

Bluetooth®+Wireless LAN Module

**Bluetooth® 3.0
IEEE802.11a/b/g/n**

WYSBMVGXB

Data Report

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Rev. record

21-May-2015> Ver.1.0 Released

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Control No. HD-AG-A100041	(1/2)	Control name 一般事項書
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適用

本仕様書は、太陽誘電株式会社(“弊社”)により製造される **Wireless LAN** ハイブリッド IC “WYSBCVGXB” (“本製品”)に適用する。

1. 型番: WYSBCVGXB
2. 機能: 無線通信モジュール(*IEEE802.11abgn* 規格準拠)
(*Bluetooth® 3.0* 規格準拠)
3. 用途: 携帯機器
4. 構造: ガリウムヒ素化合物 モノリシック半導体を用いた混成集積回路
お客様での Pb フリー実装可否(本製品の耐熱性): 可能
本製品内の環境物質含有
*RoHS 指令に適合しています。
5. 外形: 77ピン リードレスチップキャリア
6. 表示: 品名、Lot 番号
7. 仕様:
 - IEEE802.11abgn* 規格準拠
 - Bluetooth® 3.0* 規格準拠
 - インターフェース SDIO,PCM
 - EEPROM (BDアドレス、MACアドレス)内蔵
8. セキュリティ: WEP (64/128), AES, TKIP, WPA/WPA2, WAPI
9. 梱包
 - 梱包方法: リール
 - 梱包単位: 1500 個/リール
 - 梱包材料: PPE/ PET/AL/NY/PE
10. その他:
 - a. 本製品は耐放射線設計をしておりませんので、放射線のストレスを受ける環境下での使用は避けてください。
 - b. 本製品の保証使用条件は本仕様書の通りです。
本保証条件以外の条件で御使用になった結果発生した不良・不具合につきましては、弊社は責任を負い兼ねますので御了承下さい。

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Control No. HD-AG-A100041	(2/2)	Control name 一般事項書
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- c. 本仕様書に記載されている本製品は、民生機器用として製造されております。
従って、高度の安全性や信頼性が求められる医療用機器、宇宙用機器、あるいは防災機器等にお使いになるときには、本製品の適用可能性、相応性、特定目的に対する適合性をお客様の独自の責任で十分に評価、検討され、御判断下さい。
又、一般機器において御使用になる場合にも、お客様の独自の責任で十分な安全性評価を実施され、必要に応じて設計時に保護回路等を追加してください。
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- e. 本製品と本製品又は他製品の通信は、周囲の電波環境及び機器環境により確立又は維持し難くなる場合があります。
- f. 本製品は 2.4GHz/5GHz 帯の周波数を使用しています。本製品を本製品と同じ周波数を使用した他の無線機器の周辺でご使用になりますと、本製品とかかる他の無線機器との間で電波干渉が発生する可能性があります。電波干渉が発生した場合、他の無線機器を停止するか、本製品の使用場所を変えるなど電波干渉の生じない環境でご使用下さい。
- g. 本製品の量産開始前までに御社におかれましても十分なお評価をお願いいたします。
- h. 輸出注意事項
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Control No. HD-AM-A100041 (1/1)	Control name 絶対最大定格書
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Absolute maximum ratings

Item	Symbol	Rating				Remark
		Min.	Typ.	Max.	Unit	
Supply voltage 1	VIO	-	-	4.0	V	
Supply voltage 2	VDD18	-	-	1.98	V	
Supply voltage 3	VBAT	-	-	5.6	V	
Storage temperature range	Tstg	-30	-	100	Degrees C	
Operation temperature range	Topr	-20	25	70	Degrees C	

Recommended operating range

Item	Symbol	Rating				Remark
		Min.	Typ.	Max.	Unit	
Supply voltage 1	VIO	1.62/2.97	1.8/3.3	1.98/3.63	V	
Supply voltage 2	VDD18	1.71	1.8	1.89	V	
Supply voltage 3	VBAT	3.2	3.3	4.3	V	

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Control No. HD-AE-A100041	(1/11)	Control name 電気的特性書
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DC Specifications

The Specification applies for Topr.= 25 degrees C, Supply voltage=Typical voltage

No.	Parameter	Condition	Symbol	Min.	Typ.	Max.	Unit	Remark
1	Peak Current1	VIO	Ip1	-		20	mA	
2	Peak Current2	VDD18	Ip2	-		250	mA	
3	Peak Current3	VBAT	Ip3	-		300	mA	
4	Power consumption1	Burst Tx (2G-11n/150Mbps)	Pc1		219		mW	Duty=2.6%
5	Power consumption2	Continuous Rx (2G-11n/150Mbps)	Pc2		242		mW	
6	Power consumption3	Burst Tx (2G-11n/72.2Mbps)	Pc3		228		mW	Duty=4.5%
7	Power consumption4	Continuous Rx (2G-11n/72.2Mbps)	Pc4		230		mW	
8	Power consumption5	Burst Tx (11g/54Mbps)	Pc5		320		mW	Duty=20%
9	Power consumption6	Continuous Rx (11g/54Mbps)	Pc6		229		mW	
10	Power consumption7	Burst Tx (11b/11Mbps)	Pc7		520		mW	Duty=45%
11	Power consumption8	Continuous Rx (11b/11Mbps)	Pc8		230		mW	
12	Power consumption9	Burst Tx (5G-11n /150Mbps)	Pc9		252		mW	Duty=2.6%
13	Power consumption10	Continuous Rx (5G-11n /150Mbps)	Pc10		281		mW	
14	Power consumption11	Burst Tx (5G-11n /72.2Mbps)	P11		261		mW	Duty=4.5%
15	Power consumption12	Continuous Rx (5G-11n /72.2Mbps)	P12		268		mW	
16	Power consumption13	Burst Tx (11a /54Mbps)	Pc13		328		mW	Duty=20%
17	Power consumption14	Continuous Rx (11a /54Mbps)	Pc14		268		mW	
18	Power consumption15	Power Save (DTIM=1,Beacon Interval=100mS)	Pc15		13		mW	VIO=3.3V
			Pc16		11		mW	VIO=1.8V
19	Power consumption16	Deep Sleep	Pc17		3.0		mW	VIO=3.3V
			Pc18		0.81		mW	VIO=1.8V
20	Power consumption17	Power Down	Pc19		0.35		mW	VIO=3.3V
			Pc20		0.11		mW	VIO=1.8V
21	Power consumption18	Standby mode(Bluetooth)	Pc21		12.5		mW	
22	Power consumption19	Send DH5packet (Master)	Pc22		50		mW	
23	Power consumption20	Receive DH5packet (Slave)	Pc23		48		mW	
24	Power consumption21	Sniff mode	Pc24		14.5		mW	Note.1

Note.1 Sniff Mode Setting(Slave Only) ; Sniff Max Interval : 0x350, Sniff Min Interval : 0x350
Sniff Attempt :0x05, Sniff Timeout :0x05

Digital Pad Ratings

No.	Parameter	Condition	Symbol	Min.	Typ.	Max.	Unit	Remark
1	Input high voltage		VIH	0.8*VIO		VIO+0.3	V	
2	Input low voltage		VIL	-0.3		0.3*VIO	V	
3	Output high voltage		VOH	VIO-0.4		-	V	
4	Output low voltage		VOL	-		0.4	V	

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Control No. HD-AE-A100041	(2/11)	Control name 電気的特性書
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AC Specifications

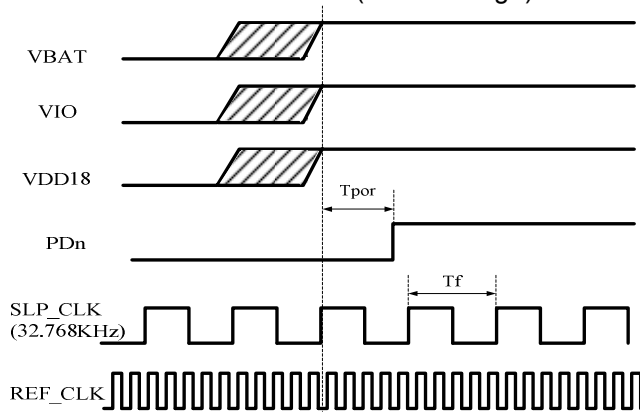
Power-on timing / External sleep clock

	Parameter	Condition	Symbol	Min	Typ	Max	Unit	Remark
1	Valid Power / RESETn / Clock to PDn de-asserted		Tpor	100			ms	
2	Input SLP_CLK frequency		Tf		32.768		KHz	
3	Input SLP_CLK high voltage		V _{IH}	0.8	1.8	1.98	V	
4	Input SLP_CLK low voltage		V _{IL}	0.0		0.25	V	
5	Input SLP_CLK phase noise requirement		PN		-125		dBc/Hz	@100KHz
6	Input SLP_CLK slew rate limit (10-90%)		SR			100	ns	
7	Input SLP_CLK duty cycle tolerance		DC	20		80	%	

<Power-on sequence>

PDn must remain asserted for minimum of Tpor after VBAT, VIO, VDD18, REF_CLK and SLP_CLK are stable.

