



F-9833 V1.0 产品规格书

(BLE 模块)

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变更记录 Change History:

变更记录					
版本	修订内容	页次	修订日期	修订人	审核人
V1.0	首次发行		2022-04-06	吴德龙	
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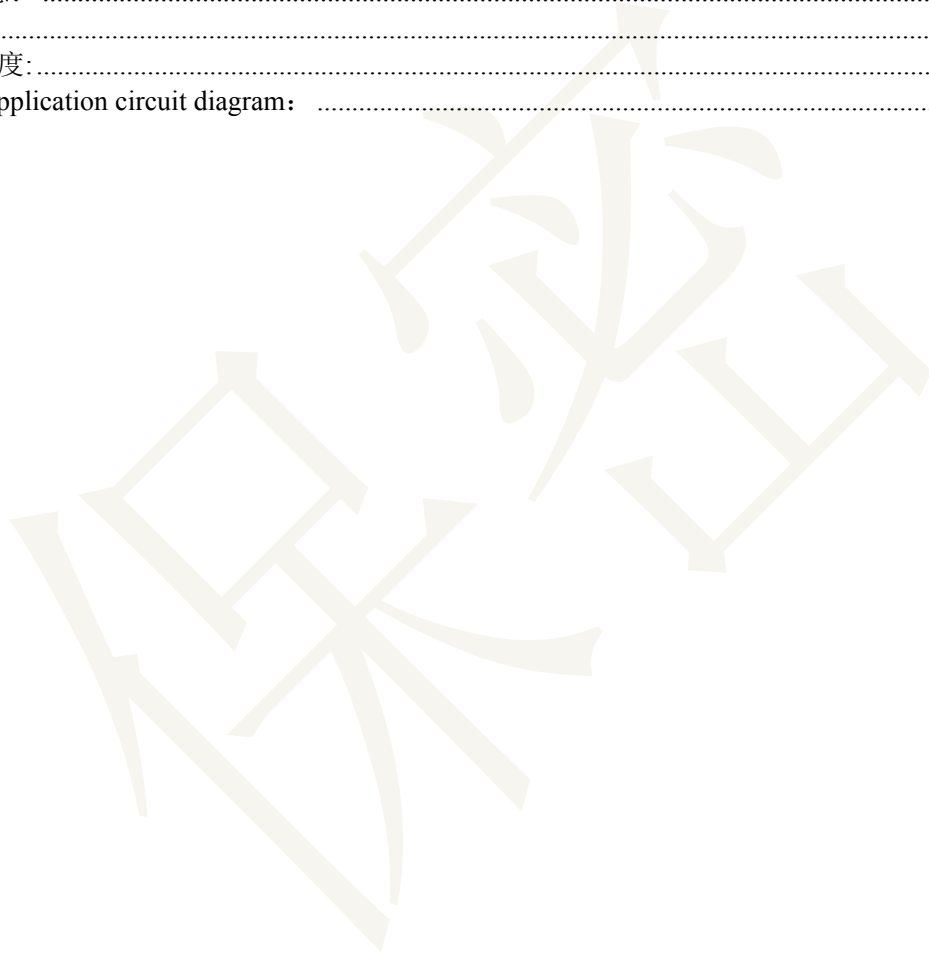
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1 摘要:

F-9833蓝牙BLE模块，采用高度集成蓝牙BLE 5.2 芯片- BK3633_QFN32 单模数据传输模块，内置 ARM968E的内核及高性能收发器，功能强大的基带处理器，内置FLASH 程序存储器适用于定制的应用程序，更好的保护应用程序的安全还提供灵活的硬件接口来连接传感器（适合小数据极低功耗传输，不支持语音，主要用于控制），主要用于客户数据透传类的产品应用。

2 基本特性 Features:

