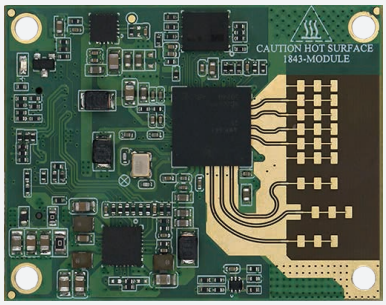
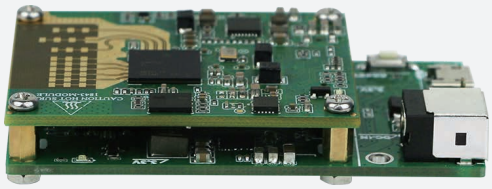
mmWave radar module

DJ-xWR1843





39mm*50mm	TI xWR1843	76~81GHz 45nm RFCMOS	ARM-Cortex R4F 200MHz	C674x DSP 600MHz	2048KB QSPI Flash

Introduction

The DJ-xWR1843 is a radar module developed by Shenzhen Haitianxiong Electronics Co., Ltd. based on Texas Instruments' xWR1843 millimeter wave radar sensor. The module size is only 39mm*50mm. The module integrates IWR1843 or AWR1843 chip, PMIC, Flash, Temperature Sensor, Micro USB and crystal oscillator, a set of dual-row pins on the board, lead to JTAG, UART, SPI, I^2C, SYNC and power supply and other required functional signal interfaces, on-board PCB antenna.
The XDS110 simulation debugging board matched with the module is used for the evaluation and development of the xWR1843 sensor. Its size is 39mm*68mm.

xWR1843 chip introduction

xWR1843 chip can be divided into IWR1843 and AWR1843.

Same:
The xWR1843 device is an radar sensor capable of operation in the 76 to 81 GHz band, and has continuous chirp up to 4GHz. The device is built with TI' s low-power 45nm RFCMOS process and enables unprecedented levels of integration in an extremely small form factor. The xWR1843 is an ideal solution for low-power, self-monitored, ultra-accurate radar systems.
The xWR1843 device is a self-contained FMCW radar sensor single-chip solution. Because it adopts TI's low-power 45nm RFCMOS process, a chip with built-in PLL, A2D converter and 3Tx, 4Rx systems is constructed. It integrates the DSP subsystem and hardware acceleration module (HWA). The DSP subsystem adopts high-performance c674x DSP of TI for radar signal processing. The hardware acceleration module helps to save MIPS on DSP and realize higher level algorithm. The device includes a ARM-R4F processor subsystem, which is responsible for radio configuration, control, and calibration.
Different:
IWR1843 is mainly used in the industrial field, and can be used in building automation, factory automation, UAV, material processing, traffic monitoring and monitoring, etc.; while AWR1843 is more inclined to the automotive category, and its chip has an additional integrated automobile interface that can provide users with programming.

Application

IWR1843

- Area scanner
- Intelligent / automatic door opening device
- Gesture recognition
- Range measurement
- Remote personnel detection
- People counting
- Robotics
- Traffic monitoring
- Vital signs

IWR1843

- Vital signs
- Short range radar
- Mid range radar
- Obstacle detection
- Occupancy detection
- Automatic parting
- Identify multiple gestures
- Mid range radar beamsteering

IWR1843 sensor characteristics

- FMCW transceiver
  - Integrated PLL, Transmitter, Receiver, Baseband,and A2D
  - 76 to 81 GHz coverage with 4 GHz available bandwidth
  - Four receive channels
  - Three transmit channels
  - Ultra-accurate chirp engine based on fractional-N PLL
  - TX power: 12 dBm
  - RX noise figure:
    - 14 dB (76 to 77 GHz)
    - 15 dB (77 to 81 GHz)
  - Phase noise at 1 MHz
    - –95 dBc/Hz (76 to 77 GHz)
    - –93 dBc/Hz (77 to 81 GHz)
- Built-in calibration and self-test (monitoring)
  - ARM® Cortex®-R4F-based radio control system
  - Built-in firmware (ROM)
  - Self-calibrating system across frequency and temperature
- C674x DSP for FMCW signal processing
- On-chip Memory: 2MB
- Cortex-R4F microcontroller for object tracking and classification, AUTOSAR, and interface control
  - Supports autonomous mode (loading user application from QSPI flash memory)
- Integrated peripherals
  - Internal memories With ECC
- IWR1843 advanced features
  - Embedded self-monitoring with no host processor involvement
  - Complex baseband architecture
  - Embedded interference detection capability
  - Programmable phase rotators in transmit path to enable beam forming
- Power management
  - Built-in LDO network for enhanced PSRR
  - I/Os support dual voltage 3.3 V/1.8 V
- Clock source
  - Supports external oscillator at 40 MHz
  - Supports externally driven clock (square/sine) at 40 MHz
  - Supports 40 MHz crystal connection with load capacitors
- Easy hardware design
  - 0.65-mm pitch, 161-pin 10.4 mm × 10.4 mm flip chip BGA package for easy assembly and lowcost PCB design
  - Small solution size

