SKB376 蓝牙4.2 模组规格书
SKB376 BLE 4.2 Module Datasheet

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1. 简介 Brief Introduction

SKB376 是一个高度集成的蓝牙 4.2 模组，可用来在 2.4GHz ISM 频段内做高速率、短距离无线通信。模组基于 SYD8811 蓝牙无线收发芯片，内部集成 32 位 ARM Cotex-M0 处理器，主频 64MHz，同时内置 32kB RAM 和 512kB Flash，可以支持模拟或者数字外设。SKB376 提供了低功耗高性价比的蓝牙传输应用。

The SKB376 is a highly integrated BLE 4.2 module, designed for high data rate, short-range wireless communication in the 2.4GHz ISM band. The module is based on SYD8811 radio transceiver IC, which integrates a 32 bit ARM Cortex-M0 64MHz CPU, 32kB Data RAM, 512kB Flash memory and analog and digital peripherals. The SKB376 provides a low power and ultra-low cost BLE solution for wireless transmission applications.

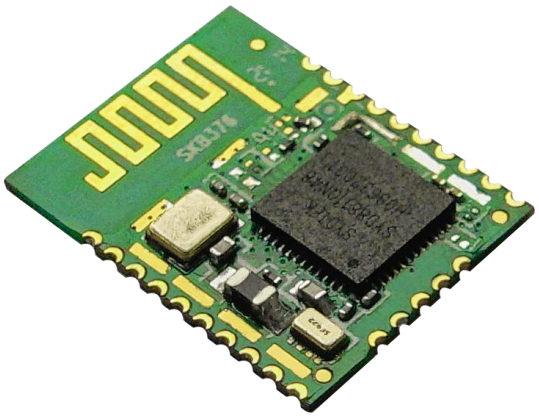

Figure 1: SKB376 Without Shielding

2. 特点 Features

◆主控芯片 Main Chip: SYD8811

◆蓝牙低功耗 4.2 协议 Bluetooth® 4.2 low energy

◆支持串口到蓝牙透传（只做从机） Support UART-to-BLE transparent transmission(Slave only).

◆支持 BLE 速率模式 Supported BLE data rates : 1 Mbps

◆4 路 32 位定时器，支持 RTC 4x32bit timers, RTC support

◆用于人机交互界面的正交解码器 Quadrature decoder for HID usage

◆电容式触控焊盘检测 Cap detection for touch pad

◆支持 32MHz 快速 PWM PWM support up to 32MHz

◆6 通道 10 位 ADC 检测功能 10bit ADC and 6 configurable channels

◆19 通用输入输出管脚 19Digital I/O pins

◆SPI 主机 SPI Master

◆支持双线通信主机（如 I2C）Two-wire Master (I2C compatible)

◆两路 UART Dual UART (CTS/RTS)

◆支持三种异步智能卡，兼容 ISO/IEC 7816-3: 1997

Support 3 kinds of Asynchronous card, compliant to ISO/IEC 7816-3: 1997

◆AES 128 硬件加密 AES 128 HW encryption

◆兼容 ROHS（无铅） ROHS compliance (Lead-free)

3. 应用场景 Applications

◆ 电脑输入输出外设 Computer peripherals and I/O devices

鼠标 Mouse

键盘 Keyboard

多点触控板 Multi-touch trackpad

◆交互式娱乐设备 Interactive entertainment devices

遥控器 Remote controller

3D 眼镜 3D Glasses

游戏控制器 Gaming controller

◆个人局域网 Personal Area Networks

健康传感及监控设备 Health/fitness sensor and monitor devices

医疗设备 Medical devices

遥控钥匙+手表手环 Key-fobs + wrist watches

◆遥控玩具 Remote control toys

◆室内定位蓝牙信标 Indoor Location Beacons

◆彩色遥控 LED 灯 Colourful LED Control

◆楼宇自动化 Building automation

◆传感器网络 Sensor networks.

◆资产追踪 Asset tracking.

Figure 3-1: SKB376 top side

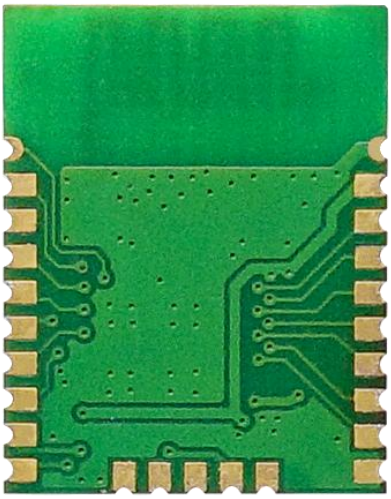

Figure 3-2: SKB376 bottom side

4. 应用框图 Application Block Diagram

SKB376 模组内部集成 1.1V DCDC，默认贴 32.768kHz 晶体和 32MHz 晶体。

SKB376 module integrates 1.1V DCDC. The 32.768kHz and 32MHz crystal is default mounted.

