REGULATORY COMPLIANCE REPORT

TITLE: FCC & IC Test Report for 15.247 & RSS-210 Frequency Hopping Device

100GDLCN – commercial meters

AUTHOR: Mark Kvamme

REV	CCO	DESCRIPTION OF CHANGE	DATE	APPROVALS	
001		INITIAL RELEASE		Engineering	
				Regulatory	

REVISION HISTORY

				APPROVALS	
A	n/a	ready to upload	05oct10	Engineering	
				Regulatory	
a1	n/a	added new rcvr equip. table	11oct10	Engineering	
				Regulatory	
B	n/a	updated AM table p24 and band edge done radiated and conducted.		Engineering	
				Regulatory	

Test Data Summary

FCC 15.247 / IC RSS-210
Frequency Hopping Transmitter 100GDLCN, 903 – 926.8 MHz
FCC ID: EWQ100GDLCN
IC: 864D-100GDLCN
Device Models (for IC): 5N, 6N
Part Numbers: ERG-5003-007, -007
OATS Registration Number: FCC 90716,   IC 864D-1

Rule	Description	Spec Limit	Max. Reading	Pass /Fail
Part 15.247 (a)(1)	System Receivers		Match this device	Pass
Part 15.31(e)	Variation of Input Voltage – Conducted	N/A	N/A	N/A
Part 15.207 / RSS-Gen 7.2.2	AC Power line Conducted Emissions	46 to 56 DbuV	N/A	N/A
Part 15.247(a)(1) / RSS-210 A8.1(b)	Carrier Frequency Separation – Conducted	Minimum 103 kHz	200kHz CW @ 903 MHz	Pass
Part 15.247(a)(1)(i) / RSS-210 A8.1(c)	Number of Hopping Channels – Conducted	Minimum 50 channels	50 channels AM Modulation 120 channels FM Modulation	Pass
Part 15.247(a)(1)(i) / RSS 210 8.1 (a)	20dB Bandwidth – Conducted	Maximum 250 khz	103kHz FM modulation	Pass
Part 15.247(b) (2) / RSS-210 A8.4(1)	Power Output – Conducted	Maximum 1 Watt	0.30 Watts FM modulation @ 926.8 MHz	Pass
Part 15.247(d) / RSS-210 A8.5	Spurious Emissions – Radiated	Maximum -20 dBc	-36.06dBc @1853.6 MHz AM modulation	Pass
Parts 15.205 & 15.209 / RSS-210 2.2, 2.6 Tables 1 & 2	Restricted Bands / Spurious Emissions – Radiated	Limit 54 dbuV/m Average Limit 74 dbuV/m Peak	53.87dbuV/m Average @ 2709 MHz 73.23dbuV/m Peak @ 2709 MHz FM modulation	Pass
Part 15.247(a)(1)(i);(g); (h) / RSS-210 A8.1(c)	Time of Occupancy, Short Burst, Intelligence	Maximum 400 ms. In 20 second period	263.21 ms. In a 20 second period AM modulation	Pass
RSS-Gen 7.2.3 and Unintentional Part 15.109	Receiver Spurious Emissions		No emissions noise floor is 27dbuV/m	Pass
Parts 1.1310 & 2.1091(mobile) or 2.1093 (portable) / RSS-102 Sec 4.2	Limits for Maximum Permissible Exposure (MPE)	Maximum 0.618 mW / cm^2 @ 20cm 6.18 W / M^2 (@ 0.2M)	FM modulation 0.137 mW / cm^2 @ 20 cm 1.37 W/M^2 @ 0.2 M	Pass
15.247 (d)	Band-edge compliance of RF Radiated Emissions	Maximum -20 dBc	-29.52 dBc AM modulation @ 926.8 MHz	Pass

Rule versions: FCC Part 1 (01-2006), FCC Part 2 (01-2006), FCC Part 15 (02-01-2006), RSS-102 Issue 4 (3-2010), RSS-210 Issue 7 (June 2007), RSS-Gen Issue 2, June 2007
Reference docs: ANSI C63.4-2003, DA 00-705 (03-30-2000), OET65 (08-1997), OET65C (06-2001), IEEE C95.3-2002.

Cognizant Personnel	
Name	Title
Mark Kvamme	Test Technician
Name	Title
Jay Holcomb	Regulatory
Name	Title
Johann De Jager	Project Lead

CONDITIONS DURING TESTING

No Modifications to the EUT were necessary during the testing.

FCC 15.31(m) – IC _n/a_;   Number of Channels
This device was tested on three channels.

ANSI C63.4 - Temperature and Humidity During Testing
The temperature during testing was within +10º C and +40º C.
The Relative humidity was between 10% and 90%.
RSS-Gen 4.3: Tests shall be performed at ambient temperature

EQUIPMENT UNDER TEST (EUT) DESCRIPTION
Itron declares that the EUT tested was representative of a production unit.

EQUIPMENT UNDER TEST

EUT Module
Manuf: Itron, Inc.
Model: **Itron 100GDL FN Endpoint**
Serial Number(s)   2072, 9567, 9081, 2070, or Listed Below
Power source   Fresh Batteries, Fully charged Batteries or Battery simulator.

Plot Information
In the zero span measurements, the line in the display is the trigger level.

15.247(a)(1)

System receivers

… … …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.

THIS DEVICE IS OPERATED IN SYSTEMS THAT THE READING DEVICES, HAVE INPUT BANDWIDTHS THAT MATCH THIS DEVICE AND THAT STAY IN SYNCRONIZATION.

15.31(e)

Variation of Supply Voltage

Vary the supply voltage from 85% to 115% of the nominal voltage. If the power level of the fundamental signal varies with supply voltage, record the voltage level at which the fundamental signal is at its highest and use that voltage level for all further testing.

DEVICE IS BATTERY OPERATED NOT CONNECTED TO THE POWER LINE. BATTERY IS NOT RECHARGABLE. THERFORE THIS TEST IS N/A.

15.207 / RSS-210 Sec. 6.6(a)

Power line Conducted Emissions

Measure the AC power line conducted emissions from 150kHz to 30 MHz using a 50μH/50Ω line impedance stabilization network (LISN) according to the procedure specified in ANSI C63.4. Verify that no emissions exceed the following limits:

Frequency (MHz)	Quasi-Peak (dBμV)	Average (dBμV)
0.15-0.5	66 to 56[*]	56 to 46[*]
0.5-5	56	46
5-30	60	50

[*]Decreases with the logarithm of frequency

DEVICE IS BATTERY OPERATED NOT CONNECTED TO THE POWER LINE. BATTERY IS NOT RECHARGABLE. THERFORE THIS TEST IS N/A.

15.247(a) (1) / RSS-210 A8.1 (b)

Carrier Frequency Separation

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.

Verify that the channel separation is > the 20dB bandwidth of a single transmission.
The EUT must have its hopping function enabled. Use the following analyzer settings:
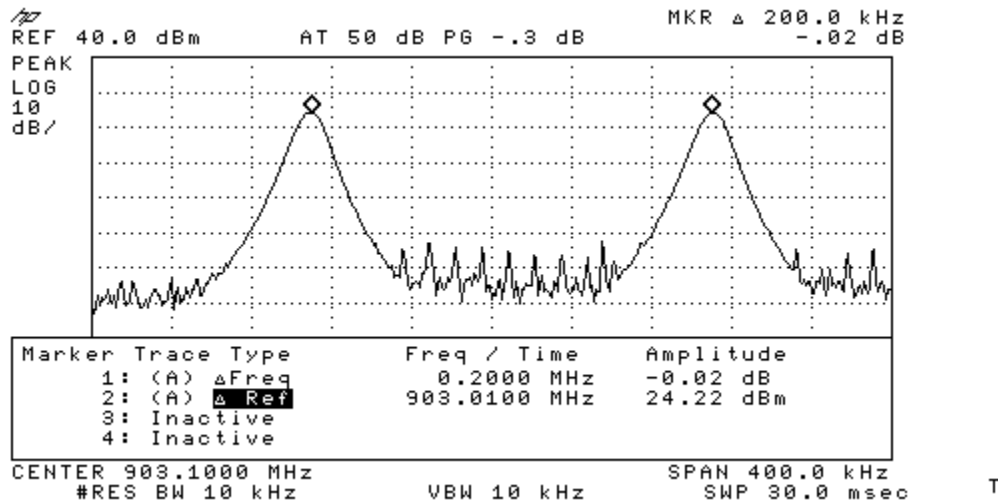
    RBW ≥ 1% of the span
    VBW ≥ RBW
    Sweep = auto
    Detector function = peak
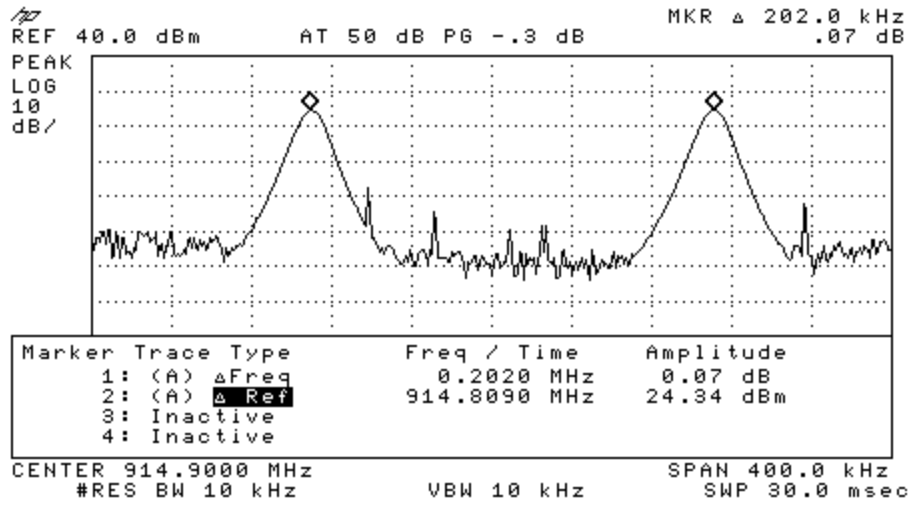   Trace = max hold

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.

Equipment Used	Serial Number	Cal Date	Due
HP8593E	3543A02032	12/8/2009	12/8/2010
12 in Huber Suhner Cable	220058002	8/9/2010	8/9/2011
Date	**Tested by**		
9/16/2010	Mark Kvamme		

Unit tested w/fresh battery: 2072

Frequency (MHz)/channel	Mode	Channel Separation (kHz)	Frequency (MHz)/channel
903.01 / 5	*CW*	*200*	*903.21 / 6*
914.809 / 64	*CW*	*202*	*915.011 / 65*
926.609 / 123	*CW*	*201*	*926.810 / 124*

```
                                              MKR Δ  202.0 kHz
REF  40.0 dBm        AT 50 dB PG -.3 dB              .07 dB
PEAK
LOG
10
dB/
```

Marker Trace Type	Freq / Time	Amplitude
1: (A) ΔFreq	0.2020 MHz	0.07 dB
2: (A) Δ Ref	914.8090 MHz	24.34 dBm
3: Inactive		
4: Inactive		

```
CENTER 914.9000 MHz                     SPAN 400.0 kHz
     #RES BW 10 kHz        VBW 10 kHz        SWP 30.0 msec      T
```

```
                                              MKR Δ  201.0 kHz
REF  40.0 dBm        AT 50 dB PG -.3 dB             -.02 dB
PEAK
LOG
10
dB/
```

Marker Trace Type	Freq / Time	Amplitude
1: (A) ΔFreq	0.2010 MHz	-0.02 dB
2: (A) Δ Ref	926.6090 MHz	24.57 dBm
3: Inactive		
4: Inactive		

```
CENTER 926.7000 MHz                     SPAN 400.0 kHz
     #RES BW 10 kHz        VBW 10 kHz        SWP 30.0 msec      T
```

15.247(a) (1) (i) / RSS-210 A8.1 (c)
Number of Hopping Channels
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.

