ARM® Cortex®-A8 SBC with MIPI® CSI Camera Interface and NEON™ GPU SBC5651

Features

- ✓ ARM Cortex-A8 processor, 800MHz
- ✓ 512MB SDRAM, 4GB Flash, 4MB SPI NOR Flash
- ✓ CSI camera port, 10-bit parallel with user programmable pinout
- ✓ LCD touchscreen support
- ✓ CAN bus interface
- ✓ Three (3) USB 2.0 ports, three (3) serial ports, and one (1) SD/MMC card slot
- ✓ 10/100 Ethernet
- ✓ Four power options: USB OTG, Li-Ion battery, StackableUSB, Terminal Block
- ✓ Pico-ITX form factor

The SBC5651 is ideal for applications requiring small, low-power SBCs typical in medical, data collection, and test and measurement systems. With Freescale's i.MX515 ARM Cortex-A8 multimedia processor at its core, the SBC5651 effortlessly interfaces to a CSI CMOS camera module for functions such as OCR, bar code scanning, edge detection, and real time video or video capture. Users can control speed and power use by adjusting processor speeds up to 800 MHz.

On-board I/O features include an LCD touchscreen for LVDS and TFT, LED backlight control, keypad interface, audio, watchdog timer, two PWM outputs, 1-wire interface, plus the features listed above. Analog expansion via USB, SPI, and I2C is available through StackableUSB™.

The Linux BSP for the SBC5651 is built through Yocto and installed on an SD card, making the board ready to program. Users can connect to their workstation via Ethernet to access their preferred Linux programming tools. Access to both OpenCV and GStreamer is available, as are sample programs for simple video applications.

Software Support

GNU/Linux

Microsoft® Windows® Embedded Partner

yocto PROJECT PARTICIPANT

gstreamer

OpenCV

Features & Standards

ARM CONNECTED

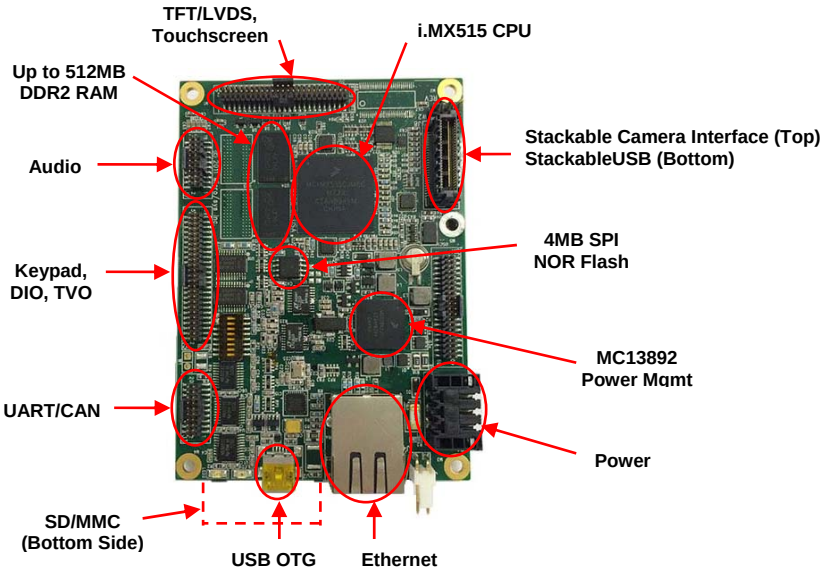
USB 2.0

RoHS COMPLIANT

IPC

Compatible Hardware

StackableUSB



Technical Details:

At the heart of the SBC5651 is the Freescale i.MX515 multimedia applications processor, a System on Chip (SOC) offering high-performance processing optimized for the lowest power consumption. The core of i.MX515 is an 800MHz ARM Cortex-A8 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 graphics operations.

Optimized for vision, the SBC5651 provides user software tools to access and control the CPU hosted CMOS camera port through Linux. The 8 -12-bit parallel port is available through a stackable connector, enabling users to test-drive different CMOS cameras during development and switch or update cameras during the OEM product life cycle.

The i.MX515 SOC integrates many peripherals, including an interrupt controller, watchdog timer, SDRAM and flash memory controllers, three (3) High-Speed USB ports, one (1) Full-Speed On-The-Go USB 2.0 port, one (1) 10/100 Ethernet MAC, three (3) 16C550 UARTs, 1-Wire interface, 24-bit flat panel display output, 4-wire resistive touchscreen interface, an 8-row x 6-column keypad controller, an audio port, and PWM and TV output. The three (3) 16C550-compatible RS232/RS485 serial ports allow communication with low-speed devices.

In addition to the peripherals built into the i.MX515, the SBC5651 adds a CAN (Controller Area Network) controller and 16-bits of programmable parallel I/O.

The SBC5651 offers three boot options for users' runtime applications: dedicated 4MB SPI NOR flash memory, a partition of the NAND flash, or a bootable SD/MMC card.

The SBC5651 memory subsystem provides up to 512MB of DDR2 SDRAM for application data. The 4MB SPI NOR flash memory holds the bootloader and operating system. 1-4GB NAND flash is available for operating system and non-volatile user storage.

