

**KTL Test Report:** 9L0235R1US

**Applicant:** Fujitsu  
2801 Telecom Parkway  
Richardson, Texas 75082

**Equipment Under Test:  
(E.U.T.)** EC 2500

**FCC ID:** CFD825FBCP-201

**In Accordance With:** **FCC Part 22, Subpart H**  
800 MHz Cellular Subscriber Units

**Tested By:** KTL Dallas Inc.  
802 N. Kealy  
Lewisville, TX  
75057-3136

**Authorized By:**  
  
Tom Tidwell, RF Group Manager

**Date:** November, 1999

**Total Number of Pages:** 48

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**Section 1. Summary of Test Results**

Manufacturer: Fujitsu

Model No.: EC 2500

Serial No.: 0008

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 22, Subpart H.

- |                                     |                            |                                     |                     |
|-------------------------------------|----------------------------|-------------------------------------|---------------------|
| <input checked="" type="checkbox"/> | New Submission             | <input type="checkbox"/>            | Production Unit     |
| <input type="checkbox"/>            | Class II Permissive Change | <input checked="" type="checkbox"/> | Pre-Production Unit |

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: 100426-0**

TESTED BY: David Light DATE: 10/29/99 – 11/2/99

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**Summary Of Test Data**

NAME OF TEST	PARA. NO.	SPEC.	MEAS.	RESULT
RF Power Output	2.1046	7W ERP	372 mW	Complies
Audio Frequency Response	2.1047	6dB/Octave	N/A	N/A
Audio Low Pass Filter Response	2.1047	Graph	N/A	N/A
Modulation Limiting	2.1047	Graph	N/A	N/A
Occupied Bandwidth (Voice & SAT)	2.1049	Mask	N/A	N/A
Occupies Bandwidth (WB Data & SAT)	2.1049	Mask	N/A	N/A
Occupied Bandwidth (ST)	2.1049	Mask	N/A	N/A
Occupied Bandwidth (SAT)	2.1049	Mask	N/A	N/A
Occupied Bandwidth (SAT)	2.1049	Not Specified	1.28 MHz	Complies
Spurious Emissions at Antenna Terminals	2.1051	-13 dBm	-14.5 dBm	Complies
Field Strength of Spurious Emissions	2.1053	82.3 dB $\mu$ V/m	54.3 dB $\mu$ V/m	Complies
Frequency Stability	2.1055	2.5 ppm	.056 ppm	Complies

**Footnotes:** (1) This device is CDMA only, therefore no analogue related testing was performed.

**Section 2.           General Equipment Specification**

<b>Frequency Range:</b>	824-849 MHz (Tx) 869-894 MHz (Rx)
<b>Necessary Bandwidth:</b>	1.23 MHz
<b>Type of Modulation and Designator:</b>	IS-95 CDMA, 1M23G7W
<b>Output Impedance:</b>	50 ohms
<b>RF Power Output (rated):</b>	+27 dBm maximum
<b>Number of Channels:</b>	788
<b>Duty Cycle:</b>	Continuous
<b>Channel Spacing:</b>	30 kHz
<b>Operator Selection of Frequency:</b>	Software Controlled
<b>Power Output Adjustment Capability:</b>	Software Controlled

**Description of Modifications For Class II Permissive Change**

**Not Applicable**

**KTL Dallas**

FCC PART 22, SUBPART H  
800 MHz CELLULAR SUBSCRIBER UNITS

*EQUIPMENT: EC 2500*

*FCC ID: CFD825FBCP-201*

PROJECT NO. 9L0235R1US

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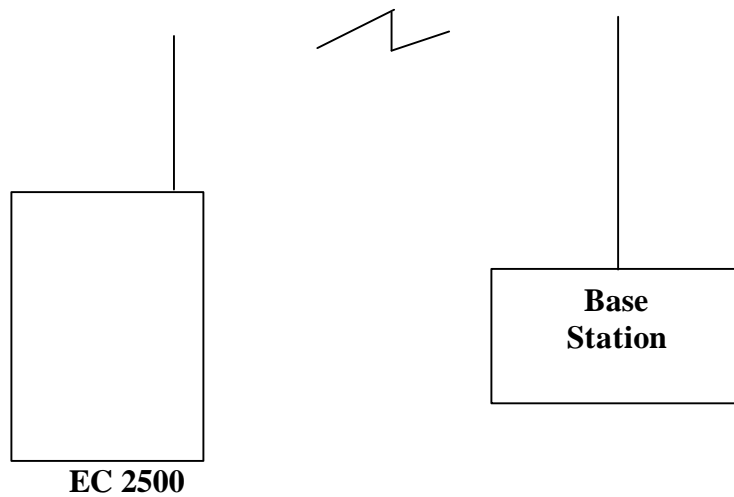
**Modifications Made During Testing**

**NONE**

**Operational Description**

The device is a Class III CDMA mobile telephone operating in the U.S. cellular band.

**System Diagram**





**Section 3. RF Power Output**

NAME OF TEST: RF Power Output	PARA. NO.: 2.1046
TESTED BY: David Light	DATE: 10/29/99

**Test Results:** Complies.

**Measurement Data:** See pages 10-12.

Channel	Output Power (dBm)	Rated Power (dBm)	Measured / Rated (dBm)
1013	25.57	27	-1.43
383	25.68	27	-1.32
777	24.96	27	-2.04

