

## nanoTRONIC S-SADE

### Solar Array Drive Electronics

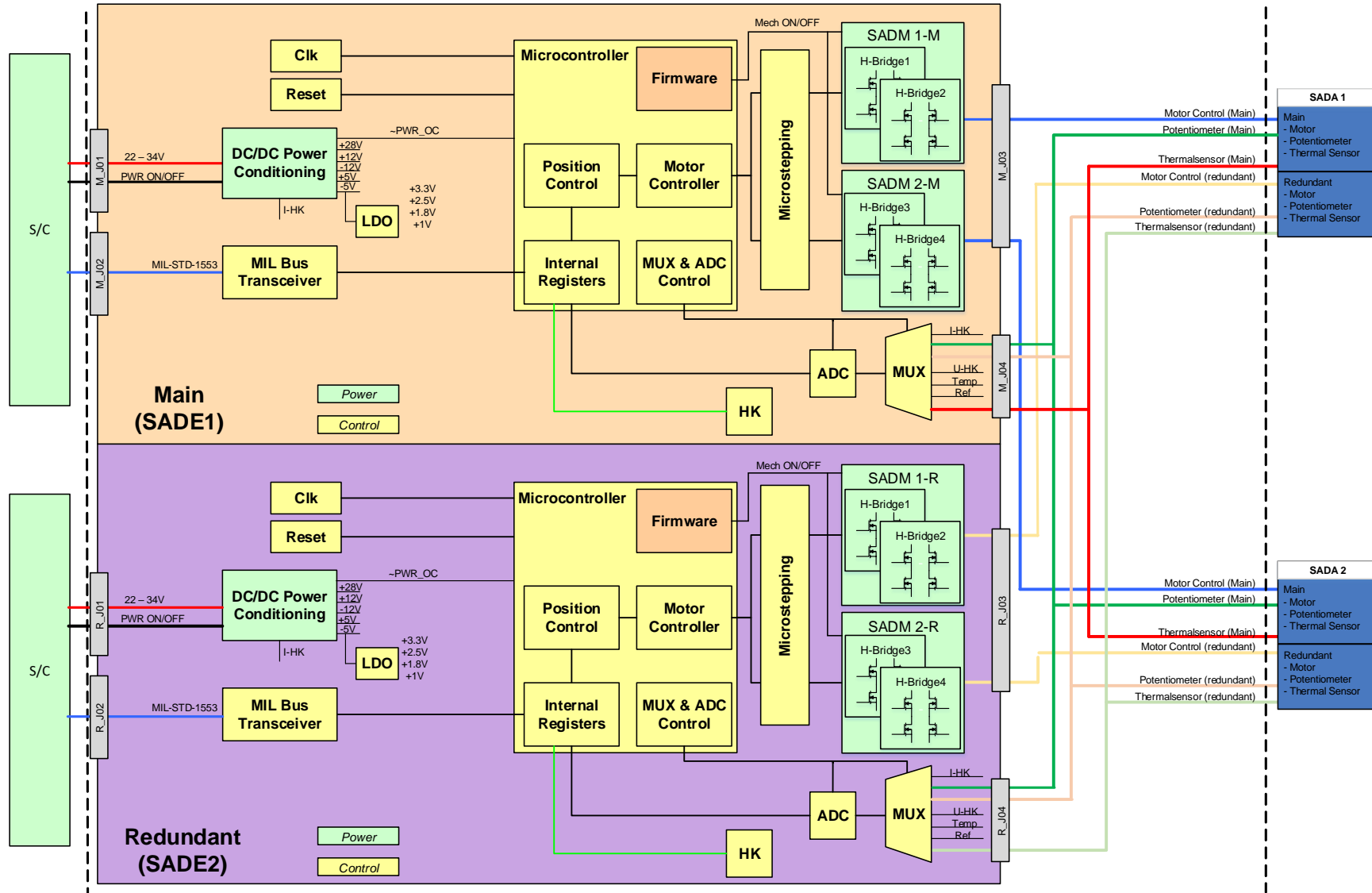


The S-SADE is a 2 axis redundant drive electronics to be used with stepping motor-based actuators (mainly SADM), with the following characteristic:

- Independent drive of both actuators
- Bus Interface (MIL-STD-1553B)
- High reliable
- Full redundancy (cold)
- Single Point Failure Free
- Radiation hardness  $\geq 100\text{kRAD TID}$
- Modularity
- Interface Flexibility
- Compact size

