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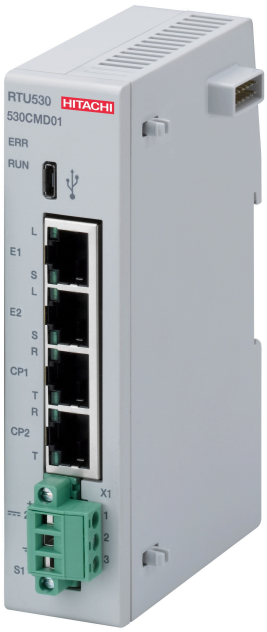
Remote Terminal Units - Data sheet

Communication unit 530CMD01

RTU530 product line



RTU530 multi CMU module with two Ethernet ports and two isolated configurable RS-232 or RS-485 ports.

- Compact and robust design
- 2x serial ports (galvanic isolated and configurable to RS-232 or RS-485)
- 2x Ethernet interface (10/100/1000 BaseT)
- CAN-FD communication for Multi CMU support
- USB configuration interface
- Power supply input with 24 V DC
- Interface to extension I/O-modules
- Crypto chip for advanced cyber security functions
- Buffered real time clock

Application

The 530CMD01 is a module of the RTU530 product line consisting of a communication unit (CMU) and a power supply in a compact and robust DIN rail housing.

The essential tasks are:

- Managing and controlling of the RTU530 product line I/O modules via the interface to the serial I/O bus.
- Scalable CMU platform up to 4 CMUs.
- Reading Process events from the input modules.
- Sending commands to the output modules.
- Communicating with control systems and local HMI systems via the serial interfaces and the Ethernet interface.
- Communication with Sub-RTU's, IED's or multimeter devices via the serial interfaces and the Ethernet interface.
- Managing the time base for the RTU530 product line station and synchronizing the I/O modules.
- Handling the dialog between RTU530 product line and Web-Browser via the LAN and USB interfaces.

The communication unit is able to handle Ethernet- and UART character based communication protocols.

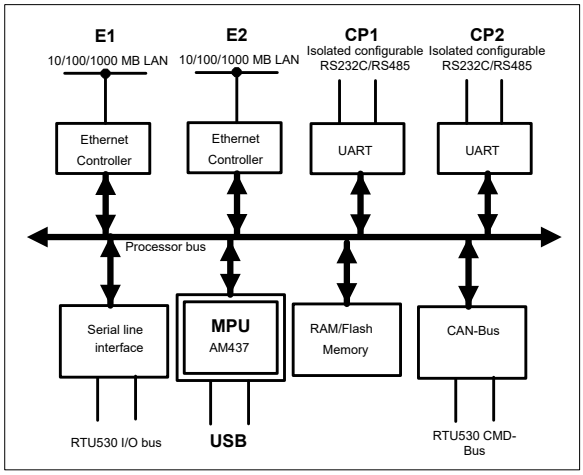
The multiprocessor system can be setup with up to 4 530CMD01 via CAN communication.

The unit has a capacitor buffered real time clock (RTC).

The unit is available in two versions:

- 530CMD01 R0001 crypto chip and real time clock
- 530CMD01 R1001 crypto chip and real time clock conformal coated

Hitachi Energy



- Crypto Co-Processor with Secure Hardware-based Key Storage
- Hardware Support for Asymmetric Sign, Verify, Key Support (e.g. Elliptic Curve Digital Signature)
- Internal High-Quality NIST SP 800-90A/B/C Random Number Generator

Characteristics

Communication unit

On the applied ARM cortex A9 controller AM437 a real-time operating system is implemented. The 530CMD01 is responsible for the interface management, the event handling, the time base and the internal data base.
The controller acts as master for the serial RTU530 I/O bus (IOB). The IOB bus interface is a 2 x 6 pin 2,54mm stacked pin header and a 2,54 female header.

System relevant configuration files are stored on the embedded multi memory card in order to guarantee a valid system configuration after Power on Reset (PoR).

The communication unit provides the following interfaces:

- Communication Port 1 and 2 (CP1 & CP2): galvanic isolated and configurable serial interfaces according RS232C or RS485 with RJ45 connectors. CP1 and CP2 can be configured independant as I/O Bus interface to the front.
- Ethernet interface 1 and 2 (E1 & E2): 10/100/1000BaseT with RJ45 connector.
- USB 2.0 device interface for diagnosis and maintenance purposes.

I/O controller (IOC)

The micro-controller (MPU) on the module processes all time critical I/O tasks of the parameterized processing functions. Moreover it carries out the interactive communication with theI/O bus. All configuration data and processing parameters are loaded by the communication unit via the RTU530 I/O bus.

