Bluetooth® Module

EYSFDCAWD (RF+Baseband (Class 2) UART)

Data Report

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

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Rev. record
19-May.-2006> Ver.1.0 Draft (Only for Web Catalog)
27-Jun.-2006> Ver.1.1 Released

Control No.	Control name
HD-AG-A061013 (1/3)	General Items

Scope

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

1. User's Code: EYSFDCAWD (UART I/F Support)
   Digit3: Customer Code ex) S: TAIYO YUDEN Standard
   Digit8: Hardware Code ex) W
   Digit9: Software Code ex) D
   *** User's Code may be modified for mass production or other cases.**
   Please see "m" for more information.
   Type: EYXFDCA
2. Function: Radio frequency transfer Module (power class 2). ***Bluetooth***® standard Ver 2.0+EDR conformity
3. Application: PC peripheral, Handy terminal
4. Structure: Hybrid IC loaded with silicon monolithic semiconductor
5. Outline: Board to Board Connector Type
6. Marking: TELEC logo mark, ARIB, TELEC qualification number, Type, Manufacture (Japanese), Manufacture (English), User's Code, Product Lot number and Country of manufacture on Shielding Case. BD address number, User's Code, FCC ID, IC (Industry Canada) ID, CE mark and Manufacture (English) on label.
   -TELEC: 001NYCA1293
   -FCC: RYYEYXFDC
   -IC: 4389A-EYXFDC
   -CE: CE0560
7. Features:
   -***Bluetooth***® 2.0+EDR conformity
   -UART Interface: Baud Rate 921.6kbps
   -Point-to-Multipoint (7 Slaves)
   -Encryption
   -Hold, Sniff and Park Mode
   -Supported Link Type: ACL (Not support Voice Over HCI)
   -AFH&Co-existence
   -EDR(Enhanced Data Rate)
8. Packing:
   Packaging method: Tray(Soft Tray)
   Packaging unit: 15pieces/Tray
   105pieces/Box
   Material of tray: Conductive PET
9. Terminal: Data input-output (20pin Board to Board Connector)
   RF input-output (Antenna)
10. Mount: Mounted with M2 screw
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 PC peripheral and Handy terminal. 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 2.0+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.
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. User's Code Modification Notice (***Bluetooth***® Modules)

User's Code 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 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.

Control No.	Control name
HD-AG-A061013 (3/3)	General Items

n. Containment of hazardous substance in this Product
*Pb (Lead) : Non use
*Additional RoHS regulation substance (Cd.Hg.Cr+6.PBB.PBDE) :Non use

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. 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-A061013 (1/1)	Absolute maximum ratings

Absolute maximum ratings

Item	Symbol	Rating				Remark
		Min.	Typ.	Max.	Unit	
Supply voltage	VDD_3.3V	-0.3		3.6	V	Ta=25 degrees C, GND reference
Input voltage	Vin	-0.3		VDD_3.3V +0.3	V	I/O terminals except USB interface

Recommendation operating range

Item	Symbol	Rating				Remark
		Min.	Typ.	Max.	Unit	
Supply voltage	VDD_3.3V	3.0	3.3	3.6	V	
Supply voltage ripple and spike noise	VDD_rn			30	mVp-p	Note 1
Operation temperature range	Topr	-25	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_3.3V 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_3.3V=3.3V

No.	Parameter	Condition	Symbol	Min.	Typ.	Max.	Unit	Remark
1	Normal supply voltage		VDD_3.3V	3.0	3.3	3.6	V	
2	Input Low Voltage1	/RESET, PIOX, PCM_IN, PCM_SYNC, PCM_CLK, UART_CTS, UART_RX	VIL1	-0.3		0.8	V	
3	Input High Voltage1	/RESET, PIOX, PCM_IN, PCM_SYNC, PCM_CLK, UART_CTS, UART_RX	VIH1	0.7xVDD _3.3V		VDD_3.3V +0.3	V	
4	Output Low Voltage1	PIOX, PCM_OUT, PCM_SYNC, PCM_CLK, UART_TX, UART_RTS	VOL1	-		0.4	V	IOL=4mA
5	Output High Voltage1	PIOX, PCM_OUT, PCM_SYNC, PCM_CLK, UART_TX, UART_RTS	VOH1	VDD_3.3V-0.4		-	V	IOH =-4mA
6	Peak current	Continuous Rx	Iccp1		40	120	mA	Note 3
7	Average current1	Sniff mode (Slave only)	Icca1		7	-	mA	Notes 1, 3
8	Average current2	Standby mode	Icca2		2	-	mA	Note 3
9	Average current3	Send DM1packet (Master)	Icca3		37	-	mA	Note 3
10	Average current4	Receive DM1packet (Slave)	Icca4		38	-	mA	Note 3
11	Average current5	Hold mode (Slave only)	Icca5		2	-	mA	Note 3
12	Average current6	Park mode (Slave only)	Icca6		3	-	mA	Notes 2, 3

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.

Control No.		Control name
HD-AE-A061013	(2/5)	Electrical characteristics

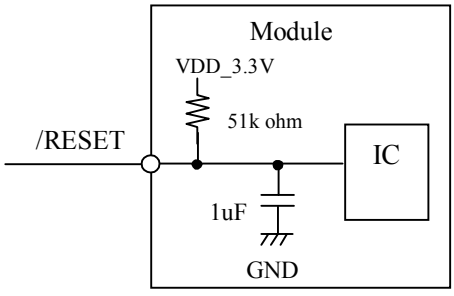
AC Specifications

The Specification applies for Topr.= 25 degrees C, VDD_3.3V=3.3V

No.	Parameter	Condition	Symbol	Min	Typ	Max	Unit	Remark
1	VDD_3.3V Rise Time from 0V to 3.0V		t1	0		2	ms	Note 1
2	VDD_3.3V=3.0V to /RESET High		t2	10			ms	Note 2
3	/RESET High to Module Ready		t3		(500)	3000	ms	Notes 3, 4, 5, 6
4	/RESET pulse width		t4	6			ms	Note 6
5	/RESET Low to VDD_3.3V Off		t5	0			ms	Note 6
6	/RESET High to /RESET Low		t6	3000			ms	Notes 6, 7
7	Module Active to /RESET Low		t7	0			ms	Notes 6, 7

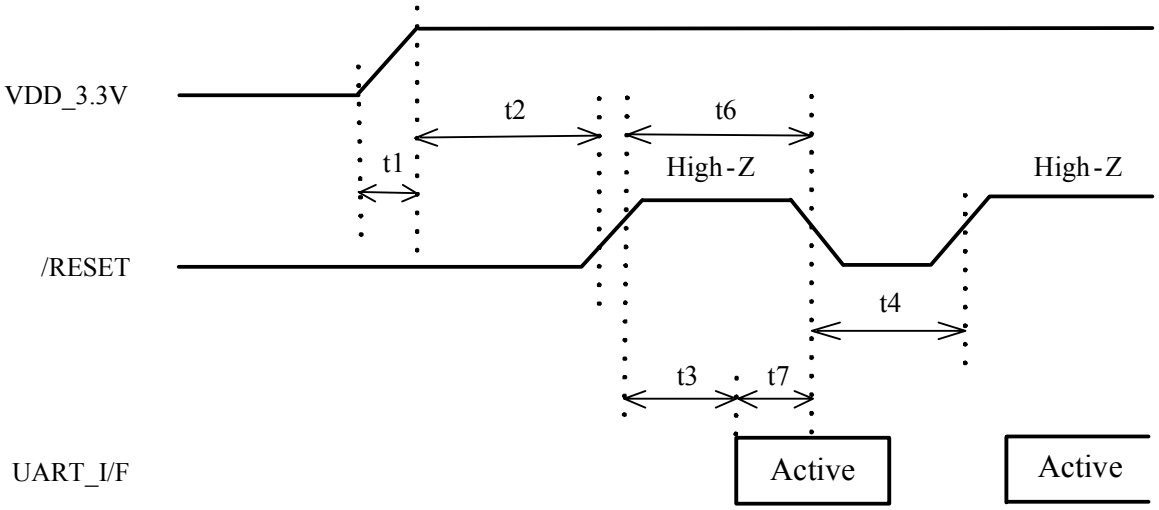
Notes:

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 flash memory. This operation occurs at every module initialization (power-on).
   If supply voltage becomes non-defined states during initialization or writing in flash memory, data in flash memory might be destroyed. If the data in flash memory 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-C061013 for HCI command which rewrites flash memory data.
2. Input /RESET signal of 10ms and more in condition of VDD_3.3V 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. Some of User Settings are stored in flash memory writable memory area and flash memory free space is controlled by Firmware. When the free space in flash memory is lower than certain amount, Defrag automatically starts. Amount of time required for Defrag will vary depending on the environment. Please conduct enough verification for the time required for the customer’s product under customer’s environment before use.
5. The Typ. is a reference value. The value may change depending on the firmware version, conditions of use and types of flash memory.
6. Internal /RESET composes of the circuit shown below. /RESET signal must be driven by open drain. Please input low voltage or open (1M ohm and over).
7. You don’t need to wait t6 if you confirm that this module has output “04 0F 04 00 01 00 00” (Hex).

