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DATA SHEET

60GHz Industrial AoPCB RADARs

TEXAS INSTRUMENTS Design Network Platinum Partner

60GHz Industrial AoPCB RADARs

OVERVIEW

The 60GHz Industrial AoPCB RADARs with Antenna on PCB (AoPCB) from Mistral are easy to use, compact, light-weight RADAR modules providing high functionality for Industrial applications. Based on Texas Instruments IWR6843 ES2.0 ultra high-resolution single chip FMCW RADAR sensor SoC, the mmWave Industrial RADAR on Modules are ideal for low power, self-calibrating, ultra-accurate RADAR systems in industrial environment.

The Industrial RADARs operate at frequency bands of 60-64GHz. These RADAR modules are among the most powerful in its category currently in market and come with advanced features such as FMCW Transceiver, DSP for Advanced Signal Processing, Hardware Accelerator (for FFT, Filtering and CFAR Processing), ARM R4F Microcontroller, Built-in Calibration and Self-test (address safety, aging and temperature-based variations). The modules include starterware and sample applications for common Industrial RADAR usages.

The Standalone RADAR modules come with Tapered 3E or ODS 1E PCB antenna to cater to different industrial applications. They support flexible interfaces like USB, CAN, UART and SPI and can be powered via USB or Header. Complex signal processing runs within the modules and only the processed Point Cloud RADAR data (Target's ID, Range, Angle and Velocity) is given out over serial/CAN interfaces. In addition, raw data output is made available via LVDS ports, for debugging and development purpose.

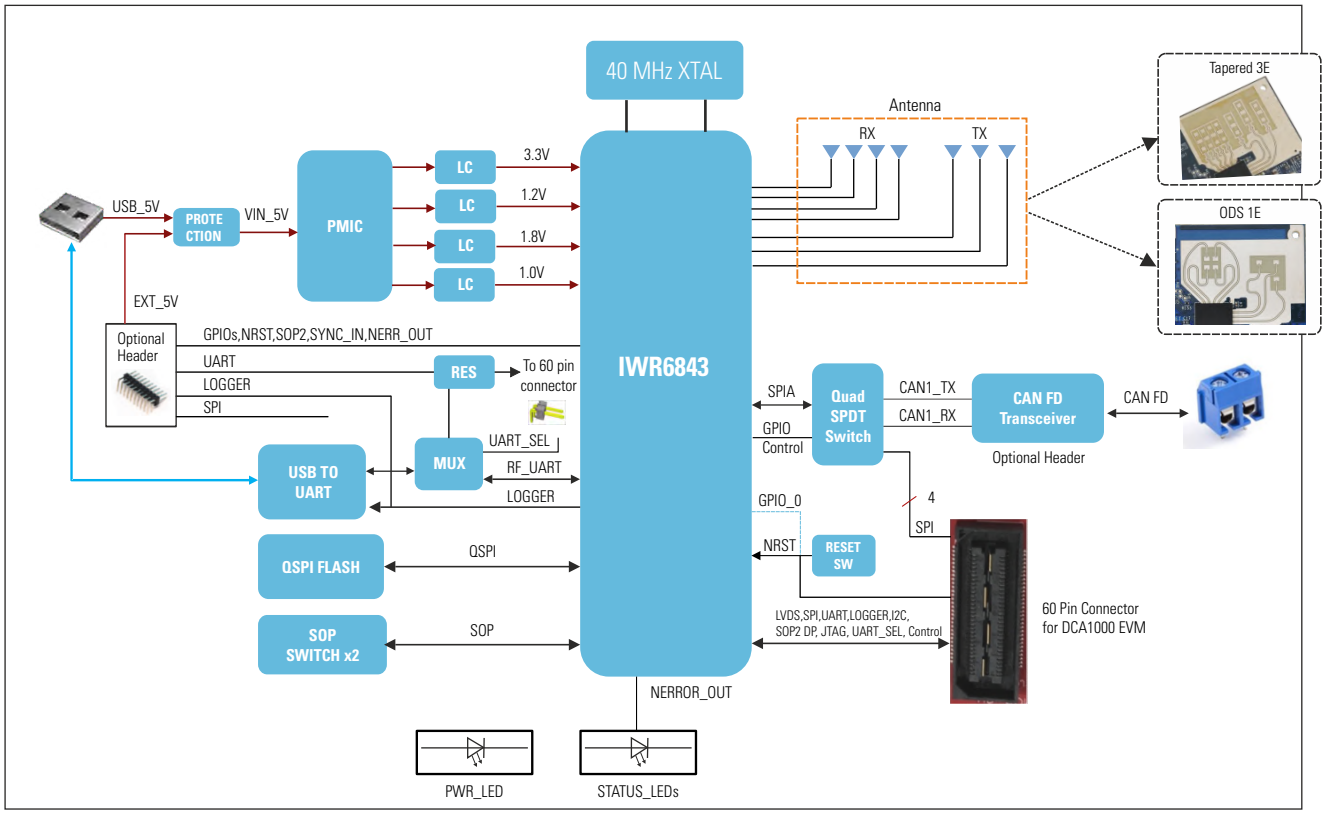
FEATURES

- Small, optimized and ready to use RADAR modules
- USB powered
- Built-in Calibration and Self-test
- Flexible Connectivity: CAN, UART, SPI, I2C, GPIOs, JTAG and LVDS
- Supports TI's SDK 3.5
- Supports raw data capture thru' DCA1000 EVM

The Raw ADC data capture can also be enabled by pairing with TI's DCA1000EVM real-time data capture adapter via the 60-pin Samtec connector. The 60GHz Industrial AoPCB RADAR come with TI SDK, along with object detection sample application.

The small footprint of the RADARs ensures that customers can design custom enclosure to suit their application. Mistral can also build and provide custom IP6x compliant enclosures based on the customer requirements.

BLOCK DIAGRAM - 60GHz Industrial AoPCB RADAR - Tapered 3E / ODS 1E



SPECIFICATIONS

The 60GHz Industrial AoPCB RADARs are built around IWR6843 ES2.0 from Texas Instruments assuring long lifecycle and support.

- mmWave RADAR
  - FMCW Transceiver with Integrated PLL, Transmitter, Receiver, Baseband and ADC
  - 60-64GHz Coverage with 4GHz Continuous Bandwidth
  - Four Receive Channels and Three Transmit Channels
  - Built-in Calibration and Self-test
  - ARM® Cortex® R4F-Based Radio Control System
  - Hardware Accelerator for Signal Processing (FFT, Filtering and CFAR Processing)
  - C674x DSP for Advanced Signal Processing
- Antenna Pattern: Tapered Three Elements and ODS One Element
- Firmware Support
  - Necessary Drivers, OSAL, mmWaveLink, mmWaveLib, mmWave API, Binary RADARs Firmware
  - Supports TI's SDK 3.5
  - Sample applications: Obstacle detection out of box demo
  - Chirp configuration files for
    - Ultra-short Range, Short Range and Medium Range
- Peripherals Support
  - CAN for external connectivity
  - 1 SPI Channel, 1 UART, I2C, GPIOs Interface Support
  - JTAG and 2-Lane LVDS Interface for Raw ADC Data and Debug
- Power: 5V @ 1.2 A (max)
- Dimensions (L x W x H): 54 x 53 x 18 mm
- Weight (gms): 15
- Operating Temperature Range: -40°C to 85°C

PERFORMANCE PARAMETERS

60GHz AoPCB ES2.0				
Antenna Type	Tapered 3E		ODS 1E	
Range max	Adult	20m	Adult	9m
	Car	50m		
Azimuth FOV max	at 2m	150°	at 2m	150°
	at 3m	130°	at 8m	120°
	at 5m	110°	at 9m	60°
	at 8m	90°		
	at 20m	80°		
	at 50m	40°		
Elevation FOV max	at 3m	60°	at 2m	150°
	at 20m	16°	at 8m	110°
			at 9m	50°
Resolution at bore sight	Range	6cm	Range	4.6cm
	Azimuth Angle	17°	Azimuth Angle	29°
	Elevation Angle	58°(computed)	Elevation Angle	29°

MISTRAL SOFTWARE IPs

Mistral offers software IPs that can support and accelerate product development lifecycle. These IPs are not a part of standard deliverables, customer can optionally order based on development needs.

Host Parser Application

Helps product developers to parse the point cloud data received from the RADAR and makes it available as an API.

- Runs on: Linux Ubuntu machines, Windows 10 (WIP)
- Python 3 implementation
- Consists of:
  - Base library and Parser with documented API
    - Does Real-time capture of Point cloud data and range profile TLVs
    - Supports 5 to 20 frames per second
  - Sample application (using the above library)
    - Connects and sends configuration file to the RADAR on start up
    - Saves the Point cloud data in CSV or text file
- Supports TI mmWave SDK 3.5.0.4 and out of box demo
- Works with xWR1843, xWR6843 and xWR6843AoP RADAR sensors
- Deliverables: Python scripts, API document and User guide

Remote Firmware Upgrade

Enables upgrade of the RADAR firmware remotely over UART interface for commercially deployed products.

- Runs on Linux Host machines
- Python 2 / 3 implementation
- Based on modified TI mmWave SDK 3.5.04
- Default factory copy and working copy of firmware for Failure Protection
- Working copy is upgradable
- CRC based firmware health check
- Works with xWR1843, xWR6843 and xWR6843AoP RADAR sensors
- Deliverables: Python scripts, Secondary bootloader binary, firmware binaries, TI mmWave SDK patches, build guide and user guide

Note: Requires few HW changes for older modules. Documented

Multi Configuration Management

Helps load and store up to five RADAR configurations and manage them remotely during both development and after deployment. One of the configurations can be set to Autoload on Power-on enabling instant streaming of point cloud data.

- Runs on Linux Host machines
- Python2/3 implementation
- Based on modified TI mmWave SDK 3.5.04
- Capability to save up to 5 configuration parameter set files and to define any one of them as Default
- Auto load of default configuration parameters during RADAR module boot
  - Does not required loading of configuration parameters from the host
- Works with xWR1843, xWR6843 and xWR6843AoP RADAR sensors
- Deliverables: Python scripts, firmware binaries, TI mmWave SDK patches, build guide and user guide.

APPLICATIONS

- Building/Factory Automation
- Robotics
- People Counting
- Traffic Monitoring
- Motion/Occupancy Detection
- Industrial Fluid Level Sensing
- Displacement Sensing
- Proximity/Position Sensing
- Gesture Recognition

CUSTOMIZATION

Mistral provides support to customize the AoPCB module for other variants of mmWave Industrial RADAR chips from Texas Instruments. Mistral also offers customization services for applications such as robotics, fluid level monitoring, People counting, vital signs monitoring and collision warning among others.

In addition, Mistral can provide customization services to support RADAR Drivers and Integration, Chirp Profile Tuning, Multi-Core SOC Application Development, RADAR integration with Camera Fusion, FCC / CE Certification, IP6x Enclosure Design, Thermal Validation and System Integration based on the customer need.

We develop products and System on Modules customized to customer specific requirements. With our expertise in Industrial Automation, Industrial RADAR and related imaging sensors and video analytics, we can help developer's reduced time to market for their products while ensuring high reliability and low cost of development.

Mistral is a TI Design Network partner and has worked with Texas Instruments on the EVM [Evaluation Module] and reference design of IWR6843AOP Chipset.

DELIVERABLES

- 60GHz Industrial AoPCB RADAR
- Quick Start Guide
- Software Package and Documentation (Online)

ORDERING

For ordering information please email us at sales@mistralsolutions.com.

ABOUT MISTRAL

Mistral is a technology design and systems engineering company providing end-to-end solutions for product design and application deployment. Mistral focuses in three business domains: Product Engineering Services, Aerospace Defense & Homeland Security.

Mistral provides total solutions for a given requirement, which may include hardware board design, embedded software development, FPGA design, systems integration and customized turnkey solutions.

Mistral's strategic partnerships with leading technology companies help provide customers with a comprehensive package of end-to-end solutions.

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