COMPAQ

COMPAQ COMPUTER CORPORATION

Emission Test Report

For

Series PE3012

Date: June 14, 2001

Compaq Computer Corporation

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This document has been compiled as the response to the following FCC inquiry pursuant to certification of the Compaq PE3012 intentional radiator (FCC ID: CNTWPE3012).

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From:  OET [mailto:oetech@fccsun07w.fcc.gov]
Sent:  Tuesday, June 05, 2001 1:20 PM
To:    Sharkey, Joe
Subject:
To:    E. Sharkey, null
From:  Joe Dichoso
       jdichoso@fcc.gov
       FCC Application Processing Branch
Re:    FCC ID CNTWPE3012
Applicant:   Compaq Computer Corporation
Correspondence Reference Number: 19518
731 Confirmation Number:   EA100772
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1) Confidential letter
2) Block diagram with oscillators and frequencies.
3) Schematic
4) Provide a photo to verify antenna and antenna location. The filing lists the antenna gain as 3 dBi while the RF safety exhibit indicates 4 dBi. Please explain/correct.
5) The device is not a module but is a computer peripheral transceiver not intended for use within other devices but is attached to the outside of a laptop. The device is a composite device(a computer peripheral and a transmitter). Indicate authorization for the computer peripheral portion. If it will be Certified, file another application under the same FCC identifier as a composite application. If it will be DOC approved, indicate so and correct the label for DOC label requirements.

This Bluetooth transmitter is a Frequency Hopping Spread Spectrum(FHSS) transmitter in the data mode and a Hybrid transmitter in the acquisition mode.
Provide the following with regard to the device operating in the data mode(FHSS)
Section 15.247(a)1.
6) The first pseudorandom sequence on page 4 of the technical description is not pseudorandom. The sequence shows that the next hop occurs in a fixed interval. Please explain.
7) The transmitter cannot coordinate its hopping sequence with the hopping sequence of other transmitters, or vice versa, for the purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters. The technical description indicates that no coordination occurs between transmitter outside a piconet. How does the device meet the non-coordination requirement for multiple transmitter within a piconet?

Provide the following information with regard to the device operating in the page and inquiry mode under the Spread spectrum Hybrid requirements in Section 15.247(f) and Section 15.247(a)1.
Hybrid spread spectrum transmitters are authorized under Section 15.247(f) of the Rules. The technical requirements in that Section require:
8) A minimum processing gain. The processing gain may be demonstrated as a combination of gain from the spreading/despreading function (using, for instance, a jamming margin test- see Section 15.247(e)(2)) and the gain from the hopping function, equal to 10log(number of hopping channels). A copy of the Processing gain measurement can be found at the end of the Rulemaking Order for DSSS transmitters and can be found at www.fcc.gov/Bureaus/Engineering_Technology/Orders/1997/fcc97114.txt
9) An average time of channel occupancy limit.
10) A power spectral density limit. The power spectral density limit is found in Section 15.247(d).

Please note that these hopping channels in the page/inquiry must also comply with the requirements set forth and described in Section 15.247(a)(1). The requirements are:
11) A Minimum channel separation.
12) Pseudorandom hop sequence.
13) Use of each frequency equally on average.
14) Receiver matching bandwidth and synchronization.

2) Block diagram with oscillators and frequencies.

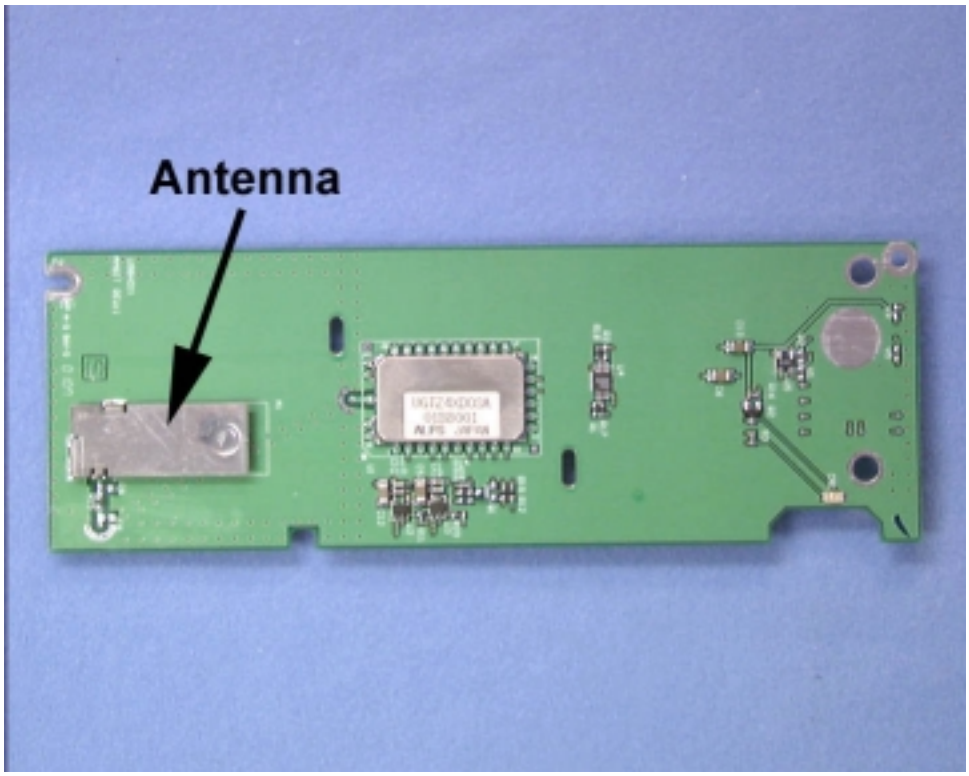
"block diagram.doc"

