MICROWAVE RADIO COMMUNICATIONS

101 Billerica Ave., Bldg. 6
N. Billerica, MA 01862-1256
Tel: (978) 671-5700
Fax: (978) 671-5800

TECHNICAL CONSTRUCTION FILE

FC3STATXU044T1AK

STRATA CLAMSHELL MICROWAVE VIDEO TRANSPORT SYSTEM MODEL# 907821-00

2006

MICROWAVE RADIO COMMUNICATIONS

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INTRODUCTION

SECTION 1

Introduction:
The FC3STATXU044T1AK is a general mobile transmitter designed for use in the **4940 Mhz. to 4990 Mhz.** band.

EMISSION DESIGNATION 90.1215 (C)

Frequency Range	Rated Transmit Power (W) Conducted	Measured Frequency Tolerance	Emission Designator
4940 – 4990 MHz	.812	<1.5	10M0D7W
4940 – 4990 MHz	1.584	<1.5	20M0D7W
4940 – 4990 MHz	1	<1.5	20 M0F9W

Operation under FCC rule parts **90, subpart Y**

Emission Designator	Peak Transmit Power (dBm)			Peak Power Spectral Density (dBm/MHz)		
	Low	Mid	High	Low	Mid	High
10M0D7W	28.49	28.35	29.62	18.43	18.34	19.62
20M0D7W	31.99	31.72	31.83	18.98	18.27	18.82
20M0F7W	31.19	32.32	31.38	18.18	19.31	18.37

APPLICATION

Application:

For transmission of video, audio, VF or other forms of data transmission, or other material from points removed from the network or broadcast operations center. This radio has been designed to satisfy the tactical deployment of transmissions for the recovery or in the case of emergency restoration of emergency services. This product capable of transmission of broadcast quality video is utilized in the transfer of high-resolution video signals for assisting in public safety events or normal surveillance operations.

A compact, mobile, weatherproof, modular transmitter, the STRATA transmitter is designed to be adaptable over a wide range of outdoor field applications, The transmitter accepts a wide range of SMPTE defined video inputs (SDI, ASI, NTSC…) delivered to a highly integrated internal MPEG-2 Encoder and COFDM modulator.

A front panel LED display details the internal RF and Baseband configurations. Status display of frequency, power, modulation, and RF output… is also viewable from the same LED display.

The STRATA TX can be deployed as a single or multi box configuration. The Transmitter (TXU), deployed as a single box digital transmitter utilizing an internal COFDM modulator and MPEG-2 encoder. A two-box design utilizing a transmitter control unit (TCU) places the baseband units internal to the TCU outputting 70MHz. To the TXU. The TXU is complete with the RF Amplifier and Up-Converter, the Baseband components integrated into the TCU. The TCU provides control and RF (70MHz) as drive to the RF Up-Converter. System control can be displaced from the RF unit by as much as 100 meters. For the sake of this application the unit (TXU) is configured as a Digital Transmitter with internal COFDM modulator and MPEG-2 encoder.

Digital Modulation:

A COFDM architecture utilizing QPSK modulation has been integrated into the STRATA design. The imbedded control allows the user to select various digital modulation formats while maintaining the specifications as set forth by ETSI TR 101 190 v1.1.1 for Digital Video Broadcasting. Output of the modulator at 70 MHz. is applied to the input to the transmitter, frequency is selected, and the RF output is delivered to the antenna.

TECHNICAL DATA SUMMARY

TECHNICAL DATA SUMMARY Frequency band: 4940 MHz to 4990 MHZ, Channel spacing: 10 or 20 MHz, Modulation Type: QPSK, 16 QAM, 64 QAM OFDM.
Maximum measured output power @ antenna port: 29.8 dBm QPSK, 30dbm 16QAM, 28dbm 16QAM.
Antenna options: Omni directional and directional for mobile per FCC 47 CFR part 90 subpart Y
SCOPE:
The purpose of the test program detailed in this document is to demonstrate the Strata FCCSTATXU044T1AK clamshell microwave transmitter systems is compliant to the essential requirements of EN 302 064-1.v1.1.1 FCC Part 2, and 90 as pertains to this document.

This report is intended as part of MRC-TCF 1000 the scope of which is to detail our compliance with the essential requirements of Article 3.2 of the R&TTE Directive 1999/5/EC

TECHNICAL CONSTRUCTION FILE FOR

APPLICATION CONSISTS OF DIGITAL TRANSMISSIONS FOR Mobile applications for public safety, emergency restoration and event coverage from sites removed from the central offices or network operation centers. The purpose is for the transmission of voice, data and or video services.
The objective of this TCF is to demonstrate the conformance of Microwave Radio Communications' STRATA Video Transport System To the following essential requirements:

1. The protection of the health and safety of the user and any other persons, including the objectives and safety requirements as detailed by Directive 73/23/eec but with no voltage limits applying.
2. The protection requirements with respect to electromagnetic compatibility as detailed by Directive 89/336/eec (the EMC Directive).
3. The radio equipment shall be so constructed as to effectively use the allocated spectrum and avoids harmful interference.
4. Justification for test method selection & Deviation

As no harmonized radio and EMC standards exists under the R&TTE directive for the particular product type/application the standards that most closely matches the product type were chosen as the basis for conformance. The standards are as follows:
CFR 47 PART 90 SUBPART- Y for fixed radio systems: point to point and multipoint systems; PUBLIC SAFTY AS DEFINED UNDER SECTION 90.523

ETSI EN 302 064-1 electromagnetic compatibility and radio spectrum matters (ERM) wireless video links 1.3GHz to 50GHz.

ETSI EN 301 489-14 immunity tests and limits for analog digital terrestrial TV broadcasting service transmitters.

ARTICLE 3.1 Annex low voltage directive EN 60950 safety

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. Also noted, the EU member country's may have additional national regulations governing the use of the system in a specific environments. These regulations are not within the scope of the R&TTE directive and not addressed in this TCF.

TECHNICAL DESCRIPTION

A technical description is contained within the manual

MEASUREMENT DATA

In Order to demonstrate compliance to the FCC Rules and Regulations as set forth in CFR 47 (as revised October 1, 2002), measurement data per paragraphs2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055 where performed at Microwave Radio Communications facilities. The results of these measurements show that the FC3STATXU044T1AK transmitter meets or exceeds all requirements for part 90.

In Order to demonstrate compliance to the FCC Rules and Regulations as set forth in CFR 47 (as revised October 1, 2002), measurement data per paragraphs2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055 where performed at Microwave Radio Communications facilities. The results of these measurements show that the STA044T1AK transmitter meets or exceeds all requirements for parts 90 and 101.

Microwave Radio Communications Inc. would like to apply for FCC Type Acceptance of this Mobile Transmitter product (STATXU44D) or FC3STATXU044T1AK.
Operating frequency (capable) 4940 – 4990 MHz.
License for Public Safety under CFR 47 part 90 subpart Y operating in the band 4940 MHz to 4990 MHZ
Transmitter output power 1 WATT (+30 dBm)
Emissions: Digital, Analog
Frequency Tolerance <2ppm

Emissions Designation(s)
Emissions: 20M0D7W, 10M0D7W, 10M0F9W
The following radio designations are covered under this submittal. The radio nomenclatures only reference the modulation or power input range. The nomenclatures for modulation may designate either analog, digital of neither. The FC3STATXU044T1AK represents the top level of this line of transmitter.
STATXU044T1OK, STATXU044T1AK, STATXU044T1CK, STATXU044T1NK, STATXU044T1PK

MICROWAVE RADIO COMMUNICATIONS

SECTION 2 SPURIOUS EMISSIONS AT THE ANTENNA TERMINAL 2.1051

The Antenna conducted spurious emissions test set up is shown in Figure 1. The analyzer was first tuned for a reference carrier level at the fundamental operating frequency. The output spectrum was then slowly scanned from 50MHz to 40 GHz. Special attention was given to those frequencies that correspond to the possible harmonic and sub – harmonics.

The FCC limit for antenna conducted spurious emissions is 55+10LOG P below the main carrier. For the FC3STATXU044T1AK with P= 812.8 mw this corresponds to 54.09 db below the main carrier (+29.1 dbm) , or a level of –24.99dBm. or 50 dB being the lesser attenuation the spurious output of the transmitter meets the requirements.
Signals where observed at the following points:
5886 MHz @ -38.7 dBm (H)
5886 MHz @ -43.0 dBm (V)
7848 MHz @ -42.4 dBm (H)
7848 MHz @ -48.1 dBm (V)
* Frequencies within 20db of FCC specification
No emissions found with in the range 18 – 40 GHz.
With the exception of the above noted points, no other signals were noted within 20db of the FCC limit. Therefore, the STATXU044T1AK meets the requirements set forth in ANSI C63.42003, ANSI TIA 603-B-2002

FIELD STRENGTH OF SPURIOUS RADIATION 2.1053

Case radiated spurious emission test set up is shown in figure 2. Observations where made at one meter from the transmitter in all planes of polarization. The output spectrum as received at one meter was slowly scanned upwards from 50MHz to 26GHz. Spacial attention was given to those frequencies which correspond to possible harmonics and sub harmonics.
A radiated reference level can be calculated using the formula:

$$E = \sqrt{\frac{30xGxP}{R}}$$

Where: G = Power Gain of Antenna
P = Transmitter Power Output in Watts
R = Distance from Radiator at which field intensity is measured.

In this case: G = 1.64 (gain of dipole over isotropic)
P = 1.76
R = One Meter

Therefore:

$$E = \sqrt{\frac{30x1.64x1.76}{1}} = 9.3055V/meter = 139.4dBuV/M$$

The FCC requires case radiated signals to be attenuated by a factor of 43+10LOG P or 43+10LOG 1.76 = 45.4551dB. Thus 139.4dBuV/M reduced by 45.4551dB = 93.9449dBuV/M. No case radiated signals were detected within 20 dB of the FCC limit and, therefore, the transmitter meets the requirements set forth in paragraph 90.209.

Reference Curtis-Straus report H028

Below data represents spurious emissions found and calculated to be acceptable according to rule part: 2.153

Radiated Emissions Table

Curtis-Straus LLC

Date: 06-Mar-07 **Company:** Microwave **Work Order:** H0280

Engineer: Evan Gould **EUT Desc:** STRATA TX Clamshell **Test Site:** "A"

Frequency Range: 1-40GHz **Measurement Distance:** 3 m

Notes: Assuming a maximum output power of 2.25W = 33.5dBm; spurious limit = 33.5dBm - 50dB = -16.5dBm
No emissions found in the range 18-40GHz.

Antenna Polarization (H/V)	Frequency (MHz)	Analyzer Reading (dBµV)	Signal Generator Output (dBm)	Antenna Gain (dBi)	Cable Factor (dB)	Adjusted Reading (dBm)	47 CFR 90.210(m)(6) Limit (dBm)	Margin (dB)	Result (Pass/Fail)
H	5886.0	66.9	-44.4	9.4	3.7	-38.7	-16.5	-22.2	Pass
V	5886.0	62.6	-48.7	9.4	3.7	-43.0	-16.5	-26.5	Pass
H	7848.0	62.2	-47.2	9.2	4.4	-42.4	-16.5	-25.9	Pass
V	7848.0	56.3	-52.9	9.2	4.4	-48.1	-16.5	-31.6	Pass

Table Result: Pass by -22.2 dB ***Worst Freq:*** 5886.0 MHz

Test Setup: **Pre-Amp:** Red-Green **Cable:** EMIR-HIGH-21 **Analyzer:** Brown **Antenna:** Black Horn
Substitution Setup: **Cable:** EMIR-HIGH-11 **Signal Gen.:** HP83752A **Antenna:** Orange

SECTION 3 NECESSARY BANDWIDTH

The OFDM pedestal operating at 1705 OFDM carriers with the spectral density of each carrier at 4.464KHz.
Therefore: 1705 X 4.464KHz = 7.6111200 MHz

SECTION 4 OCCUPIED BANDWIDTH 2.1049

To measure the occupied bandwidth, the equipment was set up as shown in figure 5, and the transmitter was modulated with a digital COFDM pedestal of 7.61MHz (8MHz). The output of the transmitter was viewed on a spectrum analyzer. The current COFDM standard adopted by Microwave Radio Communications is the ETSI EN 300 744 V1.2.1 (2001-01) for framing structure, channel coding and modulation. Since the spectrum is digitally modulated, at the center frequency, calculations where performed by establishing a reference at Fo (4950.5MHz) and the amplitude readings where calculated from a CW signal input to the transmitter. Amplitude readings where then recorded as specified in part 101.111 for emission limitations.

