

TECHNICAL SPECIFICATIONS



ACKCIO TILTMETER NODE BEAM-TM

MODEL

BEAM-TM Wireless Tiltmeter Node

MECHANICAL

DIMENSION 100mm x 100mm x 80mm

WEIGHT 0.7kg

MATERIAL Die-cast aluminium

SENSOR MEASUREMENTS

SENSOR Sisgeo self-compensated MEMS inclinometer

NUMBER OF AXES Biaxial

MEASUREMENT RANGE $\pm 15^\circ$

ACCURACY
 $\pm 0.003^\circ$ for $\pm 2.5^\circ$, $\pm 5.0^\circ$, and $\pm 10^\circ$ range
 $\pm 0.01^\circ$ for $\pm 15^\circ$ range
 0.01% FS

RESOLUTION 0.0001°

TEMPERATURE OFFSET $\pm 0.003^\circ/\text{C}$ (From -20°C to $+80^\circ\text{C}$)

SPECIFICATIONS FOR THERMISTOR

Measurement Range: -20°C to $+80^\circ\text{C}$ for 3K thermistor

Resolution: 0.1°C

Accuracy: $\pm 0.5^\circ\text{C}$ (0°C to $+50^\circ\text{C}$)

LOW-POWER MCU / PERIPHERALS

MCU	Ultra-low power Arm® Cortex®-M3 48MHz 32-bit CPU
MEMORY	128KB flash, 20KB ultra-low-leakage SRAM
CLOCK	High-precision RTC self-compensated in temperature (10ppm from -40°C to +80°C)
ON-BOARD SENSORS	Temperature sensor (range: -40°C to +80°C, resolution: 0.01°C, accuracy: ±1.8°C) Barometer sensor (range: 300 to 1100hPa, resolution: 0.18Pa, accuracy: ±1.7hPa)
EXTERNAL FLASH	8MB

INTERFACES

DISPLAY / KEYBOARD	LEDs	SYS - System status indication SENS - Sensing status indication
	Buttons	TEST - to test the Node RESET - to reset the Node FORMAT - to do a factory reset of the Node
USB DEVICE PORT	USB 2.0 full speed (Micro B connector) 5V, max 500 mA for mobile OTG	
IDC10 CONNECTOR	Only for firmware programming	

RF & MESH SPECIFICATIONS

RADIO BAND	ISM Band 863 - 870MHz, 902 - 928MHz
TRANSMIT POWER	Up to 1 W (30 dBm)
MODULATION	2-GFSK
CERTIFICATIONS	FCC: 2AT8M-TM-V3X0 IC: 27349-TMV3X0 CE/RED Anatel (Brazil) MoC (Israel)
ANTENNA	$\frac{1}{4}$ λ stub antenna with SMA connector
LINK DATA SPEED	50 kbps bitrate
DATA SECURITY	AES128 encrypted end-to-end data
HOPS	Up to 12
NETWORK SIZE	Up to 50 Nodes
RANGE*	Line-of-sight: Up to 5km Urban: Up to 1km Below ground: Up to 500m

*Ranges are based on a transmission power of 30dbm. Actual transmission distances may vary depending on deployment conditions.

SOFTWARE & FIRMWARE

FIRMWARE	Ackcio Mesh: Ackcio's long-range low-power mesh networking firmware
SOFTWARE	Ackcio Nimbus: Android app for device setup, network monitoring, and troubleshooting

PROTECTION

CIRCUIT PROTECTION	Surge protection DC breakdown voltage 60V ($\pm 20\%$ @100V/ μ s) Impulse breakdown voltage 500V (@5kV/ μ s) typical Short circuit protection in power outputs Reverse supply protection
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ESD	15kV
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SYSTEM POWER REQUIREMENTS

SUPPLY VOLTAGE	2.7V to 4V
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INTERNAL NON-RECHARGEABLE BATTERIES	1 x D-Cell Li-SOCl ₂ 3.6V nominal voltage Recommended capacity 19Ah
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TYPICAL CURRENT DRAIN	<20 μ A in system idle <100mA in system RX mode <300mA in system TX mode (depends on output RF power setting)
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ENVIRONMENTAL CONDITIONS

OPERATING TEMPERATURE	-40°C to +80°C
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PROTECTION	IP67
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LIFETIME (MONTHS)

MODEL	SAMPLING FREQUENCY (MINS)						BATTERY
	5	10	15	30	60	360	
BEAM-TM	6	10	12	15	16	18	1 x 19Ah D-Cell Li-SOCl ₂

NOTE: Above table is for reference only. Estimation is done under typical Singapore weather conditions. The radio transmission power was set to 21dBm. Battery lifetimes might vary depending on deployment conditions and the formed wireless mesh topology.

MOUNTING BRACKETS / PLATES

BEAM-PL-TM-HV	Horizontal/vertical mounting plate with mounting screws
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BEAM-PL-TM-R	Rail mounting double plate with mounting screws
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Ackcio BEAM-TM

External view



Ackcio BEAM-TM

with our **BEAM-PL-TM-HV** horizontal/vertical mounting plate in vertical mount position



Ackcio BEAM-TM

with our **BEAM-PL-TM-HV** horizontal/vertical mounting plate in horizontal mount position



Ackcio BEAM-TM

with our **BEAM-PL-TM-R** rail mounting double plate



Ackcio BEAM-TM

Inner view



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