

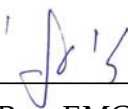
**DATE: 13 June 2006**

**I.T.L. (PRODUCT TESTING) LTD.**  
**FCC EMC/Radio Test Report**  
**for**  
**Roseman Engineering Ltd.**

**Equipment under test:**  
**915 MHz Transceiver Module**  
**RM915**

Written by:   
D. Shidlowsky, Documentation

Approved by:   
E. Pitt, Test Engineer

Approved by:   
I. Raz, EMC Laboratory Manager

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permission of I.T.L. (Product Testing) Ltd.  
This report relates only to items tested.

## Measurement/Technical Report for Roseman Engineering Ltd.

Equipment under test:  
**915 MHz Transceiver Module**

**FCC ID: JAKRM915**

**DATE: 13 June 2006**

This report concerns:                      Original Grant:                      Class II change: X

Class B verification:                      Class A verification                      Class I change:

Equipment type:                      Spread Spectrum Transmitter Module

Request Issue of Grant:

  x   Immediately upon completion of review

Limits used:

CISPR 22:                                              Part 15: X

Measurement procedure used is ANSI C63.4-2003.

Application for Certification

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## 1. General Information

### 1.1 Administrative Information

|                                |                                                                                            |
|--------------------------------|--------------------------------------------------------------------------------------------|
| Manufacturer:                  | Roseman Engineering Ltd.                                                                   |
| Manufacturer's Address:        | 65 Weizman St.<br>Givataim 53468<br>Israel<br>Tel: +972-3-573-1801<br>Fax: +972-3-573-1807 |
| Manufacturer's Representative: | Lior Yehoshua<br>Ziv Bakal                                                                 |
| Equipment Under Test (E.U.T):  | 915 MHz Transceiver Module                                                                 |
| Equipment Model No.:           | RM915                                                                                      |
| Equipment Serial No.:          | Not designated                                                                             |
| Date of Receipt of E.U.T:      | 28.05.6                                                                                    |
| Start of Test:                 | 28.05.6                                                                                    |
| End of Test:                   | 29.05.06                                                                                   |
| Test Laboratory Location:      | I.T.L (Product Testing) Ltd.<br>Kfar Bin Nun,<br>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**

See details in original application for FCC ID no. JAKRM915.

Description of change:

Two new antennas were added (See photograph of the new antennas below).



### **1.4 Test Methodology**

Radiated testing was performed according to the procedures in ANSI C63.4: 2003.

### **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 December 12, 2003).

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  $\pm 4$  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. System Test Configuration

### 2.1 Justification

See details in original application for FCC ID no. JAKRM915. Spurious radiated emissions re-testing was performed according to correspondence with Timco dated 18 January 2006. See Appendix B Correspondence.

### 2.2 EUT Exercise Software

See details in original application for FCC ID no. JAKRM915.

### 2.3 Special Accessories

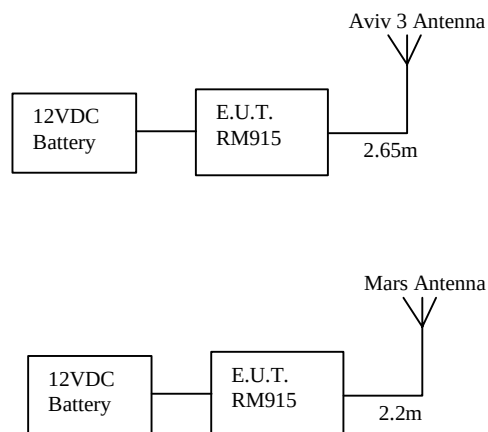
See details in original application for FCC ID no. JAKRM915.

### 2.4 Equipment Modifications

See details in original application for FCC ID no. JAKRM915.

### 2.5 Configuration of Tested System

The configuration of the tested system is described below.



**Figure 1. Configuration of Tested System**

### **3. Block Diagram**

#### **3.1 Schematic Block/Connection Diagram**

See details in original application for FCC ID no. JAKRM915.

#### **3.2 Theory of Operation**

See details in original application for FCC ID no. JAKRM915.