The SBC5651 can be powered from an external 5 VDC source, or a single cell Li-Ion

battery, or via an on-board mini-AB USB power connector, or through StackableUSB. If external power is supplied while a battery is plugged in, the battery will be recharged. Advanced power management is enabled by Freescale's MC13892. By manipulating the user-programmable clock rate, the SBC5651 can attain sub 1W power requirements.

The SBC5651 becomes a powerful front-end processor for industrial control when StackableUSB I/O microcontrollers are attached as client devices via the high reliability SUSB I/O connector.

For true 32-bit development, the SBC5651 provides BSP support for operating systems such as Linux, Windows CE, and Android. Linux users benefit from a full Yocto release so they can have a full cross-compile environment.

Specifications:

Mechanical:
- ❑ Pico-ITX mounting holes
- ❑ 3.9" (plus I/O region) x 2.8" x .6"
- ❑ Installed Secure Digital (SD) card extends past edge of board
- ❑ Max height .535" (Ethernet connector)

Power Options:
- ❑ +5v ±5% @ 250mA typical, 350mA max or
- ❑ +4.8v single cell Li-Ion battery, or
- ❑ Mini-AB USB OTG port, or
- ❑ +5v through StackableUSB connector

Power Connector	
Pin	Signal
1	+5V
2	Battery Input
3	GND

Environmental:
- ❑ Operating range 0° to +70°C, with 800MHz processor
- ❑ ET-version operating range -40° to +85°C, with 600MHz processor
- ❑ -40° to +85°C storage
- ❑ 5%-95% relative humidity, non-condensing

Processor Core:
- ❑ ARM Cortex-A8 CPU
- ❑ Freescale i.MX515 Single Core
- ❑ 800MHz or 600MHz clock rate
- ❑ NEON GPU - Hardware graphics accelerators (video, OpenGL ES 2.0 and OpenVG 1.1)

On-board Memory:
- ❑ 256-512MB DDR2 Synchronous DRAM (option)
- ❑ 4MB SPI NOR flash
- ❑ 4GB NAND flash (option)

Memory Expansion:
- ❑ One (1) SD/MMC card slot

MIPI CSI-2 Camera Port:
- ❑ 8 and 12 bit parallel operation
- ❑ Dual ports, front/back modes available
- ❑ Software

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

COM1-COM3 Serial Ports:
- ❑ Three (3) asynchronous serial ports
- ❑ 16C550-compatible
- ❑ RTS and CTS modem controls (COM1)
- ❑ RS232 on all channels
- ❑ Optional RS485/RS232 configurations

Ethernet Port:
- ❑ 10/100BASE-T Ethernet port
- ❑ Standard RJ45 connector

USB:
- ❑ One (1) Full-Speed On-The-Go USB 2.0 port providing device and limited Host functions, Mini-AB connector
- ❑ Three (3) High-Speed USB 2.0 Host ports, StackableUSB connector
- ❑ Transfers at High-Speed 480Mbit/sec, Full-Speed 12Mbit/sec, or 1.5Mbit/sec

Controller Area Network (CAN Bus):
- ❑ CAN version 2.0B, 1Mbit/sec
- ❑ Extended data and remote frames
- ❑ Two receive buffers and three transmit buffers with prioritized message storage

Digital I/O:
- ❑ 4-wire touchscreen interface
- ❑ I^2C (on StackableUSB connector)
- ❑ SPI (on StackableUSB connector)
- ❑ 1-Wire interface
- ❑ Two (2) PWM outputs
- ❑ 8-row x 6-column keypad

Audio/Video I/O:
- ❑ Microphone input, stereo line in/line out, headphone out (option)
- ❑ 24-bit TFT flat panel display output
- ❑ 24-bit LVDS flat panel display output (option)
- ❑ TV-out

External Connections:
- ❑ 50-pin header for TFT/LVDS LCD display out, and touchscreen
- ❑ 50-pin header for DIO, keypad, PWM, one-wire, and TVO
- ❑ 20-pin header for audio
- ❑ 20-pin header for CAN and UART
- ❑ SD/MMC card slot
- ❑ USB Mini-AB USB connector
- ❑ 2-pin locking header for reset
- ❑ 2.1mm barrel power input
- ❑ RJ45 jack for Ethernet
- ❑ CAMStack header with MIPI CSI ports
- ❑ StackableUSB (option)

Ordering Information:

SBC5651 – ET

SBC5651
ARM Cortex-A8 Pico-ITX Computer with MIPI CSI Camera and NEON GPU

OPERATING TEMP
Blank: Commercial (800MHz CPU)
ET: Extended Temp (600MHz CPU)

SBC5651 Options:

5651OPT1*	Upgrade to 512MB SDRAM
5651OPT7	Upgrade to 4GB flash
5651OPT8-2	Configurable RS485
5651OPT8-4	Configurable RS485
5651OPT22	CAN Bus Interface
5651OPT28	LVDS Panel Support
5651OPT45	Audio Interface
5651OPT60	StackableUSB Host
**Add "-ET" to 5651OPTxx for Extended Temp*	

Related Products:

DK5651	Standard Development Kit
DKV5651	Vision Development Kit
CS5651**	Complete Cable Set
BA2020	20-pin high density to 20-pin screw terminal
BA4052	50-pin high density to 50-pin screw terminal
CA4133	RJ45 Ethernet Cable
CA4136	Mini B to Type A USB
PS755	5V Power Supply
*** Cables nominally 15"*	