



32-bit Controller Solutions

Vybrid VF3xx Family

Single-chip solution with dual XiP Quad SPI, dual Ethernet and L2 switch

Typical Applications

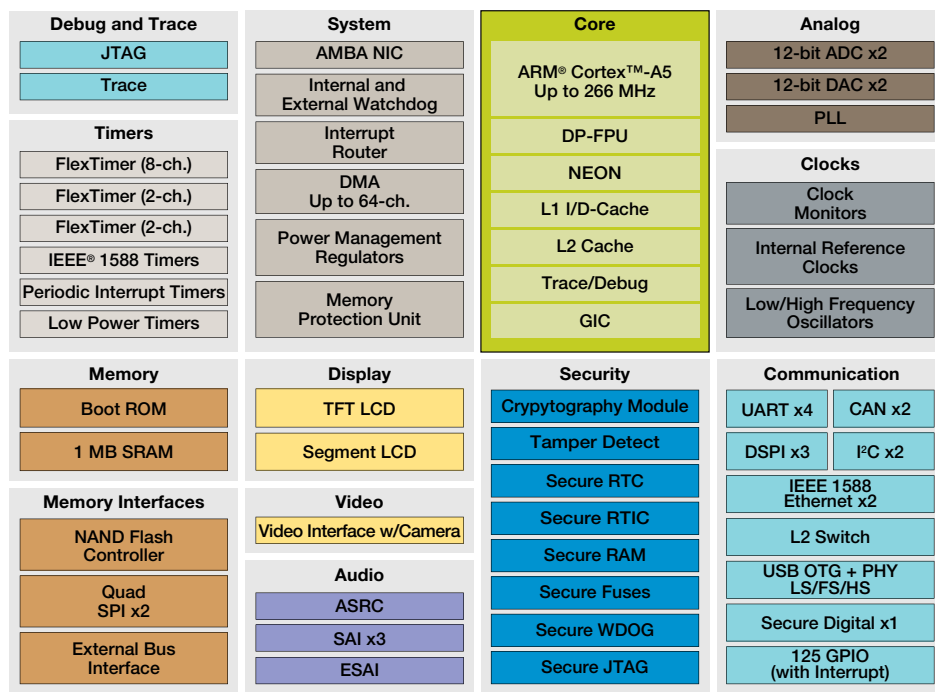
- Building/home automation
- Industrial automation
- Medical
 - Patient monitors
 - Portable medical devices such as monitors, ventilators and respirators
- Appliances
- Point-of-sale

Overview

The Vybrid VF3xx family features an ARM® Cortex™-A5 core, up to 1.5 MB of on-chip SRAM, dual Quad SPI and a rich suite of communication, connectivity and human-machine interfaces, eliminating the need for DDR memory when using a light-weight OS for an efficient single-chip solution.

The Vybrid VF3xx family features USB 2.0 (Low-, Full- and High-Speed) device/host/OTG controllers with integrated PHYs, dual 10/100 Ethernet MAC with Layer2 Ethernet switch, IEEE® 1588 hardware time stamping and reduced media independent interface. Multiple serial interfaces include UARTs with support for ISO7816 SIM/smart cards, SPI and I²C and dual CAN modules.

Vybrid VF3xx Block Diagram



Vybrid VF3xx devices can interface to a variety of external peripherals and memories for system expansion and data storage. Dual Quad SPI interfaces with Execute-in-Place (XiP), secure digital host controller and NAND flash support allow the connection to a wide variety of memory types for critical applications.

The Vybrid VF3xx family offers a variety of multimedia options for rich applications. Audio interfaces include synchronous audio interface for full-duplex audio transfer and enhanced serial audio interface for interfacing with SPDIF transceivers. Display controller units interface with TFT LCD displays for resolutions up to WVGA while a video interface unit provides image and vision capture.

Vybrid VF3xx devices include a variety of data integrity and security hardware features for

safeguarding memory, communication and system data. A cyclic redundancy check module is available for validating memory contents and communication data. An optional hardware encryption unit supports several encryption and hashing algorithms for program validation as well as authentication and securing data for transfer and storage. The optional tamper detection system includes integrated sensors for voltage, frequency and temperature, and external sensing for physical attack detection.

