



**DATE: 15 December 2013**

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

**FCC Radio Test Report**

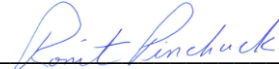
for


**Risco Ltd.**

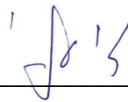
Equipment under test:

**433 MHz and 916 MHz RF Module**

**RWDTR4S916VE-40  
(433 MHz)**

Written by:   
R. Pinchuck, 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: +972-3-963-7777 Fax: +972-3-961-6584
Manufacturer's Representative:	Motti Barad
Equipment Under Test (E.U.T):	433 MHz and 916 MHz RF Module
Equipment Model No.:	RWDTR4S916VE-40
Equipment Serial No.:	Not Designated
Date of Receipt of E.U.T:	26.11.13
Start of Test:	26.11.13
End of Test:	28.11.13
Test Laboratory Location:	I.T.L (Product Testing) Ltd. Kfar Bin Nun, ISRAEL 99780
Test Specifications:	FCC Part 15 Subpart 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), IC File No.: 46405-4025; Site No. IC 4025B-1.

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 RWDTR4S916VE-40 is RF module that consists of two “Stamps” in 433.92MHz and 916MHz.

The Transceiver Si4432 is by Silicon Laboratories’ highly integrated, single chip wireless ISM. It includes a complete line of transmitters, receivers, and transceivers allowing the RF system designer to choose the optimal wireless part for their application.

The Si4432 offers advanced radio features including continuous frequency coverage from 240–930 MHz. The Si4432’s high level of integration offers reduced BOM cost while simplifying the overall system design. Additional system features such as an automatic wake-up timer, low battery detector, 64 byte TX/RX FIFOs, automatic packet handling, and preamble detection reduce overall current consumption and allow the use of lower-cost system MCUs. An integrated temperature sensor, general purpose ADC, power-on reset (POR), and GPIOs further reduce overall system cost and size.

The Si4432’s digital receive architecture features a high-performance ADC and DSP based modem which performs demodulation, filtering, and packet handling for increased flexibility and performance. This digital architecture simplifies system design while allowing for the use of lower-end MCUs. The direct digital transmit modulation and automatic PA power ramping ensure precise transmit modulation and reduced spectral spreading ensuring compliance with FCC and ETSI regulations.

### 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 September 3, 2009).

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

### 1.6 **Measurement Uncertainty**

Conducted Emission

Conducted Emission (CISPR 11, EN 55011, CISPR 22, EN 55022, ANSI C63.4) 0.15 – 30 MHz:

Expanded Uncertainty (95% Confidence, K=2):

± 3.44 dB

Radiated Emission

Radiated Emission (CISPR 11, EN 55011, CISPR 22, EN 55022, ANSI C63.4) for open site 30-1000MHz:

Expanded Uncertainty (95% Confidence, K=2):

± 4.96 dB

## 2. System Test Configuration

### 2.1 *Justification*

The module was evaluated on the table without host, transmitting modulated signal at 916MHz and 433 MHz separately. Additional evaluation was done while both transmitters 433.92MHz and 916MHz were activated for intermodulation products.

### 2.2 *EUT Exercise Software*

No exercise software was needed.

### 2.3 *Special Accessories*

No special accessories were needed.

### 2.4 *Equipment Modifications*

No modifications were needed in order to achieve compliance.

