File Number	Piece Number

File Number	TYS-PST4S-H1-IDS
Stage Mark	FM
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PST4S-H1 Star Tracker IDS

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Signature

TY-Space Technology (Beijing) Ltd.

IDS 1: Performance Index

	File Number	TYS-PST4S-H1-IDS	Page 1 of 14			
	Sub-System Name					
	Device Name	PST4S-H1 Star Tracker	Stage Mark			
	Device Code				FM	

Parameters	**Specifications**
Attitude Accuracy	Pointing: 3″ (3σ) Roll: 30″ (3σ)
Dynamic Performance	@0.1°/s: 3″ (Pointing, 3σ); 30″ (Roll, 3σ); @0.5°/s: 5″ (Pointing, 3σ); 50″ (Roll, 3σ); @1.0°/s: 10″ (Pointing, 3σ); 100″ (Roll, 3σ); @3°/s: Trackable
Data Validity Rate	>98%@ 0.5°/s; >96%@0.5°/s ~1.5°/s; >90%@1.5°/s ~2°/s
Update Rate	≥10Hz
Acquisition Rate	Max. ≤2s
Start-up Time	Better than 5s
Exclusion Angle	Sun: better than 35°; Earth: better than 25°
Time Scale Accuracy	Better than 0.1ms @ synchronization pulse (SYNC pulse)
Communication	RS422
Quaternions Continuity	The scalar of quaternion: non-negative
Life Time	7 years @1000km Orbit
Reliability	≥0.98 @ the end of 7-year running

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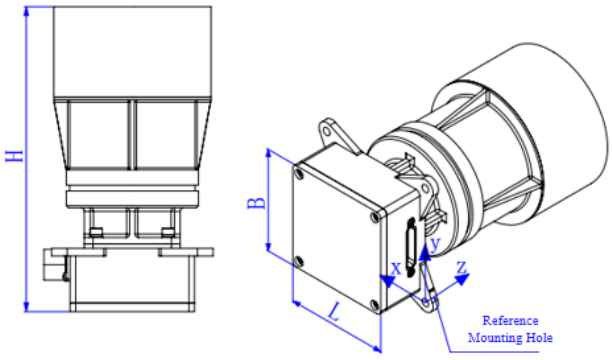
Signed (Date):	Mark		Signature, Date

