Application Report
SPRACL6–March 2019

AM574x Power Consumption Summary

ABSTRACT

This application report discusses the power consumption for common system application usage scenarios for the AM574x Sitara™ processors. The metrics contained in this document serve to provide users with a better understanding of AM574x active power behaviors and make it easier to determine a suitable configuration to meet a given power budget.

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Trademarks

1 Introduction

Power consumption is highly dependent on the individual user's application; however, this document focuses on providing several AM574x application-usage case scenarios and the environment settings that were used to perform such power measurements. This collection of real power measurements was measured on internal AM574x boards with on-board power measurement device (TI INA226).

See the AM5748 product page for additional details about the AM574x processor.

1.1 Power Measurement Setup

The following sections detail power measurements taken on a AM574x platform for typical use case applications. These measurements have been performed on an internal test evaluation reference system and not on the AM574x evaluation module (TMDXEVM5748). A heatsink (31-mm x 31-mm x 19.5-mm, #ATS-54310R-C1-R0) is installed.

NOTE: The software being used is a TI Processor SDK Linux for AM57x Sitara Processors with default configurations. Be aware power consumption varies across devices and is affected by temperature and voltage. All of the readings shown here are taken at room temperature (25°C).

The most of power supply groups has been measured using TI INA226. The test set-up details are as follows:

- SD card with Processor SDK 05.02.00 Linux
- Powertool
- Option 1: BeagleBone Black and Windows® computer
- Option 2: FT2232H Mini Module and Linux™ computer

Powertool is used to communicate with the I2C bus containing INA226 devices onboard the evaluation board. It comes with a config file that works with AM574x. The README of Powertool contains the information needed to proceed with option 1 or option 2. In the case of option 2, the powertool is compiled on the Linux PC and powertool uses the FTDI Mini Module as a USB-to-I2C converter. With option 1, the powertool is compiled on the BeagleBone Black and it uses the BeagleBone I2C1 or I2C2 bus for power measurements. With the powertool compiled, run it with the below command:

```
$ ./ptool -c configs/am574x.conf -e
```

1.2 AM574x Power Supplies

Table 1 describes the power supplies for AM574x.

Table 1. AM574x Power Supplies

PMIC SUPPLY	SIGNAL	DESCRIPTION
VDD_CORE	VDD	Core voltage domain
VDD_MPU	VDD_MPU	MPU voltage domain
VDD_DSPEVE	VDD_DSPEVE	DSP and EVE voltage
VDD_GPU	VDD_GPU	GPU voltage domain
VDD_IVA	VDD_IVA	IVA voltage domain
VDDS_DDR	VDDS_DDR1 VDDS_DDR2	SoC DDR1 & DDR2 EMIF
VDD_DDR	VDD_DDR	Board DDR SDRAM supply
Analog PHY1 (1.8 V)	VDDA_CSI VDDA_PCIE VDDA_PCIE0 VDDA_PCIE1	CSI and PCIe Analog (1.8 V)
Analog PHY2 (1.8 V)	VDDA_HDMI VDDA_SATA VDDA_USB1 VDDA_USB2 VDDA_USB3	HDMI, SATA, and USB Analog (1.8 V)
Analog PLL (1.8 V)	VDDA_ABE_PER VDDA_MPU VDDA_VIDEO VDDA_DDR VDDA_DEBUG VDDA_DSP_EVE VDDA_GMAC_CORE VDDA_GPU VDDA_IVA VDDA_OSC	Analog PLL supply (1.8 V)
Analog USB PHY (3.3 V)	VDDA33V_USB1 VDDA33V_USB2	Analog USB PHY supply (3.3 V)
1.8 V Internal I/O	VDDS18V_DDR1 VDDS18V_DDR2 VDDS18V VDDS_MLBP	DDR1 & DDR2 bias, 1.8 V Internal
3.3 V LVCMOS I/O	VDDSHV1-7 VDDSHV9-10	Supply for 3.3 V LVCMOS IOs
SD Card I/O	VDDSHV8	SD Card LVCMOS IO (1.8 V / 3.3 V)

2 High-Level Summary

The following tables contain a high-level summary of the total device power (measured in milliwatts) for each application use case and configuration.

2.1 OS Idle

In this measurement, no application is running on Linux and no display connected. The Linux CPUFreq driver automatically adjusts MPU OPP to NOM when idle. In this case, CPUFreq is manually set to each MPU OPP.

Table 2. OS Idle

MPU	GPU	DSP	IVA	POWER (mW)
NOM	HIGH	HIGH	HIGH	2150.8
OD	HIGH	HIGH	HIGH	2426.3
HIGH	HIGH	HIGH	HIGH	2851.5

2.2 Stream

Stream is a DDR bandwidth and latency testing application. The application is set to operate two threads, one for each Coretex-A15 core. This maximizes the load seen by DDR.

```
root@am57xx-evm# stream -P 2 -M 256M
```

Table 3. Stream

MPU	GPU	DSP	IVA	POWER (mW)
NOM	HIGH	HIGH	HIGH	4138.6

2.3 Dhrystone - Single Core

Dhrystone is a legacy application used to measure CPU integer performance. A single thread is running on one Coretex-A15 core. CPUFreq is used to manually select the MPU OPP.

```
root@am57xx-evm# dhrystone 2147483647 &
```

Table 4. Dhrystone - Single Core

MPU	GPU	DSP	IVA	POWER (mW)
NOM	HIGH	HIGH	HIGH	2980.1
OD	HIGH	HIGH	HIGH	3546.5
HIGH	HIGH	HIGH	HIGH	4678.9

2.4 Dhrystone - Dual Core

Dhrystone is a legacy application used to measure CPU integer performance. A single thread is run per Coretex-A15 core for a total of two threads. CPUFreq is used to manually select the MPU OPP.

```
root@am57xx-evm# dhrystone 2147483647 &
root@am57xx-evm# dhrystone 2147483647 &
```

Table 5. Dhrystone - Dual Core

MPU	GPU	DSP	IVA	POWER (mW)
NOM	HIGH	HIGH	HIGH	3897.3
OD	HIGH	HIGH	HIGH	4711.3

Table 5. Dhrystone - Dual Core (continued)

MPU	GPU	DSP	IVA	POWER (mW)
HIGH	HIGH	HIGH	HIGH	6682.8

2.5 Graphics - 3D Chameleon Man

This application is a OpenGL ES2 demo showing a matrix skinned character in combination with bump mapping. It is launched from Matrix GUI on Linux.

Table 6. Graphics - 3D Chameleon Man

MPU	GPU	DSP	IVA	POWER (mW)
NOM	HIGH	HIGH	HIGH	3056.6

2.6 Graphics - Example UI

In this measurement, the Example UI demo is run from Matrix GUI on Linux.

Table 7. Graphics - Example UI

MPU	GPU	DSP	IVA	POWER (mW)
NOM	HIGH	HIGH	HIGH	3270.7

2.7 Graphics - CoverFlow

In this measurement, the CoverFlow demo is run from Matrix GUI on Linux.

Table 8. Graphics - CoverFlow

MPU	GPU	DSP	IVA	Power (mW)
NOM	HIGH	HIGH	HIGH	3226.9

2.8 Graphics - Navigation

In this measurement, the navigation demo is running from Matrix GUI on Linux.

Table 9. Graphics - Navigation

MPU	GPU	DSP	IVA	POWER (mW)
NOM	HIGH	HIGH	HIGH	2993.4

2.9 DSP - Machine Learning (2xDSP)

In this measurement, the Machine Learning (2xDSP) demo is run from Matrix GUI on Linux.

Table 10. DSP - Machine Learning (2xDSP)

MPU	GPU	DSP	IVA	POWER (mW)
NOM	HIGH	HIGH	HIGH	4509.1

2.10 Video - H.264 Decode

In this measurement, the H.264 decode demo application is run from Matrix GUI in Linux with a display attached to HDMI.

Table 11. Video - H.264 Decode

MPU	GPU	DSP	IVA	POWER (mW)
NOM	HIGH	HIGH	HIGH	2784.4

3 AM574x Power Measurment Results

3.1 OS Idle: MPU Domain at NOM

3.1.1 OPP

Table 12. OS Idle: MPU Domain at NOM

MPU	GPU	DSP	IVA
NOM	HIGH	HIGH	HIGH

3.1.2 Power Consumption

Table 13. OS Idle: MPU Domain at NOM - Power Consumption

POWER SUPPLY GROUP	VOLTAGE [V]	CURRENT [mA]	POWER [mW]
Analog PHY1 (1.8 V)	1.79	69.7	125.0
Analog PHY2 (1.8 V)	1.80	74.2	137.5
Analog PLL (1.8 V)	1.80	30.7	62.5
Analog USB PHY (3.3 V)	3.31	2.0	6.8
SD Card I/O	3.30	0.9	3.0
1.8 V Internal I/O	1.81	96.9	173.5
VDDS_DDR	1.34	239.5	321.4
3.3 V LVCMOS I/O	3.26	22.0	79.5
VDD_IVA	1.09	21.4	25.0
VDD_CORE	0.94	558.1	537.4
VDD_DSPEVE	1.01	104.5	100.0
VDD_GPU	1.10	247.5	262.4
VDD_MPU	1.02	302.3	316.9
SoC POWER			2150.8
VDD_DDR	1.35	57.0	86.0

3.2 OS Idle: MPU Domain at OD

3.2.1 OPP

Table 14. OS Idle: MPU Domain at OD - OPP

MPU	GPU	DSP	IVA
OD	HIGH	HIGH	HIGH

3.2.2 Power Consumption

Table 15. OS Idle: MPU Domain at OD - Power Consumption

POWER SUPPLY GROUP	VOLTAGE [V]	CURRENT [mA]	POWER [mW]
Analog PHY1 (1.8 V)	1.79	68.7	125.0
Analog PHY2 (1.8 V)	1.80	73.7	131.5
Analog PLL (1.8 V)	1.80	31.0	62.5
Analog USB PHY (3.3 V)	3.31	2.1	6.8
SD Card I/O	3.30	0.9	3.0
1.8 V Internal I/O	1.81	105.2	188.5
VDDS_DDR	1.34	229.4	306.9
3.3 V LVCMOS I/O	3.25	44.2	137.5
VDD_IVA	1.09	25.0	25.0
VDD_CORE	0.94	575.0	546.4
VDD_DSPEVE	1.01	113.8	125.0
VDD_GPU	1.10	271.8	312.4
VDD_MPU	1.09	418.1	455.9
SoC POWER			2426.3
VDD_DDR	1.35	59.6	89.5

3.3 OS Idle: MPU Domain at HIGH

3.3.1 OPP

Table 16. OS Idle: MPU Domain at HIGH - OPP

MPU	GPU	DSP	IVA
HIGH	HIGH	HIGH	HIGH

3.3.2 Power Consumption

Table 17. OS Idle: MPU Domain at HIGH - Power Consumption

POWER SUPPLY GROUP	VOLTAGE [V]	CURRENT [mA]	POWER [mW]
Analog PHY1 (1.8 V)	1.79	69.3	125.0
Analog PHY2 (1.8 V)	1.80	73.4	126.5
Analog PLL (1.8 V)	1.80	30.6	62.5
Analog USB PHY (3.3 V)	3.31	2.1	6.8
SD Card I/O	3.30	0.9	2.9
1.8 V Internal I/O	1.81	120.1	225.0
VDDS_DDR	1.34	254.6	340.4
3.3 V LVCMOS I/O	3.25	44.1	137.5
VDD_IVA	1.09	26.4	25.0
VDD_CORE	0.94	583.0	549.9
VDD_DSPEVE	1.01	117.3	125.0
VDD_GPU	1.10	281.1	312.4
VDD_MPU	1.20	677.8	812.8
SoC POWER			2851.5
VDD_DDR	1.35	59.7	88.5

3.4 DDR: Stream

3.4.1 OPP

Table 18. DDR: Stream - OPP

MPU	GPU	DSP	IVA
NOM	HIGH	HIGH	HIGH

3.4.2 Power Consumption

Table 19. DDR: Stream - Power Consumption

POWER SUPPLY GROUP	VOLTAGE [V]	CURRENT [mA]	POWER [mW]
Analog PHY1 (1.8 V)	1.79	0.0	0.1
Analog PHY2 (1.8 V)	1.80	43.6	87.5
Analog PLL (1.8 V)	1.80	30.3	62.5
Analog USB PHY (3.3 V)	3.31	2.0	6.5
SD Card I/O	3.30	0.9	3.1
1.8 V Internal I/O	1.81	191.0	346.9
VDDS_DDR	1.32	644.6	852.3
3.3 V LVCMOS I/O	3.25	20.3	62.5
VDD_IVA	1.08	22.3	25.0
VDD_CORE	0.95	666.3	629.4
VDD_DSPEVE	1.01	106.1	100.0
VDD_GPU	1.10	248.9	262.4
VDD_MPU	1.04	1631.6	1700.6
SoC POWER			4138.6
VDD_DDR	1.34	717.1	961.3

3.5 Dhrystone: Single Core - MPU Domain at NOM

3.5.1 OPP

Table 20. Dhrystone: Single Core - MPU Domain at NOM - OPP

MPU	GPU	DSP	IVA
NOM	HIGH	HIGH	HIGH

3.5.2 Power Consumption

Table 21. Dhrystone: Single Core - MPU Domain at NOM - Power Consumption

POWER SUPPLY GROUP	VOTLAGE [V]	CURRENT [mA]	POWER [mW]
Analog PHY1 (1.8 V)	1.79	69.5	125.0
Analog PHY2 (1.8 V)	1.80	74.2	137.5
Analog PLL (1.8 V)	1.80	30.8	62.5
Analog USB PHY (3.3 V)	3.31	2.1	6.9
SD Card I/O	3.30	0.9	2.9
1.8 V Internal I/O	1.81	101.5	187.5
VDDS_DDR	1.34	248.2	333.4
3.3 V LVCMOS I/O	3.25	21.9	63.5
VDD_IVA	1.09	23.0	25.0
VDD_CORE	0.94	564.5	537.4
VDD_DSPEVE	1.01	108.5	100.0
VDD_GPU	1.10	257.2	287.4
VDD_MPU	1.03	1080.6	1111.2
SoC POWER			2980.1
VDD_DDR	1.35	56.0	87.5

3.6 Dhrystone: Single Core - MPU Domain at OD

3.6.1 OPP

Table 22. Dhrystone: Single Core - MPU Domain at OD - OPP

MPU	GPU	DSP	IVA
OD	HIGH	HIGH	HIGH

3.6.2 Power Consumption

Table 23. Dhrystone: Single Core - MPU Domain at OD - Power Consumption

POWER SUPPLY GROUP	VOLTAGE [V]	CURRENT [mA]	POWER [mW]
Analog PHY1 (1.8 V)	1.79	68.8	125.0
Analog PHY2 (1.8 V)	1.81	73.7	131.0
Analog PLL (1.8 V)	1.80	31.0	62.5
Analog USB PHY (3.3 V)	3.31	2.1	6.8
SD Card I/O	3.30	1.4	4.6
1.8 V Internal I/O	1.81	111.1	201.0
VDDS_DDR	1.34	244.2	325.4
3.3 V LVCMOS I/O	3.25	44.0	137.5
VDD_IVA	1.09	26.4	25.0
VDD_CORE	0.94	581.7	549.9
VDD_DSPEVE	1.01	117.6	125.0
VDD_GPU	1.10	280.5	312.4
VDD_MPU	1.10	1401.3	1540.6
SoC POWER			3546.5
VDD_DDR	1.35	62.7	92.5

3.7 Dhrystone: Single Core - MPU Domain at HIGH

3.7.1 OPP

Table 24. Dhrystone: Single Core - MPU Domain at HIGH - OPP

MPU	GPU	DSP	IVA
HIGH	HIGH	HIGH	HIGH

3.7.2 Power Consumption

Table 25. Dhrystone: Single Core - MPU Domain at HIGH - Power Consumption

POWER SUPPLY GROUP	VOLTAGE [V]	CURRENT [mA]	POWER [mW]
Analog PHY1 (1.8 V)	1.79	69.3	125.0
Analog PHY2 (1.8 V)	1.80	73.7	130.5
Analog PLL (1.8 V)	1.80	30.6	62.5
Analog USB PHY (3.3 V)	3.31	2.1	6.9
SD Card I/O	3.30	1.0	3.2
1.8 V Internal I/O	1.81	129.8	231.9
VDDS_DDR	1.34	257.5	343.9
3.3 V LVCMOS I/O	3.25	43.9	137.5
VDD_IVA	1.09	29.1	37.5
VDD_CORE	0.94	593.8	549.9
VDD_DSPEVE	1.01	124.6	125.0
VDD_GPU	1.10	297.2	324.9
VDD_MPU	1.22	2133.9	2600.4
SoC POWER			4678.9
VDD_DDR	1.35	59.9	89.0

3.8 Dhrystone: Dual Core - MPU Domain at NOM

3.8.1 OPP

Table 26. Dhrystone: Dual Core - MPU Domain at NOM

MPU	GPU	DSP	IVA
NOM	HIGH	HIGH	HIGH

3.8.2 Power Consumption

Table 27. Dhrystone: Dual Core - MPU Domain at NOM - Power Consumption

POWER SUPPLY GROUP	VOLTAGE [V]	CURRENT [mA]	POWER [mW]
Analog PHY1 (1.8 V)	1.79	69.9	125.0
Analog PHY2 (1.8 V)	1.80	74.4	137.5
Analog PLL (1.8 V)	1.80	30.8	62.5
Analog USB PHY (3.3 V)	3.31	2.0	6.6
SD Card I/O	3.30	1.0	3.2
1.8 V Internal I/O	1.81	108.4	200.0
VDDS_DDR	1.34	263.4	349.9
3.3 V LVCMOS I/O	3.25	22.0	66.5
VDD_IVA	1.09	25.3	25.0
VDD_CORE	0.94	574.0	539.4
VDD_DSPEVE	1.01	115.5	125.0
VDD_GPU	1.10	273.2	312.4
VDD_MPU	1.05	1859.7	1944.5
SoC POWER			3897.3
VDD_DDR	1.35	57.7	87.5

3.9 Dhrystone: Dual Core - MPU Domain at OD

3.9.1 OPP

Table 28. Dhrystone: Dual Core - MPU Domain at OD - OPP

MPU	GPU	DSP	IVA
OD	HIGH	HIGH	HIGH

3.9.2 Power Consumption

Table 29. Dhrystone: Dual Core - MPU Domain at OD - Power Consumption

POWER SUPPLY GROUP	VOLTAGE [V]	CURRENT [mA]	POWER [mW]
Analog PHY1 (1.8 V)	1.79	69.0	125.0
Analog PHY2 (1.8 V)	1.80	73.9	134.5
Analog PLL (1.8 V)	1.80	31.0	62.5
Analog USB PHY (3.3 V)	3.31	2.0	6.6
SD Card I/O	3.30	0.9	2.8
1.8 V Internal I/O	1.81	119.6	217.0
VDDS_DDR	1.34	225.4	303.4
3.3 V LVCMOS I/O	3.25	43.9	137.5
VDD_IVA	1.09	29.4	37.5
VDD_CORE	0.95	592.4	549.9
VDD_DSPEVE	1.01	126.3	125.0
VDD_GPU	1.10	299.3	324.9
VDD_MPU	1.11	2407.5	2684.8
SoC POWER			4711.3
VDD_DDR	1.35	59.7	90.0

3.10 Dhrystone: Dual Core - MPU Domain at HIGH

3.10.1 OPP

Table 30. Dhrystone: Dual Core - MPU Domain at HIGH - OPP

MPU	GPU	DSP	IVA
HIGH	HIGH	HIGH	HIGH

3.10.2 Power Consumption

Table 31. Dhrystone: Dual Core - MPU Domain at HIGH - Power Consumption

POWER SUPPLY GROUP	VOLTAGE [V]	CURRENT [mA]	POWER [mW]
Analog PHY1 (1.8 V)	1.79	69.1	125.0
Analog PHY2 (1.8 V)	1.80	73.8	134.0
Analog PLL (1.8 V)	1.80	30.7	62.5
Analog USB PHY (3.3 V)	3.31	2.1	7.0
SD Card I/O	3.30	0.9	3.0
1.8 V Internal I/O	1.81	148.1	263.4
VDDS_DDR	1.34	222.0	296.4
3.3 V LVCMOS I/O	3.24	43.7	137.5
VDD_IVA	1.09	35.2	37.5
VDD_CORE	0.95	617.4	585.9
VDD_DSPEVE	1.01	142.2	137.5
VDD_GPU	1.10	333.8	362.4
VDD_MPU	1.24	3660.8	4530.9
SoC POWER			6682.8
VDD_DDR	1.35	57.1	87.5

3.11 Graphics: 3D Chameleon Man

3.11.1 OPP

Table 32. Graphics: 3D Chameleon Man - OPP

MPU	GPU	DSP	IVA
NOM	HIGH	HIGH	HIGH

3.11.2 Power Consumption

Table 33. Graphics: 3D Chameleon Man - Power Consumption

POWER SUPPLY GROUP	VOLTAGE [V]	CURRENT [mA]	POWER [mW]
Analog PHY1 (1.8 V)	1.79	70.7	125.0
Analog PHY2 (1.8 V)	1.81	87.1	162.5
Analog PLL (1.8 V)	1.80	31.0	62.5
Analog USB PHY (3.3 V)	3.31	4.0	25.0
SD Card I/O	3.30	0.9	2.8
1.8 V Internal I/O	1.81	140.9	257.4
VDDS_DDR	1.33	347.0	459.4
3.3 V LVCMOS I/O	3.25	121.7	389.4
VDD_IVA	1.09	26.1	25.0
VDD_CORE	0.95	697.8	660.8
VDD_DSPEVE	1.01	116.5	125.0
VDD_GPU	1.10	309.7	345.4
VDD_MPU	1.03	407.8	416.4
SoC POWER			3056.6
VDD_DDR	1.34	297.9	458.4

3.12 Graphics: Example UI

3.12.1 OPP

Table 34. Graphics: Example UI - OPP

MPU	GPU	DSP	IVA
NOM	HIGH	HIGH	HIGH

3.12.2 Power Consumption

Table 35. Graphics: Example UI - Power Consumption

POWER SUPPLY GROUP	VOLTAGE [V]	CURRENT [mA]	POWER [mW]
Analog PHY1 (1.8 V)	1.79	70.5	125.0
Analog PHY2 (1.8 V)	1.81	87.2	162.5
Analog PLL (1.8 V)	1.80	31.0	62.5
Analog USB PHY (3.3 V)	3.31	4.0	25.0
SD Card I/O	3.30	0.9	3.0
1.8 V Internal I/O	1.81	144.4	266.4
VDDS_DDR	1.33	370.6	481.4
3.3 V LVCMOS I/O	3.25	82.3	268.4
VDD_IVA	1.09	26.4	25.0
VDD_CORE	0.95	706.8	667.3
VDD_DSPEVE	1.01	117.0	125.0
VDD_GPU	1.10	346.8	384.4
VDD_MPU	1.03	651.4	674.8
SoC POWER			3270.7
VDD_DDR	1.35	245.2	328.4

3.13 Graphics: CoverFlow

3.13.1 OPP

Table 36. Graphics: CoverFlow - OPP

MPU	GPU	DSP	IVA
NOM	HIGH	HIGH	HIGH

3.13.2 Power Consumption

Table 37. Graphics: CoverFlow - Power Consumption

POWER SUPPLY GROUP	VOLTAGE [V]	CURRENT [mA]	POWER [mW]
Analog PHY1 (1.8 V)	1.79	70.4	125.0
Analog PHY2 (1.8 V)	1.80	87.3	162.5
Analog PLL (1.8 V)	1.80	31.0	62.5
Analog USB PHY (3.3 V)	3.31	4.0	25.0
SD Card I/O	3.30	1.0	3.2
1.8 V Internal I/O	1.81	142.9	264.9
VDDS_DDR	1.33	353.5	463.9
3.3 V LVCMOS I/O	3.25	74.6	246.4
VDD_IVA	1.09	26.1	25.0
VDD_CORE	0.95	691.0	651.8
VDD_DSPEVE	1.01	116.8	125.0
VDD_GPU	1.10	299.0	333.4
VDD_MPU	1.03	713.1	738.3
SoC POWER			3226.9
VDD_DDR	1.35	238.9	325.9