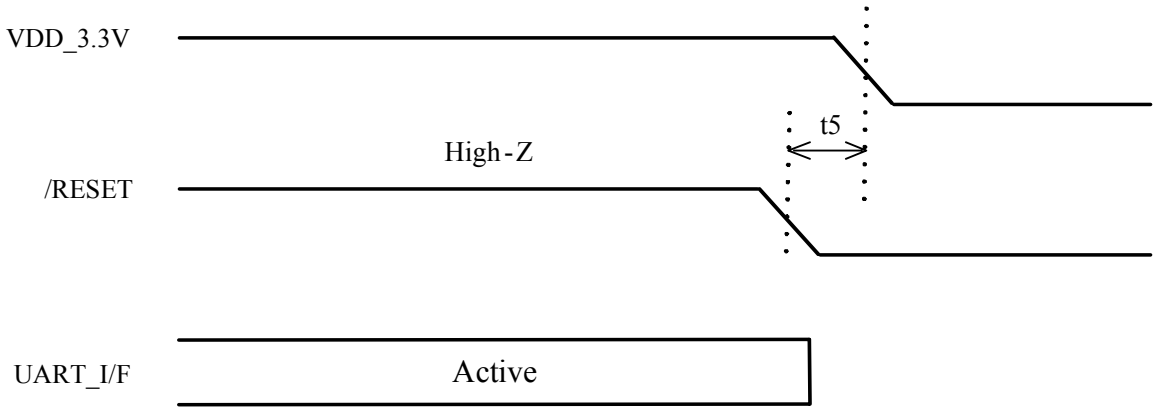


Equivalent Circuit of Internal Reset

Control No.		Control name
HD-AE-A061013	(3/5)	Electrical characteristics



Timing Diagram for Power Up Sequence



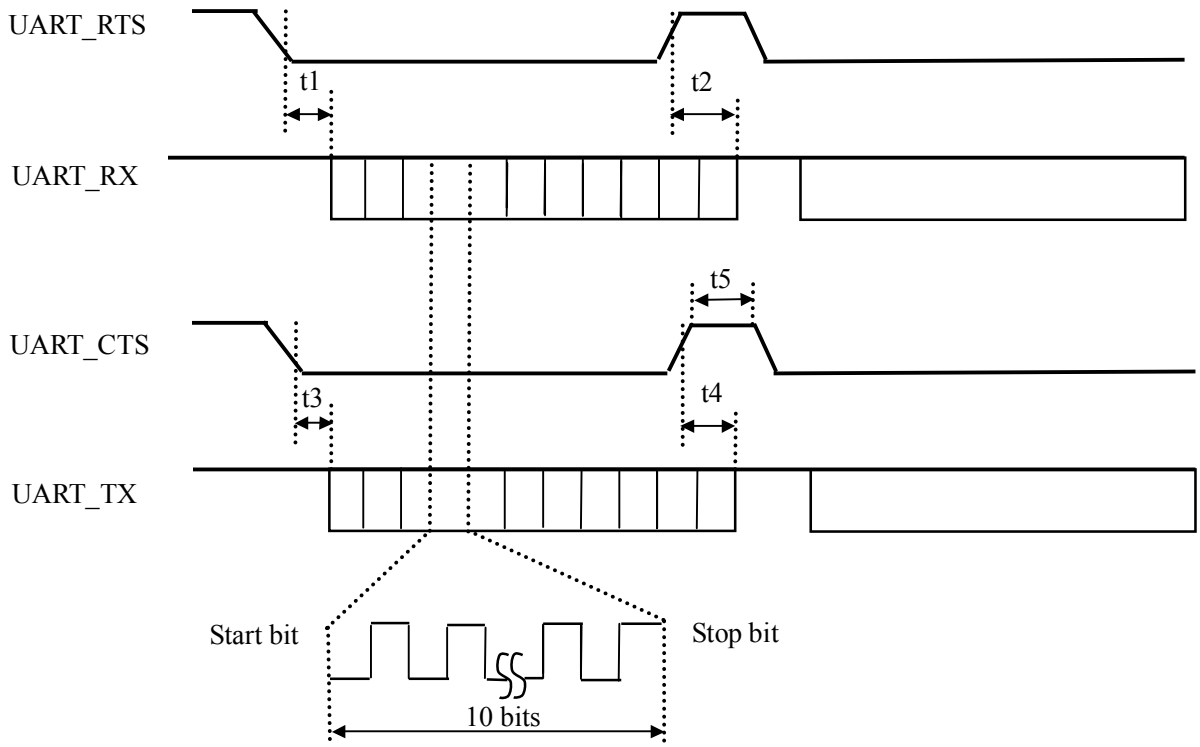
Timing Diagram for Power Down Sequence

AC Specifications

UART Interface

The Specification applies for Topr.= 25 degrees C, VDD_3.3V=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

Control No.		Control name
HD-AE-A061013	(5/5)	Electrical characteristics

<UART Parameters>

Item	Parameter
Baud Rate	921.6kbps (Error Rate 0.00% : Note1)
Date Bits	8bits
Stop Bits	1bit
Parity	None
Flow Control	CTS/RTS

Notes:
1. Simulated value.

PCM Interface

CODEC (MC145483: MOTOROLA) will be supported soon.

RF Specifications at Basic Rate

The Specification applies for Ta=25 degrees C, VDD_3.3V=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 %

Control No.		Control name
HD-AE-B061013	(2/3)	Electrical characteristics

Transmit Spectrum

Control No.		Control name
HD-AE-B061013	(3/3)	Electrical characteristics

RF Specifications at EDR

The Specification applies for Ta=25 degrees C, VDD_3.3V =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 2.0+EDR conformity

Control No.	Control name
HD-AE-C061013 (1/13)	Electrical characteristics

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 Version19.2 (Build1915)

Command Description	OpCode	Group (Hex)	Command (Hex)	Parameters	Returns	Status	Notes
LINK CONTROL							
Inquiry							
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	
Connection Management							
HCI _Create_ Connection	0x0405	1	5	BD ADDR Packet Type Page Scan Repetition Mode Page Scan Mode Clock Offset Allow Role Switch		Yes	a,b
HCI _Disconnect	0x0406	1	6	Connection Handle Reason		Yes	b
HCI _Add _SCO _Connection	0x0407	1	7	SCO Handle Packet Type		Yes	b,c, d,j.p
HCI _Create _Connection _Cancel	0x0408	1	8	BD ADDR	Status BD_ADDR	Yes	l
HCI _Accept _Connection _Request	0x0409	1	9	BD ADDR Role		Yes	
HCI _Reject _Connection _Request	0x040A	1	A	BD ADDR		Yes	
HCI _Change _Connection _Packet _Type	0x040F	1	F	Connection Handle Packet Type		Yes	
HCI _Setup _Synchronous _Connection	0x0428	1	28	Connection_Handle Transmit_Bandwidth Receive_Bandwidth Max_Latency Voice_Setting Retransmission_Effort Packet_Type		Yes	l,m, o,p
HCI _Accept _Synchronous _Connection _Request	0x0429	1	29	BD ADDR Transmit_Bandwidth Receive_Bandwidth Max_Latency Content Format Retransmission_Effort Packet_Type		Yes	l,m,o
HCI _Reject _Synchronous _Connection _Request	0x042A	1	2A	BD ADDR Reason		Yes	l,m,o

Authentication / Pairing

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 BD ADDR	Yes	
HCI _Authentication _Requested	0x0411	1	11	Connection Handle		Yes	
HCI _Change _Connection _Link _Key	0x0415	1	15	Connection Handle		Yes	

Encryption

HCI _Set _Connection _Encryption	0x0413	1	13	Connection Handle Encryption Enable		Yes	
HCI _Master _Link _Key	0x0417	1	17	Key Flag		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	1
HCI _Read _Remote _Supported _Features	0x041B	1	1B	Connection Handle		Yes	
HCI _Read _Remote _Extended _Features	0x041C	1	1C	Connection Handle Page_Number		Yes	1
HCI _Read _Remote _Version _Information	0x041D	1	1D	Connection Handle		Yes	
HCI _Read _Clock _Offset	0x041F	1	1F	Connection Handle		Yes	
HCI _Read _LMP _Handle	0x0420	1	20	Connection Handle	Status Connection Handle LMP_Handle Reseved	Yes	1

