File number	Piece number

天银星际 TY-SPACE

File Number TYS-PST4SH1-IDS

Stage mark FM

Page 15

Signature

Edit ： FUSHUXIN

Proofreading ： WANG HONGQIANG

Check ： XIAO MINGGUO

Standard check： CHAIYIN

Approval ： WANGHAIJUN

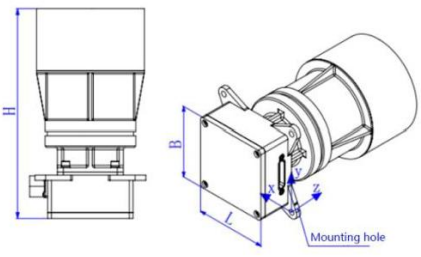
IDS 1：Data Sheet

	File number	TYS-PST4SH1-IDS	
	Sub-system name		
	Device name	PST4SH1 Star Tracker	Stage mark
	Device code		FM

Attitude Accuracy	Pointing: 3″ (3 σ) Rolling: 30″ (3 σ)
Dynamic Range	@ 0.1°/s: 3″ (Pointing, 3 σ); 30″ (Rolling, 3 σ)； @0.5°/s: 5″ (Pointing, 3 σ); 50″ (Rolling, 3 σ)； @1.0°/s: 10″ (Pointing, 3 σ); 100″ (Rolling, 3 σ)； @ 3° /s: follow up
Update Rate	≥10Hz
Acquisition Rate	Max. ≤2s
Start-up Time	Better than 5s
Exclusive Angle	Sun:better than 35°；Earth: better than 25°
Timing Accuracy	0.1ms @ synchronization pulse（SYNC pulse）
Quaternion Continuity	the scalar of quaternion: non-negative
Life Time	5years @1000Km Orbit
Communication Method	422
Reliability	≥0.98 @ the end of 5 years running

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

IDS 2：Mechanical Characteristics

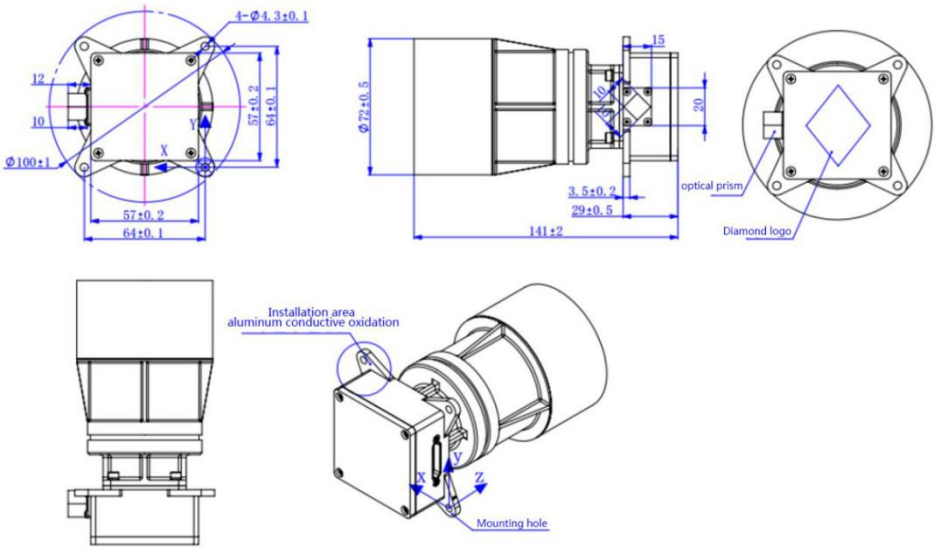
<table>
<tr><td colspan="3" rowspan="4"></td><td>File number</td><td>TYS-PST4SH1-IDS</td><td colspan="4"></td></tr>
<tr><td>Sub-system name</td><td></td><td colspan="4"></td></tr>
<tr><td>Device name</td><td>PST4SH1 Star Tracker</td><td colspan="4">Stage mark</td></tr>
<tr><td>Device code</td><td></td><td></td><td></td><td>FM</td><td></td></tr>
<tr><td colspan="3">Device weight (W / Baffle) 310g±20g</td><td colspan="2">Device number：</td><td></td><td>√</td><td></td></tr>
<tr><td rowspan="3">Weight characteristics</td><td>Envelope size mm</td><td>Envelope diameter：Φ100±1</td><td>Height：141±2</td><td></td><td>√</td><td></td></tr>
<tr><td>Centroid 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>Inertia of centroid kg.mm²</td><td>549.7±3</td><td>555.0±3</td><td>223.5±3</td><td>√
Measurement</td><td>Calculation</td><td>Estimate</td></tr>
<tr><td rowspan="4">Installation characteristics</td><td>Installed holes number：4</td><td colspan="2">Size of installed holes（tolerance）
mm：4-Φ4.3±0.1</td><td>Material:2A12-T4</td><td colspan="3">Determination method（√）</td></tr>
<tr><td colspan="2">Installation contacting area mm² ：500</td><td colspan="4" rowspan="3">Note：</td></tr>
<tr><td colspan="2">Installation surface flatness ：0.1mm/100mm×100mm</td></tr>
<tr><td colspan="2">Installation surface roughness Ra μm: 3.2μm</td></tr>
<tr><td colspan="2">Installation surface state：the installation area is oxidized by conduction</td></tr>
<tr><td colspan="8">Parameter relationship diagram (the relative relationship between the coordinate frames, position of centroid, size of device body, location of installation surface, etc.):
Note: the determination method refers to the way to determine the weight of device.
 