### 2.5 *Configuration of Tested System*

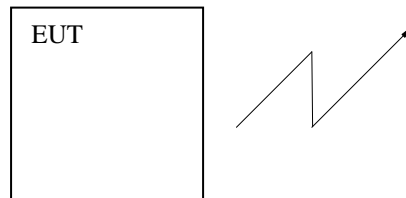


Figure 1. Configuration of Tested System

### 3. Test Set-up Photo

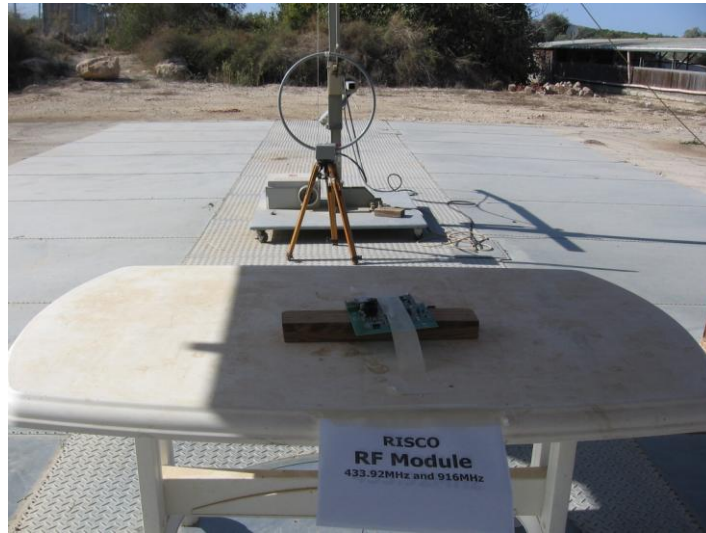


Figure 2. Radiated Emission Test

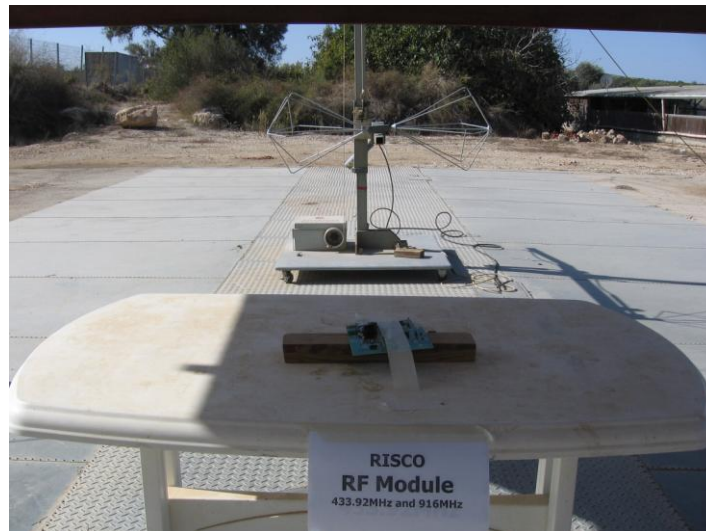


Figure 3. Radiated Emission Test





**Figure 4. Radiated Emission Test**

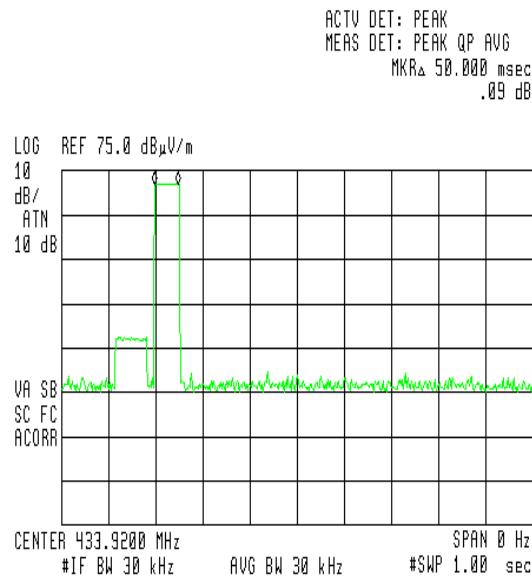


**Figure 5. Radiated Emission Test**

## 4. Average Factor Calculation

1. Transmission pulse duration = N/A
2. Transmission pulse period = N/A
3. Burst duration = 50msec
4. Time between bursts = 750msec , >100ms
5. Average Factor =  $20 \log \left[ \frac{\text{Pulse duration}}{\text{Pulse period}} \times \frac{\text{burst duration}}{100\text{msec}} \times \text{Num of burst within 100msec} \right]$

$$\text{Average Factor} = 20 \log \left[ \frac{50}{100} \right] = -6.0\text{dB}$$



