- Mobile Point of Sales (mPOS)
- Sports and Fitness
- Health Care
- Smart Home
- Game Controller

1.4 Functional Block Diagram

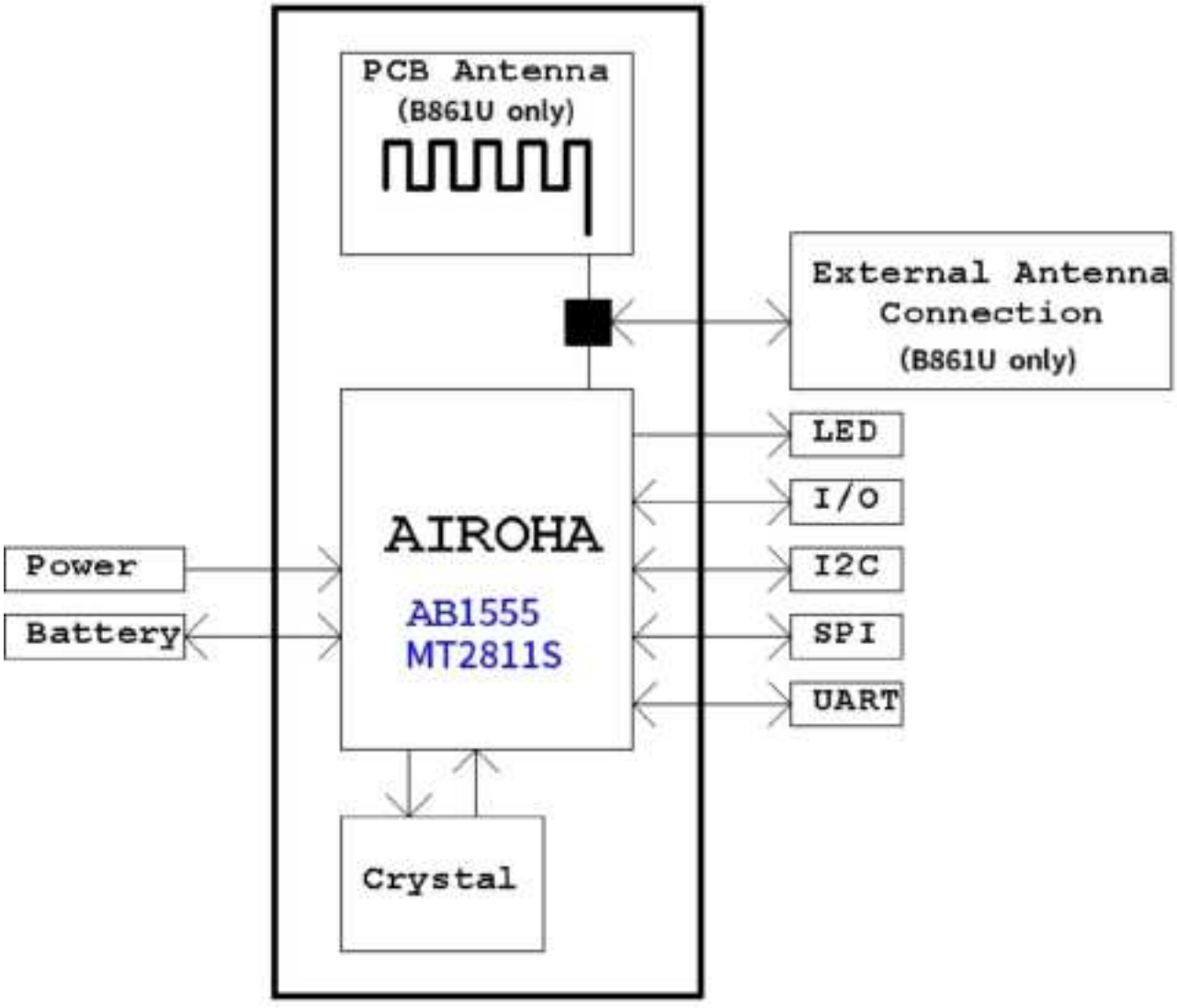


Figure 1-1 Block Diagram

2 Module Package Information

2.1 Module Pin Definition

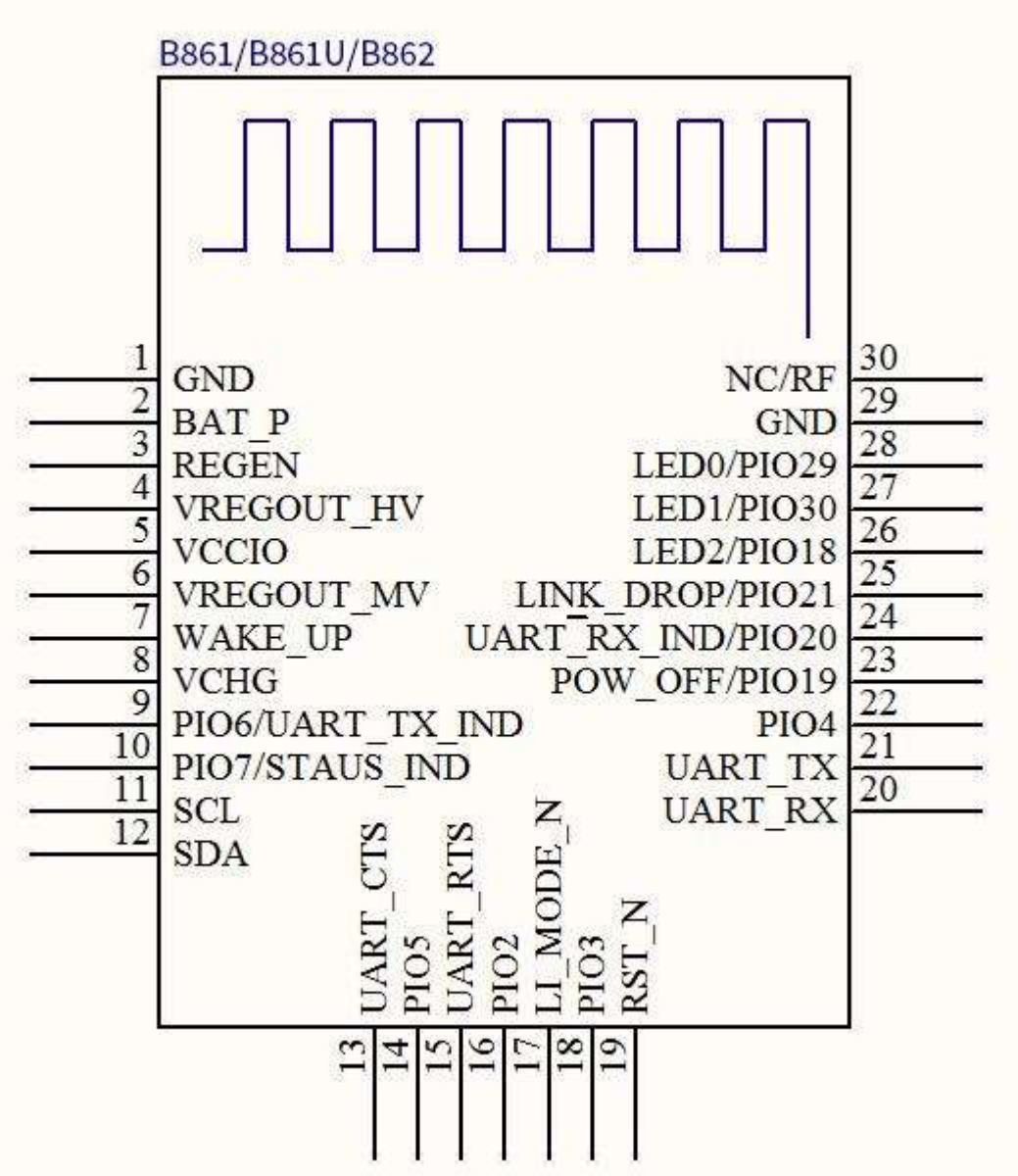


Figure 2- 1 Pin Definition

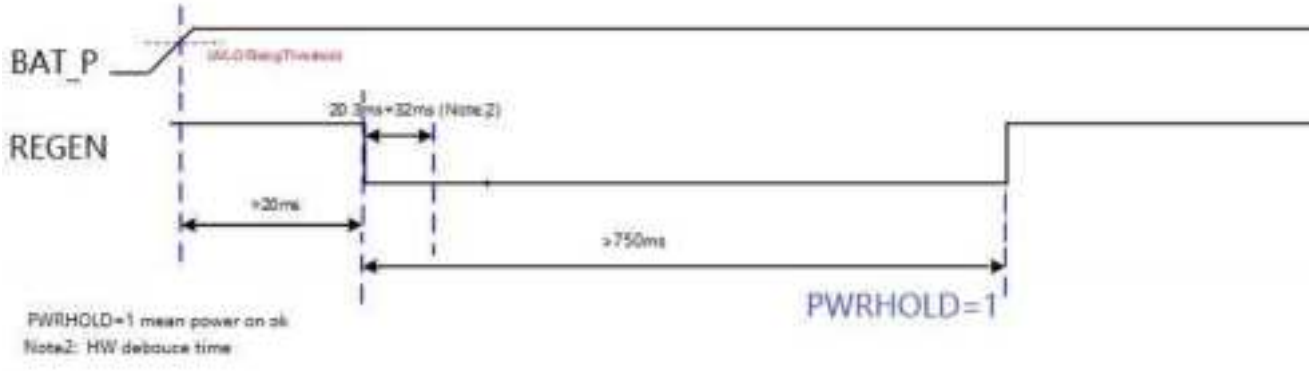
2.2 Pin Feature Description

PIN	SIGNAL	TYPE	DESCRIPTION	ALTERNATIVE
1	GND	Ground		
2	BAT_P	Supply	Battery input	
3	REGEN	Input only, Digital	Regulator Enable for BT (control by MCU at main board, ＞750ms) note2	
4	VREGOUT_HV	NC	LDO output	
5	VCCIO	NC	Supply power 1.8V-3.3V	
6	VREGOUT_MV	NC	LDO output	
7	WAKE_UP	Input only, Digital	General purpose IO - GPIO1	
8	VCHG	Supply, 5V	Charger input (5V)	
9	PIO6/UART_TX_IND	Output only, Digital	General purpose IO - GPIO4	
10	PIO7/STATUS_IND	Output only, Digital	General purpose IO - GPIO3	
11	SCL	Output only, Digital	General purpose IO - GPIO9	
12	SDA	Input/Output, Digital	UART0 port function selection (GPIO27): 0: low for race mode; 1: high for app uart mode	
13	UART_CTS	Output only, Digital	Anchor for Viper S (sync，module to main board)(GPIO11) ※Toggle at the timing of Sniffing of Host High= UART Busy Low= UART normal	
