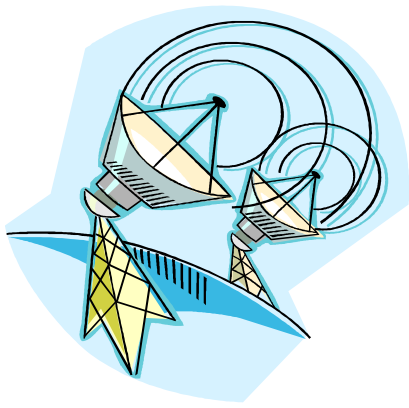




***TECHNICAL CONSTRUCTION FILE FOR***

***STRATA CLAMSHELL /DIGITAL MICROWAVE VIDEO TRANSPORT SYSTEM 2.  
to 2.5GHz***

***APPLICATION CONSISTS OF DIGITAL TRANSMISSIONS FOR ENG MOBILE /  
TELEVISION PICK-UP BROADCASTS***

**The objective of this TCF is to demonstrate the conformance of Microwave Radio Communications' STRATA Video Transport System.**

**To the essential requirements of, FCC CFR 47 part 74 and 15 for a 12MHz digital channel bandwidth pursuant to the BAS relocation program.**

**This document is intended as a permissive change to the STRATA systems present type acceptance FCC ID FC3 STATXU2D**

**Note that this document contains test data and operational limits that are not specifically required or detailed by the governing compliance limits, they are included to show Microwave Radio's due diligence in the production of a quality product and verification of compliance and public safety.**



# STRATA TX System

*Analog + Digital  
Portable 1.9 -2.5, 2.3 - 2.7 GHz  
Microwave Transmitter*

## Technical Reference Manual

Manual Part No. 400502-1  
Rev. 0 February 2005

## **Table of measurements**

- 1. Occupied bandwidth**
- 2. Frequency stability**
- 3. Adjacent channel power and spectral masks**

## **Table of equipment**

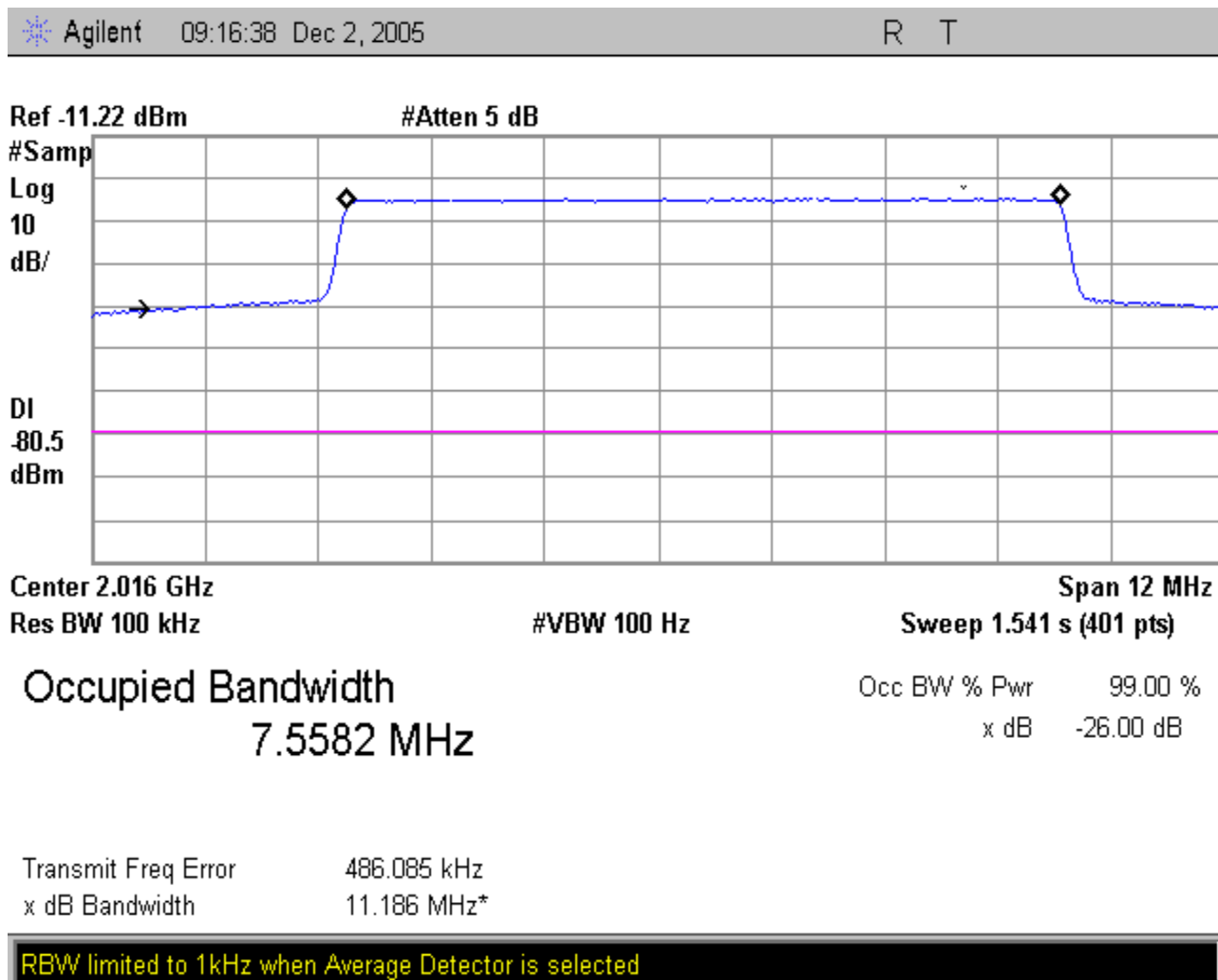
- 1. All spectral measurements made using an Agilent E4407 ESA series spectrum analyzer. Serial # 930381**
- 2. All frequency measurements made using a HP 5343A microwave frequency counter SN 33624**
- 3. All mean power measurements made using HP model 437B power meter SN# 33611 and sensor**
- 4. The DC source voltage was provided by an Agilent E3633A power supply SN# fo619**
- 5. Where attenuation was necessary for the protection of a measuring device Mecca attenuators of the relevant wattage and value were used**
- 6. All devices networked via GPIB interface and controlled using Labview virtual instrumentation and test platform**

