Label      TYS-NST4SA2--IDS

Stage mark    Z

Page      15

# NST4S-A2 Star Tracker IDS

**Signature**

Edit ：      FSX

Proofreading ： XMG

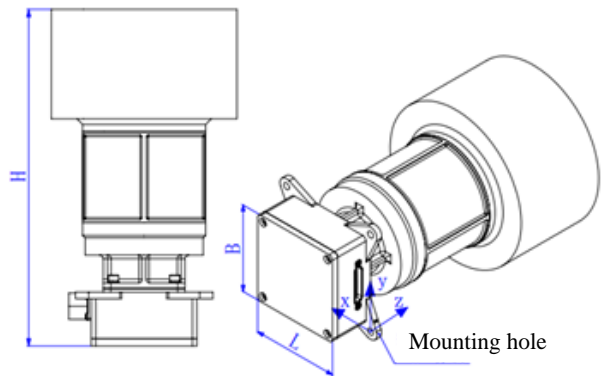Check ：      WHQ

Standard check：CY

Approval ：     WHJ

TY-Space Technology (Beijing) Ltd.

# IDS1：DATA SHEET

| | | | | | |
|---|---|---|---|---|---|
| | File number | TYS-NST4SA2-IDS | | | |
| | Sub-system name | | | | |
| | Device name | NST4S-A2 Star Tracker | Stage mark | | |
| | Device code | | | | Z |

| | |
|---|---|
| Attitude Accuracy | Pointing:   3″ (3σ)<br>Rolling:   30″ (3σ) |
| Dynamic Range | @ 0.1°/s:   3″ (Pointing, 3σ); 30″ (Rolling, 3σ);<br>@0.5°/s:   5″ (Pointing, 3σ); 50″ (Rolling, 3σ);<br>@1.0°/s:   10″ (Pointing, 3σ); 100″ (Rolling, 3σ);<br>@ 3°/s:   follow up |
| Data Validity | >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 |
| Exclusive Angle | Sun  ≤25°；Earth or other stray light  ≤20° |
| Timing Accuracy | 0.1ms @ synchronization pulse（SYNC pulse） |
| Communition | 422 |
| Quaternion Continuity | the scalar of the quaternion: non-negative |
| Life Time | 7years @1200Km Orbit. |
| Reliability | ≥0.98 @ the end of a 7years running |

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# IDS2：Mechanical Characteristics

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | File number | TYS-NST4SA2-IDS | | | | |
| | | Sub-system name | | | | | |
| | | Device name | NST4S-A2 Star Tracker | Stage mark | | | |
| | | Device code | | | | Z | |
| Device weight[note] 370±20 g | | | Device number： | | | √ | |
| Weight characteristics | Envelope size mm | Envelope diameter：Φ100±1 | | Height：182±2 | | √ | |
| | Centroid position mm | X：32±2 | Y：32±2 | Z：39±2 | | √ | |
| | Inertia of centroid kg.mm$^2$ | $P_X$ =1351±3 | $P_Y$ =1357±3 | $P_Z$ =383±3 | Measure-ment | √ Calc-ulatio-n | Esti-mate |
| Installation characteristics | Installed holes number：4 | Size of installed holes （tolerance）mm：4×Φ3.4±0.1 | | Material:2A12-T4 | Determination method（√） | | |
| | Installation contacting area mm$^2$：500 | | | Note： | | | |
| | Installation surface flatness：0.1 | | | | | | |
| | Installation surface roughness Ra μm: 3.2 | | | | | | |
| | Installation surface state：the installation area is oxidized by conduction, and the remaining area is oxidized black. | | | | | | |

Parameter relationship diagram (it should show 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 quality of device.