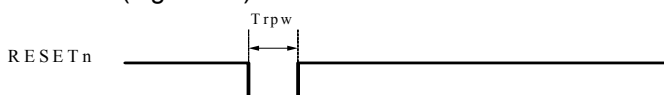
RESETn must be inactive value (asserted high) when PDn is de-asserted.



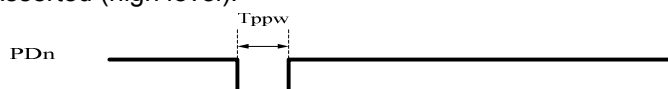
External reset(RESETn), power down(PDn)

	Parameter	Condition	Symbol	Min	Typ	Max	Unit	Remark
8	RESETn pulse width		Trpw	1			ms	
9	PDn pulse width		Tppw	100			ms	

RESETn should be asserted while VBAT, VIO, VDD18, REF_CLK and SLP_CLK are stable and PDn is de-asserted (high level).



PDn should be asserted while VBAT, VIO, VDD18, REF_CLK and SLP_CLK are stable and RESETn is de-asserted (high level).



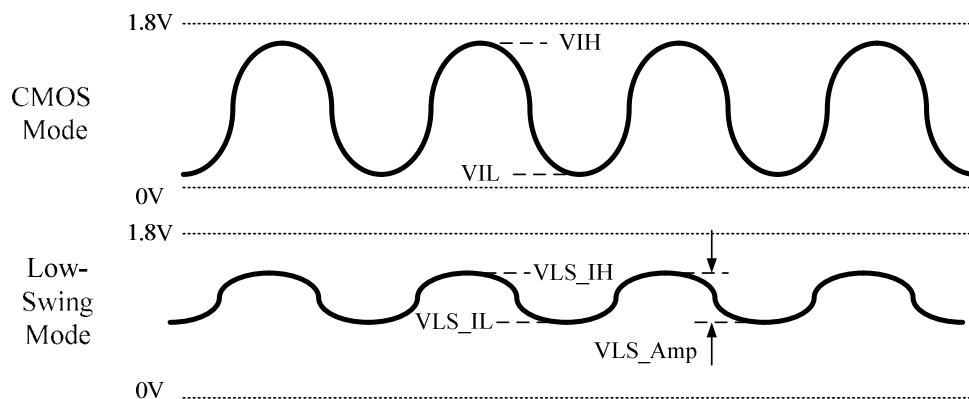
For lowest current consumption, apply all power rails to WYSBMVGXB during the assertion of PDn pin.

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Control No.		Control name							
HD-AE-A100041		(3/11)		電気的特性書					
Input fast clock specifications (Clock frequency : f (MHz)= 26 / 38.4)									
	Parameter	Condition	Symbol	Min	Typ	Max	Unit	Remark	
1	Input REF_CLK high voltage		V_{IH}	VDD18-0.5	VDD18	VDD18+0.2	V	CMOS Mode	
2	Input REF_CLK low voltage		V_{IL}	0	0	0.4	V		
3	Single-ended high-level voltage		VLS_IH	-	-	1.8	V	Low-Swing Mode	
4	Single-ended low-level voltage		VLS_IL	0	-	-	V		
5	Low-swing clock amplitude(pk-pk)		VLS_Amp	0.5	-	-	V		
6	Low-swing mid-point slope		VLS_Slope	50	-	-	MV/s		
7	Duty cycle		Duty cycle	45	50	55	%		
8	REF_CLK Phase Noise 26MHz	Offset=1KHz	PN _{1K}	-	-	-130	dBc/Hz		
		Offset=10KHz	PN _{10K}	-	-	-150	dBc/Hz		
		Offset=100KHz	PN _{100K}	-	-	-156	dBc/Hz		
		Offset>1MHz	PN _{1M}	-	-	-156	dBc/Hz		
9	REF_CLK Phase Noise 38.4MHz	Offset=1KHz	PN _{1K}	-	-	-126	dBc/Hz		
		Offset=10KHz	PN _{10K}	-	-	-146	dBc/Hz		
		Offset=100KHz	PN _{100K}	-	-	-152	dBc/Hz		
		Offset>1MHz	PN _{1M}	-	-	-152	dBc/Hz		
10	REF_CLK period		T _{pxo}	1000/f -20ppm	1000/f	1000/f +20ppm	ns		



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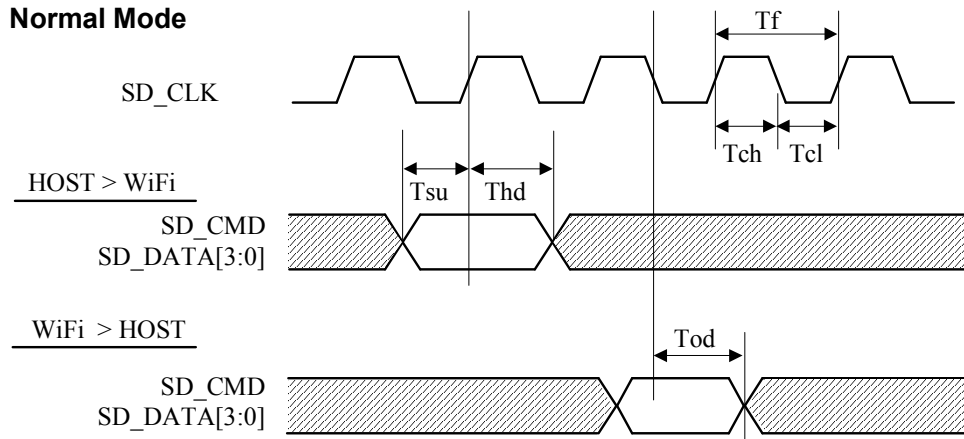
Control No. HD-AE-A100041	(4/11)	Control name 電気的特性書
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SDIO Interface Specifications

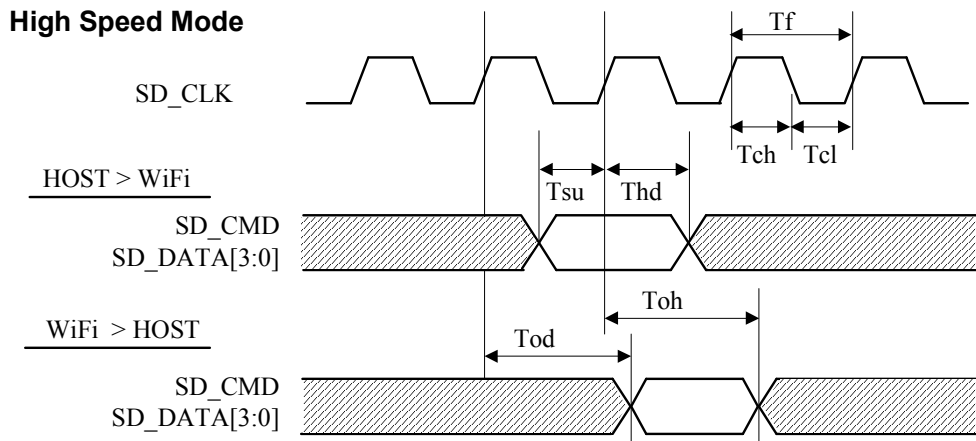
The Specification applies for Topr.= -20 to 70 degrees C , Supply voltage=Typical voltage

	Parameter	Symbol	Condition	Min	Typ	Max	Unit	Remark
1	Input SDIO_CLK Frequency	Tf	Normal	0	-	25	MHz	
			High Speed	0	-	50		
2	Input SDIO_CLK High Time	Tch	Normal	10	-	-	ns	
			High Speed	7	-	-		
3	Input SDIO_CLK Low Time	Tcl	Normal	10	-	-	ns	
			High Speed	7	-	-		
4	Input SDIO_CMD, DATA[3:0] Setup time	Tsu	Normal	5	-	-	ns	
			High Speed	6	-	-		
5	Input SDIO_CMD, DATA[3:0] Hold time	Thd	Normal	5	-	-	ns	
			High Speed	2	-	-		
6	Output SDIO_CMD, DATA[3:0] Delay time	Tod	-	-	-	14	ns	
7	Output SDIO_CMD, DATA[3:0] Hold time	Toh	High Speed	2.5	-	-	ns	

