

CI-B02CS01S 产品规格书

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1 产品功能描述

产品名称：智能语音模组(intelligence voice module)

模块可以实现的功能：

- (1) 离线语音识别，主控 CI1102 语音识别芯片；
- (2) 模组在 5 米安静环境下识别率能达到 97%以上，10 米超远距离语音识别也可以正常工作；
- (3) 模组板上设计有 LDO、DCDC 电源，模组外围供电设计简单。模组设计有音频功放，外围只需接麦克风和喇叭即可正常工作；
- (4) 模组接口丰富，包含 3 路 UART，1 组 SPI 接口，1 组 IIC（复用），5 路 PWM。模组可以贴片使用，调试和升级方便。

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2 模块板使用及技术参数

2.1 模块板各功能介绍

语音识别模块板为单面贴装，主要 IC 包括 CI1102、配套的 SPI NOR Flash、SGM4890 等。模块支持单麦克风输入，经 CI1102 识别后送给功放芯片驱动喇叭播放声音。

模块板上通过插针将 CI1102 芯片大部分功能 IO 口引出，方便开发者进行开发。

模块板实物图如图 1 所示，具体排布位置请参考图 2。

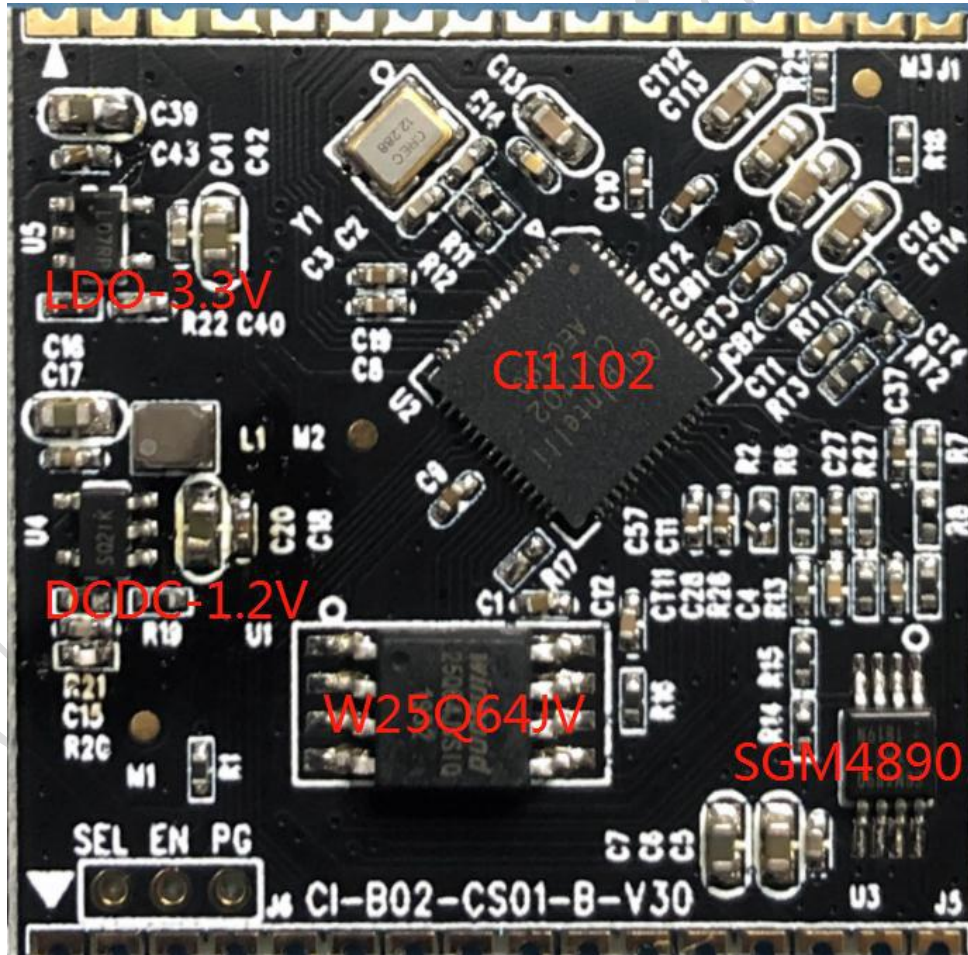


图 1 产品实物图

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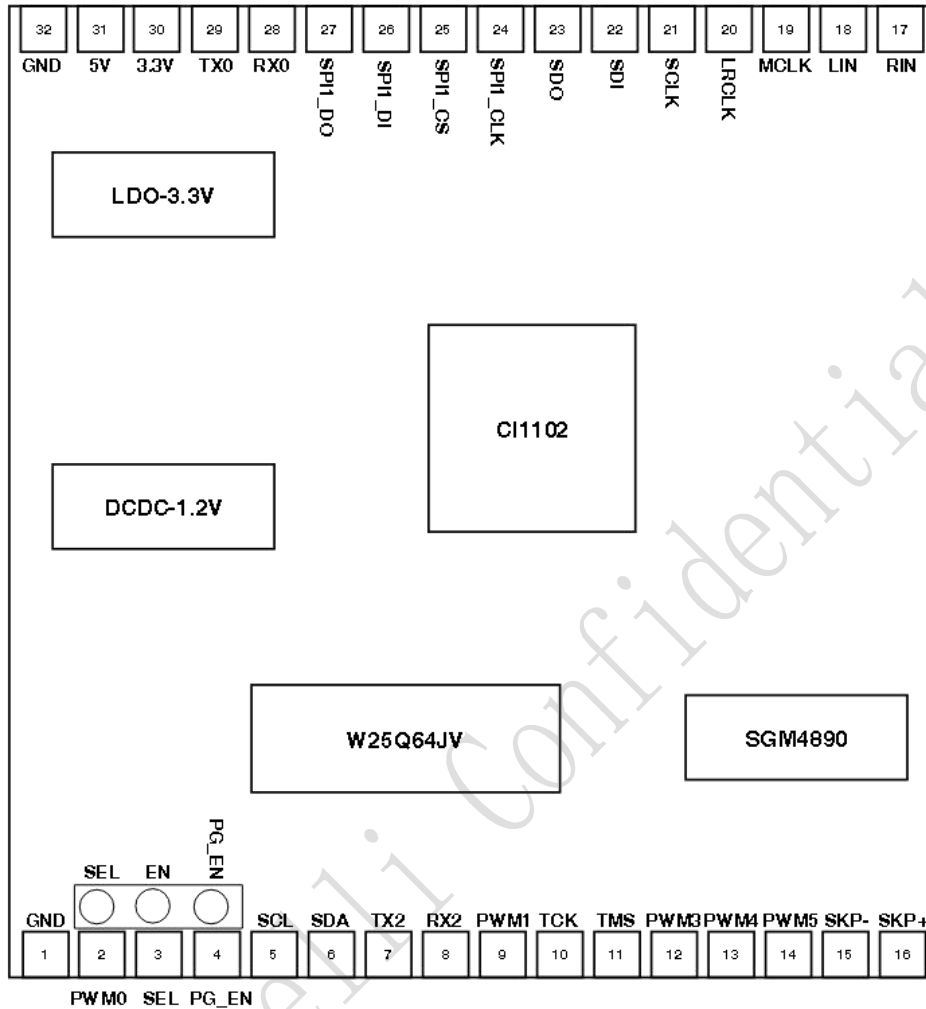


图 2 布局图

2.1.1 电源

如图 2 所示 5V 电源通过第 31 脚电源接口输入, 5V 电压经过 LDO 降压为 3.3V 电压, 5V 再经过一个 DCDC 降压为 1.2V。模组上 CI1102 需要 3.3V、1.2V 两种电源才能工作, 而功放部分采用 5V 电源供电。

