

# CAN/CANbus and CAN Protocol Licensing

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## Introduction

Actel IP partners offer a number of Controller Area Network (CAN) IP cores to Actel customers. Any CAN use falls under patents held by Robert Bosch GmbH (Bosch), and a license from Bosch is always required when a customer is building any product that uses CAN. This includes CAN IP purchased from any vendor, self-developed CAN modules, and CAN modules purchased as discrete devices.

The Bosch license offerings are relatively straightforward, and Actel partner Inicore offers a bundled license alternative with any of their CAN IP cores for limited numbers of CAN protocol node licenses. The requirement for a CAN protocol license is not a barrier to Actel FPGA opportunities.

## CANbus and the CAN Protocol: Definitions and Background

CAN (or CANbus) is a multi-master broadcast serial bus standard designed to enable communication between embedded devices without requiring a host computer. The latest version of the CAN specification is CAN 2.0, published by Bosch in 1991. CAN was internationally standardized as ISO11898-1 in 1993, and more than two billion CAN nodes have been sold worldwide.

CAN is one of the protocols used in the OBD-II on-board diagnostic standard mandatory on all autos sold in the United States from 1996 onward. CAN is also part of the EOBD standard mandatory on all gasoline-powered vehicles sold in the European Union from 2001 and all diesel-powered vehicles since 2004. CAN is part of the JOBD standard mandatory on Japanese cars since 2001, and is part of the OBD system that is mandatory on certain light vehicles in China from 2008. Aspects of CAN have been codified in various ISO standards.

- ISO 11898-5:2007 specifies the CAN physical layer for transmission rates up to 1 Mbps.
- ISO 11898-1:2003 specifies the CAN data link layer (DLL) and physical signaling.
- ISO 15765-2:2004 specifies the CAN network protocol.
- ISO 15765-4:2005 specifies a CAN variant specifically for emissions-related systems based on ISO 15765-2, ISO 11898-1, and ISO 11898-2, with the addition of various constraints.

CAN was targeted originally for automotive applications, but adoption of CAN has spread to other markets. CAN is now used in vehicles from trains to ships, as well as in military, aerospace, and industrial control applications.

## CAN Protocol Licenses from Bosch

Bosch offers two CAN protocol licenses. The *CAN Protocol License for ASIC-manufacturers* license fee is a lump sum payment of 10,200 EUR for the first 100,000 CAN products. For volumes greater than 100,000, a royalty of 2% of the net sales price of the CAN product is charged, with a maximum of 0.102 EUR per each CAN product.

Bosch also offers a *CAN Protocol License for FPGA mass programming*, charging a license fee lump sum payment of 2,500 EUR for the first 10,000 programmed FPGAs. For volumes greater than 10,000 units, a separate *CAN Protocol License for ASIC-manufacturers* agreement has to be concluded with Bosch.

Both the *CAN Protocol License for FPGA mass programming* and the *CAN Protocol License for ASIC-manufacturers* are standard license agreements from Bosch that do not require detailed negotiations. Customers going through the process and obtaining licenses from Bosch have given positive reports.

Bosch maintains a web page on the CAN protocol licenses at:

<http://www.semiconductors.bosch.de/en/20/can/2-license.asp>.

## **Inicore's Bundled Bosch CAN License Offering**

Actel partner Inicore has signed a license agreement with Bosch allowing Inicore to sublicense the CAN protocol. This is of interest for designs with a very limited number of production units— generally up to 2,000 units. Inicore pays the license fees to Bosch for these licenses, so Inicore makes a business decision based on the particulars of each request. Generally the economics of Inicore's licensing fees to Bosch favor customers with a need for more than 2,000 CAN units who deal directly with Bosch for licensing as detailed above. Customers who need CAN protocol licenses in volumes of up to 2,000 FPGAs need only work directly with Inicore.

For more information on Inicore's CAN IP cores, see the Inicore partner page:

<http://www.actel.com/products/partners/companioncore/inicore.aspx>

For more information on Inicore's CAN Protocol sublicensing, contact Inicore at:

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Bosch has reportedly stated that no CAN licensee other than Inicore has negotiated any similar sublicensing rights.