uCP1020

Industrial / IoT Gateway

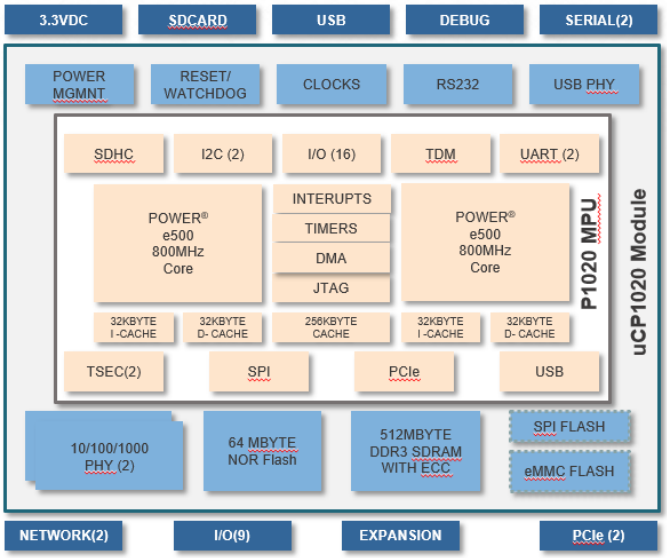
overview

The uCP1020 is a compact (80mm x 80mm) System-on-Module (SoM) designed for communication and data delivery applications that require a combination of CPU performance, high-throughput network processing and rugged operation. The module uses a dual-core, 800MHz NXP™ P1020 Power™ architecture, communications processor with integrated Gigabit Ethernet interfaces. Two PCIe lanes provide high-performance peripheral support for Wi-Fi, 3G/4G wireless connectivity or mass storage. Flexible memory configurations for NOR flash, DDR3-SDRAM with ECC (error correction) and eMMC are available.

The P1020 processor supports various serial, I/O and peripheral device interconnects. It has an Integrated Security Engine (ISE) to meet the secure data communication and storage requirements of gateways, edge access and remote site equipment.

The uCP1020 module includes all necessary subsystems, simplifying integration by requiring only minimal external circuitry and connectors. The module integrates into end-product using a 120pin board-to-board connector, it uses industrial rated parts (-40 to +85C) and requires passive cooling, no fan or moving parts.

A complete development kit with Linux software distribution is available.



Industrial / IoT Gateway / Communications

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features

Hardware Platform

- NXP QorIQ P1020 processor (P1010, P2020 optional)
- 800MHz CPU operating frequency
- 512MByte ECC DDR3-SDRAM (optional 512MByte-4GByte)
- 64MByte NOR flash (optional 8-128MByte)
- 4GByte eMMC flash memory (optional 4-32GByte)
- 1Mbyte SPI flash with lockable sectors (optional)
- 2x eTSEC 10,100,1000 Ethernet
- IEEE-1588 Network Time Synchronization
- 2x PCI Express revision 1.0A (two Lanes total)
- Up to 2x SERDES
- 2x UARTS with CTS and RTS controls
- SPI with 3x chip selects
- USB - Universal Serial Bus 2.0 Host Interface
- eSDHC – Enhanced Secure Digital Host Controller (SDcard/MMC)
- I2C peripheral interface
- Up to 9x general purpose I/O signals
- Up to 3x IRQ inputs and one IRQ output
- +3.3VDC ± 5%, 5W max (TBR)
- Parts rating -40°C to +85°C
- 120-pin Samtec Part Number QSH-060-01-S-D-A

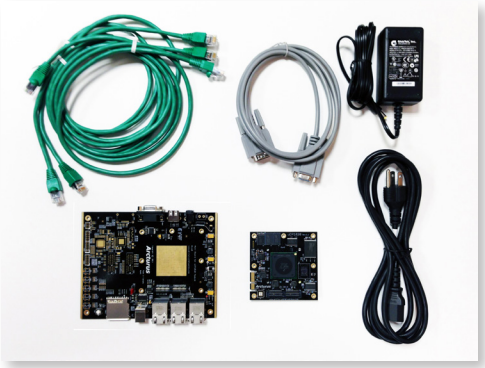
Software

- Linux kernel version 4.1.25 (or newer)
- U-Boot – 2016.09 (or newer), GCC 4.9.3, GNU binutils 2.24
- Libc: uclibc-ng-1.0.11
- Virtualization: KVM,LXC, libvirt (Hypervisor)
- Integrated Application Specific Fast (ASF) Path enhancements
- Drivers: I2C, IEEE1588, PCIe, Power Management, SDHC, SEC, SPI, TDM, USB, TSEC/FEC, Watchdog
- Performance Benchmarks: Linux IPFWD with ASF, Linux IPSEC with ASF, Linux Termination, Linux NAS, Linux RAID, Linux SATA

development kit

Development Kit Includes

- uCP1020 Module (p/n uCP1020-64EE512-800-0U1-XR)
- 64MByte NOR, 2x Ethernet, 512MByte DDR3-SDRAM w/ECC
- Host board, cables, power supply
- Schematics, getting started guide (download)
- One year of support site access
- One year of installation support and maintenance
- Documentation (download)
- Linux software distribution (download)

