SEMCO		
Issued	Checked	Approved

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REVISION	1.0
PAGE	20

Preliminary Approval Sheet

Issued	Checked	Approved

CUSTOMER	
PRODUCT NAME	SEMCO Bluetooth Module
CUSTOMER'S MODEL	
SEMCO'S MODEL	BTVZ0502SA
APPROVAL MEMO	

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SAMSUNG ELECTRO-MECHANICS

Revision History

Revision #	Date	Change Description
Ver 1.0	7th. April. 2006	Initial release

Contents

1. General Part

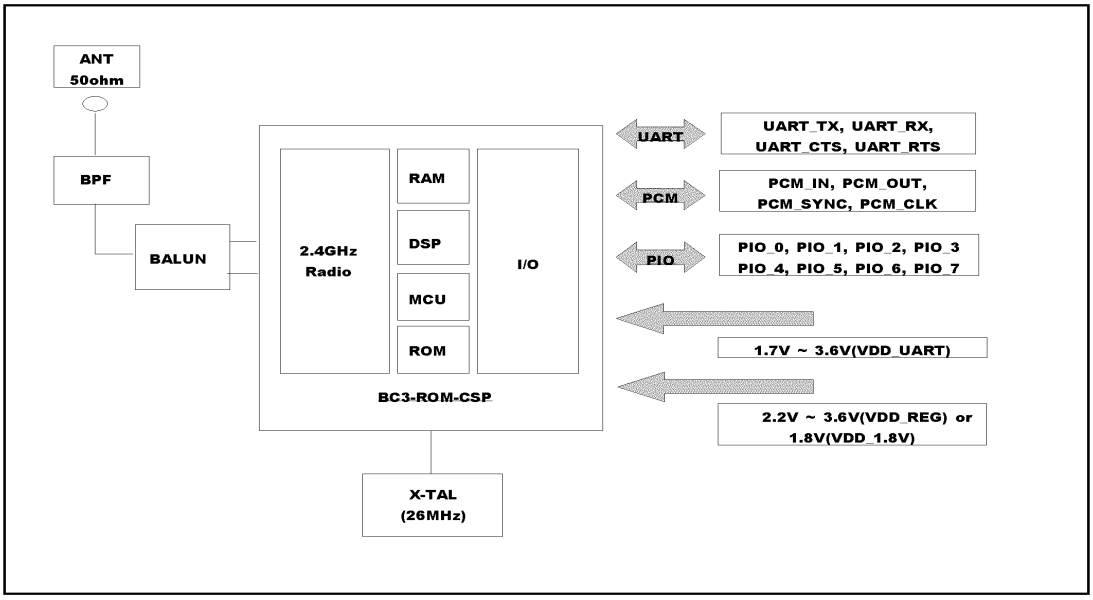
1.1 Overview

This specification covers Bluetooth module(class-2) which complies with Bluetooth specification version1.2 and integrates RF & Baseband controller in small package.
This module has deployed ***CSR's BC03-ROM CSP*** chipset.

1.2 Major Features

-, Bluetooth Spec. v1.2 Complaint
-, Flexible Supply Voltage - Supply Voltage(1.8V) : Use VDD_UART and VDD_1.8V
or Supply Voltage(2.8V) : Use VDD_UART and VDD_REG
-, Contains up to HCI stack
-, Class 2 Level Output Power Available (Max. 4dBm)
-, UART Bypass Mode Support
-, Piconet Support : Up to 7 Slaves
-, Support of all Bluetooth packet types(Voice and Data)
-, Support of Low power modes: Park, Sniff and Hold
-, Wide operating temperature range : -30 to 70℃ (Storage: -40 to 85℃)
-, UART, PCM Interface Available
-, Flexible CODEC Interface: A-Law, u-Law, and Linear
-, Low Power Consumption
-, Built-in Memory : 4Mbit ROM
-, Built-in Reference Clock : 26MHz
-, Competitive Size : 6.0mm x 6.4mm x 1.4mm

1.3 Module Block & Interfaces



1.4 Marking and External Appearance

1.4.1 Marking

SAMSUNG

1										
B	**T**	**V**	**Z**	**0**	**5**	**0**	**2**	**S**	**A**	
2	3	4	5	6	7	8	9	10	11	
00		**00**		**00**		**A**	**A**	**A**		
a		b		c		d	e	f		

No.	Index	No.	Index
1	Manufacturer	a	Manufactured Year
2,3	Product's Abbreviation (BT: Bluetooth)	b	Manufactured Month
4	Interface/Application (V: Firmware modified)	c	Manufactured Date
5,6,7	Module size (cc) (Z05 : 0.05cc)	d	Manufactured Line
8	Hardware Revision (Starting from 0)	e	History
9	Class (2: Class-2)	f	Manufactured place
10	Internal Production Code (S : Standard)		
11	Firmware Revision (Starting from A)		

