

DATE: 04 November 2008

I.T.L. (PRODUCT TESTING) LTD.

FCC Radio Test Report

for

Risco Ltd.

Equipment under test:

Two Way Keypad With Proximity Reader

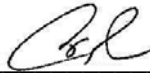
RW132KPxyzzH

Written by:



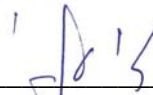
D. Shidlow, Documentation

Approved by:



A. Sharabi, Test Engineer

Approved by:



I. Raz, EMC Laboratory Manager

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This report relates only to items tested.

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1. General Information

1.1 Administrative Information

Manufacturer:	Risco Ltd.
Manufacturer's Address:	14 Hachoma St. Rishon Le T'zion 75655 Israel Tel: +972-3-963-7742 Fax: +972-3-961-6584
Manufacturer's Representative:	Efi Goren
Equipment Under Test (E.U.T):	Two Way Keypad With Proximity Reader
Equipment Model No.:	RW132KPxyzzH
Equipment Serial No.:	Not Designated
Date of Receipt of E.U.T:	01.09.08
Start of Test:	01.09.08
End of Test:	01.10.08
Test Laboratory Location:	I.T.L (Product Testing) Ltd. Kfar Bin Nun, ISRAEL 99780
Test Specifications:	FCC Part 15 Sub-part C

1.2 List of Accreditations

The EMC laboratory of I.T.L. is accredited by the following bodies:

1. The American Association for Laboratory Accreditation (A2LA) (U.S.A.), Certificate No. 1152.01.
2. The Federal Communications Commission (FCC) (U.S.A.), Registration No. 90715.
3. The Israel Ministry of the Environment (Israel), Registration No. 1104/01.
4. The Voluntary Control Council for Interference by Information Technology Equipment (VCCI) (Japan), Registration Numbers: C-1350, R-1285.
5. Industry Canada (Canada), File No. IC 4025.
6. TUV Product Services, England, ASLLAS No. 97201.
7. Nemko (Norway), Authorization No. ELA 207.

I.T.L. Product Testing Ltd. is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this test report have been determined in accordance with I.T.L.'s terms of accreditation unless stated otherwise in the report.

1.3 Product Description

The EUT is a wireless 433.92MHz 2-Way wireless keypad which is used to remotely program and operate the Agility control panel.

The unit includes a main PCB and RF module and it's powered by three 3V CR123A lithium battery, inside a plastic enclosure.

The unit uses an integral Helical antenna.

The Keypad also include a proximity function, which functions by creating a magnetic field in the frequency of 13.56MHz, which can be then altered by using a passive key. This allows another option to arm/disarm the system.

This antenna used for this is a PCB printed antenna.

1.4 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4: 2003. Radiated testing was performed at an antenna to EUT distance of 3 meters.

1.5 Test Facility

The radiated emissions tests were performed at I.T.L.'s testing facility at Kfar Bin-Nun, Israel. This site is a FCC listed test laboratory (FCC Registration No. 90715, date of listing August 22, 2006).

I.T.L.'s EMC Laboratory is also accredited by A2LA, certificate No. 1152.01.

1.6 Measurement Uncertainty

Radiated Emission

The Open Site complies with the ± 4 dB Normalized Site Attenuation requirements of ANSI C63.4-2003. In accordance with Paragraph 5.4.6.1 of this standard, this tolerance includes instrumentation calibration errors, measurement technique errors, and errors due to site anomalies.

2. Product Labeling

FCC ID: JE4RW132KP

IC: 6564A-RW132KP

THIS DEVICE COMPLIES WITH FCC RULES PART 15. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS: (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED. INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRE OPERATION.

Figure 1. FCC Label



Figure 2. Location of Label on EUT

3. System Test Configuration

3.1 *Justification*

The E.U.T. is a wall mounted unit. It was tested in the vertical position supported by a test jig.

3.2 *EUT Exercise Software*

Manufacturing software was used for all the tests.

3.3 *Special Accessories*

A test jig was used to support the unit.

3.4 *Equipment Modifications*

No modifications were needed in order to achieve compliance

3.5 *Configuration of Tested System*

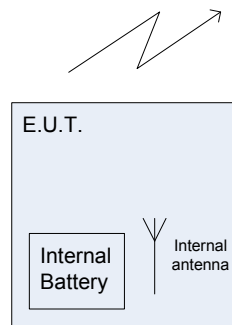


Figure 3. Configuration of Tested System

4. Test Set-up Photos



Figure 4. Radiated Emission Test 433 MHz Transmitter



Figure 5. Radiated Emission Test 13.56 MHz Transmitter



Figure 6. Frequency Tolerance Test 13.56 MHz Transmitter

5. Average Factor Calculation 433 MHz Transmitter

1. Transmission pulse duration = 187usec
2. Transmission pulse period = 412usec
3. Burst duration = 57.75msec
4. Time between bursts = 805msec , >100ms
5. Average Factor = $20 \log \left[\frac{\text{Pulse duration}}{\text{Pulse period}} \times \frac{\text{burst duration}}{100\text{msec}} \times \text{Num of burst within 100msec} \right]$

$$\text{Average Factor} = 20 \log \left[\frac{0.187}{0.412} \times \frac{57.75}{100} \times 1 \right] = -11.63\text{dB}$$

