

AM43xx Power Estimation Tool

Catalog Processors

ABSTRACT

The Power Estimation Tool (PET) provides insight into the power consumption of select Sitara™ processors. The tool includes the ability to choose multiple application scenarios and understand the power consumption as well as how advanced power saving techniques can be applied to further reduce overall power consumption.

The spreadsheet mentioned in this document can be downloaded from the following URL:
<http://www.ti.com/lit/zip/spraca3>.

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1 Introduction

The PET spreadsheet is comprised of two parts:

- Input – The input part of the spreadsheet is the mechanism in which you input device parameters needed for your application. Parameters include IP activities/loadings, desired power states, and power management usages.
- Output – The output part of the spreadsheet contains the information on System-on-Chip (SoC) power consumption based on power calculations in the spreadsheet. The output report that includes leakage, active and total average power, as well as power management voltages, is shown in this area.

The data presented in the PET spreadsheet are based on measurements performed on AM43xx revision 1.1 silicon, as well as estimates.

NOTE: The AM43xx PET applies to AM437x family devices (AM4376, AM4377, AM4378 and AM4379) and AM438x family devices (AM4382, AM4384 and AM4388).

2 Input

The Input part of the spreadsheet consists of four sections: General, Operating Performance Point (OPP), Processor Core Utilization, and Peripheral Module Utilization. To use the input part of the spreadsheet, the input fields need to be modified with their appropriate usage parameters. Cells that are designed for user input are light blue in color. Simply configure the light blue cells to a value most closely aligned with your intended scenario.

Briefly, the purpose of each of the four sections is:

- General: configure the high-level system configuration such as junction temperature and power estimation mode.
- Operating Performance Point (OPP): configure MPU OPP, MPU frequency and CORE OPP.
- Processor Core Utilization: configure processor subsystem components.
- Peripheral Module Utilization: configure peripherals.

2.1 Macro Buttons

The spreadsheet includes macros. If you cannot run macros, review your excel security settings described in the following articles:

- Change macro security settings in Excel (Office 2010) [1]
- Change macro security settings in Excel (Office 2007) [2]

The input part of the spreadsheet has command buttons to run macros.

- "Default Settings" - Clear all settings and configure them to the default values.
- "Dhrystone" - Configure settings to the Dhrystone benchmark example application scenario. [MPU intensive, high power use case]
- "OS Idle" - Configure settings to Linux OS Idle example application scenario. [MPU idle, medium power use case]

2.2 General

This section allows you to choose the DDR type, set a junction temperature (not ambient temperature) between 0°C and 105°C and power estimation mode.

- Device Revision: PG1.1
- DDR Type: LPDDR2, DDR3+VTT, DDR3L, None
- Junction Temperature (°C) : 0 to approximately 105 (negative values are not supported in the tool)
- Power Estimation Mode : Max, Typ ('Max' accounts for the worst-case silicon process variation)

2.3 **Operating Performance Point (OPP)**

This section allows you to set an operating performance point (OPP) for the MPU domain, CORE domain and the MPU frequency.

2.4 **Processor Core Utilization**

Module utilization is the percentage of the available MHz at the selected OPP needed to meet the scenario processing requirement.

A separate utilization entry is provided for the ARM® Cortex®-A9 processor subsystem.

- MPU (Cortex-A9): 0 - 100 %

For the graphics accelerator subsystem, a separate utilization entry is provided:

- Graphics Accelerator: 0 - 100 %

For PRU-ICSS subsystem, a separate utilization entry is provided:

- PRU-ICSS (Programmable Real-Time Unit Subsystem)

2.5 **Peripheral Module Utilization**

This section is used to configure the activity on peripheral modules.

For each modules, module utilization can be entered as a percentage (0-100). A separate utilization entry is provided for the following modules:

- DDR External Memory Interface (EMIF) controller
- Display Display SubSystem (DSS)
- Camera (VPFE0/1)
- Universal Serial Bus (USB) Port 0 or 1
- Ethernet MAC
- General-Purpose Memory Controller (GPMC)
- MultiMedia Card host controller (MMC)
- MultiChannel Audio Serial Port (McASP)

3 **Output**

3.1 **AM43xx Power Consumption**

The power estimation tool generates a power analysis report in this section. The report lists power consumption in mW per power rail groups.

The AM43xx Power Estimation Tool models temperature and device process effects on device power consumption. Active power consumption is the power that is consumed by portions of the AM335x that are performing some processing. Active power is independent of temperature, but dependent on voltage and module activity levels.

3.2 **Important Notes and Limitations**

The following notes and limitations apply to the AM43xx Power Estimation Tool:

It is up to you to input reasonable utilization numbers for the MPU subsystem for the purposes of maximum power analysis. 90-100% loading on the subsystem is not realistic for most application scenarios.

4 References

1. [Change macro security settings in Excel \(Office 2010\)](#)
2. [Change macro security settings in Excel \(Office 2007\)](#)
3. [Sitara™ AM438x Processors](#)
4. [Sitara AM437x Processors](#)

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