

**Nemko Test Report:** 3L0024RUS1

**Applicant:** Nokia Mobile Phones, Inc.  
6021 Connection Drive  
Irving, Texas 75039

**Equipment Under Test:** Model 2260  
(E.U.T.)

**In Accordance With:** **FCC Parts 2 and 22**  
800 MHz Cellular Subscriber Units

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



**Authorized By:**

David Light, Lab Resource Manager

**Date:** 3/7/2003

**Total Number of Pages:** 29

## Table of Contents

Section 1.	Summary of Test Results .....	3
Section 2.	General Equipment Specification.....	5
Section 3.	RF Power Output (Conducted).....	7
Section 4.	Spurious Emissions at Antenna Terminals .....	9
Section 5.	Field Strength of Spurious .....	14
Section 6.	Frequency Stability.....	17
Section 7.	Test Equipment List .....	19
ANNEX A - TEST DETAILS .....		20
ANNEX B - TEST DIAGRAMS .....		26

**Section 1. Summary of Test Results**

Manufacturer: Nokia

Model No.: Model 2260

Serial No.: ESN: 11007344015  
ESN: 11007344017General: **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.



New Submission



Production Unit



Class II Permissive Change



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".

TESTED BY: Eldon BerryDATE: February 14, 2003

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

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

**Summary Of Test Data**

NAME OF TEST	PARA. NO.	SPEC.	RESULT
RF Power Output	2.1046	7W ERP	Complies
Occupied Bandwidth (Voice & SAT)	2.1049	Mask	Complies
Occupied Bandwidth (WB Data & SAT)	2.1049	Mask	Complies
Occupied Bandwidth (ST)	2.1049	Mask	Complies
Occupied Bandwidth (SAT)	2.1049	Mask	Complies
Occupied Bandwidth (SAT)	2.1049	Not Specified	Complies
Spurious Emissions at Antenna Terminals	2.1051	-13 dBm	Complies
Field Strength of Spurious Emissions	2.1053	82.3 dB $\mu$ V/m	Complies
Frequency Stability	2.1055	2.5 ppm	Complies

**Footnotes:**

**Section 2. General Equipment Specification**

**Frequency Range, MHz:** 824.04 to 848.97

**Tunable Bands:** 824.04 to 848.97 and 1850 to 1909.92  
Not selectable by user

**Necessary Bandwidth:** 30 kHz

**Type of Modulation and Designator:** 40K0F1D, 40K0F8W, and 30K0DXW

**Output Impedance:** 50 ohms

**RF Power Output (rated):** 690.2 mW

**Duty Cycle:** Continuous

**Channel Spacing:** 30 kHz

**Operator Selection of Frequency:** Software Controlled

**Power Output Adjustment Capability:** Software Controlled

**Nemko Dallas**

**EQUIPMENT: 2260**

**FCC PARTS 2 and 22**

**800 MHz CELLULAR SUBSCRIBER UNITS**

**Report No.: 3L0024RUS1**

---

### **Operational Description**

This device is a wireless dual band/dual mode phone that operates in the cellular and PCS bands.

### **System Diagram**

Refer to separate EXHIBITS

**Section 3. RF Power Output (Conducted)**

NAME OF TEST: RF Power Output	PARA. NO.: 22.913
TESTED BY: Eldon Berry	DATE: 27Jan03

**Test Results:** Complies.**Measurement Data:**RF Power Output (Conducted)

Job No.: 3L0024R	Date: 1/27/03
Specification: CFR 47, Part 2	Temperature(°C): 23
Tested By: Eldon Berry	Humidity(%): 32
E.U.T.: 2260	
Configuration:	
Detector: Peak	

Test Equipment Used:

Power Meter: E4418B	Directional Coupler: 1054
Power Sensor: 8482H	Cable #1: 1629
Load:	Cable #2:
Spectrum Analyzer: 1036	Cable #3:
Attenuator #1 1/16/04	Cable #4:
Attenuator #2:	Cable #5:
Attenuator #3:	Cable #6:
Attenuator #4:	

Measurement Uncertainty: +/- 1.6 dB

Frequenc MH	Channe	Modulatio Typ	Output (dBm)	Output Powe (mW)
824.0	991	AMP	25.3	338.8
836.5	384	AMP	25.1	323.6
848.9	799	AMP	24.9	309
824.0	991	TDMA	27.2	434.6
836.5	384	TDMA	27.3	537.0
848.9	799	TDMA	27.3	537.0

## Nemko Dallas

## FCC PARTS 2 and 22

## 800 MHz CELLULAR SUBSCRIBER UNITS

**Report No.: 3L0024RUS1**

**EQUIPMENT: 2260**

## Test Data - ERP

**Section 4. Spurious Emissions at Antenna Terminals**

NAME OF TEST: Spurious Emissions At Antenna Terminals	PARA. NO.: 2.1051
TESTED BY: Eldon Berry	DATE: 1/30/2003

**Test Results:** Complies.

**Measurement Data:**

Frequency MHz	Channel	Modulation Type	Level (dBm)	FCC Limit (dBm)
1673.0	384	AMPS	-41.6	-13.0
2509.6	384	AMPS	-46.2	-13.0
3346.1	384	AMPS	-49.1	-13.0
4182.6	384	AMPS	-53.6	-13.0
5019.1	384	AMPS	-54.2	-13.0
5855.6	384	AMPS	-51.4	-13.0
6692.2	384	AMPS	-50.7	-13.0
7528.7	384	AMPS	-50.5	-13.0
8365.2	384	AMPS	-50.4	-13.0
Frequency MHz	Channel	Modulation Type	Level (dBm)	FCC Limit (dBm)
1673.0	384	TDMA	-37.7	-13.0
2509.6	384	TDMA	-31.2	-13.0
3346.1	384	TDMA	-40.6	-13.0
4182.6	384	TDMA	-54.0	-13.0
5019.1	384	TDMA	-53.0	-13.0
5855.6	384	TDMA	-51.1	-13.0
6692.2	384	TDMA	-48.4	-13.0
7528.7	384	TDMA	-50.1	-13.0
8365.2	384	TDMA	-50.6	-13.0