1.4.2 External Appearance

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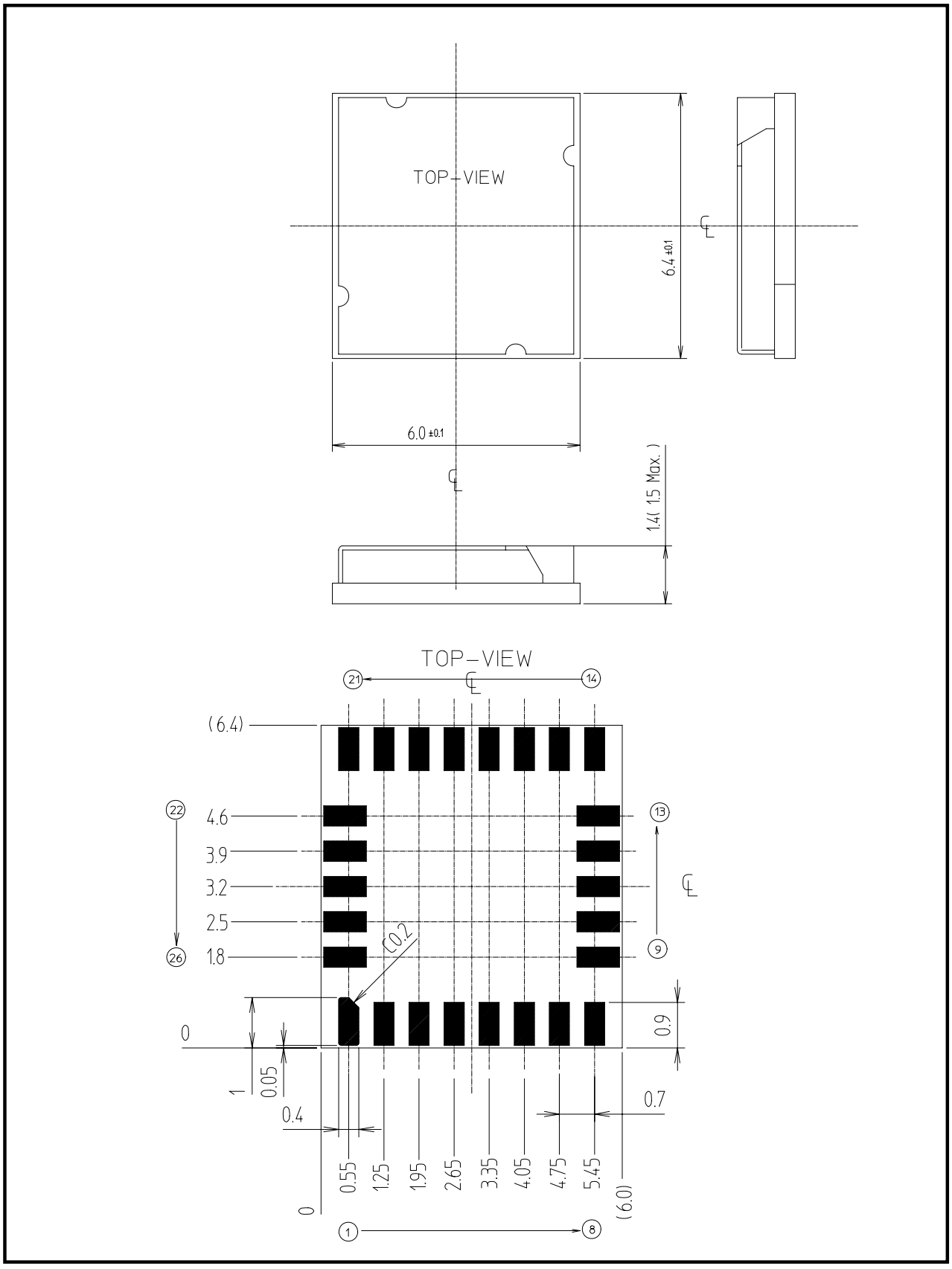
BTVZ0502SA
00 00 00 AAA

□

Pin No.1 is represented with □ indication on the top surface of the module.

1.4.3 Physical Dimension

The dimension is 6.0mm W X 6.4mm L X 1.4mm H.



1.5 PIN Description

Pin No	Pin Name	Direction	Description
1	PIO_0	I / O	Programmable input/output line
2	UART_TX	O	UART data output active high
3	PIO_2	I / O	Programmable input/output line
4	PIO_3	I / O	Programmable input/output line
5	GND	I	Ground
6	PIO_5(UART_RTS2)	I / O	Programmable input/output line
7	PIO_4(UART_TX2)	I / O	Programmable input/output line
8	RESETB	I	Reset if low. Input debounced so must be low for >5ms to cause a reset
9	PCM_OUT	O	Synchronous data output
10	PIO_6(UART_CTS2)	I / O	Programmable input/output line
11	VDD_UART	I	D.C Input Voltage for UART, PCM and PIO Interface (1.7~3.6V)
12	GND	I	Ground
13	PCM_IN	I	Synchronous data input
14	UART_RTS	O	UART request to send active low
15	PIO_7(UART_RX2)	I / O	Programmable input/output line
16	PCM_CLK	I / O	Synchronous data clock
17	UART_RX	I	UART data input active high
18	VDD_REG	I	D.C Input Voltage for Internal Regulator (2.2~3.6V)
19	GND	I	Ground
20	PCM_SYNC	I / O	Synchronous data sync
21	VDD_1.8V	I	D.C Input Voltage for the operation of Core and RF block (1.7~1.9V)
22	ANT	I / O	Antenna Port
23	GND	I	Ground
24	GND	I	Ground
25	PIO_1	I / O	Programmable input/output line
26	UART_CTS	I	UART clear to send active low

