

GWK5NO_SW 2.4GHz Wireless Subwoofer Module

1. General Description

GWK5NO_SW is the optimized module dedicated for the wireless subwoofer application, it balance well between the cost and performance by utilizing the fact of subwoofer limited frequency response bandwidth. The narrow bandwidth enables GWK5NO_SW to transmit enough redundant data to combat with the 2.4GHz interference thus maintain the good co-existence performance in the 2.4GHz ISM band.

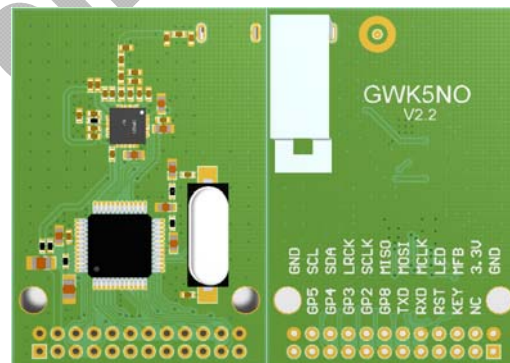
Inheriting from its GWK5 family, GWK5NO_SW features both good wireless performance and audio performance. GWK5NO_SW has good RF co-existence and robust link quality, can combat the most interference from the crowded 2.4G ISM band.

GWK5NO_SW uses non-compression PCM signal and 24bit high precision thus delivering very low THD audio. By adopting advance forward error correction and error concealment algorithm, GWK5NO_SW can reach <15ms latency, this makes it ideal for the Video synchronization, Home Theater applications.

GWK5NO_SW is ideal for the subwoofer application not only by its competitive cost, but also by its flexibility for customized functions. The SW crossover frequency can be adjusted easily by the digital filter, and the general purpose I2C can be used to control customer peripheral unit to eliminate an extra microcontroller.

2. Applications

- 5.1 Subwoofer Speaker
- 2.1 Subwoofer Speaker
- Soundbar Subwoofer
- DVD



3. Features

- 2.4GHz AFH Solution
- 24bit high precision digital audio, SNR>115dB
- I2S digital audio interface support most audio ADCs, DACs, DSPs. Supporting Sample rate 32/44.1/48/88.2/96KHz
- Optimized for subwoofer application, 20~600Hz bandwidth
- Co-existence: small foot-print(2MHz bandwidth) enabling better 2.4GHz co-existence
- Low Power: TX: 55mA/3.3V @ +5dBm RF Output, RX: 55mA/3.3V
- RF Range: 20m+ indoor
- Pairing function to support multi TX/RX operating simultaneously
- Power management function and control for green power policy
- General purpose I2C for digital amplifier control
- Flexible design, custom functions supported

4. Electrical Specification

	Description	Min/Typical/Max
General	Supply voltage	T/RX:3.3V
	Supply current	T/RX: 55mA
	Operation temperature	-10 ~ +60°C
RF	RF Frequency	2400 ~ 2483MHZ
	Modulation	GFSK
	Data rate	2M bps
	TX Power	5dBm
	RX Sensitivity	-90dBm
	RF Channels	16
	RF Range	20m+ indoor
	Output/input gain	1:1
	Frequency response	20Hz ~ 600Hz (-3dB)
	Latency	<15ms
	S/N ratio	115dB
	THD	< 0.1% @ 100Hz
	Dynamic range	90dB

Table [1]: Electrical Specification

5. GWK5NO_SW Pin Assignment



Pin #	Pin name	Type	Description
1	GND	P	Ground
2	3.3V	P	+3.3V Power Input
3	MFB	I/O	press long than 10s to enter pairing mode.
4	LED	I/O	Status LED output
5	MCLK	O	I2S Master Clock Output
6	MOSI	I/O	I2S Data Output
7	MISO	I/O	I2S Data Input
8	SCLK	I/O	I2S Bit Clock Output
9	LRCK	I/O	I2S Left and Right Clock Output
10	SDA	I/O	I2C Clock or MUTE Control, firmware configurable. When used as I2C, External 4.7K pull-up resistor required.
11	SCL	I/O	I2C Data or Standby Control, firmware configurable. When used as I2C, External 4.7K pull-up resistor required.
12	GND	P	Ground
13	NC	NA	Not Connected
14	GP5	P	General purpose IO
15	GP4	I/O	General purpose IO
16	GP3	I/O	General purpose IO
17	GP2	I/O	General purpose IO
18	GP8	I/O	General purpose IO
19	TXD	I/O	UART TX

20	RXD	I/O	UART RX
21	RST	I	Reset input, active low
22	KEY	I/O	Built-in ADC for KEY
23	NC	NA	Not Connected
24	NC	NA	Not Connected

Table [2]. GWK5NO_SW Pin Description

For ALCO only V1.01

6. I2S Digital Audio Interface

GWK5NO_SW supports 3 digital audio interface modes: Left justify mode, I2S mode and Right justify mode.