NOTE: The above data was measured using a 1 MHz RBW, 1 MHz VBW

**Equipment Used:** 1036-1629-1477-1054-1055-1056

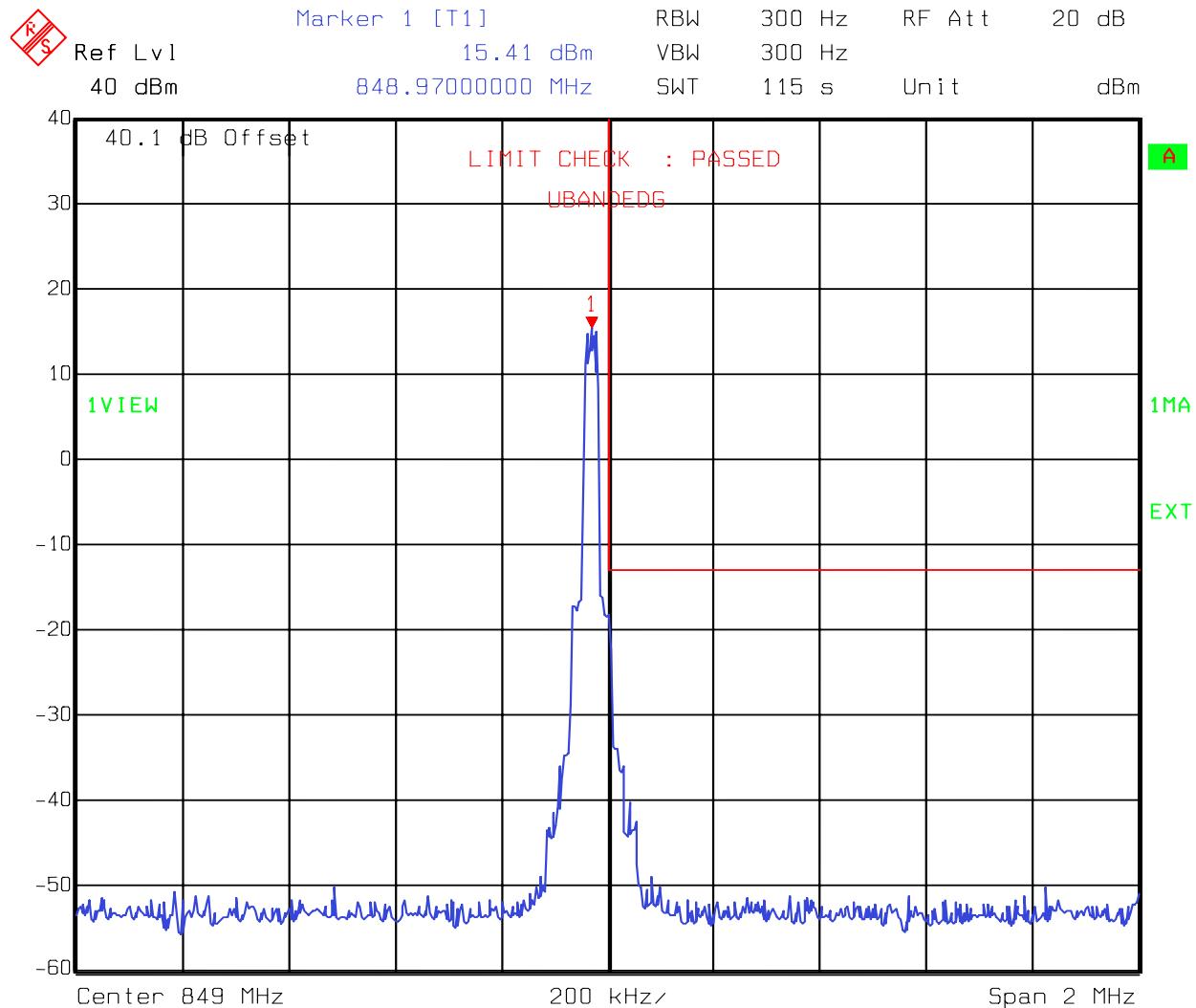
**Measurement Uncertainty:** +/- 1.7 dB

**Temperature:** 20 °C

**Relative Humidity** 22 %

## Test Plots – Spurious Emissions at Antenna Terminals

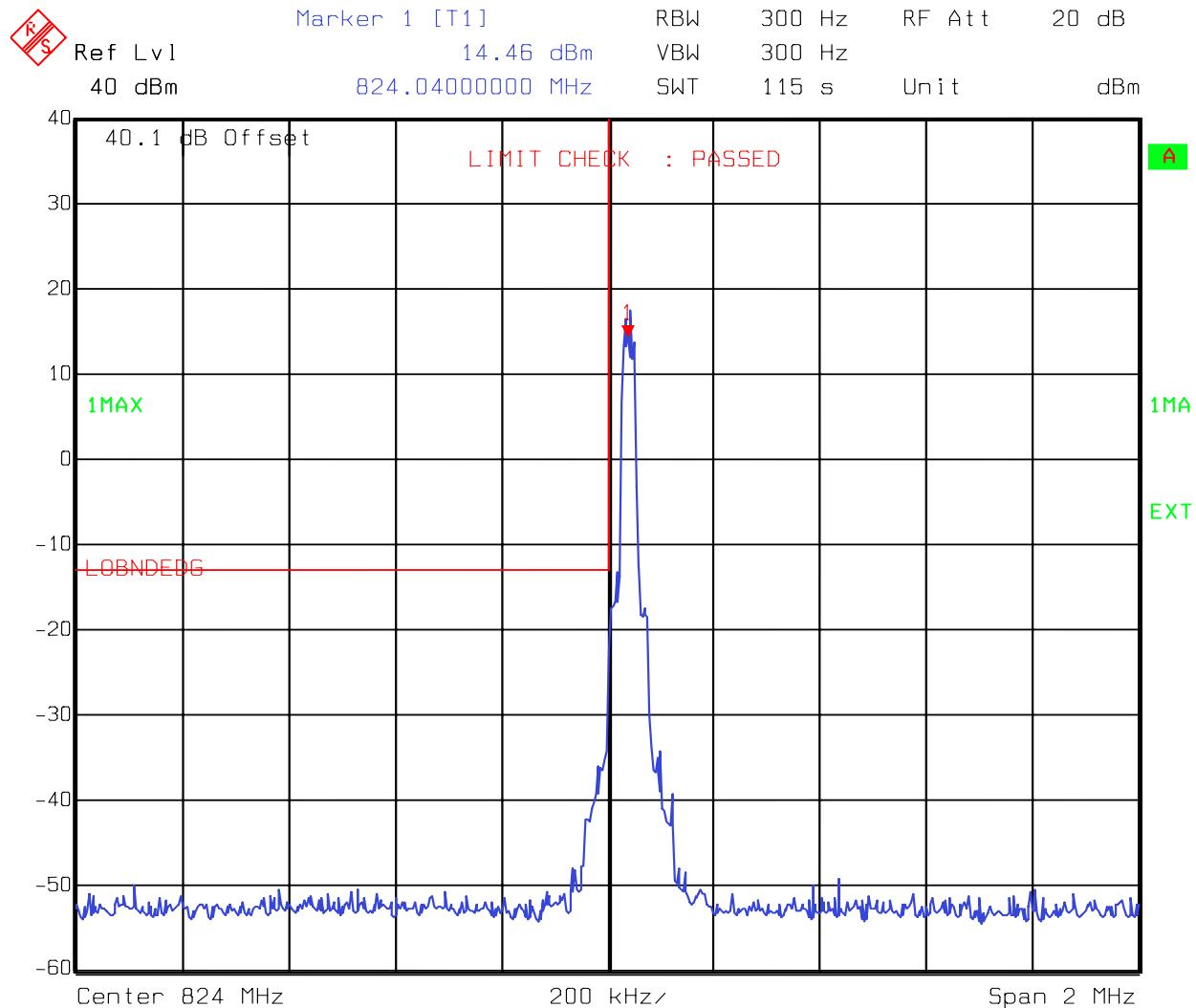
TDMA



Title: Horizontal  