- Bluetooth 5.2
- 支持 BLE 双模
- 支持 2.4G 低功耗收发器
- 集成 ARM968E 内核微处理器
- 500KB 可编程闪存和 80KB RAM
- 模块供电范围 3.0V ~ 3.6V
- 16MHz 参考时钟
- 80MHz 锁相环时钟
- 32KHz 环形振荡器
- 外部 32KHz 晶体振荡器/可选
- 真随机数发生器

接口和外部设备

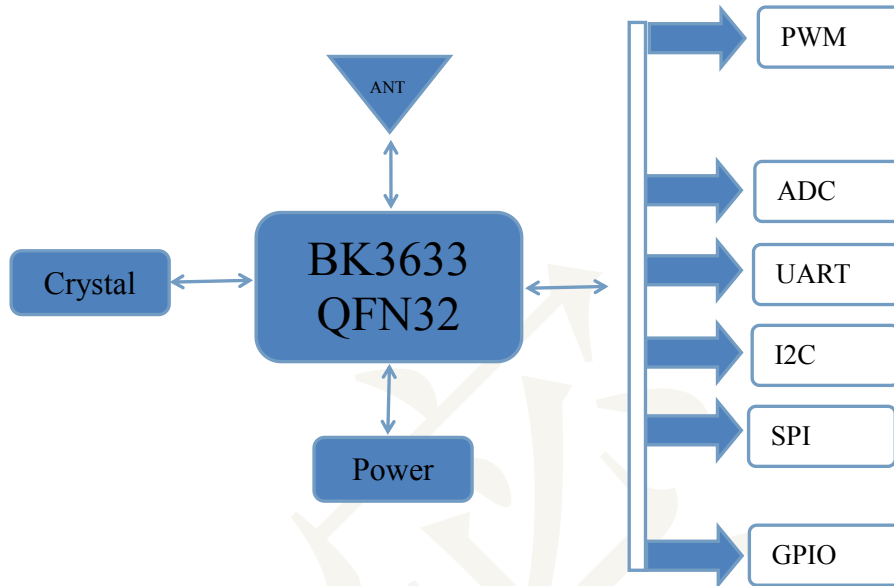
- UART*2 接口
- JTAG、SPI、I2C 接口
- 多通道 PMW 输出
- 可编程 GPIO
- ADC

3 应用领域 Application Field

- 支持 BLE 双模
- 传感器、运动和健身、Beacon
- 警报和计时器配置文件
- HID （ 键盘, 远程）
- 防丢器
- 数字电表



4 方框图 Module block diagram:



5 性能参数 performance parameter:

5.1 模组参数

模组参数	
无线标准	蓝牙 BLE 5.2
支持协议	ATT, GATT, SMP, L2CAP, GAP
天线	内外置天线
频率范围	2.402GHz-2.4835GHz
蓝牙 BLE 发射功率	最小: -20dBm, 典型: 0dBm 最大: 6dBm
蓝牙 BLE 接收灵敏度	-97dBm (<30.7%LE)
BLE 距离	0~100 米
扩展接口	UART、GPIO、ADC、PWM、I2C、SPI
加密类型	真随机数发生器
在线升级	支持
尺寸	12.6*16.8*2.5mm (LxWxH) SMD
认证信息	FCC/CE/SRRC, BT: BQB



5.2 推荐工作条件

操作范围	Min	Typical	Max	Unit
工作温度范围	-40	+20	+125	° C
电池 (VDD_BAT) 操作	+3.0	+3.3	+3.6	V
I/O 电源 (VDD_PIO)	0		+3.6	V
AIO 输入	0		+1.05	V
频率范围	2400		2484	MHz

5.3 最大额定功率

操作范围	Min	Max	Unit
存储温度	-40	+125	° C
电池 (VBAT) 操作*	+3.0	+3.6	V
I/O 电源	0	+3.6	V

5.4 电流

参数	测试条件	最小	典型	最大	单位
使用 app_gatt 工程测试	不休眠		2.8		mA
	Idle 普通休眠		1.2		mA
	降压休眠		300		uA
	深度休眠		2.0		uA
注释：上述测试结果均在 25 度 室温环境下，3.3V 供电模式下					

