

KTL Test Report:

0R02869
Issue: 2.0

Applicant:

Nortel Networks
21 Richardson Side Road
Kanata, Ontario
K2K 2C1

**Equipment Under Test:
(E.U.T.)**

CTR 28-07M
NTVG16CA N1

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:

November 8, 2000

Total Number of Pages:

64

Authorized Copy:

Soft Copy

Table of Contents

| | | |
|-------------------|---|-----------|
| Section 1. | Summary of Test Results..... | 3 |
| Section 2. | General Equipment Specification | 5 |
| Section 3. | RF Power Output..... | 6 |
| Section 4. | Occupied Bandwidth | 7 |
| Section 5. | Spurious Emissions at Antenna Terminals..... | 49 |
| Section 6. | Field Strength of Spurious Emissions | 59 |
| Section 7. | Frequency Stability..... | 60 |
| Section 8. | Test Equipment List | 61 |
| Annex A | Test Diagrams | A1 |

*EQUIPMENT: CTR 28-07M**ISSUE: 2.0*

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

☒

Production Unit

☒

Class II Permissive Change

☐

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**

A handwritten signature in blue ink, which appears to read "Glen Westwell", is positioned above the printed name.

TESTED BY:

Glen Westwell, Technologist

DATE: November 8, 2000

KTL Ottawa Inc. authorizes the above named company to reproduce this report provided it is reproduced in its entirety and for use by the company's employees only.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. KTL Ottawa Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

This report applies only to the items tested.

*EQUIPMENT: CTR 28-07M**ISSUE: 2.0*

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: 44 %

Outdoor Temperature: N/A
 Humidity: N/A

.

*EQUIPMENT: CTR 28-07M**ISSUE: 2.0*

Section 2. General Equipment Specification

| | |
|---|--|
| Manufacturer: | Nortel Networks |
| Model No.: | CTR 28-07M, NTVG16CA N1, S/W Ver. 1.2 |
| Serial No.: | NNTM532GN88Q |
| Date Received In Laboratory: | August 15, 2000 |
| KTL Identification No.: | Item #1 |
| Transmitter | |
| Supply Voltage Input: | -48 VDC |
| Frequency Range: | Tx = 28.2024 GHz to 28.3476 GHz @ 3.3 MHz Channel Spacing With 2.048 Msps Tx = 28.2035 GHz to 28.3465 GHz @ 5.5 MHz Channel Spacing With 4.224 Msps |
| Tunable Bands: | 1 |
| Types of Modulation: | 4, 16, 64 QAM, FDMA |
| Data Rate(s) | 2.048 Msps, 4.224 Msps |
| Internal/External Data Source: | External |
| Emission Designator: | 9M94D9W 5M44D9W 4M44D9W 2M14D9W |
| Output Impedance: | 50Ω |
| RF Power Output (rated): | 12 – 18 dBm |
| Channel Spacing(s): | 3.3 MHz & 5.5 MHz |
| Operator Selection of Operating Frequency: | None |
| Power Output Adjustment Capability: | 31 to 0 dB attenuation adjustment |

*EQUIPMENT: CTR 28-07M**ISSUE: 2.0*

Section 3. RF Power Output**Para. No.: 1.1046**

| | |
|---|---------------------------------------|
| Test Performed By: Glen Westwell | Date of Test: October 12, 2000 |
|---|---------------------------------------|

Minimum Standard: 101.113 (c)

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

Measurement Data:

| | Rated (dBm) | Max. Measured (dBm) |
|-------------------|--------------------|----------------------------|
| 1 Carrier | 18.0 | 18.7 |
| | 16.0 | 16.8 |
| | 14.0 | 14.7 |
| 2 Carriers | 18.0 | 18.4 |
| | 15.0 | 15.3 |
| | 12.0 | 12.6 |

EQUIPMENT: CTR 28-07M

ISSUE: 2.0

Section 4. Occupied Bandwidth

Para. No.: 2.1049

| | |
|---|--------------------------------------|
| Test Performed By: Glen Westwell | Date of Test: August 28, 2000 |
|---|--------------------------------------|

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

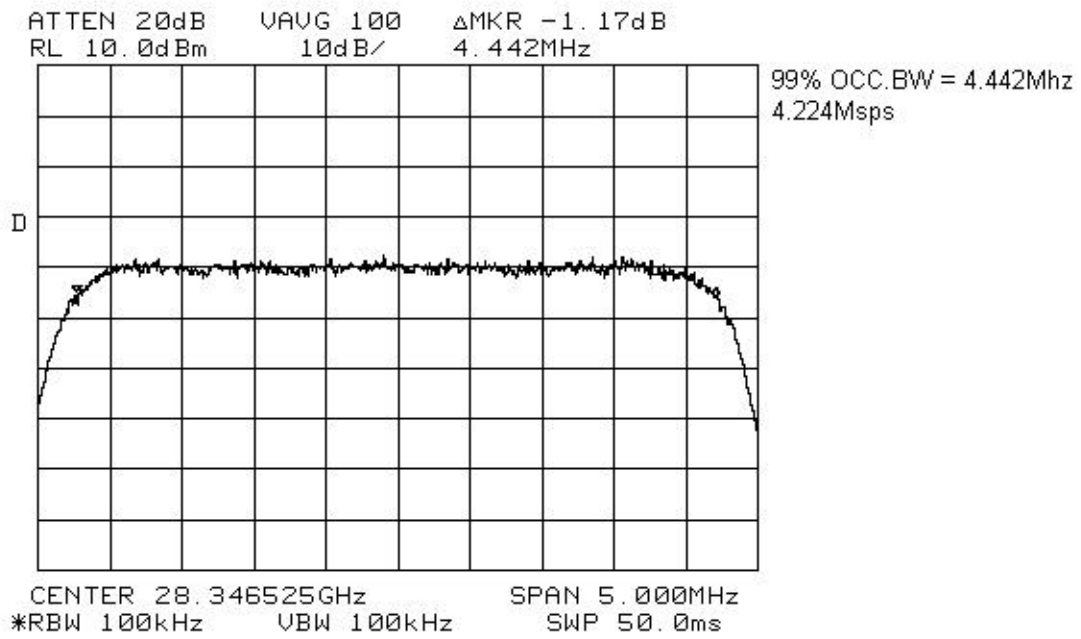
Test Results: Complies

Test Data: See attached graph(s).

Note: Band Edge Spectral Masks were plotted using 100 kHz RBW instead of 1 MHz. The limit line was adjusted 10dB lower.

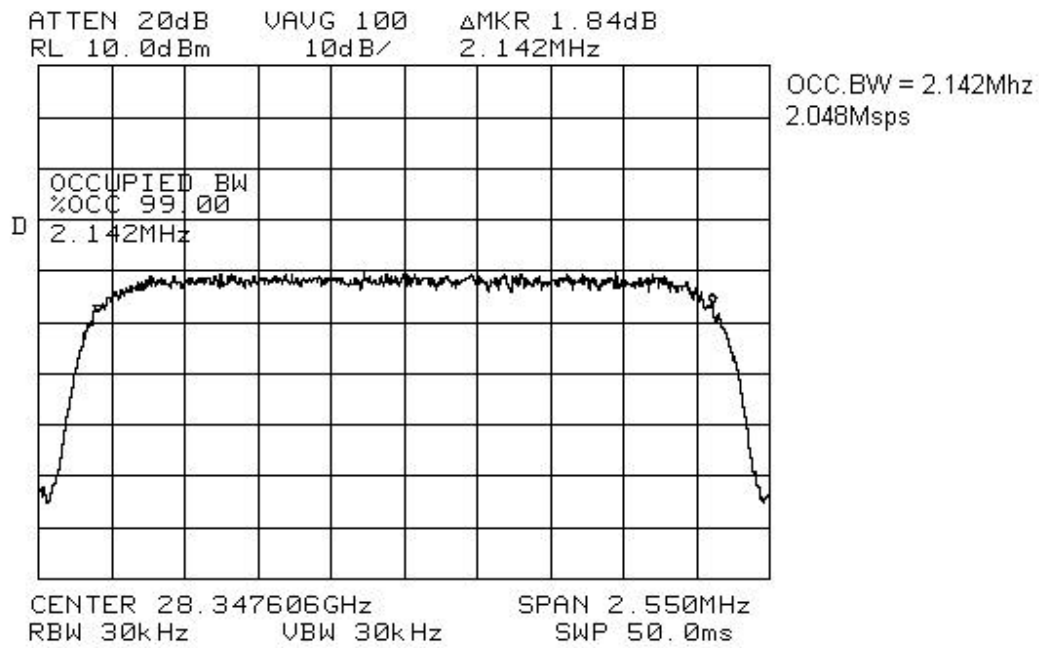
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



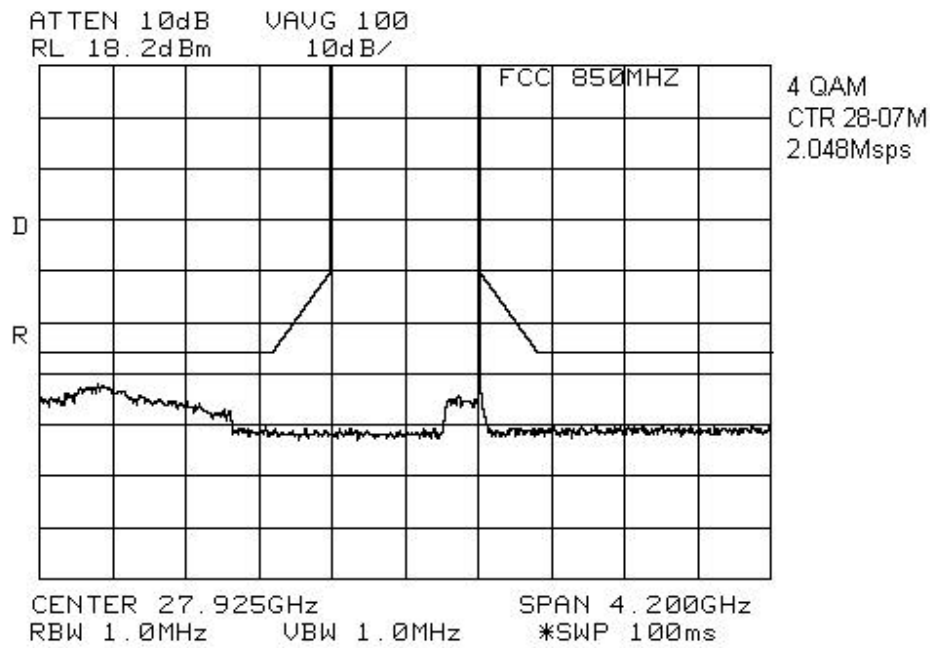
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



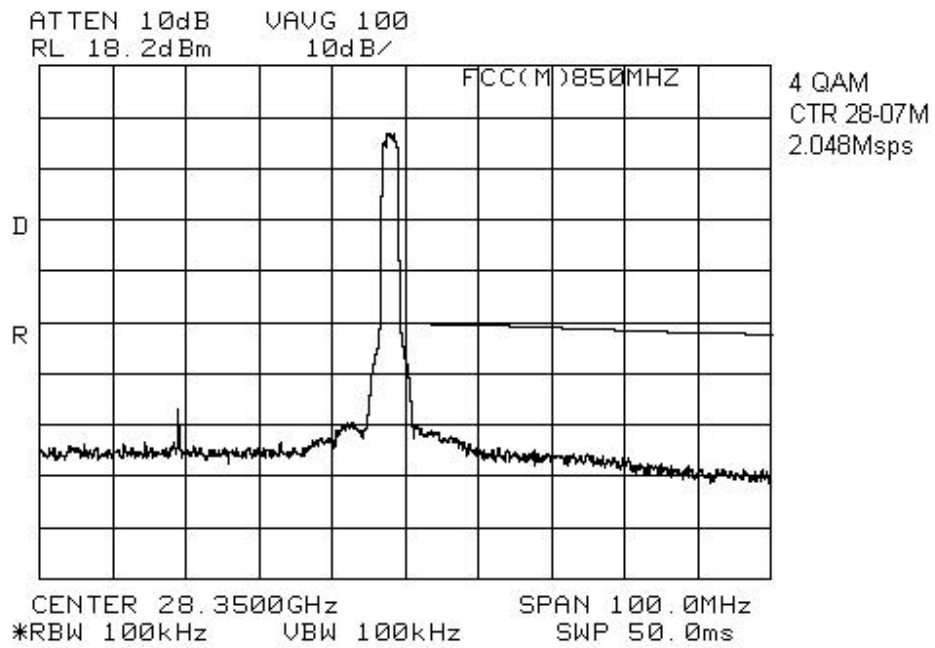
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



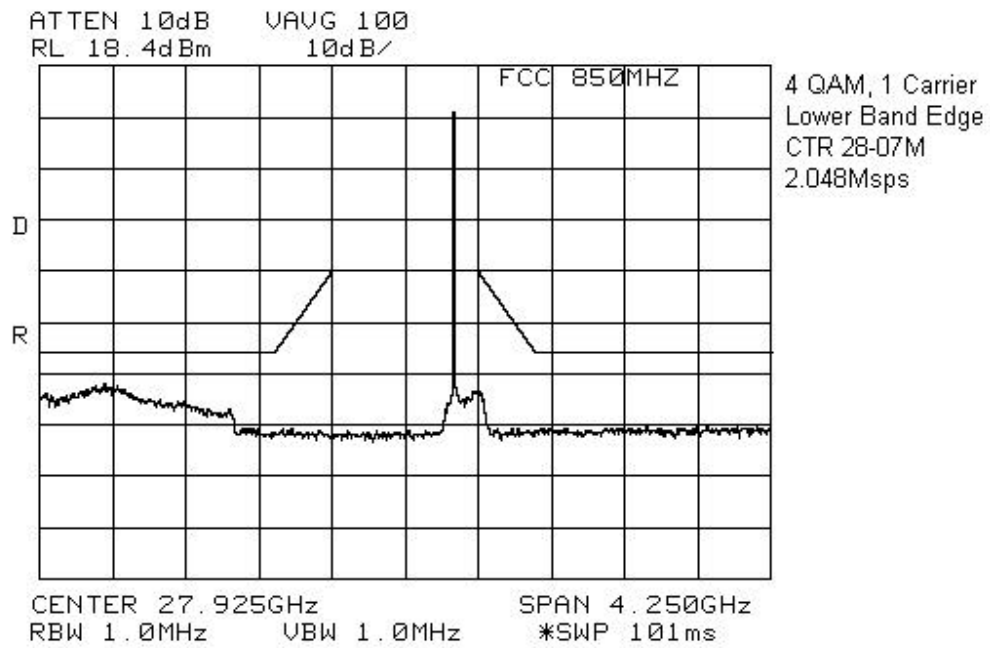
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



