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TEST REPORT
FREQUENCEY HOPPING SPREAD SPECTRUM
PER FCC PT 15.247 & IC RSS-210 ISSUE 8

APPLICANT	HITEC RCD INC.
ADDRESS	12115 PAINE STREET POWAY CALIFORNIA 92064 USA
FCC ID	IFHRX57MLINK
IC	3420A-RX57MLINK
MODELS	RX-7 M-LINK and RX-5 M-LINK
PRODUCT DESCRIPTION	7 CH 2.4 GHZ TRANSCEIVER
DATE SAMPLE RECEIVED	9/23/2014
DATE TESTED	11/26/2014, 12/9/2014
TESTED BY	Cory Leverett
APPROVED BY	Sid Sanders
REPORT ISSUE DATE	12/10/2014
TIMCO REPORT NO.	1717AUT14TestReport.docx
TEST RESULTS	☒ PASS ☐ FAIL

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ATTESTATION

This equipment has been tested in accordance with the standards identified in the referenced test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report and demonstrate that the equipment complies with the appropriate standards.

All instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025: 2005 requirements.

I attest that the necessary measurements were made by me or under my supervision, at Timco Engineering, Inc. located at 849 N.W. State Road 45, Newberry, Florida 32669 USA.

AUTHORIZED BY: Cory Leverett

FUNCTION: Engineering Project Manager

DATE: 12/10/2014

SIGNATURE:

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REPORT SUMMARY

Disclaimer:	The test results relate only to the items tested.
Purpose of Test:	To demonstrate that the EUT is compliant with FCC Pt 15.247 requirements for a FHSS radio.
Applicable Standards:	FCC Pt 15.247, ANSI C63.4: 2003, ANSI TIA-603-D: 2010, FCC Pt 15.109, IC RSS-210, RSS-GEN
Related Reports:	N/A

TEST ENVIRONMENT AND TEST SETUP

Test Facilities:	All measurements were made at one or more of the test sites of: TIMCO ENGINEERING INC. 849 N.W. State Road 45 Newberry, FL 32669.
Laboratory Test Conditions:	Temperature: 26°C Humidity: 55%
Test Exercise:	The EUT was set in continuous transmit mode of operation, hopping was enabled then stopped at three places in the band..
Deviation to the Standards:	There was no deviation from the standard.
Modification to the EUT:	No modification was made.
Supporting Test Accessories:	No supporting accessories were required for testing; there were two styles of samples used. One with normal hopping mode and another that could provide a fixed frequency at three places in the band.

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EUT DESCRIPTION

EUT Description	2.4 GHZ FHSS TRANSCEIVER
FCC ID	IFHRX57MLINK
IC	3420A-RX57MLINK
Model Number	RX-7 M-LINK and RX-5 M-LINK
Maximum Output Power	14.56 dBm
Operating Frequency	2402 – 2479 MHz
Types of Modulation	FHSS
Data Rates	7 ms /21 ms
EUT Power Source	☐ 110–120Vac/50– 60Hz
	☐ DC Power
	☒ Battery Operated Exclusively
Test Item	☐ Prototype
	☐ Pre-Production
	☒ Production
Type of Equipment	☐ Fixed
	☐ Mobile
	☒ Portable
Antenna	Lambda/4 fixe wire
Antenna Connector	Fixed

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ANTENNA REQUIREMENTS

§15.203 Antenna requirement.

Requirements:
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

Results:
The Equipment under test satisfies the requirements of FCC rules part 15.203, lambda/4 internal wire antenna fixed to the PCB board with a unique connector.

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§15.204 Antenna modifications.

Requirements:
(a) Except as otherwise described in paragraphs (b) and (d) of this section, no person shall use, manufacture, sell or lease, offer for sale or lease (including advertising for sale or lease), or import, ship, or distribute for the purpose of selling or leasing, any external radio frequency power amplifier or amplifier kit intended for use with a part 15 intentional radiator.

(b) A transmission system consisting of an intentional radiator, an external radio frequency power amplifier, and an antenna, may be authorized, marketed and used under this part. Except as described otherwise in this section, when a transmission system is authorized as a system, it must always be marketed as a complete system and must always be used in the configuration in which it was authorized.

(c) An intentional radiator may be operated only with the antenna with which it is authorized. If an antenna is marketed with the intentional radiator, it shall be of a type which is authorized with the intentional radiator. An intentional radiator may be authorized with multiple antenna types. Exceptions to the following provisions, if any, are noted in the rule section under which the transmitter operates, e.g., §15.255(b)(1)(ii) of this part.

(1) The antenna type, as used in this paragraph, refers to antennas that have similar in-band and out-of-band radiation patterns.

(2) Compliance testing shall be performed using the highest gain antenna for each type of antenna to be certified with the intentional radiator. During this testing, the intentional radiator shall be operated at its maximum available output power level.

(3) Manufacturers shall supply a list of acceptable antenna types with the application for equipment authorization of the intentional radiator.

(4) Any antenna that is of the same type and of equal or less directional gain as an antenna that is authorized with the intentional radiator may be marketed with, and used with, that intentional radiator. No retesting of this system configuration is required. The marketing or use of a system configuration that employs an antenna of a different type, or that operates at a higher gain, than the antenna authorized with the intentional radiator is not permitted unless the procedures specified in §2.1043 of this chapter are followed.

Approved Antennas:

Manufacturer	Model	Type	Gain
N/A	Lambda/4	External Wire	2.1

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§15.247 FHSS Technical requirements

Section 15.247(a)

Operation under the provisions of this Section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions:

(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

(i) For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

(ii) Frequency hopping systems operating in the 5725-5850 MHz band shall use at least 75 hopping frequencies. The maximum 20 dB bandwidth of the hopping channel is 1 MHz. The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period.

(iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. 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. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

(2) Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

Description:

M-LINK is a bidirectional FHSS-system hopping over 39 channels. The hopping sequence is generated during production by a random generator, so in every sequence each hopping frequency appears uniquely. The hopping channel separation is 2MHz. In the radio control system it is possible to change FHSS characteristic by selecting “Fast Response”. Depending on selection “Fast Response” ON/OFF the hopping frequency changes every 14ms/21ms though the dwell time is only 7ms/11ms. The result is a duty-cycle limitation per hopping-frequency to 1.3%. This duty-cycle limitation to 1.3% causes a very low utilization of the 2.4GHz-band, the coexistence of other systems in the same band is without any difficulty.

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§15.247 FHSS Technical requirements

Section 15.247(g):

Requirement:
Describe how the EUT complies with the requirement that it be designed to be capable of operating as a true frequency hopping system.

Description:

Section 15.247(h):

Requirement:
Describe how the EUT complies with the requirement that it not have the ability to be coordinated with other FHSS systems in an effort to avoid the simultaneous occupancy of individual hopping frequencies by multiple transmitters.

Description:

At the very first startup of a transmitter, the hopping table is generated in the software from random data. The random data itself is created by a random data generator in the software. To make the usage of the band even more random, a second random parameter selects, if the hopping table uses only even (2,4, 6…, 78) or only odd channels (3, 5,…,79). So, each transmitter has a unique hopping sequence and there will never be two transmitters doing exactly the same.

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Pseudorandom Frequency Hopping Sequence

Describe how the hopping sequence is generated. Provide an example of the hopping sequence channels, in order to demonstrate that the sequence meets the requirement specified in the definition of a frequency hopping spread spectrum system, found in Section 2.1.