Method of Measuring and Calculating Occupied Spectrum Requirements (Digital Mode)

Steps:

1. Determine 3 dB down points on SIN(X)/X center frequency spectrum energy plot.
2. Use the following formula to calculate the total power signal level versus the spectral energy plot:

   10log (3dB bandwidth) / (Resolution Bandwidth filter used)

   3dB bandwidth = **7.61 MHz** (4.4 KHz w/1705 COFDM carriers)
   Resolution Bandwidth used = **100 KHz**

   for Strata TX system: 10log 7.61E6/1E5 = **18.8 dB**

3. Adjust for FCC requirement to calculate using **1 MHz** resolution bandwidth (per FCC ruling 02-098, November 2001). Adjust RBW: 10log 1E6/1E5 = 10 dB

TOTAL POWER ADJUSTMENT FACTOR = 18.8 dB above highest spectral energy point.
Reference Curtis-Straus test report number EH0280-1 March 9, 2007

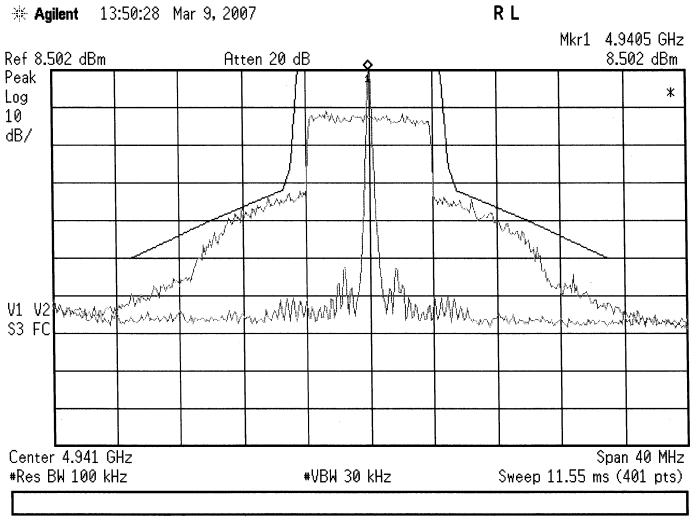
Emission Mask Plots

LIMIT

The emission mask is specified in 47 CFR 90.210(m)

PLOTS

10MHz BW; Low Channel; -8dB Attenuation



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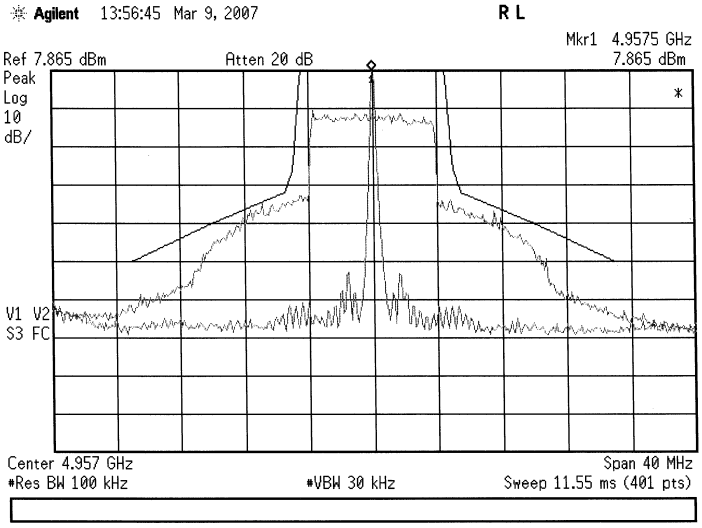
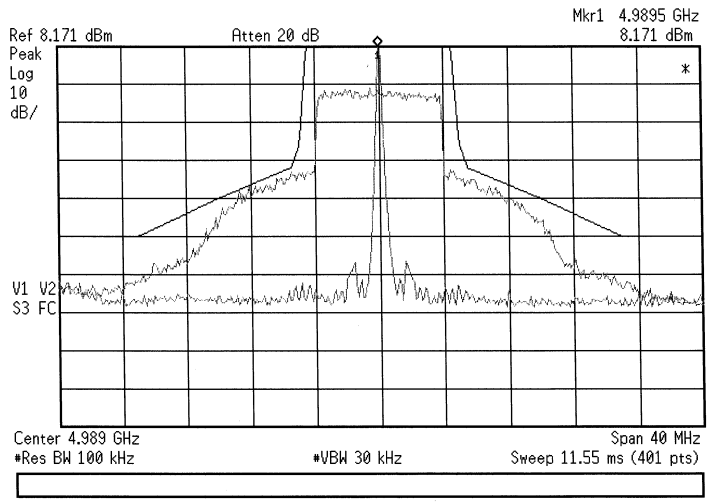
10MHz BW; Mid Channel; -8dB Attenuation



10MHz BW; High Channel; -8dB Attenuation



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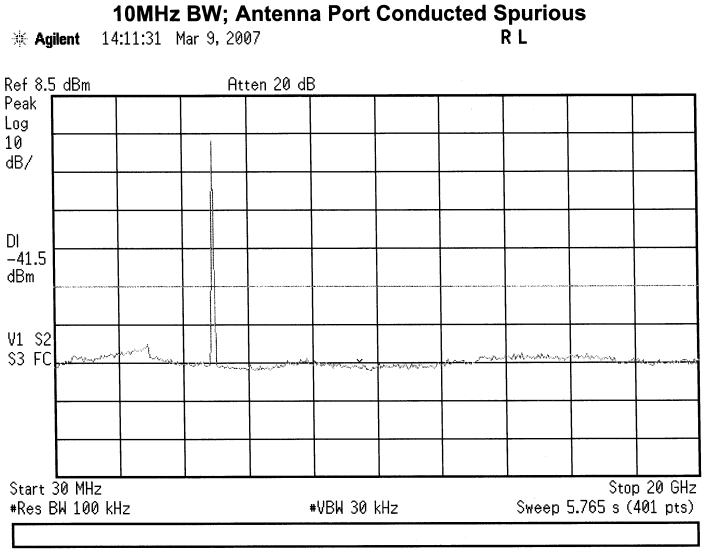
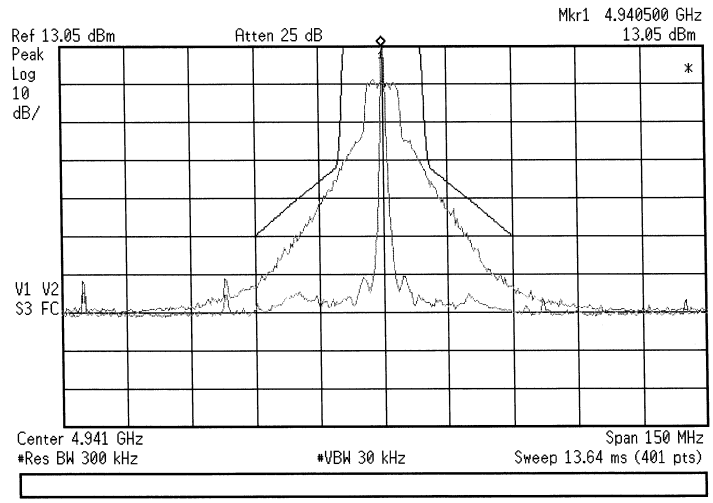
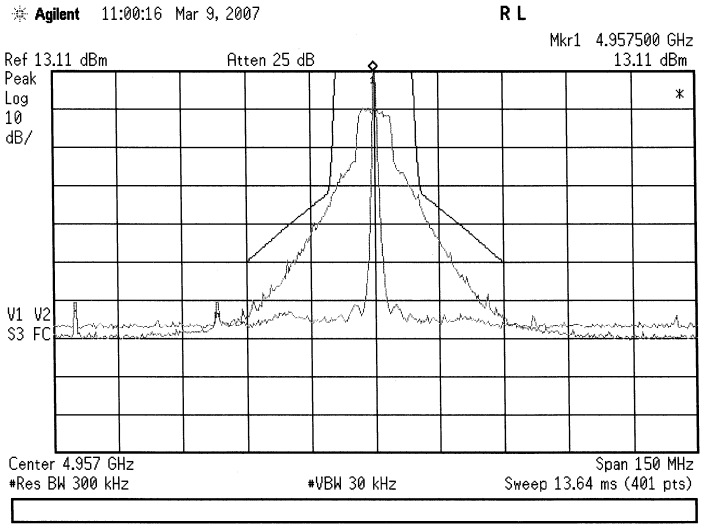
10MHz BW; Antenna Port Conducted Spurious



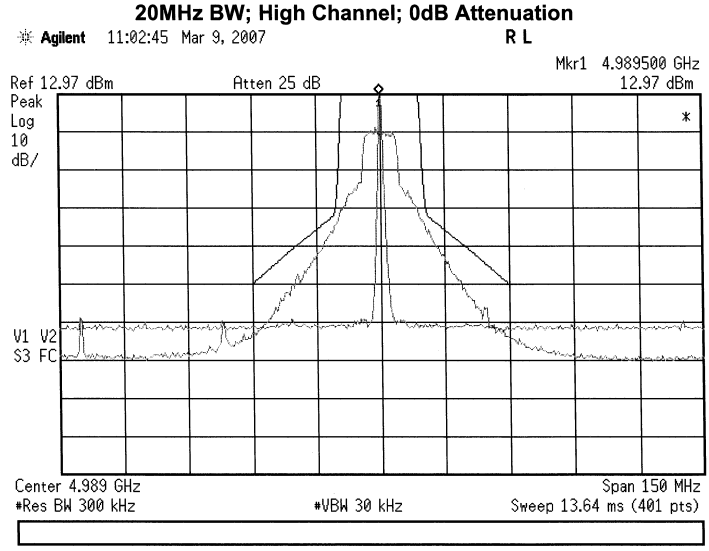
20MHz BW; Low Channel; 0dB Attenuation



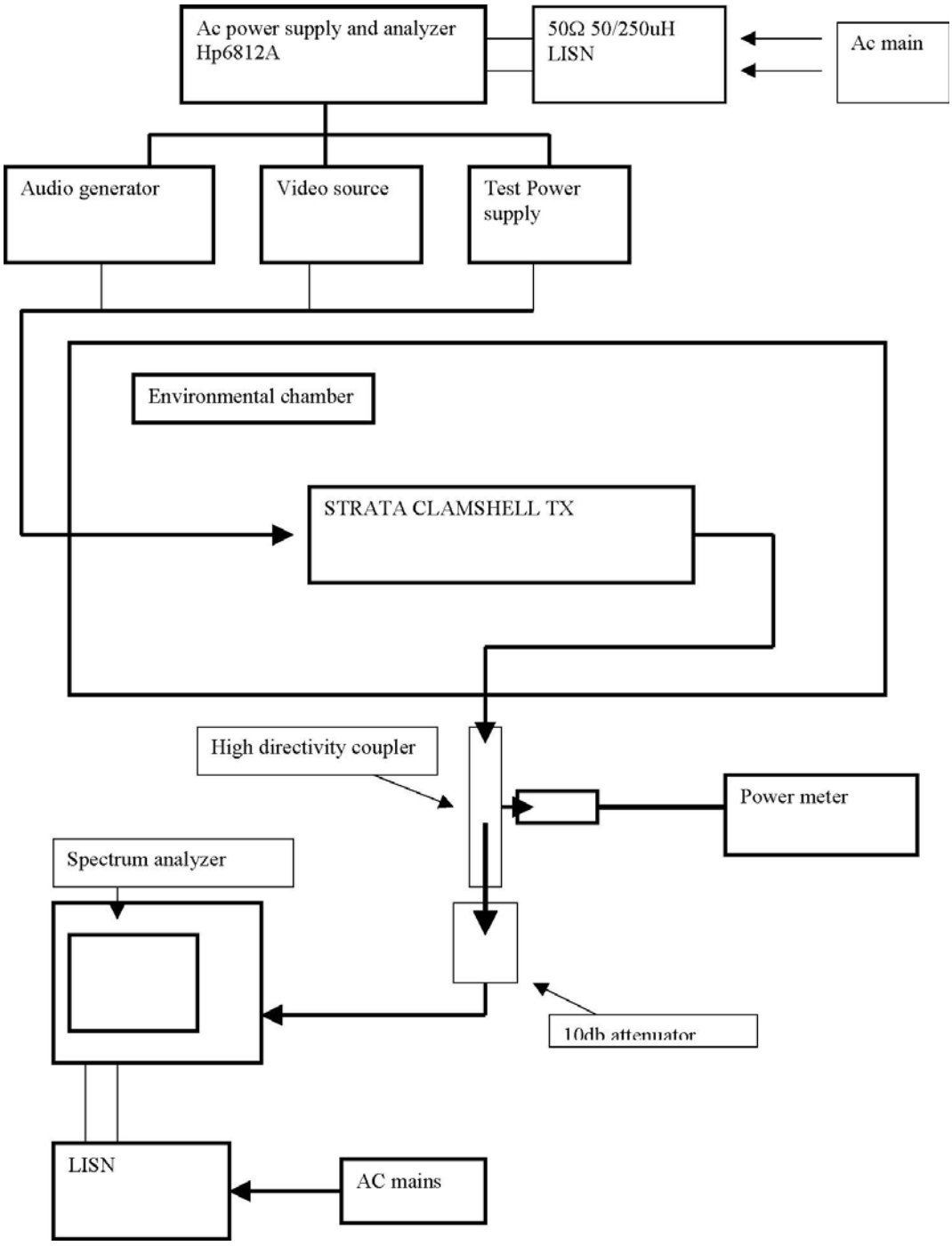
20MHz BW; Mid Channel; 0dB Attenuation



20MHz BW; High Channel; 0dB Attenuation



TEST DIAGRAM NECESSARY AND OCCUPIED BANDWIDTH



SECTION 6

STRATA TRANSMITTER CLAMSHELL 907820-01 DECLARATION OF CONFORMITY

EU DECLERATION OF CONFORMITY

RADIO & TELCOMMUNICATIONS TERMINAL EQUIPMENT DIRECTIVE 1999/5/EC PRODUCTS COVED UNDER THIS DECLARATION:

FC3STA0441AK STRATA MOBILE TRANSMITER POINT TO POINT MICROWAVE VIDEO AND DATA TRANSPORT SYSTEM
TEST STANDARDS USED AS THE BASIS OF CONFORMANCE:

EN 302 064 –1 V.1.1.2 2004 EN301 489-1 V.1.1.4 2002 EN 55022 1998/A1 20002 EN 301 390 EN60950 LOWVOLTAGE DIRECTIVE ETS 300 019 EN 751V1.1.1

THE BASIS ON WHICH CONFORMITY IS DECLARED:

THE STRATA MICROWAVE VIDEO TRANSMITTER COMPLIES WITH THE ESENTIAL REQUIRMENTS OF THE R&TTE DIRECTIVE ON THE BASIS OF THE TECHNICAL CONSTRUCTION FILE NUMBERED_*4*0000_____ .

