Bluetooth SPP Module　MBH7BT09　Data Sheet

Rev. 0.1

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All specifications are preliminary which may be changed without any prior notice

1 Application

This specification is applied for MBH7BT09 (Bluetooth™ module).

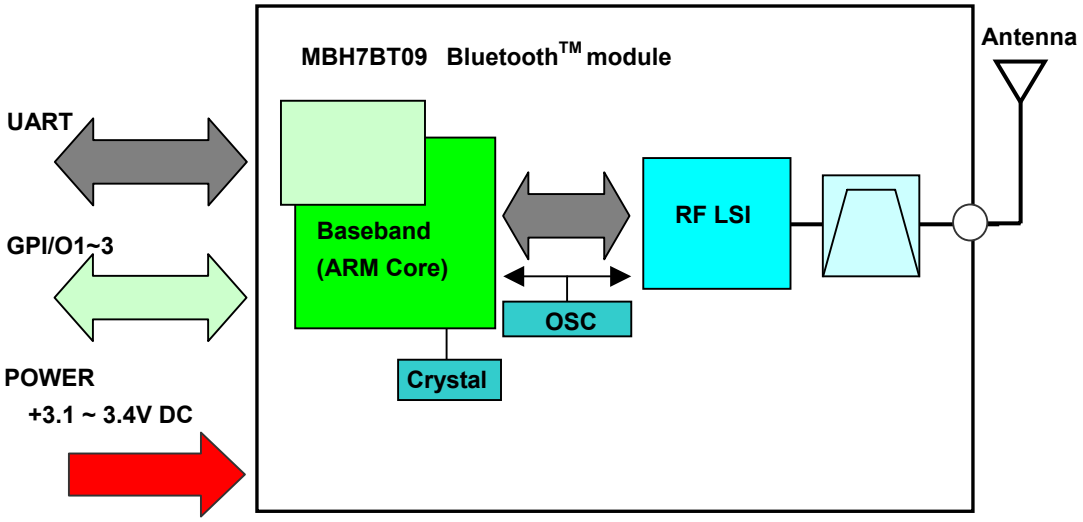
2 Summary

MBH7BT09 is Power Class 2 module conforming to Bluetooth™ Specification Version 1.1. MBH7BT09 transmits and receives in the 2.4 GHz ISM band. Although upper layer protcol stack and Profiles have to be embedded on the user's host system when user uses conventional HCI module, MBH7BT09 includes upper layer protcol stack and several Profiles. Therefore, MBH7BT09 makes it possible to reduce the resources of the user's host system required to process for Bluetooth.

MBH7BT09 has the following features:

- Built-in upper layer protcol stack (L2CAP, SDP, RFCOMM)
- Built-in profiles (GAP, SDAP, SPP)
- Power Class 2
- Hardware interface : UART interface
- Software interface : HCI, 2 kind of SPP mode (SPP1 / SPP2)
- 3.1 ~ 3.4V single power supply (Power supply via a series regulator is recommend.)

3 Block diagram



4 Electrical Characteristics

4-1. General Specification

Bluetooth Specification Version 1.1 Compliant

Carrier Frequency:	2402 MHz ~ 2480 MHz
Channel:	79 ch
Method:	FH-SS (Frequency Hopping Spread Spectrum)
Modulation:	0.5 BT Gaussian-filtered 2FSK
Symbol rate:	1 Mbps
Output Power:	+4dBm max (Power Class 2)

4-2. Absolute Maximum Rating

PowerSupply:	Vcc = +3.6 V
Input Voltage:	Vin = -0.3 ~ Vcc+0.3 V
Storage Temperature:	Tstg = -25 ~ +85 ^{o}C

4-3. Recommendable Operating Condition

Power Supply:	Vcc = +3.1 ~ +3.4 V
Operating Temparature:	Topr = -10 ~ +60 ^{o}C

4-4. I/O Terminal Characteristics

Items	Symbol	Min	Max	Unit	Test Conditions
Input "H" Voltage	V_{IH}	2.2	-	V	Vcc=Vcc Max
Input "L" Voltage	V_{IL}	-	0.8	V	Vcc=Vcc Min
Output "H" Voltage	V_{OH}	2.4	-	V	Vcc=Vcc Min, I_{OH}= -100 µA
Output "L" Voltage	V_{OL}	-	0.4	V	Vcc=Vcc Min, I_{OL}=100 µA

4-5. Power Consumption

Mode	Min	Typ	Max	Unit
Power down mode	-	20	35	mA
Inquiry / Page scan Mode (Inquiry / Page Scan Window: 11.25 ms, Inquiry / Page Scan Interval: 1.25 s)	-	45	75	mA
Connection state (DH5 packet)	-	100	165	mA

4-6. Transmitter Specification *[1]

Items	Condition	Min	Typ	Max	Unit
Output Power		-6	0	4	dBm
20 dB Bandwidth		-	-	1	MHz
Initial Carrier Frequency Tolerance	DH1 PRBS9	-75	-	+75	kHz
Carrier Frequency Drift	1 Slot 3 Slot 5 Slot	-25 -40 -40	- - -	+25 +40 +40	kHz kHz kHz
Modulation Characteristics	8 bit sequence 01010101	±115	-	-	kHz
	8 bit sequence 00001111 (avg)	±140	-	±175	kHz
Adjacent channel power	|M-N|=2 |M-N|>=3	- -	- -	-20 -40	dBm dBm
Out of Band Spurious	30 MHz --- 1 GHz 1 GHz --- 12.75 GHz 1.8 GHz --- 1.9 GHz 5.15 GHz --- 5.3 GHz	- - - -	- - - -	-36 -30 -47 -47	dBm dBm dBm dBm

4-7. Receiver Specification*[1]

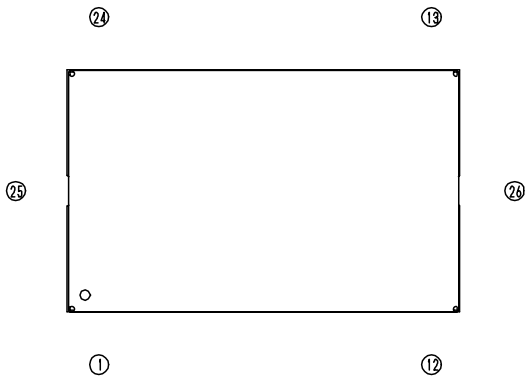
Items	Condition	Min	Typ	Max	Unit
Sensitivity	DH1 mode	-	-	-70	dBm
Sensitivity (BER) single slot packets	InputLevel= -70dBm DH1 mode	-	-	0.1	%
Sensitivity (BER) multi-slot packets	InputLevel= -70dBm DH5 mode	-	-	0.1	%
C/I Performance		-	-	0.1	%
Blocking Performance	3 0MHz~12.75GHz interfere signal	-	-	0.1	%
Intermodulation Performance	5^{th} order intermodulation	-	-	0.1	%
Maximum Input Level	Input level= -20dBm	-	-	0.1	%