## System Overview

SADE Block Diagramm



## Electrical Interfaces

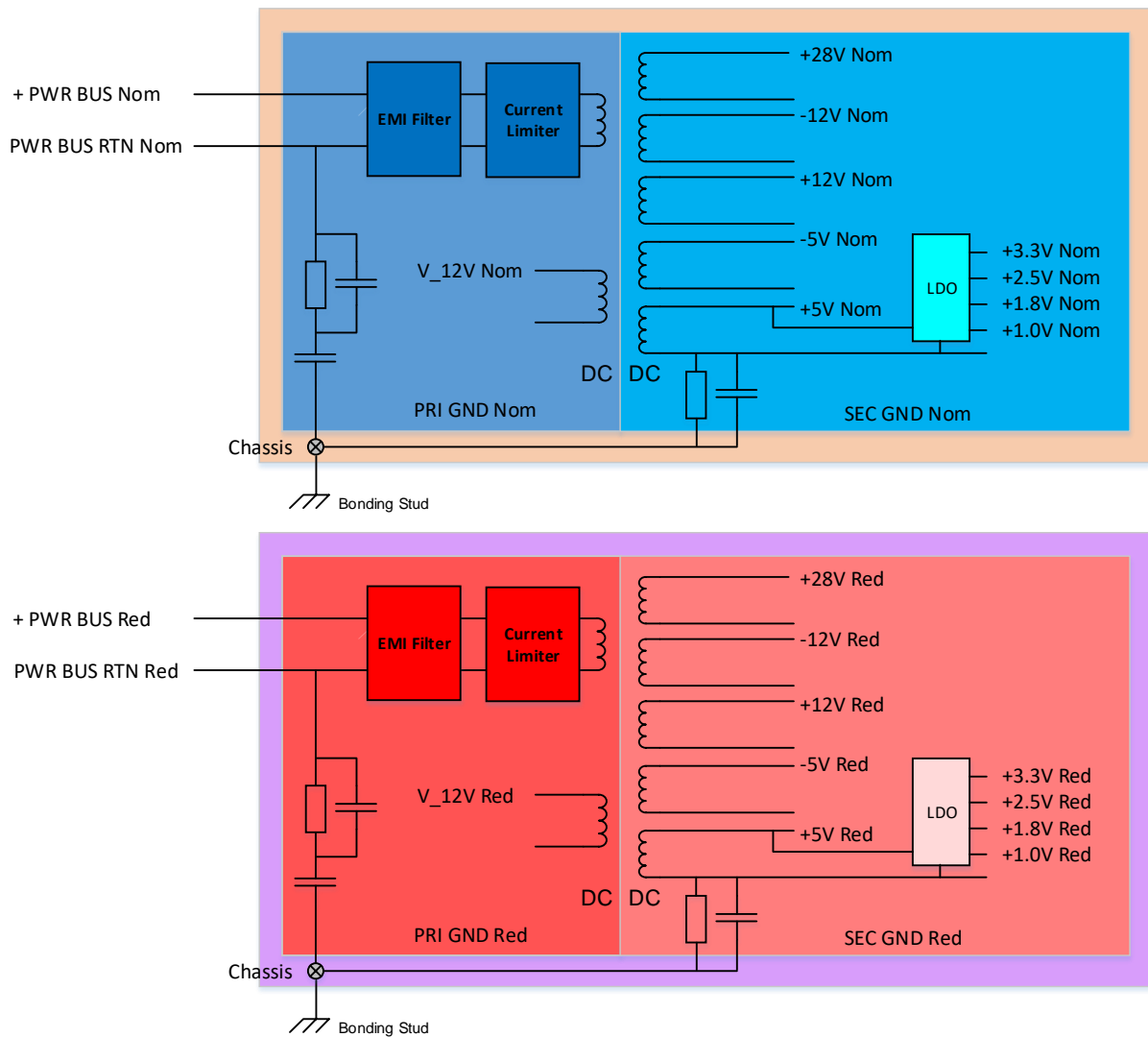
Unit-Name	Unit-Con	Connector Function	Connector Type	EMC-Code	Magn. Level
SADE-MAIN	M_J01	SADE Power nominal	DAM15P-1AON	1R/2	NMB
SADE-MAIN	M_J02	MIL Interface nominal	DEM9P-1AON	2	NMB
SADE-MAIN	M_J03	Motor1/Motor2 nominal	DAM15S-1AON	2	NMB
SADE-MAIN	M_J04	Analog Feedback nominal	DAM26S-1CON	2	NMB
SADE-RED	R_J01	SADE Power redundant	DAM15P-1AON	1R/2	NMB
SADE-RED	R_J02	MIL Interface redundant	DEM9P-1AON	2	NMB
SADE-RED	R_J03	Motor1/Motor2 redundant	DAM15S-1AON	2	NMB
SADE-RED	R_J04	Analog Feedback redundant	DAM26S-1CON	2	NMB

