C3 Board Functional Description

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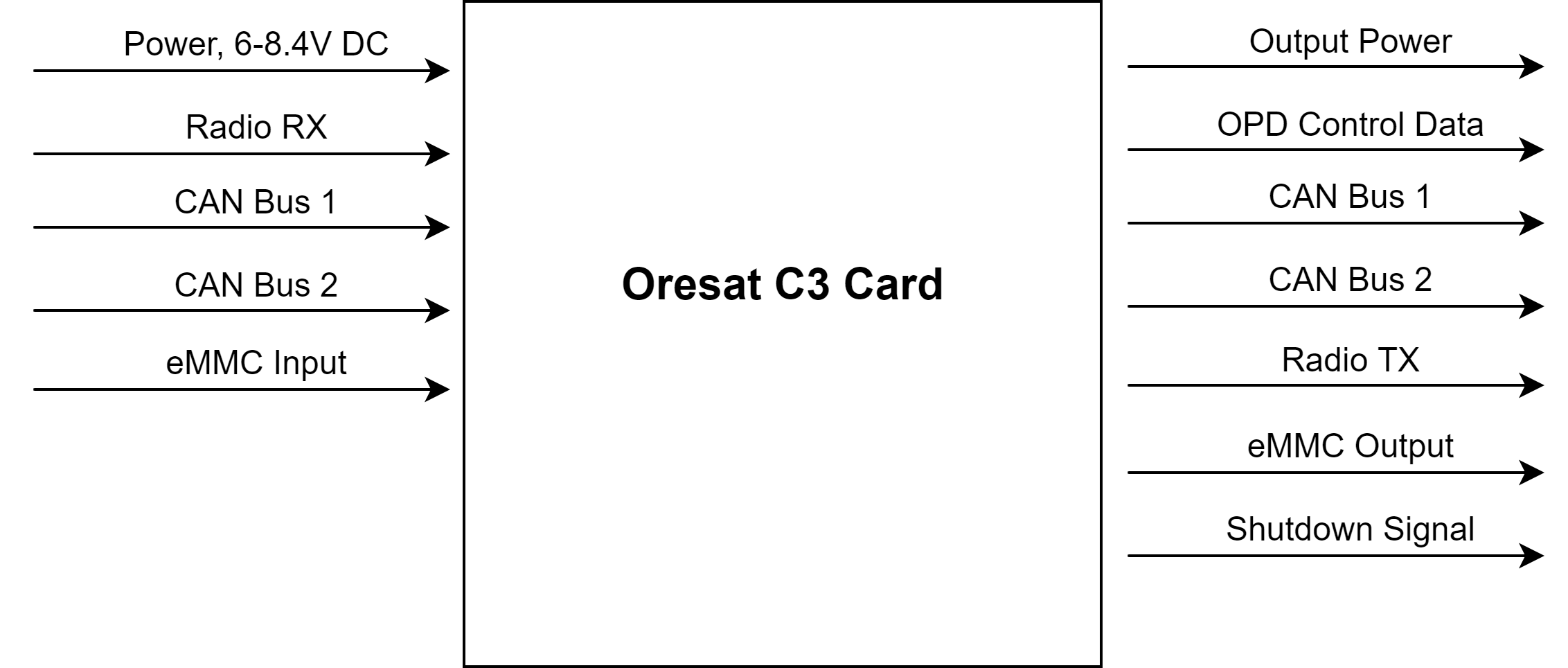
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