WUM
SMART METERING

WIRELESS UNIVERSAL MULTI-MESH SMART METERING

WUM controller is a multifunctional wireless IoT controller with internal configurable logic and Multi-Mesh function, designed for remote data acquisition, monitoring and control.

Diverse smart measuring instruments, metering devices, as well as control and management devices can be easily connected through physical parallel connection.

Based on the necessity or task, the controller can be produced in various configurations - as converter, hub, gateway or a controlled device. It is able to work both as a separate installation as well as within mesh network systems, interacting with other related IoT controllers.

The main area of application - in Automated Systems of Commercial Accounting of Energy and Power (ASCAPC), as well as in SCADA systems, as a basic integrated component for supervisory control and data acquisition.

ARCHITECTURE

COMPONENTS

WIFI

For WiFi connectivity a ESP32-WROOM-32UE is used.

- 2.4 GHz WiFi + Bluetooth ® + Bluetooth LE module
- Built around ESP32 series of SoCs, Xtensa® dualcore 32bit LX6 microprocessor
- 4/8/16 MB flash available
- 26 GPIOs, rich set of peripherals
- With external antenna connector.

CPU & Memory				Peripherals			Operating Temperature Range	Antenna	Module Dimensions (mm)	Pins	Wi-Fi Protocol	Bluetooth Protocol
Core	Core clock max freq.	Flash (MB)	PSRAM (MB)	Interfaces	Touch Sensor	Hall Sensor						
ESP32-D0WD-V3	240 MHz	4,8,16	N/A	SD card, UART, SPI, SDIO, I2C, LED PWM, Motor PWM, I2S, IR, pulse counter, GPIO, capacitive touch sensor, ADC, DAC	Yes	Yes	-40°C ~ +85/ 105°C	PCB / IPEX	18×25.5 ×3.1 / 18×19.2 ×3.2	38	802.11 b/g/n (802.11n up to 150 Mbps), 2.4 GHz	Bluetooth V4.2 BR/EDR, Bluetooth LE specification

FEATURES

CPU AND ONCHIP MEMORY

- ESP32-D0WD-V3 or ESP32-D0WDR2-V3 embedded, Xtensa dual-core 32-bit LX6 microprocessor, up to 240 MHz
- 448 KB ROM
- 520 KB SRAM
- 16 KB SRAM in RTC
- ESP32-D0WDR2-V3 also provides 2 MB PSRAM

WIFI

- 802.11b/g/n
- Bit rate: 802.11n up to 150 Mbps
- A-MPDU and A-MSDU aggregation
- 0.4 µs guard interval support
- Center frequency range of operating channel: 2412 ~ 2484 MHz

BLUETOOTH

- Bluetooth V4.2 BR/EDR and Bluetooth LE specification
- Class-1, class-2 and class-3 transmitter
- AFH
- CVSD and SBC

PERIPHERALS

- SD card, UART, SPI, SDIO, I2C, LED PWM, Motor PWM, I2S, IR, pulse counter, GPIO, capacitive touch sensor, ADC, DAC, TWAI® (compatible with ISO 11898-1, i.e. CAN Specification 2.0)

INTEGRATED COMPONENTS ON MODULE

- 40 MHz crystal oscillator
- 4/8/16 MB SPI flash

ANTENNA OPTIONS

- ESP32-WROOM-32UE: external antenna via a connector

OPERATING CONDITIONS

- Operating voltage/Power supply: 3.0 ~ 3.6 V
- Operating ambient temperature:
  – 85 °C version: –40 ~ 85 °C
  – 105 °C version: –40 ~ 105 °C. Note that
  only the modules embedded with a 4/8 MB flash support this version

CERTIFICATION

- Bluetooth certification: BQB
- RF certification: See certificates for ESP32-WROOM-32UE -
- Green certification: REACH/RoHS

RELIABILITY TEST

- HTOL/HTSL/uHAST/TCT/ESD

LoRa

LoRa connectivity is ensured by Cansec Wireless LR1262NA-A SEMTECH SX1262.

