Regulatory Compliance Test Report 15.247 FHSS - FCC/IC

Test Lab Information	**Name**	**CELLTECH LABS INC.**
	Address	21-364 Lougheed Road, Kelowna, British Columbia V1X 7R8 Canada
Test Lab Registration No.(s)	**FCC**	714830
	IC	3874A-1
Applicant Information	**Name**	**BLACKLINE GPS**
	Address	**Suite 101, 1215 13th Street SE Calgary, Alberta, T2G 3J4, Canada**
Standard(s) & Procedure(s)	**FCC**	**47 CFR Part 15.247**
	IC	**RSS-210 Issue 8; RSS-Gen Issue 3**
	ANSI	C63.4-2003
Device Classification(s)	**FCC**	Part 15 Spread Spectrum Transmitter (DSS) with GPS & 2.4GHz Receiver.
	IC	Frequency Hopping Spread Spectrum Transmitter with GPS & 2.4GHz Receiver.
Application Type(s)	**FCC/IC**	TCB/CB Certification
Device Identifier(s)	**FCC ID:**	W77LNR900.
	IC:	8255A-LNR900
Device Name: **Device Model #:**	Loner 900 101505	
Test Sample Serial No.	#1	
Transmit Frequency Band	902.0-928.0 MHz	
Transmit Frequency Range	902.765 - 927.155 MHz	
Max. RF Output Power (measured)	26.9 dBm	
Modulation	2-GFSK NRZ	
Antenna Type(s) Tested	Integral, 1.96 dBi	

This wireless device has demonstrated compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in FCC 47 CFR Part 15.247; Industry Canada RSS-210 Issue 8 and RSS-Gen Issue 3; and ANSI C63.4-2003.

I attest to the accuracy of data. All measurements were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

The results and statements contained in this report pertain only to the device(s) evaluated.

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Test Report Approved By		**Glen Westwell**	**Laboratory Manager**	**Celltech Labs Inc.**

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TEST SUMMARY

Referenced Standard(s):		FCC CFR Title 47 Part 15 Subpart C, RSS-210 Annex 8.			
Section	**Description of Test**	**Procedure Reference**	**Limit Reference**	**Test Dates**	**Result**
6.0	20 dB OCC. BW.	DA 00-705, ANSI C63.4	15.247(a)(1), RSS-210, A8.1	15th Apr. - 2 May 2014	Pass
7.0	Carrier Freq. Separation	DA 00-705, ANSI C63.4	15.247(a)(1), RSS-210, A8.1		Pass
8.0	Number of Hopping Ch.	DA 00-705, ANSI C63.4	15.247(a)(1), RSS-210, A8.1		Pass
9.0	Time of Occupancy	DA 00-705, ANSI C63.4	15.247(a)(1), RSS-210, A8.1		Pass
10.0	RF Output Power	DA 00-705, ANSI C63.4	15.247(b), RSS-210, A8.4		Pass
11.0	Spur. Emissions & Band Edge	DA 00-705, ANSI C63.4	15.247(d), RSS-210, A8.5		Pass
12.0	Restricted Band Emissions	DA 00-705, ANSI C63.4	15.209, ICES-003		Pass

REVISION LOG

Revision	Description	Implemented By	Issue Date
1.0	Initial Release	Glen Westwell	6/9/2014
1.1	Corrected ref. to 15.247, pg 3., corrected Rev Log. date., added cal. intervals, added loop antenna test set up photo page 50. Corrected model # pg. 1,5, footer.	Glen Westwell	6/9/2014

SIGNATORIES

Prepared By	Glen Westwell	Reviewed By	Art Voss	Date
				6/10/2014

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1.0 SCOPE

This report outlines the measurements made and results collected during electromagnetic emissions testing of Loner 900, model # 900 NAT 001A . The measurement results were applied against the applicable FCC requirements and limits outlined in the technical rules and regulations set forth in the Federal Communication's Commission Code of Federal Regulations Title 47 Part 15 Subpart C and Industry Canada Radio Standards Specification RSS-210 Issue 8 and RSS-Gen Issue 3.

2.0 REFERENCES

2.1 Normative References

ANSI/ISO 17025:2005	General Requirements for competence of testing and calibration laboratories
IEEE/ANSI C63.4-2003	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
CFR Title 47 Part 15C	Code of Federal Regulations Title 47: Telecommunication Part 15C: Intentional Radiators
IC Spectrum Management & Telecommunications Policy	Radio Standards Specification RSS-210 Issue 8 - Low-Power License-Exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment RSS-Gen Issue 3 - General Requirements and Information for the Certification of Radiocommunication Equipment

3.0 PASS/FAIL CRITERIA

Unless otherwise noted in the Appendices, the pass/fail criteria is the limit set forth in the reference standards. The DUT is considered to have passed the requirements if the data collected during the described measurement procedure is no greater than the specified limits as defined. The pass/fail statements made in this report only apply to the unit tested.

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4.0 FACILITIES AND ACCREDITATIONS

The facilities used in collecting the test results outlined in this report are located at 21-364 Lougheed Road, Kelowna, British Columbia, Canada V1X 7R8. The radiated emissions site conforms to the requirements set forth in ANSI C63.4 and is filed and listed with the FCC under Test Firm Registration Number 714830 and Industry Canada under Test Site File Number IC 3874A-1.

5.0 GENERAL INFORMATION

5.1 DUT Description & Specifications

Device Type:	Part 15.247 FHSS Device, with a GPS & 2.4GHz receiver.	
Device Model(s):	101505	
Test Sample Serial No.:	T/A Sample - Identical Prototype	
Device Identifier(s):	**FCC ID:**	W77LNR900
	Ind. Can.:	8255A-LNR900
Transmit Frequency Range:	902.765 - 927.155 MHz	
Max. No. of Hoping Channels Measured:	63	
Manuf. Max. Rated Output Power:	27.0dBm +/- 2dB (Conducted), Independent of data rate.	
RF Output Power Measured:	27.3 (Conducted)	
Antenna Gain:	Integral PCB Trace, 1.96 dBi.	
Modulation:	2-GFSK NRZ, **1.2 kbps & 38.4 kbps.	
DUT Power Source:	Internal DC cell.	
Type of Equipment:	Unlicensed Mobile Device (DSS).	
Deviation(s) from standard/procedure:	None	
Modification of DUT:	50 ohm connection to the RF output for conducted measurements.	
Applicable Standards:	FCC Part 15.247, DA 00-705, RSS-210, Annex 8.	

Note: ** The data rate does not effect the TX power. The RF performance in this report is reflective of both data rates.

DUT Description

This device is a frequency hopping spread spectrum part 15 device operating in the 902 - 928 MHz band.
Loner 900 is a safety device that monitors lone worker status and communicates with a remote server via a wireless access point. The product contains three radios, digital circuitry, buttons, indicators, sensors, power regulation, and a rechargeable Li-Ion battery. The GPS receiver and 2.4 GHz receiver are used for determining lone worker location and do not transmit. The 915 MHz radio transmits and receives using half-duplex operation. When the Li-Ion battery is being recharged, the product automatically powers down the radios and turns itself off.

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6.0 20 DB OCCUPIED BANDWIDTH

A.1 REFERENCES	
Normative Reference Standard	FCC CFR 15.247(a)(1)(i), RSS-210, Annex 8

A.2 LIMITS	
15,247(a)(1)(i) RSS-210, A8.1(a)	<250 kHz

A.3 ENVIRONMENTAL CONDITIONS	
Temperature	20 ºC
Humidity	40 +/- 10 %
Barometric Pressure	101 +/- 3 kPa

ASSET NUMBER	MANUFACTURER	MODEL	DESCRIPTION	LAST CAL - CAL DUE
00241	R&S	FSP40	Spec. Analyzer	4/9/2013 - 4/9/2015
00101	Pasternack	PE7013-3030	30 dB attenuator	COU

Note: Worst case data presented at maximum data rate of 38.4 kbits/s

Ch.	Measured 20 dB Occ. BW. 38.4 kbps	Limit
Bottom	68.8 kHz	<250 kHz
Mid	66.8 kHz	<250 kHz
Top	65.2 kHz	<250 kHz

Ch.	Measured 20 dB Occ. BW. 1.2 kbps	Limit
Bottom	48.0 kHz	<250 kHz
Mid	48.0 kHz	<250 kHz
Top	48.0 kHz	<250 kHz

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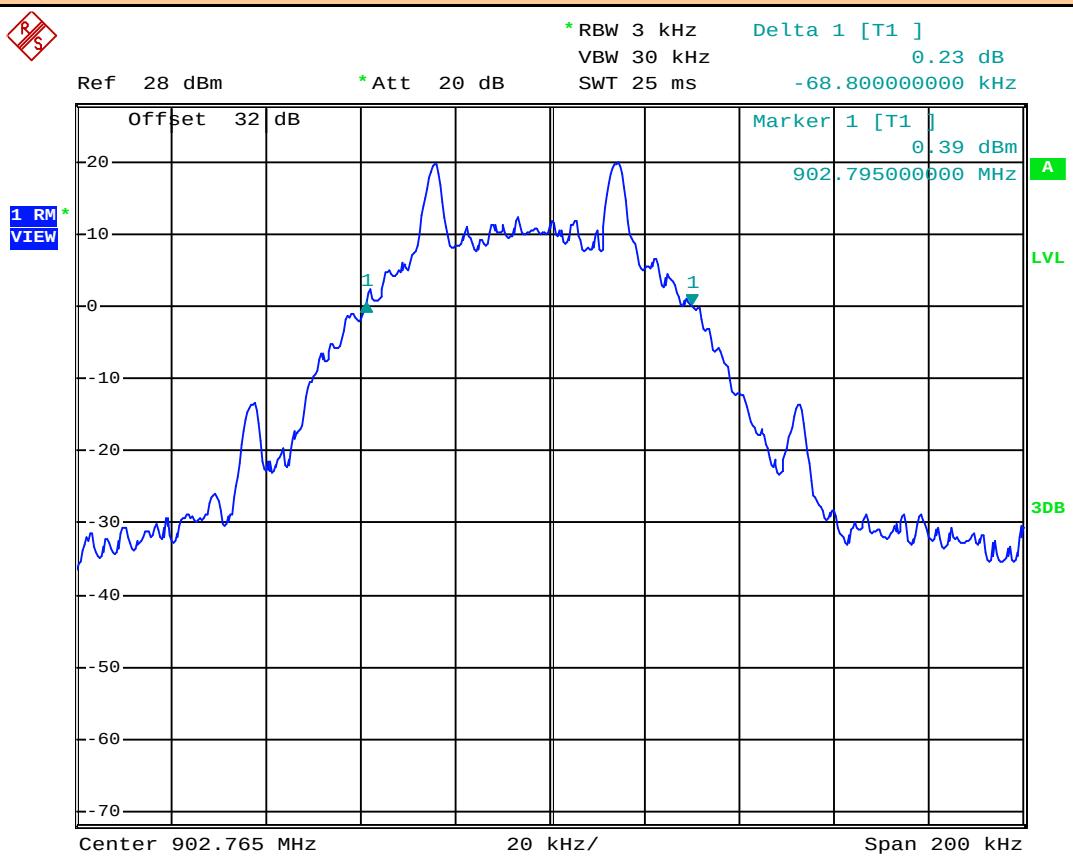
A.4 TEST RESULTS: BOTTOM CH., COMPLIES

38.4 kbps



Date: 15.APR.2014 20:01:33

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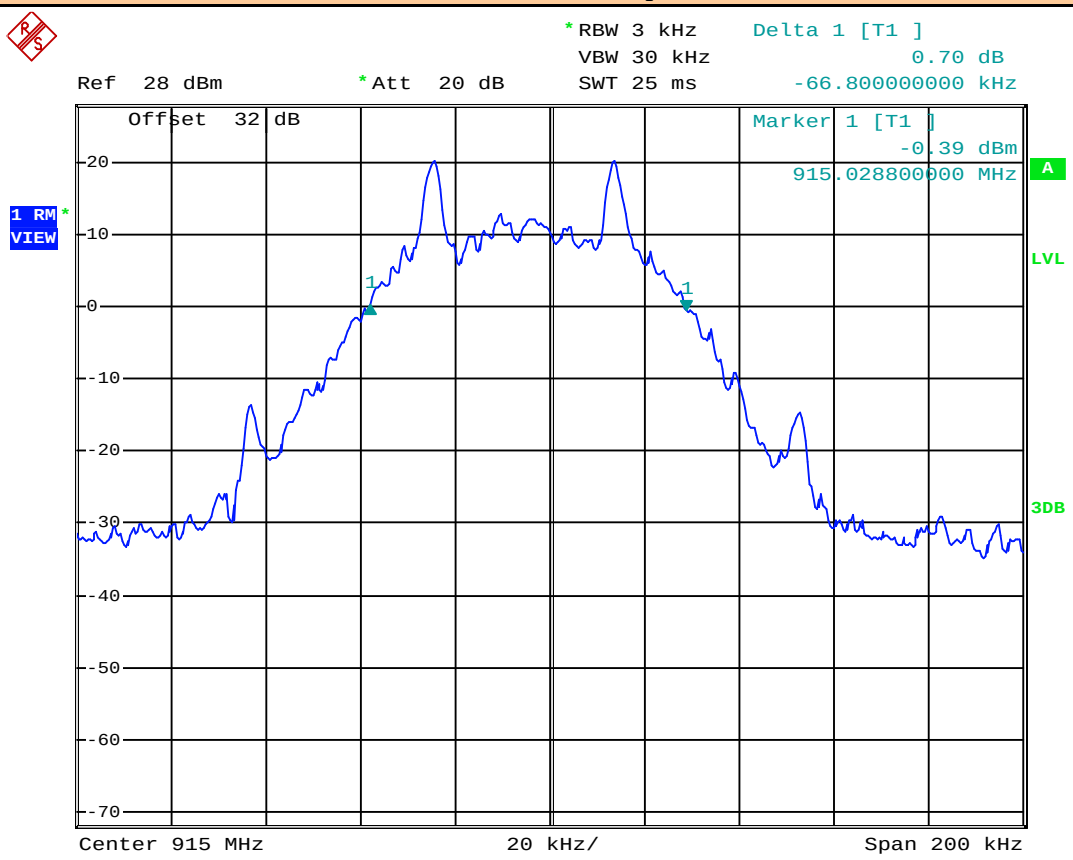
A.5 TEST RESULTS: MID CH., COMPLIES

