Processor SDK - Radar

Version 03.04.00

Release Notes
June 2018

Contents

IMPORTANT NOTES: <MUST READ>

- *This release is of Processor SDK Radar is focused on Radar Data Capture and Processing. Kindly do not use this for any Vision or Video Processing.*
- *CCS version 6.0.1.00040 or higher should be used along with Processor SDK Radar 3.04 release.*
- *With AWR12 setup and TDA3x board modification QSPI_SD boot mode will not be functional.*
- *With AWR12 setup and TDA3x board modification SD Card read and write will not be functional.*
- *With AWR12 setup and TDA3x board modification Ethernet is not available.*
- *Processor SDK Radar uses UART Console 2 for print outputs. SBL uses UART Console 3 for print outputs.*
- *With AWR12 setup and TDA3x board modification UART3 Console output is not available.*
- *With the AWR12+TDA3x ALPS setup, the console prints are available on the network console.*
- *BSP / Starterware is merged into single package – PDK Any reference to BSP/Starterware in the documentation refers to PDK.*

Build ID: 03.04.00.00

IMPORTANT NOTE: Processor SDK Radar by default supports the TDA3xx, TDA2xx and TDA2px super set device configuration. Please refer to the Device Data Manual to know the details of the CPUs supported in that part. Processor SDK Radar supports selecting only the CPUs available for the specific part.

Processor SDK Radar is based on the Vision SDK 03.04.00.00 release.
This is targeted for AWR12XX + TDA3xx and AWR12xx + TDA2xx Radar Data Processing and TDA2px Radar Data Processing.

Major New Features in the Release

New features in the release vs previous Processor SDK Radar release are:

- Support for Cascade Radar Board.
- Cascade Radar Data processing demonstration.
- DSP algorithms for second dimension, peak detection and angle of arrival detection.
- Migration to MMWAVEDFP 01. 01.00 with AWR1243 ES3.0 Support.

SDK Features (BIOS ONLY)

Installation and Usage (BIOS ONLY)

- Kindly refer the user guide vision_sdk/docs/ProcessorSDKRadar_UserGuide.pdf

Example use-cases (BIOS ONLY)

- Processor SDK Radar demonstrates use-cases as examples. Below table lists these use cases and also indicate the SOC/Platform it is validated on.

No	Use cases	TDA2x EVM	TDA2px EVM	TDA3x EVM	TDA3xx + AWR12	TDA3 xx	TDA3xx – RVP	TDA3xx – RVP	TDA2xx 4-Chip
Radar Use cases									

					BOOSTER	ALPS	(Direct Connection)	(FPDLink)	AWR12 Cascade
1.	AWR12 Firmware Flash	NO	NO	NO	NO	**YES**	NO	NO	NO
2.	Radar (Single AWR1243) Capture + Null	NO	NO	NO	**YES**	**YES**	NO	NO	NO
3.	Radar (Single AWR1243) Capture + Radar Object Detect (EVE1) + Null (TDA3xx Only)	NO	NO	NO	**YES**	**YES**	NO	NO	NO
4.	Radar (Single AWR1243) Capture + Radar Frame Copy (DSP1) + Null	NO	NO	NO	**YES**	**YES**	NO	NO	NO
5.	Radar (Single AWR1243) Capture + Radar Object Detect (EVE1) + Display (TDA3xx Only)	NO	NO	NO	**YES**	NO	**YES**	NO	NO
6.	Null Source (SD/Network) Input + Radar FFT (EVE1) + Null (SD/Network)	**YES**	**YES**	**YES**	NO	NO	NO	NO	NO
7.	Multi Radar (AWR1243) Capture + Radar FFT (EVE1) + Display (TDA3xx Only)	NO	NO	NO	NO	NO	NO	**YES**	NO
8.	Cascade Radar (4 AWR1243) Capture + Null	NO	NO	NO	NO	NO	NO	NO	**YES**
9.	Cascade Radar (4 AWR1243) Capture + Radar Object Detect (DSP) + Null	NO	NO	NO	NO	NO	NO	NO	**YES**

SDK Features

- Support the following SoC/Platforms
  - TDA3x SoC + AWR12 (ES1.0 & ES2.0) ALPS Board.
  - TDA3x SoC + AWR12 D3 RVP Board.
  - TDA3x SoC + FPDLink AWR12 D3 RVP Board.
  - TDA3x SoC ES1.0/ES1.0A (15x15) EVM + AWR12 (ES1.0 & ES2.0) Booster Pack.
  - TDA2x SoC ES1.1/ES2.0 (23x23) EVM
  - TDA2px SoC ES1.0 EVM
- Support for CPU's in the TDA3xx Device (IPU1-0, IPU1-1, DSP1, EVE)
  - Support for AR12xx Radar Sensor Data Capture
  - Support for Radar Processing Algorithm Plugin with sample Frame Copy Algorithm Function.
  - Support for Radar Processing Algorithm Plugin with FFT Algorithm Function and FFT Heat Map Draw Algorithm Functions.
  - Support for low latency inter-processor communication mechanism based on Work Queues (WorkQ).
  - EVE FFT, Peak detection and Beam forming algorithm integrated using WorkQ.
  - SD card based pre-recorded Radar Sensor ADC data read. (This feature is not supported on TDA3x modified EVM for AWR12 sensor integration with DIB and VAB)
  - SD card write of Algorithm processed output. (This feature is not supported on TDA3x modified EVM for AWR12 sensor integration with DIB and VAB)
  - Support for AWR12 Firmware Flash (on ALPS board)