One-Stop Enablement Offering: MPU + IDE + OS

- Freescale Tower System hardware development environment
- Integrated development environments
 - Reference Linux® BSP
- Full ARM ecosystem
 - Reference MQX™ BSP
 - ARM DS5 MDK
 - CodeWarrior V10.x (Eclipse) IDE with Processor Expert software modeling tool
 - Math and encryption libraries
 - Media framework
 - Complimentary bootloaders (USB, Ethernet, RF, serial)
 - Complimentary Freescale embedded GUI software driver for graphics LCD panels
 - Complimentary Freescale MQX RTOS
 - Cost-effective Nano™ SSL/Nano™ SSH for Freescale MQX RTOS

Features and Benefits

	Feature	Application Benefit
Core and System	ARM® Cortex™-A5	Power-efficient applications processor with full ARM Cortex application compatibility
	NEON media processing engine	Advanced SIMD instruction set for acceleration of media and signal processing functions
	Double precision floating point with IEEE® 754 compliance	Algorithm acceleration and improved signal processing
	Level 1 and 2 caches	Increased code throughput and reduced processor stalls
	TrustZone technology	Ensures reliable implementation of security applications ranging from digital rights management to electronic payment
	64-bit AXI bus	Increases concurrent data transfer capabilities from several bus masters
	Up to 64-channel DMA	Peripheral and memory servicing with reduced CPU loading
	Address space controllers	Provides memory protection for all cross bar switch masters, increasing software reliability
Memory and Memory Interfaces	Up to 1.5 MB of on-chip SRAM with ECC	High reliability, fast access non-blocking RAM
	FlexBus external bus interface	Enables the connection of external memories and peripherals (e.g. graphics displays)
	NAND flash controller	Supports up to 32-bit ECC current and future NAND types with minimal software overhead
	Secure digital controller	For in-application software upgrades, media files or adding Wi-Fi® support
	Dual Quad SPI with eExecute-in-Place (XiP)	Lower BOM cost and ideal for applications that do not need DDR memory and can execute code right out of flash
Communications Interface	USB On-The-Go (High-, Full- and Low-Speed) with integrated PHY	High-speed I/O required for demanding diagnosis and monitoring tasks including dynamic machine condition, plug-and-play ease for monitoring human-machine interfaces (HMI) or connect to industrial compute. Lower BOM cost with integrated PHY
	10/100 Ethernet MAC with IEEE 1588 hardware time stamping and Layer 2 switch	Precision clock synchronization for real-time, networked industrial automation, control and Ethernet daisy chaining
	Serial interfaces	Multiple communication interfaces for simple and efficient data exchange, industrial network bridging and audio system interfacing. Variety of data size, format and transmission/reception settings supported for multiple industrial communication protocols
	CAN	Enable industrial network bridging by connecting to sensors, actuators and control devices
Security	Hardware encryption accelerator	Secure data transfer and storage. Faster than software implementations with minimal CPU loading. Supports a wide variety of algorithms: DES, 3DES, AES, MD5, SHA-1, SHA-256
	Hardware tamper detection	Secure real-time clock with independent battery supply and secure key storage with internal/external tamper detect for temperature/clock/supply voltage variations and physical attack
	High assurance boot	Supports encrypted boot with code signing, peripheral access policy control and public key infrastructure RSA 2048/ECC-512
	Hardware cyclic redundancy check engine	Validates memory contents and communication data, increasing system reliability
	Independent-clocked COP, external watchdog monitor	Prevents code runaway in fail-safe applications. Drives output pin to safe state external components if watchdog event occurs
HMI	Display controller	Support for up to WQVGA with no external DRAM
	Video interface unit	24-bit parallel interface for image and vision capture
Audio	Synchronous audio interface	Supports full-duplex serial interfaces with frame synchronization, such as I ² S, AC97 and CODEC/DSP interfaces
	Enhanced serial audio interface	Full-duplex serial port for communication with a variety of serial audio devices, including industry-standard codecs, SPDIF transceivers and other processors
	Asynchronous sample rate converter	Sample rate conversion between input and output

For more information, visit freescale.com/Vybrid



Freescale, the Freescale logo and CodeWarrior are trademarks of Freescale Semiconductor, Inc., Reg. U.S. Pat. & Tm. Off. Processor Expert, Vybrid and Xtrinsic are trademarks of Freescale Semiconductor, Inc. ARM is the registered trademark of ARM Limited. ARM Cortex-A5 and ARM Cortex-M4 are trademarks of ARM Limited. All other product or service names are the property of their respective owners. © 2012 Freescale Semiconductor, Inc.

Document Number: VYBRIDVF3FS REV 1