#### 4. Radiated Measurement Photo



**Figure 2. Radiated Emission Test Aviv 3 Antenna**



**Figure 3. Radiated Emission Test Mars antenna**

## 5. Spurious Radiated Emission Data Below 1 GHz

### 5.1 Spurious Radiated Emission 30MHz-1000 MHz

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

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 1.

The frequency range 30-1000 MHz was scanned, and the list of the highest emissions was verified and updated accordingly.

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 30-1000 MHz, 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.

During this test the E.U.T. was operated in continuous transmission to enable better detection of signals.

### 5.2 Measured Data

JUDGEMENT: Passed

The signals in the band 30 – 1000 MHz were 20dB below the specification limit.

The EUT met the requirements of the F.C.C. Part 15, Subpart C, Section 15.247 specification.

TEST PERSONNEL:

Tester Signature: 

Date: 14.06.06

Typed/Printed Name: E. Pitt

### 5.3 Test Instrumentation Used, Radiated Measurements

| Instrument                 | Manufacturer | Model         | Serial Number | Calibration          | Period |
|----------------------------|--------------|---------------|---------------|----------------------|--------|
| EMI Receiver               | HP           | 85422E        | 3411A00102    | March 22, 2006       | 1 year |
| RF Section                 | HP           | 85420E        | 3427A00103    | March 22, 2006       | 1 year |
| Antenna<br>Bioconical      | ARA          | BCD 235/B     | 1041          | March 19, 2006       | 1 year |
| Antenna<br>Log Periodic    | ARA          | LPD-2010/A    | 1038          | November 17,<br>2005 | 1 year |
| Antenna Mast               | ARA          | AAM-4A        | 1001          | N/A                  | N/A    |
| Turntable                  | ARA          | ART-1001/4    | 1001          | N/A                  | N/A    |
| Mast & Table<br>Controller | ARA          | ACU-2/5       | 1001          | N/A                  | N/A    |
| Printer                    | HP           | ThinkJet 2225 | 2738508357.0  | N/A                  | N/A    |

#### **5.4 Field Strength Calculation**

The field strength is calculated directly by the EMI Receiver software, and a "Correction Factors" data disk, using the following equation:

$$[\text{dB}\mu\text{v/m}] \text{ FS} = \text{RA} + \text{AF} + \text{CF}$$

|     |                                            |
|-----|--------------------------------------------|
| FS: | Field Strength [dB $\mu$ v/m]              |
| RA: | Receiver Amplitude [dB $\mu$ v]            |
| AF: | Receiving Antenna Correction Factor [dB/m] |
| CF: | Cable Attenuation Factor [dB]              |

## 6. Spurious Radiated Emission Above 1 GHz

### 6.1 Spurious Radiated Emission Above 1 GHz

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

A preliminary measurement to characterize the E.U.T was performed inside the shielded room, 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 emission levels were compared to the requirement of Section 15.249.

In the frequency range 1-2.9 GHz, a computerized EMI receiver complying to CISPR 16 requirements and a High Pass Filter were used. The test distance was 3 meters.

In the frequency range 2.9-9.5 GHz, a spectrum analyzer including a low noise amplifier was used. The test distance was 3 meters. 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.

The configuration tested is shown in Figure 1.

### 6.2 Test Data

JUDGEMENT: Passed by 5.4 dB With Mars Antenna

JUDGEMENT: Passed by 5.5 dB With Aviv 3 Antenna

The margin between the emission level and the specification limit is 5.4 dB in the worst case at the frequency of 2744.60 MHz, vertical polarization with the Mars antenna at the operating frequency of 921.25 MHz.

The margin between the emission level and the specification limit is 5.5 dB in the worst case at the frequency of 2744.60 MHz, vertical polarization with the Aviv 3 antenna at the operating frequency of 914.85 MHz.

The EUT met the requirements of the F.C.C. Part 15, Subpart C Section 15.247, specification.

The details of the highest emissions are given in Figure 4 to Figure 7.