Normal Mode



High Speed Mode



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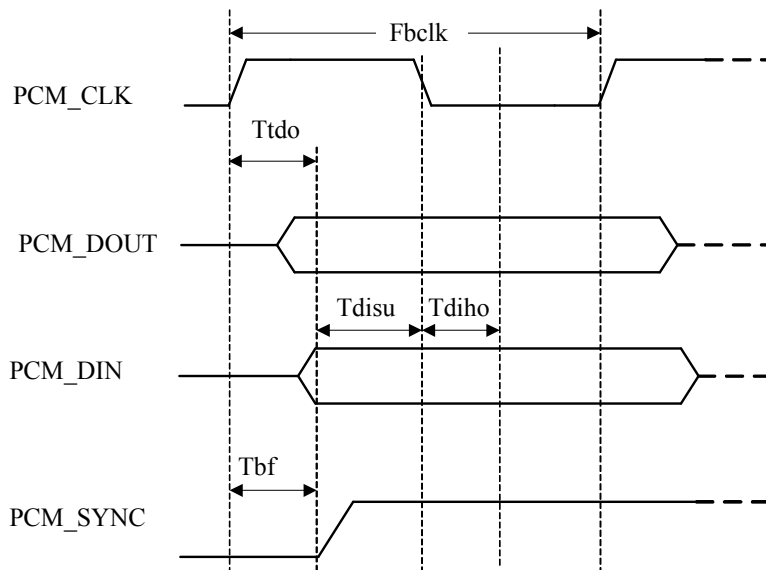
Control No. HD-AE-A100041	(5/11)	Control name 電気的特性書
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PCM timing Specifications

The Specification applies for Topr.= -20 to 70 degrees C , Supply voltage=Typical voltage

Master mode

	Parameter	Symbol	Condition	Min	Typ	Max	Unit	Remark
1	PCM_CLK Frequency	Fbclk		-	2/ 2.048	-	MHz	
2	PCM_CLK Duty Cycle			0.4	0.5	0.6	-	
3	PCM_CLK rise/fall			-	3	-	ns	
4	PCM_DOUT output delay time	Tdo		-	-	15	ns	
5	PCM_DIN input set up time	Tdisu		20	-	-	ns	
6	PCM_DIN input hold time	Tdiho		15	-	-	ns	
7	PCM_SYNC output delay time	Tbf		-	-	15	ns	



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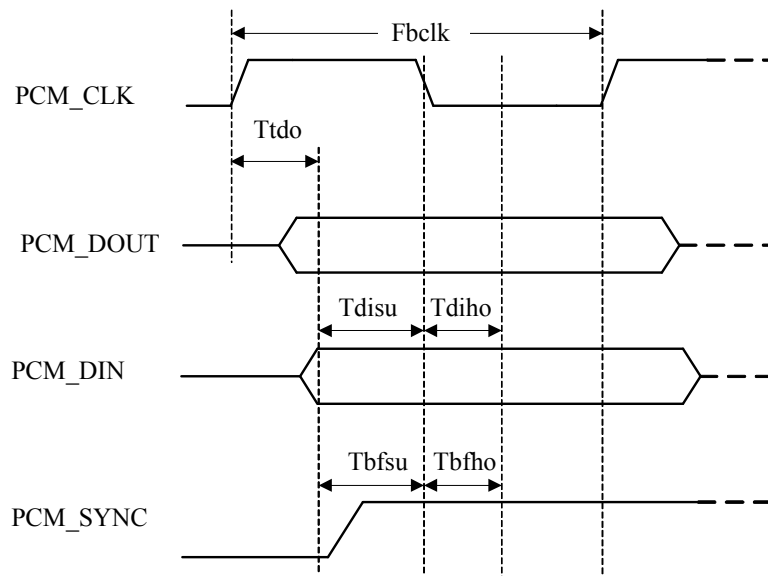
Control No. HD-AE-A100041	(6/11)	Control name 電気的特性書
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PCM timing Specifications

The Specification applies for Topr.= -20 to 70 degrees C , Supply voltage=Typical voltage

Slave mode

	Parameter	Symbol	Condition	Min	Typ	Max	Unit	Remark
1	PCM_CLK Frequency	Fbclk		-	2/ 2.048	-	MHz	
2	PCM_CLK Duty Cycle			0.4	0.5	0.6	-	
3	PCM_CLK rise/fall			-	3	-	ns	
4	PCM_DOUT output delay time	Tdo		-	-	50	ns	
5	PCM_DIN input set up time	Tdisu		15	-	-	ns	
6	PCM_DIN input hold time	Tdiho		10	-	-	ns	
7	PCM_SYNC input set up time	Tbfsu		15	-	-	ns	
8	PCM_SYNC input hold time	Tbfho		10	-	-	ns	



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Control No. HD-AE-A100041	(7/11)	Control name 電気的特性書
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RF Specifications (WLAN 11b/11Mbps, CCK, 1~13ch)

The Specification applies for Ta=25 degrees C, Supply voltage=Typical voltage

No	Parameter	Condition	Symbol	Min	Typ	Max	Unit	Remark
1	RF frequency range		FREQ	2412		2472	MHz	
2	TX Power		Po	14	16	18	dBm	
3	Spectrum Mask	1 st Side Lobe	M1	-		-30	dBc	
		2 nd Side Lobe	M2	-		-50	dBc	
4	Power up-down rump	Power up	TU	-		2	us	
		Power down	TD	-		2	us	
5	Frequency tolerance		Ft	-25		25	ppm	
6	EVM	Peak	EVM	-		35	%	
7	TX Out of band spurious1	30MHz to 1GHz	TOS1	-		-36	dBm	
8	TX Out of band spurious2	1GHz to 12.75GHz	TOS2	-		-30	dBm	
9	TX Out of band spurious3	1.8GHz to 1.9GHz 5.15GHz to 5.3GHz	TOS3			-47	dBm	
10	Rx sensitivity	FER<8%	SEN	-	-87	-84	dBm	
11	Maximum Input Level	FER<8%	MIL	-10			dBm	
12	RX Out of band spurious1	30MHz to 1GHz	ROS1	-		-57	dBm	
13	RX Out of band spurious2	1GHz to 12.75GHz	ROS2	-		-47	dBm	

RF Specifications (WLAN 11b/11Mbps, CCK, 14ch)

The Specification applies for Ta=25 degrees C, Supply voltage=Typical voltage

No	Parameter	Condition	Symbol	Min	Typ	Max	Unit	Remark
1	RF frequency range		FREQ		2484		MHz	
2	TX Power		Po	12	14	16	dBm	
3	Frequency tolerance		Ft	-25		25	ppm	
4	EVM	Peak	EVM	-		35	%	
5	TX Out of band spurious1	30MHz to 2458MHz 2510MHz to 12.75GHz	TOS1	-		-26	dBm	
6	TX Out of band spurious2	2458MHz to 2471MHz 2497MHz to 2510MHz	TOS2	-		-16	dBm	
7	Rx sensitivity	FER<8%	SEN	-	-86	-83	dBm	
8	Maximum Input Level	FER<8%	MIL	-10			dBm	
9	RX Out of band spurious1	30MHz to 1GHz	ROS1	-		-54	dBm	
10	RX Out of band spurious2	1GHz to 12.75GHz	ROS2	-		-47	dBm	

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Control No. HD-AE-A100041	(8/11)	Control name 電気的特性書
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RF Specifications (WLAN 11g/54Mbps, OFDM)

The Specification applies for Ta=25 degrees C, Supply voltage =Typical voltage

No	Parameter	Condition	Symbol	Min	Typ	Max	Unit	Remark
1	RF frequency range		FREQ	2412		2472	MHz	
2	TX Power		Po	13	15	17	dBm	
3	Spectrum Mask	1 st Side Lobe	M1	-		-20	dBc	
		2 nd Side Lobe	M2	-		-28	dBc	
		3 rd Side Lobe	M3	-		-40	dBc	
4	Symbol clock tolerance		Ft	-25		25	ppm	
5	Frequency tolerance		Ft	-25		25	ppm	
6	EVM	rms	EVM	-		-25	dB	
7	TX Out of band spurious1	30MHz to 1GHz	TOS1	-		-36	dBm	
8	TX Out of band spurious2	1GHz to 12.75GHz	TOS2	-		-30	dBm	
9	TX Out of band spurious3	1.8GHz to 1.9GHz 5.15GHz to 5.3GHz	TOS3			-47	dBm	
10	Rx sensitivity	PER<10%	SEN	-	-74	-71	dBm	
11	Maximum Input Level	PER<10%	MIL	-20		-	dBm	
12	RX Out of band spurious1	30MHz to 1GHz	ROS1	-		-57	dBm	
12	RX Out of band spurious2	1GHz to 12.75GHz	ROS2	-		-47	dBm	

RF Specifications (WLAN 11n/MCS7, BW=20MHz, OFDM)

