FTDI Chip

INTRODUCING ...

EVE

Embedded
Video
Engine

Design Made Easy

Introducing the FT800

FT800, the first chip in the EVE Series of advanced graphic controllers

EVE - Embedded Video Engine

Think display design is difficult ?

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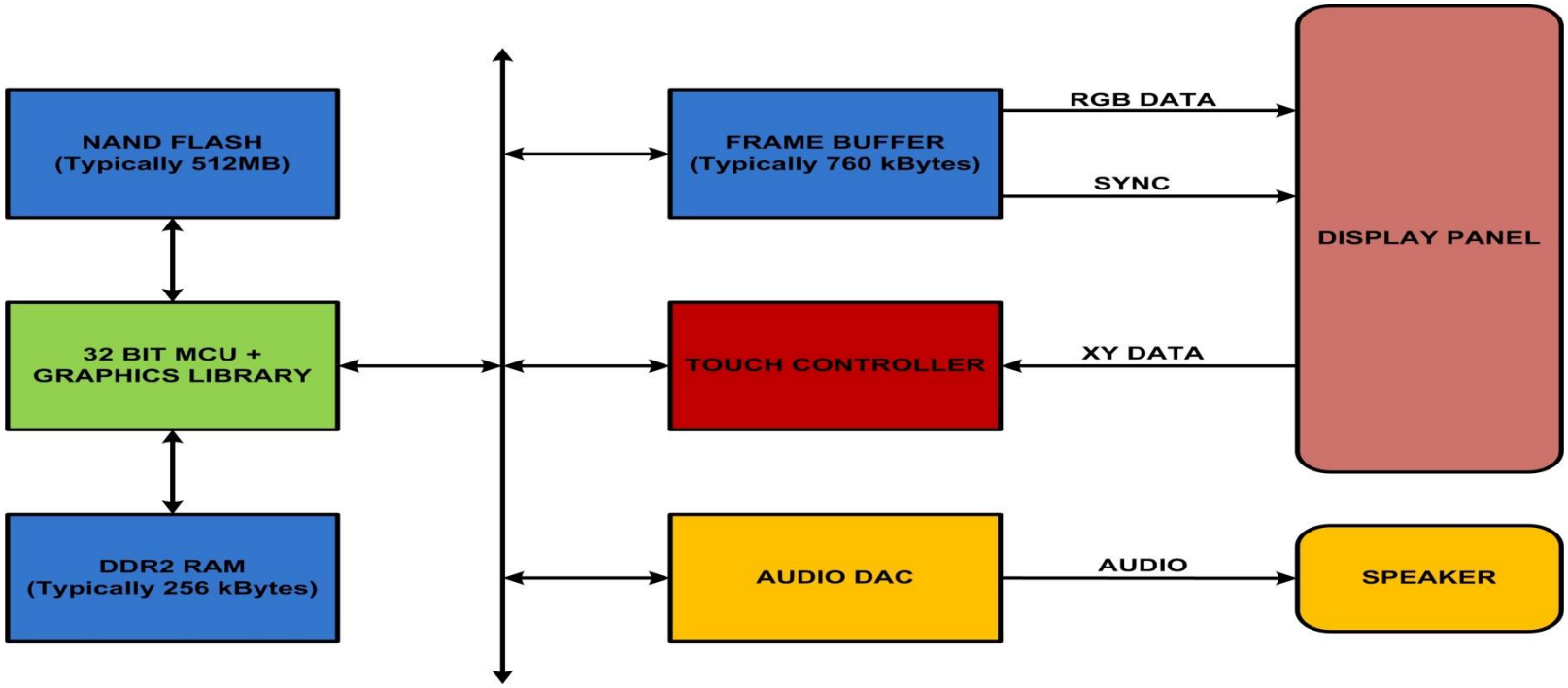
Current Intelligent Display Architecture



- Current designs usually require
  - High-end µC typically 32-bit with abundant IO + external memory
    - Higher cost and board area
  - Graphics library and sometimes an Embedded OS required
  - Expensive frame buffer IC required for display memory
  - Touch and audio implementations needed

