Smart Embedded

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EMERGING DISPLAY TECHNOLOGIES
on behalf of Adelco Electronics

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Adelco

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Who is Emerging Display Technologies?

- LCD Manufacturer since 1994 in Kaohsiung Taiwan
- Touch Panel Manufacturer since 2010
- Started Smart Embedded Modules Development in 2017
- European Support Office in Copenhagen with Technical Support
- Adelco is our Distributor in Holland and Belgium

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Goal:

Adding a modern Graphic User Interface to a system with lowest cost of ownership

Hidden Costs

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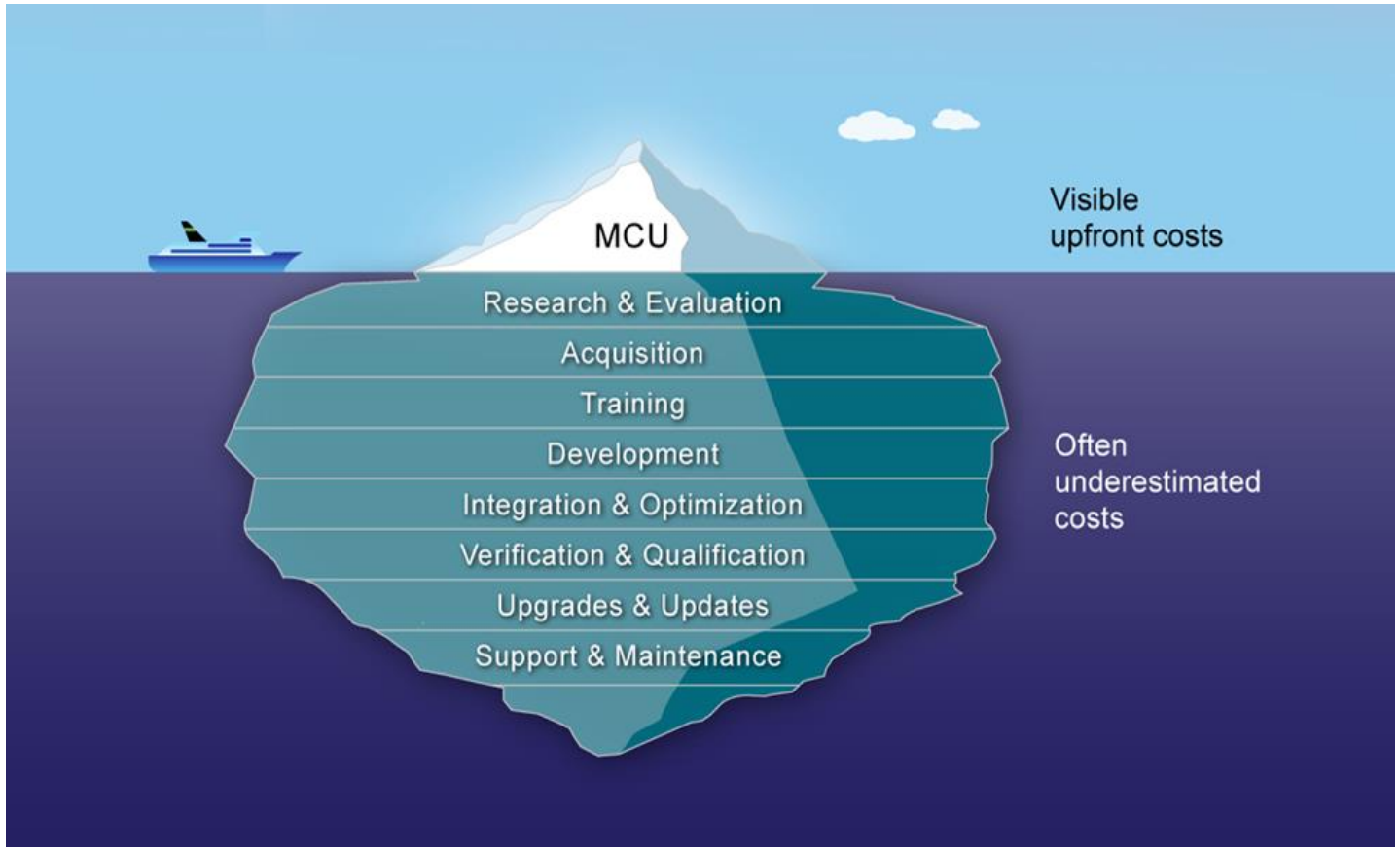