5.5 RF 参数

参数	测试条件	最小	典型	最大	单位
FOP	工作频率	2400		2483.5	MHz
FXTAL	晶振频率		16		MHz
RFSK	数据传输速率		1	2	Mbps
发射 (1 Mbps mode)					
RF TRP	输出功率	-20	0	+6	dBm
PBW	调制带宽			1	MHz
Dev	频偏	115	250	300	kHz
接收 BLE Mode					
Max Input	0.01%LE 接收功率		-10		dBm
RXSENS	30.7%LE 灵敏度 sensitivity		-95	-97	dBm
注释：上述测试结果均在 25 度 室温环境下，3.3V 供电模式下					



BT BLE Tx Verify Summary:

ItemNo.	ANT	Ch	Freq	Rate	Pow	FreqErr	$\Delta F1$ Avg	$\Delta F2$ Avg	$\Delta F2$ Max	$\Delta F2/F1$	Result
3	ANT0	0	2402	BLE	4.23dBm	44.39KHz	247.73KHz	220.27KHz	207.45KHz	0.89	PASS
4	ANT0	1	2404	BLE	4.23dBm	43.06KHz	248.62KHz	220.86KHz	206.35KHz	0.89	PASS
5	ANT0	2	2406	BLE	4.22dBm	39.67KHz	249.55KHz	221.85KHz	205.98KHz	0.89	PASS
6	ANT0	3	2408	BLE	4.22dBm	40.19KHz	247.20KHz	222.46KHz	206.97KHz	0.90	PASS
7	ANT0	4	2410	BLE	4.10dBm	39.18KHz	248.85KHz	223.68KHz	209.77KHz	0.90	PASS
8	ANT0	5	2412	BLE	4.08dBm	38.31KHz	249.09KHz	221.97KHz	207.14KHz	0.89	PASS
9	ANT0	6	2414	BLE	4.06dBm	37.35KHz	250.36KHz	222.70KHz	206.29KHz	0.89	PASS
10	ANT0	7	2416	BLE	4.04dBm	41.28KHz	248.30KHz	222.69KHz	209.12KHz	0.90	PASS
11	ANT0	8	2418	BLE	4.03dBm	44.85KHz	248.85KHz	223.49KHz	210.35KHz	0.90	PASS
12	ANT0	9	2420	BLE	4.02dBm	38.40KHz	249.63KHz	223.77KHz	210.95KHz	0.90	PASS
13	ANT0	10	2422	BLE	4.00dBm	41.37KHz	250.88KHz	222.81KHz	207.00KHz	0.89	PASS
14	ANT0	11	2424	BLE	3.98dBm	43.49KHz	251.36KHz	222.12KHz	207.53KHz	0.88	PASS
15	ANT0	12	2426	BLE	3.97dBm	40.30KHz	251.45KHz	222.76KHz	209.87KHz	0.89	PASS
16	ANT0	13	2428	BLE	3.96dBm	38.99KHz	248.10KHz	222.92KHz	210.23KHz	0.90	PASS
17	ANT0	14	2430	BLE	3.92dBm	43.26KHz	248.87KHz	223.47KHz	209.51KHz	0.90	PASS
18	ANT0	15	2432	BLE	3.92dBm	37.25KHz	248.62KHz	221.05KHz	207.24KHz	0.89	PASS
19	ANT0	16	2434	BLE	3.93dBm	41.91KHz	246.12KHz	220.75KHz	208.04KHz	0.90	PASS
20	ANT0	17	2436	BLE	3.94dBm	43.81KHz	247.01KHz	221.27KHz	207.80KHz	0.90	PASS