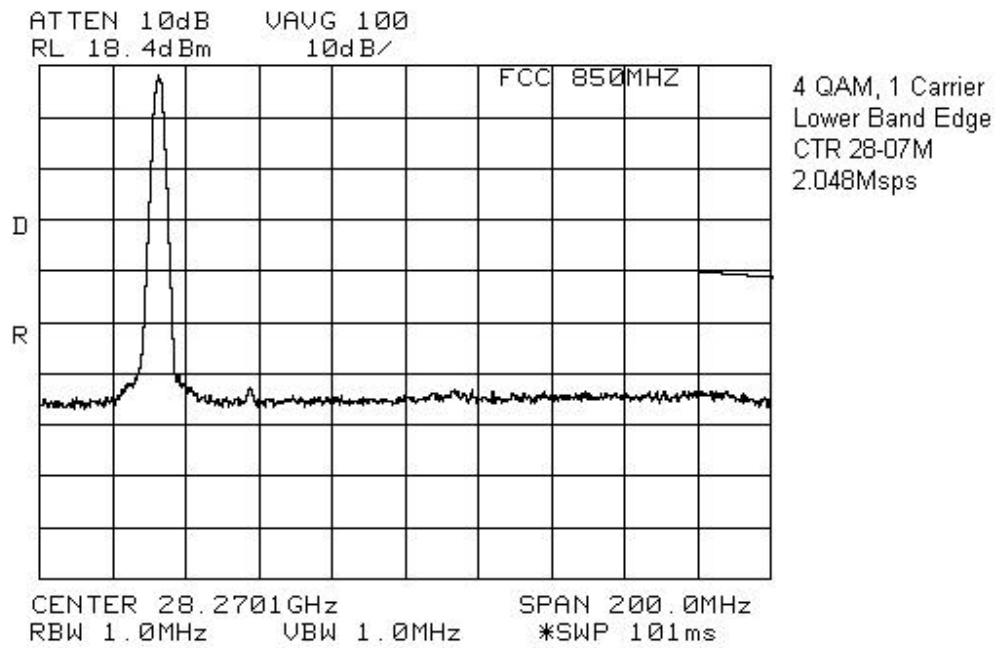
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



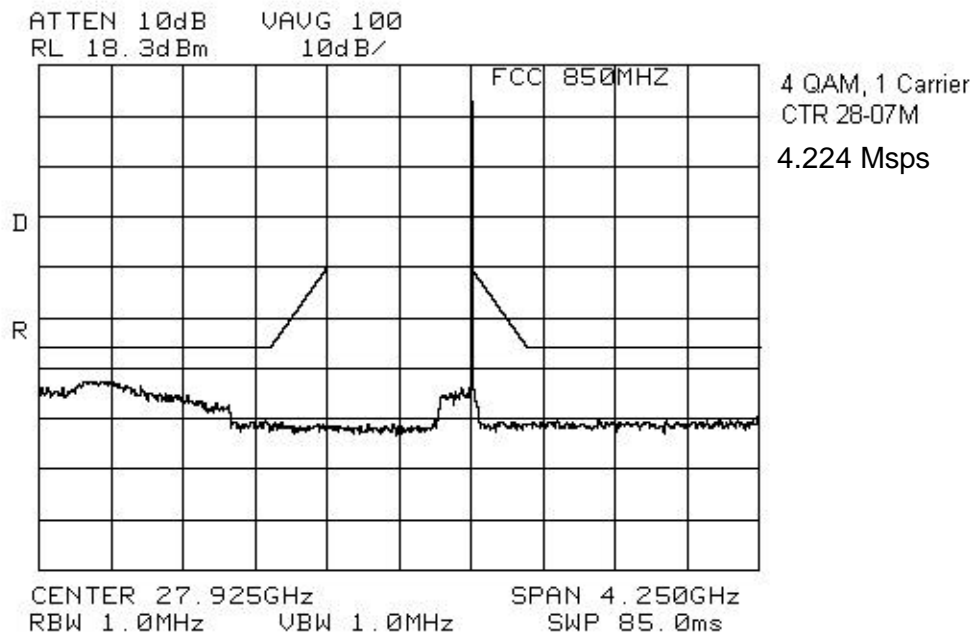
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



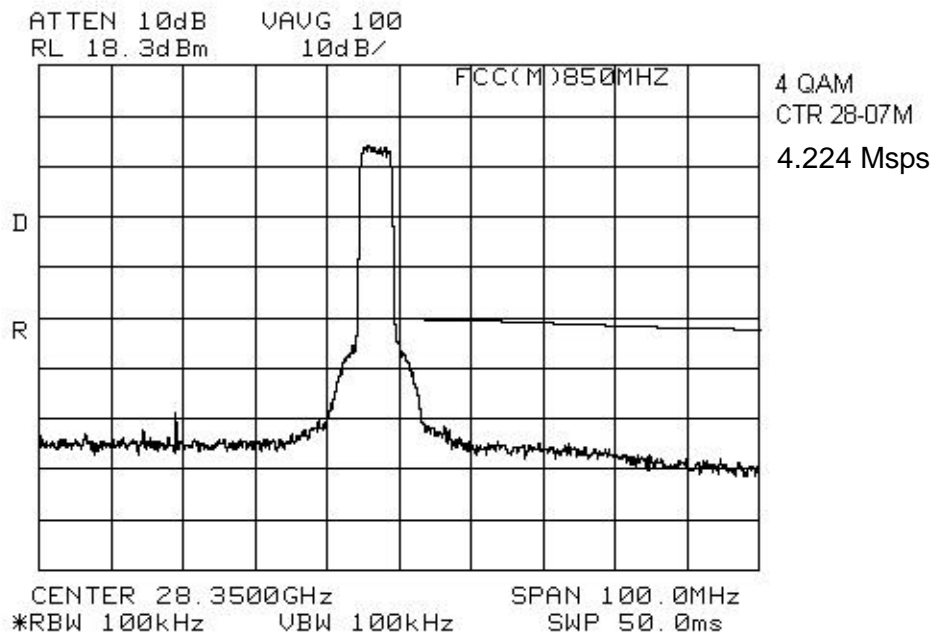
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



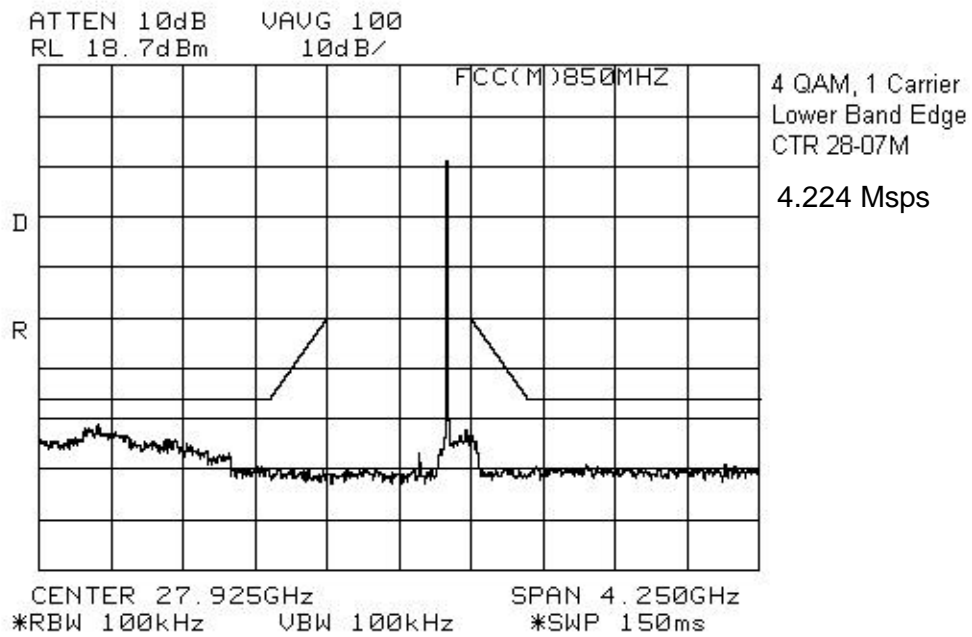
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



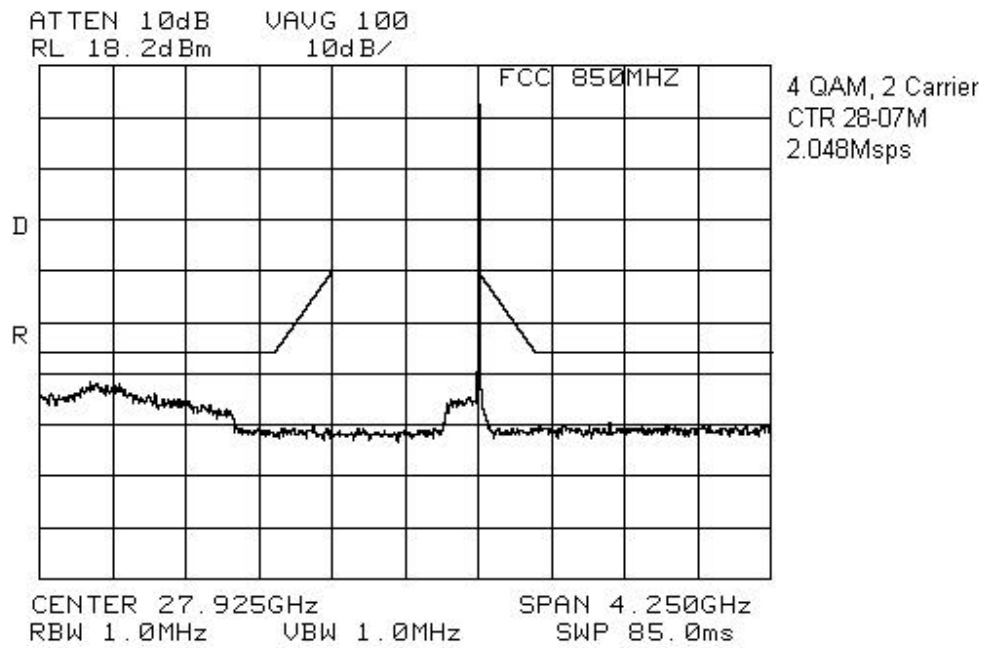
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



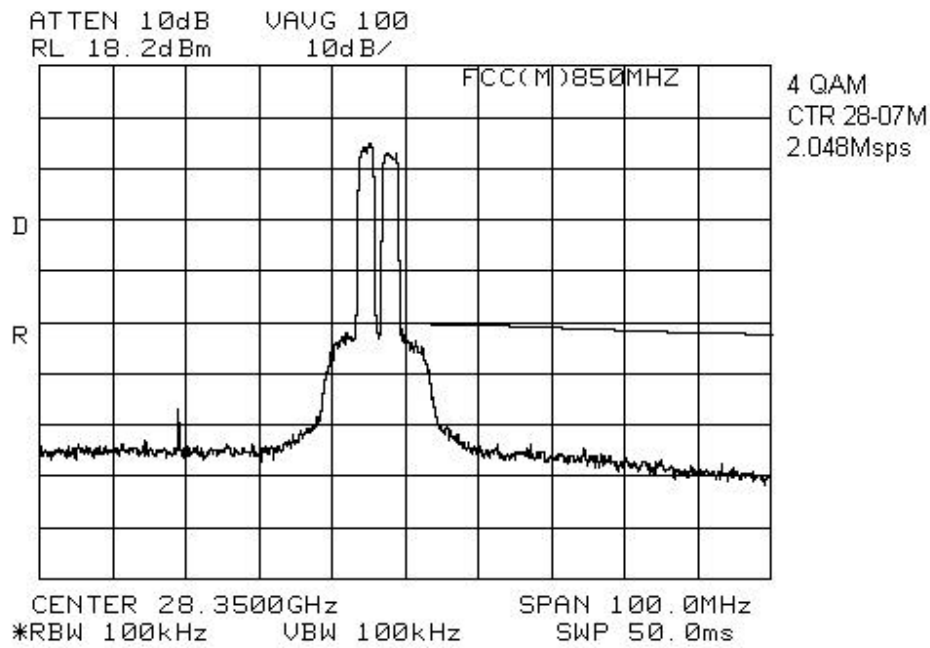
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



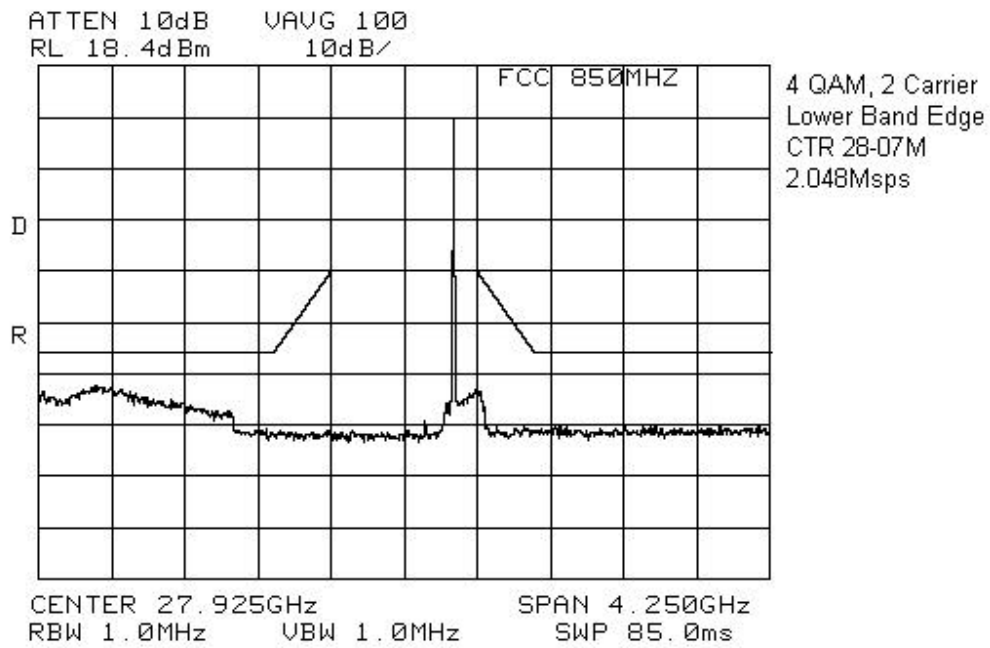
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