The SADE provides following electrical interfaces for each unit (nominal and redundant):

- System I/F towards S/C:
  - Power bus interface (28V)
  - System ON/OFF signal
  - MIL bus 1553 B interface for TM/TC
- I/Fs to the SADM pairs:
  - 2×2 step motor power I/Fs (4 lines each)
  - 2×4 coarse potentiometer (3 lines each), nominal and redundant potentiometer are cross-strapped
  - 2×2 temperature sensors (2 lines each)

The electrical interconnection is achieved by means of DSUB and High-Density DSUB connectors.

## Grounding Concept



The Power Supply Unit has a primary ground and one single secondary ground for all type circuitries (analog and digital). Between primary and secondary ground there is a galvanic isolation. The primary ground is routed through the EMI filter and is then connected by (47nF+47nF//1M) to chassis and the secondary ground is connected by 5.6M//10nF to chassis. Secondary ground is the star-point for the logic and Chassis is connected to the bonding stud.

<b>Specifications</b>																
<b>Control Interface</b>																
MIL Bus 1553 B																
<b>Motor Interface</b>																
Driving Mode	Microsteps up to 64 $\mu$ steps Several speeds possible Autozero Function Position absolute and relative possible															
<b>Mechanical Properties</b>																
Mass	< 4kg															
Dimension	324x 214 x 78 mm															
Housing Thickness	3.0 mm Al															
Interface contacting	6 x M5															
Surface coating	Surtec 650 (where electrical connective) Ematal (not electrical connective)															
Thermal Emissivity Ematal	> 0.9															
1. Eigenfrequency	~1'200 Hz															
Vibration loads:	<table border="0"> <tr> <td>Sine:</td> <td>10 Hz:</td> <td>2.6 g</td> </tr> <tr> <td></td> <td>24.2 Hz:</td> <td>15 g (<math>\perp</math> MP), 10 g (// MP)</td> </tr> <tr> <td></td> <td>100 Hz:</td> <td>15 g (<math>\perp</math> MP), 10 g (// MP)</td> </tr> <tr> <td>Random:</td> <td><math>\perp</math> MP:</td> <td>16.51 grms</td> </tr> <tr> <td></td> <td>// MP:</td> <td>14.23 grms</td> </tr> </table>	Sine:	10 Hz:	2.6 g		24.2 Hz:	15 g ( $\perp$ MP), 10 g (// MP)		100 Hz:	15 g ( $\perp$ MP), 10 g (// MP)	Random:	$\perp$ MP:	16.51 grms		// MP:	14.23 grms
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Shock loads	<table border="0"> <tr> <td>100 Hz:</td> <td>82 g</td> </tr> <tr> <td>275 - 728Hz:</td> <td>399 g</td> </tr> <tr> <td>2'500 – 10'000 Hz:</td> <td>1'000 g</td> </tr> </table>	100 Hz:	82 g	275 - 728Hz:	399 g	2'500 – 10'000 Hz:	1'000 g									
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275 - 728Hz:	399 g															
2'500 – 10'000 Hz:	1'000 g															
<b>Electrical Properties</b>																
Supply voltage	28 V (22 V – 34 V)															
Nominal Current	900 mA															
Limiting current	2.5 A															
Shutdown time	1.1 s															
Power consumption	14 W (Worst case)															
<b>Temperature</b>																
Non-op.	-35°C; +70°C															
Operating	-35°C; +70°C															

## Specifications

### Radiation on component level

Total Ionizing Dose (TID)	100 kRAD
SEU LETth	$\geq 36 \text{ MeVcm}^2\text{mg}^{-1}$
SEL LETth	$\geq 60 \text{ MeVcm}^2\text{mg}^{-1}$
SET LETth	$\geq 36 \text{ MeVcm}^2\text{mg}^{-1}$

### Additional information

Heritage	3 FM and 1 QM delivered to customer GEO
TRL	8
Reliability	0.999 for 7.5 years in orbit
Export regulation	9A515.e.2, 3A001a2c
ITAR	no

## Mechanical Interface

