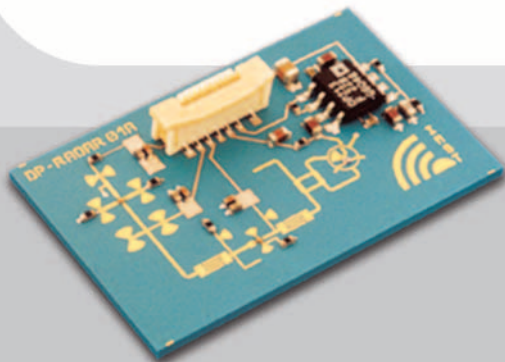


Cooperation Opportunity

The RADAR demonstrator is a first step towards a product. **IMST** and DuPont offer further development taking individual specifications into account. Parameters like costs, dimensions or functionality can be adapted to customers requirements. A demonstration of the sensor's performance can be arranged on short notice. Further discussions to initiate activities on a cooperation basis are welcome. This opportunity is particularly addressed to:

- Automotive: OEM or supplier
- Software house for signal processing
- System or component supplier



LTCC Radar Frontend

Contact us



Contact us for more detailed information. We look forward to meeting you to discuss your specific needs.

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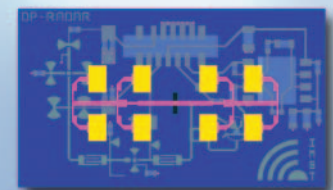
Radar Sensor



24 GHz RADAR Module for Automotive and Industrial Applications



A Joint Project of IMST GmbH and
DuPont Microcircuit Materials



LTCC Patch Antenna

- Compact Size
- Low Costs
- Rugged Design



Radar Sensor

IMST has developed a RADAR demonstrator operating in the 24 GHz band. The sensor is designed to be used in vehicles as driver assistance system. FMCW method is utilized to measure distances up to 30 m and velocity of obstacles around the car. Especially safety enhancement systems like collision warning and mitigation but also comfort features can be realized. Moreover, the sensor is capable to be integrated in manifold industrial applications where distance and velocity have to be determined with high precision. Another interesting field of application is the monitoring of buildings and real estates, because the module concept is qualified for the free 24 GHz ISM band, too.



Radar Demonstrator

Goal Specifications

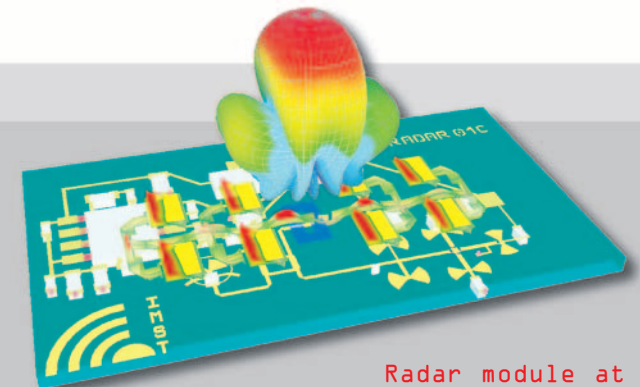
The main focus of the development is directed towards the reduction of costs in comparison with conventional sensors. Hybrid circuit technology using a 5-layer LTCC substrate from DuPont Microcircuit Materials has been realized. The patch-antenna is printed on one side of the multilayer ceramic, while the RF frontend has been integrated on the opposite side. The RF part of the demonstrator is as small as 34 mm x 21 mm. Signal conversion and signal processing are executed on an external board, which is presently connected via USB interface with a PC. All results will be evaluated and presented on the computer. A software with graphical user interface allows the setting of sensor and evaluation parameters. The table summarizes the goal specifications of the RADAR module:

Parameters	Goal Specifications
Method	FMCW
Centre Frequency	24 GHz
Bandwidth	2 GHz
Resolution	± 1 cm
Obstacle Separation	± 10 cm
Distance	10 cm to 30 m
Output Power	< 10 dBm

Antenna Characteristic

IMST has developed an unique patch antenna for the Radar sensor, which is integrated on the same LTCC multilayer substrate on the opposite side of the RF front-end. Aperture coupling is utilized to achieve a reliable transition from the frontend circuit to the buried feeding network. An expensive and susceptible connector has been avoided. The patch array is characterized by its broadband radiation performance, which has been achieved by a specific feeding geometry and configuration. The overall properties are:

- 10 dBi antenna gain
- 10 dB bandwidth over 2.5 GHz
- 3 dB beamwidth: $\pm 30^\circ$ azimuth
 $\pm 15^\circ$ elevation



Radar module at
24 GHz on LTCC