



Microcontrollers to enable Design Made Easy™

DISCOVER ANOTHER PIECE OF YOUR SYSTEM DESIGN

Ultimate Bridging Solutions with new 8-bit and 32-bit MCUs

As part of FTDI Chip's continuing ethos of 'Design Made Easy' we are proud to introduce two new series of microcontrollers (MCUs), which have been developed with key functionality designed to enhance system performance and operational efficiency.

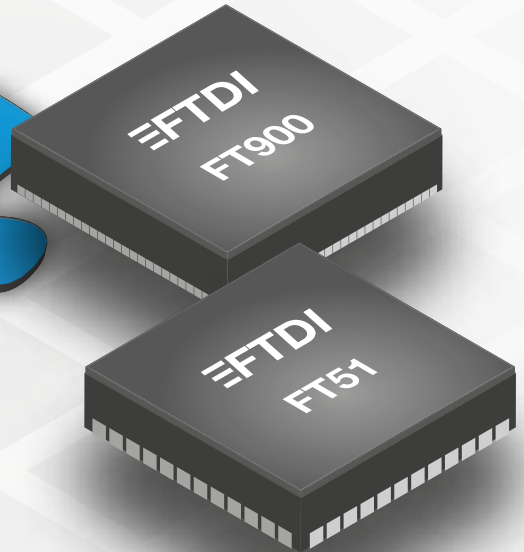
Based upon FTDI Chip's new FT32, high performance 32-bit RISC core, the FT900 series provides a plethora of connectivity options, making it the ideal choice for advanced technology bridging solutions. By executing instructions from shadow RAM, rather than flash memory, the FT900 can operate at true 0WS up to 100MHz and 293 DMIPS performance.

Optimised to use the industry standard GCC compiler, together with the Eclipse IDE, allows the FT900 to utilise a wide variety of third-party and open source software.

For less demanding applications, the FT51, based on an 8051-compatible core gives 48MIPS processing power. The FT51 incorporates a 2-port Low/Full Speed USB hub, allowing multiple devices to be cascaded or combined with other USB devices. In addition to standard 8051 functions, the FT51 includes multiple ADC/DACs facilitating analog measurement applications along with an FT120 USB device controller, analogous to the D12.



FTDI Chip
Providing a new piece
to the 'Design Made
Easy' puzzle



FT900 Series

The FT900 has been developed for high speed, computational intensive tasks. With a parallel camera input, 10/100 Base-TX Ethernet interface, CAN bus, and USB2.0 Hi-Speed peripheral and host ports, this device offers excellent interconnect capabilities and blazing computational power.

Enhanced features:

- 32-bit RISC architecture
- 256KB program/shadow memory
- High speed operation – 2.93 DMIPS/MHz
- 64KB data memory
- True OWS operation up to 100MHz
- Integrated hardware debugger
- USB DFU Bootloader

Standard features:

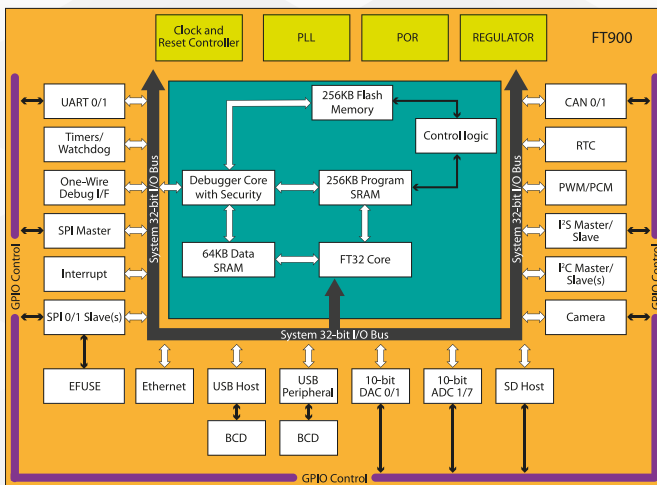
- 64-bit general purpose EFUSE memory
- Integrated Phase-Locked Loop (PLL) supports external crystal and clock source input
- 32.768KHz RTC clock support
- Four user timers with prescale and watchdog function
- 3.3V single supply operation
- Internal voltage regulator +1.2V to the digital core for lower power consumption
- Supports Battery Charging Specification, for USB2.0 Hi-Speed peripheral port
- Integrated power-on-reset circuit
- Pb-free, RoHS packaging, 100QFN and 76QFN options

