



# Video/Cameras, High Bandwidth Data Handling on iMX6 Cortex-A9 Single Board Computer

## Features



- ✓ iMX6 Cortex-A9 Quad Core processor, 1GHz w/ NEON® GPU
- ✓ Programmable Kintex-7® FPGA
- ✓ Up to 60Gb/s full duplex throughput
- ✓ 2GB DDR3 SDRAM, 8GB Flash
- ✓ PCIe bridge from CPU to FPG
- ✓ 6 USB ports, 200 digital I/O, 1 CAN
- ✓ Dual Gigabit Ethernet / Web Server
- ✓ -40° to +85°C operation



The SBC4661 is a powerful 1 GHz Quad Core Cortex-A9 with multiple video ports, quad USB3.0 and dual GigE Ethernet. Using Freescale's i.MX6® multimedia CPU included is the NEON GPU which runs multiple videos or multi-media applications. Also on-board is a powerful Kintex-7 FPGA which has its own DDR3 memory, plus 12 differential, 10-bit analog ports and over 200 digital I/O lines making the SBC4661 a highly user configurable industrial controller.

Ideal for vision applications, the SBC4661 includes hardware interfaces and software support for popular camera interfaces such as USB3Vision, GigEVision®, CamerLink®, and CoaXPress®. On-board vision processing can

be hosted and processed in the Kintex-7 FPGA and output into multiple video configurations.

The SBC4661 has the standard industrial I/O including a real-time clock, watchdog timer, audio support, 24-bit LVDS and TFT flat panel display, HDMI, 4-wire touchscreen interface, two PWM outputs, a SATA HDD port, two SD/MMC card slots, and SATA II. Additional expansion, through StackableUSB provides DAC and ADC board-to-board communication via USB, I<sup>2</sup>C, and/or SPI.

The SBC4661 is ideal for vision intensive applications, multi-processor applications or applications requiring vast amounts of data to be transferred and/or processed.

### Software Support

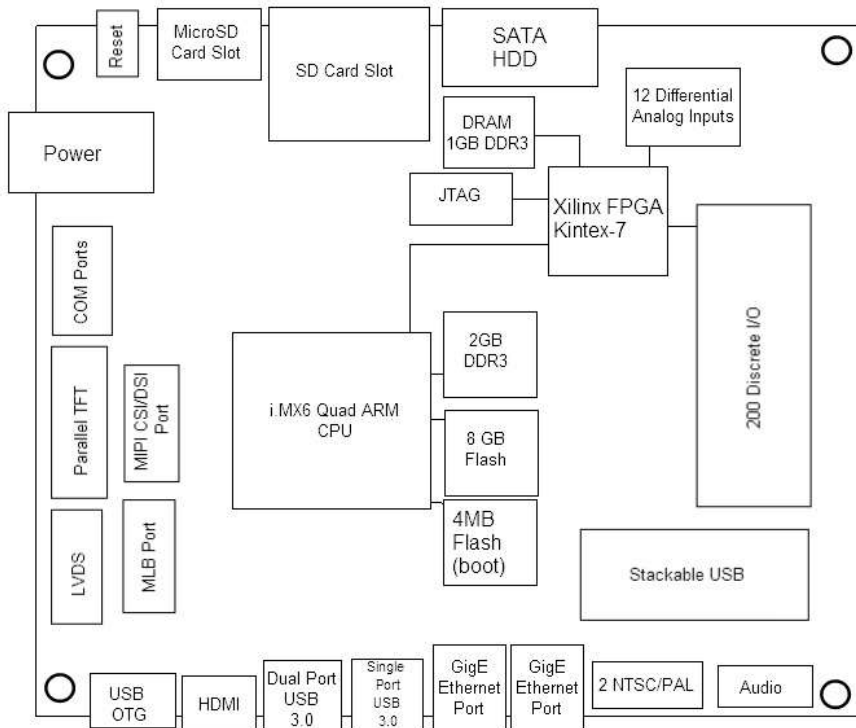
Linux  
Windows CE  
VxWorks  
Android  
C, compilers

### Compatible Hardware

StackableUSB Client Devices  
PC Hosts  
LVDS FP-Kits  
PSxxx, Power Supplies  
Secure Digital Devices  
RS232/RS485 Devices  
CAN Devices  
Ethernet Networks

### Mounting/Packaging

Standoffs, STDOFFUSB  
ENC104



## Technical Details:

At the heart of the SBC4661 is the Freescale i.MX6 multimedia processor, a System on Chip (SOC) offering high-performance processing. The core of i.MX6 is a Quad Core 1GHz ARM Cortex-A9 CPU. The CPU is augmented by a floating-point coprocessor, ARM's NEON SIMD media accelerator, and OpenGL ES 2.0 and OpenVG 1.1 hardware accelerators for fast, power-efficient 3D and 2D graphics operations.

