

# RYLR993

868/915MHz LoRaWAN® Transceiver Module

Helium Compatible

Datasheet



13mm\*13mm\*2.2mm



## PRODUCT DESCRIPTION

The RYLR993 868/915MHz LoRaWAN® Transceiver Module feature the LoRa long range modem that provides ultra-long range spread spectrum communication and high interference immunity whilst minimising current consumption.

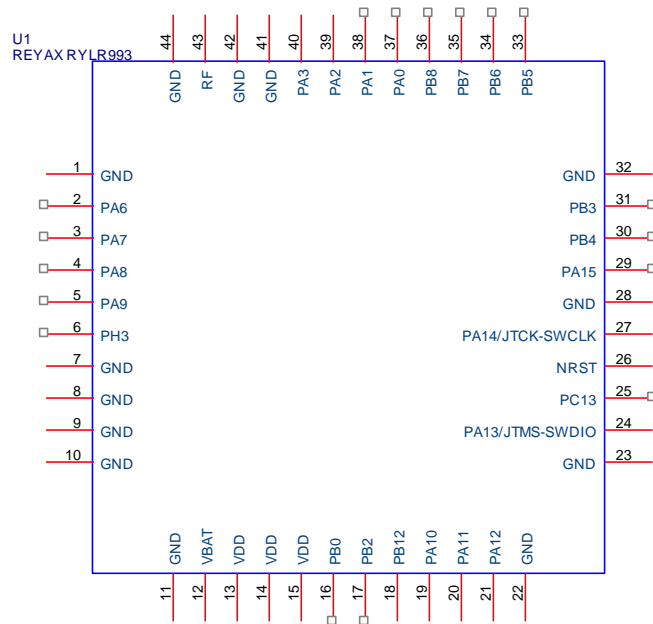
## FEATURES

- Helium Compatible.
- Industrial LoRa® SOC Engine.
- Customized firmware design service is available.
- AT Command over UART interface
- High sensitivity.
- Temperature sensor.
- Low power consumption.
- AES128 CCM Data encryption
- LoRaWAN® class A, B & C support
- LoRaWAN® and LoRa® Proprietary selection.
- Support bands : US915, EU868, AS923, IN865, KR920, RU864
- Support REYAX RYLR998 proprietary mode

## APPLICATIONS

- IoT Applications
- Mobile Equipment
- Home Security
- Industrial Monitoring and Control Equipment
- Car Alarm

