

EC864FxA WiFi-Bluetooth IoT Module



Features

- Wi-Fi and Bluetooth (WiBlue) dual radio in a single integrated module
- Fully compliant to Wi-Fi Alliance and Bluetooth Smart (4.x Low Energy single mode) specifications.
- High efficiency on-module printed PCB RF antenna (EC864FPA / EC864FxA-S)
- Very few external BOM-count to create a fully functional application circuit
- Texas Instrument CC2640R2F SimpleLink™ Wireless MCU and Espressif ESP8266 Wi-Fi Soc



CC2640

- 48MHz ARM Cortex-M3 MCU core for applications with 128K flash memory for ISP
- 8-KB SRAM for Cache and 20-KB Ultra-Low Leakage SRAM
- Dedicated ARM Cortex-M0 core, 4KB SRAM, and ROM for RF operations
- Ultra Low power consumption, 6.5mA during Active-TX at 0dBm
- TRNG and AES-128 encryption for data encryption and authentication
- 4 General-Purpose Timer Modules (8 × 16-Bit or 4 × 32-Bit Timer, PWM)
- Programmable UART, SPI, I2S, I2C, and GPIO interface
- 12-Bit ADC, 200-ksamples/s, 8-Channel Analog MUX and battery monitor
- Support for 8 Capacitive Sensing Buttons

ESP8266

- 80MHz low power 32-bit RISC MCU core
- 64-KB instruction RAM and 96-KB data RAM
- 64-KB boot ROM, and 4-MB flash for applications and data
- +20dBm output power in 802.11b mode
- Hardware accelerator engine for encryption and authentication operations
- Wake up and transmit packets in < 2ms
- UART, SPI, I2C, and GPIO interface
- 802.11 b/g/n protocol
- Wi-Fi 2.4 GHz, support WPA / WPA2
- Full Wi-Fi and TCP/IP (IPv4) protocol stack
- Station / softAP / Station+AP mode support
- Wi-Fi Direct (P2P) support

- Integrated RF Shield can models available (EC864FPA-S)
- Bluetooth Certification BQB: Available upon request
- Approvals: FCC / CE / IC (EC864FPA-S)
- REACH / RoHS compliant
- Dimensions:
 - 38 x 21.5 x 2.5 mm (EC864FPA)
 - 38 x 21.5 x 3.3 mm (EC864FPA -S)
 - 31.7 x 15.6 x 2.5 mm (EC864FNA)

