# JukeBlox Networked Media Module
# CR Series

## Datasheet

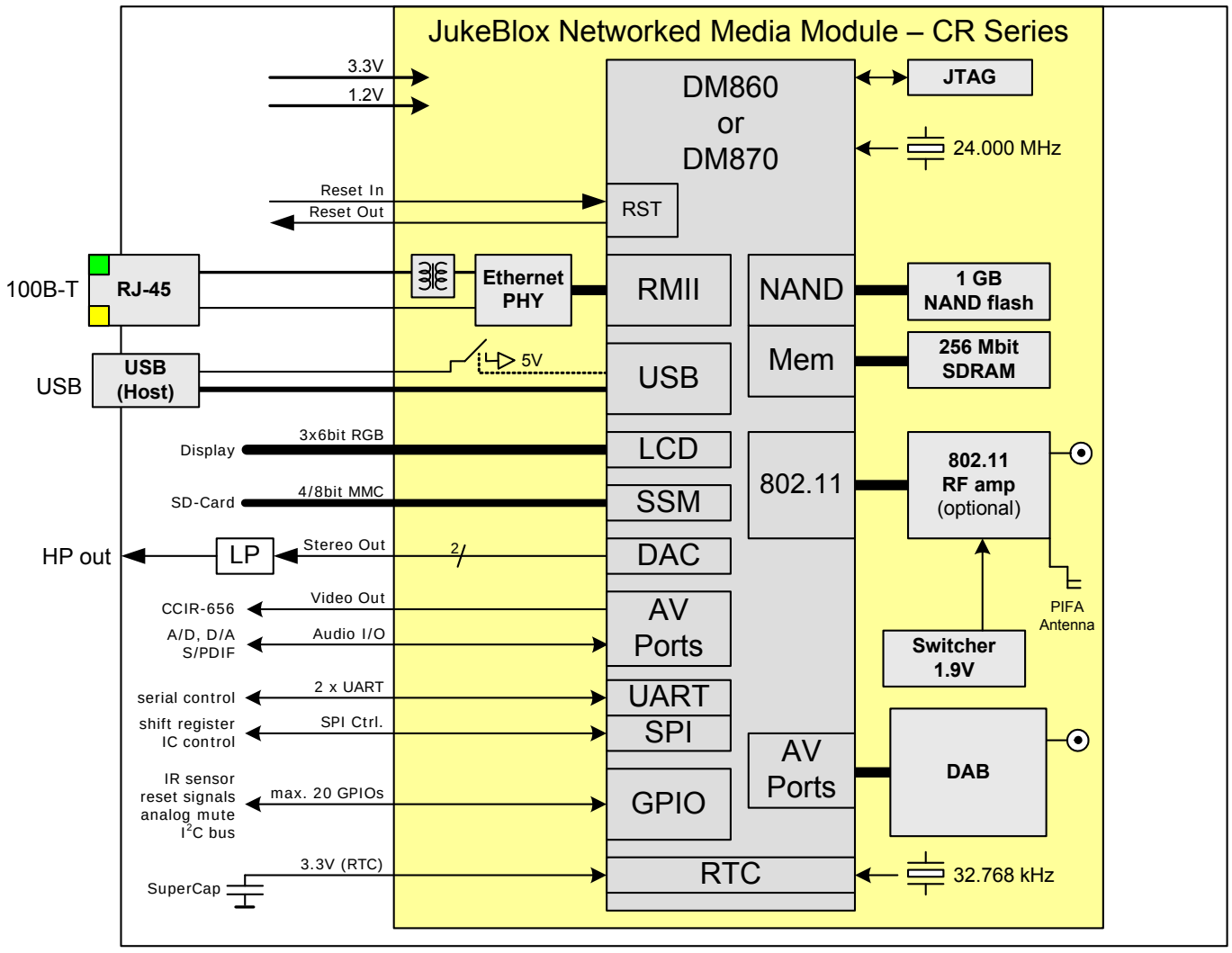
Complete audio networking system on a small module
Integrated Ethernet + USB2.0
WiFi-certified 802.11b/g (optional)
Built-in PIFA antenna
DAB radio receiver (optional)
Glueless audio, video and control ports
FCC certified

