FCC CFR47 PART 15 CERTIFICATION

TEST REPORT

FOR

2.4GHz SPREAD SPECTRUM CORDLESS TELEPHONE

MODEL: E272

FCC ID: HOLE272

REPORT NUMBER: 03U1988-1

ISSUE DATE: JUNE 07, 2003

Prepared for
CIDCO COMMUNICATIONS CORPORATION
105 COCHRANE CIRCLE
MORGAN HILL, CA 95037
USA

Prepared by
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1. TEST RESULT CERTIFICATION

COMPANY NAME: **CIDCO COMMUNICATION CORPORATION**
105 COCHRANE CIRCLE
MORGAN HILL, CA 95037
USA

EUT DESCRIPTION: **2.4GHZ SPREAD SPECTRUM CORDLESS TELEPHONE**

MODEM NAME: **E272**

DATE TESTED: **MAY 14, 2003**

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 15 SUBPART C	NO NON-COMPLIANCE NOTED

Compliance Certification Services, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: This document reports conditions under which testing was conducted and results of tests performed. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document.

Approved & Released For CCS By:

MIKE HECKROTTE
CHIEF ENGINEER
COMPLIANCE CERTIFICATION SERVICES

Tested By:

VIEN TRAN
EMC TECHNICIAN
COMPLIANCE CERTIFICATION SERVICES

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2. EUT DESCRIPTION

The E272 is a 2.4GHz cordless phone that incorporates your telephone company's calling features, such as calling ID. Voice Mail, and call Waiting ID, to provide a powerful full function caller ID cordless telephone. Listed below are some key features;

- Handset Jack
- Call timer
- Single key redialing
- English and Spanish
- Speakerphone
- New message Indicator
- Stores up to 50 caller ID recordings
- 50 directory records

Crystal

Broad Name	Crystal (MHz)
Main Unit	19.2MHz
Handset Unit	19.2MHz

The Main Unit (Base) has a peak output power of 17.7 dBm (58.88 mW), an average output power of 14.5dBm (28.18mW) and an antenna gain of 1.0 dBi.
The Handset Unit has a peak output power of 15.51 dBm (35.56 mW), an average output power of 12.83dBm (19.19mW) and an antenna gain of 1.0 dBi.

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3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4/1992, FCC CFR 47 Part 2 and FCC CFR 47 Part 15.

4. FACILITIES AND ACCREDITATION

4.1 FACILITIES AND EQUIPMENT

The open area test sites and conducted measurement facilities used to collect the radiated data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

All receiving equipment conforms to CISPR Publication 16-1, “Radio Interference Measuring Apparatus and Measurement Methods.”

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4.2 TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3/10 meter Open Area Test Sites to perform FCC Part 15/18 measurements	1300
Japan	VCCI	CISPR 22 Two OATS and one conducted Site	VCCI R-1014, R-619, C-640
Norway	NEMKO	EN50081-1, EN50081-2, EN50082-1, EN50082-2, IEC61000-6-1, IEC61000-6-2, EN50083-2, EN50091-2, EN50130-4, EN55011, EN55013, EN55014-1, EN55104, EN55015, EN61547, EN55022, EN55024, EN61000-3-2, EN61000-3-3, EN60945, EN61326-1	ELA 117
Norway	NEMKO	EN60601-1-2 and IEC 60601-1-2, the Collateral Standards for Electro-Medical Products. MDD, 93/42/EEC, AIMD 90/385/EEC	ELA-171
Taiwan	BSMI	CNS 13438	SL2-IN-E-1012
Canada	Industry Canada	RSS210 Low Power Transmitter and Receiver	Canada IC2324 A,B,C, and F

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5 CALIBRATION AND UNCERTAINTY

5.1 MEASURING INSTRUMENT CALIBRATION

The measurement instruments utilized to perform the tests documented in this report have been calibrated in accordance with the manufacturer's recommendations, and are traceable to national standards.

5.2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Radiated Emission, 30 to 200 MHz	+/- 3.3 dB
Radiated Emission, 200 to 1000 MHz	+4.5 / -2.9 dB
Radiated Emission, 1000 to 2000 MHz	+4.5 / -2.9 dB
Power Line Conducted Emission	+/- 2.9 dB

Uncertainty figures are valid to a confidence level of 95%.

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5.3 TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST				
Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
Spectrum Analyzer, 26.5 GHz	*HP*	*8593EM*	*3710A00205*	*6/11/2003*
Preamplifier, 1 ~ 26	*Miteq*	*NSP10023988*	*646456*	*4/26/2004*
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	6739	2/4/2004
LISN, 10 kHz ~ 30 MHz	*FCC*	*50/250-25-2*	*114*	*9/6/2003*
Line Filter	*Lindgren*	*LMF-3489*	*497*	*CNR*
LISN, 10 kHz ~ 30 MHz	*Solar*	*8012-50-R-24-BNC*	*837990*	*9/6/2003*
EMI Test Receiver	*R & S*	*ESHS 20*	*827129/006*	*4/17/2004*
Quasi-Peak Adaptor	*HP*	*85650A*	*2521A01038*	*4/15/2004*
SA RF Section, 1.5 GHz	*HP*	*85680A*	*2314A02604*	*11/26/2003*
Preamplifier, 1300 MHz	*HP*	*8447D*	*2944A06550*	*8/22/2003*
Peak Power Meter	*Agilent*	*E4416A*	*GB41291160*	*C.N.R*

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6. SETUP OF EQUIPMENT UNDER TEST

SETUP INFORMATION FOR TRANSMITTER TESTS

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Device Type	Manufacturer	Model	Serial Number	FCC ID
LAPTOP	**SONY**	**PCG-9251**	**N/A**	**N/A**
AC ADAPTER	**ACBEL POLYTECH**	**API-7595**	**402110**	**N/A**
AC ADAPTER	**CIDCO**	**SPA-4180-65**	**N/A**	**N/A**
AC ADAPTER	**CIDCO**	**SPA-4180-66**	**N/A**	**N/A**
CONTROLLER BOARD	**CIDCO**	**N/A**	**N/A**	**N/A**

I/O CABLES

Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	**Serial**	**1**	**DB9**	**Shielded**	**1m**	N/A

TEST SETUP

The handset unit was operated by internal battery and the base unit was operated by AC adapter.