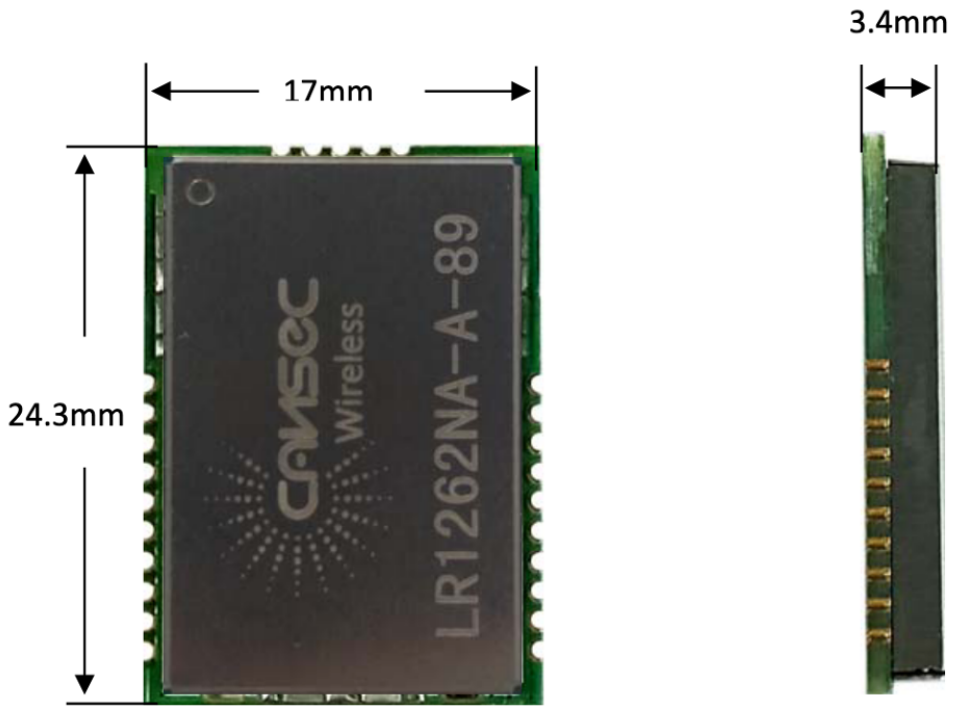
DESCRIPTION

The LR1262 module is designed based on SX1262. SX1262 sub-GHz radio transceivers are ideal for long range wireless applications. These devices support LoRa® modulation for LPWAN use cases and (G) FSK modulation for legacy use cases. The devices are highly configurable to meet different application requirements utilizing the global LoRaWAN® standard or proprietary protocols.

The devices are designed to comply with the physical layer requirements of the LoRaWAN™ specification released by the LoRa Alliance™.

The radio is suitable for systems targeting compliance with radio regulations including but not limited to ETSI EN 300 220, FCC CFR 47 Part 15, China regulatory requirements and the Japanese ARIB T-108. Continuous frequency coverage from 150 MHz to 960 MHz allows the support of all major sub-GHz ISM bands around the world.

MECHANICAL DRAWING
LR1262NA-A-XX



MODULE NAME INFORMATION

Module Type	LoRa
Chip Type	Sx1262
Antenna Type	NA: No Antenna
PCB Version	A: TCXO Crystal
	B: Crystal
Frequency	868 MHz
	915 MHz

