

## 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.

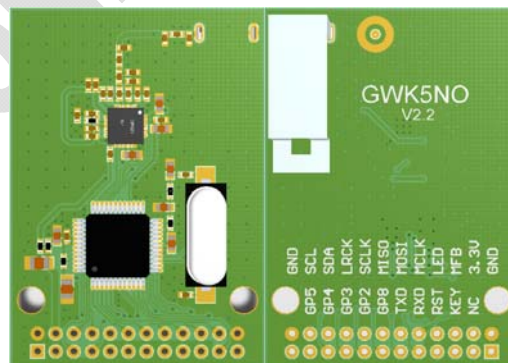
Inheriting from its GWK5 family, GWK5NO\_SW features both good wireless performance and audio performance. GWK5NO\_SW has good RF co-existence and robust link quality, can combat the most interference from the crowded 2.4G ISM band.

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
- Optimized for subwoofer application, 20~250Hz 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: 15m+ indoor
- Pairing function to support multi TX/RX operating simultaneously
- Optional I2S digital audio interface support most audio ADCs and DACs
- 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
<b>General</b>	Supply voltage	T/RX:3.3V
	Supply current	T/RX: 55mA
	Operation temperature	-10 ~ +60°C
<b>RF</b>	RF Frequency	2400 ~ 2483MHZ
	Modulation	GFSK
	Data rate	2M bps
	TX Power	5dBm
	RX Sensitivity	-90dBm
	RF Channels	16
	RF Range	15m+ indoor
	Output/input gain	1:1
	Frequency response	20Hz ~ 250Hz (-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	Power or pairing key input, press long than 3s to turn on or off the module, press long than 10s to enter pairing mode.
4	LED	I/O	Status LED output
5	MCLK	O	I2S Master Clock Output, NC when I2S is in slave mode
6	I2SMOSI	I/O	I2S Data Master Output / Slave Input
7	I2SMISO	I/O	I2S Data Master Input / Slave Output
8	SCLK	I/O	I2S Bit Clock Input / Output
9	LRCK	I/O	I2S Left and Right Clock Input / Output
10	SDA /STANDBY	I/O	I2C Data or Standby Control, firmware configurable. For Standby mode, A high level will be asserted when no TX signal >5s. When used as I2C, External 4.7K pull-up resistor required.
11	SCL /MUTE	I/O	I2C Clock or MUTE 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

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## 6. I2S Digital Audio Interface

GWK5NO\_SW supports 3 digital audio interface modes: Left justify mode, I2S mode and Right justify mode.