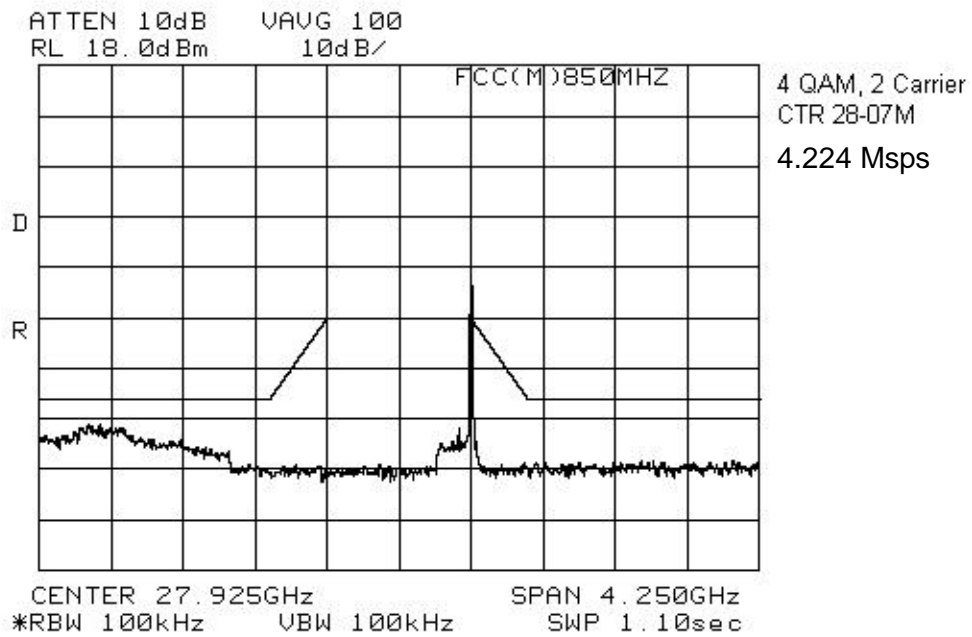
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



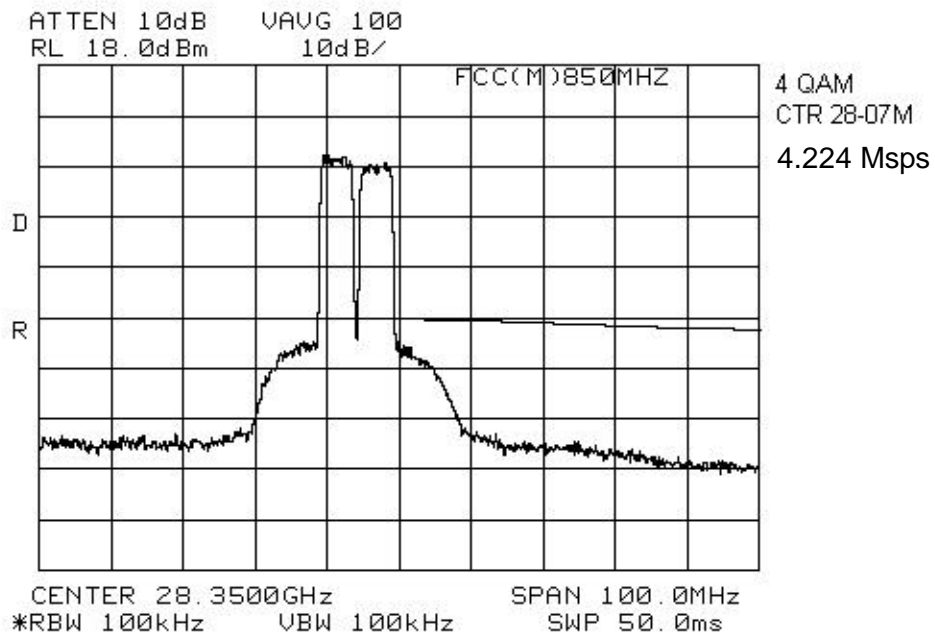
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



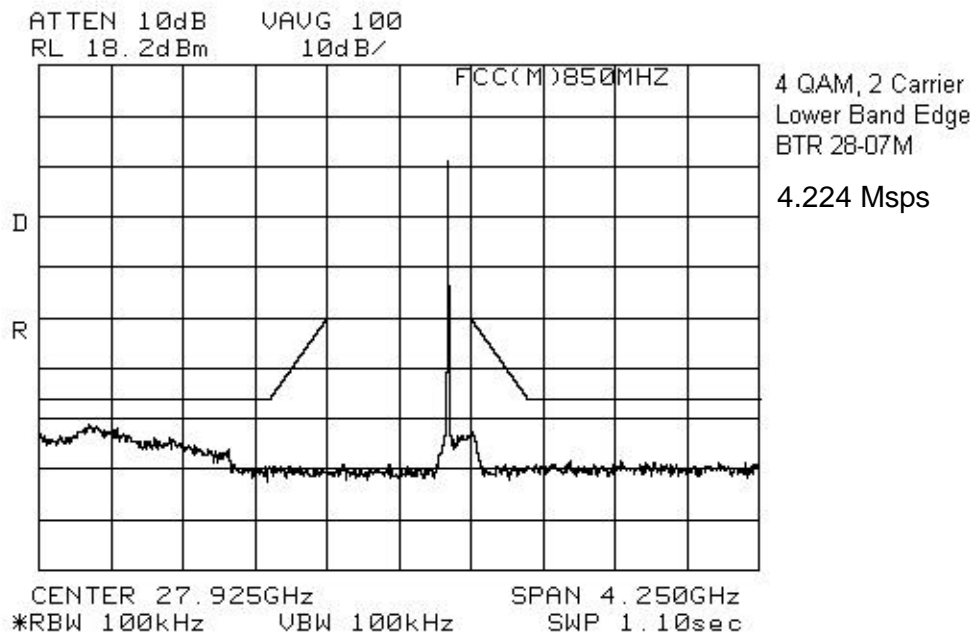
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



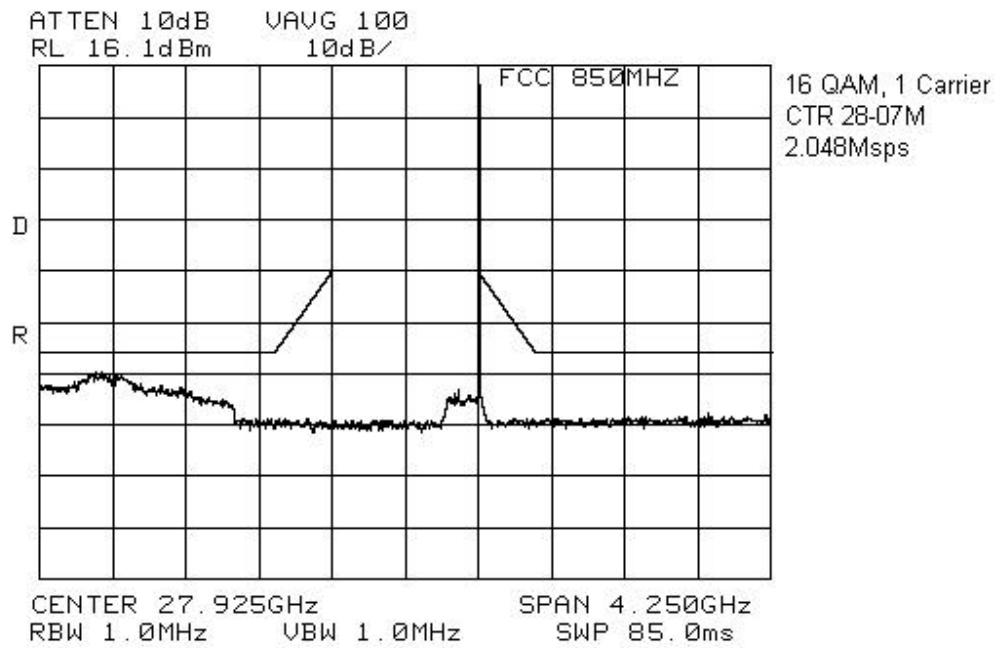
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



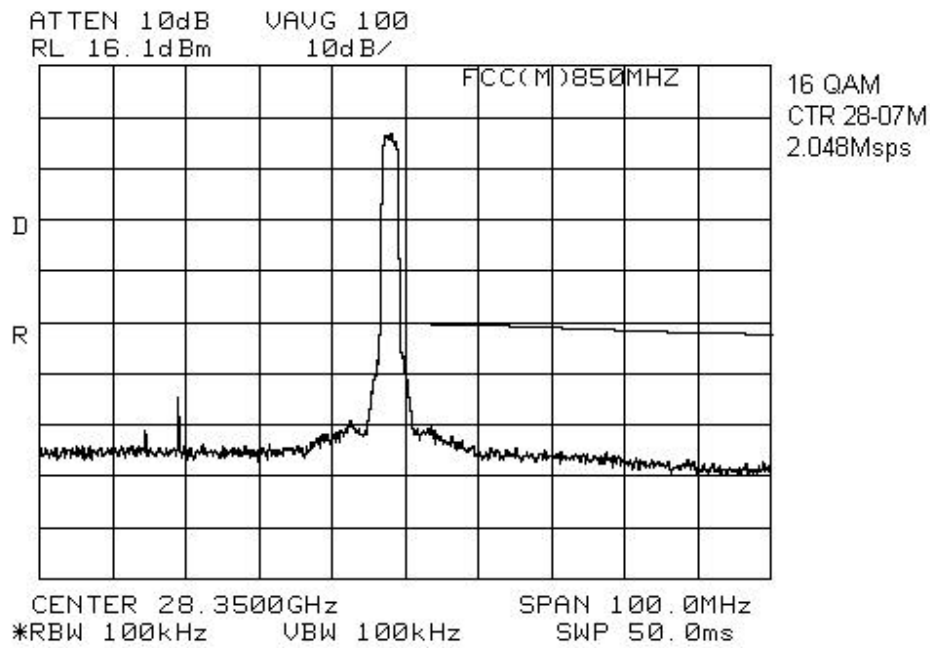
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



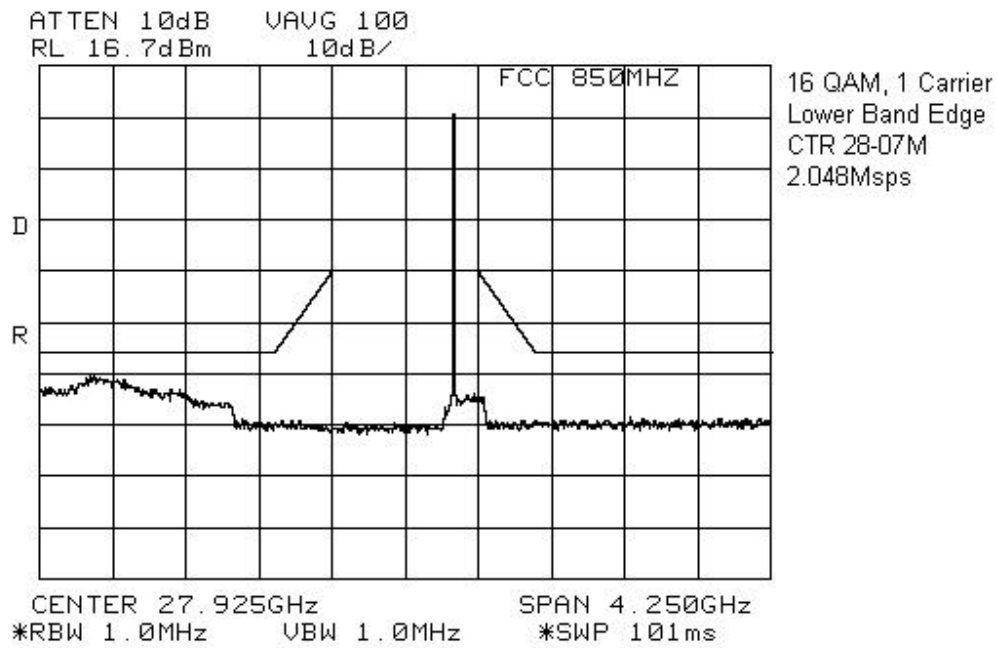
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



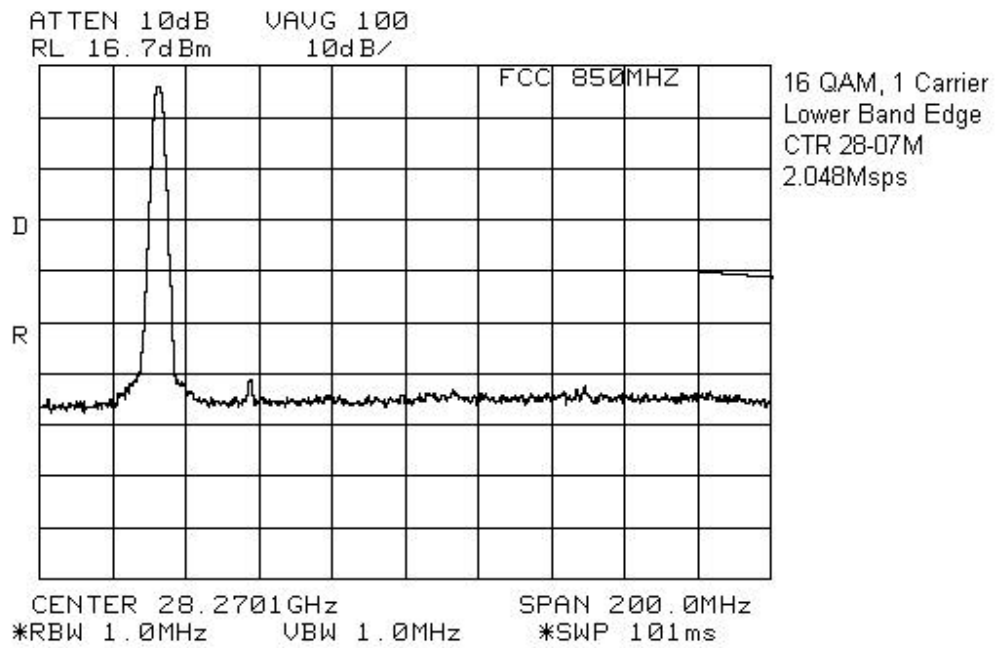
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



