REYAX
TECHNOLOGY CORPORATION, LTD

23-MAY-2024 56312E39

RYLR924

Multi-Band LoRa®/(G)FSK/SigFox®/S-band satellite Transceiver Module

Datasheet





12.7mm*12.7mm*2.2mm

Represented by:

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PRODUCT DESCRIPTION

The RYLR924 is an ultra-low power which uses Semtech® LR1121 LoRa® Engine, long range LoRa® transceiver that provides support for terrestrial ISM band communications in the sub-GHz and global 2.4GHz spectrum, as well as S-Band support for satellite connectivity.

For LPWAN use cases, the RYLR924 supports LoRa and (G)FSK modulation on both sub-GHz and 2.4GHz bands, as well as Sigfox® modulation on sub-GHz bands, and Long Range Frequency Hopping Spread Spectrum (LR-FHSS) on sub-GHz, 1.9-2.1GHz Satellite, and 2.4GHz ISM bands.

FEATURES

- Semtech LR1121 LoRa® Engine.
- Support bands : 790~960MHz LoRa®/(G)FSK, 2.4GHz LoRa®/(G)FSK, 2.1GHz satellite S-Band.
- Support DC-DC Mode
- High sensitivity.
- Low power consumption.

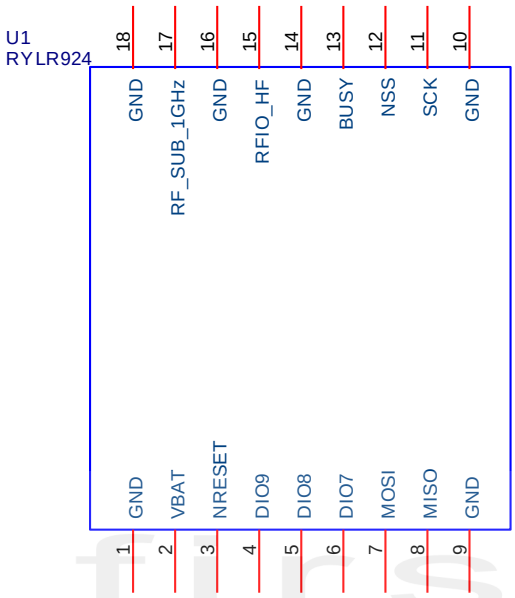
APPLICATIONS

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

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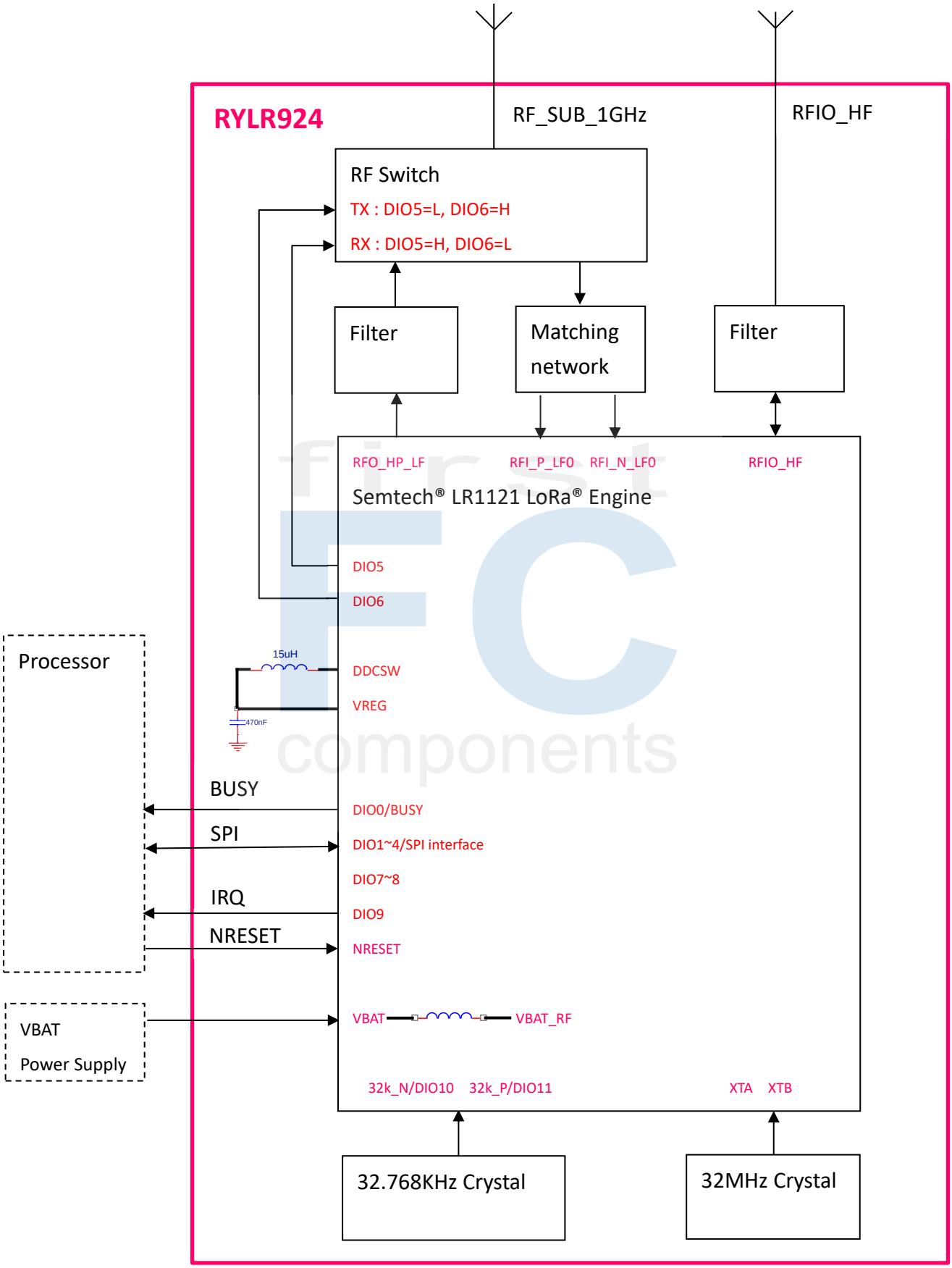
PIN DESCRIPTION