*1) Measuring method is compliant with Bluetooth™ Test Specification-RF

5 Mechanical Characteristics

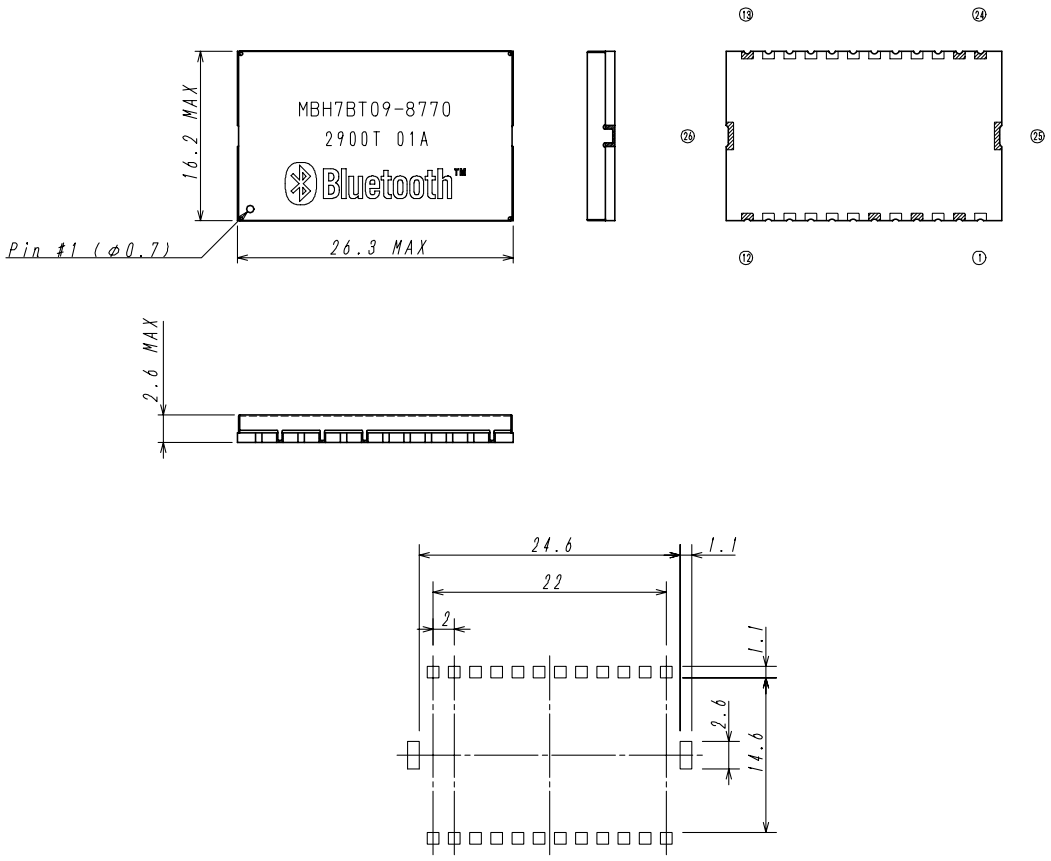
5-1. Pin Descriptions

Pin name	Pin No	I/O	Function	External connection
ANT	1	I/O	RF (Zin=50 ohm)	Antenna (50 ohm)
AGND	2	---	Gnd	Gnd (for RF)
AVDD	3	---	Power supply	DC Power supply (for RF)
GND	4	---	Gnd	Gnd (for digital)
VCC	5	---	Power supply	DC Power supply
GND	6	---	Gnd	Gnd (for digital)
PCM_SYNC	7	I/O	PCM SYNC (default input) (can't use SPP mode)	SYNC pin (external codec) It does not connect, in case a codec is not used
PCM_CLK	8	I/O	PCM Clock (default input) (can't use SPP mode)	CLK pin (external codec) It does not connect, in case a codec is not used
PCM_IN	9	I	PCM Rx data (can't use SPP mode)	Tx data pin (external codec) It does not connect, in case a codec is not used
PCM_OUT	10	O	PCM Tx data (can't use SPP mode)	Rx data pin (external codec) It does not connect, in case a codec is not used
VCC	11	---	Power supply	DC Power supply (for digital)
GND	12	---	Gnd	Gnd (for digital)
GND	13	---	Gnd	Gnd (for digital)
VCC	14	---	Power supply	DC Power supply (for digital)
CTS#	15	I	UART Clear To Send	Ready To Send (Host side uart)
RXD	16	I	UART Rx data	Tx data (Host side uart)
TXD	17	O	UART Tx data	Rx data (Host side uart)
GPIO3	18	I/O	Require disconnect *only SPP2 mode	It interrupts with falling edge It does not connect, in case a codec is not used
GPIO2	19	I/O	Single/Multi mode select *only SPP2mode	The state at the time of a power on is read "H" Single mode "L" Multi mode
GPIO1	20	I/O	Mode select	"H" download mode "L" normal operation mode
RTS#	21	O	UART Ready To Send	Clear To Send (Host side uart)
AVDD	22	---	Power supply	DC Power supply (for RF)
AGND	23	---	Gnd	Gnd (for RF)
AGND	24	---	Gnd	Gnd (for RF)
AGND	25	---	Gnd	Gnd (for RF)
GND	26	---	Gnd	Gnd (for digital)



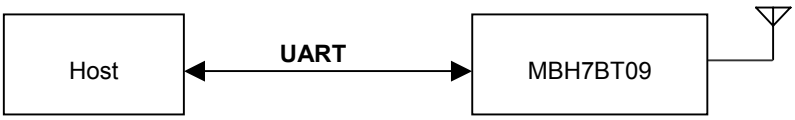
*: It is recommed that digital and RF planes (VDD and AVDD, GND and AGND) are separated.
Power supply via a series regulator is recommend.

5-2. Appearance and Dimensions



(unit : mm)

6 Interface

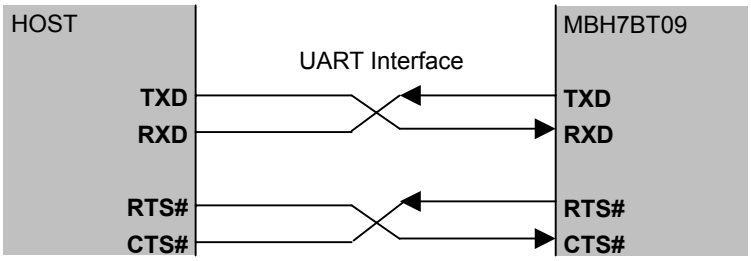


MBH7BT09 supports the UART connection to its host and accepts HCI or proprietary SPP commands.

6-1. Hardware interface

MBH7BT09 has the UART interface compatible with 16550A, and provides a simple mechanism for communicating with its host.

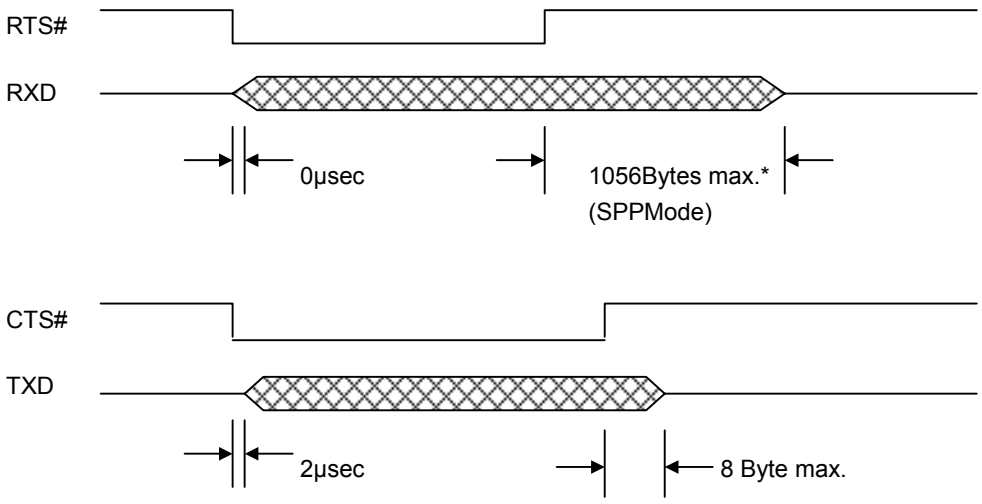
Fig. 8-1: UART interface



Four signals shown in Fig. 8-1 are used to implement the UART function. All UART connections are implemented using CMOS technology and have signalling levels of 0V and Vcc. When MBH7BT09 is connected to its host, TXD and RXD transfer data between both devices. The remaining two signals, RTS and CTS, can be used to implement UART hardware flow control, and the following procedure is used.

1) When MBH7BT09 can't receive data any more, RTS (Ready To Send) outputs "H" level.
2) MBH7BT09 send data, only when CTS (Clear To Send) inputs "L" level

fig.8-2. UART hardware flow control timing



Change of a baud rate is possible by Sppd_SetDataPort command

Item	Value
Baud rate	9.6k, 19.2k, 3 8.4k, 56k, 57.6k, 115.2k, 23 0.4k (default 115.2k)
Data bit	8 bit
Parity bit	None
Stop bit	1 bit
Flow control	Hardware flow control only (RTS/CTS)