The Specification applies for Ta=25 degrees C, Supply voltage =Typical voltage

No	Parameter	Condition	Symbol	Min	Typ	Max	Unit	Remark
1	RF frequency range		FREQ	2412		2472	MHz	
2	TX Power		Po	12	14	16	dBm	
3	Spectrum Mask	1 st Side Lobe	M1	-		-20	dBc	
		2 nd Side Lobe	M2	-		-28	dBc	
		3 rd Side Lobe	M3	-		-45	dBc	
4	Symbol clock tolerance		Ft	-25		25	ppm	
5	Frequency tolerance		Ft	-25		25	ppm	
6	EVM	rms	EVM	-		-28	dB	
7	TX Out of band spurious1	30MHz to 1GHz	TOS1	-		-36	dBm	
8	TX Out of band spurious2	1GHz to 12.75GHz	TOS2	-		-30	dBm	
9	TX Out of band spurious3	1.8GHz to 1.9GHz 5.15GHz to 5.3GHz	TOS3			-47	dBm	
10	Rx sensitivity	PER<10%	SEN	-	-71	-68	dBm	
11	Maximum Input Level	PER<10%	MIL	-20		-	dBm	
12	RX Out of band spurious1	30MHz to 1GHz	ROS1	-		-57	dBm	
13	RX Out of band spurious2	1GHz to 12.75GHz	ROS2	-		-47	dBm	

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Control No. HD-AE-A100041	(9/11)	Control name 電気的特性書
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RF Specifications (WLAN 11n/MCS7, BW=40MHz, OFDM)

The Specification applies for Ta=25 degrees C, Supply voltage =Typical voltage

No	Parameter	Condition	Symbol	Min	Typ	Max	Unit	Remark
1	RF frequency range		FREQ	2422		2462	MHz	
2	TX Power		Po	12	14	16	dBm	
3	Spectrum Mask	1 st Side Lobe	M1	-		-20	dBc	
		2 nd Side Lobe	M2	-		-28	dBc	
		3 rd Side Lobe	M3	-		-45	dBc	
4	Symbol clock tolerance		Ft	-25		25	ppm	
5	Frequency tolerance		Ft	-25		25	ppm	
6	EVM	rms	EVM	-		-28	dB	
7	TX Out of band spurious1	30MHz to 1GHz	TOS1	-		-36	dBm	
8	TX Out of band spurious2	1GHz to 12.75GHz	TOS2	-		-30	dBm	
9	TX Out of band spurious3	1.8GHz to 1.9GHz 5.15GHz to 5.3GHz	TOS3			-47	dBm	
10	Rx sensitivity	PER<10%	SEN	-	-67	-64	dBm	
11	Maximum Input Level	PER<10%	MIL	-20		-	dBm	
12	RX Out of band spurious1	30MHz to 1GHz	ROS1	-		-57	dBm	
13	RX Out of band spurious2	1GHz to 12.75GHz	ROS2	-		-47	dBm	

RF Specifications (WLAN 11a/54Mbps, OFDM)

The Specification applies for Ta=25 degrees C, Supply voltage =Typical voltage

No	Parameter	Condition	Symbol	Min	Typ	Max	Unit	Remark
1	RF frequency range		FREQ	5180		5825	MHz	
2	TX Power		Po	12	14	16	dBm	
3	Spectrum Mask	1 st Side Lobe	M1	-		-20	dBc	
		2 nd Side Lobe	M2	-		-28	dBc	
		3 rd Side Lobe	M3	-		-40	dBc	
4	Symbol clock tolerance		Ft	-20		20	ppm	
5	Frequency tolerance		Ft	-20		20	ppm	
6	EVM	rms	EVM	-		-25	dB	
7	TX Out of band spurious1	30MHz to 47MHz, 74MHz to 87.5MHz, 118MHz to 174MHz, 230MHz to 470MHz, 862MHz to 1GHz	TOS1	-		-36	dBm	
8	TX Out of band spurious2	47MHz to 74MHz, 87.5MHz to 118MHz, 174MHz to 230MHz, 470MHz to 862MHz	TOS2	-		-54	dBm	
9	TX Out of band spurious3	1GHz to 26GHz	TOS3			-30	dBm	
10	Rx sensitivity	PER<10%	SEN	-	-75	-72	dBm	
11	Maximum Input Level	PER<10%	MIL	-30		-	dBm	
12	RX Out of band spurious1		ROS1	-		-57	dBm	
13	RX Out of band spurious2		ROS2	-		-47	dBm	

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RF Specifications (WLAN 11n/MCS7, BW=20MHz, OFDM)

The Specification applies for Ta=25 degrees C, Supply voltage =Typical voltage

No	Parameter	Condition	Symbol	Min	Typ	Max	Unit	Remark
1	RF frequency range		FREQ	5180		5825	MHz	
2	TX Power		Po	11	13	15	dBm	
3	Spectrum Mask	1 st Side Lobe	M1	-		-20	dBc	
		2 nd Side Lobe	M2	-		-28	dBc	
		3 rd Side Lobe	M3	-		-45	dBc	
4	Symbol clock tolerance		Ft	-20		20	ppm	
5	Frequency tolerance		Ft	-20		20	ppm	
6	EVM	rms	EVM	-		-28	dB	
7	TX Out of band spurious1	30MHz to 47MHz, 74MHz to 87.5MHz, 118MHz to 174MHz, 230MHz to 470MHz, 862MHz to 1GHz	TOS1	-		-36	dBm	
8	TX Out of band spurious2	47MHz to 74MHz, 87.5MHz to 118MHz, 174MHz to 230MHz, 470MHz to 862MHz	TOS2	-		-54	dBm	
9	TX Out of band spurious3	1GHz to 26GHz	TOS3			-30	dBm	
10	Rx sensitivity	PER<10%	SEN	-	-72	-69	dBm	
11	Maximum Input Level	PER<10%	MIL	-30		-	dBm	
12	RX Out of band spurious1		ROS1	-		-57	dBm	
13	RX Out of band spurious2		ROS2	-		-47	dBm	

RF Specifications (WLAN 11n/MCS7, BW=40MHz, OFDM)

The Specification applies for Ta=25 degrees C, Supply voltage =Typical voltage

No	Parameter	Condition	Symbol	Min	Typ	Max	Unit	Remark
1	RF frequency range		FREQ	5190		5815	MHz	
2	TX Power		Po	11	13	15	dBm	
3	Spectrum Mask	1 st Side Lobe	M1	-		-20	dBc	
		2 nd Side Lobe	M2	-		-28	dBc	
		3 rd Side Lobe	M3	-		-45	dBc	
4	Symbol clock tolerance		Ft	-20		20	ppm	
5	Frequency tolerance		Ft	-20		20	ppm	
6	EVM	rms	EVM	-		-28	dB	
7	TX Out of band spurious1	30MHz to 47MHz, 74MHz to 87.5MHz, 118MHz to 174MHz, 230MHz to 470MHz, 862MHz to 1GHz	TOS1	-		-36	dBm	
8	TX Out of band spurious2	47MHz to 74MHz, 87.5MHz to 118MHz, 174MHz to 230MHz, 470MHz to 862MHz	TOS2	-		-54	dBm	
9	TX Out of band spurious3	1GHz to 26GHz	TOS3			-30	dBm	
10	Rx sensitivity	PER<10%	SEN	-	-70	-67	dBm	
11	Maximum Input Level	PER<10%	MIL	-30		-	dBm	
12	RX Out of band spurious1		ROS1	-		-57	dBm	
13	RX Out of band spurious2		ROS2	-		-47	dBm	

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RF Specifications (Bluetooth®)**Basic Rate**

The Specification applies for Ta=25 degrees C, Supply voltage =Typical voltage.

No.	Parameter	Condition	Sym	Min	Typ	Max	Unit	Remark
1	Frequency Range		FREQ	2402		2480	MHz	0-78ch 1MHz step
2	Initial Carrier Frequency Tolerance	Packet : DH1 Payload : PRBS9	IFT	-75	0	75	kHz	
3	Carrier Frequency Drift	Packet : DH5 Payload : 101010	CFD	-40	0	40	kHz	
4	Tx Power	Packet : DH5 Payload : PRBS9	PO	6	8	10	dBm	
5	Modulation Characteristics 1	Packet : DH5 Payload : 11110000	M1	140		175	kHz	delta F1 average
6	Modulation Characteristics 2	Packet : DH5 Payload : 10101010	M2	115	150		kHz	delta F2 average
7	20dB Bandwidth	Packet : DH5 Payload : PRBS9	B20			1	MHz	
8	Sensitivity		SEN		-86	-70	dBm	BER<=0.1%

EDR

The Specification applies for Ta=25 degrees C, Supply voltage =Typical voltage.

