



The flexible, programmable Controller for building intelligent, highly secure and Network Ready Devices

OC8-S AT A GLANCE

Architecture

CPU: Arm9-based 400 MIPS processor (AT91SAM9G20)
Memory: 2Gb Flash, 128 MB SRAM, 32kB onchip caches
Diagnostics: built in diagnostics and comprehensive statistics

Network Interface

Ethernet: RJ45: 10/100 Base, auto-sensing, auto-MDIX
Protocols: TCP,UDP,IP, XML, SOAP-webservice, ARP,ICMP, DNS, DHCP
Security: software encryption engine SHA, MD5, 3DES, AES

Interface

- 5 RS-232 / 2 RS-485 (software selectable) serial ports
921 kbps up to 10Mbps. ESD protection, 15 kV
- 24 General purpose I/O
- 4 10bit ADC (310 k-sample/s, Analog Digital Converters)
- 2 12bit DAC voltage out, 2 MSPS
- 1 12bit DAC current output (0, 4 – 20 mA)
- 1 13 bit A-grade temperature sensor
- 1 I²C
- 1 SPI up to 66 Mhz
- 1 USB 2.0 device
- 2 USB 2.0 host
- 1 Voltage reference 4.62V, 0.75%
- 1 Realtime clock

Expansion

Internal bus (20pin): SPI, I2C to add-on cards like Wireless

Energy

Input voltage: 5VDC
Input PoE: Power over Ethernet (class 1, isolated)
Power: 1mW standby, 360 mW max @ TX on
PoE external circuit supply:
 - 5V, limited to 200mA continuous (short circuit proof)
 - Seperate rectified 48V (10 Watts additional power)

Operating system

OS: Safe free-RTOS (realtime OS), Linux® v2.6.27
Drivers: bus drivers
Toolchain: license free toolchain (gcc * IBM eclipse)

Software stack and support

Royalty free software stack.
 Commercial project and indesign support available

Environment

Industrial Temperature range: -45 to 85°C

Packaging

Dimensions (h*b*d): 16 * 16 * 47 mm **Weight:** 23g

The size of a few sugar cubes, FirePort is the first device server solution that goes beyond simple network connectivity to deliver an enterprise grade, service oriented, programmable device computing and networking platform.

This embedded processor module builds on our proven ethernet control technology. It enables device manufacturers and IT system integrators to add the highest versatile and agile IT control component into their projects.

Benefits

The benefits of integrating networked devices into traditional corporate or enterprise network are tremendous. A unified corporate network reduces operations costs by more effectively leveraging IT investments. Additionally, this integration differentiates a company's product or service with increased or added value and helps facilitate opportunities such as:

- Asset tracking
- Workflow improvement/monitoring/reporting
- Pro-active maintenance services and pre-emptive diagnosis
- Fulfillment services

Enterprise-grade Security

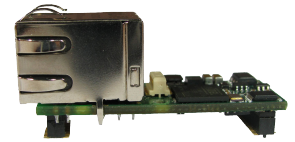
The OC8 provides the highest level of security possible using state of the art crypto technology. With a wide variety of advanced cipher technologies including AES, 3DES and RC4 this 'data center grade' protection ensures secure network operations

Example applications

- ➔ Realtime asset tracking
 - Integration with enterprise systems like SAP, Navision
- ➔ Secure remote metering
Networked PoE Access Control
 - Save power supply and installation costs
- ➔ POS Transaction Automation Terminal
 - Central processing management
- ➔ Industrial Automation
 - Seamless integration with todays control systems like Allen Bradley, Siemens and devices, sensors and activators