LINK POLICY

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 Mode Max Interval Sniff Mode 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	k
HCI _Exit _Park _State	0x0806	2	6	Connection Handle		Yes	k
HIC _QoS _Setup	0x0807	2	7	Connection Handle Flags Service Type Token Rate Peak Bandwidth Latency Delay Variation		Yes	e,m
HCI _Role _Discovery	0x0809	2	9	Connection Handle	Status Connection Handle Current Role	Yes	
HCI _Switch _Role	0x080B	2	B	BD ADDR Role		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	l
HCI _Write _Default _Link _Policy _Settings	0x080F	2	F	Default Link Policy Settings	Status	Yes	l
HCI _Flow _Specification	0x0810	2	10	Connection Handle Flags Flow direction Service Type Token Rate Token Bucket Size Peak Bandwidth Access Latency		No	l,m

HIST CONTROLLER & BASEBAND

HCI_Set_Event_Mask	0x0C01	3	1	Event Mask	States	Yes	
HCI_Reset	0x0C03	3	3		States	Yes	
HCI_Set_Event_Filter	0x0C05	3	5	Filter Type Filter Condition Type Condition	States	Yes	
HCI_Flush	0x0C08	3	8	Connection Handle	States Connection Handle	Yes	
HCI_Read_PIN_Type	0x0C09	3	9		States PIN Type	Yes	
HCI_Write_PIN_Type	0x0C0A	3	A	PIN Type	States	Yes	
HCI_Create_New_Unit_Key	0x0C0B	3	B		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	n
HCI_Delete_Stored_Link_Key	0x0C12	3	12	BD ADDR Delete All Flag	States Num Keys Deleted	Yes	n
HCI_Write_Local_Name	0x0C13	3	13	Local Name	States	Yes	f,k,n
HCI_Read_Local_Name	0x0C14	3	14		States Local Name	Yes	
HCI_Read_Connection_Accept_Timeout	0x0C15	3	15		States Conn Accept Timeout	Yes	
HCI_Write_Connection_Accept_Timeout	0x0C16	3	16	Conn Accept Timeout	States	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_Scan_Enable	0x0C19	3	19		States Scan Enable	Yes	
HCI_Write_Scan_Enable	0x0C1A	3	1A	Scan Enable	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_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_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_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_Voice_Setting	0x0C25	3	25		States Voice Setting	Yes	
HCI_Write_Voice_Setting	0x0C26	3	26	Voice Channel setting	States	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 _Num _Broadcast_ Retransmission	0x0C29	3	29		States	Yes	
HCI _Write _Num _Broadcast_ Retransmission	0x0C2A	3	2A	Num Broadcast Retransmission	States	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	
HCI _Read _Transmit _Power _Level	0x0C2D	3	2D	Connection Handle Type	States Connection Handle Power Level	Yes	
HCI _Read _Synchronous _Flow _Control _Enable	0x0C2E	3	2E		States Synchronous Flow Control Enable	No	c,d,k
HCI _Write _ Synchronous _Flow _Control _Enable	0x0C2F	3	2F	Synchronous Flow Control Enable	States	No	c,d,k
HCI _Set _Controller _To _Host _Flow _Control	0x0C31	3	31	Flow Control Enable	States	Yes	k
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 _Host _Number _Of _Completed _Packets	0x0C35	3	35	Number of Handles Connection handle [I] Host Num of Completed Packets [I]		Yes	
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 _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 _Page _Scan _Period _Mode	0x0C3B	3	3B		States Page Scan Period Mode	Yes	
HCI _Write _Page _Scan _Period _Mode	0x0C3C	3	3C	Page Scan Period Mode	States	Yes	
HCI _Read _Page _Scan _Mode	0x0C3D	3	3D		States Page Scan Mode	Yes	j
HCI _Write _Page _Scan _Mode	0x0C3E	3	3E	Page Scan Mode	States	Yes	h,j
HCI _Set _AFH _Host _Channel _Classification	0x0C3F	3	3F	AH Host Channel Classification	Status	Yes	l

HCI _Read _Inquiry _Scan _Type	0x0C42	3	42		Status Inquiry Scan Type	Yes	1
HCI _Write _Inquiry _Scan _Type	0x0C43	3	43	Inquiry Scan Type	Status	Yes	1
HCI _Read _Inquiry _Mode	0x0C44	3	44		Status Inquiry Mode	Yes	1
HCI _Write _Inquiry _Mode	0x0C45	3	45	Inquiry Mode	Status	Yes	1
HCI _Read _Page _Scan _Type	0x0C46	3	46		Status Page Scan Type	Yes	1
HCI _Write _Page _Scan _Type	0x0C47	3	47	Page Scan Type	Status	Yes	1
HCI _Read _AFH _Channel _Assessment _Mode	0x0C48	3	48		Status AFH Channel Assessment Mode	Yes	1
HCI _Write _AFH _Channel _Assessment _Mode	0x0C49	3	49	AFH Channel Assessment Mode	Status	Yes	1

INFORMATIONAL PARAMETERS

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	1
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	1
HCI _Read _Buffer _Size	0x1005	4	5		Status HC ACL Data Packet Length HC Synchronous Data Packet Length HC Total Num ACL Data Packet HC Total Num Synchronous Data Packe	Yes	
HCI _Read _Country _Code	0x1007	4	7		Status Country Code	Yes	j
HCI _Read _BD _ADDR	0x1009	4	9		Status BD ADDR	Yes	

STAUS PARAMETERS

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 _Link _Quality	0x1403	5	3	Connection Handle	Status Connection Handle Link Quality	Yes	k
HCI _Read _RSSI	0x1405	5	5	Connection Handle	Status Connection Handle RSSI	Yes	
HCI _Read _AFH _Channel _Map	0x1406	5	6	Connection Handle	Status Connection Handle AFH Mode AFH Channel Map	Yes	l
HCI _Read _Clock	0x1407	5	7	Which Clock Connection Handle	Status Connection Handle AFH Mode AFH Channel Map	Yes	l

TESTING

HCI _Read _Loopback _Mode	0x1801	6	1		States Loopback Mode	Yes	
HCI _Write _Loopback _Mode	0x1802	6	2	Loopback Mode	States	Yes	g,i
HCI _Enable _Device _Under _Test _Mode	0x1803	6	3		States	Yes	

Control No.		Control name
HD-AE-C061013	(8/13)	Electrical characteristics

Notes:

a) Up to seven connections: a slave of up to two masters, and/or a master of up to seven slave.
Some operations restricted or non-functional in a scatternet.

b) Chip resource limits constrain the rate at which ACL and SCO connections can be made and broken to approximately
20 per 15 seconds. The time limit can be configured.

c) Up to three SCO links. Each SCO link can be routed over the chip's PCM interface or over HCI/BCSP.
Preliminary Support for SCO over USB or H4 is in place, but testing has been light.

d) No HCI SCO Host Controller to Host flow control support.
No HCI SCO Host to Host Controller flow control support.

e) Limited support for "best effort" and "guaranteed" Qos only.

f) Initial device name taken from PS Keys, and so is maintained through a reset/reboot.

g) HCI Reset does not work if the device is in local loopback mode.

h) Optional Paging schemes not supported.

i) Remote ACL loopback sometimes deadlocks when the device's flow control mechanisms assert to each other.

j) Bluetooth v1.1 specification command, deprecated in the v1.2 specification; support retained for backwards compatibility.

k) Bluetooth v1.1 specification command, renamed in the v1.2 specification.
Park Mode ---> Park State
Exit Park Mode ---> Exit Park State
Set Host Controller To Host Flow Control ---> Set Controller To Host Flow Control
Change Local Name ---> Write Local Name
Read SCO Flow Control Enable ---> Read Synchronous Flow Control Enable
Write SCO Flow Control Enable ---> Write Synchronous Flow Control Enable
Get Link Quality ---> Read Link Quality

l) Command not in the Bluetooth v1.1 specification.

m) Underlying Flow_Specification functionality the same as for QoS_Setup.

n) Command which rewrites FROM in module

o) CVSD not available with 3EV3 or 3EV5 EDR packets.

p) HCI Setup Synchronous Connection command does not support HV1,HV2 and HV3 Packet Type. If you want to use those Packet Types,please use HCI Add SCO connection command.

