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***RF Hazard Evaluation Report (for General Population/Uncontrolled Environment)  
Class II Permissive Change  
on the  
ALPHA Meter  
Model: A0001SC4200***

FCC ID: I7JA001SC42

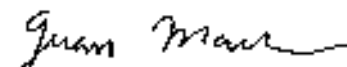
APPLICANT: Electricity Metering, ABB Inc.  
208 S. Rogers Lane  
Raleigh, NC 27610

TEST SITE: Elliott Laboratories, Inc.  
684 W. Maude Ave  
Sunnyvale, CA 94086

REPORT DATE: January 14, 2003

FINAL TEST DATE: January 8, 2003

AUTHORIZED SIGNATORY:

  
\_\_\_\_\_  
Juan Martinez  
EMC Engineer

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## **GENERAL INFORMATION**

Applicant: Electricity Metering, ABB Inc.  
208 S. Rogers Lane  
Raleigh, NC 27610

FCC ID: I7JA001SC42

## **Technical Description**

The electric meter with the ICM is intended to provide access to the metering information via the Public Switched Telephone Network. With the internal antenna, there is no physical wiring to gain access to the communication medium. The metering assembly with sensors is available in various platforms and configuration. There is a requirement for access to the metering information other than a physical visit to the metering site. There are many methods for gaining access to the metering information, both landline and wireless. When integrated with the meter platform, the ICM provides access to the meter with minimal installation and uses the existing infrastructure of the Public Switched Telephone Network.

## **New Antennas:**

Antenex Phantom TRAB8213P: 3 dBi  
Galtronics AMPS 1B11558H01: 5 dBi

## **Frequency Range**

CRM 4200 radio modules:  
Transmitter: 824.01 – 848.97 MHz  
Receiver: 869.01 – 893.97 MHz

## **Range of Operation Power**

600-mW maximum power output

## **SCOPE**

RF Hazard Evaluation testing was performed for the equipment mentioned in this report. OET Bulletin 65 or the ANSI/IEEE C95.3, "IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave" were used as a test procedure guideline to perform the required test. MPE measurements were performed for this product.

The intentional radiator above was tested in a simulated typical installation to demonstrate compliance with the relevant FCC performance and procedural standards.

## **OBJECTIVE**

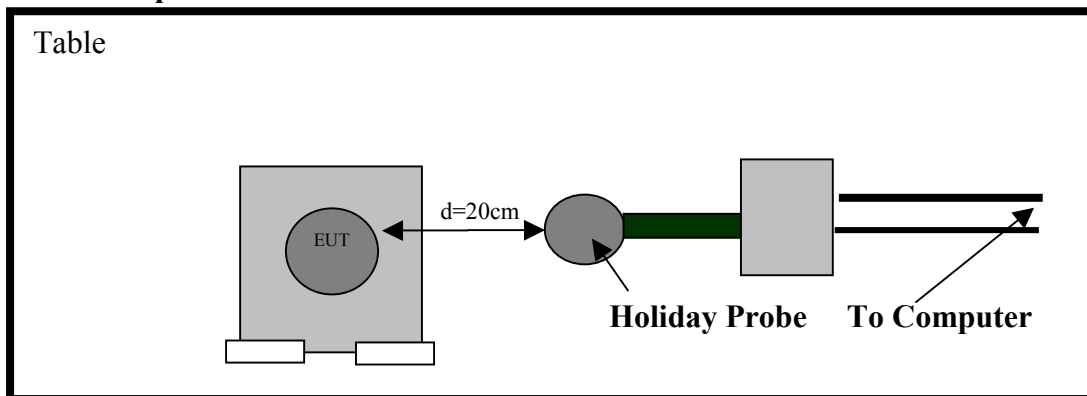
The primary objective of the manufacturer is compliance with Section 2.1091. Certification of these devices is required as a prerequisite to marketing as defined in Section 2.1033.

Certification is a procedure where the manufacturer or a contracted laboratory makes measurements and submits the test data and technical information to FCC. FCC issues a grant of equipment authorization and a certification number upon successful completion of their review of the submitted documents. Once the equipment authorization has been obtained, the label indicating compliance must be attached to all identical units subsequently manufactured.

