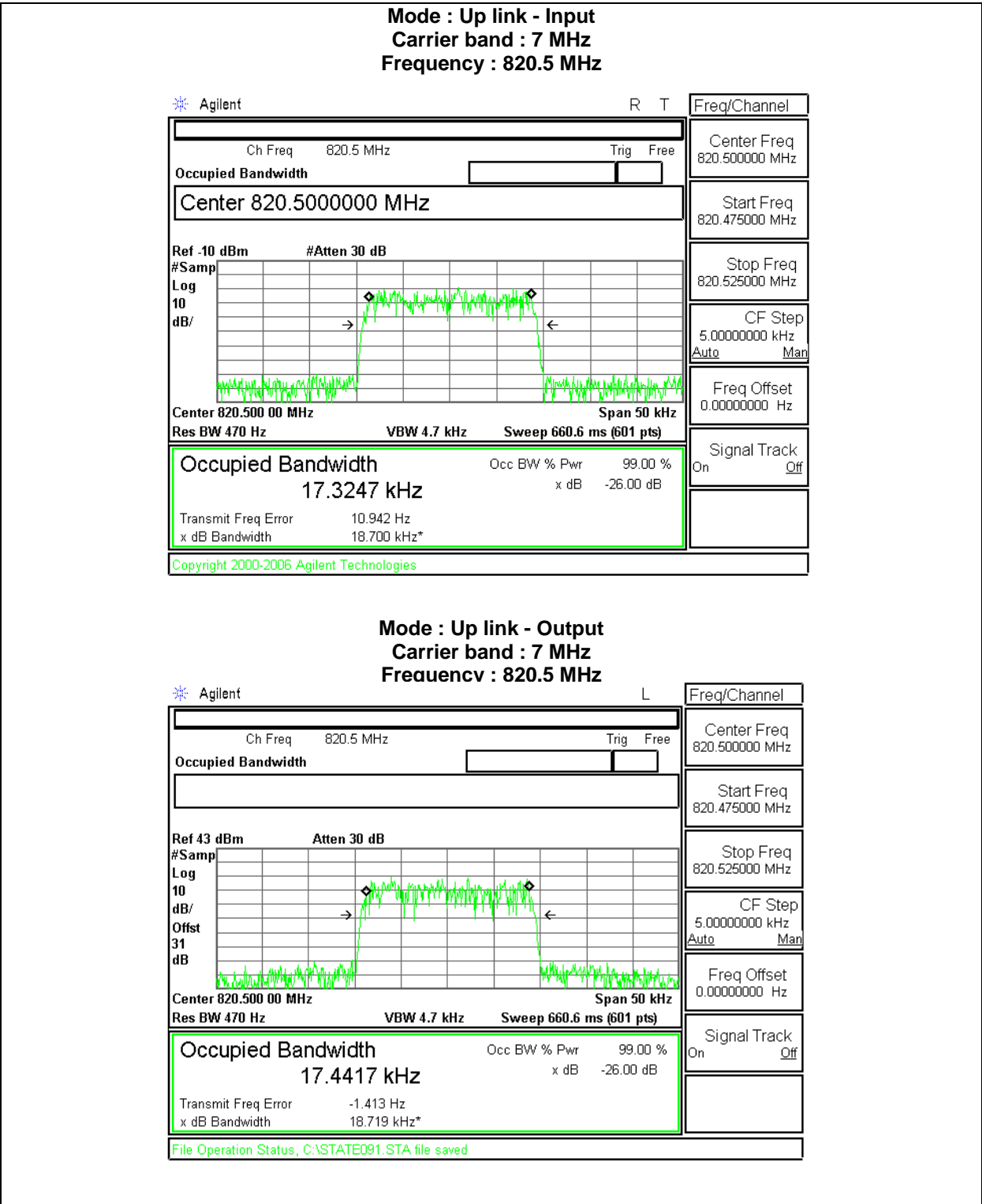


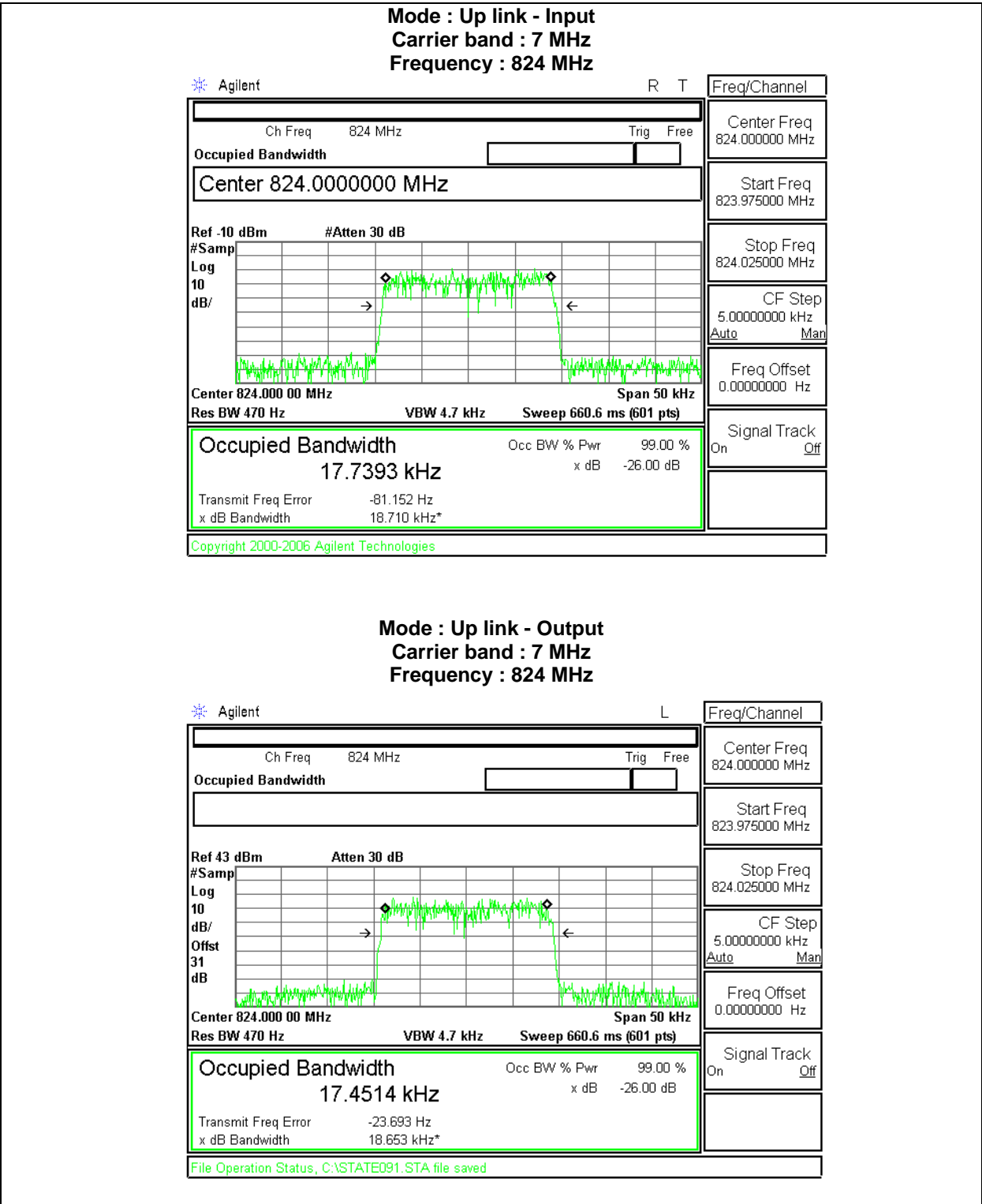
Mode : Up link - Input
Carrier band : 7 MHz
Frequency : 817 MHz



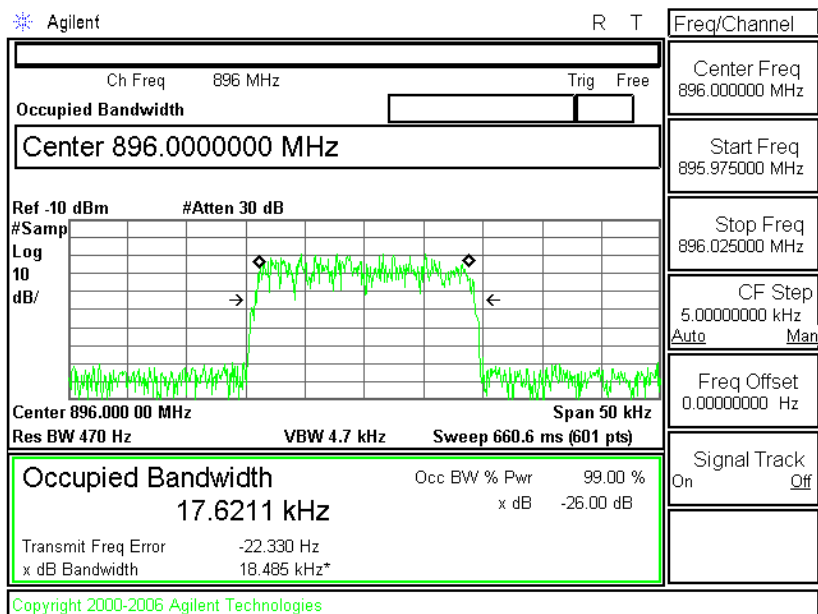
Mode : Up link - Output
Carrier band : 7 MHz
Frequency : 817 MHz



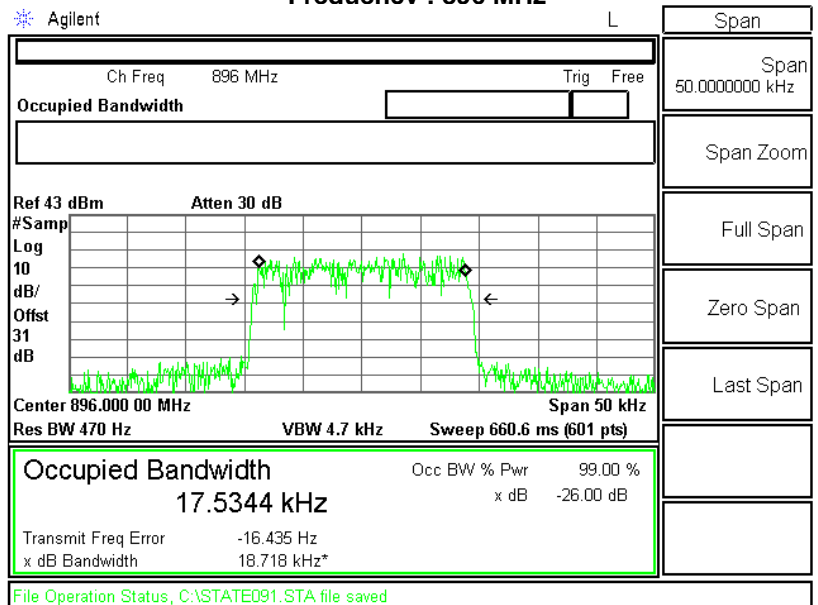


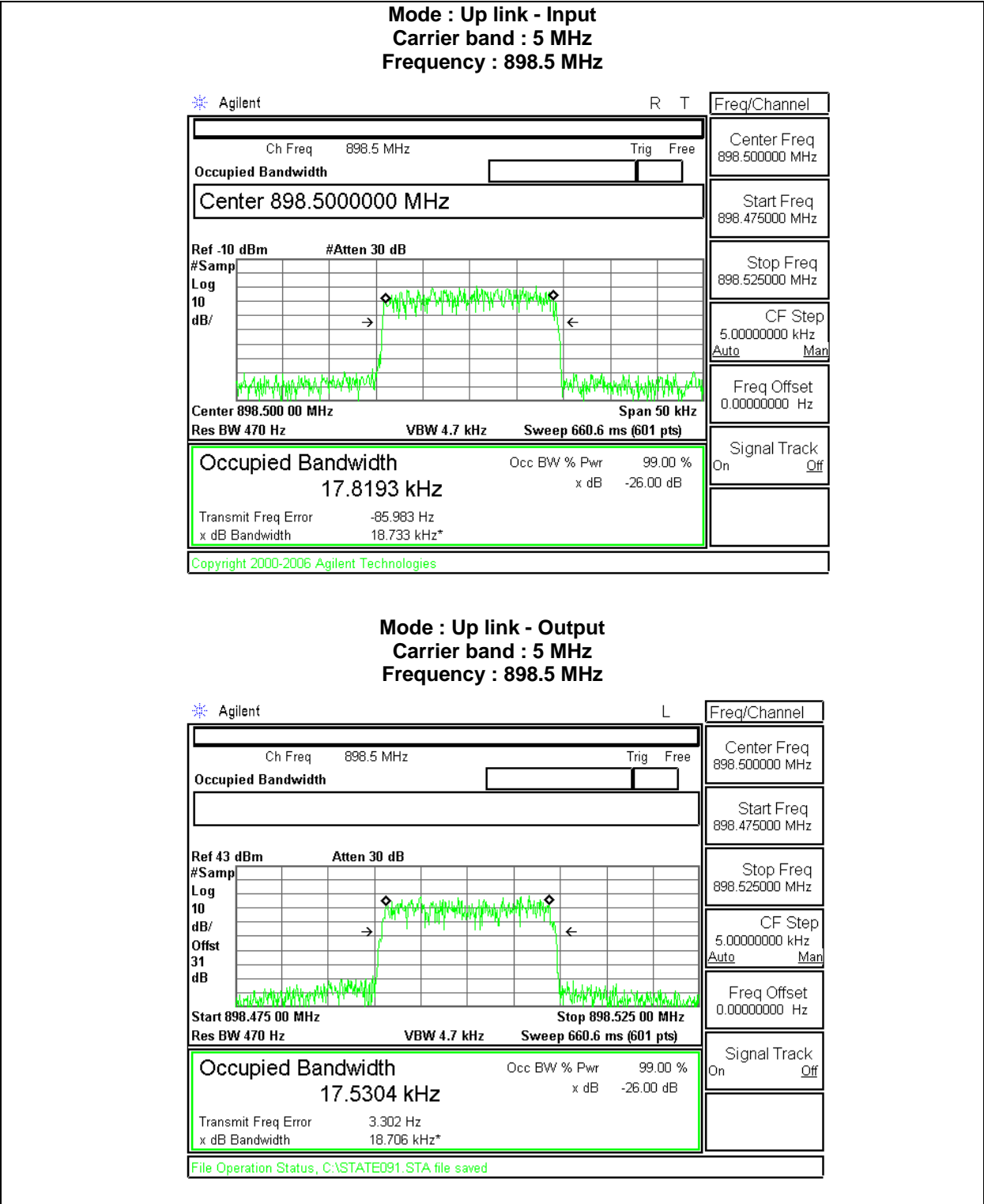


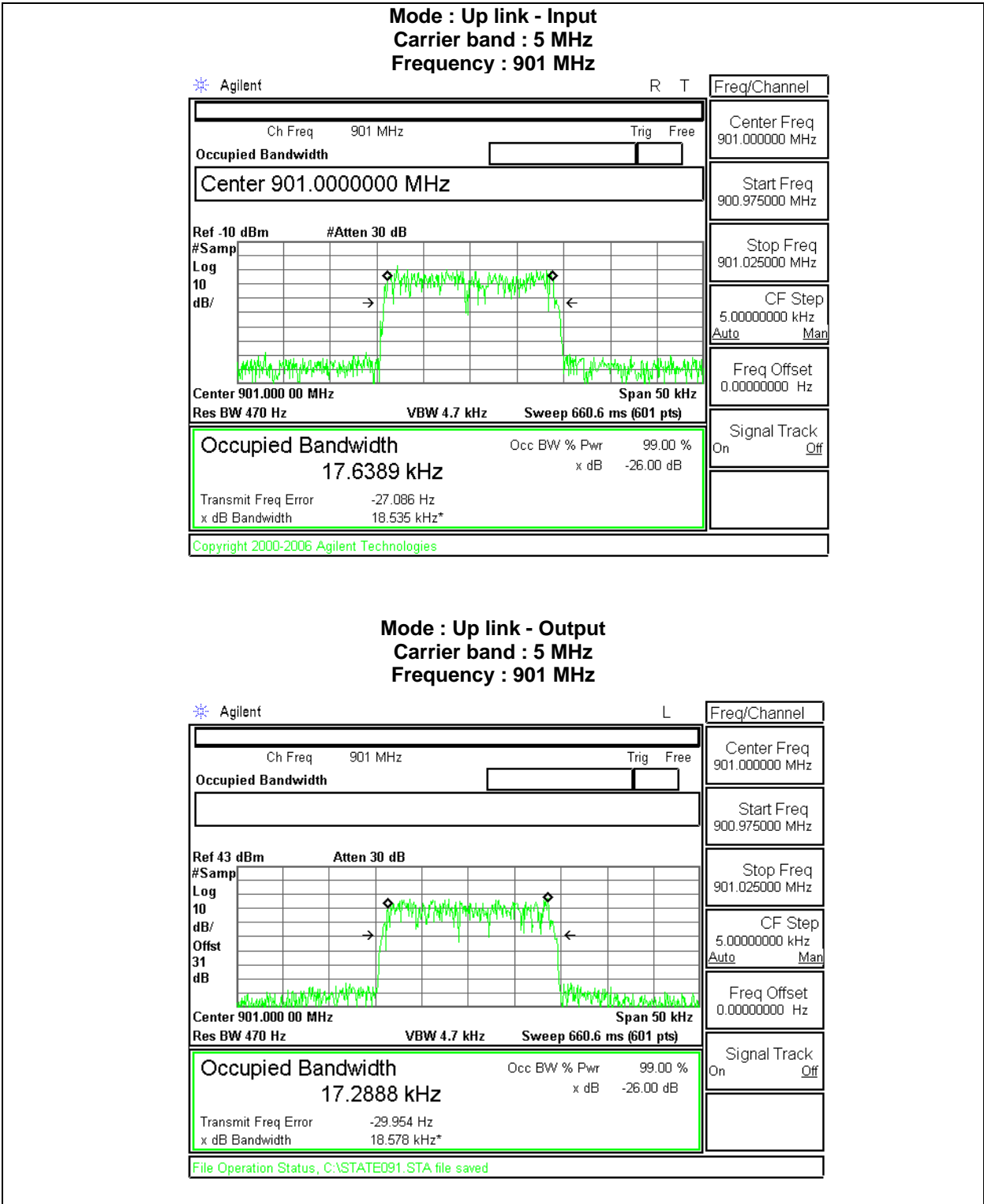
Mode : Up link - Input
Carrier band : 5 MHz
Frequency : 896 MHz

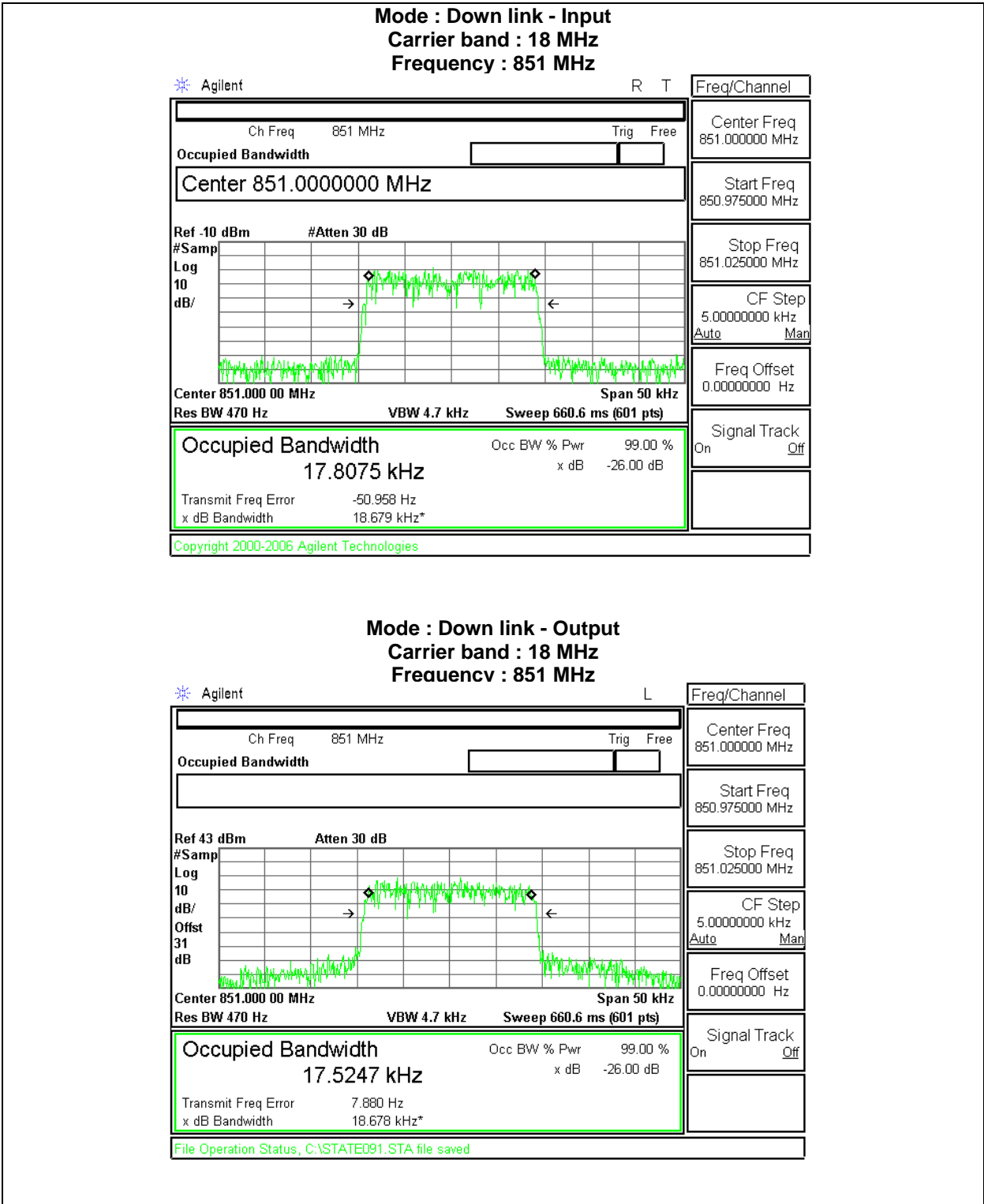


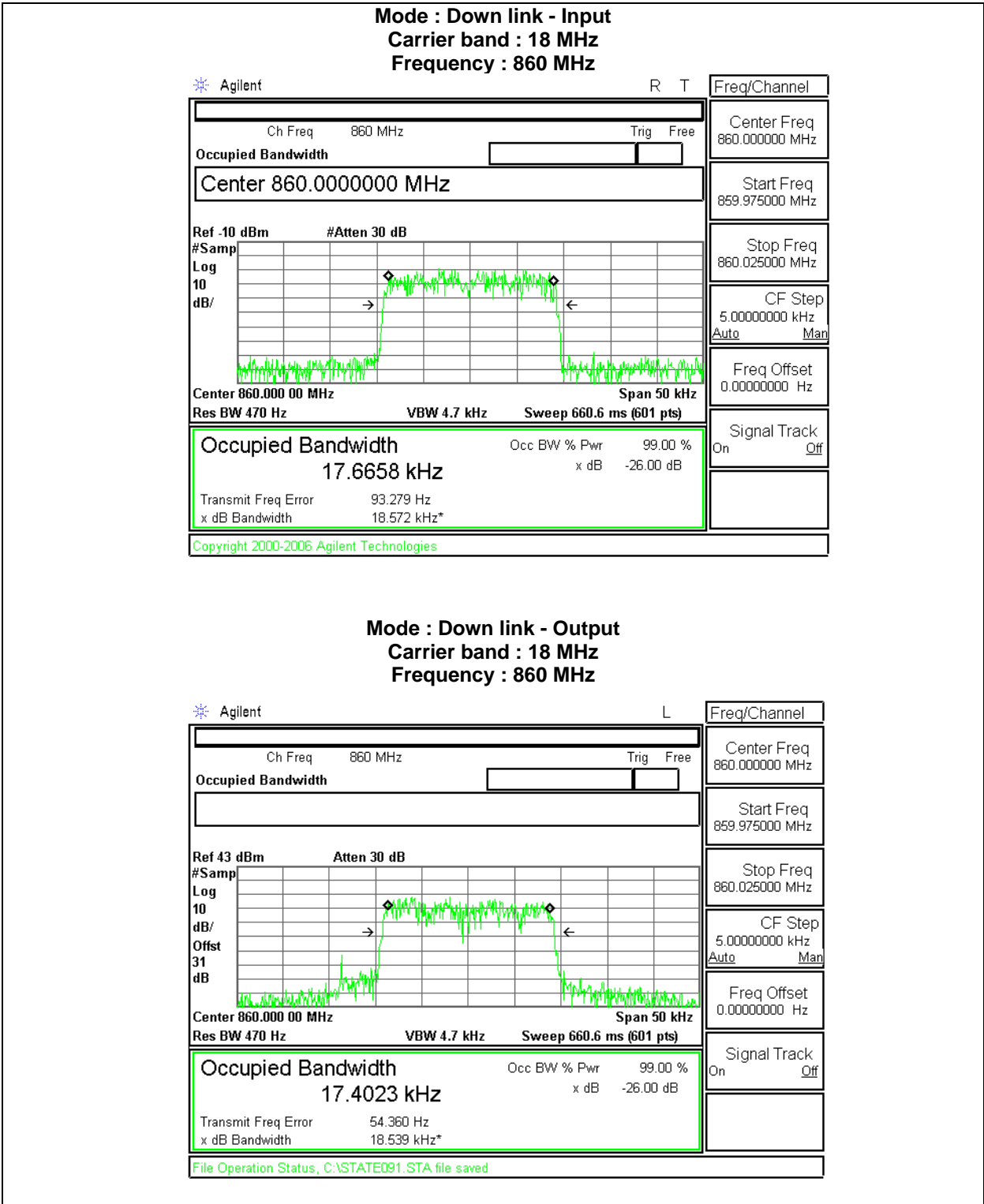
Mode : Up link - Output
Carrier band : 5 MHz
Frequency : 896 MHz