# Occupied Bandwidth

## 47CFR 2.1

The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage Beta/2 of the total mean power of a given emission.

### Mode COFDM modulated COFDM IF 8MHz ½ FEC



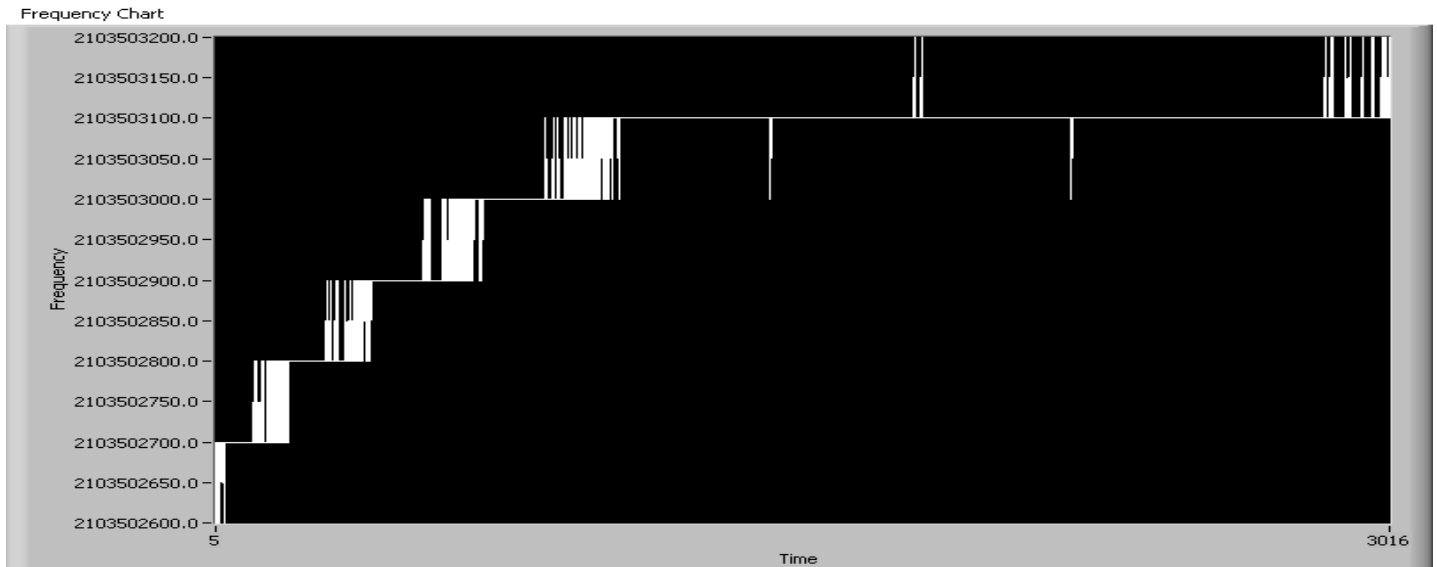
**Using an HP 5343A microwave frequency counter controlled by a lab-view.**

The histogram is plotted to a graph with a resolution of 100Hz.

