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freescale™
Vybrid

32-bit Controller Solutions

Vybrid VF5xxR Family

Automotive solutions for connected radio, entry-level infotainment and digital instrument cluster applications
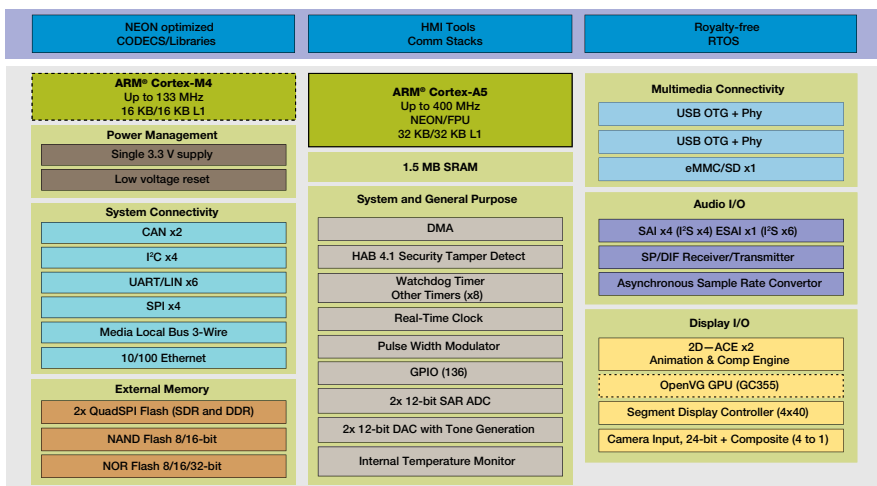
Overview

The Vybrid VF5xxR family is purpose-built and cost-optimized for connected radio, entry-level infotainment and digital instrument cluster applications. The family features generous 1.5 MB on-chip SRAM, dual-core architecture combining the high-performance low-power ARM® Cortex®-A5 application processor with the ultra-low-power ARM Cortex®-M4 microcontroller, OpenVG graphics accelerator, 2D graphics composition engine and dual QuadSPI interface with DDR support. Standard vehicle connectivity is provided through integrated CAN controllers, MLB, UART/LIN and Ethernet with IEEE® 1588 support. The integrated video ADC allows for direct connection to analog cameras without the need for expensive external circuits. Dual USB 2.0 OTG controllers (with integrated PHY) and a large variety of serial interfaces such as UART, SPI, and I²S provide connectivity to consumer electronic devices such as smartphones, tablets and Bluetooth® enabled devices. The VF5xxR family is software

Target Applications

- Connected radios
- Entry-level infotainment
- Digital instrument clusters

Vybrid VF5xxR Block Diagram

NEON optimized CODECS/Libraries	HMI Tools Comm Stacks	Royalty-free RTOS

ARM® Cortex-M4 Up to 133 MHz 16 KB/16 KB L1	ARM® Cortex-A5 Up to 400 MHz NEON/FPU 32 KB/32 KB L1	Multimedia Connectivity
Power Management		USB OTG + Phy
Single 3.3 V supply		USB OTG + Phy
Low voltage reset	**1.5 MB SRAM**	eMMC/SD x1
System Connectivity	**System and General Purpose**	**Audio I/O**
CAN x2	DMA	SAI x4 (I²S x4) ESAI x1 (I²S x6)
I²C x4	HAB 4.1 Security Tamper Detect	SP/DIF Receiver/Transmitter
UART/LIN x6	Watchdog Timer Other Timers (x8)	Asynchronous Sample Rate Convertor
SPI x4	Real-Time Clock	**Display I/O**
Media Local Bus 3-Wire	Pulse Width Modulator	2D—ACE x2 Animation & Comp Engine
10/100 Ethernet	GPIO (136)	OpenVG GPU (GC355)
External Memory	2x 12-bit SAR ADC	Segment Display Controller (4x40)
2x QuadSPI Flash (SDR and DDR)	2x 12-bit DAC with Tone Generation	Camera Input, 24-bit + Composite (4 to 1)
NAND Flash 8/16-bit	Internal Temperature Monitor	
NOR Flash 8/16/32-bit		

Optional

compatible with the VF3xxR family, providing scalability from low-cost basic connected radios without external DRAM up to entry-level infotainment systems using GPU-accelerated dual displays with compelling user interfaces.

