Alereon HS6621 UWB Radio Module User Guide

INTRODUCTION

The HS6621 UWB Radio module is a complete compact UWB radio implemented in a standard PC Mini-Card format that is intended to be embedded within a product to provide UWB functionality.

The HS6621 combines the Alereon AL5000 chipset along with on board power supplies, an antenna output, a USB function controller and a USB 2.0 system interface.

1.0 REFERENCE DESIGN FEATURES

- Optimized Performance with AL5100 (3.1GHz to 8.976GHz) WiMedia BG#1, 3, 6
- Complete Baseband Processor (BBP) and Media Access Controller (MAC)
- High Precision Data Path and Data Converters allowing reliable link at extended ranges
- Fully Integrated MAC Protocol Engine Supports All Industry Standards WiMedia protocols
    – Certified Wireless USB
    – WiMedia Link Layer Protocol
    – Bluetooth 3.0 (supported by future SW releases)
- Industry Standard Interfaces
    – USB 2.0 – Data
    – USB 2.0 – WiMedia Cable Association
- Power requirements:
    o +3.3V ±5%, 0.75A Maximum
- Small Form Factor (Minicard form factor)
- 3 GPIO lines for LED Indicators or additional system control signals
- Operating temperature / humidity range: 0°C to +50°C / 10% to 80% RH

2.0 Usage and Documentation

The HS6621 is a complete, self-contained UWB radio module requiring only +3.3V regulated power from the host system and providing USB 2.0 interfaces to the host system for data and the WiMedia association function. The AL5712 is intended to provide a simple path for a wired USB product design to migrate to a UWB enabled wireless USB product design.

The HS6621 is a wireless USB certified platform and has received FCC approval as a Modular UWB transmitter under subpart F of the FCC rules with the FCC ID: A3LCYWDCA7UR . The product implementation can apply these approvals to the product which incorporates the HS6621 .

This document provides an outline of the purpose and functionality provided by the HS6621 , complete information for the product system designer is contained in the Samsung Reference Design Kit (RDK) package consisting of: Schematic diagram, BOM, and PCB fabrication information including a full Gerber data set.

3.0 User I/O Interface

Function	Pin #	Pin #	Function
HS6621 Connector			
Function	**Pin #**	**Pin #**	**Function**
NC	1	2	3.3V
NC	3	4	GND
NC	5	6	NC
NC	7	8	NC
GND	9	10	NC
NC	11	12	NC
NC	13	14	NC
GND	15	16	USB VBUS
Host_ Select#	17	18	GND
NC	19	20	W_Disable#
GND	21	22	Association_CLR#
NC	23	24	NC
NC	25	26	GND
GND	27	28	Assoc. D+
GND	29	30	Assoc. D-
NC	31	32	Assoc. VBUS
NC	33	34	GND
GND	35	36	USB D-
C2D	37	38	USB D+
RST#/C2CLK	39	40	GND
AL_GPIO_2	41	42	Dock_LED
AL_GPIO_4	43	44	Security_LED#
AL_GPIO_5	45	46	Data_LED#
AL_GPIO_7	47	48	NC
Host_Connect_LED	49	50	GND
NC	51	52	3.3V

Figure 1, Connector Pins Configuration

HS6621 Pin Function Description

Pin #	Pin Name	I/O	Description
1	NC		No Connection
2	3.3V		+3.3V Regulated power from host system
3	NC		No Connection
4	GND		Ground connection
5	NC		No Connection
6	NC		No Connection
7	NC		No Connection
8	NC		No Connection
9	GND		Ground connection
10	NC		No Connection
11	NC		No Connection
12	NC		No Connection
13	NC		No Connection
14	NC		No Connection
15	GND		Ground connection
16	USB VBUS	I	+5V USB Vbus Signal from host system
17	Host_Select#	I	(1) Low = True 3.3V CMOS signal, allows host system to provide control of selection among multiple hosts associated to UWB radio. (2) Test function, holding Host_Select# asserted at +3.3V power application to the HS6621 and then switching it un-asserted places the HS6621 into Administrative Mode for control by Samsung manufacturing test utility software
18	GND		Ground connection
19	NC		No Connection
20	W_Disable#	I	Low = True 3.3V CMOS signal, assertion of W_Disable# completely disables the radio system.
21	GND		Ground connection
22	Association_CLR#	I	Low = True 3.3V CMOS signal, assertion of Association_CLR clears all stored host associations
23	NC		No Connection
24	NC		No Connection
25	NC		No Connection
26	GND		Ground connection
27	GND		Ground connection
28	Assoc. D+	I/O	USB D+ of Association signal
29	GND		Ground connection
30	Assoc. D-	I/O	USB D- of Association signal
31	NC		No Connection
32	Assoc. VBUS	I	+3.3V USB Vbus Signal from association connector
33	NC		No Connection
34	GND		Ground connection
35	GND		Ground connection

36	USB D-	I/O	USB D- data signal from host system
37	C2D	I/O	Test signal for 8051CF326 USB controller
38	USB D+	I/O	USB D+ data signal from host system
39	RST#/C2CLK	I/O	Test signal for 8051CF326 USB controller
40	GND		Ground connection
41	AL_GPIO_2	I/O	MAC GPIO signal, functionality may be determined by customer definition
42	Dock_LED	O	LED drive pin, functionality per table 2
43	AL_GPIO_4	I/O	MAC GPIO signal, functionality may be determined by customer definition
44	Security_LED#	O	LED drive pin, functionality per table 2
45	AL_GPIO_5	I/O	MAC GPIO signal, functionality may be determined by customer definition
46	Data_LED#	O	LED drive pin, functionality per table 2
47	AL_GPIO_7	I/O	MAC GPIO signal, functionality may be determined by customer definition
48	NC		No Connection
49	Host_Connect_LED	O	LED drive pin, functionality per table 2
50	GND		Ground connection
51	NC		No Connection
52	3.3V		+3.3V Regulated power from host system

Table 1. Pin Descriptions

4.0 DESIGN CONSIDERATIONS

4.1 Power

One +3.3 V power supply at max data rate average current of 500 mA with peak at 750 mA. Connector pins #2 and 52 (+3.3V) are connected in common, both should connect to the host system power rail. Connector pins #4, 9, 15, 18, 21, 26, 27, 29, 34, 35, 40, and 50 are connected in common, all should connect to the host system ground.

