# MGBOT®

Technical data sheet for microcontroller based board IOTIK 32B.
Rev 1.0 - October 2019.

Description

Microcontroller board IOTIK 32B based on Espressif ESP32 microcontroller module with built-in Wi-Fi and Bluetooth.

This allows to implement various IoT projects without using of additional modules for connecting to these platforms. The controller is compatible with various expansion cards for Arduino, which allows you to connect a wide range of sensors and actuators.

Additionally it has a slot for a micro SD memory card, an external power button, and an IR receiver.
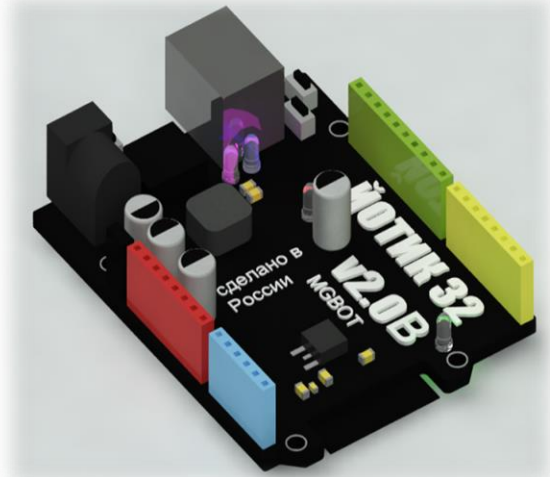
Technical specifications

Parameter	Value, range, or list
Microcontroller module	ESP32 (ESP-WROOM-32)
Built-in CPU	Tensilica Xtensa LX6
CPU capacity	32-bit
Number of CPU cores	2
CPU frequency	80 … 240 MHz
Built-in ROM	448 kb (bootloader and core functions)
Built-in RAM	520 kb (data and instructions)
Built-in RTC FAST RAM	8 kb
Built-in RTC SLOW RAM	8 kb
Built-in eFuse memory	1 kbit
Built-in Flash memory	4 Mb
Additional co-processor	ULP (ultra low power co-processor)
Wi-Fi	802.11 b/g/n
Max. speed	150 MBps
Frequency range	2.4 … 2.5 GHz
Bluetooth	Class-1, 2, 3; v4.2 BR/EDR и BLE
Max. speed	4 Mbps

Audio codecs	CVSD, SBC
Built-in sensors	Hall sensor
Digital I/O pins	14 + 4 with ADC
ADC type	SAR
ADC resolution	12-bit
Analog input pins	6
Analog output pins	2 (optional)
DAC resolution	8-bit
UART	Three (two are marked on the board, any pins can be used)
I^2C	Two (one is marked on the board, any pins can be used)
SPI	Four (one is marked on the board, any pins can be used)
I^2S	Two (any pins can be used)
PWM	Any pins can be used
Memory card interface	Micro SD, 4-bit mode, up to 64 GB
IR receiver	38 kHz
USB power	5 V
External power	8 … 30 V
Power on/off control	Using the button, it is possible to turn on / off an external power supply of 8 ... 30 V, it does not affect USB power
Max. power consumption from USB	1 A
Max. load on built-in board voltage regulator (5 V)	5 A
Max. load on built-in board voltage regulator (3.3 V)	1 A
Power protection	Reverse polarity, short circuit protection
Operating temperature range	-40 … +85 ºC
Board dimension	68.6 x 53.3 x 15.8 mm
Diameter of mounting holes	Ø 3.2 mm

Connectors, ports and pins definitions

Pin	Function	Input/output voltage	Default state	Additional features
J1.REF/5V	Power 5 V input or output	5 V	5 V, depends on function	a) It can be used as an input to power the controller board with a voltage of 5 V b) It can be used as a 5V output when the board is powered from USB (max. 1 A) c) It can be used as a 5 V output

