

Application Note

AM261x Power Estimation Tool



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ABSTRACT

The power estimation spreadsheet provides power consumption estimates based on measured and simulated data; the tool is provided as *is* and does not provide 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. The power estimation spreadsheet is preliminary and subject to change. The spreadsheet can be downloaded from [AM261X-PET-CALC](#).

Note

This is a preliminary tool and is subject to change as TI continues to characterize more devices; therefore, data can be updated and the Power Estimation Tool (PET) revised along with new findings.

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1 Introduction

The power estimation tool consists of a spreadsheet that helps calculate the estimated power based on the inputs of the application use-case a user provides. The usage of the spreadsheet is explained further in the document. By default, the spreadsheet has the most commonly used use-case settings as its' inputs.

2 Using the Power Estimation Tool

The spreadsheet consists of following 3 sections: Processing Elements, Interfaces and Power Report.

To use the input part the spreadsheet, users must modify the fields with the appropriate usage parameters. Cells designed for user input are in Yellow. Fields that cannot be modified are Gray. Fields in blue are the output calculated power. Configure the yellow cells to a value most closely aligned with your intended scenario.

The purpose of each of these sections is:

- Processing Elements:
 - Configure frequency of operation for R5F Dual Core 0, HSM M4, ICSSM0, ICSSM1, and CPSW
 - Mode of operation for R5F and HSM (Hardware Security Module)
 - User estimated percent utilization of each core

Note

For Single Core device power estimations, please use the respective Dual Core setting at 50% utilization.

- Interfaces
 - Subset of commonly used major Interfaces with selectable operating modes
 - Subset of commonly used major Interfaces with percent utilization
- Power Report:
 - Selectable VDD, VDD_SRAM, VDDA
 - Power estimation output by rail
 - Power rails are aligned with AM261x SOM/LP EVM design

3 Processing Elements

The *Processing Elements* section allows you to set the operating frequency, mode and load each compute core with utilization between 0%-100% (inclusive). Utilization here refers to the amount of time the core is utilized/ active (expressed in-terms of percentage) within a fixed time frame.

[Table 3-1](#) lists the selectable options.

Table 3-1. Selectable Options for Processor Frequency, Mode, and Utilization

Processing Element	Frequency	Mode	Utilization
HSM (Hardware Security Module)	N/A	Secure Boot, Run Time Services	0% – 100%
R5F Dual Core 0	500MHz, 400MHz, 250MHZ, 200MHz	Dual, Lockstep (AM2612) Single (AM2611)	0% – 100%
ICSSM0	225MHz	N/A	0% – 100%
ICSSM1	225MHz	N/A	0% – 100%
CPSW	200MHz	N/A	0% – 100%

4 Interfaces

The *Interface* section lets select the functional mode and utilization of a subset of the commonly used interfaces on the device. Utilization here refers to the amount of time the corresponding interface is utilized/active (expressed in-terms of percentage) within a fixed time frame.

Table 4-1 lists the selectable options.

Table 4-1. Selectable Options of Interface Mode and Utilization

Interface	Mode	Utilization
CMPSS	on_3p3v, Unused, Off	0%-100%
ADC	on_3p3v, Unused, Off	0%-100%
DAC	on_3p3v, Unused, Off	0%-100%
Ethernet[0:1]	RGMII/RMII/MII, 10/100/1000MPBS, 3p3v/1p8v, Unused, Off	0%-100%
OSPI[0:1]	Controller/Peripheral, DDR/SDR, 3p3v/1p8v 200MHz/166MHz/133MHz/100MHz/ 80MHz/67MHz/60MHz/10MHz, Off	0%-100%
GPMC	16b, 3p3v/1p8v, 133MHz/100MHz/10MHz, Unused, Off	0%-100%
USB	power_down, sleep, device[HS:FS:LS]/idle, host[HS:FS:LS]/idle	0%-100%
EPWM	on_3p3v, Unused, Off	0%-100%
MCAN	8MBPS, 3p3v, Unused, Off	0%-100%
MCSPi	Controller/Peripheral, 3p3v/1p8v, 1.563/2.083/3.125/6.25/12.5/25/40MBPS, Unused, Off	0%-100%

5 Other Inputs

- There is a selectable field for the junction temperature configuration:
 - Temperature (T_j °C): -40, -20, 0, 25, 50, 75, 85, 100, 105, 125, 140, 150.
- There is a selectable field for the package type configuration:
 - Select SIP if SIP package is being used
 - Non-SIP if Non-SIP package is being used.
- There is a selectable field for the Flash operation configuration:
 - RWW (Read While Write - OSPI 8D Mode 133MHz)
 - Octal Read (OSPI 8D Mode 133MHz)

6 Power Report

The *Power Report* section contains the generated output of the Power Estimation Tool. The report lists the power supply name, the voltage in Volts (V), and the power consumption in Watts (W) per power rail group.

Table 6-1 shows the selectable fields for the following power rails options.

Table 6-1. Selectable Fields for Power Rails

Voltage Rail	Selectable Options (V)
VDD	0.9 - 1.4 (1.20 Default)
VDD_SRAM	0.9 - 1.4 (1.20 Default)
VDDA	3.135, 3.3, 3.465 (3.3 Default)

7 Summary

This document provides a comprehensive guide to estimating power consumption for the AM261x processor, enabling developers to make informed decisions about the system's power requirements. By utilizing the tool, users can gain a better understanding of how various factors, such as processing elements, interfaces, and environmental conditions, impact power consumption. This knowledge can be leveraged to optimize system design, making sure of efficient power usage and reliable performance. Overall, the document serves as a valuable resource for developers seeking to balance power efficiency with system functionality, facilitating the creation of effective applications.

8 References

- Texas Instruments, [AM2612 product page](#)
- Texas Instruments, [AM2611 product page](#)
- Texas Instruments, [MCU-PLUS-SDK-AM261X product page](#)
- Texas Instruments, [LP-AM261x product page](#)
- Texas Instruments, [AM261x Sitara™ Microcontrollers](#) , data sheet
- Texas Instruments, [AM261 Sitara™ Microcontroller Silicon Revision 1.0](#), errata
- Texas Instruments, [AM261x Technical Reference Manual](#)
- Texas Instruments, [AM261x Register Addendum](#), technical reference manual

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