



**MET Laboratories, Inc.** *Safety Certification - EMI - Telecom Environmental Simulation*  
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March 8, 2004

Inside contactless.  
11A, Parc Club du Golf  
Cedex 3 - France

Reference: HAND'IT - 2G ( RFID reader)  
FCC ID: Q45M2502G

Dear Mr. Adel HAMZA,

Enclosed is the EMC Test Report for the Inside contactless.. HAND'IT - 2G ( RFID reader) . Inside contactless. HAND'IT - 2G ( RFID reader) Devices was tested to the requirements of Title 47 of the CFR, Part 15, Subpart C.

Thank you for using the testing services of MET Laboratories. If you have any questions regarding these results or if MET can be of further to you, please feel free to contact me. We appreciate your business and look forward to working with you again soon.

Kindest Regards,  
MET LABORATORIES, INC.

Marianne T. Bosley  
Documentation Department

Enclosures: (\Inside Contactless\EMC15024-FCC225.rpt)

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Inside contactless.

HAND'IT – 2G

FCC ID: Q45M2502G

March 8 , 2004

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## **Electro-Magnetic Compatibility Test Report**

of the

**HAND'IT - 2G**

as a Periodic Intentional Radiator  
under  
Title 47 of the CFR, Part 15, Subpart C

**MET REPORT: EMC15024-FCC225**

**March 8, 2004**

PREPARED FOR:

Inside contactless.  
11A, Parc Club du Golf  
Cedex 3 - France

PREPARED BY:

MET Laboratories, Inc.  
914 West Patapsco Avenue  
Baltimore, Maryland 21230-3432

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## Electro-Magnetic Compatibility Test Report

of the

**HAND'IT - 2G**

as a Periodic Intentional Radiator  
under  
Title 47 of the CFR, Part 15, Subpart C

MET REPORT: **EMC15024-FCC225**

Len Knight  
EMC LAB MANAGER

Marianne T. Bosley  
Documentation Department

**Engineering Statement:** The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of Part 15 of the FCC Rules under normal use and maintenance.

Liming Xu  
Project Engineer



## REPORT STATUS SHEET

Revision	Revision Date	Reason for Revision
i	March 8, 2004	Initial Issue.



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## List of Terms and Abbreviations

AC	Alternating Current
Cal	Calibration
<i>d</i>	Measurement Distance
dB	Decibels
dBFA	Decibels above one <b>microamp</b>
dBfV	Decibels above one <b>microvolt</b>
dBFA/m	Decibels above one <b>microamp per meter</b>
dBfV/m	Decibels above one <b>microvolt per meter</b>
DC	Direct Current
E	Electric Field
DSL	Digital Subscriber Line
ESD	Electrostatic Discharge
EUT	Equipment Under Test
<i>f</i>	Frequency
FCC	Federal Communications Commission
CISPR	Comite International Special des Perturbations Radioelectriques (International Special Committee on Radio Interference)
GRP	Ground Reference Plane
H	Magnetic Field
HCP	Horizontal Coupling Plane
Hz	Hertz
IEC	International Electrotechnical Commission
kHz	kilohertz
kPa	kilopascal
kV	kilovolt
LISN	Line Impedance Stabilization Network
MHz	Megahertz
FH	<b>microhenry</b>
FF	<b>microfarad</b>
Fs	<b>microseconds</b>
NEBS	Network Equipment-Building System
PRF	Pulse Repetition Frequency
RF	Radio Frequency
RMS	Root-Mean-Square
TWT	Traveling Wave Tube
V/m	Volts <b>per meter</b>
VCP	Vertical Coupling Plane



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## **I. Executive Summary**

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**A. Purpose of Test**

An EMI evaluation to determine compliance of the Inside contactless. HAND'IT- 2G with the requirements of Part 15, Subpart C was conducted. (All references are to the most current version of Title 47 of the Code of Federal Regulations in effect.) In accordance with §2.1033(b), the following test report is presented in support of the application for grant of certification of the Inside contactless. HAND'IT- 2G. Inside contactless. should retain a copy of this document for at least one year after the manufacturing of the Inside contactless. HAND'IT- 2G has been **permanently** discontinued, as per §2.938(c).

**B. Executive Summary**

All testing was conducted at MET Laboratories, Inc., 914 West Patapsco Avenue, Baltimore, Maryland 21230-3432. Radiated emissions measurements were performed on a ten-meter open air test site (OATS). In accordance with §2.948, a complete site description is on file with the FCC Laboratory Division as 31040/SIT/MET.