16:25:23 SEP 07, 2008

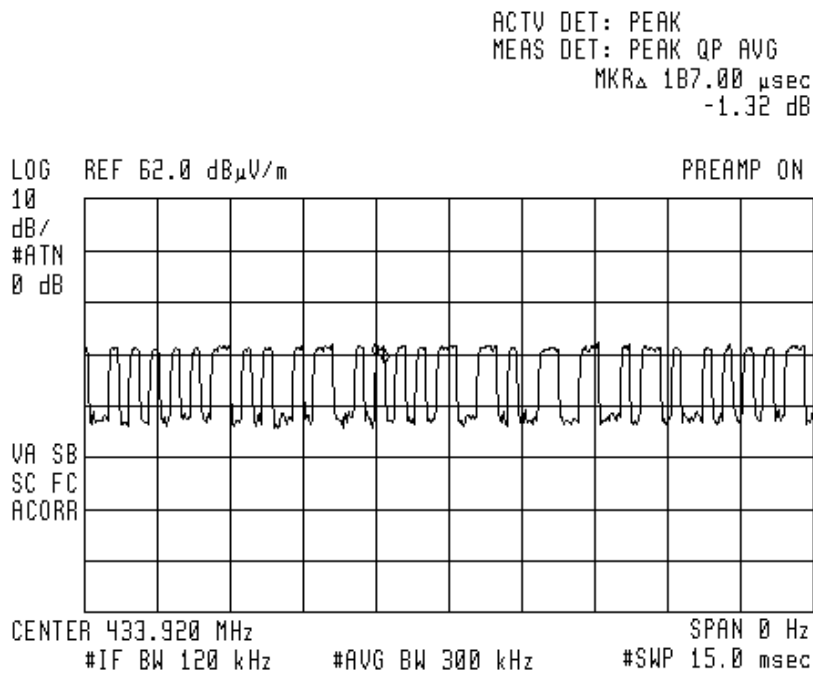


Figure 7. Transmission pulse duration = 187usec

16:24:41 SEP 07, 2008

ACTV DET: PEAK
 MEAS DET: PEAK QP AVG
 MKRΔ 412.00 μsec
 -.06 dB

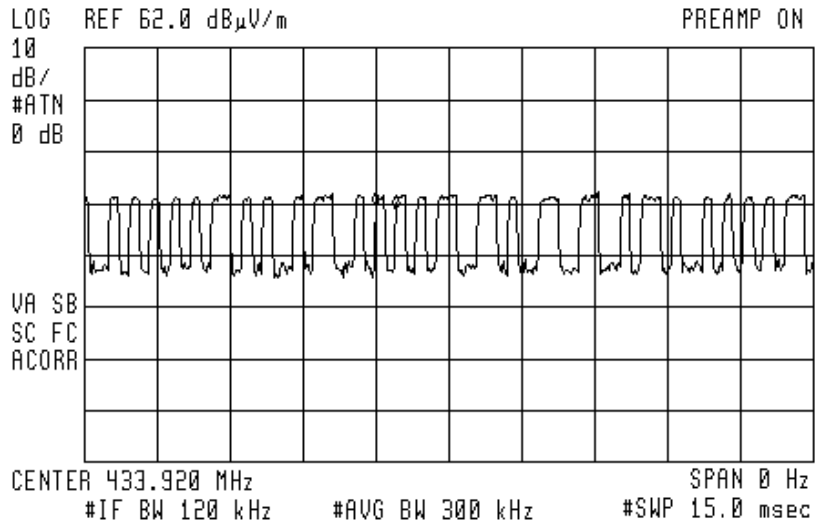


Figure 8. Transmission pulse period = 412usec

16:21:45 SEP 07, 2008

ACTV DET: PEAK
 MEAS DET: PEAK QP AVG
 MKRΔ 57.750 msec
 -1.11 dB

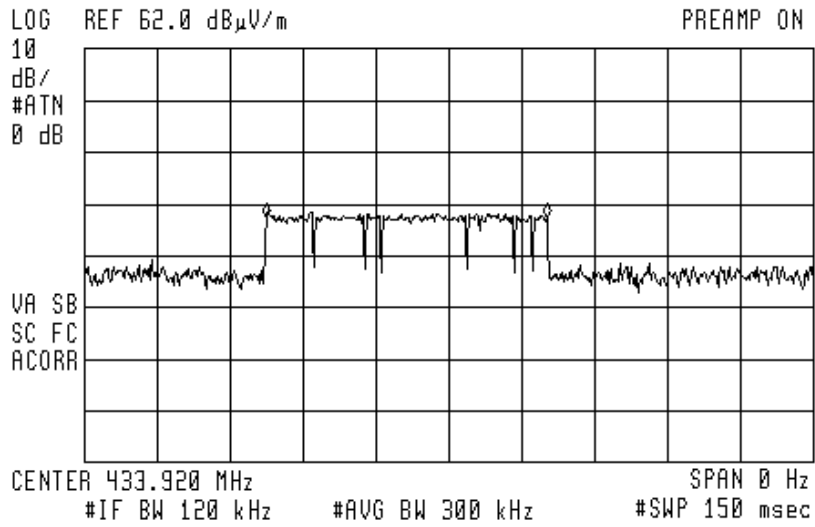


Figure 9. Burst duration = 57.75msec

16:18:40 SEP 07, 2008

ACTV DET: PEAK
 MEAS DET: PEAK QP AVG
 MKRΔ 805.00 msec
 -.13 dB

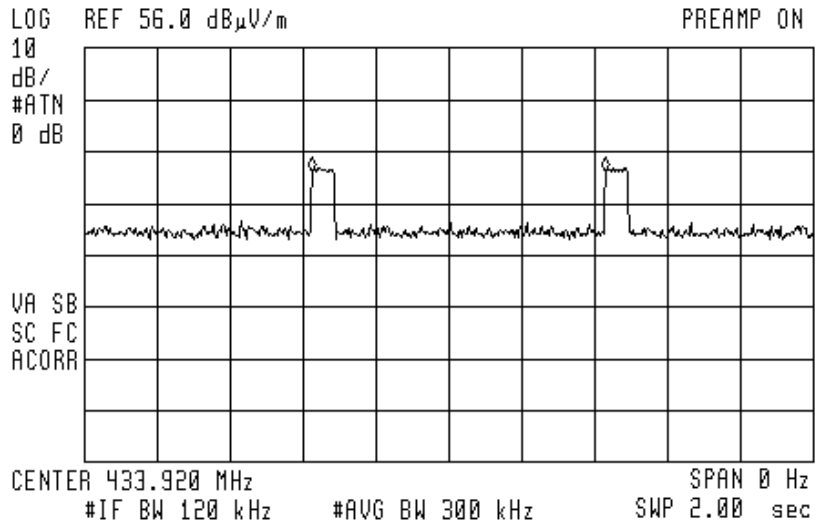


Figure 10. Time between bursts = 805msec , >100ms

5.1 Test Instrumentation Used

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
Spectrum Analyzer	HP	8592L	3826A01204	March 5, 2008	1 Year
Antenna Bioconical	ARA	BCD 235/B	1041	March 23, 2008	1 year
Antenna Log Periodic	ARA	LPD-2010/A	1038	November 22, 2007	1 year
Antenna-Log Periodic	A.H.System	SAS-200/511	253	February 4, 2007	2 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A

6. Periodic Operation 433 MHz Transmitter

6.1 Specification

F.C.C., Part 15, Subpart C, Section 15.231(a)

6.2 Requirements

Requirement	Rationale	Verdict
Continuous transmissions are not permitted.	N/A	Complies
A manually operated transmitter shall be deactivated within not more than 5 seconds after releasing the switch.	See plot in Figure 11.	Complies
An automatically operated transmitter shall cease operation within 5 seconds after activation.	See plot in Figure 12.	Complies
Periodic transmissions at regular predetermined intervals are not permitted.	N/A	Complies
Polling or supervised transmissions to determine system integrity of transmitter used in security or safety applications shall not exceed more than 2 seconds per hour.	See plot in Figure 13.	Complies

6.3 Results

JUDGEMENT: Passed

The EUT met the FCC Part 15, Subpart C, Section 15.231(a) specification requirements.

