

radino40 CC1101 868 MHz

Datasheet — Sub-GHz ISM + Bluetooth® LE module, CE certified



The In-Circuit **radino40 CC1101** combines Nordic Semiconductor's **nRF52840** microprocessor and TI's **CC1101** transceiver in a small form-factor, **EMC-compliant** module.

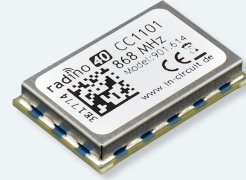
The radino40 CC1101 integrates wireless communication in the ISM bands and Bluetooth® functionality — ideal for ultra-low-power sub-GHz applications with a modern BLE 5 interface on the same module. The module is fully **CE certified**.

868 MHz
863 – 928
MHz
ISM/SRD

600 kbps
max. data
rate

0.2 µA
CC1101 sleep
current

14.9×22.9 mm
module size



radino40 CC1101 868 MHz · Model 901.614 · fully shielded,
EMC-compliant

Features

- ▶ ISM transceiver **CC1101** by Texas Instruments
 - Energy efficient
 - Frequency range 863 – 928 MHz
 - Data rates up to 600 kbps
- ▶ **nRF52840** by Nordic Semiconductor
 - 32-bit ARM® Cortex®-M4 CPU with FPU, 64 MHz
 - 1 Mbyte flash, 256 kbyte RAM
 - Dynamic multiprotocol transceiver: Bluetooth 5 / BLE, IEEE 802.15.4/Thread, ANT/ANT+, proprietary 2.4 GHz
 - 4×4 channel PWM unit with EasyDMA
 - 12-bit 200 ksps ADC
 - 5× 32-bit timer with counter mode
 - USB 2.0, I²C, QSPI, SPI, UART, NFC-A
 - Quadrature decoder (QDEC), 3× RTC
- ▶ **40 GPIOs**

Applications

- ▶ Ultra-low-power wireless applications operating in the 868/915 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 M-Bus

radino40 Family

All radino40 modules are **pin-compatible** and share the same outline, footprint and tape & reel packaging — the same PCB hosts sub-GHz (CC1101) and UWB (DW1000/DW3000) designs.

More Information

www.in-circuit.de

Sub-GHz ISM

Wireless M-Bus

BLE 5

NFC-A

CE / RED

RoHS

Hardware.**Software.**Wireless.

The radino40 CC1101 is more than a module: it comes with an SDK, example firmware and long-term OEM/ODM support — hardware, RF and embedded software developed and maintained in Germany.

■ Software & Support

Sub-GHz Firmware

- ▶ CC1101 driver and example firmware for the 868 MHz ISM band
- ▶ Long-range, low-power telemetry and control links
- ▶ BLE 5 (Nordic SoftDevice) usable in parallel — e.g. for app-based configuration

SDK & Examples

- ▶ radino40 SDK: GCC toolchain, Makefile projects
- ▶ Example projects with source code
- ▶ USB bootloader — firmware update without a debugger

Lifecycle & OEM/ODM

- ▶ Firmware maintenance and feature development by In-Circuit
- ▶ Custom hardware: form factor, battery, housing, certification
- ▶ Long-term availability for series production

radino40 Family

- ▶ Pin-compatible variants: CC1101 433 MHz, DW1000 / DW3000 (UWB)
- ▶ Same footprint, same tape & reel — no PCB change required
- ▶ Datasheets: 305000 188A (433 MHz), 165A (DW1000), 184A003 (DW3000)

■ Evaluation Hardware

The quickest way to evaluate: the **radino40 Spider RP-SMA** carrier board (datasheet 305000 193A) — the module on a development carrier with USB, buttons, LEDs, accessible pin headers and RP-SMA antenna connector. Matching 868 MHz antenna: **303.290A001** (+3 dBi, 5 cm, male RP-SMA).

