



32-bit Controller Solutions

Vybrid VF6xx Family

Dual heterogeneous core solution with XGA display, dual USB, dual Ethernet and L2 switch

Typical Applications

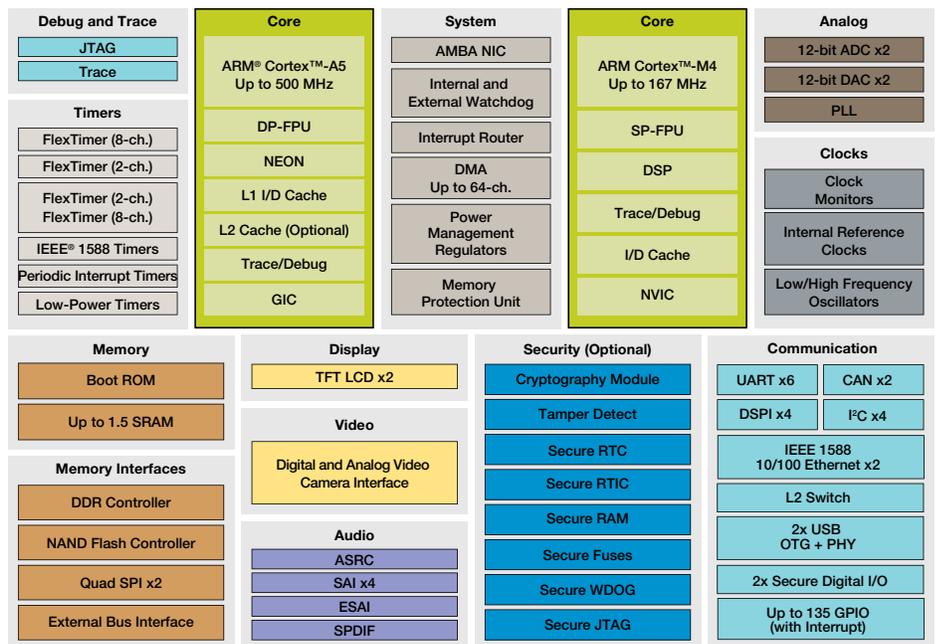
- Appliances with motors and pumps
- Building control
 - Elevator and automated doors
- Energy grid protection
 - Circuit breakers, monitors and hubs
- Industrial pumps and fans
- Infrastructure control
 - Water treatment and gas pipelines
- Kiosks with 2D displays
- Mobile patient care
 - Infusion pumps and respirators
- Motor drives
- Power inverters
- Service robots

Overview

The Vybrid VF6xx family features a heterogeneous dual-core solution that combines the ARM® Cortex™-A5 and Cortex™-M4 cores. The family also features dual USB 2.0 OTG controllers with integrated PHY, dual 10/100 Ethernet controllers with L2 switch, up to 1.5 MB of on-chip SRAM and a rich suite of communication, connectivity and human-machine interfaces (HMI). In addition, anti-clone, anti-tamper, secure boot and advanced encryption hardware deliver the highest level of security and accuracy. The VF6xx family is pin and software compatible with the VF5xx family.

Vybrid VF6xx devices include multiple serial interfaces, such as UARTs with support for ISO7816 SIM/smart cards, SPI and I²C and dual CAN modules. VF6xx devices can interface to a variety of external peripherals and memories for system expansion and data storage.

Vybrid VF6xx Block Diagram



Dual quad SPI interfaces with execute in place (XIP), dual secure digital host controller, NAND flash and DRAM controllers with ECC support allow connection to a wide variety of memory types for critical applications.

Vybrid VF6xx devices offer a host of multimedia options for rich applications with real-time control. Audio interfaces include synchronous audio interface for full-duplex audio transfer enhanced serial audio interface for interfacing with the Sony/Philips Digital Interface for digital audio support. Display controller units interface with TFT LCD displays for resolutions up to XGA (1024 x 768). A video interface unit provides image and vision capture.

Vybrid VF6xx 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 has integrated sensors for voltage, frequency and temperature, and external sensing for physical attack detection.

