



## » Computer-on-Modules 2012 «

### Computer-on-Modules



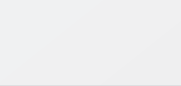
- » Flexibility
- » Scalability
- » Long solution life
- » Short time-to-market



**COM**   
**Express**®

**ETX 3.0**  
Long Term Support

**Over 14 YEARS**  
**COM Experience**

	COM Express®															ETX® (114x95mm)			
	mini (84x55mm)			compact (95x95mm)							basic (125x95mm)								
																			
<b>CPU</b>	Intel® Atom™ Z510, Z530	Intel® Atom™ E6xx / E6xxT	Intel® Atom™ N2600, N2800, D2700	Intel® Atom™ Z510, Z530	Intel® Atom™ Z520PT	Intel® Atom™ D510, D410, N450, D525	Intel® Atom™ N270	Intel® Core™ 2 Duo SL9400, SU9300, Intel® Celeron® M Processor 722, 723	AMD G-Series T44R, T52R, T40N, T56N	Intel® Atom™ N2600, N2800, D2700	Intel® Core™ Duo L2400, Intel® Celeron® M 440, ULV423	Intel® Core™2 Duo SP9300, SL9400, SU9300, T9400, P8400, Celeron® M575	Intel® Core™ i7-610E, i7-620LE, i7-620UE, i5-520E	Intel® Core™ i7-2715QE, i7-2655LE, i7-2610UE, i5-2515E, i3-2310UE, i3-2340UE, Celeron® B810E, 847E	3rd Generation Intel® Core™ processor based platform	Intel® Core™ 2 Duo, Intel® Core™ Duo, Intel® Celeron® M	Intel® Atom™ N270	AMD G-Series, T40R, T52R, T40E, T56N	
<b>CPU Clock</b>	1.1 GHz up to 1.6 GHz	0.6 GHz up to 1.6 GHz	up to 2x 2.13 GHz	up to 1.6 GHz	1.33 GHz	up to 2x 1.66 GHz	1.6 GHz	up to 2x 1.86 GHz	up to 2x 1.6 GHz	up to 2x 2.13 GHz	up to 2x 1.66 GHz	up to 2x 2.53 GHz	up to 2x 2.53 GHz	up to 2x 2.5 GHz resp. 4x 2.1 GHz	tbd	up to 2x 1.66 GHz	1.6 GHz	up to 2x 1.65 GHz	
<b>Cache</b>	32 kB Instruction Cache + 24 kB L1/512 kByte L2	32 kB Instruction Cache + 24 kB L1 Cache, 512 kB L2 Cache	32 kB Instructions cache + 24 kB L1 Cache, 1MB L2 Cache	32 kB Instruction Cache + 24 kB L1, up to 512kB L2	512 kB L2	up to 1 MB L2	512kB L2	up to 6 MB L2	512 kB L2	32 kB Instructions cache + 24 kB L1 Cache, 1MB L2 Cache	up to 4 MB L2	up to 6 MB L2	up to 4 MB L2	up to 6 MB L2 Cache	tbd	up to 4 MB L2	512 kB L2	2x 512 kB L2	
<b>Chipset</b>	Intel® SCH US15W	Intel® PCH EG20 / EG20T	Intel® SCH NM10 Express	Intel® SCH US15W	Intel® SCH US15WPT	Intel® 82801HM	Intel® 945GSE, ICH7M	Intel® GS45, ICH9M SFF	AMD FCH A50M	Intel® SCH NM10 Express	Intel® 945GME, ICH7M-DH	Intel® GS45, ICH9M SFF, Intel® GM45, ICH9EM, Intel® GL40, ICH9M	Intel® Mobile Platform Controller Hub QM57	Intel® Mobile Platform Controller Hub QM67 resp. HM65	tbd	Intel® 945GME, ICH7M	Intel® 945GSE, ICH7M	AMD FCH A55M	
<b>Bus Speed</b>	400/533 MHz FSB	n/a	n/a	400/533 MHz FSB	533 MHz FSB	667/800 MHz	400/533 MHz FSB	800/1066 MHz FSB	800/1066 MHz FSB	n/a	533/667 MHz FSB	800/1066 MHz FSB	800/1066 FSB	n/a	n/a	400/533/667 MHz	400/533 MHz	1066 MHz FSB	
<b>Memory</b>	onboard up to 2 GB DDR2	onboard up to 2 GB DDR2-800	onboard up to 4 GB DDR3 (800/1066 MHz)	up to 2 GB DDR2	onboard up to 2 GB DDR2 (industrial temperature range)	up to 2x 2 GB DDR2/DDR3	up to 2 GB DDR2	up to 4 GB DDR3	up to 2x 4 GB DDR3	up to 4 GB DDR3	physical memory up to 4 GB DDR2, Dual Channel	up to 2x 4 GB DDR3, Dual Channel	up to 2x 4 GB DDR3, Dual Channel with ECC	up to 2x 8 DDR3, Dual Channel with ECC	up to 2x 8 GB DDR3, Dual Channel	up to 2 GB DDR2	up to 2 GB DDR2	Up to 4 GB DDR3	