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NORTH BILLERICA MASS. 01862
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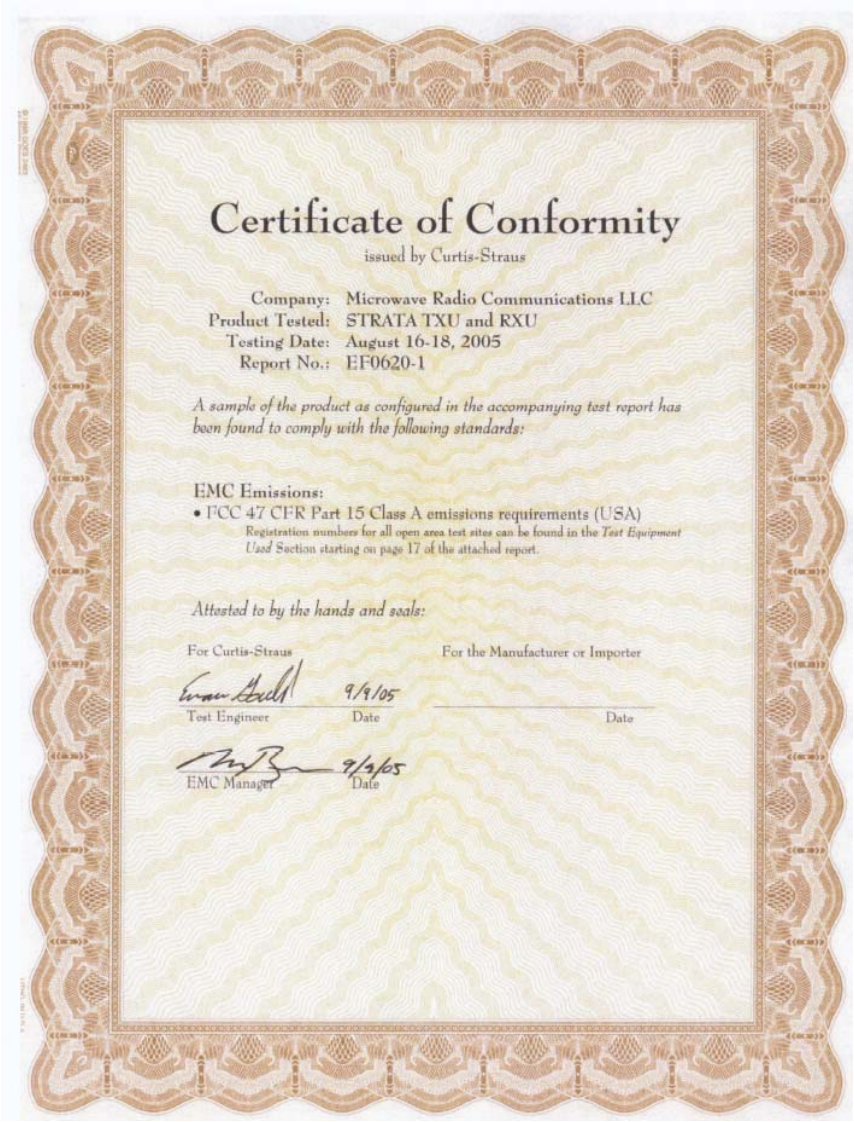
SECTION 7 EMC EMISSIONS STATEMENT

CERTIFICATE OF CONFOMITY

EMC EMISSION STATEMENT FCC 47 CFR PART 15



Certificate of Conformity

issued by Curtis-Straus

Company: Microwave Radio Communications LLC
Product Tested: STRATA TXU and RXU
Testing Date: August 16-18, 2005
Report No.: EF0620-1

A sample of the product as configured in the accompanying test report has been found to comply with the following standards:

EMC Emissions:
• FCC 47 CFR Part 15 Class A emissions requirements (USA)
Registration numbers for all open area test sites can be found in the *Test Equipment Used* Section starting on page 17 of the attached report.

Attested to by the hands and seals:

For Curtis-Straus — For the Manufacturer or Importer

9/9/05
Test Engineer — Date — Date

9/9/05
EMC Manager — Date

FIG. 1

SECTION 8 QUALITY DECLARATION

QUALITY SYSTEM ISO 9000

NATIONAL QUALITY ASSURANCE

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

FIG. 2

ISO 9001:2000 CERTIFICATION

NQA
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

ANSI-RAB QMS ACCREDITED

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

FIG. 3

MICROWAVE RADIO COMMUNICATIONS

SECTION 9 TRANSMITTER DISCRIPTION

STRATA CLAMSHELL SYSTEM DESCRIPTION
(the system description ia available in the product manual submitted as a separate attachment with the type submittal to CURTIS-STRAUS.)

Photo 1
PHOTO OF THE FC3STA044T1AK

MICROWAVE RADIO COMMUNICATIONS

SECTION 10 TEST STATION TEST SET UP WITH DUT

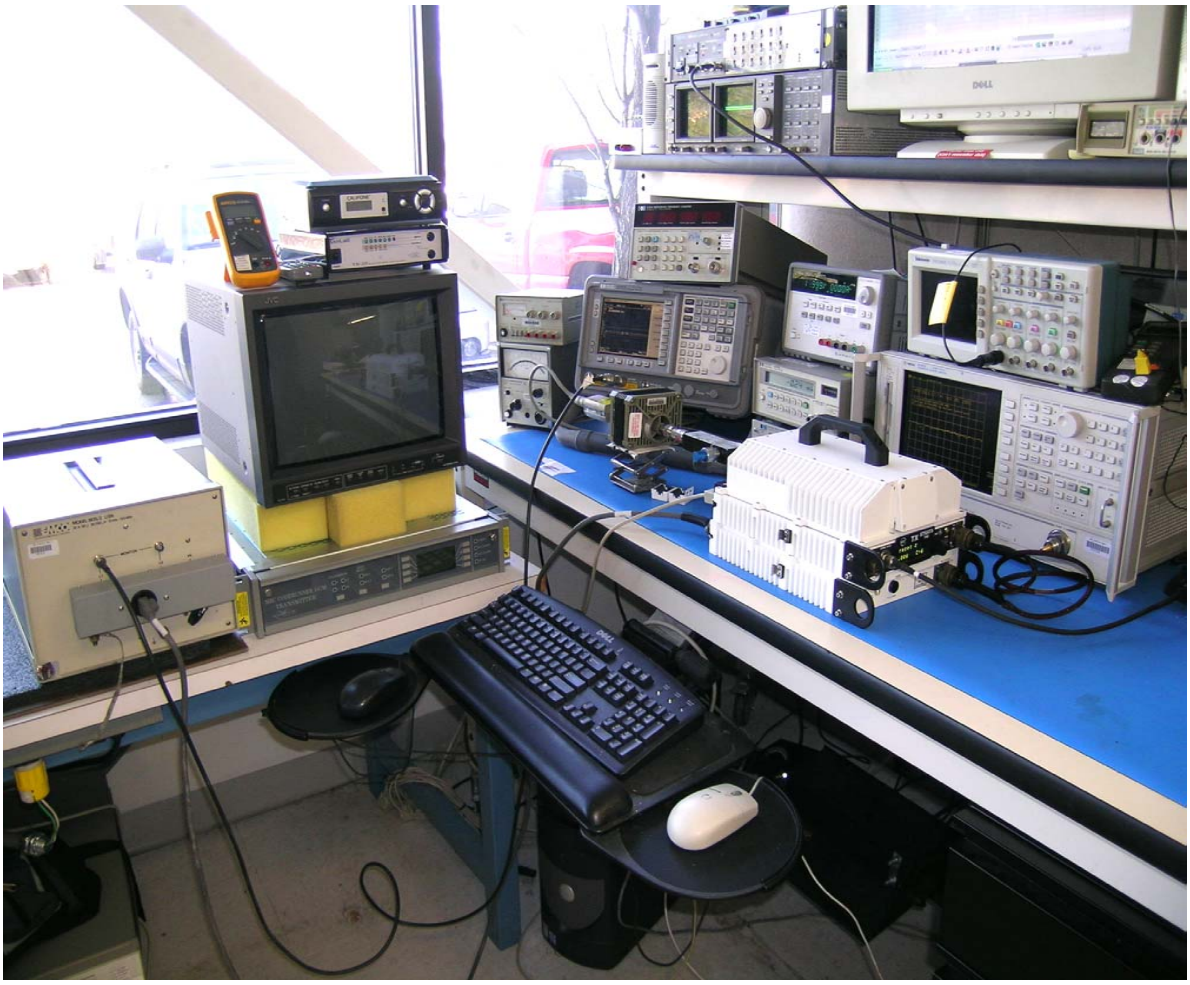


Photo 2

SECTION 11 TRANSMITTER BLOCK DIAGRAMS AND SCHEMATICS

STRATA TX BOARD LEVEL SCHEMATICS

Note: (The operational system and board level schematics have been submitted as an attachment and protected under a declaration of confidentiality)

MICROWAVE RADIO COMMUNICATIONS

SECTION 12 TRANSMITTER PHOTOS

STRATA TRANSMITTER PHOTOS
FC3STA044T1AK
MANUFACTURERS MODEL (907821-00)

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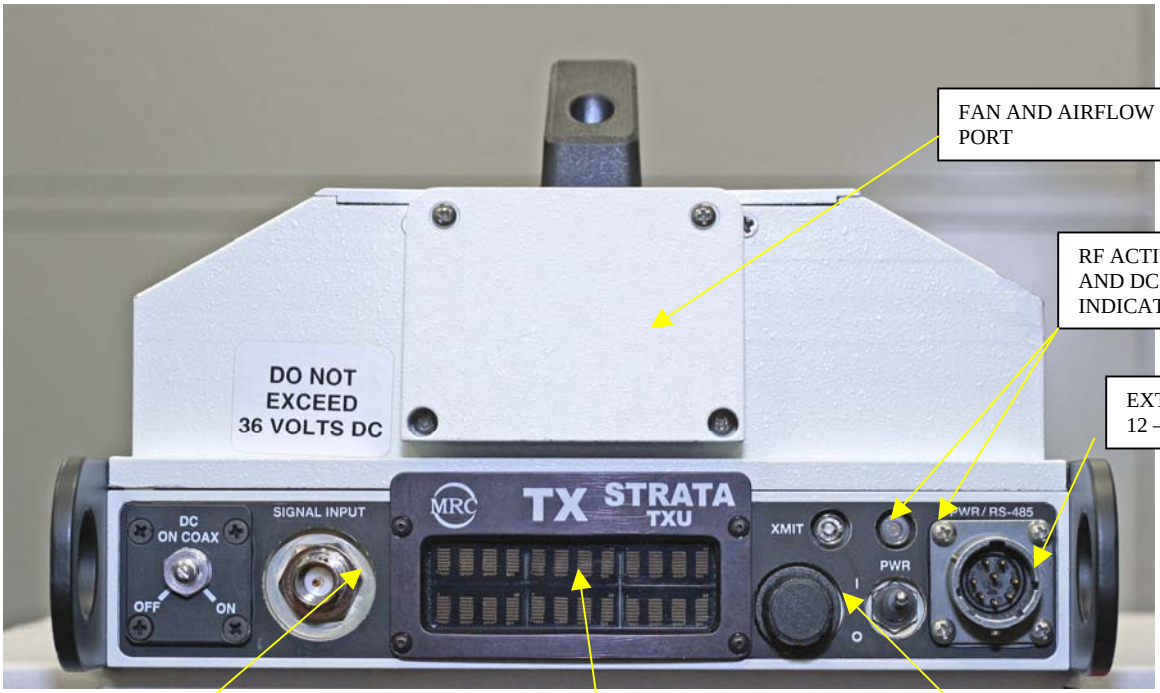
FC3STA044T1AK
MRC MODEL 907821-00

FRONT PANEL VIEW



FAN AND AIRFLOW PORT

RF ACTIVE (XMIT) AND DC POWER INDICATORS

EXTERNAL DC INPUT 12 – 36VDC

DIGITAL SWITCHED VIDEO – ASI INPUT TO MODULATOR OR VIDEO MPEG ENCODER

FRONT PANEL LCD DISPLY

FRONT PANEL MENU RF CONTROL

Photo 3

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FCC FC3STA044T1AK
INTERNAL VIEW
MRC MODEL 907821-11

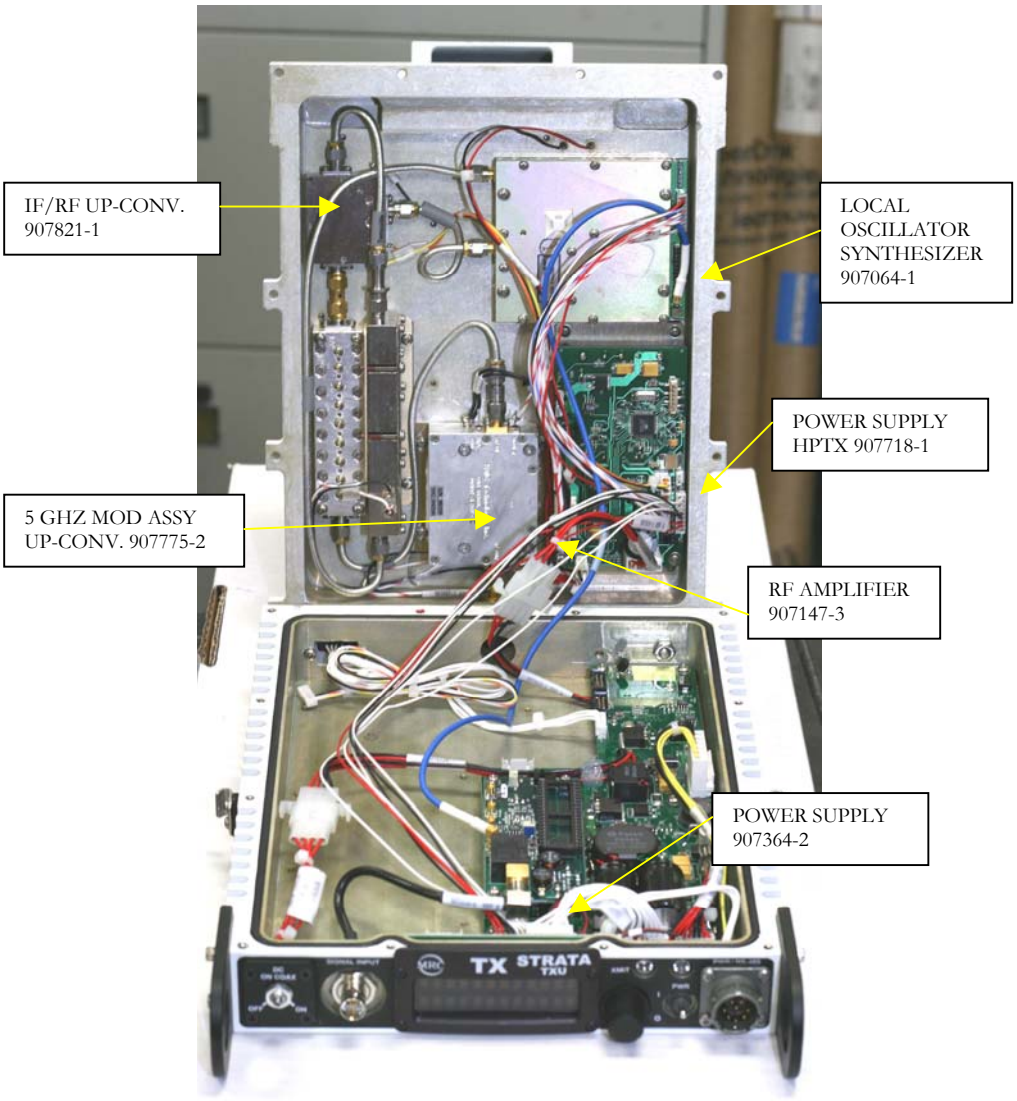

Photo 4

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FCC FC3STATXU044T1AK
REAR PANEL VIEW
MRC MODEL 907821-11

