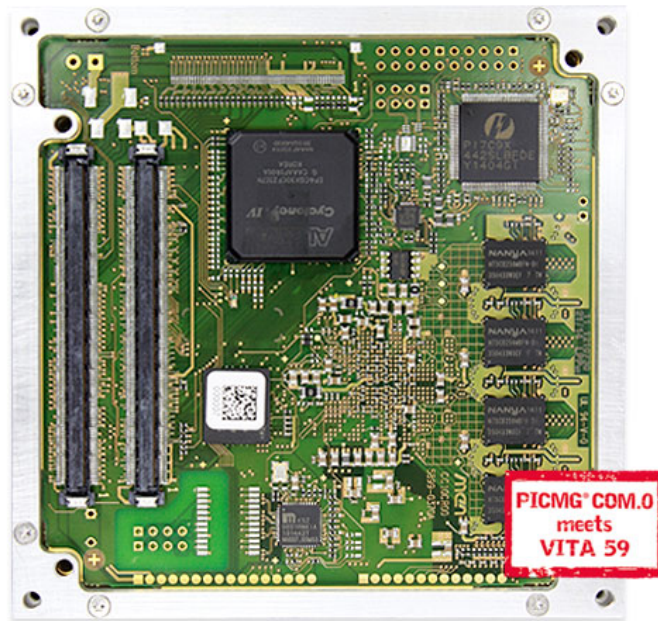


CC10C – Rugged COM Express® (VITA 59 RCE) with ARM® i.MX 6

- Freescale™ ARM® i.MX 6 Series
- Quad-core processor
- Comprehensive usage of i.MX 6 I/O
- Configurable FPGA I/O with 140 pins
- Maximum flexibility in interface configuration
- Up to 4 GB DDR3 SDRAM
- eMMC multimedia card
- U-Boot Universal Boot Loader
- -40°C to +85°C Tcase guaranteed with qualified components
- Conduction cooling
- VITA 59 in process, compliant with COM Express® Compact, type 6
- PICMG COM.0 COM Express® version also available



The CC10C is a Rugged COM Express® module (RCE) built around the Freescale™ ARM® i.MX 6 series of processors with a Cortex®-A9 architecture. Supporting different types of the i.MX 6Solo, 6DualLite, 6Dual and 6Quad families, the computer-on-module is widely scalable, e.g., to processing or graphics requirements. Where less performance is needed, you can optimize costs by choosing a single- or dual-core processor instead of a quad core.

Rugged COM Express® modules are 100% compatible to COM Express® but conform to the new VITA 59 standard (in process) which specifies the mechanics to make COM Express® modules suitable for operation in harsh environments. The CC10C is based on the "Compact", 95 x 95 mm form factor and Type 6 connector pin-out, and can even be semi-customized to become a standard COM Express® module, without much additional design effort.

With RCE-compliant mechanics for [conduction cooling](#), the module's size extends to 105 x 105 mm. It is embedded in a covered frame ensuring EMC protection and allowing efficient conductive cooling. Air cooling is also possible by applying a heat sink on top of the cover. Its optimized mechanics let the CC10C support an extended operating temperature range of -40 to +85°C.

The exclusive use of soldered components ensures that the COM withstands shock and vibration. The design is optimized for conformal coating.

