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TSL-MIT-DS-3510A Single channel thruster controller specification

This document is the initial design specification for the TSL-MIT-3510A single channel controller.

1. *Physical*

The thruster controller printed circuit assembly (PCA) shall be a daughter module designed for mounting on a motherboard. It shall be mechanically secured to the motherboard using a combination of PCB spacers and screws (both M3 size). Two inter-PCA through-hole mounting connectors shall be used for the electrical connection between the cards.

The PCA shall be 55mm x 65mm.

2. *Power Supply*

The thruster controller card shall require two separate dc power supplies. Each dc supply shall be supplied with a 0 volt return. Note that the 0V supplies shall be at the same potential. The primary input voltage shall be to drive the MIT-3000 thruster. The auxiliary input voltage shall be to supply the on-board circuitry.

Primary voltage:	24 volts dc, +/- 4 volts
Auxiliary voltage:	5 volts dc, +/- 0.25 volts
Primary supply input current:	4 A maximum
Auxiliary supply input current:	100mA maximum

3. *Inputs*

The thruster controller card shall have a control interface. The thrust produced by the thruster shall be controlled over this interface. The interface shall take the form of 8 active high TTL lines:

0	off
1 to 100	Required power output in progressive units*
255	Perform built-in test (BIT) and report status

* Not required to be linear.

4. *Outputs*

4.1 Thruster Drive

The thruster controller card shall be designed to drive a TSL MIT-3000 thruster. There shall be three outputs from the card to drive the three phase windings of the thruster and receive the sense signals.

Maximum output current: 4 A

The outputs shall incorporate thruster over-current detection and protection.

4.2 Built in test (BIT)

When commanded to perform BIT, the controller card shall start the thruster, attempt to bring it under synchronous control and then stop it. The result of the BIT test shall be reported, by setting or resetting the BIT output signal. The BIT line shall be an active high TTL line:

High = BIT Pass
Low = BIT Fail

5. Environmental Requirements

5.1 Non-operational

High temperature: 60 degrees Centigrade

Low temperature: 0 degrees Centigrade

Shock: 10g pk, half sine wave, 11ms duration

5.2 Operational

High temperature: 50 degrees Centigrade

Low temperature: 0 degrees Centigrade

Non-condensing humidity.

6. Connector details

There shall be two connectors on the PCA, one for the auxiliary supply input and the control interface, the other for the thruster input supply and the thruster output drive signals. Each connector will be a M22 2mm pitch type. The contacts of these connectors are rated at 1A each.

Connector id: J1
 Connector type: Single row, 12 way, gold/tin plating finish
 Connector code: Molex M22-6131222
 Connector pin out:

Pin	Signal	Description
1	+Vaux	Auxiliary supply voltage
2	0V	0V return for auxiliary supply
3	Control0	Control word lsb
4	Control1	
5	Control2	
6	Control3	
7	Control4	
8	Control5	
9	Control6	
10	Control7	Control word msb
11	BIT	BIT Output
12	Unused	

Connector id: J2
 Connector type: Double row 20+20 way, gold/tin plating finish
 Connector code: Molex M22-6142022
 Connector pin out:

Pin	Signal	Description
1	+Vp	Primary supply voltage
2	+Vp	Primary supply voltage
3	+Vp	Primary supply voltage
4	0V	0V return for primary supply
5	0V	0V return for primary supply
6	0V	0V return for primary supply
7	PhaseA	Output to thruster
8	PhaseA	Output to thruster
9	PhaseA	Output to thruster
10	PhaseB	Output to thruster
11	PhaseB	Output to thruster
12	PhaseB	Output to thruster
13	PhaseC	Output to thruster
14	PhaseC	Output to thruster
15	PhaseC	Output to thruster
16	Unused	
17	Unused	
18	Unused	
19	Unused	
20	Unused	
21	+Vp	Primary supply voltage
22	+Vp	Primary supply voltage
23	+Vp	Primary supply voltage
24	0V	0V return for primary supply
25	0V	0V return for primary supply
26	0V	0V return for primary supply
27	PhaseA	Output to thruster
28	PhaseA	Output to thruster
29	PhaseA	Output to thruster

30	PhaseB	Output to thruster
31	PhaseB	Output to thruster
32	PhaseB	Output to thruster
33	PhaseC	Output to thruster
34	PhaseC	Output to thruster
35	PhaseC	Output to thruster
36	Unused	
37	Unused	
38	Unused	
39	Unused	
40	Unused	