## TEST RESULTS

### Section 2.1091: Radiofrequency radiation exposure evaluation: Mobile devices.

#### Test Setup for the Internal Antenna

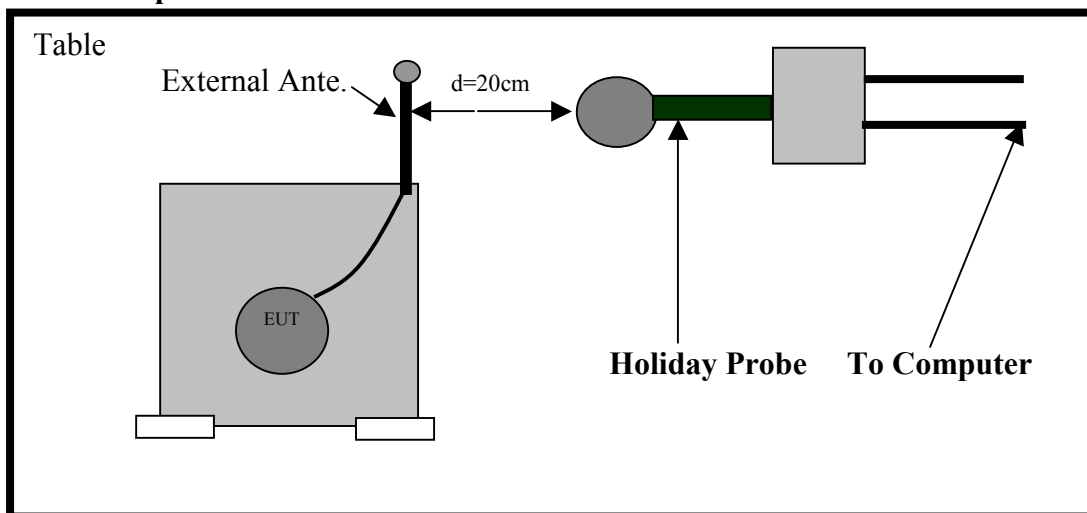


MPE Evaluation was performed using the OET Bulletin 65 or the ANSI/IEEE C95.3, "IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave" test procedure, for mobile devices.

A test fixture was built to test the EUT, with the internal antenna, mounted on a ground plane. The ground plane was grounded by braided wire to a known ground source. This configuration will demonstrate the RF exposure levels of the antenna mounted on a ground plane.

The transmitter duty cycle was set to produce 50% this was verified with a peak power meter. Operating the transmitter continuously at  $\frac{1}{2}$  power also simulated 50% this was also verified with a peak power meter. The EUT was set to transmit and the fundamental frequency set to the middle of the EUT's frequency range. The EUT and its antenna were placed on top of a table, located in a shielded room. The measuring probe was placed 20-cm away from the EUT antenna(s). The probe was moved around the antenna, while keeping the 20-cm separation. At the same time the probe was incrementing 5 to 10 cm in height to measure the maximum points of the antenna(s), this was done for each measurement. The top of the antenna(s) was also measured, 20-cm away. The probe was connected to a computer, which displayed the measured levels in  $\text{mW}/\text{cm}^2$ .

Please, refer to data included under **Exhibit 2: Test Measurement Data**

**Test Setup for the External Antenna**

MPE Evaluation was performed using the OET Bulletin 65 or the ANSI/IEEE C95.3, "IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave" test procedure, for mobile devices.

A test fixture was built to test the EUT, with the External antenna, mounted on a ground plane. The ground plane was grounded by braided wire to a known ground source. This configuration will demonstrate the RF exposure levels of the antenna mounted on a ground plane.

The transmitter duty cycle was set to produce 50% this was verified with a peak power meter. Operating the transmitter continuously at  $\frac{1}{2}$  power also simulated 50% this was also verified with a peak power meter. The EUT was set to transmit and the fundamental frequency set to the middle of the EUT's frequency range. The EUT and its antenna were placed on top of a table, located in a shielded room. The measuring probe was placed 20-cm away from the EUT antenna(s). The probe was moved around the antenna, while keeping the 20-cm separation. At the same time the probe was incrementing 5 to 10 cm in height to measure the maximum points of the antenna(s), this was done for each measurement. The top of the antenna(s) was also measured, 20-cm away. The probe was connected to a computer, which displayed the measured levels in  $\text{mW}/\text{cm}^2$ .