TEST PERSONNEL:

Tester Signature: 

Date: 09.11.08

Typed/Printed Name: A. Sharabi

Periodic Operation

E.U.T Description Two Way Keypad With Proximity Reader
 Type RW132KPxyzH
 Serial Number: Not Designated

Specification: F.C.C., Part 15, Subpart C, 15.231(a)

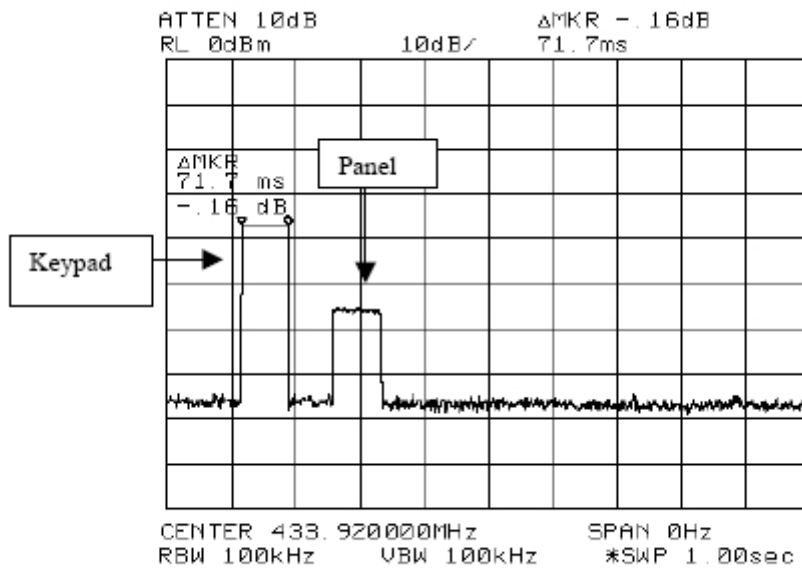


Figure 11. A manually operated transmission by the Keypad (71.7msec) And a response from the Panel

Note: In case of no acknowledgement by the panel, the above transmission is repeated up to seven times.

Periodic Operation

E.U.T Description Two Way Keypad With Proximity Reader
 Type RW132KPxyzH
 Serial Number: Not Designated

Specification: F.C.C., Part 15, Subpart C, 15.231(a)

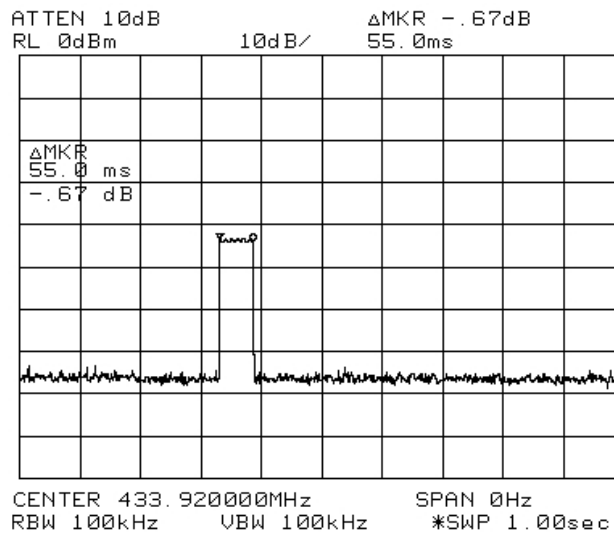


Figure 12. Power failure –Low battery (55msec)

7. Field Strength of Fundamental 433 MHz Transmitter

7.1 Test Specification

F.C.C., Part 15, Subpart C, Section 15.231(b)

7.2 Test Procedure

The E.U.T. operation mode and test set-up are as described in Section 3.

The E.U.T. was placed on a non-conductive table, 0.8 meters above the O.A.T.S. ground plane.

The EMI receiver was set to the E.U.T. Fundamental Frequency (433.92MHz) and Peak Detection.

The turntable and antenna mast were adjusted for maximum level reading on the EMI receiver.

The measurement was performed for vertical and horizontal polarizations of the test antenna.

The average result is:

Peak Level(dB μ V/m) + E.U.T. Duty Cycle Factor, in 100msec time window (dB)

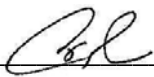
7.3 Measured Data

JUDGEMENT: Passed by 7.18 dB

The EUT met the FCC Part 15, Subpart C, Section 15.231(b) specification requirements.

The details of the highest emissions are given in Figure 14 to Figure 16.

TEST PERSONNEL:

Tester Signature:  Date: 09.11.08

Typed/Printed Name: A. Sharabi

Field Strength of Fundamental

E.U.T Description Two Way Keypad With Proximity Reader
 Type RW132KPxyzzH
 Serial Number: Not Designated

Specification: F.C.C., Part 15, Subpart C, 15.231(b)

Antenna Polarization: Horizontal/Vertical

Test Distance: 3 meters

Detector: Peak

Freq.	Pol.	Peak Amp	Average Factor	AVG Result	AVG Specification	Margin
(MHz)	V/H	(dB μ V/m)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)
433.92	H	84.69	-11.63	73.06	80.8	-7.74
433.92	V	85.25	-11.63	73.62	80.8	-7.18

Figure 14. Field Strength of Fundamental. Antenna Polarization: HORIZONTAL/VERTICAL. Detector: Peak

Notes:

1. Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.
2. "Peak Amp." (dB μ V/m) included the "Correction Factors".
3. "Correction Factors" (dB) = Test Antenna Correction Factor(dB) + Cable Loss.
4. "Average Factor = $20 \log [(Pulse\ Duration/Pulse\ period)*(Burst\ duration/100msec)] = 20 \log [(0.187/0.412)*(57.75/100)*1] = -11.63$
5. "Average Result" (dB μ V/m)=Peak Amp. (dB μ V/m)+D.C.F. (dB)

Field Strength of Fundamental

E.U.T Description Two Way Keypad With Proximity Reader
 Type RW132KPxyzH
 Serial Number: Not Designated

Specification: F.C.C., Part 15, Subpart C, 15.231(b)

Antenna Polarization: Horizontal

Test Distance: 3 meters

Detectors: Peak, Quasi-peak, Average

16:02:49 SEP 07, 2008

ACTV DET: PEAK
 MEAS DET: PEAK QP AVG
 MKR 433.90 MHz
 84.69 dB μ V/m

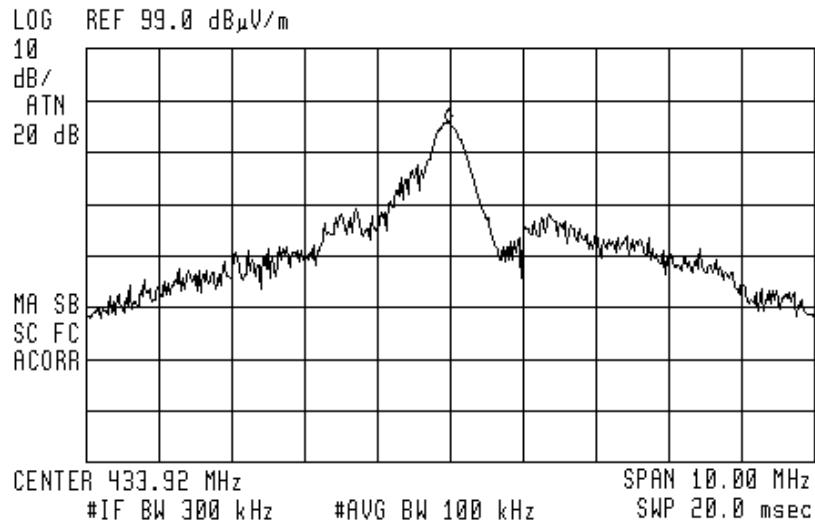


Figure 15. Field Strength of Fundamental. Antenna Polarization: HORIZONTAL.
 Detectors: Peak, Quasi-peak, Average

