Lucent Technologies
Bell Labs Innovations

June 7, 1999

Duty Cycle Correction Factor

Test Method

In order to try to obtain better measurements and comply with all the Rules of the Federal Communications Commission Part 15, Lucent Technologies Consumer Products L.P. test team, decided to test FHSS cordless telephone model 9410 in a single channel mode.

The telephone normal operation is hopping.

Correction Factor

In order to do this properly we asked for advice from Mr. Greg Czumak on how to perform the test and how we should consider any test results. The e-mail response we received from him was the following.

From: Greg Czumak[SMTP:GCZUMAK@fcc.gov]
Sent: Thursday, May 27, 1999 10:46 AM
To: mopelbaum2@pcc.lucent.com
Subject: Fcc Part 15 -Reply

This is in response to your e-mail dated May 20, 1999. Two forms of averaging are potentially available when measuring spurious radiated emissions from a frequency hopping spread spectrum radio- one is in the measurement technique, the other is mathematical.

With the transmitter modified to transmit continuously on a single channel, peak field strength measurements (RBW=1 MHz, VBW equal to or greater than RBW) are made on spurs found in restricted bands (per Section 15.205), in order to demonstrate compliance with Section 15.35(b). The VBW may then be reduced to 10 Hz (to simulate an average detector), and a new reading is taken, the "average" level of the emission. If the dwell time (transmit time) of the EUT on a single channel, under normal operating conditions, is less than 100 ms, then an additional "duty cycle" correction may be mathematically applied to the measured average value. This correction is calculated from 20log(dwell time/100ms). If the dwell time of the EUT on a single channel exceeds 100 ms, then this "duty cycle" correction is not applicable. The number of channels to which the EUT hops has no bearing on this calculation.

Please note that this technique is not found in the Rules. It is a policy which the Lab developed in an effort to ease the burden of compliance placed upon manufacturers, and is similar in nature to the duty cycle

correction afforded to pulsed emissions by Section 15.35(c).

I hope this has been responsive to your inquiry. Please contact me with any additional questions.

Corrected Factor

Accordingly to architecture and design of this telephone, it is employing a Time Division Duplex (TDD) of 5ms.

Applying the formula described in Mr. Czumak's e-mail and following the guidelines of 15.35

Final Result = Reading in Spectrum + Cable Loss **+ 20 log(dwell time/100ms)**
Final Result = Reading in Spectrum + Cable Loss **+ 20 log(5ms/100ms)**
Final Result = Reading in Spectrum + Cable Loss **+ -26 dB**

In conclusion we used a correction factor of 26 for all measurements that have something to do with the main carriers, which also have to do with signals that will be hopping, including harmonics.