**Figure 6. Transmission Burst duration = 50 msec**

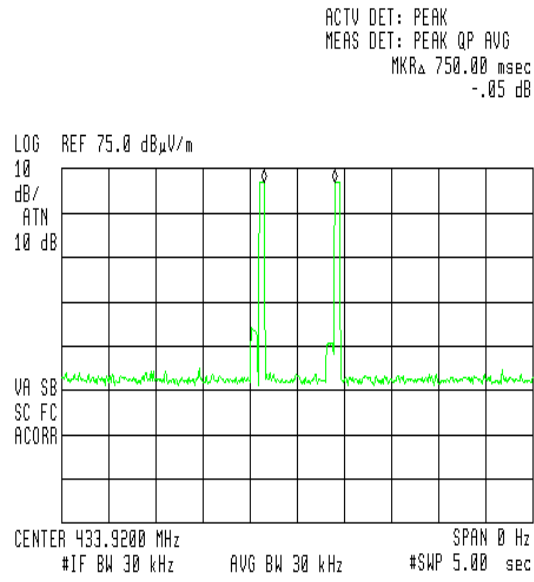


Figure 7. Time between bursts = 750msec , >100ms



#### 4.1 Test Instrumentation Used

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
Spectrum Analyzer	HP	8592L	3826A01204	February 28, 2013	1 Year
Antenna Bioconical	EMCO	3104	2606	August 30. 2013	1 year
Antenna Log Periodic	ARA	LPD-2010/A	1038	April 2, 2013	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



## 5. Periodic Operation

### 5.1 Specification

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

### 5.2 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.	N/A	Complies
An automatically operated transmitter shall cease operation within 5 seconds after activation.	See plots in Figure 8 and Figure 9	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 10	Complies

### 5.3 Results

JUDGEMENT: Passed

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

TEST PERSONNEL:

Tester Signature: 

Date: 10.03.14

Typed/Printed Name: A. Sharabi

# Periodic Operation

E.U.T Description 433 MHz and 916 MHz RF Module  
 Type RWDTR4S916VE-40  
 Serial Number: Not Designated