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Total cost of ownership

In all projects there are hidden costs

Some ways to save cost / improve customer's profit is:

- Simplify the Supply Chain
  - Save on Transportation and warehouse cost
- Shorten development time
  - Save time and Engineering cost
- Shorten 'Time to Market'
  - Start selling earlier
- Reduce risk for delays (e.g. ESD / EMC certification)
  - Development Module already certified, means 'easy' certification for final product at much lower test facility cost and risk and shorter time

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Smart Embedded Customers

Existing products that need a ‘Facelift’ to a modern GUI

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Smart Embedded Customers

…or it can be a totally new product

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EDT Solution for Smart Display

Adding a modern GUI requires:

- GUI – The Graphic Design and definition of Interactions
- Some kind of Computer system
- TFT Display and Touch System
- Software / System integration
- Interface to the ‘Real World’
- Assembly and test
- EMC/EMI certification

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EDT Solution:

- Integrated solution with ***one*** PCB on back side of Module
- All circuits to drive TFT and Backlight are included
- Single power supply
- FreeRTOS
- TouchGFX Framework for GUI development
- STM32Fxxx Processor series (Cortex M7, 200 - 400MHz)

TouchGFX

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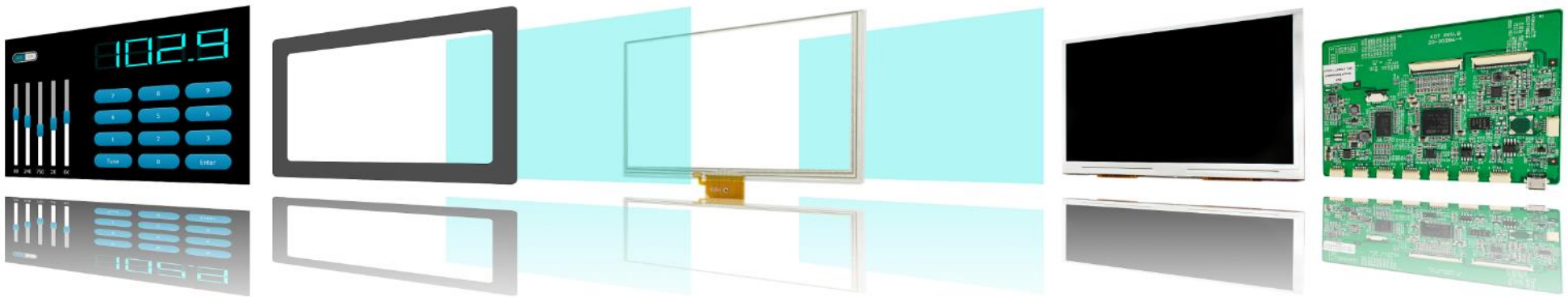

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Lowest cost of ownership

We simplify customers logistics

- One supplier of the complete solution with warranty
- One supplier has total responsibility for the final product including:
  - TFT display, Touch sensor and Cover Lens
  - Control board
  - Software
  - Assembly and test

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From Idea to Production in three steps:

1. Proof of concept
2. Optimization of solution
3. Prepare for Mass Production

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Proof of Concept:

The *Evaluation Kit* includes all that is needed to ‘Get Started’ in shortest time