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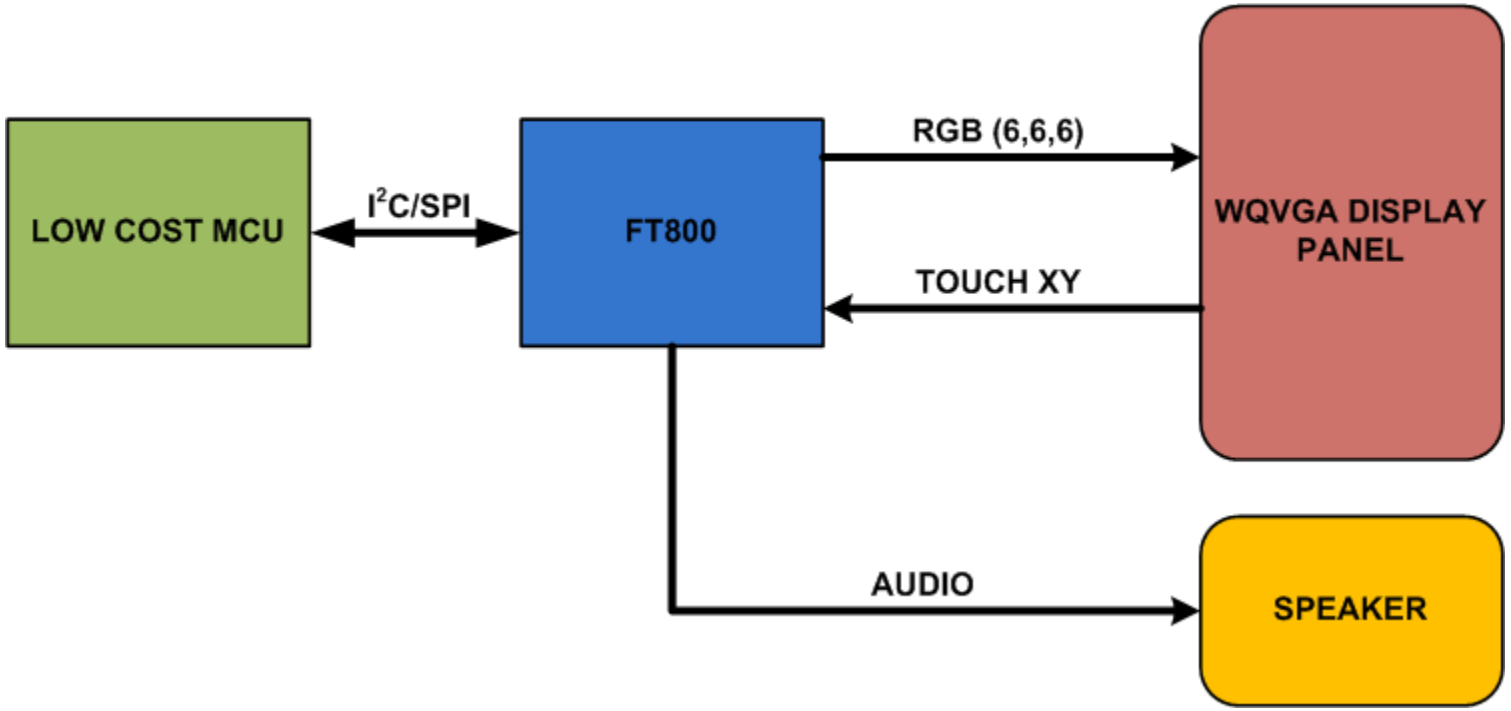
