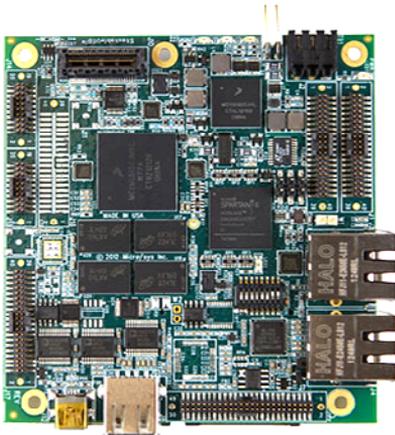




# ARM<sup>®</sup> Cortex<sup>®</sup>-A8 Computer with Xilinx Spartan<sup>®</sup>-6 FPGA SBC1652



## Features

- ✓ ARM Cortex-A8 processor, 800MHz
- ✓ Xilinx Spartan-6 FPGA
- ✓ 512MB SDRAM, 4GB Flash, 2 SD/MMC
- ✓ Four USB 2.0 ports
- ✓ Two SD/MMC card slots
- ✓ Dual CAN bus interface
- ✓ Up to 64 differential DIO from FPGA
- ✓ Dual 10/100 Ethernet / Web Server
- ✓ Camera/Vision interfaces available
- ✓ -40° to +85°C operation
- ✓ PC/104 footprint

The SBC1652 is ideal for mid-range embedded applications in rugged, harsh environments with limited access to power. The SBC1652 features a Xilinx Spartan-6 FPGA that relieves the Freescale i.MX515 ARM Cortex-A8 800MHz CPU from intense computational applications, all while delivering powerful industrial I/O for the multimedia-rich requirements of security, medical, military, and data logging embedded systems.

Features packed onto the SBC1652 include those listed above plus other industrial I/O such as real-time clock, watchdog timer, audio, SATA HDD, and 1-Wire interface, two PWM, DAC and/or ADC available through StackableUSB™.

The SBC1652 can immediately run a user's program via NAND Flash or SD card, or can be used as a host to develop an application program. For FPGA programming, the Development Kit (DKF1652) includes tools and instructions necessary for FPGA novices to install IP cores.

The SBC1652 uses minimal power and operates at extended temperatures (-40° to +85°C) on a compact 3.5" x 3.5" (PC/104) footprint.

### Software Support

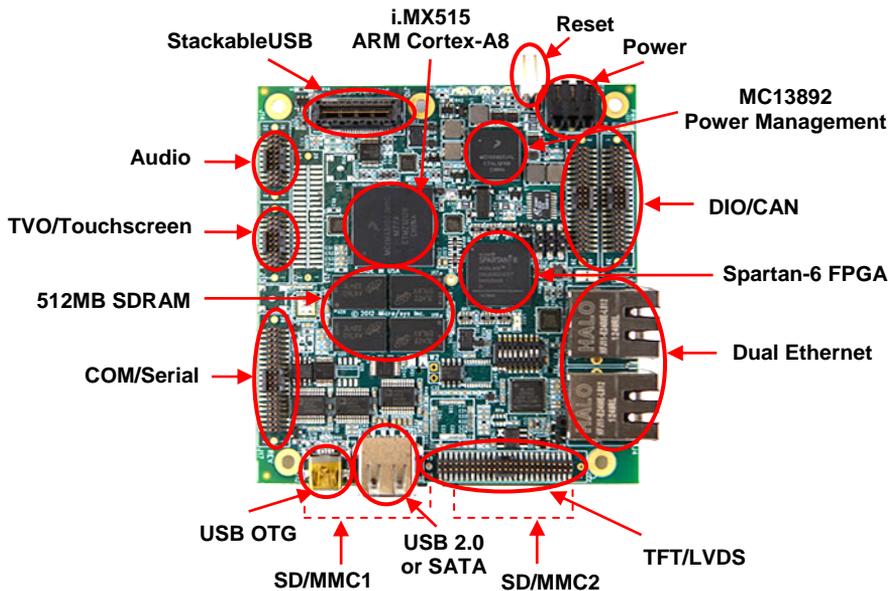


### Features & Standards



### Compatible Hardware





## Technical Details:

At the heart of the SBC1652 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.

Using Xilinx ISE® tools, the Spartan-6 FPGA can be programmed with IP cores from Micro/sys, the user, or a third party. The FPGA supports the i.MX515 by offloading repetitive, computational tasks, leaving the i.MX515 free for system level functions such as networking, application programs and general housekeeping. Other applications such as digital I/O, serial ports, and SPI ports can be implemented in the FPGA.