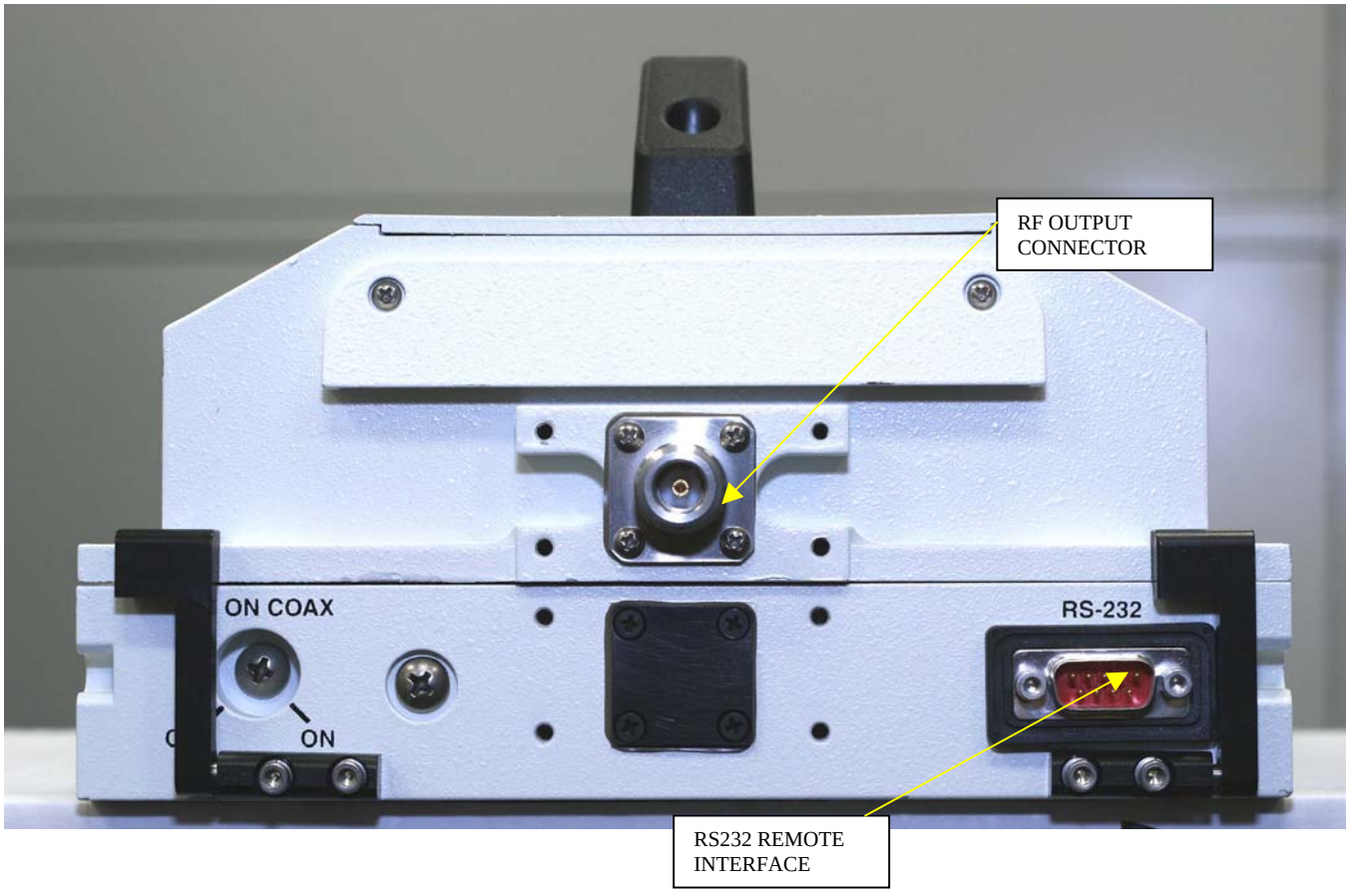

Photo 5

MICROWAVE RADIO COMMUNICATIONS

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Fax: (978) 671-5800

SECTION 13 TECHNICAL DATA SUMMARY

TECHNICAL DATA SUMMARY Frequency band: 4.4GHz to **5.0**GHZ, Channel spacing: 10 MHz,
ModulationType: qpsk, 16qam, 64qam OFDM.
Maximum measured output power@ antenna port: 31 dbm QPSK, 30dbm 16QAM, 28dbm 16QAM.
Antenna options : Omni directional and directional for mobile per FCC 47 CFR part 90 subpart Y
SCOPE:
The purpose of the test program detailed in this document is to demonstrate the Strata FCCSTA044T1AK clamshell microwave transmitter systems is compliant to the essential requirements of EN 302 064-1.v1.1.1 FCC Part 2, 15 and 90 as pertains to this document.

This report is intended as part of MRC-TCF 1000 the scope of which is to detail our compliance with the essential requirements of Article
3.2 of the R&TTE Directive 1999/5/EC

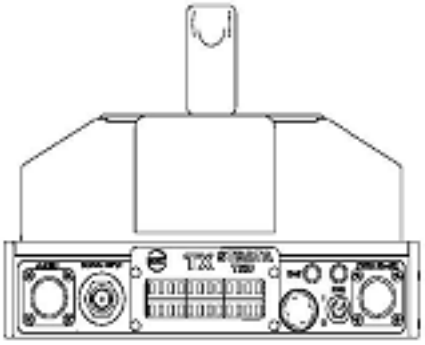
APPLICABLE DOCUMENTS

The following document form a part of this report as specified

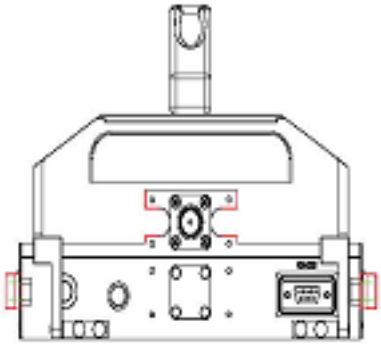
- Calibration details and certificates for the test equipment employed
- ETSI EN 302 064-1 V1.1.1 (2004-02)

SECTION 14 GENERAL REQUIREMENTS

A. PHYSICAL DESCRIPTION
The test sample is a Strata Microwave Transmitter of the clamshell design model number 907821-00.
The unit is DC powered. DC power IS provided by a test powersupply capable of the voltage variations proscribed by the governing standard.
The system measures 30cm long by 20cm wide by 12cm high and weighs approximately 5.9Kg.



FRONT VIEW



REAR VIEW

B.CABLE CONNECTIONS
1.DC POWER IN CIRCULAR BAYONET CONNECTOR
2.AUDIO INPUT CIRCULAR BAYONET CONNECTOR
3.SIGNAL INPUT 75Ω PANNEL MOUNTED BNC
4. USER COMPUTER INTERFACE AND INTERMODUAL BUS IS **A**WATER RESISTANT RS232 9 PIN D-SUB
5.RF OUTPUT BULKHEAD MOUNTED N-TYPE CONNECTOR

All measurements made with all ports populated with the appropriate cables. The lengths set at 3meters for testing purposes.

C.SUPPORT EQUIPMENT
SIGNAL INPUT: THE INPUT SIGNAL WAS FULL FIELD NTSC COLOR BARS PROVIDED BY TEKTRONIX 1910 DIGITAL GENERATOR SERIAL# B022844 CAL DATE 02/07/06
DC POWER PROVIDED BY A HP 6812A POWER SUPPLY CONTROLED BY A LAB-VIEW VERTUAL INSTRUMENT SERIAL#3523A00470 CAL DATE 07/06/06
USER INTERFACE PROVIDED BY CONFIGURATION FIRMWARE LOADED ON A DELL P4 3GHz/1GB RAM/40GB HARD DRIVE PC.

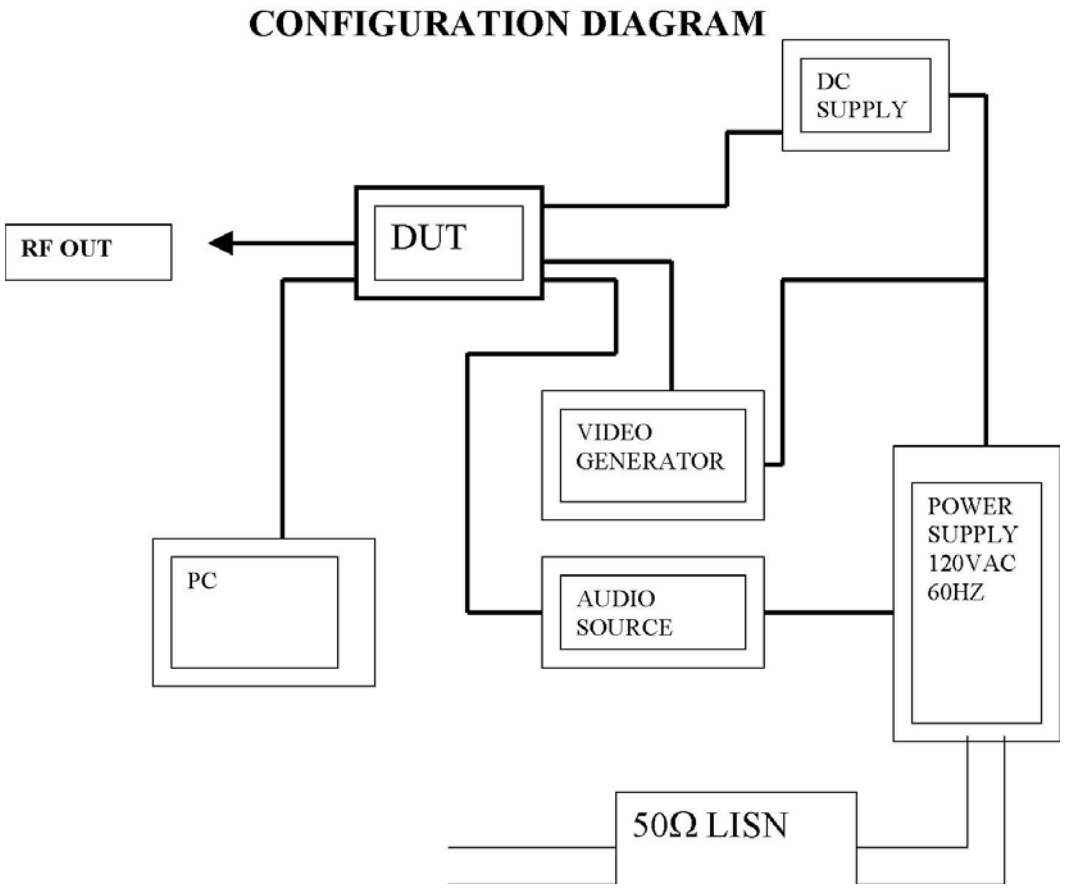


Fig. 4
General test configuration to measure RF (power, frequency and spectral matters) as well as emissions and performance tests

SECTION 15 POWER OUTPUT AND FREQUENCY STABILITY

PARAGRAPHS 2.1046 AND 2.1055

Measurements where made to determine the transmitter stability and power output over the temperature range 25 degrees C to –35 degrees C. The equipment was connected as shown in figure 6 and the temperature was cycled automatically as recorded in table 1. The transmitter was allowed to stabilize a minimum of 30 minutes before measurement.
Power and frequency measurements where performed simultaneously

Measurements where also made to determine transmitter frequency stability versus primary supply variation of the DC input voltage range of 12V to 48V. The equipment was connected as shown in figure 6a. The test data is listed in Table 1 which shows no frequency change.

