



RF Exposure Evaluation Report

References:

1. FCC OET Bulletin 65 Supplement
2. FCC CFR Part 1 (1.1307 & 1.1310), Part 2 (2.1091)
3. RSS-102- Radio Frequency Exposure Compliance of Radiocommunication Apparatus
Issue 4 March 2010, Ch, 2.5 and Ch. 4

1 Administrative Data

1.1 Identification of the Testing Laboratory Issuing the Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Address:	411 Dixon Landing Road Milpitas, CA 95035 U.S.A.
Telephone:	+1 (408) 586 6200
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1.2 Identification of the Client

Client:	Electric Transportation Engineering Corporation d.b.a ECotality North America
Street Address:	430 s. 2 nd Ave.
City/Zip Code	Phoenix, AZ, 85003
Country	USA
Contact Person:	Jeffrey Wishart
Phone No.	602.716.9576
e-mail:	jwishart@ecotality.com

1.3 Identification of the Manufacturer

Manufacturer's Name:	Same as Client.
Manufacturers Address:	
City/Zip Code	
Country	

2 Equipment under Test (EUT)

2.1 Specification of the Equipment under Test

Model No:	RFID Board Version 1.4
FCC-ID:	Y5X53339474278
IC-ID:	9443A-53339474278
Product Description:	RFID Board Version 1.4
Transmitter information:	RFID 13.56MHz
Other Radios:	Cellular: ZTE MF212 GSM/WCDMA Module (GSM/GPRS/EDGE 850/900/1800/1900, WCDMA/HSDPA 2100/1900/850 MHz) Unigen UGWDS82NSM33 802.11 b/g/n WiDi Radio Module (2412-2462 MHz)
Antenna Information:	RFID: Loop Antenna, -46 dBi Gain Cellular: Flexible antenna. +2dBi Gain in 850/1900 MHz bands of operation. WLAN: Flexible antenna. +5dBi Gain
Co-located Transmitters/ Antennas?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Test Sample Status:	Production
Device Category:	<input checked="" type="checkbox"/> Fixed Installation/ Mobile <input type="checkbox"/> Portable
Exposure Category:	<input type="checkbox"/> Occupational/ Controlled <input checked="" type="checkbox"/> General Population/ Uncontrolled

3 Assessment

This report serves as the Technical Information regarding RF Exposure evaluation of the below identified device according to the rules as stipulated in the documents listed under References above.

The device meets the conditions for exemption from routine evaluation as defined in the referenced FCC and IC rule parts.

Company	Description	Model #
Electric Transportation Engineering Corporation d.b.a ECOtality North America	RFID Board Version 1.4	RFID Board Version 1.4

Sajay Jose
(Test Lab Manager)

2013-05-06 Compliance

Date	Section	Name	Signature
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4 RF Exposure Evaluation Requirements

4.1 FCC:

Calculations can be made to predict RF field strength and power density levels around typical RF sources using the general equations (3) and (4) on page 19 of the following FCC document: “OET Bulletin 65, Edition 97-01 - Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields”.

The table below is excerpted from Table 1B of 47 CFR 1.1310 titled Limits for Maximum Permissible Exposure (MPE), Limits for General Population/Uncontrolled Exposure:

Frequency Range (MHz)	Power density (mW/cm ²)	Averaging time (minutes)
300 – 1500	f (MHz) /1500	30
1500 – 100.000	1.0	30

Using the equation from page 19 of OET Bulletin 65, Edition 97-01:

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density (in appropriate units, e.g. mW/cm²)

P = power input to the antenna (in appropriate units, e.g., mW)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

Note:

1. This device is to be used only for fixed and mobile applications.

Additionally, according to § 2.1091:

The limit for <1.5 GHz mobile operations where no routine evaluation is required is: 1.5W ERP

The limit for >1.5 GHz mobile operations where no routine evaluation is required is: 3W ERP

4.2 IC:

RSS-102 Section 2.5.2

RF exposure evaluation is required if the separation distance between the user and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 1.5 GHz and the maximum EIRP of the device is equal to or less than 2.5 W;
- at or above 1.5 GHz and the maximum EIRP of the device is equal to or less than 5 W.