**Measurement of the variation of the radiated signal level** of the fundamental frequency component, as required by §15.31(e), was not required due to battery operation. The unit was tested with a new battery.

As required by §15.231(b) of CFR 47, **radiated emissions measurements** were made in accordance with the general procedures of §2.947 and §15.31, and ANSI C63.4-1992 "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz". The measurements were performed over the frequency range of 30 MHz to the tenth harmonic of the carrier using the following equipment:

Frequency Range	Input Transducer	Measurement Instrumentation
9KHz to 30 MHz	Loop antenna	EMI receiver
30 MHz to 300MHz	Biconical Antenna	EMI receiver
300 MHz to 1 GHz	Log-Periodic Antenna	EMI receiver
above 1 GHz	Double Ridged Guide Horn	EMI receiver

The measurements were made with the detector set for "quasi-peak" with a bandwidth of 120 kHz (for measurements made between 30 MHz and 1 GHz) and with a bandwidth of 9 kHz. (for measurements made between 30 MHz and 9 KHz) In general, all radiated emissions measurements were made with the quasi-peak detector unless otherwise noted. For measurements above 1 GHz, a 1 MHz detector was used with either a "peak" detector or an "average" detector. In general, all radiated emissions above 1 GHz measurements were made with the peak detector unless otherwise noted. Additionally, it was verified that the peak levels of the emissions did not to exceed the radiated emission limit by more than 20 dB (reference §15.35(b)). A preliminary RF scan was performed in an RF-shielded enclosure. Final measurements were made on the OATS, as per §15.31(d).

**C. References**

Reference	Description
Purchase Order # 474	Inside contactless. Purchase Order and FCC Identifier for HANDIT RFID Devices Testing
Title 47 of the CFR, Part 15, Subpart C 15.225	Electromagnetic Compatibility - Radiated Emissions for a Class B Digital Device

**Table 1. References**

The EUT, as supplied to MET Laboratories, complied with the requirements stated in this test report.



Inside contactless.

HAND'IT – 2G

FCC ID: Q45M2502G

March 8 , 2004

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## II. General

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**A. Test Site**

All testing was conducted at MET Laboratories, Inc., 914 West Patapsco Avenue, Baltimore, Maryland 21230-3432. Radiated Emissions measurements were performed on the OATS. In accordance with §2.948(a)(3), a complete site description is contained at MET Laboratories. In accordance with §2.948(d), MET Laboratories has been accredited by the National Voluntary Laboratory Accreditation Program (Lab Code: 100273-0)

**B. Description of Test Sample**

The EUT is a RFID. Compact Flash Card  
RFID: Radio Frequency Identification Device ( Operation frequency: 13.56 MHz )

**C. General Test Setup**

The EUT was tested in the configuration shown on the following pages.

**D. Mode of Operation**

Only one mode – Reading a Tag

**E. Monitoring Method:**

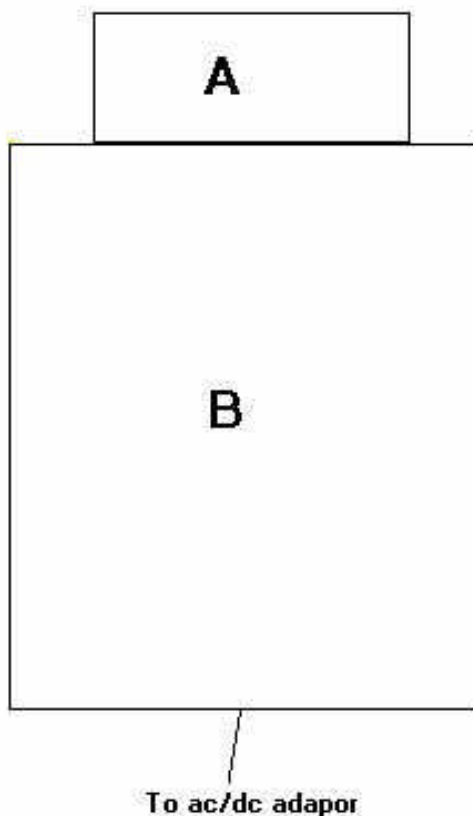
Software drive the EUT operation and the LCD (on the PDA ) will display the ID information.

**EUT**

<b>Reference to Test Configuration [Figure 1]</b>	<b>Description/ Nomenclature</b>	<b>Model Number</b>	<b>Serial Number</b>
A	HAND'IT – 2G	INS – 0312 - 0057	INS – 0312- 0057

**Support Equipment**

<b>Reference to Test Configuration [Figure 1]</b>	<b>Description/ Nomenclature</b>	<b>Manufacturer</b>	<b>Model Number</b>
B	HP 2210 PDA	HP	iPAQ H2200





**E. Modifications**

No modifications were made during testing.

