

TEST NUMBER - 370-00

**EN 55024:1998 INFORMATION TECHNOLOGY EQUIPMENT
IMMUNITY CHARACTERISTICS—LIMITS AND MEASUREMENTS**

**EN 61000-4-2 ELECTROSTATIC DISCHARGE IMMUNITY
EN 61000-4-3 RADIATED RADIO FREQUENCY (RF) IMMUNITY
EN 61000-4-4 ELECTRICAL FAST TRANSIENT / BURST IMMUNITY
EN 61000-4-5 SURGE IMMUNITY
EN 61000-4-6 CONDUCTED RF DISTURBANCE IMMUNITY**

for

Clare Corporation
78 Cherry Hill Drive
Beverly, MA 01915
(978) 524 4900

of

Embedded Modem Module

CPC 2430E with DTM Evaluation Board

on

November 21, 2000

Tested by

Clifton P. Brick

Reviewed by

Larry K. Stillings

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1.0 OVERVIEW

1.1 PURPOSE OF TEST

This report has been compiled to document the Immunity (Susceptibility) test parameters, effects and results of the Embedded Modem Module CPC 2430E with DTM Evaluation Board in comparison to the requirements for equipment as specified in the documents listed below. All results are based on a test of one sample, and represent other production units, only in as much as a sample represents other production units. If any significant changes are made to the unit, the changes shall be evaluated and a retest may be required.

89/336/EEC (3 May 1989)	Official Journal of the European Communities Council Directive on Electromagnetic Compatibility
91/31/EEC (28 April 1992)	Official Journal of the European Communities Amending Directive 89/336/EEC on: Council Directive on Electromagnetic Compatibility
EN50082-1 (January 1992)	Electromagnetic Compatibility - Generic Immunity Standard Part 1: Residential, commercial and light industry
EN55024 (September 1998)	Information technology equipment – Immunity characteristics - Limits and methods of measurement
EN61000-4-2 (1995-01)	Electromagnetic Compatibility (EMC) Part 4: Testing and measurement techniques - Section 2 Electrostatic Discharge Immunity Test
EN61000-4-2 (1998)	Electromagnetic Compatibility (EMC) Amendment A1

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1.1 OVERVIEW

1.1 PURPOSE OF TEST (cont.)

- | | |
|-----------------------|--|
| EN61000-4-3 (1995-02) | Electromagnetic Compatibility (EMC)
Part 4: Testing and measurement techniques -
Section 3 Radiated, Radio-Frequency Immunity Test |
| EN61000-4-3 (1998-08) | Electromagnetic Compatibility (EMC) Amendment A1 |
| EN61000-4-4 (1995-01) | Electromagnetic Compatibility (EMC)
Part 4: Testing and measurement techniques -
Section 4 Electrical Fast Transient/Burst Immunity Test |
| EN61000-4-5 (1995-02) | Electromagnetic Compatibility (EMC)
Part 5 Testing and measurement techniques -
Section 5 Surge Immunity Test |
| EN61000-4-6 (1996-03) | Electromagnetic Compatibility (EMC)
Part 6: Testing and measurement techniques -
Section 6 Immunity to conducted disturbances, induced by
Radio frequency fields. |

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1.2 Product Identification

Type: DAA Modem Module

Model: CPC 2430E

S/N: Pre production Unit

Input power: Embedded DC Powered + 5 VDC Power Supply to 120 VAC

Power Supplies

Manufacturer: Stancor

Model Number: STA-4850

Internal PC Boards:

Description	Part Number	Revision	Serial Number
CLARE CPC2420 Adapter		Rev A	
DTM Evaluation Board	SKC162XC		

Application Software:

Power Basic operating a continuous routine of On to Off Hook, Answering and Dialing via RS 232 control from a PC.

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1.2 Product Identification (Continued):

Oscillator Frequencies:

11.0592 MHz

Support Equipment:

Description	Manufacturer	Model	S/N
Central Office Simulator	Northeast Innovations	1040E	73515
486 PC	Hewlett Packard	Vectra VL 24 /50e	

Cables:

