

# TECHNICAL SPECIFICATIONS

## ACKCIO ANALOGUE NODES BEAM-AN-S1 & BEAM-AN-S4



### MODELS

<b>BEAM-AN-S1</b>	Supports 1 sensor (2 analogue channels and 1 thermistor channel)
<b>BEAM-AN-S4</b>	Supports 4 sensors (8 analogue channels and 4 thermistor channels)

### MECHANICAL

	<b>BEAM-AN-S1</b>	<b>BEAM-AN-S4</b>
<b>DIMENSION</b>	100mm x 100mm x 80mm	220mm x 140mm x 80mm
<b>WEIGHT</b>	0.7kg	1.7kg
<b>MATERIAL</b>	Die-cast aluminium	Die-cast aluminium

### ANALOGUE MEASUREMENTS

<b>ADC</b>	24-bit (22 true bit) low noise differential analogue-to-digital converters Auto-calibration and auto-range Sinc-3 filter for 50-60Hz supply rejection
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<b>MEASUREMENT RATE</b>	50 SPS data acquisition with variable size moving average filter
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<b>MEASUREMENT DURATION</b>	3.2 sec @ 50 samples per second with average filter size of 15
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<b>INSTRUMENT WARMUP</b>	User-configurable Min: 1s Max: 2min
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<b>POWER SUPPLY OPTIONS FOR SENSORS</b>	Configurable Output Power (PWR) 5V @ 100mA 12V @ 90mA 24V @ 40mA  Fixed Output Power -12V @ -20mA (12VN) 5V @ 40mA (PBRG)  NOTE: All power modules are within ±5% tolerance
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<b>SPECIFICATIONS FOR VOLTAGE-OUTPUT SENSORS</b>	Measurement Range: $\pm 10V$ Resolution: 0.0001V Accuracy: $\pm 0.05\%$ FS	
<b>SPECIFICATIONS FOR CURRENT LOOP-OUTPUT SENSORS</b>	Measurement Range: 0-20mA Resolution: 0.005mA Accuracy: $\pm 0.05\%$ FS	
<b>SPECIFICATIONS FOR WHEATSTONE BRIDGE AND POTENTIOMETER SENSORS*</b>	Minimum Resistance: 120 Ohm Resolution: $1\mu V/V$ Accuracy: 0.1% FS  <small>* Supported using wheatstone bridge adaptor * Contact Ackcio for half and quarter wheatstone bridge support</small>	
<b>SPECIFICATIONS FOR THERMISTOR</b>	Measurement Range: $-20^{\circ}C$ to $+80^{\circ}C$ for 3K thermistor Resolution: $0.1^{\circ}C$ Accuracy: $\pm 0.2^{\circ}C$	
<b>ABSOLUTE INPUT LIMITS</b>	$\pm 12V$	
<b>SUSTAINED INPUT VOLTAGE W/O DAMAGE</b>	$\pm 10\%$ max (connector's input voltage from nominal value)	
<b>INPUT</b>	<b>BEAM-AN-S1</b>	<b>BEAM-AN-S4</b>
<b>ANALOGUE DIFFERENTIAL INPUTS</b>	2 differential inputs + 1 single-ended input (for thermistor)	8 differential inputs + 4 single-ended inputs (for thermistor)
<b>WIRING</b>	Push-in CAGE CLAMP (0.2 - 1.5 mm <sup>2</sup> / 24 - 16 AWG)	
<b>LOW-POWER MCU / PERIPHERALS</b>		
<b>MCU</b>	Ultra-low power Arm <sup>®</sup> Cortex <sup>®</sup> -M3 48MHz 32-bit CPU	
<b>MEMORY</b>	128KB flash, 20KB ultra-low-leakage SRAM	
<b>CLOCK</b>	High-precision RTC self-compensated in temperature (10ppm from $-40^{\circ}C$ to $+80^{\circ}C$ )	
<b>ON-BOARD SENSORS</b>	Temperature sensor (range: $-40^{\circ}C$ to $+80^{\circ}C$ , resolution: $0.01^{\circ}C$ , accuracy: $\pm 1.8^{\circ}C$ ) Barometer sensor (range: 300 to 1100hPa, resolution: 0.18Pa, accuracy: $\pm 1.7hPa$ )	
<b>EXTERNAL FLASH</b>	8MB	
<b>INTERFACES</b>		
<b>DISPLAY / KEYBOARD</b>	<b>LEDs</b>	SYS - System status indication SENS - Sensing status indication
	<b>Buttons</b>	TEST - to test the Node RESET - to reset the Node FORMAT - to do a factory reset of the Node
<b>USB DEVICE PORT</b>	USB 2.0 full speed (Micro B connector) 5V, max 500 mA for mobile OTG	
<b>IDC10 CONNECTOR</b>	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	<b>BEAM-AN-S1</b> FCC: 2AT8M-AN-S1-V3X0 IC: 27349-ANS1V3X0 CE/RED RCM(Australia & New Zealand) Anatel (Brazil) MoC (Israel)	<b>BEAM-AN-S4</b> FCC: 2AT8M-AN-S4-V3X0 IC: 27349-ANS4V3X0 CE/RED RCM(Australia & New Zealand) Anatel (Brazil)
ANTENNA	¼ 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	<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

CIRCUIT PROTECTION	Surge protection DC breakdown voltage 60V (± 20%@100V/μs) Impulse breakdown voltage 500V (@5kV/μs) typical Short circuit protection in power outputs Reverse supply protection
ESD	15kV

## SYSTEM POWER REQUIREMENTS

SUPPLY VOLTAGE	2.7V to 4V	
INTERNAL NON-RECHARGEABLE BATTERIES	<b>BEAM-AN-S1</b> 1 x D-Cell Li-SOCl <sub>2</sub> 3.6V nominal voltage Recommended capacity 19Ah	<b>BEAM-AN-S4</b> 2 x D-Cell Li-SOCl <sub>2</sub> 3.6V nominal voltage Recommended capacity 19Ah
TYPICAL CURRENT DRAIN	<20μA in system idle <100mA in system RX mode <300mA in system TX mode (depends on output RF power setting)	

## ENVIRONMENTAL CONDITIONS

OPERATING TEMPERATURE -40°C to +80°C

PROTECTION IP67

## LIFETIME (MONTHS)

MODEL	SAMPLING FREQUENCY (MINS)						SENSOR	BATTERY
	5	10	15	30	60	360		
BEAM-AN-S1	12	15	16	17	18	18	Sensor 25mA @12V Excitation 1sec	1 x 19Ah D-Cell Li-SOCI2
BEAM-AN-S4	8	12	18	24	28	36	Sensor 25mA @12V Excitation 1sec	2 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

### BEAM-BK-SM

Small multi-purpose mounting bracket (vertical/horizontal/pole) with mounting screws

### BEAM-BK-LG

Large multi-purpose mounting bracket (vertical/horizontal/pole) with mounting screws





### Ackcio BEAM-AN-S1

with our **BEAM-BK-SM** small multi-purpose mounting bracket for vertical/horizontal or pole mounting



### Ackcio BEAM-AN-S4

with our **BEAM-BK-LG** large multi-purpose mounting bracket for vertical/horizontal or pole mounting



### Ackcio BEAM-AN-S1

Inner view



### Ackcio BEAM-AN-S4

Inner view

**DISCLAIMER:** Specifications are subject to change without notice. In no event will Ackcio be liable for indirect, incidental or consequential damages arising from the use of this document.



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