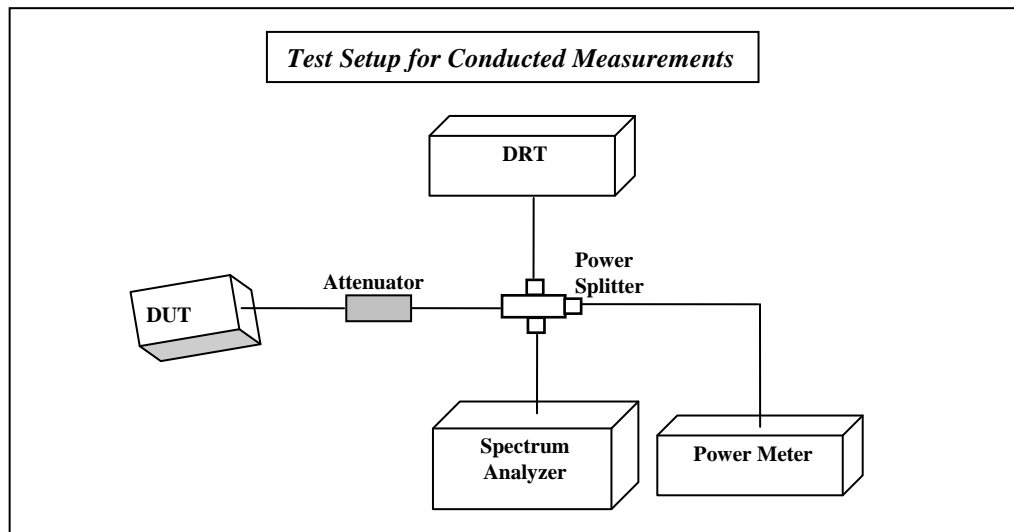
RSS-102 4.2: RF Field strength limits for devices used by the General Public (Uncontrolled Environment):

Power density

300MHz- 1500 MHz= f/150 W/m²

1500 MHz- 1500000 MHz= 10 W/m²

5 Radiated power Calculation- ERP/EIRP-



1. Connect the equipment as shown in the above diagram.
2. Adjust the settings of the Digital Radio Communication Tester (DRT) to connect the EUT at the required channel (OR) alternatively use the EUT to set to transmit at a specific mode.
3. Measure conducted power using the power meter or the Spectrum Analyzer.
4. ERP/EIRP is calculated by adding the antenna gain to the measured conducted power.

EIRP= Measured conducted power+ Antenna Gain (dBi)

(Antenna gain based on measurement or data from the antenna manufacturer.)

ERP= EIRP- 2.14

5.1 Summary:

Band of operation	Max Conducted Power from module	Antenna Gain	Peak Radiated Power- EIRP		Limits (IC) (where no routine evaluation is required)
			dBm	mW	
MHz	dBm	dBi	dBm	mW	W
GSM/GPRS/EDGE 824.2-848.8	32.99	2	34.99	3155.00	2.5
GSM/GPRS/EDGE 1850.2-1909.8	30.37	2	32.37	1725.83	5
UMTS FDDV 826.4-846.6MHz	23.73	2	25.73	374.11	2.5
UMTS FDDII 1852.4-1907.6MHz	23.01	2	25.01	316.95	5
2412-2462 (WLAN)	15.84	5	20.84	121.34	5
13.56 MHz (RFID)	N/A	-46	N/A		

Band of operation	Peak Radiated Power- EIRP	Peak Radiated Power ERP		Limits (FCC) (where no routine evaluation is required)
		dBm	mW	
MHz	dBm	dBm	mW	W
GSM/GPRS/EDGE 824.2-848.8	34.99	32.85	1927.52	1.5
GSM/GPRS/EDGE 1850.2-1909.8	32.37	30.23	1054.38	3
UMTS FDDV 826.4-846.6MHz	25.73	23.59	228.56	1.5
UMTS FDDII 1852.4-1907.6MHz	25.01	22.87	193.64	3
2412-2462 (WLAN)	20.84	18.70	74.13	3
13.56 MHz (RFID)	N/A			

Since the Peak ERP <3W (FCC) and Peak EIRP <5W (IC), this device is exempt from Routine evaluation for all bands except GSM 850 mode of operation.

