

- **Starterware_01_04_00_10 Supports following HAL Libraries:**
 - ✓ UART
 - ✓ I2C
 - ✓ GPIO
 - ✓ Mailbox
 - ✓ Spinlock
 - ✓ EDMA
 - ✓ GPMC
 - ✓ McASP
 - ✓ McSPI
 - ✓ OCMC
 - ✓ QSPI
 - ✓ SBL
 - ✓ MMU
 - ✓ TIMER
 - ✓ MMCSD
 - ✓ WD TIMER
 - ✓ PCIE
 - ✓ RTI
 - ✓ CRC
 - ✓ DCAN
 - ✓ ADC
 - ✓ ESM
 - ✓ DCC
 - ✓ L3 FW
 - ✓ UNICACHE
 - ✓ AMMU
 - ✓ CACHE_A15
 - ✓ MMU_A15
 - ✓ C66x XMC and MPU
 - ✓ IPU ECC
- **Supports following Driver libraries :**
 - ✓ I2C
 - ✓ QSPI
 - ✓ FAT
 - ✓ FAT EDMA
 - ✓ NOR
 - ✓ VIP
 - ✓ DSS
 - ✓ VPE
 - ✓ PM
 - ✓ Safety
- **TDA2xx SBL: Validated SD, NOR and QSPI boot mode on TDA2XX ES1.0 EVM.**
- **TDA2Ex SBL: Validated SD, NOR and QSPI boot mode on TDA2EX ES1.0 EVM.**
- **TDA3xx SBL: Validated QSPI, NOR and QSPI_SD boot mode on TDA3xx ES1.0 EVM**
- **UART console utility.**

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Description

StarterWare provides no-OS platform support for TI's series of ADAS specific SoCs TDA1Mxx, TDA2xx, TDA2Ex and TDA3xx. The StarterWare package contains Device Abstraction Layer libraries and peripheral/board level sample/demo examples that demonstrate the capabilities of the peripherals on TDA1Mxx, TDA2xx, TDA2Ex and TDA3xx.

TDA1Mxx device family is a derivative of TMS320DM8148 that supports Advanced Driver Assistance Systems (ADAS) applications. For more information about the TDA1Mxx device family, please contact your local TI sales representative. For more information about TMD320DM814x, please visit <http://www.ti.com/product/tms320dm8148>.

TDA2xx and TDA2Ex are high-performance, automotive vision application devices based on enhanced OMAP™ architecture integrated on a 28-nm technology. The architecture is designed for Advanced Driver Assistance applications, including Vision Analytics for Single/Dual Front Camera, LVDS/Ethernet Surround View, Night Vision, Blind Spot Detection, Sensor Fusion and LIDAR, among others, and best-in-class CPU performance, video, image, and graphics processing sufficient to support

- Streaming video up to full high definition (Full-HD) (1920×1080p, 60 fps)
- 2-dimensional (2D) and 3-dimensional (3D) graphics.

TDA3x is an ADAS application device based on enhanced OMAP™ architecture integrated on a 28-nm technology. TDA3x complements the TDA2x ADAS device family by using a common architecture, enabling scalability from entry to high performance for a broad range of applications. The device family is targeted at ADAS applications including Front Camera, Intelligent Rear Camera, Radar and Mirror Replacement.

Summary of performance for TDA3xx

Target Platform Name: Tda3xx (ADAS Low)

CPU Cores: Cortex M4, C66x (DSP)

