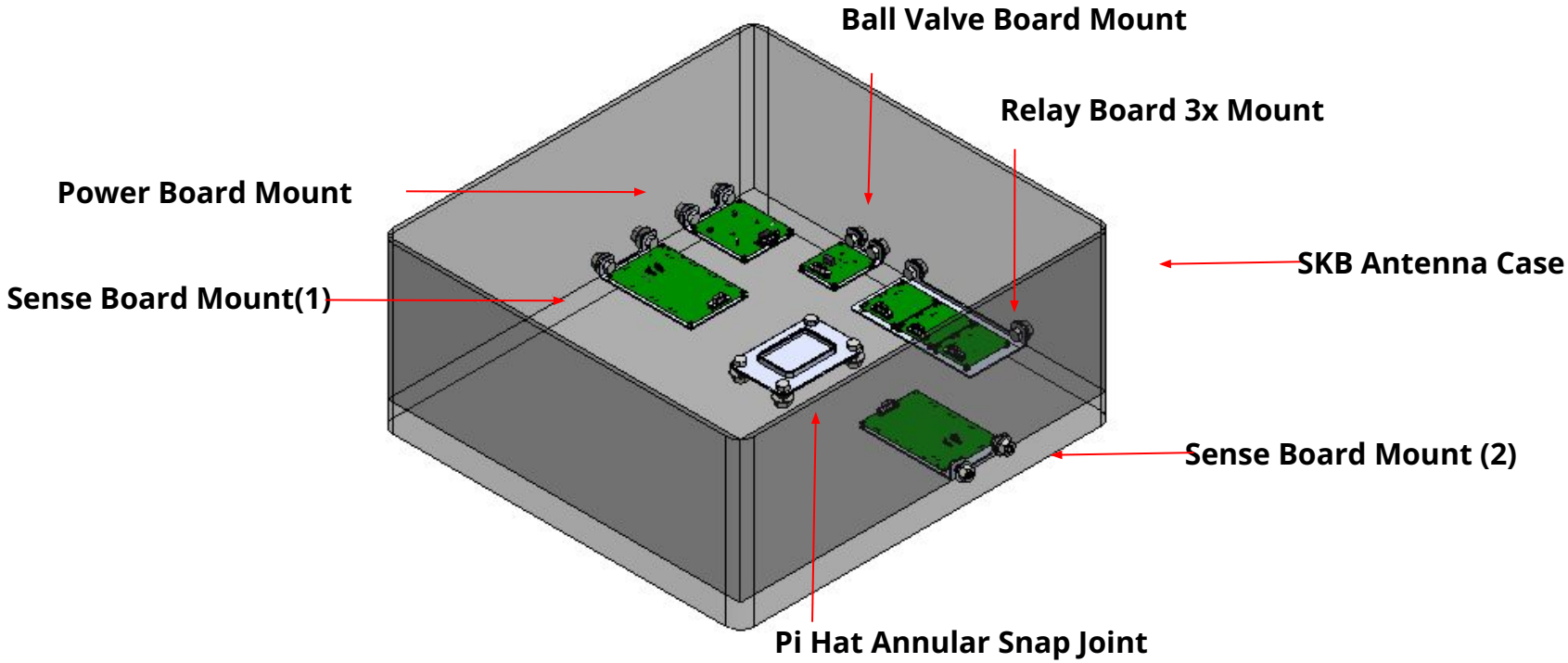
Fill Station Board Integration

Final Design Review
Tuesday, November 19, 2024
Langston Johnson

Post IDR Action Items

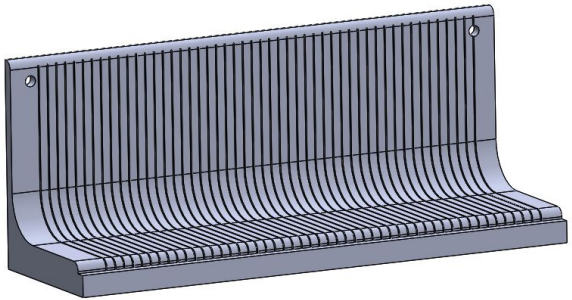
- Finalize Board Housing Design using new hole dimensions
- Finalize Filament material
- Finalize Box Dimensions and Integration Plan