HCI EVENT LIST

Event Description	**OpCode**	**Parameters**	Status	**Notes**

Inquiry

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	
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	b

Connection Management

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	
Synchronous _Connection _Complete	0x2C	Status Connection Handle BD ADDR Link Type Transmission Interval Retransmission Window Rx Packet Length Tx Packet Length Air Mode	Yes	b
Synchronous _Connection _Changed	0x2D	Status Connection Handle Transmission Interval Retransmission Window Rx Packet Length Tx Packet Length	Yes	b

Authentication / Pairing

Authentication _Complete	0x06	Status Connection Handle	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	

Encryption

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	

Remote Information

Remote _Name _Request _Complete	0x07	Status BD ADDR Remote Name	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	
Read _Remote _Extended _Features _Complete	0x23	Status Connection Handle Page Number Maximum page number Extended LMP Features	Yes	b

Link Policy

QoS _Setup _Complete	0x0D	Status Connection Handle Flags Service Type Token Rate Peak Bandwidth Latency Delay Variation	Yes	
Role _Change	0x12	Status BD ADDR New Role	Yes	
Mode _Change	0x14	Status Connection Handle Current Mode Interval	Yes	
Flow _Specification _Complete	0x21	Status Connection Handle Flags Flow direction Service Type Token Rate Token Bucket Size Peak Bandwidth Access Latency	Yes	b,c

General

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	
Number _Of _Completed _Packets	0x13	Number of Handles Connection Handle [I] HC Num HCI Data Packets [I]	Yes	
Data _Buffer _Overflow	0x1A	Link Type	No	a
Max _Slots _Change	0x1B	Connection Handle LMP Max Slots	Yes	
Read _Clock _Offset _Complete	0x1C	Status Connection Handle Clock Offset	Yes	

Host Controller & Baseband

Flush _Occurred	0x11	Connection Handle	Yes	
Loopback _Command	0x19	HCI Command Packet	Yes	
Connection _Packet _Type _Change	0x1D	Status Connection Handle Packet Type	Yes	
QoS _Violation	0x1E	Connection Handle	No	
Page _Scan _Mode _Change	0x1F	BD ADDR Page Scan Mode	No	d
Page _Scan _Repetition _Mode _Change	0x20	BD ADDR Page Scan Repetition Mode	Yes	

Notes:

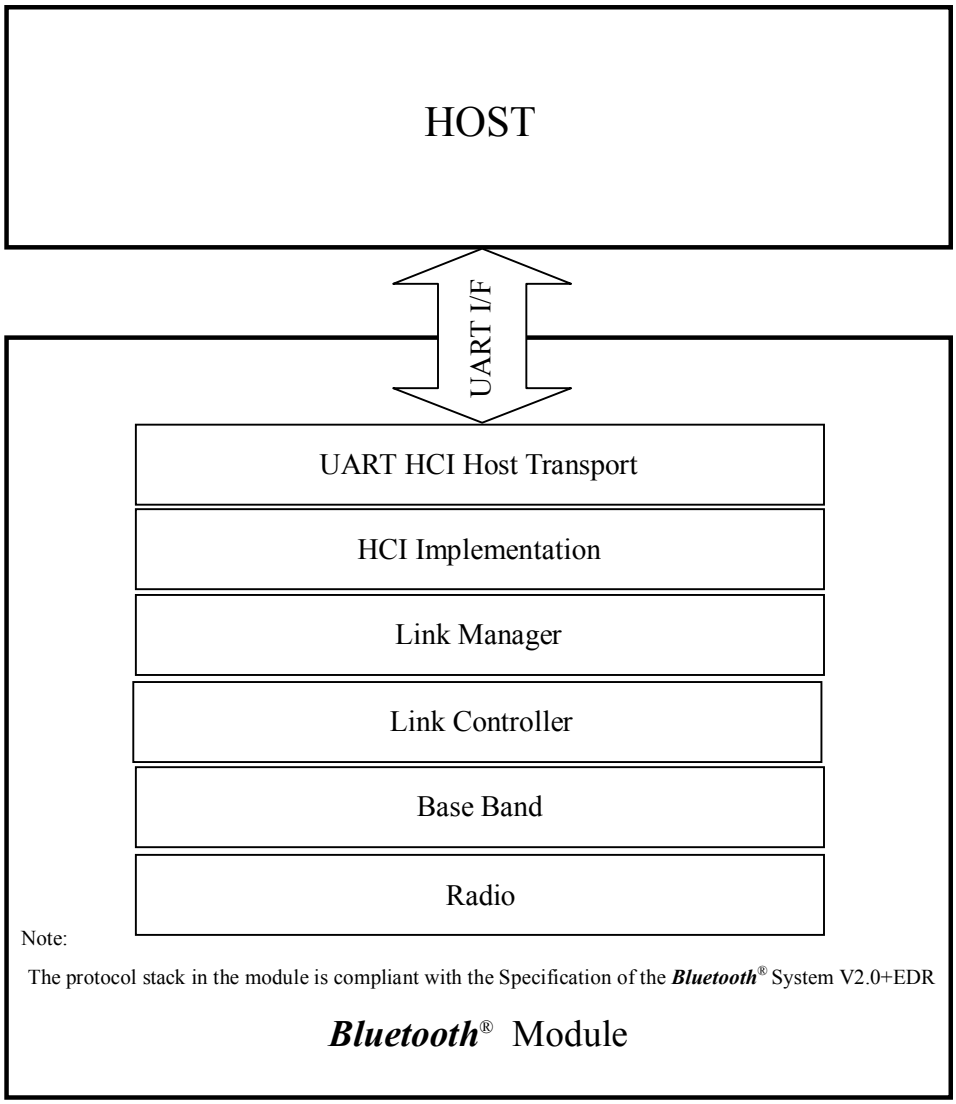
a) Significance and expected recovery procedure is ill defined.

b) Event not in the Bluetooth v1.1 specification.

c) Event provoked by local Flow Specification command, even through the command is not implemented.

d) Optional paging schemes not supported. Bluetooth v1.1 specification only.

Module Stack



PICS for Firmware Version19.2 (Build1915)

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

SUMMARY

Table 2-1: Controller Core Specification

Item	Specification Name	Support
1	Core Spec Version 1.1, Adopted 5 Feb 2001 (Ver. 1.1)	No
2	Core Spec Version 1.2, Adopted 5 Nov 2003 (Ver. 1.2)	No
3	Core Spec Version 2.0, Adopted 4 Nov 2004 (Ver. 2.0)	No
4	Core Spec Version 2.0 + EDR, Adopted 4 Nov 2004(Ver. 2.0 + EDR)	Yes

Table 2-2: EDR Features

Prerequisite: 2-1/4 (Ver. 2.0 + EDR)

Item	Feature	Support
1	EDR for asynchronous transports (single slot)	Yes
2	EDR for asynchronous transports (multi-slot)	Yes
3	EDR for synchronous transports	Yes

RF

RF Capabilities (based on PICS proforma for Radio):

Table A.1: RF Capabilities

Item	Capability	Status	Support	Values	
				Allowed	Supported
1	Power Class (1,2 or 3)	M	Yes	1 .. 3	2
2	Power Control	C.1	Yes	-	-
3	1-slot packets supported	M	Yes	-	-
4	3-slot packets supported	O	Yes	-	-
5	5-slot packets supported	O	Yes	-	-
6	79 Channels	M	Yes	-	-
7	Support for GFSK modulation	M	Yes	-	-
8	Support for π/4-DQPSK modulation	C.2	Yes	-	-
9	Support for 8DPSK modulation	C.3	Yes	-	-

C.1: Mandatory to support if Power Class 1 is supported, optional to support if Power Class 2 or 3 is supported.

C.2: Mandatory if SUMMARY, 2-1/4 is claimed; Optional if SUMMARY, 2-1/3 is claimed; Excluded otherwise.

C.3: Mandatory if SUMMARY, 2-1/4 is claimed; Else Optional if (RF, 1/8 AND SUMMARY, 2-1/3) is claimed; Excluded otherwise.

Baseband

Baseband Capabilities (based on PICS proforma for Baseband)

Table B.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 B.1a: Modulation schemes

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, 2-1/4) is claimed; Optional if (SUMMARY, 2-1/3) is claimed; Excluded otherwise.

C.2: Mandatory if (SUMMARY, 2-1/4) is claimed; Optional if (BB, 1a/2 AND SUMMARY, 2-1/3) is claimed;

Excluded otherwise.

Table B.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, 2-2/1 OR SUMMARY, 2-2/2) is claimed;

ELSE Optional IF (SUMMARY, 2-1/3 OR SUMMARY, 2-1/4) is claimed; Excluded otherwise.

C.2: Mandatory IF SUMMARY, 2-2/3 is claimed; ELSE Optional IF (SUMMARY, 2-1/3 OR SUMMARY, 2-1/4) is claimed;

Excluded otherwise.

Table B.3: SCO Link Support

Prerequisite: B.2/2 (Support of SCO link)

Item	Capability	Status	Support	Values	
				Allowed	Supported
1	SCO links to same Slave	C.1	No	1 .. 3	3
2	SCO links to different Slaves	O	No	1 .. 3	3
3	SCO links from same Master	C.1	No	1.. 3	3
4	SCO links from different Masters	O	No	2	-

C.1: Mandatory to support at least 1 link.