Power Density:

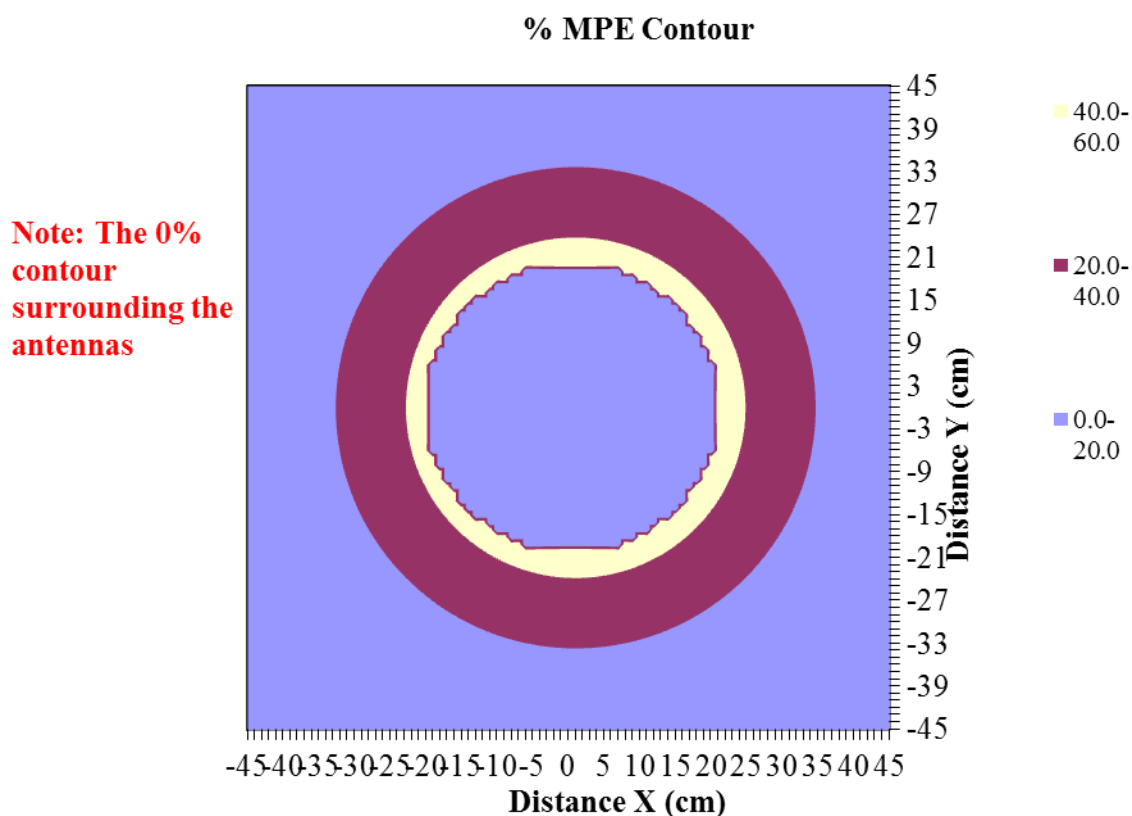
Band of operation	Peak Radiated Power- EIRP		Duty Cycle	Distance (R)	Power Density (EIRP*DutyCycle)/(4 π R ²)	Limit	Verdict
	dBm	mW					
GSM/GPRS/ EDGE 850	34.99	3155.00	50%	20	0.31	0.57	Pass

Prediction for Simultaneous Transmission

The MPE contour estimation was made using a separation distance of 1 cm to represent the worse case.

RFID Tx and Cellular 850 MHz mode of operation

Antenna No.		Total	1	2
Tx Status			On	On
Frequency	MHz		13.56	836
MPE Limit	mW/cm ²		0.98	0.56
Max % MPE	%	56.4	0.0	56.4
Power	(W)	1.580	0.000	1.580
Antenna Gain	dBi		0.00	0.00
EIRP	(W)	1.58	0.000	1.580
X	(cm)		0.0	1.0
Y	(cm)		0.0	0.0
Sector			FALSE	FALSE
Arc			FALSE	FALSE
θ_1	degs	input	-120	-120
θ_2			60	60
θ_1		actual	-120	-120
θ_2			60	60

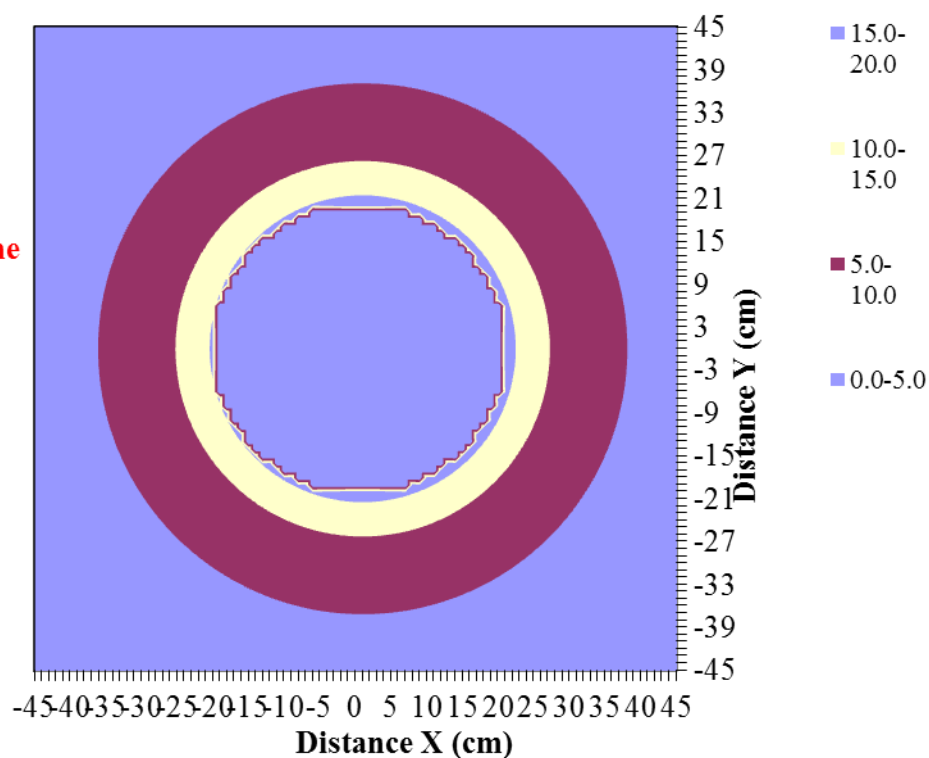


RFID Tx and Cellular 1900 MHz mode of operation

Antenna No.		Total	1	2
Tx Status			On	On
Frequency	MHz		13.56	1880
MPE Limit	mW/cm ²		0.98	1.00
Max % MPE	%	17.2	0.0	17.2
Power	(W)	0.863	0.000	0.863
Antenna Gain	dBi		0.00	0.00
EIRP	(W)	0.86	0.000	0.863
X	(cm)		0.0	1.0
Y	(cm)		0.0	0.0
Sector			FALSE	FALSE
Arc			FALSE	FALSE
θ_1	degs	input	-120	-120
θ_2			60	60
θ_1		actual	-120	-120
θ_2			60	60