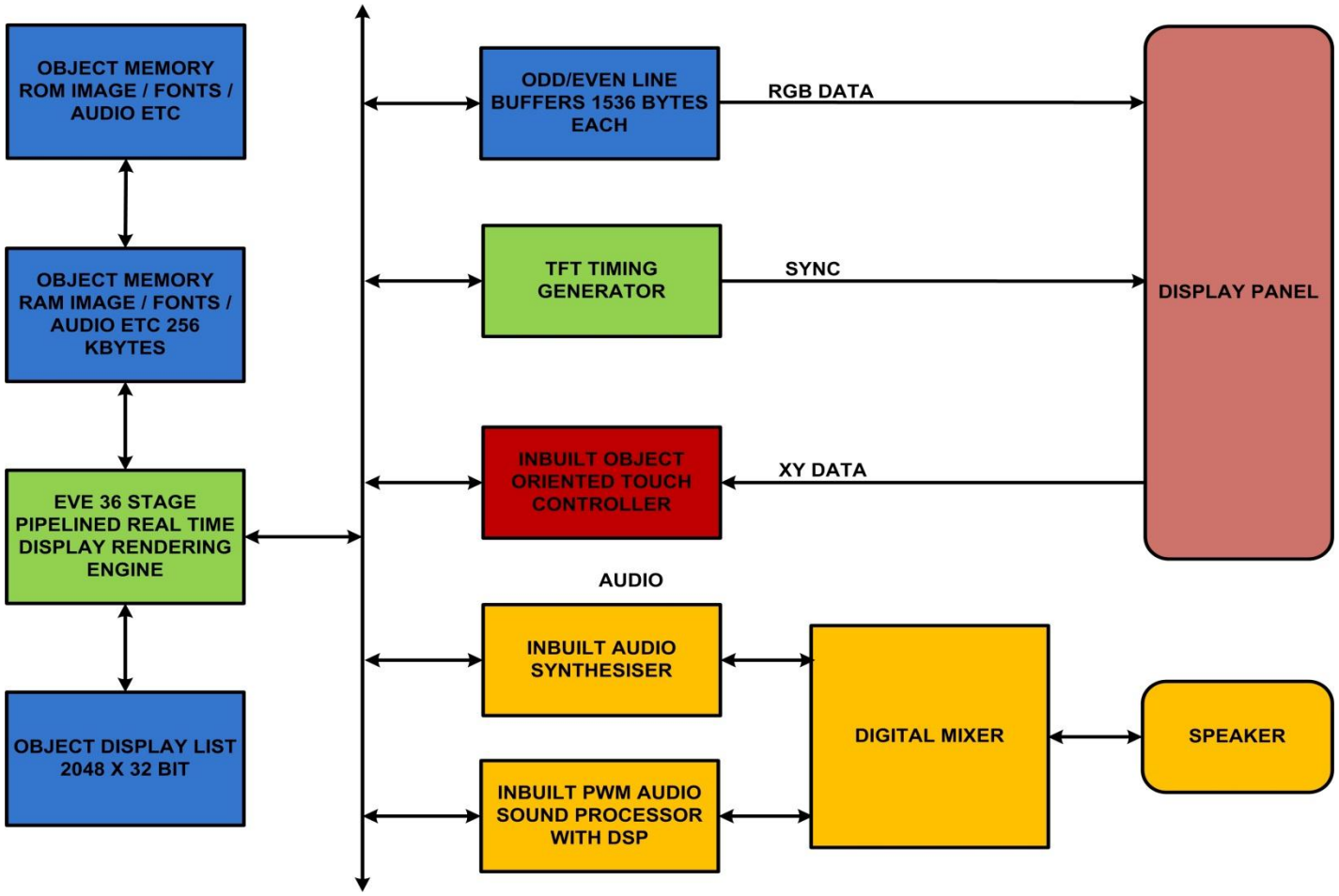
FT800 Integration