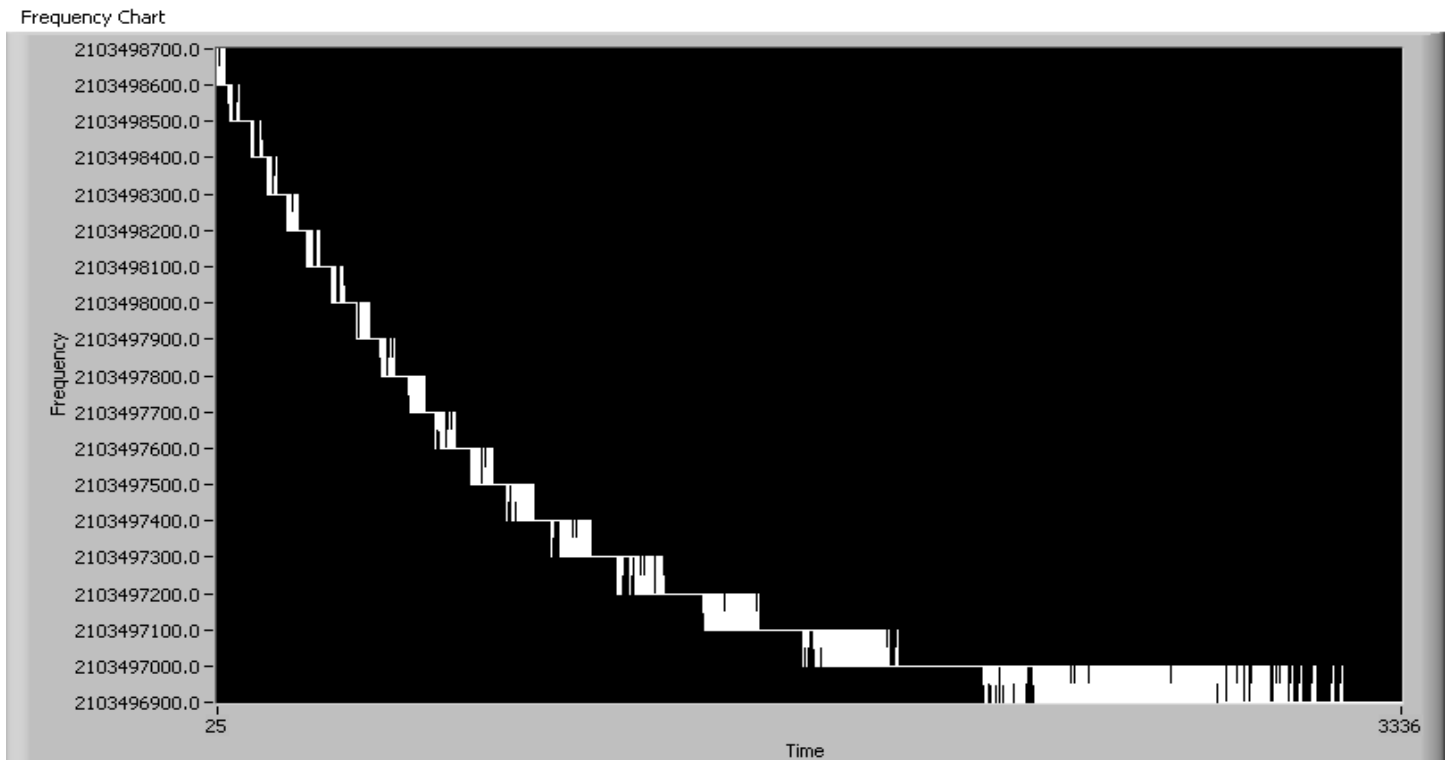
**Ramp time 15 minutes. Dwell time 2hrs, Fo 21035MHz Max deviation 600Hz**

**Frequency error 26KHz DC input varied from +14 to 38 Vdc**

**Frequency stability time and temperature - 20C**



**Frequency stability time and temperature 50C**



§74.637 Emissions and emission limitations.

(2) When using transmissions employing digital modulation techniques:

(i) For operating frequencies below 15 GHz, in any 4 kHz reference bandwidth (BREF), the center frequency of which is removed from the assigned frequency by more than 50 percent up to and including 250 percent of the authorized bandwidth: As specified by the following equation but in no event less than 50 decibels:

$$A = 35 + 0.8 (G \nless 50) + 10 \text{ Log}_{10} B.$$

(Attenuation greater than 80 decibels is not required.)

Where:

A = Attenuation (in decibels) below the mean output power level.

G = Percent removed from the carrier frequency.

B = Authorized bandwidth in megahertz.

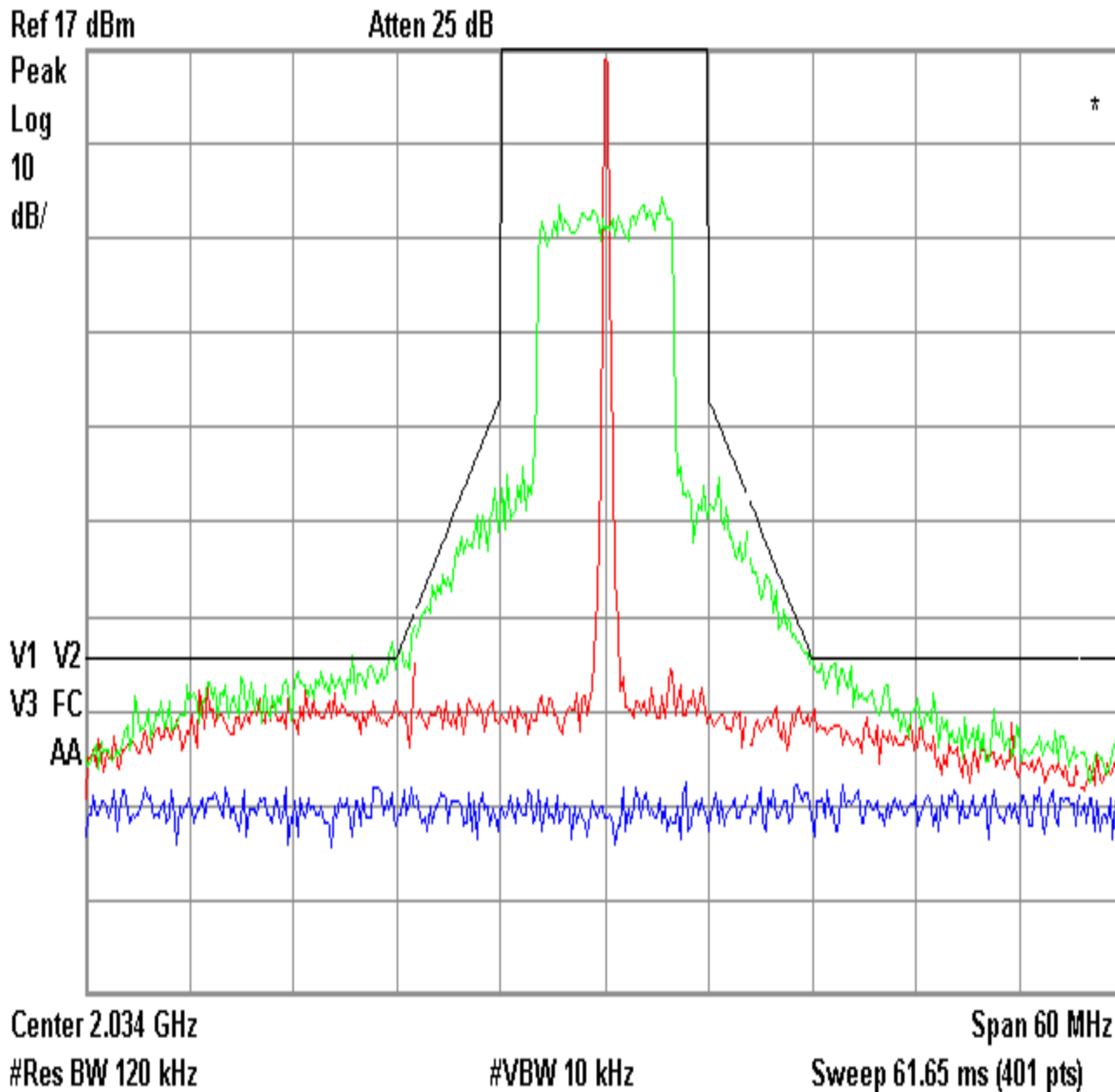
# CHANNEL A1r SPECTRAL MASK CFR 47 PART 74 (a )