**F. Disposition of Test Sample**

Returned to:

**Inside contactless.**

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Cedex 3 - France



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### **III. Electromagnetic Compatibility Emission Criteria**

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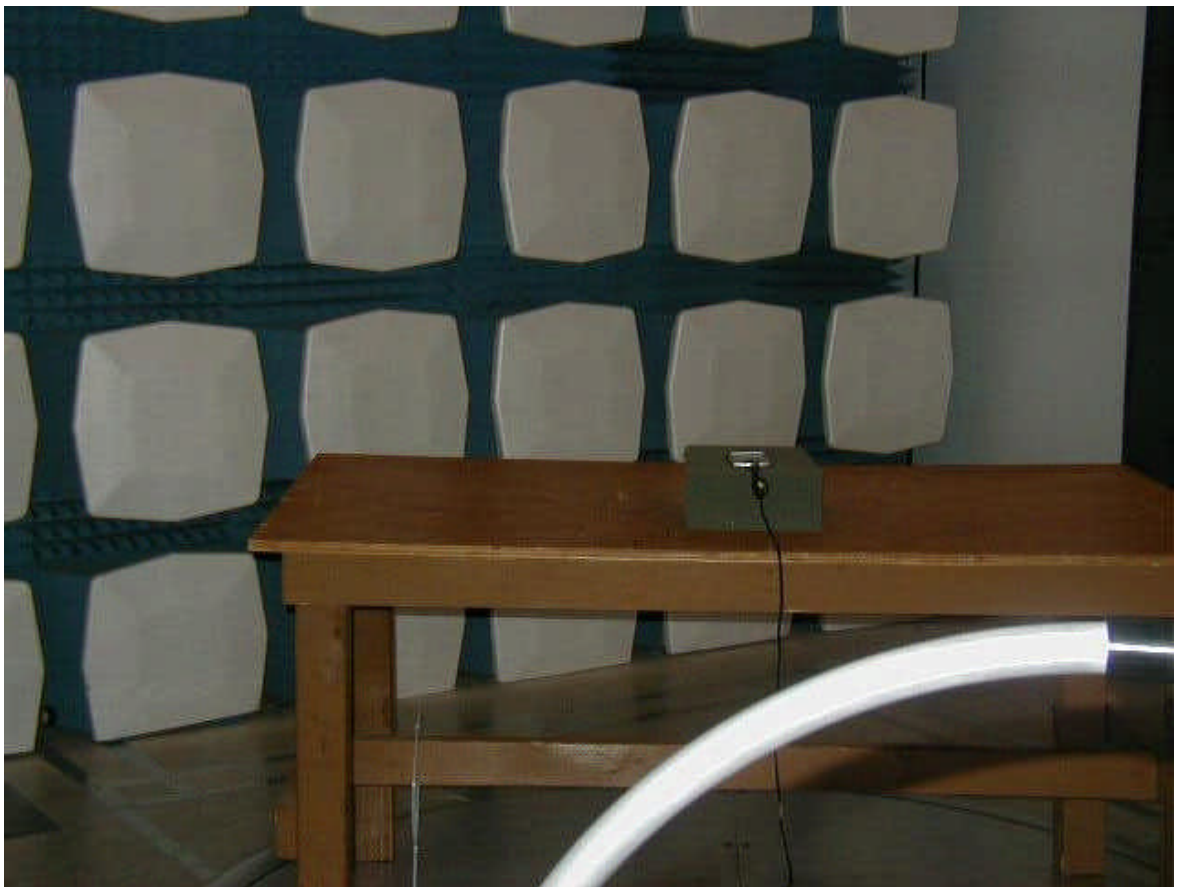
### III. Electromagnetic Interference Emission Criteria

#### A. Radiated Emissions - 13.56MHz Magnetic Field Transmitter

**Requirements:** The EUT shall meet the limits specified in FCC Part 15 Subpart C, Sections: 15.209. And 15.225

**Test Equipment:** Test Equipment for FCC Radiated Emissions is listed in Section IV of this report.

**Test Conditions:** The EUT was installed located inside a shielded enclosure. The EUT was located 3 m from a loop antenna in a test area selected for low ambient Magnetic Emissions.

