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EVK-3300. V2X Evaluation Kit.



The EVK-3300 is a versatile V2X evaluation platform targeting Tier 1's and OEMs for evaluation, development and integration of in-vehicle V2X solutions. The EVK-3300 provides a flexible set of interfaces to support different in-vehicle architectures and scalability of the key functional blocks. It facilitates the evaluation of the trade-off between complexity, cost and performance of the intended solution. The EVK-3300 includes communication stacks according to both the ETSI ITS G5 and IEEE WAVE® standards suite.



The EVK-3300 is the first release in Kapsch product line of in-vehicle solutions for vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) applications. The EVK-3300 is a fully featured V2X Evaluation Kit supporting several modes of operation that represents different product realizations for linefit, retrofit and aftermarket devices respectively. The EVK-3300 is the perfect platform for various proof-of concept and feasibility tests within the V2X area utilizing IEEE WAVE® or ETSI ITS G5 protocols. The flexible, scalable and configurable nature of the EVK-3300 makes it an essential tool for the automotive industry in their evaluation of different architectural concepts and corresponding performance measures.

Additionally, the EVK-3300 supports the development, integration and verification of full in-vehicle V2X functionality.

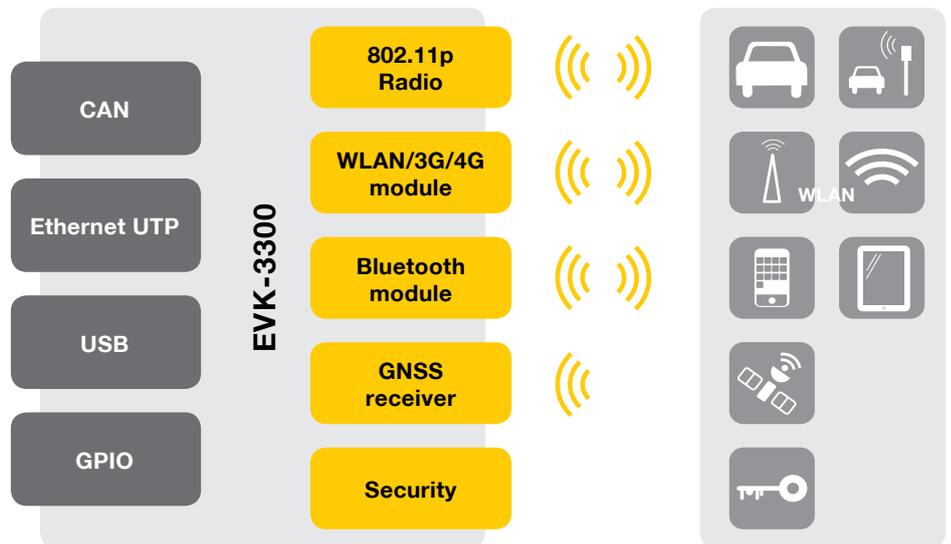
Scalability and Exchangeability.

The EVK-3300 is comprised of a mainboard that handles the platform management and wired external interfaces. The carrier board further features four different slots for plug-in add-on modules providing additional functionality and interfaces respectively.

The following add-on modules are available:

- 802.11p radio
- Multi-constellation GNSS receiver
- Bluetooth radio
- HW security acceleration and secure storage

EVK-3300 Block Diagram.



The add-on modules available for 802.11p provide various antenna diversity schemes, supporting the evaluation of different antenna system concepts in the vehicle.

Different Modes of Operation.

The EVK-3300 features three different modes of operation corresponding to different product types:

■ ITS Station mode (Retrofit and Aftermarket Device).

In this mode the EVK-3300 acts as a fully featured ITS Station, including the positional solution and, if applicable, also interfacing the vehicle CAN bus for extraction of vehicle status data. In addition, the V2X applications, such as Stationary Vehicle Warning, Emergency Vehicle Warning, In-vehicle Signage and Green Light Optimal Speed Advisory are running on the EVK-3300.

In ITS Station mode, the interface to an external device basically features messages for HMI purposes.

■ V2X Networking Module mode (Linefit module with a distributed communication stack).

