

radino 40 CC1101 433MHz

The In-Circuit radino 40 CC1101 combines Nordic Semiconductor's nRF52840 microprocessor and TI's CC1101 transceiver in a small form-factor **EMC-compliant** module.

The radino 40 CC1101 integrates wireless communication in the ISM bands and Bluetooth® functionality.

The module is fully **CE certified**.



Features

- ISM Transceiver CC1101 by Texas Instruments
 - Energy efficient
 - Frequency range 430 – 435 MHz
 - Data rates up to 600 kbps
- nRF52840 by Nordic Semiconductors
 - 32-bit ARM® Cortex®-M4 CPU with FPU, 64 MHz
 - 1 Mbyte Flash, 256 kbyte RAM
 - Dynamic multiprotocol-transceiver:
 - Bluetooth 5 / Bluetooth Low Energy
 - IEEE 802.15.4/Thread
 - ANT/ANT+
 - Proprietary 2,4 GHz
 - 4x4 channel pwm unit with EasyDMA
 - 12 bit 200 ksps ADC
 - 5x 32 bit timer with counter mode
 - USB 2.0, I²C, QSPI, SPI, UART, NFC-A
 - Quadrature decoder (QDEC)
 - 3x RTC
- 40 GPIOs

Applications

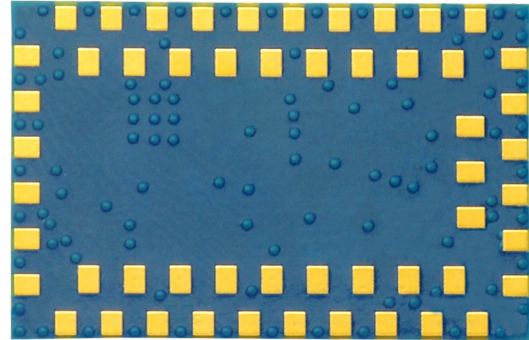
- Ultra low power wireless applications operating in the 433 MHz ISM/SRD bands
- Wireless alarm and security systems
- Industrial monitoring and control
- Wireless sensor networks
- AMR – Automatic Meter Reading
- Home and building automation
- Wireless MBUS



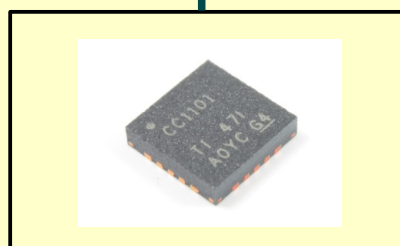
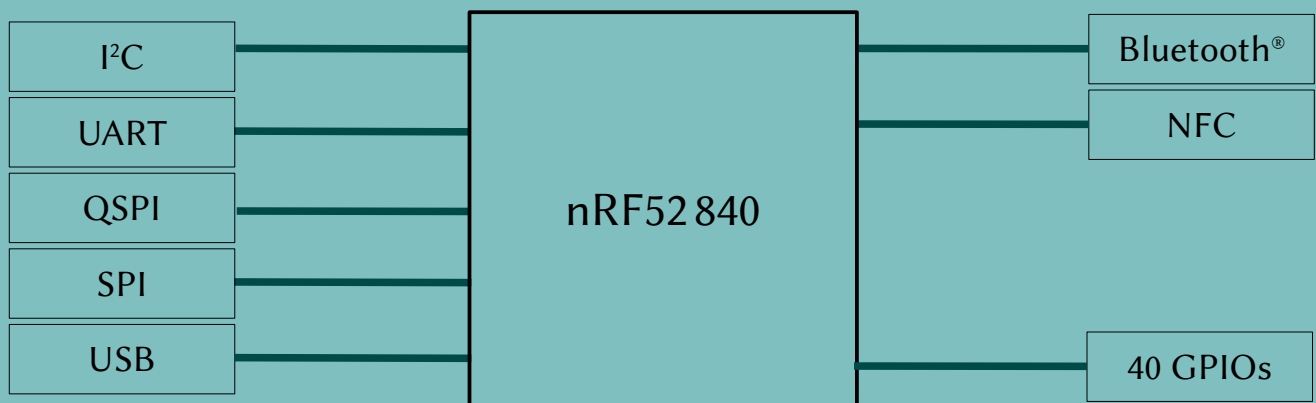
For more information visit:
<http://www.in-circuit.de/>
<http://www.radino.cc/>

Overview

The In-Circuit radino 40 CC1101 combines a **nRF52840** microprocessor and the **CC1101** RF Transceiver. Despite its small form factor, the radino 40 CC1101 offers great connectivity. Many GPIOs and interfaces (USB 2.0, I²C, QSPI, SPI, UART, NFC-A) of the **nRF52840** can be connected to external circuitry.

