ISRAEL TESTING LABORATORIES
Global Certifications You Can Trust

ACCREDITED
TESTING Cert No.1152.01

DATE: 05 February 2015

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

FCC Radio Test Report

for

Cardo Peripheral Systems

Equipment under test:

Rider Communication System

scala rider PACKTALK
2.4 GHz Bluetooth
(standard, EDR)

Approved by: _____

M. Zohar, Test Engineer

Approved by: _____

I. Raz, EMC Laboratory Manager

ISRAEL TESTING LABORATORIES
Global Certifications You Can Trust

ACCREDITED
TESTING Cert No.1152.01

Measurement/Technical Report for
Cardo Peripheral Systems

Rider Communication System

scala rider PACKTALK

FCC ID: Q95ER19

IC: 4668A-ER19

This report concerns:	Original Grant:	X
	Class I Change:	
	Class II Change:	

Equipment type: Spread Spectrum Transmitter

Limits used: 47CFR15 Section 15.247

Measurement procedure used is Public Notice: DA 00-705 Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems and ANSI C63.4-2009.

Application for Certification
prepared by:
R. Pinchuck
ITL (Product Testing) Ltd.
1 Bat Sheva St.
Lod 7116002
Israel
e-mail Rpinchuck@itl.co.il

Applicant for this device:
(different from "prepared by")
Avi Moato
Cardo Peripheral Systems
13 Hamifal St.,
Or Yehuda, 60221, Israel
Tel: +972-3-735-3111
Fax: +972-3562-3360
e-mail: moato@cardosystems.com

TABLE OF CONTENTS

1. General Information

1.1 Administrative Information

Manufacturer:	Cardo Peripheral Systems
Manufacturer's Address:	13 Hamifal St., Or Yehuda, 60221 Israel Tel: +972-3-735-3111 Fax: +972-3562-3360
Manufacturer's Representative:	Avi Moato
Equipment Under Test (E.U.T):	Rider Communication System
Equipment Model No.:	scala rider PACKTALK
Equipment Serial No.:	Not Designated
Date of Receipt of E.U.T:	16.11.2014
Start of Test:	16.11.2014
End of Test:	21.01.2015
Test Laboratory Location:	I.T.L (Product Testing) Ltd. 1 Batsheva St., Lod ISRAEL 7120101
Test Specifications:	FCC Part 15 Sub-Part C RSS-210, Issue 8, 2010

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.), FCC Designation No. US1004.
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 4025A-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

Communication and entertainment system for motorcycle helmets.
The scala rider PACKTALK offers the following key features:
Intercom Options
Multiple Device Connectivity
Entertainment Options
Cardo community and Cardo SmartSet APP
Advanced Technology

1.4 Test Methodology

Both conducted and radiated testing was performed according to the procedures in Public Notice: DA 00705 Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems, ANSI C63.4: 2009 and RSS-Gen Issue 4. Radiated testing was performed at an antenna to EUT distance of 3 meters.

1.5 Test Facility

Radiated emissions tests were performed at I.T.L.'s testing facility in Lod, Israel. I.T.L.'s EMC Laboratory is accredited by A2LA, certificate No. 1152.01 and its FCC Designation Number is US1004.

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):

± 4.98 dB

Note: See ITL Procedure No. PM 198.

2. System Test Configuration

2.1 Justification

Radiated emission screening was performed in 3 orthogonal orientations to determine the worst case.

The fundamental results are shown in the below table:

Frequency (GHz)	X axis (dBuV/m)	Y axis (dBuV/m)	Z axis (dBuV/m)
2.402	58.2	62.7	47.7
2.441	64.6	67.1	46.0
2.480	61.1	68.1	57.7

In all axes the spurious levels were under the noise level.

According to above results the worst case was the y axis.

The unit was transmitting continuously at the low channel (2402MHz) the mid channel (2441MHz) and the high channel (2480MHz), modulated with standard BlueTooth modulation in external antenna mode.

2.2 EUT Exercise Software

No special exercise software was used.

2.3 Special Accessories

No special accessories were needed to achieve compliance.

2.4 Equipment Modifications

No modifications were needed to achieve compliance.

2.5 Configuration of Tested System

Figure 1. Configuration of Tested System

3. Conducted & Radiated Measurement Test Set-up Photos

Figure 2. Conducted Emission Test

Figure 3. Radiated Emission Test

Figure 4. Radiated Emission Test

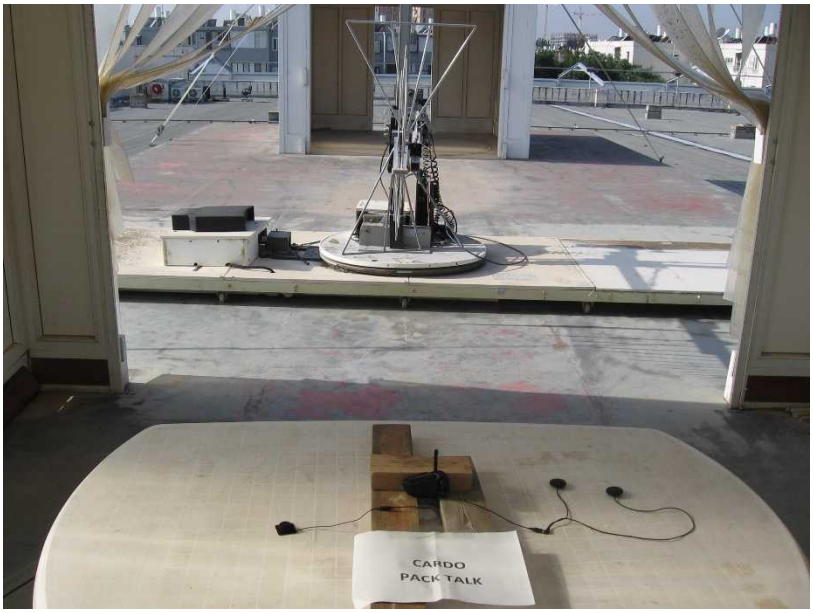

Figure 5. Radiated Emission Test

4. Conducted Emission From AC Ports

4.1 Test Specification

F.C.C., Part 15, Subpart C, 15.207

4.2 Test Procedure

The E.U.T operation mode and test setup are as described in Section 2. In order to minimize background noise interference, the conducted emission testing was performed inside a shielded room (see Section 3), with the E.U.T placed on a 0.8 meter high wooden table. In the case of a floor-standing E.U.T., it was placed on the horizontal ground plane.

The E.U.T was powered from 115 V AC / 60 Hz via 50 Ohm / 50 µHn Line Impedance Stabilization Network (LISN) on the phase and neutral lines. The LISN's were grounded to the shielded room ground plane (floor), and were kept at least 0.8 meters from the nearest boundary of the E.U.T

The center of the E.U.T.'s AC cable was folded back and forth, in order to form a bundle less than 0.80 meters and a total cable length of 1 meter.

The effect of varying the position of the cables was investigated to find the configuration that produces maximum emission. The configuration tested is shown in the photograph, *Figure 2. Conducted Emission Test.*

The emission voltages at the LISN's outputs were measured using a computerized receiver, complying with CISPR 16 requirements. The specification limits are pre-loaded to the receiver and are displayed on the receiver's spectrum display.

A frequency scan between 0.15 and 30 MHz was performed at 9 kHz I.F. band width, using peak detection.

The spectral components having the highest level on each line were measured using a quasi-peak and average detector.

4.3 Test Results

The E.U.T met the requirements of the FCC Part 15, Subpart C, 15.207 specifications.

The margin between the emission levels and the specification limit is, in the worst case, 22.39 dB for the phase line at 0.322 MHz and 26.96 dB at 0.314 MHz for the neutral line.

The details of the highest emissions are given in *Figure 6* to *Figure 9.*

TEST PERSONNEL:

Tester Signature: _____ Date: 26.01.15

Typed/Printed Name: M. Zohar

Conducted Emission

E.U.T Description	Rider Communication System
Type	scala rider PACKTALK
Serial Number:	Not Designated

Specification:	FCC Part 15, Subpart C, Class B
Lead:	Phase
Detectors:	Quasi-peak, Average

EDIT PEAK LIST (Final Measurement Results)

Trace1: CE22BQP
Trace2: CE22BAP
Trace3: ---

	TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
1	Quasi Peak	214 kHz	32.29	-30.75
2	Average	218 kHz	17.85	-35.03
1	Quasi Peak	322 kHz	37.26	-22.39
2	Average	322 kHz	22.94	-26.71
2	Average	554 kHz	13.22	-32.77
1	Quasi Peak	630 kHz	25.84	-30.15
1	Quasi Peak	1.014 MHz	22.62	-33.37
2	Average	1.014 MHz	12.71	-33.28
2	Average	1.466 MHz	12.75	-33.25
1	Quasi Peak	1.498 MHz	21.76	-34.24
2	Average	2.29 MHz	11.92	-34.07
1	Quasi Peak	2.686 MHz	20.11	-35.88
1	Quasi Peak	3.626 MHz	17.66	-38.33
2	Average	3.662 MHz	9.68	-36.31
1	Quasi Peak	6.338 MHz	15.51	-44.49
2	Average	8.414 MHz	8.04	-41.95
2	Average	14.722 MHz	8.21	-41.78
1	Quasi Peak	16.702 MHz	16.97	-43.02
1	Quasi Peak	21.13 MHz	18.54	-41.45
2	Average	24.502 MHz	13.47	-36.52

Date: 20.JAN.2015 10:53:15

Figure 6. Detectors: Quasi-peak, Average

Note: DELTA LIMIT 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.

Conducted Emission

E.U.T Description	Rider Communication System
Type	scala rider PACKTALK
Serial Number:	Not Designated

Specification:	FCC Part 15, Subpart C, Class B
Lead:	Phase
Detectors:	Quasi-peak, Average

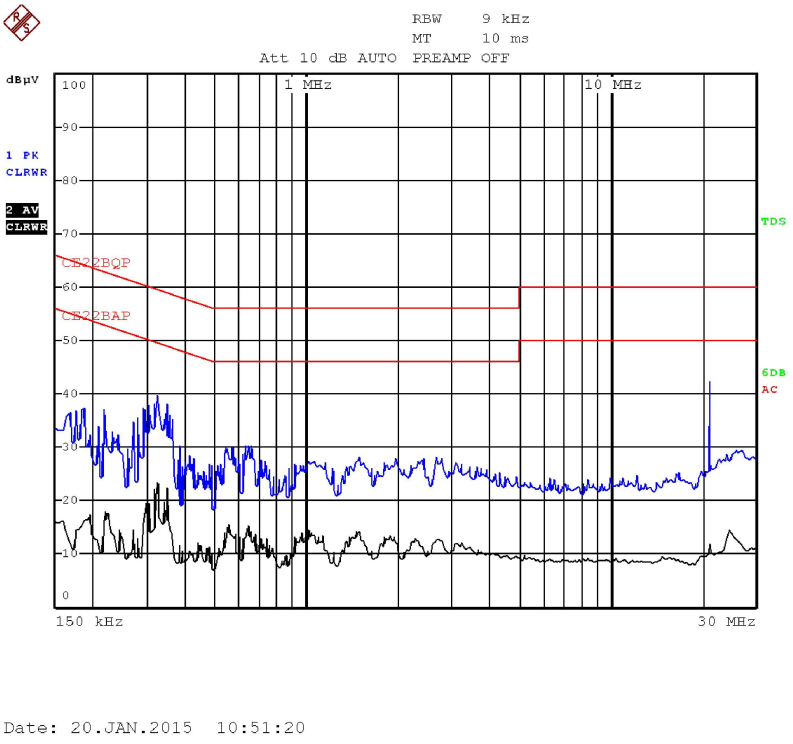

Figure 7 Detectors: Quasi-peak, Average

Conducted Emission

E.U.T Description	Rider Communication System
Type	scala rider PACKTALK
Serial Number:	Not Designated

Specification:	FCC Part 15, Subpart C, Class B
Lead:	Neutral
Detectors:	Quasi-peak, Average

EDIT PEAK LIST (Final Measurement Results)

Trace1: CE22BQP
Trace2: CE22BAP
Trace3: ---

	TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
1	Quasi Peak	202 kHz	29.93	-33.59
2	Average	242 kHz	15.73	-36.29
1	Quasi Peak	314 kHz	32.89	-26.96
2	Average	322 kHz	19.82	-29.83
1	Quasi Peak	586 kHz	24.95	-31.04
2	Average	646 kHz	13.98	-32.01
2	Average	1.082 MHz	12.59	-33.40
1	Quasi Peak	1.11 MHz	22.75	-33.24
1	Quasi Peak	1.438 MHz	22.03	-33.96
2	Average	1.438 MHz	11.00	-34.99
2	Average	2.378 MHz	11.89	-34.10
1	Quasi Peak	2.842 MHz	22.84	-33.15
2	Average	3.61 MHz	9.64	-36.35
1	Quasi Peak	3.766 MHz	21.79	-34.20
2	Average	8.794 MHz	8.15	-41.84
1	Quasi Peak	10.314 MHz	17.39	-42.60
2	Average	14.394 MHz	9.47	-40.52
1	Quasi Peak	17.13 MHz	20.01	-39.98
2	Average	24.154 MHz	16.70	-33.29
1	Quasi Peak	28.03 MHz	24.42	-35.57

Date: 20.JAN.2015 10:58:49

Figure 8. Detectors: Quasi-peak, Average

Note: DELTA LIMIT 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.

Conducted Emission

E.U.T Description	Rider Communication System
Type	scala rider PACKTALK
Serial Number:	Not Designated

Specification:	FCC Part 15, Subpart C, Class B
Lead:	Neutral
Detectors:	Quasi-peak, Average

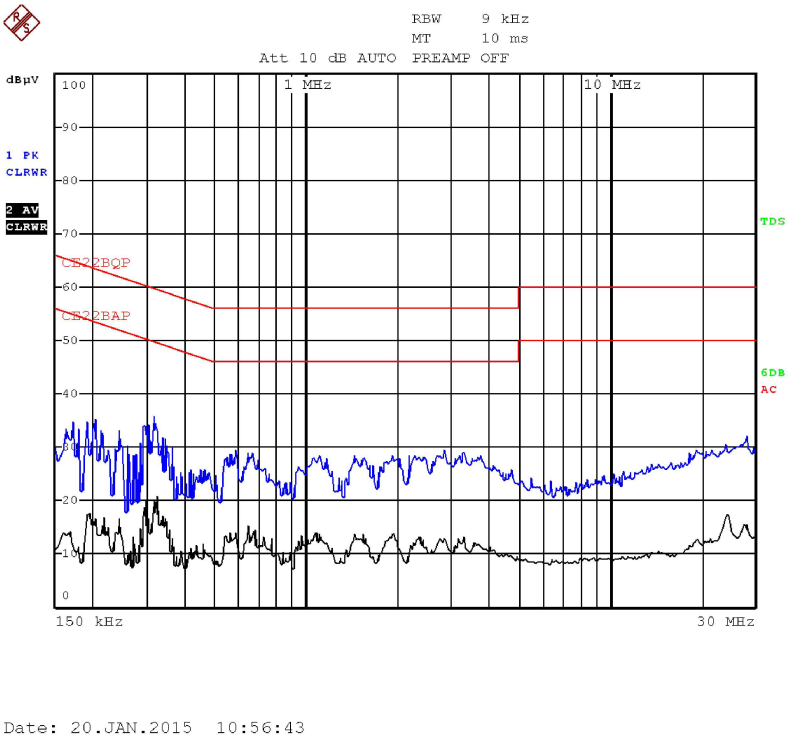

Figure 9 Detectors: Quasi-peak, Average

5. Avg. Factor Calculation

5.1 Standard BT Modulation

1. Pulse period = 1 (worst scenario)
2. Pulse duration = 1 (worst scenario)
3. Burst duration = 0.4msec
4. Time between bursts = 1.28msec
5. $$\text{Average Factor} = 20\log\left[\frac{\text{Pulse duration}}{\text{Pulse period}} \times \frac{\text{burst duration}}{100\text{msec}} \times \text{Num of burst within } 100\text{msec}\right]$$