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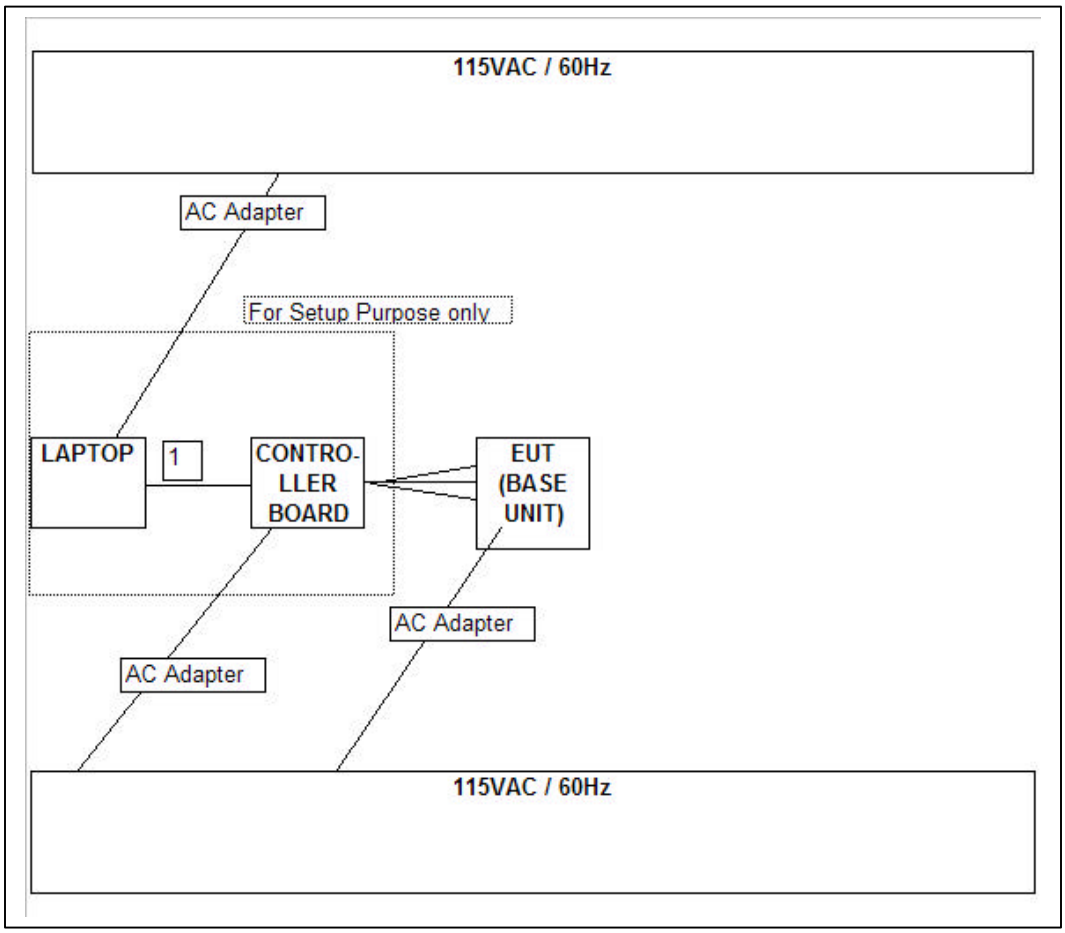
SETUP DIAGRAM FOR TRANSMITTER TESTS

STAND-ALONE HANDSET
(Handset operates by internal battery)



BASE UNIT SETUP

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7. APPLICABLE LIMITS AND TEST RESULTS

7.1 6 dB BANDWIDTH

LIMIT

§15.247 (a) (2) For direct sequence systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 100 kHz. The sweep time is coupled.

RESULTS

No non-compliance noted:

BASE UNIT

Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Minimum Limit (kHz)
Low	2404.8	1625	500
Middle	2439	1613	500
High	2475	1575	500

HANDSET UNIT

Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Minimum Limit (kHz)
Low	2404.8	1550	500
Middle	2439	1525	500
High	2475	1550	500

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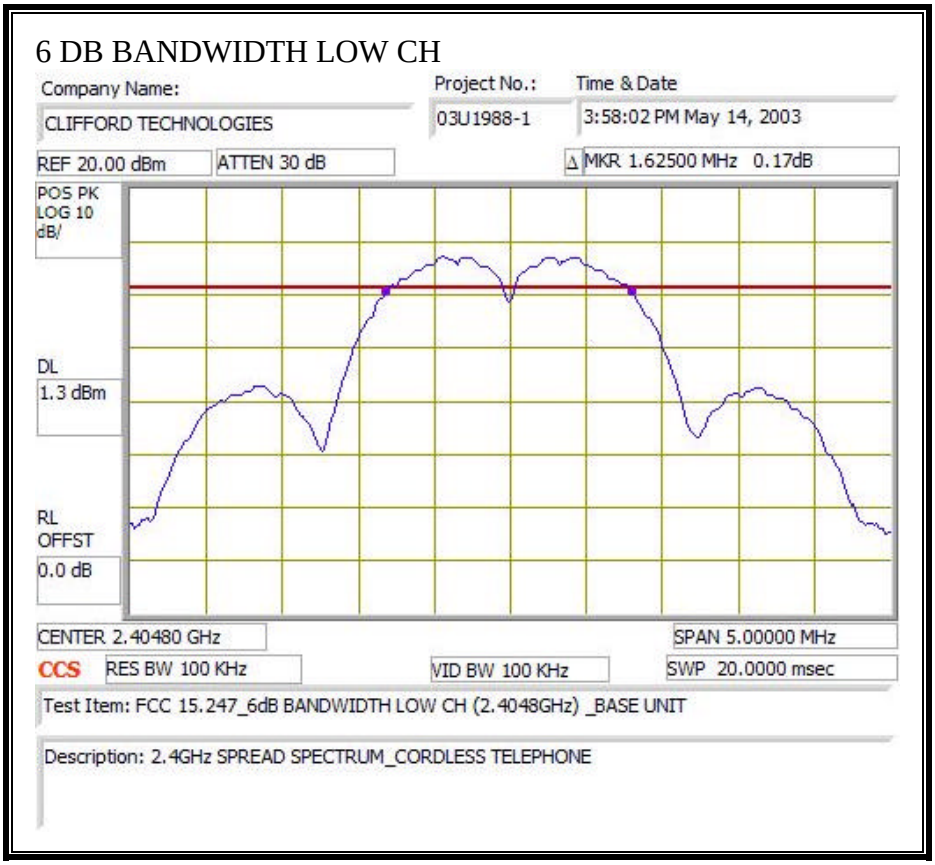
6 DB BANDWIDTH – BASE UNIT