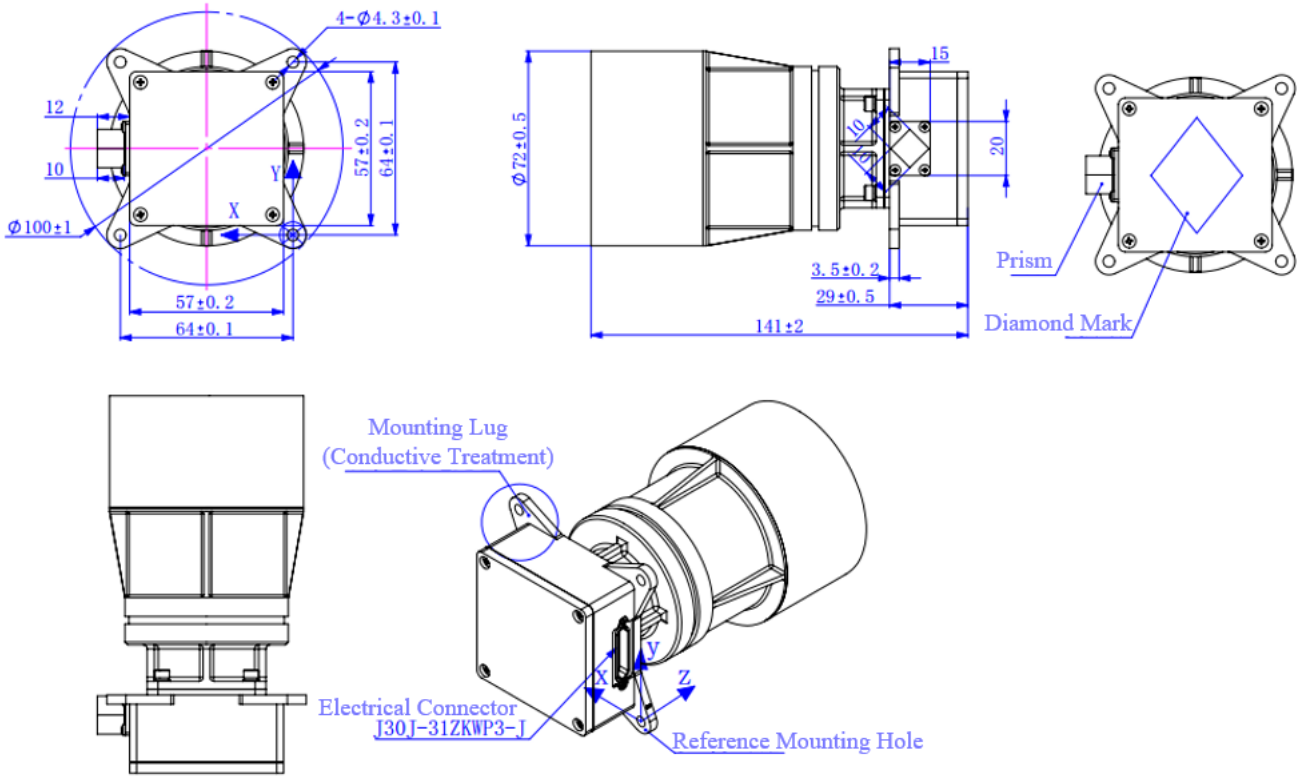
IDS 2: Mechanical Characteristics

<table>
<tr><td colspan="2" rowspan="4"></td><td colspan="2">File Number</td><td colspan="2">TYS-PST4S-H1-IDS</td><td colspan="4">Page 2 of 14</td></tr>
<tr><td colspan="2">Sub-System Name</td><td colspan="2"></td><td colspan="4"></td></tr>
<tr><td colspan="2">Device Name</td><td colspan="2">PST4S-H1 Star Tracker</td><td colspan="4">Stage Mark</td></tr>
<tr><td colspan="2">Device Code</td><td colspan="2"></td><td></td><td></td><td>FM</td><td></td></tr>
<tr><td colspan="3">Device Weight: 310±20g</td><td colspan="3">Device Count: 1</td><td></td><td>√</td><td></td></tr>
<tr><td rowspan="4">Mechanical Characteristics</td><td>Envelope Size (mm)</td><td colspan="2">Φ100±1</td><td colspan="2">Height: 141±2</td><td></td><td>√</td><td></td></tr>
<tr><td>CM Position (mm)</td><td>X: 32.4±1</td><td>Y: 32±1</td><td>Z: 18±1</td><td></td><td>√</td><td></td></tr>
<tr><td rowspan="2">Inertia at CM (kg.mm^2)</td><td rowspan="2">P_X = 549.7±3</td><td rowspan="2">P_Y =555.0±3</td><td rowspan="2">P_Z =223.5±3</td><td></td><td>√</td><td></td></tr>
<tr><td>MEAS</td><td>CALC</td><td>EST</td></tr>
<tr><td rowspan="5">Mounting Characteristics</td><td>Mounting Hole Count: 4</td><td colspan="2">Mounting Hole Dimensions (Tolerance) (mm): 4-Φ4.3±0.1</td><td>Material: 2A12-T4</td><td colspan="3">Determination Method (√)</td></tr>
<tr><td colspan="3">Mounting Contact Area (mm^2): 500</td><td colspan="3" rowspan="4">Note: The determination method refers to the way to determine the mechanical characteristics of the device.
MEAS: Measurement
CALC: Calculation
EST: Estimation</td></tr>
<tr><td colspan="3">Mounting Surface Flatness: 0.1mm/(100mm×100mm)</td></tr>
<tr><td colspan="3">Mounting Surface Roughness Ra (μm): 3.2</td></tr>
<tr><td colspan="3">Mounting Surface Treatment: Conductive Treatment</td></tr>
<tr><td colspan="7">Parameter relationship diagram (should indicate coordinate system relative orientation, CM position, device body dimensions, mounting surface location, etc.):
 

Note: The coordinate origin is located at the center of the reference mounting hole on the mounting surface (see IDS 3: Instrument Diagram).</td></tr>
<tr><td colspan="2">Edited (Date):</td><td></td><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td colspan="2">Signed (Date):</td><td>Mark</td><td colspan="2"></td><td colspan="2">Signature, Date</td></tr>
</table>

IDS 3: Instrument Diagram

	File Number	TYS-PST4S-H1-IDS	Page 3 of 14			
	Sub-System Name					
	Device Name	PST4S-H1 Star Tracker	Stage Mark			
	Device Code				FM	



Note: This schematic diagram should include overall dimensions, mounting dimensions, mounting surface, mounting points (hole diameters and their tolerances, center-to-center distance and their tolerances), positional tolerances of guide pins and holes, orientation, position, type and designation of electrical connectors, operation holes required for calibration and testing, bonding jumpers/straps (position and length), and registration measurement datum.

