Date: December 22, 2004

Subject: Request for additional information regarding FCC ID: IHDT56EZ1 (Portable Cellular/PCS GSM transceiver with embedded Bluetooth Transmitter)

Reference:

Application Received:	11/30/2004
Correspondence Reference Number:	241220A.IHD
Confirmation Number:	TC4396 & TC4397
Date of Original Email:	12/20/2004

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Questions and responses follow:
For both applications:

1. The User's Manual must include both the statement required by Section 15.19(a)(3) (for the Bluetooth TX) and the Body-worn SAR statement/warning.

Response: This information is located in the *Important Safety and Legal Information* booklet.. Please refer to exhibit 8A.

Parts 22/24 application:

2. The EUT employs EDGE modulation. Please provide occupied bandwidth plots in this mode, both for cellular operation and PCS operation.

Response: Please refer to the supplemental EMC test report submitted on 12/22/04.

3. A number of items in the SAR test report are listed as past their cal due date (p.4). Please address.

Response: Please refer to the supplemental SAR report submitted on 12/22/04.

4. Compared to the actual SAR plot data pages, the dipole validation results for 1800 MHz, taken on 11/23/04 and 11/24/04, listed on p.5 of the SAR report, appear to be typos. Please address.

Response: Please refer to the supplemental SAR report submitted on 12/22/04.

5. Please submit the required z-axis plots for the SAR data (none were submitted).

Response: Please refer to the supplemental SAR report submitted on 12/22/04.

Part 15C application:

6. What RBW and VBW were used to make the field strength measurements?

Response: Please refer to the supplemental EMC test report submitted on 12/22/04.

7. While the spurious conducted emission plot for the mid channel is labeled as 10-20 GHz, the actual plot is for 2-10 GHz (repeating the previous plot). Please provide the plot for 10-20 GHz.

Response: Please refer to the supplemental EMC test report submitted on 12/22/04.

8. Please describe the Bluetooth antenna. What is its gain?

Response: The Bluetooth antenna is mounted on the PCB inside of the EUT. The antenna installation is permanent. The gain of the Bluetooth antenna is 0dBi.

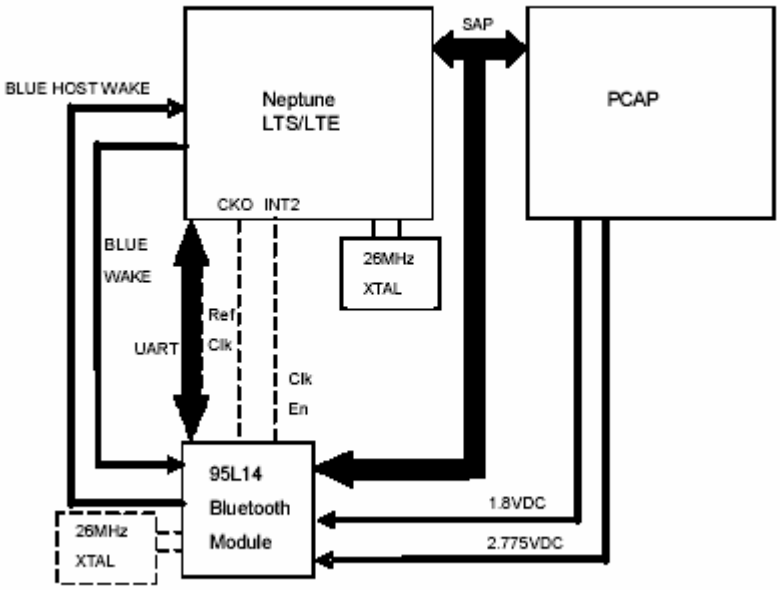
Bluetooth Operational Description

The Bluetooth is implemented as a one-chip solution module that encapsulates all lower level protocol associated with Link and physical RF interface over 2.4 GHz spectrum. The data and higher level control interface is provided on an HCI interface enabled between the host and the Bluetooth module.

The HCI interface will utilize an UART. There are two data signals (TXD and RXD) and two flow control signals (RTS and CTS). The BT module assumes a role as DTE and the Neptune LTS/LTE acts as a DCE. Therefore when the BT module is connected to Neptune LTS/LTE the RDX and TDX lines must be crossed, while CTS and RTS on Neptune connect directly to CTS and RTS on the BT module. RDX and TDX have been crossed on the BT module already; therefore, BLUE_TX (pin 5) of the BT module is connected to TXD2 (pin N 13) and BLUE_RX (pin 33) of the BT module is connected to RXD2 (pin N17) on Neptune LTS/LTE 257 pin package.

The Bluetooth UART is a dedicated UART from Neptune LTS/LTE. This bus is not shared with external peripherals.

Figure 15. Bluetooth System Block



Although most signaling is done over the HCI, wake up signaling is done with dedicated signals. Neptune LTS/LTE uses a GPIO (PC14/pin B15) to wake up the BT module. The BT module uses a dedicated signal BLUE_HOST_WAKEB (pin 9) connected to a Neptune LTS/LTE interrupt (INT 5) to wake-up the host processor.

The codec is connected onto a shared 4 wire bus with Neptune LTS/LTE and PCAP referred to as the BB_SAP (Base Band Serial Audio Code Port). The PCAP acts as the master and provides the clock and frame sync signals for the bus. The labeling on the Bluetooth module is in reference to the Neptune LTS/LTE. Therefore, the ASAP_TX line is an input and ASAP_RX is the output from Bluetooth.

Bluetooth is reset in a number of different ways. When software first initializes Bluetooth, it sends an HCI reset command over the UART interface to place the BCM2035 into a known state. If software fails to detect a response to the initial HCI reset command, it will power cycle the RF and Core voltages thus forcing a power on reset on the BCM2035.

Additionally, Neptune LTS/LTE can reset Bluetooth using the REST_OUT signal (pin W5). A level shifted version RESET_OUT at 2.775 V is connected to RESET_N (pin 22) of BT module. RESET_N is active low. This option

would be used when the software initiates a soft reset, but power supplies or the main RESETB signals are not asserted.

The Broadcom chipset requires two different frequency references, a lower frequency low power reference (32.768KHz), and a high frequency main reference (15.36 MHz, 26 MHz, etc.). The low power reference is a standard frequency available on the GSM phone whenever the phone is powered. As such, this reference is directly connected to CLK_32KHz, the buffered port from the oscillator on PCAP.

As this module will be primarily used on GSM platform, PLL components on the module were tuned for 26MHz.

This option would use a 2.5 x 3.2 mm discrete 26MHz crystal with two shunt capacitors (15pf). The XTAL circuit oscillator is contained on the BCM2035 and enables itself without any control from the host processor.

The host processor, though, must program a trim value to the Bluetooth module via an HCI command every time the Bluetooth module is POR. This trim value is programmed in the phone's SEEM at the time of factory phasing.