21	ANT0	18	2438	BLE	3.95dBm	40.94KHz	247.41KHz	221.63KHz	208.58KHz	0.90	PASS
22	ANT0	19	2440	BLE	3.97dBm	43.28KHz	247.79KHz	222.10KHz	207.44KHz	0.90	PASS
23	ANT0	20	2442	BLE	3.99dBm	38.28KHz	248.78KHz	221.87KHz	209.41KHz	0.89	PASS
24	ANT0	21	2444	BLE	4.01dBm	44.53KHz	246.75KHz	222.16KHz	206.15KHz	0.90	PASS
25	ANT0	22	2446	BLE	4.03dBm	42.10KHz	247.57KHz	222.87KHz	208.86KHz	0.90	PASS
26	ANT0	23	2448	BLE	4.04dBm	37.60KHz	248.90KHz	223.38KHz	207.95KHz	0.90	PASS
27	ANT0	24	2450	BLE	4.02dBm	41.40KHz	249.25KHz	223.04KHz	208.98KHz	0.89	PASS
28	ANT0	25	2452	BLE	4.03dBm	43.73KHz	249.52KHz	222.66KHz	206.67KHz	0.89	PASS
29	ANT0	26	2454	BLE	4.04dBm	39.32KHz	247.44KHz	223.26KHz	208.25KHz	0.90	PASS
30	ANT0	27	2456	BLE	4.04dBm	41.95KHz	248.53KHz	224.40KHz	212.28KHz	0.90	PASS
31	ANT0	28	2458	BLE	4.05dBm	39.34KHz	249.40KHz	223.29KHz	210.06KHz	0.90	PASS
32	ANT0	29	2460	BLE	4.04dBm	42.90KHz	250.42KHz	224.23KHz	211.50KHz	0.90	PASS
33	ANT0	30	2462	BLE	4.04dBm	41.78KHz	250.97KHz	222.86KHz	209.73KHz	0.89	PASS
34	ANT0	31	2464	BLE	4.03dBm	44.73KHz	247.28KHz	224.68KHz	207.76KHz	0.91	PASS
35	ANT0	32	2466	BLE	4.02dBm	40.02KHz	248.77KHz	224.02KHz	208.59KHz	0.90	PASS
36	ANT0	33	2468	BLE	4.01dBm	42.58KHz	249.25KHz	224.13KHz	205.58KHz	0.90	PASS
37	ANT0	34	2470	BLE	4.04dBm	39.36KHz	250.72KHz	224.60KHz	209.35KHz	0.90	PASS
38	ANT0	35	2472	BLE	4.03dBm	39.88KHz	247.35KHz	222.14KHz	204.84KHz	0.90	PASS
39	ANT0	36	2474	BLE	4.02dBm	38.68KHz	247.56KHz	222.63KHz	209.10KHz	0.90	PASS
40	ANT0	37	2476	BLE	4.01dBm	45.77KHz	248.57KHz	222.96KHz	206.97KHz	0.90	PASS
41	ANT0	38	2478	BLE	4.00dBm	43.11KHz	249.39KHz	223.54KHz	206.81KHz	0.90	PASS
42	ANT0	39	2480	BLE	3.99dBm	41.66KHz	253.13KHz	226.11KHz	210.93KHz	0.89	PASS



5.6 输入/输出终端特性

操作范围	Min	Typical	Max	Unit
VIL 输入逻辑低电平	VSS	-	VSS+0.3	V
VIH 输入逻辑高电平	VCC-0.3	-	VCC+0.3	V
VOL 输出逻辑低电平	VSS	-	VSS+0.3	V
VOH 输出逻辑高电平	VCC-0.3	-	VCC+0.3	V

