



THETA-3S DUO

GNSS-Aided Inertial Navigation System



Key Features

- All GNSS Constellations
- Spoofing & Jamming Detection
- Fast Acquisition Channels
- Full attitude determination
- Small Size
- Light weight

The TR-3S DUO INS is a small, advanced OEM 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 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-3S DUO 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	
	Heading		< .09 deg (2 m baseline)			
	Free inertial, land vehicles		0.5%** , DT (with velocity constraints/ZARU/ZUPT aiding)			
Anti-Jamming	Jammer-to-Signal Ratio		Up to 57 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		up to 100 Hz			
	Heading		up to 100 Hz			
	Measurements		up to 100 Hz			
Wired I/O	Main Connector		25-pin micro D-SUB connector with screw lock (MDSM25PE-Z10-VR17 by ITT Cannon)			
	GNSS Antenna		2 x MMCX, +5 VDC Ports (0.16A max)			
	USB		1 x USB 2.0 Full Speed. Up to 12 Mbps RS232 speed			
	Serial		1 x RS232 up to 460.8 kbps 2 x RS232/RS422 up to 460.8 kbps			
	CAN		1 x CAN 2.0			
	Time		1 x IRIG			
	1PPS		1 x 1PPS			
	Event Marker		1 x Event Marker			
Storage	Non-removable		Up to 64 GB			
Power	Input		+5.5 to +36 VDC			
	Power Consumption		2.8 W typical			

THETA-3S DUO 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	
Magnetometers	Measurement range	Gauss	±8.0		
	Bias in-run stability, RMS	μGauss, 1σ	8		
	Noise density, PSD	μGauss /√Hz, 1σ	15		
	SF accuracy	ppm, 1σ	500		
Physical	Dimensions	97.7 x 76 x 31 mm			
	Weight	185g			
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			

*Dual-antenna GNSS measurements are dependent on GNSS RTK performance.

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.