Bluetooth Headset

Product Name	**GST class 2 Bluetooth Headset**
Product ID	**GL2BHS82**
Hardware Version	**Rev.GL2BHS80-01**
Software Version	**Rev.GL2BHS80-01**
Product category	**End-user- product**
Bluetooth specification	**Bluetooth 1.1 compliant**
Qualification/list date	**Applying now**
QPN no	
Support Profile	**GAP, SDP, Headset profile**
Power class	**2**
Power control	**No**
Supported packet types	**HV1, HV3**
Supported hopping modes	**USA/EU(79 channels)**
Product category	**End-user- product**
Bluetooth specification	**Bluetooth 1.1 compliant**
Qualification/list date	**applying**
Passkey change support	**No**
Interoperability	**All devices that support the Bluetooth HS profile, audio gateway role**
Security	**Pairing, Encryption ,and Authentication**
Output power	**0 dBm**
Sensitivity	**<-76 dBm@0.1%BER**
Operation range	**Up to 10 meters**
Frequency range	**2400-2483.5MHz**
DC Power	**3.7V Lithium-ion battery 150mAh**
Talk time	**Up to 3 hours**
Standby time	**Up to 50 hours**

FEATURE

- 3 function button TALK, VOLUME UP, VOLUME DOWN
- 2 indicator Standby (green), Battery low (red), Pairing (green and red flash alternately) , Connection and Incoming.

GENERAL SPECIFICATION

ITEMS	SPECIFICATION
Supply Voltage	Lithium-ion battery 3.7V 150mAh
Carrier Frequency	2400MHz to 2483.5MHz(USA,Spain,France)
Modulation Method	GFSK,1Mbps,0.5BT Gaussian
Link mode	SCO
Maximum Data Rate	Synchronous:64kbps
Transmission Power	0dBm
Hopping	1600hops/sec, 1MHz channel space
Receiving Signal Range	-76dBm to -20 dBm
Receiver IF Frequency	1.5MHz center frequency
Baseband Crystal OSC	16MHz
Operation Temperature	-20 to +70 degree
Storage Temperature	-40 to +85 degree
Bluetooth Specification	Ver1.1

General Description of Bluetooth

Bluetooth is a short-range radio link intended to replace the cable(s) connecting portable and/or fixed electronic devices. Key features are robustness, low complexity, low power, and low cost.
Bluetooth operates in the unlicensed ISM band at 2.4 GHz. A frequency hop transceiver is applied to combat interference and fading. A shaped, binary FM modulation is applied to minimize transceiver complexity. The symbol rate is 1 Ms/s. A slotted channel is applied with a nominal slot length of 625 μs. For full duplex transmission, a Time-Division Duplex (TDD) scheme is used. On the channel, information is exchanged through packets. Each packet is transmitted on a different hop frequency. A packet nominally covers a single slot, but can be extended to cover up to five slots.The Bluetooth protocol uses a combination of circuit and packet switching.Slots can be reserved for synchronous packets. Bluetooth can support an asynchronous data channel, up to three simultaneous synchronous voice channels, or a channel which simultaneously supports asynchronous data and synchronous voice. Each voice channel supports a 64 kb/s synchronous (voice) channel in each direction. The asynchronous channel can support maximal 723.2 kb/s asymmetric (and still up to 57.6 kb/s in the return direction), or 433.9 kb/s symmetric. The Bluetooth system consists of a radio unit ,a link control unit, and a support unit for link management and host terminal interface
functions, see Figure 1