No.	Parameter	Condition	Sym	Min	Typ	Max	Unit	Remark
1	EDR Relative transmit power	Packet : 3-DH5 Payload : PRBS9	RTP	-4		1	dB	Power DPSK - Power GFSK
2	EDR Carrier Frequency Stability and Modulation	omega i	STA1	-75	0	75	kHz	Packet : 2-DH5 / 3-DH5
		omega l +omega o	STA1	-75	0	75	kHz	
		omega o	STA2	-10	0	10	kHz	
		RMS DEVM, π/4-DQPSK	RD1			0.20		
		RMS DEVM, 8DPSK	RD2			0.13		Payload : PRBS9
		Peak DEVM, π/4-DQPSK	PD1			0.35		
		PeakDEVM, 8DPSK	PD2			0.25		
		99% DEVM, π/4-DQPSK	DE1			0.30		
99% DEVM, 8DPSK	DE2			0.20				
3	EDR Sensitivity	2-DH5 16,000,000bit	ESEN		-89	-70	dBm	BER=10 ⁻⁴
4	EDR Sensitivity	3-DH5 16,000,000bit	ESEN		-86	-70	dBm	BER=10 ⁻⁴

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PICS for Firmware Version 14.X.X

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	No
7	Core Specification Addendum 1 (CSA1), Adopted 26 June 2008	C.2	No
8	Core Spec Version 3.0, Adopted 21 April 2009	M.1	Yes

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

C.2: Optional if one of 21/5 or 21/6 (Core Spec Version 2.1 / 2.1 + EDR) is supported; otherwise excluded

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	Yes
2	Power Class =2	M.1	No
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 $\pi/4$ -DQPSK modulation	C.2	Yes
11	Support for 8DPSK modulation	C.3	Yes
12	Enhanced Power Control	C.4	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.

C.4 Optional if SUM_ICS, 21/8 AND 1/4 supported, ELSE excluded.

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 2	M	Yes

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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	Yes
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	Yes

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

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

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	No

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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	No
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

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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

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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 Subtracting 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.

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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	No
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	No
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	No
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	No
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.

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Table 5: Link Keys

Item	Capability	Status	Support
1	Creation of link key - Unit Key	C.1	No
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

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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:2/17) 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.

Control No. HD-AE-C100041	(9/11)	Control name 電気的特性書
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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 (renegotiate 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	No
3	Respond to park mode requests	M.1	No
4	(Intentionally left blank)		No
5	Set up broadcast scan window	O	No
6	Accept changes to the broadcast scan window	M.1	No
7	Modify beacon parameters	O	No
8	Accept modification of beacon parameters	M.1	No
9	Request Unpark using PM_ADDR	C.1	No
10	Request Unpark using BD_ADDR	C.1	No
11	Slave requested Unpark	O	No
12	Accept Unpark using PM_ADDR	M.1	No
13	Accept Unpark using BD_ADDR	M.1	No

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 control)

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
5	Request to increment power a single step	M.3	Yes
6	Request to decrease power a single step	M.3	Yes
7	Request to go to max power	O	Yes
8	Respond to increment power a single step	M.3	Yes
9	Respond to decrease power a single step	M.3	Yes
10	Respond to go to max power	M.3	Yes

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

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

M.3: Mandatory IF (LMP:2/20) - (Enhanced 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

Control No. HD-AE-C100041	(10/11)	Control name 電気的特性書
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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	No
2	Accept suggested page mode	O	No
3	Request page scan mode to use	O	No
4	Accept suggested page scan mode	O	No

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

Control No. HD-AE-C100041	(11/11)	Control name 電気的特性書
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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

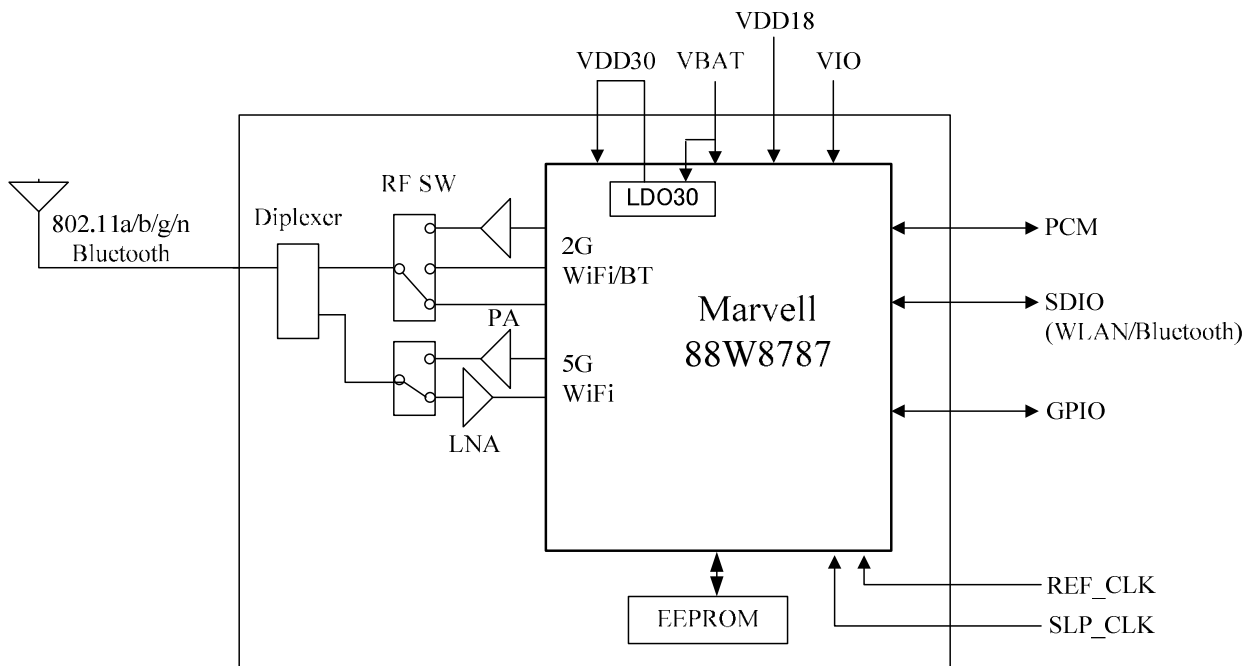
Item	Capability	Status	Support
1	This line is intentionally blank.	O	No
2	This line is intentionally blank.	O	No
3	N/A	O	No
4	N/A	O	No

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Control No. HD-MC-A100041	(1/1)	Control name 内部回路図
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内部回路図



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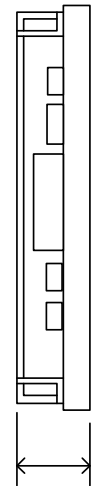
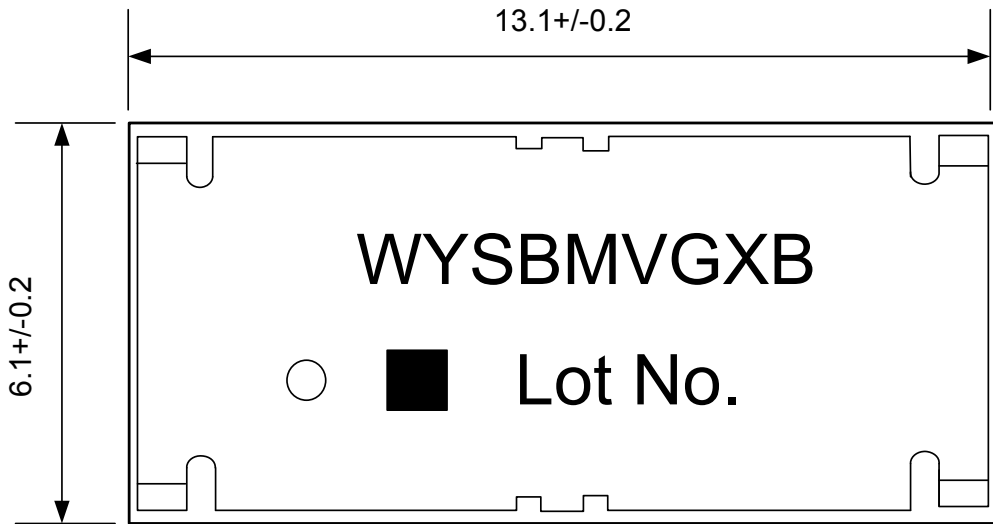
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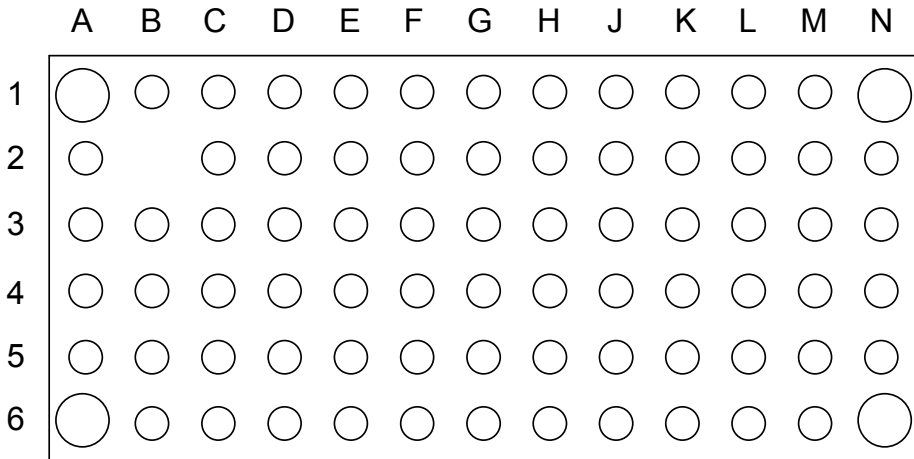
Control No. HD-AD-A100041	(1/2)	Control name 外形・外観図
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外形図