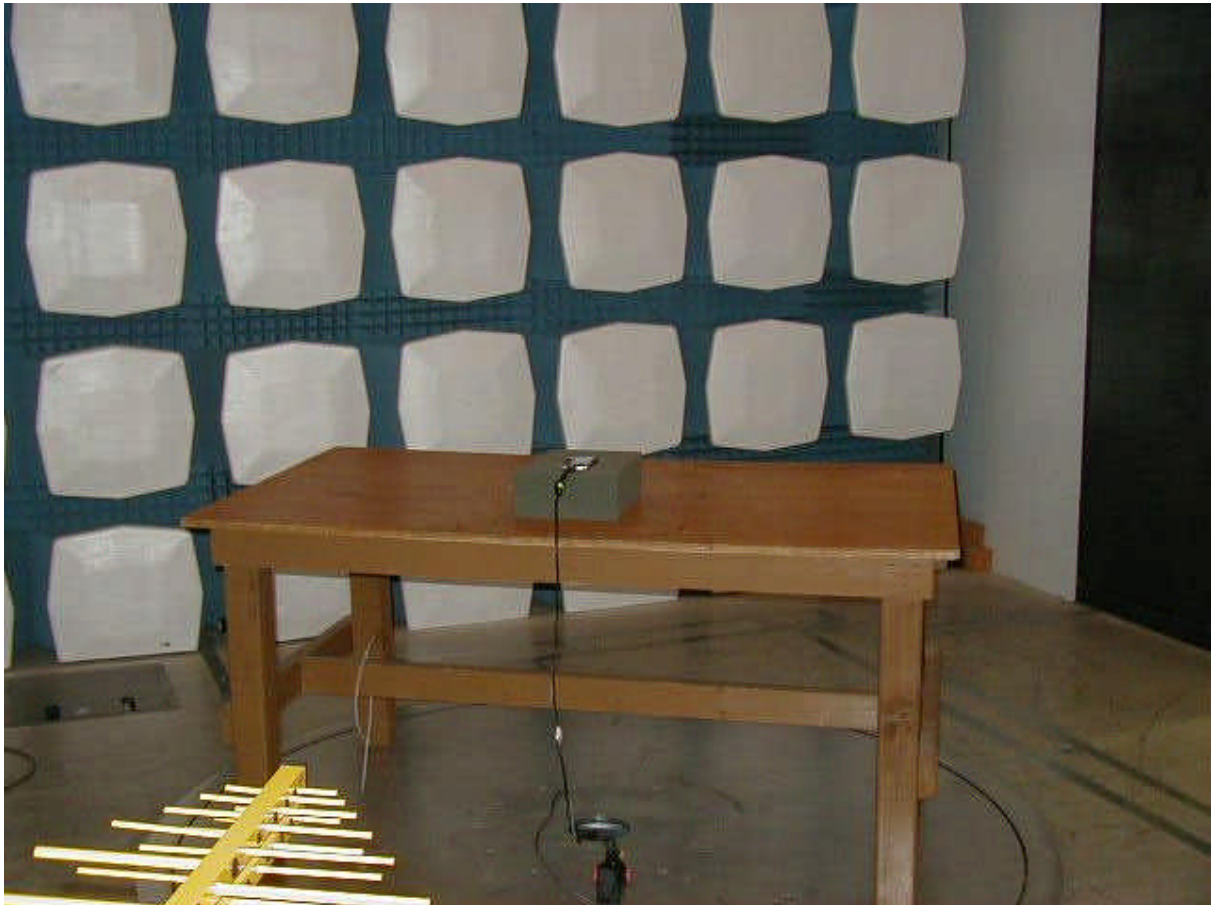






### III. Electromagnetic Compatibility Emission Requirements

Photograph:



Photograph 1. FCC 15.225 Radiated Emissions Test Setup Photo



### III. Electromagnetic Compatibility Emission Requirements

**Procedure:** As required by §15.231(b) of CFR 47, *radiated emissions measurements* were made in accordance with the general procedures of §2.947 and §15.31, and ANSI C63.4-1992 "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz".

**Results:** The EUT complied with the Field strength limits of Sections 15.225 at 3 meters

Frequency ( MHz)	Azimuth of EUT	Degree	Height (m)	Raw Amplitude (dBuV/m) QP	ACF	Cable Loss	Corrected Amplitude (dBuV/m) QP	Limit @ 3 meters (dBuV/)
13.56	0	180	1.0	20.5	33.5	-0.5	53.5	120

Note: \*EUT was scanned with loop antenna in vertical and horizontal orientations.( From 9KHz to 30MHz with QP detector, with RBW = 9 KHz )

