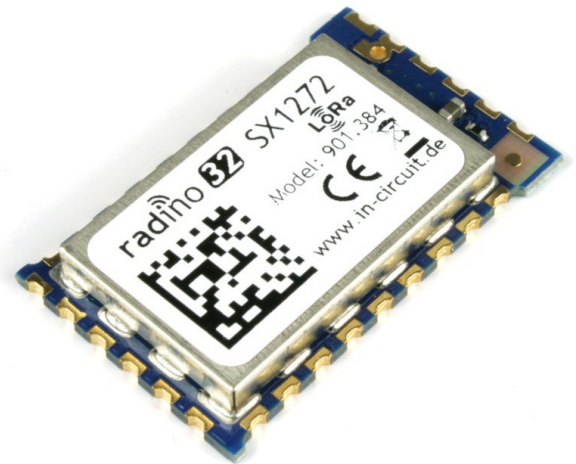


# radino 32 SX1272

The In-Circuit radino 32 SX1272 combines an **STM32L1** with the **SX1272 RF Transceiver** in a small form-factor **EMC-compliant** module.

It's part of the radino-series, which provides full-Arduino-compatible wireless communication devices in a small form factor, all **pin-compatible** to each other.



## Features

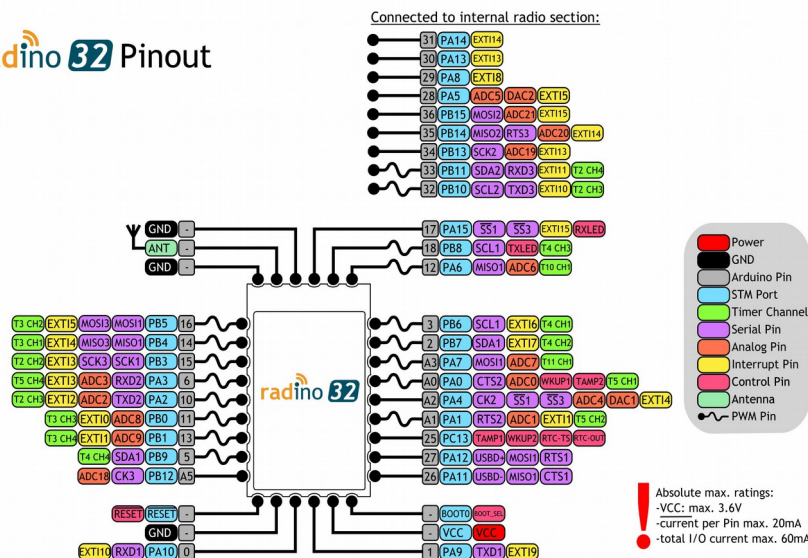
- Arduino-compatible
- RF Transceiver SX1272 connected internally  
<http://www.semtech.com/images/datasheet/sx1272.pdf>
- Available for 868MHz /915MHz
- STM32L151CC by STMicroelectronics with 32-bit ARM® Cortex®-M3 CPU
- 256 kbyte Flash, 32 kbyte RAM, 8 kbyte EPROM
- Low Power RTC
- 12 bit ADC and DAC
- 23 multifunctional GPIOs (15 PWM, 10 ADC IN, 1 DAC OUT)
- USB, I<sup>2</sup>C, 2xSPI, 2xUSART

## Applications

- Ultra low power wireless applications operating in the 868/915 MHz ISM/SRD bands
- Automated Meter Reading
- Home and Building Automation
- Wireless Alarm and Security Systems
- Industrial Monitoring and Control
- Long range Irrigation Systems

For more information visit:  
<http://www.in-circuit.de/>  
<http://www.radino.cc/>