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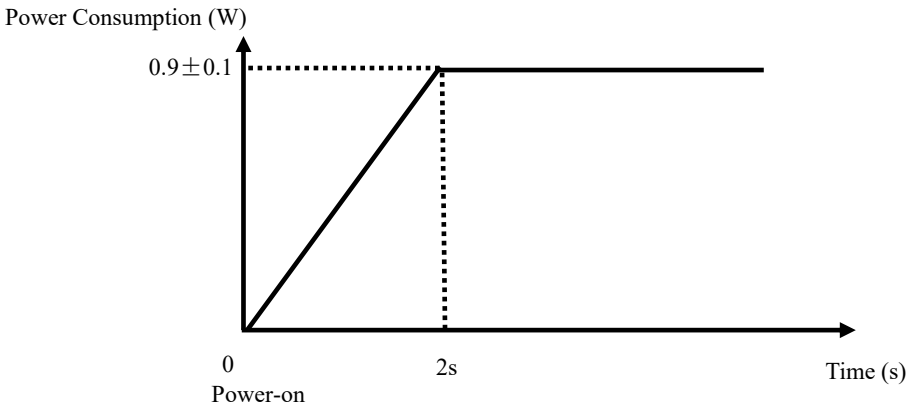
IDS 4: Thermal Characteristics

	File Number	TYS-PST4S-H1-IDS	Page 4 of 14			
	Sub-System Name					
	Device Name	PST4S-H1 Star Tracker	Stage Mark			
	Device Code				FM	

Surface (Excluding Mounting Surface)	Aluminum Alloy (2A12-T4)	Note: The inner surface of the baffle is ultra black coating. $\varepsilon_H \geq 0.85$, $\alpha_S \geq 0.96$
	Outer Surface Treatment: Aluminum Color	
	Outer Surface Emissivity: $\varepsilon_H \geq 0.6$	
Start Temperature ℃: -30～+40		Heat Capacity J/K: 310
Operating Temperature Range ℃: -30～+40		Operating Relative Humidity Range: ≤60%
Best Operating Temperature Range ℃: 20±5		Storage Relative Humidity Range: ≤70%
Storage Temperature Range ℃: -30～+40		Power Consumption @Operating State W: 0.9±0.1(Per Device) Power Consumption @Preparing State W: 0(Per Device)

Description:



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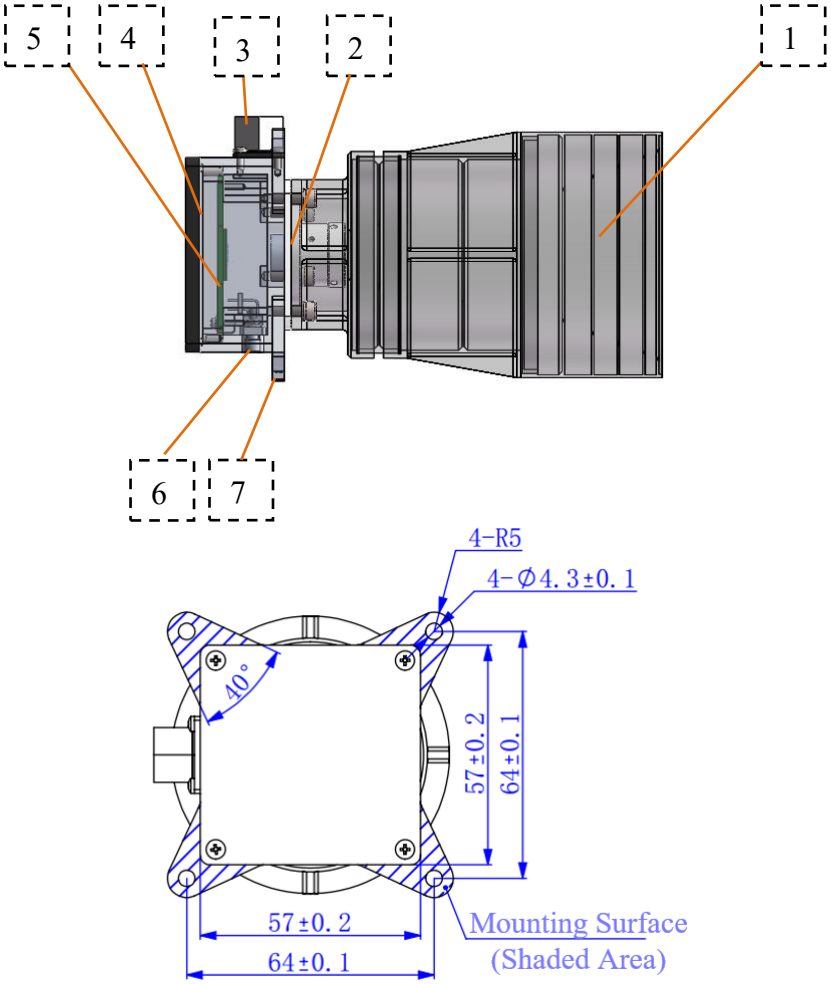
IDS 5: Thermal Diagram