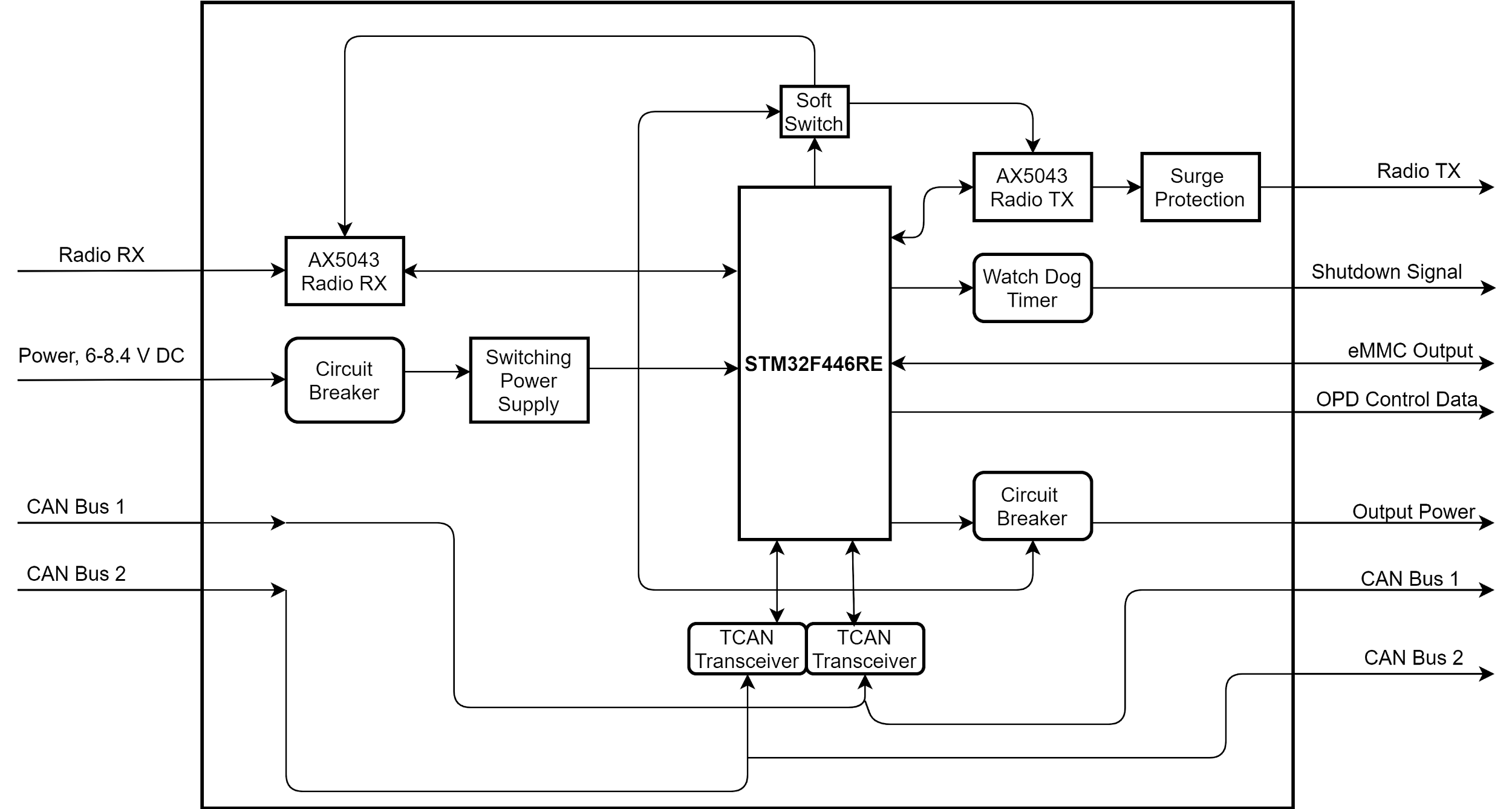
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### **OreSat C3 Board: Level 0**

