32-bit automotive MCUs

MAC57D5xx MCUs for Automotive and Industrial Instrument Clusters

The MAC57D5xx family is the next-generation platform of instrument cluster devices specifically targeted to the cluster market using single and dual high-resolution displays.

TARGET APPLICATIONS

- Instrument clusters
- Heads-up display
- Multifunction display

Leveraging a highly successful MPC56xxS product family, we are introducing a multicore architecture powered by ARM® Cortex®-M (for real-time applications) and ARM Cortex-A processors (for applications and HMI), coupled with 2D graphics accelerators, a heads-up display (HUD) warping engine, dual TFT display drive, integrated stepper motor drivers and a powerful I/O processor that will offer leading-edge performance and scalability for cost-effective applications.

This family supports up to two WVGA resolution displays, including one with in-line HUD hardware warping. Graphics content is generated using a powerful Vivante 2D graphics processing unit (GPU) supporting OpenVG1.1, and the 2D animation and composition engine (2D-ACE), which significantly reduces memory footprint for content creation.

Embedded memories include up to 4 MB flash, 1 MB SRAM with error correcting codes (ECC) and up to 1.3 MB of graphics SRAM without ECC. Memory expansion is available through DDR2 and SDR DRAM interfaces while two flexible QuadSPI modules provide SDR and DDR serial flash expansion.

In response to the growing desire for security and functional safety, the MAC57D5xx family integrates our latest SHE-compliant cryptographic services engine (CSE2) and delivers support for ISO26262 ASIL-B functional safety compliance.

FEATURES

Cortex-A5, 32-bit CPU (application processor)

- Floating point unit (FPU) supporting double-precision floating-point operations
- ARM NEON™ media processing engine
- Memory management unit
- Up to 320 MHz

Cortex-M4, 32-bit CPU (vehicle processor)

- 64 KB tightly-coupled memory (TCM)
- Single precision FPU
- Up to 160 MHz

Cortex-M0+, 32-bit CPU (I/O processor)

- Intelligent stepper motor drive
- Low-power mode peripheral management

Memory Subsystem

- System memory protection unit
- 4 MB on-chip flash including small sectors for EEPROM
- 1 MB on-chip SRAM with ECC
- 1.3 MB on-chip graphics SRAM with FlexECC

Expandable Memory Interfaces

- 2 x Dual QuadSPI serial flash controllers (including HyperFlash™ support)
- Supports SDR and DDR serial flash
- DRAM controller supporting SDR and DDR2

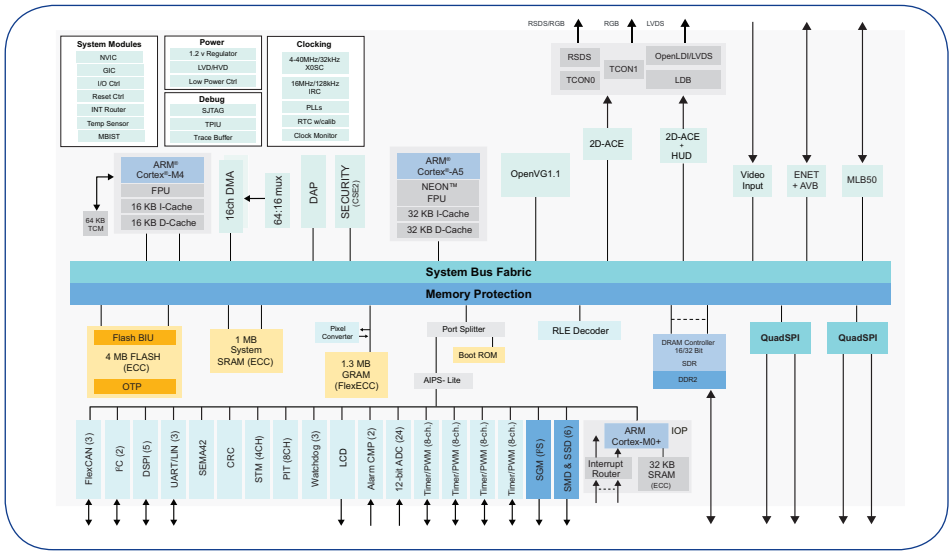
Graphics Features

- Vivante GC355 GPU supporting OpenVG™ 1.1
- 2 x 2D-ACE display controllers supporting up to 2 x WVGA displays
- In-line hardware HUD warping engine
- Digital RGB, TCON0 (RSDS), TCON1 and OpenLDI/LVDS output options
- Digital video input
- RLE decoder for memory-memory decompression

Safety and Security

- Latest CSE2 security—Secure Boot, secure mileage and component protection
- ISO 26262 ASIL-B compliant MCU

MAC57D5xx BLOCK DIAGRAM



Peripherals

- 6 stepper motor drivers with patented stall detection technology
- Sound generator module (SGM) with PWM and I²S outputs
- Autonomous RTC (self calibrating)
- Rich set of communication peripherals, including Ethernet-AVB, MLB50, CAN-FD, LIN, SPI, I²C
- Up to 32 timer/PWM channels
- 12-bit ADC and analog comparators

Key Electrical Characteristics

- –40°C to +105°C (ambient)

Package Options

- 516 MAPBGA, 208 LQFP

Tools

- S32 Design Studio
- Debugger: Green Hills Probe, Lauterbach, IAR™
- Multicore compiler: ARM, Green Hills

MAC57D5xx FAMILY MATRIX

Family Product	Flash	SRAM	Package Options	SDR	DDR2	QUAD SPI	GPU
SAC57D54H	4 MB	1.3 MB (non ECC)/ 2 x 512 kbit (w/ECC)	208 LQFP	16-bit, 160 MHz	None	2 x Dual SDR/DDR QuadSPI, 100 MHz (200 MB/s)	GC355 (OpenVG)
			516 MAPBGA	16-bit, 160 MHz	16- or 32-bit, 320 MHz		
SAC57D53H	3 MB	1.3 MB (non ECC)/ 2 x 512 kbit (w/ECC)	208 LQFP	16-bit, 160 MHz	None	2 x Dual SDR/DDR QuadSPI, 100 MHz (200 MB/s)	GC355 (OpenVG)
			516 MAPBGA	16-bit, 160 MHz	16- or 32-bit, 320 MHz		
SAC57D52L	2 MB	1.3 MB (non ECC)/ 1 x 512 kbit (w/ECC)	208 LQFP	16-bit, 160 MHz	None	2 x Dual SDR/DDR QuadSPI, 100 MHz (200 MB/s)	GC355 (OpenVG)

**Not all feature differences shown in table above, refer to datasheet for specific feature details

Product Longevity

SAFE ASSURE by NXP

Energy Efficient Solutions by Freescale

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