

File Number	Piece Number



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Stage Mark	FM
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PST3S-K4 Star Tracker IDS

Signature

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Standardization
Checked by: Dong Pengfei

Approved by: Wang Haijun

IDS 1: Performance Index

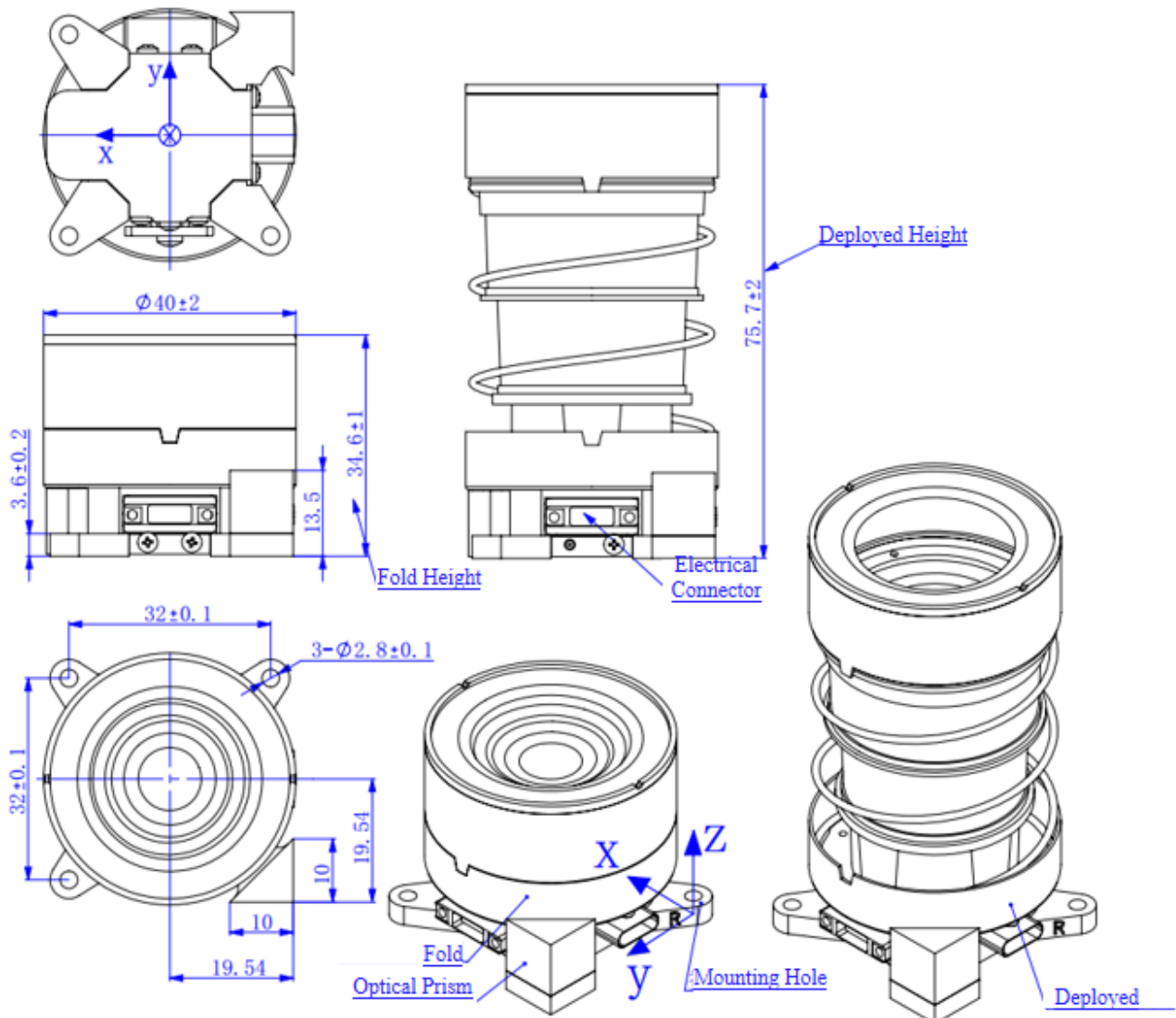
		File Number	TYS-PST3S-K4-IDS		Page 1 of 14		
		Sub-System Name					
		Device Name	PST3S-K4 Star Tracker		Stage Mark		
		Device Code					FM
Parameters	Specifications						
Attitude Accuracy	Pointing: 5" (3σ) Rolling: 50" (3σ)						
Dynamic Performance	@0.1°/s: 5" (Pointing, 3σ); 50" (Rolling, 3σ); @0.5°/s: 8" (Pointing, 3σ); 80" (Rolling, 3σ); @1.0°/s: 10" (Pointing, 3σ); 100" (Rolling, 3σ); @2°/s: Trackable						
Data Validity Rate	>98%@ 0.5°/s; >96%@0.5°/s ~1.5°/s;						
Update Rate	$\geq 10\text{Hz}$						
Acquisition Rate	Max. $\leq 2\text{s}$						
Start-up Time	Better than 5s						
Exclusion Angle	Sun: better than 35°; Earth: better than 30°						
Time Scale Accuracy	Better than 0.5ms @ synchronization pulse (SYNC pulse)						
Communication	RS422/CAN						
Quaternions Continuity	The scalar of quaternion: non-negative						
Life Time	5 years @500km Orbit						
Reliability	≥ 0.98 @ the end of 5-year running						
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IDS 2: Mechanical Characteristics