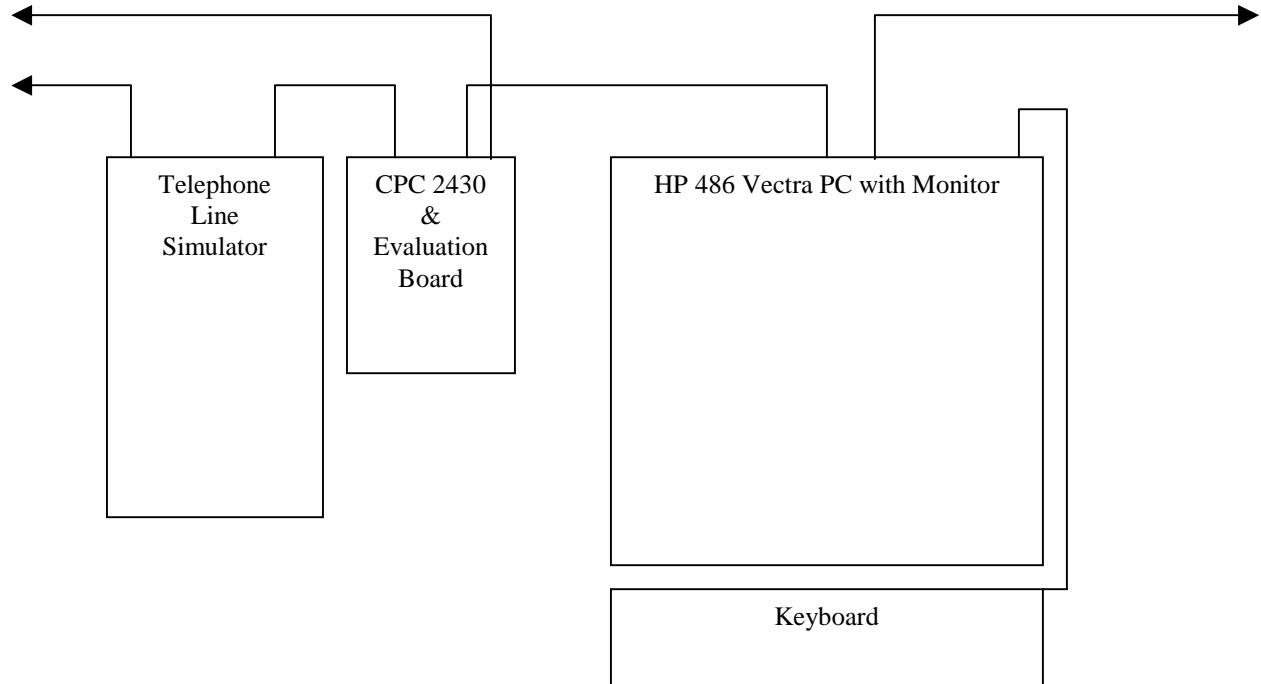
TYPE	QUANTITY	LENGTH	SHIELDING
RS 232 Cable	1	10 meters	Yes
Telephone Cable	1	2 meters	No
Power Cable	1	2 meters	No

Modifications performed on product at test facility:

None

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1.3 BLOCK DIAGRAM



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2.0 EN 61000-4-2 ELECTROSTATIC DISCHARGE TEST DESCRIPTION

2.1 TEST SETUP

The EUT setup was placed in the ESD test laboratory in accordance with the IEC standard, with the following climatic conditions:

Temperature: 21.2 degrees C

Relative Humidity: 31 %

The EUT was connected as diagrammed in Section 1.0 of this report.

A horizontal coupling (HCP) was placed on a non-conductive table, 0,8 meters above the ground plane and connected to the ground plane through two 470-kohm resistors. The EUT was placed on the table with an insulating support between the EUT and the HCP. The ESD simulator was charged and allowed to discharge through the HCP See section 9 for photographs of typical setups.

A vertical coupling plane (VCP) measuring 0,5m by 0,5m was fixed 0,1m from the vertical surfaces of the equipment, parallel to them and connected to the ground plane through two series 470 kohm resistors. The ESD simulator was charged and allowed to discharge to the VCP. This test was repeated until all vertical surface areas of the EUT were exposed to the VCP.

The ESD events were applied to such points and surfaces of the EUT that are normally accessible to the operator for normal operation or maintenance. Contact discharge is the preferred test method. Air discharges are used where contact discharge cannot be applied.

NOTES:

1. See Section 1, for ESD test locations.

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2.2 TEST RESULTS

The Embedded Modem Module CPC 2430E with DTM Evaluation Board meets the requirements set forth in EN 61000-4-2. Detailed test results are found in the following table(s).

