E-IoT Board v052

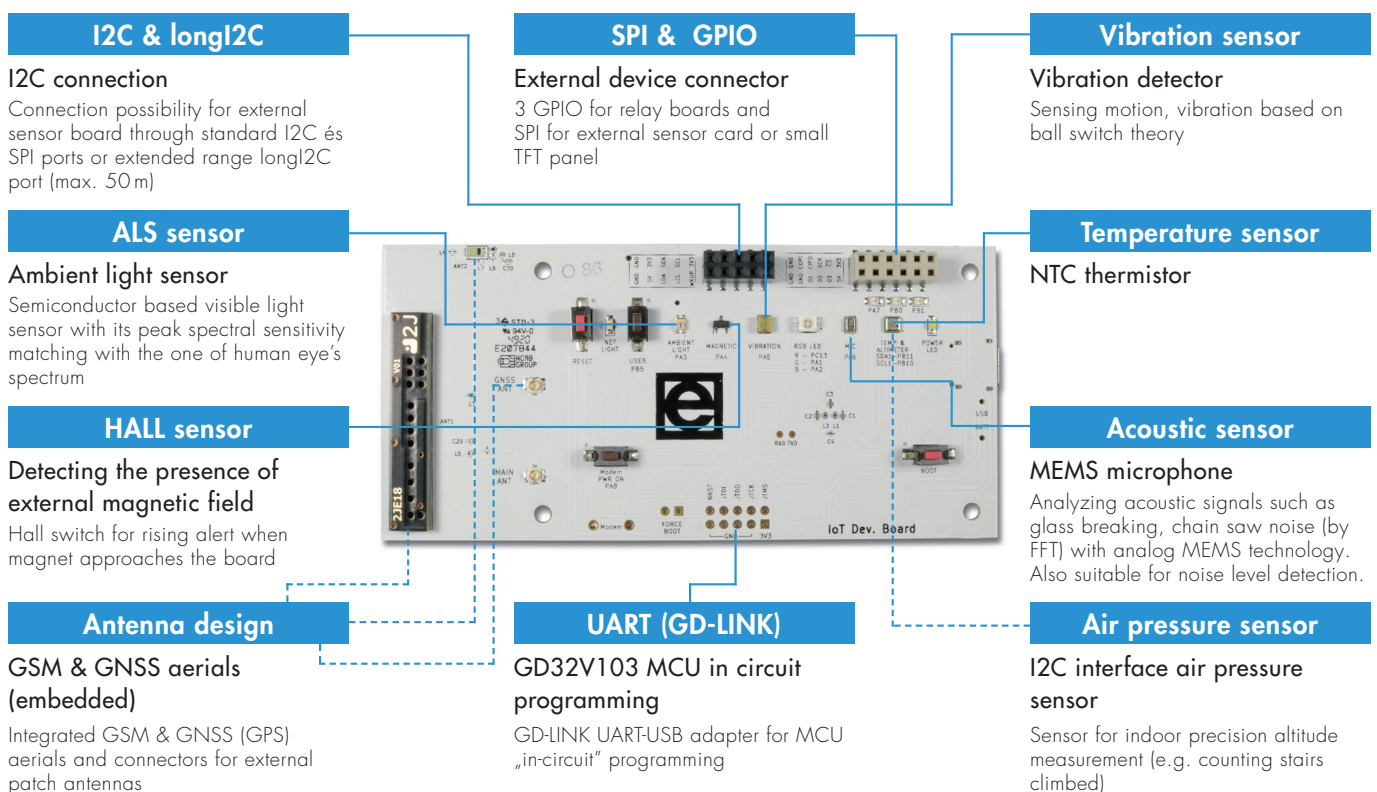## IoT Single Board Computer with integrated sensors and communication features from endrich.

The single board RISC-V computer integrates all IoT functions (sensors, MCU and communication) into one single PCB. This IoT endpoint evaluation board is capable of vibration and magnetic field sensing, ambient light intensity, temperature and air pressure measurement, altitude change calculation, and reporting the data through GSM LPWA network to a Cloud Database. This IoT board works autonomously as an island device powered by Lithium battery or USB power bank, and also reports GPS location thus can be applied even for vehicle superstructure tracking (such as cold storage or truck cargo compartment.)