38.4 kbps



Date: 15.APR.2014 20:03:06

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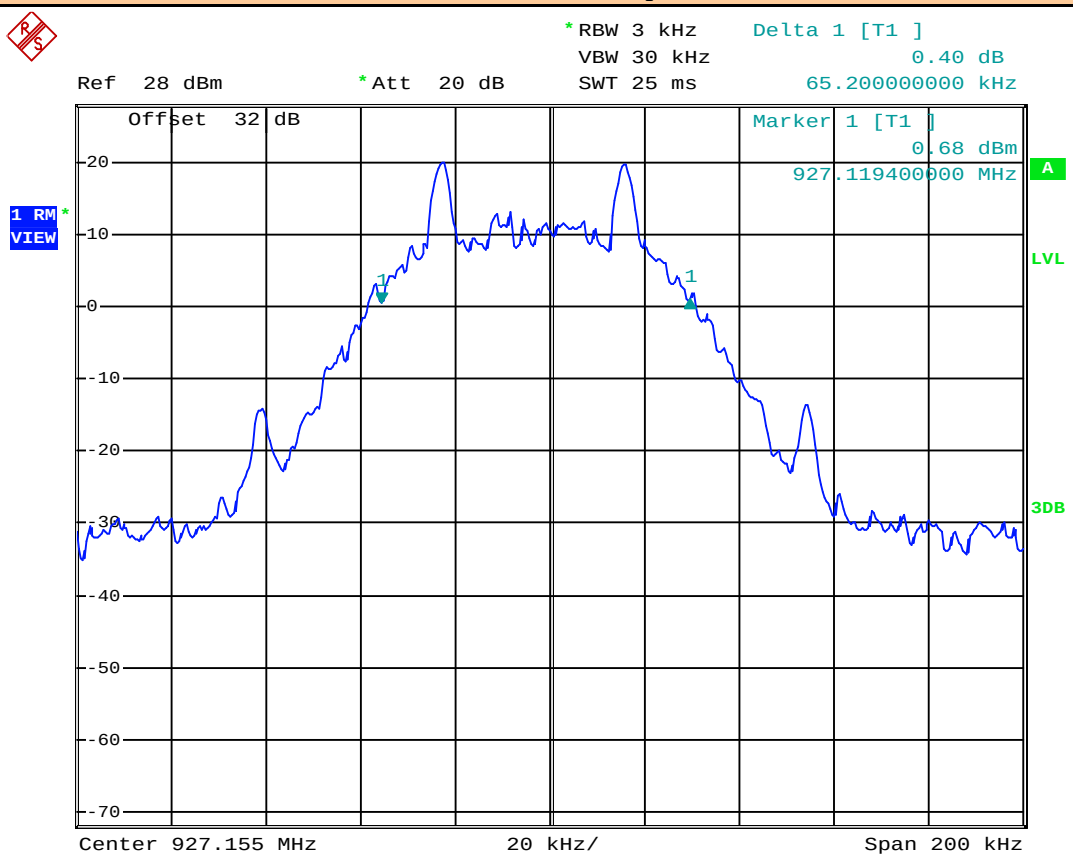
A.6 TEST RESULTS: TOP CH., COMPLIES

38.4 kbps



Date: 15.APR.2014 19:58:28

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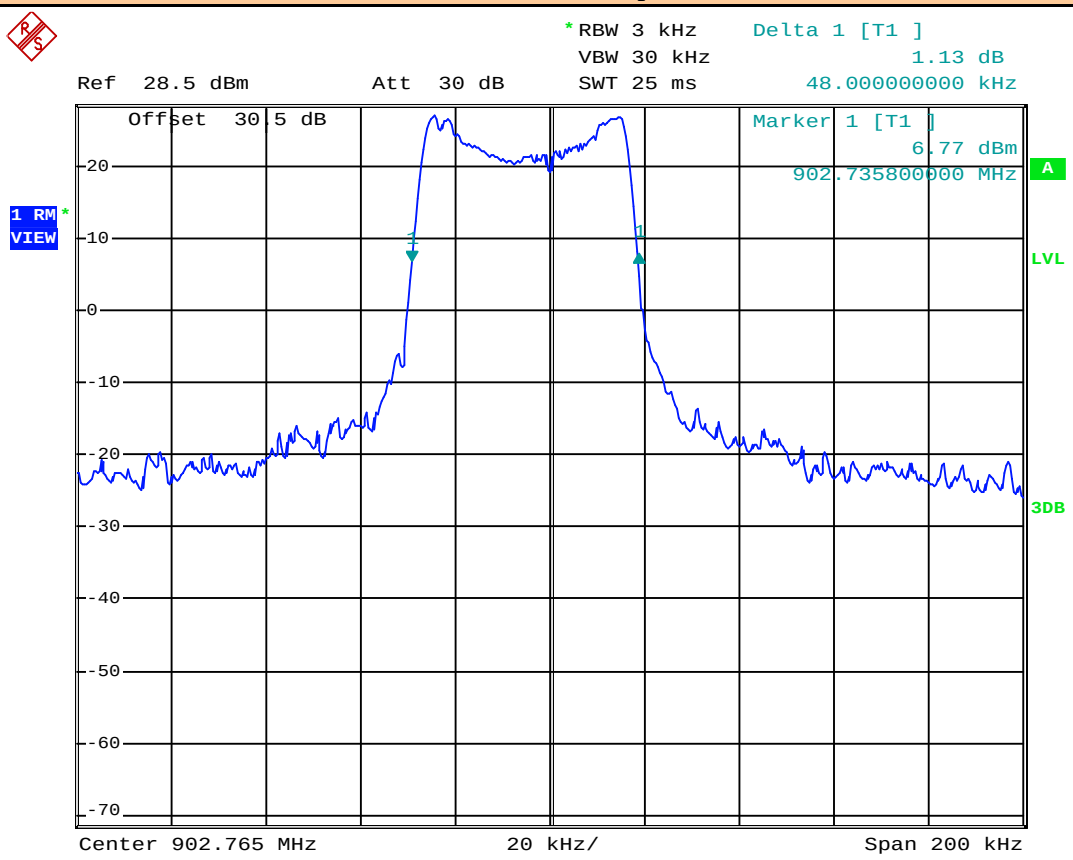
A.7 TEST RESULTS: BOTTOM CH., COMPLIES

1.2 kbps



Date: 4.JUN.2014 16:02:55

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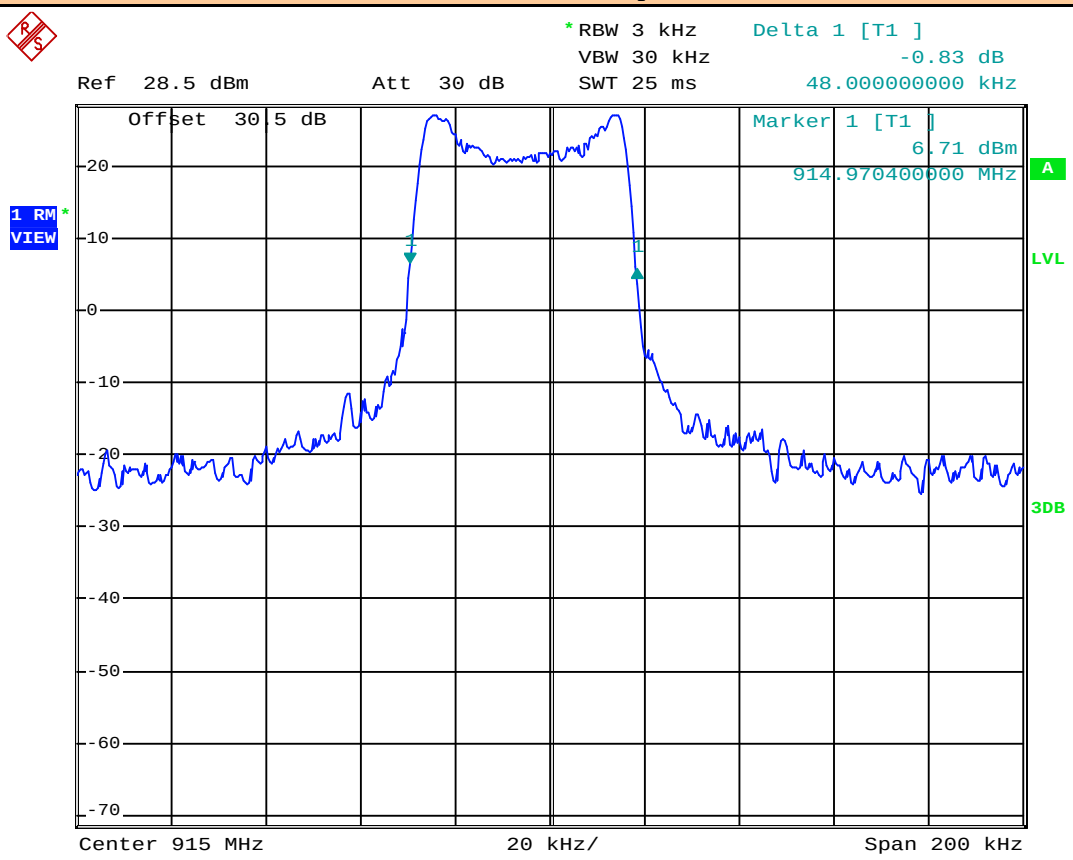
A.8 TEST RESULTS: MID CH., COMPLIES

1.2 kbps



Date: 4.JUN.2014 16:04:38

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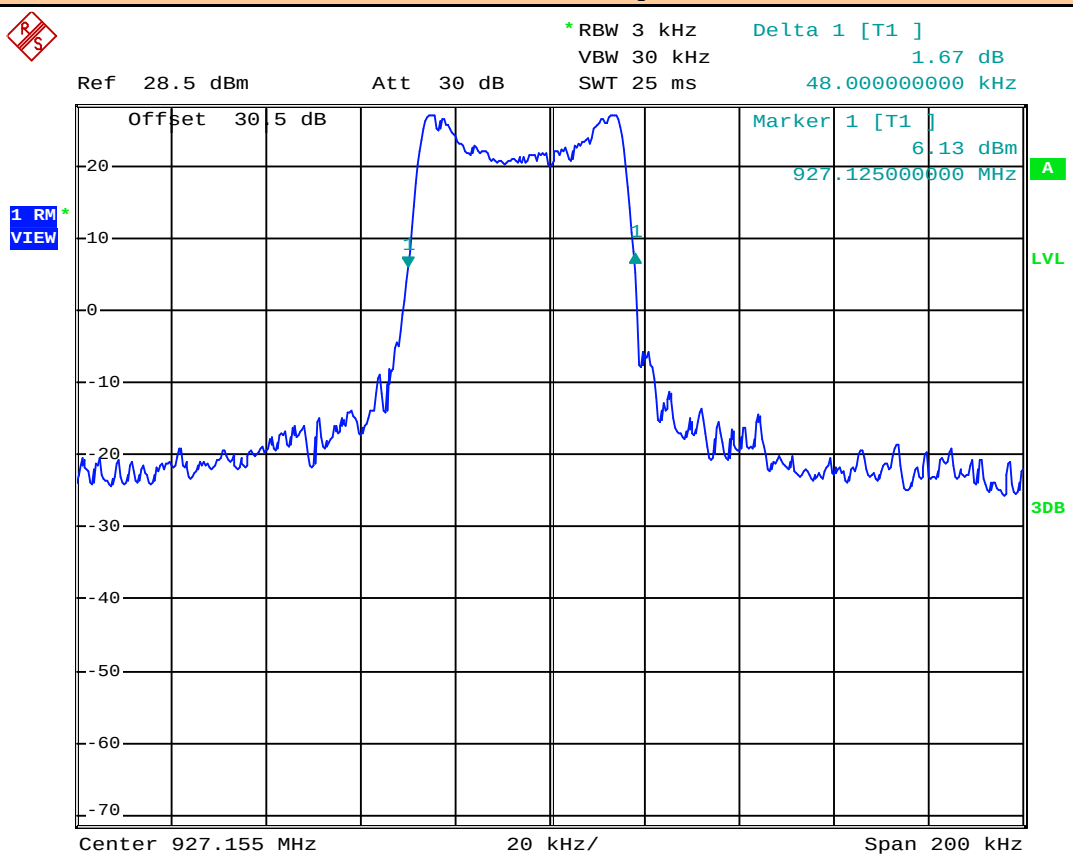
A.9 TEST RESULTS: TOP CH., COMPLIES

1.2 kbps



Date: 4.JUN.2014 16:06:11

A.10 SIGN-OFF

I attest to the accuracy of the data. All measurements reported herein were performed by me and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements.

Glen Westwell
Lab Manager
Celltech Labs Inc.

6/10/2014
Date

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7.0 CARRIER FREQUENCY SEPARATION

A.11 REFERENCES	
Normative Reference Standard	FCC CFR 15.247(a)(1), RSS-210, Annex 8.

A.12 LIMITS	
15,247(a)(1) RSS-210, 8A.1(b)	>20 dB BW or >68.8 kHz

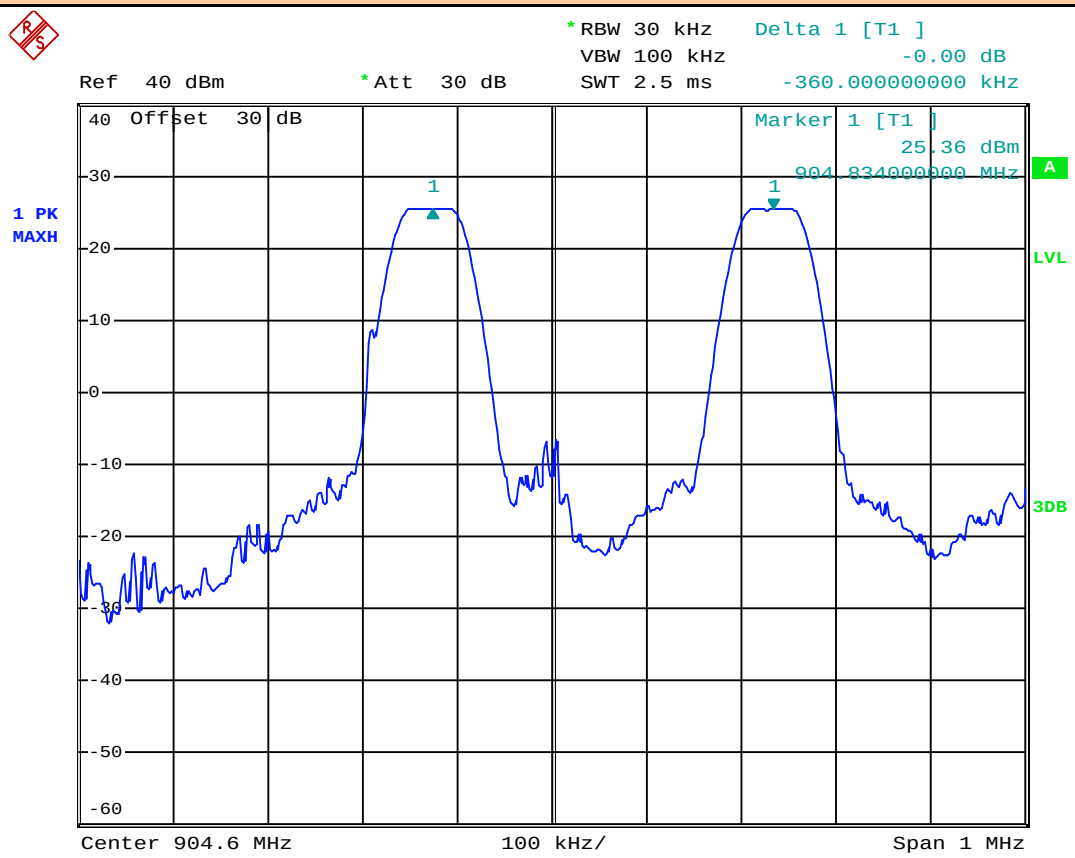
A.13 ENVIRONMENTAL CONDITIONS	
Temperature	20 ºC
Humidity	40 +/- 10 %
Barometric Pressure	101 +/- 3 kPa

ASSET NUMBER	MANUFACTURER	MODEL	DESCRIPTION	LAST CAL - CAL DUE
00241	R&S	FSP40	Spec. Analyzer	4/9/2013 - 4/9/2015
00101	Pasternack	PE7013-3030	30 dB attenuator	COU

Carrier Frequency Separation	Limit
360 kHz	>68.8 kHz

Note: The channel carrier separation is 360 kHz regardless of data rate selected.