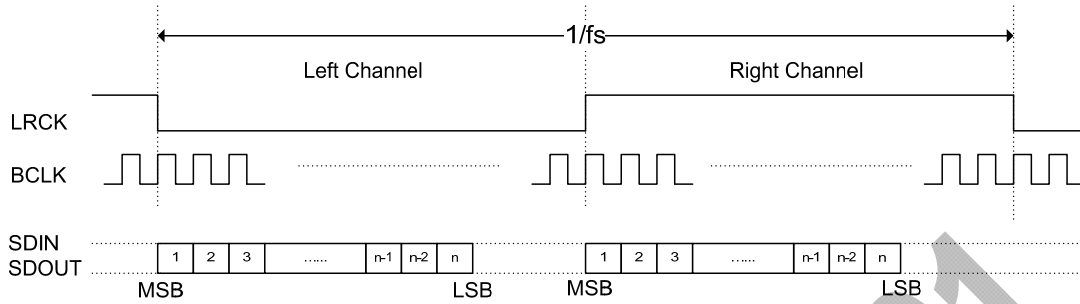


Figure [1]. Left Justify Mode

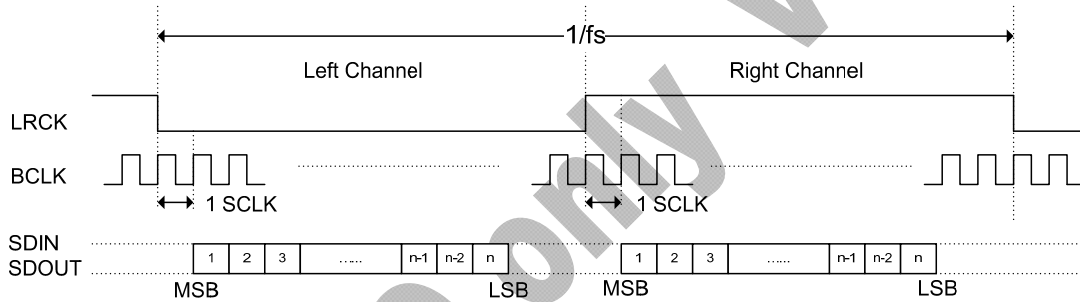


Figure [2]. Default I2S Mode

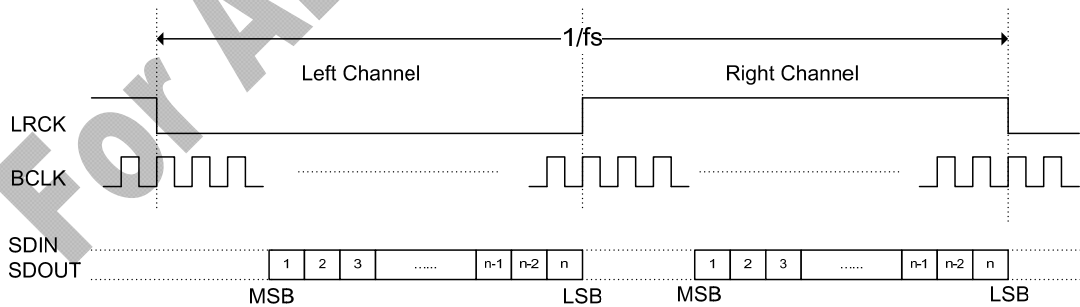


Figure [3]. Right Justify Mode

7. I2C Control Interface

GWK5A3T/R features a standard I2C Control interface. The I2C can work as a master or a slave,

It can be used to control the peripheral devices or be controlled by the external MCU / DSP.

GWK5A3T/R features a two way wireless logical data channel; The I2C can also be used to exchange the control information between the TX and RX side.

