



## Electronic Fee Collection System PREMID® by Kapsch TS3200/06

### General

The PREMID® by Kapsch TS3200/06 system comprises a family of equipment for Dedicated Short-Range Communication, DSRC, intended for applications of Electronic Fee Collection, EFC, in a Single Lane environment.

The high performance of the system makes it suitable for free flow, high speed implementations as well as for conventional low speed lanes equipped with a barrier.

The combination of full compliance with the CEN TC278 DSRC standards, the public document 'Global Specification for Short Range Communication' (GSS) and to other harmonised specifications such as A1, CARDME and CESARE/PISTA, secures interoperability with other EFC systems.

The basic platform in the TS3200/06 Roadside System is the Single Lane Transceiver TRX1320A/E that in one compact unit handles both the DSRC and the EFC functionality.

A system integrator can at commissioning of the Transceiver configure it to handle several different EFC applications to allow Transponders from several issuers to be accepted by the system.

Transaction and security schemes according to harmonised EFC specifications are pre-programmed in the unit which simplifies and shortens the integration work.

The Transceiver is connected to the Host Computer (Lane Controller) by a TCP/IP protocol that is using a standard Ethernet interface. This facilitates an easy, rapid and

low cost integration to the Host Computer.

The communication zone is designed to meet the requirements for most single lane applications where it is of utmost importance to match the correct vehicle to a transaction and to avoid cross-lane reading.

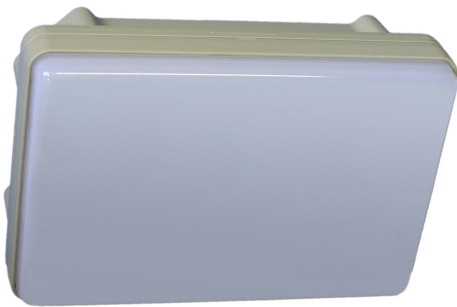
Charging services are provided by a CEN DSRC and GSS compatible Transponder mounted in the vehicle. The basic Transponder TS3204 provides the platform for a payment application with high data security and integrity. All transactions may be secured with modern cryptographic techniques based on DES and Triple-DES algorithms to resist fraud and to deter misuse.

## The Components

The TS3200/06 EFC System comprises two distinct groups of components:

- > Roadside System (RS) including Transceiver, Cables and Accessories.
- > Transponders and Transponder Accessories.

### Single Lane Transceiver



The Single Lane Transceiver TRX1320A/E is a compact roadside unit that establishes a well defined microwave communication zone where communication with Transponders in passing vehicles can take place.

The communication zones for an overhead mounted Transceiver when Transponders are mounted in passenger cars or Lorries/buses are shown in the figure below.

For a plaza-based installation one Transceiver shall be installed in each lane where the DSRC/EFC transaction shall take place.

The Transceiver contains embedded Electronic Fee Collection firmware that can be configured to handle parts of, or complete DSRC/EFC transactions with different Transponders that passes through the Transceiver communication zone.

The Transceiver will handle the EFC transaction including security functions such

as mutual authentication procedures based on the DES and Triple-DES algorithms.

The communication protocol between the Transceiver and the Host Computer is TCP/IP and a standard Ethernet 10/100BaseT interface is used.

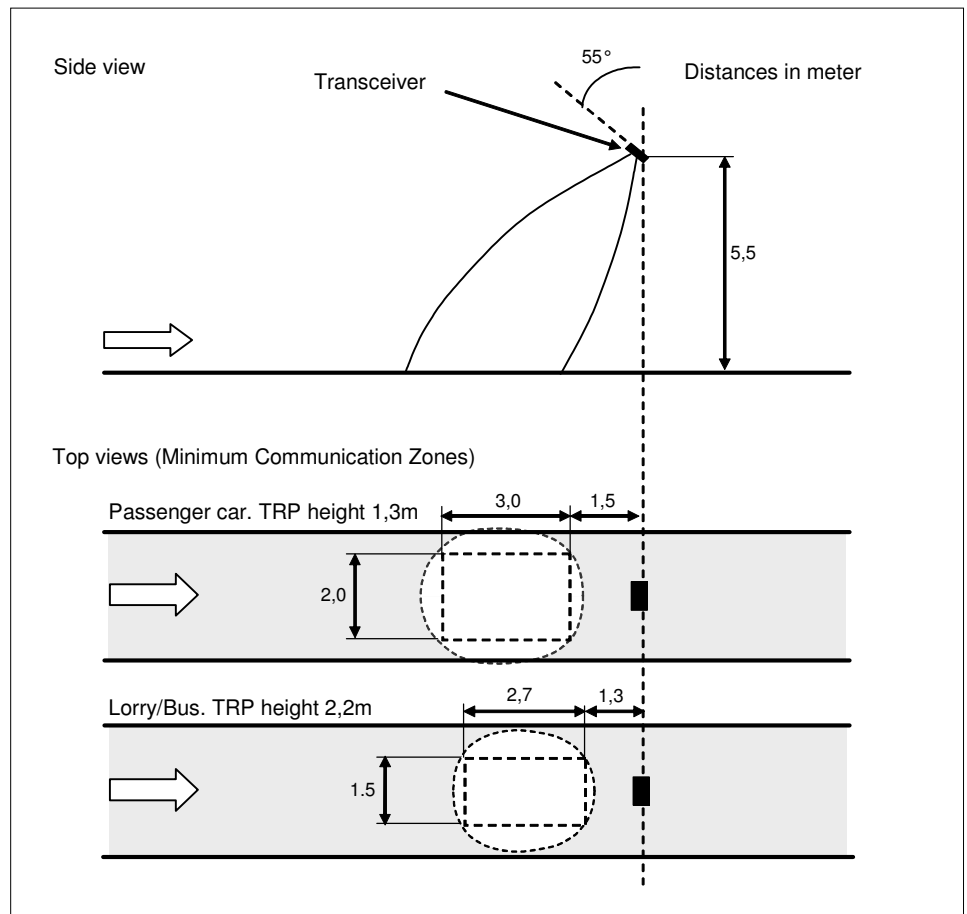
A suite of different command and messages are available to enable the Host Computer to configure the Transceiver and to transfer data between the roadside system and passing Transponders.