2033.5MHz .6 WATTS 28dbm QPSK 8 MHz FEC1/2 GUARD INTERVAL 1/8 10db ATTENUATOR 1db LOSS  
TXU,TCU,

COMPLIANCE FACTOR =  $10 \log (B_{\text{ref}} / B_{\text{res.}}) = 10 \log x .0046e6 / 100e3 = 13.3\text{dbm}$

Agilent 08:51:05 Jan 5, 2006

R T



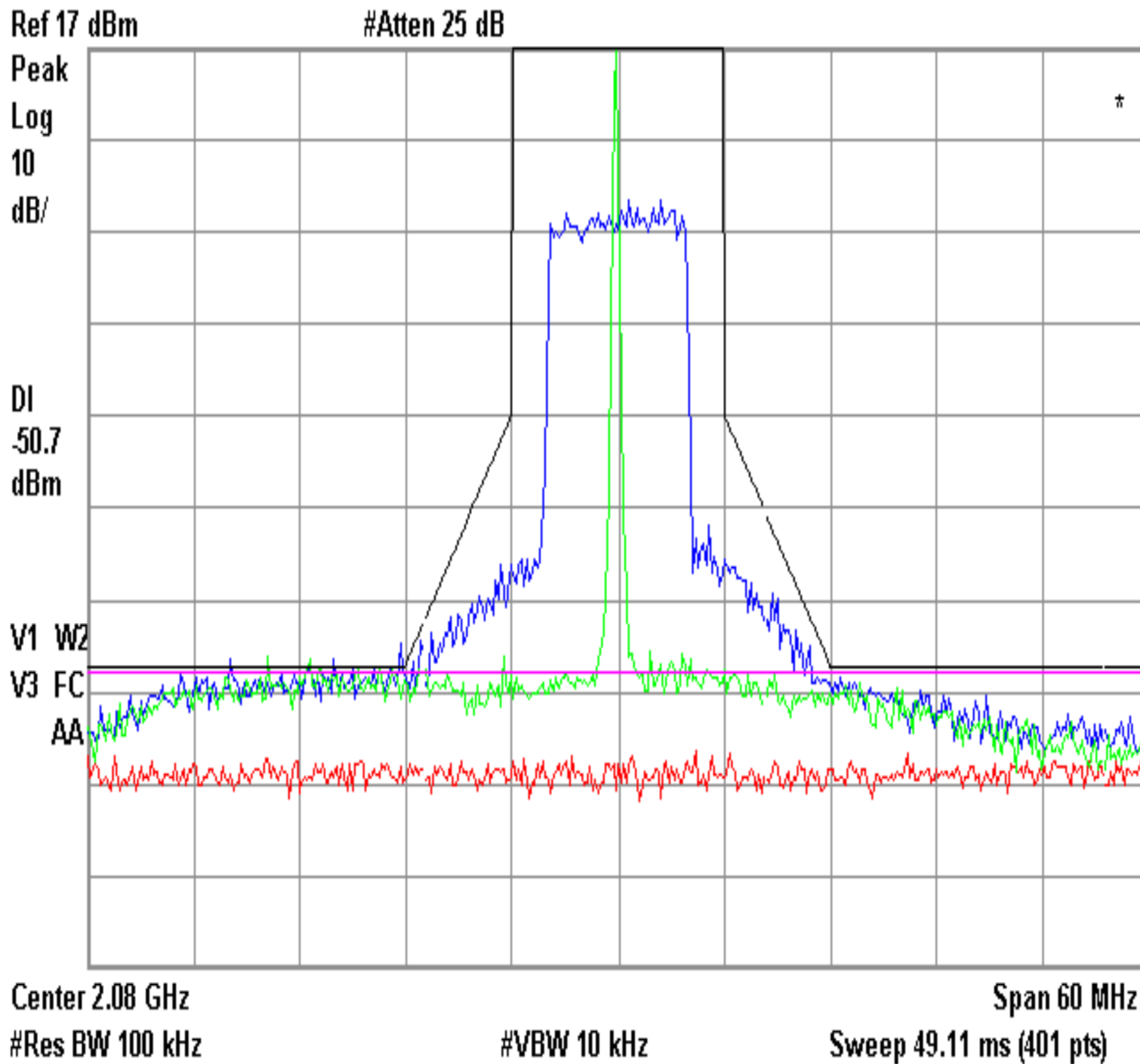
Query UNTERMINATED

2080.25 .5WATTS 27dbm COFDM,QPSK 8MHz . FEC1/2 GUARD INTERVAL 1/8 C HANNEL A5r  
TXU,TCU,

COMPLIANCE FACTOR =  $10 \log (B_{\text{ref}} / B_{\text{res}}) = 10 \log x .0046e6 / 100e3 = 13.3\text{dbm}$

