*Application Report*
*SPRABN1 – October 2015*

# *Power Estimation and Power Consumption Summary for TMS320C5517 Device*

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## ABSTRACT

This application report assists in estimating the power consumption using the power estimation spreadsheet for the TMS320C5517 devices (DSP).

The spreadsheet discussed in this document can be downloaded from the following URL: http://www.ti.com/lit/zip/sprabn1.

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# 1 Introduction

This application report assists in estimating the power consumption for the TMS320C5517 digital signal processors (DSPs). Power consumption on these devices is highly application-dependent, so a spreadsheet is provided to estimate power consumption. The power spreadsheet allows parameters that closely resemble the application and generate a realistic estimate of DSP power consumption based on the input. It also allows the ability to test the efficiency of different configurations before assembling hardware or writing code.

To obtain good results from the power spreadsheet, realistic usage parameters must be entered. The low-core voltage and other power design optimizations allow these devices to operate with industry-leading performance, while maintaining a low power-to-performance ratio.

Table 1 is the power consumption summary gathered from power spreadsheet. The data in the power spreadsheet is an estimate based on measuring units from the high end of the expected power consumption spectrum.

**Table 1. Power Consumption Summary**

| CVDD (V) | DVDDIO (V) | Configuration | Total Power (mW) |
|---|---|---|---|
| 1.05 | 1.8 | Standby Power | 0.51 |
| 1.05 | 3.3 | Typical - 75 MHz | 26.90 |
| 1.3 | 3.3 | Typical - 100 MHz | 65.08 |
| 1.3 | 3.3 | Typical - 150 MHz | 166.38 |
| 1.4 | 3.3 | Typical - 200 MHz | 248.39 |

The power data presented in Table 1 is measured under the following conditions:

- Room Temp (25 °C), 75% DMAC + 25% ADD (typical sine wave data switching)
- I/O pins are properly terminated

The current draw varies across manufacturing processes, and is highly application-dependent. Table 1 is power consumption summary considering few of the typical scenarios; for estimating power with other temperatures or enabling and disabling peripherals, use the power estimation spreadsheet.

# 2 Activity-Based Models

Power consumption is application-dependent: the power consumption for a particular application depends on the level of CPU and peripheral activity models. A clear understanding of the CPU, peripherals, and I/O activity levels of the application is recommended to get a realistic result. The output of the power estimation spreadsheet can aid in power supply design or battery life prediction. The model used in this spreadsheet is based on two modes of power consumption: static and active power. With this approach, each of the DSP components (CPU, peripherals, and I/O pins) can be isolated to determine how it contributes to the overall power consumption.

## *2.1 Static Power*

Static power is consumed when the on-chip oscillator is shut down (the clock generation domain is idle). If an external clock source is used instead of the on-chip oscillator, the static power is consumed when the external clock source is stopped; therefore, no activity on the DSP is clocked. The static power consumption depends purely on the core, I/O voltages, and the device operating temperature.

## *2.2 Active Power*

Active power is consumed by the active parts of the DSP. These include the CPU, peripherals, and I/O pins associated with the peripherals. The active power consumption is based on the supply voltages, operating frequency, and how each peripheral is configured. To get a better understanding of the distribution of the active power consumption, each module can be evaluated independently.

## 3 Modules

Each of the following modules and sub-modules can be configured in the power estimation spreadsheet, within realistic operating parameters.

- Phase-Locked Loop (PLL)
- Central Processing Unit (CPU) and CLKOUT
- External Memory Interface (EMIF)
- Multichannel Buffered Serial Port (McBSP)
- Direct Memory Access (DMA) (Up to 4 channels)
- Inter-IC Sound (I2S) (Up to 3 channels)
- MultiMedia Card/Secure Digital (MMC/SD) (Up to 2 channels)
- Serial Port Interface (SPI)
- Universal Asynchronous Receiver/Transmitter (UART)
- Inter-Integrated Circuit (I2C)
- General-Purpose Timer (Up to 3 timers)
- Real-Time Clock (RTC) and RTC CLKOUT
- General-Purpose Input/External Flag Output (GPIO/XF)
- Successive Approximation (SAR) Analog-to-Digital Converter (ADC)
- Multichannel Serial Port Interface (McSPI)
- Host Port Interface (uHPI)

The parameters used to describe each module activity are:

- Frequency is the operating frequency of a module, or the operating frequency of the interface to that module.
- Idle Status indicates whether the module is in idle or in active state.
- %Utilization is the percentage of activity in a module relative to its maximum.

Every module may not include all of these parameters.

