

2.12 Power Line Conducted Emissions for Digital Device and Receiver FCC Section 15.107

The conducted voltage measurements have been carried out in accordance with FCC Section 15.107, with a spectrum analyzer connected to a LISN and the EUT placed into an idle condition or a continuous mode of receive. Similar results were seen as compared to the EUT in a transmit mode of operation.

Therefore, please refer to the results as shown in Table 7.

2.13 Power Line Conducted Emissions for Transmitter FCC Section 15.207

The conducted voltage measurements have been carried out in accordance with FCC Section 15.207, with a spectrum analyzer connected to a LISN and the EUT placed into a continuous mode of transmit. The results are given in Tables 7a-7c.

TABLE 7a. CONDUCTED EMISSIONS DATA

CLASS B

Test Date: July 24, 2006
 UST Project: 06-0159
 Customer: Cirronet Corporation
 Model: EM2420HP Zigbee Radio

Worse Case Mode of Operaton (TX – Low channel)

(Peak vs Average Limits)

Conducted Emissions								
Test By:	Test: Peak vs Average Conducted Emissions					Client: Cirronet Corporation		
AT	Project: 06-0159			Class: B		Model: EM2420HP Zigbee Radio		
Frequency	Test Data	AF	Test Data	AF+CA-AMP	Results	Limits	Margin	PK
(MHz)	(dBm)	Table	(dBuV)	(dB)	(dBuV)	(dBuV)	(dB)	/ QP
0.21	-63.8	LISNP	43.2	-0.1	43.1	53.4	10.3	PK
9.12	-69.3	LISNP	37.7	0.4	38.1	50.0	11.9	PK
9.225	-69.6	LISNP	37.4	0.4	37.8	50.0	12.2	PK
9.327	-69.9	LISNP	37.1	0.4	37.5	50.0	12.5	PK
9.02	-70.2	LISNP	36.8	0.4	37.2	50.0	12.8	PK
0.615	-70.2	LISNP	36.8	0.0	36.8	46.0	9.2	PK
0.205	-62.9	LISNN	44.1	-0.1	44.0	53.4	9.4	PK
0.31	-69.2	LISNN	37.8	-0.1	37.7	50.0	12.2	PK
0.413	-69.3	LISNN	37.7	0.0	37.7	47.6	9.9	PK
9.227	-69.2	LISNN	37.8	0.4	38.2	50.0	11.8	PK
9.127	-69.3	LISNN	37.7	0.4	38.1	50.0	11.9	PK
0.723	-70.8	LISNN	36.2	0.1	36.3	46.0	9.7	PK

SAMPLE CALCULATIONS: $43.2 + -0.1 = 43.1$ dBuV

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TABLE 7b. CONDUCTED EMISSIONS DATA**CLASS B**

Test Date: July 26, 2006
 UST Project: 06-0159
 Customer: Cirronet Corporation
 Model: EM2420HP Zigbee Radio

Worse Case Mode of Operation (TX – Mid channel)

(Peak vs Average Limits)

Conducted Emissions								
Test By:	Test: Peak vs Average Conducted Emissions – Mid Channel					Client: Cirronet Corporation		
AT	Project: 06-0159			Class: B		Model: EM2420HP Zigbee Radio		
Frequency	Test Data	AF	Test Data	AF+CA-AMP	Results	Limits	Margin	Average
(MHz)	(dBm)	Table	(dBuV)	(dB)	(dBuV)	(dBuV)	(dB)	
0.21	-63.1	LISNP	43.9	-0.1	43.8	53.1	9.3	PK
0.318	-69.7	LISNP	37.3	0.0	37.3	49.8	12.5	PK
11.98	-73.2	LISNP	33.8	0.5	34.3	50.0	15.7	PK
11.76	-73.4	LISNP	33.6	0.5	34.1	50.0	15.9	PK
12.83	-73.5	LISNP	33.5	0.6	34.1	50.0	15.9	PK
0.425	-71.7	LISNP	35.3	0.0	35.3	47.4	12.0	PK
0.213	-64.0	LISNN	43.0	-0.1	42.9	53.1	10.2	PK
0.32	-75.4	LISNN	31.6	0.0	31.6	49.7	18.1	PK
0.64	-75.6	LISNN	31.4	0.0	31.4	46.0	14.6	PK
27.47	-70.8	LISNN	36.2	0.8	37.0	50.0	13.0	PK
27.26	-71.2	LISNN	35.8	0.8	36.6	50.0	13.4	PK
27.55	-71.5	LISNN	35.5	0.8	36.3	50.0	13.7	PK

SAMPLE CALCULATIONS: $37.30 + 0.0 = 37.3$ dBuV

Tester

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TABLE 7c. CONDUCTED EMISSIONS DATA**CLASS B**

Test Date: July 26, 2006
UST Project: 06-0159
Customer: Cirronet Corporation
Model: EM2420HP Zigbee Radio

Worse Case Mode of Operation (TX – High channel)

(Peak vs Average Limits)