**Equipment Used:** 1,2,7,8

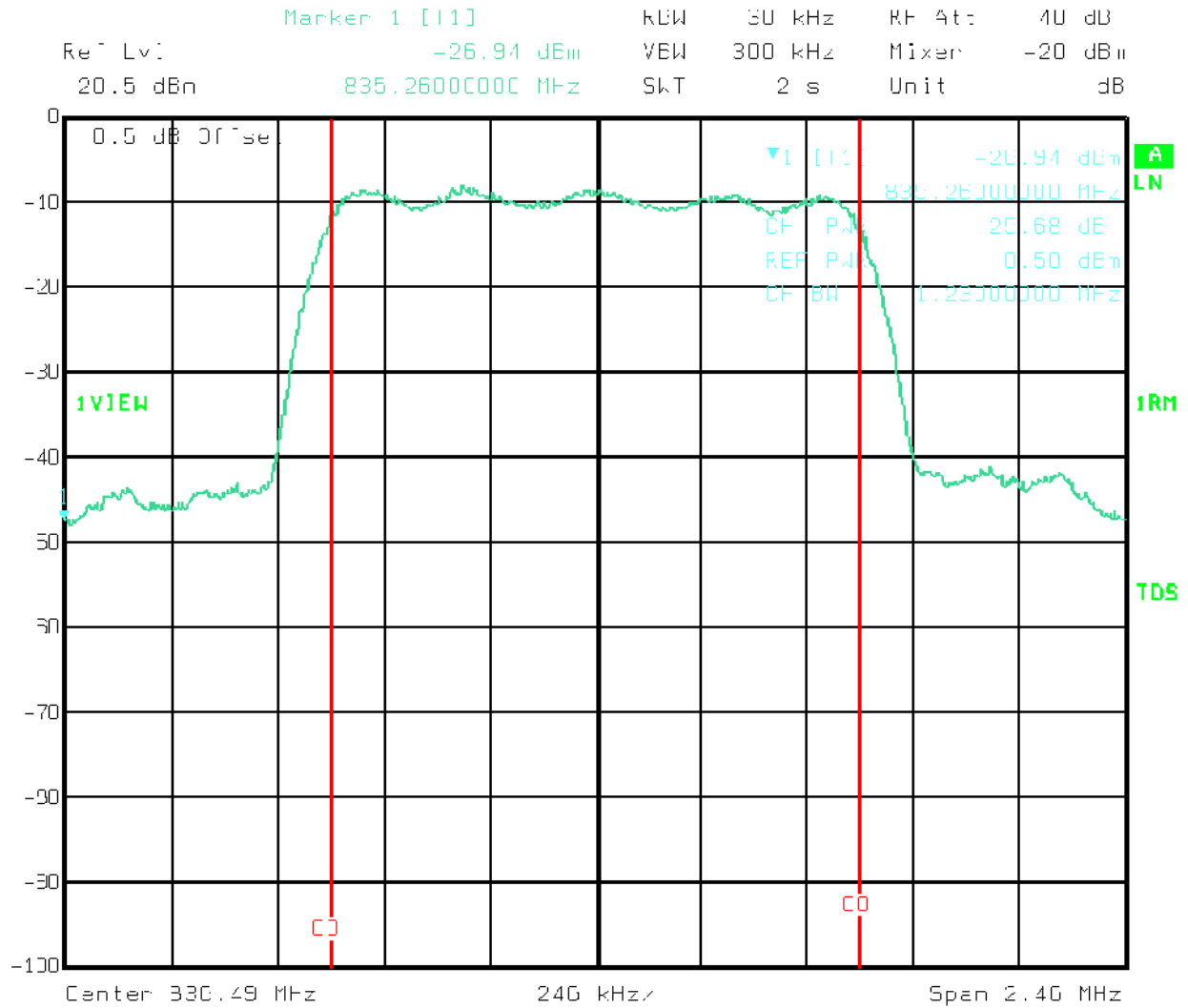
**Measurement Uncertainty:** +/- 1.6 dB

**Temperature:** 25 °C

**Relative Humidity:** 50 %

EQUIPMENT: EC 2500  
FCC ID: CFD825FBCP-201

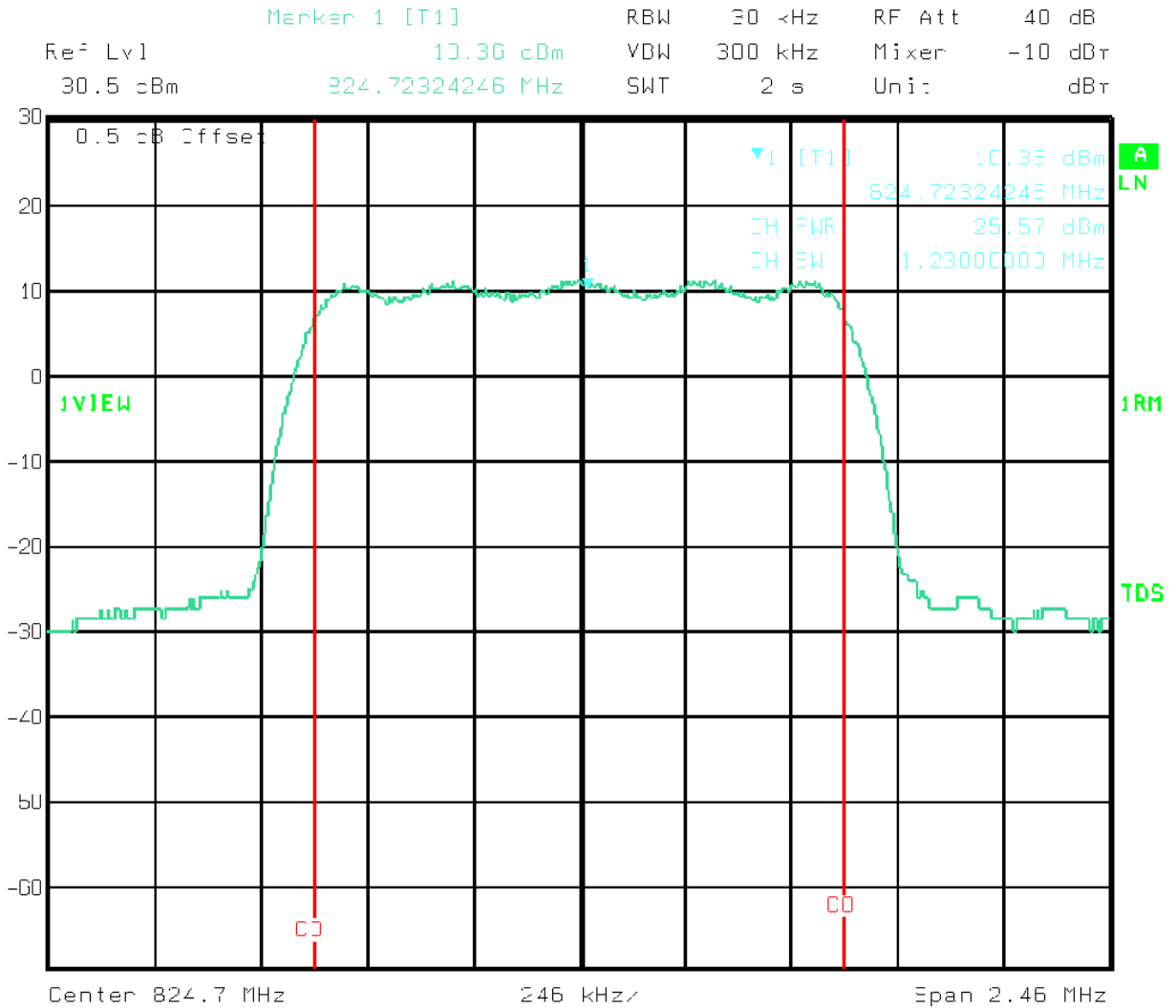
PROJECT NO. 9L0235R1US



Title: CHANNEL POWER CHANNEL 383  
 Comment A: CP01.PCX  
 Date: 29.001.1999 10:45:27

EQUIPMENT: EC 2500  
FCC ID: CFD825FBCP-201

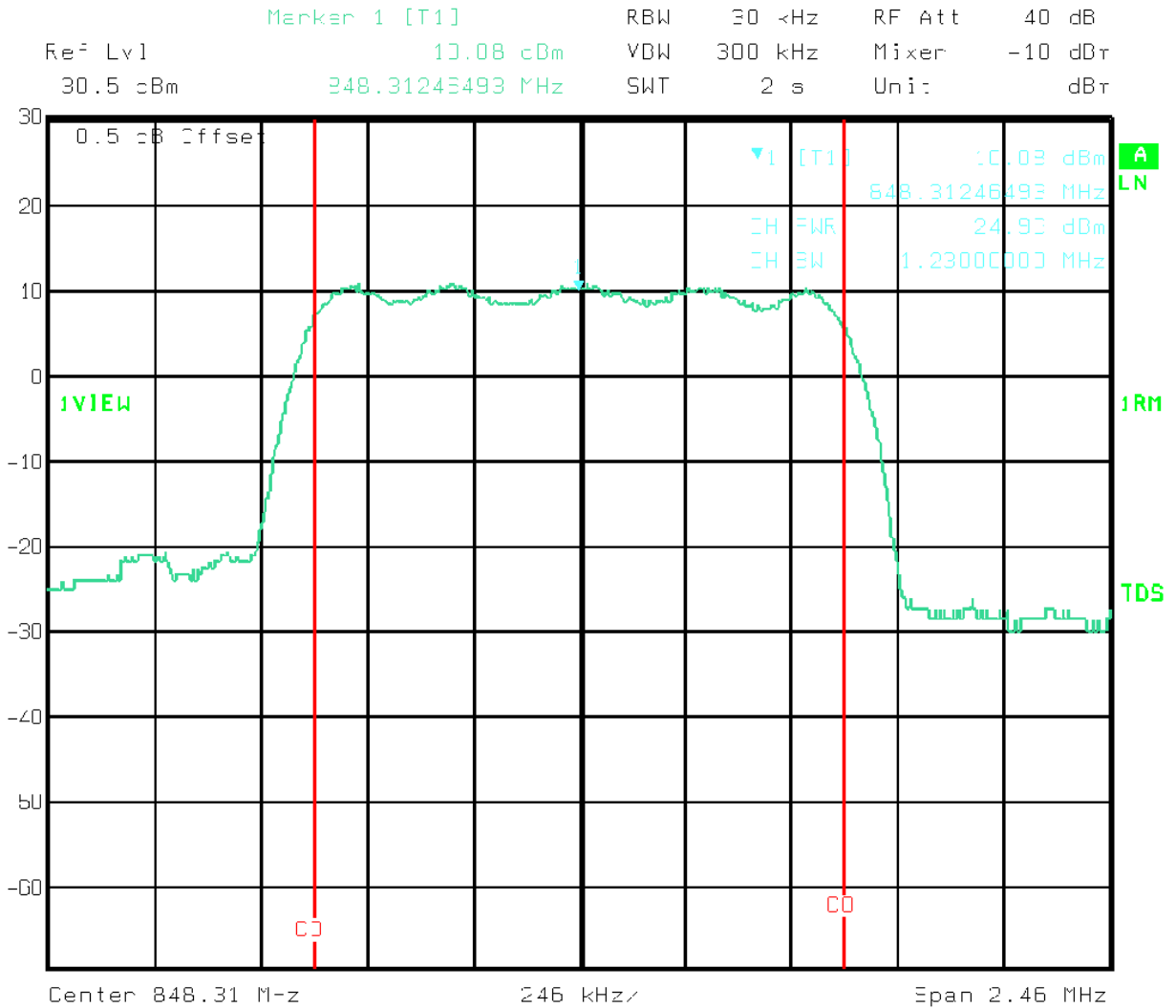
PROJECT NO. 9L0235R1US



Title: CHANNEL POWER CHANNEL 1013  
 Comment A: IP02.PCX  
 Date: 29.001.1999 14:45:53

EQUIPMENT: EC 2500  
FCC ID: CFD825FBCP-201

PROJECT NO. 9L0235R1US



Title: CHANNEL POWER CHANNEL 777  
 Comment A: IPO3.PCX  
 Date: 29.001.1999 14:48:49

**Section 4. Modulation Characteristics**

NAME OF TEST: Modulation Characteristics Audio Frequency Response	PARA. NO.: 2.1047
TESTED BY:	DATE:

**Test Results:** Complies.

**Measurement Data:** See attached graph

**Equipment Used:**

**Not Applicable**

**Measurement Uncertainty:** dB

**Temperature:** °C

**Relative Humidity:** %

*EQUIPMENT: EC 2500*  
*FCC ID: CFD825FBCP-201*

PROJECT NO. 9L0235R1US

NAME OF TEST: Modulation Characteristics Audio Low-Pass Filter Response	PARA. NO.: 2.1047
TESTED BY:	DATE:

**Test Results:** Complies.

**Measurement Data:** See attached graph

**Equipment Used:**

**Not Applicable**

**Measurement Uncertainty:** dB

**Temperature:** °C

**Relative Humidity:** %

*EQUIPMENT: EC 2500*

*FCC ID: CFD825FBCP-201*

PROJECT NO. 9L0235R1US

NAME OF TEST: Modulation Characteristics Modulation Limiting	PARA. NO.: 2.1047
TESTED BY:	DATE:

**Test Results:** Complies.

**Measurement Data:** See attached graph

**Equipment Used:**

**Not Applicable**

**Measurement Uncertainty:** kHz

**Temperature:** °C

**Relative Humidity:** %

*EQUIPMENT: EC 2500*  
*FCC ID: CFD825FBCP-201*

PROJECT NO. 9L0235R1US

NAME OF TEST: Modulation Characteristics Digital Modulation	PARA. NO.: 2.1047
TESTED BY: David Light	DATE: 11/1/99

**Test Results:** Complies.

**Measurement Data:** See data table in Section 8.

**Equipment Used:** Rohde & Schwarz CMD 80, s/n. 1050.9008.85, cal. date 12/11/98

**Measurement Uncertainty** +/- 30 Hz Frequency  
+/-0.0003 rho error

**Temperature:** 25°C

**Relative Humidity:** 50%



**Section 5. Occupied Bandwidth**

NAME OF TEST: Occupied Bandwidth (Voice + SAT)	PARA. NO.: 2.1047
TESTED BY:	DATE:

**Test Results:** Complies.

**Measurement Data:** See attached graph.

**Not Applicable**

**Equipment Used:**

**Measurement Uncertainty:** dB

**Temperature:** °C

**Relative Humidity:** %

*EQUIPMENT: EC 2500*  
*FCC ID: CFD825FBCP-201*

PROJECT NO. 9L0235R1US

NAME OF TEST: Occupied Bandwidth (ST)	PARA. NO.: 2.1047
TESTED BY:	DATE:

**Test Results:** Complies.

**Measurement Data:** See attached graph.

**Equipment Used:**

**Measurement Uncertainty:**

**Temperature:** °C

**Relative Humidity:** %

**Not Applicable**

*EQUIPMENT: EC 2500*  
*FCC ID: CFD825FBCP-201*

PROJECT NO. 9L0235R1US

NAME OF TEST: Occupied Bandwidth (Wideband Data)	PARA. NO.: 2.1047
TESTED BY:	DATE:

**Test Results:** Complies.

**Measurement Data:** See attached graph.

**Equipment Used:**

**Measurement Uncertainty:** dB

**Not Applicable**

**Temperature:** °C

**Relative Humidity:** %

*EQUIPMENT: EC 2500*  
*FCC ID: CFD825FBCP-201*

PROJECT NO. 9L0235R1US

NAME OF TEST: Occupied Bandwidth (Digital Modulation)	PARA. NO.: 2.1047
TESTED BY: David Light	DATE:10/29/99

**Test Results:** Complies.

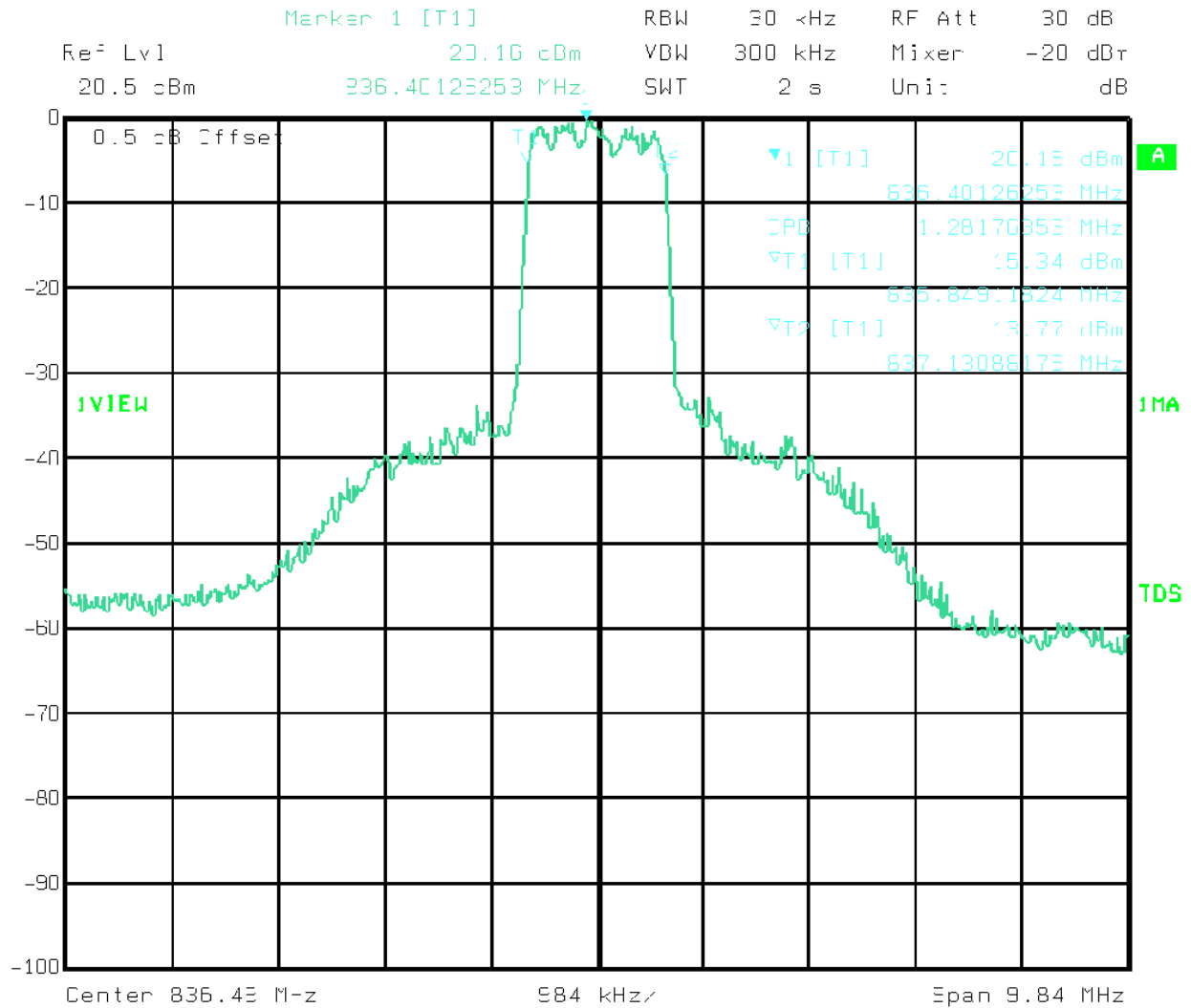
**Measurement Data:** See attached graph.

**Equipment Used:** 1,2,7,8

**Measurement Uncertainty:** +/- 1.6 dB

**Temperature:** 25 °C

**Relative Humidity:** 50 %



Title: 39% OCCUPIED BANDWIDTH  
 Comment A: 39%DBW1.FCX  
 Date: 29.001.1999 11:26:35

**Section 6. Spurious Emissions at Antenna Terminals**

NAME OF TEST: Spurious Emissions At Antenna Terminals	PARA. NO.: 2.1051
TESTED BY: David Light	DATE: 11/02/99

**Test Results:** Complies.

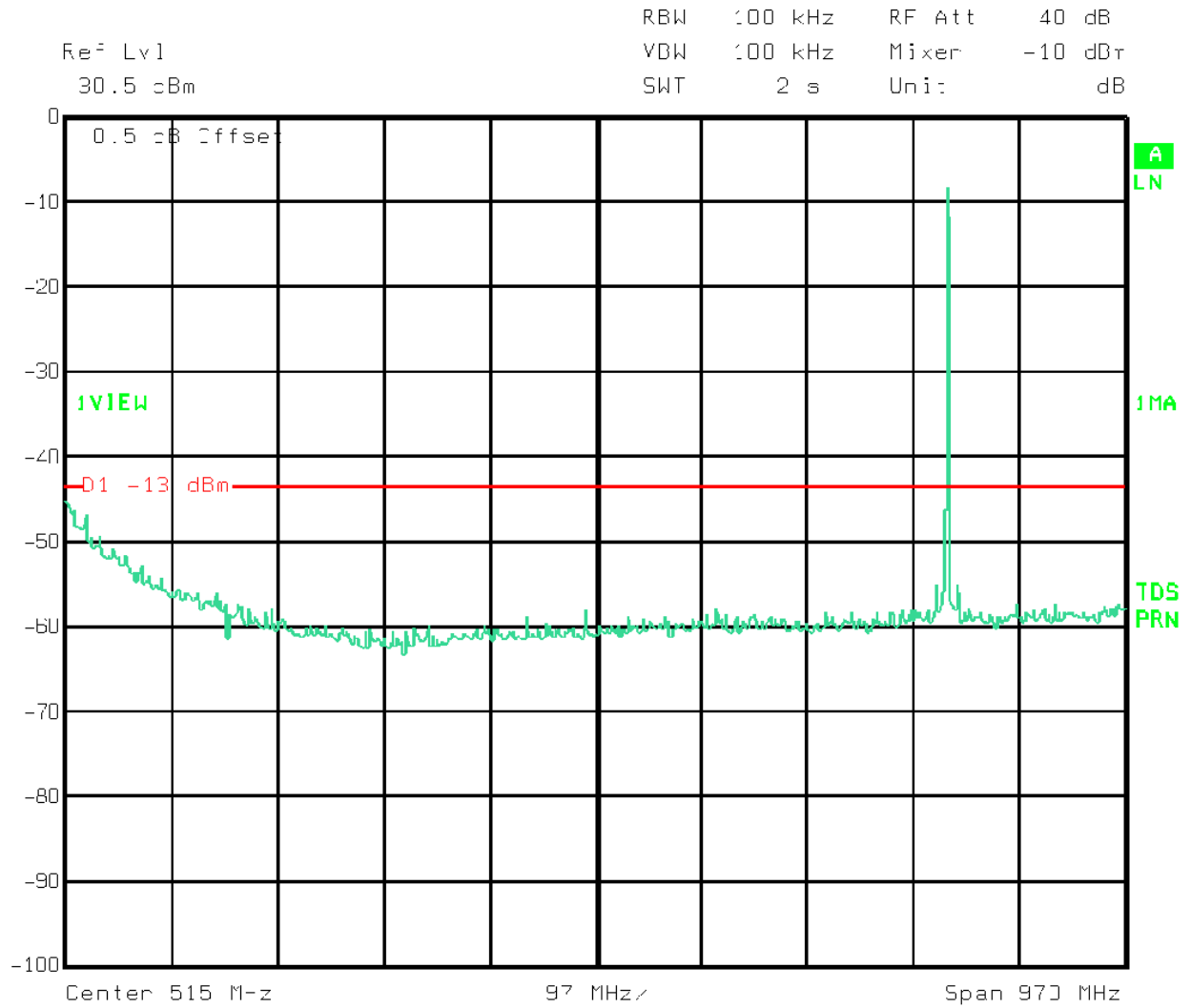
**Measurement Data:** See attached graphs.

