Technical Description

The Equipment Under Test (EUT) is a Bluetooth Wireless Keyboard. It can pair with a Bluetooth device such as the Android mobile or IOS mobile. The Bluetooth module in the EUT is operating in the frequency range from 2402MHz to 2480MHz (79 channels with 1MHz channel spacing). The EUT is powered by internal 3.7VDC Ni-MH rechargeable battery which can be charged by 5VDC from USB port.

2.4GHz Bluetooth Module:
Modulation Type: GFSK
Antenna Type: Integral, Internal (PCB Trace)
Frequency Range: 2402MHz - 2480MHz, 1MHz channel spacing, 79 channels

Nominal field strength is 90.9dBμV/m @ 3m
Production Tolerance of field strength is +/- 3dB
Antenna gain is 1.87dBi

The functions of main ICs are mentioned below.

1. BlueTooth module BT3GMD_B47P(U1):

1) BC20730 acts as the 2.4GHz radio core of Bluetooth module (U1) (BT3GMD_B47P),.
2) 24MHz crystal (Y1) provides clock for BC20730
3) U2 (24LC128) is serial EEPROM for parameter backup of BC20730.

2. Regulator:

1) U3 (LN6206)

3. Charging Circuit:

1) U2 (LN2054)

Channel Frequency Table of Bluetooth Module

CH. NO.	FRE.	Hex Value		CH. NO.	FRE.	Hex Value		CH. NO	FRE.	Hex Value		CH. NO	FRE.	Hex Value
CH0	2402MHz	0		CH26	2428MHz	1A		CH52	2454MHz	34		CH78	2480MHz	4E
CH1	2403MHz	1		CH27	2429MHz	1B		CH53	2455MHz	35				
CH2	2404MHz	2		CH28	2430MHz	1C		CH54	2456MHz	36				
CH3	2405MHz	3		CH29	2431MHz	1D		CH55	2457MHz	37				
CH4	2406MHz	4		CH30	2432MHz	1E		CH56	2458MHz	38				
CH5	2407MHz	5		CH31	2433MHz	1F		CH57	2459MHz	39				
CH6	2408MHz	6		CH32	2434MHz	20		CH58	2460MHz	3A				
CH7	2409MHz	7		CH33	2435MHz	21		CH59	2461MHz	3B				
CH8	2410MHz	8		CH34	2436MHz	22		CH60	2462MHz	3C				
CH9	2411MHz	9		CH35	2437MHz	23		CH61	2463MHz	3D				
CH10	2412MHz	A		CH36	2438MHz	24		CH62	2464MHz	3E				
CH11	2413MHz	B		CH37	2439MHz	25		CH63	2465MHz	3F				
CH12	2414MHz	C		CH38	2440MHz	26		CH64	2466MHz	40				
CH13	2415MHz	D		CH39	2441MHz	27		CH65	2467MHz	41				
CH14	2416MHz	E		CH40	2442MHz	28		CH66	2468MHz	42				
CH15	2417MHz	F		CH41	2443MHz	29		CH67	2469MHz	43				
CH16	2418MHz	10		CH42	2444MHz	2A		CH68	2470MHz	44				
CH17	2419MHz	11		CH43	2445MHz	2B		CH69	2471MHz	45				
CH18	2420MHz	12		CH44	2446MHz	2C		CH70	2472MHz	46				
CH19	2421MHz	13		CH45	2447MHz	2D		CH71	2473MHz	47				
CH20	2422MHz	14		CH46	2448MHz	2E		CH72	2474MHz	48				
CH21	2423MHz	15		CH47	2449MHz	2F		CH73	2475MHz	49				
CH22	2424MHz	16		CH48	2450MHz	30		CH74	2476MHz	4A				
CH23	2425MHz	17		CH49	2451MHz	31		CH75	2477MHz	4B				
CH24	2426MHz	18		CH50	2452MHz	32		CH76	2478MHz	4C				
CH25	2427MHz	19		CH51	2453MHz	33		CH77	2479MHz	4D				

Product Specification

Product:	**Bluetooth 3.0 HID Module ,Class 2**
Module Number:	**BT3GMD-B47P**
Doc Version:	**V2.1**
Customer:	
Date:	**Nov 5, 2012**

Office Add.: **Room 1301, Block A, Building 1, Tianan Cyber Park, Huangge Road, Longgang District, Shenzhen, Guangdong, China**

Tel: 86-755-82079392,82078660 **Fax: 86-755-82079390**

Table of Contents

Section 1:Overview

The BT3GMD-B47P is a Bluetooth Human Interface Device(HID) module based on the Broadcom BCM20730 Bluetooth 3.0 specification basic rate-compliant stand alone baseband processor with an integrated 2.4GHz transceiver.

