

File Number	Piece Number



File Number	TYS-NST20-G3-IDS
Stage Mark	FM
Page	16

NST20-G3 Star Tracker IDS

Signature

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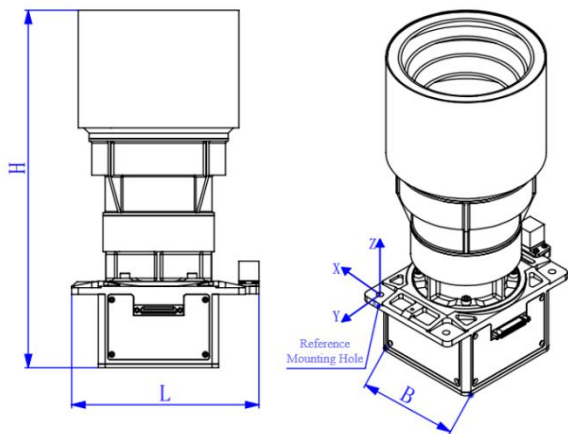
Standardization
Checked by: Li Yanan

Approved by: Wang Haijun

IDS 1: Performance Index

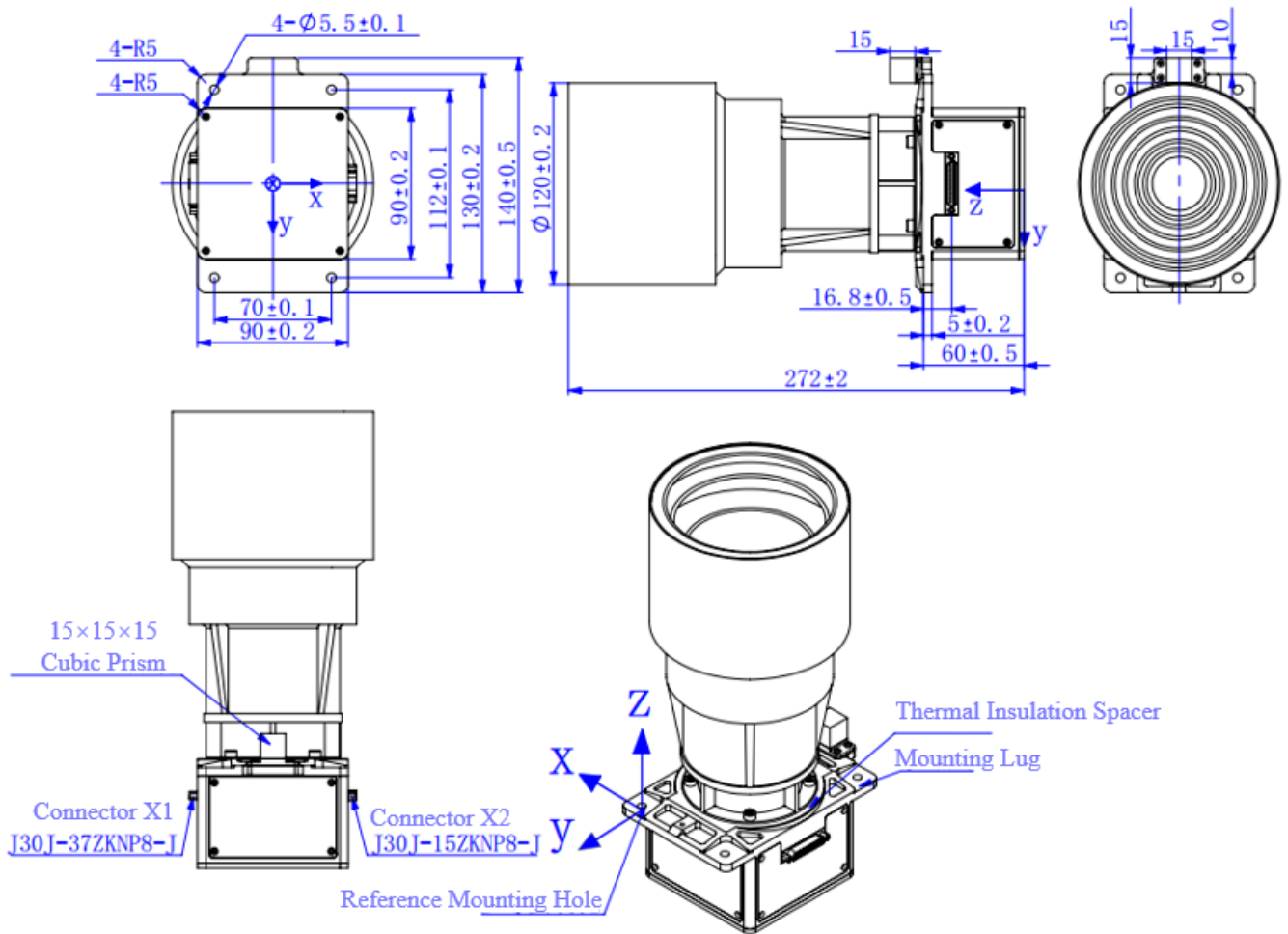
	File Number	TYS-NST20-G3-IDS	Page 1 of 17			
	Sub-System Name					
	Device Name	NST20-G3 Star Tracker	Stage Mark			
	Device Code				F M	
Parameters	Specifications					
Attitude Accuracy	Pointing: 1" (3σ) Roll: 6" (3σ)					
Dynamic Performance	@0.1°/s-0.5%: $\leq 2''$ (Pointing, 3σ); $\leq 16''$ (Roll, 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					
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