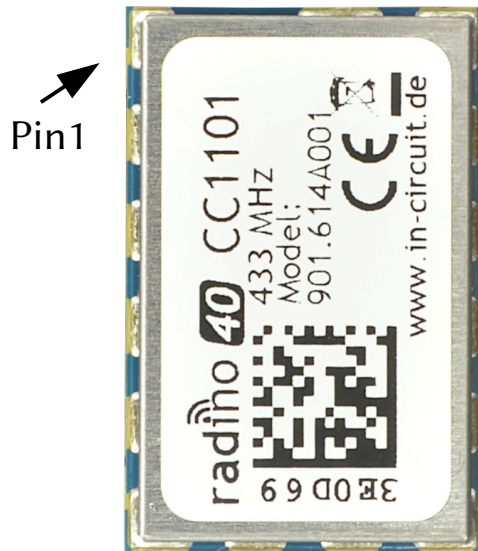


Micro Controller Section of radino 40

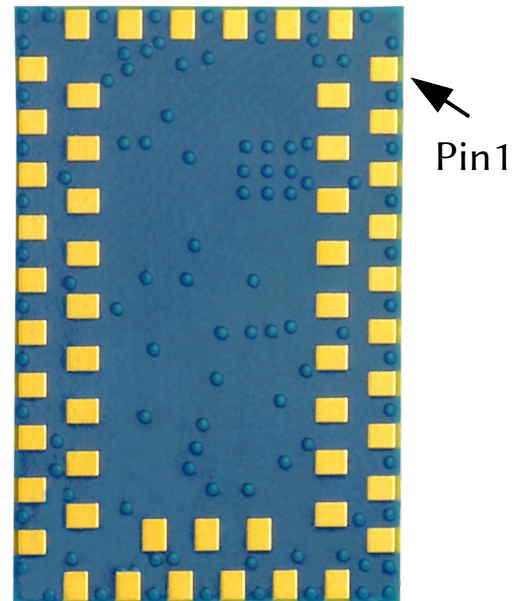


Radio Section – CC1101

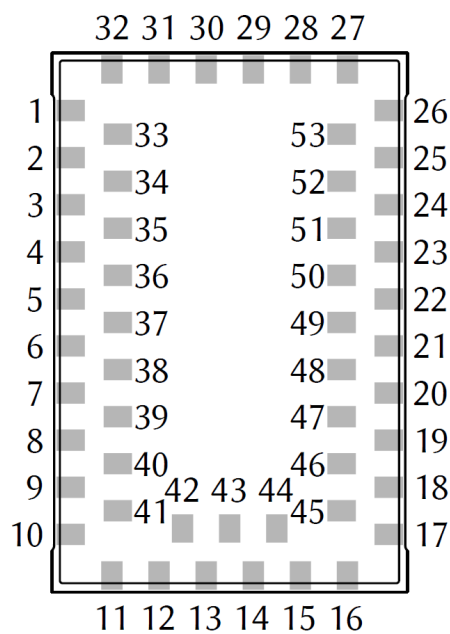
Pinout



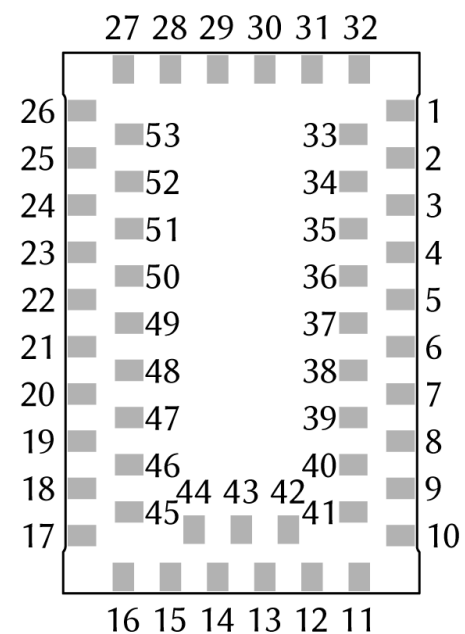
Top View



Bottom View



Pins seen from top side



Pins seen from bottom side

Pin List

radino Pin	Name	NRF52840 aQFN73Pin/Name	Description / Function
1	P0.17	AD12/P0.17	GPIO
2	P0.15	AD10/P0.15	GPIO
3	P0.14	AC9/P0.14	GPIO
4	P0.12	U1/P0.12/ TRACEDATA1	GPIO; Trace buffer TRACEDATA[1]
5	P0.07	M2/P0.07/ TRACECLK	GPIO; Trace buffer clock
6	P0.03	B13/P0.03/AIN1	GPIO (low-freq.); Analog input
7	P0.05	K2/P0.05/AIN3	GPIO; Analog input
8	P0.29	A10/P0.29/AIN5	GPIO (low-freq.); Analog input
9	P0.31	A8/P0.31/AIN7	GPIO (low-freq.); Analog input