Pin	Name	I/O	Condition
1	GND	-	Ground
2	VBAT	P	Power supply
3	NRESET	I	Reset signal, active low
4	DIO9	I/O	IRQ, Multi-purpose digital I/O
5	DIO8	I/O	Multi-purpose digital I/O
6	DIO7	I/O	Multi-purpose digital I/O
7	DIO3/MOSI	I/O	Multi-purpose digital I/O
8	DIO4/MISO	I/O	Multi-purpose digital I/O
9	GND	-	Ground
10	GND	-	Ground
11	DIO2/SCK	I/O	Multi-purpose digital I/O
12	DIO1/ NSS	I/O	Multi-purpose digital I/O
13	DIO0/BUSY	I/O	Multi-purpose digital I/O
14	GND	-	Ground
15	RFIO_HF	RFI/O	RF input/output for any frequency over 1.9GHz
16	GND	-	Ground
17	RF_SUB_1GHz	RFI/O	RF input/output for sub-GHz operation
18	GND	-	Ground

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BLOCK DIAGRAM



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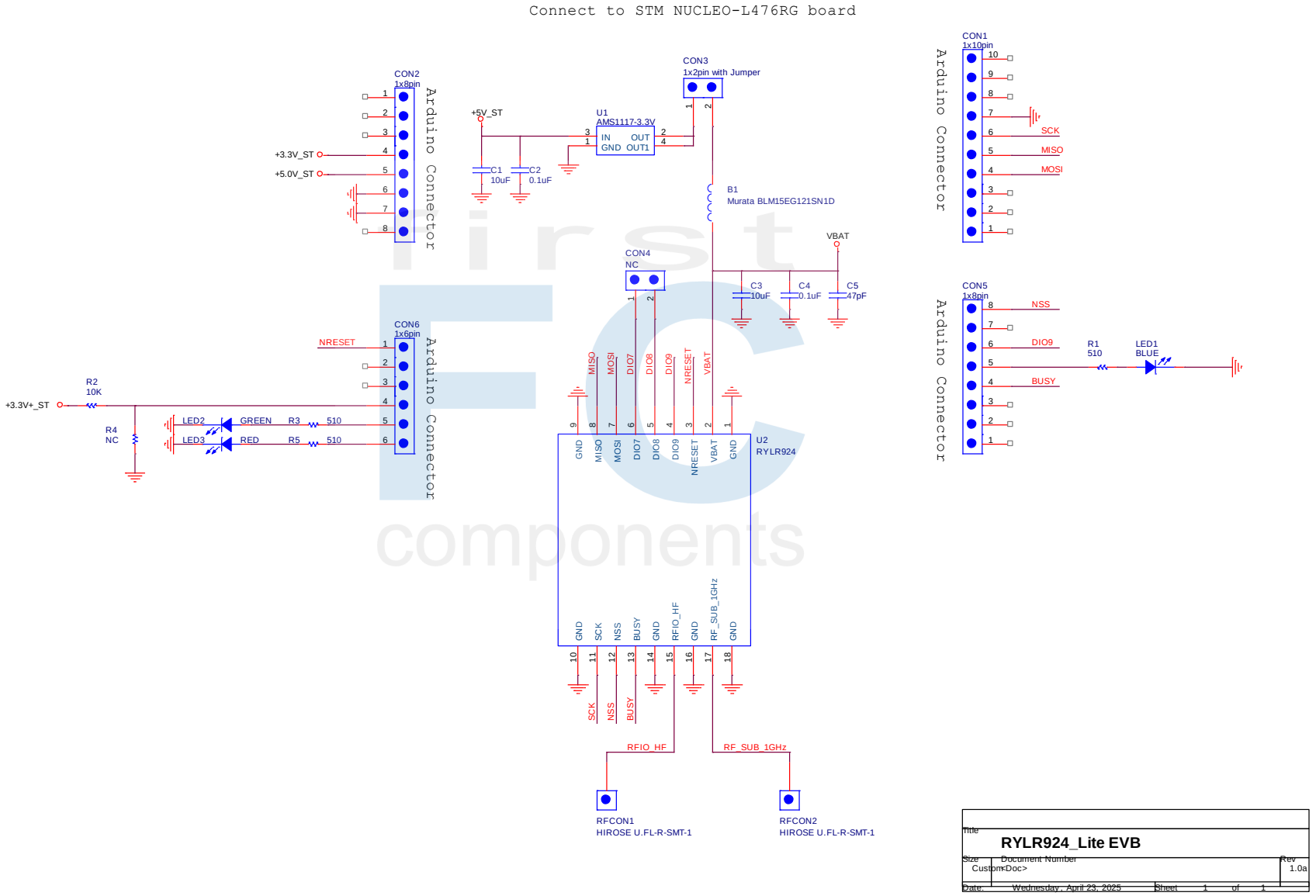
SPECIFICATION

Item	Min.	Typical	Max.	Unit	Condition
VBAT Power Supply	1.8	3.3	3.7	V	
Frequency Accuracy		±10		ppm	at 25°C ±3°C
RF_SUB_1GHz					
Frequency Range	790	868/915	960	MHz	
RF Output Power Range			22	dBm	
RF Harmonic			-36	dBm	
RF Sensitivity	-144			dBm	BWL=62.5kHz, SF=12
Transmit Current		118		mA	RFOP = +22 dBm
Receive Current		5.7		mA	LoRa® SF12 125kHz sub-GHz
RFIO_HF 2.4GHz					
Frequency Range	2400		2500	MHz	
RF Output Power Range		11.5		dBm	