Date: 27.JAN.2003 16:32:28

## Test Plots – Spurious Emissions at Antenna Terminals

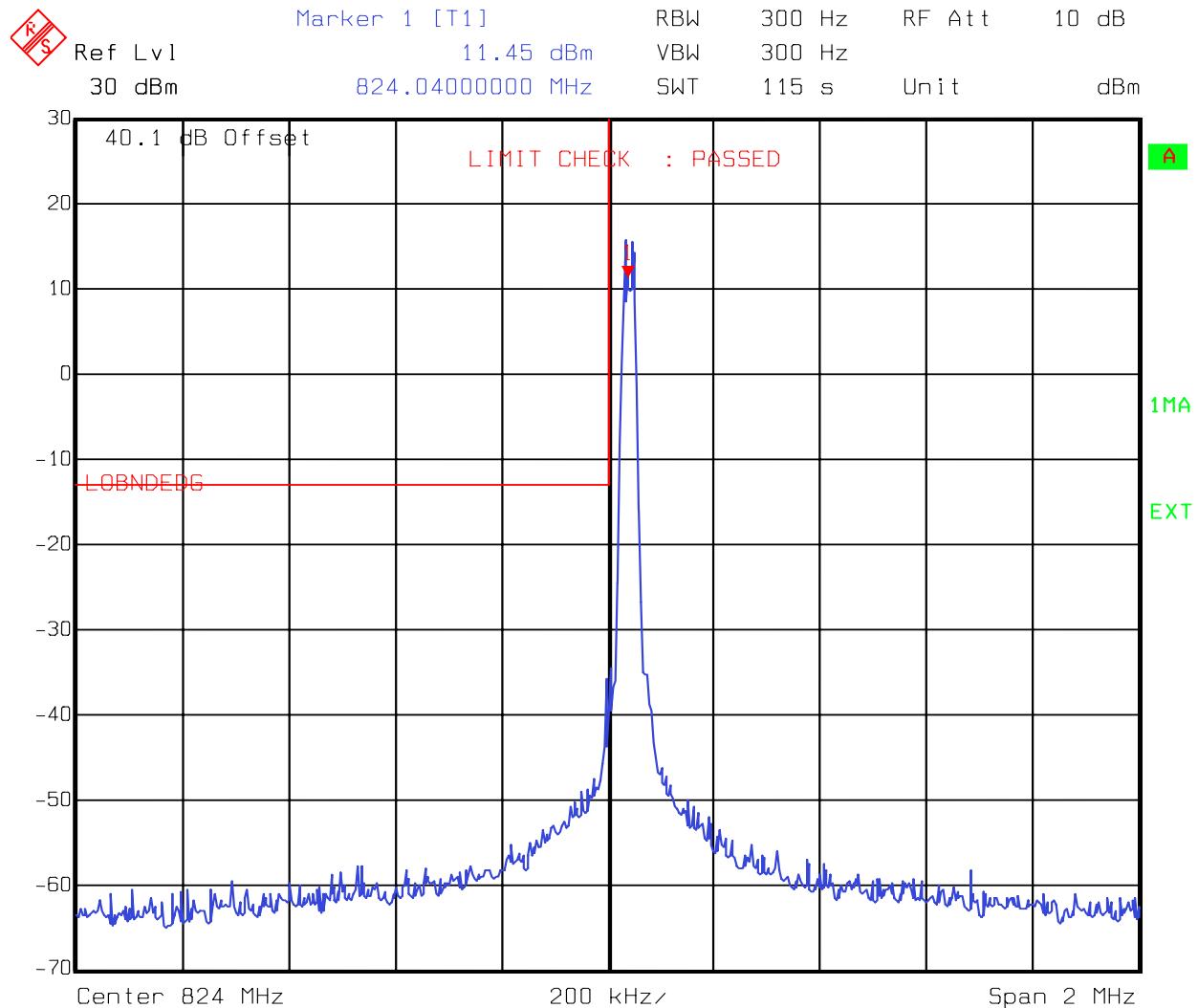
TDMA



Title: Horizontal  
Date: 27.JAN.2003 16:44:15

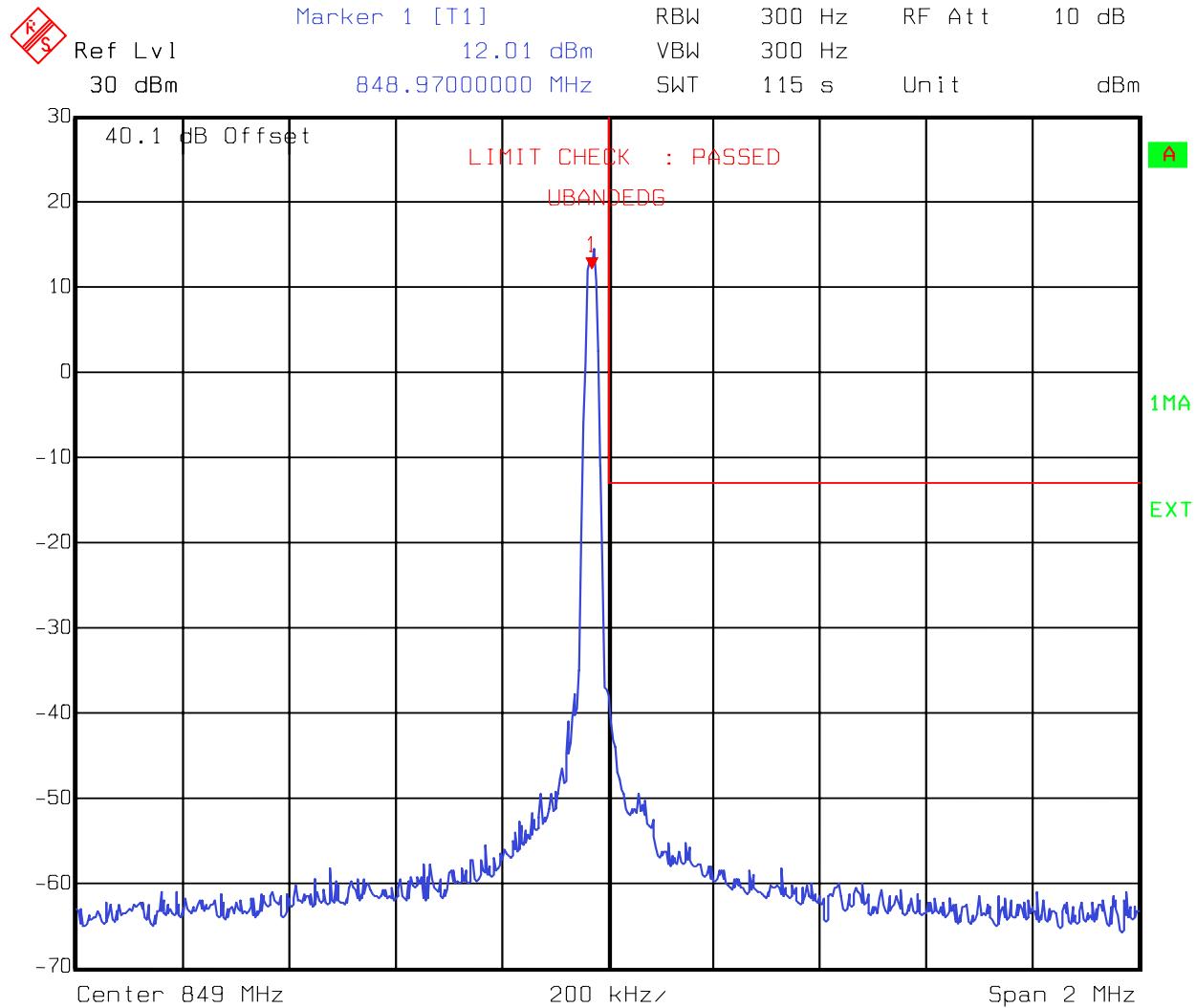
## Test Plots – Spurious Emissions at Antenna Terminals

AMPS



## Test Plots – Spurious Emissions at Antenna Terminals

AMPS



Title: Horizontal  
Date: 28.JAN.2003 12:15:55

**Nemko Dallas**

**FCC PARTS 2 and 22**

**EQUIPMENT: 2260**

**800 MHz CELLULAR SUBSCRIBER UNITS**

**Report No.: 3L0024RUS1**

## **Section 5. Field Strength of Spurious**

NAME OF TEST: Field Strength of Spurious	PARA. NO.: 2.1053
TESTED BY: Eldon Berry	DATE: 1/23/2003

**Test Results:** Complies.

**Measurement Data:** See attached table.



Nemko Dallas, Inc.