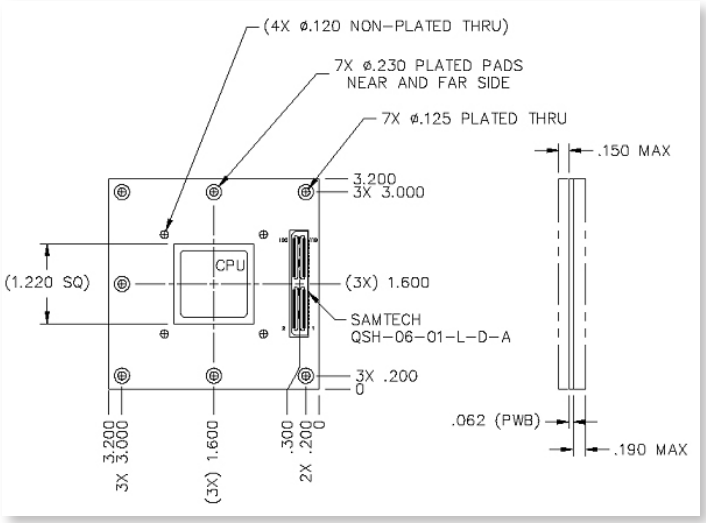


parts and physical

Physical	Description
Dimensions (Module)	80mm x 80mm
Operating Range (parts)	-40 to +85C non-condensing
Junction Temperature Rating	-40 to +125C non-condensing

Power	Specification
Supply voltage	3.3
Tolerance range	+/- 5%
Watts	6 (typical)

Part Number	Description
uCP1020 Development Kit	Development Kit
uCP1020-64EE512-800-0U1-XR	uCP1020 Module 64Mbyte NOR Flash, 2x Ethernet, 512Mbyte DDR3-SDRAM w/ EEC



- *Dual-Core Power Architecture*
- *High-Speed Data Processing*
- *Advanced Communication Peripherals*
- *Module and Development Kit*
- *Linux Software Distribution*