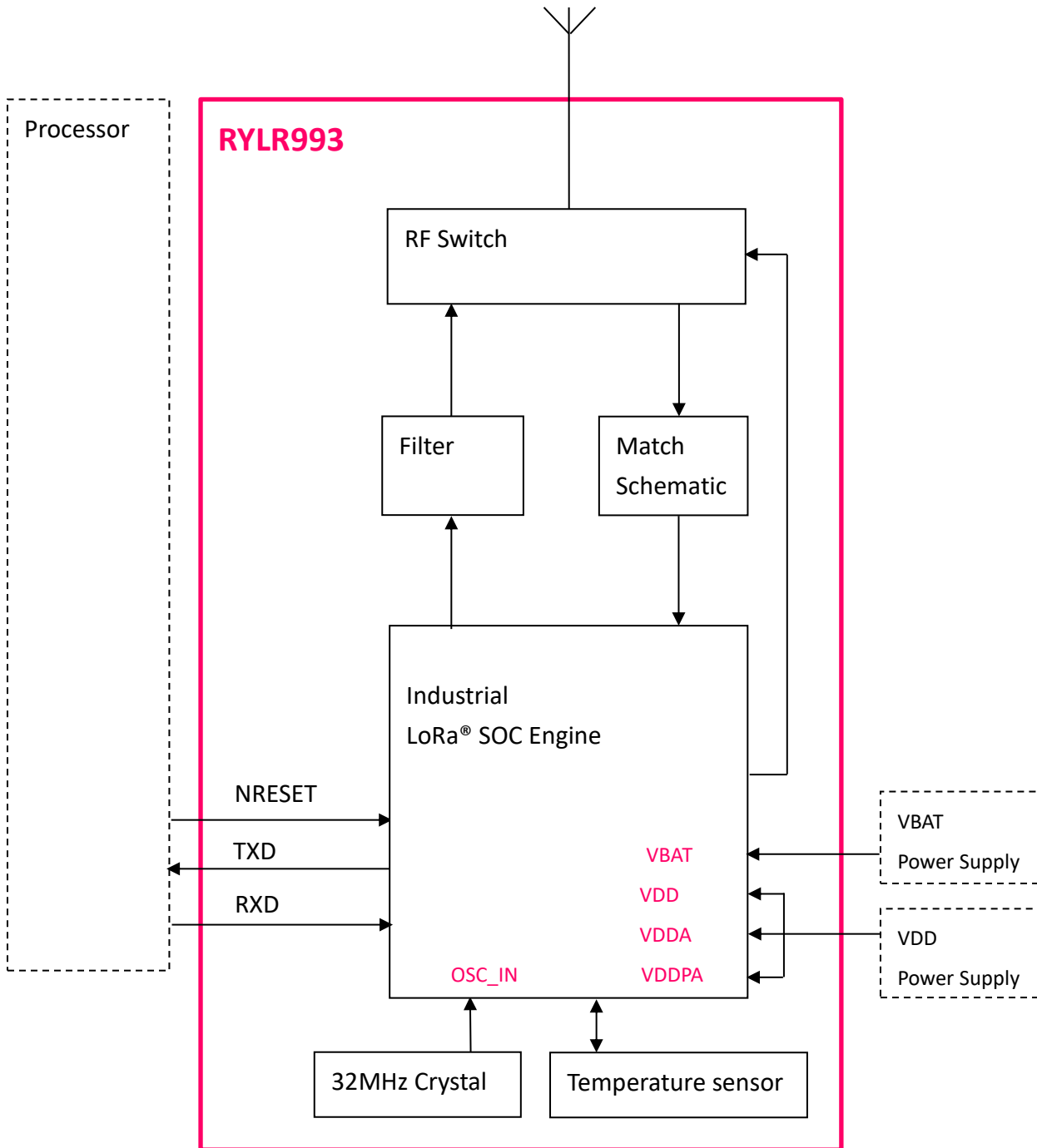
## PIN DESCRIPTION



Pin	Name	I/O	Condition
1	GND	-	Ground
2	PA6	I/O	Not Connected, Reserved for future applications
3	PA7	I/O	Not Connected, Reserved for future applications
4	PA8	I/O	Not Connected, Reserved for future applications
5	PA9	I/O	Not Connected, Reserved for future applications
6	PH3	I	Add a 10K $\Omega$ resistor between GND and PH3.
7	GND	-	Ground
8	GND	-	Ground
9	GND	-	Ground
10	GND	-	Ground
11	GND	-	Ground
12	VBAT	I	The RTC and the backup registers power supply
13	VDD	I	VDD, VDDA, VDDPA Power supply
14	VDD	I	VDD, VDDA, VDDPA Power supply
15	VDD	I	VDD, VDDA, VDDPA Power supply
16	PB0	I/O	Not Connected, Reserved for future applications
17	PB2	I/O	Not Connected, Reserved for future applications

