KTL Test Report:	0R03189
Applicant:	Nortel Networks 21 Richardson Side Road Kanata, Ontario K2K 2C1
Equipment Under Test: **(E.U.T.)**	CTR 28-08M, NTVG16CB S/W Ver. 1.2
In Accordance With:	**FCC Part 101, Subpart C**
Tested By:	KTL Ottawa Inc. 3325 River Road, R.R. 5 Ottawa, Ontario K1V 1H2
Authorized By:	 R. Grant, Wireless Group Manager
Date:	October 18, 2000
Total Number of Pages:	54
Authorized Copy:	CD

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Annex A Test Diagrams A1

Section 1. Summary of Test Results

General

All measurements are traceable to national standards.

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 101, Subpart C.

☒ New Submission
☐ Class II Permissive Change

☒ Production Unit
☐ Pre-Production Unit

T	N	B

Equipment Code

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE.
See " Summary of Test Data".

NVLAP LAB CODE: 100351-0

TESTED BY: DATE: October 18, 2000
Glen Westwell, Technologist

Summary Of Test Data

Name Of Test	Para. No.	Result
RF Power Output	101.113	Complies
Occupied Bandwidth	101.111	Complies
Spurious Emissions at Antenna Terminals	101.111	Complies
Field Strength of Spurious Emissions	101.111	Complies
* Frequency Stability	101.107	Complies

Footnotes For N/A's:

Test Conditions:

Indoor	Temperature:	23 °C
	Humidity:	45 %
Outdoor	Temperature:	22 °C
	Humidity:	43 %

.

Section 2. General Equipment Specification

Manufacturer:	Nortel Networks
Model No.:	CTR 28-08M, NTVG16CB S/W Ver. 1.2
Serial No.:	NNTM532GPHMF
Date Received In Laboratory:	October 13, 2000
KTL Identification No.:	Item #1
Supply Voltage Input:	-48 Vdc
Frequency Range:	27.8524-27.9976 GHz
Tunable Bands:	1
Necessary Bandwidth:	4.224 Msps OCC. BW = 4.43 MHz 2.048 Msps OCC. BW = 2.18 MHz
Types of Modulation:	4, 16 & 64 QAM, FDMA
Data Rate(s):	4.224Msps & 2.048 Msps
Internal/External Data Source:	External
Emission Designator:	4M43D9W 2M18D9W 8M86D9W 4M36D9W
Output Impedance:	50Ω
RF Power Output (rated):	12 to 18 dBm
Channel Spacing(s):	5.5 MHz & 3.3 MHz
Operator Selection of Operating Frequency:	None
Power Output Adjustment Capability:	Attenuation Adjust 31 – 0 dB

Section 3. RF Power Output

Para. No.: 1.1046

Test Performed By: Glen Westwell	**Date of Test:** October 15, 2000

Minimum Standard: 101.113

Test Results: Complies. The RF power output is within 1dB of the manufacturer's rating.

Measurement Data:

Rated (dBm)	Measured (dBm)
18.0	18.6
16.0	16.4
15.0	15.8
14.0	14.5
12.0	12.4

Section 4. Occupied Bandwidth

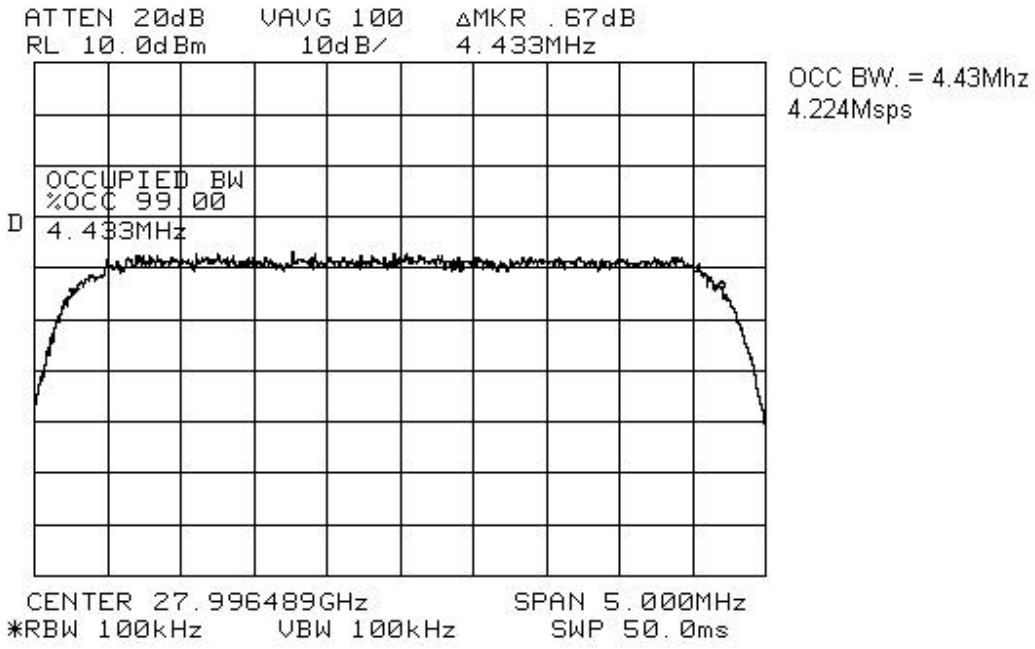
Para. No.: 2.1049

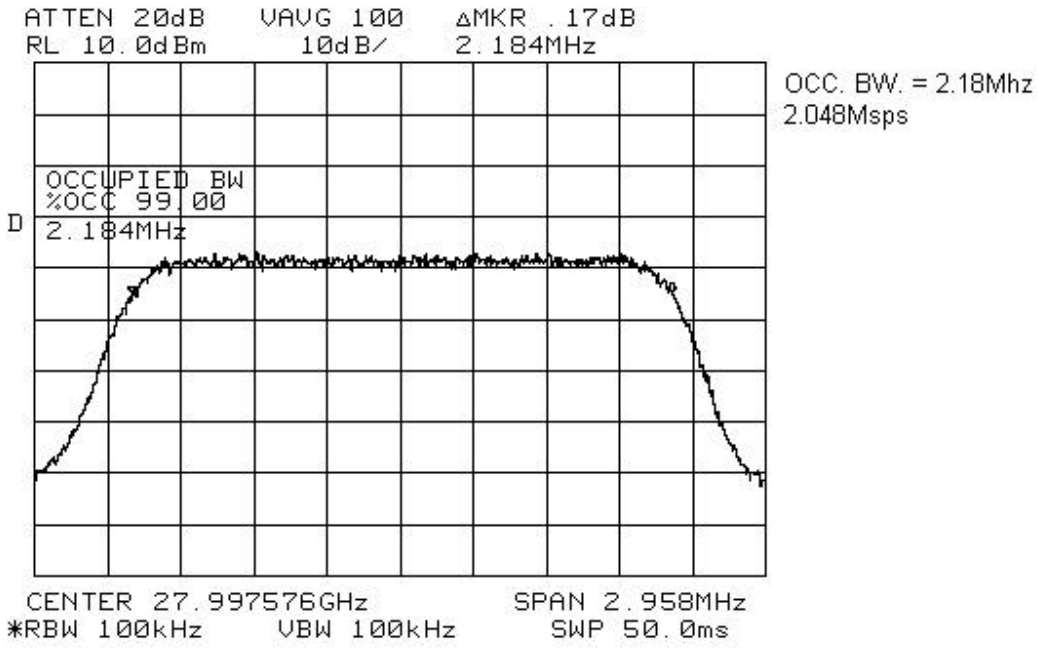
Test Performed By: Glen Westwell	**Date of Test:** August 24, 2000

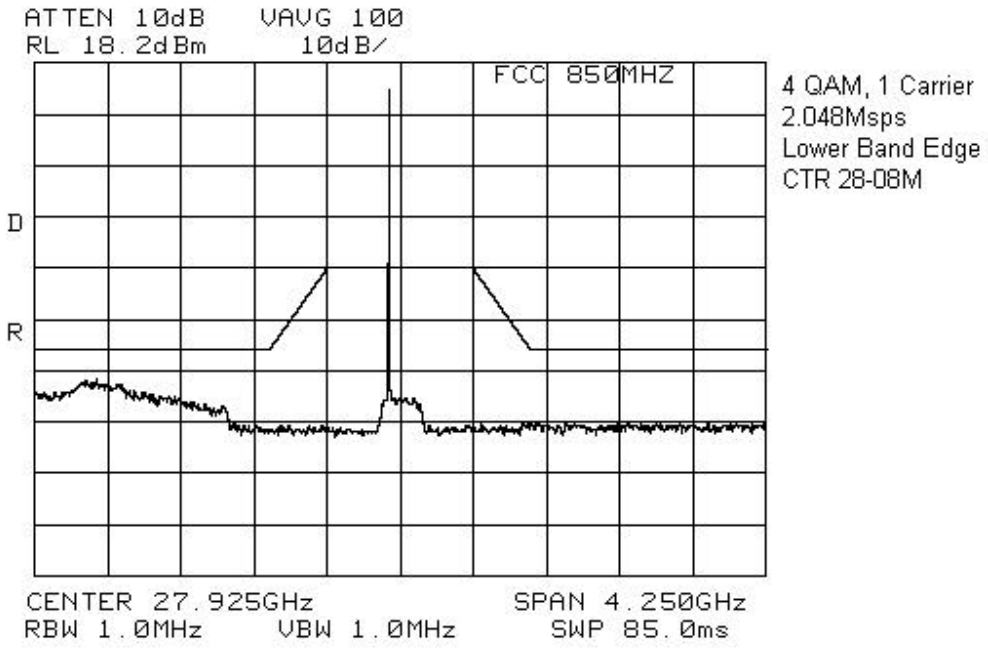
Minimum Standard: 101.111 (a)(2)(ii)

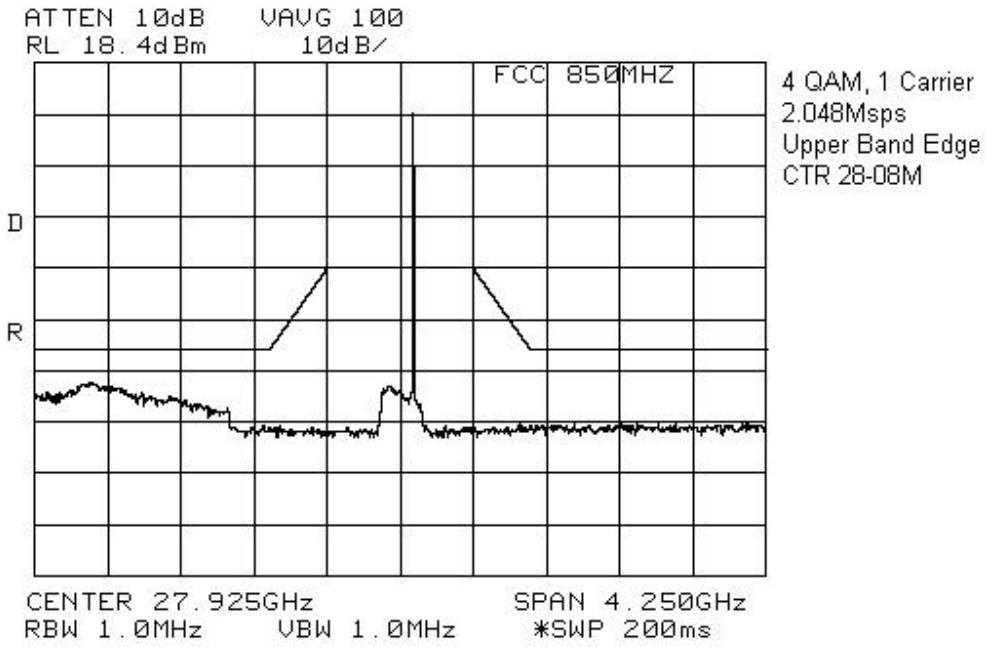
Test Results: Complies

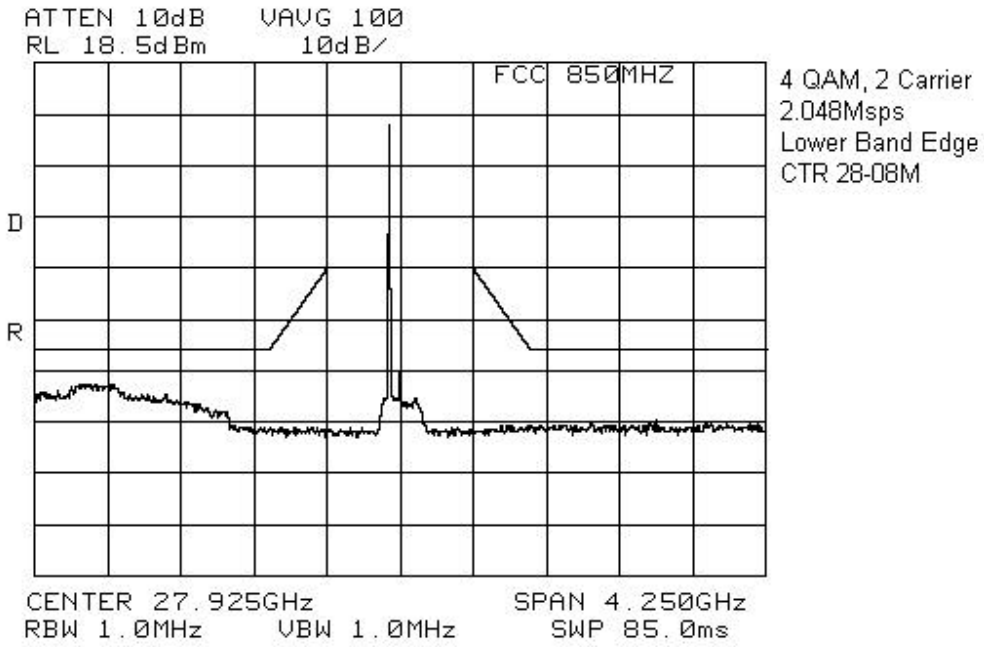
Test Data: See attached graph(s).