$$\text{AverageFactor} = 20\log\left[1 * \frac{0.4}{100} * 80\right] = 9.9dB$$

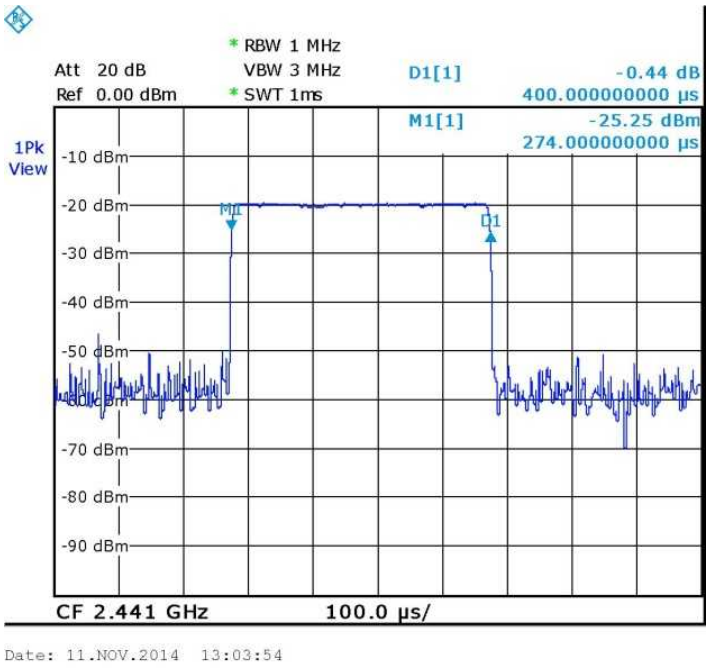

Figure 10. Burst Duration

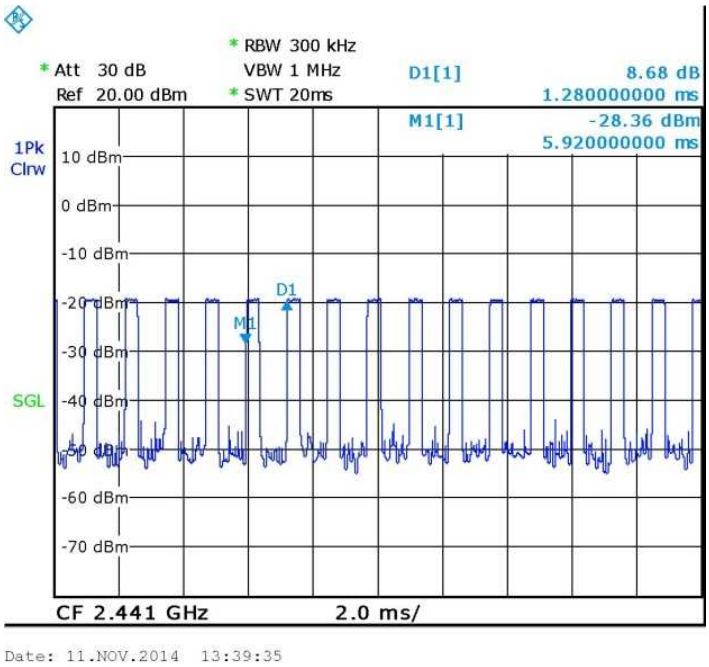

Figure 11. Number of bursts in 20msec=16
Number of bursts in 100msec=80

5.2 EDR BT modulation:

6. Pulse period = 1 (worst scenario)
7. Pulse duration = 1 (worst scenario)
8. Burst duration = 3.0msec
9. Time between bursts = 12.8msec
10. $\text{Average Factor} = 20\log\left[\frac{\text{Pulse duration}}{\text{Pulse period}} \times \frac{\text{burst duration}}{100\text{msec}} \times \text{Num of burst within } 100\text{msec}\right]$

$$\text{AverageFactor} = 20\log\left[1*\frac{3}{100}*9\right] = 11.3dB$$

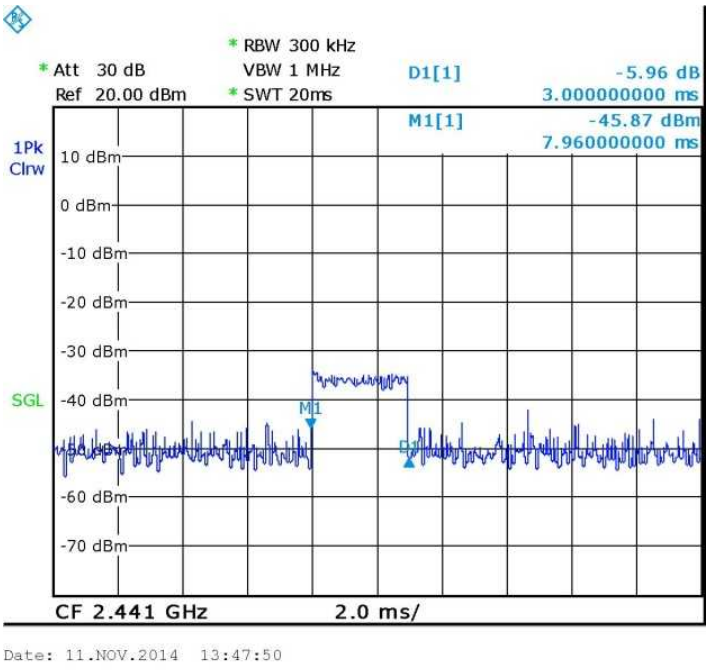

Figure 12. Burst Duration

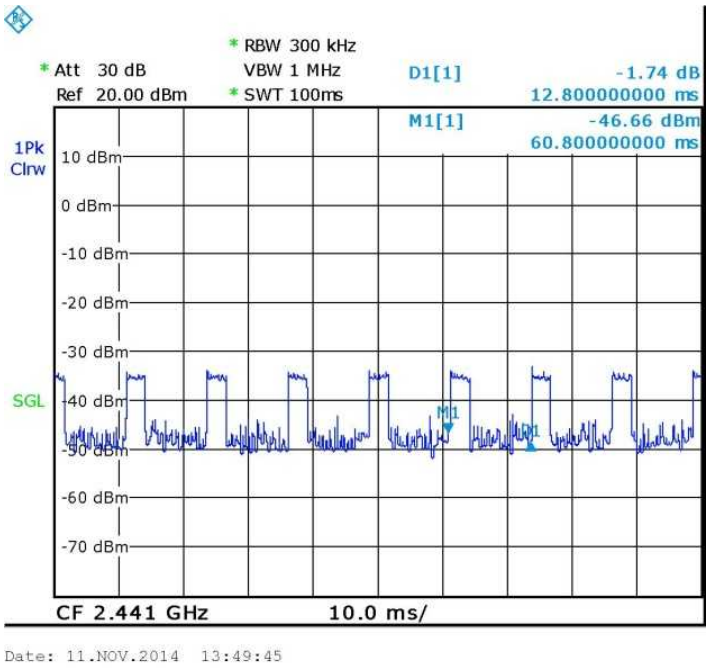

Figure 13. Number of bursts in 100msec=9

6. 26dB Bandwidth

6.1 Test Specification

F.C.C. Part 15, Subpart C: 15.247(a)(2)

6.2 Test procedure

The E.U.T was placed on a non-metallic table, 0.8 meters above the ground plane, on a remote-controlled turntable in the OATS. The test distance was 3 meters. The transmitter unit operated with normal modulation. The EMI receiver was set to 30 kHz resolution BW. The spectrum bandwidth of the transmitter unit was measured and recorded. The test was performed to measure the transmitter occupied bandwidth. 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 modulation envelope. The E.U.T. was tested in three frequencies: Low, Mid and High and in 2 modulations: EDR, standard (exterior antenna for worst case).

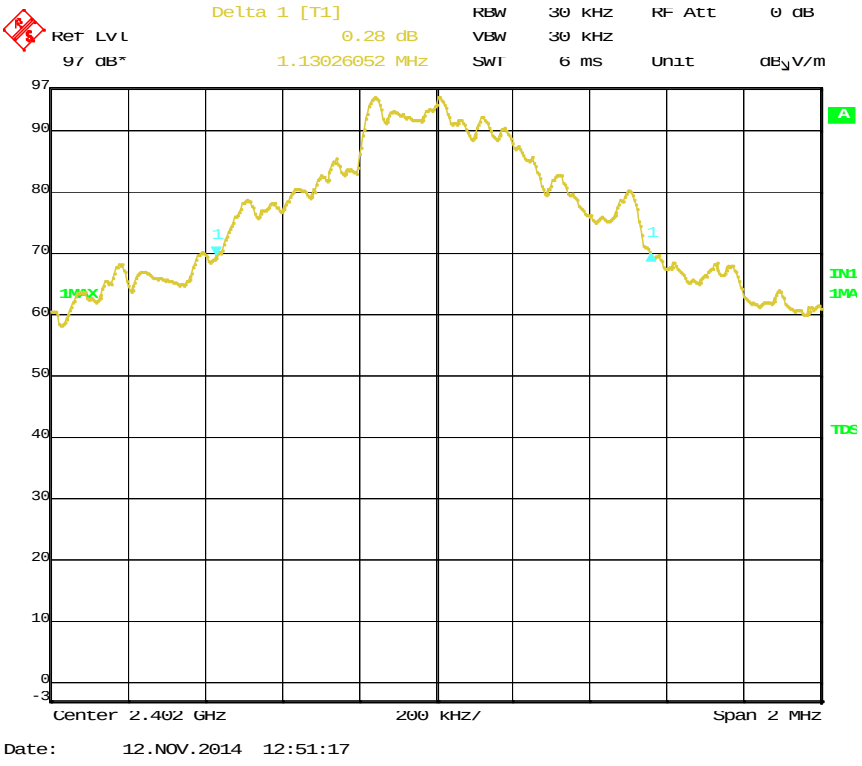

Figure 14. Low Channel, Standard Modulation

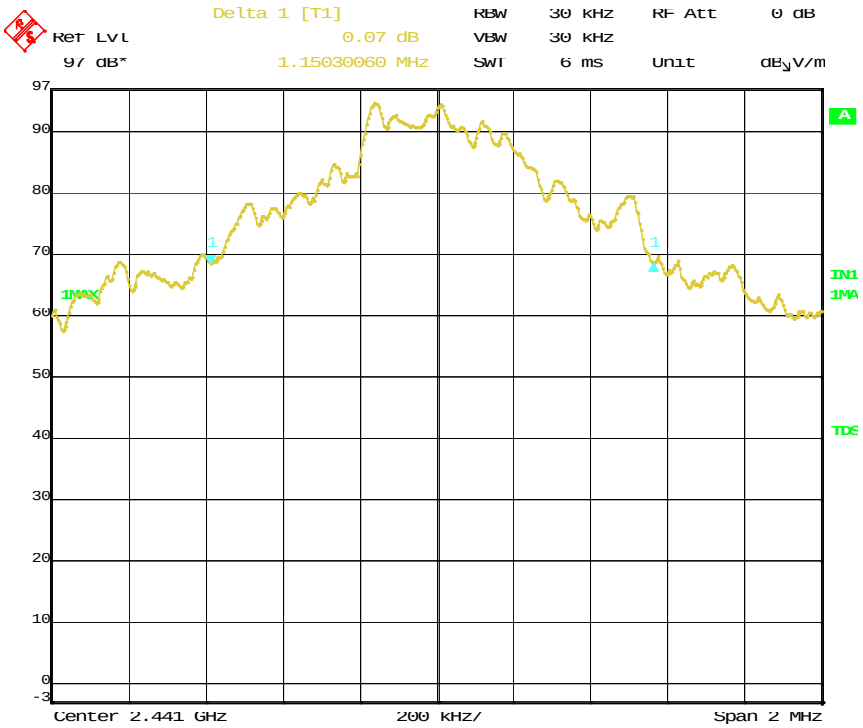

Figure 15. Mid Channel, Standard Modulation

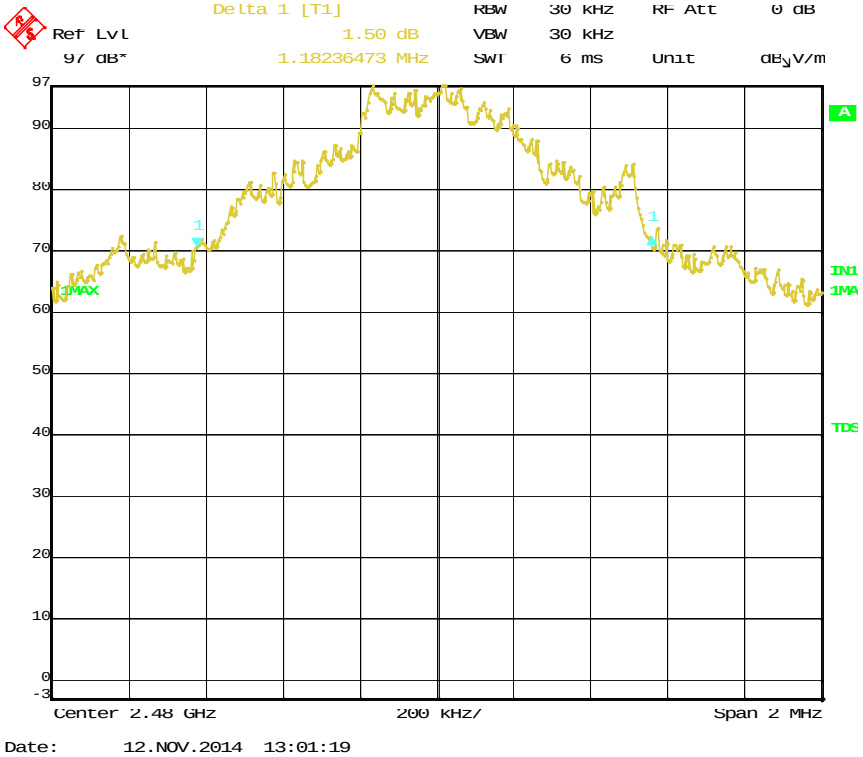

Figure 16. High Channel, Standard Modulation

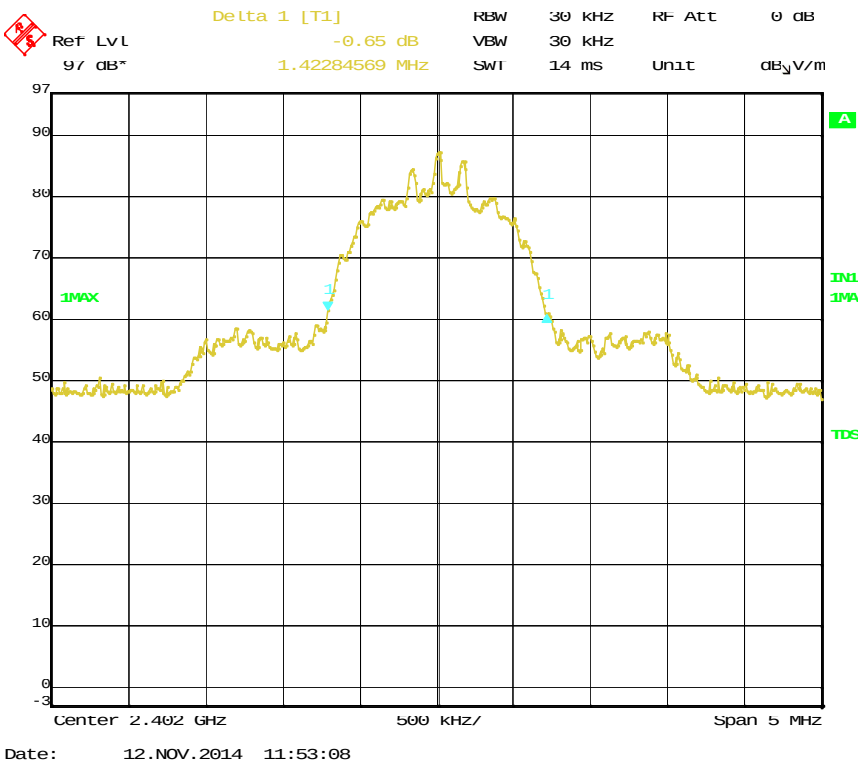

Figure 17. Low Channel, EDR Modulation

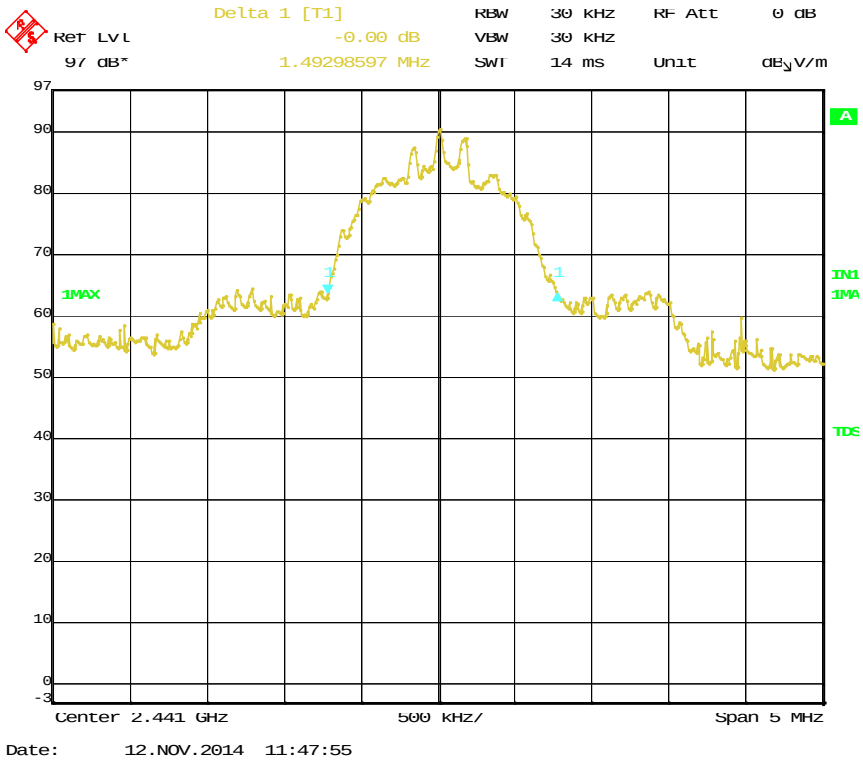

Figure 18. Mid Channel, EDR Modulation

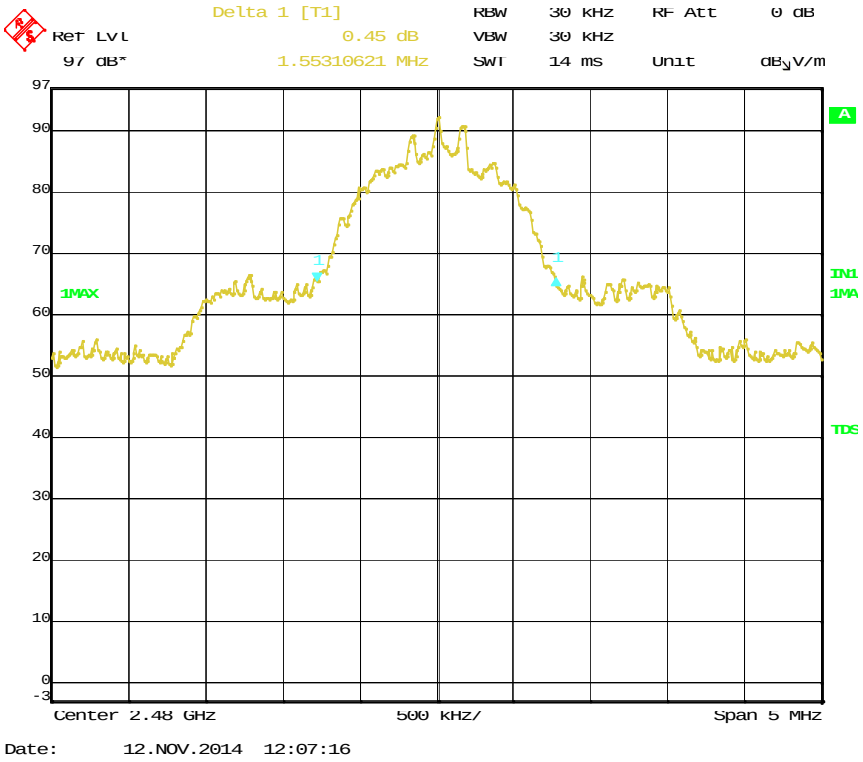

Figure 19. High Channel, EDR Modulation

6.3 Test Results

E.U.T Description: Rider Communication System
Model: scala rider PACKTALK
Serial Number: Not Designated