I2C Address is 0x0e, it is configurable by firmware.

Register	Bit	R/W	Reset	Description
0x00: Control	0: Mute	R/W	0	0: Mute off 1: Mute on
	1: Power	R/W	1	0: Power Off 1: Power On
	2; Link Status	R	0	0: Not Linked 1: Linked
	3: Standby	R/W		0: Standby off 1: Standby on
	4-5: Pairing	R/W	0	Write 1 to Enter pairing mode Read back: 0: Normal Mode 1: Pairing in progress, pairing will be timeout in 30 seconds. 2: Paired with success 3: Pairing failed, time is out
	6-7: Reserved	R/W	0	
0x01: Volume	0-7	R/W	0	Volume 0dB to -48dB 0x00: 0dB 0xd0: -48dB
0x02: Treble	0-7	R/W	0	Treble -14dB to + 14dB 0xf2: -14dB 0x00: 0dB 0x0e: +14dB
0x03: Bass	0-7	R/W	0	Bass -14dB to + 14dB 0xf2: -14dB 0x00: 0dB 0x0e: +14dB
0x04: Balance	0-7	R/W	0	Balance -12dB to + 12dB 0xf4: -12dB 0x00: 0dB 0x0c: +12dB

Table[4] I2C Registers

GWK5NO_SW I2S interface can work as master or slave mode, the IO pin function is described below. The default configuration is GWK5NO_SW Tx in I2S slave mode, and GWK5NO_SW RX in left justify master mode. Other configurations are available upon customer request.

	Master Mode	Slave Mode
MCLK	Output, Driving the external DSP or Codec	Non function, can be left open
BCLK	Output, Driving the external DSP or Codec	Input, Driven by the external DSP or Codec
LRCK	Output, Driving the external DSP or Codec	Input, Driven by the external DSP or Codec
MISO	PCM Data Input	PCM Data Output
MOSI	PCM Data Output	PCM Data Input