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

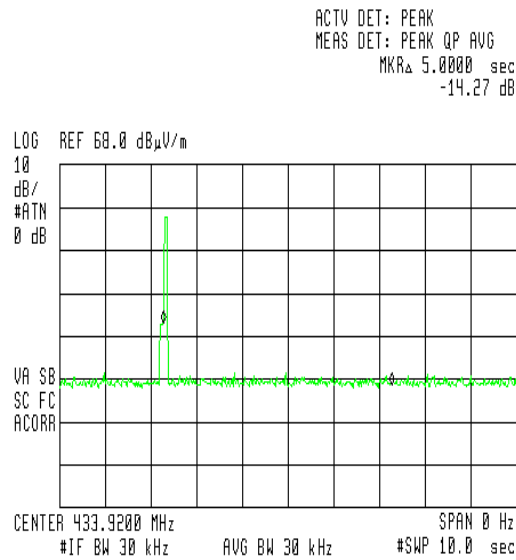


Figure 8. Automatically operated transmitter

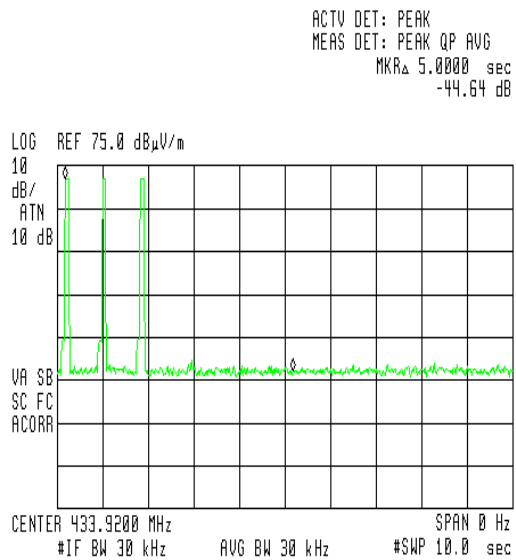


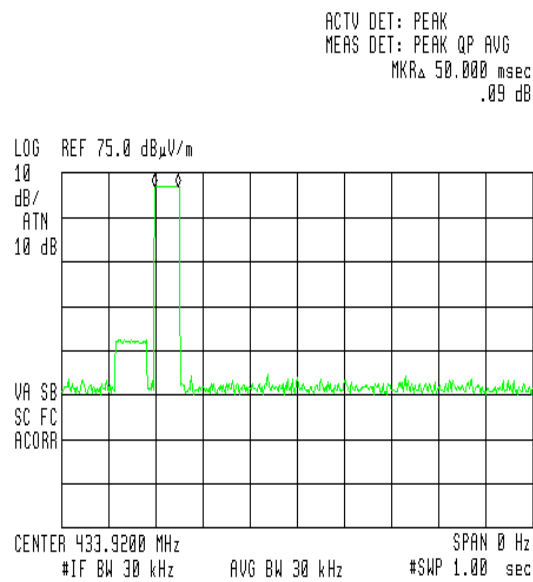
Figure 9. Automatically operated transmitter



## Periodic Operation

E.U.T Description 433 MHz and 916 MHz RF Module  
Type RWDTR4S916VE-40  
Serial Number: Not Designated

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



**Figure 10. System Integrity Within 1 Hour  
(50 milliseconds)**

### 5.4 Test Instrumentation Used

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	February 26, 2013	1 Year
RF Section	HP	85420E	3705A00248	February 26, 2013	1 year



## 6. Field Strength of Fundamental

### 6.1 Test Specification

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

### 6.2 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 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 $\mu$ V/m) + E.U.T. Duty Cycle Factor, in 100msec time window (dB)

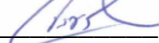
### 6.3 Measured Data

JUDGEMENT: Passed by 3 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 11 to Figure 13.

TEST PERSONNEL:

Tester Signature: \_\_\_\_\_ 

Date: 10.03.14

Typed/Printed Name: A. Sharabi





## Field Strength of Fundamental

E.U.T Description 433 MHz and 916 MHz RF Module  
Type RWDTR4S916VE-40  
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. (MHz)	Pol. V/H	Peak Reading (dB $\mu$ V/m)	Average Factor (dB)	AVG Result (dB $\mu$ V/m)	AVG Specification (dB $\mu$ V/m)	Margin (dB)
433.92	H	83.80	-6.0	77.80	80.80	-3.0
433.92	V	72.69	-6.0	66.69	80.80	-14.11

**Figure 11. 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 Reading." (dB $\mu$ V/m) included the "Correction Factors".
3. "Correction Factors" (dB) = Test Antenna Correction Factor(dB) + Cable Loss.
4. "Average Result" (dB $\mu$ V/m)=Peak Reading (dB $\mu$ V/m)+D.C.F. (dB)



## Field Strength of Fundamental

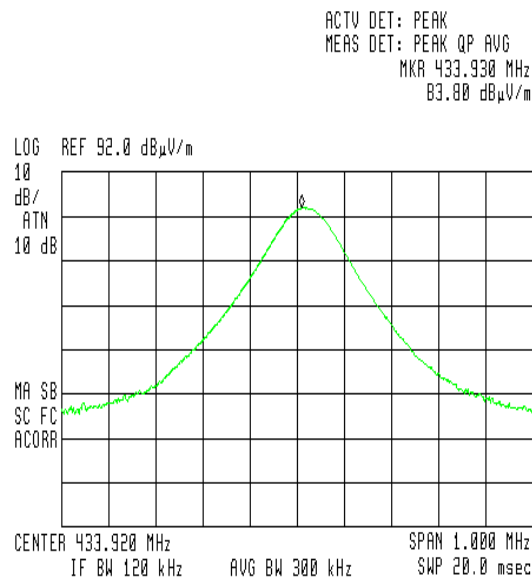
E.U.T Description 433 MHz and 916 MHz RF Module  
Type RWDTR4S916VE-40  
Serial Number: Not Designated