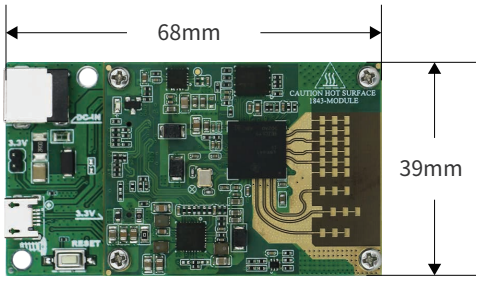
AWR1843 sensor characteristics

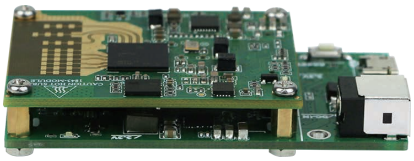
- FMCW transceiver
  - Integrated PLL, Transmitter, Receiver, Baseband,and A2D
  - 76 to 81 GHz coverage with 4 GHz available bandwidth
  - Four receive channels
  - Three transmit channels
  - Ultra-accurate chirp engine based on fractional-N PLL
  - TX power: 12 dBm
  - RX noise figure:
    - 14 dB (76 to 77 GHz)
    - 15 dB (77 to 81 GHz)
  - Phase noise at 1 MHz
    - –95 dBc/Hz (76 to 77 GHz)
    - –93 dBc/Hz (77 to 81 GHz)
- Built-in calibration and self-test (monitoring)
  - ARM® Cortex®-R4F-based radio control system
  - Built-in firmware (ROM)
  - Self-calibrating system across frequency and temperature
- C674x DSP for FMCW signal processing
- On-chip Memory: 2MB
- Cortex-R4F microcontroller for object tracking and classification, AUTOSAR, and interface control
  - Supports autonomous mode (loading user application from QSPI flash memory)
- Integrated peripherals
  - Internal memories With ECC
- Functional Safety-Compliant targeted
  - Developed for functional safety applications
  - Documentation is available to aid ISO 26262 functional safety system design
  - Hardware integrity up to ASIL B targeted
  - Safety-related certification
    - ISO 26262 certification by TUV Sud planned
- AEC-Q100 qualified
- AWR1843 advanced features
  - Embedded self-monitoring with no host processor involvement
  - Complex baseband architecture
  - Embedded interference detection capability
  - Programmable phase rotators in transmit path to enable beam forming
- Power management
  - Built-in LDO network for enhanced PSRR
  - I/Os support dual voltage 3.3 V/1.8 V
- Clock source
  - Supports external oscillator at 40 MHz
  - Supports externally driven clock (square/sine) at 40 MHz
  - Supports 40 MHz crystal connection with load capacitors
- Easy hardware design
  - 0.65-mm pitch, 161-pin 10.4 mm × 10.4 mm flip chip BGA package for easy assembly and lowcost PCB design
  - Small solution size
- Supports automotive temperature operating range

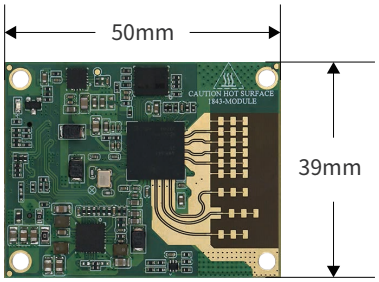
xWR1843 parameters

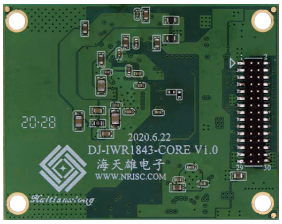
	IWR1843	AWR1843
CPU	ARM-Cortex R4F 200MHz	ARM-Cortex R4F 200MHz
DSP	C674x DSP 600MHz	C674x DSP 600MHz
RAM	2048KB QSPI Flash	2048KB QSPI Flash
Number of receiving antennas	4	4
Number of transmitting antennas	3	3
ADC sampling rate (Max)	25 MSPS	25 MSPS
Internal bus	JTAG, I²C, SPI, UART	JTAG, I²C, SPI, UART
Interface	Micro USB	Micro USB
Sensor	1 * Temperature Sensor	1 * Temperature Sensor
Hardware accelerators	Radar hardware accelerator	Radar hardware accelerator
Connector	30Pin, Connect emulator xds110	30Pin, Connect emulator xds110
Power Supply	DC 12V	DC 12V
Operating temperature range	-40 to 105 °C	-40 to 125 °C
Size	Module board:39mm*50mm Debug board:39mm*68mm	Module board:39mm*50mm Debug board:39mm*68mm
TI functional safety category	Functional Safety-Compliant	Functional Safety-Compliant

Appearance&Size

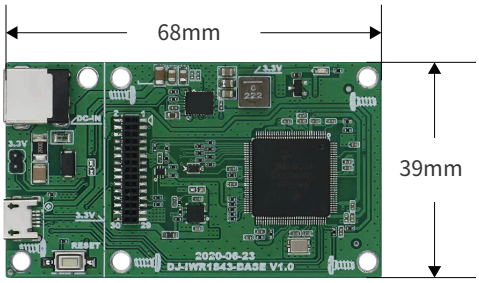


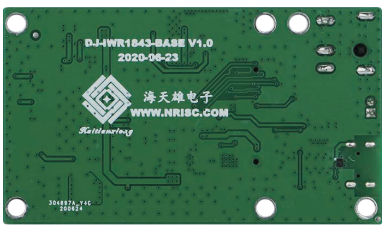






【xWR1843】





【XDS110】