

TECHNICAL SPECIFICATIONS

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



MODELS

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

MECHANICAL

BEAM-AN-S1

BEAM-AN-S4

DIMENSION	100mm x 100mm x 80mm	220mm x 140mm x 80mm
WEIGHT	0.7kg	1.7kg
MATERIAL	Die-cast aluminium	Die-cast aluminium

ANALOGUE MEASUREMENTS

ADC	24-bit (22 true bit) low noise differential analog-to-digital converters Auto-calibration and auto-range Sinc-3 filter for 50-60Hz supply rejection
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MEASUREMENT RATE	50 SPS data acquisition with variable size moving average filter
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MEASUREMENT DURATION	3.2 sec @ 50 samples per second with average filter size of 15
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INSTRUMENT WARMUP	User-configurable Min: 1s Max: 2min
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POWER SUPPLY OPTIONS FOR SENSORS	Configurable Output Power (PWR) 5V @ 100mA 12V @ 90mA 24V @ 40mA
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Fixed Output Power -12V @ -20mA (12VN) 5V @ 40mA (PBRG)
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NOTE: All power modules are within $\pm 5\%$ tolerance

SPECIFICATIONS FOR VOLTAGE-OUTPUT SENSORS	Measurement Range: $\pm 10V$ Resolution: 0.0001V Accuracy: $\pm 0.05\%$ FS
SPECIFICATIONS FOR CURRENT LOOP-OUTPUT SENSORS	Measurement Range: 0-20mA Resolution: 0.005mA Accuracy: $\pm 0.05\%$ FS
SPECIFICATIONS FOR WHEATSTONE BRIDGE AND POTENTIOMETER SENSORS	Minimum Resistance: 150 Ohm Resolution: 0.1mV/V Accuracy: 0.25% FS
SPECIFICATIONS FOR THERMISTOR	Measurement Range: $-20^{\circ}C$ to $+80^{\circ}C$ for 3K thermistor Resolution: 0.1 $^{\circ}C$ Accuracy: $\pm 0.2^{\circ}C$
ABSOLUTE INPUT LIMITS	$\pm 12V$
SUSTAINED INPUT VOLTAGE W/O DAMAGE	$\pm 10\%$ max (connector's input voltage from nominal value)

INPUT	BEAM-AN-S1	BEAM-AN-S4
ANALOGUE DIFFERENTIAL INPUTS	2 differential inputs + 1 single-ended input (for thermistor)	8 differential inputs + 4 single-ended inputs (for thermistor)
WIRING	Push-in CAGE CLAMP (0.2 - 1.5 mm ² / 24 - 16 AWG)	

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 $-40^{\circ}C$ to $+80^{\circ}C$)
ON-BOARD SENSORS	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: $\pm 1.7hPa$)
EXTERNAL FLASH	8MB

INTERFACES

DISPLAY / KEYBOARD	<p>LEDs</p> <ul style="list-style-type: none"> - SYS - System status indication - SENS - Sensing status indication <p>Buttons</p> <ul style="list-style-type: none"> - 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 SPECIFICATIONS

RADIO BAND ISM Band 863 - 870MHz, 902 - 928MHz

TRANSMIT POWER Up to 1 W (30 dBm)

MODULATION 2-GFSK

CERTIFICATIONS	BEAM-AN-S1 FCC: 2AT8M-AN-S1-V3X0 IC: 27349-ANS1V3X0 CE/RED Anatel (in progress)	BEAM-AN-S4 FCC: 2AT8M-AN-S4-V3X0 IC: 27349-ANS4V3X0 CE/RED Anatel (in progress)

ANTENNA $\frac{1}{4} \lambda$ stub antenna with SMA connector

LINK DATA SPEED 50 kbps bitrate

DATA SECURITY AES128 encrypted end-to-end data

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

ESD 15kV

SYSTEM POWER REQUIREMENTS

SUPPLY VOLTAGE 2.7V to 4V

INTERNAL NON-RECHARGEABLE BATTERIES	BEAM-AN-S1 1 x D-Cell Li-SOCI2 3.6V nominal voltage Recommended capacity 19Ah	BEAM-AN-S4 2 x D-Cell Li-SOCI2 3.6V nominal voltage Recommended capacity 19Ah

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)

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	13	16	18	20	21	22	Sensor 25mA @12V Excitation 1sec	1 x 19Ah D-Cell Li-SOCI2
BEAM-AN-S4	11	18	22	29	35	43	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

PRODUCT IMAGES



Ackcio BEAM-AN-S1



Ackcio BEAM-AN-S4



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)

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