BTM8635

Bluetooth Module Data Sheet

Document Type:	Bluetooth Module Datasheet
Document Version:	V1.0
Release Date:	August 29, 2013

Revision History

Date	Version	Description	Author
2013-08-29	V1.0	n First Release	

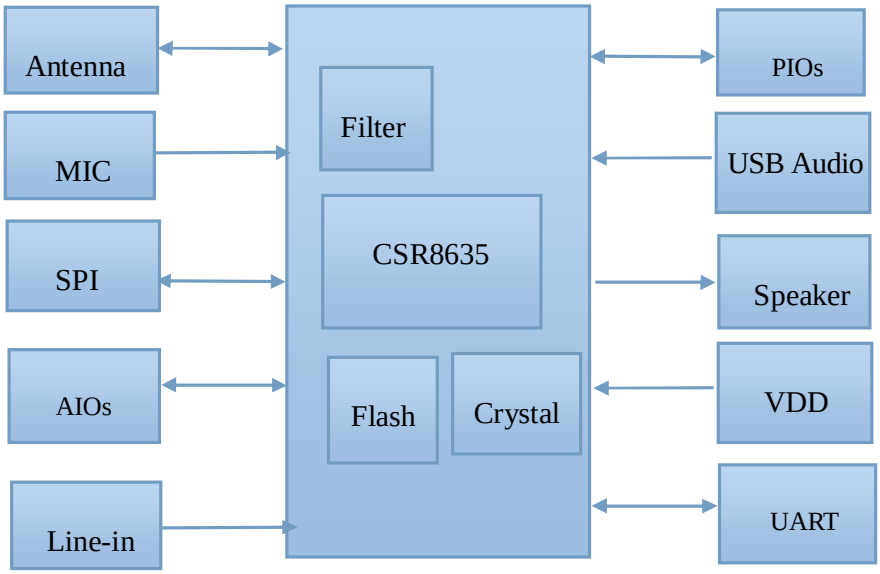
1. INTRODUCTION

The BTM8635 Bluetooth® module is a perfect solution for enhanced audio applications, such as stereo headphones and speakers. It can be connected with any Bluetooth® devices in an operating range. It is slim and light so the designers can have better flexibilities for the product shapes.

The BTM8635 Bluetooth® module complies with Bluetooth® specification version 4.0. It supports HSP, HFP, A2DP, AVRCP profiles. It integrates RF Baseband controller, antenna,… etc. and provide UART interface, programmable I/O, stereo speaker output, microphone input,… etc.

The detail information of BTM8635 Bluetooth® module is presented in this document below.

1.1 Block Diagram



1.2 Features

- ü Small overall dimension(21mm x 13.5mm x 2mm)
- ü Bluetooth® V4.0
- ü Class 2 support
- ü Physical connection as SMD type
- ü High quality stereo audio
- ü Music Enhancements: SBC,MP3,AAC and Faststream decoder, Configurable EQ,Stereo Widening(S3D)
- ü Support SMSC-T
- ü Support HSP, HFP, A2DP, AVRCP profile
- ü Based on CSR chip set CSR8635
- ü RoHS Compliant
- ü No radio signal interference, support for 802.11 co-existence

