

F&S Embedded Solutions



V1.0



Product Families of high-class Embedded Solutions

Expandable, innovative development, customer solutions, excellent support & protect guarantee.



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Our Product Portfolio



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Committed to excellence

Consult – Know-how. Built-in. The technical competence from Rutronik

Worldwide and individual consulting on the spot: by competent sales staff, application engineers and product specialists.

Components – Variety. Built-in. The product portfolio from Rutronik

Wide product range of semiconductors, passive and electromechanical components, storage, displays & boards and wireless technologies for optimum coverage of your needs.

Logistics – Reliability. Built-in. The delivery service from Rutronik

Innovative and flexible solutions: from supply chain management to individual logistics systems.

Quality – Security. Built-in. Quality management without compromise

The integrated management system (IMS) encompasses quality control, environmental protection and occupational health and safety.

F&S Embedded Solutions

The market for industrial IT solutions is growing fast and there are uncountable new designs under development to build the Internet of Things & Services.

A lot of these developments would be based on ARM processor technologies in its different performance levels and families. At the beginning of such a development, when the decision has to be done, if the whole board design should be done from the customer as a total custom solution, or if it should be a combination of existing building blocks and a custom base board, Rutronik can support both ways.

With our FAEs for MCUs and other components, we can support customers for designs "from the scratch" and with our Rutronik EMBEDDED team, we can also support the other way around.

F&S is our long-term focus partner for solutions, based on ARM processor chipsets, made as Computer-On-Modules or Single-Board-Computers. With a COM as building block, customers can reduce their time-to-market and improve the flexibility in case of scalable processor performance and feature levels.

F&S has a broad portfolio on different COMs arranged in families for different markets and I/O demands. The Pico-COM series for instance could be used in more rugged applications, with its solid connector and the small form factor. With the efus series we can provide a solution for smarter and more price sensitive applications and a good roundup in case of processor scalability. During the past decade we successfully supported many customers in the medical market, for home-automation and for time critical designs.

With its bundled operating systems, like Windows Embedded Compact and Linux, F&S is not only offering bare hardware. All modules and boards come with all needed drivers and with a full software support around.



Mario Klug Senior Marketing Manager Embedded Boards & Systems

F&S can also load custom software images during the production process and is able to reduce in such cases as well the efforts in the customer assembling process.

If it happens, that a depopulation of some functions is needed to cut down the module or board prices, due to unneeded functions, like AUDIO, Ethernet, CAN or on-board flash, F&S can modify their solutions project based and fulfill project demands with best fitting products.

Even the armStone series, as 2.5" or so called pico-ITX SBCs, is an interesting family of boards, which could be used out of the box, similar to x86 processor based SBCs. If the feature set and connectivity, given from these boards are matching with the project demands, the development could be done much faster as with a COM design or a fully custom design. For fast running tenders in several markets, armStone boards could be suitable and reduce the time for ROI.

Whatever the future will bring, Rutronik and F&S are taking care of market trends and project demands.

We invite you to take a look at the following pages and introduce the world of ARM based solutions from F&S Elektronik Systeme, a reliable German board manufacturer located in Stuttgart.

Board Families



Board Family	armStone™	efus™	NetDCU	PicoCOM	PicoMOD	QBliss	PCOMnetA5
Board Type	SBC	COM	SOM	COM	COM	COM	SBC
Baseboard Complexity	-	easy	very easy	easy	easy	advanced	-
CPU Performance Up To	Cortex-A9	Cortex-A9	Cortex-A5	Cortex-A5	Cortex-A9	Cortex-A9	Cortex-A5
Windows	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
Linux	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
Android	-	\checkmark	-	-	-	-	-
Standard	PicolTX Formfaktor	F s	F s	F S	F s	Qseven	F S
LCD Interface	RGB, LVDS	RGB, LVDS	RGB	RGB	RGB, LVDS	LVDS	RGB
Screen	DVI	DVI	-	-	DVI	DVI	-
Color Depth Up To	24Bit	24Bit	24Bit	18Bit	24Bit	24Bit	18Bit
Resolution Up To	FullHD	FullHD	SVGA	SVGA	WXGA	FullHD	WVGA
DATA-BUS	-	-	-	-	\checkmark	-	-
Camera	-	\checkmark	-	-	\checkmark	\checkmark	-
Ethernet	2x	2x	2x	2x	1x	2x	2x
Power Supply	5V	5V	5V	3.3V	3.3V	5V	5V
Size (mm)	100x72	47x62.1	100x80	40x50	80x50	70x70	80x50
Plug Connector	66pin	MXM-2 230pin	142pin	80pin	140pin	MXM-2 230pin	-

armStone™

Solutions with Computer on Module (COM) need a base board; a Single Board Computer (SBC) in an established form factor offers an alternative. The armStone[™] modules in Pico-ITX form factor are perfectly suited for developing small, but high-performance applications.

- 100 x 72mm
- Single Voltage 5V or 12V
- RGB, LVDS, DVI, WLAN/BT
- Feature Connector 2.54mm
- PicoITX Single Board Computer

efus™

The efus[™] standard has a size of 47 x 62mm only. It is equipped with finger-type contacts for a common 230 pin on MXM2 edge connector (inexpensive and certified for automotive). The efus[™] product family from low cost to high performance.

- 47 x 62mm
- Single Voltage 5V
- RGB, LVDS, DVI
- MXM2 Goldfinger Connector, 230 pins, 0.5mm
- Camera, PCIe, SATA

QBliss (Qseven)

F&S Elektronik Systeme was one of the first board manufacturers introducing a Qseven form factor board with ARM-CPU.

- **70** x 70mm
- Single Voltage 5V
- WLAN/BT, MIPI CSI
- MXM2 Goldfinger Connector, 230 Pins, 0.5mm
- Cortex-A9 up to Quad-Core

PCOMnetA5

F&S Elektronik Systeme offers PCOMnetA5, a ready-to-use Single Board Computer based on our small and inexpensive form factor PicoCOM.

It consists of a compact base board with plugged-on PicoCOMA5-V3-W13/LIN.

This module has a size of 80 x 50mm and is based on a Freescale Vybrid ARM Cortex-A5 500MHz processor.

- **80** x 50mm
- Single Voltage 5V
- RGB
- Wifi

NetDCU

The NetDCU standard has a size of 80 x 100mm, including easy and robust 2.54mm connectors and 5V single supply. Only a very simple base board is needed additionally. Even the driver components for RS232, buffer for display signals and the Ethernet transformer are already available. All NetDCUs are pin compatible and therefore easy to exchange/scale.

- 100 x 80mm
- Single Voltage 5V
- RGB
- Robust 2.54mm Connector
- Very Easy Carrier Board
- No External Hardware Required

PicoCOM

The PicoCOM form factor has a size of 40 x 50mm, is extremely compact. It has a reliable 80pol SMD connector and 3.3V single supply. Only a simple base board is necessary additionally. The base board only needs driver components (RS232, RS485, CAN, Ethernet transformer) and bushes. The product range goes from ARM9-240MHz up to Cortex-A9 - 1GHz. All PicoCOM boards are pin compatible and therefore easy to exchange/scale.

- 40 x 50mm
- Single Voltage 3.3V
- ARM9 CortexA5/CortexA9
- Audio, 1-2 Ethernet, CAN
- Very Small
- Only one Connector with 80 Pins, 0,8 Pitch

PicoMOD

The PicoMOD standard has a size of 50 x 80mm (credit card sized), a reliable 140pol SMD connector, 3.3V single supply and only a (simple) base board is necessary additionally. On the base board only the driver components (RS232, RS485, CAN, Ethernet transformer) and the bushes are missing. The current product range goes from ARM9-400MHz up to Cortex-A9 - 1GHz. All PicoMOD boards are pin compatible and therefore easy to exchange/scale.

- **80** x 50mm
- Single Voltage 3.3V
- TFT, LVDS, DVI-D
- High Flexibility
- One Connector Only, 140 Pins, 0.8 Pitch
- Address- / Data-Bus
- Camera Interface



PicoCOMA5 COM with Freescale Vybrid Processor

For Industry and Medicine

PicoCOMA5 has a size of 40 x 50mm only, making it a perfect solution for hand-held products with TFT display in industrial and medical devices (temp. range: -20 to 85°C).

High Efficiency with ARM® Cortex®-A5 and -M4

The board runs on a high-performance Freescale Vybrid CPU (Cortex[®]-A5 @ 500MHz, Cortex[®]-M4 @ 167MHz). A special feature is its long-term availability of at least 10 years.

Numerous Interfaces

The module offers a large number of interfaces: Ethernet, 3x Serial, USB 2.0 Host/Device, I²C, SPI, CAN 2.0, I/O, Audio (Line IN/OUT), SD-Card and touch panel. PicoCOMA5 offers a flexible display interface to connect most TFTs via RGB (16/18bit) or LVDS (external). Resistive and capacitive touch panels can be connected as well.

Operating Systems

The integrated operating system (Windows Embedded CE 6.0 R3/Windows Embedded Compact 2013 or Linux Buildroot) supports all interfaces, which makes it easy to develop software without in-depth knowledge of hardware.