4.4 TO 5GHz STRATA CLAMSHELL
FREQUENCY STABILITY OVER TIME AND TEMPERATURE

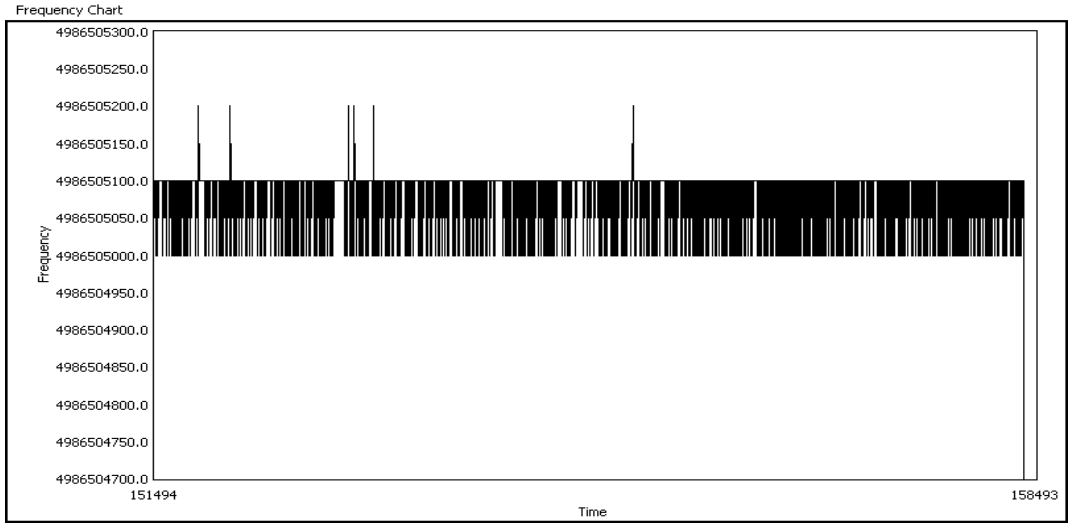
The following measurements were made using a lab-view controlled microwave frequency counter.
HP 5343A. The histogram has a 1Hz resolution and a sample rate of one second
The temperature measurements reference case temperature after a dwell time of two hours
The manufacturers specification is 2PPM over – 20 to + 50 degrees c

SETION 16 FREQUENCY STABILITY

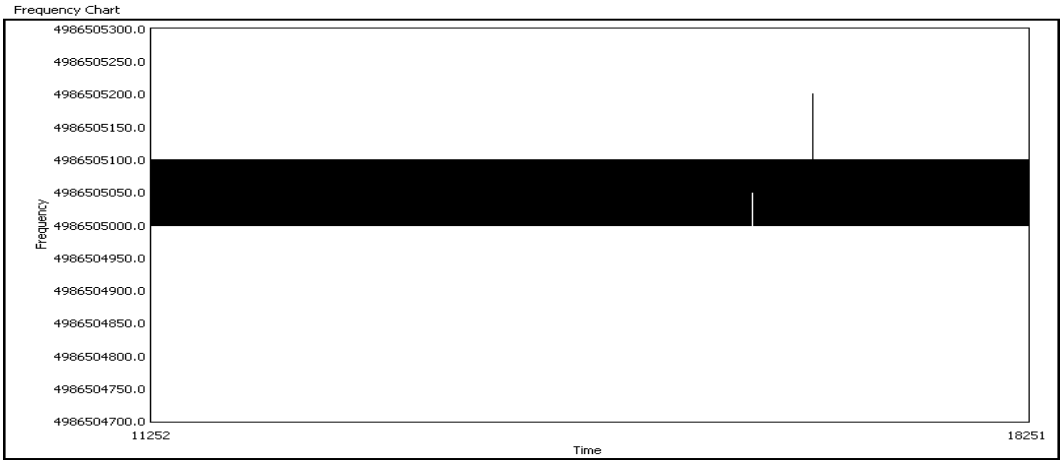
4.4 TO 5GHz STRATA CLAMSHELL
FREQUENCY STABILITY OVER TIME AND TEMPERATURE.

The following measurements were made using a lab-view controlled microwave frequency counter.
HP 5343A. The histogram has a 1Hz resolution and a sample rate of one second
The temperature measurements reference case temperature after a dwell time of two hours
The manufacturers specification is 2PPM over – 20 to + 50 degrees c
The tests are initiated at the minimum voltage of +11 VDC. The voltage is increased by 1 VDC per minute while simultaneously recording frequency stability up to the maximum of +35 VDC.
THE STRATA TRANSMITTER WAS SET UP IN EXTERNAL IF MODE. A 70MHz CW SIGNAL WITH A MEASURED FREQUENCY STABILITY OF LESS THAN 1PPM (PART # 907004) WAS USED AS SIGNAL INPUT. THE MEASURMENT S MADE IS THE UPCONVERTED AND AMPLIFIED OUTPUT TO THE ANTENNA.

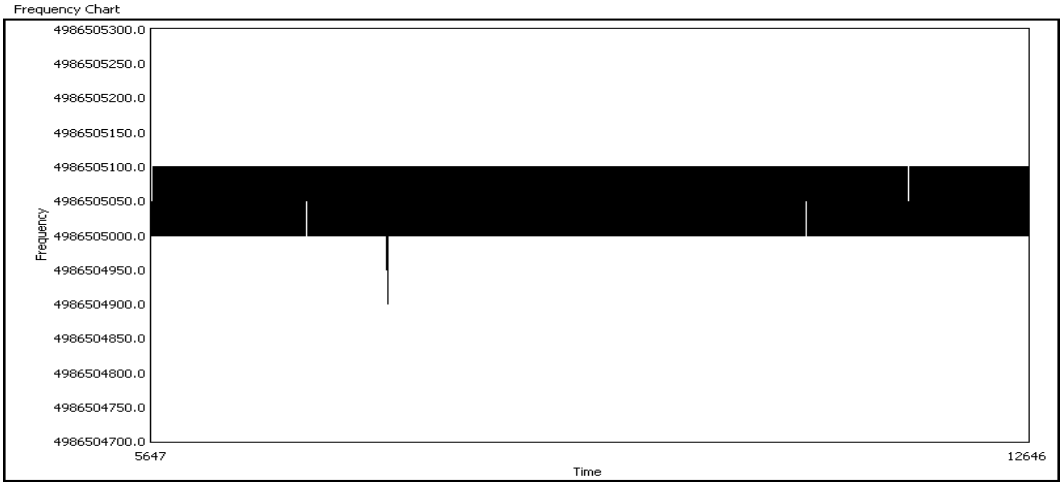
CHANNEL 13- 4986.500MHZ SET. MEASURED OUTPUT- 4986.505 FREQUENCY ERROR OF 5 KHz FREQUENCY DEVIATION OF +/- 15Hz



-20DEGREES C FREQUENCY ERROR OF 5 KHz FREQUENCY DEVIATION OF +/- 50Hz



+50 DEGREES C
FREQUENCY ERROR OF 5 KHz FREQUENCY DEVIATION OF +/- 50Hz



FREQUENCY STABILITY OVER VOLTAGE VARIATION OF THE PRIMARY POWER AS DETAILED IN 2.10055 (3)
PER THE REQUIRMENT THE VOLTAGE WAS VARYED BETWEEN 85% AND 115% OF THE NOMINAL VOLTAGE VALUE.

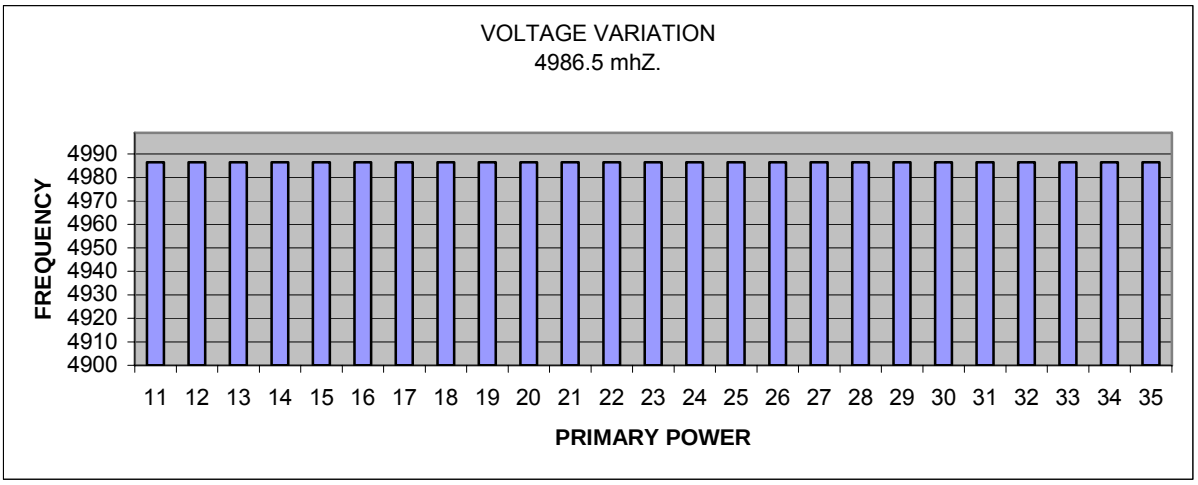
V NOMINAL 24VOLTS DC LIMITS (NOTE THE VOLTAGE VARIATION LIMITS EXCEED THE FCC REQUIRMENTS FOR THIS TEST. 11VDC TO 35VDC IN 1VOLT INCREMENTS

SET UP: AN HP 6812A POWER SUPPLY AND ANALYZER PROVIDES PRIMARY POWER. THE SUPPLY WAS COMPUTER CONTROLED USING MANUFACTURER PROVIDED SOFTWARE. A FREQUENCY MEASURMENT WAS MADE AT EACH VOLTAGE VARIATION AFTER A STABILIZATION PERIOD OF 30 SECONDS.

FREQUENCY SET
4986.500
FREQUENCY MEASURED
4986.505

4986.505	11
4986.505	12
4986.505	13
4986.505	14
4986.505	15
4986.505	16
4986.505	17
4986.505	18
4986.505	19
4986.505	20
4986.505	21
4986.505	22
4986.505	23
4986.505	24
4986.505	25
4986.505	26
4986.505	27
4986.505	28
4986.505	29
4986.505	30
4986.505	31
4986.505	32
4986.505	33
4986.505	34
4986.505	35

table 1



Frequency	T power	T power	T power
4400mhz	29.1 dBm	31.2dBm	27.3dbm
4500mhz	29.1 dBm	31.2dBm	27.3dbm
4600mhz	29.1 dBm	31.2dBm	27.3dbm
4700mhz	29.1 dBm	31.2dBm	27.3dbm
4800mhz	29.1 dBm	31.2dBm	27.3dbm
4900mhz	29.1 dBm	31.2dBm	27.3dbm
5000mhz	29.1 dBm	31.2dBm	27.3dbm
Temperature	20	-20	50

TABLE 3

90.1215 Power limits.
The peak transmitter power should not exceed the following limits Channel bandwidth

BANDWIDTH (MHz)	LOW POWER LIMIT	HIGH POWER LIMIT(DBm)
1	7	20
5	14	27
10	17	30
15	18.8	31.8
20	20	33

Table 4

The peak power spectral density is measured as a conducted emission by direct connection to a calibrated instrument (Agilent ESA-E-SERIES SPECTRUM ANALYZER). A resolution bandwidth can be used to provided the measured power is integrated to show total power over the measured bandwidth.

RATED OUTPUT POWER TEST SETUP DRAWING

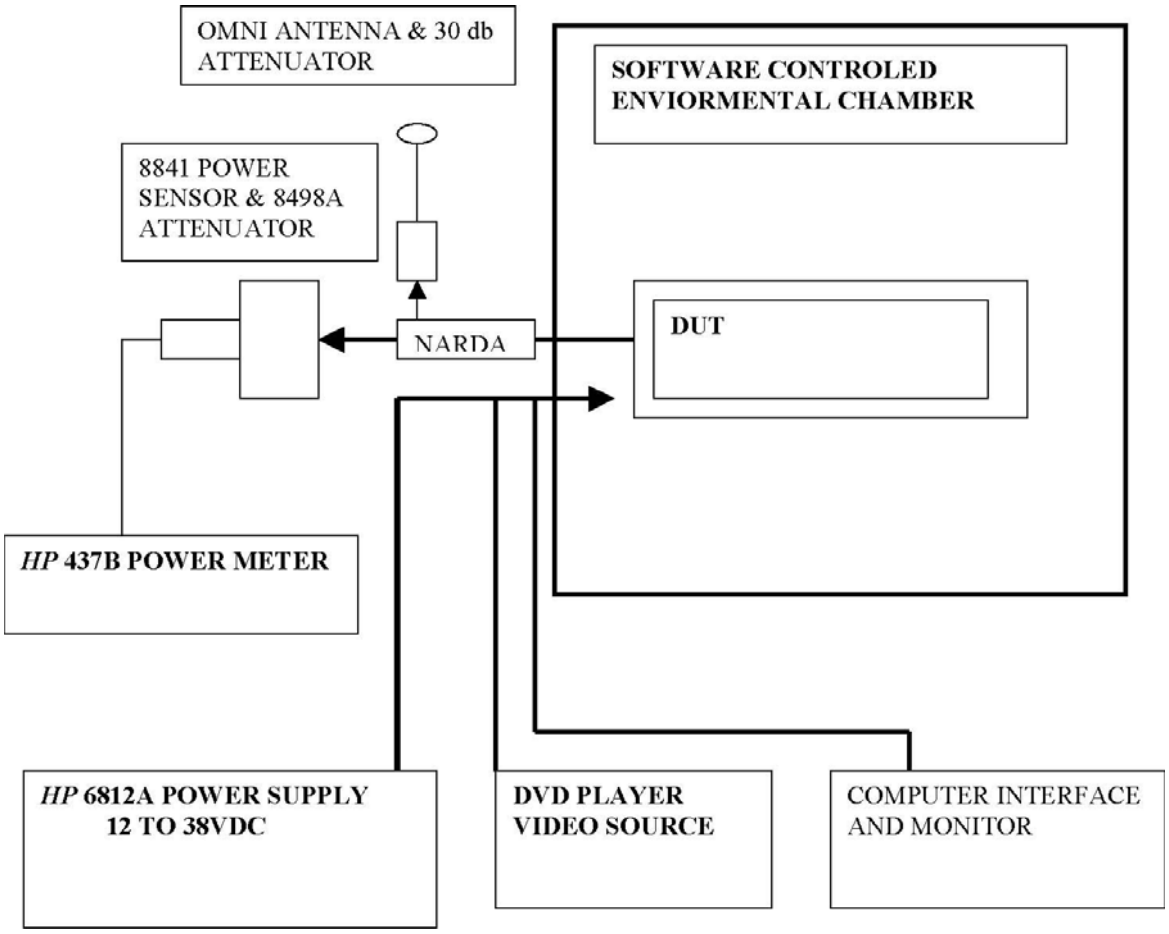


FIG. 6

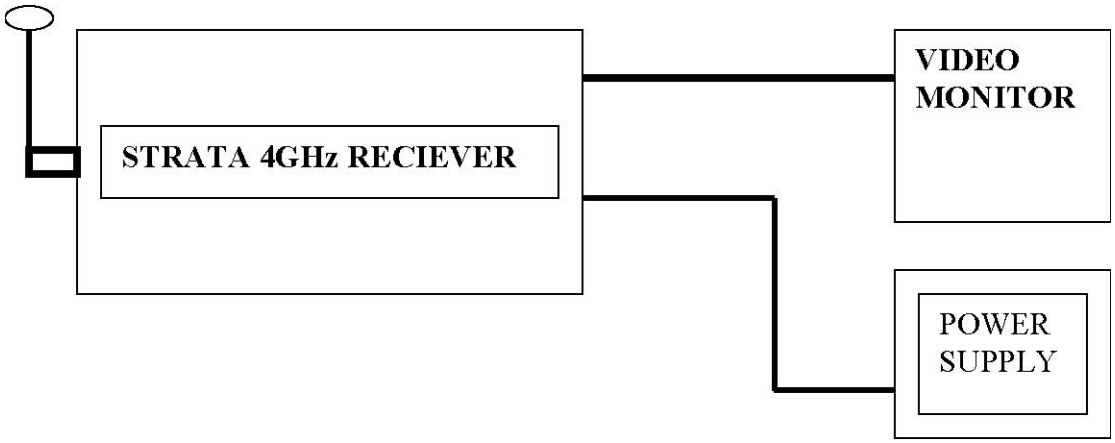


FIG 6a

TEST SET UP PHOTOGRAPHS

Photo 8

Photo 9

TEST EQUIPMENT LIST

MODEL	SERIAL #	CAL DATE	DESCRIPTION	MANUFACTURER
3293-2		8-22-06	COUPLER	NARDA
437B	393374	3-06	POWER METER	HP
8481B	1801A00389	3-06	POWER SENSSOR	HP
11271-130		6-06	TEMP. CHAMBER	TENNEY
8498A	1801A	3-06	ATTENUATOR	HP

