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LE2201/203
Toshiba TC35661 Bluetooth SPP v1.1 module

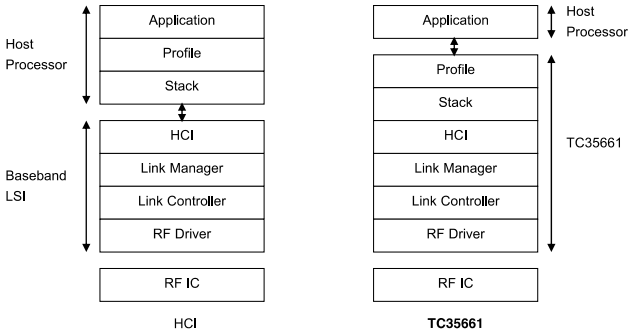
Introduction

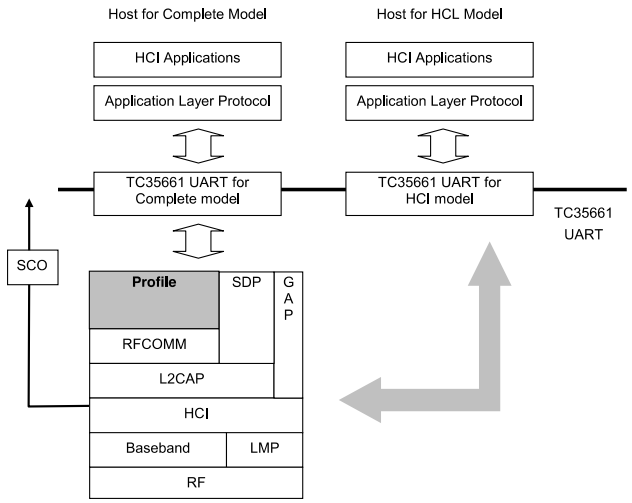
Able Trend Technology introduces the pioneer of the Bluetooth ver. 3.0 with SPP v1.1 profile compliant wireless module LE2201/203 that is a high performance, cost effective, low power and compact solution. The Bluetooth Smart module provides a complete 2.4GHz Bluetooth system based on Toshiba TC35661 chipset, which is a single chip radio and baseband IC for Bluetooth 2.4GHz systems. This module is fully compliant to Bluetooth SPP v1.1 profile for data communications.

The integrated 2.4GHz RF transceiver offers full Bluetooth compatibility as well as excellent receiver sensitivity and robustness, thus building a reliable interface to the antenna. The pre-qualified module enables its user to create a SPP v1.1 profile product within the shortest possible time to market. LE2201 can be powered directly with a standard 3V coin cell battery or pair of AAA batteries.

Certification:

- SIG BQB certification (QDID: B021317)
- Japan TELE (TELE ID: 005-100587)
- US FCC (FCC ID: 2AATFMB400EL)



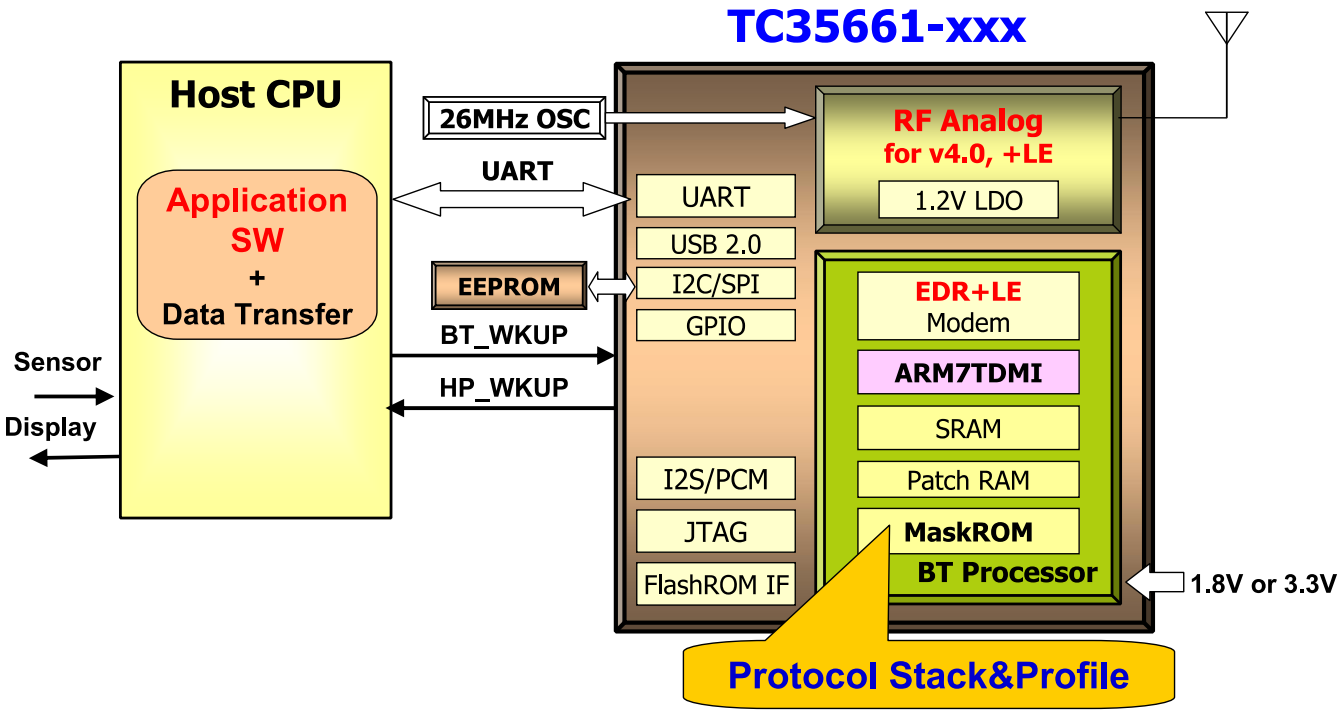


Applications

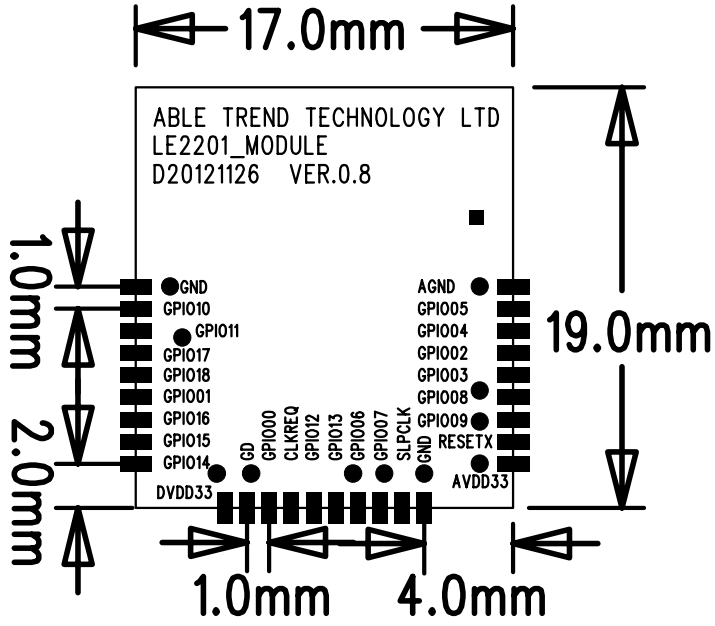
- Toys, Scanner, Power Meter, POS, Terminal control, etc...

