



Bluetooth 3.0 BR + 5.0BLE + 2.4GHz-Proprietary

Product Brief

Yichip Microelectronics ©2014

General Description

The YC10XX is a very low power, high performance and highly integrated Bluetooth 3.0 BR + 5.0BLE + 2.4G Proprietary triple-mode solution, designed for operation over the 2400MHz to 2483.5Mhz ISM frequency band.

YC10XX is manufactured using advanced 55nm CMOS low leakage process, which offers highest integration, lowest power consumption, lowest leakage current and reduced BOM cost while simplifying the overall system design. Rich peripherals including an 8 channel general purpose ADC, power-on-reset (POR), Arithmetic Accelerators, 3axis Q-decoder, ISO7816, UART/SPI/I2C and up to 23 GPIOs, which further reduce overall system cost and size.

YC10XX operates with a power supply range from 1.8 to 5.5V and has very low power consumption in both Tx and Rx modes, enabling long lifetimes in battery-operated systems while maintaining excellent RF performance. The device can enter an ultra low power sleep mode in which the registers and retention memory content are retained while low power Oscillator and sleep timer is ON.

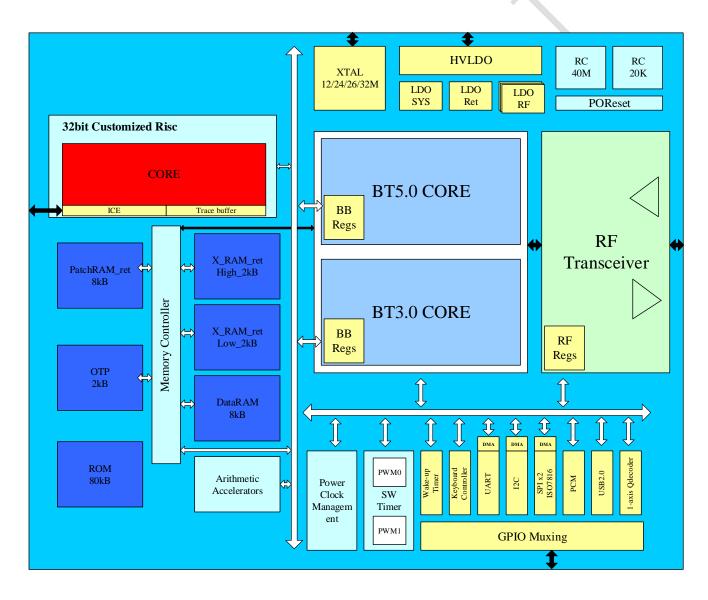
Key Features

- Bluetooth3.0BR+5.0BLE+2.4GHz-Proprietary triple-mode RF SOC
- Very Low Power Consumption
 - 10nA shut down mode (external interrupts)
 - 900nA sleep mode (32kHz RC OSC, sleep timer and register ON)
 - 2uA retention mode (32kHz RC OSC, sleep timer, 2k retention memory and register ON)
 - Rx peak current @3V (ideal DCDC)
 - 6.75mA in BLE/2.4G mode
 - 7.25mA in in 3.0 mode
 - Tx peak current @3V (-2dBm, ideal DCDC)
 - 16.5mA in BLE/2.4G mode
 - 17mA in in 3.0 mode
 - Rx peak current w/o DCDC
 - 16mA in BLE/2.4G mode
 - 17mA in 3.0 mode
 - Tx peak current w/o DCDC @ -2dBm
 - 22mA in BLE/2.4G mode
 - 23mA in 3.0 mode
 - <25uA avg, 500ms sniff hold connection
- 2.4GHz Transceiver
 - Single-end RFIO
 - -93dBm in BLE mode
 - support 250kbps, 1Mbps data rates
 - Tx Power upto +6dBm

- Oscillators
 - 16M/24M/32M XTAL supported (default 24M)
 - 50M RC oscillator
 - Low Jitter 32K RC oscillator
- Single Core Digital Architecture
 - 32bit-Risc Core for link management
 - 80kB code ROM
 - 8kB code RAM
 - All RAMs can be set to retention mode
- Arithmetic Accelerators [Accuracy: (sign, 15b.16b)]
 - multi/div/sqrt
- Analog Peripherals
 - 8 channel ADC with 10 bit accuracy/3Msps
- Digital Peripherals
 - Two-wire Master (I2C compatible), upto 400kbps; UART(RTS/CTS) with HCI-H5 protocol, upto 3.25Mbps; SPI Master, upto 24Mbps
 - ISO7816
 - AES128 HW encryption
 - LED drive capability
 - PWM
 - 1 axis Q-decoder