5.7 静电测试

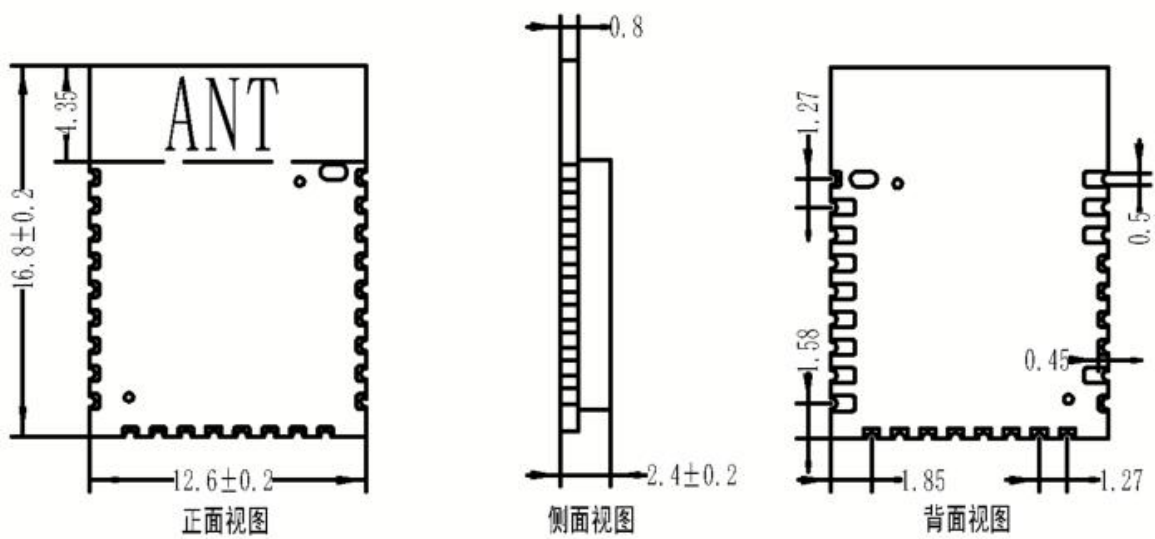
项目	条件	参数	单位
静电释放量 (人体模型 HBM)	人体模型 HBM , TAMB=25° C	+/- 2000	V
静电释放量 (机器模型 MM)	机器模型 HBM , TAMB=25° C	+/-200	V



6 模块尺寸图:

模组尺寸: $16.80\text{mm} \pm 0.2\text{mm}(\text{L}) \times 12.60\text{mm} \pm 0.2\text{mm}(\text{W}) \times 2.4\text{mm} \pm 0.2\text{mm}(\text{H})$

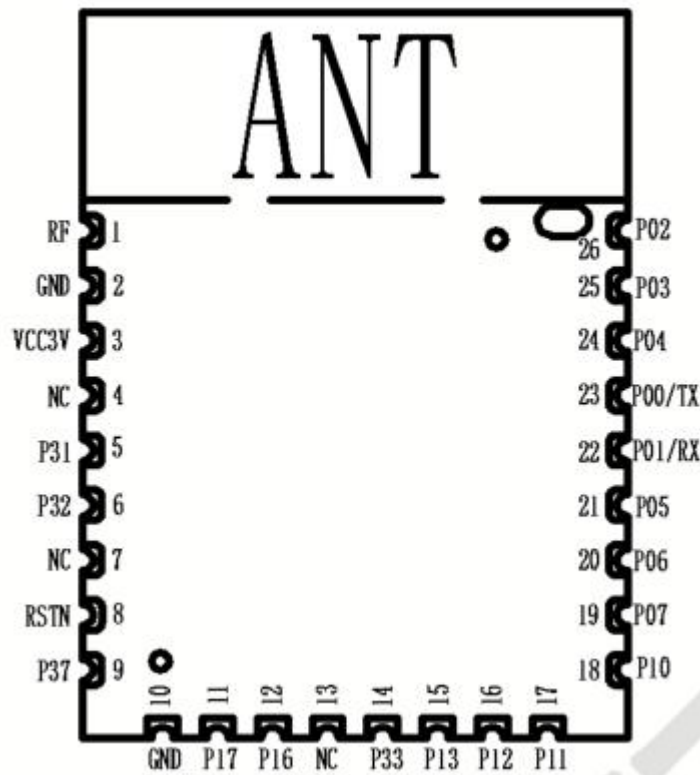
PCB厚度: $0.8\text{mm} (\pm 0.1\text{mm})$



