

Wireless Protocol Modules MiP Series

32001505CEU

Stand Alone LoRa™ Mipot

Data Sheet



Overview

The 32001505CEU is a transceiver operating in the 868 MHz SRD Band optimized for very long range, low power applications, suitable for LPWA networks. Based on LoRa® RF Technology, it provides ultra-long range spread spectrum communication and high interference immunity.

Thanks to its small LGA form factor (11.3 x 8.9 mm only) and its low current consumption, this module allows the implementation of highly integrated low power (battery operated) solutions for Internet of Things (IoT) applications, security systems, sensor networks, metering, smart buildings, agriculture, supply chain.

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I. Product Features

Mechanical highlights:

- ✓ Extremely compact dimensions (1 cm²)
- ✓ LGA pattern

Low power characteristics:

- ✓ End node average idle current consumption 108 μ A

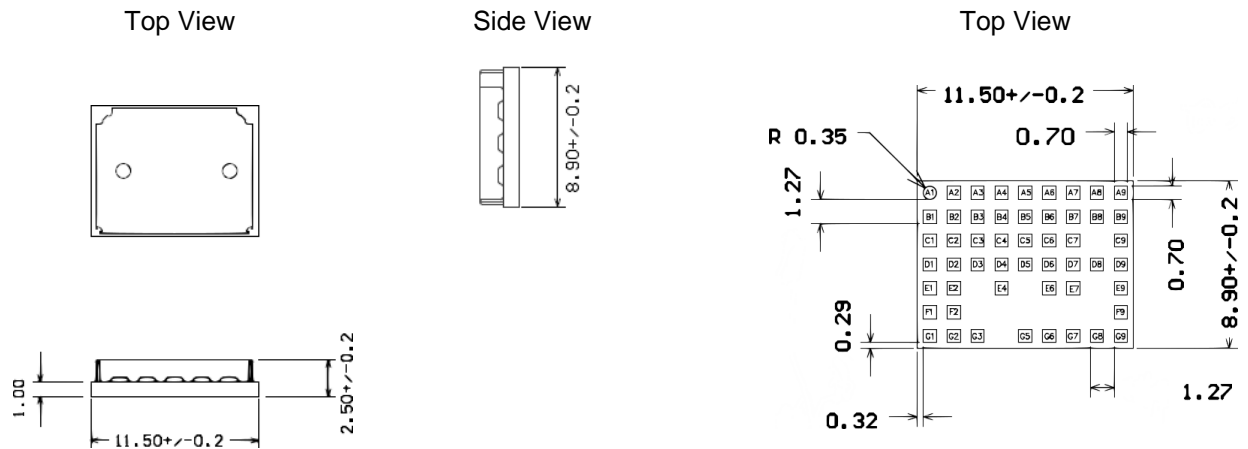
RF performances:

- ✓ -135 dBm sensitivity @LoRa®
- ✓ +14 dBm Output power

Protocol and interfaces:

- ✓ Smart peripheral interfaces selector (UART, LPUART, SPI, I²C)

