REYAX
TECHNOLOGY CORPORATION, LTD

03-JAN-2022 56312E38

RYW729x

Sub 1GHz 802.11ah Wi-Fi SPI/UART Interface Module

Datasheet



21mm*21mm*2.8mm

Represented by:

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PRODUCT DESCRIPTION

RYW729x is a highly integrated baseband (MAC & PHY), Sub 1 GHz radio module. It is fully compliant with the IEEE 802.11ah standard which is long-range and low-power version of Wi-Fi standard. Its 1/2/4 MHz channel bandwidth support yields 150 Kbps to 15 Mbps PHY rate that can support low-rate sensor to high-rate surveillance camera applications. The self-contained Wi-Fi networking with huge range of data throughput offers the ideal solution to add Wi-Fi connectivity to IoT products.

FEATURES

- Newracom NRC7292 Engine.
- Fully compliant with the IEEE 802.11ah standard
- Single-stream up to 15Mbps data rate
- Supports S1G_1M, Short/Long format
- Access point and station mode
- Up to 1000M Long range connectivity.
- Wi-Fi security – OPEN, WPA2-PSK(AES), WPA3-OWE, WPA3-SAE
- Host drivers and test tools for Linux.
- Operating temperature: -40°C to +85°C

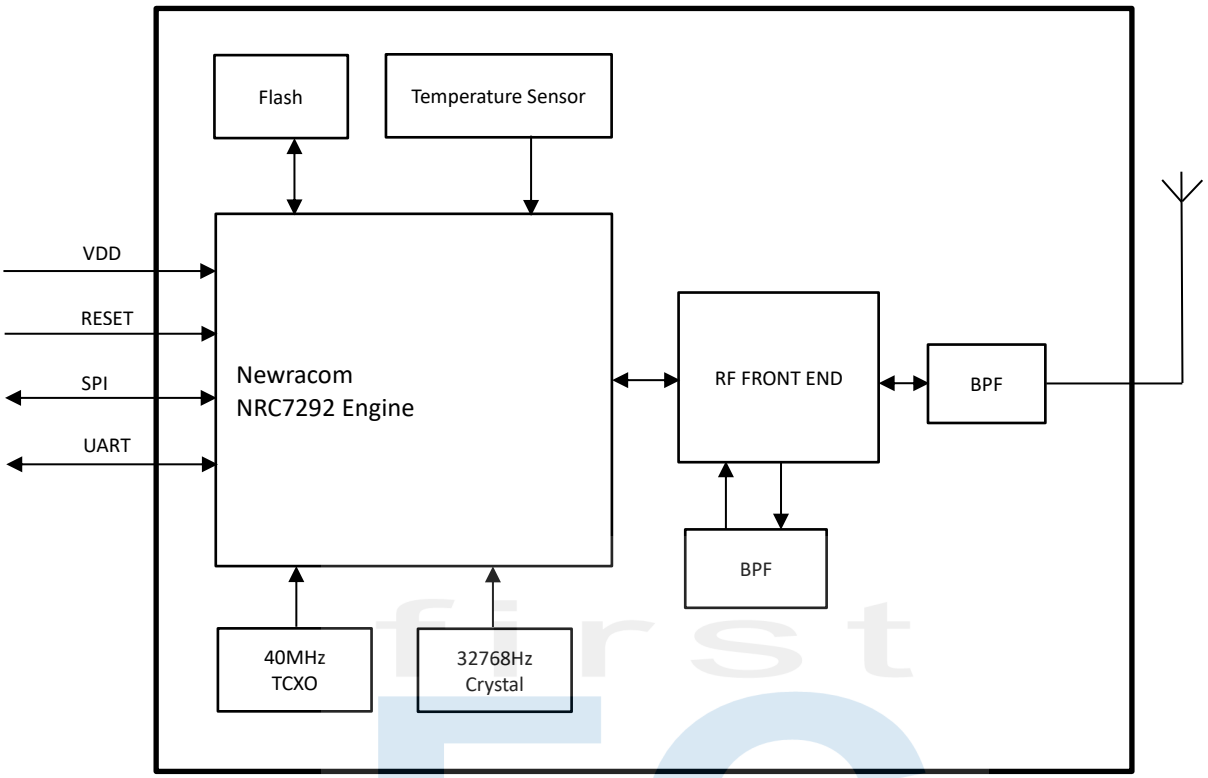
APPLICATION

- Long range IP Camara
- IoT products over Wi-Fi

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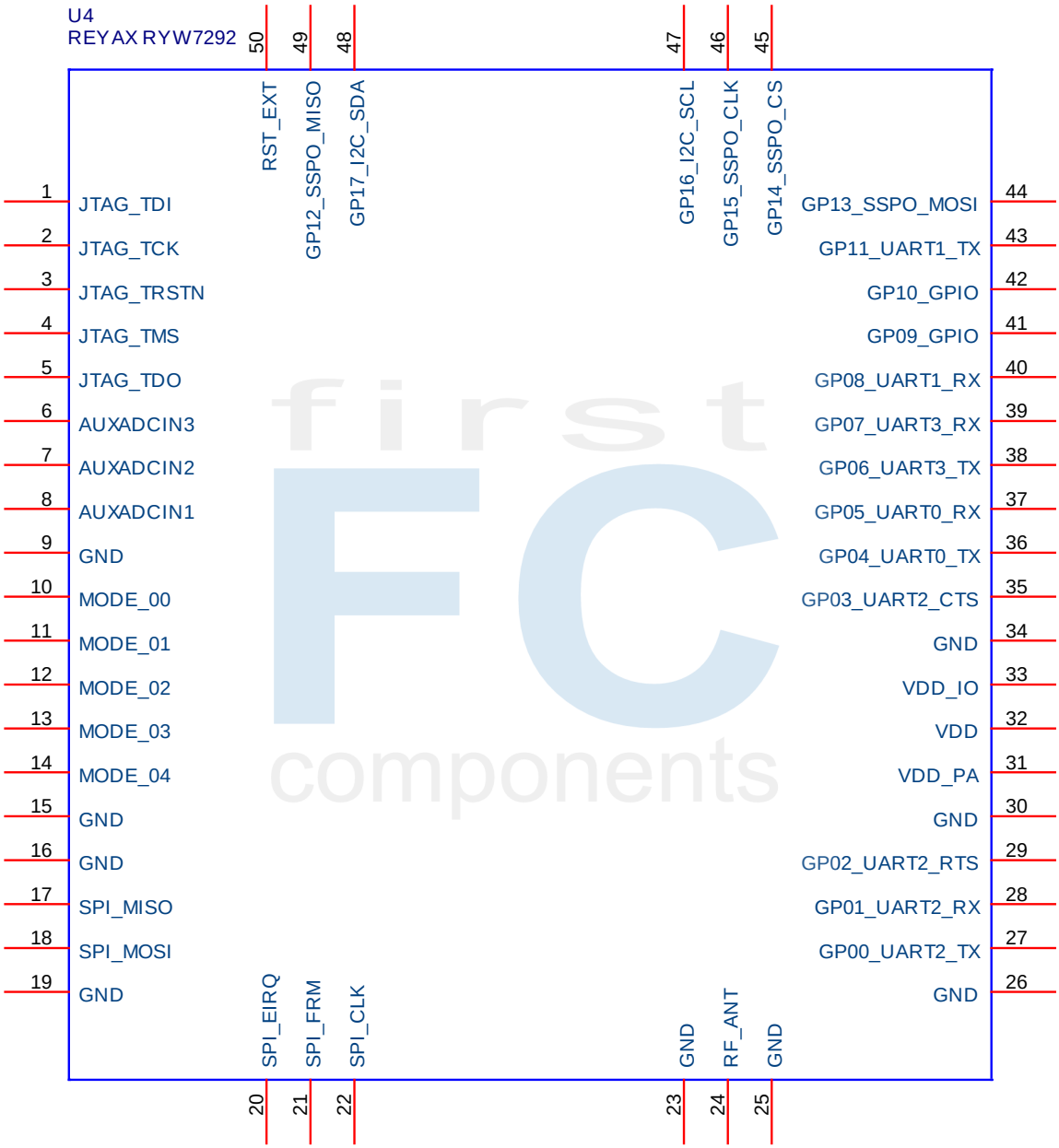
BLOCK DIAGRAM



