Bluetooth® Module

EYSMACAXX Series (RF+Baseband (Class 2))

Data Report

Part Number (EYSMACAXX) is modified for mass production.
Please ask for the detail from the local sales office.

In case you adopt this module and design some appliance, please ask for the latest specifications from the local sales office.

We wish the customer to request the Specification Report when the design for the mass production begins because the content of this Data Report might change without a previous notice to the customer.

The ***Bluetooth***® word mark and logos are owned by the ***Bluetooth*** SIG, Inc. and any use of such marks by TAIYO YUDEN CO., LTD. is under license.

Document constituent list

Control name	Control No.	Document Page
General Items	HD-AG-A080180	1/3 - 3/3
Absolute maximum ratings	HD-AM-A080180	1/1
Electrical characteristics	HD-AE-A080180	1/6 - 6/6
Electrical characteristics	HD-AE-B080180	1/2 - 2/2
Electrical characteristics	HD-AE-C080180	1/11 - 11/11
Electrical characteristics	HD-AE-D080180	1/11 - 11/11
Block Diagram	HD-MC-A080180	1/1
Outline / Appearance	HD-AD-A080180	1/1
Outline / Appearance	HD-AD-B080180	1/1
Pin Layout	HD-BA-A080180	1/2 – 2/2
Reflow Profile	-	1/1

Rev. record
9-Dec.-2008> Ver.0.1 Draft
15-Jan.-2009> Ver.0.2
30-Jan.-2009> Ver.0.3
16-Jun.-2009> Ver.0.4
2-Mar.-2010> Ver.1.0
15-Feb.-2013> Ver.1.1

Control No.	Control name
HD-AG-A080180 (1/3)	General Items

Scope

This specification ("Specification") applies to the hybrid IC "**EYSMACA**" for use ***Bluetooth***® module ("Product") manufacture by TAIYO YUDEN Co., Ltd. ("TAIYO YUDEN")

1. Part Number: EYSMACAXX (UART/PCM I/F Support)
   Digit3: Customer Code ex) S: TAIYO YUDEN Standard
   Digit8: Hardware Code ex) X: TAIYO YUDEN Standard
   Digit9: Software Code ex) X: TAIYO YUDEN Standard
   *** Part Number may be modified for mass production or other cases.**
   Please see "m" for more information.
2. Function: Radio frequency transfer Module (power class 2). ***Bluetooth***® standard Ver 2.1+EDR conformity
3. Application: Laptop PC, PC peripheral, Handy terminal
4. Structure: Hybrid IC loaded with silicon monolithic semiconductor
5. Outline: 39 pin leadless chip carrier
6. Marking: BD address, Lot and TAIYO YUDEN on shielding case.
7. Features:
   -***Bluetooth***® 2.1+EDR conformity
   -Interface: UART/PCM
   -Encryption
   -Hold, Sniff and Park Mode
   -Supported Link Type: ACL links (Piconet<7>), (e)SCO links (Piconet<3>)
   -AFH
   -EDR (Enhanced Data Rate)
8. Packing: Tray
   Packaging method: Tray & aluminum moisture barrier bag
   Packaging unit: 2860 pieces/tray
9. Terminal: 39 pin leadless chip carrier
10. Mount: SMD Type
11. Notes:
    a. Any question arising from this Specification shall be solved through mutual discussion by the parties hereof.
    b. This Product is not designed for radiation durable and should not be used under the circumstance of radiation.
    c. The operating conditions of this Product are as shown in this Specification. Please note that TAIYO YUDEN shall not be liable for a failure and/or abnormality which is caused by use under the conditions other than the operating conditions hereof.
    d. This Product mentioned in this Specification is manufactured for use in Laptop PC. Before using this Product in any special equipment (such as medical equipment, space equipment, air craft, disaster prevention equipment), where higher safety and reliability are duly required, the applicability and suitability of this Product must be fully evaluated by the customer at its sole risk to ensure correct and safety operation of those special equipments. Also, evaluation of the safety function of this Product even for use in general electronics equipment shall be thoroughly made and when necessary, a protective circuit shall be added in design stage, all at the customer's sole risk.
    e. TAIYO YUDEN warrants only that this Product is in conformity with this Specification for one year after purchase and shall in no event give any other warranty.

f. The warranty period shall be one year.

g. Communication between this Product and others might not be established nor maintained depending upon radio environment or operating conditions of this Product and other ***Bluetooth***® products.

h. This Product is designed for use in products which comply with ***Bluetooth***® Specifications (Ver 2.1+EDR) ("Bluetooth Specifications"). TAIYO YUDEN disclaims and is not responsible for any liability concerning infringement by this Product under any intellectual property right owned by third party in case the customer uses this Product in any product which does not comply with Bluetooth Specifications (the "non-complying products"). Furthermore, TAIYO YUDEN warrants only that this Product complies with this Specification and does not grant any other warranty including warranty for application of the non-complying products.

i. TAIYO YUDEN dose not render updating or upgrading service for the firmware in the Module.

j. In order to take tests for getting the certification of each country's Radio Law with a device incorporating this module, it is necessary to make the software in Host to put the module into test condition. Please contact TAIYO YUDEN for farther details.

k. Please evaluate adequately our module incorporated to your products before mass production.

l. This Product operates in the unlicensed ISM band at 2.4GHz. In case this Product is used around the other wireless devices which operate in same frequency band of this Product, there is a possibility that interference occurs between this Product and such other devices. If such interference occurs, please stop the operation of other devices or relocate this Product before using this Product or do not use this Product around the other wireless devices.

m. Part Number Modification Notice (***Bluetooth***® Modules)

Part numbers for sample modules or part numbers you see in this Specification are TAIYO YUDEN standard part numbers. In case of modification made to any modules, to meet requested specifics, the part number will carry a different part number, due to forfeit originality. Additionally, part numbers may be modified based on mass production stage, ***Bluetooth***® logo Qualification stage, or other related stages.

Please see the following examples for cases that User's Code are modified:

- for specific firmware version (our standard item firmware will be upgraded occasionally)
- for specific BD address (our standard item BD address is owned by TAIYO YUDEN)
- for different baud rate (our standard is 115.2kbps and partly1Mbps)
- for specific PnP (Plug and Play) IDs (our standard item PnP IDs are owned by TAIYO YUDEN or chip manufacture)
- for other related cases (specific or different setting, form, sizes, or display etc..)

In case you have applied for ***Bluetooth***® Qualification with our standard User's Code without previous notice to TAIYO YUDEN, we shall not be responsible for any expense that will be required to change its name/number.

n. Containment of hazardous substance in this Product

*Pb (Lead) : Non use

* This product conforms to RoHS Directive(2002/95/EC).

p. In addition when this Product is used under environmental conditions such as over voltage which are not guaranteed ,it may be destroyed in short mode. To ensure the security of customer's product, please add an extra fuse or/and a protection circuit for over voltage.

q. In some cases, TAIYO YUDEN may use replacements as component parts of Products. Such replacement shall apply only to component part of Products, which TAIYO YUDEN deems it possible to replace or substitute according to (i) Scope provided in this Specification (e.g. Official Standard (Type Approvals, Bluetooth LOGO etc.)) and (ii) Quality of Products. TAIYO YUDEN also ensures traceability of such replacement on production lot basis.

r. Do not alter Hardware and/or Software of this Product.
Please note that TAIYO YUDEN shall not be liable for any problem if it is caused by customer's alteration of Hardware or/and Software without Taiyo Yuden's prior approvals.

This module is still under development, thus specifications do not guarantee both the quality and reliability at the time of shipment. Since the specifications and mass production of the module are not confirmed either, the contents of the technical notes are subject to change without any prior notice.

Control No.	Control name
HD-AM-A080180 (1/1)	Absolute maximum ratings

Absolute maximum ratings

Item	Symbol	Rating				Remark
		Min.	Typ.	Max.	Unit	
Supply voltage	VDD_PIO, VDD_USB	-0.4		3.7	V	Ta=25 degrees C, GND reference
	VREG_IN	-0.4		5.6	V	
Input voltage	Vin	-0.3		VDD+0.3	V	I/O terminals except USB interface

Recommendation operating range

Item	Symbol	Rating				Remark
		Min.	Typ.	Max.	Unit	
Supply voltage	VDD_PIO	1.7	3.3	3.6	V	
	VDD_USB	1.7	3.3	3.6	V	
	VREG_IN	2.2	-	4.2	V	
Supply voltage ripple and spike noise	VDD_rn			30	mVp-p	Note 1
Operation temperature range	Topr	-20	25	75	Degrees C	Humidity=40%RH Note 2
Storage temperature range	Tstg	-30	25	85	Degrees C	Humidity=40%RH Note 3

Notes:

1. To fill the standard of “Supply voltage ripple and spike noise”, the capacitor, which has the capacity of 2.2uF or more, should be put in the terminal VDD outside as a bypass capacitor.
2. Operating temperature range is set to satisfy products electrical characteristics in the short term.
   In terms of product life cycle when it is used in condition of varying from TYP standard in the long term, please refer to the reliability condition.
3. Storage temperature range is the condition for transportation and storage in temporary.

Electrical characteristic

DC Specifications

The Specification applies for Topr.= 25 degrees C, VDD_PIO=VDD_USB=VREG_IN=3.3V

No.	Parameter	Condition	Symbol	Min.	Typ.	Max.	Unit	Remark
1	Normal supply voltage 1		VDD_PIO	1.7	3.3	3.6	V	
2	Normal supply voltage 2		VDD_USB	1.7	3.3	3.6	V	
3	Normal supply voltage 3		VREG_IN	2.2	-	4.2	V	
4	Input Low Voltage 1	/RESET, PIOX, PCM_IN, PCM_SYNC, PCM_CLK, UART_CTS, UART_RX	VIL1	0		0.8	V	
5	Input Low Voltage 2	USB_DP, USB_DN	VIL2	-		0.8	V	
6	Input High Voltage 1	/RESET, PIOX, PCM_IN, PCM_SYNC, PCM_CLK, UART_CTS, UART_RX	VIH1	0.7xVDD		VDD+0.3	V	
7	Input High Voltage 2	USB_DP, USB_DN	VIH2	2.0		-	V	
8	Output Low Voltage 1	PIOX, PCM_OUT, PCM_SYNC, PCM_CLK, UART_TX, UART_RTS	VOL1	-		0.4	V	IOL=4mA
9	Output Low Voltage 2	USB_DP, USB_DN	VOL2	-		0.3	V	
10	Output High voltage 1	PIOX, PCM_OUT, PCM_SYNC, PCM_CLK, UART_TX, UART_RTS	VOH1	VDD-0.4		-	V	IOH=-4mA
11	Output High voltage 2	USB_DP, USB_DN	VOH2	2.8		-	V	
12	Peak current	Continuous Rx	Iccp1		40	120	mA	Notes 3, 4
13	Average current1	Sniff mode (Slave only)	Icca1		6	-	mA	Notes 1, 3, 4
14	Average current2	Standby mode	Icca2		2	-	mA	Notes 3, 4
15	Average current3	Send DM1packet (Master)	Icca3		36	-	mA	Notes 3, 4
16	Average current4	Receive DM1packet (Slave)	Icca4		35	-	mA	Notes 3, 4
17	Average current5	Hold mode (Slave only)	Icca5		2	-	mA	Notes 3, 4
18	Average current6	Park mode (Slave only)	Icca6		3	-	mA	Notes 2, 3, 4

Notes:

1. Sniff mode parameter. Max interval 0050h
   Min interval 0010h
   Attempt 0005h
   Timeout 0005h
2. Park mode parameter. Max interval 0100h
   Min interval 0010h
3. The consumption current might fluctuate with the condition of radio communication, host performance and test circuit.
4. The value may fluctuate several (mA) depending on Firmware version.