**Equipment Used:** 1,2,7,8, 9, 10, 12

**Measurement Uncertainty:** +/- 1.6 dB

**Temperature:** 24°C

**Relative Humidity:** 50%

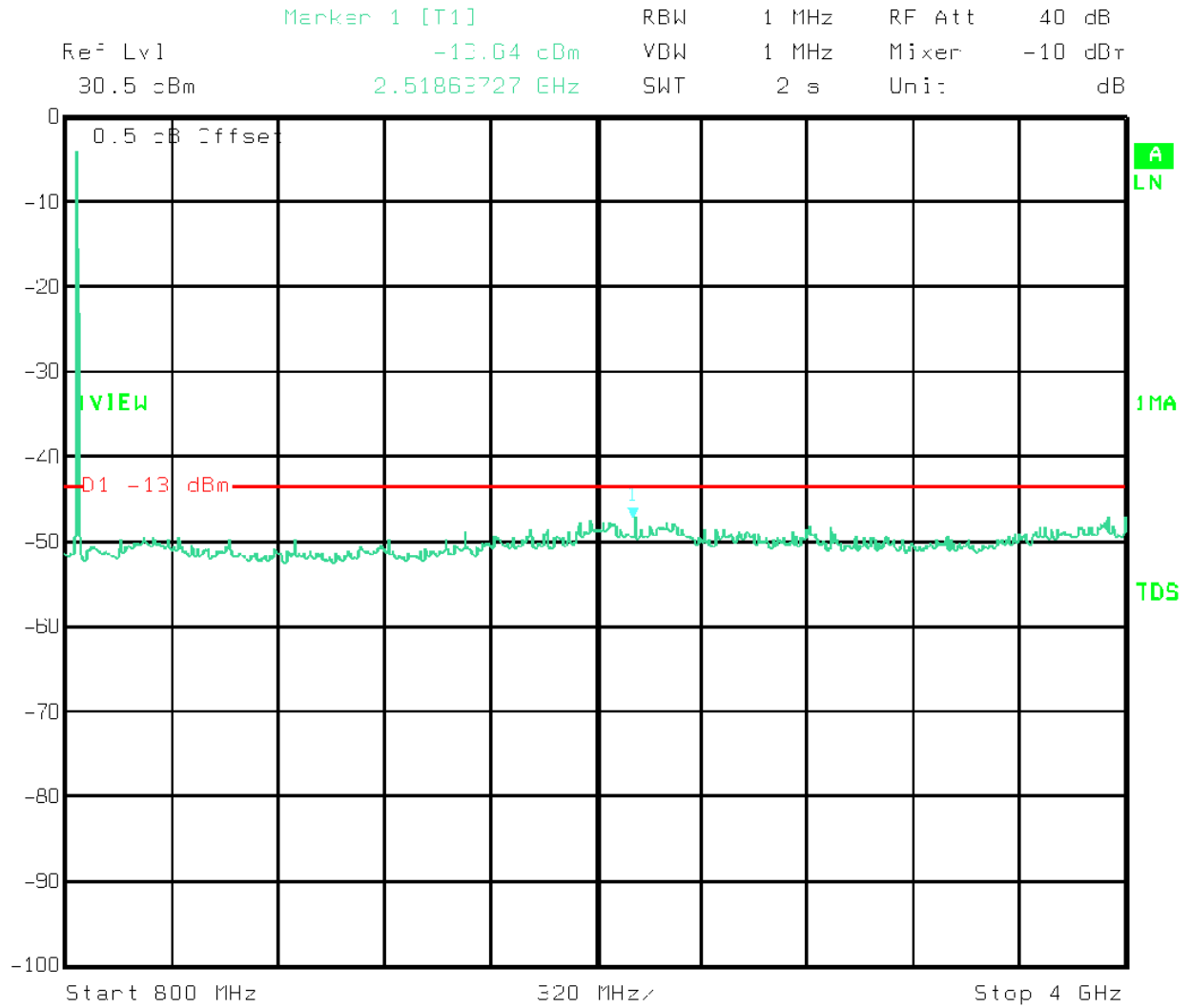


Title: ANTENNA SPURIOUS EMISSIONS  
Comment A: ASE01.PCX  
Date: 29.OCT.1999 11:38:58

EQUIPMENT: EC 2500

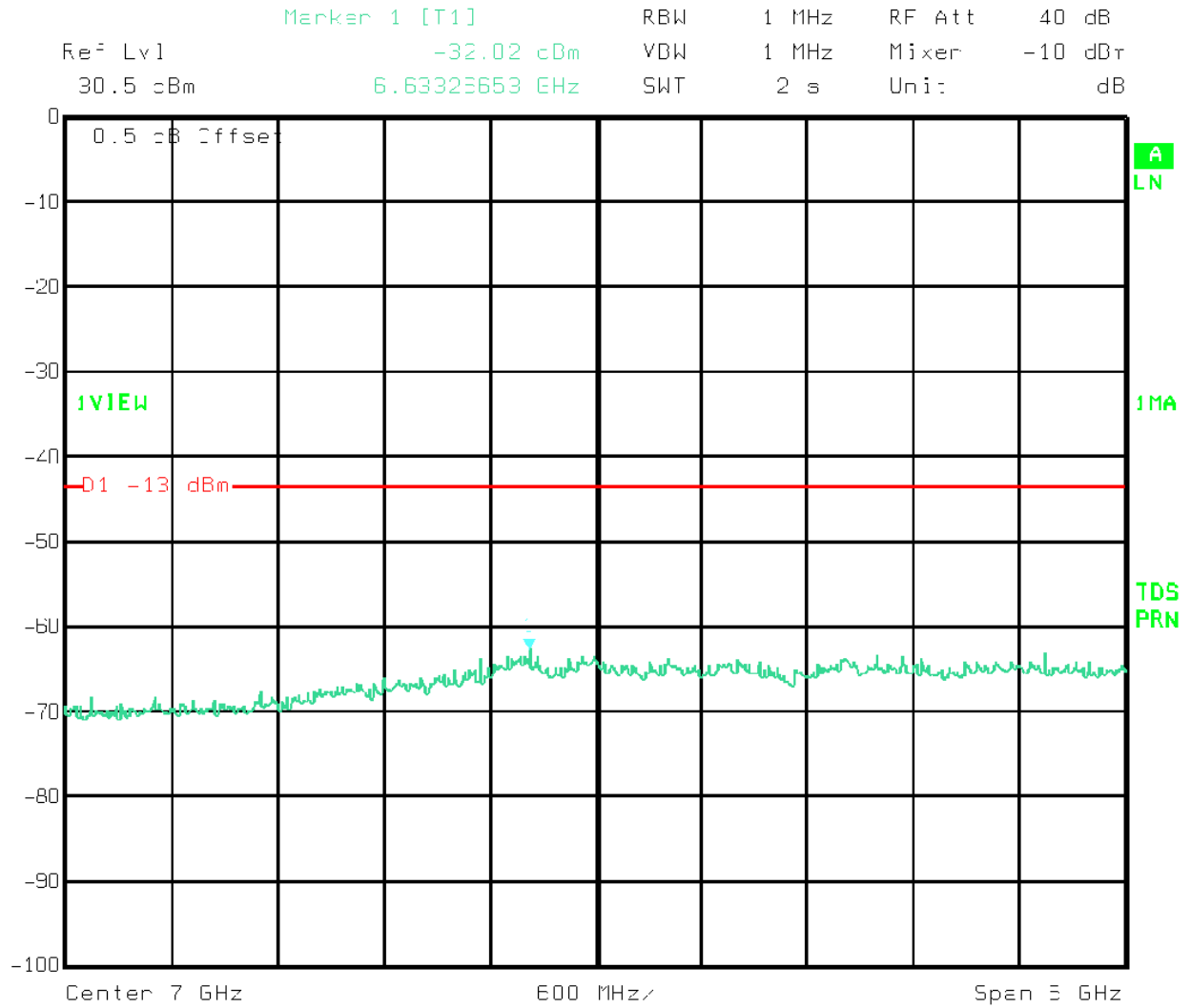
FCC ID: CFD825FBCP-201

PROJECT NO. 9L0235R1US



Title: ANTENNA IMPURIOUS EMISSIONS  
 Comment A: ASE02.PCX  
 Date: 29.OCT.1999 12:15:13