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PIN DESCRIPTION



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Pin	Name	I/O	Condition
1	JTAG_TDI	I/O	Test data input
2	JTAG_TCK	I/O	Test clock
3	JTAG_TRSTN	I/O	Test reset
4	JTAG_TMS	I/O	Test mode selection
5	JTAG_TDO	I/O	Test data output
6	AUXADCIN3	I	AUXADC input 3
7	AUXADCIN2	I	AUXADC input 2
8	AUXADCIN1	I	AUXADC input 1
9	GND	-	Ground
10	MODE_00	I	SW Define
11	MODE_01	I	SW Define
12	MODE_02	I	0: ROM BOOT 1: XIP BOOT
13	MODE_03	I	0: Cortex-M0 Master 1: Cortex-M3 Master
14	MODE_04	I	0: One CPU 1: Two CPU
15	GND	-	Ground
16	GND	-	Ground
17	SPI_MISO	O	Host SPI – Master in Slave out
18	SPI_MOSI	I	Host SPI – Master out Slave in
19	GND	-	Ground
20	SPI _EIRQ	O	Host SPI – Interrupt
21	SPI_FRM	I	Host SPI – Chip Select (active low)
22	SPI_CLK	I	Host SPI – Clock
23	GND	-	Ground
24	RF_ANT	I/O	RF IN/OUT
25	GND	-	Ground
26	GND	-	Ground
27	GP00_UART2_TX	I/O	UART Channel2 Tx
28	GP01_UART2_RX	I/O	UART Channel2 Rx
29	GP02_UART2_RTS	I/O	UART Channel2 RTS
30	GND	-	Ground
31	VDD_PA	P	PA power input
32	VDD	P	Main power input

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33	VDD _IO	P	Logic I/O power supply Input
34	GND	-	Ground
35	GP03_UART2_CTS	I/O	UART Channel2 CTS
36	GP04_UART0_TX	I/O	UART Channel0 Tx
37	GP05_UART0_RX	I/O	UART Channel0 Rx
38	GP06_UART3_TX	I/O	UART Channel3 Tx
39	GP07_UART3_RX	I/O	UART Channel3 Rx
40	GP08_UART1_RX	I/O	UART Channel1 Rx
41	GP09_GPIO	I/O	Multiple purpose (GPIO,I2C,PWM,SPI, Ext-INT)
42	GP10_GPIO	I/O	Multiple purpose (GPIO,I2C,PWM,SPI, Ext-INT)
43	GP11_UART1_TX	I/O	UART Channel1 Tx
44	GP13_SSPO_MOSI	O	SPI0_Master out slave in
45	GP14_SSPO_CS	O	SPI0_Chip Enable(active low)
46	GP15_SSPO_CLK	O	SPI0_Clock
47	GP16_I2C_SCL	I/O	I2C_SCL
48	GP17_I2C_SDA	I/O	I2C_SDA
49	GP12_SSPO_MISO	I	SPI0_Master in Slave out
50	RST_EXT	I	Reset (active high)

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SPECIFICATION

Item	Min.	Typical	Max.	Unit	Description
PA Operation Voltage	3.2	3.3	3.4	V	VDD_PA
Operation Voltage	3.2	3.3	3.4	V	VDD, VDD _IO
TX Current			350	mA	POUT = 23dBm
RX Current			42	mA	
Logic Input High Voltage VIH	2		VDD_IO	V	VDD _IO=3.3V
Logic Input Low Voltage VIL	0		0.6	V	VDD _IO=3.3V
Logic Output High Voltage VOH	1.6		VDD_IO	V	VDD _IO=3.3V
Logic Output Low Voltage VOL	0		0.7	V	VDD _IO=3.3V
RF Operation Frequency Range	868		928	MHz	
RF TX power		23		dBm	VDD_PA=3.3V
RF Transmitter spurious signal emissions			-36	dBm	
RF sensitivity	-106			dBm	BW=1MHz Rate=300Kbps Modulation=BPSK 1/2
RF sensitivity	-81			dBm	BW=4MHz Rate=13500Kbps Modulation=64QAM 5/6
Operating Temperature	-40	25	+85	˚C	