The module includes EEPROM, crystal, and PCB antenna.

1.1 Applications

- Wireless pointing devices: mice , trackballs , gestural controls
- Wireless keyboards
- 3D glasses
- Game controllers
- Point-of-sale(POS)input devices
- Remote sensors
- Home automation
- Personal health and fitness monitoring

1.2 Features

The BT3GMD-B47P offers the following features:

- On-chip support for common keyboard and mouse interfaces eliminates external processor
- Programmable keyscan matrix interface, up to 8 × 20 key-scanning matrix
- Bluetooth specification 3.0 compatible, includeing enhanced power control
- Bluetooth HID profile version 1.0 compliant
- Bluetooth Device ID profile version 1.3 compliant
- Bluetooth AVRCP-CT profile version 1.3 compliant
- Supports Adaptive Frequency Hopping(AFH)
- On-chip support for serial peripheral interface(SPI) and uart
- Programmable output power control meets Class 2 or Class 3 requirements
- Excellent receiver sensitivity
- Integrated ARM Cortex™-M3 based
- On-chip power-on reset(POR)

1.3 Functional Description

The primary component on the module is the Broadcom BCM20730, which is a Bluetooth 3.0 compliant basic rate single-chip. The baseband and radio have been integrated into a single chip implemented in standard digital CMOS. The block diagram of the module is shown in Figure 1.