18	PB12	I	L=LoRaWAN, H=LoRa Proprietary
19	PA10	O	RF_RX_ACTIVE Indicator, When data is received, This pin will output high for 500 ms.
20	PA11	O	RF_TX_ACTIVE Indicator, When data is transmitted, This pin will output high for 500 ms.
21	PA12	O	LoRaWAN Link indicator, When the RYLR993 not connect to LoRa gateway, This pin will output Hi 500ms and Low 500ms continuously.
22	GND	-	Ground
23	GND	-	Ground
24	PA13/JTMS-SWDIO	I/O	Not Connected, Reserved for future applications
25	PC13	I/O	Not Connected, Reserved for future applications
26	NRST	I	Low reset trigger input
27	PA14/JTCK-SWCLK	I/O	Not Connected, Reserved for future applications
28	GND	-	Ground
29	PA15	I/O	Not Connected, Reserved for future applications
30	PB4	I/O	Not Connected, Reserved for future applications
31	PB3	I/O	Not Connected, Reserved for future applications
32	GND	-	Ground
33	PB5	I/O	Not Connected, Reserved for future applications
34	PB6	I/O	Not Connected, Reserved for future applications
35	PB7	I/O	Not Connected, Reserved for future applications
36	PB8	I/O	Not Connected, Reserved for future applications
37	PA0	I/O	Not Connected, Reserved for future applications
38	PA1	I/O	Not Connected, Reserved for future applications
39	PA2/TXD	O	UART Data Output
40	PA3/RXD	I	UART Data Input
41	GND	-	Ground
42	GND	-	Ground
43	RF	I/O	RF Input/Output
44	GND	-	Ground