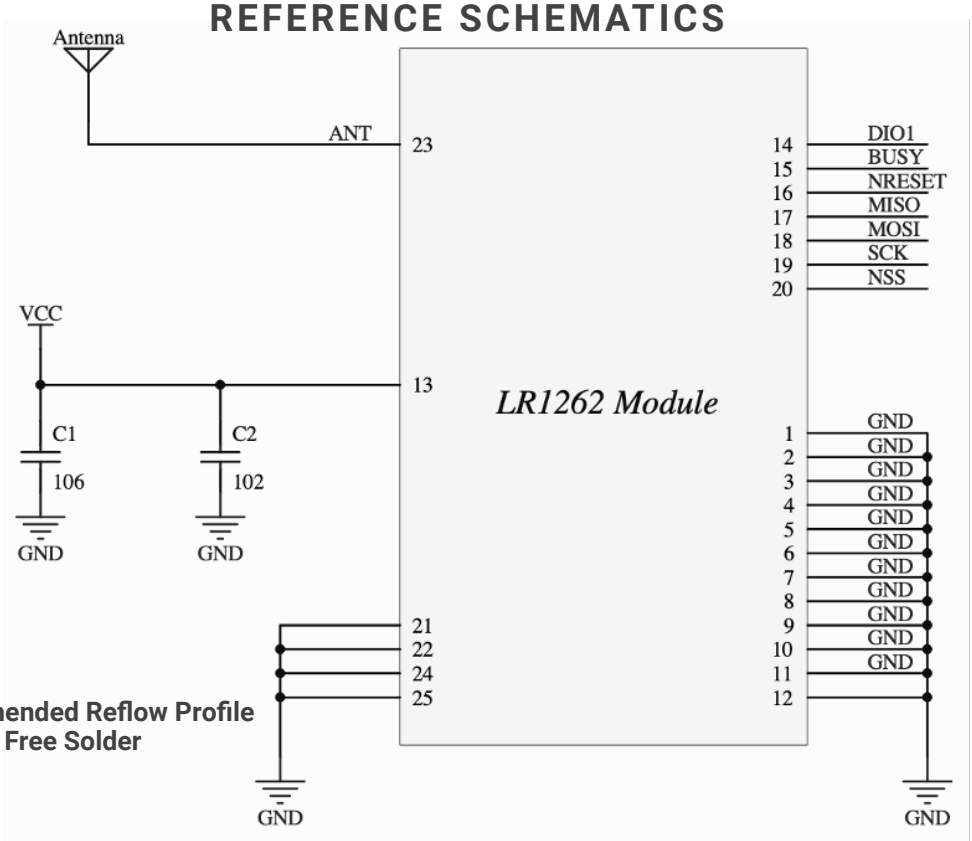
TERMINAL DESCRIPTION

Pad Number	Name	Pin Type	Description
1-12	GND	Ground Pin	Connect to GND
13	VDD	POWER	1.8V to 3.7V main chip supply
14	DIO1	I/O	Multi-purpose digital IO
15	BUSY	O	Busy indicator
16	NRESET	I	Reset trigger input
17	MISO	O	SPI slave output
18	MOSI	I	SPI slave input
19	SCK	I	SPI clock
20	NSS	I	SPI Slave Select
21	GND	Ground Pin	Connect to GND
22	GND	Ground Pin	Connect to GND
23	RF_OUT	O	RF transmitter output
24	GND	Ground Pin	Connect to GND
25	GND	Ground Pin	Connect to GND

FEATURES

- LoRa and FSK Modem
- 170 dB maximum link budget
- Wide-Supply Voltage: VBAT:1.8 to 3.6V
- RF output up to +20 dBm
- Programmable bit rate up to 62.5 kbps
  LoRa and 300 kbps FSK
- Integrated DC-DC converter and LDO
- High sensitivity: down to -148 dBm
- 88 dB blocking immunity at 1 MHz offset
- Co-channel rejection of 19 dB in LoRa mode
- Fully integrated synthesizer with a resolution of 61 Hz
- FSK, GFSK, MSK, GMSK and LoRa modulation