Unit: mm



1.35Max



Bottom View

注)モジュール裏面のPadサイズ詳細は次ページ参照ください。

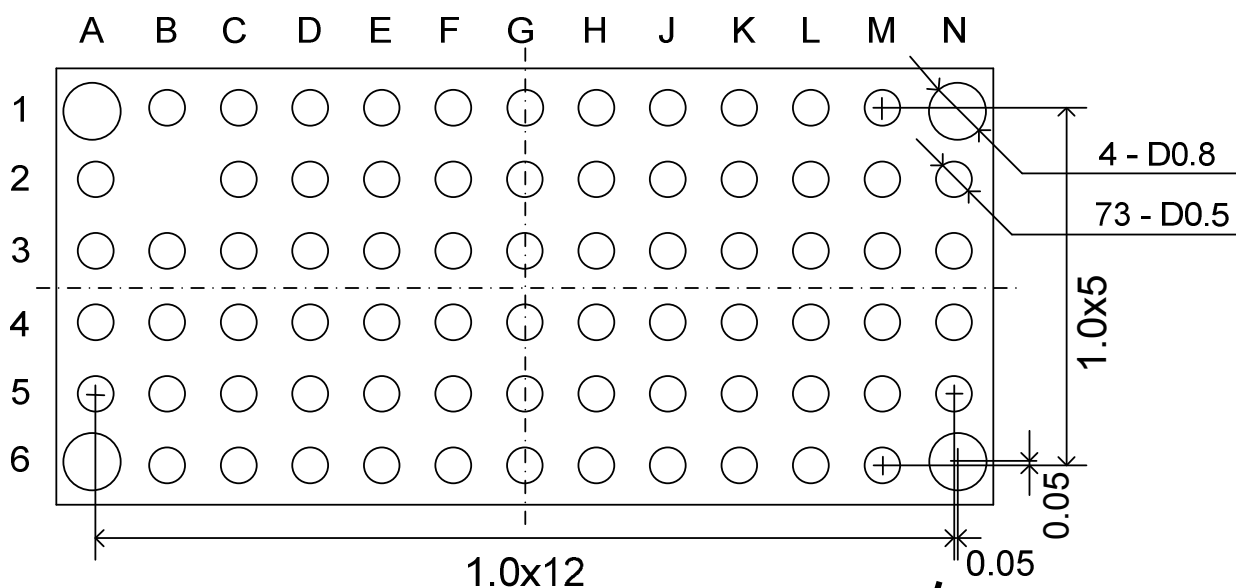
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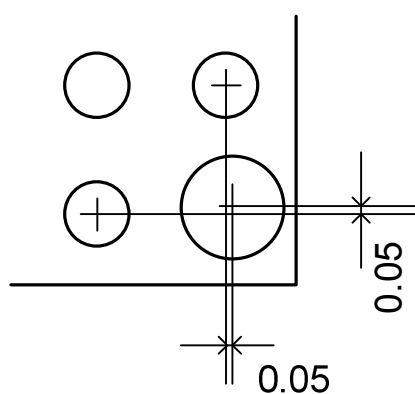
Control No. HD-AD-A100041	(2/2)	Control name 外形・外観図
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モジュール Pad 寸法図

Unit: mm



Bottom View



推奨ランドパターン設計

お客様のマザーボードにおけるモジュールの Pad 設計はモジュール自身の Pad と同サイズを推奨いたします。

推奨ハンダマスク条件

半田マスクの厚みは 0.1 mm を推奨いたします。

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Control No. HD-BA-A100041	(1/3)	Control name ピンレイアウト
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Pin Descriptions

Loc.	Pin Name	I/O	Pwr Domain	Description	Function
A1	GND	-	-	ground	PWR
A2	GND	-	-	ground	PWR
A3	ANT	I/O	-	2G/5G RF (WiFi-11abgn, BT) Antenna	RF
A4	GND	-	-	ground	PWR
A5	GND	-	-	ground	PWR
A6	GND	-	-	ground	PWR
B1	TDO	O	VIO	JTAG Test Data Output	JTAG
B3	GND	-	-	ground	PWR
B4	GND	-	-	ground	PWR
B5	GND	-	-	ground	PWR
B6	GND	-	-	ground	PWR
C1	TDI	I	VIO	JTAG Test Data Input	JTAG
C2	TCK	I	VIO	JTAG Test Clock Input	JTAG
C3	RES	-	-	(Reserved) オープン(未接続)にして下さい	-
C4	RES	-	-	(Reserved) オープン(未接続)にして下さい	-
C5	VBAT	I	VBAT	Battery power supply	PWR
C6	VBAT	I	VBAT	Battery power supply	PWR
D1	RESETn	I	VIO	Reset (0: Reset, 1: Normal Operation)	CTRL
D2	TMS	I	VIO	JTAG Controller Select	JTAG
D3	RES	-	-	(Reserved) オープン(未接続)にして下さい	-
D4	RES	-	-	(Reserved) オープン(未接続)にして下さい	-
D5	RES	-	-	(Reserved) オープン(未接続)にして下さい	-
D6	RES	-	-	(Reserved) オープン(未接続)にして下さい	-
E1	PDn	I	VIO	Power Down (no internal pull-up on this pin) (0: Full Power Down, 1: Normal Operation)	CTRL
E2	HM	I	-	Host I/F Select (See Table1)	CTRL
E3	GND	-	-	ground	PWR
E4	GND	-	-	ground	PWR
E5	RES	-	-	(Reserved) オープン(未接続)にして下さい	-
E6	RES	-	-	(Reserved) オープン(未接続)にして下さい	-
F1	VDD18	I	VDD18	1.8V power supply	PWR
F2	VDD18	I	VDD18	1.8V power supply	PWR
F3	GND	-	-	ground	PWR
F4	GND	-	-	ground	PWR
F5	RES	-	-	(Reserved) オープン(未接続)にして下さい	-
F6	VDD18	I	VDD18	1.8V power supply	PWR

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Control No. HD-BA-A100041	(2/3)	Control name ピンレイアウト
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Loc.	Pin Name	I/O	Pwr Domain	Description	Function
G1	GND	-	-	ground	PWR
G2	RES	-	-	(Reserved) オープン(未接続)にして下さい	-
G3	GND	-	-	ground	PWR
G4	GND	-	-	ground	PWR
G5	GPIO0	I/O	VIO	GPIO0	CTRL
G6	GND	-	-	ground	PWR
H1	RES	-	-	(Reserved) オープン(未接続)にして下さい	-
H2	GPIO4	I/O	VIO	GPIO4	CTRL
H3	GND	-	-	ground	PWR
H4	PCM_MCLK	O	VIO	PCM_MCLK	PCM
H5	GND	-	-	ground	PWR
H6	REF_CLK	I	VDD18	Reference Clock Input (26/38.4MHz)	CLOCK
J1	RES	-	-	(Reserved) オープン(未接続)にして下さい	-
J2	RES	-	-	(Reserved) オープン(未接続)にして下さい	-
J3	GND	-	-	Ground	PWR
J4	PCM_DIN	I	VIO	PCM_DIN	PCM
J5	GND	-	-	ground	PWR
J6	RES	-	-	(Reserved) オープン(未接続)にして下さい	-
K1	RES	-	-	(Reserved) オープン(未接続)にして下さい	-
K2	RES	-	-	(Reserved) オープン(未接続)にして下さい	-
K3	PCM_DOUT	O	VIO	PCM_DOUT	PCM
K4	PCM_SYNC	I/O	VIO	PCM_SYNC	PCM
K5	VBAT	I	VBAT	Battery power supply	PWR
K6	GND	-	-	Ground	PWR
L1	GND	-	-	Ground	PWR
L2	RES	-	-	(Reserved) オープン(未接続)にして下さい	-
L3	RES	-	-	(Reserved) オープン(未接続)にして下さい	-
L4	PCM_CLK	I/O	VIO	PCM_CLK	PCM
L5	LDO30_OUT	O	LDO30	3.0V Voltage Output	PWR
L6	VDD30	I	VDD30	3.0/3.3V Digital IO Power Supply	PWR
M1	SLP_CLK	I	VDD18	Sleep Clock Input	CLOCK
M2	RES	-	-	(Reserved) オープン(未接続)にして下さい	-
M3	SD_CMD	I/O	VIO	SDIO Command	SDIO
M4	SD_DATA[0]	I/O	VIO	SDIO Data[0]	SDIO
M5	WL_HOST_WKUP	O	VIO	WLAN -> Host Wake up (GPIO16)	CTRL
M6	VIO	I	VIO	1.8V/3.3V Digital IO Power Supply	PWR