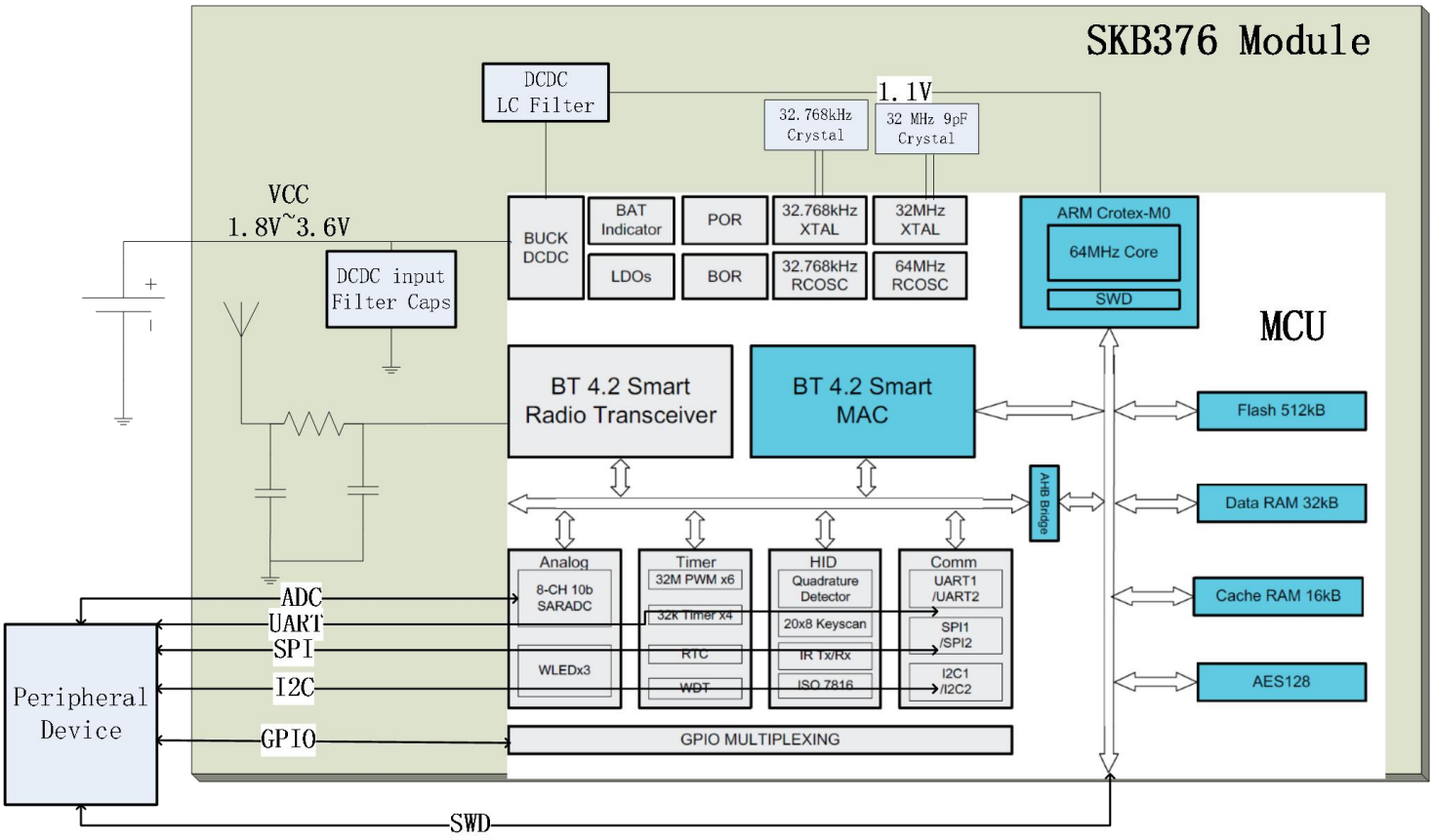

Figure 4: SKB376 Block Diagram

5. 管脚定义 Pinout Description

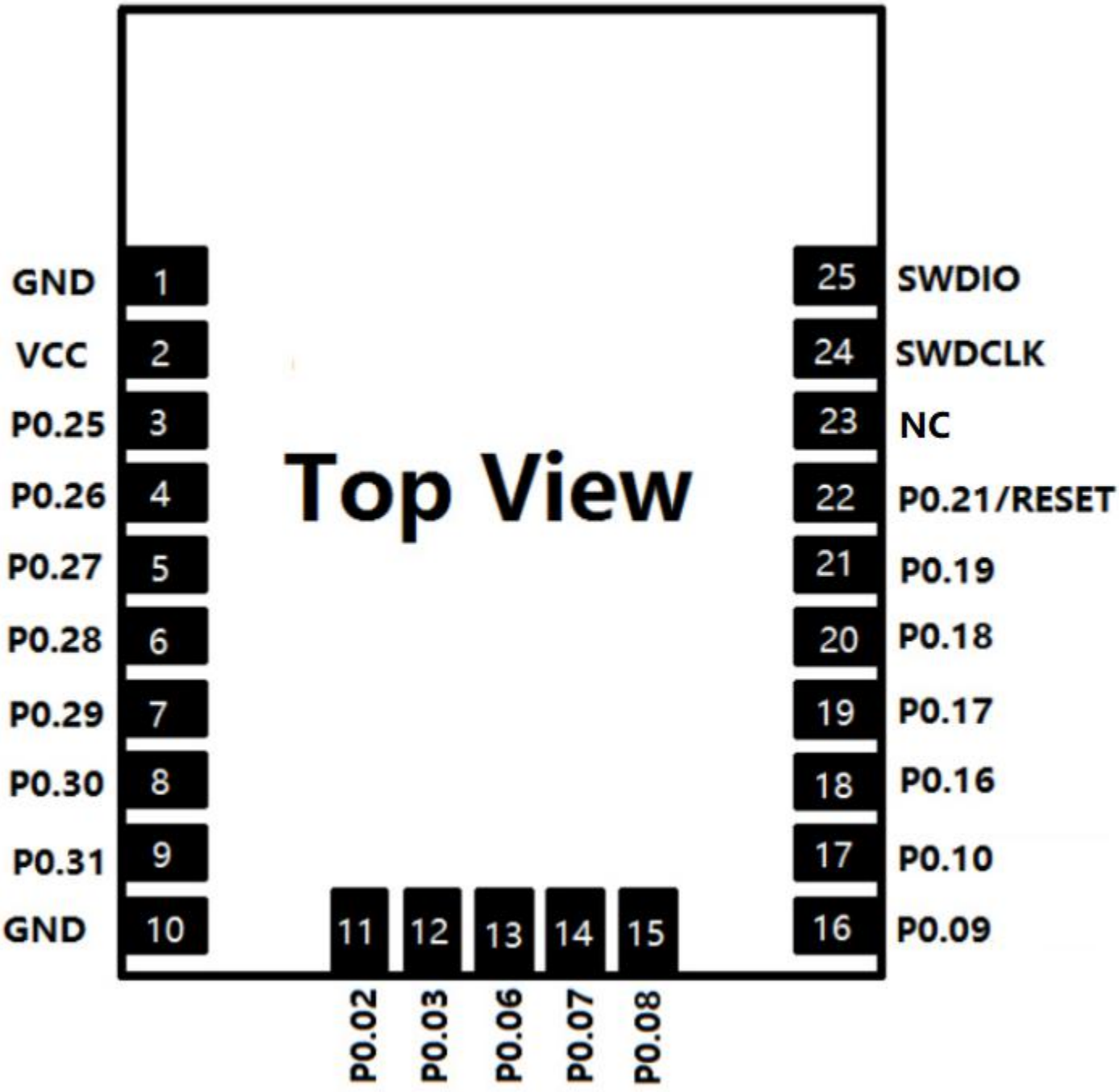

Figure 5: SKB376 Module Pinout

引脚 Pin No.	引脚名称 Pin Name	引脚类型 Pin type	备注 Remark
1	GND	Ground	接地焊盘 Ground PAD
2	VCC	Power Supply	1.8~3.6V 电源供电脚，使用一个 10uF 和一个 0.1uF 滤波电容靠近 1 脚和 2 脚 1.8V to 3.6V power supply,Place a 10uF and a 0.1uF filter capacitors near pin1 and pin2
3	P0.25	Digital I/O	通用输入/输出端口 General input/output port
4	P0.26	Digital I/O	通用输入/输出端口 General input/output port
5	P0.27	Digital I/O	通用输入/输出端口 General input/output port
6	P0.28	Digital I/O; Analog input	通用输入/输出端口 General input/output port; 模数转换输入口 ADC input 4
7	P0.29	Digital I/O; Analog input	通用输入/输出端口 General input/output port; 模数转换输入口 ADC input 5
8	P0.30	Digital I/O; Analog input	通用输入/输出端口 General input/output port; 模数转换输入口 ADC input 6
9	P0.31	Digital I/O; Analog input	通用输入/输出端口 General input/output port; 模数转换输入口 ADC input 7
10	GND	Ground	接地焊盘 Ground PAD
11	P0.02	Digital I/O; Analog input	通用输入/输出端口 General input/output port; 模数转换输入口 ADC input 0
12	P0.03	Digital I/O; Analog input	通用输入/输出端口 General input/output port; 模数转换输入口 ADC input 1
13	P0.06	Digital I/O	通用输入/输出端口 General input/output port 电容触控输入 Cap detection for touch pad input
14	P0.07	Digital I/O	通用输入/输出端口 General input/output port 电容触控输入 Cap detection for touch pad input
15	P0.08	Digital I/O	通用输入/输出端口 General input/output port 电容触控输入 Cap detection for touch pad input
16	P0.09	Digital I/O	通用输入/输出端口 General input/output port 电容触控输入 Cap detection for touch pad input
17	P0.10	Digital I/O	通用输入/输出端口 General input/output port
18	P0.16	Digital I/O	通用输入/输出端口 General input/output port

19	P0.17	Digital I/O	通用输入/输出端口 General input/output port
20	P0.18	Digital I/O	通用输入/输出端口 General input/output port
21	P0.19	Digital I/O	通用输入/输出端口 General input/output port
22	P0.21/RESET	Digital I/O; System Reset (Active low)	（默认）通用输入/输出端口（Default）General input/output port （需配置）复位（Need configuration) Reset
23	NC	Not Connect	不接，也可以接地；Not connect or connect to GND
24	SWDCLK	Hardware debug and Flash program	串行总线调试时钟输入口 SWD(Serial wire debug) clock input
25	SWDIO	Hardware Debug and Flash Program	串行总线调试数据 I/O 口 SWD(Serial wire debug) data input and output

6. 接口简介 Interfaces Introduction

6.1 数字输入输出引脚 Digital I/Os

SKB376 共有 19 个 GPIO 和 2 个 SWD 调试端口（SWDCLK, SWDIO)。 在 SYD8811 上电启动时，SWDCLK 和 SWDIO 管脚务必设置为低电平（内部有 10k 电阻拉低），在开机后，SWDCLK 和 SWDIO 可以配置为输出管脚（不推荐使用，拉高时 10k 电阻上有漏电流）。IO 口可以作为以下用途：

SKB376 has 19 GPIOs and 2 SWD port(SWDCLK, SWDIO) . The SWDCLK and SWDIO must be pulled down during the power up(They are pulled down by 10k resisters inside the module). After power up the SWDCLK and SWDIO can be used as digital output pins (NOT RECOMMANDED, because when pull up the 10k resistor has leakage current). The GPIOs may be used as following:

1、数字输入输出 Digital Input/output

2、输出驱动能力 Output drive strength

3、内部上下拉电阻 Internal pull-up and pull-down resistors

4、所有 pin 脚均支持高低电平唤醒 Wake-up from high or low level triggers on all pins

5、所有 pin 脚均支持外部中断 Trigger interrupt on all pins

6、所有 pin 脚均可配置为串口 All pins can be individually configured to carry serial interface

8、所有 pin 脚均支持 PWM 输出信号（最多 4 路低速 32.768kHz+6 路高速 32MHz）

All pins can be configured as PWM signal（4 low speed 32.768kHz+6 high speed 32MHz）.

9、共有 6 路特定管脚可以作为 ADC 输入 There are 6 dedicated ADC pins.

6.2 两线双向通信接口（兼容 I2C）Two-wire Interface (I2C Compatible)

针对芯片间两线双向通信，SKB376 集成了两组 I2C 接口（I2C_0, I2C_1）。I2C 支持宽范围的数据率，可通过寄存器配置为 31.25kHz 到 1000kHz 之间的数据率。支持多种读模式：当前读取，随机读取，以及顺序读取。写模式支持字节和页写入。

SKB376 integrates two sets of I2C interfaces (I2C_ 0, I2C_ 1) for two-way communication between chips. I2C supports a wide range of data rates, which can be configured from 31.25khz to 1000khz through registers. It supports multiple reading modes: current read, random read, and sequential reading. Write mode supports byte writing and page writing.

