

HON HAI PRECISION IND. CO., LTD.**HSINCHU SCIENCE PARK BRANCH OFFICE***5F-1, 5 Hsin-An Road**Hsinchu, Science-Based Industrial Park**Taiwan, R.O.C.***TEL: +886-3-5784975****FAX: +886-3-5775100****MIN SHENG PLANT***4-1 Ming-Sheng St.,**Tu-Cheng Industrial Area,**Taiwan, R.O.C.***TEL: +886-2-2267 6511****FAX: +886-2-2267 6512****The ThinkPad Wireless USB Half Mini PCI Express Form Factor Card (HMC) – Theory of Operation**

The ThinkPad Wireless USB Half Mini PCI Express Form Factor Card (HMC) is a cost-effective, highly-integrated design that provides wireless UWB high-speed services for wired USB devices. The HMC design provides a complete end-to-end solution while leveraging latest breakthrough wireless performance.

The ThinkPad Wireless USB HMC is shipped as a complete package including both hardware and software support. The ThinkPad Wireless USB HMC includes a working hardware sample along with user's guide, and a quick-start guide. The software package includes a Host Wired Adapter (HWA) driver/firmware and DWA firmware along with the Microsoft Windows-based utility which supports device discovery, multiple association options, field upgrade functionality, and comprehensive diagnostics.

The ThinkPad Wireless USB HMC is designed around WiQuest's WQST110 and WQST101, the industry's leading high-performance ultrawideband (UWB) chipset. The WQST110 includes a WiMedia-based ultrawideband media access controller (MAC) and physical layer (PHY) baseband processor. The WQST101 is a direct conversion UWB RF transceiver. These two devices and related components fit into a standard Half Mini PCI Express form factor.

The ThinkPad Wireless USB HMC is an Ultrawideband (UWB) WiMedia Mode 1-compliant device that operates in the 3168-4752MHz Band group.

The ThinkPad Wireless USB HMC transmits WiMedia UWB signal that has instantaneous bandwidth (BW) greater than 500MHz, or fractional occupied BW greater than 20 percent. The 1584MHz wide band represents 40 percent bandwidth (fractional bandwidth equals $2 \cdot (F_h - F_l) / (F_h + F_l)$, where F_h is upper boundary and F_l is lower boundary). Band Group 1 is divided into 3 individual bands, each 528MHz wide, with center frequencies of 3432MHz, 3960MHz and 4488MHz, respectively. The ThinkPad Wireless USB HMC transmits either by hopping between the 3 bands or stationary on each band. FCC Part 15 regulation in Subpart F, Section 15.517 and 15.519 specifies maximum average Equivalent Iso-tropically Radiated Power (EIRP) of -41.3dBm (53.9dBuV/m) measured using a resolution bandwidth of 1MHz. EIRP in dBm could be converted to a field strength, in dBuV/m at 3 meters, by adding 95.2dB.

Since the ThinkPad Wireless USB HMC occupies approximately 1584MHz while hopping (528MHz instantaneously) the average transmitted power is on the order of -9.3dBm (or -14dBm when not hopping). The 528MHz wide signal is composed of 122 modulated Orthogonal Frequency Division Multiplexed (OFDM) sub-carriers.