FTF FREESCALE TECHNOLOGY FORUM 2014

Develop Made For
iPod (MFi) Accessories

FTF-CON-F0019

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freescale™

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Agenda

- Introduction to the Made For iPod (MFi) Program
- Freescale MFi Solution Philosophy
- Freescale MFi Solution Development Hardware
- Freescale MFi Solution Software Support
- Freescale MFi Solution Development Tools
- Freescale MFi Solution Application Examples and Demos
- Solution Support and Professional Services
- Processor Families Supported by MFi Solution

Introduction to the Made For iPod (MFi) Program

Made For iPod (MFi) Program

To develop Accessories or App-based accessories for iPhone®, iPad® or iPod® devices, a company needs an MFi (Made For iPod) license from Apple

Made for iPod iPhone iPad

MFi Accessory Connection Options

Connection	Wired		Wireless			
	Lightning	30-pin	BLE	BT	BT (MFi)	WiFi
			Bluetooth 4.0	Bluetooth	Bluetooth	AirPlay
MFi License Required	Yes	Yes	No	No	Yes	Yes
Audio	Digital	Analog and Digital	No	Yes	Yes	AirPlay
Notes/ Comments	Supports all MFi functions	Some MFi functions not supported	Wearables, Home Automation, iBeacon	A2DP audio, Handsfree	MFi BT Connection, Gaming controllers	Streaming audio

https://developer.apple.com/programs/mfi/

Developer

Technologies Resources Programs Support Member Center

MFi Program

Join the MFi licensing program and get the hardware components, tools, documentation, technical support, and certification logos needed to create AirPlay audio accessories and electronic accessories that connect to iPod, iPhone, and iPad.

Hardware Components and Documentation

Get the hardware connectors and components that are required to manufacture iPod, iPhone, iPad, and AirPlay audio accessories. And access the iPod Accessory protocol specification, the communication protocol used to interact with iPod, iPhone, and iPad.

MFi Logos

Promote your electronic accessory with MFi logos. Made for iPod, Made for iPhone, Made for iPad, and AirPlay logos communicate to customers that an electronic accessory has been designed to connect specifically to iPod, iPhone, or iPad, and has been certified by the developer to meet Apple performance standards.

Join the MFi Program

- Hardware Connectors and Components ✓
- Testing Tools ✓
- Technical Information ✓
- Technical Support ✓
- Product Certification ✓
- MFi and AirPlay Logos ✓
- iPod, iPhone, and iPad Compatibility Icons ✓

Apply Now

Click here to apply for an MFi license

Freescale MFi Solution Philosophy

Freescale MFi Solution Philosophy

- Develop a flexible solution supporting the full range of possible accessories, including but not limited to audio
- Develop a solution supporting a wide range of existing Freescale MCU and MPU products, and capable of rapidly supporting new Freescale MCU and MPU products at introduction
- Architect the MFi solution to enable fast adoption of any MFi program software or hardware updates
- Make the Freescale MFi solution available to all eligible MFi licensees on the MFi portal

Made for iPod iPhone iPad

Made For iPod (MFi) Freescale Solutions

- Freescale's TWR-DOCK2, TWR-DOCK and supporting MFi software allow the Tower System to be used for, iPhone, iPad and iPod Accessory and App-based Accessory development and rapid prototyping, supporting the Lightning and 30-pin dock connectors
  - This provided MFi development support for most MCU and MPU products supported by the Tower System
- Utilize TWR-DOCK2 components and software to support Freescale MPU products not supported by the Tower System

Made for iPod iPhone iPad

Freescale MFi Applications

iPhone, iPad, and iPod devices provide a great interface for many applications, and increasingly consumers already have them and know how to use them!

Target application areas:

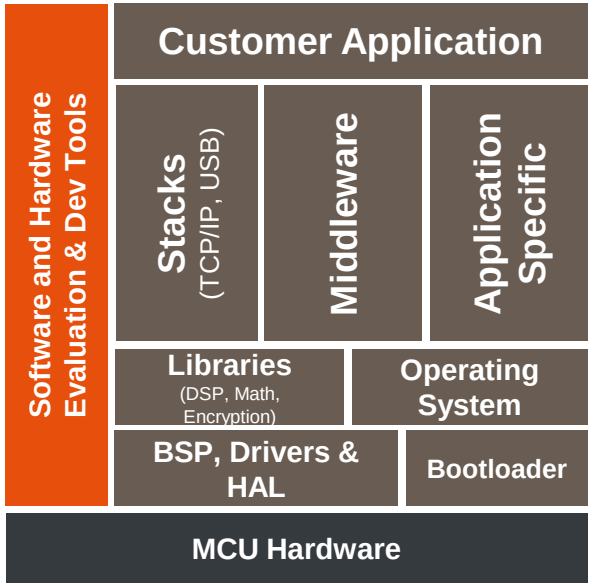
- Audio
- Toys
- Home Health
- Portable Medical
- Professional Medical
- Automotive
- Home automation
- Exercise
- Outdoor sports
- Smart metering
- Professional
- Point of Transaction
- Input devices
- *And many more, let your imagination run wild*

Freescale MFi Solution Development Hardware

Tower System Modular Development Platform

Modular development platform for 8-, 16- and 32-bit processors

Enables advanced development through rapid evaluation and prototyping



Product Features

- Modular and Expandable
- Controller modules provide easy-to-use, reconfigurable hardware, can be used stand-alone
- Interchangeable peripheral modules add functionality and make customization easy
- Open-source hardware and standardized specifications promote customization
- >80 modules to choose from
- Speeds Development Time
- Open source hardware and software allow quick development with proven designs
- Integrated debugging interface allows for easy programming and run control via standard USB cable

Cost Effective

- Sold individually and in complete kits, typically starting at $69 USD.
- Tool re-use through interchangeable modules eliminates need to purchase redundant hardware

Made For iPod (MFi) Freescale Solutions

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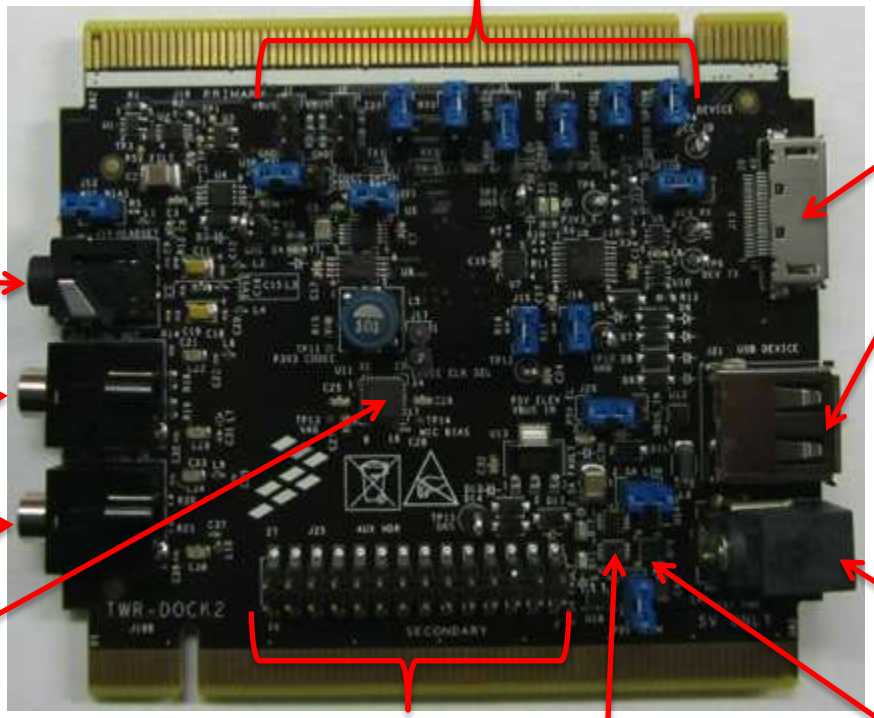
Made for iPod iPhone iPad

TWR-DOCK2 Tower Module Only

Configuration Jumpers



Custom Dock connector cable Header

USB A Receptacle for standard USB A to dock connector cable

Analog stereo headphones/headset (3.5mm)

Analog stereo audio line in (3.5mm)

Analog stereo audio line out (3.5mm)

SGTL5000 Audio Codec

Signal Access Header

External power supply input (minimum 5V 5A)

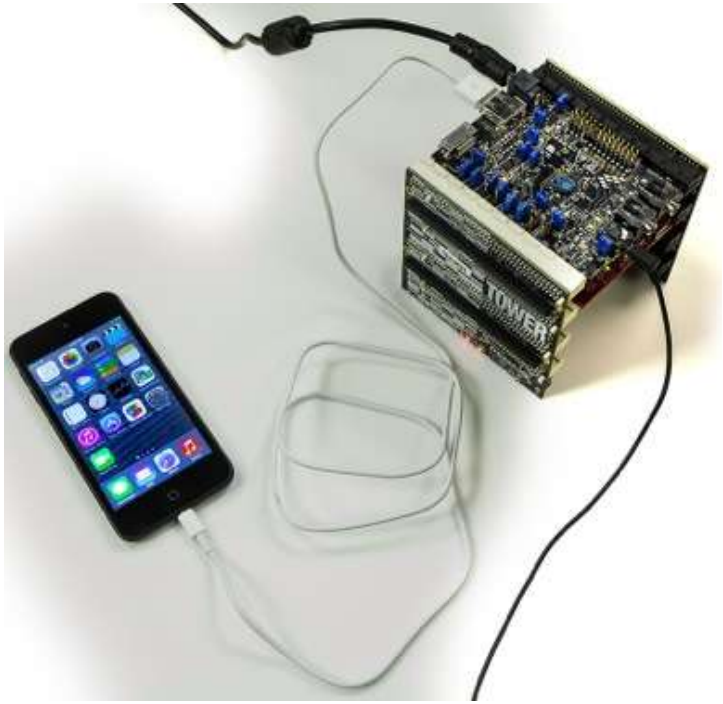
Tower System power current limit circuit (limiter set to 1A)

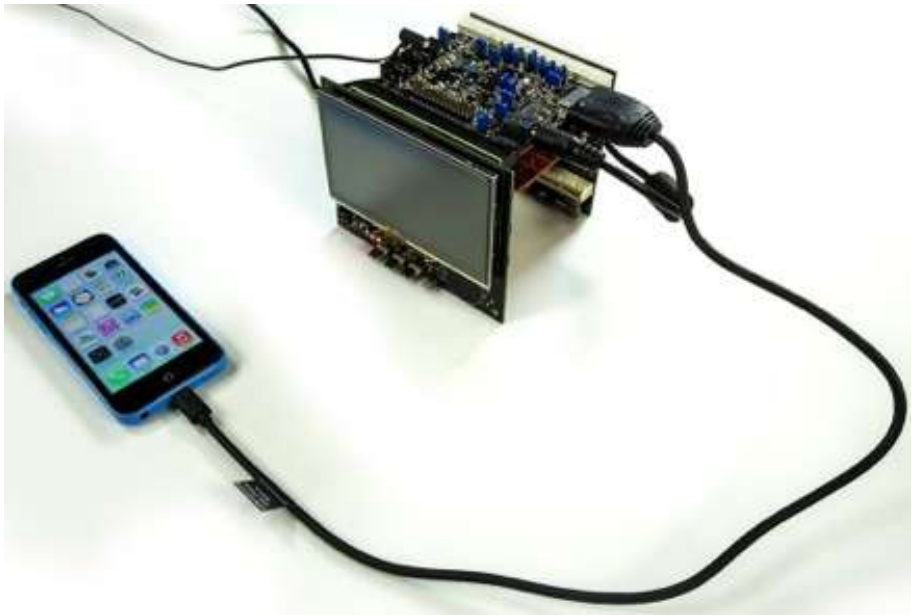
Device charge current limit circuit (limiter set to 2.5A~2.8A)

Orderable part number ($199):
MFI-FS-TWR-DOCK2

Made for iPod iPhone iPad

TWR-DOCK2 Use Examples





iPhone, iPad or iPod connected to Tower system via TWR-DOCK2 and custom Lightning or 30-pin connector cable

Made for iPod iPhone iPad

Custom 30-pin connector cable (USB and Serial connection)

Custom Lightning connector cable

TWR-DOCK2 Custom Cables

Custom 30-pin connector cable
(USB and Serial connection)