Field Strength of Fundamental

E.U.T Description Two Way Keypad With Proximity Reader
 Type RW132KPxyzzH
 Serial Number: Not Designated

Specification: F.C.C., Part 15, Subpart C, 15.231(b)

Antenna Polarization: Vertical

Test Distance: 3 meters

Detectors: Peak, Quasi-peak, Average

15:59:31 SEP 07, 2008

ACTV DET: PEAK
 MEAS DET: PEAK QP AVG
 MKR 433.90 MHz
 85.25 dB μ V/m

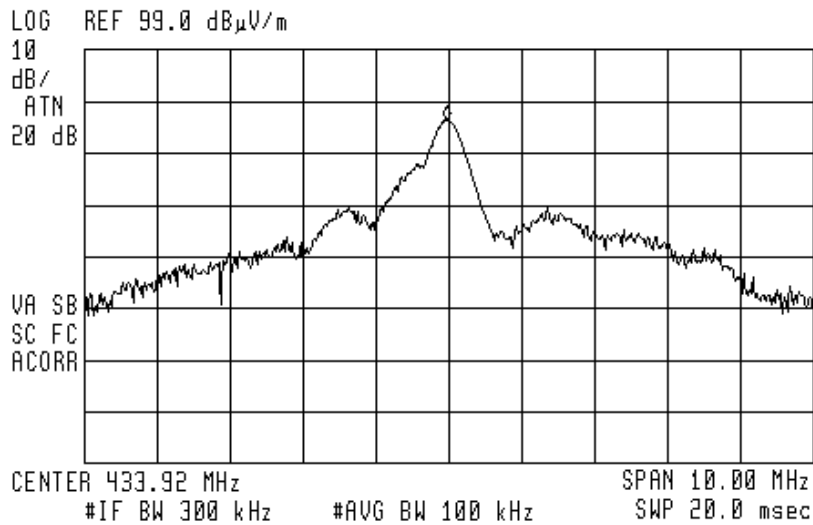


Figure 16. Field Strength of Fundamental. Antenna Polarization: VERTICAL.
 Detectors: Peak, Quasi-peak, Average

7.4 Test Instrumentation Used, Field Strength of Fundamental

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	November 12, 2007	1 year
RF Section	HP	85420E	3705A00248	November 12, 2007	1 year
Antenna Log Periodic	ARA	LPD-2010/A	1038	November 22, 2007	1 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	LaserJet 2200	JPKG19982	N/A	N/A

8. Spurious Radiated Emission 433 MHz Transmitter

8.1 Test Specification

9 kHz - 4500 MHz, F.C.C., Part 15, Subpart C

8.2 Test Procedure

The E.U.T. operation mode and test set-up are as described in Section 3. See Section 3.1 Justification of the System Test Configuration concerning the E.U.T. orientation for this test.

A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The configuration tested is shown in Figure 3. The signals from the list of the highest emissions were verified and the list was updated accordingly.

The levels of the emissions within the frequency ranges of the restricted bands (Section 15.205 of FCC Part 15) were compared to the limits of the table in Section 15.209 (a), General Requirements.

The frequency range 9 kHz-4500 MHz was scanned.

The emissions were measured using a computerized EMI receiver complying to CISPR 16 requirements. The specification limits and applicable correction factors are loaded to the receiver via a 3.5" floppy disk.

In the frequency range 9 kHz-30MHz, the loop antenna was rotated on its vertical axis. The antenna height (center of loop) was 1 meter at a distance of 3 meters.

In the frequency range 2.9-4.5 GHz, a spectrum analyzer including a low noise amplifier was used. During peak measurements, the I.F. bandwidth was 1 MHz, and video bandwidth 3 MHz. During average measurements, the I.F. bandwidth was 1 MHz and video bandwidth was 100 Hz.

The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization. Verification of the E.U.T emissions was based on the following methods: turning the E.U.T on and off; using a frequency span less than 10 MHz; observation of the signal level during turntable rotation. (Background noise is not affected by the rotation of the E.U.T.)

The emissions were measured at a distance of 3 meters.

8.3 Test Data

JUDGEMENT: Passed by 7.7 dB

The EUT met the requirements of the F.C.C. Part 15, Subpart C, specification. The margin between the emission level and the specification limit is 7.7 dB in the worst case at the frequency of 1301.76 MHz, vertical polarization.

The details of the highest emissions are given in Figure 17 to Figure 18.

TEST PERSONNEL:

Tester Signature:  Date: 09.11.08

Typed/Printed Name: A. Sharabi

Radiated Emission

E.U.T Description Two Way Keypad With Proximity Reader
 Type RW132KPxyzzH
 Serial Number: Not Designated

Specification: FCC Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 9 kHz to 4500 MHz
 Antenna: 3 meters distance Detectors: Peak

Frequency (MHz)	Peak Amp (dBμV/m)	Antenna Polarity (H/V)	Peak Specification (dBμV/m)	Margin (dB)
867.83	49.6	H	80.8	-31.2
867.83	56.4	V	80.8	-24.4
1301.76	50.6	H	74.0	-23.4
1301.76	58.0	V	74.0	-16.0

Figure 17. Radiated Emission. Antenna Polarization: HORIZONTAL/VERTICAL. Detectors: Peak

Note: Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

Radiated Emission

E.U.T Description Two Way Keypad With Proximity Reader
 Type RW132KPxyzzH
 Serial Number: Not Designated

Specification: FCC Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 9 kHz to 4500 MHz
 Antenna: 3 meters distance Detectors: Average

Frequency (MHz)	Average Amp (dBμV/m)	Antenna Polarity (H/V)	Average Specification (dBμV/m)	Margin (dB)
867.83	38.0	H	60.8	-22.8
867.83	44.8	V	60.8	-16.0
1301.76	39.0	H	54.0	-15.0
1301.76	46.3	V	54.0	-7.7

**Figure 18. Radiated Emission. Antenna Polarization: VERTICAL.
 Detectors: Average**

Note: Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

8.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	November 12, 2007	1 year
RF Section	HP	85420E	3705A00248	November 12, 2007	1 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS- 0411N313	013	November 2, 2007	1 Year
Spectrum Analyzer	HP	8592L	3826A01204	March 5, 2008	1 Year
Active Loop Antenna	EMCO	6502	9506-2950	October 15, 2008	1 year
Antenna Bioconical	ARA	BCD 235/B	1041	March 23, 2008	1 year
Antenna Log Periodic	ARA	LPD-2010/A	1038	November 22, 2007	1 year
Antenna-Log Periodic	A.H.System	SAS-200/511	253	February 4, 2007	2 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	LaserJet 2200	JPKG19982	N/A	N/A

9. Bandwidth 433 MHz Transmitter

9.1 Test procedure

The transmitter unit operated with normal modulation. The spectrum analyzer was set to 30 kHz resolution BW and center frequency of the transmitter fundamental. The spectrum bandwidth of the transmitter unit was measured and recorded. The BW was measured at 20 dBc points.