Note：The origin of the coordinates lies in the geometric center of the outer surface of the lower shell (see "Instrument diagram");</td></tr>
<tr><td colspan="3">Edited（Date）：</td><td></td><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td colspan="3">Signed（Date）：</td><td colspan="2">Mark</td><td></td><td colspan="2">Signature(Date):</td></tr>
</table>

IDS 3：Instrument Diagram

IDS 4：Thermal characteristics

	File number	TYS-PST4SH1-IDS				
	Sub-system name					
	Device name	PST4SH1 Star Tracker	Stage mark			
	Device code				FM	



Note: This sketch should include body size, mounting size, mounting plane, mounting point (aperture and its tolerances, center distance and its tolerances), position tolerances for guide pins and holes, direction, location, type and number of electrical connectors , the operating hole, the lap (position and length), the registration measurement reference for calibration and testing.

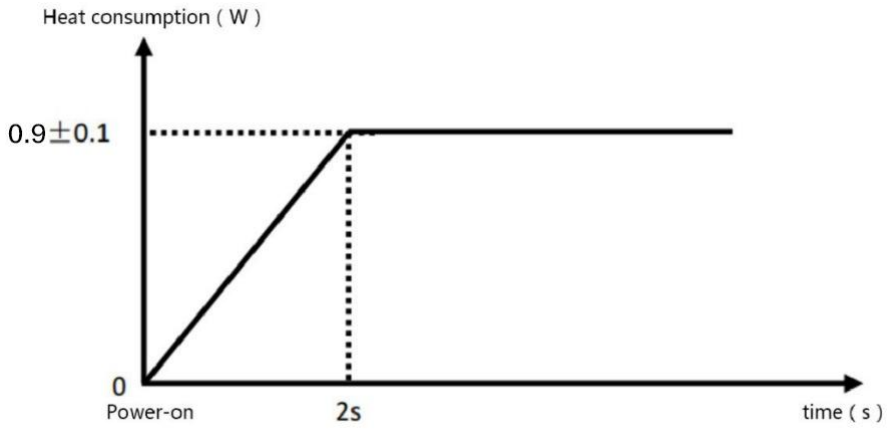
Note:The installation of baffle and star tracker circuit box should be heat-isolation,the baffle communicated with the shell of star trackercircuit box through screws,meet the requirment of connection between metal components.