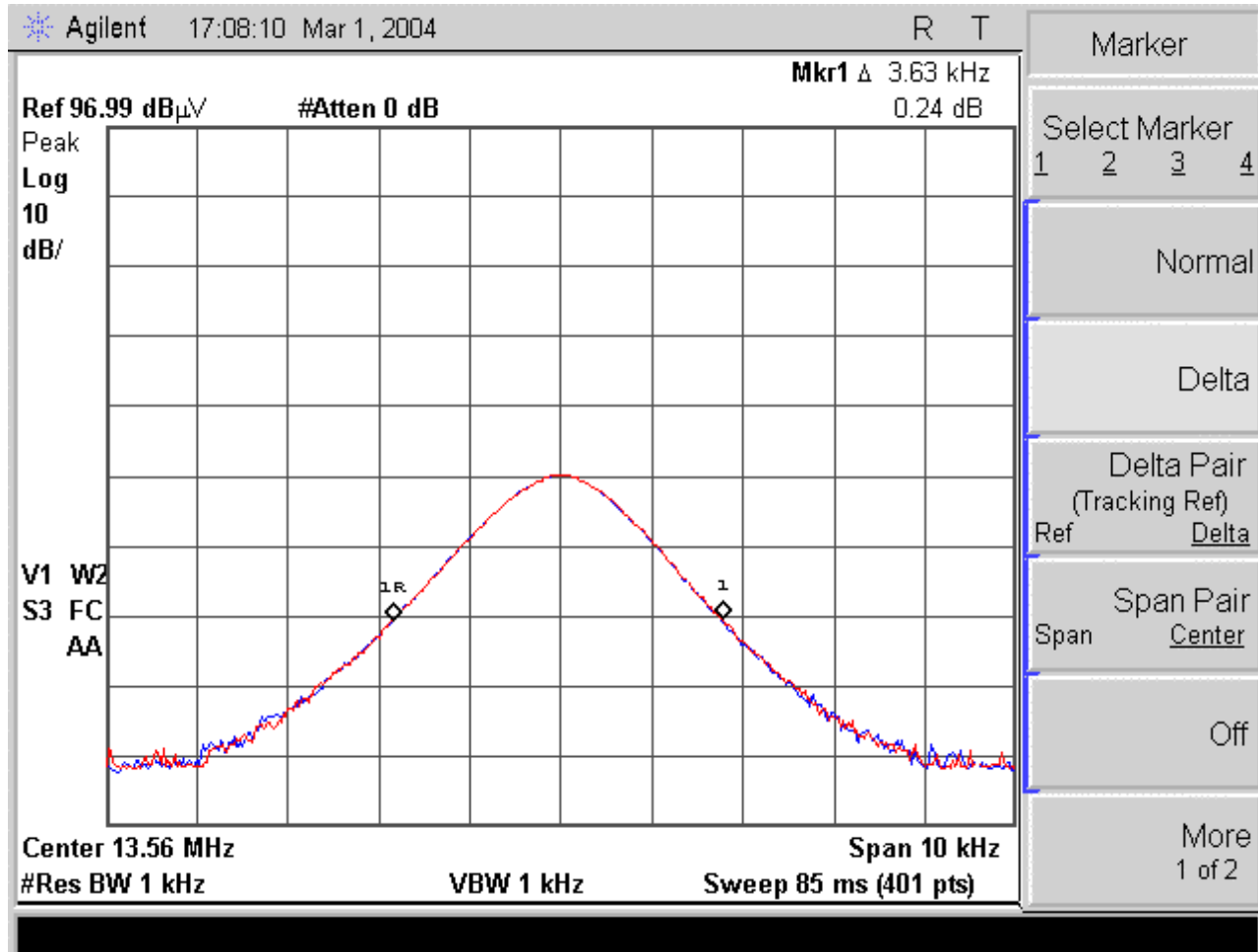
\*There is no detectable emissions ( included harmonics of the 13.56 MHz ) between 9KHz and 30MHz)

**Test Engineer:** Liming Xu

**Test Date:** 3/4/2004



## Bandwidth and band edge plot per 15.215c



\*20 B/W = 3.63 KHz, Center frequency = 13.56050 MHz

\* The frequency deviation is less than 10 Hz, ( from -20 to 50 degree C )

\* There is no detectable frequency variation when the frequency counter was set to 10Hz resolution.

Results: Low frequency =  $13.56050 \text{ MHz} - \frac{1}{2} ( 3.63 \text{ KHz} ) = 13560.50 \text{ KHz} - 1.81 \text{ KHz} = 13558.69 \text{ KHz}$

High frequency =  $13.56050 \text{ MHz} + \frac{1}{2} ( 3.63 \text{ KHz} ) = 13560.50 \text{ KHz} + 1.81 \text{ KHz} = 13562.31 \text{ KHz}$

Frequency range : (13.55869 MHz - 13.56231 MHz) is inside FCC band: (13.553MHz - 13.567MHz ).