The EUT was set up as shown in Figure 3, and its proper operation was checked. The transmitter occupied bandwidth was measured with the EMI receiver as frequency delta between reference points on the modulation envelope.

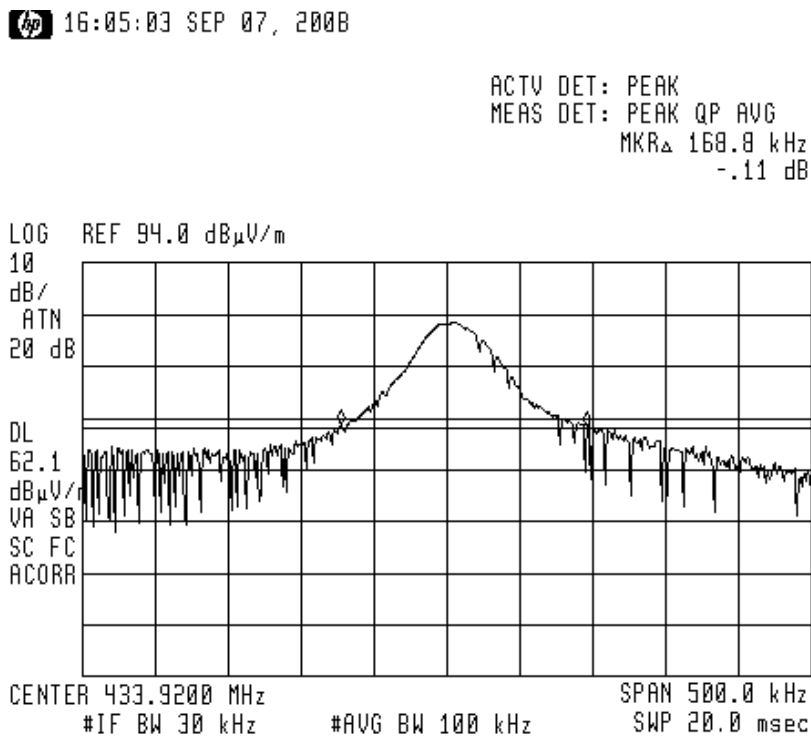


Figure 19 433.92 Center Frequency

9.2 Results table

E.U.T Description: Two Way Keypad With Proximity Reader
Model: RW132KPxyzH
Serial Number: Not Designated
Specification: F.C.C. Part 15, Subpart C: (15.231(c))

Bandwidth Reading (kHz)	Specification (1) (kHz)	Margin (kHz)
168.8	<1084.80	-916.0

Figure 20 Bandwidth

JUDGEMENT: Passed by 916.0 kHz

TEST PERSONNEL:

Tester Signature: _____ 

Date: 09.11.08

Typed/Printed Name: A. Sharabi

(1) 0.25% of the E.U.T. fundamental frequency, Section 15.231(c).

9.3 Test Equipment Used.

Bandwidth

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	November 12, 2007	1 year
RF Section	HP	85420E	3705A00248	November 12, 2007	1 year
Antenna Log Periodic	ARA	LPD-2010/A	1038	November 22, 2007	1 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	LaserJet 2200	JPKG19982	N/A	N/A

Figure 21 Test Equipment Used

10. Field Strength of Fundamental 13.56 MHz Transmitter

10.1 Test Specification

F.C.C., Part 15, Subpart C, Section 15.225(a)

10.2 Test Procedure

The E.U.T. operation mode and test set-up are as described in Section 3.

The E.U.T. was placed on a non-conductive table, 0.8 meters above the O.A.T.S. ground plane.

The EMI receiver was set to the E.U.T. Fundamental Frequency (13.56 MHz) and Peak Detection.

The distance between the E.U.T. and test antenna was 3 meters.

The turntable and antenna were adjusted for maximum level reading on the EMI receiver. The loop antenna was rotated on its vertical axis. The antenna height (center of loop) was 1 meter.

The average result is:

Peak Level(dB μ V/m) + E.U.T. Duty Cycle Factor, in 100msec time window (dB)

10.3 Measured Data

JUDGEMENT: Passed by 62.4 dB

The EUT met the FCC Part 15, Subpart C, Section 15.225(a) specification requirements.

The details of the highest emissions are given in Figure 22.

TEST PERSONNEL:

Tester Signature: _____ 

Date: 09.11.08

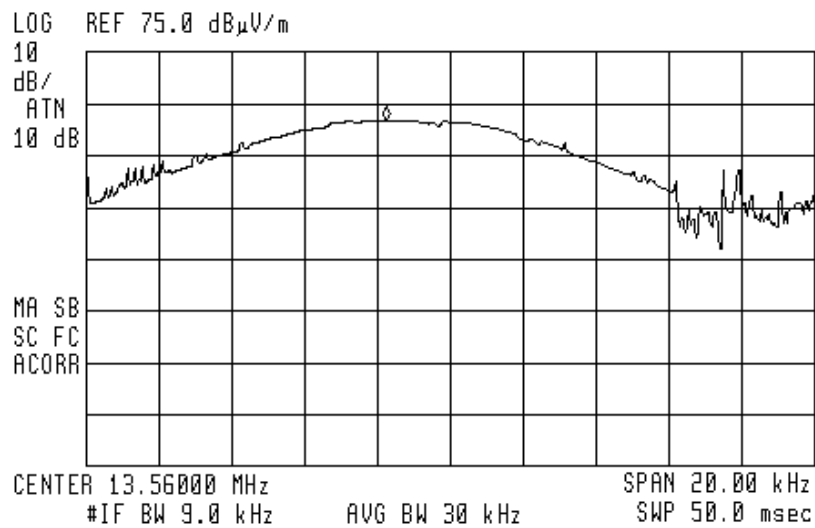
Typed/Printed Name: A. Sharabi

Field Strength of Fundamental

E.U.T Description Two Way Keypad With Proximity Reader
 Model Number RW132KPxyzzH
 Serial Number: Not Designated

13:15:57 SEP 09, 2008

ACTV DET: PEAK
 MEAS DET: PEAK QP AVG
 MKR 13.55825 MHz
 61.63 dB μ V/m



**Figure 22. Field Strength of Fundamental
 Detector: Peak**

$$L_{im30m} = 15848.00 \mu\text{V/m}$$

$$L_{im3m} = 40 \text{ dB}\mu\text{V/m} + 84.0 \text{ dB}\mu\text{V/m} = 124.0 \text{ dB}\mu\text{V/m}$$

10.4 Test Instrumentation Used, Field Strength of Fundamental

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3411A00102	November 12, 2007	1 year
EMI Receiver Filter Section	HP	85420E	3427A00103	November 12, 2007	1 year
Active Loop Antenna	EMCO	6502	9506-2950	October 15, 2008	1 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A

11. Spurious Radiated Emission 13.56 MHz Transmitter

11.1 Test Specification

9 kHz - 1000 MHz, F.C.C., Part 15, Subpart C Section 15.225(d)

11.2 Test Procedure

The E.U.T. operation mode and test set-up are as described in Section 3. See Section 3.1 Justification of the System Test Configuration concerning the E.U.T. orientation for this test.