- Low cost MCUs enabled (ATMEGA 328, PIC, 8051, etc)
- 48 pin QFN for reduced PCB area
- SPI/I²C interface options for reduced pins, simple interface
- 262 colour (RGB – 6,6,6) WQVGA graphics
- Touch controller
- Audio output

EVE's Object-Oriented Intelligent Display Architecture



- Object Memory typically only loaded on initialisation
- Compact Object Display List allows manipulation of objects over a low bandwidth SPI or I^2C interface

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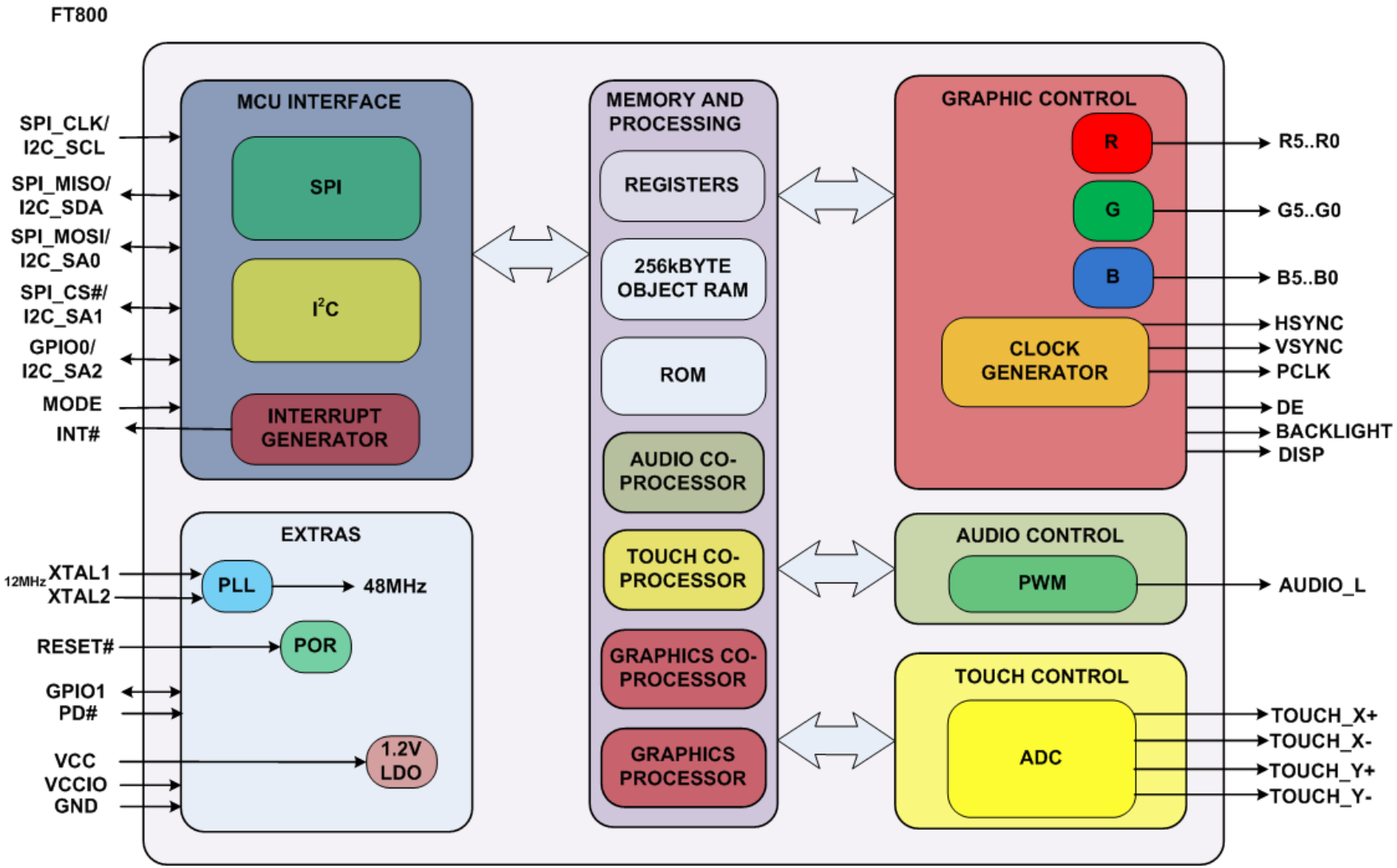
NEW FT800 - Embedded Video Engine (EVE)

3 functions, one chip, providing unparalleled value

- Generate graphics for WQVGA (480 x 272) and QVGA (320 x 240)
  - Functional support for 512 x 512 pixels
- Support Resistive Touch Screen stimulus
- Provide audio output
- No expensive frame buffer RAM required
- Easy to use, GUI based programming tools from MikroElektronika (www.mikroe.com)
- Advanced, object oriented architecture enables low cost MCU as system host using I²C and SPI interfaces

FT800 Block Diagram



Key Features - Graphics

- **FT800's object oriented approach renders images in a line by line fashion with 1/16th of a pixel resolution**
  - No expensive frame buffer (less RAM) required lowering system cost
- **Anti-Aliasing**
  - Allows the FT800 to produce sharper, smoother edges with enhanced image quality, even on lower resolution displays**.**
- **Alpha blending and masking algorithms**
  - Create shadows / 3D / fade effects
- **In-built widgets for complex shapes**

- **Colour Dither**
  - Allows the FT800 to calculate for 8-bit colour despite only providing pins for 6-bit (RGB – 6,6,6)
  - Improves half-tone appearance
- **8kbyte RAM stores display list**
  - Approximately 2000 items
- **Programmable Timing**
  - Allows the FT800 to adjust HSYNC and VSYNC timing enabling control of many different displays