Туре	PCOMA5-V1	PCOMA5-V2	PCOMA5-V3
State	Production	Production	Production
CPU			
Туре	Freescale Vybrid	Freescale Vybrid	Freescale Vybrid
Core	ARM Cortex-A5	ARM Cortex-A5 + Cortex-M4	ARM Cortex-A5
No of Cores	Single-Core	Dual-Core	Single-Core
Frequency	500MHz	500MHz + 167MHz	500MHz
L2-Cache	512kB	512kB	512kB
GPU	NEON, FPU	NEON, FPU	NEON, FPU
OS			
Linux	Buildroot	Buildroot	Buildroot
Windows	WEC 2013, WCE 6.0	WEC 2013, WCE 6.0	WEC 2013, WCE 6.0
Real Time		MQX	
Memory			
Flash	128MB	256MB	128MB
RAM	256MB	256MB	256MB
Interfaces			
SD-Card	external	external	external
Ethernet	10/100Mb IEEE1588	10/100Mb IEEE1588	2x 10/100Mb IEEE1588
USB Host	1-2x	1-2x	1-2x
USB Device	1x	1x	1x
CAN	1-2x	1-2x	1-2x
UART	Зx	Зx	Зx
I2C	1-2x	1-2x	1-2x
SPI	1x	1x	1x
Audio	Line In/Out	Line In/Out	-
Touch Panel	4-wire, analog resisitive; PCAP-Touch via I2C	4-wire, analog resisitive; PCAP-Touch via I2C	4-wire, analog resisitive; PCAP-Touch via I2C
additional Interfaces	4x 12Blt ADC (opt.)	4x 12Blt ADC (opt.)	4x 12Blt ADC (opt.)
Display			
RGB	16/18Bit	16/18Bit	16/18Bit
LVDS	external	external	external
Common			
Supply Voltage	3.3V DC/± 5%	3.3V DC/± 5%	3.3V DC/± 5%
Power Consumption	1W typ.	1W typ.	1W typ.
Operating Tempe-	0 to 70°C	0 to 70°C	0 to 70°C
rature	(opt20 to 85°C)	(opt20 to 85°C)	(opt20 to 85°C)
Size	40x50mm (lxw)	40x50mm (lxw)	40x50mm (lxw)
Weight	~10g	~10g	~10g
Long Term Availability	2028	2028	2028



PicoCOMA9X COM with Freescale i.MX 6SoloX Processor

T	DOOMAOV VI	DOOMAOV VO	DOOMAOV VO
Туре	PCOWA9X-VI	PCUWA9X-V2	PCOWA9X-V3
State	Q1/16	Q1/16	Q1/16
CPU			
Туре	Freescale i.MX 6	Freescale i.MX 6	Freescale i.MX 6
Core	ARM Cortex-A9 + Cortex-M4	ARM Cortex-A9 + Cortex-M4	ARM Cortex-A9 + Cortex-M4
No of Cores	SoloX	SoloX	SoloX
Frequency	1GHz + 200MHz	1GHz + 200MHz	1GHz + 200MHz
L2-Cache	256KB	256KB	256KB
GPU	NEON	NEON	NEON
0S			
Linux	Buildroot	Buildroot	Buildroot
Windows	WEC 7, WEC 2013	WEC 7, WEC 2013	WEC 7, WEC 2013
Real Time	MOX	MOX	MOX
Memory		-	
Flash	256MB	256MB	256MB
RAM	256MB	256MB	256MB
eMMC		2GB	
Interfaces			
SD-Card	external	external	external
Ethernet	10/100Mb	10/100Mb	2x 10/100Mb
USB Host	1x	1x	1x
USB Device	1x	1x	1x
CAN	1-2x	1-2x	1-2x
LIART	2-3x	2-3x	2-3x
120	1x	1x	1x
SPI	1x	1	1x
Audio	Line In/Out	Line In/Out	17
Audio	Awiro	Line in/ Out	1 wiro
Touch Panel	analog resisitive; PCAP-Touch via I2C	analog resisitive; PCAP-Touch via I2C	analog resisitive; PCAP-Touch via I2C
Display			
RGB	16/18bit	16/18bit	16/18bit
Common			
Supply Voltage	3.3V DC/± 5%	3.3V DC/± 5%	3.3V DC/± 5%
Power Consumption	2W typ.	2W typ.	2W typ.
Operating Tempe-	0 to 70°C (opt -20 to 85°C)	0 to 70°C (opt -20 to 85°C)	0 to 70°C (opt -20 to 85°C)
Size	40x50mm (lxw)	40x50mm (lxw)	40x50mm (lxw)
Weight	~10g	~10g	~100
Long Term Availability	2028	2028	2028

For Industrial & Medical

PicoCOMA9X is another compact and high-performance module in PicoCOM form factor (40 x 50mm). The PicoCOM form factor is perfectly suited for applications in medical and industrial with a compact design.

Asymmetric Multiprocessing

PicoCOMA9X is based on a Freescale applications processor from the very successful i.MX 6 series and has a Cortex*-A9 core, as well as a Cortex*-M4 core. NEON, FPU and OpenGL are available. In addition to Vybrid, SoloX comes with a Resource Domain Controller which makes it easier to protect memory or other peripherals from each other. Another characteristic is the long-time availability to at least 2025.

The module offers a large number of interfaces: Ethernet, 3x Serial, USB 2.0 Host, USB 2.0 Device, I²C, SPI, 2x CAN 2.0, I/O, Audio (Line IN/OUT), SD-Card. Resistive and capacitive touch panels can be connected as well.

All common TFTs up to XGA (1024 x 768) pixels can be controlled.

Available operating systems are Windows Embedded Compact 7/2013 and Linux (Buildroot/Yocto).





PicoMODA5 COM with Freescale Vybrid Processor

The PicoMODA5 is based on a Freescale Vybrid CPU, clocked at 500MHz.

Analog Camera

By the possibility of connecting analog cameras, the module fits perfectly for applications in the surveillance sector or as a rear view camera in the commercial vehicles sector. The modern Cortex[®]-A5 CPU has enough processing power to perform demanding tasks. The CPU is supported by the NEON unit and the Hardware Floatingpoint unit.

For critical real-time tasks

The Vybrid CPU has an integrated Cortex*-M4 processor, which can take care of critical real-time tasks. PicoMODA5 comes with interfaces like SD-Card, Ethernet, USB Host/Device, CAN, 4x UART, I²C, SPI Audio (LINE In/Out/Mic), I/O and analog camera.

18bit RGB is offered for display connection. A resistive 4-wire, as well as a capacitive touch controller can be connected via the I^2C interface.

Windows Embedded Compact 7 is available for this module.

Туре	PMODA5-V1	PMODA5-V2
State	Production	Production
CPU		
CPU	Freescale Vybrid	Freescale Vybrid
Core	ARM Cortex-A5	ARM Cortex-A5 + Cortex-M4
No of Cores	Single-Core	Dual-Core
Frequency	500MHz	500MHz + 167MHz
L2-Cache	512kB	512kB
GPU	NEON, FPU	NEON, FPU
OS		
Windows	WEC 7	WEC 7
Real Time		MQX
Memory		
Flash	128MB	256MB
RAM	256MB	256MB
Interfaces		
SD-Card	external/on-board	external/on-board
Ethernet	10/100MBit	10/100MBit
USB Host	1x	1x
USB Device	1x	1x
CAN	1x	1x
UART	3-4x	3-4x
12C	1x	1x
SPI	1x	1x
Audio	Line In/Out/Mic	Line In/Out/Mic
Digital I/O	max. 45	max. 45
Touch Panel	4-wire, analog resisitive; PCAP-Touch via I2C	4-wire, analog resisitive; PCAP-Touch via I2C
Camera	4/0 optional	4/0 optional
Display		
RGB	18Bit	18Bit
Common		
Supply Voltage	3.3V DC/± 5%	3.3V DC/± 5%
Power Consumption	1W typ.	1W typ.
Operating Temperature	0 to 70°C	0 to 70°C
Size	80x50mm (lxw)	80x50mm (lxw)
Weight	~20g	~20g
Long Term Availability	2028	2028





PicoMODA9 COM with Freescale i.MX 6 Processor

	PMODA9-V1	PMODA9-V2
State	Production	Production
CPU		
CPU	Freescale i.MX 6	Freescale i.MX 6
Core	ARM Cortex-A9	ARM Cortex-A9
No of Cores	Solo	DualLite
Frequency	1GHz	1GHz
L2-Cache	512KB	512KB
GPU	2D 600Mpix/s; OpenGL 53Mtri/s, 266Mpix/s	2D 600Mpix/s; OpenGL 53Mtri/s, 266Mpix/s
Video Decode	1080	p30
OS		
Linux	Buildroot	Buildroot
Windows	WEC7/WEC2013	WEC7/WEC2013
Memory		
Flash	256MB	256MB
Interfaces		
SD-Card	external/on-board	external/on-board
Ethernet	10/100MBit	10/100MBit
USB Host	1	1
USB Device	1	1
CAN	1	1
UART	4	4
I2C	1	1
SPI	1	1
Audio	Line In/Out/Mic	Line In/Out/Mic
Digital I/O	max. 64	max. 64
Touch Panel	4-wire, analog resisitive; PCAP-Touch via I2C	4-wire, analog resisitive; PCAP-Touch via I2C
Camera analog/digital	0/	1
Display		
RGB	18Bit	
LVDS		18Bit/24Bit
CRT/DVI		HDMI/DVI
Common		
Supply Voltage	3.3V DC/± 5%	3.3V DC/± 5%
Power Consumption	2W typ.	3W typ.
Operating Temp.	0 to 70°C	0 to 70°C
Size	80x50mm (lxw)	80x50mm (lxw)
Weight	~20g	~20g
Long Term Availability	2027	2027
Additional Interfaces	16 Bit A/D bus	16 Bit A/D bus

High CPU Performance

The PicoMODA9 is perfectly suited for devices, which need to display high performance graphics and videos. Functions like Multiformat CODEC (MPEG4, H.264, WMV9 and H.264 (1080@30fps), as well as 2D, 3D, OpenGL and Direct 3D Mobile are an optimal support for these demands and relieve the CPU significantly. All this leads to a positive effect on fluid displaying and low power consumption. The Freescale i.MX 6 ARM* Cortex*-A9 CPU with 1GHz offers the required high CPU performance.