A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The configuration tested is shown in Figure 3. The signals from the list of the highest emissions were verified and the list was updated accordingly.

The levels of the emissions within the frequency ranges of the restricted bands (Section 15.205 of FCC Part 15) were compared to the limits of the table in Section 15.209 (a), General Requirements.

The frequency range 9 kHz-1000 MHz was scanned.

The emissions were measured using a computerized EMI receiver complying to CISPR 16 requirements. The specification limits and applicable correction factors are loaded to the receiver via a 3.5" floppy disk.

In the frequency range 9 kHz-30MHz, the loop antenna was rotated on its vertical axis. The antenna height (center of loop) was 1 meter at a distance of 3 meters.

The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization. Verification of the E.U.T emissions was based on the following methods:

- Turning the E.U.T on and off.

- Using a frequency span less than 10 MHz.

- Observation of the signal level during turntable rotation. Background noise is not affected by the rotation of the E.U.T.

The emissions were measured at a distance of 3 meters.

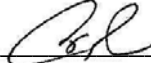
11.3 Test Data

JUDGEMENT: Passed by 30.4 dB

The EUT met the requirements of the F.C.C. Part 15, Subpart C, specification.
The margin between the emission level and the specification limit is 30.4 dB in the worst case at the frequency of 27.12 MHz.

The details of the highest emissions are given in Figure 23.

TEST PERSONNEL:

Tester Signature:  _____

Date: 09.11.08

Typed/Printed Name: A. Sharabi

Radiated Emission

E.U.T Description Two Way Keypad With Proximity Reader
 Type RW132KPxyzzH
 Serial Number: Not Designated

Specification: FCC Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 9 kHz to 1000 MHz
 Antenna: 3 meters distance Detectors: Peak

Frequency (MHz)	Peak Amp (dBμV/m)	Antenna Polarity (H/V)	Peak Specification (dBμV/m)	Margin (dB)
27.12	39.1	-	69.5	-30.4

**Figure 23. Radiated Emission. Antenna Polarization: HORIZONTAL/VERTICAL.
 Detectors: Peak**

Note: Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

$$L_{im30m} = 30 \mu V/m$$

$$L_{im3m} = 40 \text{ dB}\mu V/m + 29.5 \text{ dB}\mu V/m = 69.5 \text{ dB}\mu V/m$$

11.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	November 12, 2007	1 year
RF Section	HP	85420E	3705A00248	November 12, 2007	1 year
Active Loop Antenna	EMCO	6502	9506-2950	October 15, 2008	1 year
Antenna Bioconical	ARA	BCD 235/B	1041	March 23, 2008	1 year
Antenna Log Periodic	ARA	LPD-2010/A	1038	November 22, 2007	1 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	LaserJet 2200	JPKG19982	N/A	N/A

12. Frequency Tolerance 13.56 MHz Transmitter

12.1 Test Specification

Part 15 Sub-part C Section 15.225(e)

12.2 Test Procedure

The E.U.T operation mode and test setup are as described in Section 3.

The E.U.T. was placed in a test fixture enabling coupling from the E.U.T. to the spectrum analyzer.

The E.U.T. and test fixture were placed inside a temperature chamber. The E.U.T. was operated from fresh batteries 3 VDC (3x 3 VDC) at normal temperature (23°C).

The chamber temperature was set to +23°C.

The spectrum analyzer was set to 50.0 kHz span and 1.0 kHz resolution B.W.

The carrier frequency was measured and recorded.

The carrier frequency measurement was repeated for:

- (a). +23°C
- (b). -20°C
- (c). +50°C

The carrier frequency was measured and recorded after at least 10 minutes of exposing the E.U.T. to the temperature.

The configuration tested is shown in photograph *Figure 6. Frequency Tolerance Test 13.56 MHz Transmitter.*

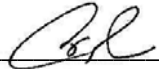
12.3 Test Results

The E.U.T met the requirements of Part 15 Sub-part C, Section 225(e) specification.

The frequency offset between the frequency measured under extreme conditions and the nominal carrier frequency measured under normal test conditions, is in the worst case, 1 kHz at -10 °C (spec: +/-1.356 kHz).

The details of the highest emissions are given in *Figure 24* to *Figure 27*.

TEST PERSONNEL:

Tester Signature: 

Date: 09.11.08

Typed/Printed Name: A. Sharabi

Frequency Tolerance

E.U.T Description Two Way Keypad With Proximity Reader
 Type RW132KPxyzH
 Serial Number: Not Designated

Specification: FCC Part 15 Sub-part C Section 15.225(e)

Temperature (°C)	Measured Carrier Frequency (MHz)	Nominal Carrier Frequency (MHz)	Δ (kHz)	Specification (kHz)	Pass/Fail
+23	13.55860	-	-	-	Pass
-20	13.55870	13.55860	+0.10	+/-1.356	Pass
+50	13.55845	13.55860	-0.15	+/-1.356	Pass