14	PIO5	Input/Output, Digital	General purpose IO - GPIO6	
15	UART_RTS	Input only, Digital	Anchor for Viper ML (GPIO12) ※Toggle at the timing of Sniffing of Host High= UART Busy Low= UART normal	
16	PIO2	Input only, Digital	UART2_TXD (GPIO22)	
17	LI_MODE_N	Input only, Digital	General purpose IO - GPIO0	
18	PIO3	Input/Output, Digital	UART2_RXD (GPIO21)	
19	RST N	Input only, Digital	RESET, pull low to reset module	
20	UART_RX	Input only, Digital	UART0_RXD (GPIO29)	

21	UART_TX	Output only, Digital	UART0_TXD (GPIO28)	
22	PIO4	Input/Output, Digital	General purpose IO - GPIO5	
23	PIO19/POWER_OFF	Input only, Digital	UART2 function sel (GPIO16): 1: AT port; 0: Log port;	
24	PIO20/UART_RX_IND	Input/Output, Digital	Part of Reset (GPIO17) sleep or normal mode switch, main board to module 1:sleep mode 0:normal mode	
25	PIO21/LINK_DROP	Input only, Digital	General purpose IO - GPIO19	
26	LED2/PIO18	Input/Output, Digital	General purpose IO - GPIO25	
27	LED1/PIO30	Input/Output, Digital	General purpose IO - GPIO24	
28	LED0	Input/Output, Digital	General purpose IO - GPIO23	
29	GND	Ground		
30	NC	NC		

Table 2- 1 Pin Feature Description

Note2



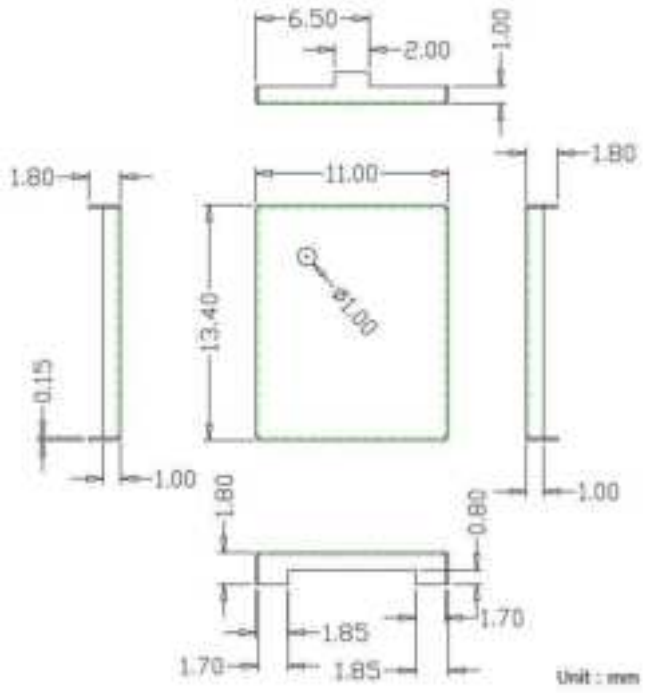
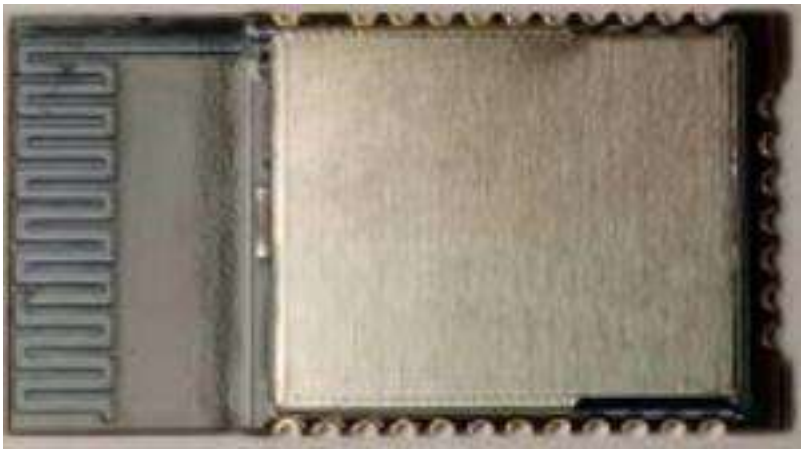


