PCTEST Engineering Laboratory, Inc.

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CERTIFICATE OF COMPLIANCE

Matsushita Electric Industrial Co., Ltd.
1006 Oaza Kadoma, Kadoma, Osaka
571 JAPAN
Attn: K. Nawata (KMECL)
Rich Mullen (PSCD, MECA)

Dates of Tests: November 18-19, 2002
Test Report S/N: 15.230115015-R1.ACJ
Test Site: PCTEST Lab, Columbia MD

FCC ID	**ACJ96NKX-TG5110**
APPLICANT	**Matsushita Electric Industrial Co., Ltd.**

FCC Rule Part(s):	**§ 15.247; ANSI C-63.4 (1992)**
Classification:	**Part 15 Spread Spectrum Transmitter (DSS)**
Max Output Power:	**0.268W Conducted (Base)**
	0.170W Conducted (Hand Set)
Method/System:	**Frequency Hopping Spread Spectrum (FHSS)**
Equipment Type:	**5.8 GHz FHSS Cordless Phone**
Frequency Range:	**5759.703 – 5838.187 MHz (FHSS)**
Model No(s).:	**KX-TG5110**
Test Device Serial No.:	**Identical Prototype [S/N: #2]**

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C-63-4.

I attest to the accuracy of data. All measurements reported herein 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.

Power output is conducted. This transmitter has been tested for SAR compliance for head and body-worn configurations. SAR compliance for body-worn operating configurations is limited to the specific belt-clip tested for this filing. Users must be informed of the operating requirements for satisfying body-worn RF exposure compliance. The highest reported SAR value is Head: 0.35 W/kg; Body: 0.79 W/kg at 25 % duty factor.

PCTEST certifies that no party to this application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862.

Randy Ortanez
President

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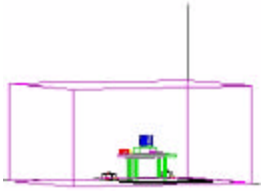
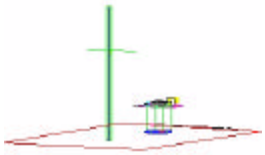
MEASUREMENT REPORT



Scope - Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission.



§2983(a) General Information

Applicant Name:	**Matsushita Electric Industrial Co., Ltd.**
Address:	**1006 Oaza Kadoma**
	Kadoma, Osaka 571 JAPAN
Attention:	**Rich Mullen (PSCD)**

- FCC ID: **ACJ96NKX-TG5110**
- Class: Spread Spectrum Transceiver (DSS)
- Type: 5.8 GHz FHSS Cordless Phone
- Freq. Range: 5759.703 – 5838.187 MHz (FHSS)
- Method/System: TDMA
- Model No(s): **KX-TG5110**
- Max. RF Output Power: 0.268W Conducted (Base)
  0.170W Conducted (Hand Set)
- Rule Part(s): § 15.247
- Dates of Tests: November 18-19, 2002
- Place of Tests: PCTEST Lab, Columbia, MD U.S.A.
- Test Report S/N: 230115015-R1.ACJ

NOTE: The receiver portion was tested and complies with Part 15B under the verification procedure.

INTRODUCTION

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C63.4-1992) and FCC Public Notice dated July 12, 1995 entitled "Guidance on Measurement for Direct Sequence Spread Spectrum Systems" were used in the measurement of **Panasonic Spread Spectrum 5.8 GHz FHSS Cordless Phone.**

These measurement tests were conducted at ***PCTEST Engineering Laboratory, Inc.*** facility in New Concept Business Park, Guilford Industrial Park, Columbia, Maryland. The site address is 6660-B Dobbin Road, Columbia, MD 21045. The test site is one of the highest points in the Columbia area with an elevation of 390 feet above mean sea level. The site coordinates are 39° 11'15" N latitude and 76° 49'38" W longitude. The facility is 1.5 miles North of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. There are no FM or TV transmitters within 15 miles of the site. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4 on October 19, 1992.

PCTEST Location

The map at right shows the location of the PCTEST Lab, its proximity to the FCC Lab, the Columbia vicinity area, the Baltimore-Washington International (BWI) airport, and the city of Baltimore, and the Washington, D.C. area. (see Figure1).