备注: 未标注公差 $\pm 0.1\text{mm}$



6.1 模块脚位定义图:





6.2 引脚功能说明:

脚位	符号名称	引脚功能	功能描述
PIN	Name	Pin Function	Description
1	RF	RF	RF signal port
2	GND	GND	GND
3	VCC3V	Analog	Power, 3.0~3.6V
4	NC	NC	NC
5	P31	Digital I/O	General purpose IO/ADC1
6	P32	Digital I/O	General purpose IO/ADC2
7	NC	NC	NC
8	RSTN	Analog	Active low pin reset
9	P37	Analog	32 kHz Crystal input, and GPIO P37
10	GND	GND	GND
11	P17	Digital I/O	General purpose IO/UART2_RXD
12	P16	Digital I/O	General purpose IO/UART2_TXD
13	NC	NC	NC
14	P33	Digital I/O	General purpose IO
15	P13	Digital I/O	General purpose IO/PWM3
16	P12	Digital I/O	General purpose IO/PWM2
17	P11	Digital I/O	General purpose IO/PWM1
18	P10	Digital I/O	General purpose IO/PWM0
19	P07	Digital I/O	General purpose IO/PWM4
20	P06	Digital I/O	General purpose IO/PMW5
21	P05	Digital I/O	General purpose IO/SPI_MOSI
22	P01	Digital I/O	General purpose IO/UART1_RXD
23	P00	Digital I/O	General purpose IO/UART1_TXD
24	P04	Digital I/O	General purpose IO/SPI_SCK
25	P03	Digital I/O	General purpose IO/SDA
26	P02	Digital I/O	General purpose IO/SCL

7 软件调试功能说明:

7.1 串口 1: TX 为 P00, RX 为 P01, 波特率为 9600 ~ 1000000

7.2 串口 2: TX 为 P16, RX 为 P17, 波特率为 9600 ~ 1000000

7.3 硬件复位功能, 复位脚为 RST, 低电平复位

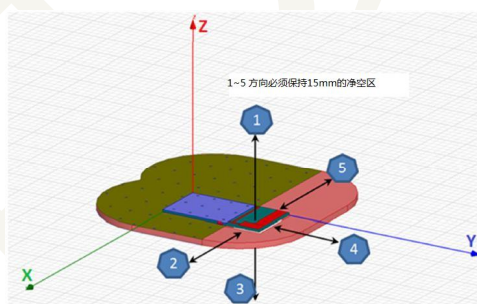


8 电路连接注意:

F-9833 中, 请注意避免功放、升压线路, DC/DC 电路等干扰源对模块的影响, 避免模块供电回路同大功率电路单元形成串联回路, 以此来提高整机 SNR;

9 注意事项:

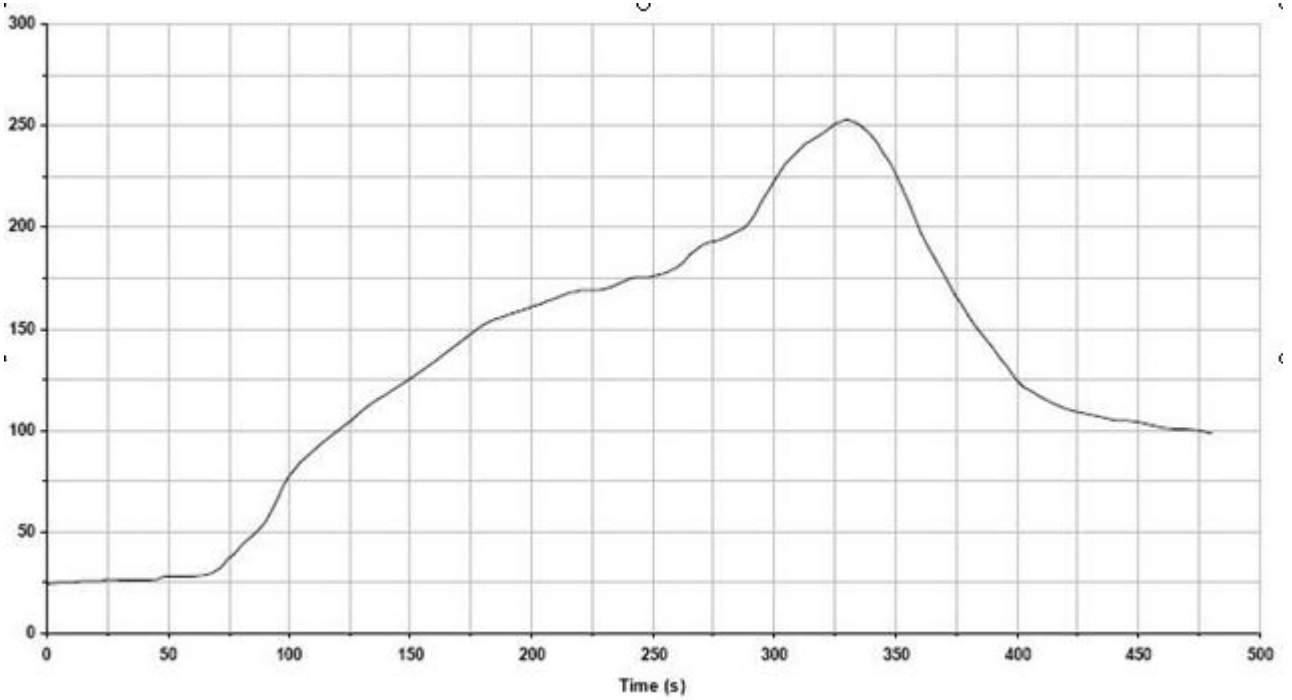
- A. 关于无线蓝牙的使用环境, 无线信号包括蓝牙应用都受周围环境的影响很大, 如树木、金属等障碍物会对无线信号有一定的吸收, 从而在实际应用中, 数据传输的距离受一定的影响。
- B. 由于蓝牙模块都要配套现有的系统, 放置在外壳中。由于金属外壳对无线射频信号是有屏蔽作用的。所以建议不要安装在金属外壳中。
- C. PCB 布板: 蓝牙模块的天线部分的是 PCB 天线, 由于金属会削弱天线的功能, 在给模块布板的时候, 模块天线下面严禁铺地和走线, 若能挖空更好。
- D. 如果模组天线旁边有电池, 金属物, 液晶屏, 喇叭等, 要求离天线距离至少 15mm(如图所示)



- E. layout 时供电线路建议使用星形走线, 并确保蓝牙模组供电线性度要好, 还有 BT 的地须与运放, 功放, MCU 等的地分开, 而且 BT 下侧不可有其他干扰地
- F. 天线周围不可走控制线, 电源线, 音频线, MIC 等干扰线.
- G. 如果模组天线附近有排座, 外壳有金属铁网等对信号有影响的, 建议选用专业的高增益天线.