10	P0.01	F2/P0.01/XL2	GPIO; Analog input; Connection for 32.768 kHz crystal
11	$\overline{\text{Reset}}$	AC13/P0.18/ $\overline{\text{RESET}}$	GPIO; nRF52840 reset
12	GND	B7/VSS	Ground
13	P0.06	L1/P0.06	GPIO; (RXD)
14	P0.08	N1/P0.08	GPIO; (TXD)
15	$\overline{\text{VDD}}$	VDD	Power supply
16	P0.13/BSL	AD8/P0.13	GPIO (internal 1k pull-down)
17	USB-	AD4/D-	USB-D-
18	USB+	AD6/D+	USB-D+
19	P0.09	L24/P0.09/NFC1	GPIO (low-freq.); NFC antenna input
20	P0.10	J24/P0.10/NFC2	GPIO (low-freq.); NFC antenna input
21	BT_ANT	→H23/ANT	Bluetooth Antenna connection
22	P1.07	P23/P1.07	GPIO (low-freq.)
23	P1.05	T23/P1.05	GPIO (low-freq.)
24	P1.03	V23/P1.03	GPIO (low-freq.)
25	P1.01	Y23/P1.01	GPIO (low-freq.)
26	P1.00	AD22/P1.00/ TRACEDATA0	GPIO (low-freq.); Trace buffer TRACEDATA[0], SWO
27	P1.15	A14/P1.15	GPIO (low-freq.)