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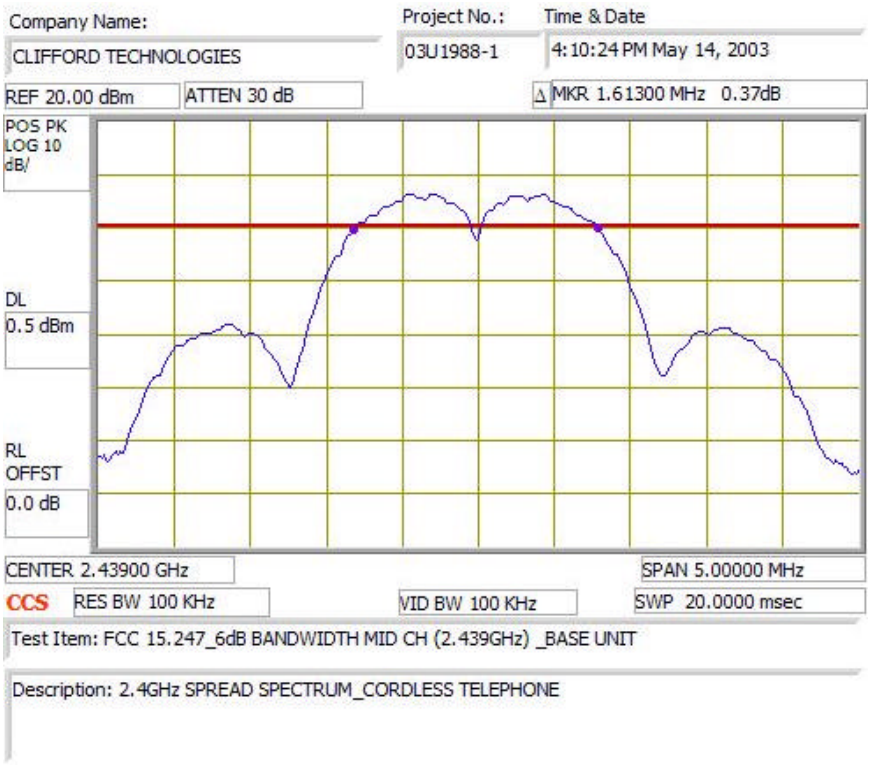
6 DB BANDWIDTH MID CH



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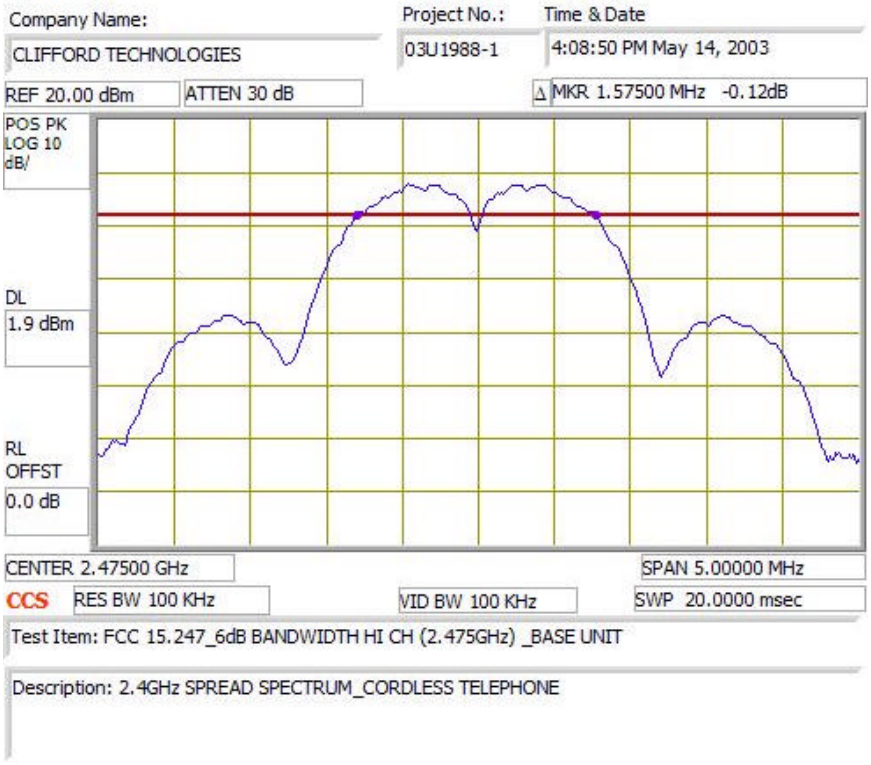
6 DB BANDWIDTH HIGH