Digital connectivity:

- Parallel camera interface
- USB2.0 Hi-Speed (480Mbps) peripheral controller with Battery Charge Detection (BCD)
- USB2.0 Hi-Speed (480Mbps) host controller with BCD emulation
- 10/100 BASE-TX Ethernet MAC with MII interface; compliant with the IEEE 802.3/802.3u standards
- Two CAN 2.0 controllers for data transfer up to 1M bit/s
- I²S master/slave interface (24.57/22.57 MHz)
- Host SD controller compliant with standard specification V3.0, which supports UHS50 and UHS104 cards
- SPI master supports single/dual/quad modes
- Two SPI slaves support single data transfer with 25MHz clock
- UART interface configured as 1 Full UART or 2 basic UARTs (TX/RX/CTS/RTS)
- Two I²C bus interfaces can be configured as master or slave, with data transfers up to 3.4Mbps
- Supports eight separate PWM channel outputs with support for PCM 8-bit/16-bit stereo audio output

Analog connectivity:

- 7 input channel muxed to a single internal ADC
- Supports two 10 bit DACs



FT51 Series

The FT51 provides an 8051-compatible core with optimised performance and unique features including multiple ADCs/DACs, USB 2.0 Full Speed Device, and USB hub function targeted at cascading multiple FT51 systems, or to connect additional USB peripherals like mouse and keyboards.

Enhanced Digital features:

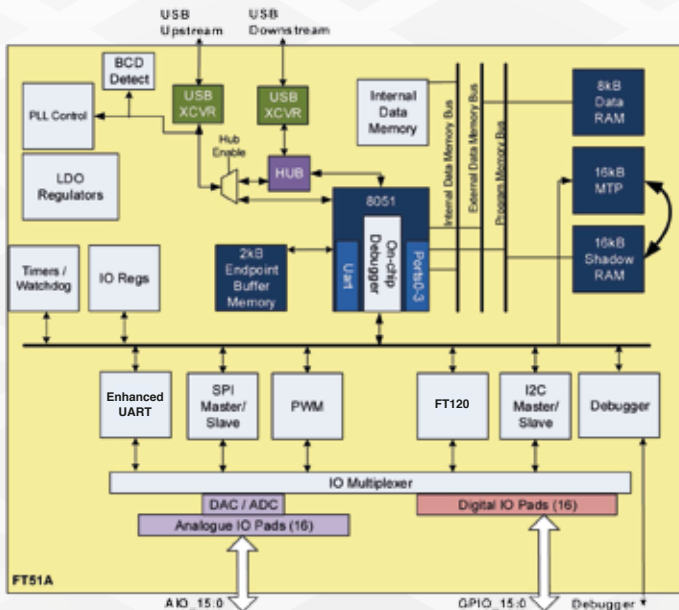
- 8051-compatible core running at a maximum frequency of 48MHz
- High speed operation 48MIPs/48MHz
- 16KB program/shadow memory
- 8KB data memory
- True 0WS operation up to 48MHz
- FT120 compatible USB2.0 Full-Speed/Low-Speed peripheral controller with BCD
- USB downstream port
- Enhanced UART with transfer rates from 300 baud to 6M baud
- Integrated hardware debugger
- PWM Controller
- I²C master/slave controller
- SPI master/slave controller
- Integrated clock generation, no external crystal required

Enhanced Analog features:

- 16 Analog IO Cells for ADC/DAC functions
- Multiple ADC/DACs possible (1-4)
- USB DFU Bootloader

Standard features:

- Standard 8051 peripheral set
- Up to 16 GPIO
- Integrated power-on-reset circuit
- Event counter/timer with watchdog function
- +5V single supply operation
- Internal 3.3V/1.8V LDO regulators
- Range of Pb-free, RoHS packaging options



Development Tools and Support

A complete set of tools, from hardware development modules to software code editors, libraries, compilers and debuggers, is currently in development and available in beta release.