OC8-S FUNCTIONS



Function	Specs	Comments
PoE Power over ethernet	Integrated 2 Watts switching power supply. Including 5V short-circuit proof supply to power other logic (limited to 200 mA continuous)	Rectified POE lines (48V) are available for up to 10 Watts of external power requiring an additional external switching power supply.
DAC	2 ports 12 bit DAC	2 Mega Sample/sec, full output swing on highest sample rate
I2C	Serial bus	2 pins, not shared with other pins
SPI	Serial bus, max 66MHz, 5 chipselect lines	8 pins, not shared with other pins
UART RS-232/485	Serial port with linedriver. RS-232, 422 and 485 RX, TX, RTS, CTS, DTR, DSR, RI	Software selectable protocols, 232, 422, 485 RS-232 650 kbps [+7V, -7V] RS-485 up to 10Mbps [+7V, -7V] Without linedriver chip selection 3v3 logic
UART RS-232/485	RX, TX, RTS, CTS	Standard UART (921 kbps) 3v3 logic level ISO7816-smartcard, IrDA (115Kbps)
UART RS-232/485	2 RX, TX ports	USART (921 kbps) 3v3 logic level
UART RS-232	2 RX, TX port	Extra UART (115 kbps) 3v3 logic level
IO	24 IO pins	12 dedicated 12 are shared on UART2, ADC SPI and IRQ's
I-controller (current output)	0-20 mA & 4-20 mA (max 230 ohm)	1 Industrial current control port
Voltage reference	Internal Class A 4,62V 0.75%	1 pin for external use
ADC	8 10 bit Analog to digital , 310 k-sample/s	4 dedicated + 4 shared
USB	1 USB-device 12Mbit/s	
USB	2 USB- host 12Mbit/s	
Temperature Sensor	Class A	13 bit, 0.03 C resolution
RTC	Realtime clock	<1 ppm
LED	RGB (red, green, blue) LED	LED controlled by 3 dedicated GPIO
IRQ	Interrupt lines	2 interrupt lines (not shared with other pins)
NRST	Reset line	External reset line (1 pin) [input/output]

SOFTWARE ARCHITECTURE

Software architecture

LICENSE	Free open source GPL license (a) For proprietary end user solutions a closed source license is available (b)				Professional Pro Pack (c) Requires commercial license
APPLICATIONS	Command & Control Protocol Bridging	Sensing	XML parser Tunneling	3rd party Chess	LUA logic engine Web Manager Pro
MANAGEMENT	Web manager Remote support	GPIO manager Config manager	File system Serial manager	Logging XML	Configuration Utility
SECURITY	IPsec SHA	MD5	AES SSL	3DES PAP/CHAP	
NETWORK	DNS DHCP	TCP NTP Auto-IP	PPP SMTP ARP	CGI HTTP FTP	SNMP
PROTOCOL	CANopen MODBUS	MODBUS USB 2.0	IP EtherNet	http-XML SOAP 1.1	Profibus Profinet
DRIVERS	CAN USB Ethernet	GPIO DAC Current Control	SPI I2C OLED	RS232/484 Flash EEPROM	DeviceNET ControlNet
KERNEL	Realtime Safe OS Preemptive scheduler	Threading Memory Guard	Semaphores Brownout detect	Timers Counters	

(a) Open source GPL3 royalty free license. Free to use, modify and redistribute under GPL license model

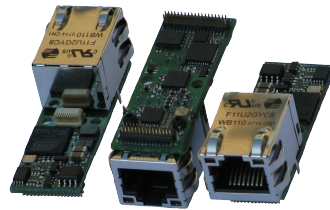
(b) Closed source commercial license for integration in internal or resellable solutions/products at a one-time cost

(c) Additional protocol and utility pack is available at a one-time cost for system integrators

For industrial end users the protocol and utility pack is included in the ready-to-go OC8 industrial controller

HARDWARE ARCHITECTURE

CPU:	Arm9-based 400 MIPS processor, 32kB onchip caches (AT91SAM9G20)	
Memory:	2Gb Flash, 128 MB SRAM (Hynix)	
Linedriver	ISL41334	Intersil
RTC	ISL1208IU8Z	Intersil
DAC	DAC122S085	National
T-sensor	SE95DP-T	NXP
V-ref	AP431ARG-7	Diodes
POE	SI3401	Silicon Labs
Currentlimiter	FPF2143	Fairchild



OC8-S PRICING (excl VAT)

System: 400MHz, 128MB SDRAM, 2Gb Flash

Realtime-OS, Linux

Type	24 GPIO 4 ADC 5 UART 2 SPI 1 I2C 2 IRQ 1 NRST 1 Ethernet	1 USB Device	2 USB host	USB EMI filter	Voltage reference	LINEDRIVER:uart1	PoE	DAC	I-controller	Realtimedclock	T-sensor	Eval KIT €	100 €/pc ^(*)	5000 €/pc
OC8-SDLICRPT	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	259	87	77
OC8-SN	✓	✓	✓	-	-	-	-	-	-	-	-		63	56

Availability: feb-2009

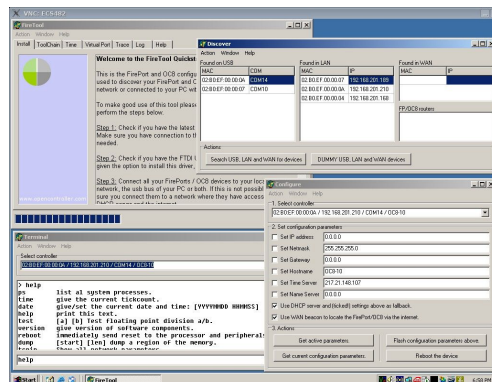
CERTIFIED Embedded system codebase (SIL, MISRA)

The OC8 codebase has become certified by LaQuSo. The awarded certificate means that the code quality complies to IEC 61508 SIL1 and MISRA 2004 derived rules.