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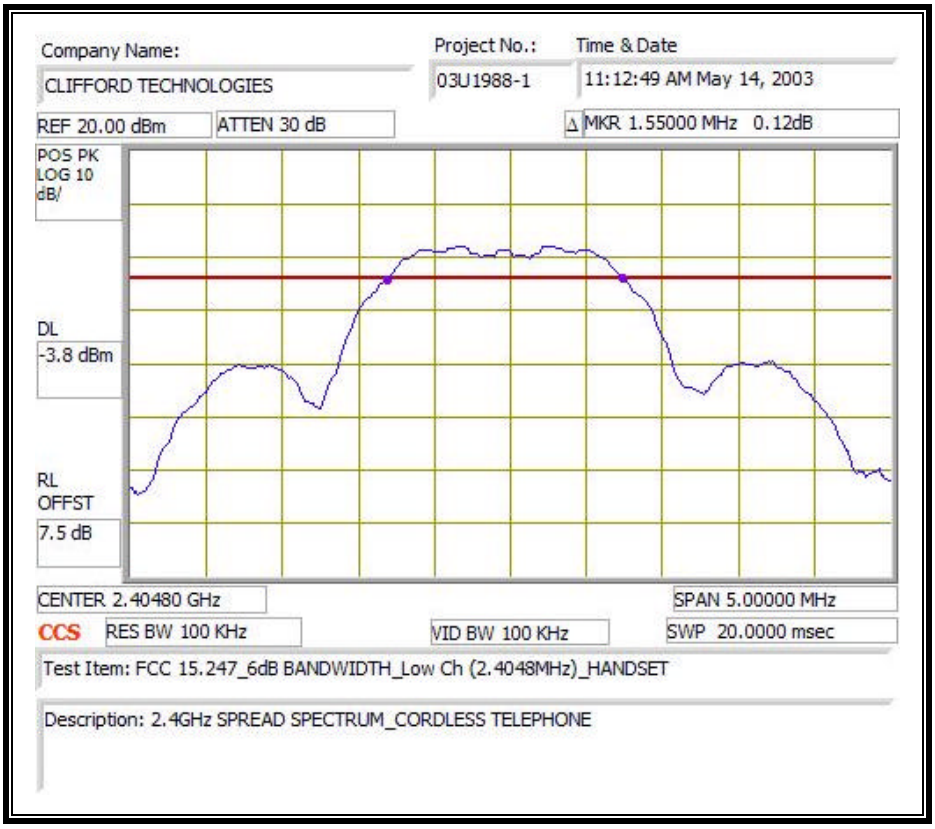
6 DB BANDWIDTH – HANDSET UNIT



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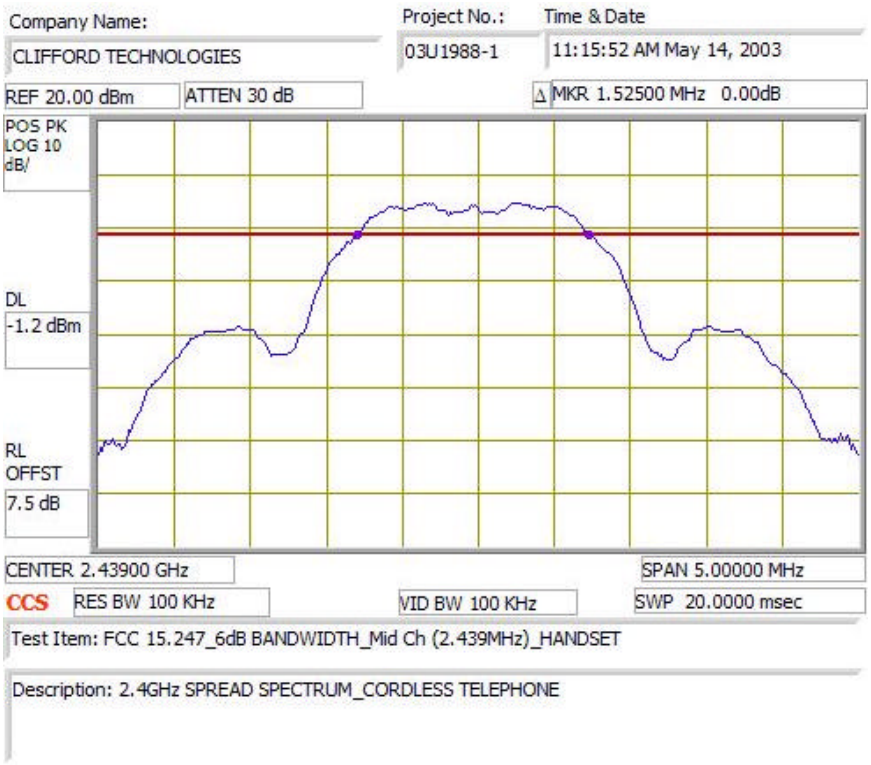
6 DB BANDWIDTH MID CH