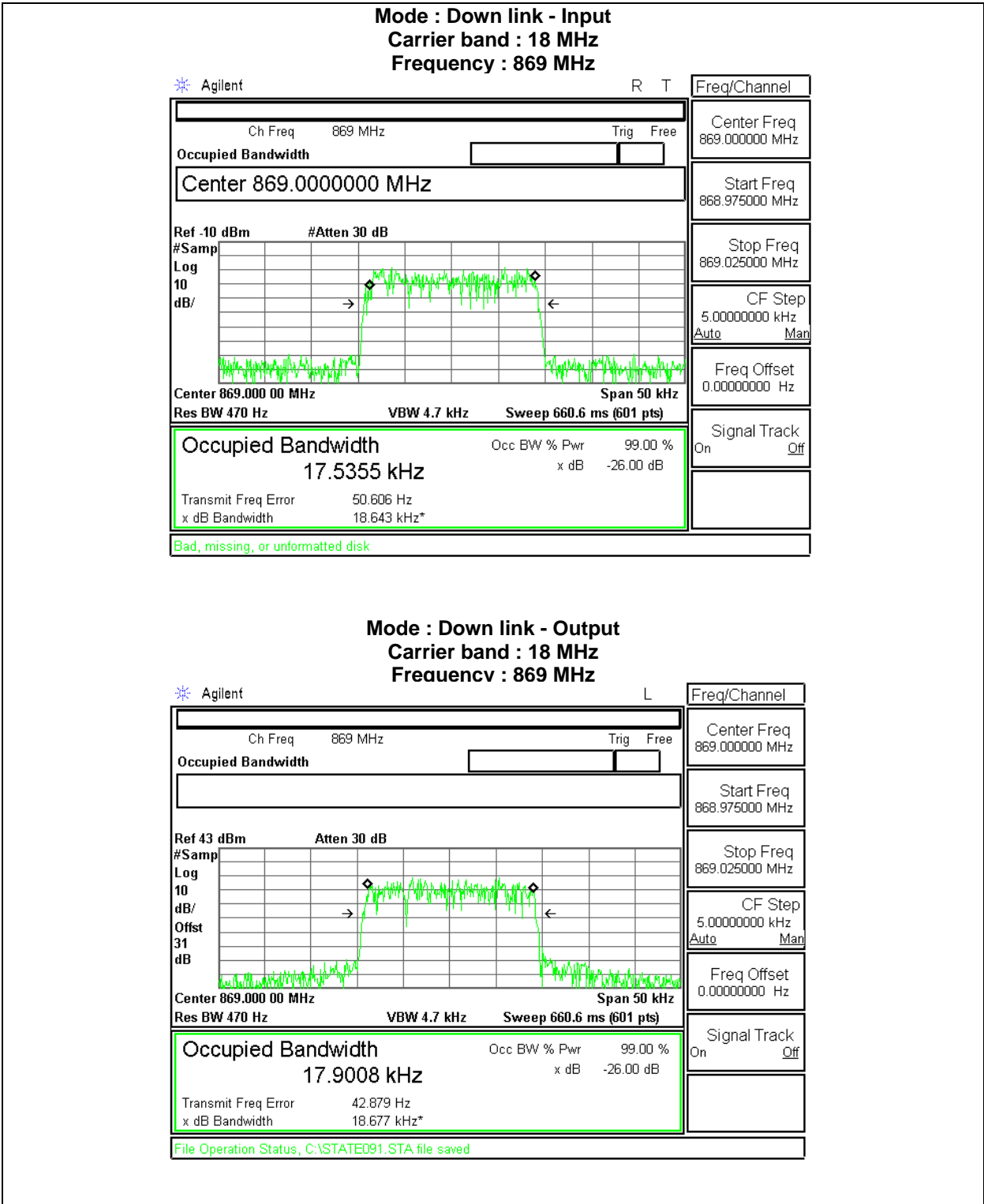


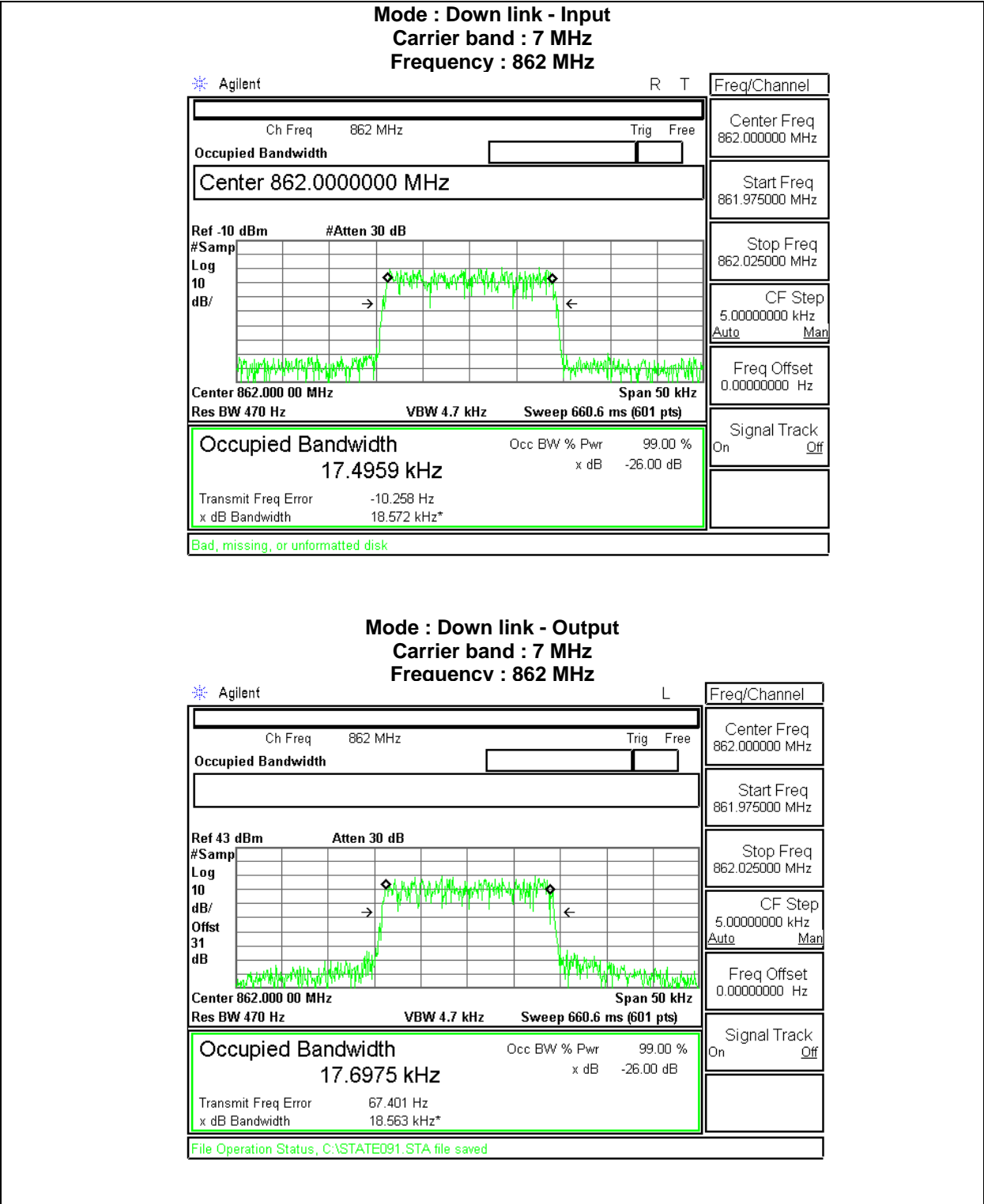


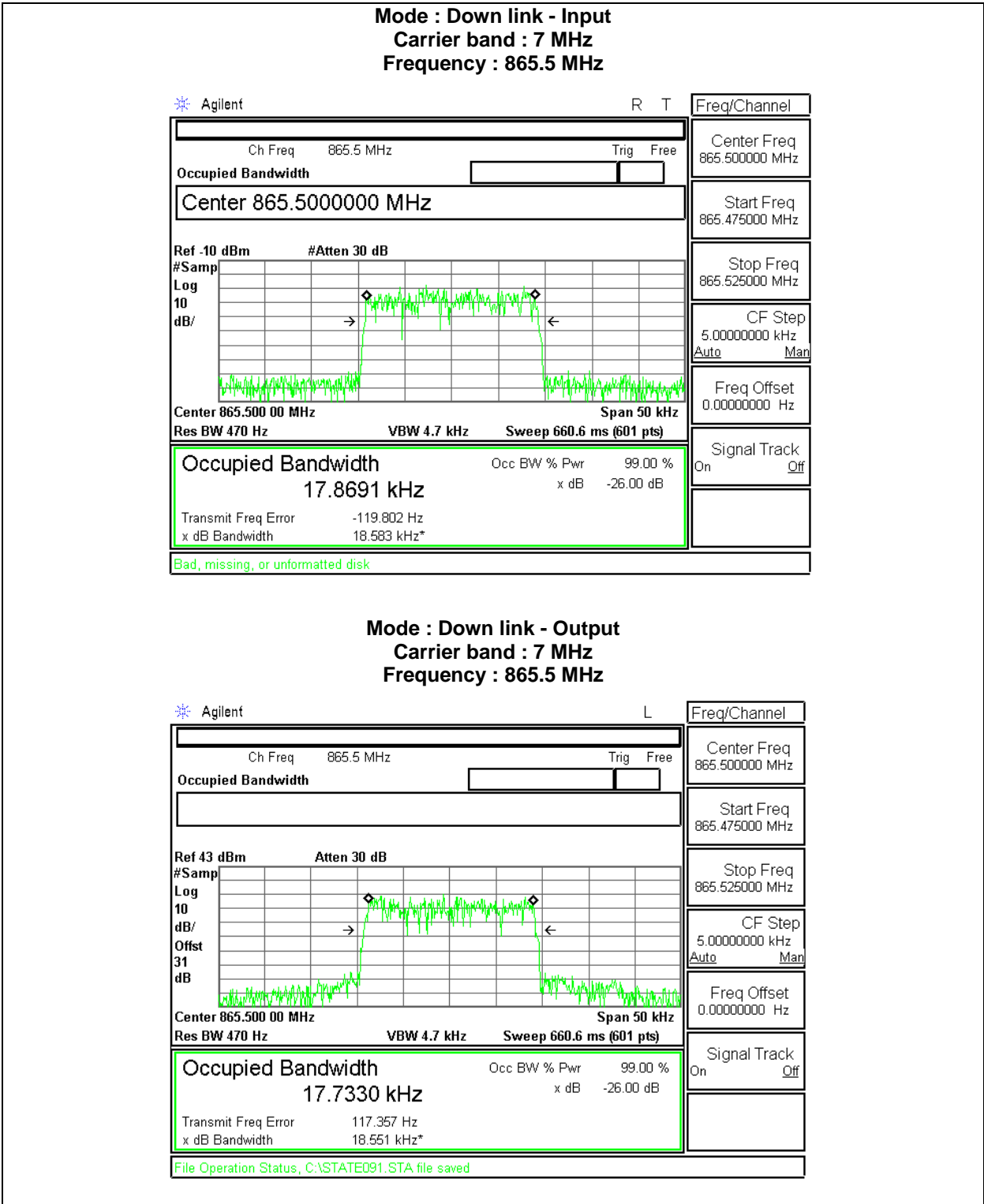


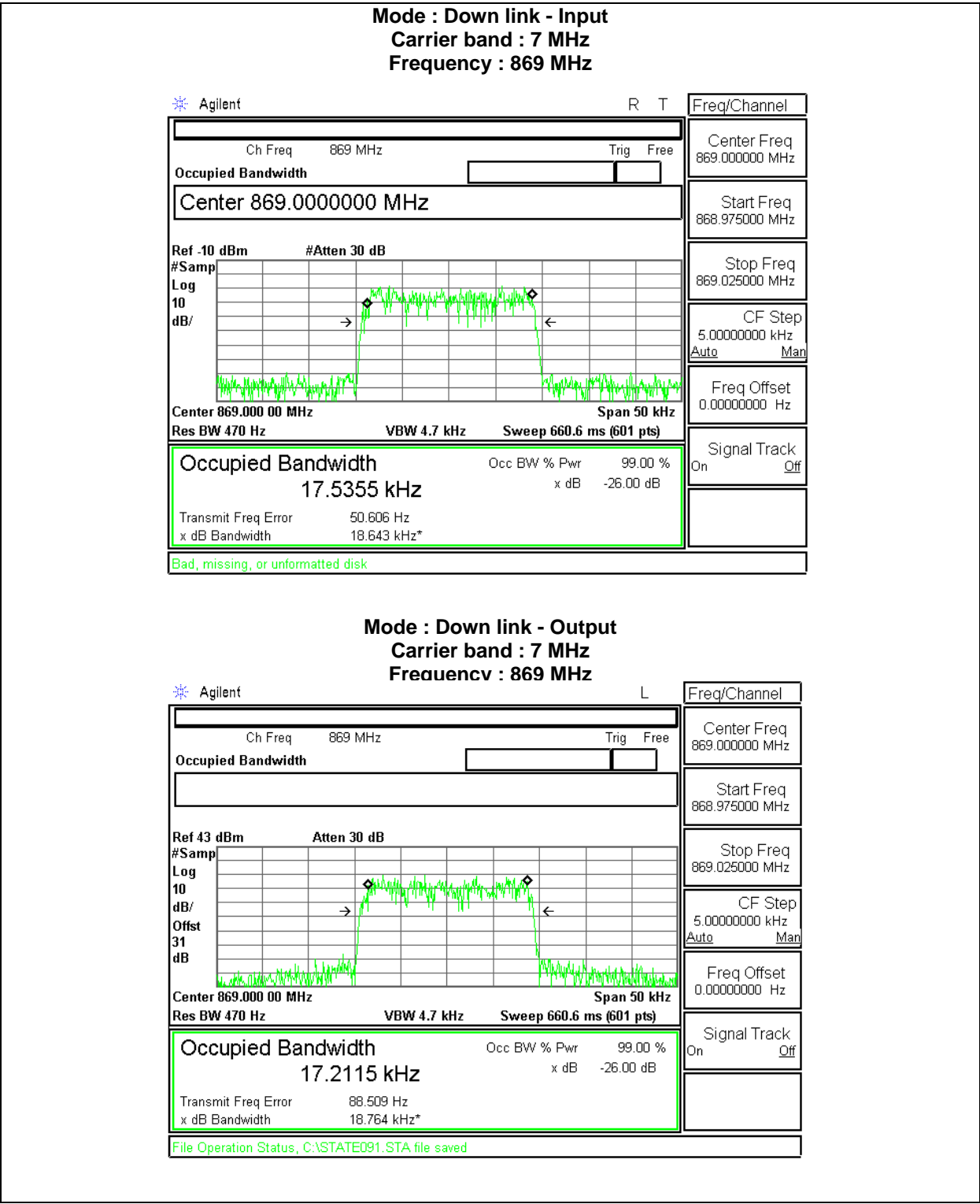


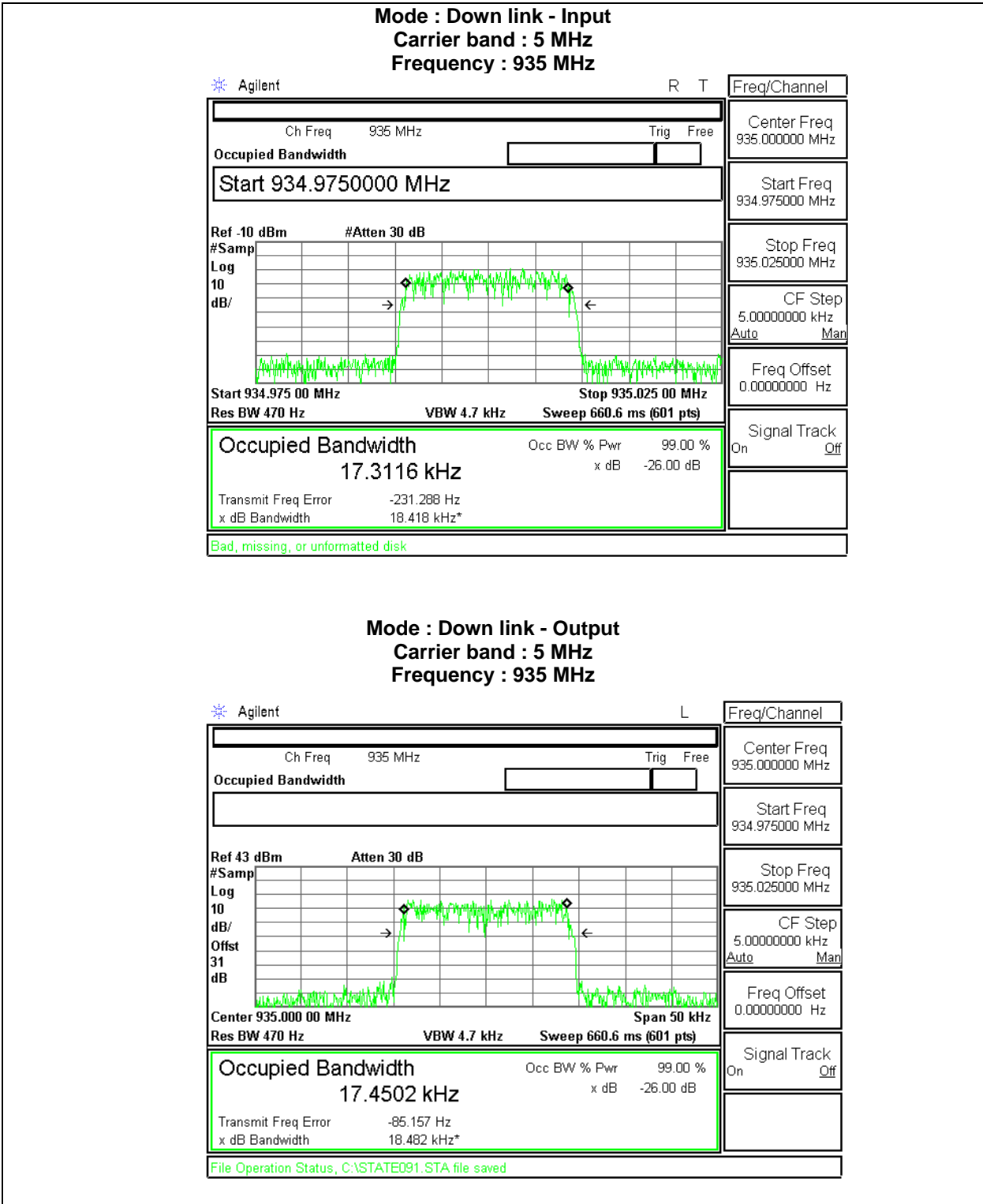


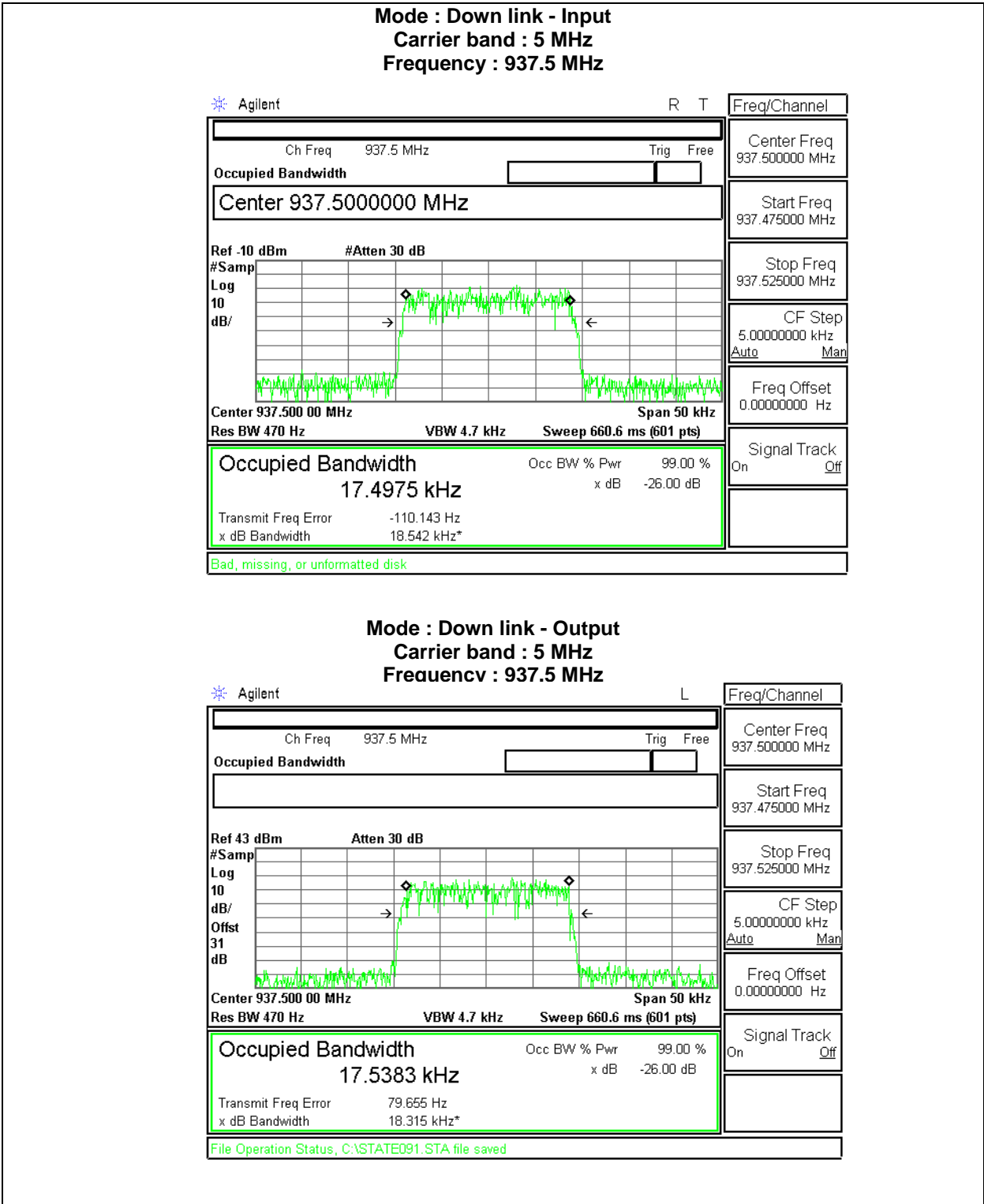


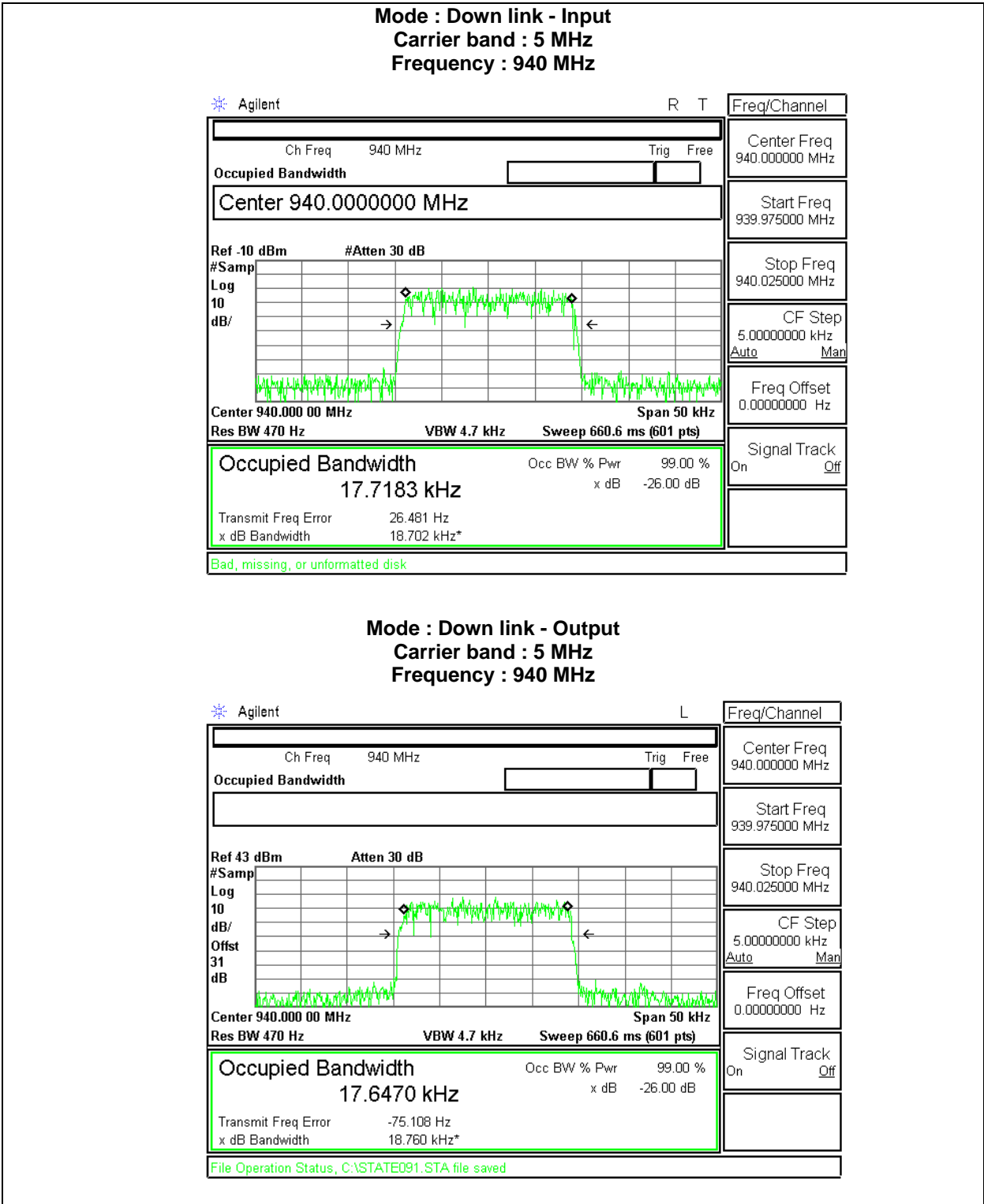












3.5 Test Conditions and Results – Emission Mask

Test Description	Measurements were made in the laboratory environment. Emission mask measurement was made using a direct connection between RF output of the EUT and spectrum analyzer. Measurement has been performed with the EUT set to maximum output level at low, mid and high channel frequencies.
Basic Standard	47 CFR § 2.1049,
Occupied Bandwidth Limits	
1. § 90.691 Emission Mask Requirements for EA-Based Systems – 25 kHz Channel Spacing – 800 MHz Operation 0 – 12.5 kHz : 0 dBc 12.5 – 37.5 kHz : $116 \cdot \log_{10}(F/6.1)$ dB 37.5 kHz - : 43 plus $10 \log_{10}(P)$ dB 2. § 90.669 Emission Limits – 25 kHz Channel Spacing – 900 MHz Operation On any frequency in an MTA licensee's spectrum block that is adjacent to a non-MTA frequency, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 plus $10 \log_{10}(P)$ dB or 80 dB, whichever is the lesser attenuation.	