2. Specification

2.1 General Specification

No	Items	Specification
1	Supply Voltage (Regulator In)	VDD_REG : 2.2~3.6V
2	Supply Voltage (UART, PCM and PIO Interface)	VDD_UART : 1.7~3.6V
3	Supply Voltage (Core and RF block)	VDD_1.8V : 1.7~1.9V
5	Carrier Frequency	2400MHz to 2483.5MHz (USA, Europe)
6	Modulation Method	GFSK,1Mbps, 0.5BT Gaussian
7	Maximum Data Rate	Asynchronous:723.2kbps/57.6kbps Synchronous: 433.9kbps/433.9kbps
8	Maximum number of active slaves	7
9	Hopping	1600hops/sec, 1MHz channel space
10	Transmission Power	Typ 1.0 dBm
11	Rx. Sensitivity (BER<0.1%)	Typ. -82.0 dBm
12	Baseband Crystal OSC	26MHz
13	Interfaces	PCM, UART, PIOs
14	Compliant	Bluetooth Specification v1.2
15	Built in Memory	ROM(4Mbit)
16	Built in Firmware	Up to HCI
17	Masked Firmware Version	HCI 18.4

2.2 Temperature Specification

No	Item	Specification
1	Operating temperature	-30 ~ +70C
2	Storage temperature	-40 ~ +85C

2.3. Tx/Rx Specifications

No.	Items	Specification				Conditions
		Min.	Typ.	Max.	Unit	
TRANSMITTER PART **Test Channel : 0ch** **39ch** **78ch**						
1	TX Output Power	-3.5	1.0	3.8	dBm	- Conducted
2	TX Frequency Accuracy	-45	-	45	kHz	- Tested with '01010101' Test Scenario
3	Tx Frequency Drift	-24	-	24	kHz	- Tested with '01010101' Test Scenario - DH1 packet
4	Tx Frequency Deviation (Test Channel : 39 Only)	140	-	173	kHz	-'00001111' Test Scenario
		120	-	-	kHz	-'01010101' Test Scenario -'01010101' deviation should be greater than 80% of '00001111' deviation
RECEIVER PART Test Channel : All channels hopping						
5	BER	-	-	0.1	%	- 'ACL Loopback whitened' Scenario - RF input : -74 dBm - Freq. Hopping

PIO PORT AND AUDIO PART			
No.	Items	Decision	Conditions
6	PIO Port	PASS, FAIL	- Checked PIO function with GPIB
7	Audio	PASS, FAIL	- Checked audio signal with GPIB

- Requirement

- Test equipment should satisfy the specifications required by Bluetooth SIG.
- Temperature : normal

2.4 Reliability Test Standard

Test Item	Conditions	Test No.
Reflow	step1: 150~170C, 70~175sec step2: 230+/-5C(peak)	Test 1
Temperature Drift	25 -> 0 -> -30 -> 50->70C, 2Hr/step	Test 2
High Temperature(Storage)	85C, 120Hr	Test 3
Low Temperature(Storage)	-40C, 120Hr	Test 4
High Humidity(Storage)	50C, 95% RH, 120Hr	Test 5
High Temperature(Operating)	70C, 120Hr (supply operating voltage)	Test 6
Low Temperature(Operating)	-30C, 120Hr (supply operating voltage)	Test 7
High Humidity(Operating)	40C, 95%RH, 120Hr (supply operating voltage)	Test 8
Thermal Shock	-40C/1Hr <-> 85C/1Hr (50 cycle)	Test 9
Press Cooker Test	121C, 100%RH, 2kf/cm square, 12Hr	Test 10
Vibration + Temperature & Humidity Cycl	Vibration Frequency: 20, 80, 350, 2000Hz Acceleration: 6.98Grms (X,Y,Z - each 50min, 2cycle) -20 ~ 50C, 50 ~ 80%RH, 10 Cycle	Test 11
Mechanical Shock	Acceleration:3000G, Time:0.2ms, 5 times at each sides	Test 12
Drop Test	Height: 152cm 8 times	Test 13
ESD Test	ANT and GND PIN : Contact discharge +/-2kV, 5times(100pF,1.5kohm)	Test 14