Table [3]: GWK5NO_SW I2S Interface

For ALCO only

8. Application Schematic

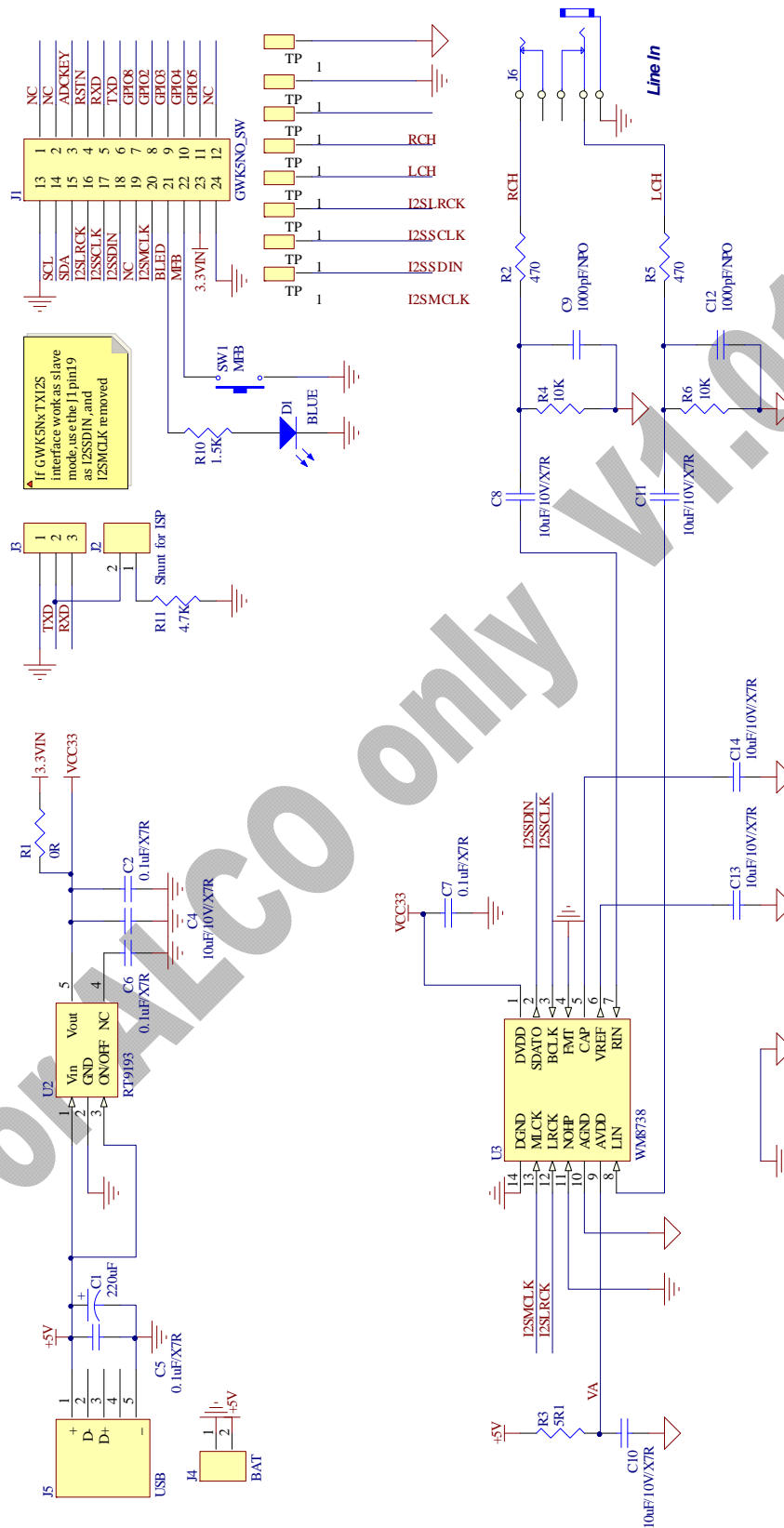


Figure [5]: GWK5NO_SW Interfacing with ADC

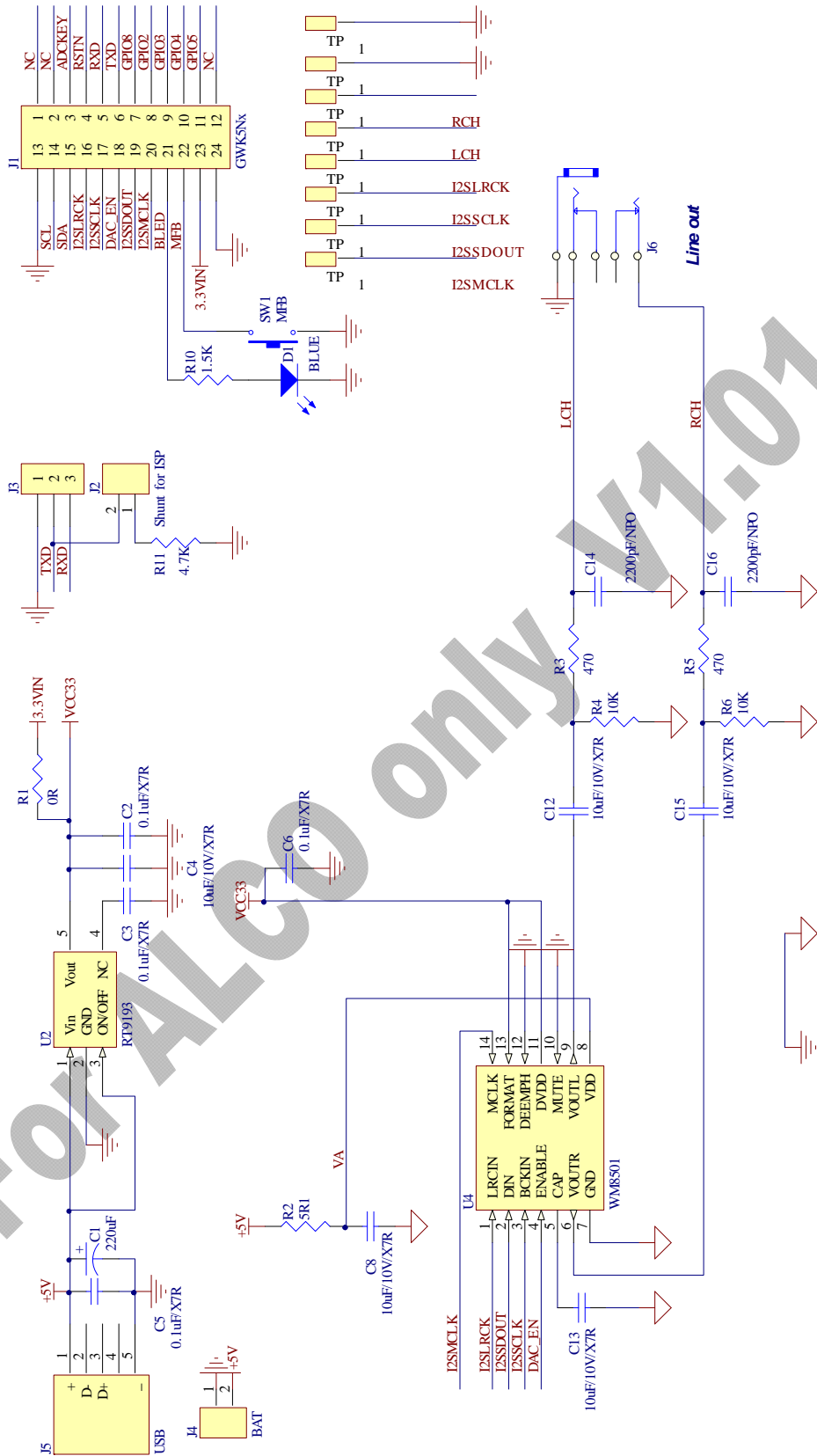


Figure [6]: GWK5NO_SW Interfacing with DAC

9. ISP Firmware Updating

GWK5NO_SW support ISP firmware updating through UART, Connect the download tool as Figure [8] then restart the module, GWK5NO_SW will enter the ISP mode.