RF Harmonic			-36	dBm	
RF Sensitivity	-129			dBm	BWL=406kHz, SF=7
Transmit Current		26		mA	IDDTXHF1, +13dBm
Receive Current		6		mA	
RFIO_HF S-Band					
Frequency Range	1900		2500	MHz	
RF Output Power Range			13	dBm	IDDTXHF3
RF Sensitivity	-132.5			dBm	BWL=125kHz, SF=12
Transmit Current		28		mA	IDDTXHF3, +13dBm
Receive Current		6		mA	
RF Input Level			10	dBm	
Filter insertion loss	1	2	3	dB	
Digital input level high	0.7xVBAT		VBAT+0.3	V	VIH
Digital input level low	-0.3		0.3xVBAT	V	VIL
Digital output level high	0.9xVBAT		VBAT	V	VOH Imax = 2.5 mA
Digital output level low	1		0.1xVBAT	V	VOL Imax = -2.5 mA
Operating Temperature	-40	25	+85	˚C	
Dimensions					12.7mm*12.7mm*2.2mm
Weight		1.5		g	

***For more detail, please refer to the Semtech LR1121 Product Information.**

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APPLICATION SCHEMATIC



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REFLOW SOLDERING

Consider the "IPC-7530 Guidelines for temperature profiling for mass soldering (reflow and wave) processes, published 2001. **Only single reflow soldering processes are recommended for REYAX modules. Repeated reflow soldering processes and soldering the module upside down are not recommended.**