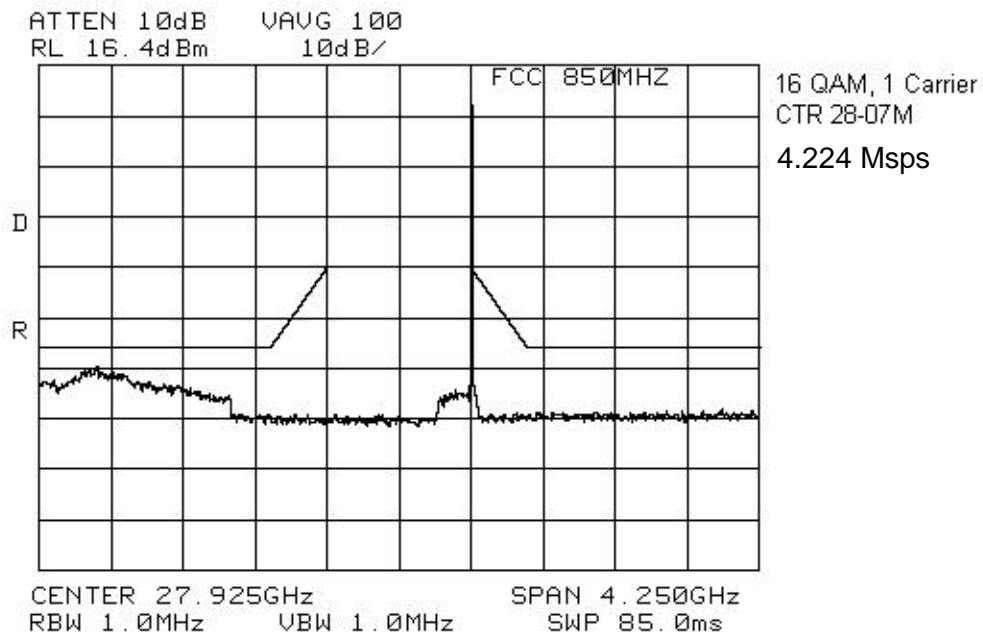
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



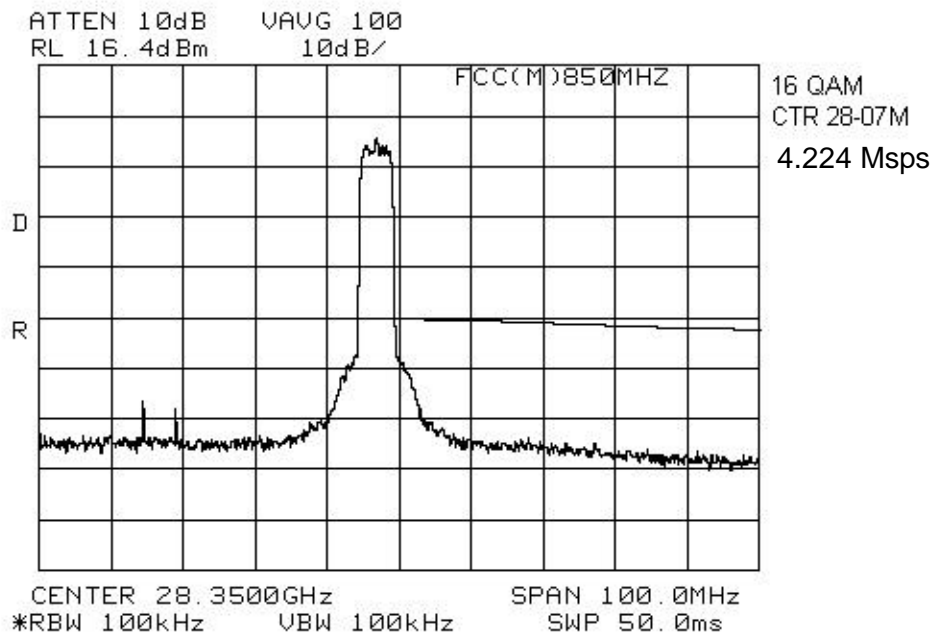
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



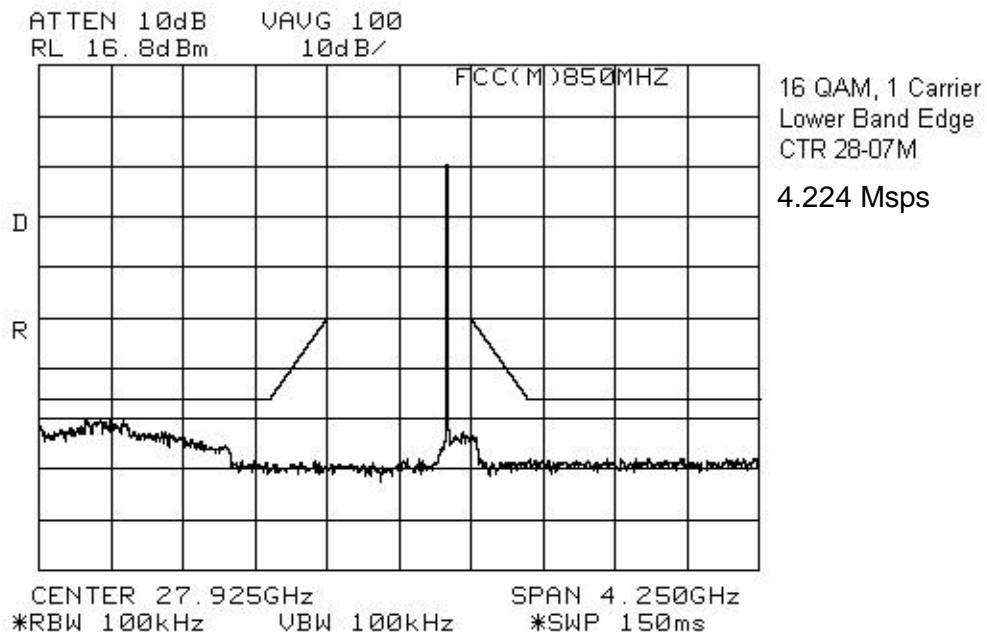
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



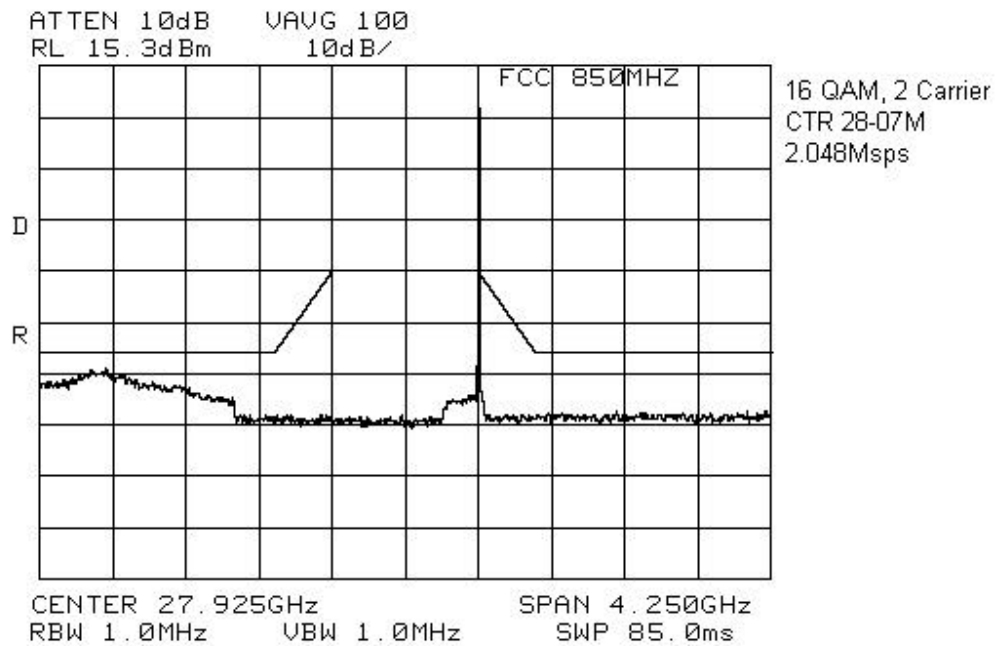
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



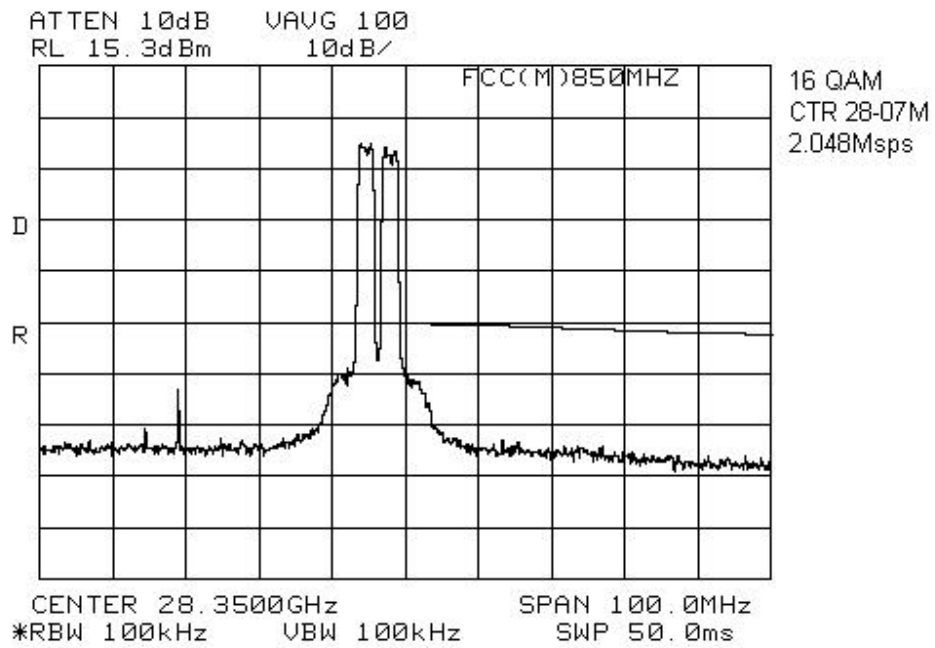
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



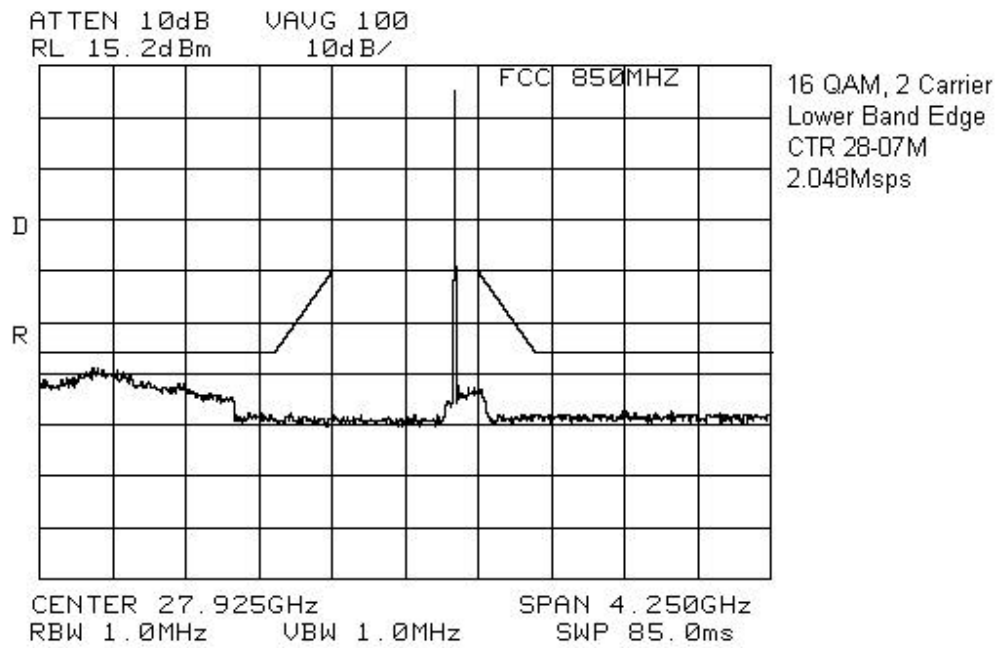
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



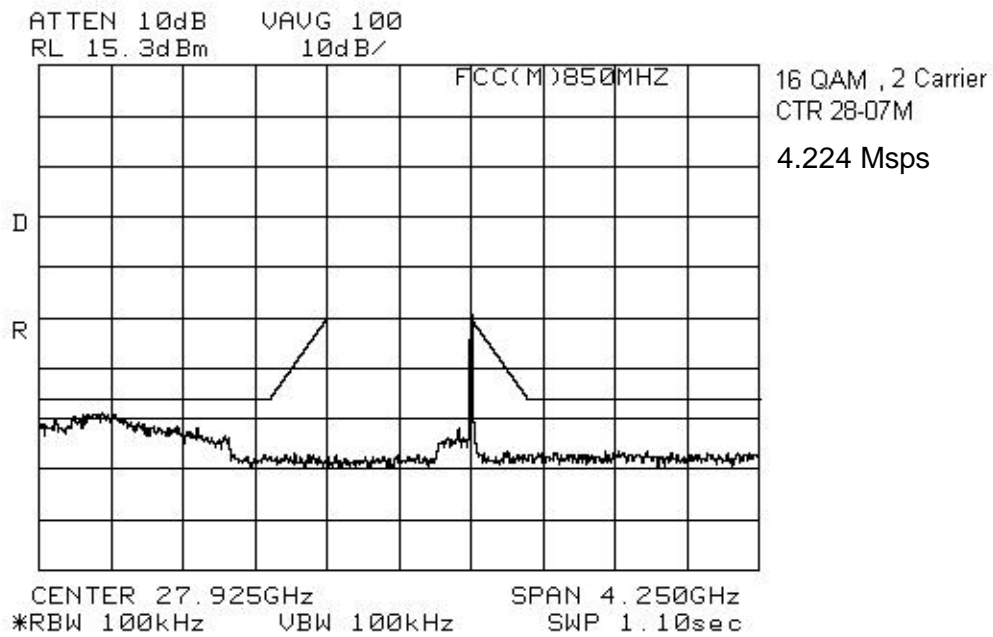
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