6-2. Software interface

MBH7BT09 has 2 kind of software interface mode

- HCI mode

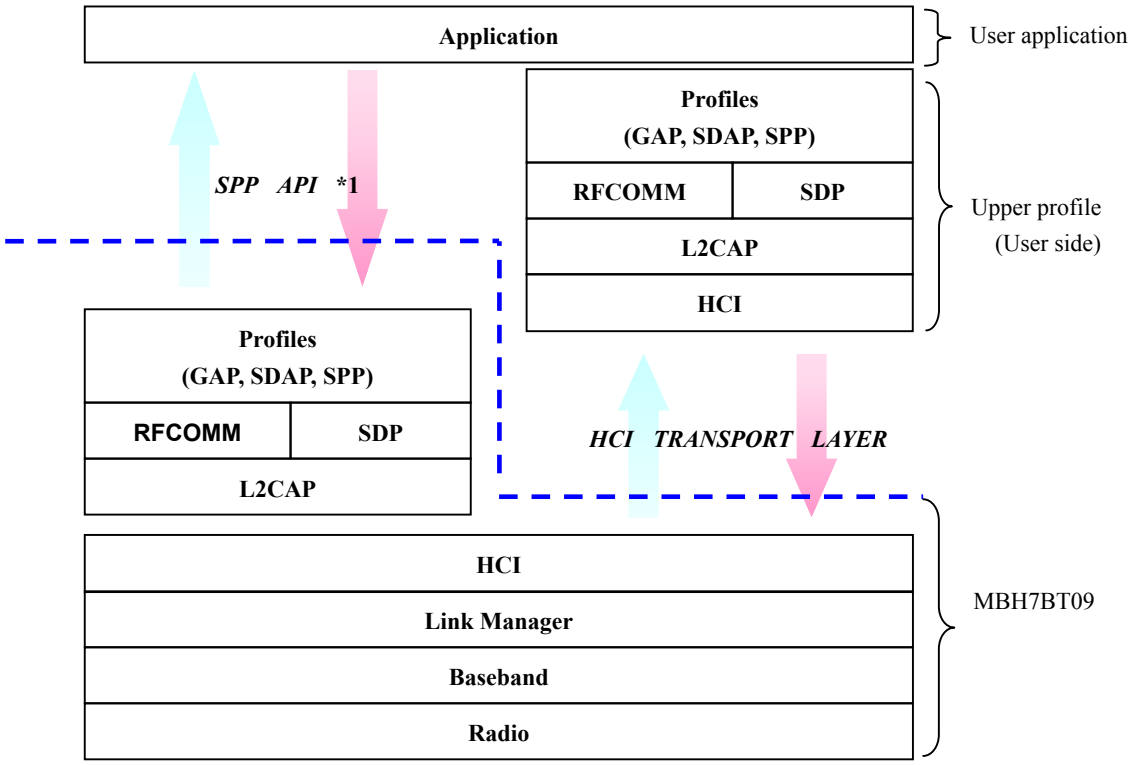
  This mode are required upper profile (Same as normaly HCI module)

- SPP1 mode

  Module processes even SerialPortProfile. Control command and data are required packet form based on "HCI" specification.

- SPP2 mode

  Module processes even SerialPortProfile. Control command are required packetform. However after connection, there is no necessity of packet-izing like the usual serial port. (There is Multi mode and Single mode and it changes in GPI/O)



*1 API

About the data packet format by SPP1 and SPP2-multi mode, it is based on H1 and H4 of the HCI specification of Bluetooth™ (Don't support SCO packet)

6-2.1. SPP interface

Transport Specification

It is based on HOST CONTROLLER INTERFACE FUNCTIONAL SPECIFICATION specified by CoreH14 of the HCI UART TRANSPORT LAYER of Bluetooth™.

Packet Specification

It is based on HOST CONTROLLER INTERFACE FUNCTIONAL SPECIFICATION specified by CoreH1 of the HCI specification of Bluetooth™. But it is not supporting about Command, Event, and the SCO packet which are specified by H1.

Flow control

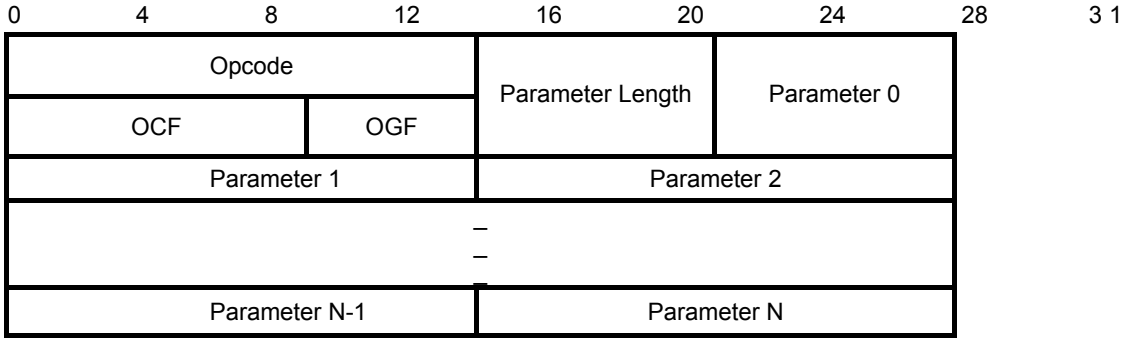
It is supported hardware flow control. And payroad size of data packet are maximum 352Byte.

Note : only SPP1 mode

Control command

Format

Based on HCI packet format.



Opcode : 2Byte

Value	Note
0xXXXX	OGFRange (6bit) : 0x30 OCFRange (10bit) : 0x0000~0x03FF *It is based on each command.

Parameter Length : 1Byte

Value	Note
0xXX	Parameters Length (Byte) * The length of the whole Parameters

Parameter : whole Parameter length

Value	Note
0xXX	It is based on each command * The length of Parameters is the integer value of a Byte unit.

Command List

Command	Function
Sppd_SetDataPort	This command is used to change baud rate
Sppd_SetDevice	This command is set to “Local_Device”,“BD-address”,”Class of device”,”Device-name” (stored in FLASH memory)
Sppd_SwichMode	This command is used to change operation-mode *only SPP_mode > HCI_mode
Sppd_Reset	This command is used to reset SPP-module
Sppd_SetSecurity	This command is used to select security mode
Sppd_Inquiry	This command will start Inquiry
Sppd_StopInquiry	This command will stop Inquiry
Sppd_SetScanParam	This command is used to change Inquiry Scan and Page Scan Parameter
Sppd_LinkKeyRsp	This command is used to reply to a Link-key request
Sppd_PinCodeRsp	This command is used to set PIN-code
Sppd_GetLocalDeviceAddr	This command is used to read BD-address of Local_Device
Sppd_GetLocalDeviceName	This command is used to read DeviceName of Local Device
Sppd_GetLocalDeviceClass	This command is used to read Device-class of Local_Device
Sppd_GetRemoteDeviceName	This command is used to read DeviceName of Remote_Device
Sppd_StartDiscovery	This command is used to search service of a remote device
Sppd_FindService	Specific Service is found from the result of “Sppd_FindService”
Sppd_Listen	This command will set Inquiry scan enable and page scan enable
Sppd_Connect	This command will create bluetooth connection
Sppd_Disconnect	This command will terminate bluetooth connection
Sppd_StopListen	This command will stop Inquiry scan enable and page scan enable
Sppd_SetSvtout	This command is used to change parameter of supervision-timeout
Sppd_SetSifSecurity *	This command is used to change Security mode for spp2-single
Sppd_GetSifSecurity *	This command is used to read security mode of spp2-single
Sppd_SetSifScanParam *	This command is used to change Inquiry Scan and Page Scan parameter of spp2-single-mode
Sppd_GetSifScanParam *	This command is used to read Inquiry Scan and Page Scan parameter of spp2-single-mode
Sppd_GetSvtout	This command is used to read super-vision-time-out of spp2-single-mode

*parts is command for a setup which becomes enable at the use of SPP2_singlemode

Description

a) Sppd_SetDataPort

Command	OCF	Command Parameters	Return Parameters
Sppd_SetDataPort	0x0001	Baud_Rate	Status

* When changed baud-rate, requiored power on reset.

CommandParameters

Value	Parameter Description
0x00	9600(bps)
0x01	19200(bps)
0x02	3 8400(bps)
0x03	56000(bps)
0x04	115200(bps)
0x05	230400(bps)
0x07	57600(bps)

Size : 1Byte

ReturnParameters

Value	Parameter Description
0x00	A command is successful
0x0C	A command failed
0x12	Parameter is invalid

Size : 1Byte

Event

Command_CompleteEvent.

b) Sppd_SetDevice

Command	OCF	Command Parameters	Return Parameters
Sppd_SetDevice	0x0002	BD_ADDR, Class_of_Device, Name	Status

CommandParameters

BD_ADDR

Value	Parameter Description
0xXXXXXXXXXXXX	BD-Address for local device *The present Value is not changed when 0xFFFFFFFFFFFF is set up.

Size : 6 Byte

Class_of_Device

Value	Parameter Description
0xXXXXXX	Class of Device for local device *The present Value is not changed when 0xFFFFFF is set up.

Size : 3 Byte

Name :

Value	Parameter Description
	Friendly name for local device *The present Value is not changed when NULL is set up.

Size : 41 Byte

ReturnParameters

Value	Parameter Description
0x00	A command is successful
0x0C	A command failed
0x12	Parameter is invalid

Size : 1 Byte

Event

Command_CompleteEvent.

c) Sppd_SwitchMode

Command	OCF	Command Parameters	Return Parameters
Sppd_SwitchMode	0x0003	Mode	Status

* When changed operation-mode, requiored power on reset.