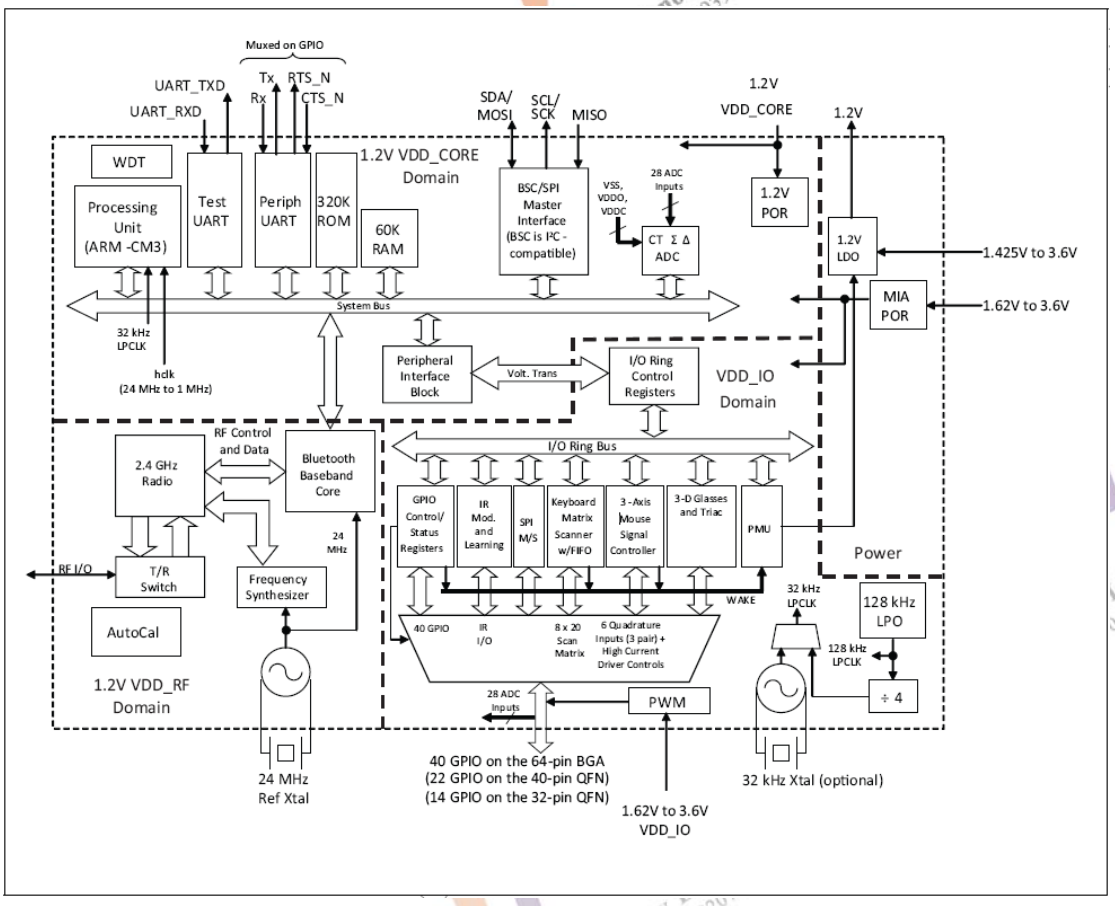


Figure 1: Block Diagram

The BT3GMD-B47P employs an integrated ARM Cortex™-M3 microprocessor core that runs software from the Link Control layer up to the Host Controller Interface (HCI).The baseband portion of the BT3GMD-B47P performs all the time-critical functions required for high-performance Bluetooth operations.

The radio incorporates the complete receive and transmit paths, including PLL, VCO, LNA, PA, upconverter,downconverter, modulator, demodulator, and channel select filtering.

The BT3GMD-B47P on-chip keyboard scanner is designed to autonomously sample keys and store them into buffer registers without requiring host microcontroller intervention. A state machine of three states(Idle, Scan, and Scan-End)controls the keyscan block.

The module has a SPI interface. The interface has a 16-byte transmit buffer and a 16-byte receive buffer .To support more flexibility for user applications. The module acts as an SPI master device that supports 1.8V or 3.3V SPI slaves.

The UART is a standard 2-wire interface (RX and TX) and has adjustable baud rates form 9600 bps to 1.5Mbps.

1.4 Physical Description

The BT3GMD-B47P is a 28.5mm×15mm FR4 PCB with 47 pads located around the perimeter. Table 1 shows the pinout diagram of the module.

PIN	Signal	PIN	Signal	PIN	Signal	PIN	Signal	PIN	Signal
1	GND	2	GND	3	P13	4	P8	5	P17
6	P22	7	UP_TX	8	UP_RX	9	P6	10	P0
11	P1	12	P5	13	P4	14	P2	15	P31
16	RESET	17	P3	18	SDA	19	SCL	20	P32
21	P16	22	P18	23	P19	24	P25	25	VDD
26	GND	27	P20	28	P24	29	P21	30	P7
31	P29	32	P28	33	P27	34	P26	35	P36
36	P30	37	P38	38	P37	39	P15	40	P14
41	P12	42	P9	43	P23	44	P11	45	P10
46	GND	47	GND						