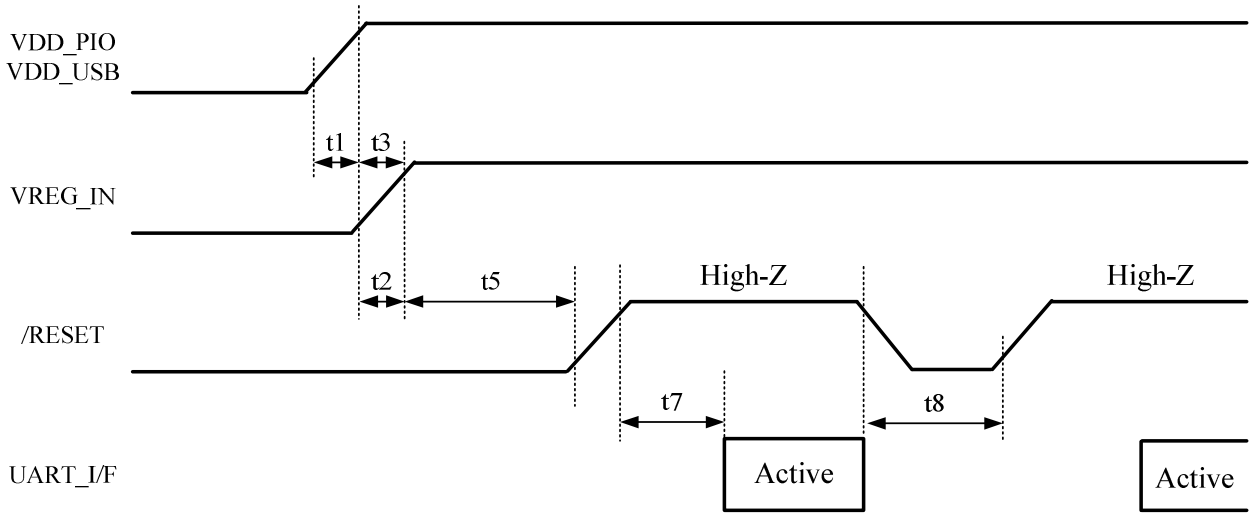
AC Specifications (UART)

The Specification applies for Topr.= 25 degrees C, VDD_PIO=VDD_USB=VREG_IN=3.3V

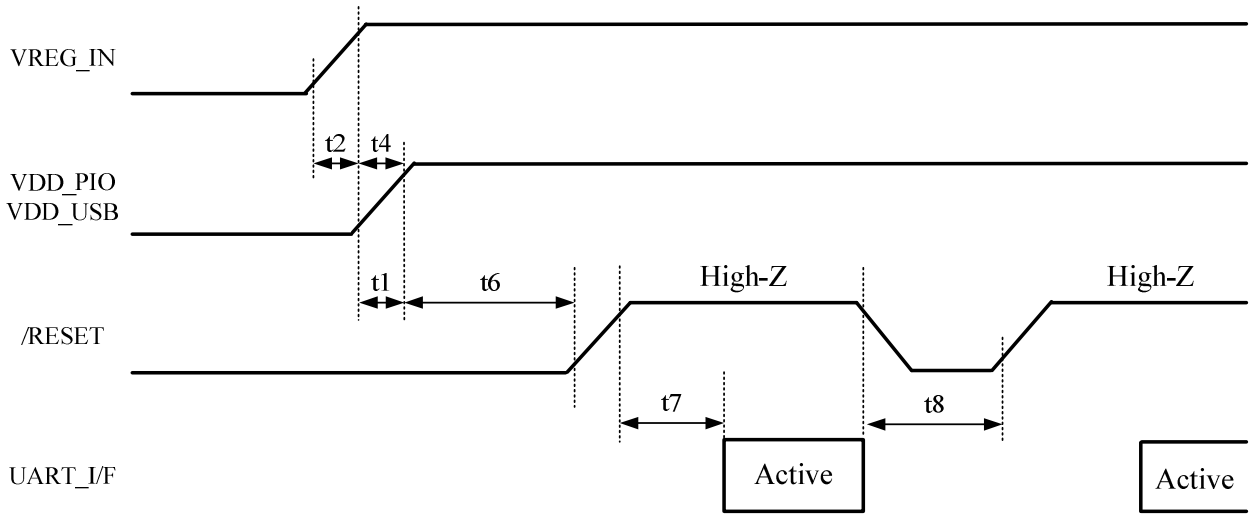
No.	Parameter	Condition	Symbol	Min	Typ	Max	Unit	Remark
1	VDD_PIO, VDD_USB Rise Time from 0V to 3.0V		t1	0		2	ms	
2	VREG_IN Rise Time from 0V to 3.0V		t2	0		2	ms	
3	VDD_PIO, VDD_USB high to VREG_IN high		t3	0		2	ms	
4	VREG_IN high to VDD_PIO, VDD_USB high		t4	0		2	ms	
5	VREG_IN high to /RESET high		t5	10			ms	Notes 1, 2
6	VDD_PIO, VDD_USB high to /RESET high		t6	10			ms	Notes 1, 2
7	/RESET high to Module Ready		t7		(1000)	3000	ms	Notes 3, 4, 5
8	/RESET pulse width		t8	6			ms	
9	/RESET low to VDD_PIO, VDD_USB low		t9	0		2	ms	
10	VDD_PIO, VDD_USB low to VREG_IN low		t10	0		2	ms	
11	/RESET low to VRE_IN low		t11	0		2	ms	
12	VREG_IN low to VDD_PIO, VDD_USB low		t12	0		2	ms	

Notes:

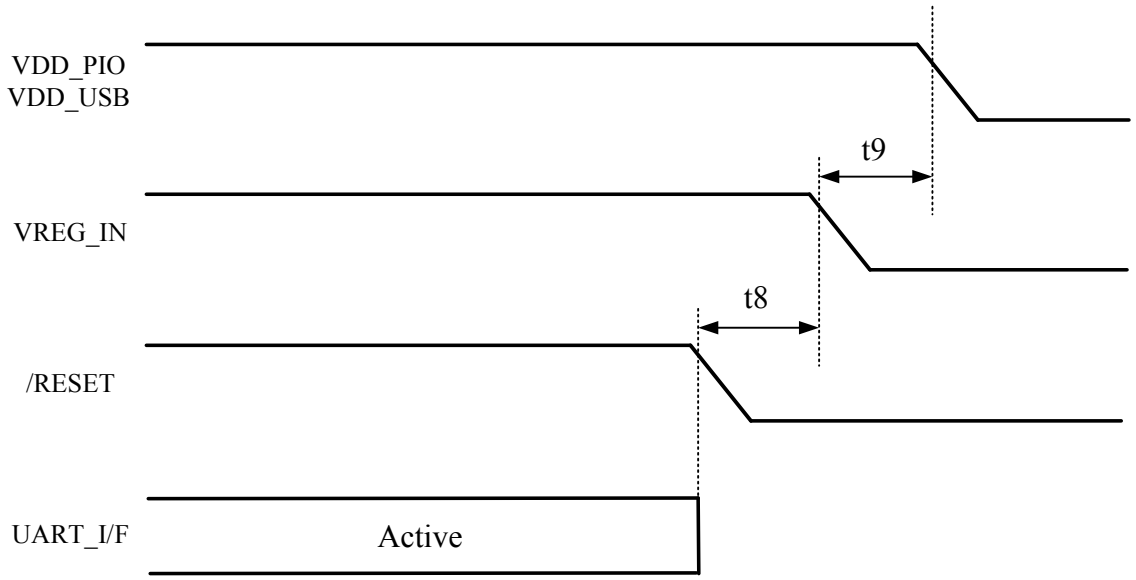
1. This module has an internal flash memory and a function to erase/sort unnecessary data if certain HCI commands are issued and consume more than a certain level of free space in the EEPROM. This operation occurs at every module initialization (power-on).
   If supply voltage becomes non-defined states during initialization or writing in EEPROM, data in EEPROM might be destroyed. If the data in EEPROM is destroyed, module will not work correctly. Therefore please be sure to stabilize power source before /RESET release.
   In addition please design module peripheral circuits to avoid temporary blackout of power source during operation. Please refer HD-AE-C080180 for HCI command which rewrites flash memory data.
2. Input /RESET signal of 10ms and more in condition of VDD at over 3.0V.
3. When the module is ready to accept the command, its module outputs the “04 0F 04 00 01 00 00” (Hex) to the UART TX Data Line. After that, please access to the module.
4. The Typ. is a reference value. The value may change depending on the firmware version, conditions of use and types of flash memory.
5. It may change due to the firmware version.



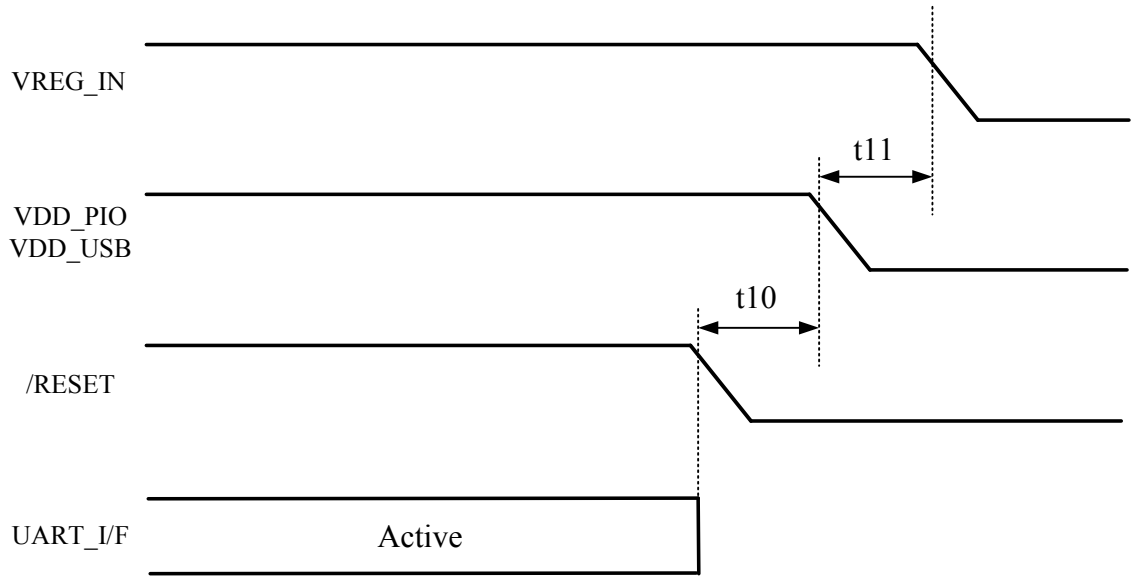
Timing Diagram for Power Up Sequence 1



Timing Diagram for Power Up Sequence 2



Timing Diagram for Power Down Sequence 1



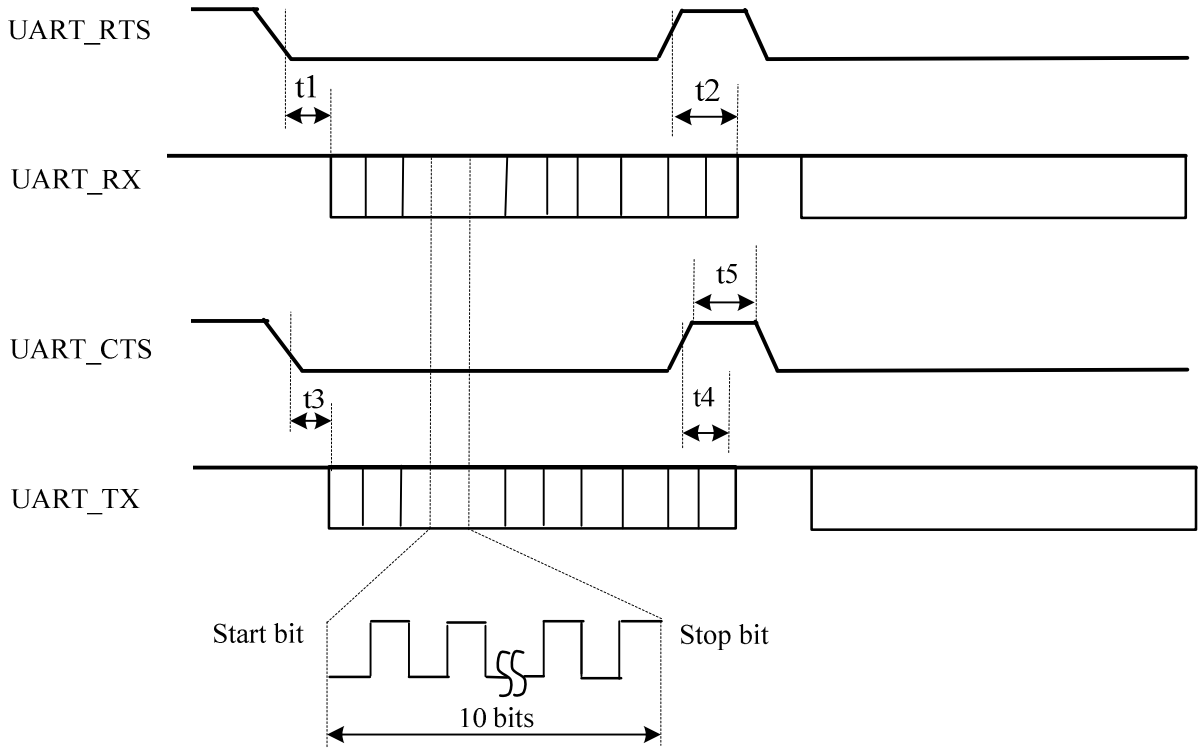
Timing Diagram for Power Down Sequence 2

