General Features

The D013E is a multi-purpose dual Ethernet controller interface with embedded processing power. The integrated Ethernet controllers, designed by duagon, feature hardware prioritisation and very low jitter. The chip-sized, space-saving component encapsulates all Ethernet relevant functions on a small 48 x 50 mm size footprint. It can be considered a communication chip that handles various Ethernet protocols. The D013E lowers the requirements to the host system, as there is no need for additional CPU power for the Ethernet stack. Moreover, the main application does not need to share CPU power with complex Ethernet protocol stacks.

The D013E is fully compliant with IEEE 802.3 and supports features like Auto Polarity, Auto Negotiation and Auto-DI-X.

The D013E is prepared for the future "Ethernet on traction vehicles" standard IEC 61375-3-4. It supports various Ethernet protocols like TRDP, TRDP with SDTv2, CIP, IPTCom, PROFINET, UDP or TCP/IP. Different kinds of web services are optionally available. An optional internal switch allows to build daisy chains and to run the appropriate ring protocols. The drivers for the bypass relays are also included (bypass relays themselves are **not** included).

The component integrates the magnetics with a galvanic insulation, the PHY, the complete protocol controller and a simple host interface.

With duagon's driver kit the D013E, featuring an easy-to-use UART emulation, can be integrated very quickly on almost any host system through a small register set (each 8-bit long). The D013E does not need a wide address range compared with a solution based on dual ported memory. Different host interfaces like serial (RS/TX), 8bit-parallel or SPI are configurable by bootstrapping pins.

The digital interfaces act on 3.3V logic levels fitting most of the modern CPU platforms.

The D013E is designed for harsh rolling stock environments and is fully compliant with EN 50155.

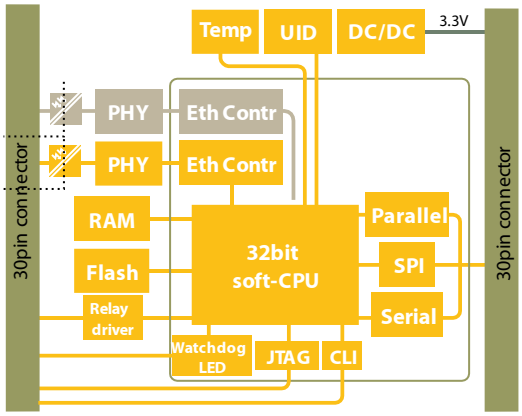
Key Benefits

- Hardware prioritisation within the duagon own Ethernet controller
- Proprietary high-performance UDP Stack (optimised for cyclic process data telegrams)
- Line redundancy handling
- Encapsulation of real-time Ethernet protocol stacks
- Freeing CPU power on the host system
- Space-saving through miniaturized form factor (48 x 50 x 10 mm)
- Fitting modern CPU platforms - powered by 3.3V
- Fully compliant with IEEE 802.3, EN 50155, EN 50121, IEC 61373 and IEC 61375

Application Examples

- Generic Ethernet Interface for various real-time protocols

D013E Hardware Architecture



Life Cycle Cost

The use of an FPGA with included duagon own soft-IP minimizes the risk and costs in case of component obsolescence. Data access and firmware updates are easily done through a service interface or directly via one of the available train buses. Further, to avoid service expenses, the interface cards have strictly been designed without the usage of electrolytic capacitors. Reference schematic and software examples help to speed up the integration time.

Technical Data

CPU base System	– 32 bit soft-CPU running at 75 MHz (FPGA) – 128 MB RAM – Flash file system
Ethernet Interface 1 + 2	– One galvanically isolated ethernet channel with reliable M12 connector – Fully compliant with IEEE 802.3 and IEC 61375 – 10/100 Mbit/s
Ethernet Protocols	– TCP/IP, UDP Sockets – IPTCom – EtherNet/IP - CIP – TRDP, TRDP with SDTv2 – PROFINET*
Diagnostic/ Service	– Different web services and web monitoring tools are available. Please ask duagon about the possibilities – Device status information/ identification readable through host interface – Temperature sensor on board for temperature supervision
Supply Voltage	– Single power supply – 3.3 V
Power Consumption	– $P_{max} < 2$ W
Operating Conditions	– Ambient temperature: –40 to +85 °C (EN 50155, class TX) – Relative humidity: 75 %, max 95 % for 30 days per year (conformal coating) according to EN 60068 – Shock and vibration: According to IEC 61373 category 1, class B – EMI: According to EN 50121 and EN 50155
Dimensions/ Weight	– 50 × 48 × 10 mm – < 20 g
1Connector types	– Soldering connectors – Socket connector with round or square pins
Environment	– Fully compliant with RoHS and REACH – 100 % 48 h cyclic climatic testing

d-008456-055899

Product Ordering Table

Product: **D013E - I - N - N - M - P**

Example: D013E-I-N-N-M-P[1]

Ethernet Protocols Interface 1[2]

TCP/IP, UDP Sockets	I
IPTCom	B
EtherNet/IP – CIP	C
CIP Scanner Light*	CSL
PROFINET*	R
RDA-RT*	RDA
TRDP	TR
TRDP with SDTv2	TRS

Ethernet Protocols Interface 2[2,3]

None	N
IPTCom	B
EtherNet/IP – CIP	C
CIP Scanner Light*	CSL
TCP/IP, UDP Sockets	I
Ring[5]	O
PROFINET*	R
RDA-RT*	RDA
TRDP	TR
TRDP with SDTv2	TRS

Web Services[4]

None	N
Alstom	AWM
duagon	dWM

Host Interface

Parallel/SPI	M
Parallel/Serial	A
None (Gateway)	GW

Connector Type

Socket round	P
Socket square	Q
Soldering	S

[1] default order options
[2] Ethernet „Sockets" is included in all interfaces
[3] Interface two is optional
[4] duagon webserver is always included
[5] Ring configuration always includes RSTP
* contact duagon for lead times and availability

Related Documents

Data Sheet D013E D013E_DS.pdf
Product Ordering Guide order_ug.pdf

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