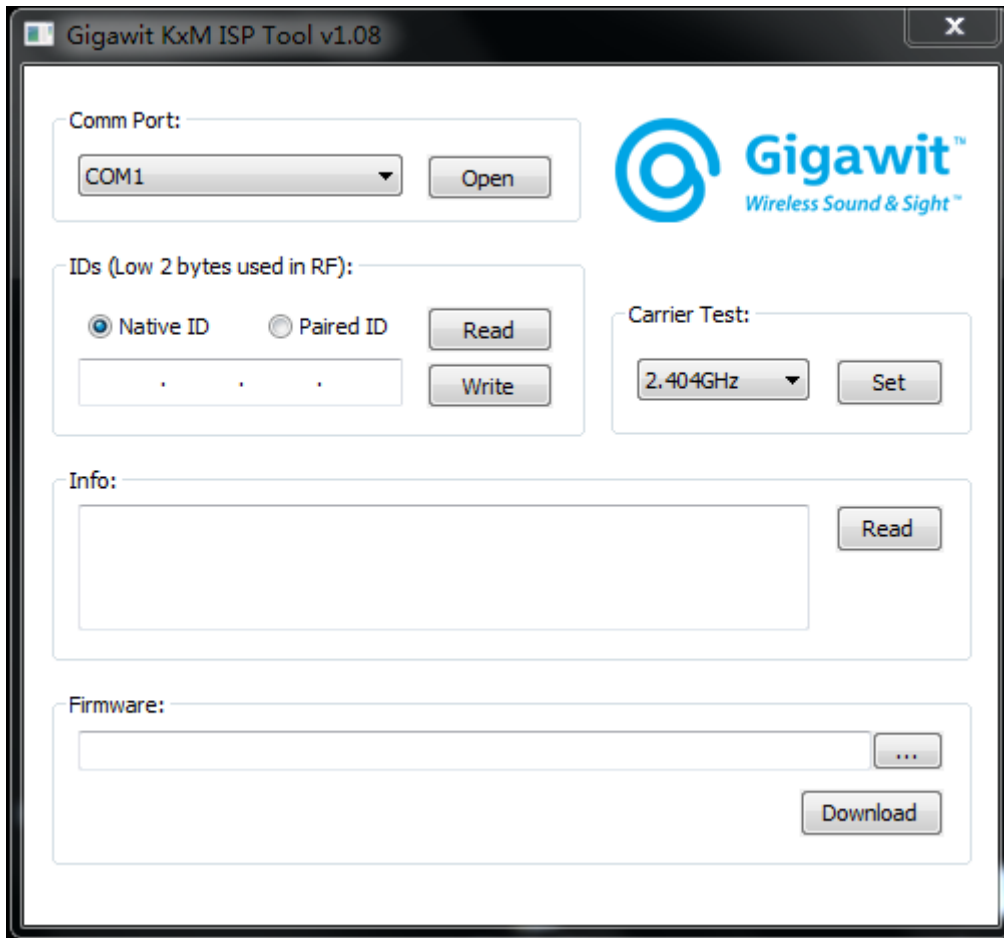


Figure [7]: Gigawit ISP tool

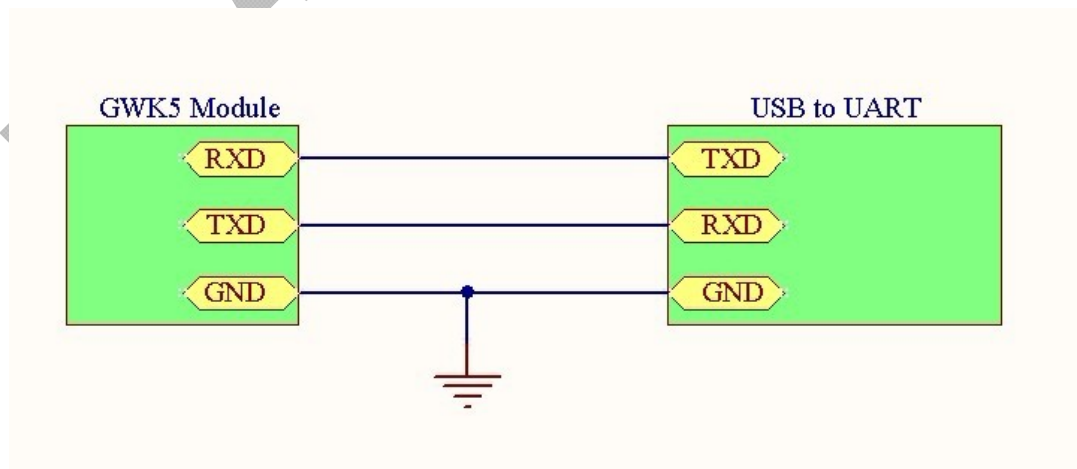


Figure [8]: Gigawit ISP Connection

10. Pairing

GWK5NO_SW support ID matching to enable multi TX/RX operating in a same area. The RX will only receive the paired TX audio signals. To pair the TX and RX module, follow the below steps.

- 1) Press the TX key long than 10 seconds Until the LED change into flashing fast. Release the key.

After this, The TX Module will stay into Pairing Mode for 30 seconds until it find the RX (the RX must be in Pairing Mode in 30 seconds, see Step 3).If the TX found the RX in 30 seconds and paired, the LED will turn to solid and quit the Pairing Mode, or it will be time out after 30 seconds and turn the Pairing Mode into the Idle Mode.

- 2) Press the RX key long than 10 seconds Until the LED change into flashing fast. Release the key.

After this, The RX Module will stay into Pairing Mode for 30 seconds until it find the TX (the TX must be in Pairing Mode, see Step 2) If the RX found the TX in 30 seconds and paired, the LED will turn to solid and quit the Pairing Mode, or it will be time out after 30 seconds and turn the Pairing Mode into the Idle Mode.

- 3) When the TX and the RX are paired, The TX/RX LED will stay in solid .the RX can receive the TX signal.