The i.MX6 SOC integrates many peripherals, including an interrupt controller, watchdog timer, DDR3 SDRAM and flash memory controllers, One High-Speed USB ports, one High-Speed On-The-Go USB port, a gigabit Ethernet MAC, four 16C550 UARTs, 24-bit flat panel display output, LVDS panel display

output, HDMI display output, Camera Sensor Interface port, Audio, FlexCAN, I2C, and PWM.

In addition to the peripherals built into the i.MX6, the SBC4661 packs on a second gigabit Ethernet port, four more USB 3.0 Super Speed ports, 4 wire resistive touch screen, NTSC/PAL camera input, and 200 bits of programmable parallel I/O via a Kintex-7 FPGA.

The Kintex-7 FPGA offers user the option to expand on the I/O and processing needs. 100% of the FPGA core is available for users firmware. Kintex-7 can communicate with the Cortex-A9 CPU via PCIe and Fast memory bus interface. The SBC4661 also provides five IRQ lines from the CPU to

FPGA for user firmware needs. For user firmware that requires large amounts of memory the Kintex-7 has up to 1GB of DDR3 memory interface to it.

The SBC4661 offers three boot options: A dedicated 4MB SPI NOR flash memory, a partition of the NAND flash, and a bootable SD/MMC card slot.

The SBC4661 memory subsystem provides 1GB of DDR3 SDRAM for application data. The 4MB SPI NOR flash memory holds the bootloader and operating system. Up to 8GB NAND flash is also available for operating system and non-volatile user storage.

Large application programs, data storage and/or portability of either of these items is available by using the second SD card slot or connecting to the SATAII HDD connector to attach an external hard drive.

Four (4) 16C550-compatible RS232 serial ports allow communication with low-speed devices. They are jumper-configurable for Full-duplex RS485 communication.

The SBC4661 becomes a powerful front-end processor for control applications with the standard StackableUSB expansion. This popular I/O channel accommodates multiple I/O boards on the top side and/or the bottom side of the board without use of a hub.

For true 32-bit application development, the SBC4661 supports 32-bit operating systems such as Linux, and Android. All have full tool suites available, including compilers and debuggers.

For pre-configured sets of options, Micro/sys can provide OEMs with a single part number for ordering. In addition, custom versions of the SBC4661 are available. Please call Micro/sys Technical Sales for details.

## Specifications:

### Mechanical:

- ❑ PC/104 footprint, 4.5" (plus I/O region) x 6.5" x .6"
- ❑ Secure Digital (SD) card extends beyond boards edge of the board
- ❑ Ethernet connector top side .535" tall

### Power Requirements:

- ❑ +5v  $\pm 5\%$  at **TBD** typical, **TBD** max

Power Connector	
Pin	Signal
1	+5V
2	+5V
3	+12V
4	Reserved
5	GND
6	GND

### Environmental:

- ❑ Operating range: -40° to +85°C @ 1GHz
- ❑ -40° to +85°C storage
- ❑ 5%-95% relative humidity, non-condensing

### Processor Core Section:

- ❑ Freescale i.MX6Q multimedia, 1Ghz clock rate
- ❑ Quad Core ARM Cortex-A9 CPU
- ❑ 1MByte L2 Cache
- ❑ 32KByte instruction and data Caches
- ❑ NEON SIMD media accelerator
- ❑ Hardware graphics accelerators (3D and 2D graphics)

### On-board Memory / Memory Expansion

- ❑ 2GB DDR3 Synchronous DRAM (soldered)
- ❑ 4MB SPI NOR flash (soldered)
- ❑ 8GB NAND flash (soldered)
- ❑ One (1) Micro-SD, and One (1) SD/MMC card slots
- ❑ SATAII HDD connector or CFAST connector option

### On-board FPGA Expansion

- ❑ Kintex-7 (70T, 160T, 325T, or 410T available FPGA sizes)
- ❑ PCIe and Fast Memory Bus interface to ARM Cortex-A9 CPU
- ❑ 1GB DDR3 Synchronous DRAM
- ❑ I/O:
  - 200 TTL bi-directional signals
  - Twelve (12) 10-bit Differential Analog inputs
  - One (1) Low Pin Count FMC connector