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		Sub-System Name					
		Device Name		PST3S-K4 Star Tracker		Stage Mark	
		Device Code					FM
Device Weight: 60±10g		Device Count: 1					√
Mechanical Characteristics	Envelope Size (mm)	Φ40±1		Expand Height: 34.6±1	Height When Unfolded: 75.7±2		√
	Centroid Position (mm)	X: 16±1		Y: 17±1	Z: 18±1		√
	Inertia of Centroid (kg.mm ²)	P _X = 15±2		P _Y = 16±2	P _Z = 14±2		√
						MEAS	CALC
Mounting Characteristics	Mounting Hole Count: 3	Mounting Hole Dimensions (Tolerance) (mm): Φ2.8±0.1			Material: 2A12-T4	Determination Method (√)	
	Mounting Contact Area (mm ²): 320				Note: The determination method refers to the way to determine the mechanical characteristics of the device. MEAS: Measurement CALC: Calculation EST: Estimation		
	Mounting Surface Flatness: 0.1mm/(100mm×100mm)						
	Mounting Surface Roughness Ra (μm): 3.2						
	Mounting Surface Treatment: Conductive Treatment						
Parameter relationship diagram (should indicate coordinate system relative orientation, centroid 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 <i>IDS 3: Instrument Diagram</i>).							
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IDS 3: Instrument Diagram

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	Sub-System Name					
	Device Name	PST3S-K4 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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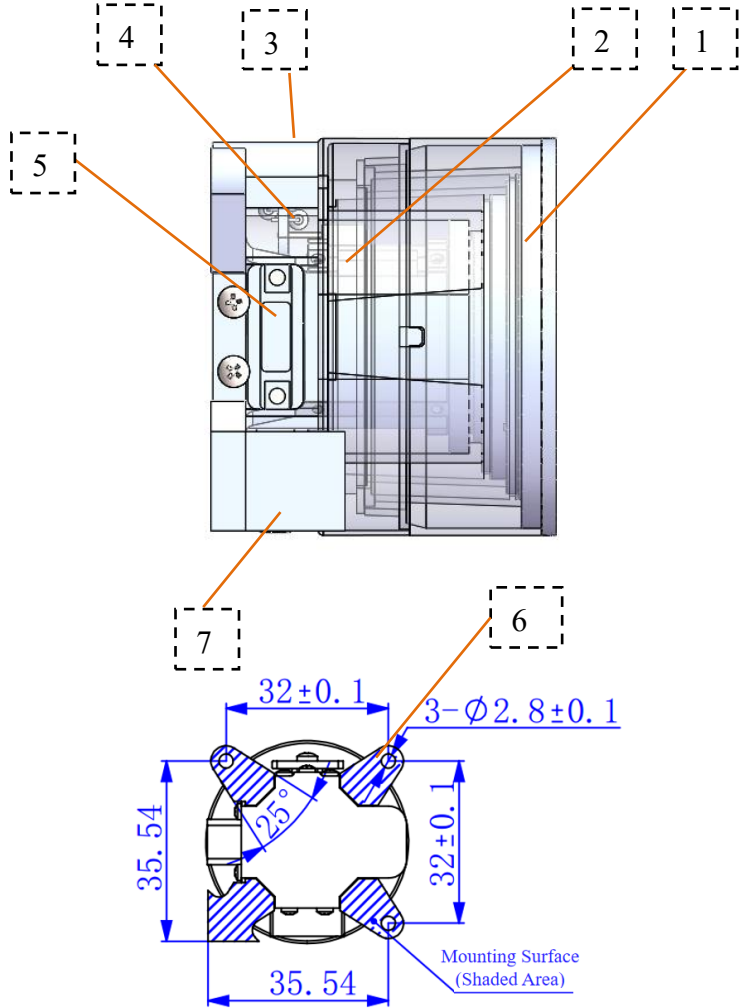
IDS 4: Thermal Characteristics