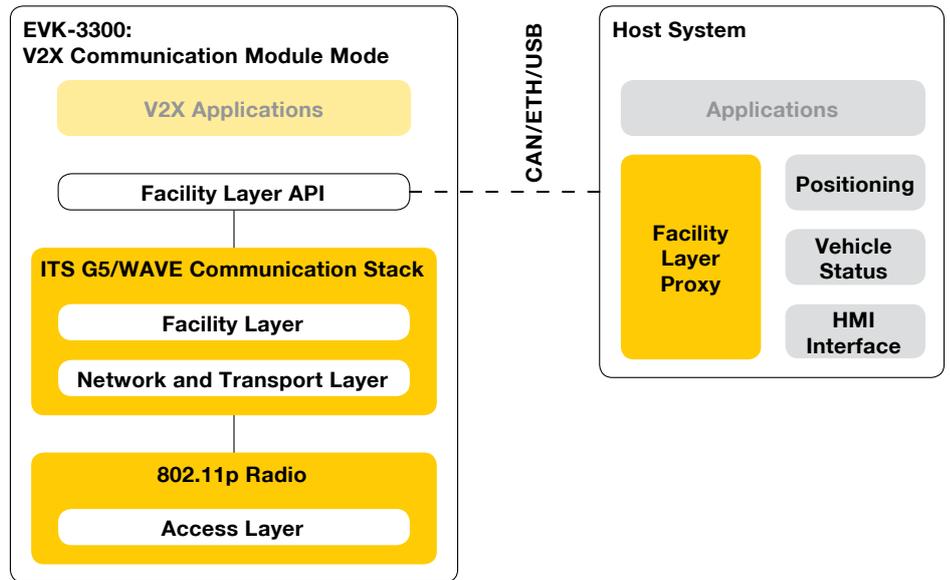
In this mode the EVK-3300 acts as transparent channel to the network and transport layer of the communication stack, including verification of incoming messages. The facilities layer is running in the host system, providing the same application interface as the V2X Communication Module mode.

■ **V2X Communication Module mode (Linefit extension module to e.g. a Telematics Unit).**

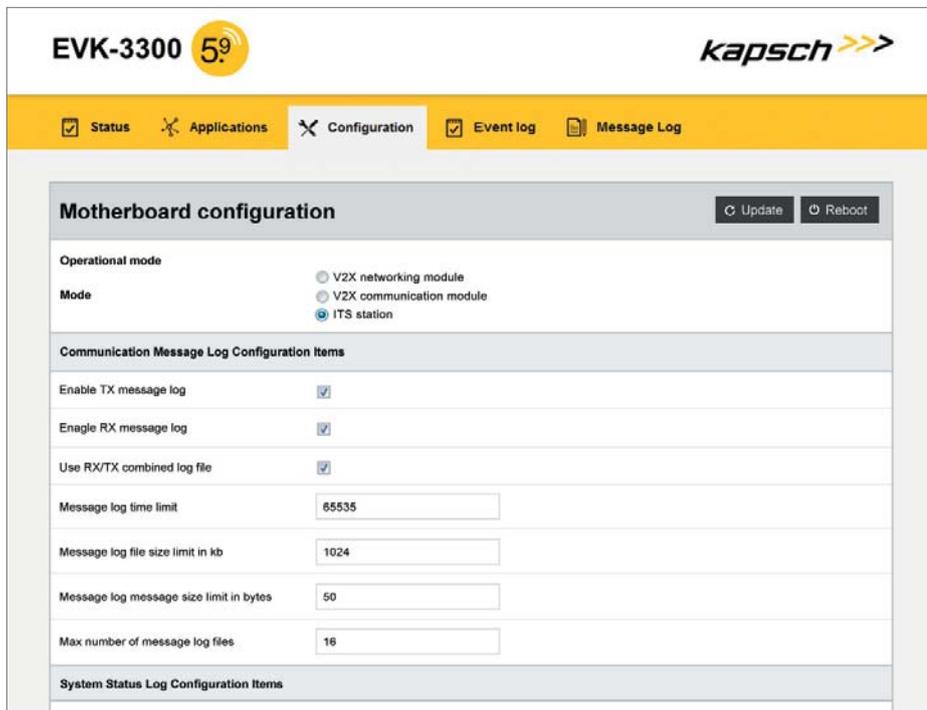
In this mode the EVK-3300 handles the protocol for the V2X communication stack, including e.g. security processing and the basic Local Dynamic Map. All V2X messages, such as CAM, DENM or BSM, IVI or TIM are generated in the EVK-3300 but the positional and vehicle status data needed are provided from the host system via an external interface.

