

## Product Brief

# Automotive 24GHz radar development kit

Based on Infineon AURIX™ family and BGT24A MMIC family

This development kit allows customers to implement and test 24GHz radar applications with range-Doppler signal processing. It comprises Infineon's BGT24A transceiver MMIC family, here BGT24ATR12, and the AURIX™ – 32-bit radar microcontroller family e.g. SAK-TC264DA – 40F200 for high performance signal processing, including FFT acceleration engine and extended memory for radar image storage.

The CPU is already pre-programmed with a sample application which samples up to four of the transceiver chip's IF channels. The measured results are transmitted via a 10/100 Mbit ethernet connection. The enclosed firmware supports transmission via ethernet and data display on a Windows PC. ADC results are then processed in a classical FMCW processing chain including but not only Hardware accelerated FFT processing. Drivers for FFT engine and DMA are included in the package. Interim processing results (like Range FFT) can be sent over Ethernet Interface to a PC for debugging and/or display.

### Contents of the kit Includes

- > Range-Doppler radar system with 2 Rx antennas and 1 Tx antenna based on AURIX™ TC264DA and BGT24ATR12

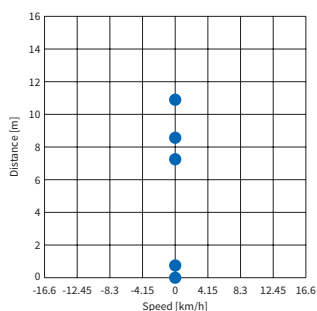
### Available through [www.MyInfineon.com](http://www.MyInfineon.com)

- > Documentation for AURIX™ and BGT24A
- > All documents to produce hardware (Gerber-files, BOM, schematics)
- > Source code for AURIX™ and PC-software (GUI)
- > Documentation including protocol description and start-up guide
- > SW environment for basic motion detection containing firmware code for motion detection processing

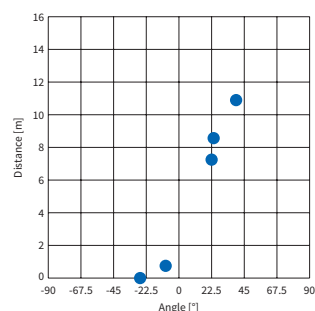
### Development kit features

- > 24GHz range-Doppler radar system for blind spot detection
- > TC264DA microcontroller for sampling and signal processing of the analog signals on-board
- > BGT24ATR12 24GHz radar IC
- > Range measurement
- > Speed measurement relative to car
- > Angle of arrival measurement
- > RCS measurement
- > 20 measurements / second update rate
- > Outputs via 100 Mbit/s ethernet or CAN
- > Target list with up to 32 targets or sampled raw data
- > System form factor close to production: 140 x 80 x 15 mm including Tx and Rx antennas

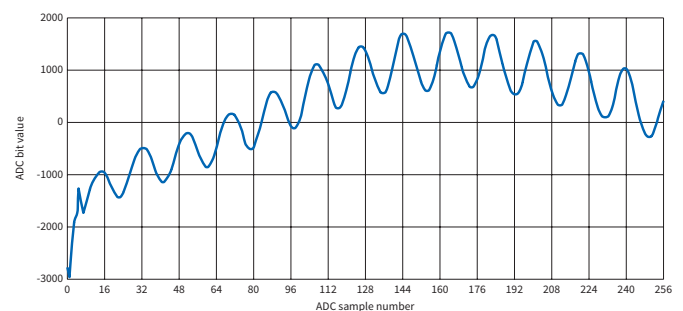
Radars targets with speed measurement



Radars targets with angle measurement

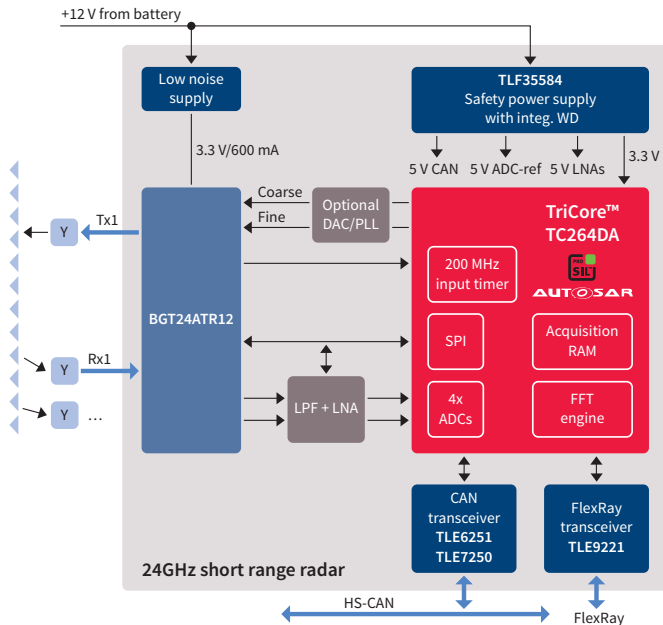


ADC value measurement



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## Based on Infineon AURIX™ family and BGT24A MMIC family



### BGT24A RF transceiver IC

Infineon's BGT24ATR12 is a Silicon Germanium (SiGe) MMIC for signal generation and reception, operating in the 24 GHz ISM band from 24.00 to 24.25 GHz. It is based on a 24 GHz fundamental voltage-controlled oscillator. A switchable frequency prescaler, with output frequencies of 1.5 GHz and 23 kHz, is included. The main RF output delivers typ. 11 dBm signal power to feed an antenna. Output power sensors, as well as a temperature sensor, are implemented for monitoring purposes. The device is controlled via SPI. The MMIC is packaged in a 32-pin leadless RoHS-compliant VQFN package and is AEC-Q100 qualified.

### TC264DA AURIX™ MCU

The AURIX™ radar processor family has products ranging from single-core lockstep to triple-core lockstep with an internal memory of up to 2.7 MB SRAM for radar image storage. It also includes radar signal processing with windowing functionality, flexibility in radar signal acquisition with 4x internal ADCs, the option of connecting external ADCs (interface for connecting up to 16-bit ADCs), high-precision input timers, high-precision output

timers for DAC, an innovative single supply 5 V or 3.3 V and safety support for ISO 26262 compliance.

### Antenna included

The design includes 1 Tx-antenna (10 x 60° opening angle) and 2 Rx-antennas (10 x 85° opening angle). This allows tracking of objects at a distance of up to 50 meters. Using range-Doppler and angle-of-arrival technology, several objects can be detected at the same time. Each object is defined by distance, speed, direction, reflectivity and angle.

### Ethernet connection

The measured results are transmitted via a 10/100 Mbit ethernet connection. The enclosed firmware supports transmission via ethernet and data display on a Windows PC.

### CAN bus

A CAN bus with a speed of up to 1 Mbit/s is included in the hardware. The measured results are also transmitted via CAN bus using a proprietary protocol.

### Power supply

The reference design supports input voltages between 8–14 VDC. A wall plug adaptor is included in the kit.

### IF amplifier

The IF signals from the radar frontend are amplified via a two-stage amplifier. This allows an increase in the dynamic range of the TC264D AURIX™ processor.

### User LEDs/buttons

Additional LEDs and buttons can be accessed from the user software. This allows users to write their own stand-alone software using this hardware.

### Firmware

The firmware is pre-programmed on the board and also delivered in source code format. This allows users to extend/change the software or use this software as a basis for their own development.

### Orderable part number

KIT\_ATV\_24GHz\_RADAR (available March 2016)

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