

Kapsch TrafficCom

KVE-3320. V2X ECU.

The KVE-3320 is a state of the art V2X ECU for integration of V2X communication into vehicles targeting OEMs. The KVE-3320 provides the flexibility to support different in-vehicle architectures and includes V2X dual communication stack configurable to both the ETSI ITS G5 and IEEE WAVE™ protocol and related standards suite. In addition to standard Day 1 functionality the unit is also prepared for active safety and traffic efficiency applications.

The KVE-3320 is a fully featured V2X ITS Station, including positioning, security and also interface to the vehicle CAN bus for data extraction. In addition to standard V2X functionality

the unit also provides Day 2 features such as support for integration with active safety sensors and traffic efficiency applications.

Main features of the KVE-3320 are:

- > V2X Radio (option 2 radios)
- > Security (signing + verification + secure storage)
- > Cyber security (anti spoofing, anti-jamming and fraud detection)
- > Positioning based on sensor fusion
- > Vehicle CAN interface (option 2 x CAN, OEM diagnostics/ housekeeping in second CAN)
- > Integrated GNSS-antenna (option)
- > External 5.9GHz antenna (option integrated)
- > Middleware software for simplified application development
- > Functional safety according to ISO 26262 level quality management is supported as standard (optionally ASIL B level is available)



Dual Communication stack support.

The KVE-3320 supports V2X dual communication stack implementations IEEE WAVE and ETSI ITS G5 selectable by configuration.

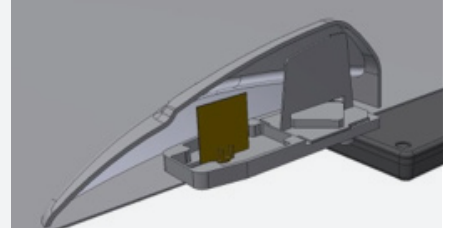
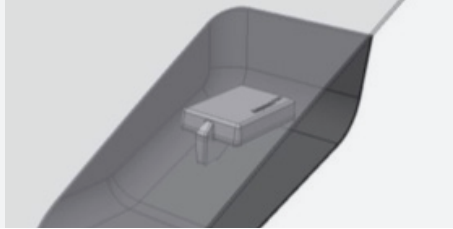
Positioning.

By combination of V2X and other active safety systems a vehicle can be provided with up to 10 s prediction of oncoming traffic events, inside and outside current line of sight. This is

made possible by exploitation of wireless ad hoc networking, in combination with the local dynamic map of the V2X communication stack.

Installation flexibility.

In order to enable easy integration with optimal performance the KVE-3320 support multiple configurations and integration strategies in the vehicle.



Applications.

The KVE-3320 is suitable for all basic V2X applications. It also features software packages and middleware that supports customized applications. Among others NHTSA and the Day 1 functionality from ETSI/C2C-CC is included in the applications.



Forward Collision Warning (FCW)



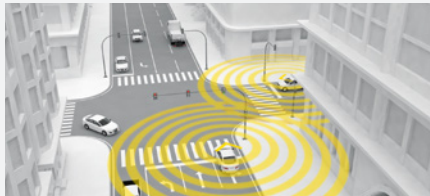
Emergency Electronic Brake Lights (EEBL)



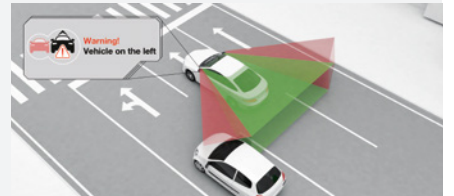
Do Not Pass Warning (DNPW)



Left Turn Assist (LTA)



Intersection Movement Assist (IMA)



Control Loss Warning (CLW)

Customized applications can be added, like as:

- > Green Light
- Optimal Speed Advisory (GLOSA)
- > Cooperative Adaptive Cruise Control (C-ACC)

Security.

The KVE-3320 provides signing of originated messages and verification of signatures of received messages. It contains a secure storage compliant for traffic events, inside and outside current line of sight. This is made possible by exploitation of wireless ad hoc networking, security evaluation according to

Common Criteria standard EAL5. KVE-3320 guarantees information integrity in combination with the local dynamic map of the V2X communication stack. through detection of jamming, spoofing of positions or dislocation of the unit from its installation.

Technical features.