A.14 TEST RESULTS: COMPLIES



Date: 4.APR.2014 14:26:24

A.15 SIGN-OFF

I attest to the accuracy of the data. All measurements reported herein were performed by me and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements.

Glen Westwell
Lab Manager
Celltech Labs Inc.

6/10/2014
Date

8.0 NUMBER OF HOPPING FREQUENCIES

A.16 REFERENCES	
Normative Reference Standard	FCC CFR 15.247(a)(1)(i), RSS-210, Annex 8.

A.17 LIMITS	
15.247(a)(1)(i) RSS-210, 8A.1(c)	≥ 50 Hopping Channels

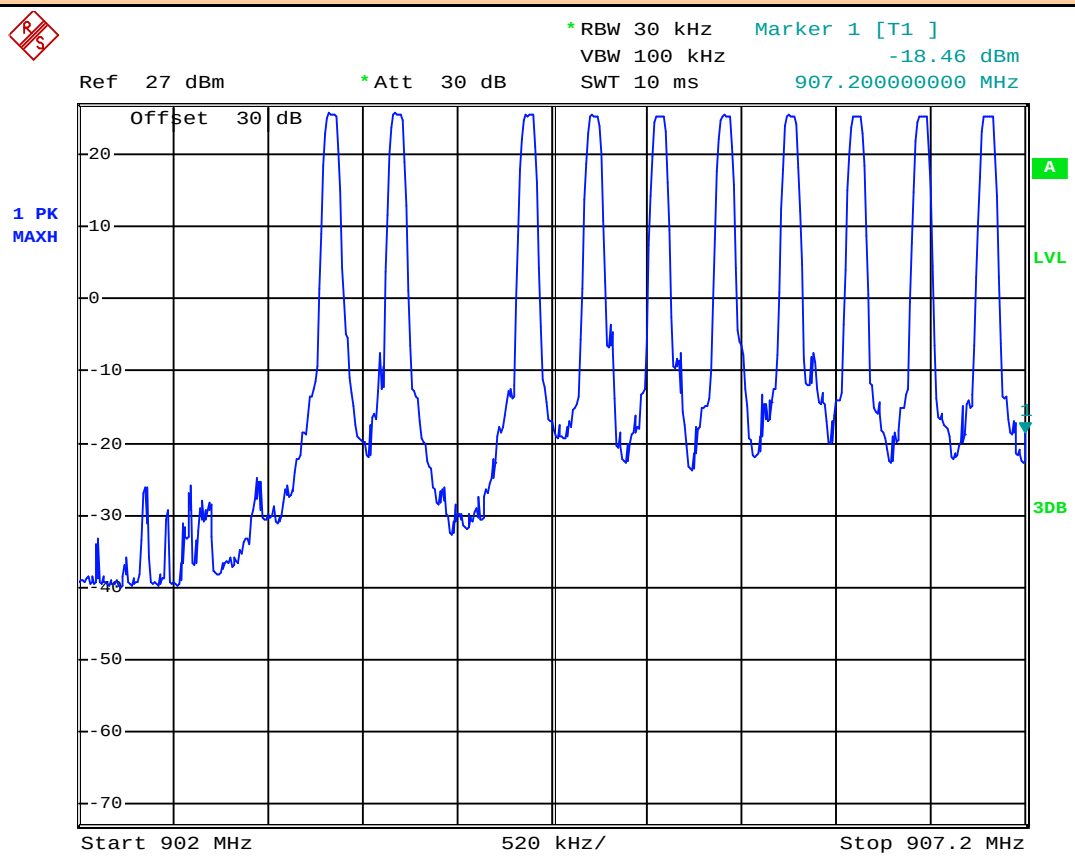
A.18 ENVIRONMENTAL CONDITIONS	
Temperature	20 ºC
Humidity	40 +/- 10 %
Barometric Pressure	101 +/- 3 kPa

ASSET NUMBER	MANUFACTURER	MODEL	DESCRIPTION	LAST CAL - CAL DUE
00241	R&S	FSP40	Spec. Analyzer	4/9/2013 - 4/9/2015
00101	Pasternack	PE7013-3030	30 dB attenuator	COU

Manufacturer Attestation data:
Frequency hopping operation in the 902-928 MHz band is divided into 288 channels with 90 kHz separation. Some channels are omitted to mitigate interference concerns, leaving a minimum of 249 channels. Using these 249 channels, multiple orthogonal pseudorandom hopping sequences are implemented each using 53-63 non - overlapping channels. The pseudorandom sequences are generated using a LFSR polynomial which guarantees that no frequency is repeated twice within the sequence. The fasted hopping rate is 5 Hz maximum with a dwell time of 0.4 ms maximum on any one channel in a 20 second period.

Number of Hopping Frequencies	Limit
63	≥ 50

A.19 TEST RESULTS: COMPLIES



Date: 3.APR.2014 18:50:58

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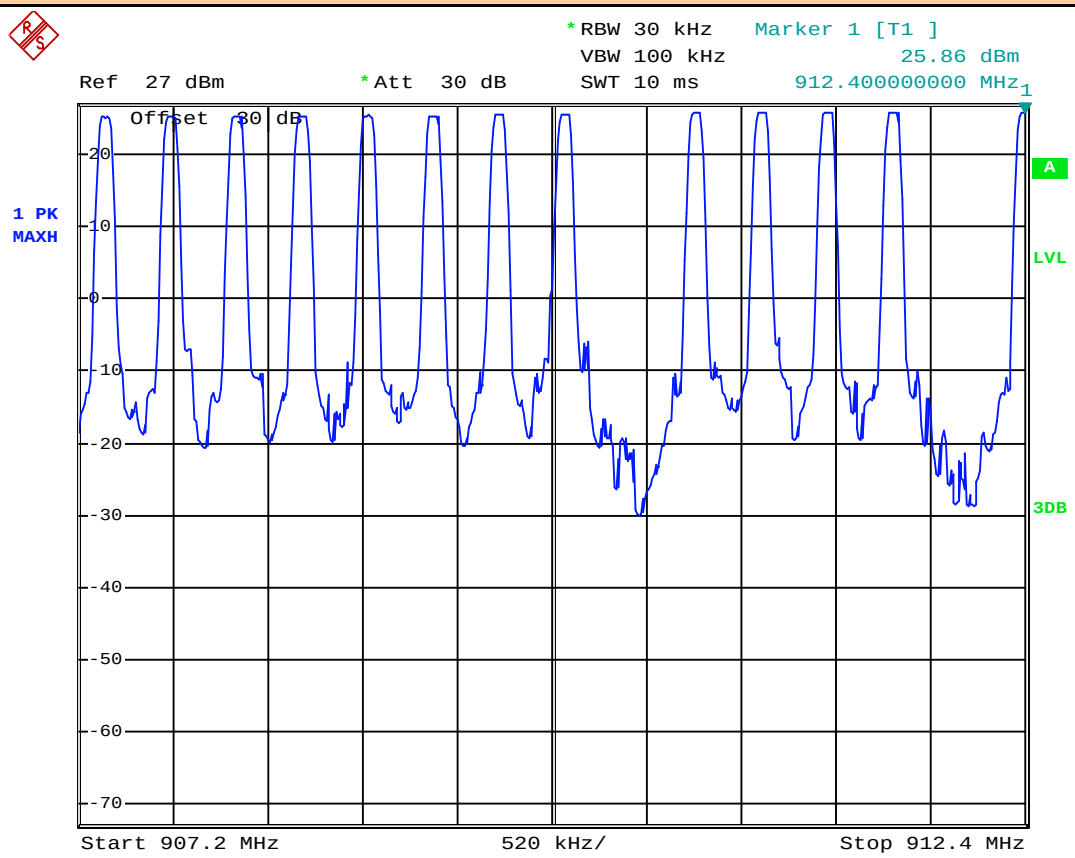
A.20 TEST RESULTS: COMPLIES



Date: 3.APR.2014 19:39:58

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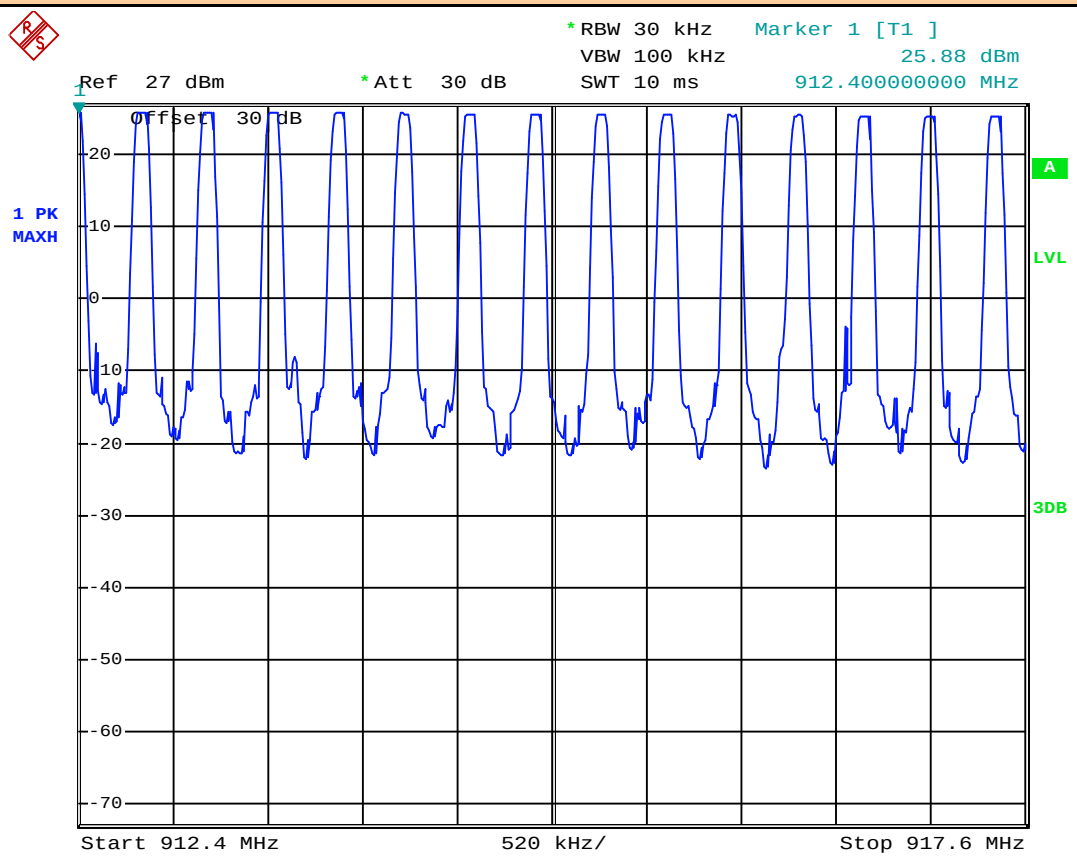
A.21 TEST RESULTS: COMPLIES



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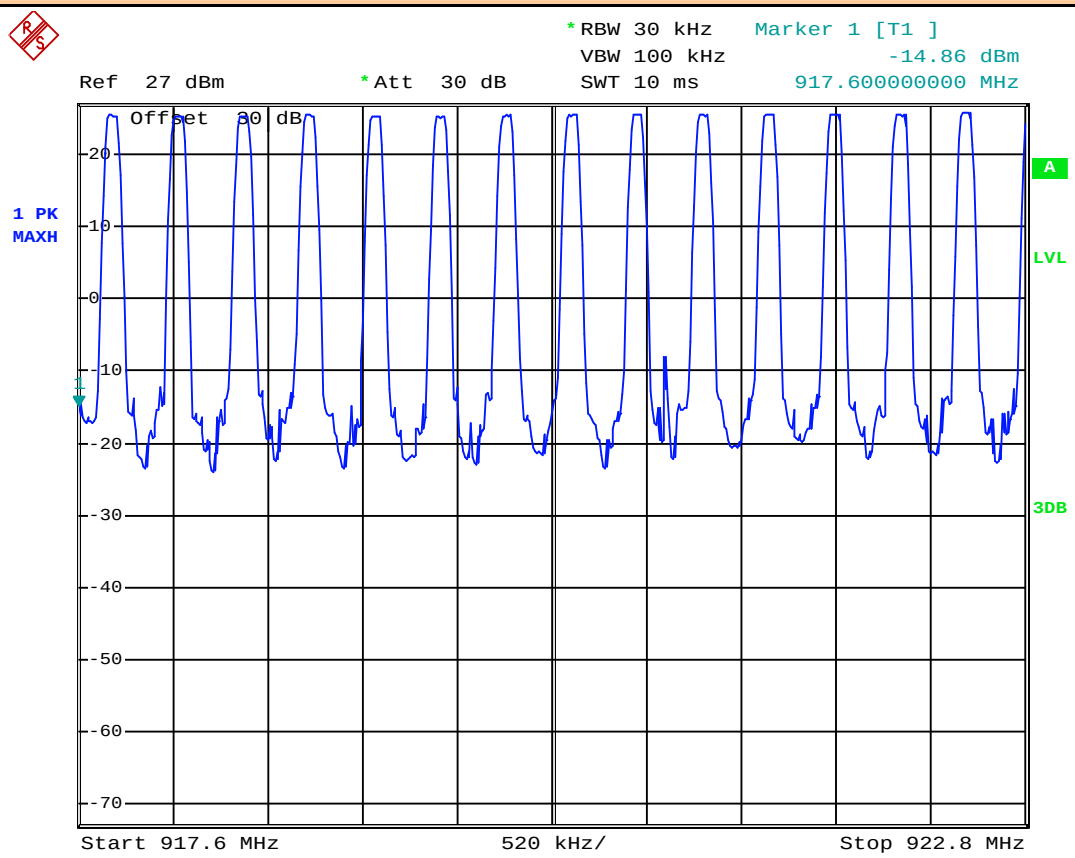
A.22 TEST RESULTS: COMPLIES



