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DATE: 11 March 2015

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

FCC Radio Test Report

for

Cardo Peripheral Systems

Equipment under test:

Rider Communication System

SRC-System PRO
2.4 GHz Bluetooth
(Standard, EDR)

Tested by: _____
I. Siboni

Approved by: _____
D. Shidlowsky

Measurement/Technical Report for
Cardo Peripheral Systems

Rider Communication System

SRC-System PRO

FCC ID: Q95ER20

IC ID: 4668A-ER20

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:
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e-mail Rpinchuck@itl.co.il

Applicant for this device:
(different from "prepared by")
Avi Moato
Cardo Peripheral Systems
13 Hamifal St.,
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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.:	SRC-System PRO
Equipment Serial No.:	Not Designated
Date of Receipt of E.U.T:	01.01.2015
Start of Test:	01.01.2015
End of Test:	20.01.2015
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.), 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

The SRC System Pro is a class 1 Bluetooth headset and Bluetooth intercom for motorbikes, designed specifically for Schuberth helmets. This system provides communication and entertainment features.

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

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

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	62.9	72.8	68.8
2.441	68.6	75.8	61.7
2.480	67.1	75.5	71.4

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 and Extender Data Rate modulation.

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

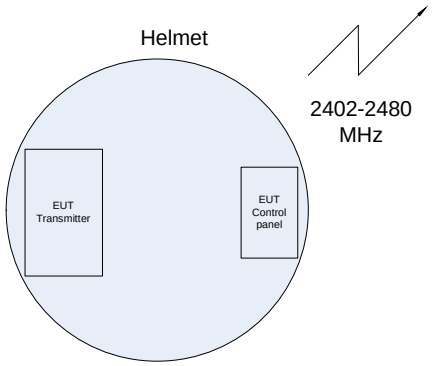

Figure 1. Configuration of Tested System

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, 23.49 dB for the phase line at 0.330 MHz and 0.338 dB at 0.338 MHz for the neutral line.

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

TEST PERSONNEL:

Tester Signature: _____ Date: 16.02.15

Typed/Printed Name: I. Siboni

Conducted Emission

E.U.T Description	Rider Communication System
Type	SRC-System PRO
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
2	Average	154 kHz	20.06	-35.71
1	Quasi Peak	238 kHz	33.55	-28.60
1	Quasi Peak	330 kHz	35.96	-23.49
2	Average	342 kHz	21.41	-27.73
2	Average	486 kHz	14.04	-32.19
1	Quasi Peak	534 kHz	29.14	-26.85
1	Quasi Peak	874 kHz	22.83	-33.16
2	Average	982 kHz	14.88	-31.11
2	Average	1.278 MHz	13.65	-32.34
1	Quasi Peak	2.022 MHz	24.27	-31.72
2	Average	2.594 MHz	13.22	-32.77
1	Quasi Peak	2.602 MHz	23.48	-32.51
1	Quasi Peak	3.614 MHz	20.86	-35.13
2	Average	3.762 MHz	11.88	-34.11
1	Quasi Peak	6.33 MHz	20.21	-39.78
2	Average	6.654 MHz	10.20	-39.79
2	Average	15.838 MHz	9.95	-40.04
1	Quasi Peak	17.358 MHz	19.53	-40.46
2	Average	26.822 MHz	23.17	-26.82
1	Quasi Peak	27.09 MHz	34.24	-25.75

Date: 20.JAN.2015 11:32:22

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	SRC-System PRO
Serial Number:	Not Designated

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

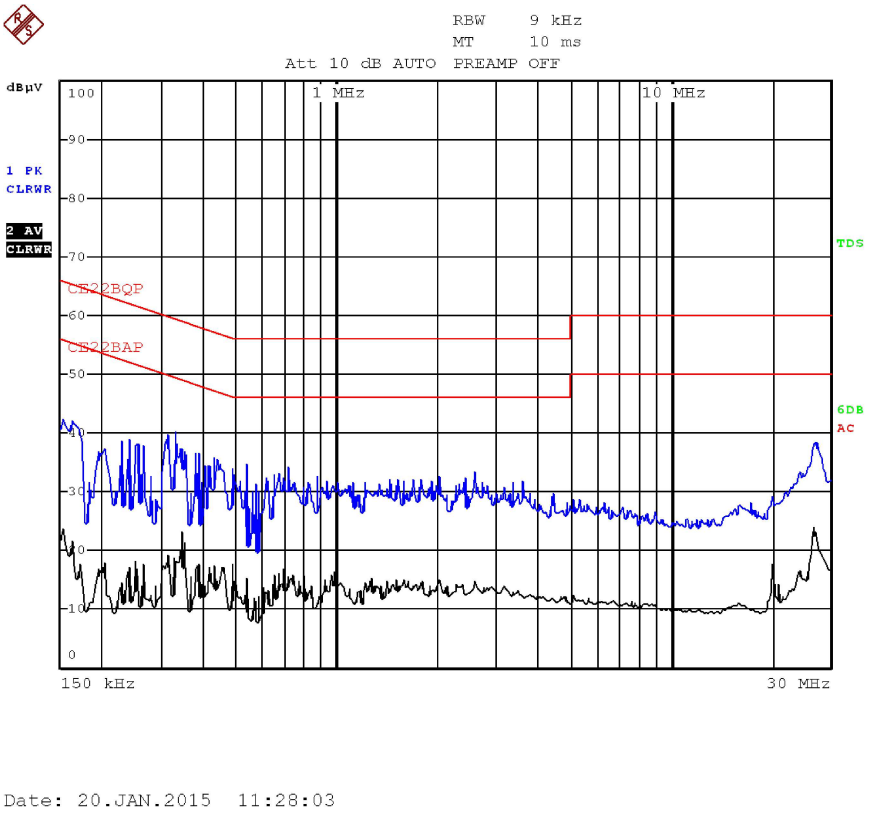

Figure 7 Detectors: Quasi-peak, Average

Conducted Emission

E.U.T Description	Rider Communication System
Type	SRC-System PRO
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
2	Average	162 kHz	19.10	-36.25
1	Quasi Peak	246 kHz	33.34	-28.55
1	Quasi Peak	338 kHz	34.30	-24.95
2	Average	338 kHz	20.18	-29.06
1	Quasi Peak	434 kHz	29.50	-27.66
2	Average	666 kHz	13.80	-32.19
2	Average	966 kHz	15.87	-30.12
1	Quasi Peak	998 kHz	26.97	-29.02
2	Average	1.302 MHz	13.91	-32.08
1	Quasi Peak	1.658 MHz	26.46	-29.53
1	Quasi Peak	2.85 MHz	25.89	-30.10
2	Average	2.934 MHz	14.03	-31.96
2	Average	3.718 MHz	13.49	-32.50
1	Quasi Peak	3.77 MHz	25.13	-30.86
2	Average	6.298 MHz	10.31	-39.68
1	Quasi Peak	10.122 MHz	20.04	-39.95
1	Quasi Peak	17.27 MHz	23.33	-36.66
2	Average	17.49 MHz	11.68	-38.31
2	Average	26.706 MHz	22.67	-27.33
1	Quasi Peak	27.242 MHz	33.88	-26.11

Date: 20.JAN.2015 11:23:22

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	SRC-System PRO
Serial Number:	Not Designated

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

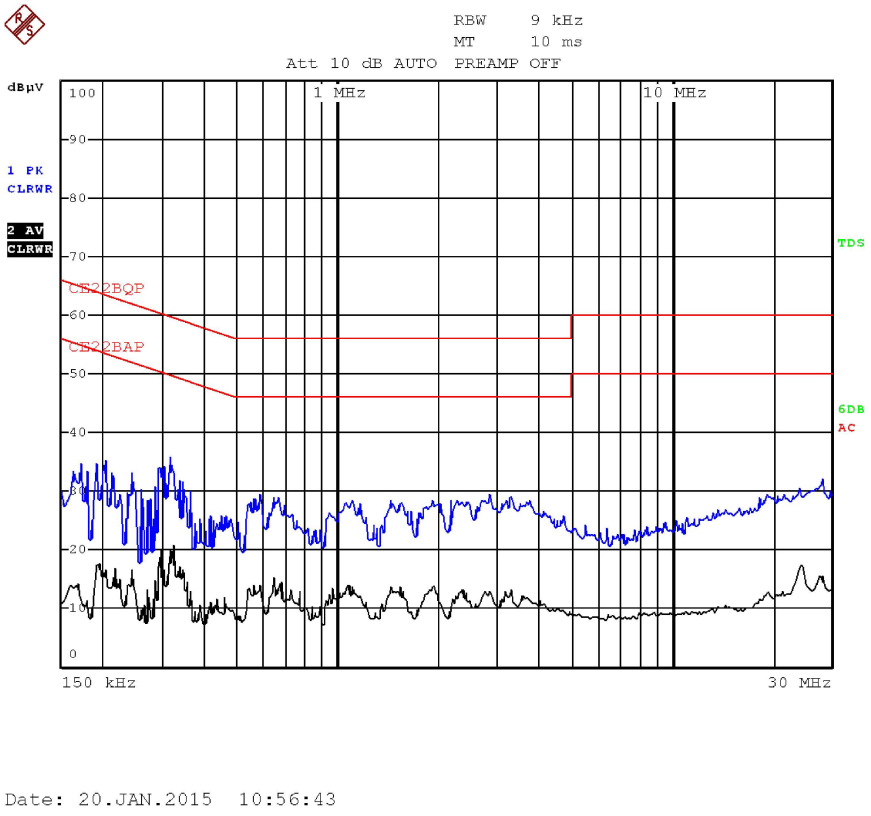

Figure 9 Detectors: Quasi-peak, Average

4.4 Test Equipment Used; Conducted Emission

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
LISN	Fischer	FCC-LISN-25A	127	June 30, 2014	1 year
Transient Limiter	HP	11947A	3107A03041	May 13, 2014	1 year
EMI Receiver	Rohde & Schwarz	ESCI7	100724	January 4, 2015	1 year