Table 1 Pin Location

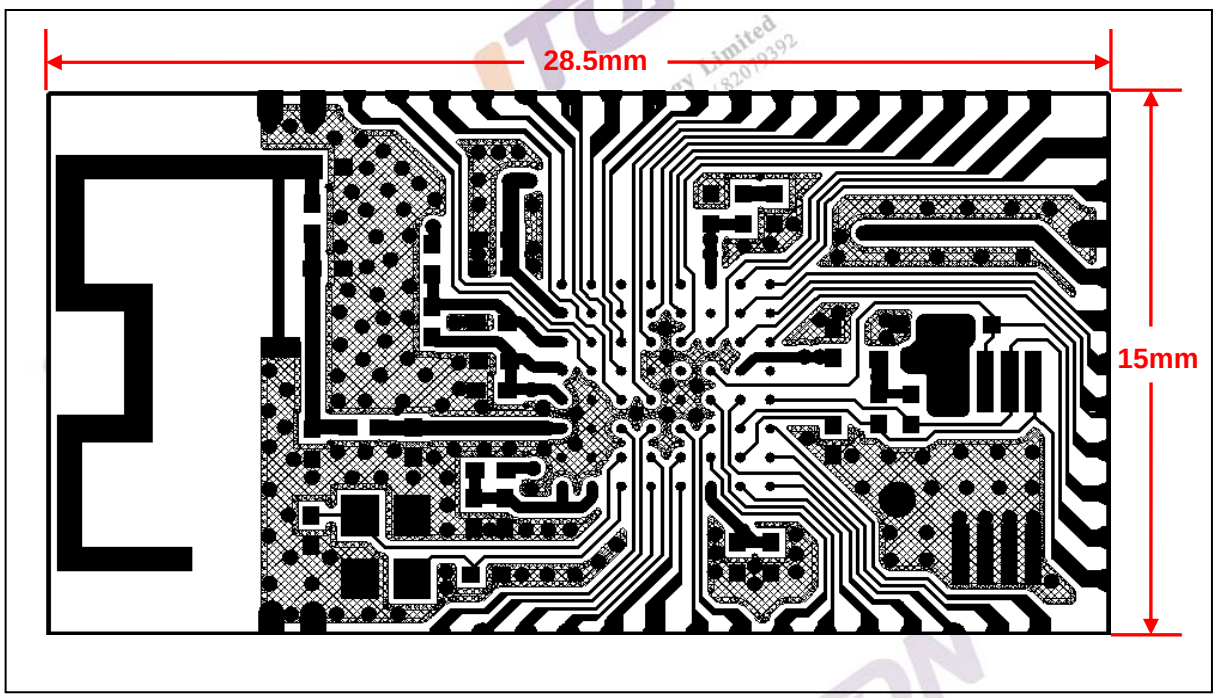


Figure 2: Module PCB Top View

Pin Number	*Pin Name*	*Default Direction*	*POR State*	*Function Description*
1, 2, 26, 46, 47	GND			Ground
25	VDD			Power supply
16	RESET		PU	Active-low system reset with open-drain output & internal pull up resistor
18	SDA	I/O	PU	Data signal for an extern I^2C device
19	SCL	I/O	PU	Clock signal for an extern I^2C device
7	UP_TX	output	PU	UART serial output-serial data output for the HCI UART interface
8	UP_RX	input		UART serial input-serial data output for the HCI UART interface
10	P0	input	Floating	GPIO:P0,Keyboard scan input(row):KSI0
11	P1	input	Floating	GPIO:P1,Keyboard scan input(row):KSI1
14	P2	input	Floating	GPIO:P2,Keyboard scan input(row):KSI2
17	P3	input	Floating	GPIO:P3,Keyboard scan input(row):KSI3
13	P4	input	Floating	GPIO:P4,Keyboard scan input(row):KSI4
12	P5	input	Floating	GPIO:P5,Keyboard scan input(row):KSI5
9	P6	input	Floating	GPIO:P6,Keyboard scan input(row):KSI6
30	P7	input	Floating	GPIO:P7,Keyboard scan input(row):KSI7
4	P8	input	Floating	GPIO:P8,Keyboard scan output(column):KSO0
42	P9	input	Floating	GPIO:P9,Keyboard scan output(column):KSO1
45	P10	input	Floating	GPIO:P10,Keyboard scan output(column):KSO2
44	P11	input	Floating	GPIO:P11,Keyboard scan output(column):KSO3
41	P12	input	Floating	GPIO:P12,Keyboard scan output(column):KSO4
3	P13	input	Floating	GPIO:P13,Keyboard scan output(column):KSO5
40	P14	input	Floating	GPIO:P14,Keyboard scan output(column):KSO6
39	P15	input	Floating	GPIO:P15,Keyboard scan output(column):KSO7
21	P16	input	Floating	GPIO:P16,Keyboard scan output(column):KSO8
5	P17	input	Floating	GPIO:P17,Keyboard scan output(column):KSO9
22	P18	input	Floating	GPIO:P18,Keyboard scan output(column):KSO10
23	P19	input	Floating	GPIO:P19,Keyboard scan output(column):KSO11
27	P20	input	Floating	GPIO:P20,Keyboard scan output(column):KSO12
29	P21	input	Floating	GPIO:P21,Keyboard scan output(column):KSO13
6	P22	input	Floating	GPIO:P22,Keyboard scan output(column):KSO14
43	P23	input	Floating	GPIO:P23,Keyboard scan output(column):KSO15
28	P24	input	Floating	GPIO:P24,Keyboard scan output(column):KSO16
24	P25	input	Floating	GPIO:P25,Keyboard scan output(column):KSO17,SPI MISO (Master mode)
34	P26	input	Floating	GPIO:P26,Current 16 mA @3.3V
33	P27	input	Floating	GPIO:P27,Current 16 mA @3.3V
32	P28	input	Floating	GPIO:P28,Current 16 mA @3.3V
31	P29	input	Floating	GPIO:P29,Current 16 mA @3.3V
36	P30	input	Floating	GPIO:P30,A/D converter input,Default as the battery capacity detection
15	P31	input	Floating	GPIO:P31, A/D converter input,
20	P32	input	PU	GPIO:P32,Default as the EEPROM write protect pin
35	P36	input	Floating	GPIO:P36,SPI CLK(Master mode)
38	P37	input	Floating	GPIO:P37,SPI CS(Master mode)
37	P38	input	Floating	GPIO:P38,SPI MOSI(Master mode)