※ ***Some features are optional for customization on demand.***

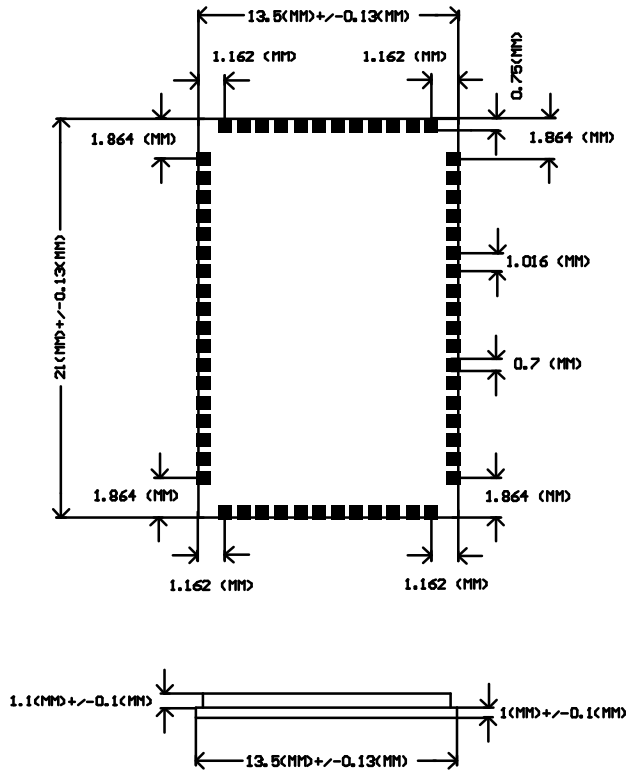
1.3 Application

- High Quality Stereo Bluetooth Headsets
- High Quality Wired Stereo Headset and Headphones
- Bluetooth Speakers

2. GENERAL SPECIFICATION

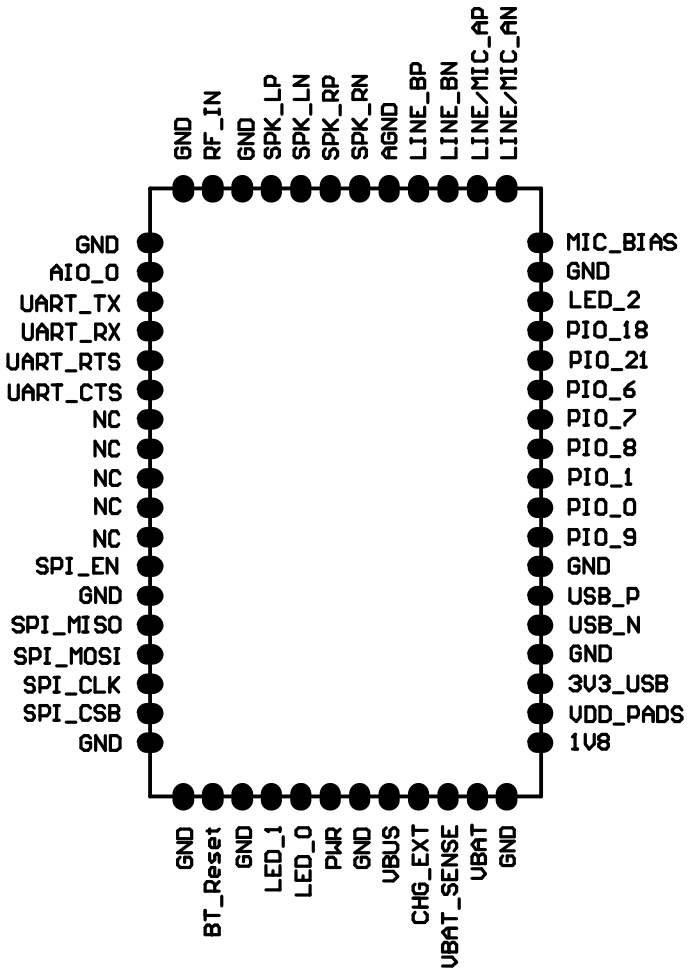
Bluetooth Specification	
Chip Set	CSR 8635 (ROM)
Module ID	BTM8635
BT Standard	Bluetooth® V4.0
RF TX Output Power	4dBm (Class II)
Sensitivity	-86dBm@0.1%BER
Frequency Band	2.402GHz~2.480GHz ISM Band
Baseband Crystal OSC	26MHz
Hopping	1600hops/sec, 1MHz channel space
RF Input Impedance	50 ohms
Environmental	RoHS Compliant

