Application Note

AM62D Power Estimation Tool

ABSTRACT

The power estimation spreadsheet provides power consumption estimates based on measured and simulated data; the estimates are provided *as is* and are not verified within a specified precision. Power consumption depends on electrical parameters, silicon process variations, environmental conditions, and use cases running on the processor during operation. Actual power consumption must be verified in the real system. This tool is meant for estimating power consumption during realistic operating modes and is not intended for power supply sizing. This power estimation spreadsheet is preliminary and subject to change. The spreadsheet mentioned in this document can be downloaded from AM62D-PET-CALC.

Table of Contents

Trademarks

1 Introduction

The power estimation tool is a design resource to assist with the development process. This tool consists of a spreadsheet that helps estimate the SoC power consumption in active state based on specific application use cases. The SoC resource utilization, speed, IO configuration and peripherals must be represented accurately in the PET inputs for the tool to be effective. The usage of the spreadsheet is explained further in the document.

2 Using the Power Estimation Tool

The input part of the spreadsheet consists of six sections: Operating Performance Point, Processor Core Utilization, LVCMOS IO, Peripheral, Estimated Power, and General. To use the input part the spreadsheet, users must modify the fields with the appropriate usage parameters. Cells designed for user input are in blue. Fields that cannot be modified are red. Fields in green are the output calculated power. Configure the blue cells to a value most closely aligned with the intended scenario.

The purpose of each of the four sections is:

- Operating Performance Point: configure frequency of operation for A53s, R5s, M4, C7x DSP and HSM.
- Processor Core Utilization: user estimated percent utilization of each core.
- LVCMOS IO: subset of commonly used IO with selectable mode and percent utilization.
- Peripherals: other peripherals with selectable mode and percent utilization.
- General: high level system configuration.
- Estimated Power: power estimation output by rail. Power rails are aligned with EVM design. Selectable VDD_CORE.

2.1 Operating Performance Point (OPP)

This section allows the user to set the operating frequency of each of the compute cores and clusters.

- A53: Bypass to 1400MHz, depending on PLL resolution frequency step.

Note

If using 1400MHz, then VDD_CORE must be set to 0.85V, per the data sheet.

- MCU R5F: Bypass to 800MHz, depending on PLL resolution frequency step.
- Device Manager R5F: 400 or 800MHz, depending on PLL resolution frequency step.
- M4F: 400 or 800MHz, depending on PLL resolution frequency step.
- C7x: Bypass to 1000MHz.

Note

If using 1000MHz, then VDD_CORE needs to be set to 0.85V, per the data sheet.

- HSM: 133 or 400MHz

2.2 Processor Core Utilization

This section allows users to load each compute core with utilization between 0%-100% (inclusive). For guidance, 0% is an *off* or *unused* state. 1% is *idle*. 100% is maximum utilization (that is, Dhrystone).

For the C7x DSP there is no mode to toggle MMA usage or not. Because of this, TI recommends that, if MMA is not used, then the valid range of % Utilization is 0 to 50%. For example, if the customer intends to model 100% activity without MMA usage, then 50% is the appropriate value. When MMA of the DSP is used, the valid range is 0 to 100%.

2.3 LVCMOS IO

This section allows the user to select both Mode and Utilization of a subset of commonly used IOs on the AM62D, including UART (3.3V), SPI (3.3V), Ethernet® (3.3V), OSPI (1.8V), and GPMC (3.3V).

Note

This is not the complete set of IOs possible on the AM62D, and any IO configuration must be confirmed through the AM62D pinmux tool. These are dual voltage IO domains (1.8V or 3.3V), but currently are fixed to match the EVM design.

- Mode: IO dependent mode and operating speed.

- Utilization (%): Specifies the utilization as a percentage of activity relative to a full load condition.

2.4 Peripherals

This section allows the user to select both Mode and Utilization of the other peripherals on the AM62D. Other peripherals include DDR, USB2, SD card, eMMC, CSI and CANFD.

- Mode: Peripheral dependent operating mode.
- Utilization (%): Specifies the utilization as a percentage of activity relative to a full load condition.

2.5 General

This section lets the user select junction temperature (not ambient temperature) and power estimation mode.

- Junction Temperature (°C): -40 to 125 approximate junction temperature
- Power Estimation Mode: Typ or Max ('Typ' is the typical power consumption of most devices. 'Max' is the worst-case possible due to silicon variation).

2.6 Estimated Power Consumption

The power estimation tool generates a power analysis report in this section. There is a selectable field for the two modes of operation of VDD_CORE. The report lists power supply name, voltage in Volts (V), and power consumption in Watts (mW) per power rail groups. Power rail groups match the AM62D EVM design.

Note

The VDD_DDR4 estimated power is from AM62D SOC only, on the EVM this rail includes both SOC and external DDR device power. The total power consumption in Watts (mW) is listed at the end of the table.

VDD_CORE: 0.75V or 0.85V for AM62D

3 Summary

The AM62D-Q1 Power Estimation Tool allows to estimate the power consumption of the processor in active state. The total power is also itemized by the main SoC supplies: VDD_CORE, VDDR_CORE, VDDA_1V8, VDDS_LPDDR4, SOC_DVDD1V8 and SOC_DVDD3V3. The results are provided *as is* and are not verified within a specified precision. For any technical questions or feedback, please use the Processors forum on E2E.

4 References

1. Texas Instruments, AM62D-Q1 Automotive 40GFLOPS DSP audio processor with Arm® Cortex®-A53, Cortex-R5F and LPDDR4, data sheet.
2. Texas Instruments, AM62D Power Estimation Tool, webpage

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Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265