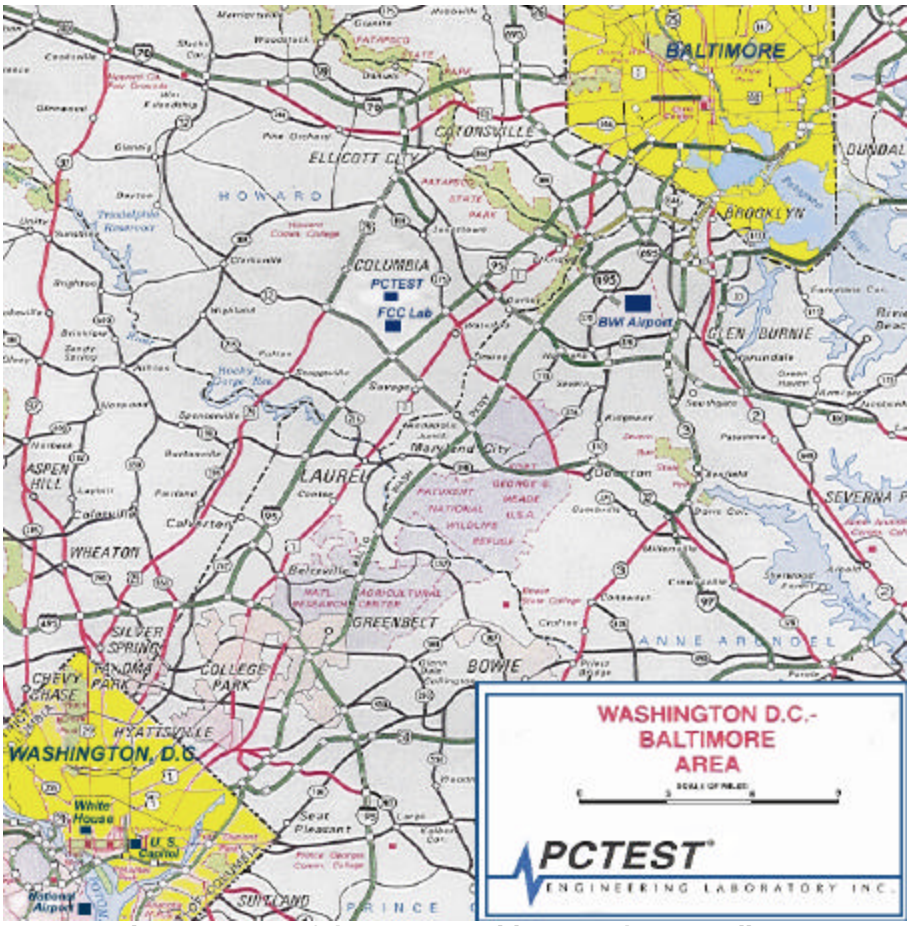


Figure 1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area.

PRODUCT INFORMATION

Channel table : Baseset

ch	Intermediate frequency (MHz)	CenterFrequency (MHz)	ch	Intermediate frequency (MHz)	CenterFrequency (MHz)	ch	Intermediate frequency (MHz)	CenterFrequency (MHz)
0	2400.02477	5759.702703	30	2426.78090	5786.458832	60	2453.53703	5813.214961
1	2400.91665	5760.594574	31	2427.67277	5787.350703	61	2454.42890	5814.106832
2	2401.80852	5761.486445	32	2428.56465	5788.242574	62	2455.32077	5814.998703
3	2402.70039	5762.378316	33	2429.45652	5789.134445	63	2456.21265	5815.890574
4	2403.59226	5763.270187	34	2430.34839	5790.026316	64	2457.10452	5816.782445
5	2404.48413	5764.162058	35	2431.24026	5790.918187	65	2457.99639	5817.674316
6	2405.37600	5765.053929	36	2432.13213	5791.810058	66	2458.88826	5818.566187
7	2406.26787	5765.945800	37	2433.02400	5792.701929	67	2459.78013	5819.458058
8	2407.15974	5766.837671	38	2433.91587	5793.593800	68	2460.67200	5820.349929
9	2408.05161	5767.729542	39	2434.80774	5794.485671	69	2461.56387	5821.241800
10	2408.94348	5768.621413	40	2435.69961	5795.377542	70	2462.45574	5822.133671
11	2409.83535	5769.513284	41	2436.59148	5796.269413	71	2463.34761	5823.025542
12	2410.72723	5770.405155	42	2437.48335	5797.161284	72	2464.23948	5823.917413
13	2411.61910	5771.297026	43	2438.37523	5798.053155	73	2465.13135	5824.809284
14	2412.51097	5772.188897	44	2439.26710	5798.945026	74	2466.02323	5825.701155
15	2413.40284	5773.080768	45	2440.15897	5799.836897	75	2466.91510	5826.593026
16	2414.29471	5773.972639	46	2441.05084	5800.728768	76	2467.80697	5827.484897
17	2415.18658	5774.864510	47	2441.94271	5801.620639	77	2468.69884	5828.376768
18	2416.07845	5775.756380	48	2442.83458	5802.512510	78	2469.59071	5829.268639
19	2416.97032	5776.648251	49	2443.72645	5803.404381	79	2470.48258	5830.160510
20	2417.86219	5777.540122	50	2444.61832	5804.296252	80	2471.37445	5831.052381
21	2418.75406	5778.431993	51	2445.51019	5805.188123	81	2472.26632	5831.944252
22	2419.64594	5779.323864	52	2446.40206	5806.079993	82	2473.15819	5832.836123
23	2420.53781	5780.215735	53	2447.29394	5806.971864	83	2474.05006	5833.727994
24	2421.42968	5781.107606	54	2448.18581	5807.863735	84	2474.94194	5834.619865
25	2422.32155	5781.999477	55	2449.07768	5808.755606	85	2475.83381	5835.511735
26	2423.21342	5782.891348	56	2449.96955	5809.647477	86	2476.72568	5836.403606
27	2424.10529	5783.783219	57	2450.86142	5810.539348	87	2477.61755	5837.295477
28	2424.99716	5784.675090	58	2451.75329	5811.431219	88	2478.50942	5838.187348
29	2425.88903	5785.566961	59	2452.64516	5812.323090			