<b>Hard Disk</b>	1x onboard SSD up to 4 GByte, 1 SDIO port (shared with GPIO)	2x SerialATA 300, 1x microSD-Card Slot on GPIO alternatively, 1x SATA 300, 1x SATA E2 SSD up to 8 GB	2x Serial ATA external supporting 3Gb/s alternatively: 1x SATA + 1x SATA onBoard SSD Flash drive up to 8GB SLC / 32GB MLC	2x SerialATA (RAID 0,1), 1x PATA	1x SerialATA, 1x PATA, optional industrial temperature range SSD onboard	3x SerialATA	2x SerialATA (AHCI), 1x PATA, optional SSD flash onboard	3x SerialATA 2, 1x PATA	4x SerialATA 3	2x SerialATA 2	2x SerialATA (AHCI; RAID 0,1), 1x PATA	4x SerialATA 2, 1x PATA (optional Flash onboard)	4x SerialATA 2 PATA (on Type 2 only)	2x SerialATA 3, 2x SerialATA 2 PATA (on Type 2 only)	2x SerialATA 3 PATA (on Type 2 only)	2x SerialATA (AHCI), 1x PATA	2x SerialATA (AHCI), 2x PATA	2x SerialATA (AHCI), 2x PATA	2x SerialATA (AHCI), 2x PATA
<b>USB</b>	USB 2.0, 8 ports (1 USB Client)	USB 2.0, 6 ports + USB Client port	USB 2.0, 8 ports	USB 2.0, 8 ports (1x USB Client)	USB 2.0, 8 ports	USB 2.0, 8 ports	USB 2.0, 8 ports	USB 2.0, 8 ports	USB 3.0 (type 6 only), 2 ports and USB 2.0, 6 ports	USB 2.0, 8 ports	USB 2.0, 8 ports	USB 2.0, 8 ports	USB 2.0, 8 ports	Type 2: USB 2.0, up to 8 ports Type 6: USB 3.0, 2 ports and USB 2.0, 6 ports	Type 2: USB 2.0, 8 ports Type 6: USB3.0, 4 ports and USB 2.0, 4 ports	USB 2.0, 4 ports; opt. 6 ports	USB 2.0, 4 ports; opt. 6 ports	USB 2.0, 4 ports; opt. 2x miniUSB 2.0	
<b>PCI Express</b>	1 PCIe x1 lane (opt. 2 PCIe x1 if no onboard LAN)	3x PCIe x1 lanes	4x PCI Express x1 Lanes, one for LAN onboard	2 PCIe x1, optional up to 5 PCIe x1	2 PCIe x1 lanes	5 PCIe x1 lanes	3 PCIe x1	5 PCIe x1 1 PEG x16	6 PCIe x1	4x PCI Express x1 Lanes, one for LAN onboard	5 PCIe x1 1 PEG x16	5 PCIe x1 1 PEG x16	Type 2: 6 PCIe x1, 1 PEG x16 Type 6: 7 PCIe x1, 1 PEG x16	Type 2: 5 PCIe Gen 2.0 x1, 1 PEG x16 Type 6: 7 PCIe Gen 2.0 x1, 1 PEG x16 (Gen 2.0)	up to 7 PCIe x1	-	-	-	
<b>PCI</b>	-	-	-	PCI 2.3, 32 bit / 33 MHz	PCI 2.3, 32 bit / 33 MHz	PCI 2.3, 32 bit / 33 MHz	PCI 2.3, 32 bit / 33 MHz	PCI 2.3, 32 bit / 33 MHz	PCI 2.3, 32 bit / 33 MHz (type 2 only)	-	PCI 2.3, 32 bit / 33 MHz	PCI 2.3, 32 bit / 33 MHz	PCI 2.3, 32 bit / 33 MHz (Type 2 only)	PCI 2.3, 32 bit / 33 MHz (Type 2 only)	PCI 2.3, 32 bit / 33 MHz (Type 2 only)	PCI 2.3, 32 bit / 33 MHz	PCI 2.3, 32 bit / 33 MHz	PCI 2.3, 32 bit / 33 MHz	
<b>ISA</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ISA Bus (ETX® 3.0 compliant)	ISA Bus (ETX® 3.0 compliant)	ISA Bus (ETX® 3.0 compliant)	
<b>Serial Ports</b>	-	2x 2-wire TTL	2x 2-wire TTL optional	-	-	-	-	-	1x 2-wire TTL	2x 2-wire TTL optional	-	-	-	-	-	2x full COM ports TTL	2x full COM ports TTL	2x full COM ports TTL	
<b>Ethernet</b>	Intel® 82574L Hartwell, 10/100/1000 Mbit	MAC in Chipset integrated, Phy: Broadcom BCM54610, 10/100/1000 Mbit	Intel® 82574L (Hartwell) 10/100/1000 Mbit	Intel® 82574L, 10/100/1000 Mbit	Intel® 82574 (Industrial Temperature Range), 10/100/1000 Mbit	Intel® 82567, 10/100/1000 Mbit	Intel® 82574L, 10/100/1000 Mbit	Intel® 82567, 10/100/1000 Mbit	Intel® 82574L, 10/100/1000 Mbit	Intel® 82574L (Hartwell) 10/100/1000 Mbit	Realtek RTL 8111C, 10/100/1000 Mbit	Intel® 82567, 10/100/1000 Mbit	Intel® 82557, 10/100/1000 Mbit	Intel® 82579, 10/100/1000 Mbit	Intel® 82579, 10/100/1000 Mbit	Intel® 82567E2Z, 10/100 Mbit	Intel® 82562V, 10/100 Mbit	Broadcom BCM54610 10/100 Mbit	