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specification

Pin	Signal	Description	Pin	Signal	Description
1	GIGE_2_LED1	Ethernet 2 Activity LED	61	GND	Ground
2	GIGE_2_BI_DC_P	Ethernet 2 Bi-directional Pair C+	62	GND	Ground
3	GIGE_2_LED2	Ethernet 2 Link LED	63	IRQ0	IRQ 0
4	GIGE_2_BI_DC_M	Ethernet 2 Bi-directional Pair C-	64	SD_RX_0	PCI Express Lane 0 Serial Data Input +
5	GIGE_3_LED1	Ethernet 3 Activity LED	65	IRQ1	IRQ 1
6	GIGE_2_BI_DD_P	Ethernet 2 Bi-directional Pair D+	66	#SD_RX_0	PCI Express Lane 0 Serial Data Input -
7	GIGE_3_LED2	Ethernet 3 Link LED	67	IRQ2	IRQ 2
8	GIGE_2_BI_DD_M	Ethernet 2 Bi-directional Pair D-	68	GND	Ground
9	GIGE_1_LED1	Ethernet 1 Activity LED	69	IRQ3	IRQ 3
10	GIGE_2_BI_DB_M	Ethernet 2 Bi-directional Pair B-	70	SD_TX_0	PCI Express Lane 0 Serial Data Output +
11	GIGE_1_LED2	Ethernet 1 Link LED	71	IRQ5	IRQ 5
12	GIGE_2_BI_DB_P	Ethernet 2 Bi-directional Pair B+	72	#SD_TX_0	PCI Express Lane 0 Serial Data Output -
13	TSEC_1588_ALARM_OUT1	IEEE-1588 Alarm Output 1	73	GND	Ground
14	GIGE_2_BI_DA_M	Ethernet 2 Bi-directional Pair A-	74	GND	Ground
15	TSEC_1588_ALARM_OUT2	IEEE-1588 Alarm Output 2	75	I2C1_SCL	I2C Serial Clock
16	GIGE_2_BI_DA_P	Ethernet 2 Bi-directional Pair A+	76	SD_REF_CLK_1	SerDes High Speed Interface Reference clock 1 +
17	TESC_1588_TRIG_IN1	IEEE-1588 Trigger Input 1	77	I2C1_SDA	I2C Serial Data
18	GIGE_3_BI_DA_P	Ethernet 3 Bi-directional Pair A+	78	#SD_REF_CLK_1	SerDes High Speed Interface Reference clock 1 -
19	TESC_1588_TRIG_IN2	IEEE-1588 Trigger Input 2	79	GPIO13	General Purpose I/O 13
20	GIGE_3_BI_DA_M	Ethernet 3 Bi-directional Pair A-	80	GND	Ground
21	TSEC_1588_PULSE_OUT1	IEEE-1588 Pulse Output 1	81	GPIO12	General Purpose I/O 12
22	GIGE_3_BI_DB_P	Ethernet 3 Bi-directional Pair B+	82	SD_TX_1	PCI Express Lane 1 Serial Data Output +
23	TSEC_1588_PULSE_OUT2	IEEE-1588 Pulse Output 2	83	GPIO11/USB_PCTL1	General Purpose I/O 11
24	GIGE_3_BI_DB_M	Ethernet 3 Bi-directional Pair B-	84	#SD_TX_1	PCI Express Lane 1 Serial Data Output -
25	UART_SOUT0	UART 0 Serial Data output	85	GPIO10/USB_PCTL0	General Purpose I/O 10
26	GIGE_3_BI_DC_P	Ethernet 3 Bi-directional Pair C+	86	GND	Ground
27	UART_SIN0	UART 0 Serial Data Input	87	GND	Ground
28	GIGE_3_BI_DC_M	Ethernet 3 Bi-directional Pair C-	88	SD_RX_1	PCI Express Lane 1 Serial Data Input +
29	UART_CTS0	UART 0 Clear to Send Input	89	5VDC	Not Used
30	GIGE_3_BI_DD_P	Ethernet 3 Bi-directional Pair D+	90	#SD_RX_1	PCI Express Lane 1 Serial Data Input -
31	UART_RTS0	UART 0 Request to Send Output	91	USB_VBUS	USB VBUS Voltage
32	GIGE_3_BI_DD_M	Ethernet 3 Bi-directional Pair D-	92	GND	Ground
33	UART_CTS1	UART 1 Clear to Send Input	93	VBUS_CONTROL	USB External +5V Enable. Used to enable VBUS
34	GIGE_1_BI_DA_P	Ethernet 1 Bi-directional Pair A+	94	USB_DP	USB Data +
35	UART_RTS1	UART 1 Request to Send Output	95	USB_ID	USB Device ID. A-Device=0, B-Device=1
36	GIGE_1_BI_DA_M	Ethernet 1 Bi-directional Pair A-	96	USB_DM	USB Data -
37	UART_SOUT1	UART 1 Serial Data Output	97	USB_EXTVBUS	USB External VBUS Detect
38	GIGE_1_BI_DB_P	Ethernet 1 Bi-directional Pair B+	98	GND	Ground
39	UART_SIN1	UART 1 Serial Data Input	99	SDHC_CLK	No connect used on module for SPI Flash
40	GIGE_1_BI_DB_M	Ethernet 1 Bi-directional Pair B-	100	SDHC_DAT_4_SPI_CS_0	No connect used on module for SPI Flash
41	TDM_RX_DATA/GPIO4/IRQ11	General Purpose I/O 4 / IRQ11	101	SDHC_CMD	No connect used on module for SPI Flash
42	GIGE_1_BI_DC_P	Ethernet 1 Bi-directional Pair C+	102	SDHC_DAT_5_SPI_CS_1	SPI Chip Select 1
43	TDM_RFS/GPIO3/IRQ10	General Purpose I/O 3 / IRQ10	103	SDHC_DAT_0	No connect used on module for SPI Flash
44	GIGE_1_BI_DC_M	Ethernet 1 Bi-directional Pair C-	104	SDHC_DAT_6_SPI_CS_2	SPI Chip Select 2
45	TDM_TFS/GPIO1/IRQ8	N/C - used on module for TEC3 PHY	105	SDHC_DAT_1	N/C - used on module for SPI Flash
46	GIGE_3_BI_DD_P	Ethernet 1 Bi-directional Pair D+	106	SDHC_DAT_7_SPI_CS_3	SPI Chip Select 3
47	TDM_TX_DATA_/GPIO0/IRQ7	General Purpose I/O 0 / IRQ7	107	SDHC_DAT_2	No connect used on module for SPI Flash
48	GIGE_3_BI_DD_M	Ethernet 1 Bi-directional Pair D-	108	GPIO8/#SDHC_CD	General Purpose I/O 8
49	TDM_TX_CLK_/GPIO2/IRQ9	General Purpose I/O 0 / IRQ9	109	SDHC_DAT_3	No connect used on module for SPI Flash
50	GND		110	GPIO9/SDHC_WP	General Purpose I/O 9
51	TDM_RX_CLK_/IRQ6	N/C used on module for TSEC2 PHY	111	GND	Ground
52	TSEC_1588_CLK_OUT	IEEE-1588 Clock Output	112	GPIO15_WD	GPIO15 connected to WD. Connect GND to disable WD
53	GPIO5	General Purpose I/O 5	113	SPI_CLK	SPI Clock
54	TSEC_1588_CLK_IN	IEEE-1588 Clock Input	114	THERM2	Open-drain Output from Remote Thermal Sensor
55	GPIO6	General Purpose I/O 6	115	SPI_MISO	SPI Master In Slave Out
56	GND	Ground	116	THERM1	Open-drain Output from Remote Thermal Sensor
57	GPIO7	General Purpose I/O 7	117	SPI_MOSI	SPI Master Out Slave In
58	SD_REF_CLK_0	SerDes High Speed Reference clock 0 +	118	#MR	Master Reset Input (active low)
59	IRQ_OUT_B	IRQ Output	119	GPIO14	General Purpose I/O 14
60	#SD_REF_CLK_0	SerDes High Speed Reference clock 0 -	120	#RESET	Rest Output (active low)