



Improving Human Machine
Interfaces with Embedded Video
Engine (EVE) Technology

DISCOVER ANOTHER PIECE OF YOUR SYSTEM DESIGN!

EVE with Embedded Video Engine Technology

The first device from the EVE series, the FT800 with intelligent display technology, has redefined the cost and quality paradigm for Human Machine Interfaces (HMIs) and development systems. Since its launch in 2013, EVE has won two prestigious awards and now holds the titles of **British Engineering Excellence 'Electronic Product of the Year'** and **Elektra 'Digital Semiconductor of the Year'**, recognising 'versatility and innovation' and 'the technological capabilities and efficiencies that differentiate it from its competitors'.



The EVE series with its highly advanced graphics controller device integrates display, audio, and touch onto a single chip. Deploying an object-oriented approach, it is capable of simplifying the implementation of intelligent displays – reducing bill of material costs, power budget, board space, and development time. The EVE series truly reflects FTDI Chip's ethos of 'Design Made Easy' by enabling shorter design cycles and simpler, more efficient integrations. The feature set allows for the optimisation of micro-controller resources within the system freeing those resources for other operations and ensuring the optimal realisation of HMIs to enhance system usability and product aesthetics.

EVE technology incorporates a wealth of advanced features:

- Targets QVGA/WQVGA displays with $\frac{1}{16}$ th pixel resolution, maximum 512 x 512 resolution
- 18-bit interface with 2-bit colour dither offering 262k colour palette with 24 bit quality
- Store up to 2000 objects/commands in 8k byte display list
- Touch controller interface
- PWM output for programmable display brightness
- Anti-aliasing support improves display perception
- Low-power – 24mA typical in active mode, and 250uA in sleep mode
- Integrated audio output – play beeps, tones or recorded audio
- Supports PCM, 4 bit ADPCM, and u-Law coding formats
- Space saving 48-pin QFN package (RoHS compliant)
- Extended temperature range: -40°C to +85°C

WINNER
beeq 2013
british engineering excellence awards

Elektra2013
WINNER

Expanding EVE Solutions

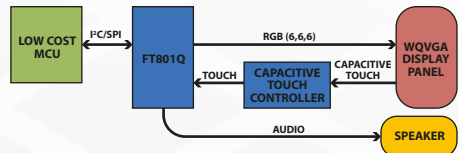
FTDI Chip is extending its award-winning EVE series. As EVE technology is scalable, watch for additional EVE products throughout the year, as this award winning technology continues to bring high-value and quality graphics to numerous HMI applications.

The FT801, a device that supports capacitive touch, targeted at screen resolutions up to 512 x 512 pixels, brings all of EVE's benefits to this class of display. The FT801 packaged in the same footprint as the FT800 promotes architecture re-use for capacitive display needs, whilst providing the same key elements as the FT800 including 3 in 1 functionality, 1/16th pixel resolution, and enabling lower BOM costs. With consistent features and chip footprints, identical tool flows and design support, FTDI Chip continues to strive to meet our development goal of 'Design Made Easy'.

Using human touch as the electrical charge to the conductive material of the touchscreen, capacitive touch technology enables higher touch sensitivity, allowing greater accuracy in operation and delivering a unique user experience. Moreover, this technology allows for systems requiring multi-touch operation and gestures.

Key features of the FT801 include:

- Support capacitive touch screen with up to 5 touches and gesture detection
- Hardware engine can recognize touch tags and track touch movement. It provides notification for up to 255 touch tags.
- Enhanced sketch processing
- Programmable interrupt controller provides interrupts to host MPU/MCU
- No frame buffer RAM required
- Advanced object oriented architecture enables low cost MPU/MCU as system host using I²C (clocking up to 3.4MHz) and SPI (up to 30MHz) interfaces
- Supports both Mutual and Projected Capacitive Touch Controller ICs



The FT801 application block diagram illustrates how the FT801 can be easily interfaced to a capacitive touch controller via an I²C interface. The capacitive touch panel module (CTPM) asserts an interrupt when a touch is detected, which the FT801 will read via I²C. The FT801 supports a Compatibility Mode where existing FT800 application code can be run and Extended Mode which supports multi-touch sensing (5) and gesturing.