3.14 Graphics: Navigation

3.14.1 OPP

Table 38. Graphics: Navigation - OPP

MPU	GPU	DSP	IVA
NOM	HIGH	HIGH	HIGH

3.14.2 Power Consumption

Table 39. Graphics: Navigation - Power Consumption

POWER SUPPLY GROUP	VOLTAGE [V]	CURRENT [mA]	POWER [mW]
Analog PHY1 (1.8 V)	1.79	70.4	125.0
Analog PHY2 (1.8 V)	1.80	87.1	162.5
Analog PLL (1.8 V)	1.80	31.0	62.5
Analog USB PHY (3.3 V)	3.31	4.0	25.0
SD Card I/O	3.30	1.0	3.2
1.8 V Internal I/O	1.81	140.6	261.9
VDDS_DDR	1.33	332.5	443.9
3.3 V LVCMOS I/O	3.25	77.4	251.9
VDD_IVA	1.09	26.1	25.0
VDD_CORE	0.95	693.9	654.3
VDD_DSPEVE	1.01	116.2	125.0
VDD_GPU	1.10	417.7	463.4
VDD_MPU	1.03	365.0	389.9
SoC POWER			2993.4
VDD_DDR	1.35	276.8	365.9

3.15 DSP: Machine Learning (2xDSP)

3.15.1 OPP

Table 40. DSP: Machine Learning (2xDSP) - OPP

MPU	GPU	DSP	IVA
NOM	HIGH	HIGH	HIGH

3.15.2 Power Consumption

Table 41. DSP: Machine Learining (2xDSP) - Power Consumption

POWER SUPPLY GROUP	VOLTAGE [V]	CURRENT [mA]	POWER [mW]
Analog PHY1 (1.8 V)	1.79	0.0	0.1
Analog PHY2 (1.8 V)	1.81	56.8	100.0
Analog PLL (1.8 V)	1.80	33.2	62.5
Analog USB PHY (3.3 V)	3.31	3.9	25.0
SD Card I/O	3.30	0.9	3.1
1.8 V Internal I/O	1.81	177.1	326.4
VDDS_DDR	1.33	410.5	551.4
3.3 V LVCMOS I/O	3.24	120.3	388.9
VDD_IVA	1.09	34.5	37.5
VDD_CORE	0.95	747.2	709.8
VDD_DSPEVE	1.02	581.8	597.9
VDD_GPU	1.10	499.0	550.4
VDD_MPU	1.03	1113.4	1156.2
SoC POWER			4509.1
VDD_DDR	1.35	342.0	446.4

3.16 IVA: HD H.264 Decode

3.16.1 OPP

Table 42. IVA: HD H.264 Decode - OPP

MPU	GPU	DSP	IVA
NOM	HIGH	HIGH	HIGH

3.16.2 Power Consumption

Table 43. IVA: HD H.264 Decode - Power Consumption

POWER SUPPLY GROUP	VOLTAGE [V]	CURRENT [mA]	POWER [mW]
Analog PHY1 (1.8 V)	1.79	0.0	0.0
Analog PHY2 (1.8 V)	1.80	56.7	100.0
Analog PLL (1.8 V)	1.80	32.9	62.5
Analog USB PHY (3.3 V)	3.31	4.0	25.0
SD Card I/O	3.30	1.2	1.0
1.8 V Internal I/O	1.81	138.0	252.4
VDDS_DDR	1.33	388.0	504.9
3.3 V LVCMOS I/O	3.25	99.8	336.4
VDD_IVA	1.09	77.8	83.0
VDD_CORE	0.95	706.6	666.3
VDD_DSPEVE	1.01	110.8	100.0
VDD_GPU	1.10	262.3	287.4
VDD_MPU	1.02	350.8	368.4
SoC POWER			2787.4
VDD_DDR	1.35	271.5	347.9

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