Transmitting Frequenc 5759.702703 - 5838.18734824 MHz (89ch)
Receiving Frequency : 5759.702703 - 5838.18734824 MHz (89ch)
Handset Local : 3355.218574MHz
Baseset Local : 3359.677929MHz
1st IF Frequency : 2400.02477-2478.50942MHz (Handset)
1st IF Frequency : 2404.48413-2482.96877 MHz(Baseset)
Channel Space : 891.87kHz
Other Clock Frequency :

PLL1 Reference clock : 13.824 MHz
PLL2 Reference clock : 129.6 MHz

PRODUCT INFORMATION (Continued)

Channel table : Handset

ch	Intermediate frequency (MHz)	CenterFrequency (MHz)	ch	Intermediate frequency (MHz)	CenterFrequency (MHz)	ch	Intermediate frequency (MHz)	CenterFrequency (MHz)
0	2404.48413	5759.702703	30	2431.24026	5786.458832	60	2457.99639	5813.214961
1	2405.37600	5760.594574	31	2432.13213	5787.350703	61	2458.88826	5814.106832
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26	2427.67277	5782.891348	56	2454.42890	5809.647477	86	2481.18503	5836.403606
27	2428.56465	5783.783219	57	2455.32077	5810.539348	87	2482.07690	5837.295477
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1st IF Frequency : 2404.48413-2482.96877 MHz(Baseset)
Channel Space : 891.87kHz
Other Clock Frequency :

PLL1 Reference clock : 13.824 MHz
PLL2 Reference clock : 129.6 MHz

Time Division Multiple Access (TDMA) Frame structure :

The basic, repeating, frame structure is 10msec long. It is sub-divided into 8 slots, each 1250usec long. The active transmission time is 937.5usec. The first 4 slots from the "up-link", when the Handsets transmit to the Baseset. The last 4 slots form the "down-link", when the Baseset transmits to the Handsets.

Description of Tests

Security Codes and FHSS Descriptions

Section 5.13: Digital Security Codes

This cordless telephone system has 1,099 billion digital security coding combinations that are provided by the following means:

- Provided with 40 bits (1,099 billion) for security codes
- When shipped from the factory, the security code is decided by the manufacturer. It is memorized in a memory IC.
- Base and Handset knows each other's security code information.
-

Section 6.2.2 (o)(a3)

Hopping channel carrier frequencies are separated by 891.87 kHz.

Each bearer is independent and hops at a rate of 100 hops/sec.

The hopping sequence is either table-generated or RNG-generated:

1. A table-generated hop sequence is 75 hops long, each channel is used exactly 40 times once in the sequence. Therefore, in a 30 second period each frequency channel is used exactly 40 times in that sequence.
2. An RNG-generated hop sequence is 3000 hops long; each channel is used exactly 40 times in the entire sequence. Therefore, in a 30 second period each frequency channel is used exactly 40 times in that sequence.

The hopping sequence contains 75 logical channels these are mapped-onto 75 physical channels using a mapping table.

The highest channel occupancy is when an FP has 4 traffic bearers (i.e. 8 slots utilized), each using the same hopping sequence. As shown previously, for a given sequence, in a 30 second period each frequency channel is used exactly 40 times. A slot is 937.5usec long, therefore the average time of occupancy on any frequency channel in a 30 second period is:

T = 937.5usec x 40 x 8 = 300.0 msec

As a comparison, the lowest channel occupancy is when only a single dummy bearer is being transmitted. The transmission is 236.1usec long, therefore the average time of occupancy on any frequency channel in a 30 second period is:

T = 236.1USEC X 40 X 1 = 9.444 msec

Description of Tests (Continued)

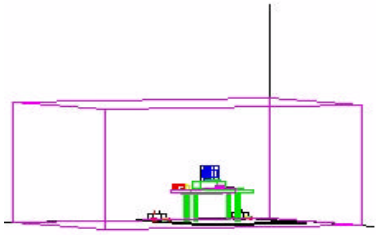
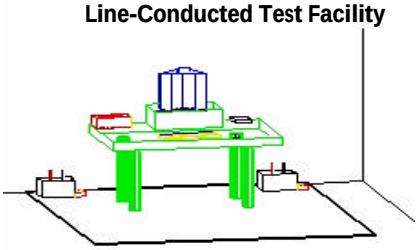