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
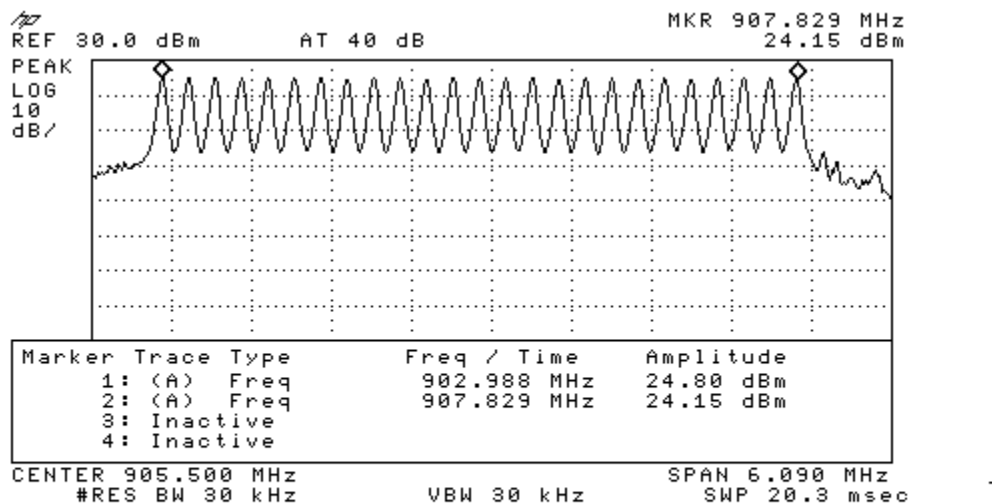Detector function = Peak
Trace = max hold

Allow the trace to stabilize. It may prove necessary to break the span up into sections, in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this Section.

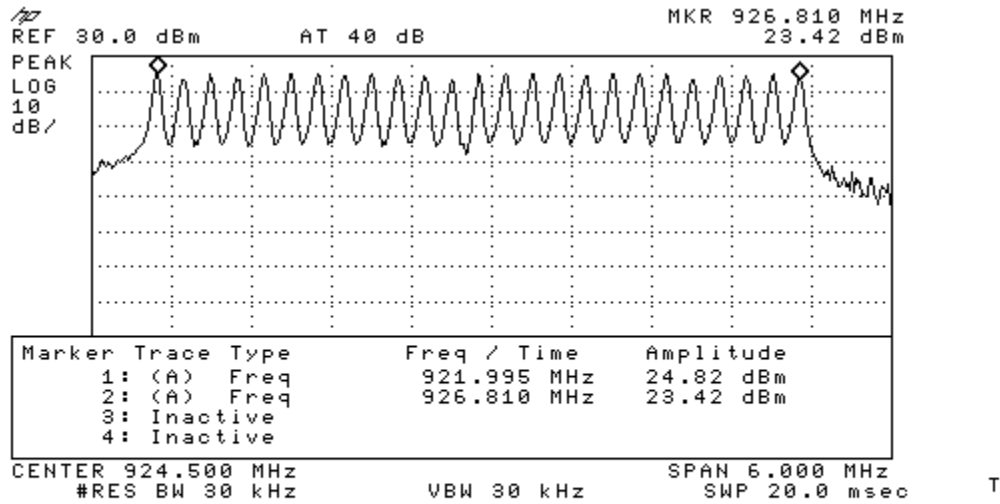| Equipment Used	Serial Number	Cal Date	Due
HP8593E	3543A02032	12/8/2009	12/8/2010
12 in Huber Suhner Cable	220058002	8/9/2010	8/9/2011
Date	Tested by		
8/26/2010	Mark Kvamme		

Unit tested w/fresh battery: 9567
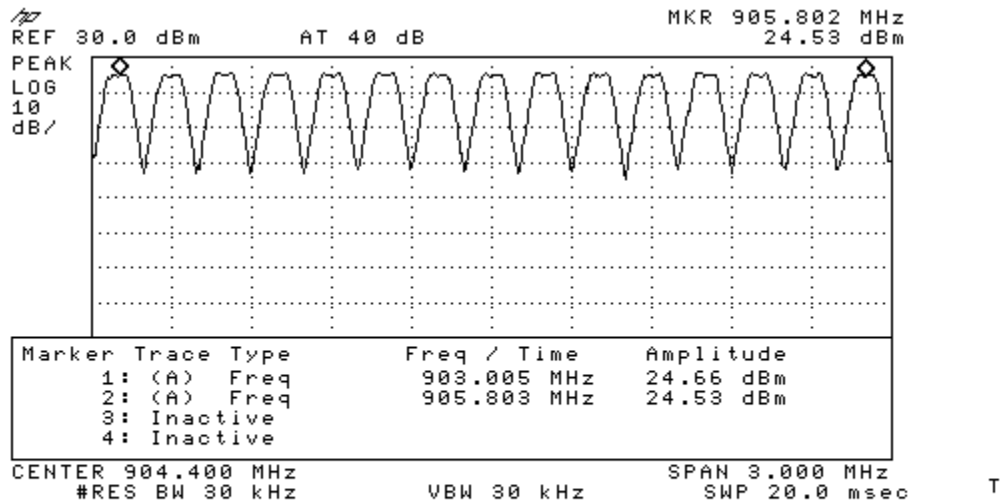
System uses 50 channels AM Mode and 120 channels FM Mode.
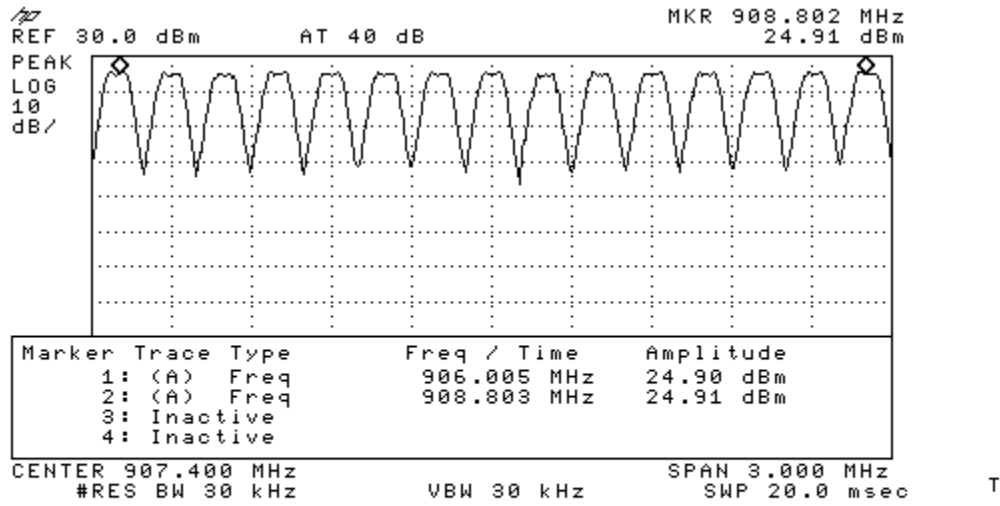
Channels 5 to 34 AM Mode

Channels 100 to 124 AM Mode

```
/0
REF 30.0 dBm        AT 40 dB              MKR 926.810 MHz
                                              23.42 dBm
PEAK
LOG
10
dB/

Marker Trace Type        Freq / Time      Amplitude
      1: (A)  Freq        921.995 MHz     24.82 dBm
      2: (A)  Freq        926.810 MHz     23.42 dBm
      3: Inactive
      4: Inactive
CENTER 924.500 MHz                        SPAN 6.000 MHz
      #RES BW 30 kHz      VBW 30 kHz      SWP 20.0 msec      T
```
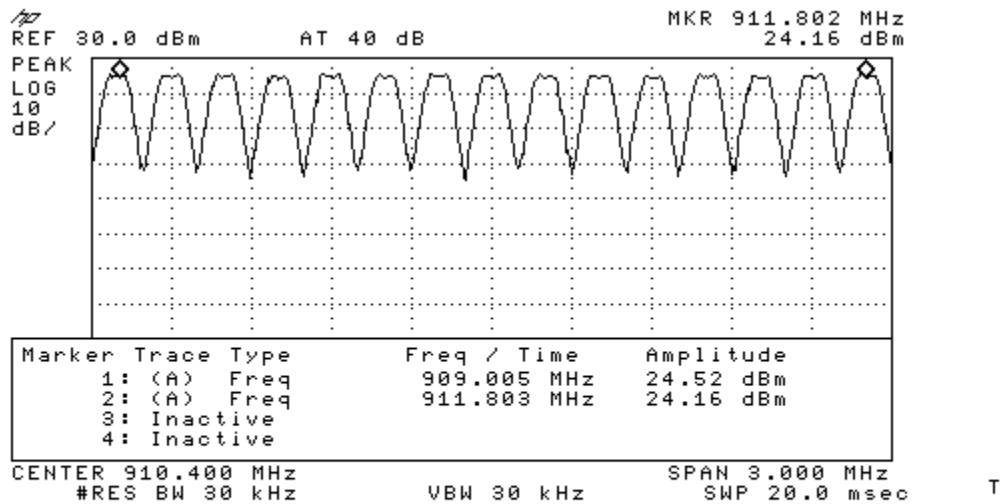
Channel 5 to 19 FM Mode

```
/0
REF 30.0 dBm        AT 40 dB              MKR 905.802 MHz
                                              24.53 dBm
PEAK
LOG
10
dB/

Marker Trace Type        Freq / Time      Amplitude
      1: (A)  Freq        903.005 MHz     24.66 dBm
      2: (A)  Freq        905.803 MHz     24.53 dBm
      3: Inactive
      4: Inactive
CENTER 904.400 MHz                        SPAN 3.000 MHz
      #RES BW 30 kHz      VBW 30 kHz      SWP 20.0 msec      T
```

Channel 20 to 34 FM Mode


```
                                           MKR 908.802 MHz
REF 30.0 dBm      AT 40 dB                       24.91 dBm
PEAK
LOG
10
dB/

Marker Trace Type      Freq / Time    Amplitude
    1: (A)  Freq       906.005 MHz    24.90 dBm
    2: (A)  Freq       908.803 MHz    24.91 dBm
    3: Inactive
    4: Inactive
CENTER 907.400 MHz                    SPAN 3.000 MHz
    #RES BW 30 kHz     VBW 30 kHz     SWP 20.0 msec      T
```