<b>Sound</b>	Intel® High Definition Audio	Intel® High Definition Audio	Intel® High Definition Audio w/ HDMI 1.3a support	Intel® High Definition Audio	Intel® High Definition Audio	Intel® High Definition Audio	Intel® High Definition Audio, AC97	Intel® High Definition Audio	Intel® High Definition Audio	Intel® High Definition Audio w/ HDMI 1.3a support	Intel® High Definition Audio, AC97	Intel® High Definition Audio	Intel® High Definition Audio	Intel® High Definition Audio	Intel® High Definition Audio	AC97, Codec Crystal CS4299	Realtek ALC886GR HDA	Realtek ALC886GR HDA	
<b>Graphics Controller</b>	Integrated Intel® Graphics HDTV/HD capable, Decoder for MPEG2(HD)/H.264	Integrated 2D/3D Graphics Engine, Gfx Core 333/400 MHz, shared VRAM Video Encode: MPEG4, H.263, H.264 Video Decode: MPEG2, MPEG4, VC1, WMV9, H.264	Integrated 2D/3D Graphics Engine, GMA 3650/3600, Gfx clock 640/400MHz, DirectX® 9.1 Video Decode: MPEG2, Blu-Ray Disk 2.0, VC-1, H.264, WMV9 up to 1080p	Intel® GMA 500, DirectX® 9, PS 3.0	Intel® GMA 500, DirectX® 9, PS 3.0	Integrated in Atom™ CPU, GMA950 (200 MHz) with DirectX® 9, PS 2.0	Intel® GMA950, DirectX® 9, PS 2.0	Intel® GMA X4500, DirectX® 10, PS 4.0	AMD Mobility Radeon HD6250/HD6310 DirectX® 11, OpenCL 1.0, PS 5.0, H.264, VC-1 (ATI Avivo HD)	Intel® GMA 5650/5600 DirectX® 9.1, OpenGL 3.0, BluRay 2.0	Intel® GMA 950 DirectX® 9, PS 3.0	Intel® GMA X4500 DirectX® 10, PS 4.0	Intel® iGFX GMA HD/5700MHD, DirectX® 10, PS 4.0	Intel® iGFX HD3000/HD2000 integrated, DirectX® 10.1, PS 4.0, OpenGL 3.0	tbd	Intel® GMA 950	Intel® GMA 950	Integrated Radeon HD6310 / HD6250 DirectX® 11, PS 5.0, OpenGL 3.2 ATI Avivo HD with H.264, VC-1, Blu-ray support	
<b>Graphics Memory</b>	up to 256 MB, DVMT	up to 352 MB, DVMT	tbd	up to 256 MB DVMT	up to 1024 MB DVMT	up to 384 MB DVMT	up to 256 MB DVMT	up to 1024 MB DVMT	tbd	tbd	up to 256 MB DVMT	up to 1700 MB DVMT	up to 1700 MB DVMT	up to 1700 MB DVMT	tbd	up to 224 MB DVMT 3.0	up to 224 MB DVMT 3.0	tbd	
<b>Display Interfaces</b>	Single Chanel LVDS 18/24 Bit 1366x768; SDVO (optional) up to 1920x1080	LVDS 18/24bit 1280x768@60Hz SDVO 1920x1080@50Hz	LVDS 18bit (N2600/2800) 1366x768@112MHz LVDS 18/24bit (D2700) 1440x900@112MHz 1x DP++ (HDMI/DVI/DisplayPort)	SDVO 1920x1080, Single-Channel LVDS 18/24 Bit, JILI support	Single channel 24 bit LVDS, Single SDVO channel	Single/Dual Channel LVDS up to 1600 x 1200, CRT up to 2048x1536, SDVO, TVout, JILI support	Dual SDVO multiplexed with PEG, DisplayPort and HDMI, Single/Dual Channel, LVDS 18/24 Bit up to 1600x1200, TVout, CRT up to 2048x1536	Single Channel LVDS 18 bit, (type 6) 24 bit (Type 2), 2x DDI (DisplayPort/HDMI/DVI) CRT up to 2560x1600 (Type 6)	tbd	Single Channel LVDS, 2x DP++ (HDMI/DVI/DisplayPort). CRT up to 1920x1200	Dual SDVO multiplexed with PEG, Single/Dual Channel LVDS 18/24 Bit, TVout, CRT, JILI support	Dual SDVO multiplexed with PEG, Single/Dual Channel LVDS 18/24 Bit, TVout, CRT, JILI support	Type 2: VGA, LVDS, PEG (Multiplexed) Type 6: VGA, LVDS, 1x DDI (SDVO/DVI/DP/HDMI), 2x DDI (DVI/DP/HDMI), PEG (Multiplexed)	3x DP++ (incl. 1x SDVO, 1x eDP) 1x CRT, 1x Dual Channel LVDS 18/24 bit (DP++ and PEG multiplexed on Type 2)	3x DP++ (Type 2: PEG multiplexed), 1x CRT, 1x SDVO	Single/Dual Channel LVDS 18/24 bit up to 1600x1200, SDVO, CRT up to 2048x1536, JILI support	Single/Dual Channel LVDS 18/24 bit up to 1920 x 1200, CRT up to (2560 x 1600)	DP++ (DisplayPort/HDMI/DVI), Dual Channel LVDS 18/24 bit up to 1920 x 1200, CRT up to (2560 x 1600)	