2.1.2 IIC 接口

模组有一组 IIC 用于与外部器件通讯控制, 需要增加 4.7K-10K 电阻上拉到 3.3V。

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2.1.3 SPI 接口

模组有一组 SPI 接口，可以外接 TF 卡或者显示屏，接 TF 卡 SPI 接口上需要上拉电阻。

2.1.4 PWM

模组有 5 路 PWM 输出，分别为 PWM0、PWM1、PWM3、PWM4、PWM5，具体应用参照表 1。

2.1.5 ESD 设计

模组上没有设计 ESD 器件,对与 ESD 高要求的产品可以在底板的接口位置添加 ESD 器件，包括 MIC、SPK、UART、电源等（详情请咨询 FAE）。

2.1.6 GPIO

模组板所有 IO 都可以配置为 GPIO，模组板一共 22 个 GPIO，所有 GPIO 为 3.3V 电平，与不能兼容电平对接必须进行电平转换，可参考图 3。

2.1.7 UART

UART 为 3.3V 电平，与不能兼容电平对接必须进行电平转换，可参考图 3。正常使用 UART 的收发功能只需和外部连接 UART_TX，UART_RX。

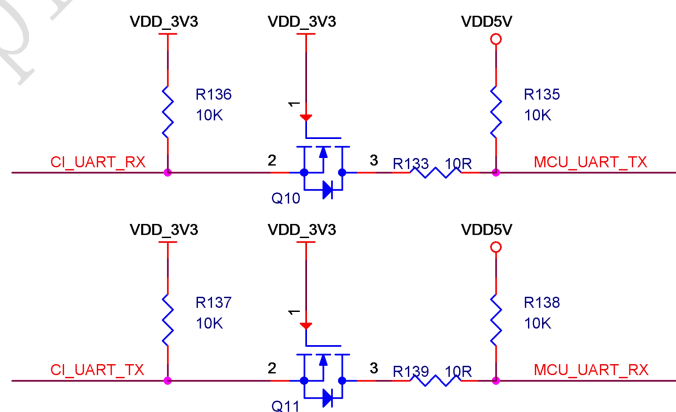


图 3 电平转换电路参考图

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2.2 管脚定义

表 1 管脚排列表

管脚号	管脚名称	I/O 类型	IO 驱动能力	IO 上电默认状态	功能定义
1	GND	P	-	-	地输入
2	PWM0	IO, T+D	4mA	IN, T+D	1.PWM 输出通道 0 2.GPIO[15] 3.SDC_CARD_DETECT_N
3	SEL	IO, T+D	4mA	IN, T+D	1.BOOT_SEL 引脚, 与 EN 短接, 进入调试模式 2.I2S1_SDO 3.IIS_TEST
4	PG_EN	IO, T+D	4mA	-	1.FLASH_PG_EN 引脚, 与 EN 短接, 进入 UART 升级模式 2.I2S1_MCLK 3.IIS_TEST 4.SPI1_CLK
5	SCL	IO, T+U	4mA	IN, T+U	1.I2C1_SCL 2.UART1_RX 3.GPIO[24]
6	SDA	IO, T+U	4mA	IN, T+U	1.I2C1_SDA 2.UART1_TX 3.GPIO[23]
7	TX2	IO, T+U	4mA	IN, T+U	1.UART2_TX 2.GPIO[25]

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					3.I2C1_SDA
8	RX2	IO, T+U	4mA	IN, T+U	1.UART2_RX 2.GPIO[26] 3.I2C1_SCL 4.EXT_INT[1]
9	PWM1	IO, T+D	4mA	IN, T+D	1.PWM 输出通道 1 2.GPIO[16]
10	TCK	IO, T+D	4mA	IN, T+D	1.JTAG 时钟 2.GPIO[21]
11	TMS	IO, T+U	4mA		1.JTAG 的 TMS 信号 2.GPIO[22]
12	PWM3	IO, T+D	4mA	IN, T+D	1.PWM 输出通道 3 2.GPIO[18]
13	PWM4	IO, T+D	4mA	IN, T+D	1.PWM 输出通道 4 2.GPIO[19]], note2 3.I2C1_SDA
14	PWM5	IO, T+D	4mA	-	1.PWM 输出通道 5 2.GPIO[20]], note2 3.I2C1_SCL
15	SKP-	-	-	-	喇叭输出
16	SKP+	-	-	-	喇叭输出
17	RIN	-	-	-	麦克风负极输入
18	LIN	-	-	-	麦克风正极输入
19	MCLK	IO, T+D	4mA	-	1.I2S1_MCLK 2.GPIO[31]/FLASH_PG_EN