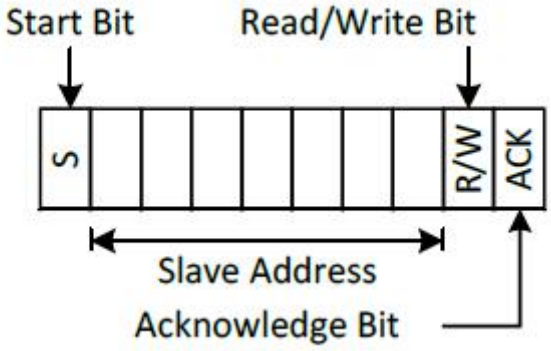

Figure 6-1 I2C Control frame format

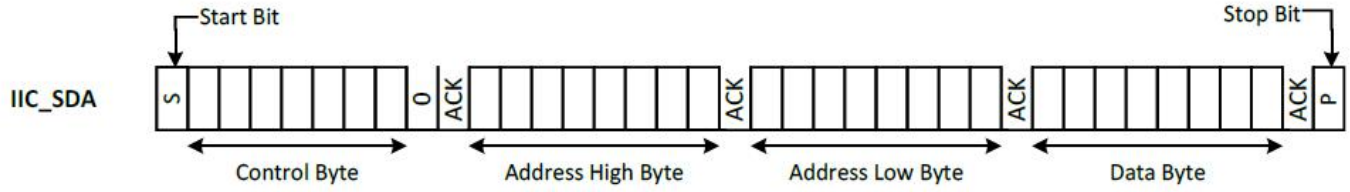

Figure 6-2 I2C byte write format

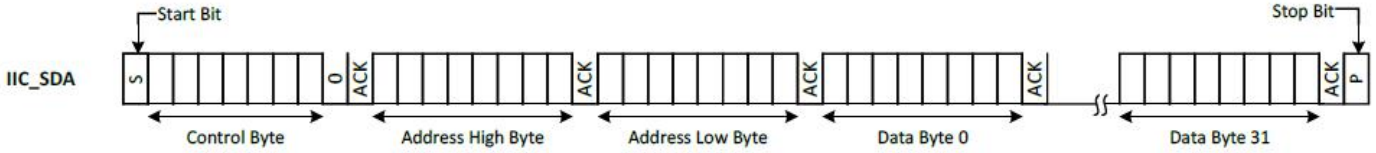

Figure 6-3 I2C page write format

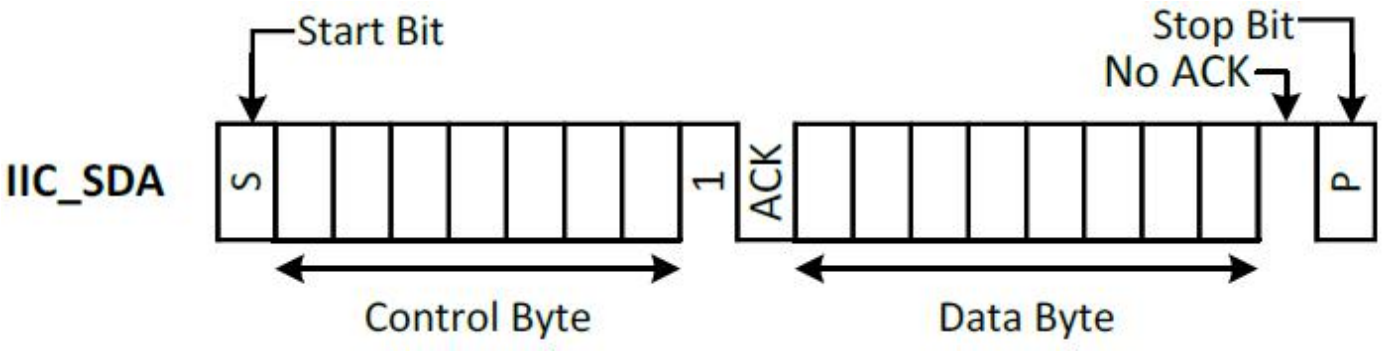

Figure 6-4 I2C current read format

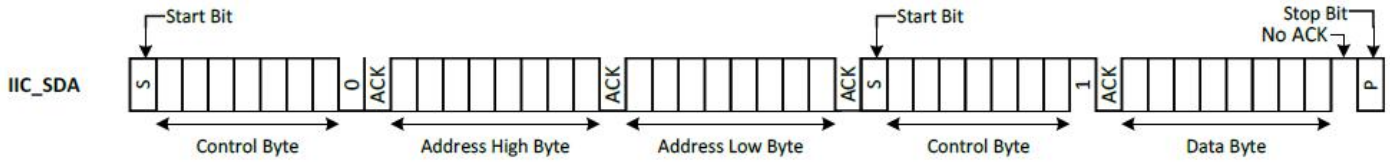

Figure 6-5 I2C random read format

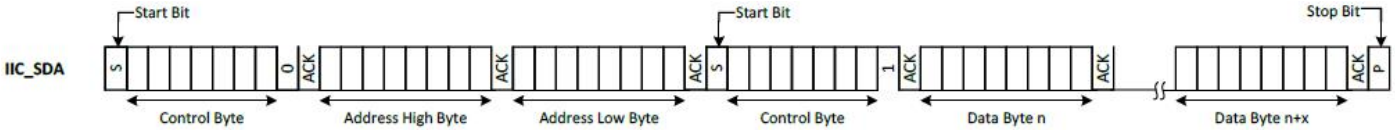

Figure 6-6 I2C sequential read format

6.3 程序烧录口 Flash Program I/Os

SKB376 有两个烧录管脚，分别是 SWDCLK 和 SWDIO。这个双线串行调试接口提供了一个调试访问接口（DAP），为程序代码的非侵入性调试提供了一个灵活而强大的机制，可以支持断点调试和步进调试。

注意：需要使用芯片原厂 SYDTEK 提供的特定开发软件。

SKB376 has two programmer pins, respectively SWDCLK pin and SWDIO pin. The two pin Serial Wire Debug (SWD) interface provided as a part of the Debug Access Port (DAP) offers a flexible and powerful mechanism for non-intrusive debugging of program code. Breakpoints and single stepping are part of this support.

Note: Dedicated SWD developing software by SYDTEK is required.

6.4 串行外围接口 Serial Peripheral Interface

SKB376 同时为 SPI 接口提供了两组配置。一组是 4 线 SPI：CSN (chip select), SCLK (clock), SDI (MOSI data) 和 SDO (MISO data)，另外一组是 2 线或 3 线 SPI 接口：CSN (chip select) – optional, SCLK (clock), SDIO (bi-directional Data). 这两组配置仅支持 master 操作，不支持 slave 操作。

SKB376 has 2 kinds of configuration for SPI interface. One is 4 line SPI: CSN (chip select), SCLK (clock), SDI (MOSI data) and SDO (MISO data). Another is 2-line or 3-line: CSN (chip select) – optional, SCLK (clock), SDIO (bi-directional Data). Both configuration support master only. Slave operation is not support.

读写操作模式数据包都由两字节构成，首字节包含地址（7bit）和指示数据方向的 bit-7 MSB，第二字节包含传送数据。

The data packets in both read and write operation mode are composed of two bytes,The first byte contains the address (7bit) and the bit-7 MSB indicating the direction of data, and the second byte contains the transmitted data.

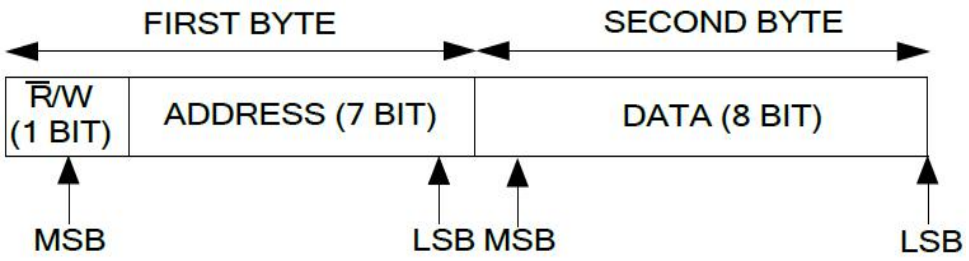

Figure 6-7 SPI data package

6.4.1 写操作 Write Operation

SKB376 始终会初始化写操作， 写操作包含两个字节，从主机控制器传到 device。SCLK 用以同步通信。SKB376 在 SCLK 的下降沿改变 SDIO 或 SDI，device 在 SCLK 的上升沿读取 SDIO 或者 SDI。

SKB376 always initializes the write operation, which contains two bytes and is passed from the host controller to the device. SCLK is used for synchronous communication. SkB376 changes SDIO or SDI on the falling edge of SCLK, and device reads SDIO or SDI on the rising edge of SCLK.

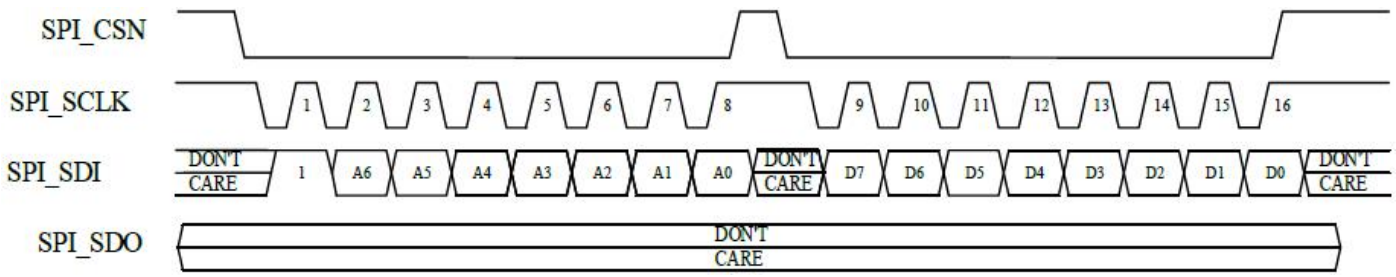

Figure 6-8 4-wire SPI write operation

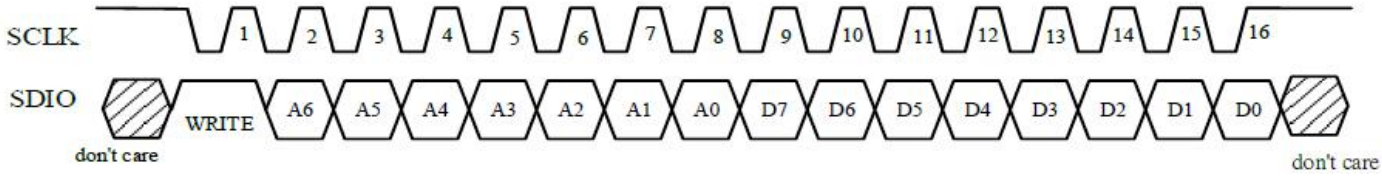

Figure 6-9 3-wire SPI write operation

6.4.2 读操作 Read Operation

主机控制器初始化读操作，包含两个字节。首字节包含 7 位地址和始终为 0 的 MSB 以指示数据方向。第二字节包含 slave device 驱动的 8 位数据。SPI_SCLK 用以同步通信。对于 2 线/3 线 SPI，SDIO 在 SCLK 的下降沿改变，在 SLCK 的上升沿读取。SYD8811 放开 SDIO 总线，并在最后一位地址位的下降沿把 SDIO 总线控制交给 device。