<b>Power Support</b>	4.75 V – 14.7 V; ACPI 3.0	4.75 V – 14.7 V; ACPI 3.0	4.75 V – 20 V, ACPI 3.0	8.5 V – 18 V; ACPI 3.0	4.75 V – 18 V; ACPI 3.0	4.75 V – 18 V; ACPI 3.0	8.5 V – 18 V; ACPI 3.0	8.5 V – 18 V; ACPI 3.0	4.75 V – 18V; ACPI 3.0	4.75 V – 20 V, ACPI 3.0	8.5 V – 18 V; ACPI 2.0	8.5 V – 18 V; ACPI 3.0	8 V – 18 V; ACPI 3.0	8.5 V – 18 V; ACPI 3.0	8.5 V – 20 V; ACPI 3.0	5 V; ACPI 2.0, APM 1.2	5 V; ACPI 2.0	5 V; ACPI 3.0	
<b>Form Factor</b>	COM Express® mini: 84 x 55 mm Pin-out Type 1	COM Express® mini: 84 x 55 mm Pin-out Type 10	COM Express® mini: 84 x 55 mm Pin-out Type 10	COM Express® compact: 95 x 95 mm Pin-out Type 2	COM Express® compact: 95 x 95 mm Pin-out Type 2	COM Express® compact: 95 x 95 mm Pin-out Type 2	COM Express® compact: 95 x 95 mm Pin-out Type 2	COM Express® compact: 95 x 95 mm Pin-out Type 2	COM Express® compact: 95 x 95 mm Pin-out Type 2 or 6	COM Express® compact: 95 x 95 mm Pin-out Type 6	COM Express® basic: 125 x 95 mm Pin-out Type 2	COM Express® basic: 125 x 95 mm Pin-out Type 2	COM Express® basic: 125 x 95 mm Pin-out Type 2 or 6	COM Express® basic: 125 x 95 mm Pin-out Type 2 or 6	COM Express® basic: 125 x 95 mm Pin-out Type 2 or 6	ETX 3.0: 95 x 114 mm	ETX 3.0: 95 x 114 mm	ETX 3.0: 95 x 114 mm	
<b>Temperature</b>	Operation: 0°C to 60°C Storage: -30°C to 85°C	Operation: 0°C to +60°C Storage: -30°C to +85°C	Operation: 0°C to +60°C, Storage: -30° to +85°C,	Operation: 0°C to +60°C Storage: -40°C to +85°C	Operation: -40°C to +85°C Storage: -40°C to +85°C	Operation: 0°C to +60°C, Storage: -30°C to +85°C,	Operation: 0°C to +60°C, Storage: -30°C to +85°C,	Operation: 0°C to +60°C, Storage: -30°C to +85°C,	Operation: 0°C to +70°C, Storage: -30°C to +85°C	Operation: 0°C to +60°C, Storage: -30°C to +85°C,	Operation: 0°C to +60°C, Storage: -30°C to +85°C,	Operation: 0°C to +60°C, Storage: -30°C to +85°C,	Operation: 0°C to +60°C, Storage: -30°C to +85°C	Operation: 0°C to +60°C, Storage: -30°C to +85°C,	Operation: 0°C to +60°C, Storage: -30°C to +85°C,	Operation: 0°C to +60°C, Storage: -30°C to +85°C,	Operation: 0°C to +60°C, Storage: -30°C to +85°C,	Operation: 0°C to +60°C, Storage: -30°C to +85°C,	
		Industrial Temperature Range: -40°C to +85°C	Extended Temperature: -25°C to +75°C on request	Industrial Temperature Range: -40°C to +85°C	Extended Temperature: -25°C to +75°C or -40°C to +85°C (only D525) on request	Extended Temperature: -25°C to +75°C on request	Extended Temperature: -25°C to +75°C on request	Extended Temperature: -25°C to +75°C on request	Extended Temperature: -25°C to +75°C on request	Extended Temperature: -25°C to +75°C on request	Extended Temperature: -25°C to +75°C on request	Extended Temperature: -25°C to +75°C or -40°C to +85°C (esp. Celeron® 722, SU9300, SL9400) on request	Extended Temperature: -25°C to +75°C or -40°C to +85°C (esp. i7-2610UE, i7-2655LE) on request	Extended Temperature: -25°C to +75°C on request	Extended Temperature: -25°C to +75°C on request	Extended Temperature: -25°C to +75°C on request	Extended Temperature: -25°C to +75°C on request	Extended Temperature: -25°C to +75°C on request	