Product Specification

Model Name	LE2201
Product Description	Bluetooth SPP v1.1 Profile
Bluetooth Standard	Bluetooth EDR Compliant with SPP v1.1 Profile
Chipset	Toshiba TC35661
Dimension	17mm x 19mm x 2.0mm
Operating Conditions	
Operating Voltage	2.5~3.3V
Temperature	-10+70°C
Storage Temperature	-55~+125°C
Electrical Specifications	
Frequency Range	2402~2480MHz
Maximum RF Transmit Power	+2.5dBm
RF power control range	20dB
Receive Sensitivity	-90dBm (Bit error rate (BER) > 0.1%)
Out of band blocking	
fTX=fRX=2460MHz, 30MHz - 2000MHz	-20dBm
fTX=fRX=2460MHz, 2GHz – 2.4GHz	-27dBm
fTX=fRX=2460MHz, 2.498GMHz – 3GHz	-27dBm
fTX=fRX=2460MHz, 3GHz – 12.75GHz	-20dBm



Dimensions



Bottom View

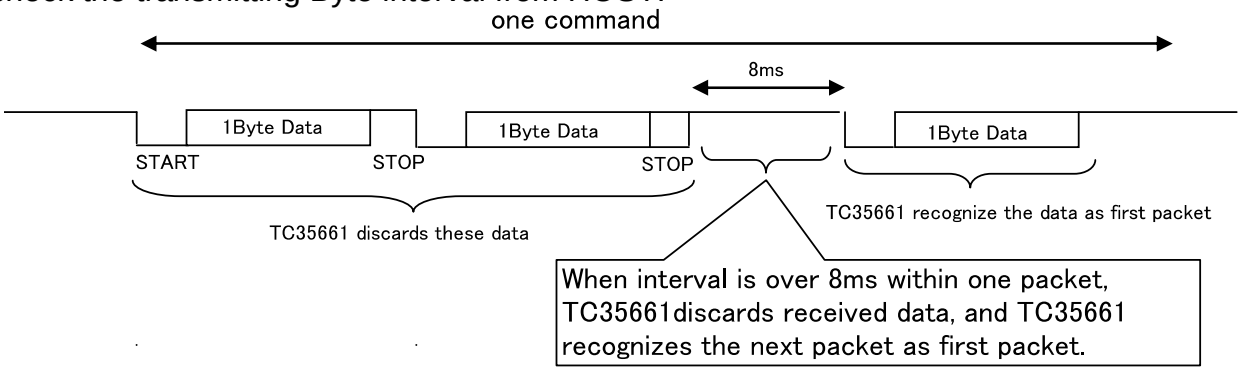
Pin Assignment

Pin	Name	Description	Pin	Name	Description
1	GND	Ground	15	GPIO13	Configurable IO
2	GPIO10	Configurable IO	16	GPIO06	UART TX (Output)
3	GPIO11	Configurable IO	17	GPIO07	UART RX (Input)
4	GPIO17	Configurable IO	18	SLPCLK	32KHz Sleep Clock
5	GPIO18	Configurable IO	19	GND	Ground
6	GPIO01	Status (Output)	20	AVDD33	Analog 3V3
7	GPIO16	Configurable IO	21	RESETX	Reset
8	GPIO15	I2C SCL	22	GPIO09	UART CTS (Input)
9	GPIO14	I2C SDA	23	GPIO08	UART RTS (Output)
10	DVDD33	Digital 3V3	24	GPIO03	LED1 (4mA)
11	GD	Ground	25	GPIO02	LED0 (4mA)
12	GPIO00	BT Wakeup (Input)	26	GPIO04	Host Wakeup
13	CLKREQ	Clock Request	27	GPIO05	Configurable IO
14	GPIO12	Configurable IO	28	GND	Ground

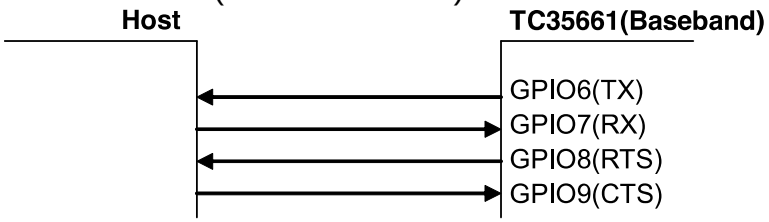
UART interface

TC35661 UART interface uses 4 signals, Tx/Rx pins and RTS/CTS pins and has following functions.

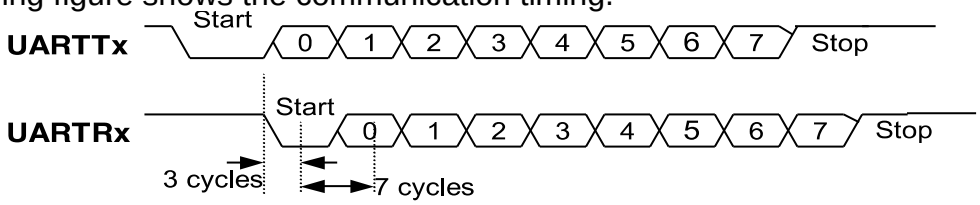
1. Programmable Baud Rate (Default value is 115200bps)
2. 4pins communication (Tx/Rx/RTS/CTS)
3. Data Format = Start bit + 8bit data + 1bit Stop bit without parity bit.
4. Support of Error detection, time-out/Over-run/Flaming Error
   TC35661 UART has the error detection function to get more reliable communication.
   When TC35661 detects UART communication error, TC35661 return the HW_Error_Event with error code to inform host CPU of the communication error.
   Timer of maximum transmit interval between each bytes is 8ms. If this error code occurs, check the transmitting Byte interval from HOST.



5. 4pins communication (Tx/Rx/RTS/CTS)



6. Data Format = Start bit + 8bit data + 1bit Stop bit without Parity bit
   Following figure shows the communication timing.



