

WQST110RDK-HUB-USB4 – Theory of Operation

WiQuest's Wireless USB 4-Port Hub is a cost-effective, highly-integrated design that provides wireless UWB high-speed services for wired USB devices. With this reference design, WiQuest enables equipment manufacturers to build a complete Device Wired Adapter (DWA). The Wireless USB Hub design provides a complete end-to-end solution based on the Certified Wireless USB specification from the USB-IF while leveraging WiQuest breakthrough wireless performance.

The WiQuest Wireless USB 4-Port Hub Reference Design Kit is shipped as a complete package including both hardware and software support. The hardware information includes a working Hub sample along with schematics, layout source files, a detailed bill-of-material, design manual, user's guide, and a quick-start guide. The software package includes DWA firmware along with the WiQuest Microsoft Windows-based utility which supports device discovery, multiple association options, field upgrade functionality, and comprehensive diagnostics.

The WiQuest Wireless USB 4-Port Hub 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.

WiQuest Communications Wireless USB Hub (WQST110RDK-HUB-USB4) Reference Design is an Ultrawideband (UWB) WiMedia Mode 1-compliant device that operates in the 3168-4752MHz Band group.

The WiQuest Wireless USB Hub transmits a 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 WiQuest Wireless USB 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 WiQuest Wireless USB Hub 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.