Operation Frequency (MHz)	Modulation	Bandwidth Reading (MHz)
Low	Standard	1.13
Mid	Standard	1.15
High	Standard	1.18
Low	EDR	1.42
Mid	EDR	1.49
High	EDR	1.55

Figure 20 26 dB Minimum Bandwidth

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: _____ Date: 31.12.14

Typed/Printed Name: M. Zohar

6.4 Test Equipment Used, 26 dB Bandwidth

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	R&S	ESIB7	100120	December 19, 2013	1 year
Spectrum Analyzer	R&S	FSL6	100194	December 1, 2013	1 year
Active Loop Antenna	EMCO	6502	9506-2950	November 4, 2014	1 year
Biconilog Antenna	EMCO	3142B	1250	May 22, 2014	2 years
Horn Antenna	ETS	3115	6142	March 14, 2012	3 years
Spectrum Analyzer	HP	8592L	3826A01204	February 28, 2014	1 year
Spectrum Analyzer	HP	8564E	3442A00275	March 2, 2014	1 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	August 22, 2014	1 year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	August 29, 2014	1 year
Antenna Mast	ETS	2070-2	9608-1497	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Table Controller	ETS/EMCO	2090	9608-1456	N/A	N/A

Figure 21 Test Equipment Used

7. 20dB Bandwidth

7.1 Test Specification

Specification: FCC Part 15, Subpart C (15.247-a2)

7.2 Test procedure

The E.U.T was placed on a non-metallic table, 0.8 meters above the ground plane, on a remote-controlled turntable in the OATS. The test distance was 3 meters. The transmitter unit operated with normal modulation. The EMI receiver was set to 30 kHz resolution BW. The spectrum bandwidth of the transmitter unit was measured and recorded. The test was performed to measure the transmitter occupied bandwidth. 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 modulation envelope. The E.U.T. was tested in three frequencies: Low, Middle and High. And in 2 modulations: EDR, standard (exterior antenna for worst case).

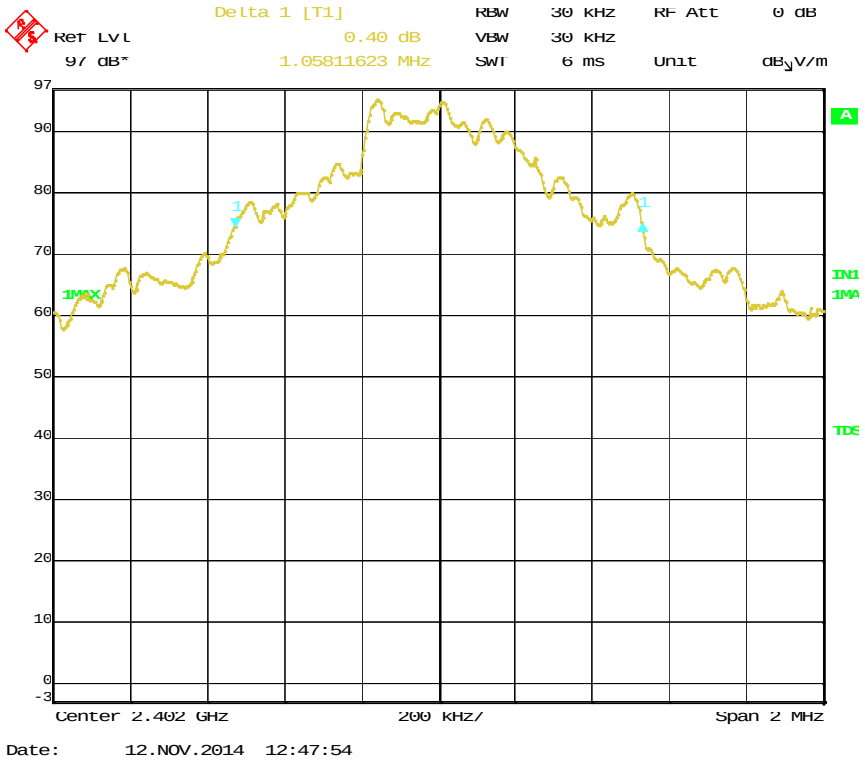

Figure 22. Low Channel, Standard Modulation

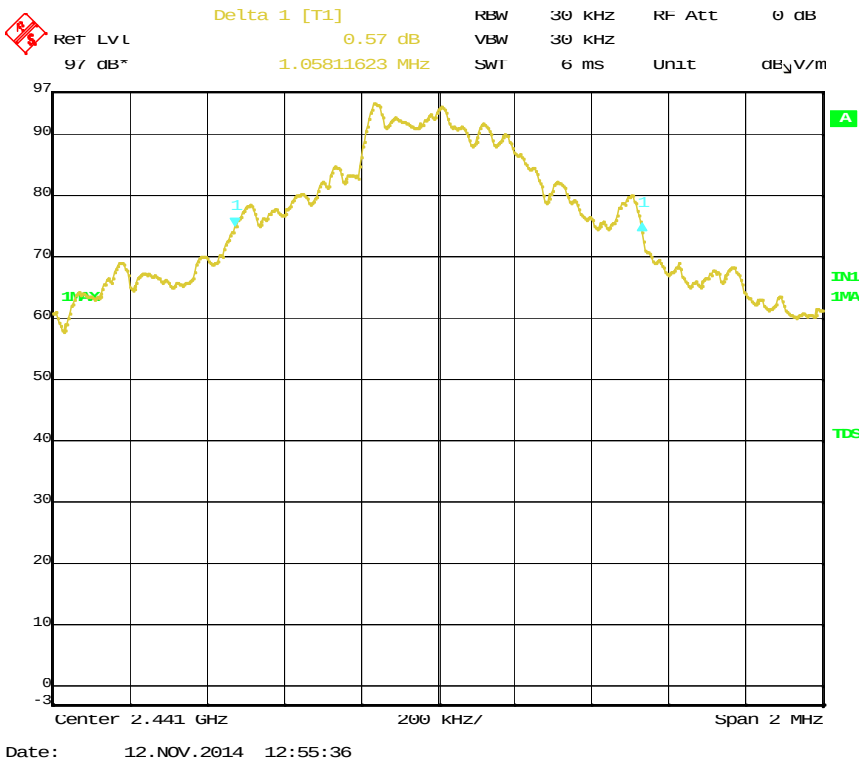

Figure 23. Mid Channel, Standard Modulation

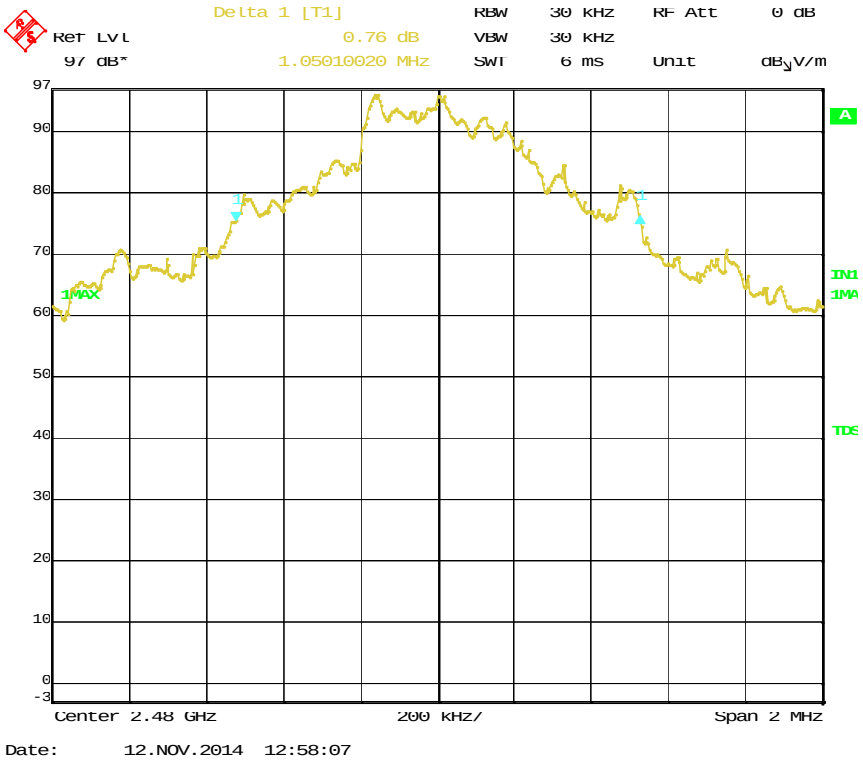

Figure 24. High Channel, Standard Modulation

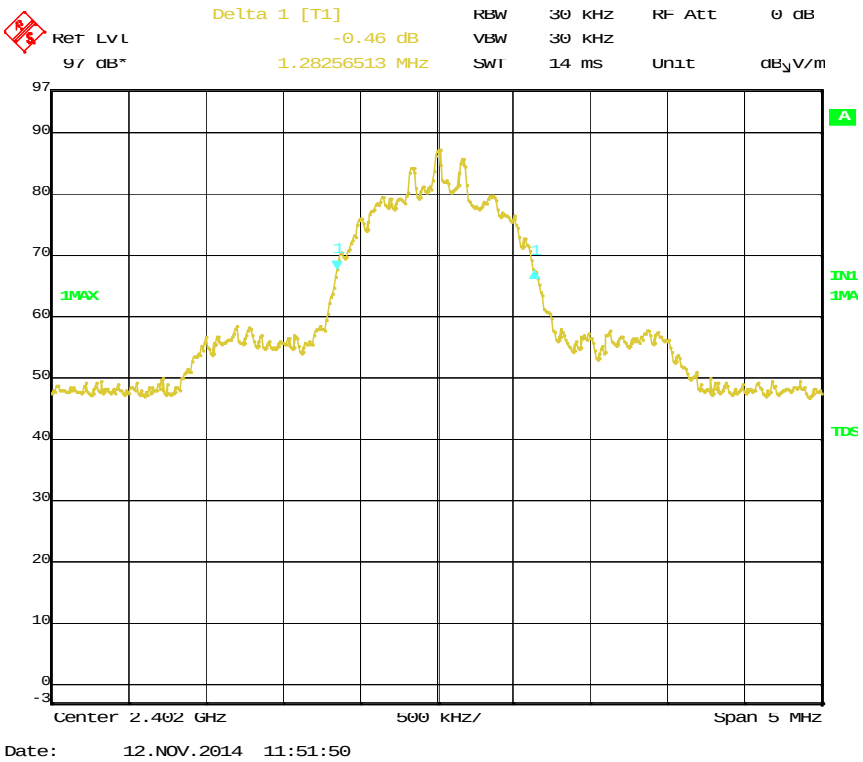

Figure 25. Low Channel, EDR Modulation

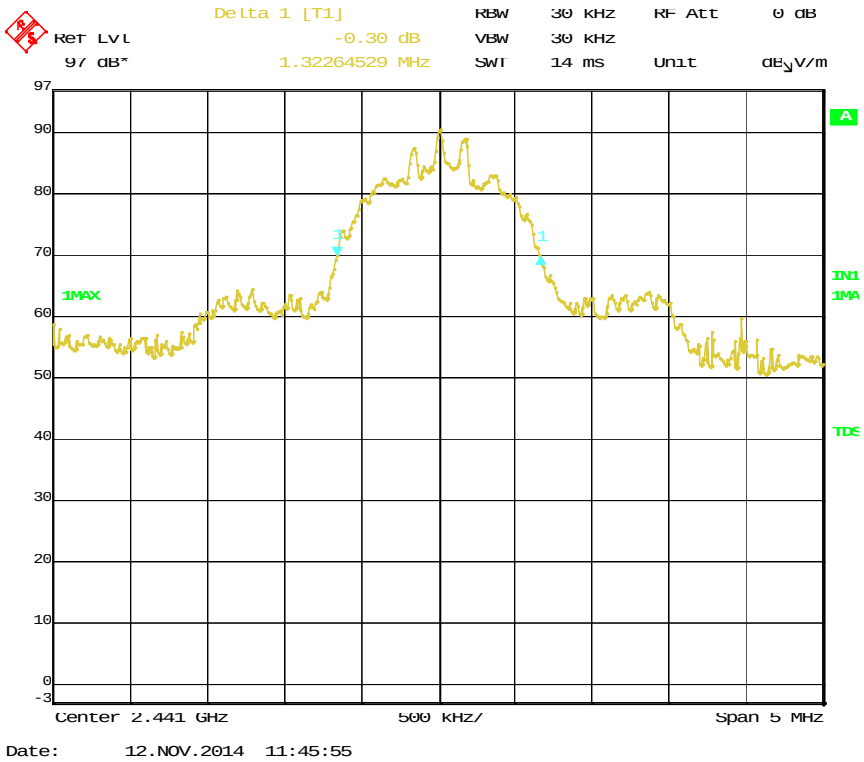

Figure 26. Mid Channel, EDR Modulation

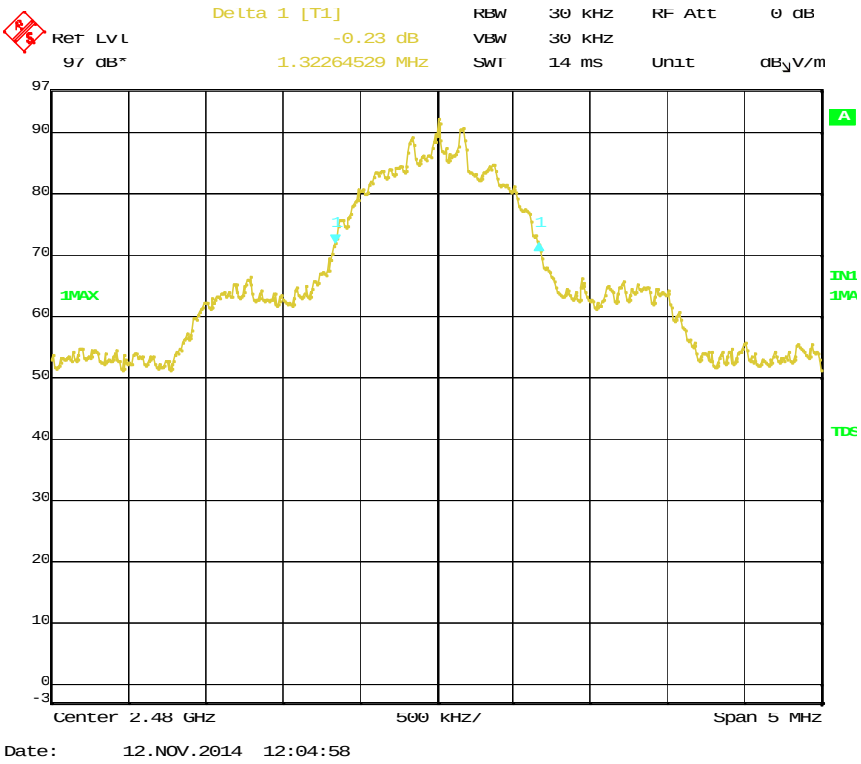

Figure 27. High Channel, EDR Modulation

7.3 Test Results

E.U.T Description: Rider Communication System
Model: scala rider PACKTALK
Serial Number: Not Designated

Operation Frequency (MHz)	Modulation	Bandwidth Reading (MHz)
Low	Standard	1.05
Mid	Standard	1.05
High	Standard	1.05
Low	EDR	1.28
Mid	EDR	1.32
High	EDR	1.32

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: _____ Date: 31.12.14

Typed/Printed Name: M. Zohar

7.4 Test Equipment Used; 20dB Bandwidth

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	R&S	ESIB7	100120	December 19, 2013	1 year
Spectrum Analyzer	R&S	FSL6	100194	December 1, 2013	1 year
Active Loop Antenna	EMCO	6502	9506-2950	November 4, 2014	1 year
Biconilog Antenna	EMCO	3142B	1250	May 22, 2014	2 years
Horn Antenna	ETS	3115	6142	March 14, 2012	3 years
Spectrum Analyzer	HP	8592L	3826A01204	February 28, 2014	1 year
Spectrum Analyzer	HP	8564E	3442A00275	March 2, 2014	1 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	August 22, 2014	1 year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	August 29, 2014	1 year
Antenna Mast	ETS	2070-2	9608-1497	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Table Controller	ETS/EMCO	2090	9608-1456	N/A	N/A

Figure 28 Test Equipment Used

8. Number of Hopping Frequencies Section 15.247(a)(1)(iii)

8.1 Test Specification

F.C.C., Part 15, Subpart C

8.2 Test Procedure

The E.U.T. was set to hopping mode.
The spectrum analyzer was set to the following parameters:

Span: Every 20 MHz Frequency

Band of Operation: 2402-2480 MHz
RBW: 30kHz
VBW: 300kHz
Detector Function: Peak
Trace: Maximum Hold
The number of hopping frequencies is 79 (See plots).