## 4 Using the Power Estimation Spreadsheet

The power estimation involves entering the appropriate usage parameters as input data in the spreadsheet. Cells designed for user input are white in color. The following steps explain how to use the spreadsheet:

1. Select the voltage, PLLs configuration, device frequency, and temperature for the estimated end application.
2. Fill in the appropriate module use parameters.

The spreadsheet takes the information provided and displays the details of power consumption for the chosen configuration.

As the spreadsheet is configured, not all settings are checked for conflicts; for example, peripheral clock frequency out of allowed range. For maximum frequency limitations, see the device-specific data manual. For best results, enter the information from left to right, starting at the top and moving downward.

### *4.1 Choosing Appropriate Values*

The accuracy of the results produced by the power estimation spreadsheet depends on how closely the entered parameters match with those of the actual system. Each module must be considered separately for a given process, and must account for all activity included in a given operation. For instance, EMIF activity is not included in the CPU activity when the code is executed from external memory. The EMIF activity must be included separately in the EMIF section of the spreadsheet.

### 4.2 Frequency

In some cases, the frequency parameter for a particular module denotes the output frequency of that module. For others, it denotes the internal operating frequency of the module.

The PLL frequency is simply the output frequency of the clock generator in the PLL-lock mode. The PLL synthesized is distributed to the CPU and the peripheral. Some of the internal logic of the peripheral runs at the same rate as the CPU. Other peripherals support a user-configurable pre-scaler to run the module at an integer fraction of the CPU clock. For example, the internal logic of the DMA runs at the same rate as the CPU, but the I2C modules can be programmed to run its internal logic (state machine) at a much slower speed. The clock frequency of the PLL and module clocks should not be set in a manner that violates the frequency restrictions imposed by the device data sheet and module reference guide.

**Table 2. Peripheral Operating Frequency**

| Peripheral | MAX | MIN | Units | Remarks |
|---|---|---|---|---|
| EMIF | 100 | | MHz | If CPU frequency is less than or equal to 100 MHz |
| | 1/2 CPU frequency | | MHz | If CPU frequency is greater than 100 MHz |
| McBSP | 50 | | MHz | |
| MMC SD | 50 | | MHz | |
| I2S | 50 | | MHz | |
| McSPI | 50 | | MHz | |
| I2C | 13.3 | | MHz | |
| UART | 1/6 CPU frequency | | MHz | |
| SPI | 50 | | MHz | |
| GPIO | 1/6 CPU frequency | | MHz | |
| HPI | 175 | | MHz | |
| Timer | | | | The frequency in this case indicates the output frequency or the periodic frequency. |
| DMA | CPU frequency | | MHz | The internal operating frequency of the DMA is automatically set to the CPU clock, and is not user-configurable. |
| RTC | 32.768 | | KHz | |
| USB | 12 | | MHz | |
| PLL | 625 | 125 | MHz | |
| 10-Bit SAR | 2 | | MHz | |

**NOTE:** In the power spreadsheet, none of the usage parameters are configurable on the Watchdog Timer (WDT) module. The current consumed by only the WDT while active and running is extremely small; therefore, its contribution to the total current consumed by the device is assumed to be negligible.

### 4.3 CPU Operating Conditions (Typical)

**Table 3. CPU Operating Conditions**

| CPU Operating Frequency | Supply Voltage (Typical ) |
|---|---|
| 75 Mhz | 1.05 V |
| 120 Mhz | 1.3 V |
| 200 Mhz | 1.4 V |

### 4.4 Percentage Utilization

Utilization is explicitly defined for each module, to provide a more accurate estimate of power consumption. If a module is not listed, it is assumed to be in use whenever it is not idle, or, in cases such as RTC and WDT, the contribution of the modules, while active and being maximally utilized, is small enough to be neglected as compared to the total current consumed.