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Control No. HD-BA-A100041	(3/3)	Control name ピンレイアウト
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Loc.	Pin Name	I/O	Pwr Domain	Description	Function
N1	GND	-	-	Ground	PWR
N2	SD_DATA[2]	I/O	VIO	SDIO Data[2]	SDIO
N3	SD_DATA[3]	I/O	VIO	SDIO Data[3]	SDIO
N4	SD_CLK	I	VIO	SDIO Clock	SDIO
N5	SD_DATA[1]	I/O	VIO	SDIO Data[1]	SDIO
N6	GND	-	-	ground	PWR

Table1. HOST INTERFACE / FW BOOT SELECT

HM	FW_BOOT	WLAN	BT
PULL DOWN(100Kohm)	SDIO	SDIO	SDIO

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Control No. HQ-BA-523	(1/2)	Control name 取扱注意要領
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本書類では特に実装時のお願い・条件について記載します。

お願い／条件

(1) 使用・保管環境の管理

1. 弊社出荷時の防湿梱包状態で保管する場合、**40°C/90%RH** 以下の環境で保管ください。
2. 工程の環境は **30°C/60%RH** 以下に管理してください。
3. モジュールを開梱状態で保管する(工程間の滞留含む)場合 **25±5°C/10%RH** 以下の環境で保管してください。

(2) 製品取扱時のお願い・条件

防湿梱包品入庫後、防湿袋に穴、裂け、キズ等の無い事を確認してください。万が一以上があった場合、2-(2)項に従い、処置をお願いいたします。

梱包に添付のラベルを参照ください。

1. 梱包日から **12ヶ月以内** にすべての実装(リフロー)作業(リワーク含む)を終了してください。
2. 防湿梱包開梱後、直ちに湿度インジケータにて梱包内の環境が**<10%RH** であることを確認してください。
3. 開封後**168時間以内**に**全ての**実装作業(リワーク含むリフロー作業)を終了してください。
本モジュール以外の実装作業含みます
4. (1)項、及び(2)-2・(2)-3の基準からはずれた場合、**125°C 24h**にてベーキングを行ってください。
5. (2)-4 項記載の条件によるベーキングは 1 回を原則とします。
6. 本モジュールは内部に半導体を有するため、取扱中には静電気に留意してください。
(100V以下)
必要に応じて、導電マット・アースバンド・静電靴・イオナイザー等を用いて、静電気の対策を講じてください。
7. 機械的振動、衝撃を極力少なくし、落下させないでください。

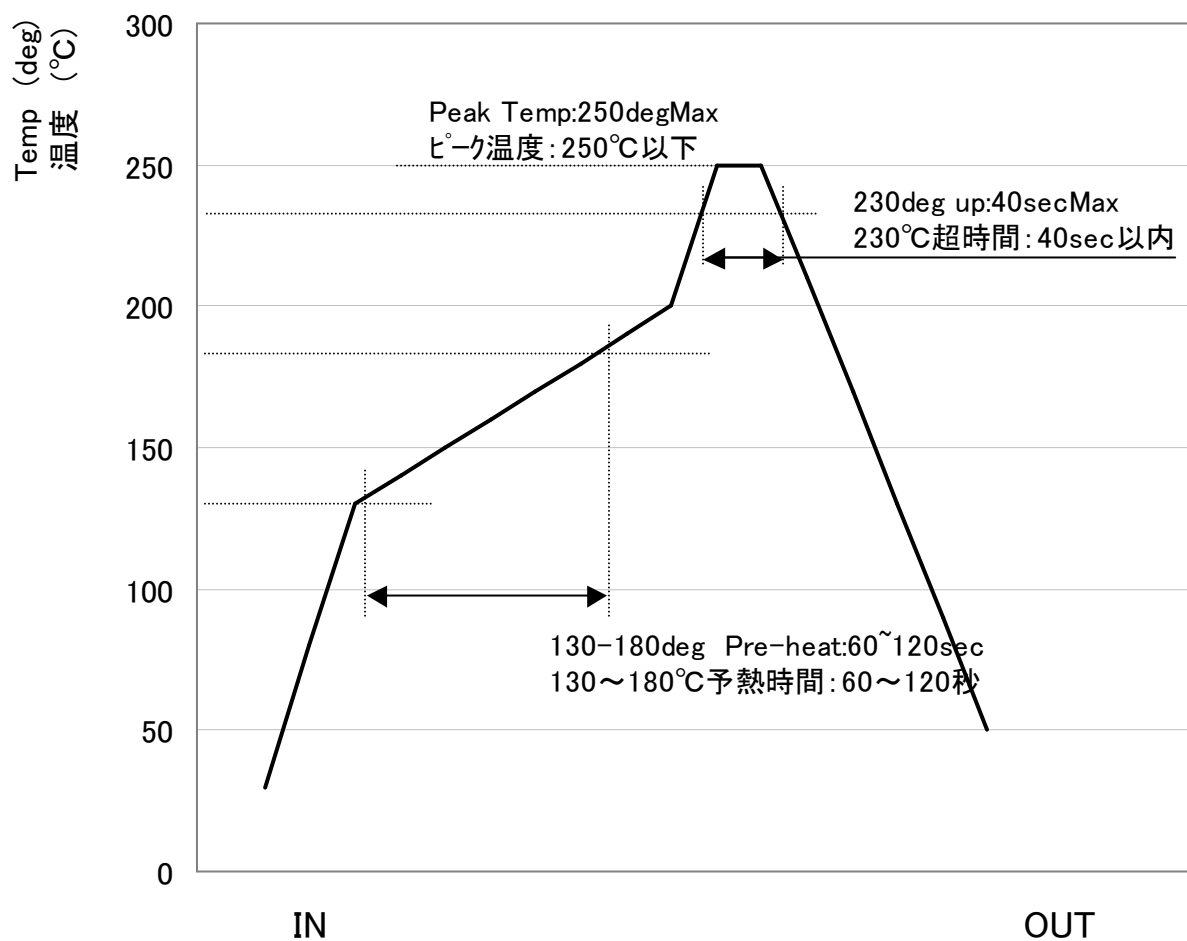
TAIYO YUDEN

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Control No. HQ-BA-523	(2/2)	Control name 取扱注意要領
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8. モジュールを実装する際には、裏面の電極を認識してください。
9. 本製品本体は洗浄しないで下さい。
10. モジュールのリフロー時温度条件は、下記の範囲内で行って下さい。
リフロー回数は最大2回として下さい。



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Control No. HD-BB-A100041 (1/3)	Control name 梱包仕様書
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梱包仕様

(1) 梱包材料

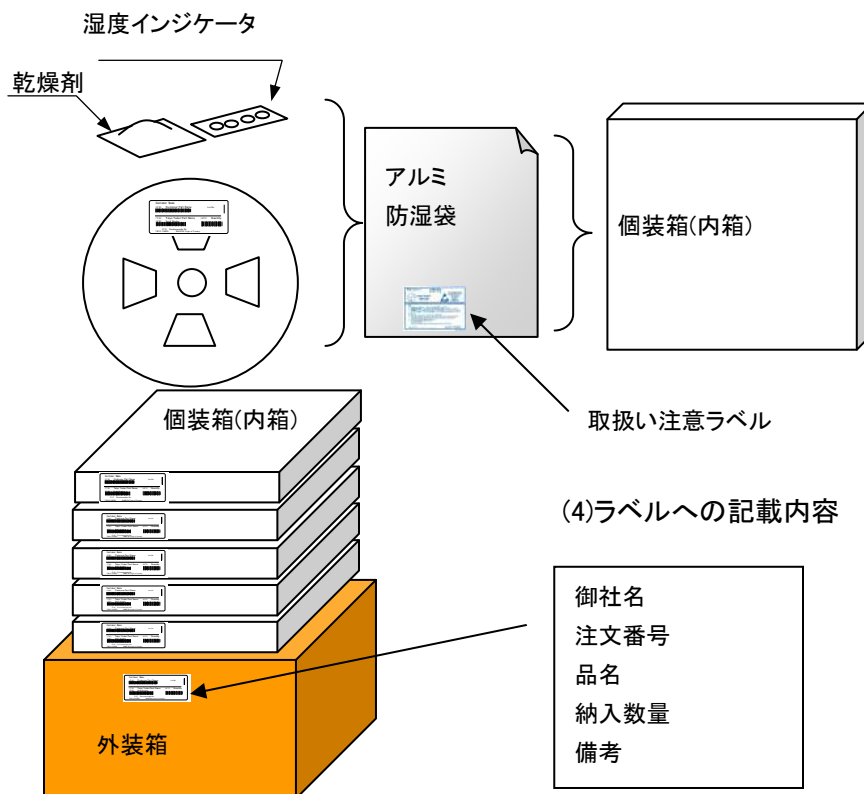
部材名	概要	材質	備考
エンボス	24mm 幅-12mm ピッチ	導電性 PS	
カバーテープ			
リール	φ330mm	導電性 PS	
乾燥材	30g x 1		
湿度インジケータ			
アルミ防湿袋	420 x 460(mm)	(AS)Polyester/AL/Nylon /Polyethylene(AS)	
ラベル			
個装箱(内箱)	376x 376 x52(mm)		
個装箱(外箱)	400 x 390 x290(mm)		