Table 2 Pin Function Descriptions

Section 2: Supporting Documentions

2.1 Reference Schematic

The most recent schematic , bill of material ,and layout file are available from the ITON Technology Limit. Contact your ITON representative for details.

2.2 Layout Considerations

The BT3GMD-B47P module is placed at the location where the antenna is away from the power supply(i.e.,BT1 Battery contacts)and any digital signal traces. There should be no key matrix membrane under the antenna area and the user's hand should not be over the antenna area when the keyboard is in use. The antenna keep-out area which is 5mm around the parameter of the module region is shown in the red dotted box. PCB material and signal traces should not be placed within the antenna keep-out area to assure optimum antenna performance.

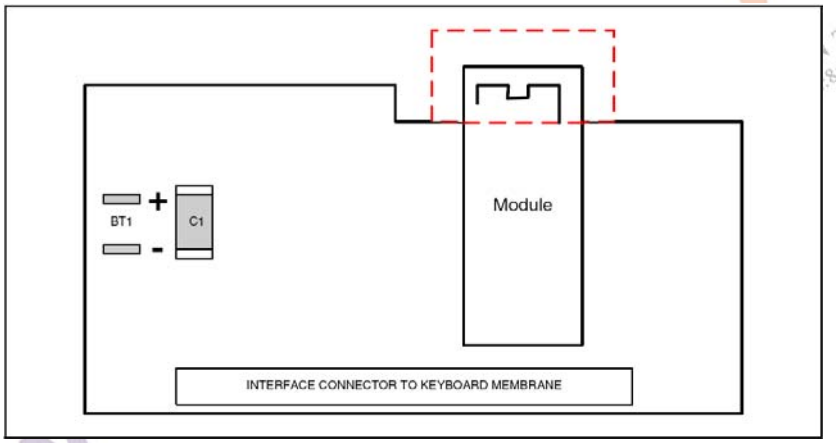


Figure 3: Keyboard PCB

2.3 Electrical Characteristics

Table 3: BCM20730 Maximum Electrical Rating

Rating	*Symbol*	*Value*	*Unit*
Dc supply voltage	—	1.4(Min)--3.8(Max)	V
Voltage on input or output pin	—	Vss -0.3 to Vdd +0.3	V
Operating ambient temperature range	Topr	0 to +70	℃
Storage temperature range	Tstg	-40 to +125	℃

Table 4 :BT3GMD_B47P Power supply

Rating	*Minimum*	*Typical*	*Maximum*
Dc supply voltage	1.75V	2.8V	3.6V

2.4 RF Specification

Table 5 : Module RF Specifications(Vdd_RF=1.5,T=25C)

	BQB Specifications		*Measured*			
Transmitter	***Min***	***Max***	***Min***	***Avg***	***Max***	***Unit***
Output Power	–6	4	2.65	2.66	3.16	dBm
Output Spectrum – Frequency Range	2400	2483.5	2401.24	–	2480.78	MHz
Output Spectrum – 20 dB BW	–	1000	930	920	930	kHz
Output Spectrum – Adjacent Channel	–	–	–	–	–	–
|M–N|=2	–	–20	–48.19	–48.08	–47.71	dBm
|M–N|>=3	–	–40	–52.49	–52.24	–52.36	dBm
Modulation Characteristics	–	–	–	–	–	–
Delta f2max>=99.9% of all Delta f2max	115	–	134.4	132.8	133.7	kHz
Delta f1 (average)	140	175	151.0	152.7	151.8	kHz
Delta f2 / Delta f1	0.8	–	0.95	0.92	0.93	Ratio
Initial Carrier Frequency Tolerance	–75	75	5.3	7.8	11.2	kHz from Ftx
Carrier Frequency Drift	–	–	–	–	–	–
DH1	–	25	7	9	7	kHz from Fo
DH3	–	40	11	8	9	kHz from Fo
Drift Rate	–20	20	6.83	–6.43	–5.67	kHz/50 µs
Single-slot Sensitivity (non-hopping)	–	–	–	–	–	–
2402	–	–	–	–86.14	–	dBm
2441	–	–	–	–86.92	–	dBm
2480	–	–	–	–87.25	–	dBm

