
**COMPLIANCE WORLDWIDE INC.
TEST REPORT 326-06**

In Accordance with the Requirements of

**Industry Canada RSS 210, Issue 6
Federal Communications Commission CFR Title 47 Part 15, 15.249 Subpart C
Low Power License-Exempt Radio Communication Devices
Intentional Radiators**

Issued to


**Sensitech Inc.
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Suite 258X
Beverly, MA 01915
(978) 927-7033**

for

**TempTale RF
Gateway/Repeater/Signpost 900**

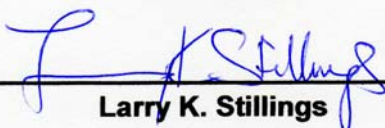
**FCC ID: SRMT11008340
IC: 6654A-11008340**

Report Issued on December 19, 2006



Brian F. Breault

Reviewed By



Larry K. Stillings

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1. Scope

This test report certifies that the SensiTech Gateway/Repeater/Signpost 900, as tested, meets the RSS 210 Rules and FCC Part 15, Subpart C requirements. The scope of this test report is limited to the test sample provided by the client, only in as much as that sample represents other production units. If any significant changes are made to the unit, the changes shall be evaluated and a retest may be required.

2. Product Details

- 2.1. Manufacturer:** SensiTech
- 2.2. Model Number:** Gateway/Repeater/Signpost 900
- 2.3. Serial Number:** Proto

2.4. Description:

The TempTale RF Gateway is a reader that is attached via an Ethernet connection to the PC controlling the wireless network. The TTRF Gateway chooses a channel within the band (set at shipment at either 915 MHz or 868 MHz) based on the current signal-to-noise ratio measured in each channel.

The TTRF Repeater is used to extend the area that is covered by the network. The Repeater passes signals from the TTRF monitors and other repeaters to the TTRF Gateway. TTRF Repeaters uses the same channel as the TTRF Gateway that it finds when first installed.

The Signpost is used at locations where it is not necessary to read data from the TTRF monitors. TTRF Signposts transmit a location ID that is stored in the monitors. As such, TTRF Signposts are typically used to record the length of time a shipment spends at a specific facility. TTRF Signposts are used in facilities that do not have a TTRF Gateway and TTRF Repeaters.

- 2.5. Power Source:** 12V DC using a 20 Volts, 60 Hz adapter
- 2.6. EMC Modifications:** None

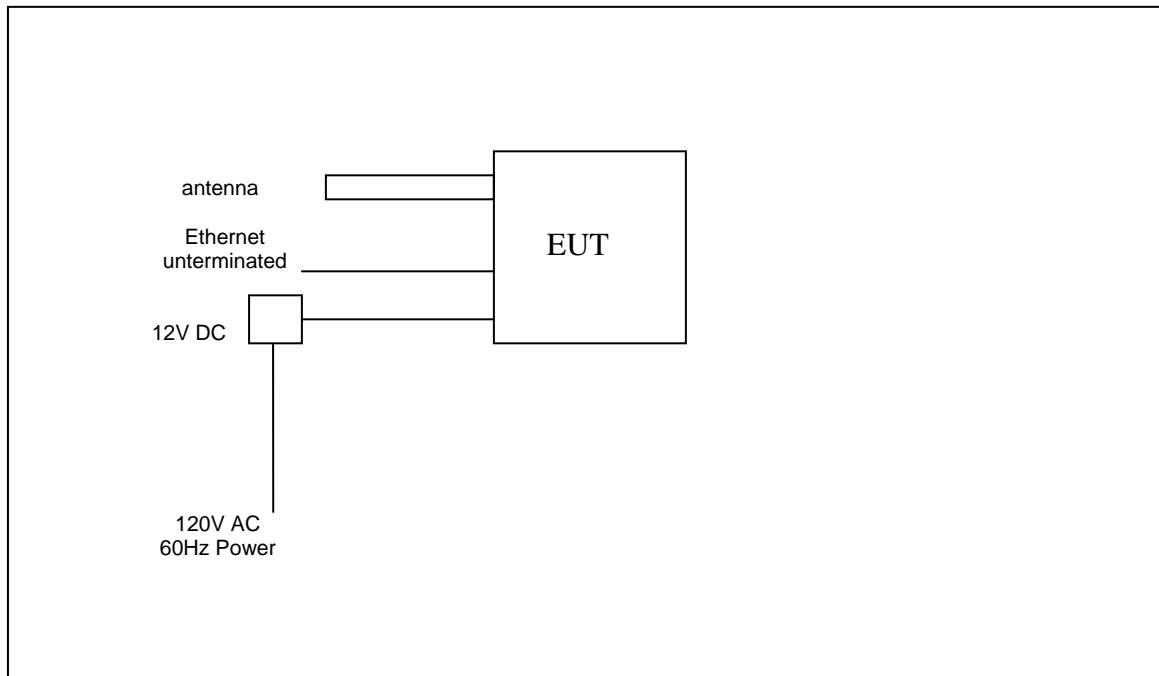
3. Product Configuration

3.1. Operational Characteristics & Software

The TempTale RF Gateway/Repeater/Signpost uses Remote Site Server software and TempTale RF monitors, gateways, repeaters, and signposts to capture temperature data and download the data wirelessly to a local computer.

For testing purposes, a command set was provided to set the frequency, output power and modulation characteristics.

3.2. Block Diagram



4. Measurements Parameters

4.1. Measurement Equipment Used to Perform Test

Device	Manufacturer	Model No.	Serial No.	Cal Due
EMI Receiver	Hewlett Packard	8546A	3650A00360	1/5/2007
Spectrum Analyzer	Hewlett Packard	8593E	3829A03887	3/13/2007
Microwave Preamp	Hewlett Packard	8449B	3008A01323	9/21/2008
Biconilog Antenna	Com-Power	AC220	25509	7/31/2007
Horn Antenna	Electro-Metrics	EM-6961	6337	8/25/2007

4.2. Measurement & Equipment Setup

Test Date: 11/22/2006
 Test Engineer: Brian Breault
 Normal Site Temperature (15 - 35°C): 21.6
 Relative Humidity (20 -75%RH): 35
 Frequency Range: 902.8 – 927.54 MHz
 Measurement Distance: 3 Meters
 EMI Receiver IF Bandwidth: Depends on measurement
 EMI Receiver Avg Bandwidth: Depends on measurement
 Detector Function: Depends on measurement

4.3. Measurement Procedure

Test measurements were made in accordance FCC Part 15.249: Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz, 5725 - 5875 MHz, and 24.0 - 24.25 GHz.