In connection with an I/O adapter (e. g. 530ADD01) or the RTU530 communication unit the module is interfaced to the RTU530 I/O bus.

During initialization and operation the module executes a number of tests. If a fault occurs it is reported to the communication unit. A failure of the connected module(s) is detected and signalized by the communication unit.

Crypto Chip

The Crypto Chip on the board contains following points:

Technical data

In addition to the RTU500 series general technical data, the following applies:

General standards	
Safety tested according to	• IEC 61010-1 • IEC 61010-2-201
Environmental conditions tested according to	• IEC 60255-21-1 class 1 • IEC 60255-21-2 class 1 • IEC 60870-2-2 class Bm and C1
Electromagnetic compatibility (EMC) tested according to	• IEC 61000-6-2 • IEC 61000-6-4 • IEC 61000-6-5
Insulation classification according to	IEC 60664-1 • Pollution degree 2 • Over voltage category II • Altitude: ≤ 3,000 m

Environmental conditions - climatic	
Operating temperature EN 60068-2-14	-25 °C ... 70 °C
Start up EN 60068-2-1	-40 °C
Relative humidity EN 60068-2-30	5 ... 95 % (non condensing)

Environmental conditions - mechanical	
Vibration sinusoidal, Test Fc , IEC 60068-2-6	3.5 mm (3 ... 9 Hz) 10 m/s² (9 ... 35 Hz) 1 octave/min, 1 cycle per axis IEC 60255-21-3 class 1 3 mm (3 ... 9 Hz) 10 m/s² (9 ... 200 Hz) 15 m/s² (200 ... 500 Hz) 1 octave/min, 10 cycles per axis IEC 60870-2-2 class Bm 0.035 mm (10 ... 60 Hz) 5 m/s² (60 ... 150 Hz) 1 octave/min, 1 cycle per axis IEC 60255-21-1 class 1
Shock and Bump, Test Ea, IEC 60068-2-27	250 m/s², 10 ms 4 shocks per direction IEC 60721-3-3 class 3M5 150 m/s², 11 ms 3 shocks per direction IEC 60255-21-2 class 1 IEC 60870-2-2 class Bm 100 m/s², 16 ms 1000 shocks per direction IEC 60255-21-2 class 1

Emission test	

Immunity test	
Electrostatic discharge, IEC 61000-4-2	8 kV air / 6 kV contact (level 3), criterion A
Radiated radio-frequency electromagnetic field, IEC 61000-4-3	80 MHz to 1 GHz: 10 V/m (level 3), criterion A 1 GHz to 2.7 GHz: 10 V/m (level 3), criterion A
Power frequency magnetic field, IEC 61000-4-8	100 A/m (level 5), criterion A

Mean time between failure (MTBF)	
Calculation according to Telcordia III 40°C	1,267,200 h

Mechanical layout	
Dimensions	30 mm x 125 mm x 85 mm (Width x Height x Depth)
Housing type	Plastic housing (V-2), RAL 7035 light gray
Mounting	DIN rail mounting (EN 50022 TS35: 35 mm x 15 mm or 35 mm x 7.5 mm)
Enclosure protection class	IP30
Weight	0.2 kg

Conformal coating	
Material base	Acrylate resins (AR)
Standards	• IPC-CC-830B • MIL-I-46058C • UL 94 • UL 746E
Noxious gas protection (coating material)	Noxious gas test according to DIN EN 60068-2-60 or BMW GS 95003-4
Dielectric strength (coating material)	60 kV/ mm according to IPC-TM-650 or DIN EN 60243-1
Resistance to condensation (coating material)	1.0 x 10^{10} Ohm based on DIN EN ISO 6270-2

Connection type	
Power supply input (X1)	1 x 3 pole 5.08 mm pluggable screw terminals (included in delivery), 0.2... 2.5 mm²/ AWG 24 - AWG 12
Connector to the I/O modules (X2/X3)	2 x 6 pin, 2.54mm stacked pin header and a 2.54mm female header

Main Processing Unit MPU	
CPU	Cortex A9, AM4372B @ 600 MHz
RAM	256 MByte
eMMC	4 GByte
SRAM	128 kByte

Real time clock RTC (Backup)	
Capacitor	1F
Time resolution	1 sec, 1ms with time sync
Buffering time	> 96 hours
Free running	± 50 ppm

embedded MMC	
Type	Kingston EMMC04G-W627-E01U
Capacity	4 GByte

Signaling by LEDs	
ERR (red)	ON: RTU in error state Flashing: RTU in warning state For more details see RTU500 series Function Description
RUN (green)	Communication module in operation Flashing: Communication module in recovery mode
T	Transmit data on serial communication ports CP
R	Receive data on serial communication ports CP
S	Ethernet communication speed: Flashing 1Hz: 1000 Mbit/s ON: 100 Mbit/s OFF: 10 Mbit/s
L	Link up (ON) / Activity (Flashing) on Ethernet interface E