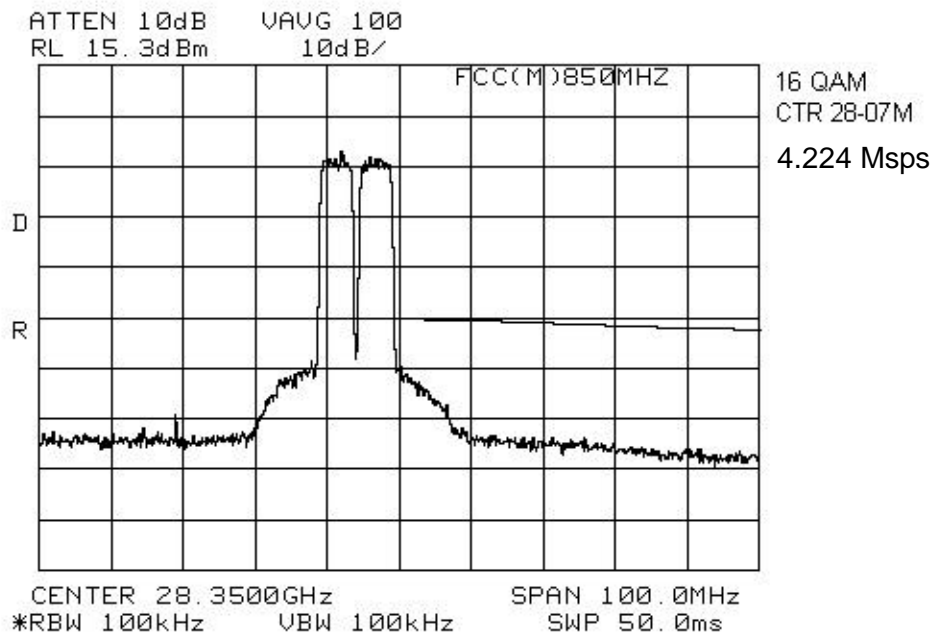
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



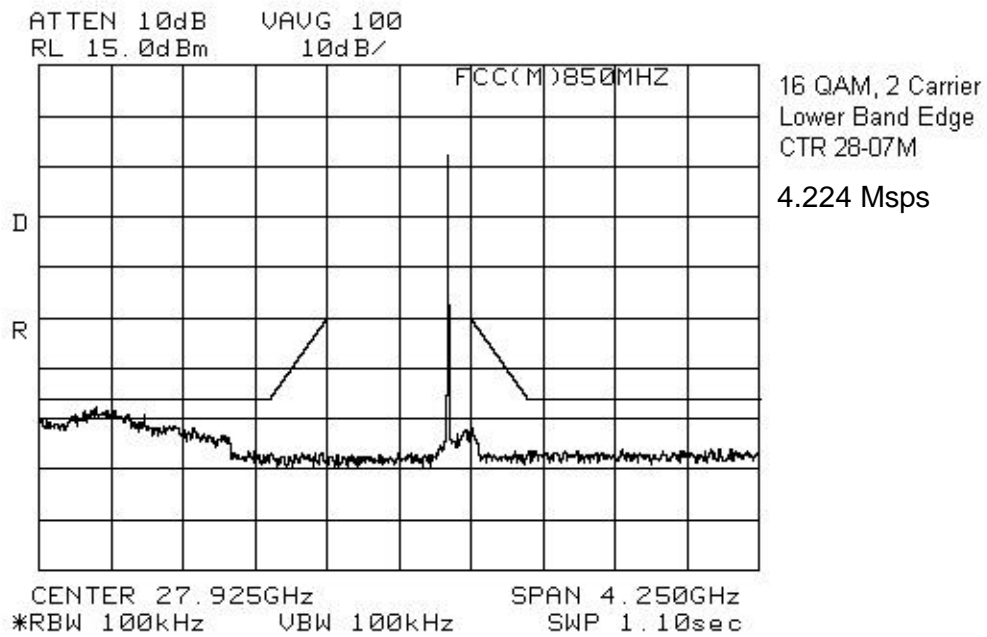
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



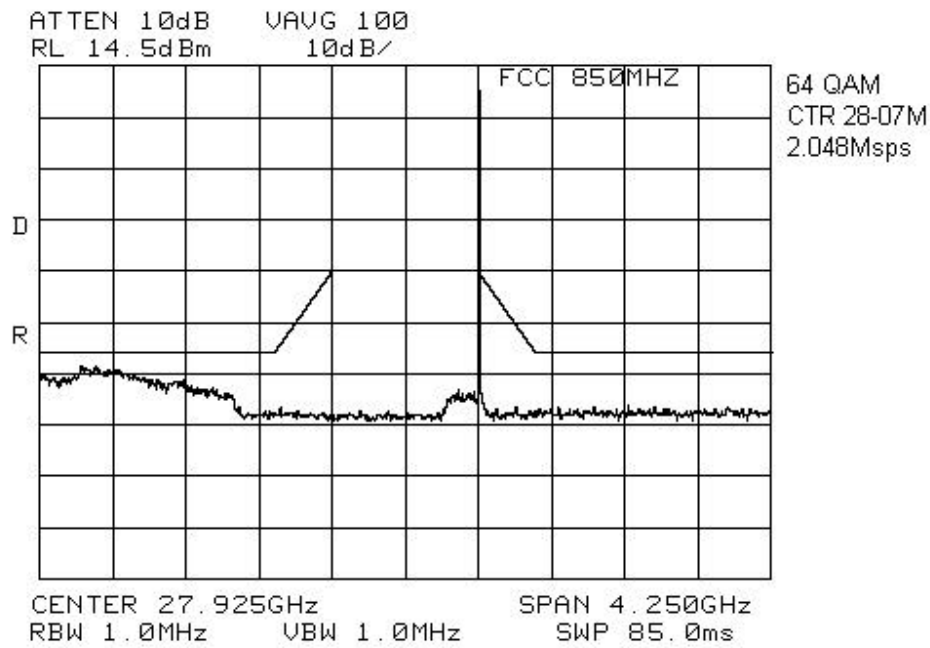
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



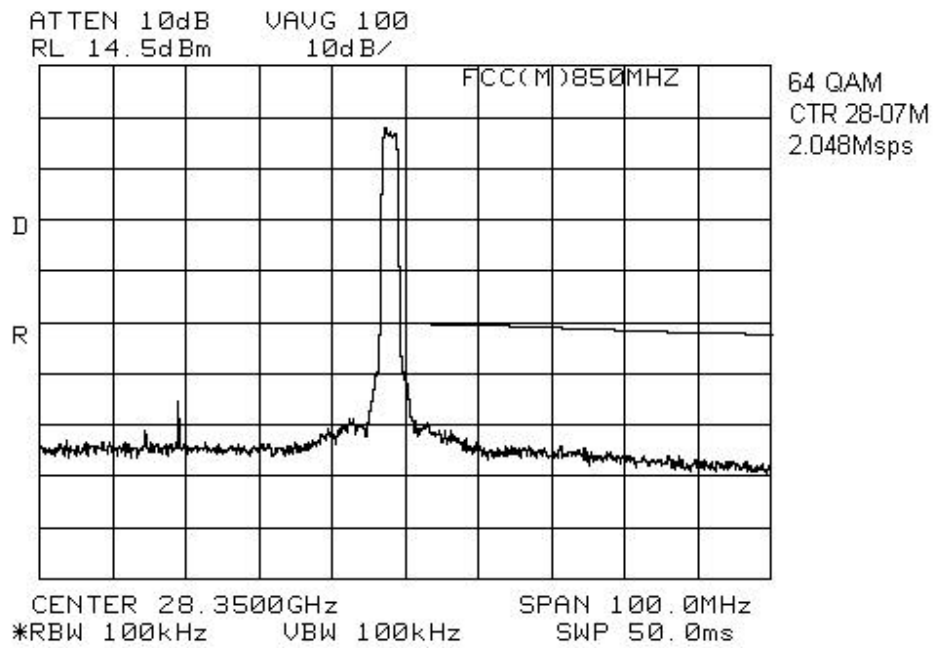
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



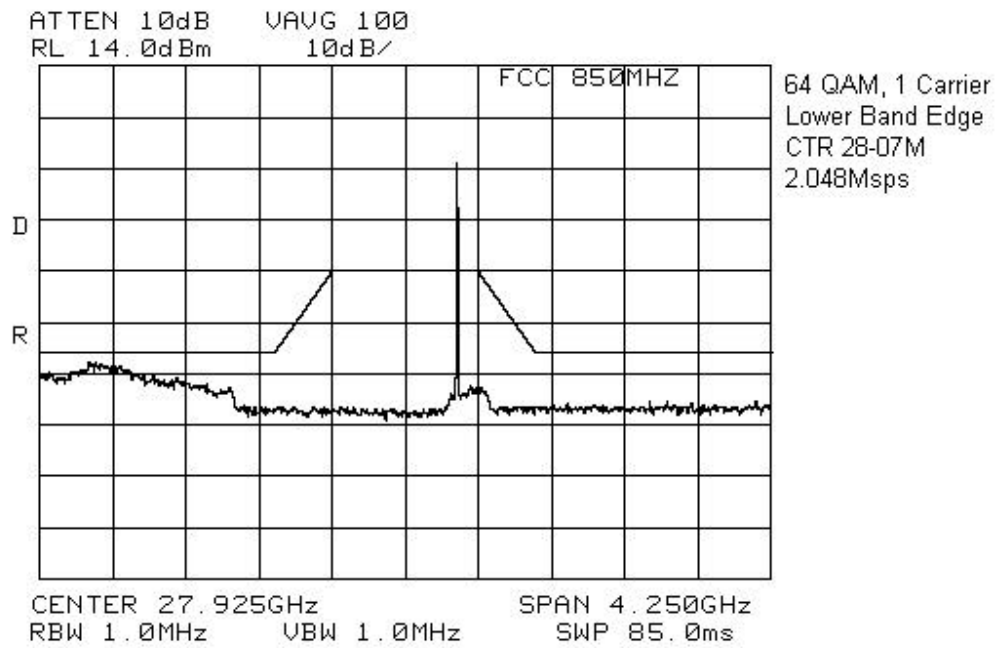
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



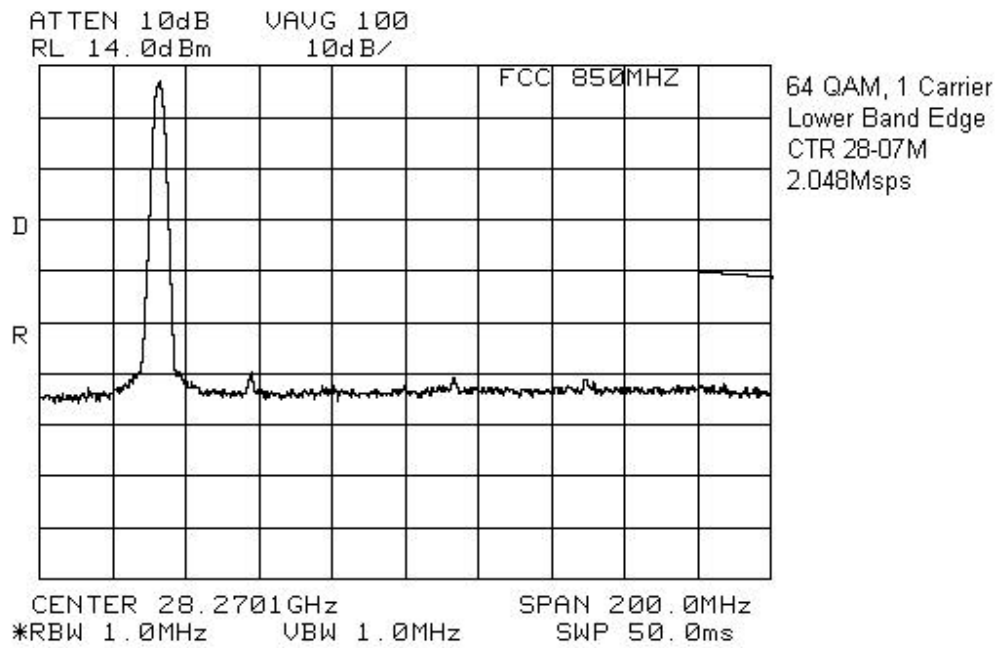
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



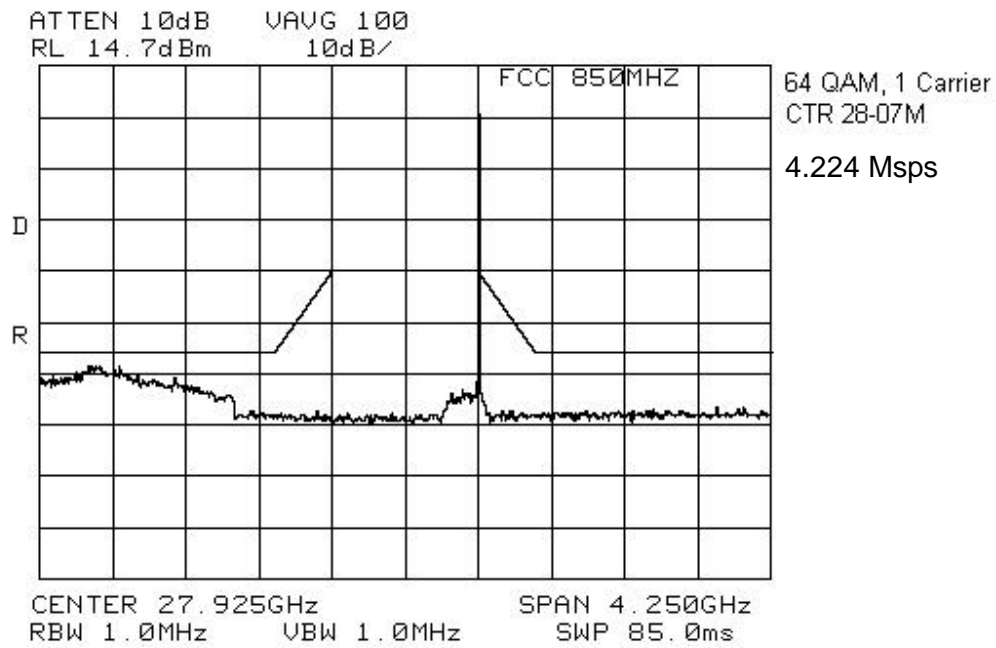
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