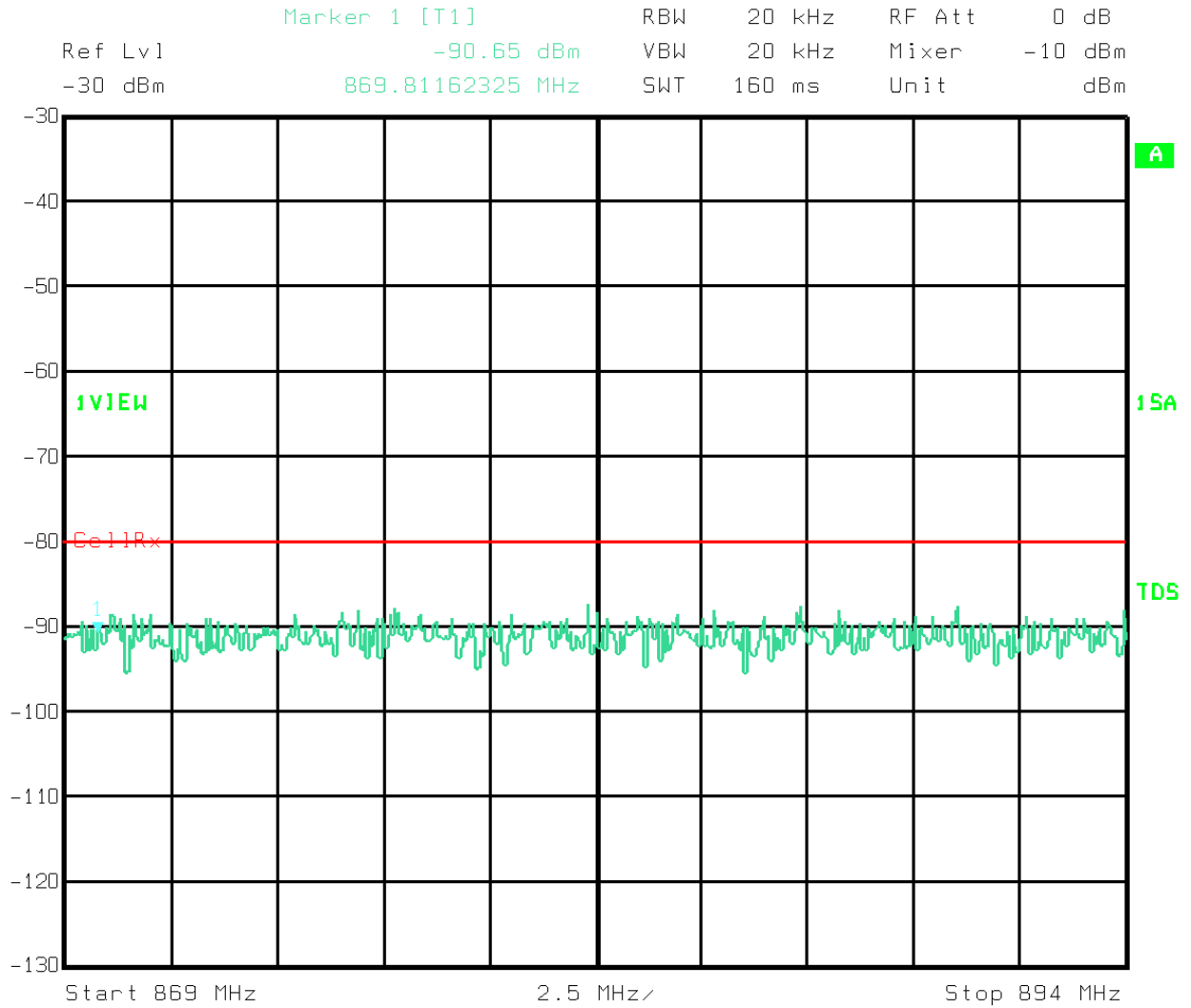




Title: ANTENNA SPURIOUS EMISSIONS  
 Comment A: ASE03.PCX  
 Date: 29.OCT.1999 12:17:13