Figure 10 Test Equipment Used

5. 26dB Bandwidth

5.1 Test Specification

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

5.2 Test Procedure

The E.U.T. was set to the applicable test frequency. The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (30 dB) and an appropriate coaxial cable (cable loss = 0.5 dB). The spectrum analyzer was set to 100 kHz resolution BW. The spectrum bandwidth of the E.U.T. at the point of 26 dB below maximum peak power was measured and recorded.

The E.U.T. was tested in three frequencies: Low, Mid and High (2402 MHz, 2441 MHz, and 2480 MHz) and in 2 modulations: EDR and standard.

5.3 Test Results

Operation Frequency (MHz)	Modulation	Bandwidth Reading (MHz)
Low	Standard	1.155
Mid	Standard	1.170
High	Standard	1.100
Low	EDR	1.438
Mid	EDR	1.450
High	EDR	1.475

Figure 11 26 dB Minimum Bandwidth

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: _____ Date: 16.02.15

Typed/Printed Name: I. Siboni

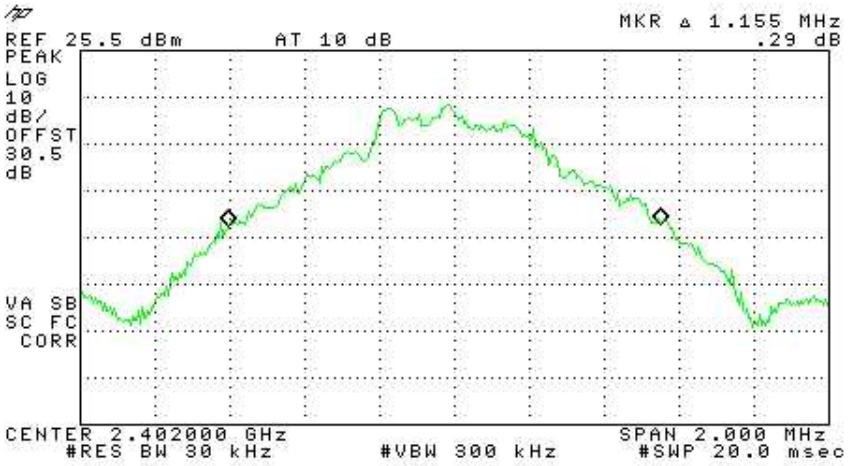

Figure 12. Low Channel, Standard Modulation

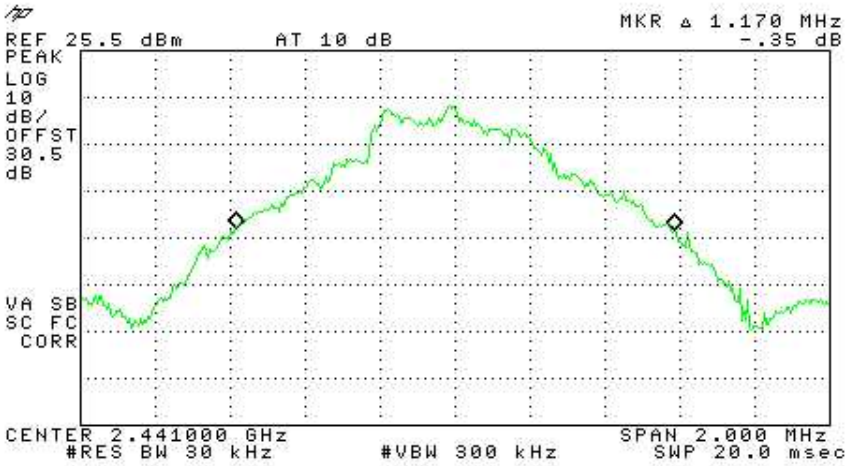

Figure 13. Mid Channel, Standard Modulation

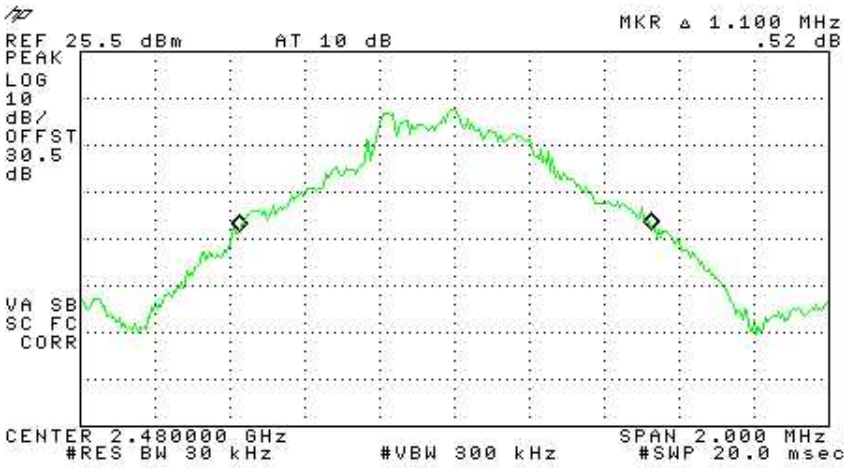

Figure 14. High Channel, Standard Modulation

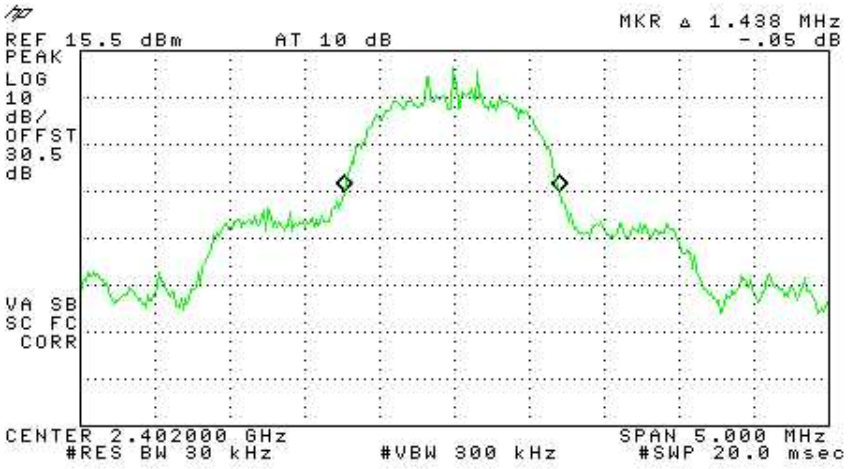

Figure 15. Low Channel, EDR Modulation

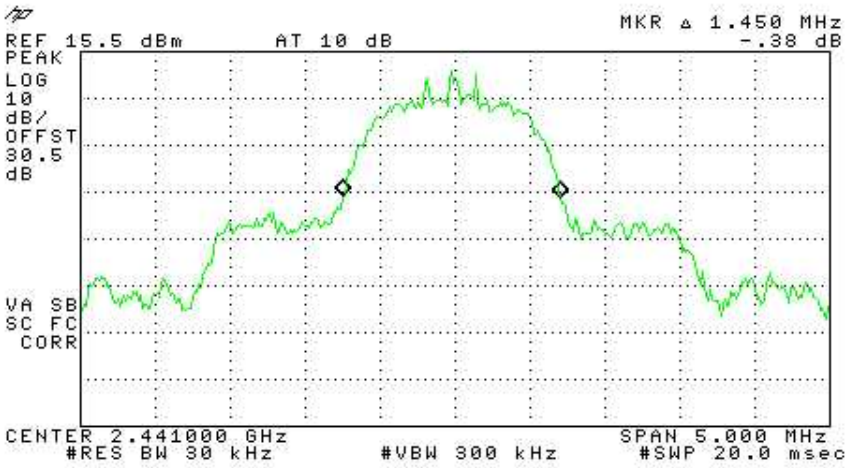

Figure 16. Mid Channel, EDR Modulation

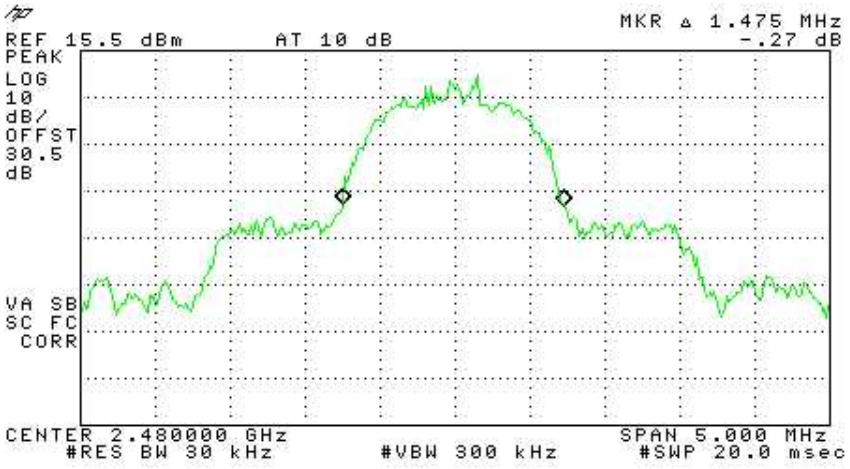

Figure 17. High Channel, EDR Modulation

5.4 Test Equipment Used, 26 dB Bandwidth

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
Spectrum Analyzer	HP	8592L	3826A01204	February 28, 2014	1 year
30 db Attenuator	Weinschel Engineering	49-30-34	PD426	January 14, 2015	1 year

Figure 18 Test Equipment Used

6. 20dB Bandwidth

6.1 Test Specification

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

6.2 Test Procedure

The E.U.T. was set to the applicable test frequency. The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (30 dB) and an appropriate coaxial cable (cable loss = 0.5 dB). The spectrum analyzer was set to 100 kHz resolution BW. The spectrum bandwidth of the E.U.T. at the point of 20 dB below maximum peak power was measured and recorded.

The E.U.T. was tested in three frequencies: Low, Mid and High (2402 MHz, 2441 MHz, and 2480 MHz) and in 2 modulations: EDR and standard.

6.3 Test Results

Operation Frequency (MHz)	Modulation	Bandwidth Reading (MHz)
Low	Standard	0.925
Mid	Standard	0.915
High	Standard	0.838
Low	EDR	1.338
Mid	EDR	1.350
High	EDR	1.350

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: _____ Date: 16.02.15

Typed/Printed Name: I. Siboni

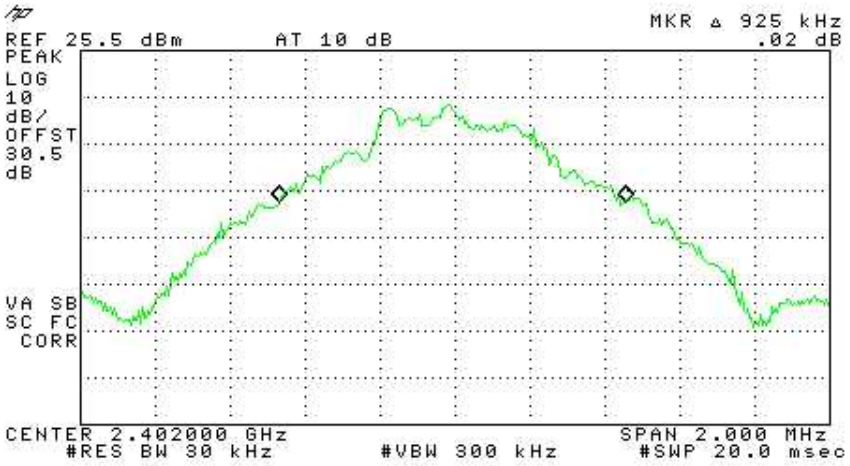

Figure 19. Low Channel, Standard Modulation

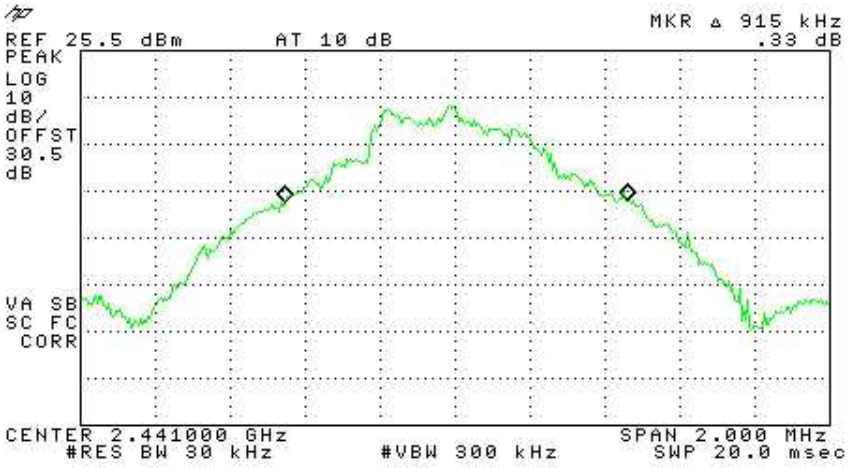

Figure 20. Mid Channel, Standard Modulation

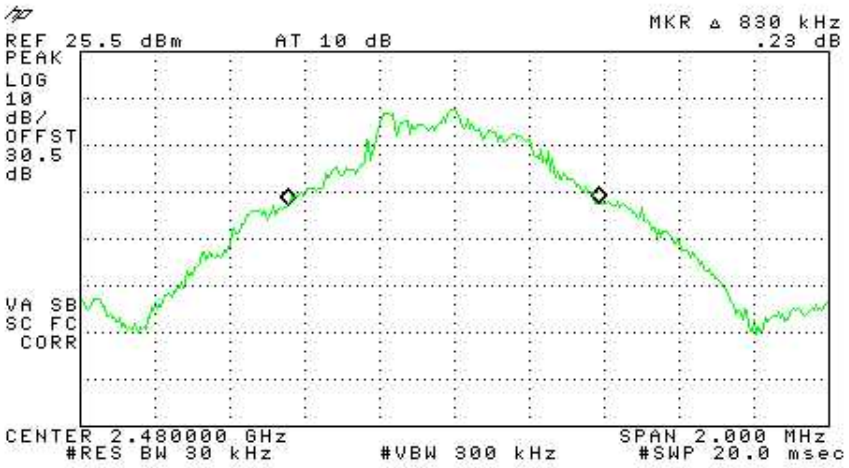

Figure 21. High Channel, Standard Modulation

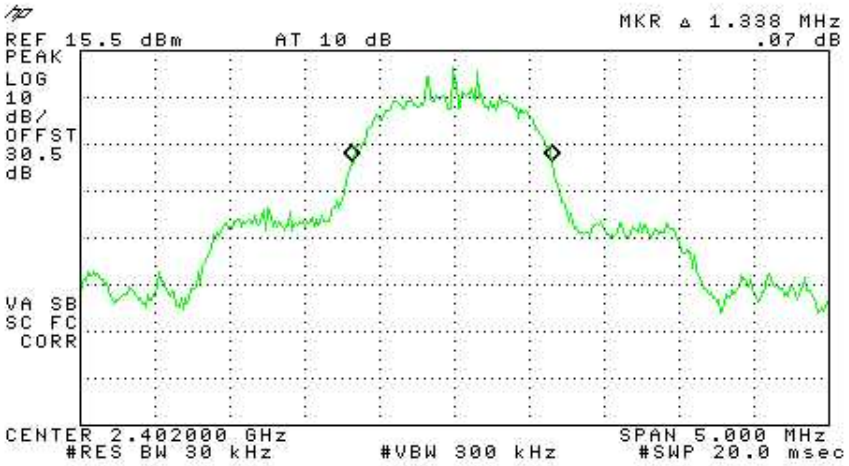

Figure 22. Low Channel, EDR Modulation

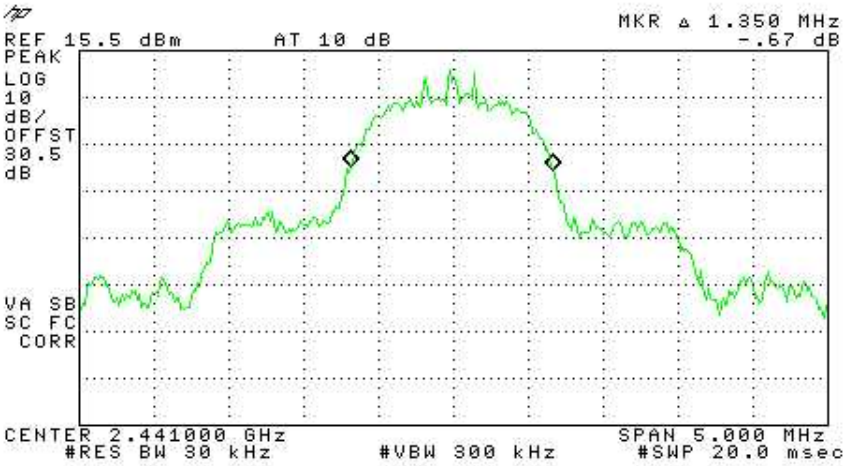

Figure 23. Mid Channel, EDR Modulation

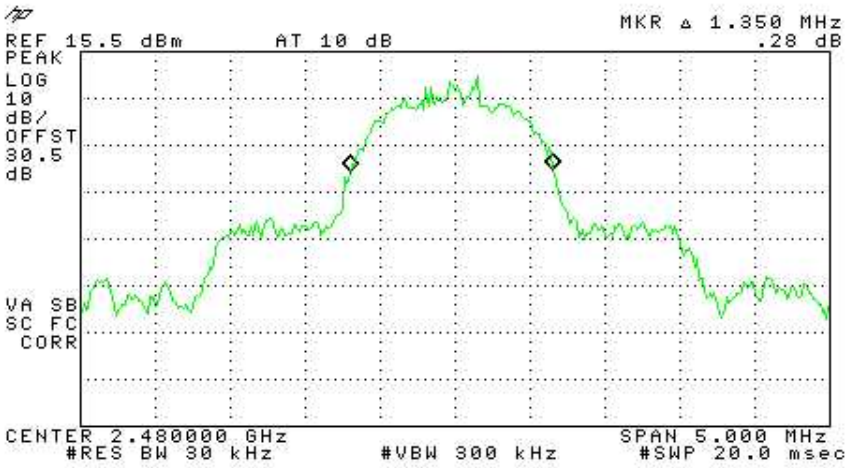

Figure 24. High Channel, EDR Modulation