(Note)Cycle = 7 / setting Baud Rate

Tolerance of transfer clock is less than 1.0%.

UART Transport

Packet Format in HCI mode
UART Protocol in HCI mode is based on Bluetooth Core Spec.H4 (UART Transport Layer). The HCI packet indicator shall be sent immediately before the HCI packet.

HCI packet type	HCI packet indicator
HCI Command Packet	0x01
HCI ACL Data Packet	0x02
HCI Synchronous Data Packet	0x03 (No Sup put)
HCI Event Packet	0x04

Packet Format in Complete mode
UART Protocol in Complete mode is based on TOSHIBA original.
Following table shows the packet format of TC35661 UART Transport packet.

TC35661 UART Transport Packet Format

Packet Length	**Interface Data**
3 bytes	N bytes

The Packet Length shows all length with Interface data and Packet length.
The maximum Packet length is 7561019Bytes.

The Interface Data Format

Service ID	**OpCode**	**Length**	**Parameter**
1 Byte	1 Byte	2 Bytes	N Bytes

Service ID means Bluetooth Protocol Layer for data field.
OpCode means the content of Data field.
Length means the volume of Data field.
The command is input from Host CPU to TC35661 and the event is from TC35661 to host CPU.

The type of BT Service ID

Service ID	**Description**
0xE1	Bluetooth Management Interface
0xE2	Handsfree Interface
0xE3	Object Push Interface
0xE4	Dialup Networking Interface
0xE5	SPP v1.1
0xE8	Audio/Video Interface
0xE9	PBAP

Other	Reserved

RTS/CTS Flow Control

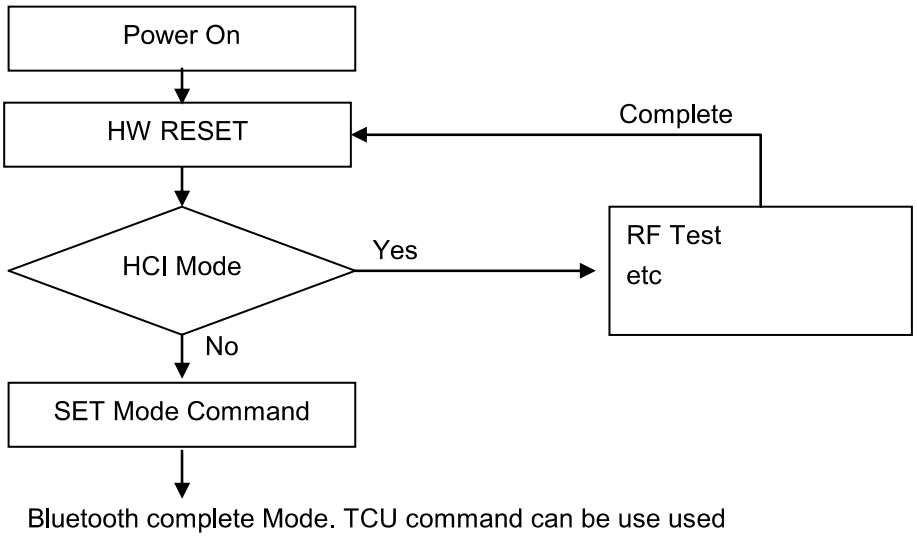
CTS/RTS signals are used to get more reliable serial communication and to avoid the lost of Communication data.

1. CTS signal
   When CTS signal is set to GND, TC35661 setup the sending data to host CPU.
   After CTS signal is set to VCC and TC35661 has sending data, TC35661 stops to output sending data to host CPU.

2. RTS signal
   When RTS signal is set to GND, host CPU can send the data to TC35661.
   If TC35661 cannot arrange to receive the data from host CPU, TC35661 is set RTS signal to VCC.

Initial Control Sequence

After to release Reset sequence, TC35661 is set to HCI mode, which is used to set RF IC control parameters, to update the firmware. To change the complete mode from HCI mode, Host CPU sends the command “HCI_Set_Mode command” in HCI Vendor Specific command.



Command and response for initialize

After Power on, or HW Rest, TC35661 starts HW initialize for 200ms.
RTS pin becomes H level during HW initial sequence
Host CPU needs to wait RTS until L level or 200ms, and then send HCI_RESET.
Data format of HCI_RESET are 01 03 0c 00
Then TC35661 generates response.
Response data are 04 0e 04 04 03 0c 00.
RTS pin becomes H level during the SW initial sequence.
HOST CPU sends the following command.

1. Change UART baudrate. Default is 115200bps

2. Get data from EEPROM

3. Set BD_ADDR

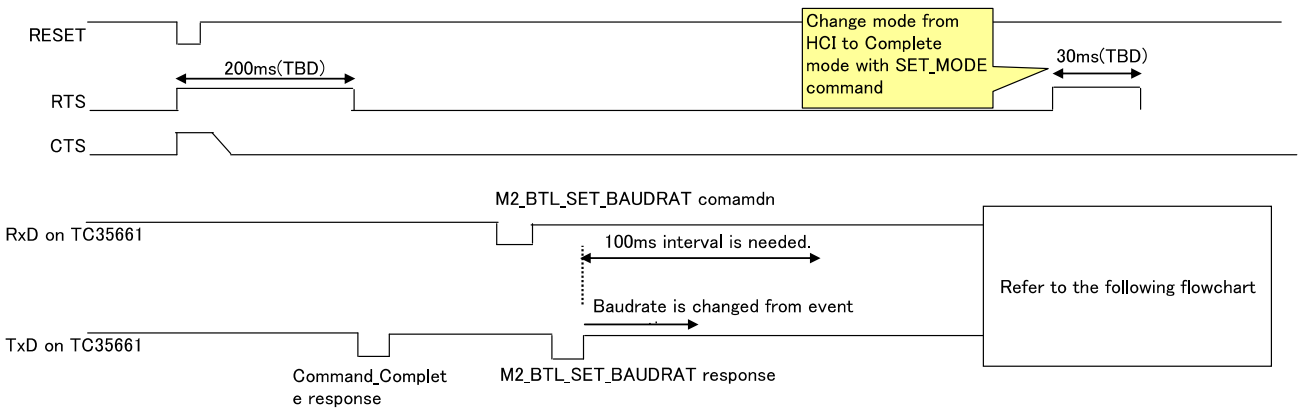
4. Set Sleep mode

   HOST CPU sends M2_HCI_BTL_SET_DEEP_SLEEP command.
   Sleep parameter depends on each vender. For example jitter and drift value of 32KHz clock. Jitter and drift influence sync window length and sleep time.
   Please be careful to decide the value.