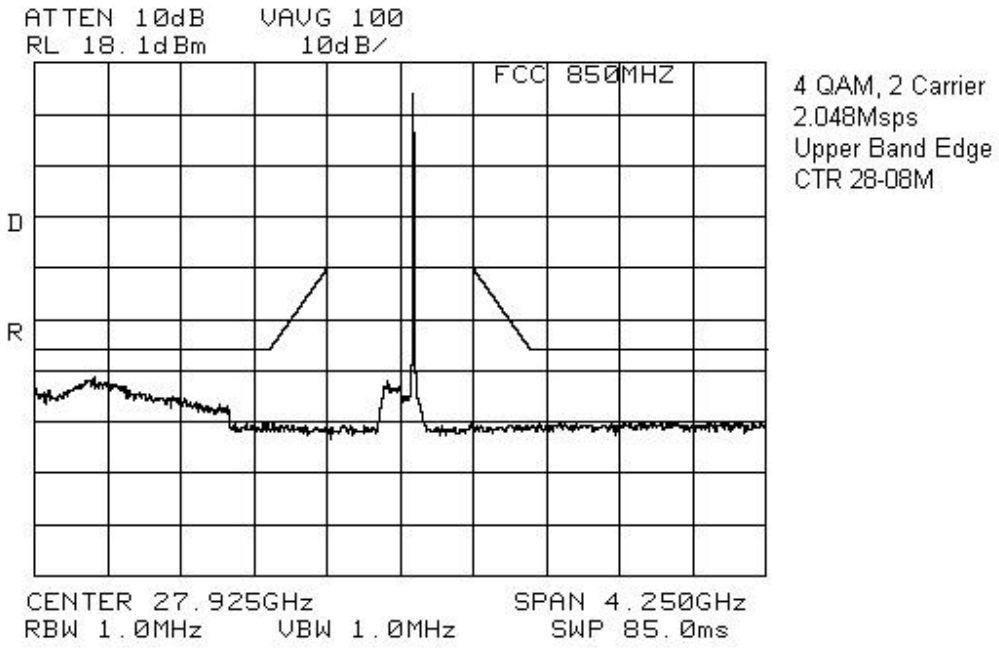

ATTEN 20dB
RL 10.0dBm
VAVG 100
10dB/
ΔMKR .67dB
4.433MHz
OCC BW. = 4.43Mhz
4.224Msps
OCCUPIED BW
%OCC 99.00
D
4.433MHz
CENTER 27.996489GHz
SPAN 5.000MHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms

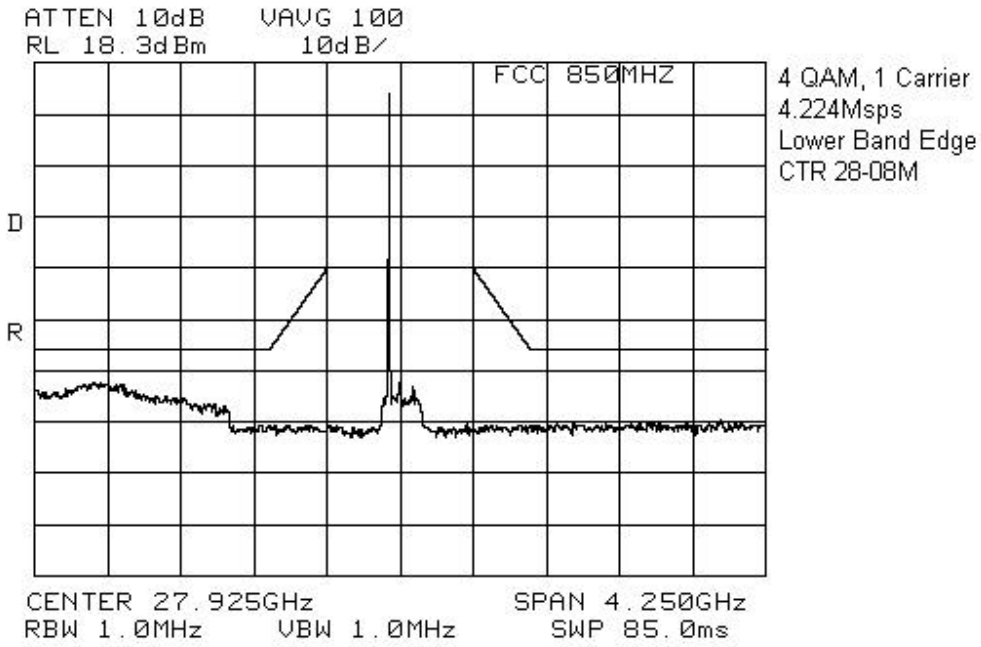

ATTEN 20dB
RL 10.0dBm
VAVG 100
10dB/
ΔMKR .17dB
2.184MHz
OCC. BW. = 2.18Mhz
2.048Msps
OCCUPIED BW
%OCC 99.00
D
2.184MHz
CENTER 27.997576GHz
SPAN 2.958MHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms

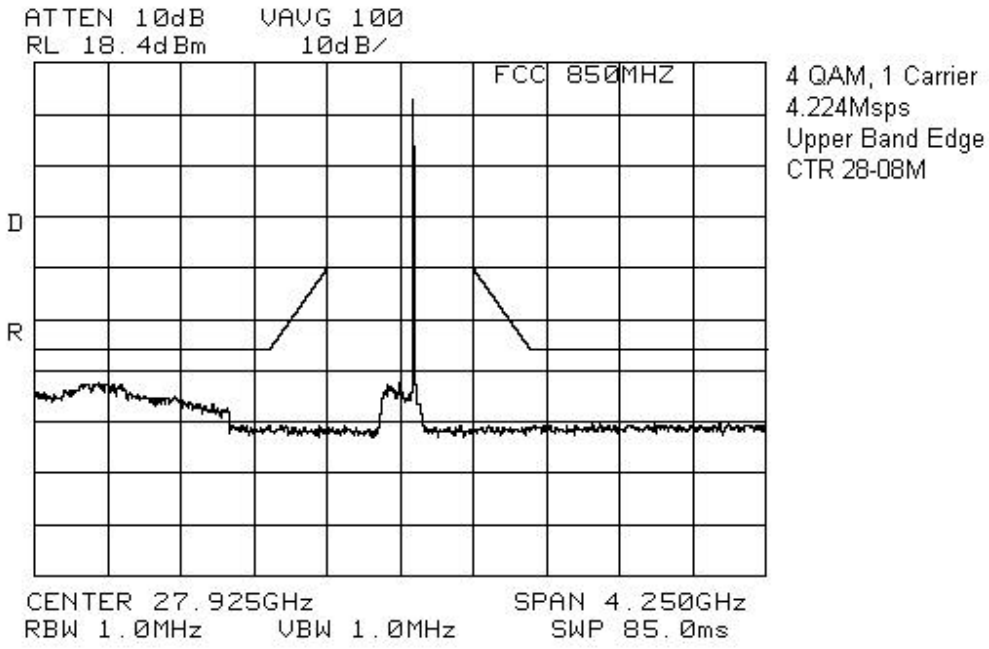

ATTEN 10dB
VAVG 100
RL 18.2dBm
10dB/
FCC 850MHZ
4 QAM, 1 Carrier
2.048Msps
Lower Band Edge
CTR 28-08M
D
R
CENTER 27.925GHz
SPAN 4.250GHz
RBW 1.0MHz
VBW 1.0MHz
SWP 85.0ms

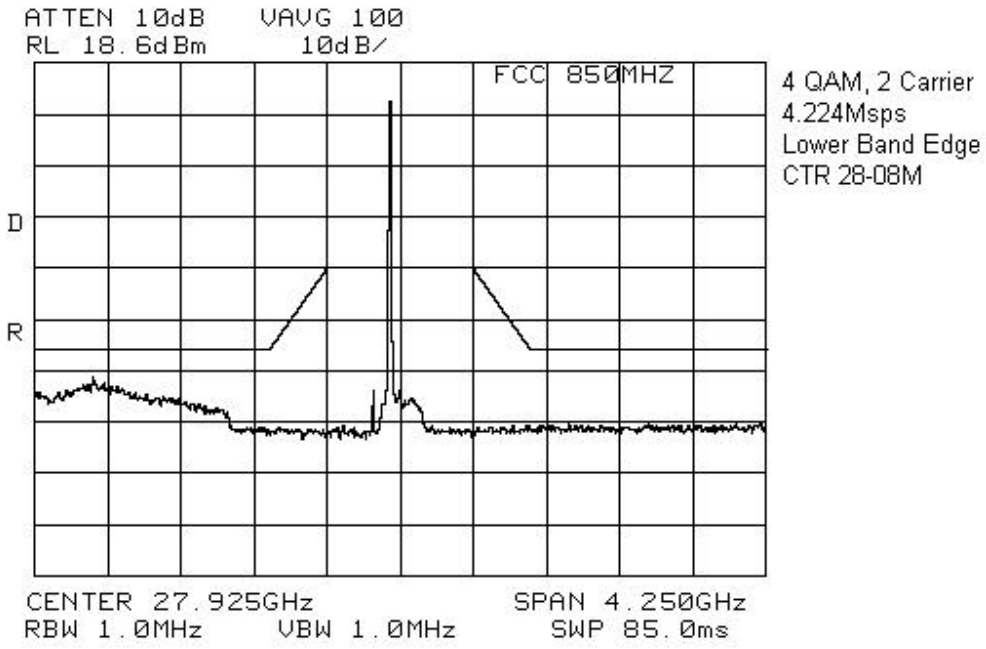

ATTEN 10dB
VAVG 100
RL 18.4dBm
10dB/
FCC 850MHZ
4 QAM, 1 Carrier
2.048Msps
Upper Band Edge
CTR 28-08M
D
R
CENTER 27.925GHz
SPAN 4.250GHz
RBW 1.0MHz
VBW 1.0MHz
*SWP 200ms

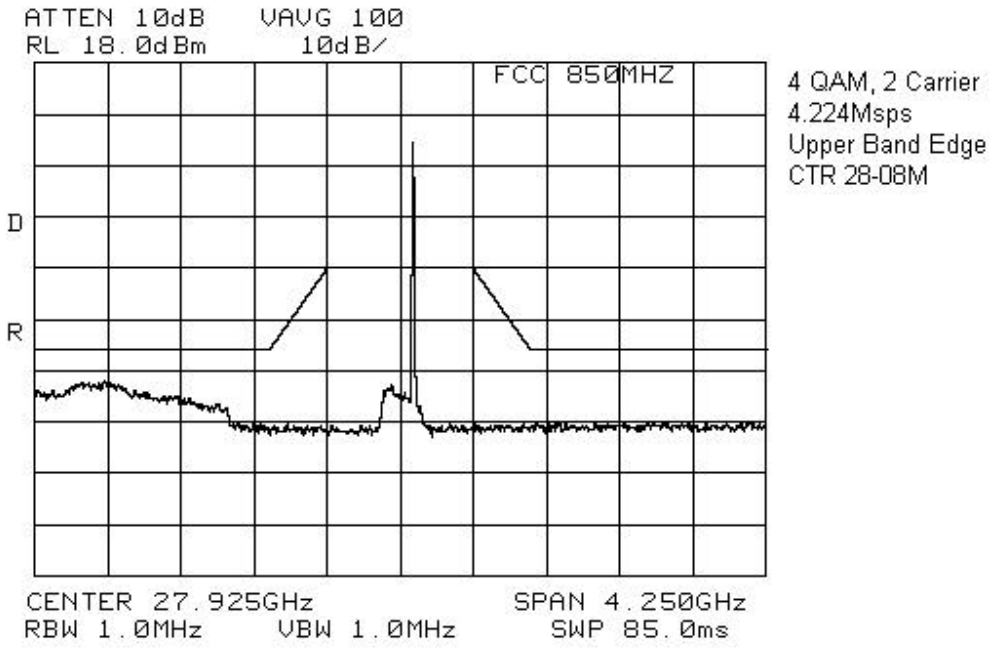

ATTEN 10dB
VAVG 100
RL 18.5dBm
10dB/
FCC 850MHZ
4 QAM, 2 Carrier
2.048Msps
Lower Band Edge
CTR 28-08M
D
R
CENTER 27.925GHz
SPAN 4.250GHz
RBW 1.0MHz
VBW 1.0MHz
SWP 85.0ms