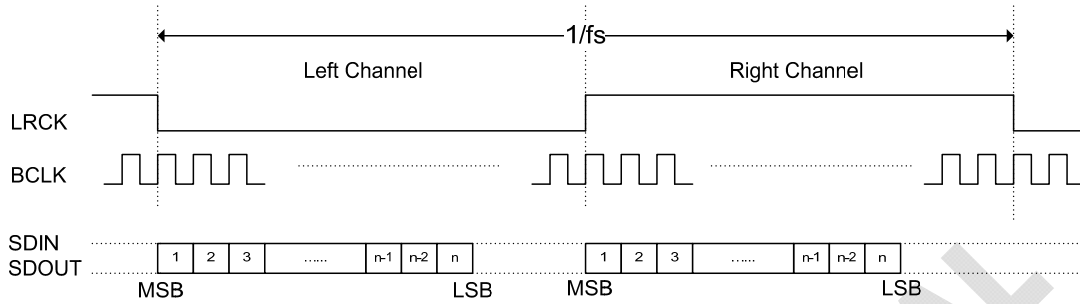


Figure [1]. Left Justify Mode

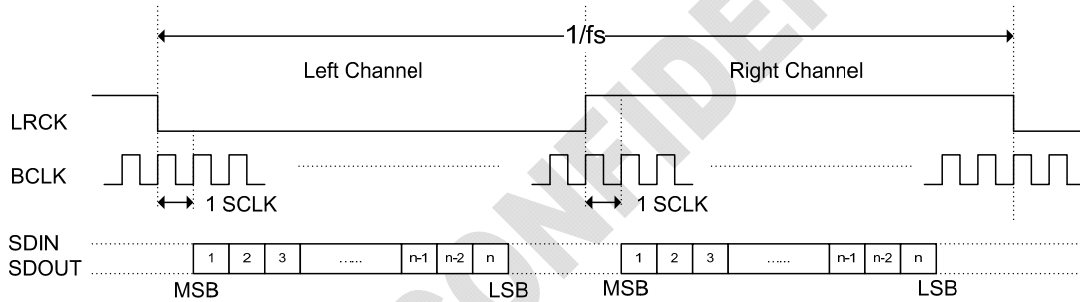


Figure [2]. Default I2S Mode

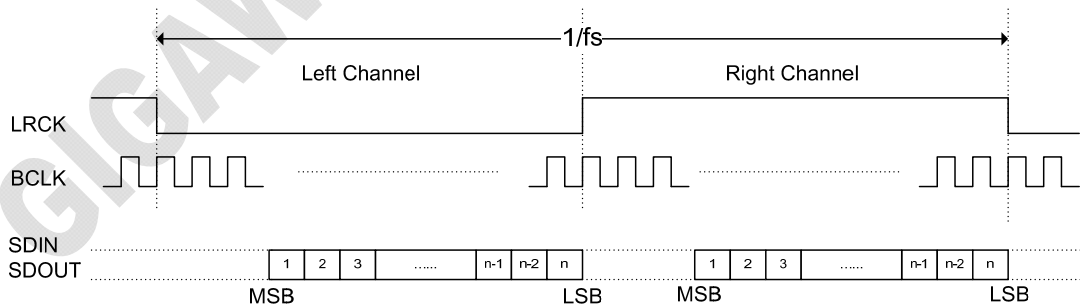


Figure [3]. Right Justify Mode

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.

	<b>Master Mode</b>	<b>Slave Mode</b>
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

## 7. Application Schematic

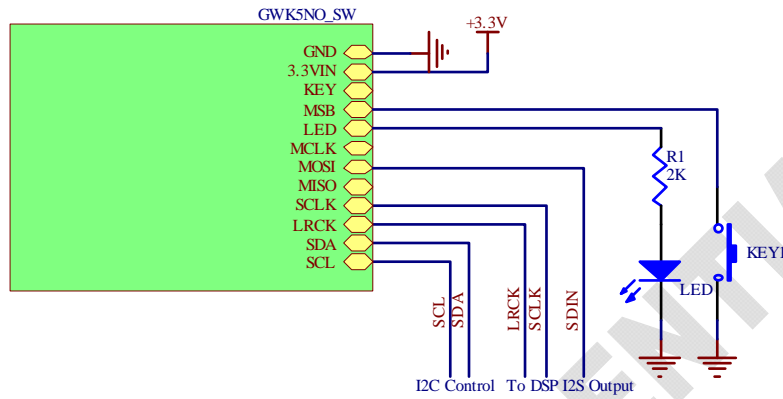


Figure [4]: GWK5NO\_SW Interfacing with DSP (I2S Slave Input Mode)