Figure 4. Shielded Enclosure Line-Conducted Test Facility



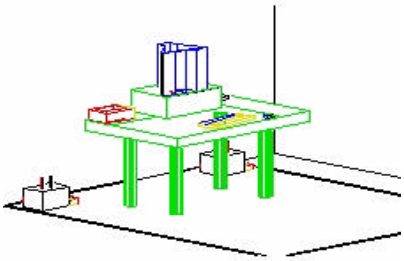


Figure 3. Wooden Table & Bonded LISNs

Conducted Emissions

The line-conducted facility is located inside a 16'x20'x10' shielded enclosure. It is manufactured by Ray Proof Series 81 (see Figure 2). The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 65-6. A 1m. x 1.5m. wooden table 80cm. high is placed 40cm. away from the vertical wall and 1.5m away from the side wall of the shielded room (see Figure 3). Solar Electronics and EMCO Model 3725/2 (10kHz-30MHz) 50Ω/50µH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room (see Figure 4). The EUT is powered from the Solar LISN and the support equipment is powered from the EMCO LISN. Power to the LISNs are filtered by a high-current high-insertion loss Ray Proof power line filters (100dB 14kHz-10GHz). The purpose of the filter is to attenuate ambient signal interference and this filter is also bonded to the shielded enclosure. All electrical cables are shielded by braided tinned copper zipper tubing with inner diameter of 1/2". If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply lines will be connected to the Solar LISN. LISN schematic diagram is shown in Figure 5. All interconnecting cables more than 1 meter were shortened by non-inductive bundling (serpentine fashion) to a 1-meter length. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer to determine the frequency producing the maximum EME from the EUT. The spectrum was scanned from 450kHz to 30MHz with 20 msec. sweep time. The frequency producing the maximum level was reexamined using EMI/ Field Intensity Meter and Quasi-Peak adapter. The detector function was set to CISPR quasi-peak mode. The bandwidth of the receiver was set to 10 kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission. Each emission was maximized by: switching power lines; varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and/or support equipment, and powering the monitor from the floor mounted outlet box and the computer aux AC outlet, if applicable; whichever determined the worst-case emission. Photographs of the worst-case emission can be seen in Appendix C. Each EME reported was calibrated using the HP8640B signal generator.

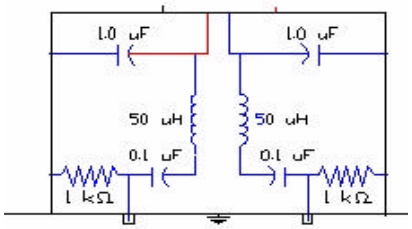


Figure 5. LISN Schematic Diagram

Description of Tests (Continued)

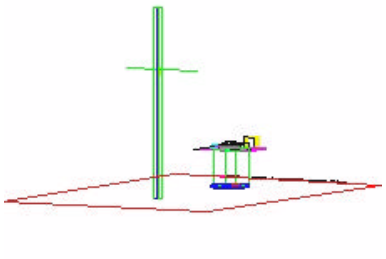


Figure 6. 3-Meter Test Site

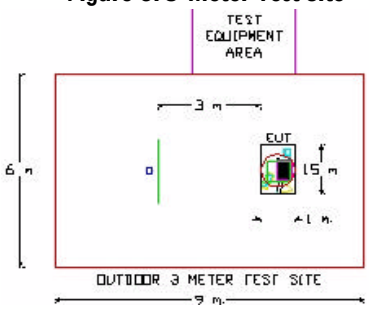


Figure 7. Dimensions of Outdoor Test Site

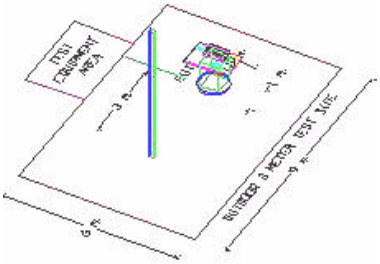


Figure 8. Turntable and System Setup

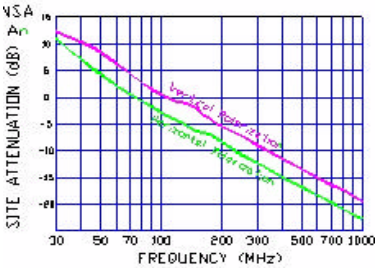


Figure 9. Normalized Site Attenuation Curves (H&V)

Radiated Emissions

Preliminary measurements were made indoors at 1 meter using broadband antennas, broadband amplifier, and spectrum analyzer to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, turntable azimuth with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30 to 200 MHz using biconical antenna and from 200 to 1000 MHz using log-spiral antenna. Above 1 GHz, linearly polarized double ridge horn antennas were used.

Final measurements were made outdoors at 3-meter test range using Roberts™ Dipole antennas or horn antenna (see Figure 6). The test equipment was placed on a wooden and plastic bench situated on a 1.5 x 2 meter area adjacent to the measurement area (see Figure 7). Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. Each frequency found during pre-scan measurements was re-examined and investigated using EMI/Field Intensity Meter and Quasi-Peak Adapter. The detector function was set to CISPR quasi-peak mode and the bandwidth of the receiver was set to 100kHz or 1 MHz depending on the frequency or type of signal.

The half-wave dipole antenna was tuned to the frequency found during preliminary radiated measurements. The EUT, support equipment and interconnecting cables were re-configured to the set-up producing the maximum emission for the frequency and were placed on top of a 0.8-meter high non-metallic 1 x 1.5 meter table (see Figure 8). The EUT, support equipment, and interconnecting cables were re-arranged and manipulated to maximize each EME emission. The turntable containing the system was rotated; the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission. Each emission was maximized by: varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and/or support equipment, and powering the monitor from the floor mounted outlet box and the computer aux AC outlet, if applicable; and changing the polarity of the antenna, whichever determined the worst-case emission. Photographs of the worst-case emission can be seen in Appendix C. Each EME reported was calibrated using the HP8640B signal generator. The Theoretical Normalized Site Attenuation Curves for both horizontal and vertical polarization are shown in Figure 9.