OPP Table / Frequency: 500 MHz for C66x, 532 MHz for DDR and 212.8 MHz for M4

Tools Versions: C6000 CG Tool 7.4.2 for C66x; TMS470 CG 5.2.5 for cortex M4

Dependent Component Versions: None

Table 1. Memory Statistics

| CONFIGURATION ID | MEMORY STATISTICS ⁶ | | | | |
|-----------------------------------|--------------------------------|-------------|--------------------|--------------|-------|
| | PROGRAM MEMORY | DATA MEMORY | | | TOTAL |
| | | DATA | UNINITIALIZED DATA | STACK | |
| starterware_boards_c66x | 12800 | 3860 | 2416 | Not Measured | 19076 |
| starterware_boards_m4 | 6766 | 5310 | 0 | Not Measured | 12076 |
| sbl_lib_m4 | 6536 | 1164 | 20 | Not Measured | 7720 |
| starterware_devices_c66x | 5376 | 428 | 32 | Not Measured | 5836 |
| starterware_devices_m4 | 2842 | 0 | 0 | Not Measured | 2842 |
| starterware_hal_c66x | 57536 | 1840 | 50 | Not Measured | 59426 |
| starterware_hal_m4 | 21988 | 796 | 52 | Not Measured | 22836 |
| starterware_examples_utility_c66x | 1184 | 384 | 12 | Not Measured | 1580 |
| starterware_examples_utility_m4 | 818 | 0 | 0 | Not Measured | 818 |
| fat_lib_m4 | 10179 | 1874 | 32 | Not Measured | 12085 |
| i2c_lib_c66x | 10592 | 4 | 436 | Not Measured | 11032 |
| i2c_lib_m4 | 4382 | 412 | 0 | Not Measured | 4794 |
| norflash_lib_m4 | 3998 | 0 | 96 | Not Measured | 4094 |
| utils_platform_c66x | 6976 | 1892 | 16 | Not Measured | 8884 |
| utils_platform_m4 | 2259 | 1584 | 0 | Not Measured | 3843 |
| starterware_pm_hal_c66x | 37440 | 38985 | 0 | Not Measured | 76425 |
| starterware_pm_hal_m4 | 15424 | 38549 | 0 | Not Measured | 53973 |
| starterware_pm_lib_c66x | 10880 | 7812 | 8 | Not Measured | 18700 |

| | | | | | |
|-----------------------|--------|--------|--------|--------------|--------|
| starterware_pm_lib_m4 | 4488 | 7812 | 8 | Not Measured | 12308 |
| qspi_flashlib_m4 | 3860 | 344 | 0 | Not Measured | 4204 |
| sys_config_c66x | 10880 | 608 | 1088 | Not Measured | 12576 |
| sys_config_m4 | 2764 | 1584 | 0 | Not Measured | 4348 |
| starterware_common_m4 | 1578 | 2056 | 0 | Not Measured | 3634 |
| starterware_osal_m4 | 278 | 0 | 0 | Not Measured | 278 |
| uartConsole_c66 | 4544 | 68 | 4 | Not Measured | 4616 |
| uartConsole_m4 | 1566 | 22 | 0 | Not Measured | 1588 |
| starterware_vpslib_m4 | 201542 | 331706 | 192076 | Not Measured | 725324 |

⁶ All memory requirements are expressed in bytes.

Peripheral performance for TDA3xx

1. CRC performance

| CONFIGURATION | PROCESSOR | TRANSFER SIZE | THROUGHPUT |
|--|-----------|---------------|------------|
| EDMA used, pattern/ EDMA ACnt = 8bytes, cache disabled | M4 | 1800 kB | 459 MB/s |
| EDMA used, pattern/ EDMA ACnt = 8bytes, cache disabled | DSP | 1800 kB | 459 MB/s |

2. DCAN performance

| CONFIGURATION | PROCESSOR | BAUDRATE | MESSAGES TRANSMITTED PER SEC | MESSAGE SIZE | HW UTILIZATION |
|-----------------|-----------|-----------|------------------------------|--------------|----------------|
| Cache - Enabled | M4 | 1Mbit/sec | 7291 | 128 bits | 93% |

Summary of performance for TDA2xx

Target Platform Name: Tda2xx (Vayu)

CPU Cores: Cortex A15 (host), Cortex M4, C66x (DSP)

OPP Table / Frequency: 750 MHz for A15, 600 MHz for C66x, 532 MHz for DDR and 212.8 MHz for M4

Tools Versions: gcc-arm-none-eabi-4_7-2013q3 for Cortex A15; C6000 CG Tool 7.4.2 for C66x; TMS470 CG 5.2.5 for cortex M4

Dependent Component Versions: None

Table 2. Memory Statistics

| CONFIGURATION ID | MEMORY STATISTICS ⁶ | | | | |
|-----------------------------------|--------------------------------|-------------|--------------------|--------------|--------|
| | PROGRAM MEMORY | DATA MEMORY | | | TOTAL |
| | | DATA | UNINITIALIZED DATA | STACK | |
| starterware_boards_c66x | 13376 | 4100 | 2416 | Not Measured | 19892 |
| starterware_boards_m4 | 7094 | 5550 | 0 | Not Measured | 12644 |
| starterware_devices_c66x | 5376 | 428 | 44 | Not Measured | 5848 |
| starterware_devices_m4 | 2842 | 0 | 0 | Not Measured | 2842 |
| starterware_hal_c66x | 51360 | 872 | 50 | Not Measured | 52282 |
| starterware_hal_m4 | 19492 | 4 | 52 | Not Measured | 19548 |
| starterware_examples_utility_c66x | 1184 | 384 | 12 | Not Measured | 1580 |
| starterware_examples_utility_m4 | 822 | 0 | 0 | Not Measured | 822 |
| fat_lib_m4 | 10125 | 1874 | 32 | Not Measured | 12031 |
| i2c_lib_c66x | 11552 | 104 | 868 | Not Measured | 12524 |
| i2c_lib_m4 | 4642 | 820 | 0 | Not Measured | 5462 |
| norflash_lib_m4 | 3998 | 0 | 96 | Not Measured | 4094 |
| utils_platform_c66x | 13632 | 3564 | 16 | Not Measured | 17212 |
| utils_platform_m4 | 5829 | 3180 | 0 | Not Measured | 9009 |
| starterware_pm_hal_c66x | 41696 | 74461 | 0 | Not Measured | 116157 |
| starterware_pm_hal_m4 | 17016 | 73635 | 0 | Not Measured | 90651 |
| starterware_pm_lib_c66x | 12768 | 21408 | 8 | Not Measured | 34184 |
| starterware_pm_lib_m4 | 5284 | 21276 | 8 | Not Measured | 26568 |

| | | | | | |
|-----------------------|--------|--------|--------|--------------|---------|
| qspi_flashlib_m4 | 3860 | 344 | 0 | Not Measured | 4204 |
| sys_config_c66x | 11264 | 608 | 1088 | Not Measured | 12960 |
| sys_config_m4 | 2576 | 1584 | 0 | Not Measured | 4160 |
| starterware_common_m4 | 1578 | 2056 | 0 | Not Measured | 3634 |
| starterware_osal_m4 | 278 | 0 | 0 | Not Measured | 278 |
| uartConsole_c66x | 4704 | 108 | 4 | Not Measured | 4816 |
| uartConsole_m4 | 1634 | 22 | 0 | Not Measured | 1656 |
| starterware_vpslib_m4 | 141818 | 559870 | 736952 | Not Measured | 1438640 |

⁶ All memory requirements are expressed in bytes.

Peripheral performance for TDA2xx

1. DCAN performance

| CONFIGURATION | PROCESSOR | BAUDRATE | MESSAGES TRANSMITTED PER SEC | MESSAGE SIZE | HW UTILIZATION |
|------------------|-----------|-----------|------------------------------|--------------|----------------|
| Cache - Enabled | M4 | 1Mbit/sec | 7291 | 128 bits | 93% |
| Cache - Disabled | A15 | 1Mbit/sec | 7291 | 128 bits | 93% |

Summary of performance for TDA2Ex

Target Platform Name: TDA2Ex (J6 Eco)

CPU Cores: Cortex A15 (host), Cortex M4, C66x (DSP)

OPP Table / Frequency: 800 MHz for A15, 600 MHz for C66x, 666 MHz for DDR and 212.8 MHz for M4

Tools Versions: gcc-arm-none-eabi-4_7-2013q3 for Cortex A15; C6000 CG Tool 7.4.2 for C66x; TMS470 CG 5.2.5 for cortex M4