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Key Features - Audio/Touch

- **Mono audio (single pin) output from PWM**
- **64-voice polyphonic synthesiser**
  - Play pre-stored sounds allowing for fast implementation of sound generation e.g. bells, chirps, beeps, alarms, clicks, DTMF tones
- **Audio wave playback for mono-8-bit linear PCM, 4-bit ADPCM and µ-Law coding format at sampling frequency from 8kHz to 48kHz**

- **Designed for resistive touch screens**
- **Includes median filtering and touch force sensing to adjust the screens sensitivity.**
- **4 wire control (X+, X-, Y+, Y-)**
  - Screen pressure alters resistance between the +/- signals with the value returned to the FT800.
  - 10 bit ADC & processing enables location to be determined

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Display Made Easy - Widgets

- Object oriented architecture with built-in widgets
  - Widgets built into FT800 ROM and available to micro-controller for customization
  - Execute short commands from MCU to draw a clock widget

Cmd_dlstart()

Cmd_clock(current time)

Cmd_display()

Cmd_swap()

Complex graphics available for GUI integration

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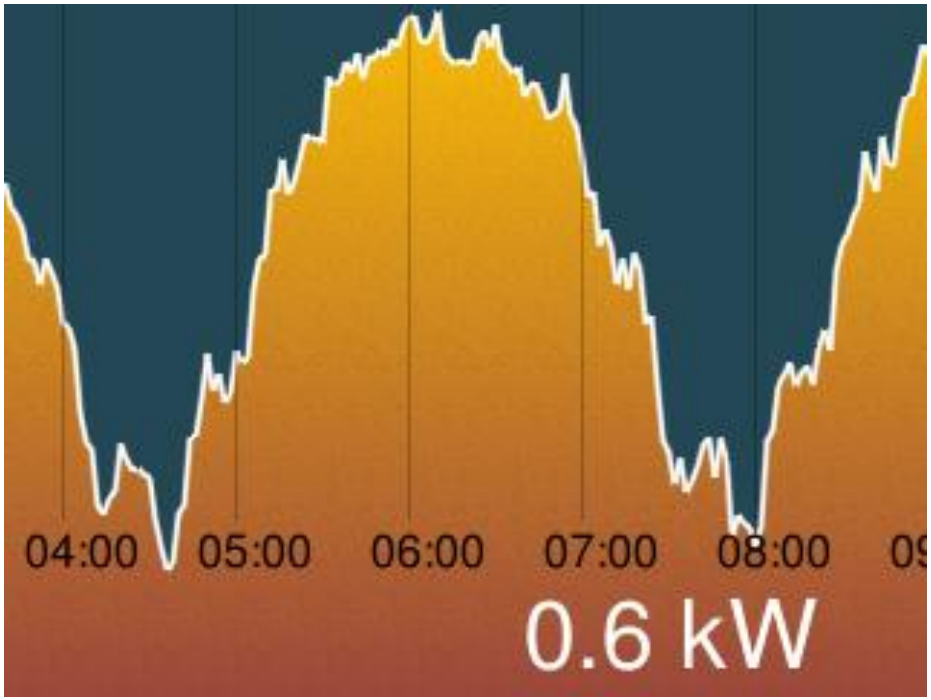
Display Made Easy - Screen Captures



- Capture screen shots
- Customized screen shots with text overlays

Cmd_Dlstart()

Plot_Bargraph(Bargraph primitive)

Cmd_Text(display inbuilt text)

Cmd_Display()

Cmd_Swap()

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Graphics Example – Programming Guide

To draw a red circle on a black screen = 8 instructions

```
wr32(RAM_DL + 0, CLEAR(1,  1,  1);          //Clear the screen to black

wr32(RAM_DL + 4, COLOUR_RGB(160, 22, 22));  //Set the draw colour to red

wr32(RAM_DL + 8, POINT_SIZE(320));          //Set size to 320/16 = 20
                                              pixels
wr32(RAM_DL + 12, BEGIN(POINTS));           //Start the point draw

wr32(RAM_DL + 16, VERTEX2II(192,133,  0,  0));  //Draw circle 192 pixels from
                                                  left and 133 down
wr32(RAM_DL + 20, END());                   //End the point draw

wr32(RAM_DL + 24, DISPLAY());               //End the display list (28
                                              bytes used)
wr32(REG_DLSWAP, SWAP FRAME);               //Make this display list active
                                              on the next frame
```