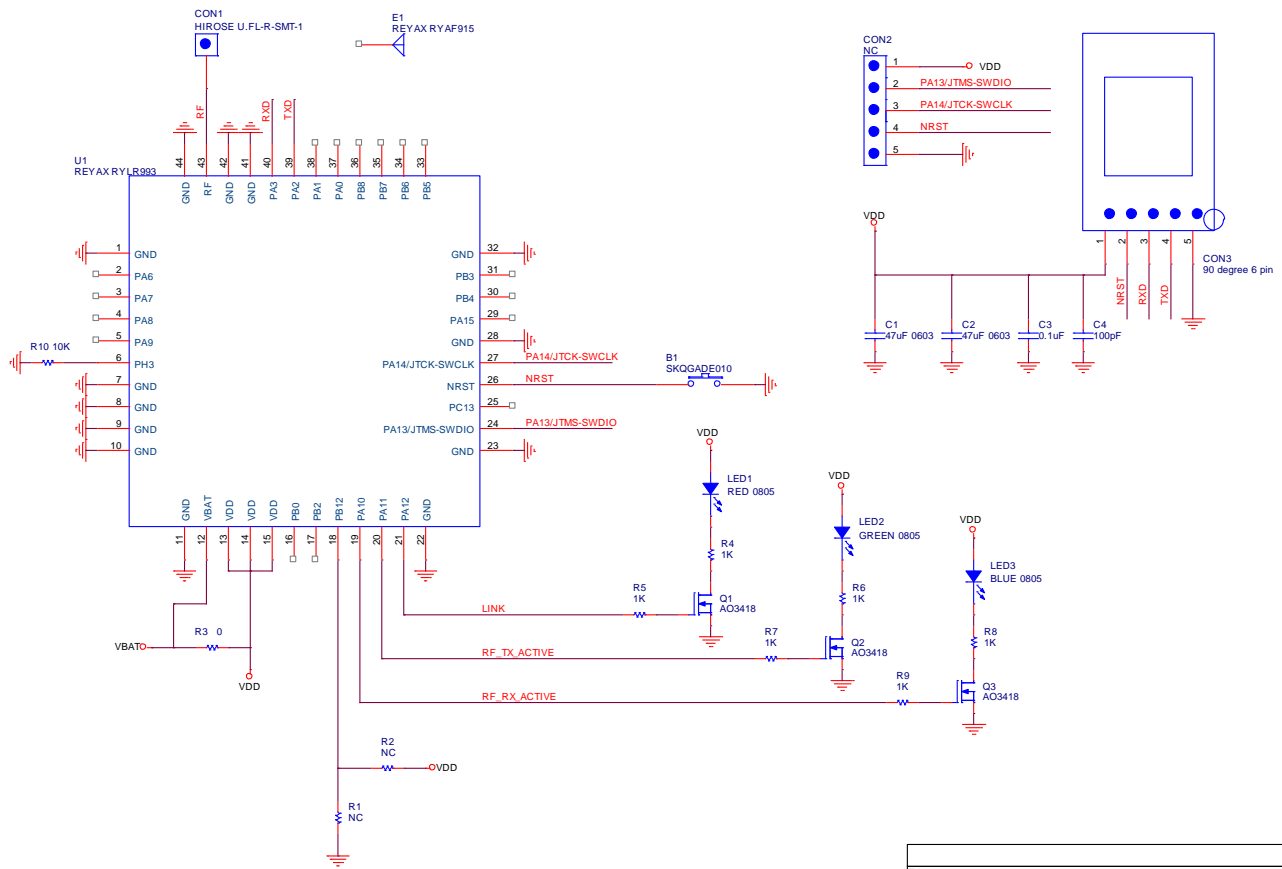
# BLOCK DIAGRAM



## SPECIFICATION

Item	Min.	Typical	Max.	Unit	Condition
VDD Power Supply	1.8	3.3	3.6	V	
VBAT Power Supply	1.55	3.3	3.6	V	
Frequency Accuracy		±5		ppm	at 25°C ±3°C
RF Output Power Range	-4	20	22	dBm	
RF Harmonic			-36	dBm	
RF sensitivity	-148			dBm	
RF Input Level			10	dBm	
Filter insertion loss	1	2	3	dB	
Frequency Range	820	868/915	960	MHz	
Transmit Current		140		mA	RFOP = +22 dBm
Class A Current		5		uA	
Class B & C Current		5		mA	
Baud rate		9600		bps	8, N, 1
Temperature sensor Accuracy		2		°C	
Digital input level high	0.8		VDD	V	VIH