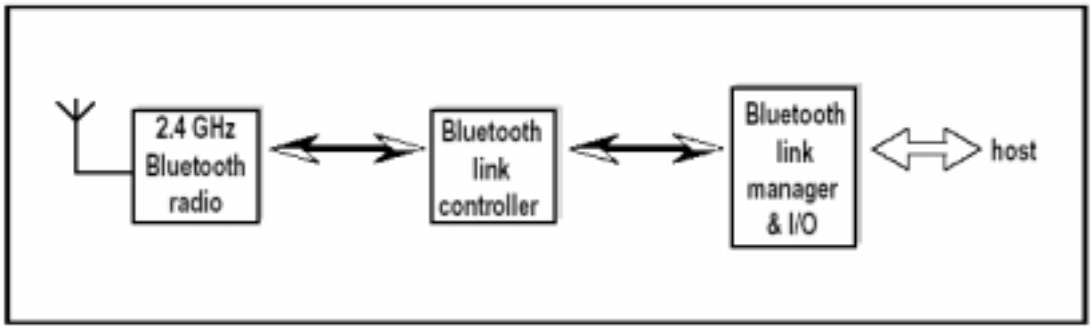

Figure 1

The current document describes the specifications of the Bluetooth link controller, which carries out the baseband protocols and other low-level link routines. Link layer messages for link set-up and control are defined in the Link Manager Protocol.
The Bluetooth system provides a point-to-point connection (only two Bluetooth units involved), or a point-to-multipoint connection.
In the point-to-multipoint connection, the channel is shared among several Bluetooth

units. Two or more units sharing the same channel form a ***piconet***. One Bluetooth unit acts as the master of the piconet, whereas the other unit(s)
acts as slave(s). Up to seven slaves can be active in the piconet. In addition, many more slaves can remain locked to the master in a so-called parked state. These parked slaves cannot be active on the channel, but remain synchronized to the master. Both for active and parked slaves, the channel access is controlled by the master. Multiple piconets with overlapping coverage areas form a ***scatternet***. Each piconet can only have a single master. However, slaves can participate in different piconets on a time-division multiplex basis. In addition, a master in one piconet can be a slave in another piconet. The piconets shall not be frequencysynchronized. Each piconet has its own hopping channel.

CHANNEL DEFINITION

The channel is represented by a pseudo-random hopping sequence hopping through the 79 or 23 RF channels. The hopping sequence is unique for the piconet and is determined by the Bluetooth device address of the master; the phase in the hopping sequence is determined by the Bluetooth clock of the master. The channel is divided into time slots where each slot corresponds to an RF hop frequency. Consecutive hops correspond to different RF hop frequencies. The nominal hop rate is 1600 hops/s. All Bluetooth units participating in the piconet are time- and hop-synchronized to the channel.
Here is a real example of the hopping sequence.

Pkt Num	M/S	Freq (MHz)	Master Clk	AM Addr	Pkt Type
0	M	2445	0x034a40a4	AM1	DM1
1	S	2406	0x034a40aa	AM1	DM1
2	M	2465	0x034a40d0	AM1	DM1
3	S	2466	0x034a40d6	AM1	DM1
4	M	2404	0x034a4104	AM1	DM1
5	S	2458	0x034a410a	AM1	DM1
6	S	2411	0x034a410e	AM1	DM1
7	M	2461	0x034a412c	AM1	DM1
8	M	2442	0x034a41d8	AM0	FHS
9	M	2463	0x0012eb20	AM1	DM1
10	M	2467	0x0012eb24	AM1	DM1
11	S	2434	0x0012eb76	AM1	DM1
12	S	2438	0x0012eb7a	AM1	DM1

13	M	2457	0x0012eb7c	AM1	DM1
14	S	2466	0x0012eb7e	AM1	DM1
15	M	2418	0x0012eb84	AM1	DM1
16	S	2411	0x0012ebd6	AM1	DM1
17	S	2413	0x0012ebda	AM1	DM1
18	M	2446	0x0012ebdc	AM1	DM1
19	M	2448	0x0012ebe0	AM1	DM1
20	S	2477	0x0012ec32	AM1	DM1

TIME SLOTS

The channel is divided into time slots, each 625 μs in length. The time slots are numbered according to the Bluetooth clock of the piconet master. The slot numbering ranges from 0 to $2^{27}-1$ and is cyclic with a cycle length of 2^{27}. In the time slots, master and slave can transmit packets.

A TDD scheme is used where master and slave alternatively transmit, see Figure 2 The master shall start its transmission in evennumbered time slots only, and the slave shall start its transmission in oddnumbered time slots only. The packet start shall be aligned with the slot start. Packets transmitted by the master or the slave may extend over up to five time slots.

The RF hop frequency shall remain fixed for the duration of the packet. For a single packet, the RF hop frequency to be used is derived from the current Bluetooth clock value. For a multi-slot packet, the RF hop frequency to be used for the entire packet is derived from the Bluetooth clock value in the first slot of the packet. The RF hop frequency in the first slot after a multi-slot packet shall use the frequency as determined by the current Bluetooth clock value. Figure 3 illustrates the hop definition on single- and multi-slot packets. If a packet occupies more than one time slot, the hop frequency applied shall be the hop frequency as applied in the time slot where the packet transmission was started.