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Bill of Material Comparison

	FT800	COMPETITOR (frame buffer design)
MCU	Low End	High End
Graphic Memory	2kBytes (on chip)	~780kbytes (1 byte per RGB x 512 x 512)
Touch Controller	Integrated	Separate
Audio output	Integrated	Separate
Cost	Low	High

- Reduce system cost by 40-60% in current products
- Enable high quality, affordable displays in new products
- Enables a total BOM for a complete system in volume, under $19
  - FT800 - $2.75
  - Display - $9 to $10
  - Components & PCB - $3.5
  - Assembly and test - $1.75

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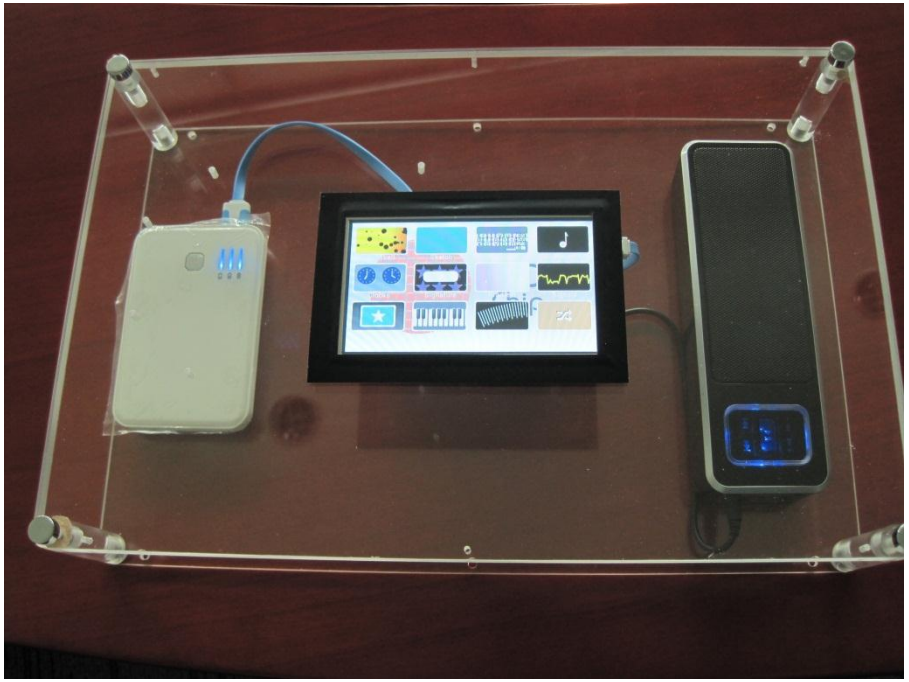
EVE Demonstrations

- Check out our interactive and static displays including:
  - ATMega328 (Arduino Pro)
  - Intel 8051
  - FTDI's Vinculum II
  - ARM
  - Microchip PIC



- Demonstration examples for: 3D objects, transparent text, gradients, 3D animations, preloaded fonts, zoom effects, anti-aliasing/angled texts, signature support, widgets for ease of use…..and more !!