Digital input level low			0.2	V	VIL
Digital output level high	0.9			V	VOH I <sub>max</sub> = 1 mA
Digital output level low			0.1	V	VOL I <sub>max</sub> = -1 mA
Operating Temperature	-40	25	+85	°C	
Dimensions					13mm*13mm*2.2mm
Weight		0.71		g	

# APPLICATION SCHEMATIC



Title		RYLR993_Lite	
Size	Document Number	Rev	
	CustomDoc>	1.2	
Date:	Tuesday, August 09, 2022	Sheet	1 of 1

## 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

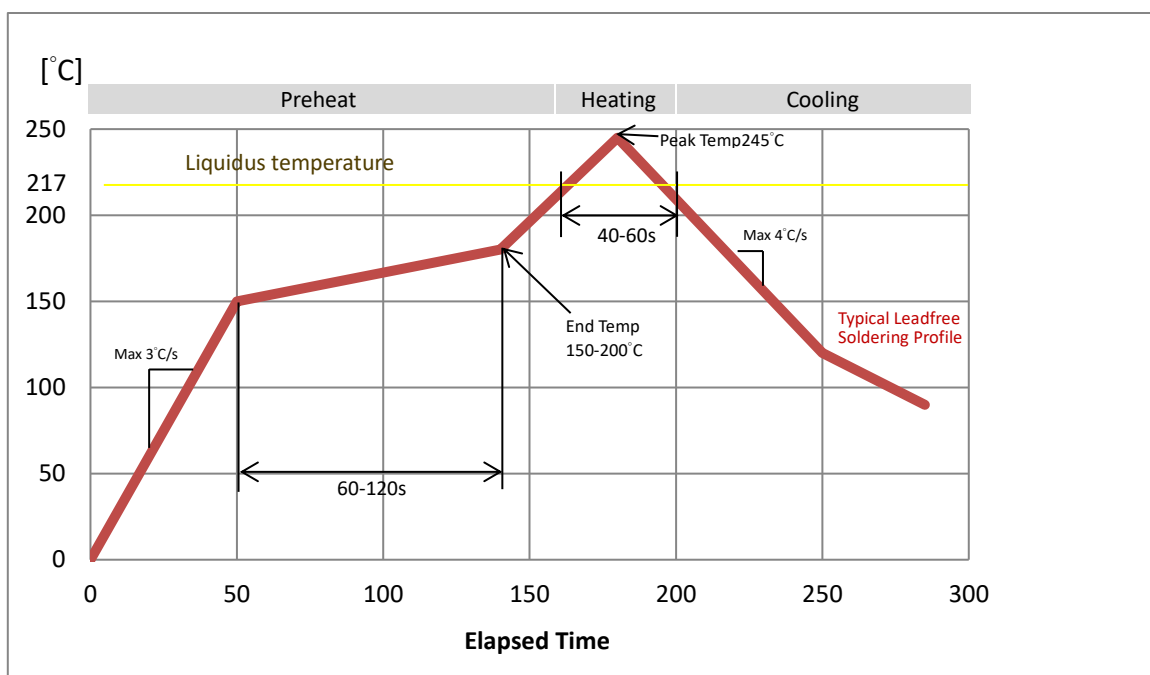
The temperature rises above the liquidus temperature of 217°C. Avoid a sudden rise in temperature as the slump of the paste could become worse.

