



DIO021E

Data Sheet

Ethernet Remote I/O Module

Digital/Analog I/O Module with Multi-Protocol Ethernet Interface

- **8 digital inputs, 2 digital outputs**
- **4 analog inputs**
- **One 10BASE-T/100BASE-TX Ethernet interface**
- **One multi-protocol serial communications port (RS232/422/485)**
- **Coding pins for optional geographical addressing**
- **Web server for remote diagnostics and firmware updates**
- **-40 °C to +70 °C (+85 °C for 10 minutes) operating temperature**

Product Description

Digital and Analog I/O

The DIO021E is a remote I/O module controlled via Ethernet, with 8 digital inputs, 2 digital outputs, and 4 analog inputs. All digital inputs can be used as PWM outputs or event counters. The digital outputs allow bidirectional current flow. The analog inputs support voltage, current, or resistive measurements. All I/O channels are galvanically isolated from the internal logic and the Ethernet interface.

Communication Interfaces

Additionally, the DIO021E provides a multi-protocol serial interface (RS232/422/485) with the physical layer selectable by software, a maintenance port to access the command line interface, and 8 code inputs. The code inputs can be used to generate an index, which enables geographical addressing by the application. The integrated Ethernet controller, designed by duagon, features hardware prioritization and low jitter. The DIO021E complies with IEEE 802.3 and supports auto-negotiation, auto-crossover, and half or full duplex operation.

Flexible Application Software

Applications for the DIO021E are generally developed by the customer. duagon provides a build environment for this purpose, including the development library, a demo application, and accompanying documentation. On request, duagon also offers application development as an engineering service. Alternatively, the DIO021E can be ordered as an off-the-shelf platform, requiring configuration only.

For Rolling Stock Environments

The DIO021E can be powered directly from battery, supporting voltage ranges of 24 V DC to 110 V DC. It is designed for harsh rolling stock environment and complies with the EN 50155 standard: it withstands -40 °C to +85 °C operating temperatures, is coated against humidity and provides enhanced EMI and vibration robustness.



Technical Data

Ethernet Interface Functionality

- General network support: IPv4
- Protocols: TRDP, TCP/IP with UDP Sockets, TRDP with Safe Data Transmission (SDTv2)
- Maintenance interfaces
 - Web-based interface
 - Command line interface (CLI)

Cybersecurity

- Cybersecurity packages: duagon Enhanced Package

Memory

- System RAM: 128 MB max., soldered DDR2
- Flash: 32 MB

Interfaces

- Code inputs: 8 ×, D-Sub, 9-pin, receptacle
- Digital I/O
 - Digital inputs: 8 channels, isolated, Phoenix Contact FMC, 20-pin, plug, connector X0
 - Digital outputs: 2 channels, isolated, Phoenix Contact FMC, 20-pin, plug, connector X0
- Analog I/O: analog inputs, 4 channels, isolated, Phoenix Contact FMC, 20-pin, plug, connector X1
- Ethernet: 1 × 10BASE-T/100BASE-TX, M12, D-coded, receptacle
- Serial: 1 × RS232/422/485, non-isolated, D-Sub, 9-pin, plug
- LED
 - Status: 1 × initialization, 1 × system status, 1 × power status, 1 × error
 - Ethernet: 1 × link/activity, 1 × speed
 - User configurable: 4 ×
 - COM: 1 × activity, 1 × mode
 - Digital input: 8 × status
 - Digital output: 2 × status

Electrical Specifications

- Supply voltage
 - 24 V DC to 36 V DC nom. (EN 50155)
 - 48 V DC to 110 V DC nom. (EN 50155)
- Power consumption: 5.5 W max.