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		Sub-System Name				
		Device Name	PST3S-K4 Star Tracker		Stage Mark	
		Device Code				
Surface (Excluding Mounting Surface)	Aluminum Alloy (2A12-T4)		Note: The inner surface of the baffle is ultra black coating. $\varepsilon_H \geq 0.85$, $\alpha_S \geq 0.95$			
	Outer Surface Treatment: Golden Anodized					
	Outer Surface Emissivity: $\varepsilon_H \geq 0.6$					
Start Temperature °C: -30~+40			Heat Capacity J/K: 55			
Operating Temperature Range °C: -30~+40			Operating Relative Humidity Range: $\leq 60\%$			
Best Operating Temperature Range °C: 20±5			Storage Relative Humidity Range: $\leq 70\%$			
Storage Temperature Range °C: -30~+40			Power Consumption @Operating State W: 0.8±0.1(Per Device) Power Consumption @Preparing State W: 0 (Per Device)			
Description:						

IDS 5: Thermal Diagram

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	Sub-System Name					
	Device Name	PST3S-K4 Star Tracker	Stage Mark			
	Device Code				FM	

Diagram:



- 1—Baffle
- 2—Lens
- 3—Circuit Box
- 4—Circuit Board
- 5—Connector
- 6—Mounting Lug
- 7—Optical Prism

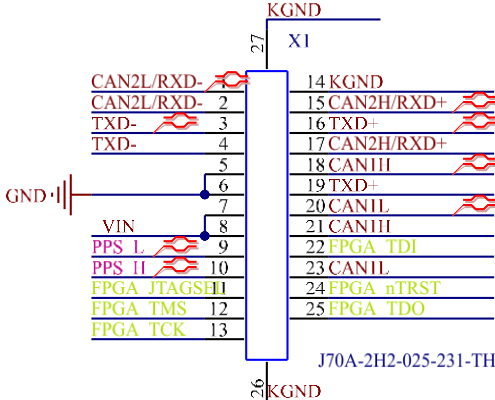
Note: The installation of baffle and star tracker circuit box should be heat-conduction.

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IDS 6: Power

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		Sub-System Name						
		Device Name		PST3S-K4 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	5%	100mV (p-p)		2A/5ms		0.8±0.1W		
Notes: (1) The internal grounding of the star tracker is designed as isolation, while the external structure contact grounding. (2) Current characteristics for the baffle ejection of star tracker (peak value/duration): 1.5 A / 10 s. 10s refers to the the total time from sending the pop-up command to sending the shutdown command. (3) The temperature of the star tracker should be $\geq 0^{\circ}\text{C}$ when sending the baffle deployment command.								
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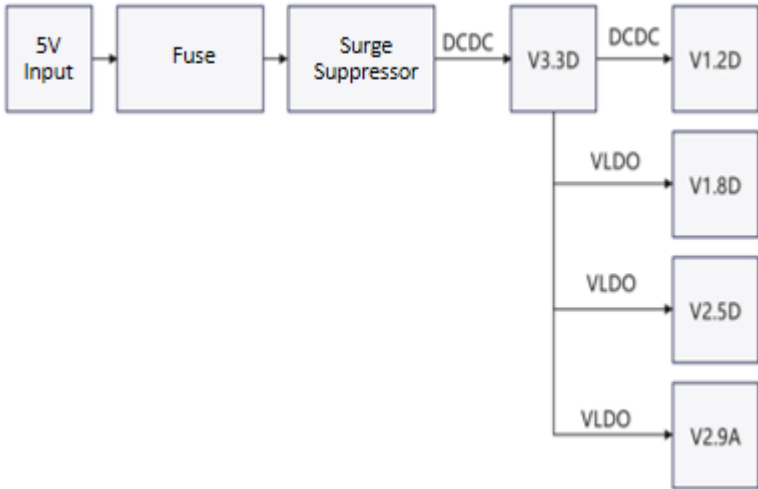
IDS 7: Electrical Connector Contact Assignment – Single-Ended PPS