Figure 2-6 Shielding Case dimension

Figure 2-7 Fixing Hole location

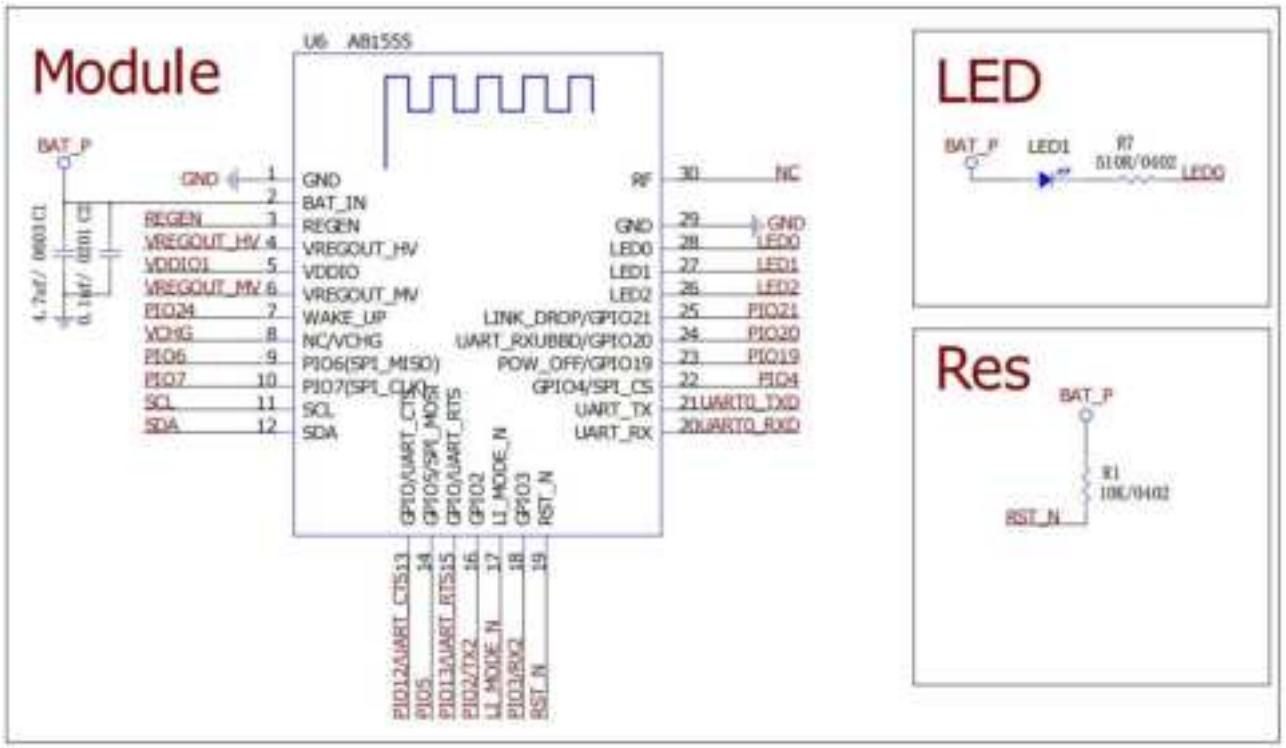
2.5 Physical module drawing



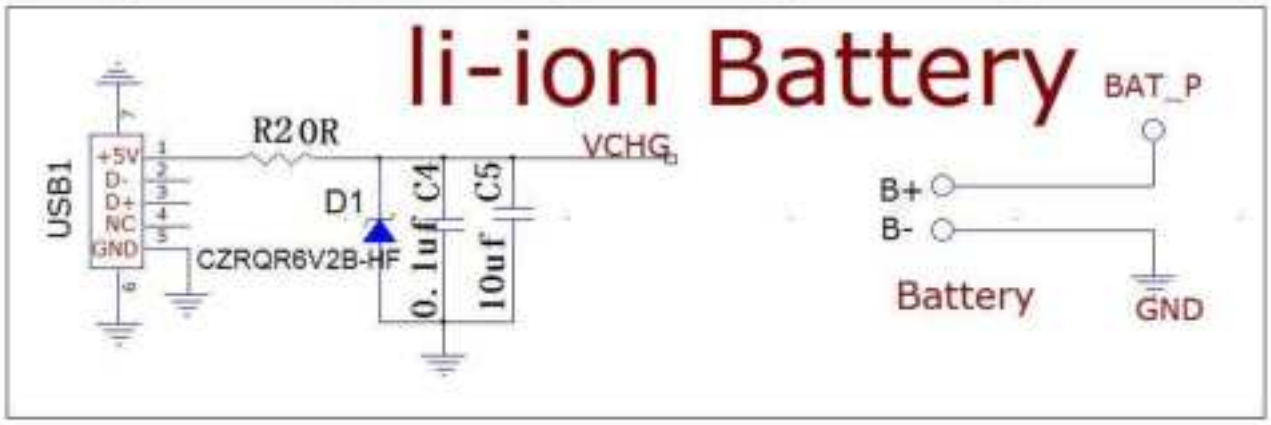
（TOP）

（BOTTOM）

3 General Application Schematic Diagram



➢ **Li-ion Battery**


li-ion Battery
BAT_P
USB1
+5V
D-
D+
NC
GND
R20R
VCHG
D1
CZRQR6V2B-HF
C4
0.1uf
C5
10uf
B+
B-
Battery
GND

4 Electrical Characteristics

4.1 Recommended Operating Conditions

Item	Condition	Min.	Typ.	Max.	Unit
I/O supply voltage (VCCIO)		3.0	3.3	3.6	V
Battery Input (BAT_P)		2.7		4.4	V
Charger supply voltage (VCHG)		4.5	5	6	V
Operating temperature		-40		+85	°C

