



THETA-2S

GNSS-Aided Inertial Navigation System



Key Features

- In-Band Interference Rejection
- Spoofing & Jamming Detection
- Fast Acquisition Channels
- Full attitude determination
- Small Size
- Light weight

The THETA-2S is a small, advanced GNSS-aided Inertial Navigation System that combines two complementary technologies: GNSS and INS. The footprint is suitable for any application requiring precise, uninterrupted navigation and attitude within a compact size. Patented anti-spoofing and jamming detection and suppression enhances resilience, complemented by a comprehensive suite of interfaces for various applications.

Accelerometers and gyroscopes are fully calibrated, temperature-compensated, and mathematically aligned to an orthogonal coordinate system.

THETA-2S Specifications



Tracking	Total Channels	874				
	GPS	L1 C/A, L1C, P1, P2, L2C, L5				
	GLONASS	L1 C/A, P1, P2, L2 C/A, L3				
	Galileo	E1, E5, E5A, E5B, E6				
	BeiDou	B1, B1C, B2B, B2, B2A, B3				
	QZSS	L1C C/A, L1C, L2C, L5, L6, L1S, L1Sb, L5S				
	SBAS	L1, L5				
	NavIC	L1, L5, S				
	L-Band	1525 - 1560 Mhz				
Performance*		Horizontal (m)		Vertical (m)		
	Standalone	1.000		1.500		
	SBAS	0.500		0.850		
	DGPS	0.250		0.500		
	RTK	0.008 + 1 ppm		0.015 + 1 ppm		
	Free inertial, land vehicles	0.5%** , DT (with velocity constraints/ZARU/ZUPT aiding)				
Anti-Jamming	Jamming Suppression	Up to 30 dB IBIR				
	Jammer-to-Signal Ratio	Up to 90 dB				
GNSS+INS Accuracy (RMS)**	Outage (s)	Position Mode	Position Accuracy		Attitude Accuracy	
			Horizontal (m)	Vertical (m)	Heading (deg)	Pitch/Roll (deg)
	0	Stand Alone	< 1	< 1.5	< 0.1	< 0.05
		RTK	0.008	0.015		
	60	Stand Alone	< 8	< 4	< 0.15	< 0.09
		RTK	< 7	< 2		
Time to First Fix	Cold Start	< 35 s				
	Warm Start	< 5 s				
	Reacquisition	< 1 s				
	RTK Initialization	2 - 6 s				
Output Rate	Position/ Measurements	up to 200 Hz				
Wired I/O	Main Connector	25-pin micro D-SUB connector with screw lock (MDSM-25PE-Z10-VR17 by ITT Cannon)				
	GNSS Antenna	1 x SMA, +5 VDC Ports (0.16A max)				
	Serial	1 x RS232 up to 460.8 kbps 1 x RS232/RS422 up to 460.8 kbps				
	USB	1 x USB 2.0 Full Speed. Up to 3.0 Mbps UART				
	CAN	1 x CAN 2.0				
	Event Marker	1 x Event Marker				
	1PPS	1 x 1PPS output synchronized to GPS or UTC				
Storage	Internal Memory	Up to 16 GB				
Power	Input	+5.5 to +36 VDC				
	Power Consumption	3.2 W (AJ mode off) / 3.6 W (AJ mode on)				

THETA-2S Specifications



IMU Performance (KERNEL-110)	Gyroscope performance	Technology	MEMS		
		Dynamic range	± 2000 °/s		
		Bias in-run stability	2 °/hr		
		Noise, Angular Random Walk (ARW)	0.3 °/√hr		
	Accelerometer performance	Technology	MEMS		
			Kernel 110-08	Kernel 110-15	Kernel 110-40
		Dynamic range	± 8 g	± 15 g	± 40 g
		Bias in-run stability	0.1 mg	0.03 mg	0.05 mg
		Noise, Angular Random Walk (ARW)	0.02 m/s/√hr	.045 m/s/√hr	0.06 m/s/√hr
IMU Performance (KERNEL-201)	Gyroscope performance	Technology	MEMS		
		Dynamic range	± 450 °/s		
		Bias in-run stability	0.7 °/hr		
		Noise, Angular Random Walk (ARW)	0.065 °/√hr		
	Accelerometer performance	Technology	MEMS		
			Kernel 201-08	Kernel 201-40	
		Dynamic range	± 8 g	± 40 g	
		Bias in-run stability	0.005 mg	0.025 mg	
		Noise, Angular Random Walk (ARW)	0.015 m/s/√hr	0.045 m/s/√hr	
Physical	Dimensions	85.3 x 56 x 31.3 mm			
	Weight	190 g			
Environmental	Operating Temperature	-40°C to +80°C			
	Storage Temperature	-40°C to +85°C			
	Shock & Vibration	MIL-STD-810G ISO-9022-31-06 Shock, Severity 5 IEC 60068-2-6 Sine Vibration			

*GNSS performance is dependent on signal quality, satellite geometry, ionospheric and tropospheric conditions, baseline length, multipath effects and RF interference.

** Under ideal conditions, including proper static alignment and suitable in-field dynamic motion during GNSS signal loss.

***Performance may degrade under unmitigated vibration or significant temperature variation; unit-to-unit variation may occur.

Refer to the user manual for full specifications. Specifications may be changed without notice.