BOKRA

Teensy 4.0, 3.2 & LC Adapter

Teensy are popular compact development boards for development and use in projects. They are based on NXP microcontrollers. **BOKRA Teensy Adapter** is designed to install Teensy and mikroBUS modules and provides a device based on this module with non-isolated 5VDC power, up to 1A.

The **BOKRA Teensy Adapter** allows you to install the following Teensy modules:

Teensy 4.0   Teensy 3.2   Teensy LC   previously produced
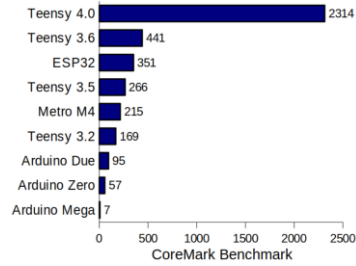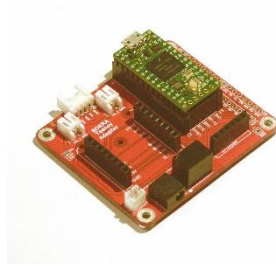   Teensy 3.1

Key features of Teensy are as follows:

Feature	Teensy LC	Teensy 3.2	Teensy 4.0
MCU Ядро Скорость, MHz	MKL26Z64VFT4 Cortex-M0+ 48	MK20DX256VLH7 Cortex-M4 72	iMXRT1062 Cortex-M7 600
Flash Memory, KB	62	256	2048K
RAM, KB	8	64	1024K
EEPROM, KB	1/8 (emu)	2	64 (emu)
DMA, channels	4	16	32
Digital IO Output voltage Output current Input voltage	27 3.3V + one 5V 5mA + four 20mA 3.3V only	34 3.3V 10mA 5V tolerance	40 3.3V 3.3V only
Analog Input ADC, bit Touch Sensing	13 12 11	21 13 12	14 16
Analog Output DAC, bit	1 12	1 12	2
Timers, total PWM RTC	7 10 0	12 12 1	10 31 1
Connection USB Serial SPI I2C CAN Bus I2S Digital Audio S/PDIF Digital Audio SDIO	 1 3 2 2 0 1 0 0	 1 3 1 2 1 1 0 0	 2 7 3 3 3 2 1 1
Cryptographic Acceleration Random Number Generator	0 0	0 0	1 1

[Teensy 4.0](#) uses the most powerful microcontroller - 600 MHz Cortex-M7. Here are the test results:

The correspondence between the Teensy contacts and the **BOKRA Teensy Adapter** contacts (connector with mikroBUS interface) is as follows:

| Teensy 3.2		Teensy LC		Teensy 4.0		mikroBUS Left	Teensy 3.2, LC, 4.0		mikroBUS Right
№	Pin	№	Pin	№	Pin		№	Pin	
14	A0	14	A0	14	A0	AN	23	PWM	PWM
5	D5	5	D5	-	On/Off	RST	22	PWM	INT
10	D10	10	D10	10	D10	CS	0	RX1	RX
13	D13 (LED)	13	D13 (LED)	13	D13 (LED)	SCK	1	TX1	TX
12	D12	12	D12	12	D12	MISO	19	D19	SCL
11	D11	11	D11	11	D11	MOSI	18	D18	SDA
3V	3V3	3V	3V3	3V	3V3	3V3	5V	VIN	5V
GND	GND	GND	GND	GND	GND	GND	GND	GND	GND

There are slight differences in the use of contacts for different Teensy models. The selection depending on the Teensy model used is made using JP15, JP16, JP17 and JP18.

The MBL (labeled P1) and MBR (labeled P8) connectors are all mikroBUS bus signals. Thus, through these connectors it is easy to connect another module (or even several) with mikroBUS slots, increasing the number of slots on the common bus.