Dependent Component Versions: None

Table 3. Memory Statistics

| CONFIGURATION ID | MEMORY STATISTICS ⁶ | | | | |
|-----------------------------------|--------------------------------|-------------|--------------------|--------------|--------|
| | PROGRAM MEMORY | DATA MEMORY | | | TOTAL |
| | | DATA | UNINITIALIZED DATA | STACK | |
| starterware_boards_c66x | 13792 | 4116 | 2416 | Not Measured | 20324 |
| starterware_boards_m4 | 7294 | 5566 | 0 | Not Measured | 12860 |
| starterware_devices_c66x | 5408 | 428 | 48 | Not Measured | 5884 |
| starterware_devices_m4 | 2842 | 0 | 0 | Not Measured | 2842 |
| starterware_hal_c66x | 51104 | 872 | 50 | Not Measured | 52026 |
| starterware_hal_m4 | 19388 | 4 | 52 | Not Measured | 19444 |
| starterware_examples_utility_c66x | 1184 | 384 | 12 | Not Measured | 1580 |
| starterware_examples_utility_m4 | 822 | 0 | 0 | Not Measured | 822 |
| fat_lib_m4 | 10125 | 1874 | 32 | Not Measured | 12031 |
| i2c_lib_c66x | 11808 | 124 | 1012 | Not Measured | 12944 |
| i2c_lib_m4 | 4718 | 956 | 0 | Not Measured | 5674 |
| norflash_lib_m4 | 3998 | 0 | 96 | Not Measured | 4094 |
| utils_platform_c66x | 13632 | 3564 | 16 | Not Measured | 17212 |
| utils_platform_m4 | 5851 | 3180 | 0 | Not Measured | 9031 |
| starterware_pm_hal_c66x | 41536 | 71221 | 0 | Not Measured | 112757 |
| starterware_pm_hal_m4 | 16980 | 70612 | 0 | Not Measured | 87592 |
| starterware_pm_lib_c66x | 12512 | 20548 | 8 | Not Measured | 33068 |
| starterware_pm_lib_m4 | 5162 | 20452 | 8 | Not Measured | 25622 |

| | | | | | |
|-----------------------|--------|--------|--------|-----------------|--------|
| qspi_flashlib_m4 | 3860 | 344 | 0 | Not Measured | 4204 |
| sys_config_c66x | 10912 | 608 | 1088 | Not Measured | 12608 |
| sys_config_m4 | 2406 | 1584 | 0 | Not Measured | 3990 |
| starterware_common_m4 | 1578 | 2056 | 0 | Not Measured | 3634 |
| starterware_osal_m4 | 278 | 0 | 0 | Not Measured | 278 |
| uartConsole_c66x | 4704 | 108 | 4 | Not Measured | 4816 |
| uartConsole_m4 | 1634 | 22 | 0 | Not Measured | 1656 |
| starterware_vpslib_m4 | 141826 | 253726 | 196280 | Not Measured | 591832 |

⁶ All memory requirements are expressed in bytes.

Summary of performance for TDA1Mxx

Target Platform Name: TDA1Mxx (Vision Mid)

CPU Cores: Cortex A8 (host), Cortex M3 (vpss/video), C674x (dsp)

OPP Table / Frequency: Not Available

Tools Versions: gcc-arm-none-eabi-4_7-2013q3 for cortex A8 gcc build, C6000 CG Tool 7.4.2 for C674x; TMS470 CG 5.2.4 for cortex M3 and cortex A8 cgt build