The test methods used to generate the data in this test report is in accordance with ANSI C63.4: 2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

The output power of the device under test was set to +3 dBm using the TXPow command via the terminal interface.

5. Measurement Summary

Test Requirement	FCC Rule Requirement	Test Report Section	Result	Comment
Antenna Requirement	15.203	N.A	Compliant	The DUT uses a reverse polarity SMA connector with a unique matching external antenna.
Radiated Field Strength of Fundamental	15.249 (a)	6.1	Compliant	
Radiated Field Strength of Harmonics	15.249 (a)	6.2	Compliant	
Occupied Bandwidth		6.3	Compliant	
99% Bandwidth		6.4	Compliant	
Band Edge Measurements		6.5	Compliant	
Spurious Radiated Emissions	15.249 (d), 15.209	6.6/6.7	Compliant	
Determination of Average Factor		6.8	Compliant	
Conducted Emissions	15.207	6.9/6.10	Compliant	

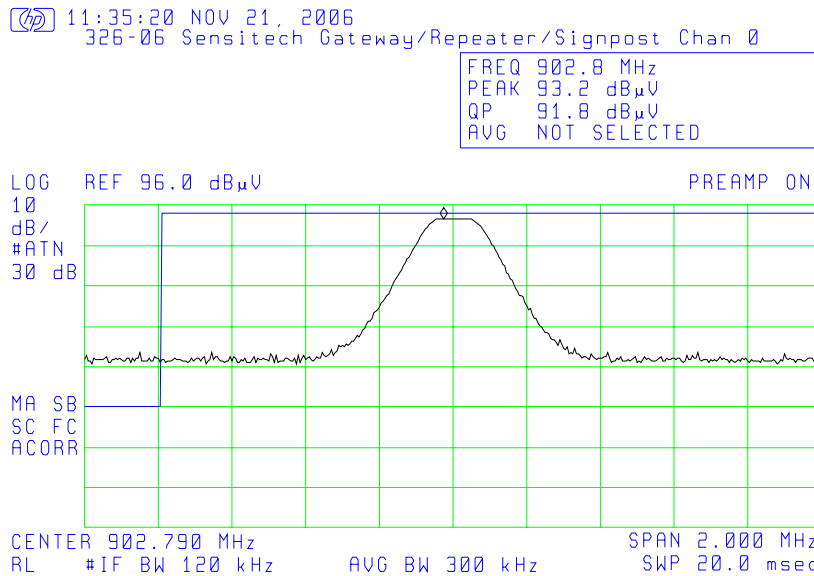
6. Measurement Data

6.1. Radiated Field Strength of Fundamental (15.249, Section (a))

Requirement: The 3 meter field strength of the fundamental emissions from intentional radiators operated within the 902-928 MHz frequency bands shall comply with the following requirement: 50 millivolts/meter (94 dB μ V/m), quasi-peak mode measurement.

6.1.1. Radiated Field Strength of Fundamental – Low Frequency

Frequency (MHz)	Amplitude (dB μ V/m)		Q-Peak Limit	Margin (dB)	Ant Pol	Ant Ht	TT Pos	Result
	Peak	Q-Peak						
902.80	93.2	91.8	94.0	-2.2	V	137	340	Passed



6. Measurement Data (continued)

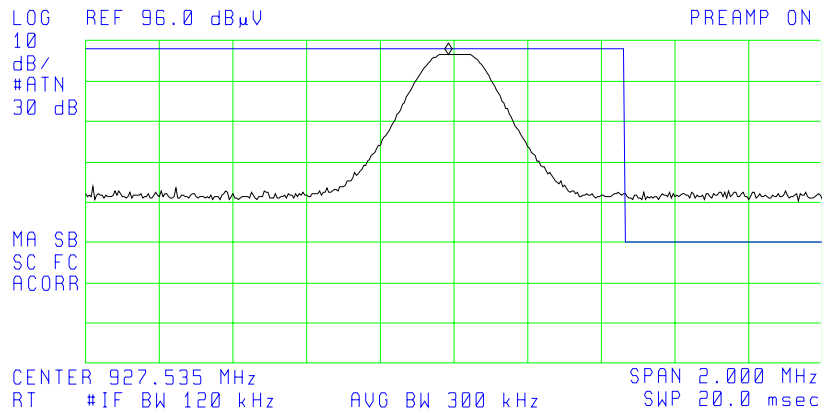
6.1. Radiated Field Strength of Fundamental (15.249, Section (a)) (continued)

6.1.2. Radiated Field Strength of Fundamental – High Frequency

Frequency (MHz)	Amplitude (dB μ V/m)		Q-Peak Limit	Margin (dB)	Ant Pol	Ant Ht	TT Pos	Result
	Peak	Q-Peak			H/V	cm	Deg	
927.54	92.8	91.6	94.0	-2.4	V	120	86	Passed

12:36:34 NOV 21, 2006
326-06 Sensitech Gateway/Repeater/Signpost Chan 3

FREQ 927.5 MHz
PEAK 92.8 dB μ V
QP 91.6 dB μ V
AVG NOT SELECTED



6. Measurement Data (continued)

6.2. Radiated Field Strength of Harmonics (15.249, Section (a))

Requirement: The 3 meter field strength of the harmonic emissions from intentional radiators operated within the 902-928 MHz frequency bands shall comply with the following: 500 microvolts/meter (54 dB μ V/m), average mode measurement. Peak field strength may not be greater than 20 dB above the average limit (74 dB μ V/m).