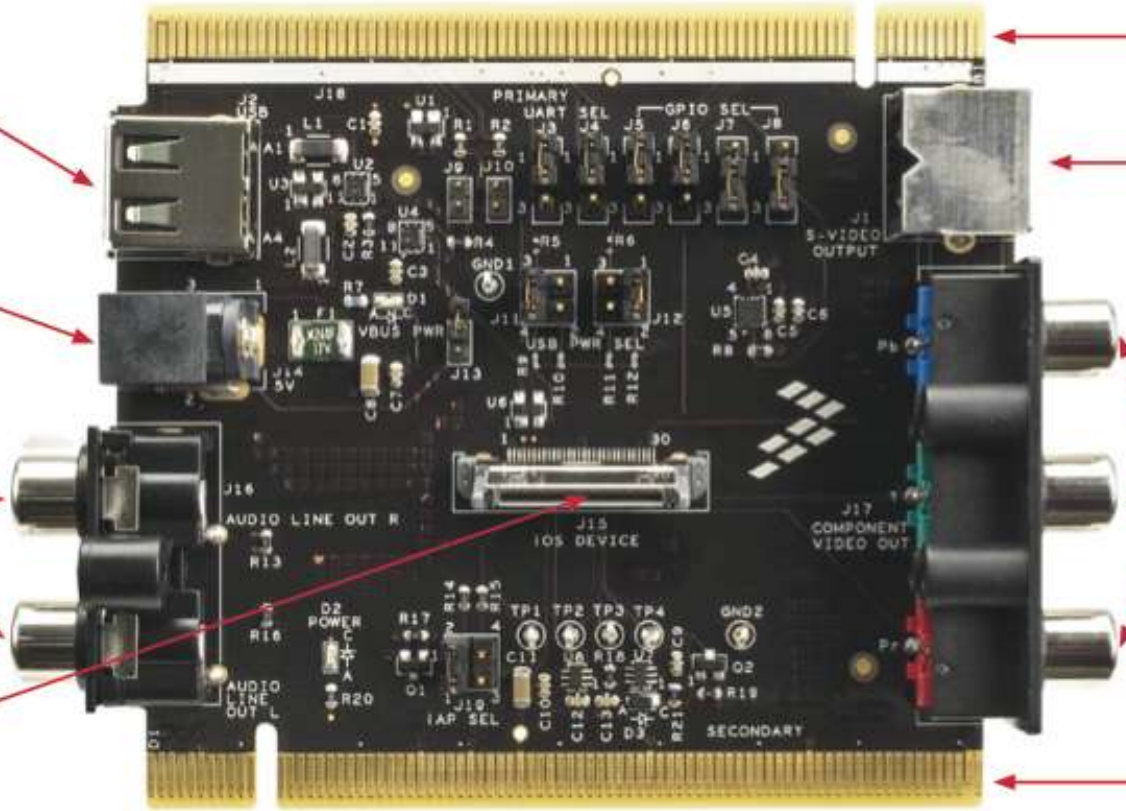
Custom Lightning
connector cable

- The TWR-DOCK2 custom cables use a JAE DD 40-pin connector to connect to the TWR-DOCK2 module
- The 40-pin connector supports all currently required signals, and allows for possible future expansion
- The set of TWR-DOCK2 custom cables support all currently available wired connection options to iPhone, iPad, and iPod devices
- The set of TWR-DOCK2 custom cables support all current iPhone, iPad, and iPod device charging specifications
- The set of TWR-DOCK2 custom cables supports the development of device power accessories

Orderable part number ($199): MFI-FS-TWR-DOCK2-CBL

Made for iPod iPhone iPad

TWR-DOCK Tower System Dock Module



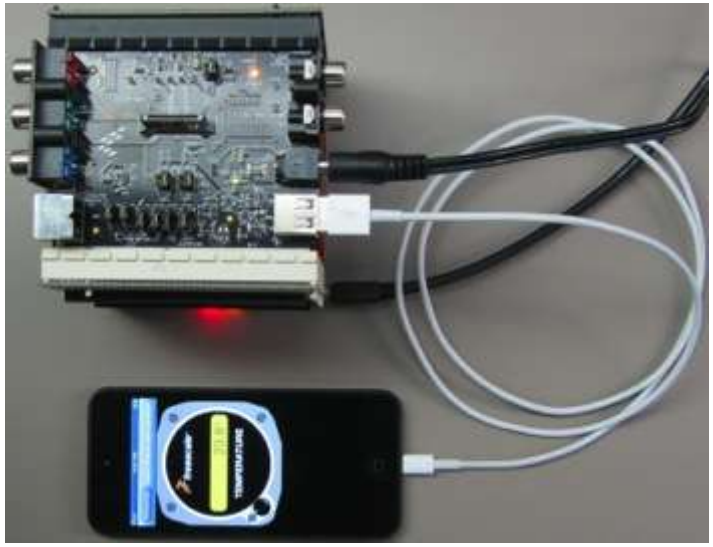
Orderable part number ($139):
MFI-FSL-TWR-DOCK

Made for iPod iPhone iPad

TWR-DOCK Use Examples

iPhone or iPod connected directly to Tower system via TWR-DOCK 30-pin connector

iPad connected to Tower system via TWR-DOCK 30-pin connector and extension cable



iPhone, iPad or iPod connected Tower system via TWR-DOCK and USB to Lightning or 30-pin cable

Made for iPod iPhone iPad

TWR-DOCK2-KL46 Kit (ARM Cortex-M0+)

Orderable part number ($399): MFI-FS-TWR-DOCK2-KL46

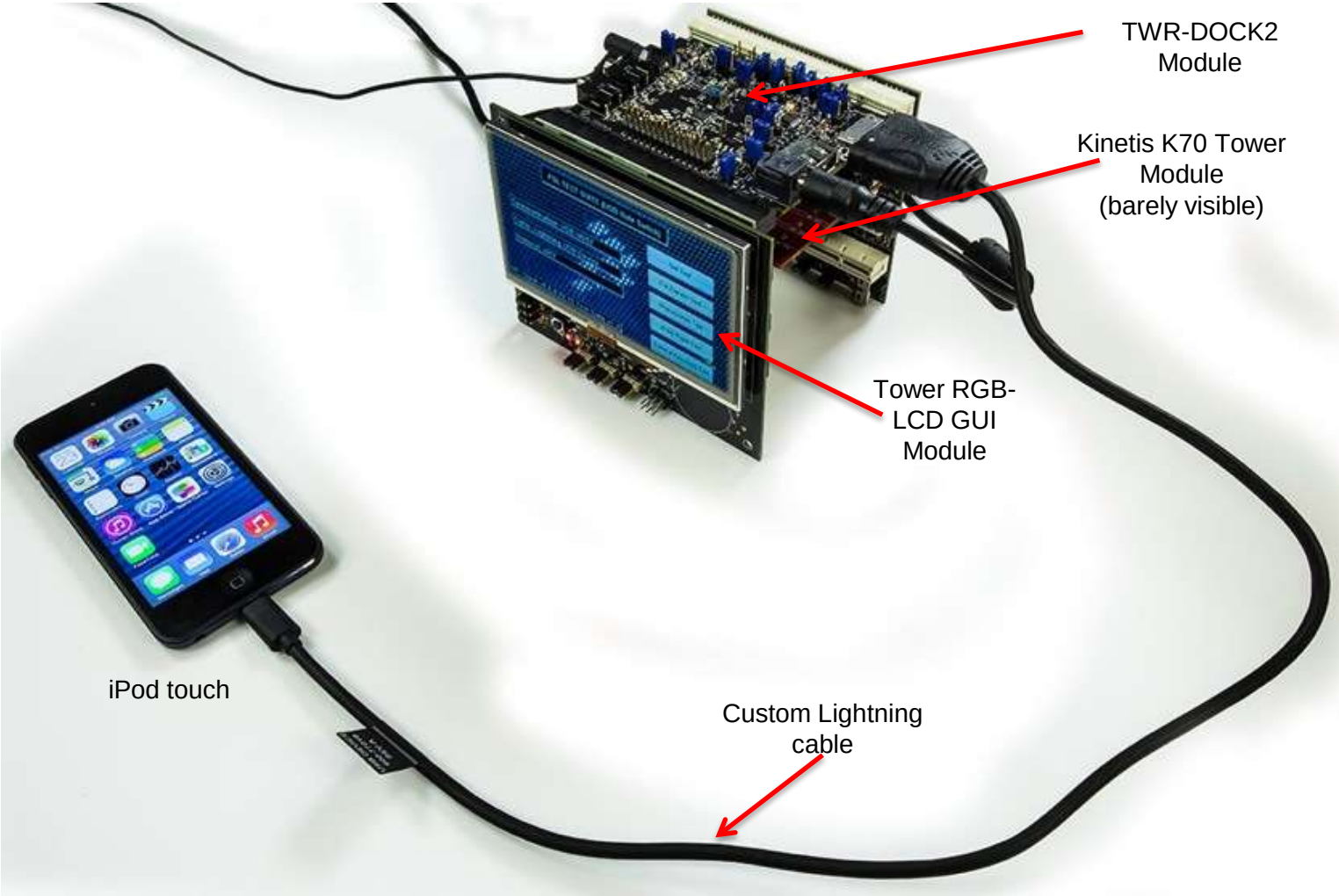
Made for iPod iPhone iPad

TWR-DOCK2-K70LCD Kit (ARM Cortex-M4)

Orderable part number ($499):MFI-FS-TWR-DOCK2-K70LCD

Made for iPod iPhone iPad

TWR-DOCK2-K70LCD Complete Accessory Development System



iPod touch is not included in kit

Example Tower System MFi System Configurations

TWR-K60D100M

+

TWR-DOCK2

+

TWR-ELEV

=

MFi Simple Digital Speaker Dock

+

MED-EKG

+

TWR-DOCK

+

TWR-ELEV

=

TWR-K53N512

iOS App Based EKG

TWR-K60D100M

+

TWR-DOCK2

+

TWRPI-MPL115A

+

TWR-ELEV

=

iOS App Based Altimeter

TWR-K70F120M

+

TWR-LCD-RGB

+

TWR-DOCK2

+

TWR-ELEV

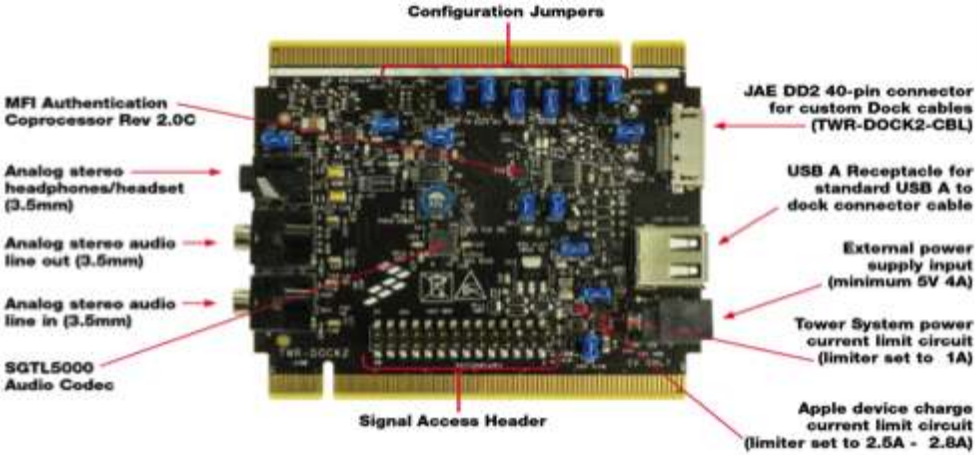
=

MFi GUI Digital Speaker Dock

Freescale's Made For iPod (MFi) Solutions

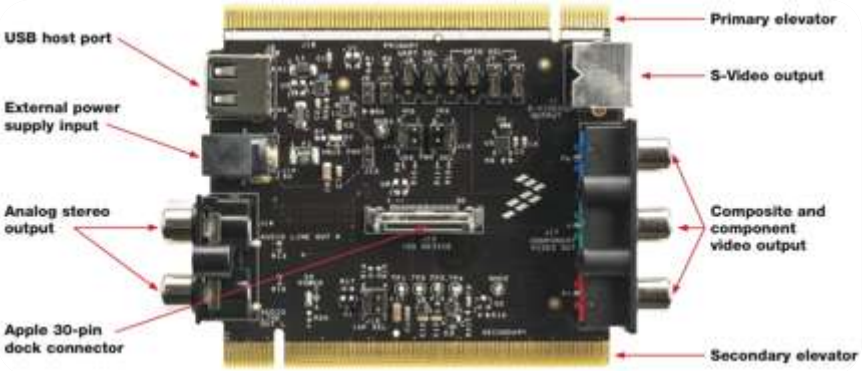
Freescale's MFi solutions are based on the TWR-DOCK2 and TWR-DOCK peripheral modules

TWR-DOCK2



- Custom cables supporting all Lightning and 30-pin dock connector options for smart accessories
- USB A receptacle for standard USB to Lightning™ and to 30-pin dock connector cables
- Digital audio streaming in both directions over USB
- Includes SGTL5000 hardware audio codec for analog audio input and output
- Control and communication with various devices
- Available only on MFi Portal for $199, custom dock connector cable set sold separately for $199

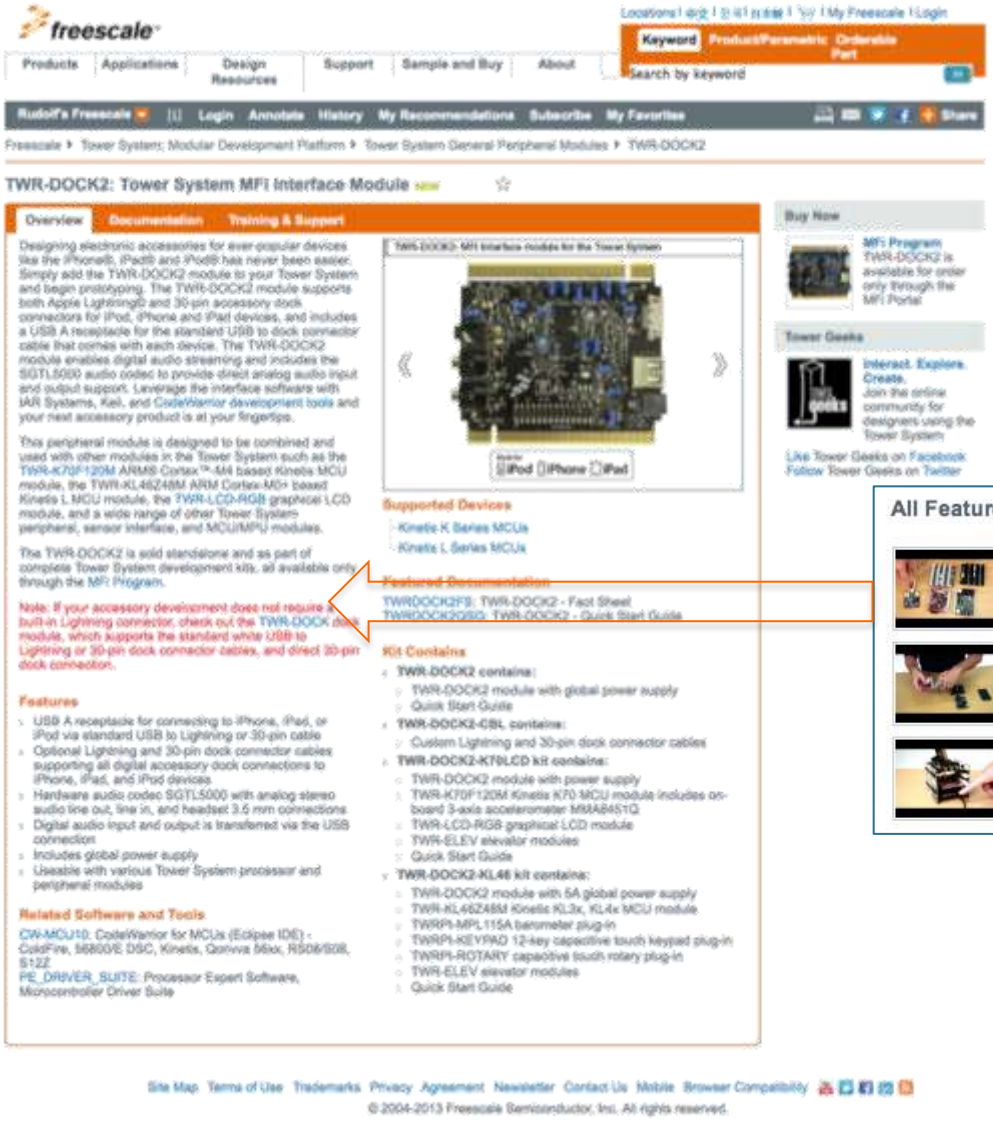
TWR-DOCK



- Direct 30-pin dock connection
- USB A receptacle for standard USB to Lightning™ and to 30-pin dock connector cables
- Analog audio and video signals with standard RCA and S-Video connectors
- Digital audio streaming in both directions over USB (requires hardware audio codec module like TWR-AUDIO-SGTL or TWR-AUDIO-DA7321)
- Control and communication with various devices
- Available only on MFi Portal for $139