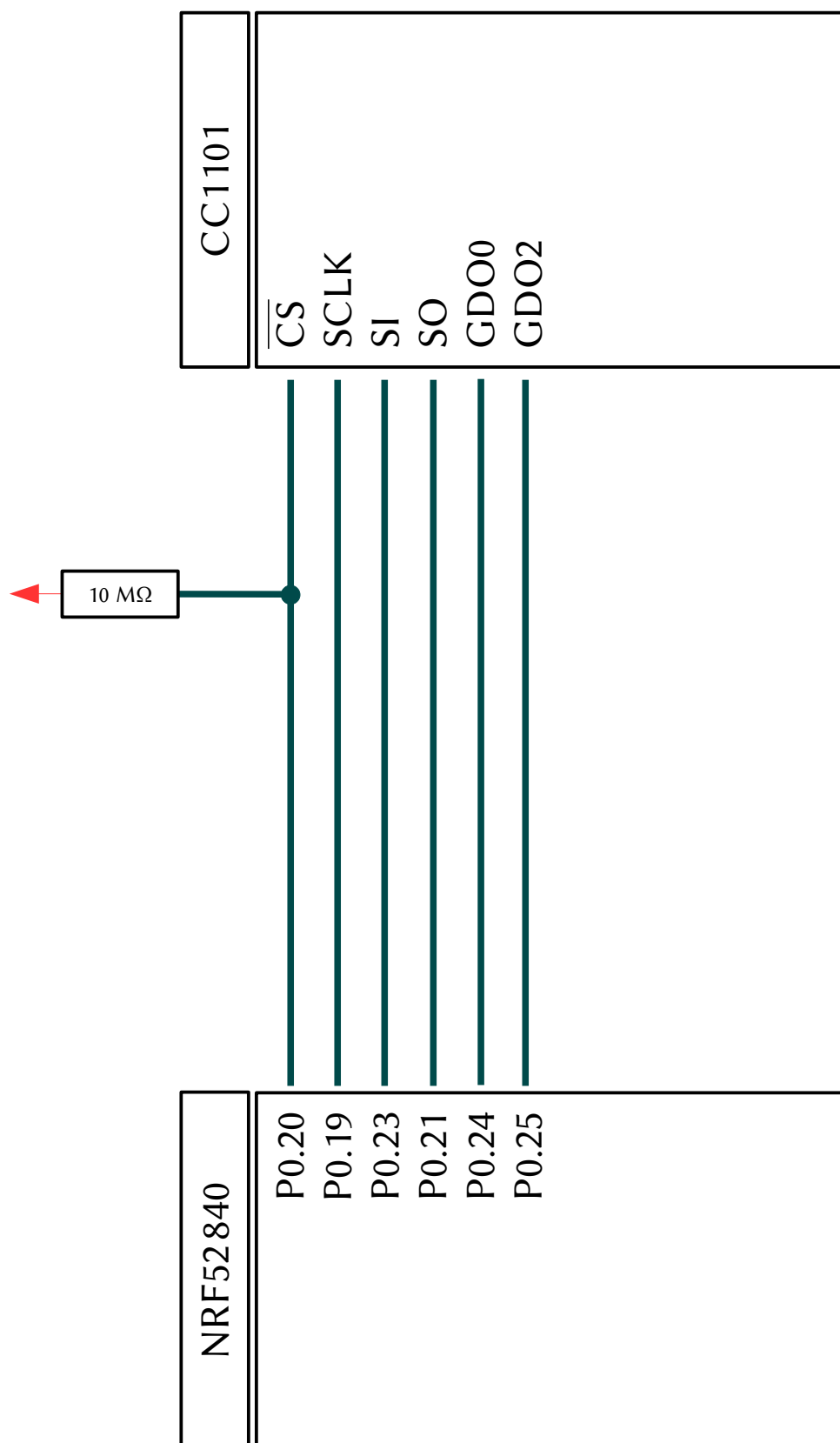
radino Pin	Name	NRF52 840 aQFN73Pin/Name	Description / Function
28	P1.14	B15/P1.14	GPIO (low-freq.)
29	P1.13	A15/P1.13	GPIO (low-freq.)
30	GND	VSS	Ground
31	ANT	-	Antenna pin CC1101
32	GND	VSS	Ground
33	P0.16	AC11/P0.16	GPIO
34	P1.08	P2/P1.08	GPIO
35	P1.10	A20/P1.10	GPIO
36	P0.11	T2/P0.11	GPIO
37	P0.02	A12/P0.02/AIN0	GPIO (low-freq.); Analog input
38	P0.04	J1/P0.04/AIN2	GPIO; Analog input
39	P0.28	B11/P0.28/AIN4	GPIO (low-freq.); Analog input
40	P0.30	B9/P0.30/AIN6	GPIO (low-freq.); Analog input
41	P0.00	D2/P0.0/XL1	GPIO; Analog input; Connection for 32.768 kHz crystal
42	P0.27	H2/P0.27	GPIO
43	P0.26	G1/P0.26	GPIO
44	P1.09	R1/P1.09/ TRACEDATA3	GPIO; Trace buffer TRACEDATA[3]
45	$\overline{\text{VUSB}}$	AD2/VBUS	5V Power supply for USB connectivity
46	SWCLK	AA24/SWDCLK	Serial wire debug clock input
47	SWDIO	AC24/SWDIO	Debug serial data
48	GND	VSS	Ground
49	GND	VSS	Ground
50	P1.11	B19/P1.11	GPIO (low-freq.) ; Trace buffer TRACEDATA[2]
51	P1.02	W24/P1.02	GPIO (low-freq.)
52	P1.04	U24/P1.04	GPIO (low-freq.)
53	P1.06	R24/P1.06	GPIO (low-freq.)