Emission Mask Configuration Settings

Power Interface Mode # (See Section 2.4)	EUT Configurations Mode # (See Section 2.9)	EUT Operation Mode # (See 2.6)
1	2,3	2,3
Supplementary information: None		

Emission Mask Spectrum Analyzer Settings

Span (MHz)	Resolution Bandwidth (MHz)	Occupied Bandwidth Requirements	
		dBc	%
50 kHz	470 Hz	-26	99
Supplementary information: 99% bandwidth was applied.			

Table 5 Emission Mask measured results

Table 5-A Uplink results

Carrier Band	UP LINK Bandwidth (kHz)		
	Frequency (MHz)	Emission mask	Result
iDEN 18 MHz	806	§ 90.691	Pass
	815	§ 90.691	Pass
	824	§ 90.691	Pass
iDEN 7 MHz	817	§ 90.691	Pass
	820.5	§ 90.691	Pass
	824	§ 90.691	Pass

iDEN 5 MHz	896	§ 90.669	Pass
	898.5	§ 90.669	Pass
	901	§ 90.669	Pass
Supplementary information: Modulation signal 16-QAM, 99% bandwidth			

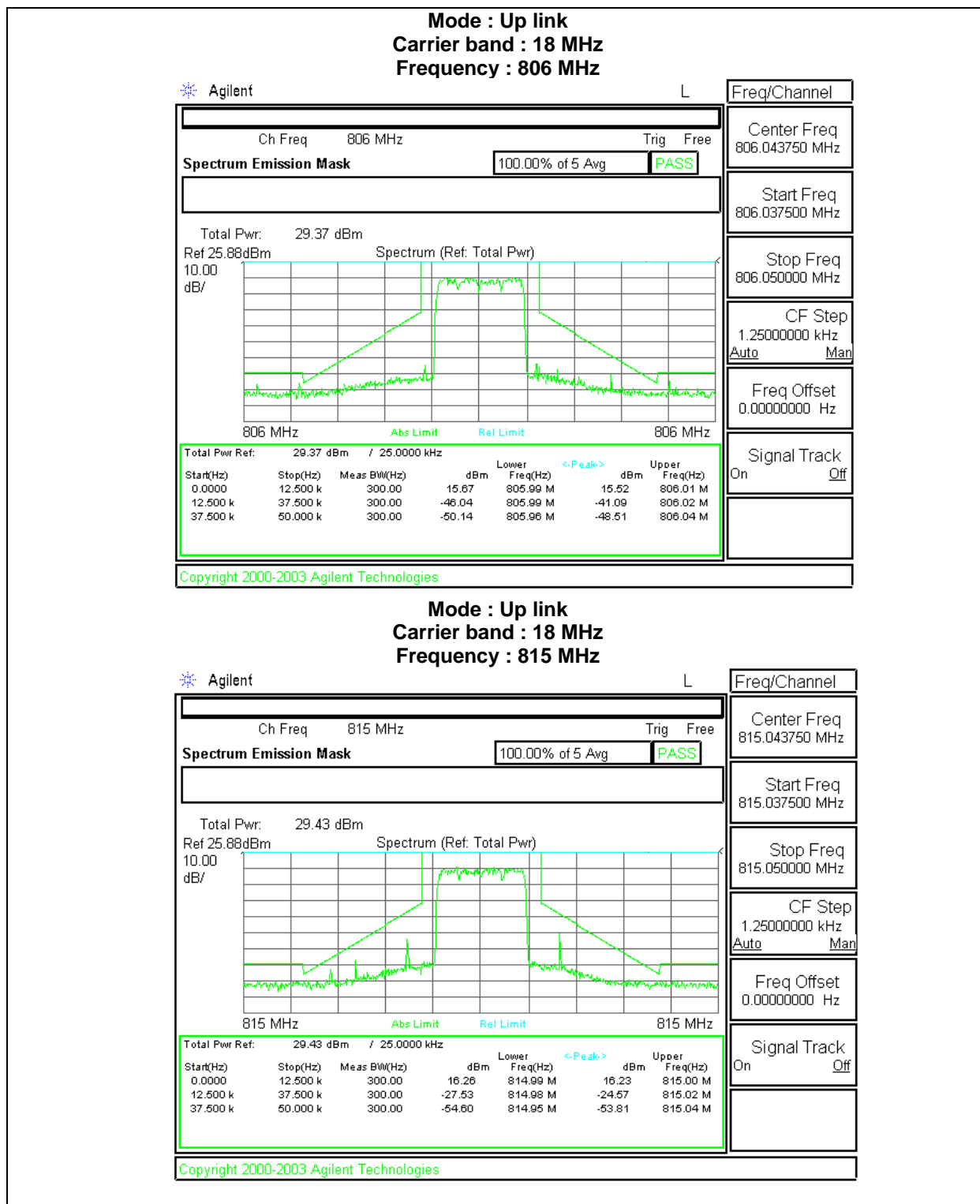
Table 5-B Downlink results

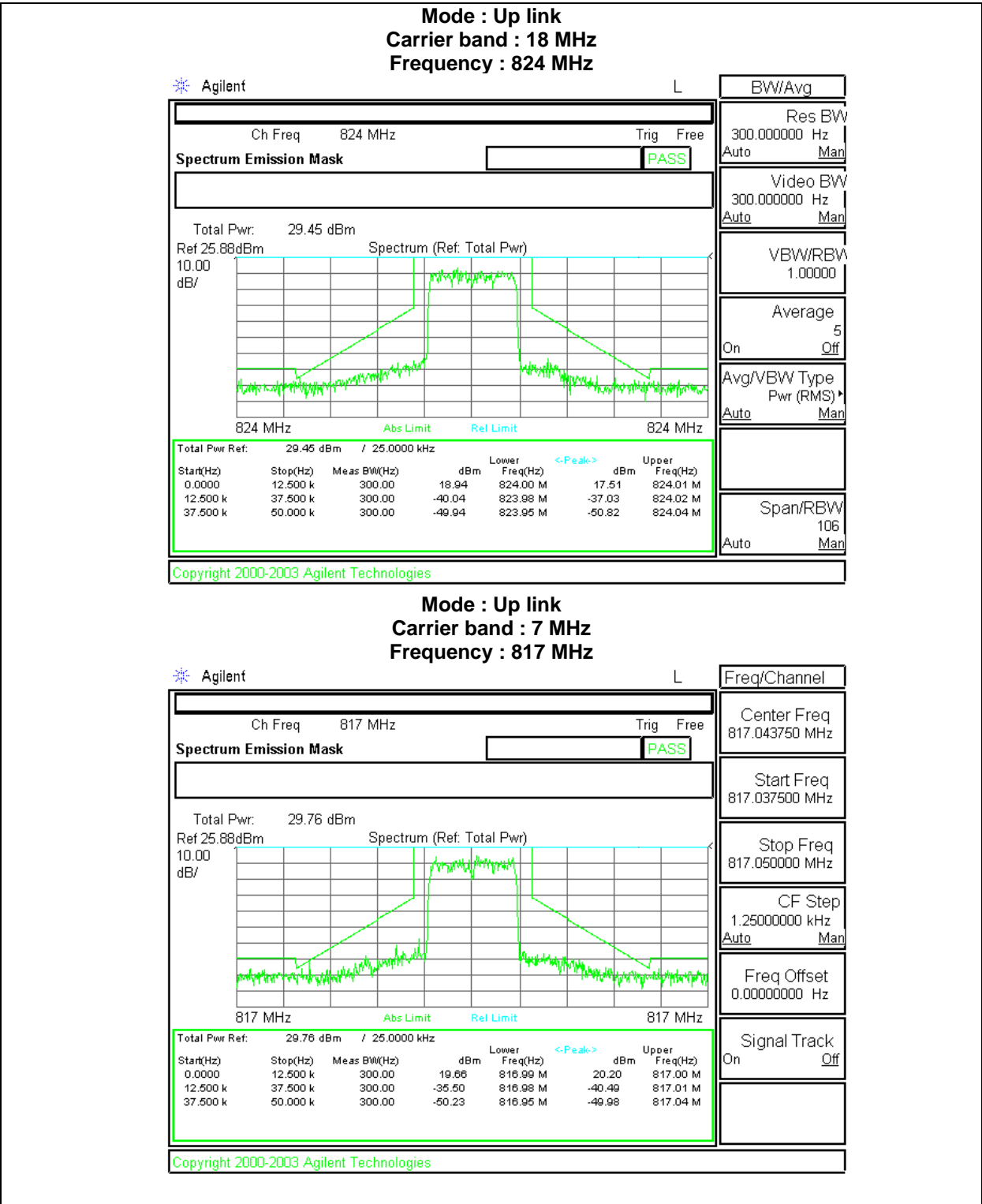
Carrier Band	DOWN LINK Bandwidth (kHz)		
	Frequency (MHz)	Input channel	Output channel
iDEN 18 MHz	851	§ 90.691	Pass
	860	§ 90.691	Pass
	869	§ 90.691	Pass
iDEN 7 MHz	862	§ 90.691	Pass
	865.5	§ 90.691	Pass
	869	§ 90.691	Pass
iDEN 5 MHz	935	§ 90.669	Pass
	937.5	§ 90.669	Pass
	940	§ 90.669	Pass
Supplementary information: Modulation signal 16-QAM, 99% bandwidth			

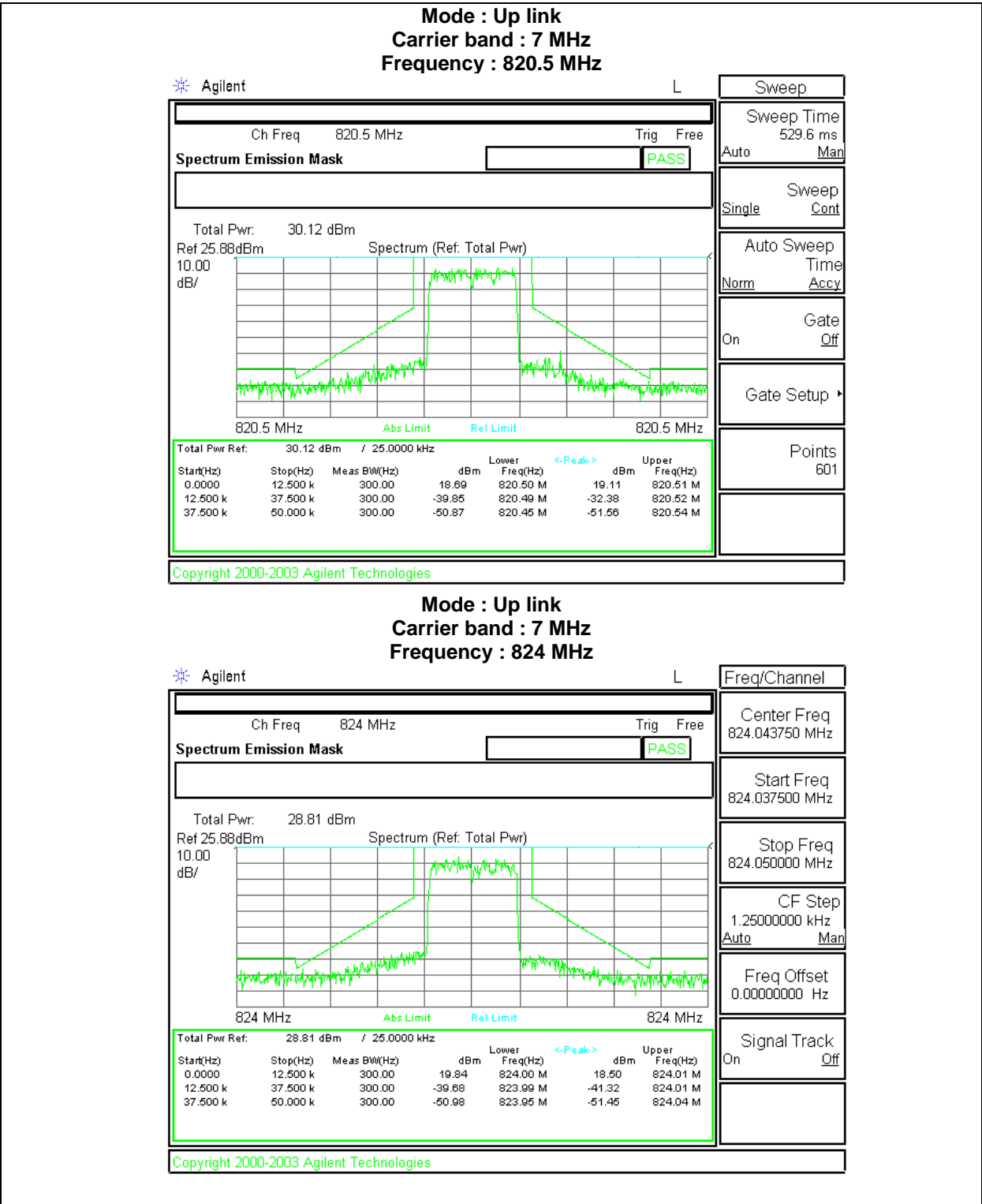
Emission Mask Test Equipment

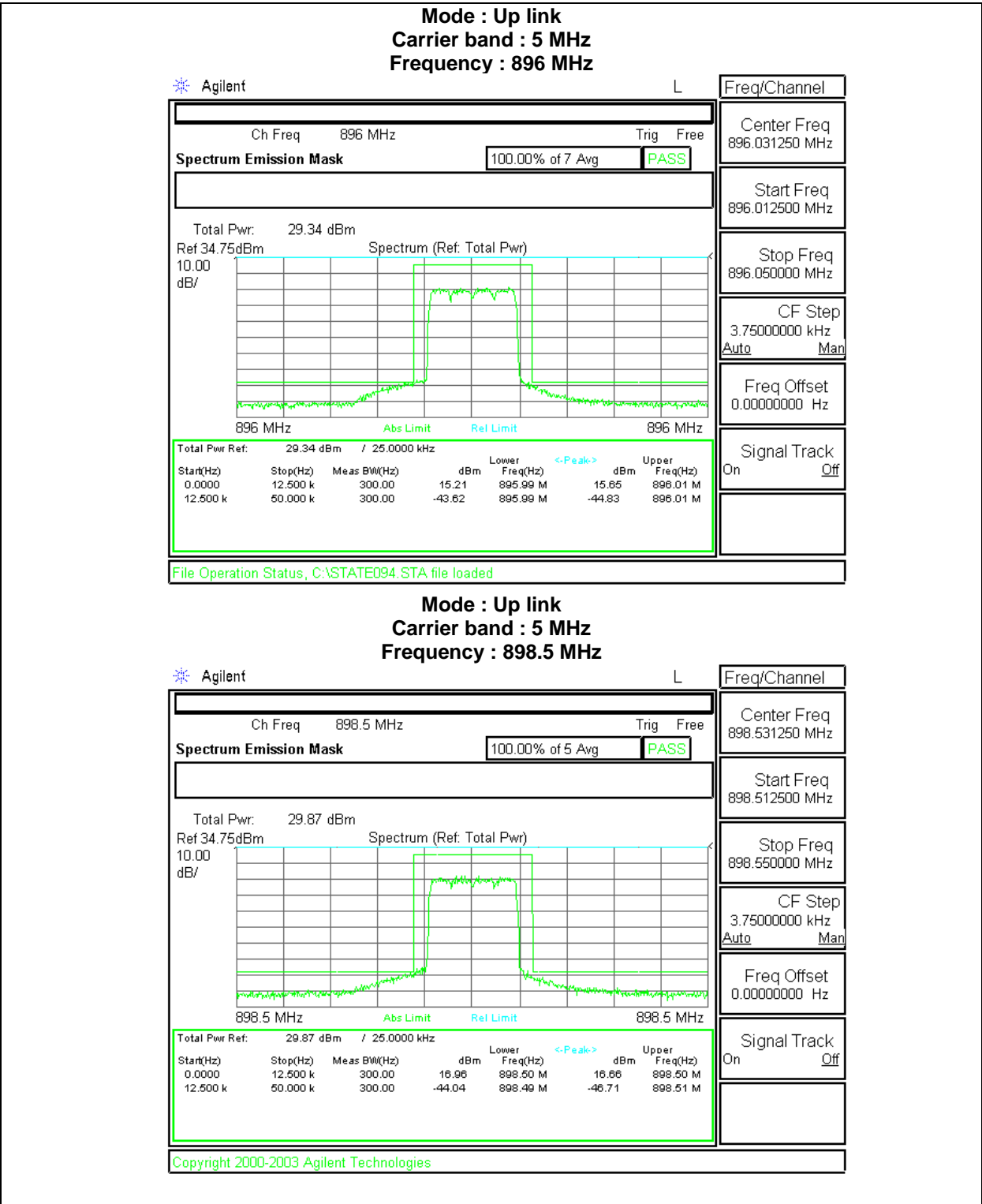
Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Signal Generator	Aeroflex	IFR3413	341006/212	2006-05-12	2007-05-12
Spectrum Analyzer	Agilent	E4440A	MY44022474	2006-11-06	2007-11-06
Fixed Attenuator	H.P	8498A	3318A10568		

