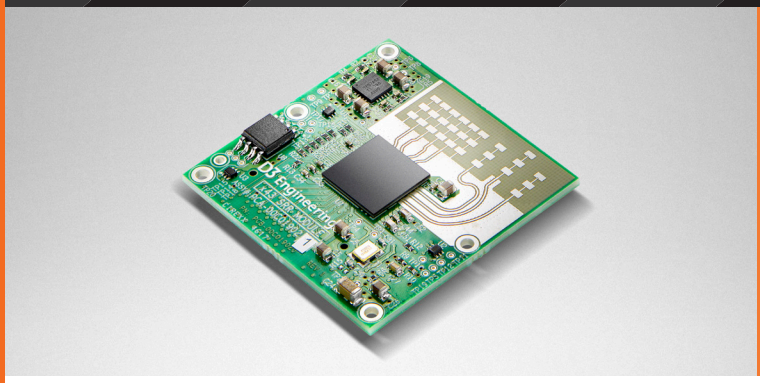
PRODUCT FAMILY DATA SHEET

DESIGNCORE®
EMBEDDED AUTOMOTIVE RADAR MODULES

D3 Engineering



D3 Engineering's compact radar modules facilitate rapid integration of real-time radar into automotive applications.

High performance 76-81GHz radar for vehicle control and safety applications

D3 Engineering integrates Texas Instruments mmWave radar technology into compact modules ready for integration into vehicle systems. The embedded radar modules facilitate development of applications ranging from blind spot detection and parking assist to cross traffic alert and adaptive cruise control.

76-81GHZ RADAR-ON-A-CHIP

These modules integrate a TI mmWave radar-on-a-chip RF front end with antennas and a variety of communication and connectivity options.

The self-contained FMCW transceiver chip simplifies the implementation of automotive radar sensors in the 76-81GHz band. Texas Instruments' low power 45nm RFCMOS process enables monolithic implementation of a three transmitter / four receiver system with built-in PLL and ADC.

With most of the required functions integrated on the monolithic CMOS die, D3 Engineering created a compact radar module incorporating the TI mmWave device, power management, boot PROM ICs, and a PC board antenna. The D3 Radar Module is one third the size and half the weight of state-of-the-art lidar range finders. This allows easy placement of the sensor in plastic enclosures for rugged designs with minimum weight and no need for optics.

The ARM R4F (lock-step) based processor subsystem provides on-chip radio configuration, control, and calibration. Built-in self-test (BIST) provides continuous motoring and self-calibration of the RF and analog subsystems.

FMCW transceiver
Integrated PLL, transmitter, receiver, baseband, and ADC
76-81GHz coverage with 4GHz available bandwidth

Radio processor for built-in calibration and self-test
ARM Cortex R4F-based radio control system
Built-in firmware (ROM)
Self-calibrating across frequency and temperature

The integrated processor provides measurement output (including object location, speed, and velocity) directly over serial or CAN interface, without the need for external processing of complex radar signals.

The module is controlled via an API interface to the on-chip Cortex-R4F application processor. The user provides power and a serial connection (SPI, CAN) to set up and read data from the module. These RFICs offer additional raw data output capabilities via LVDS/CSI ports.

76-81GHZ RADAR SENSORS

Additional modules are in development to offer higher levels of performance and flexibility via a programmable digital signal processor (DSP), addressing standard short-range, mid-range, and long-range automotive radar applications.

OEM/ODM PRODUCTION MODULES AND EMBEDDED SYSTEM DEVELOPMENT

D3 Engineering supports OEM/ODM customers with embedded system development and customized production modules for automotive radar applications.

D3 Engineering is a platinum partner in the TI Design Network and a Premier Ecosystem Partner for radar and vision systems development.

FEATURES

Texas Instruments AWR1xxx mmWave all-CMOS Radar Technology

Small Form Factor Module

Low Power, High Performance

Ambient Temp Range –40°C to 85°C

Simple Interface (Serial, Power)

Easy Integration into Embedded Systems

Long-Lifetime Availability and Support

Customization and Integration with DesignCore® Platforms

ADAS APPLICATIONS

Adaptive Cruise Control (ACC)

Automatic Emergency Braking (AEB)

Blind Spot Detection (BSD)

Pedestrian/Bicyclist Detection

Lane Change Assist (LCA)

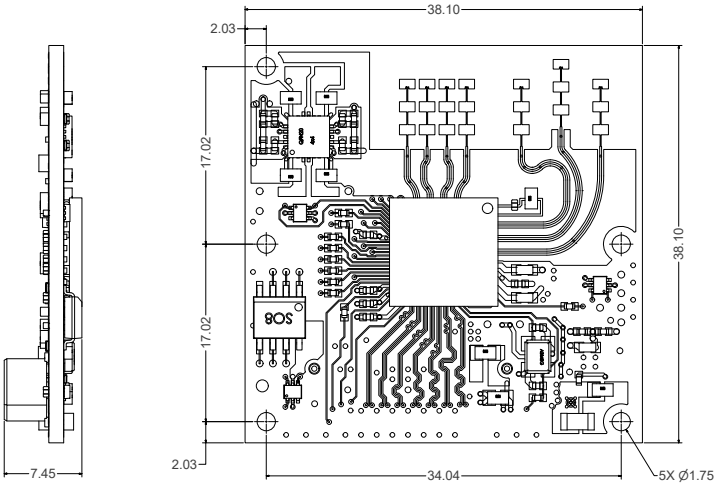
Rear Collision Avoidance (RCA)

