GBDA60 User Guide

1. Introduction

This document specifies the ways for simple use to GBDA60 .

2. User interface tables

2.1 Press

Function	GSH300	GBDA60	Button
Power On	/	Off	Long-press (2s) PAP until blue LED flashes
Pairing	Pairing	Off	Very-long-press (5s) PAP until LED flashes blue/red
Initiate connect	On and no AV connect	On and in Standby state	Short-press (1s) PAP
Power Off	/	On	Very-long-press (5s) PAP until red LED flashes

Note: A Short Press is assumed to be any button press less than or equal to 1 seconds. A Long Press is assumed to be any button press longer than 2 seconds. See the following tables for detailed press-functionality descriptions

2.2 LED

GBDA60 State	Blue LED	Red LED
Power off	OFF	OFF
Pairing mode	Blue LED and Red LED flash by turns	Red LED and Blue LED flash by turns
Pairing successful	Flash 3 times	OFF
Standby(no audio channel)	Flash 1 time every 2s	OFF
Active mode (audio channel open)	Flash 3 times in 500ms,long off 2s	OFF
Standby(Low battery)	Flash 1 time every 2s	Flash 1 time every 5s
Active mode(Low battery)	Flash 3 times in 500ms,long off 2s	Flash 1 time every 5s
Charging mode	Across to the status	On until charging is over

Note : Full battery voltage has been set to 3.7V
Low battery voltage has been set to 3.3V
Shutdown voltage has been set to 3.0V
To temporarily return from shutdown point change battery

2.3 PIO Assignment

PIO	Definition	Function
PIO0	REDLED_ENA	Blue led control
PIO1	BLUELED_ENA	Red led control
PIO3	PAP	Power and pairing button, pairing/connect/ power on/power off
PIO9	POWER_HOLD	Power on/off control

3.TRANSMITTER CHARACTERISTICS

The requirements stated in this section are given as power levels at the antenna connector of the equipment. If the equipment does not have a connector, a reference antenna with 0 dBi gain is assumed.
Due to difficulty in measurement accuracy in radiated measurements, it is preferred that systems with an integral antenna provide a temporary antenna connector during type approval.
If transmitting antennas of directional gain greater than 0 dBi are used, the applicable paragraphs in ETSI 300 328 and FCC part 15 must be compensated for.
The equipment is classified into three power classes.

Power Class	Maximum Output Power (Pmax)	Nominal Output Power	Minimum Output Power[1)]	Power Control
1	100 mW (20 dBm)	N/A	1 mW (0 dBm)	Pmin<+4 dBm to Pmax Optional: Pmin[2)] to Pmax
2	2.5 mW (4 dBm)	1 mW (0 dBm)	0.25 mW (-6 dBm)	Optional: Pmin[2)] to Pmax
3	1 mW (0 dBm)	N/A	N/A	Optional: Pmin[2)] to Pmax

Table 3.1: Power classes

Note 1. Minimum output power at maximum power setting.

Note 2. The lower power limit Pmin<-30dBm is suggested but is not mandatory, and may be chosen according to application needs.

A power control is required for power class 1 equipment. The power control is used for limiting the transmitted power over 0 dBm. Power control capability under 0 dBm is optional and could be used for optimizing the power consumption and overall interference level. The power steps shall form a monotonic sequence, with a maximum step size of 8 dB and a minimum step size of 2 dB.
A class 1 equipment with a maximum transmit power of +20 dBm must be able to control its transmit power down to 4 dBm or less.

Equipment with power control capability optimizes the output power in a link with LMP commands . It is done by measuring RSSI and report back if the power should be increased or decreased.

Note that power class 1 must not be used for sending packets from one device to another if the receiving side of a connection does not support the necessary messaging for power control of the sending side (i.e. RSSI measurements and related messages). In this case, the transmitter should comply with the rules of a class 2 or class 3 transmitter.

Also note that if a class 1 device is paging or inquiring very close to another device, the input power could be larger than the requirement in 4.5 Maximum usable level. This can cause the listening device to fail to respond. It is therefore useful to page and inquireas well using transmission according to power class 2 or class 3.

3.1 MODULATION CHARACTERISTICS

The Modulation is GFSK (Gaussian Frequency Shift Keying) with a BT=0.5. The Modulation index must be between 0.28 and 0.35. A binary one is represented by a positive frequency deviation, and a binary zero is represented by a negative frequency deviation. The symbol timing shall be better than ±20 ppm.