**Dallas Headquarters:**  
802 N. Kealy  
Lewisville, TX 75057  
Tel: (972) 436-9600  
Fax: (972) 436-2667

**Test Data - Radiated Emissions**

<u>ERP Substitution Method</u>										
Page <u>1</u> of <u>1</u>										
Job No.:	3L0024R		Date:	23Jan03		Complete <input checked="" type="checkbox"/> X				
Specification:	Part 22		Temperature(°C):	21		Preliminary <input type="checkbox"/>				
Tested By:	Eldon Berry		Relative Humidity(%)	16						
E.U.T.:	Model 2260									
Configuration:	PCS									
Sample No.:	S01									
Location:	AC 1		RBW:	100 kHz		Measurement				
Detector Type:	Peak		VBW:	100 kHz		Distance: <u>3</u> m				
<b>Test Equipment Used</b>										
Antenna:	1304		Directional Coupler:							
Pre-Amp:	1016		Cable #1:	1485						
Filter:			Cable #2:	1484						
Receiver:	1036		Cable #3:	1046						
Attenuator #1:			Cable #4:							
Attenuator #2:			Mixer:							
Additional equipment used:										
Measurement Uncertainty: <u>+/-1.7 dB</u>										
Frequency (MHz)	Meter Reading (dBm)	Correction Factor (dB)		Pre-Amp Gain (dB)	Substitution Antenna Gain (dBd)		ERP (dBm)	ERP (mW)	Polarity	Comments
1673.04	-67.3	31.0		32.6	7.3		-61.7	0.0000	V	
2509.56	-47.8	35.5		33	8.0		-37.4	0.0002	V	
3346.08	-56.7	39.8		32.7	8.0		-41.6	0.0001	V	
4182.60	-68.0	45.3		33.2	8.2		-47.7	0.0000	V	
5019.12	-66.9	41.3		32.7	8.2		-50.1	0.0000	V	
5855.64	-69.8	39.8		31.8	9.3		-52.5	0.0000	V	
6692.16	-70.4	41.3		31.6	9.4		-51.3	0.0000	V	
7528.68	-72.7	41.8		32.5	9.2		-54.2	0.0000	V	
8365.20	-71.1	42.8		33.4	9.1		-52.6	0.0000	V	
1673.04	-72.8	33.0		32.6	7.3		-65.2	0.0000	H	
2509.56	-52.7	35.5		33	8.0		-42.3	0.0001	H	
3346.08	-49.5	36.3		32.7	8.0		-37.9	0.0002	H	
4182.60	-69.6	34.8		33.2	8.2		-59.8	0.0000	H	
5019.12	-69.5	38.3		32.7	8.2		-55.7	0.0000	H	
5855.64	-69.4	37.8		31.8	9.3		-54.1	0.0000	H	
6692.16	-73.8	39.2		31.6	9.4		-56.9	0.0000	H	
7528.68	-74.7	41.5		32.5	9.2		-56.6	0.0000	H	
8365.20	-73.7	42.5		33.4	9.1		-55.5	0.0000	H	
Notes: Searched spectrum to the 10th harmonic of carrier										