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		Sub-System Name				
		Device Name		PST3S-K4 Star Tracker	Stage Mark	
		Device Code				FM
Name (by Function): X01		Electrical Connector P/N: J70A-2H2-025-231-TH			Pin / Hole: Hole	
Contact Number	Signal (Function) Description	Voltage/V	Current/A	Polarity	Remarks (Shielded / Twisted)	
16,19	TXD+	RS422 Standard	RS422 Standard	Asynchronously Transmit+	3,16 Twisted, 4,19 Twisted	
3,4	TXD-			Asynchronously Transmit-		
15,17	CAN2H/RXD+	CAN2.0B/RS422 Standard	CAN2.0B/RS422 Standard	Asynchronously Receive+/CAN2H	1,15 Twisted, 2,17 Twisted	
1,2	CAN2L/RXD-			Asynchronously Receive-/CAN2L		
20,23	CAN1L	CAN2.0B Standard	CAN2.0B Standard	CAN1L	18,20 Twisted, 21,23 Twisted	
18,21	CAN1H			CAN1H		
7,8	VIN	5V	0.2A	Power	Two-Point Two-Wire	
5,6	GND	0V	0.2A	Power Ground		
14	KGND				Case Ground	
10	PPS_H				Internal Use	
11,12,13,22,24,25						
						
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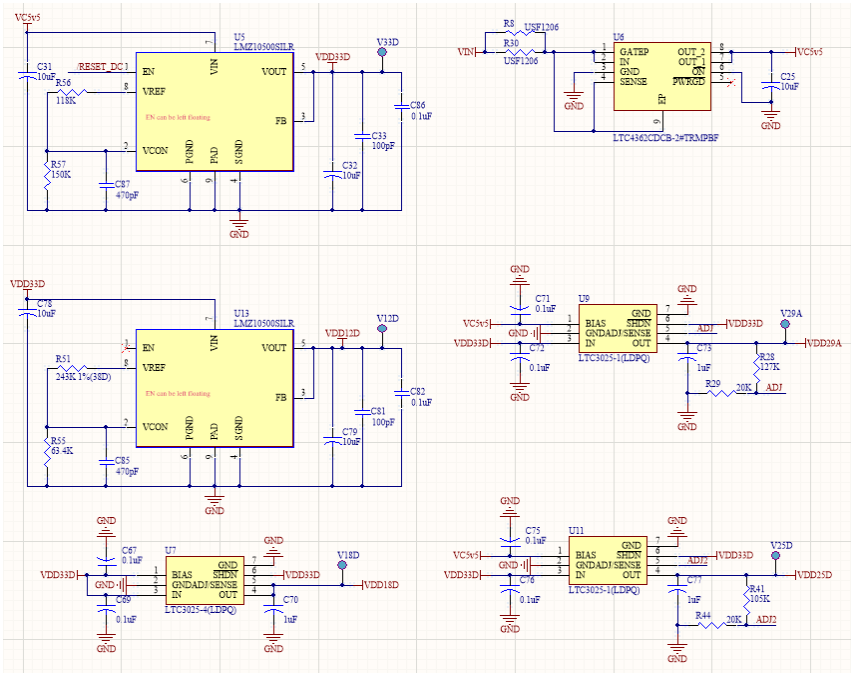
IDS 7: Electrical Connector Contact Assignment – Differential PPS

		File Number		TYS-PST3S-K4-IDS		Page 7 of 14	
		Sub-System Name					
		Device Name		PST3S-K4 Star Tracker		Stage Mark	
		Device Code				FM	
Name (by Function): X01		Electrical Connector P/N: J70A-2H2-025-231-TH				Pin / Hole: Hole	
Contact Number	Signal (Function) Description	Voltage/V	Current/A	Polarity		Remarks (Shielded / Twisted)	
16,19	TXD+	RS422 Standard	RS422 Standard	Asynchronously Transmit+		3,16 Twisted, 4,19 Twisted	
3,4	TXD-			Asynchronously Transmit-			
15,17	CAN2H/RXD+	CAN2.0B/RS422 Standard	CAN2.0B/RS422 Standard	Asynchronously Receive+/CAN2H		1,15 Twisted, 2,17 Twisted	
1,2	CAN2L/RXD-			Asynchronously Receive-/CAN2L			
20,23	CAN1L	CAN2.0B Standard	CAN2.0B Standard	CAN1L		18,20 Twisted, 21,23 Twisted	
18,21	CAN1H			CAN1H			
7,8	VIN	5V	0.2A	Power		Two-Point Two-Wire	
5,6	GND	0V	0.2A	Power Ground			
14	KGND					Case Ground	
10	PPS_H	RS422 Standard	RS422 Standard	PPS Receive+		9,10 Twisted	
9	PPS_L			PPS Receive-			
11,12,13,22,24,25						Internal Use	
Edited (Date):							
Signed (Date):		Mark				Signature, Date	