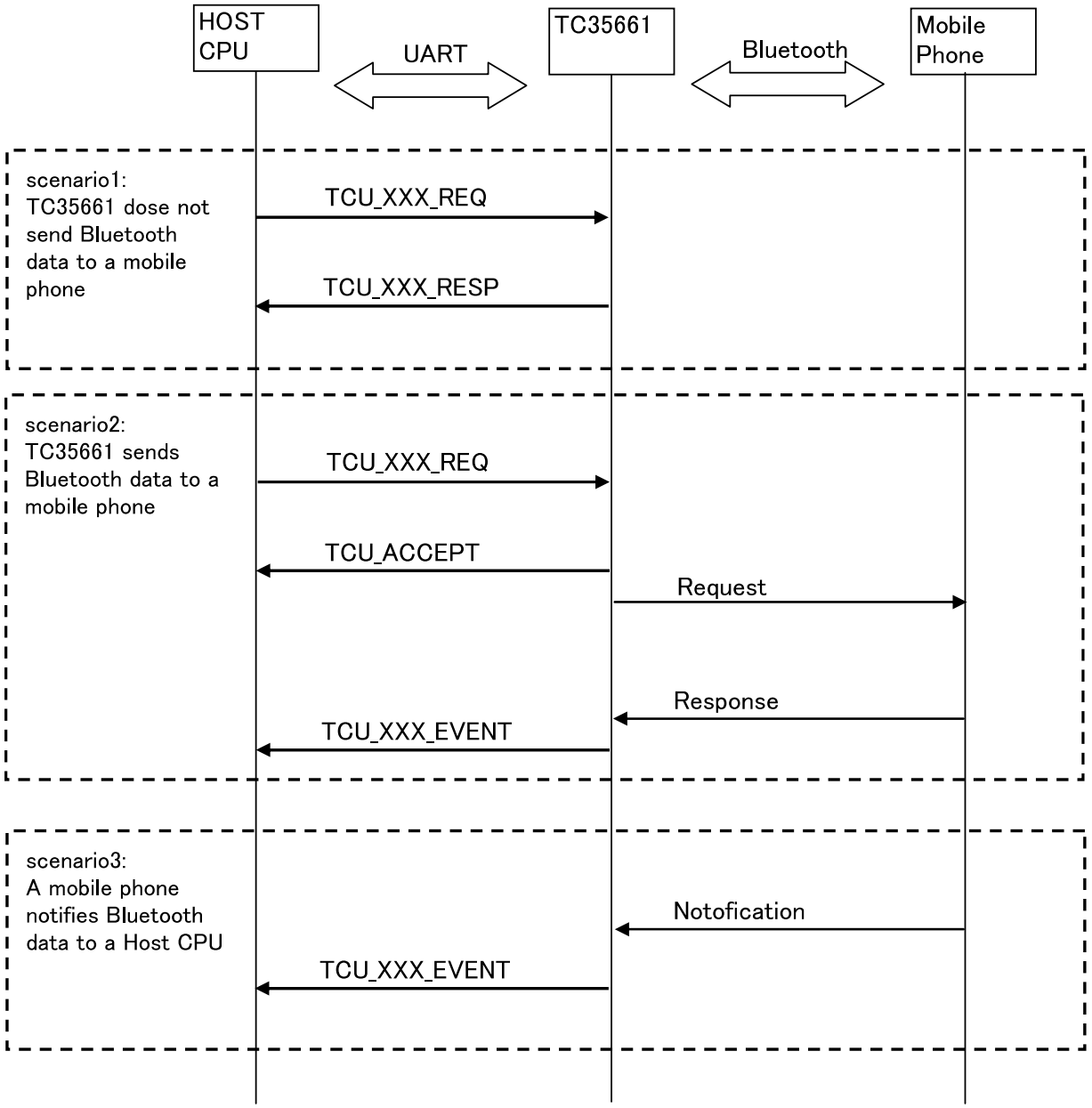
5. Change mode HCI to Complete
   HOST CPU sends Set Mode command after initialize on HCI mode.
   Set Mode data are 01 08 fc 03 00 99 01.
   TC35661 generates response send set RTS=H for 30ms.
   Response 04 ff 05 08 00 99 00 01.
   HOST CPU needs to wait 30ms.
   HOST CPU can send TCU_MNG_INIT command, which is 1st command for complete mode.
   Local device name (example TC35661) is set at this timing.

6. Set Class of device

Initial timing chart



Command sequence for complete mode



SPP Commands

Following table shows the SPP v1.1 Command Interface ServiceID and OpCode list.

ServiceID	OpCode	Description
0xE5	0x01	TCU_SPP_SETUP_REQ
0xE5	0x81	TCU_SPP_SETUP_RESP
0xE5	0x02	TCU_SPP_SHUTDOWN_REQ
0xE5	0x82	TCU_SPP_SHUTDOWN_RESP
0xE5	0x03	TCU_SPP_CONNECT_REQ
0xE5	0x43	TCU_SPP_CONNECT_EVENT
0xE5	0x04	TCU_SPP_DISCONNECT_REQ
0xE5	0x44	TCU_SPP_DISCONNECT_EVENT
0xE5	0x47	TCU_SPP_LINE_NOTIFY_EVENT
0xE5	0x08	TCU_SPP_DATA_TRANSFER_REQ
0xE5	0x48	TCU_SPP_DATA_RECEIVE_EVENT
0xE5	0xF1	TCU_SPP_DATA_SEND_EVENT
0xE5	0x20	TCU_SPP_UUID_ASSIGN_REQ
0xE5	0xA0	TCU_SPP_UUID_ASSIGN_RESP

TCU_SPP_SETUP_REQ

To setup SPP device.
ACK Response TCU_SPP_SETUP_RESP is generated, when this command is completed.

Command Format:

ServiceID	1 Byte
OpCode	1 Byte
Parameter Length	2 Bytes

ServiceID 0xE5
OpCode 0x01
Parameter Length 0x0000
Parameters: -NONE-

TCU_SPP_SETUP_RESP

ACK Response for TCU_SPP_SETUP_REQ.

Command Format:

ServiceID	1 Byte
OpCode	1 Byte
Parameter Length	2 Bytes
Status	1 Byte

ServiceID 0xE5
OpCode 0x81
Parameter Length 0x0001

Parameters:

Parameters	**Parameter Description**	**Value**
Status	TCU_SPP_SETUP_REQ Result	
	Successful	0x00
	Parameter Failure	0x01
	No Device Initialization	0x03
	Setup SPP	0x40

TCU_SPP_SHUTDOWN_REQ

To shutdown SPP Function.

ACK Response TCU_SPP_SHUTDOWN_RESP is generated, when this command is completed.

(Note) This command should be issued, when SPP connection is not established.