Description:

Equal Hopping Frequency Use

Describe how each individual EUT meets the requirement that each of its hopping channels is used equally on average (e.g., that each new transmission event begins on the next channel in the hopping sequence after the final channel used in the previous transmission event).

Description:

De Facto EIRP Limit

Describe how the EUT complies with the de facto EIRP limit for every antenna proposed for use with the EUT. This includes those devices that will be used in point-to-point applications. If the peak output power, must be reduced so that the de facto EIRP limit may be met for a particular antenna, describe exactly how much it will be reduced for that antenna. If the peak output power level is raised above the limit in order to compensate for cable loss between the EUT and the antenna, specify the minimum length of cable which will always be used, the type of cable, and its loss, in dB per unit length, for the frequency of the emission. The limit is specified in one of the subparagraphs of this Section. Also, specify who will be responsible for ensuring that compliant operation is maintained for every antenna that will be used with the EUT.

Description:

Point-to-Point Operation

If the EIRP relaxation for point-to-point operation is proposed for any particular antenna, describe who will be responsible for ensuring that the EUT is only used in such an application.

Description:

Not Applicable this EUT is not used for point to point operation.

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System Receiver Input Bandwidth

Requirement:

Describe how the associated receiver(s) complies with the requirement that its input bandwidth (either RF or IF) matches the bandwidth of the transmitted signal.

Description:

System Receiver Hopping Capability

Requirement:

Describe how the associated receiver(s) has the ability to shift frequencies in synchronization with the transmitted signals.

Description:

With each binding process (binding means connecting a Receiver to exclusively ONE (Transmitter), the hopping sequence is communicated to the receiver. The binding has to be done one time only, as long as the same transmitter is used. If another transmitter is used, the receiver has to be bound to this one, while it loses the binding to the old one. As you see, the binding process itself cannot use frequency hopping, it is done completely on channel 1, but with the lowest possible RF power of 1mW (0dBm).

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TEST PROCEDURES

FOR FCC 15.247 FHSS / IC RSS 210 i8 compliance, the test procedures FCC DA-00-705 measurement guidance, and ANSI C63.4-2003 was followed to test this FHSS device.

Conducted Testing Procedures

POWER LINE CONDUCTED INTERFERENCE: The procedure used was ANSI C63.4-2003 using a 50uH LISN. Both lines were observed with the EUT transmitting. The resolution bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed.

Carrier Frequency Separation: The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:
Span = wide enough to capture the peaks of two adjacent channels
Resolution (or IF) Bandwidth (RBW) ≥ 1% of the span
Video (or Average) Bandwidth (VBW) ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold
Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section. Submit this plot

Number of Hopping Frequencies: The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:
Span = the frequency band of operation
RBW ≥ 1% of the span
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold
Allow the trace to stabilize. It may prove necessary to break the span up to sections, in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).

Time of Occupancy (Dwell Time): The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:
Span = zero span, centered on a hopping channel
RBW = 1 MHz
VBW ≥ RBW
Sweep = as necessary to capture the entire dwell time per hopping channel
Detector function = peak
Trace = max hold
If possible, use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s). An oscilloscope may be used instead of a spectrum analyzer.
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Conducted Testing Procedures

20 dB Bandwidth:

Use the following spectrum analyzer settings:
Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channe
RBW ≥ 1% of the 20 dB bandwidth
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold
The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).
Power plot is also provided.

Peak Output Power: Use the following spectrum analyzer settings:
Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel
RBW > the 20 dB bandwidth of the emission being measured
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold
allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power (see the NOTE above regarding external attenuation and cable loss). The limit is specified in one of the subparagraphs of this Section. Submit this plot. A peak responding power meter may be used instead of a spectrum analyzer.

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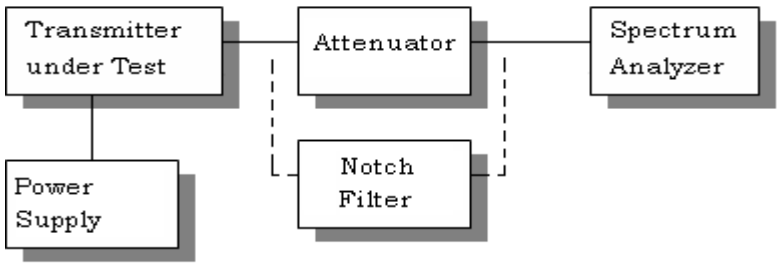
Conducted Testing Procedures

Band-edge Compliance of RF Conducted Emissions: Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation
RBW ≥ 1% of the span
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold
Allow the trace to stabilize. Set the marker on the emission at the bandedge, or on the highest modulation product outside of the band, if this level is greater than that at the bandedge. Enable the marker-delta function, then use the marker-to-peak function to move the marker to the peak of the in-band emission. The marker-delta value now displayed must comply with the limit specified in this Section. Submit this plot.
Now, using the same instrument settings, enable the hopping function of the EUT. Allow the trace to stabilize. Follow the same procedure listed above to determine if any spurious emissions caused by the hopping function also comply with the specified limit. Submit this plot.

Spurious RF Conducted Emissions: Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.
RBW = 100 kHz
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold
Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded. The level displayed must comply with the limit specified in this Section. Submit these plots or table of the measurements.



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Radiated Testing Procedures

RADIATED SPURIOUS EMISSIONS INTO THE ADJACENT RESTRICTED BANDS: Any adjacent restricted bands were investigated for emissions. Emissions appearing in these bands are measured to find the field strength. The emissions are measured with EUT fixed at the nearest channel to the restricted bands, and then with the EUT's hopping enabled. The RBW and detector function are set as required by ANSI C63.4-2003 and the FCC procedure DA-00-705 was used.

Spurious Radiated Emissions: This test is required for any spurious emission or modulation product that falls in a Restricted Band, as defined in Section 15.205. It must be performed with the highest gain of each type of antenna proposed for use with the EUT. Use the following spectrum analyzer settings:
Span = wide enough to fully capture the emission being measured
RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold
Follow the guidelines in ANSI C63.4-1992 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization, etc. A pre-amp and a high pass filter are required for this test, in order to provide the measuring system with sufficient sensitivity. Allow the trace to stabilize. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, which must comply with the limit specified in Section 15.35(b). Submit this data.

Now set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the dwell time per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a "duty cycle correction factor", derived from 20log(dwell time/100 ms), in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

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CONDUCTED TESTING RESULTS:

RF Power

Rules Part No.: 15.247(b), RSS-210, ANNEX A8.4

Requirements: (b) The maximum peak conducted output power of the intentional radiator shall not exceed the following:

(1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

(2) For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

(3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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RF Power

Test Data:

Conducted RF power:

Frequency MHz	Conducted Power (dBm)	Conducted Power (mW)	Max Antenna Gain for all Antennas dBi	RF Output Power (dBm)
2402	12.55	17.1	2.1	14.56
2440	12.31	17.1	2.1	14.41
2479	11.43	13.8	2.1	13.44