Date: 3.APR.2014 19:00:18

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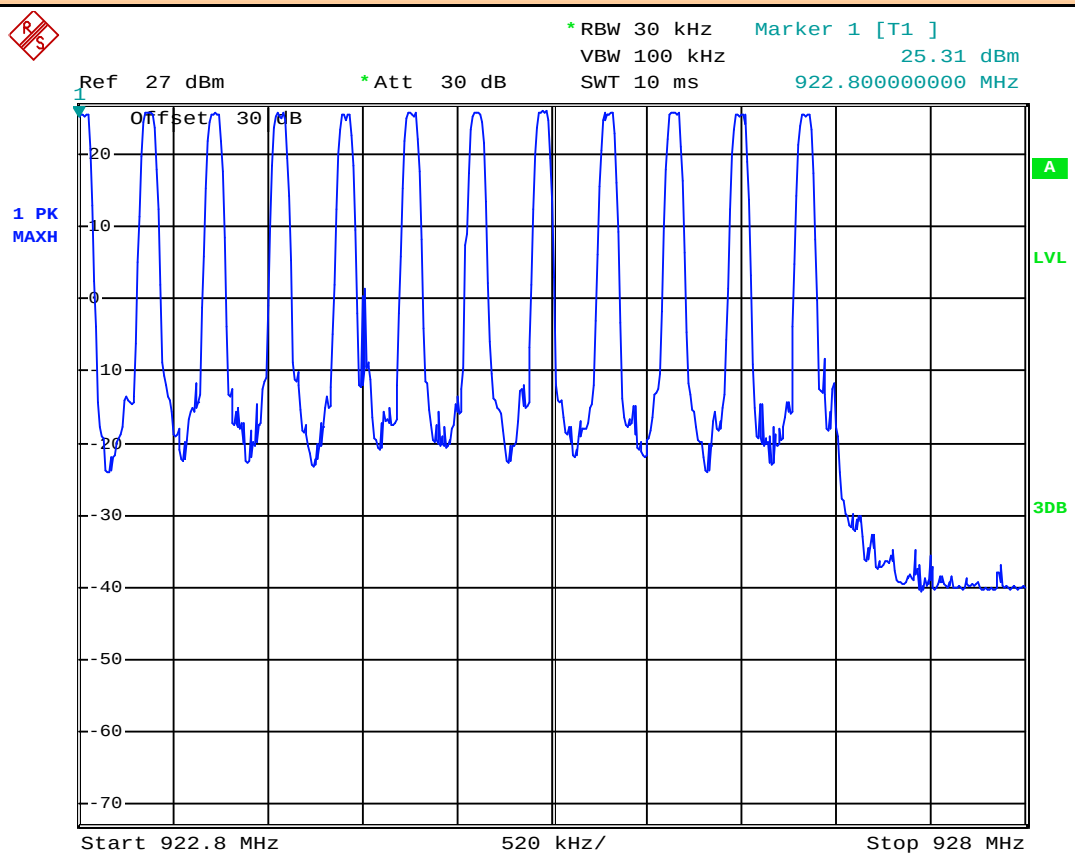
A.23 TEST RESULTS: COMPLIES



Date: 3.APR.2014 19:01:57

A.24 SIGN-OFF

I attest to the accuracy of the data. All measurements reported herein were performed by me and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements.

Glen Westwell
Lab Manager
Celltech Labs Inc.

6/10/2014
Date

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9.0 TIME OF OCCUPANCY - MANUFACTURER SUPPLIED DATA

A.25 REFERENCES	
Normative Reference Standard	FCC CFR 15.247(a)(1)(i), RSS-210, Annex 8.

A.26 LIMITS	
15,247(a)(1)(i) RSS-210, 8A.1(d)	≤ 0.4 Seconds within a 20 Second Period.

A.27 ENVIRONMENTAL CONDITIONS	
Temperature	20 ºC
Humidity	40 +/- 10 %
Barometric Pressure	101 +/- 3 kPa

ASSET NUMBER	MANUFACTURER	MODEL	DESCRIPTION	CAL DUE
00241	R&S	FSP40	Spec. Analyzer	4/9/2015
00101	Pasternack	PE7013-3030	30 dB attenuator	COU

.

Time of Occupancy / 20 Seconds	Limit
0.289S / 20S	0.4S / 20S

TIME OF OCCUPANCY

The worst case time of occupancy was seen with the slowest over-the-air data rate, 1.2 kbps. The time of occupancy was observed during two operational modes: synchronization and maximal length payload.

TEST RESULTS:

Operational Mode	Time of Occupancy	Time of Occupancy in 20 seconds	Limit
Synchronization	94 ms / 10.388 seconds*	180.978 ms	0.4s / 20 s
Maximal Length Payload	289 ms / 53 seconds**	289 ms	0.4s / 20 s

* The transmit time at each hop was observed to be 94 ms. During synchronization, the radio will progress through at least 53 hopping channels at a 5 Hz rate with a 196 ms period. This gives a total loop time of 10.388 seconds. To translate this to a 20 second equivalency, the following calculation was made:

$$\frac{94\ ms}{10388\ ms} \times 20000\ ms = 180.978\ ms$$

** Once an endpoint is synchronized with an access point, the radio will progress through at least 53 hopping channels at a 1 Hz rate. The length of the transmission will vary, but with a maximal length payload, the transmit time was observed to be 289 ms.

MEASUREMENTS:

Figure 1 Time of occupancy during synchronization mode

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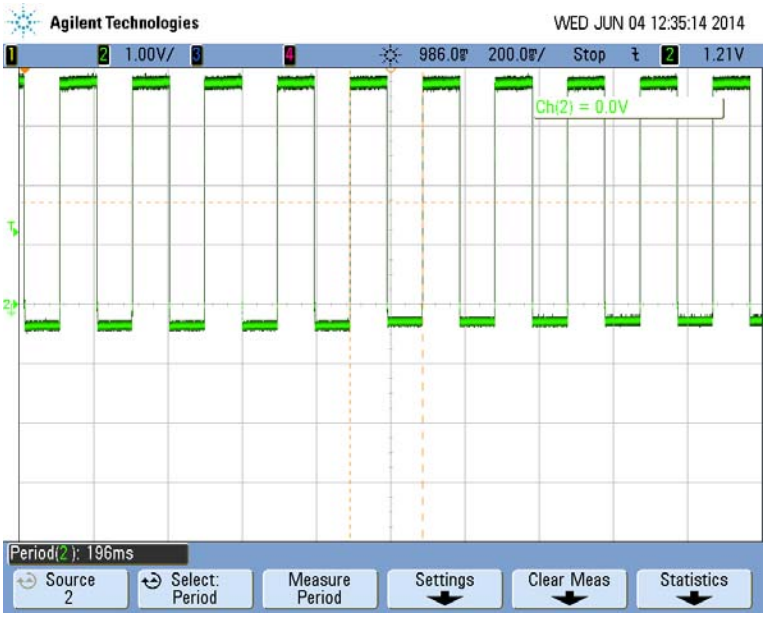

Figure 2 Hopping rate during synchronization

Figure 3 Time of occupancy during maximal length payload

A.28 SIGN-OFF

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Date

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10.0 RF OUTPUT POWER MEASUREMENT

A.29 REFERENCES	
Normative Reference Standard	15.247(b)(2)(4), RSS-210, Annex 8.

A.30 LIMITS	
15.247(b)(2)(4) RSS-210, 8A.4(1)	1W (30dBm) conducted, 4W (36dBm) E.I.R.P.

A.31 ENVIRONMENTAL CONDITIONS	
Temperature	15 ºC
Humidity	40 +/- 10 %
Barometric Pressure	101 +/- 3 kPa

ASSET NUMBER	MANUFACTURER	MODEL	DESCRIPTION	LAST CAL - CAL DUE
00241	R&S	FSP40	Spec. Analyzer	4/9/2013 - 4/9/2015
00101	Pasternack	PE7013-3030	30 dB attenuator	COU

38.6 kbps

Conducted TX Peak Power, 15.247(b)(2)			
CH.	Measured Peak Power (dBm)	Limit (dBm)	Margin (dB)
Bottom	26.8	30.0	-3.2
Mid	26.8	30.0	-3.2
Top	26.9	30.0	-3.1

E.I.R.P., 15.247(b)(4)					
CH.	Measured Peak Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
Bottom	26.8	1.96	28.76	36.0	-7.24
Mid	26.8	1.96	28.76	36.0	-7.24
Top	26.9	1.96	28.86	36.0	-7.14

- The Loner 900 uses an integral antenna that has a gain of 1.96 dBi. As detailed in the table above this device complies with the De Facto EIRP limit described in DA 00-705.

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1.2 kbps

Conducted TX Peak Power, 15.247(b)(2)			
CH.	Measured Peak Power (dBm)	Limit (dBm)	Margin (dB)
Bottom	26.7	30.0	-3.30
Mid	26.8	30.0	-3.20
Top	26.9	30.0	-3.1

E.I.R.P., 15.247(b)(4)					
CH.	Measured Peak Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
Bottom	26.7	1.96	28.66	36.0	-7.34
Mid	26.8	1.96	28.76	36.0	-7.24
Top	26.9	1.96	28.86	36.0	-7.14

The Loner 900 uses an integral antenna that has a gain of 1.96 dBi. As detailed in the table above this device complies with the De Facto EIRP limit described in DA 00-705.

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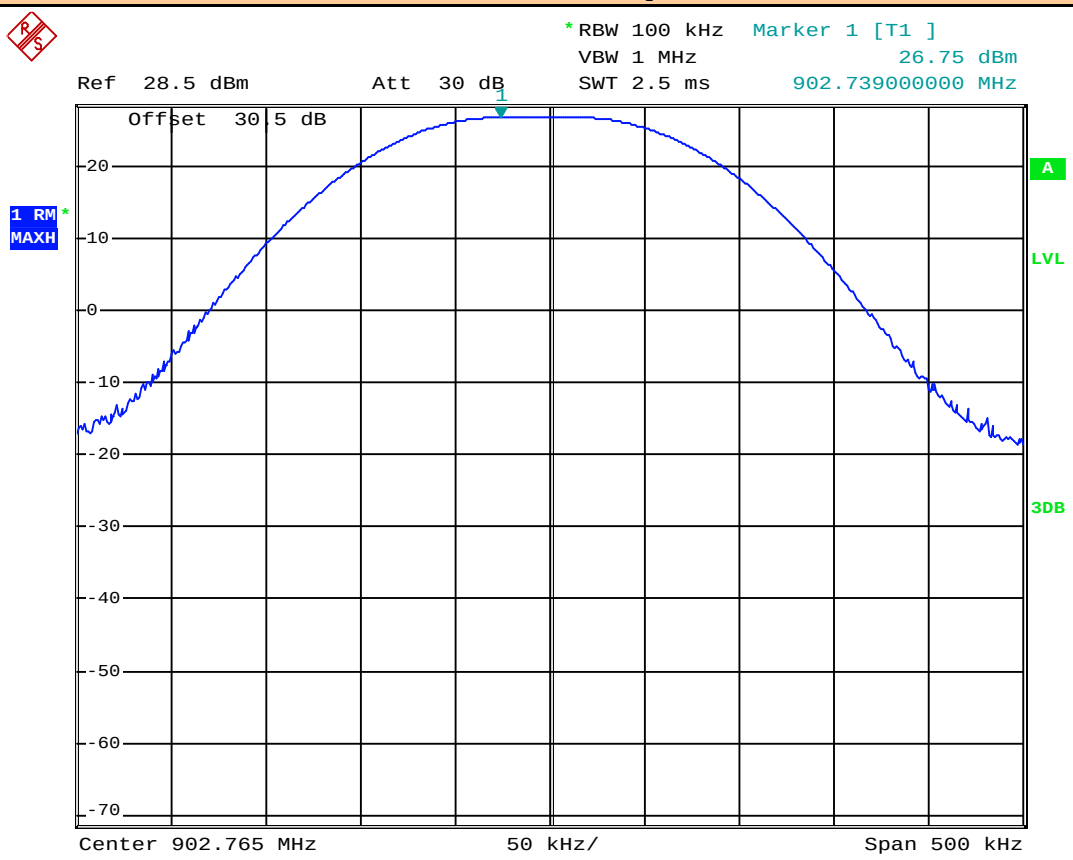
A.32 TEST RESULTS: COMPLIES

38.6 kbps



Date: 4.JUN.2014 15:35:29

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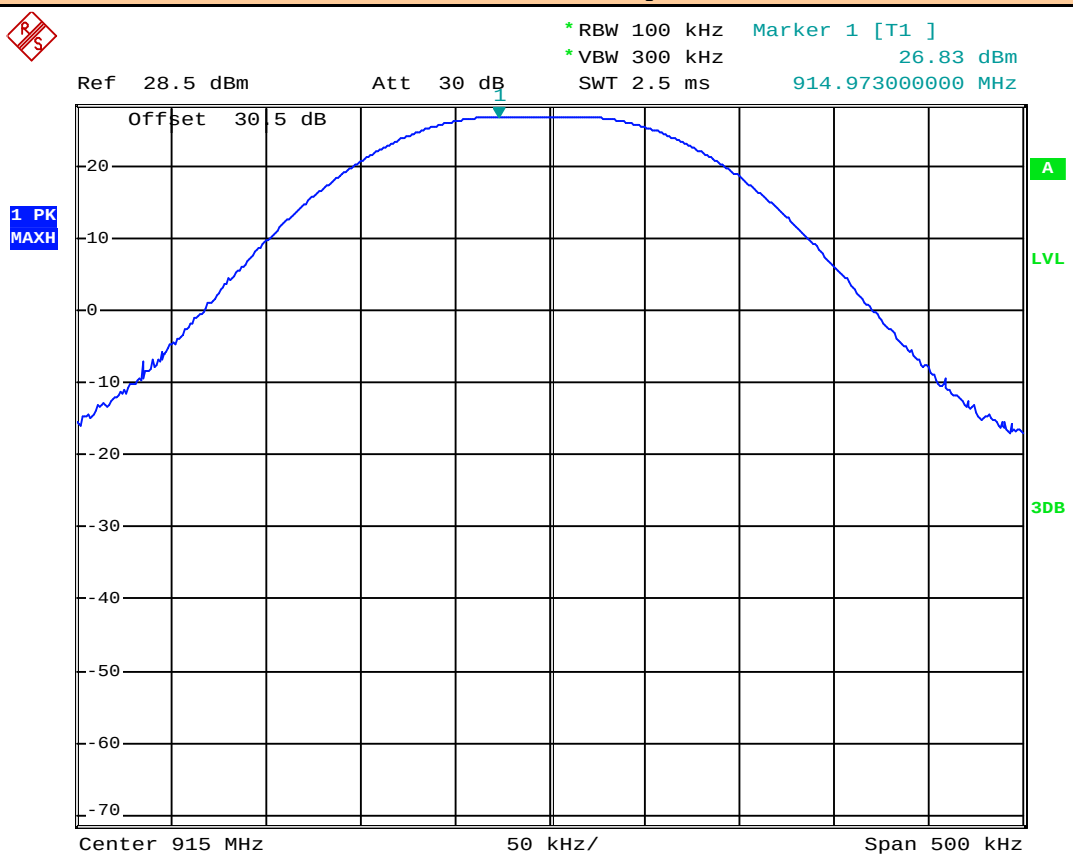
A.33 TEST RESULTS: COMPLIES