Please, refer to data included under **Exhibit 2: Test Measurement Data**

**EQUIPMENT UNDER TEST (EUT) DETAILS**

The EUT is a Wireless Electric Meter, which is designed to provide data for the Utility Companies. The EUT consisted of the following component(s):

Manufacturer/Model/Description	Serial Number
Electricity/ALPHA meter/Electric Meter	N/A

**SUPPORT EQUIPMENT**

The following equipment was used as remote support equipment for emissions testing:

Manufacturer/Model/Description	Serial Number	FCC ID Number
N/A		

**EXTERNAL I/O CABLING**

The I/O cabling configuration during emissions testing was as follows:

Cable Description	Length (m)	From Unit/Port	To Unit/Port
N/A			

**TEST SOFTWARE**

Internal software was used to configure the EUT properly for the required tests.

**TEST MODES**

During testing the EUT was set to transmit at maximum power.

***EXHIBIT 1: Test Equipment Calibration Data***



**RF Exposure Measurements, 29-Jan-03****Engineer: jmartinez**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Assett #</u>	<u>Cal interval</u>	<u>Last Calibrated</u>	<u>Cal Due</u>
Holaday Industries	Field Probe 200KHz - 40GHz	HI-4455	910	12	8/14/02	8/14/03

---

**Peak Power Measurements, 29-Jan-03****Engineer: jmartinez**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Assett #</u>	<u>Cal interval</u>	<u>Last Calibrated</u>	<u>Cal Due</u>
Rohde & Schwarz	Peak Power Sensor 100uW - 2 Watts	NRV-Z32	1423	12	9/6/02	9/6/03
Rohde & Schwarz	Power Meter	NRVS	1422	12	9/6/02	9/6/03

## ***EXHIBIT 2: Test Measurement Data***

The following data includes conducted and radiated emission measurements of the unit.

9 Pages



## EMC Test Data

Client:	Electricity Metering, ABB Inc.	Job Number:	J49799
Model:	A0001SC4200	T-Log Number:	T49823
		Proj Eng:	Juan Martinez
Contact:	Bill A. Melvin		
Emissions Spec:	FCC 22H, Part 2.1091 Mobile	Class:	N/A
Immunity Spec:	-	Environment:	-

## EMC Test Data

For The

**Electricity Metering, ABB Inc.**

Model

**A0001SC4200**



## EMC Test Data

Client:	Electricity Metering, ABB Inc.	Job Number:	J49799
Model:	A0001SC4200	T-Log Number:	T49823
		Proj Eng:	Juan Martinez
Contact:	Bill A. Melvin		
Emissions Spec:	FCC 22H, Part 2.1091 Mobile	Class:	N/A
Immunity Spec:	-	Environment:	-

### EUT INFORMATION

#### General Description

The EUT is a Wireless Electric Meter which is designed to provided data for the Utility Companies. Normally, the EUT would be placed on a table top during operation. The EUT was, therefore, treated as table-top equipment during testing to simulate the end user environment. The electrical rating of the EUT is 208V, 60 Hz, .5 Amps.

#### Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
Electricity Metering, ABB Inc.	A0001SC4200	Wireless Electric Meter	N/A	I7J-A0001SC4200

#### EUT Antennas

The EUT contains an approved module (FCC ID: APV09002). The EUT is marketed with two antennas:

Manufacturer	Model	Description	Serial Number	Antenna Gain (dBi)
Antenex	TRAB8213P	External Antenna	N/A	3
Glatronics	1B11558H01	Internal Antenna	N/A	5

#### EUT Enclosure

The EUT enclosure is primarily constructed of fabricated sheet steel. It measures approximately 13 cm wide by 11 cm deep by 14 cm high.