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Number of Hopping Channels

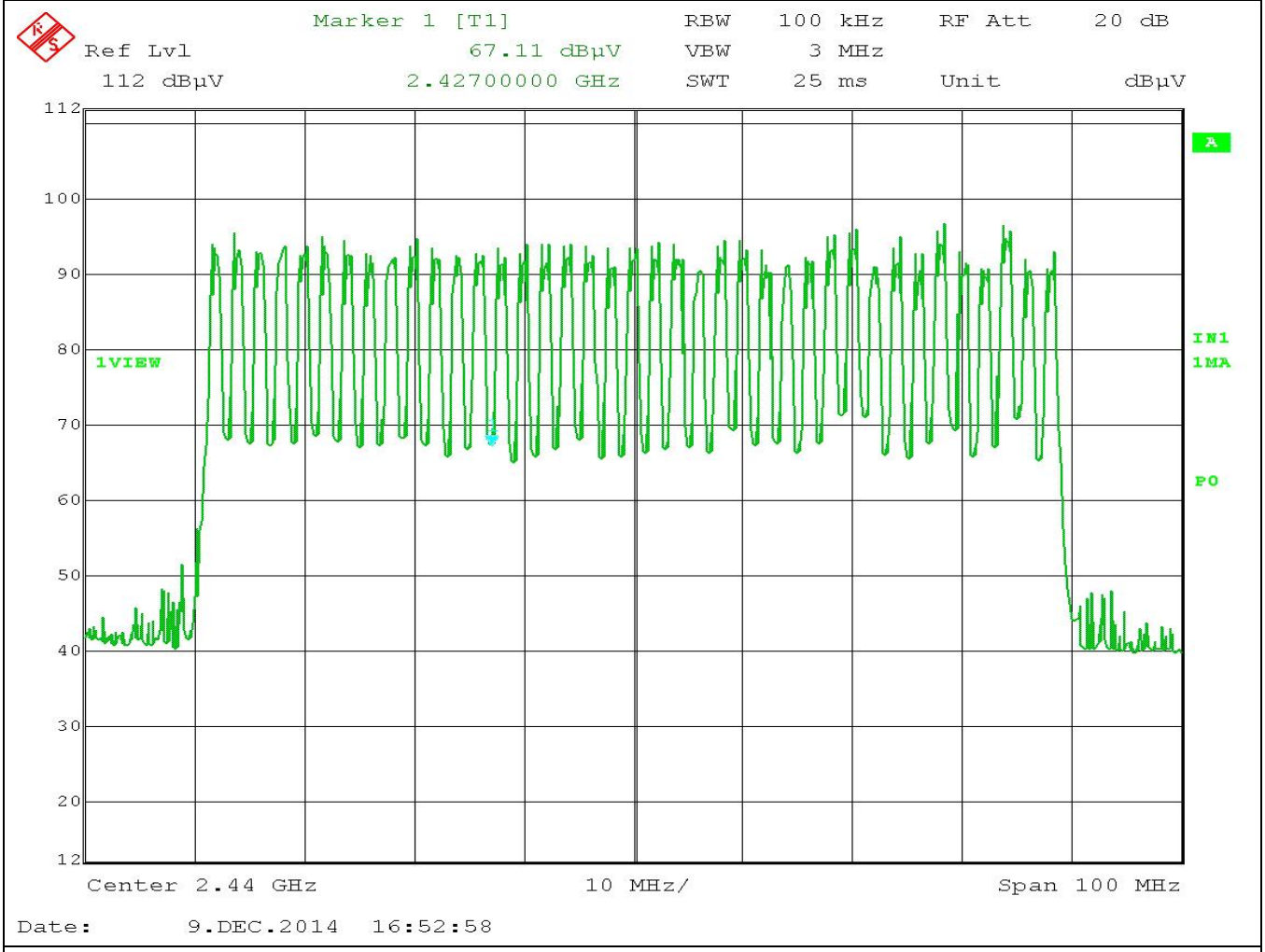
Rules Part No.: 15.247(a)(1), RSS-210, Annex 8

Requirements:

902-928 MHz	20 dB bandwidth < 250 kHz, at least 50 hopping frequencies.
	20 dB bandwidth ≥ 250 kHz, at least 25 hopping frequencies.
2400-2483.5 MHz	Minimum of 15 frequencies
5725-5850 MHz	Minimum of 75 frequencies

Test Data:

39 Hopping Channels



Results meet all requirements

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Dwell Time of Hopping Channel

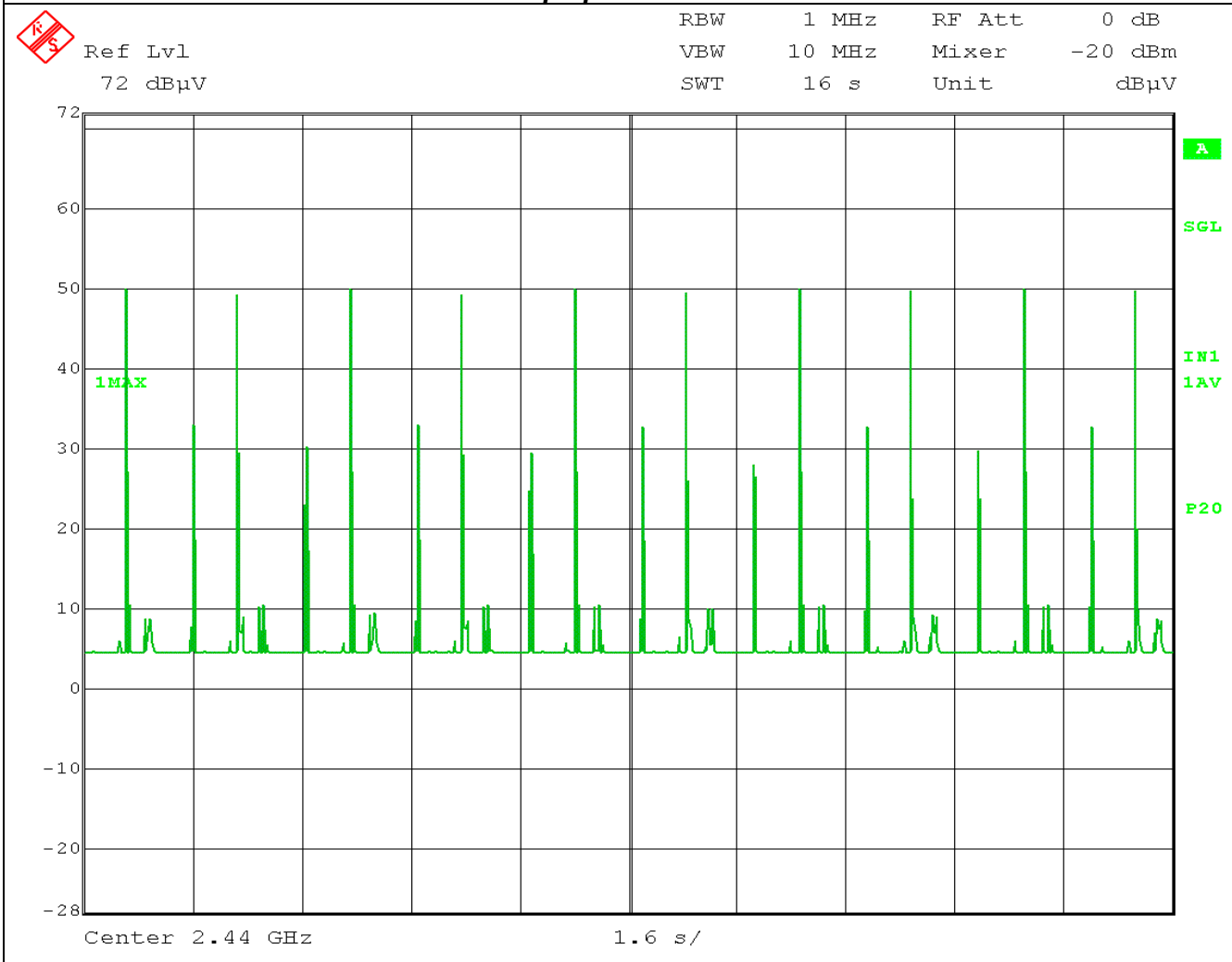
RULES PART NO.: 15.247(a)(1)(i), RSS-210, ANNEX 8

REQUIREMENTS:

902-928 MHz	If 20 dB bandwidth is < 250 kHz, average time of occupancy of any frequency shall not exceed 0.4 sec in 20 seconds.
	If 20 dB bandwidth is 250 kHz or greater, dwell time < = 0.4 seconds in a 10 second period.
2400-2483.5 MHz	< = 0.4 seconds in a 0.4 seconds multiplied the number of hopping channels employed.
5725-5850 MHz	< = 0.4 seconds in a 30 second period.