2.5 Current Consumption

Test Equipment : Agilent 66319D

Test Condition : Temp. = Room temperature

Mode	Interface	Average		Unit
		2.8v	1.8v	
wse_0x1	BCSP, 115.2kbps	313.09	307.63	uA
wse_0x2	"	303.17	288.41	uA
wse_0x3	"	609.76	564.13	uA
inquiry	"	32.47	33.21	mA
stand_by(Host Connection)	"	28.51	20.32	uA
stand_by(No Host Connection)	"	8.67	9.00	mA
Sniff Mode with 1.28s interval as Master	"	145.90	103.27	uA
Sniff Mode with 1.28s interval as Slave	"	144.48	106.24	uA
Sniff Mode with 40ms interval as Master	"	6.24	6.32	mA
Sniff Mode with 40ms interval as Slave	"	5.95	4.51	mA
	"			
Park Mode with 1.28s interval as Slave	"	72.74	61.43	uA
ACL Connection_Master_No traffic	"	6.17	6.96	mA
ACL Connection_Slave_No traffic	"	13.29	14.02	mA
ACL DH1 with CMU200_Loopback	"	35.86	36.33	mA
ACL DH1 with CMU200_TX Mode	"	33.20	33.81	mA
ACL DH3 with CMU200_Loopback	"	38.52	38.95	mA
ACL DH3 with CMU200_TX Mode	"	39.02	39.96	mA
ACL DH5 with CMU200_Loopback	"	38.66	38.92	mA
ACL DH5 with CMU200_TX Mode	"	40.94	41.84	mA
SCO HV1 with CMU200	"	36.51	37.15	mA
SCO HV1_No_Codec	"	31.95	33.35	mA
SCO HV1_Real Connection	"	36.60	35.87	mA
SCO HV2_No_Codec	"	20.56	21.91	mA
SCO HV2_Real Connection	"	24.40	23.61	mA
SCO HV3_No_Codec	"	16.07	17.40	mA
SCO HV3_Real Connection	"	19.20	17.24	mA

3. Interface

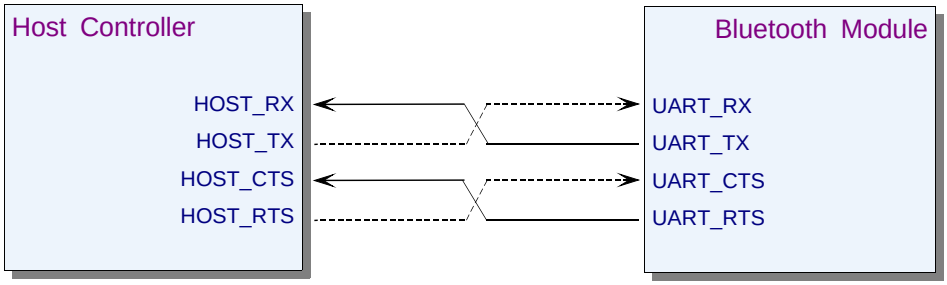
3.1 UART Interface

Four signals are used to implement the UART function.

UART_RX and UART_TX transfer data and UART_CTS and UART_RTS can be used to implement RS232 hardware flow control where both are active low indicators.

The interface consists of four-line connection as described in below:

Signal name	Driving source	Description
UART_TX	BTVZ0502SA module	Data from BTVZ0502SA module
UART_RX	Host	Data from Host
UART_RTS	BTVZ0502SA module	Request to send output of BTVZ0502SA module
UART_CTS	Host	Clear to send input of BTVZ0502SA module



Possible UART Settings

Bluetooth Module can handle UART baudrate from 9.6kbps up to 1.5Mbps.

User can change data format the following selection using PSKEY.

However, host shall communicate with default setting UART connection initiated at first time.

Baud Rate = (PSKEY_UART_BAUD_RATE) / (0.004096)

Property	Possible Values
BCSP- Specific Hardware	Enable or Disable
Baudrate	Min 9600 Baud, Max 1.5M Baud
Flow Control	RTS/CTS or None
Data bit length	8bit
Parity	None, Odd or Even
Number of Stop Bits	1 or 2

Default Data Format

Property	Possible Values
BCSP- Specific Hardware	Enable
Baudrate	115.2kbps
Flow Control	None
Data bit length	8bit
Parity	Even
Number of Stop Bits	1

3.2 PCM Interface

Bluetooth module offers a bi-directional digital audio interface that routes directly into the baseband layer and does not pass through the HCI protocol layer. It allows the data to be sent to and recevied from a SCO connection.
This interface consists of four signals : a clock(PCM_CLK), a data input(PCM_IN), a data output(PCM_OUT), and a frame-synchronization signal(PCM_SYNC)

Bluetooth module interfaces directly to PCM audio devices including the following :

- Qualcomm MSM 3000 series and MSM 5000 series CDMA baseband devices
- OKI MSM7705 four channel A-law and u-low CODEC
- Motorola MC145481 8-bit A-law and u-law CODEC
- Motorola MC145483 13-bit linear CODEC

Possible PCM settings

Bluetooth module can operate as the PCM interface master generating an output clock of 256kHz. When configured as PCM interface slave it can operate with input clock up to 2048kHz.
User can change data format the following selection using PSKEY.