6.2.1. Low Channel (902.80 MHz)

Frequency (MHz)	Amplitude (dB μ V)		Corr. Fact. (dB)	Amplitude (dB μ V/m)		Average Limit	Margin (dB)	Ant Pol	Ant Ht	TT Pos	Result
	Peak	Avg		Peak	Avg			H/V	cm	Deg	
1805.600	52.53	32.53	-5.26	47.27	27.27	54.00	-26.73	H	102	30	Passed
2708.400 ¹	46.35	26.35	-2.07	44.28	24.28	54.00	-29.72	H	123	25	Passed
3611.200 ¹	44.66	24.66	1.78	46.44	26.44	54.00	-27.56	V	123	350	Passed
4514.000 ¹	43.03	23.03	2.47	45.50	25.50	54.00	-28.50	Noise Floor			Passed
5416.800 ¹	43.43	23.43	5.70	49.13	29.13	54.00	-24.87	Noise Floor			Passed
6319.600	43.03	23.03	8.10	51.13	31.13	54.00	-22.87	Noise Floor			Passed
7222.400	43.60	23.60	4.24	47.84	27.84	54.00	-26.16	Noise Floor			Passed
8125.200 ¹	42.92	22.92	5.68	48.60	28.60	54.00	-25.40	Noise Floor			Passed
9028.000 ¹	42.71	22.71	6.27	48.98	28.98	54.00	-25.02	Noise Floor			Passed

¹ Frequency falls within the Restricted Bands of Operation. See FCC Part 15, Section 15.205 for additional information.

6.2.2. High Channel (927.54 MHz)

Frequency (MHz)	Amplitude (dB μ V)		Corr. Fact. (dB)	Amplitude (dB μ V/m)		Average Limit	Margin (dB)	Ant Pol	Ant Ht	TT Pos	Result
	Peak	Avg		Peak	Avg			H/V	cm	Deg	
1855.080	57.88	37.88	-5.78	52.10	32.10	54.00	-21.90	H	100	40	Passed
2782.620 ¹	46.58	26.58	-3.05	43.53	23.53	54.00	-30.47	H	116	30	Passed
3710.160 ¹	45.71	25.71	-1.20	44.51	24.51	54.00	-29.49	V	111	185	Passed
4637.700 ¹	43.55	23.55	0.64	44.19	24.19	54.00	-29.81	Noise Floor			Passed
5565.240	43.08	23.08	2.83	45.91	25.91	54.00	-28.09	Noise Floor			Passed
6492.780	43.00	23.00	3.40	46.40	26.40	54.00	-27.60	Noise Floor			Passed
7420.320 ¹	43.91	23.91	4.90	48.81	28.81	54.00	-25.19	Noise Floor			Passed
8347.860 ¹	43.63	23.63	7.78	51.41	31.41	54.00	-22.59	Noise Floor			Passed
9275.400	43.45	23.45	7.67	51.12	31.12	54.00	-22.88	Noise Floor			Passed

¹ Frequency falls within the Restricted Bands of Operation. See FCC Part 15, Section 15.205 for additional information.

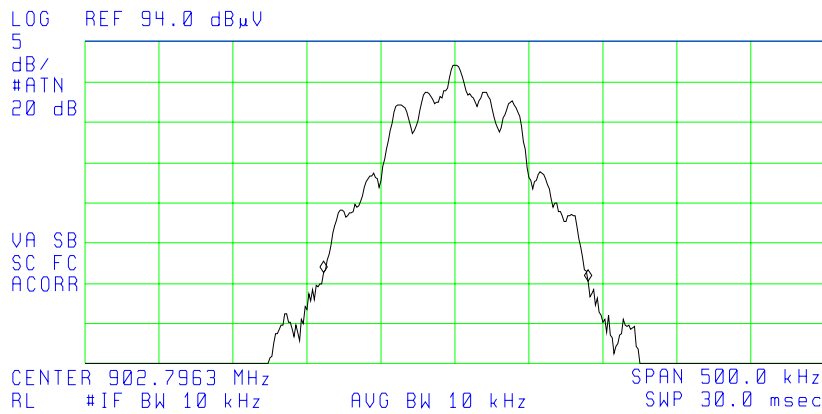
6. Measurement Data (continued)

6.3 Occupied Bandwidth

Requirement: The occupied bandwidth measurements on an intentional radiator shall be made in accordance with the requirements outlined in ANSI C63.4-2003, Section 13.1.7.

6.3.1. Occupied Bandwidth, Low Channel
-26 dB Bandwidth = 178.8 kHz

11:45:22 NOV 21, 2006
326-06 Sensitech Gateway/Repeater/Signpost Chan 0
ACTV DET: PEAK
MEAS DET: PEAK QP
MKRΔ 178.8 kHz
-1.11 dB

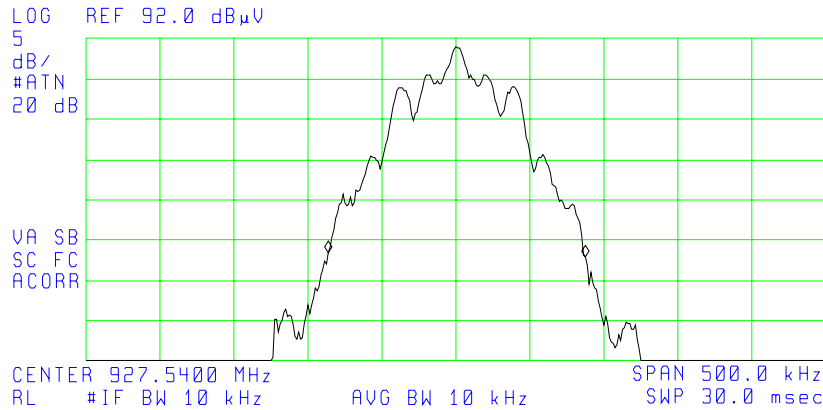


6. Measurement Data (continued)

6.3. Occupied Bandwidth (continued)

6.3.2. Occupied Bandwidth, High Channel
-26 dB Bandwidth = 173.8 kHz

12:48:55 NOV 21, 2006
326-06 Sensitech Gateway/Repeater/Signpost Chan 3
ACTV DET: PEAK
MEAS DET: PEAK QP
MKRΔ 173.8 kHz
-.65 dB