Test Engineer: Liming Xu

Test Date: 3/1/2004



**Results:** The EUT complied with the Radiated Emissions limits of Sections 15.209

**Radiated Emissions Limits Test Results, Class B and Reciever ( Pass )**

Frequency (MHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Antenna Height (m)	Uncorrected Amplitude (dBuv)	Antenna Correction Factor (dB) (+)	Cable Loss (dB) (+)	Distance Correction Factor (dB) (-)	Corrected Amplitude (dBuv)	Limit (dBuv)	Margin (dB)
41.400	0	H	1.00	7.12	9.01	1.47	0.00	17.60	40.00	-22.40
41.400	0	V	1.00	20.81	8.40	1.47	0.00	30.68	40.00	-9.32
54.700	0	H	1.00	10.66	10.63	1.68	0.00	22.97	40.00	-17.03
54.700	0	V	1.00	9.09	9.33	1.68	0.00	20.10	40.00	-19.90
148.600	0	H	1.00	8.49	7.97	2.64	0.00	19.10	43.50	-24.40
148.600	0	V	1.00	14.80	7.80	2.64	0.00	25.24	43.50	-18.26
300.000	0	H	1.00	12.74	13.30	3.65	0.00	29.69	46.00	-16.31
300.000	0	V	1.00	11.26	12.40	3.65	0.00	27.31	46.00	-18.69
449.000	90	H	1.00	15.05	16.16	4.29	0.00	35.50	46.00	-10.50
449.000	0	V	1.00	16.00	16.46	4.29	0.00	36.75	46.00	-9.25
873.000	0	H	1.00	11.02	21.94	5.54	0.00	38.50	46.00	-7.50
873.000	0	V	1.00	9.41	21.46	5.54	0.00	36.41	46.00	-9.59

**Test Engineer:** Liming Xu

**Test Date:** 3/4/2004

**15.207(c) : AC Conducted Emissions**

**Test Procedure:** The EUT is installed on a 0.8m high wooden table inside a shielded enclosure. The EUT is situated such that the back of the EUT was 0.4 m from one wall of the shielded enclosure, and the remaining sides of the EUT were no closer than 0.8 m from any other conductive surface. The EUT is powered from a 50  $\Omega$ /50  $\mu$ H Line Impedance Stabilization Network (LISN). The EMC receiver scanned the frequency range from 150 kHz to 30 MHz. Conducted Emissions measurements are made in accordance with *ANSI C63.4-2001 "Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz"*. The measurements are performed over the frequency range of 150 kHz to 30 MHz using a 50  $\Omega$ /50  $\mu$ H LISN as the input transducer to an EMC field intensity meter.

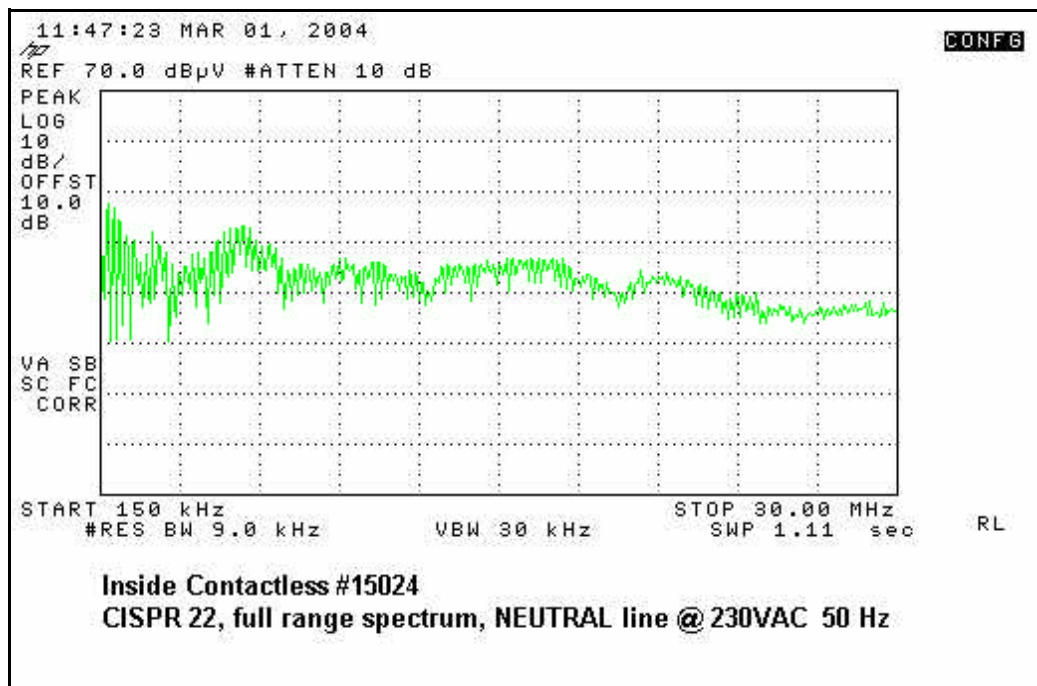
**Results:** The EUT was found compliant with the requirements of Section 15.207(c).