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| **Module:** | Oresat C3 Card |
| **Inputs:** | Power (6-8.4 V DC)  Radio RX signal(L Band and UHF Band)  CAN Bus 1  CAN Bus 2  eMMC Input |
| **Outputs:** | Output Power (3.3 V, 200mA max)  OPD Control Data (I2C)  CAN Bus 1  CAN Bus 2  Radio TX(L Band and UHF Band)  eMMC Output  Shutdown Signal |
| **Functionality:** | Receive 6-8.4 V power from solar array. Receive commands from ground station via Radio RX signal. Step down power to 3.3 V limited current power supply for all subsystems. Control Power to each subsystem via OPD Control Data. Communicate with critical mission subsystems via CAN 1. Communicate with lesser mission subsystems via CAN 2. Transmit mission data via Radio TX signal. Store mission data in eMMC. Shutdown entire system power in case of MCU single event latchup via Shutdown Signal. |

### **Oresat C3 Board: Level 1**

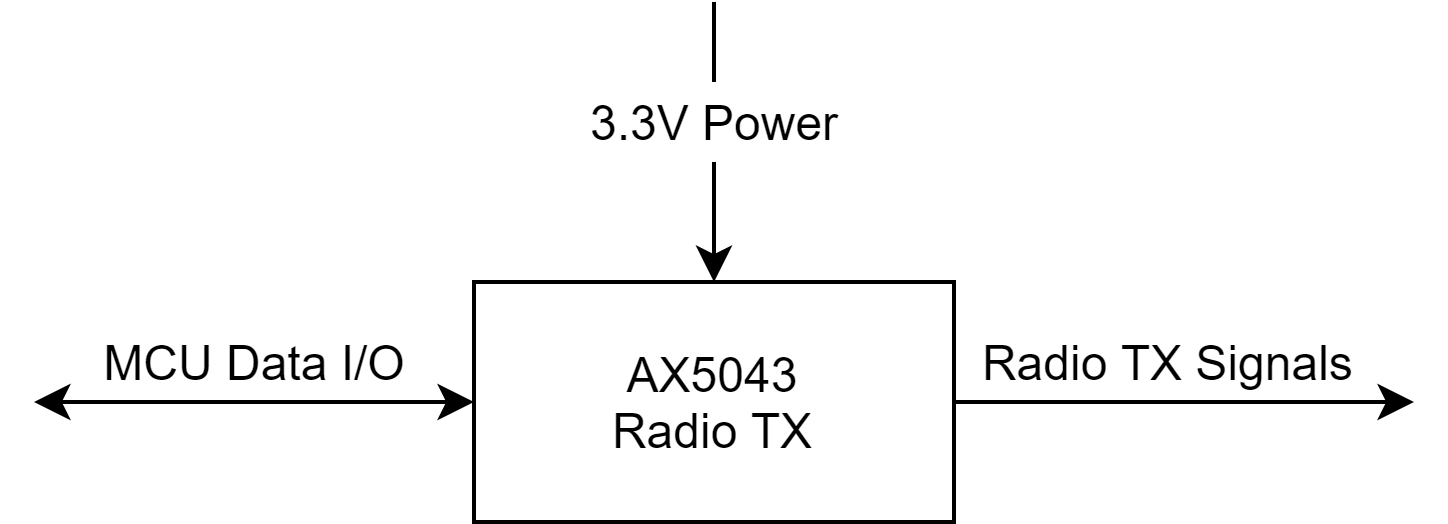
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### **AX5043 Radio RX: Level 1**

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| **Module:** | AX5043 Radio RX |
| **Inputs:** | Radio RX Signals(L Band, UHF Band)  Microcontroller Data  3.3 V Power |
| **Outputs:** | Microcontroller Data |
| **Functionality:** | Receive L Band and UHF signals from ground station. Convert analog RF signals into SPI output for Microcontroller. Receive SPI data from Microcontroller. Gives ground station commands to microcontroller. |

### **AX5043 Radio TX: Level 1**

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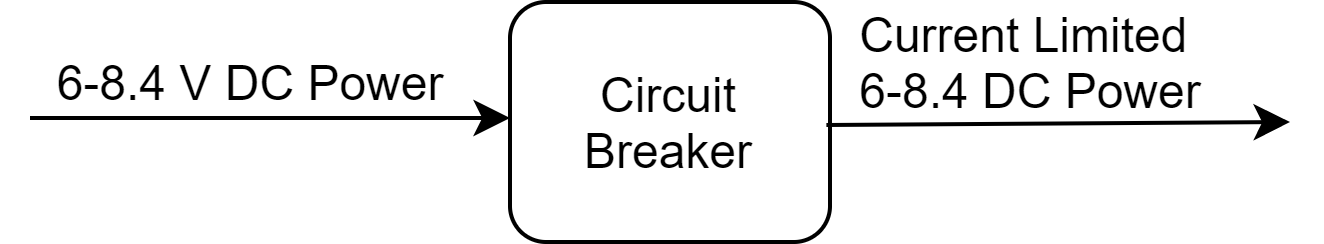
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| --- | --- |
| **Module:** | AX5043 Radio TX |
| **Inputs:** | Microcontroller Data  3.3 V Power |
| **Outputs:** | Radio TX Signals( L Band, UHF Band)  Microcontroller Data |
| **Functionality:** | Receive SPI data from Microcontroller. Transmit system health and mission data to ground stations(L Band, UHF band) |