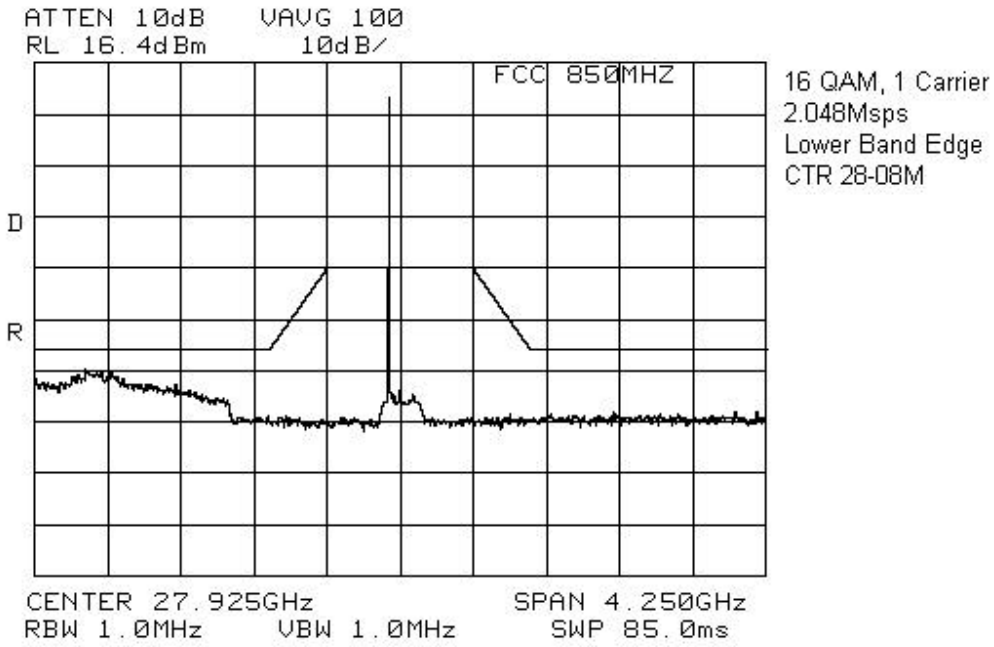

ATTEN 10dB
VAVG 100
RL 18.1dBm
10dB/
FCC 850MHZ
D
R
CENTER 27.925GHz
SPAN 4.250GHz
RBW 1.0MHz
VBW 1.0MHz
SWP 85.0ms
4 QAM, 2 Carrier
2.048Msps
Upper Band Edge
CTR 28-08M

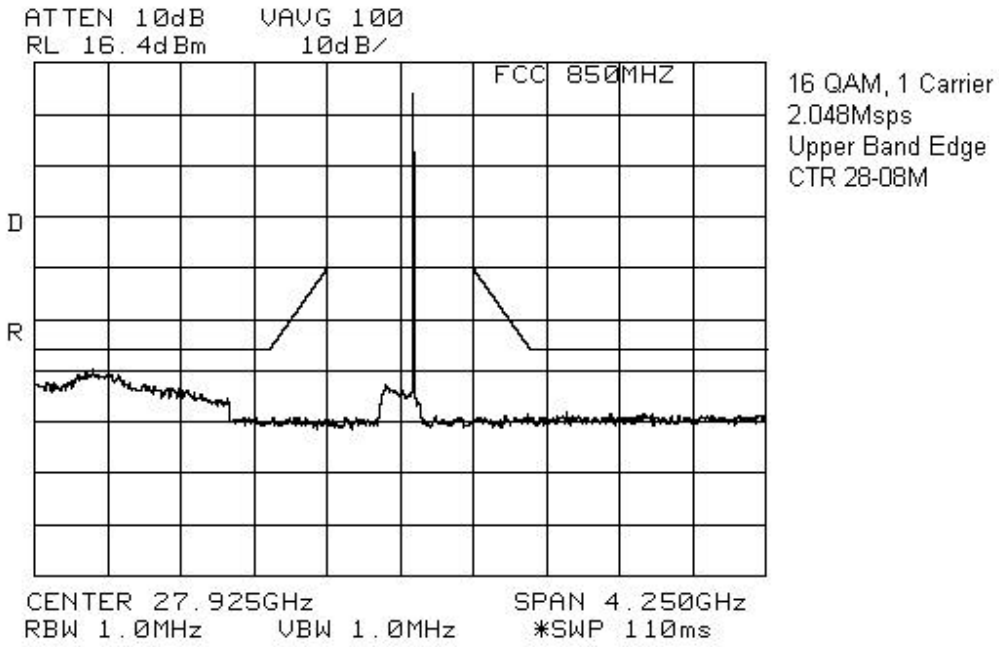

ATTEN 10dB
VAVG 100
RL 18.3dBm
10dB/
FCC 850MHZ
4 QAM, 1 Carrier
4.224Msps
Lower Band Edge
CTR 28-08M
D
R
CENTER 27.925GHz
SPAN 4.250GHz
RBW 1.0MHz
VBW 1.0MHz
SWP 85.0ms

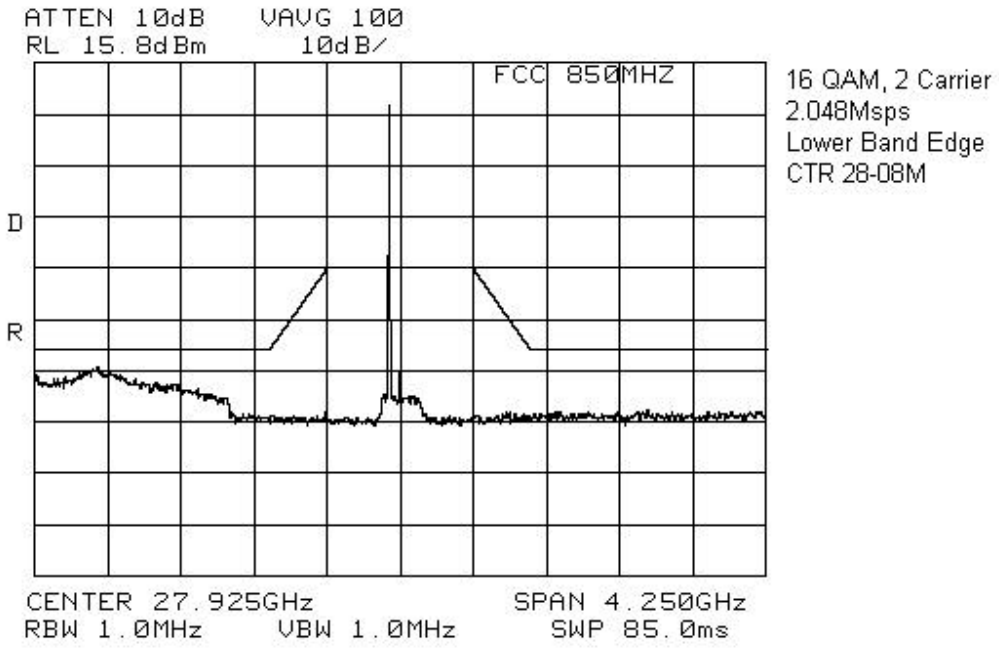

ATTEN 10dB
VAVG 100
RL 18.4dBm
10dB/
FCC 850MHZ
4 QAM, 1 Carrier
4.224Msps
Upper Band Edge
CTR 28-08M
D
R
CENTER 27.925GHz
SPAN 4.250GHz
RBW 1.0MHz
VBW 1.0MHz
SWP 85.0ms

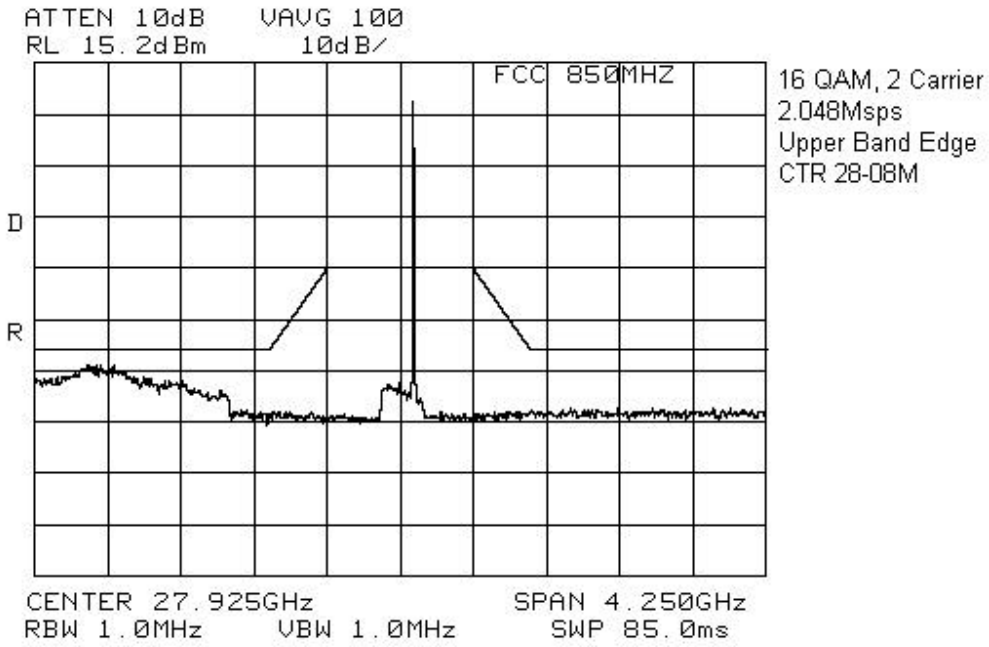

ATTEN 10dB
VAVG 100
RL 18.6dBm
10dB/
FCC 850MHZ
4 QAM, 2 Carrier
4.224Msps
Lower Band Edge
CTR 28-08M
D
R
CENTER 27.925GHz
SPAN 4.250GHz
RBW 1.0MHz
VBW 1.0MHz
SWP 85.0ms

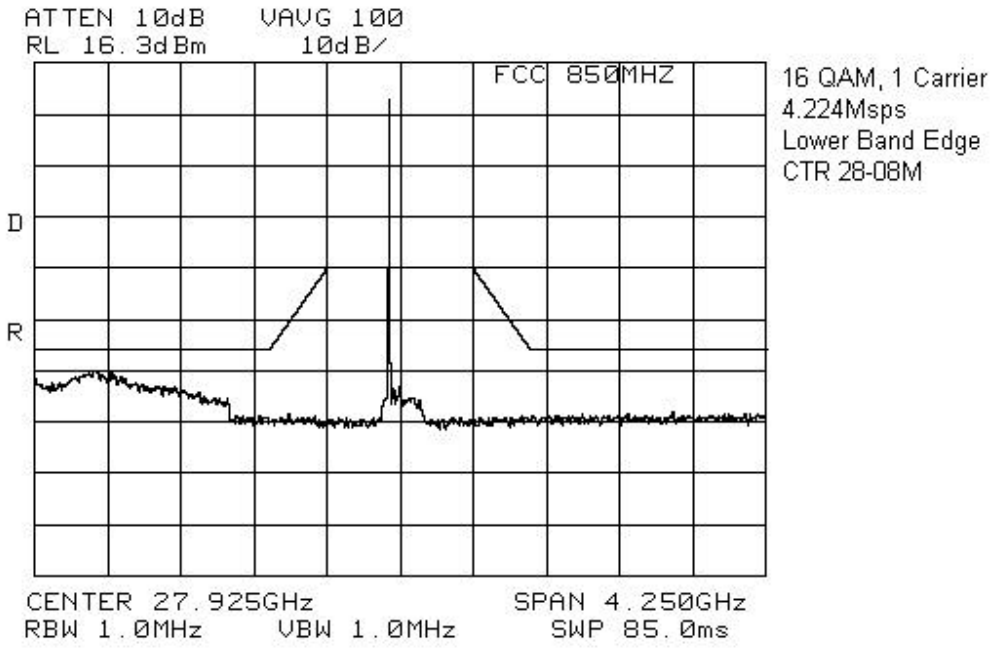

ATTEN 10dB
VAVG 100
RL 18.0dBm
10dB/
FCC 850MHZ
D
R
CENTER 27.925GHz
SPAN 4.250GHz
RBW 1.0MHz
VBW 1.0MHz
SWP 85.0ms
4 QAM, 2 Carrier
4.224Msps
Upper Band Edge
CTR 28-08M

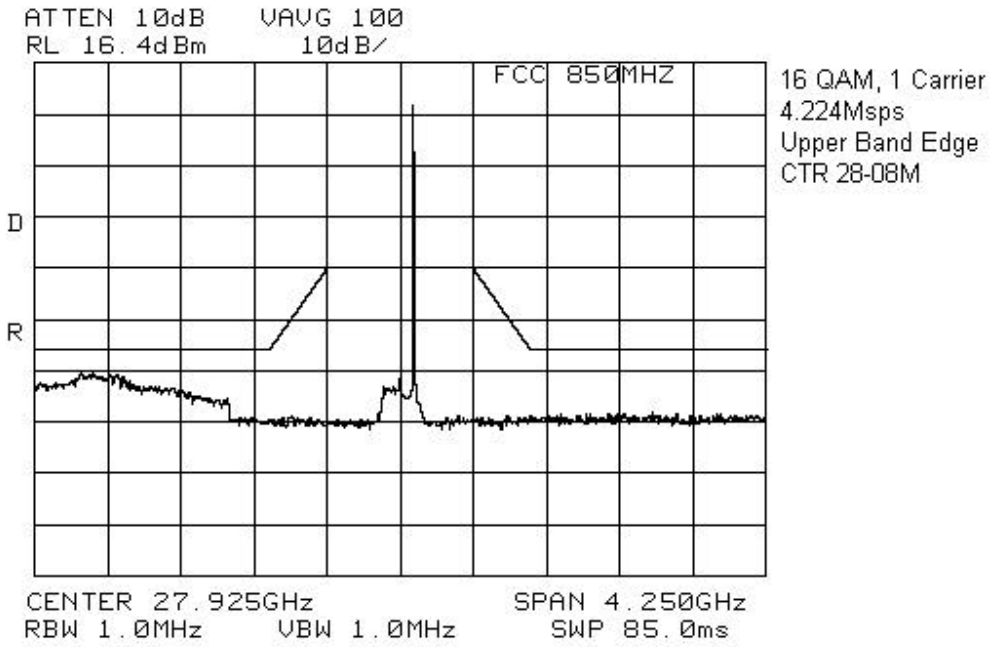

ATTEN 10dB
VAVG 100
RL 16.4dBm
10dB/
FCC 850MHZ
D
R
CENTER 27.925GHz
SPAN 4.250GHz
RBW 1.0MHz
VBW 1.0MHz
SWP 85.0ms
16 QAM, 1 Carrier
2.048Msps
Lower Band Edge
CTR 28-08M