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MODE PIN

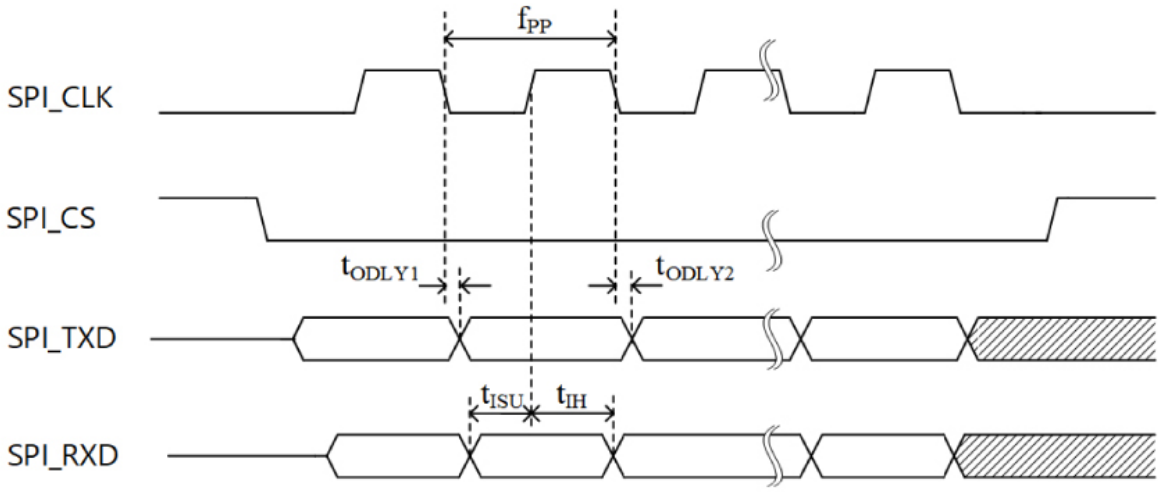
The pin10 MODE_00 ~pin14 MODE_04 are assigned as MODE[4:0] for boot mode selection so that RYW7292 can provide flexible and configurable boot options as shown in Table.

Mode	Description
[4]	When 1 , only one of two CPU processors boots up. When 0 , both of two CPU processors boots up sequentially.
[3]	When 1 , the Master CPU is Cortex-M3. When 0 , the Master CPU is Cortex-M0.
[2]	When 1, the start address for boot is remapped to the start address of XIP memory in physical memory map. When 0, the start address for boot is remapped to the start address of ROM memory in physical memory map.
[1]:[0]	When MODE[2]== '0' 2'b00, image download by mailbox between two CPU processors 2'b01, image download via HSPI from Host 2'b10, image download via UART3 from Host 2'b11, firmware upgrade to external Flash memory via UART2 When MODE[2]== '1' should be 2'00