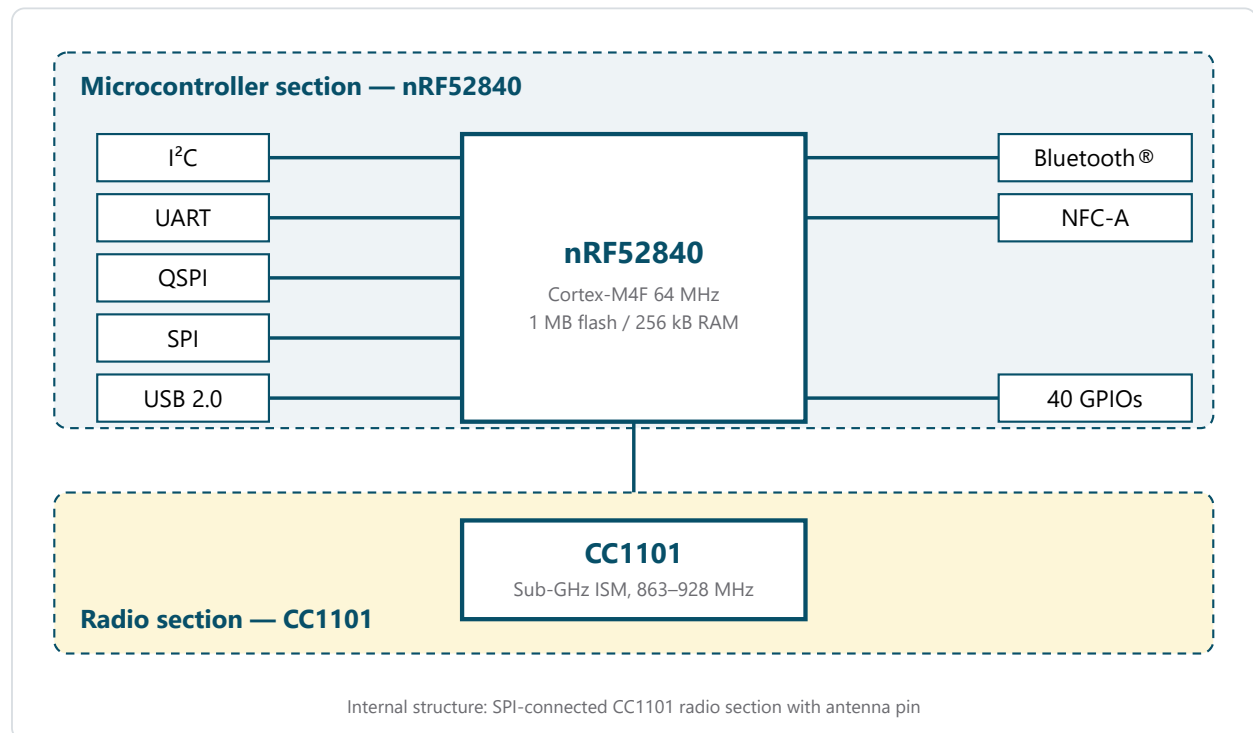
■ Why In-Circuit

- ▶ Hardware, RF and embedded software from one team — made in Dresden, Germany
- ▶ Proven module platform — radino40 family in industrial series products
- ▶ From evaluation kit to certified series product, incl. long-term firmware maintenance

Overview

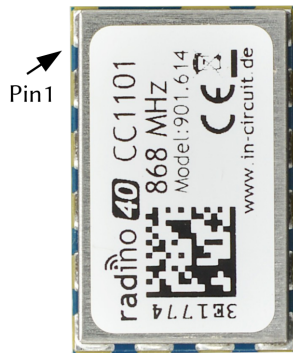
The In-Circuit radino40 CC1101 combines a **nRF52840** microprocessor and the **CC1101** RF transceiver. Despite its small form factor, the radino40 CC1101 offers great connectivity: many GPIOs and interfaces (USB 2.0, I²C, QSPI, SPI, UART, NFC-A) of the nRF52840 can be connected to external circuitry.