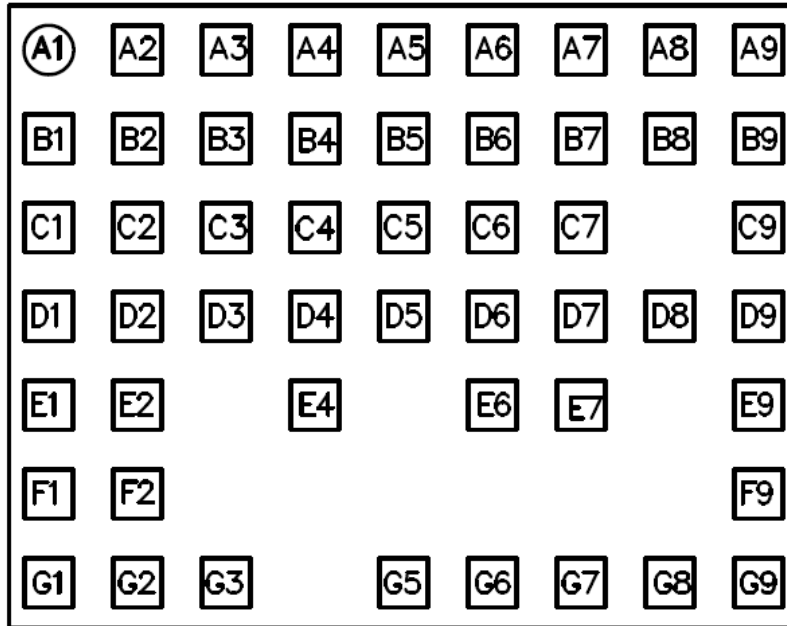
2. Mechanical Dimensions



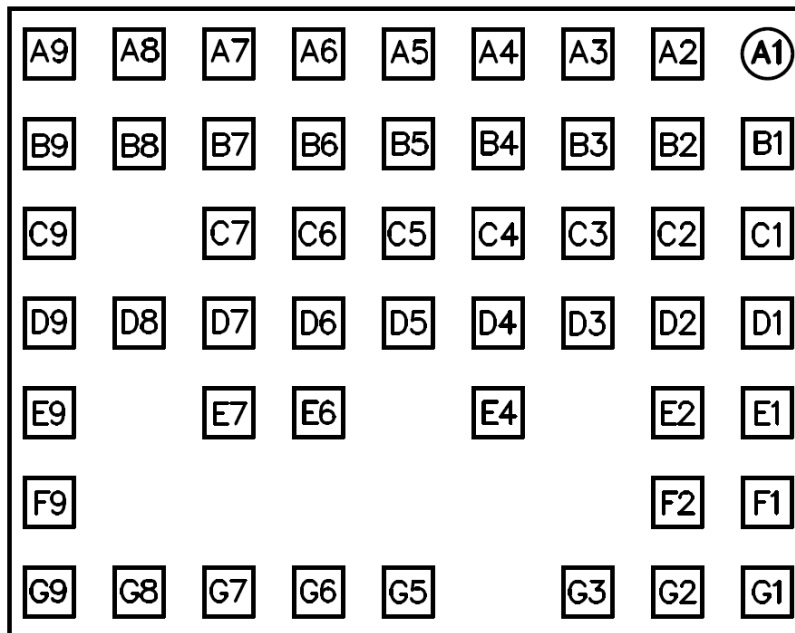
Note: all dimensions are in millimetres (mm)

3. Pinout

Top View



Bottom View



Pin	Name	Type	Pin	Name	Type
A1	SPI1_MISO	I/O	D1	GND	S
A2	SPI1_SCK	I/O	D2	NC	-
A3	SPI1_NSS	I/O	D3	NC	-
A4	LPUART1_TX	I/O	D4	GND	S
A5	LPUART1_RX	I/O	D5	NC	-
A6	SPI1_MOSI	I/O	D6	NC	-
A7	I2C1_SCL	I/O	D7	VBAT	S
A8	I2C1_SDA	I/O	D8	NC	-
A9	VDD	S	D9	SPI2_MISO	I/O
B1	NWAKE	I/O	E1	GND	S
B2	NDATAINDICATE	I/O	E2	GND	S
B3	USART2_TX	I/O	E4	NC	-
B4	USART2_RX	I/O	E6	NC	-
B5	USART1_TX	I/O	E7	NC	-
B6	USART1_RX	I/O	E9	SPI2_MOSI	I/O
B7	NC	-	F1	ANT	RF I/O
B8	VDDA	S	F2	GND	S
B9	VDD	S	F9	SPI2_NSS	I/O
C1	BOOT0	I/O	G1	GND	S
C2	NC	-	G2	GND	S
C3	NC	-	G3	GND	S
C4	GND	S	G5	NC	-
C5	NC	-	G6	NC	-
C6	NC	-	G7	NC	-
C7	VREF+	S	G8	NC	-
C9	GND	S	G9	SPI2_SCK	I/O

Note: NC means “do not connect”, leave the pin floating.

4. Electrical characteristics

4.1 Absolute Maximum Ratings

Parameter	Max.	Unit
Supply Voltage (VDD)	+3.9	V
Radio Frequency Input Level, pin FI	0	dBm
Voltage Standing Wave Ratio (VSWR) at RF Input, ANT, pin FI	10:1	
I/O Pin voltage	VDD + 0.3	V
Storage Temperature	-40 ÷ +100	°C
Operating Temperature	-40 ÷ +85	°C

4.2 Operating Conditions

GENERAL ELECTRICAL CHARACTERISTICS @ 25 °C

Parameter	Min.	Typ.	Max.	Unit	Notes
Supply Voltage (VDD)	+2.1	+3.0	+3.6	V	
VDDA	0	-	+3.6	V	
VBAT	+1.55	-	+3.6	V	
VIN	-0.3	-	VDD + 0.3	V	
Sleep DC Current	-	2.2	-	µA	

RECEIVER ELECTRICAL CHARACTERISTICS @ 25 °C

Parameter	Min.	Typ.	Max.	Unit	Notes
DC Current Drain	-	-	11	mA	5
Operating Frequency	868.1	-	868.5	MHz	
Channel Frequency Precision	-	±15	-	kHz	
Sensitivity, LoRa®	-	-135	-	dBm	2,3,4
Image Frequency Rejection	-	54	-	dB	6
Spurious radiated level	-	-	-57	dBm	
Data Rate LoRa®	0.25	-	11	kbit/s	
Output Logic Low	GND	-	0.05	V	
Output Logic High	VDD - 0.2	-	VDD	V	

TRANSMITTER ELECTRICAL CHARACTERISTICS @ 25 °C

Parameter	Min.	Typ.	Max.	Unit	Notes
Current Drain (CW @14dBm)	-	103	-	mA	1,2
Operating frequency	868.1	-	868.5	MHz	
Occupied Bandwidth LoRa®	125		250	kHz	
Operating Channel Width LoRa®		200		kHz	
Maximum Output power (on 50 Ω load)	-	14	-	dBm	1,2,7
RF Output Impedance	-	50	-	Ω	
Data Rate LoRa®	0.25	-	11	kbit/s	
Input Logic Low	GND	-	0.05	V	
Input Logic High	VDD - 0.2	-	VDD	V	

4.2.1 Notes:

Note 1: VDD = 3.6 V.