### Video Camera Interface

- ❑ One (1) CVBS (composite) video input support, NTSC or PAL format
- ❑ One (1) MIPI CSI-2 Serial Camera Port, 1/2/3/4 Lane mode supported
- ❑ Gigabit Ethernet Ports
- ❑ USB3.0 Ports

### Video Interfaces:

- ❑ Up to 2 Active Displays
- ❑ One (1) HDMI 1.4 port
- ❑ One (1) 24-Bit TFT Display Port up to 255Mpixels per second
- ❑ Two (2) LVDS Display Ports up to 85Mpixels per second
- ❑ One (1) MIPI DSI Port, two lanes at 1Gbps

### Audio I/O:

- ❑ SGT5000 Audio Codec
- ❑ Microphone input, stereo line in / line out, headphone out ports

### Ethernet Ports:

- ❑ Two (2) Gigabit Ethernet ports
- ❑ Standard RJ45 connectors

### USB:

- ❑ Four (3) Super-Speed USB 3.0 Host ports, Type-A USB3.0 connector, StackableUSB connector
- ❑ One (1) High-Speed On-The-Go USB 2.0 port providing device and limited Host functions, Mini-AB connector
- ❑ One (1) High-Speed USB 2.0 Host ports, StackableUSB connector

- ❑ Transfers at High-Speed 480Mbit/sec, at Super-Speed 5Gbit/sec

### Serial Ports:

- ❑ Four (4) asynchronous serial ports
- ❑ 16C550-compatible
- ❑ RTS and CTS modem controls
- ❑ RS232 or RS485 Jumper Configurable

### Controller Area Network:

- ❑ 1 - FlexCAN
- ❑ Supports version 2.0B specification with both standard and extended message frames

### MLB Network:

- ❑ One (1) MediaLB (MLB) interface to MOST Networks 150Mbps

### Watchdog Timer:

- ❑ Program must refresh watchdog timer periodically, or system will be reset
- ❑ Enabled through software

### Real Time Clock:

- ❑ RTC with on-board battery

### Digital I/O:

- ❑ 4-wire Resistive touchscreen interface
- ❑ I<sup>2</sup>C (on StackableUSB connector)
- ❑ SPI (on StackableUSB connector)
- ❑ Three (3) PWM outputs

### External Connections:

- ❑ 6-pin removable terminal strip for power input
- ❑ 2-pin locking header for reset
- ❑ 20-pin header for COM1-COM4, RS232
- ❑ 20-pin header for COM1-COM4, RS485
- ❑ 40-pin headers for Parallel TFT display
- ❑ Two (2) 20-pin header for LVDS display
- ❑ 40-pin headers for MIPI CSI & DSI Ports
- ❑ 20-pin header for MLB Port
- ❑ One (1) USB OTG Mini-AB connector
- ❑ One (1) HDMI Type A connector
- ❑ Three (3) USB 3.0 Type A connectors
- ❑ Two (2) modular RJ45 jacks for Ethernet
- ❑ Two (2) MCX plugs for NTSC/PAL camera input
- ❑ 20-pin header for Audio, and CAN
- ❑ Seven (7) 40-pin headers for I/O

- ❑ 40-pin headers for Analog Input
- ❑ One (1) SD/MMC card slots
- ❑ One (1) Micro SD card slots
- ❑ SATA HDD connector

#### **Development Kit:**

- ❑ Single Board Computer
- ❑ Complete cable set
- ❑ Documentation, sample software

### **Ordering Information:**

#### **OEM Single Board Computers:**

SBC4661-ET	i.MX6Q ARM Quad Core Cortex-A9 CPU, 1GHz, 2GB DDR3 SDRAM, 4MB NOR Flash, dual Ethernet, -40°C to +85°C operating temperature
CS4661	Complete Cable Set
4661OPT8	Upgrade to 8GB flash
4661OPT24	CFast Interface
4661OPT45	Audio Interface
4661OPT48	First Video Decoder
-FPGA XXX	Configurable FPGA I/O

#### **Related Products:**

BA2020	20-pin high density to 20- pin screw terminal
BA4040	40-pin high density to 40- pin screw terminal
CA4133	RJ45 Ethernet Cable
CA4136	Mini B to Type A USB
CA4156	Mcx Camera Input Cable
CA4157	SATAII Cable
CA4158	HDMI Display Cable
CA4159	USB 3.0 Cable

*Cables nominally 15", other lengths available*

*StackableUSB trademark Micro/sys, Inc.*

*VxWorks trademark Wind River*

*Android trademark Google, Inc.*

#### **Development Board Kits\***

DK4661-ET-Linux	SBC4661-ET Linux- installed development kit
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*\*See Development Kit Specifications*