TEST PERSONNEL:

Tester Signature: 

Date: 14.06.06

Typed/Printed Name: E. Pitt

## Spurious Radiated Emission Above 1 GHz

E.U.T Description 915 MHz Transceiver Module  
 Model Number RM915 With Mars Antenna  
 Serial Number: Not designated

Specification: F.C.C., Part 15, Subpart C, 15.247

Antenna Polarization: Frequency range: 1.0 GHz to 9.5 GHz  
 Horizontal/Vertical  
 Test Distance: 3 meters Detector: Peak

| Operation Freq. | Freq.   | Peak Results   | Polarization | Peak. Specification | Peak. Margin |
|-----------------|---------|----------------|--------------|---------------------|--------------|
| (MHz)           | (MHz)   | (dB $\mu$ V/m) | (H/L)        | (dB $\mu$ V/m)      | (dB)         |
| 914.85          | 2744.60 | 59.4           | H            | 74.0                | -14.6        |
| 921.25          | 2763.80 | 58.5           | H            | 74.0                | -15.5        |
| 927.65          | 2783.00 | 60.3           | H            | 74.0                | -13.7        |
| 914.85          | 2744.60 | 59.7           | V            | 74.0                | -14.3        |
| 921.25          | 2763.80 | 60.9           | V            | 74.0                | -13.1        |
| 927.65          | 2783.00 | 61.8           | V            | 74.0                | -12.2        |

**Figure 4. Spurious Radiated Emission. Antenna Polarization: HORIZONTAL/VERTICAL. Detector: Peak**

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.

“Peak Reading” includes correction factor.

“Correction Factor” = Antenna Factor + Cable Loss

## Spurious Radiated Emission Above 1 GHz

E.U.T Description 915 MHz Transceiver Module  
 Model Number RM915 With Mars Antenna  
 Serial Number: Not designated

Specification: F.C.C., Part 15, Subpart C, 15.247

Antenna Polarization: Frequency range: 1.0 GHz to 9.5 GHz  
 Horizontal/Vertical  
 Test Distance: 3 meters Detector: Average

| Operation Freq. | Freq.   | Average Result | Polarization | Average Specification | Average Margin |
|-----------------|---------|----------------|--------------|-----------------------|----------------|
| (MHz)           | (MHz)   | (dB $\mu$ V/m) | (H/L)        | (dB $\mu$ V/m)        | (dB)           |
| 914.85          | 2744.60 | 46.7           | H            | 54.0                  | -7.3           |
| 921.25          | 2763.80 | 46.0           | H            | 54.0                  | -8.0           |
| 927.65          | 2783.00 | 47.0           | H            | 54.0                  | -7.0           |
| 914.85          | 2744.60 | 46.3           | V            | 54.0                  | -7.7           |
| 921.25          | 2763.80 | 48.6           | V            | 54.0                  | -5.4           |
| 927.65          | 2783.00 | 47.9           | V            | 54.0                  | -6.1           |

**Figure 5. Spurious Radiated Emission. Antenna Polarization: HORIZONTAL/VERTICAL. Detector: Average**

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.

“Average Reading” includes correction factor.

“Correction Factor” = Antenna Factor + Cable Loss

## Spurious Radiated Emission Above 1 GHz

E.U.T Description 915 MHz Transceiver Module  
 Model Number RM915 With Aviv 3 Antenna  
 Serial Number: Not designated

Specification: F.C.C., Part 15, Subpart C, 15.247

Antenna Polarization: Horizontal/Vertical Frequency range: 1.0 GHz to 9.5 GHz  
 Test Distance: 3 meters Detector: Peak

| Operation Freq. | Freq.   | Peak Results | Polarization | Peak. Specification | Peak. Margin |
|-----------------|---------|--------------|--------------|---------------------|--------------|
| (MHz)           | (MHz)   | (dBμV/m)     | (H/L)        | (dB μV/m)           | (dB)         |
| 914.85          | 2744.60 | 60.5         | H            | 74.0                | -13.5        |
| 921.25          | 2763.80 | 59.7         | H            | 74.0                | -14.3        |
| 927.65          | 2783.00 | 58.6         | H            | 74.0                | -15.4        |
| 914.85          | 2744.60 | 60.8         | V            | 74.0                | -13.2        |
| 921.25          | 2763.80 | 59.2         | V            | 74.0                | -14.8        |
| 927.65          | 2783.00 | 59.9         | V            | 74.0                | -14.1        |

**Figure 6. Spurious Radiated Emission. Antenna Polarization: HORIZONTAL/VERTICAL. Detector: Peak**

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.