Agilent 09:37:28 Jan 5, 2006

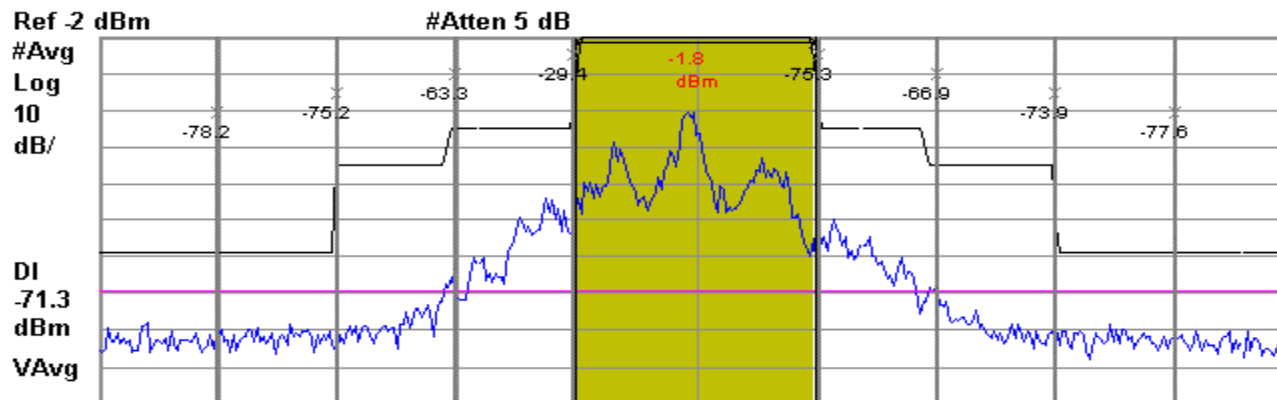
R T



RBW limited to 1kHz when Average Detector is selected

# **Analog output 38dbm 6.5 watts modulated ntsc color bars full field, 40db attenuation between HPU out put and analyzer**