Power supply input (X1)	
Input voltage	24 V DC
Input tolerance range	-20% ... +20%
Power consumption (peak)	32 Watt
Power consumption (typical)	3,7 Watt
Current demand (peak)	2.0 A
Starting current	<20 A; 50µs - 1.5ms (Class S1 according to IEC 60870-4)
Plug type	1 x 3 pole 5.08 mm pluggable screw terminals (included in delivery), 0.2... 2.5 mm²/ AWG 24 - AWG 12
Reverse polarity protection	yes
Input fuse	internal fuse
External circuit-breaker	10 A trip current, the plus lead needs a be protected by a circuit-breaker
Galvanic isolation	no

Power supply input - immunity, emission and insulation tests	
Electrical fast transient / Burst, IEC 61000-4-4	4 kV (level 4), criterion A
Surge 1.2/50 µs, IEC 61000-4-5	4 kV line to earth (level 4), 1 kV line to line, criterion A
Conducted disturbances, induced by radio-frequency fields, IEC 61000-4-6	10 V (level 3)
Ring wave, IEC 61000-4-12	2.5 kV line to earth, 1 kV line to line (level 3), criterion A
Conducted, common mode disturbances in the frequency range 0 Hz to 150 kHz, IEC 61000-4-16	30 V continuous disturbance/ 300 V short duration disturbance (level 4)
Ripple on DC power supply, IEC 61000-4-17	20% Un
Damped oscillatory wave, IEC 61000-4-18	2 kV line to earth, 1 kV line to line @ 1 MHz (level 3), criterion A
Conducted emissions - asymetrical DC ports, common mode (0.15 MHz to 30 MHz), CISPR 16-2-1/ EN 55016-2-1	EN 55011/ CISPR 11 class A

current for the power supply via I/O bus	
5 V DC (± 5%)	1.45A
24 V DC (± 20%)	1.0 A
Total allowed consumtion	30 W

Gigabit Ethernet interfaces (E)	
Electrical specification	IEEE 802.3
Protocol	Gigabit Ethernet, Fast Ethernet
Data rate	10 Mbps, 100 Mbps, 1 Gbps or auto
Duplex	auto
Cable	shielded CAT5e cable (or better)
Plug type	RJ-45 (8P8C)
Galvanic isolation	1.5 kV isolation voltage
Electrical fast transient / Burst, IEC 61000-4-4	4 kV (level 4), criterion A
Surge 1.2/50 µs, IEC 61000-4-5	4 kV (level 4), criterion A
Conducted disturbances, induced by radio-frequency fields, IEC 61000-4-6	10 V (level 3), criterion A
Ring wave, IEC 61000-4-12	2.5 kV (level 3), criterion A
Conducted, common mode disturbances in the frequency range 0 Hz to 150 kHz, IEC 61000-4-16	30 V continuous disturbance / 300 V short duration disturbance (level 4)
Damped oscillatory wave, IEC 61000-4-18	2 kV line to earth, 1 kV line to line (level 3), criterion A

Gigabit Ethernet interfaces (E)	
Conducted emissions - symmetrical network ports (0.15 MHz to 30 MHz), CISPR 16-2-1/ EN 55016-2-1	EN 55032 / CISPR 32 class A

Serial interfaces (CP1, CP2)	
Electrical specification	EIA RS-232 or EIA RS-422/485, CP1 and CP2: EIA RS232 or EIA RS485
Data rate	200 bps... 1000 kbps
Plug type	RJ-45 (8P8C)
Cable	shielded cable, up to 3 m (RS-232), up to 50m (RS-485)
Galvanic isolation	500 V isolation voltage
Electrical fast transient / Burst, IEC 61000-4-4	4 kV (level 4), criterion A
Surge 1.2/50 µs, IEC 61000-4-5	no remark, 4 kV (level 4), criterion A
Conducted disturbances, induced by radio-frequency fields, IEC 61000-4-6	no remark, 10 V (level 3), criterion A
Damped oscillatory wave, IEC 61000-4-18	2 kV line to earth, 1 kV line to line (level 3), criterion A

USB interface USB0	
Connector	micro USB Type B (female)
Type	USB 2.0 device, low, full and high speed (max. 480 MBit/s)
Cable type to PC	USB Type A <-> micro USB Type B

Ordering information	
530CMD01 R0001 crypto chip and real time clock	1KGT050700R0001
530CMD01 R1001 crypto chip and real time clock conformal coated	1KGT050700R1001

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