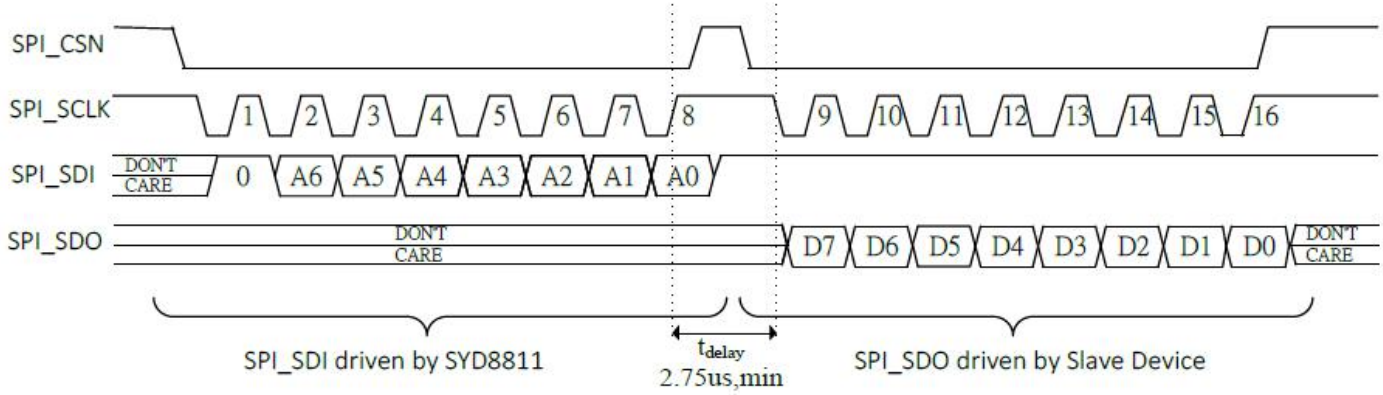

Figure 6-10 4-wire SPI read operation

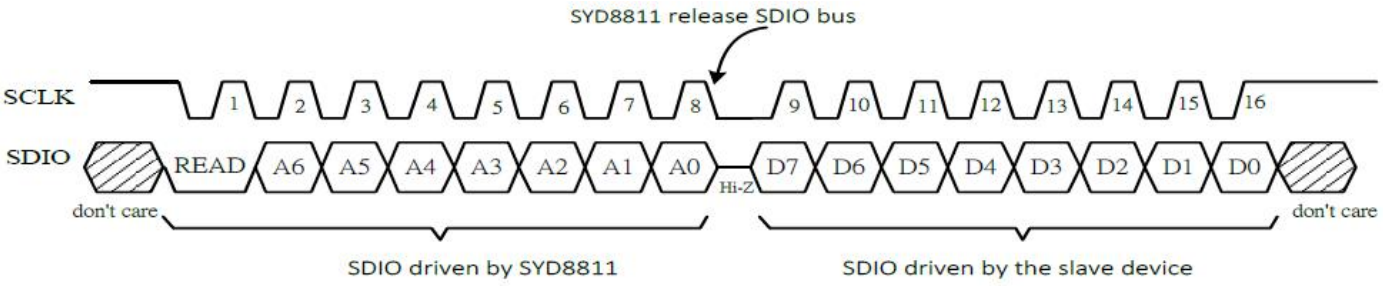

Figure 6-11 3-wire SPI read operation

6.5 通用串行异步通信 UART

SKB376 集成了两组 UART 接口（UART0, UART1）。其中 UART0 拥有 CTS/RTS 和 flow control（UART1 没有）。采用 8-y-1 标准数据帧格式，即 8 位（8）数据位 ，有奇偶校验位，1（1）停止位。如下图所示：

SKB376 integrates 2 UART(Universal Asynchronous Receiver/Transmitter) interfaces. UART0 has CTS&RTS, which support flow control (UART1 doesn't support). Standard data frame 8-y-1 is adopted, i.e. 8 bit data, 1 bit parity checking, 1bit stop indicator. Like below:

Figure 6-12. UART Data Frame

UART 口支持如下波特率单位 bps

UART support the following baud-rate in bps unit:

1200/2400/4800/9600/14400/19200/28800/38400/57600/76800/115200/230400/460800/921600.

注：UART 电平与 VCC 供电电平一致，如果与外设电平不一致，需要采用下图所示电平转换电路：

Note：UART voltage level is the same as VCC. If it is inconsistent with the peripheral voltage level, the level conversion circuit shown in the following figure is required:

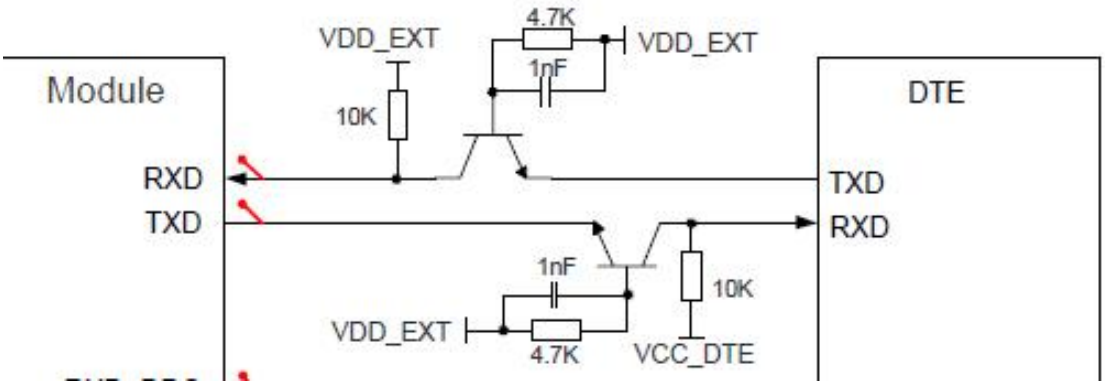

Figure 6-13 UART Level shift circuit

6.6 模数转换 Analog to Digital Converter (ADC)

SKB376 集成了 10 位低功耗通用模数转换器（GPADC），GPADC 采样率为 1MHz。通过切换 GPADC 输入到不同的 GPIO，该 GPADC 可以最大支持 7 通道，其中一通道被用于分压检测电池电压(VBAT)，其余 6 通道可通过配置以检测 GPIO 电压。为了达到更高的精度，GPADC 内部的参考电压在芯片出厂时已经完成校准（需从 eFuse 中读出），从而可以广泛用于电源监测、温度侦测、模拟信号采样等应用。

SKB376 integrates a 10 bit low power general purpose analog-to-digital converter (GPADC) with a sampling rate of 1MHz. By switching GPADC input to different GPIO, the GPADC can support up to 7 channels, one of which is used to detect divided battery voltage (VBAT), and the other 6 channels can be configured to detect GPIO voltage. In order to achieve higher accuracy, the reference voltage of GPADC has been calibrated (read from eFuse)

when the module leaves the factory, so it can be widely used in power monitoring, temperature detection, analog signal sampling and other applications.