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

		Sub-system name					
		Device name	PST4SH1 Star Tracker	Stage mark			
		Device code				FM	
Surface (except for mounting surface)	Aluminum alloy（2A12-T4）	Note: The inner surface of the baffle is treated with ultra black coating，ε_H：≥0.85，α_S：≥0.96					
	Outside surface treatment: aluminum anodization						
	ε_H：≥0.6						
	Preparing state heat consumption W：0（per device）						

Start temperature ℃：-30~+40	Heat capacity J/K：310
Operating temperature range ℃：-40~+40	The best operating temperature range ℃：20±5
Storage temperature range ℃：-40~+40	Operating relative humidity range： ≤60 %
Operating state heat consumption W：0.9±0.1（per device）	Storage relative humidity range：≤70 %

Description:

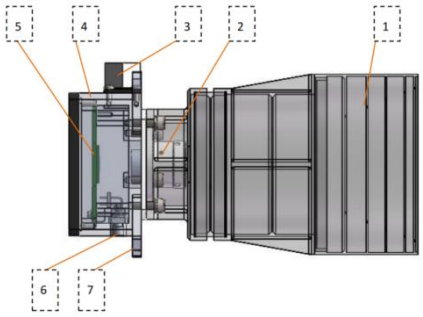


Edited（Date）：			
Signed（Date）：	Mark		Signature(Date):

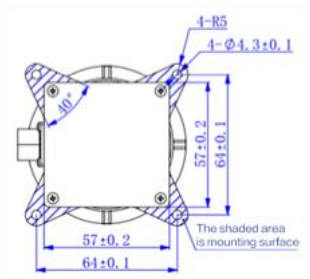
IDS 5：Thermal Diagram

	File number	TYS-PST4SH1-IDS				
	Sub-system name					
	Device name	PST4SH1 Star Tracker	Stage mark			
	Device code				FM	

Diagram：



1－Baffle　　2－Lens
3－Prism　　4－Circuit box
5－Image sensor & Circuit board　　6－Connector
7－Installing lugs（Contact surfaces）
The structure of NST4S-H1 Star Tracker is shown as above,
The power distribution: circuit board: about 0.9W±1W;



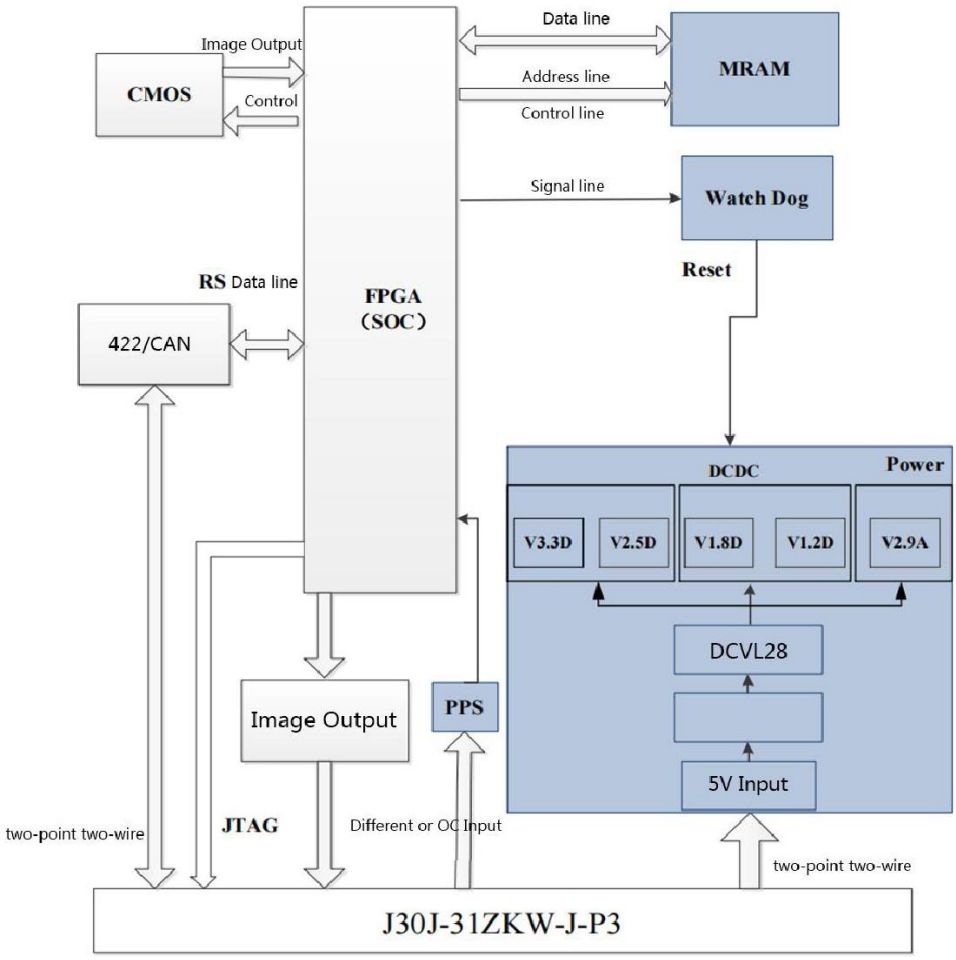
Note:The installation of baffle and star tracker circuit box should be heat-isolation,the baffle communicated with the shell of star trackercircuit box through screws,meet the requirment of connection between metal components.