	File Number	TYS-PST4S-H1-IDS	Page 5 of 14			
	Sub-System Name					
	Device Name	PST4S-H1 Star Tracker	Stage Mark			
	Device Code				FM	

Diagram:



1—Baffle 2—Lens

3—Optical Prism 4—Circuit Box

5—Power Supply & Image Processing Circuit Board

6—Connector 7—Mounting Lug

Note: The installation of baffle and star tracker circuit box should be heat-isolation, the baffle communicated with the shell of star tracker circuit box through screws, meet the requirement of connection between metal components.

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IDS 6: Power

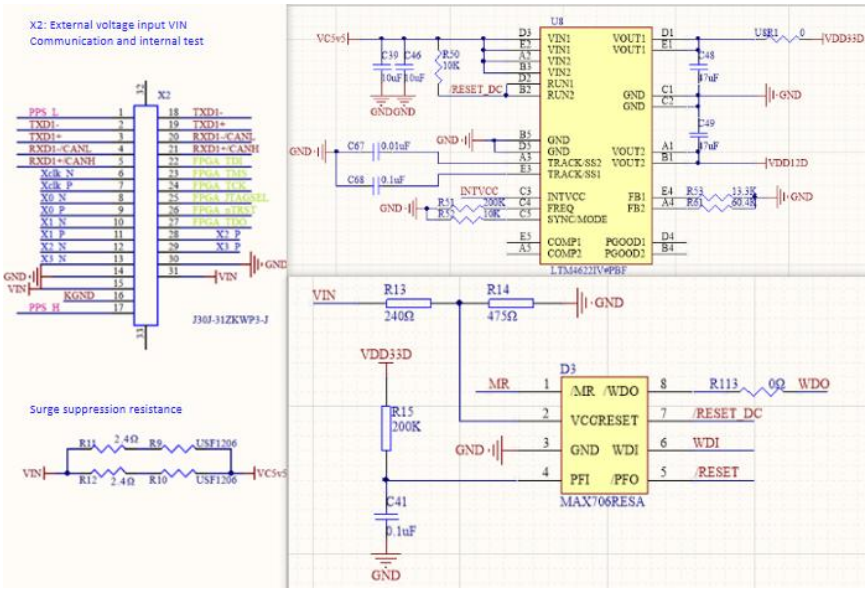
		File Number	TYS-PST4S-H1-IDS	Page 6 of 14			
		Sub-System Name					
		Device Name	PST4S-H1 Star Tracker	Stage Mark			
		Device Code				FM	
Operating Mode (Long Term/Short Term / Other)		Long Term		Device Count			1
Voltage	Voltage Stability	Ripple Voltage	Inrush Current (Peak / Duration)	Power Consumption			
5V	/	100mV (p-p)	2A/5ms	0.9±0.1W			
Notes: Safe Operating Voltage: 4.8V～5.4V.							
Edited (Date):							
Signed (Date):		Mark		Signature, Date			