- Watch software demonstration of MikroElektronika's Visual TFT

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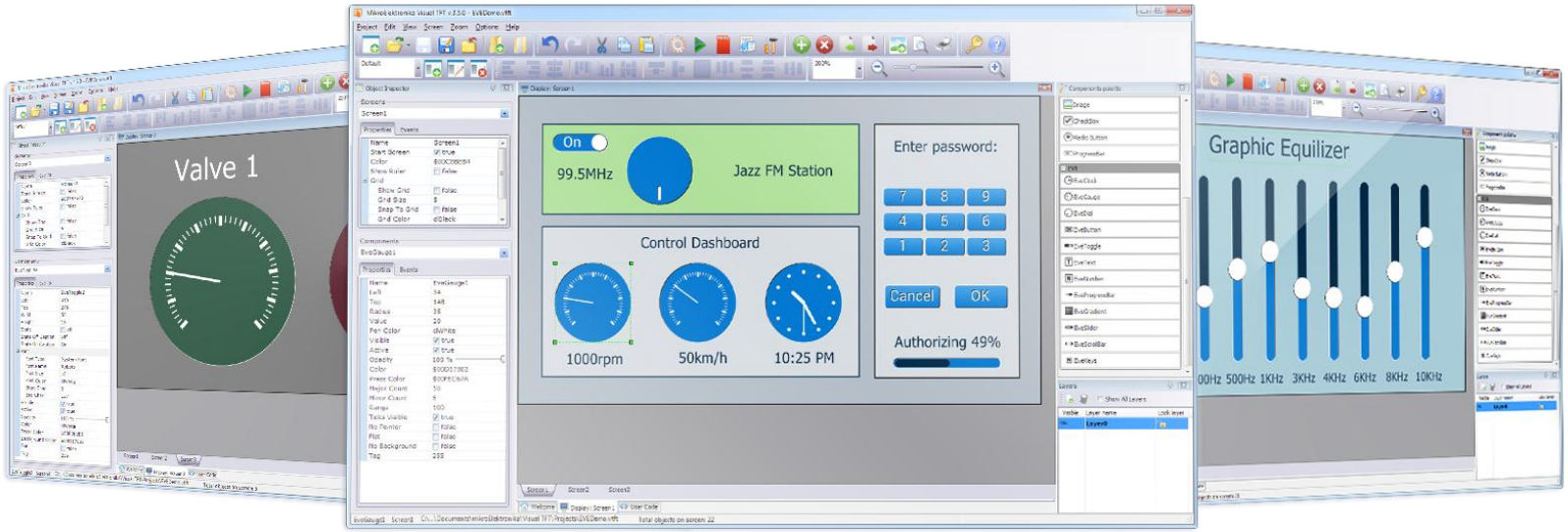
Software Development Support



FT800 support on Visual TFT from MikroElektronika (www.mikroe.com):

- Library for FT800 functions
- GUI development interface
- Compiler support for multiple MCU architectures
- Continuing partnership for leadership graphic solutions
- Support available NOW !

MikroElektronika
DEVELOPMENT TOOLS | COMPILERS | BOOKS

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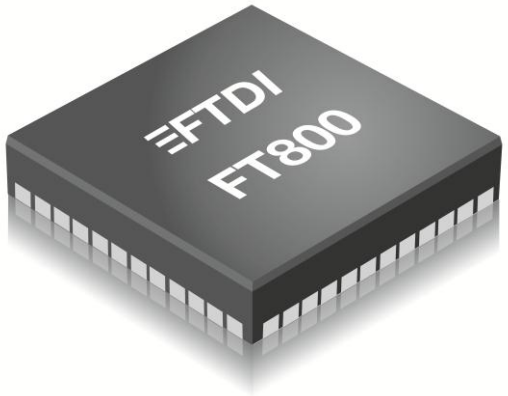
Applications

Any product with a human interface

- Multi-function printers
- Electronic point of sales units
- GPS displays
- Medical devices
- Signature pads
- Smart home controllers
- White goods control panels
- Thermostats
- Vending machine control panels
- Elevator controls
- Cameras
- E-book readers
- Petrol pump displays
- Taxi meter displays
- Public transport systems
- .. and many more!

Summary - FT800

- Expands the “Made EASY” philosophy from USB to Display solutions
- Provides 3 functions in one IC – Display, Touch, Audio
- 262 colour (plus 2-bit colour dither) with RGB interface to WQVGA displays
- -40ºC to +85ºC
- GUI based development tools
- 1.2V core logic
- 1.8V to 3.3V IO for MCU
- 3.3V support for display
- Low power: Active 35 mA (typ) Sleep 25 uA (typ)
- Low pin - 48 pin QFN (7mm x 7mm)
- $2.75 for 100 kU