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

IDS6 ： Circuit and Interface Schematics

	File number	TYS-PST4SH1-IDS				
	Sub-system name					
	Device name	PST4SH1 Star Tracker	Stage mark			
	Device code				FM	

Diagram：



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

IDS 7：Power

	File number	TYS-PST4SH1-IDS			
	Sub-system name				
	Device name	PST4SH1 Star Tracker	Stage mark		
	Device code				FM

Working mode (long term/short term/others）	Long term	Single non-long-term power-up working hours S		Device number	1

Voltage V	Voltage stability %	Ripple voltage mV （P-P）	Device starting current characteristics （peak/duration）	Power W
5	5	100	2A/5ms	0.9±0.1

Safe Operating Voltage:4.75V-5.25V

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

IDS 8: Electrical Connector Contact Assignment

	File number	TYS-PST4SH1-IDS			
	Sub-system name				
	Device name	PST4SH1 Star Tracker	Stage mark		
	Device code				FM

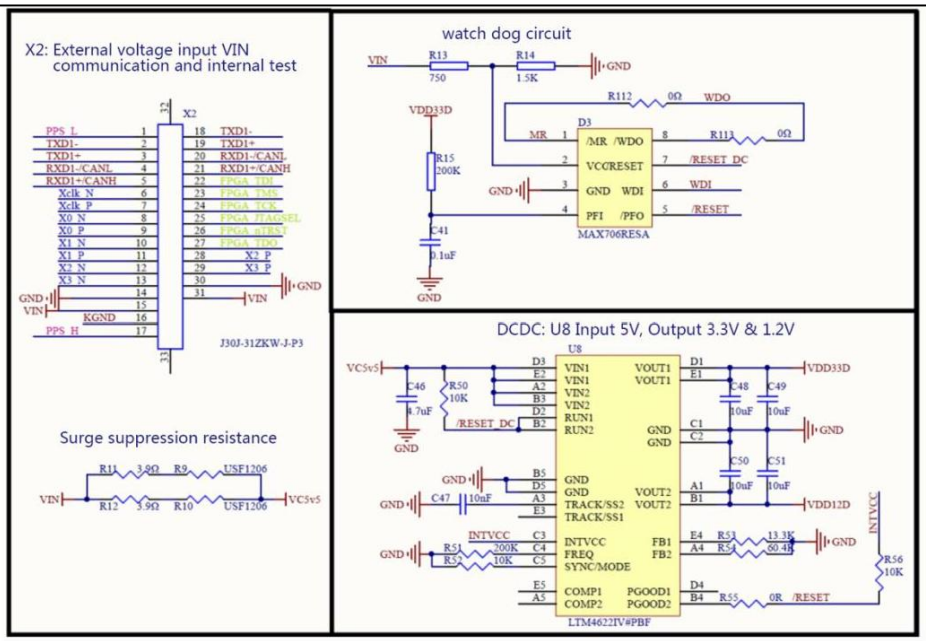
Name (by function)	information and ground test	Electrical connector code	J30J-31ZKWP3-J	Needle / Hole	Hole