Command Format:

ServiceID	1 Byte
OpCode	1 Byte
Parameter Length	2 Bytes

ServiceID 0xE5
OpCode 0x02
Parameter Length 0x0000

Parameters: - NONE -

TCU_SPP_SHUTDOWN_RESP

ACK Response for TCU_SPP_SHUTDOWN_REQ.

Command Format:

ServiceID	1 Byte
OpCode	1 Byte
Parameter Length	2 Bytes
Status	1 Byte

ServiceID 0xE5
OpCode 0x82
Parameter Length 0x0001

Parameters:

Parameters	**Parameter Description**	**Value**
Status	TCU_SPP_SHUTDOWN_REQ Result :	
	Successful	0x00
	Parameter Failure	0x01
	No device Initialization	0x03
	No setup SPP	0x41
	Establish SPP	0x42
	On releasing SPP	0x43

TCU_SPP_CONNECT_REQ

To establish ACL connection and SPP connection with specified remote device.

TCU_ACCPET is generated to notify the command operation start for Host CPU.
When service level connection is established, TCU_SPP_CONNECT_EVENT is generated.

Command Format:

ServiceID	1 Byte
OpCode	1 Byte
Parameter Length	2 Bytes
BD_ADDR	6 Bytes
BaudRate	1 Byte
DataFormat	1 Byte
FlowControl	1 Byte
XonChar	1 Byte
XoffChar	1 Byte
ParmMask	2 Byte
Server_Channel_Validity	1 Byte
Sever_Channel	1 Byte
Use_of_Link_Key	1 Byte
Link_Key	16 Bytes

ServiceID 0xE5
OpCode 0x03
Parameter Length 0x000D or 0x000E or 0x000F or 0x0010 or 0x001E or 0x0020

Parameters:

Parameters	Parameter Description	Value
BD_ADDR	Remote BD ADDR	0xXXXXXXXXXXX
BaudRate	Baudrate setting	
	− 2400bps	0x00
	− 4800bps	0x01
	− 7200bps	0x02
	− 9600bps	0x03
	− 19200bps	0x04
	− 38400bps	0x05
	− 57600bps	0x06
	− 115200bps	0x07
	− 230400bps	0x08
DataFormat	Data bit length, stop bit length, parity existence, parity type setting	
	Unused This bit is ignored	BIT0
	DataBit − DataBits5: 0x00 − DataBits7: 0x01 − DataBits6: 0x02 − DataBits8: 0x03	BIT1-2
	StopBit − StopBit1: 0x00 − StopBits1_5: 0x01	BIT3
	Parity − NonParity: 0x00 − Parity: 0x01	BIT4
	ParityType − OddParity: 0x00 − MarkParity: 0x01 − EvenParity: 0x02 − SpaceParity: 0x03	BIT5-6
	Unused This bit is ignored.	BIT7
FlowControl	Flow controll setting	
	− NoFlowControl	0x00
	− XFlowInput	BIT1-ON
	− XFlowOutput	BIT2-ON
	− RTRInput	BIT3-ON
	− RTROutput	BIT4-ON
	− RTCInput	BIT5-ON
	− RTCOutput	BIT6-ON
	− Unused This bit is ignored.	BIT7

XonChar	Xon Chiropractor setting	
	− YES	0x01
	− NO	0x00
XoffChar	Xoff Chiropractor setting	
	− YES	0x01
	− NO	0x00
ParmMask	Field setting	
	− RFCOMM_RPN_MASK_BAUD	BIT0-ON
	− RFCOMM_RPN_MASK_DATA	BIT1-ON
	− RFCOMM_RPN_MASK_STOP	BIT2-ON
	− RFCOMM_RPN_MASK_PARITY	BIT3-ON
	− RFCOMM_RPN_MASK_PARITY_TYPE	BIT4-ON
	− RFCOMM_RPN_MASK_XON_CHAR	BIT5-ON
	− RFCOMM_RPN_MASK_XOFF_CHAR	BIT6-ON
	− Unuse	BIT7-0
	− RFCOMM_RPN_MASK_FLOW_X_IN	BIT8-ON
	− RFCOMM_RPN_MASK_FLOW_X_OUT	BIT9-ON
	− RFCOMM_RPN_MASK_FLOW_RTR_IN	BIT10-ON
	− RFCOMM_RPN_MASK_FLOW_RTR_OUT	BIT11-ON
	− RFCOMM_RPN_MASK_FLOW_RTC_IN	BIT12-ON
	− RFCOMM_RPN_MASK_FLOW_RTC_OUT	BIT13-ON
	− Unused This bit is ignored	BIT14-15
Server_Channel_ Validity	Server_Channel validity	
	− Server_Channel parameter is not valid	0x00
	− Server_Channel parameter is valid	0x01
Server_Channel	Used Server Channel information TCU_MNG_DISCOVER_REMOTE_SERVER_EVENT command can get Server Channel. Even if Select_Server_Channel sets 0x00(This parameter is not valid), Do not omit this parameter.	0x00
Use_of_Link_Key	Link_Key setting When TCU_MNG_INIT_REQ / Paired_Information_Stored _Setting is enabled, this parameter can be omitted. Then TC35661 uses LinkKey into EEPROM automatically.	
	− Unused Paired information into EEPROM is not used. Pairing is occurred.	0x00
	− Use Host needs to send LinkKey.	0x01
Link_Key	Link key When Use_of_Link_Keyis 0x00, this field is ignored. When TCU_MNG_INIT_REQ / Paired_Information_Stored_Setting is enabled, this parameter should be omitted. Then TC35661 uses LinkKey into EEPROM automatically	0xXXXXXXXXXX

The following response is notified with TCU_ACCEPT

Parameters	Parameter Description	Value
Status	Success	0x00
	Parameter Failure	0x01
	No Device Initialization	0x03
	On searching device	0x04
	On searching service	0x05
	Under Connection Setup of other Profile	0x0E
	No setup SPP	0x41
	On progress SPP connection or Establish SPP	0x42
	Releasing SPP	0x43

TCU_SPP_CONNECT_EVENT

This event is generated, when SPP connection is established.