Channels 35 to 49 FM Mode


```
                                           MKR 911.802 MHz
REF 30.0 dBm      AT 40 dB                       24.16 dBm
PEAK
LOG
10
dB/

Marker Trace Type      Freq / Time    Amplitude
    1: (A)  Freq       909.005 MHz    24.52 dBm
    2: (A)  Freq       911.803 MHz    24.16 dBm
    3: Inactive
    4: Inactive
CENTER 910.400 MHz                    SPAN 3.000 MHz
    #RES BW 30 kHz     VBW 30 kHz     SWP 20.0 msec      T
```

Channel 50 to 64 FM Mode

```
/♫♫                                              MKR 914.802 MHz
REF 30.0 dBm         AT 40 dB                         24.70 dBm
PEAK
LOG
10
dB/
```

Marker Trace Type		Freq / Time	Amplitude
1:	(A) Freq	912.005 MHz	24.64 dBm
2:	(A) Freq	914.803 MHz	24.70 dBm
3:	Inactive		
4:	Inactive		

```
CENTER 913.400 MHz                          SPAN 3.000 MHz
    #RES BW 30 kHz        VBW 30 kHz         SWP 20.0 msec      T
```

Channel 65 to 79 FM Mode

```
/♫♫                                              MKR 917.802 MHz
REF 30.0 dBm         AT 40 dB                         24.66 dBm
PEAK
LOG
10
dB/
```

Marker Trace Type		Freq / Time	Amplitude
1:	(A) Freq	915.005 MHz	24.65 dBm
2:	(A) Freq	917.803 MHz	24.66 dBm
3:	Inactive		
4:	Inactive		

```
CENTER 916.400 MHz                          SPAN 3.000 MHz
    #RES BW 30 kHz        VBW 30 kHz         SWP 20.0 msec      T
```

Channel 80 to 94 FM Mode

Channel 95 to 109 FM Mode
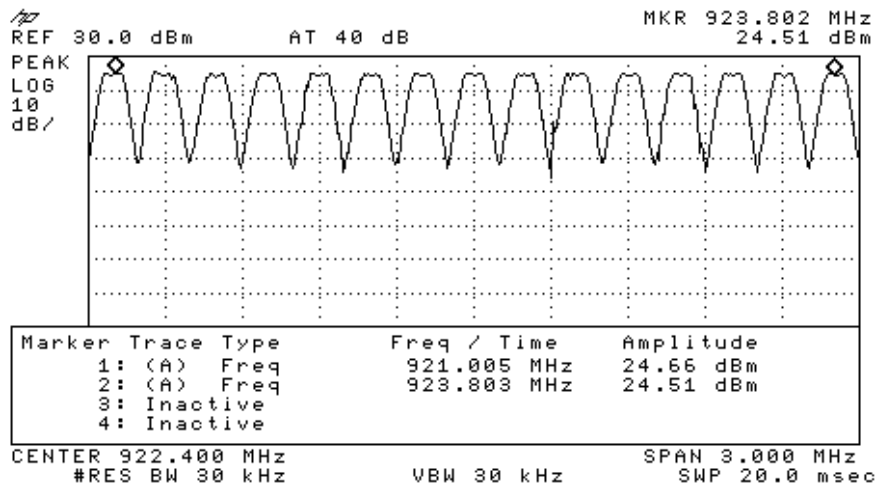
Channel 110 to 124 FM Mode
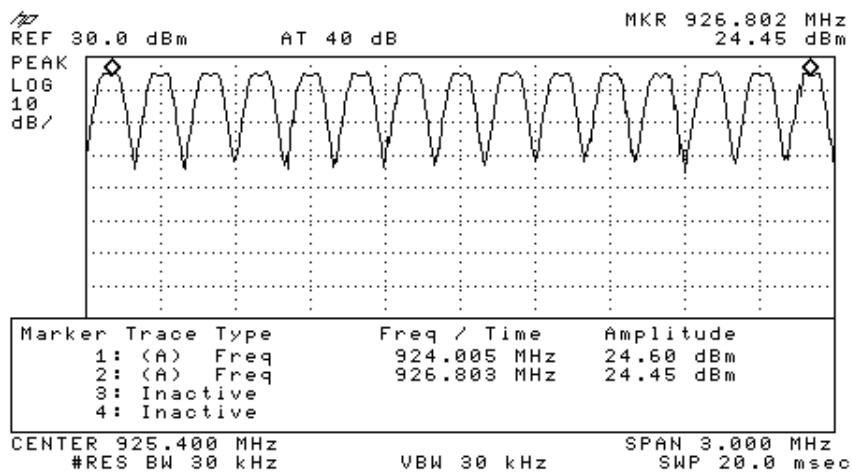
15.247(a) (1) (i) / RSS-210 A8.1 (a)

20 dB Bandwidth

Verify that the 20 dB bandwidth of the hopping channel is less than 250 kHz.

Use the following spectrum analyzer settings:

Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel.
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 mission, 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.

Equipment Used	Serial Number	Cal Date	Due
HP8593E	3543A02032	12/8/2009	12/8/2010
12 in Huber Suhner Cable	220058002	8/9/2010	8/9/2011
Date	Tested by		
9/16/2010	Mark Kvamme		

Unit tested w/fresh battery: 2072

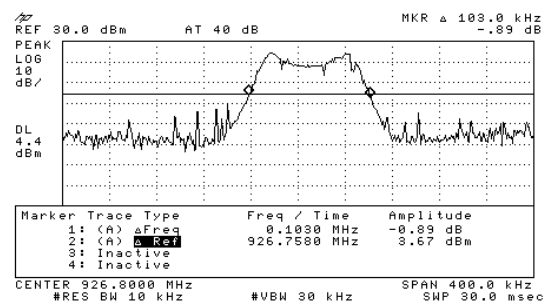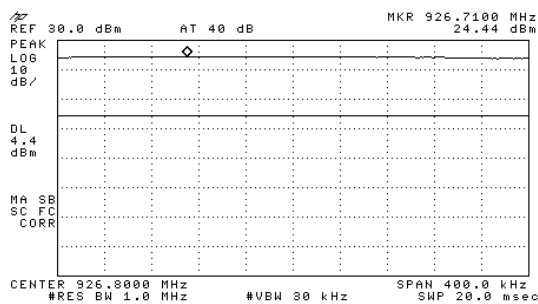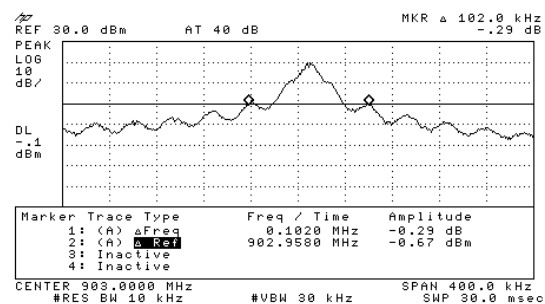| Frequency (MHz)/channel	Bandwidth	Mode	Power level
903 / 5	103 kHz	FM	3
915 / 65	103 kHz	FM	3
926.8 / 124	103 kHz	FM	3
903 / 5	102 kHz	AM	2
915 / 65	102 kHz	AM	2
926.8 / 124	81 KHz	AM	2

FM Mode 903 MHz, Channel 5
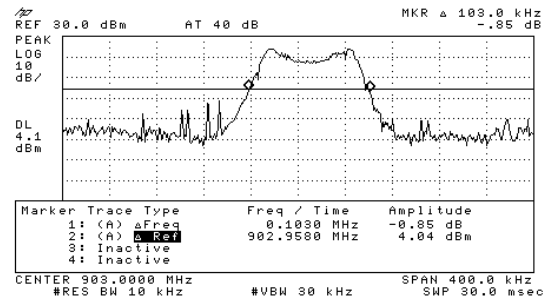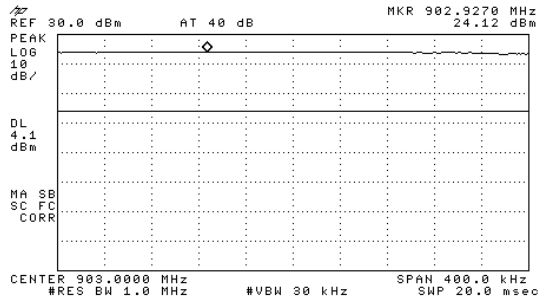
FM Mode 915 MHz, Channel 65
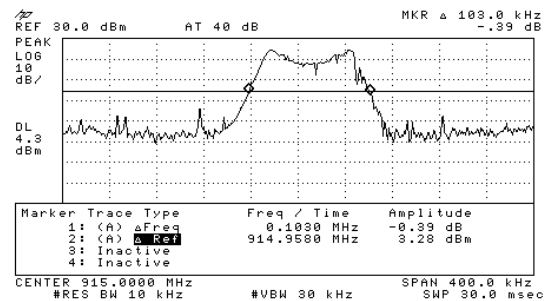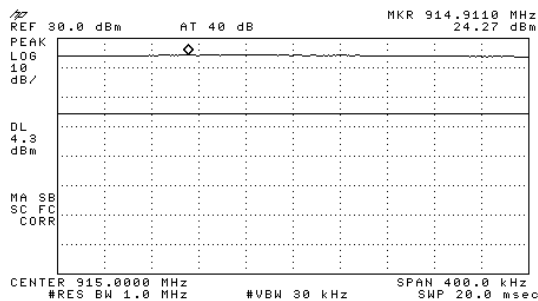
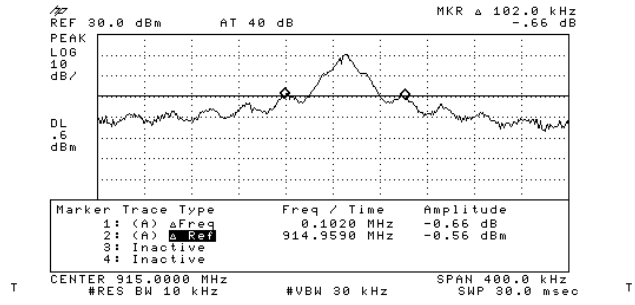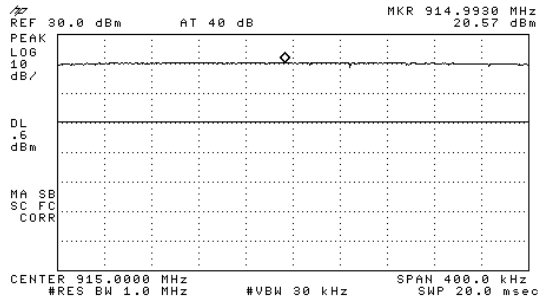## FM Mode 926.8 MHz, Channel 124

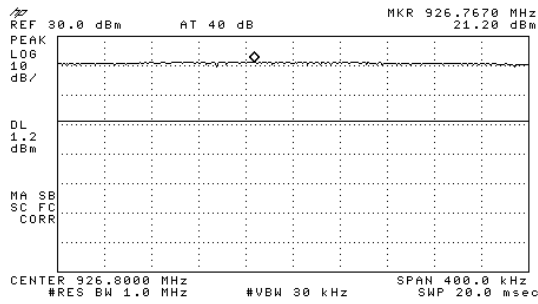## AM Mode 903 MHz, Channel 5

AM Mode 915 MHz, Channel 65

REF 30.0 dBm   AT 40 dB   MKR 914.9930 MHz
                                            20.57 dBm
PEAK
LOG
10
dB/