Compact Size and Expandable Temperature Range

- The compact size (80 x 50mm) and the optionally extensible temperature range (-40 to 85°C) can realize portable devices in rough environments easily.
- Numerous interfaces (Ethernet, 4x Serial, USB Host and Device, CAN, I²C, SPI, Audio, micro SD-Card Slot, Adress-/ Data-Bus, as well as Wifi and a camera interface/ HDMI-DVI) enable a wide range of applications.
- All common TFT displays with RGB and LVDS interface up to WXGA can be controlled (both display interfaces are available simultaneously).
- Available operating systems are Windows Embedded Compact 7/WEC2013 and Linux (Buildroot/Yocto).





efus[™]A7UL COM with Freescale i.MX 6UltraLite Processor

Entrance Level Module

efus[™]A7UL is another compact and inexpensive module in efus[™] form factor. It is perfectly suited for applications with numerous interfaces in medicine and industry.

Energy-saving and Low-cost Processor

efus[™]A7UL is based on a Freescale applications processor from the very successful i.MX 6 series and has a Cortex[®]-A7 core.

If you design cost and space constrained applications where power efficiency, small form factor and security are critical, then the i.MX 6UltraLite is the perfect solution. The i.MX 6UltraLite is the smallest, most secure and most energy-efficient ARM*-based applications processor. Another characteristic is the long-time availability to at least 2030.

Numerous Interfaces

The module offers interfaces like 2x SD Card, Ethernet, Wifi, Bluetooth, 4x Serial, USB2.0 Host/Device, 2x CAN, 2x I²C, 2x SPI and I2S Audio.

LCD TFTs can be connected via 18bit RGB. Touch is available externally via I²C.

Available operating systems are Windows Embedded Compact 2013 and Linux (Buildroot/Yocto).

Туре	efusA7UL-V1	efusA7UL-V2	efusA7UL-V4
State	Production	Production	Production
CPU			
Туре	Freescale i.MX 6	Freescale i.MX 6	Freescale i.MX 6
Core	ARM Cortex-A7	ARM Cortex-A7	ARM Cortex-A7
No of Cores	UltraLite	UltraLite	UltraLite
Frequency	528MHz	528MHz	528MHz
L2-Cache	128KB	128KB	128KB
GPU	NEON Security	NEON Security	NEON Security
OS			
Linux	Buildroot/Yocto	Buildroot/Yocto	Buildroot/Yocto
Windows	WEC 2013	WEC 2013	WEC 2013
Android	5.1.1	5.1.1	5.1.1
Memory			
Flash	128MB NAND	256MB NAND	256MB NAND
RAM	256MB	256MB	512MB
eMMC			4GB
Interfaces			
SD-Card	2x external	2x external	2x external
Ethernet	10/100Mb	10/100Mb	2x 10/100Mb
WLAN			IEEE802.11b/g/n
USB Host	1x	1x	1x
USB Device	1x	1x	1x
CAN	2x	2x	2x
UART	4x	4x	4x
12C	2x	2x	2x
SPI	2x	2x	2x
Audio	I2S	125	I2S
Touch Panel	ext. Via I2C	ext. Via I2C	ext. Via I2C
additional interfaces			Bluetooth BT3.0
Display			
RGB	18bit	18bit	18bit
Common			
Supply Voltage	5V DC/± 5%	5V DC/± 5%	5V DC/± 5%
Power Consumption	2W typ.	2W typ.	2W typ.
Operating Tempe- rature	0 to 70°C	0 to 70°C	0 to 70°C
Size	47x62.1mm (lxw)	47x62.1mm (lxw)	47x62.1mm (lxw)
Weight	~15g	~15g	~15g
Long Term Availability	2030	2030	2030





efus[™]A9 COM with Freescale i.MX 6 Processor

_		
Туре	efusA9-V2	efusA9-V3
State	Production	Production
CPU		
Туре	Freescale i.MX 6	Freescale i.MX 6
Core	ARM Cortex-A9	ARM Cortex-A9
No of Cores	Solo	DualLite
Frequency	1GHz	1GHz
L2-Cache	512KB	512KB
GPU	2D 600Mpix/s; OpenGL 53Mtri/s, 266Mpix/s	2D 600Mpix/s; OpenGL 53Mtri/s, 266Mpix/s
Video Decode	1080p30	1080p30
OS		
Linux	Buildroot, Yocto	Buildroot, Yocto
Windows	WEC 7, WEC 2013	WEC 7, WEC 2013
Memory		
Flash	256MB	256MB
RAM	512MB	512MB
eMMC		2GB
Interfaces		
SD-Card	2x external	2x external
Ethernet	10/100/1000Mb	10/100/1000Mb
USB Host	1x	1x
USB Device	1x	1x
CAN	2x	2x
UART	4x	4x
I2C	2x	2x
SPI	2x	2x
Audio	125	125
Touch Panel	ext. via I2C	ext. via I2C
Camera analog/digital	0/MIPI-CSI	0/MIPI-CSI efusA9-V3I: Parallel 8bit
PCle	1x	1x
Display		
RGB	18bit	18bit
LVDS	2x 24bit	2x 24bit
CRT/DVI	0/DVI	0/DVI
Common	-,	.,
Supply Voltage	5V DC/± 5%	5V DC/± 5%
Operating Temperature	0 to 70°C	0 to 70°C efusA9-V3I: -20 to 85°C
Size	47x62.1mm (lxw)	47x62.1mm (lxw)
Weight	~15g	~15g
Long Term Availability	2027	2027

Certified for Industry and Automotive

The efus[™] form factor has a size of only 47 x 62mm. It is equipped with finger-type contacts for common 230 pins MXM-2 edge connectors, which are inexpensive and certified for industry and automotive.

Easy Base Board

efus[™]A9 was designed by "EasyLayout" guidelines. EasyLayout describes the concept of no crossing lines or avoidable through holes. This enables an easy base board and good EMC behavior.

Convincing Equipment and Long-Term Availability

The i.MX 6 Cortex[®]-A9 CPU has high processing power and excellent multimedia features (3D graphics, 1080p Decoder, H.264 HP, ARM[®]v7[™], NEON and VFPv3). Other important features are the long-term availability of up to 15 years and a temperature range of -40 to 85°C. The efus[™]A9 module comes with interfaces like Gigabit-Ethernet, USB Host/Device, 2x CAN, 2x I²C, 2x SPI, 4x Serial, GPIOs, 1+1 µSD-Card, I2S, SATA, PCIe and camera. Digital RGB, 2 channel LVDS and DVI are offered simultaneously for display connection. A resistive 4-wire, as well as a capacitive touch controller can be connected via the I²C interface.

Wireless Extensions

The circuit board space of efus[™]A9 can be expanded with wireless modules (Bluetooth, Wifi, ZigBee, Z-Wave, EnOcean).

Available operating systems are Windows Embedded Compact 7/2013 and Linux (Buildroot/Yocto).





efus[™]A9X COM with Freescale i.MX 6SoloX Processor

Easy Base Board

Along with the attribute of an easy baseboard (EasyLayout), efus[™] has a size of 47 x 62mm only and is therefore suitable for compact housings. The low power loss of only 2 Watt (typ.) makes it easy to cool the module.

Asymmetric Multiprocessing

SoloX is the second processor in Freescale's portfolio which supports Asymmetric Multiprocessing. Both cores (Cortex[®]-A9 + M4) are connected to the internal bus fabric and have the possibility to access all peripherals.

The module offers interfaces like 2x Gigabit Ethernet, 4x Serial, USB2.0 Host/Device, 2x CAN, 2x I²C, 2x SPI, I2S Audio, 2x SDIO, PCIe, Camera (analog/digital), Wifi and Bluetooth, as well as high accuracy RTC (TXCO).