**Table 4. Module Percentage Utilization**

| Module | Utilization Details |
|---|---|
| CPU | Because the CPU can be involved in a wide range of activities, it is difficult to provide an exact CPU utilization number. Whenever the CPU is active (non-idle), it is executing some type of instruction. For this reason, 0% activity is assumed as a CPU executing the smallest amount of power the CPU can consume while active. Conversely, 100% activity is assumed as the most power-intensive instruction—the dual multiply and accumulate. All other instructions fall somewhere in between. No single algorithm will achieve 100% utilization, but some highly optimized functions can come close.<br>On the other hand, when the CPU performs control-oriented tasks, it consumes far less current. Assume, for example, that a certain application executes control code half of the time and a highly optimized algorithm for the other half. If the control code is estimated to be at 30% utilization, and the dense DSP code is estimated to be at 90% utilization, the overall utilization will be 60% (30% × 50% + 90% × 50%). If the application spent more time executing the optimized algorithm, utilization would go up, and vice versa. Examining individual segments of an application and estimating the time spent and the CPU utilization in each segment can provide a more accurate percentage of the CPU utilization |
| EMIF | EMIF utilization is related to the maximum bandwidth of the EMIF. 100% utilization corresponds to the maximum transfer rate for a given frequency when doing these types of transfers. This number is scaled down by both slower and less frequent transfers. In case of SDRAM, for writes, 100% utilization or maximum throughput is one 16-bit word/cycle (with write posting enabled). The utilization percentage is defined as the throughput of the application under inquiry, divided by the maximum throughput rates as defined above. For example, a CPU reading data from SDRAM at the rate of a 16-bit word every 20 cycles yields 20% EMIF utilization. |
| DMA | DMA utilization for a given channel is based on the maximum attainable data transfer rate between the SARAM and DARAM port, which is one 32-bit transfer per CPU cycle. Twenty-percent DMA channel utilization would yield one 32-bit transfer per five CPU cycles. |
| I2S | I2S utilization is defined as the percentage of time that the I2S is transferring data. The rest of the time the I2S is assumed to be not transferring any data. |
| MMCSD | MMCSD utilization is defined as the percentage of time that the MMCSD is transferring data. The rest of the time the MMCSD is assumed to be not transferring any data. |
| SPI | SPI utilization is defined as the percentage of time that the SPI is transferring data. The rest of the time the SPI is assumed to be not transferring any data. |
| UART | UART utilization is defined as the percentage of time that the UART is transferring data. The rest of the time the UART is assumed to be not transferring any data. |
| I2C | I2C utilization is defined as the percentage of time that the I2C is transferring data. The rest of the time the I2C is assumed to be not transferring any data. |
| TIMER | Timer utilization is defined as the percentage of time that the timer is counting. |
| USB | USB utilization is based on the maximum attainable data transfer rate between the DSP memory and the USB host device. |
| GPIO/XF | Utilization for general-purpose outputs is the percentage of time that they are switching at their specified frequency. |
| SAR | SAR utilization is defined as the percentage of time that the SAR is performing the analog-to-digital conversion. |
| McBSP | McBSP utilization is defined as the percentage of time that the McBSP is transferring data. The rest of the time the I2S is assumed to be not transferring any data. |
| McSPI | McSPI utilization is defined as the percentage of time that the McSPI is transferring data. The rest of the time the McSPI is assumed to be not transferring any data. |
| UHPI | UHPI utilization is defined as the percentage of time that the UHPI is transferring data. The rest of the time the UHPI is assumed to be not transferring any data. |

### 4.5 Other Parameters

Some modules, outlined in the following sections, have additional parameters for a more granular estimation of the power consumption.

- MMC/SD – This value lists the total number of MMC/SD instances consuming active power.
- Timer – This value lists the total number of timer instances consuming active power.
- GPIO/XF – This value lists the total number of GPIO pins consuming active power.

### *4.6 Power Units*

The results are estimated in the spreadsheet and displayed in milliamps (mA) or milliwatts (mW). Click the units in the total row of the calculated results, and use the drop-down menu to select the desired units.

### *4.7 Peripheral Enabling, Disabling, and Shut Off*

As mentioned previously, the C5517 device provides the capability to disable modules that are not being used through the clock gating. When a peripheral is disabled, its clock is turned off, reducing the power consumption of the device.

The spreadsheet accommodates this power saving feature by including fields from which a peripheral can be specified as disabled or enabled.

- If a module is not used for a given application, it is recommended to keep it in a disabled state.
- The module can be kept enabled with no activity. To achieve this, program the % utilization or the frequency fields to a value of 0; the numbers in the module's row will be indicative of the power consumed by clocking the module.
- A peripheral can be shut off if the peripheral is never used in the design, or not supported.

### *4.8 Using the Results*

The results presented in the spreadsheet are based on measured data using the C5517 device. Most production units, if correctly used, typically consume power around the value given in the spreadsheet. Transient currents can cause power to spike above the estimated value for short periods, but long-term power consumption should be similar to the spreadsheet value. This allows for better estimates of power supply requirements and more accurate battery life predictions.

### *4.9 Example*

**NOTE:** Before using the spreadsheet, open it and verify that macros are enabled.

The following examples demonstrate how to choose appropriate values for a particular application. These values may be imported into the spreadsheet by clicking the appropriate macro button.

The Standby (IDLE3) macro button reports the power consumed with the RTCCLOCK. PLL is powered down or disabled, and the system is operating in PLL bypass mode with the RTCCLOCK as the system clock. CPU is in IDLE state which it is in active. All peripherals are disabled except EMIF, and USB are shut off.