Nemko Dallas

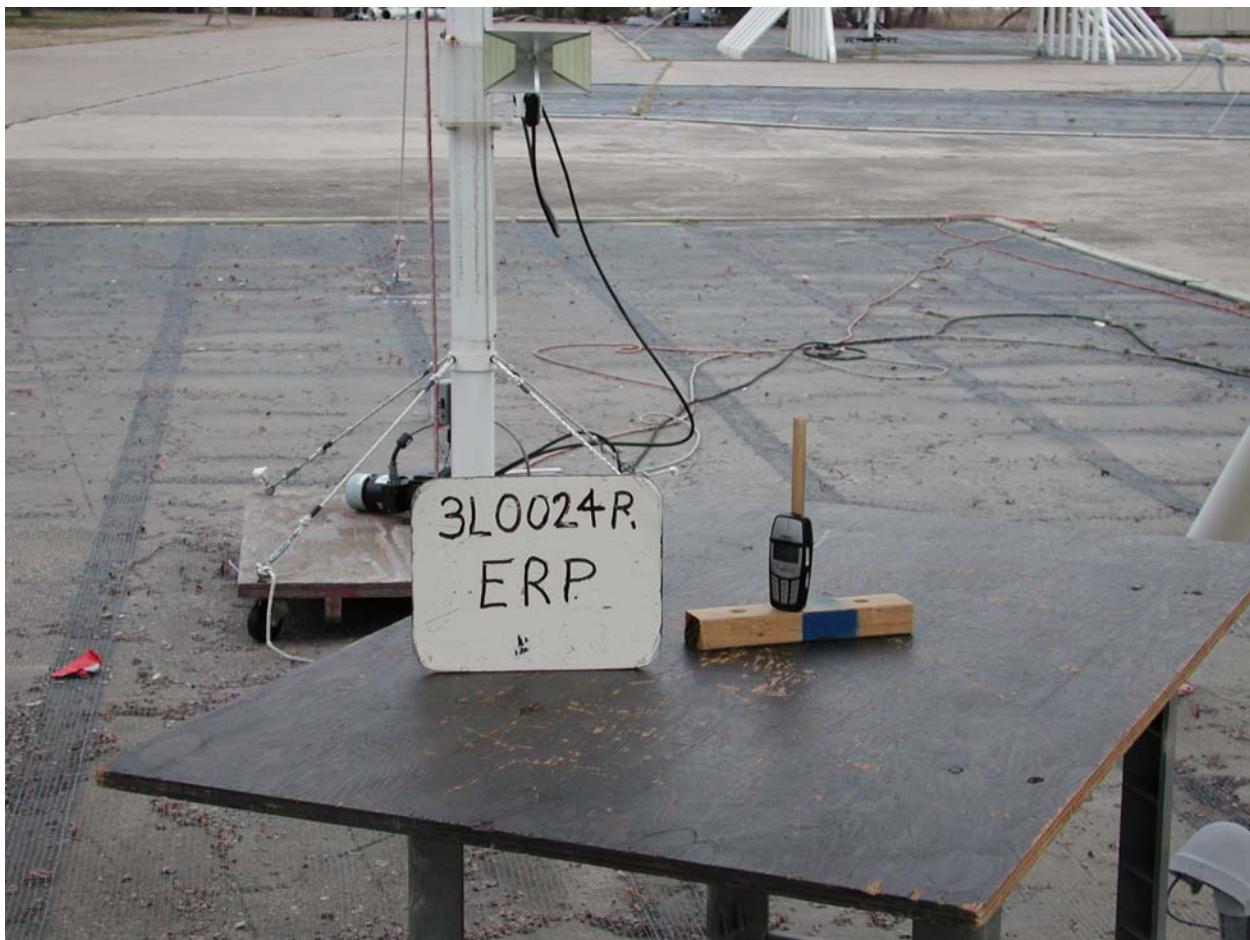
FCC PARTS 2 and 22

800 MHz CELLULAR SUBSCRIBER UNITS

EQUIPMENT: 2260

Report No.: 3L0024RUS1

**Photographs of Test Setup**



**Section 6. Frequency Stability**

NAME OF TEST: Frequency Stability	PARA. NO.: 2.1055
TESTED BY: Eldon Berry	DATE:

**Test Results:** Complies.**Measurement Data:** See attached tables.**Equipment Used:****Measurement Uncertainty:** ppm**Temperature:** 22 °C**Relative Humidity:** 30 %

EQUIPMENT: 2260

## Test Data – Frequency Stability

Band of Operation Cellular  
 Mode of Operation: AMPS  
 Channel 384  
 Standard Test Frequency: 836.52 MHz  
 Standard Test Voltage: 3.8 Vdc

Temperature	Voltage (Vdc)	Frequency (MHz)	Change (Hz)	Change (ppm)
50	3.8	836.520267	276	0.329
40	3.8	836.520327	327	0.391
30	3.8	836.520340	340	0.406
20	3.8	836.520341	341	0.407
10	3.8	836.520344	344	0.411
0	3.8	836.520458	458	0.547
-10	3.8	836.520405	405	0.484
-20	3.8	836.520317	317	0.378
-30	3.8	836.520311	311	0.371
20	4.4	836.520334	334	0.399
20	3.4*	836.520334	334	0.399

Band of Operation Cellular  
 Mode of Operation TDMA  
 Channel 384  
 Standard Test Frequency: 836.52 MHz  
 Standard Test Voltage: 3.8 Vdc

Temperature	Voltage (Vdc)	Frequency (MHz)	Change (Hz)	Change (ppm)
50	3.8	836.520004	4	0.004
40	3.8	836.519995	-5	0.005
30	3.8	836.519994	-6	0.007
20	3.8	836.519994	-6	0.007
10	3.8	836.519993	-7	0.008
0	3.8	836.519994	-6	0.007
-10	3.8	836.519992	-8	0.009
-20	3.8	836.519993	-7	0.008
-30	3.8	836.519995	-5	0.005
-20	4.4	836.519992	-8	0.009
-30	3.4*	836.519993	-7	0.008

\*Note – Unit cutoff point.

EQUIPMENT: 2260

## Section 7. Test Equipment List

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
406	POWER METER	HP 436A	2512A22082	04/03/02	04/03/03
993	Horn antenna	A.H. Systems SAS-200/571	XXX	01/08/02	01/09/04
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	07/15/02	07/15/03
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	12/18/01	12/19/03
1053	SIGNAL GENERATOR	ROHDE & SCHWARZ SMIQ 03	DE22081	08/13/02	08/13/03
1055	DUAL DIRECTIONAL COUPLER	NARDA 3022	73393	Cal Not Req	N/A
1304	HORN ANTENNA	ELECTRO METRICS RGA-60	6151	07/30/01	07/31/03
1304	HORN ANTENNA	ELECTRO METRICS RGA-60	6151	07/30/01	07/31/03
1404	Dipole set	EMCO 3121C	9701-1256	06/10/02	06/10/03
1466	10 db Attenuator DC 8.0 Ghz	Midwest Microwave 292/10db	NONE	CBU	N/A
1477	20db Attenuator DC 18 Ghz	MCL Inc. BW-S20W5	NONE	CBU	N/A
1482	Band Pass Filter	K & L 11SH10-4000/T12000-0/0	2	CBU	N/A
1483	Cable 4m	Storm PR90-010-144	N/A	CBU	N/A
1484	Cable 2.0-18.0 Ghz	Storm PR90-010-072	N/A	07/15/02	07/15/03
1485	Cable 2.0-18.0 Ghz	Storm PR90-010-216	N/A	07/15/02	07/15/03
1629	CABLE, 6 ft	MEGAPHASE 10311 1GVT4	N/A	CBU	N/A
1983	CABLE	KTL Site A OATS	N/A	08/05/02	08/05/03
283	Environmental Chamber with controller # 1189006	ENVIROTRONICS SH27 & 2030-22844	129010083	01/10/02	01/10/03
	Cellular Test System	Wavetek 3600D	9228038	11/25/02	11/25/03
1054	DUAL DIRECTIONAL COUPLER	NARDA 3020A	34366	Cal Not Req	N/A
1058	DUAL DIRECTIONAL COUPLER	HEWLETT PACKARD 11692D	1212A03366	Cal Not Req	N/A

