

TECHNICAL SPECIFICATIONS

ACKCIO VIBRATING WIRE NODES BEAM-VW-S1 & BEAM-VW-S8



MODELS

| | |
|-------------------|---|
| BEAM-VW-S1 | Supports 1 sensor (1 vibrating wire channel, 1 pulse counter, and 1 thermistor channel) |
| BEAM-VW-S8 | Supports 8 sensors (8 vibrating wire channels and 8 thermistor channels) |

MECHANICAL

BEAM-VW-S1

BEAM-VW-S8

DIMENSION

100mm x 100mm x 80mm

220mm x 140mm x 80mm

WEIGHT

0.7kg

1.7kg

MATERIAL

Die-cast aluminium

Die-cast aluminium

VIBRATING WIRE MEASUREMENTS

VIBRATING WIRE MODULE

12-bit differential analogue-to-digital converter

MEASUREMENT RATE

5 samples per second data acquisition with variable size moving average filter after resonant frequency lock

MEASUREMENT DURATION

5s per measurement cycle

VIBRATING WIRE READING SPECIFICATIONS

Excitation Wave: 8V peak-to-peak sweep
 Measurement Range: 450 - 6000Hz
 Resolution: 0.01Hz
 Accuracy: $\pm 0.04\%$ FS

THERMISTOR READING SPECIFICATIONS

Measurement Range: -20°C to $+80^{\circ}\text{C}$ for 3K thermistor
 Resolution: 0.1°C
 Accuracy: $\pm 0.2^{\circ}\text{C}$

SUSTAINED INPUT VOLTAGE W/O DAMAGE

3.6V DC max

SENSOR RESISTANCE

50 Ohms

| INPUT | BEAM-VW-S1 | BEAM-VW-S8 |
|------------------------------|---|---|
| ANALOGUE DIFFERENTIAL INPUTS | 1 vibrating wire channel, 1 thermistor channel, and 1 pulse counter | 8 vibrating wire channels and 8 thermistor channels |
| 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°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 | BEAM-VW-S1 FCC: 2AT8M-VW-S1-V3X0 IC: 27349-VWS1V3X0 CE/RED RCM(Australia & New Zealand) Anatel (Brazil) | BEAM-VW-S8 FCC: 2AT8M-VW-S8-V3X0 IC: 27349-VWS8V3X0 CE/RED RCM(Australia & New Zealand) Anatel (Brazil) MoC (Israel) |
| 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

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-VW-S1

1 x D-Cell Li-SOCl₂ 3.6V nominal voltage
 Recommended capacity 19Ah

BEAM-VW-S8

2 x D-Cell Li-SOCl₂ 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) | | | | | | BATTERY |
|------------|---------------------------|----|----|----|----|-----|--------------------------------------|
| | 5 | 10 | 15 | 30 | 60 | 360 | |
| BEAM-VW-S1 | 3 | 6 | 8 | 12 | 14 | 18 | 1 x 19Ah D-Size Li-SOCl ₂ |
| BEAM-VW-S8 | 1 | 2 | 3 | 6 | 9 | 24 | 2 x 19Ah D-Size 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-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-VW-S1

External view



Ackcio BEAM-VW-S8

External view



Ackcio BEAM-VW-S1

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



Ackcio BEAM-VW-S8

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

Ackcio BEAM-VW-S1

Inner view



Ackcio BEAM-VW-S8

Inner view



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