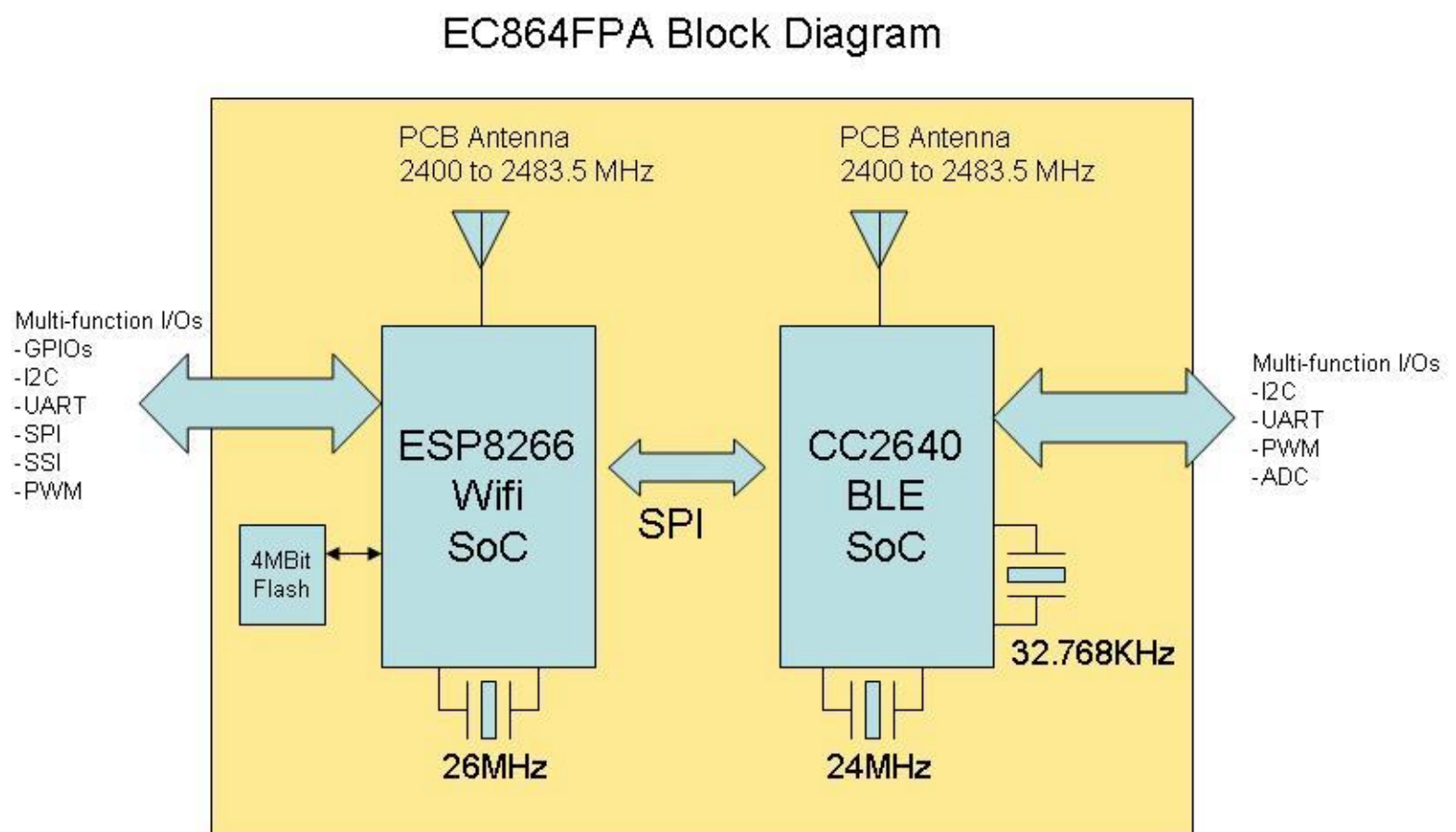
Applications

- Dual-mode Internet of Things (IoT) Device
- Wi-Fi-to-Bluetooth Gateway
- Home Automation Hub
- IoT Message Display
- RC and Interactive Toy
- Wireless Alarm and Security Controller
- Lighting and HAVC control
- Remote Control and Assisted Living

Standard Firmwares Available

- DxCloud IoT Gateway
- DataExchanger (serial data transfer)