IDS 7: Electrical Connector Contact Assignment – Differential PPS

		File Number		TYS-PST4S-H1-IDS	Page 7 of 14
		Sub-System Name			
		Device Name		PST4S-H1 Star Tracker	Stage Mark
		Device Code			FM
Name (by Function): Ground, Signal Test		Electrical Connector P/N: J30J-31ZKWP3-J			Pin / Hole: Hole
Contact Number	Signal (Function) Description	Voltage/V	Current/A	Polarity	Remarks (Shielded / Twisted)
2,18	TXD1-	RS422 Standard	RS422 Standard	Asynchronously Transmit-	2,3 Twisted, 18,19 Twisted
3,19	TXD1+			Asynchronously Transmit+	
4,20	RXD1-	RS422 Standard	RS422 Standard	Asynchronously Receive-	4,5 Twisted, 20,21 Twisted
5,21	RXD1+			Asynchronously Receive+	
17	PPS H	RS422 Standard	RS422 Standard	Synchronize Signal+	1,17 Twisted
1	PPS L			Synchronize Signal-	
15,31	VIN	5V	0.18A	Power	
14,30	GND	0V	0.18A	Power Ground	
16	KGND	/	/	Case Ground	Case Ground
6,7,8,9,10, 11,12,13,22, 23,24,25,26, 27,28,29					Internal Use
Edited (Date):					
Signed (Date):		Mark			Signature, Date

IDS 8: Electrical Interface Features - Power

	File Number	TYS-PST4S-H1-IDS	Page 8 of 14			
	Sub-System Name					
	Device Name	PST4S-H1 Star Tracker	Stage Mark			
	Device Code				FM	

Interface Signal	Power Supply
Signal Characteristics	Operating Voltage: 4.8V～5.4V; Reflected Ripple Voltage ≤100mV(p-p); Starting Current Rising Slope <10^6A/s, Peak Value <2A, Length of Time<5ms.
Interface Circuit	
Notes	GND: Power Ground KGND: Case Ground GND is complete isolation with KGND

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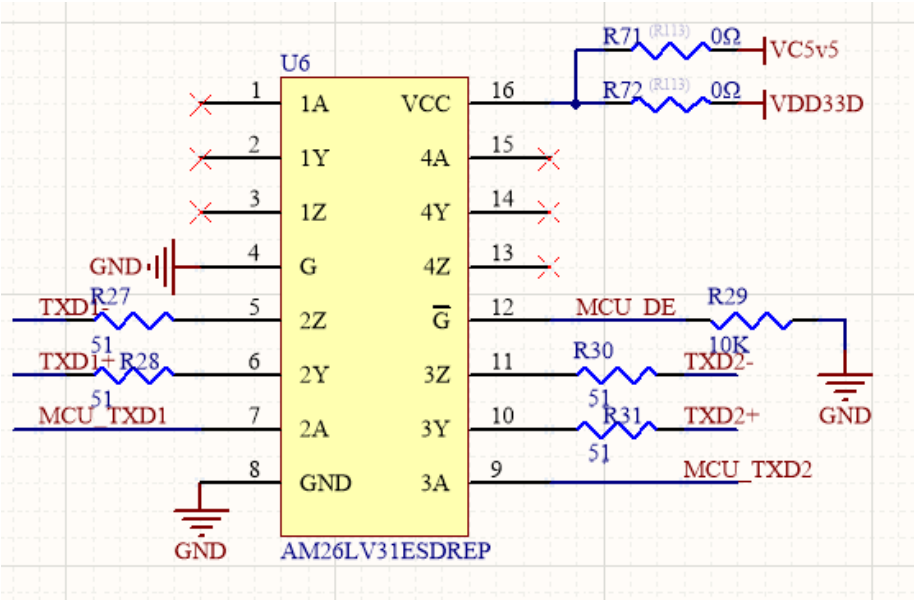
IDS 9: Electrical Interface Features - RS422 (Transmit)

	File Number	TYS-PST4S-H1-IDS	Page 9 of 14			
	Sub-System Name					
	Device Name	PST4S-H1 Star Tracker	Stage Mark			
	Device Code				FM	

Interface Signal	Digital Signal: RS422 (Transmit)
Signal Characteristics	RS422 Communication Baud Rate: 115200bps (±0.5%); Comply with EIA-422-B Standard; Interface Chip: AM26LV31ESDREP, 3.3V
Interface Circuit	
Notes	TXD1+ and TXD1- are signals interfacing to the satellite bus; TXD2+ and TXD2- are not used for on-board applications. R71: not soldered.