TABLE 3

Fig 5

Photo 10

NECESSARY BANDWIDTH 20MHZ CHANNEL BANDWIDTH Po= 32.7dbm, 2. WATT QPSK MODULATED COFDM 8MHz BANDWIDTH ½ FEC INPUT SIGNAL COMPOSITE VIDEO NTSC SET UP: 10db 50 OHM ATTENUATOR AND 1 db CABLE LOSS

SECTION 18 FREQUENCY SPECTRUM TO BE INVESTIGATED

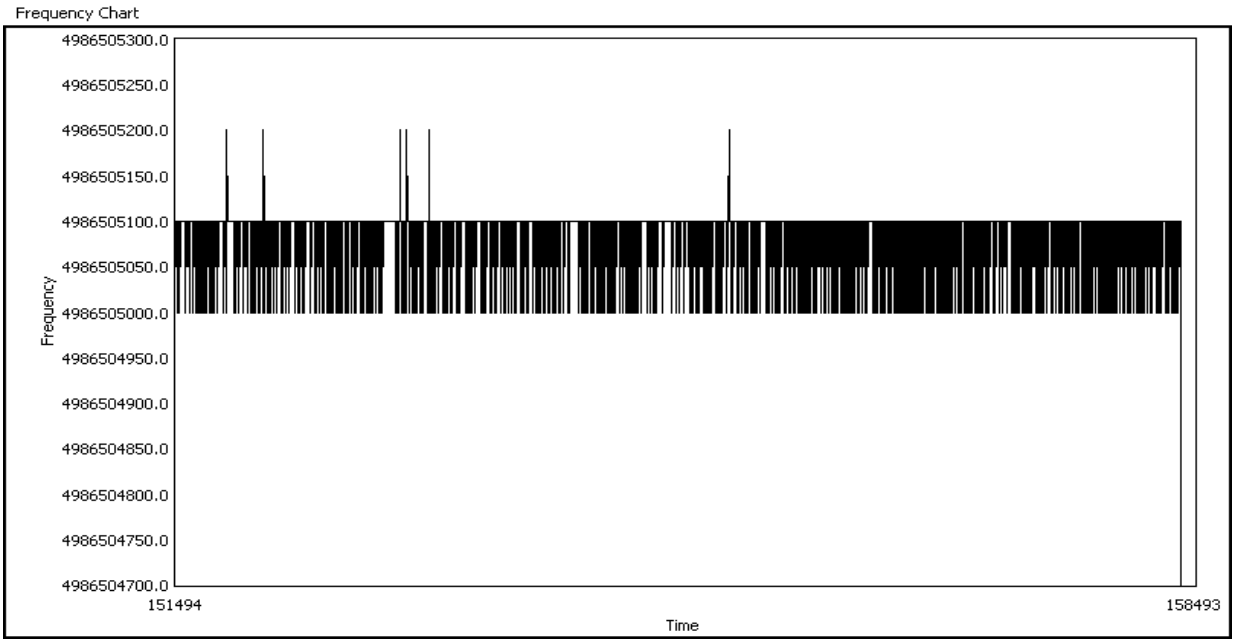
4.4 TO 5GHz STRATA CLAMSHELL
FREQUENCY STABILITY OVER TIME AND TEMPERATURE.

The following measurements were made using a lab-view controlled microwave frequency counter.
HP 5343A. The histogram has a 1Hz resolution and a sample rate of one second
The temperature measurements reference case temperature after a dwell time of two hours
The manufacturers specification is 2PPM over – 20 to + 50 degrees c
The tests are initiated at the minimum voltage of +11 VDC. The voltage is increased by 1 VDC per minute while simultaneously recording frequency stability up to the maximum of +35 VDC.

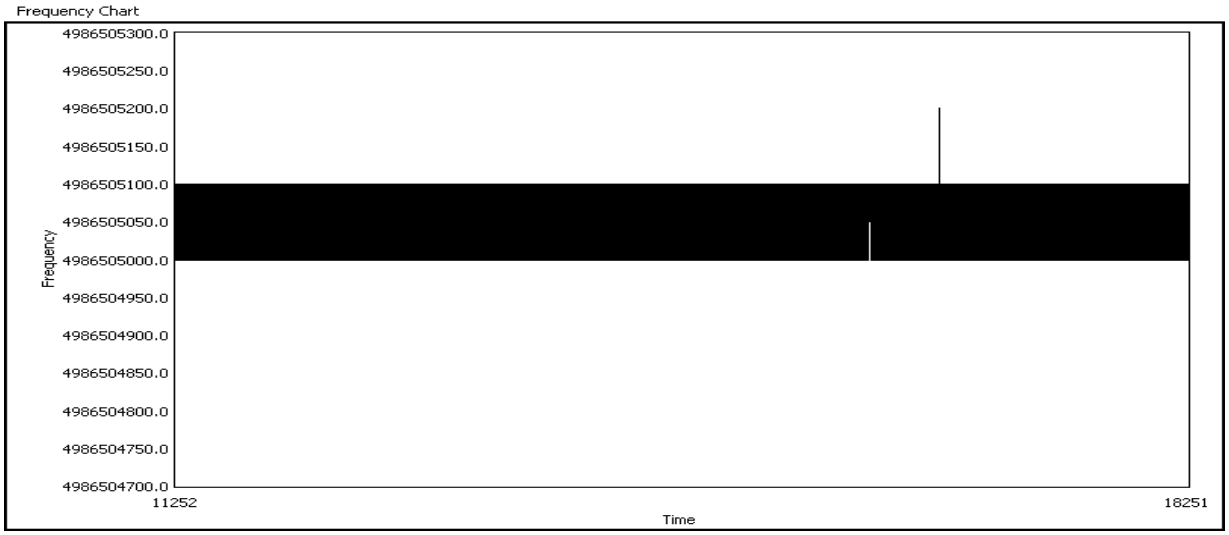
TEST PROFILE

THE STRATA TRANSMITTER WAS SET UP IN EXTERNAL IF MODE. A 70MHz CW SIGNAL WITH A MEASURED FREQUENCY STABILITY OF LESS THAN 1PPM (PART # 907004) WAS USED AS SIGNAL INPUT. THE MEASURMENT S MADE IS THE UPCONVERTED AND AMPLIFIED OUTPUT TO THE ANTENNA.

CHANNEL 13- 4986.500MHZ SET. MEASURED OUTPUT- 4986.505 FREQUENCY ERROR OF 5 KHz
FREQUENCY DEVIATION OF +/- 15Hz



-20DEGREES C
FREQUENCY ERROR OF 5 KHz FREQUENCY DEVIATION OF +/- 50Hz



+50 DEGREES C
FREQUENCY ERROR OF 5 KHz FREQUENCY DEVIATION OF +/- 50Hz

FREQUENCY STABILITY OVER VOLTAGE VARIATION OF THE PRIMARY POWER AS DETAILED IN 2.10055 (3) PER THE REQUIRMENT THE VOLTAGE WAS VARYED BETWEEN 85% AND 115% OF THE NOMINAL VOLTAGE VALUE.

V NOMINAL 24VOLTS DC LIMITS (NOTE THE VOLTAGE VARIATION LIMITS EXCEED THE FCC REQUIRMENTS FOR THIS TEST. 11VDC TO 35VDC IN 1VOLT INCREMENTS

SET UP: AN HP 6812A POWER SUPPLY AND ANALYZER PROVIDES PRIMARY POWER. THE SUPPLY WAS COMPUTER CONTROLED USING MANUFACTURER PROVIDED SOFTWARE. A FREQUENCY MEASURMENT WAS MADE AT EACH VOLTAGE VARIATION AFTER A STABILIZATION PERIOD OF 30 SECONDS.

FREQUENCY SET 4986.500
FREQUENCY MEASURED 4986.505

4986.505	11
4986.505	12
4986.505	13
4986.505	14
4986.505	15
4986.505	16
4986.505	17
4986.505	18
4986.505	19
4986.505	20
4986.505	21
4986.505	22
4986.505	23
4986.505	24
4986.505	25
4986.505	26
4986.505	27
4986.505	28
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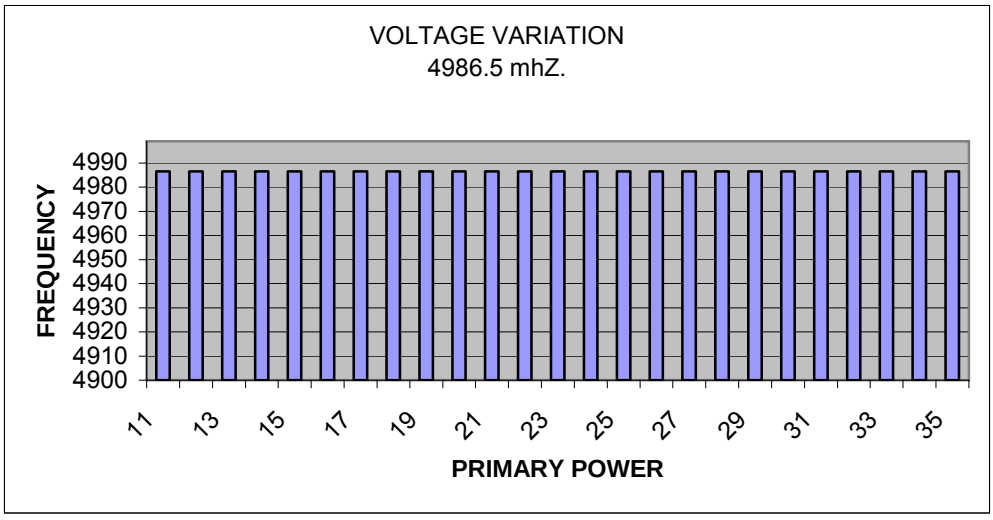
4986.505	34
4986.505	35

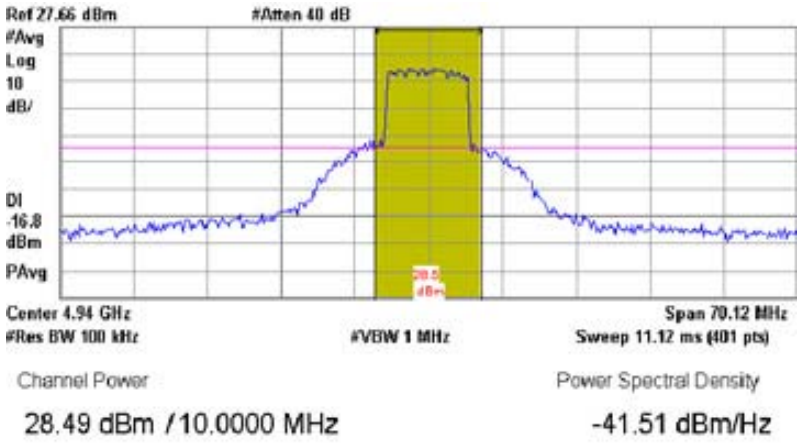


SECTION 19 PEAK POWER SPECTRAL DENSITY

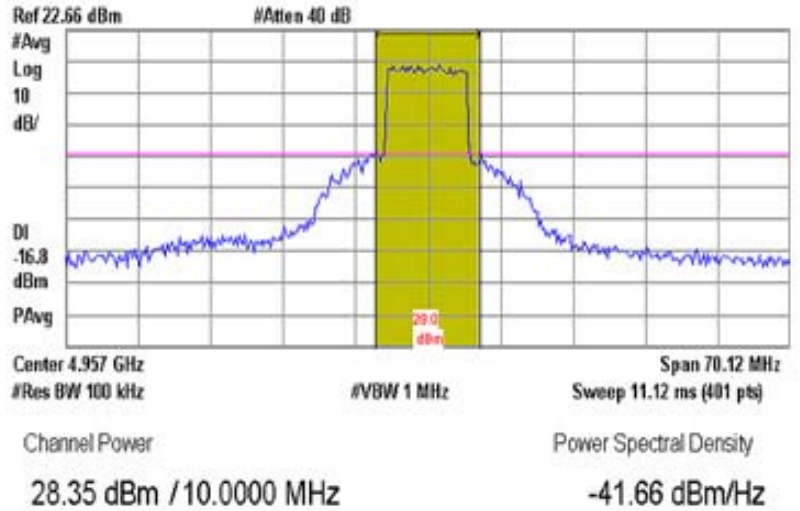
The peak power spectral density is measured as a conducted emission by direct connection to a calibrated instrument (Agilent ESA-E-SERIES SPECTRUM ANALYZER). A resolution bandwidth can be used to provided the measured power is integrated to show total power over the measured bandwidth.