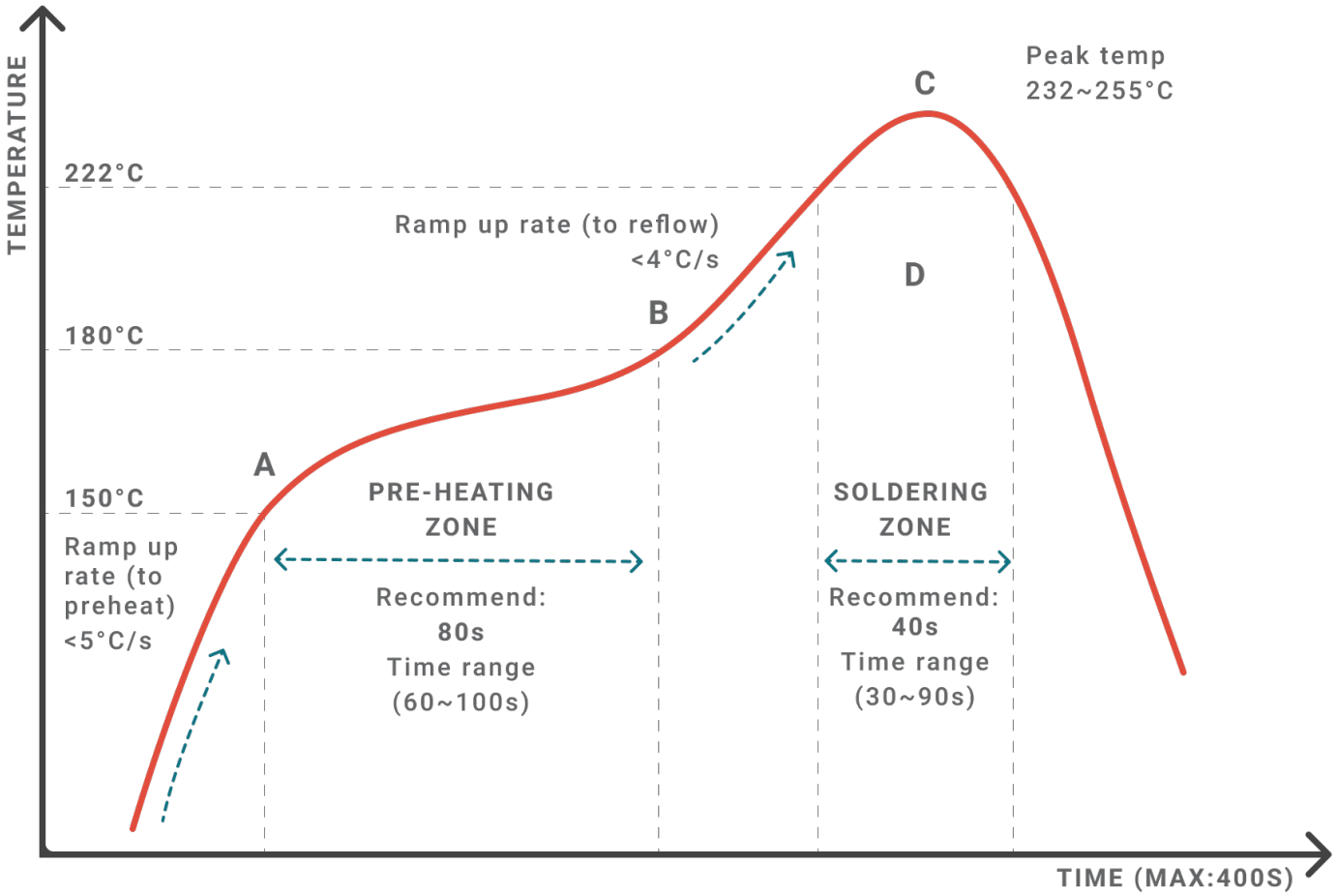
REFERENCE SCHEMATICS



Recommended Reflow Profile for Lead Free Solder

APPLICATIONS

- Smart meters
- Supply chain and logistics
- Building automation
- Agricultural sensors
- Smart cities
- Retail store sensors
- Asset tracking
- Street lights
- Parking sensors
- Environmental sensors
- Healthcare
- Safety and security sensors
- Remote control applications
- Built-in bit synchronizer for clock recovery
- Automatic Channel Activity Detection (CAD) with ultra-fast AFC
- Regular crystals and TXCO crystals are optional
- Preamble detection
- Package and Operating Conditions:
  3.4 mm Pitch, 17 mm×24.3mm Stamp
  Package for Easy Assembly and
  Low-Cost PCB Design
- Operating Temperature Range: -40°C to +85°C



SPECIFICATIONS

Parameter		Min	Typ	Max	Unit
Operating Voltage		1.8	-	3.7	V
Operating Temperature		-40	-	+85	°C
Current Consumption	Sleep Mode	-	1.5	-	uA
	Receive mode(@LDO mode)	-	12	-	mA
	Transmit Mode	-	120	-	mA
TX Power (For Carrier)		-	19	20	dBm
RX Sensitivity (For Lora Modulation)		-	-	-148	dBm
Distance		3K			m

LTE

For LTE a A7670C module is used

Standard	Frequency	A7670C
GSM	GSM850MHz	
	EGSM900MHz	✓
	DCS1800MHz	✓
	PCS1900MHz	
LTE-FDD	LTE-FDD B1	✓
	LTE-FDD B2	
	LTE-FDD B3	✓
	LTE-FDD B4	
	LTE-FDD B5	✓
	LTE-FDD B7	
	LTE-FDD B8	✓
	LTE-FDD B20	
	LTE-FDD B28	
	LTE-FDD B66	
LTE-TDD	LTE TDD B34	✓
	LTE TDD B38	✓
	LTE TDD B39	✓
	LTE TDD B40	✓
	LTE TDD B41	✓
Category		CAT1

HARDWARE INTERFACE LIST

Interface	A7670C
Power input	✓
USB2.0	✓
Full function serial port	✓
Ordinary serial port	✓
DEBUG serial port	✓
USIM	✓
GPIO	✓
ADC	1
Power output	✓
PCM	✓
I2C	✓
USB_BOOT	✓
NETLIGHT indication	✓
STATUS indication	✓
Antenna	✓

GPRS GSM MODULE SIM800L

SIM800L is a miniature cellular module which allows for GPRS transmission, sending and receiving SMS and making and receiving voice calls. Low cost and small footprint and quad band frequency support make this module perfect solution for any project that require long range connectivity. After connecting power module boots up, searches for cellular network and login automatically. On board LED displays connection state (no network coverage - fast blinking, logged in - slow blinking).

NOTICE: Be prepared to handle huge power consumption with peek up to 2A. Maximum voltage on UART in this module is 2.8V. Higher voltage will kill the module.