# » Benefits of Computer-on-Modules «

Deadline

With Computer-on-Modules

Without Computer-on-Modules

## Advantages at a glance

- » Scalable computing power
- » Scalable dimension
- » Short time-to-market
- » Optimized for harsh environments
- » Simplified development
- » Long-term availability
- » Industry standard with strong eco system

Automation



Industrial Control



Medical



Military/Aerospace



Infotainment



Transportation



Energy



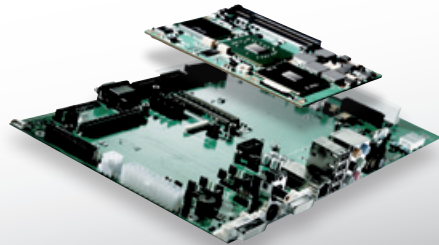
Communications



# » Faster to complete solutions with... «

## Concentrate on Your Core Business

Thanks to Computer-on-Modules (COM), customers can concentrate on their core business and only have to design the necessary interfaces and circuits for their individual carrier boards. The standardized computer module is then simply plugged into the carrier board. Customers can focus on their application-specific elements without worrying about the computing core.



## Broad Knowledge Base Accelerates Time-to-Market

Kontron offers a variety of hardware and software tools to speed up and simplify your R&D processes.

With complete **starter kits** that, which include all required hard- and software for quick evaluation, engineers can start development while defining their application-specific solution. In addition to the available starter kits Kontron also provides various additional **Graphics Adapters** help developers to convert panel signals to the required specification of the target application.



Find out more on  
[kontron.com/mars](http://kontron.com/mars),  
[kontron.com/mysafechoice](http://kontron.com/mysafechoice)

## Boards & More – Individual Carrier Board Design

When Carrier Board design and Computer-on-Modules come from a single source, system functionality can be optimally tuned for the application. Kontrons Boards & More Team offers the correct form factor fit – in the highest quality.

With x86, ARM and PowerPC design experience, Kontron develops and delivers any kind of Carrier Board, including test, memory, heatsink, housing, assembly, individual configuration, packaging and shipment.

Even if you can't find a suitable module in Kontron's broad product range, we'll take on the design and the manufacturing of complete boards with any desired CPU in any desired form factor.



Find out more on  
[kontron.com/boardsandmore](http://kontron.com/boardsandmore)

More about ARM modules  
[on kontron.com/arm](http://kontron.com/arm)

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