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					3.IIS_TEST 4.SPI1_CLK
20	LRCK	IO, T+D	4mA	IN, T+D	1.I2S1_LRCLK 2.GPIO[28] 3.IIS_TEST 4.SPI1_DIN
21	SCLK	IO, T+D	4mA	IN, T+D	1.I2S1_SCLK 2.GPIO[30] 3.IIS_TEST 4.SPI1_DOUT
22	SDI	IO, T+D	4mA	OUT, T+D	1.I2S1_SDI 2.GPIO[27] 3.IIS_TEST 4.SPI1_CS
23	SDO	IO, T+D	4mA	IN, T+D	1.I2S1_SDO 2.GPIO[29]/BOOT_SEL[1] 3.IIS_TEST
24	SPI1_CLK	IO, T+D	8mA	IN, T+D	1.SPI1_CLK 2.GPIO[7] 3.SDC0_D2 4.SPI2_D3
25	SPI1_CS	IO, T+U	4mA	IN, T+D	1.SPI1_CS 2.GPIO[4] 3.SDC0_CLK 4.SPI2_D2
26	SPI1_DI	IO, T+D	4mA	IN, T+D	1.SPI1_DIN

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					2.GPIO[5] 3.SDC0_CMD 4.SPI2_D0
27	SPI1_DO	IO, T+D	8mA	IN, T+D	1.SPI1_DOUT 2.GPIO[6] 3.SDC0_D3 4.SPI2_CLK
28	RX0	IO, T+U	4mA	IN, T+U	1.UART0_RX 2.GPIO[1]
29	TX0	IO, T+U	4mA	IN, T+U	1.UART0_TX 2.GPIO[0]
30	3.3V	P	-	-	3.3V 电源输出, note1
31	5V	P	-	-	5V 电源输入
32	GND	P	-	-	地输入