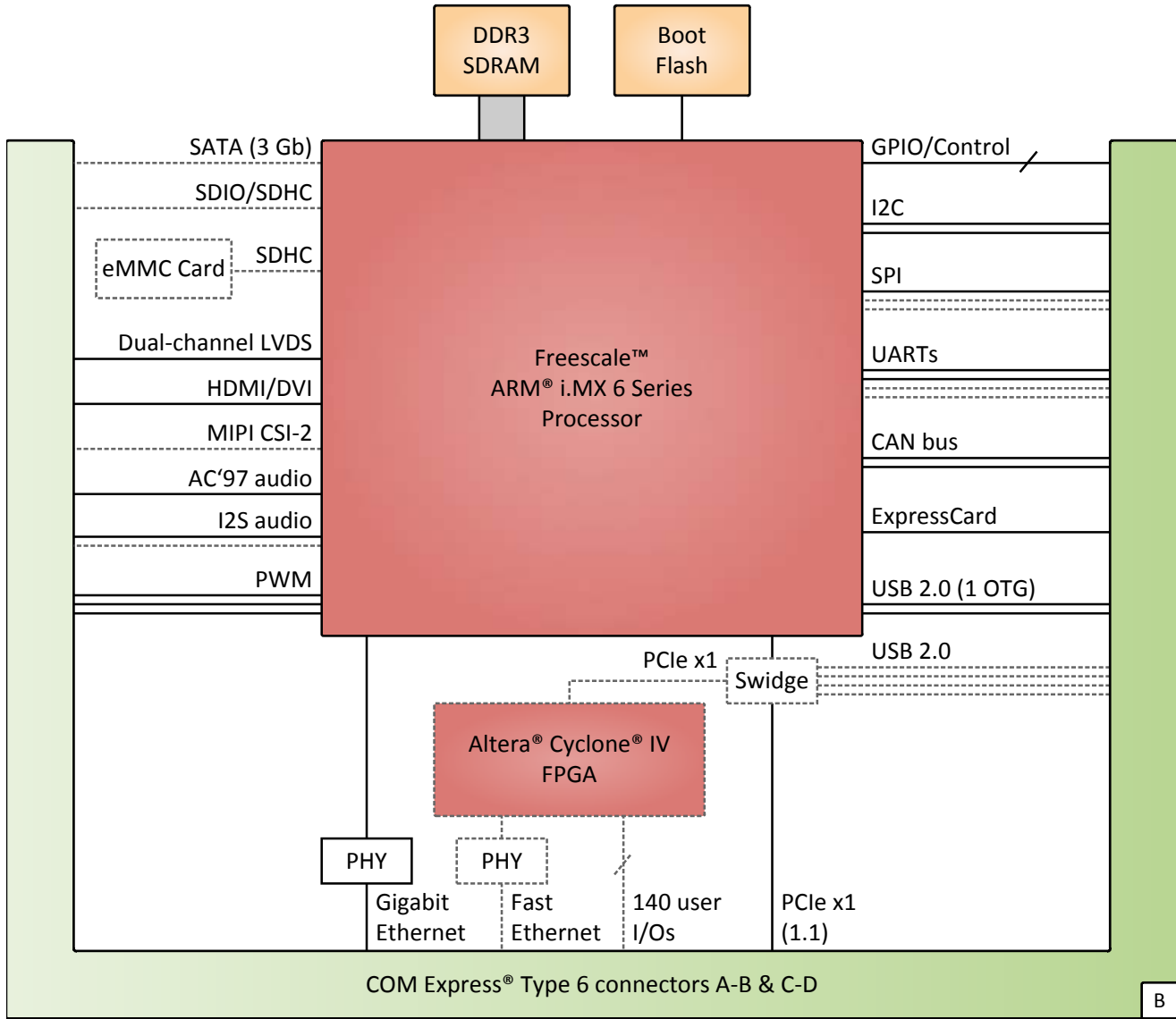
Adding to its rugged design, the computer-on-module's range of supported functions leave almost nothing to wish for. With a maximum of 4 GB DDR3 RAM and an onboard eMMC device, the CC10C covers all basic memory needs. 3-Gbit SATA is provided for external mass storage.

One of the biggest strengths of the CC10C lies in its I/O flexibility. The i.MX 6 provides an abundance of onchip controllers and interfaces, including Gigabit Ethernet, USB 2.0 (also with OTG/client support) and PCI Express®. Different video outputs like LVDS and HDMI/DVI, audio and an optional camera interface make the card fit for multimedia applications. Other serial ports provide UARTs or CAN bus. Where the processor's standard functions are not a perfect match, an onboard FPGA opens up 140 signal pins for user I/O. As IP cores are easy to integrate, the CC10C becomes a semi-custom solution with the suitable functionality even for more specialized applications. The resulting I/O functionality in the ordered version depends on the customer's requirements and will always be a tailored combination of i.MX 6 and FPGA-based I/O, without the need for a completely new design.

For evaluation and development purposes a microATX carrier board, the [XC15](#), is available.



Diagram



B Onboard Options

Technical Data

CPU	<ul style="list-style-type: none">■ Freescale™ ARM® i.MX 6 Series (ARM® Cortex®-A9 architecture)■ The following CPU types are available:<ul style="list-style-type: none">□ i.MX6S (i.MX 6Solo family)□ i.MX6DL (i.MX 6DualLite family)□ i.MX6D (i.MX 6Dual family)□ i.MX6Q (i.MX 6Quad family)■ See overview of supported processor types for processor options and a feature matrix of the i.MX 6 series.
Memory	<ul style="list-style-type: none">■ System Memory<ul style="list-style-type: none">□ Soldered DDR3□ 1 GB, 2 GB, or 4 GB■ Boot Flash<ul style="list-style-type: none">□ 4 MB, 8 MB, or 16 MB
Mass Storage	<ul style="list-style-type: none">■ The following mass storage devices can be assembled:<ul style="list-style-type: none">□ eMMC device, soldered; different sizes available
Graphics	<ul style="list-style-type: none">■ Integrated in i.MX 6 processor■ Multi-stream-capable HD video engine delivering up to 1080p60 decode, 1080p30 encode and 3D video playback in HD■ Maximum resolution: 1920 x 1200 pixels (WUXGA)■ Superior 3D graphics performance with up to four shaders performing 200 Mt/s and OpenCL™ support■ Separate 2D and/or OpenVG Vertex acceleration engines for optimal user interface experience■ Stereoscopic image sensor support for 3D imaging