EQUIPMENT: EC 2500  
FCC ID: CFD825FBCP-201

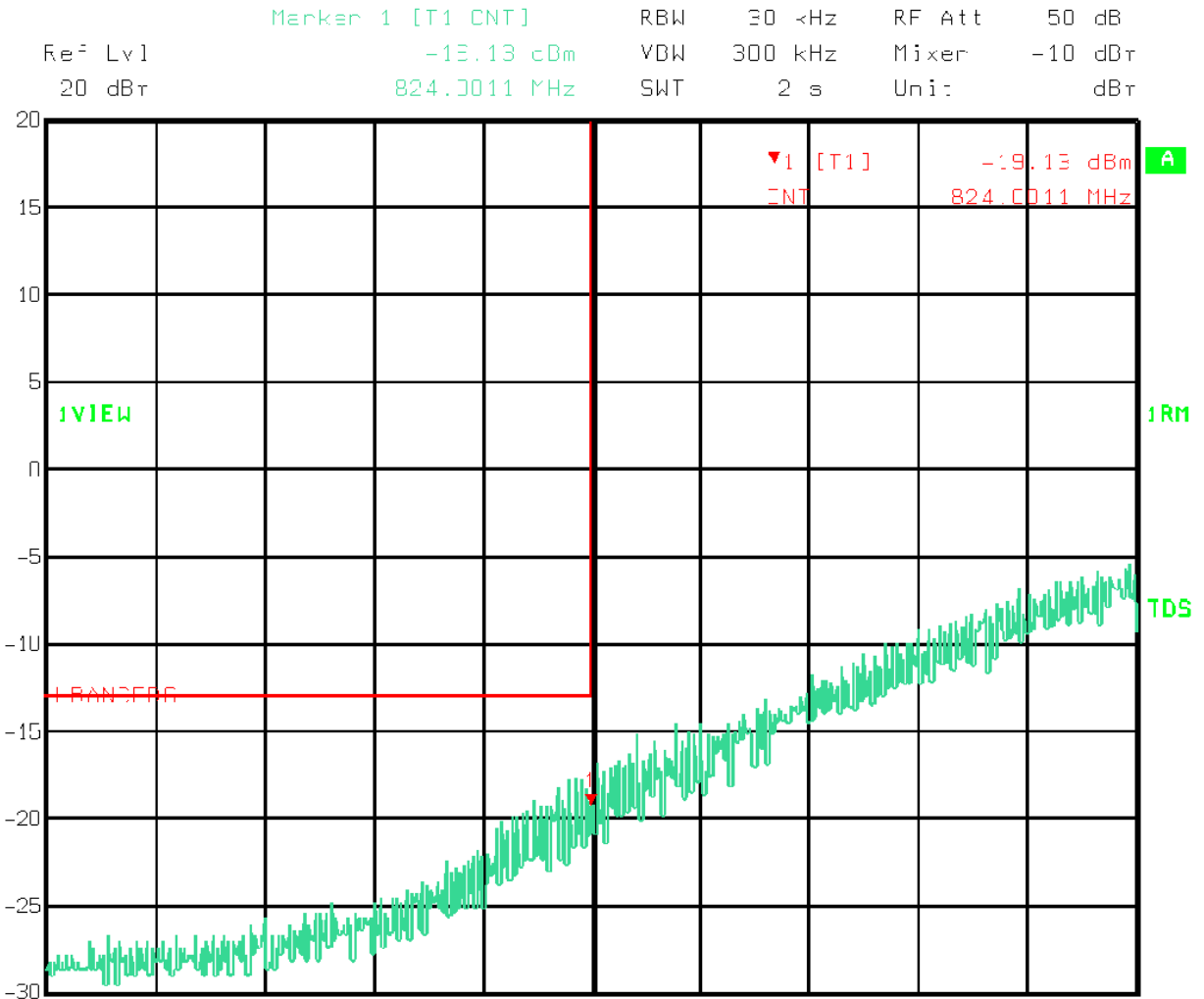
PROJECT NO. 9L0235R1US



Title: RECEIVE BAND ANTENNA PORT SPURIOUS EMISSIONS  
Comment A: RBAPSE1.PCX  
Date: 2.NOV.1999 10:17:57

EQUIPMENT: EC 2500  
FCC ID: CFD825FBCP-201

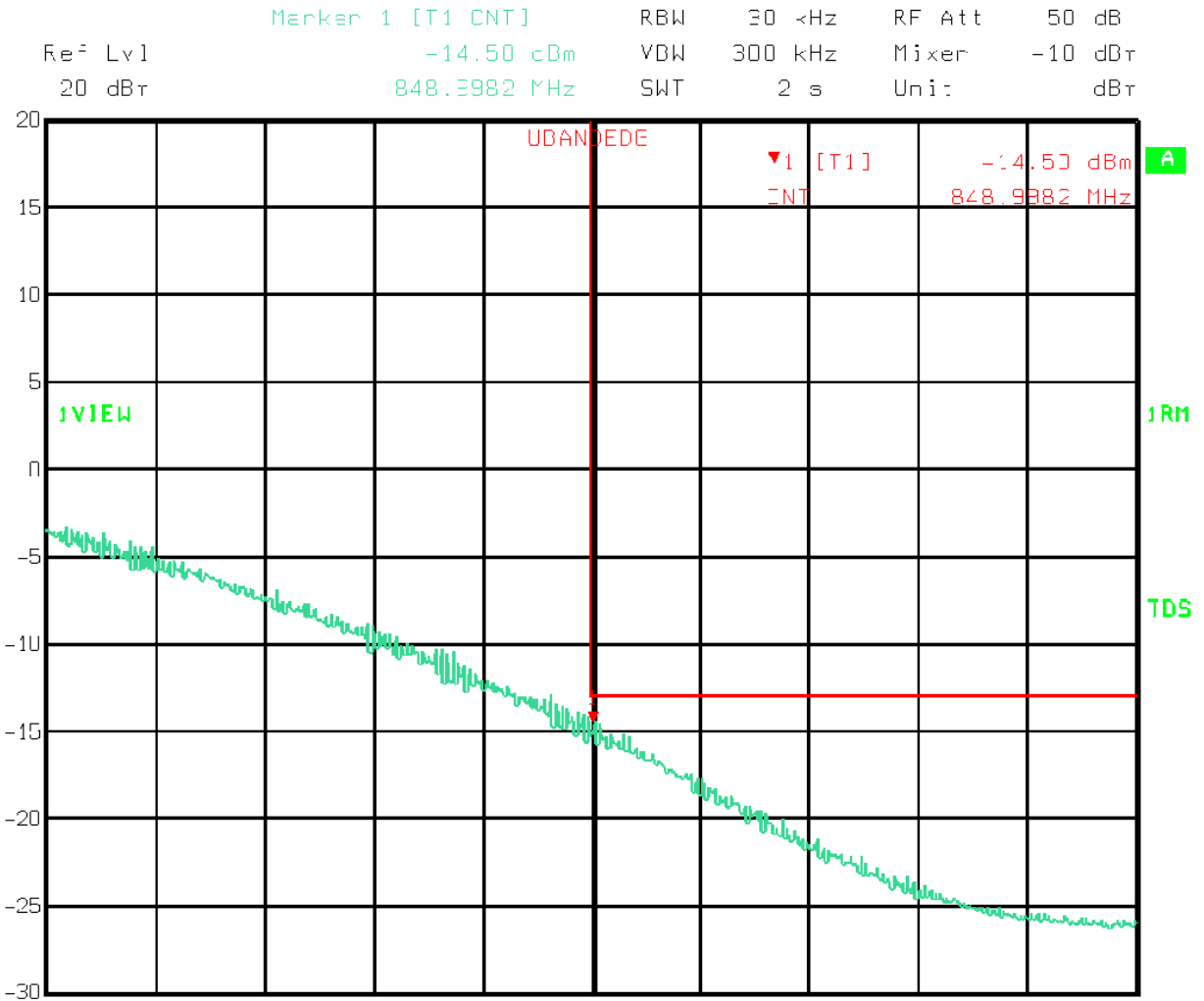
PROJECT NO. 9L0235R1US



Title:            LOWER BAND EDGE  
Comment A:      \_BE1A.PCX  
Date:            2.NOV.1999 12:15:30

EQUIPMENT: EC 2500  
FCC ID: CFD825FBCP-201

PROJECT NO. 9L0235R1US



Title: UPPER BAND EDGE  
Comment A: LBE1A.PCX  
Date: 2.NOV.1999 12:22:30

**Section 7. Field Strength of Spurious**

NAME OF TEST: Field Strength of Spurious	PARA. NO.: 2.1053
TESTED BY: David Light	DATE: 11/01/99

**Test Results:** Complies.

**Measurement Data:** See attached table.

**Equipment Used:** 677, CF24, CF46

**Measurement Uncertainty:** +/- 4.0 dB

**Temperature:** 21°C

**Relative Humidity:** 48%

EQUIPMENT: EC 2500  
FCC ID: CFD825FBCP-201

PROJECT NO. 9L0235R1US

Test Data - Radiated Emissions

Microwave Radiated Emissions Data										
Complete <input checked="" type="checkbox"/>		Preliminary <input type="checkbox"/>		Page <u>1</u> of <u>1</u>						
Client: <u>Fujitsu</u>				Test #: <u>MW-2</u>			W.O.#: <u>9L0235R</u>			
EUT: <u>EC2500</u>				S/N: <u>0008</u>			Photo ID: <u>9L235R MW-2</u>			
Technician: <u>D. Light</u>			Specification: <u>CFR 47 Part 2.1053</u>			Lab: <u>ANC1</u>		Date: <u>11/01/99</u>		
Equipment Used: <u>677-CF24-CF46</u>										
Configuration: <u>Transmit Channel 383</u>										
Bandwidth: <u>1 MHz</u>		Video Bandwidth: <u>1 MHz</u>		Antenna Distance <u>3</u> m			Detector:			
Climatic Conditions:		EUT Power: <u>115</u> V.A.C.			<input checked="" type="checkbox"/> 60 Hz		<input type="checkbox"/> Peak			
Temperature: <u>21</u> C		<u>208</u> V.A.C.			<input type="checkbox"/> 50 Hz		<input checked="" type="checkbox"/> Average			
Relative Humidity: <u>48</u> %		<u>230</u> V.A.C.								
Atmospheric Pressure: <u>1010</u> mbar		<input checked="" type="checkbox"/> Other <u>3.6 VDC</u>			<input type="checkbox"/> 1 Phase		<input type="checkbox"/> 3 Phase			
Freq. (MHz)	Meter Reading (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	RF Gain (dB)	Conver. Factor	Corrected Reading (dBuV/m)	ERP (mW)	ERP (dBm)	Pol.	Comments:
832.0	65	24.1	2.2	0	0	91.3	0.405	-3.929	V	Fundamental
1664	17	25.1	2.25	0	0	44.35	8E-06	-50.88	V	Noise Floor
2496	16	29	3.6	0	0	48.6	2E-05	-46.63	V	Noise Floor
3328	24	30.8	4.2	0	0	59	2E-04	-36.23	V	Noise Floor
4160	18	31.6	4.7	0	0	54.3	8E-05	-40.93	V	Noise Floor
832.0	66	24.1	2.2	0	0	92.3	0.509	-2.929	H	Fundamental
1664	17	25.1	2.25	0	0	44.35	8E-06	-50.88	H	Noise Floor
2496	16	29	3.6	0	0	48.6	2E-05	-46.63	H	Noise Floor
3328	24	30.8	4.2	0	0	59	2E-04	-36.23	H	Noise Floor
4160	18	31.6	4.7	0	0	54.3	8E-05	-40.93	H	Noise Floor
										Scanned
										800 MHz-9 GHz

**Photographs of Test Setup**

FRONT VIEW



SIDE VIEW



**Section 8. Frequency Stability**

NAME OF TEST: Frequency Stability	PARA. NO.: 2.1055
TESTED BY: David Light	DATE: 11/01/99

**Test Results:** Complies.

**Measurement Data:** See attached table.

Standard Test Frequency: 836.79 MHz  
Standard Test Voltage: 3.6 Vdc

**Equipment Used:** Rohde & Schwarz CMD 80, s/n. 1050.9008.85, cal. date 12/11/98

**Measurement Uncertainty** +/- 30 Hz Frequency  
+/-0.0003 rho error

**Lab Conditions**

**Temperature:** 25°C

**Relative Humidity:** 50%



EQUIPMENT: EC 2500  
FCC ID: CFD825FBCP-201

PROJECT NO. 9L0235R1US

<b>Frequency Stability</b>			
Client: <u>Fujitsu</u>			W.O.# <u>9L0235R</u>
EUT: <u>EC2500</u>			S/N: <u>0008</u>
Date: <u>11/1/99</u>			Tech: <u>D. Light</u>
Equipment used: Rohde & Schwarz CMD80, s/n 1050.9008.85 Cal date 12/11/98 G5006 - G3873			
Temperature	Voltage (DC)	Rho	Frequency Error (Hz)
20 °C	3.6	0.983	-24
20 °C	3.06	0.985	-15
20 °C	4.14	0.983	-33
10 °C	3.6	0.986	-14
0 °C	3.6	0.983	14
-10 °C	3.6	0.985	-27
-20 °C	3.6	0.985	-29
-30 °C	3.6	0.975	-47
30 °C	3.6	0.987	23
40 °C	3.6	0.986	-14
50 °C	3.6	0.988	14