DL
.6
dBm

MA SB
SC FC
  CORR

CENTER 915.0000 MHz   SPAN 400.0 kHz
  #RES BW 1.0 MHz   #VBW 30 kHz   SWP 20.0 msec   T

REF 30.0 dBm   AT 40 dB   MKR Δ 102.0 kHz
                                            -.66 dB
PEAK
LOG
10
dB/

DL
.6
dBm

Marker Trace Type	Freq / Time	Amplitude
1: (A) ΔFreq	0.1020 MHz	-0.66 dB
2: (A) Δ Ref	914.9590 MHz	-0.56 dBm
3: Inactive		
4: Inactive		

CENTER 915.0000 MHz   SPAN 400.0 kHz
  #RES BW 10 kHz   #VBW 30 kHz   SWP 30.0 msec   T

AM Mode 926.8 MHz, Channel 124

REF 30.0 dBm   AT 40 dB   MKR 926.7670 MHz
                                            21.20 dBm
PEAK
LOG
10
dB/

DL
1.2
dBm

MA SB
SC FC
  CORR

CENTER 926.8000 MHz   SPAN 400.0 kHz
  #RES BW 1.0 MHz   #VBW 30 kHz   SWP 20.0 msec   T

REF 30.0 dBm   AT 40 dB   MKR Δ 81.0 kHz
                                            -1.24 dB
PEAK
LOG
10
dB/

DL
1.2
dBm

Marker Trace Type	Freq / Time	Amplitude
1: (A) ΔFreq	0.0810 MHz	-1.24 dB
2: (A) Δ Ref	926.7800 MHz	1.06 dBm
3: Inactive		
4: Inactive		

CENTER 926.8000 MHz   SPAN 400.0 kHz
  #RES BW 10 kHz   #VBW 30 kHz   SWP 30.0 msec   T

15.247(a) (1) (i); (g); (h) / RSS-210 A8.1 (c)

Time of Occupancy

Verify that the transmitted signal does not occupy a single frequency for more than 400 mS in a 20 second period.

Short Bursts

… a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

Intelligence

The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

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 $\geq$ 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 maximum possible occupancy time on any one frequency is 400 mS within a 20 second period.

The system this product is used in does not incorporate any type of intelligence to avoid the simultaneous occupancy of individual hopping frequencies.
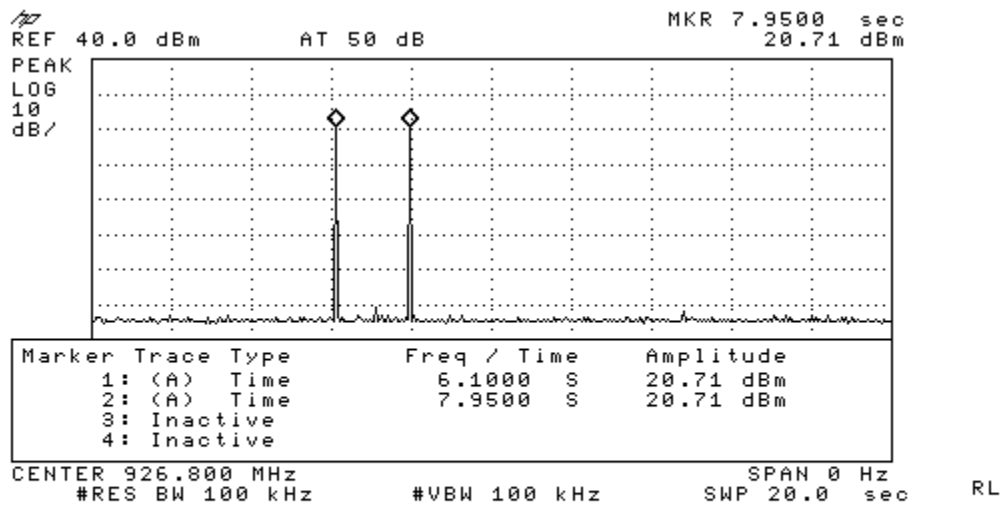
Equipment Used	Serial Number	Cal Date	Due
HP8593E	3543A02032	12/8/2009	12/8/2010
12 in Huber Suhner Cable	220058002	8/9/2010	8/9/2011
Date	Tested by		
9/16/2010	Mark Kvamme		

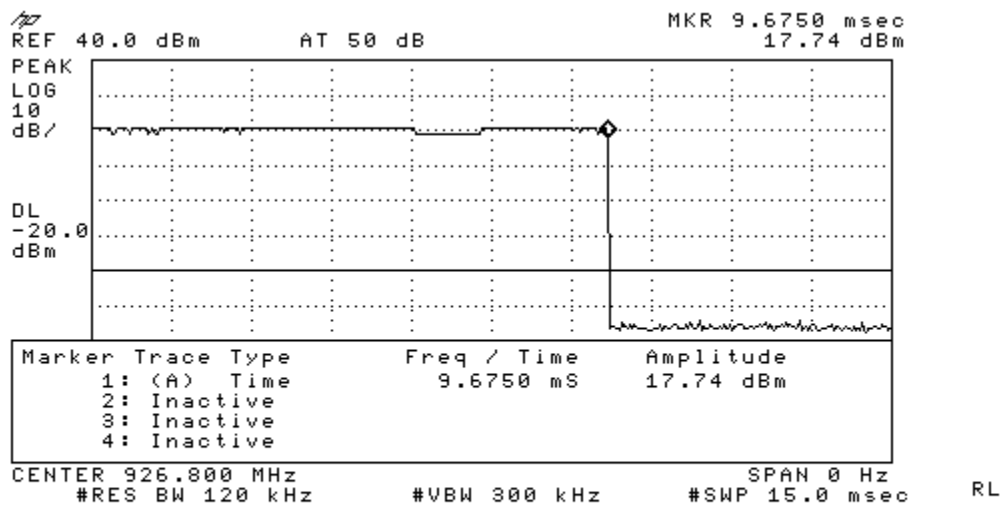| Mode	Initial message length	Number of Initial messages	Two way message length	Number of two way messages	Total transmission time in 20 second period (milliseconds)
AM	5.2125	1	51.60	5	263.2125
FM	9.675	1	10.763	1	20.438

Unit tested w/fresh battery: *9081*

FM mode of operation.

The maximum transmissions on a single channel during a 20 second period are two. The initial message is 9.675 milliseconds long and the final message is 10.763 milliseconds long. Total occupancy for FM is: 9.675 + 10.763 = 20.44mS
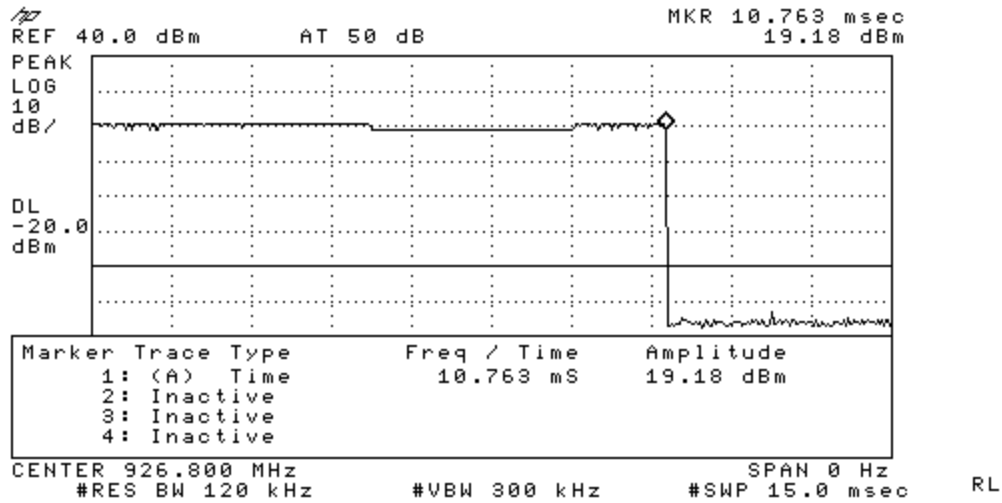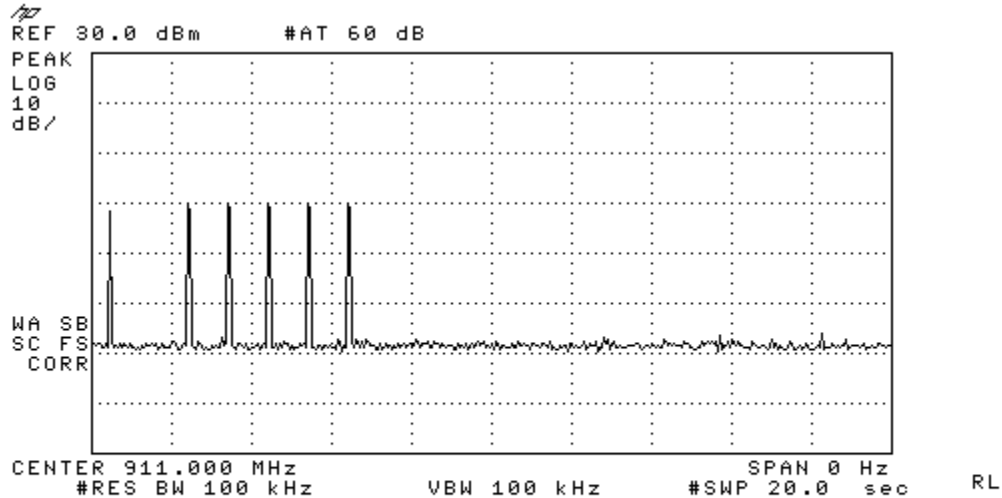

Initial FM message length.