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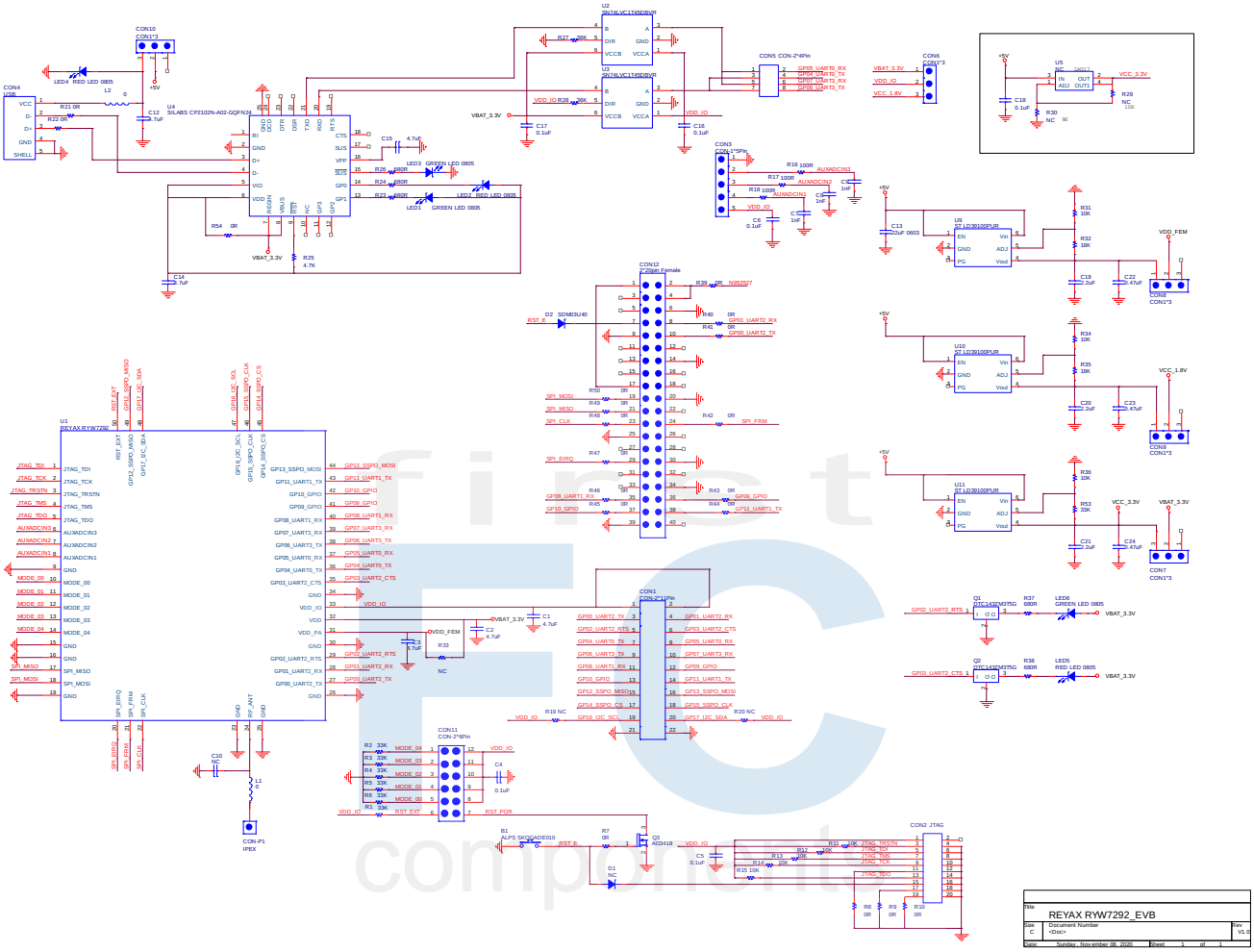
SPI INTERFACE TIMING DATA



Symbol	Parameter		Min.	Typical	Max.	Unit
fpp	Frequency	Master	3.3		24	MHz
		Slave			4	MHz
tODLY1	Output delay time1		0		10	ns
tODLY2	Output delay time2		0		10	ns
tISU	Input setup time		18			ns
tIH	Input hold time		20			ns

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RYW729x EVB SCHEMATIC



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REFLOW SOLDERING

Consider the "IPC-7530 Guidelines for temperature profiling for mass soldering (reflow and wave) processes, published 2001.

Preheat phase

Initial heating of component leads and balls. Residual humidity will be dried out. Please note that this preheat phase will not replace prior baking procedures.

- Temperature rise rate: max. 3 °C/s If the temperature rise is too rapid in the preheat phase it may cause excessive slumping.
- Time: 60 - 120 s If the preheat is insufficient, rather large solder balls tend to be generated. Conversely, if performed excessively, fine balls and large balls will be generated in clusters.
- End Temperature: 150 - 200 °C If the temperature is too low, non-melting tends to be caused in areas containing large heat capacity.

