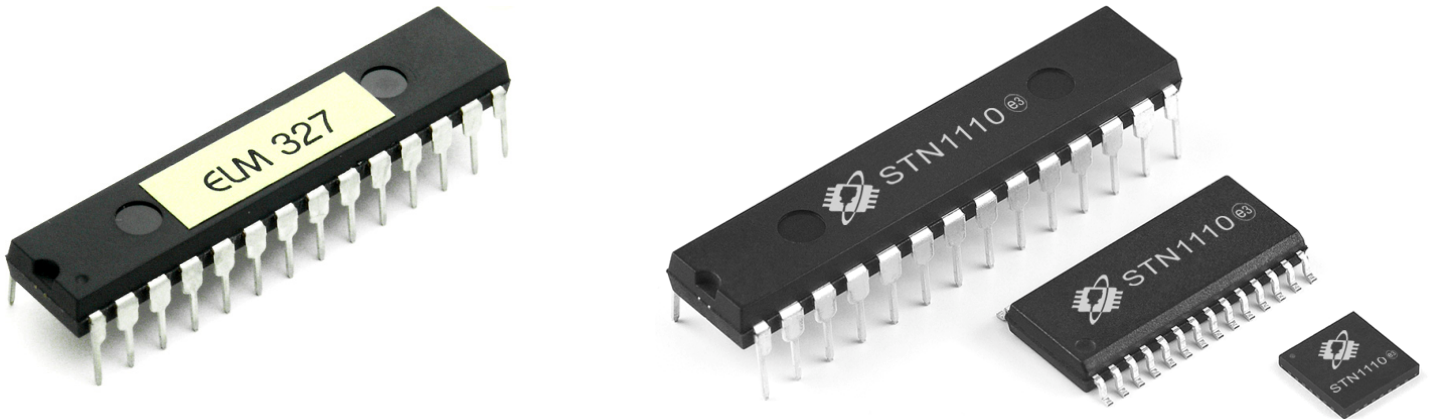# STN1110 vs ELM327 Comparison

Quick Overview

STN1110 is the world's smallest, lowest cost multiprotocol OBD to UART interpreter IC. To maintain compatibility with existing applications, STN1110 has full support for the ELM327 command set, while outperforming the original ELM327 IC in every category: price, size, stability, performance, and features.

	ELM327 v1.4	STN1110
Base microcontroller	PIC18F2580	PIC24HJ128GP502
Architecture	8-bit	16-bit
Processing speed	4 MIPS	40 MIPS
Flash (ROM)	32 KB	128 KB
RAM	1.5 KB	8 KB
Pin count	28	28
Available packages	PDIP, SOIC	PDIP, SOIC, QFN
Supply voltage range	4.5 to 5.5V	3.0 to 3.6V[1]
Supports all OBD-II protocols	yes	yes
ELM327 command set	yes	yes
Enhanced "ST" command set	no	yes
Firmware upgradeable	no	yes
Large OBD message memory buffer	no	yes
Low power mode	yes	yes
Supported UART baud rates	9600 bps to 500 kbps	38 bps to 10 Mbps
OBD message filtering	basic	advanced
Price each, for 1000 units	$24	$10
Price each, high volume	$19	$4.95

The following pages provide more in-depth comparisons of the features and performance.

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[1] STN1110 features 5V tolerant inputs, making it compatible with 5V logic

Base Microcontroller

As with any computing platform, the base hardware has much to do with the performance and feature set of a device.
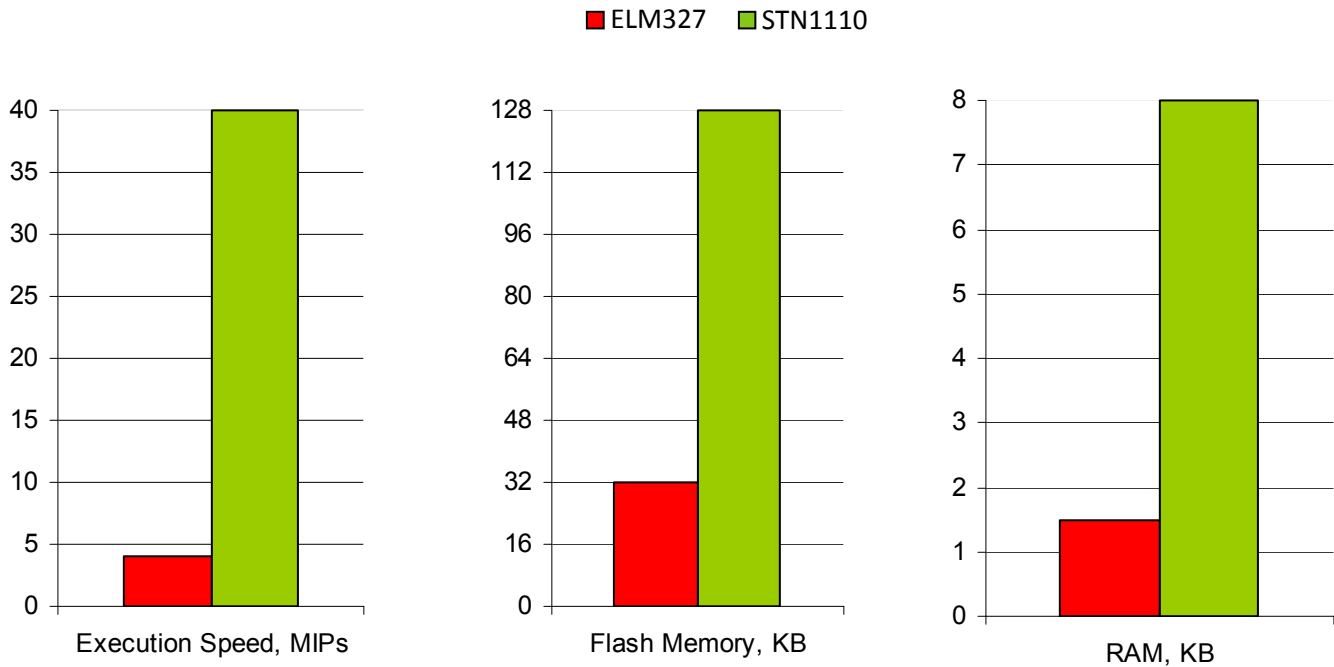
As you can see from the graphs, STN1110 can execute its software **ten times faster** than the ELM327, has **four times as much flash** program memory, and over **five times as much RAM.** Paradoxically, the STN1110 costs *less* than the ELM327, thanks to the economies of scale.