Note 2: All RF parameters measured with input (pin FI, ANT) connected to 50 Ω impedance signal source or load.

Note 3: LoRa® PER (packet error rate) = 1 %, packet of 64 bytes, preamble of 8 bytes, error correction code CR = 4/5, CRC on payload enabled, no reduced encoding, no implicit header

Note 4: Sensitivities given using highest LNA gain step.

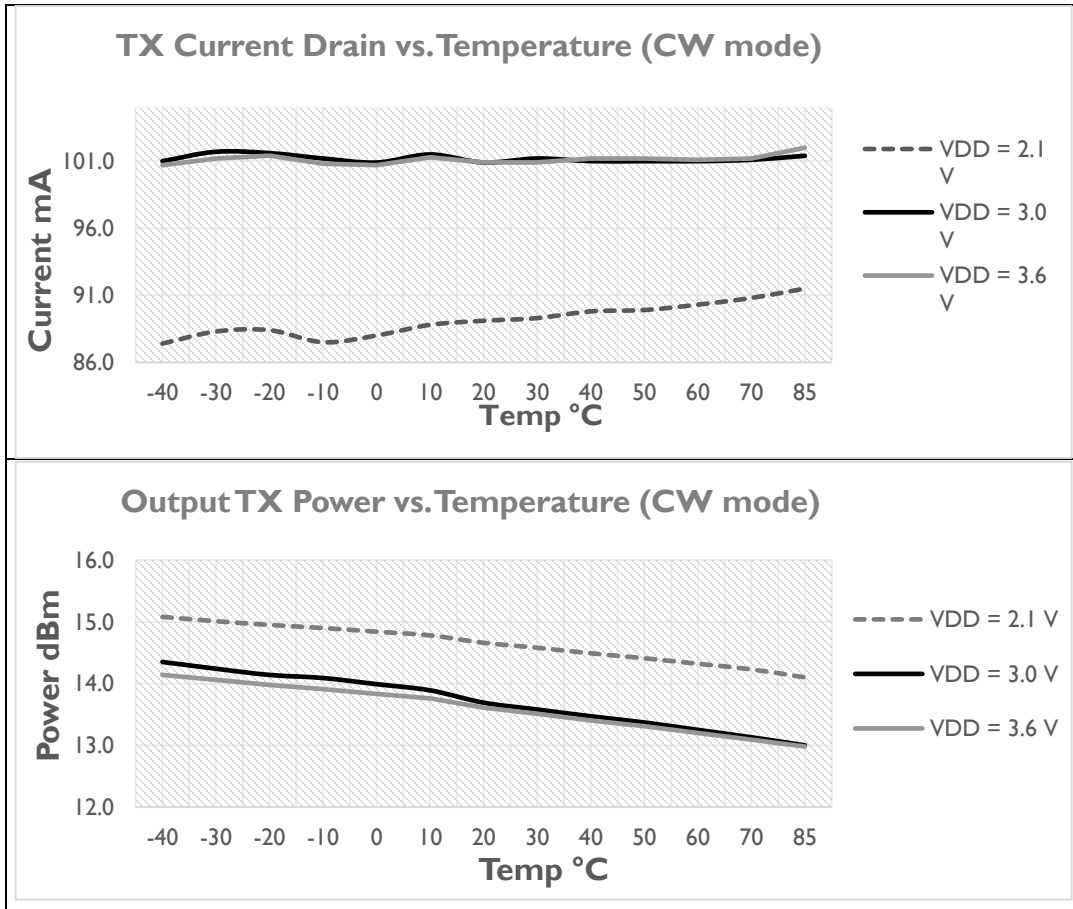
Note 5: Power consumption measured with -140 dBm signal and AGC ON.

Note 6: Blocking immunity, ACR and co-channel rejection, given for a single tone interferer and referenced to sensitivity +6 dB, blocking tests performed with unmodulated signal measured as per ETSI 300 220-1.

Note 7: In order to not exceed the maximum power permitted by the ETSI EN 300 220 regulation, choose an appropriate antenna system and power supply.

4.3 Temperature Range Curves

Note: All RF parameters measured with input (pin 3) connected to a 50 Ω impedance signal source or load.



5. Application Notes

Title	Description	Doc
Command Reference Manual	Description of all commands	32001505DEU_Com_Ref
Manufacturing Process Information for LGA MiP Series Modules	Packaging information, Tape & Reel Specification, Reflow soldering information	AN_MNF002

6. Ordering Information

Part Number	Description	Region
32001505CEU	MiP-LoMi-IC128N-EU	Europe

7. Regulatory Approvals

Doc	Title	Description
DoC
CE Approval

8. Revision History

Revision	Date	Description
0.1	14.05.2021	Preliminary
1.0	15.11.2021	- Added Top View - Removed 2-FSK modulation scheme