Comprehensive network control tools

An all in one set of tools for managing OC8 devices is delivered free of charge



Quality

EMI: Compliant with CISPR22 Class B
EMC: Compliant with EN55022

Environment

Opencontroller is committed to being a leader in the device networking industry in protecting the environment. Opencontroller is committed to comply with the requirements of all applicable environmental legislation and regulations, including the restriction of hazardous substances in our products.



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Evaluation KIT OC8 (219 euro)

The evaluation kit contains:

- OC8 controller
- IO Card (8 800mA 60VDC optocoupled relays)
- IO Card (10 GPIO)
- www.opencontroller.com for other Cards



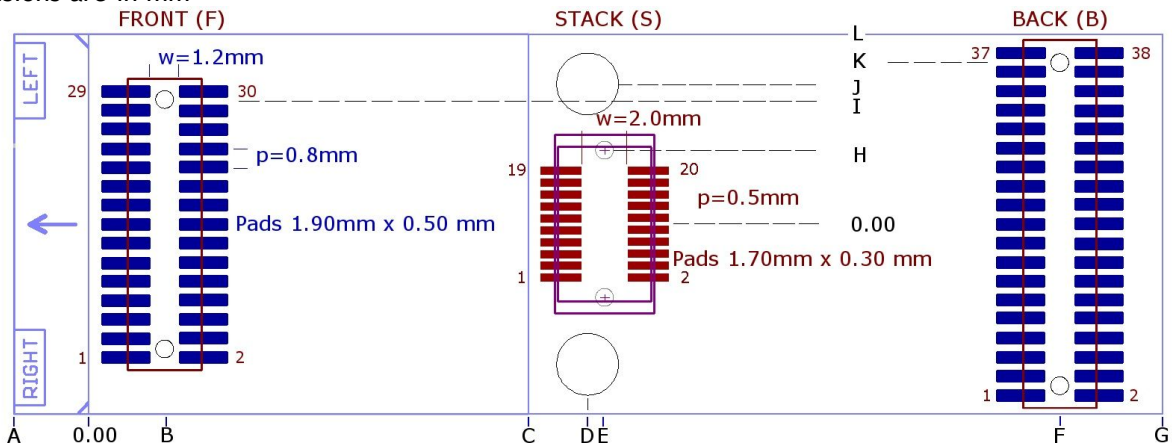
The OC8 front panel gives access to following:

- USB
- mini USB for chip programming via USB to JTAG conversion
- micro SD for additional storage capacity (FAT file system)
- Navigation button, 4 directions and select function
- OLED display (128 * 64 white pixels)
- Signaling/error LED
- mini USB activity LED
- Blue 'ON' status LED
- 8 Green LED's for additional signaling
- Wireless antenna, RP-SMA flange



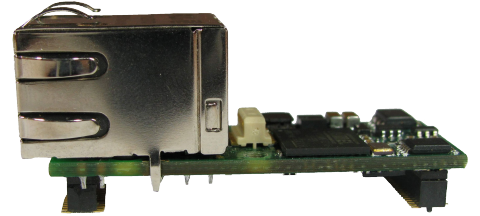
PINOUT (topview)