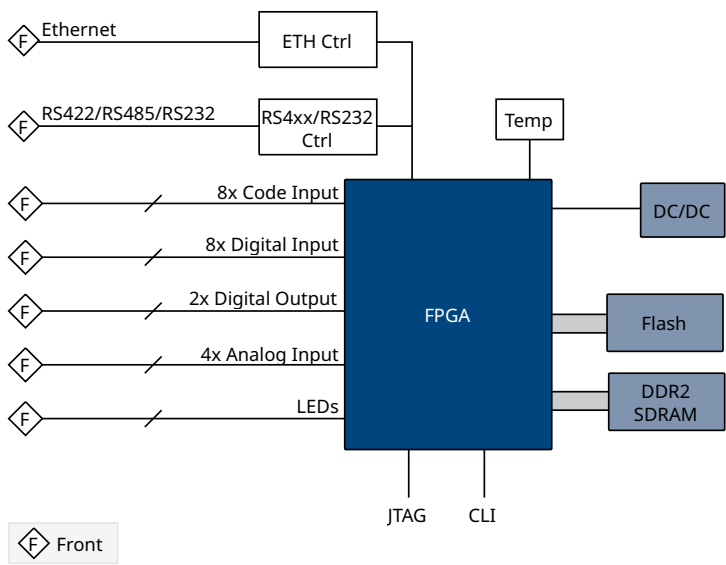
Mechanical Specifications

- Dimensions: (W) 136 mm, (D) 116 mm, (H) 60.1 mm
- Weight: 614 g

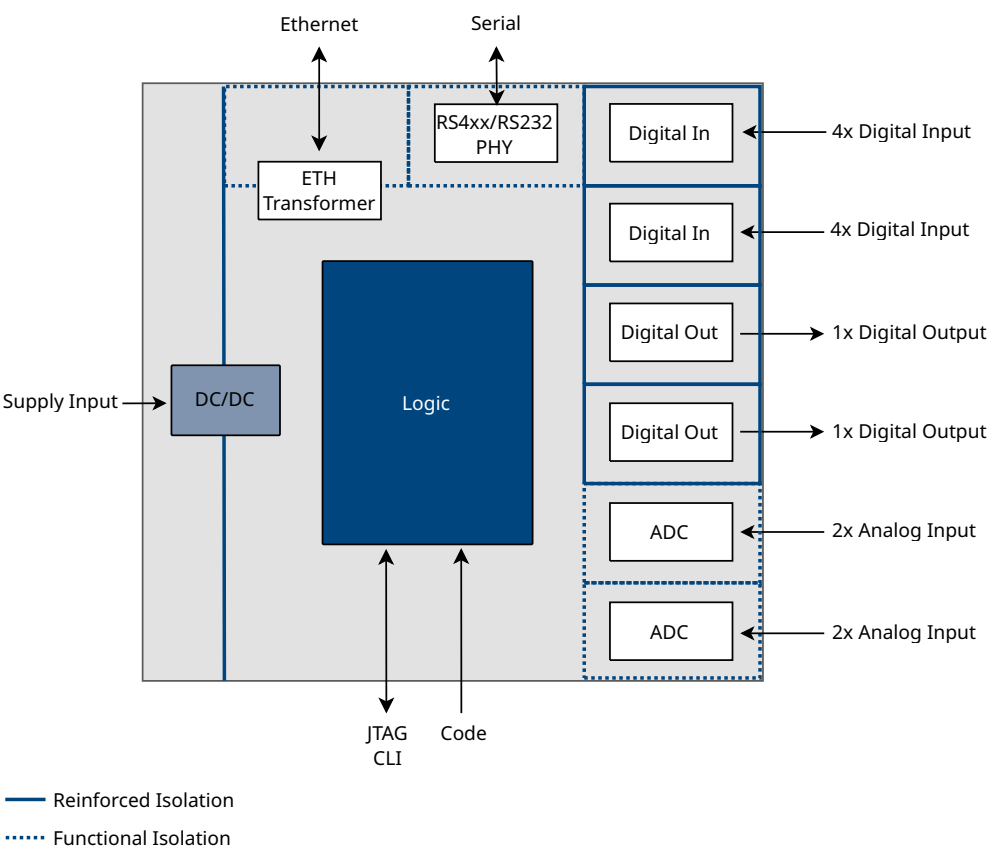
Product Compliance: Rail - Rolling Stock

- Operating temperature: -40 °C to +70 °C, +85 °C for 10 min (EN 50155:2017, class OT4, ST1)
- Rapid temperature variations: EN 50155:2017, class H1, no requirements
- Storage temperature: -40 °C (EN 50155:2017) to +85 °C (EN 60068-2-2, Bb)
- Altitude: +2000 m max. (EN 50125-1:2014, class AX)
- Humidity: 75 % RH max. typ. yearly average, 95 % RH max. for 30 consecutive days/year (EN 60068-2-30)
- Shock: 30 ms @ 50 m/s² (EN 61373:2010/AC:2017-09, vehicle body, cat. 1, class A)
- Vibration: 10 min @ 1.01 m/s² (functional) and 5 h @ 5.72 m/s² (long-life) (EN 61373:2010/AC:2017-09, vehicle body, cat. 1, class B)
- Pollution degree: EN 50124-1:2017, class PD2
- Protective coatings: EN 50155:2017, class PC2 (Any PCB protected on both sides)
- Useful life: 20 years (EN 50155:2017, class L4)

Functional Diagram



Galvanic Isolation



Ordering Information

Ordering Options

DIO021E - [1] - [2] - [3] - [4]

DIO021E - I - LV - G (example)

Position	Description	Options	Code
1	Ethernet Interface 0	TCP/IP, UDP sockets	-I
		TRDP	-TR
		TRDP with Safe Data Transmission (SDTv2)	-TRS
2	Cybersecurity Packages	None	<empty>
		duagon Enhanced Package	-CSE
3	Power Supply	24 V, 36 V	-LV
		48 V, 72 V, 96 V, 110 V	-HV
4	Grounding Bolt	With grounding bolt	-G
		Without grounding bolt	-N

- 1

-TRS: SDTv2 is a purely functional implementation, it does **not** meet SIL requirements.
- 2

Cybersecurity packages offer features to reach a security level up to SL2 according to IEC 62443-4-2.
Contact duagon for availability and lead times.
- 4

-N: **Contact duagon** for availability and lead times.