**Test Engineer(s):** Aldo Coletta

**Test Date(s):** 03/01/2004

**15.207(c) : AC Conducted Emissions****Conducted Emissions - Voltage, Worst Case Emissions, AC Power, Neutral Line, (120Vac)**

Frequency (MHz)	Quasi-Peak Amplitude (dBmV)	Quasi-Peak Limit (dBmV)	Quasi-Peak Margin (dBmV)	Average Amplitude (dBmV)	Average Limit (dBmV)	Average Margin (dBmV)
0.718	45.9	56	-10.1	38.2	46	-7.8
0.96	43.9	56	-12.1	37.7	46	-8.3
0.24	43.2	62.1	-18.9	40.1	52.1	-12
5.293	41.9	60	-18.1	35.9	50	-14.1
5.527	41.9	60	-18.1	35.1	50	-14.9
5.278	41.7	60	-18.3	32.1	50	-17.9
5.515	41.2	60	-18.8	29.9	50	-20.1
1.202	40.7	56	-15.3	34.3	46	-11.7
2.162	40.4	56	-15.6	33.4	46	-12.6
1.44	39.8	56	-16.2	31.2	46	-14.8

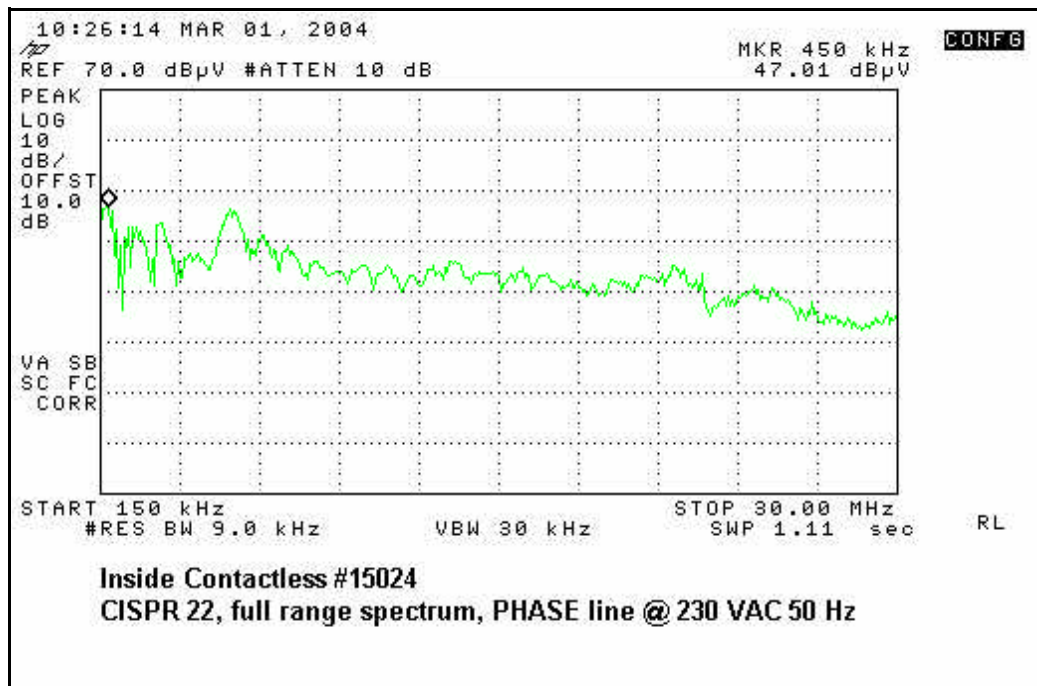
**Conducted Emission Limits, Neutral Line Plot Full Range**



## 15.207(c) : AC Conducted Emissions ( Plots )

Conducted Emissions - Voltage, Worst Case Emissions, AC Power, Phase Line (120Vac)