Description of Tests (Continued)

§ 15.205 Restricted Bands

Special attention is made for the EUT's harmonic and spurious radiated emission in the restricted bands of operation. The EUT was tested from 9kHz and up to the tenth harmonic of the fundamental frequency of the transmitter using CISPR quasi peak detector below 1GHz. Above 1 GHz, average measurements was used using RBW 1 MHz – VBW 10Hz and linearly polarized horn antennas. In addition, peak measurements were taken to ensure that the peak levels are not more than 20dB above the average limit. All out of band emissions, other than those created by the spreading sequence, data sequence, and the carrier modulation must not exceed the limits show in Table 2 per 15.209.

Frequency (MHz)	F/S (UV/m)	Meas. Dist. (Meters)
0.009-0.490	2400/F (kHz)	300
0.490-1.705	24000/F (kHz)	30
1.705-30.00	30	30
30.0-88.0	100	3
88.0-216.0	150	3
216.0-960.0	200	3
Above 960	500	3

Tab. 2. Radiated Emission Limits Per 15.209

Test Equipment

HP 8565E	**Agilent Spectrum Analyzer 9kHz – 50GHz**
HP83017A	**Microwave Analyzer 40dB Gain (0.5 – 26.5 GHz)**
HP 3784A	**Digital Transmission Analyzer**
EMCO 3115	**Horn Antenna (1 – 18GHz)**
HP 8495A	**20dB Attenuator (DC-40GHz) 0-70dB**
HP 8493B	**10dB Attenuator**
MicroCoax Cables	**Low Loss Microwave Cables (1-26.5 GHz)**
CDI Dipoles	**Dipole Antennas (30 – 1000 MHz)**
EMCO 3116	**Horn Antenna (18 – 40GHz)**

Description of Tests (Continued)

§ 15.203 Antenna Requirement

An intentional radiator antenna shall be designed to ensure that no antenna other that that furnished by the applicant can 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 this requirement.

The Panasonic Base Set **KX-TG5110** unit complies with the requirement of §15.203. The antenna is a p**ermanently attached omni-directional antenna.**

The Panasonic Hand Set **KX-TG5110** unit complies with the requirement of §15.203. The antenna is a p**ermanently attached omni-directional antenna.**

CONCLUSION

There are no provisions for connection to an external antenna. The unit meets the Antenna Requirements of §15.203.

Description of Tests (Continued)

§15.247(a)(2) – 20dB Bandwidth (Base)

Res. Bandwidth =	100 kHz (7dB/div)
Vid. BW =	100 kHz
Span =	3.0MHz
Ref. Level	- 30.00 dBm
Sweep	5.0ms

(see attached spectrum plots)

FREQ (MHz)	Channel	20dB Bandwidth (MHz)
5759.703	00	0.870
5798.945	44	0.840
5938.187	88	0.848

Table 3. 20dB Bandwidth measurements

Minimum Standard – The transmitter shall have a maximum 20dB bandwidth of 1000 kHz .

REMARKS:

PASS

Description of Tests (Continued)

§15.247(a)(2) – 20dB Bandwidth (Hand Set)

Res. Bandwidth =	100 kHz (7dB/div)
Vid. BW =	100 kHz
Span =	3.0 MHz
Ref. Level	- 32.1 dBm
Sweep	5.0ms

(see attached spectrum plots)

FREQ (MHz)	Channel	20dB Bandwidth (MHz)
5759.703	00	0.833
5798.945	44	0.840
5938.187	88	0.848

Table 3. 20dB Bandwidth measurements

Minimum Standard – The transmitter shall have a maximum 20dB bandwidth of 1000kHz.

REMARKS:

PASS

Description of Tests (Continued)

§15.247(b) Maximum Peak Output Power (Base)

Minimum Standard – The maximum peak output power of the transmitter shall not exceed 1 watt. Conducted power measurements were taken with a power meter.

Max. Power Peak + Atten = dBm ⇒ Watts

FREQ (MHz)	Channel	Power Output (dBm)	Power Output (W)
5759.703	00	23.28	0.213
5798.945	44	24.27	0.268
5938.187	88	24.24	0.266

Table 4. Output Power Measurements

Minimum Standard – The transmitter peak output power of the transmitter shall not exceed 1 watt. (+30 dBm)

REMARKS:

PASS

Description of Tests (Continued)

§15.247(b) Maximum Peak Output Power (Hand Set)

Minimum Standard – The maximum peak output power of the transmitter shall not exceed 1 watt. Conducted power measurements were taken with a power meter.