TEST DATA:

Hops per Channel



Results meet all requirements

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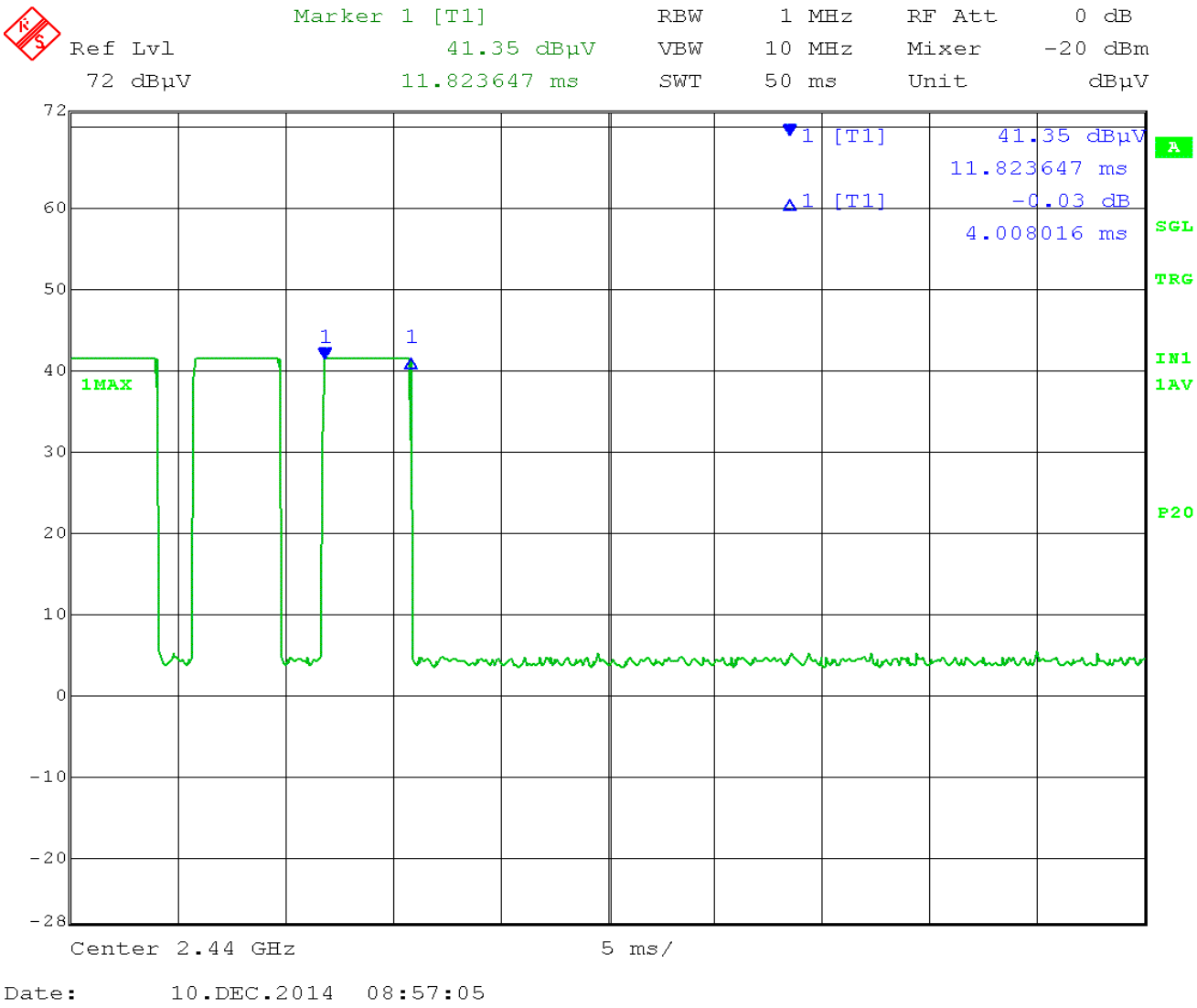
Dwell time of Hopping Channel

Channel dwell time per hop



Results meet all requirements

Data Rate	Hops per Channel	Length of Hop	Dwell Time
7ms/21ms	20	4 ms	80 ms

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Emission Bandwidth

RULES PART NO.: 15.247(a)(2), RSS-210, ANNEX 8

REQUIREMENTS: The 6 dB bandwidth must be less than 500 kHz.

TEST DATA:

20 dB Occupied Bandwidth

Results meet all requirements

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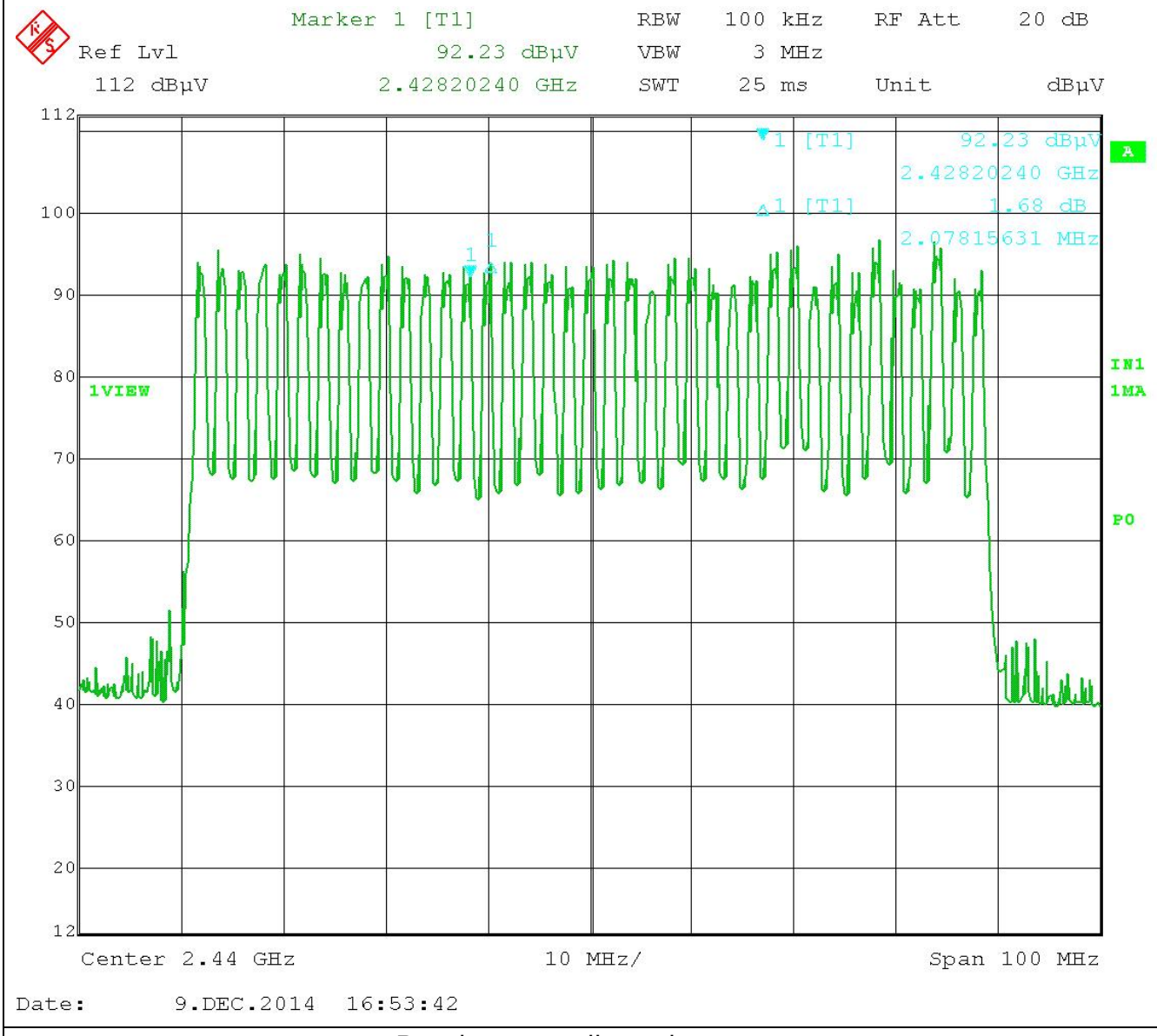
Carrier Frequency Separation