FT900 MICROCONTROLLER AS EVE APPLICATION ORIENTED CONTROLLER

FTDI Chip has augmented its EVE technology with a high performance 32 bit micro-controller with advanced feature set that creates an Application Oriented Controller (AOC). The FT900 is a complete System-On-Chip 32-bit RISC microcontroller for embedded applications, featuring a high level of integration and low power consumption. The device offers extended connectivity options including USB, Ethernet, and CAN interfaces to promote wide system applications over varying distances and in numerous application segments. With advanced hi-speed operation (2.93 DMIPS/MHz) and true zero wait states up to 100MHz the FT900 is capable of processing large data flows to enable unique video imaging (e.g. Streaming video) and quality audio applications when used in conjunction with the FT800 and FT801.



In this example, the FT900 processor accepts video input from a camera sensor over the parallel interface or from a networked camera via an Ethernet connection. Processing of the image can then be performed with the FT900 to create an FT800 compatible display list for output on a QVGA/WQVGA display, up to 15-30fps.

The addition of the FT900 further extends the EVE's application ecosystem by enabling:

- Embedded Video Application
- Remote E-Metering
- Remote Cameras
- CCTV Monitor
- Security systems
- Back-up cameras
- Home networking
- ...and many more!

EVE Development Platforms and Accessories

EVE support includes a wide array of options, including hardware systems, technical documentation, application sample software and accessories.

Modules are provided in a variety of form factors, designed to meet prototyping needs and satisfy end-product design requirements.



The simple VM800C modules are credit card sized and use highly integrated EVE graphical controller ICs. They are offered with or without displays and can support 3.5", 4.3" or 5" TFT LCDs. A 4 wire resistive touch screen can be interfaced to the specified LCD. The modules come equipped with an audio power amplifier and a micro-speaker which enables mono audio output. The boards can be powered at 3.3V or 5V and they provide SPI master interface to connect to the system microcontroller.



The VM800B 'basic' modules expand on the VM800C product by offering the same functionality, and provides a high quality display system in an elegantly designed, form-fitted bezel. Offered in black or pearl colours, this display sub-system provides the engineer a low priced option which can shorten development time while enabling a production finished look and is designed to control 3.5", 4.3" or 5" TFT displays.



The VM800P 'plus' is the latest in the series of FT800 support modules and further extends system integration by providing a complete video subsystem with embedded microcontroller. In addition to the features supplied with the basic modules outlined above, this system provides an in-built MCU, the ATMEGA328P, which is supported by the Arduino libraries.

Further functionality is provided in the form of a Real Time Clock (RTC) with battery backup, and an SD CARD connector plus pre-loaded 4GB SD CARD, allowing for demonstration code to be easily sampled. Plug in daughter cards are available to expand the IO capability to include GPIO, RS232, RS422, RS485 and Ethernet, promoting improved connectivity and the ability to transmit over longer distances.

EVE Development Support

FTDI Chip have provided a range of sample applications to demonstrate how to initialise the FT800/FT801 and develop display lists of primitive objects. These can be used as building blocks to create vibrant and dynamic images.

Projects can be realised from a variety of tools and programming techniques, supporting very basic EVE functions to sophisticated animated, interactive demos. Samples are provided for different MCU families e.g. ATME1 (Arduino), Freescale, PIC, ARM.

• HAL – Hardware Abstraction Layer

The HAL takes all the low level HEX values for each function call and wraps them up to a high level function call to enable the user to focus on the display list contents without too much concern for how the SPI traffic is created and dispatched. The HAL supports MPSSE cables and Arduino PCBs and provides an excellent starter platform.

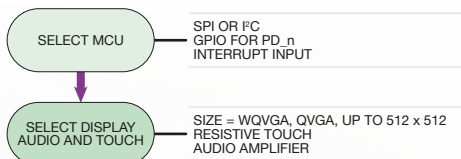
• Arduino Library

A Library created in a syntax familiar to Arduino users to enable rapid prototyping of FT800/FT801 applications with Arduino Pro and Uno form factors is being finalised.