- Includes free interface software Kinetis K and Kinetis L MCU families
- May be used with a wide range of Tower System MCU/MPU, peripheral, sensor and communication modules
- Example demos are available
- *i.MX and Vybrid support planned for mid 2014*

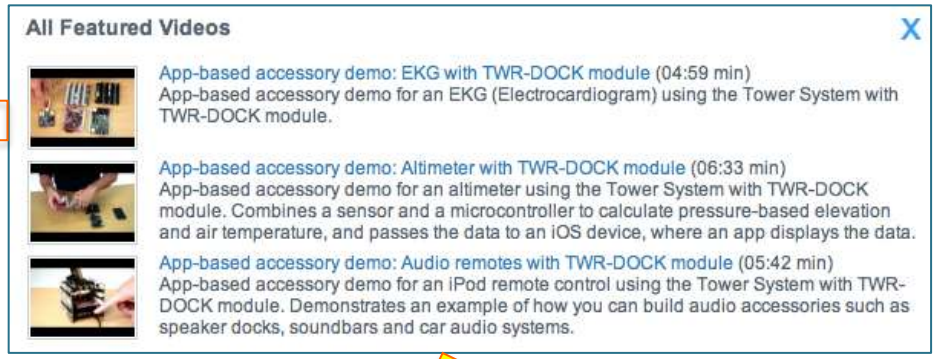
TWR-DOCK2 Freescale Web Page



For more information and the TWR-DOCK Fact Sheet, visit:

http://www.freescale.com/mfi

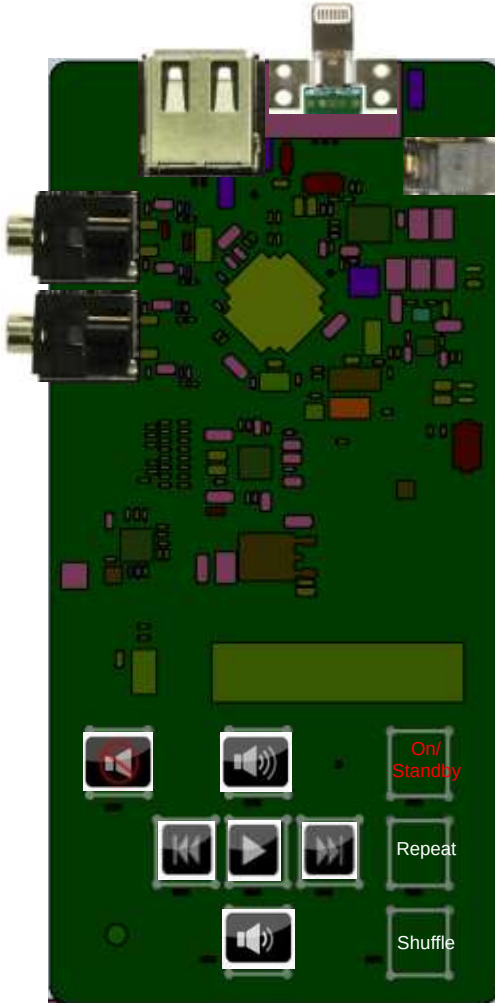
Link to Apple MFi developer web page



Check out the videos!
(On the TWR-DOCK Web Page)

Kinetis KL26 MFi Audio Interface (MFI-KL26-AI) Module

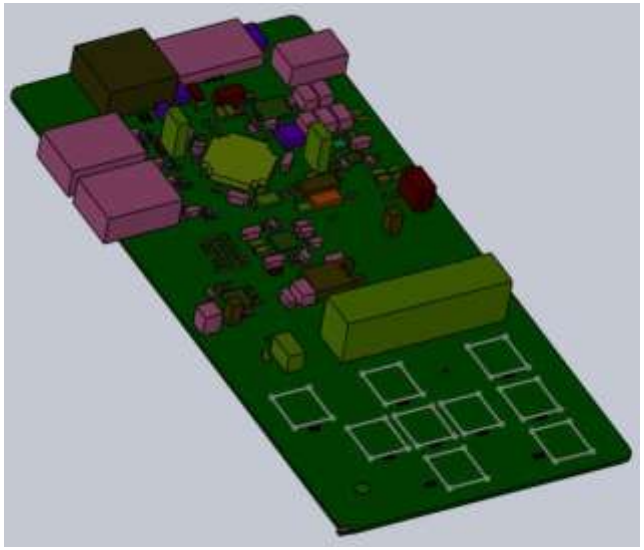
Audio Interface Module for iPhone, iPad, and iPod devices with Apple Lightning™ connector

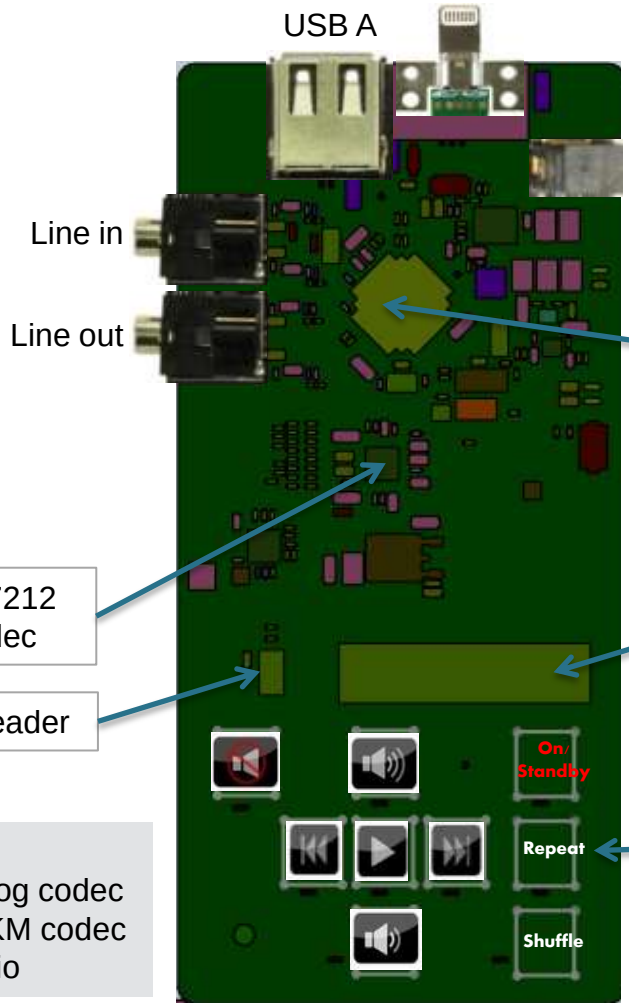


The MFI-KL26-AI provides line level analog audio input and output with basic playback control and charging for iPhone, iPad, and iPod devices with Apple Lightning dock connectors. It may be used as a reference design or basic development system.

- Kinetis KL26 MCU pre-programmed with MFi and Audio Playback control software
- Connectivity;
  - Lighting dock connector
  - USB A receptacle for use with standard USB to Lighting cables
    - Note: Physical design prevents simultaneous use of above dock connector options
  - 3.5mm analog audio line output
  - 3.5mm analog audio line input
  - Barrel receptacle for 6 to 12V power supply
  - Auxiliary header for serial, GPIO and power lines access
  - Debug interface header for use with Kinetis L MCU development tools
- Capacitive touch pads, configured for playback control
- Standard configuration;
  - Analog line audio input and output with Dialog DA7212 audio codec
- Build options;
  - Analog line audio input and output with AKM AK4954A audio codec
  - FM modulated analog audio output with Quintic QN8007B FM transmitter
- Charging current for connected device is limited to 2.4A

MFI-KL26-AI Module



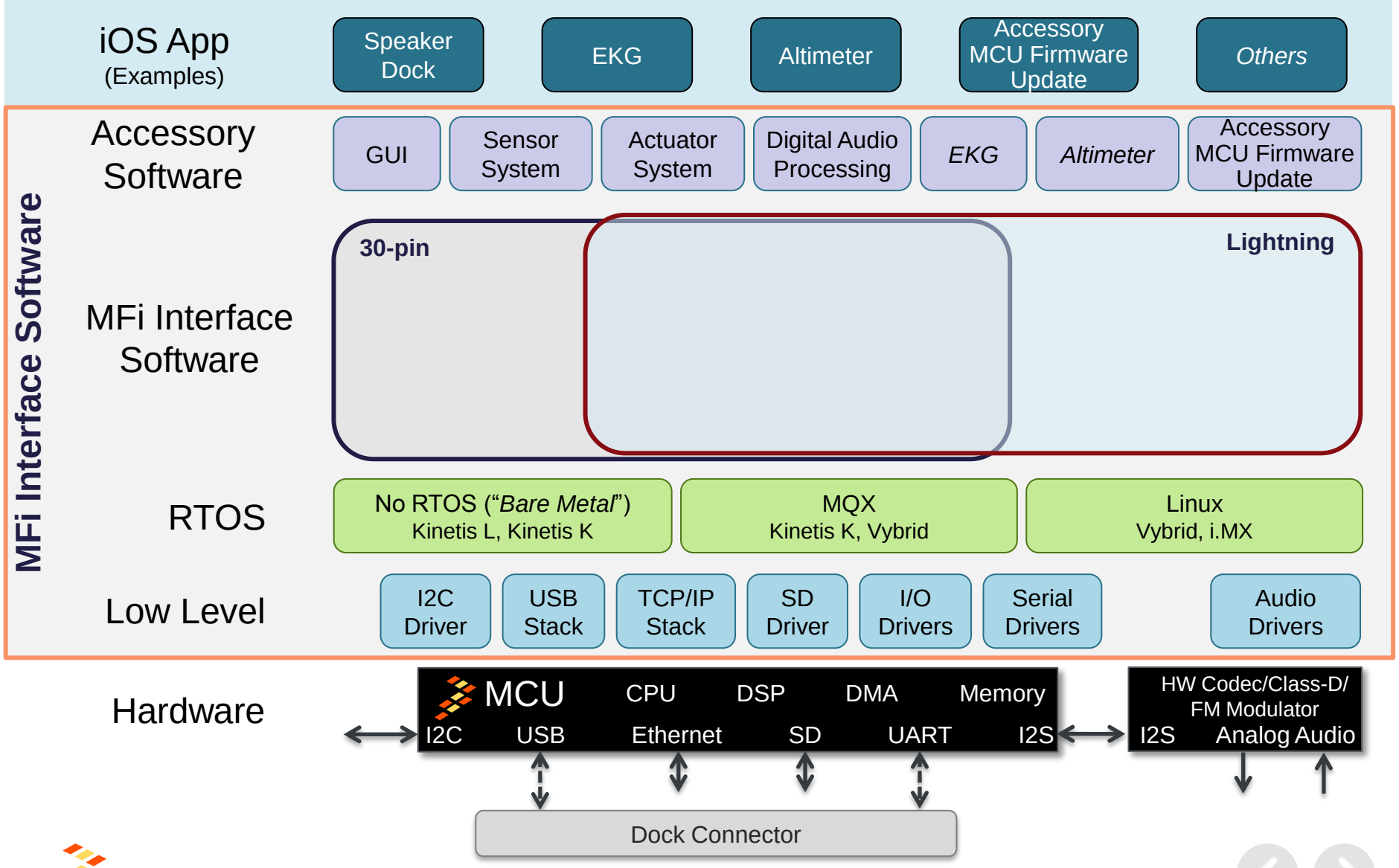


Planned versions:

1. MFI-KL26-AI-DA: Analog line audio with Dialog codec
2. MFI-KL26-AI-AKM: Analog line audio with AKM codec
3. MFI-KL26-AI-FM: FM modulated analog audio