3. PHYSICAL CHARACTERISTIC



Note: Tolerence without mark default +/-0.05mm

尺寸未标注公差处公差为+/-0.05mm


GND
RF_IN
GND
SPK_LP
SPK_LN
SPK_RP
SPK_RN
AGND
LINE_BP
LINE_BN
LINE/MIC_AP
LINE/MIC_AN
GND
AIO_0
UART_TX
UART_RX
UART_RTS
UART_CTS
NC
NC
NC
NC
NC
SPI_EN
GND
SPI_MISO
SPI_MOSI
SPI_CLK
SPI_CSB
GND
MIC_BIAS
GND
LED_2
PIO_18
PIO_21
PIO_6
PIO_7
PIO_8
PIO_1
PIO_0
PIO_9
GND
USB_P
USB_N
GND
3V3_USB
VDD_PADS
1V8
GND
BT_Reset
GND
LED_1
LED_0
PWR
GND
VBUS
CHG_EXT
VBAT_SENSE
VBAT
GND

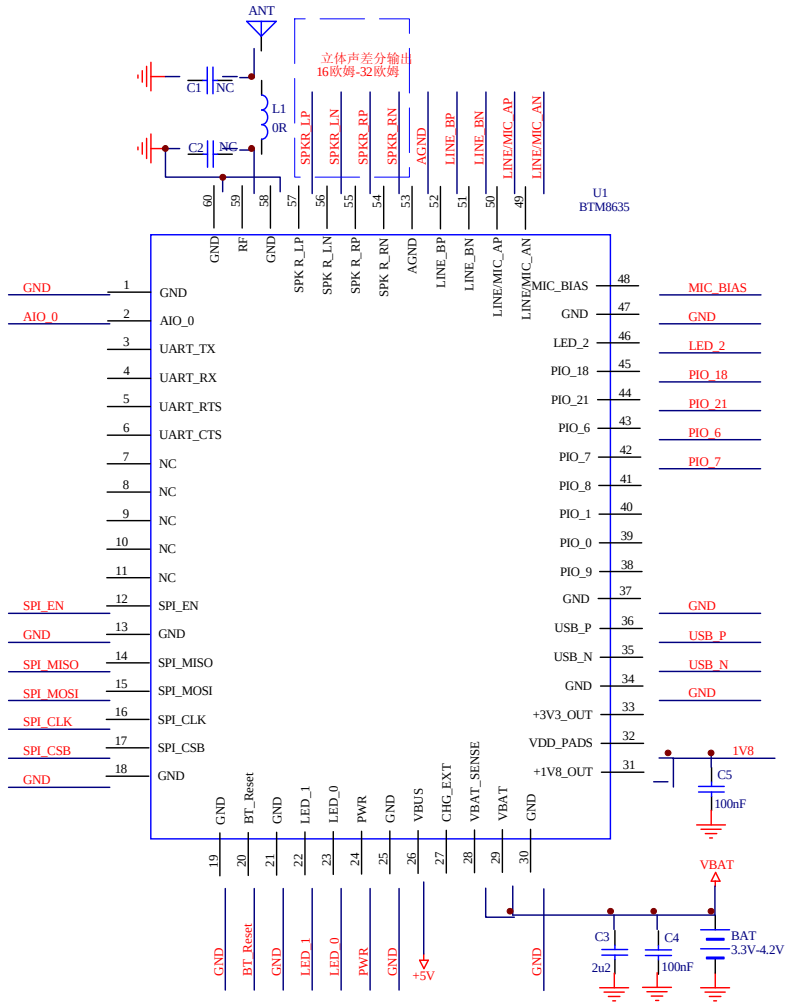
3.1 Pin Description

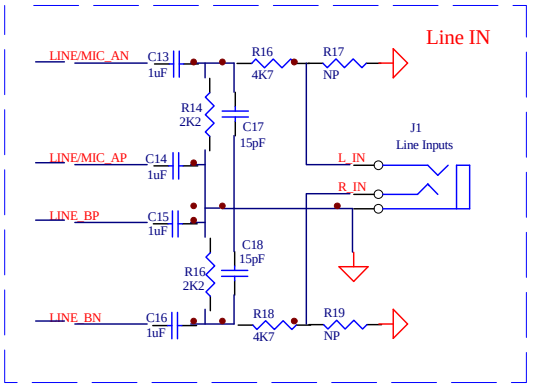
Pin#	Pin Name	Pad Type	Description
1	GND	Ground	Ground
2	AIO_0	Bi-directional VDD/Low-voltage regulator output	Analogue programmable input/ output line circuitry and 1.5V regulated output (from internal low-voltage regulator)
3	UART_TX	Bi-directional CMOS output, tri-state, with weak internal pull-up	UART data output
4	UART_RX	CMOS input with weak internal pull-down	UART data input
5	UART_RTS	Bi-directional CMOS output, tri-state, with weak internal pull-up	UART request to send active low
6	UART_CTS	CMOS input with weak internal pull-down	UART clear to send active low
7	NC	NC	NC
8	NC	NC	NC
9	NC	NC	NC
10	NC	NC	NC
11	NC	NC	NC
12	SPI_EN	Bi-directional with programmable strength internal pull-up/down	SPI select input: 1: SPI
13	GND	Ground	Ground
14	SPI_MISO	CMOS output, tri-state, with weak internal pull-down	SPI data output
15	SPI_MOSI	CMOS input, with weak internal pull-down	SPI data input
16	SPI_CLK	Input with weak internal pull-down	SPI clock
17	SPI_CSB	Input with weak internal pull-up	Chip select for Serial Peripheral Interface (SPI),active low
18	GND	Ground	Ground
19	GND	Ground	Ground
20	BT_Reset	CMOS input with weak internal pull-up	Active LOW reset

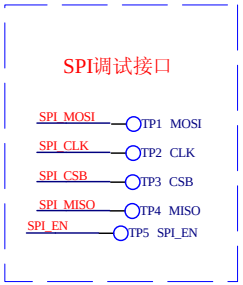
21	GND	Ground	Ground
22	LED_1	Open drain output	LED driver