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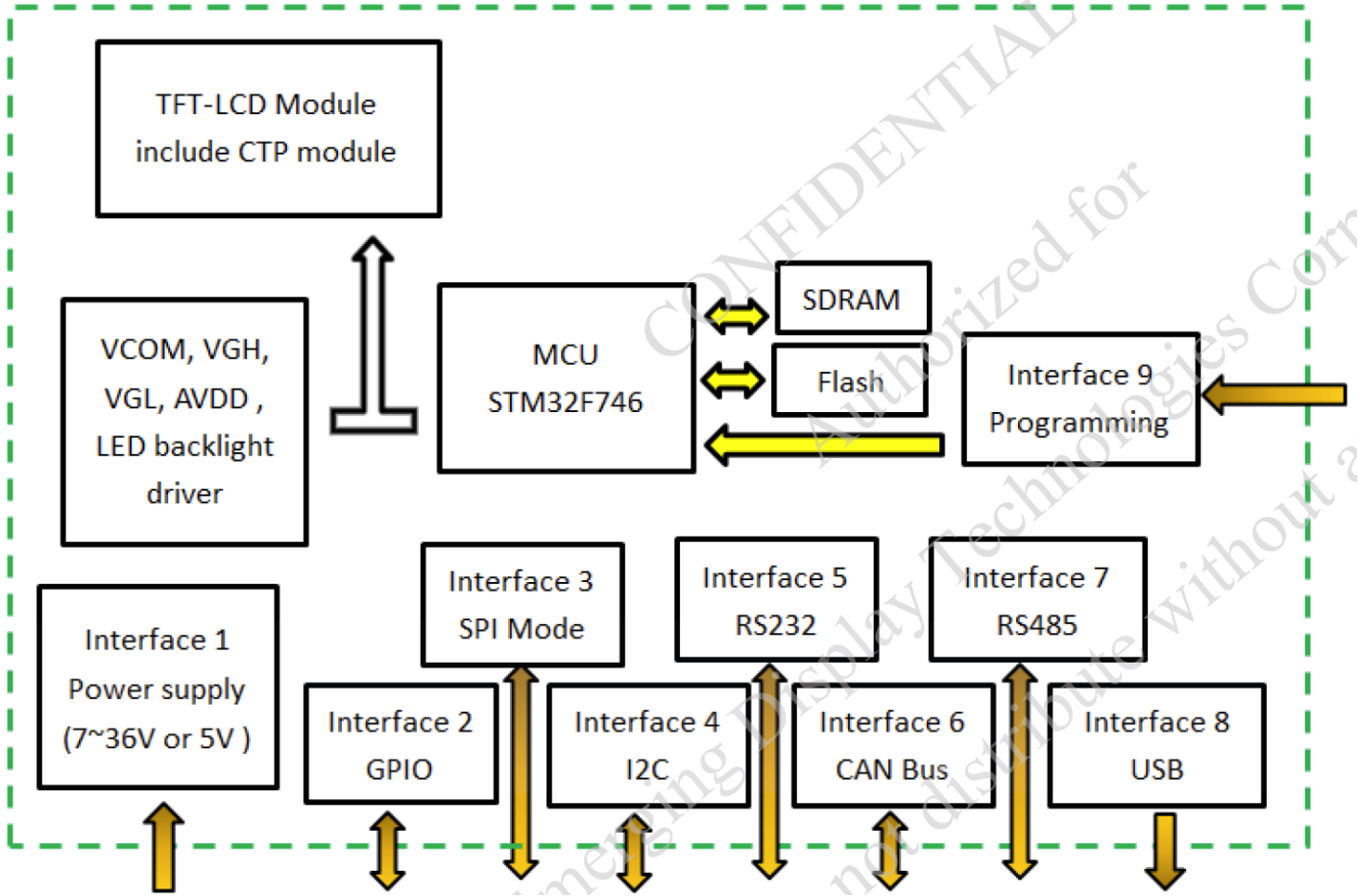
1) Proof of Concept

- **Block Diagram:**



1) Proof of Concept:

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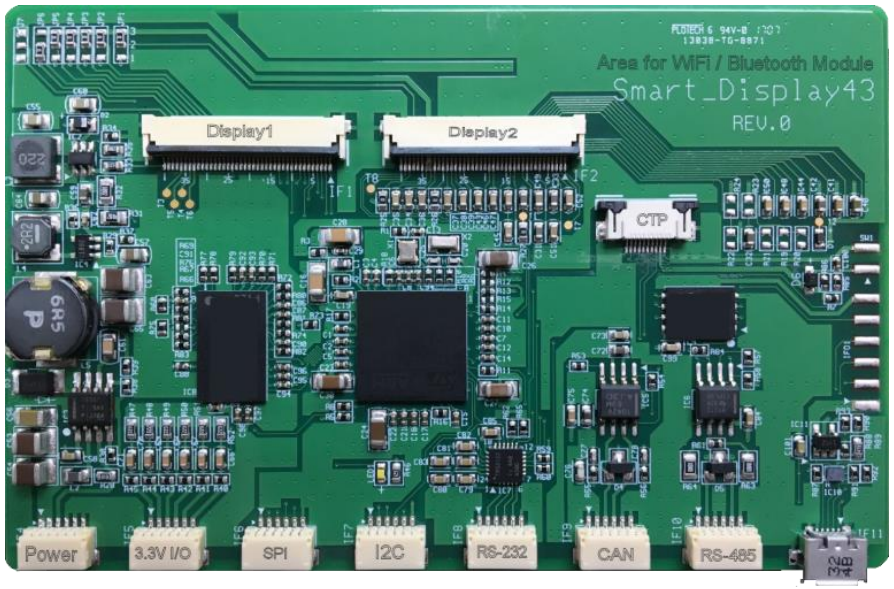
Customer provide GUI files and description pof functions and use a Smart Embedded Development module for quick prototypes

- Implementation using TouchGFX Designer
- Use In-House development for core functions I/O etc.