The FPGA communicates to the i.MX515 via a memory bus configuration using the Freescale-defined WEIM bus. The SBC1652 ships with the FPGA 95% available for the users' IP. If the optional digital I/O, SPI and COM ports are ordered, 80% of the FPGA remains available for the user.

The SBC1652 memory subsystem provides 512MB of DDR2 SDRAM for application data. The 4MB SPI NOR flash memory holds the bootloader and operating system. Up to 4GB NAND flash is also available for operating system and non-volatile user storage.

The SBC1652 integrates many additional features including an interrupt controller, watchdog timer, SDRAM and flash memory controllers, three High-Speed USB ports, one Full-Speed On-The-Go USB port, a 10/100 Ethernet MAC, three 16C550 UARTs, 1-Wire interface, 24-bit flat panel display output, 4-wire resistive touchscreen interface, an audio port, and two PWM. Additional peripherals include a second 10/100 Ethernet port and dual Controller Area Network controllers (CAN).

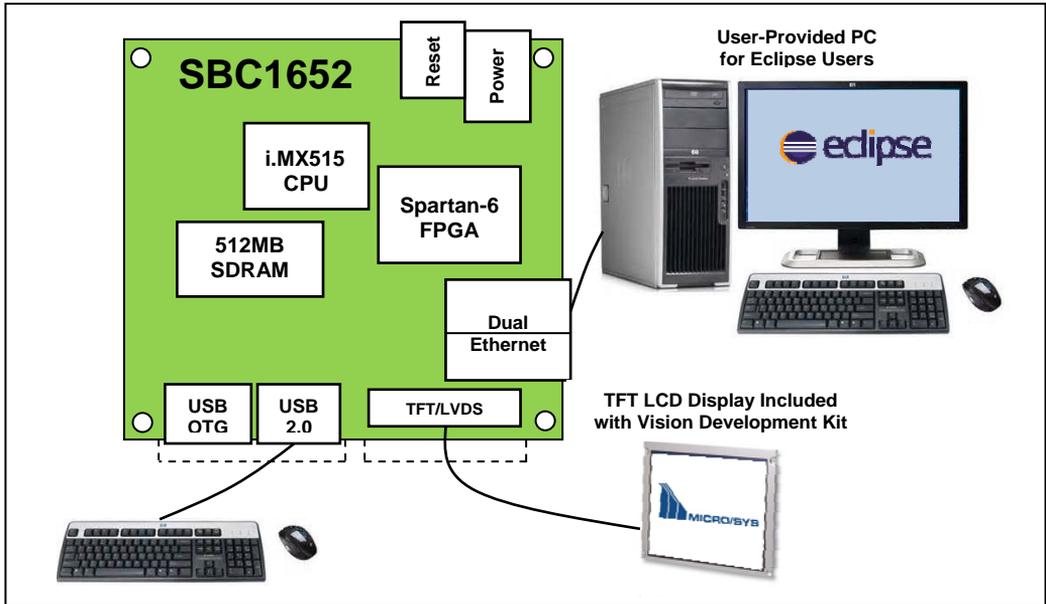
Large application programs, data storage and/or portability of either of these items is available via one of two SD card slots or connecting to the SATA HDD connector to attach an external hard drive.

The SBC1652 becomes a powerful front-end processor for control applications when mated with a StackableUSB I/O board offering DAC and ACD via an easily programmable PIC32 microcontroller.

The SBC1652 has both a Linux and a WindowsCE BSP. The SBC1652 comes

standard with a factory installed Linux runtime image. The Linux BSP (included with the Development Kit) is supplied on SD card and includes integrated Linux support layers.

Micro/sys can provide OEMs with customized versions of the SBC1652 and a single part number for ordering.