Frequency (MHz)	Quasi-Peak Amplitude (dBμV)	Quasi-Peak Limit (dBμV)	Quasi-Peak Margin (dBμV)	Average Amplitude (dBμV)	Average Limit (dBμV)	Average Margin (dBμV)
0.443	46.7	57.01	-10.31	40.7	47.01	-6.31
0.297	46.3	60.33	-14.03	40.9	50.33	-9.43
0.596	44.9	56	-11.1	36.2	46	-9.8
5.179	44	60	-16	28.8	50	-21.2
5.034	43.8	60	-16.2	33	50	-17
5.191	43.4	60	-16.6	32.1	50	-17.9
5.049	43.4	60	-16.6	35.6	50	-14.4
5.369	42.8	60	-17.2	31.1	50	-18.9
2.22	42.7	56	-13.3	31.1	46	-14.9
1.183	42.3	56	-13.7	32.8	46	-13.2



Conducted Emission Limits, Phase Line Plot Full Range

**Frequency Stability over Temperature Variations****Technical Specifications:** §15.225 (c)

**Measurement Procedures:** As required by §15.225 (c) of CFR 47, *frequency tolerance measurements* were made over the temperature range of -20EC to +50EC. The frequency measurements were made using direct input to a spectrum analyzer. Climatic control was accomplished using an environmental simulation chamber. The temperature was first lowered to -20EC and then raised hourly in 10E increments. The unit remained in the chamber during temperature transitions and during the measurement process.

Frequency tolerance of carrier signal: +/- 0.01% for a temperature variation from - 20EC to + 50EC at normal supply voltage.

Temperature (EC)	Carrier Frequency (MHz)	Frequency Deviation (Hz)	Deviation Limit (KHz)
-20	13.56050	10 *	± 1.3
-10	13.56050	10 *	± 1.3
0	13.56050	10 *	± 1.3
+10	13.56050	10 *	± 1.3
+20	13.56050	10 *	± 1.3
+30	13.56050	10 *	± 1.3
+40	13.56050	10 *	± 1.3
+50	13.56050	10 *	± 1.3

**Table 9. CARRIER FREQUENCY DEVIATIONS DUE TO TEMPERATURE  
INSTABILITY**

\* The frequency deviation is less than 10 Hz,

\* There is no detectable frequency variation when the frequency counter was set to 10Hz resolution.

**Results:** The unit meets the requirements of 15.225 (c)

**Test Engineer:** Liming Xu

**Test Date:** 3/4/2004



**Frequency Stability over Voltage Variations****Technical Specifications:** §15.225 (c)

**Measurement Procedures:** As required by §15.225 (c) of CFR 47, *frequency tolerance measurements* were made over changes in the supply voltage to the EUT from 85% to 115% of the nominal supply voltage using a variable transformer to vary the AC supply. The frequency measurements were made using direct input to a spectrum analyzer.

Frequency tolerance of carrier signal:  $\pm 0.01\%$  for a variation in primary voltage from 85% to 115% of the rated supply.

Percentage of Rated Supply	AC (V)	Carrier Frequency (MHz)	Frequency Deviation (Hz)	Deviation Limit (kHz)
85%	102	13.56050	10 *	$\pm 1.3$
100%	120	13.56050	10 *	$\pm 1.3$
115%	138	13.56050	10 *	$\pm 1.3$

**Table 10. Carrier Frequency Deviations Due to Voltage Variations**

**Results:** The unit meets the requirements of §15.225 (c)

\* The frequency deviation is less than 10 Hz,

\* There is no detectable frequency variation when the frequency counter was set to 10Hz resolution.

**Test Engineer:** Liming Xu

**Test Date:** 3/4/2004



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## IV. Test Equipment

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#### IV. Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ANSI/NCSL Z540-1-1994 and ANSI/ISO/IEC 17025:2000.

MET #	Equipment	Manufacturer	Model	Cal Date	Cal Due
1T4300	SEMI-ANECHOIC CHAMBER # 1	EMC TEST SYSTEMS	NONE	5/3/2003	5/3/2004
1T4303	ANTENNA; BILOG	SCHAFNER - CHASE EMC	CBL6140A	4/9/03	4/9/04
1T4351	Spectrum analyzer	Agilent	E 7405A	8/21/03	8/21/04
1T4272	Loop antenna	EMCO	8512	11/25/03	11/25/04
1T4302	EMI Receiver	HP	8546A	10/16/2003	10/16/2004

**Table 10. Test Equipment**

Note: Functionally verified test equipment is verified at the time of testing.



Inside contactless.

HAND'IT – 2G

FCC ID: Q45M2502G

March 8 , 2004

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**END OF REPORT**

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