CAN Newsletter Online

RADAR SENSORS

Coming with multiple CAN FD ports

At CES 2022, NXP has introduced the S32R45 and S32R41 radar processors providing CAN FD connectivity. The chips are suitable for semi- and autonomously driving vehicles.

Imaging radar sensors need to be able to measure simultaneously velocity and to classify objects at distances of up to 300 m (Source: NXP)

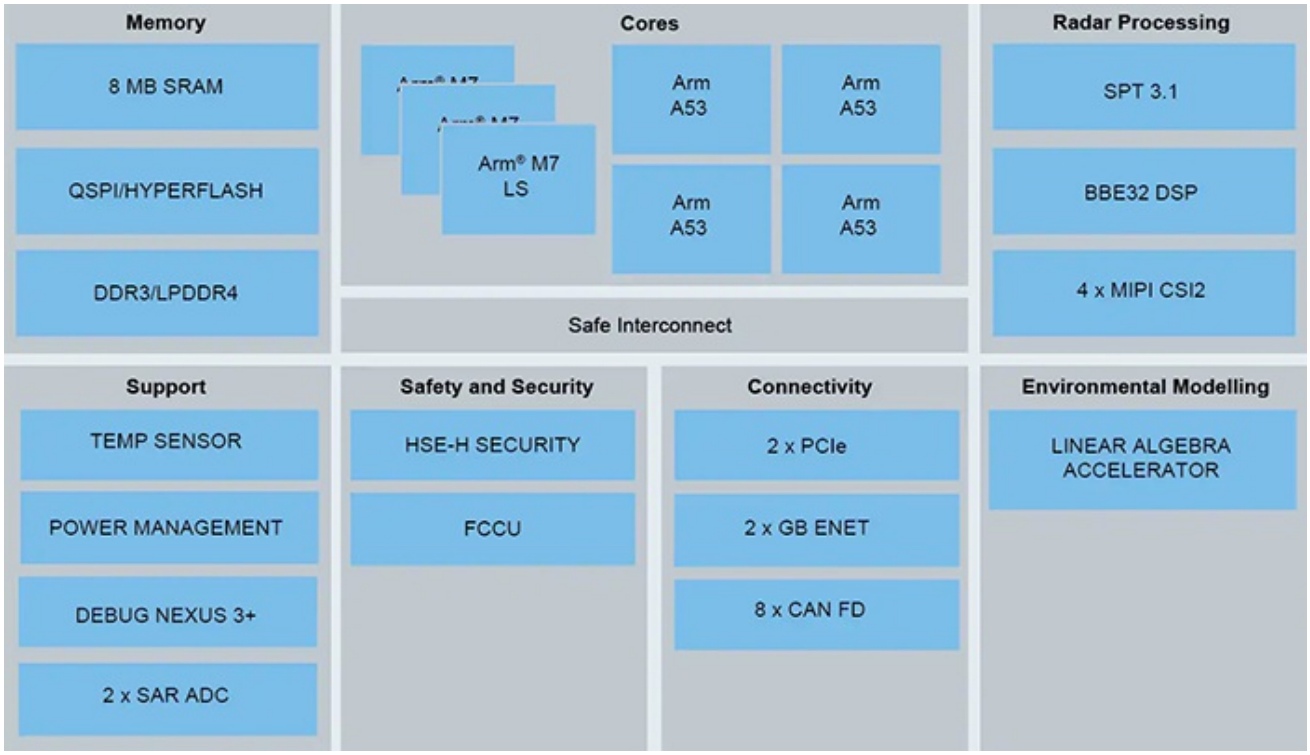
The S32R45 is a 16-nm imaging radar processor, which has been released into mass production with initial customer ramp-up starting in the first half of 2022. Additionally, the NXP S32R41 has been introduced to extend 4D imaging radars. Together these processors serve the L2+ through L5 autonomy sectors, enabling 4D imaging radar for 360-degree surround sensing. Both products come with on-chip CAN FD interfaces.

Imaging radar extends radar's ability beyond detecting bulky objects to "seeing" a vehicle's environment through fine resolution point clouds that enhance environmental mapping and scene understanding. These images enable the classification of objects, such as vulnerable road-users and vehicles in complex urban scenarios, e.g. a motorcycle driving close to a large delivery truck, or a child entering a roadway between parked cars. In addition, imaging radar needs to be able to simultaneously measure velocity and classify objects at distances of up to 300 m, beyond the range of human eyesight. It also needs to identify fast-moving vehicles and distinguish them from slower ones or even static obstacles, such as a lost tire, in the driver's path. NXP addresses these needs with its latest imaging radar processor updates.

NXP's 4D imaging radar delivers concurrent 3-in-1 multi-mode radar sensing across short-, mid-, and long-range operation, enabling the simultaneous sensing of a very wide field of view around the car. To achieve this, the chipmaker leverages an architecture to boost performance beyond the raw sensor hardware capabilities with a sensor configuration utilizing 192 virtual antenna channels. The boost is enabled by the combination of proprietary radar hardware acceleration (deliver up to 64 times the compute performance of legacy processors), super-resolution radar software algorithms to achieve sub-degree angular resolution, and advanced MIMO waveforms that allow simultaneous operation of antenna channels. This architecture helps to overcome the limitations of other high-resolution sensors such as Lidar and high-antenna count massive MIMO radar, whose cost and complexity limit their applications to a narrow set of use cases.

"NXP's new imaging radar processors are shaping the way vehicles understand the world around them by creating high resolution images that enhance the detection and classification of objects, a key step in improving road safety and saving lives. The extended S32R family line-up harnesses our leadership in radar processing, super-resolution algorithms and advanced MIMO waveforms to deliver the benefits of imaging radar to the rapidly growing L2+ vehicle segment," said Torsten Lehmann from NXP.

The introduction of the S32R41 is tailored for L2+ autonomous driving applications, which some industry analysis project could account for close to 50 % of vehicle production by 2030. The L2+ segment, which was not well served by classical high-resolution sensors, will now benefit from 4D imaging radar sensing with up to six corner, front and rear radar sensors in 360-degree surround fashion.



The S32R45 is equipped with eight CAN FD interfaces (Source: NXP)

The S32R45 radar processor is the flagship of NXP's sixth generation of automotive radar chipset family. It helps to enable increasingly autonomous driving, from L2+ through the L5 use cases, in which more than ten imaging radar sensors per vehicle can be required. The combination of the S32R45 and the S32R41 radar processors with the NXP TEF82xx RFCMOS transceivers delivers the fine angular resolution, processing power and range required for production-ready imaging radar solutions. The S32R platform offers a common architecture for software reuse and speedy development along with a highly performant hardware security engine, OTA (over-the-air) update support, and compliance with the latest cybersecurity standards.

The S32R41 features two CAN FD interfaces and the S32R45 provides eight CAN FD ports. The CAN FD cores are based on the FlexCAN core from NXP. The multi-core ARM processors feature also two 1-Gbit/s Ethernet interfaces. The chips are ASIL-D compliant and support Autosar MCAL 4.4.

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