Enablement Offering: MPU + IDE + OS

- Freescale Tower System hardware development environment
- Integrated development environments with complimentary MQX™ and Timesys Linux® BSPs
- Complimentary bootloaders (USB, Ethernet, serial)
- ARM Development Studio 5 (DS-5™) Vybrid Controller Edition

Features and Benefits

	Feature	Application Benefit
Core and System	ARM Cortex-A5 up to 500 MHz	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. 512 KB L2 cache optional
	TrustZone technology	Ensures reliable implementation of security applications ranging from digital rights management to electronic payment
	ARM Cortex-M4	High-performance real-time core
	DSP instruction support	Enhanced signal processing capabilities with single cycle 32-bit MAC
	Single precision floating point, IEEE 754 compliant	Facilitates algorithm development and improved analog signal processing
	16 KB instruction and data caches	Maximum code execution performance and reduced power consumption
	64 KB tightly coupled memory	No-wait state memory access
	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	High reliability, fast access non-blocking RAM with ECC protection on 512 KB of SRAM (reduced to 1 MB SRAM when L2 cache enabled). Can eliminate the need for external DRAM
	FlexBus external bus interface	Enables the connection of external memories and peripherals (e.g., graphics displays, FPGA, ASICs)
	NAND flash controller	Supports up to 32-bit ECC current and future NAND types with minimal software overhead
	SDHC controller	For in-application software upgrades, media files or adding Wi-Fi® support
	Dual quad SPI with execute in place (XIP)	Supports up to 80 MHz external SPI flash
	DRAM controller with 8-bit ECC	Support for DDR3 and LPDDR2 memories up to 800 MHz data rate. DDR3 memory is half the cost of DDR2 memory
Communications Interface	Dual 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 (HMIs) or connect to industrial compute. Lower BOM cost with integrated PHY
	Dual 10/100 Ethernet MAC with IEEE 1588 hardware time stamping	Precision clock synchronization for real-time, networked industrial automation and control
	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
	Dual 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 and drives output pin to safe state external components if watchdog event occurs
HMI	Dual display controllers	Support for up to two SVGA resolution TFT displays
	Video interface unit	Analog or 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
	Sony Philips Digital Interface	Receive and transmit digital audio using the IEC60958 standard consumer format
	Asynchronous sample rate converter	Sample rate conversion between input and output audio streams
Other	Integrated power management in 364 MAPBGA package	Reduces the system cost
	Operating temperature range (-40 °C to +85 °C)	Qualified for consumer and industrial applications

Get Started Today

The Freescale Tower System provides a modular and expandable development platform for evaluating and prototyping with Vybrid controller solutions. The TWR-VF65GS10 module is a development tool for the Vybrid family of controllers that operates as a standalone debug tool or as part of an assembled Tower System development platform. With full support from MQX software solutions, Timesys Linux BSP and the ARM DS-5 toolchain, your next application-rich design is at your fingertips. For more information, visit freescale.com/TWR-VF65GS10 and freescale.com/TWR-VF65GS10-DS5.

Tower Systems for Vybrid Controllers

Ordering Part Number	Description	MSRP (USD)
TWR-VF65GS10	<ul style="list-style-type: none">TWR-VF65GS10 module, USB cable, quick start guideComplimentary 1 year, non-renewable license to ARM Development Studio 5 (DS-5) starter kit for Vybrid controller Tower System module (256 KB code size limitation)	\$199
TWR-VF65GS10-KIT	<ul style="list-style-type: none">TWR-VF65GS10 module, USB cable, quick start guideComplimentary 1 year, non-renewable license to ARM Development Studio 5 (DS-5) starter kit for Vybrid controller Tower System module (256 KB code size limitation)TWR-ELEV elevator modulesTWR-SER serial module	\$269
TWR-VF65GS10-PRO	<ul style="list-style-type: none">TWR-VF65GS10 module, USB cable, quick start guideComplimentary 1 year, non-renewable license to ARM Development Studio 5 (DS-5) starter kit for Vybrid controller Tower System module (256 KB code size limitation)TWR-ELEV elevator modulesTWR-SER2 enhanced serial moduleTWR-LCD-RGB graphical LCD module	\$399
TWR-VF65GS10-DS5	<ul style="list-style-type: none">Same as TWR-VF65GS10-PRO except includes 1 year, renewable license for ARM Development Studio 5 (DS-5) Vybrid controllers edition (hardware platform independent, 1 MB code size limitation)	\$1,500

For more information, visit freescale.com/Vybrid

Visit Freescale Solution Advisor to select the best Vybrid controller solution for your design: freescale.com/SA

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