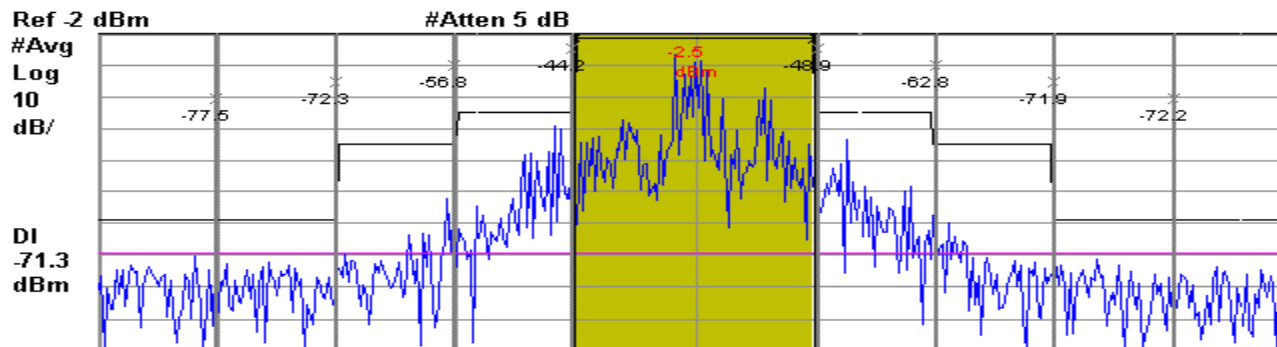
Agilent 08:20:11 Dec 16, 2005 R T



RBW limited to 1kHz when Average Detector is selected

**DEVIATION +/- 3MHz AUDIO SUBS SET 4.83 & 5.8 MHz**

Agilent 08:56:25 Dec 16, 2005 R T



RBW limited to 1kHz when Average Detector is selected

Ref -2 dBm

#Atten 5 dB

#Avg

Log

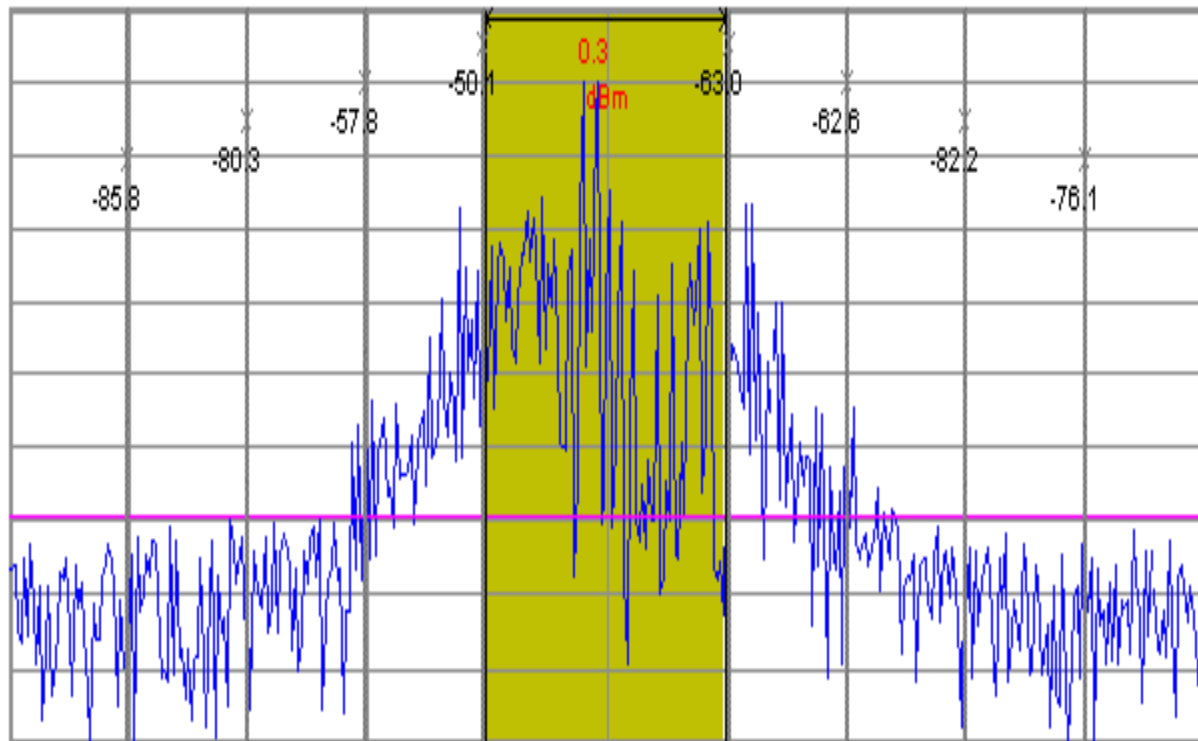
10

dB/

DI

-71.3

dBm



Center 2.458 GHz

Span 60 MHz

#Res BW 100 kHz

#VBW 300 kHz

Sweep 9.829 ms (401 pts)

| RMS Results   | Freq Offset | Ref BW    | dBc    | Lower  | dBm    | dBc    | Upper | dBm |
|---------------|-------------|-----------|--------|--------|--------|--------|-------|-----|
| Carrier Power | 6.000 MHz   | 4.000 kHz | -50.15 | -49.87 | -62.98 | -62.71 |       |     |
| 0.28 dBm /    | 12.00 MHz   | 4.000 kHz | -57.84 | -57.56 | -62.81 | -62.33 |       |     |
| 12.0000 MHz   | 18.00 MHz   | 4.000 kHz | -80.25 | -79.98 | -82.24 | -81.96 |       |     |
|               | 24.00 MHz   | 4.000 kHz | -85.77 | -85.49 | -76.11 | -75.83 |       |     |

RBW limited to 1kHz when Average Detector is selected

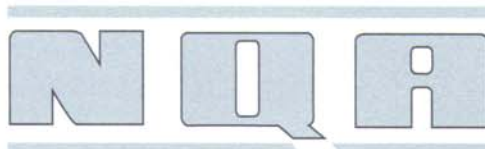
**TCB****GRANT OF EQUIPMENT  
AUTHORIZATION****TCB****Certification****Issued Under the Authority of the  
Federal Communications Commission****By:****Curtis-Straus LLC  
527 Great Road  
Littleton, MA 01460  
United States****Date of Grant: 10/03/2003****Application Dated: 10/03/2003****Microwave Radio Communications LLC  
101 Billerica Avenue, Bldg. 6  
N. Billerica, MA 01862-1256  
United States****Attention: Anthony Finizio , President****NOT TRANSFERABLE**

EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and  
is VALID ONLY for the equipment identified hereon for use under the  
Commission's Rules and Regulations listed below.

**FCC IDENTIFIER: FC3STATXU2D****Name of Grantee: Microwave Radio Communications LLC****Equipment Class: Licensed Non-Broadcast Station Transmitter****Notes: STRATA Transmitter**

| Grant Notes | FCC Rule Parts | Frequency       | Output | Frequency | Emission   |
|-------------|----------------|-----------------|--------|-----------|------------|
|             |                | Range (MHZ)     | Watts  | Tolerance | Designator |
|             | 74, 90         | 1990.0 - 2700.0 | 2.0    | 2.0 PM    | 17M0F9W    |
|             | 74, 90         | 1990.0 - 2700.0 | 2.0    | 2.0 PM    | 17M0W7D    |
|             | 74, 90         | 1990.0 - 2700.0 | 2.0    | 2.0 PM    | 16M0W7D    |

Power listed is conducted at the antenna terminals. The antenna(s) used for this transmitter must be installed on top of the roof of a land vehicle or on the bottom or wing of an airborne platform to provide a separation distance of at least 75 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. Maximum allowable antenna gain is 15.5dBi.