Contact number	Signal (function) description	Voltage/V	Current/A	Polar	Remarks(shielded/twisted)
2，18	TXD1-	RS422standard	RS422 standard	422 Transmit-	2,3twisted，18,19 twisted
3，19	TXD1+			422 Receive +	2,3twisted，18,19 twisted
4，20	RXD1-	RS422 standard	RS422 standard	422 Transmit-	4,5twisted，20,21twisted
5，21	RXD1+	RS422 standard	RS422 standard	422 Receive +	4,5twisted，20,21twisted
17	PPSH	RS422 standard	RS422 standard	Synchronize signal+	1,17twisted
1	PPS L			Synchronize signal-	1,17twisted
15，31	VIN	/	/	Power	
14，30	GND	/	/	Power ground	
16	KGND	/	/	Structure ground	Structure ground
22	FPGA_TDI	/	/	JTAG _TDI	Internal use, prohibit external use
23	FPGA_TMS	/	/	JTAG TMS	
24	FPGA_TCK	/	/	JTAG _TCK	
25	FPGA_JTAGSEL	/	/	JTAG SEL	
26	FPGA_nTRST	/	/	JTAG_nTRST	
27	FPGA_TDO	/	/	JTAG _TDO	
6	Xclk_N	/	/	Cameralink Xclk-	
7	Xclk_P	/	/	Cameralink Xclk+	
8	X0_N	/	/	Cameralink X0-	
9	X0_P	/	/	Cameralink X0+	
10	X1_N	/	/	Cameralink X1-	
11	X1_P	/	/	Cameralink X1+	
12	X2_N	/	/	Cameralink X2-	
28	X2_P	/	/	Cameralink X2+	
13	X3_N	/	/	Cameralink X3-	
29	X3_P	/	/	Cameralink X3+	

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

IDS 9: Electrical Interface Features-Power

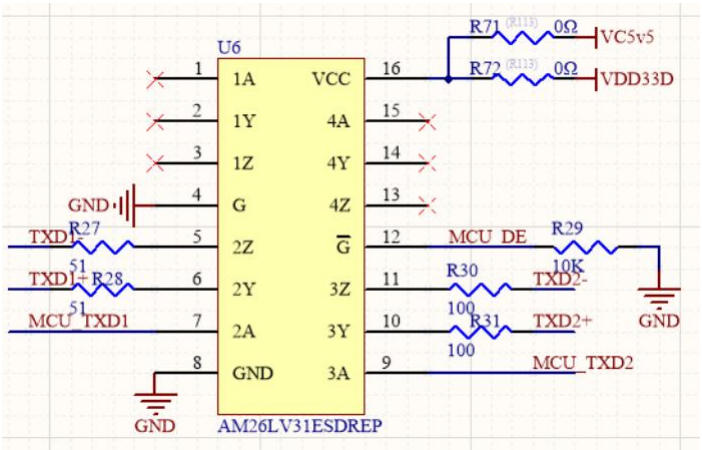
	File number	TYS-PST4SH1-IDS				
	Sub-system name					
	Device name	PST4SH1 Star Tracker	Stage mark			
	Device code				FM	

Interface signal	Power supply
Signal characteristics	Operating voltage:4.75V-5.25V Reflected ripple voltage≤100mV(p-p)； Starting current rising slope＜10^6A/s,peak value＜2A,length of time＜5ms.
Interface Circuit	
Explanation	GND:power ground KGND:packaging ground GND is complete isolation with KGND