38.6 kbps



Date: 4.JUN.2014 15:42:51

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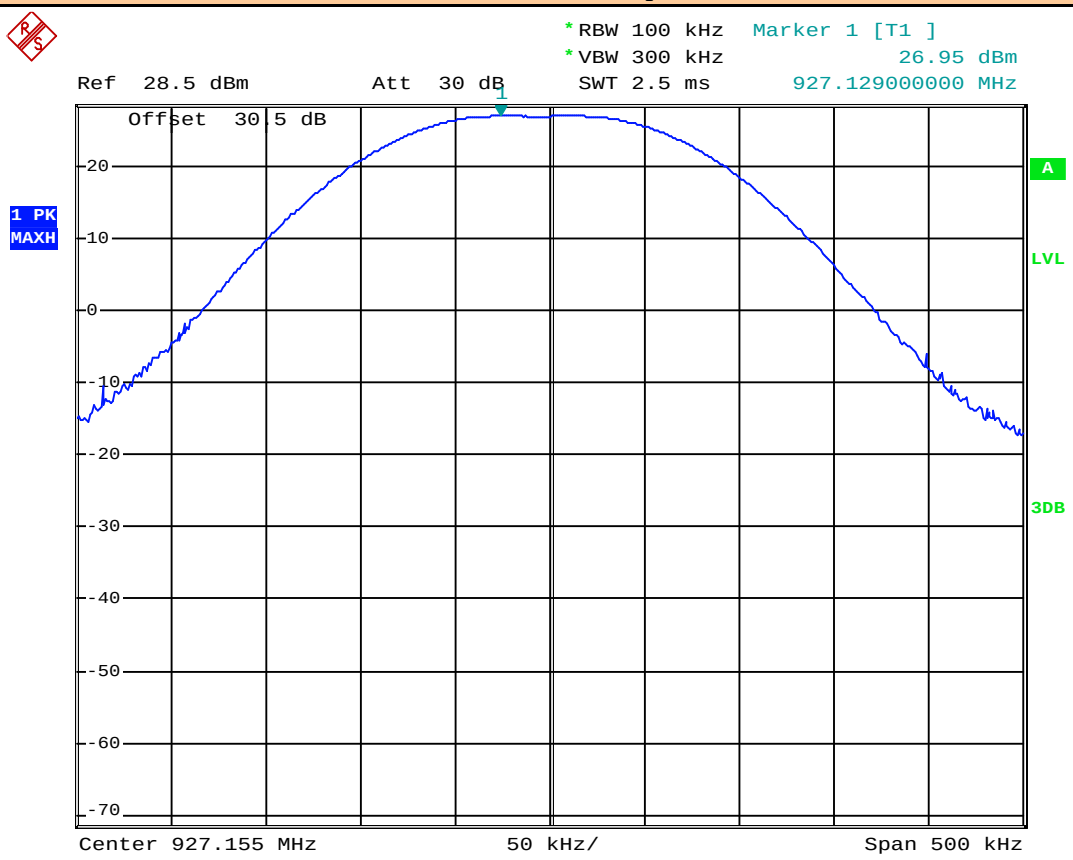
A.34 TEST RESULTS: COMPLIES

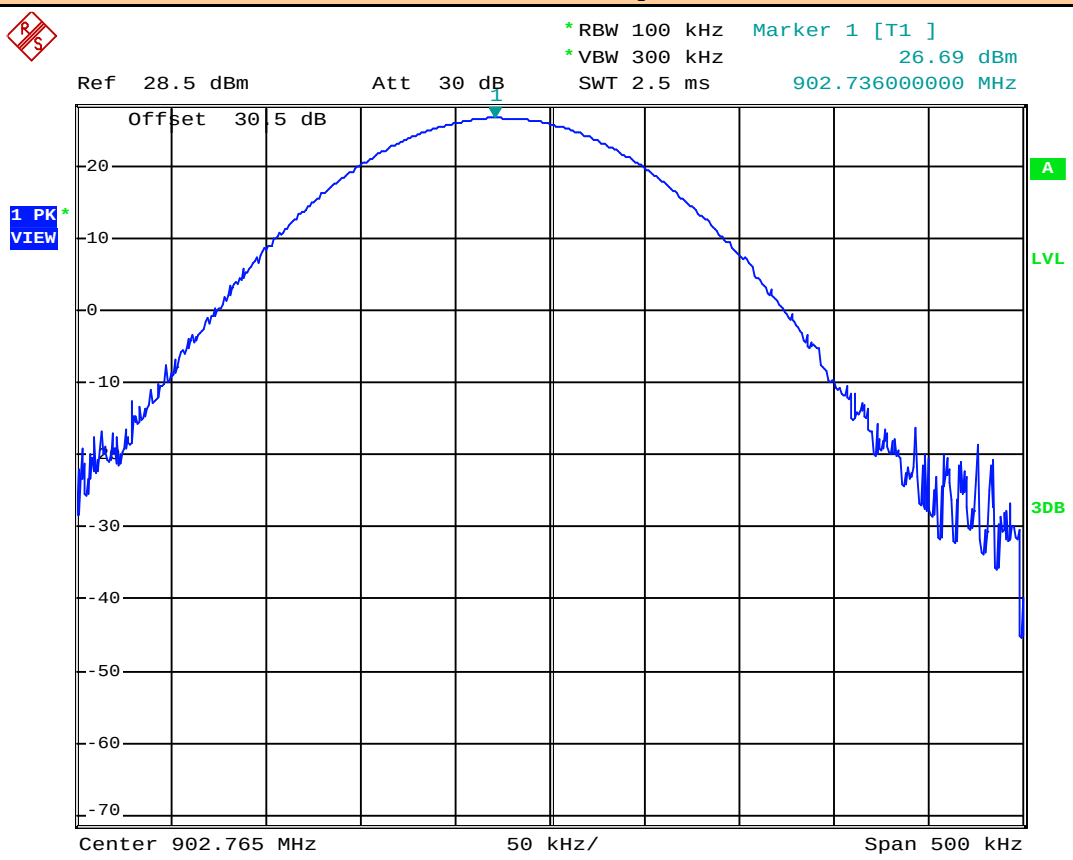
38.6 kbps



Date: 4.JUN.2014 15:45:26

A.35 TEST RESULTS: COMPLIES

1.2 kbps



Date: 4.JUN.2014 15:40:03

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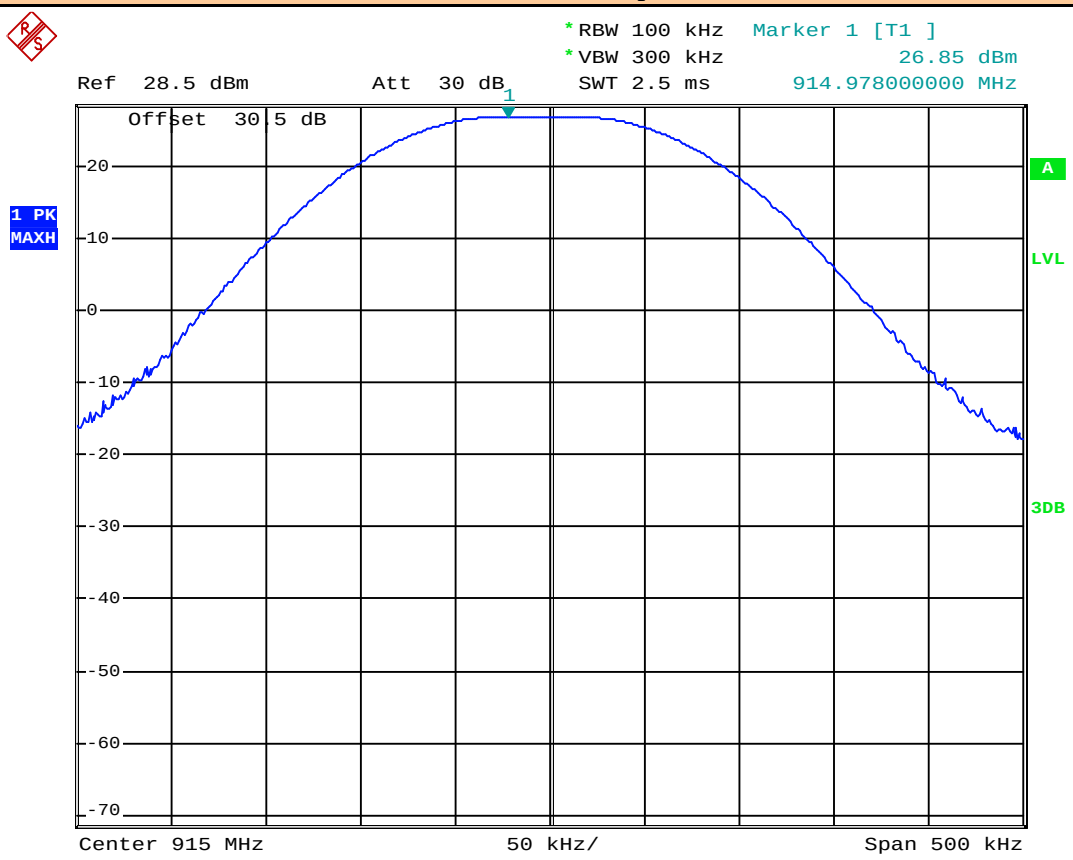
A.36 TEST RESULTS: COMPLIES

1.2 kbps



Date: 4.JUN.2014 15:44:07

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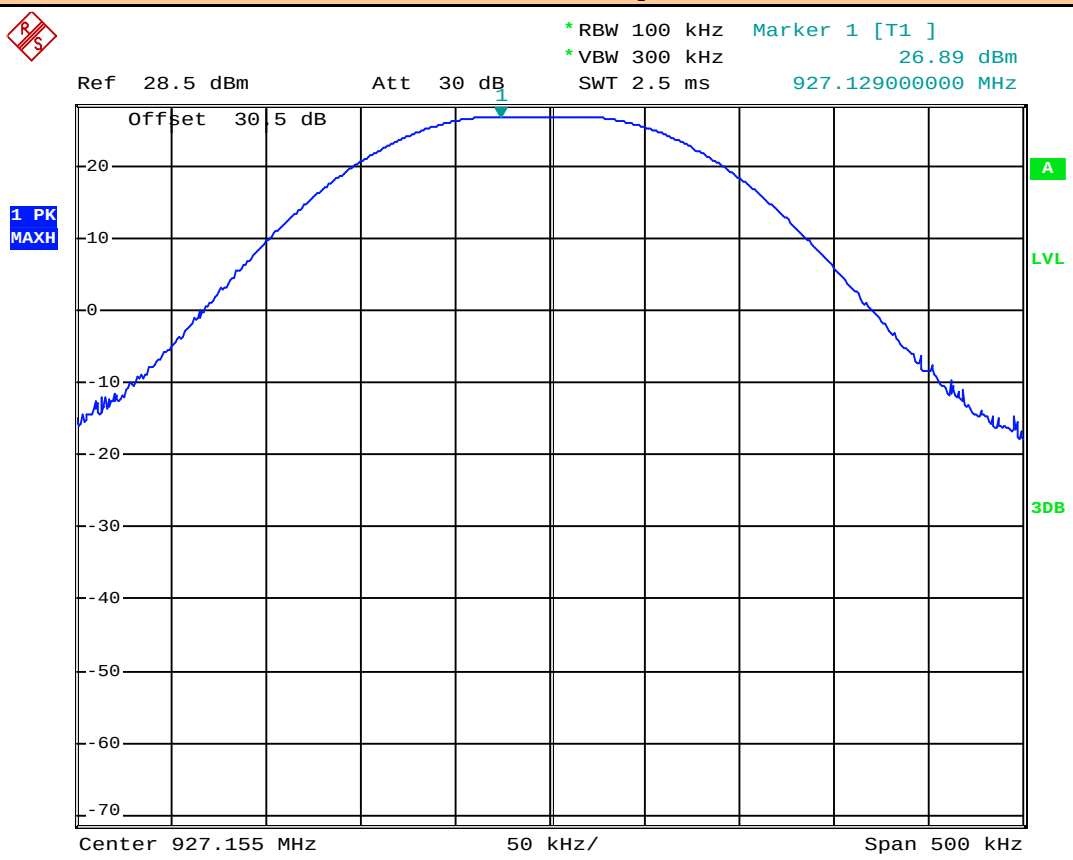
A.37 TEST RESULTS: COMPLIES

1.2 kbps



Date: 4.JUN.2014 15:47:01

A.38 SIGN-OFF

I attest to the accuracy of the data. All measurements reported herein were performed by me and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements.

Glen Westwell
Lab Manager
Celltech Labs Inc.

6/10/2014
Date

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11.0 CONDUCTED SPURIOUS EMISSIONS & BAND-EDGE

A.39 REFERENCES	
Normative Reference Standard	FCC CFR 15.247(d), RSS-210, Annex 8.

A.40 LIMITS	
15.247(d) RSS-210, A8.5	>20 dBc

A.41 ENVIRONMENTAL CONDITIONS	
Temperature	20 ºC
Humidity	40 +/- 10 %
Barometric Pressure	101 +/- 3 kPa

ASSET NUMBER	MANUFACTURER	MODEL	DESCRIPTION	LAST CAL - CAL DUE
00241	R&S	FSP40	Spec. Analyzer	4/9/2013 - 4/9/2015
00101	Pasternack	PE7013-3030	30 dB attenuator	COU

Note:
(1) Worst case data presented. The spectrum was spanned out for emission search up to the 10th harmonic. All relevant emissions have been presented.
(2) When the Li-Ion battery is being recharged, the product automatically powers down the radios and turns itself off.