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

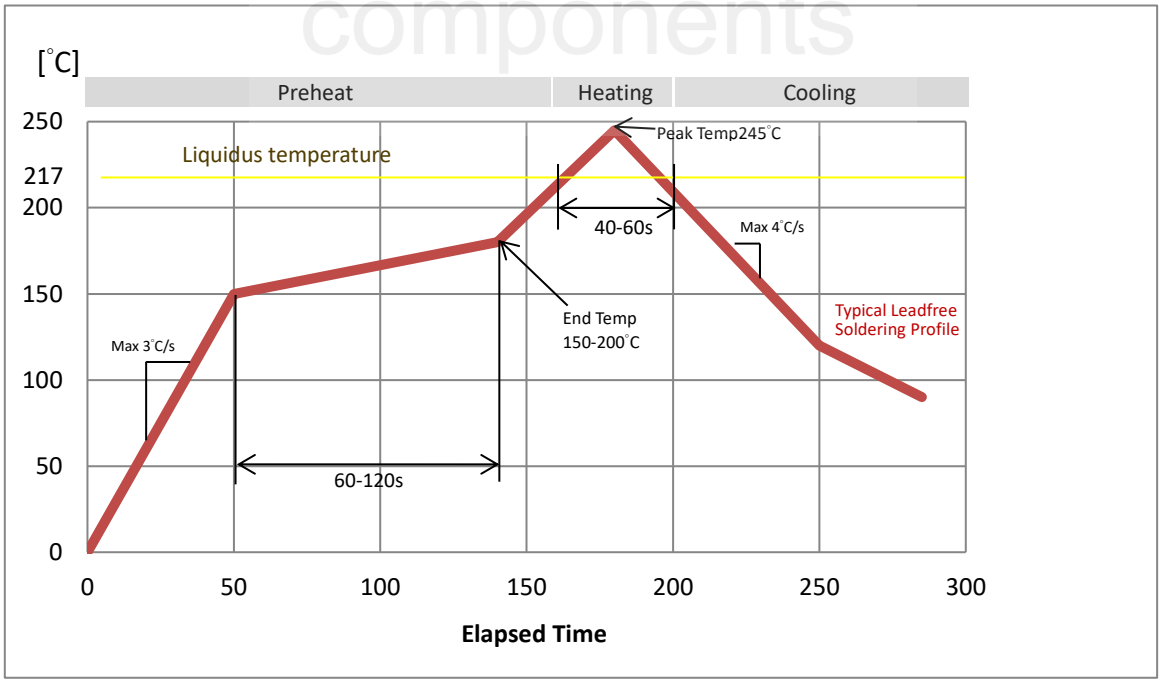
The temperature rises above the liquidus temperature of 217°C. Avoid a sudden rise in temperature as the slump of the paste could become worse.

- 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.