note1: 3.3v 输出电流不超过 50mA。

note2: PWM4、PWM5 这两个信号是同时配置为 GPIO 或 PWM 使用。

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2.3 产品尺寸特性

产品尺寸正视图如图 4 所示。

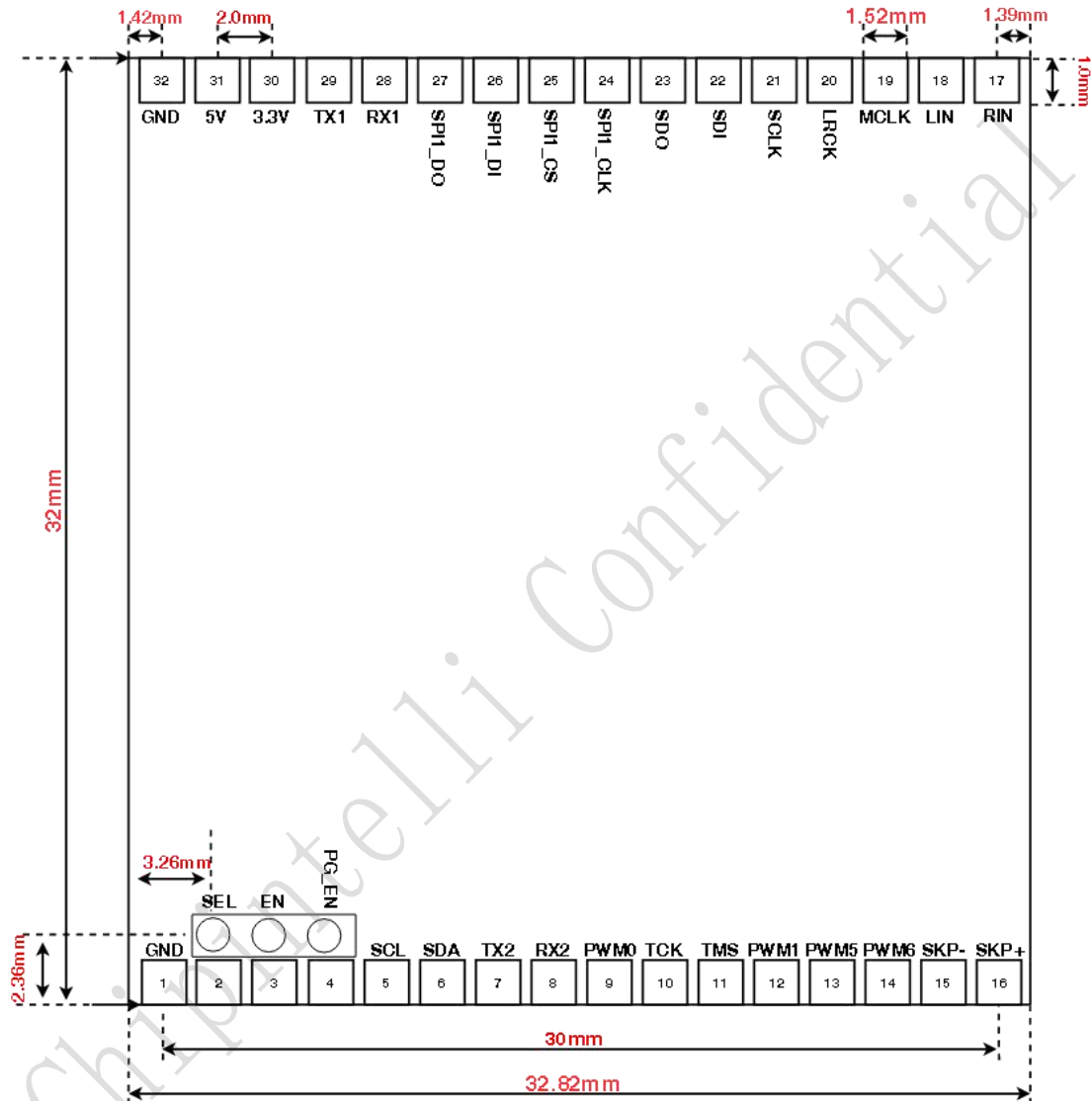


图 4 产品尺寸图

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2.4 电气特性

表 3 电气特性参数表

参数	条件	最小值	典型值	最大值	单位	备注
模组输入电压		4.5	5	5.5	V	NOTE1
模组播音状态电流 (正常音量)	8 欧 2W	32	65	/	mA	NOTE2
模组工作电流		/	45	/	mA	NOTE3
待机电流	5V 供电	/	30	/	mA	
模组工作环境温度		0	25	85	°C	
模组存储环境温度		0	25	85	°C	
模组存储湿度		0%	/	5%	RH	NOTE4
I/O 接口电平电压		3	3.3	3.6	V	
焊接温度		/	220	245	°C	
模组板尺寸		32mm X 32.82mm X 3.0mm			mm	

NOTE1: 5V 为模组典型输入电压，输入超过 5.5V 电压会损坏模组。

NOTE2: 需要为模组预留一组驱动能力为 500mA 的电源输入，喇叭播音瞬间最大电流可能会达到 500mA。

NOTE3: 典型值为静音状态测得。最大值为识别并播音，根据喇叭型号最大可能需要 500 mA 电流的输入。

NOTE4: 模组需要真空保存，开封后 4 小时焊接使用，没使用需要置于 5%RH 干燥柜并在 48 小时内焊接使用，在工厂暴露后需要烘烤。

2.5 使用注意事项

(1) 5V 供电需保证 500mA 的额定供电能力，要求电源干净，纹波在 30mV 左右。

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(2) 此模块板的所有 IO 均为 3.3V 输入，如果需要接 5V 或 2.5V 逻辑电平，必须加转接电路。

(3) 模组板上 PG_EN 与 EN 短接，模组进入 UART 升级模式；BOOT_SEL 与 EN 短接，模组进入调试模式。

(4) 通讯接口部分可以串联一个小电阻，如 22R。

(5) 可以将模块上的喇叭和 MIC 接口引出到主板采用插座接口。

(6) UART0 的 TX 和 RX 信号需要接到底板上，需要通过 UART0 进行固件升级。

(7) LAYOUT 的时候请注意，5V 输入处增加电容，MIC 走线尽量短；MIC 走线要注意屏蔽，SPK 走线尽量短而粗，走线区域不得有其它走线穿插。

(8) 控制底板翘曲程度，防止模块焊接不良。

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3 包装

1. 装盘：把模块板放入塑料托盘，每一个托盘可装 18pcs，如图 5。



图 5

2. 装袋：将装好模块板的托盘放入防静电袋中真空包装，15 托盘为一袋共 270pcs，真空包装后的托盘如图 6，然后再把真空包放入盒子。



图 6

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图 7

3. 装箱：每 4 包为一箱，每箱数量为 1080pcs。

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