LCD TFTs can be connected via 18Bit RGB (up to WXGA) or 24bit LVDS (up to WXGA). Touch is available externally via I^2C .

Available operating systems are Windows Embedded Compact 2013, Linux (Buildroot/Yocto) and Android Lollipop.

Туре	efusA9X-V2	efusA9X-V4
State	Production	Production
CPU		
CPU	Freescale i.MX 6	Freescale i.MX 6
Core	ARM Cortex-A9 + Cortex-M4	ARM Cortex-A9 + Cortex-M4
No of Cores	SoloX	SoloX
Frequency	1GHz + 200MHz	1GHz + 200MHz
L2-Cache	256KB	256KB
GPU	FPU, NEON, OpenGL/ES	FPU, NEON, OpenGL/ES
OS		
Linux	Buildroot, Yocto	Buildroot, Yocto
Windows	WEC 2013	WEC 2013
Real Time	MQX	MQX
Android	5.1.1	5.1.1
Memory		
Flash	256MB	256MB
RAM	512MB	512MB
eMMC		4GB
Interfaces		
SD-Card	2x external	2x external
Ethernet	2x 10/100/1000Mb	2x 10/100/1000Mb
WiFi		IEEE802.11b/g/n standard
USB Host	1x	1x
USB Device	1x	1x
CAN	2x	2x
UART	4x	4x
I2C	2x	2x
SPI	2x	2x
Audio	125	I2S
Touch Panel	ext. via I2C	ext. via I2C
Camera analog/digital	1/Parallel 8bit	1/Parallel 8bit
PCle	1x	1x
additional Interfaces		Bluetooth BT3.0,2.1+EDR
Display		
RGB	18Bit	18Bit
LVDS	24Bit	24Bit
Common		
Supply Voltage	5V DC/± 5%	5V DC/± 5%
Power Consumption	2W typ.	2W typ.
Operating Temperature	0 to 70°C, opt20 to 85°C	0 to 70°C, opt20 to 85°C
Size	47x62.1mm (lxw)	47x62.1mm (lxw)
Weight	~15g	~15g
Long Term Availability	2025	2025