Mounting hole

Note：The origin of the coordinates lies in the geometric center of the outer surface of the lower shell (see "Instrument diagram");

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# IDS3：Instrument Diagram
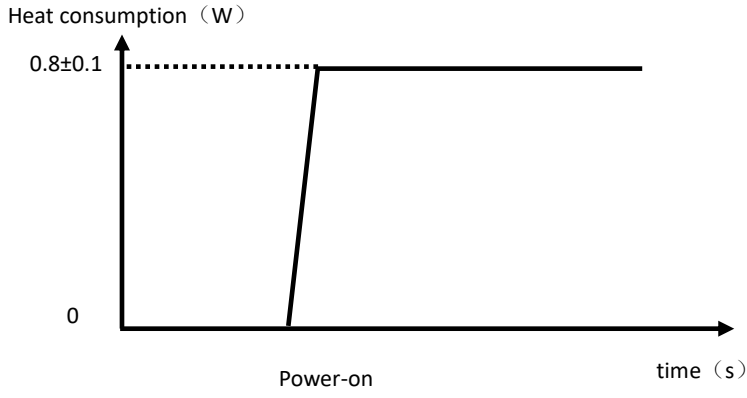
| | File number | TYS-NST4SA2-IDS | | | | |
|---|---|---|---|---|---|---|
| | Sub-system name | | | | | |
| | Device name | NST4S-A2 Star Tracker | Stage mark | | | |
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Note: This sketch should include body size, mounting size, mounting plane, mounting 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.
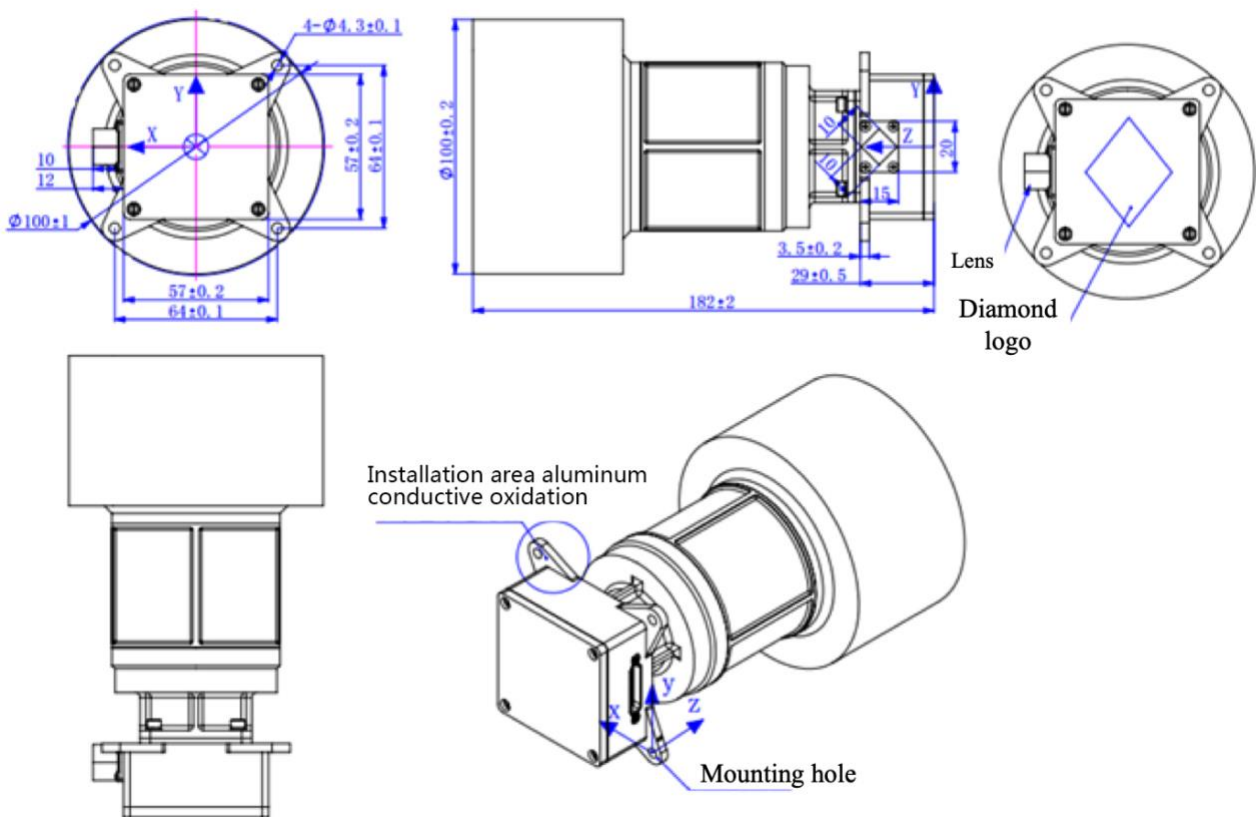