The Typical-75 MHz macro button can be used to quickly visualize the use case scenario. The details of the peripherals and their operating conditions used in this scenario are for voice encoder:

- Core voltage: 1.05 V
- ANA voltage: 1.3 V
- PLL voltage: 1.3 V
- DVDDIO voltage: 3.3 V
- LDOI voltage: 3.3 V
- CPU frequency: 75 MHz
- CPU: Enabled, 70% utilization
- I2S: Enabled and running at 1.5 MHz, 100% utilization
- DMA: Enabled and 2% utilization
- UART: Enabled and running at 3 MHz, 50% utilization
- I2C: Enabled, 400 KHz, 10% utilization

All other modules are not used and disabled. EMIF and USB are shut off.

The Typical 100 MHz Macro button is similar to Typical 75 MHz macro button, except that core is at 1.3 V, EMIF is enabled, and the device is running at 100 MHz.

The Typical 150 MHz Macro button is similar to Typical 75 MHz macro button, except that core and PLL voltages are at 1.3 V, EMIF and USB is enabled, and the device is running at 150 MHz.

The Typical 200 MHz Macro button is similar to Typical 75 MHz macro button, except that core and PLL voltages are at 1.4 V, EMIF and USB is enabled, and the device is running at 200 MHz.

### *4.10 Limitations*

The current implementation of the power estimation spreadsheet has the following limitations:

- Currently five macros are shown to demonstrate power consumption summary for various supported frequencies. Based on the user application, however, one can edit and fill in the correct parameters to get realistic power consumption data.
- The device uses pin multiplexing to accommodate a larger number of peripheral functions in the smallest possible package, providing the ultimate flexibility for end applications. The user must choose the correct peripheral function, by considering the end application aligned with pin-muxing configuration. The power spreadsheet does not highlight warnings or errors if the wrong pin-mux configuration is chosen.

## 5 Downloads

The TMS320C5517 power spreadsheet can be downloaded from the following UR: http://www.ti.com/lit/zip/sprabn1.

## 6 References


- *TMS320C5517 Fixed-Point Digital Signal Processor* (SPRS727)
- *TMS320C5517 Digital Signal Processor Technical Reference Manual* (SPRUH16)

# Power Estimation Illustration Using Power Spreadsheet Snapshots

## A.1 Idle3 Power Calculation

Table 5 illustrates the IDLE3 power calculation using the power spreadsheet,

**Table 5. Idle3 Power Calculation**

| | CVDD - 1.05 V | CVDD - 1.3 V | CVDD - 1.4 V |
|---|---|---|---|
| DVDD IO at 1.8 V | | | |
| Idle3 mode | 0.51 mW | 0.69 mW | 0.78 mW |
| DVDD IO at 3.3 V | | | |
| Idle3 mode | 0.85 mW | 1.03 mW | 1.11 mW |

Figure 1 shows the IDLE3 power calculation using the power spreadsheet.