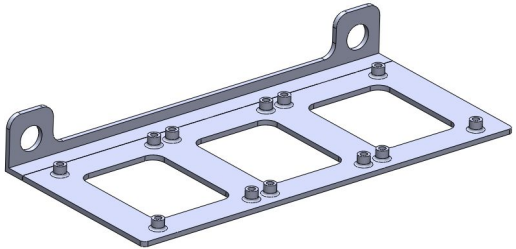
System Overview



Surface Mounting

PCB Racking (Previous)	**Surface Mounting(Current)**
- Greater Density of Boards - Flexibility in Arrangement - Does not require Screw Holes - Great Accessibility	- Less material - More Secure - Simpler Design - Simpler Tolerancing - All sides exposed
- More Material - Two exposed sides	- Requires Screw Holes

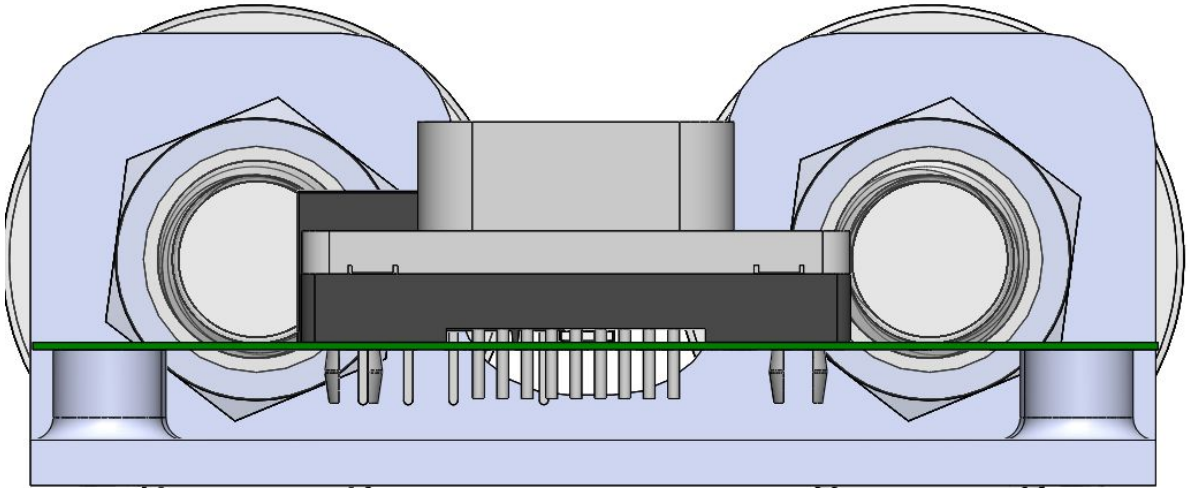




Surface Mounting

Base Clearance: 0.2”

0.5” Screw Hole Diameter



Box Integration

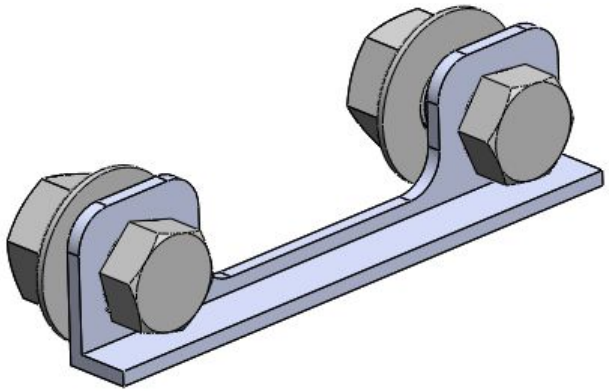
Box: SKB Field-Ready iSeries Antenna Case

	Length	Width	Height
Exterior	26.5"	26.56"	11.65"

	Base Depth	Lid Depth	Total
Interior	8"	2"	10"