23	LED_0	Open drain output	LED driver
24	PWR	Analogue	Take high to enable high-voltage linear regulator and switch-mode regulator
25	GND	Ground	Ground
26	VBUS	Power input	Charger input
27	CHG_EXT	Analogue out	External battery charger control
28	VBAT_SENSE	Analogue out	Battery charger sense input
29	BVAT	Powr in	Battery positive terminal
30	GND	Ground	Ground
31	1V8_OUT	Power	High-voltage linear regulator output (1.8V out)
32	VDD_PADS	Powr in	Positive supply input for input/output ports
33	3V3_OUT	Power out	3.3V bypass linear regulator output
34	GND	Ground	Ground
35	USB_N	Bi-directional	USB data minus
36	USB_P	Bi-directional	USB data plus with selectable internal 1.5kΩ pull-up resistor
37	GND	Ground	Ground
38	PIO_9	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line

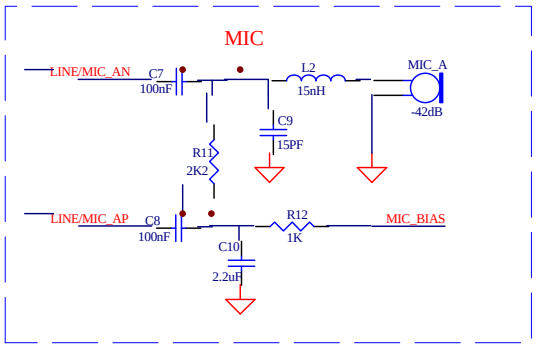
39	PIO_0	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
40	PIO_1	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
41	PIO_8	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
42	PIO_7	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
43	PIO_6	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
44	PIO_21	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
45	PIO_18	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
46	LED_2	Open drain output	LED driver
47	GND	Ground	Digital Ground
48	MIC_BIAS	Analogue	Microphone bias
49	LINE/MIC_AN	Analogue	Line-in negative, right
50	LINE/MIC_AP	Analogue	Line-in positive, right
51	LINE_BN	Analogue	Line-in negative,left
52	LINE_BP	Analogue	Line-in positive,left
53	AGND	Ground	Analog Ground
54	SPK_RN	Analogue	Speaker output negative, right
55	SPK_RP	Analogue	Speaker output positive, right
56	SPK_LN	Analogue	Speaker output negative, left
57	SPK_LP	Analogue	Speaker output positive, left
58	GND	Ground	Digital Ground
59	RF	RF	RF out
60	GND	Ground	Digital Ground