Two way FM message length.

```
/↗↗
REF 40.0 dBm        AT 50 dB              MKR 10.763 msec
                                              19.18 dBm
PEAK
LOG
10
dB/

DL
-20.0
dBm


        Marker Trace Type       Freq / Time     Amplitude
            1: (A)   Time        10.763 mS       19.18 dBm
            2: Inactive
            3: Inactive
            4: Inactive
CENTER 926.800 MHz                              SPAN 0 Hz
      #RES BW 120 kHz    #VBW 300 kHz      #SWP 15.0 msec   RL
```
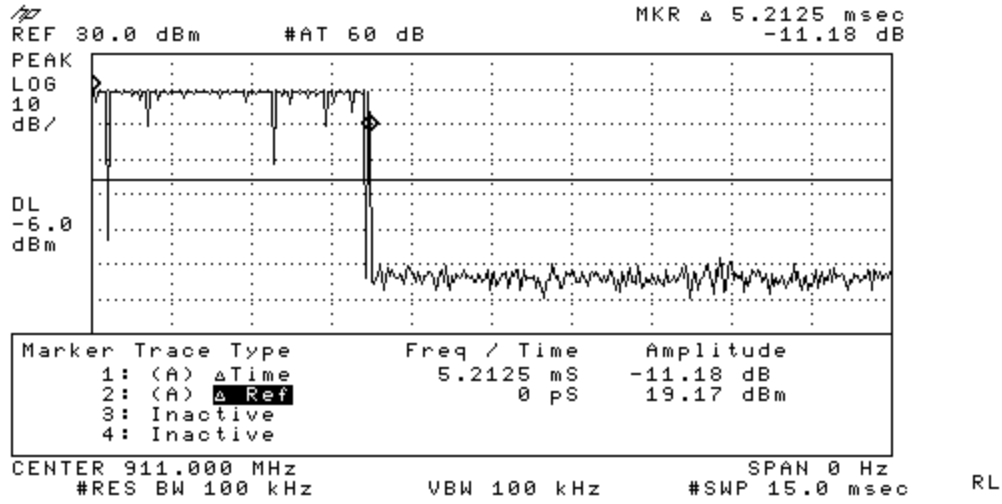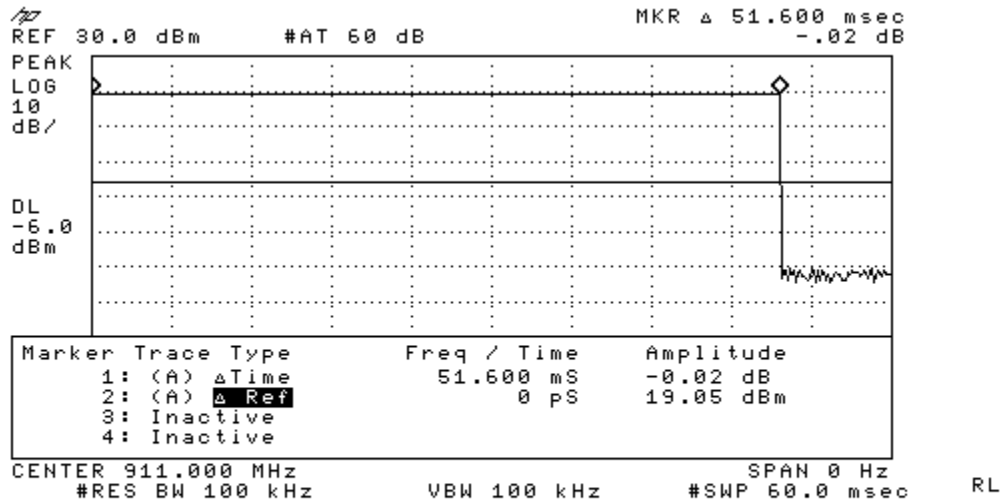
AM mode of operation.

The maximum transmissions on a single channel during a 20 second period are six. The initial message is 5.2125 milliseconds long and the 5 linked message are identical and each are 51.6 milliseconds long. Total occupancy is: 263.21 = 5.2125 + (5 * 51.6)

```
/↗↗
REF 30.0 dBm        #AT 60 dB
PEAK
LOG
10
dB/


WA SB
SC FS
  CORR



CENTER 911.000 MHz                              SPAN 0 Hz
      #RES BW 100 kHz    VBW 100 kHz       #SWP 20.0  sec   RL
```

Initial AM message length.

```
↯                                               MKR ∆ 5.2125 msec
REF 30.0 dBm        #AT 60 dB                          -11.18 dB
PEAK
LOG
10
dB/

DL
-6.0
dBm

Marker Trace Type        Freq / Time      Amplitude
   1: (A) ∆Time          5.2125 mS        -11.18 dB
   2: (A) ∆ Ref                0 pS        19.17 dBm
   3: Inactive
   4: Inactive
CENTER 911.000 MHz                           SPAN 0 Hz
   #RES BW 100 kHz       VBW 100 kHz     #SWP 15.0 msec    RL
```

Five Two Way AM message length for each of the five.

```
↯                                               MKR ∆ 51.600 msec
REF 30.0 dBm        #AT 60 dB                            -.02 dB
PEAK
LOG
10
dB/

DL
-6.0
dBm

Marker Trace Type        Freq / Time      Amplitude
   1: (A) ∆Time          51.600 mS        -0.02 dB
   2: (A) ∆ Ref                0 pS        19.05 dBm
   3: Inactive
   4: Inactive
CENTER 911.000 MHz                           SPAN 0 Hz
   #RES BW 100 kHz       VBW 100 kHz     #SWP 60.0 msec    RL
```

15.247(b) (2) / RSS-210 A8.4 (1)

Power Output

The maximum peak conducted output power of the intentional radiator shall not exceed the following: For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels.

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

      Set RF level offset=cable loss

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. 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.

Equipment Used	Serial Number	Cal Date	Due
HP8593E	3543A02032	12/8/2009	12/8/2010
12 in Huber Suhner Cable	220058002	8/9/2010	8/9/2011
Date	**Tested by**		
9/16/2010	Mark Kvamme		

Unit tested w/fresh battery: *2072*

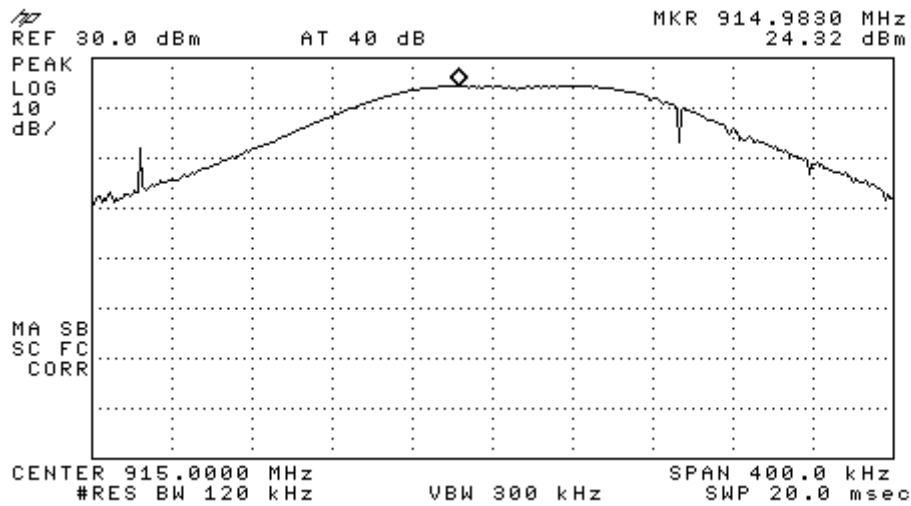| Frequency (MHz)/channel	Mode	Power level	Power (dBm)*	Power (Watts)
903 / 5	*FM*	*3*	*24.46*	*0.28*
915 / 65	*FM*	*3*	*24.62*	*0.29*
926.8 / 124	*FM*	*3*	*24.84*	*0.30*
903 / 5	*AM*	*2*	*20.86*	*0.12*
915 / 65	*AM*	*2*	*20.13*	*0.10*
926.8 / 124	*AM*	*2*	*21.5*	*0.14*

      *0.3db cable loss was added to the power readings to correct for cable loss.
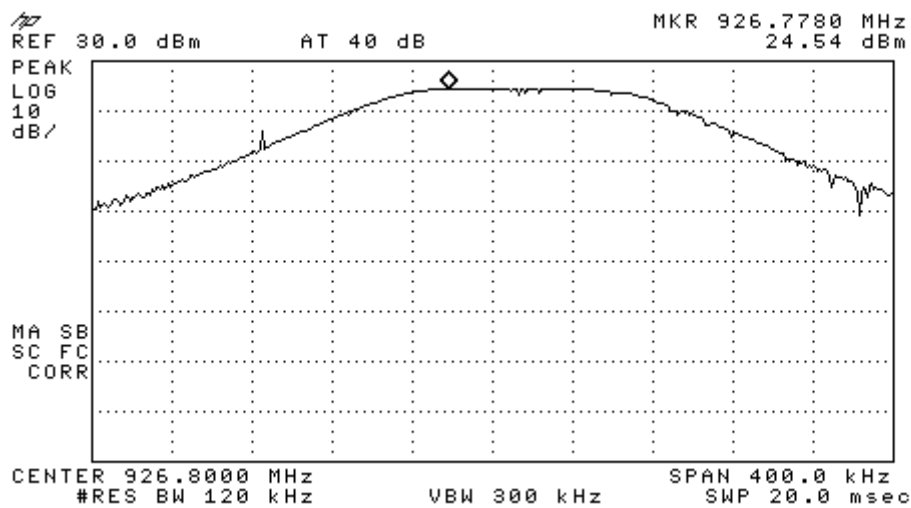
FM Mode, power level 3, Channels 5,65,124
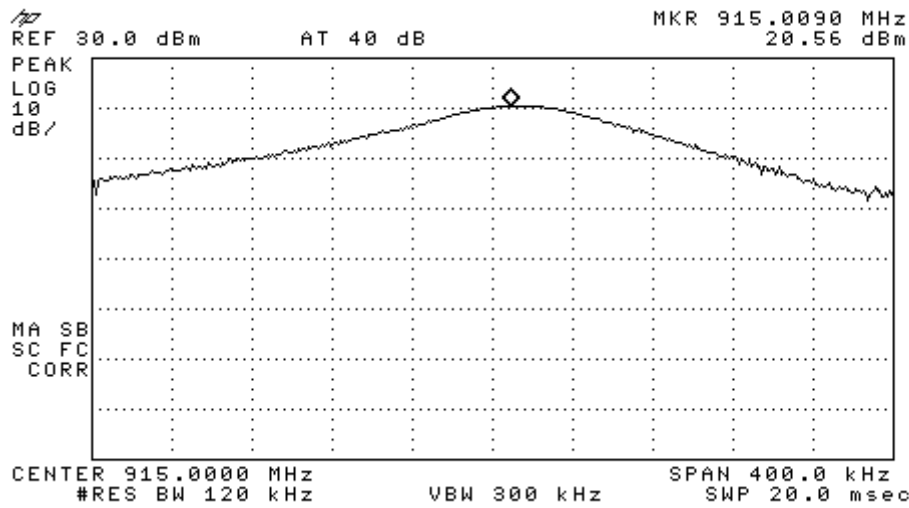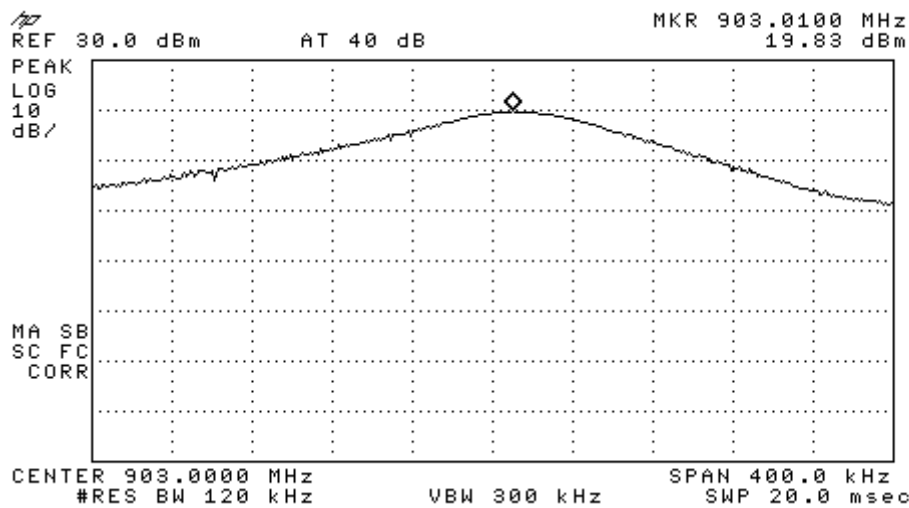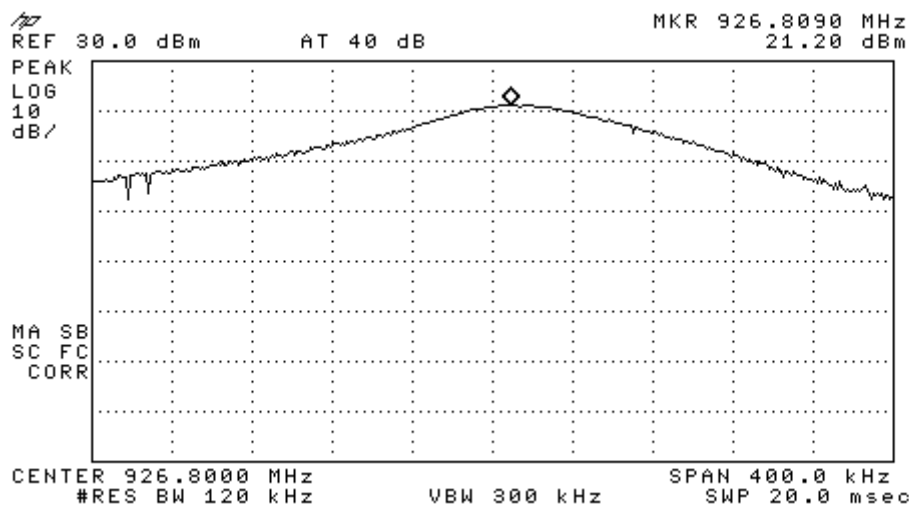*Readings do not include 0.3db cable loss*
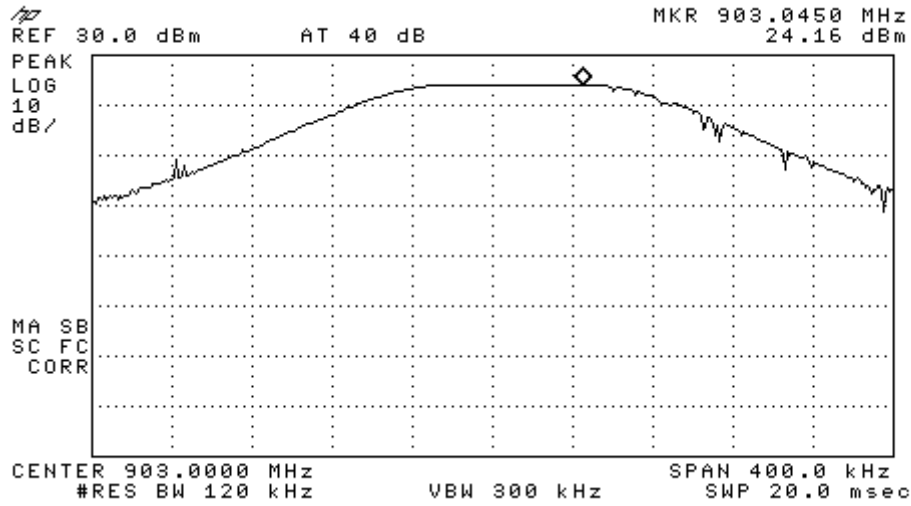
AM Mode, power level 2, Channels 5,65,124
Readings do not include 0.3db cable loss