Prerequisite: B.2/3 (Support of eSCO link)

Item	Capability	Status	Support	Values	
				Allowed	Supported
5	eSCO links to same Slave	C.2	No	(1 .. 6)	6
6	eSCO links to different Slaves	O	No	(2 .. 5)	3
7	eSCO links from same Master	C.2	No	(1 .. 6)	6
8	eSCO links from different Masters	O	No	(2 ..)	-

C.2: Mandatory to support at least 1 link.

Table B.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 B.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 B.5a: Enhanced Data Rate ACL packet types

Prerequisite: B.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, 2-2/1 OR SUMMARY, 2-2/2) is claimed; ELSE Optional IF BB, 1a/2 is claimed; Excluded otherwise.

C.2: Mandatory IF SUMMARY, 2-2/2 is claimed; ELSE Optional IF BB, 1a/2 is claimed; Excluded otherwise.

C.3: Mandatory IF (SUMMARY, 2-2/1 OR SUMMARY, 2-2/2) is claimed; ELSE Optional IF BB 1a/3 is claimed; Excluded otherwise.

C.4: Mandatory IF SUMMARY, 2-2/2 is claimed; ELSE Optional IF (BB, 5a/2 AND BB, 5a/4) is claimed; Excluded otherwise.

C.5: Mandatory IF SUMMARY 2-2/2 is claimed; ELSE Optional IF (BB, 5a/3 AND BB, 5a/4) is claimed; Excluded otherwise.

Table B.6: SCO and eSCO Packet Types

Prerequisite for items 1-4: B.2/2 (Support of SCO link)

Item	Capability	Status	Support
1	Support of HV1 packet type	M	Yes
2	Support of HV2 packet type	O	Yes
3	Support of HV3 packet type	O	Yes
4	Support of DV packet type	M	Yes

Prerequisite for items 5-7: B.2/3 (Support of eSCO link)

Item	Capability	Status	Support
5	Support of EV3 packet type	M	Yes
6	Support of EV4 packet type	O	Yes
7	Support of EV5 packet type	O	Yes

Table B.6a: Enhanced Data Rate eSCO packet types

Prerequisite: B.2/5 (Support of 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, 2-2/3 is claimed; ELSE Optional IF BB, 1a/2 is claimed; Excluded otherwise.

C.2:Optional IF BB, 1a/2 is claimed; Excluded otherwise.

C.3: Mandatory IF SUMMARY, 2-2/3 is claimed; ELSE Optional IF BB, 1a/3 is claimed; Excluded otherwise.

C.4: Optional IF BB, 1a/3 is claimed; Excluded otherwise.

Table B.7: Page Procedures

Item	Capability	Status	Support
1	Support paging	M	Yes
2	Support page scan	M	Yes
3			
4			
5	Supports Interlaced Scan during page scan	O	Yes

Table B.8: Paging Schemes

Item	Capability	Status	Support
1	Supports mandatory scan mode)	M	Yes

Table B.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 B.9 (b): 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 B.10: Inquiry Procedures

Item	Capability	Status	Support
1	Support inquiry	O	Yes
2	Inquiry scan with first FHS	O	Yes
3			
4			
5	Supports the dedicated inquiry access code	O	Yes
6	Supports Interlaced Scan during inquiry scan	O	Yes

Table B.11: Piconet Capabilities

Item	Capability	Status	Support	Values	
				Allowed	Supported
1	Broadcast messages	O	Yes	N/A	-
2	Point-to-multipoint connections	O	Yes	(2 .. 7)	7

Table B.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 B.13: Synchronous Coding Schemes

Prerequisite: B.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

Link Manager

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

Table C.1: Response Messages

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

Table C.2: Supported Features

Item	Capability	Status	Support
1	3-slot packets	O	Yes
2	5-slot packets	O	Yes
3	Encryption	O	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

C.1: If Power Class 1 is supported (RF, 1/1=1) then Mandatory, else Optional.

C.2: Mandatory IF (SUMMARY 2-2/1 OR SUMMARY 2-2/2) is claimed;

ELSE Optional IF (SUMMARY 2-1/3 OR SUMMARY 2-1/4) is claimed; Excluded otherwise.

C.3: Mandatory IF SUMMARY 2-2/3 is claimed; ELSE Optional IF (SUMMARY 2-1/3 OR SUMMARY 2-1/4) is claimed;

Excluded otherwise.

Table C.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 C.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 of Pairing /4 and Pairing /5.

C.2: Mandatory to support if Pairing /5 AND (Pairing /1 OR Pairing /2) is supported.

Table C.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			
6			
7	Accept pairing with Unit Key	O	Yes

C.1: Mandatory to support at least one of the key types.

Table C.6: Encryption

Prerequisite: C.2/3 (Encryption supported)

Item	Capability	Status	Support
1	Initiate encryption	O	Yes
2	Accept encryption requests	M	Yes
3			
4			
5	Key size negotiation	M	Yes
6	Start encryption	M	Yes
7	Accept start of encryption	M	Yes
8	Stop encryption	M	Yes
9	Accept stop of encryption	M	Yes

Table C.7: Clock Offset Information

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

Table C.8: Slot Offset Information

Prerequisite: C.2/4 (Slot offset)

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

C.1: Mandatory to support if support if Role Switch/1 (Master/Slave switch) otherwise optional.

Table C.9: Timing Accuracy Information

Prerequisite: C.2/5 (Timing accuracy)

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

Table C.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 C.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 to support if any of the optional features in Supported Features /1-3, Supported Features /5, Supported Features /7-12, Supported Features /14-16, Adaptive Frequency Hopping /1 is requested by the IUT otherwise optional.

C.2: Mandatory if a feature requiring another features page is supported, otherwise optional.

Table C.12: Name Information

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

Table C.13: Role Switch

Prerequisite: C.2/6 (Role switch)

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

Table C.14: Detach

Item	Capability	Status	Support
1	Detach connection	M	Yes

Table C.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, otherwise excluded.

Table C.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, otherwise excluded.

Table C.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 to support if LMP, 15 /1 (Force hold mode) is supported, otherwise optional.

Table C.16: Sniff mode

Prerequisite: C.2/8 (Sniff mode)

Item	Capability	Status	Support
1			
2	Request sniff mode	O	Yes
3	Respond to sniff mode requests (renegotiate or reject)	M	Yes
4			
5	Request un-sniff	C.1	Yes
6	Accept un-sniff requests	M	Yes

C.1: If LMP, 16/2 (Request sniff mode) is supported then mandatory to support, otherwise optional.

Table C.17: Park mode

Prerequisite: C.2/9 (Park Mode)

Item	Capability	Status	Support
1			
2	Request park mode	O	Yes
3	Respond to park mode requests	M	Yes
4			
5	Set up broadcast scan window	O	Yes
6	Accept changes to the broadcast scan window	M	Yes
7	Modify beacon parameters	O	Yes
8	Accept modification of beacon parameters	M	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	Yes
13	Accept Unpark using BD_ADDR	M	Yes

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 to support, otherwise optional.

Table C.18: Power Control

Prerequisite: C.2/13 (RSSI)

Item	Capability	Status	Support
1	Request to increase power	M	Yes
2	Request to decrease power	M	Yes

Prerequisite: C.2/10 (Power control)

Item	Capability	Status	Support
3	Respond when max power reached	M	Yes
4	Respond when min power reached	M	Yes

Table C.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 C.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 to support if support of LMP, 2 /11 is stated in the feature request, otherwise optional.

Table C.21: SCO Links

Prerequisite: C.2/12 (SCO link)

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 link, as Master	C.1	Yes
5	Remove SCO link, as Slave	C.2	Yes
6	Negotiate SCO link parameters, as Master	C.3	Yes
7	Negotiate SCO link parameters, sa Slave	C.4	Yes

C.1: Mandatory to support if LMP, 21 /1 (Initiating SCO links, as Master) is supported, otherwise optional.

C.2: Mandatory to support if LMP, 21 /2 (Initiating SCO links, as Slave) is supported, otherwise optional.

C.3: Mandatory to support if LMP, 21 /1 (Initiating SCO links, as Master) or LMP, 21/3 (Accept SCO links) is supported, otherwise optional.

C.4: Mandatory to support if LMP, 21 /2 (Initiating SCO links, as Slave) or LMP, 21/3 (Accept SCO links) is supported, otherwise optional.Comments:

Table C.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 to support if LMP, 2 /1 and/or LMP, 2 /2 is supported in the feature request, otherwise optional.

Table C.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 C.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 C.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 C.26: Adaptive Frequency Hopping

Prerequisite: C.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, otherwise excluded.

C.2: Mandatory if LMP, 26/6 is supported, otherwise excluded.