2.3 TEST DATA

The test results are based upon 10 discharges at both polarities at each test point

Contact Discharge Data

PERFORMANCE CATEGORY

VOLTAGE=>	Level 1		Level 2		Level 3		Level 4	
	2K V		4K V		6K V		8K V	
Position Key	+	-	+	-	+	-	+	-
1	X	X	X	X	X	X	X	X
2	X	X	X	X	X	X	X	X
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								

Indirect Discharge

PERFORMANCE CATEGORY

VOLTAGE=>	Level 1		Level 2		Level 3		Level 4	
	2K V		4K V		6K V		8K V	
Coupling Plane Orientation	+	-	+	-	+	-	+	-
Horizontal (table top)	X	X	X	X	X	X	X	X
Vertical (Front)	X	X	X	X	X	X	X	X
Vertical (Left)	X	X	X	X	X	X	X	X
Vertical (Rear)	X	X	X	X	X	X	X	X
Vertical (Right)	X	X	X	X	X	X	X	X

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2.3 TEST DATA (Continued)

Air Discharge Data

PERFORMANCE CATEGORY

VOLTAGE=>	Level 1		Level 2		Level 3		Level 4	
	2K V		4K V		8K V		15K V	
Position Key	+	-	+	-	+	-	+	-
1	X	X	X	X	X	X		
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								

PERFORMANCE CATEGORY EXPLANATION

Category 1 - Normal Performance within specified limits.

Category 2 - Temporary loss of function that is self-recoverable.

Category 3 - Temporary loss of function requires operator intervention

Category 4 - Loss of function which is not recoverable and is due to a damaged EUT

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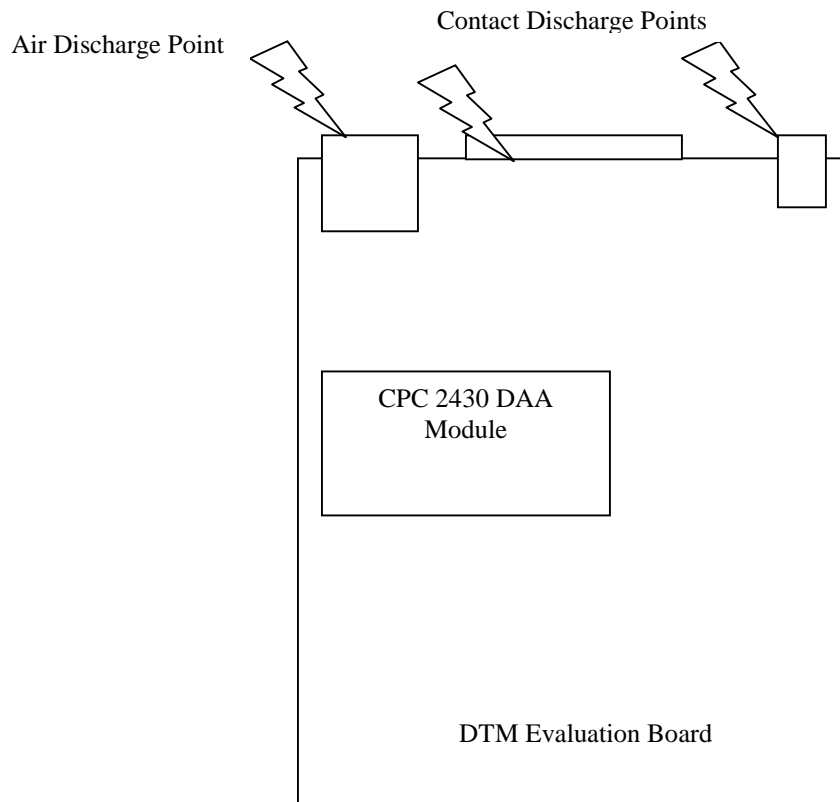
2.4 TEST EQUIPMENT

<u>Equipment</u>	Serial #	Last Calibration	Calibration Due
Haefely PSD 25B	082 197-25	Verified	N/A
Haefely Contact Probe	082 213-09	Verified	N/A

All equipment used for testing has been calibrated according to the methods and procedures defined by the National Institute of Standards and Technology (NIST).