IDS 8: Electrical Interface Features - Power

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		Sub-System Name					
		Device Name	PST3S-K4 Star Tracker		Stage Mark		
		Device Code					FM
Interface Signal	Power Supply						
Signal Characteristics	5V power and the ground are two-point two-wire.						
Interface Circuit	 <pre> graph LR A[5V Input] --> B[Fuse] B --> C[Surge Suppressor] C -- DCDC --> D[V3.3D] D -- DCDC --> E[V1.2D] D -- VLDO --> F[V1.8D] D -- VLDO --> G[V2.5D] D -- VLDO --> H[V2.9A] </pre>						
Notes							
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Signed (Date):		Mark				Signature, Date	

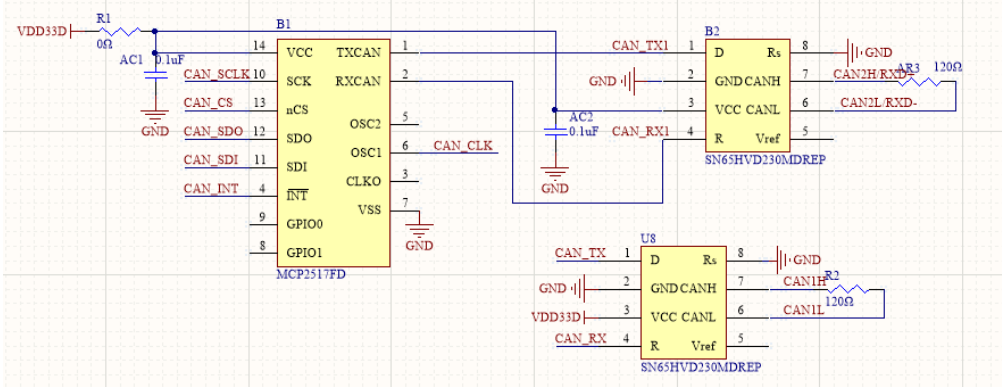
IDS 9: Electrical Interface Features - Power

		File Number	TYS-PST3S-K4-IDS		Page 9 of 14		
		Sub-System Name					
		Device Name	PST3S-K4 Star Tracker		Stage Mark		
		Device Code					FM
Interface Signal	Power Supply						
Signal Characteristics	5V power and the ground are two-point two-wire.						
Interface Circuit							
Notes							
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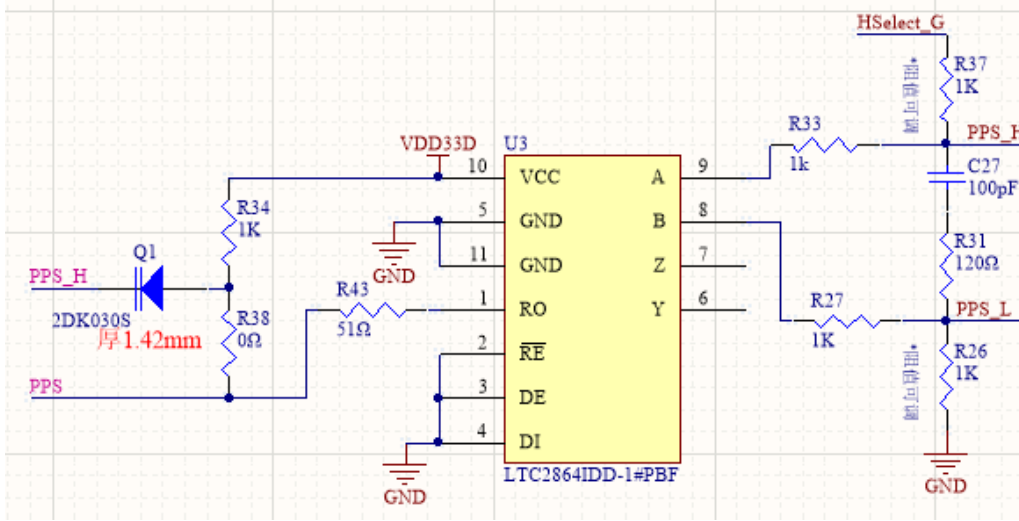
IDS 10: Electrical Interface Features - RS422