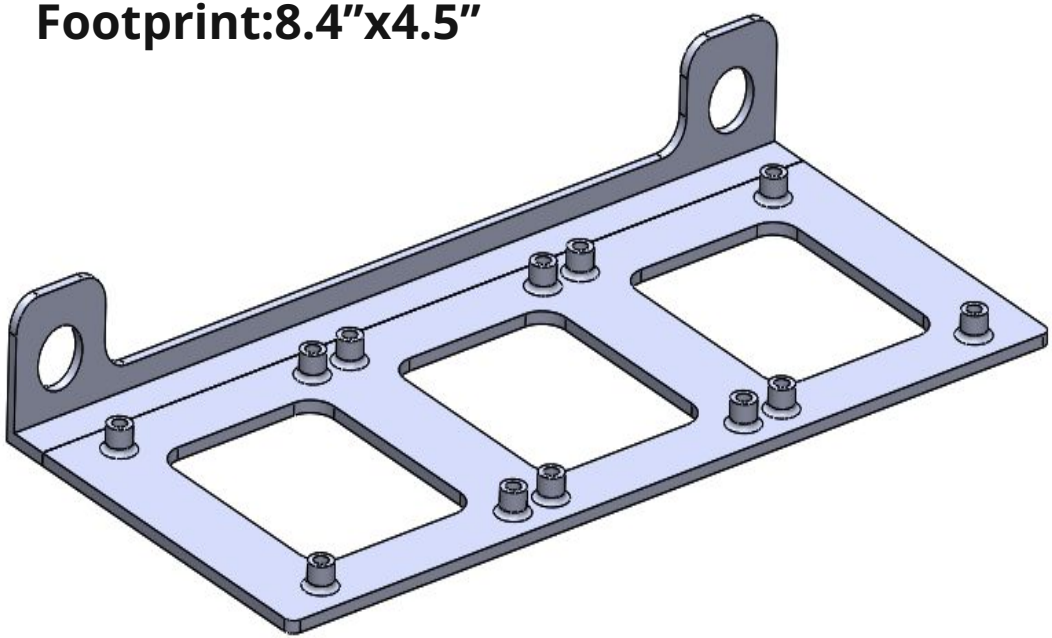
Box Integration

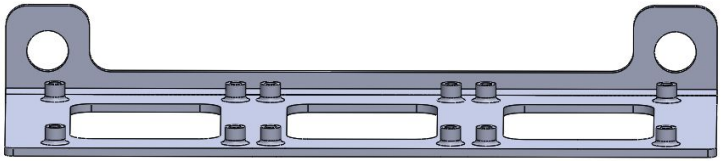
- 0.5” Diameter



Relay Mount

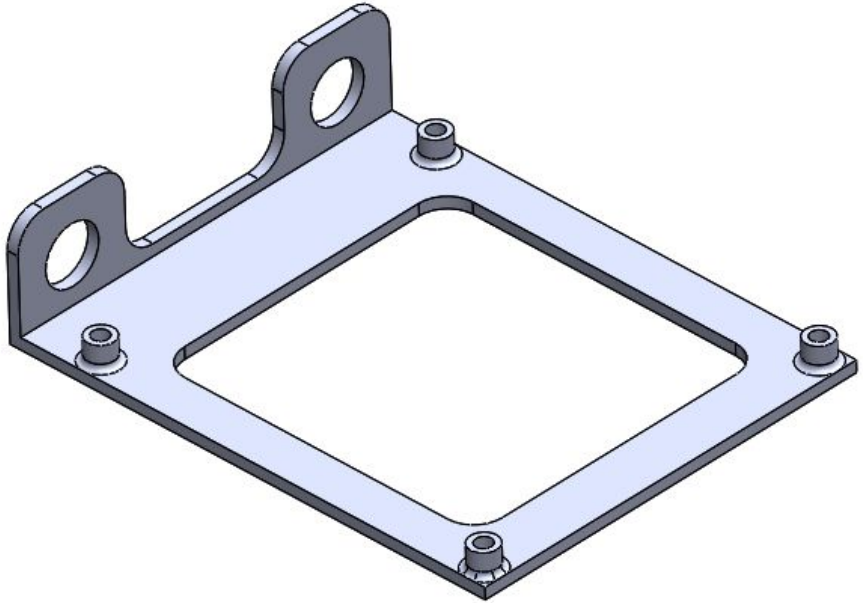
Footprint:8.4”x4.5”