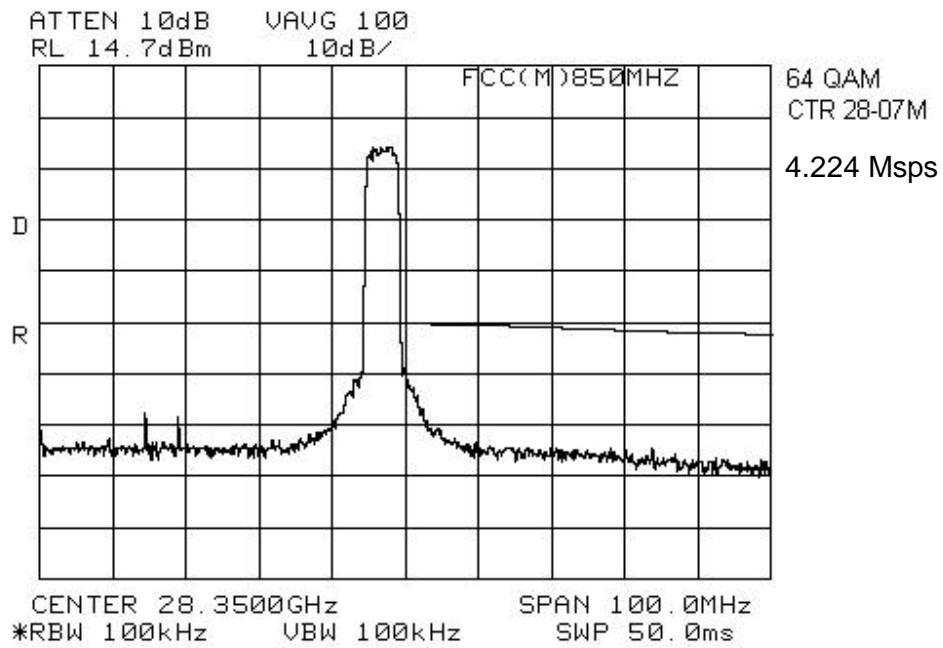
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



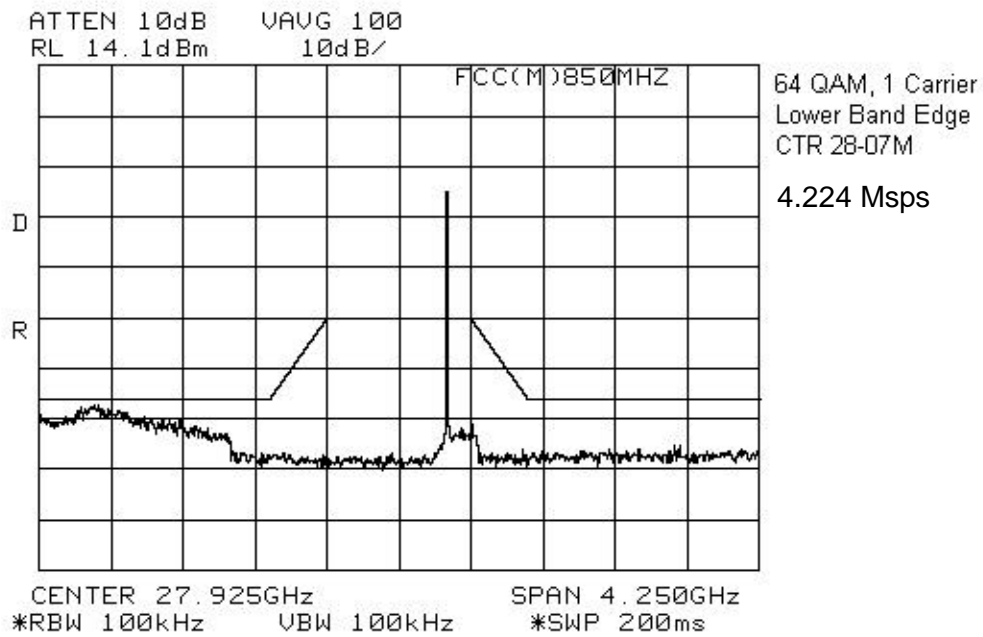
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



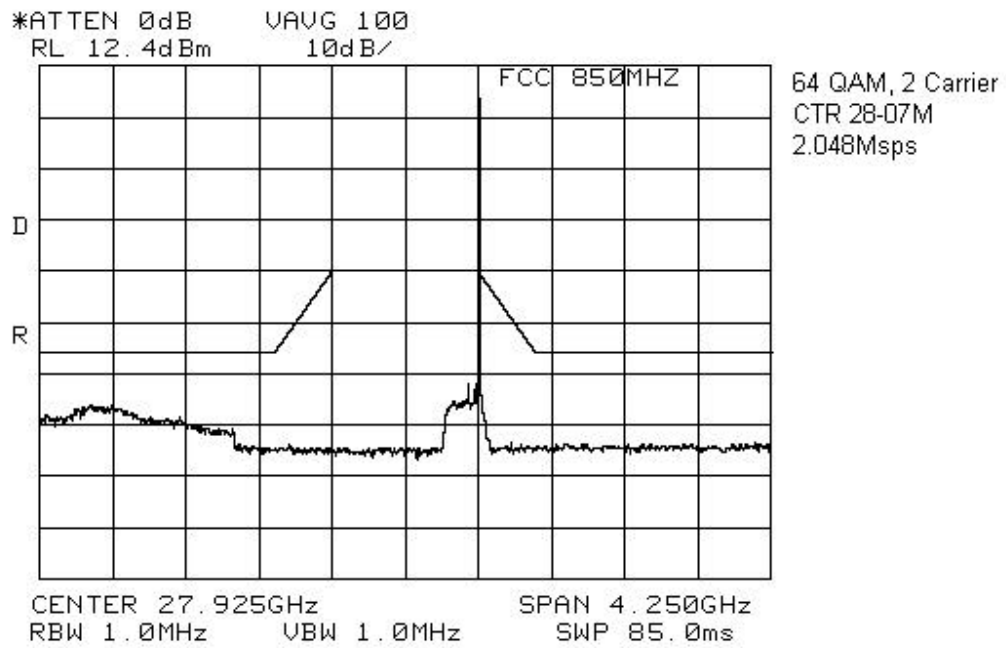
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



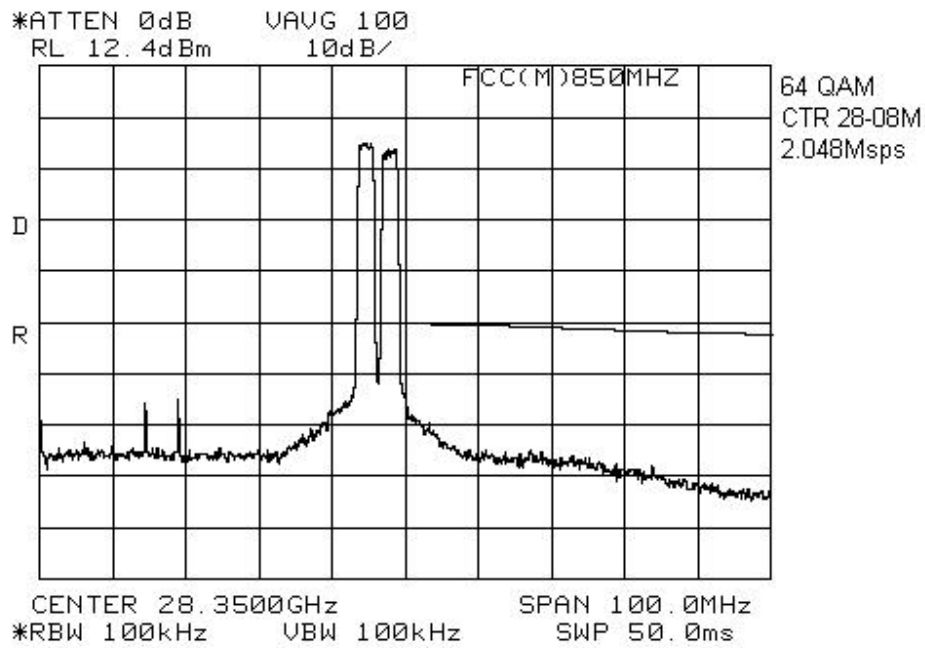
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



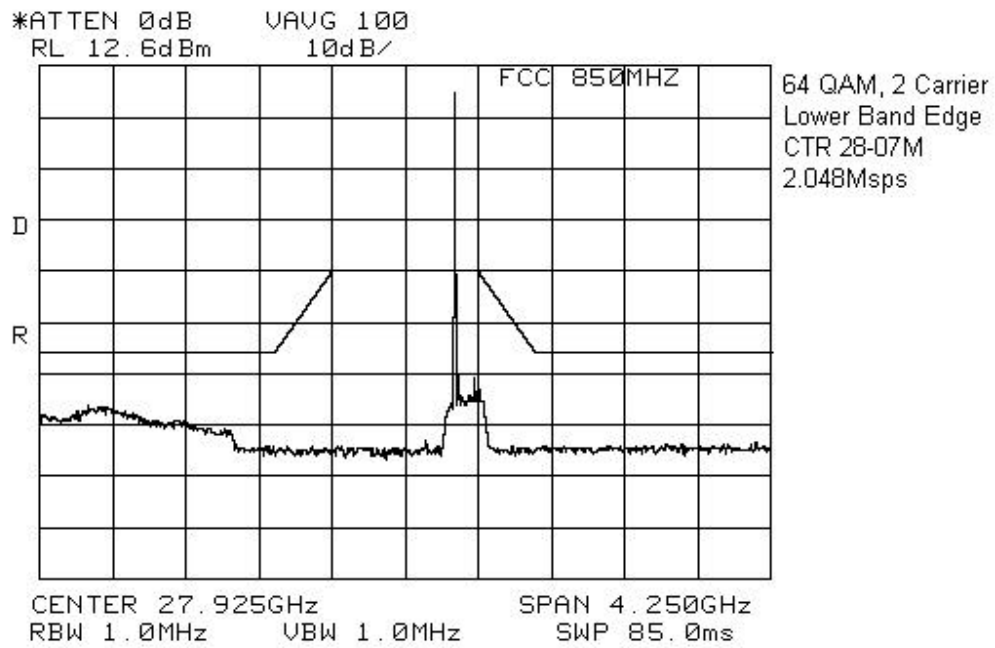
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



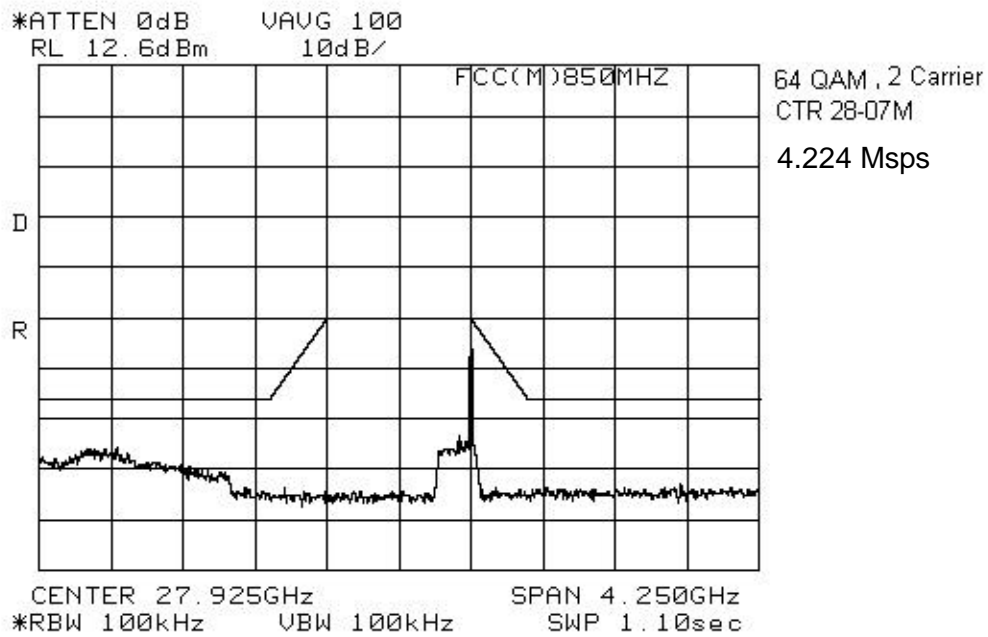
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