Interconnection

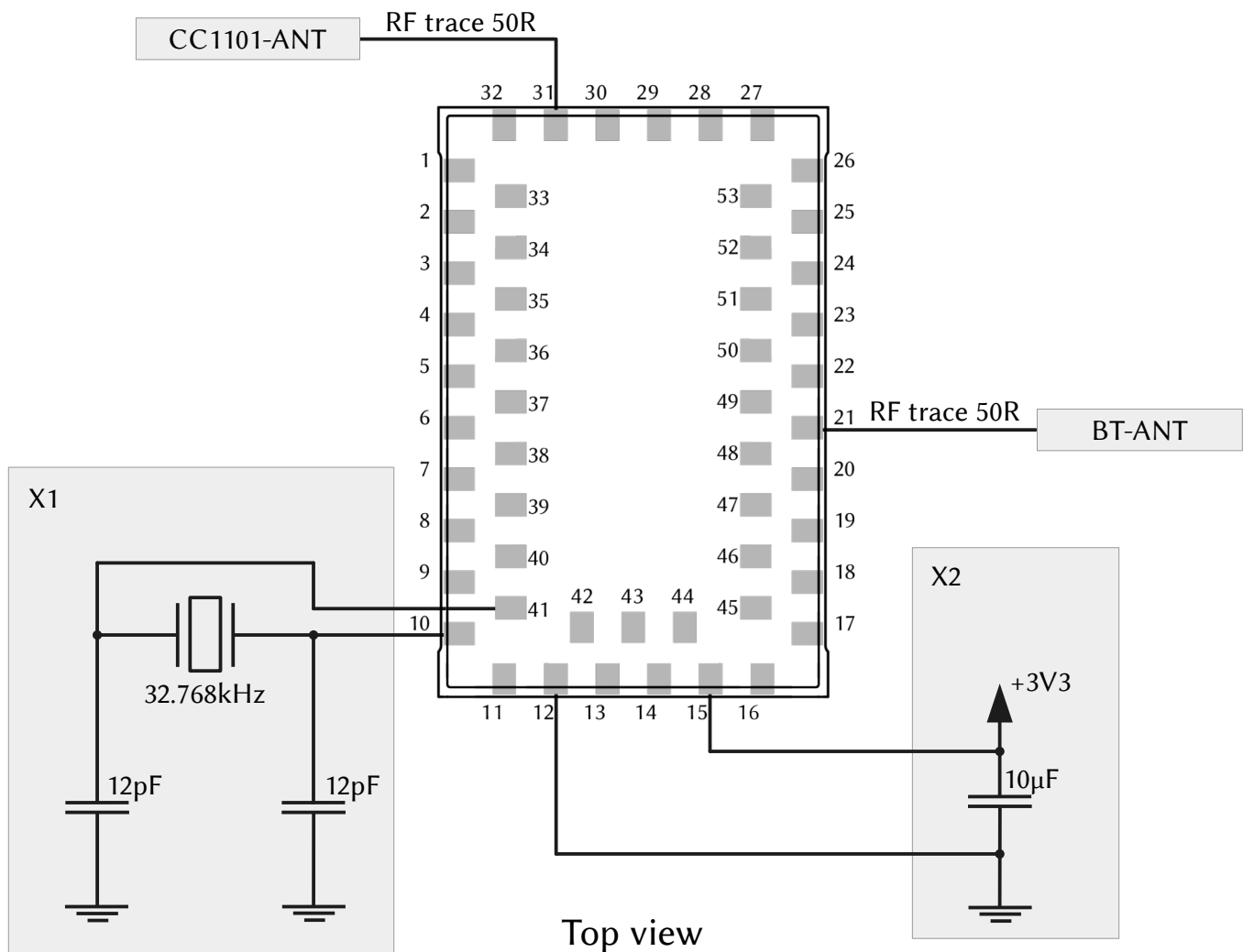
The nRF52840 and the CC1101 are connected internally. The interconnections are listed below.

Signal Name	NRF52840 Pin/Name	CC1101 Port/Name	Description / Function
RF_ $\overline{SS}$	AD16/P0.20	7/ $\overline{CS}$	CC1101 SPI chip select
RF_SCK	AC15/P0.19	1/SCLK	CC1101 SPI clock
RF_MOSI	AC19/P0.23	20/SI	CC1101 SPI data output
RF_MISO	AC17/P0.21	2/SO (GDO1)	CC1101 SPI data input
RF_GDO0	AD20/P0.24	6/GDO0 (ATEST)	CC1101 digital output pin for general use
RF_GDO2	AC21/P0.25	3/GDO2	CC1101 digital output pin for general use