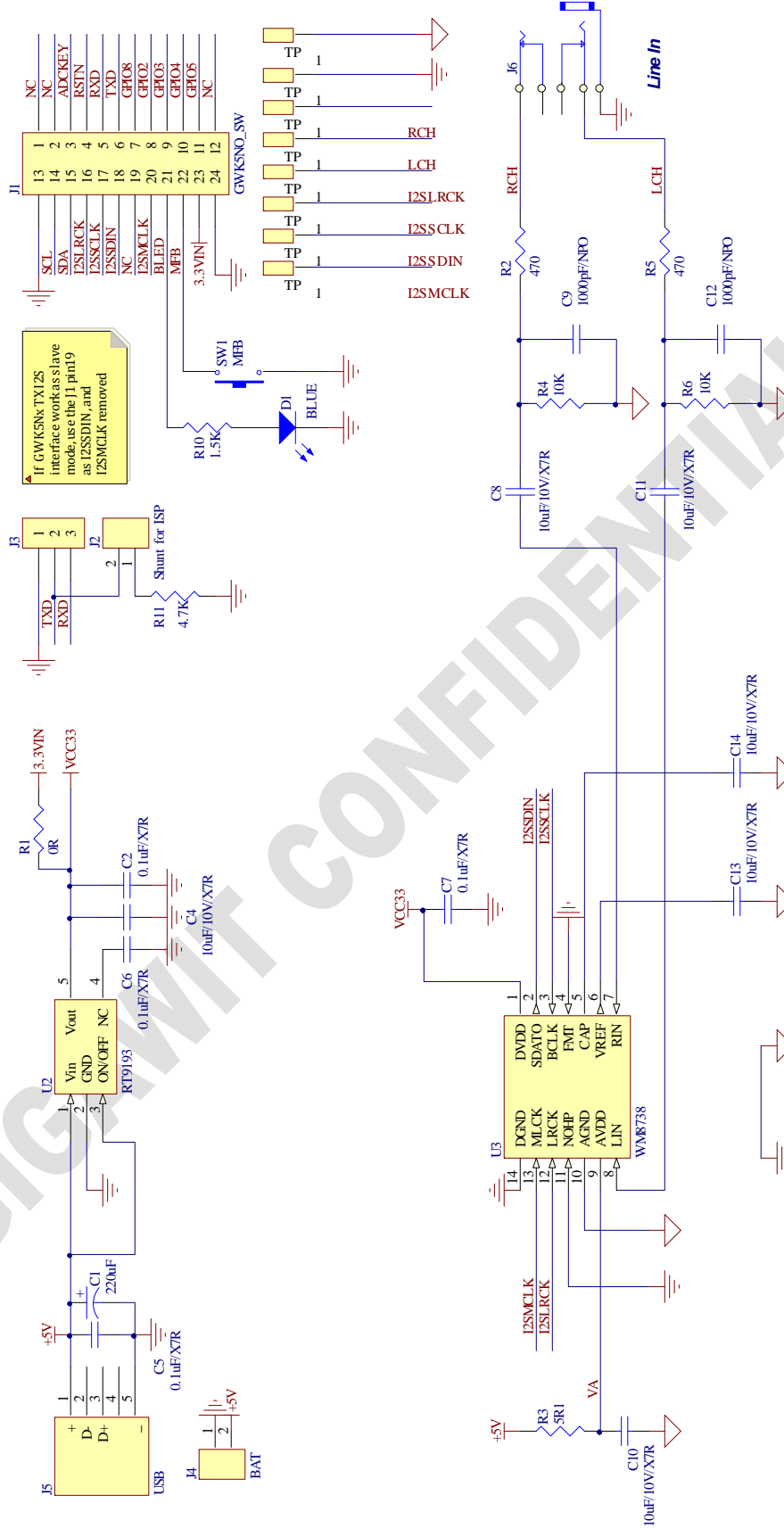


Figure [5]: GWK5NO\_SW Interfacing with ADC



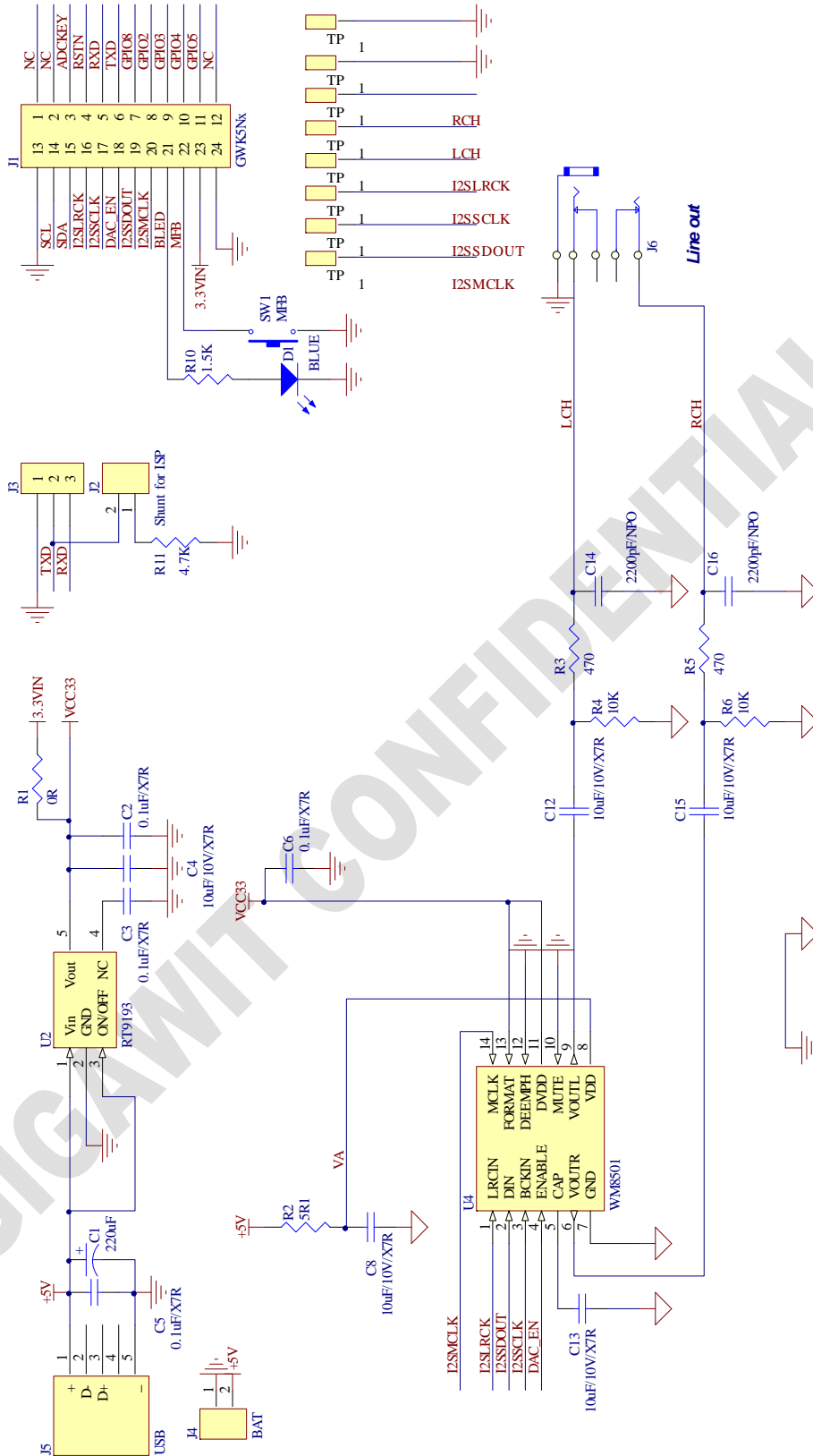


Figure [6]: GWK5NO\_SW Interfacing with DAC

### 8. ISP Firmware Updating

GWK5NO\_SW support ISP firmware updating through UART, When TXD pin connected with a 4.7K resistor to the GND, GWK5NO\_SW will enter the ISP mode.