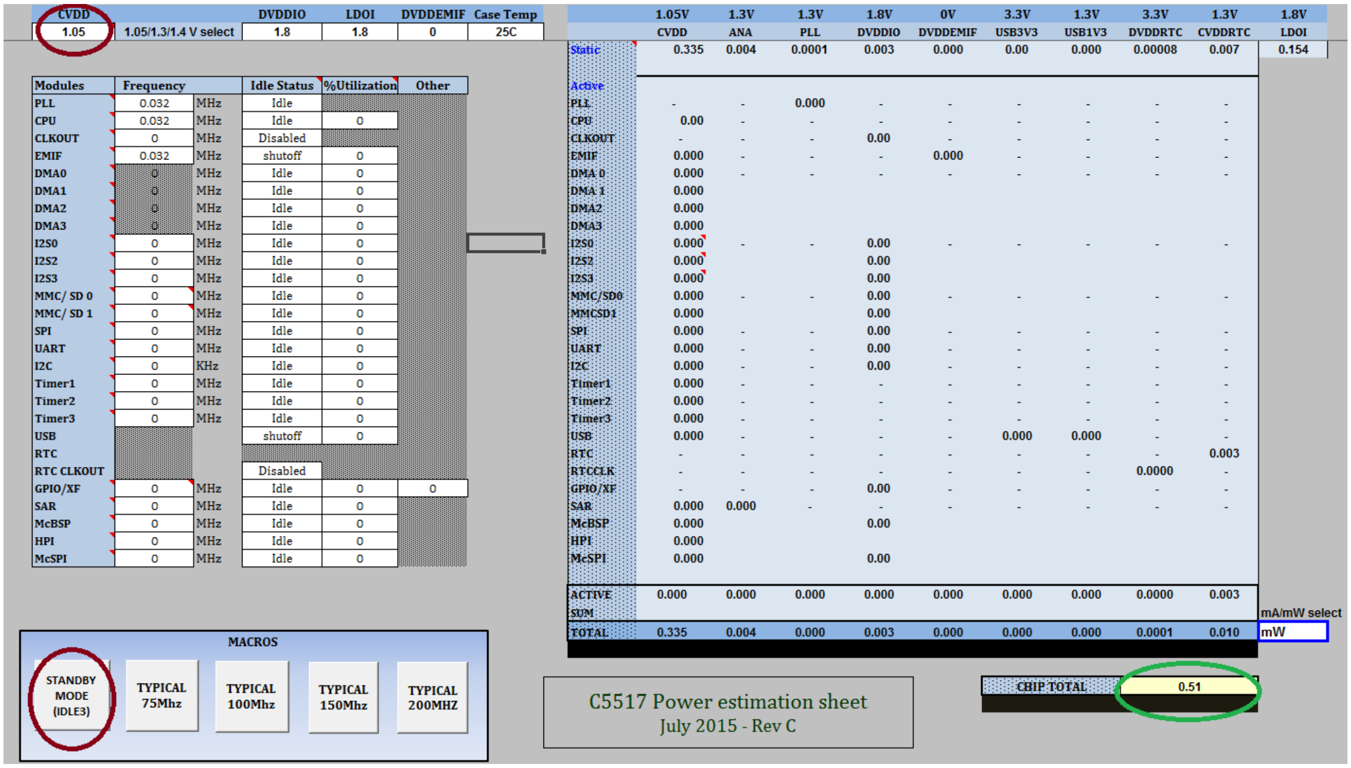
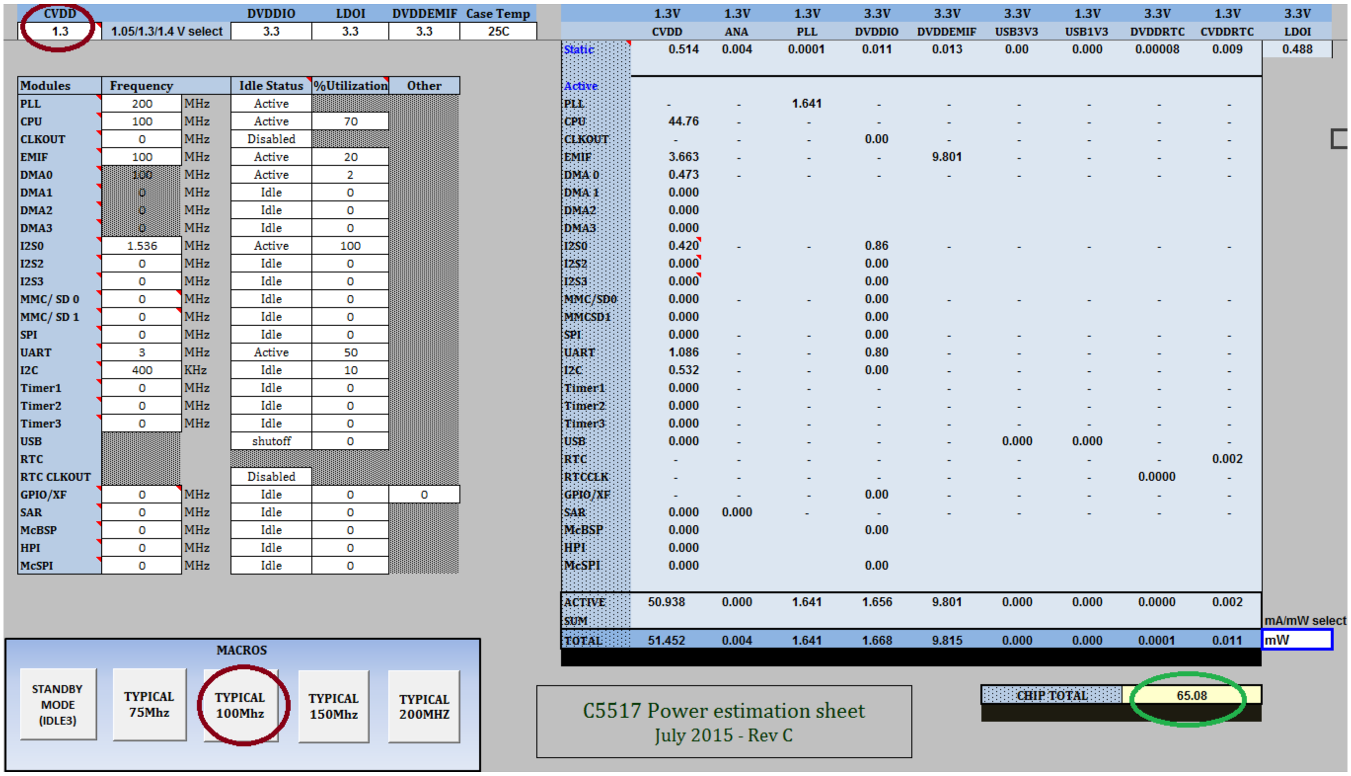