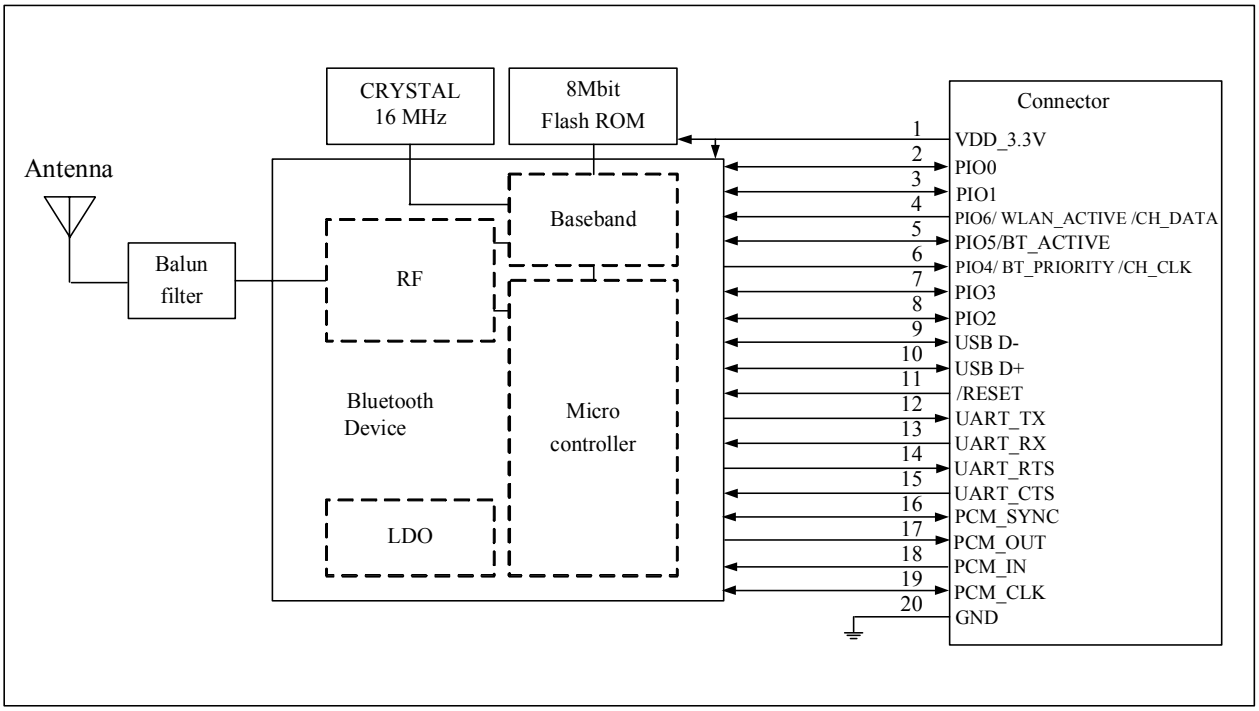
C.3: Mandatory if LMP, 26/1 or LMP, 26/4 is supported, otherwise optional.

Notes:

This Data Report is based on “1846_BC4-Ext_RF.ICS-2.0.E.0”, “1847_HCIStack2.0EDR_BB.ICS-2.0.E.0”, “1848_HCIStack2.0EDR_LMP.ICS-2.0.E.0”and “SUM.ICS-2.0.E.4”.

Control No.		Control name
HD-MC-A061013	(1/1)	Circuit Schematic

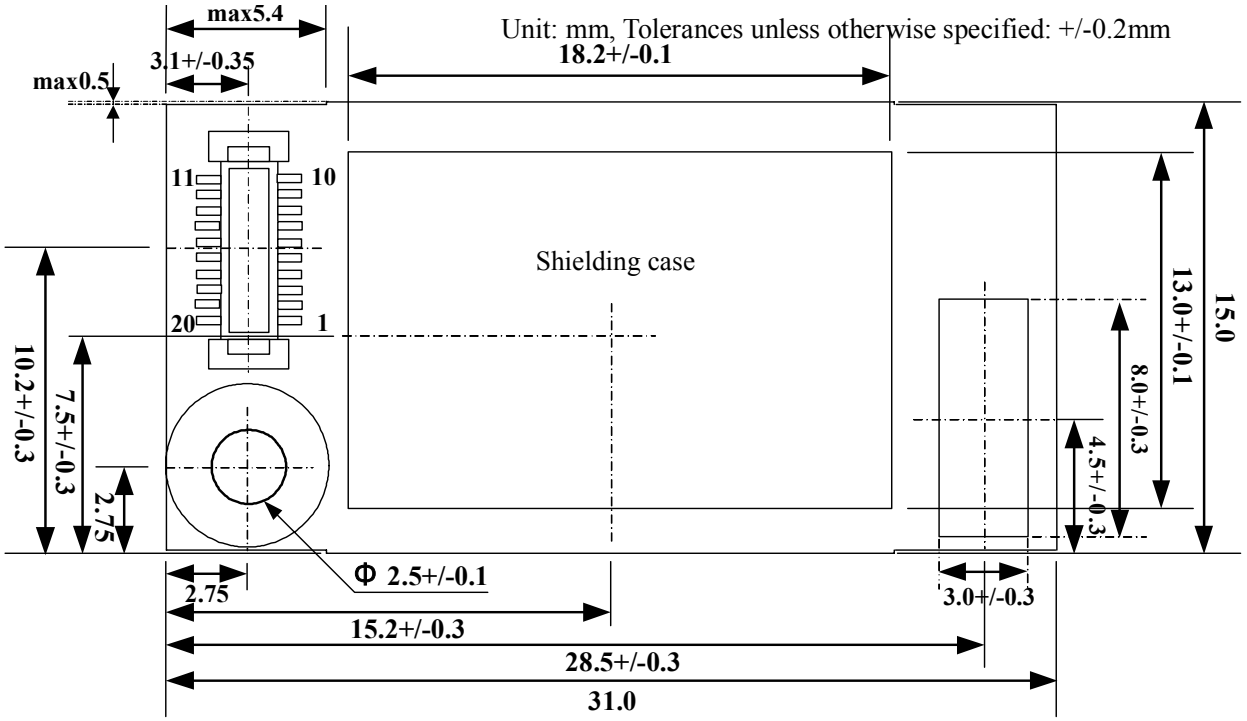
Block Diagram

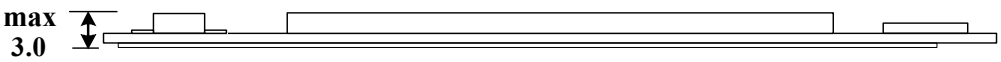


EYSFDCAWD

Control No.	Control name
HD-AD-A061013 (1/2)	Outline/Appearance

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



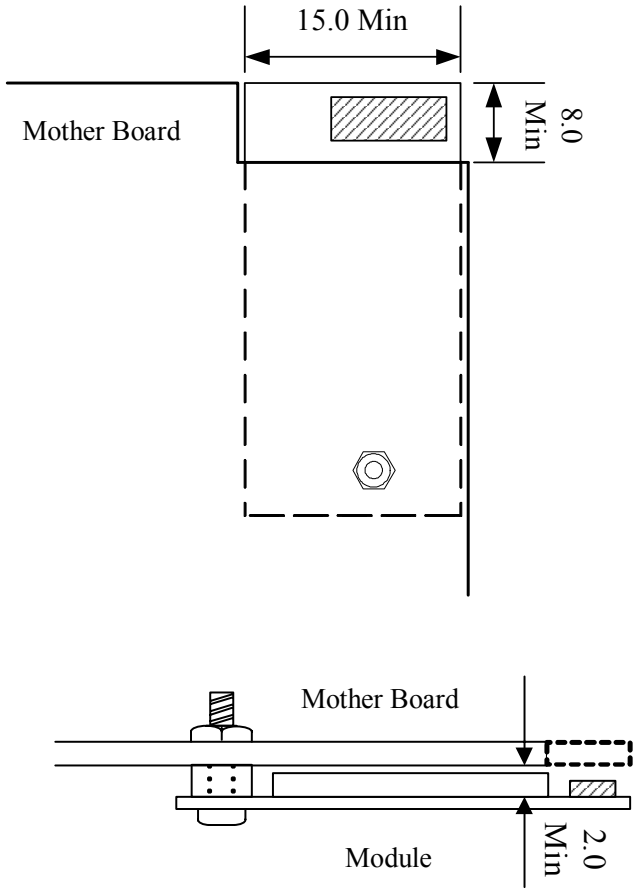


Note:

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

Recommendation for Module Mouting

Unit : mm



Notes:

a. We recommend cutting motherboard, on which Taiyo Yuden module will be mounted, as described in the followings in order to ensure antenna characteristics.