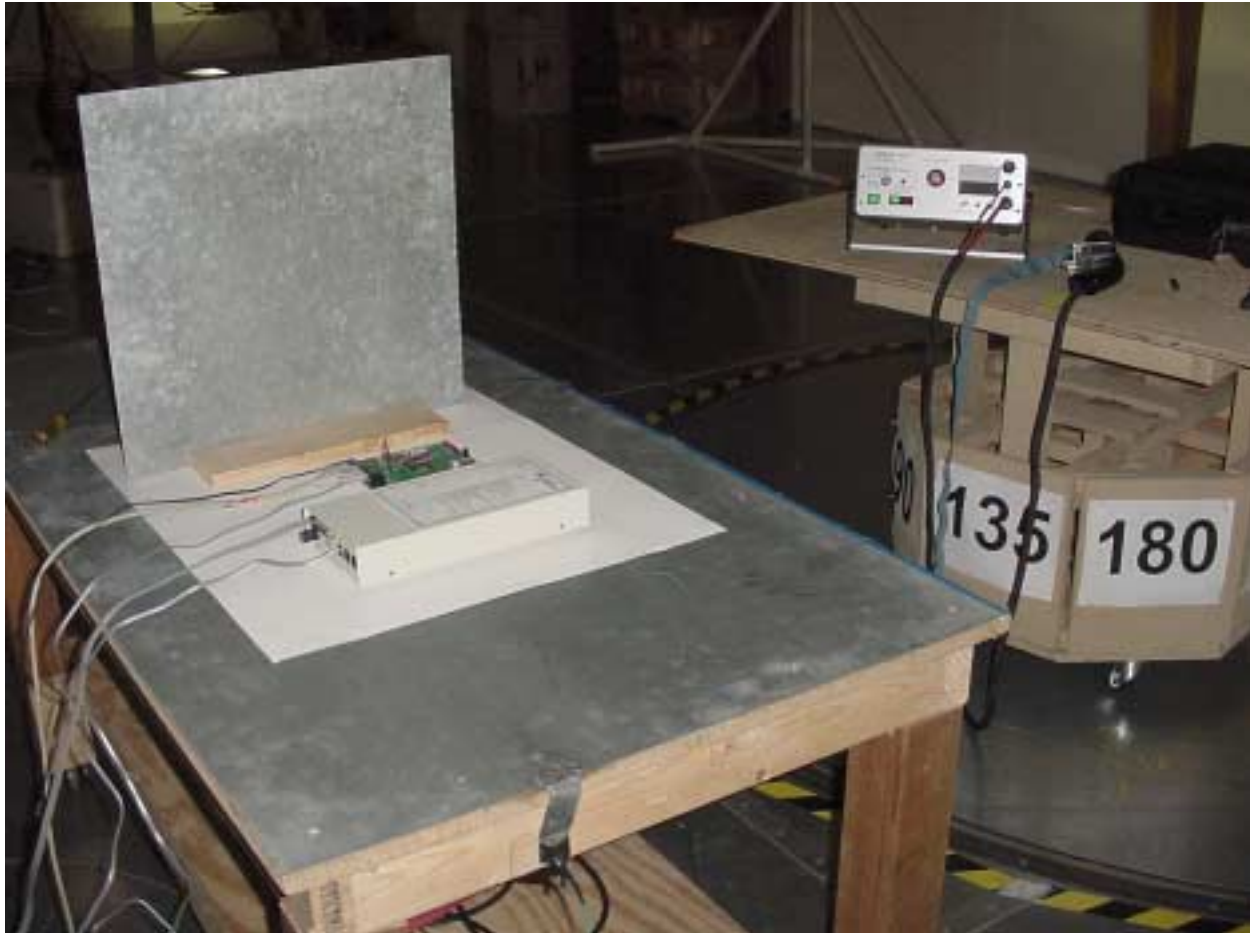
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2.5 TEST POINT DIAGRAM



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2.6 ELECTROSTATIC DISCHARGE PHOTOGRAPHS



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3.0 EN 61000-4-3 RADIATED RADIO-FREQUENCY TEST DESCRIPTION

3.1 TEST SETUP

The EUT setup was placed in the ferrite tile chamber in accordance with the IEC standard, with the following climatic conditions:

Temperature: 21.6 degrees C

Relative Humidity: 44 %

The EUT was connected as diagrammed in Section 1.0 of this report. All testing and verification for EUT operation was monitored utilizing the color camera system contained in the chamber and/or external peripheral equipment located outside of the chamber. The customer was not present during testing.

3.2 TEST RESULTS

The Embedded Modem Module CPC 2430E with DTM Evaluation Board meets the requirements set forth in EN 61000-4-3.