Block Diagram

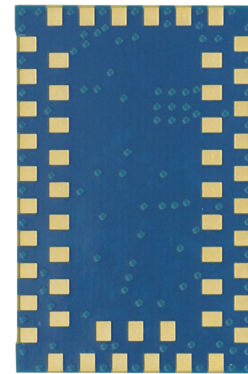


Pinout

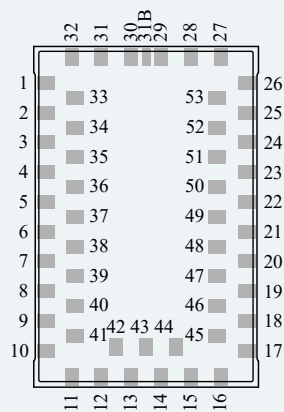
Pin 1 is located at the top-left corner (top view) and marked on the module shield.



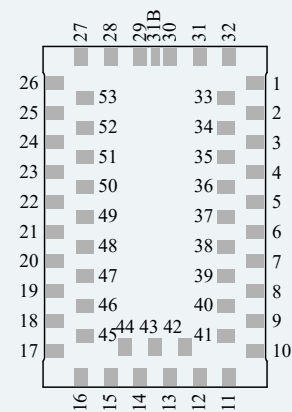
Top View



Bottom View



Top view — pins seen from top side



Bottom view — pins seen from bottom side

Pin List

Pin	Name	nRF52840 aQFN73 Pin/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	<u>Reset</u>	AC13/P0.18/ <u>RESET</u>	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	<u>VDD</u>	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.)

Pin	Name	nRF52840 aQFN73 Pin/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	VUSB	AD2/VBUS	5 V 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.)

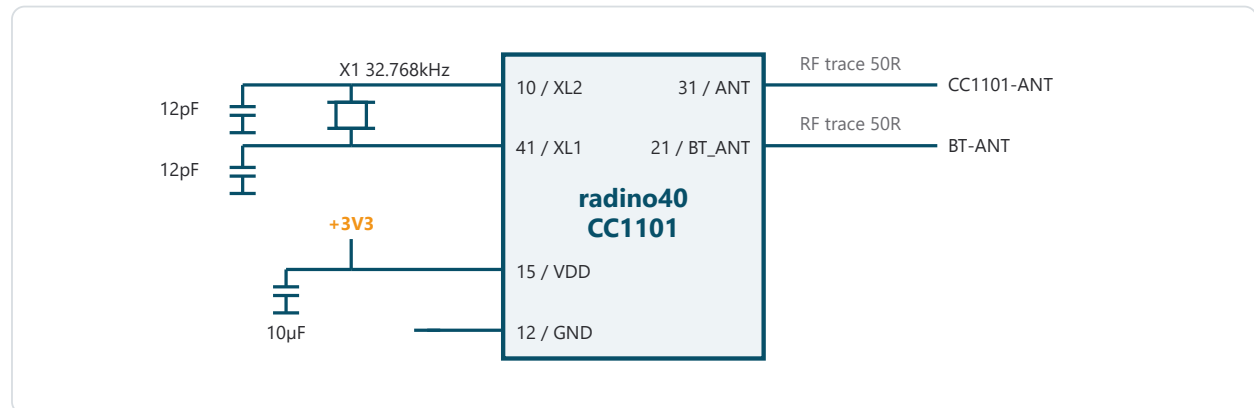
Interconnection

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

Signal Name	nRF52840 aQFN73 Pin/Name	CC1101 Port/Name	Description / Function
RF_SS	AD16/P0.20	7/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

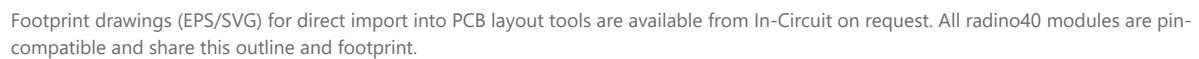
Internal biasing (see interconnection diagram, datasheet A001): 10 MΩ on the RF_SS net.