CommandParameters

Value	Parameter Description
0x00	HCI Mode
0x01	SPP1 Mode
0x02	SPP2 Mode

Size : 1Byte

ReturnParameters

Value	Parameter Description
0x00	A command is successful
0x0C	A command failed
0x12	Parameter is invalid

Size : 1Byte

Event

Command_CompleteEvent.

d) Sppd_Reset

Command	OCF	Command Parameters	Return Parameters
Sppd_Reset	0x0041		Status

* A baud rate and operation mode are not changed.

CommandParameters

none

ReturnParameters

Value	Parameter Description
0x00	A command is successful
0x12	Parameter is invalid

Size : 1 Byte

Event

Command_CompleteEvent.

e) Sppd_SetSecurity

Command	OCF	Command Parameters	Return Parameters
Sppd_SetSecurity	0x0042	SEC_MODE, ENC_MODE	Status

*ENC_MODE can select only security mode2

When setting of SEC_MODE was “1”, encription is forced off

When setting of SEC-mode was “3”, encryption is forced on

CommandParameters

SEC_MODE

Value	Parameter Description
0x01	Security mode1 (non-security mode) default
0x02	Security mode2 (Security mode2 at GAP)
0x03	Security mode3 (Security mode3 at GAP)

Size : 1 Byte

ENC_MODE

Value	Parameter Description
0x00	Non-Encryption mode
0x01	Encryption mode

Size : 1 Byte

ReturnParameters

Value	Parameter Description
0x00	A command is successful
0x0C	A command failed
0x12	Parameter is invalid

Size : 1 Byte

Event

Command_CompleteEvent.

f) Sppd_Inquiry

Command	OCF	Command Parameters	Return Parameters
Sppd_Inquiry	0x0043	Inq_mode Inq_len Num_resp	Status

CommandParameters

Inq_mode

Value	Parameter Description
0x00	Start “Generic Inquiry”
0x01	Start “Limited_Inquiry”

Size : 1 Byte

Inq_len

Value	Parameter Description
0xXX	Maximum amount of time specified before the inquiry is halted Range : 0x01~0x30 (parameter setting) Time : 0xXX x 1.28sec Range : 1.28~61.44sec

Size : 1 Byte

Num_resp

Value	Parameter Description
0x00	Unlimited number of responses
0xXX	Maximum number of responses from the inquiry is haited. range : 0x01~0xFF

Size : 1 Byte

ReturnParameters

Value	Parameter Description
0x00	A command is successful
0x0C	A command failed
0x12	Parameter is invalid

Size : 1 Byte

Event

Command_CompleteEvent.

SPPD_InquiryResultIndEvent (report inquiry result)

SPPD_InquiryCompleteIndEvent

g) Sppd_StopInquiry

Command	OCF	Command Parameters	Return Parameters
Sppd_StopInquiry	0x0044		Status

CommandParameters

none

ReturnParameters

Value	Parameter Description
0x00	A command is successful
0x0C	A command failed
0x12	Parameter is invalid

Size : 1 Byte

Event

Command_CompleteEvent.

h) Sppd_SetScanParam

Command	OCF	Command Parameters	Return Parameters
Sppd_SetScanParam	0x0045	Inq_window Inq_interval Page_window Page_interval	Status

* Before publishing ListenCommand, it is necessary to set up.

Command Parameters

Inq_window

Value	Parameter Description
0xXXXX	Time which is performing inquiry length (Inq_window <= Inq_interval) range : 0x0012 – 0x1000 and 0x0000 time : 0xXXXX * 0.625 msec Range : 11.25msec –2550 msec Default : 0x48 *The present Value is not changed when 0x0000 is set up.

Size : 2 Byte

Inq_interval

Value	Parameter Description
0xXXXX	Interval which is executing inquiry to next inquiry Range : 0x0050 – 0x1000 and 0x0000 Time : 0xXXXX * 0.625 msec Range : 50msec –2550 msec (50msec span, Fraction omission) Default : 0x800 * The present Value is not changed when 0x0000 is set up.

Size : 2Byte

Page_window

Value	Parameter Description
0xXXXX	Time which is perfoming page length (Page_window <= Page_interval) Range : 0x0012 – 0x1000 and 0x0000 Time = 0xXXXX * 0.625 msec Range : 11.25msec –2550 msec Default : 0x48 The present Value is not changed when 0x0000 is set up.

Size : 2Byte

Page_Interval

Value	Parameter Description
0xXXXX	Interval which is executing page to next page Range : 0x0050 – 0x1000 and 0x0000 Time = 0xXXXX * 0.625 msec Range : 50msec –2550 msec (50msec span, Fraction omission) Default : 0x800 *The present Value is not changed when 0x0000 is set up.

Size : 2 Byte

ReturnParameters

Value	Parameter Description
0x00	A command is successful
0x0C	A command failed
0x12	Parameter is invalid

Size : 1 Byte

Event

Command_CompleteEvent.

i) Sppd_LinkKeyRsp

Command	OCF	Command Parameters	Return Parameters
Sppd_LinkKeyRsp	0x0046	BD_ADDR, Is_Available, Link_Key	Status

*This command is used to response to SPPD_LinkKeyReqIndEvent

CommandParameters

BD_ADDR

Value	Parameter Description
0xXXXXXXXXXXXX	BD-Address of remote_device

Size : 6 Byte

Is_Available

Value	Parameter Description
0x00	Link_Key is invalid. Don't use link_key which set at Parameters Link_Key
0x01	Link_Key is effective. Use link_key which set at Parameters Link_Key

Size : 1Byte

Link_Key

Value	Parameter Description
0xXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXX	Link_Key for the associated BD_ADDR

Size : 16Byte

ReturnParameters

Value	Parameter Description
0x00	A command is successful
0x0C	A command failed
0x12	Parameter is invalid

Size : 1Byte

Event

Command_CompleteEvent.

j) Sppd_PinCodeRsp

Command	OCF	Command Parameters	Return Parameters
Sppd_PinCodeRsp	0x0047	BD_ADDR, Is_Available, PIN_LEN, PIN	Status

*This command is used to response to SPPD_PinCodeReqIndEvent

CommandParameters

BD_ADDR

Value	Parameter Description
0xXXXXXXXXXXXX	BD-Address of Remote_Device

Size : 6 Byte

Is_Available

Value	Parameter Description
0x00	PINCode is invalid. Don't use PIN Code which set at PIN parameters
0x01	PINCode is effective. Use PIN Code which set at PIN parameters

Size : 1 Byte

PIN_LEN

Value	Parameter Description
0xXX	The PIN code length specifics the length, in bytes, of the PIN code to be used. Range : 0x01 – 0x10

Size : 1 Byte

PIN

Value	Parameter Description
0xXXXXXXXXXX XXXXXXXXXX XXXXXXXXX	PIN Codes can be up to a maximum of 128 bits. *The PIN_Code Parameter is a string parameter. Endianess does therefore not apply to the PIN_Code Parameter. The first byte of the PIN code should be transmitted first.

Size : 16 Byte

ReturnParameters

Value	Parameter Description
0x00	A command is successful
0x0C	A command failed
0x12	Parameters is invalid

Size : 1 Byte

Event

Command_CompleteEvent.

k) Sppd_GetLocalDeviceAddr

Command	OCF	Command Parameters	Return Parameters
Sppd_ GetLocalDeviceAddr	0x0048		Status

CommandParameters

none

ReturnParameters

Value	Parameter Description
0x00	A command is successful
0x0C	A command failed
0x12	Parameters is invalid

Size : 1 Byte

Event

Command_CompleteEvent.

SPPD_LocalDeviceAddrIndEvent (report LocalDeviceAddress)

l) Sppd_GetLocalDeviceName

Command	OCF	Command Parameters	Return Parameters
Sppd_ GetLocalDeviceName	0x0049		Status

CommandParameters

none

ReturnParameters

Value	Parameter Description
0x00	A command is successful
0x0C	A command failed
0x12	Parameters is invalid

Size : 1 Byte

Event

Command_CompleteEvent.

SPPD_LocalDeviceNameIndEvent (Report Local Device Name)

m) Sppd_GetLocalDeviceClass

Command	OCF	Command Parameters	Return Parameters
Sppd_ GetLocalDeviceClass	0x004A		Status

CommandParameters

none

ReturnParameters

Value	Parameter Description
0x00	A command is successful
0x0C	A command failed
0x12	Parameters is invalid

Size : 1 Byte

Event

Command_CompleteEvent.

SPPD_LocalDeviceClassIndEvent (Report Local Device Class)

n) Sppd_GetRemoteDeviceName

Command	OCF	Command Parameters	Return Parameters
Sppd_GetRemote DeviceName	0x004D	-	Status

CommandParameters

Value	Parameter Description
0xXXXXXXXXXXXX	BDAddress for the device whose name is requested

Size : 6Byte

ReturnParameters

Value	Parameter Description
0x00	A command is successful
0x0C	A command failed
0x12	Parameters is invalid

Size : 1Byte

Event

Command_CompleteEvent.