## CONFIDENTIAL

## Introduction

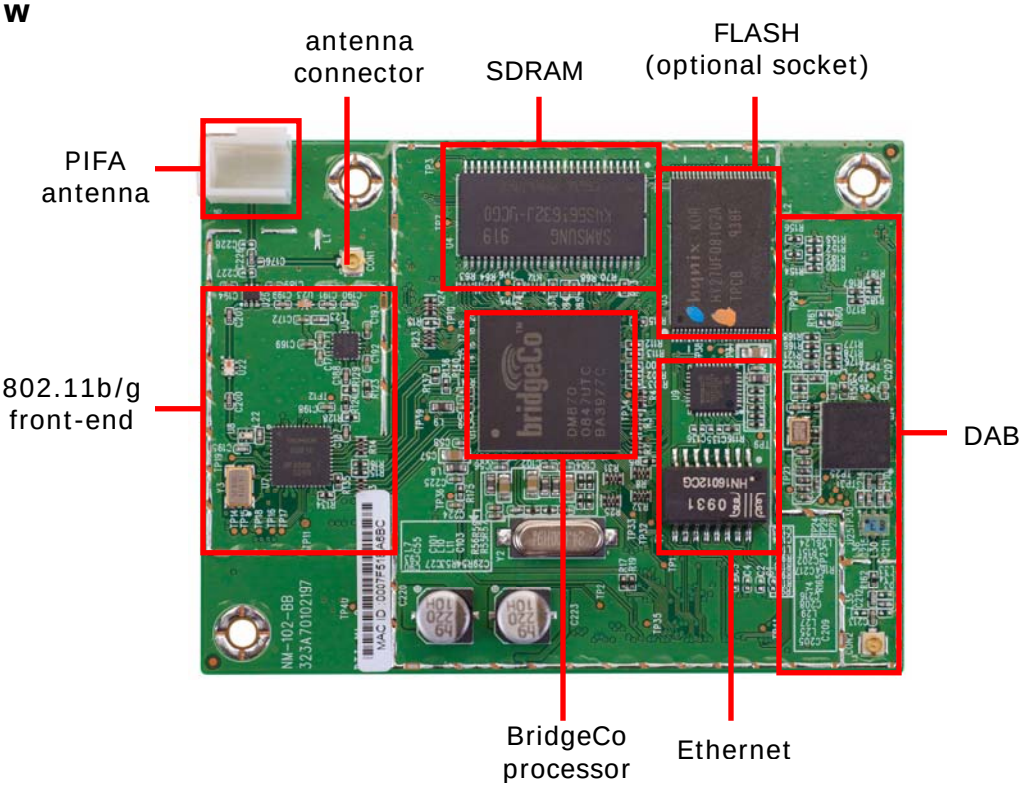
The CR-series module is a single-board networked media player module, based on BridgeCo's DM860 and DM870 media processors, and enables fast product developments with Ethernet, USB and optional WiFi and/or DAB radio connectivity. The module connects to standard legacy components in various audio, video/LCD and control formats.