Application Circuit



Ref	Function
X1	Crystal, for RTC functionality (32.768 kHz, 2×12 pF)
X2	Power supply, 10 µF (min.) ceramic capacitor in parallel
BT-ANT	Bluetooth antenna (50 Ω RF trace)
CC1101-ANT	CC1101 antenna (50 Ω RF trace)

Module size **14.90 × 22.90 mm**, height **3.6 ± 0.15 mm**, fully shielded. The module is assembled like a standard SMT component — solderable in a regular reflow process using the recommended land pattern below. Pin 1 is marked on the module shield.



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

Rating	Min	Typ.	Max	Unit
Operating temperature	−40		85	°C
V_{DD}	1.8	3.3	3.6	V

DC Characteristics

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

Symbol	Rating	Min	Max	Unit
V_{IL}	Input low voltage	0	$0.3 V_{DD}$	V
V_{IH1}	Input high voltage	$0.7 V_{DD}$	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 Semiconductor nRF52840

$V_{CC} = 3.3\text{ V}$, $T_A = 25\text{ °C}$

Running mode	up to 10 mA
Stop mode	down to 0.4 μA

For details see manufacturers' datasheets.

Texas Instruments CC1101

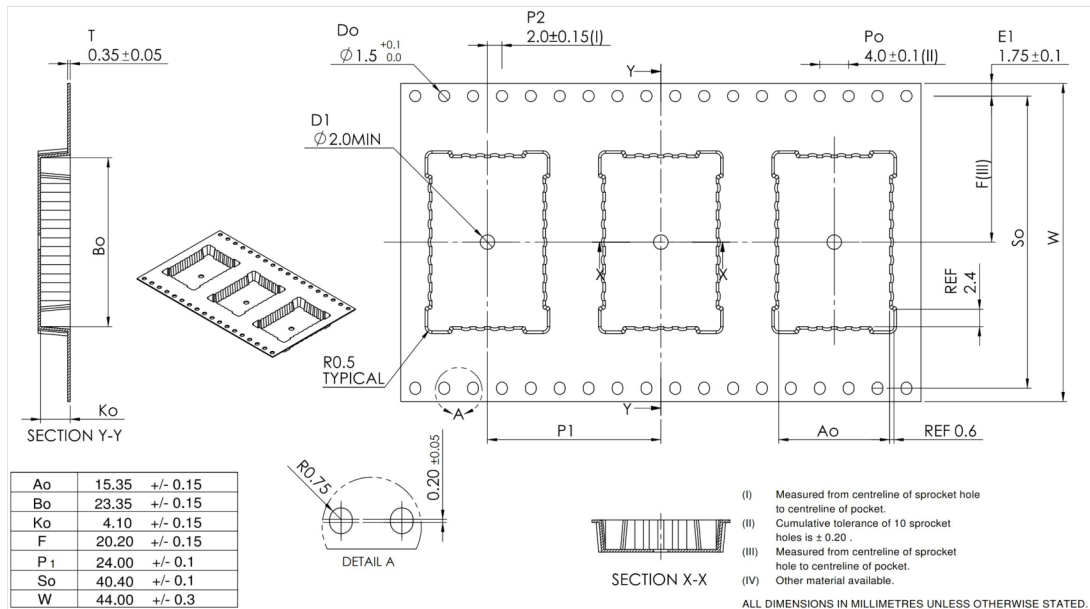
$V_{CC} = 3.0\text{ V}$, $T_A = 25\text{ °C}$

Condition	Typ.	Max	Unit
Power-down (SLEEP state, register values retained, all GDO pins programmed to 0x2F)	0.2	1	μA
IDLE state (voltage regulator to digital part and crystal oscillator running)	1.7	---	mA
Receive mode 868 MHz, 38.4 kBaud, optimized settings, input at sensitivity limit	15.6	---	mA
Receive mode 868 MHz, 38.4 kBaud, optimized settings, input well above sensitivity limit	14.6	---	mA
Transmit mode 868 MHz, +12 dBm output power	34.2	---	mA
Transmit mode 868 MHz, +10 dBm output power	29.2	---	mA
Transmit mode 868 MHz, 0 dBm output power	16.0	---	mA
Transmit mode 868 MHz, −6 dBm output power	13.1	---	mA
Transmit mode 915 MHz, +10 dBm output power	30.7	---	mA
Transmit mode 915 MHz, 0 dBm output power	17.2	---	mA
Transmit mode 915 MHz, −6 dBm output power	17.0	---	mA

Values from manufacturers' datasheets.