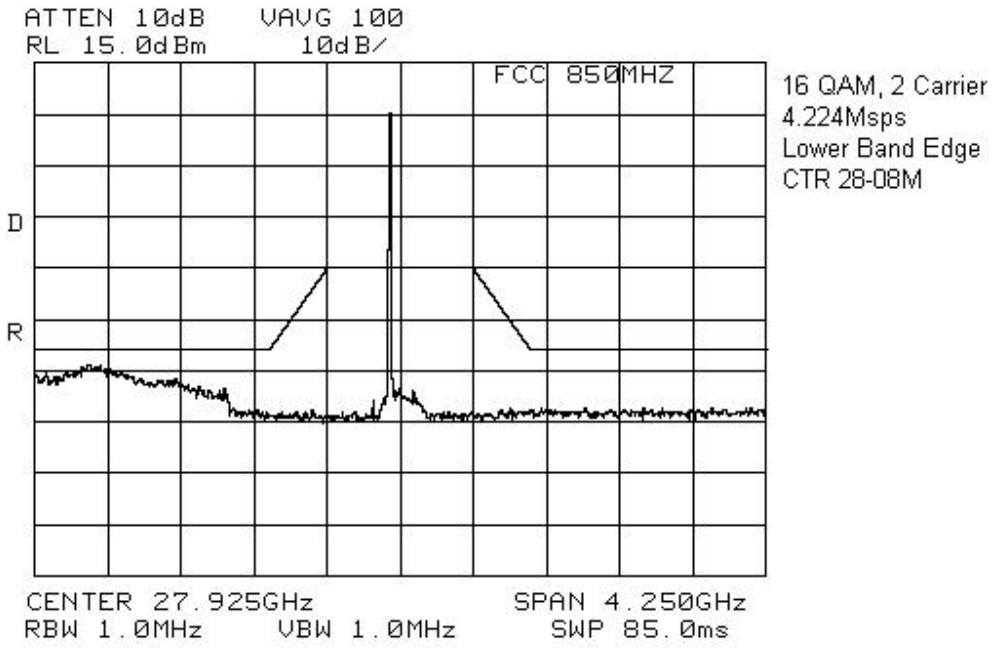

ATTEN 10dB
VAVG 100
RL 16.4dBm
10dB/
FCC 850MHZ
D
R
CENTER 27.925GHz
SPAN 4.250GHz
RBW 1.0MHz
VBW 1.0MHz
*SWP 110ms
16 QAM, 1 Carrier
2.048Msps
Upper Band Edge
CTR 28-08M

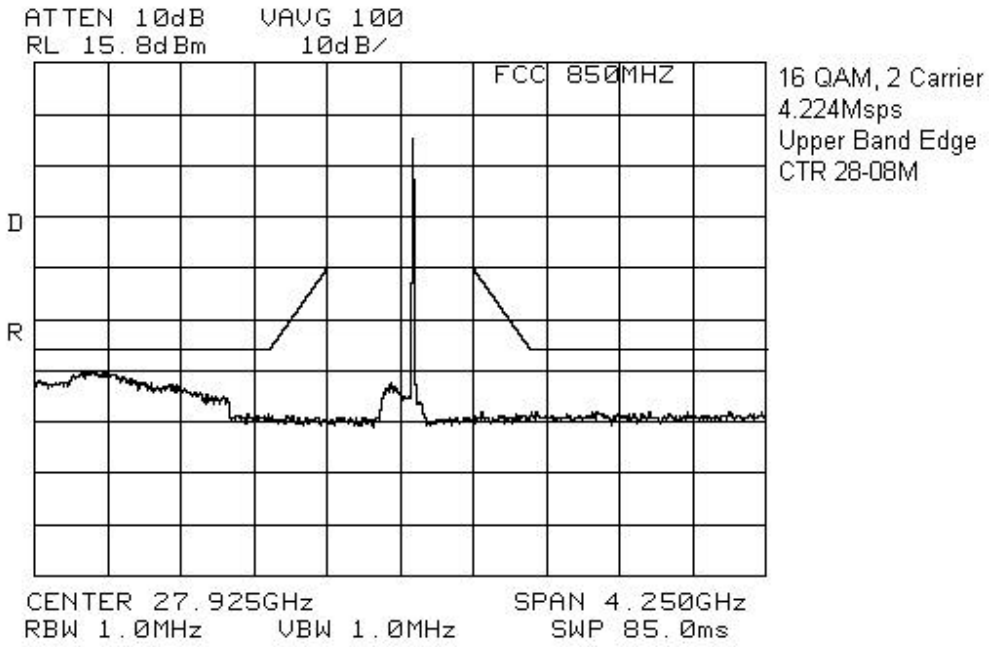

ATTEN 10dB
VAVG 100
RL 15.8dBm
10dB/
FCC 850MHZ
16 QAM, 2 Carrier
2.048Msps
Lower Band Edge
CTR 28-08M
D
R
CENTER 27.925GHz
SPAN 4.250GHz
RBW 1.0MHz
VBW 1.0MHz
SWP 85.0ms

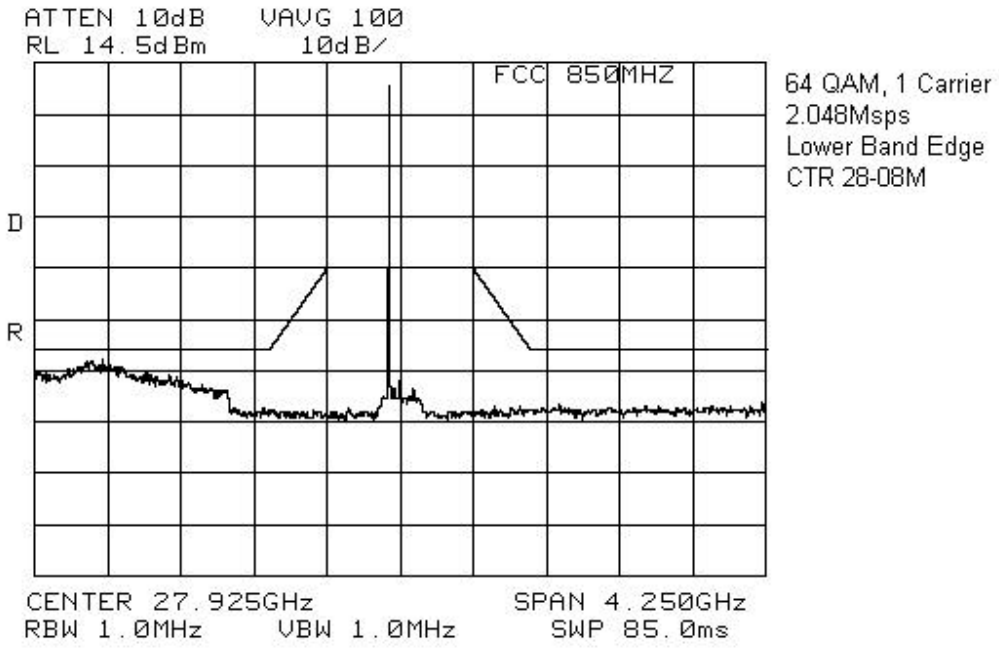

ATTEN 10dB
VAVG 100
RL 15.2dBm
10dB/
FCC 850MHZ
16 QAM, 2 Carrier
2.048Msps
Upper Band Edge
CTR 28-08M
D
R
CENTER 27.925GHz
SPAN 4.250GHz
RBW 1.0MHz
VBW 1.0MHz
SWP 85.0ms

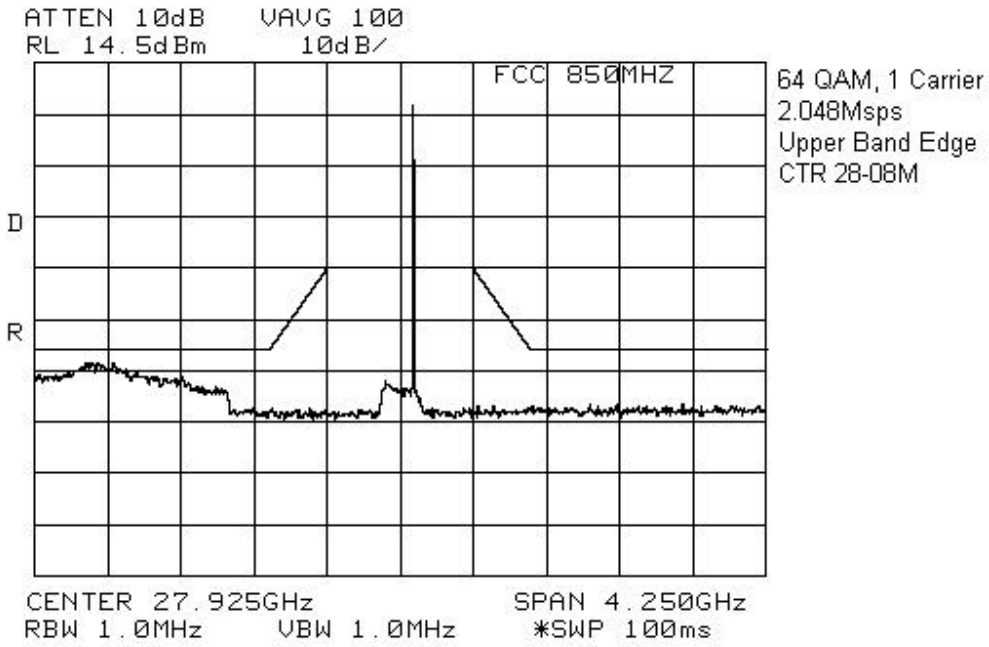

ATTEN 10dB
VAVG 100
RL 16.3dBm
10dB/
FCC 850MHZ
16 QAM, 1 Carrier
4.224Msps
Lower Band Edge
CTR 28-08M
D
R
CENTER 27.925GHz
SPAN 4.250GHz
RBW 1.0MHz
VBW 1.0MHz
SWP 85.0ms

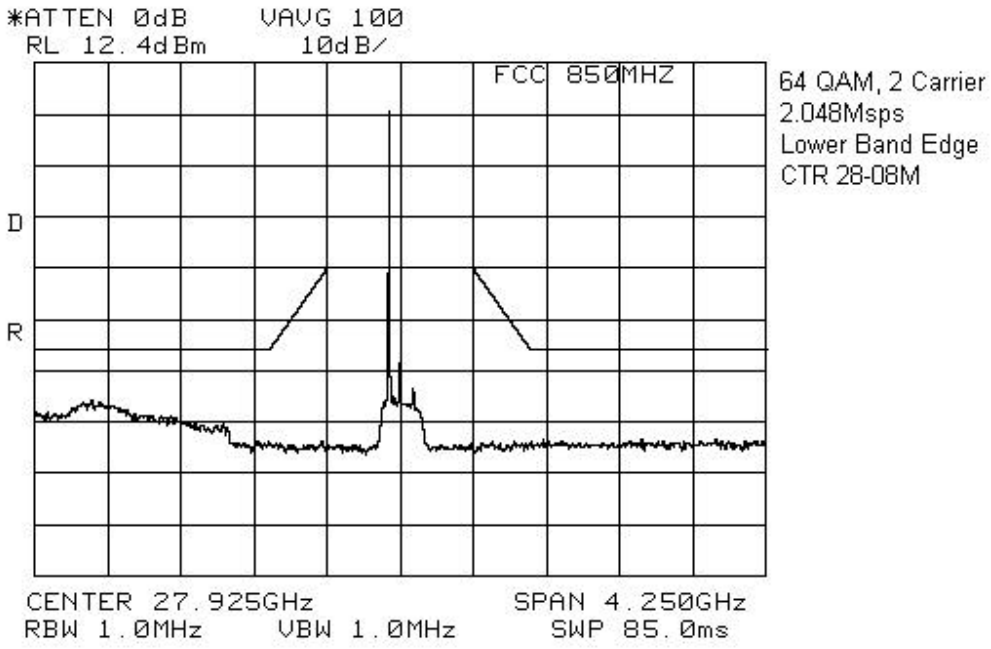

ATTEN 10dB
VAVG 100
RL 16.4dBm
10dB/
FCC 850MHZ
16 QAM, 1 Carrier
4.224Msps
Upper Band Edge
CTR 28-08M
D
R
CENTER 27.925GHz
SPAN 4.250GHz
RBW 1.0MHz
VBW 1.0MHz
SWP 85.0ms