				when the board is powered from an external source of 8 ... 30 V (max. 5 A)
J1.EN	EN input of ESP32	0 / 3.3 V	Input, 3.3 V pull-up resistor	Can be used to reset the controller
J1.3.3V	Power output 3.3 V	3.3 V	Output, 3.3 V	It can be used as an output of the built-in voltage regulator 3.3 V (max. 1 A)
J1.5V	Power 5 V input or output	5 V	5 V, depends on function	a) It can be used as an input to power the controller board with a voltage of 5 V b) It can be used as a 5V output when the board is powered from USB (max. 1 A) c) It can be used as a 5 V output when the board is powered from an external source of 8 ... 30 V (max. 5 A)
J1.GND	GND	0 V	0 V	Ground, 0 V potential, must always be connected to GND pins of other devices
J1.GND	GND	0 V	0 V	Ground, 0 V potential, must always be connected to GND pins of other devices
J1.VIN	External power 8...30 V input or output	8 … 30 V	Input, 8 … 30 V	Connected to the central terminal of the DC2.1 power socket, a voltage in the range of 8 ... 30 V can be connected
J2.A18 (J2.25)	a) Analog input A18 b) Digital I/O pin GPIO25	0 / 3.3 V - digital I/O mode 0 ... 5 V - analog input mode	Input, 0 V	Connected to the ESP32 controller via a resistive voltage divider, input resistance 138 kOhm, it is possible to short-circuit the voltage divider resistor and directly output the controller port as digital I/O with a logic voltage of 3.3V maximum
J2.A19 (J2.26)	a) Analog input A19 b) Digital I/O pin GPIO26	0 / 3.3 V - digital I/O mode 0 ... 5 V - analog input mode	Input, 0 V	Connected to the ESP32 controller via a resistive voltage divider, input resistance 138 kOhm, it is possible to short-circuit the voltage divider resistor and directly output the controller port as digital I/O with a logic voltage of 3.3V maximum
J2.A4 (J2.32)	a) Analog input A4 b) Digital I/O	0 / 3.3 V - digital I/O mode 0 ... 5 V - analog	Input, 0 V	Connected to the ESP32 controller via a resistive voltage divider, input resistance 138

	pin GPIO32	input mode		kOhm, it is possible to short-circuit the voltage divider resistor and directly output the controller port as digital I/O with a logic voltage of 3.3V maximum
J2.A5 (J2.33)	a) Analog input A5 b) Digital I/O pin GPIO33	0 / 3.3 V - digital I/O mode 0 ... 5 V - analog input mode	Input, 0 V	Connected to the ESP32 controller via a resistive voltage divider, input resistance 138 kOhm, it is possible to short-circuit the voltage divider resistor and directly output the controller port as digital I/O with a logic voltage of 3.3V maximum
J2.A6 (J2.34)	a) Analog input A6 b) Digital input GPIO34	0 … 5 V	Input, 0 V	Connected to the ESP32 controller via a resistive voltage divider, input resistance 138 kOhm
J2.A7 (J2.35)	a) Analog input A7 b) Digital input GPIO35	0 … 5 V	Input, 0 V	Connected to the ESP32 controller via a resistive voltage divider, input resistance 138 kOhm
J3.RXD (J3.3)	a) RXD input of UART0 b) Digital I/O pin GPIO3	0 / 5 V	Input, 5 V pull-up resistor	It is recommended not to use it as an I/O port and do not connect anything to it, as it is used for programming and debugging the controller
J3.TXD (J3.1)	a) TXD output of UART0 b) Digital I/O pin GPIO1	0 / 5 V	Input, 5 V pull-up resistor	It is recommended not to use it as an I/O port and do not connect anything to it, as it is used for programming and debugging the controller
J3.21 (J3.SDA)	a) Digital I/O pin GPIO21 b) SDA signal of I^2C	0 / 5 V	Input, 5 V pull-up resistor	General-purpose digital I/O port, I^2C interface, PWM output
J3.22 (J3.SCL)	a) Digital I/O pin GPIO22 b) SCL signal of I^2C	0 / 5 V	Input, 5 V pull-up resistor	General-purpose digital I/O port, I^2C interface, PWM output
J3.16 (J3.RX2)	a) Digital I/O pin GPIO16 b) RXD signal of UART2	0 / 5 V	Input, 5 V pull-up resistor	General-purpose digital I/O port, UART interface, PWM output
J3.17 (J3.TX2)	a) Digital I/O pin GPIO17 b) TXD signal of UART2	0 / 5 V	Input, 5 V pull-up resistor	General-purpose digital I/O port, UART interface, PWM output