Agilent power meter E4418B s/n GB40206972 Cal'd 9/19/02 Due 9/19/03

Agilent power sensor 8482H s/n 3318A05855 Cal'd 12/19/02 Due 12/19/03

**Nemko Dallas**

**EQUIPMENT: 2260**

**FCC PARTS 2 and 22**  
**800 MHz CELLULAR SUBSCRIBER UNITS**  
**Report No.: 3L0024RUS1**

**ANNEX A - TEST DETAILS**

NAME OF TEST: RF Power Output

PARA. NO.: 2.1046

**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:

**Test Method:** TIA/EIA-603-1992, Section 2.2.12

The antenna substitution method was used to determine the equivalent radiated power at spurious frequencies. The spurious emissions were measured at a distance of 3 meters. The EUT was then replaced with a reference substitution antenna with a known gain referenced to a dipole. This antenna was fed with a signal at the spurious frequency. The level of the signal was adjusted to repeat the previously measured level. The resulting erp is the signal level fed to the reference antenna corrected for gain referenced to a dipole.

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 2.1049
----------------------------------	-------------------

(i) **Minimum Standard:** No in-band emission requirements.

Para. No. 22.917(a). The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

**Method Of Measurement:**

Spectrum Analyzer Settings on band edges (up to 1 MHz from band edge):

RBW: 1% of 26 dBc bandwidth

VBW:  $\geq$  RBW

Span: 2 MHz

Sweep: Auto

Spectrum Analyzer Settings out-of-band(> 1MHz from band edge):

RBW: 100 kHz or greater

VBW:  $\geq$  RBW

Sweep: Auto

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.

Input Signal Characteristics:

RF level: Maximum recommended by manufacturer

10 kbps WBD + DAT

ST

NAME OF TEST: Spurious Emission at Antenna Terminals	PARA. NO.: 2.1053
---	-------------------

**Minimum Standard:** Para. No. 22.917(a). The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

**Method Of Measurement:**

Spectrum Analyzer Settings:

RBW: 100 kHz or greater.

VBW:  $\geq$  RBW

Start Frequency: 0 MHz

Stop Frequency: 10 GHz

Sweep: Auto

NAME OF TEST: Field Strength of Spurious Radiation	PARA. NO.: 2.1053
--	-------------------

**Minimum Standard:** Para. No. 22.917(a). The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

**Test Method:** TIA/EIA-603-1992, Section 2.2.12

The antenna substitution method was used to determine the equivalent radiated power at spurious frequencies. The spurious emissions were measured at a distance of 3 meters. The EUT was then replaced with a reference substitution antenna with a known gain referenced to a dipole. This antenna was fed with a signal at the spurious frequency. The level of the signal was adjusted to repeat the previously measured level. The resulting erp is the signal level fed to the reference antenna corrected for gain referenced to a dipole.

*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.

Freq. Range (MHz)	Mobile > 3 W	Mobile ≤ 3 W
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:

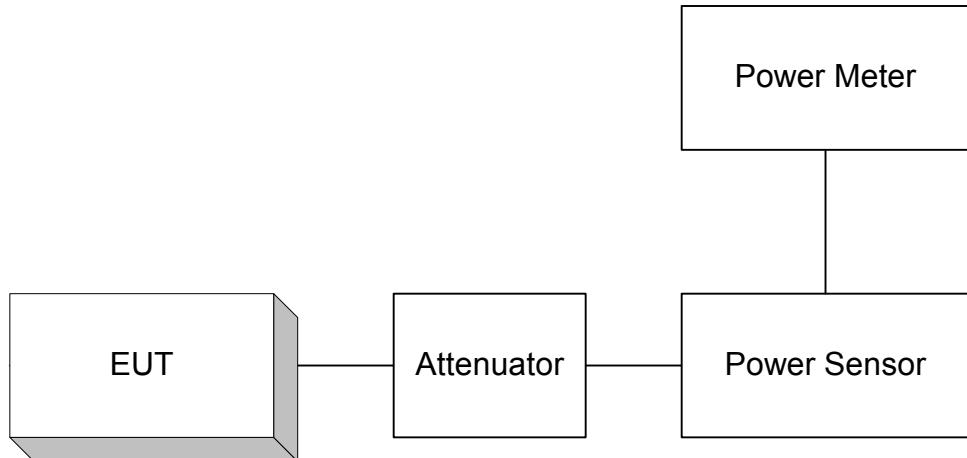
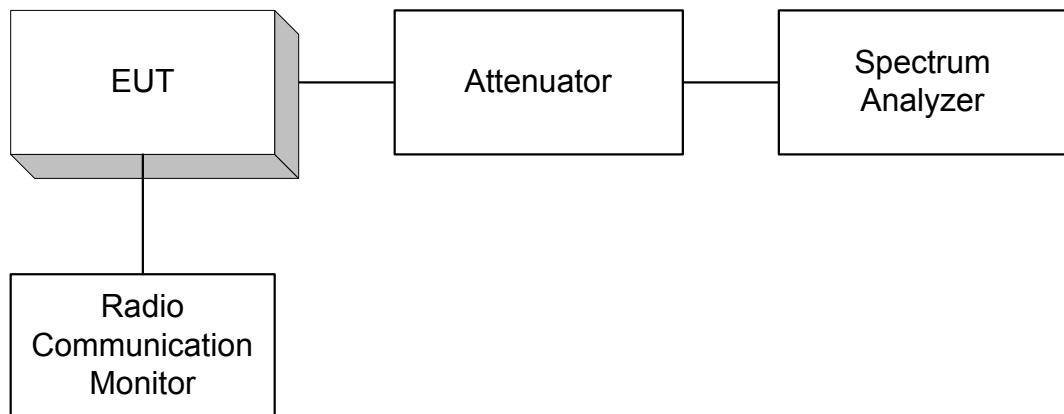
The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature and the frequency is measured in 30 second intervals for a period of 5 minutes.