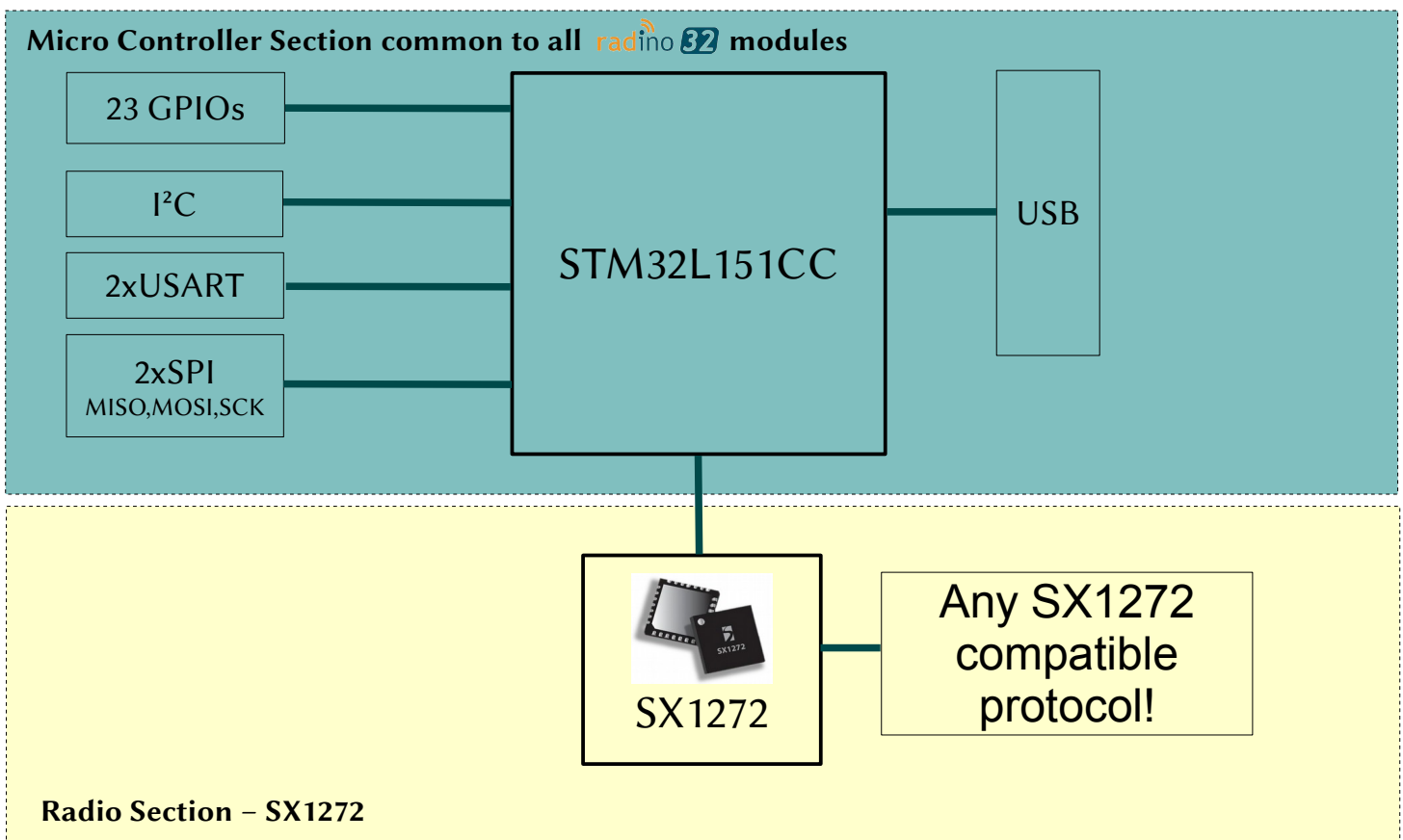
## radino 32 Pinout



## Overview

The In-Circuit radino 32 SX1272 combines an STM32L151 with the SX1272 RF Transceiver. Despite its small form factor, the radino 32 SX1272 offers great connectivity. Many GPIOs and interfaces (USB, I<sup>2</sup>C, 2xSPI, 2xUSART) of the STM32L151 can be connected to external circuitry.