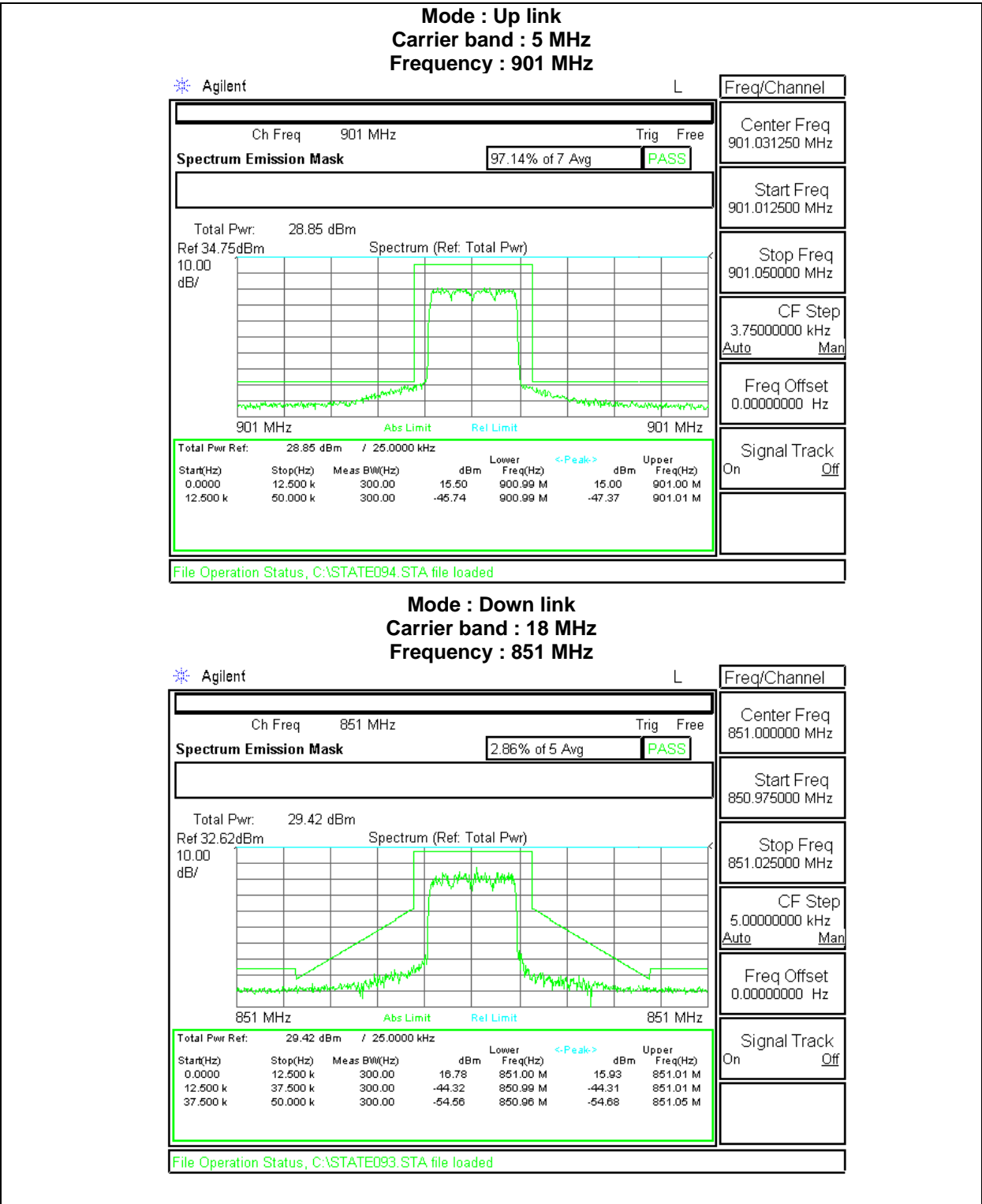
Figure 3 Emission Mask Plots

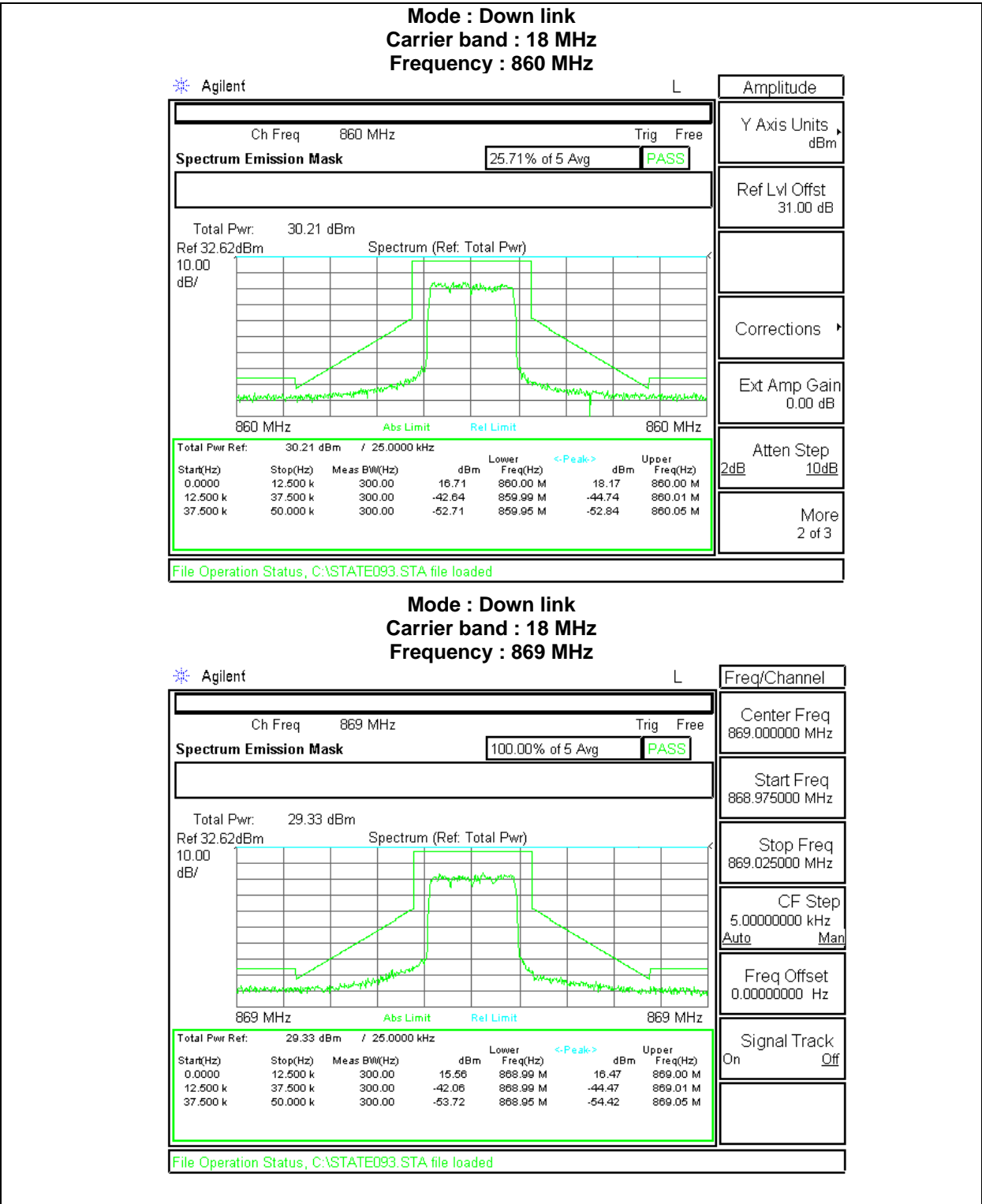


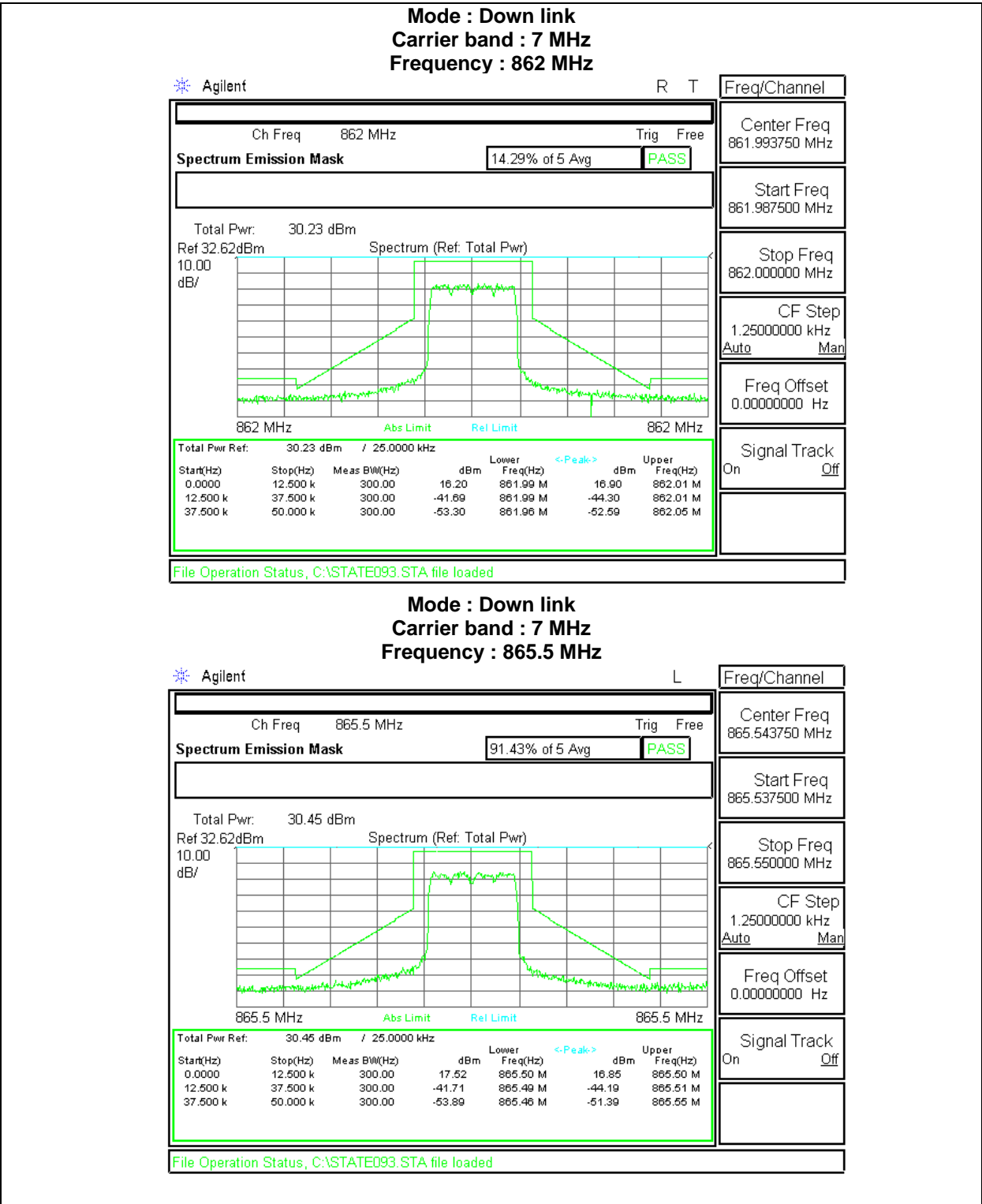


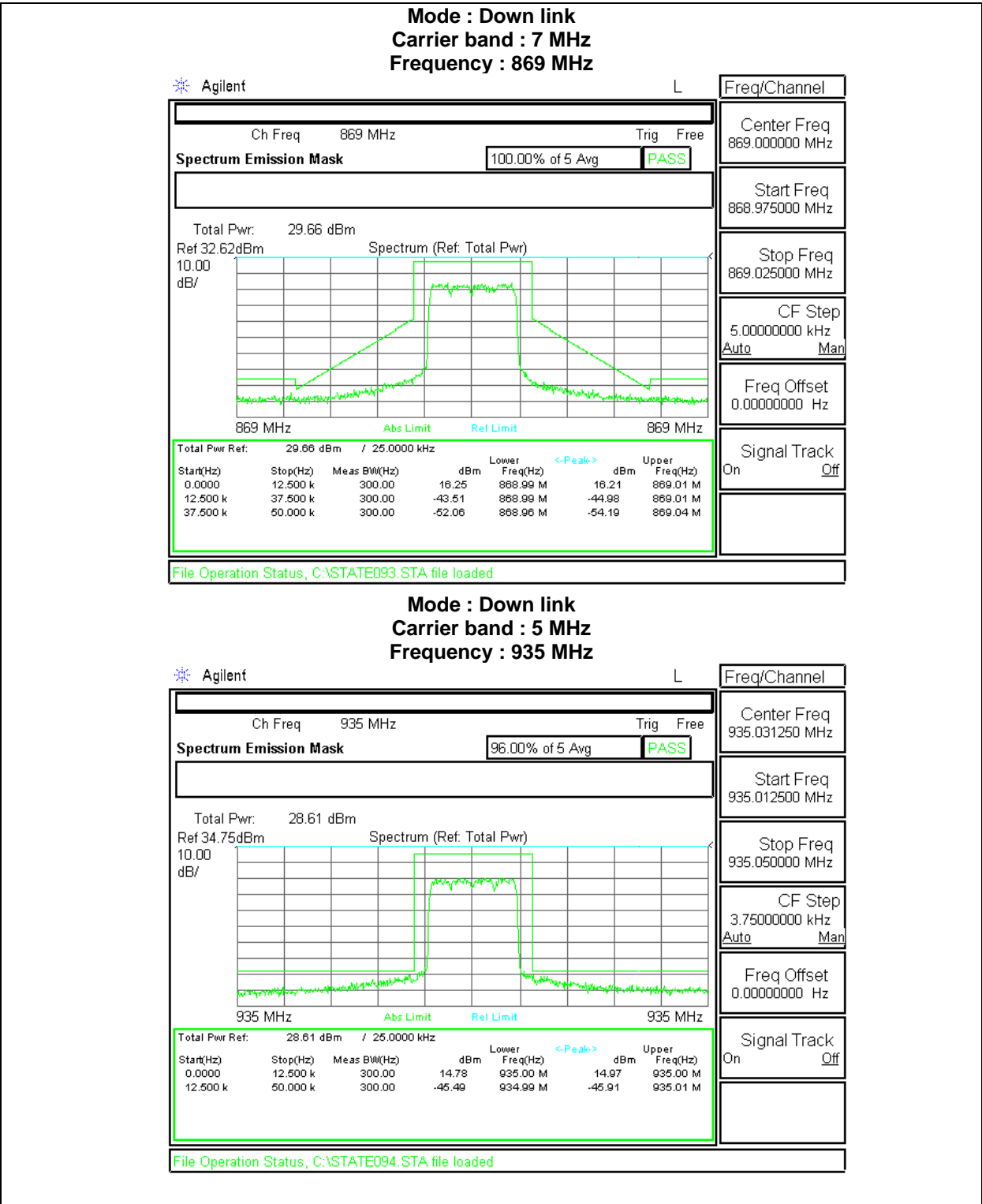


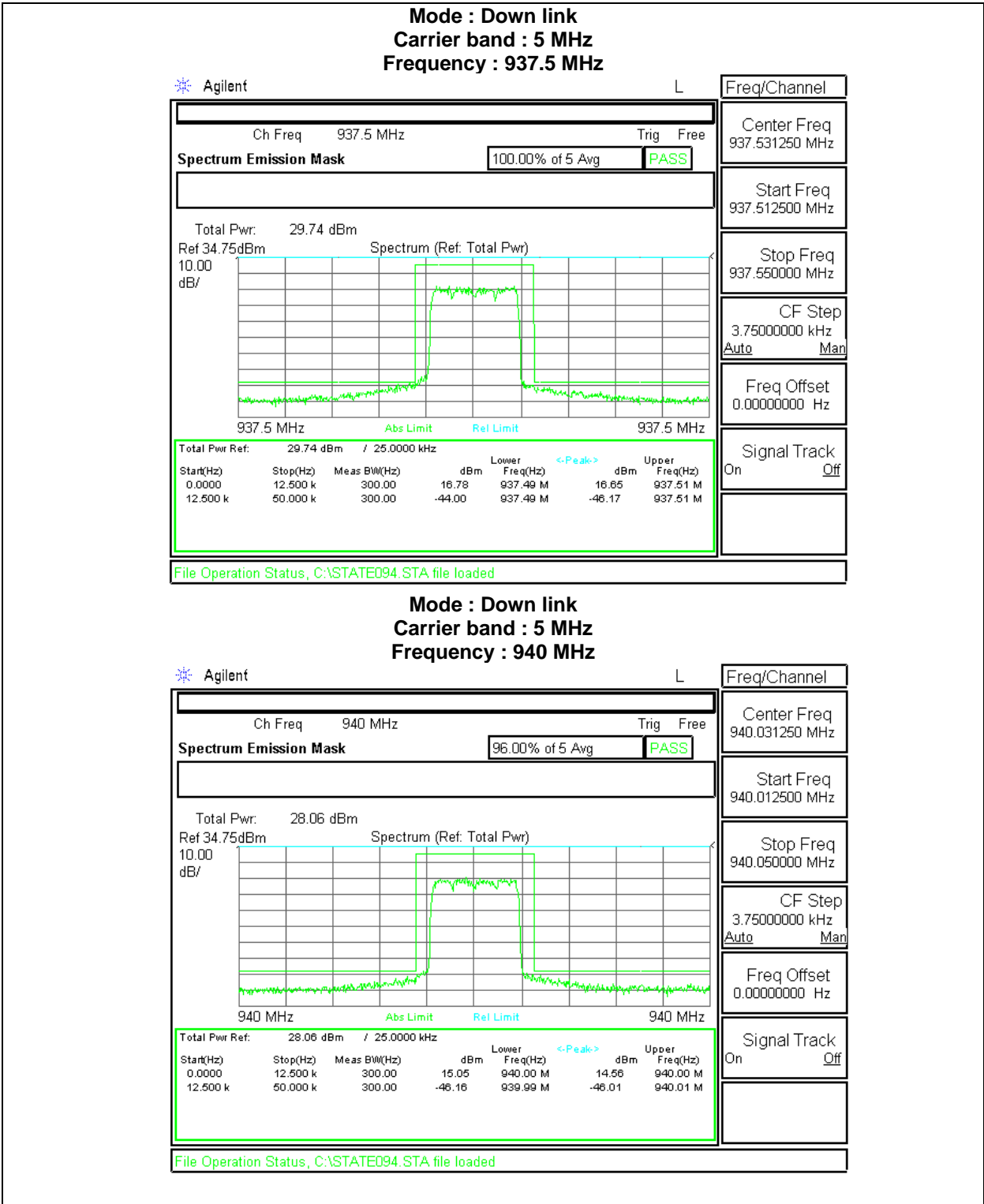












3.6 Test Conditions and Results – Spurious Emission at Antenna Terminal

Test Description	Measurements were made in the laboratory environment. Conducted spurious emission measurement was made using a direct connection between RF output of the EUT and spectrum analyzer. A modulated carrier signal from the generator was applied to the both uplink and down link port of the EUT. Measurement has been performed with the EUT set to maximum output level at low, mid and high channel frequencies. The spectrum was investigated from 30 MHz to 10 th harmonics of carrier. Inter-modulation requirements were performed with two modulated carriers set at 1 MHz deviation. One carrier was set at the band edge of both Uplink and Downlink and other carrier was set at 1 MHz deviation from the first carrier.
Basic Standard	47 CFR § 2.1051
Occupied Bandwidth Limits	
§ 90.210 & § 90.669 Emission limit : On any frequency in an MTA licensee's spectrum block that is adjacent to a non-MTA frequency, the power of any emission shall be attenuated below the transmitter power(P) by at least $43 + 10\log_{10}(P)$ dB or 80 dB, whichever is the lesser attenuation.	

Emission Mask Configuration Settings

Power Interface Mode # (See Section 2.4)	EUT Configurations Mode # (See Section 2.9)	EUT Operation Mode # (See 2.6)
1	2,3	2,3
Supplementary information: None		

Conducted spurious emission Spectrum Analyzer Settings

Frequency Range (MHz)	Resolution Bandwidth	Resolution Bandwidth
30 MHz ~ 1 GHz	100 kHz	300 kHz
1 GHz ~ 10 GHz	1 MHz	3 MHz
Supplementary information:		

Table 6 Antenna terminal Conducted spurious emission results

Table 6-A Up Link

Carrier Band	Tuned Frequency (MHz)	Loss offset (dB)	Spurious emission measured (dBm)	Limit (dBm)	Margin (dB)
iDEN 18 MHz	806	31	-26.79	-13	-13.79
	815	31	-26.45	-13	-13.45
	824	31	-27.36	-13	-14.36
iDEN 7 MHz	817	31	-26.22	-13	-13.22
	820.5	31	-28.17	-13	-15.17
	824	31	-27.69	-13	-14.69
iDEN 5 MHz	896	31	-27.64	-13	-14.64
	898.5	31	-27.64	-13	-14.64
	901	31	-27.73	-13	-14.73
Supplementary information: -. Carrier signal was modulated with iDEN 16-QAM, Power measurement : Peak power measured -. For each tuned carrier frequency, the maximum spurious emission detected was recorded.					

Table 6-B Up Link Two carrier Intermodulation

Carrier Band	Tuned Frequency (MHz)	Loss offset (dB)	Spurious emission measured (dBm)	Limit (dBm)	Margin (dB)
iDEN 18 MHz	Low edge	31	-28.71	-13	-15.71
	High edge	31	-31.91	-13	-18.91
iDEN 7 MHz	Low edge	31	-29.54	-13	-16.54
	High edge	31	-33.63	-13	-20.63
iDEN 5 MHz	Low edge	31	-28.58	-13	-15.58
	High edge	31	-32.04	-13	-19.04
Supplementary information: -. Carrier signal was modulated with iDEN 16-QAM, Power measurement : Peak power measured -. For each tuned carrier frequency, the maximum spurious emission detected was recorded.					

Table 6-C Down link

Carrier Band	Tuned Frequency (MHz)	Loss offset (dB)	Spurious emission measured (dBm)	Limit (dBm)	Margin (dB)
iDEN 18 MHz	851	31	-25.33	-13	-12.33
	860	31	-26.49	-13	-13.49
	869	31	-23.34	-13	-10.34
iDEN 7 MHz	862	31	-24.50	-13	-11.50
	865.5	31	-26.23	-13	-13.23
	869	31	-23.20	-13	-10.20
iDEN 5 MHz	935	31	-27.52	-13	-14.52
	937.5	31	-26.28	-13	-13.28
	940	31	-27.29	-13	-14.29
Supplementary information:					

- Carrier signal was modulated with iDEN 16-QAM, Power measurement : Peak power measured
- For each tuned carrier frequency, the maximum spurious emission detected was recorded.

Table 6-D Down Link Two carrier Intermodulation

Carrier Band	Tuned Frequency (MHz)	Loss offset (dB)	Spurious emission measured (dBm)	Limit (dBm)	Margin (dB)
iDEN 18 MHz	Low edge	31	-28.61	-13	-15.61
	High edge	31	-31.90	-13	-18.90
iDEN 7 MHz	Low edge	31	-30.56	-13	-17.56
	High edge	31	-31.73	-13	-18.73
iDEN 5 MHz	Low edge	31	-30.10	-13	-17.10
	High edge	31	-33.83	-13	-20.83

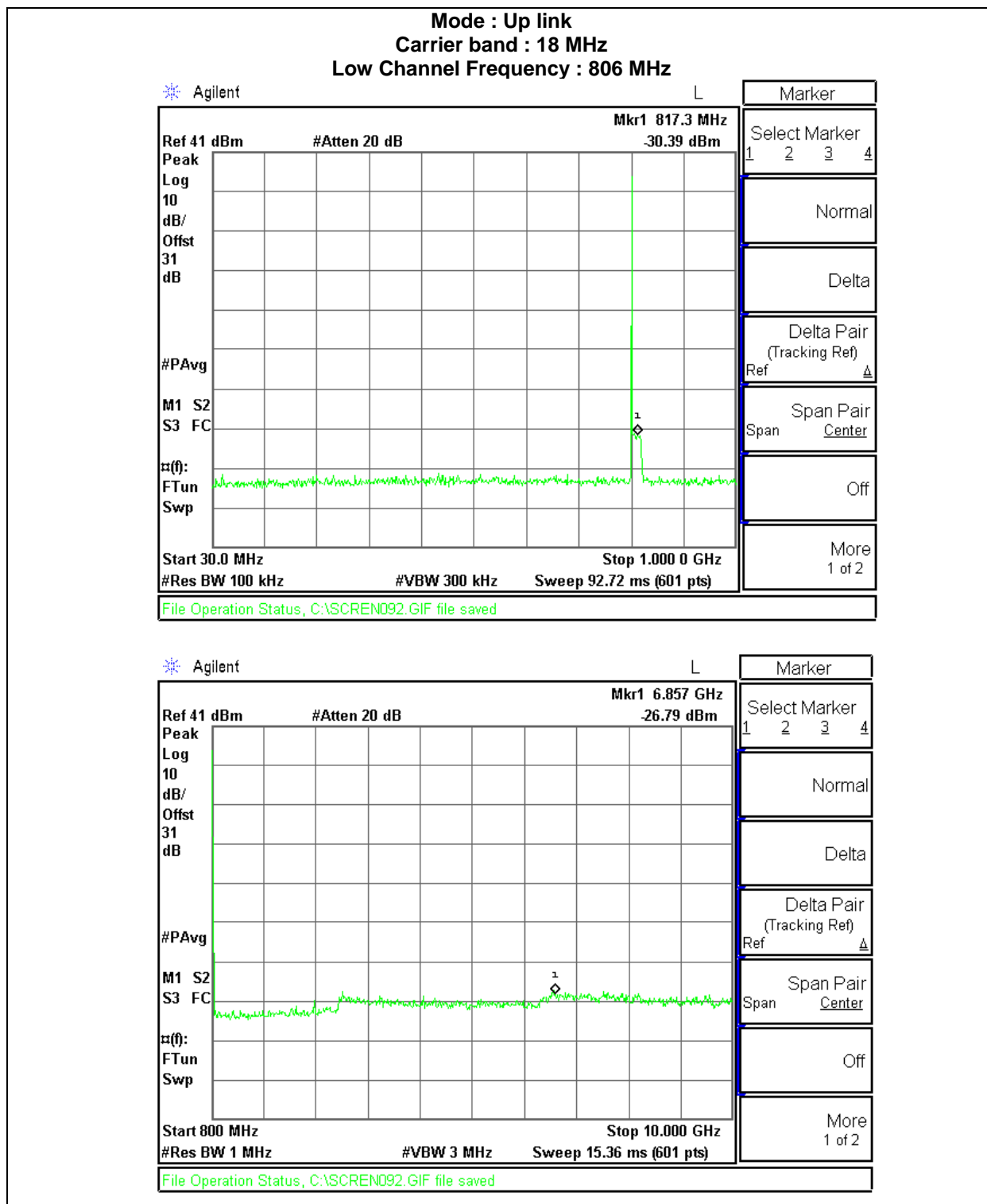
Supplementary information:

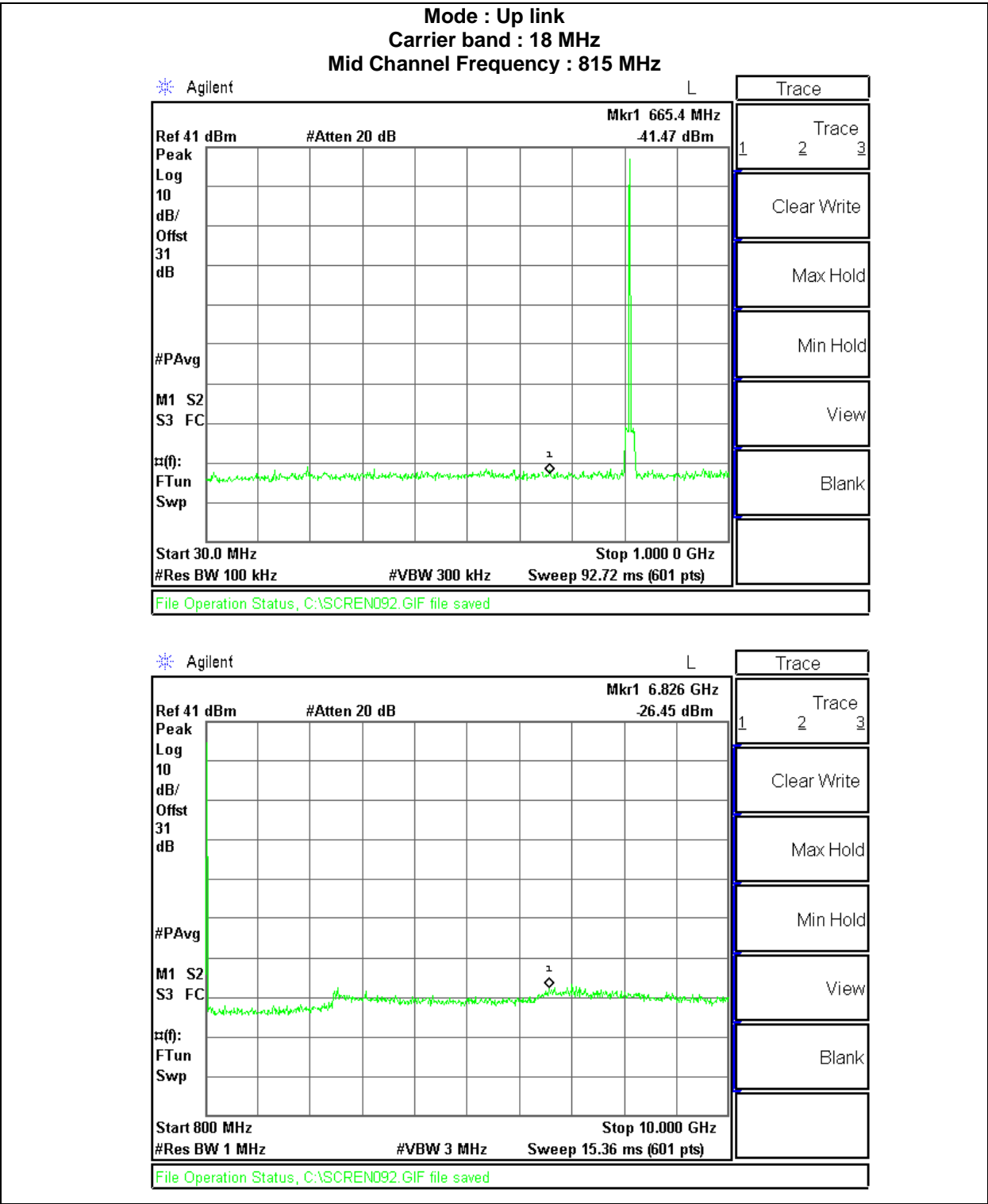
- Carrier signal was modulated with iDEN 16-QAM, Power measurement : Peak power measured
- For each tuned carrier frequency, the maximum spurious emission detected was recorded.

Emission Mask Test Equipment

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Signal Generator	Aeroflex	IFR3413	341006/212	2006-05-12	2007-05-12
Spectrum Analyzer	Agilent	E4440A	MY44022474	2006-11-06	2007-11-06
Fixed Attenuator	H.P	8498A	3318A10568		

Figure 7 Conducted Spurious Emission plots at Antenna terminal





Agilent

L

Ref 41 dBm

Peak

Log

10

dB/

Offst

31

dB

#PAvg

M1 S2

S3 FC

⌘(f):