**Figure 1. IDLE3 Power Snapshot**

## A.2 Typical 100-MHz Power Calculation for the C5517 Device (with EMIF active)



| CVDD | | DVDDIO | LDOI | DVDDEMIF | Case Temp |
|---|---|---|---|---|---|
| 1.3 | 1.05/1.3/1.4 V select | 3.3 | 3.3 | 3.3 | 25C |

| Modules | Frequency | | Idle Status | %Utilization | Other |
|---|---|---|---|---|---|
| PLL | 200 | MHz | Active | | |
| CPU | 100 | MHz | Active | 70 | |
| CLKOUT | 0 | MHz | Disabled | | |
| EMIF | 100 | MHz | Active | 20 | |
| DMA0 | 100 | MHz | Active | 2 | |
| DMA1 | 0 | MHz | Idle | 0 | |
| DMA2 | 0 | MHz | Idle | 0 | |
| DMA3 | 0 | MHz | Idle | 0 | |
| I2S0 | 1.536 | MHz | Active | 100 | |
| I2S2 | 0 | MHz | Idle | 0 | |
| I2S3 | 0 | MHz | Idle | 0 | |
| MMC/ SD 0 | 0 | MHz | Idle | 0 | |
| MMC/ SD 1 | 0 | MHz | Idle | 0 | |
| SPI | 0 | MHz | Idle | 0 | |
| UART | 3 | MHz | Active | 50 | |
| I2C | 400 | KHz | Idle | 10 | |
| Timer1 | 0 | MHz | Idle | 0 | |
| Timer2 | 0 | MHz | Idle | 0 | |
| Timer3 | 0 | MHz | Idle | 0 | |
| USB | | | shutoff | 0 | |
| RTC | | | | | |
| RTC CLKOUT | | | Disabled | | |
| GPIO/XF | 0 | MHz | Idle | 0 | 0 |
| SAR | 0 | MHz | Idle | 0 | |
| McBSP | 0 | MHz | Idle | 0 | |
| HPI | 0 | MHz | Idle | 0 | |
| McSPI | 0 | MHz | Idle | 0 | |

| | 1.3V CVDD | 1.3V ANA | 1.3V PLL | 3.3V DVDDIO | 3.3V DVDDEMIF | 3.3V USB3V3 | 1.3V USB1V3 | 3.3V DVDDRTC | 1.3V CVDDRTC |
|---|---|---|---|---|---|---|---|---|---|
| Static | 0.514 | 0.004 | 0.0001 | 0.011 | 0.013 | 0.00 | 0.000 | 0.00008 | 0.009 |
| Active | | | | | | | | | |
| PLL | - | - | 1.641 | - | - | - | - | - | - |
| CPU | 44.76 | - | - | - | - | - | - | - | - |
| CLKOUT | - | - | - | 0.00 | - | - | - | - | - |
| EMIF | 3.663 | - | - | - | 9.801 | - | - | - | - |
| DMA 0 | 0.473 | - | - | - | - | - | - | - | - |
| DMA 1 | 0.000 | | | | | | | | |
| DMA2 | 0.000 | | | | | | | | |
| DMA3 | 0.000 | | | | | | | | |
| I2S0 | 0.420 | - | - | 0.86 | - | - | - | - | - |
| I2S2 | 0.000 | | | 0.00 | | | | | |
| I2S3 | 0.000 | | | 0.00 | | | | | |
| MMC/SD0 | 0.000 | - | - | 0.00 | - | - | - | - | - |
| MMCSD1 | 0.000 | | | 0.00 | | | | | |
| SPI | 0.000 | - | - | 0.00 | - | - | - | - | - |
| UART | 1.086 | - | - | 0.80 | - | - | - | - | - |
| I2C | 0.532 | - | - | 0.00 | - | - | - | - | - |
| Timer1 | 0.000 | - | - | - | - | - | - | - | - |
| Timer2 | 0.000 | - | - | - | - | - | - | - | - |
| Timer3 | 0.000 | - | - | - | - | - | - | - | - |
| USB | 0.000 | - | - | - | - | 0.000 | 0.000 | - | - |
| RTC | - | - | - | - | - | - | - | - | 0.002 |
| RTCCLK | - | - | - | - | - | - | - | 0.0000 | - |
| GPIO/XF | - | - | - | 0.00 | - | - | - | - | - |
| SAR | 0.000 | 0.000 | - | - | - | - | - | - | - |
| McBSP | 0.000 | | | 0.00 | | | | | |
| HPI | 0.000 | | | | | | | | |
| McSPI | 0.000 | | | 0.00 | | | | | |
| ACTIVE SUM | 50.938 | 0.000 | 1.641 | 1.656 | 9.801 | 0.000 | 0.000 | 0.0000 | 0.002 |
| TOTAL | 51.452 | 0.004 | 1.641 | 1.668 | 9.815 | 0.000 | 0.000 | 0.0001 | 0.011 |