6.4 Test Equipment Used; 20 dB Bandwidth

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
Spectrum Analyzer	HP	8592L	3826A01204	February 28, 2014	1 year
30 db Attenuator	Weinschel Engineering	49-30-34	PD426	January 14, 2015	1 year

Figure 25 Test Equipment Used

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

7.1 Test Specification

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

7.2 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	SRC-System PRO
Serial Number:	Not Designated

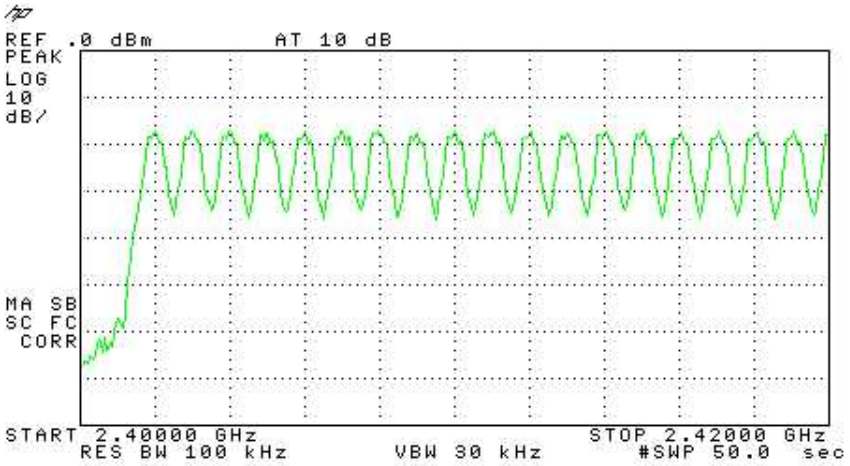

Figure 26. Frequency Hopping, Standard modulation

Number of Hopping Frequencies

E.U.T Description	Rider Communication System
Type	SRC-System PRO
Serial Number:	Not Designated

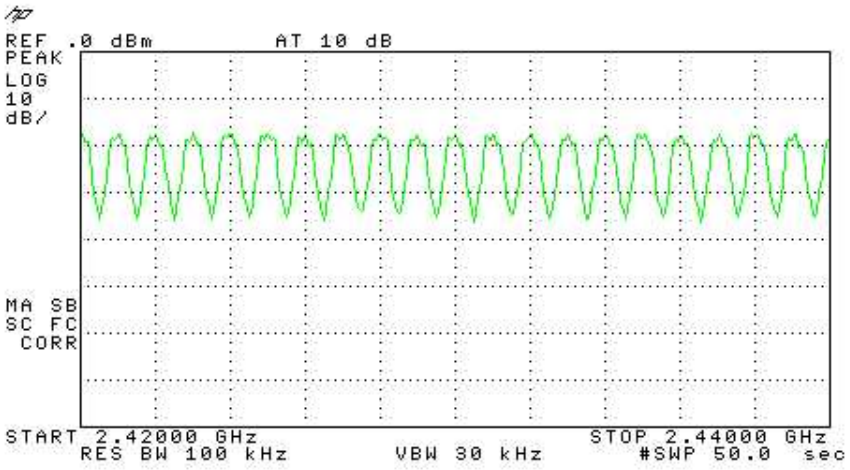

Figure 27. Frequency Hopping, Standard modulation

Number of Hopping Frequencies

E.U.T Description	Rider Communication System
Type	SRC-System PRO
Serial Number:	Not Designated

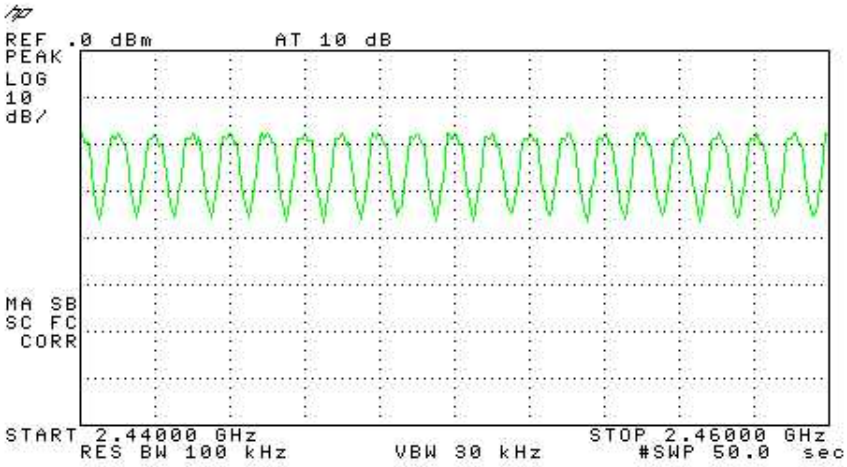

Figure 28. Frequency Hopping, Standard modulation

Number of Hopping Frequencies

E.U.T Description	Rider Communication System
Type	SRC-System PRO
Serial Number:	Not Designated

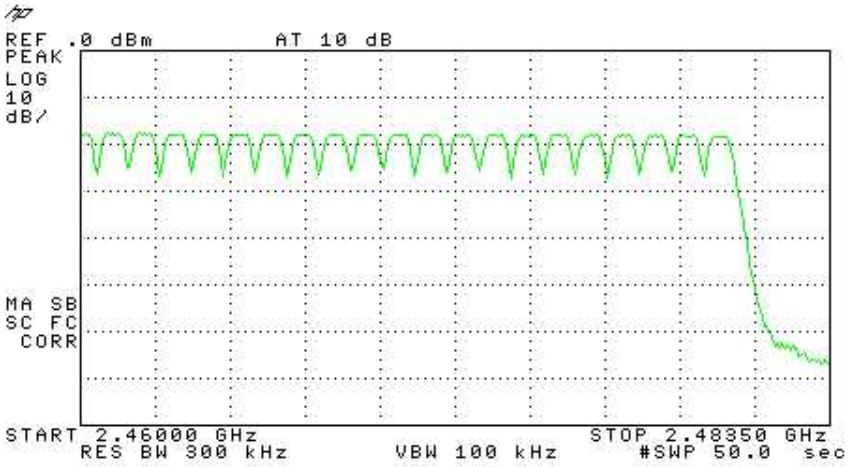

Figure 29. Frequency Hopping, Standard modulation

Number of Hopping Frequencies

E.U.T Description	Rider Communication System
Type	SRC-System PRO
Serial Number:	Not Designated