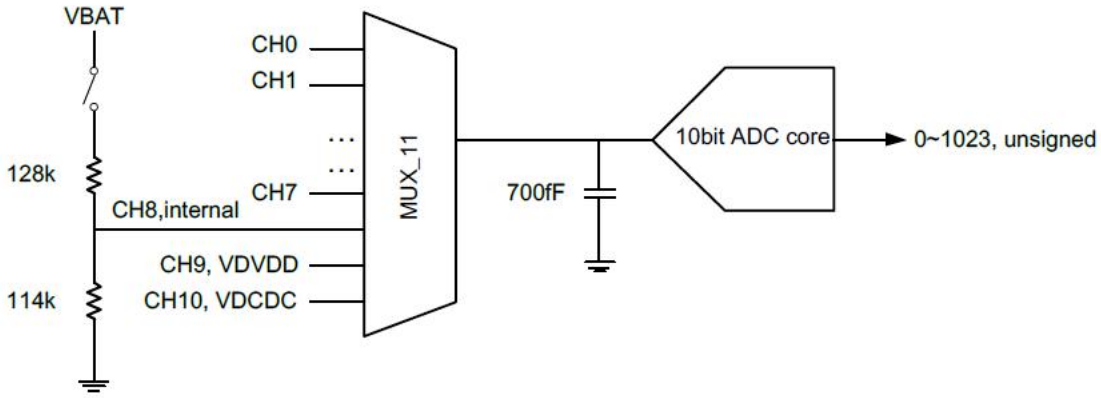

Figure 6-14 GPADC input channel select and VBAT resistance divider configuration

Table 6-1 ADC Pins

SKB376 Pin Number	Pin Number	Description
6	P0.28	Digital I/O; Analog input 4
7	P0.29	Digital I/O; Analog input 5
8	P0.30	Digital I/O; Analog input 6
9	P0.31	Digital I/O; Analog input 7
11	P0.02	Digital I/O; Analog input 2
12	P0.03	Digital I/O; Analog input 3

6.7 电容触控 Capacitive Touch Detection

SKB376 集成了电容触控功能，当手指放置在触控 PAD 上，电容触控单元将检测到电容变化， 支持睡眠模式下电容触控唤醒。

SKB376 integrates the capacitive touch detection function. When the finger is placed on the touch pad, the capacitive touch unit will detect the capacitance change and support the touch event to wake-up the module from sleep mode.

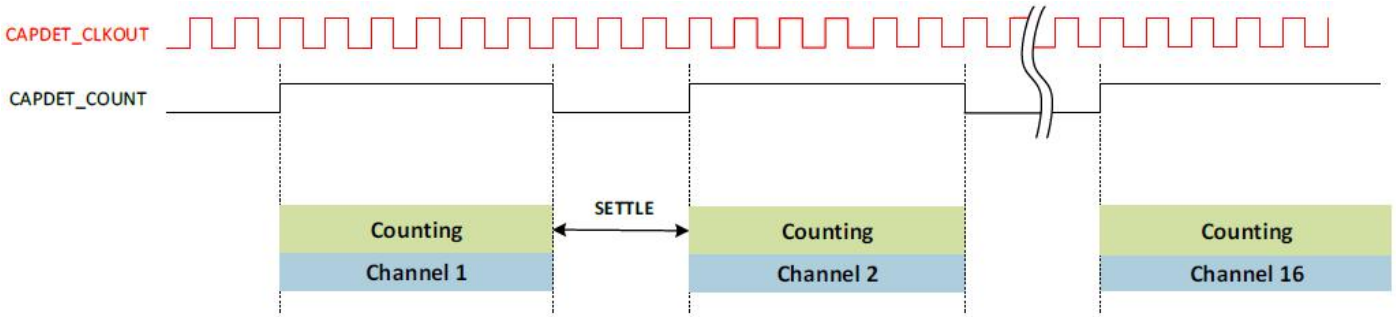

Figure 6-15 Cap-Detect time sequence

Table 6-2 Capacitive Touch Detectiont Pins

SKB376 Pin Number	Pin Name	Description
13	P0.06	Digital I/O;Cap detection for touch pad input
14	P0.07	Digital I/O;Cap detection for touch pad input
15	P0.08	Digital I/O;Cap detection for touch pad input
16	P0.09	Digital I/O;Cap detection for touch pad input

注意：请预留并联一个电容和 ESD 保护器件，串联一个电阻留作灵敏度调试。如下图：

Note: Please reserve a parallel capacitor and an ESD protection component and a shunt resister for sensitivity adjust. Like the figure below:

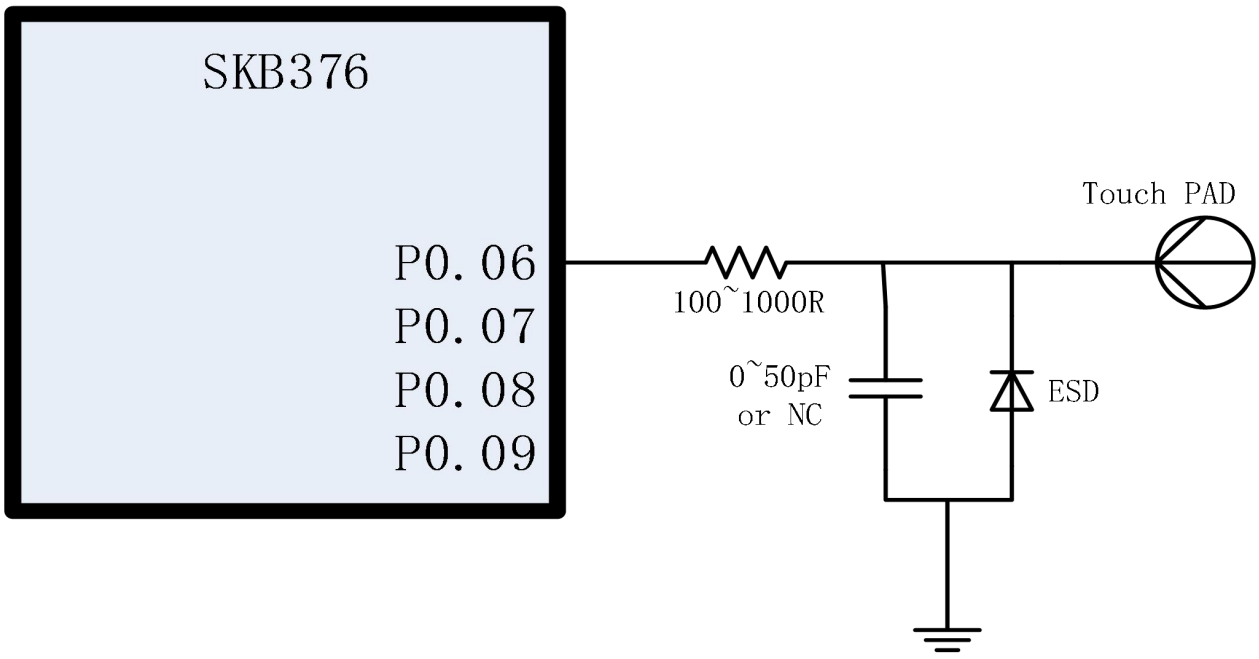

Figure 6-16： Touch PAD recommended circuit

6.8 脉宽调制 PWM

SKB376 集成了 4 路低速 PWM(32.768kHz)和 6 路高速 PWM(最高 32MHz)。低速 PWM 可以通过单独的寄存器来控制不同的 PWM 发生器，并通过数据选择器（MUX）输出到 3 个不同的 GPIO。最小的正或负 PWM 宽度为 1/32ms（步长），1~255 步的设置范围可实现灵活的应用。 可以通过预先设定好 PMW 脉宽占比的 PMW 信号来控制 Buzzer 或者 LED 调光等效果。

SKB376 integrates 4-way low-speed PWM (32.768KHz) and 6-way high-speed PWM (up to 32MHz). Low speed PWM can control different PWM generators through separate registers and output to three different GPIOs through MUX. The minimum positive or negative PWM width is 1 / 32ms (step size), and the setting range of 1 ~ 255 steps can realize flexible application. You can control the buzzer or LED dimming by setting the PMW signal of PMW duty in advance.

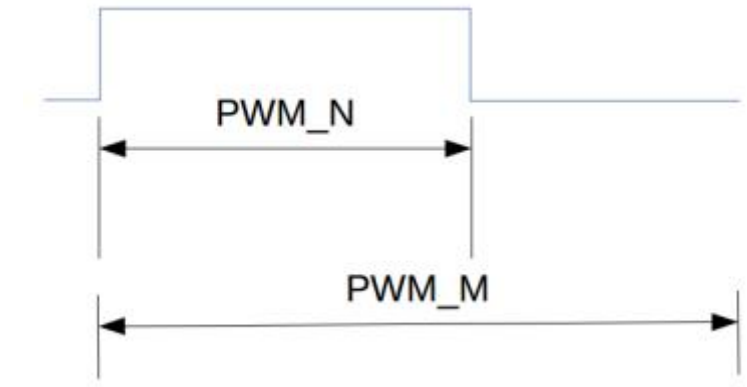

Figure 6-17　PWM Time Setting

SKB376 集成了 LED 控制，从而提供常用的开关模式和呼吸灯模式。最小的 LED 开启时间宽度为 1/32s（步长），最大 255 步调节控制。LED 反复开关模式下的重复次数应当被配置在 1~127 times 之间，寄存器表对此会有详细的设置描述。

LED control is integrated in SKB376 to provide switching mode and breathing mode. The minimum LED opening time width is 1/32s (step length), and it support the maximum 255 step adjustment control. The number of repeated times in LED switching mode should be configured between 1 and 127 times. The register table has a detailed description of the settings about it.