Signals not activated in mikroBUS from the installed Teensy are output to the AUX1 and AUX2 connectors, which makes it possible to use almost all Teensy functions without changing programs. The correspondence between the Teensy contacts and the contacts of the AUX1 and AUX2 connectors is as follows:

Teensy 3.2		Teensy LC		Teensy 4.0		AUX1	Teensy 3.2, LC, 4.0		AUX2
№	Pin	№	Pin	№	Pin		№	Pin	
7	RX3	7	RX3	7	RX2	1	-	Program	1
8	TX3	8	TX3	8	TX2	2	21	A7	2
3	PWM	3	PWM	3	PWM	3	20	A6	3
4	PWM	4	PWM	4	PWM	4	17	A3	4
-	DAC	-	DAC	9	PWM	5	16	A2	5
-	Vbat	-	Vbat	-	Vbat	6	15	A1	6
3V	3V3	3V	3V3	3V	3V3	3V3	5V	VIN	VIN
GND	GND	GND	GND	GND	GND	GND	GND	GND	GND

Third-party ESP-M3 modules can be installed in J4. Thus, a device based on **BOKRA BOKRA Teensy Adapter** can be easily provided with Wi-Fi connection. The ESP-M3 is UART controlled from the 2nd mikroBUS slot on the module. For stability, there is a DC-DC converter that provides 3.3VDC power for the ESP-M3, independent of the power supply on the mikroBUS common bus. There is a software control option for turning on the ESP-M3 using a single-pin P4 connector. To do this, P4 must be connected using the jumper JP12.
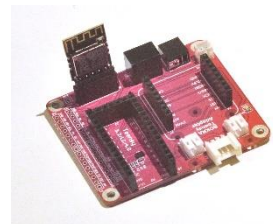

The I^{2}C interface is most often used when designing devices based on this module. To do this, the adapter has an I^{2}C connector, through which you can connect external devices and sensors.

The adapter has a temperature sensor - an [LM75B](#) chip, also connected via I^{2}C. Temperature measurement accuracy: ±2 °C for the temperature range from −25 °C to +100 °C, ±3 °C for the temperature range from −55°C to +125 °C. The LM75B chip can be replaced by the user on the [TMP1075](#) chip (maximum accuracy -

$\pm1°C$). The I^{2}C address for the LM75B is 1001111*. This address can be changed by the user using jumpers JP1, JP2 and JP3.

The module power supply is non-isolated, in the range from 9VDC to 36VDC. The module converts the input power to the output, 5VDC. The maximum current is 1A. There are two connectors for distributing 5VDC to other modules and a connector for transmitting VIN input voltage to other modules.

Since some of the modules installed in mikroBUS and Teensy slots can themselves generate 5VDC and 3.3VDC, the module provides the ability to disconnect the corresponding power contacts of the mikroBUS slot from the common mikroBUS bus. It is also possible to disconnect SCL and SDA signals from the common bus for each mikroBUS slot.
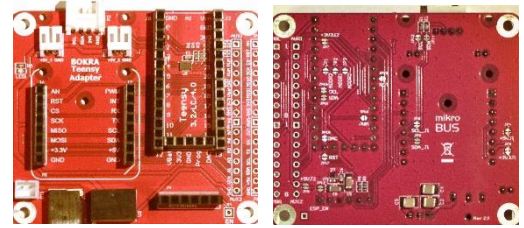
If necessary, you can connect pull-up resistors for I^{2}C (jumpers J3 and J4).

BOKRA Teensy Adapter size 65 x 56 mm. The format of the module corresponds to the popular format of the Raspberry Pi 3A+, which greatly simplifies its use with the Raspberry Pi.

- Data acquisition systems (DAS) and PLC
- Communication devices
- Devices and tools
- Lighting systems

- Environmental monitoring
- Smart home control
- Consumer electronics
- Security systems