Heating/ Reflow phase

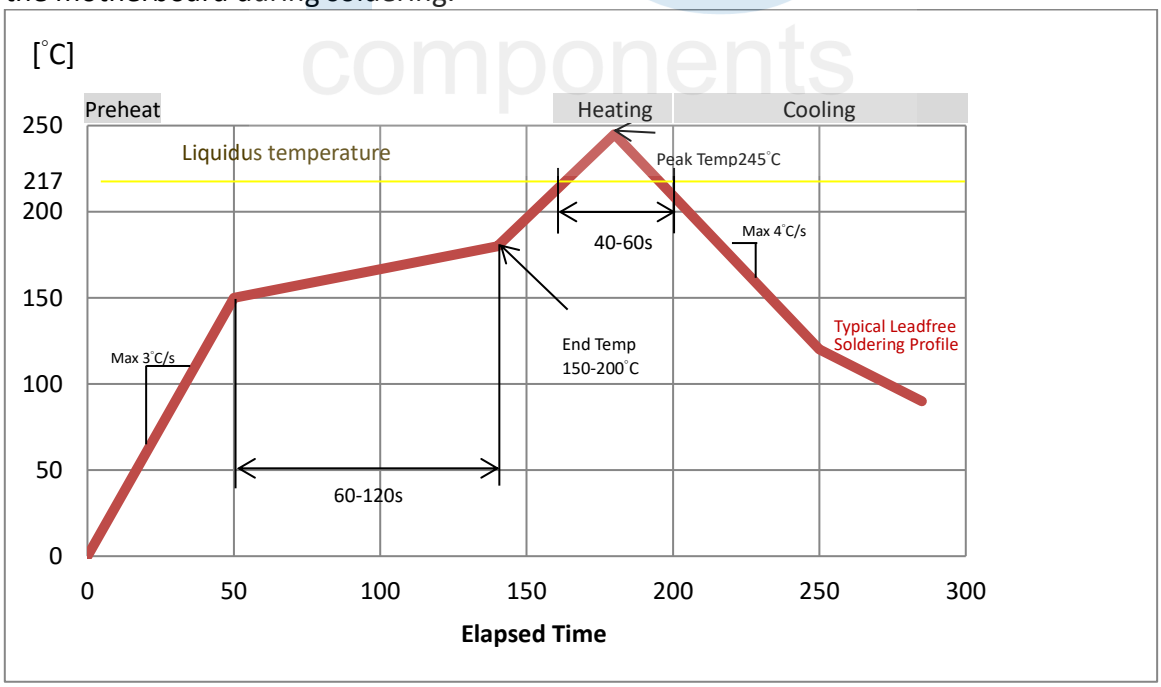
The temperature rises above the liquidus temperature of 217°C. Avoid a sudden rise in temperature as the slump of the paste could become worse.

- Limit time above 217 °C liquidus temperature: 40 - 60 s
- Peak reflow temperature: 245 °C

Cooling phase

A controlled cooling avoids negative metallurgical effects (solder becomes more brittle) of the solder and possible mechanical tensions in the products. Controlled cooling helps to achieve bright solder fillets with a good shape and low contact angle.

- Temperature fall rate: max 4 °C/s To avoid falling off, the module should be placed on the topside of the motherboard during soldering.