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

IDS 10: Electrical Interface Features- RS422(Transmit)

	File number	TYS-PST4SH1-IDS				
	Sub-system name					
	Device name	PST4SH1 Star Tracker	Stage mark			
	Device code				FM	

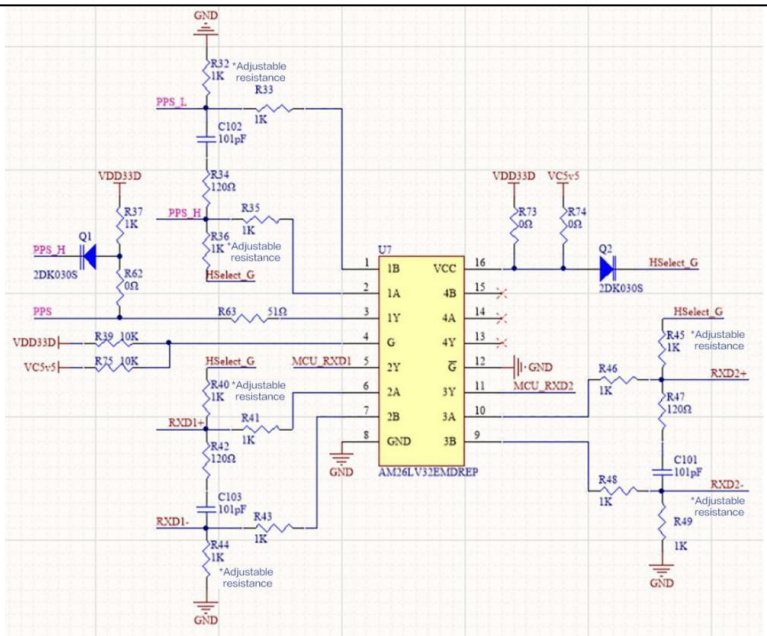
Interface signal	Digital signal, RS422. (Sent)
Signal characteristics	422 communication baud rate: 115200bps; Meet the standard: EIA-422-B Baud rate: 115200bps(±0.5%) Interface Chip:AM26LV31ESDREP,3.3v
Interface Circuit	 Note: TXD1+、TXD1-are for connecting OBC. TXD2+、TXD2-are internal used.
Explanation	R71 is not weld@ RS422(transmit).

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

IDS 11: Electrical Interface Features- RS422(Receive)

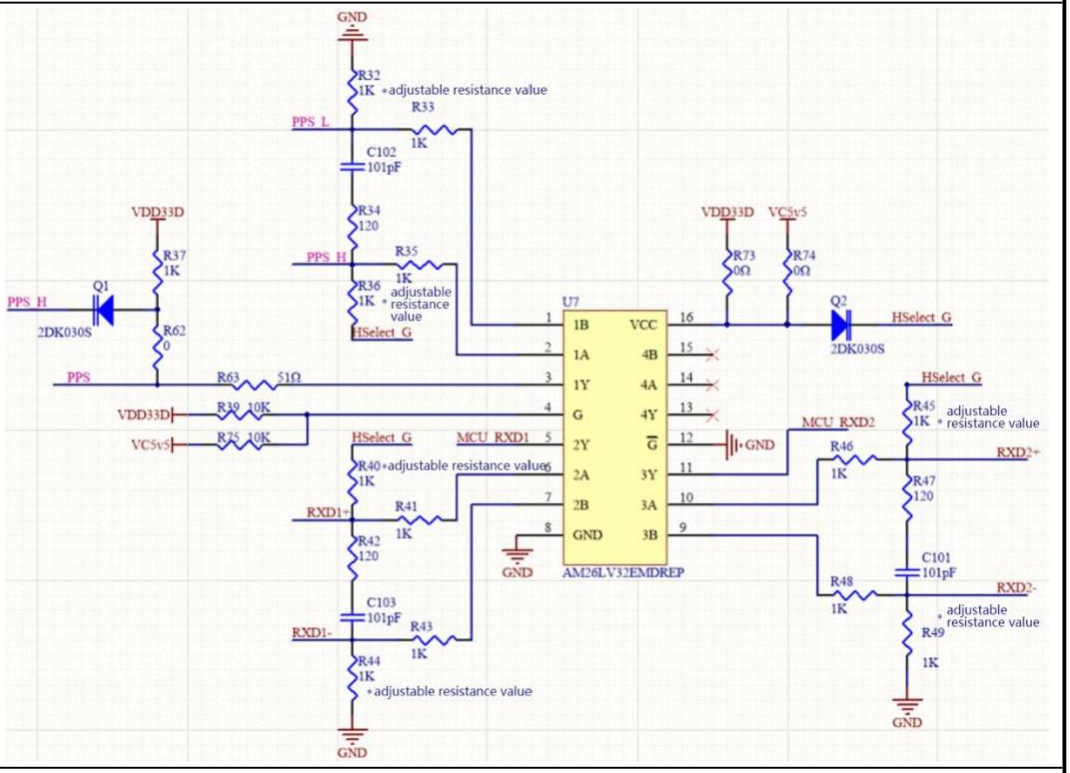
IDS 12：Electrical Interface Features-Second pulse (Different)