	File Number	TYS-PST3S-K4-IDS	Page 10 of 14		
	Sub-System Name				
	Device Name	PST3S-K4 Star Tracker	Stage Mark		
	Device Code				FM
Interface Signal	Digital Signal, RS422				
Signal Characteristics	RS422 Communication Baud Rate: 115200bps, 1 start bit, 8 data bits (LSB first), 1 stop bit, odd parity; Communication Method: Two-point Two-wire				
Interface Circuit					
Notes					
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Signed (Date):		Mark		Signature, Date	

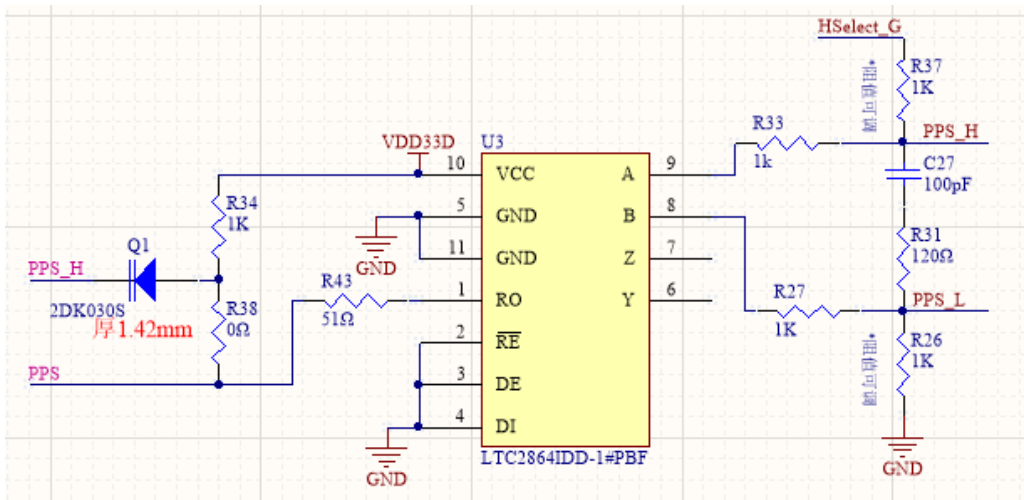
IDS 10: Electrical Interface Features - CAN

		File Number	TYS-PST3S-K4-IDS	Page 10 of 14			
		Sub-System Name					
		Device Name	PST3S-K4 Star Tracker	Stage Mark			
		Device Code				FM	
Interface Signal	Digital signal, CAN.						
Signal Characteristics	CAN Bus Rate: 500kbps; Communication Method: Two-point Two-wire.						
Interface Circuit							
Notes	Welding of R2 and AR3 is determined by the overall circuit requirements (not welded by default). Add CAN controller.						
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IDS 11: Electrical Interface Features - Single-Ended PPS