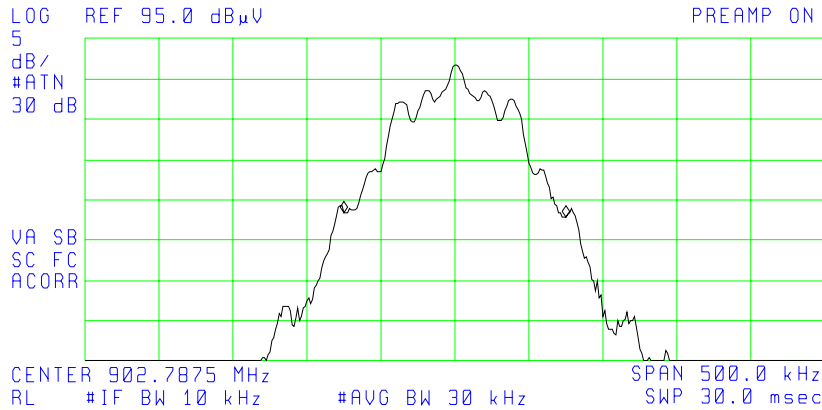


6. Measurement Data (continued)

6.4. 99% Bandwidth

6.4.1. 99% Bandwidth, Low Channel
99% Bandwidth = 150 kHz

16:38:28 NOV 22, 2006
326-06 Sensitech Gateway/Repeater/Signpost Chan 0
ACTV DET: PEAK
MEAS DET: PEAK QP
MKRΔ 150.0 kHz
-.53 dB

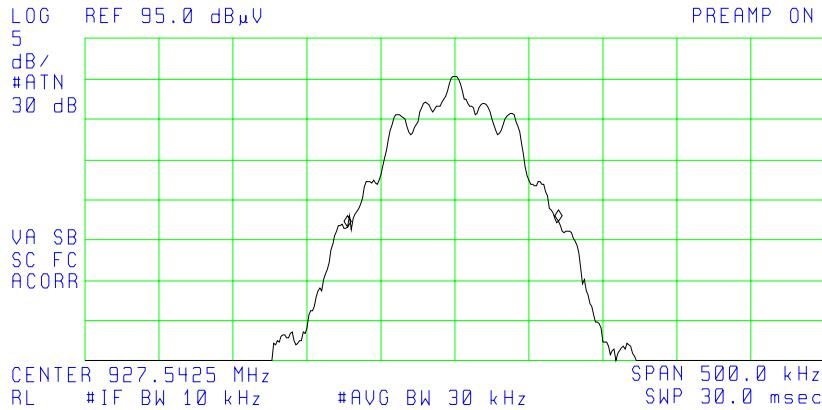


6. Measurement Data (continued)

6.4. 99% Bandwidth (continued)

6.4.2. 99% Bandwidth, High Channel
99% Bandwidth = 142.5 kHz

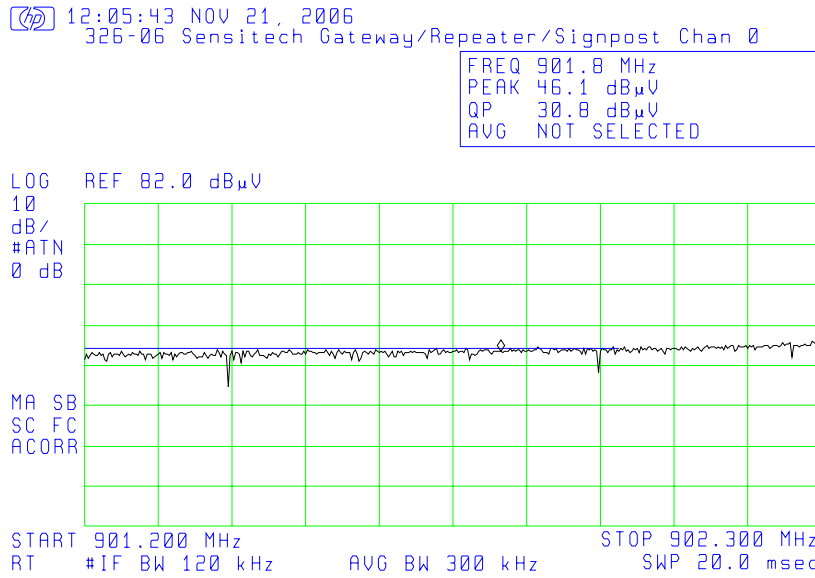
16:31:10 NOV 22, 2006
326-06 Sensitech Gateway/Repeater/Signpost Chan 3
ACTV DET: PEAK
MEAS DET: PEAK QP
MKRΔ 142.5 kHz
.64 dB



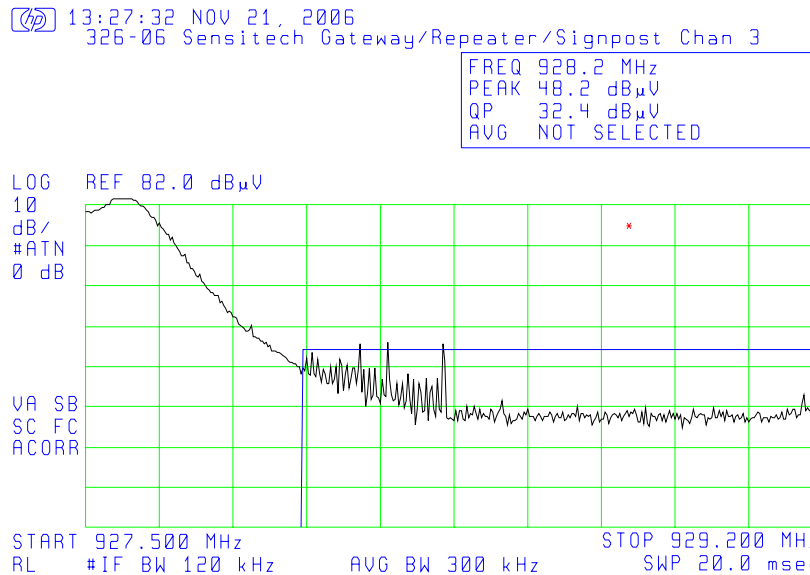
6. Measurement Data (continued)