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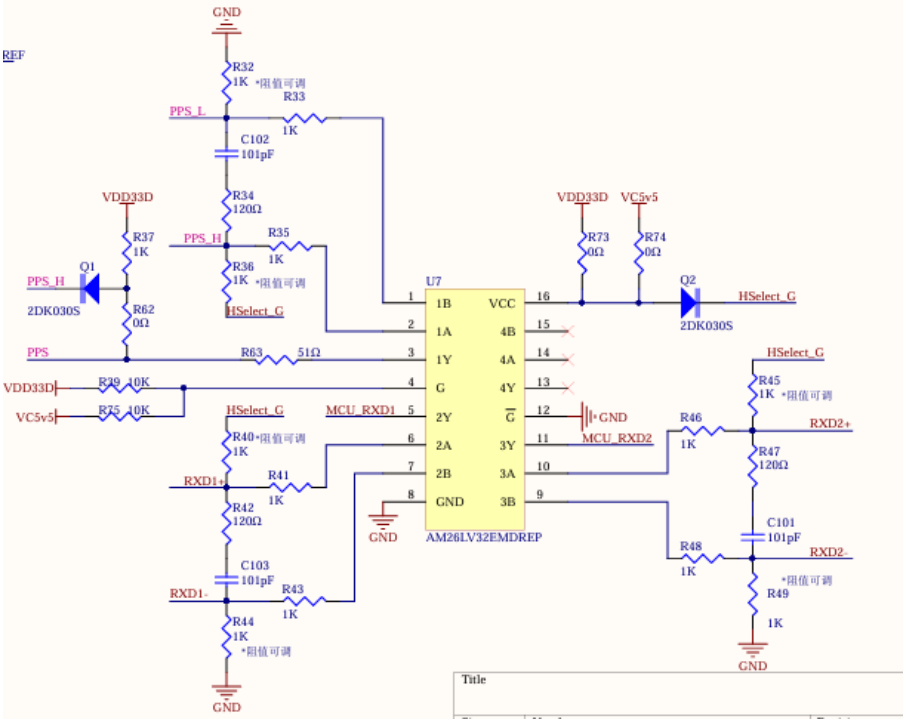
IDS 10: Electrical Interface Features - RS422 (Receive)

	File Number	TYS-PST4S-H1-IDS	Page 10 of 14			
	Sub-System Name					
	Device Name	PST4S-H1 Star Tracker	Stage Mark			
	Device Code				FM	

Interface Signal	Digital Signal: RS422 (Receive)
Signal Characteristics	RS422 Communication Baud Rate: 115200bps (±0.3%); Comply with EIA-422-B Standard; Interface Chip: AM26LV31ESDREP, 3.3V
Interface Circuit	
Notes	RXD1+ and RXD1- are signals interfacing to the satellite bus; RXD2+ and RXD2- are not used for on-board applications. R74, R75: not soldered.

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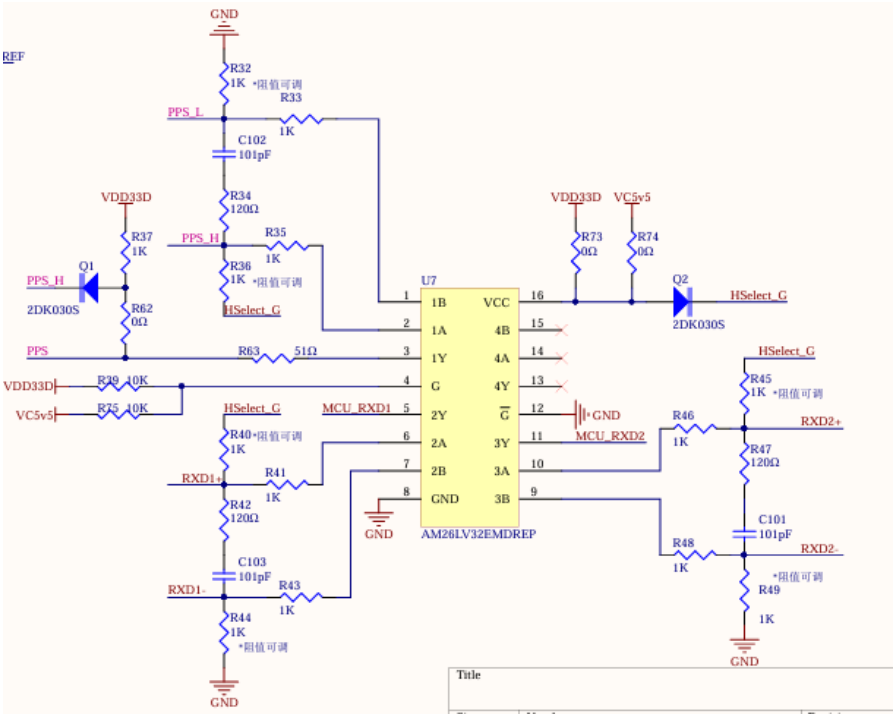
IDS 11: Electrical Interface Features - Differential PPS