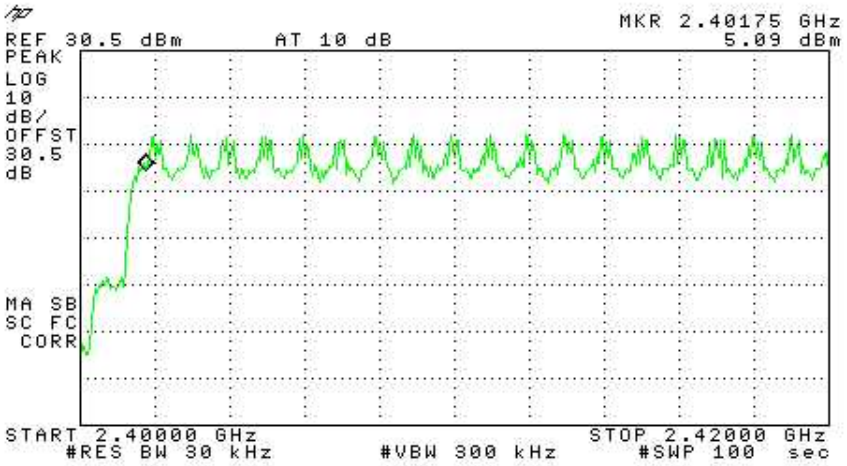

Figure 30. Frequency Hopping, EDR modulation

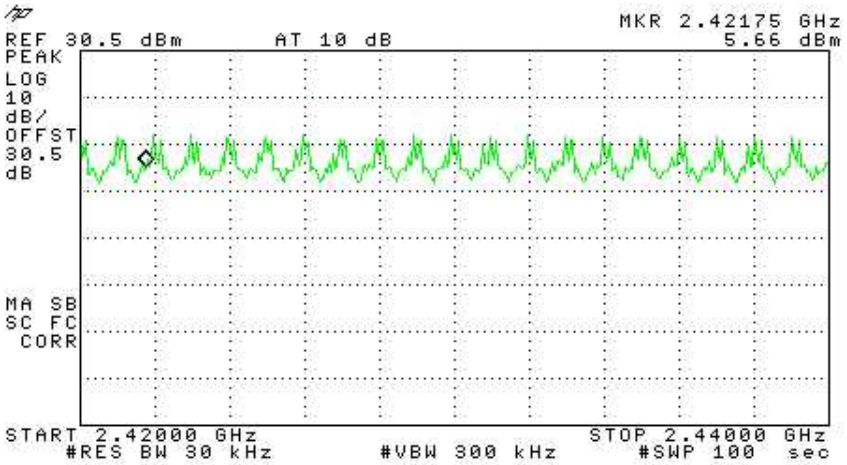

Figure 31. Frequency Hopping, EDR modulation

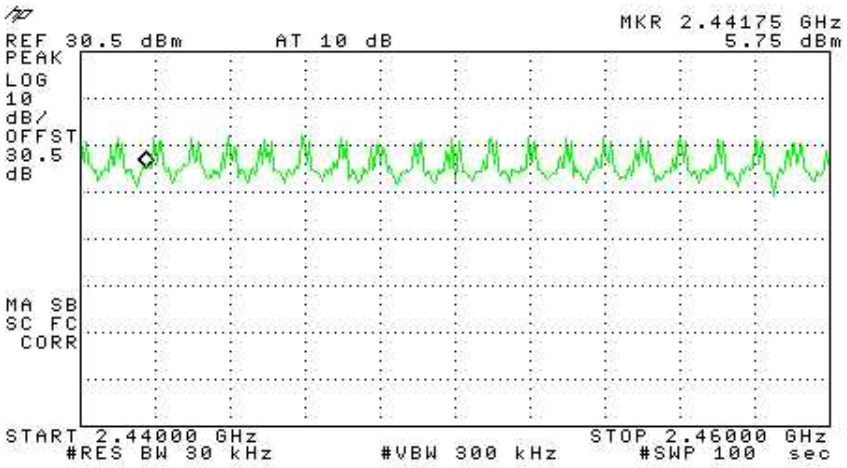

Figure 32. Frequency Hopping, EDR modulation

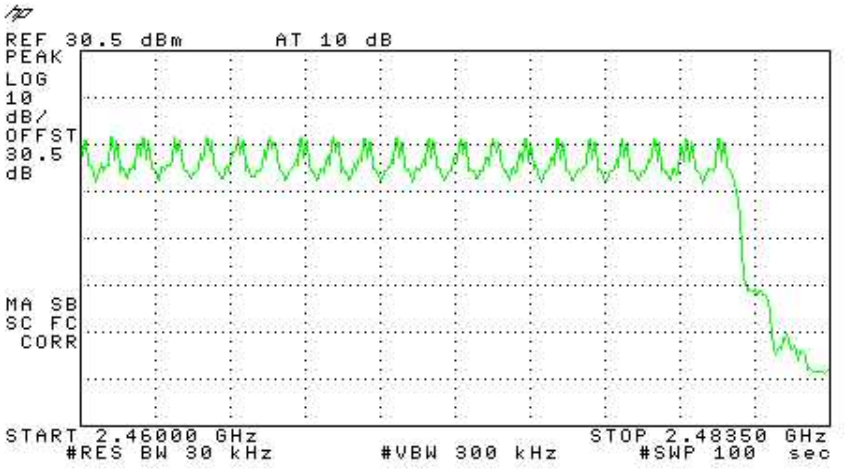

Figure 33. Frequency Hopping, EDR modulation

7.3 Test Results

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

Figure 34 Number of Hopping Frequencies

TEST PERSONNEL:

Tester Signature: _____ Date: 16.02.15

Typed/Printed Name: I. Siboni

7.4 Test Instrumentation Used; Number of Frequency Hopping

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
Spectrum Analyzer	HP	8592L	3826A01204	February 28, 2014	1 year
30 db Attenuator	Weinschel Engineering	49-30-34	PD426	January 14, 2015	1 year

Figure 35 Test Equipment Used

8. Channel Frequency Separation

8.1 Test Specification

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

8.2 Test Procedure

The E.U.T. was set to hopping mode.
The spectrum analyzer was set to the following parameters:
Span: 20 MHz
RBW: 30kHz
VBW: 300kHz
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.

8.3 Test Results

Modulation	Channel Frequency Separation (KHz)	Specification (KHz)	Margin (kHz)
Standard	1000	780	220
EDR	1000	990	10

Figure 36 Channel Frequency Separation

JUDGEMENT: Passed by 10 kHz

TEST PERSONNEL:

Tester Signature: _____ Date: 16.02.15
Typed/Printed Name: I. Siboni

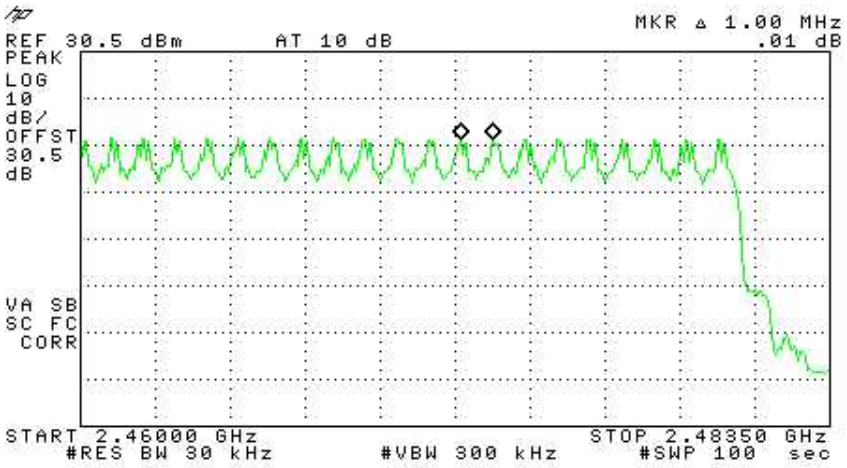

Figure 37. Standard Modulation

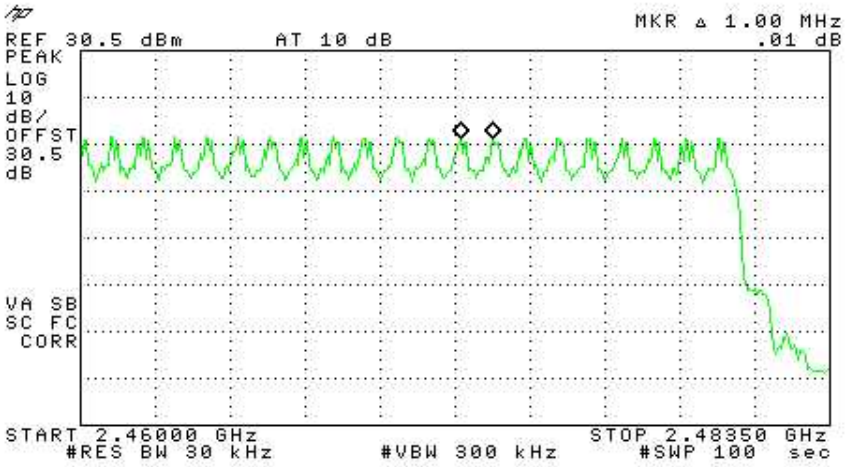

Figure 38. EDR Modulation

8.4 Test Instrumentation Used; Channel Frequency Separation

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
Spectrum Analyzer	HP	8592L	3826A01204	February 28, 2014	1 year
30 db Attenuator	Weinschel Engineering	49-30-34	PD426	January 14, 2015	1 year

Figure 39 Test Equipment Used

9. Conducted Power Output

9.1 Test Specification

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

9.2 Test procedure

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator (30 dB) and an appropriate coaxial cable (cable loss = 0.5 dB). The Spectrum Analyzer was set to 1.0 MHz resolution BW. Peak power level was measured at selected operation frequencies.

The E.U.T. was tested at 2402 MHz, 2441 MHz and 2480 MHz and in 2 modulations: EDR and Standard.