Max. Power Peak + Atten = dBm ⇒ Watts

FREQ (MHz)	Channel	Power Output (dBm)	Power Output (W)
5759.703	00	22.29	0.170
5798.945	44	21.90	0.155
5938.187	88	21.70	0.148

Table 4. Output Power Measurements

Minimum Standard – The transmitter peak output power of the transmitter shall not exceed 1 watt. (+30 dBm)

REMARKS:

PASS

RADIATED Measurements

(Fundamental & Harmonics) (Base) A. Transmitter Portion

Distance of Measurements: 3 meters

Channel: 00

FREQ. (MHz)	Level* (dBm)	AFCL (dB)	POL (H/V)	DET QP/AVG	F/S (µV/m)	F/S (dBµV/m)	Margin (dB)
5759.7	- 29.48	41.0	V	Peak	843335	118.5	n/a
11519.4	- 116.0	57.2	V	Peak	257.04	48.2	5.8
17279.1	- 128.0	60.3	V	Peak	92.2571	39.3	14.7
23038.8	- 135.0	63.0	V	Peak	56.2341	35.0	19.0
28798.5	- 135.0	67.0	V	Peak	89.1251	39.0	15.0

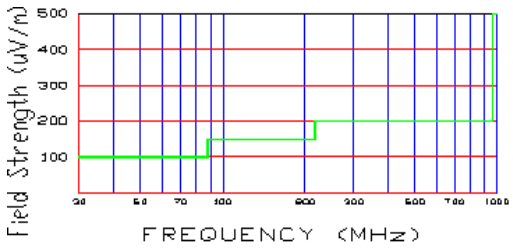


Figure 10. Restricted band harmonics and spurious limits.

Above 1 GHz limit is 500 uV/m (54dBu/m)

NOTES:

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in table 2. (note: * Restricted Band)

2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz

3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz

4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.

5. The antenna is manipulated through typical positions, polarity and length during the tests.

6. The EUT is supplied with nominal AC voltage or/and a new/fully recharged battery.

7. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.

8. < - 135 are below the analyzer floor level.

RADIATED Measurements

(Fundamental & Harmonics) (CONT.) (Base) B. Transmitter Portion

Distance of Measurements: 3 meters

Channel: 44

FREQ. (MHz)	Level* (dBm)	AFCL (dB)	POL (H/V)	DET QP/AVG	F/S (µV/m)	F/S (dBµV/m)	Margin (dB)
5798.9	- 28.8	44.3	V	Peak	944061	119.5	n/a
11597.9	- 115.8	57.3	V	Peak	266.073	48.5	5.5
17396.8	- 128.5	60.5	V	Peak	89.1251	39.0	15.0
23195.8	- 135.0	63.3	V	Peak	58.2103	35.3	18.7
28994.7	- 135.0	67.0	V	Peak	89.1251	39.0	15.0

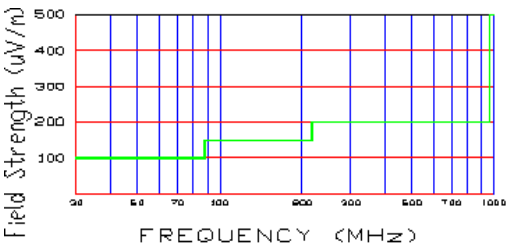


Figure 11. Restricted band harmonics and spurious limits.

Above 1 GHz limit is 500 uV/m (54dBu/m)

NOTES:

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in table 2. (note: * Restricted Band)

2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz

3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz

4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.

5. The antenna is manipulated through typical positions, polarity and length during the tests.

6. The EUT is supplied with nominal AC voltage or/and a new/fully recharged battery.

7. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.

8. < - 135 are below the analyzer floor level.

RADIATED Measurements

(Fundamental & Harmonics) (CONT.) (Base) C. Transmitter Portion

Distance of Measurements: 3 meters

Channel: 88

FREQ. (MHz)	Level* (dBm)	AFCL (dB)	POL (H/V)	DET QP/AVG	F/S (µV/m)	F/S (dBµV/m)	Margin (dB)
5838.2	- 29.0	41.5	V	Peak	944061	119.5	n/a
11676.37	- 117.0	57.5	V	Peak	237.137	47.5	6.5
17514.8	- 128.2	60.7	V	Peak	94.4061	39.5	14.5
23352.8	- 135.0	64.0	V	Peak	63.0957	36.0	18.0
29190.9	- 135.0	67.0	V	Peak	89.1251	39.0	15.0

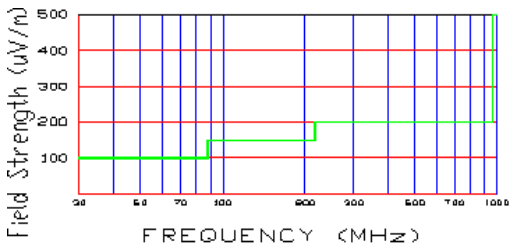


Figure 12. Restricted band harmonics and spurious limits.

Above 1 GHz limit is 500 uV/m (54dBu/m)

NOTES:

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in table 2. (note: * Restricted Band)

2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz

3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz

4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.

5. The antenna is manipulated through typical positions, polarity and length during the tests.

6. The EUT is supplied with nominal AC voltage or/and a new/fully recharged battery.

7. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.

8. < - 135 are below the analyzer floor level.