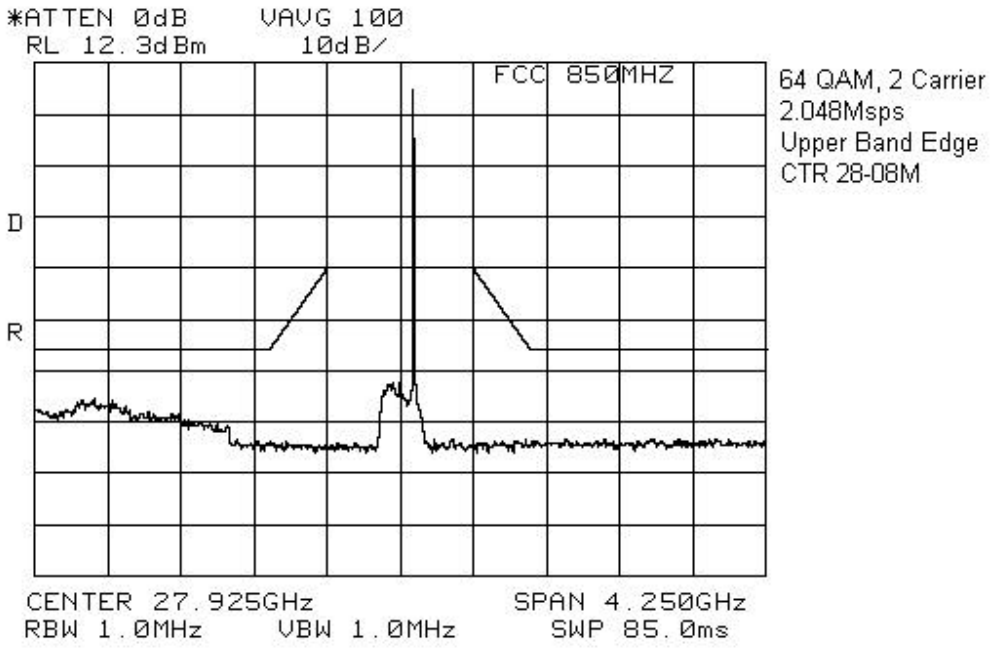

ATTEN 10dB
VAVG 100
RL 15.0dBm
10dB/
FCC 850MHZ
16 QAM, 2 Carrier
4.224Msps
Lower Band Edge
CTR 28-08M
D
R
CENTER 27.925GHz
SPAN 4.250GHz
RBW 1.0MHz
VBW 1.0MHz
SWP 85.0ms

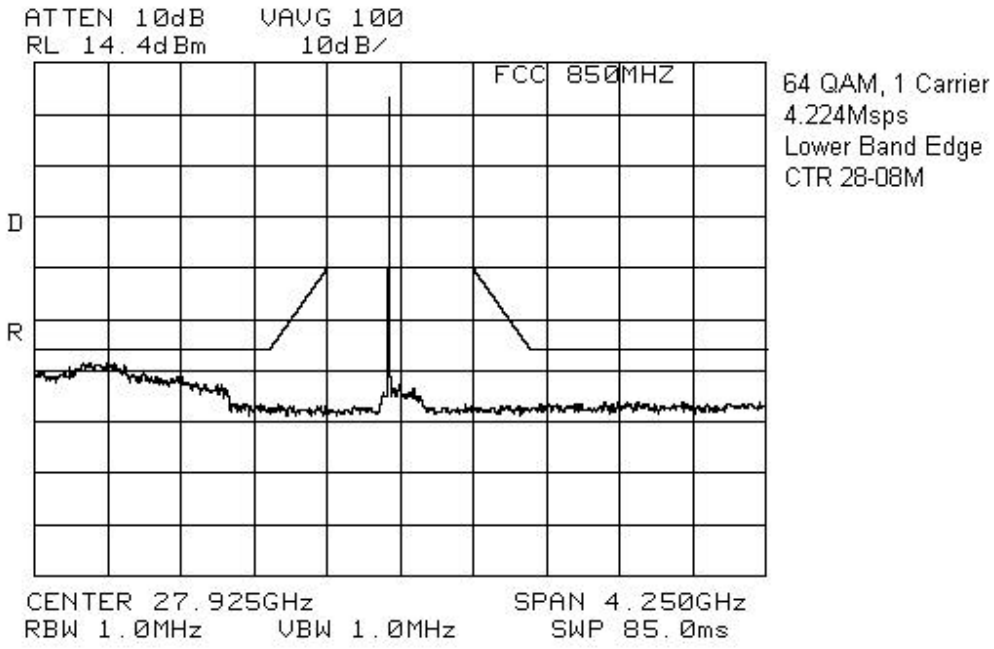

ATTEN 10dB
VAVG 100
RL 15.8dBm
10dB/
FCC 850MHZ
16 QAM, 2 Carrier
4.224Msps
Upper Band Edge
CTR 28-08M
D
R
CENTER 27.925GHz
SPAN 4.250GHz
RBW 1.0MHz
VBW 1.0MHz
SWP 85.0ms

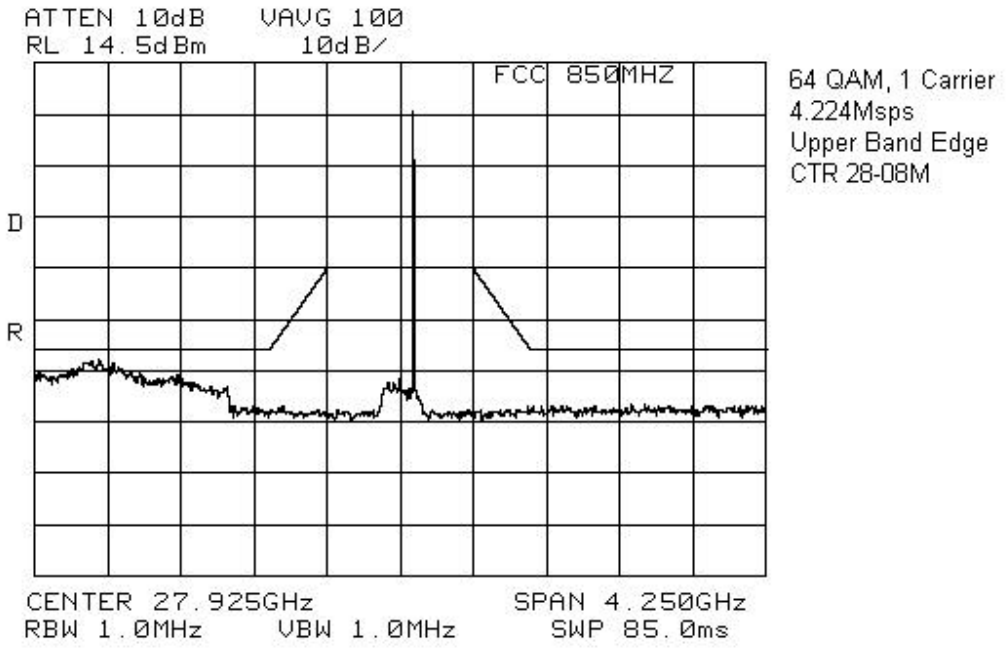

ATTEN 10dB
VAVG 100
RL 14.5dBm
10dB/
FCC 850MHZ
64 QAM, 1 Carrier
2.048Msps
Lower Band Edge
CTR 28-08M
D
R
CENTER 27.925GHz
SPAN 4.250GHz
RBW 1.0MHz
VBW 1.0MHz
SWP 85.0ms

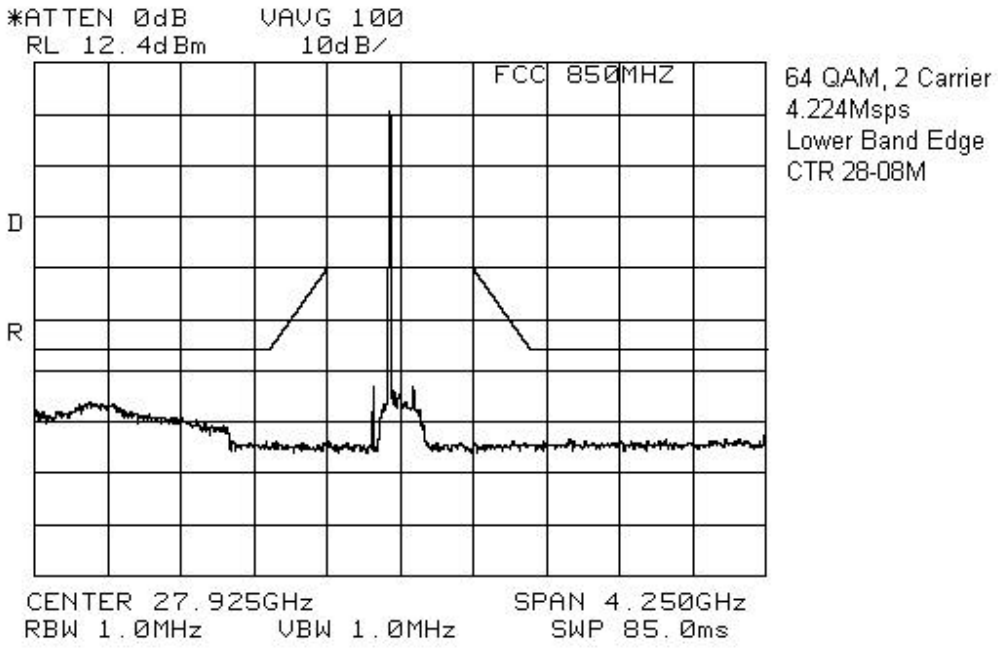

ATTEN 10dB
VAVG 100
RL 14.5dBm
10dB/
FCC 850MHZ
64 QAM, 1 Carrier
2.048Msps
Upper Band Edge
CTR 28-08M
D
R
CENTER 27.925GHz
SPAN 4.250GHz
RBW 1.0MHz
VBW 1.0MHz
*SWP 100ms

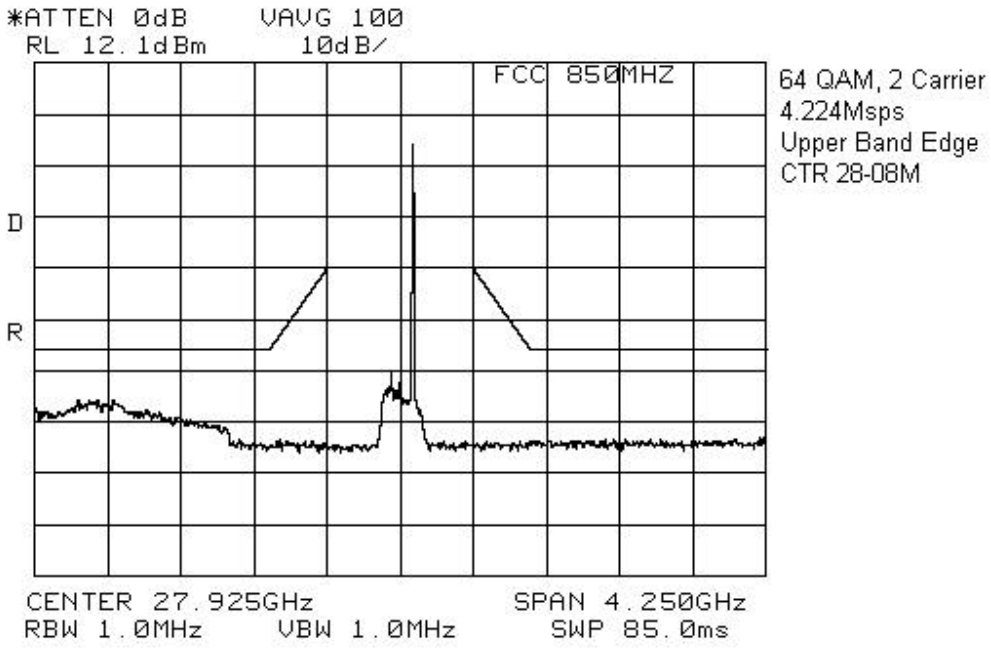

*ATTEN 0dB
VAVG 100
RL 12.4dBm
10dB/
FCC 850MHZ
64 QAM, 2 Carrier
2.048Msps
Lower Band Edge
CTR 28-08M
D
R
CENTER 27.925GHz
SPAN 4.250GHz
RBW 1.0MHz
VBW 1.0MHz
SWP 85.0ms


*ATTEN 0dB
VAVG 100
RL 12.3dBm
10dB/
FCC 850MHZ
64 QAM, 2 Carrier
2.048Msps
Upper Band Edge
CTR 28-08M
D
R
CENTER 27.925GHz
SPAN 4.250GHz
RBW 1.0MHz
VBW 1.0MHz
SWP 85.0ms


ATTEN 10dB
VAVG 100
RL 14.4dBm
10dB/
FCC 850MHZ
64 QAM, 1 Carrier
4.224Msps
Lower Band Edge
CTR 28-08M
D
R
CENTER 27.925GHz
SPAN 4.250GHz
RBW 1.0MHz
VBW 1.0MHz
SWP 85.0ms


ATTEN 10dB
VAVG 100
RL 14.5dBm
10dB/
FCC 850MHZ
D
R
CENTER 27.925GHz
SPAN 4.250GHz
RBW 1.0MHz
VBW 1.0MHz
SWP 85.0ms
64 QAM, 1 Carrier
4.224Msps
Upper Band Edge
CTR 28-08M


*ATTEN 0dB
VAVG 100
RL 12.4dBm
10dB/
FCC 850MHZ
64 QAM, 2 Carrier
4.224Msps
Lower Band Edge
CTR 28-08M
D
R
CENTER 27.925GHz
SPAN 4.250GHz
RBW 1.0MHz
VBW 1.0MHz
SWP 85.0ms