Example: PCB for 4.3” Dev. Module

- 7-36Volt Power Supply
- 3.3V I/0, SPI, I2C,
- RS232, CAN, RS485,
- USB OTG



2) Optimization of solution:

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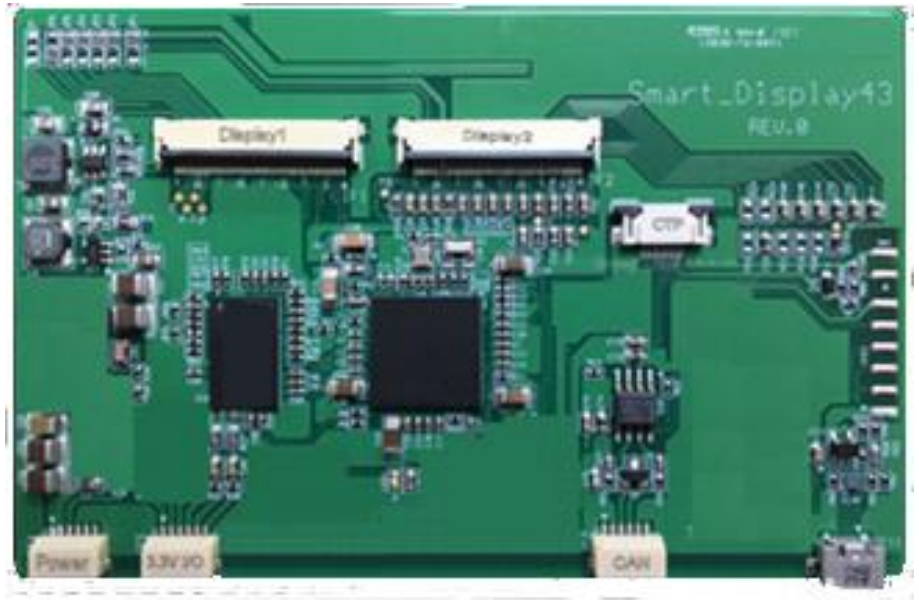
Develop custom Cover Lens Cost Down of PCB by using only necessary Interfaces
Optimize functionality adding other needed features
Final verification of GUI and functions, Sign Off

Example:
5 Volt Power Supply
3.3V I/0,
CAN
USB OTG



3) Prepare for Mass Production

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Reliability test of complete solution
Build Test Jigs for customized module
Develop special Test Software
Develop special packaging if needed

Product is delivered programmed and testet with the real application

Requirements to a Smart Embedded solution

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- Real time operating system, deterministic reaction time
- Smooth animations –> High framerates
- ‘Low’ memory requirements (RAM)
- Low power
- Small CPU load to handle more functions than ‘just’ graphics
- Many interfaces, easy expandable
- Wide Power supply input range
- Easy GUI development

FreeRTOS

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- FreeRTOS is designed to be smart and simple
- We get a free high quality Real Time Oriented Operating System with very little memory footprint
- We can include Control functions in many applications depending on the ‘Hard Real-Time’ requirements to this control function
- It is a multi-tasking system, so the control functions can be written independently of the Graphics

TouchGFX Graphic Framework

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By using TouchGFX we get a number of advantages

- High GUI performance, better looking animations
- Can run display-resolutions (up to XGA: 1024x768)
- Small memory footprint (RAM)
- Highly optimized Graphic handling
- Use less MCU computing, low power consumption
- ‘Instant start up time’
- Window's based graphic development system

Hardware:

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We selected STM32xx family of processors because 10 years guaranteed lifetime

Longevity Commitment

STMicroelectronics provides a minimum longevity commitment of 10 years for a set of products listed below.