FTun

Swp

Mkr1 6.826 GHz

-26.45 dBm

Start 800 MHz

Stop 10.000 GHz

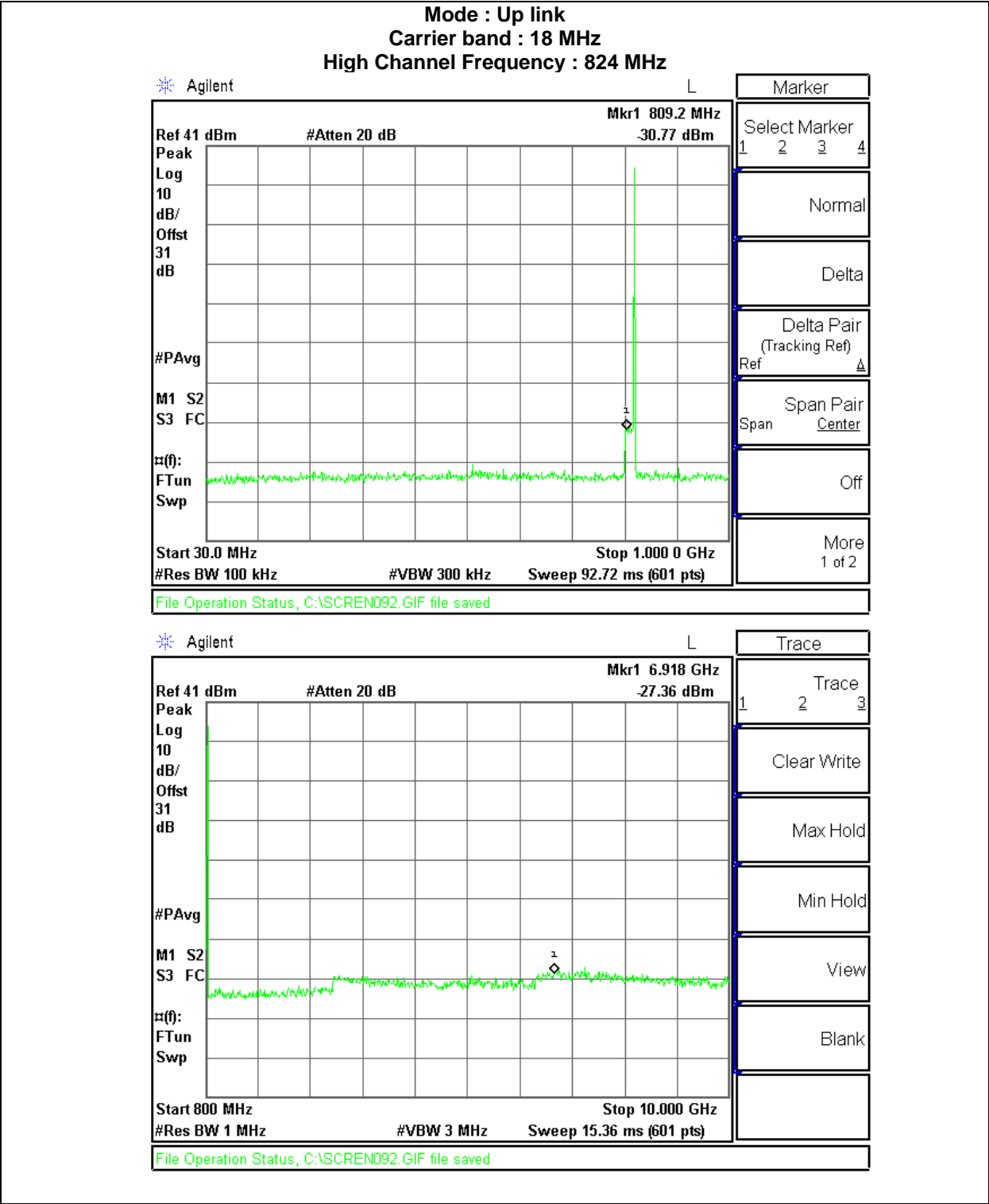
#Res BW 1 MHz

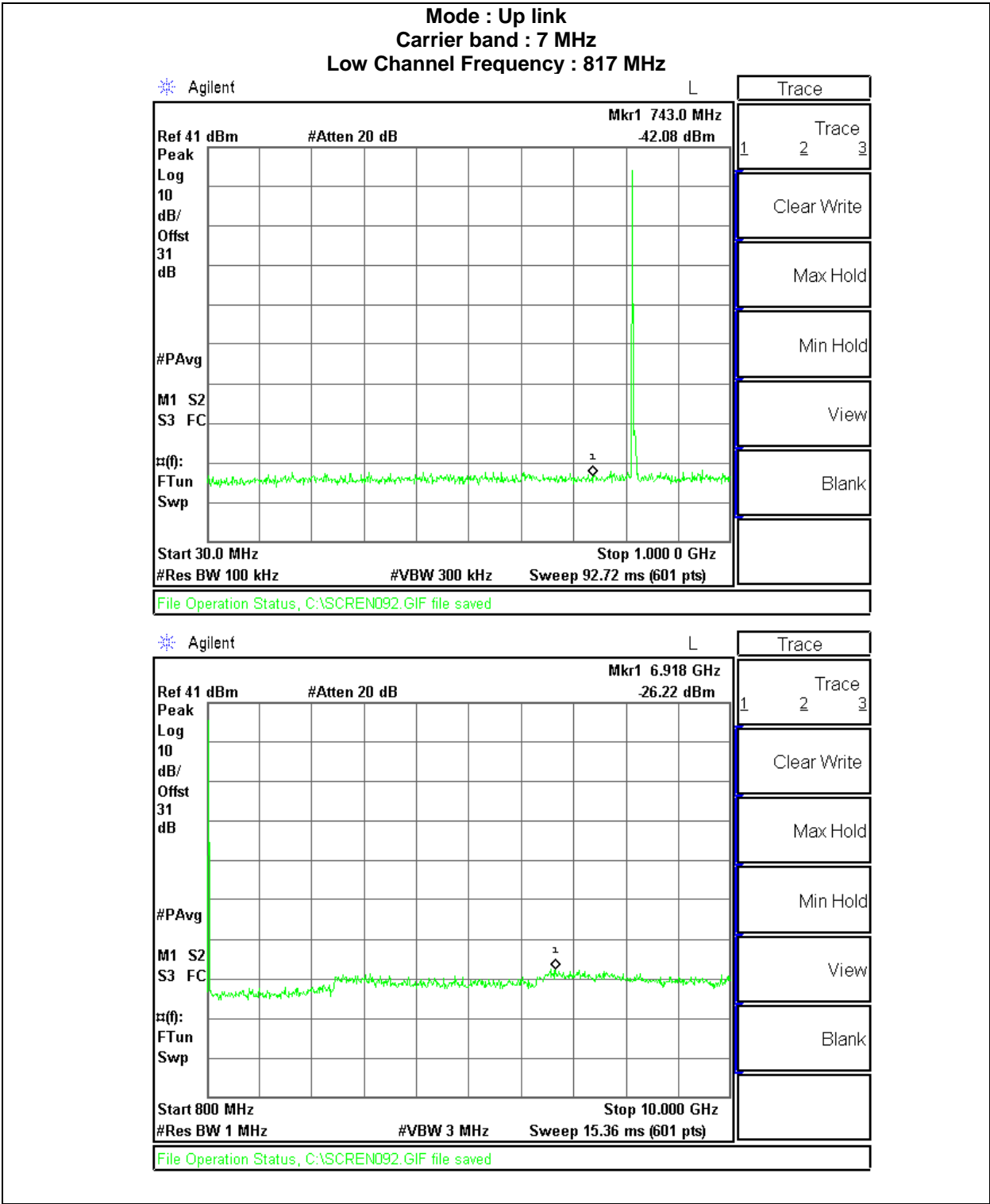
#VBW 3 MHz

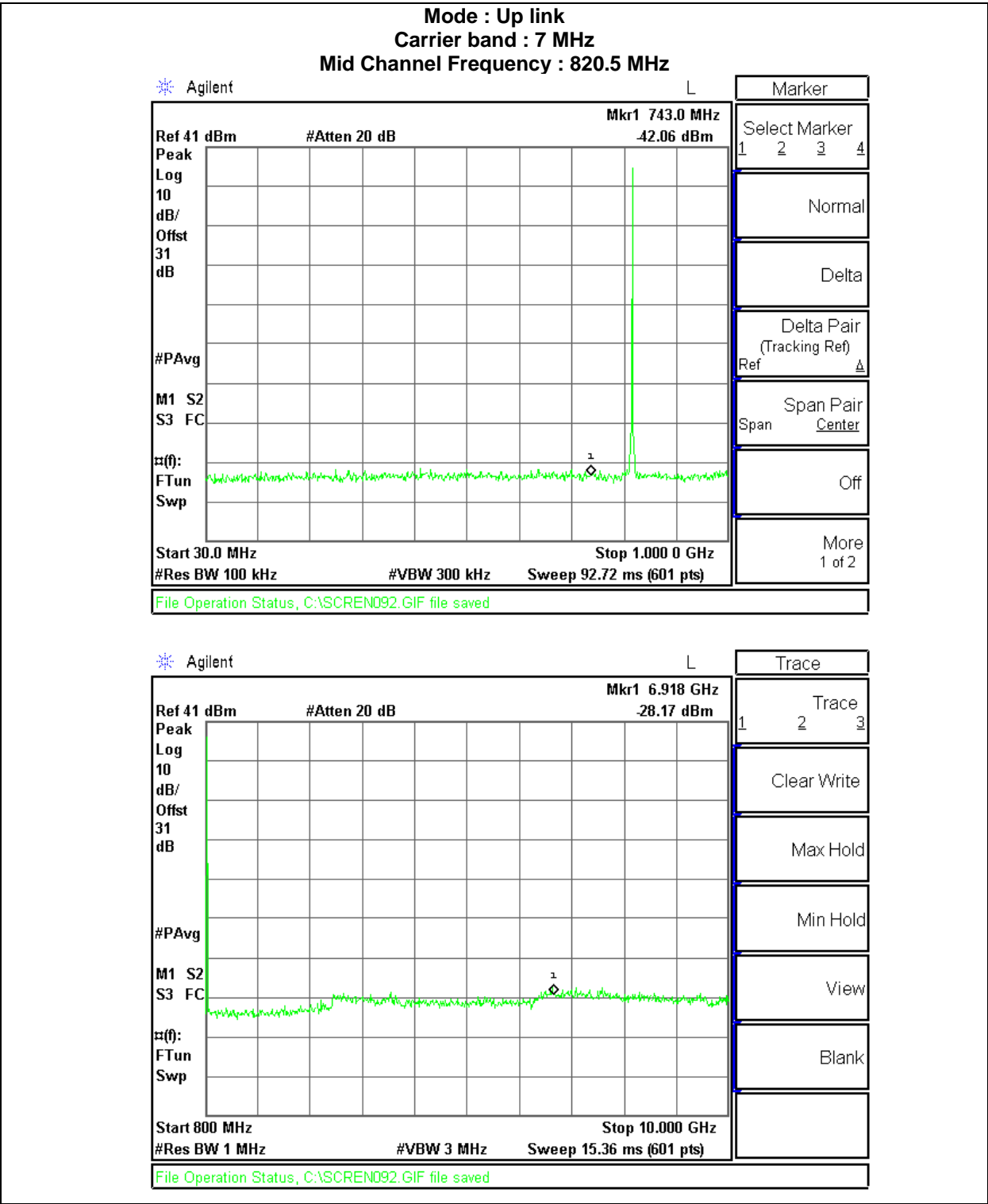
Sweep 15.36 ms (601 pts)

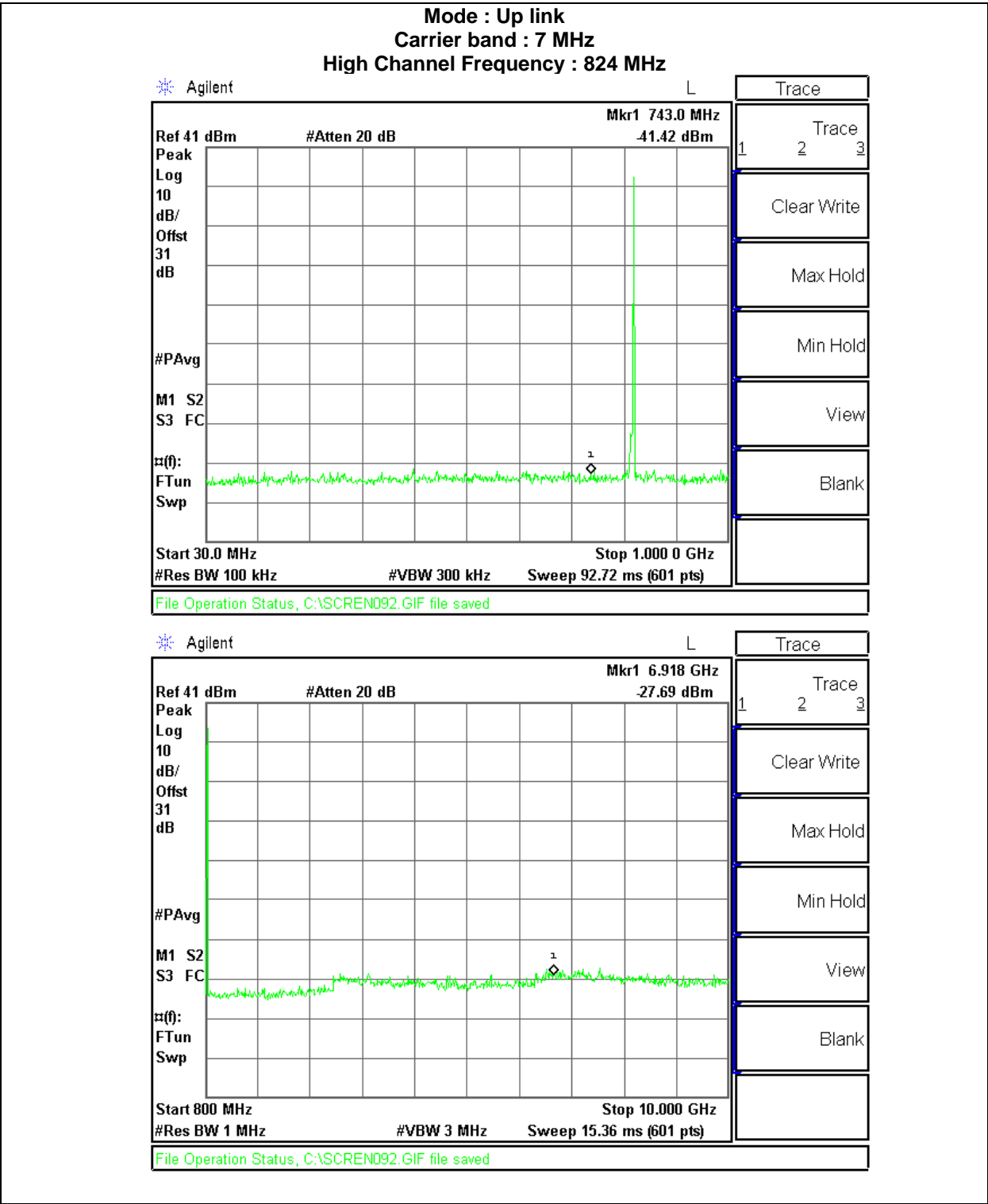
File Operation Status, C:\SCREEN092.GIF file saved

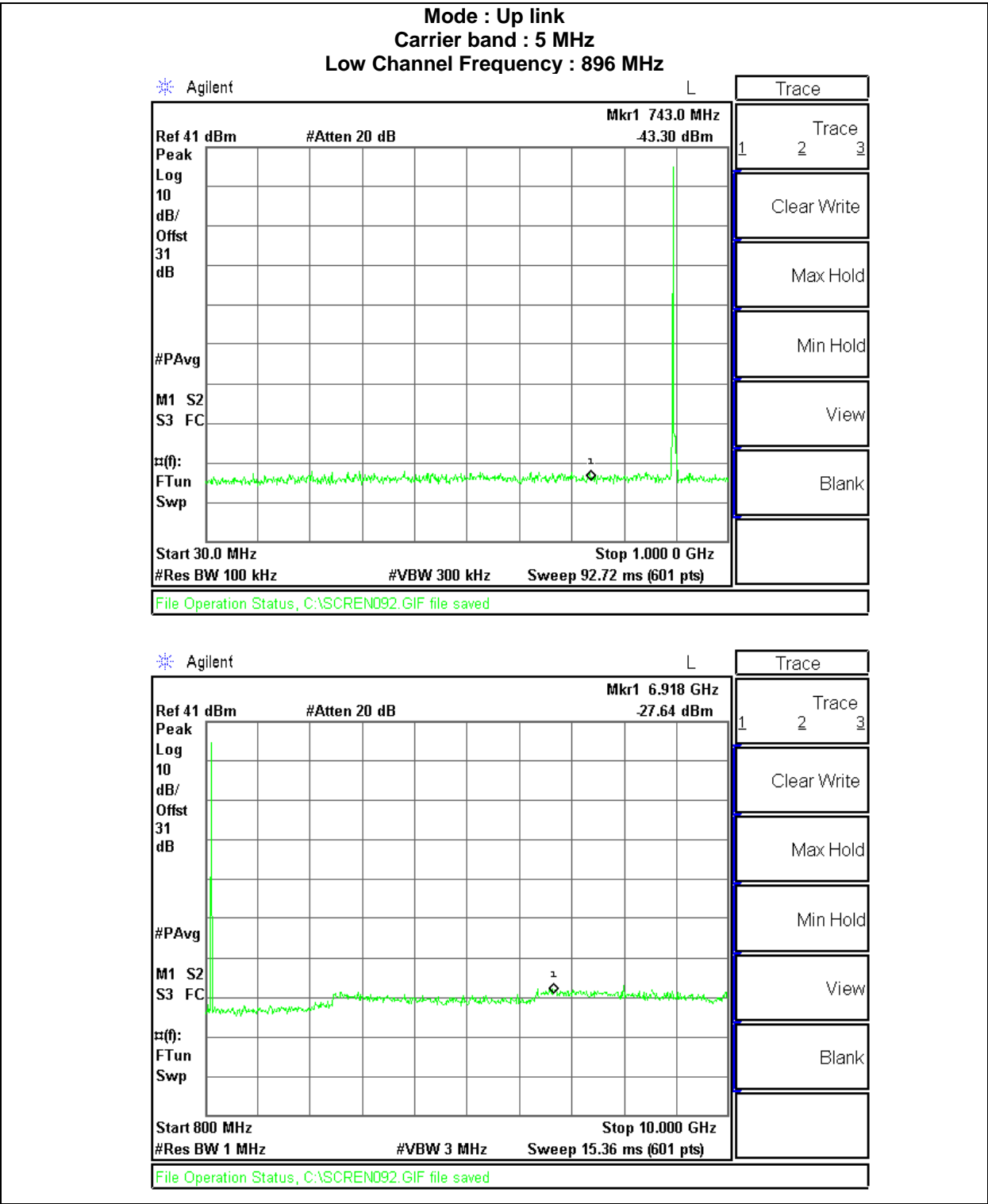
Trace		
1	2	3
Trace		
Clear Write		
Max Hold		
Min Hold		
View		
Blank		

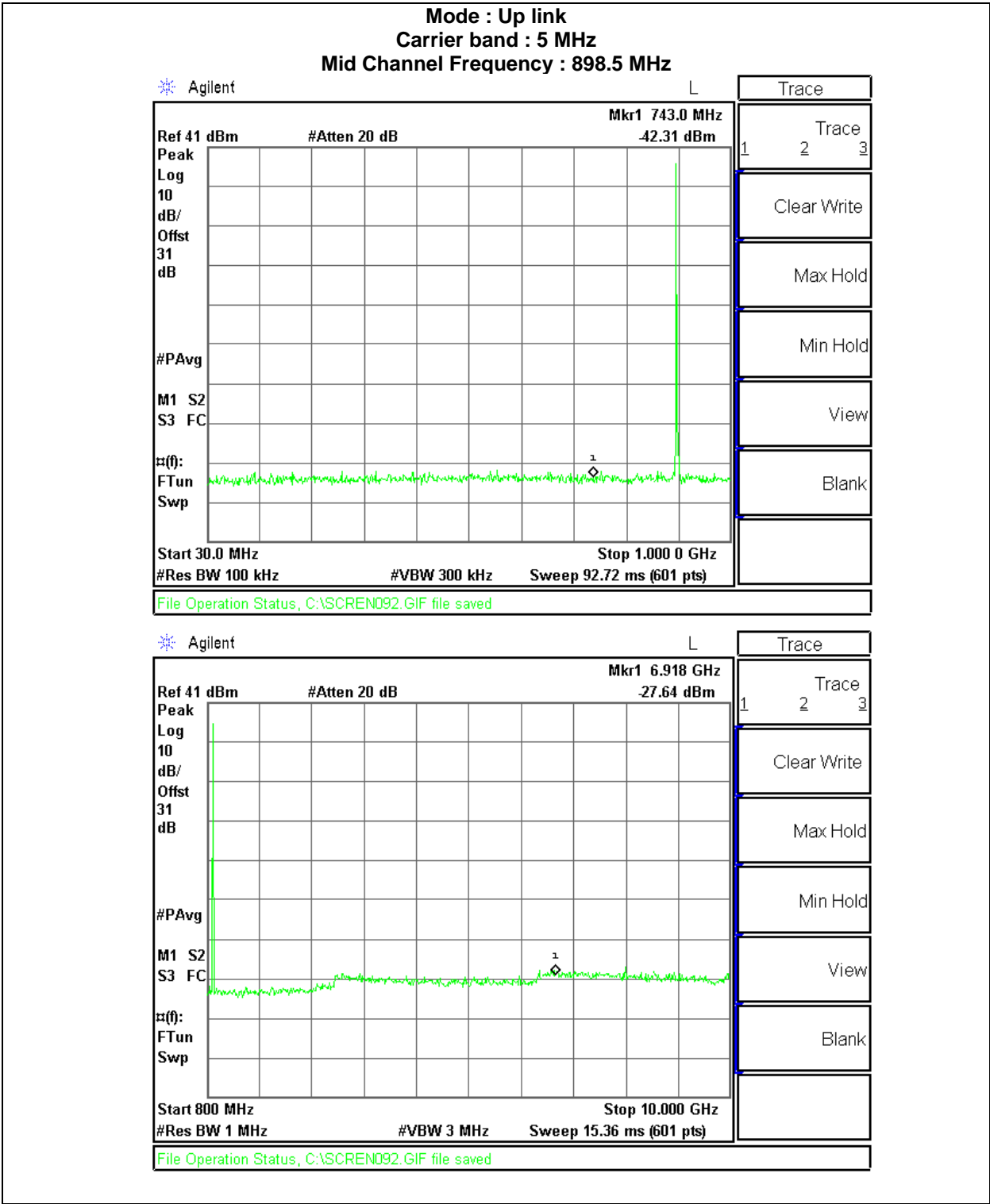


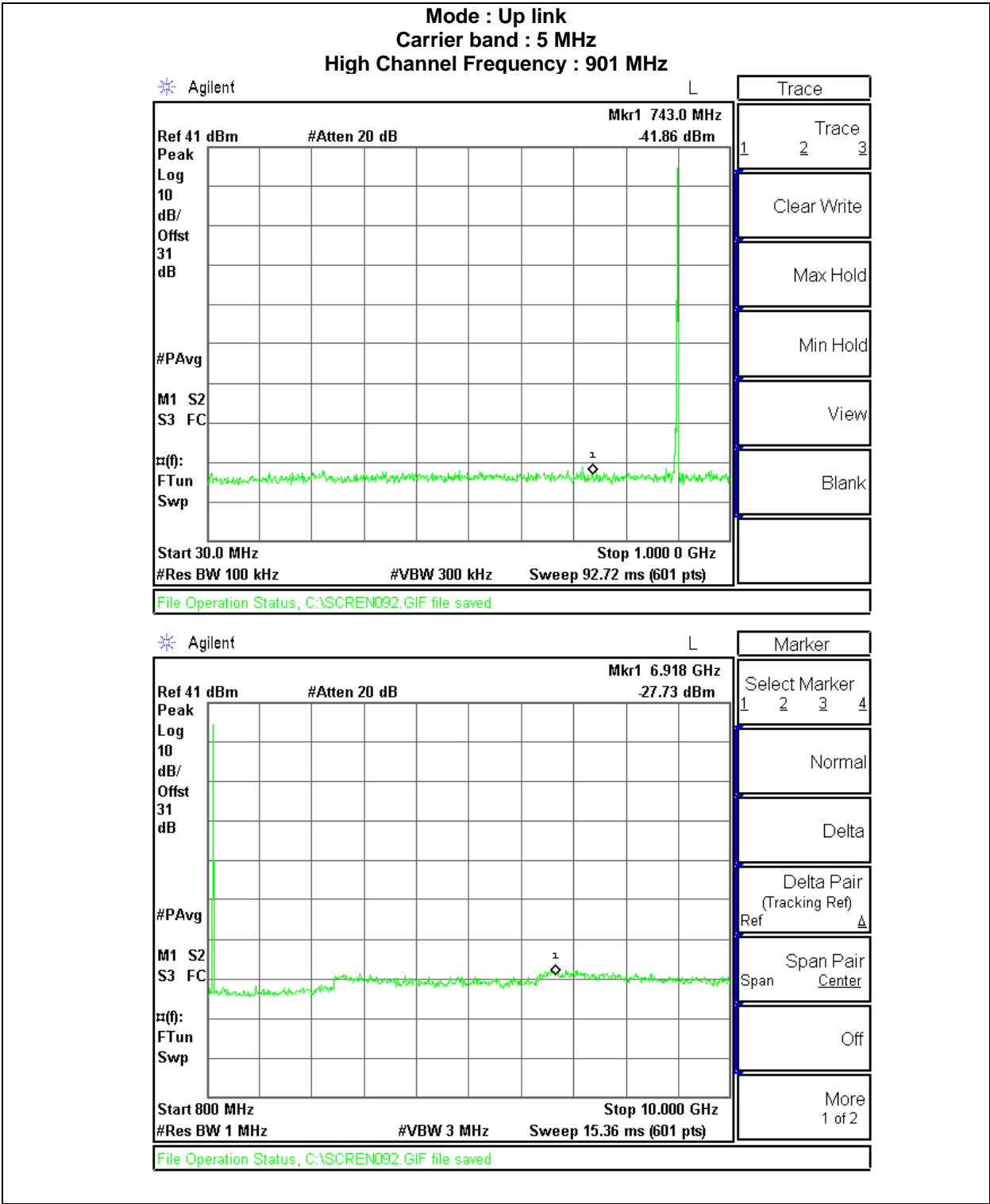




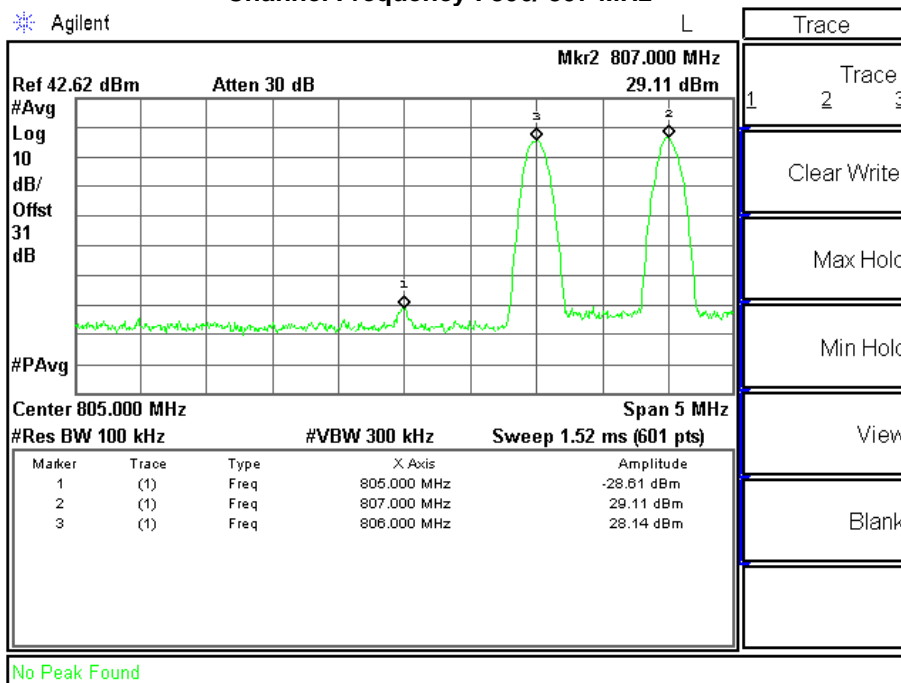




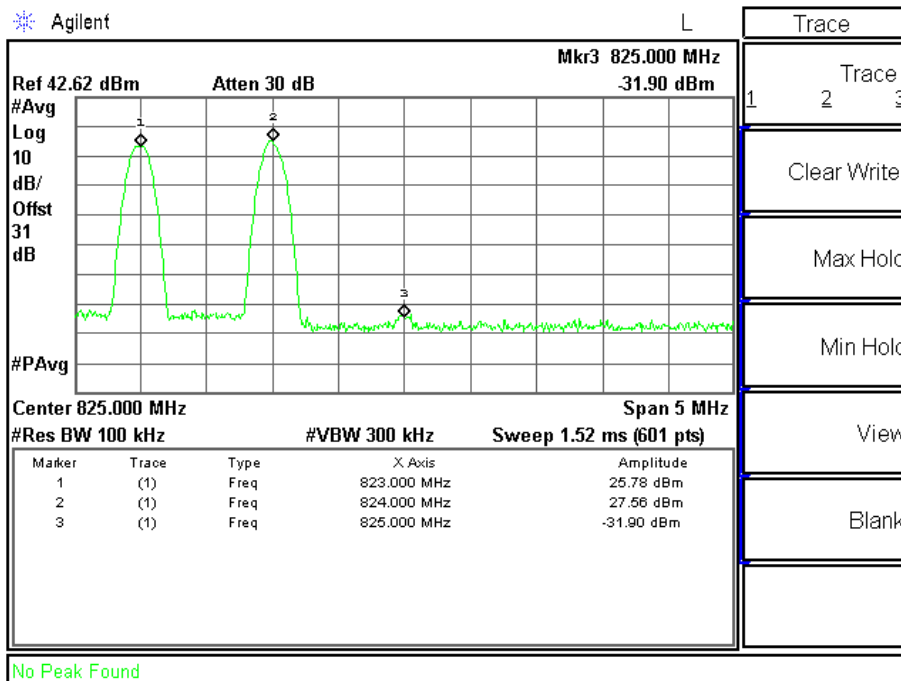




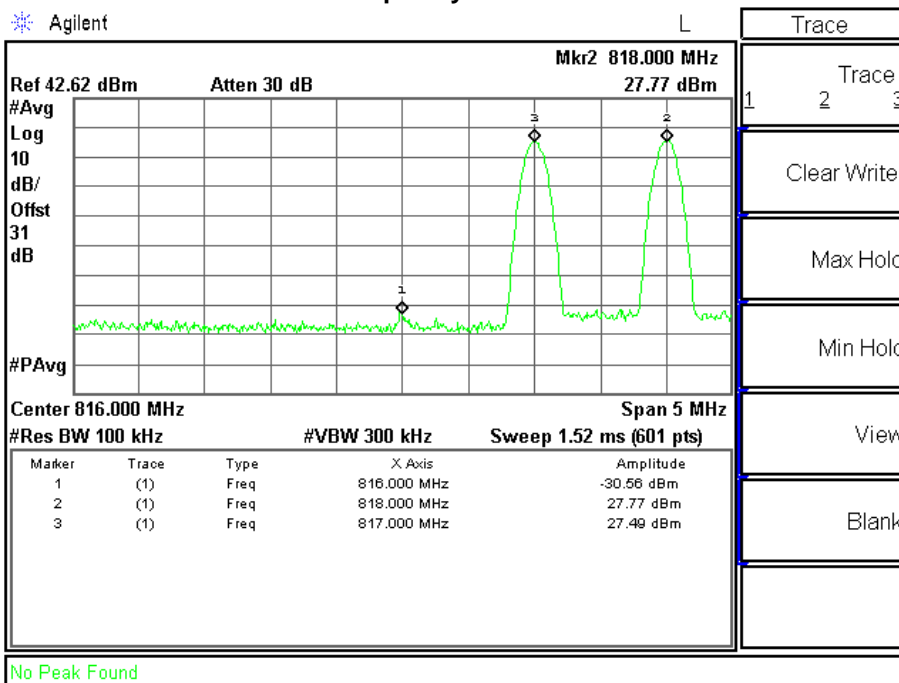
Mode : Up link – Two Carrier Intermodulation
Carrier band : 18 MHz – Low end band edge
Channel Frequency : 806/ 807 MHz