“Peak Reading” includes correction factor.

“Correction Factor” = Antenna Factor + Cable Loss

## Spurious Radiated Emission Above 1 GHz

E.U.T Description 915 MHz Transceiver Module  
 Model Number RM915 With Aviv 3 Antenna  
 Serial Number: Not designated

Specification: F.C.C., Part 15, Subpart C, 15.247

Antenna Polarization:  
 Horizontal/Vertical

Frequency range: 1.0 GHz to 9.5 GHz

Test Distance: 3 meters

Detector: Average

| Operation Freq. | Freq.   | Average Result | Polarization | Average Specification | Average Margin |
|-----------------|---------|----------------|--------------|-----------------------|----------------|
| (MHz)           | (MHz)   | (dB $\mu$ V/m) | (H/L)        | (dB $\mu$ V/m)        | (dB)           |
| 914.85          | 2744.60 | 47.9           | H            | 54.0                  | -6.1           |
| 921.25          | 2763.80 | 46.6           | H            | 54.0                  | -7.4           |
| 927.65          | 2783.00 | 44.9           | H            | 54.0                  | -9.1           |
| 914.85          | 2744.60 | 48.5           | V            | 54.0                  | -5.5           |
| 921.25          | 2763.80 | 46.1           | V            | 54.0                  | -7.9           |
| 927.65          | 2783.00 | 47.5           | V            | 54.0                  | -6.5           |

**Figure 7. Spurious Radiated Emission. Antenna Polarization: HORIZONTAL/VERTICAL. Detector: Average**

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.

“Average Reading” includes correction factor.

“Correction Factor” = Antenna Factor + Cable Loss

### 6.3 *Test Instrumentation Used, Spurious Radiated Measurements Above 1 GHz*

| Instrument                 | Manufacturer     | Model                | Serial Number | Calibration      | Period |
|----------------------------|------------------|----------------------|---------------|------------------|--------|
| EMI Receiver               | HP               | 85422E               | 3411A00102    | March 22, 2006   | 1 year |
| RF Section                 | HP               | 85420E               | 3427A00103    | March 22, 2006   | 1 year |
| Antenna-Log<br>Periodic    | A.H.System       | SAS-200/511          | 253           | January 24, 2005 | 2 year |
| Low Noise<br>Amplifier     | DBS<br>MICROWAVE | LNA-DBS-<br>0411N313 | 013           | October 16, 2005 | 1 year |
| Spectrum<br>Analyzer       | HP               | 8592L                | 3926A01204    | February 6, 2006 | 1 year |
| Antenna Mast               | ARA              | AAM-4A               | 1001          | N/A              | N/A    |
| Turntable                  | ARA              | ART-1001/4           | 1001          | N/A              | N/A    |
| Mast & Table<br>Controller | ARA              | ACU-2/5              | 1001          | N/A              | N/A    |
| Printer                    | HP               | ThinkJet 2225        | 2738508357.0  | N/A              | N/A    |

## **7. Radiated Emission Rx Mode**

### **7.1 Test Specification**

30-1000 MHz, FCC Part 15, Subpart B, CLASS B

### **7.2 Test Procedure**

The E.U.T operation mode and test set-up are as described in section 7.1.

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 effect of varying the position of the cables was investigated to find the configuration that produces maximum emission.

The E.U.T. highest frequency source or used frequency is 16 MHz.

The frequency range 30-1000 MHz was scanned, and the list of the highest emissions was verified and updated accordingly.

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.

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.

The E.U.T. was tested the operating frequencies of 914.85, 921.25, and 927.65 MHz and both Aviv 3 and Mars antennas.

### 7.3 Test Results

The E.U.T met the requirements of the FCC Part 15, Subpart B ,Class B specification.

The results for all three operating frequencies and both antennas were the same.

JUDGEMENT: Passed by 18.4 dB

The margin between the emission level and the specification limit is 18.4 dB in the worst case at the frequency of 163.84 MHz, horizontal and vertical polarizations.

The EUT met the requirements of the F.C.C. Part 15, Subpart C Section 15.247, specification.