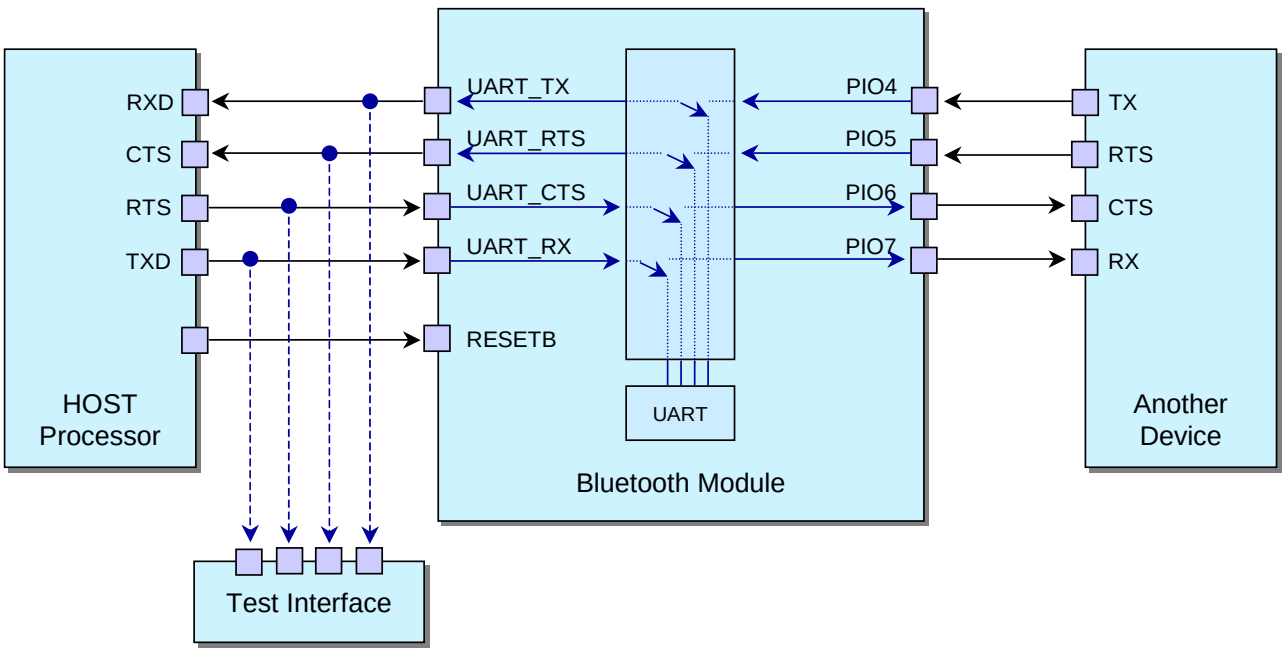
Property	Possible Values
Mode	Slave, Master
Clock rate	Master mode : 128, 256, 512kHz Slave mode : up to 2048kHz
Clock formats	Long Frame Sync, Short Frame Sync
Sample formats	13 or 16-bit linear, 8-bit u-law or A-law

Default Data Format

Property	Possible Values
Mode	Master
Clock rate	256kHz
Clock formats	Long Frame Sync
Sample formats	13-bit linear

3.3 UART Bypass Mode

- For devices that do not tri-state the UART bus, the UART bypass mode on bluetooth module can be used.
- The default state of the module after reset is de-asserted is for the host UART bus to be connected to its UART.
- In order to apply the UART bypass mode, a BCCMD command will be issued to the module upon this, it will switch the bypass to PIO(4,5,6,7). Once the bypass mode has been invoked, it will enter the deep sleep state indefinitely.
- In order to re-establish communication with the module, it must be reset so that the default configuration takes affect.
- It is important for the host to ensure a clean bluetooth disconnection of any active links before the bypass mode is invoked. Therefore it is not possible to have active bluetooth links while operating the bypass mode.

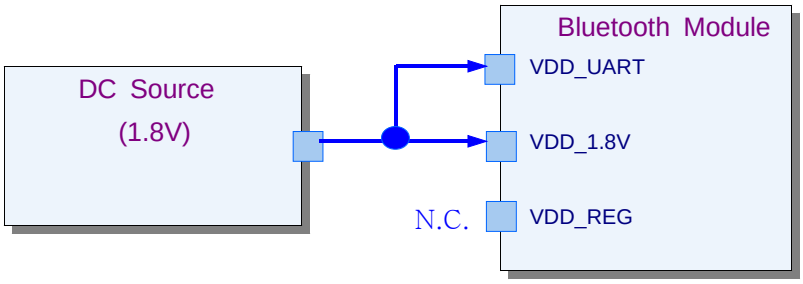


3.4 Supply Voltage

There are three pins for supply voltage; VDD_UART, VDD_REG, VDD_1.8V
VDD_UART is D.C Input Voltage for UART, PCM and PIO Interface and covers 1.7V to 3.6V.
VDD_REG is D.C Input Voltage for Internal Regulator and covers 2.2V to 3.6V.
VDD_1.8V is D.C Input Voltage for the operation of Core and RF block
and covers 1.7V to 1.9V.