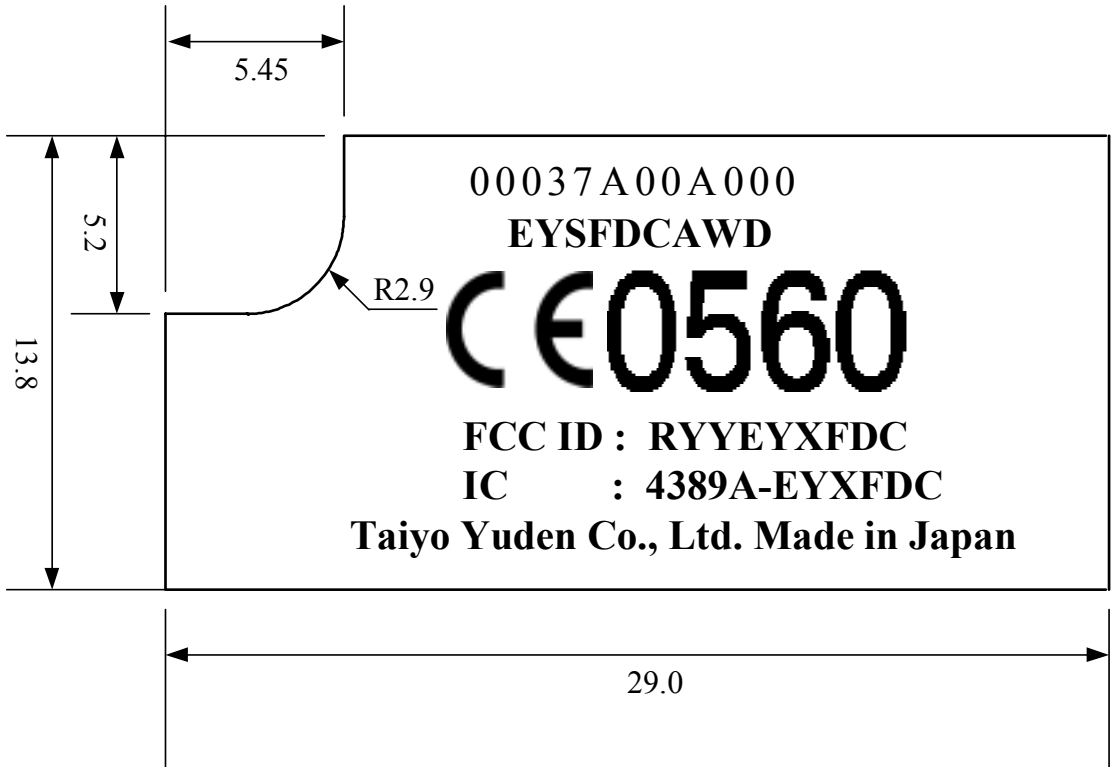
b. In addition we recommend keeping a case away from module antenna area and making the case with materials other than metal.

EYSFDCAWD

Control No.		Control name
HD-AD-B061013	(1/1)	Outline/Appearance

Indication label

Unit: mm



Material: PET (UL969) / Label color : White

Control No.		Control name
HD-BA-A061013	(1/2)	Pin Layout

Pin Descriptions

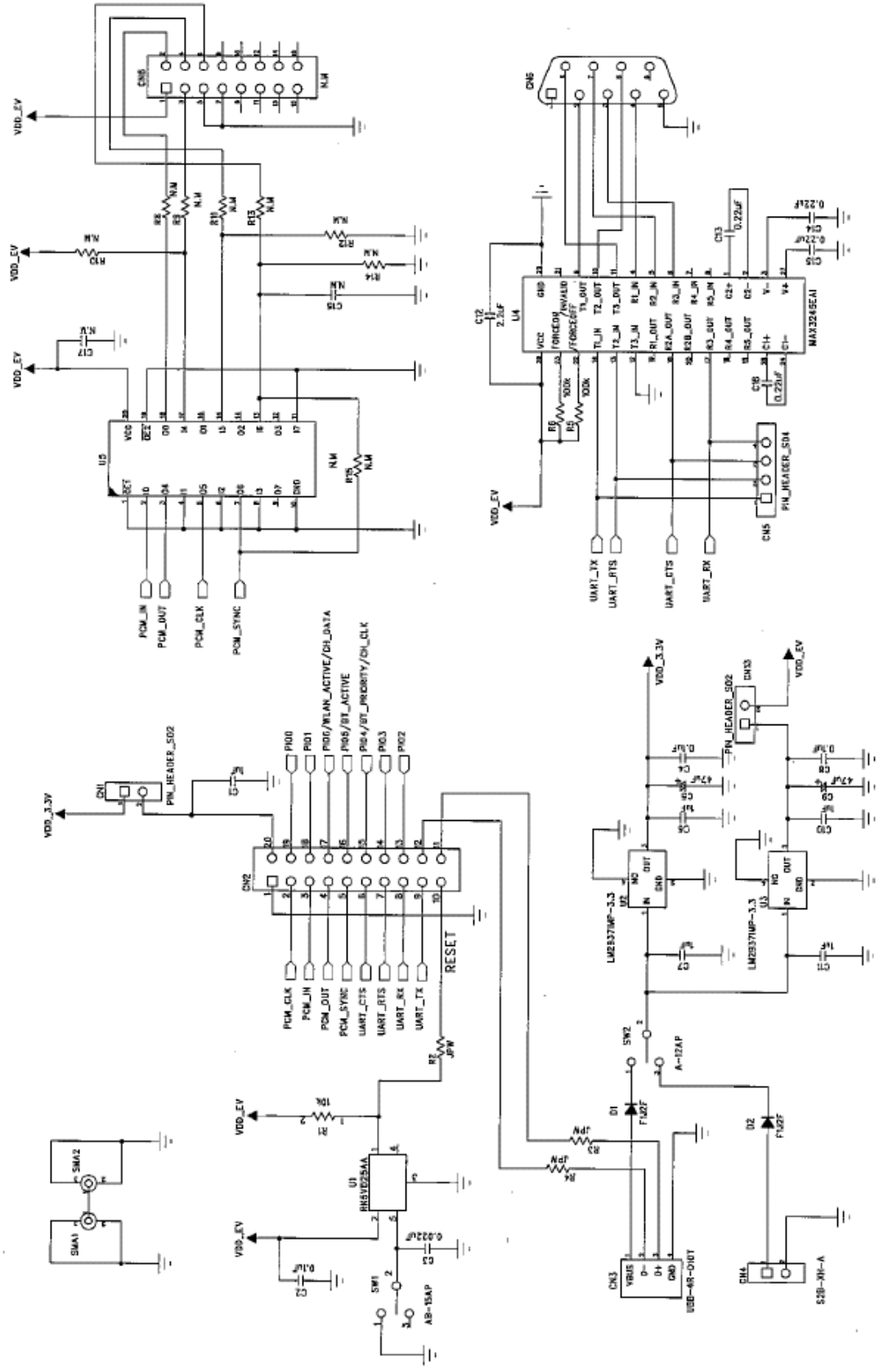
Terminal No.	Terminal name	Input/Output	Description	Remark
1	VDD_3.3V	Input	DC3.3V Power supply	Note 1
2	PIO0	Input/Output	Reserved, Keep on set side terminal open. Bi-directional with programmable strength internal pull-up/down.	Note 2
3	PIO1	Input/Output	Reserved, Keep on set side terminal open. Bi-directional with programmable strength internal pull-up/down.	Note 2
4	PIO6/ WLAN_ACTIVE/ CH_DATA	Input	WLAN_Active/CH_Data input for Co-existence signaling.	Note 2
5	PIO5/ BT_ACTIVE	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.)	Note 2
6	PIO4/ BT_PRIORITY/ CH_CLK	Output	BT_Priority/CH_CLK output for Co-existence signaling.	Note 2
7	PIO3	Input/Output	Reserved, Keep on set side terminal open. Bi-directional with programmable strength internal pull-up/down.	Note 2
8	PIO2	Input/Output	Reserved, Keep on set side terminal open. Bi-directional with programmable strength internal pull-up/down.	Note 2
9	USB_D-	-	This signal should be connected to ground	
10	USB_D+	-	This signal should be connected to ground	
11	/RESET	Input	Active low RESET signal with internal weak pull-up	Note 3
12	UART_TX	Output	TX data to host	
13	UART_RX	Input	RX data from host (with weak internal pull-down)	
14	UART_RTS	Output	UART request to send active low(flow control signal to host, tristatable with internal pull-up)	
15	UART_CTS	Input	UART clear to send active low (flow control signal from host, with weak internal pull-down)	
16	PCM_SYNC	Input/Output	Synchronous data SYNC (with weak internal pull-down)	
17	PCM_OUT	Output	Synchronous data (tristatable with internal weak pull-down)	
18	PCM_IN	Input	Synchronous data (with internal weak pull-down)	
19	PCM_CLK	Input/Output	Synchronous data clock (with weak internal pull-down)	
20	GND	-	Ground	