DEVELOPMENT HARDWARE

Full featured hardware development platforms to support the processor families will be available in a variety of form factors, including low cost Dual In Line options. Key features include:

FT900

- Generic platform with UART, SPI, USB, analog functions/timers and SD card
- Camera platform with Ethernet, camera interface, USB, generic inputs and SD card
- Industrial platform with CAN bus, USB, Ethernet, analog functions, timers, generic inputs and SD card

FT51

- Access to DAC, ADC, I²C, UART, PWM and GPIO interfaces
- 2 port, USB 2.0 Full Speed hub
- Mini-USB host port connector
- Debugger interface connector
- USB power LED
- Powered from single 5V supply

FT900 FIRMWARE DEVELOPMENT

Developing firmware for the FT900 series will be facilitated via easy to install plug-ins developed for the Eclipse IDE with GCC compiler capability.

Eclipse offers a fully colour coded editor for developing application firmware. With Eclipse, the primary programming language will be 'C' language. For the FT900, the additional memory and processing power of the FT900 will allow for a Real Time Operating System to be implemented, and as a result a port of FreeRTOS will be available to run on the core.



FT51 FIRMWARE DEVELOPMENT

Developing firmware for the FT51 series will be facilitated via Eclipse plug-ins as per the FT900. All FT51 sample code/libraries will be open source to further ease code development.

FIRMWARE DOWNLOAD AND DEBUG

With the FTDI developed plug-in, the functionality of Eclipse is extended to support loading of compiled firmware into the target device via a dedicated 1-wire debug pin on the ICs. Running and debugging the firmware is also supported via the debugger pin with up to 3 breakpoints supported to assist debug. A dedicated debugger/programmer module is available to support these devices and interface with the Eclipse IDE.



FT900 Applications

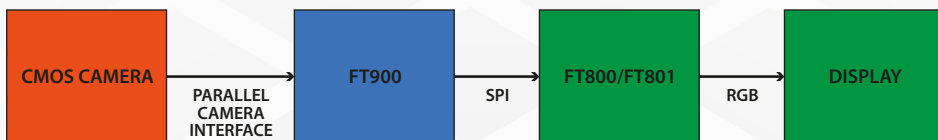
The FT900 is a general purpose microcontroller targeted at high performance systems and as an application controller that can be used in conjunction with EVE display controllers.

Target Applications include:

- Closed Circuit Monitoring
- Security Network Systems
- Traffic Control
- Audio Players
- Access/Entry Systems
- Industrial Control and Monitoring
- Security Digital Video Recording
- Remote Cameras
- Home Networks
- Back-up Cameras
- Medical Monitoring
- ... and many more

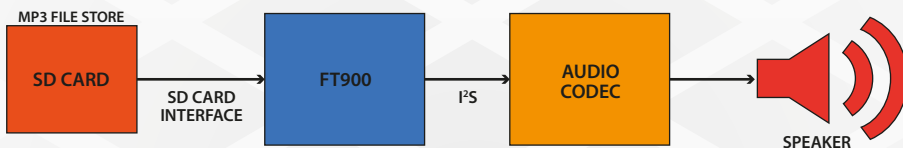
FT900 AND EVE BASED VIDEO

The FT900 will accept video input from a CMOS camera sensor over the parallel camera interface or from a networked camera over Ethernet. Processing of the image can then be performed within the FT900 to create an FT800 compatible bit-map for output on a QVGA or WQVGA display, with target frame rate of up to 15fps.



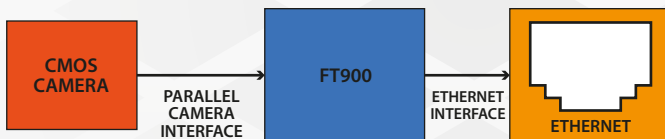
FT900 BASED AUDIO

By making use of the SD CARD interface and the I²S interface to an external codec the FT900 may be used to implement a full feature MP3 player for streaming music and audio file playback.