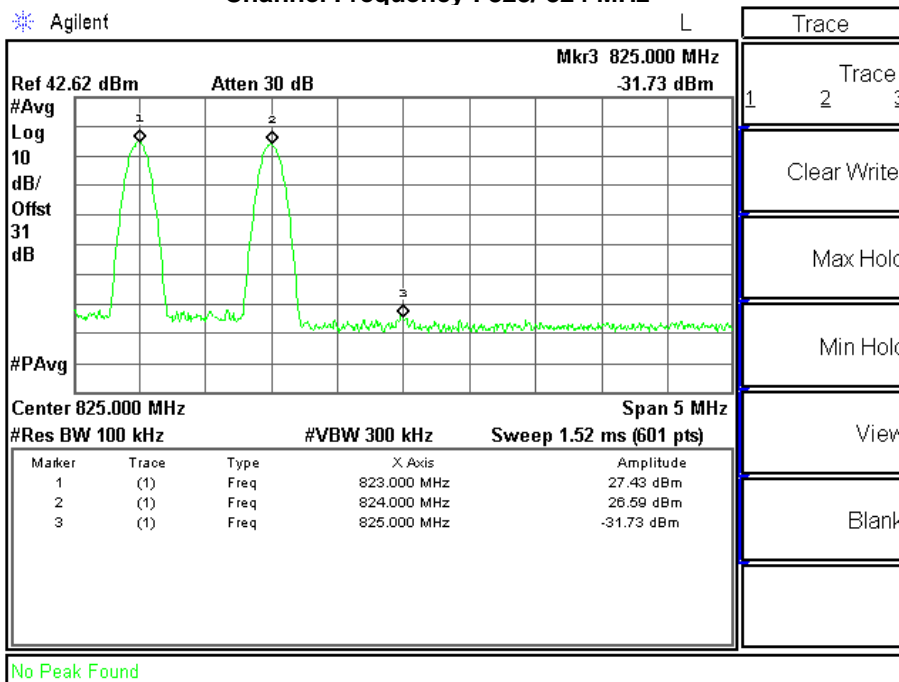
Carrier band : 18 MHz – High end band edge
Channel Frequency : 823/ 824 MHz



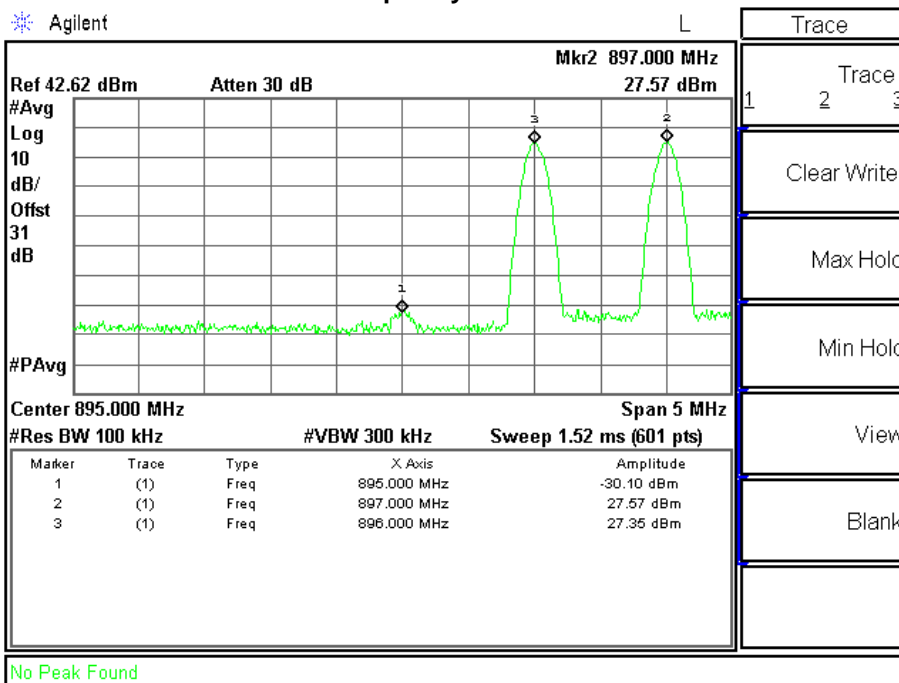
Mode : Up link – Two Carrier Intermodulation
Carrier band : 7 MHz – Low end band edge
Channel Frequency : 817/ 818 MHz



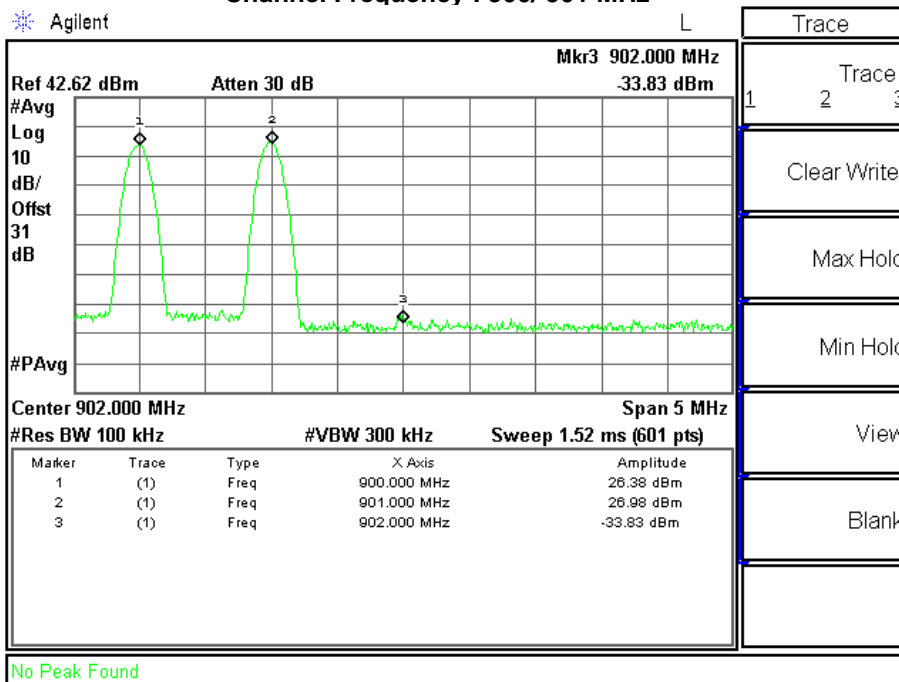
Carrier band : 7 MHz – High end band edge
Channel Frequency : 823/ 824 MHz



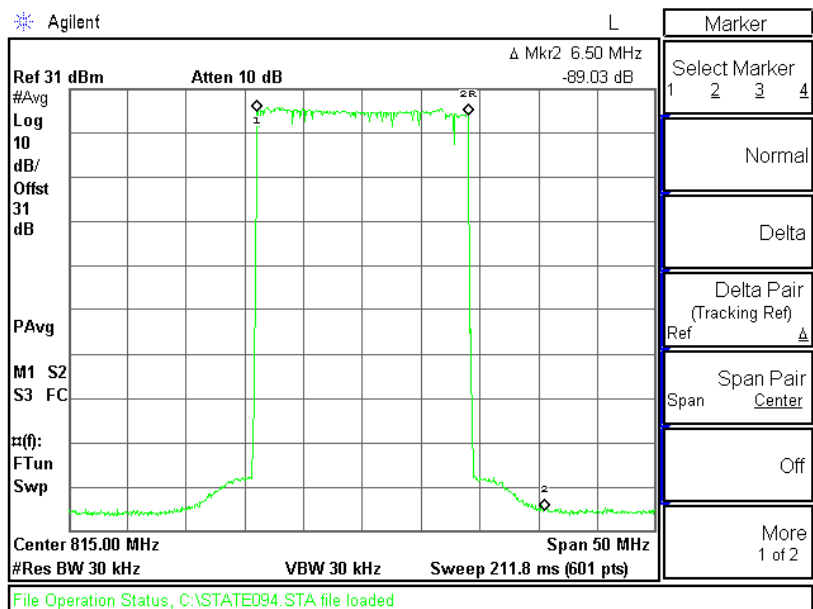
Mode : Up link – Two Carrier Intermodulation
Carrier band : 5 MHz – Low end band edge
Channel Frequency : 896/ 897 MHz



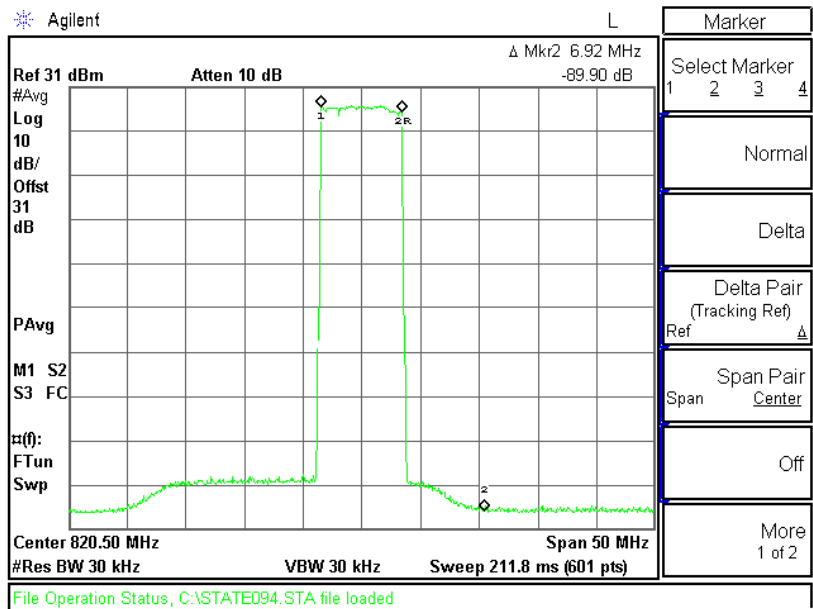
Carrier band : 5 MHz – High end band edge
Channel Frequency : 900/ 901 MHz



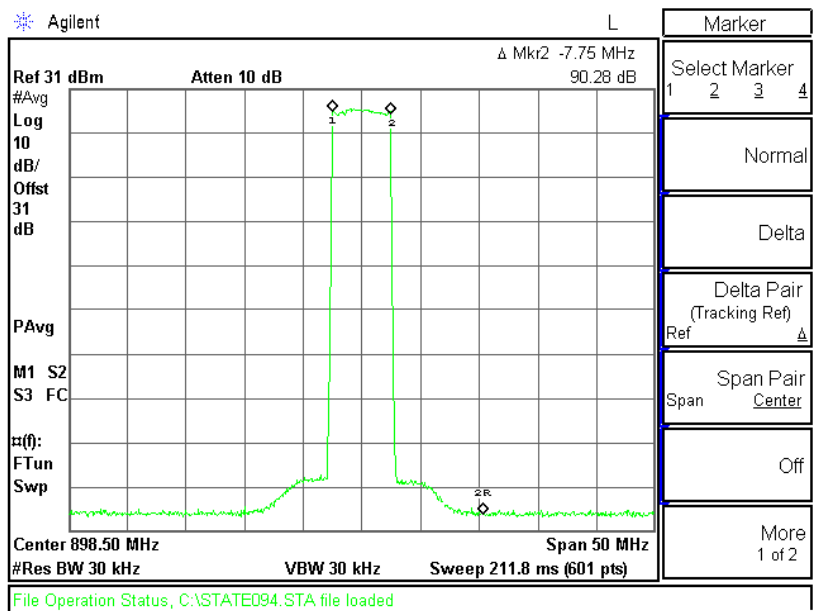
Mode : Up link – Out of band Rejection
Carrier band : 18 MHz

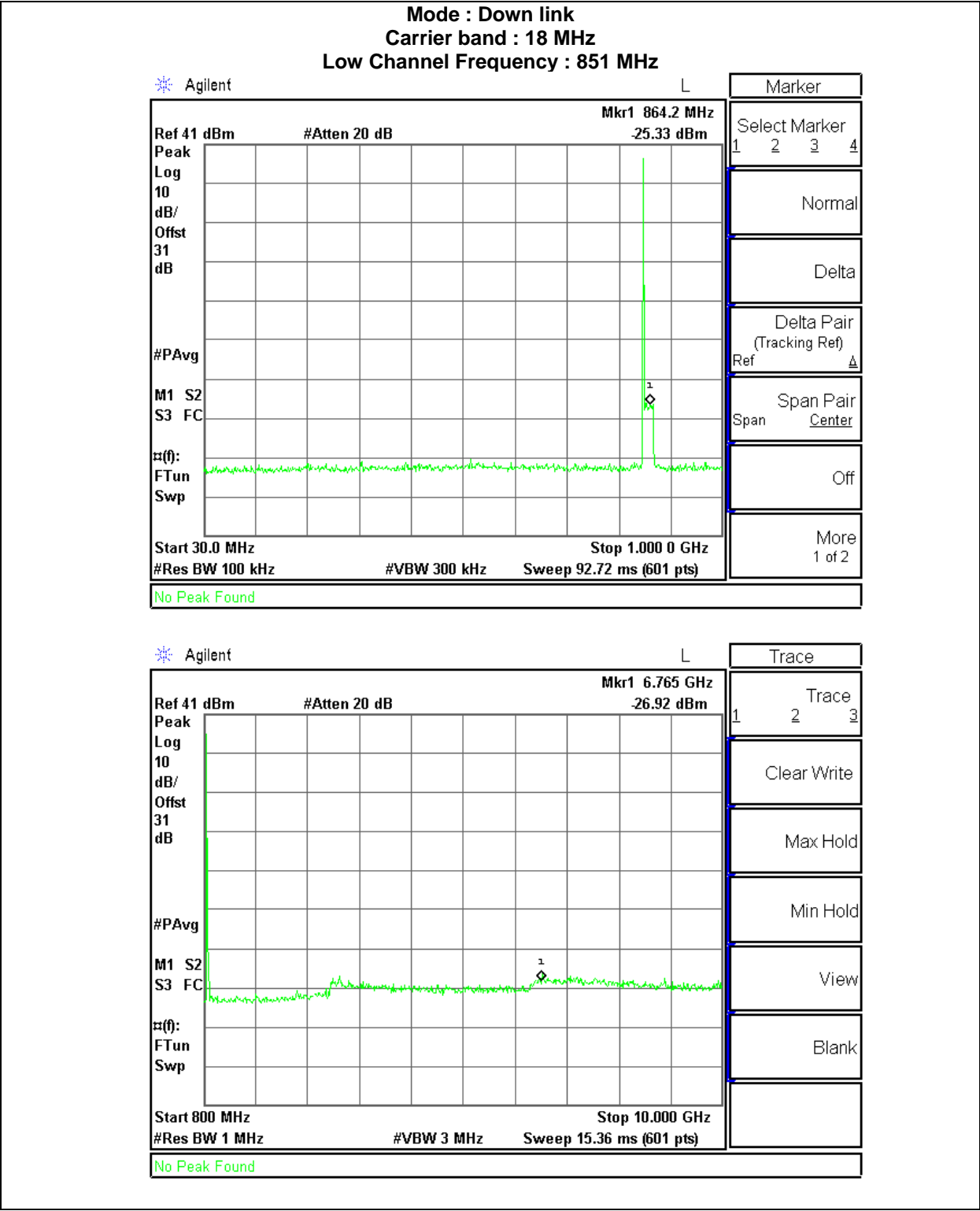


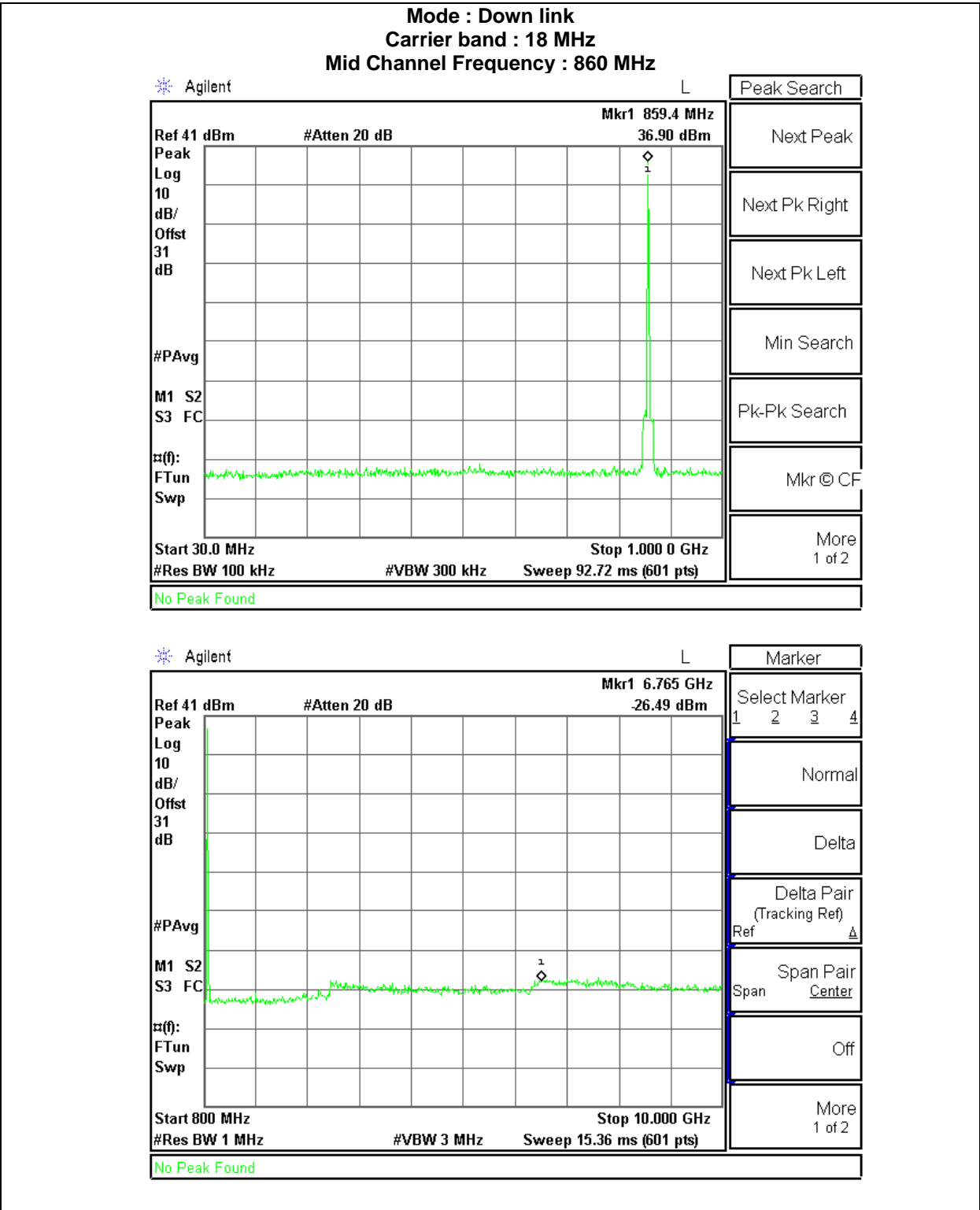
Mode : Up link – Out of band Rejection
Carrier band : 7 MHz

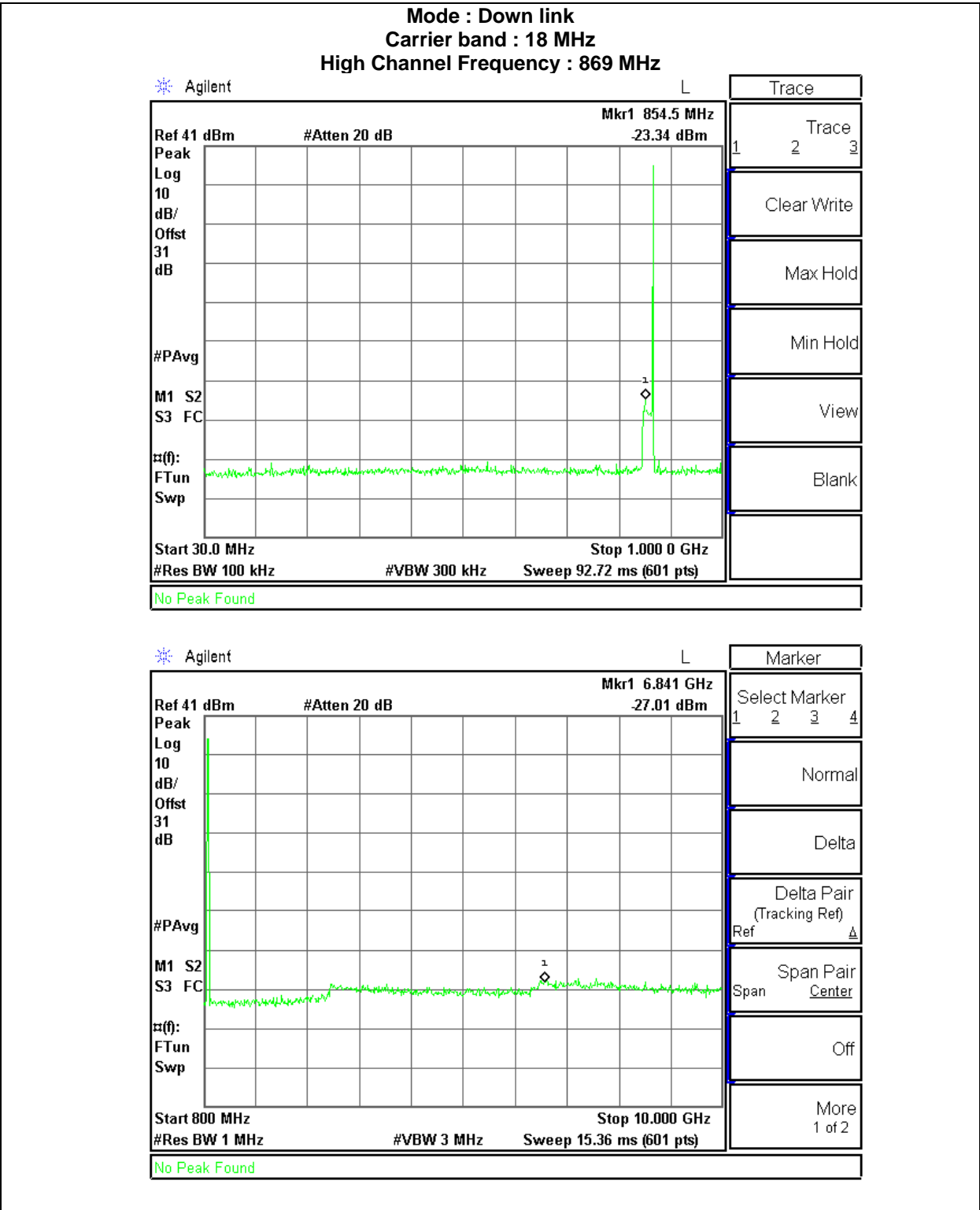


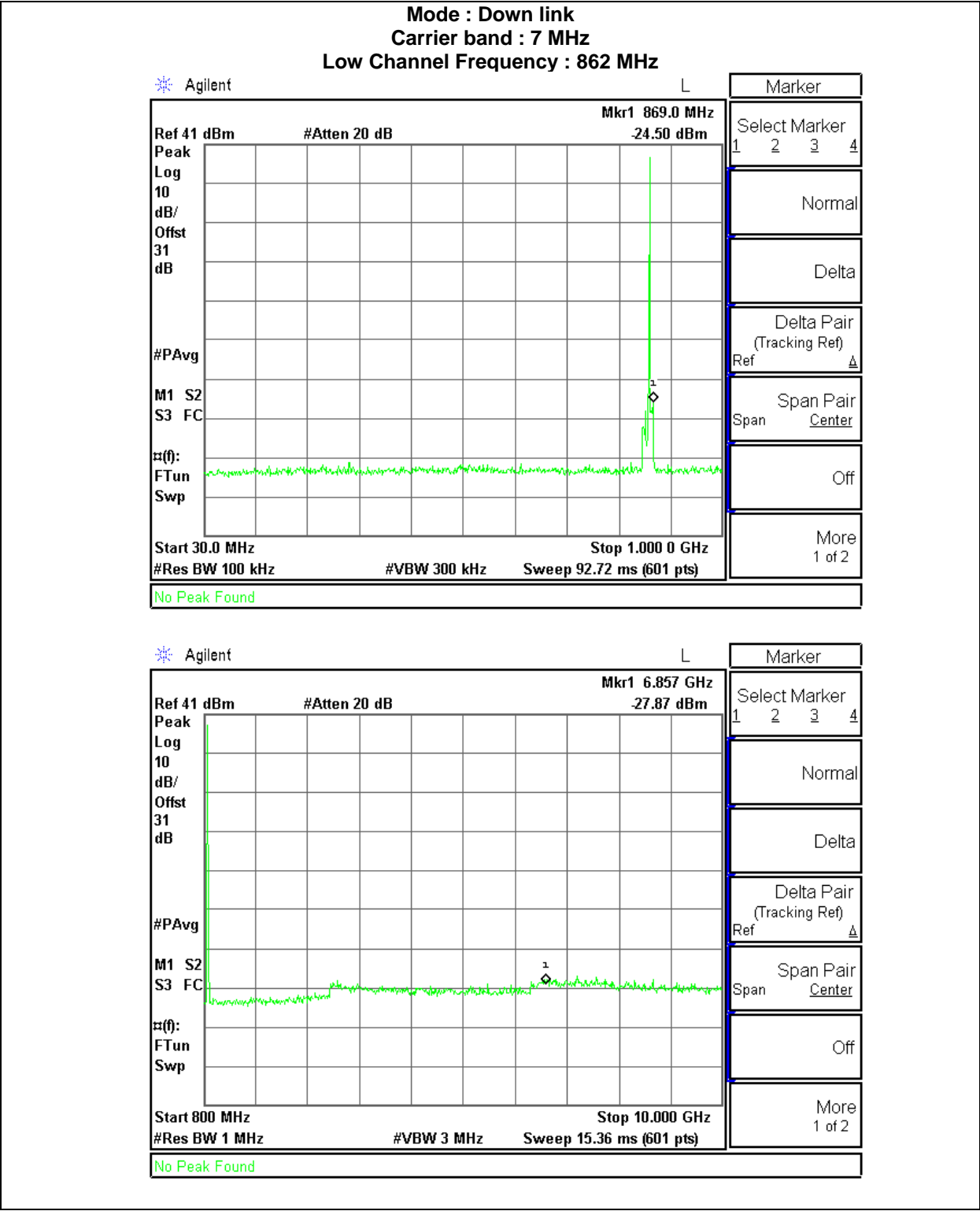
Mode : Up link – Out of band Rejection
Carrier band : 5 MHz