J3.4	Digital I/O pin GPIO4	0 / 5 V	Input, 5 V pull-up resistor	General-purpose digital I/O port, PWM output
J3.13	Digital I/O pin GPIO13	0 / 5 V	Input, 5 V pull-up resistor	General-purpose digital I/O port, PWM output
J4.14	Digital I/O pin GPIO14	0 / 5 V	Input, 5 V pull-up resistor	General-purpose digital I/O port, PWM output
J4.15	Digital I/O pin GPIO15	0 / 5 V	Input, 5 V pull-up resistor	General-purpose digital I/O port, PWM output
J4.5 (J3.SS)	a) Digital I/O pin GPIO5 b) SS signal of SPI	0 / 5 V	Input, 5 V pull-up resistor	General-purpose digital I/O port, SPI interface, PWM output
J3.23 (J3.MOSI)	a) Digital I/O pin GPIO23 b) MOSI signal of SPI	0 / 5 V	Input, 5 V pull-up resistor	General-purpose digital I/O port, SPI interface, PWM output
J4.19 (J3.MISO)	a) Digital I/O pin GPIO19 b) MISO signal of SPI	0 / 5 V	Input, 5 V pull-up resistor	General-purpose digital I/O port, SPI interface, PWM output
J4.18 (J3.SCK)	a) Digital I/O pin GPIO18 b) SCK signal of SPI	0 / 5 V	Input, 5 V pull-up resistor	General-purpose digital I/O port, SPI interface, PWM output
J4.GND	GND	0 V	0 V	Ground, 0 V potential, must always be connected to GND pins of other devices
J3.SDA (J3.21)	a) Digital I/O pin GPIO21 b) SDA signal I^2C	0 / 5 V	Input, 5 V pull-up resistor	General-purpose digital I/O port, I^2C interface, PWM output
J4.SCL (J3.22)	a) Digital I/O pin GPIO22 b) SCL signal of I^2C	0 / 5 V	Input, 5 V pull-up resistor	General-purpose digital I/O port, I^2C interface, PWM output
USB connector	a) USB power supply 5V b) Controller programming via USB	5 V	*	*
DC2.1 power connector	External power supply 8 … 30 V	8 … 30 V	*	*