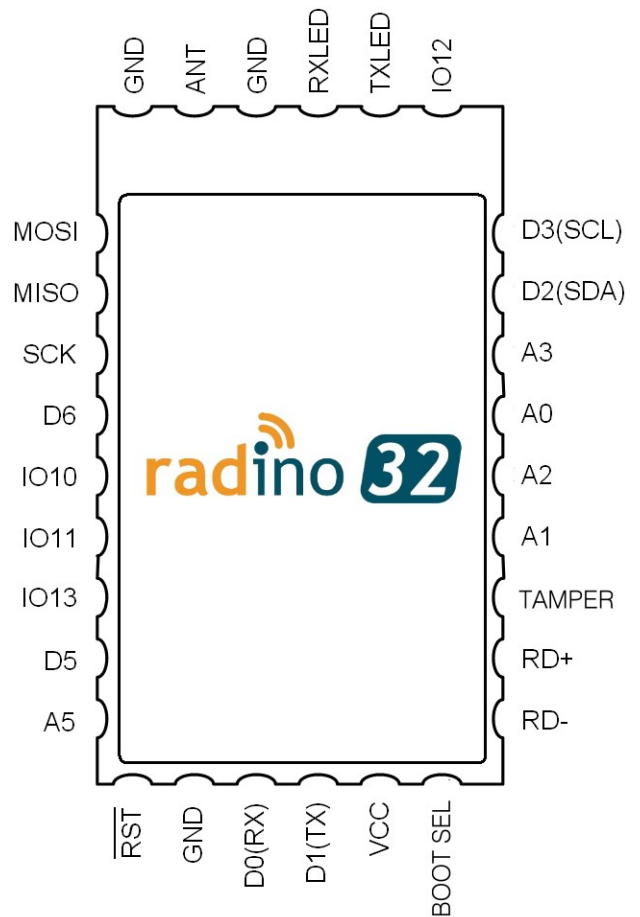
With our Arduino Library for radino the radino 32 SX1272 becomes fully Arduino-compatible, which enables easy programming, using the Arduino IDE (<http://www.arduino.cc/>).