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# IDS4：Thermal characteristics

| | | File number | TYS-NST4SA2-IDS | | | |
|---|---|---|---|---|---|---|
| | | Sub-system name | | | | |
| | | Device name | NST4S-A2 Star Tracker | Stage mark | | |
| | | Device code | | | | Z |

| Surface (except for mounting surface) | Aluminum alloy（2A12-T4） | Note: |
|---|---|---|
| | Outside surface treatment: Black anodized | |
| | $\varepsilon_H$：≥0.85 | |
| | | |

| Start temperature ℃：-30~+40 | Better Operating @ ℃： 0~+10 | Heat capacity J/K：350 |
|---|---|---|
| Operating temperature range ℃： -40~+40 | Operating relative humidity range：≤60 % | |
| Storage temperature range ℃： -40~+40 | Storage relative humidity range：≤70% | |

Operating state heat consumption W：0.8±0.1　　　（per device）

Heat consumption（W）

0.8±0.1

0

Power-on

time（s）

| Edited（Date）： | | | |
|---|---|---|---|
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# IDS 5：Thermal Diagram

| | File number | TYS-NST4SA2-IDS | | | | |
|---|---|---|---|---|---|---|
| | Sub-system name | | | | | |
| | Device name | NST4S-A2 Star Tracker | Stage mark | | | |
| | Device code | | | | Z | |