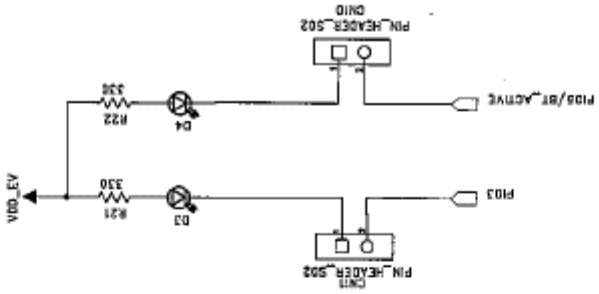
Control No.		Control name
HD-BA-A061013	(2/2)	Pin Layout

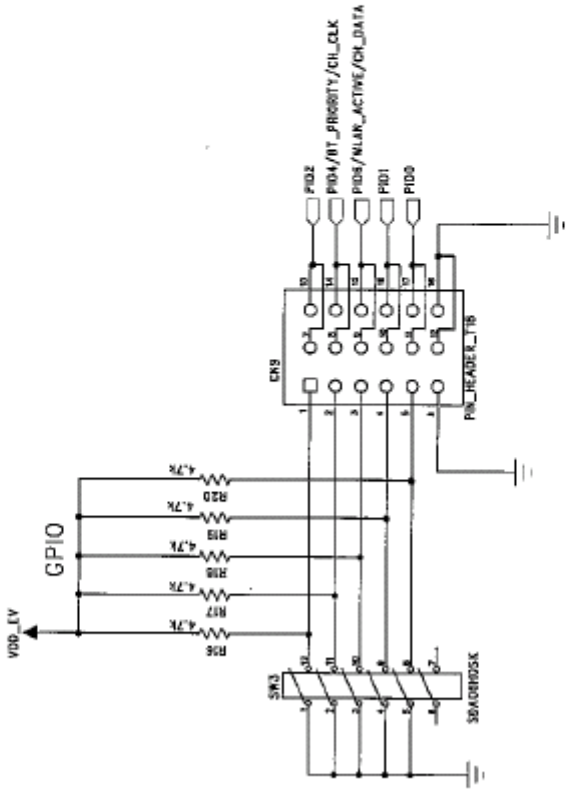
Notes:

1. Pin1 (VDD_3.3V) is used for power supply of BT module. (MAX 200mA).
   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_3.3V outside as a bypass capacitor .
2. Strength pull-downs (pull-ups) are equivalent to a few kOhms resistance, but are more accurately modeled as a 40uA current drain (source)
3. Weak pull-ups can be thought of 1M Ohm connections to VDD, but are more accurately modeled as a -1uA current source.
4. PCM interface will be supported in the future.

Evaluation Board Schematic Sample




PIN_HEADER_S02
CN10
PIO6/BT_ACTIVE
R22
330
D4
VDD_EV
R21
330
D3
PIO3
PIN_HEADER_S02
CN11


PIO2
PIO4/BT_PRIORITY/CH_CLK
PIO5/WLAN_ACTIVE/CH_DATA
PIO1
PIO0
CN9
PIN_HEADER_7P6
GPIO
4.7K
R20
4.7K
R19
4.7K
R18
4.7K
R17
4.7K
R16
VDD_EV
SW3
SDA08R05K

Evaluation Board BOM Sample

Parts No.	Description	Value	Parts name and standard	Supplier
U1	IC		RN5VD25AA-TR	RICOH or equivalent
U2	IC		LM2937IMP-3.3	NATIONAL or equivalent
U3	IC		LM2937IMP-3.3	NATIONAL or equivalent
U4	IC		MAX3245CAI	MAXIM
CN1	CONNECTOR		PIN_HEADER_S02	HIROSE or equivalent
CN2	CONNECTOR		AXK5F20545YJ (Connect EYSFDCAWD)	Matsushita Electric Works or equivalent
CN3	CONNECTOR		UBB-4R-D14T-1	JST or equivalent
CN4	CONNECTOR		S2B-XH-A	JST or equivalent
CN5	CONNECTOR		PIN_HEADER_S04	HIROSE or equivalent
CN6	CONNECTOR		RDED-9S-LNA	HIROSE or equivalent
CN7	CONNECTOR		PIN_HEADER_S02	HIROSE or equivalent
CN9	CONNECTOR		PIN_HEADER_T18	HIROSE or equivalent
CN10	CONNECTOR		PIN_HEADER_S02	HIROSE or equivalent
CN11	CONNECTOR		PIN_HEADER_S02	HIROSE or equivalent
CN12	CONNECTOR		PIN_HEADER_S02	HIROSE or equivalent
CN13	CONNECTOR		PIN_HEADER_S02	HIROSE or equivalent
SMA1	CONNECTOR		82SMA-50-0-1	SUHNER or equivalent
SMA2	CONNECTOR		U.FL-R-SMT-1	HIROSE or equivalent
SW1	SWITCH		AB-15AP	NIKKAI or equivalent
SW2	SWITCH		A-12AP	NIKKAI or equivalent
SW3	SWITCH		SMS506	FUJISOKU or equivalent
C1	CAPACITOR	1uF	LMK107 BJ105KA-T	TAIYO YUDEN or equivalent
C2	CAPACITOR	0.1uF	EMK107 BJ104KA-T	TAIYO YUDEN or equivalent
C3	CAPACITOR	22 nF	TMK107 BJ223KA-T	TAIYO YUDEN or equivalent
C4	CAPACITOR	0.1uF	EMK107 BJ104KA-T	TAIYO YUDEN or equivalent
C5	CAPACITOR	47uF	TMCM-C 1A 476M	HITACHI AIC or equivalent
C6	CAPACITOR	1uF	LMK107 BJ105KA-T	TAIYO YUDEN or equivalent
C7	CAPACITOR	1uF	LMK107 BJ105KA-T	TAIYO YUDEN or equivalent
C8	CAPACITOR	0.1uF	EMK107 BJ104KA-T	TAIYO YUDEN or equivalent
C9	CAPACITOR	47uF	TMCM-C 1A 476M	HITACHI AIC or equivalent
C10	CAPACITOR	1uF	LMK107 BJ105KA-T	TAIYO YUDEN or equivalent
C11	CAPACITOR	1uF	LMK107 BJ105KA-T	TAIYO YUDEN or equivalent
C12	CAPACITOR	2.2uF	JMK107 BJ225MA-T	TAIYO YUDEN or equivalent
C13	CAPACITOR	0.22uF	EMK107 BJ224KA-T	TAIYO YUDEN or equivalent
C14	CAPACITOR	0.22uF	EMK107 BJ224KA-T	TAIYO YUDEN or equivalent
C15	CAPACITOR	0.22uF	EMK107 BJ224KA-T	TAIYO YUDEN or equivalent
C16	CAPACITOR	0.22uF	EMK107 BJ224KA-T	TAIYO YUDEN or equivalent
R1	RESISTOR	10k ohm	MCR03 103J	ROHM or equivalent
R2	RESISTOR	JPW	MCR03 JPW	ROHM or equivalent
R3	RESISTOR	JPW	MCR03 JPW	ROHM or equivalent
R4	RESISTOR	JPW	MCR03 JPW	ROHM or equivalent

Parts No.	Description	Value	Parts name and standard	Supplier
R5	RESISTOR	100k ohm	MCR03 104J	ROHM or equivalent
R6	RESISTOR	100k ohm	MCR03 104J	ROHM or equivalent
R16	RESISTOR	4.7k ohm	MCR03 472J	ROHM or equivalent
R17	RESISTOR	4.7k ohm	MCR03 472J	ROHM or equivalent
R18	RESISTOR	4.7k ohm	MCR03 472J	ROHM or equivalent
R19	RESISTOR	4.7k ohm	MCR03 472J	ROHM or equivalent
R20	RESISTOR	4.7k ohm	MCR03 472J	ROHM or equivalent
R21	RESISTOR	330 ohm	MCR03 331J	ROHM or equivalent
R22	RESISTOR	330 ohm	MCR03 331J	ROHM or equivalent
D1	DIODE		F1J2F	ORIJIN or equivalent
D2	DIODE		F1J2F	ORIJIN or equivalent
D3	DIODE		SML-010MT(GREEN)	ROHM or equivalent
D4	DIODE		SML-010MT(GREEN)	ROHM or equivalent
	SMA CONNECTOR		82 SMA-50-0-1/111NH	SCHNER or equivalent