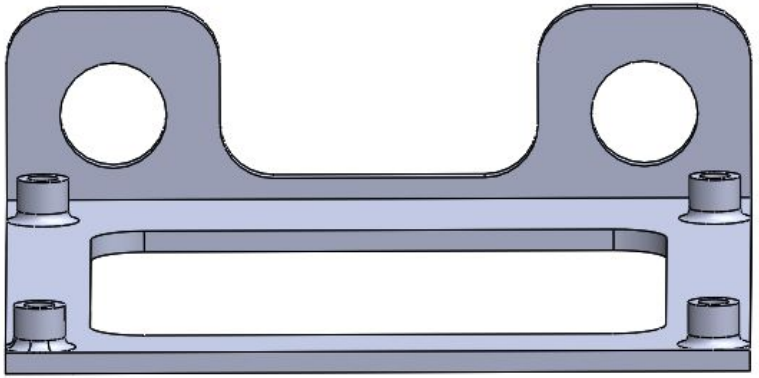




Power Mount

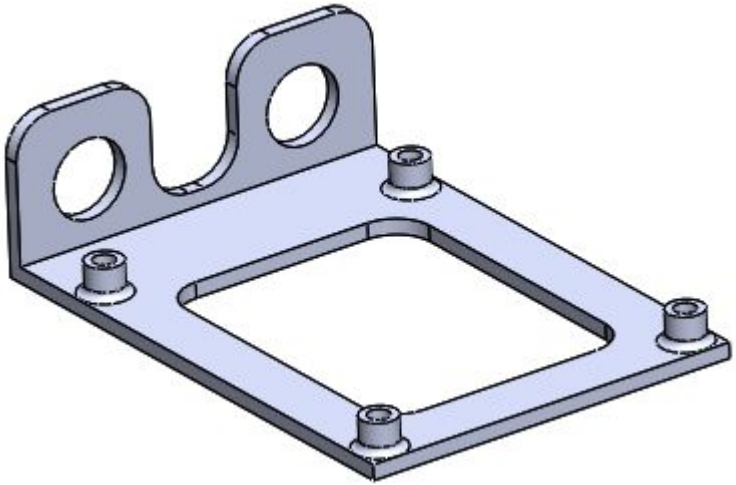
Footprint: 3.49”x3.34”

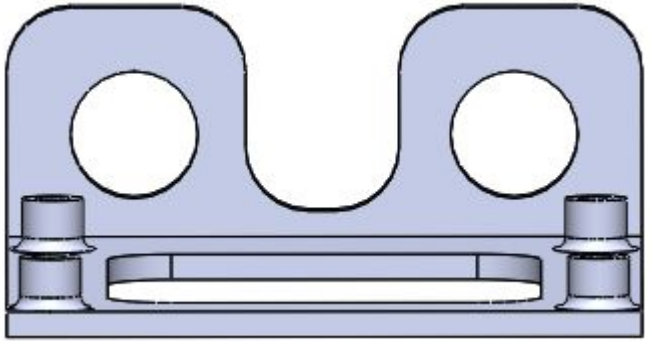




Ball Valve Mount

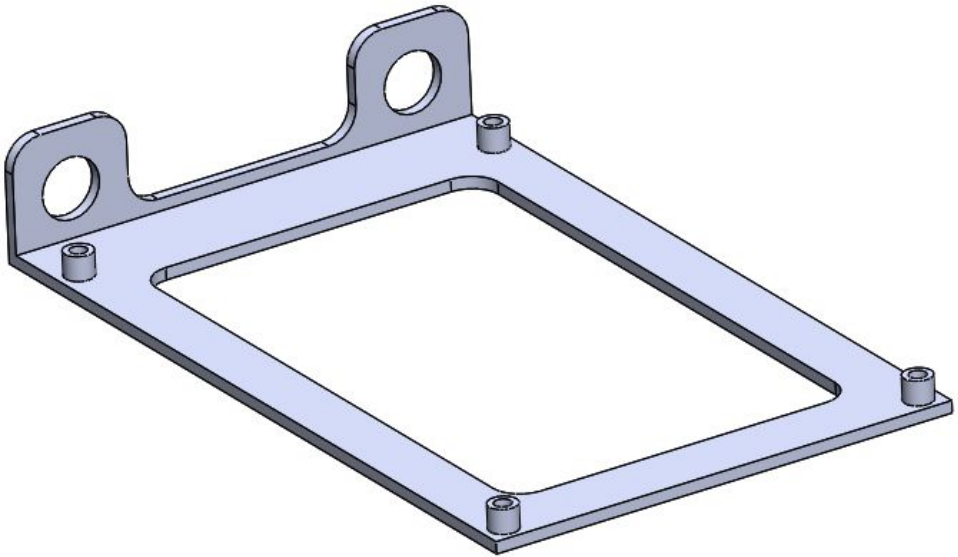
Footprint: 3.5”x2.49”

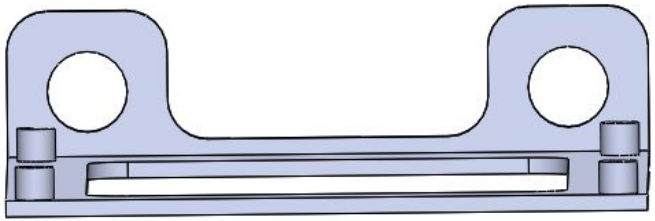




Sense Mount

Footprint: 6”x4”