Diagram：
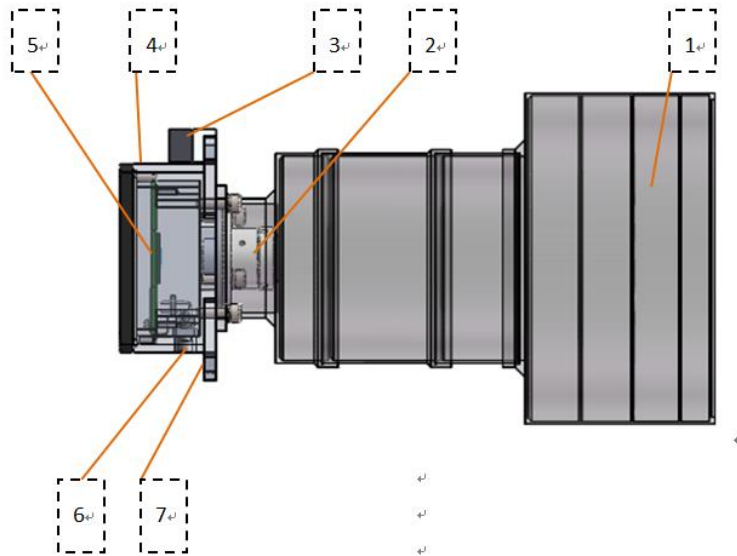


1－Baffle            2－Lens
3－Prism          4－Circuit box
5－Image sensor & Circuit board      6－Connector
7－Installing lugs（Contact surfaces）
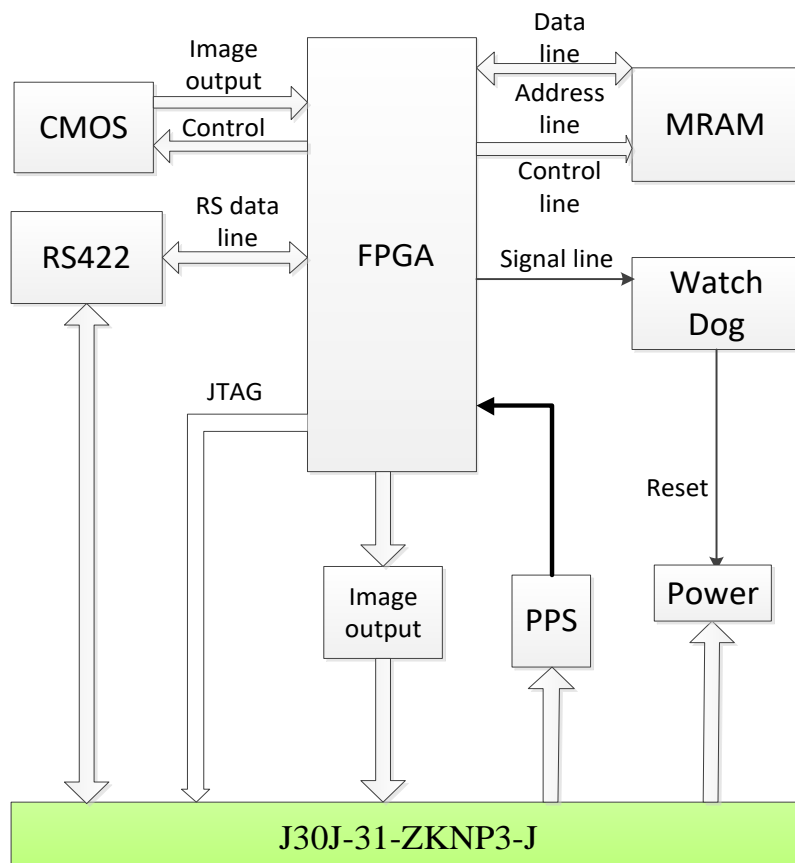
The structure of NST4S-A2 Star Tracker is shown as above,
The power distribution is:1,circuit board: about 0.8W;

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|---|---|---|---|
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# IDS 6：Circuit and Interface Schematics

| | File number | TYS-NST4SA2-IDS | | | | |
|---|---|---|---|---|---|---|
| | Sub-system name | | | | | |
| | Device name | NST4S-A2 Star Tracker | Stage mark | | | |
| | Device code | | | | Z | |

Simplified diagram：



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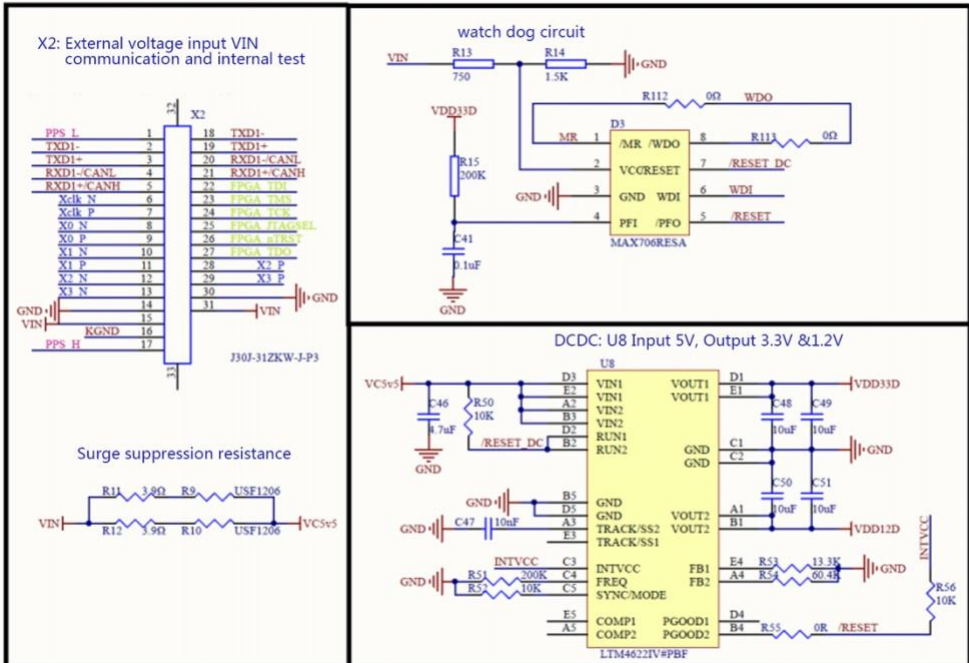
# IDS 7：Power