15.247(d) / RSS-210 A8.5

Spurious Emissions

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 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. 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) (see §15.205(c)). (note: 15.247 (b)(3) is for digital modulation.

Follow the procedure outlined in Annex A, and B of this document.

Equipment Used	Serial Number	Cal Date	Due
Agilent E7405A Spectrum Analyzer	MY45113415	8/4/2010	8/4/2011
Roberts Dipole 400-1000 MHz	4106	9/14/2010	9/14/2012
AH systems preamplifer PAM 0126	146	12/3/2009	12/3/2010
Microcoax 40 foot cable	UFB505A-1-4800-000000	4/7/2009	4/7/2011
microwave circuits 1.3ghz high pass filter	405735	8/16/2010	8/16/2011
Huber&Suhner Sucotest cable 36"	1	8/16/2010	8/16/2011
EMCO 3146 Log periodic	9203-3358	10/12/2009	10/12/2011
EMCO Biconical antenna serial number	9807-3129	10/2/2009	10/2/2011
EMCO 3115 double ridge wave guide	9508-4550	3/22/2010	3/22/2012
ETS Lindgren Dipole antenna	78573	9/18/2008	9/18/2010
Date	Tested by	Temperature/humidity	
9/9/2010 to 9/20/2010	Mark Kvamme	73/74	

Unit tested w/fresh battery:2070

Frequency range investigated was 9 kHz to 9.28GHz.

FM mode test results
(1)Level (dbuV/m)=Level (dbuV) – Amplifier Gain (db) +Ant. Factor (db/m) + Cable Loss (db)
(2) Antenna used was Roberts Dipole S.N. 4106

Freq. MHz	Level dBm	Level dBuV	Amplifier Gain dB	Ant. Factor dB	Cable Loss dB	Peak Level dBuV/m(1)	emissions dBc
927	-13.92	93.08	0	28.73	2.62	124.43	
1854	-17.85	89.15	34.52	27.03	4.82	86.48	-37.95
1806	-19.35	87.65	34.51	26.86	4.75	84.75	-39.68
1830	-19.66	87.34	34.52	26.95	4.78	84.55	-39.88
6321	-49.08	57.92	34.76	34.83	8.1	66.09	-58.34
6405	-50.59	56.41	34.72	34.67	8.19	64.55	-59.41
6489	-52.16	54.84	34.68	34.6	8.25	63.01	-60.95

AM mode results.
(1)Level (dbuV/m)=Level (dbuV) – Amplifier Gain (db) +Ant. Factor (db/m) + Cable Loss (db)
(2) Antenna used was ETS Lindgren Dipole S.N. 78573

Freq. MHz	Level dBm	Level dBuV	Amplifier Gain dB	Ant. Factor dB	Cable Loss dB	peak Level dBuV/m(1)	emissions dBc
926.8	-16.62	90.38	0	28.23	2.62	121.23	
1853.6	-19.16	87.84	34.52	27.03	4.82	85.17	-36.06
1830	-20.82	86.18	34.52	26.95	4.78	83.39	-37.84
1806	-21.8	85.2	34.51	26.86	4.75	82.3	-38.93
6321	-53.29	53.71	34.76	34.83	8.1	61.88	-59.35
6405	-55.73	51.27	34.72	34.67	8.19	59.41	-61.82
5560.8	-54.51	52.49	35.02	34.16	7.51	59.14	-62.09

15.205, 15.209 / RSS-210 2.2, 2.6

Restricted Bands Spurious Emissions

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

(b) Except as provided in paragraphs (d) and (e) of this section, the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

Measure the field strength of all transmitter spurious emissions in the restricted bands listed below. Follow the procedure outlined in Annex A and B of this document.

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
0.495-0.505 1	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2655-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			

Equipment Used	Serial Number	Cal Date	Due
Agilent E7405A Spectrum Analyzer	MY45113415	8/4/2010	8/4/2011
Roberts Dipole 400-1000 MHz	4106	9/14/2010	9/14/2012
AH systems preamplifer PAM 0126	146	12/3/2009	12/3/2010
Microcoax 40 foot cable	UFB505A-1-4800-000000	4/7/2009	4/7/2011
microwave circuits 1.3ghz high pass filter	405735	8/16/2010	8/16/2011
Huber&Suhner Sucotest cable 36"	1	8/16/2010	8/16/2011
EMCO 3146 Log periodic	9203-3358	10/12/2009	10/12/2011
EMCO Biconical antenna serial number	9807-3129	10/2/2009	10/2/2011
EMCO 3115 double ridge wave guide	9508-4550	3/22/2010	3/22/2012
ETS Lindgren Dipole antenna	78573	9/18/2008	9/18/2010
Date	Tested by	Temperature/humidity	
9/9/2010 to 9/20/2010	Mark Kvamme	73/74	

Unit tested w/fresh battery: *2070*

Per FCC DA 00-705. a Duty Cycle Correction Factor (20log(dwell time/100mS)) can be applied to show compliance to the 15.209 limit.
FM Mode time averaging
20 log (10.763ms / 100mS) = -19.36 dB   dwell time is defined here as: 10.763 ms.

AM Mode time averaging
20 log (51.6ms / 100mS) = -5.75 dB   dwell time is defined here as: 51.6 ms.

Spurious Emission Limits

Frequency (MHz)	Field Strength (microvolts/meter)	in dBuV/m	Measurement Distance (meters)
0.009-0.490 2400F	2440F (kHz)		300
0.490-1.705 24000F	2400F (kHz)		30
1.705-30.0	30	29.5	30
30-88	100	40	3
88-216	200	43.5	3
216-960	200	46	3
Above 960	500	54	3

FS (dBuV/) = 20 * log (FS(uV/m))

FM Mode results

Freq. MHz	rbw=1MHz vbw=1MHz Peak Level dBm	rbw=1MHz vbw=1MHz Peak Level dBuV	Amplifier Gain dB	Ant. Factor dB	Cable Loss dB	rbw=1MHz vbw=1MHz peak Level dBuV/m(1)	rbw=1MHz vbw=1MHz Average Level dBuV/m(2)
2709	-33.44	73.56	34.48	28.87	5.28	73.23	53.87
2745	-34.05	72.95	34.47	28.94	5.27	72.69	53.33
2781	-34.44	72.56	34.46	29.01	5.27	72.38	53.02
4515	-41.74	65.26	34.56	32.38	6.82	69.9	50.54
4635	-44.12	62.88	34.59	32.52	6.89	67.7	48.34
4575	-45.03	61.97	34.58	32.43	6.86	66.68	47.32

(1)Level (dbuV/m)=Level (dbuV) – Amplifier Gain (db) +Ant. Factor (db/m) + Cable Loss (db)
(2)Level (dbuV/m)=Level (dbuV) – Amplifier Gain (db) +Ant. Factor (db/m) + Cable Loss (db) + FM correction factor (-19.36db)

AM Mode results

Freq. MHz	rbw=1MHz vbw=1MHz Peak Level dBm	rbw=1MHz vbw=10hz Average Level dBm	rbw=1MHz vbw=1MHz Peak Level dBuV	rbw=1MHz vbw=10hz Average Level dBuV	Amplifier Gain dB	Ant. Factor dB	Cable Loss dB	rbw=1MHz vbw=1MHz peak Level dBuV/m(1)	rbw=1MHz vbw=10hz Average Level dBuV/m(2)
2709	-37.49	-57.78	69.51	49.22	34.48	28.87	5.28	69.18	43.14
2745	-38.79	-57.99	68.21	49.01	34.47	28.94	5.27	67.95	43
2780.4	-37.87	-57.57	69.13	49.43	34.46	29.01	5.27	68.95	43.5
4515	-46.19	-62.35	60.81	44.65	34.56	32.38	6.82	65.45	43.54
4634	-48.98	-63.83	58.02	43.17	34.59	32.52	6.89	62.84	42.24
4575	-48.69	-63.82	58.31	43.18	34.58	32.43	6.86	63.02	42.14