NATIONAL QUALITY ASSURANCE, USA

## CERTIFICATE OF REGISTRATION

*This is to certify that the Quality Management System of:*

**MICROWAVE RADIO COMMUNICATIONS,  
A DIVISION OF VISLINK, INC.  
101 BILLERICA AVENUE  
BUILDING # 6  
NORTH BILLERICA, MA 01862**

*has been assessed and approved by National Quality Assurance,  
U.S.A., against the following quality assurance management system  
standard:*

**ISO 9001 : 2000**

*The Quality Management System is applicable to:*

**DESIGN, MANUFACTURE, SALE AND SERVICING  
OF MICROWAVE RADIO SYSTEMS**

*The approval is subject to the company maintaining its system to the  
required standards, which will be monitored by NQA, U.S.A.*

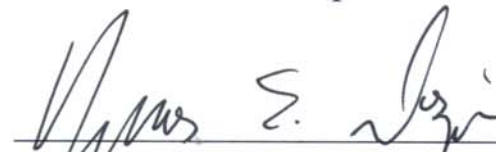
Certificate No: 10076

Date: December 18, 1995

Reissued: September 23, 2004

Valid Until: September 22, 2006



  
**For and On Behalf of NQA, USA  
Acton, MA 01720**



# *Certificate of Registration*

This is to certify that the Quality Management System of

**MICROWAVE RADIO COMMUNICATIONS,  
A DIVISION OF VISLINK, INC.  
101 BILLERICA AVENUE  
BUILDING #6  
NORTH BILLERICA, MA 01862**

applicable to

**DESIGN, MANUFACTURE, SALE AND SERVICING  
OF MICROWAVE RADIO SYSTEMS**

has been assessed and registered by  
National Quality Assurance Limited against the provisions of

**BS EN ISO 9001 : 2000**

This registration is subject to the company maintaining a quality management system,  
to the above standard, which will be monitored by NQA.

The Seal of National Quality Assurance Limited  
was hereto affixed in the presence of:

Managing Director



Certificate No: 6403  
Date: 22 March 1995  
Reissued: 23 September 2004  
Valid Until: 22 September 2006  
EAC Code: 19





6 COOK ST  
BILLERICA, MA 01821

Certificate No. 2939153

**CERTIFICATE OF CALIBRATION  
FOR  
MICROWAVE RADIO COMMUNICATIONS**

Description: HEWLETT-PACKARD, 5343A, FREQUENCY COUNTER

Serial No: 2424A01678

Asset No:

Simco ID: 33624-260

Dept: M. SALKINS

PO No: 731855

|                                                    |                                  |                       |
|----------------------------------------------------|----------------------------------|-----------------------|
| Calibration Date: 01/23/06                         | Calibration Interval: 24 Months  | Recall Date: 01/23/08 |
| Arrival Condition:<br>MEETS MANUFACTURER'S SPEC'S. | Service:<br>CALIBRATED & CLEANED |                       |

Procedure: 635-0121 REV 0

Temperature: 72°F

Relative Humidity: 40%

Standards Used:

| Type                       | Simco ID   | Due Date | Intvl<br>Mos | Acc/Unc                    | Trace No.    |
|----------------------------|------------|----------|--------------|----------------------------|--------------|
| LORAN-C FREQUENCY STANDARD | 23565*551  | 10/12/06 | 12           | FREQ+/-1x10 <sup>-12</sup> | LORAN-C      |
| ELECTRONIC COUNTER         | 23565*440  | 10/27/06 | 12           | FREQ+/-5x10 <sup>-10</sup> | LORAN-C      |
| SYNTHESIZED SWEEPER        | 36528*42   | 08/11/06 | 12           | FREQ.                      | LORAN-C      |
| SYNTHESIZED SWEEPER        | 36528*42   | 08/11/06 | 12           | POWER +/-1.8dB             | 1-82906237-1 |
| POWER METER                | 23565*436  | 02/10/06 | 12           | +/-0.02 dB                 | 267222-02    |
| POWER SENSOR               | 23565*1051 | 04/28/06 | 12           | CFUnc 0.9-1.7%             | 700174       |

Work performed by:

**Philip Maltais**

Electronic Technician D ( 11450 )

Reviewed by:

**Richard J. McMeniman**

Driver

SIMCO Electronics' quality management system conforms to ISO 9001:2000, ISO/IEC 17025:1999. All calibrations are performed using internationally recognized standards traceable to the International System of Units (SI Units). Traceability is achieved through calibrations by the National Institute of Standards and Technology (NIST), other National Measurement Institutes (NMIs), or by using natural physical constants, intrinsic standards or ratio calibration techniques. Instruments are calibrated with a test accuracy ratio of 4:1 or greater, otherwise measurement uncertainty analysis and/or guard bands are applied during the measurement process. The information shown on this certificate applies only to the instrument identified above and may not be reproduced, except in full, without prior written consent from SIMCO Electronics. There is no implied warranty that the instrument will maintain its specified tolerances during the calibration interval due to possible drift, environment, or other factors beyond our control.

Dated: 01/23/06

Duplicate Certificate

Page 1 of 1





2125 SW 28TH STREET  
ALLENTOWN, PA 18103

Certificate No. 2795904

**CERTIFICATE OF CALIBRATION  
FOR  
MICROWAVE RADIO COMMUNICATIONS**

Description: **AGILENT, E4407B, SPECTRUM ANALYZER**

Serial No: **MY44210942**

Asset No:

Simco ID: **33624-851**

Dept: **NONE**

PO No: **731725**

|                                                           |                                             |                              |
|-----------------------------------------------------------|---------------------------------------------|------------------------------|
| Calibration Date: <b>08/09/05</b>                         | Calibration Interval: <b>12 Months</b>      | Recall Date: <b>08/09/06</b> |
| Arrival Condition:<br><b>MEETS MANUFACTURER'S SPEC'S.</b> | Service:<br><b>CALIBRATED &amp; CLEANED</b> |                              |