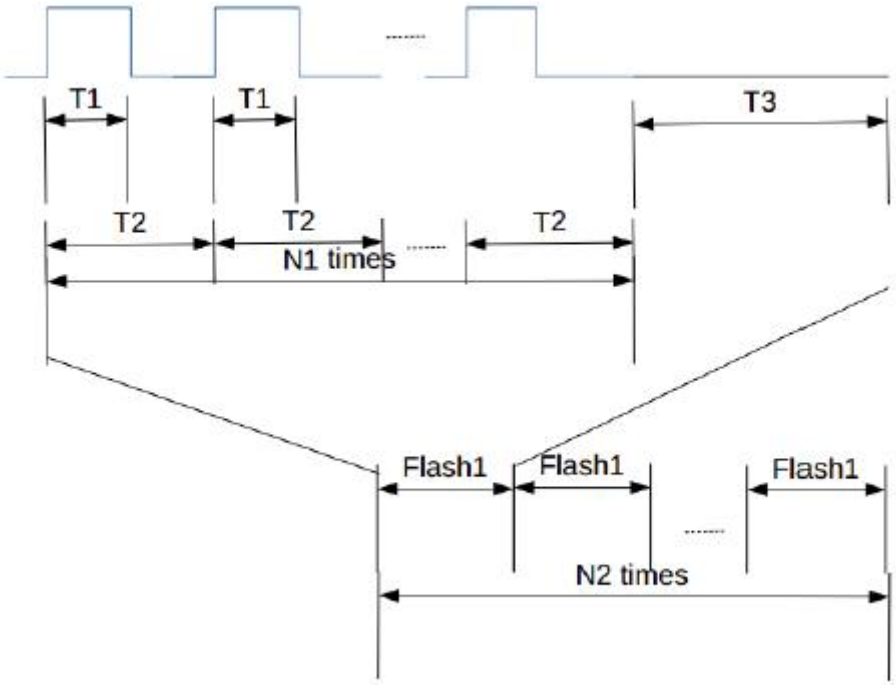

Figure6-18 LED on/off configuration

T1, T2,T3 为 8 位宽度控制寄存器，最小步长为 31.25ms。呼吸灯模式下，min、max、T4 都是 8 位宽度控制寄存器，最小步长 0.5ms。定义 sp 为呼吸模式加速度，可通过 4 位宽度控制寄存器来调节，最小步长 31.25us。

T1, T2, T3 are 8-bit width control registers, with a minimum step size of 31.25ms. In the breathing mode, Min, Max and T4 are all 8-bit width control registers, with a minimum step of 0.5ms. “sp” is defined as the acceleration of breathing mode, which can be adjusted by 4-bit width control register, with a minimum step of 31.25us.

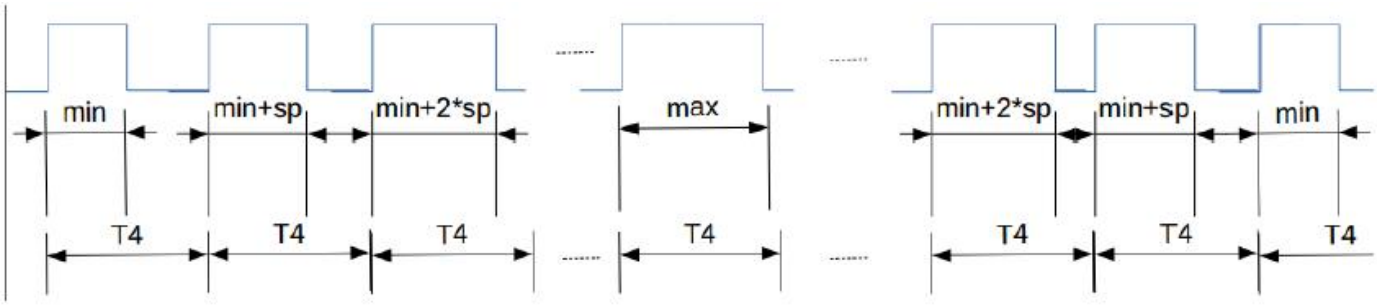

Figure 6-19 LED breathing configuration

6.9 ISO-7816-3

SKB376 集成了一个智能卡控制器，支持 3 种异步智能卡。采用 ISO 7816-3 接口，能够激活、失活、冷/热重启、ATR 配对和数据交换。

SKB376 integrates a smart card controller and supports three kinds of asynchronous smart cards. With ISO 7816-3 interface, it can be activated, deactivated, cold / hot restart, ATR pairing and data exchange.

- Compliant to ISO/IEC 7816-3: 1997
- Supports FIFO 8 bytes
- Interrupt report
- Flexible clock frequency and baud rate
- Parity/error check and resend
- T=0 protocol
- Wait time configuration
  - ATR wait time
  - Reset time
  - Guard time

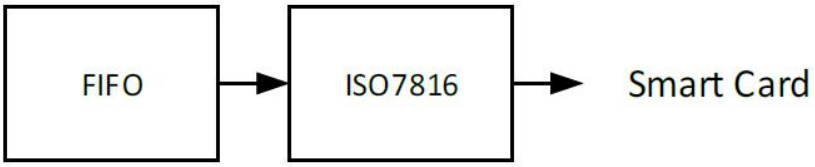

Figure 6-20 Function block of ISO7816

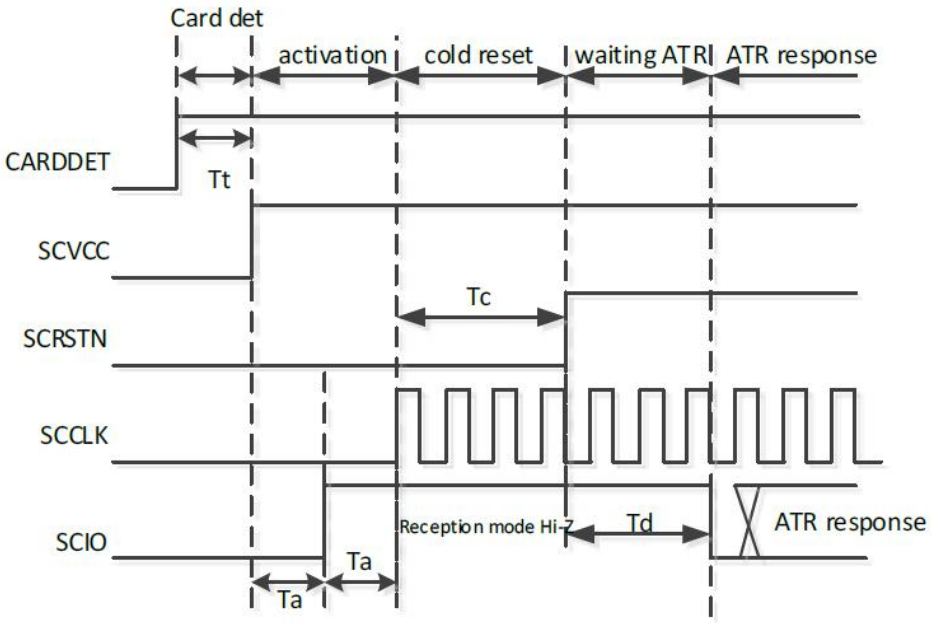

Figure 6-20 Activation, Cold Reset and ATR

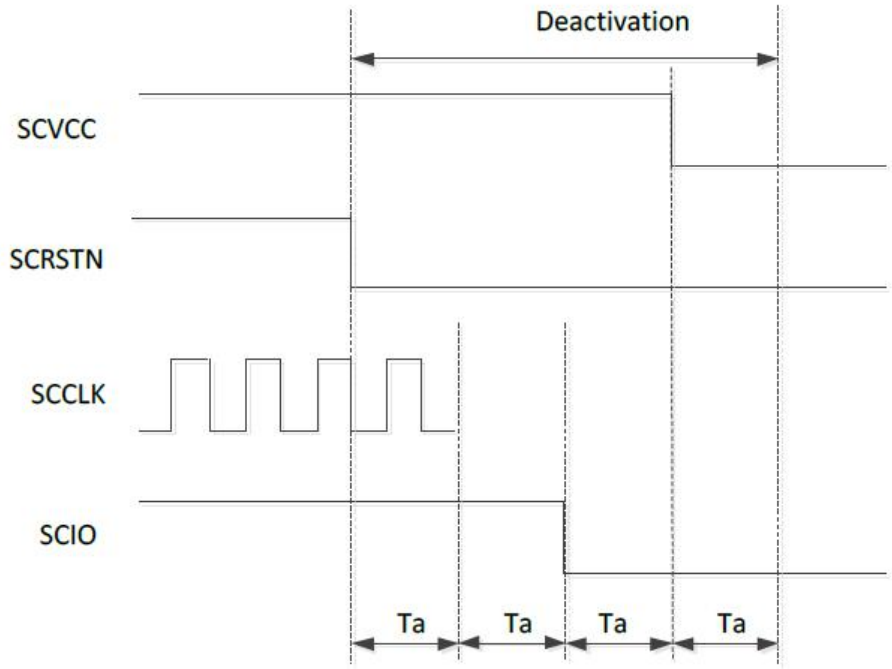

Figure 6-21 Deactivation Sequence

6.10 红外发射和接收 Infra Red Transmission and Reception

SKB376 集成红外发射和接收单元，红外生成器提供了灵活的方式以发射任意用于遥控的红外编码，拥有高效的消息队列，用户可以采用少量字节描述特定红外指令的波形。

SKB376 integrates infrared transmitting and receiving units. The infrared generator provides a flexible way to transmit any infrared code used for remote control. It has an efficient message queue. Users can use a small number of bytes to describe the infrared waveform of specific instructions.