Section3: Application Examples

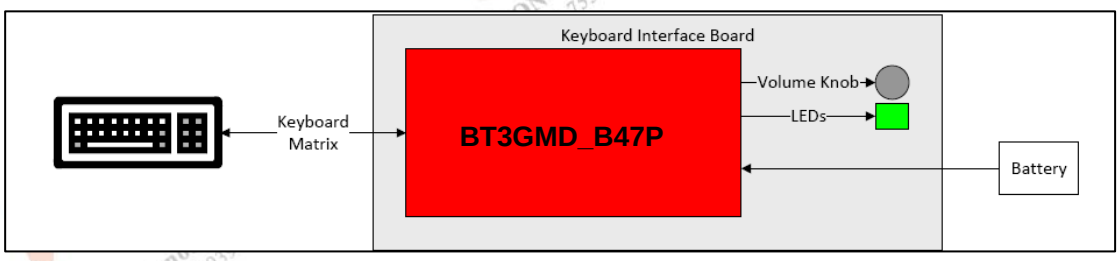


Figure 4: Keyboard PCB

Power consumption	***Vdd @1.8V***	***Vdd @2.8V***
operating current(1 key is pressed)	1mA	<2mA
Standby current (average)	0.4mA	0.4mA
Deep sleep	18uA	18uA