## Pinout and Terminal Description



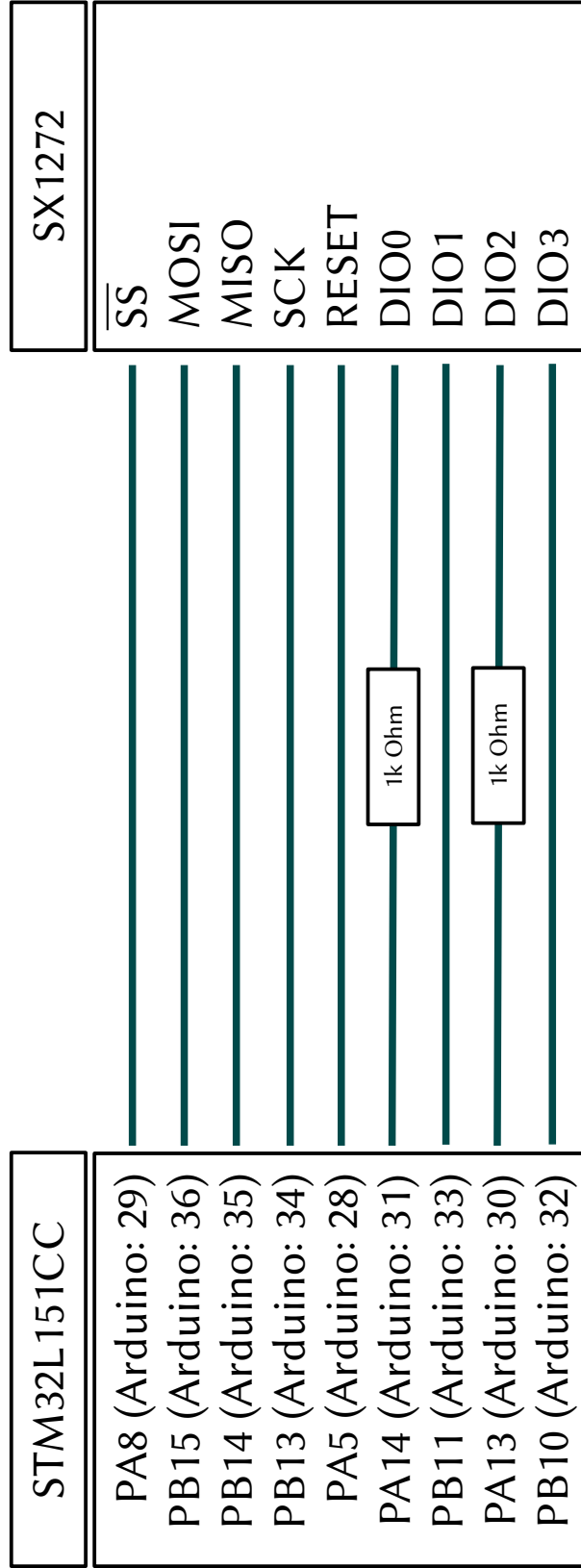
Top View



radino Pin No.	Name	Arduino Pin No.	STM32L151 CC Port	Description / Function (bold = main function)
1	MOSI	16	PB5	<b>SPI1-MOSI</b> SPI3-MOSI; I2C1-SMBA; PWM; TIM3-CH2; EXTI5; GPIO
2	MISO	14	PB4	<b>SPI1-MISO</b> SPI3-MISO; PWM; TIM3-CH1; EXTI4(shared with P20); GPIO
3	SCK	15	PB3	<b>SPI1-SCK</b> SPI3-SCK; PWM; TIM2-CH2; EXTI3 (shared with P4); GPIO
4	D6	6 A7	PA3	GPIO; USART2-RX PWM; TIM5-CH4; ADC3; OPAMP1-VOUT; EXTI3 (shared with P3)
5	IO10	10 A10	PA2	GPIO; USTAR2-TX; PWM; TIM2-CH3; ADC2; OPAMP1-VINM; EXTI2
6	IO11	11	PB0	GPIO; PWM; TIM3-CH3; ADC8; OAMP2-VOUT; EXTI0
7	IO13	13	PB1	GPIO; PWM; TIM3-CH4; ADC9; EXTI1 (shared with P19)
8	D5	5	PB9	GPIO; I2C-SDA; PWM; TIM4-CH4;
9	A5	A5 23	PB12	ADC18; USATR3-CK; SPI2-NSS; GPIO;

radino Pin No	Name	Arduino Pin No.	STM32L151 CC Port	Description / Function (bold = main function)
10	Reset	-	NRST	Reset of STM32L151CC
11	GND	-	VSS	Ground
12	D0(RX)	0	PA10	<b>USART1-RX</b> ; EXT110; GPIO
13	D1(TX)	1	PA9	<b>USART1-TX</b> ; EXT19; GPIO
14	V <sub>CC</sub>	-	VCC	Power supply
15	BOOT_SELECT	-	BOOT0	Boot Select
16	RD-	26	PA11	<b>USB-D-</b> ; USART1-CTS; SPI1-MISO; GPIO
17	RD+	27	PA12	<b>USB-D+</b> ; USATR1-RTS; SPI1-MOSI; GPIO
18	TAMPER	25	PC13-WKUP2	RTC-TAMP1; WKUP2; RTC-TS; RTC-OUT; GPIO
19	A1	A1 19	PA1	ADC1; USART2-RTS; OAMP1-VINP; PWM; TIM5-CH2; EXT11(shared with P7); GPIO
20	A2	A2 20	PA4	ADC4; DAC1; USART2-CK; SPI1-NSS; SPI3-NSS; EXT14(shared with P4); GPIO
21	A0	A0 18	PA0-WKUP1	ADC0; USART2-CTS; WKUP1; RTC-TAMP2; PWM; TIM5-CH1; GPIO
22	A3	A3 21	PA7	ADC7; SPI1-MOSI; PWM; TIM11-CH1; OPAMP2-VINM; GPIO
23	D2(SDA)	2	PB7	<b>I2C1-SDA</b> ; USATR1-RX; PWM; TIM4-CH2; EXT17; GPIO
24	D3(SCL)	3	PB6	<b>I2C1-SCL</b> ; USART1-TX; PWM; TIM4-CH1; EXT16; GPIO
25	IO12	12 A11	PA6	GPIO; SPI1-MISO; PWM; TIM10-CH1; OPAMP2-VINP; ADC6
26	TXLED	18	PB8	<b>TXLED</b> ; I2C1-SCL; PWM; TIM4-CH3; GPIO
27	RXLED	17	PA15	<b>RXLED</b> ; SPI1-NSS; SPI3-NSS; EXT115; GPIO
28	GND	-	VSS	Ground
29	ANTENNA	-	-	Antenna pin
30	GND	-	VSS	Ground
-	RF_MISO	35	PB14	<b>connected to internal radio section</b> Signal: MISO
-	RF_MOSI	36	PB15	<b>connected to internal radio section</b> Signal: MOSI
-	RF_SCK	34	PB13	<b>connected to internal radio section</b> Signal: SCK
-	RF_SS	29	PA8	<b>connected to internal radio section</b> Signal: SS
-	RF_DIO0	31	PA14	<b>connected to internal radio section</b> Signal: DIO0
-	RF_DIO1	33	PB11	<b>connected to internal radio section</b> Signal: DIO1
-	RF_DIO2	30	PA13	<b>connected to internal radio section</b> Signal: DIO2
-	RF_DIO3	32	PB10	<b>connected to internal radio section</b> Signal: DIO3
-	RF_RST	28	PA5	<b>connected to internal radio section</b> Signal: RESET