SPPD_RemoteDeviceNameIndEvent (Report Local Device Name)

o) Sppd_StartDiscovery

Command	OCF	Command Parameters	Return Parameters
Sppd_ StartDiscovery	0x004E	SearchPattern	Status

CommandParameters

Value	Parameter Description
0xXXXX	UUID (16bit_UUID)

Size : 2 Byte

ReturnParameters

Value	Parameter Description
0x00	A command is successful
0x0C	A command failed
0x12	Parameters is invalid

Size : 1 Byte

Event

Command_CompleteEvent.

SPPD_DiscoveryCompleteIndEvent (Report result)

p) Sppd_FindService

Command	OCF	Command Parameters	Return Parameters
Sppd_ FindService	0x004F	BD_ADDR Search Pattern	Status

CommandParameters

BD_ADDR

Value	Parameter Description
0xXXXXXXXXXXXX	BDAddress for the device whose service is requested When 0xFFFFFFFFFFFF is set up,all device is searched

Size : 1Byte

Search Pattern

Value	Parameter Description
0xXXXX	UUID (16bit_UUID)

Size : 2Byte

ReturnParameters

Value	Parameter Description
0x00	A command is successful
0x0C	A command failed
0x12	Parameters is invalid

Size : 1Byte

Event

Command_CompleteEvent.

SPPD_FindServiceResultIndEvent (It reports, whenever uuid is found.)

SPPD_FindServiceCompleteIndEvent (The end of command is reported)

q) Sppd_SetSvtout

Command	OCF	Command Parameters	Return Parameters
Sppd_SetSvtout	0x0050	Timeout	Status

CommandParameters

Value	Parameter Description
0xXXXX	Supervision Timeout Range : 0x0000~0xFFFF (setting) Time : 0xXXXXx0.625msec Range : 0.625~40900msec Default : 0x7D00 (20sec) *The present Value is not changed when 0x0000 is set up.

Size : 2 Byte

ReturnParameters

Value	Parameter Description
0x00	A command is successful
0x0C	A command failed

Size : 1 Byte

Event

Command_CompleteEvent.

r) Sppd_Listen

Command	OCF	Command Parameters	Return Parameters
Sppd_Listen	0x0081		Status

* If this Command is performed, MBH7BT09 will be carried out for being set as Generic discoverable modeand Connectable mode, and awaiting the demand from Remote_Device.

It is required to publish Sppd_StopListenCommand in order to cancel this mode. If it awaits and ConnectCommand is published among the mode, an error will occur. Moreover, if Sppd_ResetCommand is published, since a SPP module is initialized, it will await and the mode will be canceled.

CommandParameters

none

ReturnParameters

Value	Parameter Description
0x00	A command is successful
0x0C	A command failed
0x12	Parameters is invalid

Size : 1 Byte

Event

Command_Complete event

SPPD_ConnectIndEvent (report create connection)

s) Sppd_Connect

Command	OCF	Command Parameters	Return Parameters
Sppd_Connect	0x0082	BD_ADDR	Status

CommandParameters

Value	Parameter Description
0xXXXXXXXXXXXX	BD-Address of Remote_Device to connect. *BD_Addr when 0xFFFFFFFFFFFF is specified, arbitrary partners and connection based on SPP are established.

Size : 6 Byte

ReturnParameters :

Value	Parameter Description
0x00	A command is successful
0x0B	Connect already
0x0C	A command failed
0x12	Parameters is invalid

Size : 1 Byte

Event

Command_Complete event

SPPD_ConnectIndEvent (report create connection)

t) Sppd_Disconnect

Command	OCF	Command Parameters	Return Parameters
Sppd_Disconnect	0x0083	Port_Handle	Status

* When it connects from "Listen-Mode", after "Disconnect" does not return to "Listen-Mode" again. If make it "Listen-Mode" again, please publish "Sppd_ListenCommand" again.

CommandParameters

Value	Parameter Description
0xXXXX	Number of virtual com port to disconnect.

Size : 2 Byte (12bit effective)

ReturnParameters

Value	Parameter Description
0x00	A command is successful
0x0C	A command failed
0x12	Parameters is invalid

Size : 1Byte

Event

Command_Complete event

SPPD_DisconnectIndEvent (report disconnecting was completed.)

u) Sppd_StopListen

Command	OCF	Command Parameters	Return Parameters
Sppd_StopListen	0x0084		Status

* It becomes an error when this Command is published during connection.

CommandParameters

none

ReturnParameters :

Value	Parameter Description
0x00	A command is successful
0x0C	A command failed
0x12	Parameter is invalid

Size : 1 Byte

Event

Command_Complete event

v) Sppd_SetSifSecurity

Command	OCF	Command Parameters	Return Parameters
Sppd_SetSifSecurity	0x00A1	SEC_MODE ENC_MODE PIN_LEN PIN	Status

* This command setting effective at SPP2 single mode

CommandParameters

SEC_MODE

Value	Parameter Description
0x01	Security mode1 (non-security mode) default
0x02	Security mode2 (Security mode2 at GAP)
0x03	Security mode3 (Security mode3 at GAP)

Size : 1Byte

ENC_MODE

Value	Parameter Description
0x00	Non-Encryption mode
0x01	Encryption mode

Size : 1Byte

PIN_LEN

Value	Parameter Description
0x00	The PIN code length specifics the length, in bytes, of the PIN code to be used. Range : 0x01-0x10

Size : 1Byte

PIN

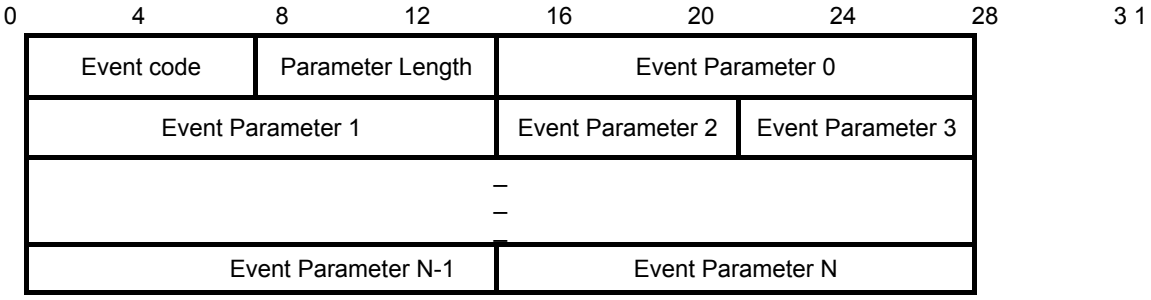
Value	Parameter Description
0xXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXX	PIN Codes can be up to a maximum of 128 bits. *The PIN_Code Parameter is a string parameter. Endianess does therefore not apply to the PIN_Code Parameter. The first byte of the PIN code should be transmitted first.

Size : 16Byte

- **Event**

Event format

Based on HCI event packet format.



Eventcode : 1Byte

Value	Note
0xXX	Event code of 1Byte is assigned to each event for each Event discernment. Code range : 0x00~0xFF

Parameter Length : 1Byte

Value	Note
0xXX	Length of packet parameter Byte length of Parameters of a packet

Parameter : All Parameters length

Value	Note
0xXX	Parameters and ParametersSize are defined for every Event. Size of each Parameters is the integer value of a Byte unit.

Event list

Event	Function
Command complete event will be occur.	It notifies whether Command was received.
Hardware Error event	Generating of an error is notified.
Sppd_ConnectInd	Opening of a virtual port is notified.
Sppd_DisconnectInd	Close of a virtual port is notified.
Sppd_InquiryResultInd event	A host is notified of the information on Remote_Device which answered Inquiry.
Sppd_InquiryComplete Ind event	A host is notified of Inquiry having been completed.
Sppd_LinkKeyInd	It notifies that new Link_Key was generated.
Sppd_LinkKeyReq	It notifies that Link_Key is required for attestation with Remote_Device.
Sppd_PincodeReq	It notifies that PINCode is required for attestation with Remote_Device.
Sppd_LocalDeviceNameInd	A host is notified of DeviceName of Local_Device.
Sppd_LocalDeviceAddrInd	A host is notified of Address of Local_Device.
Sppd_LocalDeviceClassInd	A host is notified of the Device class of Local_Device.
Sppd_RemoteDeviceName Ind event	A host is notified of DeviceName of Remote_Device.
Sppd_DiscoveryComplete Ind event	A host is notified of discovery of Service having been completed.
Sppd_FindServiceResult Ind event	A host is notified of the information on Service discovered from the data obtained as a result of Sppd_StartDiscovery.
Sppd_FindServiceComplete Ind event	A host is notified of having ended discovering the information on Service from the data obtained as a result of Sppd_StartDiscovery.
Sppd_SifSecuiryIndevent	A host is notified of Parameters of the Security relation used at the time of SPP2_singleMode.
Sppd_SifScanParamIndevent	A host is notified of the setup Parameters of Inq_Scan and Page_Scan which are used at the time of SPP2_singleMode.
Sppd_SvtoutIndevent	A host is notified of SupervisionTimeOutValue set up.

a) Command_Complete event

Event	EventCode	Event Parameters
Command_Complete	0x0E	Num_Command_Packets, Command_Opcode, Status

Event Parameters :

Num_Command_Packets

Value	Parameter Description
0x0A	In order that a host may return number of Command_packets fixed Value 0x0A which can transmit to a SPP module, there is no meaning.