**Section 9. Test Equipment List**

	<u>KTL ID</u>	<u>Description</u>	<u>Manufacturer Model Number</u>	<u>Serial Number</u>	<u>Calibration Date</u>
1	CF24	CABLE, 3.6m	KTL Semi-Flex, Workhorse	N/A	11/17/98
2	CF39	CABLE 2m	Astrolab 32027-2-29094-72TC	N/A	08/31/99
3	CF46	CABLE, 4M	STORM PR90-010-144	N/A	10/15/99
4	660	SPECTRUM ANALYZER	HEWLETT PACKARD 8567A	2541A00109	08/18/99
5	677	RECEIVER, 1-18 GHz	ELECTRO METRICS EMC 50	185	08/31/99
6	G2228	AMPLIFIER, RF	RF CONSULTANTS LNA14	NONE	02/09/99
7	G2632	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	06/14/99
8	G3725	DUAL DIRECTIONAL COUPLER	NARDA 3020A	34366	05/19/99
9	G3726	DUAL DIRECTIONAL COUPLER	NARDA 3022	73393	05/19/99
10	G3727	DUAL DIRECTIONAL COUPLER	HEWLETT PACKARD 11692D	1212A03366	05/07/99
11	AC4		Anechoic Chamber #4		
12	G1712	TUNABLE NOTCH FILTER	K&L 3TNF-500/1000-N/N	162	CBU

Calibration interval on all items is typically 12 months from the calibration date shown. Where relevant, measuring equipment is subjected to in-service checks between testing. Should any measurement equipment be utilized beyond its scheduled calibration date, the measuring equipment is subjected to in-service checks prior to use. KTL shall notify clients promptly, in writing, of identification of defective measuring equipment that casts doubt on the validity of results given in this report.

**LEGEND:**

- CNR Calibration not required
- N/A Not Applicable
- CBU Calibrated before use.

**ANNEX A - TEST DETAILS**

<b>NAME OF TEST: RF Power Output</b>	<b>PARA. NO.: 1.1046</b>
--------------------------------------	--------------------------

**Minimum Standard:** Para. No. 22.913(a). The E.R.P. of mobile transmitter and auxiliary test transmitter must not exceed 7 watts.

EIA IS-19B Para. No. 3.2.1.3. The transmitter shall be compiled of 8 distinct power levels.

The output power shown above shall be maintained within the range of +2 dB, -4 dB of nominal dBW value

PL	I	II	III
0	+6	+2	-2
1	+2	+2	-2
2	-2	-2	-2
3	-6	-6	-6
4	-10	-10	-10
5	-14	-14	-14
6	-18	-18	-18
7	-22	-22	-22

**Method Of Measurement:**

Detachable Antenna:

The power at antenna terminals is measured using an in-line power meter.

Integral Antenna:

If the antenna is not detachable from the circuit then the Power Output is derived from the radiated field strength of the fundamental emission by using the plane wave relation  $GP/4\pi R^2 = E^2/120\pi$  and proceeding as follows:

$$P = \frac{E^2 R^2}{30G} = \frac{E^2 3^2}{30G}$$

where,

- P = the equivalent radiated power in watts
- E = the maximum measured field strength in V/m
- R = the measurement range (3 meters)
- G = the numeric gain of the transmit antenna in relation to a halfwave dipole antenna

<b>NAME OF TEST: Audio Frequency Response</b>	<b>PARA. NO.: 2.1047</b>
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**Minimum Standard:** Para. No. 15-19-B. From 300 to 3000 Hz the audio frequency response shall not vary more than +1 to -3 dB from a true 6dB octave pre-emphasis characteristic as referred to 1000 Hz level (with the exception of a permissible 6dB per octave roll-off from 2500 to 3000 Hz).

**Method Of Measurement:**

Operate the transmitter with the compressor disabled, and monitor the output with a frequency deviation meter or standard test receiver without standard 750-microsecond de-emphasis, with expander disabled, and without C-message weighted filter (see 6.6.2). Apply a sine wave audio input to the transmitter external audio input port, vary the modulating frequency from 300 to 3000 Hz and observe the input levels necessary to maintain a constant  $\pm 2.9$  kHz system deviation.

<b>NAME OF TEST: Audio Low Pass Filter Response</b>	<b>PARA. NO.: 2.1047</b>
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**Minimum Standard:** Para. No. 22.915 (d). For mobile stations, signals must be attenuated as a function of frequency as follows:

- i. In the frequency ranges 3.0 to 5.9 Hz and 6.1 to 15 kHz, 40 log (f/3) dB.
- ii. In the frequency range 5.9 to 6.1 kHz, 35 dB
- iii. In the frequency range above 15 kHz, 28 dB.

**Method Of Measurement:**

Adjust the audio input frequency to 1000 Hz and adjust the input level to 20 dB greater than that required to produce  $\pm 8$  kHz deviation. Note the output level on the frequency deviation meter or standard test receiver. Using the output level as reference (0dB), vary the modulating frequency from 3000 Hz to 30,000 Hz and observe the change in output while maintaining a constant audio input level.

<b>NAME OF TEST: Modulation Limiting</b>	<b>PARA. NO.: 2.1047</b>
--	--------------------------

**Minimum Standard:**            Para. No. 22.915(b)

The levels of the modulating signals must be set to the values specified below and must be maintained within  $\pm 10\%$  of these values.

- Voice:  $\pm 12$  kHz
- SAT:  $\pm 2$  kHz
- Wideband Data:  $\pm 8$  kHz
- ST:     $\pm 8$  kHz

**Method Of Measurement:**

Voice: A 1 kHz audio tone is injected at levels between -45 and +20 dBVrms. The peak deviation is noted. This is repeated with a 300 Hz tone and a 3 kHz tone.

SAT:                            A SAT tone is generated by the mobile station and the peak deviation is measured.

Wideband Data:            Wideband data is generated by the mobile station and the peak deviation is measured.

ST:                             ST data is generated by the mobile station and the peak deviation is measured.

<b>NAME OF TEST: Occupied Bandwidth (Voice &amp; SAT)</b>	<b>PARA. NO.: 2.1049</b>
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**Minimum Standard:** 22.917(b) The mean power of any emission removed from the carrier frequency by a displacement frequency ( $f_d$  in kHz) must be attenuated below the mean power of the unmodulated carrier (P) as follows:

- (i) On any frequency removed from the carrier frequency by more than 20 kHz but not more than 45 kHz: at least 26 dB
- (ii) On any frequency removed from the carrier frequency by more than 45 kHz, up to the first multiple of the carrier frequency:

at least 60 dB or  $43 + 10 \log (P)$  dB, whichever is the lesser attenuation.

**Method Of Measurement:**

Spectrum Analyzer Settings:

RBW: 300 Hz  
VBW:  $\geq$  RBW  
Span: 100 kHz  
Sweep: Auto  
Mask: CELLF3E

Input Signal Characteristics (F3E/F3D):

AF1 frequency: 2.5 kHz  
AF1 level: 16 dB above the level sufficient to produce  $\pm 6$  kHz deviation with a 1 kHz tone.  
SAT: 6000 Hz SAT  
SAT level: sufficient to produce  $\pm 2$  kHz deviation.



<b>NAME OF TEST: Occupied Bandwidth (WBD &amp; SAT)</b>	<b>PARA. NO.: 2.1049</b>
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**Minimum Standard:** 22.917(d) The mean power of any emission removed from the carrier frequency by a displacement frequency ( $f_d$  in kHz) must be attenuated below the mean power of the unmodulated carrier (P) as follows:

(1) On any frequency removed from the carrier frequency by more than 20 kHz but not more than 45 kHz:

at least 26 dB

(2) On any frequency removed from the carrier frequency by more than 45 kHz but not more than 90 kHz:

at least 45 dB

(3) On any frequency removed from the carrier frequency by more than 90 kHz, up to the first multiple of the carrier frequency:

at least 60 dB or  $43 + 10 \log (P)$  dB, whichever is the lesser attenuation.

**Method Of Measurement:**

Spectrum Analyzer Settings:

RBW: 300 Hz  
VBW:  $\geq$  RBW  
Span: 200 kHz  
Sweep: Auto  
Mask: CELLF1D

Input Signal Characteristics:

RF level: Maximum recommended by manufacturer  
10 kbps WBD + DAT  
ST

<b>NAME OF TEST: Spurious Emission at Antenna Terminals</b>	<b>PARA. NO.: 2.1051</b>
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**Minimum Standard:** Para. No. 22.917(b). The mean power of emissions must be attenuated below the mean power of the unmodulated carrier on any frequency twice or more than twice the fundamental emission by at least  $43 + 10 \log P$ . This is equivalent to -13 dBm absolute power.

**Method Of Measurement:**

Spectrum Analyzer Settings:

RBW: 30 kHz (AMPS). As required for digital modulations.

VBW:  $\geq$  RBW

Start Frequency: 0 MHz

Stop Frequency: 10 GHz

Sweep: Auto

<b>NAME OF TEST: Field Strength of Spurious Radiation</b>	<b>PARA. NO.: 2.1053</b>
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**Minimum Standard:** Para. No. 22.917(b). The mean power of emissions must be attenuated below the mean power of the unmodulated carrier on any frequency twice or more than twice the fundamental emission by at least  $43 + 10 \log P$ . This is equivalent to -13 dBm absolute power.