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

Antenna Polarization: Horizontal

Test Distance: 3 meters

Detector: Peak



**Figure 12. Field Strength of Fundamental. Antenna Polarization: HORIZONTAL.  
Detector: Peak**

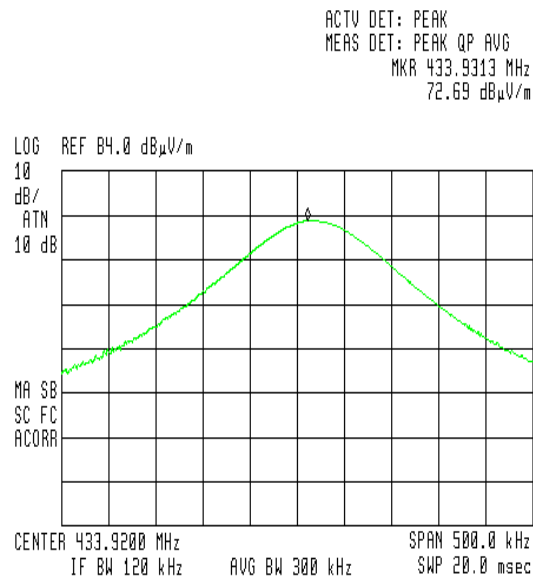


# Field Strength of Fundamental

E.U.T Description 433 MHz and 916 MHz RF Module  
Type RWDTR4S916VE-40  
Serial Number: Not Designated

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

Antenna Polarization: Vertical  
Test Distance: 3 meters Detector: Peak



**Figure 13. Field Strength of Fundamental. Antenna Polarization: VERTICAL. Detector: Peak**



#### 6.4 Test Instrumentation Used, Field Strength of Fundamental

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	February 26, 2013	1 year
RF Section	HP	85420E	3705A00248	February 26, 2013	1 year
Antenna Log Periodic	ARA	LPD-2010/A	1038	April 2, 2013	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



## 7. Radiated Emission, 9 kHz – 30 MHz

### 7.1 Test Specification

9 kHz-30 MHz, FCC, Part 15, Subpart C, Section 209

### 7.2 Test Procedure

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 3.1.

The frequency range 9 kHz-30 MHz was scanned.

The emissions were measured using a computerized EMI receiver complying with 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 E.U.T. was operated at the frequency of 433 MHz. This frequency was measured using a peak detector.

### 7.3 Measured Data

JUDGEMENT: Passed

The EUT was tested and it met the requirements of the FCC Part 15, Subpart C, specification.

TEST PERSONNEL:

Tester Signature: \_\_\_\_\_ 

Date: 10.03.14

Typed/Printed Name: A. Sharabi



## Radiated Emission

E.U.T Description 433 MHz and 916 MHz RF Module  
 Type RWDTR4S916VE-40  
 Serial Number: Not Designated

Specification: FCC Part 15, Subpart C

Antenna: 3 meters distance

Frequency range: 9 kHz to 30 MHz

Detectors: Peak

Frequency (MHz)	Peak Reading (dB $\mu$ A/m)	Correction (dB)	Average Specification (dB $\mu$ A/m)	Margin (dB)
No emission were detected within this band				

**Figure 14. 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.*



#### 7.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	February 26, 2013	1 year
RF Section	HP	85420E	3705A00248	February 26, 2013	1 year
Active Loop Antenna	EMCO	6502	9506-2950	November 4, 2013	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

#### 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]

Example: FS = 30.7 dB $\mu$ V (RA) + 14.0 dB (AF) + 0.9 dB (CF) = 45.6 dB $\mu$ V

No external pre-amplifiers are used.



## 8. Radiated Emission 30 MHz - 5 GHz

### 8.1 Test Specification

30 MHz - 5 GHz, 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.

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 emissions were measured using a computerized EMI receiver complying with 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 2.9 – 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. 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 16.3 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 was 16.3 dB in the worst case at the frequency of 2169 MHz, vertical polarization.