10 推荐回流温度:

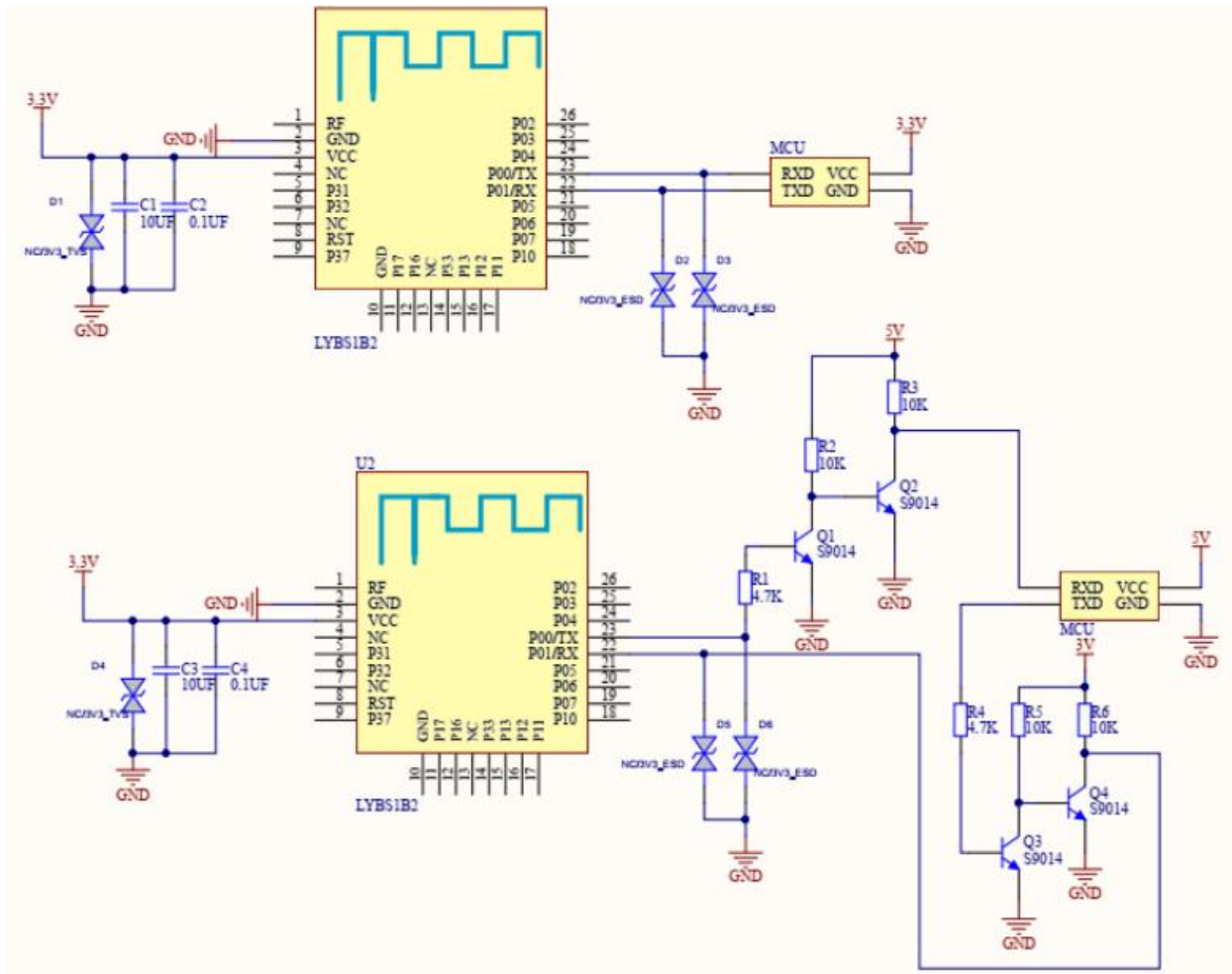


Key features of the profile:

- Initial Ramp=1-2.5°C/sec to 175°C equilibrium
- Equilibrium time=60 to 80 seconds
- Ramp to Maximum temperature (250°C)=3°C/sec Max
- Time above liquidus temperature(217°C): 45 - 90 seconds
- Device absolute maximum reflow temperature: 250°C



11 应用电路 Application circuit diagram:



参考应用仅供参考！

THE END!