- Flexible carrier frequency and duty cycle.
- Flexible MARK and SPACE.
- Any IR remote control protocol.
- Supported 8 commands message queue in the FIFO.
- Interrupt report

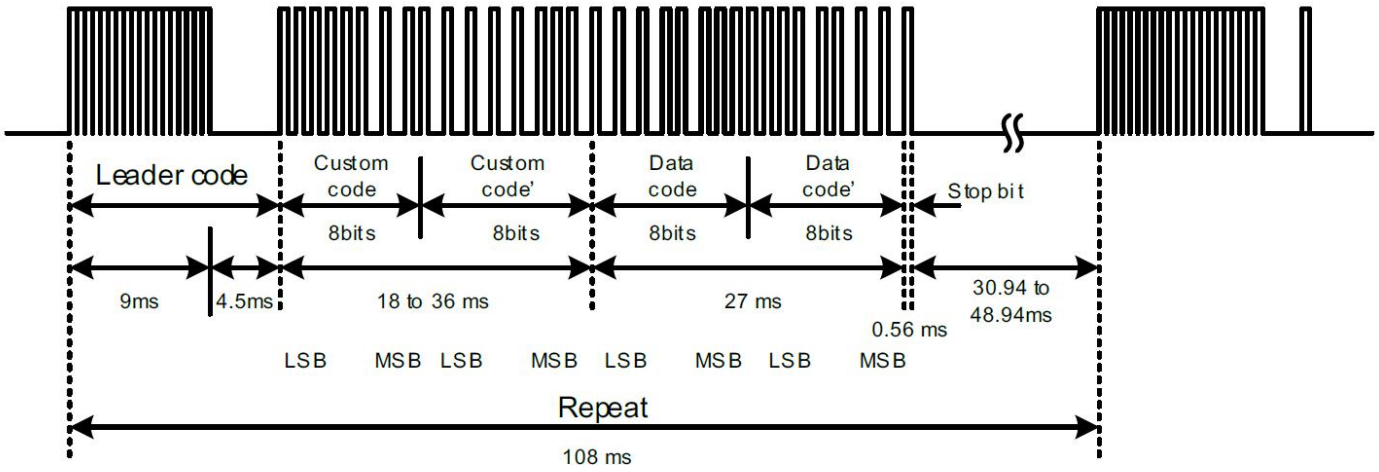

Figure 6-22 NEC coded wave format

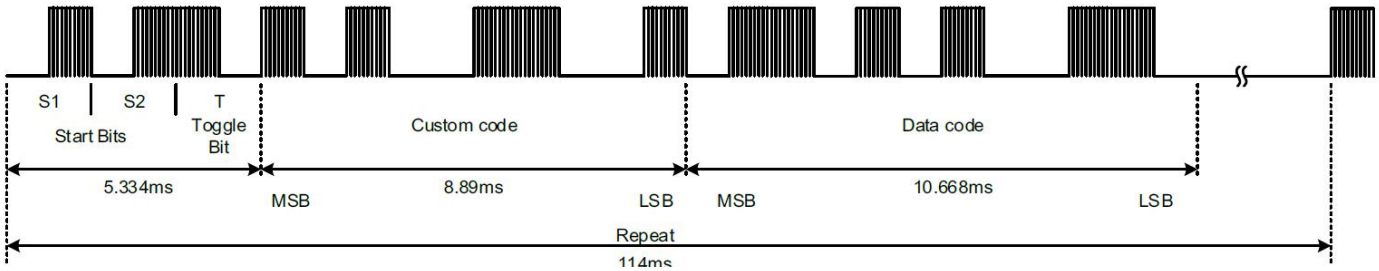

Figure 6-23 RCS5 coded wave format

备注：请开发上述功能前和我司技术支持确认软件是否支持，默认标准软件只做串口透传功能。

Note：Please confirm with FAE that the above function is supported or not by the firmware before developing. By default, the firmware support only UART to BLE transparent transmission.

7. 模组参数 Module Specifications

Hardware Features	
Model	SKB376
Antenna Type	PCB Antenna/ External Antenna
Chip-set Solution	SYD8811
Voltage	1.8V~3.6V
Dimension(L×W×H)	17.4×13.7×1.9 mm
Wireless Features	
Wireless Standards	Bluetooth ® 4.2
Frequency Range	2400MHz---2483.5MHz

Data Rates	1Mbps(Bluetooth ® 4.2)
Wireless Security	AES HW Encryption
Transmit Power	Tx Power -20 to +4 dBm in 2 dB Steps
Work Mode	Peripheral (Slave device in BLE connection)
Others	
Certification	ROHS
Environment	Operating Temperature: -40℃~85℃
	Storage Temperature: -40℃~125℃
	Operating Humidity: 10%~50% Non-condensing
	Storage Humidity: 5%~90% Non-condensing

8. PCB 设计参考 PCB Design Guide

请为模组的 PCB 天线预留足够的镂空区域，最小镂空尺寸 16.5*6.6mm，请根据下图 PCB 封装推荐来检查设计是否规范。

Please reserve empty area for PCB Antenna when you are going to design a device`s board, the empty range minimum size :16.5*6.6mm , please kindly check the PCB footprint for reference.

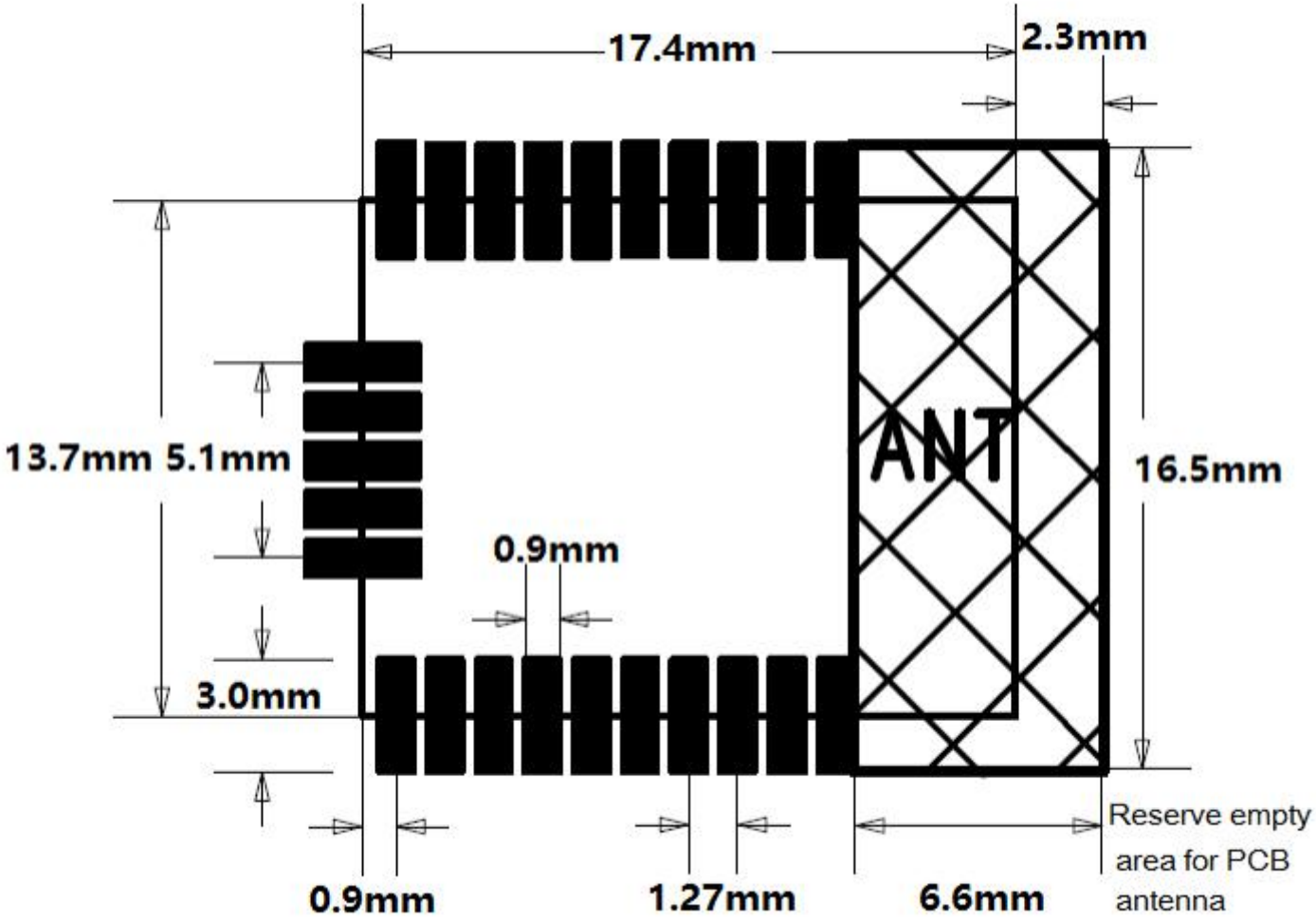

Figure 8　SKB376 Recommended PCB Footprint

9. 电气参数 Electrical Characteristics

极限参数 Absolute Maximum Ratings

Table9-1: Absolute Maximum Ratings

Parameter	Condition	Min.	Max.	Uni	Note
Storage Temperature	T_A	-40	125	°C	
Operating Temperature	T_J	-40	85	°C	
Humidity	RH	0	50	%	Non-condensing, Non-biased
ESD Protection（HBM）	V_{ESD}	-2000	2000	V	Class 2 on all pins, as per human body model. JESD22-A114E with 15 sec zap interval.
Supply Voltage	VCC	-0.3	3.9	V	
Voltage On Any I/O Pin	VCC_{IO}	-0.3	VCC+0.3	V	