10MHZ CHANNEL PLAN DESIGNATOR 10MOD7W

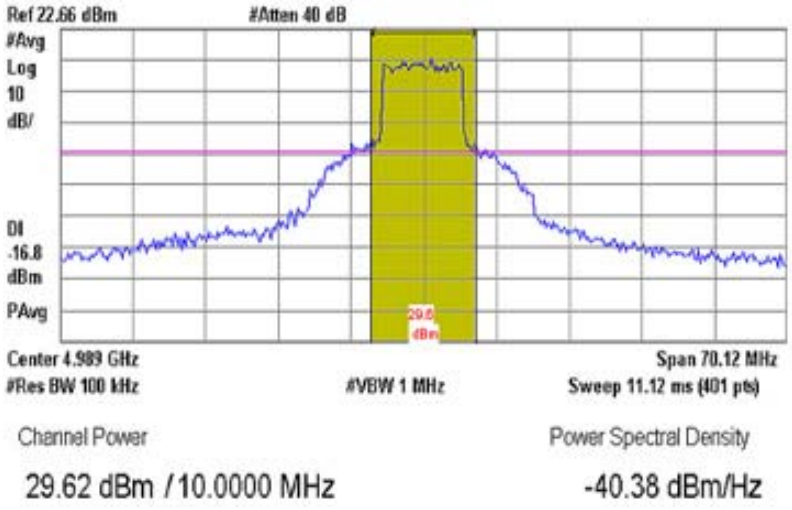
Low, Mid and High channels
Modulation QPSK COFDM 8MHz signal band width ½ FEC GI 1/8 output power is software limited to +28.5dBm. Power is integrated across the 10MHz channel band width per; 90.1215
High Power limit: +30dBm. Spectral density limit: 21dbm PER 1 MHz



Low channel 4940.5MHz 10MOD7W

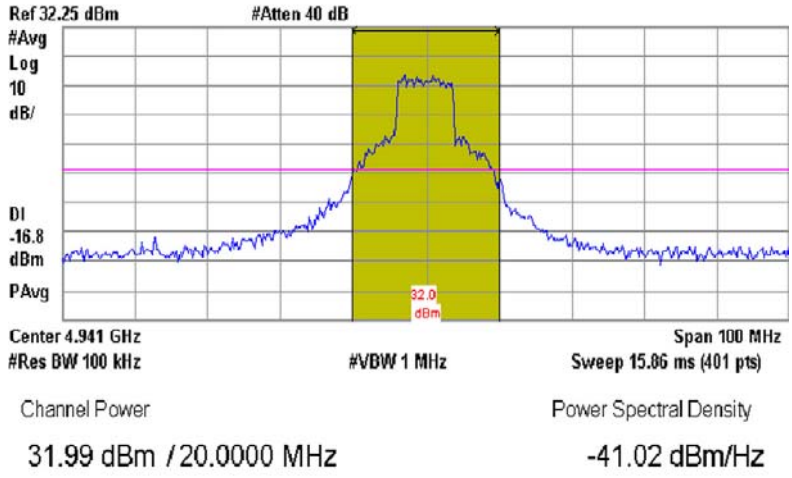


Mid channel 4957.5MHz 10MOD7W

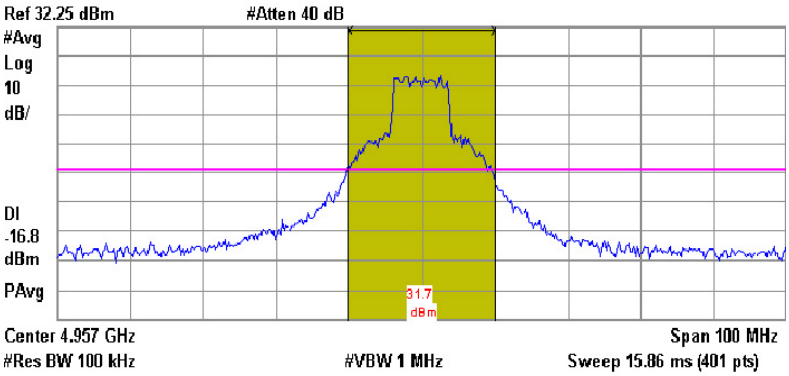


High channel 4989.5MHz 10MOD7W

20MHZ CHANNEL PLAN DESIGNATOR 20MOD7W
MODULATION QPSK COFDM 8MHz SIGNAL BANDWIDTH ½ FEC GI 1/8. OUTPUT POWER IS SOFTWARE LIMITED TO 32.dbm. POWER IS INTEGRATED ACROSS THE 20MHz CHANNEL BANDWIDTH PER -90.1215



Low channel 4940.5MHz 20MOD7W



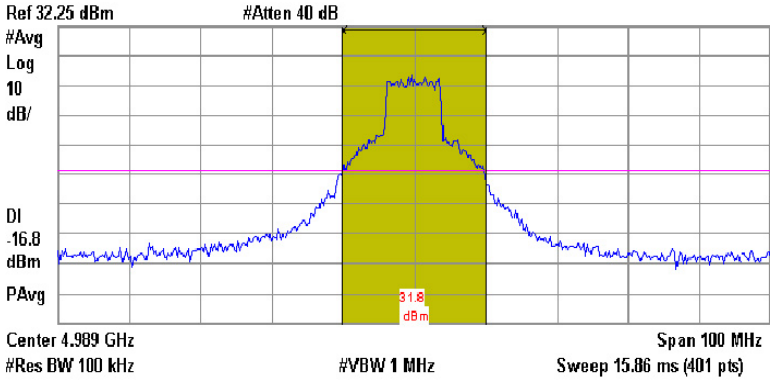
Channel Power

31.72 dBm / 20.0000 MHz

Power Spectral Density

-41.73 dBm/Hz

Mid channel 4957.5MHz 20MOD7W



Channel Power

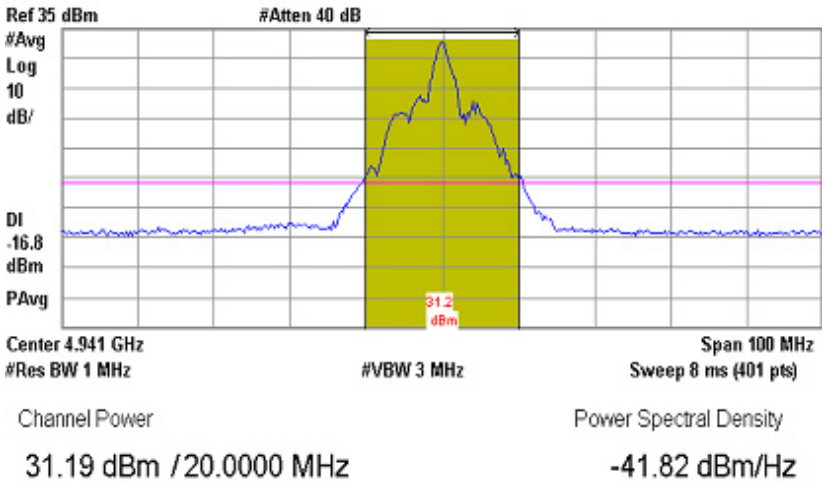
31.83 dBm / 20.0000 MHz

Power Spectral Density

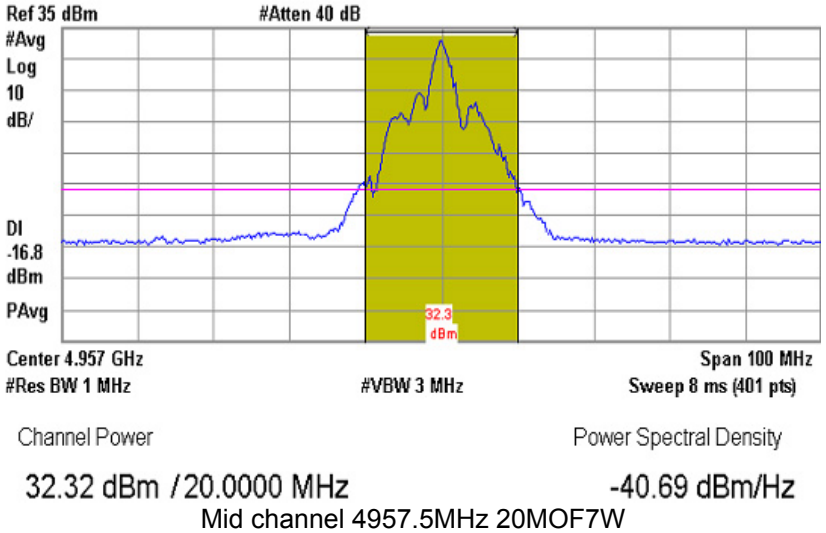
-41.18 dBm/Hz

High channel 4989.5MHz 20MOD7W

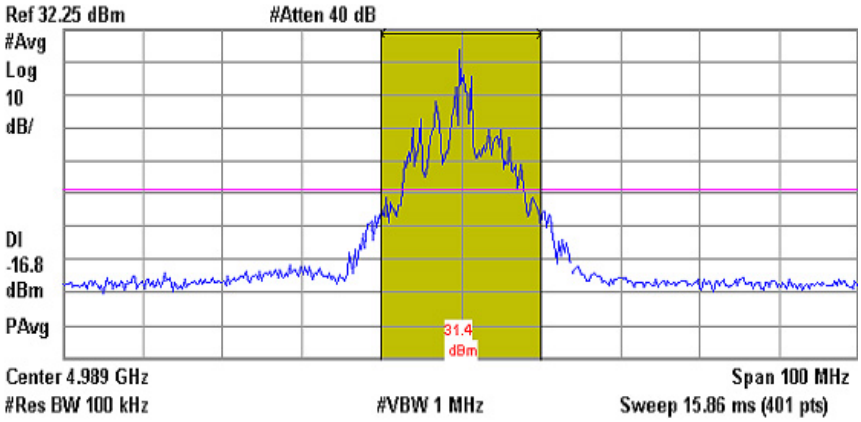
MODULATION: Analog FM
Video deviation: 3MHz Audio Sub – carrier channel frequencies: 4830KHz, 5200KHz, 5800KHz 6200KHz With pre - Emphasis
The TX output power is software limited to: +32.dBm. Spectral Power is integrated across the 20 MHz channel band width per 90.1215 (d)



Low channel 4940.5MHz 20M0F7W



Mid channel 4957.5MHz 20MOF7W



Channel Power

31.38 dBm / 20.0000 MHz

Power Spectral Density

-41.63 dBm/Hz

SECTION 20 MPE CALCULATIONS

STRATA TRANSMITTER MPE CALCULATIONS
FC3STATXU044T1AK
MANUFACTURERS MODEL (907821-00)

MPE CALCULATION

The MRC STRATA 4.4 – 5.0 (FC3STATXU044T1AK) Transmitter is designed to operate in a mobile environment. The specific operational band is in the 4940 – 4990 public safety band. Since the device is intended to operate typically in 10 MHz channel spectrum then the output power limitation of 1Watt (30dBm) applies to this device. The choice of antenna is typically user defined. As stated in CFR47, 90.1215 the maximum antenna gain of 9Dbi will be calculated. Dependant on the mode of operation, this radio can be utilized for restoration of emergency communications services in a point to point environment. In this case, directional antennas of up to 26 dBi can be utilized. In some cases, this unit is applied to airborne use as permitted. As defined by the rules governing this type of application the antenna is restricted to a certain gain based on the 1 Watt allowed transmit output.

These two antennas suggested for normal operation have been included in the MPE calculations below. One, a 5dBi omni directional and a 20 dBi parabolic direction antenna.

The parabolic antenna is designed to operate in the band: 4.4GHz. to 5.0GHz. It produces mid band gain of 20dbi, the F/B ratio is >-25db with side lobe rejection of 20 db. Beam-width in the horizontal plane 14° vertical 19.5° On occasion for mobile ENG coverage operators may operate a Omni directional antenna of 5dbi mid-band gain, use of this antenna is exclusive for digital COFDM transmission at maximum power of 1W. This antenna would be utilized for airborne to reach single or multi receive sites on the ground. The higher gain antenna is tri-pod or fixed mounted and deployment is restricted to static operation. Vehicle mast deployment is generally designed to provide for rapid field deployment on vehicles.. Therefore this calculation will be provided in two parts, maximum gain of the 1W output with both 5 dBi and 20dBi gain antennas. MPE Calculations have been provided to detail each potential case.

STRATA 4.4 – 5.0 GHZ. MOBILE DIGITAL MICROWAVE TRANSMITTER

Calculated use with Standard 5dbi Gain antenna.

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density

P = power input to the antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

Maximum peak output power at antenna input terminal:	30.00	(dBm)
Maximum peak output power at antenna input terminal:	1000	(mW)
Antenna gain(typical):	5	(dBi)
Maximum antenna gain:	5	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	4960	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	1	(mW/cm^2)
Power density at prediction frequency:	0.994718	(mW/cm^2)
Maximum allowable antenna gain:	7.0126986	(dBi)

Fig 6A

STRATA 4.4 – 5.0 GHZ. MOBILE DIGITAL MICROWAVE TRANSMITTER

Calculated use with Standard 20dbi Gain antenna.

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density

P = power input to the antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

Maximum peak output power at antenna input terminal:	30.00	(dBm)
Maximum peak output power at antenna input terminal:	1000	(mW)
Antenna gain(typical):	20	(dBi)
Maximum antenna gain:	20	(numeric)
Prediction distance:	100	(cm)
Prediction frequency:	2500	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	1	(mW/cm^2)
Power density at prediction frequency:	0.159155	(mW/cm^2)
Maximum allowable antenna gain:	20.9921	(dBi)

Fig 6B

WARNING!
THIS EQUIPMENT IF HANDLED IMPROPERLY WILL POSE A RADIATION HAZARD

Microwave Radio Communications Inc. in compliance with RF exposure limits set forth in OET Bulletin 65, Edition 97-01 utilizes this page for the intent of expressing our concerns to the user of this equipment STRATA 4 - 5 GHz Transmitter Unit (STA044T1AK) that there exists a radiation hazard with improper use of this equipment.