Size : 1Byte

Command_Opcode

Value	Parameter Description
0xXXXX	The operation Code of Command corresponding to Event

Size : 2Byte

Status

Value	Parameter Description
0x00	A command is successful
0x01	Unknown Command is received.
0x0B	Connection is already made.
0x0C	A command failed
0x12	Parameters is invalid

Size : 1Byte

b) Hardware_Error event

Event	EventCode	Event Parameters
Hardware_Error	0x10	Hardware_Code

* Only Sppd_ResetCommand is received after this Event is generated.

Event Parameters :

Value	Parameter Description
0x01	It fails reception of a packet by shortage of a memory.
0x02	Packet type is invalid
0x03	Packet length is invalid
0x04	Overrun occurs in UART.
0x05	A parity error occurs in UART.
0x06	A parity framing error occurs in UART.
0x07	A break occurs in UART.
0x08	A FIFO error occurs in UART.

Size : 1Byte

c) SPPD_Event

Event	EventCode	Event Parameters
SPPD_Event	0xF0	Event_ID, Parameters based on Event_ID

Event_Parameters :

Event_ID

Value	Parameter Description
0x01	EventID of SPPD_ConnectIndEvent
0x02	EventID of SPPD_DisconnectIndEvent
0x03	EventID of SPPD_InquiryResultIndEvent
0x04	EventID of SPPD_InquiryCompleteIndEvent
0x05	EventID of SPPD_LinkKeyIndEvent
0x06	EventID of SPPD_LinkKeyReqEvent
0x07	EventID of SPPD_PinCodeReqEvent
0x08	EventID of SPPD_LocalDeviceNameIndEvent
0x09	EventID of SPPD_LocalDeviceAddrIndEvent
0x0A	EventID of SPPD_LocalDeviceClassIndEvent
0x0B	EventID of SPPD_remoteDeviceNameIndEvent
0x0C	EventID of SPPD_DiscoveryCompleteIndEvent
0x0D	EventID of SPPD_FindServiceResultIndEvent
0x0E	EventID of SPPD_FindServiceCompleteIndEvent
0x81	EventID of SPPD_SifSercuiryIndEvent
0x82	EventID of SPPD_SifScanParamIndEvent
0xF3	EventID of SPPD_SvtoutIndEvent

Size : 1Byte

This Event is divided into 17 kinds by ParametersEvent_ID. I mention the details of every Event_ID later.

c-1) SPPD_ConnectInd event

Event	EventCode	Event Parameters
SPPD_ConnectInd	0xF0	Event_ID, Status, Port_Handle, BD_ADDR

* This Event notifies a host of what was opened by Virtual-COM Port. When it succeeds openly, the both sides of a client and a server are notified of this Event. When it fails, it is notified only to the side which published Sppd_ConnectCommand. Only in the case of status=0x0, Parameters Port_Handle andBD_ADDR is effective.

Event_Parameters

Event_ID

Value	Parameter Description
0x01	EventID of SPPD_ConnectIndEvent

Size : 1Byte

Status

Value	Parameter Description
0x00	Opening of Virtual-COM Port is successful.
0x01	Opening of Virtual-COM Port is failure.

Size : 1Byte

Port_Handle

Value	Parameter Description
0xXXXX	The port handle of opened Virtual-COM Port

Size : 2Byte(12bit□□)

BD_ADDR

Value	Parameter Description
0xXXXXXXXXXXXX	The RemoteBluetoothDeviceAddress of opened Virtual-COM Port

Size : 6Byte

c-2) SPPD_DisconnectInd event

Event	EventCode	Event Parameters
SPPD_DisconnectInd	0xF0	Event_ID, Status, Port_Handle

* This Event notifies a host of Virtual-COM Port having been Closed. When it succeeds in closing, the both sides of a client and a server are notified of this Event. When it fails, it is notified only to the side which published Sppd_DisconnectCommand.

Event_Parameters

Event_ID

Value	Parameter Description
0x02	EventID of SPPD_DisconntIndEvent

Size : 1Byte

Status

Value	Parameter Description
0x00	Closing of Virtual-COM Port is successful.
0x01	Closing of Virtual-COM Port is failure.

Size : 1Byte

Port_Handle

Value	Parameter Description
0xXXXX	The port handle of Closed Virtual-COM Port

Size : 2Byte(12bit effective)

c-3) SPPD_InquiryResultInd event

Event	EventCode	Event Parameters
SPPD_InquiryResultInd	0xF0	Event_ID, BD_ADDR, Class_of_Device

* This Event notifies a host of the information about Remote_Device which answered into Inquiry. This Event is not notified without the response of Remote_Device.

Event_Parameters

Event_ID

Value	Parameter Description
0x03	EventID of SPPD_InquiryResultIndEvent

Size : 1Byte

BD_ADDR

Value	Parameter Description
0xXXXXXXXXXXXX	BluetoothDeviceAddress of Remote_Device which answered

Size : 6Byte

Classt_of_Device

Value	Parameter Description
0xXXXXXX	The Device class of Remote_Device which answered

Size : 3 Byte

c-4) SPPD_InquiryCompleteInd event

Event	EventCode	Event Parameters
SPPD_ InquiryCompleteInd	0xF0	Event_ID,

* This Event notifies a host of Inquiry having been completed.

Event_Parameters

Event_ID

Value	Parameter Description
0x04	EventID of SPPD_InquiryCompleteIndEvent

Size : 1Byte

c-5) SPPD_LinkKeyInd event

Event	EventCode	Event Parameters
SPPD_LinkKeyInd	0xF0	Event_ID, BD_ADDR, Link_Key, Key_Type

* This Event notifies a host of Link_Key newly having been generated. Parameters BD_ADDR shows which Remote_Device and Link_Key were generated. Parameters Key_Type shows the type of the key used into pairing.

Event_Parameters

Event_ID

Value	Parameter Description
0x05	EventID of SPPD_LinkKeyIndEvent

Size : 1Byte

BD_ADDR

Value	Parameter Description
0xXXXXXXXXXXXX	BluetoothDeviceAddress of Remote_Device of generated Link_Key

Size : 6Byte

Link_Key

Value	Parameter Description
0xXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXX	Link_Key generated newly

Size : 16Byte

Key_Type

Value	Parameter Description
0x00	Combination key
0x01	The unit key of Local_Device
0x02	The unit key of Remote_Device

Size : 1Byte

c-6) SPPD_LinkKeyReq event

Event	EventCode	Event Parameters
SPPD_LinkKeyReq	0xF0	Event_ID, BD_ADDR

* A host needs to send Link_Key (it saves using Sppd_LinkKeyRsp) to a SPP module within 5 seconds, if this Event is received. A BluetoothTM module starts pairing as a thing without Link_Key, when Link_Key is not obtained, even if 5 seconds pass after this notice of Event. Once it attests, a SPP module will save Link_Key and will use it for the attestation on and after next time. Saved Link_Key is held in between [until the memory which carries out / a memory / hard Reset (power supply re-injection), or is saved is lost].

Event_Parameters

Event_ID

Value	Parameter Description
0x06	EventID of SPPD_LinkKeyReqEvent

Size : 1Byte

BD_ADDR

Value	Parameter Description
0xXXXXXXXXXXXX	BluetoothDeviceAddress of Remote_Device to attest

Size : 6Byte

c-7) SPPD_PinCodeReq event

Event	EventCode	Event Parameters
SPPD_PinCodeReq	0xF0	Event_ID, BD_ADDR

* Generated Link_Key is saved as a result of pairing. And it is used for the attestation on and after next time. Saved Link_Key is held in between [until the memory which carries out / a memory / hard Reset (power supply re-injection), or is saved is lost].