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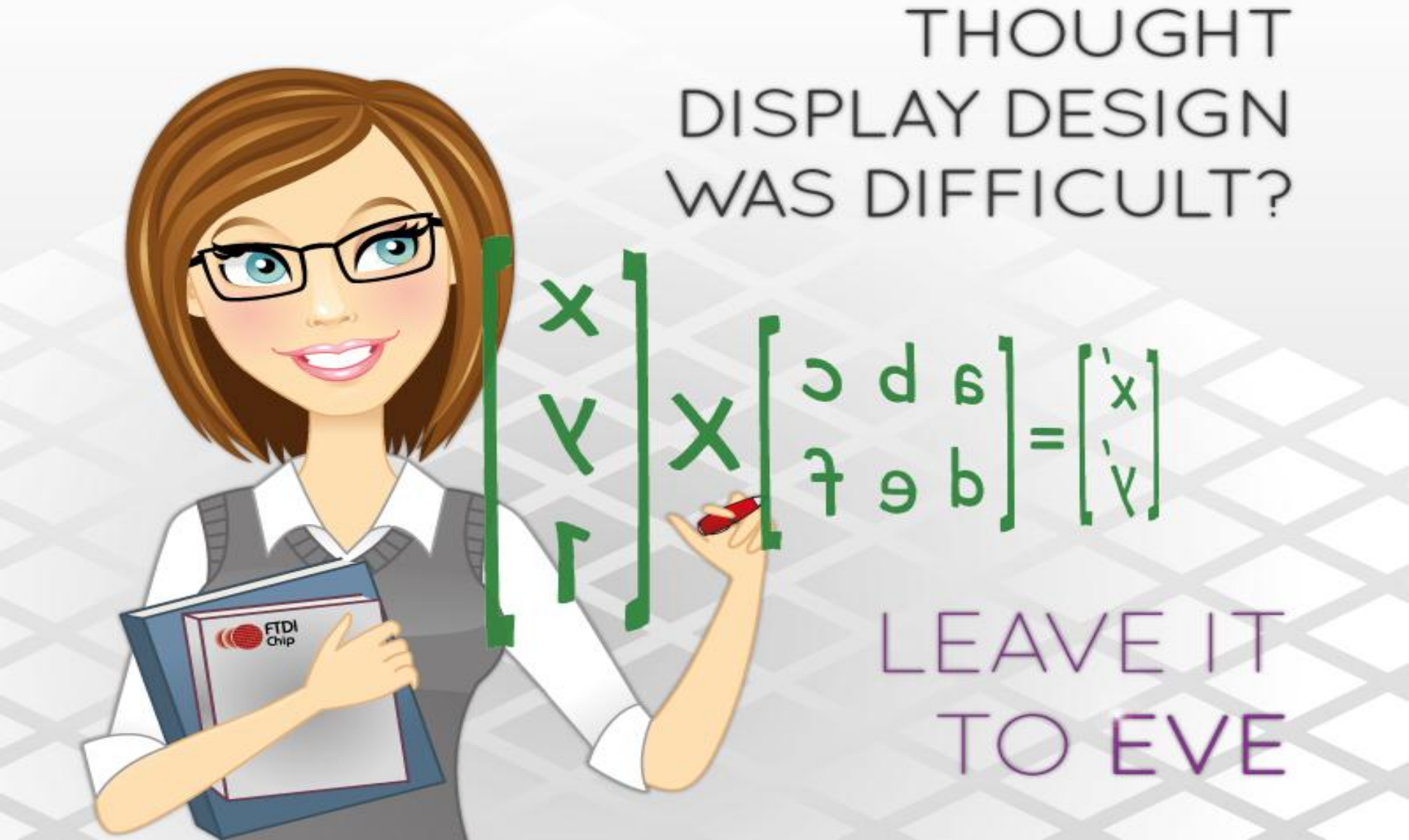
Display Made Easy from FTDI Chip



Back-Up

Contact us

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FTDI are ISO9001:2008 certified.

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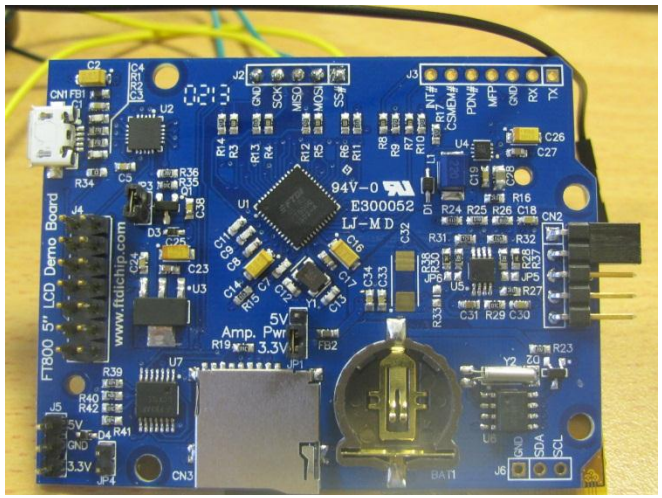
Development Hardware



- Development board containing with FT800
- Includes connector for RGB and timing signals to the display
- Includes connector for touch controller interface
- Includes audio amp
- Includes connector to mate with external MCU via SPI or I²C

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