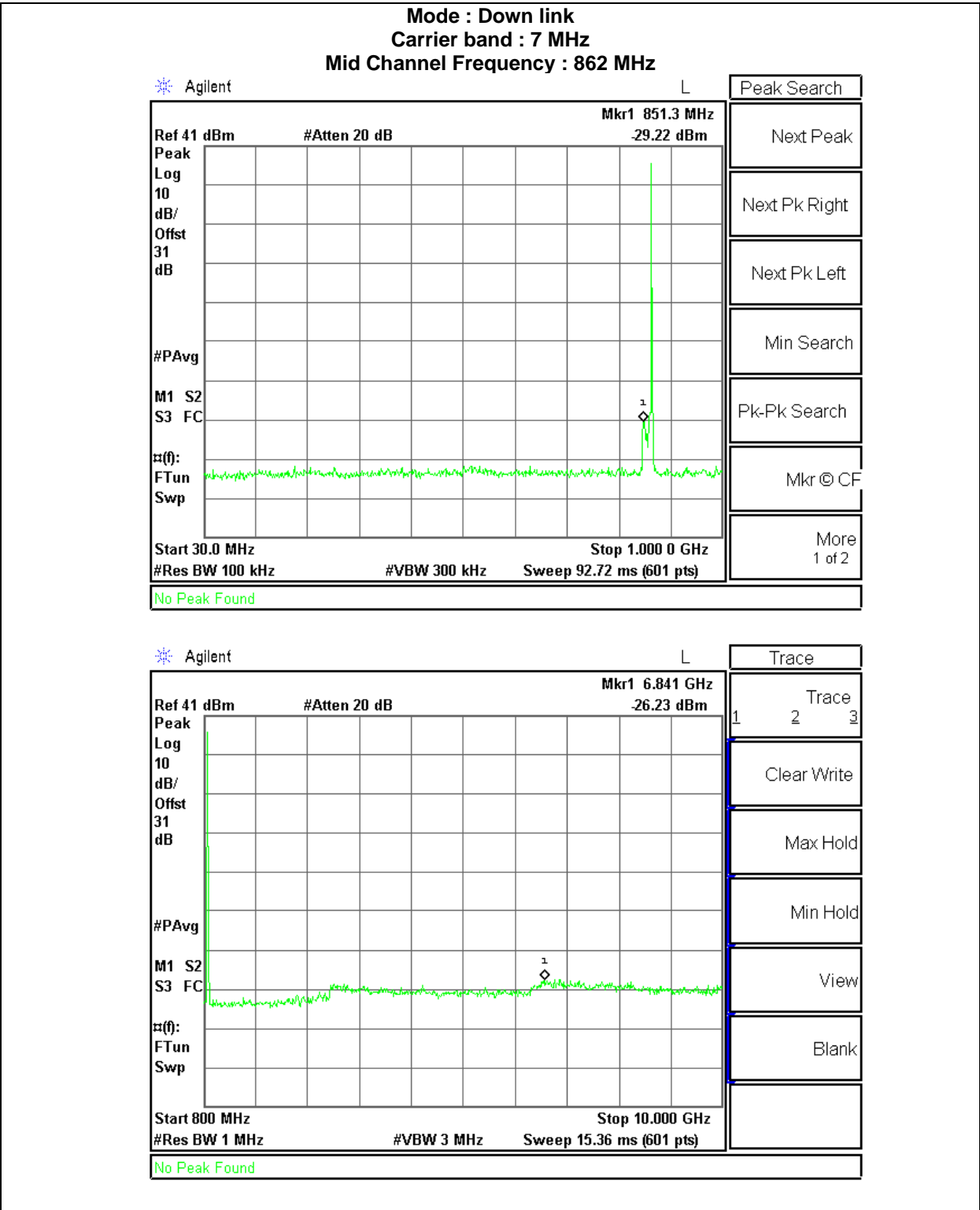


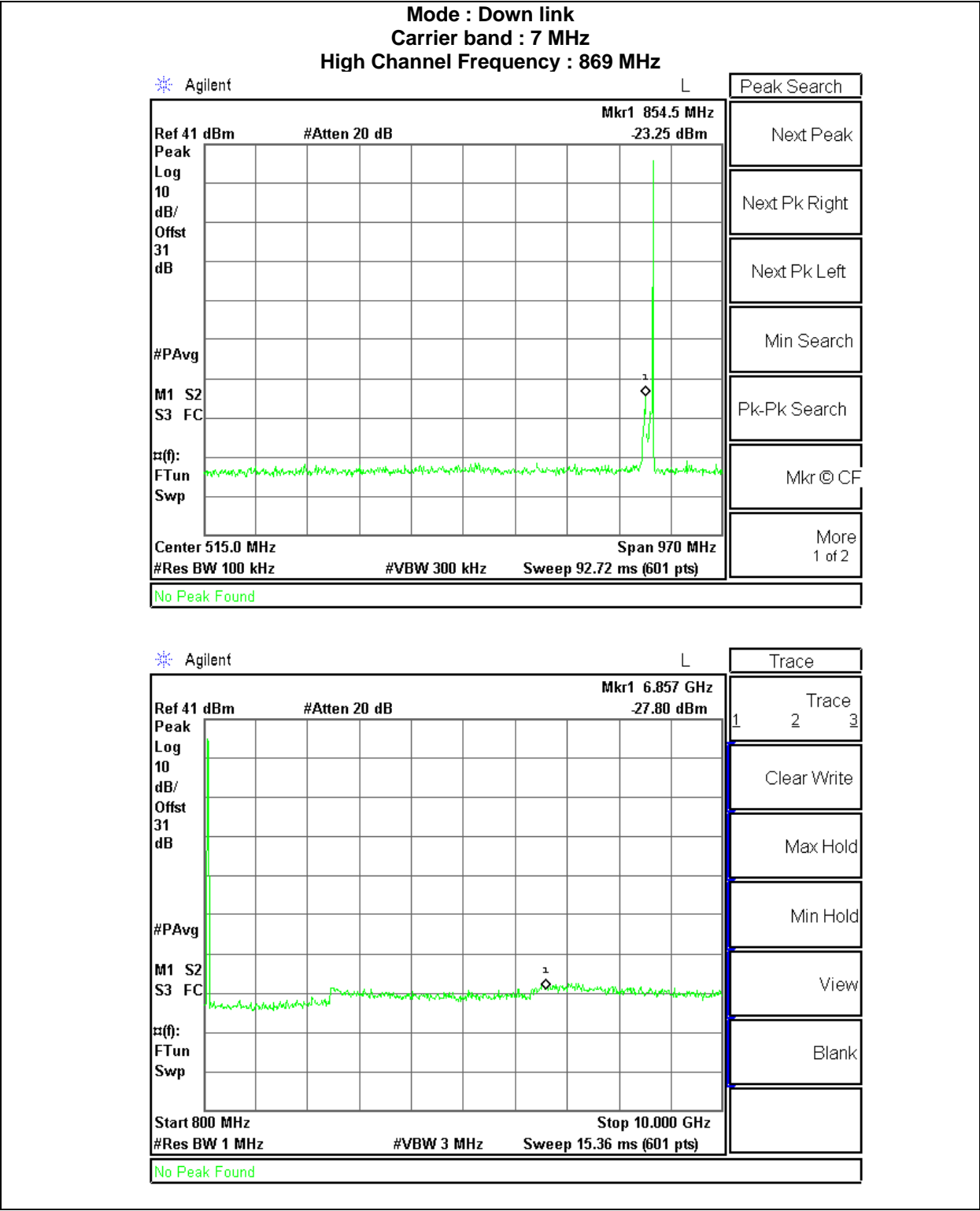


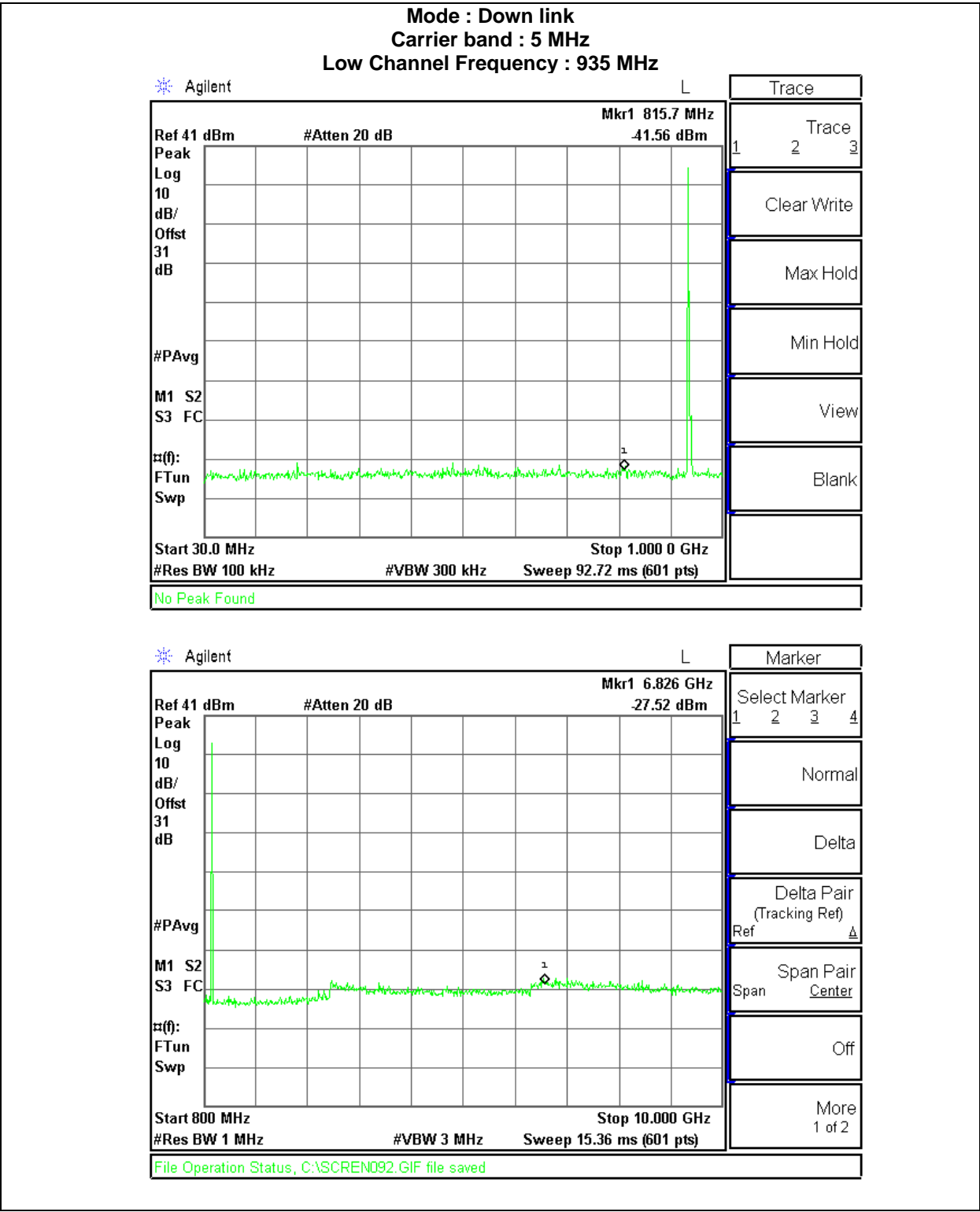


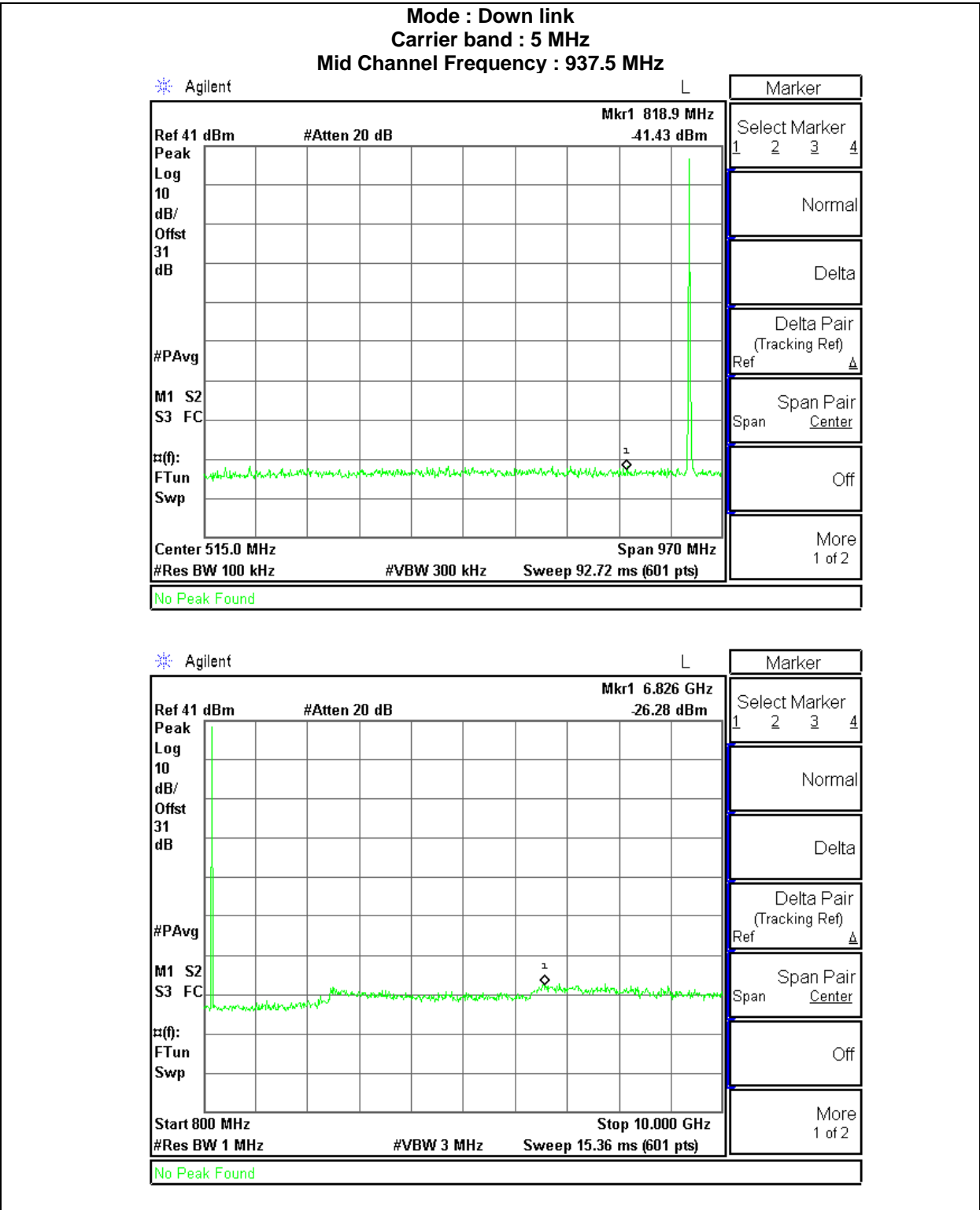


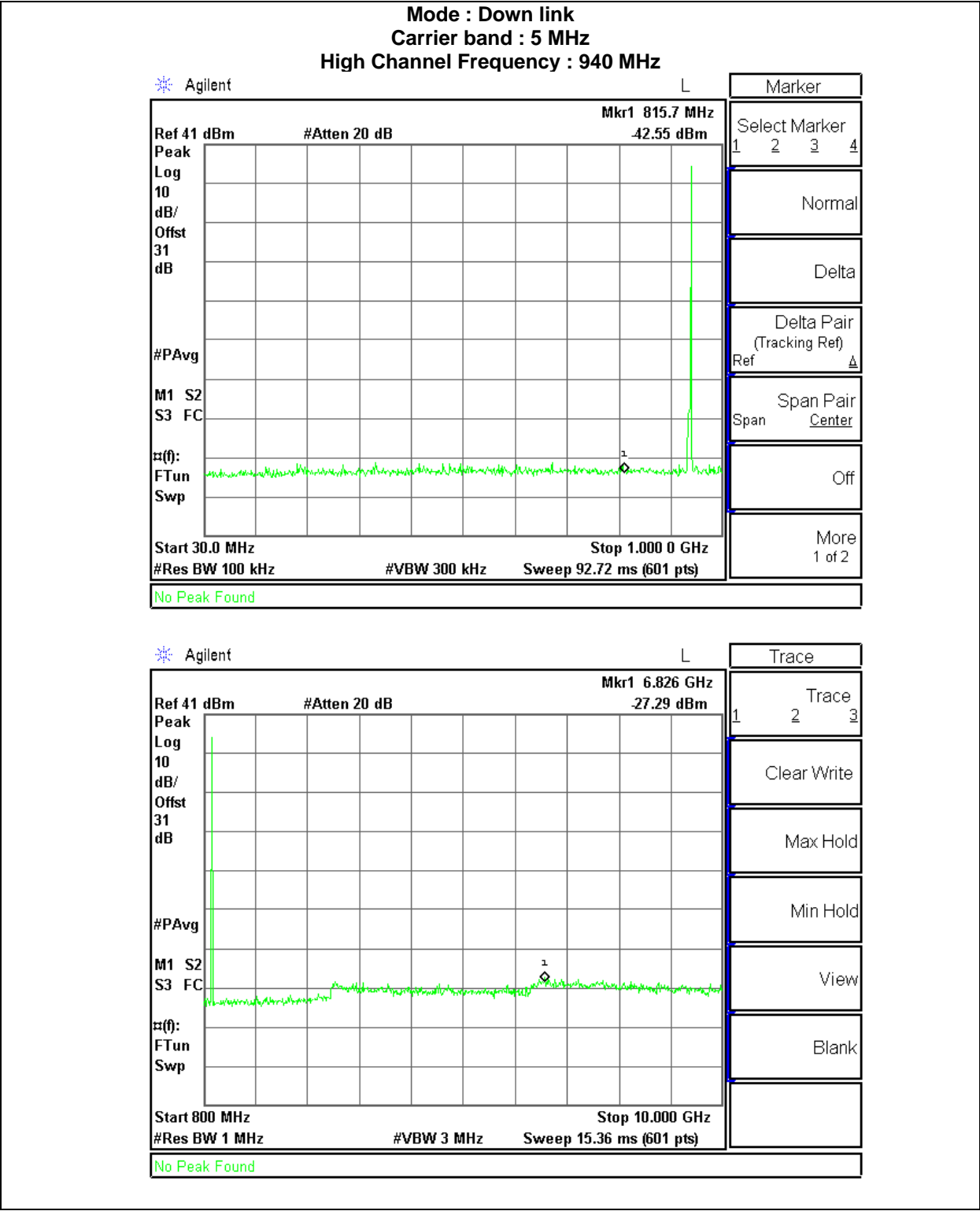




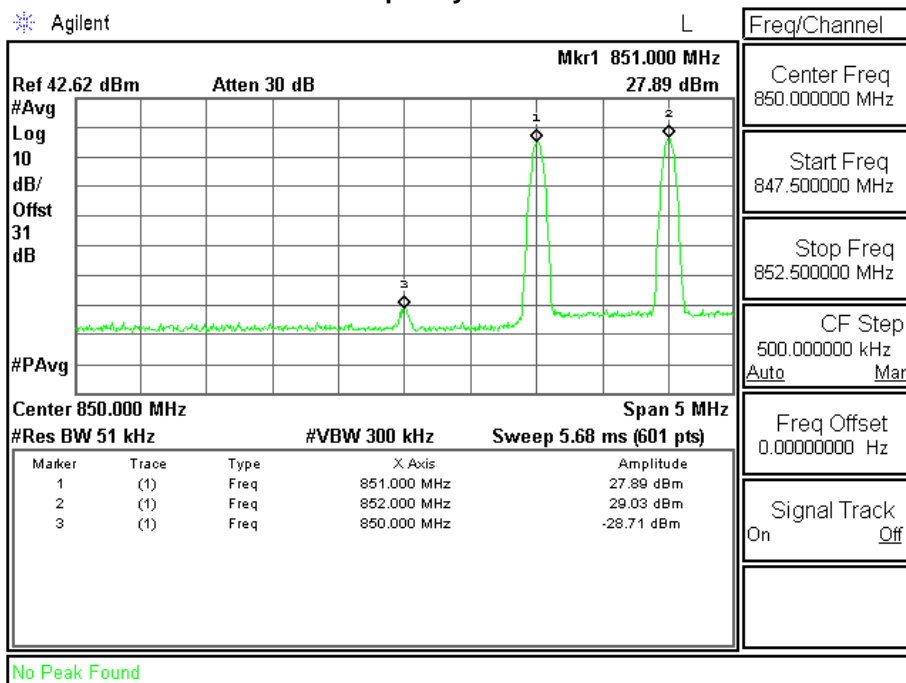




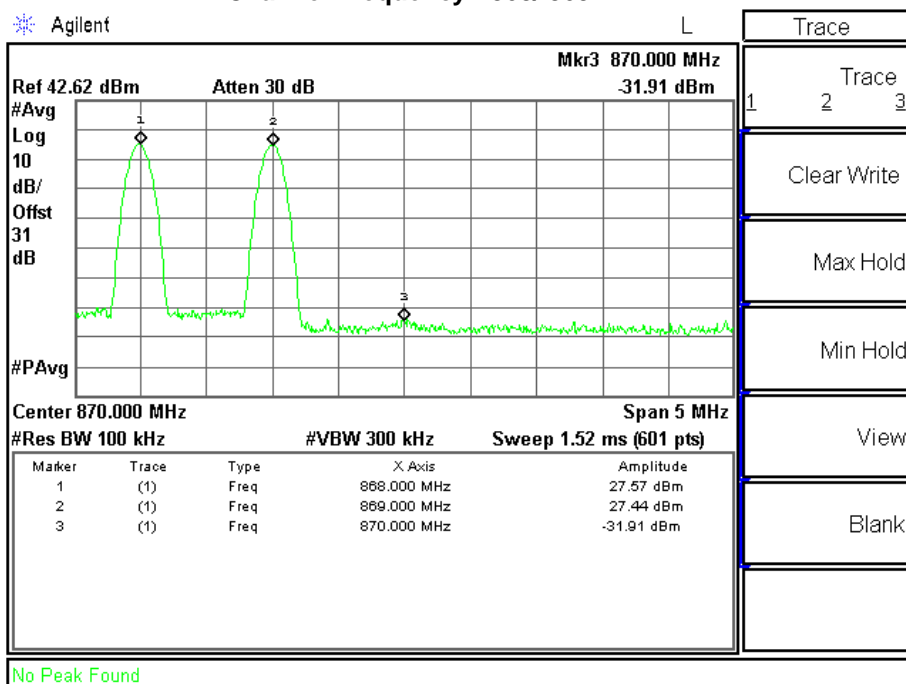




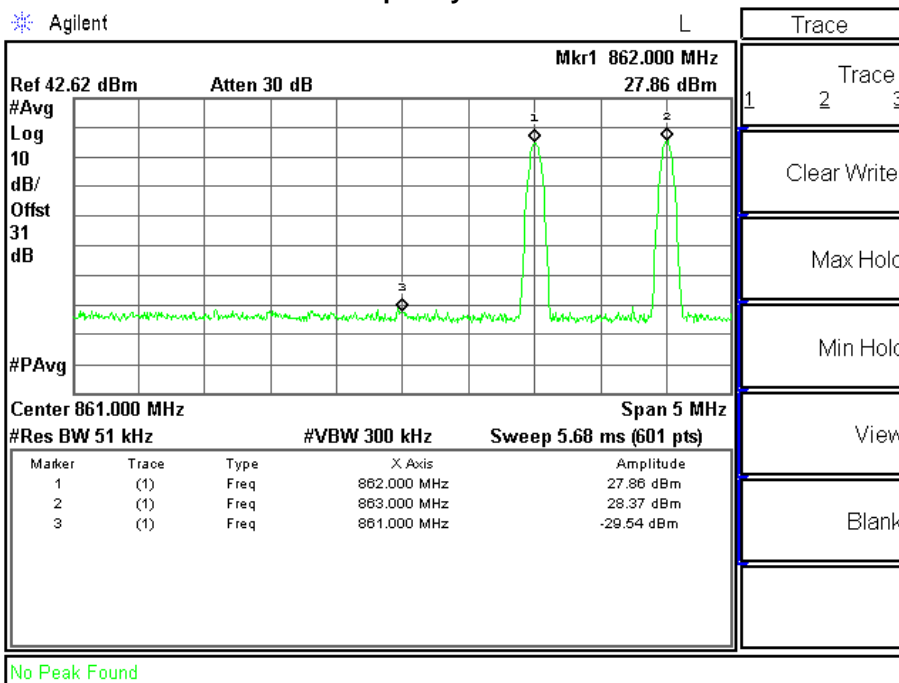
Mode : Down link – Two Carrier Intermodulation
Carrier band : 18 MHz – Low end band edge
Channel Frequency : 850/ 851 MHz