Block Diagram

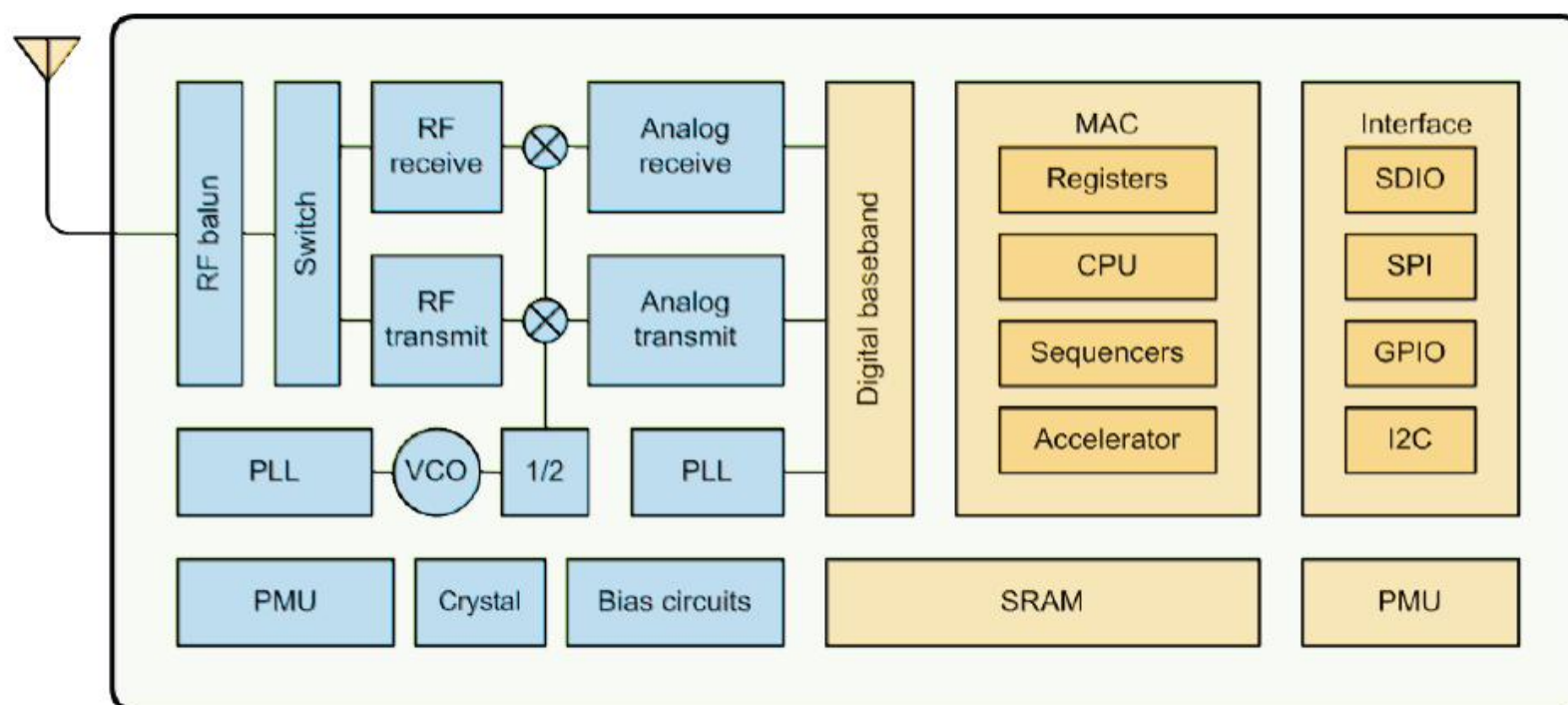


** Remark ** PCB antennas are only available for EC864FPA and EC864FPA-S parts.

Detail Descriptions

EC864FxA integrates Expressif's ESP8266 Wifi SoC and Texas Instrument's CC2640 BLE SoC to form an integrated module to provide WLAN and BLE connectivity. Four dedicated I/Os from each SoC are connected together for inter-chip communications (e.g. SPI).