| 3.3V LDOI |
|---|
| 0.488 |

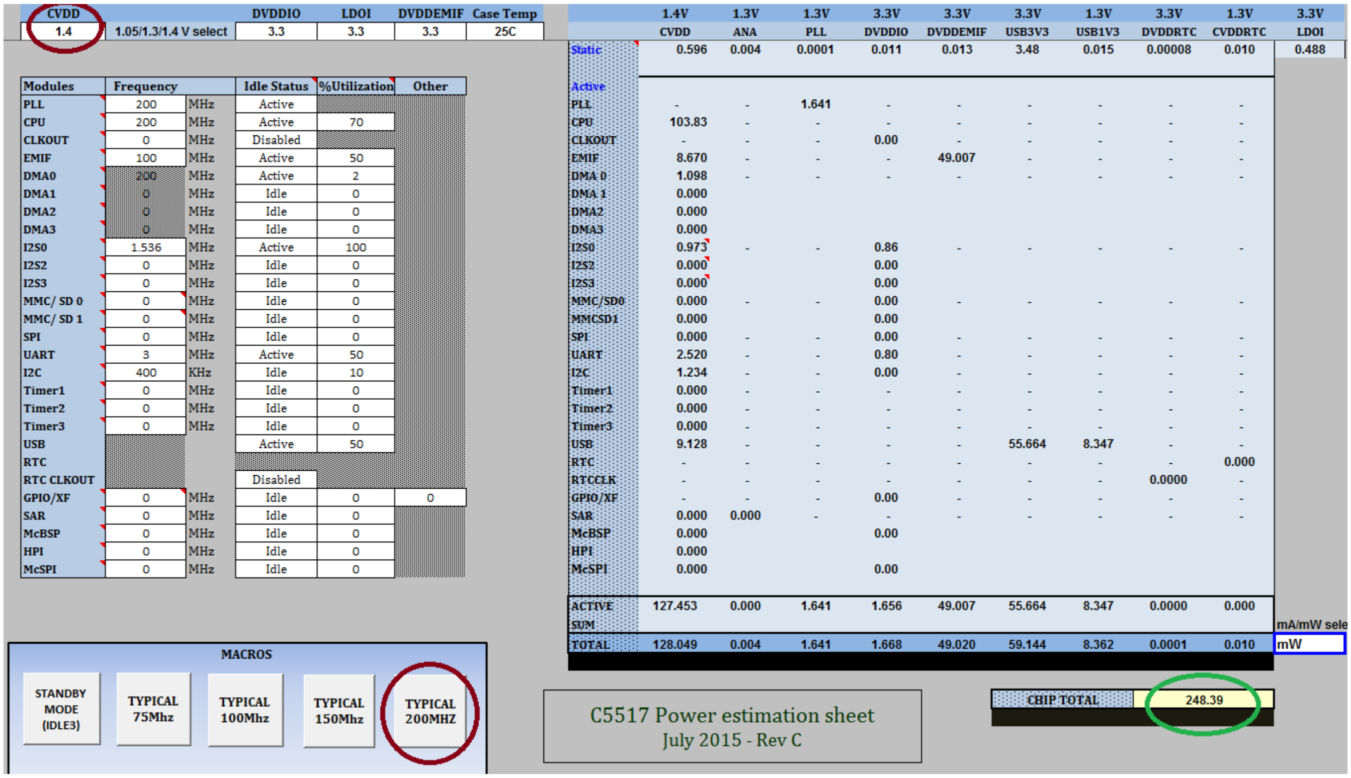
mA/mW select: mW

CHIP TOTAL: 65.08



**Figure 2. 100-Mhz Power Calculation (with EMIF active)**

## A.3 Typical 200-MHz Power Calculation for the C5517 Device (with EMIF active)



| CVDD | | DVDDIO | LDOI | DVDDEMIF | Case Temp |
|---|---|---|---|---|---|
| 1.4 | 1.05/1.3/1.4 V select | 3.3 | 3.3 | 3.3 | 25C |