### Detailed Interconnection diagram



Portname

Pin description

# Electrical Characteristics

## Absolut Maximum Ratings

Note: These are absolute maximum ratings beyond which the module can be permanently damaged. These are not maximum operating conditions.

Rating	Min	Max	Unit
Storage Temperature	-40	115	°C
$V_{CC}$	-0.5	3.9	V
Current per IO		20	mA
Total Current by sum of all IOs		60	mA

## Recommended Operating Conditions

Environmental conditions

Rating	Min	Typ.	Max	Unit
Operating Temperature	-40		85	°C
$V_{CC}$	1.8	3.3	3.6	V

### DC Characteristics

$T_A = -40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$ ,  $V_{CC} = 2.7\text{V}$  to  $3.6\text{V}$  (unless otherwise noted)

Symbol	Rating	Min	Typ.	Max	Unit
$V_{BS}$	BOOT_SELECT Voltage	0		5.5	V
$V_{IL}$	Input Low Voltage,	-0.3		$0.2V_{CC}$	V
$V_{IH1}$	Input High Voltage, Pins: P4, P6, P7, P20	$0.9V_{CC}$		$V_{CC} + 0.3$	V
$V_{IH2}$	Input High Voltage, all other Pins	$0.9V_{CC}$		5.25	V
$V_{OL}$	Output Low Voltage			0.5	V
$V_{OH}$	Output High Voltage	$0.9V_{CC}$			V

## Current consumption parameters

Operation conditions:  $V_{CC}=3.3V$ ,  $T_A=-40^{\circ}C$  to  $+85^{\circ}C$ .

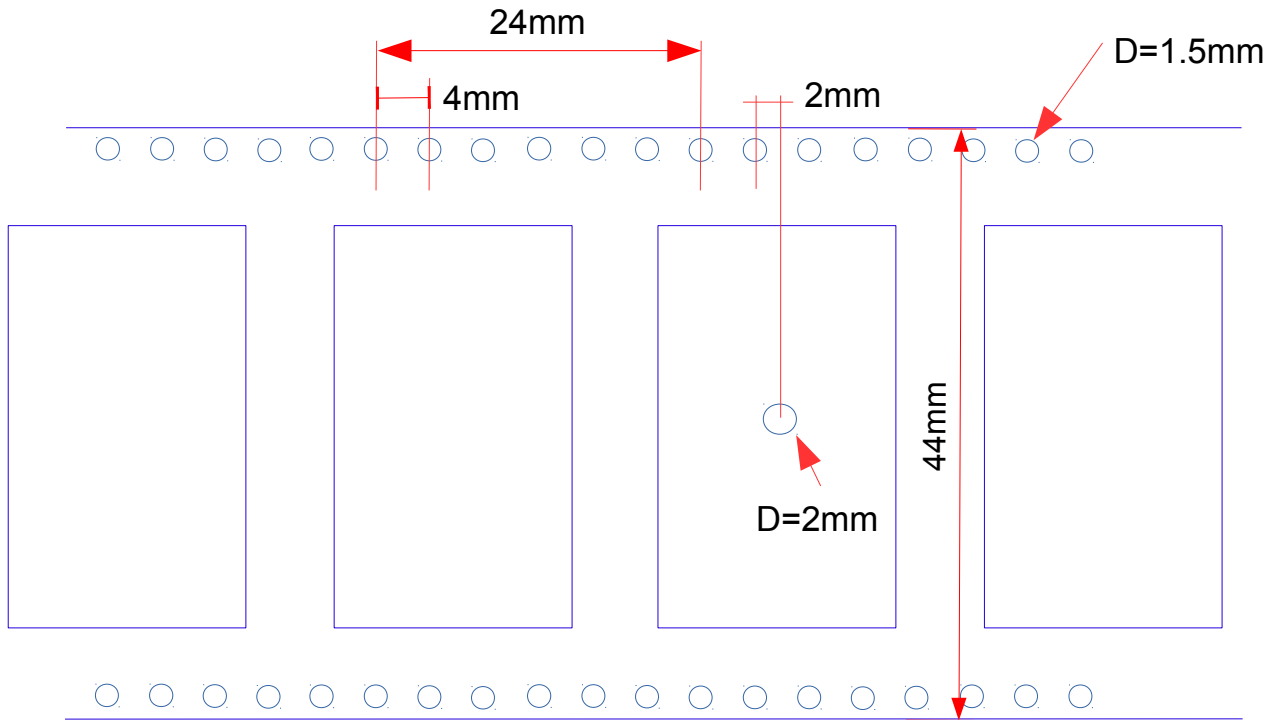
Symbol	Rating	Min	Typ.	Max	Unit
$I_{LT}$	Low-power transmit mode (SX1272: Low power transmit, $P_{out}=+7dBm$ ; STM: Low-power run mode)	---	18	---	mA
$I_{HT}$	High-power transmit mode (SX1272: High power transmit, $P_{out}=+20dBm$ ; STM: Low-power run mode)	---	125	---	mA
$I_R$	Receive mode (SX1272: Receive mode, LnaBosst Off; STM: Low-power run mode)	---	10.5	---	mA
$I_S$	Deep sleep mode (Sx1272: Sleep mode; STM: Standby mode, RTC disabled)	---	0.4	---	$\mu A$