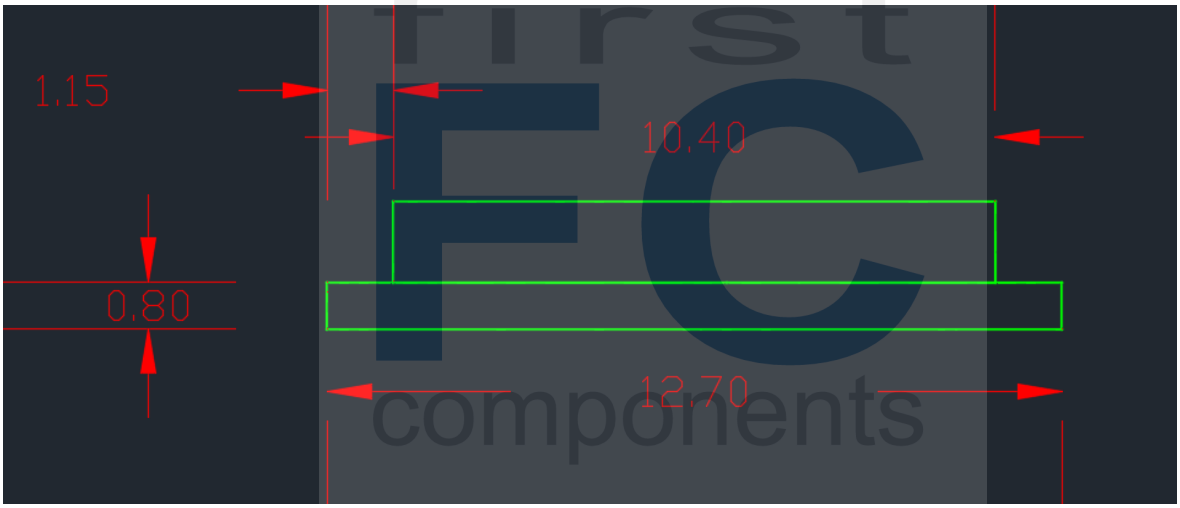
Recommended soldering profile

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DIEMENSIONS

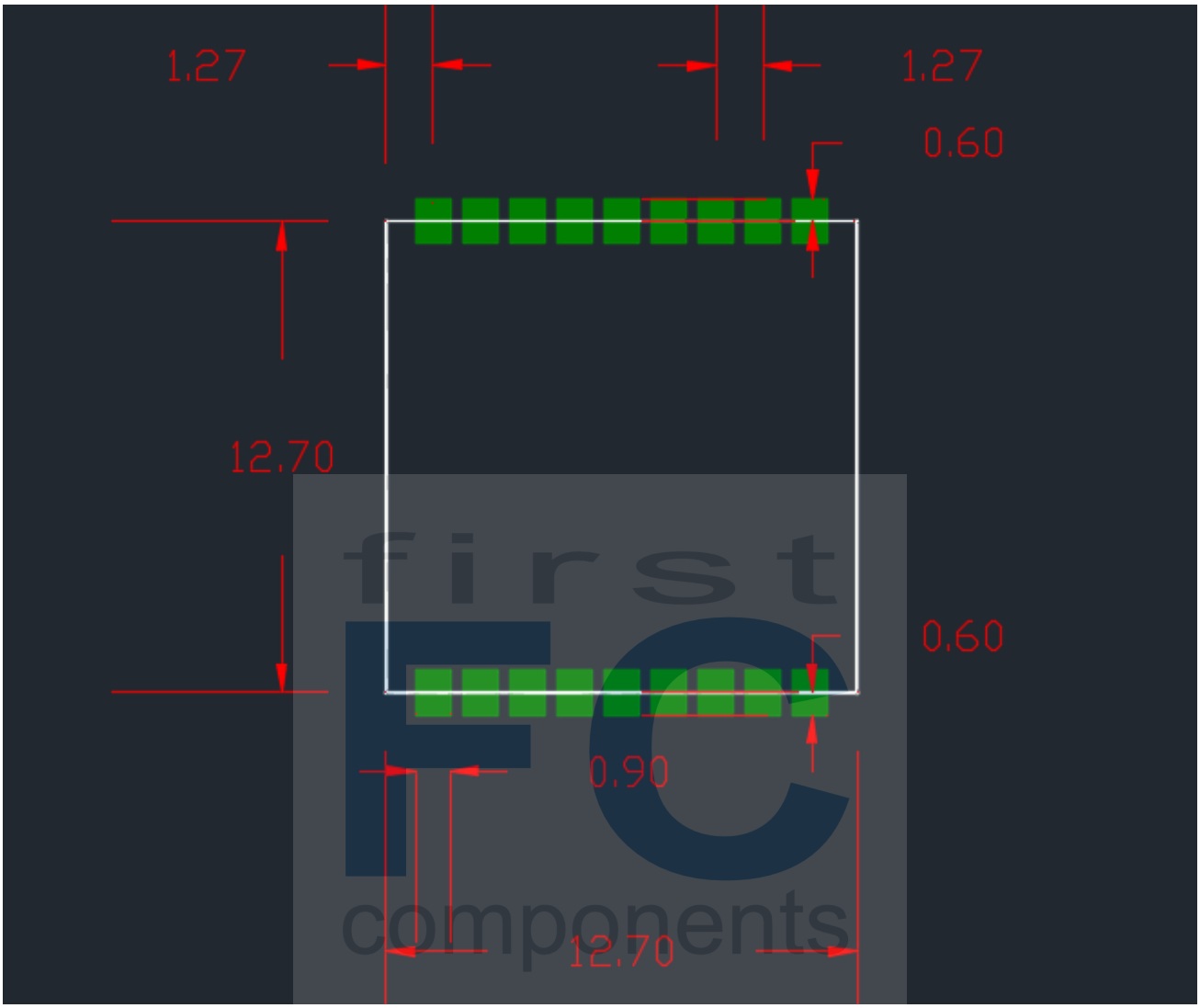




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LAYOUT FOOTPRINT RECOMMENDATIONS



Unit : mm

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