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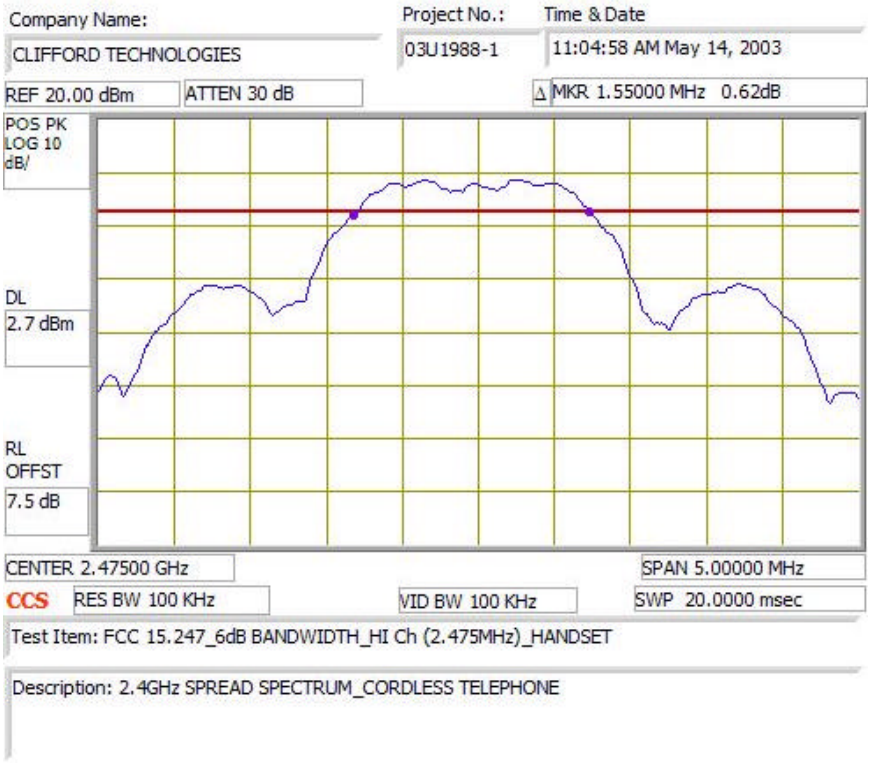
6 DB BANDWIDTH HIGH CH



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7.2 OUTPUT POWER

PEAK POWER LIMIT

§15.247 (b) The maximum peak output power of the intentional radiator shall not exceed the following:

§15.247 (b) (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz , and 5725-5850 MHz bands: 1 watt.

§15.247 (b) (4) Except as shown in paragraphs (b)(3) (i), (ii) and (iii) of this section, if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum antenna gain is 1.0 dBi, therefore the limit is 30 dBm.

AVERAGE POWER LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter. The power meter is set to simultaneously read peak power and average power.

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RESULTS

No non-compliance noted:

The cable assembly insertion loss of 0 dB was entered as an offset in the power meter to allow for direct reading of power.

BASE UNIT

Channel	Frequency (MHz)	Peak Power (dBm)	AVG Power (dBm)	Limit (dBm)	Margin (dB)
Low	2408	15.4	12.5	30	-17.5
Middle	2439	16.3	13.2	30	-16.8
High	2475	17.7	14.5	30	-15.5

The cable assembly insertion loss of 7.5 dB was entered as an offset in the power meter to allow for direct reading of power.

HANDSET UNIT

Channel	Frequency (MHz)	Peak Power (dBm)	AVG Power (dBm)	Limit (dBm)	Margin (dB)
Low	2408	15.57	12.6	30	-17.4
Middle	2439	15.34	12.62	30	-17.38
High	2475	15.51	12.83	30	-17.17

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7.3 MAXIMUM PERMISSIBLE EXPOSURE

LIMITS

§15.247 (b) (5) Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See §1.1307(b)(1) of this chapter.

CALCULATIONS

Given

$E = \sqrt{(30 * P * G)} / d$

and

$S = E \wedge 2 / 3770$

where

E = Field Strength in Volts / meter
P = Power in Watts
G = Numeric antenna gain
d = distance in meters
S = Power Density in milliwatts / square centimeter

Combining equations and rearranging the terms to express the distance as a function of the remaining variables yields:

$d = \sqrt{((30 * P * G) / (3770 * S))}$

Changing to units of mW and cm, using:

P (mW) = P (W) / 1000 and
d (cm) =100 * d (m)

yields

$d = 100 * \sqrt{((30 * (P / 1000) * G) / (3770 * S))}$

$d = 0.282 * \sqrt{(P * G / S)}$

where

d = distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power Density in mW / cm^2

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Substituting the logarithmic form of power and gain using:

P (mW) = 10 ^ (P (dBm) / 10) and

G (numeric) = 10 ^ (G (dBi) / 10)

yields

d = 0.282 * 10 ^ ((P + G) / 20) / √ S Equation (1)

where

d = MPE distance in cm

P = Power in dBm

G = Antenna Gain in dBi

S = Power Density Limit in mW / cm^2

Equation (1) and the measured peak power is used to calculate the MPE distance.

LIMITS

S = 1.0 mW / cm^2 from 1.1310 Table 1

RESULTS

No non-compliance noted:

Mode	Power Density Limit (mW/cm^2)	Output Power (dBm)	Antenna Gain (dBi)	MPE Distance (cm)
BASE	1.0	12.83	1.00	1.39

NOTE: For mobile or fixed location transmitters, the minimum separation distance is 20 cm, even if calculations indicate that the MPE distance would be less.

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7.4 PEAK POWER SPECTRAL DENSITY

LIMIT

§15.247 (d) For direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer, the maximum level in a 3 kHz bandwidth is measured with the spectrum analyzer using RBW = 3 kHz and VBW >= 3KHz, sweep time = span / 3 kHz, and video averaging is turned off. The PPSD is the highest level found across the emission in any 3 kHz band.