| | | | |
|---|---|---|---|
| | File number | TYS-NST4SA2-IDS | |
| | Sub-system name | | |
| | Device name | NST4S-A2 Star Tracker | Stage mark |
| | Device code | | Z |

| 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 | 4% | 150 | 2A/5ms | 0.8±0.1 |

CAUTION:
Safe Running Voltage Range: 4.8V ~ 5.2V

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| Signed（Date）： | Mark | Changed number | Signature, date |
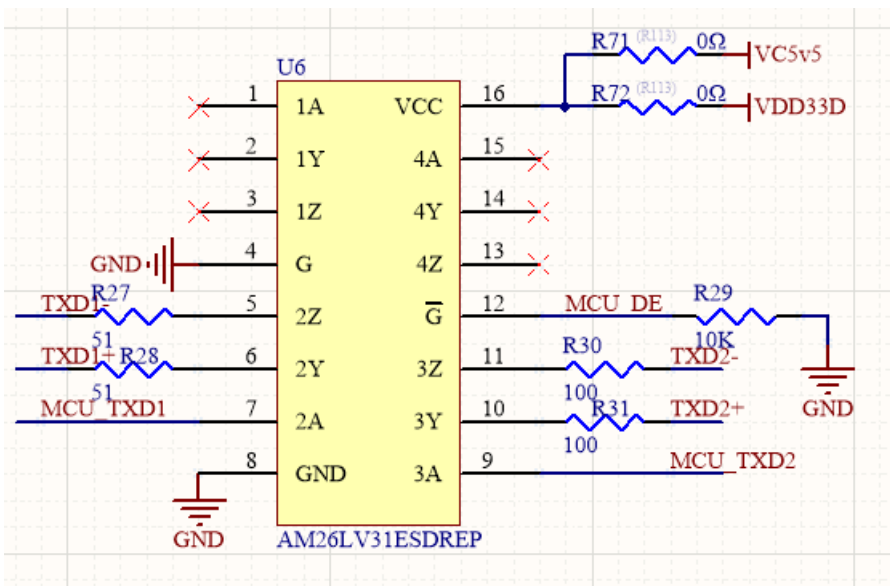
# IDS 8: Electrical Connector Contact Assignment

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | File number | | | TYS-NST4SA2-IDS | | | |
| | Sub-system name | | | | | | |
| | Device name | | | NST4S-A2 Star Tracker | | Stage mark | |
| | Device code | | | | | | Z |

| Name (by function) | | XK-01 | 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- | | 0/+3.3(±1) | ≤0.075 | 422 Transmit- | 2,3 twisted，18,19 twisted | |
| 3，19 | TXD1+ | | 0/+3.3(±1) | ≤0.075 | 422 Transmit+ | | |
| 4，20 | RXD1- | | 0/+3.3(±1) | ≤0.075 | 422 Receive - | 4,5 twisted，20,21 twisted | |
| 5，21 | RXD1+ | | 0/+3.3(±1) | ≤0.075 | 422 Receive + | | |
| 17 | PPS H | | 0/+3.3(±1) | ≤0.075 | PPS Receive + | | |
| 1 | PPS L | | 0/+3.3(±1) | ≤0.075 | PPS Receive - | | |
| 15，31 | VIN | | / | / | power | | |
| 14，30 | GND | | / | / | power Ground | | |
| 16 | KGND | | / | / | Structure Ground | Structure Ground | |
| others | | | | | | Internal use, prohibit external use | |