Emission Freq. (MHz)	Emission Level (dBm)	dBc	Limit (dBc)	Margin (dB)
Lower Band Edge				
902.0	-29.54	57.36	20	-37.36
902.0	-41.97	68.78	20	-48.78
100.29	-39.4	50.72	20	-30.72
1806.4	-37.66	49.18	20	-29.18
Upper Band Edge				
928.0	-25.9	54.1	20	-34.1
928.0	-43.5	69.94	20	-49.94
100.0	-39.67	50.36	20	-30.36
1856.0	-37.84	48.53	20	-28.53

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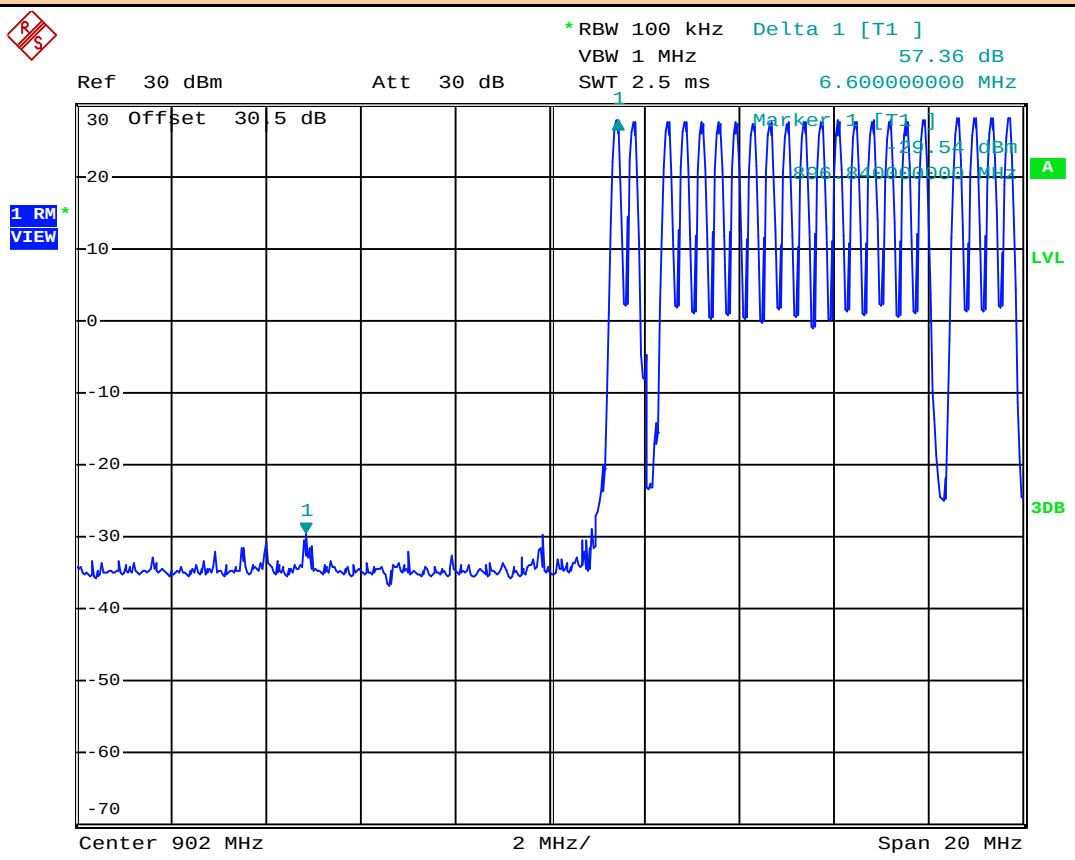
A.42 TEST RESULTS, LOWER BAND-EDGE: COMPLIES



Date: 5.JUN.2014 14:30:03

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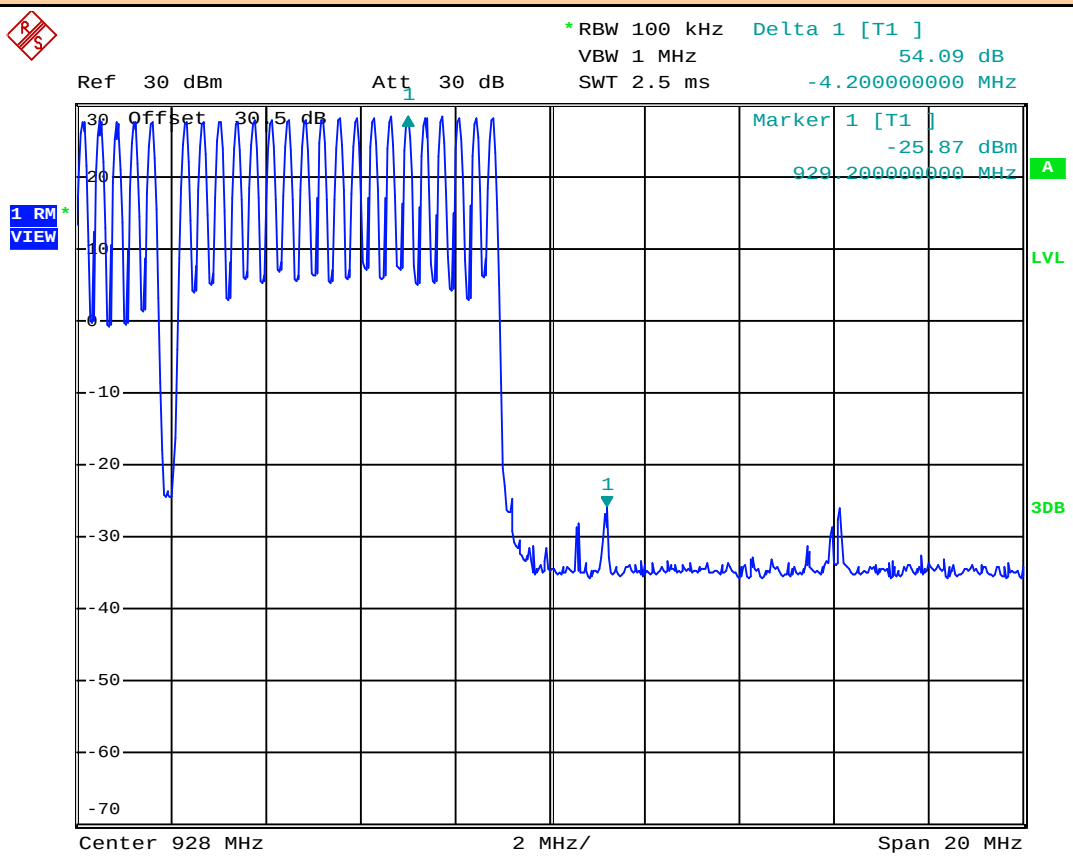
A.43 TEST RESULTS, LOWER BAND-EDGE: COMPLIES



Date: 5.JUN.2014 14:25:33

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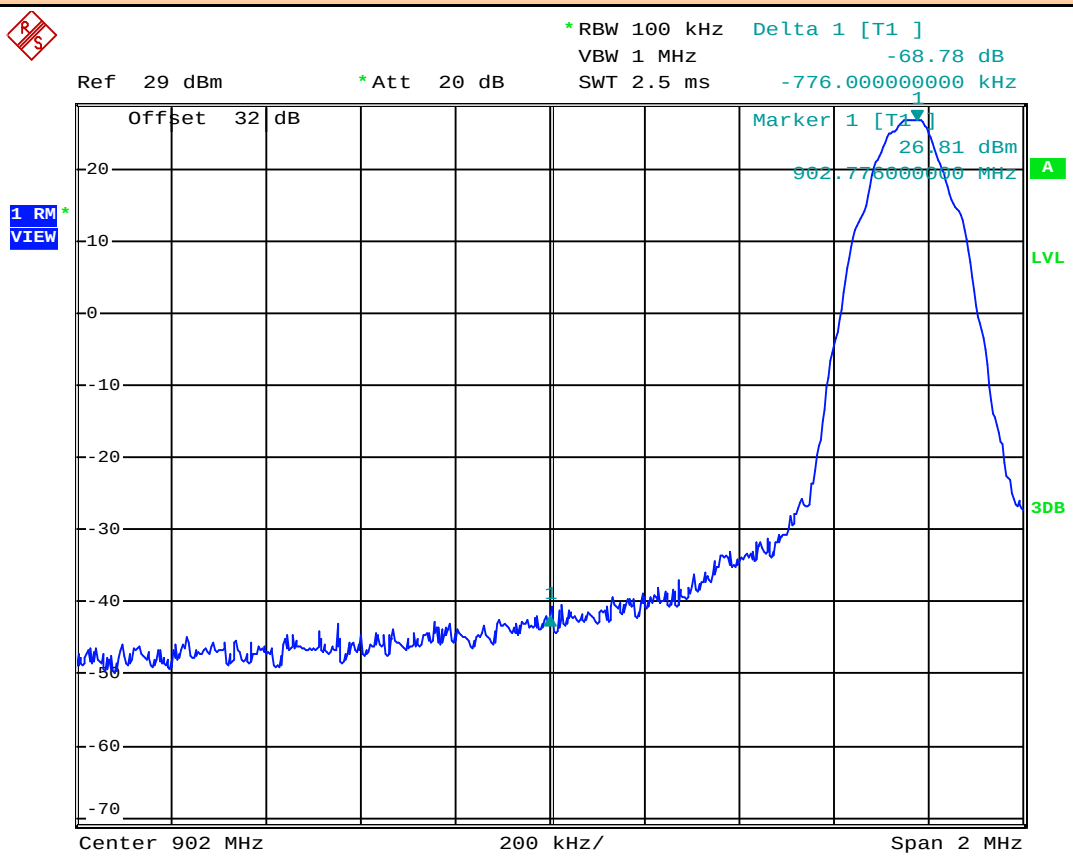
A.44 TEST RESULTS, LOWER BAND-EDGE: COMPLIES



Date: 11.APR.2014 17:53:02

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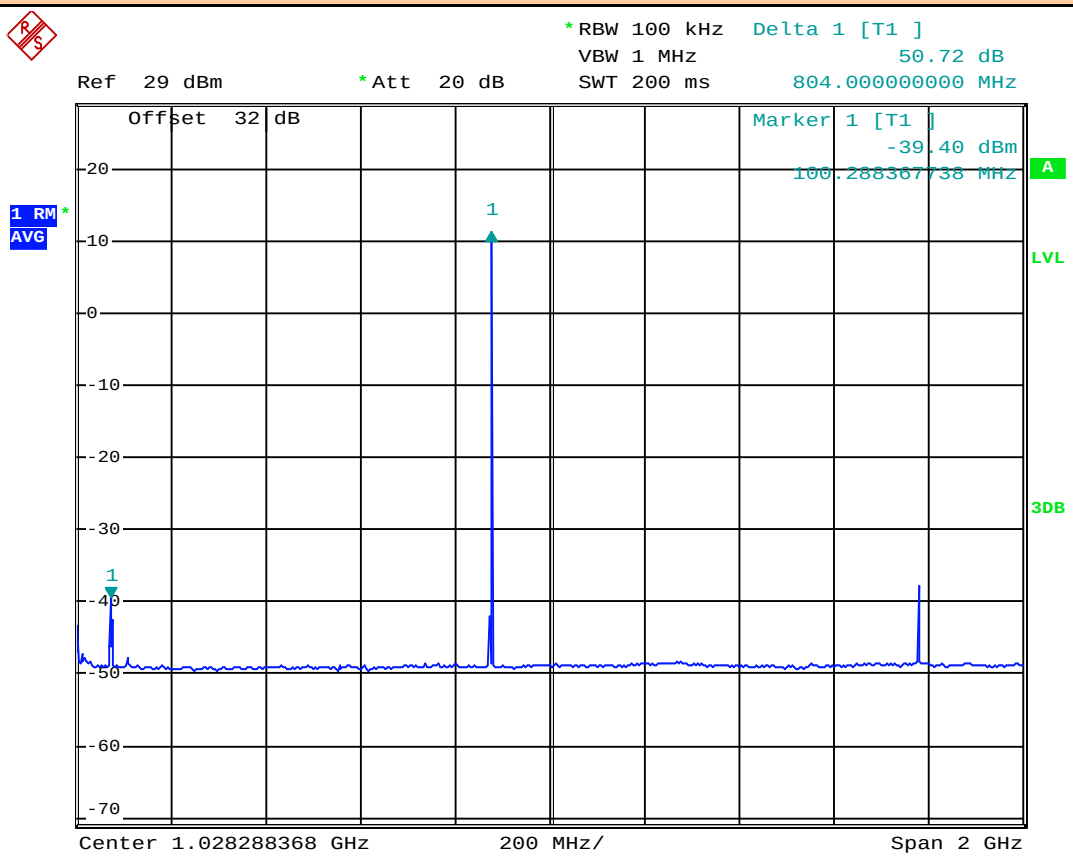
A.45 TEST RESULTS: COMPLIES



Date: 11.APR.2014 17:59:55

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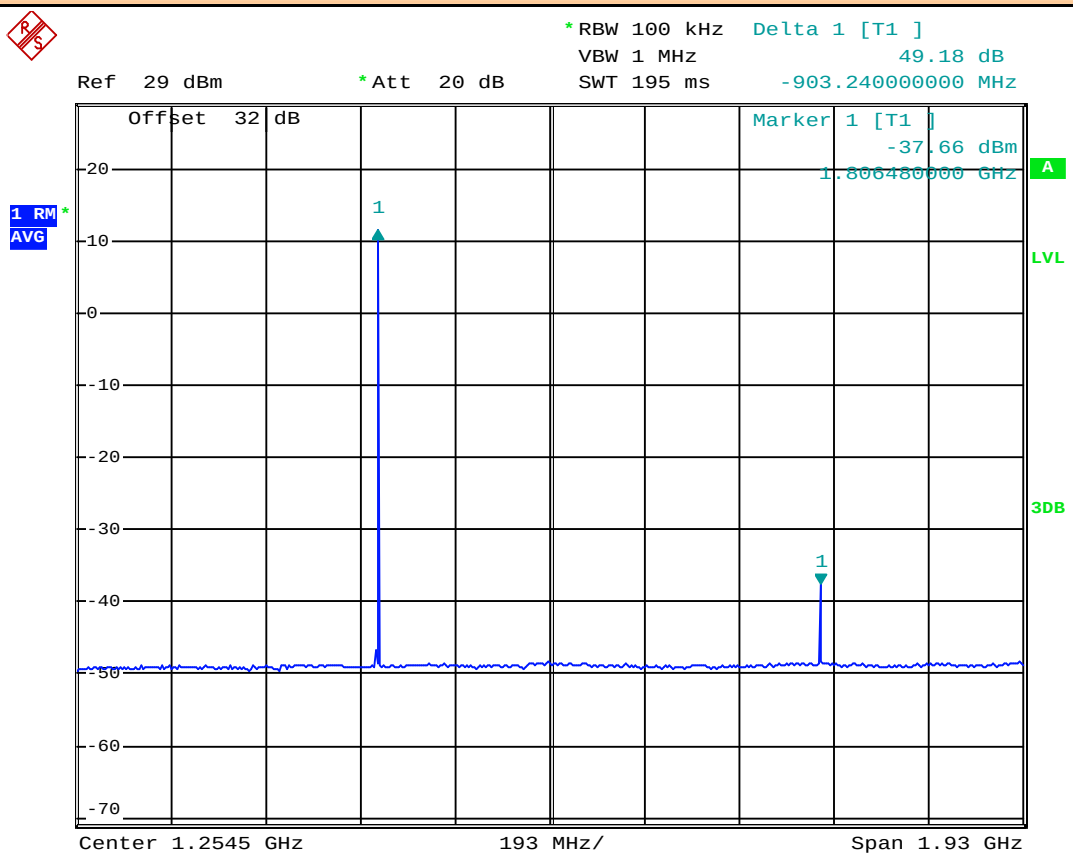
A.46 TEST RESULTS: COMPLIES