Faster execution speed, combined with the advantages of 16-bit architecture, means greater maximum data throughput, and allows for more tasks to be running concurrently. Large flash memory means there is more room for additional features. The combination of the two has a less tangible, but nonetheless very important benefit. Embedded programmers are all-too-familiar with the tradeoff: when clock cycles and ROM are at a premium, code quality is sacrificed in the name of efficiency. STN1110's abundant reserves of execution speed and program memory allow the programmers to write high quality, modular code that is easy to maintain and modify, drastically reducing the cost of adding new features and custom functionality.

ELM327 users are familiar with BUFFER FULL errors, which most often occur when multiple OBD messages are quickly received back-to-back (e.g., Mode $06 responses on CAN). Eight kilobytes of RAM ensure that STN1110 has plenty of memory to buffer OBD responses, and eliminate BUFFER FULL errors even at low UART baud rates.

User Upgradeable Firmware/Bootloader

ELM327 does not have a bootloader. If a firmware update becomes necessary, the only recourse is to recall the device and replace the ELM327 with an updated version.

STN1110 features a sophisticated bootloader that allows the user to reflash the device in the field, for example to add custom functionality or take advantage of new features. The bootloader uses secure encryption, and an advanced error detection and recovery mechanism that allows it to work reliably – even over poor quality communication links. If an update is interrupted, it can be safely restarted. Regular updates are available via the internet.

Enhanced "ST" Command Set

ST commands are designed to provide extended functionality, without breaking compatibility with the ELM327 "AT" command set. Here are some examples of functionality provided by "ST" commands that is not available in the original ELM327:

- Set up **multiple advanced OBD message pass/block filters**
- Print **device manufacturer ID** string and **unique serial number**
- One-time OEM programmable **device descriptor string**
- Set **UART baud rate to a value lower or higher** than the minimum or maximum baud rate supported by the ELM327
- More flexible **low power mode** functionality
- **Enhanced CAN support**
  - Support for "raw" CAN alongside ISO 15765
  - Improved flow control mechanism
- **Enhanced J1939 support**
  - Monitor multiple PGNs
  - Better transport protocol session management
- **Enhanced ISO 9141 support**
  - Greater control over timing parameters
  - Support for a wider range of non-standard baud rates

Both "ST" and "AT" command sets are available simultaneously.

Supported UART Baud Rates

STN1110 supports baud rates as low as 38 bps and as high as 10 Mbps, versus ELM327's 9600 bps to 500 kbps, making it suitable for a wider range of embedded applications.

Automatic Protocol Detection Algorithm

Default ELM327 automatic protocol detection algorithm does not work on some vehicles that use the ISO 9141-2 or the SAE J1850 protocol. STN1110 features a superior algorithm that ensures the device connects reliably even to vehicles that do not fully conform to the OBD-II standards.

Smart Keep-Alives

ELM327 can drop a connection to an ISO 9141 or ISO 14230 ECU, when the user software sends several requests not supported by the ECU. STN1110 overcomes this problem by monitoring ECU responses, and inserting a "keep-alive" message if an ECU response hasn't been received within a predetermined amount of time.

Low Power Mode

STN1110 supports all ELM327 "Low Power mode" commands for backwards compatibility, as well as a native "PowerSave" mode that has a number of important advantages:

- More intuitive/straightforward configuration
- Parameters support a higher range of values, to best fit your situation
- Default settings that are optimized for more reliable operation

In practice, this means that STN1110 is easier to configure, more immune to false wake-ups, and can be awaken from sleep mode without switching to a lower baud rate beforehand.

Advanced Filtering

In addition to emulating all ELM327 filter commands, STN1110 allows the setting of multiple dynamic pass, block, and flow control filters. The filters can be precisely fine-tuned to only pass messages of interest, greatly reducing host bandwidth and processing requirements.

Migrating ELM327 Designs to STN1110

STN1110 provides a natural migration path for ELM327-based designs. Since STN1110 faithfully emulates the ELM327 command set (with the exception of obvious software defects), in the vast majority of cases, no software change is necessary.

STN1110 is not a drop-in replacement for ELM327; however the hardware changes are minimal. Please refer to the STN1110 datasheet for detailed specifications and example circuits.