Procedure: **MFR. MANUAL**

Temperature: **72°F**

Relative Humidity: **50%**

Standards Used:

| Type                     | Simco ID  | Due Date | Intvl<br>Mos | Acc/Unc         | Trace No.     |
|--------------------------|-----------|----------|--------------|-----------------|---------------|
| SWEEP GENERATOR          | 17834*637 | 10/06/06 | 18           | Freq +/-0.25ppm | LORAN (USNO)  |
| SIGNAL GENERATOR         | 17834*521 | 10/21/05 | 13           | Level +/-0.05dB | 267222 D5266  |
| POWER METER              | 17834*578 | 09/12/06 | 25           | Rngs +/- 0.5%   | 264412 264703 |
| COUNTER                  | 17834*498 | 09/13/05 | 11           | Freq+/-0.092ppm | LORAN (USNO)  |
| LORAN RECEIVER           | 17834*285 | 10/14/05 | 17           | IntOsc+/-0.5ppm | LORAN (USNO)  |
| POWER SPLITTER           | 17834*398 | 06/10/06 | 12           | Tracking<0.25dB | 1-82906237-1  |
| SYNTHESIZER FUNCTION GEN | 17834*519 | 04/28/06 | 10           | Freq +/-5ppm    | LORAN (USNO)  |
| PWR SENSOR; 26.5 GHz     | 17834*658 | 08/14/06 | 22           | CF Unc +/-2.4%  | 1-71278213    |

Work performed by:  
**Sheldon C. Wotring**  
Electronic Technician C ( 11231 )

Reviewed by:  
**Annette Singer**  
Mechanical Technician A

SIMCO Electronics' quality management system conforms to ISO 9001:2000, ISO/IEC 17025:1999. All calibrations are performed using internationally recognized standards traceable to the International System of Units (SI Units). Traceability is achieved through calibrations by the National Institute of Standards and Technology (NIST), other National Measurement Institutes (NMIs), or by using natural physical constants, intrinsic standards or ratio calibration techniques. Instruments are calibrated with a test accuracy ratio of 4:1 or greater, otherwise measurement uncertainty analysis and/or guard bands are applied during the measurement process. The information shown on this certificate applies only to the instrument identified above and may not be reproduced, except in full, without prior written consent from SIMCO Electronics. There is no implied warranty that the instrument will maintain its specified tolerances during the calibration interval due to possible drift, environment, or other factors beyond our control.

Dated: **08/09/05**

Duplicate Certificate

Page 1 of 1





1178 BORDEAUX DRIVE  
SUNNYVALE, CA 94089

Certificate No. 2956385

**CERTIFICATE OF CALIBRATION  
FOR  
MICROWAVE RADIO COMMUNICATIONS**

Description: EMCO, 3825/2, LISN

Serial No: 9508-2455

Asset No:

Simco ID: 33624-893

Dept: P.SLAWSON

PO No: 731855

|                                                    |                                  |                       |
|----------------------------------------------------|----------------------------------|-----------------------|
| Calibration Date: 02/02/06                         | Calibration Interval: 12 Months  | Recall Date: 02/02/07 |
| Arrival Condition:<br>MEETS MANUFACTURER'S SPEC'S. | Service:<br>CALIBRATED & CLEANED |                       |

Procedure: 010-0370 REV 0

Temperature: 68°F

Relative Humidity: 60%

Standards Used:

| Type                  | Simco ID | Due Date | Intvl<br>Mos | Acc/Unc           | Trace No.     |
|-----------------------|----------|----------|--------------|-------------------|---------------|
| LF IMPEDANCE ANALYZER | 1011*341 | 03/15/06 | 12           | OSC LEV +/-1.5mV  | D5266         |
| LF IMPEDANCE ANALYZER | 1011*341 | 03/15/06 | 12           | CAP +/-0.03 pF    | 266244-02     |
| LF IMPEDANCE ANALYZER | 1011*341 | 03/15/06 | 12           | @100 ohm +/-0.013 | 268691-03     |
| PARAMETER TEST SET    | 1011*340 | 10/04/06 | 12           | DIREC/ >= 35 dB   | a50139/a5005  |
| Network Analyzer      | 1011*339 | 01/12/07 | 12           | FREQ RESP/+-1dB   | UK5544/UK5691 |

Work performed by:

**Keith Richardson**  
Electronic Technician D ( 793 )

Reviewed by:

**Mark Sok**  
Final Inspector

SIMCO Electronics' quality management system conforms to ISO 9001:2000, ISO/IEC 17025:1999. All calibrations are performed using internationally recognized standards traceable to the International System of Units (SI Units). Traceability is achieved through calibrations by the National Institute of Standards and Technology (NIST), other National Measurement Institutes (NMIs), or by using natural physical constants, intrinsic standards or ratio calibration techniques. Instruments are calibrated with a test accuracy ratio of 4:1 or greater, otherwise measurement uncertainty analysis and/or guard bands are applied during the measurement process. The information shown on this certificate applies only to the instrument identified above and may not be reproduced, except in full, without prior written consent from SIMCO Electronics. There is no implied warranty that the instrument will maintain its specified tolerances during the calibration interval due to possible drift, environment, or other factors beyond our control.

Dated: 02/02/06



## SET UP PICTURES SPECTRAL MASKS AND RADIO MEASUREMENTS



*Temperature chamber output power and frequency stability*





**TRANSMITTER UNIT**  
**TRANSMITTER CONTROL UNIT**

ATTESTATION TEST SET UP  
FIGURE 7