FT900 LOW COST IP CAMERA

Easily interface video from a camera sensor via the FT900 to remote location via Ethernet connectivity.



FT51 Applications

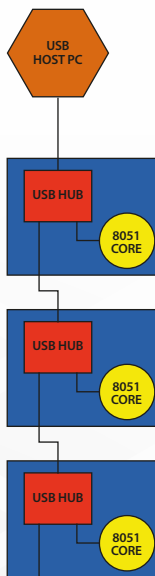
FT51 offers outstanding performance with an extensive range of interfaces including DAC, ADC, SPI, PWM and USB and is ideally suited for control of a distributed network array of sensors/relays.

A unique USB hub feature of the chip allows multiple devices to be cascaded over USB, back to the main host controller. As a result, the FT51 can be seen as a microcontroller for a single unit, or as a link in a chain of sub-systems that can easily pass data to a USB host system for analysis.

Target Applications include:

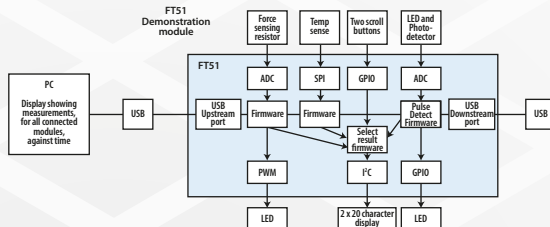
- Cascadable USB DAQ
- Industrial Control
- Multi-room Thermostat
- Medical Monitor
- Window Monitor System
- Security Systems
- Fitness Equipment
- Smart Home Control
- Weather Station
- Keyboard with USB mouse port

... and many more



FT51 SENSOR APPLICATION

The application uses the ADC, I²C, PWM, GPIO and USB interfaces to create a sensor controller as detailed in the table below.



Module Feature	Implementation	FT51 Input	FT51 Output	Display	Logged data / PC display
Pressure sense and display	Potential divider with force sensing resistor.	ADC	PWM, I ² C	LED brightness intensity Numerical Display of force	Pressure vs time
Heart-beat monitor and display	LED and photo-detector	ADC	GPIO, I ² C	LED pulses as heart beats Numerical Display of pulse rate	Pulse rate vs time
Body temperature	Temp sensor	SPI	I ² C	Numerical display of temp	Temp. vs time
Display control feature	Push buttons and 2x20 character display	GPIO	I ² C	Selected result (pressure, heart rate, temp)	-

Readings are made from each of the sensor inputs and an output is displayed locally on the demonstration PCB as well as being reported back to the PC. Up to 4 boards may be cascaded to increase the amount of data that can be collected and reported back to the PC for storage and analysis.

About FTDI Chip



FTDI Chip develops innovative silicon solutions that enhance interaction with today's technology. Through application of its "Design Made Easy" ethos, the company is able to support engineers with highly sophisticated, feature-rich, robust and simple-to-use product platforms. These enable creation of electronic designs with higher performance, fewer peripheral components, lower power budgets and diminished board real estate. FTDI Chip's long-established, continuously expanding Universal Serial Bus (USB) product line boasts such universally recognized product brands as the ubiquitous R-Chip, X-Chip, Vinculum, and H-Series. As well as host and bridge chips, it includes highly-integrated system solutions with built-in microcontroller functionality. The company's Embedded Video Engine (EVE) graphic controllers each pack display, audio and touch functionality onto a single chip. The unique, more streamlined

approach utilised by these ICs allows dramatic reductions in the development time and bill-of-materials costs involved in next generation Human Machine Interfaces (HMI) implementation. FTDI Chip also provides families of highly differentiated, speed-optimised microcontrollers with augmented connectivity features. These application oriented controllers (AOCs), are targeted at key areas where they add value via their elevated processing performance and increased operational efficiency.

FTDI Chip is a fab-less semiconductor company, partnered with the world's leading foundries. The company is headquartered in Glasgow, UK, with research and development facilities located in Glasgow, Singapore and Taipei (Taiwan), plus regional sales and technical support sites in Glasgow, Taipei, Portland (Oregon, USA) and Shanghai (China).



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