Command Format:

ServiceID	1 Byte
OpCode	1 Byte
Parameter Length	2 Bytes
Status	1 Byte
BD_ADDR	6 Bytes
Negotiated_Frame_Size	2 Bytes
Length_of_Device_Name	1 Byte
Device_Name	MAX 248Bytes

ServiceID 0xE5
OpCode 0x43
Parameter Length 0x000A-0x0022

Parameters:

Parameters	Parameter Description	Value
Status	TCU_SPP_SERVICELEVEL_CONNECT_REQ Result :	
	Successful	0x00
	No SDP service supported	0x8D
	SPP connection timer-out	0xD0

	SPP connection failure	0xD3
BD_ADDR	Remote Device BD_ADDR	0xXXXXXXXXXXXX
Negotiated_Frame_Size	Max Frame size between RFCOMM entity (Note) information field size is equal to the following condition. Negotiated_Frame_Size When RFCOMM credit base flow control is active, Negotiated_Frame_Size-1 (Credits Field) byte RFCOMM entry depends on Credit filed status or flow control status during RFCOMM connection. When Status is failed, 0xFFFF is used.	Max 0x03F4
Length_of_Device_Name	Remote Device User-friendly name Length When no User-friendly name is setting. This value is 0x00.	0x00 - 0x18
Device_Name	Remote device UTF-8 encoded User-friendly name If Length_of_Device_Name is 0x00, this data is ignored. (MAX:24Bytes)	

TCU_SPP_DISCONNECT_REQ

To disconnect SPP connection.

TCU_ACCEPT is generated to notify the start of this command operation.
When the connection is disconnected, TCU_SPP__DISCONNECT_EVENT is generated.

(Note1)
SPP release timer is 5sec.
When this timer is expired, all internal SPP resource is released.
TCU_MNG_CONNECTION_STATUS_EVENT and TCU_SPP__DISCONNECT_EVENT are notified.

Command Format:

ServiceID	1 Byte
OpCode	1 Byte
Parameter Length	2 Bytes

ServiceID 0xE5
OpCode 0x04
Parameter Length 0x0000
Parameters: - NONE -

The following response is notified with TCU_ACCEPT

Parameters	Parameter Description	Value
Status	Success	0x00
	Parameter Failure	0x01
	No Device Initialization	0x03
	Under Connection Setup of other Profile	0x0E
	No setup SPP	0x41

TCU_SPP_DISCONNECT_EVENT

This event is generated, when SPP disconnection is completed.

(Note) If there is no BD_ADDR to notify, BD_ADDRD is set as 0xFFFFFFFFFFFF.

Command Format:

ServiceID	1 Byte
OpCode	1 Byte
Parameter Length	2 Bytes
Status	1 Byte
BD_ADDR	6 Bytes
Reason	1 Byte

ServiceID 0xE5
OpCode 0x44
Parameter Length 0x0008

Parameters:

Parameters	Parameter Description	Value
Status	TCU_SPP_SERVICELEVEL_DISCONNECT_REQ Result:	
	Successful	0x00
	SPP releasing timer-out	0xD2
BD_ADDR	BD_ADDR of remote device	0xXXXXXXXXXXXX
Reason	Reason for Disconnection	
	Releasing required from local host	0x01
	Releasing required from remote device	0x02
	Disconnection error	0x03
	Link loss	0x04

TCU_SPP_LINE_NOTIFY_EVENT

To notify line status, which is received from B-Party.

Command Format:

ServiceID	1 Byte

OpCode	1 Byte
Parameter Length	2 Bytes

ServiceID 0xE5
OpCode 0x47
Parameter Length 0x0001

Parameters:

Parameters	Parameter Description	Value
Line_Status	Line Ststus is specified on TS 07.10	0xXX

TCU_SPP_DATA_TRANSFER_REQ

To send SPP data to remote device.
TCU_ACCEPT is generated to notify the start of this command operation.
TCU_SPP_DATA_SEND_EVENT is generated, when this command is completed.

Command Format:

ServiceID	1 Byte
OpCode	1 Byte
Parameter Length	2 Bytes
Length_of_Data	2 Bytes
Data	MAX 1012Bytes

ServiceID: 0xE5
OpCode: 0x08
Parameter Length: 0x0003 - 0x03F6

Parameters:

Parameters	Parameter Description	Value
Length_of_Data	SPP Data Length	Max. 0x03F4
Data	SPP Data (1Byte - 1012Bytes)	

The following response is notified with TCU_ACCEPT

Parameters	Parameter Description	Value
Status	Success	0x00
	Parameter Failure	0x01
	No Device Initialization	0x03
	No setup SPP	0x41
	Releasing SPP	0x43
	No SPP connection	0x44
	On transferring SPP data	0x46
	Under SPP operation	0x47

TCU_SPP_DATA_RECEIVE_EVENT

To notify SPP Data, which is received from B-Party

Command Format:

ServiceID	1 Byte
OpCode	1 Byte
Parameter Length	2 Bytes
Length_of_Data	2 Bytes
Data	MAX 1012Bytes

ServiceID: 0xE5
OpCode: 0x48
Parameter Length: 0x0003 - 0x03F6

Parameters:

Parameters	**Parameter Description**	**Value**
Length_of_Data	Received data length	Max. 0x03F4
Data	Received Data (1Byte - 1012Bytes)	

TCU_SPP_DATA_SEND_EVENT

This event is generated, SPP Data Transfer : TCU_SPP_DATA_TRANSFER_REQ is completed to send SPP data to B-Party.

Command Format:

ServiceID	1 Byte
OpCode	1 Byte
Parameter Length	2 Bytes

ServiceID 0xE5
OpCode 0xF1
Parameter Length 0x0000
Parameter -NONE-

TCU_SPP_UUID_ASSIGN_REQ

This command sets Service Class ID (UUID) on SDP for SPP.
This command is used to connect to the service with the UUID Bluetooth SIG dosen't specify. This command sets both UUID for initiator and accepter.
TC35661 use the UUID to initiate SPP connection and to respond SPP connection.
TCU_SPP_UUID_ASSIGN_RESP is generated, when this command is completed.

(NOTE) This command is enabled when SPP is not started.

Command Format:

ServiceID	1 Byte
OpCode	1 Byte
Parameter Length	2 Bytes
Initiate_UUID_Data_Type	1 Byte
Initiate_UUID_Value	2 Bytes / 4 Bytes / 16 Bytes
Accept_UUID_Data_Type	1 Byte
Accept_UUID_Value	2 Bytes / 4 Bytes / 16 Bytes

ServiceID: 0xE5
OpCode: 0x20
Parameter Length: 0x0006 - 0x0022

Parameters:

Parameters	**Parameter Description**	**Value**
Initiate_UUID_Data_Type	UUID data type for initiation.	
	− UUID16	0x19
	− UUID32	0x1A
	− UUID128	0x1C
Initiate_UUID_Value	UUID value for initiate connection.	(Note)
Accept_UUID_Data_Type	UUID data type for acceptance.	
	− UUID16	0x19
	− UUID32	0x1A
	− UUID128	0x1C
Accept_UUID_Value	UUID value for accept connection	(Note)

(Note)The UUID_Value should be enter with big-endian.
For example 0x12345678 (UUID32): 0x12, 0x34, 0x56, 0x78

TCU_SPP_UUID_ASSIGN_RESP

This response is generated when UUID setting is complete by TCU_SPP_UUID_ASSIGN_REQ command.