		File Number		TYS-NST20-G3-IDS		Page 2 of 17	
		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>).							
Edited (Date):							
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IDS 3: Instrument Diagram

	File Number	TYS-NST20-G3-IDS	Page 3 of 17			
	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.

Edited (Date):			
Signed (Date):	Mark		Signature, Date

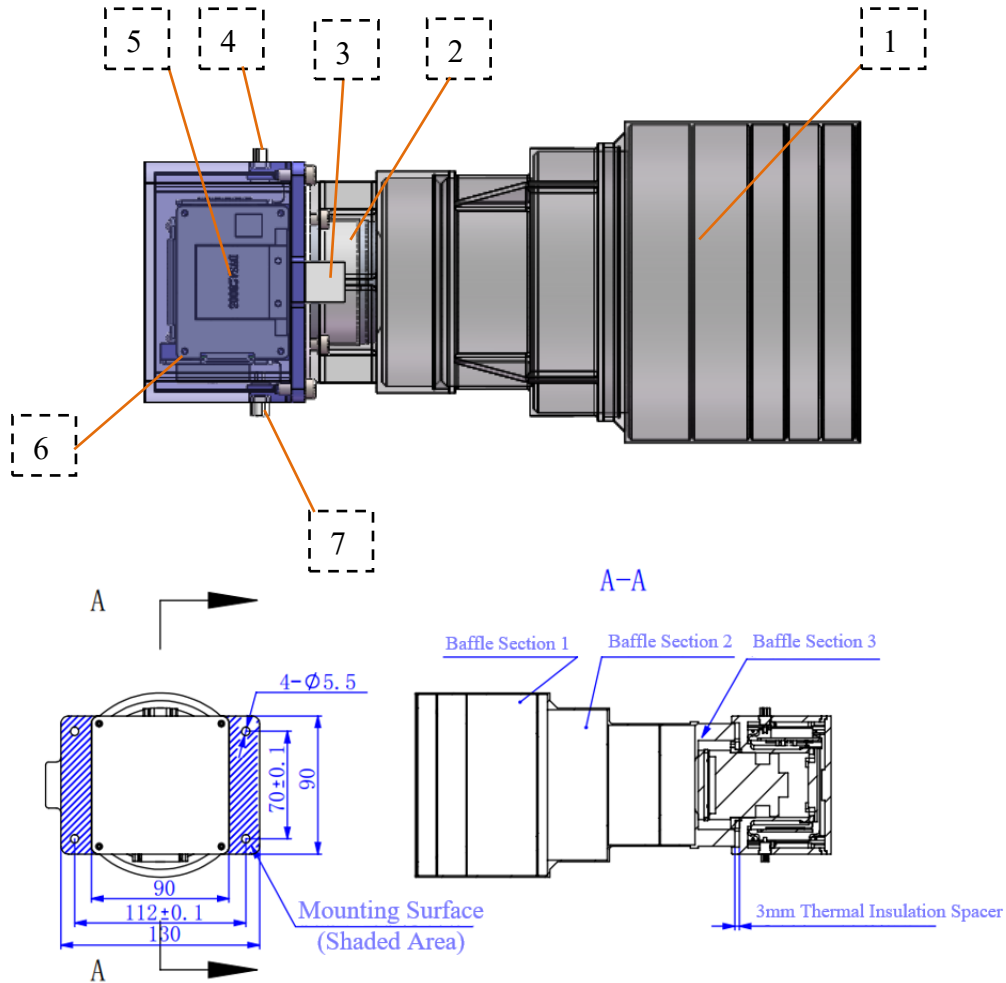
IDS 4: Thermal Characteristics

		File Number	TYS-NST20-G3-IDS		Page 4 of 17	
		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

	File Number	TYS-NST20-G3-IDS	Page 5 of 17			
	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

		File Number		TYS-NST20-G3-IDS		Page 6 of 17		
		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 17	
		Sub-System Name					
		Device Name		NST20-G3 Star Tracker		Stage Mark	
		Device Code					FM
Name (by Function)	Pin / Hole	Pin / Hole Number	Description	Model	Remarks		
X1	Hole	37	Communication Interface	J30J-37ZKN-J			
X2	Hole	15	Power Interface	J30J-15ZKN-J			
Edited (Date):							
Signed (Date):		Mark				Signature, Date	

IDS 8: Electrical Connector Contact Assignment – X1

		File Number		TYS-NST20-G3-IDS		Page 8 of 17			
		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 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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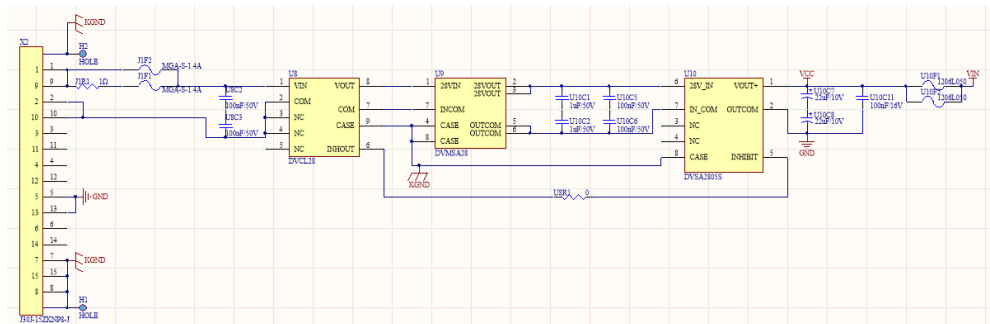
IDS 9: Electrical Connector Contact Assignment – X2

		File Number		TYS-NST20-G3-IDS		Page 9 of 17	
		Sub-System Name					
		Device Name		NST20-G3 Star Tracker		Stage Mark	
		Device Code					
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	

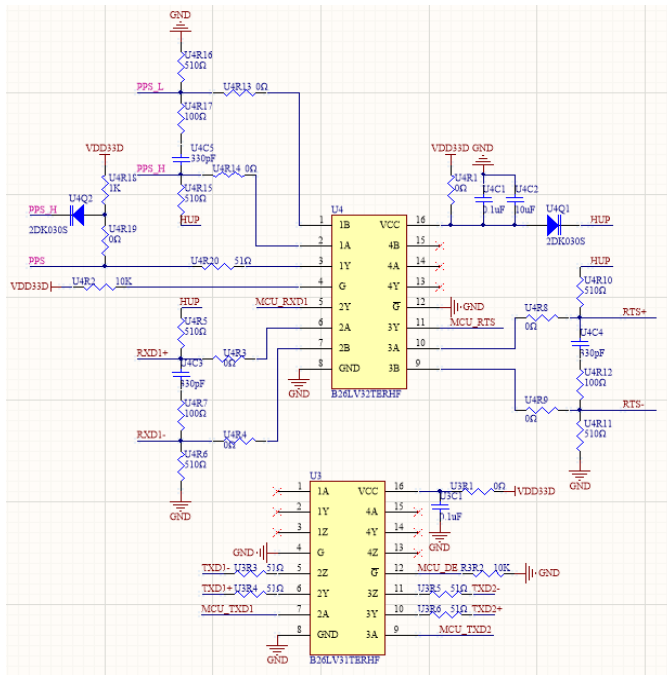
IDS 10: Electrical Interface Features - G

		File Number		TYS-NST20-G3-IDS		Page 10 of 17					
		Sub-System Name									
		Device Name		NST20-G3 Star Tracker		Stage Mark					
		Device Code						FM			
Interface Signal		Power Supply									
Signal Characteristics		28V power and the ground are two-point two-wire.									
Interface Circuit											
Notes											
Edited (Date):											
Signed (Date):		Mark				Signature, Date					

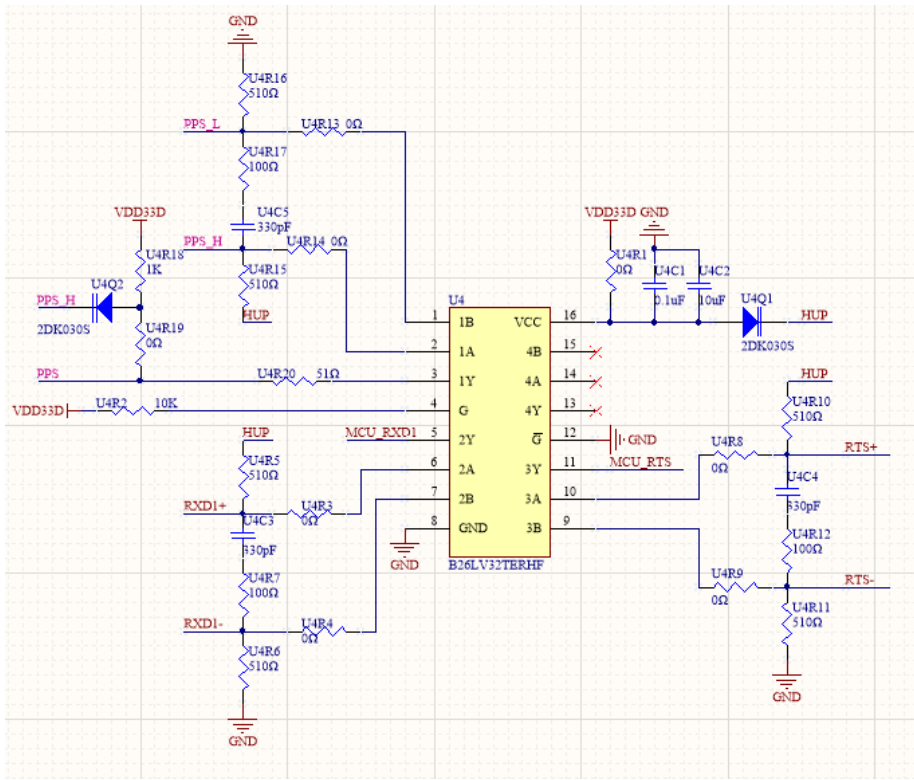
IDS 11: Electrical Interface Features - B

		File Number	TYS-NST20-G3-IDS		Page 11 of 17		
		Sub-System Name					
		Device Name	NST20-G3 Star Tracker		Stage Mark		
		Device Code					FM
Interface Signal	Power Supply						
Signal Characteristics	28V power and the ground are two-point two-wire.						
Interface Circuit							
Notes							
Edited (Date):							
Signed (Date):		Mark			Signature, Date		

IDS 12: Electrical Interface Features

		File Number	TYS-NST20-G3-IDS		Page 12 of 17		
		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	

