

File Number	Piece Number



File Number	TYS-NST20-G3-IDS
Stage Mark	FM
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NST20-G3 Star Tracker IDS

Signature

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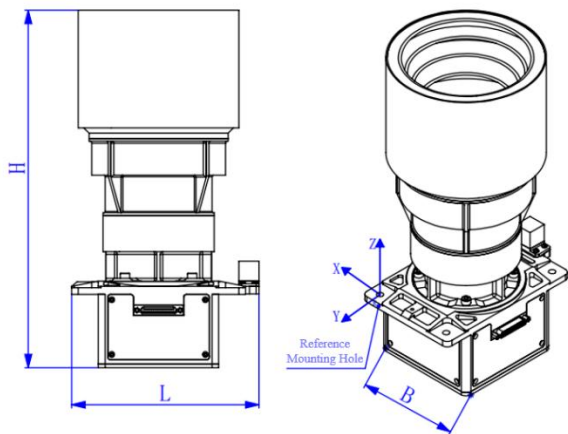
Standardization
Checked by: Dong Pengfei

Approved by: Xiao Mingguo

IDS 1: Performance Index

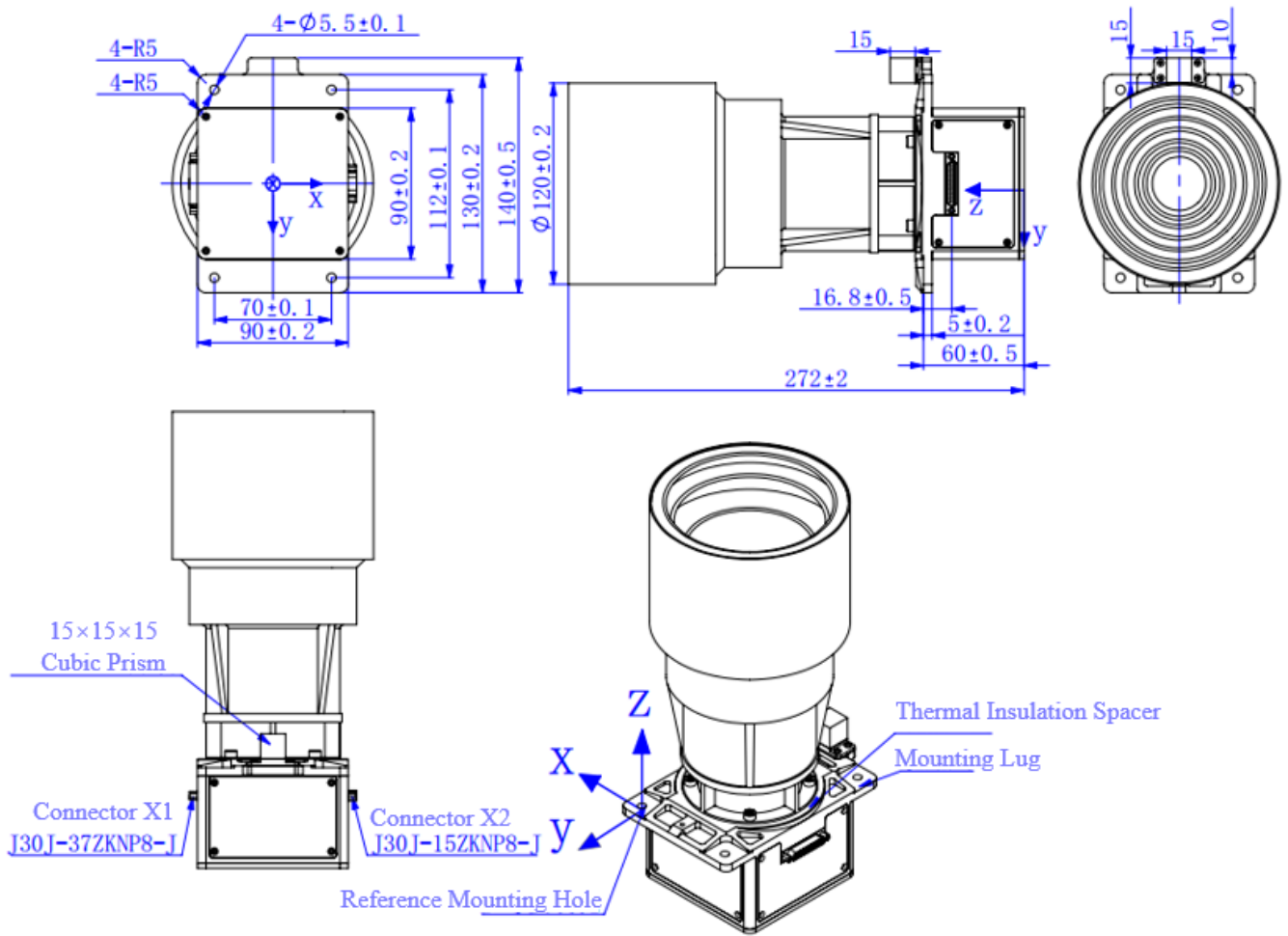
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		Sub-System Name					
		Device Name	NST20-G3 Star Tracker		Stage Mark		
		Device Code					FM
Parameters	Specifications						
Attitude Accuracy	Pointing: 1" (3σ) Roll: 6" (3σ)						
Dynamic Performance	@0.1°/s-0.5%: $\leq 2''$ (Pointing, 3σ); $\leq 16''$ (Roll, 3σ); @0.5°/s-1.2%: $\leq 5''$ (Pointing, 3σ); $\leq 30''$ (Roll, 3σ).						
Update Rate	$\geq 10\text{Hz}$						
Acquisition Rate	Max. $\leq 2\text{s}$						
Start-up Time	Better than 5s						
Exclusion Angle	Sun: better than 30°; Earth: better than 20°						
Time Scale Accuracy	Better than 40us @ synchronization pulse (SYNC pulse)						
Communication	RS422/CAN						
Quaternions Continuity	The scalar of quaternion: non-negative						
Life Time	7 years @1000km Orbit						
Reliability	≥ 0.98 @ the end of 7-year running						
Edited (Date):							
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IDS 2: Mechanical Characteristics

