Application Note

AM62x Power Consumption Summary

ABSTRACT

This application report discusses the power consumption for common system application usage scenarios for the AM62x Sitara™ processors. The metrics contained in this document serve to provide users with a better understanding of AM62x active power behaviors: making it easier to determine a suitable configuration to meet a given power budget.

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1 Introduction

Power consumption is highly dependent on the individual user's application; however, this document focuses on providing several AM62x 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 AM62x boards with on-board power measurement device (TI INA231).

For additional details about the AM62x processor, see the AM625 and AM623 product pages .

1.1 Power Measurement Setup

The following section details power measurements taken on an AM62x platform for typical use case applications. These measurements have been performed on an internal test evaluation reference system, a Silicon Validation Board (SVB), under temperature controlled forced air, keeping the thermal junction temperature, Tj =~38°C. During all tests the MAIN CBA is set to 250 MHz, and the M4 is set to 400 MHz. The Power Consumption Report reflects Primary SoC Power Supplies, VDD_CORE, VDDR_CORE, and VDDS_DDR. This report does not discuss IO and Analog Power Supplies.

Note

All of the readings shown here are taken at room temperature (25°C).

1.2 AM62x Power Supplies

Table 1-1 describes the power supplies for AM62x.

Table 1-1. AM62x Power Supplies

SOC Voltages	SVB Supply Rail	Description
VDD_CORE	VDD_CORE	Core voltage domain supply
VDDR_CORE	VDDR_CORE	eFuse/Core voltage domain supply
VDDS_DDR_C	VDDS_DDR	DDR clock voltage domain supply
VDDS_DDR		DDR PHIO IO voltage domain supply
NA	VDD_DIMM	Not a voltage domain of SOC

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 Idle

2.1.1 1250 MHz with VDD_CORE = 0.75 V

This measurement models an optimized idle operating system within the Code Composer Studio environment.

A53 (MHz)	M4 (MHz)	VDD_CORE (V)	Power (W)
1250	400	0.750	0.398

2.1.2 1400 MHz with VDD_CORE = 0.85 V

This measurement models an optimized idle operating system within the Code Composer Studio environment.

A53 (MHz)	M4 (MHz)	VDD_CORE (V)	Power (W)
1400	400	0.850	0.513

2.2 Dhrystone – Single Core A53

In this measurement, the dhrystone benchmark test is running in Code Composer Studio environment.

A53 (MHz)	M4 (MHz)	VDD_CORE (V)	Power (W)
200	400	0.750	0.377
1000	400	0.750	0.444
1250	400	0.750	0.465
1400	400	0.850	0.614

2.3 Dhrystone – Dual Core A53

In this measurement, the dhrystone benchmark test is running in the Code Composer Studio environment.

A53 (MHz)	M4 (MHz)	VDD_CORE (V)	Power (W)
1250	400	0.750	0.538

2.4 Dhrystone – Quad Core A53

In this measurement, the dhrystone benchmark test is running in the Code Composer Studio environment.

A53 (MHz)	M4 (MHz)	VDD_CORE (V)	Power (W)
200	400	0.750	0.420
1000	400	0.750	0.622
1250	400	0.750	0.684
1400	400	0.850	0.933

2.5 Stream – Single Core A53 – LPDDR4

In this measurement, the Stream DDR benchmark test is running in the Code Composer Studio environment.

A53 (MHz)	M4 (MHz)	VDD_CORE (V)	Power (W)
1250	400	0.750	0.528
1400	400	0.850	0.684

2.6 Stream – Dual Core A53 – LPDDR4

In this measurement, the Stream DDR benchmark test is running in the Code Composer Studio environment.

A53 (MHz)	M4 (MHz)	VDD_CORE (V)	Power (W)
1250	400	0.750	0.619
1400	400	0.850	0.807

2.7 Stream – Quad Core A53 – LPDDR4

In this measurement, the Stream DDR benchmark test is running in the Code Composer Studio environment.

A53 (MHz)	M4 (MHz)	VDD_CORE (V)	Power (W)
1250	400	0.750	0.700
1400	400	0.850	0.925

2.8 Linux – Stream with DDR4

In this measurement, the Stream DDR benchmark test is running while running Linux OS.

A53 (MHz)	M4 (MHz)	VDD_CORE (V)	Power (W)
1250	400	0.750	0.796

2.9 Linux – Stream with LPDDR4

In this measurement, the Stream DDR benchmark test is running while running Linux OS.

A53 (MHz)	M4 (MHz)	VDD_CORE (V)	Power (W)
1250	400	0.750	0.689

3 AM62x Power Measurement Results

3.1 Idle

3.1.1 1250 MHz with VDD_CORE = 0.75 V

A53 (MHz)	M4 (MHz)	Power (W)
1250	400	0.398

3.1.2 Power Consumption

Rail Name	Power (W)	Voltage(V)	Current(A)
VDD_CORE	0.350	0.749	0.468
VDDR_CORE	0.003	0.850	0.003
VDDS_DDR	0.045	1.099	0.041
Total	**0.398**		
VDD_DIMM	0.012	1.103	0.011

3.1.3 1450 MHz with VDD_CORE = 0.85 V

A53 (MHz)	M4 (MHz)	Power (W)
1400	400	0.513

3.1.4 Power Consumption

Rail Name	Power (W)	Voltage(V)	Current(A)
VDD_CORE	0.466	0.849	0.549
VDDR_CORE	0.002	0.850	0.003
VDDS_DDR	0.045	1.099	0.041
Total	**0.513**		
VDD_DIMM	0.012	1.103	0.011

3.2 Dhrystone – Single Core A53 – 200 MHz

3.2.1 OPP

A53 (MHz)	M4 (MHz)	Power (W)
200	400	0.377

3.2.2 Power Consumption

Rail Name	Power (W)	Voltage(V)	Current(A)
VDD_CORE	0.329	0.749	0.440
VDDR_CORE	0.003	0.850	0.003
VDDS_DDR	0.045	1.099	0.041
Total	**0.377**		
VDD_DIMM	0.012	1.101	0.011

3.3 Dhrystone – Single Core A53 – 1000 MHz

3.3.1 OPP

A53 (MHz)	M4 (MHz)	Power (W)
1000	400	0.444

3.3.2 Power Consumption

Rail Name	Power (W)	Voltage(V)	Current(A)
VDD_CORE	0.395	0.749	0.529
VDDR_CORE	0.004	0.850	0.004
VDDS_DDR	0.045	1.099	0.041
Total	**0.444**		
VDD_DIMM	0.012	1.101	0.011

3.4 Dhrystone – Single Core – 1250 MHz

3.4.1 OPP

A53 (MHz)	M4 (MHz)	Power (W)
1250	400	0.465

3.4.2 Power Consumption

Rail Name	Power (W)	Voltage(V)	Current(A)
VDD_CORE	0.416	0.749	0.557
VDDR_CORE	0.004	0.850	0.005
VDDS_DDR	0.045	1.099	0.041
Total	**0.465**		
VDD_DIMM	0.012	1.103	0.011

3.5 Dhrystone – Single Core – 1400 MHz

3.5.1 OPP

A53 (MHz)	M4 (MHz)	Power (W)
1400	400	0.614

3.5.2 Power Consumption

Rail Name	Power (W)	Voltage(V)	Current(A)
VDD_CORE	0.565	0.849	0.665
VDDR_CORE	0.004	0.850	0.005
VDDS_DDR	0.045	1.099	0.041
Total	**0.614**		
VDD_DIMM	0.012	1.103	0.011

3.6 Dhrystone – Dual Core A53 – 1250 MHz

3.6.1 OPP

A53 (MHz)	M4 (MHz)	Power (W)
1250	400	0.538

3.6.2 Power Consumption

Rail Name	Power (W)	Voltage(V)	Current(A)
VDD_CORE	0.487	0.749	0.653
VDDR_CORE	0.006	0.850	0.007
VDDS_DDR	0.045	1.099	0.041
Total	**0.538**		
VDD_DIMM	0.012	1.103	0.011

3.7 Dhrystone – Quad Core A53 – 200 MHz

3.7.1 OPP

A53 (MHz)	M4 (MHz)	Power (W)
200	400	0.420

3.7.2 Power Consumption

Rail Name	Power (W)	Voltage(V)	Current(A)
VDD_CORE	0.371	0.749	0.496
VDDR_CORE	0.004	0.850	0.005
VDDS_DDR	0.045	1.099	0.041
Total	**0.420**		
VDD_DIMM	0.012	1.103	0.011

3.8 Dhrystone – Quad Core A53 – 1000 MHz

3.8.1 OPP

A53 (MHz)	M4 (MHz)	Power (W)
1000	400	0.622

3.8.2 Power Consumption

Rail Name	Power (W)	Voltage(V)	Current(A)
VDD_CORE	0.570	0.749	0.762
VDDR_CORE	0.007	0.850	0.008
VDDS_DDR	0.045	1.099	0.041
Total	**0.622**		
VDD_DIMM	0.012	1.103	0.011

3.9 Dhrystone – Quad Core A53 – 1250 MHz

3.9.1 OPP

A53 (MHz)	M4 (MHz)	Power (W)
1250	400	0.684

3.9.2 Power Consumption

Rail Name	Power (W)	Voltage(V)	Current(A)
VDD_CORE	0.631	0.748	0.846
VDDR_CORE	0.008	0.849	0.009
VDDS_DDR	0.045	1.099	0.041