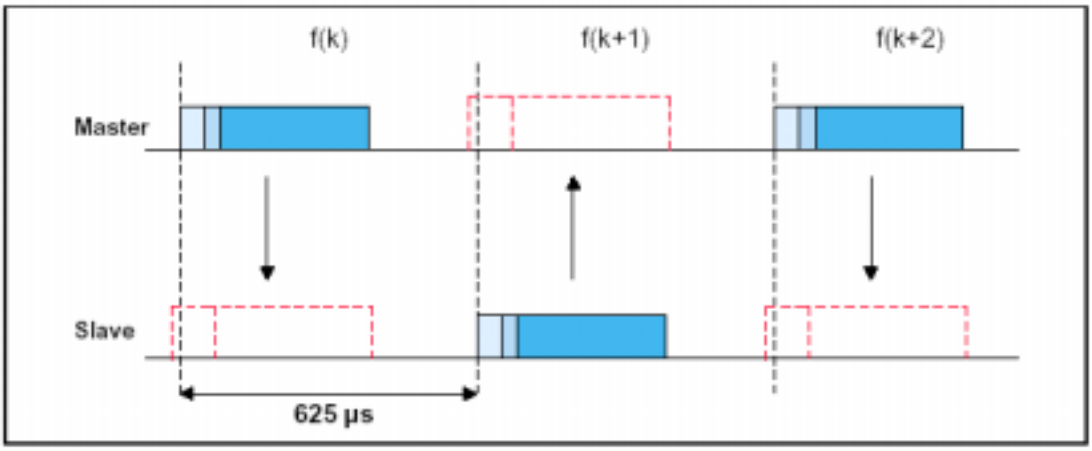
f(k)
f(k+1)
f(k+2)
Master
Slave
625 µs

Fig 2

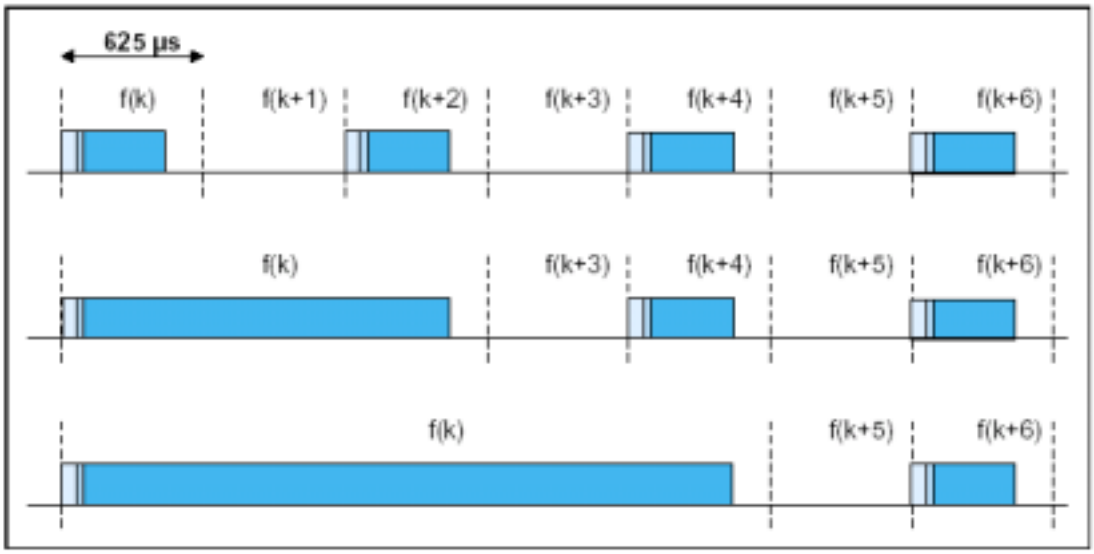
625 µs
f(k)
f(k+1)
f(k+2)
f(k+3)
f(k+4)
f(k+5)
f(k+6)
f(k)
f(k+3)
f(k+4)
f(k+5)
f(k+6)
f(k)
f(k+5)
f(k+6)

Fig 3