Micro SD card slot	Micro SD card slot	*	*	*

Buttons and LEDs definitions

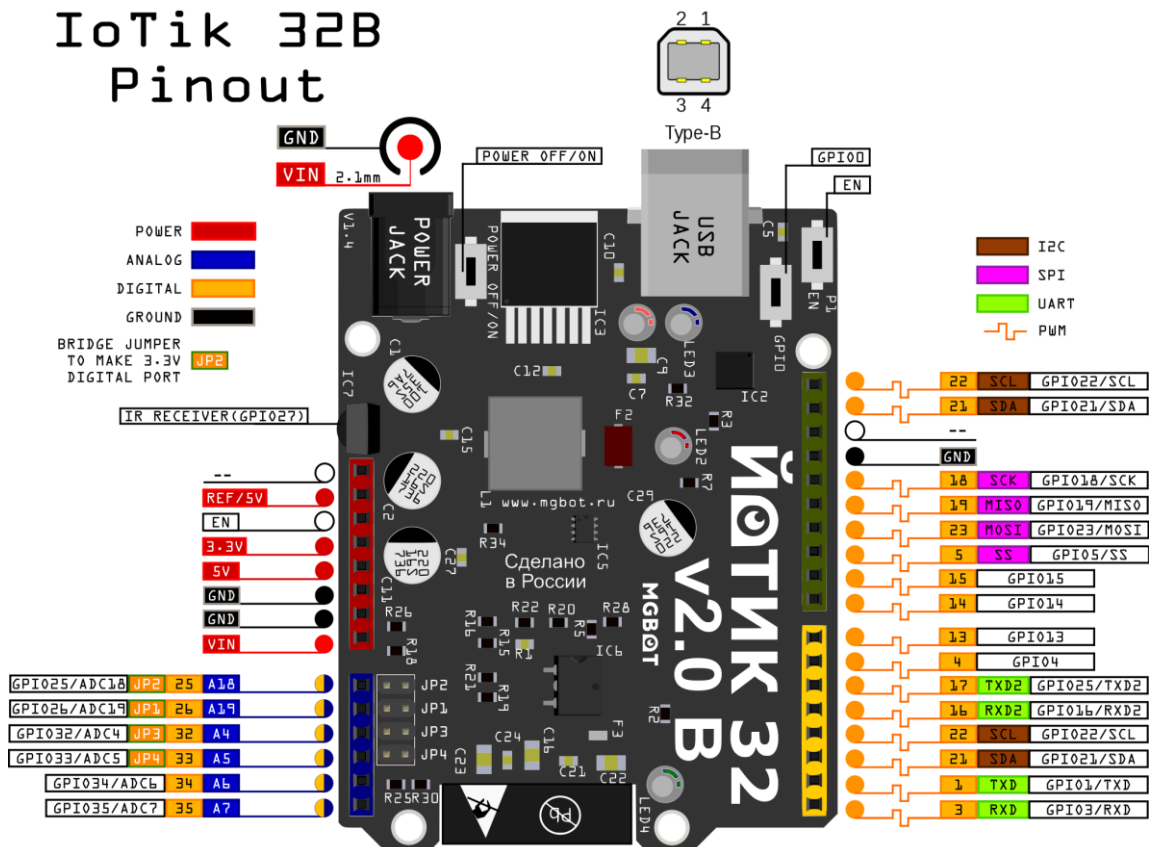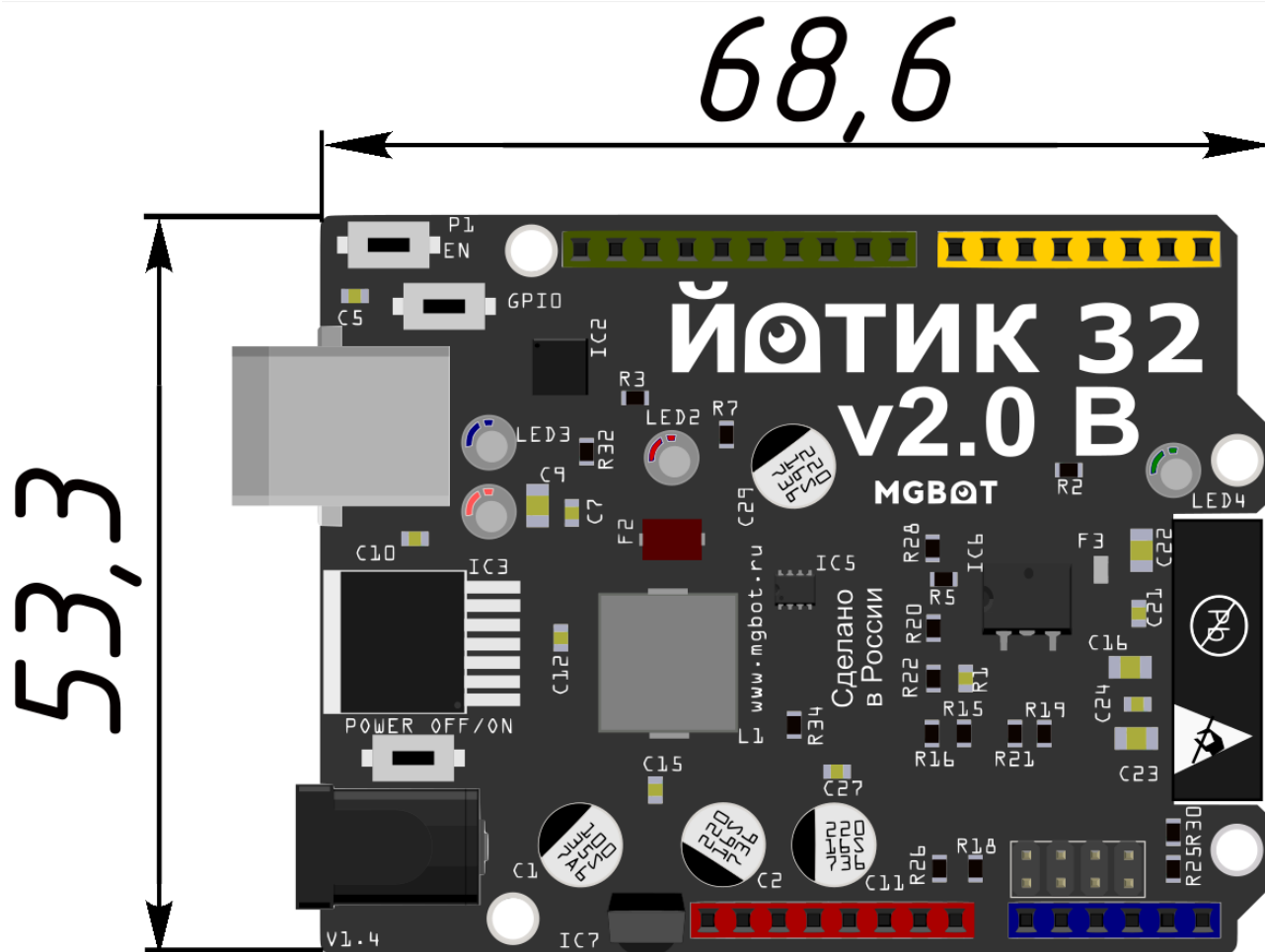| Symbol	Function	LED color	Features
Button P1 (EN)	Used to reset the controller by setting a logical "0" at EN input	*	*
Button P2 (GPIO0)	Together with the P1 button puts the controller into programming mode by setting a logical "0" at the GPIO0 input	*	In the Arduino IDE controller is switched to the mode of receiving the program code automatically via the USB port
Button P3 (POWER OFF/ON)	A short press on the button turns on or off the power supply to the controller board from an external power supply of 8 ... 30 V	*	Initial State — Power Off
Light-emitting diode LED1	Lights up when 5 V power is supplied via the USB port	Blue	*
Light-emitting diode LED2	Lights up when power is supplied from an external source of 8 ... 30 V	Red	*
Light-emitting diode LED3	Controlled via GPIO18 I/O port in normal output or PWM mode	Pink	*
Light-emitting diode LED4	Lights up when 3.3 V power is supplied to the ESP32	Green	*
IR receiver	Connected to GPIO27 I/O Port	*	*