### **Surge Protector: Level 1**

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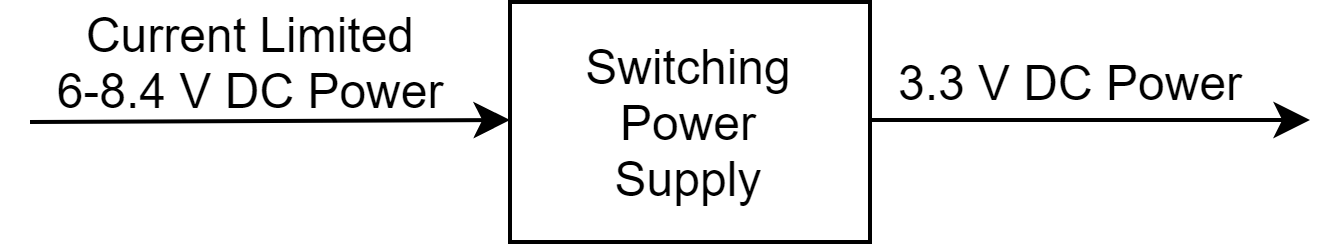
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| --- | --- |
| **Module:** | Surge Protector |
| **Inputs:** | Radio TX Signals, EMI |
| **Outputs:** | Radio TX Signals |
| **Functionality:** | Limits Voltage/Current from exceeding the AX5043 IC’s maximum input voltage of 5.5 V. Protects the AX5043 from voltages induced by EMI. |

### **Circuit Breaker: Level 1**

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| **Module:** | Circuit Breaker |
| **Inputs:** | 6-8.4 V DC Power |
| **Outputs:** | Current Limited 6-8.4 V DC Power |
| **Functionality:** | Limit current to protect downstream systems from overcurrent damage. Break circuit if current threshold is reached. |

**Switching Power Supply: Level 1**

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| **Module:** | Switching Power Supply |
| **Inputs:** | Current Limited 6 - 8.4 V DC Power |
| **Outputs:** | 3.3 V DC Power |
| **Functionality:** | Step down current-limited power supply from 6-8.4 V DC down to 3.3 V DC for use by all subsystems. |

### **Radio Soft Switch: Level 1**

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| **Module:** | Radio Soft Switch |
| **Inputs:** | Microcontroller Control Signal  3.3 V DC Power |
| **Outputs:** | RX Radio Power (3.3 V DC)  TX Radio Power(3.3 V DC) |
| **Functionality:** | Receives control signal from microcontroller, determines whether or not to provide power to RX Radio or TX Radio individually. |