**SBC1652 Development Platform Setup**

## Specifications:

### Mechanical:

- ❑ PC/104 footprint
- ❑ 3.55" (plus I/O region) x 3.775" x .6"
- ❑ Installed Secure Digital (SD) card extends past edge of board
- ❑ Max height .535" (Ethernet connector)

### Environmental:

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

### Power Requirements:

- ❑ +5v ±5% at 500mA typical, 850mA max

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

### Processor Core Section:

- ❑ Freescale i.MX515 processor (for multimedia specs, see SBC1654 or SBC1655 Datasheets)
- ❑ 800MHz or 600MHz clock rate
- ❑ ARM Cortex-A8 CPU core
- ❑ JTAG (IEEE 1149.1) debug interface

### On-board Memory

- ❑ 512MB DDR2 Synchronous DRAM
- ❑ 4MB SPI NOR flash
- ❑ 2GB or 4GB NAND flash (option)

### Memory Expansion

- ❑ Two SD/MMC card slots
- ❑ SATA HDD connector (option)

### User Programmable FPGA

- ❑ Xilinx Spartan-6 XC6SLX16
- ❑ Configurable with Micro/sys FPGA options (see Ordering Info)
- ❑ Program apps with Development Kit

### Watchdog Timer:

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

### Serial Interfaces:

- ❑ Three RS232 asynchronous serial ports
- ❑ Four optional serial ports in FPGA
- ❑ 16C550-compatible
- ❑ RTS and CTS modem controls
- ❑ Four RS485 half-duplex ports (option)
- ❑ SPI
- ❑ I2C

### Ethernet Ports:

- ❑ Two 10/100BASE-T Ethernet ports
- ❑ Standard RJ45 connectors

### USB:

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

### Real Time Clock:

- ❑ RTC with onboard battery, 10 year life

### Controller Area Network:

- ❑ Dual CAN 2.0B, 1Mbit/sec (option)
- ❑ Standard and extended data and remote frames
- ❑ Two receive buffers and three transmit buffers with prioritized message storage

### Digital I/O:

- ❑ Up to 64 TTL programmable bi-directional signals from FPGA
- ❑ 1-Wire interface
- ❑ Two PWM outputs

### Audio/Video I/O:

- ❑ Microphone/headphone, line in/line out (option)
- ❑ 24-bit LVDS (option) /TFT LCD interface
- ❑ 4-wire resistive touchscreen interface

### External Connections:

- ❑ Four 40-pin headers for COM1-COM7, RS485, DIO, and CAN
- ❑ One 50-pin header for LVDS/TFT
- ❑ Two 20-pin headers for Audio and TVOut/Touchscreen
- ❑ Two 8-pin modular RJ45 Ethernet jacks
- ❑ Two SD/MMC card slots
- ❑ SATA HDD connector (option)
- ❑ StackableUSB connector (option)
- ❑ USB On-The-Go, Mini-AB

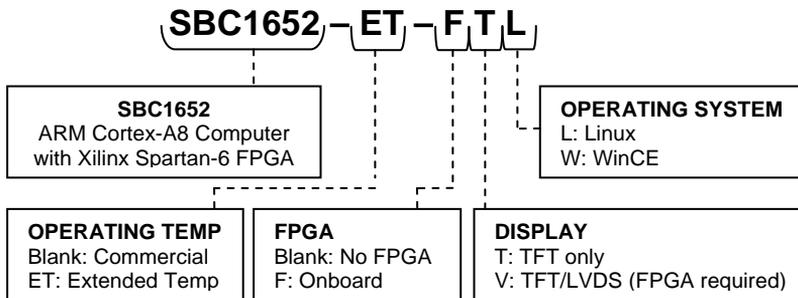
### External Connections (cont'd):

- ❑ USB 2.0, Type A (option)
- ❑ 2-pin locking header for reset
- ❑ 3-pin removable terminal strip for power input

### Development Kit Includes:

- ❑ Single Board Computer
- ❑ Complete cable set
- ❑ Documentation, sample software
- ❑ DKF1652 for FPGA development

## Ordering Information:



### SBC1652 Options:

1652OPT6*	Upgrade to 2GB flash
1652OPT7	Upgrade to 4GB flash
1652OPT8-2	Configurable RS485
1652OPT8-4	Configurable RS485
1652OPT22	CAN Bus Interface
1652OPT22-1	Dual CAN Bus Interface
1652OPT24*	SATA Interface
1652OPT45	Audio Interface
1652OPT60-1	StackableUSB Host
1652OPT63**	Type A USB Header
*Add "-ET" to 1652OPTxx for Extended Temp	
*Not available in Extended Temp.	
** 1652OPT24 & 1652OPT63 not available together	

### Related Products:

DKF1652	FPGA Development Kit
CS1652*	Complete Cable Set
BA2020	20-pin high density to 20-pin screw terminal
BA4040	40-pin high density to 40-pin screw terminal
BA4052	50-pin high density to 50-pin screw terminal
CA4133	RJ45 Ethernet Cable
CA4136	Mini B to Type A USB
* Cables nominally 15", other sizes available	