Host software source code examples for Linux and Windows are available showing how to implement the communication with the Transceiver.

The unit contains a web based interface for

configuration and maintenance of the unit and a standard Web browser can be used to get access to this interface. The interface can be used to supervise internal events in the Transceiver as well as to log all the Host and Transponder communication messages.

Additional standard accessories for the Transceiver include TRX-cable and a power supply.



Communication zone with Transceiver TRX1320A/E

**Transponders / On Board Units**

The PREMID® by Kapsch Transponders and On Board Units are available with different functionality to fulfil user and issuer requirements in various DSRC Applications.

The basic functionality of the unit is to provide a secure storage for application data and to provide a dedicated communication channel between the vehicle and the roadside when the unit passes through a Transceiver communication zone.

The memory in the Transponder is partitioned into data structures defined by 'Elements' and 'Attributes' according to the CEN DSRC and EFC standards.

**Transponder TS3204**

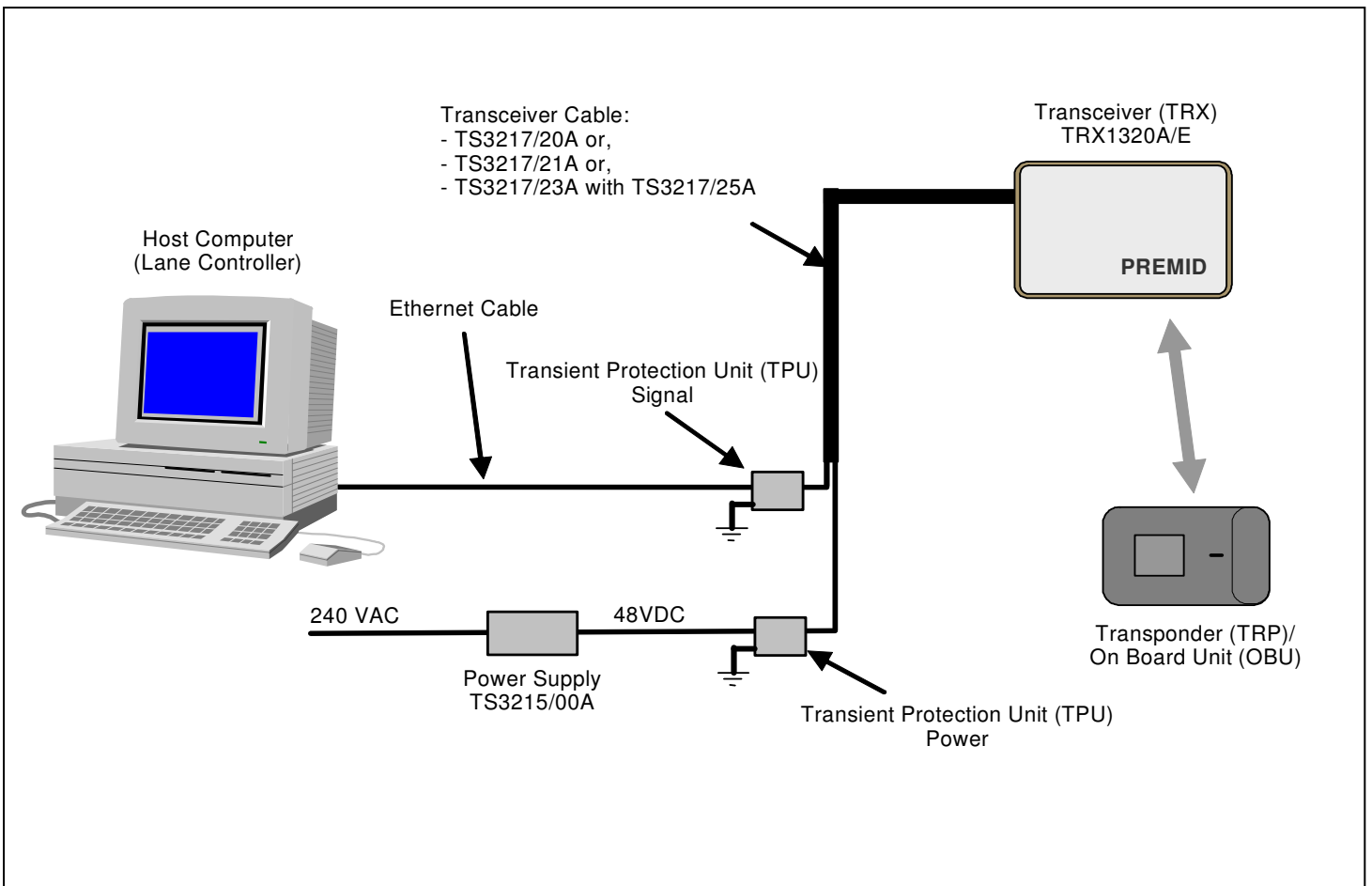


This basic model of Transponder is powered by a built-in battery and it is designed to be mounted on the inside of the vehicle windscreen by using a selection of brackets suitable for both passenger cars and Lorries and buses.

Security functions based on the DES and Triple-DES encryption algorithms facilitate data protection and authentication.

The Transponders include an audible interface to the driver by means of a built-in buzzer. A tamper detection option provides a possibility to detect if the Transponder is removed from the vehicle.

The Transponder can be customised with operator/issuer specific graphics such as a label and/or a logotype print.



**Link characteristics****Downlink**

- > Frequencies: 5.7975, 5.8025, 5.8075 and 5.8125 GHz
- > Emitted power: Maximum 2W (33dBm) E.I.R.P.
- > Antenna Polarisation: Left hand circular.
- > Modulation: Two level amplitude modulation
- > Data Coding: FM0
- > Data rate: 500 kBit/s

**Uplink**

- > Subcarrier frequencies: 1.5 and 2.0MHz
- > Antenna Polarisation: Left hand circular