Event_Parameters

Event_ID

Value	Parameter Description
0x07	EventID of SPPD_PinCodeReqEvent

Size : 1Byte

BD_ADDR

Value	Parameter Description
0xXXXXXXXXXXXX	BluetoothDeviceAddress of Remote_Device to attest

Size : 6Byte

c-8) SPPD_LocalDeviceNameInd event

Event	EventCode	Event Parameters
SPPD_LocalDeviceNameInd	0xF0	Event_ID, Name

Event_Parameters

Event_ID

Value	Parameter Description
0x08	EventID of SPPD_LocalDeviceNameIndEvent

Size : 1Byte

Name

Value	Parameter Description
	DeviceName Setup(ed) by Local_Device (The character sequence of a maximum of 40 Byte(s) which carry out a Null terminus)

Size : 41Byte

c-9) SPPD_LocalDeviceAddrInd event

Event	EventCode	Event Parameters
SPPD_LocalDeviceAddrInd	0xF0	Event_ID, BD_ADDR

Event_Parameters

Event_ID

Value	Parameter Description
0x09	EventID of SPPD_LocalDeviceAddrIndEvent

Size : 1Byte

BD_ADDR

Value	Parameter Description
0xXXXXXXXXXXXX	BluetoothDeviceAddress Setup(ed) by Local_Device

Size : 6Byte

c-10) SPPD_LocalDeviceClassInd event

Event	EventCode	Event Parameters
SPPD_LocalDeviceClasstInd	0xF0	Event_ID, Class_of_Device

Event_Parameters :

Event_ID

Value	Parameter Description
0x0A	EventID of SPPD_LocalDeviceClassIndEvent

Size : 1Byte

Class_of_Device

Value	Parameter Description
0xXXXXXX	The BluetoothDevice class Setup(ed) by Local_Device

Size : 3 Byte

c-11) SPPD_RemoteDeviceNameInd event

Event	EventCode	Event Parameters
SPPD_RemoteDeviceNameInd	0xF0	Event_ID Status Name_Len Name

Event_Parameters

Event_ID

Value	Parameter Description
0x0B	EventID of SPPD_RemoteDeviceNameIndEvent

Size : 1Byte

Status

Value	Parameter Description
0x00	It succeeds in acquisition of Remote_DeviceName.
0x01	It fails in acquisition of Remote_DeviceName.

Size : 1Byte

Name_Len

Value	Parameter Description
0xXX	The length of Remote_DeviceName Range : 0x00~0xF8

Size : 1Byte

Name

Value	Parameter Description
	DeviceName Setup(ed) by Remote_Device When Size does not fulfill 248Byte(s), Null shows a terminus.

Size : 248Byte

c-12) SPPD_DiscoveryCompleteInd event

Event	EventCode	Event Parameters
SPPD_DiscoveryCompleteInd	0xF0	Event_ID

Event_Parameters

Event_ID

Value	Parameter Description
0x0C	EventID of SPPD_DiscoveryCompleteIndEvent

Size : 1Byte

c-13) SPPD_FindServiceResultInd event

Event	EventCode	Event Parameters
SPPD_FindServiceResultInd	0xF0	Event_ID BD_ADDR SCN ServiceName

Event_Parameters :

Event_ID

Value	Parameter Description
0x0D	EventID of SPPD_FindServiceResultIndEvent

Size : 1Byte

BD_ADDR

Value	Parameter Description
0xXXXXXXXXXXXX	BluetoothDeviceAddress by which Service reference was carried out

Size : 6Byte

SCN

Value	Parameter Description
0xXX	The server channel number discovered by reference "0" is returned in case it does not exist.

Size : 1Byte

ServiceName

Value	Parameter Description
	ServiceName discovered by reference "Null" is returned in case it does not exist.

Size : 21Byte

c-14) SPPD_FindServiceCompleteInd event

Event	EventCode	Event Parameters
SPPD_FindServiceCompleteInd	0xF0	Event_ID

Event_Parameters :

Event_ID

Value	Parameter Description
0x0E	EventID of SPPD_FindServiceCompleteIndEvent

Size : 1Byte

c-15) SPPD_SifSecurityInd event

Event	EventCode	Event Parameters
SPPD_SifSecurityInd	0xF0	Event_ID SEC_MODE ENC_MODE PIN_LEN PIN

Event_Parameters :

Event_ID

Value	Parameter Description
0x21	EventID of SPPD_SifSecurityIndEvent

Size : 1Byte

SEC_MODE

Value	Parameter Description
0x01	Setup Default of Securitynone GAP to SecurityMode1
0x02	Those with Security It is Setup to SecurityMode2 of GAP.
0x03	Those with Security It is Setup to SecurityMode3 of GAP.

Size : 1Byte

ENC_MODE

Value	Parameter Description
0x00	With no encryption
0x01	Those with encryption

Size : 1Byte

PIN_LEN

Value	Parameter Description
0xXX	PINCode length is specified per Byte. Setup Range : 0x01~0x10

Size : 1Byte

PIN

Value	Parameter Description
0xXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXX	It is Setup about PINCode required at the time of attestation. Range which can be set up : 128bit * : Since it is a 8-bit data sequence, the 1st Byte is transmitted at the head.

Size : 16 Byte

c-16) SPPD_SifScanParamInd event

Event	EventCode	Event Parameters
SPPD_SifScanParamInd	0xF0	Event_ID Inq_window Inq_Interval Page_ window Page_Interval

Event_Parameters :

Event_ID

Value	Parameter Description
0x22	EventID of SPPD_ SifScanParamIndEvent

Size : 1Byte

Inq_Window

Value	Parameter Description
0xXXXX	Time which is performing Inquiry Scan (Inq_window <= Inq_interval) Range : 0x0012 – 0x1000 and 0x0000 Time = 0xXXXX * 0.625 msec Range : 11.25msec –2550 msec Default : 0x48 The present Value is not changed when 0x0000 is set up.

Size : 1Byte

Inq_Interval

Value	Parameter Description
0xXXXX	Time until it starts following Inquiry Scan from an Inquiry Scan start Range : 0x0050 – 0x1000 and 0x0000 Time = 0xXXXX * 0.625 msec Range : 50msec –2550msec (50msec intervals,fraction omission) Default : 0x800(It is 1.25sec because of omission.) The present Value is not changed when 0x0000 is set up.

Size : 1Byte

Page_Window

Value	Parameter Description
0xXXXX	Time which is performing Page Scan (Page_window <= Page_interval) Range : 0x0012 – 0x1000 and 0x0000 Time = 0xXXXX * 0.625 msec Range : 11.25msec –2550 msec Default : 0x48 The present Value is not changed when 0x0000 is set up.

Size : 1Byte

Page_Interval

Value	Parameter Description
0xXXXX	Time until it starts following Page Scan from an Page Scan start Range : 0x0050 – 0x1000 and 0x0000 Time = 0xXXXX * 0.625 msec Range : 50msec –2550 msec (50msecintervals,fraction omission) Default : 0x800(It is 1.25sec because of omission.) The present Value is not changed when 0x0000 is set up.

Size : 1Byte

c-17) SPPD_SvtoutInd event

Event	EventCode	Event Parameters
SPPD_SvtoutInd	0xF0	Event_ID Timeout

Event_Parameters :

Event_ID

Value	Parameter Description
0xF3	EventID of SPPD_ SvtoutIndEvent

Size : 1Byte

Timeout

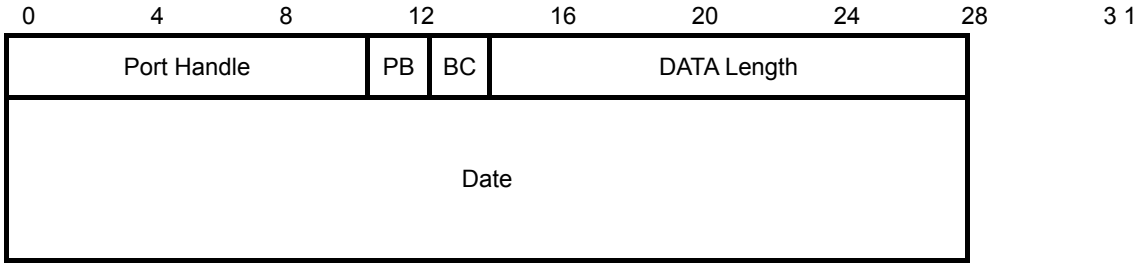
Value	Parameter Description
0xXXXX	SetupValue of SupervisionTimeout Range : 0x0000 – 0xFFFF Time = 0xXXXX * 0.625 msec Range : 0.625msec –40900msec Default : 0x7D00(20sec) The present Value is not changed when 0x0000 is set up.

Size : 2Byte

Data format

a) At the time of SPP1Mode

It is necessary to packet-ize the data transmitted and received after Link establishment of Bluetooth in a upper rank (host side).(8-2.1 Reference)



Port Handle : 12bit

Value	Note
0xXX	It is used for transmission of a data_packet. It is ID of Virtual-COM Port.