*ATTEN 0dB
VAVG 100
RL 12.1dBm
10dB/
FCC 850MHZ
64 QAM, 2 Carrier
4.224Msps
Upper Band Edge
CTR 28-08M
D
R
CENTER 27.925GHz
SPAN 4.250GHz
RBW 1.0MHz
VBW 1.0MHz
SWP 85.0ms

Section 5. Spurious Emissions at Antenna Terminals

Para. No.: 2.1051

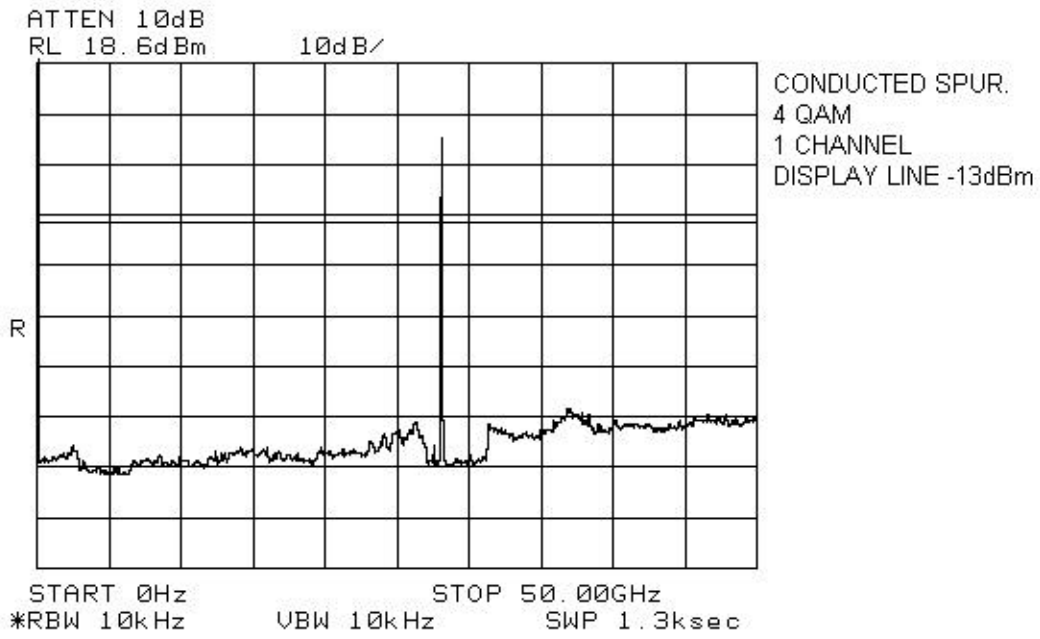
Test Performed By: Glen Westwell	**Date of Test:** August 22, 2000

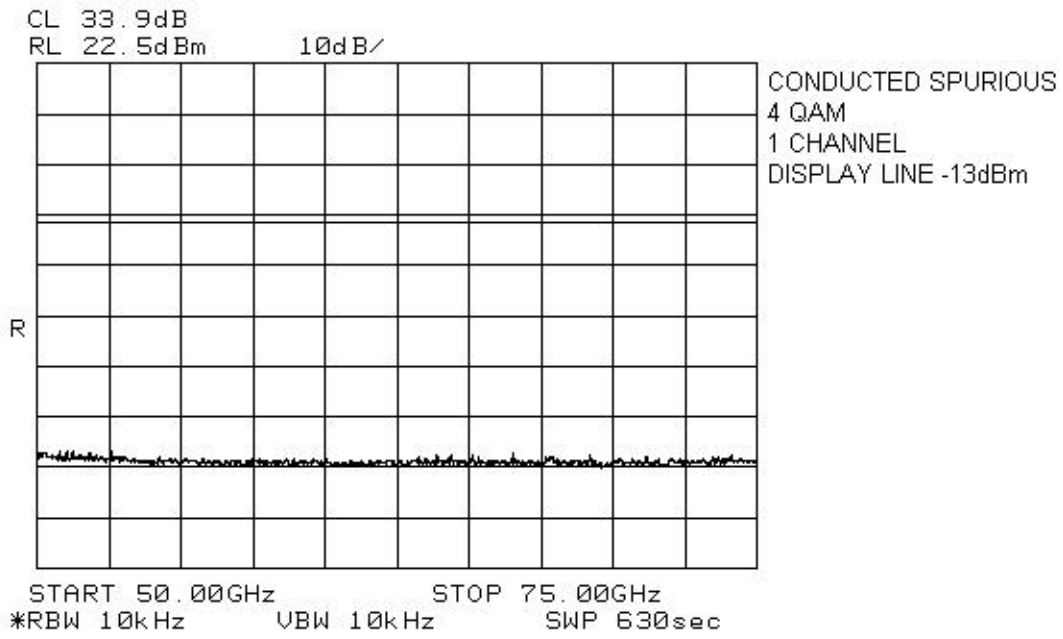
Minimum Standard: 101.111 (a)(2)(iii), -13 dBm

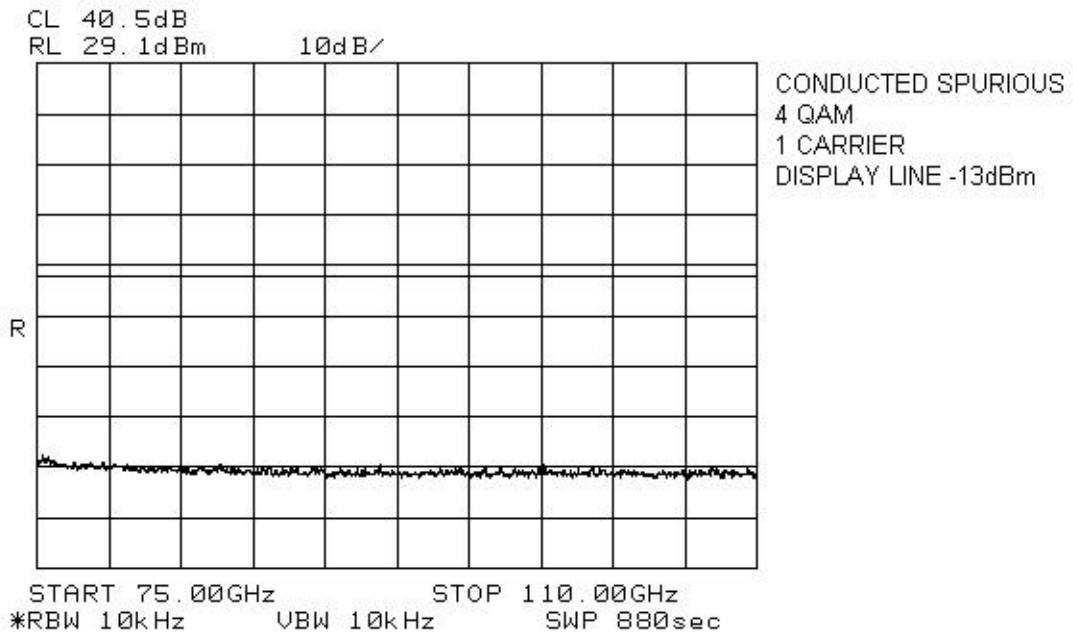
Test Results: Complies

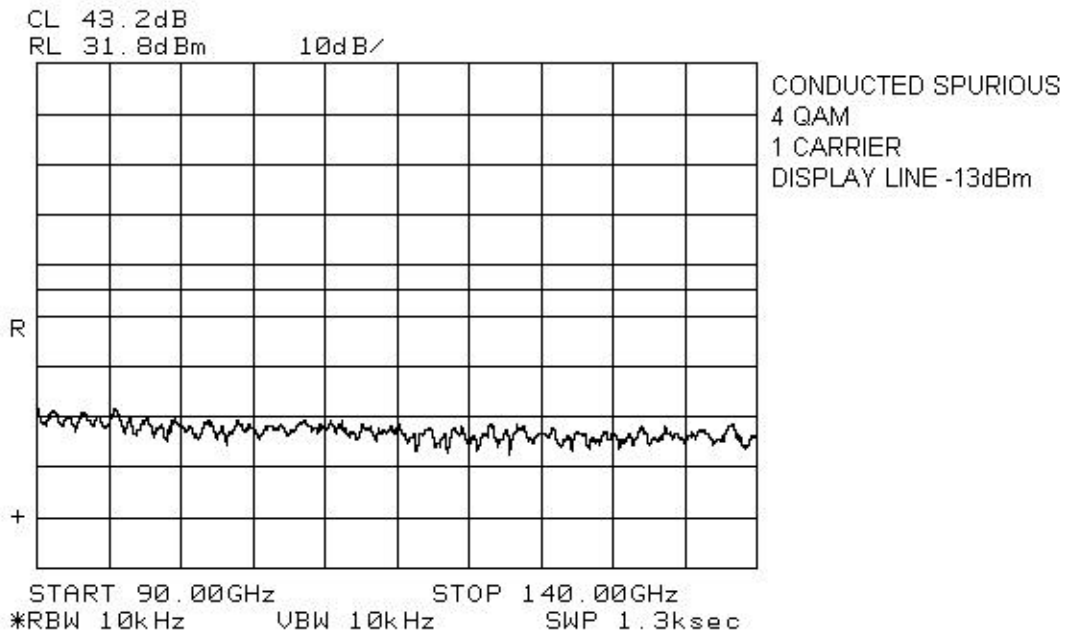
No emissions were detected within 20 dB of the specification limit.

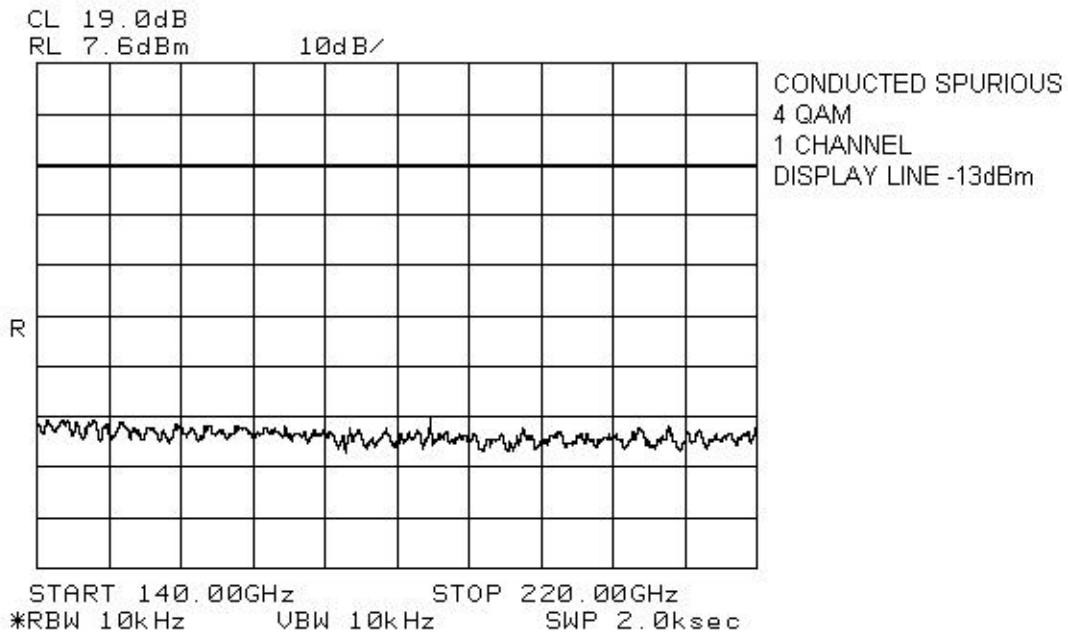
Test Data: See attached graph(s).