Freescale MFi Solution Software Support

Freescale MFi Software



Freescale MFi Software Memory Requirements

Use Case (Kinetis MCU, no RTOS)	**Approximate Memory Requirement**	
	Flash (KB)	**RAM (KB)**
All MFi Functions and Features	100	17
Digital Audio Playback for Lightning and 30-pin devices	80	16
Digital Audio Playback for Lightning iOS devices	45	14
Non-Audio Accessory using the standard USB to Lightning or 30-pin connector cables	70	11
Non-Audio Accessory using standard USB to Lightning connector cable for iOS devices	40	9
Non-Audio Accessory using built in Lightning and 30-pin dock connectors	45	8
Non-Audio Accessory using built in Lightning dock connector for iOS devices	25	7
Note: The above are approximate typical memory requirements, actual memory needs will vary depending on the actual MFi features and functions selected, compiler and optimization level used, and the size of user configurable buffers		

MFi Solutions Availability Plan

Development	Alpha	Beta	General Availability

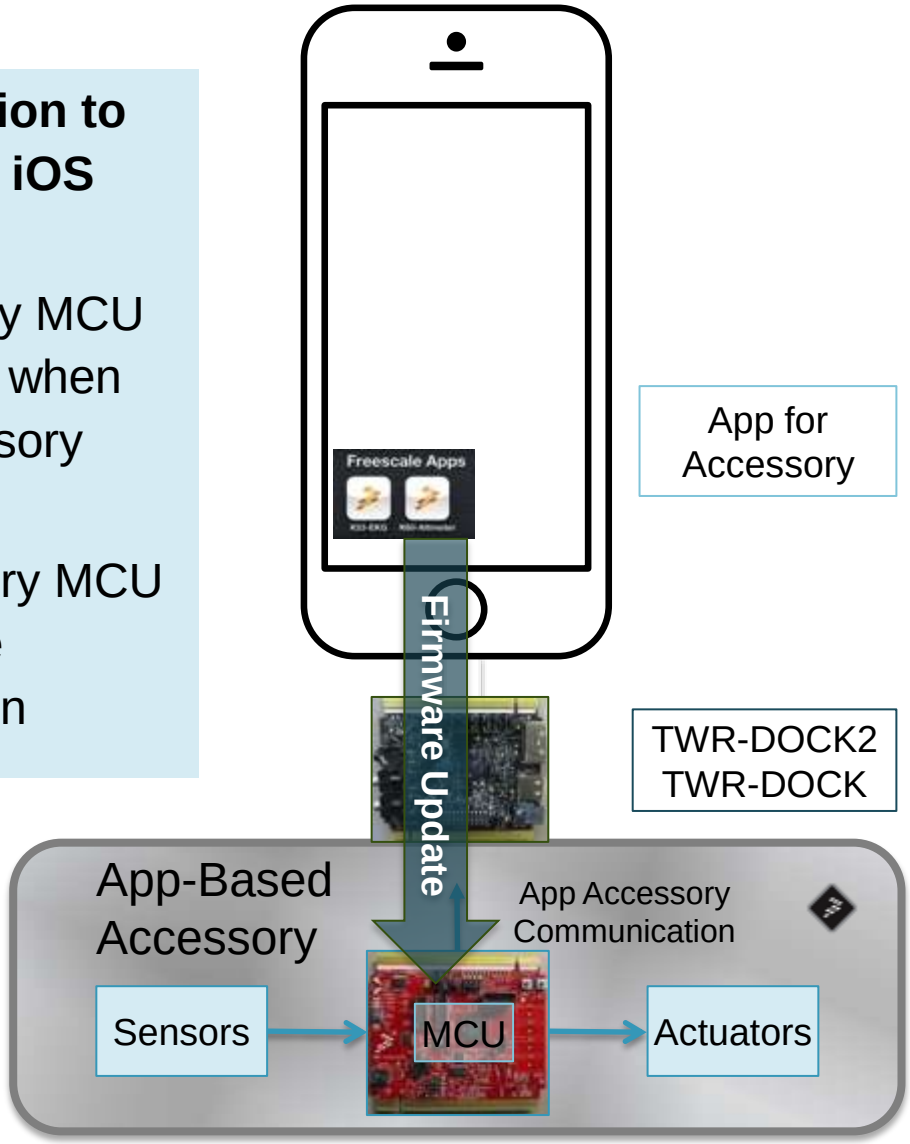
Software Function and OS	MCU/MPU Family (CPU)	Q4-2013	Q1-2014	Q2-2014	Q3-2014	Q4-2014
MFi no OS	Kinetis L	Beta				
	Kinetis K	Beta				
MFi MQX (integrated in FAS)	Kinetis K	Development	Alpha	Alpha	Beta	
	Vybrid (M4)	Development	Alpha	Alpha	Beta	
	Vybrid (A5)	Development	Alpha	Alpha	Beta	
MFi Linux (integrated in FAS)	Vybrid (A5)	Development	Alpha	Alpha	Beta	
	i.MX6	Development	Alpha	Alpha	Beta	

Notes: Subject to change

Accessory Firmware Update

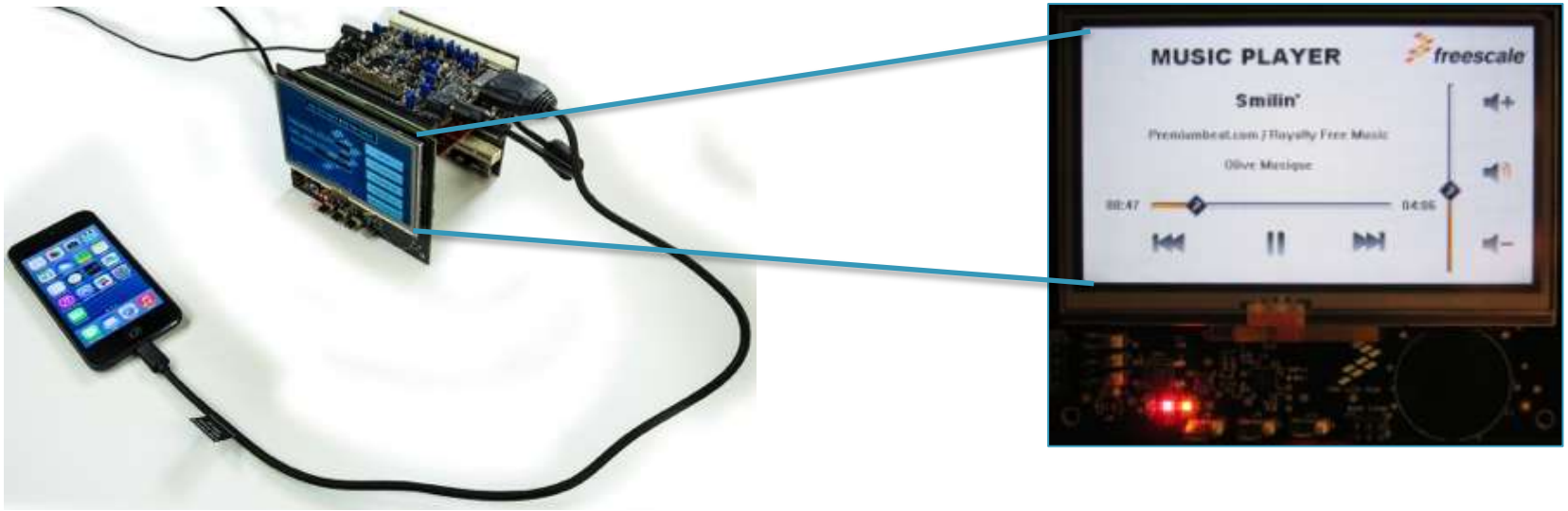
Freescale MFi Software includes a function to update Accessory MCU firmware via the iOS App:

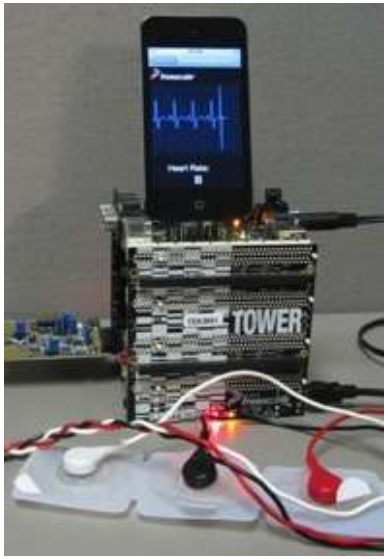
- An App update may include the Accessory MCU firmware update, which will be completed when the iOS device is connected to the Accessory with the App active
- This supports secure method of Accessory MCU firmware updates without the need for the Accessory to include a network connection



Available as Beta now, will be included in next release of Freescale MFi software

Freescale‘s MFi Demo Software





Demos:

- Simple iPod control with digital audio– *Now*
- iPod control functions with GUI and digital audio – *Now*
- Digital audio streaming with optional post processing, and iOS App control – *Planned*
- iOS App based EKG– *Available with Lightning connector*
- iOS App based Altimeter – *Available with Lightning connector*

What other demos would you like?

Devices:

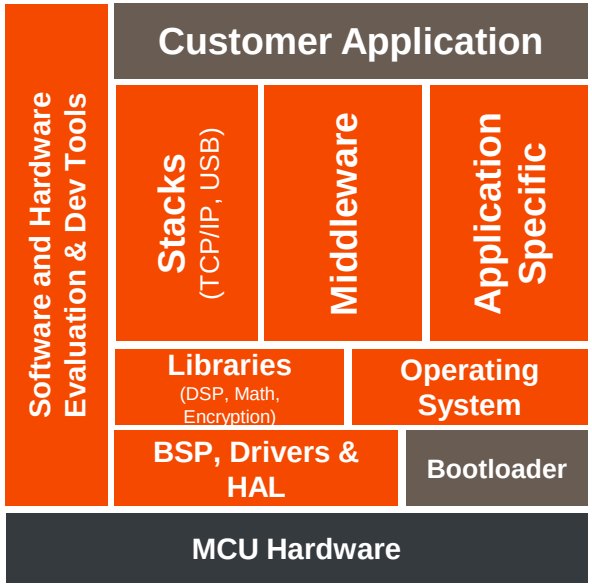
- Tested with all iPhone, iPad, and iPod devices introduced since 2009

Freescale MFi Solution Development Tools

Freescale Processor Expert Software

Create, configure, generate software and drivers for Freescale microcontrollers.

Master complex peripherals with a few mouse clicks, without the need to read thousands of data sheet pages.



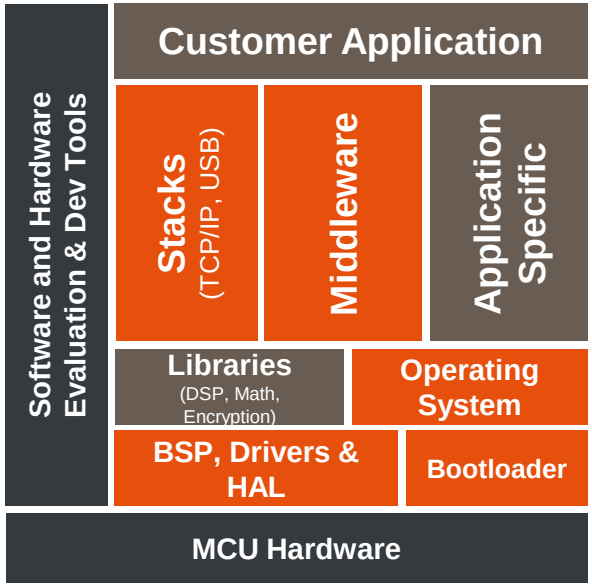
Product Features

- Standalone or Integrated for
  - Eclipse based IDE's
  - Freescale CodeWarrior
  - IAR Embedded Workbench
  - Keil MDK
- Supports Kinetis, S08, S12, S12Z, ColdFire, DSC and Power Architecture with reusable software components
- Knowledge base of pins, registers, muxing, clocks and dependencies
- Initialization and driver code generation with design time consistency checking
- Bare Metal and RTOS drivers
- On-chip and Off-chip Device Drivers
- Middleware and Stacks: RTOS, TSS libraries and communication stacks
- Component Development Environment (CDE) to create and distribute own components

Freescale MQX™ Software Solutions

Commercial-grade MCU software platform at no cost with optional support packages

Enabling the development of connected and intelligent applications of the future



Product Features

- MQX™ Real Time Operating System Kernel
  - Deterministic multi-tasking preemptive scheduler
  - Extensive inter-task synchronization, message passing, and much more
- MQX™ Real Time Communication Suite

  Now with optional IPv6 add-on package
  - Broad networking protocol support (TCP,UDP, ICMP, HTTP, DHCP, FTP, Telnet, …)
  - Fully re-entrant, responsive, designed for embedded systems
- MQX™ File System
  - Embedded FAT file system compatible with FAT-12, FAT-16, or FAT-32 file systems
- MQX™ USB Host/Device Stack
  - USB 1.0/2.0; low-/full-/high-speed
- Board Support Packages
  - Pre-configured MQX Kernel, stacks, and peripheral drivers for Freescale HW

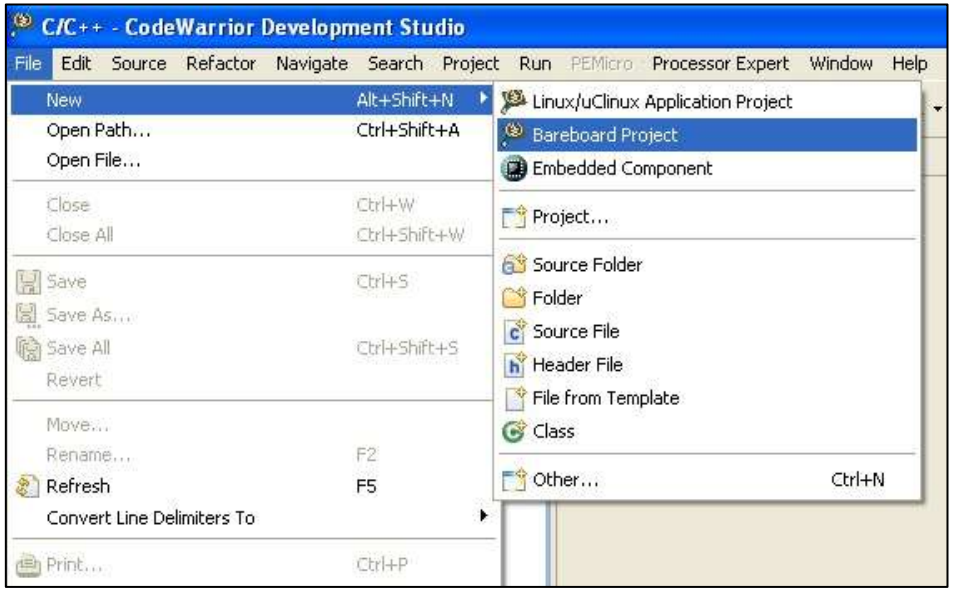
Creating a New MFi Project 1

The Freescale MFi solution is released for the following development suites:

- CodeWarrior
- IAR
- Keil

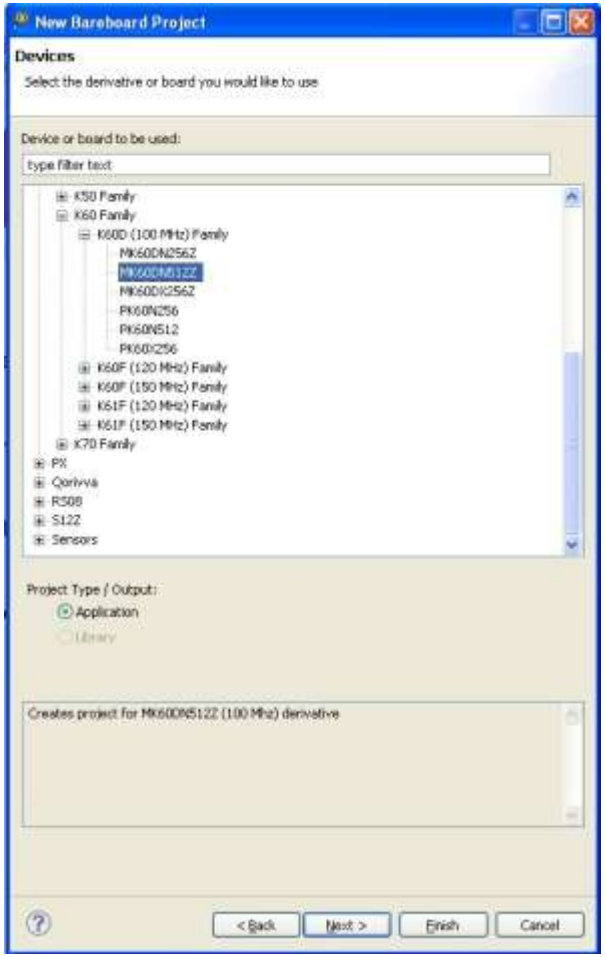
The following examples are based on CodeWarrior (showing selected steps only)

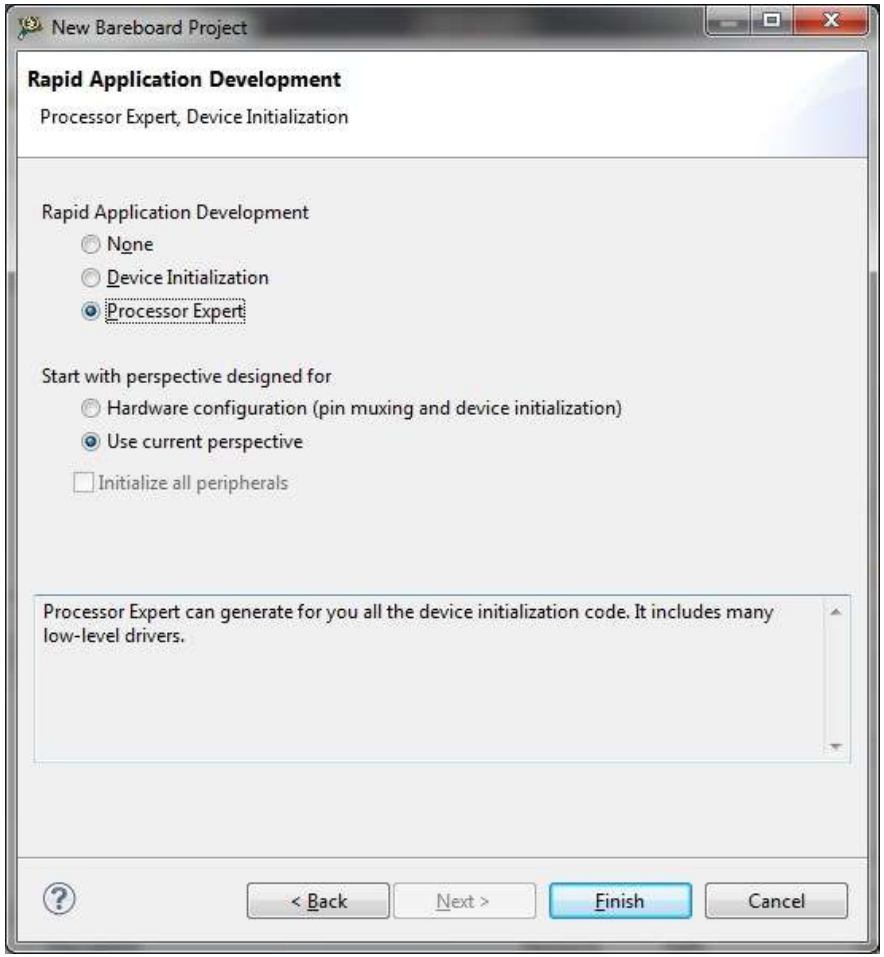
Open CodeWarrior and select the New Project Wizard:



Creating a New MFi Project 2

Select the target MCU device, and the Processor Expert configuration tool:





Creating a New MFi Project 3

CodeWarrior Window after Project Creation:

C/C++ - Kinetis PEx Test/Sources/ProcessorExpert.c - CodeWarrior Development Studio

File Edit Search Project Run MQX Tools Processor Expert Window Help

CodeWarrior Projects

- ProcessorExpert.pe 873 KB Processor Exp
- Project_Headers
- Project_Settings
- RAM
- Sources
  - Events.c 1 KB C Source File
  - Events.h 1 KB C Header File
  - ProcessorExpert.c 2 KB C Source File

Components - Kinetis PEx Test

- Generator_Configurations
  - RAM
  - FLASH
- OSs
- Processors
  - Cpu:MK60DN512VLQ10
  - Cpu:MK60DN512VLQ10
- Components

Commander

- Project Creation: Import project, Import example project, Import MCU executable file, New MCU project
- Build/Debug: Build (All), Clean (All), Debug

Components Library | Component Inspector - Cpu

Properties | Methods | Events | Build options | Resources

Name	Value	Details
CPU type	MK60DN512VLQ10	
Clock settings		
Initialization priority	minimal priority	15
Watchdog disable	yes	
CPU interrupts/resets		
External Bus	Disabled	
Clock configurations	1	

ProcessorExpert.c

```
13 **         No public methods
14 **
15 ** ###################################################################*/
16 /* MODULE ProcessorExpert */
17
18
19 /* Including needed modules to compile this module/procedure */
20 #include "Cpu.h"
21 #include "Events.h"
22 /* Including shared modules, which are used for whole project */
23 #include "PE_Types.h"
24 #include "PE_Error.h"
```

Outline

- C:\Users\r80267\Documents\EmbeddedSW
- Cpu.h
- Events.h
- PE_Types.h
- PE_Error.h
- PE_Const.h
- IO_Map.h
- main(void) : int

Problems | Console

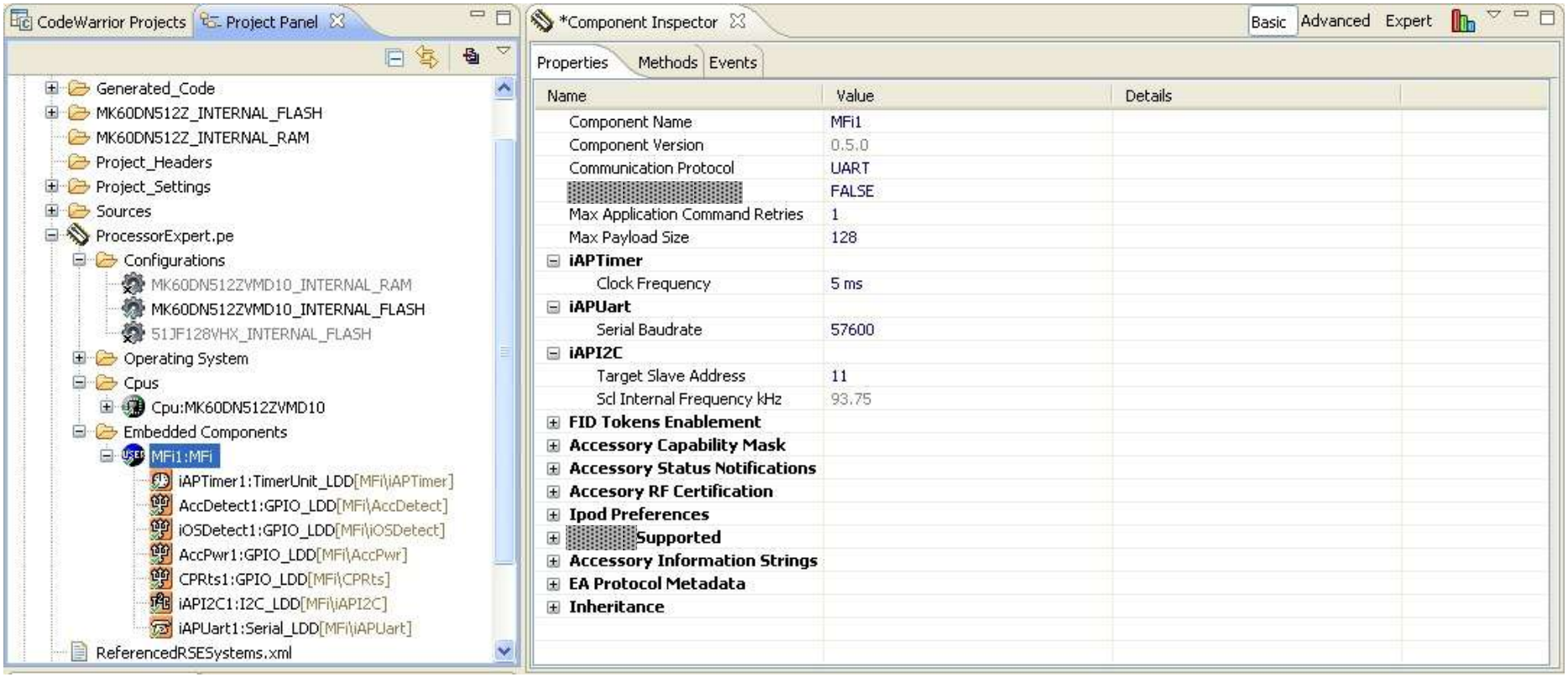
0 items

Description	Resource	Path	Location	Type

Writable | Smart Insert | 7 : 32

Creating a New MFi Project 4

Project Panel and Component Inspector windows:



Creating a New MFi Project 5

MFi Component Inspector window:

Components Library | *Component Inspector - MFi1 | Components - MFI_iap2

Properties | Methods | Events

Name	Value	Details
Component Name	MFi1	
Component Version	0.6.0 PreBeta Integration 04	
iPod Accessory Protocol selection		
Accessory Communication Protocol	UART	
iPod iPhone and iPad Device	FALSE	
iAPTimer		
Clock Frequency	5 ms	
iAPUart		
Serial Baudrate	57600	
iAPI2C		
Target Slave Address	11	
Scl Internal Frequency kHz	75.0	
Accessory Information		
Vendor ID	0000 H	
Product ID	0000 H	
Accessory Name	Accessory Name	
Accessory Manufacturer	Accessory Manufacturer	
Accessory Model	Accessory Model	
Accessory Serial Number	000001	
Firmware version		
Firmware Major	00 H	
Firmware Minor	06 H	
Firmware Revision	00 H	
Hardware version		
Hardware Major	00 H	
Hardware Minor	00 H	
Hardware Revision	00 H	
External Application Info		
Preferred App Bundle Seed Identifier		
External Accessory Protocol	1	
Power options		
Power Source Type	None	
Maximum Current Drawn from Device in mA	10 D	

Creating a New MFi Project 6

MFi interface software, and Digital Audio configuration:

Component Inspector

Properties | Methods | Events

Name	Value	Details
Component Name	MFi1	
Component Version	0.6.0 PreBeta Integration 04	
iPod Accessory Protocol selection		
Accessory Communication Protocol	USB	iPod, iPhone
iPod iPhone and iPad Device	FALSE	
iAPTimer		
iAPUart		
iAPI2C		
Digital Audio Configuration		
Audio Buffer Size	1 Kbyte	Buffer can st
Digital Audio Sampling Rates Enablers	yes	
Digital Sample Rate 32kHz	FALSE	
Digital Sample Rate 44_1kHz	TRUE	
Digital Sample Rate 48kHz	TRUE	
Codec Support	SGTL5000	
Sample Size	16 bits	
SGTL5000 Configuration	yes	
SGTL5000 Slave Address	0A	
System Master Clock	24.576	MHz
Digital Audio type selection	Synchronous	
Sample Rate Compensator usage	no	
I2S bus configuration		
I2S mode selection	I2S slave	
I2S alligment selection	Left justified	
GPIO usage		
SGTL5000 I2C address pin	no	
Coprocessor I2C address pin	yes	