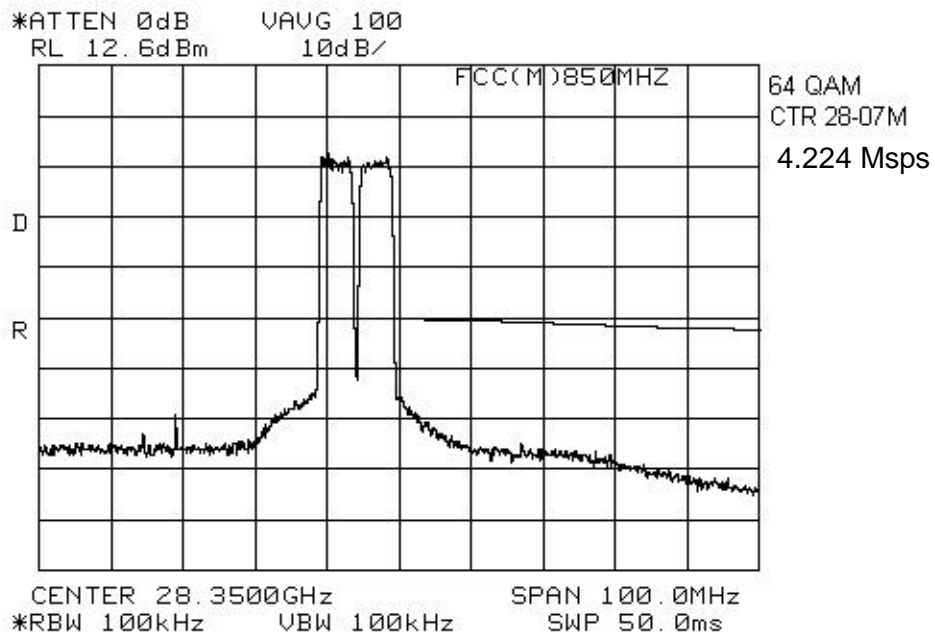
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



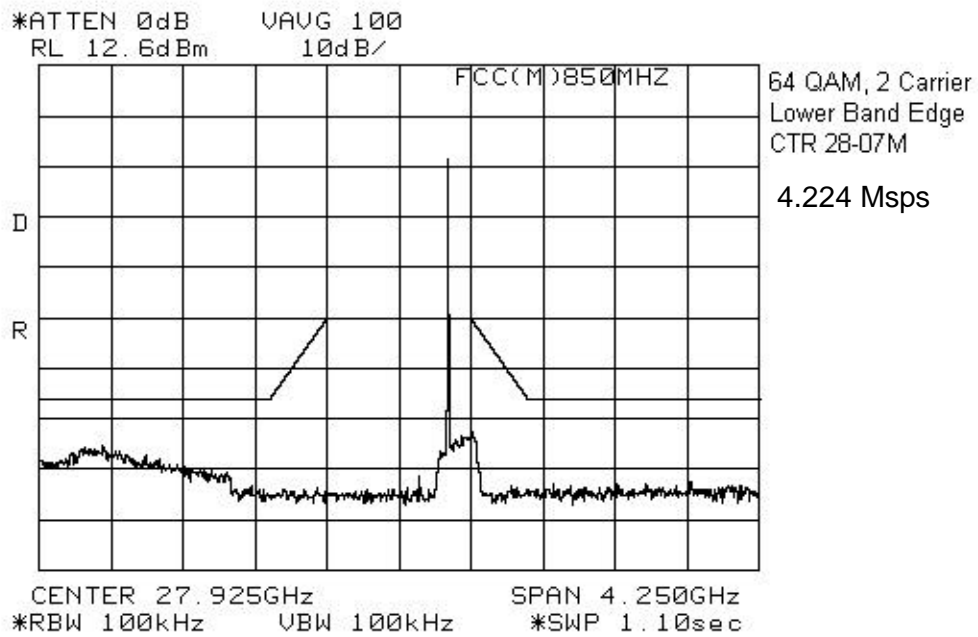
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



EQUIPMENT: CTR 28-07M

ISSUE: 2.0



EQUIPMENT: CTR 28-07M

ISSUE: 2.0

Section 5. Spurious Emissions at Antenna Terminals

Para. No.: 2.1051

| | |
|---|--------------------------------------|
| Test Performed By: Glen Westwell | Date of Test: August 29, 2000 |
|---|--------------------------------------|

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

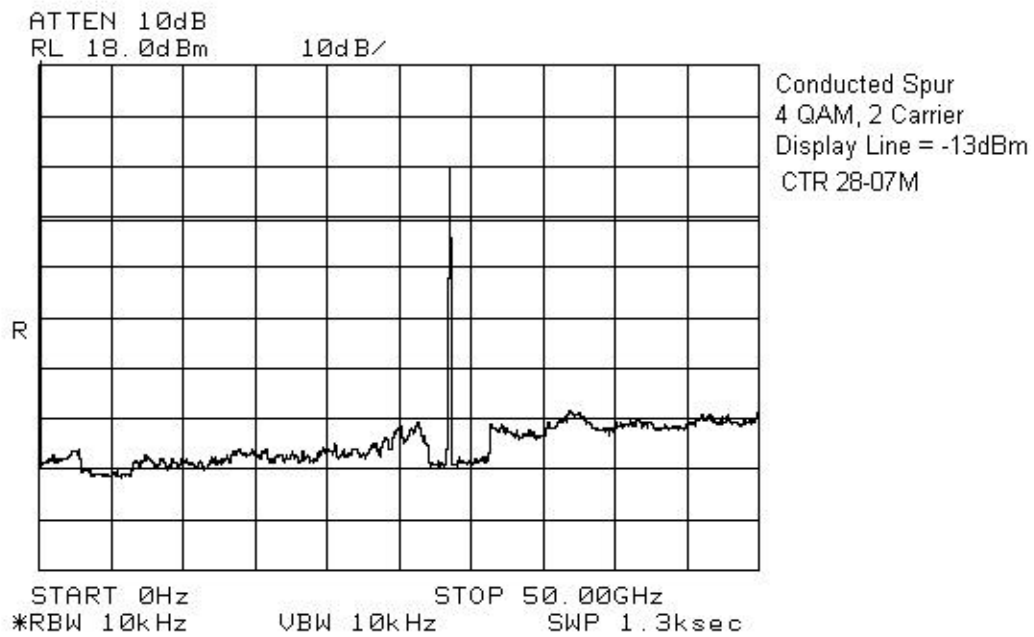
Test Results: Complies

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

Test Data: See attached graph(s).

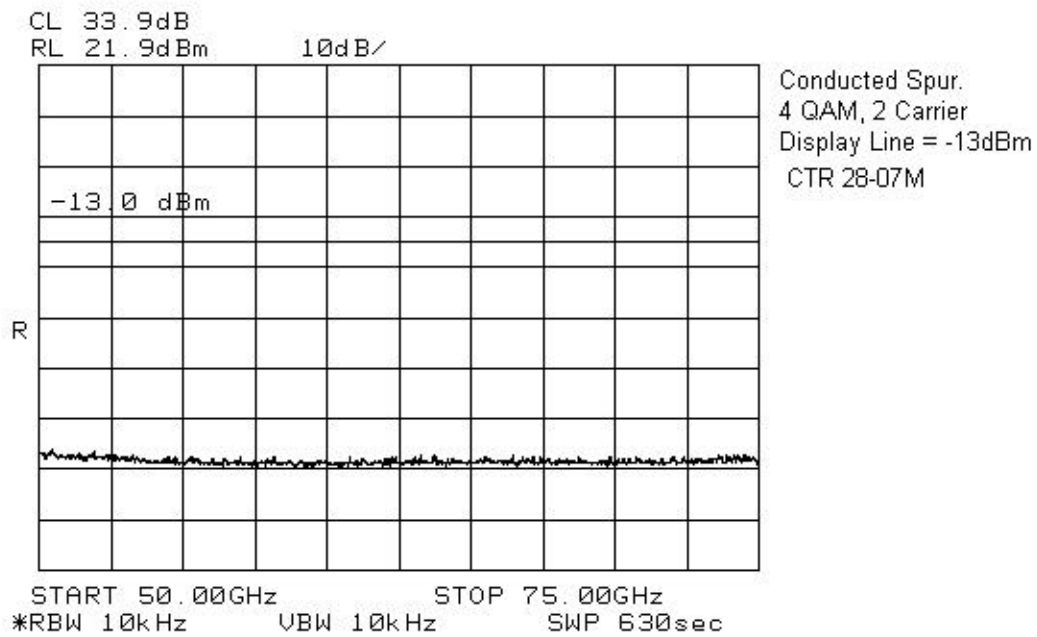
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



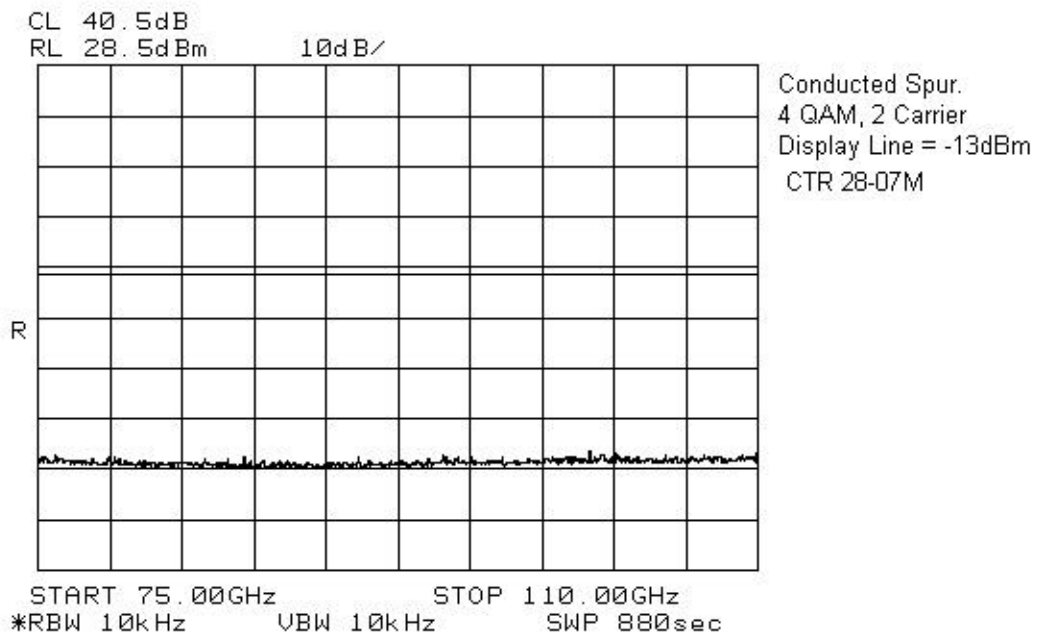
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



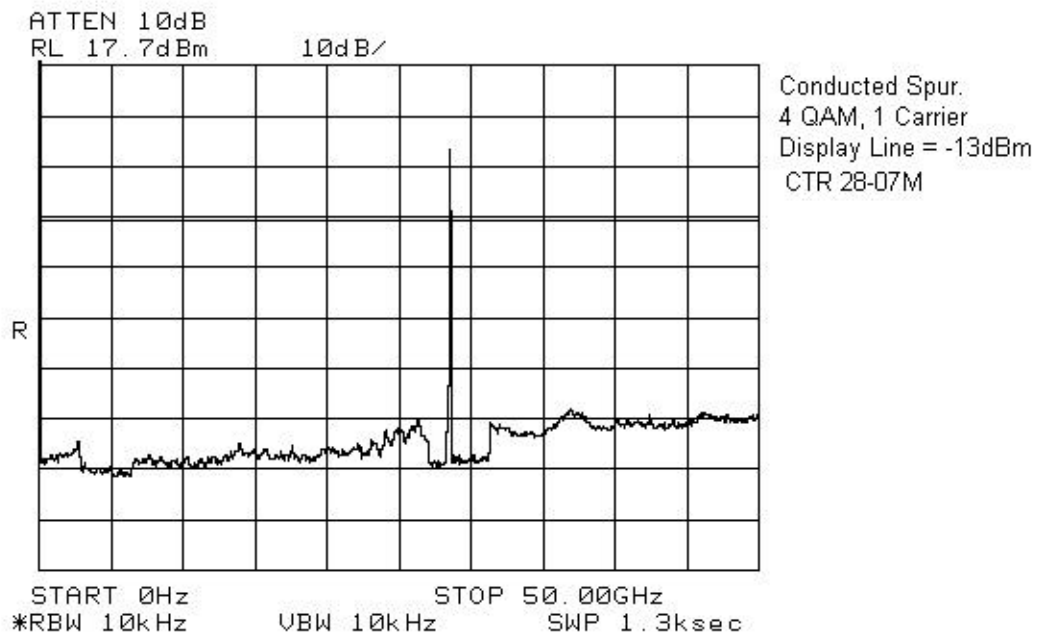
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



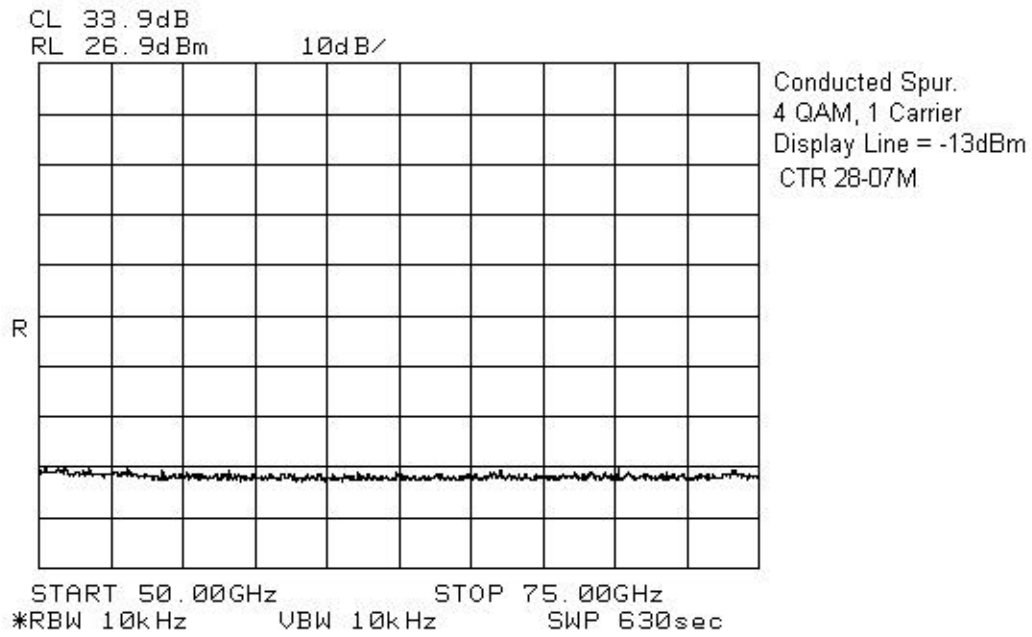
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