| | | | | |
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| Edited (Date): | | | | |
| Signed (Date): | | Mark | Changed number | Signature, date |
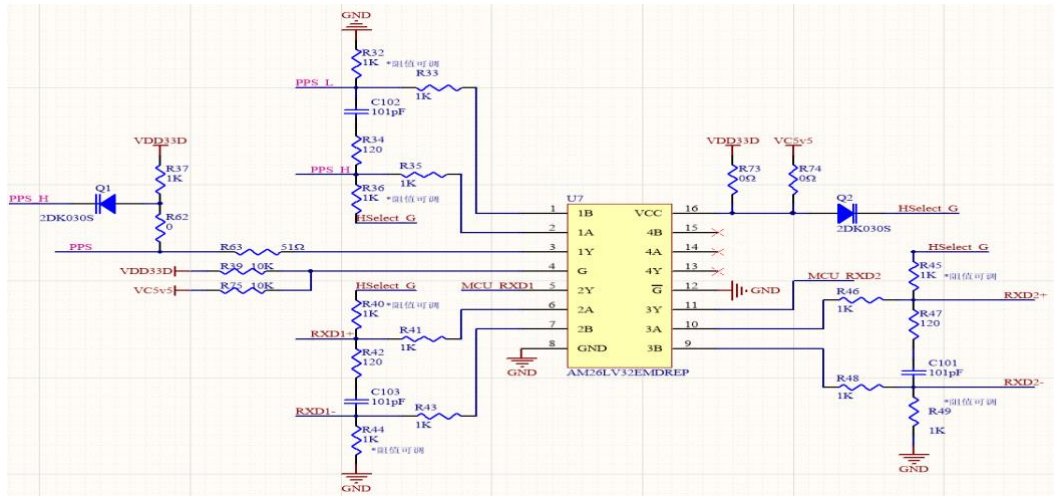
# IDS 9：Electrical Interface Features-Power

| | | | | | |
|---|---|---|---|---|---|
| | File number | TYS-NST4SA2-IDS | | | |
| | Sub-system name | | | | |
| | Device name | NST4S-A2 Star Tracker | Stage mark | | |
| | Device code | | | | Z |

| | |
|---|---|
| Interface signal | Power supply |
| Signal characteristics | Operating voltage：5V±0.2V； <br> Reflected ripple :＜100mV(p-p)； <br> Electric current @the baffle depolyed(peak/duration):2A/5s |
| Interface Circuit |  |
| Explanation | The power ground (GND) is isolated with the structure ground (KGND). |