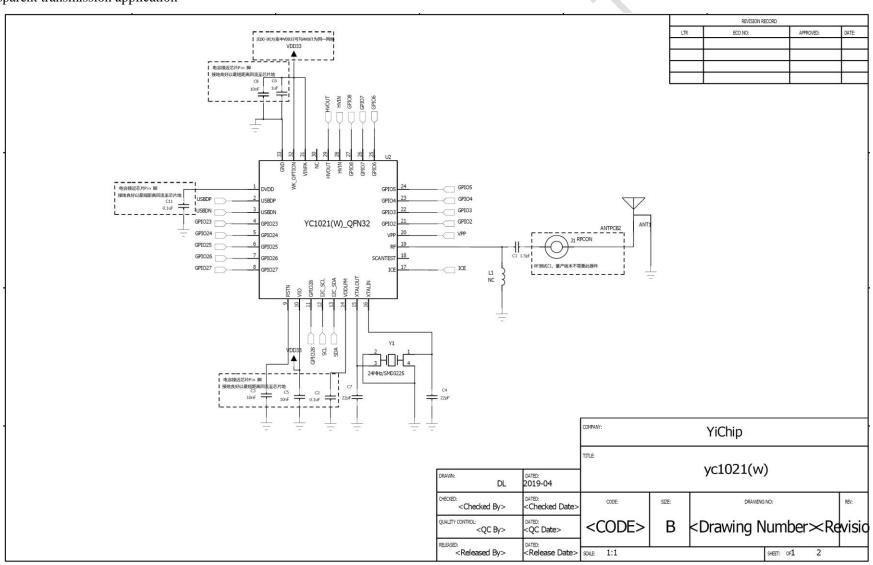
Block Diagram





Application Schematic

Transparent transmission application





Package Information

		WK_option	VINPA	NC	HVOUT	HVIN	GPIO8	GPIO7	GPI06		
		32	31	30	29	28	27	26	25		
DVDD	1									24	GPIO5
USBDP	2									23	GPIO4
USBDN	3									22	GPIO3
GPIO23	4		Y	C1	02	21(W)		21	GPIO2
GPIO24	5		\bigcap		J/15	- (3) 2L		20	VPP
				ין יו	1 —)	\	. 1		1		
GPIO25	6		Y		1 = 2				4	19	RFN
GPIO25	7		Y			* •			•	19	RFN
			Y			~					
GPIO26	7	9	10	11	12	13	14	15	16	18	SCANMODE



4x4	Pin Name	Туре	Function Description
32L		2) 2	7 direction 2 doct-passin
32	WK_OPTION	Power_I	Shut down mode select, active low. If not needed connect with VINPA.
1	DVDD	Power_O	internal LDO output, 1.2V. Need an external bypass cap here 1uF
2	USBDP	Dig_IO	USB port.
3	USBDN	Dig_IO	USB port.
/	GPIO17	Dig_IO	pls check "sheet: GPIO_Muxing"
/	GPIO18	Dig_IO	pls check "sheet: GPIO_Muxing"
/	GPIO19	Dig_IO	pls check "sheet: GPIO_Muxing"
/	GPIO20	Dig_IO	pls check "sheet: GPIO_Muxing"
/	GPIO21	Dig_IO	pls check "sheet: GPIO_Muxing"
/	GPIO22	Dig_IO	pls check "sheet: GPIO_Muxing"
4	GPIO23	Dig_IO	pls check "sheet: GPIO_Muxing"
5	GPIO24	Dig_IO	pls check "sheet: GPIO_Muxing"
6	GPIO25	Dig_IO	pls check "sheet: GPIO_Muxing"
7	GPIO26	Dig_IO	pls check "sheet: GPIO_Muxing"
8	GPIO27	Dig_IO	pls check "sheet: GPIO_Muxing"
0	DOTN		Gloable reset, active low. OR gated with internal POR. NC if not
9	RSTN	Dig_I	needed.
10	VIO	Power_I	I/O Power, 1.8~3.6V, 100nF//10pF bypass cap
11	GPIO28	Dig_IO	pls check "sheet: GPIO_Muxing"
/	GPIO29	Dig_IO	pls check "sheet: GPIO_Muxing"
/	GPIO30	Dig_IO	pls check "sheet: GPIO_Muxing"
/	GPIO31	Dig_IO	pls check "sheet: GPIO_Muxing"
12	I2C_SCL	Dig_IO	Internal pull up 1Kohm to VIO and no need external pull up resistor.
13	I2C_SDA	Dig_IO	Internal pull up 1Kohm to VIO and no need external pull up resistor.
14	VDDLPM	Power_O	internal LDO output, 1.2V. Need an external bypass cap here 100nF
15	XTALOUT	Ana_O	XTAL port
16	XTALIN	Ana_I	XTAL port, or external CLK in
17	ICE	Dig_IO	debug port, Tx & Rx
18	SCANMODE	Dig_I	SCAN Test enable pin
19	RFN	RF Port	ANT port
/	RFP	RF Port	ANT port
/	GPIO0	Dig_IO	pls check "sheet: GPIO_Muxing"
/	GPIO1	Dig_IO	pls check "sheet: GPIO_Muxing"
20	VPP	Power_I	OTP Program Power, 6.5V
21	GPIO2	Dig_IO	pls check "sheet: GPIO_Muxing"
22	GPIO3	Dig_IO	pls check "sheet: GPIO_Muxing"
23	GPIO4	Dig_IO	pls check "sheet: GPIO_Muxing"
24	GPIO5	Dig_IO	pls check "sheet: GPIO_Muxing"
25	GPIO6	Dig_IO	pls check "sheet: GPIO_Muxing"
26	GPIO7	Dig_IO	pls check "sheet: GPIO_Muxing"
27	GPIO8	Dig_IO	pls check "sheet: GPIO_Muxing"