Table 5: keyboard Performance

Section 4: Mechanical Specification

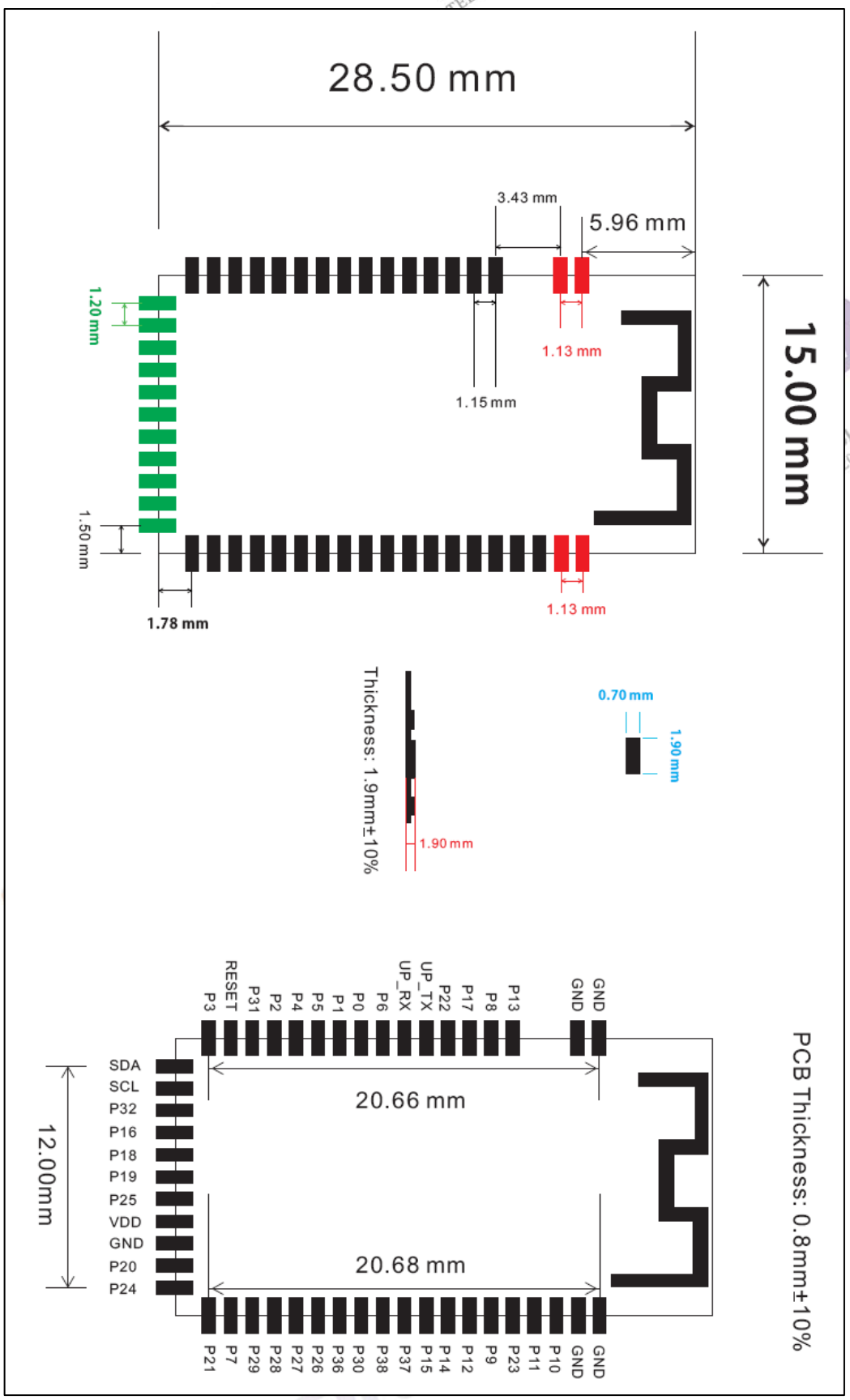
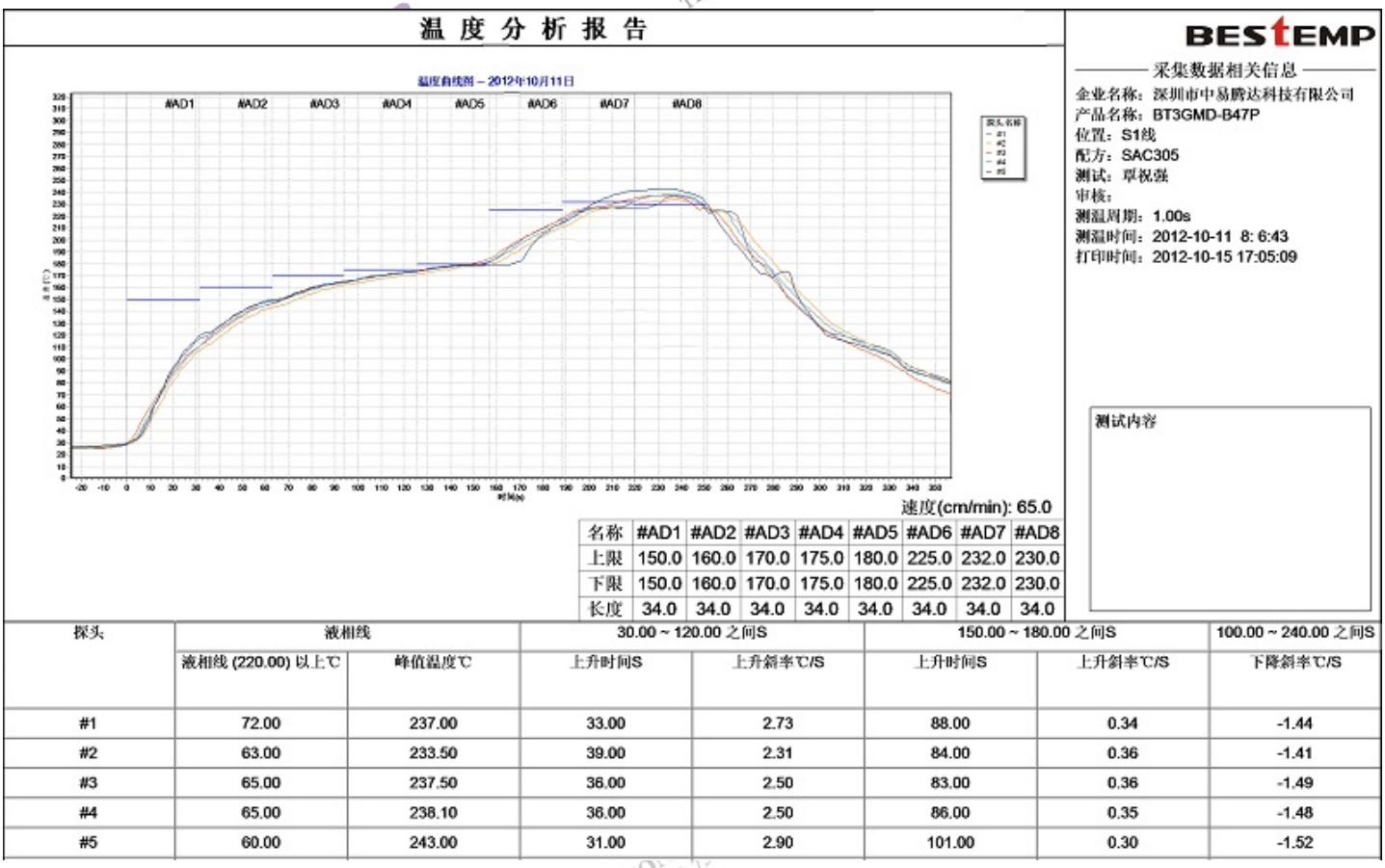