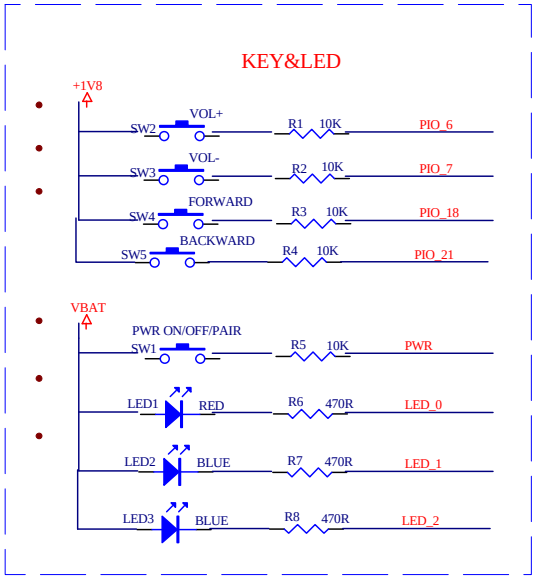
4. REFERENCE SCHEMATIC

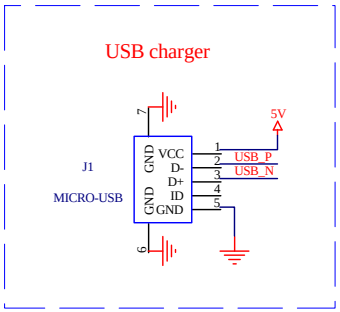


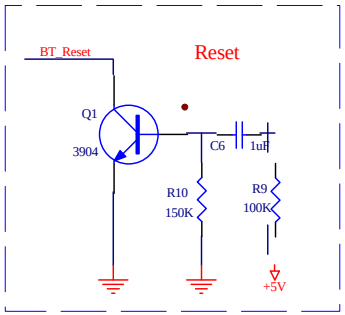


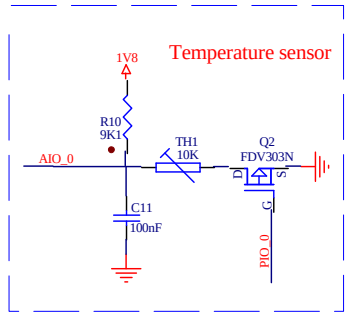












5.PHYSICAL INTERFACE

5.1 Programmable I/O ports

- The module provide 11 lines of programmable bidirectional I/O,Can configurate to different function by firmware.

5.2 Analogue I/O ports

- The module has a analogue port AIO_0,typically connections to thermistor for battery pack temperature measurements during charger control.

5.3 LED Driver

- The module provide 3 synchronized PWM LED driver for RGB leds.Can controlled by firmware.The driver are open-drain outputs,and the LEDs must pull up to positive supply. Refer to the section 4.1

5.4 Audio Interfaces

Audio interface as following features:

Stereo or dual mono analogue audio output through SPK_LP,SPK_LN,SPK_RP,SPK_RN.

- Stereo and mono analogue input through LINE/MIC_AN,LINE/MIC_AP,LINE_BN,LINE_BP.

The module is designed for different output,if a single-ended audio output is required,use an external differential to single-ended converter.

5.5 Microphone input

The module contains an independent low-noise microphone bias generator.The microphone bias generator is recommended for biasing electret condenser microphone.section 4.1 is a basing circuit for microphone with a sensitivity between -40~-60db.