The details of the highest emissions are given in Figure 8 to Figure 9.

TEST PERSONNEL:

Tester Signature: 

Date: 14.06.06

Typed/Printed Name: E. Pitt

## Radiated Emission

E.U.T Description 915 MHz Transceiver Module  
 Type RM915  
 Serial Number: Not designated

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Horizontal/Vertical Frequency range: 30 MHz to 1000 MHz  
 Antenna: 3 meters distance Detectors: Peak, Quasi-peak

| Frequency | Peak Amp       | QP Amp         | Correction | Specification  | Margin |
|-----------|----------------|----------------|------------|----------------|--------|
| (MHz)     | (dB $\mu$ V/m) | (dB $\mu$ V/m) | (dB)       | (dB $\mu$ V/m) | (dB)   |
| 32.77     | 24.7           | 18.1           | 14.8       | 40.0           | -21.9  |
| 42.80     | 24.0           | 17.3           | 12.4       | 40.0           | -22.7  |
| 64.20     | 25.9           | 20.2           | 10.1       | 40.0           | -19.8  |
| 81.92     | 26.0           | 20.5           | 10.5       | 40.0           | -19.5  |
| 163.84    | 31.1           | 25.1           | 15.0       | 43.5           | -18.4  |
| 311.30    | 28.9           | 23.4           | 23.1       | 46.0           | -22.6  |

**Figure 8. Radiated Emission. Antenna Polarization: HORIZONTAL.  
 Detectors: Peak, Quasi-peak**

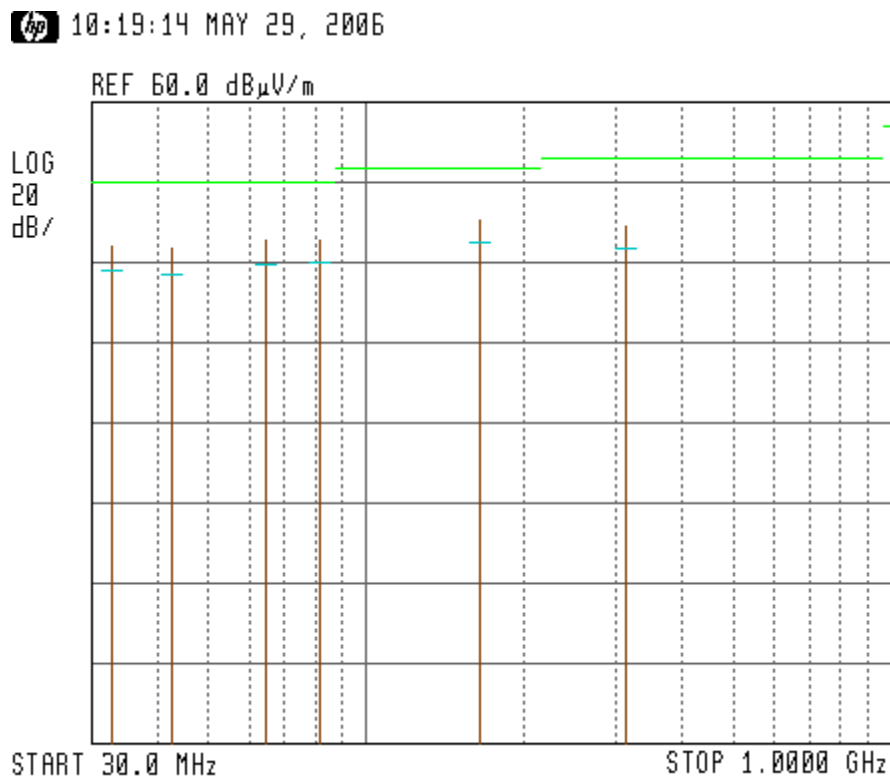
*Note: Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.*

# Radiated Emission

E.U.T Description 915 MHz Transceiver Module  
 Type RM915  
 Serial Number: Not designated

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Horizontal/Vertical Frequency range: 30 MHz to 1000 MHz  
 Antenna: 3 meters distance Detectors: Peak, Quasi-peak



**Figure 9. Radiated Emission. Antenna Polarization: HORIZONTAL  
 Detectors: Peak, Quasi-peak**

*Note:*

1. Horizontal axis shows logarithmic frequency scale.
2. The vertical axis shows amplitude (in dB  $\mu$ V/m).
3. Peak detection is designated by the top of each vertical line.
4. Quasi-peak detection is designated by the first dash mark (from the top) of each vertical line.