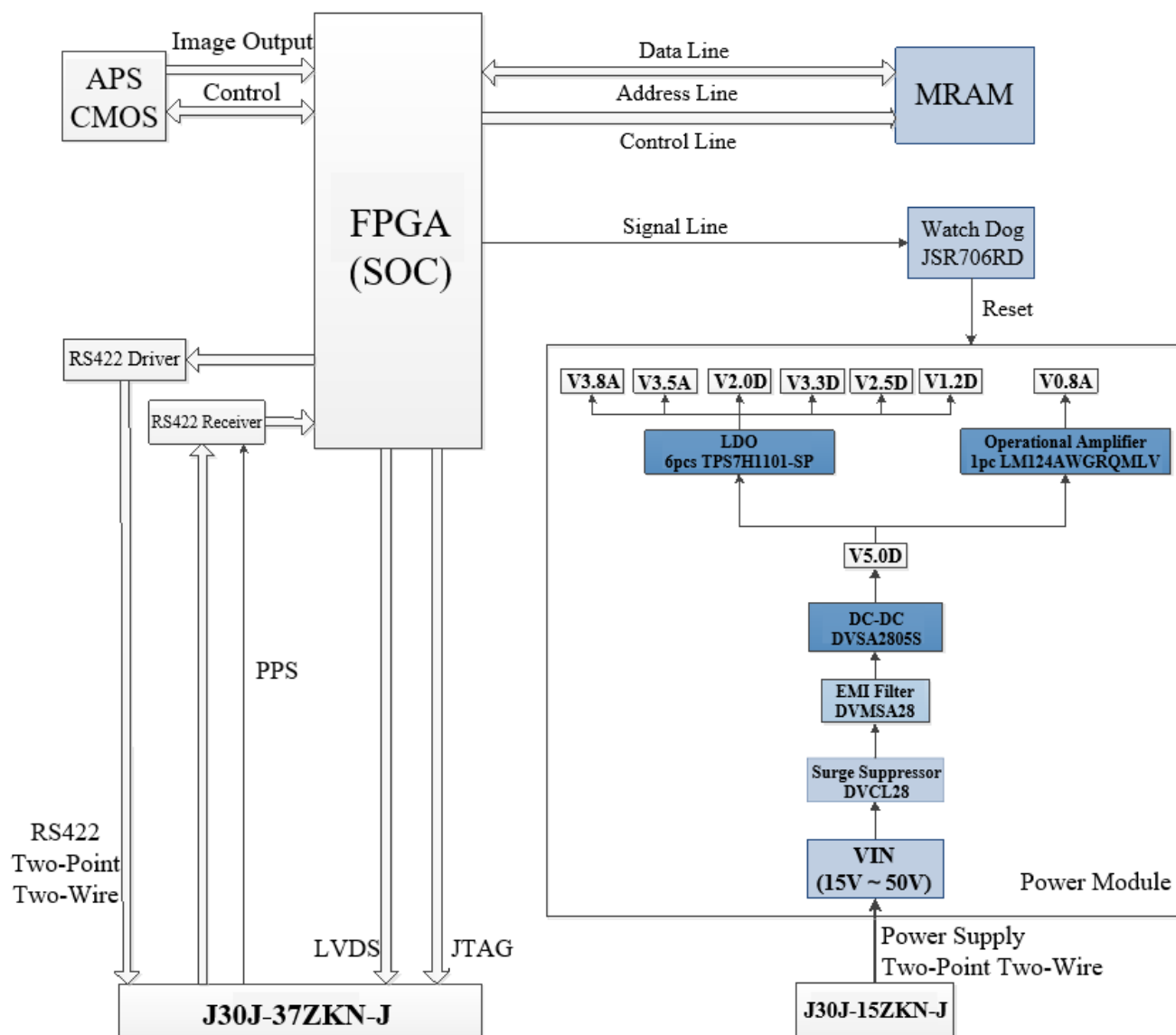
IDS 13: Electrical Interface Features - Differential PPS

		File Number	TYS-NST20-G3-IDS		Page 13 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):							
Signed (Date):		Mark				Signature, Date	

IDS 14: Circuit and Interface Schematics

	File Number	TY5-NST20-G3-IDS	Page 14 of 16			
	Sub-System Name					
	Device Name	NST20-G3 Star Tracker	Stage Mark			
	Device Code				FM	

Schematic Diagram:



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IDS 15: Mounting Requirements

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