## Block Diagram

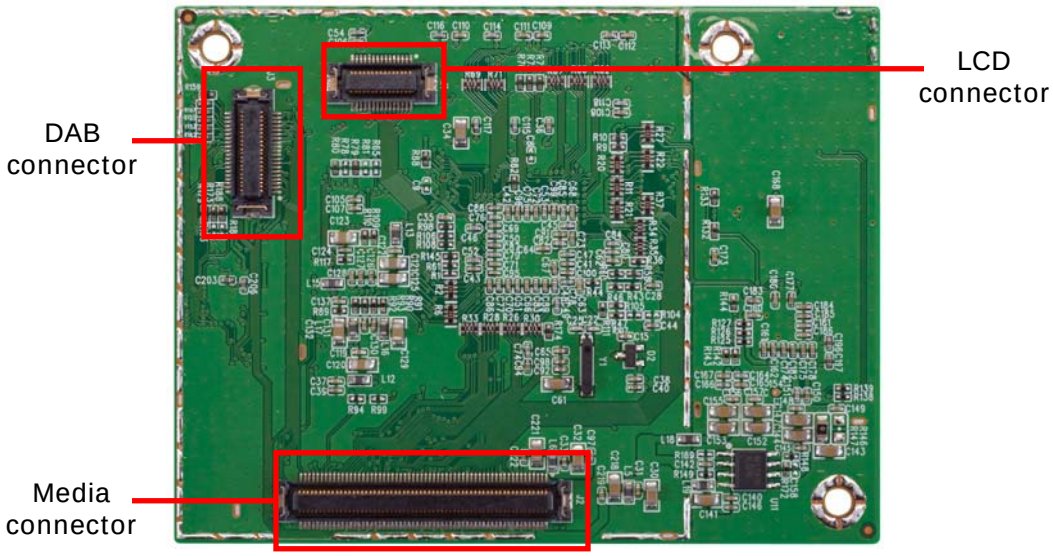


# Overview

## Top View




## Bottom View



# Ordering Guide

| Part Number | BridgeCo ICs | WiFi | Ethernet | USB | Real-Time Clock | DAB / DAB+ / DMB Audio | LCD | PIFA Ant. |
|---|---|---|---|---|---|---|---|---|
| | | Contains shield | | | | Incl. connector | Incl. connector | |
| **CR870-2A** | DM870+T6201 | X | X | X | X | X | X | X |
| **CR870-2B** | DM870+T6201 | X | X | X | | | X | X |
| **CR870-2C** | DM870+T6201 | X | X | | | | X | X |
| **CR870-2D** | DM870+T6201 | X | | X | X | | X | X |
| **CR870-2F** | DM870+T6201 | X | X | X | X | | X | X |
| | | | | | | | | |
| **CR860-2A** | DM860 | n/a | X | X | | | | n/a |
| **CR860-2B** | DM860 | n/a | X | X | X | | X | n/a |

# Electrical Specifications

| Parameter | State | Model | Component | Symbol | min. | typ. | max. | Units |
|---|---|---|---|---|---|---|---|---|
| Input Voltage | | | Main | VIN | +2.97<br>+1.08 | +3.3<br>+1.2 | +3.63<br>+1.32 | V<br>V |
| | | | DAB | VIN | +1.62<br>+2.97<br>+1.35 | +1.8<br>+3.3<br>+1.5 | +1.98<br>+3.63<br>+1.65 | V<br>V<br>V |
| Power Consumption | Reset State | CR870<br>CR860 | | PIN | tbd<br>tbd | tbd<br>tbd | tbd<br>tbd | W<br>W |
| | WLAN Operating | CR870<br>CR860 | | PIN | tbd<br>tbd | tbd<br>tbd | tbd<br>tbd | W<br>W |

# Operating Conditions

| Parameter | min. | max. | Units |
|---|---|---|---|
| Operating Temperature | 0 | +70 | °C |
| Operating Humidity | 10 | 90 (non condensing) | %RH |
| Storage Temperature | -10 | +75 | °C |
| Storage Humidity | 10 | 95 (non condensing) | %RH |
| Storage Temperature Cycle Test 24 hrs | -10 | +75 | °C |

## WiFi Specification (CR870 only)

| Feature | Description |
|---|---|
| WLAN Standards | IEEE 802.11b<br>IEEE 802.11g |
| Frequency Band | 2.412 – 2.497 GHz (2.4GHz ISM Band, 14 Channels)<br>Channel 1 - Channel 13, Channel 14<br>North America, Japan Telec, Europe ETSI |
| Modulation | 802.11b mode (DS-SS: IEEE 802.11b)<br>802.11g mode (OFDM: IEEE 802.11g) |
| Transmission Speed | 802.11b mode<br>11Mbps, 5.5Mbps, 1Mbps<br>802.11g mode<br>54Mbps, 48Mbps, 36Mbps, 24Mbps, 18Mbps, 12Mbps, 9Mbps, 6Mbps |
| Tx Power | 802.11b mode (16.5dBm, +/-1dBm)<br>802.11g mode (21dBm, +/-1dBm) |
| Power-on Ramp | < 2us |
| RF Carrier Suppression | < 15dBc |
| TX EVM | < -5dB |
| Rx Sensitivity<br>(incl. CE2 Mother board) | 802.11b mode<br>=<-88dBm @ 1Mbps, =<-85dBm @ 5.5Mbps, =<-83dBm @ 11Mbps<br>802.11g mode<br>=<-86dBm @ 6Mbps, =<-75dBm @ 36Mbps, =<-69dBm @ 54Mbps |
| Throughput Rate<br>(measured for each module) | See factory test specification |

## Regulatory compliance

| Description | Country | Compliance |
|---|---|---|
| Electromagnetic Compatibility<br>(Prescan) | USA<br>Europe | FCC CFR47 Part15B<br>EN 55022<br>EN 55024<br>EN 61000-3-2<br>EN 61000-3-3<br>EN 61000-4-2<br>EN 61000-4-3<br>EN 61000-4-4<br>EN 61000-4-5<br>EN 61000-4-6<br>EN 61000-4-8<br>EN 61000-4-11 |
| Radio Regulations (CM870 only) | TBD | TBD |