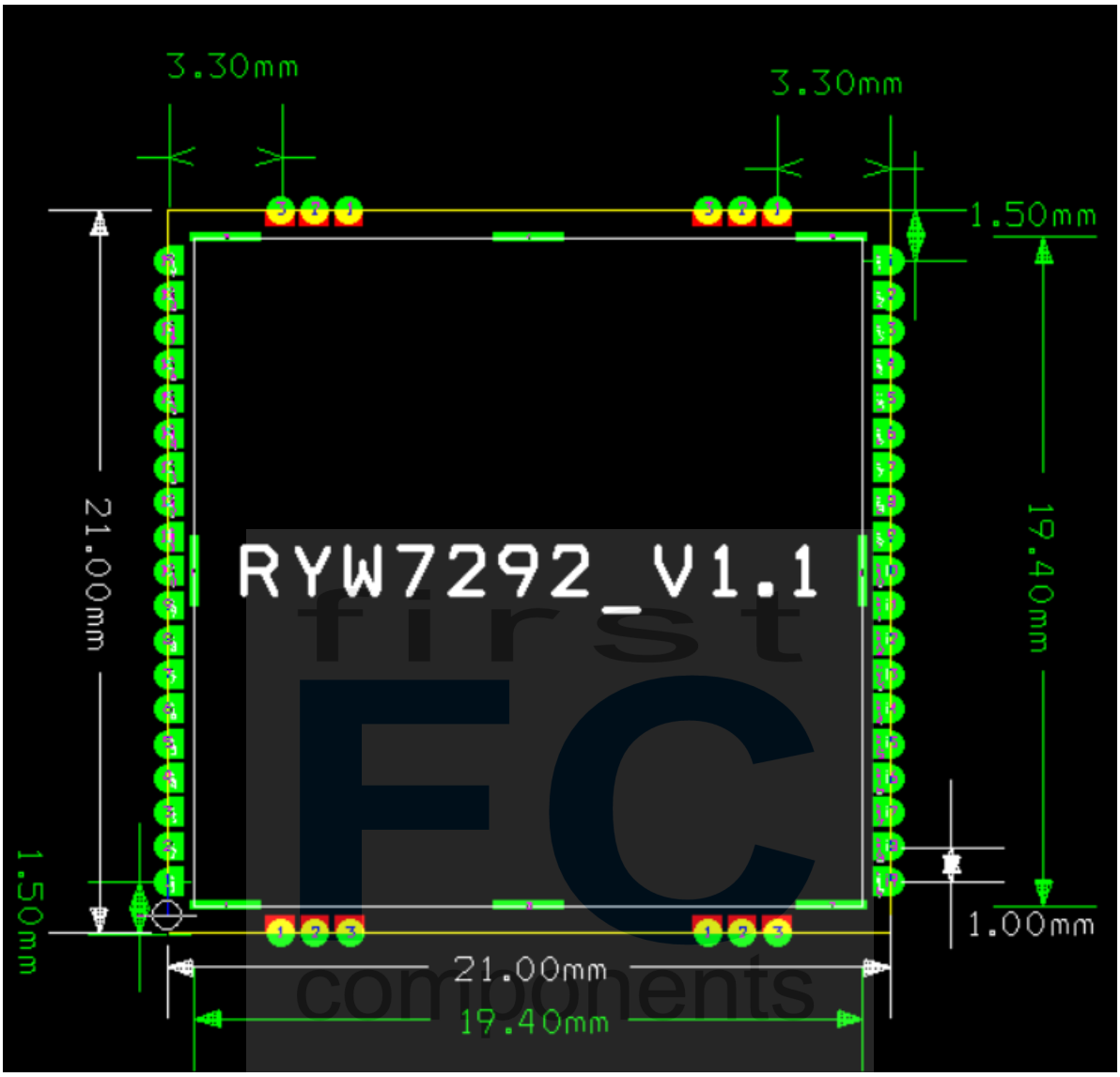


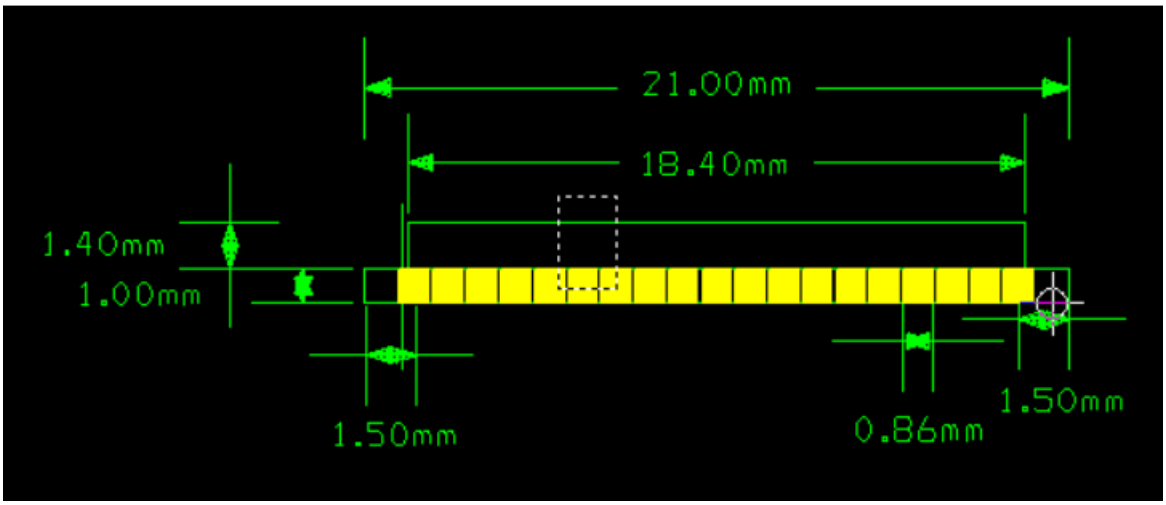
Recommended soldering profile

***Note: Does not support upside-down/bottom side reflow.**

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DIMENSIONS

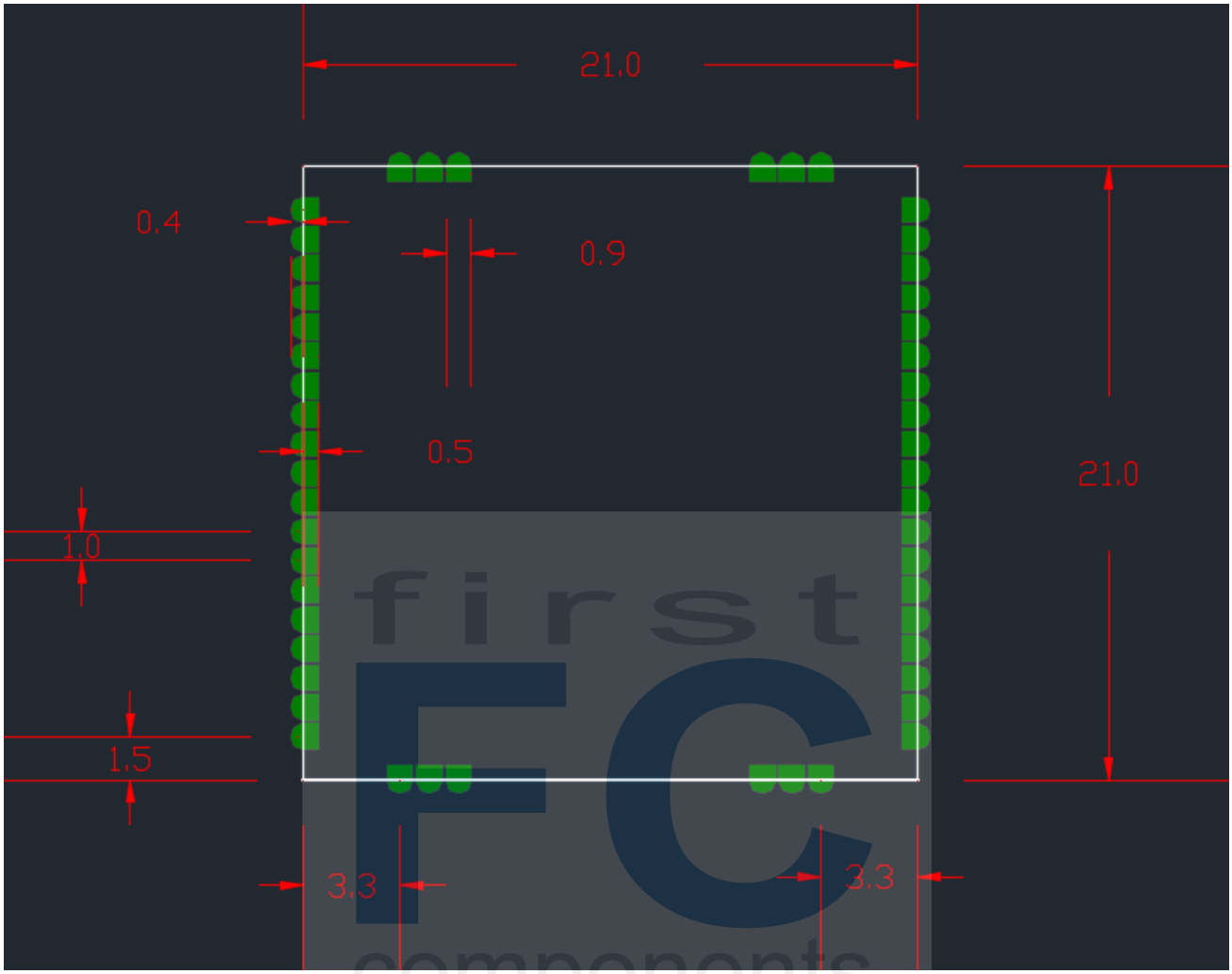




unit : mm

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LAYOUT FOOTPRINT RECOMMENDATIONS



unit : mm

ORDER INFORMATION

Ordering No.	Frequency
RYW7292	US 915MHz
RYW7293	EU 868MHz

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