推荐参数 Recommended Operation Ratings

Table9-2: Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power Supply	VCC	1.7	3.3	3.6	V
Input Low Voltage	V_{IL}	0		0.3*VCC	V
Input High Voltage	V_{IH}	0.7*VCC		VCC	V

电流 Current

Table9-3: Power Consumption in Different States

System State	TX @0dBm	RX	Deep sleep Mode	Sleep Mode	Idle Mode
Average Current @3V	5 mA	3 mA	1uA	3uA	5uA

10. 生产过程推荐 Manufacturing Process Recommendations

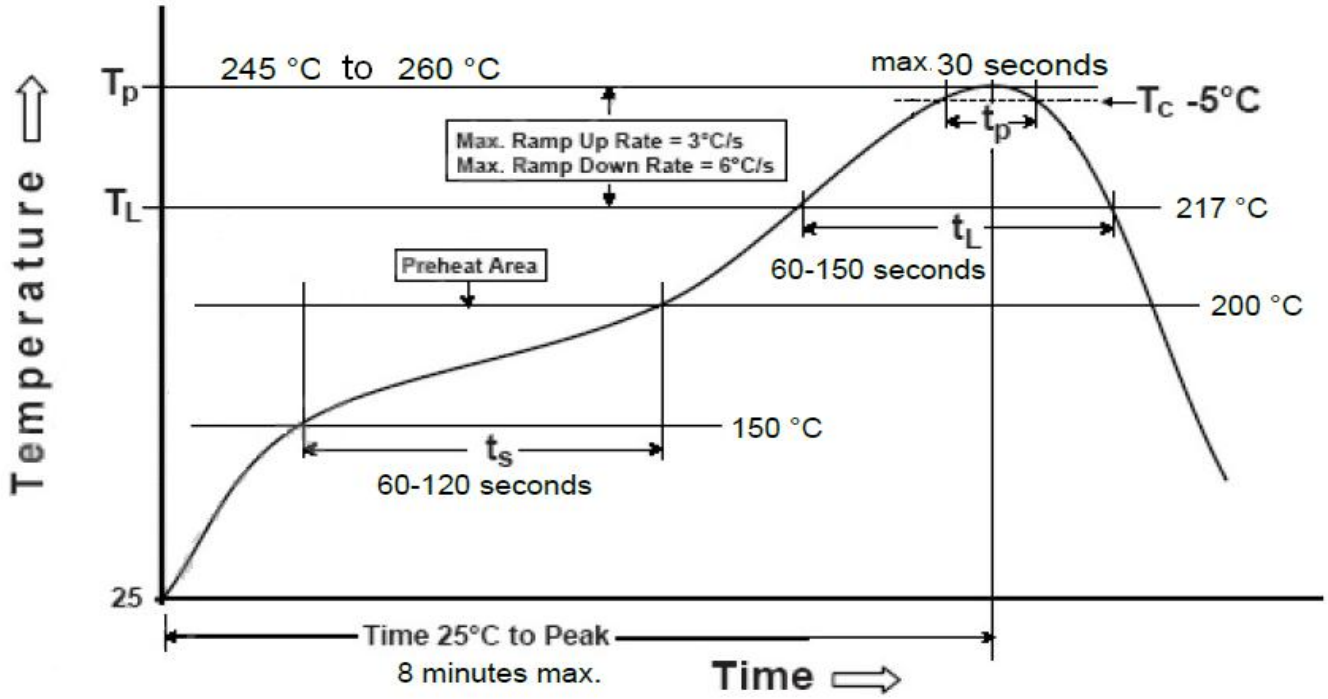

Figure 10: SKB376 Typical Lead-free Soldering Profile

注意：

1.最终的炉温曲线取决于工厂的其他因素，如锡膏的种类、尺寸、厚度、模组基板的性质等。

2.超出推荐炉温曲线的最高温度可能会损坏模组！

Note：

1. The final re-flow soldering temperature map chosen at the factory depends on additional external factors, for example, choice of soldering paste,size, thickness and properties of the module`s baseboard etc.

2. Exceeding the maximum soldering temperature in the recommended soldering profile may permanently damage the module！

11. 包装信息 Packaging Specification

SKB376 模块放入托盘，每个托盘 528 个单元。每个托盘烘干后真空包装。

SKB376 modules are put into tray and 528 units per tray. Each tray is 'dry' and vacuum packaging.

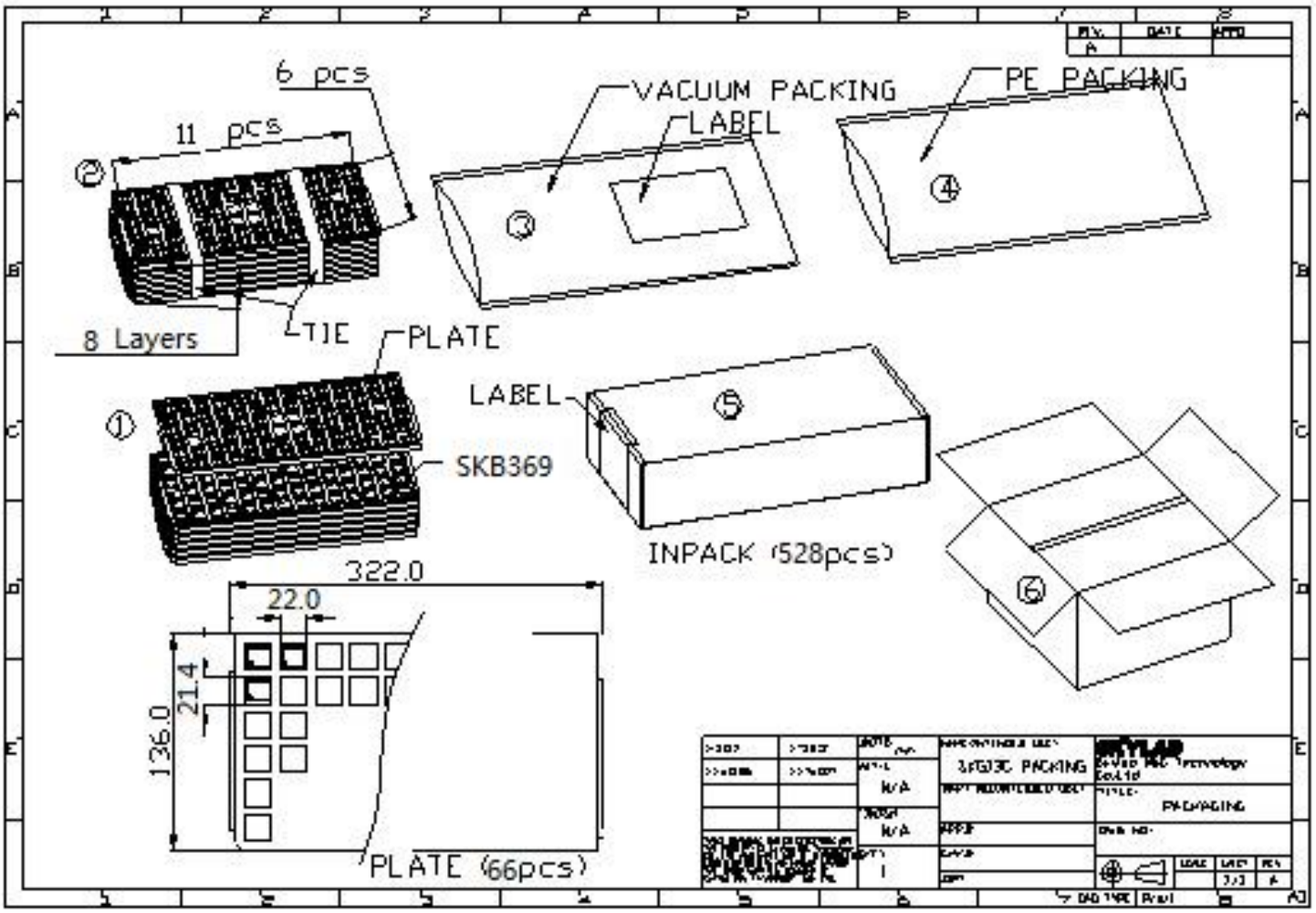

Figure 11: SKB376 Packaging

12. 订购信息 Ordering Information

Module No.	Crystal	Shielding	Antenna	Temperature Grade
SKB376-XXPI	No	No	PCB	Industry
SKB376-CSEI	32.768K	Shielding	External (IPEX-III)	Industry

尾缀含义 Sub-fix definition

SKB376-ABCD

A	A=C	支持 32.768kHz 晶体　32.768kHz Crystal support
	A=X	不支持 Not support
B	B=S	支持屏蔽盖 Sheild cover support
	B=X	不支持屏蔽盖 Not support
C	C=P	支持 PCB 天线 PCB antenna
	C=E	外置天线 External antenna (IPEX-III)
D	D=C	商用级 Commercial(0~70℃)
	D=I	工业级 Industrial(-40~85℃)
	D=V	车规级 Vehicle(-40~125℃)

13. 联系信息 Contact Information

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Address: 6 Floor, No.9 Building, Lijincheng Scientific & Technical park, Gongye East Road, Longhua District, Shenzhen, Guangdong, China

Phone: 86-755 8340 8210（Sales Support）

Phone: 86-755 8340 8510（Technical Support）

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E-Mail: sales1@skylab.com.cn

Website: www.skylab.com.cn　　www.skylabmodule.com