Date: 11.APR.2014 18:04:32

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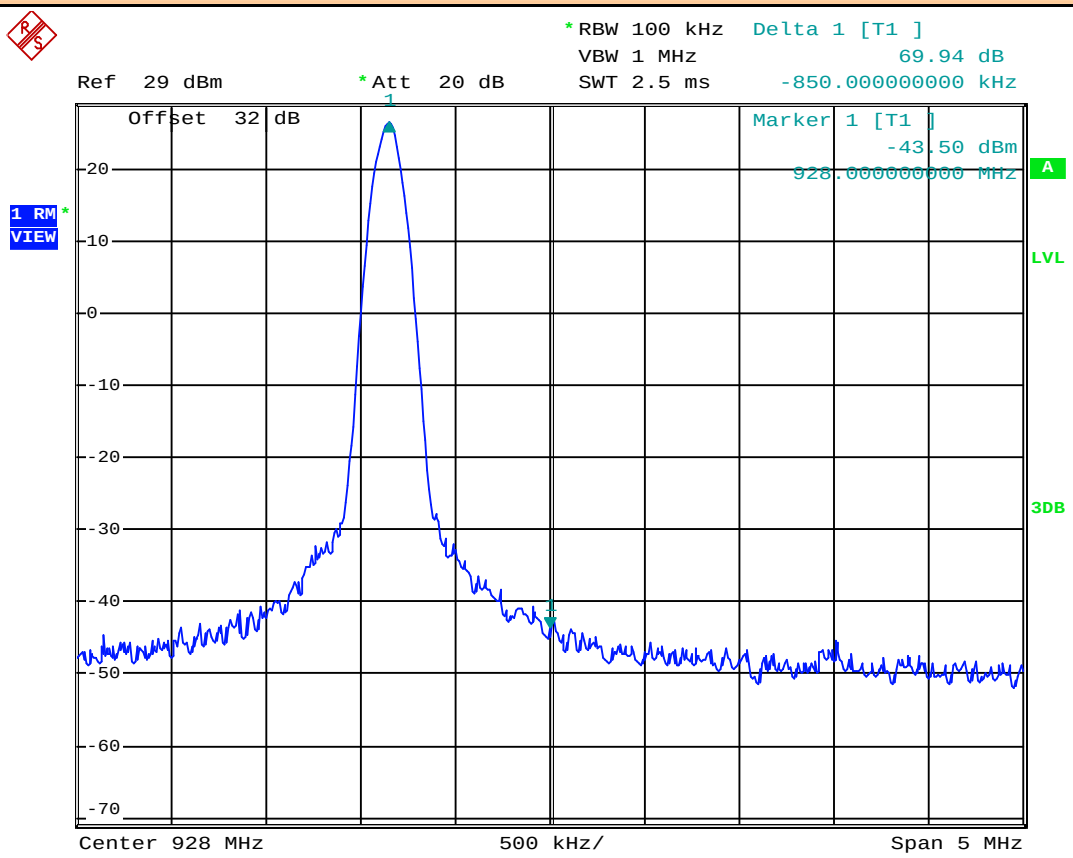
A.47 TEST RESULTS, UPPER BAND-EDGE: COMPLIES



Date: 11.APR.2014 18:10:43

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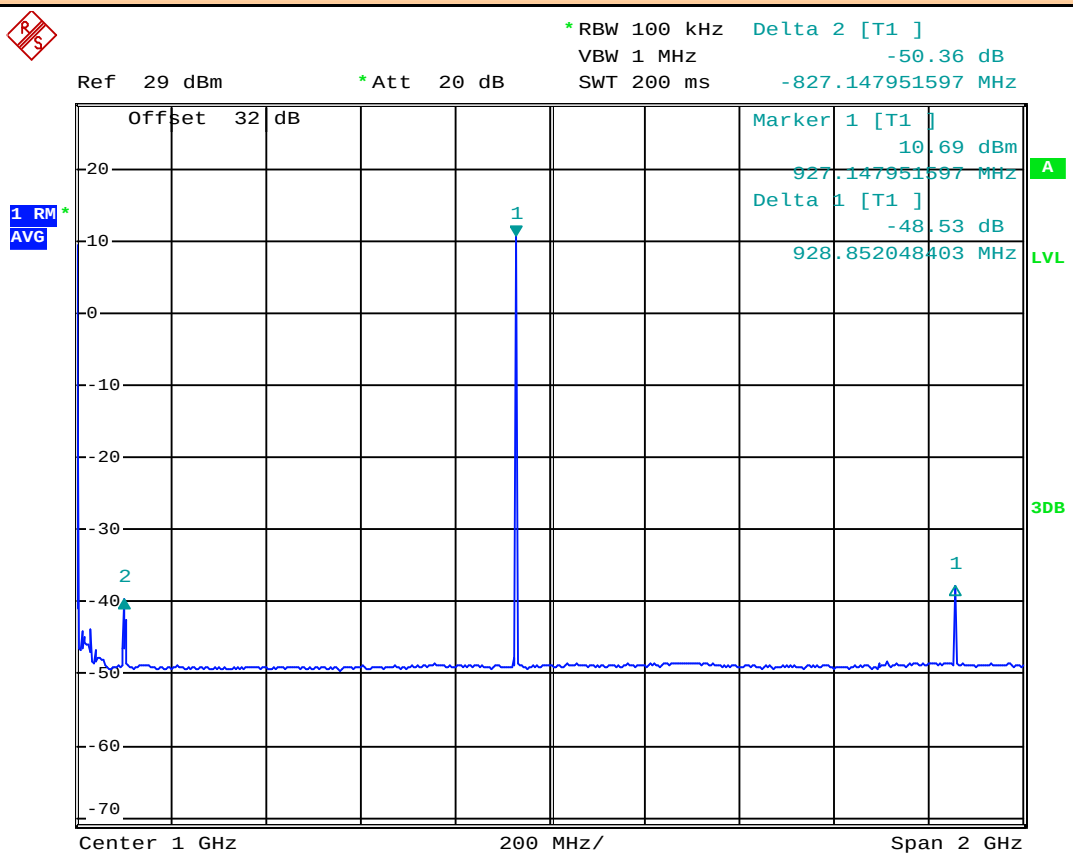
A.48 TEST RESULTS: COMPLIES



Date: 11.APR.2014 18:14:01

A.49 SIGN-OFF

I attest to the accuracy of the data. All measurements reported herein were performed by me and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements.

Glen Westwell
Lab Manager
Celltech Labs Inc.

6/10/2014
Date

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12.0 FIELD STRENGTH OF SPURIOUS & RESTRICTED BAND EMISSIONS

REFERENCES	
Normative Reference Standard	FCC CFR 47 §15.209, RSS-210, Annex 8.5, IECS-003
Procedure Reference	ANSI C63.4:2003

ENVIRONMENTAL CONDITIONS	
Temperature	25 +/- 5 ºC
Humidity	40 +/- 10 %
Barometric Pressure	101 +/- 3 kPa

EQUIPMENT LIST

ASSET NUMBER	MANUFACTURER	MODEL	DESCRIPTION	LAST CAL / CAL DUE
00051	HP	8566B	Spectrum Analyzer RF Section	09 May 12 / 09 May14
00049	HP	85650A	Quasi-peak Adapter	10 May 12 / 10 May14
00047	HP	85685A	RF Preselector	09 May 12 / 09 May14
00072	EMCO	2075	Mini-mast	n/a
00073	EMCO	2080	Turn Table	n/a
00071	EMCO	2090	Multi-Device Controller	n/a
00239	MITEQ	JS4-00102600-35	LNA	COU
00050	Chase	CBL-6111A	Bilog Antenna	03 May 12 / 03 May14
00034	ETS	3115	Double Ridged Guide Horn	06 Dec 12 / 06 Dec 14
00204	Microwave Ccts	H02G18G3	High Pass Filter	COU
00101	Pasternack	PE7013-3030	30 dB attenuator	COU

MEASUREMENT EQUIPMENT SETUP

MEASUREMENT EQUIPMENT CONNECTIONS

For the field strength measurements, the measurement equipment was connected as shown below. Various antenna types may be required to cover the applicable frequency range tested. The ranges in which each antenna was used are shown below.

Frequency Range	RX Antenna	TX Antenna
9kHz – 30Mhz	Active Loop	N/a
30 MHz - 1GHz	Bilog	N/a
1 GHz - 18 GHz	ETS 3115 Horn	N/a
18-26.5 GHz	Waveline Horn	N/a

MEASUREMENT EQUIPMENT SETTINGS

For the spurious out-of-band emissions, the spectrum analyzer was set to the following settings:

Measurement	RBW	VBW	Detector
	kHz	kHz	
< 1 GHz	100	300	Peak*
> 1 GHz	1000	3000	Peak*

- The spectrum was searched from the lowest frequency generated by the EUT to the 10th harmonic of the fundamental.
- All detected emissions are reported.

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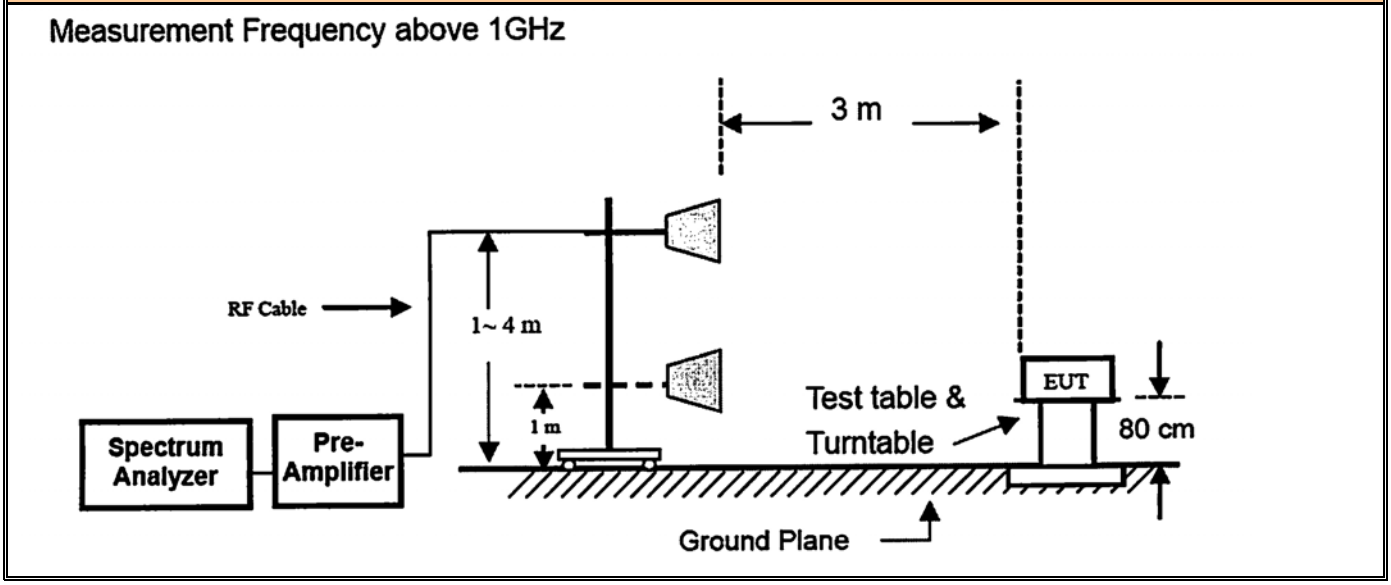
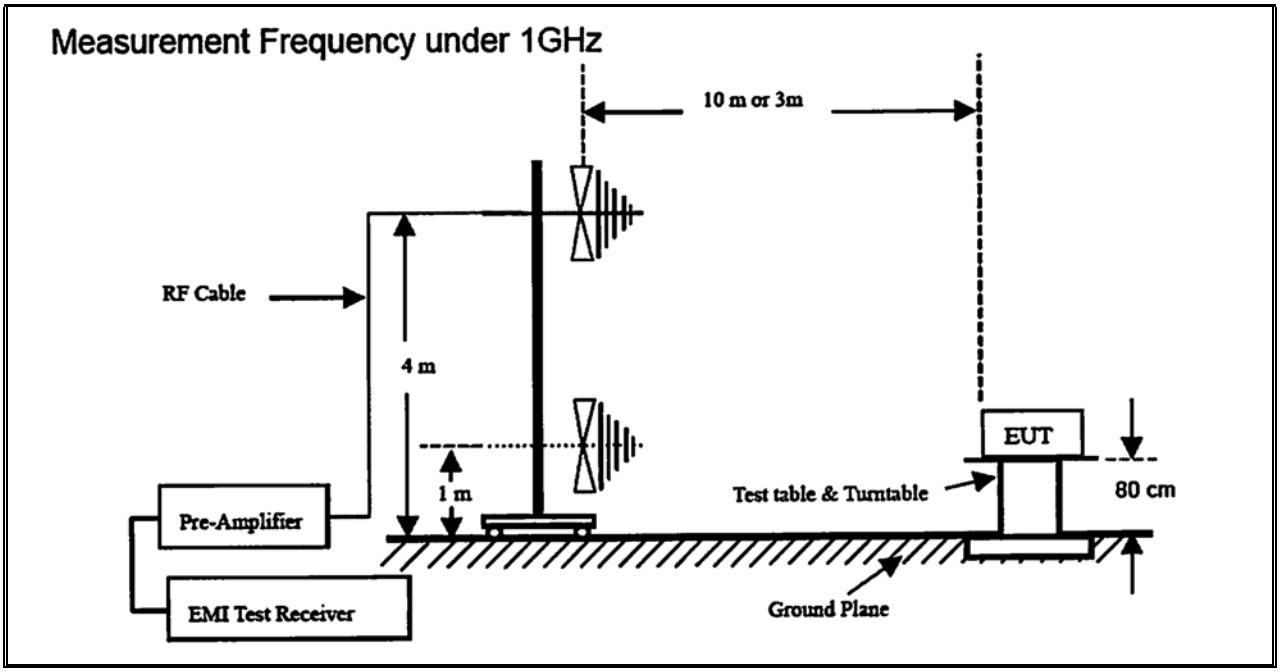
SETUP DRAWING, SETUP DRAWING – RADIATED TX SPURIOUS EMISSIONS (> 1 GHZ)



SETUP DRAWING, SETUP DRAWING – RADIATED TX SPURIOUS EMISSIONS (< 1 GHZ)



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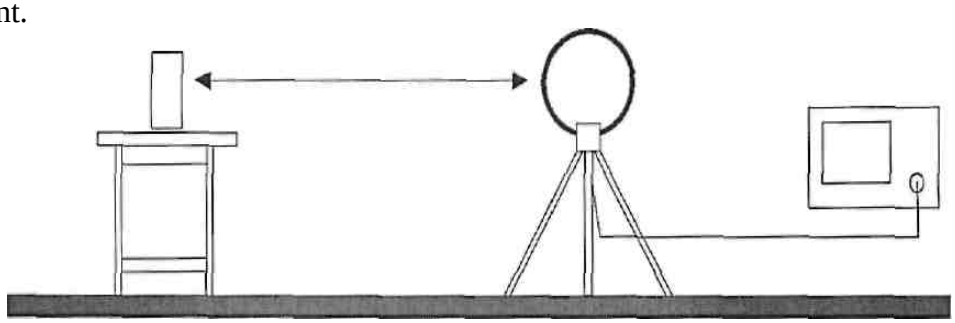
SETUP DRAWING, 9KHZ-30MHZ

Active Loop Ant.