RESULTS

No non-compliance noted:

BASE UNIT

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2408	0.16	8	-7.84
Middle	2437	0.12	8	-7.88
High	2475	2.38	8	-5.62

HANDSET UNIT

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2408	-1.88	8	-9.88
Middle	2437	-1.01	8	-9.01
High	2475	3.40	8	-4.6

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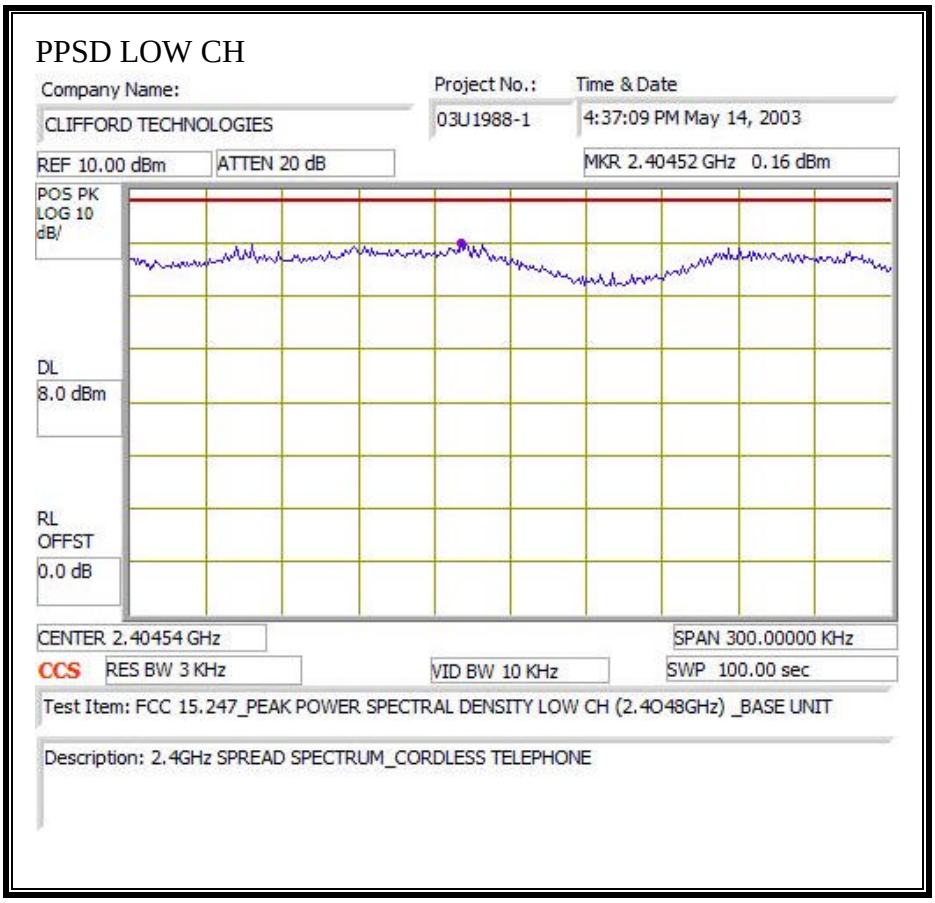
PEAK POWER SPECTRAL – BASE UNIT



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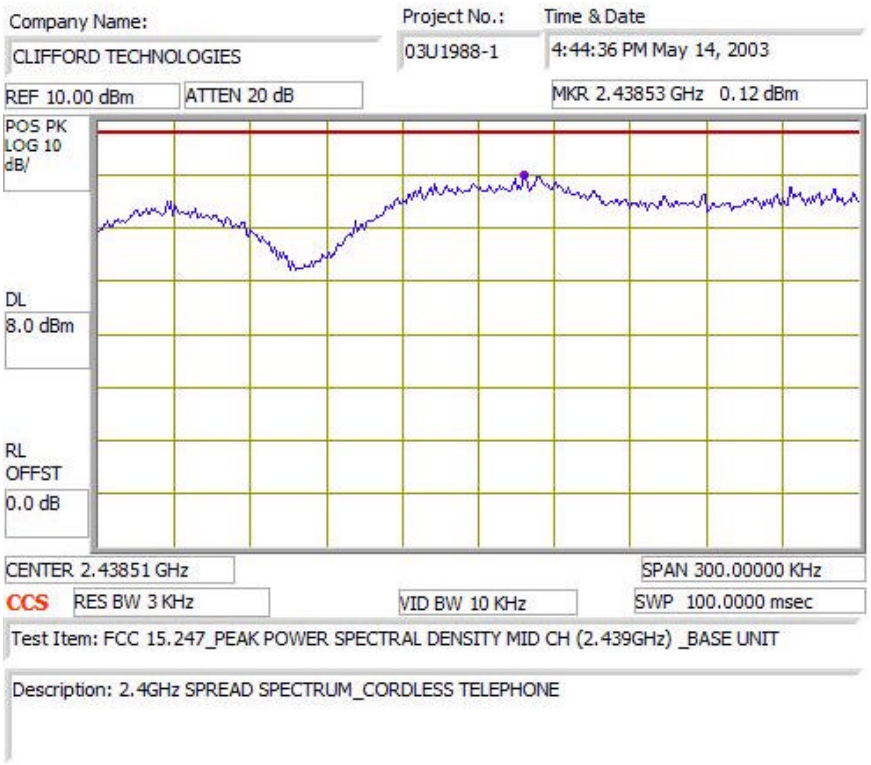
PPSD MID CH



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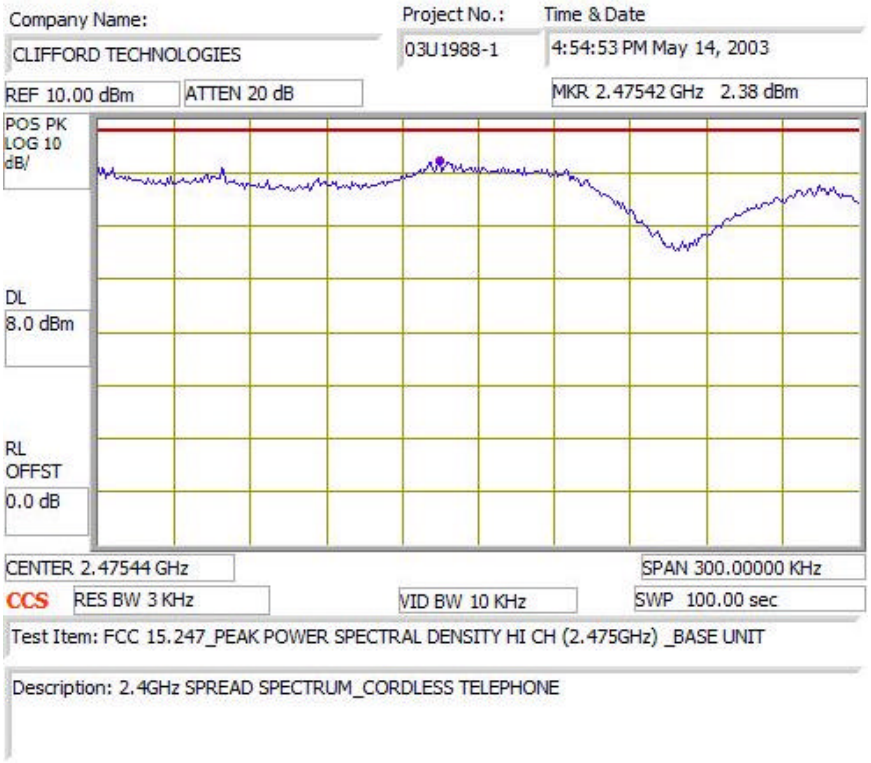
PPSD HIGH CH