Table 4- 1 Recommended Operating Conditions

4.2 IO Port Characteristics

Symbol	Description	Condition	Min.	Typ.	Max.	Unit
DIIH0	Digital high input current for IO Type 0	PU/PD disabled DVDIO = 3.3 DVDIO*0.65 < VIN0 < DVDIO+0.3V	-5	-	5	µA
		PU enabled DVDIO = 3.3 DVDIO*0.75 < VIN0 < DVDIO	-40	-	5	µA
		PD enabled DVDIO = 3.3 DVDIO*0.75 < VIN0 < DVDIO	7	-	80	µA
DIIL0	Digital low input current for IO Type 0	PU/PD disabled DVDIO = 3.3 -0.3V < VIN0 < DVDIO*0.35	-10	-	5	µA

		PU enabled, DVDIO = 3.3V 0 < VIN0 < DVDIO*0.25	-70	-	-6	µA
		PD enabled, DVDIO = 3.3V 0 < VIN0 <DVDIO*0.25	-5	-	40	µA
DIOH0	Digital high output current for IO Type 0	DVOH = 2.805V DVDIO = 3.3V Max. driving mode	24	-	-	mA
DIOL0	Digital low output current for IO Type 0	DVOL = 0.495V DVDIO = 3.3V Max. driving mode	24	-	-	mA
DRPU0	Digital I/O pull-up resistance for IO Type 0	DVDIO = 3.3V VIN0 =0V	40	75	190	kΩ
DRPD0	Digital I/O pull-down resistance for IO Type 0	DVDIO = 3.3V VIN0 = 3.3V	40	75	190	kΩ
DVOH0	Digital output high voltage for IO Type 0	DVDIO = 3.3V	0.85*DVDIO	-	-	V
DVOL0	Digital output low voltage for IO Type 0	DVDIO = 3.3V	-	-	0.15*DVDIO	V
VIH0	Digital input high voltage for IO Type 0	DVDIO = 3.3V	0.75*DVDIO		DVDIO	

VIL0	Digital input low voltage for IO Type 0	DVDIO = 3.3V	0		0.25*DVDIO	
DIIH1	Digital high input current for IO Type 1	PU/PD disabled DVDIO = 3.3,DVDIO*0.65 < VIN1 < DVDIO+0.3V	-5	-	5	µA
		DVDIO = 3.3V 4.5V < VIN1 < 5.5V	-5	-	5	µA
		PU enabled DVDIO = 3.3V DVDIO*0.75 < VIN1 < DVDIO	-40		5	µA
		PD enabled DVDIO = 3.3V DVDIO*0.75 < VIN1 < DVDIO	7		80	µA
DIIL1	Digital low input current for IO Type 1	PU/PD disabled DVDIO = 3.3V, -0.3V < VIN1 < DVDIO*0.35	-10	-	5	µA
		PU enabled DVDIO = 3.38V 0 < VIN1 < DVDIO*0.25	-70	-	-6	µA
		PD enabled DVDIO = 3.3V 0 < VIN1 < DVDIO*0.25	-5	-	40	µA
DIOH1	Digital high output current for IO Type 1	DVOH = 2.805V DVDIO = 3.3V Max. driving mode	24	-	-	mA

DIOL1	Digital low output current for IO Type 1	DVOL = 0.495V DVDIO = 3.3V Max. driving mode	24	-	-	mA
DRPU1	Digital I/O pull-up resistance for IO Type 1	DVDIO = 3.3V VIN1 = 0V	40	75	190	kΩ
DRPD1	Digital I/O pull-down resistance for IO Type 1	DVDIO = 3.3V VIN1 = 3.3V	40	75	190	kΩ
DVOH1	Digital output high voltage for IO Type 1	DVDIO = 3.3V	0.85*DVDIO	-	-	V
DVOL1	Digital output low voltage for IO Type 1	DVDIO = 3.3V	-	-	0.15*DVDIO	V
VIH1	Digital input high voltage for IO Type 1	DVDIO = 3.3V	2.0V		DVDIO	
VIL1	Digital input low voltage for IO Type 1	DVDIO = 3.3V	0		0.8	
DIIH2	Digital high input current for IO Type 2	PU/PD disabled DVDIO = 3.3V,DVDIO*0.65 < VIN2 < DVDIO+0.3V	-5	-	5	µA
		DVDIO = 3.3V 4.5V < VIN2 < 5.5V	-5	-	5	µA

		PU enabled, RSEL1 DVDIO = 3.3V DVDIO*0.75 < VIN2 < DVDIO	-60	-	5	µA
		PU enabled, RSEL2 DVDIO = 3.3V DVDIO*0.75 < VIN2 < DVDIO	-120	-	5	µA
		PD enabled, RSEL1 DVDIO = 3.3V DVDIO*0.75 < VIN2 < DVDIO	10	-	110	µA
		PD enabled, RSEL2 DVDIO = 3.3V DVDIO*0.75 < VIN2 < DVDIO	20	-	220	µA
DIIL2	Digital low input current for IO Type 2	PU/PD disabled, DVDIO = 3.3V, -0.3V < VIN2 < DVDIO*0.35	-10	-	5	µA
		PU enabled, RSEL1 DVDIO = 3.3V 0 < VIN2 < DVDIO*0.25	-100	-	-10	µA
		PU enabled, RSEL2 DVDIO = 3.3V 0 < VIN2 < DVDIO*0.25	-200	-	-20	µA
		PD enabled, RSEL1 DVDIO = 3.3V 0 < VIN2 <DVDIO*0.25	-5	-	60	µA

		PD enabled, RSEL2 DVDIO = 3.3V 0 < VIN2 < DVDIO*0.25	-5	-	120	µA
DIOH2	Digital high output current for IO Type 2	DVOH = 2.805V DVDIO = 3.3V Max. driving mode	24	-	-	mA
DIOL2	Digital low output current for IO Type 2	DVOL = 0.495V DVDIO = 3.3V Max. driving mode	24	-	-	mA
DRPU2	Digital I/O pull-up resistance for IO Type 2 RSEL1 : (GPIO_R1, GPIO_R0) = (1, 0) or (0,1) RSEL2 : (GPIO_R1, GPIO_R0) = (1, 1)	DVDIO = 3.3V VIN2 = 0V, RSEL1	25	45	100	kΩ
		DVDIO = 3.3V VIN2 = 0V, RSEL2	10	23	50	kΩ
DRPD2	Digital I/O pull-down resistance for IO Type 2 RSEL1 : (GPIO_R1, GPIO_R0) = (1, 0) or (0,1) RSEL2 : (GPIO_R1, GPIO_R0) = (1, 1)	DVDIO = 3.3V VIN2 = 3.3V, RSEL1	25	45	100	kΩ
		DVDIO = 3.3V VIN2 = 3.3V, RSEL2	10	23	50	kΩ
DVOH2	Digital output high voltage for IO Type 2	DVDIO = 3.3V	0.85*DVDIO	-	-	V
DVOL2	Digital output low voltage for IO Type 2	DVDIO = 3.3V	-	-	0.15*DVDIO	V