6.5. Band Edge Measurements

6.5.1. Measurement Results – Lower Band Edge



6.5.2. Measurement Results – Upper Band Edge



6. Measurement Data (continued)

6.6. Spurious Radiated Emissions, 30 MHz to 1 GHz (15.249, Section (d))

Requirement: Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

6.6.1. Spurious Radiated Emissions, 30 MHz to 1 GHz Test Setup

6.5.1.1. Regulatory Limit: FCC Part 209, Quasi-Peak

Frequency Range (MHz)	Distance (Meters)	Limit (dBµV/m)
30 to 88	3	40.0
88 to 216	3	43.5
216 to 960	3	46.0
960 to 1000	3	54.0

6.6.1.2. Measurement Equipment Used to Perform Test

Device	Manufacturer	Model No.	Serial No.	Cal Due
EMI Receiver	Hewlett Packard	8546A	3650A00360	1/5/2007
Biconilog Antenna	Com-Power	AC220	25509	7/31/2007

6.6.1.3. Measurement & Equipment Setup

Test Date:	11/20/2006
Test Engineer:	Robert McCall
Site Temperature (°C):	21.0
Relative Humidity (%RH):	36
Frequency Range:	30 MHz to 1 GHz
EMI Receiver IF Bandwidth :	120 kHz
EMI Receiver Avg Bandwidth:	300 kHz
Detector Functions:	Peak and Quasi-Peak
Frequency Range:	1 GHz to 10 th Harmonic
EMI Receiver IF Bandwidth :	1 MHz
EMI Receiver Avg Bandwidth:	3 MHz
Detector Functions:	Peak and Average
Antenna Height:	1 to 4 meters
Measurement Distance:	3 Meters

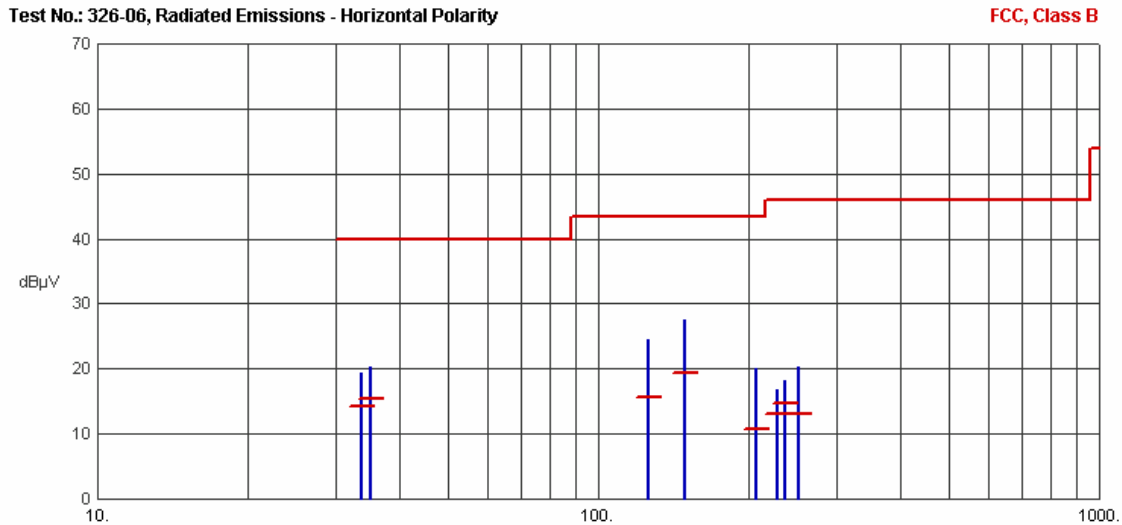
6.6.1.4. Test Procedure

Test measurements were made in accordance with ANSI C63.4-2003, Standard Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronics Equipment in the Range of 9 kHz to 40 GHz.

6. Measurement Data (continued)

6.6. Spurious Radiated Emissions (30 MHz to 1 GHz) Test Results (continued)

6.6.2. Horizontal Polarity



Frequency (MHz)	Pk Amp (dBµV/m)	QP Amp (dBµV/m)	QP Limit (dBµV/m)	Margin (dB)	Ant Ht (cm)	Table (Deg)	Comments
33.7850	19.33	14.31	40.00	-25.69	N/A	N/A	
35.1932	20.36	15.41	40.00	-24.59	N/A	N/A	
125.6773	24.61	15.53	43.50	-27.97	N/A	N/A	
148.7988	27.52	19.44	43.50	-24.06	N/A	N/A	
206.4287	20.16	10.83	43.50	-32.67	N/A	N/A	
228.5567	16.88	13.06	46.00	-32.94	N/A	N/A	
235.9178	18.16	14.74	46.00	-31.26	N/A	N/A	
250.6820	20.36	13.18	46.00	-32.82	N/A	N/A	