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3.3 TEST DATA

SIDE OF EUT	POLARITY (H / V)	FREQUENCY (MHz)	VOLTS PER METER	1kHz 80% AM	PERFORMANCE CATEGORY
FRONT	V	27 - 1000	3	YES	A
FRONT	H	27 - 1000	3	YES	A
FRONT	V	895 - 905	3	NO	A
FRONT	H	895 - 905	3	NO	A
LEFT	V	27 - 1000	3	YES	A
LEFT	H	27 - 1000	3	YES	A
LEFT	V	895 - 905	3	NO	A
LEFT	H	895 - 905	3	NO	A
RIGHT	V	27 - 1000	3	YES	A
RIGHT	H	27 - 1000	3	YES	A
RIGHT	V	895 - 905	3	NO	A
RIGHT	H	895 - 905	3	NO	A
BACK	V	27 - 1000	3	YES	A
BACK	H	27 - 1000	3	YES	A
BACK	V	895 - 905	3	NO	A
BACK	H	895 - 905	3	NO	A

PERFORMANCE CATEGORY EXPLANATION

Category A - Normal Performance within specified limits.

Category B - Temporary loss of function that is self-recoverable.

Category C - Temporary loss of function requires operator intervention

Category D - Loss of function which is not recoverable and is due to a damaged EUT

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3.4 TEST EQUIPMENT

<u>Equipment</u>	Serial #	Last Calibration	Calibration Due
Fluke 6060A Generator	3775031	Verified	N/A
HP Function Generator 3325A	2512A20263	5-16-2000	5-16-2001
HP Signal Generator 8640B	2337A23283	Verified	N/A
IFI LPA-5B Leveling PreAmplifier	806-1095	Verified	N/A
IFI SMX100 Wideband Amplifier	803-1095	Verified	N/A
IFI E Field Sensor EFS5	807	6-13-2000	6-13-2001
IFI E Field Sensor EFS5	808	Verified	N/A
Narda E-Field Probe 8760	9022	Verified	N/A
Narda E-Field Probe 8760	9025	Verified	N/A

All equipment used for testing has been calibrated according to the methods and procedures defined by the National Institute of Standards and Technology (NIST).

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3.5 RADIATED RADIO FREQUENCY PHOTOGRAPHS



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4.0 EN 61000-4-4 ELECTRICAL FAST TRANSIENT/BURST TEST DESCRIPTION

4.1 TEST SETUP

The EUT setup was placed in the EFT test laboratory in accordance with the IEC standard, with the following climatic conditions:

Temperature: 22.1 degrees C

Relative Humidity: 41%

The EUT was connected as diagrammed in Section 1.0 of this report. All testing and verification for EUT operation was monitored utilizing the camera system located in the chamber and/or peripheral equipment located outside of the chamber. The customer was not present during testing.

The EFT events were applied to such the Mains and to cables at each I/O port of the EUT that are normally accessible to the operator for normal operation or maintenance.

NOTES:

1. See Section 1.0, for the block diagram of the EUT setup.

4.2 TEST RESULTS

The Embedded Modem Module CPC 2430E with DTM Evaluation Board meets the requirements set forth in EN 61000-4-4. Detailed test results are found in the following table(s).

4.3 TEST DATA

POWER PERFORMANCE CATEGORY

		Level 1	Level 2	Level 3	Level 4
VOLTAGE=>		0.5KV	1KV	2KV	4KV
Line	Polarity				
N	+	X	X	X	
N	-	X	X	X	
L	+	X	X	X	
L	-	X	X	X	
PE	+	X	X	X	
PE	-	X	X	X	

I/O PERFORMANCE CATEGORY

		Level 1	Level 2	Level 3	Level 4
VOLTAGE=>		0.25KV	0.5KV	1KV	2KV
I/O or Group	Polarity				
	+	X	X	X	
	-	X	X	X	
	+				
	-				

PERFORMANCE CATEGORY EXPLANATION

Category 1 - Normal Performance within specified limits.

Category 2 - Temporary loss of function that is self-recoverable.

Category 3 - Temporary loss of function requires operator intervention

Category 4 - Loss of function which is not recoverable and is due to a damaged EUT

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4.4 TEST EQUIPMENT

<u>Equipment</u>	Serial #	Last Calibration	Calibration Due
Haefely PEFT.1	081-944-23	Verified	N/A
Haefely Coupling Clamp IP4A	082 148-17	Verified	N/A

All equipment used for testing has been calibrated according to the methods and procedures defined by the National Institute of Standards and Technology (NIST).

