

System Basis Chips 101 - a Beginner's Guide to CAN, CAN FD and LIN SBCs



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What is a system basis chip (SBC)?

SBCs are simply integrated circuits that integrate Controller Area Network (CAN) or Local Interconnect Network (LIN) transceivers with an internal/external “power element.” This power element could be a low-dropout regulator (LDO), a DC/DC converter or both.

When a designer needs additional output power or layout options that require a discrete solution using both a transceiver and a discrete LDO or DC/DC converter, SBCs are a good fit.

SBCs are not new to the market; however, recent innovations in integration and performance have expanded the use of these devices. For automotive designers, the high level of integration and increased reliability enable lighter and lower-cost designs. The move from classical CAN to CAN Flexible Data Rate (CAN FD) requires solutions that bridge the gap between CAN FD controller processor availability while also helping increase the number of Classical CAN/CAN FD buses.

Before going into too much depth regarding SBC, let's focus first on CAN or LIN transceivers. If you're familiar with these protocols, you know that these transceivers provide input and output of their corresponding technologies. Once they receive data packets, these transceivers present data to either a microcontroller or microprocessor for further action. Conversely, they receive information from the same processor for outbound communication to the associated bus.

Although CAN and LIN transceivers are fairly basic in nature, suppliers are increasingly adding additional features to further increase protection while reducing design complexity, space and cost. These features often include bus fault protection and electrostatic discharge protection, as well as the ability to send and receive data to the processors through a 1.8-V to 3.3-V or 5-V input/output (also known as V_{IO}).

Right now, I'll focus on LDO-based SBCs, but the same concepts apply to higher-output DC/DC converters.

A good example of an SBC is the [TCAN4550-Q1](#), which includes both a CAN FD controller and a CAN FD transceiver in a single package. The device communicates with microcontrollers and microprocessors through the Serial Peripheral Interface, which is very prominent in most processing solutions and enables the addition of CAN FD's advanced functionality to almost any design. [Figure 1](#) is a basic block diagram of this device and how it connects to a microprocessor.



Figure 2 highlights the LDO portion of the SBC. The TCAN4550-Q1's LDO provides 125 mA of current. Approximately 50 mA is used to power the CAN FD transceiver, with up to 70 mA of output remaining to supply sufficient current for the embedded microcontroller or other components.

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TI has both [CAN and LIN SBCs](#) developed from its [standard portfolio of CAN and LIN transceivers](#). The [TLIN1441-Q1](#) LIN SBC also includes many of the features discussed above and a 125-mA LDO.

Additional Resources

- For information about the integrated LDO in the TCAN4550-Q1, see the application report, "[Understanding LDO Performance in the TCAN4550-Q1](#)."
- Read the technical article, "[Explore the non-speed-related benefits of CAN FD](#)."
- Evaluate the [TCAN4550-Q1](#) and its CAN FD protocol support with the [TCAN4550-Q1 evaluation module](#).

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