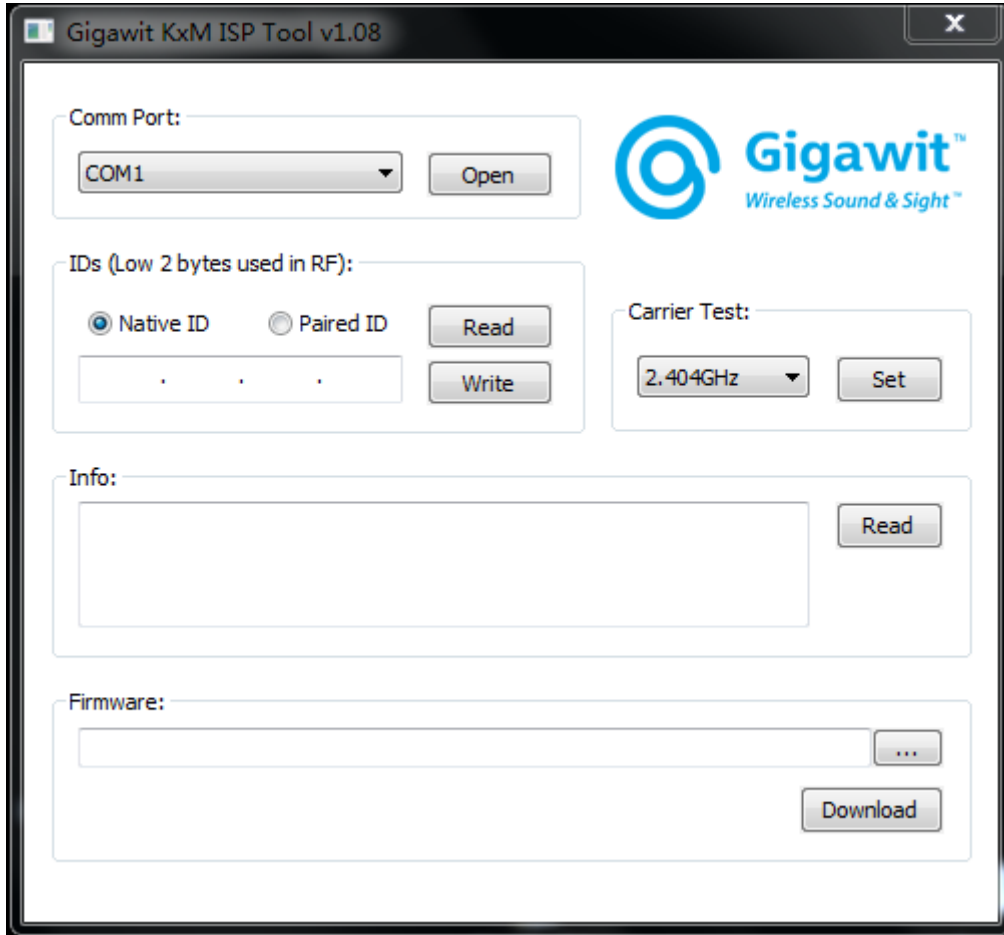


Figure [7]: Gigawit ISP tool

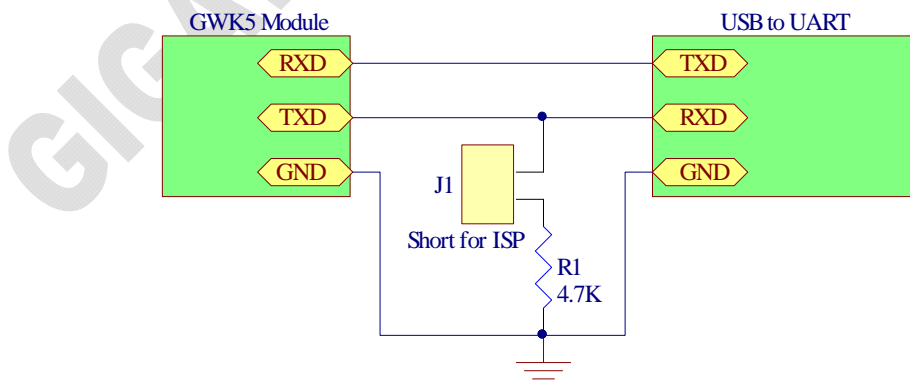


Figure [8]: Gigawit ISP Connection

### 9. 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) Power on the TX and RX Module. The TX/RX LED will keep solid for 5 seconds, and then turn into Idle Mode and flash slowly.
- 2) 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.

- 3) 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.

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

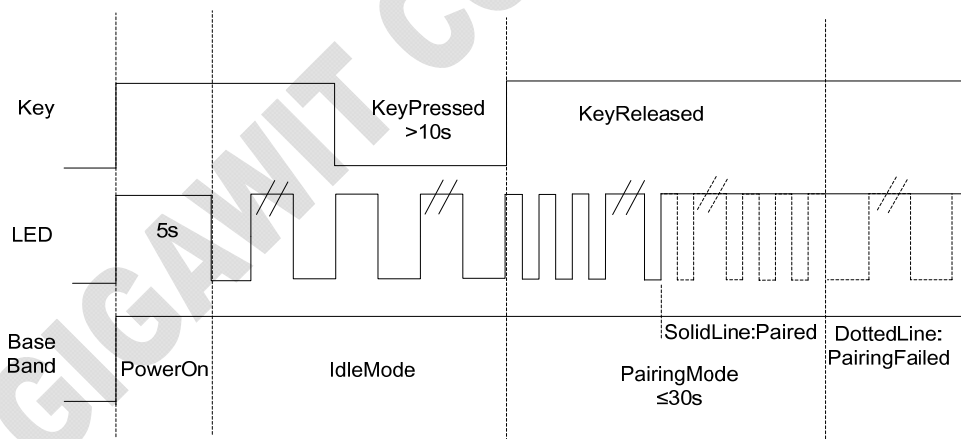


Figure [9]: Key and LED Timing at pairing mode

In some application, a simple pairing method can be implemented by using a slider switch with 4 positions. See the following schematic, 4 IDs can be set using the switch. To be paired, the TX/RX switch S2 should be in the same position. The module will be rebooted when the switch id changed to let the ID be effective. The whole pairing ID is a combination of above KEY/LED pairing ID (stored in EEPROM) and the switch ID(see table [5])