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4.5 ELECTRICAL FAST TRANSIENT/BURST PHOTOGRAPHS



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4.6 ELECTRICAL FAST TRANSIENT/BURST PHOTOGRAPHS



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5.0 EN 61000-4-5 SURGE IMMUNITY TEST DESCRIPTION

5.1 TEST SETUP

The EUT setup was placed in the Surge test laboratory in accordance with the IEC standard, with the following climatic conditions:

Temperature: 21.1 degrees C

Relative Humidity: 38 %

The EUT was connected as diagrammed in Section 1.0 of this report. All testing and verification for EUT operation was monitored. The customer was not present during testing.

The Surge events were applied to the Mains of the EUT. The mains power was supplied from a 60 Hz 120 VAC source.

NOTES:

1. See Section 1, for the block diagram of the EUT setup.

5.2 TEST RESULTS

The Embedded Modem Module CPC 2430E with DTM Evaluation Board meets the requirements set forth in EN 61000-4-5. Detailed test results are found in the following table(s).

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5.3 TEST DATA

SURGE PERFORMANCE CATEGORY

		Level 1	Level 2	Level 3	Level 4
VOLTAGE=>		0.5KV	1KV	2KV	4KV
Line	Polarity				
L-PE	+	X	X	X	
L-PE	-	X	X	X	
N-PE	+	X	X	X	
N-PE	-	X	X	X	
L-N	+	X	X	X	
L-N	-	X	X	X	

PERFORMANCE CATEGORY

Category 1 - Normal Performance within specified limits.

Category 2 - Temporary loss of function that is self-recoverable.

Category 3 - Temporary loss of function requires operator intervention

Category 4 - Loss of function which is not recoverable and is due to a damaged EUT

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5.4 TEST EQUIPMENT

<u>Equipment</u>	Serial #	Last Calibration	Calibration Due
Haefely P-Surge 4.1	083-061-06	5-9-2000	5-9-2001

All equipment used for testing has been calibrated according to the methods and procedures defined by the National Institute of Standards and Technology (NIST).

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5.5 SURGE IMMUNITY PHOTOGRAPHS



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6.0 EN 61000-4-6 CONDUCTED DISTURBANCE RADIO-FREQUENCY TEST DESCRIPTION

6.1 SETUP

The EUT setup was placed in the ferrite tile chamber in accordance with the IEC standard, with the following climatic conditions:

Temperature: 21.4 degrees C

Relative Humidity: 32 %

The EUT was connected as diagrammed in Section 1.0 of this report. All testing and verification for EUT operation was monitored utilizing the color camera system contained in the chamber and/or external peripheral equipment located outside of the chamber. The customer was not present during testing.

6.2 TEST RESULTS

The Embedded Modem Module CPC 2430E with DTM Evaluation Board meets the requirements set forth in EN 61000-4-6.

6.3 TEST DATA

FCC -801-M2-16A 2 WIRE POWER INJECTION

FREQUENCY (MHz)	VOLTS PER METER	1kHz 80% AM	PERFORMANCE CATEGORY
0.15 – 80	3	YES	A

CW-CDN-T2 2 WIRE I/O INJECTION

FREQUENCY (MHz)	VOLTS PER METER	1kHz 80% AM	PERFORMANCE CATEGORY
0.15 - 80	3	YES	A

PERFORMANCE CATEGORY EXPLANATION

Category A - Normal Performance within specified limits.

Category B - Temporary loss of function that is self-recoverable.

Category C - Temporary loss of function requires operator intervention

Category D - Loss of function which is not recoverable and is due to a damaged EUT

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6.4 TEST EQUIPMENT

<u>Equipment</u>	Serial #	Last Calibration	Calibration Due
Fluke 6060A Generator	3775031	Verified	N/A
HP Function Generator 3325A	2512A20263	5-16-2000	5-16-2001
IFI LPA-5B Leveling PreAmplifier	806-1095	Verified	N/A
IFI SMX100 Wideband Amplifier	803-1095	Verified	N/A
FCC -801-M2-16A	2027	5-13-2000	5-13-2001
CW-CDN-M3	CW001	8-9-2000	8-9-2001
CW-CDN-S1	CW001	9-12-2000	9-12-2001
CW-CDN-T2	CW001	9-20-2000	9-20-2001

All equipment used for testing has been calibrated according to the methods and procedures defined by the National Institute of Standards and Technology (NIST).