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		Sub-System Name					
		Device Name		NST20-G3 Star Tracker		Stage Mark	
		Device Code					FM
Device Weight: 1.2±0.2kg		Device Count: 1					√
Mechanical Characteristics	Envelope Size (mm)	L: 140±0.5	B: 120±0.2	H: 272±2		√	
	CM Position (mm)	X: -34±2	Y: -58±2	Z: 25±2		√	
	Inertia at CM (kg.mm ²)	6866±5	6603±5	2198±5		√	
					MEAS	CALC	EST
Mounting Characteristics	Mounting Hole Count: 4	Mounting Hole Dimensions (Tolerance) (mm): 4-Φ5.5±0.1		Material: 2A12-T4	Determination Method (√)		
	Mounting Contact Area (mm ²): 3400			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, 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 <i>IDS 3: Instrument Diagram</i>).							
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Signed (Date):		Mark				Signature, Date	

IDS 3: Instrument Diagram

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	Sub-System Name					
	Device Name	NST20-G3 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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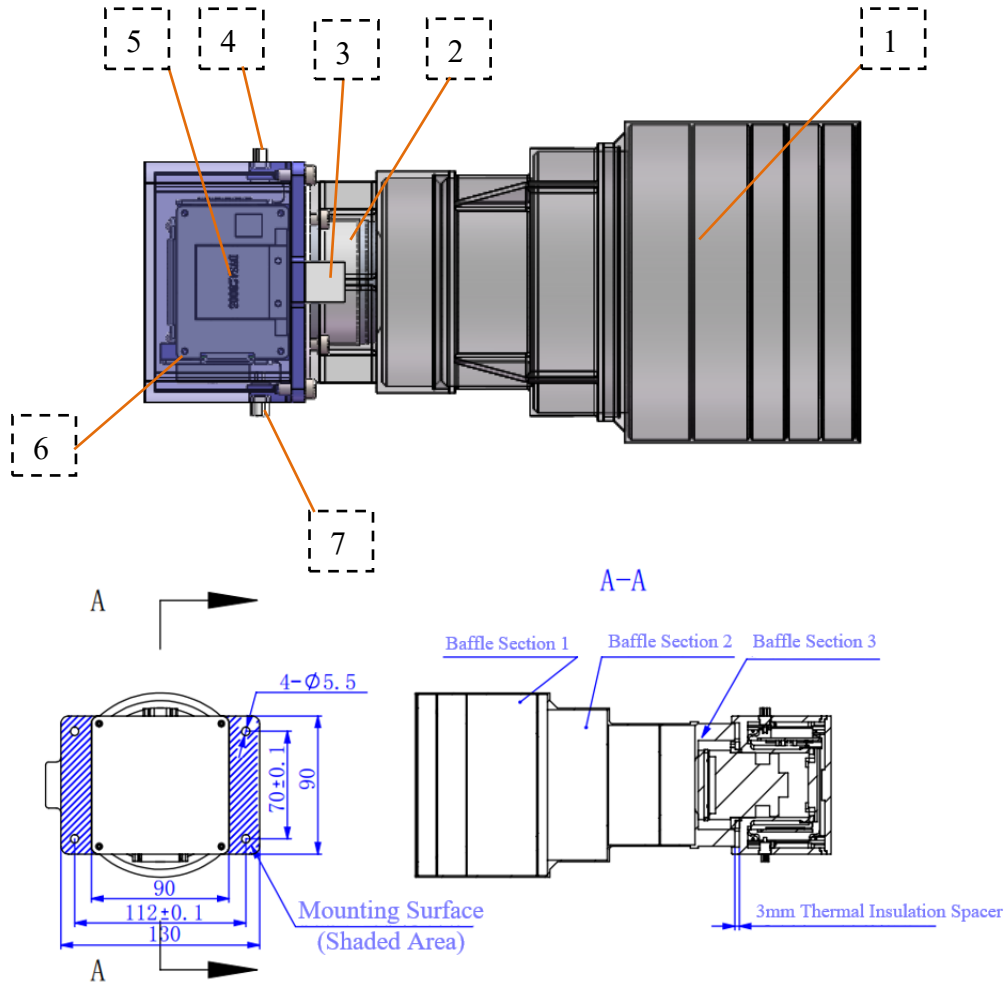
IDS 4: Thermal Characteristics

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		Sub-System Name				
		Device Name	NST20-G3 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. $\epsilon_H \geq 0.85$, $\alpha_S \geq 0.96$			
	Outer Surface Treatment: Aluminum Nature Color					
	Outer Surface Emissivity: $\epsilon_H \geq 0.6$					
Start Temperature °C: -30~+40			Heat Capacity J/K: 1200			
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: 4.0 ± 0.5 (Per Device) Power Consumption @Preparing State W: 0 (Per Device)			
Description:						

IDS 5: Thermal Diagram

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	Sub-System Name					
	Device Name	NST20-G3 Star Tracker	Stage Mark			
	Device Code				FM	

Diagram:



- | | |
|---|----------------|
| 1—Baffle | 2—Lens |
| 3—Optical Prism | 4—X1 Connector |
| 5—Power Supply & Image Processing Circuit Board | |
| 6—Circuit Box | 7—X2 Connector |

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

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		Sub-System Name						
		Device Name		NST20-G3 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		
28V	$\pm 1V$	350mV (p-p)		2A/5ms		4.0 $\pm$ 0.5W		
Edited (Date):								
Signed (Date):				Mark		Signature, Date		

IDS 7: Electrical Connector

		File Number		TYS-NST20-G3-IDS		Page 7 of 16	
		Sub-System Name					
		Device Name		NST20-G3 Star Tracker		Stage Mark	
		Device Code					
Name (by Function)	Pin / Hole	Pin / Hole Number	Description	Model	Remarks		
X1	Hole	37	Communication Interface	J30J-37ZKNP8-J			
X2	Hole	15	Power Interface	J30J-15ZKNP8-J			
Edited (Date):							
Signed (Date):		Mark				Signature, Date	

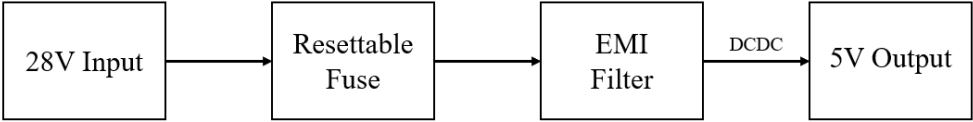
IDS 8: Electrical Connector Contact Assignment – X1

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		Sub-System Name							
		Device Name		NST20-G3 Star Tracker		Stage Mark			
		Device Code						FM	
Name (by Function): X1		Electrical Connector P/N: J30J-37ZKN-J				Pin / Hole: Hole			
Contact Number	Signal (Function) Description	Voltage/V	Current/A	Polarity		Remarks (Shielded / Twisted)			
9,27	GND	0	0						
10,28	TXD1+	RS422 Standard	RS422 Standard	422 Transmit+		10,11 Twisted, 28,29 Twisted			
11,29	TXD1-			422 Transmit-					
12,30	TXD2+	RS422 Standard	RS422 Standard	422 Transmit+		12,13 Twisted, 30,31 Twisted			
13,31	TXD2-			422 Transmit-					
14,32	RXD1+	RS422 Standard	RS422 Standard	422 Receive+		14,15 Twisted; 32,33 Twisted			
15,33	RXD1-			422 Receive-					
16,34	RTS+	RS422 Standard	RS422 Standard	RTS Receive+		16,17 Twisted; 34,35 Twisted			
17,35	RTS-			RTS Receive-					
18,36	PPS_H	RS422 Standard	RS422 Standard	PPS Differential+		18,19 Twisted; 36,37 Twisted			
19,37	PPS_L			PPS Differential-					
1,2,3,4,5,6,7,8 ,20,21,22,23, 24,25,26						Internal Use			
X1 1 20 2 21 3 22 4 23 5 24 6 25 7 26 8 27 9 28 10 29 11 30 12 31 13 32 14 33 15 34 16 35 17 36 18 37 19 X3 P X3 N X2 P X2 N X1 P X1 N X0 P X0 N Xclk P Xclk N FPGA nTRST FPGA TMS FPGA TDO FPGA TDI FPGA TCK GND TXD1+ TXD1- TXD2+ TXD2- RXD1+ RXD1- RTS+ RTS- pps H pps L J30J-37ZKN-J									
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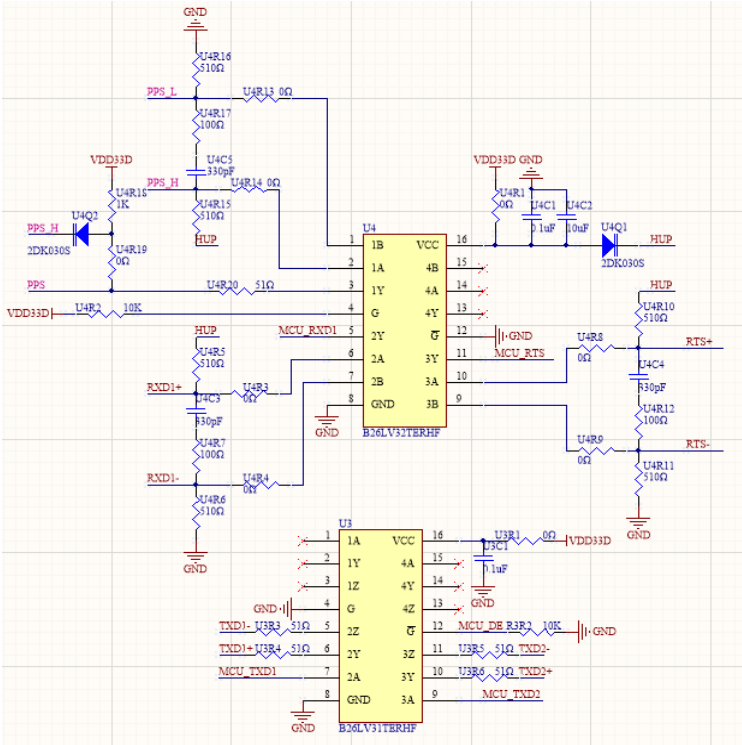
IDS 9: Electrical Connector Contact Assignment – X2