AC Specifications

UART Interface

The Specification applies for Topr.= 25 degrees C, VDD_PIO=VDD_USB=VREG_IN=3.3V

No.	Parameter	Condition	Symbol	Min	Typ	Max	Unit	Remark
1	RTS Low to RX Data On		t1	0			ms	
2	RTS High to RX Data Off		t2			1	byte	
3	CTS Low to TX Data On		t3	0			ms	
4	CTS High to TX Data Off		t4			2	byte	
5	CTS High Pulse Width		t5	4			bit	



Timing Diagram for UART signals

<UART Parameters>

Item	Parameter
Baud Rate	115.2kbps, see Note
Date Bits	8bits
Stop Bits	1bit
Parity	None
Flow Control	CTS/RTS

PCM Interface

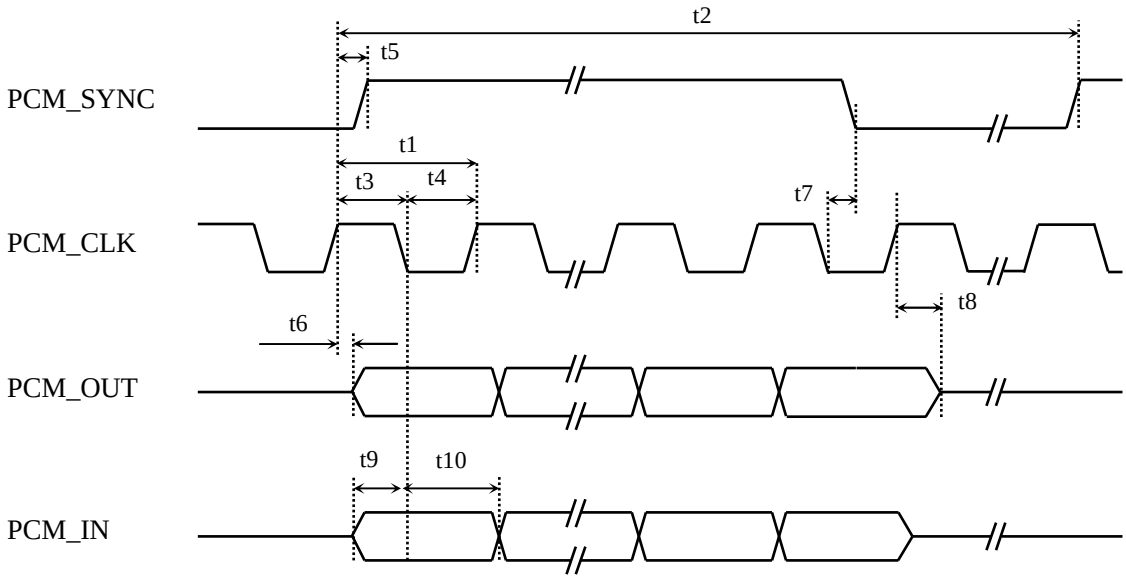
Support CODEC: MC145483 (MOTOROLA)

Please contact TAIYO YUDEN if you want to use the other CODEC.

AC Specifications

The Specification applies for Topr.= 25 degrees C, VDD_PIO=VDD_USB=VREG_IN=3.3V

No.	Parameter	Condition	Symbol	Min	Typ	Max	Unit	Remark
1	PCM_CLK Frequency		t1	-	256	-	kHz	
2	PCM_SYNC Frequency		t2	-	8	-	kHz	
3	PCM_CLK High		t3	980			ns	
4	PCM_CLK Low		t4	730			ns	
5	Delay time from PCM_CLK High to PCM_SYNC High		t5			20	ns	
6	Delay time from PCM_CLK High to valid PCM_OUT		t6			20	ns	
7	Delay time from PCM_CLK Low to PCM_SYNC Low (Long Frame SYNC only)		t7			20	ns	
8	Delay time from PCM_CLK High to PCM_OUT invalid		t8			20	ns	
9	Setup time for PCMIN valid to PCM_CLK Low		t9	30			ns	
10	Hold time for PCM_CLK Low to PCM_IN valid		t10	10			ns	



SPI Interface

This module does not support SPI Interface.

RF Specifications at Basic Rate

The Specification applies for Ta=25 degrees C, VDD_PIO=VDD_USB=VREG_IN=3.3V

No.	Parameter	Condition	Symbol	Min	Typ	Max	Unit	Remark
1	Frequency band		FREQ	2400		2483.5	MHz	
2	Tx power		PO	-6	0	+4	dBm	
3	Modulation characteristics 1	dF1: F0(11110000)	M1	140		175	kHz	
4	Modulation characteristics 2	dF2: AA(10101010)	M4	115			kHz	
5	Modulation characteristics 3	dF2/dF1	MC	0.8				
6	In-band spurious emission 2	2MHz(|M-N|=2)	ISE1			-20	dBm	
7	In-band spurious emission 3	3MHz or greater (|M-N|>=3)	ISE2			-40	dBm	
8	Initial Carrier Frequency		ICF	-75		+75	kHz	
9	Frequency Drift 1	DH1	FD1	-25		+25	kHz	
10	Frequency Drift 2	DH3,DH5	FD2	-40		+40	kHz	
11	Drift rate	DH1,DH3,DH5	DR			400	Hz/us	
12	C/I co-channel		CIC			11	dB	-60dBm
13	C/I 1MHz		CI1			0	dB	-60dBm
14	C/I 2MHz		CI2			-30	dB	-60dBm
15	C/I >= 3MHz		CI3			-40	dB	-67dBm
16	C/I Image		CI4			-9	dB	-3MHz offset -67dBm
17	C/I Image +/- 1MHz		CI5			-20	dB	-67dBm
18	Out-of-Band Blocking 1	30MHz to 2000MHz f=2460MHz	OBB1			-10	dBm	BER<=0.1 %
19	Out-of-Band Blocking 2	2000 to 2399MHz f=2460MHz	OBB2			-27	dBm	BER<=0.1 %
20	Out-of-Band Blocking 3	2484 to 3000MHz f=2460MHz	OBB3			-27	dBm	BER<=0.1 %
21	Out-of-Band Blocking 4	3000MHz to 12.75GHz f=2460MHz	OBB4			-10	dBm	BER<=0.1 %
22	Maximum Input Level		MAXP	-20			dBm	BER<=0.1 %
23	20dB Bandwidth		B20			1	MHz	
24	Sensitivity-single	DH1	SEN1			-70	dBm	BER<=0.1 %
25	Sensitivity-multi	DH3,DH5	SEN2			-70	dBm	BER<=0.1 %

RF Specifications at EDR

The Specification applies for Ta=25 degrees C, VDD_PIO=VDD_USB=VREG_IN=3.3V

No.	Parameter	Condition	Symbol	Min	Typ	Max	Unit	Remark
1	RMS DEVM 1	Pai/4DQPSK	RDE1			0.20		
2	RMS DEVM 2	8DPSK	RDE2			0.13		
3	Peak DEVM 1	Pai/4DQPSK	PDE1			0.35		
4	Peak DEVM 2	8DPSK	PDE2			0.25		
5	99% DEVM 1	Pai/4DQPSK	D991			0.30		
6	99% DEVM 2	8DPSK	D992			0.20		
7	EDR In-band spurious emission 1	|M-N|=1	EISE1	26			dB	
8	EDR In-band spurious emission 2	|M-N|=2	EISE2			-20	dBm	
9	EDR In-band spurious emission 3	|M-N|=3	EISE3			-40	dBm	
10	EDR Initial Carrier Frequency		EICF	-75		+75	kHz	
11	EDR Drift		ED	-10		+10	kHz	
12	Relative transmit power	PDPSK	RTP	PGFSK -4		PGFSK +1	dB	
13	Actual Sensitivity Level	2-DH5(3-DH5) 16000000bit	ESEN			-70	dBm	BER= 10^{-4}
14	BER Floor Performance	2-DH5(3-DH5) 160000000bit	FSEN			-60	dBm	BER= 10^{-5}
15	C/I co-channel	2-DH5	2CIC			13	dB	-60dBm
16	C/I 1MHz	2-DH5	2CI1			0	dB	-60dBm
17	C/I 2MHz	2-DH5	2CI2			-30	dB	-60dBm
18	C/I >= 3MHz	2-DH5	2CI3			-40	dB	-67dBm
19	C/I Image	2-DH5	2CI4			-7	dB	-67dBm -3MHz offset
20	C/I Image +/- 1MHz	2-DH5	2CI5			-20	dB	-67dBm
21	C/I co-channel	3-DH5	3CIC			21	dB	-60dBm
22	C/I 1MHz	3-DH5	3CI1			5	dB	-60dBm
23	C/I 2MHz	3-DH5	3CI2			-25	dB	-60dBm
24	C/I >= 3MHz	3-DH5	3CI3			-33	dB	-67dBm
25	C/I Image	3-DH5	3CI4			0	dB	-67dBm -3MHz offset
26	C/I Image +/- 1MHz	3-DH5	3CI5			-13	dB	-67dBm
27	Maximum Input Level	2-DH5(3-DH5)	EMAXP	-20			dBm	

Note:

Bluetooth® standard Ver 2.1+EDR conformity

Supported HCI Commands / HCI Events

The ***Bluetooth***® functions of this module is as written in the attached PICS. Depending on firmware version Upgrade, the ***Bluetooth***® functions are subject to change without notice.

HCI COMMAND LIST Firmware Version 23C (Build4839)

Command Description	OpCode	Group (Hex)	Command (Hex)	Parameters	Returns	Status	Notes
Device Setup							
HCI _Reset	0x0C03	3	3		States	Yes	
Controller Flow Control							
HCI _Read _Buffer _Size	0x1005	4	5		Status HC ACL Data Packet Length HC Synchronous Data Packet Length HC Total Num ACL Data Packets HC Total Num Synchronous Data Packets	Yes	
Controller Information							
HCI _Read _Local _Version _ Information	0x1001	4	1		Status HCI Version HCI Revision LMP Version Manufacturer Name LMP Subversion	Yes	
HCI _Read _Local _Supported _Commands	0x1002	4	2		Status Supported Commands	Yes	
HCI _Read _Local _Supported _Features	0x1003	4	3		Status LMP Features	Yes	
HCI _Read _Local _Extended _Features	0x1004	4	4	Page number	Status Page number Maximum Page Number Extended LMP Features	Yes	
HCI _Read _BD _ADDR	0x1009	4	9		Status BD ADDR	Yes	
Controller Configuration							
HCI _Read _Local _Name	0x0C14	3	14		States	Yes	
HCI _Write _Local _Name	0x0C13	3	13	Local Name	States	Yes	
HCI _Read _Class _of _Device	0x0C23	3	23		States Class of Device	Yes	
HCI _Write _Class _of _Device	0x0C24	3	24	Class of Device	States	Yes	
HCI _Read _Number _Of _Support _IAC	0x0C38	3	38		States Num Support IAC	Yes	
HCI _Read _Current _IAC _LAP	0x0C39	3	39		States Num Current IAC IAC LAP [I]	Yes	
HCI _Write _Current _IAC _LAP	0x0C3A	3	3A	Num Current IAC IAC LAP [I]	States	Yes	
HCI _Read _Scan _Enable	0x0C19	3	19		States Scan Enable	Yes	
HCI _Write _Scan _Enable	0x0C1A	3	1A	Scan Enable	States	Yes	

Device Discover

HCI _Inquiry	0x0401	1	1	LAP Inquiry Length Num Responses		Yes	
HCI _ Inquiry_ Cancel	0x0402	1	2		Status	Yes	
HCI_ Periodic_ Inquiry _Mode	0x0403	1	3	Max Period Length Min Period Length LAP Inquiry Length Num Responses	Status	Yes	
HCI _Exit _Periodic _Inquiry _Mode	0x0404	1	4		Status	Yes	
HCI _Read _Inquiry _Scan _Activity	0x0C1D	3	1D		States Inquiry Scan Interval Inquiry Scan Window	Yes	
HCI _Write _Inquiry _Scan _Activity	0x0C1E	3	1E	Inquiry Scan Interval Inquiry Scan Window	States	Yes	
HCI _Read _Inquiry _Scan _Type	0x0C42	3	42		Status Scan Type	Yes	
HCI _Write _Inquiry _Scan _Type	0x0C43	3	43	Scan Type	Status	Yes	
HCI _Read _Inquiry _Mode	0x0C44	3	44		Status Inquiry Mode	Yes	
HCI _Write _Inquiry _Mode	0x0C45	3	45	Inquiry Mode	Status	Yes	
HCI_Read_Inquiry_Response _Transmit_Power_Level	0x0C58	3	58		Status TX_Power	Yes	
HCI_Write_Inquiry_Transmit_Power _Level	0x0C59	3	59	TX_Power	Status	Yes	
HCI_Read_Extended_Inquiry_ Response	0x0C51	3	51		Status FEC_Required Extended_Inquiry_ Response	Yes	
HCI_Write_Extended_Inquiry_ Response	0x0C52	3	52	FEC_Required Extended_Inquiry_ Response	Status	Yes	