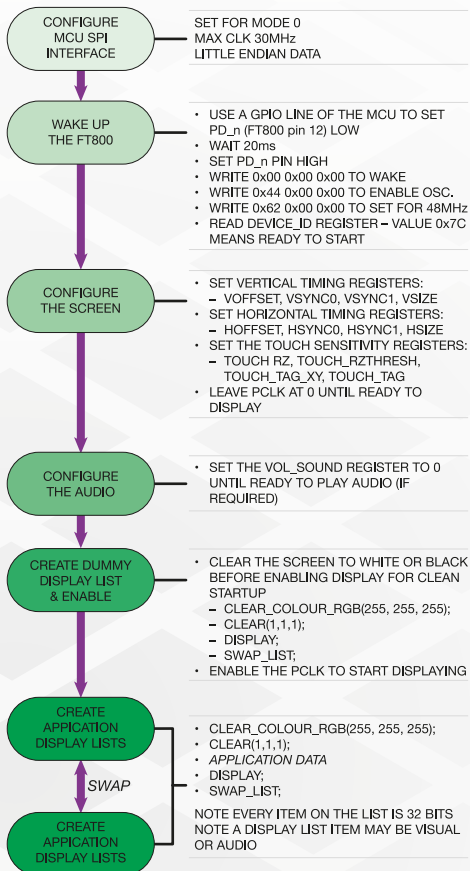
• FT800 Simulator

A PC based tool to allow simulation of display list commands. The simulator allows the user to rapidly experiment with changes to their display list without the need for hardware. This enables users to learn the EVE display list and create attractive, high impact displays before porting code to the system processor.

HARDWARE



SOFTWARE



EVE Applications

Complex graphics made easy combined with unparalleled value in embedded design technology allow the FT800 series to benefit a wide-range of current products and in new applications including:

- Point of Sale Terminals
 - Multi-function Printers
 - Barcode Scanners
 - Digital Tachographs
 - Signature capture devices
 - Credit card signature pads
 - Universal remote controllers
 - Smart home display panels
 - Medical appliances
 - Domestic appliances
 - Industrial control panels
 - Portable instrumentation
 - Audio/Visual equipment
 - Home Security Systems
 - Bedside clocks
 - Gas chromatography equipment
 - Power metering displays
 - Security alarm panels
 - Elevator displays
 - Door intercom systems
 - GPS displays
 - Taxi meter displays
 - Automotive touch screens
 - Office phones and switch boards
 - Tourist info kiosks
 - Thermostats
 - Museum & tour guide displays
 - Tele/video conference systems
 - Games consoles, toys
 - Fitness equipment
 - Public transport
 - Cameras
 - Mobile phones
 - e-Book readers
 - Picture book frames
 - Petrol pump displays
 - Touch screen telephones (POTs) with DTMF tones included in FT800 audio library
 - Vending machine selector panels
 - Hi tech supermarket shelving price display
- ...and many more!

FT800 CHOSEN TO DRIVE ADVANCED GAMING SYSTEM

Following from the huge success of the original Gameduino, which brought vintage gaming to Arduino, a second edition of the shield has been released. This new version completely converts the Arduino into a comprehensive portable modern gaming system through the incorporation of the FT800 device with EVE technology.

Utilising the FT800, the Gameduino 2's graphic engine is more sophisticated, advanced, and truly 'Makes Design Easy'. This system allows simplified JPEG loading, can support alpha transparency and boasts a complete 32-bit colour portfolio. An SPI peripheral like its predecessor, developers can build onto the platform that includes a comprehensive feature set; touch control, a 3-axis accelerometer, microSD storage, headphone audio output and clear graphics on a sleek 4.3 inch display.

For more information visit <http://excamera.com/sphinx/gameduino2/>



EVE Third Party Support



FTDI Chip has collaborated with MikroElektronika (ME), who specialise in the manufacture and sale of microcontroller development boards, accessory boards, compilers, additional software and books. This collaboration has provided libraries to access easy to use, GUI based tool, Visual TFT for developing display images that can be compiled for numerous system microcontrollers.

The EVE library from ME consists of 12 new components which support a number of EVE features and assist in GUI design. These include an EVEClock, EVEGradient, EVEScrollbar and EVEProgressBar.

The tool allows engineers to create imagery for the processor by simply dragging and dropping objects onto a palette, which is then converted automatically to code. This can then be compiled by the extensive list of compilers supported by ME and further edited if required.



Visit www.mikroe.com for details.



4D systems, a global leader in the research, development and manufacture of intelligent graphic solutions, has utilised the FT800 in a number of their product to produce a unique display including the 4DLCD-FT843. This product connects to any system with an SPI interface to bring state-of-the-art display, audio, and touch capabilities into the end product which enables engineers to rapidly create high quality Human Machine Interfaces(HMIs). The FT800 further benefits the system by providing 3 in 1 functionality: a 4.3" TFT display (with 480 x 272 pixel resolution); PWM audio output (with amplifier enable); 64 voice polyphonic sound synthesizer and a 4-wire resistive touch screen, all integrated on a simple ribbon or flexi-film connector.

4D systems has gone on to create another device, an Arduino shield aptly named 'ADAM' (Arduino Display Adaptor Module). It provides users with the capability to interface with the 4DLCD-FT843 intelligent SPI display, with an Arduino PCB enabling connection from the display subsystem to this popular development environment.



More information available at:

www.4dsystems.com.au

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)s 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).



www.youtube.com/FTDIChip



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