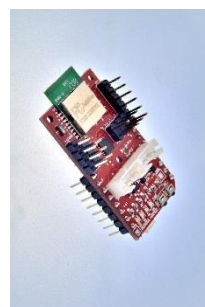The following figure shows the **location of elements on the BOKRA Teensy Adapter**.
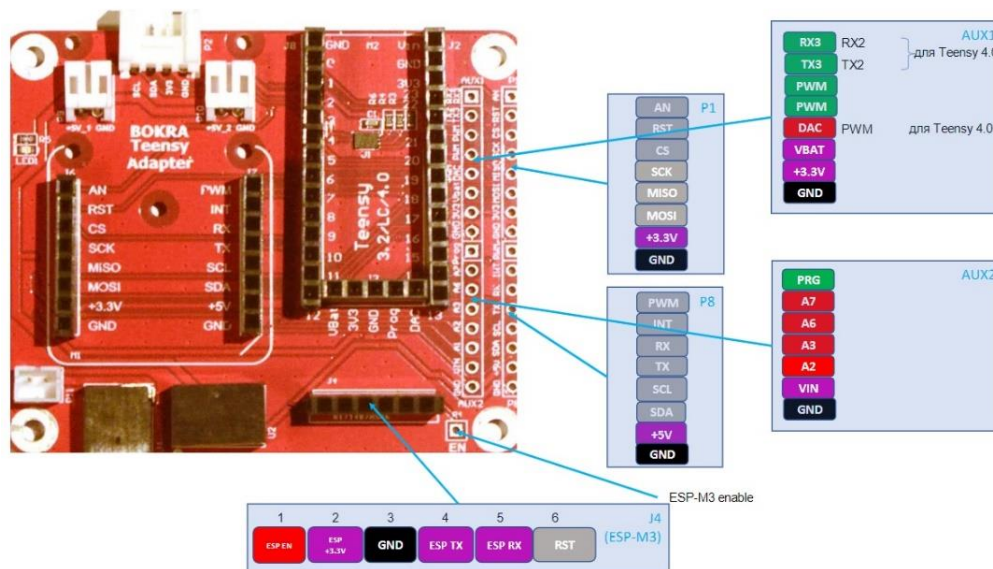
Install on your **BOKRA Teensy Adapter** in the mikroBUS slot one of the BOKRA SoM Pro or Lite series, one of the modules for wireless communication or another module with the mikroBUS interface:
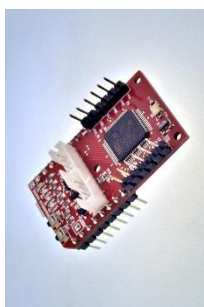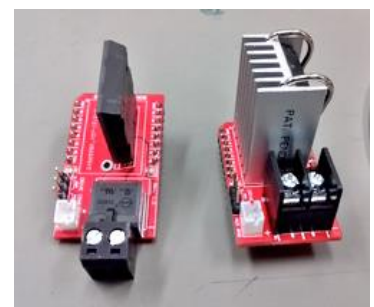

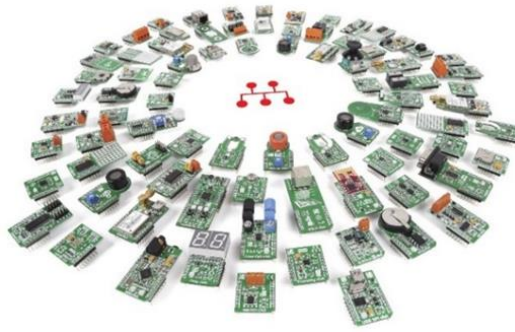BOKRA STM32F405 Pro   BOKRA LPC824 Lite   BOKRA BT832   BOKRA mikroBUS 60VDC SSR

[MikroElekronika](#) manufactures numerous modules with mikroBUS interface - Click® modules:
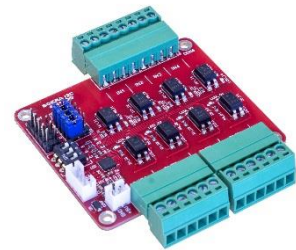
Through I^{2}C or MBL and MBR connectors, you can easily connect Raspberry Pi 3A+ (65 x 56 mm) format modules manufactured by us or modules of the same size from other manufacturers to the adapter:

Analog input	Relay	Digital input and output
BOKRA I2C 8AI LTC2309	BOKRA I2C 4RO SRD	BOKRA I2C 4DI+4DO

It is also easy to connect numerous sensors, peripherals and modules from Grove Systems via the I^{2}C connector to the **BOKRA Teensy Adapter**.

BOKRA Teensy Adapter schematic: