Processor SDK - Radar

Version 03.01.00

Release Notes
October 2017

Contents

Build ID: 03.01.00.00

IMPORTANT NOTE: Processor SDK Radar by default supports the TDA3xx and TDA2xx 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 03.01.00.00 release.
This is targeted for AWR12XX + TDA3xx Radar Data Processing and TDA2xx Radar Data Processing.

Major New Features in the Release

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

* Peak Detection and Beam Forming Algorithm Function support

* 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.

* Migration to MMWAVEDFP 00.09.00.

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	TDA2xx EVM	TDA3xx EVM	TDA3xx + AWR12 BOOSTER	TDA3xx ALPS	TDA3xx – RVP (Direct Connection)	TDA3xx – RVP (FPDLink)
Radar Use cases							
1.	AWR12 Firmware Flash	NO	NO	NO	**YES**	NO	NO
2.	Radar (Single AWR1243) Capture + Null	NO	NO	**YES**	**YES**	NO	NO
3.	Radar (Single AWR1243) Capture + Radar Object Detect (EVE1) + Null (TDA3xx Only)	NO	NO	**YES**	**YES**	NO	NO
4.	Radar (Single AWR1243) Capture + Radar Frame Copy (DSP1) + Null	NO	NO	**YES**	**YES**	NO	NO
5.	Radar (Single AWR1243) Capture + Radar Object Detect (EVE1) + Display (TDA3xx Only)	NO	NO	**YES**	NO	**YES**	NO
6.	Null Source (SD/Network) Input + Radar FFT (EVE1) + Null (SD/Network)	**YES**	**YES**	NO	NO	NO	NO
7.	Multi Radar (AWR1243) Capture + Radar FFT (EVE1) + Display (TDA3xx Only)	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
- 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.

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- o Support for AWR12 advanced frame configuration, Dynamic Configuration of parameters to change the radar waveform properties.
- o Support for interpreting chirp profile data along with ADC data.
- o 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)
  - o Support for Radar Processing Algorithm Plugin with FFT Algorithm Function and FFT Heat Map Draw Algorithm Functions.
  - o Support for low latency inter-processor communication mechanism based on Work Queues (WorkQ).
  - o EVE FFT, peak detection and beam forming algorithm integrated using WorkQ.
  - o SD card based pre-recorded Radar Sensor ADC data read.
  - o SD card write of Algorithm processed output.
  - o Support for TI Fast Data Transfer Protocol (TFDTP) networking protocol.
  - o Network (TCP/IP, TFDTP) based pre-recorded Radar Sensor ADC data read.
  - o Network (TCP/IP, TFDTP) based write of Algorithm processed output.
- 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.
  - o Radar Process Algorithm Plugin which allows plugging in Algorithm Functions
  - o Sample Algorithm Function of Radar Frame Copy which copies the input frame data to output frame data.
  - o Radar FFT Algorithm Function which performs Range and Doppler FFT with work thread on EVE.
  - o Radar Peak detection CFAR-CA Algorithm with work thread on EVE.
  - o Radar Beam Forming Algorithm with work thread on EVE.
  - o Radar FFT Heat Map Draw, to display the FFT output data.
  - o Radar Object Draw algorithm to display the object detection output.

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_01_00_00_manifest.html

Validation Hardware

This software package is tested with the below hardware

- **TDA3xx EVM and TDA2xx EVM**
  - ▪ Radar SD Card/Network Read and Write Usecase (Null Source Input + Radar FFT (EVE1) + Null output)
- **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)

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- 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)
  - **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
  - **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	QM
CSL/FL / StarterWare	Yes	Yes	Yes	QM
BSP / Drivers	Yes	Yes	Yes	QM
EVE SW	Yes	Yes	Yes	QM
VXLib (C66x)	Yes	Yes	Yes	QM
NDK / NSP / AVB	Yes	Yes	Yes	QM
IVAHD codecs	Yes	No	Yes	QM
EDMA LLD	Yes	Yes	Yes	QM
Framework Components	Yes	Yes	Yes	QM
BIOS	Yes	Yes	Yes	QM
BIOS-IPC	Yes	Yes	Yes	QM

IPCLib	Yes	Yes	Yes	QM
Links Framework‡	Yes	Yes	Yes	QM
AutoSAR MCAL	Yes	Yes	Yes	ASIL – B

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

- o **Core SDK Framework (links_fw)**
    - o Core SDK – Contains Links and Chain Framework for both Bios and HLOS
    - o SW quality processes like MISRA-C/KW static checker etc. are done only for links framework
- o **Demo Application (apps)**
    - o Demo applications to validate VSDK FW
    - o 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

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Bugs Fixed In This Release

Defect ID	Defect Summary	Fix Version/s	Affects Version/s
ADASVISION-1664	[RADAR] Flashing of firmware does not take right number of radars	VISION_SDK_03_01_00_00	VISION_SDK_03_01_00_00
ADASVISION-1624	Utils queue Sem Wr can increment up to 65535	VISION_SDK_03_01_00_00	VISION_SDK_03_00_00_00
ADASVISION-1640	[RADAR] Alg Plugin takes prevLinkQueId to get prevLink information	VISION_SDK_03_01_00_00	VISION_SDK_03_00_00_00
ADASVISION-1638	[TDA2xx] Hang observed on loading IPC LIB binaries	VISION_SDK_03_01_00_00	VISION_SDK_03_01_00_00
ADASVISION-1637	[RADAR] ISS Pitch Alignment is not in sync with ISS Link	VISION_SDK_03_01_00_00	VISION_SDK_03_01_00_00
ADASVISION-1665	[RADAR] AWR ES1.0 start and stop fails without adequate delay	VISION_SDK_03_01_00_00	VISION_SDK_03_01_00_00
ADASVISION-1639	[RADAR] Multi-Radar structure does not handle different radar heights and widths	VISION_SDK_03_01_00_00	VISION_SDK_03_01_00_00

Known Issues / Limitations

Module	Description	Workaround	Frequency of Occurrence	CQ ID
Processor SDK Radar	[RADAR] Elevation Angle Output for test source is incorrect	Use Real Objects	Always	ADASVISION-1636

Refer also to PDK Release Notes for additional known issues

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Compatibility Info

This section contains information about compatibility of APIs between this release and 03.00.00.00.

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
Alg Link	algorithmLink.h	No	Addition of Rear View Draw, TIDL Pre and Post Process, Algorithm. Change not influencing Processor SDK Radar
DSS M2M Write Back Link	dssM2mWbLink.h	No	[New File] DSSM2MWB Link can be used to do processing on video input frames. These frames may be from capture or decoded video frames coming over network.
Encoder Link	encLink.h	No	Addition of maxPicSizeRatio for I-Frame, IDR frame interval value. Change not influencing Processor SDK Radar.
Graphics Link	grpxSrcLink.h	No	Addition of Semantic segmentation overlay. Change not influencing Processor SDK Radar.
ISS ISP Configuration Link	issIspConfiguration.h	No	Addition of ISS M2M configuration parameter Initialization. Change not influencing Processor SDK Radar.
ISS Mem2Mem Configuration Link	issM2mIspLink.h	No	Removal of ISS M2M configuration parameter Initialization. Change not influencing Processor SDK Radar.
ISS M2M Resizer Link	issM2mResizerLink.h	No	[New File] ISS M2M Isp Link is used for ISP operations available in ISS. This link operates in M2M mode (Input Data read from memory, operation by ISP and Output Data written back to memory)
ISS M2M Simcop Link	issM2mSimcopLink.h	No	Removal of ISS M2M Simcop Configuration Parameters. Change not influencing Processor SDK Radar.
ISS Simcop configuration	issSimcopConfiguration.h	No	[New File]: ISS M2M SIMCOP Link is used for SIMCOP operations available in ISS This link operates in M2M mode (Input Data read from memory, operation by SIMCOP (LDC and VTNF) and Output Data written back to memory)
System Link	system.h	No	Addition of support for Printing Display Error Statistics and API to check for HLOS Fast boot. Change not influencing Processor SDK Radar.
System Buffer	system_buffer.h	No	Addition of pointer to native pixel map for QNX. Moved SYSTEM_MAX_META_DATA_PLANES definition to system_const.h.
System Common	system_common.h	No	Addition of TDA2Px CPU frequencies.
System Constant	system_const.h	No	Buffer alignment of QNX applications made to 32. Includes definition of SYSTEM_MAX_META_DATA_PLANES.
System Debug	system_debug.h	No	Added support for debug for DSS M2M WB Link. Change not influencing Processor SDK Radar.
System Link ID	system_linkId.h	No	Added support DSS M2M WB and ISS Resizer Link. Change not influencing Processor SDK Radar.
System Link Common	systemLink_common.h	No	Support for DSS M2M Write Back Statistics. Change not influencing Processor SDK Radar.

| VPE Link | vpeLink.h | No | Support for TDA2Px. |

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	Addition of Display Error Statistics.
UTILS	utils_mem_if.h	No	API Addition for Physical to Virtual address translation.
UTILS	utils_spinlock.h	No	Additional header file include for hw_types.h and soc.h
UTILS	utils_stat_collector.h	No	Support for statistic collectors for TDA2Px.
UTILS	utils_taskTimer.h	No	[New File]: This module defines APIs that could be used for profiling in multi-task environment.

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