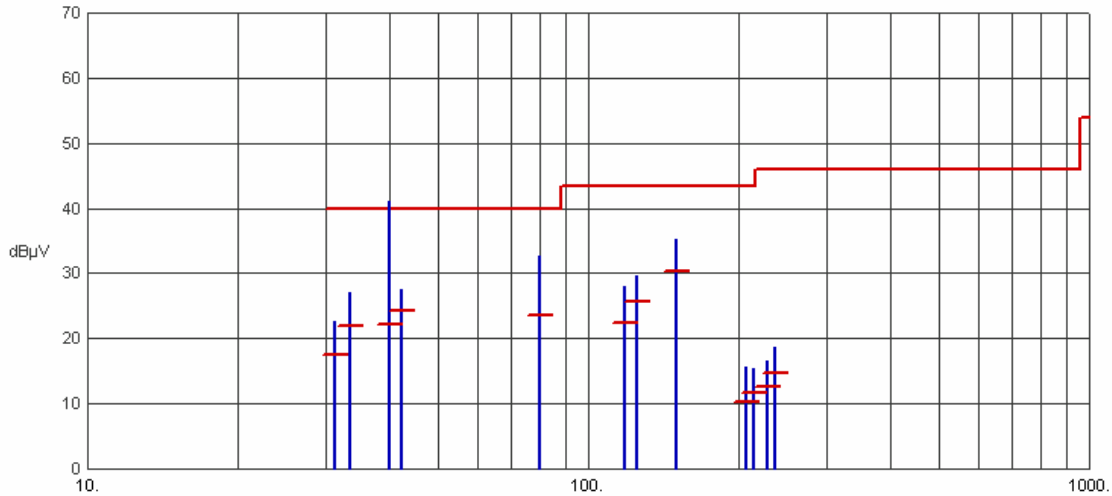
6. Measurement Data (continued)

6.6. Spurious Radiated Emissions (30 MHz to 1 GHz) Test Results (continued)

6.6.3. Vertical Polarity

Test No.: 326-06, Radiated Emissions - Vertical Polarity

FCC, Class B



Frequency (MHz)	Pk Amp (dBµV/m)	QP Amp (dBµV/m)	QP Limit (dBµV/m)	Margin (dB)	Ant Ht (cm)	Table (Deg)	Comments
31.1879	22.57	17.52	40.00	-22.48	N/A	N/A	
33.4965	27.01	22.02	40.00	-17.98	N/A	N/A	
40.0025	41.01	22.17	40.00	-17.83	N/A	N/A	
42.4595	27.57	24.35	40.00	-15.65	N/A	N/A	
80.0036	32.67	23.50	40.00	-16.50	N/A	N/A	
118.5314	27.92	22.33	43.50	-21.17	N/A	N/A	
125.4306	29.72	25.59	43.50	-17.91	N/A	N/A	
150.0149	35.32	30.43	43.50	-13.07	N/A	N/A	
206.4349	15.61	10.18	43.50	-33.32	N/A	N/A	
213.8024	15.29	11.73	43.50	-31.77	N/A	N/A	
228.5623	16.56	12.65	46.00	-33.35	N/A	N/A	
235.9160	18.73	14.72	46.00	-31.28	N/A	N/A	

6.7. Spurious Radiated Emissions (1 – 9.275 GHz) Test Results

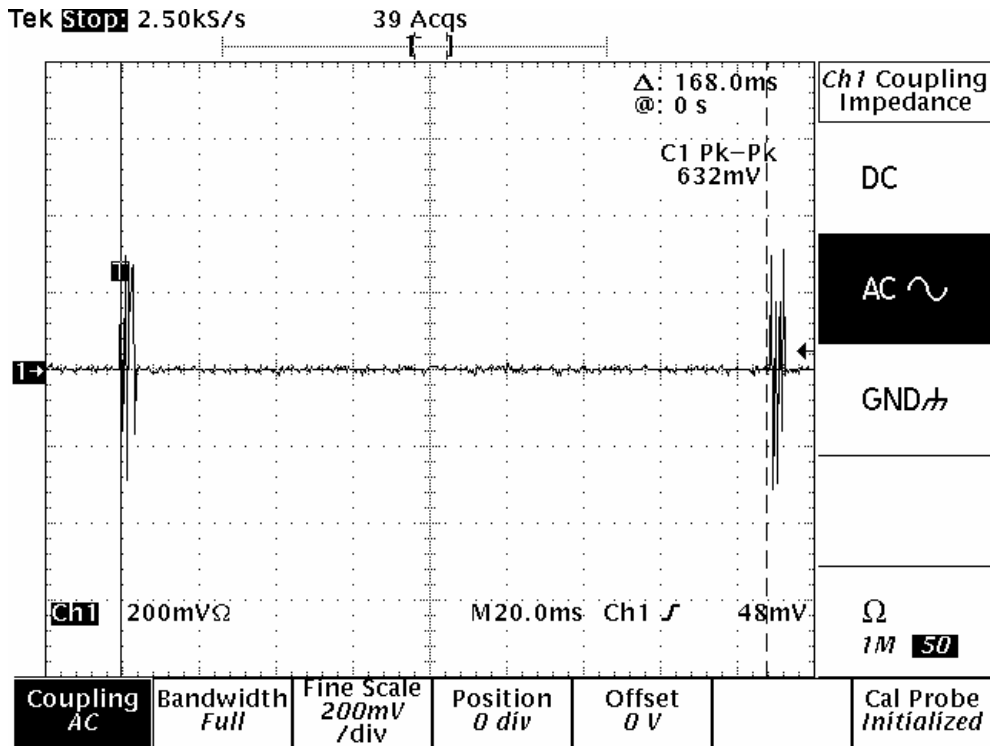
There were no spurious emissions above 1 GHz other than the harmonics previously reported.

6. Measurement Data (continued)

6.8. Determination of Average Factor

Total Duration of 1 cycle: 168 ms
 Maximum Duration of 1 cycle 100 ms
 Total On-Time in 1 cycle: 3.83 ms
 On-Time divided by cycle: 3.83 ms / 100 ms = 0.0383
 Average Factor: $20 \cdot \log(0.0383) = -28.3\text{dB}$
 FCC and IC maximum allowed average factor is -20dB .