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		Sub-System Name							
		Device Name		NST20-G3 Star Tracker		Stage Mark			
		Device Code						FM	
Name (by Function): X2		Electrical Connector P/N: J30J-15ZKN-J				Pin / Hole: Hole			
Contact Number	Signal (Function) Description	Voltage/V	Current/A	Polarity		Remarks (Shielded / Twisted)			
1,9	VIN+	27~29V	0.14A	+		1,2 Twisted, 9,10 Twisted			
2,10	VIN-	0	0.14A	-					
5,13	SGND	0	0						
7,8,15	KGND	0	0						
3,4,6,11,12,14	NC								
X2 J30J-15ZKN-J									
Edited (Date):									
Signed (Date):		Mark				Signature, Date			

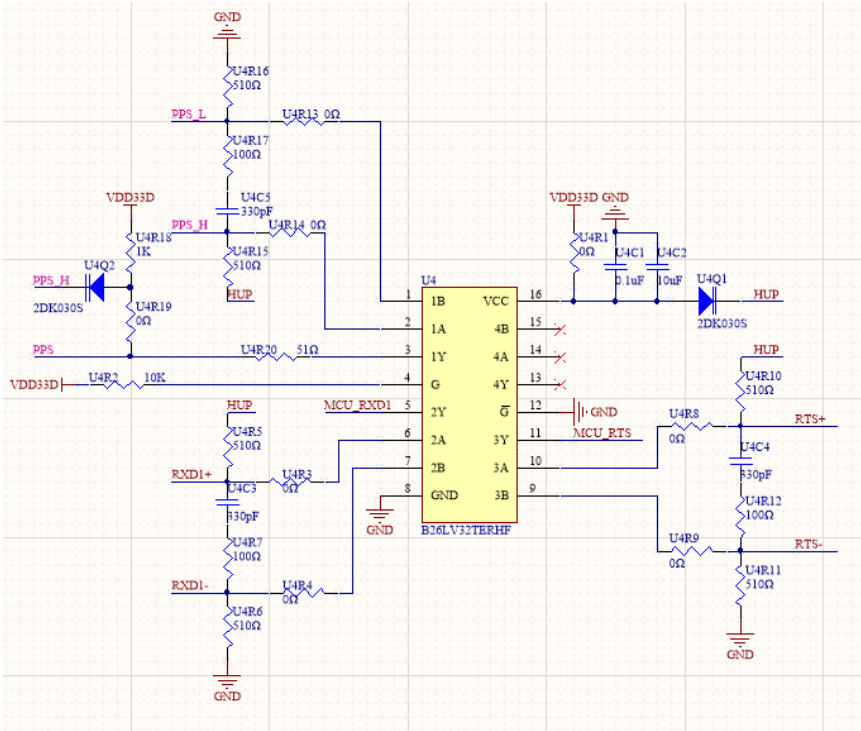
IDS 10: Electrical Interface Features – Power

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		Sub-System Name				
		Device Name	NST20-G3 Star Tracker		Stage Mark	
		Device Code				
Interface Signal	Power Supply					
Signal Characteristics	28V power and the ground are two-point two-wire.					
Interface Circuit	 <pre> graph LR A[28V Input] --> B[Resettable Fuse] B --> C[EMI Filter] C -- DCDC --> D[5V Output] </pre>					
Notes						
Edited (Date):						
Signed (Date):		Mark		Signature, Date		