Note:
(1) Worst case data presented. The spectrum was spanned out for emission search up to the 10th harmonic. All relevant emissions have been presented.
(2) When the Li-Ion battery is being recharged, the product automatically powers down the radios and turns itself off.

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15.205 Restricted Band Emissions (worst Case)
902.765 MHz

Frequency (MHz)	Antenna Pol.	Emission Level (dBuV/m) @1m	Antenna Factor (dB)	*Amp Gain. (dB)	Distance Correction	Emission Level (dBuV/m@3m)	Limit (dBuV/m@3 m)	Margin
2708.295	V	57.4	28.7	-29.6	-9.54	46.96	54.0	-7.04
	H	53.3	28.7	-29.6	-9.54	42.86	54.0	-11.14
3611.06	V	51.5	31.6	-30.4	-9.54	43.16	54.0	-10.84
	H	N.D.	31.5	-30.4	-9.54	N.D.	54.0	----
4513.825	V	51.2	32.3	-30.6	-9.54	43.36	54.0	-10.64
	H	51.6	32.3	-30.6	-9.54	43.76	54.0	-10.24
5416.59	V	50.3	36.8	-30.1	-9.54	47.46	54.0	-6.54
	H	49.2	36.8	-30.1	-9.54	46.36	54.0	-7.64
8124.885	V	N.D.	37.3	-28.5	-9.54	N.D.	54.0	----
	H	N.D.	37.4	-28.5	-9.54	N.D.	54.0	----
9027.65	V	51.3	37.3	-27.3	-9.54	51.9	54.0	-2.1
**	H	52.8	37.4	-27.3	-9.54	53.36	54.0	-0.64

**Data presented using a Pk detector results compared to average limits (pk to avg ratio is approx. 2dB).
Device characterization was performed on 3 orthogonal axis to determine worst case orientation.
The device was tested using a fresh charge throughout all testing.
* Amp gain value includes cable & notch filter loss.
N.D. = Not Detected.

15.205 Restricted Band Emissions (worst Case)
915.0 MHz

Frequency (MHz)	Antenna Pol.	Emission Level (dBuV/m) @1m	Antenna Factor (dB)	*Amp Gain. (dB)	Distance Correction	Emission Level (dBuV/m@3m)	Limit (dBuV/m@3m)	Margin
2745.0	V	52.6	28.7	-29.6	-9.54	42.16	54.0	-11.84
	H	55.8	28.7	-29.6	-9.54	45.36	54.0	-8.64
3660.0	V	N.D.	31.6	-30.4	-9.54	N.D.	54.0	----
	H	N.D.	31.5	-30.4	-9.54	N.D.	54.0	----
4575.0	V	52.6	32.3	-30.6	-9.54	44.76	54.0	-9.24
	H	52.4	32.3	-30.6	-9.54	44.56	54.0	-9.44
8235.0	V	N.D.	36.8	-28.5	-9.54	N.D.	54.0	----
	H	N.D	36.8	-28.5	-9.54	N.D.	54.0	----
9150.0	V	N.D.	37.3	-27.3	-9.54	N.D.	54.0	----
	H	50.9	37.4	-27.3	-9.54	51.46	54.0	-2.54

Data presented using a Pk detector results compared to average limits (pk to avg ratio is approx. 2dB).
Device characterization was performed on 3 orthogonal axis to determine worst case orientation.
The device was tested using a fresh charge throughout all testing.
* Amp gain value includes cable & notch filter loss.
N.D. = Not Detected.

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15.205 Restricted Band Emissions (worst Case)
927.155 MHz

Frequency (MHz)	Antenna Pol.	Emission Level (dBuV/m) @1m	Antenna Factor (dB)	*Amp Gain. (dB)	Distance Correction	Emission Level (dBuV/m@3m)	Limit (dBuV/m@3m)	Margin
2781.465	V	52.3	28.7	-29.6	-9.54	41.86	54.0	-12.14
	H	48.6	28.7	-29.6	-9.54	38.16	54.0	-15.84
3708.62	V	N.D.	31.6	-30.4	-9.54	N.D.	54.0	----
	H	N.D.	31.5	-30.4	-9.54	N.D.	54.0	----
4635.775	V	53.3	32.3	-30.6	-9.54	45.46	54.0	-8.54
	H	53.7	32.3	-30.6	-9.54	45.86	54.0	-8.14
7417.24	V	N.D.	36.8	-29.7	-9.54	N.D.	54.0	----
	H	N.D.	36.8	-29.7	-9.54	N.D.	54.0	----
8344.395	V	N.D.	37.3	-28.5	-9.54	N.D.	54.0	----
	H	N.D.	37.4	-28.5	-9.54	N.D.	54.0	----

Data presented using a Pk detector results compared to average limits (pk to avg ratio is approx. 2dB).
Device characterization was performed on 3 orthogonal axis to determine worst case orientation.
The device was tested using a fresh charge throughout all testing.
* Amp gain value includes cable & notch filter loss.
N.D. = Not Detected.

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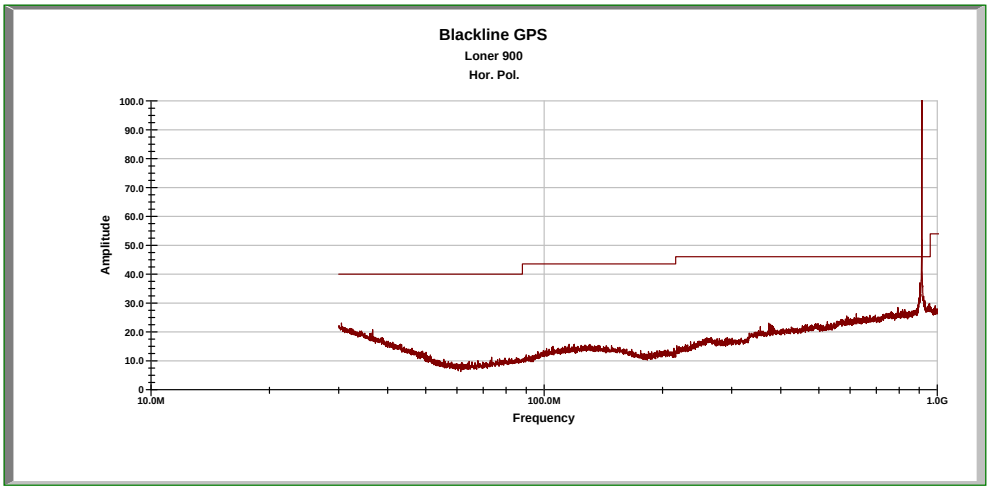
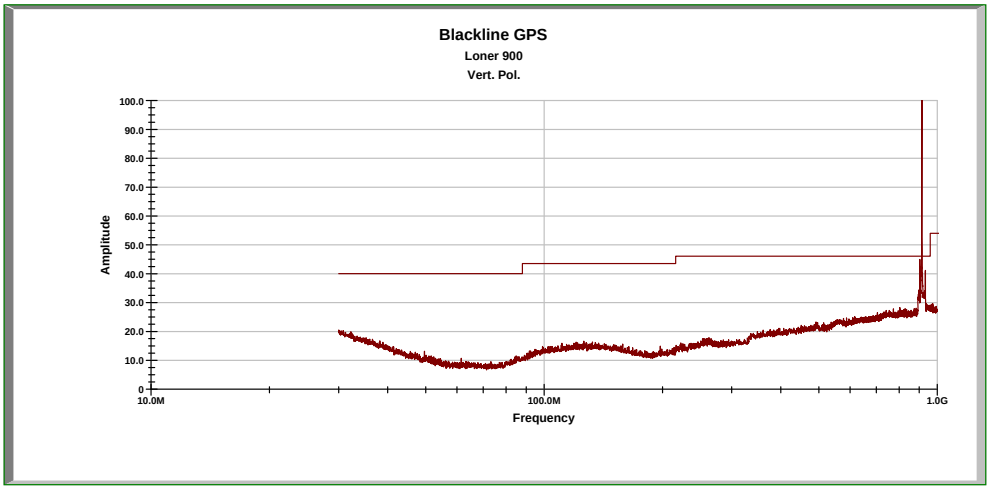
15.209, RSS-210, General Field Strength - Radiated Emissions

30 MHz - 1 GHz





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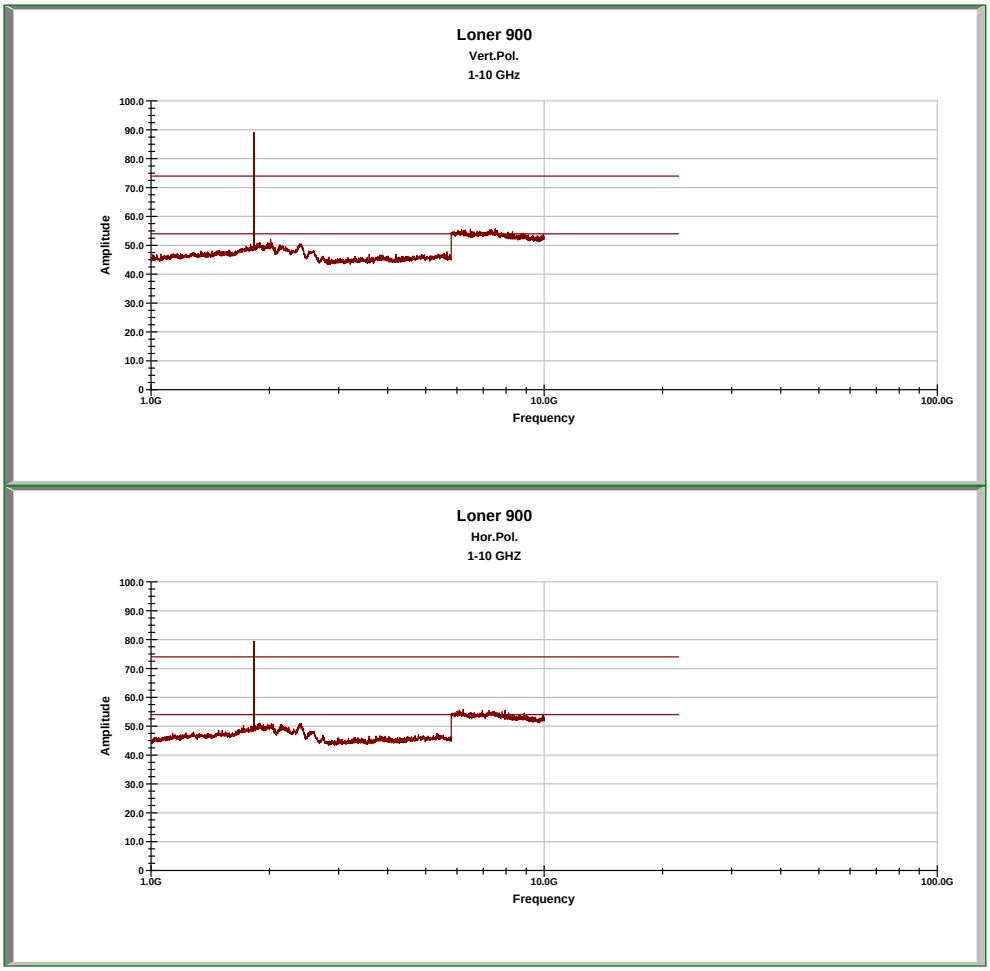
1-10 GHz


Loner 900
Vert.Pol.
1-10 GHz
Amplitude
Frequency
1.0G
10.0G
100.0G
Loner 900
Hor.Pol.
1-10 GHZ
Amplitude
Frequency
1.0G
10.0G
100.0G

13.0 ANTENNA REQUIREMENT §15.203

§ 15.203 Antenna Requirement

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. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

The DUT complies with the antenna requirements of 15.203 as follows:

Integral antenna is used.

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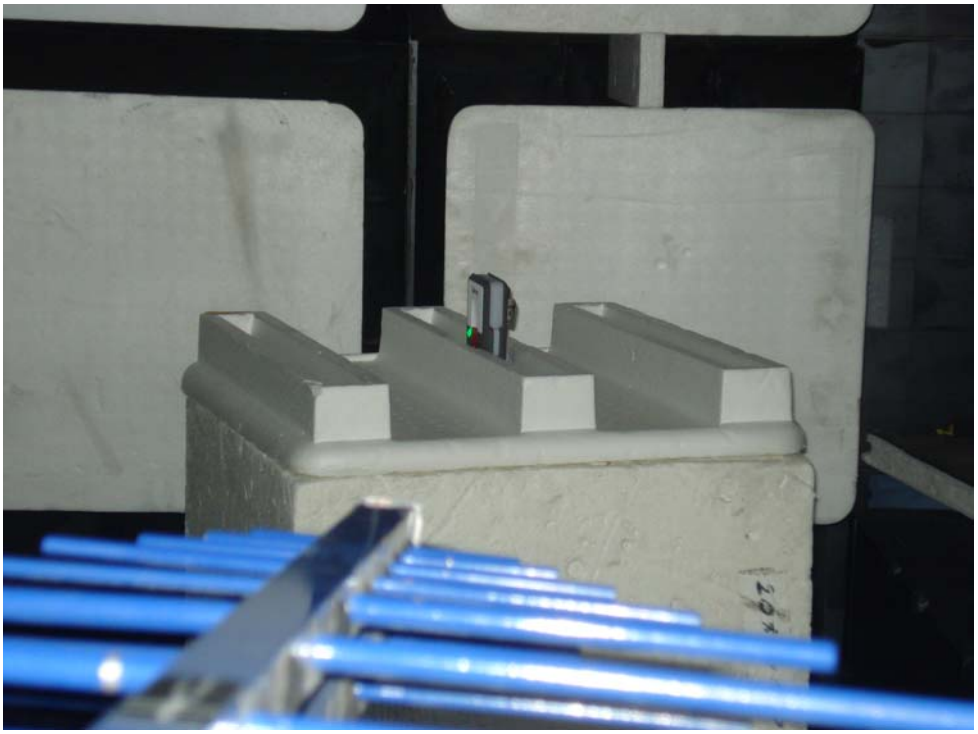
14.0 TEST SET UP PHOTO'S



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Loop Antenna Emissions Search

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END OF DOCUMENT