#### 7.4 Test Instrumentation Used, Radiated Measurements

| Instrument              | Manufacturer | Model         | Serial Number | Calibration       | Period |
|-------------------------|--------------|---------------|---------------|-------------------|--------|
| EMI Receiver            | HP           | 85422E        | 3411A00102    | March 22, 2006    | 1 year |
| RF Section              | HP           | 85420E        | 3427A00103    | March 22, 2006    | 1 year |
| Antenna Bioconical      | ARA          | BCD 235/B     | 1041          | March 19, 2006    | 1 year |
| Antenna Log Periodic    | ARA          | LPD-2010/A    | 1038          | November 17, 2005 | 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           | ThinkJet 2225 | 2738508357.0  | N/A               | N/A    |

### **7.5 Field Strength Calculation**

The field strength is calculated directly by the EMI Receiver software, and a "Correction Factors" data disk, using the following equation:

$$FS = RA + AF + CF$$

|     |                                            |
|-----|--------------------------------------------|
| FS: | Field Strength [dB $\mu$ v/m]              |
| RA: | Receiver Amplitude [dB $\mu$ v]            |
| AF: | Receiving Antenna Correction Factor [dB/m] |
| CF: | Cable Attenuation Factor [dB]              |

No external pre-amplifiers are used.

## 8. Photographs of Tested E.U.T. Antennas



**Figure 10 Mars Antenna**



**Figure 11 Mars Antenna**



**Figure 12 Aviv 3 Antenna**



**Figure 13 Aviv 3 Antenna**

## 9. APPENDIX A - CORRECTION FACTORS

### 9.1 Correction factors for CABLE

from EMI receiver  
to test antenna  
at 3 meter range.

| FREQUENCY<br>(MHz) | CORRECTION<br>FACTOR<br>(dB) | FREQUENCY<br>(MHz) | CORRECTION<br>FACTOR<br>(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".

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

| FREQUENCY | CORRECTION |
|-----------|------------|
| (GHz)     | 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.*

### 9.3 Correction factors for

### CABLE

from EMI receiver  
to test antenna

| FREQUENCY<br>(MHz) | CORRECTION<br>FACTOR<br>(dB) | FREQUENCY<br>(MHz) | CORRECTION<br>FACTOR<br>(dB) |
|--------------------|------------------------------|--------------------|------------------------------|
| 10.0               | 0.2                          | 1200.0             | 1.6                          |
| 20.0               | 0.2                          | 1400.0             | 1.8                          |
| 30.0               | 0.2                          | 1600.0             | 2.1                          |
| 40.0               | 0.2                          | 1800.0             | 2.2                          |
| 50.0               | 0.3                          | 2000.0             | 2.3                          |
| 60.0               | 0.4                          | 2300.0             | 2.8                          |
| 70.0               | 0.4                          | 2600.0             | 2.7                          |
| 80.0               | 0.4                          | 2900.0             | 3.1                          |
| 90.0               | 0.5                          |                    |                              |
| 100.0              | 0.5                          |                    |                              |
| 150.0              | 0.6                          |                    |                              |
| 200.0              | 0.6                          |                    |                              |
| 250.0              | 0.7                          |                    |                              |
| 300.0              | 0.8                          |                    |                              |
| 350.0              | 0.9                          |                    |                              |
| 400.0              | 1.0                          |                    |                              |
| 450.0              | 1.1                          |                    |                              |
| 500.0              | 1.2                          |                    |                              |
| 600.0              | 1.3                          |                    |                              |
| 700.0              | 1.4                          |                    |                              |
| 800.0              | 1.4                          |                    |                              |
| 900.0              | 1.5                          |                    |                              |
| 1000.0             | 1.5                          |                    |                              |

#### NOTES:

1. The cable type is RG-214.
2. The overall length of the cable is 5.5 meters.

#### 9.4 Correction factors for

#### CABLE

from spectrum analyzer  
to test antenna above 2.9 GHz

| FREQUENCY<br>(GHz) | CORRECTION<br>FACTOR<br>(dB) | FREQUENCY<br>(GHz) | CORRECTION<br>FACTOR<br>(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.