STM32 and STM8 MCU

For STM32 ARM® Cortex®-M and STM8 microcontrollers the 10 years longevity commitment starts from the following dates:

- STM32F0 Series, starting January 1st 2017
- STM32F1 Series, starting January 1st 2017
- STM32F2 Series, starting January 1st 2017
- STM32F3 Series, starting January 1st 2017
- STM32F4 Series, starting January 1st 2017
- STM32F7 Series, starting January 1st 2017

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STM32F7 / H7xx, 200 / 400MHz

- Advanced architecture including
  - High performance graphic controller
  - Low power operation
  - High capacity internal FLASH and RAM
  - External QSPI FLASH and SDRAM
  - Many interfaces including:
    - RS232 / RS485 / CAN / USB / I2C / SPI….
  - We use Industry Standard IC’s for serial interfaces

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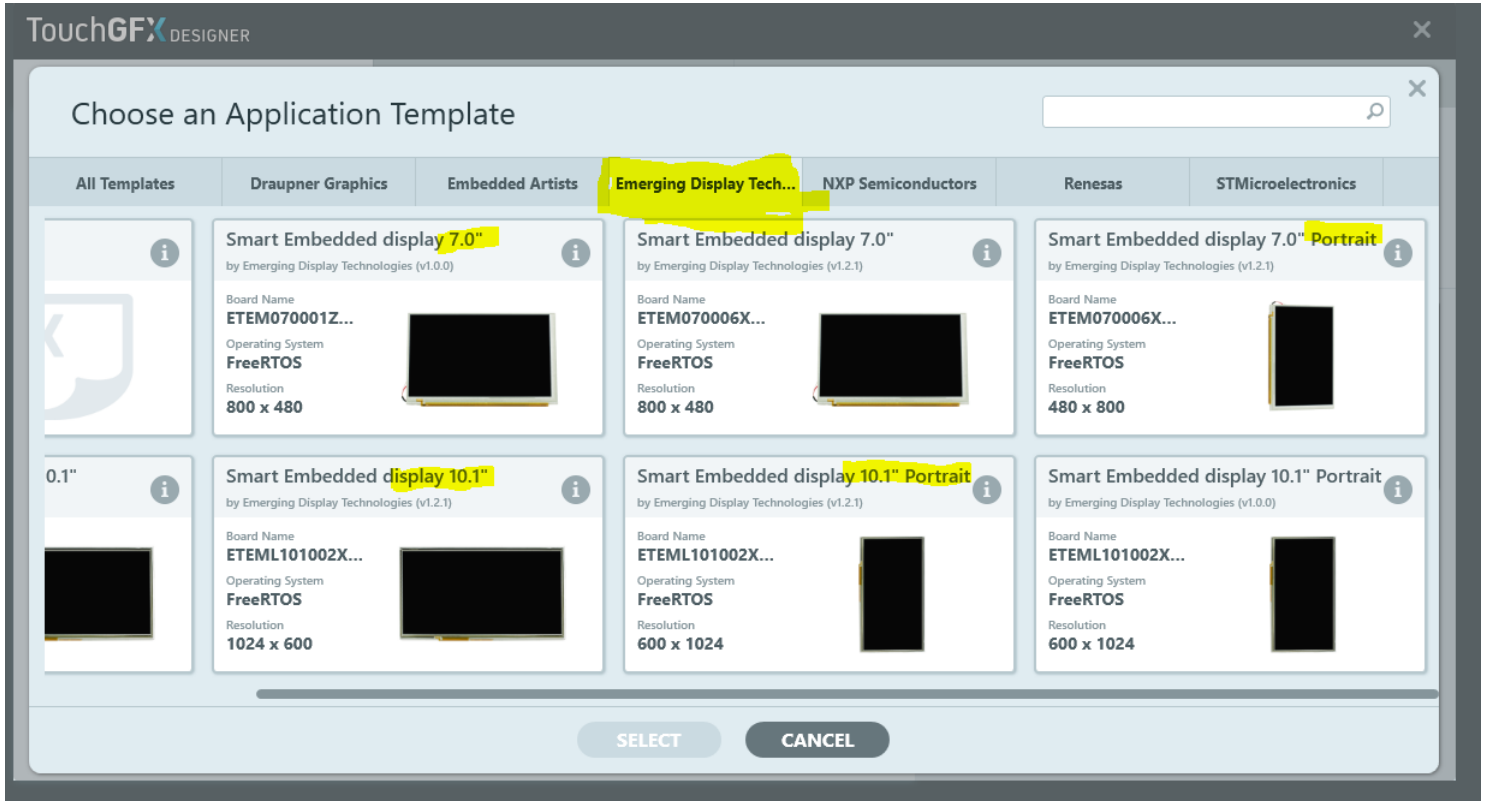
Smart Embedded Modules Integrated in TouchGFX Designer



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Thank You!

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