All dimensions are in mm



Name	Pin #	Function OC8-N	Function OC8-S	Name	Pin #	Function OC8-N	Function OC8-S
BACK (B) CONNECTOR (OUPIIN 2081-2x19G15DP 0.8mm. Suitable PCB header OUPIIN 2082-2x19G15DP series)							
TX1+	B38	UART 1 TX+RS422/485	UART 1 TX+RS422/485	CNL	B37	CAN L	UART / CAN L
TX1	B36	UART 1 TX	UART 1 TX	CNH	B35	CAN H	UART / CAN H
RX1+	B35	UART 1 RX+RS422/485	UART 1 RX+RS422/485	POUT	B33	5V@200mA output	5V@200mA output
RX1	B32	UART 1 RX	UART 1 RX	VREF	B31	4,62 V	4,62 V
CTS1	B30	UART 1 CTS	UART 1 CTS	GND	B29	Ground	Ground
RTS1	B28	UART 1 RTS	UART 1 RTS	VA	B27	DAC chA [0 - 4,62V]	DAC chA [0 - 4,62V]
DTR1	B26	UART 1 DTR	UART 1 DTR	VB	B25	DAC chB [0 - 4,62V]	DAC chB [0 - 4,62V]
DSR1	B24	UART 1 DSR	UART 1 DSR	VCC	B23	5V power	5V power
GP05	B22	GPIO PA13	GPIO PA30 UART 3 RX	IA	B21	I chA [0 - 20mA]	I chA [0 - 20mA]
GP08	B20	GPIO PB27	GPIO PA301 UART 3 TX	GP12	B19	GPIO PB12	GPIO PB18
IRQ1	B18	IRQ1 [input]	IRQ1 [input]	GP06	B17	GPIO PB19	GPIO PB19
VBAT	B16	3v3 in RTC battery	3v3 in RTC battery	OMISO	B15	SPI 0 MISO / GPIO 15	SPI 0 MISO / GPIO 15
GP02	B14	GPIO PB28	GPIO PB17	OMOSI	B13	SPI 0 MOSI / GPIO 16	SPI 0 MOSI / GPIO 16
GP01	B12	GPIO PB30	GPIO PB30	OCLK	B11	SPI 0 CLK / GPIO 17	SPI 0 CLK / GPIO 17
GP07	B10	GPIO PB29	GPIO PB31	OCS3	B9	SPI 0 CS3 / GPIO 18	SPI 0 CS3 / GPIO 18
SDA	B8	I2C data	I2C data	OCS1	B7	SPI 0 CS1 / GPIO 19	SPI 0 CS1 / GPIO 19
SCL	B6	I2C clock	I2C clock	OCS0	B5	SPI 0 CS0 / GPIO 20	SPI 0 CS0 / GPIO 20
AD4	B4	Analog in [0 - 5V] AD5	Analog in [0 - 5V] AD4	AD2	B3	Analog in [0 - 5V] AD7	Analog in [0 - 5V] AD2
AD3	B2	Analog in [0 - 5V] AD4	Analog in [0 - 5V] AD3	AD1	B1	Analog in [0 - 5V] AD6	Analog in [0 - 5V] AD1
FRONT (F) CONNECTOR (OUPIIN 2081-2x15G15DP 0.8mm. Suitable PCB header OUPIIN 2082-2x15G15DP series)							
USBH1-	F29	-	USB host 1 -	USBH1+	F30	-	USB host 1 +
POE+	F27	POE rectified high volts+	POE rectified high volts+	CTS0	F28	UART 0 CTS / GPIO 21	UART 0 CTS / GPIO 21
POE-	F25	POE rectified high Volts-	POE rectified high Volts-	RTS0	F26	UART 0 RTS / GPIO 22	UART 0 RTS / GPIO 22
USBH2+	F23	-	USB host 2 +	TX0	F24	UART 0 TX / GPIO 23	UART 0 TX / GPIO 23
USBH2-	F21	-	USB host 2 -	RX0	F22	UART 0 RX / GPIO 24	UART 0 RX / GPIO 24
GP25	F19	-	GPIO PB12 UART 5 TX	NRST	F20	Reset-line [in & out]	Reset-line [in & out]
GP26	F17	-	GPIO PB13 UART 5 RX	GND	B29	Ground	Ground
JSEL	F15	JTAG select	JTAG select	GP09	F16	GPIO PB26	GPIO PB16
ERASE	F13	Hard erase	Hard erase	GP11	F14	GPIO PB20	GPIO PB8 UART 2 TX
TDI	F11	JTAG	JTAG	GP03	F12	GPIO PB23	GPIO PB9 UART 2 RX
TMS	F9	JTAG	JTAG	GP04	F10	GPIO PB22	GPIO PA4 UART 2 RTS
TCK	F7	JTAG	JTAG	GP10	F8	GPIO PB21	GPIO PA5 UART 2 CTS
TDO	F5	JTAG	JTAG	IRQ0	F6	IRQ0 [input]	IRQ0 [input]
DRXD	F3	UART 4 RX & debug RX	UART 4 RX & debug RX	DDP	F4	USB device +	USB device +
DTXD	F1	UART 4 TX & debug TX	UART 4 TX & debug TX	DDM	F2	USB device -	USB device -

