BSD – Blind Spot Detection
Master Control Unit: BSD3.0 SG1
Slave Control Unit: BSD3.0 SG2

System Function and Purpose

The BSD is an advanced driver assistant system, to warn the driver of the subject vehicle against potential collisions with vehicles to the side and/or to the rear of the subject vehicle, and moving in the same direction as the subject vehicle during lane change manoeuvres. The system therefore detects vehicles to the rear and sides of the subject vehicle.

When the subject vehicle driver indicates the desire to make a lane change, the system will evaluate the situation and warn the driver if a lane change is not recommended. BSD is not meant to encourage aggressive driving. The absence of a warning will not guarantee that the driver can safely make a lane change manoeuvre. The system will not take any automatic action to prevent possible collisions. Responsibility for the safe operation of the vehicle remains with the driver.

BSD System Architecture

The BSD consists of two radar sensor units which are mounted behind the rear bumper in the left and right rear corners of a car so that the rear and the sides of the car can be observed.
One of the units is the main control unit "master" and the other is the "slave".
The two units interchange data between each other via the sensor CAN-bus.
The master interchanges data with other electronic control units of the vehicle via the vehicle CAN-bus.
Both units incorporate an RF part and a DSP to perfom the radar signal processing.
Only the master incorporates a microprocessor which handles the communication to the vehicle CAN-bus.
The warning lamps for the left and the right side are connected to the slave.

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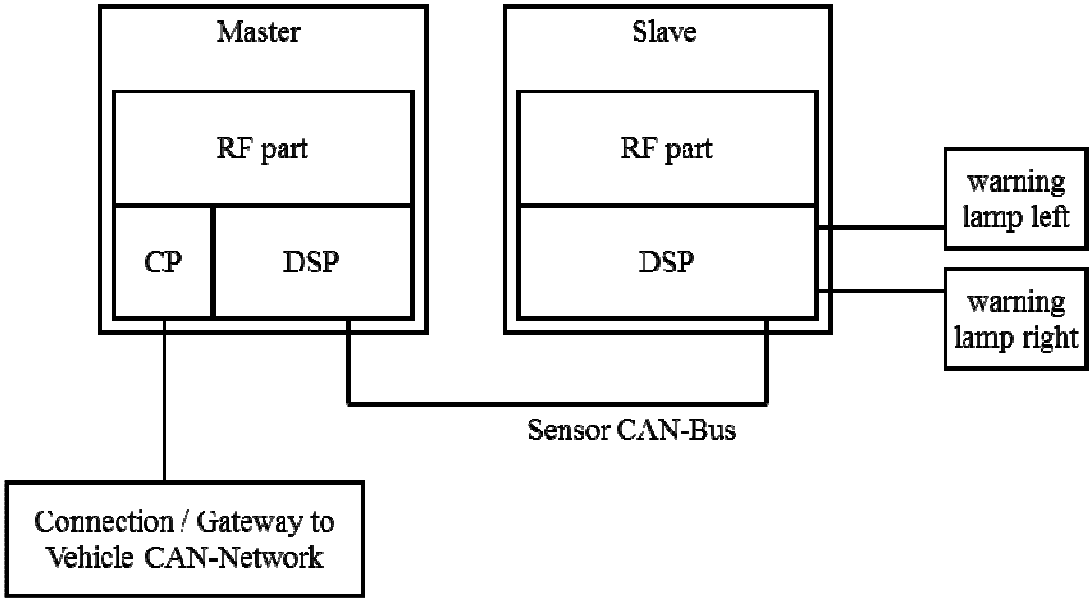
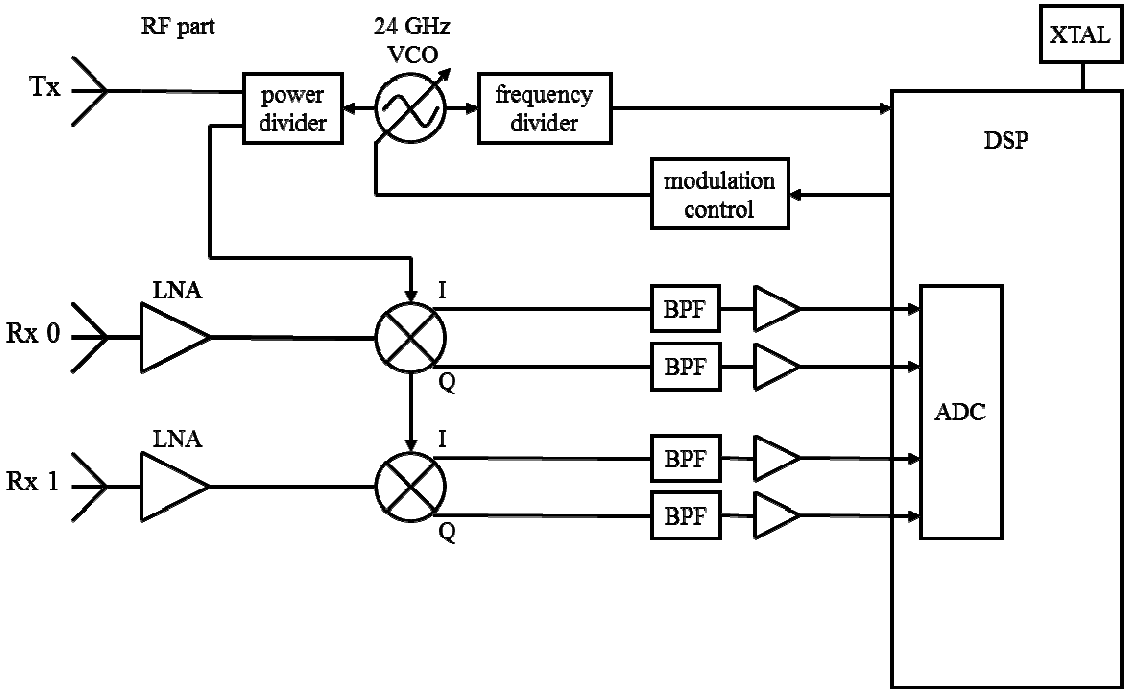