TEST PERSONNEL:

Tester Signature: \_\_\_\_\_ 

Date: 10.03.14

Typed/Printed Name: A. Sharabi



## Radiated Emission

E.U.T Description 433 MHz and 916 MHz RF Module  
Type RWDTR4S916VE-40  
Serial Number: Not Designated

Specification: FCC Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical      Frequency range: 30 MHz to 5GHz  
Antenna: 3 meters distance      Detectors: Peak

Frequency (MHz)	Antenna Polarity (H/V)	Peak Reading (dB $\mu$ V/m)	Average Factor (dB $\mu$ V/m)	Average Result dB $\mu$ V/m)	Average Specification (dB $\mu$ V/m)	Margin (dB)
867.9	H	40.3	-6.0	34.3	60.8	-26.5
867.9	V	41.5	-6.0	35.5	60.8	-25.3
1301.4	H	44.9	-6.0	38.9	60.8	-21.9
1301.4	V	46.2	-6.0	40.2	60.8	-20.6
1735.0	H	47.2	-6.0	41.2	60.8	-19.6
1735.0	V	46.0	-6.0	40.0	60.8	-20.8
2169.0	H	49.0	-6.0	43.0	60.8	-17.8
2169.0	V	50.5	-6.0	44.5	60.8	-16.3

**Figure 15. Radiated Emission. Antenna Polarization: VERTICAL.  
Detectors: Peak, Quasi-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 Reading." (dB $\mu$ V/m) included the "Correction Factors".
3. "Correction Factors" (dB) = Test Antenna Correction Factor(dB) + Cable Loss.
4. "Average Result" (dB $\mu$ V/m)=Peak Reading (dB $\mu$ V/m)+ Average Factor (dB)



#### 8.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	February 26, 2013	1 year
RF Section	HP	85420E	3705A00248	February 26, 2013	1 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS- 0411N313	013	August 21, 2013	1 Year
Spectrum Analyzer	HP	8592L	3826A01204	February 28, 2013	1 Year
Antenna Biconical	EMCO	3104	2606	August 30, 2013	1 year
Antenna Log Periodic	ARA	LPD-2010/A	1038	April 2, 2013	1 year
Antenna-Log Periodic	A.H.System	SAS-200/511	253	April 2, 2013	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. 20dB Bandwidth

### 9.1 Test procedure

The transmitter unit operated with normal modulation. The spectrum analyzer was set to 100 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 1 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.

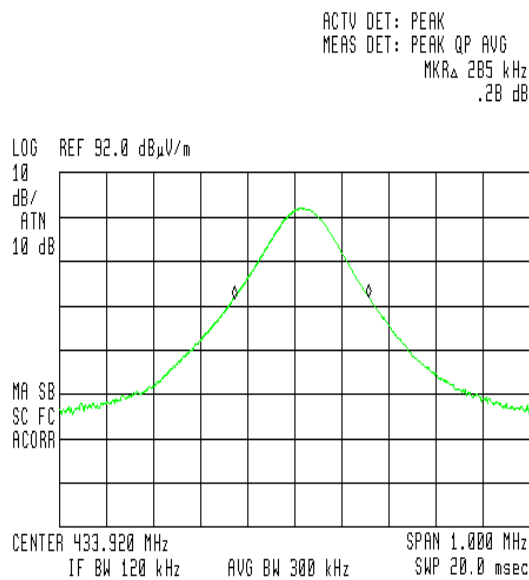


Figure 16 20dB Bandwidth



## 9.2 Results table


E.U.T Description: 433 MHz and 916 MHz RF Module  
Model: RWDTR4S916VE-40  
Serial Number: Not Designated  
Specification: F.C.C. Part 15, Subpart C: (15.231(c))

Bandwidth Reading (kHz)	Specification (1) (kHz)	Margin (kHz)
285	1840	799

Figure 17 20 dB Bandwidth

JUDGEMENT: Passed by 799 kHz

TEST PERSONNEL:

Tester Signature: \_\_\_\_\_ 

Date: 10.03.14

Typed/Printed Name: A. Sharabi

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



**9.3 Test Equipment Used. 20dB Bandwidth**

<b>Instrument</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Serial Number</b>	<b>Calibration</b>	<b>Period</b>
EMI Receiver	HP	85422E	3906A00276	February 26, 2013	1 year
RF Section	HP	85420E	3705A00248	February 26, 2013	1 year
Antenna Log Periodic	ARA	LPD-2010/A	1038	April 2, 2013	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 18 Test Equipment Used**

## 10. 26dB Bandwidth

### 10.1 Test procedure

The transmitter unit operated with normal modulation. The spectrum analyzer was set to 100 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 26 dBc points.