NetDCUA5 COM with Freescale Vybrid Processor

TypeNetDCUA5-V1NetDCUA5-V1StateProductionProductionCPUFreescale VybridFreescale VybridCoreARM Cortex.A5ARM Cortex.A5No of CoresSingle-CoreSingle-CoreFrequency500MHz500MHzL2-Cache512KB512KBGPUNEONNEONOSUNEONUnuxBuildrootBuildrootWindowsWCE 6.0, WEC 2013WCE 6.0, WEC 2013MemoryFlash128MB128MBRAM256MB256MBInterfacesSD-Cardon-boardSD-Cardon-boardon-boardEthernet2x 10/100 Mb IEEE15882x 10/100 Mb IEEE1588USB Device1x1xQAN2x2xUART3x3x12C1x1xAudioLine In/Out/MicLine In/Out/MicDigital I/Omax. 21max. 21AudioLine In/Out/Mic4-wire, analog resistive, cap. Touch via 12CDisplayRGB18Bit18BitCommon1,5W typ.1,5W typ.Operating Temperature0 to 70°C-25 to 85°COreating Temperature0 to 70°C-25 to 85°C			
StateProductionProductionCPUCPUFreescale VybridFreescale VybridCoreARM Cortex-A5ARM Cortex-A5No of CoresSingle-CoreSingle-CoreFrequency500MHz500MHzL2-Cache512KB512KBGPUNEONNEONOSULinuxBuildrootBuildrootWindowsWCE 6.0, WEC 2013WCE 6.0, WEC 2013MemoryIFlash128MB128MBInterfacesSD-Cardon-boardSD-Cardon-boardon-boardEthernet2x 10/100 Mb IEEE15882x 10/100 Mb IEEE1588USB Host1 x1 xUSB Device1 x1 xQART3x3x12C1 x1 xQART3x3xSPI1 x1 xAudioLine In/Out/MicLine In/Out/MicDigital I/Omax. 21max. 21Touch Panel28 MB18BitCommonSupply Voltage5V DC/± 5%Supply Voltage5V DC/± 5%5V DC/± 5%Power Consumption1,5W typ.0.25 to 85'Cm)Operating Temperature100 r00 rm100 r00 rmOperating Temperature100 r00 rm100 r00 rmOperating Temperature100 r00 rm100 r00 rmOperating Temperature100 r00 rm100 r00 rm	Туре	NetDCUA5-V1	NetDCUA5-V1I
CPUCPUFreescale VybridFreescale VybridCoreARM Cortex.A5ARM Cortex.A5No of CoresSingle-CoreSingle-CoreFrequency500MHz500MHzL2-Cache512KB512KBGPUNEONNEONOSLinuxBuildrootBuildrootWindowsWCE 6.0, WEC 2013WCE 6.0, WEC 2013MemoryFlash128MB128MBRAM256MB256MBInterfacesSD-Cardon-boardon-boardEthernet2x 10/100 Mb IEEE15882x 10/100 Mb IEEE1588USB Host1x1x1xQAN2x2x2xUART3x3x3x12C1x1x1xSPI1x1x1xAudioLine In/Out/MicLine In/Out/MicDigital I/Omax. 214-wire, analog resistive, cap. Touch via I2CDisplayRGB18Bit18BitCommonSupply Voltage5V DC/± 5%5V DC/± 5%Power Consumption1,5W typ.1,5W typ.Operating Temperature0 to 70°C25 to 85°CFire100:v60:mer (huru)100:v60:mer (huru)	State	Production	Production
CPU Freescale Vybrid Freescale Vybrid Core ARM Cortex-A5 ARM Cortex-A5 No of Cores Single-Core Single-Core Frequency 500MHz 500MHz L2-Cache 512KB 512KB GPU NEON NEON OS	CPU		
Core ARM Cortex-A5 ARM Cortex-A5 No of Cores Single-Core Single-Core Frequency 500MHz 500MHz L2-Cache 512KB 512KB GPU NEON NEON OS Linux Buildroot Buildroot Windows WCE 6.0, WEC 2013 WCE 6.0, WEC 2013 Memory Flash 128MB 128MB RAM 256MB 256MB Interfaces SD-Card on-board on-board Ethernet 2x 10/100 Mb IEEE1588 2x 10/100 Mb IEEE1588 USB Device 1x 1x QAN 2x 2x UART 3x 3x I2C 1x 1x SPI 1x 1x Audio Line In/Out/Mic Line In/Out/Mic Digital I/O max. 21 max. 21 Audio 18Bit 18Bit Cap	CPU	Freescale Vybrid	Freescale Vybrid
No of Cores Single-Core Single-Core Frequency 500MHz 500MHz L2-Cache 512KB 512KB GPU NEON NEON OS	Core	ARM Cortex-A5	ARM Cortex-A5
Frequency 500MHz 500MHz L2-Cache 512KB 512KB GPU NEON NEON OS	No of Cores	Single-Core	Single-Core
L2-Cache 512KB 512KB GPU NEON NEON OS Uinux Buildroot Buildroot Windows WCE 6.0, WEC 2013 WCE 6.0, WEC 2013 Memory Uinux Buildroot Buildroot Flash 128MB 128MB 128MB RAM 256MB 256MB Interfaces SD-Card on-board on-board Ethernet 2x 10/100 Mb IEEE1588 2x 10/100 Mb IEEE1588 USB Host 1 x USB Device 1 x 1 x 1 x CAN 2x a 2x 1 x USB Device 1 x 1 x 1 x CAN 2x a 2x 1 x UART 3x 3x 3x 12C UART 1 x 1 x 1 x SPI 1 x 1 x<	Frequency	500MHz	500MHz
GPU NEON NEON OS Inux Buildroot Buildroot Windows WCE 6.0, WEC 2013 WCE 6.0, WEC 2013 Memory Interfaces Interfaces SD-Card On-board On-board Ethernet 2x 10/100 Mb IEEE1588 2x 10/100 Mb IEEE1588 USB Host 1x 1x USB Device 1x 1x QART 3x 3x I2C 1x 1x UART 3x 3x I2C 1x 1x QART 3x 3x I2C 1x 1x UART 3x 3x I2C 1x 1x SPI 1x 1x Audio Line In/Out/Mic Line In/Out/Mic Digital I/O max. 21 max. 21 Touch Panel 2x Touch via 12C Display RGB 18Bit 18Bit Common SV DC/± 5% SV DC/± 5% <t< td=""><td>L2-Cache</td><td>512KB</td><td>512KB</td></t<>	L2-Cache	512KB	512KB
OS Buildroot Buildroot Linux Buildroot Buildroot Windows WCE 6.0, WEC 2013 WCE 6.0, WEC 2013 Memory WCE 6.0, WEC 2013 MEC 6.0, WEC 2013 Flash 128MB 128MB RAM 256MB 256MB Interfaces SD-Card on-board on-board SD-Card 0n-board 1x 1x USB Host 1x 1x 1x USB Device 1x 1x 1x CAN 2x 2x 2x UART 3x 3x 1x SPI 1x 1x 1x <tr< td=""><td>GPU</td><td>NEON</td><td>NEON</td></tr<>	GPU	NEON	NEON
Linux Buildroot Buildroot Windows WCE 6.0, WEC 2013 WCE 6.0, WEC 2013 Memory WCE 6.0, WEC 2013 Flash 128MB 128MB RAM 256MB 256MB Interfaces SD-Card on-board on-board Ethernet 2x 10/100 Mb IEEE1588 2x 10/100 Mb IEEE1588 USB Host 1x 1x USB Bovice 1x 1x CAN 2x 2x UART 3x 3x I2C 1x 1x SPI 1x 1x SPI 1x 1x SPI 1x 1x Audio Line In/Out/Mic Line In/Out/Mic Digital I/O max. 21 max. 21 Touch Panel 4-wire, analog resistive, cap. Touch via 12C Display SV DC/± 5% RGB 18Bit 18Bit Common 5V DC/± 5% Supply	OS		
Windows WCE 6.0, WEC 2013 WCE 6.0, WEC 2013 Memory I I Flash 128MB 128MB RAM 256MB 256MB Interfaces I SD-Card On-board On-board Ethernet 2x 10/100 Mb IEEE1588 2x 10/100 Mb IEEE1588 2x 10/100 Mb IEEE1588 USB Host 1 x 1 x 1 x USB Device 1 x 1 x 1 x CAN 2 x 2 x 2 x UART 3 x 3 x 1 x SPI 1 x 1 x 1 x Audio Line In/Out/Mic Line In/Out/Mic Line In/Out/Mic Digital I/O max. 21 4-wire, analog resistive, cap. Touch via 12C Cap. Touch via 12C Display RGB 18Bit 18Bit 18Bit Common SV DC/± 5% 5V DC/± 5% <td>Linux</td> <td>Buildroot</td> <td>Buildroot</td>	Linux	Buildroot	Buildroot
Memory Flash 128MB 128MB RAM 256MB 256MB Interfaces 5D-Card on-board on-board SD-Card 2x 10/100 Mb IEEE1588 2x 10/100 Mb IEEE1588 2x 10/100 Mb IEEE1588 USB Host 1x 1x 1x USB Device 1x 1x 1x CAN 2x 2x 2x UART 3x 3x 3x I2C 1x 1x 1x SPI 1x 1x 1x SPI 1x 1x 1x SPI 1x 1x 1x SPI 1x 1x 1x Audio Line In/Out/Mic Line In/Out/Mic Line In/Out/Mic Digital I/O max. 21 4-wire, analog resistive, cap. Touch via 12C Cap. Touch via 12C Display RGB 18Bit 18Bit Common Supply Voltage SV DC/± 5% SV DC/± 5% SV DC/± 5% Power Consumption	Windows	WCE 6.0, WEC 2013	WCE 6.0, WEC 2013
Flash 128MB 128MB RAM 256MB 256MB Interfaces SD-Card on-board on-board SD-Card $2x 10/100$ Mb IEEE1588 $2x 10/100$ Mb IEEE1588 $2x 10/100$ Mb IEEE1588 USB Host $1x$ $1x$ $1x$ USB Device $1x$ $1x$ $1x$ CAN $2x$ $2x$ $2x$ UART $3x$ $3x$ $3x$ I2C $1x$ $1x$ $1x$ Audio Line In/Out/Mic Line In/Out/Mic Digital I/O max. 21 max. 21 Touch Panel 4 -wire, analog resistive, cap. Touch via I2C Touch via I2C Display Italistit 18Bit 18Bit Common SV DC/± 5% 5V DC/± 5% Power Consumption $1,5W$ typ. $1,5W$ typ. Operating Temperature 0 to 70°C -25 to 85°C	Memory		
RAM 256MB 256MB Interfaces SD-Card on-board on-board SD-Card 2x 10/100 Mb IEEE1588 2x 10/100 Mb IEEE1588 2x 10/100 Mb IEEE1588 USB Host 1x 1x 1x USB Device 1x 1x 1x CAN 2x 2x 2x UART 3x 3x 3x I2C 1x 1x 1x SPI 1x 1x 1x Audio Line In/Out/Mic Line In/Out/Mic Line In/Out/Mic Digital I/O max. 21 4-wire, analog resistive, cap. Touch via I2C Touch Panel Touch Panel 4-wire, analog resistive, cap. Touch via I2C Touch via I2C Touch via I2C Display RGB 18Bit 18Bit 18Bit Common Supply Voltage SV DC/± 5% SV DC/± 5% Power Consumption 1,SW typ. 1,SW typ. -25 to R8 °C Operating Temperature 0 to 70°C -25 to R8 °C Sire C	Flash	128MB	128MB
Interfaces SD-Card on-board on-board Ethernet $2x 10/100$ Mb IEEE1588 $2x 10/100$ Mb IEEE1588 USB Host $1x$ $1x$ USB Device $1x$ $1x$ CAN $2x$ $2x$ UART $3x$ $3x$ I2C $1x$ $1x$ VART $3x$ $3x$ I2C $1x$ $1x$ VART $3x$ $3x$ I2C $1x$ $1x$ Jay $1x$ $1x$ Audio Line In/Out/Mic Line In/Out/Mic Digital I/O max. 21 max. 21 Touch Panel 4 -wire, analog resistive, cap. Touch via I2C cap. Touch via I2C Display ItaBit 18Bit 18Bit Common SV DC/± 5% 5V DC/± 5% 5V DC/± 5% Power Consumption 1,5W typ. 1,5W typ. -25 to 85°C Operating Temperature 0 to 70°C -25 to 85°C -25 tor 85°C	RAM	256MB	256MB
SD-Card on-board on-board Ethernet $2x 10/100$ Mb IEEE1588 $2x 10/100$ Mb IEEE1588 USB Host $1x$ $1x$ USB Device $1x$ $1x$ URT $3x$ $3x$ VART $3x$ $3x$ I2C $1x$ $1x$ SPI $1x$ $1x$ Audio Line In/Out/Mic Line In/Out/Mic Digital I/O max. 21 max. 21 Touch Panel 4-wire, analog resistive, cap. Touch via I2C Display RGB 18Bit 18Bit 18Bit 5V DC/± 5% 5V DC/± 5% Power Consumption $1,5W$ typ. -25 to 8° C Operating Temperature $00 to 70^\circ$ C $-25 to 8^\circ$ C Displot $100 t$	Interfaces		
Ethernet $2x 10/100$ Mb IEEE1588 $2x 10/100$ Mb IEEE1588 USB Host $1x$ $1x$ USB Device $1x$ $1x$ USB Device $1x$ $1x$ CAN $2x$ $2x$ UART $3x$ $3x$ I2C $1x$ $1x$ VART $3x$ $3x$ SPI $1x$ $1x$ Audio Line In/Out/Mic Line In/Out/Mic Digital I/O max. 21 max. 21 Touch Panel 4-wire, analog resistive, cap. Touch via I2C Display RGB 18Bit 18Bit Common Supply Voltage 5V DC/± 5% 5V DC/± 5% Power Consumption $1,5W$ typ. $1,5W$ typ. -25 to 8°°C Operating Temperature 0 to 70°C -25 to 8°°C Size	SD-Card	on-board	on-board
USB Host 1x 1x USB Device 1x 1x USB Device 1x 1x CAN 2x 2x UART 3x 3x I2C 1x 1x SPI 1x 1x Audio Line In/Out/Mic Line In/Out/Mic Digital I/O max. 21 max. 21 Touch Panel 4-wire, analog resistive, cap. Touch via I2C Display RGB 18Bit 18Bit Common Styply Voltage 5V DC/± 5% 5V DC/± 5% Power Consumption 1,5W typ. 1,5W typ. Operating Temperature 0 to 70°C -25 to 85°C	Ethernet	2x 10/100 Mb IEEE1588	2x 10/100 Mb IEEE1588
USB Device $1x$ $1x$ CAN $2x$ $2x$ UART $3x$ $3x$ IZC $1x$ $1x$ SPI $1x$ $1x$ Audio Line In/Out/Mic Line In/Out/Mic Digital I/O max. 21 max. 21 Touch Panel 4 -wire, analog resistive, cap. Touch via I2C Display RGB 18Bit 18Bit Common SV DC/± 5% 5V DC/± 5% Supply Voltage 5V DC/± 5% 5V DC/± 5% Power Consumption 1,5W typ. 1,5W typ. Operating Temperature 0 to 70°C -25 to 8°C	USB Host	1x	1x
CAN $2x$ $2x$ UART $3x$ $3x$ I2C $1x$ $1x$ I2C $1x$ $1x$ SPI $1x$ $1x$ Audio Line In/Out/Mic Line In/Out/Mic Digital I/O max. 21 max. 21 Touch Panel 4 -wire, analog resistive, cap. Touch via I2C Touch via I2C Display RGB 18Bit 18Bit Common Supply Voltage $5V DC/\pm 5\%$ $5V DC/\pm 5\%$ Power Consumption $1,5W typ.$ $1,5W typ.$ $0 to 70^{\circ}C$ Operating Temperature $0 to 70^{\circ}C$ $-25 to 85^{\circ}C$ $5irap.$	USB Device	1x	1x
UART $3x$ $3x$ I2C $1x$ $1x$ I2C $1x$ $1x$ SPI $1x$ $1x$ AudioLine In/Out/MicLine In/Out/MicDigital I/Omax. 21max. 21Touch Panel 4 -wire, analog resistive, cap. Touch via I2C 4 -wire, analog resistive, cap. Touch via I2CDisplayRGB18Bit18BitCommonSupply Voltage $5V DC/\pm 5\%$ Power Consumption $1,5W typ.$ $1,5W typ.$ Operating Temperature $0 to 70^{\circ}C$ $-25 to 85^{\circ}C$ Size $100 ve0 area (hur)$ $100 ve0 area (hur)$	CAN	2x	2x
12C 1x 1x SPI 1x 1x Audio Line In/Out/Mic Line In/Out/Mic Digital I/O max. 21 max. 21 Touch Panel 4-wire, analog resistive, cap. Touch via I2C 4-wire, analog resistive, cap. Touch via I2C Display RGB 18Bit 18Bit Common 5V DC/± 5% 5V DC/± 5% Power Consumption 1,5W typ. 1,5W typ. Operating Temperature 0 to 70°C -25 to 85°C	UART	Зx	Зx
SPI 1x 1x Audio Line In/Out/Mic Line In/Out/Mic Digital I/O max. 21 max. 21 Touch Panel 4-wire, analog resistive, cap. Touch via I2C 4-wire, analog resistive, cap. Touch via I2C Display RGB 18Bit 18Bit Common Supply Voltage 5V DC/± 5% Power Consumption 1,5W typ. Operating Temperature 0 to 70°C -225 to 85°C 5000	I2C	1x	1x
Audio Line In/Out/Mic Line In/Out/Mic Digital I/O max. 21 max. 21 Touch Panel 4-wire, analog resistive, cap. Touch via I2C 4-wire, analog resistive, cap. Touch via I2C Display RGB 18Bit 18Bit Common 5V DC/± 5% 5V DC/± 5% Power Consumption 1,5W typ. 1,5W typ. Operating Temperature 0 to 70°C -25 to 85°C	SPI	1x	1x
Digital I/O max. 21 max. 21 Touch Panel 4-wire, analog resistive, cap. Touch via I2C 4-wire, analog resistive, cap. Touch via I2C Display Touch via I2C RGB 18Bit 18Bit Common Supply Voltage 5V DC/± 5% 5V DC/± 5% Power Consumption 1,5W typ. 1,5W typ. Operating Temperature 0 to 70°C -225 to 85°C	Audio	Line In/Out/Mic	Line In/Out/Mic
Touch Panel 4-wire, analog resistive, cap. Touch via I2C 4-wire, analog resistive, cap. Touch via I2C Display Kommon RGB 18Bit 18Bit Common 5V DC/± 5% 5V DC/± 5% Power Consumption 1,5W typ. 1,5W typ. Operating Temperature 0 to 70°C -25 to 85°C Size 100×00×mm (hur) 100×00×mm (hur)	Digital I/O	max. 21	max. 21
Display RGB 18Bit 18Bit Common 5V DC/± 5% 5V DC/± 5% Supply Voltage 5V DC/± 5% 5V DC/± 5% Power Consumption 1,5W typ. 1,5W typ. Operating Temperature 0 to 70°C -25 to 85°C Size 100×00×mm (hum) 100×00×mm (hum)	Touch Panel	4-wire, analog resistive, cap. Touch via I2C	4-wire, analog resistive, cap. Touch via I2C
RGB 18Bit 18Bit Common 5V DC/± 5% 5V DC/± 5% Supply Voltage 5V DC/± 5% 5V DC/± 5% Power Consumption 1,5W typ. 1,5W typ. Operating Temperature 0 to 70°C -25 to 85°C Size 100×90×mm (hum) 100×90×mm (hum)	Display		
Common Supply Voltage 5V DC/± 5% 5V DC/± 5% Power Consumption 1,5W typ. 1,5W typ. Operating Temperature 0 to 70°C -25 to 85°C Size 100×90 mm (hur) 100×90 mm (hur)	RGB	18Bit	18Bit
Supply Voltage 5V DC/± 5% 5V DC/± 5% Power Consumption 1,5W typ. 1,5W typ. Operating Temperature 0 to 70°C -25 to 85°C Size 100×20mm (lww) 100×20mm (lww)	Common		
Power Consumption 1,5W typ. 1,5W typ. Operating Temperature 0 to 70°C -25 to 85°C Size 100x90mm (lww) 100x90mm (lww)	Supply Voltage	5V DC/± 5%	5V DC/± 5%
Operating Temperature 0 to 70°C -25 to 85°C Size 100×80mm (km) 100×80mm (km)	Power Consumption	1,5W typ.	1,5W typ.
Size 100x80mm (huu) 100x80mm (huu)	Operating Temperature	0 to 70°C	-25 to 85°C
Size 100x80/1111 (ixw) 100x80/1111 (ixw)	Size	100x80mm (lxw)	100x80mm (lxw)
Weight ~45g ~45g	Weight	~45g	~45g
Long Term Availability 2028 2028	Long Term Availability	2028	2028