VIH2	Digital input high voltage for IO Type 2	DVDIO = 3.3V	2.0V		DVDIO	
VIL2	Digital input low voltage for IO Type 2	DVDIO = 3.3V	0		0.8	
DIIH3	Digital high input current for IO Type 3	PU/PD disabled DVDIO = 3.3V,DVDIO*0.65 < VIN3 < DVDIO+0.3V	-5	-	5	µA
		DVDIO = 3.3V 4.5V < VIN3 < 5.5V	-5	-	5	µA
		PU enabled DVDIO = 3.3V DVDIO*0.75 < VIN3 < DVDIO	-40		5	µA
		PD enabled DVDIO = 3.3V DVDIO*0.75 < VIN3 < DVDIO	7		80	µA
DIIL3	Digital low input current for IO Type 3	PU/PD disabled DVDIO = 3.3V, -0.3V < VIN3 < DVDIO*0.35	-10	-	5	µA
		PU enabled DVDIO = 3.3V 0 < VIN3 < DVDIO*0.25	-70	-	-6	µA
		PD enabled DVDIO = 3.3V 0 < VIN3 < DVDIO*0.25	-5	-	40	µA

DIOH3	Digital high output current for IO Type 3	DVOH = 2.805V DVDIO = 3.3V Max. driving mode	24	-	-	mA
DIOL3	Digital low output current for IO Type 3	DVOL = 0.495V DVDIO = 3.3V Max. driving mode	24	-	-	mA
DRPU3	Digital I/O pull-up resistance for IO Type 3	DVDIO = 3.3V VIN3 = 0V	40	75	190	kΩ
DRPD3	Digital I/O pull-down resistance for IO Type 3	DVDIO = 3.3V VIN3 = 3.3V	40	75	190	kΩ
DVOH3	Digital output high voltage for IO Type 3	DVDIO = 3.3V	0.85*DVDIO	-	-	V
DVOL3	Digital output low voltage for IO Type 3	DVDIO = 3.3V	-	-	0.15*D	V
VIH3	Digital input high voltage for IO Type 3	DVDIO = 3.3V	2.0V		DVDIO	
VIL3	Digital input low voltage for IO Type 3	DVDIO = 3.3V	0		0.8	
DIIH4	Digital high input current for IO Type 4	PU/PD disabled DVDIO = 3.3V,DVDIO*0.65 < VIN4 < DVDIO+0.3V	-5	-	5	µA
		PU enabled DVDIO = 3.3V DVDIO*0.75 < VIN4 < DVDIO	-40		5	µA
		PD enabled DVDIO = 3.3V DVDIO*0.75 < VIN4 < DVDIO	7		80	µA
DIIL4	Digital low input current	PU/PD disabled DVDIO	-10	-	5	µA

	for IO Type 4	= 3.3V, -0.3V < VIN4 < DVDIO*0.35				
		PU enabled DVDIO = 3.38V 0 < VIN4 <DVDIO*0.25	-70	-	-6	µA
		PD enabled DVDIO = 3.3V 0 < VIN4 < DVDIO*0.25	-5	-	40	µA
DIOH4	Digital high output current for IO Type 4	DVOH = 2.805V DVDIO = 3.3V Max. driving mode	24	-	-	mA
DRPU4	Digital I/O pull-up resistance for IO Type 4	DVDIO = 3.3V VIN4 = 0V	40	75	190	kΩ
DRPD4	Digital I/O pull-down resistance for IO Type 4	DVDIO = 3.3V VIN4 = 3.3V	40	75	190	kΩ
DVOH4	Digital output high voltage for IO Type 4	DVDIO = 3.3V	0.85*DVDIO	-	-	V
DVOL4	Digital output low voltage for IO Type 4	DVDIO = 3.3V	-	-	0.15*DVDIO	V
VIH4	Digital input high voltage for IO Type 4	DVDIO = 3.3V	2.0V		DVDIO	
VIL4	Digital input low voltage for IO Type 4	DVDIO = 3.3V	0		0.8	

Table 4-2 IO ports characteristics

4.3 External Clock Source Characteristics

Item	Min.	Typ.	Max.	Unit
CRYSTAL REQUIREMENT				
Nominal Frequency	-	26	-	MHz
Operating Temperature Range	-40	25	85	℃
Frequency Tolerance	-10	-	10	ppm

Frequency Stability	-20	-	20	ppm
Load Capacitance	-	9	-	pF
Aging	-	±3	-	ppm
Drive Level	-	100	-	uW
Effective Resistance Rr	-	60	-	Ω
Shunt Capacitance C0	-	-	3	pF
Insulation Resistance	500	-	-	MΩ
Storage Temperature Range	-40	-	85	

Table 4- 3 Reference Clock

4.4 Battery Charging Characteristics

Parameter	Conditions	Min.	Typical	Max.	Unit
VBUS Operation					
VBUS operating voltage		4.1	5	7.2	V
V_{BUS_UVLO}	VBUS rising for power good	3.8	3.9	4.1	V
	VBUS falling for power not good	3	3.1	3.2	V
V_{BUS_OVP}	VBUS over voltage rising level	7.2	7.5	7.8	V
	VBUS over voltage hysteresis	-	200	-	mV
Weak VBUS detection	(VBUS-VBAT) falling level to start reducing ISYS	30	145	290	mV
	Hysteresis of (VBUS-VBAT) rising to release reducing ISYS	-	50	-	mV
Power Path Control					
Power path threshold	The threshold of to enter battery supplement mode, (VBAT-VSYS)	10	22	35	mV
	The threshold of to exit battery supplement mode,	-3	-1.5	0	mV
	(VBAT-VSYS)				

VBUS to VSYS on resistance	VBUS=4.4V, ISYS=500mA, ICC=0mA, ICL=1000mA	-	370	780	mΩ
Battery Charger					
Battery charge voltage regulation, VCV	Battery charge voltage regulation range	4.05	-	4.6	V
	Regulation voltage step	-	50	-	mV
	Accuracy @ T_A=25°C	-0.5	-	0.5	%
Recharge threshold, V_{RECHG}	Recharge threshold back tofast charging from VCV	20	50	80	mV
		70	100	130	mV
		120	150	180	mV
		170	200	230	mV
Pre-charge to Fast charge threshold, VPRECC_CC	Pre-charge to fast charge threshold range	2.3	2.4	2.5	V
		2.45	2.55	2.65	V
		2.6	2.7	2.8	V
		2.75	2.85	2.95	V
		2.9	3	3.1	V
		3.05	3.15	3.25	V
		3.2	3.3	3.4	V
		3.35	3.45	3.55	V
	Hysteresis, fast charge backto Pre-charge	-	90	-	mV
VBUS poor adaptor management, VBUS_PAM	ΔV is defined by this spec.. VSYS=VCV+ΔV @ VBUS=5V, ISYS=1mA, VCV=4.2V	100	200	300	mV
	ΔV is defined by this spec..				