Component Inspector - MFi1 | Components Library

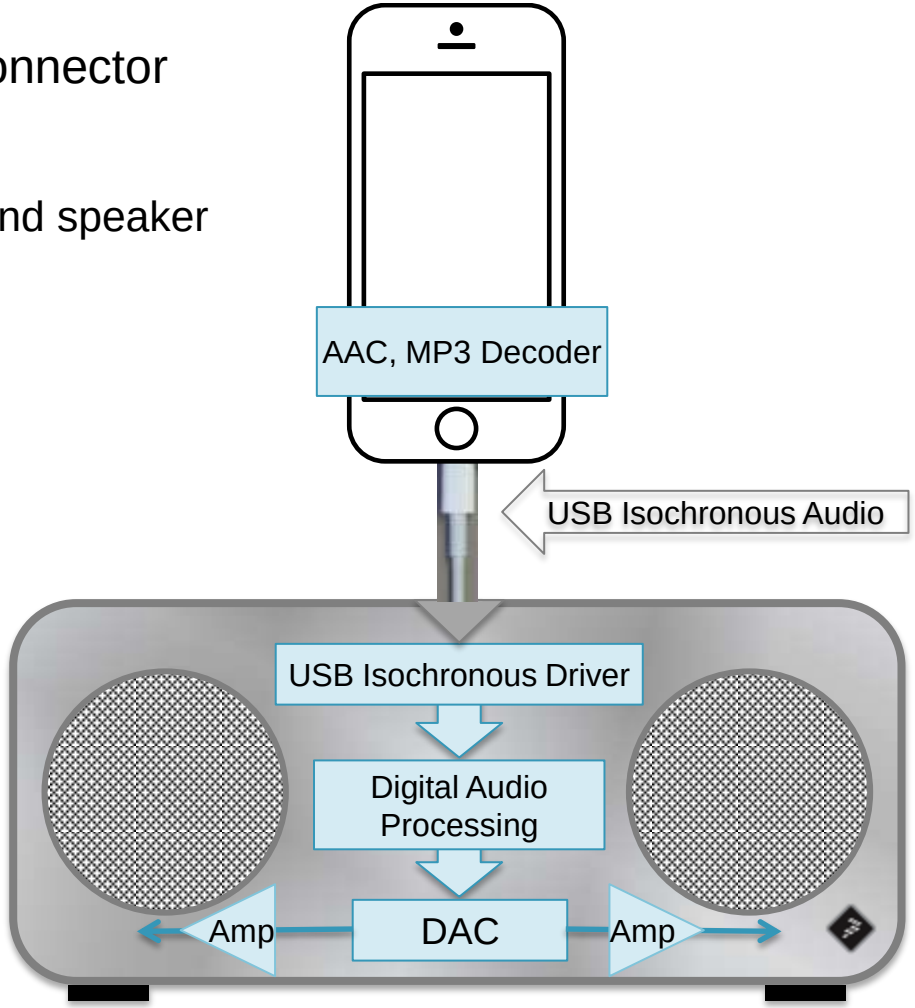
Properties | Methods | Events

Name	Value
Component Name	MFi1
Component Version	0.6.0 PreBeta 05
iPod Accessory Protocol selection	
Accessory Communication Protocol	USB
iPod iPhone and iPad Device Authentication	FALSE
Digital Audio Usage	no
iAPTimer	
Clock Frequency	5 ms
iAPUart	
Serial Baudrate	57600
iAPI2C	
Target Slave Address	11
Scl Internal Frequency kHz	75.0
Accessory Information	
enabler	TRUE
Identification Information	
Current Language	English
Supported Languages	1
Transport Component	USB Host Component
Human Interface Device Component usage	TRUE
Feature Support	
Accessory	TRUE
Accessory	TRUE
Comm with iOS App	FALSE
Assistive Touch	FALSE
External Accessory Protocol	FALSE
Device	FALSE
Bluetooth Pairing and Connection Status	FALSE
Human Interface Device	TRUE
Location	FALSE
Media Library Access	FALSE
Now Playing	TRUE
Power	FALSE
USB Device Mode Audio	FALSE
Voice Over	FALSE
	FALSE
Digital Audio Configuration	

Freescale MFi Solution Application Examples and Demos

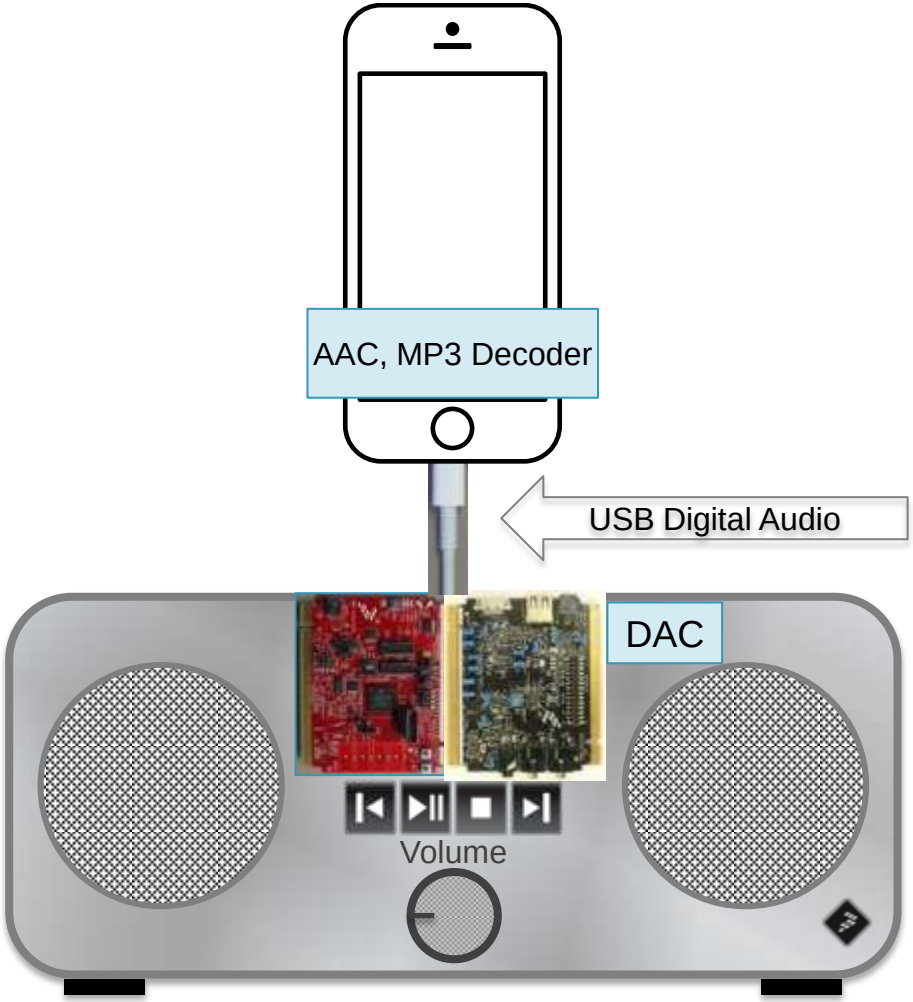
Fully Digital Speaker Dock

- Required with all devices with Lightning connector
- Best potential audio quality
  - Depends only on quality of source material and speaker dock implementation
- Easy to add digital audio processing



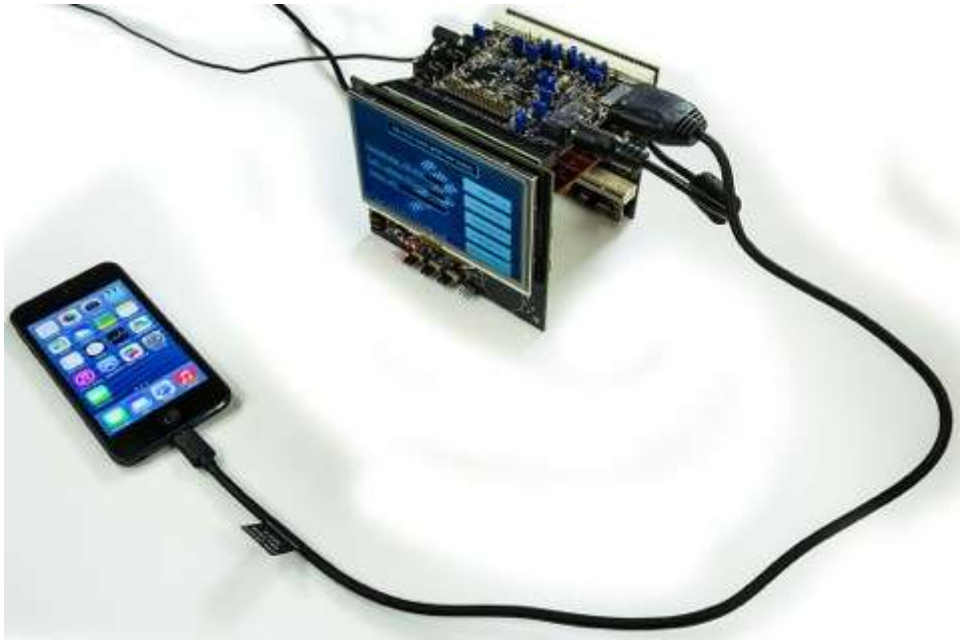
Demo example: Simple Speaker Dock

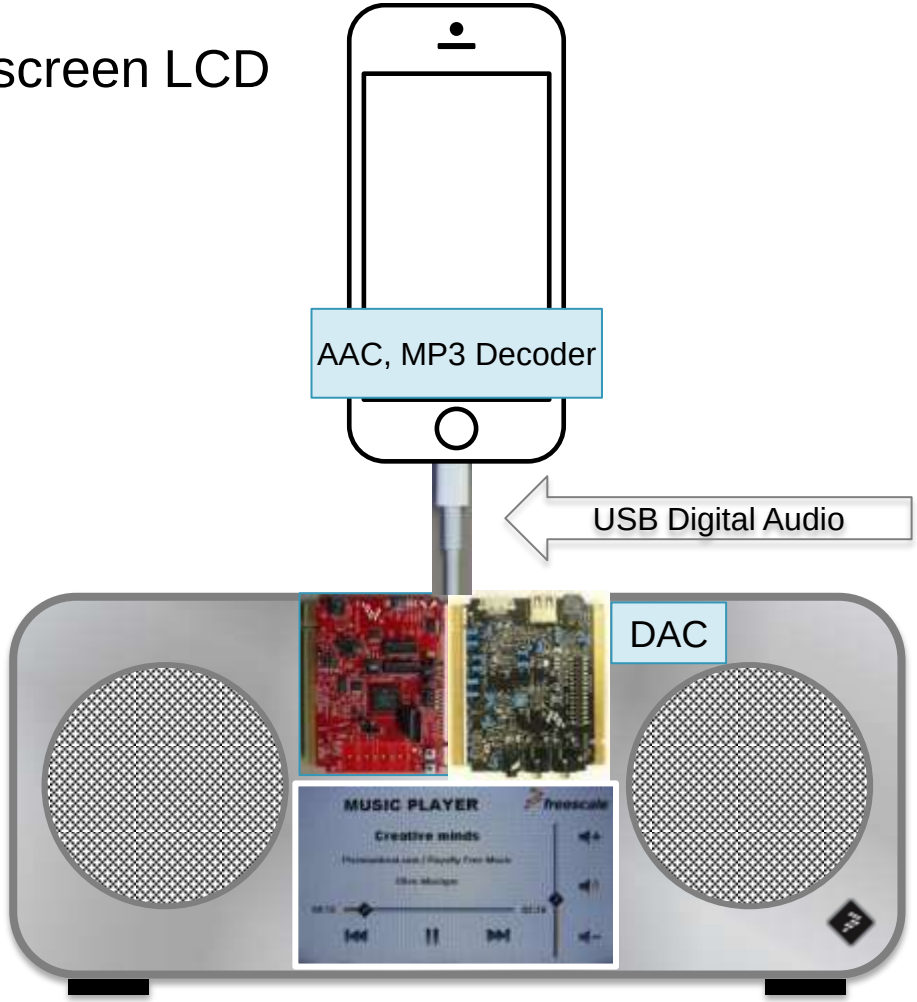
- Simple playback control
- USB digital audio streaming, or
  - Optional analog audio line output
- Optional digital audio processing



Demo example: GUI Speaker Dock

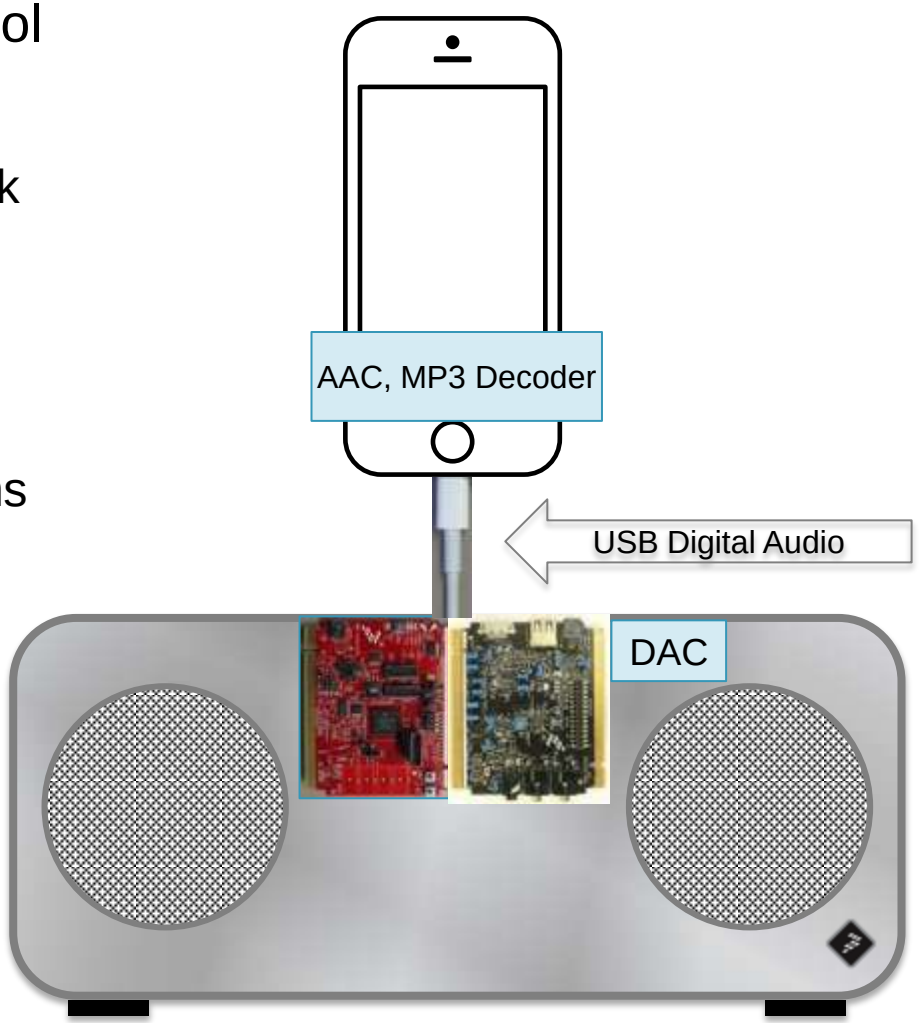
- Playback and audio control via touchscreen LCD
- USB digital audio streaming, or
  - Optional analog audio line output
- Optional digital audio processing





