Application Brief

AM275x Power Estimation Tool

TEXAS INSTRUMENTS

Introduction

The power estimation spreadsheet provides power consumption estimates based on measured and simulated data; these estimates are delivered *as is* with no stated level of precision. Power consumption depends on electrical parameters, silicon process variations, environmental conditions, and use cases running on the processor during operation. Verify actual power consumption in the real system. This tool is meant for estimating power consumption during realistic operating modes; the tool is not intended for power supply sizing. This power estimation spreadsheet is preliminary and subject to change. Download the *AM275x Power Estimation Tool Spreadsheet*.

Note

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

Using the Power Estimation Tool

The input part of the spreadsheet consists of two sections: *Processing Elements* and *I/O Elements*. The output part of the spreadsheet is under *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 blue. Fields that cannot be modified are pink. 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 these sections is:

- Processing Elements:
  - Configure frequency of operation for R5Fs and C7x
  - User estimated percent utilization of each core
- I/O Elements:
  - Subset of commonly used major interfaces with selectable mode
  - Subset of commonly used major interfaces with percent utilization
- Power Report:
  - Power estimation output by rail

Processing Elements

This 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 1 lists the selectable options.

Table 1. Selectable Options for Frequency, Mode, and Utilization

Processing Element	Frequency (MHz)	Utilization
DM_R5	1000, 800, 400	0%-100%
R5FFS0	1000, 800, 400	0% – 100%
R5FFS1	1000, 800, 400	0% – 100%
C7x0	1000, 750, 500, 400, 250	0% – 100%
C7x1	1000, 750, 500, 400, 250	0% – 100%

Note

Users also select the junction temperature, power estimation mode, and VDD_CORE in this section. The clock speed of 1000MHz is contingent upon the core voltage, specifically being at or above 0.85 volts.

Processing Elements can mimic OPNs, so users can use the following values to more accurately simulate OPNs.

I/O Elements

This section lets you select both the modes and the utilization of subsets of the commonly used I/Os. Utilization here refers to the amount of time the corresponding interface is utilized or active, or both (expressed in-terms of percentage) within a fixed time frame.

Table 2 lists the selectable options.

Table 2. Selectable Options of Mode and Utilization

Interface	Mode	Utilization
CANFD (also known as MCAN)	• 12mbs_3p3v • 8mbs_3p3v • 5mbs_3p3v • 1mbs_3p3v • 250kbs_3p3v • 12mbs_1p8v • 8mbs_1p8v • 5mbs_1p8v • 1mbs_1p8v • 250kbs_1p8v • unused • off	0%–100%
ECAP	• pwm_out_5m_3p3v • pwm_out_1m_3p3v • pwm_out_5m_1p8v • pwm_out_1m_1p8v • capture_in_5m_3p3v • capture_in_1m_3p3v • capture_in_5m_1p8v • capture_in_1m_1p8v • unused • off	0%–100%
EPWM	• on_3p3v • on_1p8v • unused • off	0%–100%
Ethernet_0 and Ethernet_1	• rgmii_1000_1p8v • rgmii_100_1p8v • rgmii_10_1p8v • rmii_100_1p8v • rmii_10_1p8v • rgmii_1000_3p3v • rgmii_100_3p3v • rgmii_10_3p3v • rmii_100_3p3v • rmii_10_3p3v • unused • off	0%–100%
I2C	• i2c_400k_1p8v • i2c_100k_1p8v • i2c_400k_3p3v • i2c_100k_3p3v • unused • off	0%–100%
WKUP_I2C	• i2c_3p4m_1p8v • i2c_1m_1p8v • i2c_400k_1p8v • i2c_100k_1p8v • i2c_400k_3p3v • i2c_100k_3p3v • off	0%–100%

Table 2. Selectable Options of Mode and Utilization (continued)

Interface	Mode	Utilization
MCASP	• 8Ch_RX_48_ksps_24b_3p3v • 4Ch_RX_48_ksps_24b_3p3v • 2Ch_RX_48_ksps_24b_3p3v • 16Ch_TX_48_ksps_24b_3p3v • 8Ch_TX_48_ksps_24b_3p3v • 4Ch_TX_48_ksps_24b_3p3v • 2Ch_TX_48_ksps_24b_3p3v • 16Ch_RXTX_48ksps_24b_3p3v • 12Ch_RXTX_48ksps_24b_3p3v • 8Ch_RXTX_48ksps_24b_3p3v • 4Ch_RXTX_48ksps_24b_3p3v • 2Ch_RXTX_48ksps_24b_3p3v • 8Ch_RX_48_ksps_24b_1p8v • 4Ch_RX_48_ksps_24b_1p8v • 2Ch_RX_48_ksps_24b_1p8v • 16Ch_TX_48_ksps_24b_1p8v • 8Ch_TX_48_ksps_24b_1p8v • 4Ch_TX_48_ksps_24b_1p8v • 2Ch_TX_48_ksps_24b_1p8v • 16Ch_RXTX_48ksps_24b_1p8v • 12Ch_RXTX_48ksps_24b_1p8v • 8Ch_RXTX_48ksps_24b_1p8v • 4Ch_RXTX_48ksps_24b_1p8v • 2Ch_RXTX_48ksps_24b_1p8v • unused • off	0%–100%
FSS	• qspi_ddr_controller_160_3p3v • qspi_ddr_controller_133_3p3v • qspi_sdr_controller_133_3p3v • qspi_sdr_controller_108_3p3v • ospi_ddr_controller_160_3p3v • ospi_ddr_controller_133_3p3v • ospi_sdr_controller_133_3p3v • ospi_sdr_controller_108_3p3v • qspi_ddr_controller_160_1p8v • qspi_ddr_controller_133_1p8v • qspi_sdr_controller_133_1p8v • qspi_sdr_controller_108_1p8v • ospi_ddr_controller_160_1p8v • ospi_ddr_controller_133_1p8v • ospi_sdr_controller_133_1p8v • ospi_sdr_controller_108_1p8v • unused • off	0%–100%
SPI	• Controller_25_Mbaud_3p3v • Controller_12.5_Mbaud_3p3v • Controller_6.25_Mbaud_3p3v • Controller_3.125_Mbaud_3p3v • Controller_2.083_Mbaud_3p3v • Controller_1.563_Mbaud_3p3v • Peripheral_25_Mbaud_3p3v • Peripheral_12.5_Mbaud_3p3v • Peripheral_6.25_Mbaud_3p3v • Peripheral_3.125_Mbaud_3p3v • Peripheral_2.083_Mbaud_3p3v • Controller_25_Mbaud_1p8v • Controller_12.5_Mbaud_1p8n • Controller_6.25_Mbaud_1p8v • Controller_3.125_Mbaud_1p8v • Controller_2.083_Mbaud_1p8v • Controller_1.563_Mbaud_1p8v • Peripheral_25_Mbaud_1p8v • Peripheral_12.5_Mbaud_1p8v • Peripheral_6.25_Mbaud_1p8v • Peripheral_3.125_Mbaud_1p8v • Peripheral_2.083_Mbaud_1p8v • unused • off	0%–100%
UART	• 3p6m_1p8v • 1m_1p8v • 112k_1p8v • 3p6m_3p3v • 1m_3p3v • 112k_3p3v • unused • off	0%–100%

Power Report

The power estimation tool generates a power analysis report in the *Power Report* section. The report lists power supply name, voltage in Volts (V), and power consumption mW per power rail groups. VDD_CORE is selected in *Processing Elements* because the voltage determines if 1000MHz frequency is available, and the input is reflected in the summary.

Trademarks

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