5.6 Reset

- The module is reset from several sources:
  - Reset# pin
  - Power on reset
  - Software configured watch-dog

The Reset pin is an active low reset and is internally filtered using the internal low frequency clock oscillator.Recommended the low period >10ms.
RAM data not available after cold reset.

shows pin states of module on reset

Pin name	I/O type	Reset			
PIO_0	Digital Bidirectional	Strong pull up	PIO_18	Digital Bidirectional	Strong pull down
PIO_1	Digital Bidirectional	Strong pull up	PIO_21	Digital Bidirectional	Weak pull down
PIO_6	Digital Bidirectional	Strong pull down			
PIO_7	Digital Bidirectional	Strong pull down			
PIO_8	Digital Bidirectional	Strong pull up			
PIO_9	Digital Bidirectional	Strong pull down			

5.7 RF Interface

The module integrates a balun filter. A 50ohms load is needed.

5.8 Batter charger

5.8.1 battery charger hardware operating modes

The battery charger hardware is controlled by VM ,it has 5 modes:
Disabled
Trickle charger
Fast charger
Standby:fully charged or float charge
Error:charging input voltage,VCHG is too low.

5.8.2 External charge mode

The external mode is for charging higher capacity batteries using an external bass device.The current is controlled by sinking a varying current into the CHG_EXT pin, and the current is determined by measuring the voltage dorp across a resistor.The max current up to 700mA.

5.9 Serial Interfaces

5.9.1 UART

This is a standard UART interface for communicating with other serial devices. The UART interface provides a simple mechanism for communicating with other serial devices using the RS232 protocol.

When the module is connected to another digital device,UART_RX and UART_TX transfer data between the two devices. The remaining two signals, UART_CTS and UART_RTS, can be used to implement RS232 hardware flow control where both are active low indicators.

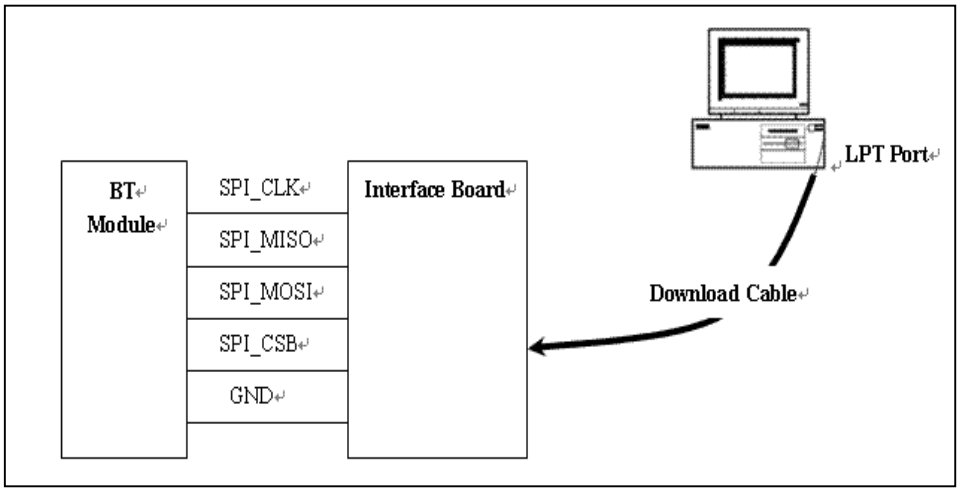
Note: The serial port interface(UART)can be used for system debugging.Don't support to use command set for profile function application by UART,such as HFP/A2DP/AVRCP and so on.These profiles function application can be contolled only by PIO,such as

pairing/connect/answer/play/pause/next/previous function application and so on.

5.9.2 SPI

The synchronous serial port interface (SPI) can be used for system debugging. It can also be used for in-system programming for the flash memory within the module. SPI interface uses the SPI_MOSI, SPI_MISO, SPI_CSB and SPI_CLK pins. Testing points for the SPI interface are reserved on board in case that the firmware shall be updated during manufacture.

The module operates as a slave and thus SPI_MISO is an output of the module. SPI_MISO is not in high-impedance state when SPI_CSB is pulled high. Instead, the module outputs 0 if the processor is running and 1 if it is stopped. Thus the module should NOT be connected in a multi-slave arrangement by simple parallel connection of slave SPI_MISO lines.