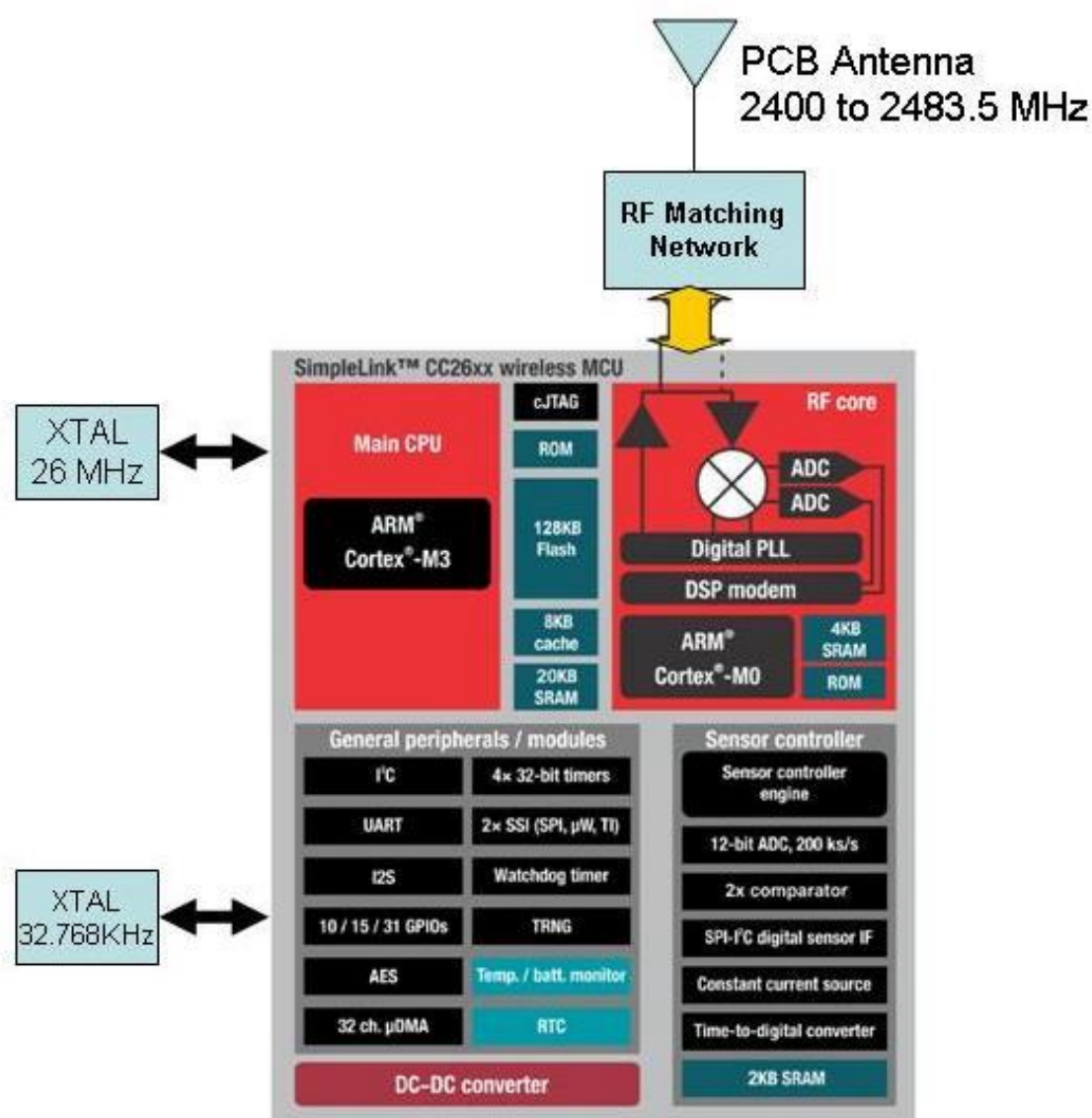
ESP8266 SoC



ESP8266EX offers a complete and self-contained Wi-Fi networking solution; it can be used to host the application or to offload Wi-Fi networking functions from another application processor. When ESP8266EX hosts the application, it boots up directly from an external flash. It has integrated cache to improve the performance of the system in such applications. Alternately, serving as a Wi-Fi adapter, wireless internet access can be added to any microcontroller-based design with simple connectivity (SPI/SDIO or I2C/UART interface). ESP8266EX is among the most integrated Wi-Fi chips in the industry; it integrates the antenna switches, RF balun, power amplifier, low noise receive amplifier, filters, power management modules, it requires minimal external circuitry, and the entire solution, including front-end module, is designed to occupy minimal PCB area. ESP8266EX also integrates an enhanced version of Tensilica's L106 Diamond series 32-bit processor, with on-chip SRAM, besides the Wi-Fi functionalities. ESP8266EX is often integrated with external sensors and other application specific devices through its GPIOs; codes for such applications are provided in examples in the SDK.

Sophisticated system-level features include fast sleep/wake context switching for energy-efficient VoIP, adaptive radio biasing for low-power operation, advanced signal processing, and spur cancellation and radio co-existence features for common cellular, Bluetooth, DDR, LVDS, LCD interference mitigation. For more detail information on ESP8266, please refer to ESP8266EX : A Beginner's Guide.

CC2640 SoC



TI CC2640 SoC

CC2640 is a wireless MCU targeting Bluetooth Smart applications. The CC2640 device contains a 32-bit ARM Cortex-M3 processor that runs at 48 MHz as the main processor and a rich peripheral feature set that includes a unique ultralow power sensor controller. This sensor controller is ideal for interfacing external sensors and for collecting analog and digital data autonomously while the rest of the system is in sleep mode. Thus, the CC2640 device is ideal for a wide range of applications where long battery lifetime, small form factor, and ease of use is important.

The *Bluetooth* Low Energy controller is embedded into ROM and runs partly on an ARM Cortex-M0 processor.

This architecture improves overall system performance and power consumption and frees up flash memory for the application. For more detail information on CC2640, please refer to CC2640 SimpleLink Bluetooth Smart Wireless MCU (SWRS176A) from Texas Instruments.

General Electrical Specification

Absolute Maximum Ratings		
Ratings	Min.	Max.
Storage Temperature	-40 °C	+90 °C
Supply Voltage VDD	-0.3 V	3.9 V
Recommended Operating Condition		
Operating Condition	Min.	Max.
Operating Temperature range – (C-grade)	-20 °C	+75 °C
Supply Voltage VDD, VDDIO	3.0 V	3.8 V

Parameter	Description	Min.	Typ.	Max.	Units
Operating Frequency		TBC			
Carrier frequency		TBC			
Modulation Method		TBC			
Air transmission rate			TBC		
RF Output Power			TBC		
RX Sensitivity			TBC		
Current Consumption – TX			TBC		
Current Consumption – RX			TBC		
Current Consumption – Radio Off			TBC		
Current Consumption – Idle			TBC		
Current Consumption – Standby			TBC		
Current Consumption – Deep Sleep			TBC		
Current Consumption – Connected			TBC		