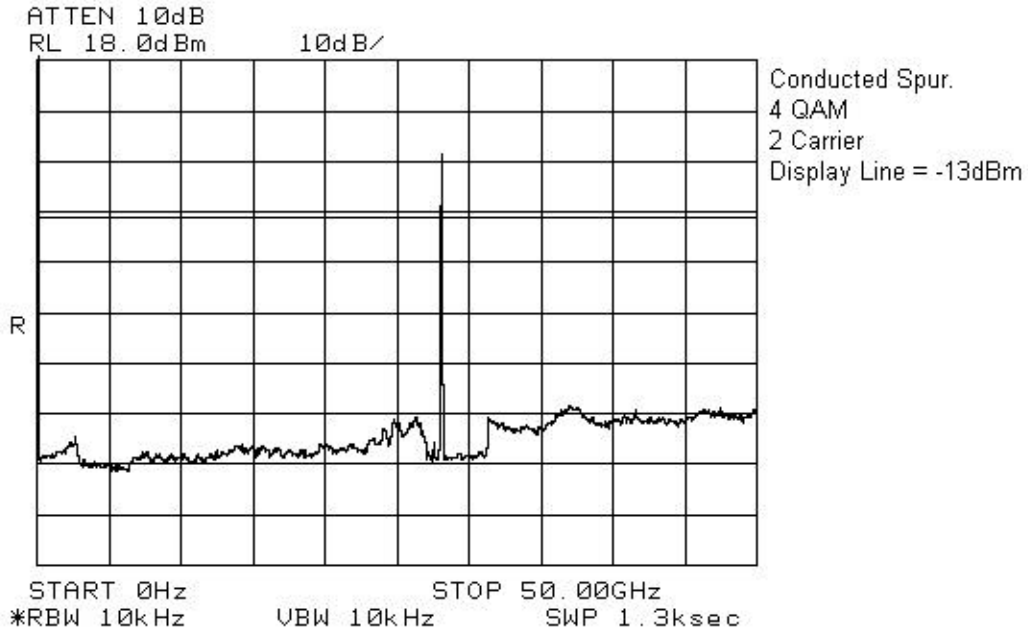

ATTEN 10dB
RL 18.6dBm
10dB/
R
CONDUCTED SPUR.
4 QAM
1 CHANNEL
DISPLAY LINE -13dBm
START 0Hz
STOP 50.00GHz
*RBW 10kHz
VBW 10kHz
SWP 1.3ksec

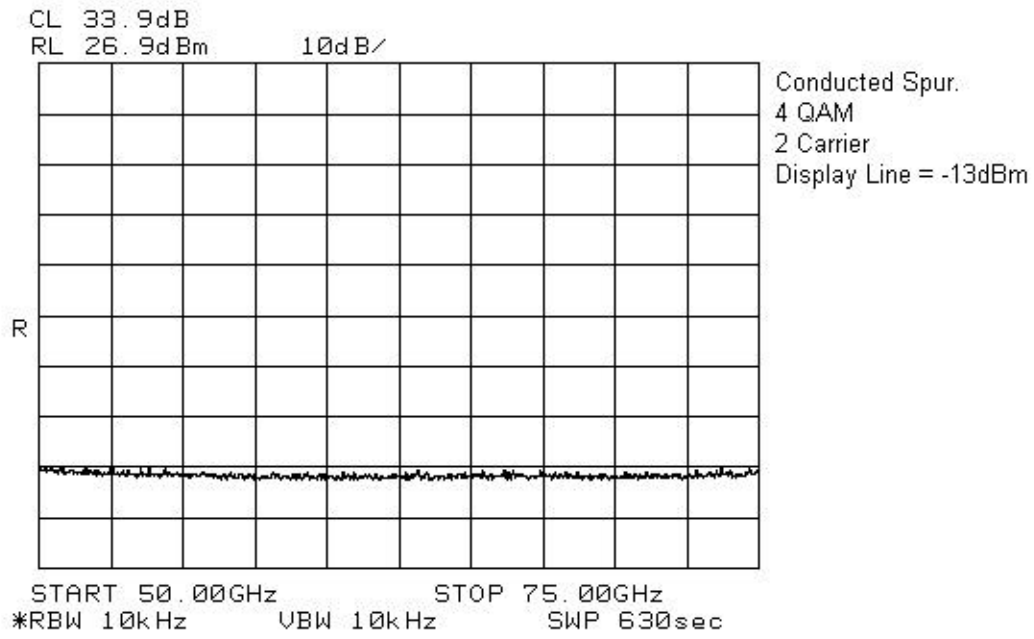

CL 33.9dB
RL 22.5dBm
10dB/
R
CONDUCTED SPURIOUS
4 QAM
1 CHANNEL
DISPLAY LINE -13dBm
START 50.00GHz
STOP 75.00GHz
*RBW 10kHz
VBW 10kHz
SWP 630sec

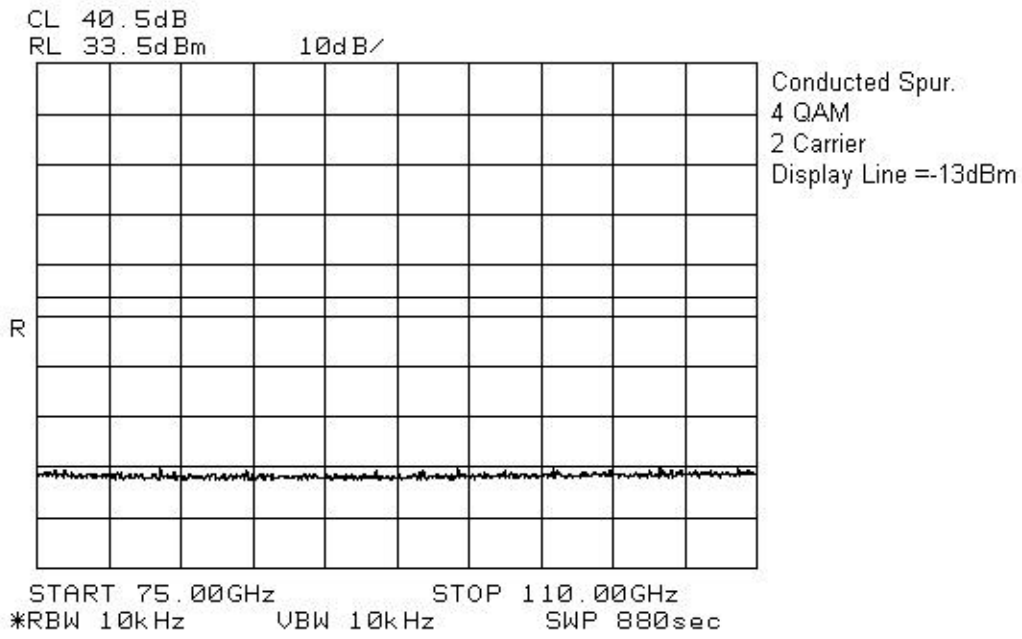

CL 40.5dB
RL 29.1dBm
10dB/
R
CONDUCTED SPURIOUS
4 QAM
1 CARRIER
DISPLAY LINE -13dBm
START 75.00GHz
STOP 110.00GHz
*RBW 10kHz
VBW 10kHz
SWP 880sec

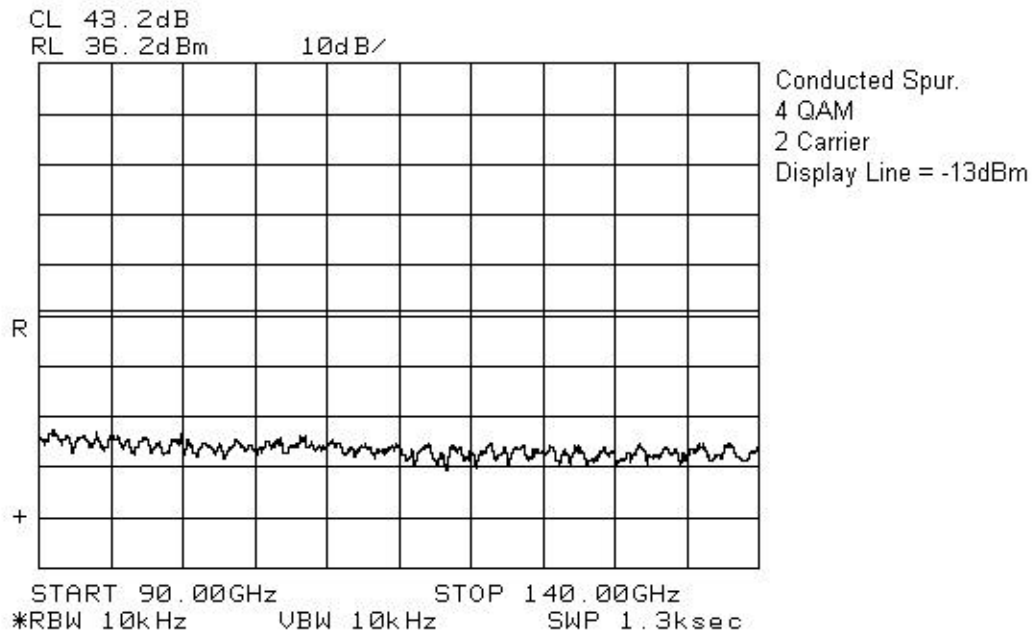

CL 43.2dB
RL 31.8dBm
10dB/
CONDUCTED SPURIOUS
4 QAM
1 CARRIER
DISPLAY LINE -13dBm
R
+
START 90.00GHz
STOP 140.00GHz
*RBW 10kHz
VBW 10kHz
SWP 1.3ksec

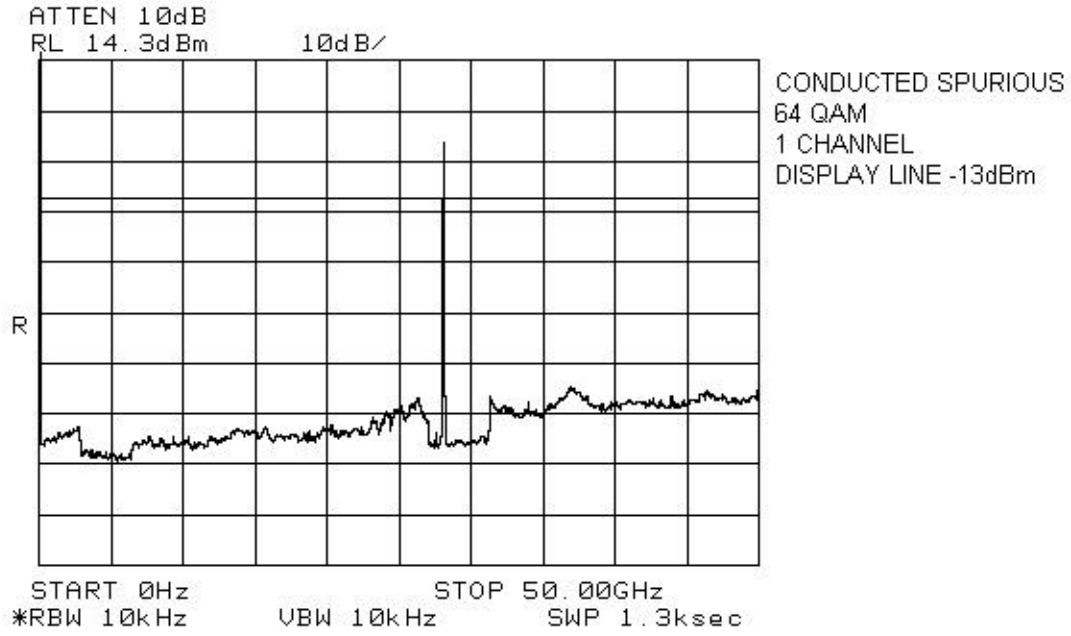

CL 19.0dB
RL 7.6dBm
10dB/
R
CONDUCTED SPURIOUS
4 QAM
1 CHANNEL
DISPLAY LINE -13dBm
START 140.00GHz
STOP 220.00GHz
*RBW 10kHz
VBW 10kHz
SWP 2.0ksec

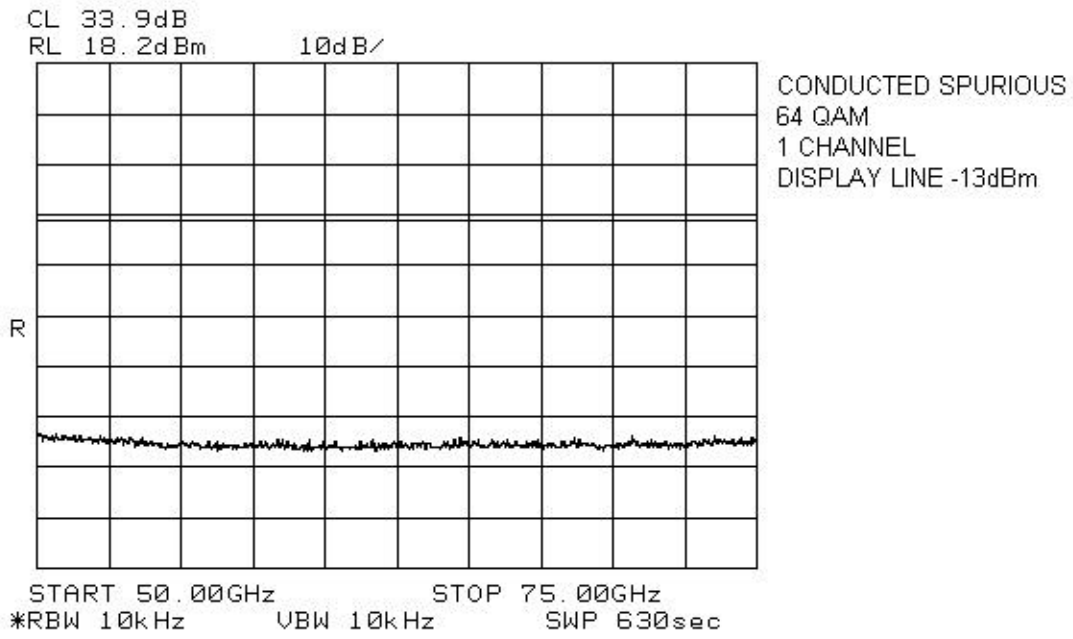

ATTEN 10dB
RL 18.0dBm
10dB/
R
Conducted Spur.
4 QAM
2 Carrier
Display Line = -13dBm
START 0Hz
STOP 50.00GHz
*RBW 10kHz
VBW 10kHz
SWP 1.3ksec