    - Support for TI Fast Data Transfer Protocol (TFDTP) networking protocol.
    - Network (TCP/IP, TFDTP) based pre-recorded Radar Sensor ADC data read.
    - Network (TCP/IP, TFDTP) based write of Algorithm processed output.
    - Support for the TDA3xx RVP platform for direct connection of AWR12 with TDA3x CSI and single channel FPDLink based connection of AWR12 to TDA3xx.
    - Support for AWR12 advanced frame configuration, Dynamic Configuration of parameters to change the radar waveform properties.
    - Support for interpreting chirp profile data along with ADC data.
    - Support to read back programmed profile, chirp and frame configuration parameters.
- Support for CPU's in the TDA2xx Device (IPU1-0, IPU1-1, DSP1, EVE)
    - Support for Radar Processing Algorithm Plugin with FFT Algorithm Function and FFT Heat Map Draw Algorithm Functions.
    - Support for low latency inter-processor communication mechanism based on Work Queues (WorkQ).
    - EVE FFT, peak detection and beam forming algorithm integrated using WorkQ.
    - SD card based pre-recorded Radar Sensor ADC data read.
    - SD card write of Algorithm processed output.
    - Support for TI Fast Data Transfer Protocol (TFDTP) networking protocol.
    - Network (TCP/IP, TFDTP) based pre-recorded Radar Sensor ADC data read.
    - Network (TCP/IP, TFDTP) based write of Algorithm processed output.
- Support for TDA2px EVM using Network and File read and write of Radar Data.
- Support for Links Such as Dup, Merge, Select, Sync, NullSrc, Null and IPC (In/Out).
- Algorithm link with algorithm plug-in's support on all CPU's.
    - Radar Process Algorithm Plugin which allows plugging in Algorithm Functions
    - Sample Algorithm Function of Radar Frame Copy which copies the input frame data to output frame data.
    - Radar FFT Algorithm Function which performs Range and Doppler FFT with work thread on EVE.
    - Radar Peak detection CFAR-CA Algorithm with work thread on EVE.
    - Radar Beam Forming Algorithm with work thread on EVE.
    - Radar FFT Heat Map Draw, to display the FFT output data.
    - Radar Object Draw algorithm to display the object detection output.
- Example usecases highlighting Radar Object Detection in terms of range, velocity and angle of arrival.
- Support for SPI communication to AWR12 over FPDLink Back Channel on the TDA3xx RVP setup.
- Support for multi-AWR12 radar configurations.
- Support for the Dynamic Chirp Configuration API for ES2.0 AWR1243.
- Driver support for Monitoring and run time calibration.
- Support for Radar System Planner to the documents section for offline analysis of TDA compute and bandwidth requirement.
- Support for multi-channel processing as part of the Radar Algorithm Process.

Component Versions

The versions of the different components included in the Processor SDK Radar Package can be referred to at vision_sdk\docs\Radar\Processor_SDK_Radar_03_04_00_00_manifest.html

Validation Hardware

This software package is tested with the below hardware

- **TDA3xx, TDA2xx and TDA2px EVM**
  - Radar SD Card/Network Read and Write Usecase (Null Source Input + Radar FFT (EVE1) + Null output)
- **TDA3xx RVP + AWR1243 (Direct Connection & FPDLink)**
  - Radar (Single AWR1243) Capture + Radar FFT (EVE1) + Display (TDA3xx Only)
  - Satellite Radar (Single AWR1243) FPDLink Capture + Radar FFT (EVE1) + Display
- **TDA2xx 4 Chip AWR1243 Cascade Radar Board:**
  - Cascade Radar (4 AWR1243) Capture + Null (TDA2xx Only)
  - Cascade Radar (4 AWR1243) Capture + Radar Object Detect (DSP) + Null (TDA2xx Only)
- **TDA3xx + AWR1243 ALPS Board:**
  - AWR12 Firmware Flash (ALPS board Only)
  - Radar (Single AWR1243) Capture + Null (TDA3xx Only)
  - Radar (Single AWR1243) Capture + Radar FFT (EVE1) + Null (TDA3xx Only)
  - Radar (Single AWR1243) Capture + Radar Frame Copy (DSP1) + Null (TDA3xx Only)
- **TDA3xx EVM + AWR1243 Booster + AR1xxx Debug Dev Pack**
  - Radar (Single AWR1243) Capture + Null (TDA3xx Only)
  - Radar (Single AWR1243) Capture + Radar FFT (EVE1) + Display (TDA3xx Only)
  - Radar (Single AWR1243) Capture + Radar FFT (EVE1) + Null (TDA3xx Only)
  - Radar (Single AWR1243) Capture + Radar Frame Copy (DSP1) + Null (TDA3xx Only)
- **Boot mode Supported**
  - TDA2x EVM: QSPI boot, SD boot, NOR boot, CCS boot
  - TDA3x EVM: QSPI boot, QSPI+SD boot (SBL in QSPI, AppImage in SD card), CCS boot
  - TDA3x RVP: QSPI boot, QSPI+SD boot (SBL in QSPI, AppImage in SD card), CCS boot
  - TDA3x EVM + AWR1243 Booster: QSPI boot, CCS boot
  - TDA3x + AWR1243 ALPS: QSPI boot, CCS boot