## 9.5 Correction factors for

## CABLE

from EMI receiver  
to test antenna  
at 10 meter range.

| FREQUENCY<br>(MHz) | CORRECTION<br>FACTOR<br>(dB) | FREQUENCY<br>(MHz) | CORRECTION<br>FACTOR<br>(dB) |
|--------------------|------------------------------|--------------------|------------------------------|
| 10.0               | 0.3                          | 1200.0             | 9.8                          |
| 20.0               | 0.8                          | 1400.0             | 10.0                         |
| 30.0               | 0.9                          | 1600.0             | 11.3                         |
| 40.0               | 1.2                          | 1800.0             | 12.2                         |
| 50.0               | 1.4                          | 2000.0             | 13.1                         |
| 60.0               | 1.6                          | 2300.0             | 14.5                         |
| 70.0               | 1.8                          | 2600.0             | 15.9                         |
| 80.0               | 1.9                          | 2900.0             | 16.4                         |
| 90.0               | 2.0                          |                    |                              |
| 100.0              | 2.1                          |                    |                              |
| 150.0              | 2.6                          |                    |                              |
| 200.0              | 3.2                          |                    |                              |
| 250.0              | 3.8                          |                    |                              |
| 300.0              | 4.2                          |                    |                              |
| 350.0              | 4.6                          |                    |                              |
| 400.0              | 5.1                          |                    |                              |
| 450.0              | 5.3                          |                    |                              |
| 500.0              | 5.6                          |                    |                              |
| 600.0              | 6.3                          |                    |                              |
| 700.0              | 7.0                          |                    |                              |
| 800.0              | 7.6                          |                    |                              |
| 900.0              | 8.0                          |                    |                              |
| 1000.0             | 8.7                          |                    |                              |

### NOTES:

1. The cable type is RG-214.
2. The overall length of the cable is 34 meters.
3. The above data is located in file 34M10MO.CBL on the disk marked "Radiated Emissions Tests EMI Receiver".

## 12.6 Correction factors for LOG PERIODIC ANTENNA

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

**Distance of 3 meters**

| <b>FREQUENCY</b><br>(MHz) | <b>AFE</b><br>(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**

| <b>FREQUENCY</b><br>(MHz) | <b>AFE</b><br>(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".

## 9.6 Correction factors for

## LOG PERIODIC ANTENNA

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

| FREQUENCY<br>(GHz) | ANTENNA<br>FACTOR<br>(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<br>(GHz) | ANTENNA<br>FACTOR<br>(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".

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

| <b>FREQUENCY</b><br>(MHz) | <b>AFE</b><br>(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".

**9.8 Correction factors for BICONICAL ANTENNA**  
**Type BCD-235/B,**  
**10 meter range**

| FREQUENCY<br>(MHz) | AFE<br>(dB/m) |
|--------------------|---------------|
| 30.0               | 12.1          |
| 40.0               | 10.6          |
| 50.0               | 10.6          |
| 60.0               | 8.9           |
| 70.0               | 8.5           |
| 80.0               | 9.6           |
| 90.0               | 9.4           |
| 100.0              | 9.6           |
| 110.0              | 10.3          |
| 120.0              | 10.7          |
| 130.0              | 12.6          |
| 140.0              | 12.7          |
| 150.0              | 12.7          |
| 160.0              | 13.8          |
| 170.0              | 13.7          |
| 180.0              | 14.9          |
| 190.0              | 13.4          |
| 200.0              | 13.1          |
| 210.0              | 14.0          |
| 220.0              | 14.5          |
| 230.0              | 15.8          |
| 240.0              | 16.0          |
| 250.0              | 16.6          |
| 260.0              | 16.7          |
| 270.0              | 18.3          |
| 280.0              | 18.5          |
| 290.0              | 19.3          |
| 300.0              | 20.9          |

**NOTES:**

1. Antenna serial number is 1041.
2. The above list is located in file 41BC10M1.ANT on the disk marked "Radiated Emissions Tests EMI Receiver".