Pins Configurations

EC864FPA / EC864FPA-S

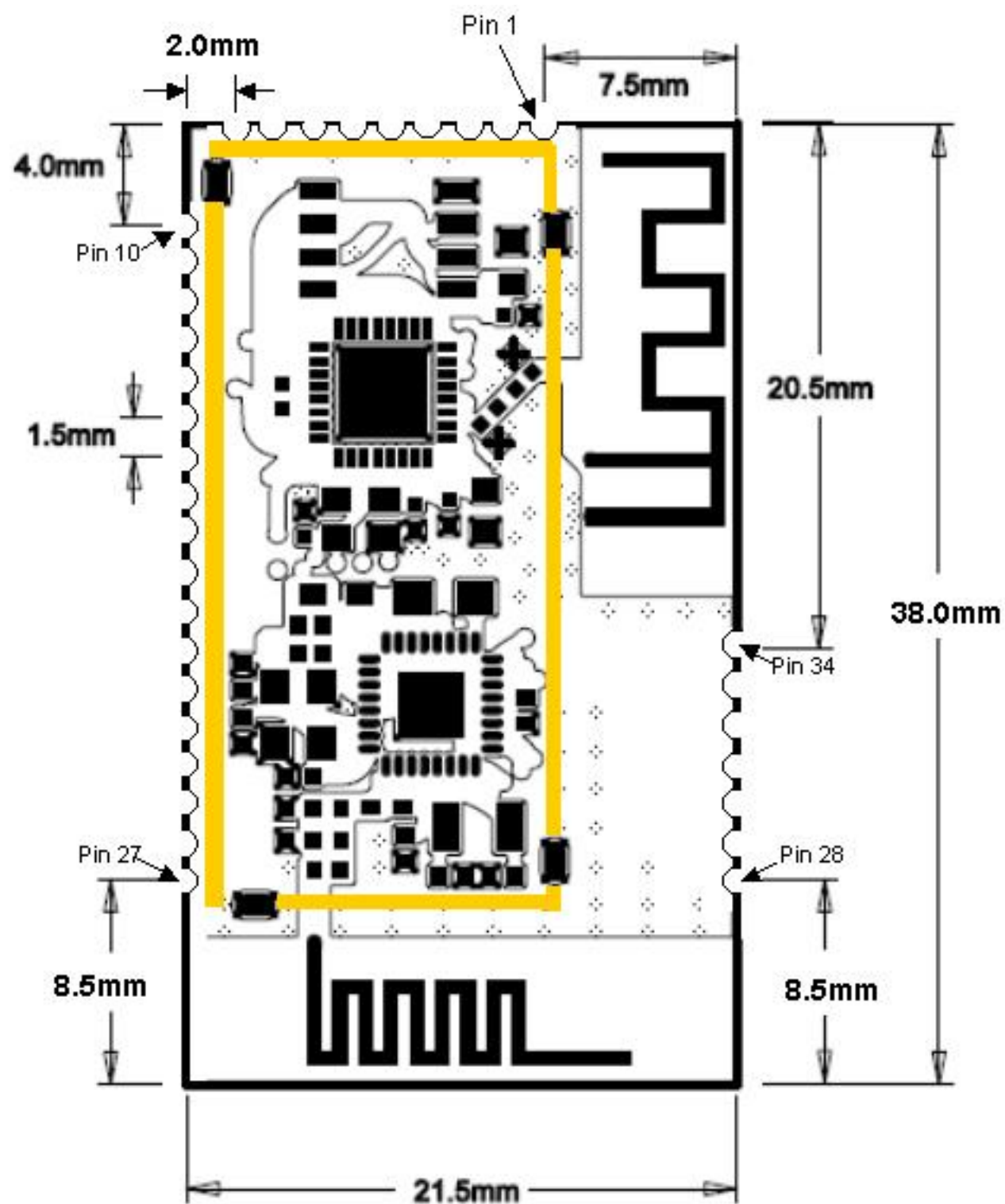
pin No.	Pin Name	Pin No.	Pin Name
1	GND	21	GND
2	TOUT	22	BT_V33
3	WF_V33	23	DIO_4
4	CH_PD	24	DIO_3
5	DIO_11	25	DIO_2
6	DIO_9	26	DIO_0
7	DIO_10	27	GND
8	DIO_12	28	GND
9	GND	29	JTAG_TSMC
10	GPIO2	30	JTAG_TCKC
11	GPIO0	31	DIO_5
12	DIO_1	32	DIO_6
13	XPD_DCD	33	BT_RSTB
14	GPIO5	34	GND
15	GND		
16	WF_RSTB		
17	URXD		
18	UTXD		
19	DIO_7		
20	DIO_8		

