File number	Piece number

TY-SPACE

Label	TYS-NST4SA2IDS
Stage mark	<u>z</u>
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 nu	umber		TYS-NST4SA2-IDS					
		Sub-sy	ystem na	ıme						
		Device	e name		NST4S-A2 Star Trac	cker	Sta	ge ma	rk	
		Device	e code						Z	
Attitude Accuracy	Pointing: 3" (Rolling: 30" (
O.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										
Data Validity	>98%@ 0.5°/s;	>96%	6@0.5°/s	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°; Ea	rth or o	ther stra	y ligh	t ≤20°					
Timing Accuracy	0.1ms @ synchr	onizatio	on pulse	(SY	NC pulse)					
Communitation	422									
Quaternion Continuity	the scalar of the quaternion: non-negative									
Life Time	7years @1200Km Orbit.									
Reliability	≥0.98 @ the end of a 7years running									
Edited (Date):										
Signed (Date):			Mark	Char	nged number	Sign	atur	e, date	e	

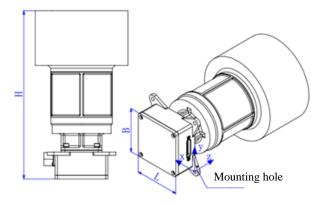


IDS2: Mechanical Characteristics

			File number	TYS-NST4SA2-IDS			
			Sub-system name				
			Device name	NST4S-A2 Star Tracker	Stage	e mark	5
			Device code			7	Z
Device v	weight ^{note)} 370±20 g		Device number:			$\sqrt{}$	
	Envelope size mm	Envelope diam	neter: $\Phi 100 \pm 1$	Height: 182±2		$\sqrt{}$	
Weight charact	Centroid position mm	X: 32±2	Y: 32±2	Z: 39±2		√	
eristics	Inertia of centroid kg.mm ²	$P_X = 1351 \pm 3$	P _Y =1357±3	P _Z =383±3	Mea- sure- ment	√ Calculati	I High-
	Installed holes number: 4	Size of installe (tolerance) n	ed holes nm: 4×Φ3.4±0.1	Material:2A12-T4	Determination method $()$		
Installa Installation contacting area mm ² :		500	Note:				
Installation surface flatness: 0.1							
charact	Installation surface	roughness Ra	um: 3.2				
eristics	Installation surface soxidized by conduct 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.



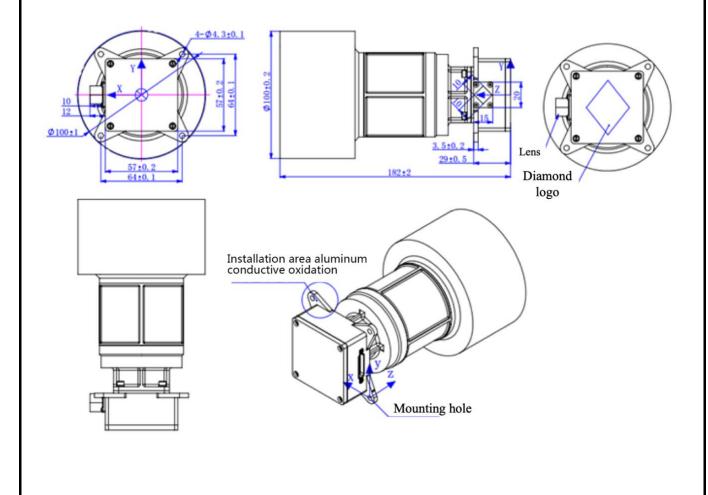
Note: The origin of the coordinates lies in the geometric center of the outer surface of the lower shell (see "Instrument diagram");

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IDS3: Instrument Diagram

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

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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Signed (Date):	Mark	Changed number	Signature, date



IDS4: Thermal characteristics

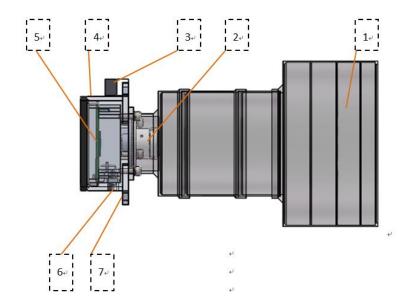
]	File number	TYS-NST4SA2-II	DS				
		5	Sub-system name						
]	Device name	NST4S-A2 Star Tra	acker	Sta	age ma	ırk	
]	Device code					Z	
	Aluminum alloy (2A12-7	[4]	Note:		'			'	
Surface (except for	Outside surface treatr Black anodized	nent:							
mounting	ε _H : ≥0.85								
surface)	ЕН: ≥0.03								
Start temperar	ture °C: -30~+40	Better	Operating @ °C:	0~+10	Heat c	capac	city J/K	: 350	
Operating ten	nperature range $^{\circ}$ C: -40 \sim +4	10	Operating relative	humidity range:	60 %				
	erature range $^{\circ}$ C: -40 \sim +40			umidity range: ≤70	0%				
Operating star	te heat consumption W: 0.5	8±0.1	(per device	e)					
	Heat consumption (W. 0.8±0.1		/er-on	time (s)					
Edited (Date	e) :								
Signed (Date	e):		Mark	Changed numb	er		Signat	ure, da	te