Figure 5: 47Pin-Bluetooth Module

Section 5: Information for Manufacture



温 度 分 析 报 告

BESTEMP

采集数据相关信息

企业名称：深圳市中易腾达科技有限公司
产品名称：BT3GMD-B47P
位置：S1线
配方：SAC305
测试：覃祝强
审核：
测温周期：1.00s
测温时间：2012-10-11 8: 6:43
打印时间：2012-10-15 17:05:09

测试内容

速度(cm/min): 65.0

名称	#AD1	#AD2	#AD3	#AD4	#AD5	#AD6	#AD7	#AD8
上限	150.0	160.0	170.0	175.0	180.0	225.0	232.0	230.0
下限	150.0	160.0	170.0	175.0	180.0	225.0	232.0	230.0
长度	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0

探头	液相线		30.00 ~ 120.00 之间S		150.00 ~ 180.00 之间S		100.00 ~ 240.00 之间S
	液相线 (220.00) 以上℃	峰值温度℃	上升时间S	上升斜率℃/S	上升时间S	上升斜率℃/S	下降斜率℃/S
#1	72.00	237.00	33.00	2.73	88.00	0.34	-1.44
#2	63.00	233.50	39.00	2.31	84.00	0.36	-1.41
#3	65.00	237.50	36.00	2.50	83.00	0.36	-1.49
#4	65.00	238.10	36.00	2.50	86.00	0.35	-1.48
#5	60.00	243.00	31.00	2.90	101.00	0.30	-1.52

Figure 6: Temperature analysis report

Section 6: Packaging Specifications

Parameter	***Value***
Quantity per layer	50 pieces
Layers per electrostatic bags	20

Table 6: Packaging Specifications

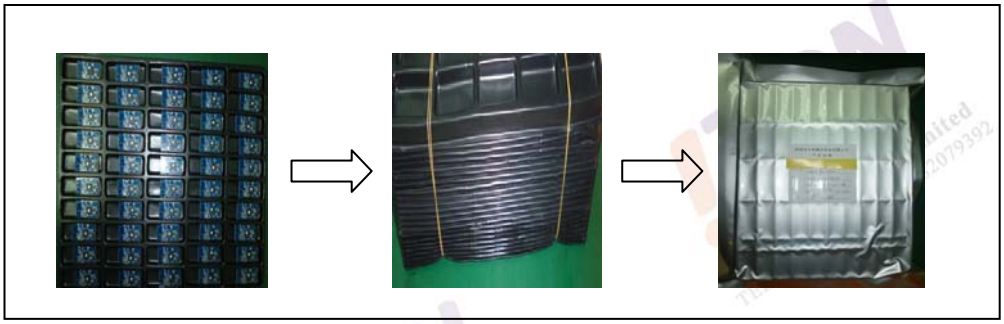


Figure 7: Packaging samples