| | | | |
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| Edited (Date): | | | |
| Signed (Date): | Mark | Changed number | Signature, date |
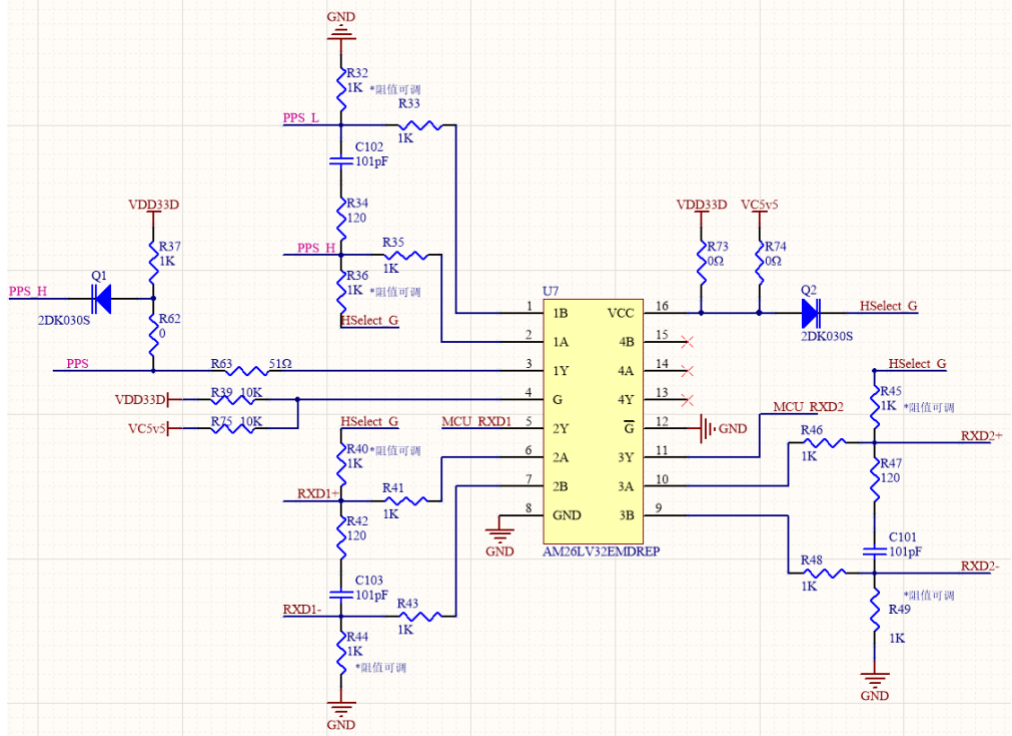
# IDS 10：Electrical Interface Features-422

| | File number | TYS-NST4SA2-IDS | | | | |
|---|---|---|---|---|---|---|
| | Sub-system name | | | | | |
| | Device name | NST4S-A2 Star Tracker | Stage mark | | | |
| | Device code | | | | Z | |

| Interface signal | Digital signal, RS422. (Sent) |
|---|---|
| Signal characteristics | 422 communication baud rate: 115200bps;<br>Meet the standard: EIA-422-B<br>Interface Chip:AM26LV31ESDREP，,3.3v |
| Interface Circuit |  |
| Explanation | TXD1+ & TXD1- are for connecting OBC.<br>TXD2+ & TXD2- are internal used. |

| Edited (Date): | | | | |
|---|---|---|---|---|
| Signed (Date): | | Mark | Changed number | Signature, date |
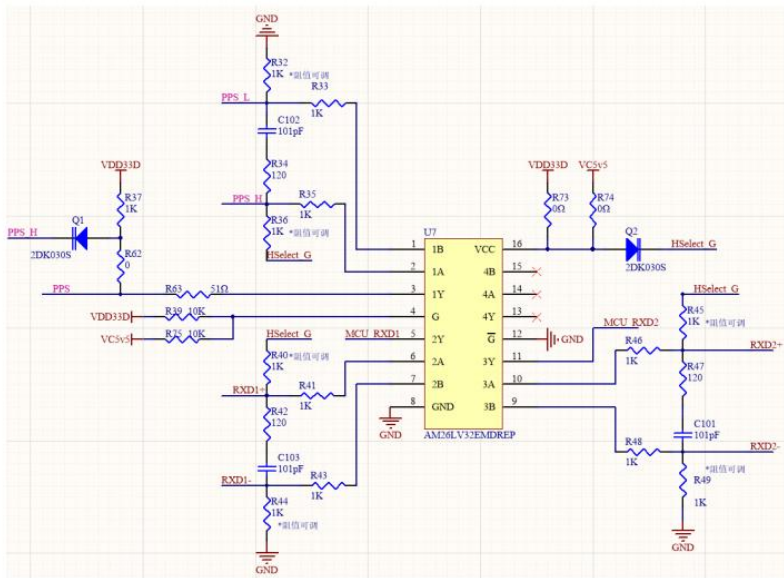
# IDS 11：Electrical Interface Features-422