Figure 24. Frequency Error

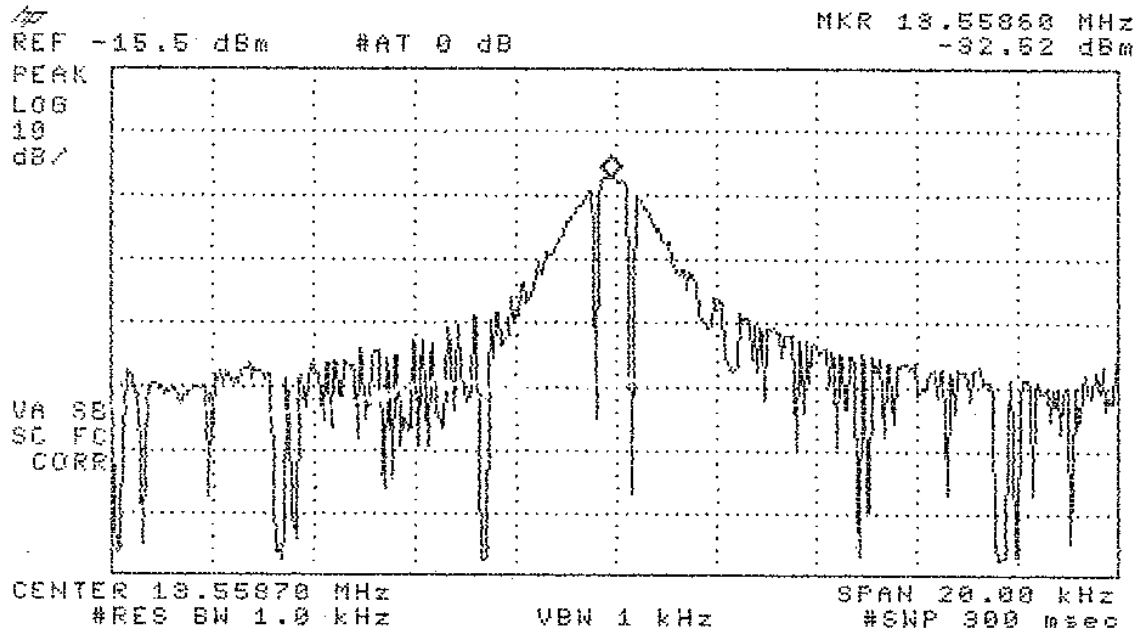


Figure 25. +24 °C

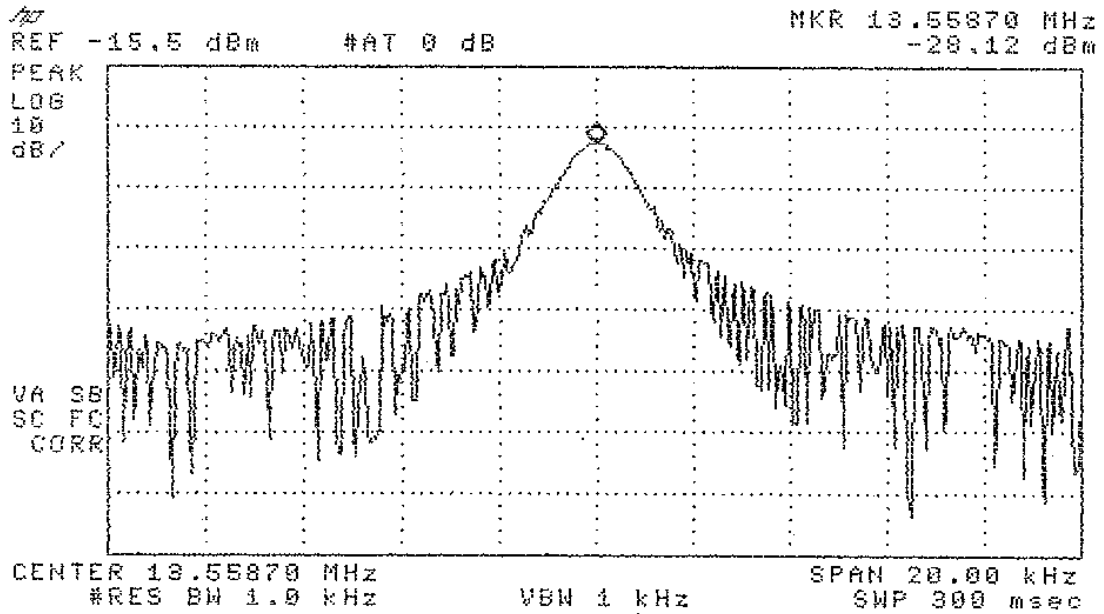


Figure 26. -20°C

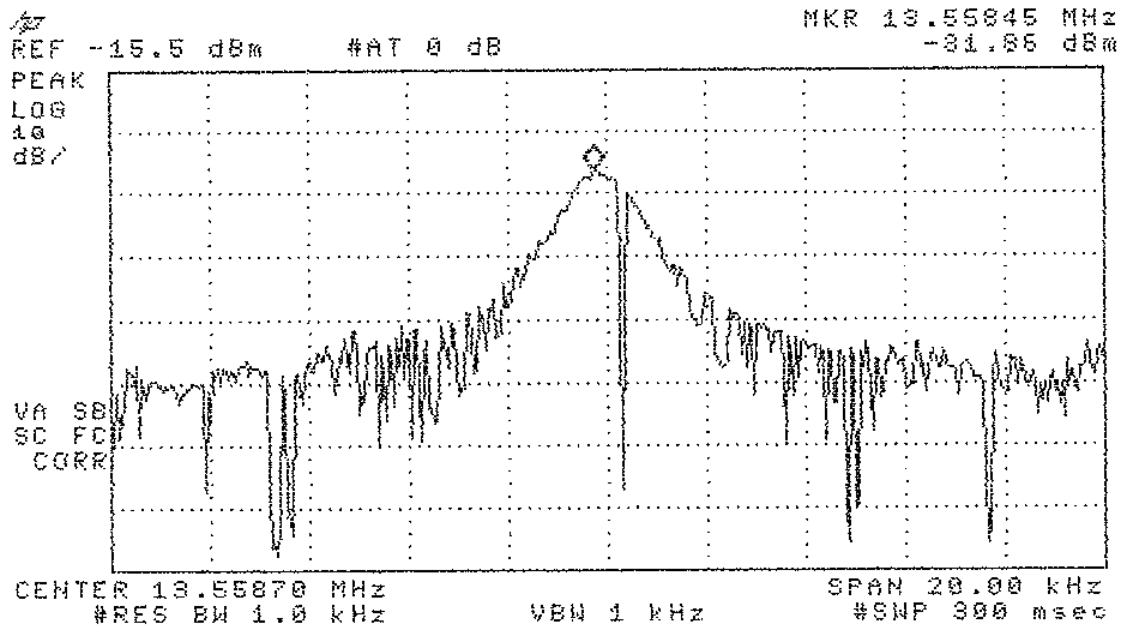


Figure 27. +50 °C

12.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
Environmental Chamber	THERMOTRON CORP	SM 32C Mini Max	25-1030	N/A	N/A
Digital Thermometer	Fluke	Hydra 2635	692300	November 12, 2006	2 years
Digital Temperature Indicator	Fluke	JF52	4015014	November 12, 2006	2 years
EMC Analyzer	HP	8593EM	3536A00120	February 26, 2008	1 year

13. APPENDIX A - CORRECTION FACTORS

13.1 Correction factors for CABLE from EMI receiver to test antenna at 3 meter range.

FREQUENCY (MHz)	CORRECTION FACTOR (dB)	FREQUENCY (MHz)	CORRECTION FACTOR (dB)
10.0	0.3	1200.0	7.3
20.0	0.6	1400.0	7.8
30.0	0.8	1600.0	8.4
40.0	0.9	1800.0	9.1
50.0	1.1	2000.0	9.9
60.0	1.2	2300.0	11.2
70.0	1.3	2600.0	12.2
80.0	1.4	2900.0	13.0
90.0	1.6		
100.0	1.7		
150.0	2.0		
200.0	2.3		
250.0	2.7		
300.0	3.1		
350.0	3.4		
400.0	3.7		
450.0	4.0		
500.0	4.3		
600.0	4.7		
700.0	5.3		
800.0	5.9		
900.0	6.3		
1000.0	6.7		

NOTES:

1. The cable type is RG-214.
2. The overall length of the cable is 27 meters.
3. The above data is located in file 27MO3MO.CBL on the disk marked "Radiated Emission Tests EMI Receiver".