Connection Setup

HCI _Create_ Connection	0x0405	1	5	BD ADDR Packet Type Page Scan Repetition Mode Reserved Clock Offset Allow Role Switch		Yes	
HCI _Accept _Connection _Request	0x0409	1	9	BD ADDR Role		Yes	
HCI _Reject _Connection _Request	0x040A	1	A	BD ADDR Reason		Yes	
HCI _Create _Connection _Cancel	0x0408	1	8	BD ADDR	Status BD ADDR	Yes	
HCI _Disconnect	0x0406	1	6	Connection Handle Reason Packet Type		Yes	
HCI _Read _Page _Timeout	0x0C17	3	17		States Page Timeout	Yes	
HCI _Write _Page _Timeout	0x0C18	3	18	Page Timeout	States	Yes	
HCI _Read _Page _Scan _Activity	0x0C1B	3	1B		States Page Scan Interval Page Scan Window	Yes	

HCI _Write _Page _Scan _Activity	0x0C1C	3	1C	Page Scan Interval Page Scan Window	States	Yes	
HCI _Read _Page _Scan _Type	0x0C46	3	46		States	Yes	
					Page_Scan_Type		
HCI _Write _Page _Scan_Type	0x0C47	3	47	Page_Scan_Type	States	Yes	
HCI_Read_Connection_ Accept_Timeout	0x0C15	3	15		Status Conn_Accept_Timeout	Yes	
HCI_Write_Connection_ Accept_Timeout	0x0C16	3	16	Conn_Accept_Timeout	Status	Yes	

Remote Information

HCI _Remote _Name_ Request	0x0419	1	19	BD ADDR Page Scan Repetition Mode Page Scan Mode Clock Offset		Yes	
HCI _Remote _Name _Request _Cancel	0x041A	1	1A	BD_ADDR	Status BD_ADDR	Yes	
HCI _Read _Remote _Supported _Features	0x041B	1	1B	Connection Handle		Yes	
HCI _Read _Remote _Extended _Features	0x041C	1	1C	Connection Handle Page_Number		Yes	
HCI _Read _Remote _Version _Information	0x041D	1	1D	Connection Handle		Yes	

Synchronous Connections

HCI _Setup _Synchronous _Connection	0x0428	1	28	Connection Handle Transmit Bandwidth Receive Bandwidth Max Latency Voice Setting Retransmission Effort Packet Type		Yes	
HCI _Accept _Synchronous _Connection _Request	0x0429	1	29	BD ADDR Transmit Bandwidth Receive Bandwidth Max Latency Content Format Retransmission Effort Packet Type		Yes	
HCI _Reject _Synchronous _Connection _Request	0x042A	1	2A	BD ADDR		Yes	
HCI _Read _Voice _Setting	0x0C25	3	25		States Voice Setting	Yes	
HCI _Write _Voice _Setting	0x0C26	3	26	Voice setting	States	Yes	
HCI_Write_Default_Erroneous_Data_Reporting	0x0C5B	3	5B	Erroneous_Data_Reporting	Status	No	
HCI_Read_Default_Erroneous_Data_Reporting	0x0C5A	3	5A		Status Erroneous_Data_ Reporting	No	

Control No.	Control name
HD-AE-C080180 (4/11)	Electrical characteristics

Connection State

HCI _Hold _Mode	0x0801	2	1	Connection Handle Hold Mode Max Interval Hold Mode Min Internal		Yes	
HCI _Sniff _Mode	0x0803	2	3	Connection Handle Sniff Max Interval Sniff Min Interval Sniff Attempt Sniff Timeout		Yes	
HCI _Exit _Sniff _Mode	0x0804	2	4	Connection Handle		Yes	
HCI _Park _State	0x0805	2	5	Connection Handle Beacon Max Interval Beacon Min Interval		Yes	
HCI _Exit _Park _State	0x0806	2	6	Connection Handle		Yes	
HCI _Read _Link _Policy _Settings	0x080C	2	C	Connection Handle	States Connection Handle Link Policy Settings	Yes	
HCI _Write _Link _Policy _Settings	0x080D	2	D	Connection Handle Link Policy settings	States Connection Handle	Yes	
HCI _Read _Default _Link _Policy _Settings	0x080E	2	E		Status Default Link Policy Settings	Yes	
HCI _Write _Default _Link _Policy_Settings	0x080F	2	F	Default Link Policy Settings	Status	Yes	
HCI _Read _Hold _Mode _Activity	0x0C2B	3	2B		States Hold Mode Activity	Yes	
HCI _Write _Hold _Mode _Activity	0x0C2C	3	2C	Hold Mode Activity	States	Yes	

Piconet Structure

HCI _Role _Discovery	0x0809	2	9	Connection Handle	Status Connection Handle Current Role	Yes	
HCI _Switch _Role	0x080B	2	B	BD ADDR Role		Yes	

Quality Service

HCI _Flow _Specification	0x0810	2	10	Connection Handle Flags Flow direction Service Type Token Rate Token Bucket Size Peak Bandwidth Access Latency		Yes	
HCI _QoS _Setup	0x0807	2	7	Connection Handle Flags Service Type Token Rate Peak Bandwidth Latency Delay Variation		Yes	
HCI _Flush	0x0C08	3	8	Connection Handle	States Connection Handle	Yes	
HCI _Read _Automatic _Flush _Timeout	0x0C27	3	27	Connection Handle	States Connection Handle Flush Timeout	Yes	

HCI _Write _Automatic _Flush_ Timeout	0x0C28	3	28	Connection Handle Flash Timeout	States Connection Handle	Yes	
HCI _Read _Failed _Contact _Counter	0x1401	5	1	Connection Handle	Status Connection Handle Failed Contact Counter	Yes	
HCI _Reset _Failed _Contact _Counter	0x1402	5	2	Connection Handle	Status Connection Handle	Yes	
HCI _Read _Num _Broadcast_ Retransmission	0x0C29	3	29		States	Yes	
HCI _Write _Num _Broadcast_ Retransmission	0x0C2A	3	2A	Num Broadcast Retransmission	States	Yes	
HCI_Enhanced_Flush	0x0C5F	3	5F	Connection_Handle Packet_Type Connection_Handle Maximum_Latency Minimum_Remote_ Timeout Minimum_Local_Timeout		Yes	

Physical Links

HCI _Read _Link _Supervision _Timeout	0x0C36	3	36	Connection Handle	States Connection Handle Link Supervision Timeout	Yes	
HCI _Write _Link _Supervision _Timeout	0x0C37	3	37	Connection Handle Link Supervision Timeout	States Connection Handle	Yes	
HCI Read _AFH _Channel _Assessment _Mode	0x0C48	3	48		Status AFH Channel Assessment Mode	Yes	
HCI Write _AFH _Channel _Assessment _Mode	0x0C49	3	49	AFH Channel Assessment Mode	Status	Yes	
HCI _Set _AFH _Host _Channel _Classification	0x0C3F	3	3F	AH Host Channel Classification	Status	Yes	
HCI _Change _Connection _Packet_Type	0x040F	1	F	Connection Handle Packet Type		Yes	

Host Flow Control

HCI _Host _Buffer _Size	0x0C33	3	33	Host ACL Data Packet Length Host SCO Data Packet Length Host Total Num ACL Data Packets Host Total Num SCO Data Packets	States	Yes	

HCI _Set _Event _Mask	0x0C01	3	1	Event Mask	States	Yes	
HCI _Set _Event _Filter	0x0C05	3	5	Filter Type Filter Condition Type Condition	States	Yes	
HCI _Set _Controller _To _Host _Flow _Control	0x0C31	3	31	Flow Control Enable	States	Yes	
HCI _Host _Number _Of _Completed _Packets	0x0C35	3	35	Number of Handles Connection handle [I] Host Num of Completed Packets [I]		Yes	
HCI _Read _Synchronous _Flow _Control _Enable	0x0C2E	3	2E		States Synchronous Flow Control Enable	Yes	
HCI _Write _ Synchronous _Flow _Control _Enable	0x0C2F	3	2F	Synchronous Flow Control Enable	States	Yes	

Link Information

HCI _Read _LMP _Handle	0x0420	1	20	Connection Handle	Status Connection Handle LMP_Handle Reseved	Yes	
HCI _Read _Transmit _Power _Level	0x0C2D	3	2D	Connection Handle Type	States Connection Handle Power Level	Yes	
HCI _Read _Link _Quality	0x1403	5	3	Connection Handle	Status Connection Handle Link Quality	Yes	
HCI _Read _RSSI	0x1405	5	5	Connection Handle	Status Connection Handle RSSI	Yes	
HCI _Read _Clock _Offset	0x041F	1	1F	Connection Handle		Yes	
HCI _Read _Clock	0x1407	5	7	Connection Handle Which Clock	Status Connection Handle Clock Accuracy	Yes	
HCI _Read _AFH _Channel _Map	0x1406	5	6	Connection Handle	Status Connection Handle AFH Mode AFH Channel Map	Yes	

Authentication and Encryption

HCI _Read _Authentication _Enable	0x0C1F	3	1F		States Authentication Enable	Yes	
HCI _Write _Authentication _Enable	0x0C20	3	20	Authentication Enable	States	Yes	
HCI _Read _Encryption _Mode	0x0C21	3	21		States Encryption Mode	Yes	
HCI _Write _Encryption _Mode	0x0C22	3	22	Encryption Mode	States	Yes	
HCI _Link _Key _Request _Reply	0x040B	1	B	BD ADDR Link Key	Status BD ADDR	Yes	
HCI _Link _Key _Request _Negative _Reply	0x040C	1	C	BD ADDR	Status BD ADDR	Yes	
HCI _PIN _Code _Request _Reply	0x040D	1	D	BD ADDR PIN Code Length PIN Code	Status BD ADDR	Yes	
HCI _PIN _Code _Request _Negative _Reply	0x040E	1	E	BD ADDR	Status	Yes	

HCI _Authentication _Requested	0x0411	1	11	Connection Handle		Yes	
HCI _Set _Connection _Encryption	0x0413	1	13	Connection Handle Encryption Enable		Yes	
HCI _Change _Connection _Link _Key	0x0415	1	15	Connection Handle		Yes	
HCI _Master _Link _Key	0x0417	1	17	Key Flag		Yes	
HCI _Read _PIN _Type	0x0C09	3	9		States PIN Type	Yes	
HCI _Write _PIN _Type	0x0C0A	3	A	PIN Type	States	Yes	
HCI _Read _Stored _Link _Key	0x0C0D	3	D	BD ADDR Read All Flag	States Max Num Keys Num Keys Read	Yes	
HCI _Write _Stored _Link _Key	0x0C11	3	11	Num Keys To Write BD ADDR [I] Link Key [I]	States Num Keys Written	Yes	
HCI _Delete _Stored _Link _Key	0x0C12	3	12	BD ADDR Delete All Flag	States Num Keys Deleted Local Name	Yes	
HCI _Create _New _Unit _Key	0x0C0B	3	B		States	Yes	
HCI_User_Confirmation_Request_ Reply	0x042C	1	2C	BD ADDR	Status	Yes	
HCI_User_Confirmation_Request_ Negative_Reply	0x042D	1	2D	BD ADDR	Status	Yes	
					BD ADDR		
HCI_User_Passkey_Request_Reply	0x042E	1	2E	BD ADDR	Status	Yes	
				Numeric_Value	BD ADDR		
HCI_User_Passkey_Request_ Negative_Reply	0x042F	1	2F	BD ADDR	Status	Yes	
					BD ADDR		
HCI_Remote_OOB_Data_Request_ Reply	0x0430	1	30	BD ADDR	Status	Yes	
				C (Hash C)	BD ADDR		
				R (Randomizer R)			
HCI_Remote_OOB_Data_Request_ Negative_Reply	0x0433	1	33	BD ADDR	Status	Yes	
HCI_Read_Local_OOB_Data	0x0C57	3	57		Status	Yes	
					C (Hash C)		
					R (Randomizer R)		
HCI_Write_Simple_Pairing_mode	0x0C56	3	56	Simple_Pairing_Mode	Status	Yes	
HCI_Read_Simple_Pairing_mode	0x0C55	3	55		Status	Yes	
					Simple_Pairing_Mode		
HCI_Refresh_Encryption_Key	0x0C53	3	53	Connection_Handle	Status	Yes	