Command Format:

ServiceID	1 Byte
OpCode	1 Byte
Parameter Length	2 Bytes
Status	1 Byte

ServiceID: 0xE5
OpCode: 0xA0
Parameter Length: 0x0001

Parameters:

Parameters	Parameter Description	Value
Status	Result	
	− Success	0x00
	− Parameter Failure	0x01
	− No Device Initialization	0x03
	− Setup SPP	0x40

Response time from command to Event

Command (TCU_SPP_XXX)	Description	Maximum respond time(s)
CONNECT_REQ TCU_MNG_CONNECTION_ STATUS_EVENT (Connected)	UnSniff/UnPark time	4
	Complete ACL connection	35
	SUM	**39**
CONNECT_REQ CONNECT_EVENT	SPP connection timer (including unSniff/UnPark time)	70
	SUM	**70**
DISCONNECT_REQ DISCONNECT_EVENT	SPP disconnection timer (including unSniff/UnPark time)	5
	SUM	**5**
DATA_SEND_REQ DATA_SEND_EVENT	UnSniff/UnPark time left: normal maximum time Right unSniff/Park timer	4
	SUM	**4**

Vendor Specific Commands

Following table shows the Vendor Specific Command Interface ServiceID and OpCode list.

ServiceID	OpCode	Description
0xEF	0x0D	TCU_VEN_SET_GPIO_WRITE_REQ
0xEF	0x8D	TCU_VEN_SET_GPIO_WRITE_RESP
0xEF	0x0E	TCU_VEN_SET_GPIO_PULSE_REQ
0xEF	0x8E	TCU_VEN_SET_GPIO_PULSE_RESP
0xEF	0x0F	TCU_VEN_SET_HOST_WAKEUP_NOTIFICATION_REQ
0xEF	0x8F	TCU_VEN_SET_HOST_WAKEUP_NOTIFICATION_RESP

TCU_VEN_SET_GPIO_WRITE_REQ

This command is used to set GPIO output data.
Command Format:

ServiceID	1 Byte
OpCode	1 Byte
Parameter Length	2 Bytes
Trace Type	5 Bytes

ServiceID: 0xEF
OpCode: 0x0D
Parameter Length: 0x0002

Parameters:

Parameters	**Parameter Description**	**Value**
Port	GPIO select	
	-GPIO Number	0x00-0x12
Value	GPIO output data	
	-L output	0x00
	-H outout	0x01

TCU_VEN_SET_GPIO_WRITE_RESP

This is an ACK response for TCU_VEN_SET_GPIO_WRITE_REQ.

Command Format:

ServiceID	1 Byte
OpCode	1 Byte
Parameter Length	2 Bytes
Status	1 Byte

ServiceID: 0xEF
OpCode: 0x8D
Parameter Length: 0x0001

Parameters:

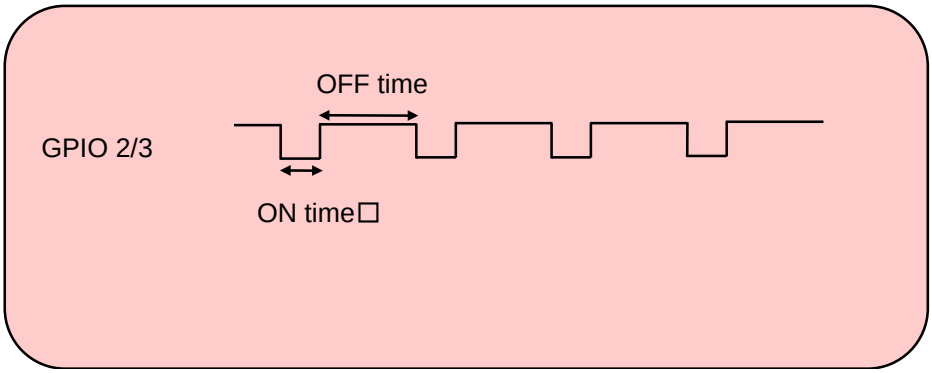
Parameters	**Parameter Description**	**Value**
Status	TCU_VEN_SET_GPIO_WRITE_REQ operation result.	
	- Successful.	0x00
	- Parameter Failure.	0x01
	- No Device Initialization.	0x03

TCU_VEN_SET_GPIO_PULSE_REQ

This command is used to set GPIO pulse output.

Command Format:

ServiceID	1 Byte
OpCode	1 Byte
Parameter Length	2 Bytes
Trace Type	5 Bytes



ServiceID: 0xEF
OpCode: 0x0E
Parameter Length: 0x0005

Parameters:

Parameters	Parameter Description	Value
Port	Port select	
	-GPIO2	0x00
	-GPIO3	0x01
ON time	L level output time.(Unit:10ms)	
	-STOP. (H output)	0x0000
	-ACTIVE (Range: 10ms-9990ms)	0x0001-0x03E7
OFF time	H level output time.(Unit:10ms)	
	-STOP. (H output)	0x0000
	-ACTIVE (Range: 10ms-9990ms)	0x0001-0x03E7

TCU_VEN_SET_GPIO_PULSE_RESP

This is an ACK response for TCU_VEN_SET_GPIO_PULSE_REQ.

Command Format:

ServiceID	1 Byte
OpCode	1 Byte
Parameter Length	2 Bytes
Status	1 Byte

ServiceID: 0xEF
OpCode: 0x8E
Parameter Length: 0x0001

Parameters:

Parameters	Parameter Description	Value
Status	TCU_VEN_SET_GPIO_PULSE_REQ operation result.	
	- Successful.	0x00
	- Parameter Failure.	0x01
	- No Device Initialization.	0x03

TCU_VEN_SET_HOST_WAKEUP_NOTIFICATION_REQ

Wakeup signal notification from the Host.

Command Format:

ServiceID	1 Byte
OpCode	1 Byte
Parameter Length	2 Bytes
Mode	1 Byte

ServiceID: 0xEF
OpCode: 0x0F
Parameter Length: 0x0001

Parameter:

Parameters	**Parameter Description**	**Value**
Mode	Host Wakeup(GPIO4)Control.	
	- Disable	0x00
	- Enable	0x01

TCU_VEN_SET_HOST_WAKEUP_RESP

This is an ACK response for TCU_VEN_SET_HOST_WAKEUP_NOTIFICATION_REQ.