**9.9 Correction factors for BICONICAL ANTENNA**  
**Type 3109,**  
**1.0 meter range**

| FREQUENCY<br>(MHz) | AFE<br>(dB/m) |
|--------------------|---------------|
| 20.0               | 11.1          |
| 30.0               | 12.0          |
| 40.0               | 12.0          |
| 50.0               | 11.4          |
| 60.0               | 10.3          |
| 70.0               | 10.7          |
| 80.0               | 8.3           |
| 90.0               | 9.0           |
| 100.0              | 10.0          |
| 110.0              | 11.6          |
| 120.0              | 13.6          |
| 130.0              | 14.2          |
| 140.0              | 13.5          |
| 150.0              | 12.7          |
| 160.0              | 12.7          |
| 170.0              | 13.6          |
| 180.0              | 15.3          |
| 190.0              | 14.6          |
| 200.0              | 14.7          |
| 210.0              | 15.3          |
| 220.0              | 15.8          |
| 230.0              | 17.0          |
| 240.0              | 18.0          |
| 250.0              | 18.1          |
| 260.0              | 18.0          |
| 270.0              | 17.5          |
| 280.0              | 18.2          |
| 290.0              | 19.7          |
| 300.0              | 21.8          |

**NOTES:**

1. Antenna serial number is 3244.
2. The above list is located in file 44BIC10M1.ANT on the disk marked "Radiated Emissions Tests EMI Receiver"

**9.10 Correction factors for BICONICAL ANTENNA**  
**Type 3109,**  
**3 meter range**

| FREQUENCY<br>(MHz) | AFE<br>(dB/m) |
|--------------------|---------------|
| 20.0               | 18.4          |
| 30.0               | 14.0          |
| 40.0               | 12.3          |
| 50.0               | 10.6          |
| 60.0               | 8.3           |
| 70.0               | 8.7           |
| 80.0               | 7.2           |
| 90.0               | 8.6           |
| 100.0              | 10.1          |
| 110.0              | 11.2          |
| 120.0              | 11.8          |
| 130.0              | 12.3          |
| 140.0              | 12.7          |
| 150.0              | 12.5          |
| 160.0              | 12.4          |
| 170.0              | 12.1          |
| 180.0              | 12.2          |
| 190.0              | 12.8          |
| 200.0              | 13.7          |
| 210.0              | 14.5          |
| 220.0              | 15.4          |
| 230.0              | 15.9          |
| 240.0              | 16.3          |
| 250.0              | 16.7          |
| 260.0              | 17.1          |
| 270.0              | 17.2          |
| 280.0              | 17.5          |
| 290.0              | 18.1          |
| 300.0              | 18.9          |

**NOTES:**

1. Antenna serial number is 3244.
2. The above list is located in file 44BIC3M1.ANT on the disk marked "Radiated Emissions Tests EMI Receiver"

## 10. APPENDIX B - CORRESPONDENCE

Date: 18/01/2006

From: Sid Sanders

To: EMC

Subject: RE: Permissive Change Class II for RM 915-Roseman Engineering  
18 Jan 2006

Shaike,

You are correct, this can be done by a Class II change. They can add new antenna this way & leave the original antenna on the Certification.

Regards,

Sid

-----Original Message-----

**From:** Emc [mailto:emc@itl.co.il]

**Sent:** 18 January, 2006 10:02 AM

**To:** Sid Sanders (E-mail)

**Cc:** Shmuel Hazon (E-mail); Lior Yehoshua (E-mail)

**Subject:** Permissive Change Class II for RM 915-Roseman Engineering

Hi Sid,

1. The subject product is a 902-928 spread spectrum transceiver authorized for FCC (ID # JAKRM915).
2. The customer would like to change the antenna in use to another antenna having 0 dBi gain.
3. To authorize the above change, I suggest a Permissive Change Class II and re-testing of radiated emission 30 MHz- 9.3 GHz.
4. Please verify/comment.

Regards

Shaika Raz

EMC Laboratory Manager

EMC Laboratory

ITL (Product Testing) Ltd.

Kfar Bin Nun

Israel

Tel: +972-8-979-7799

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