YC10XX—Bluetooth SOC 3.0 BR +5.0BLE+2.4GProprietary

/	GPIO9	Dig_IO	pls check "sheet: GPIO_Muxing"
/	GPIO10	Dig_IO	pls check "sheet: GPIO_Muxing"
/	GPIO11	Dig_IO	pls check "sheet: GPIO_Muxing"
/	GPIO12	Dig_IO	pls check "sheet: GPIO_Muxing"
/	GPIO13	Dig_IO	pls check "sheet: GPIO_Muxing"
/	GPIO14	Dig_IO	pls check "sheet: GPIO_Muxing"
/	GPIO15	Dig_IO	pls check "sheet: GPIO_Muxing"
/	GPIO16	Dig_IO	pls check "sheet: GPIO_Muxing"
28	HVIN	Power_I	HV LDO input, 3~5.5V, 4.7uF bypass cap
29	HVOUT	Power_O	HV LDO output, 2.85V. Bypass cap need here, 1uF
30	NC	NC	NC
31	VINPA	Power_I	Tx_PA's power supply, 1.8~3.6V,100nF//5pF bypass cap

Note: Most GPIOs are by default configured to input status after power-on reset, except for GPIO2 & GPIO24/25/26 which are in output status. If a GPIO is not used as well as it is not configured to output, it can be connected to GND. But GPIO2 & GPIO24/25/26 MUST NOT be connect to GND at any time.

GPIO Muxing Table

10			
GPIOs	Function1	Function2	Function-Ana
GPIO[0]			
GPIO[1]			
GPIO[2]	UARTRTS	EXEN	
GPIO[3]	UARTCTS	PWM OUT4	adc_channel1
GPIO[4]	PWM OUT0		adc_channel2
GPIO[5]	PWM OUT1		adc_channel3
GPIO[6]	UARTTX		adc_channel4
GPIO[7]	UARTRX		adc_channel5
GPIO[8]	PWM OUT5		wakeup
GPIO[9]	SPIMISO-B		
GPIO[10]	SPICS-B		
GPIO[11]	SPICLK-B		
GPIO[12]	SPIMOSI-B		
GPIO[18]			CMP-
GPIO[19]			CMP+
GPIO[20]	PWM OUT0		
GPIO[21]	PWM OUT1		
GPIO[22]	PWM OUT2		
GPIO[23]	SPIMISO		adc_channel6
GPIO[24]	SPICS		adc_channel7
GPIO[25]	SPICLK	TWSCLK	adc_channel8
GPIO[26]	SPIMOSI	TWSDAT	
GPIO[27]	PWM OUT2	ZA	
GPIO[28]	PWM OUT3	ZB	
GPIO[29]			
GPIO[30]	SCL	TWSCLK	
GPIO[31]	SDA	TWSDAT	
GPIO[32]	ICE		

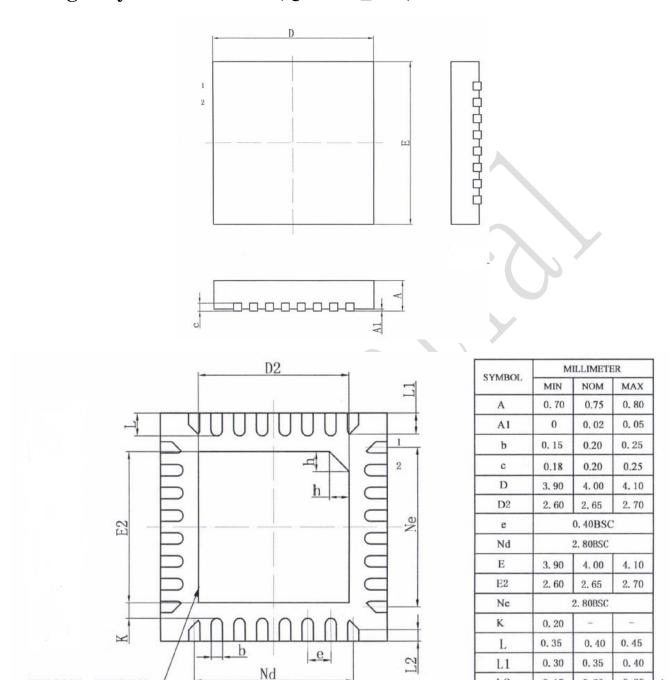
Note: Drive capability of GPIO[3:5] & GPIO[27:29] is up to 100mA, GPIO8 internal pulldown also can drive 100mA, other GPIO's drive capability is 10mA.