(1)Level (dbuV/m)=Level (dbuV) – Amplifier Gain (db) +Ant. Factor (db/m) + Cable Loss (db)
(2)Level (dbuV/m)=Level (dbuV) – Amplifier Gain (db) +Ant. Factor (db/m) + Cable Loss (db) +
AM correction factor (-5.75db)
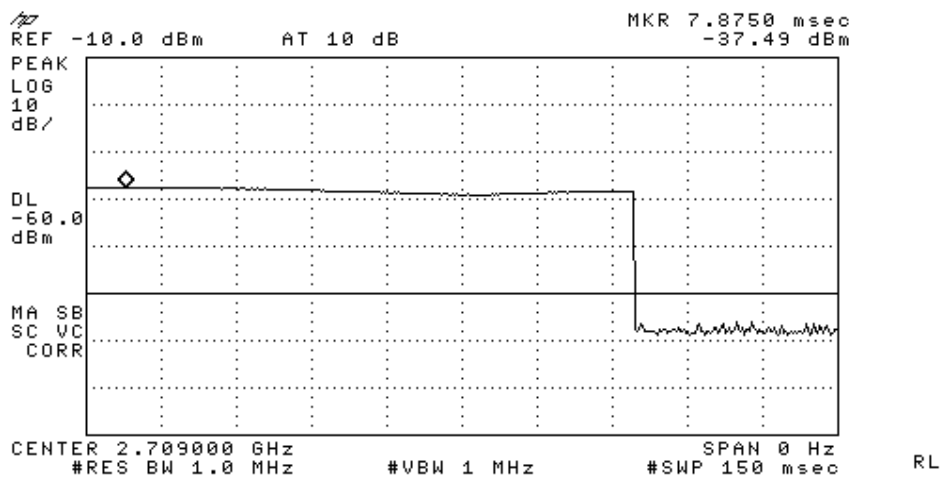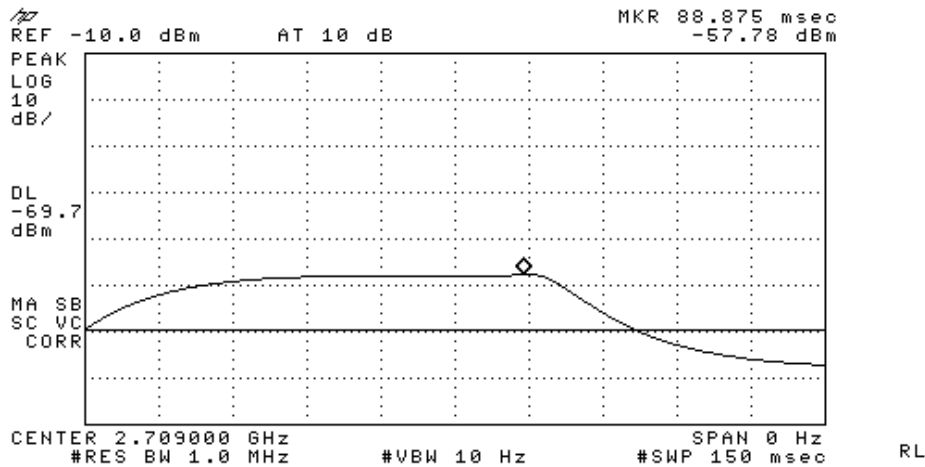
RSS-Gen 7.2.3 Receiver Spurious Emission Limits and Unintentional 15.109

7.2.3.2 Radiated Measurement

All spurious emissions shall comply with the limits of Table 1.

Receiver Spurious Emissions

The receiver shall be operated in the normal receive mode near the mid-point of the band over which the receiver is designed to operate. Unless otherwise specified in the applicable RSS, the radiated emission measurement is the standard measurement method (with the device's antenna in place) to measure receiver spurious emissions. Radiated emission measurements are to be performed using a calibrated open-area test site. As an alternative, the conducted measurement method may be used when the antenna is detachable. In such a case, the receiver spurious signal may be measured at the antenna port. If the receiver is super-regenerative, stabilize it by coupling to it an un-modulated carrier on the receiver frequency (antenna conducted measurement) or by transmitting an un-modulated carrier on the receiver frequency from an antenna in the proximity of the receiver (radiated measurement). Taking care not to overload the receiver, vary the amplitude and frequency of the stabilizing signal to obtain the highest level of the spurious emissions from the receiver. For either method, the search for spurious emissions shall be from the lowest frequency internally generated or used in the receiver (e.g. local oscillator, intermediate or carrier frequency), or 30 MHz, whichever is the higher, to at least 3 times the highest tunable or local oscillator frequency, whichever is the higher, without exceeding 40 GHz.

Receiver Spurious Emission Standard

The following receiver spurious emission limits shall be complied with:

  (a) *If a radiated measurement is made, all spurious emissions shall comply with the limits of Table 1. The resolution bandwidth of the spectrum analyzer shall be 100 kHz for spurious emission measurements below 1.0 GHz, and 1.0 MHz for measurements above 1.0 GHz.*

Equipment Used	Serial Number	Cal Date	Due
Agilent E7405A Spectrum Analyzer	MY45113415	8/4/2010	8/4/2011
AH systems preamplifer PAM 0126	146	12/3/2009	12/3/2010
Microcoax 40 foot cable	UFB505A-1-4800-000000	4/7/2009	4/7/2011
Huber&Suhner Sucotest cable 36"	1	8/16/2010	8/16/2011
Emco 3110B Biconical (30MHz-to 300MHz)	9807-3129	10/2/2009	10/2/2011
Emco 3146 Log Periodic (200MHz to 1GHz)	9203-3358	10/12/2009	10/12/2011
Emco 3115 waveguide (1Ghz – 18GHz)	9508-4550	3/22/2010	3/22/2012
Date	Tested by	Temp/Humidity, ºF / %	
9/30/2010	Mark Kvamme	70F / 70%	

Unit tested w/fresh battery: *2070*

Table 1- Spurious Emission Limits for Receivers

Spurious Frequency (MHz)	Field Strength (microvolt/m at 3 meters)	in dBuV/m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

FS(uV/m) = 10 raised to the power of {(dBuV/m)/20}

Frequency range investigated was 30MHz to 9.28 GHz. Emissions from the Receiver were below the noise floor.

No emissions noise floor is 27dbuV/m

1.1310 & 2.1091(mobile) or 2.1093(portable) / RSS-102 Sec 4.2-Canada Safety Code 6; Table 5

Maximum Permissible Exposure (MPE)

Radiofrequency radiation exposure limits. - The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

1.1307 (b) In addition to the actions listed in paragraph (a) of this section, Commission actions granting construction permits, licenses to transmit or renewals thereof, equipment authorizations or modifications in existing facilities, require the preparation of an Environmental Assessment (EA) if the particular facility, operation or transmitter would cause human exposure to levels of radiofrequency radiation in excess of the limits in §§1.1310 and 2.1093 of this chapter.

Mode	unit 2070 Field strenth (dbuV/m)	EIRP (dbm)	unit 2072 conducted power (dbm)	conducted power (milliwatts)	antenna gain (dbi)	antenna gain numeric
AM	121.66	27.66	21.5	140	6.16	4.13
FM	122.43	28.43	24.84	300	3.59	2.29

Determine the maximum power density for the general / uncontrolled population minimum separation distance of 20 cm. (f_{MHz} / 1500 mW/cm^2 == f_{MHz} / 150 W/M^2)

The power density is calculated as:

$$P_d = \frac{P_t \times G}{4 \times \pi \times r^2}$$

P_d = power density in *mW/cm²*
P_t = transmit power in milliwatts
G = numeric antenna gain
r = distance between body and transmitter in centimeters.

FCC Limits: 926.8MHz / 1500 = 0.618 mW / cm^2 @ 20cm
IC Limits: 926.8MHz / 150 = 6.18 W / M^2 (@ 0.2M)

<u>FM Mode</u>
Max antenna gain = 3.59 dBi = 2.29 numeric
Max TX power = 24.84 dBm = 300 milliwatts

results: P_D = (300 x 2.29) / (4 x pi x 20cm^2) = 0.137 mW / cm^2 @ 20 cm
                W/m2 = 10 times mW/cm²   = 1.37 *W/M²* @ 0.2 M

<u>AM Mode</u>
Max antenna gain = 6.16 dBi = 4.13 numeric
Max TX power = 21.5 dBm = 140 milliwatts

results: P_D = (140 x 4.13) / (4 x pi x 20cm^2) = .115 mW / cm^2 @ 20 cm
                W/m2 = 10 times mW/cm²   = 1.15 *W/M²* @ 0.2 M

These results are not in excess of the limits set forth in the rules, therefore an EA is not required.

15.247 (d)
Band-edge compliance of RF Conducted Emissions
see spurious emissions section above for rules.

Use the following spectrum analyzer settings:

> Span = wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation
> RBW $\geq$ 1% of the span
> VBW $\geq$ RBW
> Sweep = auto
> Detector function = peak
> Trace = max hold

Allow the trace to stabilize. Set the marker on the emission at the band edge, or on the highest modulation product outside of the band, if this level is greater than that at the band edge. Enable the marker-delta function, and 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.