The EUT was set up as shown in Figure 1 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.

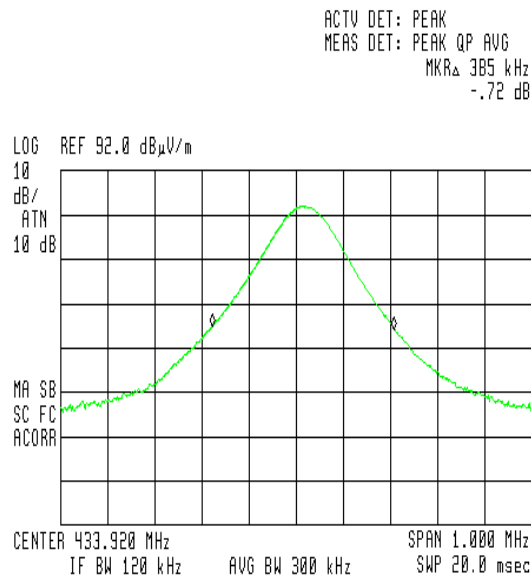


Figure 19 26 dB bandwidth



## 10.2 Results table

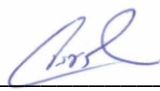
E.U.T Description: 433 MHz and 916 MHz RF Module  
Model: RWDTR4S916VE-40  
Serial Number: Not Designated  
Specification: F.C.C. Part 15, Subpart C: (15.231(c))

Bandwidth Reading (kHz)	Specification (1) (kHz)	Margin (kHz)
385	No spec	-

Figure 20 26 dB Bandwidth

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: \_\_\_\_\_ 

Date: 10.03.14

Typed/Printed Name: A. Sharabi

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





**10.3 Test Equipment Used. 26 dB Bandwidth**

<b>Instrument</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Serial Number</b>	<b>Calibration</b>	<b>Period</b>
EMI Receiver	HP	85422E	3906A00276	February 26, 2013	1 year
RF Section	HP	85420E	3705A00248	February 26, 2013	1 year
Antenna Log Periodic	ARA	LPD-2010/A	1038	April 2, 2013	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**



# 11. APPENDIX A - CORRECTION FACTORS

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

FREQUENCY (MHz)	CORRECTION FACTOR (dB)
10.0	0.3
20.0	0.6
30.0	0.8
40.0	0.9
50.0	1.1
60.0	1.2
70.0	1.3
80.0	1.4
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

FREQUENCY (MHz)	CORRECTION FACTOR (dB)
1200.0	7.3
1400.0	7.8
1600.0	8.4
1800.0	9.1
2000.0	9.9
2300.0	11.2
2600.0	12.2
2900.0	13.0

**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".



**11.2 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.*



**11.3 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**

<b>FREQUENCY (MHz)</b>	<b>AFE (dB/m)</b>
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 (MHz)</b>	<b>AFE (dB/m)</b>
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".*



**11.4 Correction factors for**

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

<b>FREQUENCY (GHz)</b>	<b>ANTENNA FACTOR (dB)</b>
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

<b>FREQUENCY (GHz)</b>	<b>ANTENNA FACTOR (dB)</b>
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".*



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

<b>FREQUENCY (MHz)</b>	<b>AFE (dB/m)</b>
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".*



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

<b>FREQUENCY</b> <b>(MHz)</b>	<b>Magnetic</b> <b>Antenna</b> <b>Factor</b> <b>(dB)</b>	<b>Electric</b> <b>Antenna</b> <b>Factor</b> <b>(dB)</b>
.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