Conducted Emissions								
Test By:	Test: Peak vs Average Conducted Emissions – High Channel					Client: Cirronet Corporation		
AT	Project: 06-0159			Class: B		Model: EM2420HP Zigbee Radio		
Frequency	Test Data	AF	Test Data	AF+CA-AMP	Results	Limits	Margin	Average
(MHz)	(dBm)	Table	(dBuV)	(dB)	(dBuV)	(dBuV)	(dB)	
11.13	-74.0	LISNP	33.0	0.5	33.5	50.0	16.5	PK
0.213	-63.2	LISNP	43.8	-0.1	43.7	53.1	9.4	PK
0.18	-65.2	LISNP	41.8	-0.1	41.7	54.5	12.8	PK
0.273	-69.3	LISNP	37.7	-0.1	37.6	51.0	13.4	PK
27.36	-71.7	LISNP	35.3	0.7	36.0	50.0	14.0	PK
0.321	-70.0	LISNP	37.0	0.0	37.0	49.7	12.7	
								PK
27.78	-71.4	LISNN	35.6	0.8	36.4	50.0	13.6	PK
27.66	-71.5	LISNN	35.5	0.8	36.3	50.0	13.7	PK
27.89	-71.5	LISNN	35.5	0.8	36.3	50.0	13.7	PK
27.26	-70.9	LISNN	36.1	0.8	36.9	50.0	13.1	PK
27.455	-71.6	LISNN	35.4	0.8	36.2	50.0	13.8	PK
27.548	-71.7	LISNN	35.3	0.8	36.1	50.0	13.9	PK

SAMPLE CALCULATIONS: $33.0 + 0.5 = 33.5$ dBuV

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2.14 Radiated Emissions for Digital Device & Receiver (47 CFR 15.109a)

Radiated emissions were evaluated from 30 to 14500 MHz while the EUT was placed into a Receive mode of operation. Measurements were made with the analyzer's bandwidth set to 120 kHz measurements made less than 1 GHz and 1 MHz for measurements made greater than or equal to 1 GHz. The results for less than 1 GHz are shown in Table 8a – 8c.

**TABLE 8a RADIATED EMISSIONS DATA
(Digital Device & Receiver)**

CLASS B

Test Date: July 25, 2006
 UST Project: 06-0159
 Customer: Cirronet Corporation
 Product: EM2420HP Zigbee Radio

Measurements 30 MHz – 1 GHz

Radiated Emissions									
Test By: AT		Test: FCC Part 15 Low Channel			Client: Cirronet Corporation				
Project: 06-0159			Class: B		Model: EM2420HP Zigbee Radio				
Frequency Range		Table	Model		S/N	Valid	Calibrated:		
		GBI3mV	BIA 25		S/N 2451	Yes	May 25, 2006		
Frequency	Test Data	AF	Test Data	AF+CA-AMP	Results	Limits	Distance/ Polarity	Margin	PK
(MHz)	(dBm)	Table	(dBuV)	(dB)	(uV/m)	(uV/m)		(dB)	/ QP
36.30	-88.0	GBI3mV	19.0	11.4	32.9	100.0	3m./VERT	9.6	PK

No other emissions were detected between 30 MHz and 1 GHz in either Vertical or Horizontal Polarity.

** Conversion from 1 meter to 3 meters = -9.54 dB

SAMPLE CALCULATION:

RESULTS (uV/m @ 3m) = Antilog ((-88.0 + 11.4 = 107)/20) = 32.9

CONVERSION FROM dBm TO dBuV = 107 dB

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**TABLE 8b RADIATED EMISSIONS DATA
(Digital Device & Receiver)**

CLASS B

Test Date: July 25, 2006
 UST Project: 06-0159
 Customer: Cirronet Corporation
 Product: EM2420HP Zigbee Radio

Measurements 30 MHz – 1 GHz

Radiated Emissions									
Test By: AT		Test: FCC Part 15 Mid Channel			Client: Cirronet Corporation				
Project: 06-0159			Class: B		Model: EM2420HP Zigbee Radio				
Frequency Range		Table	Model		S/N	Valid	Calibrated:		
		GBI3mV	BIA 25		S/N 2451	Yes	May 25, 2006		
Frequency	Test Data	AF	Test Data	AF+CA-AMP	Results	Limits	Distance/ Polarity	Margin	PK
(MHz)	(dBm)	Table	(dBuV)	(dB)	(uV/m)	(uV/m)		(dB)	/ QP
38.10	-88.0	GBI3mV	19.0	11.6	34.0	100.0	3m./VERT	9.4	PK

No other emissions were detected between 30 MHz and 1 GHz in either Vertical or Horizontal Polarity.

** Conversion from 1 meter to 3 meters = -9.54 dB

SAMPLE CALCULATION:

RESULTS (uV/m @ 3m) = Antilog ((-88.0 + 11.6 = 107)/20) = 34.0

CONVERSION FROM dBm TO dBuV = 107 dB

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**TABLE 8c RADIATED EMISSIONS DATA
(Digital Device & Receiver)**

CLASS B

Test Date: July 25, 2006
 UST Project: 06-0159
 Customer: Cirronet Corporation
 Product: EM2420HP Zigbee Radio

Measurements 30 MHz – 1 GHz

Radiated Emissions									
Test By: AT		Test: FCC Part 15 High Channel			Client: Cirronet Corporation				
Project: 06-0159			Class: B		Model: EM2420HP Zigbee Radio				
Frequency Range		Table	Model		S/N	Valid	Calibrated:		
		GBI3mV	BIA 25		S/N 2451	Yes	May 25, 2006		
Frequency	Test Data	AF	Test Data	AF+CA-AMP	Results	Limits	Distance/ Polarity	Margin	PK
(MHz)	(dBm)	Table	(dBuV)	(dB)	(uV/m)	(uV/m)		(dB)	/ QP
38.10	-90.0	GBI3mV	17.0	11.6	27.0	100.0	3m./VERT	11.4	PK

No other emissions were detected between 30 MHz and 1 GHz in either Vertical or Horizontal Polarity.

** Conversion from 1 meter to 3 meters = -9.54 dB

SAMPLE CALCULATION:

RESULTS (uV/m @ 3m) = Antilog ((-90.0 + 11.6 = 107)/20) = 27.0

CONVERSION FROM dBm TO dBuV = 107 dB

Tester

Signature: _____



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