The E.U.T was evaluated in 2 modulations: EDR and standard.

Number of Hopping Frequencies

E.U.T Description	Rider Communication System
Type	scala rider PACKTALK
Serial Number:	Not Designated

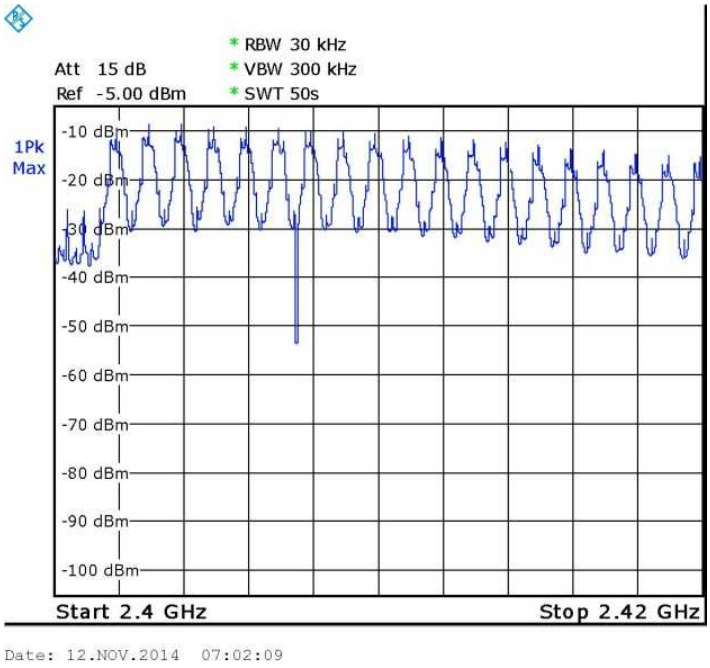

Figure 29. Frequency Hopping, Standard modulation

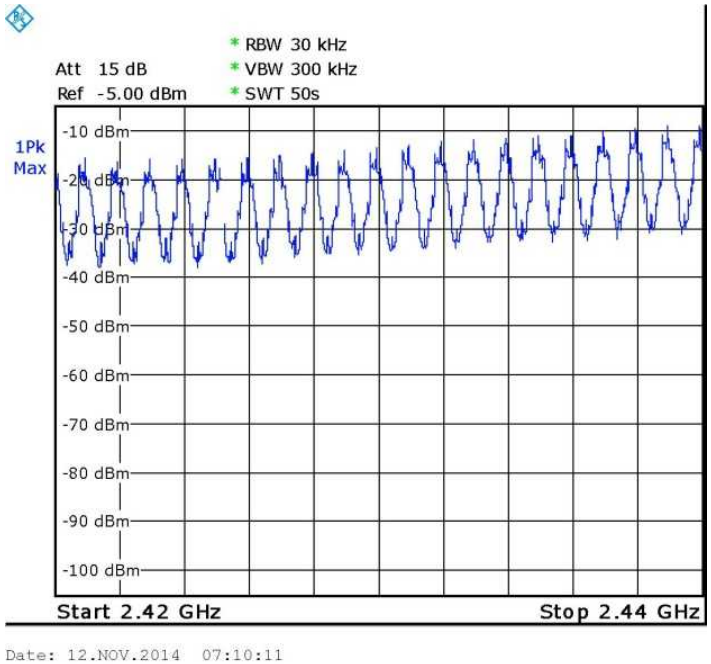

Figure 30. Frequency Hopping, Standard modulation

Number of Hopping Frequencies

E.U.T Description	Rider Communication System
Type	scala rider PACKTALK
Serial Number:	Not Designated

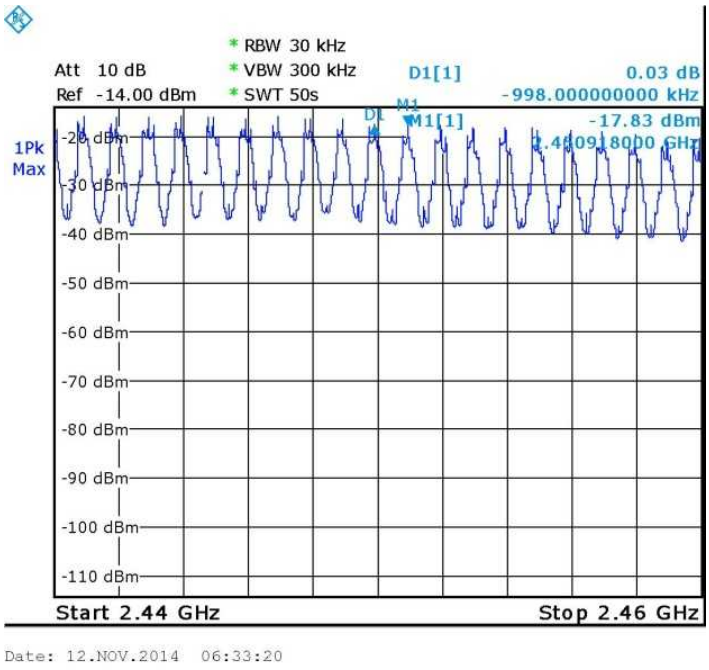

Figure 31. Frequency Hopping, Standard modulation

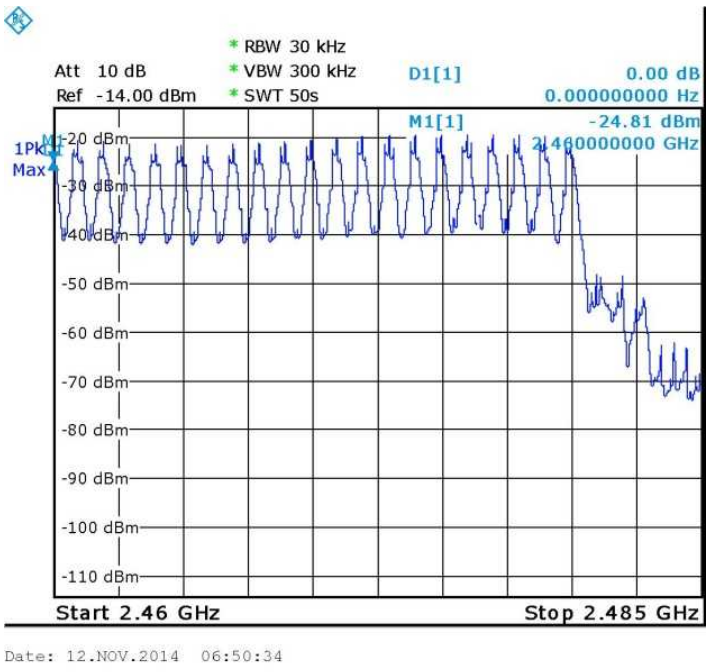

Figure 32. Frequency Hopping, Standard modulation

Number of Hopping Frequencies

E.U.T Description	Rider Communication System
Type	scala rider PACKTALK
Serial Number:	Not Designated

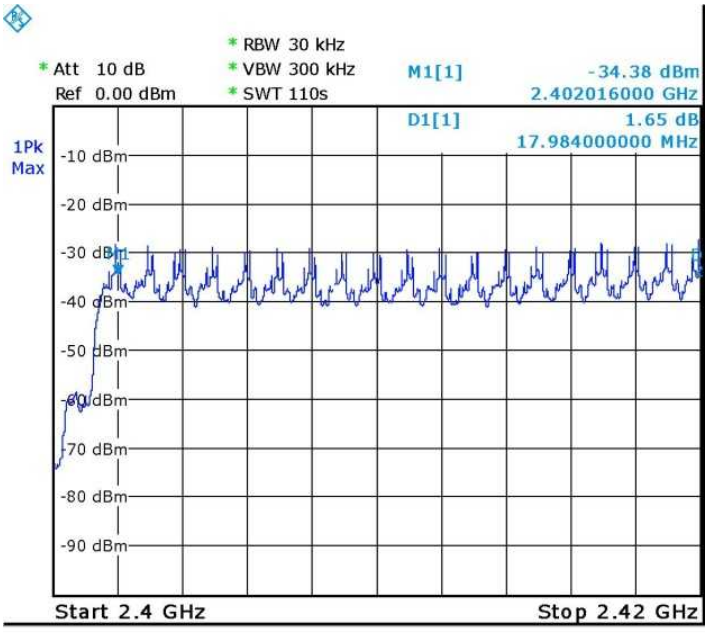

Figure 33. Frequency Hopping, EDR modulation

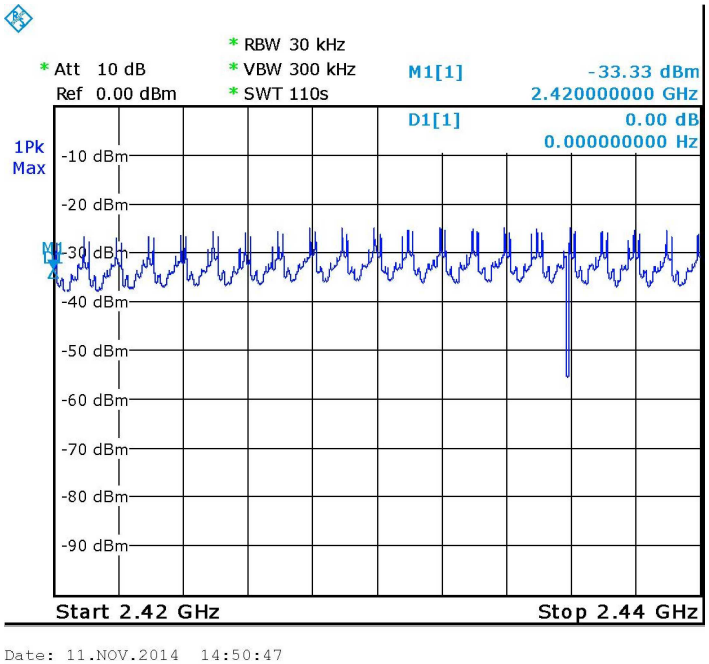

Figure 34. Frequency Hopping, EDR modulation

Number of Hopping Frequencies

E.U.T Description	Rider Communication System
Type	scala rider PACKTALK
Serial Number:	Not Designated

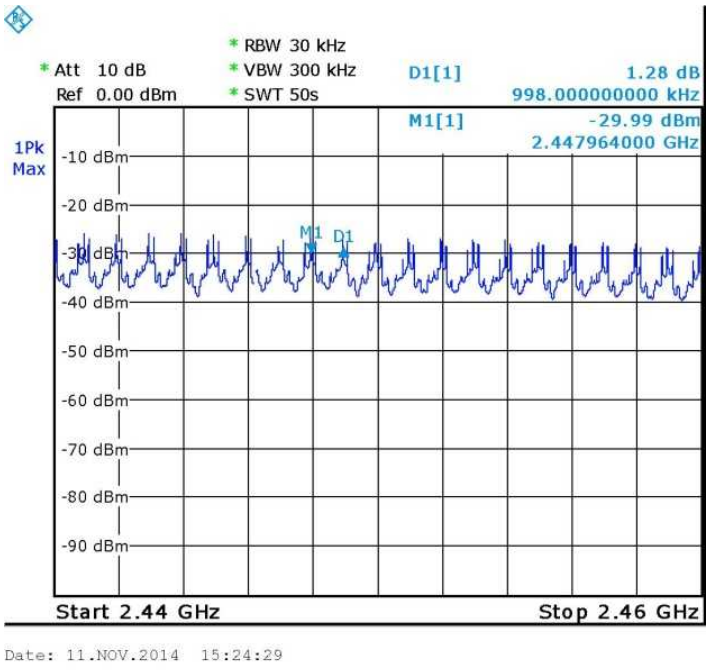

Figure 35. Frequency Hopping, EDR modulation

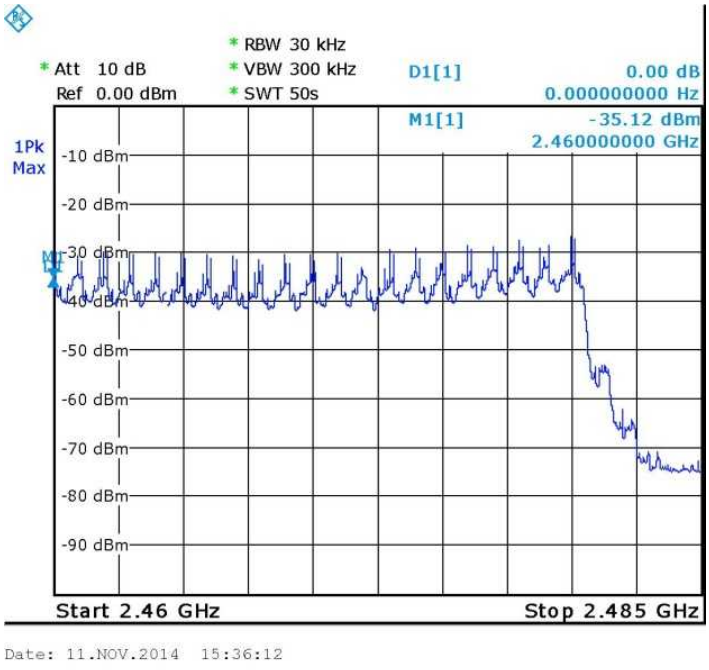

Figure 36. Frequency Hopping, EDR modulation

8.3 Results table

E.U.T. Description: Rider Communication System
Model No.: scala rider PACKTALK

Serial Number: Not Designated

Specification: FCC Part 15, Subpart C, 15.247(a)(1)(iii)

Modulation	Number of Hopping Frequencies	Specification
Standard	79	>75
EDR	79	>75

Figure 37 Number of Hopping Frequencies

TEST PERSONNEL:

Tester Signature: _____ Date: 31.12.14

Typed/Printed Name: M. Zohar

8.4 Test Instrumentation Used; Number of Frequency Hopping

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	R&S	ESIB7	100120	December 19, 2013	1 year
Spectrum Analyzer	R&S	FSL6	100194	December 1, 2013	1 year
Active Loop Antenna	EMCO	6502	9506-2950	November 4, 2014	1 year
Biconilog Antenna	EMCO	3142B	1250	May 22, 2014	2 years
Horn Antenna	ETS	3115	6142	March 14, 2012	3 years
Spectrum Analyzer	HP	8592L	3826A01204	February 28, 2014	1 year
Spectrum Analyzer	HP	8564E	3442A00275	March 2, 2014	1 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	August 22, 2014	1 year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	August 29, 2014	1 year
Antenna Mast	ETS	2070-2	9608-1497	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Table Controller	ETS/EMCO	2090	9608-1456	N/A	N/A

Figure 38 Test Equipment Used

9. Channel Frequency Separation

9.1 Test Specification

Specification: FCC Part 15, Subpart C, 15.247(a) (1)

9.2 Test procedure

The E.U.T. was set to hopping mode.
The spectrum analyzer was set to the following parameters:
Span: 20 MHz
RBW: 30 kHz
VBW: 300 kHz
Detector Function: Peak
Trace: Maximum Hold
The marker delta function to determine the separation between the peaks of the adjacent channels was used.

The E.U.T was evaluated in 2 modulations: EDR and standard.