Dependent Component Versions: None

Table 4. Memory Statistics

| CONFIGURATION ID | MEMORY STATISTICS ⁶ | | | | |
|---------------------------------|--------------------------------|-------------|--------------------|--------------|-------|
| | PROGRAM MEMORY | DATA MEMORY | | | TOTAL |
| | | DATA | UNINITIALIZED DATA | STACK | |
| starterware_boards_c674x | 12640 | 2736 | 2416 | Not Measured | 17792 |
| starterware_boards_a8 | 7864 | 4188 | 0 | Not Measured | 12052 |
| starterware_boards_m3 | 6702 | 4186 | 0 | Not Measured | 10888 |
| starterware_devices_c674x | 5376 | 428 | 40 | Not Measured | 5844 |
| starterware_devices_a8 | 3716 | 0 | 0 | Not Measured | 3716 |
| starterware_devices_m3 | 2842 | 0 | 0 | Not Measured | 2842 |
| starterware_hal_c674x | 35744 | 164 | 0 | Not Measured | 35908 |
| starterware_hal_a8 | 18992 | 4 | 0 | Not Measured | 18996 |
| starterware_hal_m3 | 13040 | 4 | 0 | Not Measured | 13044 |
| starterware_examples_utility_a8 | 896 | 0 | 0 | Not Measured | 896 |
| starterware_examples_utility_m3 | 700 | 0 | 0 | Not Measured | 700 |
| i2c_lib_c674x | 11552 | 116 | 724 | Not Measured | 12392 |
| i2c_lib_a8 | 7200 | 684 | 0 | Not Measured | 7884 |
| i2c_lib_m3 | 4682 | 684 | 0 | Not Measured | 5366 |
| utils_platform_c674x | 2624 | 0 | 0 | Not Measured | 2624 |
| utils_platform_a8 | 1232 | 0 | 0 | Not Measured | 1232 |
| utils_platform_m3 | 966 | 0 | 0 | Not Measured | 966 |
| sys_config_c674x | 6304 | 608 | 1088 | Not Measured | 8000 |

| | | | | | |
|-----------------------|--------|--------|--------|--------------|--------|
| sys_config_a8 | 1744 | 1084 | 0 | Not Measured | 2828 |
| sys_config_m3 | 288 | 1584 | 0 | Not Measured | 1872 |
| starterware_common_a8 | 628 | 4 | 0 | Not Measured | 632 |
| starterware_common_m3 | 1578 | 2056 | 0 | Not Measured | 3634 |
| starterware_osal_a8 | 260 | 0 | 0 | Not Measured | 260 |
| starterware_osal_m3 | 176 | 0 | 0 | Not Measured | 176 |
| uartConsole_c674x | 4608 | 92 | 4 | Not Measured | 4704 |
| uartConsole_a8 | 2520 | 24 | 0 | Not Measured | 2544 |
| uartConsole_m3 | 1594 | 22 | 0 | Not Measured | 1616 |
| starterware_vpslib_m3 | 102197 | 234176 | 185740 | Not Measured | 522113 |

Table 5. Resource Usage

| DETAILS | TDA2XX | TDA3XX | TDA2EX | TDA1MXX |
|---------------|---|---|--|--|
| EDMA Channels | I2C1(Tx-26, Rx-27), I2C2(Tx-28, Rx-29), I2C3(Tx-24, Rx-25), I2C4(Tx-3, Rx-4), I2C5(Tx-5, Rx-5), MMC1(Tx-60, Rx-61), MMC2(Tx-46, Rx-47), MMC3(Tx-76, Rx-77), MMC4(Tx-56, Rx-57), SBL(1) | I2C1(Tx-26, Rx-27), I2C2(Tx-28, Rx-29), MMC4(Tx-60, Rx-61), SBL(1) | I2C1(Tx-26, Rx-27), I2C2(Tx-28, Rx-29), I2C3(Tx-24, Rx-25), I2C4(Tx-3, Rx-4), I2C5(Tx-5, Rx-5), I2C6(Tx-7, Rx-8), MMC1(Tx-60, Rx-61), MMC2(Tx-46, Rx-47), MMC3(Tx-76, Rx- | I2C1(Tx-58, Rx-59), I2C2(Tx-60, Rx-61), I2C3(Tx-3, Rx-4), I2C4(Tx-5, Rx-6), |

References

- DM814x TRM : <http://www.ti.com/lit/ug/sprugz8c/sprugz8c.pdf>

Glossary

| | |
|-----------|---|
| Constants | Elements that go into .const memory section |
| Scratch | Memory space that can be reused across different instances of the algorithm |
| Shared | Sum of Constants and Scratch |
| Instance | Persistent-memory that contains persistent information - allocated for each instance of the algorithm |

Acronyms

| | |
|-----|--------------------------|
| XDM | eXpressDSP Digital Media |
|-----|--------------------------|

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