IDS 5: Thermal Diagram

File number	TYS-NST4SA2-IDS				
Sub-system name					
Device name	NST4S-A2 Star Tracker	ker Stage mark		ζ	
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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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: CMOS Control RS data line Address line FPGA FPG		IDS 0. CIT		The face benefitation	
Device name Device code Device code NST4S-A2 Star Tracker Stage mark			File number	TYS-NST4SA2-IDS	
Simplified diagram: Data line Address line MRAM Control line Signal line Watch Dog JTAG JTAG PPGA JTAG PPGA Bignal line Watch Dog JTAG PPS Power Output PS Bignal line Watch Dog JTAG PPS Bignal line PPS Power			Sub-system na	me	
Simplified diagram: Data Image output Address line Address line RS data RS422 FPGA Signal line PPS Power output PPS Power Output FPGA Signal line FPGA Signal line FPGA Signal line PPS Power Output FPS Fower OUTPUT FOWER OUT			Device name	NST4S-A2 Star Tracke	r Stage mark
CMOS Control line Address line MRAM Control line Signal line Watch Dog JTAG PPS Output PPS Output PS Outpu			Device code		Z
	Simplified diagram:	CMOS Control RS data line JTAG	FPGA	line Address line Control line Signal line Watch Dog Reset Power	
	Edited (Date):				
			Mark	Changed number	Signature date



IDS 7: Power

			File n	umber	TYS-NS	T4SA2-IDS				
			Sub-s	ystem nam	e					
			Devic	e name	NST4S-A	A2 Star Tracker	Sta	ige ma	ırk	
			Devic	e code					Z	
Working meterm/short term	node (long m/others)	Long term	Single nor working h		n power-up		•	Device number		1
Voltage V	Voltage stability %	Ri _j	pple voltag P)		Device starting compeak/duration)	urrent character	ristics	Powe	r W	
5	4%	15	0	2	A/5ms			0.8±0) .1	
CAUTION:										
Safe Running	Voltage Range: 4	$4.8V \sim 5.2$	V							
Edited (Date):									



IDS 8: Electrical Connector Contact Assignment

			Fi	le number		TY	S-NST4SA2-IDS			
St		Su	Sub-system name							
			De	evice name		NS	Γ4S-A2 Star Tracker	St	age mar	·k
			De	evice code						Z
Name (by	function)	XK-()1	Electrical co	onnector cod	de	J30J-31ZKWP3-J	Needl	e / Hole	Hole
Contact number	Signal (fur descrip)	Voltage/V	Current/		Polar]		(shielded / sted)
2, 18	TXD			0/+3.3(±1)	≤0.075	422	Transmit-	2		ed, 18,19
3, 19	TXD	1+		0/+3.3(±1)	≤0.075	422	Transmit+		twi	sted
4, 20	RXD	1-		0/+3.3(±1)	≤0.075	422	Receive -	4	,5 twist	ed, 20,21
5, 21	RXD	1+		0/+3.3(±1)	≤0.075	422	Receive +		twi	sted
17	PPS	Н		0/+3.3(±1)	≤0.075	PPS	Receive +			
1	PPS	L		0/+3.3(±1)	≤0.075	PPS	Receive -			
15, 31	VIN	1		/	/		power			
14, 30	GNI)		/	/		power Ground			
16	KGN	D		/	/		Structure Ground	Š	Structur	e Ground
others									Intern	al use,
ouicis								pr	ohibit e	xternal use
Edited (Dat	re):									
Signed (Da	te):			Mar	k		Changed number		Signa	ture, date



IDS 9: Electrical Interface Features-Power

		File number	T	YS-NST4SA2-IDS			
		Sub-system nar	me				
		Device name	N	ST4S-A2 Star Tracker	Stage mark		
		Device code				Z	
Interface signal	Power supply						
Signal characteristics	Operating voltage: Reflected ripple : Electric current @	<100mV(p-p);	ved(peak/	duration):2A/5s			
Interface Circuit	X2: External voltage i communication a communi	18 TXDI- 19 TXDI- 19 TXDI- 19 TXDI- 20 RXDI-(CANI) 21 RXDI-(CANI) 21 RXDI-(CANI) 22 PRO- 22 PRO- 24 PRO- 25 PRO- 25 PRO- 26 PRO- 26 X3 P 30 31 VIN J30J-31ZKW-J-P3 VC	VIN R13 750 VDD33D R13 750 C41 D.1ss GND	D3	3V 8(1.2V	VVDD33D VVDD12D VVDD12D R56 10K	
Explanation	The power ground	(GND) is isolate	ed with th	ne structure ground (KGNI	O).		
Edited (Date):							
Signed (Date):		Mark		Changed number	S	Signature,	date