Equipment Used	Serial Number	Cal Date	Due
HP8593E	3543A02032	12/8/2009	12/8/2010
12 in Huber Suhner Cable	220058002	8/9/2010	8/9/2011
Date	**Tested by**		
9/16/2010	Mark Kvamme		

Unit tested w/fresh battery Conducted: 2072
Unit tested w/fresh battery Radiated : 2070

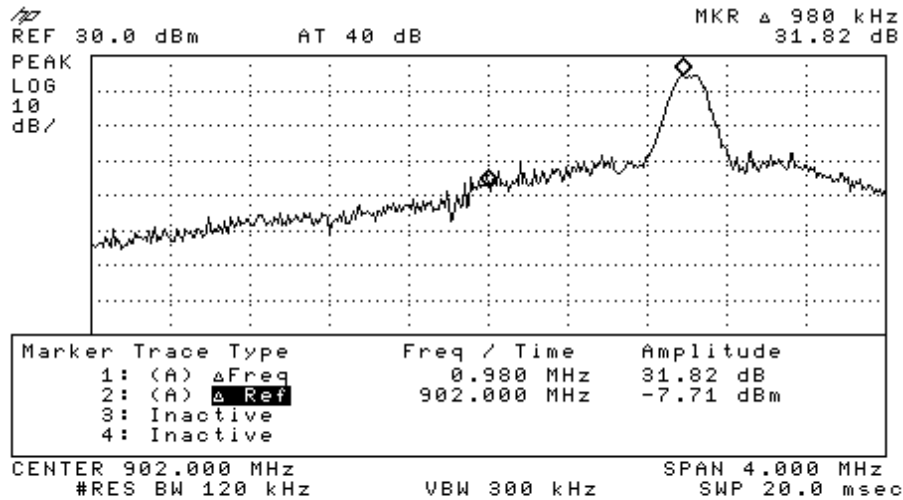| Frequency (MHz)/channel	Measurment Setup	Mode	Power level	Band edge (dBc)
903 / 5	*Conducted*	*FM*	*3*	*-31.82*
926.8 / 124	*Conducted*	*FM*	*3*	*-39.15*
903 / 5	*Conducted*	*AM*	*2*	*-30.07*
926.8 / 124	*Conducted*	*AM*	*2*	*-34.1*
903 / 5	*Radiated (1)*	*FM*	*3*	*-31.92*
926.8 / 124	*Radiated (1)*	*FM*	*3*	*-38.14*
903 / 5	*Radiated (1)*	*AM*	*2*	*-30.44*
926.8 / 124	*Radiated (1)*	*AM*	*2*	***-29.52***

(1) **Radiated measurements** @TUV SUD American OATS - Taylors Falls location (test data attached)

2070.pdf

Conducted measurements:

FM Mode power level 3

AM Mode power level 2


```
                                           MKR △ 1.170 MHz
REF 30.0 dBm        AT 40 dB                      30.07 dB
PEAK
LOG
10
dB/




Marker Trace Type        Freq / Time      Amplitude
    1: (A) △Freq           1.170 MHz       30.07 dB
    2: (A) △ Ref          901.840 MHz     -10.18 dBm
    3: Inactive
    4: Inactive
CENTER 902.000 MHz                     SPAN 4.000 MHz
    #RES BW 120 kHz      VBW 300 kHz    SWP 20.0 msec        T
```



```
                                           MKR △ -1.200 MHz
REF 30.0 dBm        AT 40 dB                      34.10 dB
PEAK
LOG
10
dB/




Marker Trace Type        Freq / Time      Amplitude
    1: (A) △Freq          -1.200 MHz       34.10 dB
    2: (A) △ Ref          928.000 MHz     -12.83 dBm
    3: Inactive
    4: Inactive
CENTER 928.000 MHz                     SPAN 4.000 MHz
    #RES BW 120 kHz      VBW 300 kHz    SWP 20.0 msec        T
```

ANNEX A
direct from FCC DA-00-705, March 30, 2000

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 $\geq$ 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.

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 $\geq$ 1 GHz, 100 kHz for f < 1 GHz

VBW $\geq$ 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.

If the emission on which a radiated measurement must be made is located at the edge of the authorized band of operation, then the alternative "marker-delta" method, listed at the end of this document, may be employed.

Alternative Test Procedures

If antenna conducted tests cannot be performed on this device, radiated tests to show compliance with the peak output power limit specified in Section 15.247(b) (2) and the spurious RF conducted emission limit specified in Section 15.247(d) are acceptable. A pre-amp, and, in the latter case, a high pass filter, are required for the following measurements.

1) Calculate the transmitter's peak power using the following equation:

$$E = \frac{\sqrt{30PG}}{d}$$

Where: E is the measured maximum fundamental field strength in V/m, utilizing a RBW $\geq$ the 20 dB bandwidth of the emission, VBW > RBW, peak detector function. Follow the procedures in C63.4-2003 with respect to maximizing the emission.

G is the numeric gain of the transmitting antenna with reference to an isotropic radiator.

d is the distance in meters from which the field strength was measured.

P is the power in watts for which you are solving:

$$P = \frac{(E \times d)^2}{30G}$$

2) To demonstrate compliance with the spurious RF conducted emission requirement of Section 15.247(d), use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured

RBW = 100 kHz

VBW $\geq$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

Measure the field strength of both the fundamental emission and all spurious emissions with these settings. Follow the procedures in C63.4-2003 with respect to maximizing the emissions. The measured field strength of all spurious emissions must be below the measured field strength of the fundamental emission by the amount specified in Section 15.247(d). Note that if the emission falls in a Restricted Band, as defined in Section 15.205, the procedure for measuring spurious radiated emissions, listed above, must be followed.

Marker-Delta Method

In making radiated band-edge measurements, there can be a problem obtaining meaningful data since a measurement instrument that is tuned to a band-edge frequency may also capture some in-band signals when using the resolution bandwidth (RBW) required by measurement procedure ANSI C63.4-1992 (hereafter C63.4). In an effort to compensate for this problem, we have developed the following technique for determining band-edge compliance.

STEP 1) Perform an in-band field strength measurement of the fundamental emission using the RBW and detector function required by C63.4 and our Rules for the frequency being measured. For example, for a device operating in the 902-928 MHz band under Section 15.249, use a 120 kHz RBW with a CISPR QP detector (a peak detector with 100 kHz RBW may alternatively be used). For transmitters operating above 1 GHz, use a 1 MHz RBW, a 1 MHz VBW, and a peak detector (as required by Section 15.35). Repeat the measurement with an average detector (i.e., 1 MHz RBW with 10 Hz VBW). Note: For pulsed emissions, other factors must be included. Please contact the FCC Lab for details if the emission under investigation is pulsed. Also, please note that radiated measurements of the fundamental emission of a transmitter operating under 15.247 are not normally required, but they are necessary in connection with this procedure.

STEP 2) Choose a spectrum analyzer span that encompasses both the peak of the fundamental emission and the band-edge emission under investigation. Set the analyzer RBW to 1% of the total span (but never less than 30 kHz) with a video bandwidth equal to or greater than the RBW. Record the peak levels of the fundamental emission and the relevant band-edge emission (i.e., run several sweeps in peak hold mode). Observe the stored trace and measure the amplitude delta between the peak of the fundamental and the peak of the band-edge emission. This is not a field strength measurement; it is only a relative measurement to determine the amount by which the emission drops at the band-edge relative to the highest fundamental emission level.

STEP 3) Subtract the delta measured in step (2) from the field strengths measured in step (1). The resultant field strengths (CISPR QP, average, or peak, as appropriate) are then used to determine band-edge compliance as required by Section 15.205.

STEP 4) The above "delta" measurement technique may be used for measuring emissions that are up to two "standard" bandwidths away from the band-edge, where a "standard" bandwidth is the bandwidth specified by C63.4 for the frequency being measured. For example, for band-edge measurements in the restricted band that begins at 2483.5 MHz, C63.4 specifies a measurement bandwidth of at least 1 MHz. Therefore you may use the "delta" technique for measuring emissions up to 2 MHz removed from the band-edge. Radiated emissions that are removed by more than two "standard" bandwidths must be measured in the conventional manner.

ANNEX B

Field Strength Measurement Procedure

This test measures the field strength of radiated emissions using a spectrum analyzer and a receiving antenna in accordance with ANSI C63.4-2003. During the test, the EUT is to be placed on a non-conducting support at 80 cm above the horizontal ground plane of the OATS. The horizontal distance between the antenna and the EUT is to be exactly 3 meters. The bandwidths used shall be; 200 Hz from 9 kHz to 150 kHz, 9 kHz from 150 kHz to 30 MHz, 120 kHz from 30 MHz to 1000 MHz, and 1 MHz from 1 GHz to 40 GHz, with the detector set to peak hold.

1) The antenna correction factor, preamplifier gain (if the preamplifier is installed), and cable loss are stored in tables in the EMC analyzer and the level at the analyzer is the corrected level in dbuV/m.
2) Monitor the frequency range of interest at a fixed antenna height and EUT azimuth.
3) If appropriate, manipulate the system cables to produce the highest amplitude signal relative to the limit. Note the amplitude and frequency of the suspect signal.
4) Rotate the EUT 360° to maximize the suspected highest amplitude signal. If the signal or another at a different frequency is observed to exceed the previously noted highest amplitude signal by 1 dB or more, go back to the azimuth and repeat step 3). Otherwise, orient the EUT azimuth to repeat the highest amplitude observation and proceed.
5) Move the antenna over its fully allowed range of travel to maximize the suspected highest amplitude signal. If the signal or another at a different frequency is observed to exceed the previously noted highest amplitude signal by 1 dB or more, return to step 3) with the antenna fixed at this height. Otherwise, move the antenna to the height that repeats the highest amplitude observation and proceed.
6) Change the polarity of the antenna and repeat step 3), step 4), and step 5). Compare the resulting suspected highest amplitude signal with that found for the other polarity. Select and note the higher of the two signals.
7) The final maximized level displayed on the EMC analyzer is the field strength.
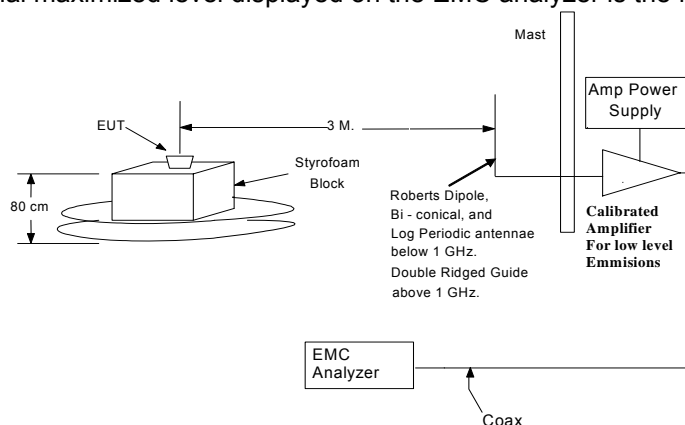
ANNEX C

Several of the FCC parts that are referenced.

Section 15.247(b) (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.

1997 FCC Decisions, Amendment of Parts 2 and 15. 7 CR 534, 12 FCC Rcd 7488, 62 FR 26239, 1997 FCC LEXIS 1927. FCC 917-114 Report and Order, Released: April 10, 1997:
Section 15.247(c): Spurious emissions. The following tests are required:

(1) RF antenna conducted test: Set RBW = 100 kHz, Video bandwidth (VBW) > RBW, scan up through 10th harmonic. All harmonics/spurs must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.
(2) Radiated emission test: Applies to harmonics/spurs that fall in the restricted bands listed in Section 15.205. The maximum permitted average field strength is listed in Section 15.209. A pre-amp (and possibly a high-pass filter) is necessary for this measurement. For measurements above 1 GHz, set RBW = 1 MHz, VBW = 10 Hz, Sweep: Auto. If the emission is pulsed, modify the unit for continuous operation, use the settings shown above, then correct the reading by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation. See Section 15.35(b) and (c).

Section 15.35 Measurement detector functions and bandwidths. - The conducted and radiated emission limits shown in this part are based on the following, unless otherwise specified elsewhere in this part:

(a) …

(b) Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz. When average radiated emission measurements are specified in this part, including average emission measurements below 1000 MHz, there also is a limit on the peak level of the radio frequency emissions. Unless otherwise specified, e.g., see §§15.250, 15.252, 15.255, and 15.509-15.519, the limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device, e.g., the total peak power level. Note that the use of a pulse desensitization correction factor may be needed to determine the total peak emission level. The instruction manual or application note for the measurement instrument should be consulted for determining pulse desensitization factors, as necessary.

(c) Unless otherwise specified, e.g. §15.255(b), when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to Declaration of Conformity or verification.
DA-00-705, does.