- > Subcarrier modulation: M-PSK
- > Data Coding: NRZI
- > Data rate: 250 kBit/s

**Reference standards**

- > EN 12253 RTTT-DSRC Physical Layer using microwaves at 5.8GHz
- > EN 12975 RTTT-DSRC Data Link Layer: Medium Access and Logical Link Control
- > EN 12834 RTTT-DSRC, Application Layer
- > EN 13372 DSRC Profiles for RTTT Applications
- > EN ISO 14906 EFC - Application Interface for DSRC.
- > Compliant with the GSS specifications.
- > Compliant with the A1, CARDME and CESARE/PISTA specifications

**Link components****Transceiver**

- > TRX1320A/E Single Lane Transceiver

**Cables**

- > TS3217/23A Transceiver Cable, length specified at time of order, excl. connectors
- > TS3217/25A Connector kit including Transceiver connector
- > TS3217/20A/XX Transceiver Cable, terminated at Transceiver end.  
Available length: XX = 40, 50, 60, 70, 100 m.
- > TS3217/21A/XX Transceiver Cable, terminated in both ends.  
Available length: XX= 10, 14, 18, 22, 26, 30 m.

**Road Side Accessories**

- > TS3215/00A Transceiver Power supply 48 VDC, 1 Amp
- > Crimp tools for connector kit.

**Transponders**

- > TS3204/02A Transponder Unit basic, with buzzer (excl. bracket)
- > TS3204/00A Transponder Unit with buzzer and tamper detection (excl. bracket)
- > TS3220/00A Transponder bracket, raked windscreens (passenger cars)
- > TS3220/01A Transponder bracket, vertical windscreens (lorries and buses)
- > TS3220/05A Slide-in transponder bracket, raked windscreens (passenger cars)

**System documentation****Data Sheets**

- > Single Lane Transceiver TRX1320A/E
- > Transponder Unit, basic TS3204/02A
- > Transponder Unit, tamper detection TS3204/00A

**Technical Manuals**

- > System Description TS3200/06
- > Programmer's Manual TS3200/06, Roadside System
- > Installation and Service Manual. TS3200/06, Roadside System
- > Device Description Transponder TS3204

**Environmental impact**

- > All TS3200/06 products include components selected to minimise environmental impact and are marked to assist recycling or safe disposal

**Safety in use**

- > Emitted power is according to EN 12253 and IEEE C95.1 specified limits, 3kHz to 300GHz.

**Type approvals**

- > The TS3200/06 components are CE-marked and conform to the EU Directives: 1999/5/EC, 89/336/EEC and 73/23/EC for Radio, EMC and Low Voltage.