IDS 10: Electrical Interface Features-422

		File number	TYS-NST4SA2-IDS	S	
		Sub-system name			
		Device name	NST4S-A2 Star Trac	ker Stag	e mark
		Device code			Z
Interface signal	Digital signal, RS42	2. (Sent)			
Signal characteristics	422 communication Meet the standard: E Interface Chip:AN	EIA-422-B			
Interface Circuit	GND TXDR27 TXD1+R28 MCU51TXD	5 2Z 2Y	VCC 4A 15 4Y 4Z 13 4Z 13 4Z 13 10 100 3Z 3Y 3A 100 100 1100	(R113) 0Ω VI	DD33D GND
Explanation			11- are for connecting EXD2- are internal use		
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Signed (Date):		Mark	Changed no	umber	Signature, date



IDS 11: Electrical Interface Features-422

		File number	TY	S-NST4SA2-	IDS				
		Sub-system name							
		Device name	NST	Γ4S-A2 Star T	racker	er Stage mark		ark	
		Device code						Z	
Interface signal	Digital signal, RS42	2. (Received)							
Signal characteristics	422 communication	baud rate: 115200bp	os; Me	eet the standar	rd: EIA-42	22-В			
Interface Circuit		9 10K	MCU RXI	6 2A 3Y 2B 3A 6ND 3B	16 15 × 14 × 13 × 11 10 9	MCU R	RXD2 46	HSelect G	RXD2+
Explanation		Note: RXD1+, R RXD2+, R		-are for conne - are internal		С.			
Edited (Date):									
Signed (Date):		Mark		Change	d number		Sig	gnature,	, date



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

		File number	TYS-NS	T4SA2-IDS				
		Sub-system name						
		Device name	NST4S-A	A2 Star Tracker	Stag	ge ma	rk	
		Device code					Z	
Interface signal	Second pulse signa	ıl						
Signal characteristics		e signal input mode ve pulse width is 1~						er
	E3. [.3.3.4. E3. E3.3.4.].3. E		nd pulse	circuit			-1-1-1-1-1	
Interface circuit	VDD33D	R32	1 1 1B 2 1A 3 1Y 4 G J RXD1 5 2Y 6 2A 7 2B GND AM26L	G 12 -GND 3Y 11 10 10	Q2 2DK030S ICU RXD2 R46 1K	R45 1K * 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	值可调 RXD2	
Explanation	R32、R33、R3.	5、R34、R36、R6	3 and C1	02 are not weld@) singl	e seco	ond pul	se.
Edited (Date):								
Signed (Date):		Mark		Changed number		Sig	nature	, date



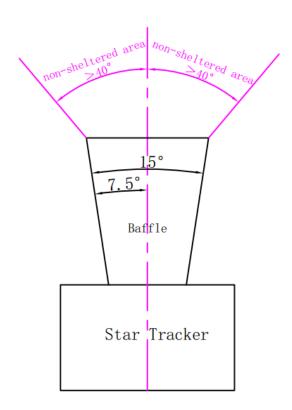
IDS 13: Electrical Interface Features-Second pulse(Different)

		File number	TYS	S-NST4SA2-IDS				
		Sub-system name	116					
			Device name NST4S-A2 Star Tra		r Stage mark			
		Device code	NSI	45-A2 Star Tracker	Sta	ge ma		
		Device code					Z	
Interface signal	Second pulse signa	ıl						
Signal characteristics		ne second pulse signal input mode is differential and is triggered by the lower ge. the negative pulse width is 1~2ms. Meet the standard: EIA-422-B.					er'	
		Secon	nd pu	alse circuit				
Interface circuit	VDD33D R37 IK PPS H Q1 R62 DK030S R62 VDD33D R62 VCSv5	R12	1A 1Y G 2Y 2A 2B	VDD33D VCSy5 R73 R74 602 OC B S S DK030S HSelect G DK030S HSelect G II II R47 II R47 II R48 II R47 III R48 R49 II R48 R49 II R48 R47	RXD2+			
Explanation	R37、R62 and 0	Q1 are not weld@ diff	Perent	second pulse.				
Edited (Date):								
Signed (Date):		Mark		Changed number		Sig	nature	, date



IDS 14: Installation requirements

File number	TYS-NST4SA2-IDS				
Sub-system name					
Device name	NST4S-A2 Star Tracker	Star Stage mark		nark	
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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Signed (Date):	Mark	Changed number	Signature, date