APPLICATIONS

- Industrial IoT
- Smart Building / Smart City / Smart Factory
- Metering
- Hard- & Software developers
- Automation
- And many more

FUNCTIONS

- Sensors: ALS, Hall, Vibration, Temperature, Air pressure / Altitude, Noise
- Control: RISC-V based MCU for detection, transmission and control
- Transmission: NB-IoT / LTE-M / 2G
- GNSS- global positioning

I2C & longI2C

I2C connection
Connection possibility for external sensor board through standard I2C és SPI ports or extended range longI2C port (max. 50 m)

SPI & GPIO

External device connector
3 GPIO for relay boards and SPI for external sensor card or small TFT panel

Vibration sensor

Vibration detector
Sensing motion, vibration based on ball switch theory

ALS sensor

Ambient light sensor
Semiconductor based visible light sensor with its peak spectral sensitivity matching with the one of human eye's spectrum

Temperature sensor

NTC thermistor

HALL sensor

Detecting the presence of external magnetic field
Hall switch for rising alert when magnet approaches the board

Acoustic sensor

MEMS microphone
Analyzing acoustic signals such as glass breaking, chain saw noise (by FFT) with analog MEMS technology. Also suitable for noise level detection.

Antenna design

GSM & GNSS aerials (embedded)
Integrated GSM & GNSS (GPS) aerials and connectors for external patch antennas

UART (GD-LINK)

GD32V103 MCU in circuit programming
GD-LINK UART-USB adapter for MCU „in-circuit" programming

Air pressure sensor

I2C interface air pressure sensor
Sensor for indoor precision altitude measurement (e.g. counting stairs climbed)

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External relay board

Possibility to connect on 3 channels to external relay board for controlling mains voltage devices such as fans or lighting fixtures

TVS overvoltage prot.

ProTEK overvoltage protection
Based on transient suppressor diode technology the USB 2.0 line can be protected against ESD, SURGE and EFT

Extension connector

External connector for I2C, SPI & longI2C
Connection possibility for external sensor board through standard I2C és SPI portor extended range EI2CTM port (max. 50m)

MEMS Oscillators

SiTime MEMS Oscillators
Special high precision MEMS oscillators for temperature independent precise timing (32.768 kHz RTC & 8 MHz)

MPS DC/DC mini module

STEP DOWN (buck) converter
For creating 3.8V for the GSM modem, when supplied by 5V (USB). It is able to carry the max 3A peak current. External inductor is not needed.

Li Battery or USB power

Li-SoCl2 + SPC (3.6V) or USB (5V)
Special ER primary battery with connected SPC (lithium chemistry based supercap-like battery) offering large pulse current and long lifetime or 5V USB may power the card

MCU

GigaDevice ARM M23 / RISC-V
GigaDevice IoT MCU family ARM M23 & RISC-V and MCU in-circuit programmer UART connector (for GD-LINK)

Communication module

Fibocom GSM modules N510 & MA510
Based on LPWA technology, ideal for IoT devices: NB-IoT, LTE-M, 2G support (with MA510)

More than one development board

- **IoT Evaluation board:**
  collecting environmental parameters, evaluating and control, sendig data to Endrich Cloud via GSM

- **RISC-V MCU Evaluation board:**
  in circuit programmer via GD-Link or USB, offering pheripherials such as sensors, LEDs, switches

- **GSM modem evaluation board:**
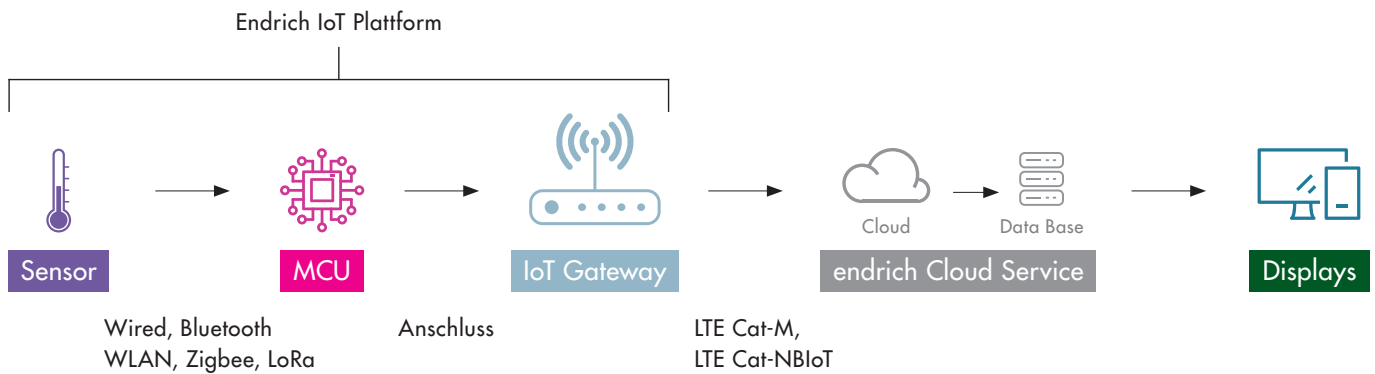 accessing GSM modem through USB-URAT bridge, AT commands from PC by unsing terminal emulation
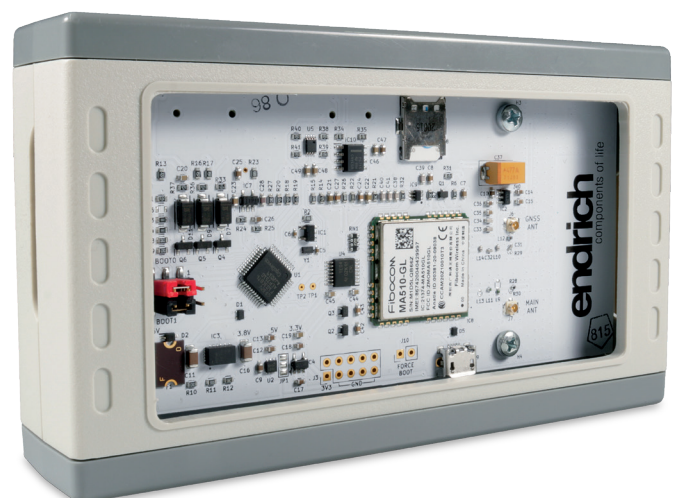
Open Hardware and embedded software polocy
- The Hardware schematics an the gerber files as well as the embedded C software sample code ist available for free.