Interconnection diagram

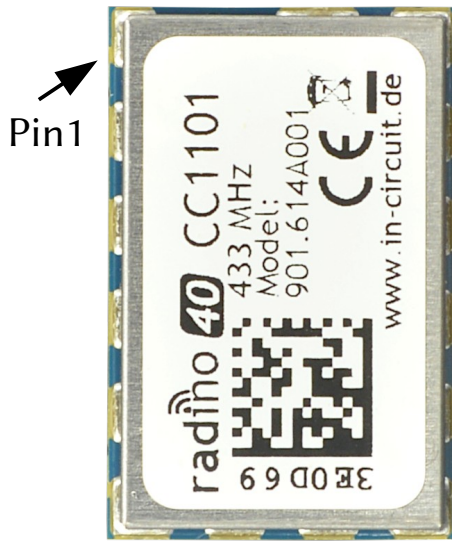


Application Circuit Diagram

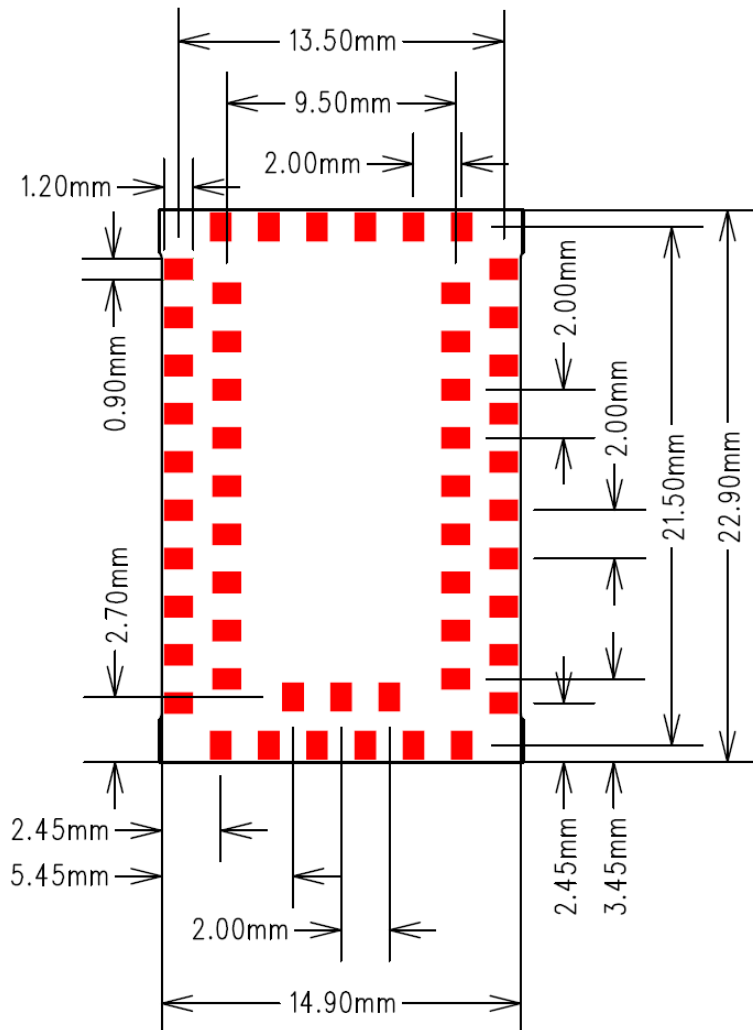


Ref	Function
X1	Crystal, for RTC functionality
X2	Power supply, 10µF (min.) ceramic capacitor in parallel
BT-ANT	Bluetooth Antenna
CC1101-ANT	CC1101 Antenna

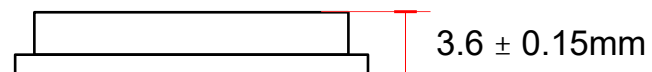
Dimensions & Footprint



Top View



Recommended Land Pattern



Electrical Characteristics

Absolute Maximum Ratings

Note: These are absolute maximum ratings beyond which the module can be permanently damaged.

Rating	Min	Max	Unit
Storage Temperature	-40	125	°C
V_{DD}	-0.3	3.9	V
Current per IO		10	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_{DD}	1.8	3.3	3.6	V

DC Characteristics

$T_A = -40^{\circ}\text{C}$ to 85°C , $V_{DD} = 1.8\text{V}$ to 3.6V (unless otherwise noted)

Symbol	Rating	Min	Typ.	Max	Unit
V_{IL}	Input Low Voltage,	0		$0.3V_{DD}$	V
V_{IH1}	Input High Voltage	$0.7V_{DD}$		V_{DD}	V
V_{OL}	Output Low Voltage	0		0.4	V
V_{OH}	Output High Voltage	$V_{DD}-0.4$		V_{DD}	V

Current consumption parameters

Nordic Semiconductors nRF52 840

Operation conditions: $V_{CC}=3.3V$, $T_A=25^{\circ}C$

At running mode:

up to 10 mA

At stop mode:

down to 0.4 μA

For details view manufacturer's datasheet.

Texas Instruments CC1101

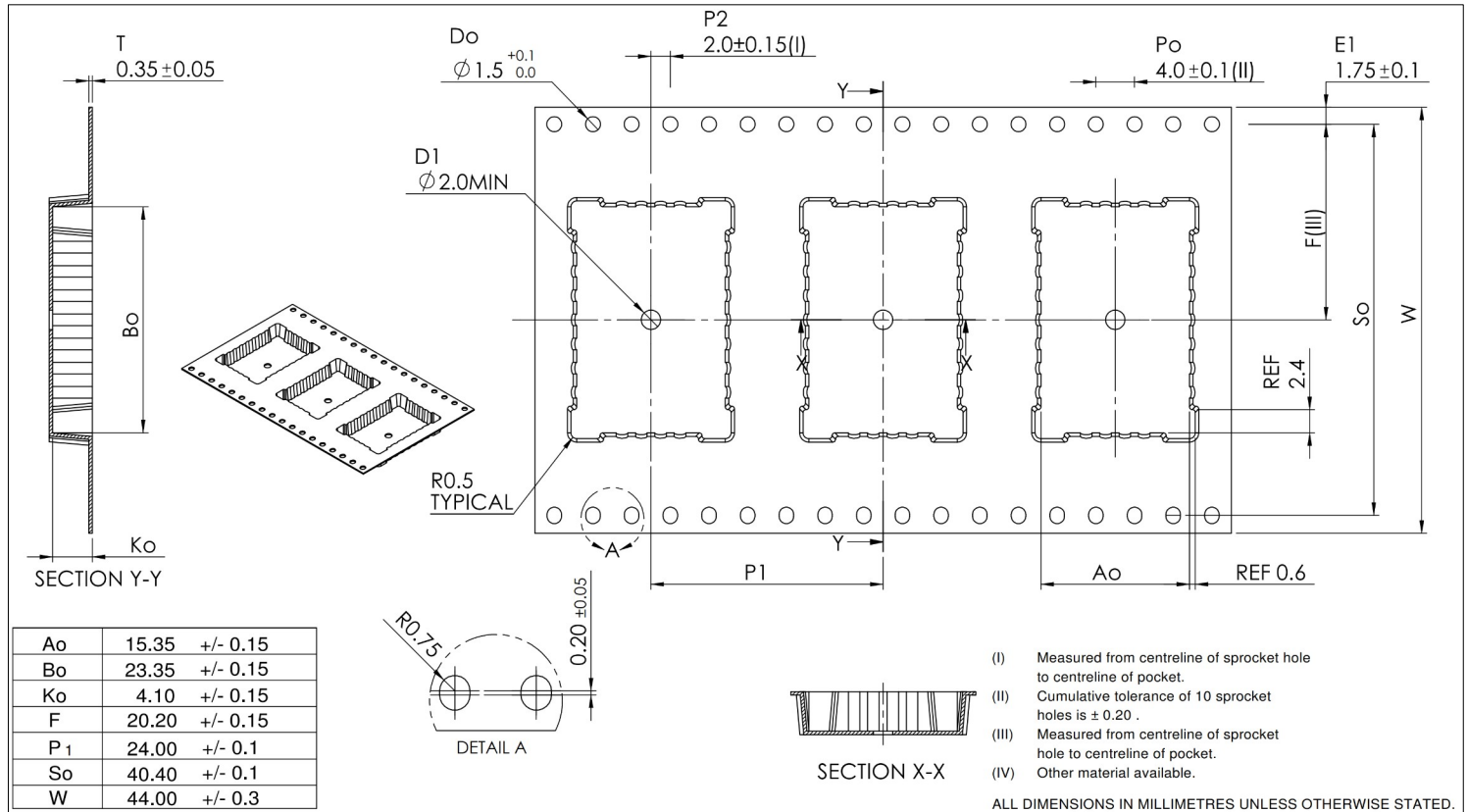
Operation conditions: $V_{CC}=3.0V$, $T_A=25^{\circ}C$.

Parameter	Condition	Min	Typ.	Max	Unit
Current consumption in power down modes	Voltage regulator to digital part off, register values retained (SLEEP state). All GDO pins programmed to 0x2F (HW to 0)	---	0.2	1	μA
Current consumption	Only voltage regulator to digital part and crystal oscillator running (IDLE state)	---	1.7	---	mA
Current consumption 433 MHz	Receive mode, 38.4 kBaud, register settings optimized for reduced current, input at sensitivity limit	---	15.7	---	mA
	Receive mode, 38.4 kBaud, register settings optimized for reduced current, input well above sensitivity limit	---	15.0	---	mA
	Transmit mode, +10 dBm output power	---	29.2	---	mA
	Transmit mode, 0 dBm output power	---	16.0	---	mA
	Transmit mode, -6 dBm output power	---	13.1	---	mA

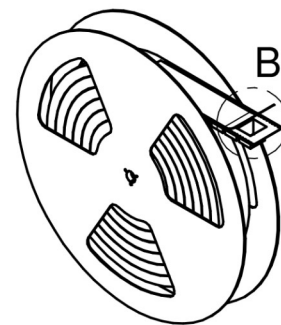
Values from manufacturers datasheet.

Packaging: tape & reel specification

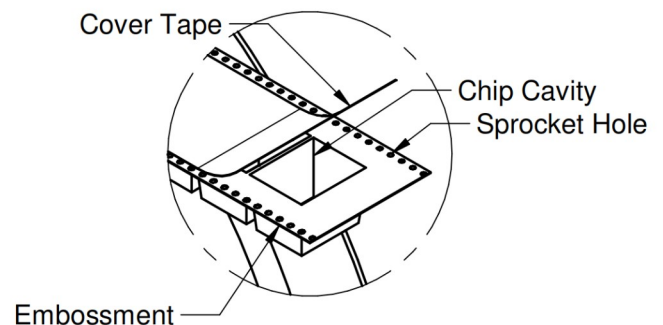
All radino modules come in a tape & reel package suitable for pick and place machines. Small quantities are delivered as cut-tape. There are 2 kinds of 13" reels available with 100pcs and 500pcs per reel (see section ordering information)



Transport
direction
(Barcode to
the left)



detail B

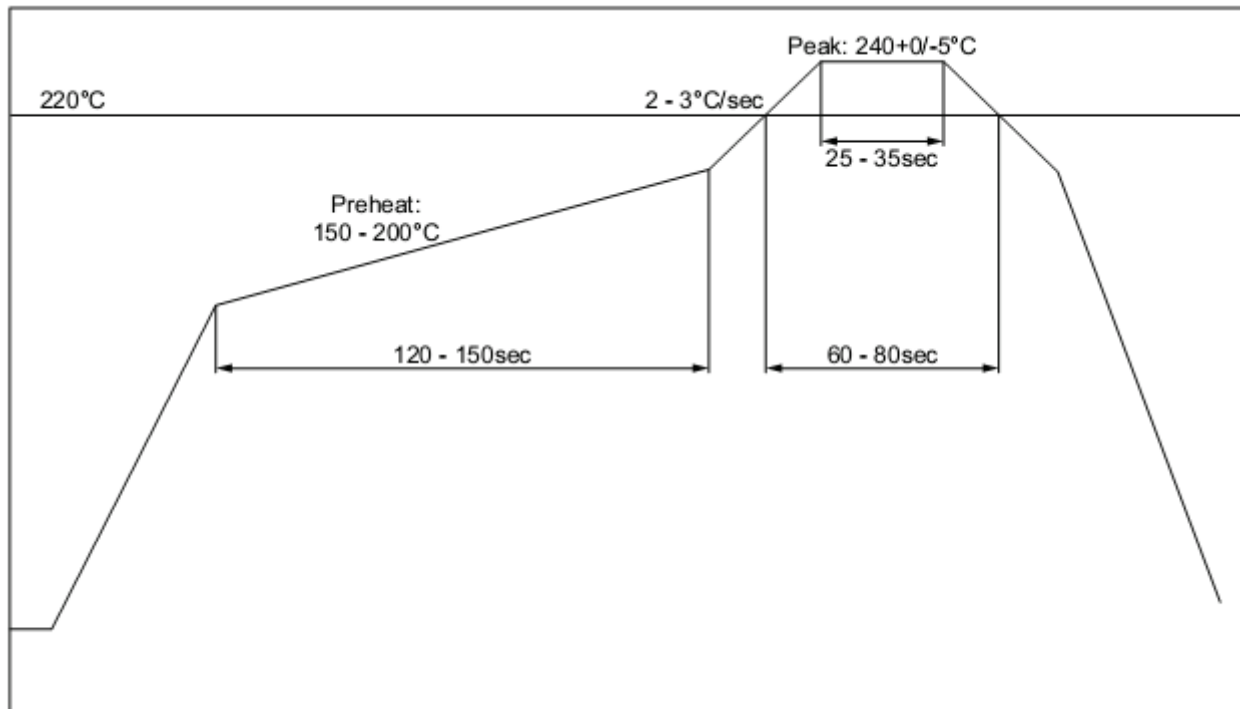


Reflow temperature profile

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°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
radino40 CC1101 433MHz	901.614A001	1	Cut Tape, Reels 100/500

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

Certifications



European RED Directive Statements
The radino40 CC1101 433MHz module has been tested and found to comply with Annex II of the Radio Equipment Directive (RED) 2014/53/EU 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	2025/07/15	Initial version	Kormann