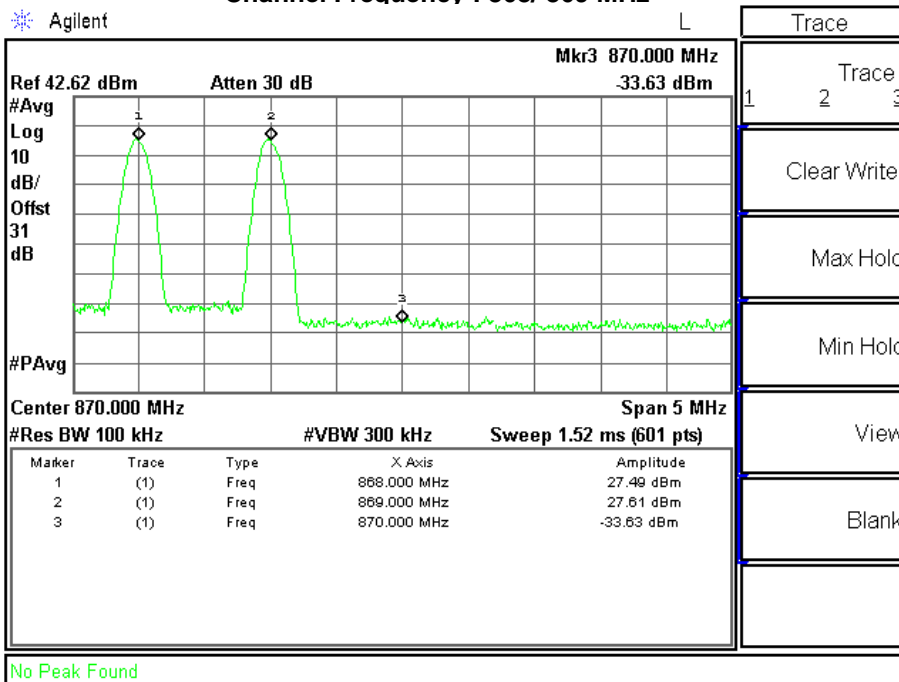
Carrier band : 18 MHz – High end band edge
Channel Frequency : 868/ 869 MHz



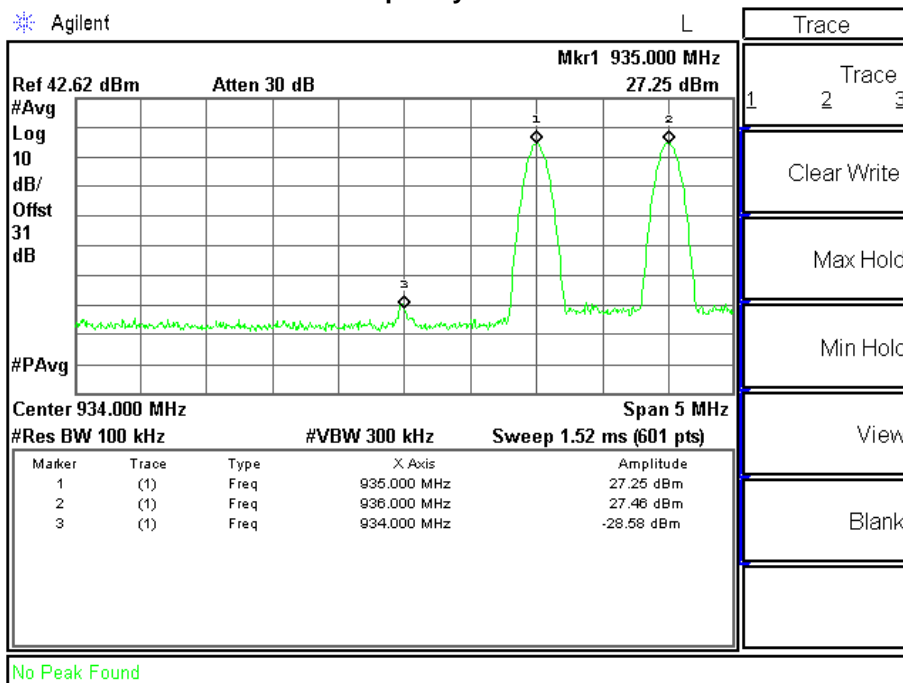
Mode : Down link – Two Carrier Intermodulation
Carrier band : 7 MHz – Low end band edge
Channel Frequency : 862/ 863 MHz



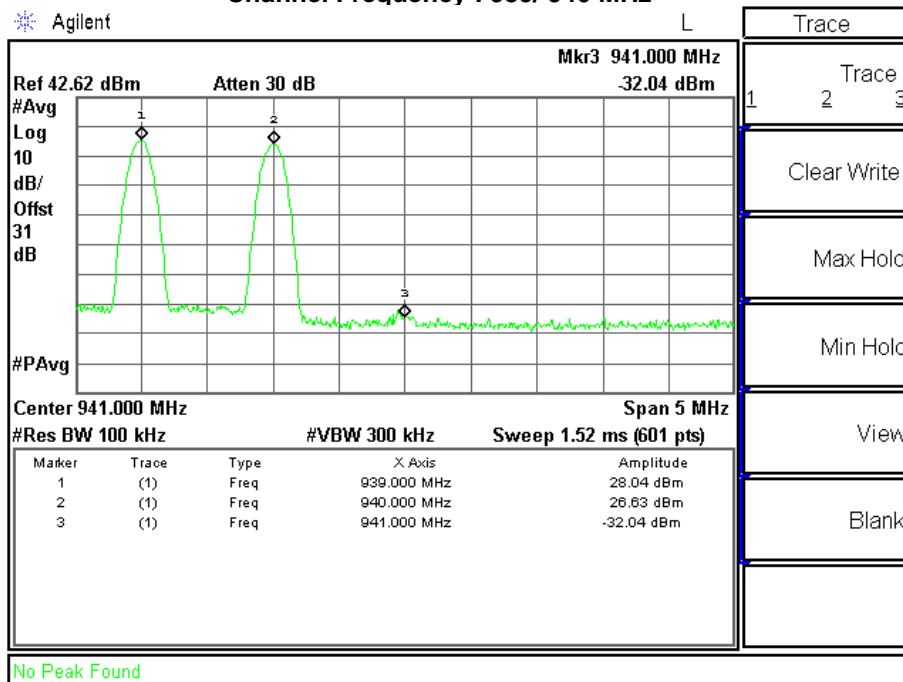
Carrier band : 7 MHz – High end band edge
Channel Frequency : 868/ 869 MHz



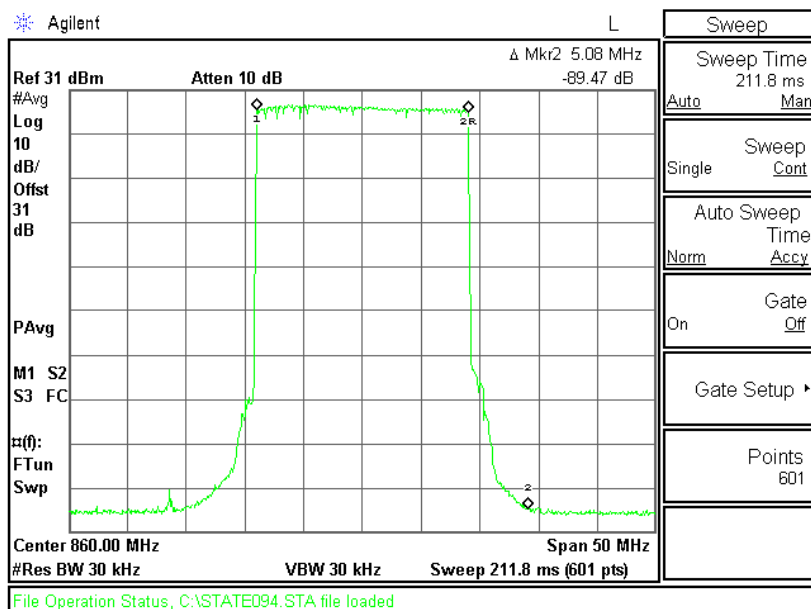
Mode : Down link – Two Carrier Intermodulation
Carrier band : 5 MHz – Low end band edge
Channel Frequency : 935/ 936 MHz



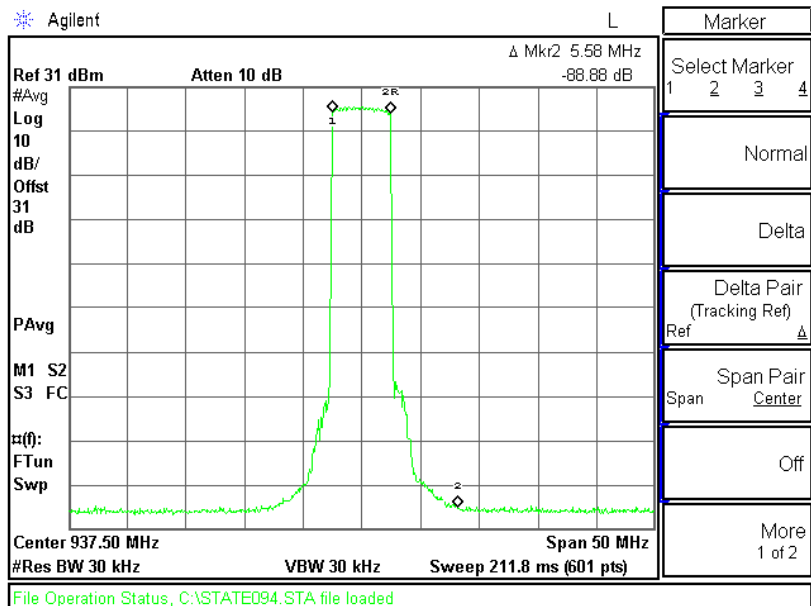
Carrier band : 5 MHz – High end band edge
Channel Frequency : 939/ 940 MHz



Mode : Down link – Out of band Rejection
Carrier band : 18 MHz



Mode : Down link – Out of band Rejection
Carrier band : 5 MHz



3.7 Test Conditions and Results – Radiated Spurious Emission

Test Description	Measurements were made in a 10-meter open field test site that complies to CISPR 16/ANSI C63.4. Preliminary (peak) measurements were performed at semi-anechoic chamber with an antenna to EUT separation distance of 3 meter. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in both horizontal and vertical polarities. Final measurements (quasi-peak or average as noted) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4-meters in accordance with procedure of substitution method specified in TIA/EIA-603-A-2003. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable. The maximum EIRP of the emission was up to 10 th harmonics.	
Basic Standard		TIA/EIA/603-A-2003
Radiated Spurious Emission LIMITS		
§ 90.210 & § 90.669 Emission limit : On any frequency in an MTA licensee's spectrum block that is adjacent to a non-MTA frequency, the power of any emission shall be attenuated below the transmitter power(P) by at lease 43+ 10log ₁₀ (P) dB or 80 dB, whichever is the lesser attenuation.		
Parameters required prior to the test	Laboratory Ambient Temperature	10 to 40 °C
	Relative Humidity	10 to 90 %
Parameters recorded during the test	Laboratory Ambient Temperature	27 °C
	Relative Humidity	47 %
	Frequency range	Measurement Point
Fully configured sample scanned over the following frequency range	1GHz – 10GHz	(3 meter measurement distance)
Limits – EIRP		
Frequency (MHz)	Limit (dBm EIRP)	
	Peak	Average
Harmonics up to 10 th	-13	NA
Supplementary information:		

Conducted spurious emission Spectrum Analyzer Settings

Frequency Range (MHz)	Resolution Bandwidth	Resolution Bandwidth
1 GHz ~ 10 GHz	1 MHz	3 MHz
Supplementary information: Peak measurement		

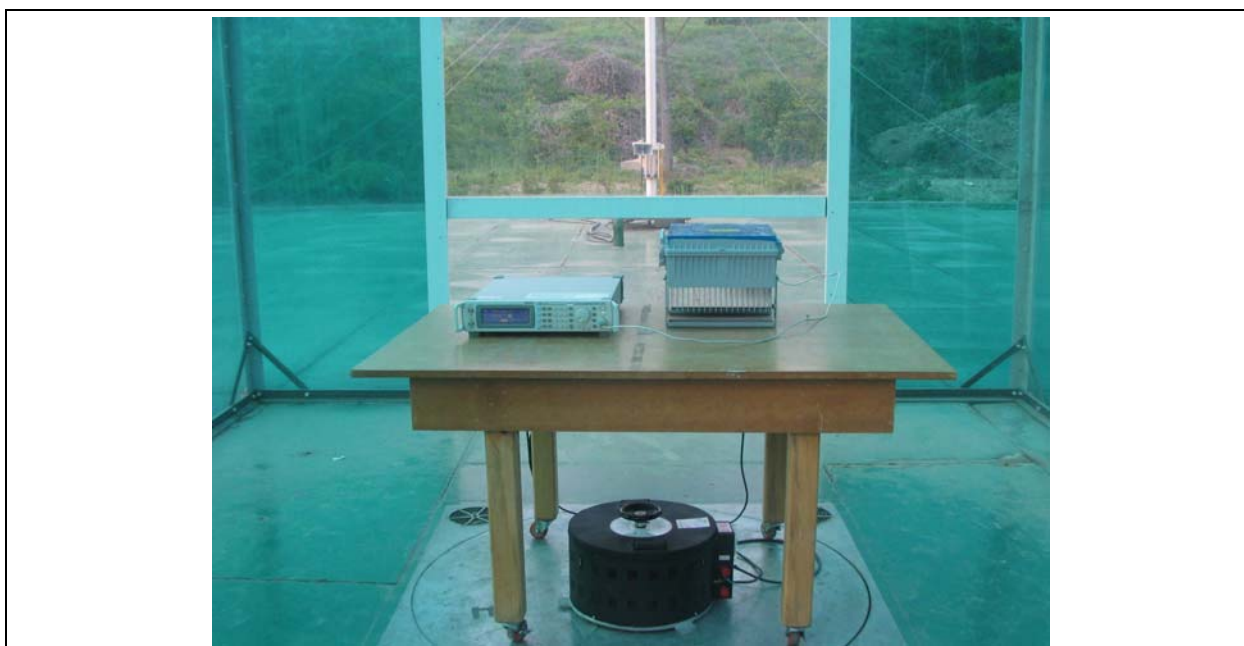
Radiated Emissions EUT Configuration Settings

Power Interface Mode # (See Section 2.4)	EUT Configurations Mode # (See Section 2.9)	EUT Operation Mode # (See Section 2.6)
1	2,3	2,3
Supplementary information: The EUT operation modes specified in Section 2.4 have been investigated and final measurement.		

Radiated Emissions Test Equipment

Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Bilog Antenna	Schwarzbwck	VULB9160	9160-3122	2006-12-29	2007-12-29
Test Receiver	Rohde & Schwarz	ESVN30	832854/010	2005-06-22	2006-06-22
Signal Generator	Aeroflex	IFR3413	341006/012	2006-09-26	2007-09-26
Horn Antenna	Schwarzbeck	BBHA 9120D	234	2007-02-08	2008-02-08
Test Receiver	Rohde & Schwarz	ESPI	100063	2006-11-09	2007-11-09

Figure 8 Test setup for Spurious Radiated Emissions



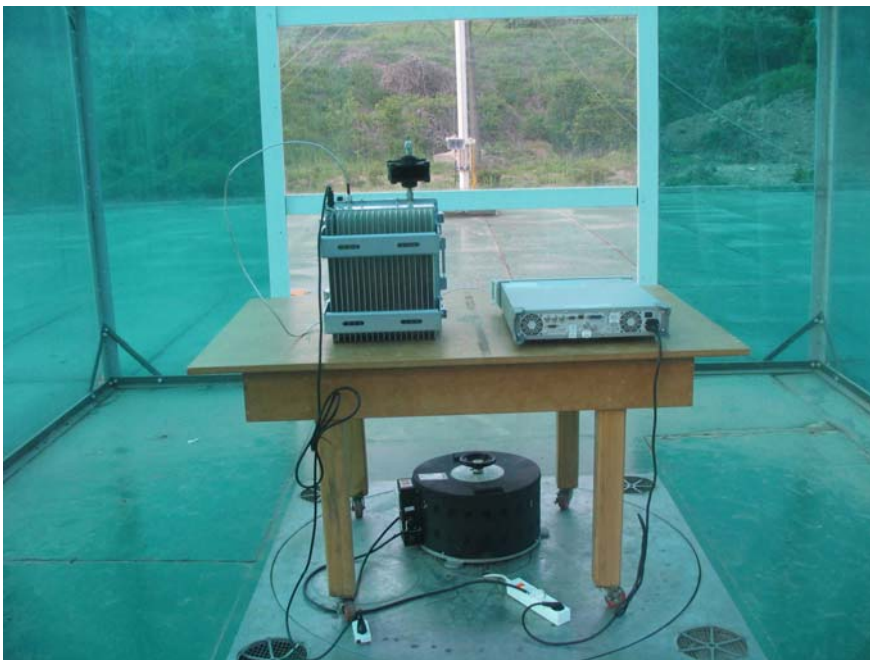


Table 7 Spurious Radiated Emissions Data Points

Test Frequency (MHz)	Meter Reading (dBuV)	Detector (Pk/QP)	Polarity (V/H)	Azimuth (Degrees)	Antenna Height (cm)	Gain/Loss Factor (dB)	Transducer Factor (dB/m)	Level dBuV/m	Limit 1 dBuV/m	Margin (dB)
Supplementary information: No emissions were detected within 20dB below the permitted limit.										

3.8 Test Conditions and Results – Frequency Stability

Test Description	For Temperature Frequency Stability, measurements were made with the product placed in an environmental chamber and the temperature varied from -30°C to $+50^{\circ}\text{C}$ at the normal supply voltage. The frequency drift of the fundamental frequency was measured with a spectrum analyzer. For Power Supply Frequency Stability, measurements were made in a laboratory environment and the supply voltage varied from 85% to 115%. The ambient temperature was 20°C .
Basic Standard	47 CFR § 2.1055, § 90.213
Frequency Stability Limits	
+/- 1 ppm of the Operating Frequency Tuned	

Frequency Stability Configuration Settings

Power Interface Mode # (See Section 2.4)	EUT Configurations Mode # (See Section 2.10)	EUT Operation Mode # (See 2.7)
1,2,3	2,3	2,3
Supplementary information: None		

Frequency Stability Test Equipment

Description	Manufacturer	Model	Identifier
Temperature chamber	NeingYoul	NY-THR	13200
Temperature Recorder	Yokogawa	SR-1006	-
Signal Generator	Aeroflex	IFR3413	341006/212
Spectrum Analyzer	Agilent	E4440A	MY44022474
Fixed Attenuator	H.P	8498A	3318A10568

Table 8 Frequency Stability Test results

Frequency Stability with variation of Ambient Temperature - Uplink

Carrier Band	Temperature (°C)	Assigned Frequency (Hz)	Measured Frequency (Hz)	Drift (ppm)	Limit (ppm)
iDEN 18 MHz Mid channel tuned	50	815,000,000.000	814,999,999.996	-0.000005	1.0
	40	815,000,000.000	814,999,999.996	-0.000005	1.0
	30	815,000,000.000	815,000,000.008	0.000010	1.0
	20	Reference			
	10	815,000,000.000	814,999,999.976	-0.000029	1.0
	0	815,000,000.000	814,999,999.967	-0.000040	1.0
	-10	815,000,000.000	814,999,999.993	-0.000009	1.0
	-20	815,000,000.000	814,999,999.959	-0.000050	1.0
	-30	815,000,000.000	814,999,999.996	-0.000005	1.0
	50	820,500,000.000	820,500,000.011	0.000013	1.0
iDEN 7 MHz Mid channel tuned	40	820,500,000.000	820,500,000.033	0.000040	1.0
	30	820,500,000.000	820,500,000.013	0.000016	1.0
	20	Reference			
	10	820,500,000.000	820,500,000.006	0.000007	1.0
	0	820,500,000.000	820,500,000.025	0.000030	1.0
	-10	820,500,000.000	820,500,000.000	0.000000	1.0
	-20	820,500,000.000	820,500,000.020	0.000024	1.0
	-30	820,500,000.000	820,499,999.989	-0.000013	1.0
	50	898,500,000.000	898,499,999.968	-0.000036	1.0
	40	898,500,000.000	898,499,999.998	-0.000002	1.0
iDEN 5 MHz Mid channel tuned	30	898,500,000.000	898,499,999.948	-0.000058	1.0
	20	Reference			
	10	898,500,000.000	898,499,999.983	-0.000019	1.0
	0	898,500,000.000	898,500,000.026	0.000029	1.0
	-10	898,500,000.000	898,499,999.970	-0.000033	1.0
	-20	898,500,000.000	898,500,000.025	0.000028	1.0
	-30	898,500,000.000	898,499,999.980	-0.000022	1.0

Supplementary information:

- No modulation,
- Before the testing, the signal generator and spectrum analyzer were synchronized by using the external sync. Frequency measurement was made by spectrum analyzer
- Reference inout voltage : 120Vac

Frequency Stability with variation of Input voltage

Carrier Band	Input voltage (V)	Assigned Frequency (Hz)	Measured Frequency (Hz)	Drift (ppm)	Limit (ppm)
iDEN 18 MHz Mid channel	102 Vac	815,000,000.000	814,999,999.994	-0.000007	1.0
	138 Vac	815,000,000.000	814,999,999.974	-0.000032	1.0
iDEN 7 MHz Mid channel	102 Vac	820,500,000.000	820,500,000.026	0.000032	1.0
	138 Vac	820,500,000.000	820,499,999.979	-0.000026	1.0
iDEN 5 MHz Mid channel	102 Vac	898,500,000.000	898,500,000.003	0.000003	1.0
	138 Vac	898,500,000.000	898,499,999.991	-0.000010	1.0

Supplementary information:

- No modulation,
- Before the testing, the signal generator and spectrum analyzer were synchronized by using the external sync. Frequency measurement was made by spectrum analyzer
- Reference temperature : 20 °C

Frequency Stability with variation of Ambient Temperature - Downlink

Carrier Band	Temperature (°C)	Assigned Frequency (Hz)	Measured Frequency (Hz)	Drift (ppm)	Limit (ppm)
iDEN 18 MHz Mid channel tuned	50	860,000,000.000	859,999,999.982	-0.000021	1.0
	40	860,000,000.000	859,999,999.986	-0.000016	1.0
	30	860,000,000.000	859,999,999.990	-0.000012	1.0
	20	Reference			
	10	860,000,000.000	860,000,000.024	0.000028	1.0
	0	860,000,000.000	859,999,999.996	-0.000005	1.0
	-10	860,000,000.000	859,999,999.989	-0.000013	1.0
	-20	860,000,000.000	859,999,999.954	-0.000053	1.0
	-30	860,000,000.000	860,000,000.011	0.000013	1.0
iDEN 7 MHz Mid channel tuned	50	865,500,000.000	865,500,000.010	0.000012	1.0
	40	865,500,000.000	865,500,000.005	0.000006	1.0
	30	865,500,000.000	865,500,000.013	0.000015	1.0
	20	Reference			
	10	865,500,000.000	865,499,999.953	-0.000054	1.0
	0	865,500,000.000	865,499,999.954	-0.000053	1.0
	-10	865,500,000.000	865,499,999.985	-0.000017	1.0
	-20	865,500,000.000	865,500,000.009	0.000010	1.0
	-30	865,500,000.000	865,500,000.012	0.000014	1.0
iDEN 5 MHz Mid channel tuned	50	937,500,000.000	937,500,000.000	0.000000	1.0
	40	937,500,000.000	937,499,999.950	-0.000053	1.0
	30	937,500,000.000	937,499,999.994	-0.000006	1.0
	20	Reference			
	10	937,500,000.000	937,499,999.999	-0.000001	1.0
	0	937,500,000.000	937,499,999.996	-0.000004	1.0
	-10	937,500,000.000	937,499,999.989	-0.000012	1.0
	-20	937,500,000.000	937,499,999.997	-0.000003	1.0
	-30	937,500,000.000	937,499,999.988	-0.000013	1.0

Supplementary information:

- No modulation,
- Before the testing, the signal generator and spectrum analyzer were synchronized by using the external sync. Frequency measurement was made by spectrum analyzer
- Reference inout voltage : 120Vac

Frequency Stability with variation of Input voltage - Downlink

Carrier Band	Input voltage (V)	Assigned Frequency (Hz)	Measured Frequency (Hz)	Drift (ppm)	Limit (ppm)
iDEN 18 MHz	102 Vac	860,000,000.000	860,000,000.003	0.003	0.000003
Mid channel	138 Vac	860,000,000.000	860,000,000.013	0.013	0.000015
iDEN 7 MHz	102 Vac	865,500,000.000	865,499,999.993	-0.007	-0.000008
Mid channel	138 Vac	865,500,000.000	865,499,999.998	-0.002	-0.000002
iDEN 5 MHz	102 Vac	937,500,000.000	937,499,999.982	-0.018	-0.000019
Mid channel	138 Vac	937,500,000.000	937,500,000.012	0.012	0.000013

Supplementary information:

- No modulation,
- Before the testing, the signal generator and spectrum analyzer were synchronized by using the external sync. Frequency measurement was made by spectrum analyzer
- Reference temperature : 20 °C