#### Modification History

Mod. #	Test	Date	Modification
1	-	-	None



## EMC Test Data

Client:	Electricity Metering, ABB Inc.	Job Number:	J49799
Model:	A0001SC4200	T-Log Number:	T49823
		Proj Eng:	Juan Martinez
Contact:	Bill A. Melvin		
Emissions Spec:	FCC 22H, Part 2.1091 Mobile	Class:	N/A
Immunity Spec:	-	Environment:	-

### Test Configuration #1

#### Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
IBM	2647	Laptop	78-A0868	DoC

#### Remote Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
None				

#### EUT Interface Ports

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
AC	208 Vac	Multiwire	Unshielded	1.8

#### Local Support Interface Ports

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
RS-232	EUT	Optical	Unshielded	1.6

#### EUT Operation During Emissions

Continuously transmitting at full power at the middle of the cellular frequency range.



## EMC Test Data

Client: Electricity Metering, ABB Inc.	Job Number: J49799
Model: A0001SC4200	T-Log Number: T49823
	Proj Eng: Juan Martinez
Contact: Bill A. Melvin	
Spec: FCC 22H, Part 2.1091 Mobile	Class: N/A

### Section 2.1046 & RSS-133 (6.2): RF Power

#### Test Specifics

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 1/8/03  
Test Engineer: jmartinez  
Test Location: SVOATS #4

Config. Used: 1  
Config Change: None  
EUT Voltage: 5 Vdc

#### General Test Configuration

The EUT was located on the turntable for radiated field strength measurements and the local support equipment was located underneath the table.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

#### Ambient Conditions:

Temperature: 10°C  
Rel. Humidity: 58%

#### Summary of Results

Run #	Test Performed	Limit	Result	Measurement
1	Radiated Output Power	22.913(a)	pass	33.0 dBm (EIRP)
2	Calculated Output Power	22.913(a)	pass	28.1 dBm (EIRP)

#### Modifications Made During Testing:

No modifications were made to the EUT during testing

#### Deviations From The Standard

No deviations were made from the requirements of the standard.



## EMC Test Data

Client: Electricity Metering, ABB Inc.	Job Number: J49799
Model: A0001SC4200	T-Log Number: T49823
Contact: Bill A. Melvin	Proj Eng: Juan Martinez
Spec: FCC 22H, Part 2.1091 Mobile	Class: N/A

### Run #1a: Radiated Output Power (EIRP)

#### EUT with Internal Antenna.

Channel	Frequency (MHz)	Field Strength at 3m	Antenna Pol. (H/V)	Res BW
Low	824.01	123.5	V	30 kHz
Low	824.01	120.7	H	30 kHz
Middle	836.00	123.6	V	30 kHz
Middle	836.00	120.3	H	30 kHz
High	848.97	123.7	V	30 kHz
High	849.97	119.9	H	30 kHz

Note 1: Add note here

Note 2:

### Run #1b: Output Power (Substitution Method)

			Substitution <sup>Note 1</sup>					Comments
Frequency	Level	Pol	Pin	Gain	EIRP	ERP	Limit	
MHz	dBμV/m	v/h	(dBm)	(dBi)	(dBm)	(dBm)	(dBm)	
824.01	123.5	v	26.4	6.4	32.8	30.6	38.4	
836.00	123.6	v	26.7	6.3	33.0	30.8	38.4	
848.97	123.7	v	26.2	6.3	32.5	30.3	38.4	

Note 1: Field Strength = Measured - reduced by dB = S.A. level that will be measured. The reduced by dB was then added to the signal generators (Pin) level to get the correct output power and then added the Gain (dBi) of the antenna.