6.ELECTRICAL CHARACTERISTIC

6.1 Absolute Maximum Ratings

Rating	Min	Max	Unit
Storage temperature	-40	105	°C
Supply Voltage			
VBAT	2.8	4.25	V
VCHG	-0.4	5.75	V

6.2 Recommended Operating Conditions

Rating	Min	Typ	Max	Unit
Operating temperature range	-40		85	°C
Supply Voltage				
VBAT	2.8	3.30	4.25	V
VCHG	4.75	5.00	5.75	V

6.3 RF characteristics

Receiver		Average	Bluetooth Spec	Transmitter		Average	Bluetooth Spec	Unit
Sensitivity at 0.1 Ber	2402MHz	-86	<=-70	Output Power	2402MHz	3.8	-6~+4	dBm
	2441MHz	-85			2441MHz	3.3		dBm
	2480MHz	-87			2480MHz	3.6		dBm

7. RECOMMENDED TEMPERATURE REFLOW PROFILE

The soldering profile depends on various parameters necessitating a set up for each application. The data here is given only for guidance on solder reflow.

2F Friday March 09, 2012 10:21:21

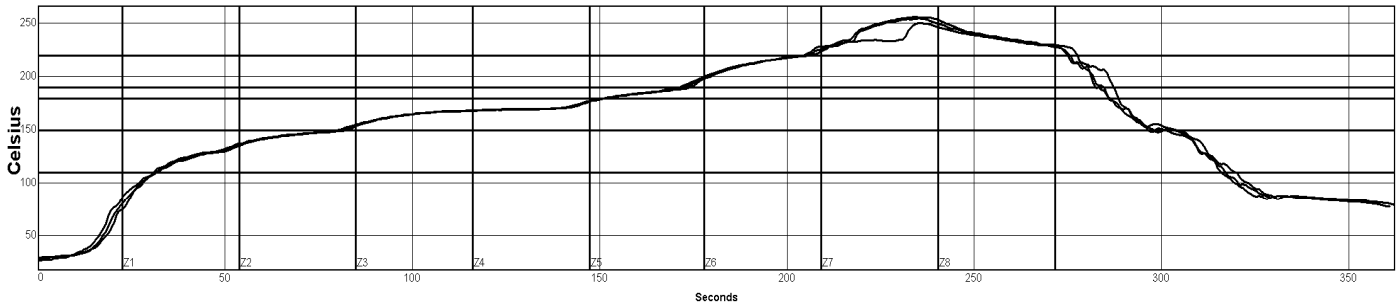
Site:

Oven Name: WQ Process Window Name: 无铅

Setpoints (Celsius)

Zone	1	2	3	4	5	6	7	8
Top	140	150	170	170	190	225	265	230
Bottom	140	150	170	170	190	225	265	230

Conveyor Speed (cm/min): 75.0



PWI= 304%	Max Rising Slope		Preheat 110-190C		Soak Time 150-180C		Reflow Time /220C		Peak Temp	
2	3.9	189%	141.4	157%	70.4	-296%	71.1	111%	254.8	97%
3	4.0	197%	139.7	149%	70.6	-294%	70.3	103%	250.6	11%
4	3.9	192%	142.1	160%	69.6	-304%	71.2	112%	256.5	130%

Process Window:

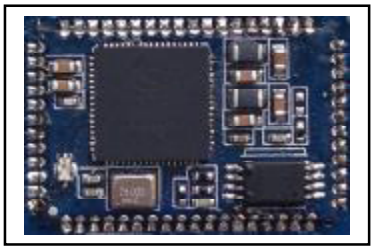
Solder Paste: SYSTEM DEFAULT

Statistic Name	Low Limit	High Limit	Units
Max Rising Slope (Target=2.0)	0.0	3.0	Degrees/Second
Preheat Time 110-190C	90	130	Seconds
Soak Time 150-180C	90	110	Seconds
Time Above Reflow - 220C	50	70	Seconds
Peak Temperature	245	255	Degrees Celsius

Description:

8. PACKAGING INFORMATION

1. BLUETOOTH® Module: BTM8635



2. Assembly

3. Dimension