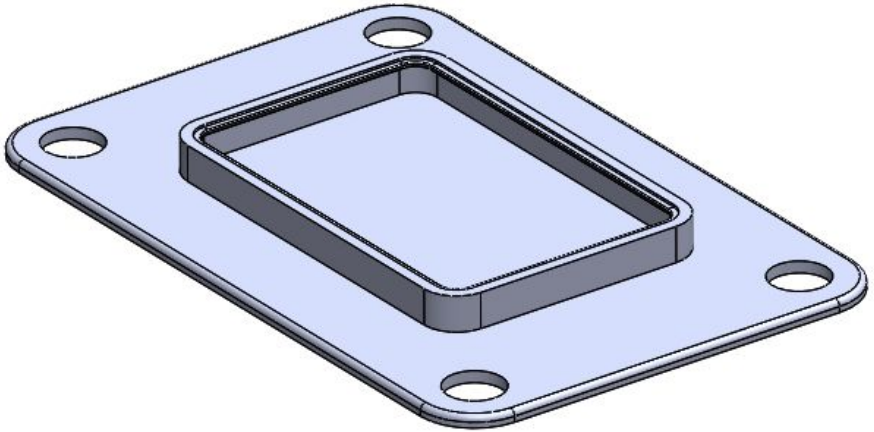


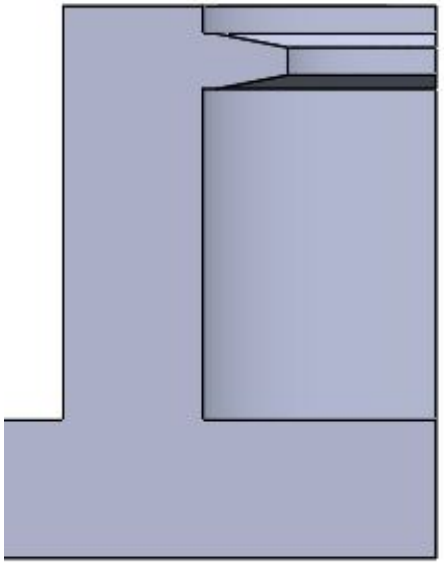


Pi-Hat Snap Joint

Overhang Length: .08±.02” (2.032±.5mm)

Raspberry Pi 5 Dimensions: 3.35”x2.21”





Filament:PETG

Consideration	PETG	PLA	TPU/TPE
Elasticity	Greater range of elastic deformation than PLA	Rigid, deforms far less before breaking.	Flexible Polymers
Environment	Resistant to UV rays and high temperatures.	Susceptible to environmental conditions. Softened at Lower Temperatures than PETG	TPU has greater abrasion resistance and chemical resistance. No inherent resistance to UV, and can degrade at high temperatures.
Printing Temperature (Nozzle)	220-250°C	190-230°C	210-230°C Can deform during print. Poorer adhesion to bed.

Bill of Materials

Fill Station - Bill of Materials								
Product	**Link**	**Vendor**	**System(s)**	**Package Quantity**	**Quantity per Package**	**Package Price**	**Total Price**	**In Stock ?**
Steel Hex Screw 7/16” Thread Size ¾” Long	Hex Screw	McMaster-Carr	Box Integration	3	5	$3.92	$11.76	Yes
Steel Nex Nut 7/16” Thread Size	Hex Nut	McMaster-Carr	Box Integration	2	10	$6	$12.70	Yes
Steel Washer 7/16” Screw Size, 0.5” ID	Washer	McMaster-Carr	Box Integration	1	100	$11.99	$11.99	Yes
Stainlesss Steel Pan 6-40 Thread size Head Philps 3/16” Long	Screw	McMaster-Carr	Board Housing	2	25	$4.87	$9.74	Yes
PETG Filament								Yes

Requirements + Verification Plan

Requirement	Verification Plan	Verified? (T/F)
Box Mounting Maintains Integrity of the Seal	“Dust Test”	F
Boards remain secure under transport	“Shake Test”	F
Annular cantilever deformation is elastic	Snap Fit Testing	F

Manufacturing Plan: 3D Printing

System	Part Name	PreReqs	Quantity	Status
Board Mounts	Relay	None	2	NOT READY
Board Mounts	Power	None	1	NOT READY
Board Mounts	Ball Valve	None	1	NOT READY
Board Mounts	Sense	None	1	NOT READY
Board Mounts	Pi-Hat Snap	Verify Pi-Hat Dimensions	1	NOT READY

Next Steps

- Verify Pi-Hat Dimensions
- Begin Snap Fit Testing and Integration Testing