Proximity Warning

Parking Assist

Driver Monitoring

DesignCore® RS-1443A Radar Module



D3 ENGINEERING RADAR TEAM EXPERTISE

D3 Engineering provides Starter Kits, Reference Designs, custom development services, and production modules for embedded radar systems.

- Dedicated radar test lab
- Extensive experience in >60GHz RF technology
- Hardware and antenna design
- Software, firmware, and algorithm development
- Integration and fusion of other sensor modalities (Visible, Lidar, IR)
- Algorithm optimization
- Regulatory and certification
- Prototype, pilot, and ODM production

DesignCore® RS-1443A Radar Module Connector Pinout

Pin 1	VDD_3V3	VDD_2V2	Pin 2
Pin 3	VDD_3V3	VDD_2V2	Pin 4
Pin 5	VDD_1V2	VDD_1V8	Pin 6
Pin 7	JTAG_TMS	VDD_VIO	Pin 8
Pin 9	JTAG_TDO	CSI2_TX0M	Pin 10
Pin 11	JTAG_TDI	CSI2_TX0P	Pin 12
Pin 13	JTAG_TCK	DGND	Pin 14
Pin 15	SPI_HOST_INTn	CSI2_TX1M	Pin 16
Pin 17	SPI_MISO	CSI2_TX1P	Pin 18
Pin 19	SPI_CSn	DGND	Pin 20
Pin 21	SPI_MOSI	CSI2_CLKM	Pin 22
Pin 23	SPI_CLK	CSI2_CLKP	Pin 24
Pin 25	DIG_SYNC_IN	DGND	Pin 26
Pin 27	DIG_SYNC_OUT	CSI2_TX2M	Pin 28
Pin 29	ERROR_INn	CSI2_TX2P	Pin 30
Pin 31	ERROR_OUTn	DGND	Pin 32
Pin 33	GPIO1	CSI2_TX3M	Pin 34
Pin 35	RS232_TX	CSI2_TX3P	Pin 36
Pin 37	RS232_RX	DGND	Pin 38
Pin 39	MCU_CLKOUT	HS_DEBUG1M	Pin 40
Pin 41	UART4_TX	HS_DEBUG1P	Pin 42
Pin 43	UART3_TX	DGND	Pin 44
Pin 45	OSC_CLKOUT	HS_DEBUG2M	Pin 46
Pin 47	GPIO0	HS_DEBUG2P	Pin 48
Pin 49	I2C_SCL	DGND	Pin 50
Pin 51	I2C_SDA	GPIO2	Pin 52
Pin 53	ANA_TEST1	EXT_CLK_IN	Pin 54
Pin 55	ANA_TEST2	WARM_RESETn	Pin 56
Pin 57	ANA_TEST3	PMIC_CLKOUT	Pin 58
Pin 59	ANA_TEST4	RESETn	Pin 60

AUTOMOTIVE RADAR MODULES

We provide modules for demonstration and prototype, and transfer the production module designs for automotive applications.

Model	D3RM-A14	D3RM-A12
Device	TI AWR1443	TI AWR1243
Radar/RF	4 RX 3 TX 76-81GHz	4 RX 3 TX 76-81GHz
Antenna	Standard	Standard
Logic Level Interfaces**	LVDS CAN FD SPI UART	CSI2 CAN FD SPI UART
Kits	Starter Direct	Starter Direct Satellite
Features	77GHz radar-on-a-chip solution for entry-level radar applications Onboard processor with algorithms for Range FFT, Doppler FFT, Angle Estimation, and Object Detection	Radar Sensor for integration with external DSP
Available	Call*	Call*

*This module is currently available as an unlicensed test module. Contact D3 for availability of CE/FCC certified modules.

**For line level interfaces with these devices, see our RS-1443A and RS-1243A Starter Kits.

ACCELERATE TIME TO MARKET

D3 Engineering provides a Radar Starter Kit for rapid development of your proof-of-concept prototype. We support additional radar system development with our proven DesignCore® Reference Designs and our full-cycle embedded system design services. Our expertise with radar, image sensors, optics, video analytics, and imaging system design will help you get to market faster, while reducing the risks and costs of new product development.

CALL: **1-585-429-1550**
EMAIL: **sales@D3Engineering.com**
VISIT: **D3Engineering.com/Solutions/Autonomous-Systems/Auto**