	VSYS=VBUS-ΔV @ VBUS=4V, ISYS=1mA, w/o battery	-	40	-	mV
VSYS dynamic power management, VSYS_DPM	ΔV is defined by this spec.. VSYS_DPM=VBAT+ΔV @VBAT>3.6V	0.04	0.1	0.16	V
	VSYS_DPM@VBAT<3.4V	3.42	3.6	3.78	V
		3.515	3.7	3.885	V
		3.61	3.8	3.99	V
		3.705	3.9	4.095	V
		3.86	4	4.14	V
		3.895	4.1	4.305	V
		3.99	4.2	4.41	V
		4.085	4.3	4.515	V
Fast charging current, ICHG	Resistance at CHR_ISET is 400kΩ		5		mA
	Resistance at CHR_ISET is 40kΩ	45	50	55	mA
	Resistance at CHR_ISET is 4kΩ	450	500	550	mA
Charge termination current,Iterm	RG_ITERM_ITH[1:0]=2'b00	4.25	5	5.75	%*ICHG
	RG_ITERM_ITH[1:0]=2'b01	8.5	10	11.5	%*ICHG
	RG_ITERM_ITH[1:0]=2'b10	17	20	23	%*ICHG
	RG_ITERM_ITH[1:0]=2'b11	34	40	46	%*ICHG

Pre-charge current, PRECC	RG_PRECC_ITH[1:0]=2'b00	4.5	5	5.5	%*ICHG
	RG_PRECC_ITH[1:0]=2'b01	9	10	11	%*ICHG
	RG_PRECC_ITH[1:0]=2'b10	18	20	22	%*ICHG
	RG_PRECC_ITH[1:0]=2'b11	36	40	44	%*ICHG
Charge termination extensiontimer, Iterm_TIMER	RG_T_ITERM_EXT[1:0]=2'b00	-	0	-	Minutes
	RG_T_ITERM_EXT[1:0]=2'b01	13.5	15	16.5	Minutes
	RG_T_ITERM_EXT[1:0]=2'b10	27	30	33	Minutes
	RG_T_ITERM_EXT[1:0]=2'b11	54	60	66	Minutes
Fast charging safety timer, ICHG_TIMER	CC/CV mode charging time-out protection	-	0	-	Hours
		2.7	3	3.3	Hours
		4.05	4.5	4.95	Hours
		8.1	9	9.9	Hours
Double fast charging safety timer threshold	IBAT<"percentage of ICHG" during ICL or thermal regulation mode	-	50	-	%
Pause fast charging safety timer threshold	IBAT<"percentage of ICHG" during ICL or thermal regulation mode	-	20	-	%
Thermal regulation	Chip junction temperature, programmable threshold.	110	120	130	°C
VBAT to VSYS on resistance	VBUS=5V, VBAT=4.2V, ISYS=300mA	-	80	260	mΩ
Input current Regulation					
	RG_ICL_ITH[3:0]=4'b0001	-	75	100	mA

Input current limit, ICL	RG_ICL_ITH[3:0]=4'b0010	-	200	240	mA
	RG_ICL_ITH[3:0]=4'b0011	-	300	360	mA
	RG_ICL_ITH[3:0]=4'b0100	-	400	500	mA
	RG_ICL_ITH[3:0]=4'b0101	-	500	600	mA
	RG_ICL_ITH[3:0]=4'b0110	-	600	720	mA
	RG_ICL_ITH[3:0]=4'b0111	-	700	840	mA
	RG_ICL_ITH[3:0]=4'b1000	-	800	960	mA
	RG_ICL_ITH[3:0]=4'b1001	-	900	1080	mA
	RG_ICL_ITH[3:0]=4'b1010	-	1000	1200	mA
Battery Voltage Protection					
Battery voltage protection threshold, VBAT_OVP	VBAT_OVP, percentage ofVCV	-	104	-	%
	Hysteresis, percentage of VCV	-	2	-	%
HW JEITA					
JEITA_VOLT_HOT	JEITA detection hot voltage		0.3999		V
JEITA_VOLT_COLD	JEITA detection cold voltage		1.1029		V

Table 4- 7 Battery Charging

4.5 Typical Power Consumption

4.5.1 Power Consumption – HID Mode

Parameter	Current (avg.)	Units	Notes
Standby mode	287	uA	----
Deep Power-down mode	2	uA	—
Connected (No data)	1.85	mA	No data was transmitted
Connected (Transfer data)	4.01	mA	AB1555 Transmit Data Send 50 Byte every (100ms) BT 4.0 interval=20ms 5000Bytes/S

Table 4- 8 Typical Power Consumption-Classic

Note: BT3.0 and BLE both in standby mode.

4.5.2 Power Consumption - Low Energy Mode

Parameter	Current (avg.)	Units	Notes
Standby mode	287	uA	---
Deep Power-Down mode	2	uA	—
Connected (No data)	1.63	mA	No data was transmitted,
Connected (Transfer data)	2.43	mA	AB1555 Transmit Data Send 50 Byte every (100ms) BT 4.0 interval=20ms 500Bytes/S

Table 4- 9 Typical Power Consumption-Low Energy

Note: power consumption values were taken under following conditions:

1. BAT_P pin=3.3V

4.6 RF Parameters

4.6.1 Transmit

Basic Data Rate – transmitter specification

Description	Condition	Min	Typical	Max	Unit
Frequency range		2,402	-	2,480	MHz
Maximum transmit power		-	6	8	dBm
Gain step		2	4	8	dB
Δf1avg (00001111)		140	157	175	kHz
Δf2max (10101010)		115	122	-	kHz
Δf1avg/Δf2avg		0.8	0.9	-	kHz
Initial carrier frequency drift		-75	10	75	kHz
Frequency drift	DH1	-25	15	25	kHz
	DH3	-40	18	40	kHz
	DH5	-40	18	40	kHz
Maximum drift rate		-	9		kHz/µs
Bandwidth 20dB of TX outputspectrum		-	920	1,000	kHz
In-band spurious emission	±2 MHz offset	-	-38	-20	dBm
	±3 MHz offset	-	-43	-40	dBm
	> ±3 MHz offset	-	-43	-40	dBm
Out-of-band spurious emission	30 MHz to 1 GHz	-	-	-36	dBm
	1 to 12.75 GHz	-	-	-30	dBm
	1.8 to 1.9 GHz	-	-	-47	dBm
	5.15 to 5.3 GHz	-	-	-47	dBm

Table 4- 10 Transmitter Basic Data Rate

Enhanced Data Rate – receiver specifications

Description	Condition	Min	Typical	Max	Unit
Frequency range		2,402	-	2,480	MHz
Max. transmit power	π/4 DQPSK	-	5	-	dBm

	8PSK	-	5	-	dBm
Relative transmit power	π/4 DQPSK	-4	-1.5	1	dB
	8PSK	-4	-1.5	1	dB
Freq. stability ω0	π/4 DQPSK	-10	4	10	kHz
	8PSK	-10	4	10	kHz
Freq. stability ω1	π/4 DQPSK	-75	20	75	kHz
	8PSK	-75	20	75	kHz
| ω0+ω1|	π/4 DQPSK	-75	20	75	kHz
	8PSK	-75	20	75	kHz
RMS DEVM	π/4 DQPSK	-	8	20	%
	8PSK	-	8	13	%
99% DEVM	π/4 DQPSK	-	12	30	%
	8PSK	-	12	20	%
Peak DEVM	π/4 DQPSK	-	17	35	%
	8PSK	-	17	25	%
In-band spurious emission	π/4 DQPSK, ±1 MHz offset	-	-33	-26	dBm
	8PSK, ±1 MHz offset	-	-33	-26	dBm
	π/4 DQPSK, ±2 MHz offset	-	-30	-20	dBm
	8PSK, ±2 MHz offset	-	-30	-20	dBm
	π/4 DQPSK, ±3 MHz offset	-	-43	-40	dBm
	8PSK, ±3 MHz offset	-	-43	-40	dBm