In V2X Communication Module mode, the host system interfaces the facility layer of the V2X communication stack.

EVK-3300 V2X Communication Module mode.



Simple configuration and monitoring.



The EVK-3300 features a web based graphical user interface for configuration and monitoring of the Evaluation Kit. Via this intuitive tool, the user is able to setup and monitor the status of e.g. the 802.11p radios, GNSS receiver and the platform, as well as manage applications running on the EVK-3300 and extract message and event logs in a simple manner.

EVK-3300 Graphical User Interface.

Getting started quickly with the EVK Proxy.

In order to kick-start your usage of the EVK-3300 it is delivered with a device driver that hosts a Proxy service supporting Remote Procedure Calls. Hence, the developers using the EVK-3300 do not need to spend time on setting up and manage the serial interface between the V2X Evaluation Kit and their system, but can focus on getting the application or subsystem development going.

The interface specification, including the message set, for the serial interface is available upon request

Modular and Portable Architecture.

The HW and SW Architecture in the EVK-3300 is designed to allow an efficient partitioning of the function blocks needed for the foreseen products realizations, which will reduce the time-to-market for these products considerably. The HW components are compliant AEC-Q100, auto grade 3, to the largest extent possible.

The SW components in the EVK-3300 are designed to be platform and OS independent in order to support partitioning and porting of functional blocks in an efficient manner for V2X solutions that are distributed between different physical entities.

EVK-3300 Features.

- Supports both IEEE WAVE® and ETSI ITS G5 communication stacks.
- Dual radio support for either concurrent or redundant channel operation.
- Flexible interfaces and configurable modes of operation representing different in-vehicle product types.
- Easy-to-Use graphical user interface for configuration and monitoring.

References.

Kapsch 802.11p radio and protocol stack experience is one of the longest and most extensive in the market, being developed and evaluated since 2008 in various projects, POCs and FOTs on a variety of platforms.

IEEE WAVE®.

- US DOT RSE and ASD, HIA projects
- Singapore ERP2 SET
- Testfeld Telematik FOT

ETSI ITS G5.

- ETSI Plugtest PT-2
- ETSI Plugtest PT-3
- Testfeld Telematik FOT

Technical Specifications

Dimensions	■ (LxWxH): 120 x 170 x 35 mm
Weight	■ 550 g
Main connector	■ Tyco MQS 26W
RF connectors	■ FAKRA
Operating temperature	■ -40 °C to +85 °C
Power Management	■ Supply voltage: 8-36 VDC ■ Protection according to ISO 7637 ■ Simple Power Management scheme to avoid draining of vehicle battery when parked based on: <ul style="list-style-type: none">■ Ignition status sensing■ CAN activity/inactivity■ On/Off button
Power Consumption (12V)	■ Full operation: typically 250 mA ■ Parked mode: 100uA
Interfaces	■ Ethernet (RJ45) ■ BroadR-Reach® automotive Ethernet (Registered trademark of Broadcom) ■ USB 2.0 HS OTG ■ 2x HS CAN 2.0B ■ 4x Digital Inputs ■ 2x Digital Outputs
Available add-on modules	■ 802.11p radios ■ 1x1 802.11p radio <ul style="list-style-type: none">■ Sensitivity: -95 dBm @ 6Mbps■ Maximum output power: +23 dBm ■ 2x2 802.11p radio (MRC) <ul style="list-style-type: none">■ Sensitivity: -93 dBm @ 6Mbps■ Maximum output power: +23 dBm ■ GNSS Module <ul style="list-style-type: none">■ Multi constellation GNSS receiver: GPS, GLONASS and QZSS ■ SBAS support; WAAS, EGNOS, MSAS <ul style="list-style-type: none">■ 10Hz update rate ■ Bluetooth Module v2.1+EDR ■ Serial Port Profile (SPP)
Security (planned Q1 2014)	■ Tamper resistant secure storage, EAL 4+ ■ Signing: Up to 20 messages per second ■ Verification: Up to 400 messages per second

About Kapsch Group.

Kapsch is one of Austria's most successful technology corporations to specialize in the future-oriented market segments of intelligent transport systems (ITS) and information and communications technology (ICT). Kapsch. Always one step ahead.