Package Physical Dimension (QFN4x4_32L)

EXPOSED THERMAL

PAD ZONE



BOTTOM VIEW

0.15

0.30

L2

h

L/F载体尺寸 (Mil)

0.20

0.35

112*112

0.25

0.40



Other Packages

VDDLPM XTALOUT XTALIN RF	3	YC1088	16 15 14	ICE SCANMODE GPIO30/DN GPIO31/DP
VSS GPIO4	5	SOP16L [12	DVDD
GPIO5	7		10	HVIN/VPP
GPIO6	8		9	GPIO8

												_	
		GND	WK_OPTION	VIN	NC	HVOUT		NIAH	NC	GPIO8	GPI06		
		33	32	31	30	29] [:	28	27	26	25		
DVDD	1								,		. [24	GPIO5
NC	2							X	,			23	GPIO4
NC	3			•		1.0	10	A)		22	GPIO3
NC	4			- h	\mathbf{C}				<i>\</i>			21	NC
GPIO23	5		Q	F	N 4	X	4_	3	2 I			20	VPP
GPIO24	6			_								19	RFN
GPIO25	7											18	SCANMODE
GPIO26	8											17	ICE
		9	10	11	12	2	13	14	15	16			
		RSTN	VIO	NC NC	J.S. J.		2C_SDA	DDLPM	TALOUT	TALIN			•



VDDLPM XTALOUT XTALIN RF VSS GPIO5 GPIO6 VPP/GPIO8	1 2 3 4 5 6	YC1059 -SOP16L	16 15 14 13 12 11 10	GPIO28 GPIO27 GPIO26 GPIO25 DVDD VIN/VINPA /VIO GPIO20
VPP/GPIO8	8		9	GPIO20

		_		
VDDLPM	1		16	GPIO29/ICE
XTALOUT	2		15	GPIO28
XTALIN	3	ا د لم	14	GPIO26
RF	4	YC1058- SOP16L	13	GPIO22
VSS	5		12	GPIO21
GPIO3	6		11	DVDD
GPIO4	7		10	VIN
GPIO5	8		9	GPIO8

			HVOUT/VDD	HVIN	grotag	orional arrival	GPI08	90Id9		7							
			20	19	1	8	17	16									
DVDD		1							15		GPIO)5					
USBDP/GPI	O21	2		Y	\mathbf{C}^{-1}	1 N	6	3	14		GPIO)4					
USBDN/GPI	O22	3		Τ,	.	LU	V.	,	13		GPIO)3					
GPIO25		4		QF	N3:	x3 _	20	L	12		RF						
GPIO26		5						>	11		ICE]				
		X	6	7		8	9	10									
			GPI027	GP1028	Na lada	T I	XTALOUT	XTALIN									
$\dot{\sim}$			GPI	GPI		20	XTAI	XTA									
		\] [
]	
		VINLPM	VINPA	VIN	HVOUT	HVIN	GPI016	GPIOIS	GPIO14	GPI013	GPI012	GPIO11	GPIO10	GPI09	GPIO8		
		56	55	51		52	51	50	49	48	47		45		43]
NC	,	50	33	54	53	52	51	50	49	40	47	46	45	44	43		CNIOZ
DVDD	1															42	GPIO7 GPIO6
USB_DP	3															41	GPIO5
USB_DN	4															39	GPIO4
GPIO17	5															38	GPIO3
GPIO18	6															37	GPIO2
GPIO19	7				7	V		٦1	0	7	6					36	VPP
GPIO20	8					1	•		. U		V					35	GPIO1
GPIO21	9															34	GPIO0
GPIO22	10															33	NC
GPIO23	11															32	RFN
GPIO24	12															31	NC
GPIO25	13															30	NC
GPIO26	14															29	NC
		15	16	17	18	19	20	21	22	23	24	25	26	27	28		
		GPIO27	RSTN	OIA	GP1028	GPI029	GPIO30	GP1031	12C_SCL	I2C_SDA	VDDLPM	XTALOUT	XTALIN	ICE	SCANMODE		