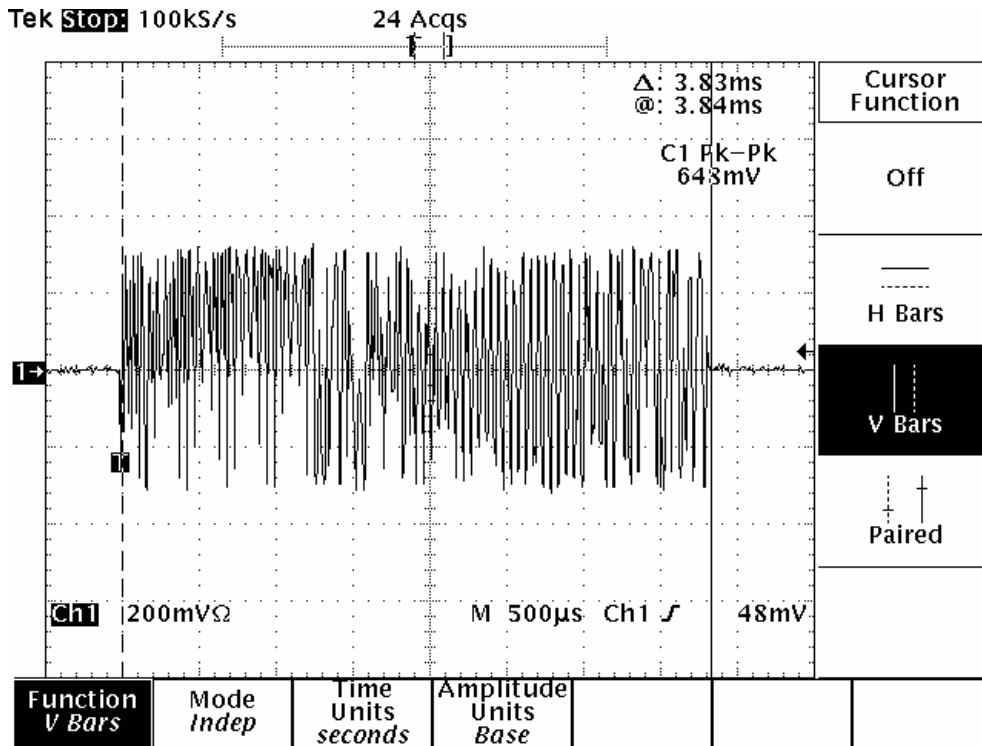
6.8.1. Plot showing total duration of pulse train



6. Measurement Data (continued)

6.8. Determination of Average Factor (continued)

6.8.2. Plot showing individual pulse:



6. Measurement Data (continued)

6.9. Conducted Emissions Test Setup

6.9.1. Regulatory Limit: 15.207

Frequency Range (MHz)	Limits (dBµV)	
	Quasi-Peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5.0	56	46
5.0 to 30.0	60	50

* Decreases with the logarithm of the frequency.

6.9.2. Measurement Equipment Used to Perform Test

Device	Manufacturer	Model No.	Serial No.	Cal Due
EMI Receiver	Hewlett Packard	8546A	3650A00360	1/5/2007
LISN	EMCO	EM3825/2	9109-1860	1/11/2007

6.9.3. Measurement & Equipment Setup

Test Date:	11/20/2006
Test Engineer:	Robert McCall
Site Temperature (°C):	21.3
Relative Humidity (%RH):	33
Frequency Range:	0.15 MHz to 30 MHz
EMI Receiver IF Bandwidth:	9 kHz
EMI Receiver Avg Bandwidth:	30 kHz
Detector Functions:	Peak, Quasi-Peak. & Average

6.9.4. Test Procedure

Test measurements were made in accordance with ANSI C63.4-2003, Standard Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronics Equipment in the Range of 9 kHz to 40 GHz.

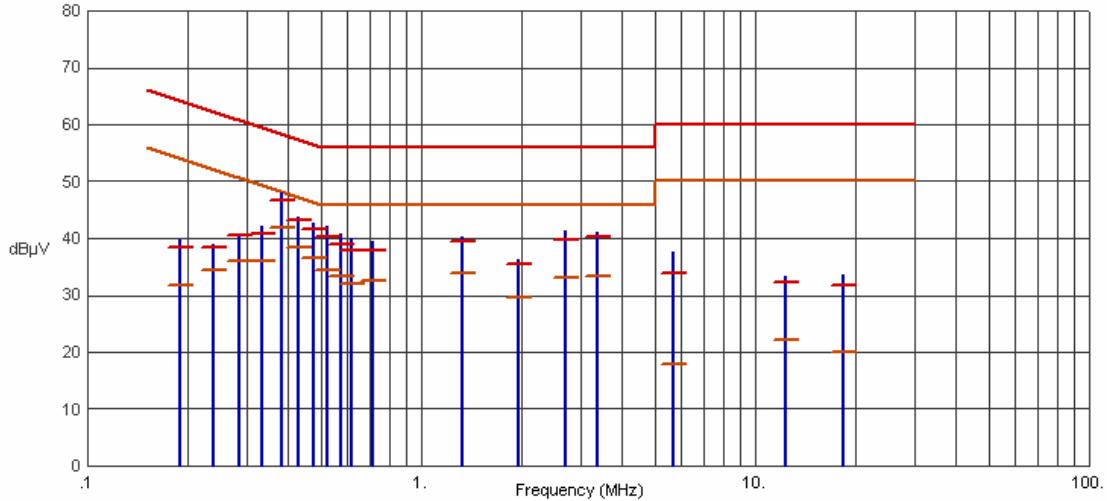
6. Measurement Data (continued)