RULES PART NO.: 15.247(a)(2), RSS-210, ANNEX 8

REQUIREMENTS: The hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

TEST DATA:

Carrier Channel Separation



Results meet all requirements

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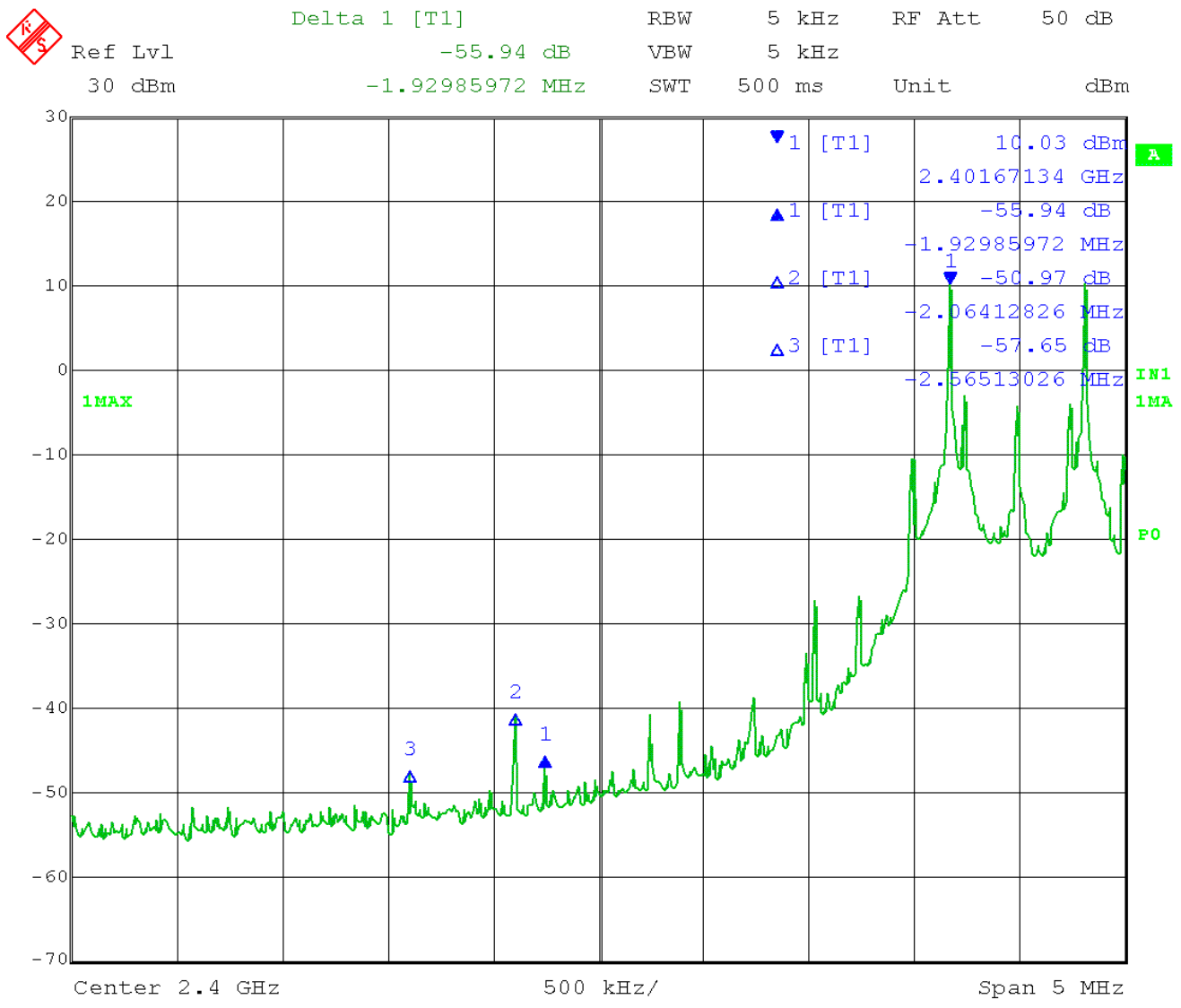
Low Band Edge

TEST DATA:

Low Band Edge with Hopping Stopped @ Lowest Channel Used in Band



Results meet all requirements

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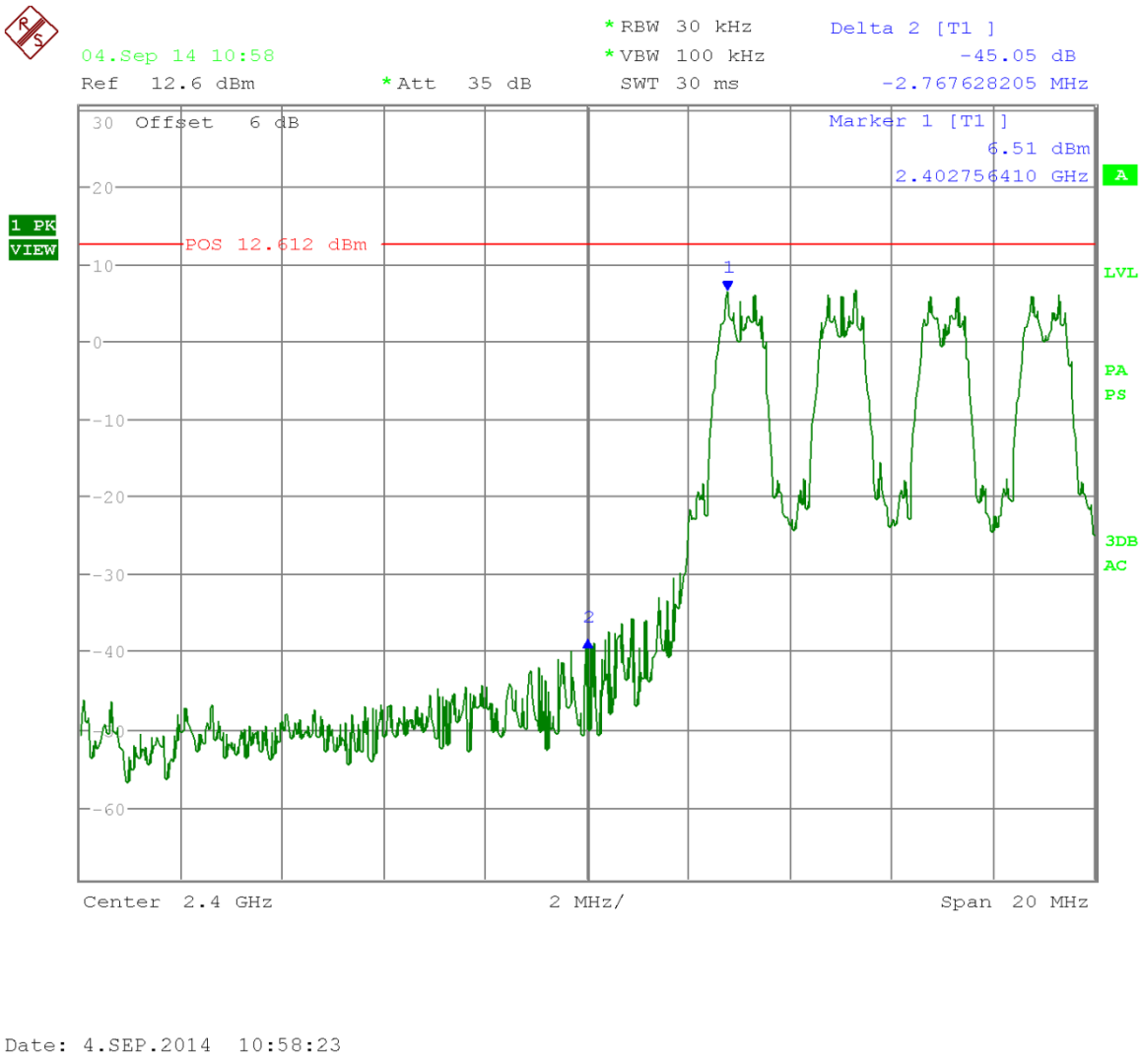
Low Band Edge

Low Band Edge with Hopping On

Results meet all requirements

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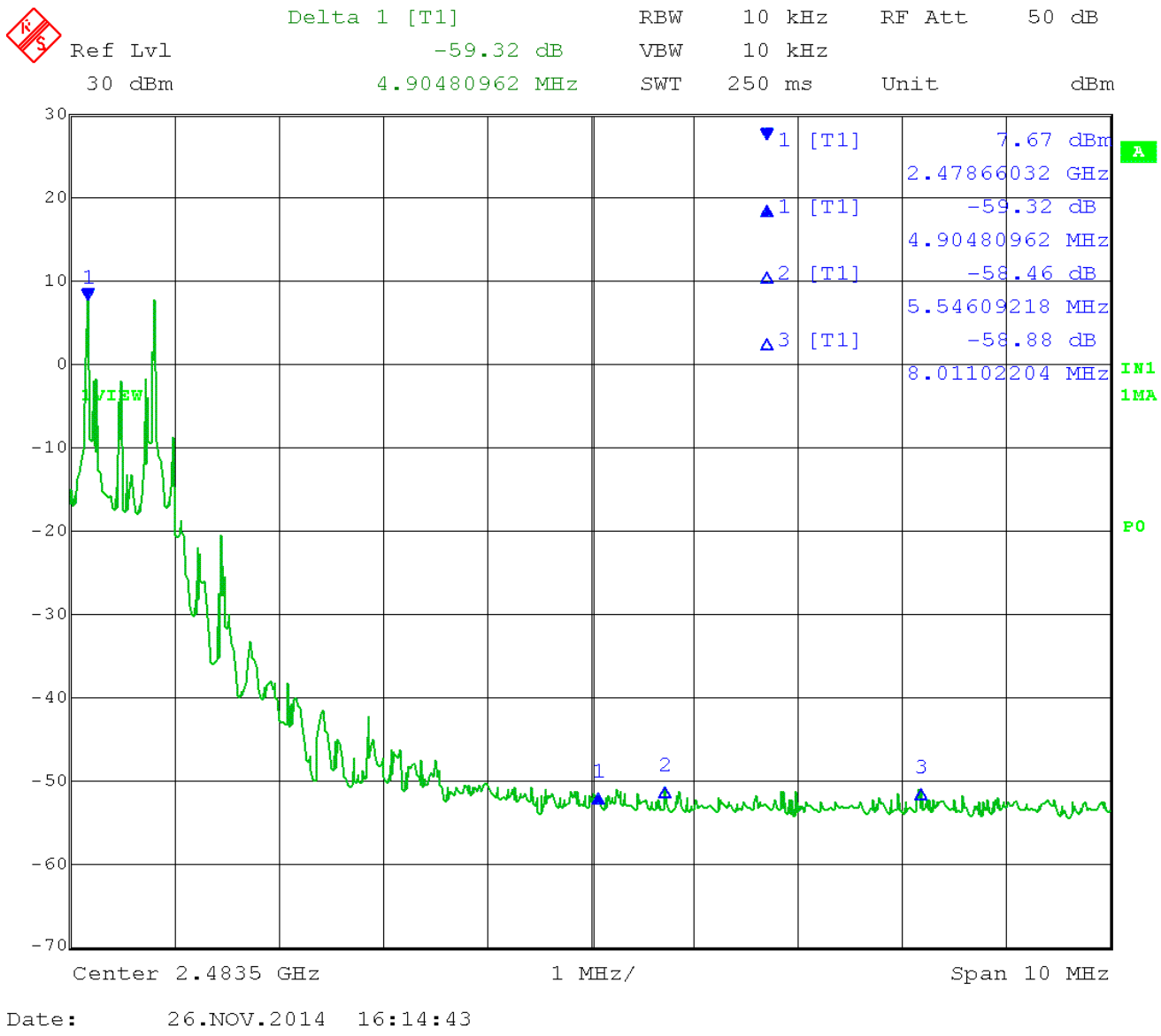
High Band Edge