Note 2: Pin is the power input (dBm) to the substitution antenna to obtain the field strength recorded from the EUT. G is the gain (dBi) for the substitution antenna. ERP is the effective radiated power (Pin + GdBi - 2.2) from the substitution antenna. EIRP is calculated as follows (Pin+GdBi)



## EMC Test Data

Client: Electricity Metering, ABB Inc.	Job Number: J49799
Model: A0001SC4200	T-Log Number: T49823
	Proj Eng: Juan Martinez
Contact: Bill A. Melvin	
Spec: FCC 22H, Part 2.1091 Mobile	Class: N/A

### Run #2: Calculated Radiated Output Power (ERP) EUT with External Antenna.

Power	Loss (Note 1)	Gain of Antenna	Power EIRP	Power ERP
(dBm)	(dB)	(dBi)	(dBm)	(dBm)
27.8	0.5	3	30.3	28.1

Note 1: The module is interconnected by a .5 dB loss in cable

Note 2:





## EMC Test Data

Client: Electricity Metering, ABB Inc.	Job Number: J49799
Model: A0001SC4200	T-Log Number: T49823
	Proj Eng: Juan Martinez
Contact: Bill A. Melvin	
Spec: FCC 22H, Part 2.1091 Mobile	Class: N/A

### MPE Routine Evaluation: Per Section 2.1091

#### Test Specifics

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 1/8/03  
Test Engineer: jmartinez  
Test Location: Chamber #2

Config. Used: 1  
Config Change: None  
EUT Voltage: 5 Vdc

#### General Test Configuration

The EUT was located on the turntable for MPE evaluation testing. The transmit antenna was placed in the middle of the table. The Probe was placed 20 cm from the antenna. Tests were performed inside a Chamber.

#### Ambient Conditions:

Temperature: 21°C  
Rel. Humidity: 45%

#### Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	MPE Routing Evaluation	.549 mW/cm <sup>2</sup>	Pass	Refer to individual runs
2	MPE Routing Evaluation	.549 mW/cm <sup>2</sup>	Pass	Refer to individual runs

Modifications Made During Testing: None



## EMC Test Data

Client: Electricity Metering, ABB Inc.	Job Number: J49799
Model: A0001SC4200	T-Log Number: T49823
	Proj Eng: Juan Martinez
Contact: Bill A. Melvin	
Spec: FCC 22H, Part 2.1091 Mobile	Class: N/A

### Section 1.1310 RF Hazard MPE limits

Uncontrolled/polupoaded

<u>Frequency (MHz)</u>	<u>Limit (mW/cm^2)</u>
300 - 1500 MHz	Freq (MHz) / 1500

$$824 \text{ MHz} / 1500 = .549 \text{ mw/cm}^2$$

### Run #1: RF Hazard Evaluation Test

Fundamental frequency: 824.01 MHz

5 dBi antenna tested over a ground plane.

Measured	Position	1.1310		Comment
mW/cm^2	Degrees	Limit (mW/cm^2)	Margin	Note
0.279	0	0.549	-0.270	1, 2, & 3
0.204	90	0.549	-0.345	1, 2, & 3
0.160	180	0.549	-0.389	1, 2, & 3
0.194	270	0.549	-0.355	1, 2, & 3

Note 1:	Measured at 20 cm distance as required by OET 65 C, procedure for RF Hazard evaluation for mobile devices
Note 2:	Transmitter set to 50% duty cycle. Metal plane grounded by means of a ground braid.
Note 3:	The total loss from cable is .5 dB
Note 4:	Power Checked with Peak Power Meter



## EMC Test Data

Client: Electricity Metering, ABB Inc.	Job Number: J49799
Model: A0001SC4200	T-Log Number: T49823
	Proj Eng: Juan Martinez
Contact: Bill A. Melvin	
Spec: FCC 22H, Part 2.1091 Mobile	Class: N/A

### Run #2: RF Hazard Evaluation Test (External Antenna)

Fundamental frequency: 824.01 MHz

3 dBi antenna tested over a ground plane

Measured	Position	1.1310		Comment
mW/cm <sup>2</sup>	Degrees	Limit (mW/cm <sup>2</sup> )	Margin	Note
0.114	0	0.549	-0.435	1, 2, 3, & 4
0.061	90	0.549	-0.488	1, 2, 3, & 4
0.082	180	0.549	-0.467	1, 2, 3, & 4
0.005	270	0.549	-0.544	1, 2, 3, & 4

Note 1: Measured at 20 cm distance as required by OET 65 C, procedure for RF Hazard evaluation for mobile devices

Note 2: Transmitter set to 50% duty cycle. Metal plane grounded by means of a ground braid.

Note 3: Power Checked with Peak Power Meter