	File Number	TYS-PST4S-H1-IDS	Page 11 of 14			
	Sub-System Name					
	Device Name	PST4S-H1 Star Tracker	Stage Mark			
	Device Code				FM	

Interface Signal	Pulse Per Second (PPS)
Signal Characteristics	Second Pulse Signal: Single-Ended Input; Falling Edge Aligned to Integer Seconds; Negative Pulse Width 1~2ms; Comply with EIA-422-B Standard.
Interface Circuit	
Notes	R37, R62, R62, Q1, R74, R75: not soldered @Differential PPS

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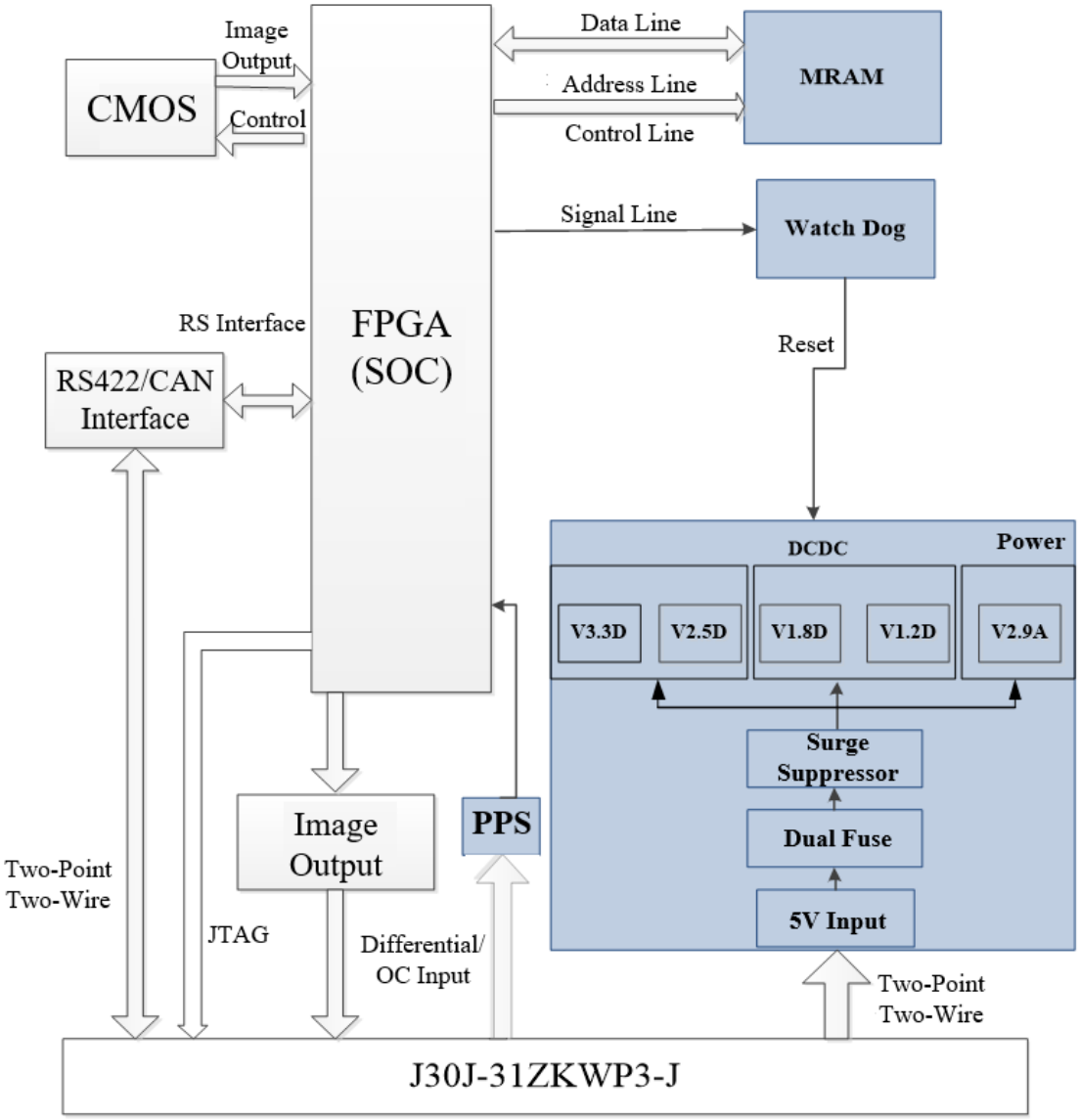
IDS 12: Circuit and Interface Schematics