Data sheet

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Endrich IoT Plattform

Sensor	MCU	IoT Gateway

Wired, Bluetooth
WLAN, Zigbee, LoRa

Anschluss

LTE Cat-M,
LTE Cat-NBIoT

Cloud

Data Base

endrich Cloud Service

Displays

Target	Transfer sensor data via LTE-M/NarrowBand GSM network

OVERVIEW	
Product type	Development Board
Product family	E-IoT Board
MCU	GD32VF103,32Bit, GigaDevice RISC-V
Housing	G1814 UL94-HB ABS Gainta Industries LTD.
Module	Fibocom MA510-GL-00 Tri Mode
Wireless technologies	CAT-NB2 (NB-IoT), CAT-M1, LTE-M, GPRS, GNSS (GPS)

BAND	
Operating frequency LTE FDD CatM1	B1 / B2 / B3 / B4 / B5 / B8 / B12 / B13 / B14 / B18 / B19 / B20 / B25 / B26 / B27 / B28 / B66 / B85
Operating frequency LTE FDD CatNB2	B1 / B2 / B3 / B4 / B5 / B8 / B12 / B13 / B18 / B19 / B20 / B25 / B26 / B28 / B66 / B71 / B85
Operating frequency GSM / GPRS / EGPRS	850 / 900 / 1800 / 1900

Special version for B31/ 450 MHz can be ordered

DIMENSIONS	
Dimension	130 x 76 x 30 mm
Weight	134 g (with housing)

INTERFACES	
I2C	Yes
I2C long	Yes, extended range (max. 50 m)
SPI	Yes
GPIO	Yes
USB-C	Power / accessing MCU in DFU mode
Micro USB	Accessing GSM Modem from PC
Network access	Micro SIM card holder (push/push)
Antenna	2JE18 (LTE), 2JL60 (GNSS)

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SENSORS	
Hall Sensor	Hall 1503SU
Ambient Light Sensor	ALS-PDIC15-21C/L230/TR8 Ambient Light Sensor
Air pressure/Altimeter & Temperature	MS5637
MEMS microphone	F4-(S) MOE-N090R38-3P
Vibration	VS1/2 Micro vibration sensor

FEATURES	
Protocols	PPP / TCP / UDP / SSL / TLS / FTP(S) / HTTP(S) / MQTT / CoAP / LWM2M
AT commands	3GPP TS 27.007 and 27.005 + proprietary Fibocom AT

TRANSMISSION RATE	
Data rate upload	Cat.M1 (1119 kbps), Cat.NB2 (150 kbps), EGPRS (236 kbps), GPRS (85.6 kbps)
Data rate download	Cat.M1 (589 kbps), Cat.NB2 (136 kbps), EGPRS (296 kbps), GPRS (107 kbps)

GENERAL	
Operating temperature	-20 °C to +85 °C
Power	Li-SoCl2(+SPC) 3,6V or 5V USB
Protection class	NO

Safty Instructions

⚠️ The E-IoT Board v052 is an ESD sensitive to electrostatic discharge (ESD).
Take special care to use adequate grounding of personnel and machines in manual handling.

This IoT evaluation board was designed as an evaluation and development tool. This evaluation board is intended to be operated in a research and development environment.

For more information please visit https://e-iot.info/