CASE I : The voltage of operation is only 1.8V

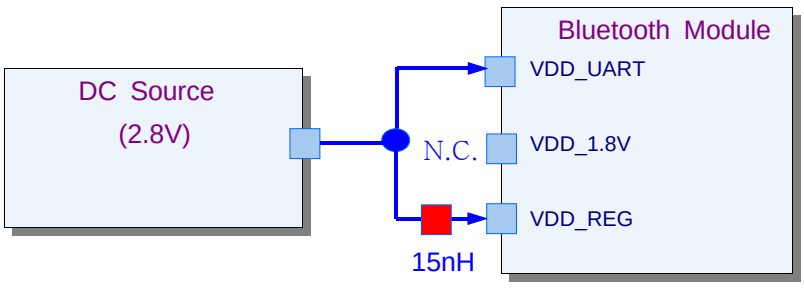
In this case, VDD_UART and VDD_1.8V need to be connected for correct operation.
You must not connect VDD_REG and must maintain OPEN state.



CASE I : 1.8V Supply Voltage

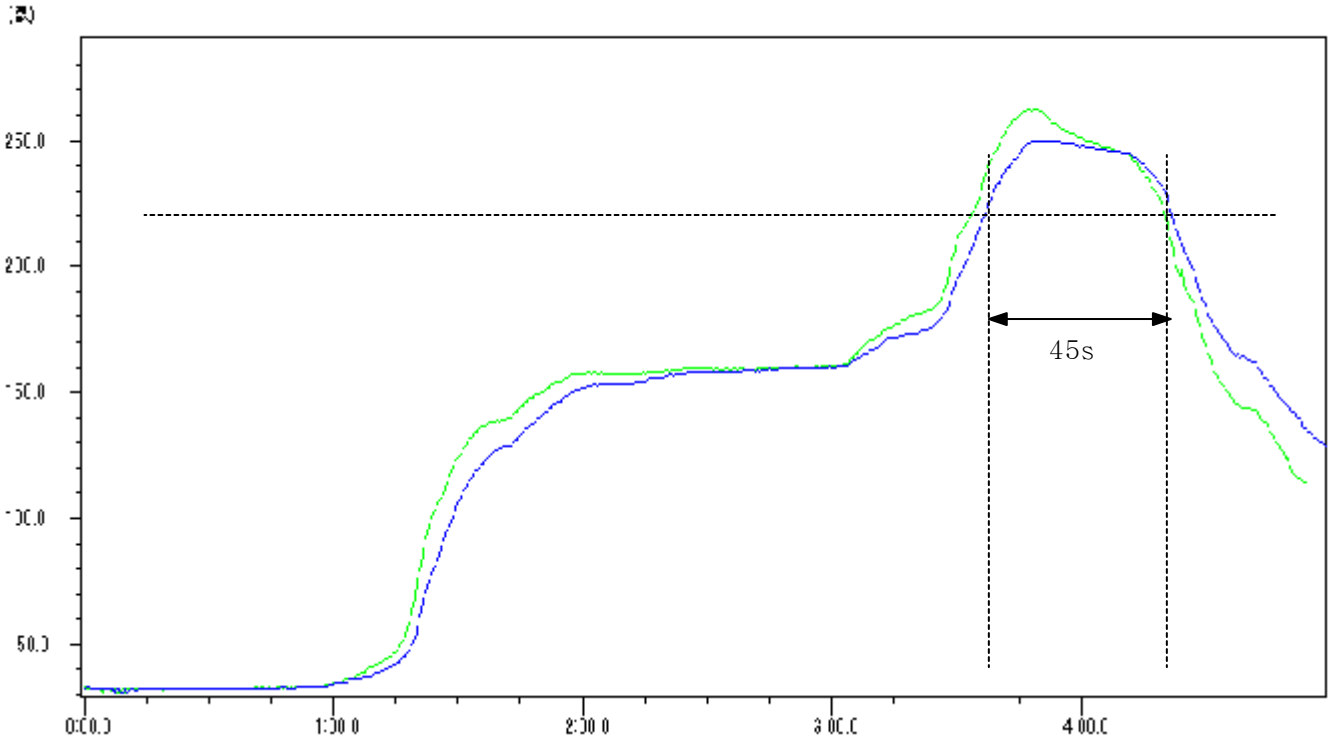
CASE II : The voltage of operation is only 2.8V

In this case, VDD_UART and VDD_REG need to be connected for correct operation.
You must not connect VDD_1.8V and must maintain OPEN state.
And for the purpose of stable RF characteristics, the RF choke of 15nH inductor should be connected directly to the VDD_REG pin.



CASE II : 2.8V Supply Voltage

4. Recommended Reflow Temperature Profile



SOLDER 조성(합금)	Pb_Free(SnAgCu)				
구 분	온 도 구 간				비 고
	DRY ZONE	PREHEAT(SORK) ZONE	REFLOW ZONE	PEAK ZONE	
설정온도(℃)		150~180	220~220℃	262℃	□ N2
경과시간(min)		89s	45s	max. 3s	
적용제품	BLUETOOTH				

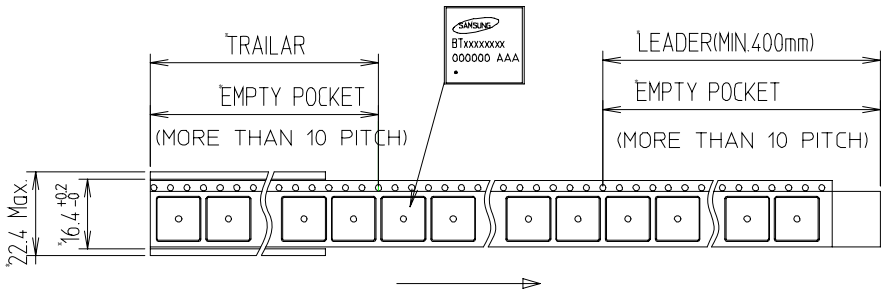
**** Lead free devices will withstand up to 1 reflow to a maximum temperature of 260℃**

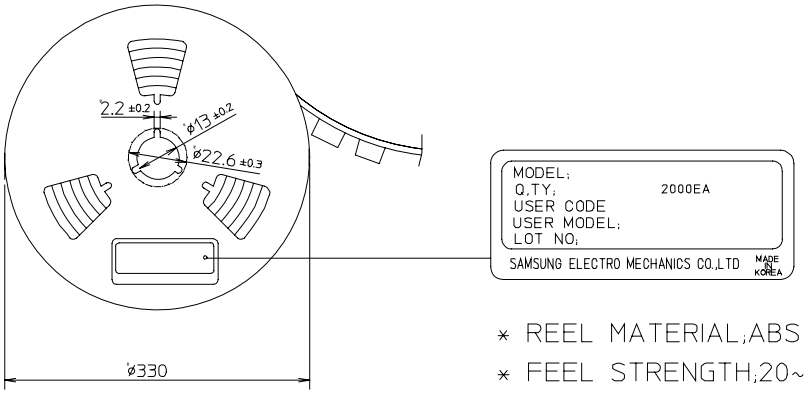
5. Packaging Information

5.1. Carrier dimension

NO	PART NAME	Q'TY	MATERIAL	FINISH	REMARK

대오비비





* REEL MATERIAL;ABS
* FEEL STRENGTH;20~70gms

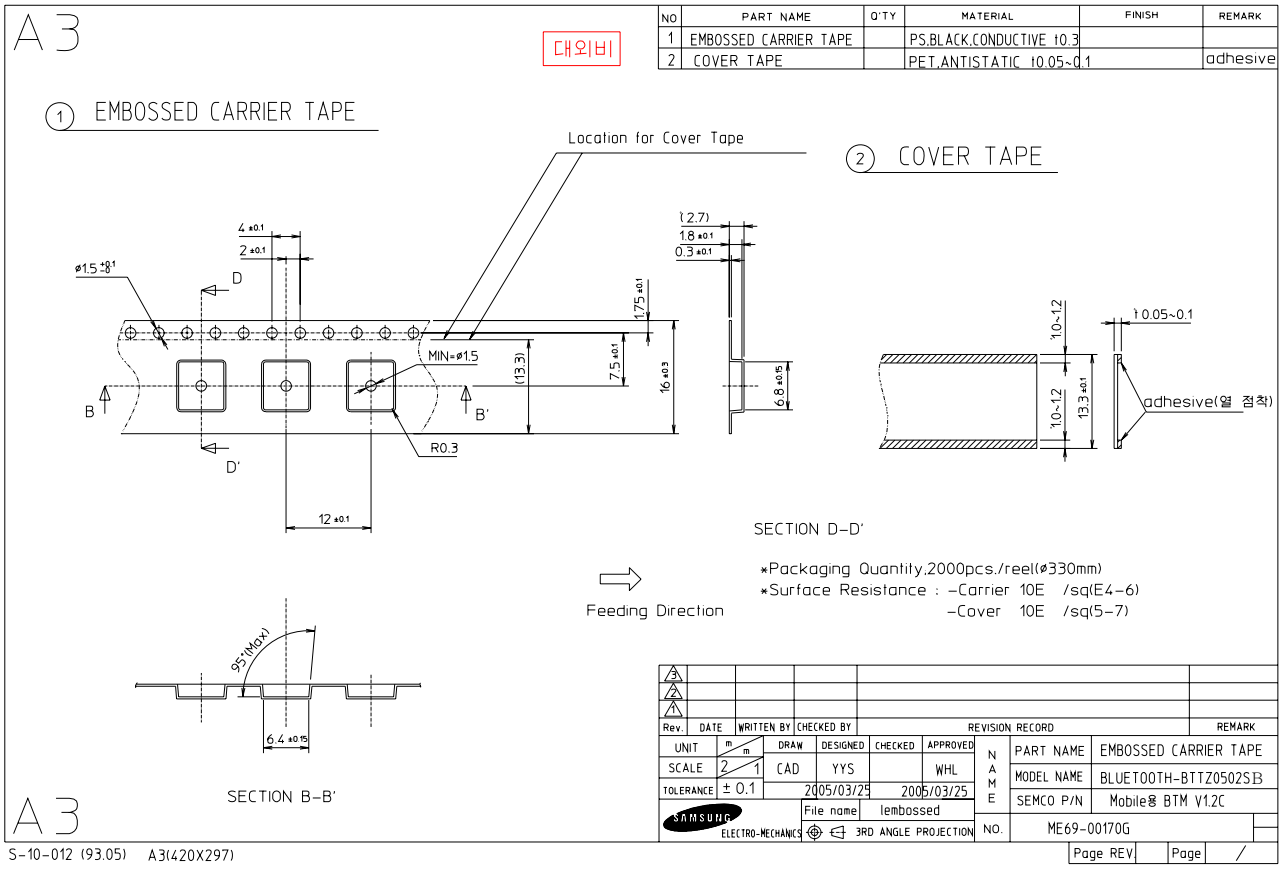
1. THE TAPE END WILL HAVE A EMPTY POCKET AT THE LEADER AND TRAILER OF CARRIER TAPE.
2. THE TAPE END WILL NOT BE STICKED BY GLUE IN ORDER TO MAKE IT EASIER TO PEEL OFF FROM REEL
3. THE FEEDING ROUND HOLE WILL BE ON THE RIGHT SIDE AGAINST THE LEADING DIRECTION

Rev.	DATE	WRITTEN BY	CHECKED BY	REVISION RECORD	REMARK
3					
2					
1					

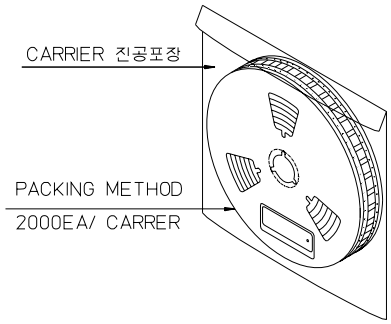
UNIT	m / m	DRAW	DESIGNED	CHECKED	APPROVED	NAME	PART NAME	PACKING METHOD
SCALE	N / S	CAD	YYS		WHL		MODEL NAME	BLUETOOTH-BTTZ0502SB
TOLERANCE		2005/03/25		2005/03/25			SEMCO P/N	Mobile용 BTM V1.2C
SAMSUNG ELECTRO-MECHANICS		File name				NO.		
		3RD ANGLE PROJECTION						

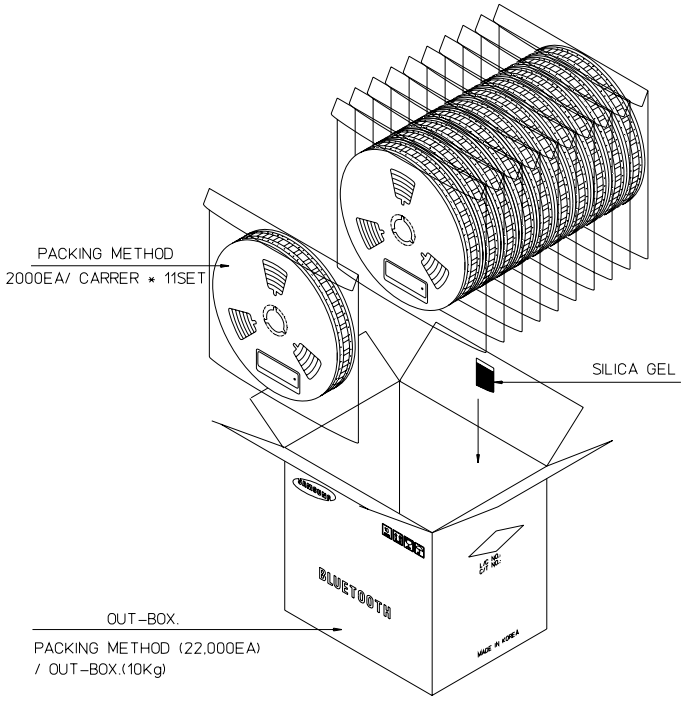
S-10-012 (93.05) A4(297X210)

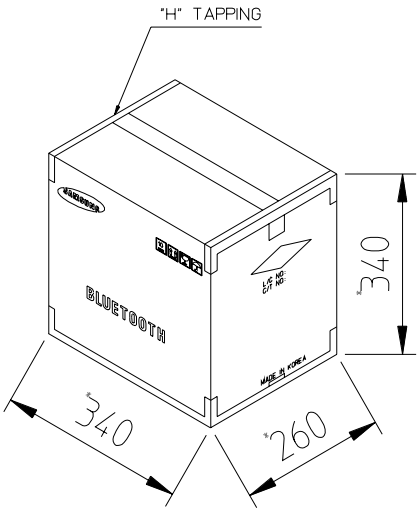
5.2 Taping Package/Reel dimension



5.3 Packing Box dimension







Status of Approval Sheet

The progression of Samsung Electo-Mechanics Bluetooth™ Module Approval Sheet follows the following format.

Preliminary Approval Sheet
All detailed specifications may be changed by Samsung Electro-Mechanics without notice. Version of Approval sheet may be upgraded without any prior notice.

Production Approval Sheet
Final Approval sheet.

The status of this Approval sheet is **Preliminary Approval Sheet.**

Bluetooth™ Module BTVZ0502SA
Preliminary Approval Sheet
Revision 1.0
April 2006