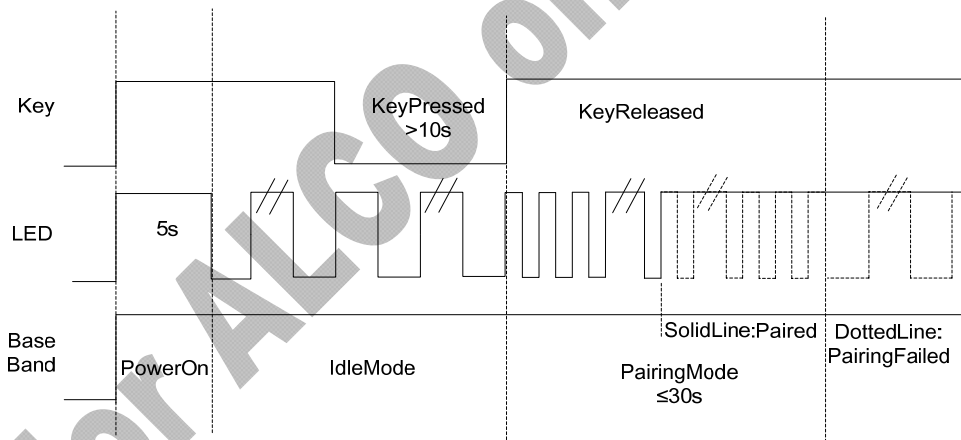


Figure [9]: Key and LED Timing at pairing mode

Physical Dimension

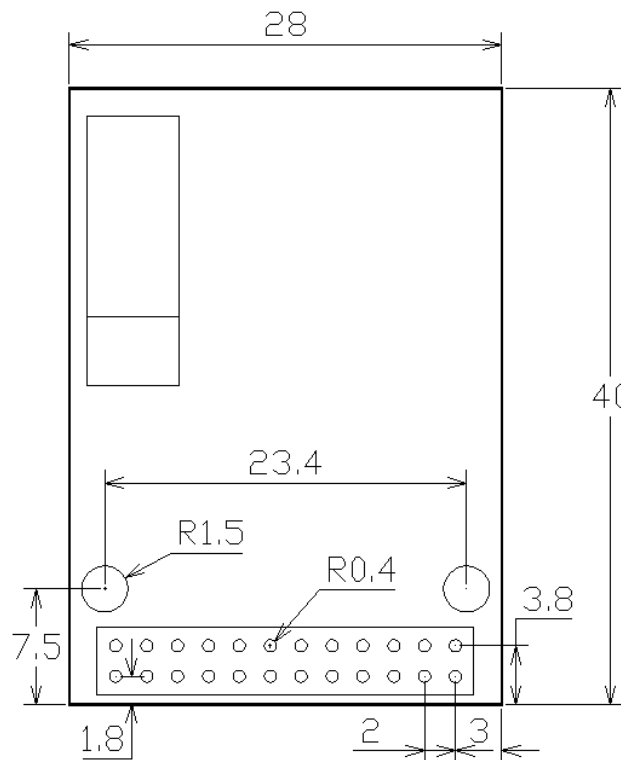
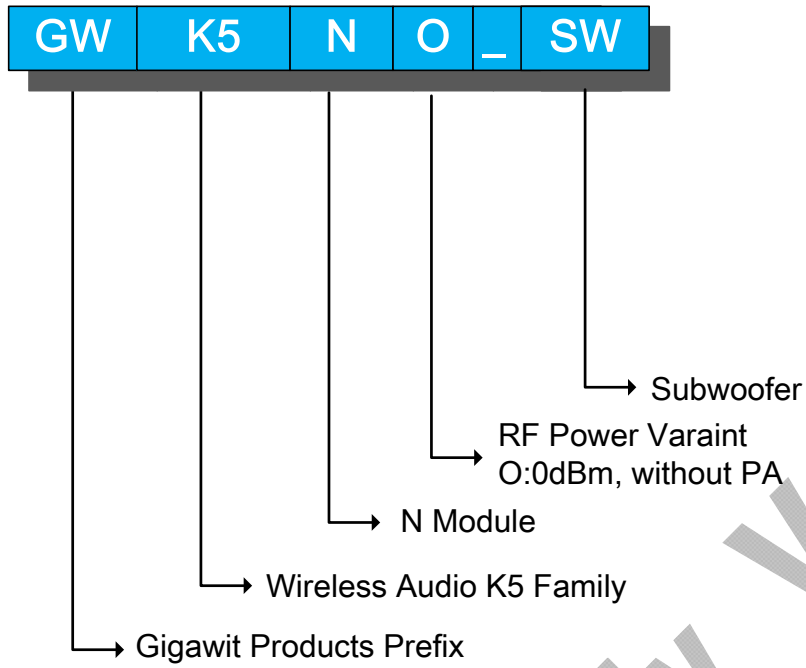


Figure [11]. GWK5NO_SW Module outline

11. Naming Rule



12. Ordering Information

Gigawit ID.	Description
GWK5NO_SW1	GWK5NO_SW TX I2S slave mode RX I2S master mode
GWK5NO_SW2	GWK5NO_SW TX I2S master mode RX I2S master mode

13. Contact

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14. Revision History

2012-3-14 Version 1.0, Original version
2012-04-16 Version 1.01, modify some description about PIN name