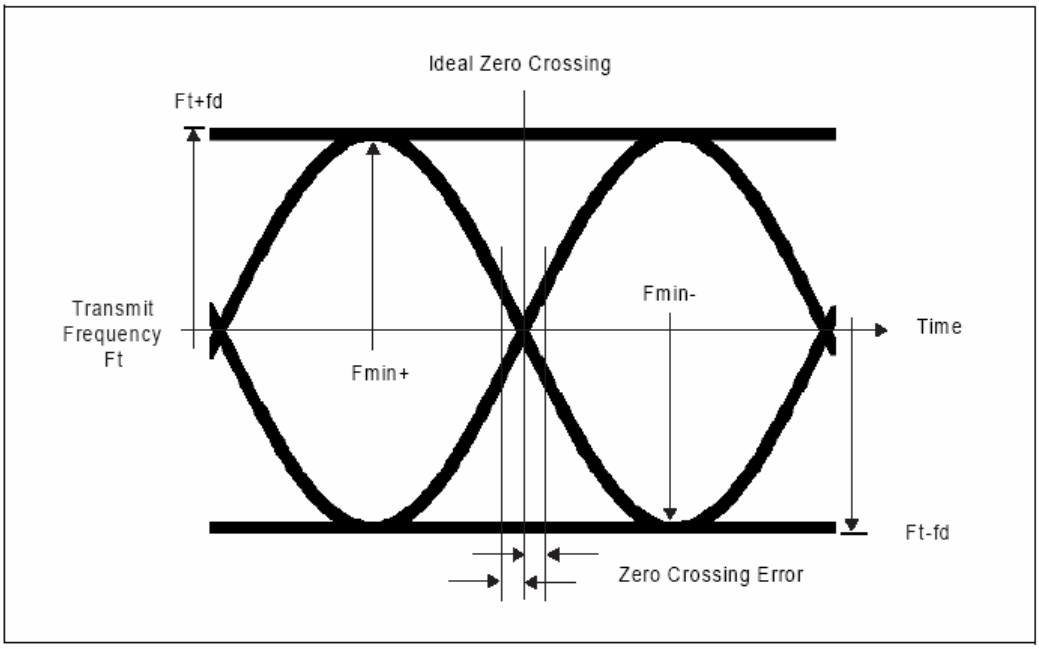

Figure 3.1: Figure 3-1 Actual transmit modulation.

For each transmit channel, the minimum frequency deviation (Fmin = the lesser of {Fmin+, Fmin-}) which corresponds to 1010 sequence shall be no smaller than ±80% of the frequency deviation (fd) which corresponds to a 00001111 sequence.
In addition, the minimum deviation shall never be smaller than 115 kHz. The

data transmitted has a symbol rate of 1 Ms/s.

The zero crossing error is the time difference between the ideal symbol period and the measured crossing time. This shall be less than ± 1/8 of a symbol period.

3.2 SPURIOUS EMISSIONS

The spurious emission, in-band and out-of-band, is measured with a frequency hopping transmitter hopping on a single frequency; this means that the synthesizer must change frequency between receive slot and transmit slot, but always returns to the same transmit frequency.
For the USA, FCC parts 15.247, 15.249, 15.205 and 15.209 are applicable regulations.
For Japan, RCR STD-33 applies and, for Europe, ETSI 300 328.

3.2.1 In-band Spurious Emission

Within the ISM band the transmitter shall pass a spectrum mask, given in Table 3.2. The spectrum must comply with the FCC's 20-dB bandwidth definition and should be measured accordingly. In addition to the FCC requirement an adjacent channel power on adjacent channels with a difference in channel number of two or greater an adjacent channel power is defined. This adjacent channel power is defined as the sum of the measured power in a 1 MHz channel. The transmitted power shall be measured in a 100 kHz bandwidth using maximum hold. The transmitter is transmitting on channel M and the adjacent channel power is measured on channel number N. The transmitter is sending a pseudo random data pattern throughout the test.

Frequency offset	Transmit Power
± 500 kHz	-20 dBc
|M-N| = 2	-20 dBm
|M-N| ≥ 3	-40 dBm

Table 3.2: Transmit Spectrum mask.

Note: If the output power is less than 0dBm then, wherever appropriate, the FCC's 20 dB relative requirement overrules the absolute adjacent channel power requirement stated in the above table.

Exceptions are allowed in up to three bands of 1 MHz width centered on a frequency which is an integer multiple of 1 MHz. They must, however, comply with an absolute value of –20 dBm.

3.2.2 Out-of-Band Spurious Emission

The measured power should be measured in a 100 kHz bandwidth.

Frequency Band	Operation mode	Idle mode
30 MHz - 1 GHz	-36 dBm	-57 dBm
1 GHz – 12.75 GHz	-30 dBm	-47 dBm
1.8 GHz – 1.9 GHz	-47 dBm	-47 dBm
5.15 GHz – 5.3 GHz	-47 dBm	-47 dBm

Table 3.3: Out-of-band spurious emission requirement

3.3 RADIO FREQUENCY TOLERANCE

The transmitted initial center frequency accuracy must be ±75 kHz from F_C.
The initial frequency accuracy is defined as being the frequency accuracy before any information is transmitted. Note that the frequency drift requirement is not included in the ±75 kHz.
The transmitter center frequency drift in a packet is specified in Table 3.4. The different packets are defined in the Baseband Specification.

Type of Packet	Frequency Drift
One-slot packet	±25 kHz
Three-slot packet	±40 kHz
Five-slot packet	±40 kHz
Maximum drift rate[1)]	400 Hz/µs

Table 3.4: Frequency drift in a package

Note 1. The maximum drift rate is allowed anywhere in a packet.

Federal Communications Commission (FCC) Statement

15.21
You are cautioned that changes or modifications not expressly approved by the part responsible for compliance could void the user's authority to operate the equipment.

15.105(b)
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-Reorient or relocate the receiving antenna.
-Increase the separation between the equipment and receiver.
-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
-Consult the dealer or an experienced radio/TV technician for help.

Operation is subject to the following two conditions:

1) this device may not cause interference and

2) this device must accept any interference, including interference that may cause undesired operation of the device.

FCC RF Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.