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This document explains the function of the Electronic Load, its schematic level design, and its board level design.

Electronic Load Board

Electronic Load Board Design

Revision: 1.0



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# Introduction

This document explains how the Electronic Load will fulfill the following Functions and conform to the following Requirements. This document refers to the Electronic Load version 1.0.

## Functions

The Electronic Load is responsible for the following

* Testing the overall capacity of the batteries
* Testing load capacity

## Requirements

1. Provide power from a wall outlet
2. Provide 18650 3.7V battery

# Detailed Description

This section references the Electronic Load [Schematic](C://Users/jjays/Documents/GitHub/Resources/Subsystems/Electronics/Testing/ElectronicLoad/Documentation/ElectronicLoad.pdf). Page numbers will be listed and may have coordinates listed (number and letter combination found around the frame).

## Functional Block Diagram

The block diagram can be found on the first page of the schematic.

## Schematic

### Current Load

Load is put on the battery by applying a voltage through the power transistor that can apply a certain amount current thought the batteries by changing the voltage through the positive input of the amplifier. This load is controlled through a knob in 100 mA increments and displayed on an LCD.

## Board

The board shall be double layered with copper and ENIG finish.

### Layout Constraints

Unless specified in the following subsections, all signals shall use the default parameters below. Signals in the following subsections do not include their sense signals unless otherwise specified. Trace width can be broken if a trace needs to bottleneck down to a pin, the bottleneck shall be minimized.

Trace width:

Vias: , unlimited count

Separation:

Length: unlimited

Devices with specific placement and routing considerations are called out on the schematic, see “CAD Note:”

#### Power Load Traces- Load\_Input-, I\_ALT+, Load\_Input+, Feedback

Trace width: At least

#### USB Differential pair- USB\_CONN\_P, USB\_CONN\_N

Length: Length match

Gap width:

# Testing

All tests shall be performed at room temperature and will not be performed under vacuum since the electronic load PCB will not be included on the actual satellite. If any modifications are performed, take note. Include enough information to understand circuit behavior and for others to replicate the results. Include any software written to execute the test and link it in the test notes section. Save all software, waveforms, etc. in a subfolder of the board’s test folder for each test. When testing, keep the following guidelines in mind:

* Waveforms shall be captured whenever appropriate
* Have the event take fill the screen (for fast events, zoom in, for slow events, zoom out)
* Label each channel accurately
* Only have bandwidth limiting, if necessary, for the test (this applies to the oscilloscope and probe settings)
* If ringing or overshoot occurs, use a ground spring or differential probe

## Before First Power-On Check

Resistance checks

**Configuration: Board Name**

This test is required to be executed before the electronic board is connected to any external power source.

### Test Instructions

Measure the resistance of various points in reference to PGND located at the output connector.

### Test Data

The data for this test will be recorded into the table below:

| Node | Resistance |  |
| --- | --- | --- |
| TP1 |  |  |
| 5.0 V |  |  |
| 3.1 V |  |  |
| 12 V |  |  |
| Load input |  |  |
| USB\_VCC |  |  |
| U1 Feedback |  |  |

## Amp supply accuracy test

**Results: Pass/Fail**

**Configuration: Board Name**

This test evaluates the board supplies the accurate number of amps to the batteries.

### Test Instructions

Set the electronic load to apply at 1 amp load first then increment by 1 amp till 5.3 amps are reached. Use the Digital Multimeter to measure the accuracy of the amps being supplied.

### Test Data

|  |  | |  | | Use the knob to increment the amps by 1A and measure the accuracy | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Amps supplied | Volts |  | |  | | Actual amps measured | Passing criteria | Pass or fail |
|  | 0.5V | 1V | | 8V | |  | Accuracy: |  |
|  |  |  | |  | |  |  | P |
|  |  |  | |  | |  |  | P |
|  |  |  | |  | |  |  | P |
|  |  |  | |  | |  |  | P |
|  |  |  | |  | |  |  | P |
|  |  |  | |  | |  |  | P |
|  |  |  | |  | |  |  | P |
|  |  |  | |  | |  |  | P |
|  |  |  | |  | |  |  | P |
|  |  |  | |  | |  |  | P |
|  |  |  | |  | |  |  | P |
|  |  |  | |  | |  |  | P |
|  |  |  | |  | |  |  | P |

### Test notes

Delete me if no notes are required.

## Temperature test

This test evaluates that the board can handle up to 10Amps for a prolonged period and not overheat/melt.

### Test instructions

Set the electronic load to 10 amps and 10 volts for 100W. And leave it for 10 minutes. Use a temperature gun to monitor temperature of heatsink. Log and plot temperature.

### Test data

| Measure the current at the output connector @48 W | | |
| --- | --- | --- |
| Temperature @ every 60s | Board melt/overheat | Pass / Fail |
|  | No | P |
|  | No | P |
|  | No | P |
|  | No | P |
|  | No | P |

### Test notes

Delete me if no notes are required.