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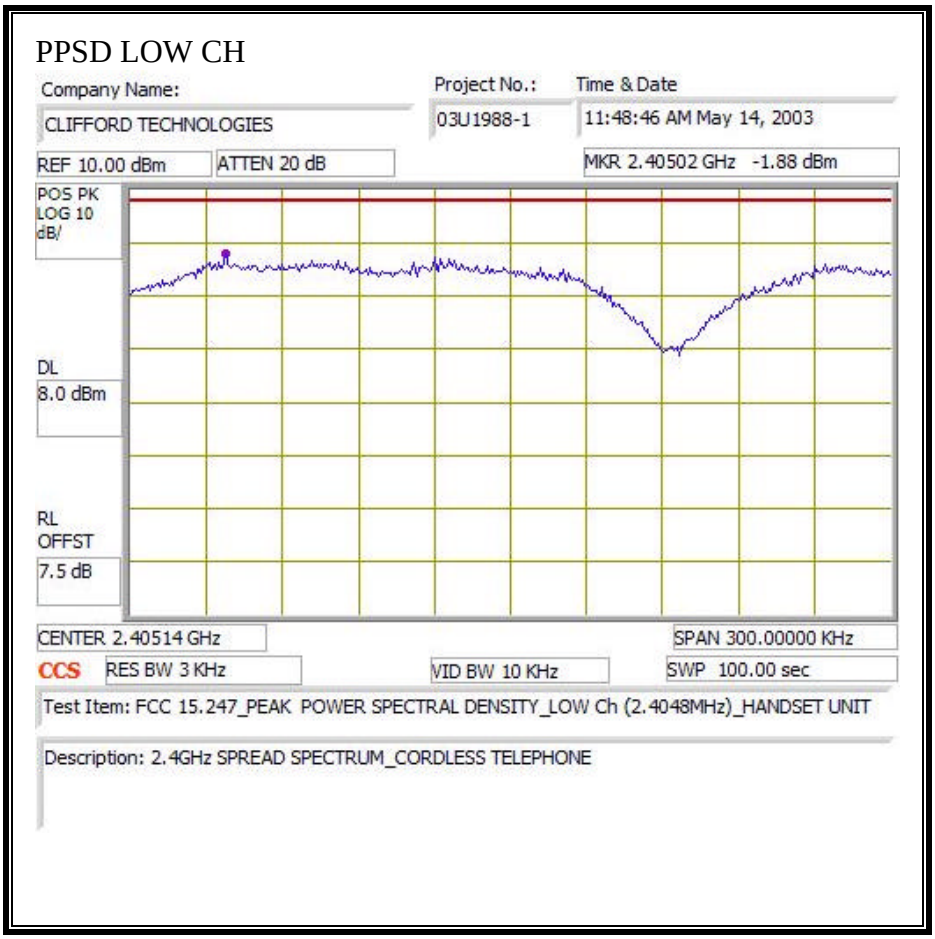
PEAK POWER SPECTRAL DENSITY - HANDSET UNIT



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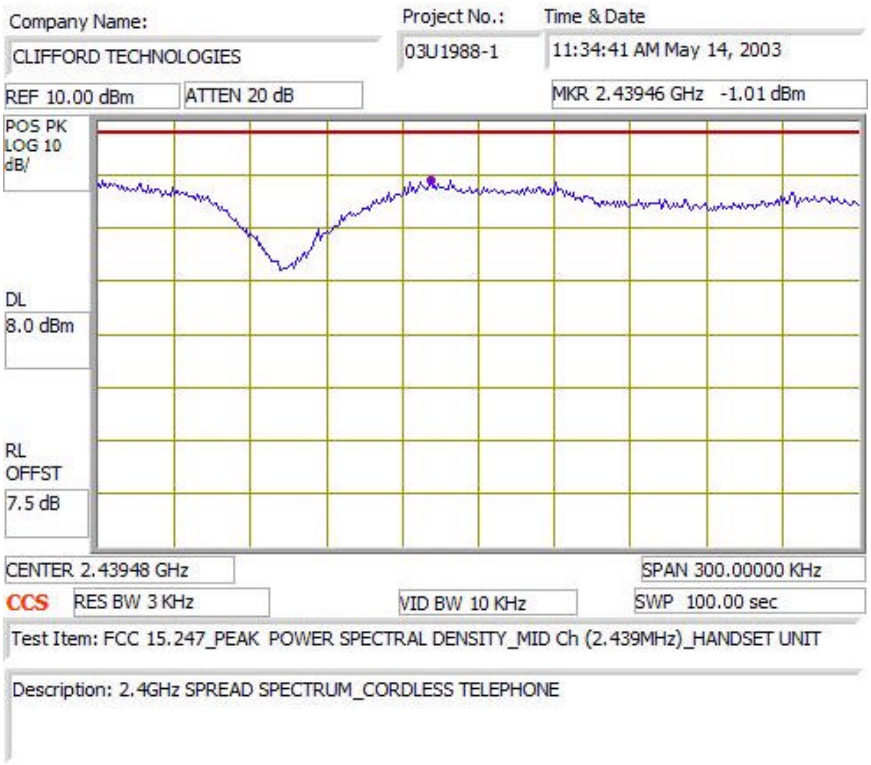
PPSD MID CH