	File number	TYS-PST4SH1-IDS				
	Sub-system name					
	Device name	PST4SH1 Star Tracker	Stage mark			
	Device code				FM	

Interface signal	Digital signal, RS422. (receive)
Signal characteristics	422 communication baud rate: 115200bps; Meet the standard: EIA-422-B Baud rate: 115200bps(±3%) Interface Chip:AM26LV32ESDREP,3.3v
Interface Circuit	 Note: RXD1+，RXD1- are for connecting OBC. RXD2+，RXD2- are internal used.
Explanation	R74 , R75is not weld@ RS422(receive).

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

	Sub-system name					
	Device name	PST4SH1 Star Tracker	Stage mark			
	Device code				FM	

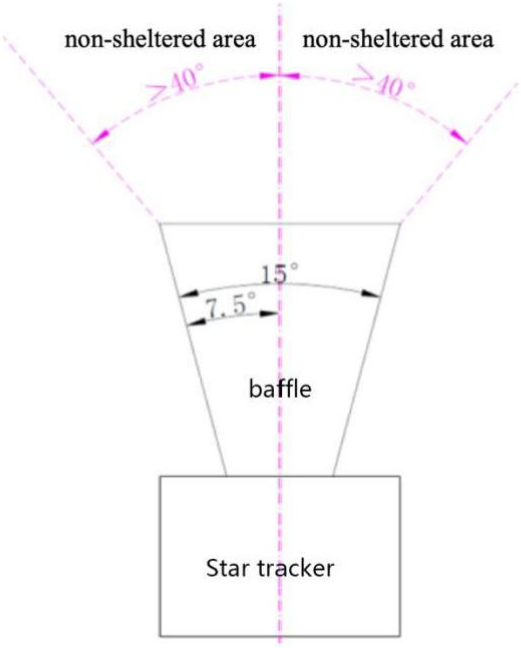
Interface signal	Second pulse signal
Signal characteristics	@ Differential second pulse, the second integer is aligned by the lower edge, and the negative pulse width is 1~2ms.
Interface circuit	
Explanation	R37, R62, Q1 , R74, R75are not weld@ different second pulse.

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

IDS 13：Installation requirements

	File number	TYS-PST4SH1-IDS	

	Sub-system name					
	Device name	PST4SH1 Star Tracker	Stage mark			
	Device code				FM	



Be sure: Nothing sheltered in the field of view: the circular cone of 80° around the top of the Baffle.

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

IDS 14：Device Description

	File number	TYS-PST4SH1-IDS	

	Sub-system name					
	Device name	PST4SH1 Star Tracker	Stage mark			
	Device code				FM	

Note: the special requirements for the interface and other inconvenient presentation are described in this section.

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