Asymmetric Multiprocessing and Long-Term Availability The Freescale Vybrid represents the heart of the module, a Cortex*-A5 CPU. This Freescale Processor is available for a minimum of 10 years.

Various Interfaces

The NetDCUA5 offers interfaces like USB Host/Device, 2x LAN, RS232, 2x CAN, SPI, I²C and Audio (IN/OUT/MIC). The module can be set up with an additional SD-Card.

Additionally, a display interface with 18Bit colors via RGB is available, so TFTs up to SVGA (800×600) can be controlled. There is an interface for the connection of a resistive touch panel and capacitive touch panels are connected via I²C.

Available operating systems are Windows Embedded CE 6.0 R3/ Windows Embedded Compact 2013 or Linux (Buildroot).







QBlissA9 Qseven Module with Freescale i.MX 6 Processor

Long-Term Availablility

- QBlissA9 runs on the Freescale i.MX 6 ARM* Cortex*-A9 processor.
- A highlight of this CPU is its long availability for more than 15 years.

Multimedia CPU

- Especially for multimedia, additional hardware units are available in i.MX 6 (OpenGL/ ES 2.x, 3D with OpenCL, OpenVG 1.1), relieving the CPU significantly and having a positive effect on fluid displaying and low power consumption.
- The QBlissA9 holds up to 4GByte DDR3 SDRAM, 32GByte Flash, Gigabit Ethernet and Wifi on module. Further interfaces are USB 2.0 Host, USB 2.0 Device, CAN, I²C, SPI, AC97, SDIO, PCIe, serial interfaces, as well as 2-channel LVDS, (up to WUXGA) and DVI (up to Full HD).
- Touch panels can be connected via I²C.
- Available operating systems are Windows Embedded Compact 7/2013 and Linux (Buildroot/Yocto).

Туре	QBlissA9-V1	QBlissA9-V2
State	Production	Production
CPU		
Туре	Freescale i.MX 6	Freescale i.MX 6
Core	ARM Cortex-A9	ARM Cortex-A9
No of Cores	Solo	Quad
Frequency	1GHz	1GHz
L2-Cache	512KB	1MB
GPU	2D 600Mpix/s, OpenGL 53Mtri/s, 266Mpix/s	2D 600Mpix/s, OpenVG 300Mpix/s, OpenGL 176Mtri/s, 1Gpix/s
Video Decode	1080p30	1080p60
OS		
Linux	Buildroot/Yocto	Buildroot/Yocto
Windows	WEC7/WEC2013	WEC7/WEC2013
Memory		
Flash	128MB	128MB
RAM	512MB	1GB
Interfaces		
SD-Card	on-board	external
Ethernet	10/100/1000Mb IEEE1588	10/100/1000Mb IEEE1588
WLAN		IEEE802.11b/g/n standard
USB Host	4x	4x
USB Device	1x	1x
CAN	1x	1x
UART	1x	1x
I2C	2x	2x
SPI	1x	1x
Audio	AC97	AC97
Touch Panel	via I2C	via I2C
Camera analog/digital	0/1	0/1
PCle	1x	1x
SATA		1x
additional interfaces		Bluetooth
Display		
LVDS	2x 18/24Bit	2x 18/24Bit
CRT/DVI	0/DVI	0/DVI
Common		
Supply Voltage	5V DC/± 5%	5V DC/± 5%
Operating Temperature	-25 to 85°C	0 to 85°C
Size	70x70mm (lxw)	70x70mm (lxw)
Weight	~25g	~25g
Long Term Availability	2027	2027