High Band Edge with Hopping Stopped @ Highest Channel Used in Band



Results meet all requirements

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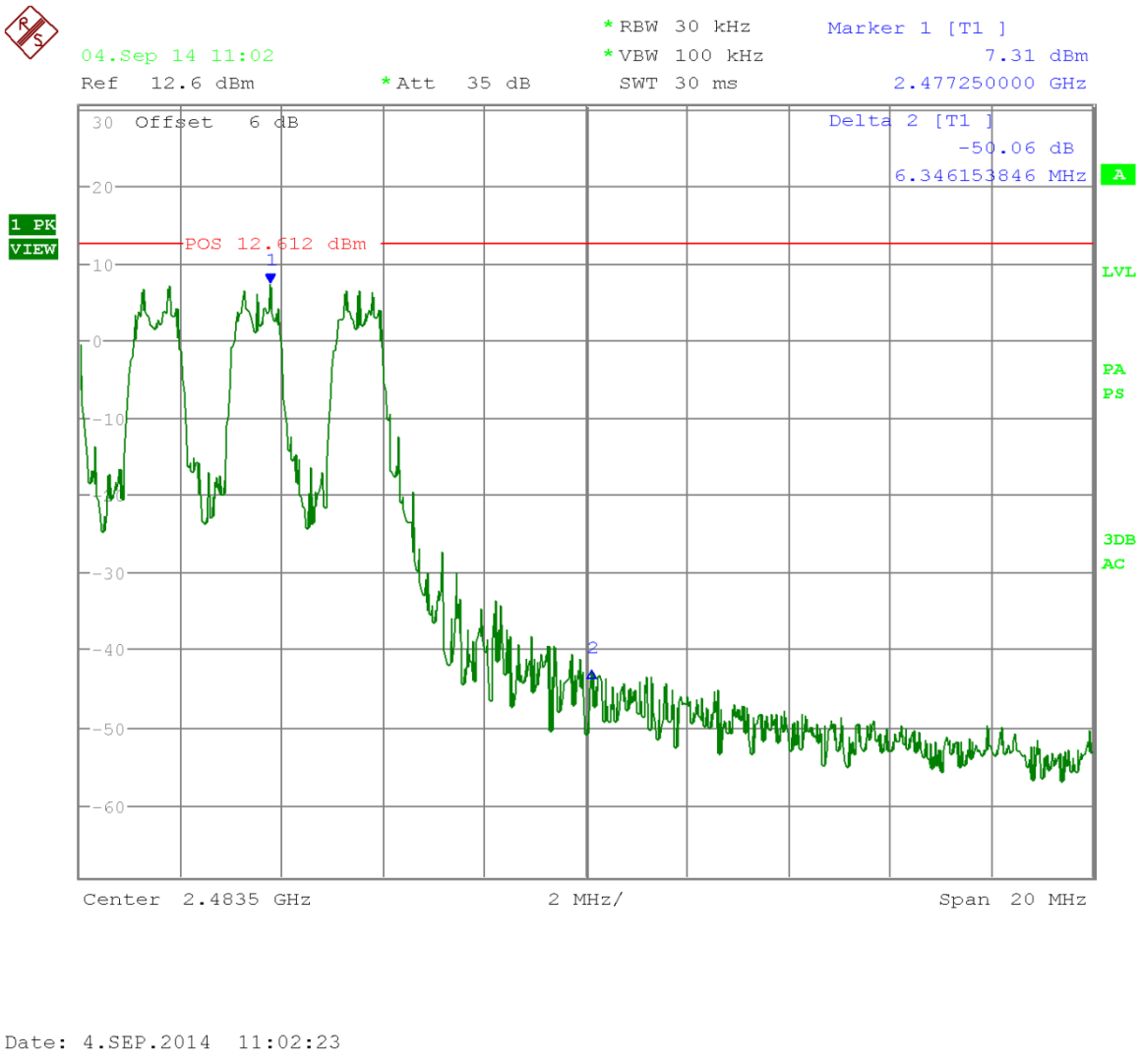
High Band Edge

High Band Edge with Hopping On



Results meet all requirements

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Conducted Spurious Emissions Outside of Band

Rule Part: §15.247(d)

Requirement:
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Test Results:

Antenna Conducted Emissions								
Frequency (MHz)	**Level (dBm)**	**Level (dBc)**	**Frequency (MHz)**	**Level (dBm)**	**Level (dBc)**	**Frequency (MHz)**	**Level (dBm)**	**Level (dBc)**
2402	12.55	0	**2440**	12.31	0	**2479**	11.43	0
4804	-58.15	70.7	**4880**	-49.77	62.08	**4958**	-45.65	57.08
7206	-58.58	71.13	**7320**	-73.93	86.24	**7437**	-75.27	86.7
9608	-71.79	84.34	**9760**	-75.94	88.25	**9916**	-70.75	82.18
12010	-76.06	88.61	**12200**	-75.5	87.81	**12395**	-74.09	85.52
14412	-73.37	85.92	**14640**	-65.85	78.16	**14874**	-74.88	86.31
16814	-77.38	89.93	**17080**	-76.39	88.7	**17353**	-77.52	88.95
19216	-76.83	89.38	**19520**	-77.59	89.9	**19832**	-76.65	88.08
21618	-73.08	85.63	**21960**	-73.73	86.04	**22311**	-74.94	86.37
24020	-74.41	86.96	**24400**	-75.69	88	**24790**	-73.95	85.38
Meets all Requirements								

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RADIATED TESTING RESULTS:

Radiated RF power:

dBuV/m FIELD STRENGTH to EIRP CALCULATION: EIRP=E + 20log(d) – 104.8

EIRP=the equivalent isotropic radiated power in dBm
E= Electric Field Strength in dBuV/m
D= measurement distance in meters

Frequency MHz	Field Strength @ 3M	EIRP Power dBm	EIRP Power mW
2402	112.65	17.42	55
2440	111.93	16.70	46.7
2479	111.63	16.40	43.66

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SPURIOUS EMISSIONS INTO ADJACENT RESTRICTED BAND

RULES PART NO.: 15.247(d), 15.205 RSS-210 ANNEX 8, RSS-GEN

REQUIREMENTS: . Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (§15.205(c)). Emissions that fall in the restricted bands. These emissions must be less than or equal to 500 µV/m (54 dBµV/m).

In the 902 to 928 MHz band the emissions need only meet 20 dBc in the adjacent bands as they are not in a restricted band.

See plots on the following pages.