## Packaging: tape & reel specification

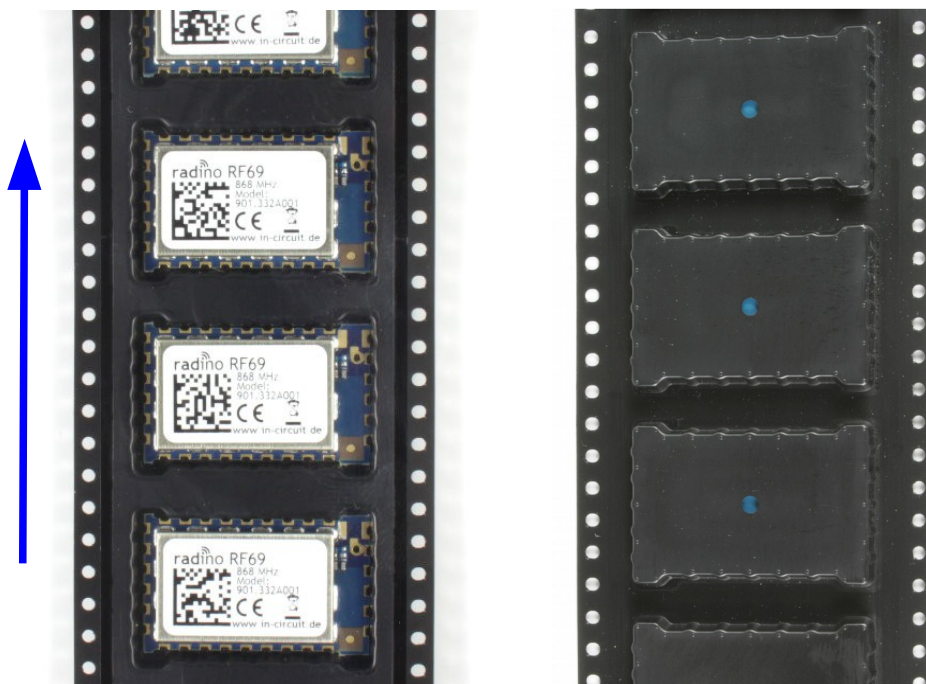
All radino modules come in a tape & reel package suitable for pick and place machines. Small quantities are delivered as cut-tape. There are 2 kinds of reels available with 100pcs and 500pcs per reel (see section ordering information)

Except the number of modules, all parameters are same to both reel sizes:

- 13" reel size
- 44mm tape width
- tape pocket dimensions 29mm x 19mm x 4mm
- module spacing 24mm
- 2mm hole in the middle of the module body
- 1.5mm tape holes for transport



Transport direction  
(Antenna connector to the right)