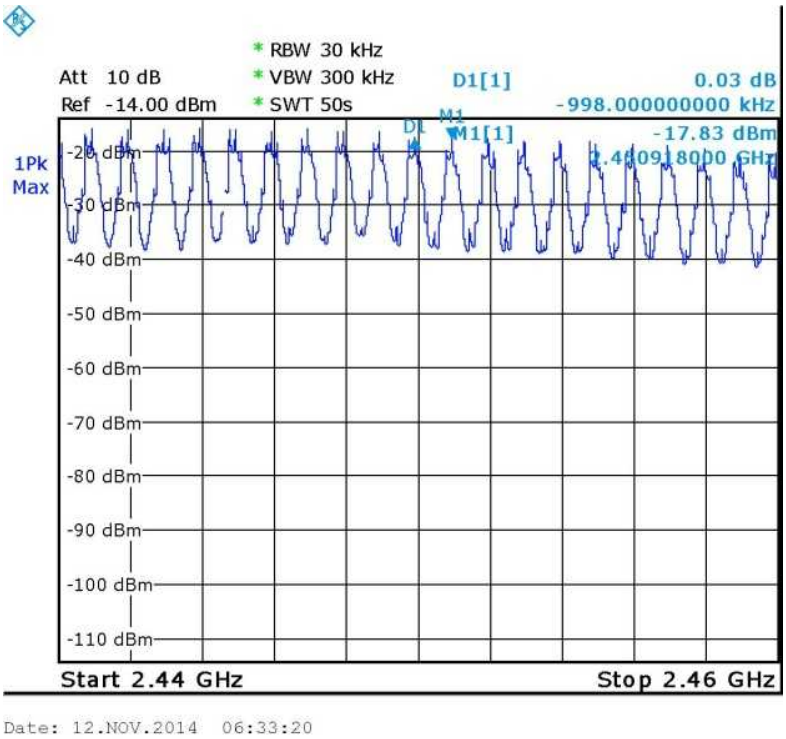

Figure 39. Standard Modulation

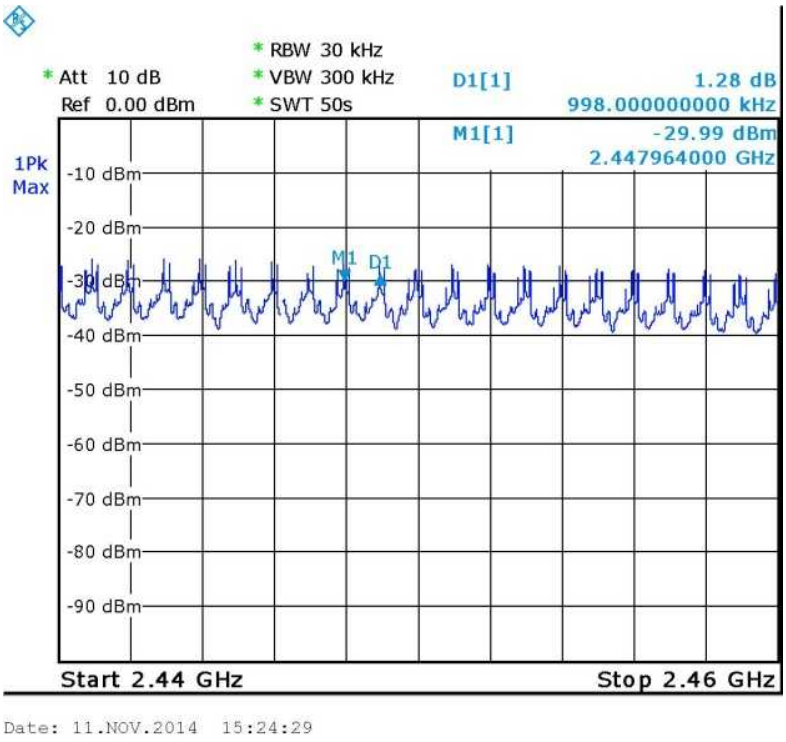

Figure 40. EDR Modulation

9.3 Results table

E.U.T. Description: Rider Communication System
Model No.: scala rider PACKTALK
Serial Number: Not Designated
Specification: FCC Part 15, Subpart C, 15.247(a) (1)

Modulation	Channel Frequency Separation (kHz)	Specification (kHz)	Margin (kHz)
Standard	998	780	218
EDR	998	990	8

Figure 41 Channel Frequency Separation

JUDGEMENT: Passed by 8 kHz

TEST PERSONNEL:

Tester Signature: _____ Date: 31.12.14

Typed/Printed Name: M. Zohar

9.4 Test Instrumentation Used; Channel Frequency Separation

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	R&S	ESIB7	100120	December 19, 2013	1 year
Spectrum Analyzer	R&S	FSL6	100194	December 1, 2013	1 year
Active Loop Antenna	EMCO	6502	9506-2950	November 4, 2014	1 year
Biconilog Antenna	EMCO	3142B	1250	May 22, 2014	2 years
Horn Antenna	ETS	3115	6142	March 14, 2012	3 years
Spectrum Analyzer	HP	8592L	3826A01204	February 28, 2014	1 year
Spectrum Analyzer	HP	8564E	3442A00275	March 2, 2014	1 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	August 22, 2014	1 year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	August 29, 2014	1 year
Antenna Mast	ETS	2070-2	9608-1497	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Table Controller	ETS/EMCO	2090	9608-1456	N/A	N/A

Figure 42 Test Equipment Used

10. Radiated Power Output

10.1 Test Specification

F.C.C. Part 15, Subpart C: 15.247(b)

10.2 Test procedure

The E.U.T was placed on a non-metallic table, 0.8 meters above the ground plane, on a remote-controlled turntable in the OATS. The test distance was 3 meters.
The transmitter unit operated with normal modulation. The EMI receiver was set to 1 MHz resolution BW. The EUT was set up as shown in Figure 3, and its proper operation was checked.

The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.
The E.U.T was evaluated in 2 modulations: EDR and standard (external antenna)

The E.U.T. was tested in three operating channels and frequencies:
2.402 GHz, 2.441 GHz and 2.480 GHz.

Radiated output power levels were measured at selected operation frequencies and the results were converted to power level according to the formula as shown below:

$$P = \frac{(E_{V/m} \times d)^2}{(30 \times G)} \text{ [W]}$$

E- Field Strength (v/m)

d- Distance from transmitter (m)

G- Antenna gain

P- Peak power (W)

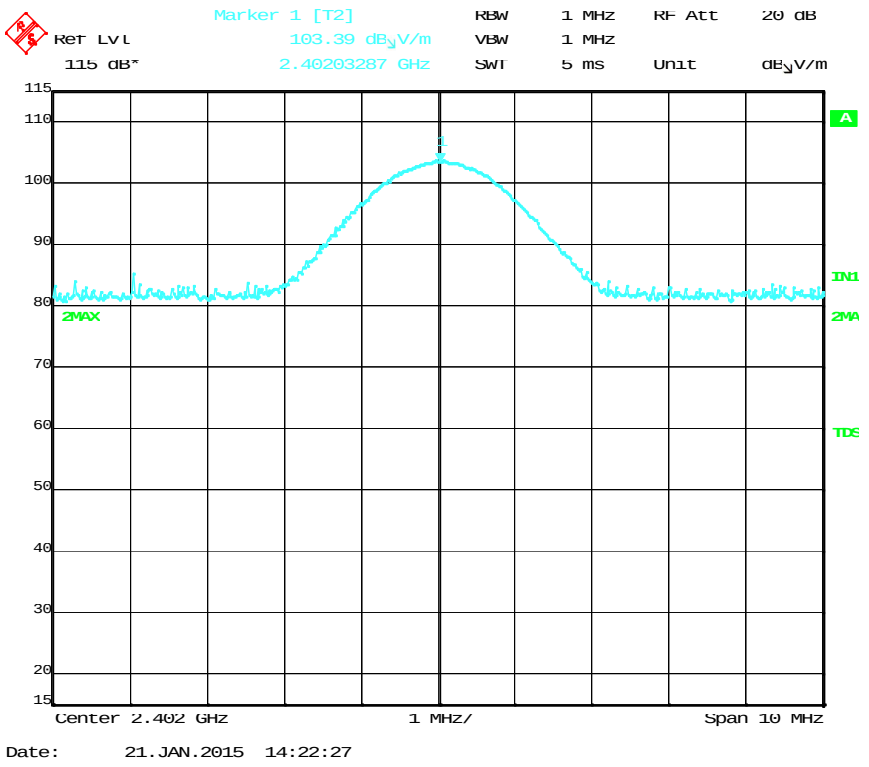

Figure 43 2402.00 MHz – Vertical, Standard Modulation – External Antenna

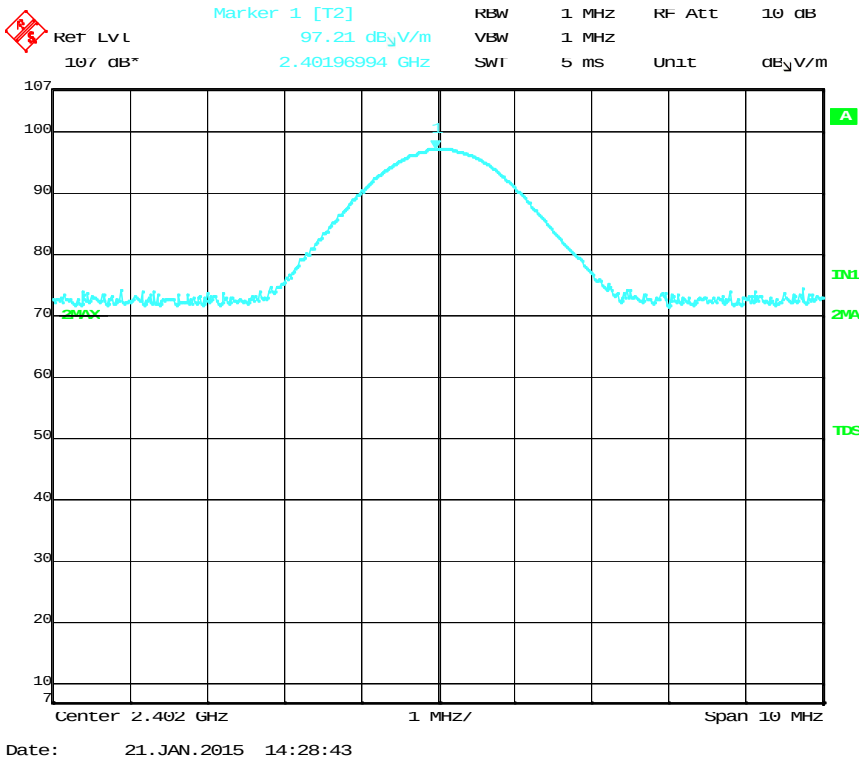

Figure 44 2402.00 MHz – Horizontal, Standard Modulation – External Antenna

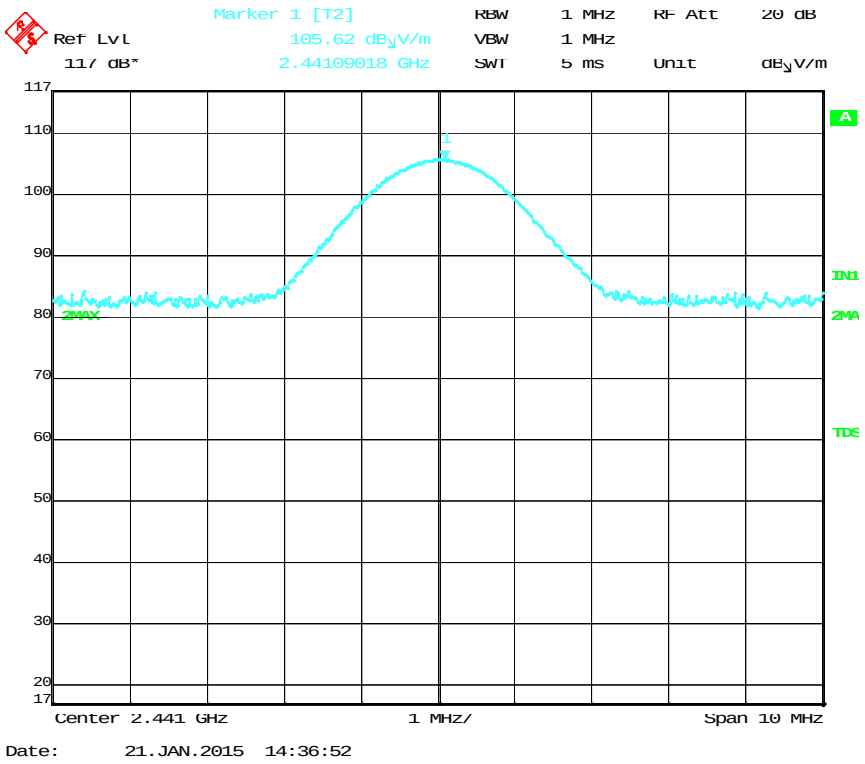

Figure 45 2441.00 MHz – Vertical, Standard Modulation – External Antenna

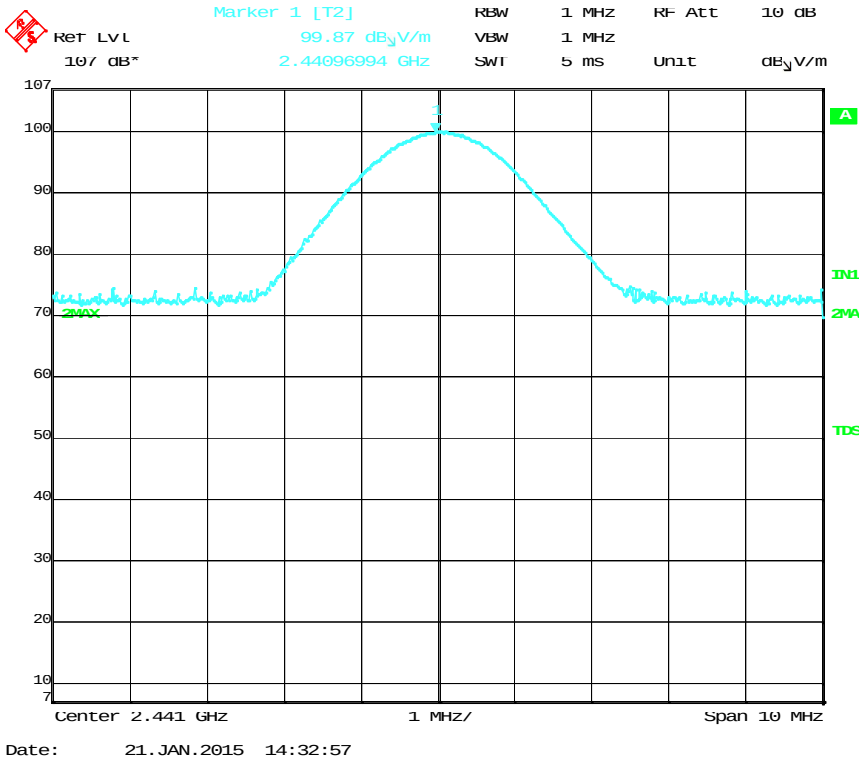

Figure 46 2441.00 MHz – Horizontal, Standard Modulation – External Antenna

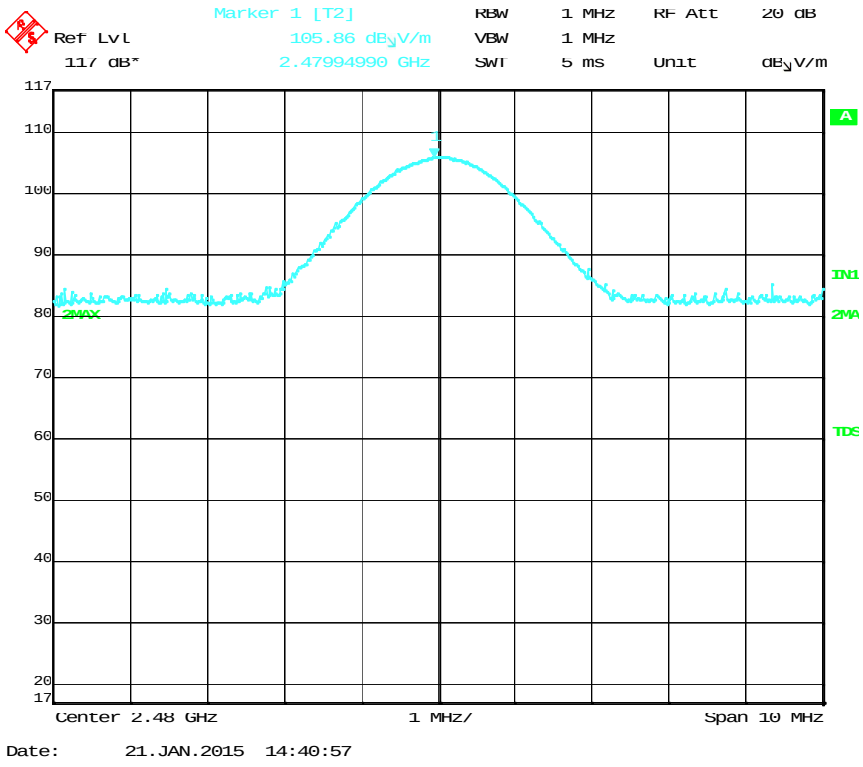

Figure 47 2480.00 MHz – Vertical, Standard Modulation – External Antenna

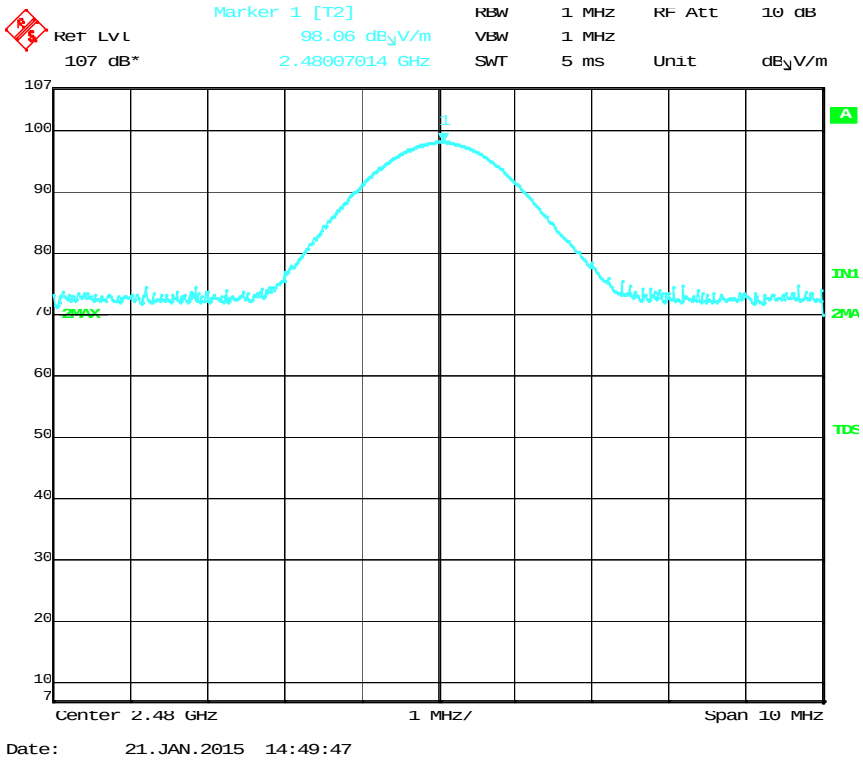

Figure 48 2480.00 MHz – Horizontal, Standard Modulation – External Antenna

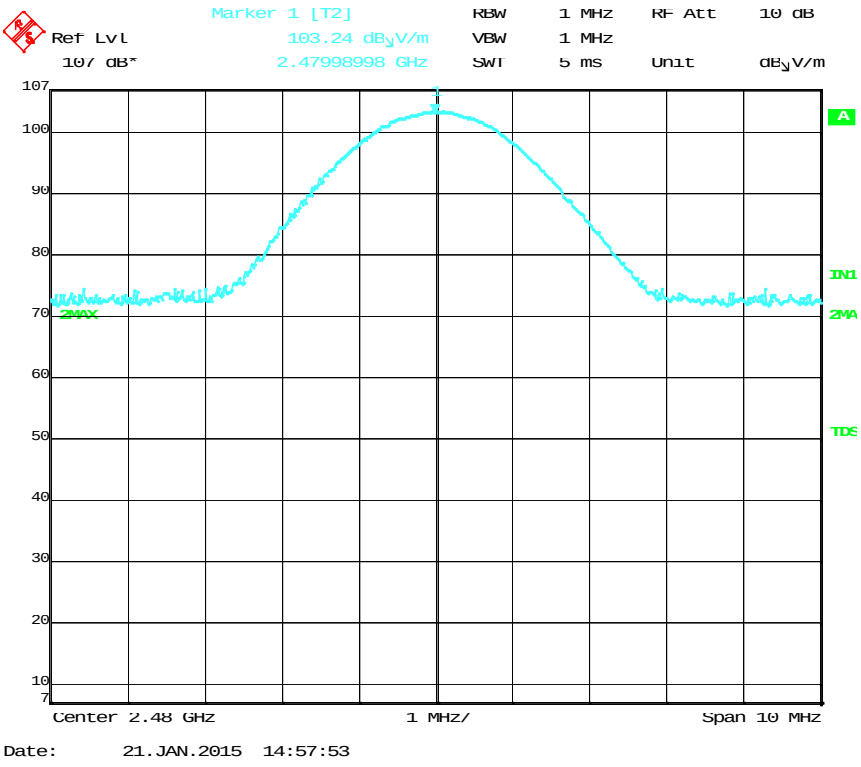

Figure 49 2402.00 MHz – Vertical, EDR Modulation

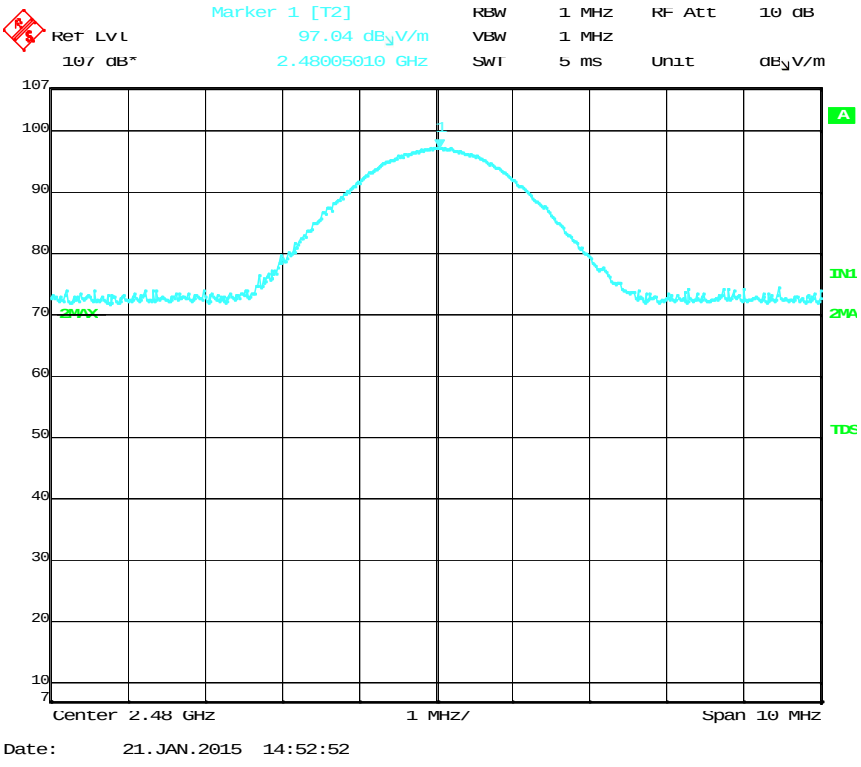

Figure 50 2402.00 MHz – Horizontal, EDR Modulation

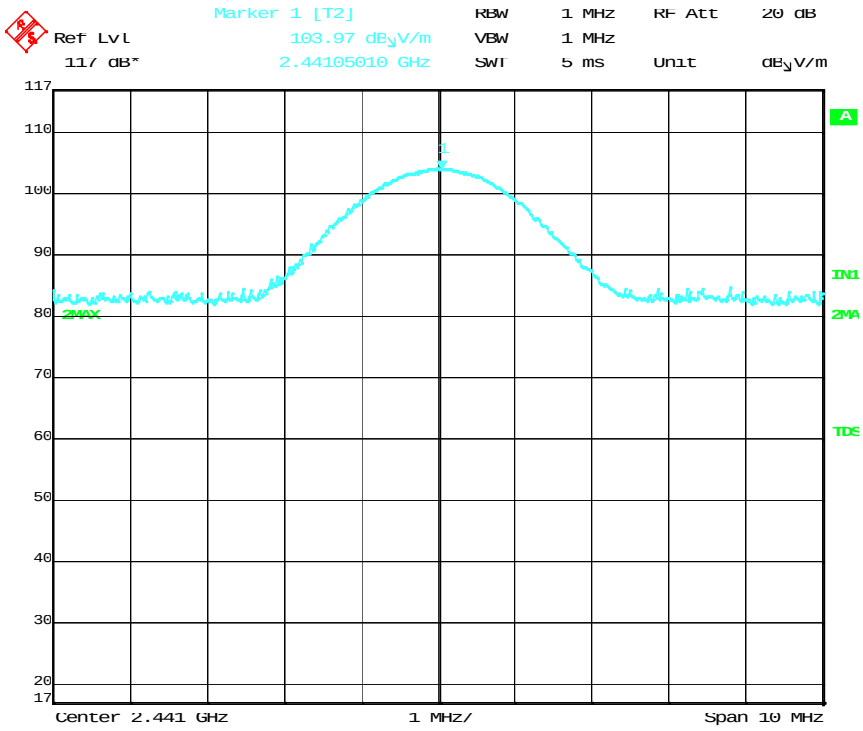

Figure 51 2441.00 MHz – Vertical, EDR Modulation

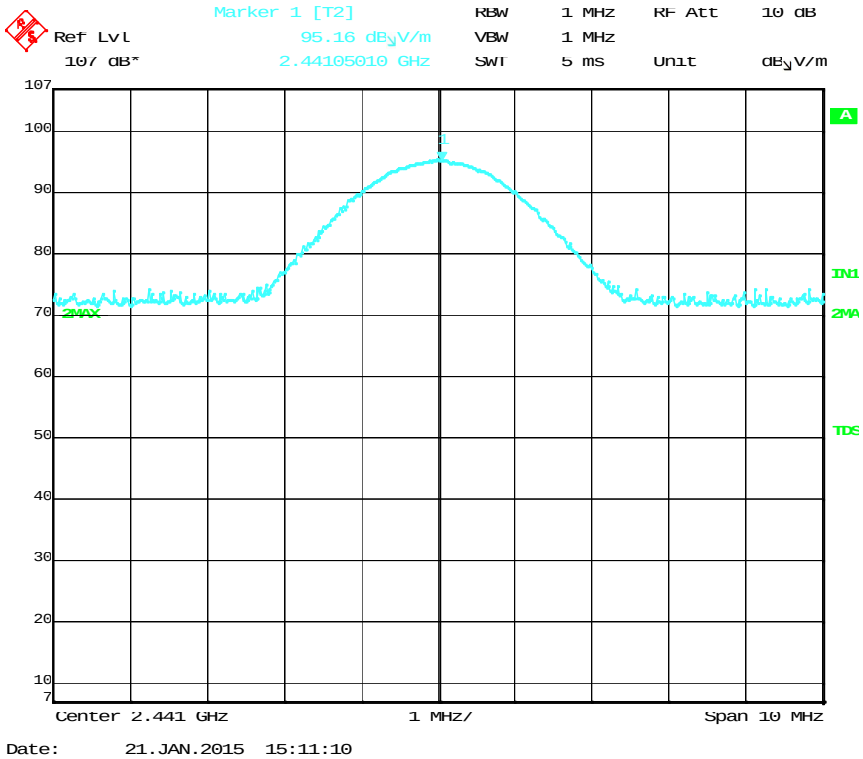

Figure 52 2441.00 MHz – Horizontal, EDR Modulation

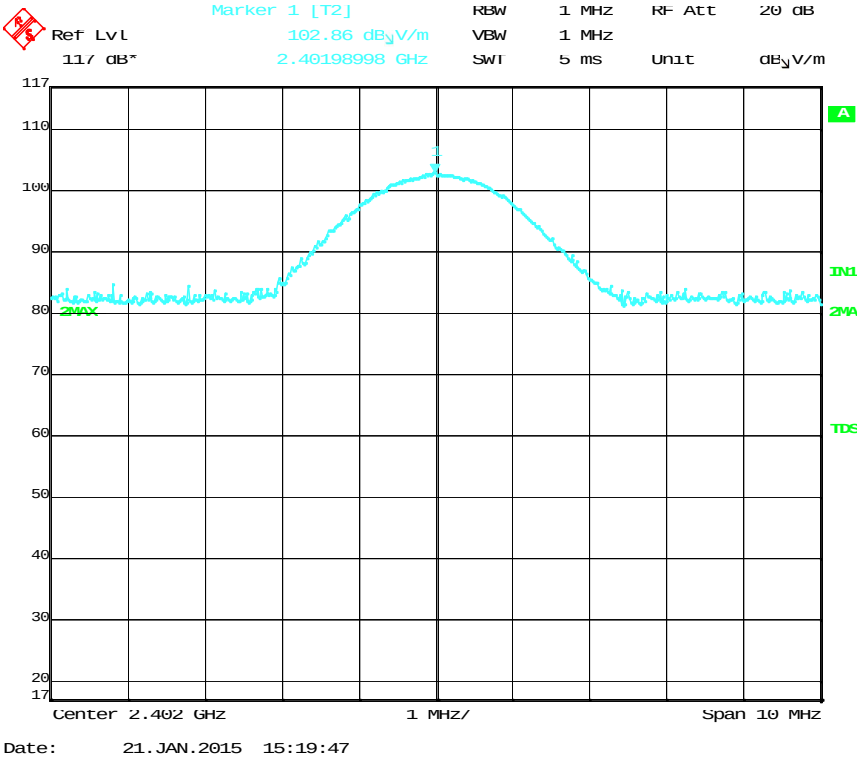

Figure 53 2480.00 MHz – Vertical, EDR Modulation

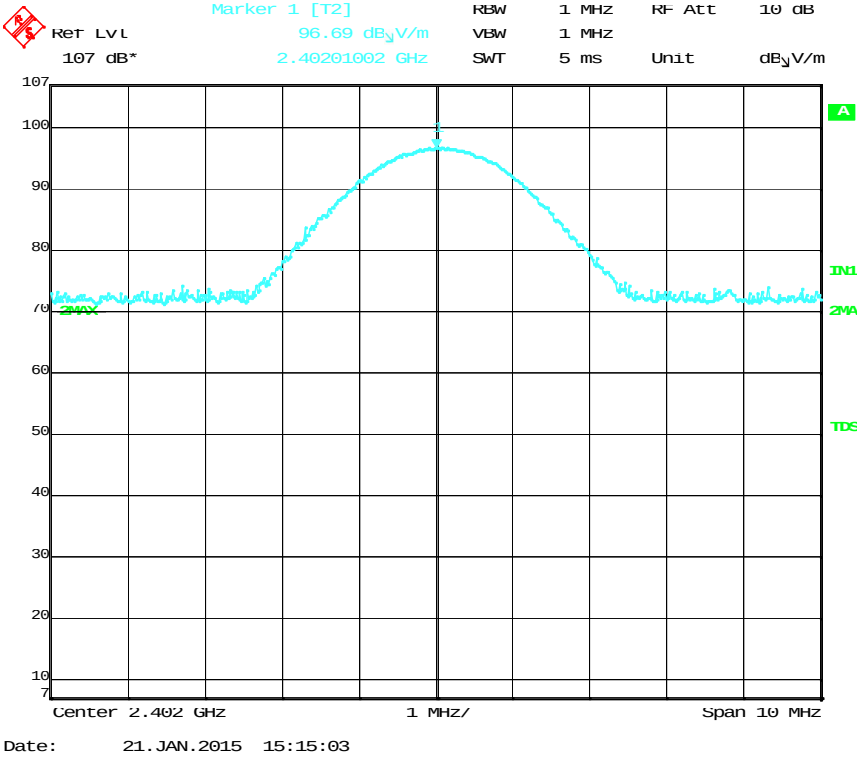

Figure 54 2480.00 MHz – Horizontal, EDR Modulation

10.3 Results Calculation

E.U.T. Description: Rider Communication System
Model No.: scala rider PACKTALK
Serial Number: Not Designated
Specification: F.C.C. Part 15, Subpart C

The following calculations were used to determine maximum peak conducted output power.

$$P = \frac{(E_{V/m} \times d)^2}{(30 \times G)} \text{ [W]}$$

Operation Frequency (MHz)	Modulation	Polarization V/H	Power (dBuV/m)	Conducted Power (dBm)	Power (W)	Specification (W)	Margin (W)
Low	Standard	V	103.39	8.19	0.0066	1.0	-0.9934
Low		H	97.21	2.01	0.0016	1.0	-0.9984
Mid		V	105.62	10.42	0.0109	1.0	-0.9891
Mid		H	99.87	4.67	0.0031	1.0	-0.9969
High		V	105.86	10.66	0.0115	1.0	-0.9885
High		H	98.06	2.86	0.0019	1.0	-0.9981
Low	EDR	V	103.24	8.04	0.0063	1.0	-0.9937
Low		H	97.04	1.84	0.0016	1.0	-0.9984
Mid		V	103.97	8.77	0.0079	1.0	-0.9921
Mid		H	95.16	-0.04	0.0010	1.0	-0.9990
High		V	102.86	7.66	0.0057	1.0	-0.9943
High		H	96.69	1.49	0.0014	1.0	-0.9986

Figure 55 Radiated Power Output

JUDGEMENT: Passed by 0.9885 W

TEST PERSONNEL:
Tester Signature: _____ Date: 26.01.15
Typed/Printed Name: I. Siboni

10.4 Test Equipment Used, Radiated Maximum Power Output

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	R&S	ESIB7	100120	December 19, 2013	1 year
Spectrum Analyzer	R&S	FSL6	100194	December 1, 2013	1 year
Active Loop Antenna	EMCO	6502	9506-2950	November 4, 2014	1 year
Biconilog Antenna	EMCO	3142B	1250	May 22, 2014	2 years
Horn Antenna	ETS	3115	6142	March 14, 2012	3 years
Spectrum Analyzer	HP	8592L	3826A01204	February 28, 2014	1 year
Spectrum Analyzer	HP	8564E	3442A00275	March 2, 2014	1 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	August 22, 2014	1 year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	August 29, 2014	1 year
Antenna Mast	ETS	2070-2	9608-1497	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Table Controller	ETS/EMCO	2090	9608-1456	N/A	N/A

Figure 56 Test Equipment Used

11. Dwell Time on Each Channel

11.1 Test Specification

FCC Part 15, Section 15.247(a)(1)(iii)

11.2 Test Procedure

The E.U.T. was tested in radiated mode. The spectrum analyzer was set to 1 MHz RBW and 3 MHz VBW.