Testing

HCI _Read _Loopback _Mode	0x1801	6	1		States Loopback Mode	Yes	
HCI _Write _Loopback _Mode	0x1802	6	2	Loopback Mode	Status	Yes	
HCI _Enable _Device _Under _Test_Mode	0x1803	6	3		Status	Yes	
HCI_Write_Simple_Pairing_ Debug_mode	0x1804	6	4	Simple_Pairing_Debug_ Mode	Status	Yes	

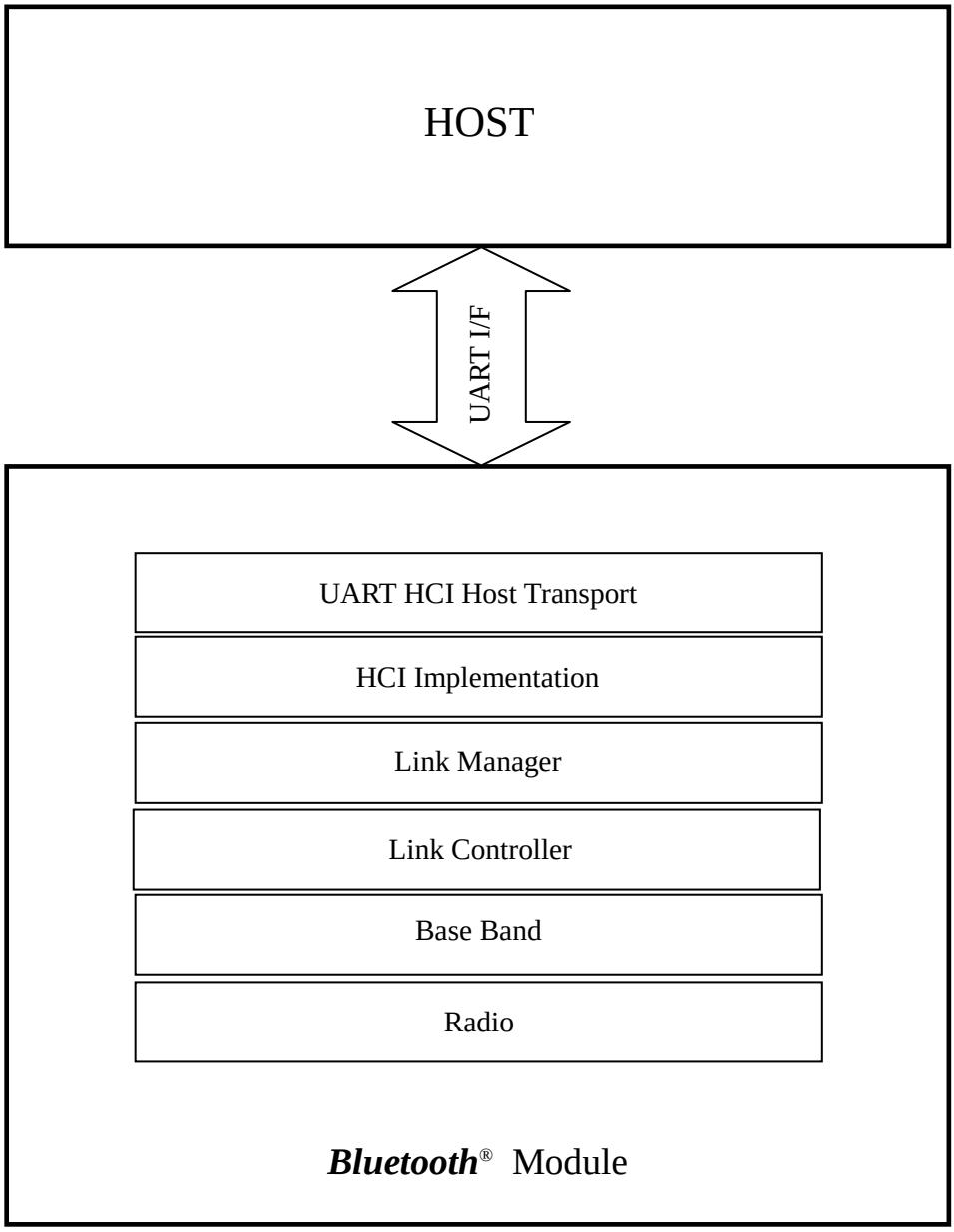
HCI EVENT LIST

Event Description	**OpCode**	**Parameters**	Status	**Notes**
Inquiry _Complete	0x01	Status	Yes	
Inquiry _Result	0x02	Num Responses BD ADDR [I] Page Scan Repetition Mode [I] Page Scan Period Mode [I] Page Scan Mode [I] Class of Device [I] Clock Offset [I]	Yes	
Connection _Complete	0x03	Status Connection Handle BD ADDR Link Type Encryption Mode	Yes	
Connection _Request	0x04	BD ADDR Class of Device Link Type	Yes	
Disconnection _Complete	0x05	Status Connection Handle Reason	Yes	
Authentication _Complete	0x06	Status Connection Handle	Yes	
Remote _Name _Request _Complete	0x07	Status BD ADDR Remote Name	Yes	
Encryption _Change	0x08	Status Connection Handle Encryption Enable	Yes	
Change _Connection _Link _Key _Complete	0x09	Status Connection Handle	Yes	
Master _Link _Key _Complete	0x0A	Status Connection Handle Key Flag	Yes	
Read _Remote _Supported _Features _Complete	0x0B	Status Connection Handle LMP Features	Yes	
Read _Remote _Version _Information _Complete	0x0C	Status Connection Handle LMP Version Manufacture Name LMP Subversion	Yes	
QoS _Setup _Complete	0x0D	Status Connection Handle Flags Service Type Token Rate Peak Bandwidth Latency Delay Variation	Yes	
Command _Complete	0x0E	Num HCI Command Packets Command Opcode Return Parameters	Yes	

Command _Status	0x0F	Status Num HCI Command Packets Command Opcode	Yes	
Hardware _Error	0x10	Hardware Code	Yes	
Flush _Occurred	0x11	Connection Handle	Yes	
Role _Change	0x12	Status BD ADDR New Role	Yes	
Number _Of _Completed _Packets	0x13	Number of Handles Connection Handle [I] HC Num HCI Data Packets [I]	Yes	
Mode _Change	0x14	Status Connection Handle Current Mode Interval	Yes	
Return _Link _Keys	0x15	Num Keys BD ADDR [I] Link Key [I]	Yes	
PIN _Code _Request	0x16	BD ADDR	Yes	
Link _Key _Request	0x17	BD ADDR	Yes	
Link _Key _Notification	0x18	BD ADDR Link Key	Yes	
Loopback _Command	0x19	HCI Command Packet	Yes	
Data _Buffer _Overflow	0x1A	Link Type	No	
Max _Slots _Change	0x1B	Connection Handle LMP Max Slots	Yes	
Read _Clock _Offset _Complete	0x1C	Status Connection Handle Clock Offset	Yes	
Connection _Packet _Type _Change	0x1D	Status Connection Handle Packet Type	Yes	
QoS _Violation	0x1E	Connection Handle	No	
Page _Scan _Repetition _Mode _Change	0x20	BD ADDR Page Scan Repetition Mode	Yes	
Flow _Specification _Complete	0x21	Status Connection Handle Flags Flow direction Service Type Token Rate Token Bucket Size Peak Bandwidth Access Latency	Yes	
Inquiry _Result _with _RSSI	0x22	Num Responses BD ADDR [I] Page Scan Repetition Mode [I] Page Scan Period Mode [I] Page Scan Mode [I] Class of Device [I] Clock Offset [I] RSSI [I]	Yes	
Read _Remote _Extended _Features _Complete	0x23	Status Connection Handle Page Number Maximum page number Extended LMP Features	Yes	

Synchronous _Connection _Complete	0x2C	Status Connection Handle BD ADDR Link Type Transmission Interval Retransmission Window Rx Packet Length Tx Packet Length Air Mode	Yes	
Synchronous _Connection _Changed	0x2D	Status Connection Handle Transmission Interval Retransmission Window Rx Packet Length Tx Packet Length	Yes	
Sniff Subrating	0x2E	Status Connection_Handle Maximum_Transmit_Latency Maximum_Receive_Latency Minimum_Remote_Timeout Minimum_Local_Timeout	Yes	
Extended Inquiry Result	0x2F	Num_Responses BD_ADDR Page_Scan_Repetition_Mode Reserved Class_of_Device Clock_Offset RSSI Extended_Inquiry_Response	Yes	
Encryption Key Refresh Complete	0x30	Status Connection_Handle	Yes	
IO Capability Request	0x31	BD_ADDR	Yes	
IO Capability Response	0x32	BD_ADDR IO_Capability OOB_Data_Present Authentication_ Requirements	Yes	
User Confirmation Request	0x33	BD_ADDR Numeric_Value	Yes	
User Passkey Request	0x34	BD_ADDR	Yes	
Remote OOB Data Request	0x35	BD_ADDR	Yes	
Simple Pairing Complete	0x36	Status BD_ADDR	Yes	
Link Supervision Timeout Changed	0x38	Connection_Handle Link_Supervision_Timeout	Yes	
Enhanced Flush Complete	0x39	Connection_Handle	Yes	
User Passkey Notification	0x3B	BD_ADDR Passkey	Yes	
Keypress Notification	0x3C	BD_ADDR Notification_Type	Yes	
Remote Host Supported Features Notification	0x3D	BD_ADDR Host_Supported_Features	Yes	

Module Stack



Note:

The protocol stack in the module is compliant with the Specification of the ***Bluetooth***® System V2.1+EDR

PICS for Firmware Version 23C (Build4839)

The ***Bluetooth***® functions of this module are as below. Depending on firmware version upgrade, the ***Bluetooth***® functions are subject to change without notice.

Summary ICS:

Table 21: Controller Core Specification

Item	Capability	Status	Support
5	Core Spec Version 2.1	M.1	No
6	Core Spec Version 2.1 + EDR (Ver. 2.1 + EDR)	M.1	Yes

M.1: Mandatory to choose at least one version from Table 21.

Table 22: EDR Features

Item	Capability	Status	Support
1	EDR for asynchronous transports (single slot)	C.1	Yes
2	EDR for asynchronous transports (multi slot)	C.1	Yes
3	EDR for asynchronous transports	C.1	Yes

C.1: For implementations supporting Ver. 2.1+EDR, the Supplier shall indicate support for one or more Enhanced Data Rate features (per specification Volume 0, Part B) in Table 22.

RF Capabilities (based on PICS proforma for Radio):

Table 1: RF Capabilities

Item	Capability	Status	Support
1	Power Class =1	M.1	No
2	Power Class =2	M.1	Yes
3	Power Class=3	M.1	No
4	Power Control	C.1	Yes
5	1-slot packets supported	M	Yes
6	3-slot packets supported	O	Yes
7	5-slot packets supported	O	Yes
8	79 Channels	M	Yes
9	Support for GFSK modulation	M	Yes
10	Support for π/4-DQPSK modulation	C.2	Yes
11	Support for 8DPSK modulation	C.3	Yes

M.1: Must choose One and only One Power Class

C.1: Mandatory to support IF Power Class 1 is supported, ELSE Optional

C.2: Mandatory IF SUM (21/4) OR SUM (21/6) is claimed, Optional IF SUM (21/3) OR SUM (21/5) is claimed, Excluded otherwise.

C.3: Mandatory IF SUM (21/4) OR SUM (21/6) is claimed, Optional IF RF(1/8) AND (SUM (21/3) OR SUM (21/5)) are claimed

Baseband Capabilities (based on PICS proforma for Baseband)

Table 1: Physical Channel

Item	Capability	Status	Support
1	Support frequency band and 79 RF channels	M	Yes
2	Adaptive Frequency Hopping Kernel	M	Yes

Table 1a: Modulation schemes

Item	Capability	Status	Support
1	Basic Data Rate, 1 Mbps payload data rate	M	Yes
2	Enhanced Data Rate, 2 Mbps payload data rate	C.1	Yes
3	Enhanced Data Rate, 3 Mbps payload data rate	C.2	Yes

C.1 Mandatory IF SUMMARY(21/6) is claimed, Optional IF SUMMARY(21/5) is claimed

C.2 Mandatory IF SUMMARY(21/6) is claimed, Optional IF BB(1a/2) AND SUMMARY(21/5) are claimed

Table 2: Link Types

Item	Capability	Status	Support
1	Support of ACL link	M	Yes
2	Support of SCO link	O	Yes
3	Support of eSCO link	O	Yes
4	Support of Enhanced Data Rate ACL links	C.1	Yes
5	Support of Enhanced Data Rate eSCO links	C.2	Yes

C.1 Mandatory IF SUMMARY(22/1) OR SUMMARY(22/2) is claimed, Optional IF SUMMARY(21/5) OR SUMMARY(21/6) is claimed

C.2 Mandatory IF SUMMARY(22/3) is claimed, Optional IF SUMMARY(21/5) OR SUMMARY(21/6) is claimed

Table 3: SCO Link support

Prerequisite for Items (3/5-8):(2/3) (Support of eSCO link)

Prerequisite for Items (3/1-4):(2/2) (Support of SCO link)

Item	Capability	Status	Support
1	SCO links to same Slave	C.1	Yes
2	SCO links to different Slaves	O	Yes
3	SCO links from same Master	C.1	Yes
4	SCO links from different Masters	O	No
5	eSCO links to same Slave	C.2	Yes
6	eSCO links to different Slaves	O	Yes
7	eSCO links from same Master	C.2	Yes
8	eSCO links from different Masters	O	No

C.2: Mandatory to support at least One link (3/5 or 3/7)

C.1: Mandatory to support at least One link (3/1 3/3)

Table 4: Common packet types

Item	Capability	Status	Support
1	Support of ID packet type	M	Yes
2	Support of NULL packet type	M	Yes
3	Support of POLL packet type	M	Yes
4	Support of FHS packet type	M	Yes
5	Support of DM1 packet type	M	Yes

Table 5: ACL packet types

Item	Capability	Status	Support
1	Support of DH1 packet type	M	Yes
2	Support of DM3 packet type	O	Yes
3	Support of DH3 packet type	O	Yes
4	Support of DM5 packet type	O	Yes
5	Support of DH5 packet type	O	Yes
6	Support of AUX1 packet type	O	Yes

Table 5a: Enhanced Data Rate ACL Packet Types

Prerequisite: 2/4 (Support of Enhanced Data Rate ACL links)

Item	Capability	Status	Support
1	Support 2-DH1 packet type	C.1	Yes
2	Support 2-DH3 packet type	C.2	Yes
3	Support 2-DH5 packet type	C.2	Yes
4	Support 3-DH1 packet type	C.3	Yes
5	Support 3-DH3 packet type	C.4	Yes
6	Support 3-DH5 packet type	C.5	Yes

C.1 Mandatory IF SUMMARY(22/1) OR SUMMARY(22/2) is claimed, Optional IF BB(1a/2) is claimed

C.2 Mandatory IF SUMMARY(22/2) is claimed, Optional IF BB(1a/2) is claimed

C.3 Mandatory IF SUMMARY(22/1) OR SUMMARY(22/2) is claimed, Optional IF BB(1a/3) is claimed

C.4 Mandatory IF SUMMARY(22/2) is claimed, Optional IF BB(5a/2) AND BB(5a/4) are claimed

C.5 Mandatory IF SUMMARY(22/2) is claimed, Optional IF BB(5a/3) AND BB(5a/4) are claimed

Table 6: SCO and eSCO packet types

Prerequisite for Items (6/1-4):(2/2) (Support of SCO link)

Prerequisite for Items (6/5-7):(2/3) (Support of eSCO link)

Item	Capability	Status	Support
1	Support of HV1 packet type	C.1	Yes
2	Support of HV2 packet type	O	Yes
3	Support of HV3 packet type	O	Yes
4	Support of DV packet type	C.1	Yes
5	Support of EV3 packet type	C.2	Yes
6	Support of EV4 packet type	O	Yes
7	Support of EV5 packet type	O	Yes

C.1 Mandatory IF only (2/2) SCO link is supported

C.2 Mandatory IF only (2/3) eSCO link is supported

Table 6a: Enhanced Data Rate eSCO packet types

Prerequisite: 2/5 (Support Enhanced Data Rate eSCO links)

Item	Capability	Status	Support
1	Support 2 –EV3 packet type	C.1	Yes
2	Support 2 –EV5 packet type	C.2	Yes
3	Support 3 –EV3 packet type	C.3	Yes
4	Support 3 –EV5 packet type	C.4	Yes

C.1 Mandatory IF SUMMARY(22/3) is claimed, Optional IF BB(1a/2) is claimed

C.2 Optional IF BB(1a/2) is claimed

C.3 Mandatory IF SUMMARY(22/3) is claimed Optional IF BB(1a/3) is claimed

C.4 Optional IF BB(1a/3) is claimed

Table 7: Page procedures

Item	Capability	Status	Support
1	Support paging	M	Yes
2	Support page scan	M	Yes
3	(Intentionally left blank)		No
4	(Intentionally left blank)		No
5	Supports Interlaced Scan during page scan	O	Yes

Table 8: Paging schemes

Item	Capability	Status	Support
1	Supports mandatory scan mode	M	Yes

Table 9: Paging modes

Item	Capability	Status	Support
1	Supports paging mode R0	C.1	Yes
2	Supports paging mode R1	C.1	Yes
3	Supports paging mode R2	C.1	Yes

C.1: At least one of the paging scan modes must be supported.

Table 9b: Paging train repetition

Item	Capability	Status	Support
1	Supports Npage >= 1	O	Yes
2	Supports Npage >= 128	O	Yes
3	Supports Npage >= 256	M	Yes

Note: The master should use Npage >= 256 unless it knows what SR mode the slave uses.

Table 10: Inquiry procedures

Item	Capability	Status	Support
1	Support inquiry	O	Yes
2	Inquiry scan with first FHS	O	Yes
3	(Intentionally left blank)		No
4	(Intentionally left blank)		No
5	Supports the dedicated inquiry access code	O	Yes
6	Supports Interlaced Scan during inquiry scan	O	Yes
7	Extended Inquiry Response	O	Yes

Table 11: Piconet capabilities

Item	Capability	Status	Support
1	Broadcast messages	O	Yes
2	Point-to-multipoint connections	O	Yes

Table 12: Scatternet capabilities

Item	Capability	Status	Support
1	Act as Master in one piconet and as Slave in another piconet	O	Yes
2	Act as Slave in more than one piconet	O	Yes

Table 13: Synchronous Coding Schemes

Prerequisite: 2/2 (SCO link support)

Item	Capability	Status	Support
1	A-law	O	Yes
2	u-law	O	Yes
3	CVSD	O	Yes
4	Transparent Synchronous Data	O	Yes

Table 14: Erroneous Data Reporting

Item	Capability	Status	Support
1	Erroneous Data Reporting for SCO	C.1	Yes
2	Erroneous Data Reporting for eSCO	C.2	Yes

C.1: Optional IF ((SUM ICS: 21/5 OR SUM ICS: 21/6) AND HCI: 9/6) is supported, ELSE excluded.

C.2: Optional IF ((SUM ICS: 21/5 OR SUM ICS: 21/6) AND HCI: 9/7) is supported, ELSE excluded.

Table 15: This table is intentionally left blank: DO NOT USE

Item	Capability	Status	Support
1	(Intentionally left blank)		No

Table 16: Non-flushable Packet Boundary Flag

Item	Capability	Status	Support
1	Support Non-flushable Packet Boundary Flag	C.1	Yes

C.1 MANDATORY IF ((SUM ICS: 21/5 OR SUM ICS 21/6) AND HCI: 12/10) is supported, ELSE OPTIONAL IF (SUM ICS: 21/5 OR SUM ICS: 21/6) is supported, ELSE excluded.

Table 17: Connection States

Item	Capability	Status	Support
1	Sniff Subrating Mode	C.1	Yes

C.1 MANDATORY IF ((SUM ICS: 21/5 OR SUM ICS 21/6) AND LMP: 2/8) is supported, ELSE OPTIONAL IF (SUM ICS: 21/5 OR SUM ICS: 21/6) is supported, ELSE excluded.

Link Manager Capabilities (based on PICS proforma for Link Manager)

Table 1: Response Messages

Item	Capability	Status	Support
1	Accept message	M	Yes
2	Reject message	M	Yes

Table 2: Supported Features

Item	Capability	Status	Support
1	3-slot packets	O	Yes
2	5-slot packets	O	Yes
3	Encryption	C.5	Yes
4	Slot offset	O	Yes
5	Timing accuracy	O	Yes
6	Role switch (Master/Slave)	O	Yes
7	Hold mode	O	Yes
8	Sniff mode	O	Yes
9	Park mode	O	Yes
10	Power Control	C.1	Yes
11	Channel quality driven data rate	O	Yes
12	SCO link	O	Yes
13	RSSI	O	Yes
14	Broadcast encryption	O	Yes
15	eSCO link	O	Yes
16	Adaptive frequency hopping	M	Yes
17	Enhanced Data Rate ACL	C.2	Yes
18	Enhanced Data Rate eSCO	C.3	Yes
19	Simple Pairing	C.4	Yes

C.1: Mandatory IF (RF:1/1) supported, ELSE Optional

C.2 Mandatory IF (SUMMARY:22/1) OR (SUMMARY:22/2) is claimed, Optional IF (SUMMARY:21/5) OR (SUMMARY:21/6) is claimed

C.3 Mandatory IF (SUMMARY:22/3) is claimed, Optional IF (SUMMARY:21/5) OR (SUMMARY:21/6) is claimed

C.4 Mandatory IF (SUMMARY 2-1/5 OR SUMMARY 2-1/6) is claimed, ELSE Excluded.

C.5 Optional IF (SUMMARY 2-1/1 OR SUMMARY 2-1/2 OR SUMMARY 2-1/3 OR SUMMARY 2-1/4) ELSE Mandatory

Table 3: Authentication

Item	Capability	Status	Support
1	Initiate authentication before connection completed	O	Yes
2	Initiate authentication after connection completed	O	Yes
3	Respond to authentication request	M	Yes

Table 4: Pairing

Item	Capability	Status	Support
1	Initiate pairing before connection completed	O	Yes
2	Initiate pairing after connection completed	O	Yes
3	Respond to pairing request	M	Yes
4	Use fixed PIN and request responder to initiator switch	C.1	Yes
5	Use variable PIN	C.1	Yes
6	Accept initiator to responder switch	C.2	Yes

C.1: Mandatory to support at least One, (LMP:4/4) OR (LMP:4/5) OR both

C.2: Mandatory IF (LMP: 4/5) AND (LMP:4/1), OR (LMP: 4/5) AND (LMP:4/2)) is supported.

Table 5: Link Keys

Item	Capability	Status	Support
1	Creation of link key - Unit Key	C.1	Yes
2	Creation of link key - Combination Key	C.1	Yes
3	Initiate change of link key	O	Yes
4	Accept change of link key	M	Yes
5	(Intentionally left blank)		No
6	(Intentionally left blank)		No
7	Accept pairing with Unit Key	O	Yes

C.1: Mandatory to support at least One - either (LMP:5/1) OR (LMP:5/2).

Table 6: Encryption

Prerequisite: 2/3(Encryption supported)

Item	Capability	Status	Support
1	Initiate encryption	C.1	Yes
2	Accept encryption requests	M.1	Yes
3	(Intentionally left blank)		No
4	(Intentionally left blank)		No
5	Key size negotiation	M.1	Yes
6	Start encryption, as master	M.1	Yes
7	Accept start of encryption	M.1	Yes
8	Stop encryption, as master	M.1	Yes
9	Accept stop of encryption	M.1	Yes
10	Encryption Pause/Resume	M.1	Yes

M.1: Mandatory IF (LMP:2/3) - (Encryption) is supported.

C.1: Mandatory IF (SUMMARY 2-1/5 OR SUMMARY 2-1/6) is claimed, ELSE Optional.

Table 7: Clock offset information

Item	Capability	Status	Support
1	Request clock offset information	O	Yes
2	Respond to clock offset requests	M	Yes

Table 8: Slot offset information

Prerequisite: 2/4 (Slot offset)

Item	Capability	Status	Support
1	Send slot offset information	C.1	Yes

C.1: Mandatory IF (LMP:13/1) - (Master/Slave switch) supported, ELSE Optional.

Table 9: Timing accuracy information

Prerequisite: 2/5 (Timing accuracy)

Item	Capability	Status	Support
1	Request timing accuracy information	O	Yes
2	Respond to timing accuracy information requests	M.1	Yes

M.1: Mandatory IF (LMP:2/5) - (Timing Accuracy) supported

Table 10: LM version information

Item	Capability	Status	Support
1	Request LM version information	O	Yes
2	Respond to LM version information requests	M	Yes

Table 11: Feature support

Item	Capability	Status	Support
1	Request supported features	C.1	Yes
2	Respond to supported features requests	M	Yes
3	Request extended features mask	C.2	Yes
4	Respond to extended features Request	C.2	Yes

C.1: Mandatory IF any of the Optional features in (LMP:2/1-3), (LMP:2/5), (LMP:2/7-12), (LMP:2/14-16), (LMP:26/1) is requested by the IUT, ELSE Optional.

C.2 Mandatory IF a feature requiring another features page is supported, ELSE Optional.

Table 12: Name information

Item	Capability	Status	Support
1	Request name information	O	Yes
2	Respond to name requests	M	Yes

Table 13: Role Switch

Prerequisite: 2/6(Role switch)

Item	Capability	Status	Support
1	Request Master Slave switch	O	Yes
2	Accept Master Slave switch requests	M.1	Yes

M.1 Mandatory IF LMP:(2/6) - (Role Switch) supported

Table 14: Detach

Item	Capability	Status	Support
1	Detach connection	M	Yes

Table 14a: Setting up and Removing Enhanced Data Rate ACL Connection

Item	Capability	Status	Support
1	Enter Enhanced Data Rate	C.1	Yes
2	Exit Enhanced Data Rate	C.1	Yes

C.1 Mandatory IF (LMP:2/17) supported, ELSE Excluded.

Table 14b: Setting up and Removing Enhanced Data Rate eSCO Connection

Item	Capability	Status	Support
1	Enter and exit eSCO using Enhanced Data Rate Packets	C.1	Yes

C.1 Mandatory IF (LMP:2/18) supported, ELSE Excluded.

Table 15: Hold mode

Prerequisite: 2/7 (Hold mode)

Item	Capability	Status	Support
1	Force hold mode	O	Yes
2	Request hold mode	C.1	Yes
3	Respond to hold mode requests	M	Yes
4	Accept forced hold mode	M	Yes

C.1: Mandatory IF (LMP:15/1) - (Force hold mode) is supported, ELSE Optional.

Table 16: Sniff mode

Item	Capability	Status	Support
1	(Intentionally left blank)		No
2	Request sniff mode	O	Yes
3	Respond to sniff mode requests (rengotiate or reject)	M.1	Yes
4	(Intentionally left blank)		No
5	Request un-sniff	C.1	Yes
6	Accept un-sniff requests	M.1	Yes
7	Sniff Subrating Mode	C2	Yes

C.1: Mandatory IF (LMP:16/2) - (Request sniff mode) is supported, ELSE Optional.

M.1: Mandatory IF (LMP:2/8) - (Sniff Mode) is supported.

C.2 Mandatory IF (SUMMARY 2-1/5 OR SUMMARY 2-1/6) is claimed, ELSE Excluded

Table 17: Park mode

Item	Capability	Status	Support
1	(Intentionally left blank)		No
2	Request park mode	O	Yes
3	Respond to park mode requests	M.1	Yes
4	(Intentionally left blank)		No
5	Set up broadcast scan window	O	Yes
6	Accept changes to the broadcast scan window	M.1	Yes
7	Modify beacon parameters	O	Yes
8	Accept modification of beacon parameters	M.1	Yes
9	Request Unpark using PM_ADDR	C.1	Yes
10	Request Unpark using BD_ADDR	C.1	Yes
11	Slave requested Unpark	O	Yes
12	Accept Unpark using PM_ADDR	M.1	Yes
13	Accept Unpark using BD_ADDR	M.1	Yes

M.1: Mandatory IF (LMP:2/9) - (Park Mode) is supported

C.1: IF (LMP:17/3) - (Respond to park mode requests) is supported, THEN at least One of (LMP:17/9) - (Unpark using PM_ADDR) OR (LMP:17/10) - (Unpark using BD_ADDR) is Mandatory, ELSE Optional.

Table 18: Power Control

Prerequisite: 2/13 (RSSI)
Prerequisite: 2/10(Power contorol)

Item	Capability	Status	Support
1	Request to increase power	M.1	Yes
2	Request to decrease power	M.1	Yes
3	Respond when max power reached	M.2	Yes
4	Respond when min power reached	M.2	Yes

M.1: Mandatory IF (LMP:2/13) - (RSSI) is supported
M.2: Mandatory IF (LMP:2/10) - (Power Control) is supported

Table 19: Link supervision timeout

Item	Capability	Status	Support
1	Set link supervision timeout value	O	Yes
2	Accept link supervision timeout setting	M	Yes

Table 20: Quality of Service

Item	Capability	Status	Support
1	Channel quality driven change between DM and DH packet types	C.1	Yes
2	Force/Request change of Quality of Service	M	Yes
3	Request change of Quality of Service	M	Yes

C.1: Mandatory IF support of (LMP:2/11) is stated in the feature request, ELSE Optional.

Table 21: SCO Links

Prerequisite: 2/12 (SCO links)

Item	Capability	Status	Support
1	Initiate SCO links, as Master	O	Yes
2	Initiate SCO links, as Slave	O	Yes
3	Accept SCO links	O	Yes
4	Remove SCO links, as Master	C.1	Yes
5	Remove SCO links, as Slave	C.2	Yes
6	Negotiate SCO link parameters, as Master	C.3	Yes
7	Negotiate SCO link parameters, as Slave	C.4	Yes

C.1: Mandatory IF (LMP:21/1) - (Initiating SCO links, as Master) is supported, ELSE Optional.

C.2: Mandatory IF (LMP:21/2) - (Initiating SCO links, as Slave) is supported, ELSE Optional.

C.3: Mandatory IF (LMP:21/1) - (Initiating SCO links, as Master) OR (LMP:21/3) - (Accept SCO links) is supported, ELSE Optional.

C.4: Mandatory IF (LMP:21/2) - (Initiating SCO links, as Slave) OR (LMP:21/3) - (Accept SCO links) is supported, ELSE Optional.

Table 22: Multi-Slot packages

Item	Capability	Status	Support
1	Accept maximum allowed number of slots to be used	C.1	Yes
2	Request maximum number of slots to be used	C.1	Yes
3	Accept request of maximum number of slots to be used	C.1	Yes

C.1: Mandatory IF (LMP:2/1) AND/OR (LMP:2/2) is supported in the feature request, ELSE Optional.

Table 23: Paging scheme

Item	Capability	Status	Support
1	Request page mode to use	O	Yes
2	Accept suggested page mode	O	Yes
3	Request page scan mode to use	O	Yes
4	Accept suggested page scan mode	O	Yes

Table 24: Connection Establishment

Item	Capability	Status	Support
1	Create connection for higher layers	M	Yes
2	Respond to requests to establish connections for higher layers	M	Yes
3	Indicate that link set-up is completed	M	Yes

Table 25: Test Mode

Item	Capability	Status	Support
1	Activate test mode	O	Yes
2	Ability to reject activation of test mode if test mode is disabled	M	Yes
3	Control test mode	O	Yes
4	Ability to reject test mode control commands if test mode is disabled.	M	Yes

Table 26: Adaptive Frequency Hopping

Prerequisite: 2/20(AFH)

Item	Capability	Status	Support
1	Support of AFH switch as master	O	Yes
2	Support of AFH switch as slave	M	Yes
3	Support of Channel Classification reporting as master	C.1	Yes
4	Support of Channel Classification reporting as slave	C.2	Yes
5	Support channel classification from host	C.3	Yes
6	Support of Channel Classification	O	Yes

C.1: Optional IF (LMP:26/6) is supported, ELSE Excluded.

C.2: Mandatory IF (LMP:26/6) is supported, ELSE Excluded.

C.3: Mandatory IF (LMP:26/1) OR (LMP:26/4) is supported, ELSE Optional.

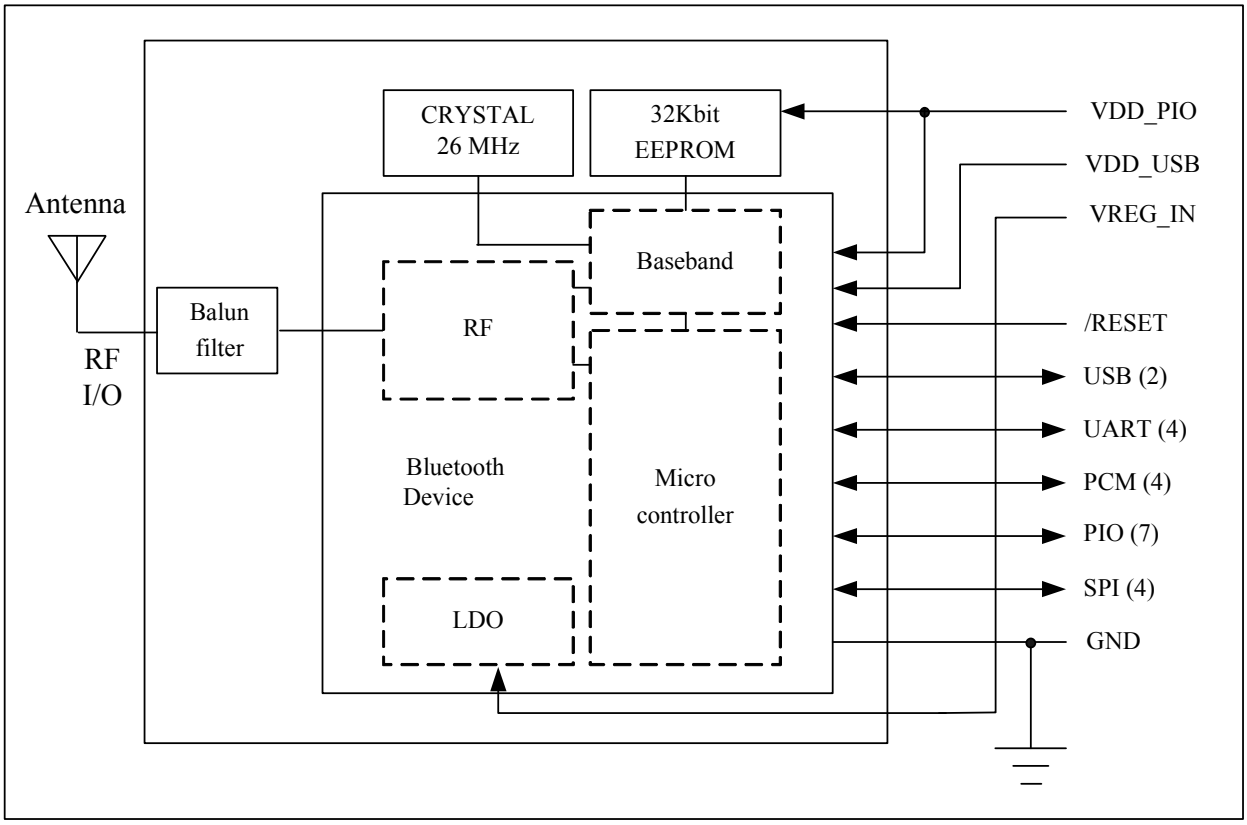
M.1: Mandatory IF (LMP:2/20) - (AFH) supported

Table 27: This Table is intentionally left blank

Item	Capability	Status	Support
1	This line is intentionally blank.	O	No
2	This line is intentionally blank.	O	No
3	N/A	O	No
4	N/A	O	No

Control No.		Control name
HD-MC-A080180	(1/1)	Circuit Schematic

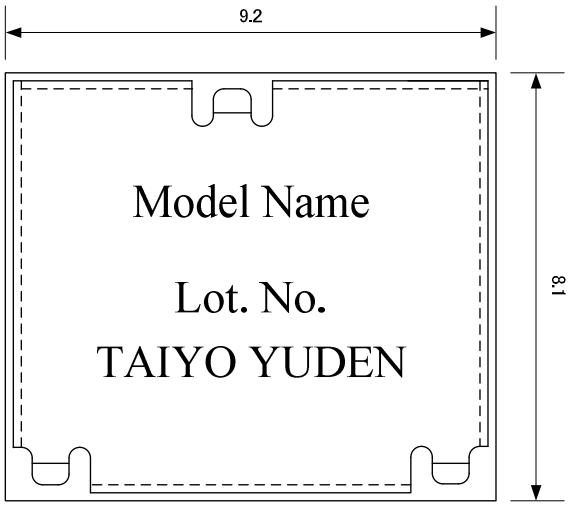
Block Diagram



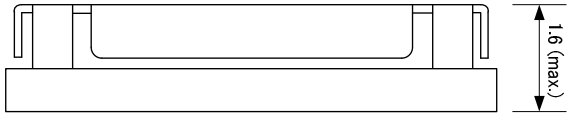
Control No.		Control name
HD-AD-A080180	(1/1)	Outline/Appearance

Unit: mm, Tolerances unless otherwise specified: +/-0.2mm

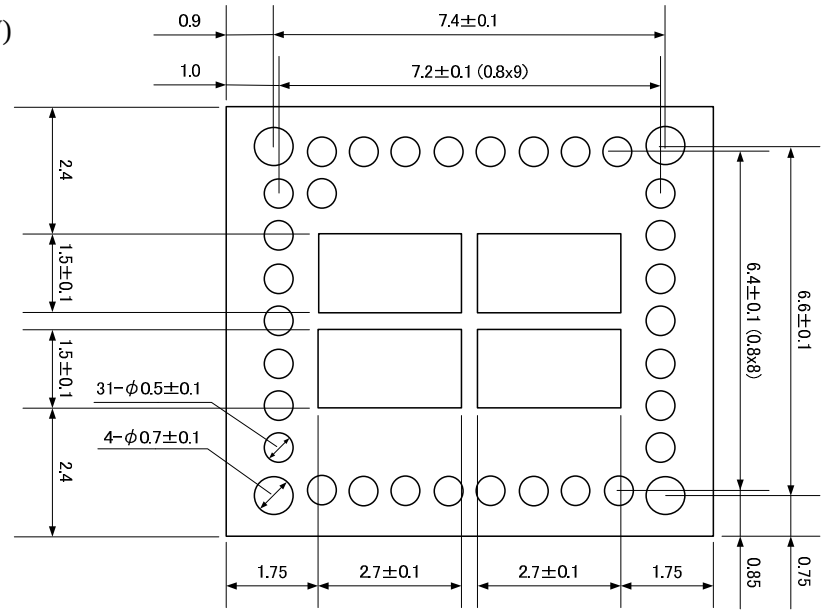
(TOP VIEW)



(SIDE VIEW)



(BOTTOM VIEW)



TOP VIEW

Note:

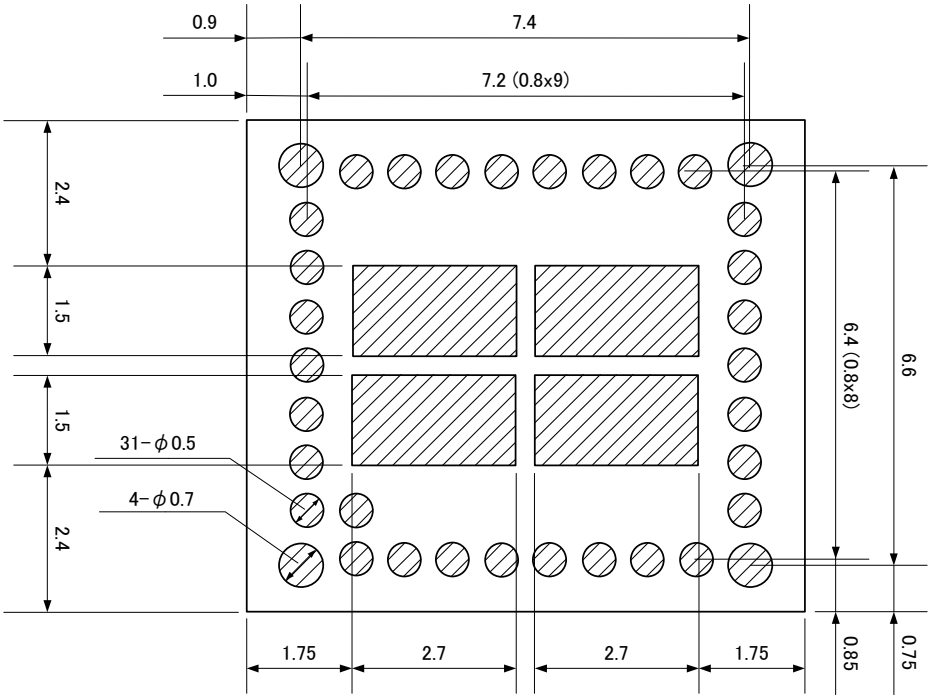
Outline/Appearance data is PRELIMINARY, not guaranteed and subject to change without notice.

Please contact Taiyo Yuden for the details of module mountings.

Control No.		Control name
HD-AD-B080180	(1/1)	Outline/Appearance

LAND PATERNE EXAMPLE

Unit: mm

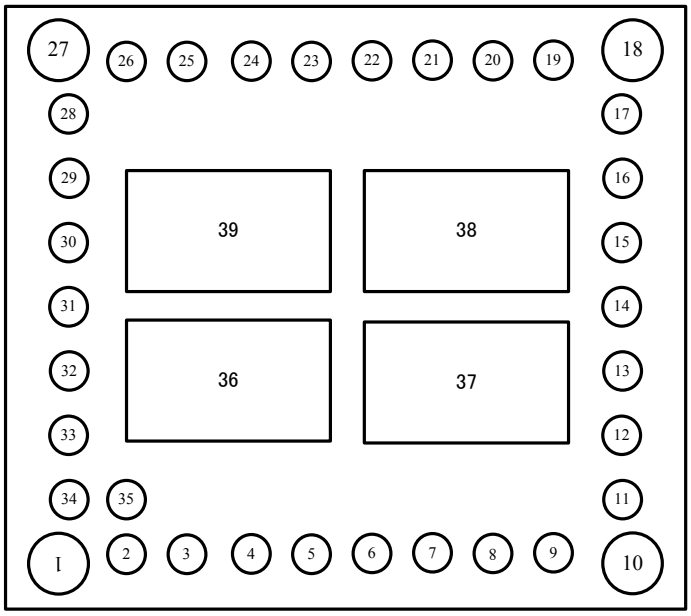


Caution

Do not wire on mother board except ground pattern where reverse side of module to be placed.

Control No.		Control name
HD-BA-A080180	(1/2)	Pin Layout

Pin Descriptions



TOP VIEW

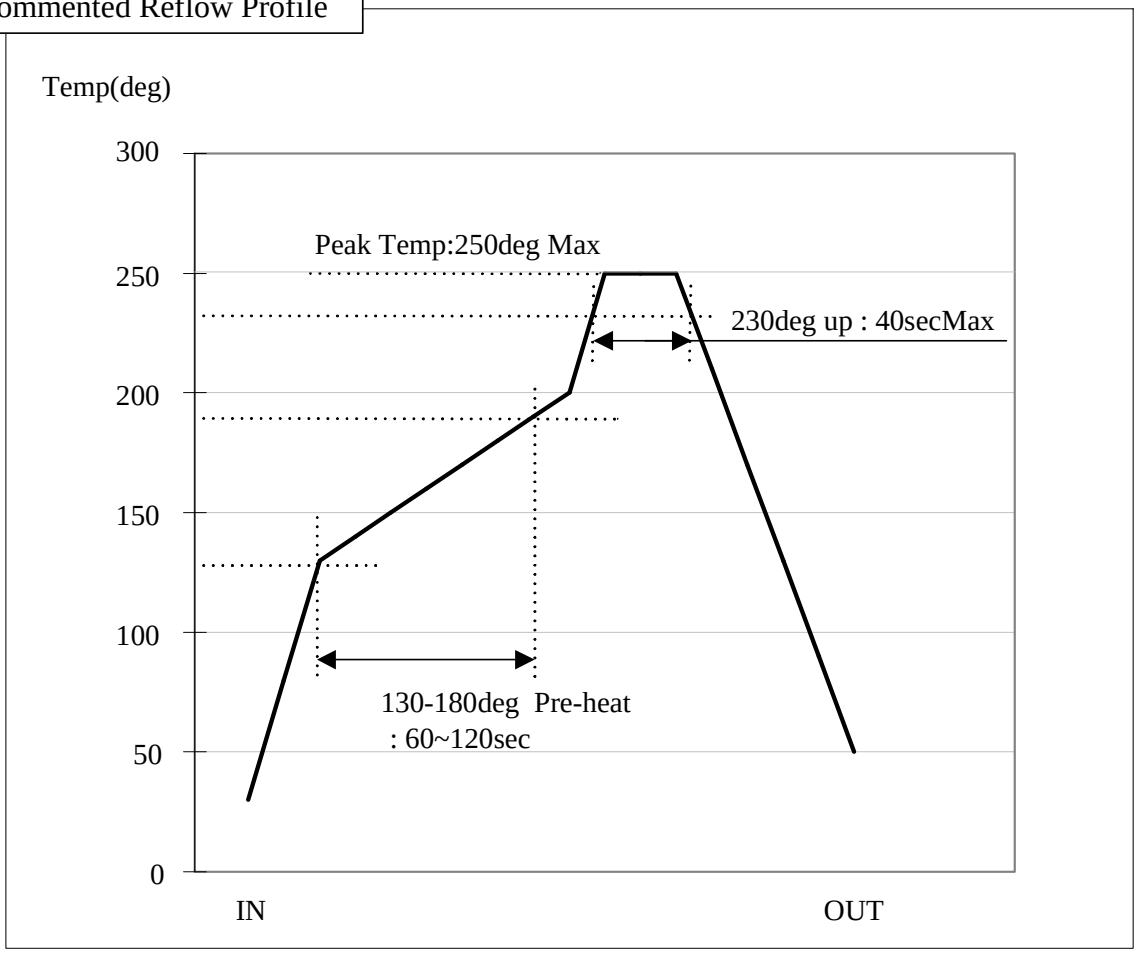
Terminal No.	Terminal name	Type	Input/ Output	Description	Block	Remark
33	VDD_PIO	Power	Input	DC3.3V Power supply for PIO	Power	
32	VDD_USB	Power	Input	DC3.3V Power supply for UART ports and USB ports		
34	VREG_IN	Power	Input	Internal Regulator input		
2	/RESET	CMOS	Input	Active low RESET signal with internal weak pull-up	/RESET	
26	USB_DP	CMOS	Input/ Output	This signal should be connected to ground	USB	
25	USB_DN	CMOS	Input/ Output	This signal should be connected to ground		
29	UART_TX	CMOS	Output	TX data to host	UART	
31	UART_RX	CMOS	Input	RX data from host (with weak internal pull-down)		
28	UART_RTS	CMOS	Output	UART request to send active low(flow control signal to host, tristatable with internal pull-up)		
30	UART_CTS	CMOS	Input	UART clear to send active low (flow control signal from host, with weak internal pull-down)		
22	PCM_SYNC	CMOS	Input/ Output	Synchronous data SYNC (with weak internal pull-down)	PCM	
20	PCM_OUT	CMOS	Output	Synchronous data (tristatable with internal weak pull-down)		
21	PCM_IN	CMOS	Input	Synchronous data (with internal weak pull-down)		
23	PCM_CLK	CMOS	Input /Output	Synchronous data clock (with weak internal pull-down)		

Control No.	Control name
HD-BA-A080180 (2/2)	Pin Layout

Terminal No.	Terminal name	Type	Input/ Output	Description	Block	Remark
3	PIO0	CMOS	Input/ Output	Reserved, Keep on set side terminal open. Bi-directional with programmable strength internal pull-up/down.	PIO	
9	PIO1	CMOS	Input/ Output	Reserved, Keep on set side terminal open. Bi-directional with programmable strength internal pull-up/down.		
11	PIO7	CMOS	Input/ Output	Reserved, Keep on set side terminal open. Bi-directional with programmable strength internal pull-up/down.		
16	PIO5/ BT_ACTIVE	CMOS	Input/ Output	Reserved, Keep on set side terminal open. Bi-directional with programmable strength internal pull-up/down. (BT_ Active output for Co-existence signaling.)		
17	PIO6	CMOS	Input/ Output	Reserved, Keep on set side terminal open. Bi-directional with programmable strength internal pull-up/down.		
19	PIO4/ BT_PRIORITY / CH_CLK	CMOS	Output	BT_Priority/CH_CLK output for Co-existence signaling.		
8	PIO9	CMOS	Input/ Output	Reserved, Keep on set side terminal open. Bi-directional with programmable strength internal pull-up/down.		
13	SPI_CSB	CMOS	Input	Do not Connection	SPI	
15	SPI_MISO	CMOS	Output	Do not Connection		
12	SPI_CLK	CMOS	Input	Do not Connection		
14	SPI_MOSI	CMOS	Input	Do not Connection		
5	RF_IN_OUT	RF	Input/ Output	50 ohm antenna connection	RF	
1	GND	Power	-	Ground	Power	
4	GND	Power	-	Ground		
6	GND	Power	-	Ground		
7	GND	Power	-	Ground		
10	GND	Power	-	Ground		
18	GND	Power	-	Ground		
24	GND	Power	-	Ground		
27	GND	Power	-	Ground		
35	GND	Power	-	Ground		
36	GND	Power	-	Ground		
37	GND	Power	-	Ground		
38	GND	Power	-	Ground		
39	GND	Power	-	Ground		

Notes:

1. Weak pull-ups can be thought of 1M Ohm connections to VDD, but are more accurately modeled as a -1uA current source.
2. Pin 32, 33 and 34 is used for power supply of BT module. To fill the standard of “Supply voltage ripple and spike noise”, the capacitor, which has the capacity of 2.2uF or more, should be put in the terminal VDD outside as a bypass capacitor.

Control No. (1/1)	Control name Reflow Profile

Recommented Reflow Profile