6.10. Conducted Emissions Test Results

6.10.1. 120 Volts, 60 Hz Phase

Test No.: 326-06, 120 Volts, 60 Hz Phase

FCC, Class B



Frequency (MHz)	Pk Amp (dBµV)	QP Amp (dBµV)	QP Limit (dBµV)	QP Margin (dB)	Avg Amp (dBµV)	Avg Limit (dBµV)	Avg Margin (dB)	Comments
.1900	39.70	38.48	64.04	-25.56	31.83	54.04	-22.21	
.2378	38.92	38.43	62.17	-23.74	34.29	52.17	-17.88	
.2853	40.93	40.43	60.66	-20.23	35.95	50.66	-14.71	
.3335	42.17	40.91	59.36	-18.45	36.05	49.36	-13.31	
.3812	48.08	46.63	58.25	-11.62	41.86	48.25	-6.39	
.4282	43.65	43.17	57.29	-14.12	38.41	47.29	-8.88	
.4766	42.79	41.73	56.40	-14.67	36.63	46.40	-9.77	
.5221	42.19	40.23	56.00	-15.77	34.49	46.00	-11.51	
.5713	40.82	38.95	56.00	-17.05	33.46	46.00	-12.54	
.6168	40.02	37.75	56.00	-18.25	32.01	46.00	-13.99	
.7136	39.47	37.98	56.00	-18.02	32.61	46.00	-13.39	
1.3332	40.27	39.60	56.00	-16.40	33.79	46.00	-12.21	
1.9514	36.23	35.56	56.00	-20.44	29.73	46.00	-16.27	
2.7117	41.45	39.66	56.00	-16.34	33.17	46.00	-12.83	
3.3805	41.18	40.36	56.00	-15.64	33.35	46.00	-12.65	
5.7029	37.48	33.88	60.00	-26.12	17.79	50.00	-32.21	
12.3777	33.35	32.29	60.00	-27.71	22.15	50.00	-27.85	
18.3296	33.57	31.69	60.00	-28.31	20.06	50.00	-29.94	

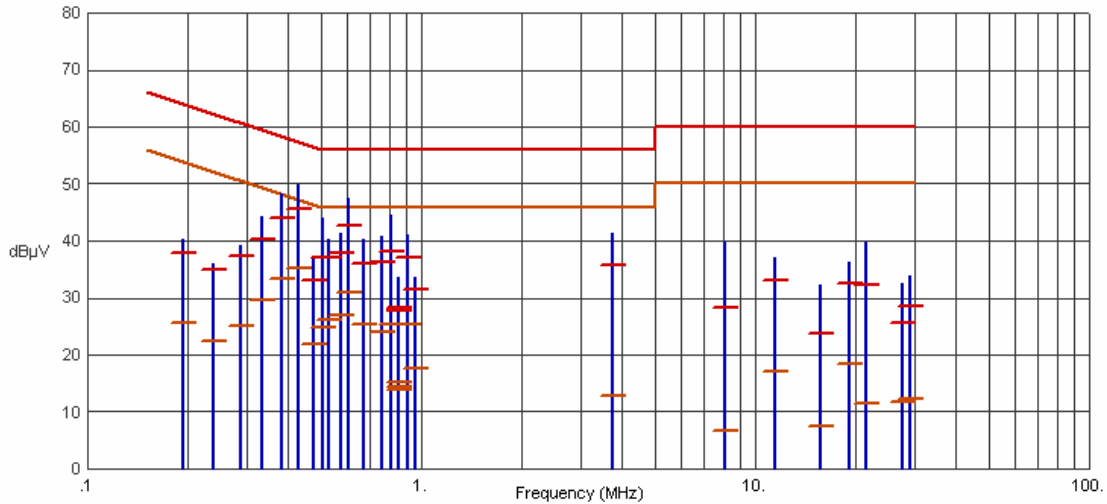
6. Measurement Data (continued)

6.10. Conducted Emissions Test Results (continued)

6.10.2. 120 Volts, 60 Hz Neutral

Test No.: 236-06, 120 Volts, 60 Hz Neutral

FCC, Class B



Frequency (MHz)	Pk Amp (dBµV)	QP Amp (dBµV)	QP Limit (dBµV)	QP Margin (dB)	Avg Amp (dBµV)	Avg Limit (dBµV)	Avg Margin (dB)	Comments
.1900	37.57	36.07	64.04	-27.97	25.12	54.04	-28.92	
.2371	36.39	35.41	62.20	-26.79	26.41	52.20	-25.79	
.2842	36.20	35.28	60.69	-25.41	27.07	50.69	-23.62	
.3302	34.59	33.57	59.45	-25.88	24.44	49.45	-25.01	
.3779	42.28	40.63	58.33	-17.70	31.95	48.33	-16.38	
.4263	36.50	35.58	57.32	-21.74	29.46	47.32	-17.86	
.4735	33.96	32.82	56.45	-23.63	27.68	46.45	-18.77	
.5225	32.88	32.41	56.00	-23.59	29.19	46.00	-16.81	
.5696	33.23	32.61	56.00	-23.39	29.59	46.00	-16.41	
.7123	34.58	33.82	56.00	-22.18	30.96	46.00	-15.04	
.8068	35.19	33.90	56.00	-22.10	31.84	46.00	-14.16	
.9987	35.74	35.28	56.00	-20.72	34.18	46.00	-11.82	
1.0933	35.92	35.39	56.00	-20.61	34.46	46.00	-11.54	
1.2845	35.80	35.36	56.00	-20.64	33.20	46.00	-12.80	
1.5666	33.27	31.51	56.00	-24.49	28.37	46.00	-17.63	
3.2350	36.14	35.38	56.00	-20.62	31.44	46.00	-14.56	
5.4172	34.96	32.34	60.00	-27.66	25.36	50.00	-24.64	
7.5510	33.67	30.48	60.00	-29.52	15.05	50.00	-34.95	
11.9404	33.26	32.36	60.00	-27.64	26.13	50.00	-23.87	
16.2213	32.00	30.85	60.00	-29.15	24.00	50.00	-26.00	
22.7628	30.27	26.64	60.00	-33.36	7.61	50.00	-42.39	

7. Test Site Description

Compliance Worldwide is located at 357 Main Street in Sandown, New Hampshire. The test sites at Compliance Worldwide are used for conducted and radiated emissions testing in accordance with Federal Communications Commission (FCC) and Industry Canada standards. A description of the test sites is on file with the FCC (registration number **96392**) and Industry Canada (file number **IC 3023A-1**).

The radiated emissions test site is a 3 and 10 meter enclosed open area test site (OATS). Personnel, support equipment and test equipment are located in the basement beneath the OATS ground plane.

The conducted emissions site is part of a 16' x 20' x 12' ferrite tile chamber and uses one of the walls for the vertical ground plane required by EN 55022.

Both sites are designed to test products or systems 1.5 meter W x 1.5 meter L x 2.0 meter H, floor standing or table top.