

Reference Number	Related Requirement	Failure Mode	Type of Failure	Cause of Failure	Effect of Failure	Before Mitigation			Mitigation of Failure	After Mitigation		
						Likelihood	Criticality	RPN		Likelihood	Criticality	RPN
1a	1.1.3	uSD card not present	Operator Error	uSD card is not inserted into the receptacle	System will be unable to log data to a uSD card for storage and off-loading	0.50	9	4.50	Go into an error state when uSD is not detected. Prompt user to override by storing data on backup flash storage - notify them that doing so will dramatically limit their deployment time	0.50	7	3.50
1b	1.1.3	uSD card is broken	Hardware Failure	The uSD card is damaged and inoperable	System will be unable to log data to a uSD card for storage and off-loading.	0.10	9	0.90	Go into an error state when uSD is not detected. Prompt user to override by storing data on backup flash storage - notify them that doing so will dramatically limit their deployment time.	0.10	9	0.90
					Depending on the physical damage to the card, an electrical short may develop, leading to excess heating and power draw	0.10	9	0.90	Protect the SD card with a strong receptacle. Have fuses that can limit the current drawn in the event of a short circuit	0.05	9	0.45

1c	1.1.3	Secondary flash storage is non-operable	Hardware Failure	The SPI bus is having electrical issues, or CS line is not set correctly	System will be unable to log data to the backup storage system in the event of an error on the uSD card.	0.10	3	0.30	Proper installation of the secondary flash chip during assembly. Ensure that the proper CS line is selected in the code when initializing the device. Ensure that there is no damage to the board	0.10	2	0.20
				The flash chip is physically damaged	A short may develop, leading to excess heating and power draw	0.05	8	0.40	Warn user of fault in secondary flash storage	0.05	8	0.40
1d	1.1.8	Tertiary flash storage is non-operable	Hardware Failure	The SPI bus is having electrical issues, or CS line is not set correctly. The microcontroller may be physically damaged	System will be unable to load settings from the on-board	0.10	9	0.90	Automatically backup configuration settings to the secondary flash storage device - load if there is an error. Warn user of fault in tertiary flash	0.01	9	0.09
					System will be unable to load webpage information for serving the dashboard and UI	0.10	1	0.10	Backup the web server information to secondary flash storage - load if there is an error. Warn user of fault in tertiary flash storage	0.01	1	0.01
2	1.1.10	The power switch is non-operable	Hardware Failure	The switch is melted and locked into a certain setting. Debris or corrosion jammed the switch into its	The system will be unable to turn on	0.01	10	0.10	Ensure that components are protected during use by strong case. Ensure that components are able to withstand intended soldering conditions (especially temperature)	0.01	10	0.10
					The system will be unable to turn off	0.01	1	0.01	Ensure that power connections are easily removable - remove connections in event of failure	0.01	1	0.01

3		The battery does not charge when plugged into USB power	Hardware Failure	Internal failure of the IC. Faulty connections	The system will be unable to charge the battery by itself	0.10	1	0.10	Ensure that the battery is easily removable and an external charger is available for it	0.10	1	0.10
				Physical damage to the charging IC	A short may develop, leading to excess heating and power draw	0.01	1	0.01	Have fuses on the board that can limit the current drawn in the event of a short circuit. Protect the IC from physical damage with a case	0.01	1	0.01
4a		The GPS does not receive a valid satellite fix	Radio Failure	The radio antenna does not have a clear LOS to the sky	The system will be unable to locate itself in geographic coordinates	0.90	5	4.50	Ensure that the GPS radio antenna has a clear line of sight to the sky. Ensure that antenna is clear of concrete or metal obstructions.	0.01	5	0.05
					The system will not be able to coordinate the system time to UTC reported by satellites	0.90	2	1.80	Allow the user to overwrite the current RTC setting via UI.	0.90	1	0.90