block diagram of BSD system architecture



block diagram shows RF part and DSP part for master and slave

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The RF parts each consist of

- one 24-GHz-VCO,
- one transmit antenna and
- two receivers (each consisting of antenna, LNA, mixer, BPF and base-band amplifier).

The transmit signal is generated by the 24-GHz-VCO.
The 24-GHz-VCO is frequency modulated by a modulation control circuit and the DSP.
A frequency divider is used to align the modulation of the 24-GHz-VCO and to keep it within the frequency band limits.
The transmit antenna is a microstrip patch antenna array with 1x8 elements.
It is designed to illuminate the rear and the side of the vehicle and is thus a medium gain antenna.
The two receivers down-convert the receive signals directly to zero-IF by using the 24-GHz-VCO signal.
The base-band receive signals are digitized by ADCs in the DSP.
The receive antennas are microstrip patch antennas which also have a medium gain (1x8 elements).

Technical Data

Model Name of Master	BSD3.0 SG1 – HRE
Model Name of Slave	BSD3.0 SG2 – HRE
Supply Voltage	+9 V … +15 V
Supply Current	Typ. 0,36 A
Frequency Band 1	24075 MHz ... 24175 MHz
Modulation Bandwidth	< 100 MHz
Frequency Band 2	24150 MHz … 24250 MHz
Modulation Bandwidth	< 100 MHz
Frequency Band 3	24050 MHz … 24250 MHz
Modulation Bandwidth	< 200 MHz
Modulation	FMCW
EIRP average	< +12,7 dBmW
EIRP peak	< +20 dBmW
Antenna Type	microstrip patch array
Transmit Antenna Gain	11 dBi
Operating Temperature Range	-40...85°C

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Abbreviations

ADC	analog-to-digital converter
BPF	band pass filter
CAN	controller area network
CP	communication processor
DSP	digital signal processor
EIRP	equivalent isotropically radiated power
FMCW	frequency modulated continuous wave
IF	intermediate frequency
LNA	low noise amplifier
RF	radio frequency
Rx	Receive
Tx	Transmit
VCO	voltage controlled oscillator
XTAL	crystal oscillator

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