### **TCAN Transceiver: Level 1**

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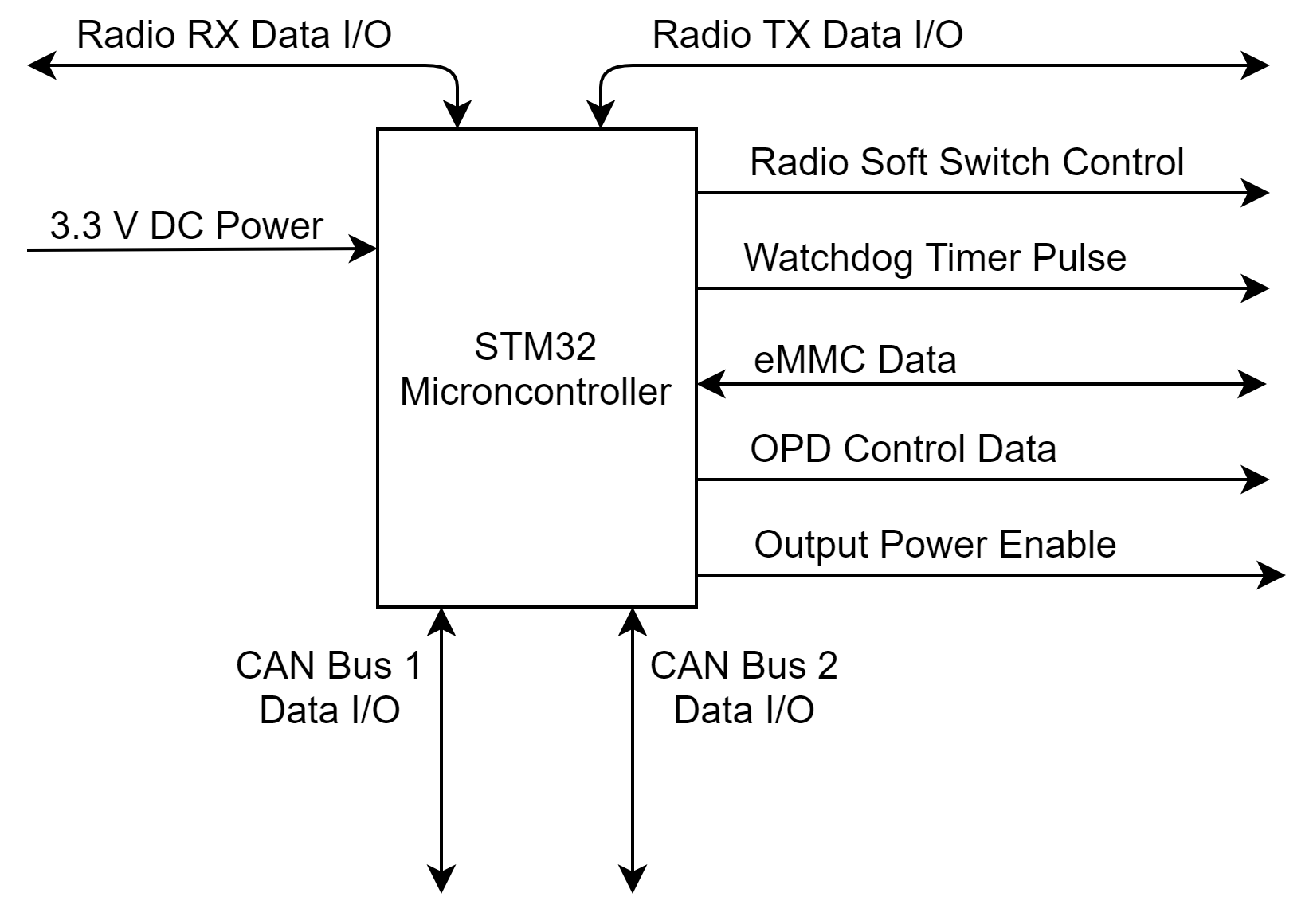
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| --- | --- |
| **Module:** | TCAN Transceiver |
| **Inputs:** | Microcontroller Data  CAN Bus Data |
| **Outputs:** | Microcontroller Data  CAN Bus Data |
| **Functionality:** | Receives data from microcontroller, sends down CAN bus. Receives data from CAN bus, sends to microcontroller. |

### **Watchdog Timer: Level 1**

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| **Module:** | Watchdog Timer |
| **Inputs:** | Microcontroller Pulse Signal |
| **Outputs:** | Shutdown Signal |
| **Functionality:** | Receives pulse in regular timed interval from microcontroller indicating system is in good health. Enables shutdown signal if pulse not received, thereby shutting down power to entire Oresat system and resetting. |

### **STM32 Microcontroller: Level 1**

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| **Module:** | STM32 Microcontroller |
| **Inputs:** | 3.3 V DC Power  CAN Bus 1 Data  CAN Bus 2 Data  Radio RX Data  Radio TX Data  eMMC Interface |
| **Outputs:** | Radio RX Data  Radio TX Data  Radio Soft Switch Control  Watchdog Timer Pulse  eMMC Interface  OPD Control Data  Output Power  CAN Bus 1  CAN Bus 2 |
| **Functionality:** | Communicates with all critical subsystems through CAN bus 1. Communicates with all mission subsystems through CAN bus 2. Controls power for all subsystems through OPD Control Data line. Reads and writes memory to and from eMMC. Kicks watchdog to indicate system health. Controls power to Radio TX and RX. Receives commands from ground station through Radio RX line. Transmits mission and system health information through Radio TX line. |