Enablement Software

Vybrid automotive families include software for connected radio and cluster applications. Built upon auto-grade BSPs for MQX™, our software is the ideal starting point for your radio and cluster designs. The enablement components are included with every chip we sell, and provide a full working system complete with BSP, middleware and example applications. Our software solution is highly configurable and architected with Vybrid families in mind, scaling from low-cost solutions that use the internal SRAM only, up to feature-rich, graphics-intensive solutions.

Development Tools

EVB-VF522R3

Evaluation platform for cost optimized automotive connected radio and infotainment systems.

Industry-Leading Partners

In addition to the enablement components, we have teamed up with select industry-leading partners that have rich automotive heritage and embedded systems know-how to provide third-party components for areas like Bluetooth, HMI tools and acoustic echo cancellation/noise suppression. These include:

Altia Design with DeepScreen

Altia's suite of user interface engineering tools offers a concept-to-code solution for getting best-in-class user interfaces for Vybrid product families.

OpenSynergy Blue SDK

Provides an efficient way to add reliable Bluetooth radio communications to any embedded device.

Cybercom blueGO

A robust and portable multi-profile Bluetooth software application framework for advanced hands-free functionality in automotive IVI systems. blueGO minimizes the Bluetooth application development effort and is subject to continuous IOP testing.

Alango Voice Communication Package

A suite of front-end digital signal processing technologies enabling high quality voice communication specifically optimized for small footprint embedded applications such as connected radio hands-free on Vybrid's production software platform.

Advanced Connected Radio System Diagram
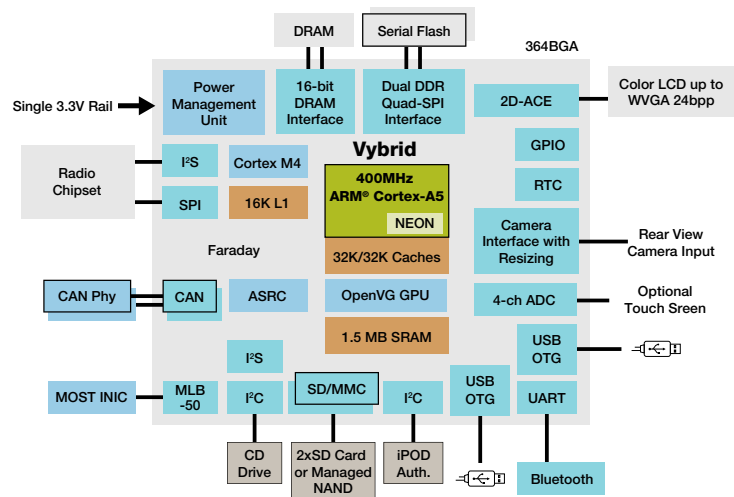
Key Features for the VF5xxR

CPU	400 MHz ARM® Cortex®-A5, 167 MHz ARM Cortex®-M4
On-chip memory	1.5 MB (512 KB ECC) or 1 MB and 512 KB L2 cache
Serial flash interface	2x QuadSPI Flash with DDR support
NAND	16-bit up to 32-bit HW ECC
FlexBus interface (parallel NOR)	Yes (address/data mux'd plus 8-bit dedicated data)
Display interface	TFT and 40 x 4 segmented LCD or 2x TFT up to WVGA
Video ADC/camera Input	4x composite 24-bit parallel
Ethernet	2x 10/100 Ethernet with IEEE® 1588
Analog-to-Digital Converter	10-channel, 12-bit ADC
USB	2x USB OTG HS
Audio interface	SAI x4 (i²s x4) and ESAI x1 (2 TX, 4 TX OR RX)
UART, DSPI, I²C	6, 4, 4
SD/MMC interface	2
CAN	2x FlexCAN
MOST	1x MLB50
GPIO	Up to 136
Package	364-pin MAPBGA, 17x17 mm², 0.8 mm pitch

For more information, visit freescale.com/Vybrid

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