Technical Data

Onboard Interfaces

- Available via COM Express® connectors
- Video
 - One HDMI/DVI interface
 - One LVDS interface, dual-channel
 - One MIPI CSI-2 camera serial host interface; optional
- Audio
 - One AC'97 audio interface
 - One I2S audio interface
- SATA
 - One channel, SATA Revision 2.x (3 Gbit/s); only with i.MX6D or i.MX6Q
- SDIO/SDHC
 - One channel for MMC/SD/SDIO cards
- USB
 - Two host channels, USB 2.0 (480 Mbit/s), or
 - Six host channels, USB 2.0 (480 Mbit/s)
 - One channel always implemented as OTG (On-The-Go) host/client channel
- Ethernet
 - One channel, 1000BASE-T (1 Gbit/s)
 - One channel, 100BASE-T (100 Mbit/s); optional
 - Two link and activity LED signals per channel
- PCI Express®
 - One x1 link (250 MB/s per link), PCIe® 1.1 (2.5 Gbit/s per lane)
- ExpressCard®
 - One interface
- CAN bus
 - Two CAN bus channels, 2.0B CAN protocol, 1 Mbit/s
 - Two additional CAN bus channels, 2.0A/B CAN protocol, 1 Mbit/s; with FPGA; optional
 - External transceivers to be implemented on carrier board
- UART
 - Up to six interfaces, up to 4 Mbit/s
 - Physical interfaces RS232 or RS422/RS485 depending on interface controller and implementation on carrier board
- PWM
 - Three PWM interfaces
- I2C
 - Up to four I2C interfaces
- SPI
 - Up to three SPI interfaces
- COM Express® control signals
 - Four COM Express® control signals
- GPIO
 - 9 GPIO lines, 4 GPO lines, 3 GPI lines
 - 64 GPIO lines, with FPGA; optional

FPGA

- No FPGA assembled, with custom configuration of i.MX 6 I/O interfaces, or
- FPGA Altera® Cyclone® IV, with custom IP core and i.MX 6 I/O configuration
 - Total available pin count: 140 pins on COM Express® connectors
- [The IP cores that make sense and/or can be implemented depend on the board model, available pin counts and number of logic elements. Please contact MEN for information on feasibility.](#)

Supervision and Control

- Power supervision and watchdog
- Temperature measurement
 - i.MX 6 temperature measurement
 - Additional onboard temperature sensor; optional
- Real-time clock, with supercapacitor or battery backup on the carrier board

Technical Data

Computer-On-Module Standard

- CC10C: VITA 59 RCE: Rugged COM Express® in process
 - With conduction cooling cover and frame
 - Rugged COM Express® Compact, Module Pin-out Type 6
- CC10: PICMG COM.0 COM Express® Module Base Specification
 - COM Express® Compact, Module Pin-out Type 6

Electrical Specifications

- Supply voltage
 - +12 V (9 to 16 V)
- Power consumption
 - 12 W, measured in stress test using 15CC10C00, i.MX6Q quad-core @ 1.0 GHz
 - 7.4 W, measured in test (activity on Gb Ethernet and 1 USB interface) using 15CC10C00, i.MX6Q quad-core @ 1.0 GHz
 - 5 W, measured in test (activity on Gb Ethernet and 1 USB interface) using 15CC10-00, i.MX6S single-core @ 800 MHz

Mechanical Specifications

- Dimensions
 - 105 mm x 105 mm x 18 mm (models conforming to VITA 59 RCE Compact format, PCB mounted between a cover and a frame)
 - 95 mm x 95 mm (models conforming to PICMG COM.0 COM Express® Compact format)
- Weight
 - 356 g (model 15CC10C00)
 - 40 g (model 15CC10-00)