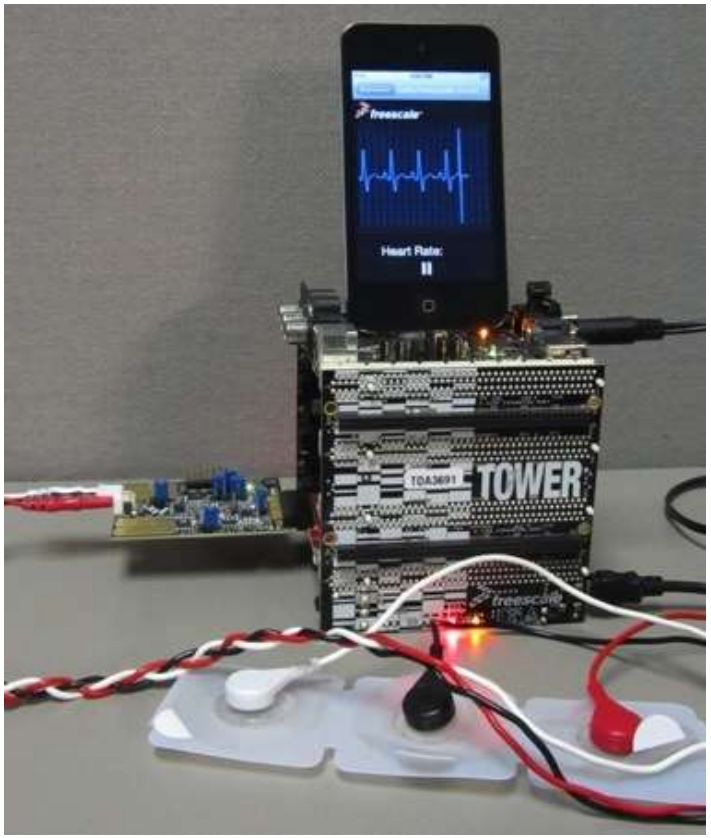
App-Based Speaker Dock

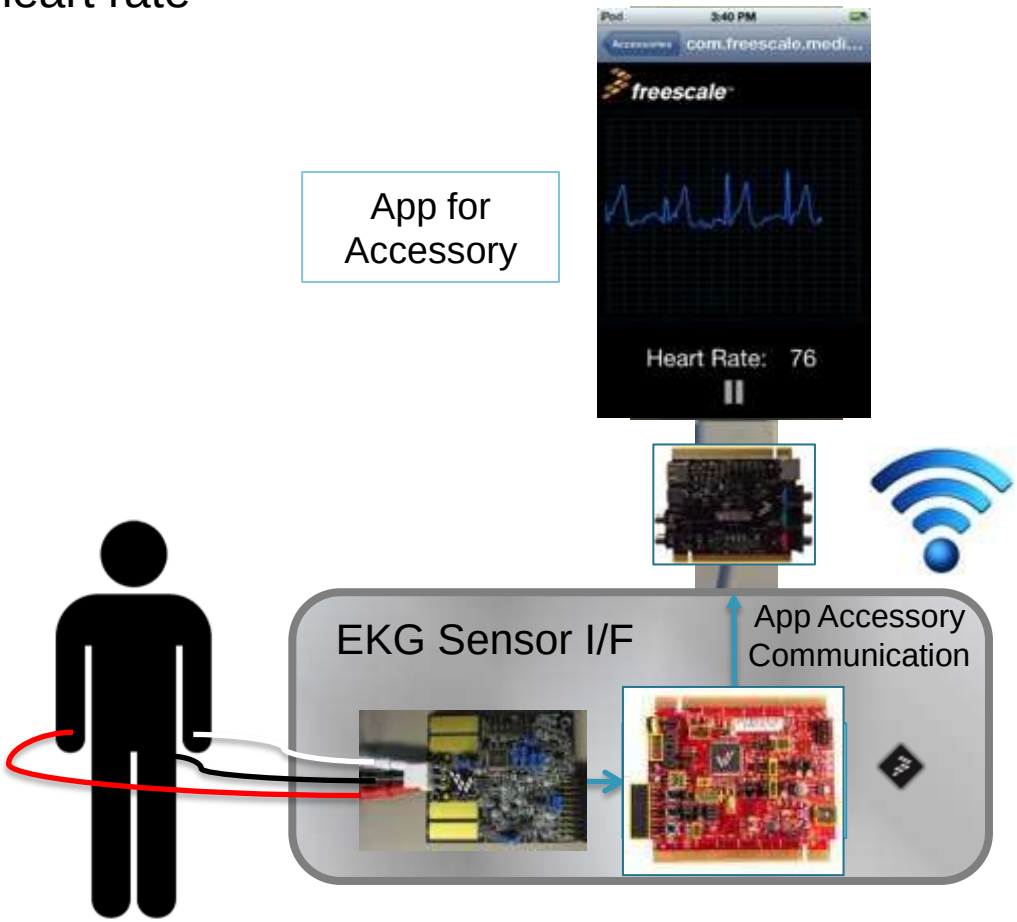
- Uses smartphone based App to control the speaker dock
  - Saves on separate GUI on speaker dock
  - Limited to smartphone or devices that support App-Based Accessories (such as iOS devices)
  - Possible with multiple connection options



Demo example: EKG - Electrocardiogram

- Kinetis K53 with EKG sensor module
- iOS App to display EKG graph and heart rate



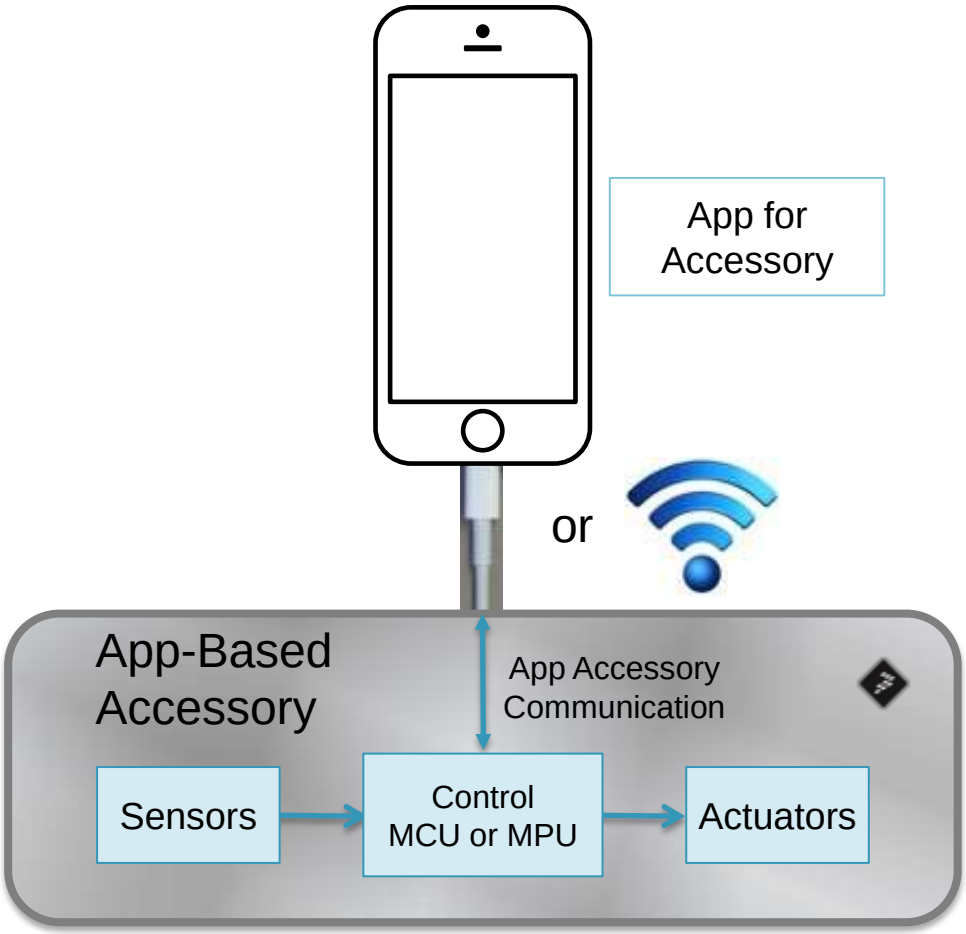


Demo example: Altimeter

- Air pressure based altimeter
  - High sensitivity: ~ 30 cm (12”)
- Ambient air temperature

Anatomy Of An App-Based Accessory

- **App provides**
  - User interface
  - Network or Remote access
  - Optional additional processing
- **Accessory provides**
  - Additional sensors
    - E.g. Pressure, Chemical (e.g. Glucose), Level, Light, Voltage, Current
  - Actuators as needed
    - E.g. Motors, Switches, Valves, Lights
  - Local control and processing
    - May be very low power and independent of device
  - Optionally, power for device



Freescale MCU MFi Accessory Demos

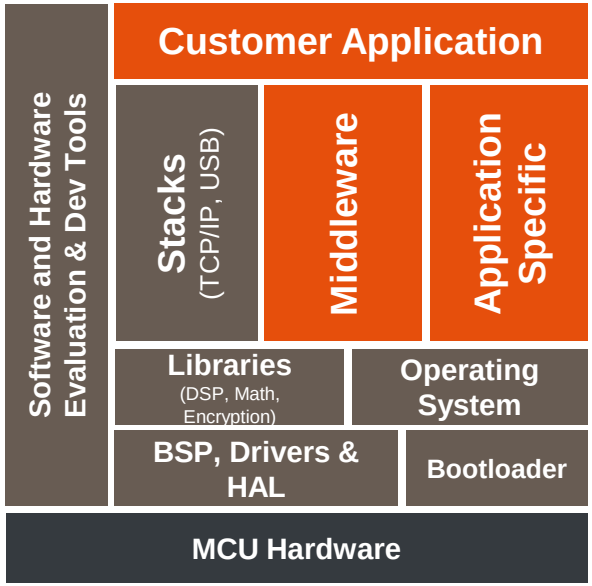
Demo	Application Area	Target MCU/ key Tower Module	iOS App Required	Connectivity	Availability
MFi Simple Remote	MFi Audio	K40X256 TWR-DOCK	No	UART	Available
MFi GUI Remote	MFi Audio	K60D100M TWR-DOCK	No	UART	Available
MFi Altimeter	MFi Sports	K60D100M TWR-DOCK(2)	iOS	USB	Available
MFi EKG	MFi Medical	K53N512 TWR-DOCK(2)	iOS	UART	Available
Tweet Jukebox	MFi Audio	Vybrid TWR-DOCK	No	UART	Available
iPod Simple Control with Digital Audio	MFi Audio	KL46 TWR-DOCK2	No	USB	Available
iPod GUI Control with Digital Audio	MFi Audio	K70F120M TWR-DOCK2	No	USB	Available
iOS App Controlled Speaker Dock	MFi Audio	K60D100M TWR-DOCK2	iOS	USB	In Development

Freescale Audio Solution Support and Services

Freescale Audio Solutions Framework

Integrated framework with consistent API to enable rapid development of audio software

Implements industry standard audio decoders, encoders, audio post processing libraries, and connectivity