13.2 Correction factors for CABLE
from EMI receiver
to test antenna
at 3 meter range.

FREQUENCY (GHz)	CORRECTION FACTOR (dB)
1.0	1.2
2.0	1.6
3.0	2.0
4.0	2.4
5.0	3.0
6.0	3.4
7.0	3.8
8.0	4.2
9.0	4.6
10.0	5.0
12.0	5.8

NOTES:

- 1. The cable type is RG-8.*
- 2. The overall length of the cable is 10 meters.*

13.3 Correction factors for CABLE
from spectrum analyzer
to test antenna above 2.9 GHz

FREQUENCY (GHz)	CORRECTION FACTOR (dB)	FREQUENCY (GHz)	CORRECTION FACTOR (dB)
1.0	1.9	14.0	9.1
2.0	2.7	15.0	9.5
3.0	3.5	16.0	9.9
4.0	4.2	17.0	10.2
5.0	4.9	18.0	10.4
6.0	5.5	19.0	10.7
7.0	6.0	20.0	10.9
8.0	6.5	21.0	11.2
9.0	7.0	22.0	11.6
10.0	7.5	23.0	11.9
11.0	7.9	24.0	12.3
12.0	8.3	25.0	12.6
13.0	8.7	26.0	13.0

NOTES:

- 1. The cable type is SUCOFLEX 104 E manufactured by SUHNER.*
- 2. The cable is used for measurements above 2.9 GHz.*
- 3. The overall length of the cable is 10 meters.*

12.6 Correction factors for LOG PERIODIC ANTENNA

**Type LPD 2010/A
at 3 and 10 meter ranges.**

Distance of 3 meters

FREQUENCY (MHz)	AFE (dB/m)
200.0	9.1
250.0	10.2
300.0	12.5
400.0	15.4
500.0	16.1
600.0	19.2
700.0	19.4
800.0	19.9
900.0	21.2
1000.0	23.5

Distance of 10 meters

FREQUENCY (MHz)	AFE (dB/m)
200.0	9.0
250.0	10.1
300.0	11.8
400.0	15.3
500.0	15.6
600.0	18.7
700.0	19.1
800.0	20.2
900.0	21.1
1000.0	23.2

NOTES:

1. Antenna serial number is 1038.
2. The above lists are located in file number 38M30.ANT for a 3 meter range,
and file number 38M100.ANT for a 10 meter range.
3. The files mentioned above are located on the disk marked "Radiated Emission
Test EMI Receiver".

13.4 Correction factors for

LOG PERIODIC ANTENNA

**Type SAS-200/511
at 3 meter range.**

FREQUENCY (GHz)	ANTENNA FACTOR (dB)
1.0	24.9
1.5	27.8
2.0	29.9
2.5	31.2
3.0	32.8
3.5	33.6
4.0	34.3
4.5	35.2
5.0	36.2
5.5	36.7
6.0	37.2
6.5	38.1

FREQUENCY (GHz)	ANTENNA FACTOR (dB)
7.0	38.6
7.5	39.2
8.0	39.9
8.5	40.4
9.0	40.8
9.5	41.1
10.0	41.7
10.5	42.4
11.0	42.5
11.5	43.1
12.0	43.4
12.5	44.4
13.0	44.6

NOTES:

1. Antenna serial number is 253.
2. The above lists are located in file number SAS3M0.ANT for a 3 meter range.
3. The files mentioned above are located on the disk marked "Antenna Factors".

**13.5 Correction factors for BICONICAL ANTENNA
Type BCD-235/B,
at 3 meter range**

FREQUENCY (MHz)	AFE (dB/m)
20.0	19.4
30.0	14.8
40.0	11.9
50.0	10.2
60.0	9.1
70.0	8.5
80.0	8.9
90.0	9.6
100.0	10.3
110.0	11.0
120.0	11.5
130.0	11.7
140.0	12.1
150.0	12.6
160.0	12.8
170.0	13.0
180.0	13.5
190.0	14.0
200.0	14.8
210.0	15.3
220.0	15.8
230.0	16.2
240.0	16.6
250.0	17.6
260.0	18.2
270.0	18.4
280.0	18.7
290.0	19.2
300.0	19.9
310	20.7
320	21.9
330	23.4
340	25.1
350	27.0

NOTES:

1. Antenna serial number is 1041.
2. The above list is located in file 19BC10M1.ANT on the disk marked "Radiated Emissions Tests EMI Receiver".

13.6 Correction factors for ACTIVE LOOP ANTENNA
Model 6502
S/N 9506-2950

FREQUENCY (MHz)	Magnetic Antenna Factor (dB)	Electric Antenna Factor (dB)
.009	-35.1	16.4
.010	-35.7	15.8
.020	-38.5	13.0
.050	-39.6	11.9
.075	-39.8	11.8
.100	-40.0	11.6
.150	-40.0	11.5
.250	-40.0	11.6
.500	-40.0	11.5
.750	-40.1	11.5
1.000	-39.9	11.7
2.000	-39.5	12.0
3.000	-39.4	12.1
4.000	-39.7	11.9
5.000	-39.7	11.8
10.000	40.2	11.3
15.000	-40.7	10.8
20.000	-40.5	11.0
25.000	-41.3	10.2
30.000	42.3	9.2

14. APPENDIX B – Comparison of Industry Canada Requirements With FCC Requirements

FCC Specification	FCC Standard	IC Standard
Spurious Emissions Transmission Mode	47CFR15.231(b)	RSS-210 Section 2.6 Annex 1 A1.1.2
Maximum Transmitting Power	47CFR15.231(b)	RSS-210 Section 2.6 Annex 1 A1.1.2
Periodic Operation Requirement	47CFR15.231(a)(1-5)	RSS-210 Section 2.6 Annex 1 A1.1.1
Occupied Bandwidth	47CFR15.231(c)	RSS-210 Section 2.6 Annex 1 A1.1.3
Frequency Tolerance	47CFR15.225(e)	RSS-210 Section 2.6 Annex 1 A2.6
Maximum Transmitting Power	47CFR15.225(a)	RSS-210 Section 2.6 Annex 1 A2.6(a)
Spurious Emission	47CFR15.225(d)	RSS-210 Section 2.6 Annex 1 A2.6(d)