	File Number	TYS-PST4S-H1-IDS	Page 12 of 14			
	Sub-System Name					
	Device Name	PST4S-H1 Star Tracker	Stage Mark			
	Device Code				FM	

Schematic Diagram:



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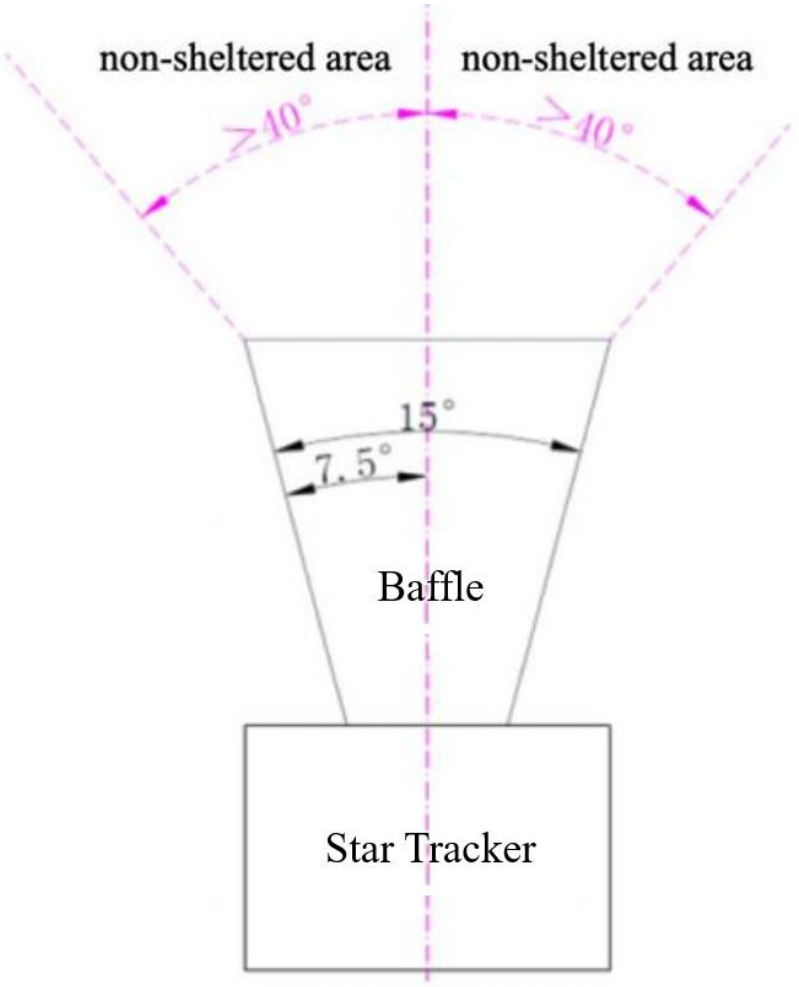
IDS 13: Mounting Requirements

	File Number	TYS-PST4S-H1-IDS	Page 13 of 14			
	Sub-System Name					
	Device Name	PST4S-H1 Star Tracker	Stage Mark			
	Device Code				FM	



Mounting Requirements: Ensure that nothing sheltered in the field of view (no obstructions within the 80° cone from the top of the baffle).

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IDS 14: Device Description

	File Number	TYS-PST4S-H1-IDS	Page 14 of 14			
	Sub-System Name					
	Device Name	PST4S-H1 Star Tracker	Stage Mark			
	Device Code				FM	

None.

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