

# 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

RESOLUTION                          0.0001 $^\circ$

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

SPECIFICATIONS FOR THERMISTOR                      Measurement Range:  $-20^\circ\text{C}$  to  $+80^\circ\text{C}$  for 3K thermistor  
 Resolution: 0.1 $^\circ\text{C}$   
 Accuracy:  $\pm 0.5^\circ\text{C}$  ( $0^\circ\text{C}$  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 -20°C to +80°C)
ON-BOARD SENSORS	Temperature sensor (range: -40 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	<b>LEDs</b> <ul style="list-style-type: none"><li>- SYS - System status indication</li><li>- SENS - Sensing status indication</li></ul> <b>Buttons</b> <ul style="list-style-type: none"><li>- TEST - to test the Node</li><li>- RESET - to reset the Node</li><li>- FORMAT - to do a factory reset of the Node</li></ul>
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 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 (in progress)
ANTENNA	¼ λ stub antenna with SMA connector
LINK DATA SPEED	50 kbps bitrate
DATA SECURITY	AES128 encrypted end-to-end data

## SOFTWARE & FIRMWARE

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

## PROTECTION

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

<b>SUPPLY VOLTAGE</b>	2.7V to 4V
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<b>INTERNAL NON-RECHARGEABLE BATTERIES</b>	1 x D-Cell Li-SOCI2 3.6V nominal voltage Recommended capacity 19Ah
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<b>TYPICAL CURRENT DRAIN</b>	<20 $\mu$ 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

<b>OPERATING TEMPERATURE</b>	-40°C to +80°C
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<b>PROTECTION</b>	IP67
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## LIFETIME (MONTHS)

MODEL	SAMPLING FREQUENCY (MINS)						BATTERY
	5	10	15	30	60	360	
<b>BEAM-TM</b>	12	16	18	20	21	22	1 x 19Ah D-Cell Li-SOCI2

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

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



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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