Table 4- 11 Transmitter Enhanced Data Rate

Bluetooth LE 1M － transmitter specification

Description	Condition	Min	Typical	Max	Unit
Frequency range		2,402	-	2,480	MHz
Output power		-20	0	-	dBm
Modulation characteristic	Δf1avg (00001111)	235	250	265	kHz
	Δf2max (10101010)	185	215	-	kHz
	Δf1avg/Δf2avg	0.8	0.9	-	kHz
Carrier frequency offset anddrift	Frequency offset	-150	±5	150	kHz

	Frequency drift	-50	±5	50	kHz
	Maximum drift rate	-20	±3	20	kHz/μs
In-band spurious emission	±2 MHz offset	-	-35	-20	dBm
	±3 MHz offset	-	-40	-30	dBm
	> ±3 MHz offset	-	-40	-30	dBm

Table 4- 12 Transmitter Low Energy

Bluetooth LE 2M – transmitter specification

Description	Condition	Min	Typical	Max	Unit
Frequency range		2,402	-	2,480	MHz
Output power		-20	0	-	dBm
Modulation characteristic	Δf1avg (00001111)	450	500	550	kHz
	Δf2max (10101010)	370	454	-	kHz
	Δf1avg/Δf2avg	0.8	0.9	-	kHz
Carrier frequency offset anddrift	Frequency offset	-150	±5	150	kHz
	Frequency drift	-50	±5	50	kHz
	Maximum drift rate	-20	±3	20	kHz/μs
In-band spurious emission	±2 MHz offset	-	-35	-20	dBm
	±3 MHz offset	-	-40	-30	dBm
	> ±3 MHz offset	-	-40	-30	dBm

Table 4- 13 Bluetooth LE 2M –*transmitter* specifications

4.6.2 Receive

Basic Data Rate

Description	Condition	Min	Typical	Max	Unit
Frequency range		2,402	-	2,480	MHz
Receiver sensitivity	BER < 0.1% (DH5)	-	-94	-70	dBm
Max. detectable input power	BER < 0.1%	-20	-5	-	dBm

C/I co-channel selectivity	BER < 0.1%	-	6	11	dB
C/I 1 MHz adj. channelselectivity	BER < 0.1%	-	-7	0	dB
C/I 2 MHz adj. channelselectivity	BER < 0.1%	-	-40	-30	dB
C/I ≥ 3 MHz adj. channelselectivity[1]	BER < 0.1%	-	-43	-40	dB
C/I image channel selectivity	BER < 0.1%	-	-20	-9	dB
C/I image 1 MHz adj. channelselectivity	BER < 0.1%	-	-35	-20	dB
Out-of-band blocking	30 to 2,000 MHz	-10	-4	-	dBm
	2,000 to 2,350 MHz	-27	-14	-	dBm
	2,350 to 2,400 MHz	-27	-18	-	dBm
	2,500 to 2,550 MHz	-27	-18	-	dBm
	2,550 to 3,000 MHz	-27	-14	-	dBm
	3,000 MHz to 12.75 GHz	-10	1	-	dBm
Intermodulation		-39	-30	-	dBm

Table 4- 14 Receiver Basic Data Rate

Enhanced Data Rate

Description	Condition	Min	Typical	Max	Unit
Frequency range		2,402	-	2,480	MHz
Receiver sensitivity	π/4 DQPSK, BER < 0.01% (2DH5)	-	-94	-70	dBm
	8PSK, BER < 0.01%	-	-87	-70	dBm
Maximum detectable inputpower	π/4 DQPSK, BER < 0.01% (3DH5)	-20	-5	-	dBm
	8PSK, BER < 0.01%	-20	-5	-	dBm
C/I co-channel selectivity	π/4 DQPSK, BER < 0.01%	-	9	13	dB
	8PSK, BER < 0.01%	-	16	21	dB

C/I 1MHz adj. channelselectivity	π/4 DQPSK, BER < 0.01%	-	-12	0	dB
	8PSK, BER < 0.01%	-	-6	5	dB
C/I 2MHz adj. channelselectivity	π/4 DQPSK, BER < 0.01%	-	-40	-30	dB
	8PSK, BER < 0.01%	-	-36	-25	dB
C/I ≥ 3MHz adj. channelselectivity[2]	π/4 DQPSK, BER < 0.01%	-	-43	-40	dB
	8PSK, BER < 0.01%	-	-40	-33	dB
C/I image channelselectivity	π/4 DQPSK, BER < 0.01%	-	-20	-7	dB
	8PSK, BER < 0.01%	-	-15	0	dB
C/I image 1 MHz adj.channel selectivity	π/4 DQPSK, BER < 0.01%	-	-40	-20	dB
	8PSK, BER < 0.01%	-	-30	-13	dB

Table 4- 15 Receiver Enhanced Data Rate

Bluetooth LE 1M － receiver specifications

Description	Condition	Min	Typical	Max	Unit
Frequency range		2,402	-	2,480	MHz
Receiver sensitivity	PER < 30.8%	-	-96	-70	dBm
Max. detectable input power	PER < 30.8%	-10	-5	-	dBm
C/I co-channel selectivity	PER < 30.8%	-	6	21	dB
C/I 1 MHz adj. channelselectivity	PER < 30.8%	-	-7	15	dB
C/I 2 MHz adj. channelselectivity	PER < 30.8%	-	-30	-17	dB
C/I ≥ 3 MHz adj. channelselectivity[3]	PER < 30.8%	-	-33	-27	dB
C/I image channel selectivity	PER < 30.8%	-	-20	-9	dB
C/I image 1 MHz adj. channelselectivity	PER < 30.8%	-	-30	-15	dB
Out-of-band blocking	30MHz to 2,000MHz	-	-	-30	dBm
	2,001MHz to 2,339MHz	-	-	-35	dBm
	2,501MHz to 3,000MHz	-	-	-35	dBm
	3,001MHz to 12.75GHz	-	-	-30	dBm