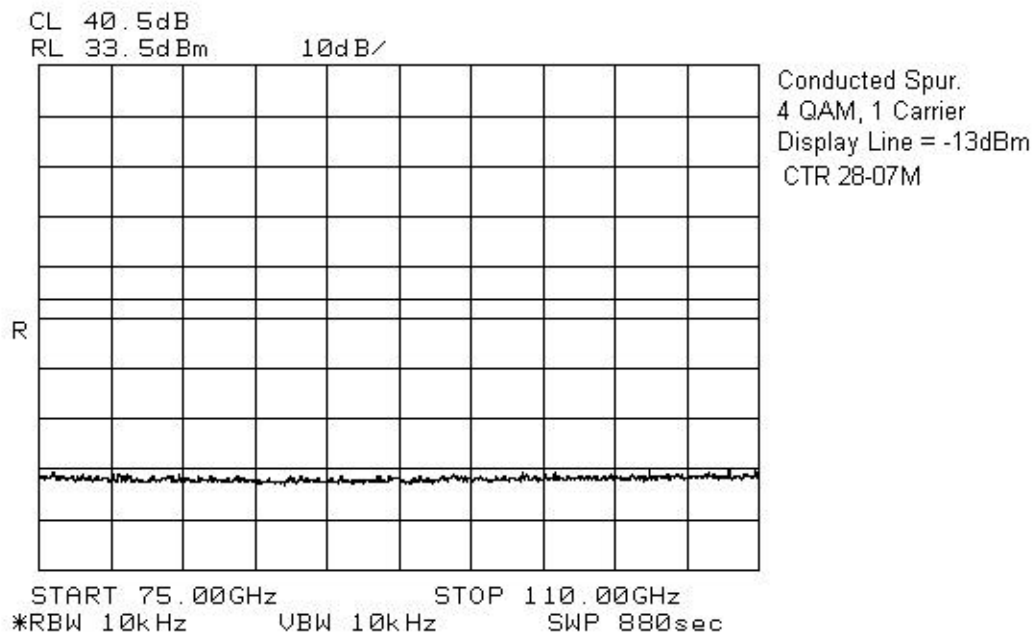
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



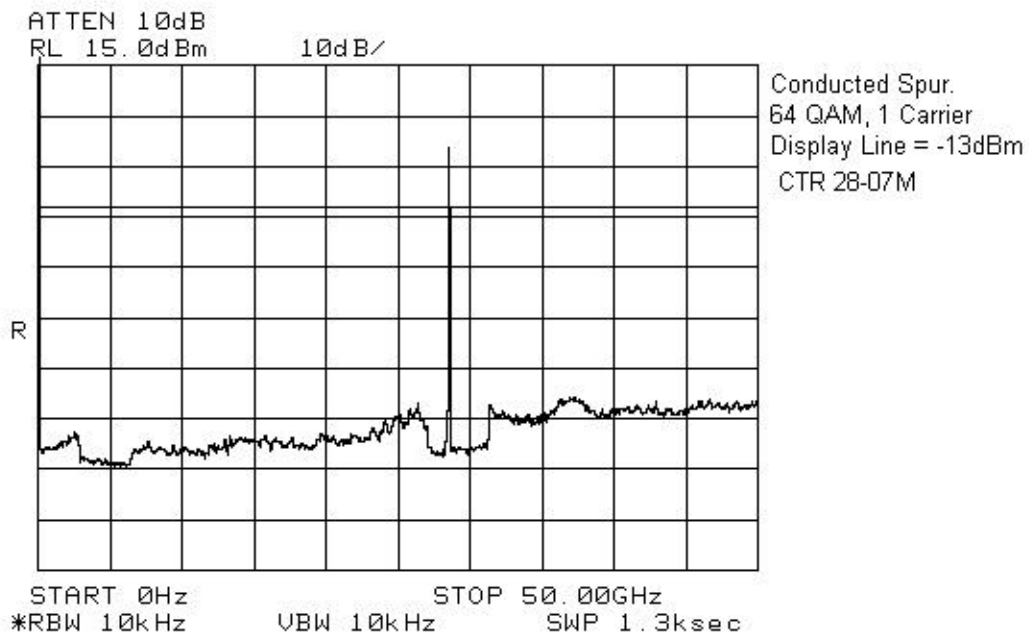
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



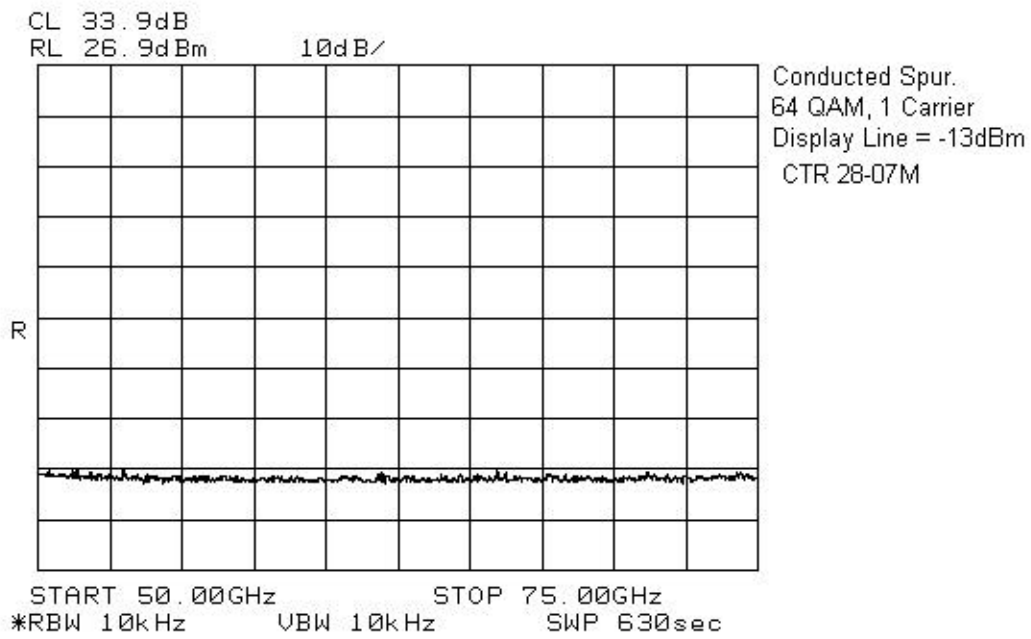
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



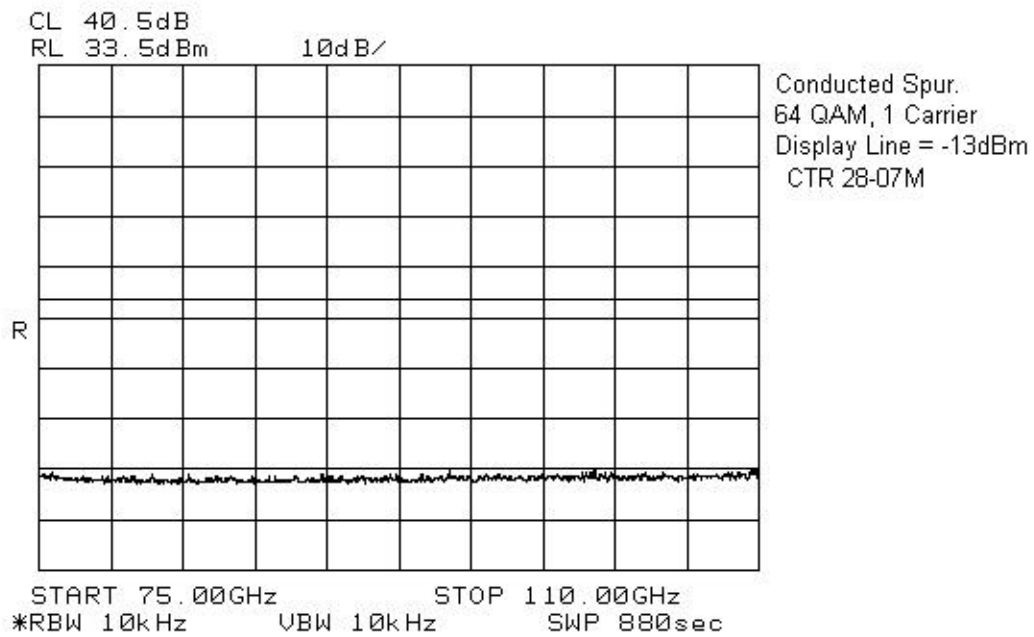
EQUIPMENT: CTR 28-07M

ISSUE: 2.0



EQUIPMENT: CTR 28-07M

ISSUE: 2.0



EQUIPMENT: CTR 28-07M

ISSUE: 2.0

Section 6. Field Strength of Spurious Emissions

Para. No.: 2.1053

| | |
|---|--------------------------------------|
| Test Performed By: Glen Westwell | Date of Test: August 30, 2000 |
|---|--------------------------------------|

Minimum Standard: 101.111 (a)(2)(iii), -13 dBm
84.4 dB μ V/m @ 3m < 1 GHz
82.2 dB μ V/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 110 GHz.
No emissions were detected.

*EQUIPMENT: CTR 28-07M**ISSUE: 2.0*

Section 7. Frequency Stability**Para. No.: 2.1055**

| | |
|---|--------------------------------------|
| Test Performed By: Glen Westwell | Date of Test: August 30, 2000 |
|---|--------------------------------------|

Minimum Standard: 101.107, 0.001% (283 kHz)**Test Results:** Complies

The maximum frequency drift is 30 kHz.
This is 0.00011%

Test Data: Standard Test Voltage: STV -48 VDC
Standard Test Frequency: 28 275.000 MHz

| Test Condition | Frequency (MHz) | Frequency Drift (kHz) |
|----------------|-----------------|-----------------------|
| STV | 28 275.020 | 20 |
| 115% STV | 28 275.019 | 19 |
| 85% STV | 28 275.020 | 20 |
| -30 °C | 28 275.009 | 9 |
| -20 °C | 28 275.017 | 17 |
| -10 °C | 28 275.025 | 25 |
| 0 °C | 28 275.029 | 29 |
| +10 °C | 28 275.030 | 30 |
| +30 °C | 28 275.020 | 20 |
| +40 °C | 28 275.010 | 10 |
| +50 °C | 28 275.001 | 1 |

*EQUIPMENT: CTR 28-07M**ISSUE: 2.0*

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 |
| 3 Year | RF Generator | Rohde & Schwarz | SIMIQ03E | DE24154 | Oct. 4/99 | Oct. 4/01 |
| | Power Supply | Hewlett Packard | 6274B | 2552A-08243 | NCR | NCR |
| 1 Year | Power Meter | Hewlett Packard | E4418B | FA001413 | Nov. 8/99 | Dec. 7/00 |
| 1 Year | Power Sensor | Hewlett Packard | 8487A | FA001419 | Nov. 18/99 | Dec. 7/00 |
| | 20 dB Attenuator | Dorado | | 20-507 | COU | COU |
| | Waveguide to SMA | Dorado | | | COU | COU |
| | Power Supply | Tektronix | PS280 | FA001428 | NCR | NCR |

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

EQUIPMENT: CTR 28-07M

ISSUE: 2.0

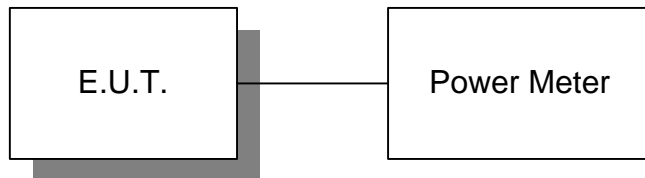
Annex A

Test Diagrams

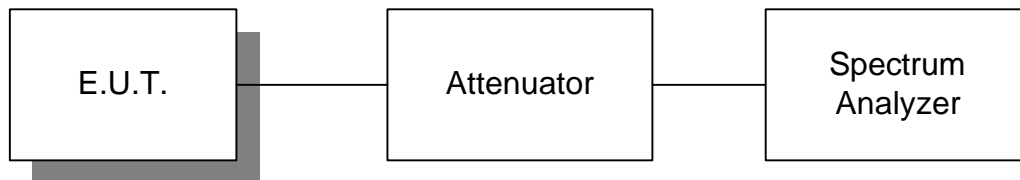
EQUIPMENT: CTR 28-07M

ISSUE: 2.0

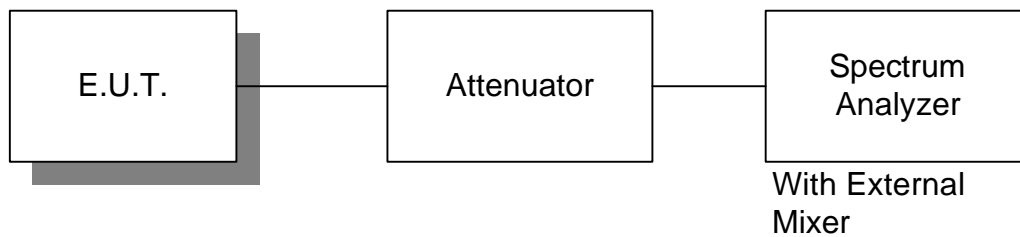
Para. No. 2.1046 - R.F. Power Output



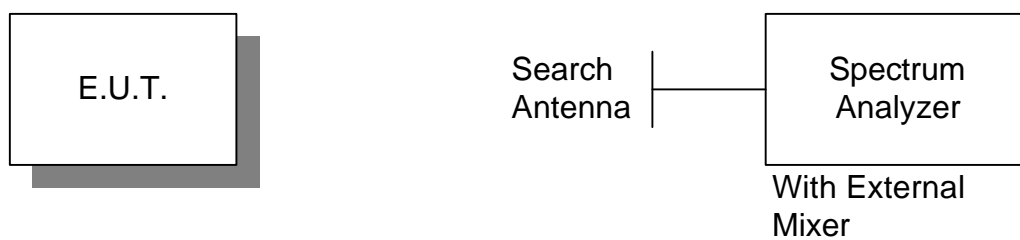
Para. No. 2.1049 - Occupied Bandwidth



Para. No. 2.1051 - Spurious Emissions at Antenna Terminals



Para. No. 2.1053 - Field Strength of Spurious Radiation



EQUIPMENT: CTR 28-07M

ISSUE: 2.0

Para. No. 2.1055 - Frequency Stability