3) Schematic

Schematic Diagram PE3012

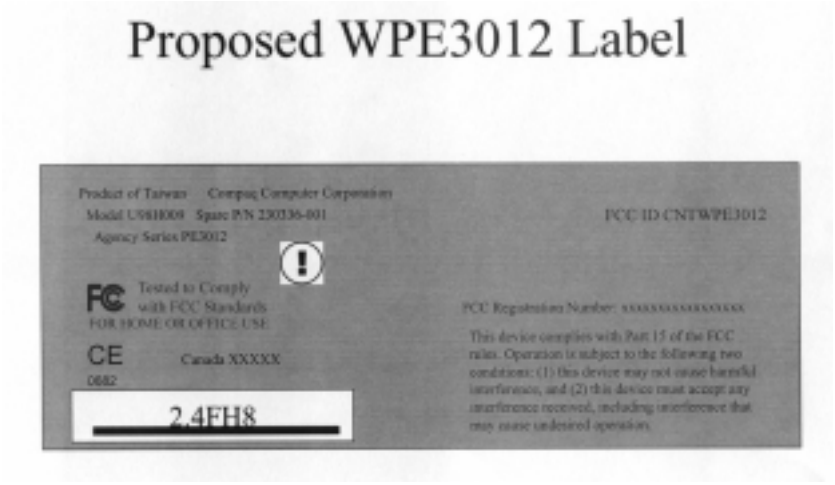
4) Provide a photo to verify antenna and antenna location. The filing lists the antenna gain as 3 dBi while the RF safety exhibit indicates 4 dBi. Please explain/correct.

The peak measured gain of the antenna has been 5.5 dBi. It is a planar inverted F antenna (PIFA).



5) The device is not a module but is a computer peripheral transceiver not intended for use within other devices but is attached to the outside of a laptop. The device is a composite device(a computer peripheral and a transmitter). Indicate authorization for the computer peripheral portion. If it will be DOC approved, indicate so and correct the label for DOC label requirements.

As a computer peripheral the device will be self declared. An FCC Grant is being sought for the intentional radiator under Part 15 Section C. The revised "proposed label" is attached below.



6) The first pseudorandom sequence on page 4 of the technical description is not pseudorandom. The sequence shows that the next hop ocurs in a fixed interval. Please explain.

The first sequence shown on page 4 is for page scan and inquiry scan. This particular sample set was based upon an initial clock of 0x0000000 and a ULAP of 0x000000000 which is unlikely. The second and third sample sets in the Bluetooth specification have different ULAP values (more realistic) and show the randomness of the page and inquiry scan. Attached is the second sample set with a clock start of 0x0000000 and a ULAP of 0x2a9ef25.

secondset.doc

7) The transmitter cannot coordinate its hopping sequence with the hopping sequence of other transmitters, or vice versa, for the purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters. The technical description indicates that no coordination occurs between transmitter outside a piconet. How does the device meet the non-coordination requirement for multiple transmitter within a piconet?

Inside a piconet only one of the member's transmitters is active at any given time, so no frequency coordination is needed to ensure they do not hop on each other.

8) A minimum processing gain for Spread Spectrum Hybrid device.

Attached is the Processing Gain test conducted on the BlueCore device provided by its manufacturer provided for the purpose of FCC approval. The net processing gain for the hybrid device was 20 dB.

BlueCore Processing Gain

9) An average time of channel occupancy limit.

"Average time of occupancy .doc"

10) A power spectral density limit. The power spectral density limit is found in Section 15.247(d).

"Power and Bandwidth.doc"

11) A Minimum channel separation.

The minimum channel separation for page and inquiry mode is the same as for other states – 1 MHz

12) Pseudorandom hop sequence.

The hop sequence for page and inquiry is pseudorandom when the address is not 0x00000000 as shown in #6 above. The sequence is generated in the same manner as the pseudorandom pattern when the device is in connected state, the inputs to the state machine are just different.

13) Use of each frequency equally on average.

The same as #12 above.

14) Receiver matching bandwidth and synchronization.

In the page and inquiry state, as well as in the connected state, the same filter is employed for transmit and receive. This ensures that the receiver bandwidth matches the transmit bandwidth.