



Overview of Microcontroller Families and Brands

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Introduction:

This report explores the differences and characteristics of microcontroller families, which are used in various applications, including industrial automation and the Internet of Things, in modern embedded system design.

Types Of Microcontrollers:

STM32F103C8T6:

The STM32F103C8T6 is a microcontroller in the STM32F103xx family, featuring a 32-bit RISC core, enhanced I/Os, peripherals, and communication interfaces like I2Cs, SPIs, USARTs, USB, and CAN.

ATmega328:

The Atmega328p is a popular 8-bit AVR microcontroller, combining 32KB ISP flash memory and read-while-write capabilities, offering a lightweight alternative to Arduino boards, ensuring ease of programming and community support.

PIC16F877A:

The PIC16F877A is a popular 8-bit microcontroller in the PIC family of MCUs, considered old and past its time. It's the de-facto microcontroller for beginners and the choice for experts.

Attiny85:

The ATtiny series of AVR microcontroller, known for their small form factor and low GPIOs, are popular for projects. The aTtiny85 is the most popular due to its more I/O pins. Despite new performance upgrades, ATtiny85 remains revered.

MSP430G2452:

The MSP430 family of microcontrollers from TI are considered as some of the most modern microcontrollers and the most popular member of that family so far has been the MSP430G2452. The MSP430G2452 is a powerful, and relatively cheap microcontroller based on a 16-bit RISC CPU manufactured by Texas Instruments.

ESP8266:

The ESP8266, manufactured by Espressif Systems. It belongs to the ESP (Embedded Systems Platform) family of microcontrollers, a low-cost Wi-Fi microchip developed by Espressif Systems, has been a significant impactor in the last decade, leading the trend of fused communication microcontrollers. Its multiple versions, including the ESP-12e, have been pivotal in various projects and products.

ESP32:

The ESP32 manufactured by Espressif Systems, is a low-cost, low-power microcontroller with integrated Wi-Fi and Bluetooth, using Tensilica Xtensa LX6 microprocessor. It features built-in antenna switches, RF balun, power amplifier, filters, and security features for modern applications.

ATMEGA32U4:

The Atmega32u4 is a low-power Microchip 8-bit AVR® RISC-based microcontroller with 32 KB self-programming flash, 2.5 KB SRAM, 1 KB EEPROM, USB 2.0, 12-channel A/D-converter, and JTAG interface.

STM8S103F3:

The STM8 family of microcontrollers features a high-performance 8-bit core and advanced peripherals in a compact form factor. The family comprises four series: STM8S, STM8L, STM8AF, and STM8AL. The STM8S series is mainstream, while the STM8S103F3 is popular. Its 8 Kbyte Flash program memory ensures system robustness.

NXP LPC1768:

The LPC1768 is a Cortex®-M3 microcontroller is a low-power, high-performance Cortex®-M3 microcontroller for embedded applications, offering 512 kB of flash memory and 64 kB of data memory, along with peripherals like Ethernet MAC and USB interface.

Comparison between PIC16F877A and TM4C123GH6PM

| Feature | PIC16F877A | TM4C123GH6PM |
|------------------------|------------------------------------|--------------------------------------|
| Manufacturer | Microchip Technology | Microchip Technology |
| Microcontroller Family | PIC16 | ARM Cortex-M4 |
| Clock Speed | Up to 20 MHz | Up to 80 MHz |
| Flash Memory | 14 KB | 256 KB |
| RAM | 368 bytes | 32 KB |
| ADC | 10-bit | 12-bit SAR |
| Number of I/O Pins | 33 | 43 |
| UARTs | 2 | 8 |
| I2C | 1 | 4 |
| SPI | 1 | 4 |
| USB | No | Yes |
| CAN | No | 2 |
| PWM Channels | 4 | 16 |
| Operating Temperature | -40°C to 85°C | -40°C to 105°C |
| Special Features | Timer, Capture/Compare /PWM, USART | Hibernation module, QEI, Comparators |

References:

- <https://www.electronics-lab.com/top-10-popular-microcontrollers-among-makers/>
- TM4C123GH6PM Data sheet pg(44)
- PIC16F877A Data sheet