Environmental Specifications

- Temperature range (operation)
 - -40°C to +85°C Tcase (VITA 59 cover/frame) (qualified components) (model 15CC10C00)
 - -40°C to +85°C (qualified components) (model 15CC10-00)
- Temperature range (storage): -40°C to +85°C
- Cooling concept
 - Conduction-cooled (models conforming to VITA 59 RCE Compact format, PCB mounted between a cover and a frame)
 - Air-cooled (models conforming to PICMG COM.0 COM Express® Compact format)
- Relative humidity (operation): max. 95% non-condensing
- Relative humidity (storage): max. 95% non-condensing
- Altitude: -300 m to +3000 m
- Shock: 50 m/s², 30 ms (EN 61373)
- Vibration (function): 1 m/s², 5 Hz to 150 Hz (EN 61373)
- Vibration (lifetime): 7.9 m/s², 5 Hz to 150 Hz (EN 61373)
- Conformal coating; optional

Reliability

- MTBF
 - 652 986 h @ 40°C according to IEC/TR 62380 (RDF 2000) (model 15CC10C00)
 - 1 233 470 h @ 40°C according to IEC/TR 62380 (RDF 2000) (model 15CC10-00)

Safety

- Flammability
 - UL 94V-0

EMC

- EMC behavior generally depends on the system and housing surrounding the COM module.
- The Rugged COM Express® module in its cover and frame supports the system to meet the requirements of
 - EN 55022 (radio disturbance)
 - IEC 61000-4-2 (ESD)
 - IEC 61000-4-3 (electromagnetic field immunity)
 - IEC 61000-4-4 (burst)
 - IEC 61000-4-5 (surge)
 - IEC 61000-4-6 (conducted disturbances)

Software Support

- Linux (in preparation)
- VxWorks® (in preparation)
- [For more information on supported operating system versions and drivers see Downloads.](#)

Technical Data

BIOS

■ U-Boot Universal Boot Loader

Configuration & Options

Standard Configurations

Article No.	CPU	Memory	Storage	Multimedia	I/O	FPGA	Temperature	Standard Compliance
15CC10C00	i.MX6Q, 1 GHz	2 GB RAM, 4 MB Flash	1 SATA, 4 GB eMMC	LVDS, HDMI/DVI, AC'97, I2S	6 USB, Gb ETH, Fast ETH, UARTs, CAN, GPIO, PWM, I2C, SPI	Yes	-40..+85°C Tcase	VITA 59 RCE
15CC10-00	i.MX6S, 800 MHz	1 GB RAM, 4 MB Flash	4 GB eMMC	LVDS, HDMI/DVI, MIPI CSI, AC'97, I2S	2 USB, Gb ETH, UARTs, CAN, GPIO, PWM, I2C, SPI	No	-40..+85°C	PICMG COM.0

Ordering Information

Standard CC10C Models	15CC10-00	COM Express® "Compact", type 6, Freescale™ i.MX6S, 0.8 GHz, 1 GB RAM, 4 GB eMMC, 2 USB, 1 Gb ETH, no FPGA, -40..+85°C with qualified components; without VITA 59 conduction cooling frame
	15CC10C00	Rugged COM Express® "Compact", type 6, Freescale™ i.MX6Q, 1 GHz, 2 GB RAM, 4 GB eMMC, 6 USB, 1 Gb Ethernet, 1 Fast Ethernet, PCIe® 1.1, with FPGA, -40..+85°C Tcase with qualified components; with VITA 59 conduction cooling frame
Related Hardware	08XC15-00	XC15, evaluation and development board for COM Express® and Rugged COM Express® (VITA-59) modules
Miscellaneous Accessories	05CC10-00	Heat spreader for COM Express® CC10 and display controller CC10S
Software: Linux	This product is designed to work under Linux. See below for all available separate software packages.	
	13MD05-90	MDISS System (and Device Driver) Package (MEN) for Linux. This software package includes most standard device drivers available from MEN.
	13Z016-06	MDISS driver (MEN) for 16Z029_CAN (CANopen master)
	13Z100-91	Linux FPGA update tool (MEN)
Software: VxWorks®	This product is designed to work under VxWorks®. For details regarding supported/unsupported board functions please refer to the corresponding software data sheets.	
	13MD05-60	MDISS System Package (MEN) for VxWorks®
	13Z015-06	MDISS low-level driver sources (MEN) for 16Z029_CAN (MSCAN/Layer2)
	13Z016-06	MDISS driver (MEN) for 16Z029_CAN (CANopen master)
	13Z017-06	MDISS low-level driver sources (MEN) for 16Z034_GPIO, 16Z037_GPIO and 16Z127_GPIO
	13Z025-60	VxWorks® native driver (MEN) for 16Z025_UART, 16Z057_UART and 16Z125_UART
	13Z100-60	VxWorks® FPGA update tool (MEN)
For operating systems not mentioned here contact MEN sales .		
Documentation	Compare Chart Computer-On-Modules » Download	
	You can find the official COM Express® Carrier Design Guide directly on www.picmg.org .	
	20CC10C00	CC10C/CC10 User Manual

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