| | File number | TYS-NST4SA2-IDS | | | | |
|---|---|---|---|---|---|---|
| | Sub-system name | | | | | |
| | Device name | NST4S-A2 Star Tracker | Stage mark | | | |
| | Device code | | | | Z | |

| Interface signal | Digital signal, RS422. (Received) |
|---|---|
| Signal characteristics | 422 communication baud rate: 115200bps; Meet the standard: EIA-422-B |
| Interface Circuit |  |
| Explanation | Note: RXD1+，RXD1-are for connecting OBC.<br>RXD2+，RXD2- are internal used. |

| Edited (Date): | | | | |
|---|---|---|---|---|
| Signed (Date): | | Mark | Changed number | Signature, date |

# IDS 12：Electrical Interface Features-Second pulse(Single)

| | | | | | | |
|---|---|---|---|---|---|---|
| | File number | TYS-NST4SA2-IDS | | | | |
| | Sub-system name | | | | | |
| | Device name | NST4S-A2 Star Tracker | Stage mark | | | |
| | Device code | | | | Z | |

| | |
|---|---|
| Interface signal | Second pulse signal |
| Signal characteristics | The second pulse signal input mode is differential and is triggered by the lower edge. the negative pulse width is 1~2ms. Meet the standard: EIA-422-B. |
| Interface circuit | Second pulse circuit  |
| Explanation | R32、R33、R35、R34、R36、R63 and C102 are not weld@ single second pulse. |

| Edited (Date): | | | |
|---|---|---|---|
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# IDS 13：Electrical Interface Features-Second pulse(Different)

| | | File number | TYS-NST4SA2-IDS | | | | |
|---|---|---|---|---|---|---|---|
| | | Sub-system name | | | | | |
| | | Device name | NST4S-A2 Star Tracker | Stage mark | | | |
| | | Device code | | | | Z | |
| **Interface signal** | Second pulse signal | | | | | | |
| **Signal characteristics** | The second pulse signal input mode is differential and is triggered by the lower edge. the negative pulse width is 1~2ms. Meet the standard: EIA-422-B. | | | | | | |
| **Interface circuit** | Second pulse circuit<br> | | | | | | |
| **Explanation** | R37、R62 and Q1 are not weld@ different second pulse. | | | | | | |
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| Signed (Date): | | Mark | Changed number | | | Signature, date | |

# IDS 14：Installation requirements

| | | | | | | |
|---|---|---|---|---|---|---|
| | File number | TYS-NST4SA2-IDS | | | | |
| | Sub-system name | | | | | |
| | Device name | NST4S-A2 Star Tracker | Stage mark | | | |
| | Device code | | | | Z | |
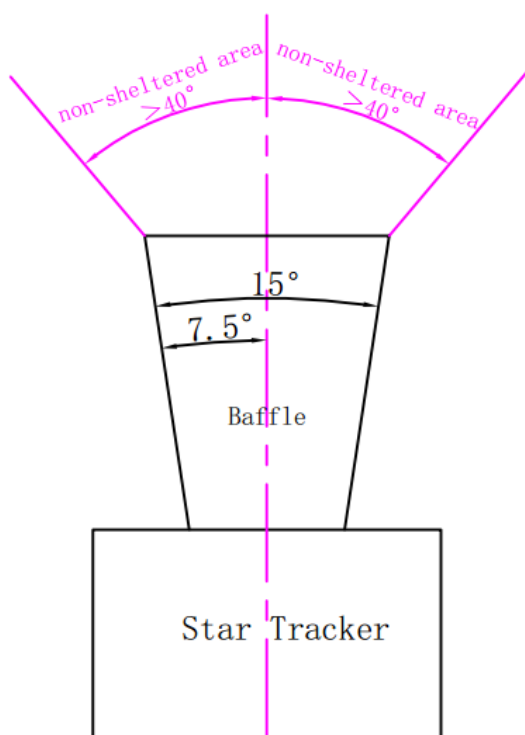


Installation Notes:

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

| | | | |
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