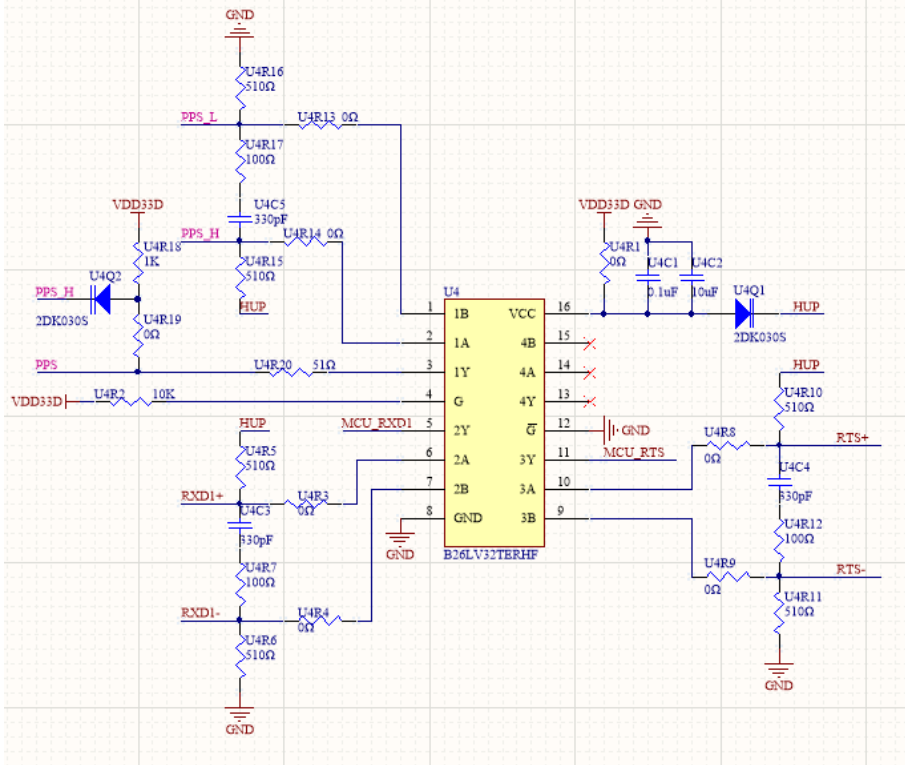
IDS 11: Electrical Interface Features – RS422

		File Number		TYS-NST20-G3-IDS		Page 11 of 16		
		Sub-System Name						
		Device Name		NST20-G3 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		RXD1 and TXD1 are telemetry and remote control ports.						
Edited (Date):								
Signed (Date):		Mark				Signature, Date		