Rail Name	Power (W)	Voltage(V)	Current(A)
Total	**0.684**		
VDD_DIMM	0.012	1.103	0.011

3.10 Dhrystone – Quad Core A53 – 1400 MHz

3.10.1 OPP

A53 (MHz)	M4 (MHz)	Power (W)
1400	400	0.933

3.10.2 Power Consumption

Rail Name	Power (W)	Voltage(V)	Current(A)
VDD_CORE	0.880	0.849	1.036
VDDR_CORE	0.008	0.849	0.010
VDDS_DDR	0.045	1.099	0.041
Total	**0.933**		
VDD_DIMM	0.012	1.103	0.011

3.11 Stream – Single Core A53 – 1250 MHz – LPDDR4

3.11.1 OPP

A53 (MHz)	M4 (MHz)	Power (W)
1250	400	0.528

3.11.2 Power Consumption

Rail Name	Power (W)	Voltage(V)	Current(A)
VDD_CORE	0.445	0.749	0.593
VDDR_CORE	0.003	0.850	0.004
VDDS_DDR	0.080	1.099	0.073
Total	**0.528**		
VDD_DIMM	0.041	1.103	0.037

3.12 Stream – Single Core A53 – 1400 MHz

3.12.1 OPP

A53 (MHz)	M4 (MHz)	Power (W)
1400	400	0.684

3.12.2 Power Consumption

Rail Name	Power (W)	Voltage(V)	Current(A)
VDD_CORE	0.594	0.849	0.699
VDDR_CORE	0.004	0.850	0.004
VDDS_DDR	0.086	1.099	0.078
Total	**0.684**		
VDD_DIMM	0.039	1.103	0.035

3.13 Stream – Dual Core A53 – 1250 MHz – LPDDR4

3.13.1 OPP

A53 (MHz)	M4 (MHz)	Power (W)
1250	400	0.619

3.13.2 Power Consumption

Rail Name	Power (W)	Voltage(V)	Current(A)
VDD_CORE	0.530	0.749	0.709
VDDR_CORE	0.004	0.850	0.005
VDDS_DDR	0.085	1.099	0.078
Total	**0.619**		
VDD_DIMM	0.058	1.101	0.052

3.14 Stream – Dual Core A53 – 1400 MHz – LPDDR4

3.14.1 OPP

A53 (MHz)	M4 (MHz)	Power (W)
1400	400	0.807

3.14.2 Power Consumption

Rail Name	Power (W)	Voltage(V)	Current(A)
VDD_CORE	0.710	0.849	0.835
VDDR_CORE	0.005	0.850	0.005
VDDS_DDR	0.092	1.099	0.084
Total	**0.807**		
VDD_DIMM	0.062	1.101	0.056

3.15 Stream – Quad Core A53 – 1250 MHz – LPDDR4

3.15.1 OPP

A53 (MHz)	M4 (MHz)	Power (W)
1250	400	0.700

3.15.2 Power Consumption

Rail Name	Power (W)	Voltage(V)	Current(A)
VDD_CORE	0.605	0.748	0.811
VDDR_CORE	0.005	0.850	0.006
VDDS_DDR	0.090	1.099	0.082
Total	**0.700**		
VDD_DIMM	0.067	1.101	0.060

3.16 Stream – Quad Core A53 – 1400 MHz – LPDDR4

3.16.1 OPP

A53 (MHz)	M4 (MHz)	Power (W)
1400	400	0.925

3.16.2 Power Consumption

Rail Name	Power (W)	Voltage(V)	Current(A)
VDD_CORE	0.828	0.849	0.976
VDDR_CORE	0.005	0.85	0.006
VDDS_DDR	0.092	1.099	0.084
Total	**0.925**		
VDD_DIMM	0.069	1.101	0.063

3.17 Linux – Stream with DDR4

3.17.1 OPP

A53 (MHz)	M4 (MHz)	Power (W)
1250	400	0.796

3.17.2 Power Consumption

Rail Name	Power (W)	Voltage(V)	Current(A)
VDD_CORE	0.610	0.746	0.818
VDDR_CORE	0.006	0.850	0.007
VDDS_DDR	0.180	1.199	0.150
Total	**0.796**		
VDD_DIMM	0.190	1.195	0.159

3.18 Linux – Stream with LPDDR4

3.18.1 OPP

A53 (MHz)	M4 (MHz)	Power (W)
1250	400	0.689

3.18.2 Power Consumption

Rail Name	Power (W)	Voltage(V)	Current(A)
VDD_CORE	0.596	0.749	0.797
VDDR_CORE	0.006	0.849	0.008
VDDS_DDR	0.087	1.100	0.079
Total	**0.689**		
VDD_DIMM	0.051	1.104	0.046

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