- 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.

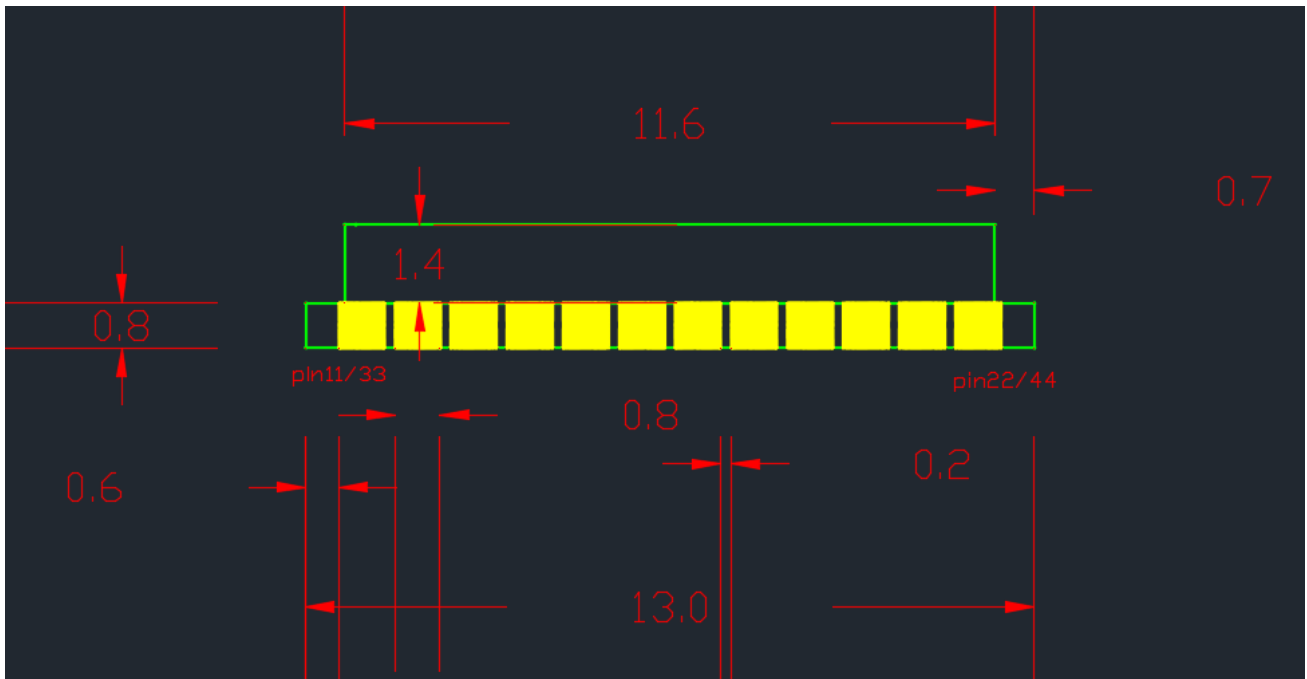
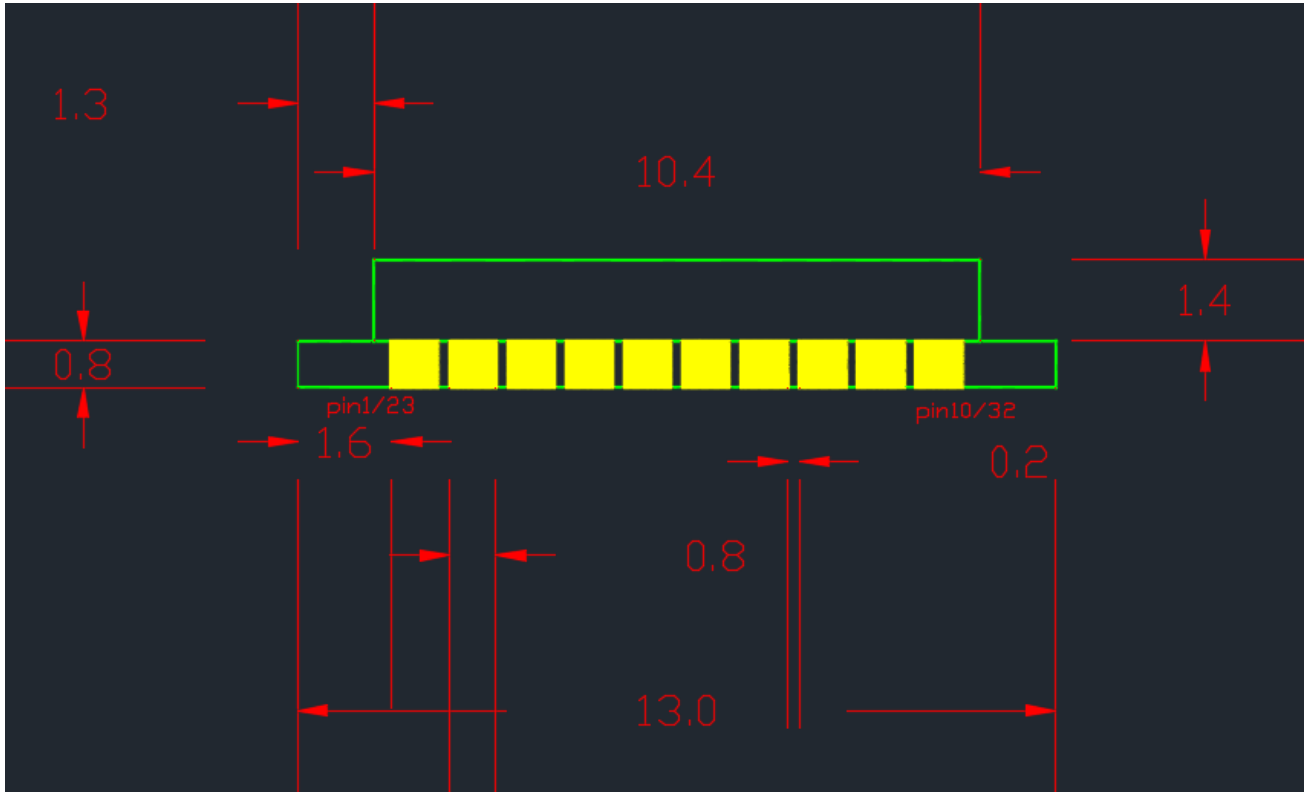
- Temperature fall rate: max 4 °C/s To avoid falling off, the REYAX module should be placed on the topside of the motherboard during soldering.



Recommended soldering profile



## DIMENSIONS



Unit : mm