| Modules | Frequency | | Idle Status | %Utilization | Other |
|---|---|---|---|---|---|
| PLL | 200 | MHz | Active | | |
| CPU | 200 | MHz | Active | 70 | |
| CLKOUT | 0 | MHz | Disabled | | |
| EMIF | 100 | MHz | Active | 50 | |
| DMA0 | 200 | MHz | Active | 2 | |
| DMA1 | 0 | MHz | Idle | 0 | |
| DMA2 | 0 | MHz | Idle | 0 | |
| DMA3 | 0 | MHz | Idle | 0 | |
| I2S0 | 1.536 | MHz | Active | 100 | |
| I2S2 | 0 | MHz | Idle | 0 | |
| I2S3 | 0 | MHz | Idle | 0 | |
| MMC/ SD 0 | 0 | MHz | Idle | 0 | |
| MMC/ SD 1 | 0 | MHz | Idle | 0 | |
| SPI | 0 | MHz | Idle | 0 | |
| UART | 3 | MHz | Active | 50 | |
| I2C | 400 | KHz | Idle | 10 | |
| Timer1 | 0 | MHz | Idle | 0 | |
| Timer2 | 0 | MHz | Idle | 0 | |
| Timer3 | 0 | MHz | Idle | 0 | |
| USB | | | Active | 50 | |
| RTC | | | | | |
| RTC CLKOUT | | | Disabled | | |
| GPIO/XF | 0 | MHz | Idle | 0 | 0 |
| SAR | 0 | MHz | Idle | 0 | |
| McBSP | 0 | MHz | Idle | 0 | |
| HPI | 0 | MHz | Idle | 0 | |
| McSPI | 0 | MHz | Idle | 0 | |

| | 1.4V | 1.3V | 1.3V | 3.3V | 3.3V | 3.3V | 1.3V | 3.3V | 1.3V | 3.3V |
|---|---|---|---|---|---|---|---|---|---|---|
| | CVDD | ANA | PLL | DVDDIO | DVDDEMIF | USB3V3 | USB1V3 | DVDDRTC | CVDDRTC | LDOI |
| Static | 0.596 | 0.004 | 0.0001 | 0.011 | 0.013 | 3.48 | 0.015 | 0.00008 | 0.010 | 0.488 |
| Active | | | | | | | | | | |
| PLL | - | - | 1.641 | - | - | - | - | - | - | |
| CPU | 103.83 | - | - | - | - | - | - | - | - | |
| CLKOUT | - | - | - | 0.00 | - | - | - | - | - | |
| EMIF | 8.670 | - | - | - | 49.007 | - | - | - | - | |
| DMA 0 | 1.098 | - | - | - | - | - | - | - | - | |
| DMA 1 | 0.000 | | | | | | | | | |
| DMA2 | 0.000 | | | | | | | | | |
| DMA3 | 0.000 | | | | | | | | | |
| I2S0 | 0.973 | - | - | 0.86 | - | - | - | - | - | |
| I2S2 | 0.000 | | | 0.00 | | | | | | |
| I2S3 | 0.000 | | | 0.00 | | | | | | |
| MMC/SD0 | 0.000 | - | - | 0.00 | - | - | - | - | - | |
| MMCSD1 | 0.000 | | | 0.00 | | | | | | |
| SPI | 0.000 | - | - | 0.00 | - | - | - | - | - | |
| UART | 2.520 | - | - | 0.80 | - | - | - | - | - | |
| I2C | 1.234 | - | - | 0.00 | - | - | - | - | - | |
| Timer1 | 0.000 | - | - | - | - | - | - | - | - | |
| Timer2 | 0.000 | - | - | - | - | - | - | - | - | |
| Timer3 | 0.000 | - | - | - | - | - | - | - | - | |
| USB | 9.128 | - | - | - | - | 55.664 | 8.347 | - | - | |
| RTC | - | - | - | - | - | - | - | - | 0.000 | |
| RTCCLK | - | - | - | - | - | - | - | 0.0000 | - | |
| GPIO/XF | - | - | - | 0.00 | - | - | - | - | - | |
| SAR | 0.000 | 0.000 | - | - | - | - | - | - | - | |
| McBSP | 0.000 | | | 0.00 | | | | | | |
| HPI | 0.000 | | | | | | | | | |
| McSPI | 0.000 | | | 0.00 | | | | | | |
| ACTIVE SUM | 127.453 | 0.000 | 1.641 | 1.656 | 49.007 | 55.664 | 8.347 | 0.0000 | 0.000 | mA/mW sele |
| TOTAL | 128.049 | 0.004 | 1.641 | 1.668 | 49.020 | 59.144 | 8.362 | 0.0001 | 0.010 | mW |

| CHIP TOTAL | 248.39 |
|---|---|



**Figure 3. 200-MHz Power Calculation (with EMIF)**