Refer user guide for exact board number and revision that this release is validated with.

SW Quality – Status

Software Component	System Testing	MISRA - C *	Static analysis	Quality / Safety
SBL	Yes	Yes	Yes	TI SW Development process
CSL/FL / StarterWare	Yes	Yes	Yes	TI SW Development process

BSP / Drivers	Yes	Yes	Yes	TI SW Development process
EVE SW	Yes	Yes	Yes	TI SW Development process
VXLib (C66x)	Yes	Yes	Yes	TI SW Development process
NDK / NSP / AVB	Yes	Yes	Yes	TI SW Development process
IVAHD codecs	Yes	No	Yes	TI SW Development process
EDMA LLD	Yes	Yes	Yes	TI SW Development process
Framework Components	Yes	Yes	Yes	TI SW Development process
BIOS	Yes	Yes	Yes	TI SW Development process
BIOS-IPC	Yes	Yes	Yes	TI SW Development process
IPCLib	Yes	Yes	Yes	TI SW Development process
Links Framework‡	Yes	Yes	Yes	TI SW Development process
AutoSAR MCAL	Yes	Yes	Yes	ASIL – B

‡Processor SDK Radar/Vision Software Development Kit (Vision SDK) is broadly divided into

- **Core SDK Framework (links_fw)**
  - Core SDK – Contains Links and Chain Framework for both Bios and HLOS
  - SW quality processes like MISRA-C/KW static checker etc. are done only for links framework
- **Demo Application (apps)**
  - Demo applications to validate VSDK FW
  - SW quality processes like MISRA-C/KW static checker etc. are NOT done for apps and sample_app

Compilers	Production ready	Compiler Qualification Kit
EVE TI compiler	Yes	Available from TI
ARM M4 compiler	Yes	Available from TI
C66x TI compiler	Yes	Available from TI
ARM A15 compiler	Yes	3P

Bugs Fixed In This Release

JIRA ID	Description	Severity	Affects Version/s
ADASVISION-1866	[RADAR] Alg Plugins do not support different number of antennas for advanced frame sub frames	S2-Major	VISION_SDK_03_03_00_00
ADASVISION-1859	[TFDTP][RADAR] Frames are dropped with Network Transmit when the number of Radar Frames are finite	S2-Major	VISION_SDK_03_02_00_00, VISION_SDK_03_03_00_00
ADASVISION-1887	[RADAR] Chirp reconfig is getting called for AWR ES1.0 devices.	S2-Major	VISION_SDK_03_04_00_00

Known Issues / Limitations

JIRA ID	Description	Severity	Workaround	Affects Version/s
ADASVISION-1885	[Radar][Network] Network transmission fails when running only IPU1_0 and IPU1_1 on Cascade Radar EVM	Minor	NA	VISION_SDK_03_04_00_00
ADASVISION-1883	Matlab Script for Cascade Radar use case should support single radar	Minor	NA	VISION_SDK_03_04_00_00

Refer also to PDK Release Notes for additional known issues.

Compatibility Info

This section contains information about compatibility of APIs between this release and 03.01.00.00.

NOTE: It is recommended to recompile the user created use-cases, alg plugins, links against the new release interface files even if no code level change is required in the user application.

Link API

Module	Interface file	Change in user application required	Change details
Display Distributer Link	dispDistSrcLink.h	No	[New File] Disp Dist Src Link is a source link which provides input to the next links. It can be used to integrate other links while taking input from HLOS applications using a display distribution user/distributor framework. Change not influencing Processor SDK Radar.
System Buffer	system_buffer.h	No	Added a parameter to system buffer to allow or disallow translation when the buffers are exchanged between RTOS and HLOS. Change not influencing Processor SDK Radar.
System Link ID	system_linkId.h	No	Addition of the Display Distributer Link Ids. Change not influencing Processor SDK Radar.
Ultra Sonic Capture Link	ultrasonicCaptureLink.h	No	Addition of support of multiple ultra-sonic sensors and PGA460. Change not influencing Processor SDK Radar.

Utils API – This API is used by users when writing an algorithm plugin or use-case or link

Module	Interface file	Change in user application required	Change details
UTILS	utils_link_stats_if.h	No	Support for the measurement of the CPU load for SMP CPUs