Single Chip 24 GHz Radar Transceiver

Innovative—Patented techniques achieve:

» Superior Tx-to-Rx and Rx-to-Rx isolation (USPTO 8,044,845)

» Accurate frequency calibration (USPTO 7,804,369)

Flexible—Programmability allows:

» Seamless interfacing to a variety of antenna apertures or the use of external LNAs

» Low power duty cycling and the use of single or dual receivers for consumer, industrial, security, traffic management and automotive applications

Transmit and Receive
Adapts across multiple applications by allowing the precise control and monitoring of the transmit frequency and bandwidth through digital interface software. Integrated frequency calibration allows the utilization of the full bandwidth without exceeding emission masks, even when operated over large temperature ranges. Adjustable transmit power and receiver gain enables the chip to be used with different antenna gains, external low noise amplifiers, external power amplifiers, or switches for unparalleled flexibility in many applications.

By using two direct-conversion receivers, extremely accurate calculations of target positions are possible. A 250 MHz baseband bandwidth permits measurements of targets with large ranges of velocity.

A standard serial interface is flexible enough to use with any microcontroller or digital signal processor. It can change the transmit frequency over 400 thousand times per second.

This product is the only 24 GHz frequency modulated continuous wave (FMCW) Radar transceiver that is self-contained in a single 5 mm x 5 mm package. All other similar products require additional components to modulate the frequency. The highly-integrated design facilitates measurements of two dimensional position and velocity of multiple targets with short measurement cycles.

Ideally suited to automotive, security, government, and industrial applications, this product can be customized for a variety of other uses. ViaSat can integrate the RF chip incorporating all transceiver functions with your antenna, baseband hardware, and signal processing software, or build a custom transceiver/sensor for your application.

A SINGLE CHIP
The benefits of all RF components on a single chip—especially important at millimeter wave frequencies:

Performance Reliability
Eliminates performance variation risks inherent in current products. The performance you receive is consistent from chip to chip in contrast to using multiple discrete components.

Cost Savings
In addition to the performance advantages, there are significant cost savings. A single monolithic transceiver, in a surface mount package, lowers total costs and makes production easier compared to multiple discrete components.

Integration of the transceiver with processing circuitry, antennas, and other components is simpler and less expensive, with no post-assembly tuning or manual alignment required.

Smallest Size
Smaller and lighter than any other internally modulated 24 GHz RADAR transceiver on the market, the surface mount package is only 5 millimeters square.

SINGLE CHIP 24 GHZ RADAR TRANSCEIVER AT-A-GLANCE

Features
» Transmitter with adjustable output power up to +7 dBm

» Low phase noise voltage controlled oscillator

» Low VCO tuning gradient for low noise frequency modulation

» Dual direct conversion receivers with adjustable gain

» Excellent transmit-to-receive isolation

» Internal DAC for precise frequency control

» PLL for accurate frequency calibration

» Standard serial programming interface

» Low drop out DC voltage regulators

» ESD protection

» Operating temperature range from -40° to +125° C
**INTERNAL PLL**
- PLL Reference, Max: 100 MHz
- Tuning Error Output: 0 to 3.1 V
- External Loop Filter: User Specified Loop BW

**FREQUENCY MODULATION**
- Three Methods
  - Internal 15-bit DAC
  - Modulated PLL reference
  - Voltage ramp
- DAC Tuning Gradient: 9 KHz/bit, Typical
- VCO Tuning Gradient: 30 MHz/V, Typical
- Phase Detector Gain: 4 mA/2π rad, Typical

**ENVIRONMENTAL**
- Operating Temperature
  - Minimum: -40° C
  - Maximum: 125° C

**MECHANICAL**
- Overall Size: 5 x 5 mm
- Overall Thickness: 1 mm

**ACTIVE PRODUCTION**
- Over 1 million per year capability
- Available in JEDEC trays or tape & reel

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**HIGH VOLUME MICROWAVE RADARS LESS THAN 1 IN²—POSSIBLE ONLY WITH THE SC3001.2**

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**CONTACT**

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