		±5%
1	10K	1.65
2	6.09K	1.25
3	3K	0.75
4	0R	0V

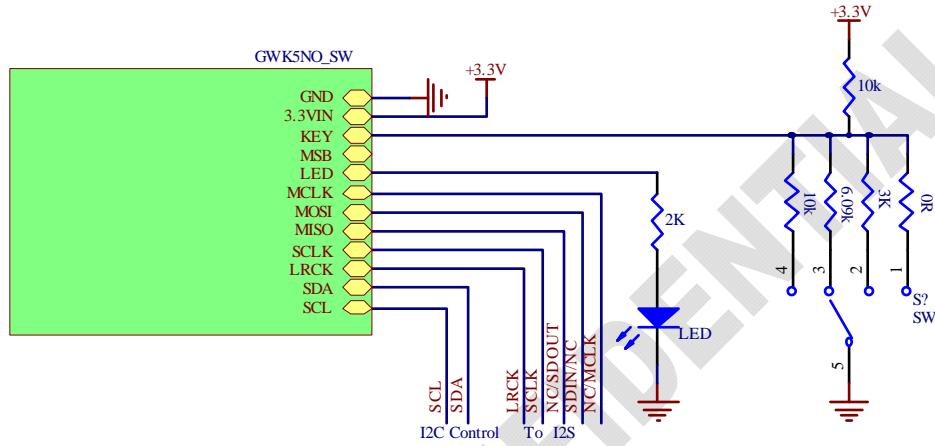


Figure [10]: Simple pairing method

**10. Physical Dimension**

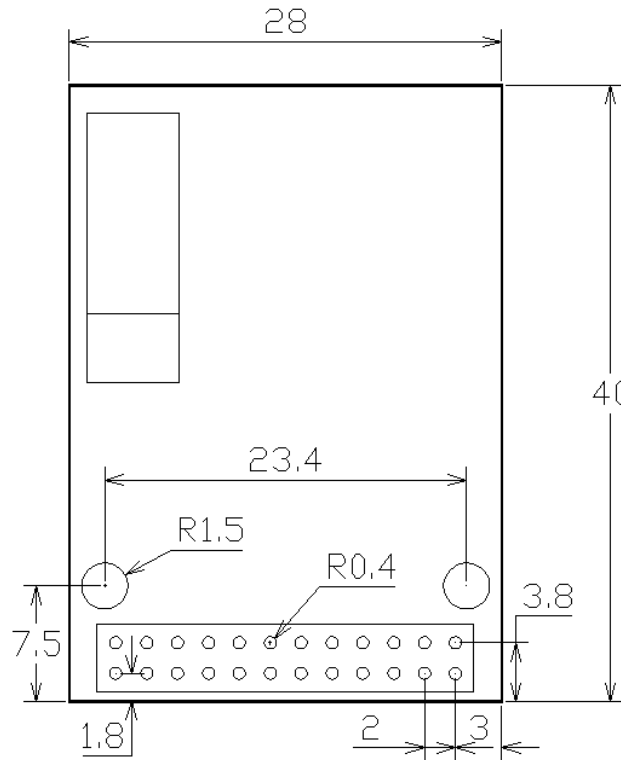
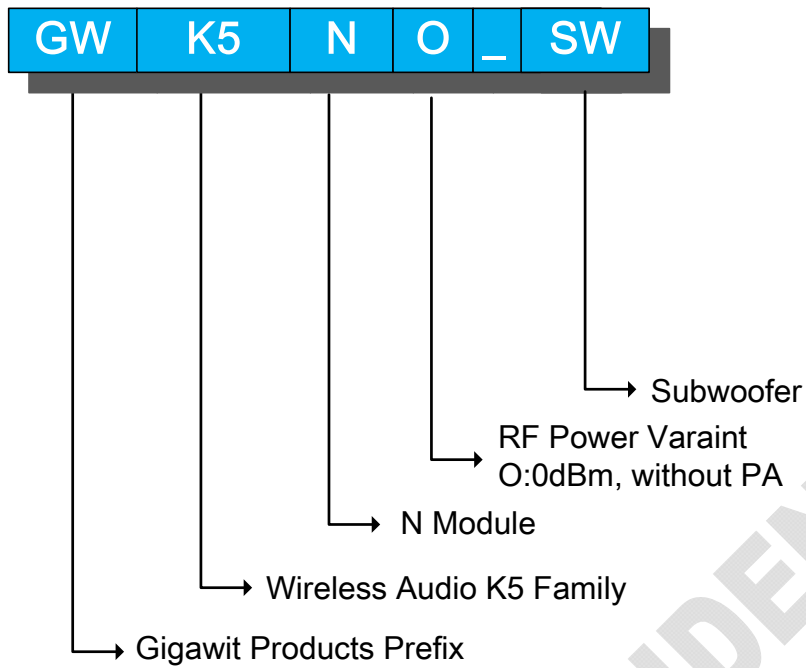


Figure [11]. GWK5NO\_SW Module outline

## 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

2011-06-01      Version 1.0, Original version