IDS 12: Electrical Interface Features - Single-Ended PPS

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		Sub-System Name						
		Device Name	NST20-G3 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								
Notes		U4R20, U4R16, U4R13, U4R17, U4C5, U4R14, U4R15: not soldered @Single-Ended PPS						
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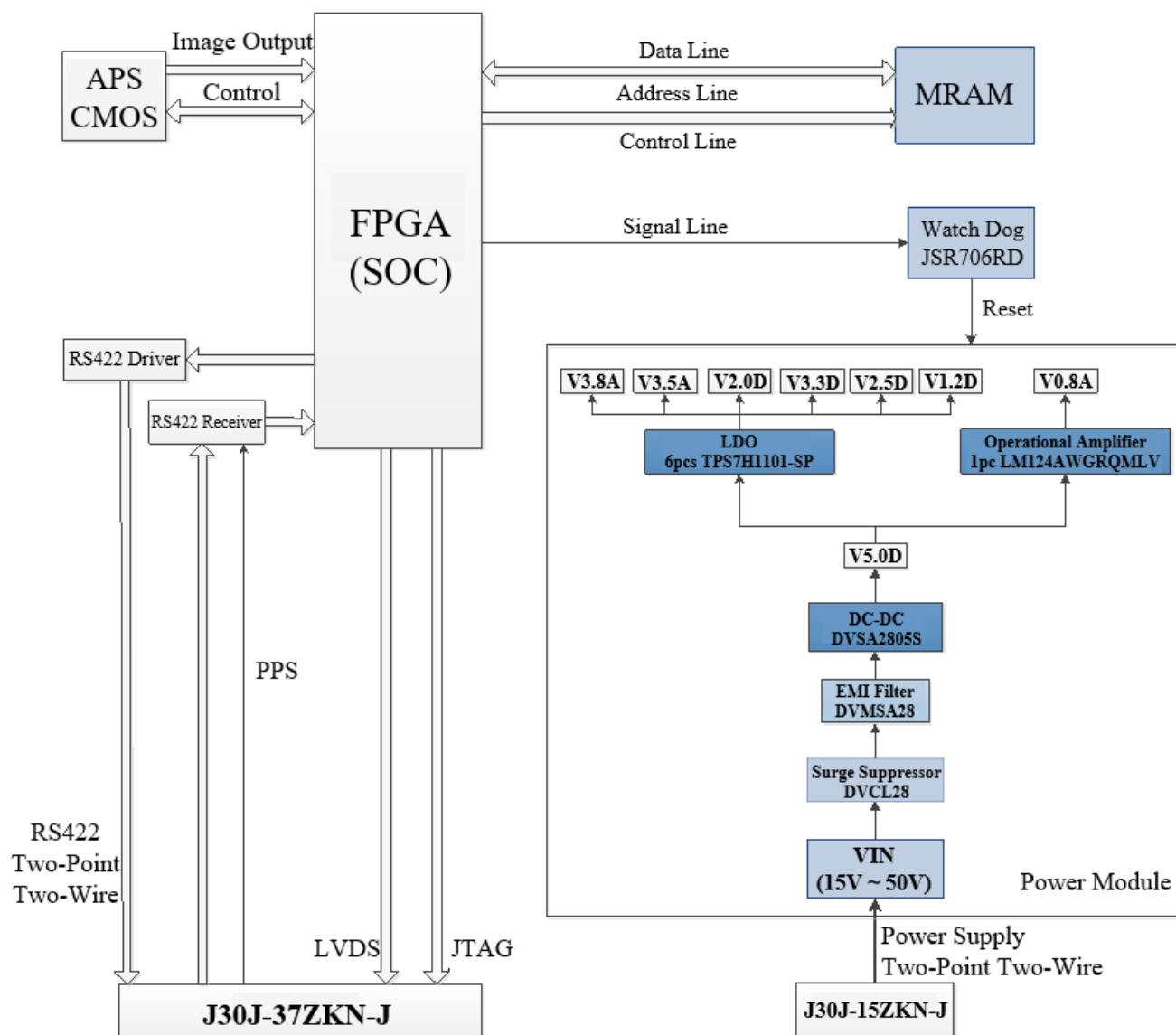
IDS 12: Electrical Interface Features - Differential PPS

		File Number	TYS-NST20-G3-IDS		Page 12 of 16		
		Sub-System Name					
		Device Name	NST20-G3 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							
Notes	U4R18, U4R19, U4Q2: not soldered @Differential PPS						
Edited (Date):							
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IDS 13: Circuit and Interface Schematics

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	Sub-System Name					
	Device Name	NST20-G3 Star Tracker	Stage Mark			
	Device Code				FM	

Schematic Diagram:

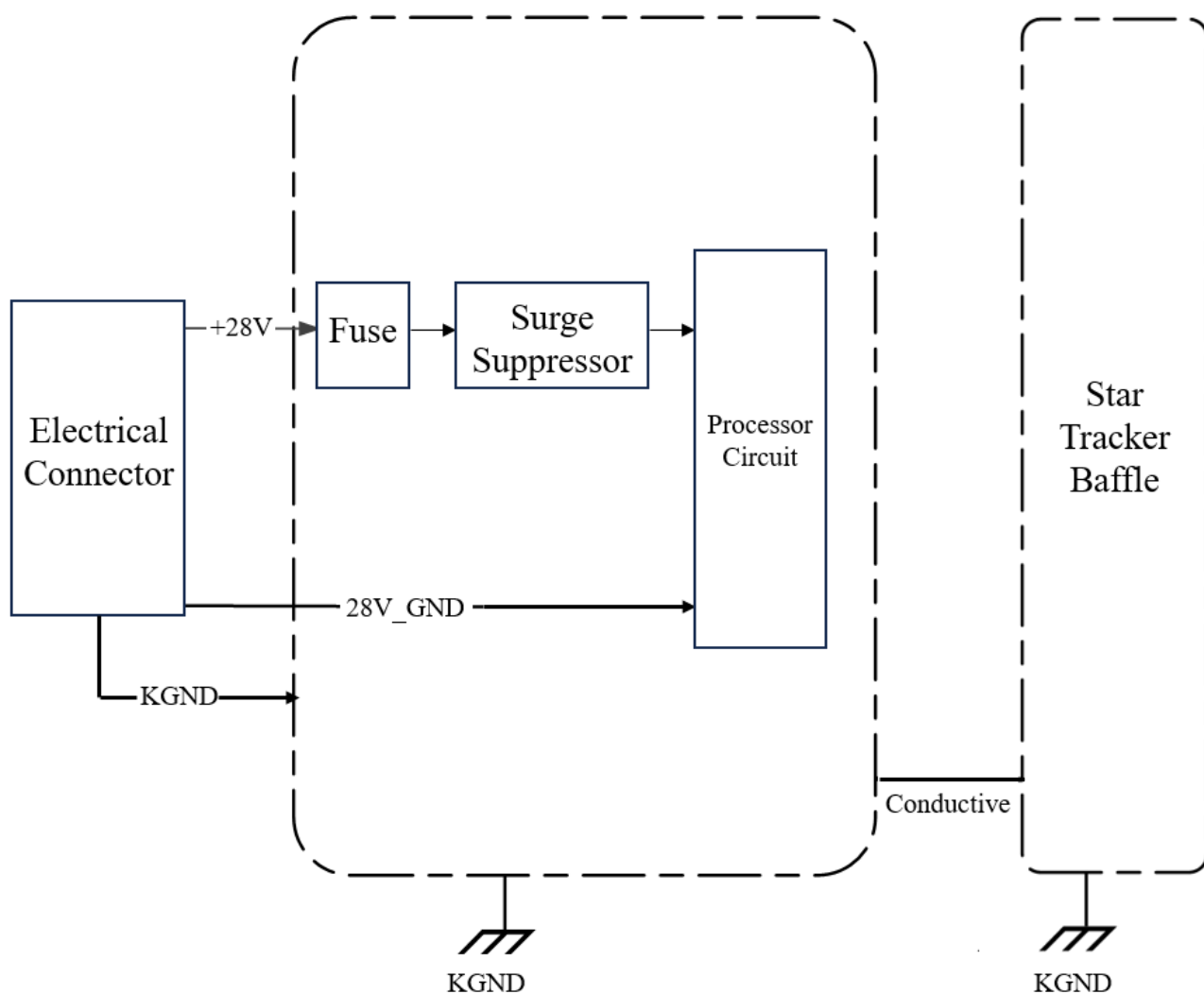


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IDS 14: Device Grounding Diagram

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	Sub-System Name					
	Device Name	NST20-G3 Star Tracker	Stage Mark			
	Device Code				FM	

Schematic Diagram:



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IDS 15: Mounting Requirements

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	Sub-System Name					
	Device Name	NST20-G3 Star Tracker	Stage Mark			
	Device Code				FM	

non-sheltered area non-sheltered area

$>40^\circ$ $>40^\circ$

15°

7.5°

Baffle

Star Tracker

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 16: Device Description

	File Number	TYS-NST20-G3-IDS	Page 15 of 16		
	Sub-System Name				
	Device Name	NST20-G3 Star Tracker	Stage Mark		
	Device Code				FM
None.					
Edited (Date):					
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