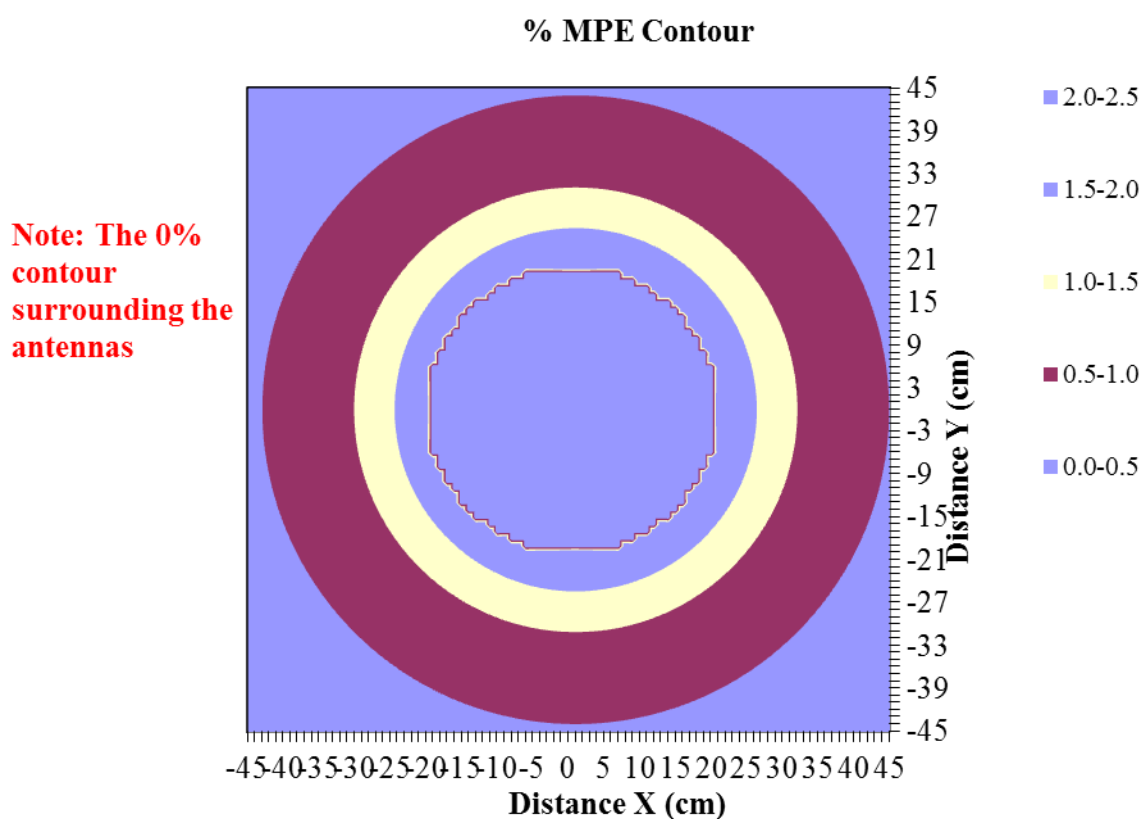
% MPE Contour

Note: The 0% contour surrounding the antennas



RFID Tx and WLAN mode of operation

Antenna No.		Total	1	2
Tx Status			On	On
Frequency	MHz		13.56	2440
MPE Limit	mW/cm ²		0.98	1.00
Max % MPE	%	2.4	0.0	2.4
Power	(W)	0.121	0.000	0.121
Antenna Gain	dBi		0.00	0.00
EIRP	(W)	0.12	0.000	0.121
X	(cm)		0.0	1.0
Y	(cm)		0.0	0.0
Sector			FALSE	FALSE
Arc			FALSE	FALSE
θ_1	degs	input	-120	-120
θ_2			60	60
θ_1		actual	-120	-120
θ_2			60	60



Verdict: Since the max MPE is <100%, the device is compliant in all simultaneous transmission modes of operation.