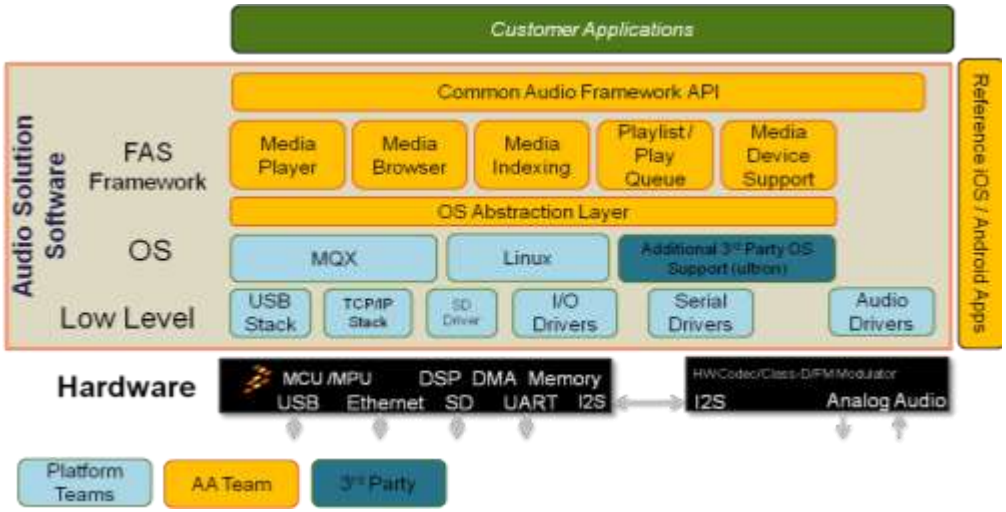


Product Features

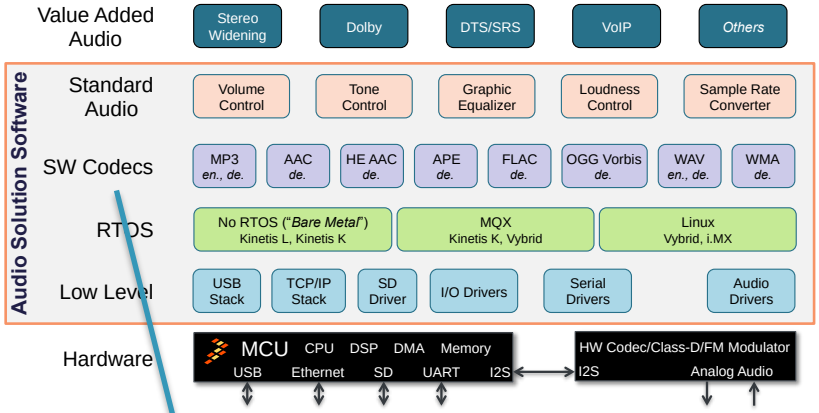
- A highly configurable and integrated audio solution
- An integrated solution based on industry standard audio decoders, encoders, audio post processing libraries, and popular consumer electronics connectivity
- Architected to meet the needs of low-end to high-end solutions with consistent implementation across all ARM based microcontroller product lines

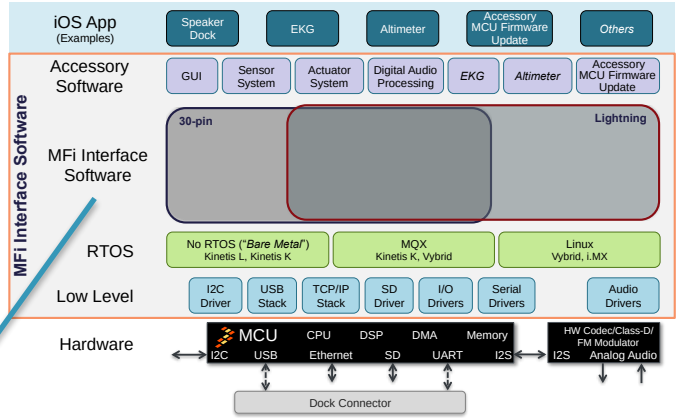
Freescale Audio Solution (FAS) Framework

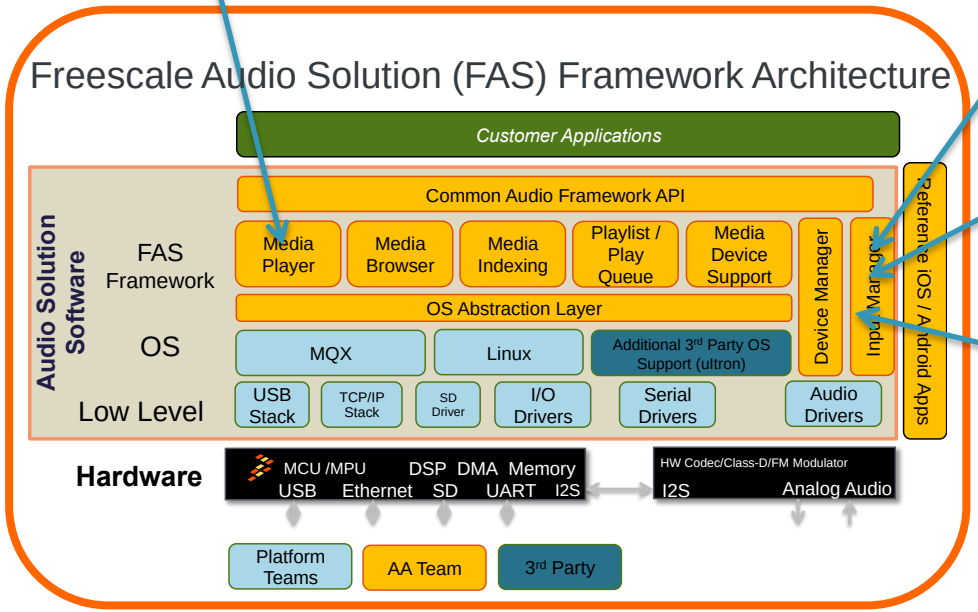
- Freescale Audio Solution (FAS) Framework is being developed for Kinetis, Vybrid, and i.MX processors
- The framework includes functional blocks to deliver media player functionality:
  - Multimedia Framework with Radio Tuner and CD Support.
  - CE Device Connectivity supporting MFi, USB, SD and AOAP
  - External device management and control.
  - Input management and control for touch screen, buttons and knobs.
  - HMI Framework
  - Bluetooth Stack and Profiles with AEC/NS (HFP, A2DP, AVRCP)
- Using an OS Abstraction provides platform support on MQX and Linux* and can be modified to work with any modern operating system



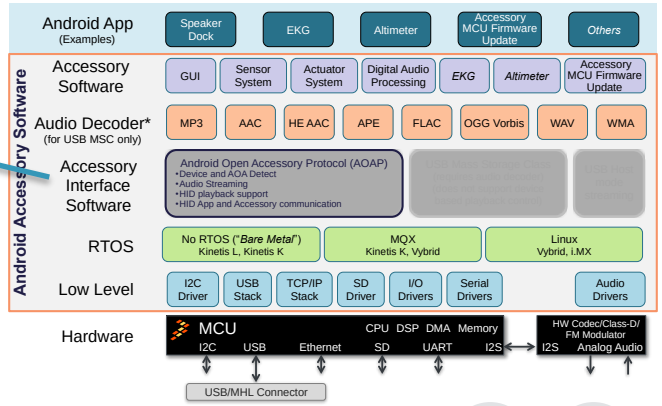
AA Solutions Framework and Components



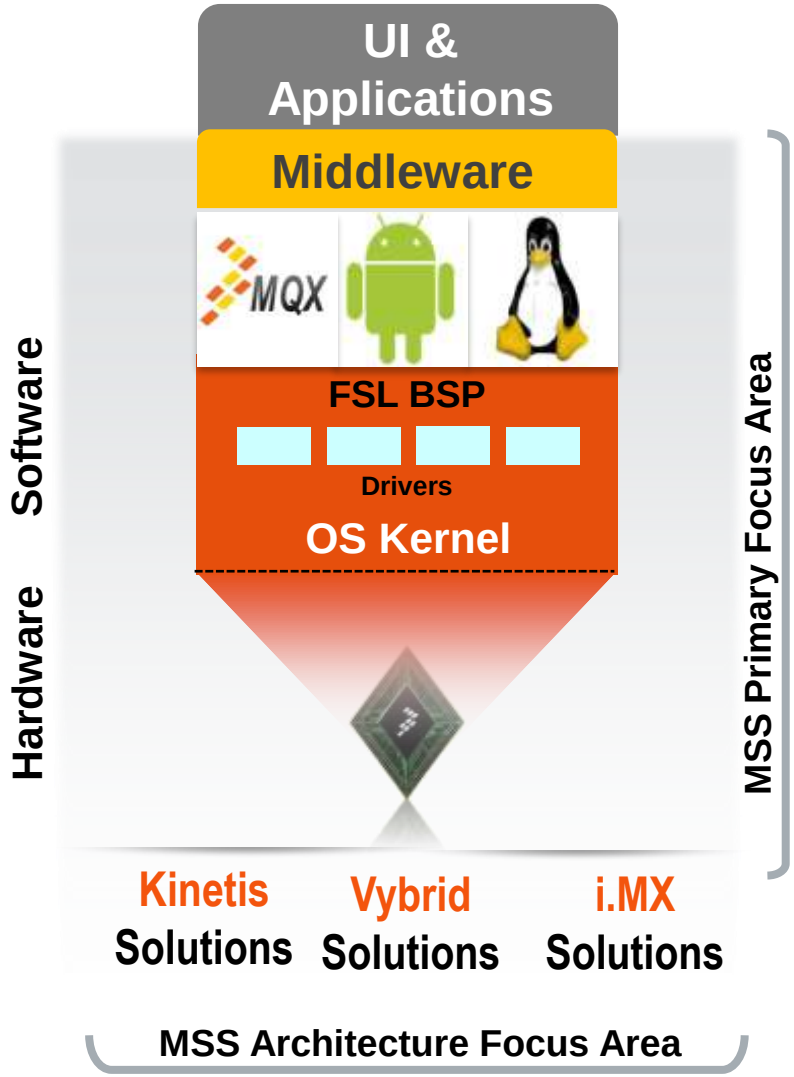




Other



Professional Services Focus



Software Services

- Linux, Android, MQX BSP's, **Audio Framework**
  - Customization
  - Integration
  - Development
  - Porting
  - Testing
  - Optimization
  - Issue analysis, Debug & Fix
- Long-term support on Customer Board

Hardware Services

- Schematic and layout optimization & review
- Simulation
- On-site board bring-up

Services Development Methodologies & Quality: Engineering Discipline

define

- Requirements Gathering
- Project Assessments
- IP Selection

design

- Design Consulting
- System Consulting
- Architecture

develop

- Custom Development
- Porting / Migration
- Integration

integration and test

- Testing
- Documentation
- Performance Testing
- Performance Optimization

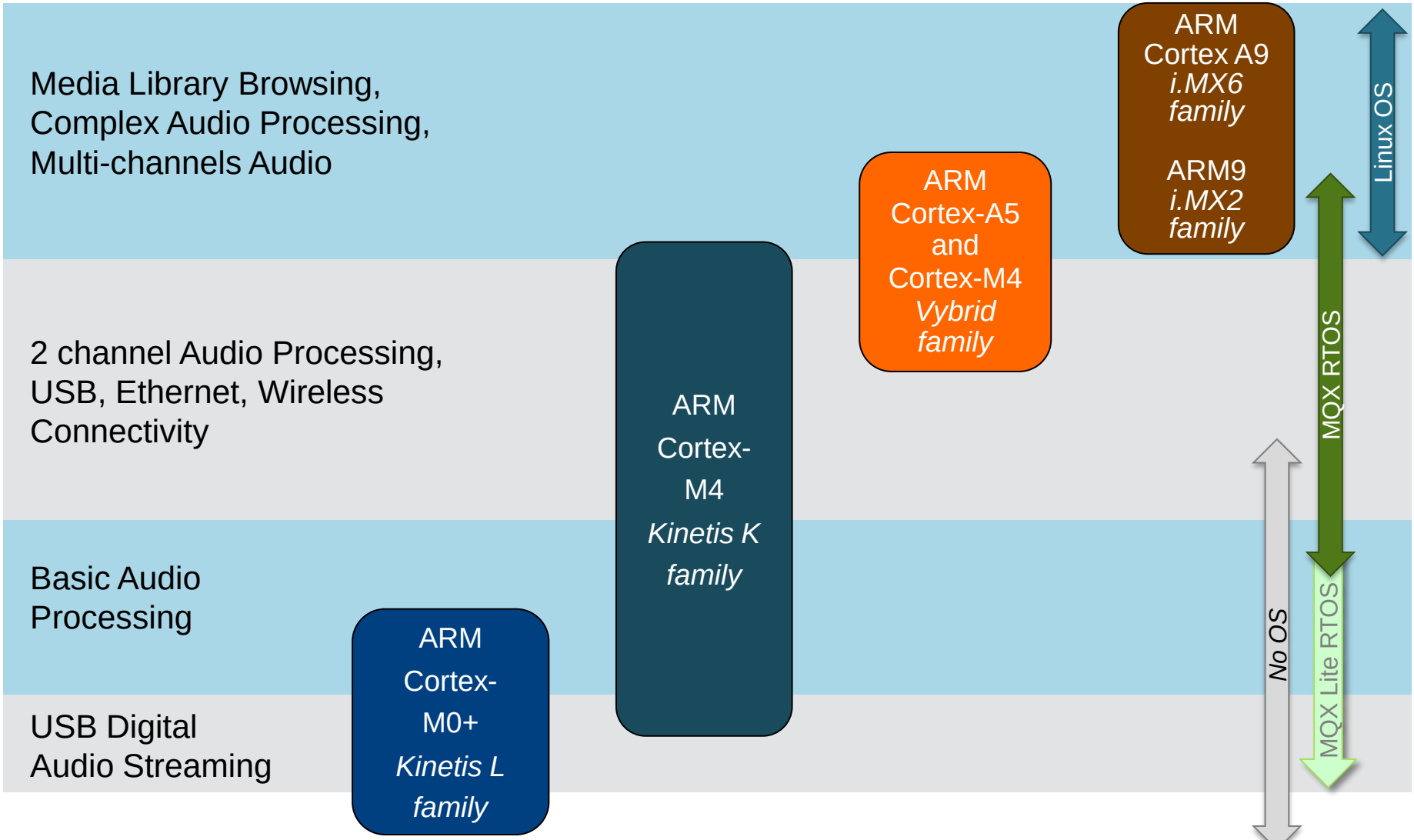
deploy

- Knowledge Transfer
- Project Specific Support (3rd Level)
- Maintenance
- Performance Tuning

Quality Assurance (ISO, CMMI & SPICE Level III)

Processor Families Supported by MFi Solution

Accessories and Digital Audio MCUs and MPUs



Summary

- The Freescale Audio Solution (FAS) and Framework are designed for a wide range of stereo and mono audio applications
  - Kinetis K, Vybrid and i.MX for audio processing, Kinetis L for streaming only applications
- Freescale MFi software solution and TWR-DOCK2 support Made For iPod (MFi) Accessories and App-Based Accessories development

Q & A

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