**Calculation Of Field Strength Limit:**

An example of attenuation requirement of  $43 + 10 \log P$  is equivalent to -13 dBm ( $5 \times 10^{-5}$  Watts) at the antenna terminal. We determine the field strength limit by using the plane wave relation.

$$GP/4\pi R^2 = E^2/120\pi$$

For emissions  $\leq 1$  GHz:

$G = 1.64$  (Dipole Gain)

$P = 10^{-5}$  Watts (Maximum spurious output power)

$R = 3m$  (Measurement Distance)

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

$$E = \frac{\sqrt{30 \times 1.64 \times 5 \times 10^{-5}}}{3} = 0.016533 \text{ V / m} = 84.4 \text{ dBmV / m}$$

For emissions  $> 1$  GHz:

$G = 1$  (Isotropic Gain)

$P = 1 \times 10^{-5}$  Watts (Maximum spurious output power)

$R = 3m$  (Measurement Distance)

$$E = 84.4 - 20 \log \sqrt{1.64} = 82.3 \text{ dBmV / m @ } 3m$$

*The spectrum is searched to 10 GHz.*

**NAME OF TEST: Frequency Stability** **PARA. NO.: 2.1055**

**Minimum Standard:** Para. No. 22.355. The transmitter carrier frequency shall remain within the tolerances given in Table C-1.

<b>Freq. Range (MHz)</b>	<b>Mobile &gt; 3 W</b>	<b>Mobile ≤ 3 W</b>
821 to 896	2.5	2.5

Table C-1

**Method Of Measurement:**

Frequency Stability With Voltage Variation:

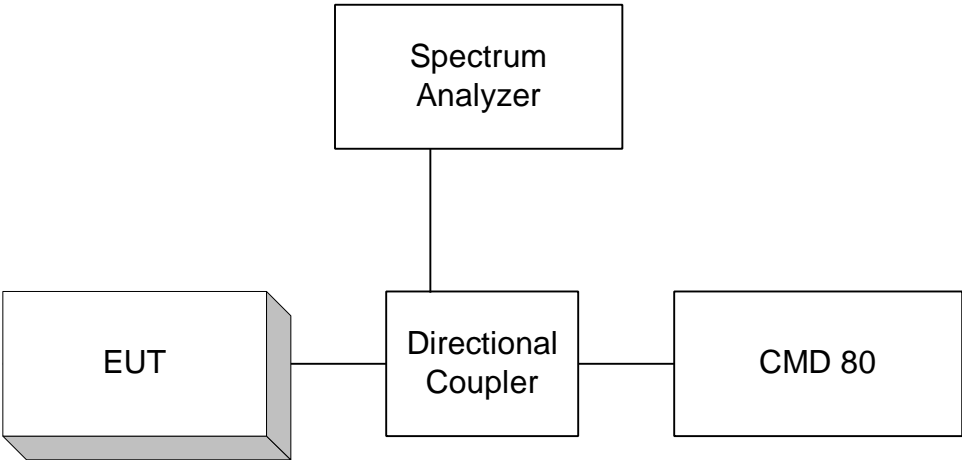
The E.U.T. is placed in an environmental chamber and allowed to stabilize at +20 degrees Celsius for at least 15 minutes. The frequency counter and signal generator are phase locked with the same 10 MHz reference frequency by connecting the 10 MHz ref. out of the counter to the 10 MHz ref, in of the signal generator. With the voltage input to the E.U.T. set to 85% S.T.V., the frequency is measured in 30 second intervals for a period of 5 minutes. This procedure is repeated at 100% S.T.V. and 115% S.T.V.

Frequency Stability With Temperature Variation:

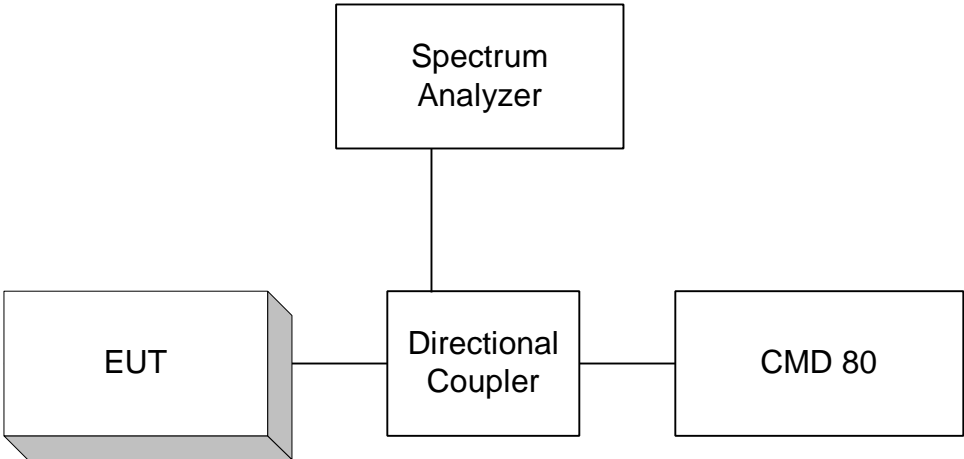
The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature and the frequency is measured in 30 second intervals for a period of 5 minutes.

**ANNEX B - TEST DIAGRAMS**

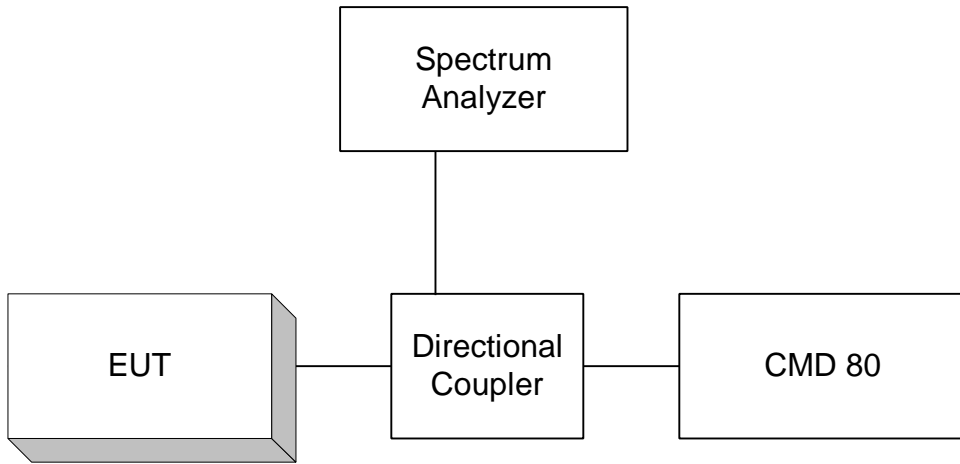
**Para. No. 2.1046 - R.F. Power Output**



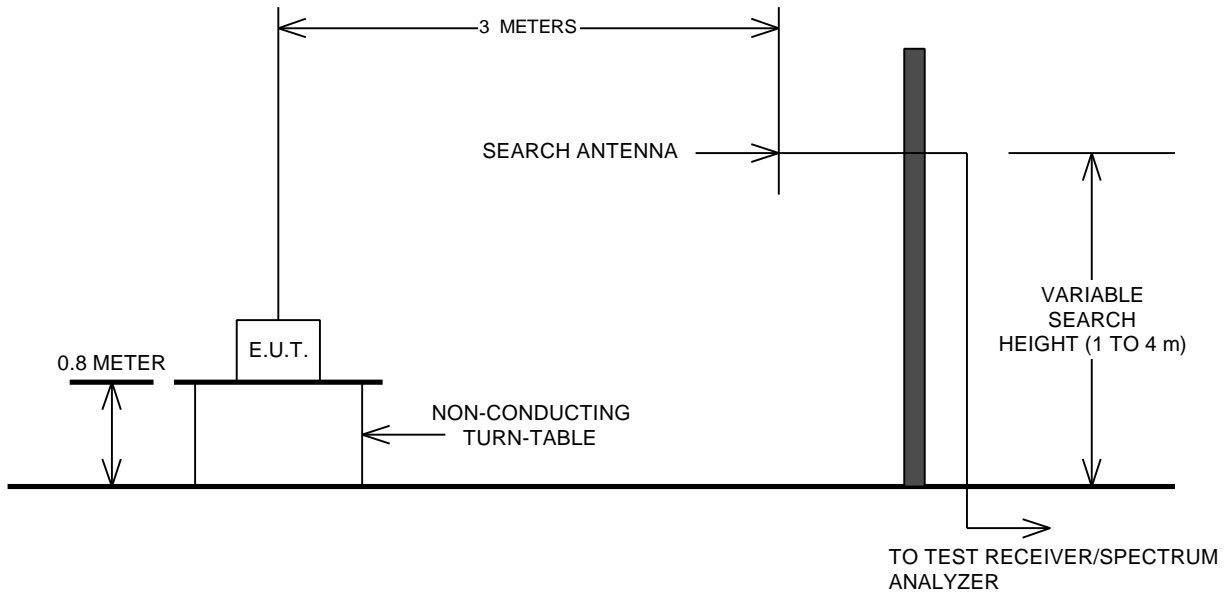
**Para. No. 2.1049 - Occupied Bandwidth**



**Para. No. 2.1051 Spurious Emissions at Antenna Terminals**



**Para. No. 2.1053 - Field Strength of Spurious Radiation**



**Para. No. 2.1055 - Frequency Stability**