The STRATA transmitter with rated 1-WATT RF Power output is designed as an intentional radiator, as such, this device has been designed to produce and emit radiation into an isotropic antenna for the purpose of delivering a digitally modulated signal to an appropriate receiving device.

Due to the low output power of this device in and of itself it poses no such hazard until connected properly and securely to a properly matched antenna. Therefore it is necessary for the equipment operator to be made aware of the safe operating parameters of this device. Below is a chart based on the use of a 5dBi Omni directional antenna. The radiation limits at a distance of below 20cm exceeds the allowable safe exposure limits. Beyond a distance of 20 cm you will notice that the usable antenna gain (expressed in dBi) increases logarithmically with distance spherically from the radiator.

In the case of an antenna with a concentrated beam such as a parabolic antenna, the caution to exposure levels would be relative to antenna gain and distance only with in the radiation pattern of the parabola. Notwithstanding, radiation exposure due to antenna inefficiency (side lobe and front to back emission) although severely reduced should be calculated. A case-by-case analysis of each antenna that is to be utilized with this device should be investigated.

The intent of this document is to bring awareness to the operator of this device the potential for hazardous RF exposure limits if improperly used. Microwave Radio Communications Inc. cautions the user to contact our customer service department to receive exposure data or the antenna manufacturer to receive the radiation pattern of the antenna if not purchased through Microwave Radio Communications Inc.

Radiation Limit for Mobile Transmitter at 1WATT
(+30dBm)

MPE Based on 5dBi Omni Antenna

mW/cm^2 5dBi Omni										
5.02099	-2.007	(Max Allowable Antenna Gain dBi)								
2.231555		1.513								
1.25525			4.012							
0.80336				5.95						
0.557889					7.534					
0.409877						8.87				
0.313812							10.033			
0.247951								11.056		
0.20084									11.9	
0.089262										15.49
Distance cm	10	15	20	25	30	35	40	45	50	75

radiation exposure levels below 1Mw/cm^2 are permissible levels in accordance with OET Bulletin 65, Edition 97-01.
The above graph depicts permissible levels at required safe distances from the isotropic radiator. The incremental gain of the radiator can be increased in accordance with the distance of the human body removed from the radiator by the corresponding distance in centimeters. As can be observed, the distances are marginal but notice should be observed never the less.

Fig 7

SECTION 20 TEST FACILITY AND COMPLIANCE OBJECTIVES

1.2 TEST FACILITIES:

MICROWAVE RADIO COMMUNICATIONS INC., 978-671-5700
COMPLIANCE TEST DEPARTMENT
101 BILLERICA AVENUE
NORTH BILLERICA, MA. 01862

CURTIS-STRAUS LLC 978-486-8828 FAX.
527 GREAT ROAD 978-486-8880 PHONE
LITTELTON MA.

Note: This report contains data which is not covered by Curtis-Straus's A2LA accreditation.

Prepared by:_____Dwayne Johnson

Technician

Authorized by:_____Hocine Belal

Manager

RADIO AND TELECOMMUNICATION TERMINAL EQUIPMENT
DIRECTIVE 99/5/EC TECHNICAL FILE FOR ARTICLE 3, ESSENTIAL
REQUIREMENT 1. (a) MICROWAVE RADIO COMMUNICATIONS
_____
STRATA FC3STA044T1AK DIGITAL VIDEO TRANSMITTER SYSTEM

PREPARED BY MICROWAVE RADIO
COMMUNICATIONS INC.
PRODUCTION TEST AND COMPLIANCE DEPT
101 BILLERICA AVENUE, BLDG.6
THE MANUFACTURER HEREBY DECLARES THAT IT WILL TAKE ALL MEASURES TO INSURE THE COMPLIANCE OF THE PRODUCT DETAILED IN THIS TECHNICAL FILE WITH THE FCC R&TTE DIRECTIVES THAT APPLY.

SECTION 21 ENGINEERING CERTIFICATION

It is here by stated that as an ISO-9001:2000 certified company the Certification tests on the Microwave Radio Communications STRATA Transmitter (FC3STATXU044T1AK) where made under factory test conditions. All test equipment calibration certification is on file here at the Microwave Radio Communications Inc. facility. All of the submitted data in the attached report is true and correct to the best of my knowledge and belief.

Richard Miller
Systems Engineering

PLACE SIGNATURE DATE

FULL NAME

EN 302-064-1-v1.1.1

- REPORT OF MEASUREMENTS FOR STRATA MICROWAVE, VIDEO TRANSPORT SYSTEM
- MODEL NUMBER: 907821-00
- REPORT NUMBER: 5000

TESTS PERFORMED BY: DWAYNE JOHNSON

APPENDIX - A MIL-SDT – 461E ELECTROMAGNETIC INTERFERENCE

Requirements for the control of Electromagnetic Interference Characteristics of sub-systems and equipment § RE-103 – Radiated emissions, antenna spurious and harmonic outputs, 10 KHz to 40 GHz.

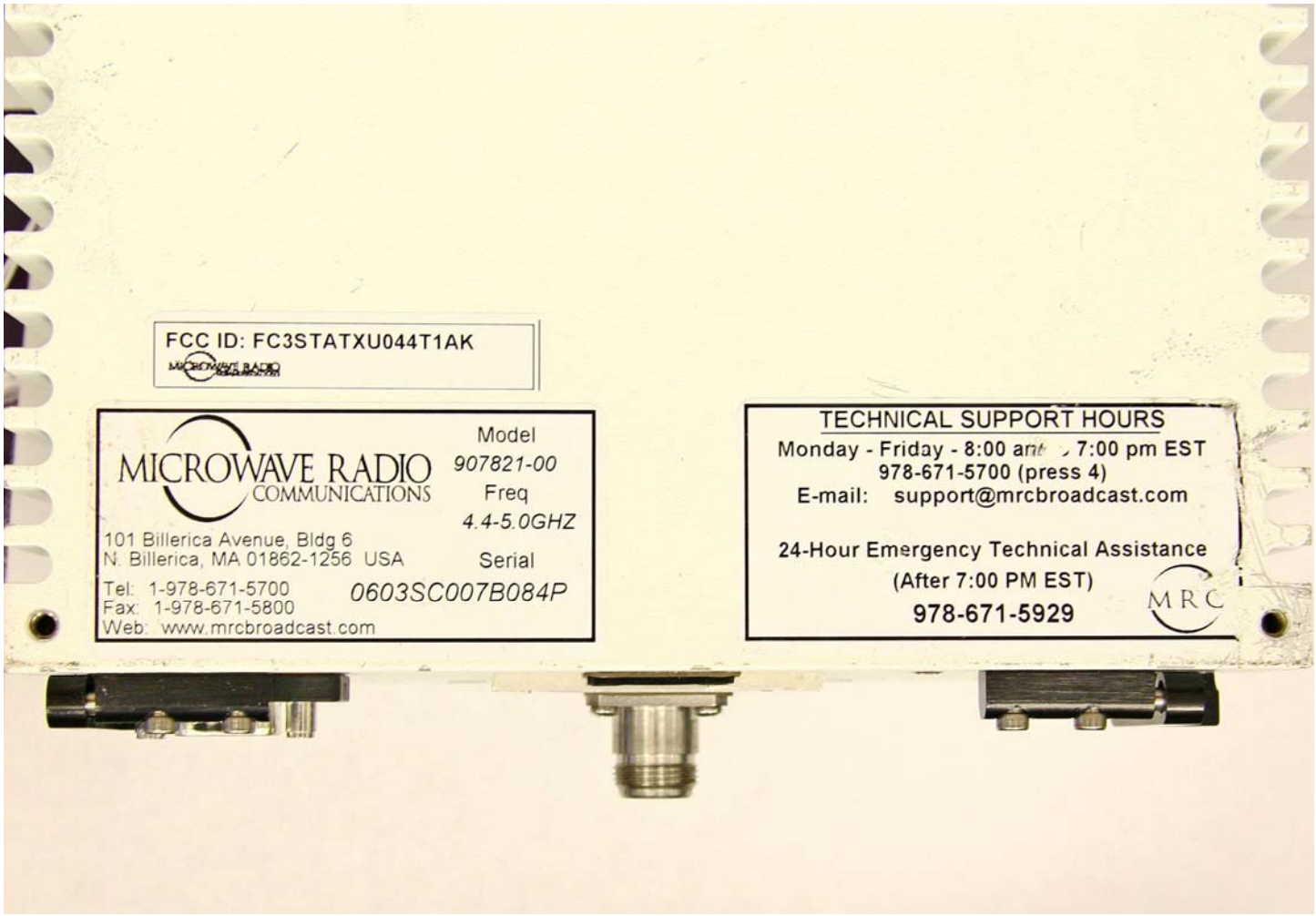
REFERENCE CURTIS-STRAUS REPORT EFO326-1 MAY 20, 2005

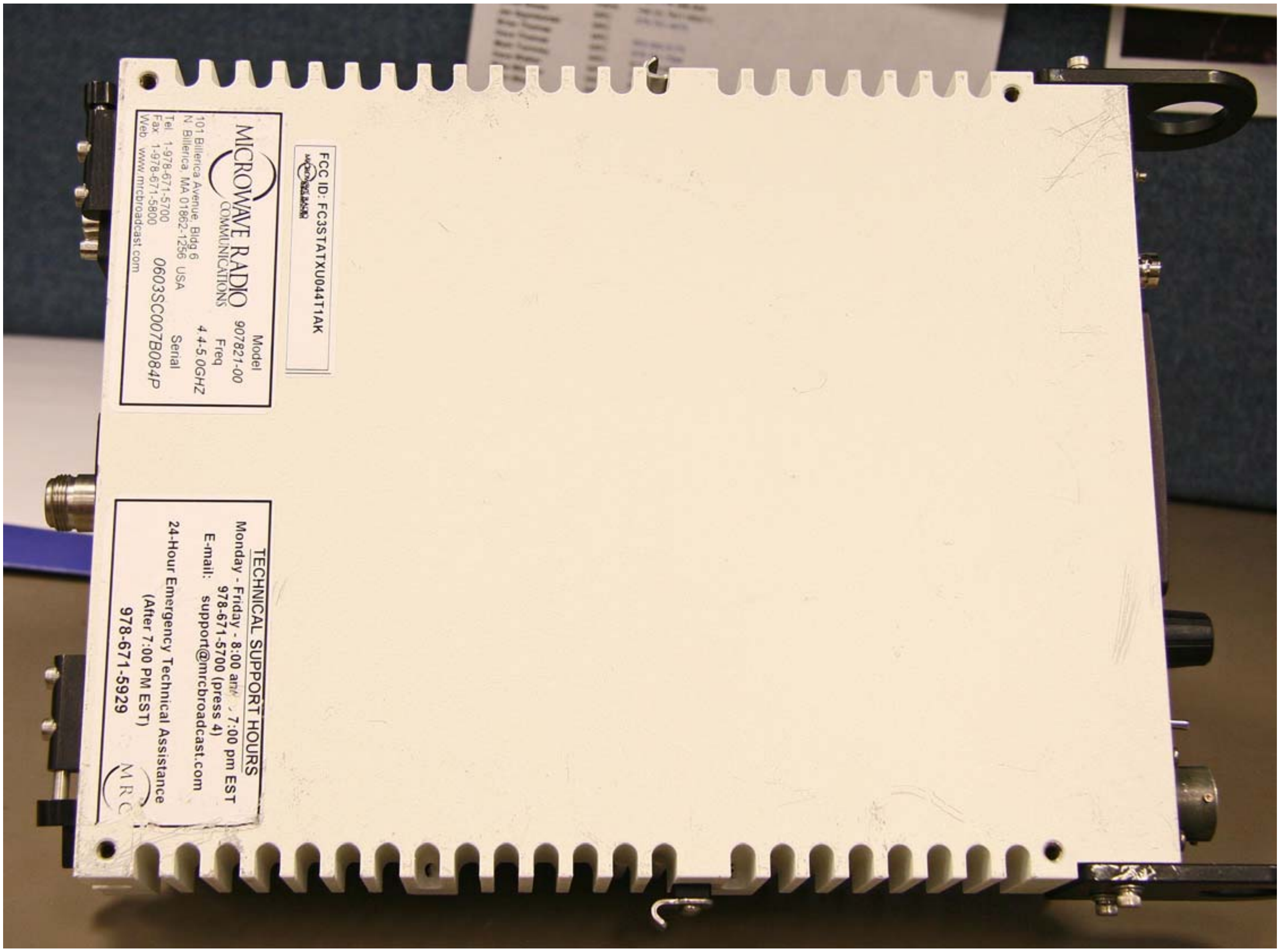
APPENDIX – B EN 301 489-1:V1.6.1

Electromagnetic compatibility and radio spectrum matters
Electromagnetic compatibility standard for radio equipment and services – vehicular use.

REFERENCE CURTIS-STRUAS REPORT EGO471-1 STRATA RE-BAND APRIL 27, 2005

APPENDIX – C FCC LABEL LOCATION




FCC ID: FC3STATXU044T1AK
MICROWAVE RADIO
COMMUNICATIONS
101 Billerica Avenue, Bldg 6
N. Billerica, MA 01862-1256 USA
Tel 1-978-671-5700
Fax 1-978-671-5800
Web www.mrcbroadcast.com
Model
907821-00
Freq
4.4-5.0GHZ
Serial
0603SC007B084P
TECHNICAL SUPPORT HOURS
Monday - Friday - 8:00 a 7:00 pm EST
978-671-5700 (press 4)
E-mail: support@mrcbroadcast.com
24-Hour Emergency Technical Assistance
(After 7:00 PM EST)
978-671-5929
MRC