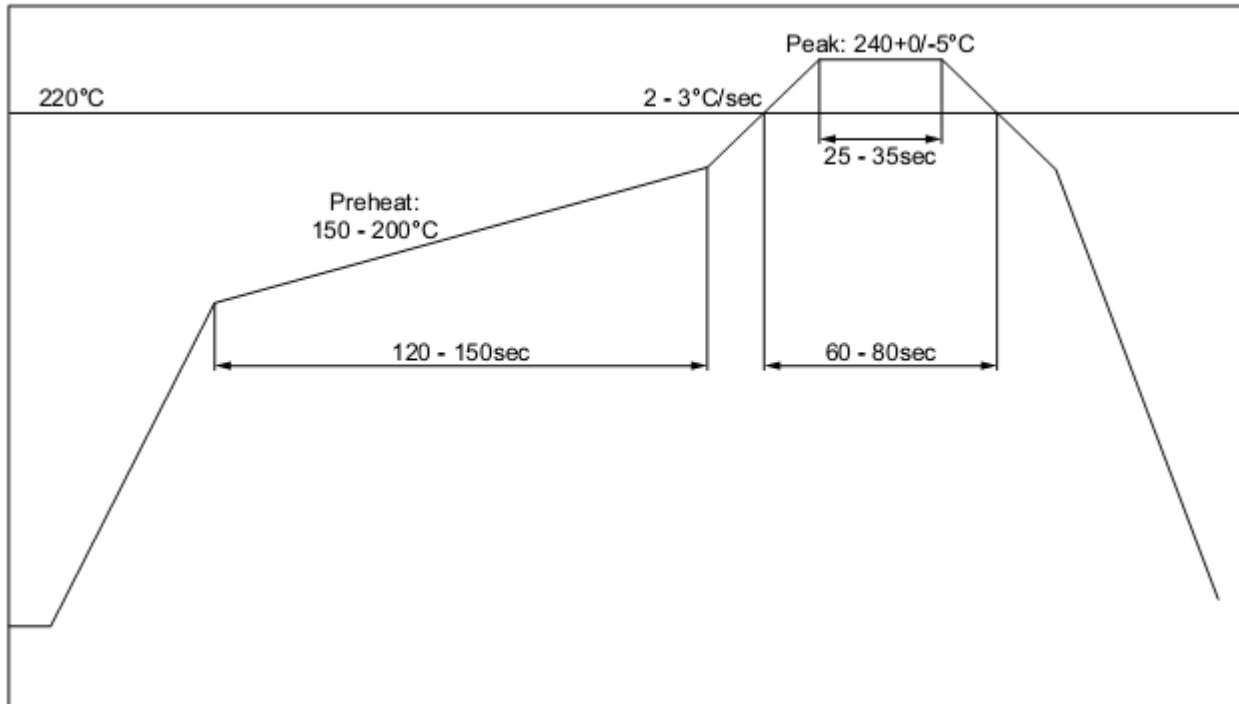


## Reflow temperature profile

The single most critical stage in the automated assembly process is the reflow stage. The reflow profile shall not exceed the following maximum ratings:

- heating gradients  $<3^{\circ}\text{C}/\text{sec}$
- peak zone temperature of the module  $<245^{\circ}\text{C}$
- time in peak zone  $<40$  sec.
- time above  $220^{\circ}\text{C}$   $<80$  sec.

Excessive temperatures, transport times and shocks during the reflow process **MUST** not be applied to the module.



Recommended reflow temperature profile

## Washability

The radino modules are wash-resistant, but are not sealed. In-Circuit recommends manufacturing without washing. If washing is needed make sure that a drying time is provided to the modules before applying electrical power. The drying time should be sufficient to allow any moisture that may have migrated into the module to evaporate, thus eliminating the potential for shorting damage during power-up or testing.

If the wash contains contaminants, the performance may be adversely affected, even after drying.

## Ordering Information

Part	Ordering Code	MOQ	Package
radino32 SX1272	901.384	1	Cut Tape, Reels 100/500

All radino modules are available online: <http://www.radino.cc/>

## Certifications



### European R&TTE Directive Statements

The radino32 CC1101 module has been tested and found to comply with Annex IV of the R&TTE Directive 1999/5/EC and is subject of a notified body opinion. The module has been approved for Antennas with gains of 2 dBi or less.



### RoHS / WEEE compliant

WEEE-Reg.-Nr. DE 17225017



### Revision history:

Version	Date	Changes	Editor
A	2016/08/19		Grünig