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

The E.U.T was evaluated in 2 modulations: EDR and standard.

Test Results

The E.U.T met the requirements of the FCC Part 15, Section 15.247(a)(1)(iii).

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: _____ Date: 31.12.14

Typed/Printed Name: M. Zohar

Additional information of the results is given in *Figure 57* to *Figure 60.*

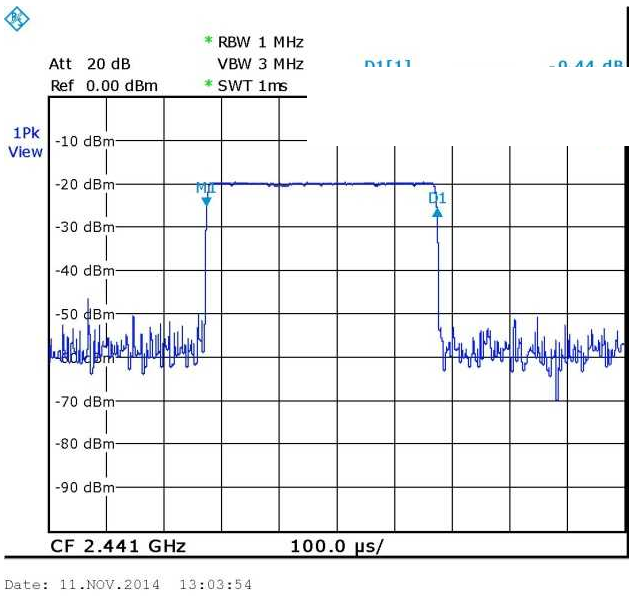

Figure 57 — Ton= 0.4msec, Standard Modulation

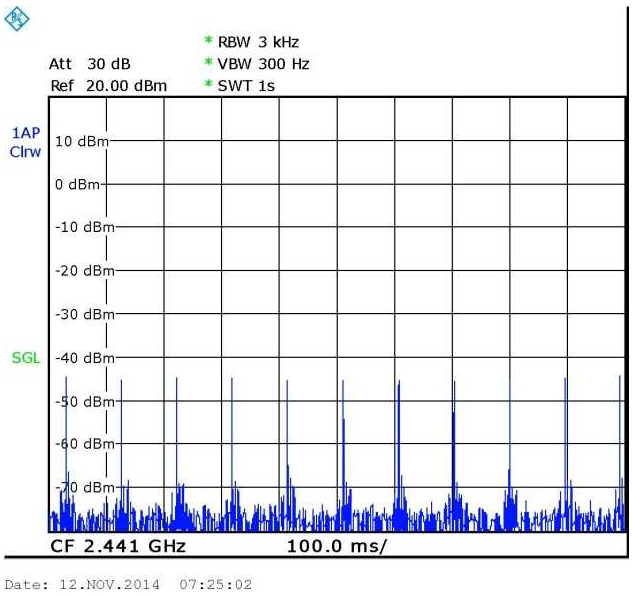

Figure 58 — Num bursts at 1sec = 11, Standard Modulation

[11 X 0.4msecX31.6 =139msec, limit 400msec]

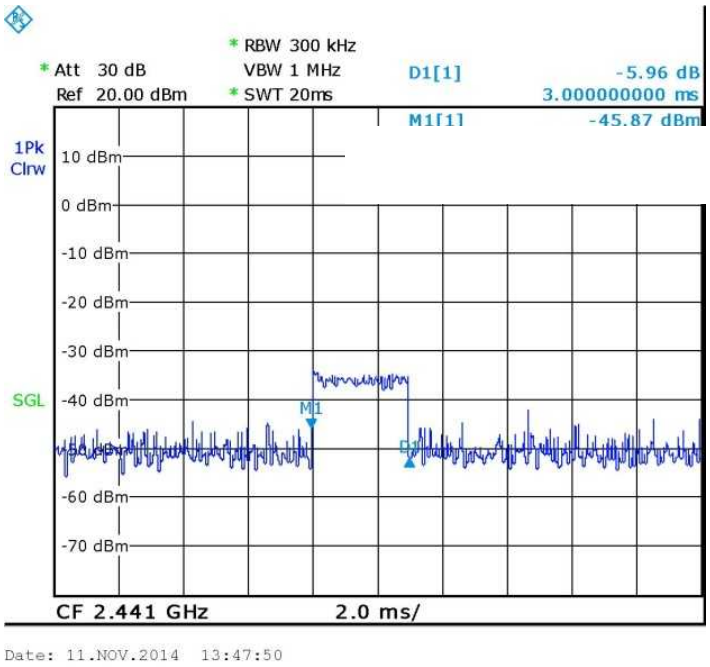

Figure 59 — Ton=3.0msec, EDR Modulation

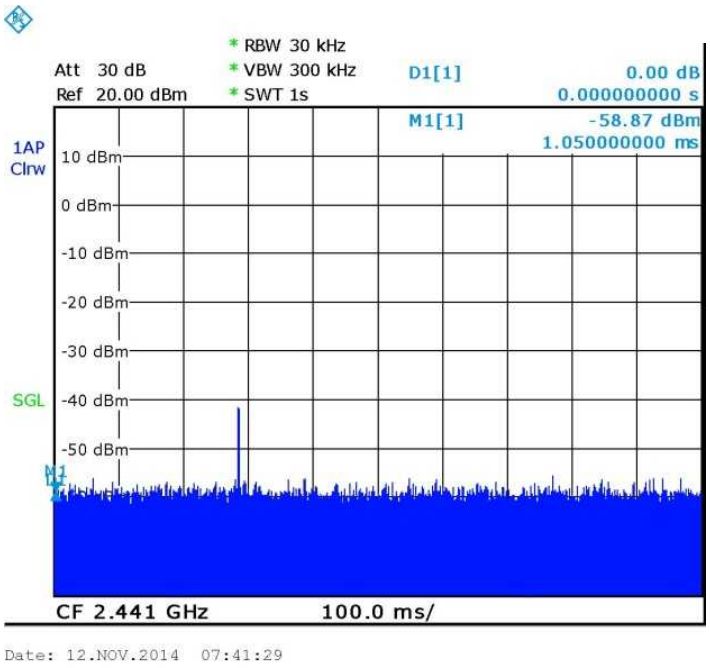

Figure 60 — Num bursts at 1sec= 1, EDR Modulation

[1 X 3.0msec X 31.9 =95.7msec, limit 400msec]

11.3 Test Equipment Used; Dwell Time

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	R&S	ESIB7	100120	December 19, 2013	1 year
Spectrum Analyzer	R&S	FSL6	100194	December 1, 2013	1 year
Active Loop Antenna	EMCO	6502	9506-2950	November 4, 2014	1 year
Biconilog Antenna	EMCO	3142B	1250	May 22, 2014	2 years
Horn Antenna	ETS	3115	6142	March 14, 2012	3 years
Spectrum Analyzer	HP	8592L	3826A01204	February 28, 2014	1 year
Spectrum Analyzer	HP	8564E	3442A00275	March 2, 2014	1 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	August 22, 2014	1 year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	August 29, 2014	1 year
Antenna Mast	ETS	2070-2	9608-1497	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Table Controller	ETS/EMCO	2090	9608-1456	N/A	N/A

Figure 61 Test Equipment Used

12. Band Edge

[In Accordance with section 15.247(d)]

12.1 Test procedure

The E.U.T was placed on a non-metallic table, 0.8 meters above the ground plane, on a remote-controlled turntable in the OATS. The test distance was 3 meters. The transmitter unit operated with normal modulation. The EMI receiver was set to 100 KHz resolution BW. The EUT was set up as shown in Figure 3, and its proper operation was checked.

The EMI receiver was adjusted to the transmission channel at the maximum radiated level. The display line was set to 20 dBc and the EMI receiver was set to the band edge frequencies.

The E.U.T was evaluated in 2 modulations: EDR and standard (external antenna) and in hopping mode.
Maximum power level below 2400 MHz and above 2483.5 MHz was measured relative to power level at the Low and the High channels correspondingly.

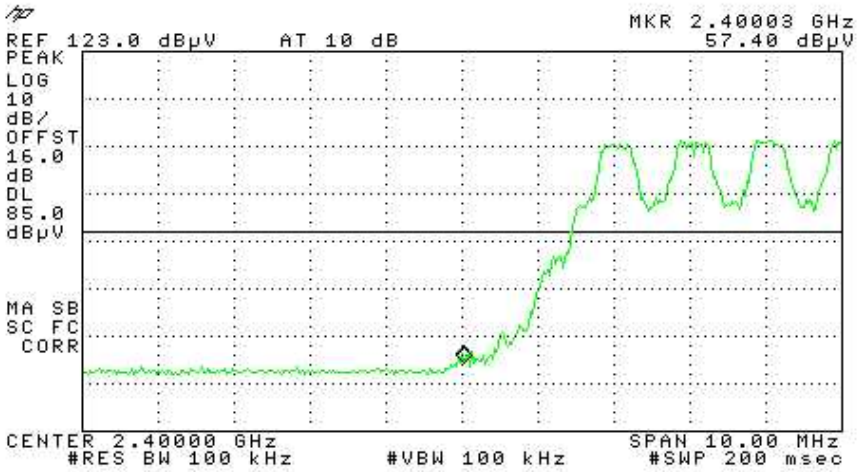

Figure 62 — Lower Band Edge, Standard Modulation

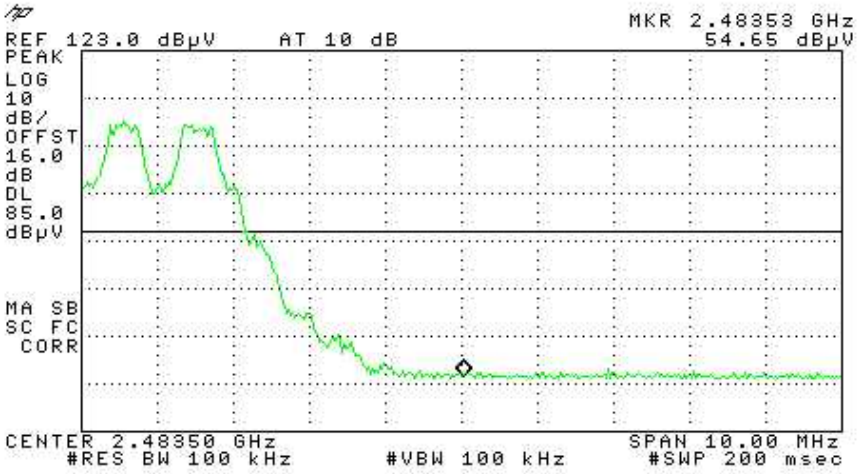

Figure 63 — Upper Band Edge, Standard Modulation

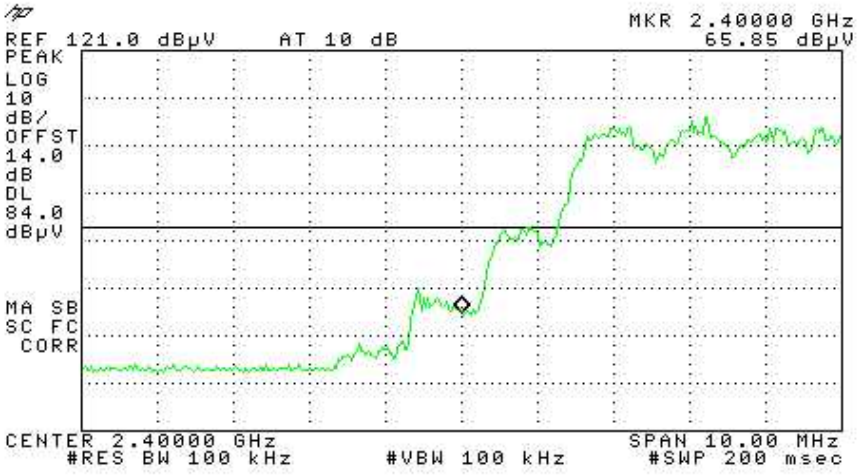

Figure 64 — Lower Band Edge, EDR Modulation

Figure 65 — Upper Band Edge, EDR Modulation

12.2 Results table

E.U.T. Description: Rider Communication System
Model No.: scala rider PACKTALK
Serial Number: Not Designated
Specification: F.C.C. Part 15, Subpart C (15.247 (d))

Operation Frequency (MHz)	Modulation	Band Edge Frequency (MHz)	Spectrum Level (dBuV/m)	Specification (dBuV/m)	Margin (dB)
2402	Standard	2400.0	57.4	85.0	-27.6
2480	Standard	2483.5	54.6	85.0	-30.4
2402	EDR	2400.0	65.8	84.0	-18.2
2480	EDR	2483.5	57.6	84.0	-26.4

Figure 66 Band Edge

JUDGEMENT: Passed by 18.2 dB

TEST PERSONNEL:
Tester Signature: _____ Date: 26.01.15
Typed/Printed Name: I. Siboni

12.3 Test Equipment Used, Band Edge Spectrum

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	R&S	ESIB7	100120	December 19, 2013	1 year
Spectrum Analyzer	R&S	FSL6	100194	December 1, 2013	1 year
Active Loop Antenna	EMCO	6502	9506-2950	November 4, 2014	1 year
Biconilog Antenna	EMCO	3142B	1250	May 22, 2014	2 years
Horn Antenna	ETS	3115	6142	March 14, 2012	3 years
Spectrum Analyzer	HP	8592L	3826A01204	February 28, 2014	1 year
Spectrum Analyzer	HP	8564E	3442A00275	March 2, 2014	1 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	August 22, 2014	1 year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	August 29, 2014	1 year
Antenna Mast	ETS	2070-2	9608-1497	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Table Controller	ETS/EMCO	2090	9608-1456	N/A	N/A

Figure 67 Test Equipment Used

13. Radiated Emission, 9 kHz – 30 MHz

13.1 Test Specification

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

13.2 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.

The E.U.T was evaluated in standard modulation.

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.

13.3 Measured Data

JUDGEMENT: Passed

The EUT met the requirements of the F.C.C. Part 15, Subpart C, Section 209 specification.

The results for all three channels were the same.

No signals were detected in the frequency range of 9 kHz – 30 MHz.

TEST PERSONNEL:

Tester Signature: _____ Date: 31.12.14

Typed/Printed Name: M. Zohar

13.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	R&S	ESIB7	100120	December 19, 2013	1 year
Spectrum Analyzer	R&S	FSL6	100194	December 1, 2013	1 year
Active Loop Antenna	EMCO	6502	9506-2950	November 4, 2014	1 year
Biconilog Antenna	EMCO	3142B	1250	May 22, 2014	2 years
Horn Antenna	ETS	3115	6142	March 14, 2012	3 years
Spectrum Analyzer	HP	8592L	3826A01204	February 28, 2014	1 year
Spectrum Analyzer	HP	8564E	3442A00275	March 2, 2014	1 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	August 22, 2014	1 year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	August 29, 2014	1 year
Antenna Mast	ETS	2070-2	9608-1497	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Table Controller	ETS/EMCO	2090	9608-1456	N/A	N/A

Figure 68 Test Equipment Used

13.5 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 [dBμv/m]
RA:	Receiver Amplitude [dBμv]
AF:	Receiving Antenna Correction Factor [dB/m]
CF:	Cable Attenuation Factor [dB]

Example: FS = 30.7 dBμV (RA) + 14.0 dB (AF) + 0.9 dB (CF) = 45.6 dBμV

No external pre-amplifiers are used.

14. Spurious Radiated Emission 30 – 25000 MHz

14.1 Test Specification

30 MHz- 25,000 MHz, F.C.C., Part 15, Subpart C

14.2 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 E.U.T was evaluated in 2 modulations: EDR and standard.

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

In the frequency range 1-6.0 GHz, a computerized EMI receiver complying with CISPR 16 requirements was used.
In the frequency range 6.0-25.0 GHz, a spectrum analyzer including a low noise amplifier was used. During average measurements the IF bandwidth was 1 MHz and the video bandwidth was 100Hz. During peak measurements the IF bandwidth was 1 MHz and the video bandwidth was 3 MHz.
The test distance was 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.)

14.3 Test Data

JUDGEMENT: Passed

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

For the operation channel 2.402 GHz, the margin between the emission level and the specification limit is 1.1 db in the worst case at the frequency of 2390.0 MHz, vertical polarization, EDR modulation.

For the operation channel 2.441 GHz, the margin between the emission level and the specification limit is 1.7 db in the worst case at the frequency of 4882.0 MHz, vertical polarization, EDR modulation.

For the operation channel 2.480 GHz, the margin between the emission level and the specification limit is 1.6 db in the worst case at the frequency of 2483.5 MHz, vertical polarization, EDR modulation.