4.2 LED Indicator Functions

Name	Functional Description
Dock LED	Steady flashing when dock power is applied and radio is beaconing but not connected to a host. LED is solid when a wireless connection is made to a Host PC.
Security LED	Normally off, Flashes during cable association process, Goes solid when a successful cable association is made. During wireless operation, this LED is off when there is not wireless connection to a host, when successful Secure wireless connection is made to a pre-associated host, the LED goes solid.
Data LED	Flashes when data is being passed wireless in either direction.
Host Connect LED	Normally off. The LED goes solid when a wireless connection is made with the host. This "Host Connect" LED indicates that the dock is successfully connected to the host.

Table 2. LED Indicator Functionality

4.3 UWB Antenna

The HS6621 has received FCC approval when employed with a specific antenna. The approved antennas are:

- BlueWaveTel UWBH-001
- BlueWaveTel UWBH-002

These is the only antennas approved by the FCC for use with the Alereon HS6621 , any substitution of any other antenna automatically invalidates the FCC approval.

5.0 Regulatory Information

The HS6621 is approved under subpart F of the FCC rules as a Modular UWB Transmitter.

The product into which the HS6621 is incorporated must bear a label per the FCC requirements which shows the FCC ID assigned to the HS6621 as follows.

FCC ID: U9YHS6621

The following information must be conveyed in the information supplied to the End User of the product into which the HS6621 is incorporated.

The compliance statement exactly as prescribed by the FCC:

> This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
> This device is authorized under 47 CFR 15.519 (the FCC Rules and Regulations). The operation of this device is subject to the following restriction: This UWB device shall transmit only when it is sending information to an associated receiver. This UWB device shall cease transmission within 10 seconds unless it receives an acknowledgement from the associated receiver that its transmission is being received. An acknowledgement of reception must continue to be received by the transmitting device at least every 10 seconds of operation or the UWB device must cease transmitting.

The users manual or instruction manual shall caution the user that changes or modifications to the equipment not expressly approved by the party responsible for the grant of equipment authorization issued by the FCC could void the user's authority to operate the equipment under the grant of equipment authorization, an example:

> **Warning:** Changes or modifications to this device not expressly approved by Samsung could void the users authority to operate the device under the FCC Equipment Authorization. This includes changes or substitutions of the antenna which is furnished with the device.

6.0 Mechanical

The HS6621 PCB is designed to allow the user to optionally choose one of two mechanical envelopes:

1. Full Minicard, this is PCB standard PCB configuration.
2. Half Minicard configuration. This optional configuration is achieved by removing the inert top one-half of the PCBA, a score line is provided on the PCB to facilitate this action in production. This should not be considered a field-changeable option.
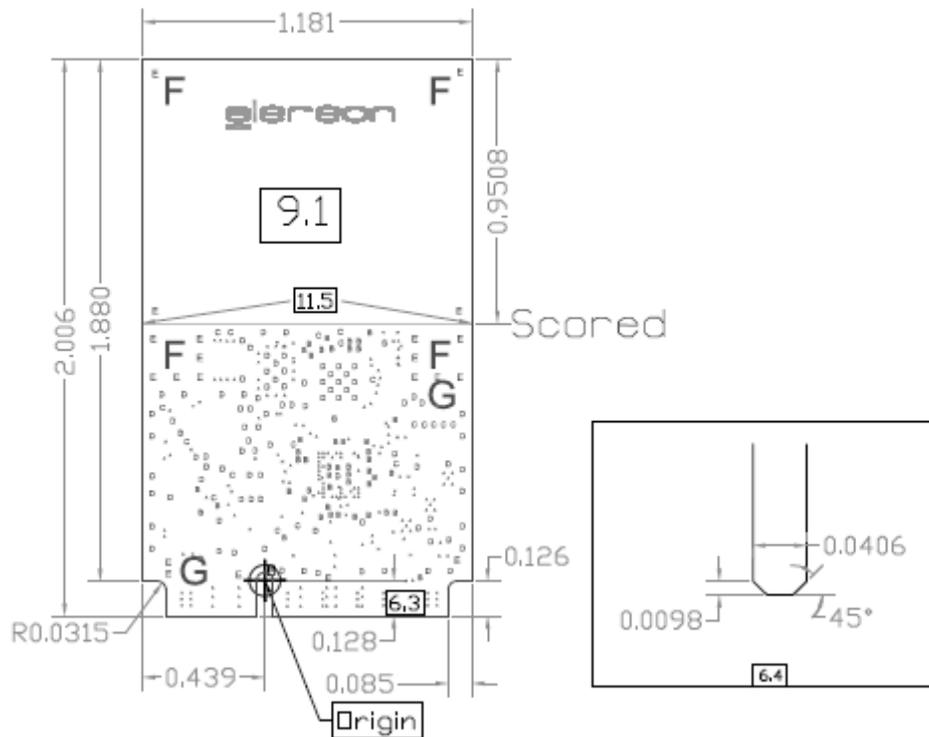
Recommended connector: Molex 67910-0002 PCI Express Mini Card Connector with Molex 48099-4000 PCI Express Mini Card Latch.