Table 4- 16 Receiver Low Energy

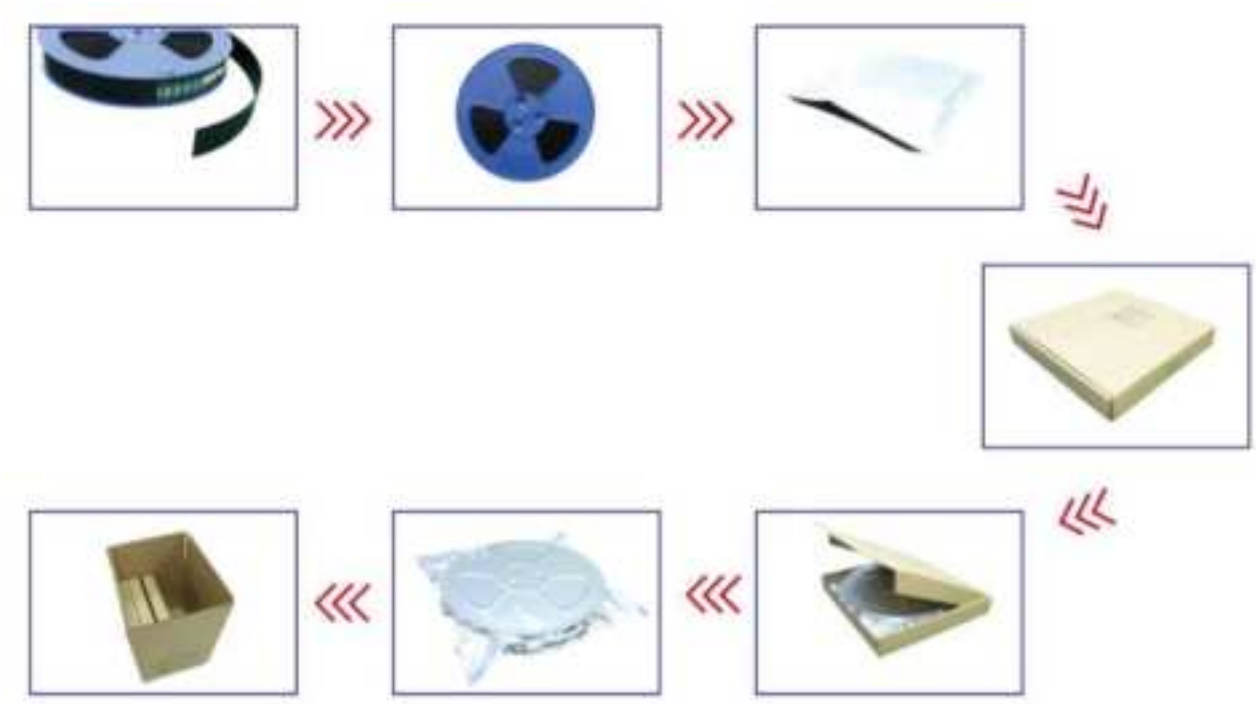
Bluetooth LE 2M – receiver specifications

Description	Condition	Min	Typical	Max	Unit
Frequency range		2,402	-	2,480	MHz
Receiver sensitivity	PER < 30.8%	-	-93	-70	dBm
Max. detectable input power	PER < 30.8%	-10	-5	-	dBm
C/I co-channel selectivity	PER < 30.8%	-	6	21	dB
C/I 2 MHz adj. channelselectivity	PER < 30.8%	-	-7	15	dB
C/I 4 MHz adj. channelselectivity	PER < 30.8%	-	-30	-17	dB
C/I ≥ 6 MHz adj. channelselectivity[3]	PER < 30.8%	-	-33	-27	dB
C/I image channel selectivity	PER < 30.8%	-	-20	-9	dB
C/I image 2 MHz adj. channelselectivity	PER < 30.8%	-	-30	-15	dB
Out-of-band blocking	30MHz to 2,000MHz	-	-	-30	dBm
	2,001MHz to 2,339MHz	-	-	-35	dBm
	2,501MHz to 3,000MHz	-	-	-35	dBm
	3,001MHz to 12.75GHz	-	-	-30	dBm

Table 4- 17 Bluetooth LE 2M – receiver specifications

4.7 packaging

Braid packaging



4.8 Firmware Differentiation

Different firmware models are distinguished by large colored dots on the mask cover. The green dots represent Wacom_AB1555_V2.00_Intuos_PBM.rar and the blue dots represent Wacom_AB1555_V2.00_Intuos_PBS.rar.

RF Exposure Statement:

RF exposure assessment has been performed to prove that this unit will not generate the harmful EM emission above the reference level as specified in EC Council Recommendation (1999/519/EC).

EU Regulatory Conformance:

Hereby, we (Iton Technology Corp.) declared that this device is in compliance with the Directive 2041/53/EU.

The deivce can be used in EU countries without any restrictions.

FCC Statement
FCC standards: FCC CFR Title 47 Part 15 Subpart C Section 15.247
PCB antenna with antenna gain 1.97dBi

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
—Reorient or relocate the receiving antenna.
—Increase the separation between the equipment and receiver.
—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
—Consult the dealer or an experienced radio/TV technician for help.

FCC Radiation Exposure Statement

This modular complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

If the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: “Contains Transmitter Module FCC ID: VYV-B861U Or Contains FCC ID: VYV-B861U”
When the module is installed inside another device, the user manual of the host must contain below warning statements;
1. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference.
(2) This device must accept any interference received, including interference that may cause undesired operation.
Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.
However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
—Reorient or relocate the receiving antenna.
—Increase the separation between the equipment and receiver.
—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
—Consult the dealer or an experienced radio/TV technician for help.
2. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product.
Any company of the host device which install this modular with limit modular approval should perform the test of radiated & conducted emission and spurious emission,etc. according to FCC part 15C : 15.247 and 15.209 & 15.207 ,15B Class B requirement, Only if the test result comply with FCC part 15C : 15.247 and 15.209 & 15.207 ,15B Class B requirement， then the host can be sold legally.

IC STATEMENT

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:
(1) This device may not cause interference.
(2) This device must accept any interference, including interference that may cause undesired operation of the device
Cet appareil contient des émetteurs / récepteurs exemptés de licence conformes aux RSS (RSS) d'Innovation, Sciences et Développement économique Canada. Le fonctionnement est soumis aux deux conditions suivantes :
(1) Cet appareil ne doit pas causer d'interférences.
(2) Cet appareil doit accepter toutes les interférences, y compris celles susceptibles de provoquer un fonctionnement indésirable de l'appareil.

IC Radiation Exposure Statement
The modular can be installed or integrated in mobile or fix devices only. This modular cannot be installed in any portable device .

This modular complies with IC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. This modular must be installed and operated with a minimum distance of 20 cm between the radiator and user body. Cette modulaire doit être installé et utilisé à une distance minimum de 20 cm entre le radiateur et le corps de l'utilisateur.

If the IC number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following:
"Contains IC: 27588-B861U"

when the module is installed inside another device, the user manual of this device must contain below warning statements;
1. This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:
(1) This device may not cause interference.
(2) This device must accept any interference, including interference that may cause undesired operation of the device.
2. Cet appareil contient des émetteurs / récepteurs exemptés de licence conformes aux RSS (RSS) d'Innovation, Sciences et Développement économique Canada. Le fonctionnement est soumis aux deux conditions suivantes :
(1) Cet appareil ne doit pas causer d'interférences.
(2) Cet appareil doit accepter toutes les interférences, y compris celles susceptibles de provoquer un fonctionnement indésirable de l'appareil.

The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product