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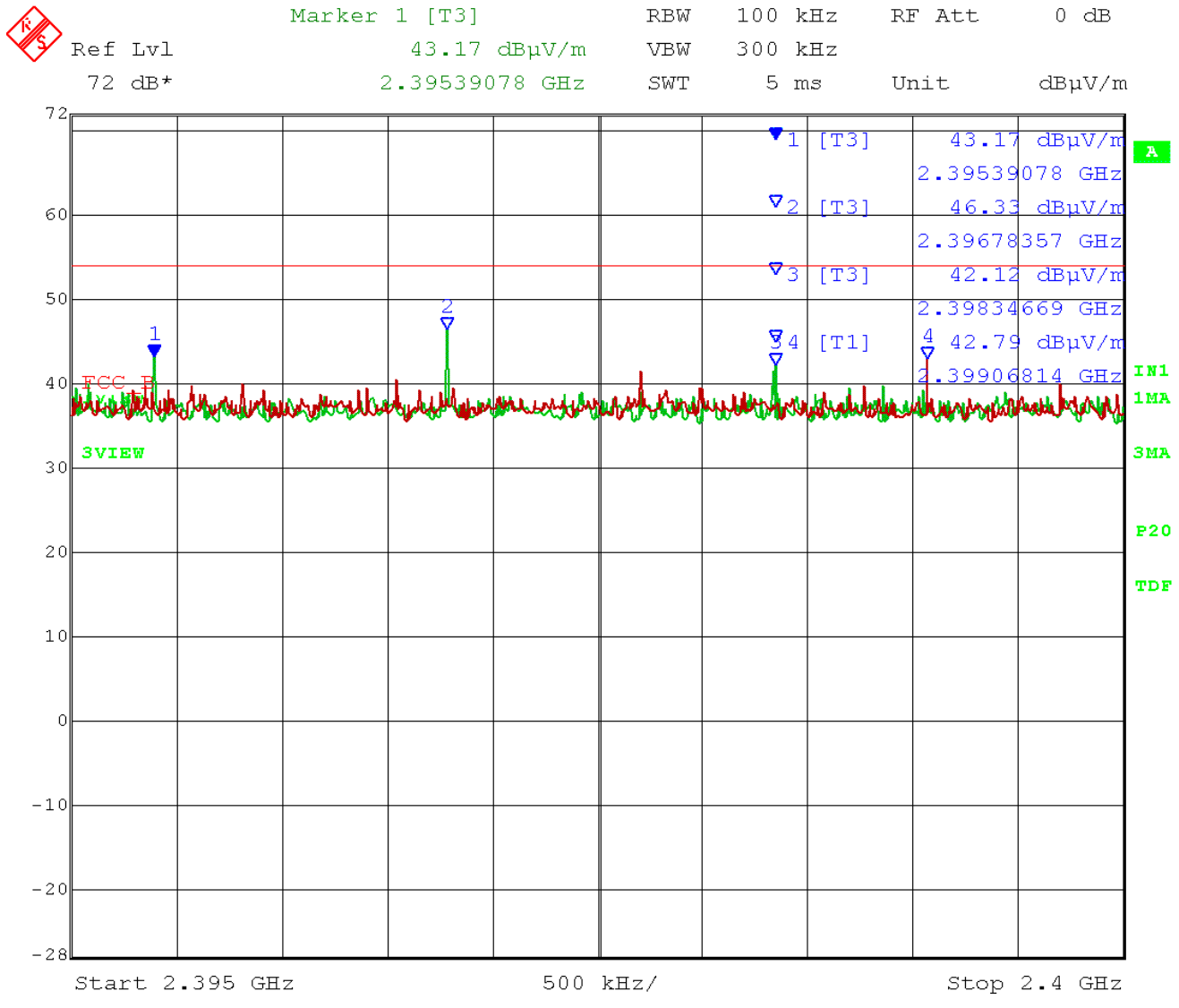
SPURIOUS EMISSIONS INTO ADJACENT RESTRICTED BAND

Field Strength Lower Restricted Band Hopping On



Results meet all requirements

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Field Strength Upper Restricted Band Hopping On

Results meet all requirements

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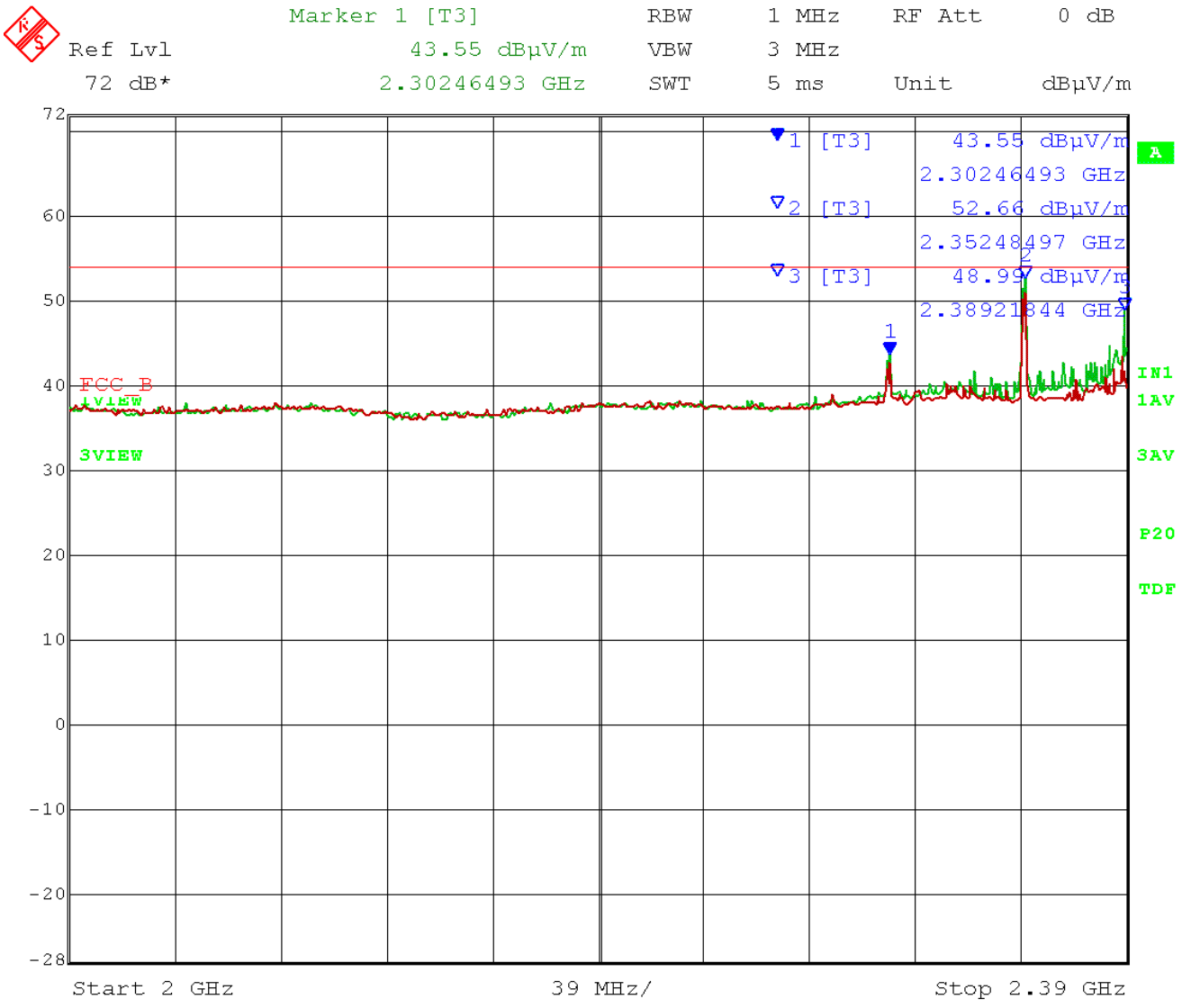
RADIATED SPURIOUS EMISSIONS INTO ADJACENT RESTRICTED BAND

Field Strength Lower Restricted Band Hopping Stopped



Results meet all requirements

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Field Strength Upper Restricted Band Hopping Stopped Vertical

Results meet all requirements

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EMC EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
3-Meter Semi-Anechoic Chamber	Panashield	N/A	N/A	12/31/13	12/31/15
Coaxial Cable - Chamber 3 cable set	Semiflex	N/A	Chamber 3 cable set	1/26/12	1/26/15
EMI Test Receiver	Rhode & Schwarz	*ESU40	1302.6005.40	3/21/13	3/21/15
Antenna: Biconnical	Eaton	94455-1	1096	5/10/13	5/10/15
Antenna: Log-Periodic	Electro-Metrics	LPA-25	1122	5/09/13	5/09/15
Antenna: Double-Ridged Horn/ETS Horn 2	ETS-Lindgren	3117	00041534	10/05/12	10/05/14
RF Power Meter	Boonton	4531	11793	1/19/13	1/19/15
Sensor	Boonton	51072A	34647	1/19/13	1/19/15
Band Reject Filter	Lorch Microwave	6BR6-2442/300-N	Z1	12/7/12	12/7/14
Field Strength Software	TIMCO	Ver 4.9	NA	NA	NA

*EMI RECEIVER SOFTWARE VERSION

The receiver firmware used was version 4.43 Service Pack 3

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