RADIATED Measurements

(Fundamental & Harmonics) (Hand Set) A. Transmitter Portion

Distance of Measurements: 3 meters

Channel: 00

FREQ. (MHz)	Level* (dBm)	AFCL (dB)	POL (H/V)	DET QP/AVG	F/S (µV/m)	F/S (dBµV/m)	Margin (dB)
5759.7	- 31.4	44.0	V	Peak	959401	119.5	n/a
11519.4	- 116.5	52.8	V	Peak	146.218	43.3	10.7
17279.1	- 128.5	62.3	V	Peak	109.648	40.8	13.2
23038.8	- 135.0	66.0	V	Peak	79.4328	38.0	16.0
28798.5	- 135.0	69.0	V	Peak	112.202	41.0	13.0

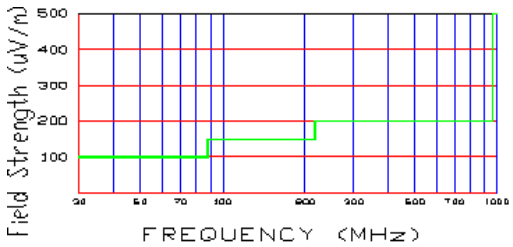


Figure 10. Restricted band harmonics and spurious limits.

Above 1 GHz limit is 500 uV/m (54dBu/m)

NOTES:

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in table 2. (note: * Restricted Band)

2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz

3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz

4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.

5. The antenna is manipulated through typical positions, polarity and length during the tests.

6. The EUT is supplied with nominal AC voltage or/and a new/fully recharged battery.

7. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.

8. < - 135 are below the analyzer floor level.

RADIATED Measurements

(Fundamental & Harmonics) (CONT.) (Hand Set) B. Transmitter Portion

Distance of Measurements: 3 meters

Channel: 44

FREQ. (MHz)	Level* (dBm)	AFCL (dB)	POL (H/V)	DET QP/AVG	F/S (µV/m)	F/S (dBµV/m)	Margin (dB)
5798.9	- 32.0	44.3	V	Peak	920450	119.3	n/a
11597.9	- 116.3	52.9	V	Peak	151.356	43.6	10.4
17396.8	- 128.9	62.5	V	Peak	107.152	40.6	13.4
23195.8	- 135.0	66.4	V	Peak	83.1764	38.4	15.6
28994.7	- 135.0	69.4	V	Peak	117.49	41.4	12.6

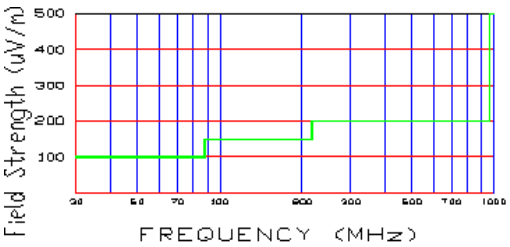


Figure 11. Restricted band harmonics and spurious limits.

Above 1 GHz limit is 500 uV/m (54dBu/m)

NOTES:

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in table 2. (note: * Restricted Band)

2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz

3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz

4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.

5. The antenna is manipulated through typical positions, polarity and length during the tests.

6. The EUT is supplied with nominal AC voltage or/and a new/fully recharged battery.

7. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.

8. < - 135 are below the analyzer floor level.

RADIATED Measurements

(Fundamental & Harmonics) (CONT.) (Hand Set) C. Transmitter Portion

Distance of Measurements: 3 meters

Channel: 88

FREQ. (MHz)	Level* (dBm)	AFCL (dB)	POL (H/V)	DET QP/AVG	F/S (µV/m)	F/S (dBµV/m)	Margin (dB)
5838.2	- 32.4	44.5	V	Peak	899498	119.1	n/a
11676.4	- 117.2	53.0	V	Peak	138038	42.8	11.2
17514.6	- 128.0	63.7	V	Peak	136.458	42.8	11.3
23353.8	- 135.0	66.9	V	Peak	88.1049	38.9	15.1
29190.9	- 135.0	69.9	V	Peak	124.451	41.9	12.1

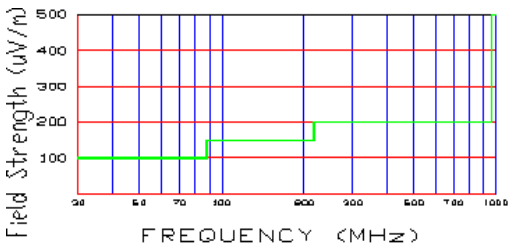


Figure 12. Restricted band harmonics and spurious limits.

Above 1 GHz limit is 500 uV/m (54dBu/m)

NOTES:

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in table 2. (note: * Restricted Band)

2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz

3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz

4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.

5. The antenna is manipulated through typical positions, polarity and length during the tests.

6. The EUT is supplied with nominal AC voltage or/and a new/fully recharged battery.

7. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.

8. < - 130 are below the analyzer floor level.

FREQUENCY Measurements

Base Set and Hand Set (Rx - Data Portion)

Distance of Measurements: 3 meters

Channels: 44

FREQ. (MHz)	Level* (dBm)	AFCL** (dB)	POL (H/V)	Height (m)	Azimuth (° angle)	F/S (µV/m)	Margin*** (dB)
88.1	- 81.5	8.39	H	2.8	30	49.6	- 9.6
138.2	- 85.1	12.9	V	2.5	225	55.0	- 8.7
152.0	- 86.4	13.7	H	2.3	190	51.9	- 9.2
188.4	- 86.9	15.9	H	1.6	315	63.2	- 7.5
248.8	- 88.3	18.8	V	1.3	180	74.2	- 8.6
525.2	- 99.4	26.3	H	1.1	45	51.3	- 11.8

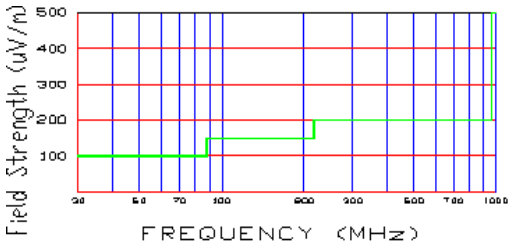


Figure 13. Restricted band harmonics and spurious limits.

Above 1 GHz limit is 500 uV/m (54dBu/m)

NOTES:

1.All emissions were investigated and the worst case emissions are reported

2. For hand-held devices, the EUT is rotated through three orthogonal axis to determine which configuration produces the maximum emissions

3. The EUT is supplied with the minimal AC voltage or/and a new/fully recharged battery.

4. The EUT was tested up to the 10th harmonic (5.8 GHz) and no significant emission was found.

RADIATED Measurements

Type	Model	Cal. Due Date	S/N
Microwave Spectrum Analyzer	HP 8566B (100Hz-22GHz)	12/05/03	3638A08713
Microwave Spectrum Analyzer	HP 8566B (100Hz-22GHz)	04/17/03	2542A11898
Spectrum Analyzer/Tracking Gen.	HP 8591A (9kHz-1.8GHz)	06/02/03	3144A02458
Spectrum Analyzer	HP 8591A (9kHz-1.8GHz)	10/15/03	3108A02053
Spectrum Analyzer	HP 8594A (9kHz-2.9GHz)	11/02/03	3051A00187
Signal Generator*	HP 8640B (500Hz-1GHz)	06/02/03	2232A19558
Signal Generator*	HP 8640B (500Hz-1GHz)	06/02/03	1851A09816
Signal Generator*	Rohde & Schwarz (0.1-1000MHz)	09/11/03	894215/012
Ailtech/Eaton Receiver	NM 37/57A-SL (30-1000MHz)	04/12/03	0792-03271
Ailtech/Eaton Receiver	NM 37/57A (30-1000MHz)	03/11/03	0805-03334
Ailtech/Eaton Receiver	NM 17/27A (0.1-32MHz)	09/17/03	608-03241
Quasi-Peak Adapter	HP 85650A	08/09/03	2043A00301
Ailtech/Eaton Adapter	CCA-7 CISPR/ANSI QP Adapter	03/11/03	0194-04082
RG58 Coax Test Cable	No. 167		n/a
Harmonic/Flicker Test System	HP 6841A (IEC 555-2/3)		3531A00115
Broadband Amplifier (2)	HP 8447D		1145A00470, 1937A03348
Broadband Amplifier	HP 8447F		2443A03784
Transient Limiter	HP 11947A (9kHz-200MHz)		2820A00300
Horn Antenna	EMCO Model 3115 (1-18GHz)		9704-5182
Horn Antenna	EMCO Model 3115 (1-18GHz)		9205-3874
Horn Antenna	EMCO Model 3116 (18-40GHz)		9203-2178
Biconical Antenna (4)	Eaton 94455/Eaton 94455-1/Singer 94455-1/Compliance Design		1295, 1332, 0355
Log-Spiral Antenna (3)	Ailtech/Eaton 93490-1		0608, 1103, 1104
Roberts Dipoles	Compliance Design (1 set) A100		5118
Ailtech Dipoles	DM-105A (1 set)		33448-111
EMCO LISN (2)	3816/2		1077, 1079
EMCO LISN	3725/2		2009
Microwave Preamplifier 40dB Gain	HP 83017A (0.5-26.5GHz)		3123A00181
Microwave Cables	MicroCoax (1.0-26.5GHz)		
Ailtech/Eaton Receiver	NM37/57A-SL		0792-03271
Spectrum Analyzer	HP 8591A		3034A01395
Modulation Analyzer	HP 8901A		2432A03467
NTSC Pattern Generator	Leader 408		0377433
Noise Figure Meter	HP 8970B		3106A02189
Noise Figure Meter	Ailtech 7510		TE31700
Noise Generator	Ailtech 7010		1473
Microwave Survey Meter	Holaday Model 1501 (2.450GHz)		80931
Digital Thermometer	Extech Instruments 421305		426966
Attenuator	HP 8495A (0-70dB) DC-4GHz		
Bi-Directional Coax Coupler	Narda 3020A (50-1000MHz)		
Shielded Screen Room	RF Lindgren Model 26-2/2-0		6710 (PCT270)
Shielded Semi-Anechoic Chamber	Ray Proof Model S81		R2437 (PCT278)
Environmental Chamber	Associated Systems Model 1025 (Temperature/Humidity)		PCT285

* Calibration traceable to the National Institute of Standards and Technology (NIST).

Conclusion

The data collected shows that the **Panasonic 5.8GHz FHSS Cordless Phone FCC ID: ACJ96NKX-TG5110** complies with Part 15C of the FCC Rules.