(2) 梱包数量

最大 1500 個/リール

最大 7500 個/箱 (外箱)

(3) パッキング仕様



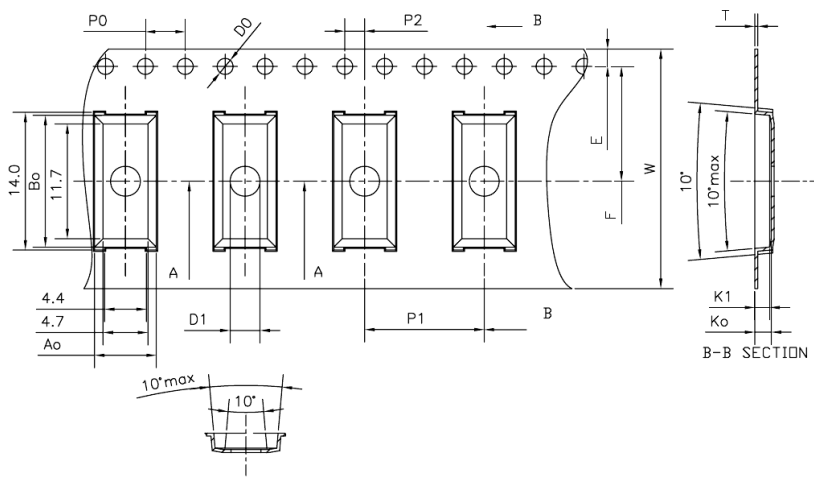
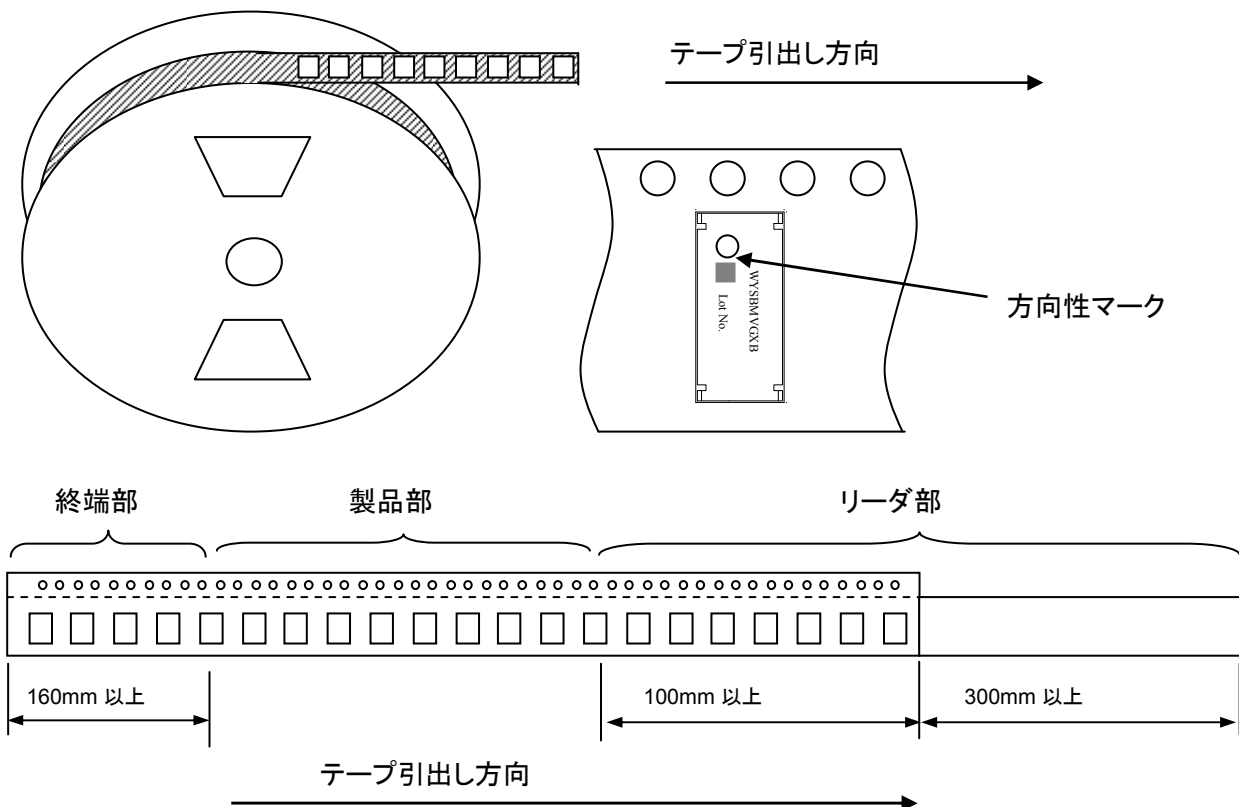
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Control No. HD-BB-A100041	(2/3)	Control name 梱包仕様書
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(5)テーピング仕様



Unit: mm

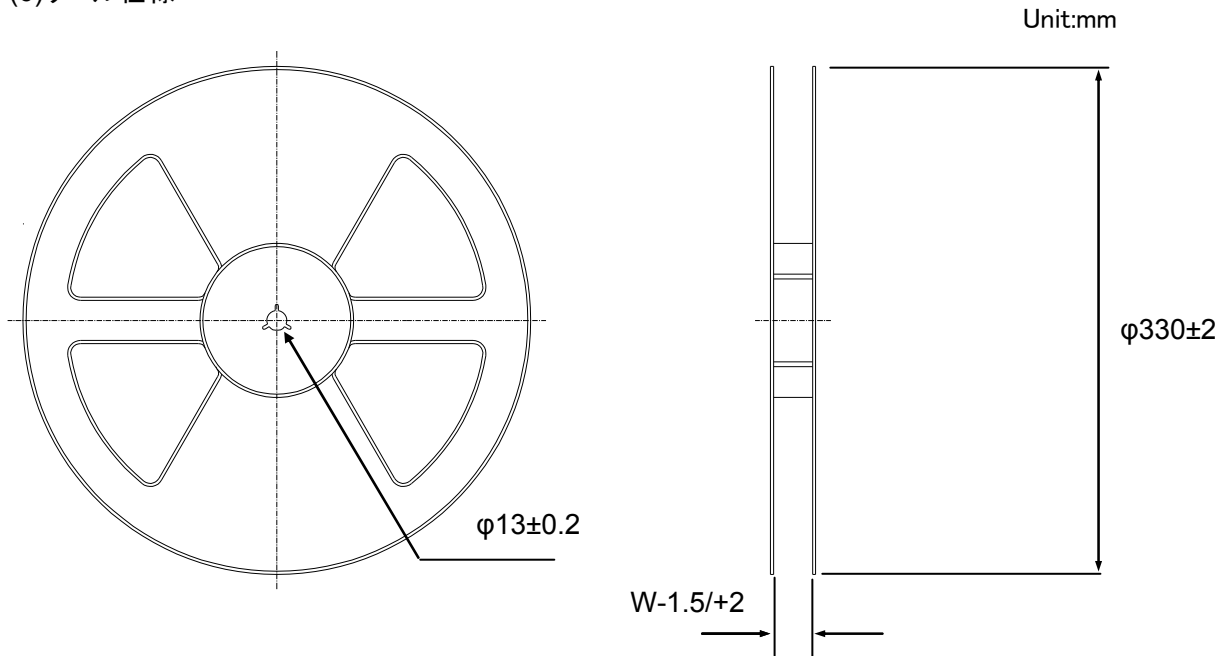
Symbol	Ao	Bo	Ko	K1	Po	P1	P2	T
Spec	6.4±0.10	13.4±0.10	1.95±0.10	1.8±0.10	4.0±0.10	12.0±0.10	2.0±0.1	0.30±0.05
Symbol	E	F	Do	D1	W	10Po		
Spec	1.75±0.10	11.5±0.1	1.50 ^{0.01}	3.0 ^{0.01}	24.0±0.3	40.0±0.20		

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Control No. HD-BB-A100041	(3/3)	Control name 梱包仕様書
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(6) リール仕様



Tape wide	8mm	12mm	16mm	24mm	32mm	44mm
W	9.4mm	13.4mm	17.4mm	25.4mm	33.4mm	45.4mm

(7) テーピング性能

エンボステープ、トップカバーテープともに、引出し方向に 10N の力を加えた場合に、これに耐える事

トップカバーテープの剥離強度は、角度 165~180 度に保ち、300mm/min のスピードでトップカバーテープを引っ張ったとき、0.1~1.3N とする。

(8) 備考

1リール中の部品の欠落は 2 個までとする。

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