Transceivers for Optical Networks in Automotive Applications

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Abstract

The need for in-car-networks being capable of increased datarates led to the development of optical data links via POF (plastic optical fibre).

At Infineon Technologies, currently optical transceivers are developed and under preproduction for the MOST (media oriented systems transport) as well as for the byteflight system. The two optical networks are quite different concerning electrical/optical parameters and system design.

Transceiver technology is based on advanced components, on a high integration level within one package and a new concept for fibre coupling.

Moreover, the development of transceivers for the next generation of optical networks has been started.

1 Introduction

Up to now, mainly copper cables have been used for the data transfer within cars. But modern automobiles include more and more electronic equipment for control-, safety-, communication- and entertainment applications generating a huge amount
of data which must be transmitted between the devices. The increasing datarate (10 to 100 MBit/s) affords optical data links via POF (plastic optical fibre).

Bus systems with physical layers based on POF have especially in automotive applications many advantages compared to their electrical counterparts:

- light cables
- high data rate at low cost
- immunity to EMI noise and increased transmission security
- no crosstalk between fibres
- complete electrical isolation, no ground loops

In contrast to silica fibre technology, the handling / connectorisation is easy and the system cost is low when using POF in combination with suitable transceivers.

Siemens and now Infineon Technologies Fiber Optics Group started many years ago to realise plastic fibre optical components. The standard components for up to 5 MBps have extensively been used in trains and different industrial applications. Currently, optical transceivers are under development and preproduction for two different, new optical networks in cars.

2 Actual Optical Networks for Automobiles

In automotive applications, there is a clear difference between multimedia and safety relevant applications. This fact also influences the development of two different optical networks.

For multimedia applications, the first time that an optical network was used in a series car production was in 1997, when DaimlerChrysler introduced the D2B optical bus with a bandwidth of 5.6 MBps in the S-Class and afterwards adopted it to all DC car classes. D2B as well as the following optical multimedia network called MOST (Media Oriented Systems Transport) use a ring topology (see Fig. 1). The MOST system, which has been developed by OASIS Silicon Systems and partners, enables the user to transmit data at about 22 MBps. The multimedia system can connect e.g. GPS, telephone, radio, TV, active speakers, CD, rear seat video and many more with a user-friendly Human/Machine interface. A quasi-standard was defined by the MOST consortium in close collaboration with various automobile manufacturers under the leadership of BMW, DaimlerChrysler and Audi who will use MOST in their production starting in 2001/2002. The MOST consortium developed from a partnership of car makers, set makers and system architects and is open to any interested company.

The second optical bus system handles safety and information data at 10 MBps in an active star (see Fig. 1) network called byteflight system developed by BMW. It