By 5.9 GHz ITS Radio

- > Integrates radio transceiver, PA, LNA, antenna switch, Filters and peripherals
- > 1 x TX-channel (option 2 x TX)
- > 1 x RX-channels (option 2 x TX)
- > Typ. Sensitivity @ 6Mbps: -95 dBm
- > Maximum Output Power: 23 dBm
- > Prepared for different 5.9GHz/IEEE 802.11p radio module/chip vendors (electric characteristics may change between suppliers)
- > Frequency band supported: Europe and North America 5855-5925 MHz (10 MHz channel bandwidth)
- > Option: 2 radios

GNSS Receiver

- > GNSS module with 3D dead-reckoning (DR) functionality built on the exceptional performance of the concurrent GNSS (GPS, GLONASS, Galileo-ready, BeiDou, QZSS and SBAS).
- > Sensor fusion from GNSS Receiver, on-board 3-Dimensional inertial sensors, and speed data from the vehicle deliver continuous navigation in road-vehicle applications
- > Update rate: 2 Hz (20Hz extrapolated)
- > Time to First Fix: < 30s (Cold Start)
- > Position Accuracy (CEP50): 2 m

Antennas

- > RF Connectors for external GNSS and 5.9GHz antennas
- > Option: Integrated 5.9GHz antenna (omnidirectional, 0 dB gain)
- > Option: Integrated GNSS antenna (active patch)

CPU

High performance, ultra-efficient processor family featuring an advanced implementation of a single ARM® Cortex®-A7 core, which operates at speeds up to 528 MHz

Memory

- CPU On-chip memory:
- > 128KB L2 + 128KB SRAM
- External Memory:
- > 512MB DDR3L SDRAM
 - > 64MB Serial NOR Flash

Hardware Security

- IEEE 1609.2 Hardware Security
- > Outgoing messages signatures generation: In-house developed SAM IC
 - > Incoming messages verification: CPUs internal "Elliptic Curve" HW Accelerator

Vehicle Communication Interface

- > High Speed CAN 2.0B interface (supports both standard and extended message frames)
- > CAN transceiver compliant to ISO 11898 standard enabling data rates up to 2Mbit/s
- > Option: 2nd CAN bus for onboard diagnostics and fail safe mode

Power Interface

- > Voltage regulators, filters and protection in accordance with ISO 16750-2 "Electrical Loads"
- > Input supply voltage range: 8-36V.
- > Average current consumption below 100mA (12V)
- > Power ON/OFF on Ignition signal

Diagnostics Interface

- > 2x High Speed USB 2.0 OTG

Radio Compliance

- > IEEE 802.11p
- > IEEE 1609.4
- > ETSI EN 302 571
- > ETSI EN 302 663 (ITS-G5)

EMC & ESD Compliance

- > Conducted susceptibility ISO 7637
- > Radiated emissions CISPR 25
- > Radiated susceptibility ISO 11 451 & 11 452
- > ESD ISO 10605

Mechanical Environmental Compliance

Compliant with applicable automotive standards and praxis regarding environmental requirements such as temperature, vibration, humidity etc.

Mechanics

- > Enclosure: Integrated (semi) PVC, sealed housing
- > Dimensions: 80 x 60 x 20 mm
- > Weight: 100 g

External Connectors

- Automotive industry standard
- > Power & CAN Interface: Mini50™
 - > RF: FAKRA II

Operating Temperature

- > -40 to +85 °C
- > AEC-Q100 qualified components used

Dual stack support

IEEE WAVE Standards Support

ETSI ITS G5 Standards Suite

Basic set of applications

Options

Day 1 applications

Information Security

Functional Safety



Kapsch TrafficCom

Kapsch TrafficCom is a provider of intelligent transportation systems (ITS) in the segments of toll collection, city access control and parking space management, traffic management, traffic monitoring, utility vehicle monitoring, electronic vehicle registration and V2X cooperative systems. The end-to-end solutions of Kapsch TrafficCom cover the entire value creation chain of its customers, from components and design to the installation and operation of systems, all from a single source. The core business comprises the development, installation and operation of electronic toll collection and traffic management systems. Reference projects in more than 50 countries on all continents have made Kapsch TrafficCom a globally recognized ITS provider. As part of the Kapsch Group, an Austrian family-owned technology group founded in 1892, Kapsch TrafficCom is headquartered in Vienna, Austria, and has subsidiaries and branches in 33 countries. It has also been listed since 2007 on the Vienna Stock Exchange (KTCG) and earned revenues of EUR 526 million in the 2015/16 fiscal year. The company employs over 4,600 employees worldwide.

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