QBlissA9r2 Qseven Module with Freescale i.MX 6 Processor

_				
Туре	QBlissA9r2			
State	Q1/2016			
CPU				
Туре	Freescale i.MX 6			
Core	ARM Cortex-A9			
No of Cores	Solo/DualLite/QuadPlus			
Frequency	1.2GHz			
L2-Cache	IMB			
GPU	3D, 2D 600Mpix/s, OpenVG 300 Mpix/s, OpenGL 176Mtri/s, 1Gpix/s			
Video Decode	1080p60			
OS				
Linux	Buildroot/Yocto			
Windows	WEC 7/2013			
Memory				
Flash	max. 1GB SLC NAND			
RAM	max. 4GB DDR3L			
Interfaces				
SD-Card	on-board / external			
Ethernet	10/100/1000 Mbit			
WLAN	IEEE802.11b/g/n			
USB Host	4x (Hub)			
USB Device	1x OTG			
CAN	1x			
UART	1x			
I2C	2x			
SPI	1x			
Audio	AC97/12S			
Touch Panel	via I2C			
PCle	1x			
SATA	1x			
additional interfaces	Bluetooth 3.0			
Display				
LVDS	2x 18/24bit			
CRT/DVI	0/DVI			
Common				
Supply Voltage	5V DC/± 5%			
Operating Temperature	0 to 70°C opt20 to 85°C opt40 to 85°C			
Size	70x70x11mm (lxwxd)			
Weight	~25g			
Long Term Availability	2027			

QBlissA9r2 with i.MX6 QuadPlus CPU

- QBlissA9r2 is an upgrade to QBlissA9.
- One of its distinctive features is the option to choose the Freescale i.MX 6QuadPlus processor, which offers ultimate performance.
- Multimedia options like 3D, 2D, OpenVG and OpenGL make QBlissA9r2 a powerful board for your high-end application.
- QBlissA9r2 comes with up to 1GB SLC NAND, 4GB DDR3L RAM, 32GB eMMC, SD-Card, Gigabit Ethernet, Wifi and Bluetooth, USB Host/Device, UART, 2x I²C, SPI, Audio (AC97/I2S), 2x MIPI-CSI camera, PCIe and SATA.
- Displays can be connected via dual-channel LVDS (18/24bit) or DVI and touch panels via I²C.
- Available operating systems are WEC7/Windows Embedded Compact 2013 and Linux (Buildroot/Yocto).



armStone[™]A5 Single Board Computer with Freescale Vybrid Processor

Asymmetric Multiprocessing

- The basis of the armStone[™]A5 is the Vybrid CPU (Asymmetric Multiprocessing) by Freescale. It is suitable for industrial environments and long-term availability of at least 10 years.
- It owns two cores: Cortex*-A5 - 500MHz and M4 - 167MHz.
 Functions such as 2D acceleration and Window-Layer, FPU, as well as NEON are also available.

Various Interfaces

- Optionally, the board can be upgraded with a micro-SD card.
- The board offers interfaces like USB Host/Device, 2x LAN, 3x RS232, 2x CAN, SPI, I²C, Audio (IN/OUT/MIC) partly on standard connectors or on plug connectors.
- Additionally, a LVDS interface is available (max. resolution up to XGA) or as an alternative, a RGB interface up to SVGA. Touch panel interfaces for resistive and also capacitive touch are offered as well.
- Available operating systems are Windows Embedded Compact 7/2013 and Linux (Buildroot).

Туре	aStoneA5-V1	aStoneA5-V2			
State	Production	Production			
CPU					
Туре	Freescale Vybrid	Freescale Vybrid			
Core	ARM Cortex-A5	ARM Cortex-A5 + Cortex-M4			
No of Cores	Single-Core	Dual-Core			
Frequency	500MHz	500MHz + 167MHz			
L2-Cache	512KB	512KB			
GPU	NEON	NEON			
OS					
Linux	Buildroot Buildroot				
Windows	WEC 7, WEC 2013	WEC 7, WEC 2013			
Real Time		MQX			
Memory					
Flash	128MB	128MB			
RAM	256MB	256MB			
Interfaces					
SD-Card	microSD on-board	microSD on-board			
Ethernet	10/100Mb IEEE1588	2x 10/100MBit IEEE1588			
USB Host	1x	1x			
USB Device	1x	1x			
CAN	1x	2x			
UART	Зx	Зx			
I2C	1x	1x			
SPI	1x 1x				
Audio	Line In/Out/Mic Line In/Out/Mic				
Digital I/O	max. 66	max. 66			
Touch Panel	4-wire, analog resistive, PCAP-Touch interface via I2C	4-wire analog resistive, PCAP-Touch interface via I2C			
Display					
RGB	18Bit	18Bit			
LVDS	18Bit	18Bit			
Common					
Supply Voltage	5V/ 8-14V DC/± 5%	5V/8-14V DC/± 5%			
Power Consumption	3W typ.	3W typ.			
Operating Temperature	0 to 70°C 0 to 70°C				
Size	100x72mm (lxw)	100x72mm (lxw)			
Weight	~55g	~55g			
Long Term Availability	2023	2023			





armStone[™]A9 Single Board Computer with Freescale i.MX 6 Processor

Туре	aStoneA9-V1	aStoneA9-V2			
State	Production Production				
CPU					
Туре	Freescale i.MX 6	Freescale i.MX 6			
Core	ARM Cortex-A9	ARM Cortex-A9			
No of Cores	Quad	Solo			
Frequency	1GHz	1GHz			
L2-Cache	1MB	512KB			
GPU	2D 600Mpix/s; OpenVG 300Mpix/s, OpenGL 176Mtri/s, 1Gpix/s	2D 600Mpix/s; OpenVG 300Mpix/s, OpenGL 176Mtri/s, 1Gpix/s			
Video Decode	1080p60	1080p30			
0S					
Linux	Buildroot/Yocto	Buildroot/Yocto			
Windows	WEC 7, WEC 2013	WEC 7, WEC 2013			
Memory					
Flash	128MB	128MB			
RAM	1GB	512MB			
Interfaces					
SD-Card	on-board	on-board			
Ethernet	10/100/1000MBit IEEE1588	10/100/1000MBit IEEE1588			
USB Host	4x	4x			
USB Device	1x	1x			
CAN	1x	1x			
UART	Зx	Зx			
I2C	1x	1x			
SPI	1x	1x			
Audio	Line In/Out/Mic	Line In/Out/Mic			
Digital I/O	max. 66 max. 66				
Touch Panel	4-wire, analog resistive; PCAP-Touch via I2C	4-wire, analog resistive; PCAP-Touch via I2C			
PCle	1x 1x				
SATA	1x				
Display					
RGB	18bit	18bit			
LVDS	2x 18/24Bit	2x 18/24Bit			
CRT/DVI	0/DVI	0/DVI			
Common					
Supply Voltage	5V/8-14V DC/± 5%	5V/8-14V DC/± 5%			
Power Consumption	4W typ.	4W typ.			
Operating Temperature	0 to 70°C	0 to 70°C aStoneA9-V2I: -25 to 85°C			
Size	100x72mm (lxw)	100x72mm (lxw)			
Weight	~60g	~60g			
Long Term Availability	2029	2029			

Applicable without Base Board

 The advantage of Single Board Computers (SBC) is that they can be applied without a base board, and therefore they are especially suited for quick "Time-To-Market". The armStone[™]A9 runs on the Freescale i.MX 6 ARM[®] Cortex[®]-A9 CPU (NEON, FPU, OpenGL/ ES 2.x, 3D, MPEG4).

Long Term Availablility

• A highlight of this CPU is its long availability for more than 15 years (Freescale Product Longevity Program).

Various Interfaces

- The armStone[™]A9 is equipped with Gigabit Ethernet, 4x USB 2.0 Host, USB 2.0 Device, CAN, I²C, SPI, Audio, SDIO, PCIe and serial interfaces.
- For display control, there is 2-channel LVDS up to WUXGA, RGB up to SVGA, and HDMI/DVI up to Full HD available. This interfaces are dual independent.
- For the connection of a touch panel (resisitive and capacitive), the touch controller board with I²C is used.
- Available operating systems are Windows Embedded Compact 7/2013 and Linux (Buildroot/Yocto).