Table 1: Back and Front connector



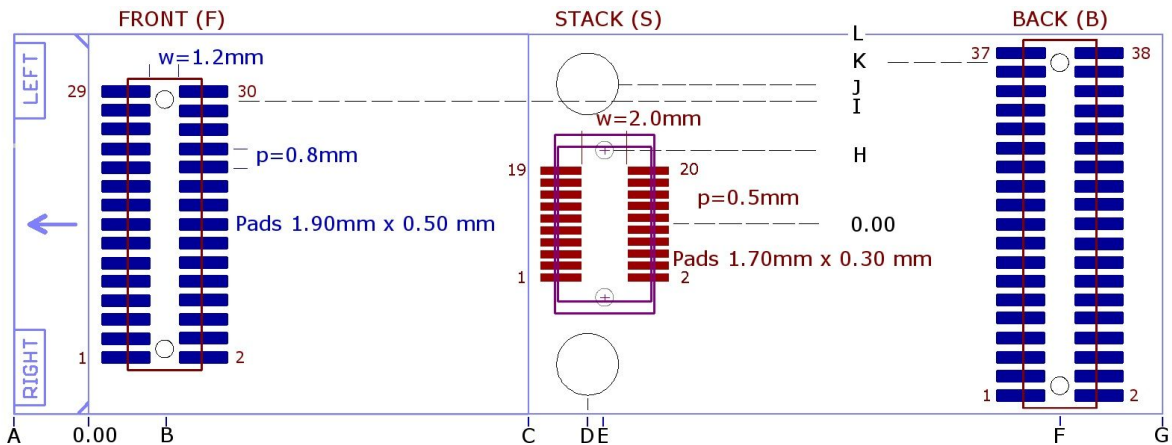
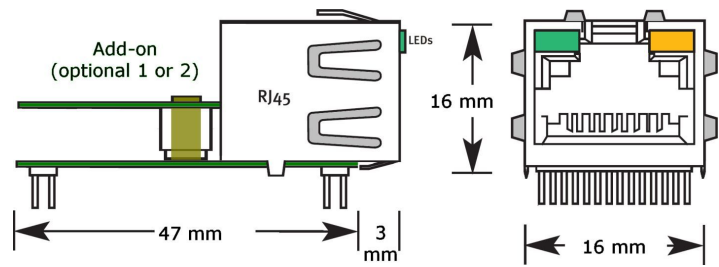
Name	Pin #	Function OC8-N	Function OC8-S	Name	Pin #	Function OC8-N	Function OC8-S
STACK (S) CONNECTOR (OUPIIN 2317-20G15DPT 0.5mm. Suitable PCB header OUPIIN 2342-20G15DP4 series 0.5mm pitch 5.0 mm stacking height)							
VCC	F19	5V power in	5V power in	DRXD	F20	UART 4 RX & debug RX	UART 4 RX & debug RX
NRST	F17	Reset-line [in & out]	Reset-line [in & out]	DTXD	B29	UART 4 TX & debug TX	UART 4 TX & debug TX
JSEL	F15	JTAG select	JTAG select	GP27	F16	GPIO PA2	GPIO PA6
3V3	F13	3V3 power [150mA max]	3V3 power [150mA max]	IRQ1	F14	IRQ 1	IRQ 1
TMS	F11	JTAG	JTAG	GND	F12	Ground	Ground
TCK	F9	JTAG	JTAG	1CS3	F10	SPI 1 CS3	SPI 1 CS3
TDO	F7	JTAG	JTAG	1CS0	F8	SPI 1 CS0	SPI 1 CS0
TDI	F5	JTAG	JTAG	1CLK	F6	SPI 1 CLK	SPI 1 CLK
SDA	F3	I2C data	I2C data	1MOSI	F4	SPI 1 MOSI	SPI 1 MOSI
SCL	F1	I2C clock	I2C clock	1MISO	F2	SPI 1 MISO	SPI 1 MISO

Table 2: Stack connector

Table 1 & 2 notes:

- GPIO operate on 3v3
- I2C and ADC's are 5V tolerant

DIMENSIONS



OC8 and OC8-S dimensions in mm [100 μ m tolerance unless otherwise notified].

Item	Value [mm]	Item	Value [mm]
A	-3.10 (outside PCB area)	I	5.25
B	3.35 \varnothing 0.5 mm [+0.1 -0.0]	J	5.90
C	18.50	H	3.10
D	21.00 [M2] \varnothing 2.00 mm[+/- 0.05]	K	6.80
E	21.70 \varnothing 0.5 mm [+0.1 -0.0]	L	8.00
F	42.05		
G	47.00		

Table 3: dimensions

Table 3 notes:

- PCB starts at origin 0.00mm
- RJ45 jack stops at line C [150 μ m tolerance]