EC864FNA

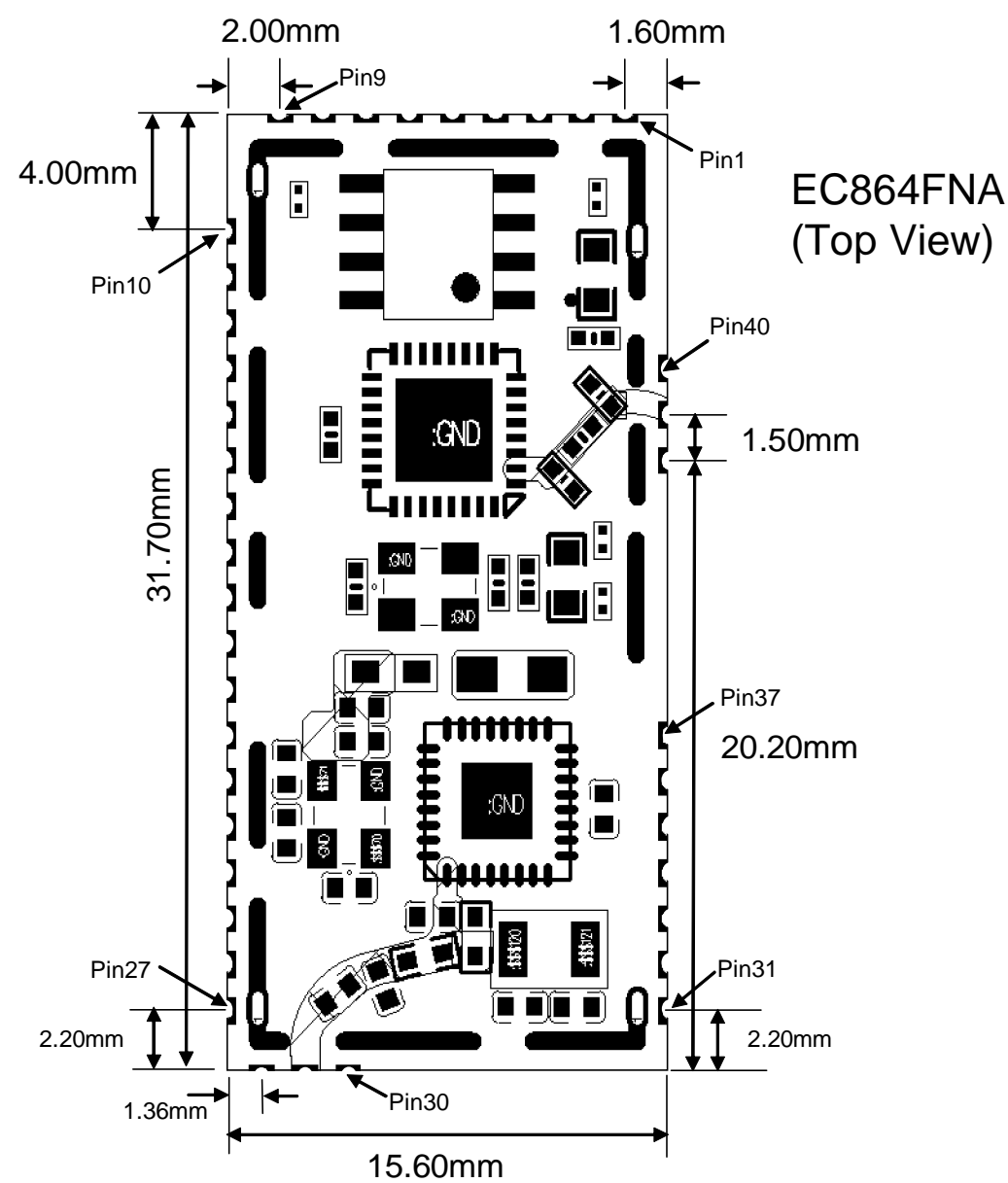
in No.	Pin Name	Pin No.	Pin Name
1	GND	21	GND
2	TOUT	22	BT_V33
3	WF_V33	23	DIO_4
4	CH_PD	24	DIO_3
5	DIO_11	25	DIO_2
6	DIO_9	26	DIO_0
7	DIO_10	27	GND
8	DIO_12	28	GND
9	GND	29	BT_ANT
10	GPIO2	30	GND
11	GPIO0	31	GND
12	DIO_1	32	JTAG_TMSC
13	XPD_DCDC	33	JTAG_TCKC
14	GPIO5	34	DIO_5
15	GND	35	DIO_6
16	WF_RSTB	36	BT_RSTB
17	URXD	37	GND
18	UTXD	38	GND
19	DIO_7	39	WF_ANT
20	DIO_8	40	GND