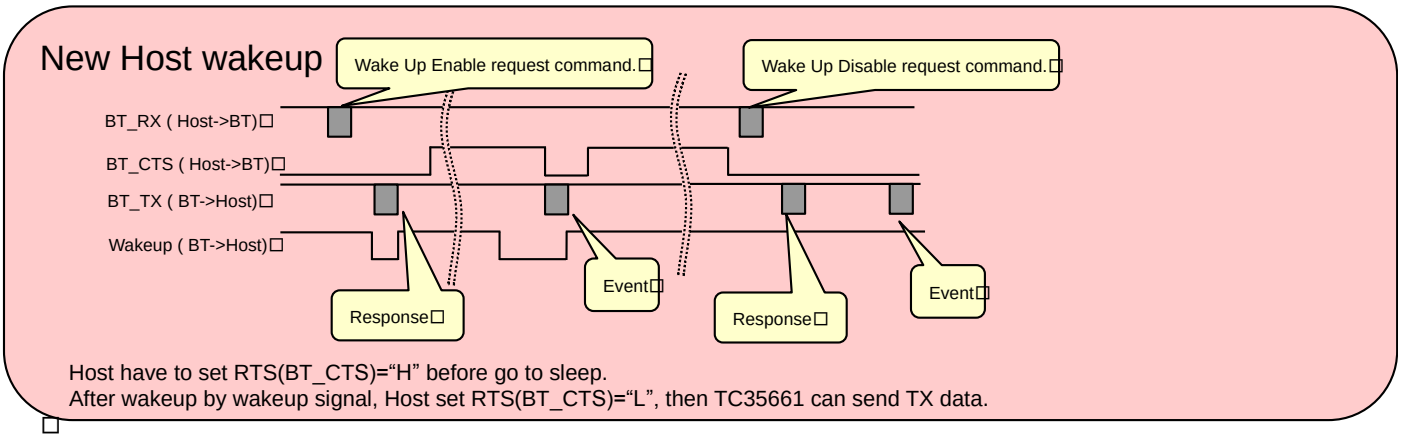
Command Format:

ServiceID	1 Byte
OpCode	1 Byte
Parameter Length	2 Bytes
Status	1 Byte

ServiceID: 0xEF
OpCode: 0x8F
Parameter Length: 0x0001

Parameters:

Parameters	**Parameter Description**	**Value**
Status	TCU_VEN_SET_HOST_WAKEUP_REQ operation result.	
	- Successful.	0x00
	- Parameter Failure.	0x01
	- No Device Initialization.	0x03



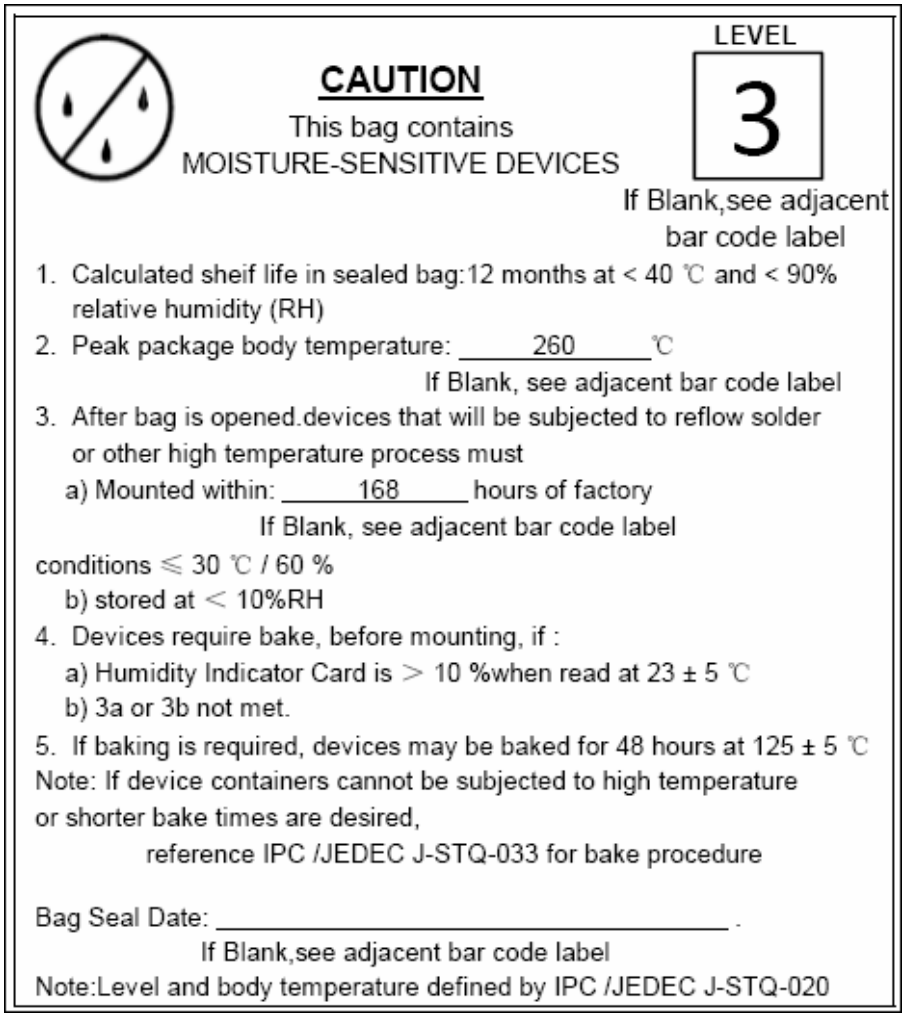
Host have to set RTS(BT_CTS)="H" before go to sleep.
After wakeup by wakeup signal, Host set RTS(BT_CTS)="L", then TC35661 can send TX data.

Timer specification

Maximum response time from REQ to RESP

Following table shows maximum response time from REQ to RESP

Command Name	msec
TCU_VEN_SET_GPIO_WRITE_REQ	100
TCU_VEN_SET_GPIO_PULSE_REQ	100
TCU_VEN_SET_HOST_WAKEUP_NOTIFICATION_REQ	100



The module **MUST** go through 125°C baking for at least 9 hours before SMT AND IR reflow process!

LABEL OF THE END PRODUCT:
The final end product must be labeled in a visible area with the following “Contains Transmitter Module FCC ID: 2AATFMB400EL” or “Contains FCC ID: 2AATFMB400EL” must be used.

If the size of the end product is larger than 8x10cm, then the following FCC part 15.19 statement has to also be available on the label:

This device complies with Part 15 of the **FCC** Rules. Operation is subject to the following two conditions:
(1) this device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.

IMPORTANT NOTE:

FCC Radiation Exposure Statement:

This equipment complies with FCC/IC radiation exposure limits set forth for an uncontrolled environment and is safe for intended operation as described in this manual.

This device is intended only for OEM integrators under the following conditions:

1) The transmitter module may not be co-located with any other transmitter or antenna

As long as condition above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.)

IMPORTANT NOTE: In the event that these conditions do not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID could not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

Manual Information To the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.
The end user manual shall include all required regulatory information / warning as show in this manual.