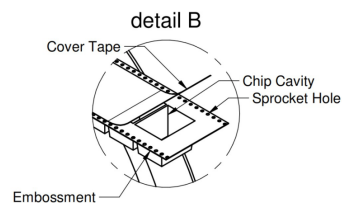
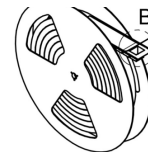
■ Packaging: Tape & Reel Specification

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



Tape specification (mm): A_o 15.35 · B_o 23.35 · K_o 4.10 · F 20.20 · P_1 24.00 · S_o 40.40 · W 44.00

Transport
direction
(Barcode to
the left)



Modules in tape and reel — transport direction: barcode to the left

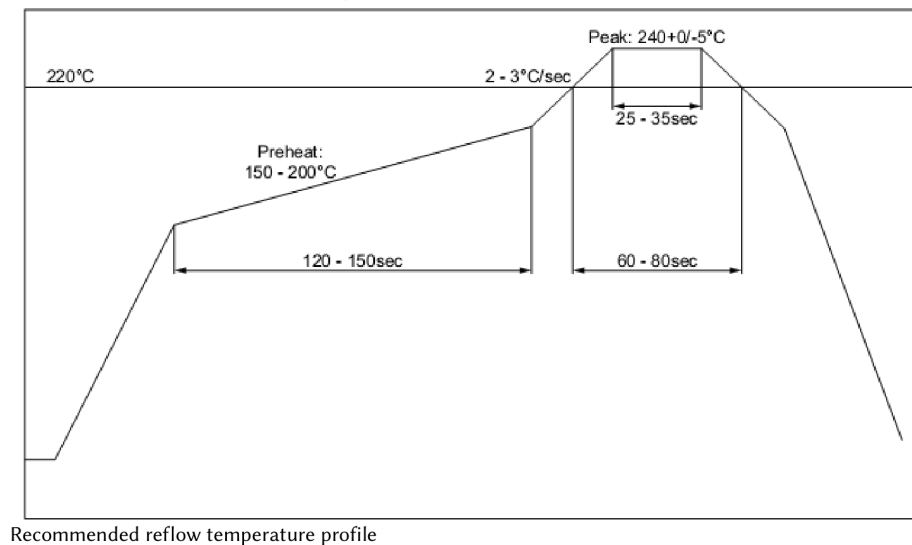
All modules of the radino40 family are pin-compatible and share the same outline dimensions, footprint and tape & reel packaging.

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 °C/sec
- ▶ Peak zone temperature of the module < 245 °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

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 868 MHz	901.614	1	Cut tape; reels 100 / 500

Recommended Accessories

Part	Ordering code	Note
Antenna 868 MHz, +3 dBi, 5 cm, male RP-SMA	303.290A001	Straight whip antenna
radino40 Spider RP-SMA	901.327E	Carrier/evaluation board (datasheet 305000 193A)

All radino modules are available online at www.in-circuit.de · SDK access and OEM/ODM engineering services on request.

Certifications



European RED Directive Statements

The radino40 CC1101 868 MHz 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

Get in Touch

In-Circuit Solutions GmbH

Boltenhagener Str. 124, D-01109 Dresden, Germany
www.in-circuit.de · sales@in-circuit.de

Revision History

Version	Date	Changes	Editor
A	2025/07/15	Initial version	Kormann
A002	2026/08/24	New layout; software & ecosystem section added	Träger