armStone[™]A9r2 Single Board Computer with Freescale i.MX 6 Processor

Туре	aStoneA9r2-V1	aStoneA9r2-V2I	armStoneA9r2-V3
State	Q1/2016	Q1/2016	Q1/2016
CPU			
Туре	Freescale i.MX 6	Freescale i.MX 6	Freescale i.MX 6
Core	ARM Cortex-A9	ARM Cortex-A9	ARM Cortex-A9
No of Cores	QuadPlus	Solo	DualLite
Frequency	1GHz	1GHz	1GHz
L2-Cache	1MB	512KB	512KB
GPU	3D, 2D 600Mpix/s; OpenVG 300Mpix/s, OpenGL 176Mtri/s, 1Gpix/s	2D 600Mpix/s; OpenGL 35Mtri/s, 266Mpxl/s	3D, 2D 600Mpix/s; OpenVG 300Mpix/s, OpenGL 176Mtri/s, 1Gpix/s
Video Decode	1080p60	1080p30	1080p30
OS			
Linux	Buildroot/Yocto	Buildroot/Yocto	Buildroot/Yocto
Windows	WEC 2013	WEC 2013	WEC 2013
Memory			
Flash	256MB SLC	128MB SLC	256MB SLC
RAM	1GB DDR3L	512MB DDR3L	1GB DDR3L
eMMC	4GB		4GB
Interfaces			
SD-Card	on-board	on-board	on-board
Ethernet	10/100/1000Mbit IEEE1588	10/100/1000Mbit IEEE1588	10/100/1000Mbit IEEE1588
WLAN	IEEE 802.11a/b/g/n dual band		IEEE 802.11a/b/g/n dual band
USB Host	4x	4x	4x
USB Device	1x	1x	1x
CAN	2x	2x	2x
UART	5x	5x	5x
12C	1x	1x	1x
SPI	2x	2x	2x
Audio	Line In/Out/Mic	Line In/Out/Mic	Line In/Out/Mic
Digital I/O	max. 66	max. 66	max. 66
Touch Panel	4/5-wire, analog resi- stive and PCAP Touch via I2C	4/5-wire, analog resi- stive and PCAP Touch via I2C	4/5-wire, analog resi- stive and PCAP Touch via I2C
Camera A/D	0/MIPI-CSI		0/MIPI-CSI
PCle	1x		1x
SATA	1x		
Add. interfaces	Bluetooth 3.0		Bluetooth 3.0
Display			
LVDS	2x 18/24bit		2x 18/24bit
CRT/DVI	0/DVI	0/DVI	0/DVI
Common			
Supply Voltage	5V DC/± 5%	5V DC/± 5%	5V DC/± 5%
Power Consumption	4W typ.	4W typ.	4W typ.
Operating Temp.	0 to 70°C	0 to 70°C	0 to 70°C
Size	100x72x15 (lxwxd)	100x72x15 (lxwxd)	100x72x15 (lxwxd)
Weight	~60g	~60g	~60g
Long Term Availability	2029	2029	2029
Long Term Availability	2023	2023	2023

armStoneA9r2 with WLAN/BT onboard

- armStoneA9r2 is an upgrade of armStoneA9
 One of its distinctive features is the option to choose the Freescale i.MX 6QuadPlus processor, which offers ultimate performance.
- armStone[™]A9r2 uses an i.MX 6Solo/DualLite/QuadPlus ARM[®] Cortex[®]-A9 processor (3D, 2D, OpenGL, OpenVG).

Long Term Availablility

• A highlight of this CPU is its long availability for more than 15 years (Freescale Product Longevity Program).

Various Interfaces

- armStone[™]A9r2 comes with up to 4GByte DDR3 SDRAM, up to 1GByte SLC Flash, and additional 32GB eMMC.
 Special features compared to armStone[™]A9 are Wifi, Bluetooth and camera interface.
- Further interfaces are Gigabit Ethernet, 4x USB 2.0 Host, USB 2.0 Device, 2x CAN, I²C, 2x SPI, Audio, SATA, PCIe and 5x serial interfaces.
- For display control, 2-channel LVDS and DVI are available simultaneously (with different content also).
- It is also possible to connect a resistive or capacitive touch panel via I²C.
- Available operating systems are Windows Embedded Compact 2013 and Linux (Buildroot/Yocto)







PCOMnetA5 Single Board Computer with Freescale Vybrid Processor

Small, compact SBC

- The baseboard has a size of 80 x 50mm and offers the following functions and interfaces:
- SD-Card, 2x Ethernet, Wifi, 2x USB Host, USB Device, 2x CAN, 2x Serial, I²C, SPI and Digital I/O.
- PCOMnetA5 is a ready-to-use product based on our small and inexpensive form factor PicoCOM.
- It is based on a compact base board with plugged-on PicoCOMA5-V3-W13/LIN.
- The RGB display interface is available on a 40 pole film cable socket.
- The 4 signals for displays with resistive touch panel are available as well.
- To connect displays with PCAP touch panel, an additional adapter is needed.
- PicoCOMA5-V3-W13/-LIN with Freescale Vybrid Cortex*-A5 CPU is plugged on the module and offers high computing power as well as 256MB RAM and 128MB Flash.
- Windows Embedded Compact 2013 and Linux (Buildroot) were customized to run the module.

Туре	PCOMnetA5	
State	Production	
CPU		
Туре	Freescale Vybrid	
Core	ARM Cortex-A5	
No of Cores	Single-Core	
Frequency	500MHz	
L2-Cache	512KB	
GPU	NEON, FPU	
OS		
Linux	Buildroot	
Windows	WEC 2013	
Memory		
Flash	128MB	
RAM	256MB	
eMMC		
Interfaces		
SD-Card	microSD on-board	
Ethernet	2x 10/100MBit IEEE1588	
WiFi	optional	
USB Host	2x	
USB Device	1x	
CAN	2x	
UART	2x	
I ² C	1x	
SPI	1x	
Digital I/O	max. 7	
Touch Panel	4-wire, analog resistive, PCAP-Touch interface via I ² C	
Display		
RGB	18Bit	
Common		
Supply Voltage	5V DC/± 5%	
Power Consumption	2W typ.	
Operating Temp.	0 to 70°C (opt20 to 85°C)	
Size	80x50mm (lxw)	
Long Term Availability	2028	



Solutions with F&S Boards and Displays

Rutronik offers complete optimized solutions as close to mass-production developer kits. This can reduce the important time-to-market and cut down the engineering costs.

SKIT-Selection

During the Design-In phase, our team can specify in cooperation with developers a best fitting set, including module-type, TFT, touch and cables with the right length.

If it should be a COM or a SBC out of this catalogue, during the first project meeting we can put together, what is needed, so at the end we can provide a solution that is more close to the project specifications, compared to standard developer kits.

Visualization

With high specialized display manufacturers we are also able to offer optimized solutions for visualization. From 3.5" up to Full-HD, we can offer a wide range of different fitting solutions that can be combined with a matching F&S boardlevel product.

Touch-Usage

We have touch-solutions with different technologies available. Resistive touch panels for smaller displays up to PCAP with multi touch & customized cover lens for special requirements, we can provide a solution. For bigger displays we can also offer SAW and IR solutions.

Adaption

All needed adapters will be covered by us, nothing would be missing for getting the kit working out of the box.

Cabling

Our Pre-Sales support is also taking care of customized cables for display and board. Length, shield and type of cable, we're taking care to hand over a solution and not just components.



Support & Customers

F&S Elektronik Systeme develops and produces secure embedded solutions for the medical and industrial sector, as well as for home automation. Hardware design, porting of operating systems and the production is located in Stuttgart/Germany.

Freescale Proven Partner

All modules are based on Freescale solutions (Vybrid, i.MX 6), guaranteeing long-term availability up to 15 years, scalable processing power (ARM[®] Cortex[®]-A5/A7/A9 Single- up to Quad-Core) and heterogeneous multiprocessing (additional ARM[®] Cortex[®]-M4).

All F&S boards are shipped with a customized operating system (Android, Linux or Windows Embedded Compact).

Custom Solutions

Customized solutions, based on their standard products, are a specialty of F&S.

They serve both development segments, hardware and software, since more than twenty years.

In-depth knowledge and the understanding that every project is unique, pave the way for a successful F&S solution, meeting your sophisticated requirements.



Support Services

F&S Elektronik Systeme attaches great importance on customer support.

The F&S development team supervises an online forum and answers upcoming questions by phone or e-mail.

F&S Project Guarantee

All upcoming problems during development will be solved and wishes will be fulfilled.

Aim is to complete the customer's project successfully and to continue support services after the start of the series production and throughout the lifetime of the project.

Starterkits

Ready-to-run starter kits are available for every F&S board. Every kit includes a module, cable kit and display with adapters, helping developers to start their project without any obstacles.

Workshops

Workshops at the F&S headquarters in Stuttgart/Germany complete the range.

The attendant receives a 4h Workshop held by a F&S software engineer (Linux or Windows Embedded Compact).

RUTRONIK EMBEDDED



Boards & Systems

Storage

Displays

Wireless

Individual System Solutions Combine Technologies

The performance of embedded systems is growing disproportionately; one of the reasons for this is the improvement of intelligent sensors and actuators. There are more and more autonomous systems which record and process data, responding very specifically to it. When the systems are networked together wirelessly or wired via IP protocol this creates the Internet of Things. Machines, systems, appliances and small smart everyday objects will in the future become part of the so-called Cyber Physical Systems (CPS).

All systems are characterised by certain common characteristics: Programming capability, storage capacity, functional user interfaces and communications links. Embedded systems require integrated vision when selecting the components because there are complex dependencies between the real physical and the virtual digital world.

RUTRONIK EMBEDDED complies stringently with this integrated analysis, enabling it to always develop the right solution.



Cyber Physical Systems (CPS) comprise the networking of embedded systems via wired or wireless communications networks

Boards & Systems

based on ever faster, more powerful, smaller and energysaving components. Suitable and standardised power supplies, sensors and electromechanical components which guarantee functional reliability even under extreme operating conditions

Storage

solutions in compact sizes with any number of read/write cycles with the highest storage density

Displays

and touch systems, which provide the user with a perfect visualisation and operation of the real world and facilitate intuitive operation and the interaction of extremely complex systems

Wireless

technologies facilitate the global linking of processes and databases in all conventional transmission standards and in a matter of seconds



Boards & Systems





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Wireless

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