Module Outline

EC864FPA / EC864FPA-S Module Outline

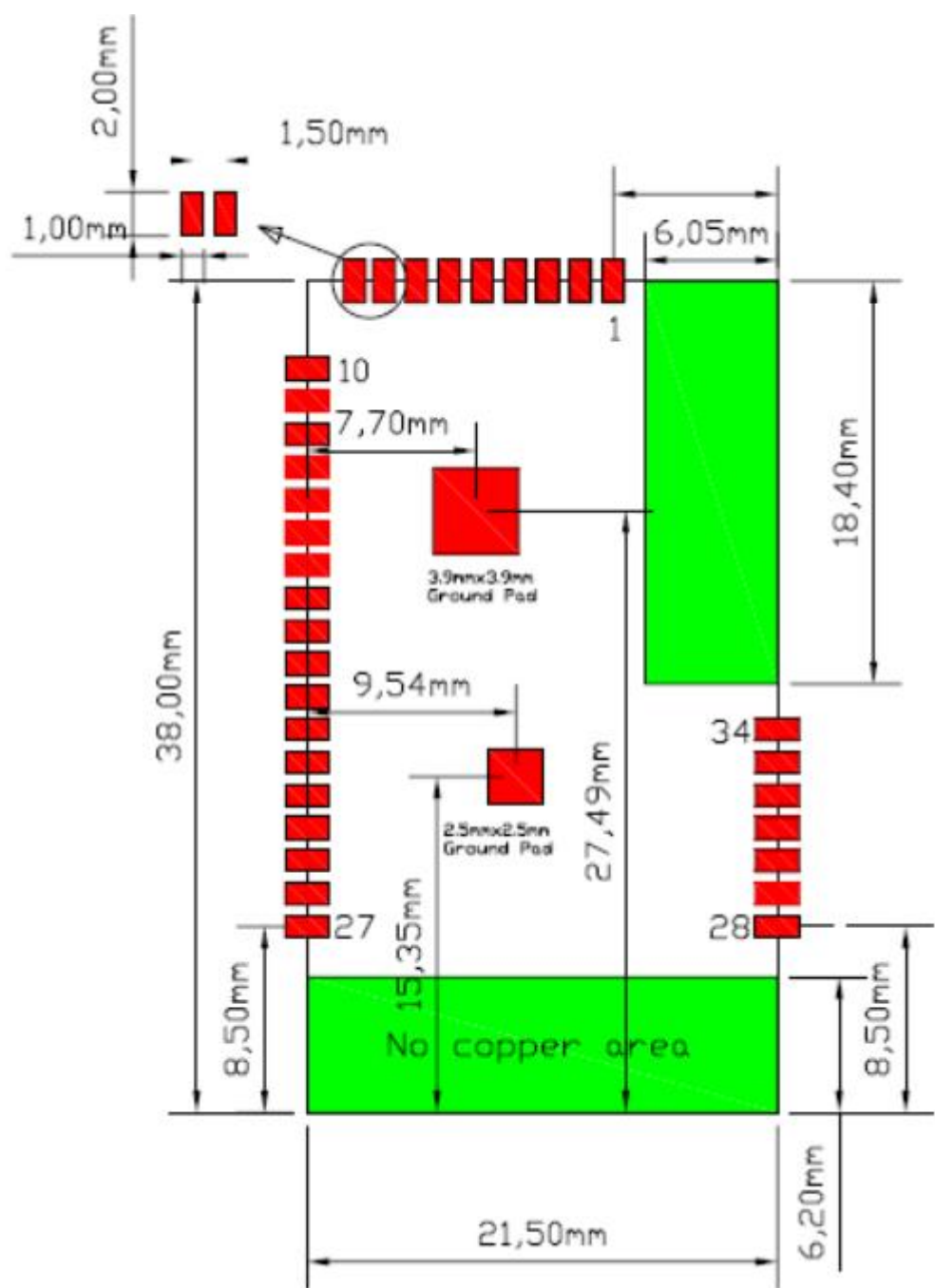


EC864FNA Module Outline

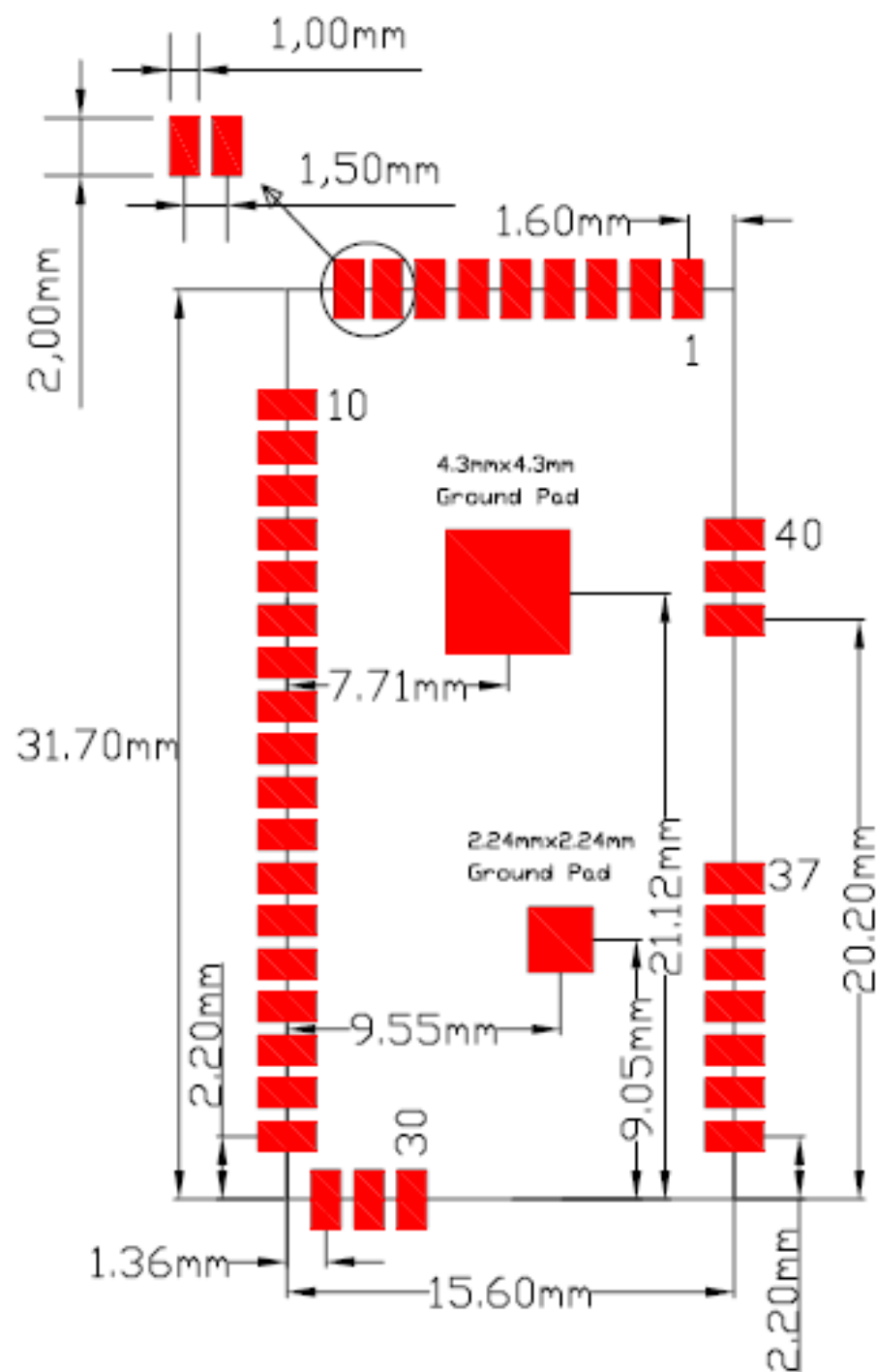


I +/- 0.1mm or 1.5% whichever is greater for all module outline measurements.

EC864FPA Recommended Layout Pattern (Top View)



EC864FNA Recommended Layout Pattern (Top View)



Precautions

- Storage Condition**

This product should be stored without opening the packing, and under temperature 0-60 °C and humidity 30-70% RH. It should be used within 15 months after reception.

- ElectroStatic Discharge (ESD)**

This product is sensitive to ElectroStatic Discharge (ESD). Observe precautions for handling electrostatic sensitive devices. Such precautions are described in the ANSI/ESD S20.20, IEC/ST61340-5, JESD625-A or equivalent standards.

- Module Reflow Installation**

For RoHS/Pb-free applications, Sn96.5/Ag3.0/Cu0.5 solder is recommended.

Profile Feature	Recommended Parameters
Ramp-up rate before liquidous	< 2°C / second
Preheat	150-200°C 60-90 seconds
Maximum time at liquidous	40 – 80 seconds
Maximum peak temperature	230° - 240°C (below 250°C)
Ramp-down rate	< 6°C / second

Ordering Information

Part Number	FW Code Available	Description
EC864FPA	Please check with your sales rep	WiBlue module with integrated PCB antenna
EC864FPA-S		WiBlue module with integrated PCB antenna and shield can
EC864FNA		WiBlue module (external antenna required)
EC864FNA-S		WiBlue module with shield can (external antenna required)
EC864FPA-P3	N/A	WiBlue module with integrated PCB antenna (3-pack)
EC864FPA-S3	N/A	WiBlue module with integrated PCB antenna and shield can (3-pack)

Revision History

Rev.	Date	Description	By
01	2015-09-02	Initial release	Paul
02	2015-09-22	Updated Module Outline	Paul
03	2016-06-29	Modified block diagram and added detail descriptions	Paul
04	2016-10-21	Updated pin assignment to align with module v2.1 Updated Approvals	Paul / Dennis
05	2016-11-22	Updated PCB recommended land patterns	Paul
06	2016-12-01	Updated PCB recommended land patterns and module outline for EC864FNA to synchronize with v2.1	Paul
07	2017-02-08	Updated Module Photo	Dominic
08	2017-07-27	Added new part numbers for multi-pack	Dominic