9.3 Results Table

Operation Frequency (MHz)	Modulation	Power (dBm)	Specification (dBm)	Margin (dB)
Low	Standard	14.6	30	-15.4
Mid		14.3	30	-15.7
High		13.9	30	-16.1
Low	EDR	13.6	30	-16.4
Mid		13.5	30	-16.5
High		13.0	30	-17.0

Figure 40 Conducted Power Output

JUDGEMENT: Passed by 15.4 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 16.02.15

Typed/Printed Name: I. Siboni

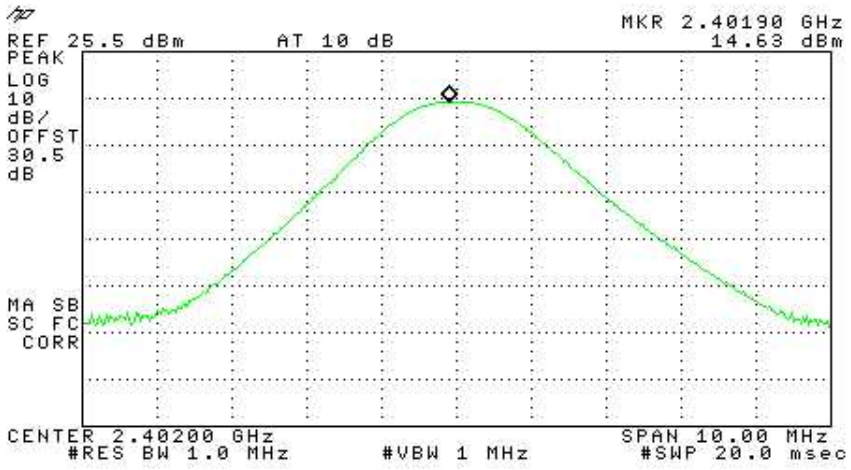

Figure 41 2402.00 MHz –Standard Modulation

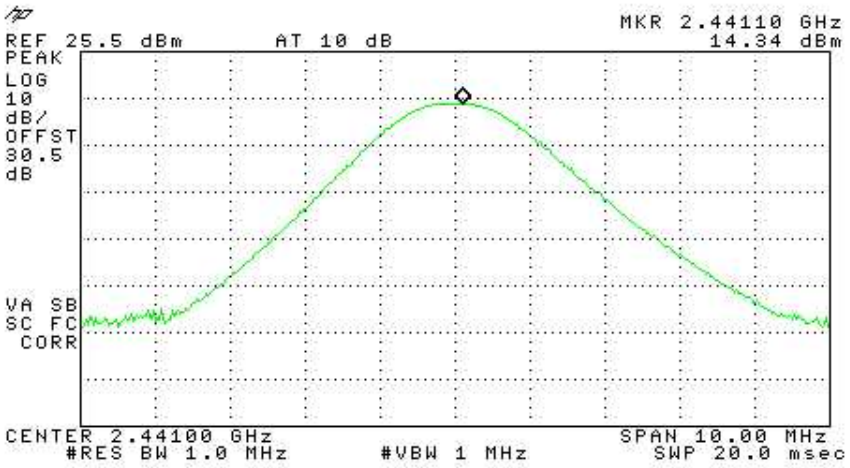

Figure 42 2441.00 MHz –Standard Modulation

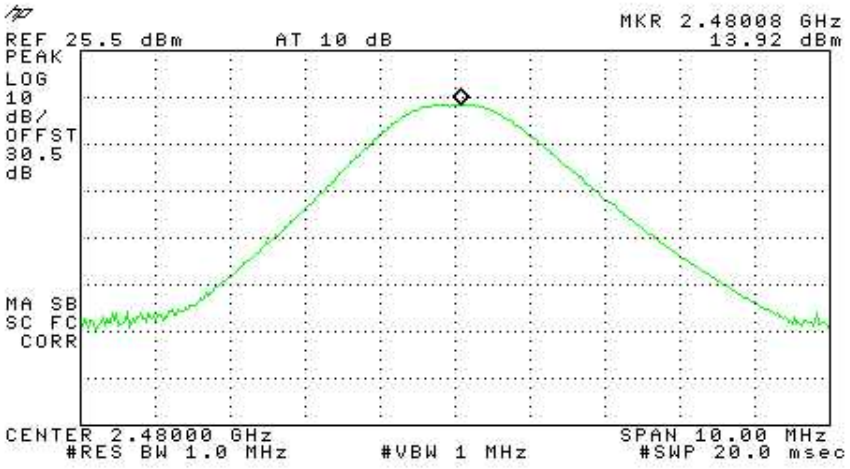

Figure 43 2480.00 MHz –Standard Modulation

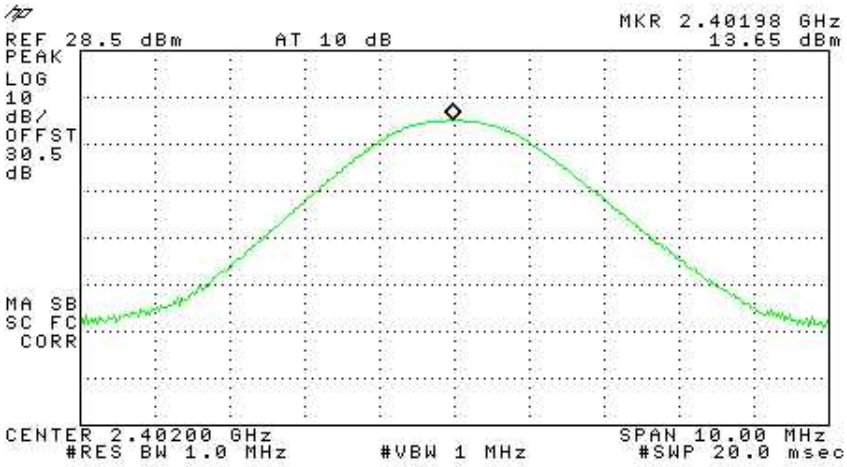

Figure 44 2402.00 MHz EDR Modulation

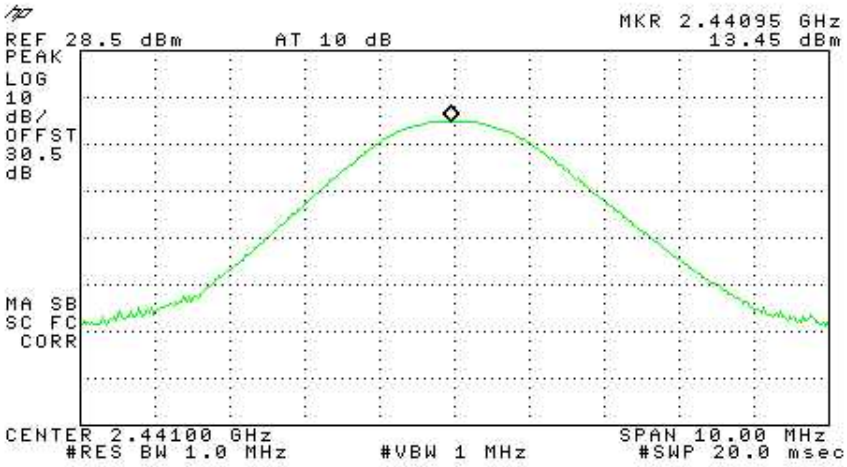

Figure 45 2441.00 MHz –EDR Modulation

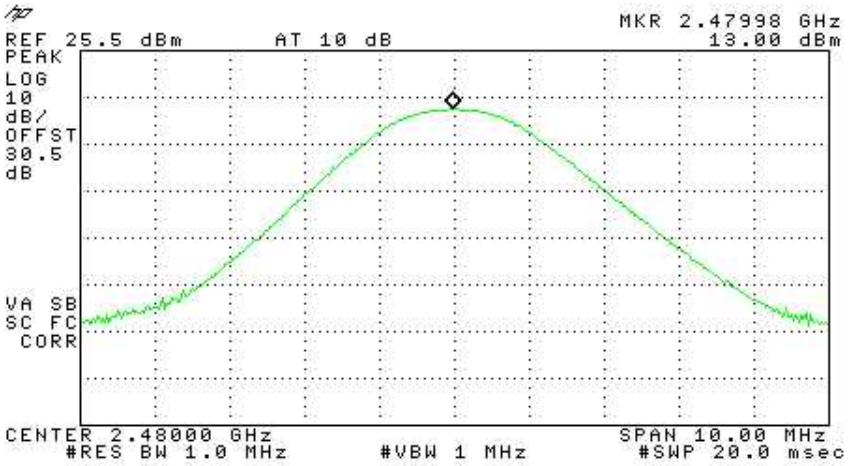

Figure 46 2480.00 MHz –EDR Modulation

9.4 Test Equipment Used, Conducted Maximum Power Output

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
Spectrum Analyzer	HP	8592L	3826A01204	February 28, 2014	1 year
30 db Attenuator	Weinschel Engineering	49-30-34	PD426	January 14, 2015	1 year

Figure 47 Test Equipment Used

10. Dwell Time on Each Channel

10.1 Test Specification

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

10.2 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.

10.3 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: 16.02.15

Typed/Printed Name: I. Siboni

Additional information of the results is given in *Figure 48* to *Figure 51*.

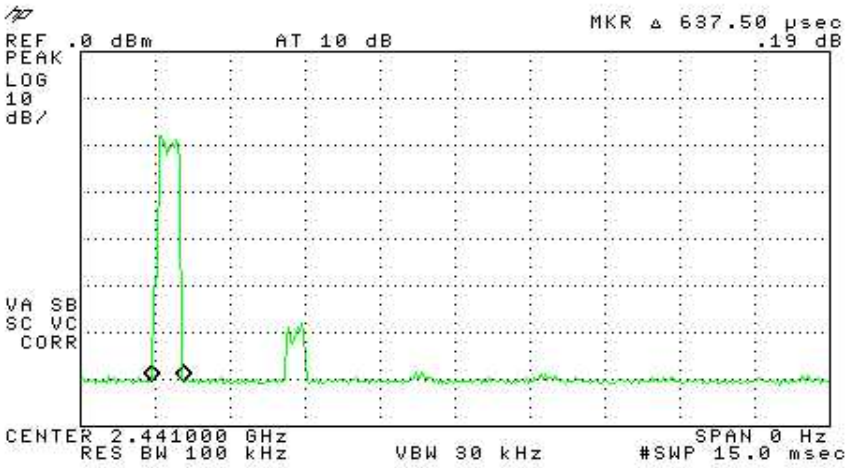

Figure 48 — Ton=0.6msec , Standard Modulation

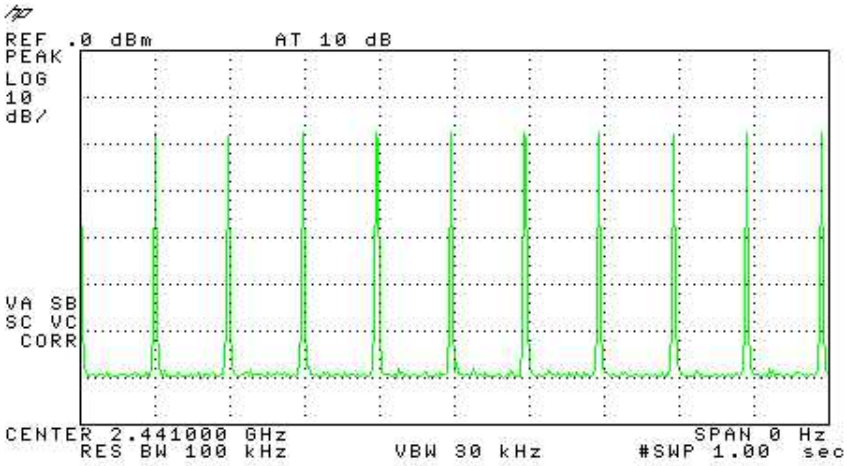

Figure 49 — num bursts at 1sec=10, Standard Modulation

[4 X 0.3msecX31.6 =370msec, limit 400msec]

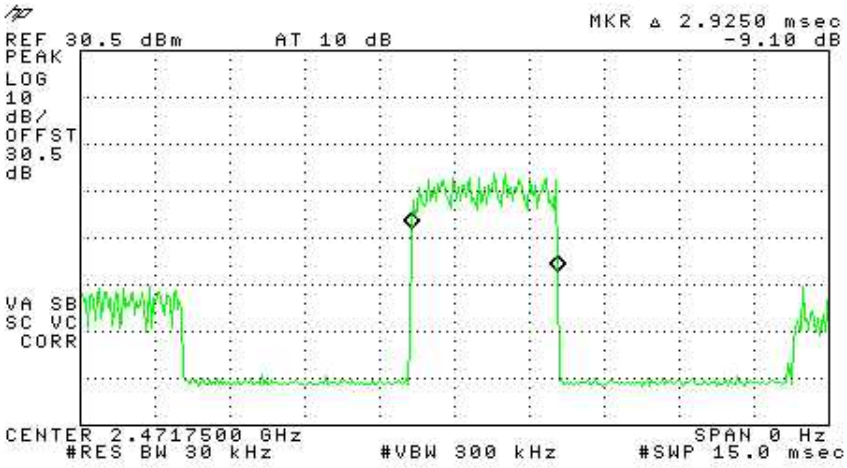

Figure 50 — Ton=2.9msec, EDR Modulation

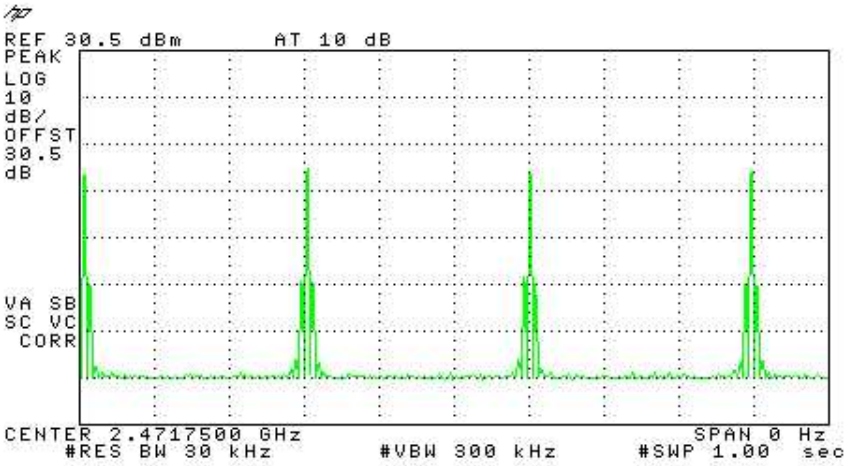

Figure 51 — num bursts at 1sec=4, EDR Modulation

[4 X2.9msec X 31.9 =370.0msec, limit 400msec]

10.4 Test Equipment Used; Dwell Time

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
Spectrum Analyzer	HP	8592L	3826A01204	February 28, 2014	1 year
30 db Attenuator	Weinschel Engineering	49-30-34	PD426	January 14, 2015	1 year

Figure 52 Test Equipment Used

11. Band Edge

[In Accordance with section 15.247(d)]

11.1 Test Specification

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

11.2 Test Procedure

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (30 dB) and an appropriate coaxial cable
(cable loss = 0.5 dB). The spectrum analyzer was set to 100 kHz resolution BW.

The EUT was evaluated in 2 modulations: EDR and standard.

Maximum power level below 2400 MHz and above 2483.5 MHz was measured relative to power level at the Low and High channels correspondingly.

11.3 Test Results

Operation Frequency (MHz)	Modulation	Band Edge Frequency (MHz)	Spectrum Level (dBm)	Specification (dBm)	Margin (dB)
2402	Standard	2400.0	-33.70	-6.6	-27.10
2480	Standard	2483.5	-39.99	-7.9	-32.09
2402	EDR	2400.0	-31.10	-7.4	-23.70
2480	EDR	2483.5	-38.99	-7.0	-31.99

Figure 53 Band Edge

JUDGEMENT: Passed by 23.70 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 16.02.15

Typed/Printed Name: I. Siboni

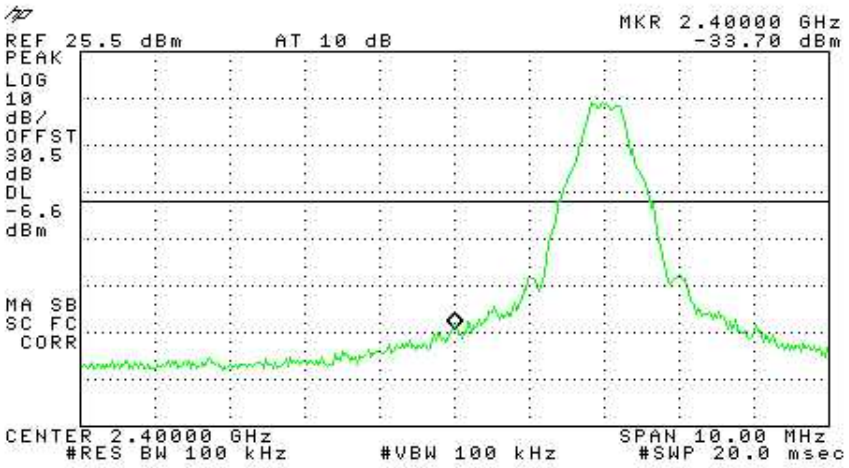

Figure 54 — Lower Band Edge, Standard Modulation

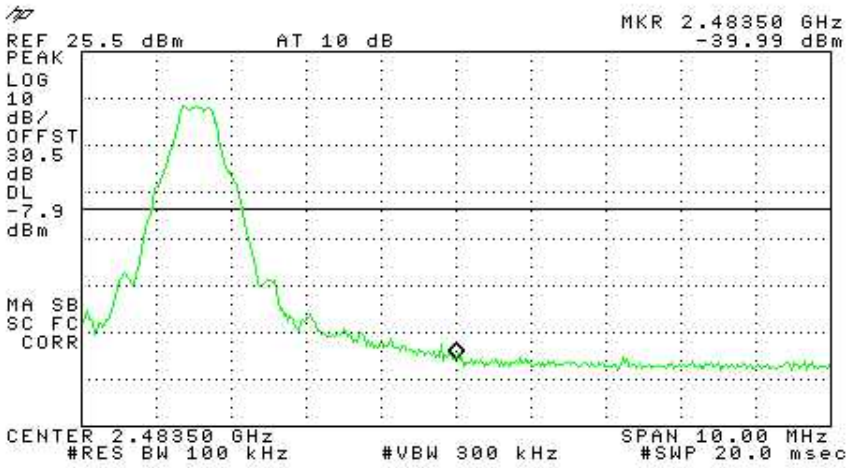

Figure 55 — Upper Band Edge, Standard Modulation

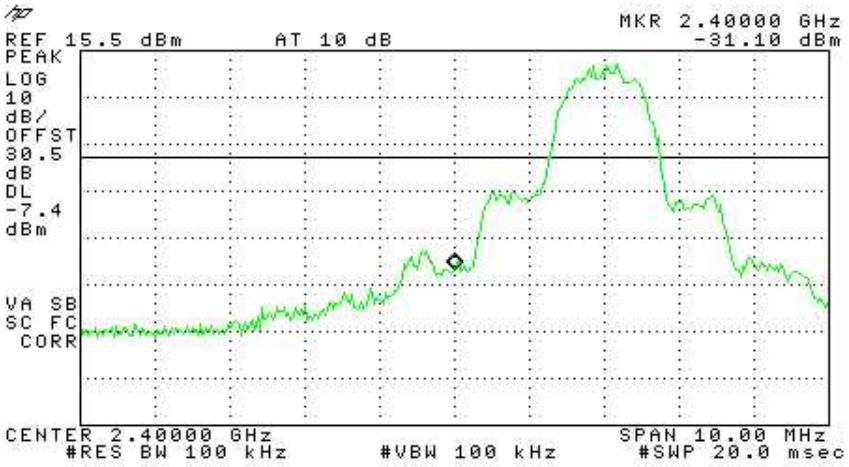

Figure 56 — Lower Band Edge, EDR Modulation

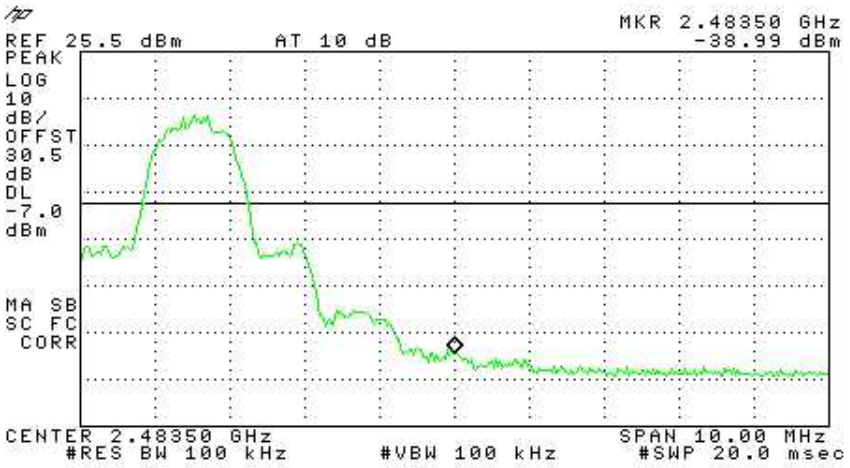

Figure 57 — Upper Band Edge, EDR Modulation

11.4 Test Equipment Used; Band Edge Spectrum

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
Spectrum Analyzer	HP	8592L	3826A01204	February 28, 2014	1 year
30 db Attenuator	Weinschel Engineering	49-30-34	PD426	January 14, 2015	1 year

Figure 58 Test Equipment Used

12. Radiated Emission, 9 kHz – 30 MHz

12.1 Test Specification

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

12.2 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.

12.3 Test Results

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.

All emission detected were greater than 20 dB below the limit.

TEST PERSONNEL:

Tester Signature: _____ Date: 16.02.15

Typed/Printed Name: I. Siboni

12.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	R&S	ESBI7	100120	January 1, 2015	1 year
Active Loop Antenna	EMCO	6502	9506-2950	November 4, 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 59 Test Equipment Used

12.5 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.

13. Spurious Radiated Emission 30 – 25000 MHz

13.1 Test Specification

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

13.2 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, standard (ext.ant for worst case according preliminary measurements).

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.)

13.3 Test Results

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 2.7 dB in the worst case at the frequency of 2390 MHz, horizontal polarization.

For the operation channel 2.441 GHz, the margin between the emission level and the specification limit is 5.9 dB in the worst case at the frequency of 4882.0 MHz, vertical polarization.

For the operation channel 2.480 GHz, the margin between the emission level and the specification limit is 0.6 dB in the worst case at the frequency of 2482.5 MHz, horizontal polarization.

TEST PERSONNEL:

Tester Signature: _____ Date: 16.02.15

Typed/Printed Name: I. Siboni

Radiated Emission

E.U.T Description	Rider Communication System
Type	SRC-System PRO
Serial Number:	Not Designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical
Frequency range: 30 MHz 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	63.5	74.0	-10.5
2402.0	Standard	2390.0	V	65.2	74.0	-8.8
2402.0	Standard	4804.0	H	61.6	74.0	-12.4
2402.0	Standard	4804.0	V	60.8	74.0	-13.2
2441.0	Standard	4882.0	H	62.8	74.0	-11.2
2441.0	Standard	4882.0	V	62.3	74.0	-11.7
2480.0	Standard	4960.0	H	62.9	74.0	-11.1
2480.0	Standard	4960.0	V	62.9	74.0	-11.1
2480.0	Standard	2483.5	H	64.1	74.0	-9.9
2480.0	Standard	2483.5	V	64.7	74.0	-9.3

Figure 60. 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 SRC-System PRO
Serial Number: Not Designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 30 MHz 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	49.7	54.0	-4.3
2402.0	Standard	2390.0	V	50.7	54.0	-3.3
2402.0	Standard	4804.0	H	47.7	54.0	-6.3
2402.0	Standard	4804.0	V	47.8	54.0	-6.2
2441.0	Standard	4882.0	H	48.0	54.0	-6.0
2441.0	Standard	4882.0	V	48.1	54.0	-5.9
2480.0	Standard	4960.0	H	48.8	54.0	-5.2
2480.0	Standard	4960.0	V	48.8	54.0	-5.2
2480.0	Standard	2483.5	H	50.6	54.0	-3.4
2480.0	Standard	2483.5	V	50.9	54.0	-3.1

Figure 61. 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 SRC-System PRO
Serial Number: Not Designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 30 MHz 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	63.2	74.0	-10.8
2402.0	EDR	2390.0	V	63.8	74.0	-10.2
2402.0	EDR	4804.0	H	61.6	74.0	-12.4
2402.0	EDR	4804.0	V	60.8	74.0	-13.2
2441.0	EDR	4882.0	H	62.8	74.0	-11.2
2441.0	EDR	4882.0	V	62.3	74.0	-11.7
2480.0	EDR	4960.0	H	62.9	74.0	-11.1
2480.0	EDR	4960.0	V	62.9	74.0	-11.1
2480.0	EDR	2483.5	H	66.1	74.0	-7.9
2480.0	EDR	2483.5	V	65.8	74.0	-8.2

Figure 62. 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 SRC-System PRO
Serial Number: Not Designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 30 MHz 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	51.3	54.0	-2.7
2402.0	EDR	2390.0	V	51.1	54.0	-2.9
2402.0	EDR	4804.0	H	47.7	54.0	-6.3
2402.0	EDR	4804.0	V	47.8	54.0	-6.2
2441.0	EDR	4882.0	H	48.0	54.0	-6.0
2441.0	EDR	4882.0	V	48.1	54.0	-5.9
2480.0	EDR	4960.0	H	48.8	54.0	-5.2
2480.0	EDR	4960.0	V	48.8	54.0	-5.2
2480.0	EDR	2483.5	H	53.4	54.0	-0.6
2480.0	EDR	2483.5	V	52.3	54.0	-1.7

Figure 63. 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

13.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	R&S	ESBI7	100120	January 1, 2015	1 year
Spectrum Analyzer	R&S	FSL6	100194	January 1, 2015	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 64 Test Equipment Used

13.5 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.

14. Antenna Gain/Information

The antenna gain is 0dBi, integral.

15. 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 in the cushion of a motorcycle helmet. The distance between the E.U.T. and the user in the worst case application, is 2 cm.

Calculation of Maximum Permissible Exposure (MPE)

Based on Section 1.1310 Requirements

(a) FCC limits at 2402 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 14.6 dBm = 28.8 mW

G_T- Antenna Gain, 0 dBi = 1 numeric

R- Distance from Transmitter using 2 cm worst case

(c) The peak power density is:

$$S = \frac{28.8 \times 1}{4\pi (2)^2} = 0.572\frac{mW}{cm^2}$$

(d)This is below the FCC limit.

16. APPENDIX B - CORRECTION FACTORS

16.1 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".

16.2 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.

16.3 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.

16.5 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			

16.6 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

16.7 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

17. Comparison Industry Canada Requirements With FCC

Cardo Peripheral Systems M/N: Cardo SHO-1
IC: 4668A-ER17 FCC ID: Q95ER17

Test	FCC	IC
❑ 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