ALTHEN
SENSORS & CONTROLS

ANALOGUE NODES BM-Y1-C1 & BM-Y1-C4

Technical Manual

Further information can be found at
www.althensensors.com

Specification

Model	
BM-Y1-C1	Supports 1 sensor (2 analogue channels and 1 thermistor channel)
BM-Y1-C4	Supports 4 sensors (8 analogue channels and 4 thermistor channels)

Mechanical	**BM-Y-C1**	**BM-Y-C4**
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 analogue-to-digital converters Auto-calibration and auto-range Sinc-3 filter for 50-60Hz supply rejection
Measurement rate	50 SPS data acquisition with variable size moving average filter
Measurement duration	3.2 sec @ 50 samples per second with average filter size of 15
Instrument warmup	User-configurable Min: 1s Max: 2min
Power supply options for sensor	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
Specifications for voltage-output sensors	Measurement Range: ±10V Resolution: 0.0001V Accuracy: ±0.05% FS
Specifications for current loop-output sensors	Measurement Range: 0-20mA Resolution: 0.005mA Accuracy: ±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°C to +80°C for 3K thermistor Resolution: 0.1°C Accuracy: ±0.2°C
Absolute input limits	±12V
Sustained input voltage w/o damage	±10% max (connector's input voltage from nominal value)

Input	**BM-Y-C1**	**BM-Y-C4**
Analog 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 mm2 / 24 - 16 AWG)	

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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	BM-Y1-C1	BM-Y1-C4
	FCC: 2AT8M-AN-S1-V3X0 IC: 27349-ANS1V3X0 CE/RED Anatel (Brazil) MoC (Israel)	FCC: 2AT8M-AN-S4-V3X0 IC: 27349-ANS4V3X0 CE/RED 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 and Firmware

Firmware	Long-range low-power mesh networking firmware
Software	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

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System Power Requirements

Supply voltage	ISM Band 863 - 870MHz, 902 - 928MHz	
Internal non-rechargeable batteries	BM-Y1-C1 1 x D-Cell Li-SOCl2 3.6V nominal voltage Recommended capacity 19Ah	BM-Y1-C4 2 x D-Cell Li-SOCl2 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		
BM-Y1-C1	12	15	16	17	18	18	Sensor 25mA @12V Excitation 1sec	1 x 19Ah D-Cell Li-SOCl2
BM-Y1-C4	8	12	18	24	28	36	Sensor 25mA @12V Excitation 1sec	2 x 19Ah D-Cell Li-SOCl2

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

BM-Y-BKSM	Small multi-purpose mounting bracket (vertical/horizontal/pole) with mounting screws
BM-Y-BKLG	Large multi-purpose mounting bracket (vertical/horizontal/pole) with mounting screws

BM-Y1-C1

External view

BM-Y1-C4

External view

ANALOGUE NODES BM-Y1-C1 & BM-Y1-C4

BM-Y1-C1

with our **BM-Y-BKSM** large multi-purpose mounting bracket for vertical/horizontal or pole mounting

BM-Y1-C4

with our **BM-Y-BKLG** large multi-purpose mounting bracket for vertical/horizontal or pole mounting

BM-Y1-C1

Inner view

BM-Y1-C4

Inner view

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