This module has two antennas included. First is made of wire which solders directly to NET pin on PCB very useful in narrow places. Second is PCB antenna with double sided tape and attached pigtail cable with IPX connector. This one has better performance and allows to put your module inside a metal case as long the antenna is outside.

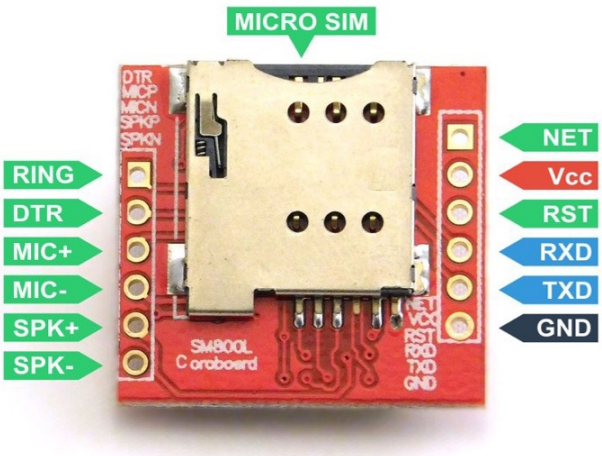
SPECIFICATION

Supply voltage	3.8V - 4.2V
Recommended supply voltage	4V
Power consumption	sleep mode < 2.0mA
	idle mode < 7.0mA
GSM transmission (avg)	350 mA
GSM transmission (peek)	2000mA
Module size	25 x 23 mm
Interface	UART (max. 2.8V) and AT commands
SIM card socket	microSIM (bottom side)
Supported frequencies	Quad Band (850/950/1800/1900 MHz)
Antenna connector	IPX
Status signaling	LED
Working temperature range	-40 do + 85 ° C

SET INCLUDES

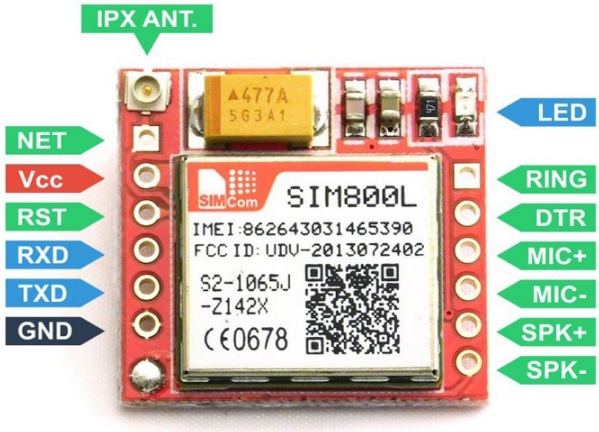
- SIM800L module
- Goldpin headers
- Wire antenna
- PCB antenna with pigtail and IPX connector

MODULE PINOUT



PINOUT (BOTTOM SIDE - LEFT)

- RING (not marked on PBC, first from top, square) - LOW state while receiving call
- DTR - sleep mode. Default in HIGH state (module in sleep mode, serial communication disabled). After setting it in LOW the module will wake up.
- MICP, MICN - microphone (P+/N-)
- SPKP, SPKN - speaker (P+/N-)



PINOUT (BOTTOM SIDE - RIGHT)

- NET - antenna
- VCC - supply voltage
- RESET - reset
- RXD - serial communication
- TXD - serial communication
- GND - ground

KEY FEATURES

DESCRIPTION

- Wireless solution
- Supports different protocols and producers
- Hybrid solution – WiFi Mesh + LoRa Mesh
- Data acquisition from smart electricity and water meters

USAGE

Data acquisition from smart electricity and water meters using DLMS, IEC 62056-21, Modbus protocols

ADVANTAGES

- Easy to install, deploy and use
- No need to replace the existent meters
- No rigid dependence on new producers
- Multi-Mesh technology widens the coverage and cuts down the number of gateways (more coverage – less gateways)
- Best price/performance solution

ENHANCED CAPABILITIES

- 2 RS-485 interfaces for smart-meters connection – up to 32 meters per each interface
- Protocols supported DLMS, IEC 62056-21, Modbus – 2 ports for impulse counting
- WLAN connection – WiFi Mesh
- WAN connection – LoRa Mesh for WUM Concentrator
- WAN connection – LTE for WUM Gateway

PRODUCT LINE OF IOT WUM CONTROLLERS

- WUM Converter - Wi-Fi Mesh
- WUM Concentrator - WiFi Mesh + LoRa Mesh
- WUM Gateway - WiFi Mesh + LoRa Mesh + LTE

WUM
SMART METERING

CONTACTS

iDomus Company S.R.L.

https://idomus.company

info@idomus.company