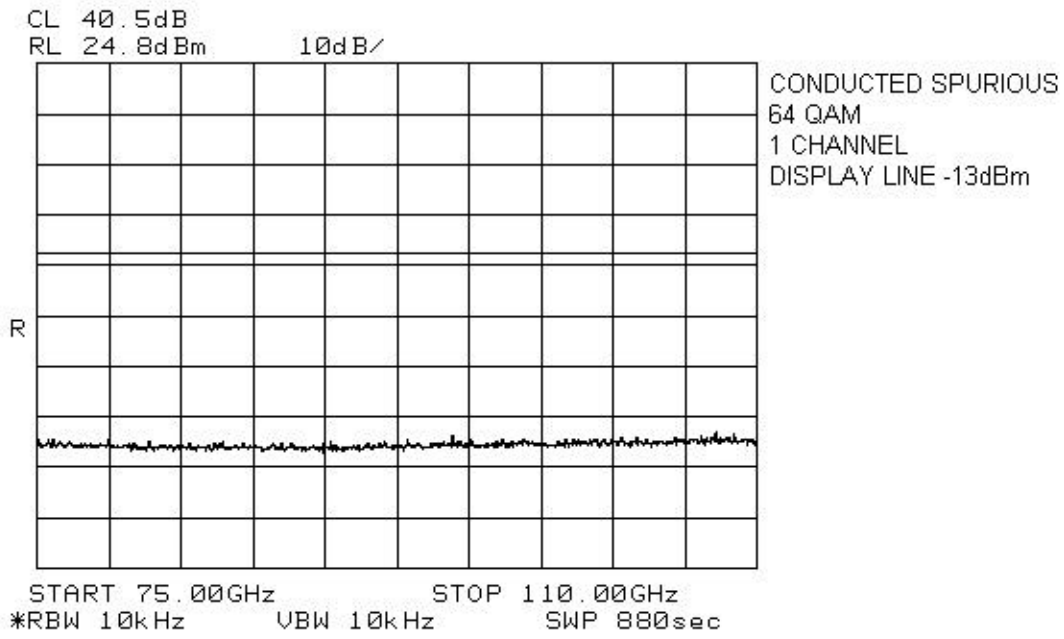

CL 33.9dB
RL 26.9dBm
10dB/
R
Conducted Spur.
4 QAM
2 Carrier
Display Line = -13dBm
START 50.00GHz
STOP 75.00GHz
*RBW 10kHz
VBW 10kHz
SWP 630sec

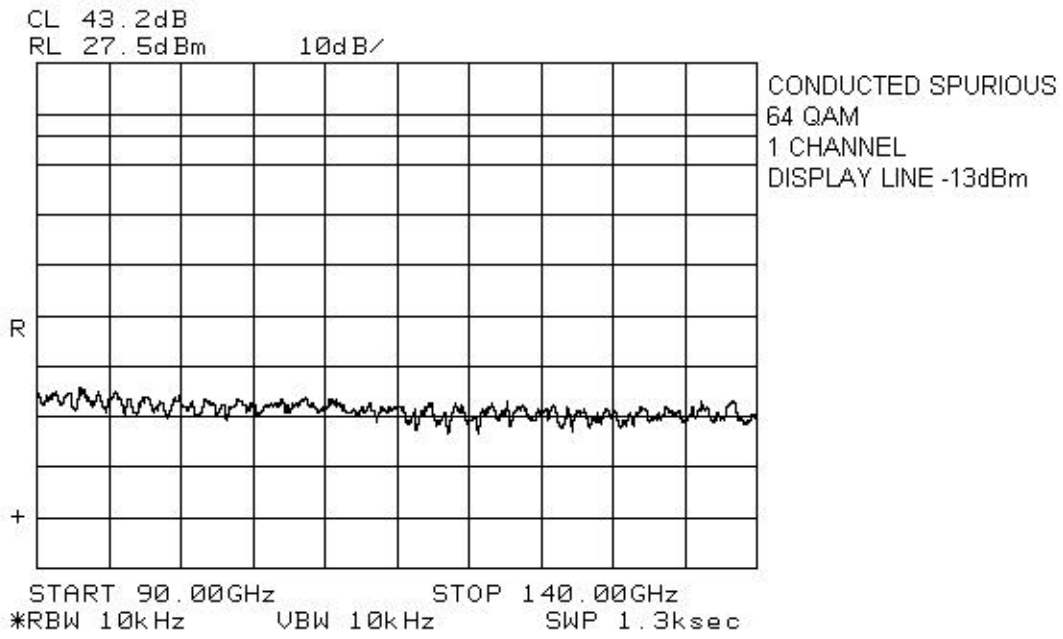

CL 40.5dB
RL 33.5dBm
10dB/
R
Conducted Spur.
4 QAM
2 Carrier
Display Line =-13dBm
START 75.00GHz
STOP 110.00GHz
*RBW 10kHz
VBW 10kHz
SWP 880sec

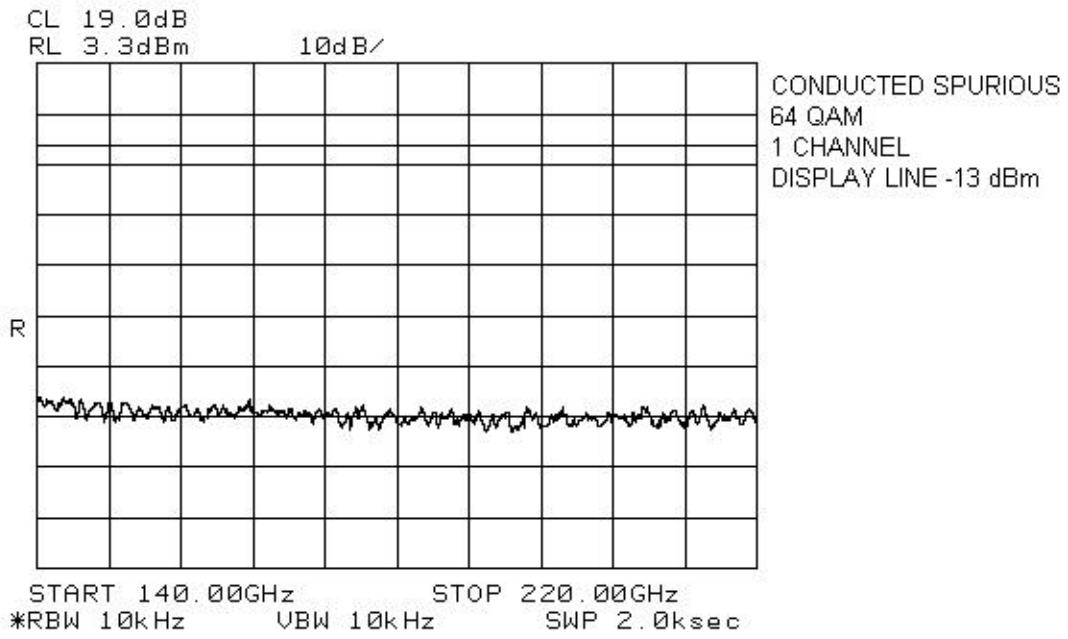

CL 43.2dB
RL 36.2dBm
10dB/
R
+
START 90.00GHz
STOP 140.00GHz
*RBW 10kHz
VBW 10kHz
SWP 1.3ksec
Conducted Spur.
4 QAM
2 Carrier
Display Line = -13dBm


ATTEN 10dB
RL 14.3dBm
10dB/
R
CONDUCTED SPURIOUS
64 QAM
1 CHANNEL
DISPLAY LINE -13dBm
START 0Hz
STOP 50.00GHz
*RBW 10kHz
VBW 10kHz
SWP 1.3ksec


CL 33.9dB
RL 18.2dBm
10dB/
R
CONDUCTED SPURIOUS
64 QAM
1 CHANNEL
DISPLAY LINE -13dBm
START 50.00GHz
STOP 75.00GHz
*RBW 10kHz
VBW 10kHz
SWP 630sec


CL 40.5dB
RL 24.8dBm
10dB/
R
CONDUCTED SPURIOUS
64 QAM
1 CHANNEL
DISPLAY LINE -13dBm
START 75.00GHz
STOP 110.00GHz
*RBW 10kHz
VBW 10kHz
SWP 880sec


CL 43.2dB
RL 27.5dBm
10dB/
CONDUCTED SPURIOUS
64 QAM
1 CHANNEL
DISPLAY LINE -13dBm
R
+
START 90.00GHz
STOP 140.00GHz
*RBW 10kHz
VBW 10kHz
SWP 1.3ksec


CL 19.0dB
RL 3.3dBm
10dB/
R
CONDUCTED SPURIOUS
64 QAM
1 CHANNEL
DISPLAY LINE -13 dBm
START 140.00GHz
STOP 220.00GHz
*RBW 10kHz
VBW 10kHz
SWP 2.0ksec

Section 6. Field Strength of Spurious Emissions

Para. No.: 2.1053

Test Performed By: Glen Westwell	**Date of Test:** August 21, 2000

Minimum Standard: 101.111 (a)(2)(iii), -13 dBm

84.4 dBµV/m @ 3m < 1 GHz
82.2 dBµV/m @ 3m > 1 GHz

Test Results: Complies

No emissions were detected within 20 dB of the specification limit.

Test Data: The spectrum was searched from 400 MHz to 140 GHz.

No emissions were detected.

Section 7. Frequency Stability

Para. No.: 2.1055

Test Performed By: Glen Westwell	**Date of Test:** August 21, 2000

Minimum Standard: 101.107 (a), 0.001% (279 kHz)

Test Results: Complies

The maximum frequency drift is 12 kHz.
This is 0.0000429%

Test Data: Standard Test Voltage: STV -48 VDC
Standard Test Frequency: 27925 MHz

Test Condition	Frequency (MHz)	Frequency Drift (kHz)
STV	27 924.993	7
115% STV	27 924.993	7
85% STV	27 924.994	6
-30 °C	27 925.001	1
-20 °C	27 925.001	1
-10 °C	27 925.001	1
0 °C	27 924.999	1
+10 °C	27 924.997	3
+30 °C	27 924.994	6
+40 °C	27 924.994	6
+50 °C	27 924.988	12

Section 8. Test Equipment List

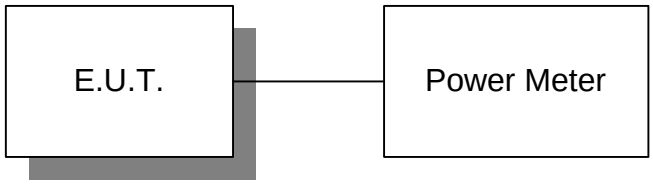
CAL CYCLE	EQUIPMENT	MANUFACTURER	MODEL	SERIAL	LAST CAL.	NEXT CAL.
1 Year	Spectrum Analyzer	Hewlett Packard	8565E	FA000981	June 16/00	June 16/01
1 Year	Climate Chamber	Thermotron	SM-16C	15649-S	COU	COU
1 Year	Horn Antenna	EMCO #2	3115	4336	Nov. 11/99	Nov. 11/00
3 Year	Waveguide Attenuator	Millitech	FXA-28-S20TG0	FA001295	Oct. 13/98	Oct. 13/01
1 Year	Power Meter	Hewlett Packard	E4418B	FA001413	Nov. 8/99	Dec. 7/00
3 Year	Harmonic Mixer	Hewlett Packard	50-75 GHz	FA001027	Mar. 9/00	Mar. 9/03
3 Year	Harmonic Mixer	Hewlett Packard	75-110 GHz	FA001302	Oct. 13/00	Oct. 13/01
3 Year	Diplexer	Olsen-OML	DPL.20(HP)	——	Mar. 15/00	Mar. 15/03
3 Year	Mixer Antenna 90-140 GHz	Olsen-OML	M05HWA(HP)	——	Mar. 15/00	Mar. 15/03
3 Year	Mixer Antenna 140-220 GHz	Olsen-OML	M05HWA(HP)	——	Mar. 15/00	Mar. 15/03

NA: Not Applicable
NCR: No Cal Required
COU: CAL On Use

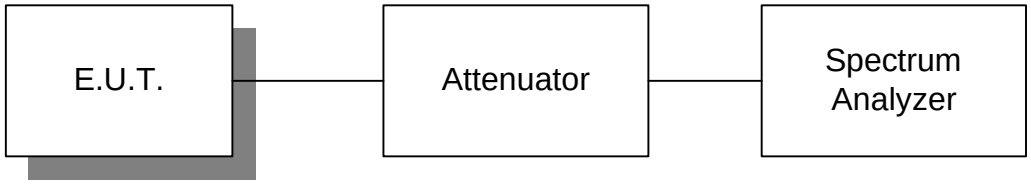
Annex A

Test Diagrams

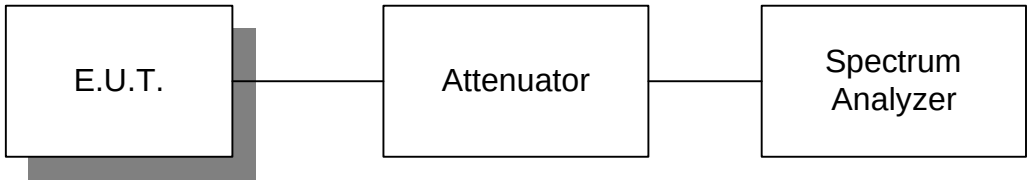
Para. No. 2.1046 - R.F. Power Output



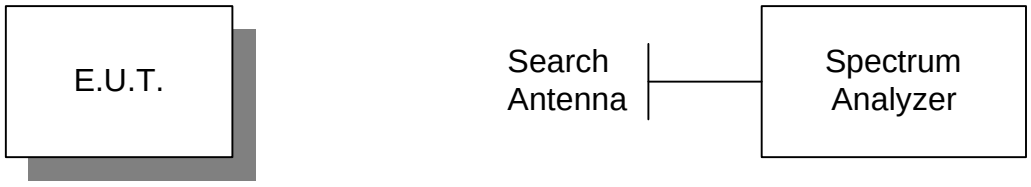
Para. No. 2.1049 - Occupied Bandwidth



Para. No. 2.1051 - Spurious Emissions at Antenna Terminals



Para. No. 2.1053 - Field Strength of Spurious Radiation



Para. No. 2.1055 - Frequency Stability