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		Sub-System Name					
		Device Name	PST3S-K4 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 1ms.						
Interface Circuit	PPS circuit 						
Notes	R43, R37, R33, C27, R31, R27 and R26 are not welded @Single-Ended PPS						
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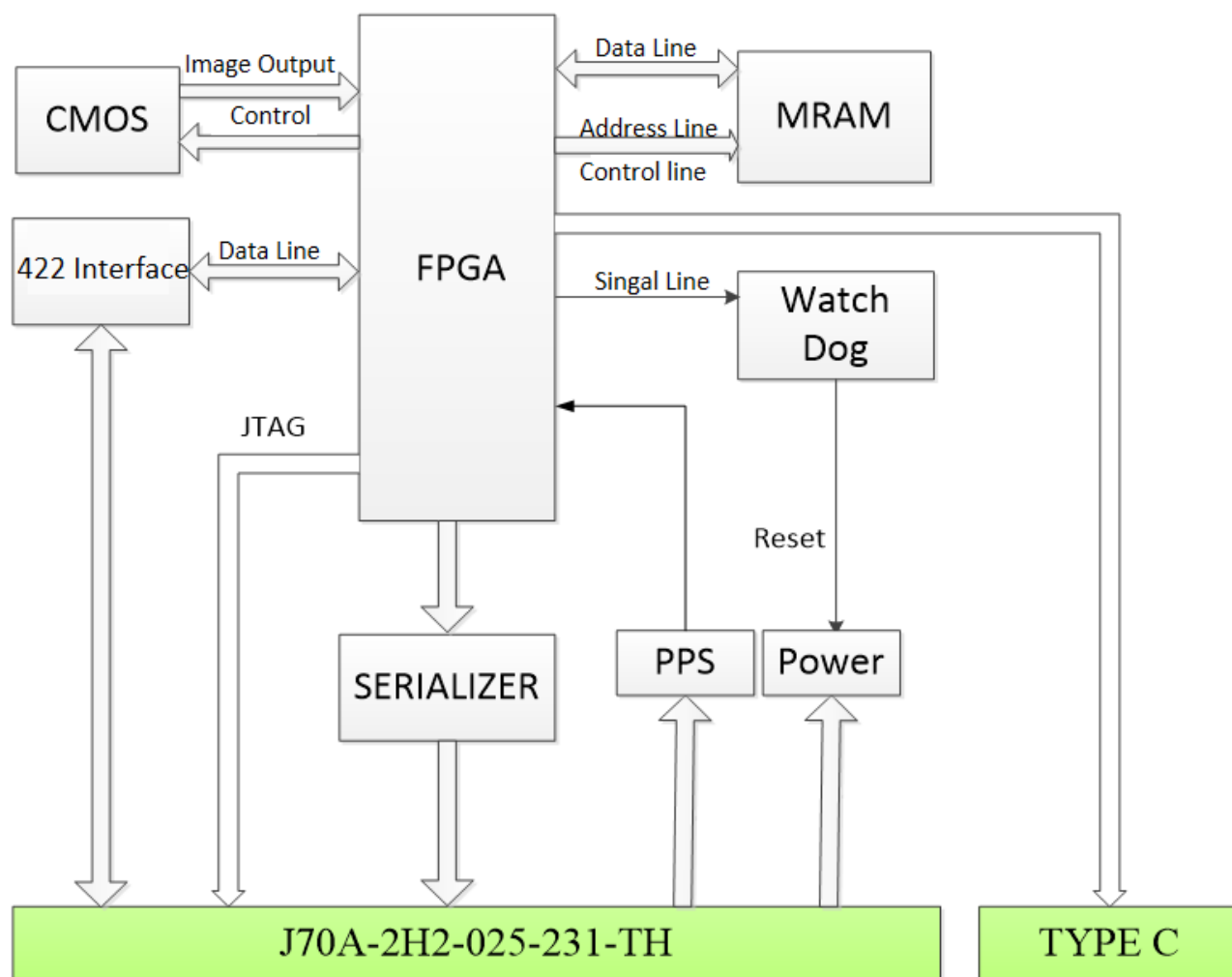
IDS 11: Electrical Interface Features - Differential PPS

		File Number	TYS-PST3S-K4-IDS		Page 11 of 14		
		Sub-System Name					
		Device Name	PST3S-K4 Star Tracker		Stage Mark		
		Device Code					FM
Interface Signal	Pulse Per Second (PPS)						
Signal Characteristics	Second Pulse Signal: Differential Input; Falling Edge Aligned to Integer Seconds; Negative Pulse Width 1ms.						
Interface Circuit	PPS circuit 						
Notes	R34, R38 and Q1 are not welded @Differential PPS						
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IDS 12: Circuit and Interface Schematics

	File Number	TYS-PST3S-K4-IDS	Page 12 of 14			
	Sub-System Name					
	Device Name	PST3S-K4 Star Tracker	Stage Mark			
	Device Code				FM	

Schematic Diagram :



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IDS 13: Mounting Requirements

	File Number	TYS-PST3S-K4-IDS	Page 13 of 14			
	Sub-System Name					
	Device Name	PST3S-K4 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-PST3S-K4-IDS	Page 14 of 14		
	Sub-System Name				
	Device Name	PST3S-K4 Star Tracker	Stage Mark		
	Device Code				FM
None.					
Edited (Date):					
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