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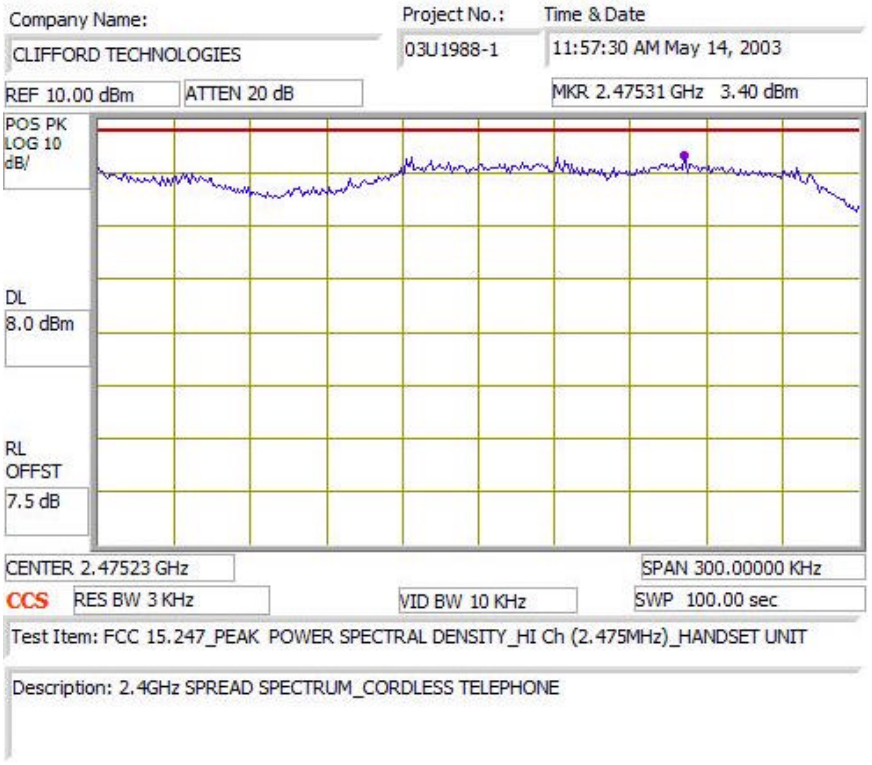

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7.5 CONDUCTED SPURIOUS EMISSIONS

LIMITS

§15.247 (c) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in§15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 100 kHz.

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

No non-compliance noted:

COMPLIANCE CERTIFICATION SERVICES DOCUMENT NO: CCSUP4031A
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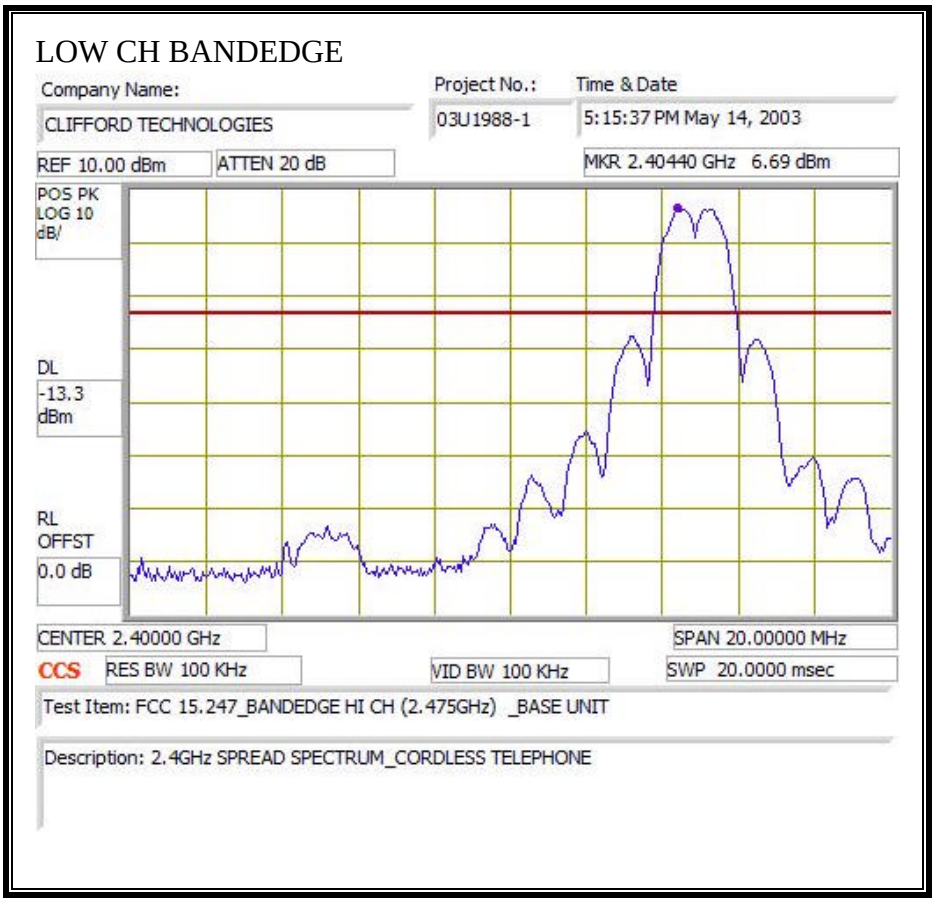
SPURIOUS EMISSIONS, LOW CHANNEL - BASE UNIT



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