Packet Boundary Flag(PB Flag) : 2bit

Value	Note
0x02	0x02 Fixed

Broadcast Flag(BC Flag) : 2bit

Value	Note
0x00	0x00 Fixed

Data Length : 2Byte

Value	Note
0xXXXX	Data length of a Byte unit Range : 0x00~0x160

b) SPP2Mode

After LINK establishment, data can be transmitted and received like the usual serial port. (There is no necessity for packet-izing.)

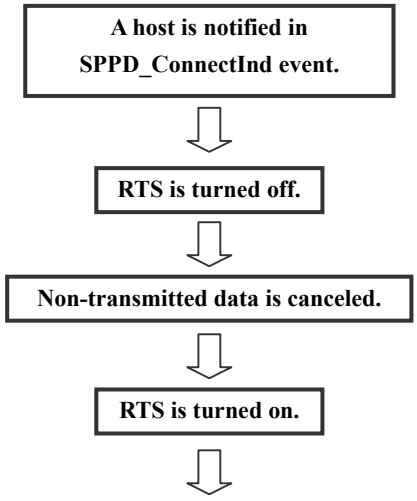
b-1) SigleMode

At the time of SingleMode, connection of Bluetooth is automatically established to the connection request from a partner based on the information set up. And it changes into the state in which data communications are possible.(Only serial data is transmitted and received to UART.)When connection is not establishable between RemoteDevices, RTS is turned OFF ("H") and data reception is not performed. If Link is established, RTS will be turned ON ("L") and the data from a host will be made receivable. At the same time, the data from RemoteDevice is transmitted to a host. When it is disconnected from RemoteDevice or disconnects by Supervision Timeout, RTS is turned OFF and the data reception from a host is forbidden.

b-2) MultiMode

Serial data is transmitted and received only for after Link establishment. At the time of a power supply injection, it becomes the Command interface Mode(Control Command is a packet like SPP1.).

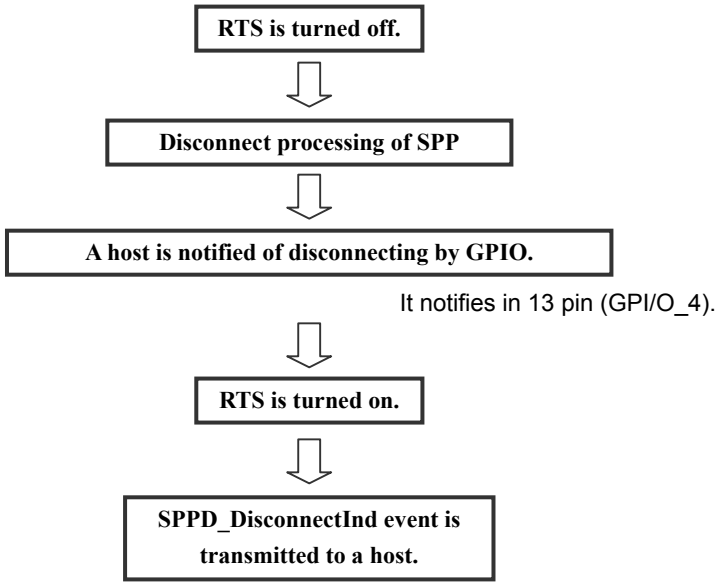
Connection is established in the Command interface Mode. After notifying SPPD_ConnectInd event “Event by Status=0(Normal)”, it shifts to “data through Mode” automatically. In case it shifts to “data through Mode” , this module performs the following operation.



In the following case, this module shifts to CommandMode.

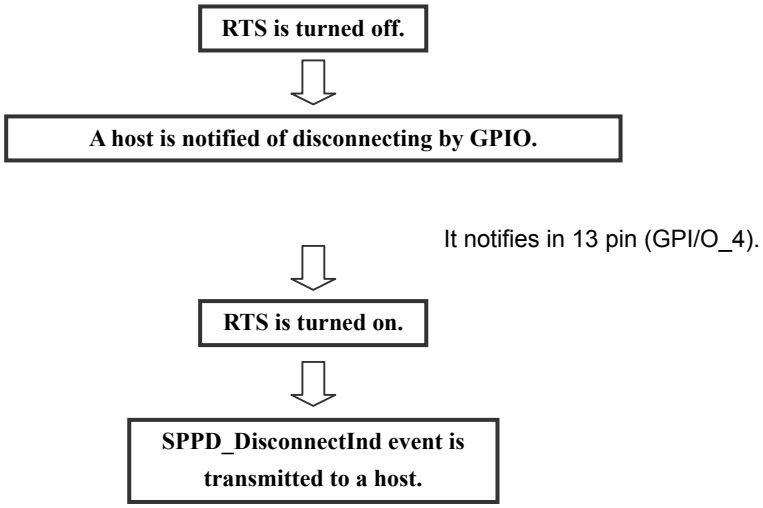
1) The request from a host

Operation in a module



2) The request from a partner, the reasons of aggravation of communication quality etc., Link disconnnect by SupervisionTimeout.

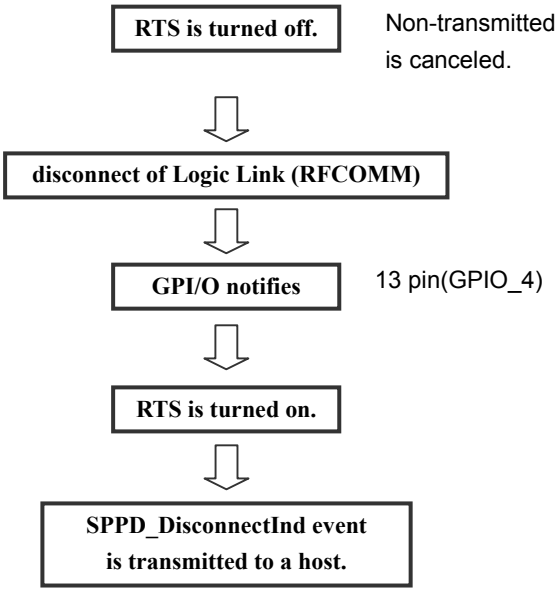
Operation in a module



disconnect sequence

In SPP1Mode, a disconnect request is performed in Sppd_DisconnectCommand.(8-2.1.□t)

* In SPP2Mode, disconnect processing is performed by the two following kinds of methods. In addition, the processing inside this module is as follows.



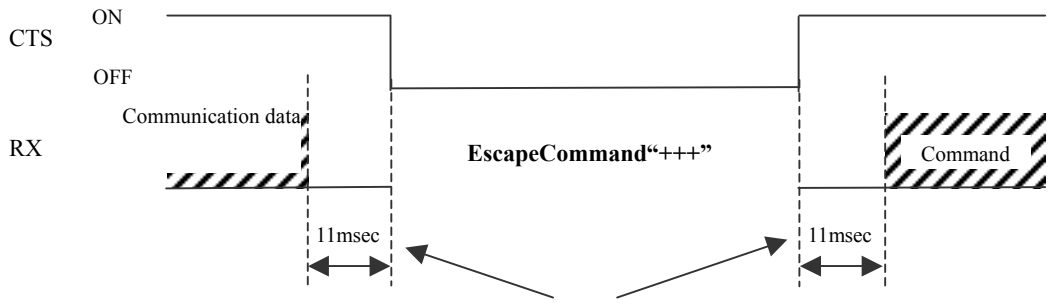
a) GPI/O is used.

A host is able to request disconnect by making 8pin(s) (GPI/O_3) of this module into the "L" level (10microsec grade).

This GPI/O applies interruption to CPU with falling edge, and starts Link disconnect processing of Bluetooth by making the interruption into a trigger (the above-mentioned disconnect sequence).

b) Escape Command is used.

CTS of this module can be turned OFF ("H" level), and Link disconnecting processing of Bluetooth can be started by transmitting Escape Command "+++." The procedure of disconnect becomes as follows.



* : Escape Command is effective when a CTS signal is OFF. When an RTS signal is ON, "+++" is treated as data.("+++" is transmitted to Remote as it is, and does not perform disconnect processing.)In addition if the escape Command issue back RTS is turned on it, Sppd_DisconnectInd event will be transmitted to a host.

It is at the disconnect time by RFCOMM, and DisconnectEvent is transmitted. However, since disconnect processing of a physical Link layer is performed between 3 sec grades after that, please cut disconnect processing of a power supply etc. after progress more than 3 sec.

- **The notice of disconnect**

  a) The notice by GPI/O

  13 Pin (GPI/O_4) outputs and notifies "L" between 10msec(s) (Min).

  b) The notice by Event

  After RTS is turned on after disconnect processing, I notify a host in DiconnectIndEvent.