TEST PERSONNEL:

Tester Signature: _____ Date: 31.12.14

Typed/Printed Name: M. Zohar

Radiated Emission

E.U.T Description	Rider Communication System
Type	scala rider PACKTALK
Serial Number:	Not Designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical
Frequency range: 1.0 GHz to 25.0 GHz
Test Distance: 3 meters
Detector: Peak

Operation Frequency (MHz)	Modulation	Freq. (MHz)	Polarity (H/V)	Peak Reading (dBµV/m)	Peak. Specification (dB µV/m)	Peak. Margin (dB)
2402.0	Standard	2390.0	H	53.1	74.0	-20.9
2402.0	Standard	2390.0	V	54.9	74.0	-19.1
2402.0	Standard	4804.0	H	60.7	74.0	-13.3
2402.0	Standard	4804.0	V	62.1	74.0	-11.9
2402.0	Standard	9608.0	H	66.9	81.0	-14.1
2402.0	Standard	9608.0	V	67.1	89.0	-21.9
2441.0	Standard	4882.0	H	60.0	74.0	-14.0
2441.0	Standard	4882.0	V	61.8	74.0	-12.2
2441.0	Standard	9764.0	H	67.0	84.0	-17.0
2441.0	Standard	9764.0	V	67.2	91.0	-23.8
2480.0	Standard	4960.0	H	60.2	74.0	-13.8
2480.0	Standard	4960.0	V	63.5	74.0	-10.5
2480.0	Standard	9920.0	H	66.0	84.0	-18.0
2480.0	Standard	9920.0	V	65.2	92.0	-26.8
2480.0	Standard	2483.5	H	61.9	74.0	-12.1
2480.0	Standard	2483.5	V	64.7	74.0	-9.3

Figure 69. 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 Amp" includes correction factor.

* “Correction Factor” = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

Radiated Emission

E.U.T Description Rider Communication System
Type scala rider PACKTALK
Serial Number: Not Designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 1.0 GHz to 25.0 GHz
Test Distance: 3 meters Detector: Average

Operation Frequency (MHz)	Modulation	Freq. (MHz)	Polarity (H/V)	Average Reading (dBµV/m)	Average Specification (dB µV/m)	Average Margin (dB)
2402.0	Standard	2390.0	H	43.2	54.0	-10.8
2402.0	Standard	2390.0	V	45.0	54.0	-9.0
2402.0	Standard	4804.0	H	50.8	54.0	-3.2
2402.0	Standard	4804.0	V	52.2	54.0	-1.8
2402.0	Standard	9608.0	H	N/A	N/A	N/A
2402.0	Standard	9608.0	V	N/A	N/A	N/A
2441.0	Standard	4882.0	H	50.1	54.0	-3.9
2441.0	Standard	4882.0	V	51.9	54.0	-2.1
2441.0	Standard	9764.0	H	N/A	N/A	N/A
2441.0	Standard	9764.0	V	N/A	N/A	N/A
2480.0	Standard	4960.0	H	40.3	54.0	-13.7
2480.0	Standard	4960.0	V	43.7	54.0	-10.3
2480.0	Standard	9920.0	H	N/A	N/A	N/A
2480.0	Standard	9920.0	V	N/A	N/A	N/A
2480.0	Standard	2483.5	H	49.2	54.0	-4.8
2480.0	Standard	2483.5	V	50.2	54.0	-3.8

Figure 70. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Average

Notes:

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 Amp" includes correction factor.

* Correction Factor = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

Radiated Emission

E.U.T Description Rider Communication System
Type scala rider PACKTALK
Serial Number: Not Designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 1.0 GHz to 25.0 GHz
Test Distance: 3 meters Detector: Peak

Operation Frequency (MHz)	Modulation	Freq. (MHz)	Polarity (H/V)	Peak Reading (dBµV/m)	Peak. Specification (dB µV/m)	Peak. Margin (dB)
2402.0	EDR	2390.0	H	61.2	74.0	-12.8
2402.0	EDR	2390.0	V	61.7	74.0	-12.3
2402.0	EDR	4804.0	H	69.8	74.0	-4.2
2402.0	EDR	4804.0	V	70.8	74.0	-3.2
2402.0	EDR	9608.0	H	61.2	71.0	-9.8
2402.0	EDR	9608.0	V	60.0	71.1	-11.1
2441.0	EDR	4882.0	H	71.5	74.0	-2.5
2441.0	EDR	4882.0	V	70.9	74.0	-3.1
2441.0	EDR	9764.0	H	60.9	71.0	-10.1
2441.0	EDR	9764.0	V	60.1	70.0	-9.9
2480.0	EDR	4960.0	H	72.2	74.0	-1.8
2480.0	EDR	4960.0	V	72.3	74.0	-1.7
2480.0	EDR	9920.0	H	57.2	75.6	-18.4
2480.0	EDR	9920.0	V	58.7	74.2	-15.5
2480.0	EDR	2483.5	H	69.2	74.0	-4.8
2480.0	EDR	2483.5	V	63.4	74.0	-10.6

Figure 71. 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 Amp" includes correction factor.

* “Correction Factor” = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

Radiated Emission

E.U.T Description	Rider Communication System
Type	scala rider PACKTALK
Serial Number:	Not Designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical
Frequency range: 1.0 GHz to 25.0 GHz
Test Distance: 3 meters
Detector: Average

Operation Frequency (MHz)	Modulation	Freq. (MHz)	Polarity (H/V)	Average Reading (dBµV/m)	Average Specification (dB µV/m)	Average Margin (dB)
2402.0	EDR	2390.0	H	52.3	54.0	-1.7
2402.0	EDR	2390.0	V	52.9	54.0	-1.1
2402.0	EDR	4804.0	H	48.7	54.0	-5.3
2402.0	EDR	4804.0	V	49.4	54.0	-4.6
2402.0	EDR	9608.0	H	N/A	N/A	N/A
2402.0	EDR	9608.0	V	N/A	N/A	N/A
2441.0	EDR	4882.0	H	51.4	54.0	-2.6
2441.0	EDR	4882.0	V	52.3	54.0	-1.7
2441.0	EDR	9764.0	H	N/A	N/A	N/A
2441.0	EDR	9764.0	V	N/A	N/A	N/A
2480.0	EDR	4960.0	H	52.1	54.0	-1.9
2480.0	EDR	4960.0	V	52.0	54.0	-2.0
2480.0	EDR	9920.0	H	N/A	N/A	N/A
2480.0	EDR	9920.0	V	N/A	N/A	N/A
2480.0	EDR	2483.5	H	45.8	54.0	-8.2
2480.0	EDR	2483.5	V	52.4	54.0	-1.6

Figure 72. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Average

Notes:

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 Amp" includes correction factor.

* Correction Factor = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

Intermodulation Radiated Emission

E.U.T Description	Rider Communication System
Type	scala rider PACKTALK
Serial Number:	Not Designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical
Frequency range: 1.0 GHz to 25.0 GHz
Test Distance: 3 meters
Detector: Peak
Frequency: 2405 MHz + 2402 MHz

Frequency (MHz)	Modulation	Polarity (H/V)	Peak Reading (dBµV/m)	Peak Specification (dB µV/m)	Peak Margin (dB)
2399.0	PT + standard	H	57.1	73.0	-15.9
2399.0	PT + standard	V	74.3	80.0	-5.7
2396.0	PT + standard	H	52.5	73.0	-20.5
2396.0	PT + standard	V	73.6	80.0	-6.4
2393.0	PT + standard	H	52.7	73.0	-20.3
2393.0	PT + standard	V	73.7	80.0	-6.3
2390.0	PT + standard	H	64.1	74.0	-9.9
2390.0	PT + standard	V	68.3	74.0	-5.7

Note: All the above results was OATS background noise

Figure 73. 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 Amp" includes correction factor.

* "Correction Factor" = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

Intermodulation Radiated Emission

E.U.T Description	Rider Communication System
Type	scala rider PACKTALK
Serial Number:	Not Designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical
Test Distance: 3 meters
Frequency: 2405 MHz + 2402 MHz

Frequency range: 1.0 GHz to 25.0 GHz
Detector: Average

Frequency (MHz)	Modulation	Polarity (H/V)	AVG. Reading (dBµV/m)	AVG. Specification (dB µV/m)	AVG. Margin (dB)
2399.0	PT + standard	H	N/A	N/A	N/A
2399.0	PT + standard	V	N/A	N/A	N/A
2396.0	PT + standard	H	N/A	N/A	N/A
2396.0	PT + standard	V	N/A	N/A	N/A
2393.0	PT + standard	H	N/A	N/A	N/A
2393.0	PT + standard	V	N/A	N/A	N/A
2390.0	PT + standard	H	41.1	54.0	-12.9
2390.0	PT + standard	V	43.1	54.0	-10.9

Note: All the above results was OATS background noise

Figure 74. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Average

Notes:

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 Amp" includes correction factor.

* Correction Factor = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

14.4 Test Instrumentation Used; Radiated Measurements

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	R&S	ESIB7	100120	December 19, 2013	1 year
Spectrum Analyzer	R&S	FSL6	100194	December 1, 2013	1 year
Active Loop Antenna	EMCO	6502	9506-2950	November 4, 2014	1 year
Biconilog Antenna	EMCO	3142B	1250	May 22, 2014	2 years
Horn Antenna	ETS	3115	6142	March 14, 2012	3 years
Horn Antenna	ARA	SWH-28	1007	March 30, 2014	3 years
Spectrum Analyzer	HP	8592L	3826A01204	February 28, 2014	1 year
Spectrum Analyzer	HP	8564E	3442A00275	March 2, 2014	1 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	August 22, 2014	1 year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	August 29, 2014	1 year
Antenna Mast	ETS	2070-2	9608-1497	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Table Controller	ETS/EMCO	2090	9608-1456	N/A	N/A

Figure 75 Test Equipment Used

14.5 Field Strength Calculation 30 – 1000 MHz

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

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

FS:	Field Strength [dBμv/m]
RA:	Receiver Amplitude [dBμv]
AF:	Receiving Antenna Correction Factor [dB/m]
CF:	Cable Attenuation Factor [dB]

Example: FS = 30.7 dBμV (RA) + 14.0 dB (AF) + 0.9 dB (CF) = 45.6 dBμV

No external pre-amplifiers are used.

15. Antenna Gain/Information

The antenna gain is 1.7 dBi, integral.

16. R.F Exposure/Safety

Typical use of the E.U.T. is as a Rider Communication System. The typical placement of the E.U.T. is on a motorcycle helmet. See photo on following page. The distance between the E.U.T. and the user in the worst case application, is 3 cm.

Calculation of Maximum Permissible Exposure (MPE)

Based on Section 1.1310 Requirements

(a) FCC limits at 2480 MHz is: $1\frac{mW}{cm^2}$

Using table 1 of Section 1.1310 limit for general population/uncontrolled exposures, the above level is an average over 30 minutes.

(b) The power density produced by the E.U.T. is

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

P_t- Transmitted Power 105.86 dBuV/m = 11.64 mW

G_T- Antenna Gain, 0 dBi = testing performed radiated, power results include antenna gain

R- Distance from Transmitter using 3 cm worst case

(c) The peak power density is :

$$S = \frac{11.64}{4\pi (3)^2} = 0.103\frac{mW}{cm^2}$$

(d) Intermodulated RF Exposure

2405 MHz - Transmitted Power 104.4 dBuV/m (Peak) = 8.31764 mW
Bluetooth - Transmitted Power 105.86 dBuV/m = 11.64 mW

$$S = \frac{(8.32 + 11.64)}{4\pi (3)^2} = 0.1765\frac{mW}{cm^2}$$

(e)These are below the FCC limit.

17. APPENDIX B - CORRECTION FACTORS

17.1 Correction factors for CABLE

from EMI receiver to test antenna at 3 meter range.

Frequency (MHz)	Cable Loss (dB)	Frequency (MHz)	Cable Loss (dB)
0.010	0.4	50.00	1.2
0.015	0.2	100.00	0.7
0.020	0.2	150.00	20.1
0.030	0.3	200.00	2.3
0.050	0.3	300.00	2.9
0.075	0.3	500.00	3.8
0.100	0.2	750.00	4.8
0.150	0.2	1000.00	5.4
0.200	0.3	1500.00	6.7
0.500	0.4	2000.00	9.0
1.00	0.4	2500.00	9.4
1.50	0.5	3000.00	9.9
2.00	0.5	3500.00	10.2
5.00	0.6	4000.00	11.2
10.00	0.8	4500.00	12.1
15.00	0.9	5000.00	13.1
20.00	0.8	5500.00	13.5
		6000.00	14.5

NOTES:

1. The cable type is SPUMA400 RF-11N(X2) and 39m long

2. The cable is manufactured by Huber + Suhner

17.2 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.

17.3 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.

17.4 Correction factors for Bilog ANTENNA

Model: 3142
Antenna serial number: 1250
3 meter range

FREQUENCY (MHz)	AFE (dB/m)	FREQUENCY (MHz)	AFE (dB/m)
30	18.4	1100	25
40	13.7	1200	24.9
50	9.9	1300	26
60	8.1	1400	26.1
70	7.4	1500	27.1
80	7.2	1600	27.2
90	7.5	1700	28.3
100	8.5	1800	28.1
120	7.8	1900	28.5
140	8.5	2000	28.9
160	10.8		
180	10.4		
200	10.5		
250	12.7		
300	14.3		
400	17		
600	19.6		
700	21.1		
800	21.4		
900	23.5		
1000	24.3		

17.5 Correction factors for Horn ANTENNA.

Model: 3115

Antenna serial number: 6142

3 meter range

FREQUENCY	Antenna Factor	FREQUENCY	Antenna Factor
(MHz)	(dB/m)	**(MHz)**	(dB/m)
1000	**23.9**	**10500**	**38.4**
1500	**25.4**	**11000**	**38.5**
2000	**27.3**	**11500**	**39.4**
2500	**28.5**	**12000**	**39.2**
3000	**30.4**	**12500**	**39.4**
3500	**31.6**	**13000**	**40.7**
4000	**33**	**14000**	**42.1**
4500	**32.7**	**15000**	**40.1**
5000	**34.1**	**16000**	**38.2**
5500	**34.5**	**17000**	**41.7**
6000	**34.9**	**17500**	**45.7**
6500	**35.1**	**18000**	**47.7**
7000	**35.9**		
7500	**37.5**		
8000	**37.6**		
8500	**38.3**		
9000	**38.5**		
9500	**38.1**		
10000	**38.6**		

17.6 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 38M3O.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".*

17.7 Correction factors for Double-Ridged Waveguide Horn

Model: 3115, S/N 29845
at 3 meter range.

FREQUENCY (GHz)	ANTENNA FACTOR (dB 1/m)	ANTENNA Gain (dBi)	FREQUENCY (GHz)	ANTENNA FACTOR (dB 1/m)	ANTENNA Gain (dBi)
1.0	24.8	5.4	10.0	38.8	11.4
1.5	26.1	7.6	10.5	38.9	11.8
2.0	28.6	7.7	11.0	39.0	12.1
2.5	29.8	8.4	11.5	39.6	11.8
3.0	31.4	8.4	12.0	39.8	12.0
3.5	32.4	8.7	12.5	39.6	12.5
4.0	33.7	8.6	13.0	40.0	12.5
4.5	33.4	9.9	13.5	39.8	13.0
5.0	34.5	9.7	14.0	40.2	13.0
5.5	35.1	9.9	14.5	40.6	12.9
6.0	35.4	10.4	15.0	41.3	12.4
6.5	35.6	10.8	15.5	39.5	14.6
7.0	36.2	10.9	16.0	38.8	15.5
7.5	37.3	10.4	16.5	40.0	14.6
8.0	37.7	10.6	17.0	41.4	13.4
8.5	38.3	10.5	17.5	44.8	10.3
9.0	38.5	10.8	18.0	47.2	8.1
9.5	38.7	11.1			

17.8 Correction factors for Horn Antenna

Model: SWH-28
at 1 meter range.

FREQUENCY (GHz)	AFE (dB /m)	Gain (dB1)
18.0	40.3	16.1
19.0	40.3	16.3
20.0	40.3	16.1
21.0	40.3	16.3
22.0	40.4	16.8
23.0	40.5	16.4
24.0	40.5	16.6
25.0	40.5	16.7
26.0	40.6	16.4

17.9 Correction factors for ACTIVE LOOP ANTENNA

Model 6502
S/N 9506-2950

FREQUENCY	Magnetic Antenna Factor	Electric Antenna Factor
(MHz)	(dB)	(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

18. Comparison Industry Canada Requirements With FCC

Cardo Peripheral Systems M/N: scala rider PACKTALK
IC: 4668A-ER19 FCC ID: Q95ER19

Test	FCC	IC
❑ Conducted Emission	15.207	RSS 210 Issue 8 Clause 2.5
❑ Radiated Emission	15.209	RSS 210 Issue 8 Clause 2.5
❑ Max power / Peak power	15.247(b)(3)	RSS 210 Issue 8 A8.4(4)
❑ 6dB BW	15.247(a)2	RSS 210 Issue 8 A8.2a
❑ Power density	15.247(e)	RSS 210 Issue 8 A8.2b
❑ Spurious radiated emission in the restricted band	15.205(c)	RSS 210 Issue 8 2.5 RSS Gen 7.2.2 (Table 1)
❑ Band edge spectrum	15.247(d)	RSS 210 Issue 8 A8.5
❑ RF Exposure Limits	1.1310	RSS 102 4.4