IOTIK 32B components

TOP VIEW

EN(RESET)
GPIO0
LED3 (GPIO18 INDICATOR)
LED1 (USB POWER INDICATOR)
POWER ON/OFF
POWER (8...30V)
IR RECEIVER (GPIO27)

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v2.0 B
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LED1 (EXTERNAL POWER INDICATOR)
LED4 (3.3V INDICATOR)

PCB ANTENNA
ESP-WROOM-32

USB TYPE-A (5V)
MICROSD CARD SLOT

BOTTOM VIEW
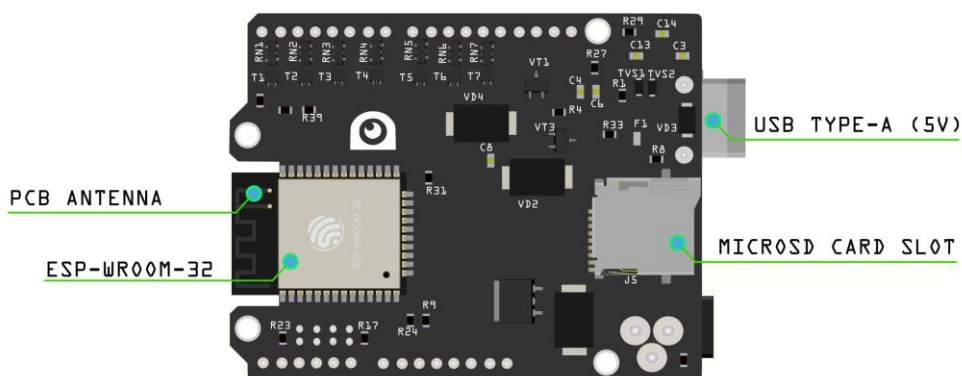
IOTIK 32B pinout

IoTik 32B Pinout

GND
VIN 2.1mm

POWER OFF/ON

Type-B

GPIO0
EN

POWER
ANALOG
DIGITAL
GROUND

BRIDGE JUMPER
TO MAKE 3.3V
DIGITAL PORT JP2

IR RECEIVER(GPIO27)

I2C
SPI
UART
PWM

22	SCL	GPIO22/SCL
21	SDA	GPIO21/SDA
--		
	GND	
18	SCK	GPIO18/SCK
19	MISO	GPIO19/MISO
23	MOSI	GPIO23/MOSI
5	SS	GPIO5/SS
15		GPIO15
14		GPIO14
13		GPIO13
4		GPIO4
17	TXD2	GPIO25/TXD2
16	RXD2	GPIO16/RXD2
22	SCL	GPIO22/SCL
21	SDA	GPIO21/SDA
1	TXD	GPIO1/TXD
3	RXD	GPIO3/RXD

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REF/5V
EN
3.3V
5V
GND
GND
VIN

GPIO25/ADC18	JP2	25	A18
GPIO26/ADC19	JP1	26	A19
GPIO32/ADC4	JP3	32	A4
GPIO33/ADC5	JP4	33	A5
GPIO34/ADC6		34	A6
GPIO35/ADC7		35	A7

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IOTIK 32B Dimensions

Useful links:

Arduino IDE software:
https://www.arduino.cc/en/main/software
Installation Guide for ESP32 core in Arduino IDE:
https://github.com/espressif/arduino-esp32
Code examples:
https://github.com/vrxfile/SmartAgriculture_IOTIK32
https://github.com/vrxfile/esp32_webinar
https://github.com/vrxfile/ESP32_ULP_SLEEP_TEST

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