**Nemko Dallas**

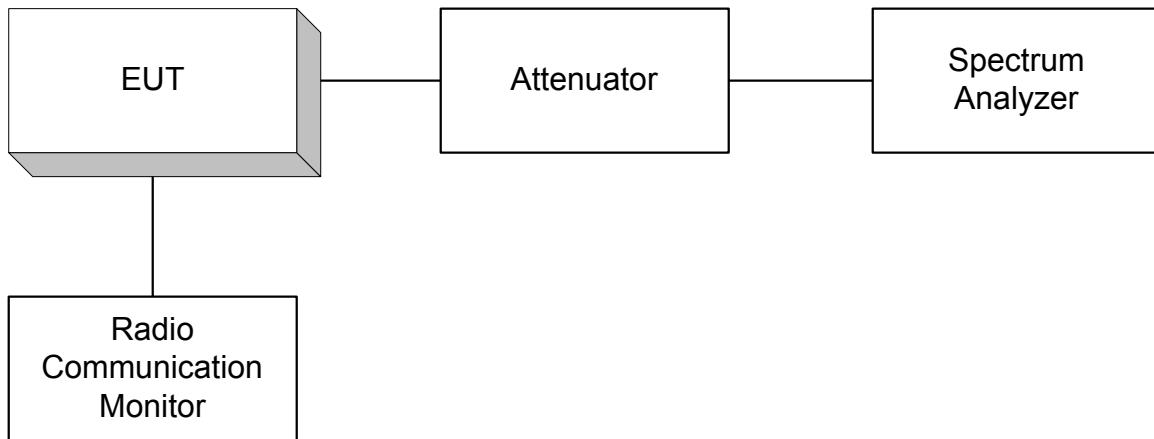
**EQUIPMENT: 2260**

**FCC PARTS 2 and 22**  
**800 MHz CELLULAR SUBSCRIBER UNITS**  
**Report No.: 3L0024RUS1**

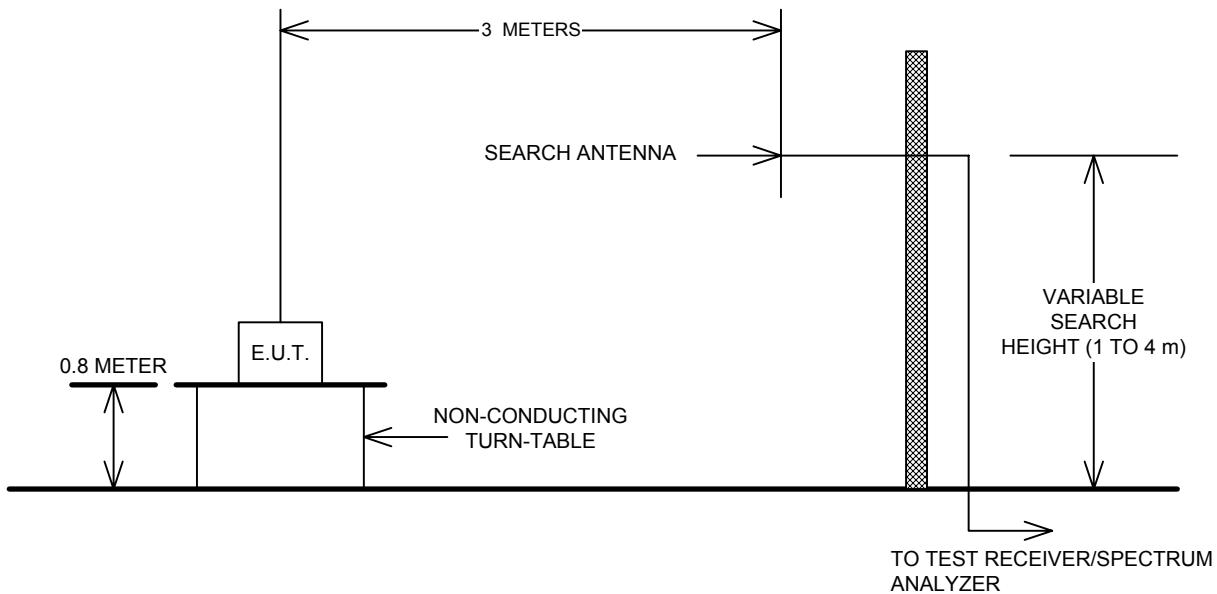
**ANNEX B - TEST DIAGRAMS**

**Para. No. 2.1046 - R.F. Power Output****Para. No. 2.1049 - Occupied Bandwidth**

*The Radio Communication Monitor is used only to provide modulation input for external modulation.*

**Para. No. 2.1053 Spurious Emissions at Antenna Terminals**

*The Radio Communication Monitor is used only to provide modulation input for external modulation.*

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

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

