EECE72545

**Power Budget**

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**Device Power Consumption:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Component/Device | Number of units | Worst case | Standby | Nominal Voltage | Total  power | Note |
| TPS562201 | 1 | 750 µA | 1 µA | 14.8V | 11 mW | [1] |
| Power LED | 1 | 0.73 mA | 0.73 mA | 3V3 | 2.4 mW |  |
| CAT6219 | 1 | 90 µA | 1 µA | 5V | 0.45 mW | Quiescent |
| INA219 | 1 | 1 mA | 6 µA | 3V3 | 3.3 mW |  |
| ‘Heartbeat’ LED | 1 | 0.07 mA | 0 | 3V3 | 231 mW |  |
| ICL3232 | 1 | 121 mA | 1 µA | 3V3 | 399 mW |  |
| TX/RX LED | 2 | 2.86 mA | 0 | 3V3 | 9.5 mW |  |
| MCP2542 | 1 | 140 mA | 4 µA | 3V3 | 100 mW |  |
| LCD | 1 | 3 mA | 1 mA | 5V | 15 mW |  |
| LCD Backlight | 1 | 20 mA | 0 | 5V | 100 mW |  |
| MCP23S08 | 1 | 125 mA | 1 µA | 3V3 | 412.5 mW |  |
| DRV8814 | 1 |  |  |  |  | [2] |
| Stepper Motor | 1 | 400 mA | 0 | 14.8V | 5.92 W | Half-stepping |
| DRV8884 | 1 |  |  |  |  | [3] |
| DC Motor | 2 | 3 A | 0 | 14.8V | 44.4 W | Stall |
| Fault LED | 2 | 20 mA | 0 | 3V3 | 66 mW |  |
| 74LVC2G14 | 1 | 200 mA | 8 µA | 3V3 | 660 mW | Outputs shorted |
| Servo | 1 | 300 mA | 0 | 5V | 1.5W |  |
| HC-10 Bluetooth | 1 | 50 mA | 200 µA | 3V3 | 165 mW | Transmit mode |
| µSD Card | 1 | 50 mA | - | 3V3 | 165 mW | Writing |
| NTC Thermistor | 2 | 2.2 mA | 2.2 mA | 3V3 | 7.3 mW |  |
| Ultrasonic Rangefinder | 1 | 20 mA | 2.5mA | 5V | 100 mW | Transmitting |

[1] **TPS562201 Power Consumption:**

Worse case power dissipation (IOUT = 1A, 25°C):

*The following method was taken from TI: Application Report AN-1566 “Techniques for Thermal Analysis of Switching Power Supply Designs”*

[2] **DRV8814 Power Consumption:**

The DRV8814 has internal 5V and 3V3 regulators.

Worse case power dissipation (VM = 14.8V, IOUT = 1.5A, 25°C):

[3] **DRV8884 Power Consumption:**

The DRV8884 has internal 5V and 3V3 regulators.

Worse case power dissipation (VM = 14.8V, IOUT = 0.4A, 25°C):

**Per Rail Power Consumption:**

|  |  |
| --- | --- |
| Rail | Total Power |
| 5V | 1715.45 mW |
| 3V3 | 2311 mW |

**Efficiency Corrected Power Consumption:**

Because the 5V and 3V3 rails are converted from the battery voltage, there are losses associated with each conversion. The efficiency of the TPS562201 is about 91% at 300mA, and the CAT6219, being a linear regulator, is about 50%. Therefore, 3V3 rail could draw a total 2.888W from the 5V rail. The 5V rail, along with the previously calculated 3V3 draw, could draw a total 5.058W from the 14.8V battery.