## RoHS

Uses only RoHS compliant components

## Environmental Test

Withstands 4 hours at 70°C, 90% RH

## ESD and Transient Test (Applies to LAN and USB external connections only)

ESD: +/- 2kV operation, +/- 4kV no destruction (part of CE test)
Fast electrical transients: +/- 500V operation, +/- 1000V no destruction (part of CE test)

## Magnetic Field Test

Passes EN55022 and EN55024 (part of CE test)

## MTBF

>10000 hours

## Mechanical Specifications

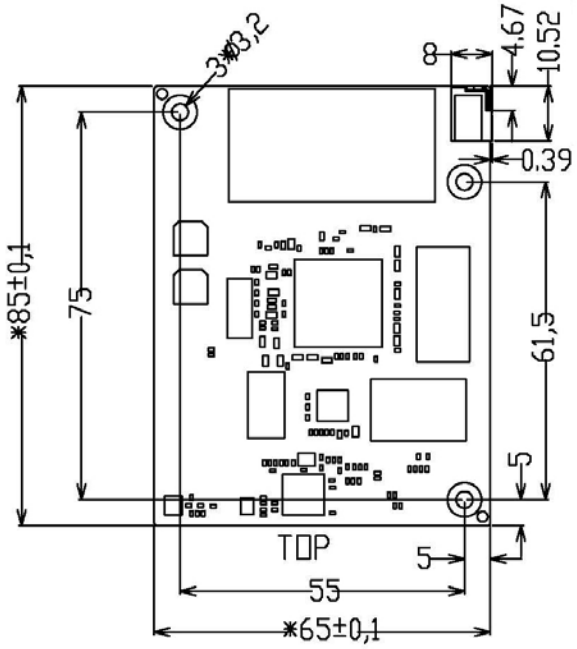
Passes drop test according to I.E.C. 68-2-32, height 100 cm, 1 corner, 6 faces.
Passes vibration test with sine, vertical, 60 minutes, 600 to 18000 cpm, 1G

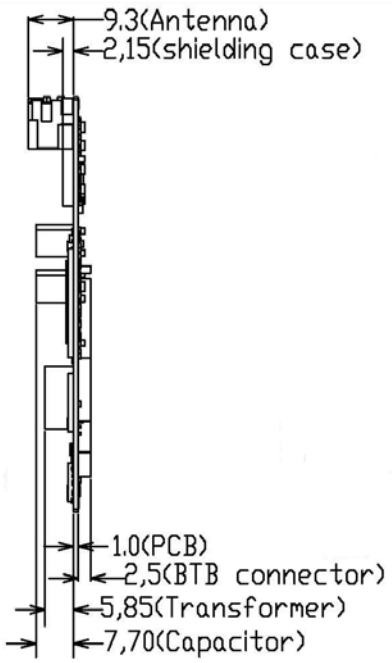
## Module Quality

Defect Rate: 7 months <0.5% failures, 14 months <1% failures
AQL CR=0, MA=0.4, MI=0.4

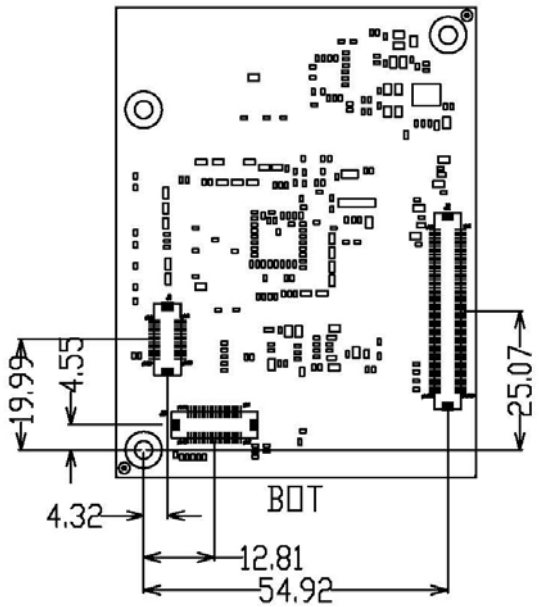
# Board Dimensions

## Top View and Side View




## Bottom View (showing connector locations)




Note:

1. All dimensions are measured in **millimetres** (mm).
2. PCB's thickness: 1.00 +/- 0.10mm
3. Tolerance: +/-0.10mm
4. Outline Tolerance: +/-0.10mm
5. NPTH Hole: +/-0.05mm
6. PTH Hole: +/-0.075mm

## Module weight

CR860-1: 25g
CR870-1: 25g

## Connectors

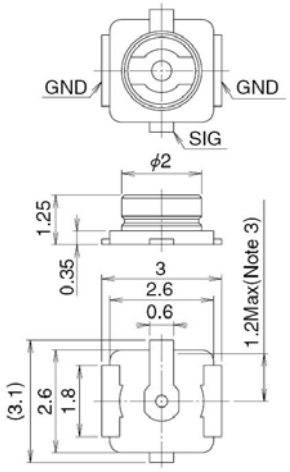
### WLAN Antenna Connectors (optional)

One coaxial antenna connector is provided as an alternative to the built-in PIFA antenna. The choice between using the PIFA antenna or using the coaxial socket is a build option, determined by the position of a surface mount capacitor on the module PCB. Please see ordering guide for build option details.

The surface-mount receptible parts:

Hirose
U.FL-R-SMT (CL No. 331-0471-0)

### Coaxial antenna connector dimensions




## Module Connectors

The CR860/CR870 module uses 3 male connectors as interfaces to the main board, described below.

| Connector Number | Connector Purpose | Connector Type | Number of Pins | Pin Configuration | Female Mating Connector Part Numbers |
|---|---|---|---|---|---|
| J1 | LCD | B2B Connector | 30 | 2 x 15 x 0.5mm | 24-5046-030-100-829 (Kyocera) |
| J2 | Media | | 120 | 2 x 60 x 0.5mm | 24-5046-120-100-829 (Kyocera) |
| J3 | DAB | | 40 | 2 x 20 x 0.5mm | 24-5046-040-100-829 (Kyocera) |

The pinout and signal names are shown on the next page. The following table provides an overview for the most important control and interface signals.

## Key Connections

| Signal(s) | Connector ID | Pin Number(s) | Description |
|---|---|---|---|
| VIN | J2 | 3, 4, 5, 6 | Input voltage; +3.3V |
| | J2 | 9, 10, 11, 12 | Input voltage; +1.2V |
| | J3 | 4, 6 | Input voltage; +1.8V |
| | J3 | 10 | Input voltage; +3.3V |
| | J3 | 12 | Input voltage; +1.5V |
| SPI_DOUT<br>SPI_DIN<br>SPI_CLK<br>SPI_NCS0, 1 | J2<br>J2<br>J2<br>J2 | 25<br>27<br>29<br>30, 32 | SPI bus from DM870's SPI controller. |
| RXD1, TXD1 | J2 | 35, 37 | 3.3V logic level UART I/Os for the debug UART. Provide external RS-232 transceiver to connect to a PC's COM port. |
| NRESET | J2 | 34 | Low-active input to reset the module; internal 10K pull-up |
| NPD_RF | J2 | 119 | Low-active input to shut down the power for the 802.11 Rf part; internal 10K pull-up |
| AOUTLP/AOUTLN | J2 | 63, 65 | Differential stereo output from PWM-DAC. |
| AOUTRP/AOUTRN | J2 | 60, 58 | |
| BIST activate | J2 | 48 | Low-active input to invoke the production BIST; DM870-internal pull-up |
| Factory Reset | J2 | 68 | High-active input to reset the configuration; DM870-internal pull-down |
| IR input | J2 | 70 | Infrared sensor input. This is a Schmitt-Trigger input and can handle interrupt inputs with slow slopes. |
| ETH_NRESET | J2 | 72 | Low-active reset for the on-board Ethernet phy. This output is driven by the DM870 and is not suited for other purpose. |
| SDA, SCL | J2 | 73, 75 | I2C bus created by GPIO-14 and GPIO-13. No internal pull-ups; if I2C is to be used, please add the proper external pull-up resistors. |
| ETH_LED_ACT<br>ETH_LED_SPEED | J2<br>J2 | 100<br>102 | 3.3V push-pull outputs (max. ±12mA) to drive the Ethernet LEDs. A low-level indicates 100Mbps mode and activity respectively. |

## Detailed Connector PIN Descriptions

### J2 – Media Connector

| Function | GPIO | Signal | IC PIN | Power | PIN Number | | Power | IC PIN | Signal | GPIO | Function |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | GND | 1 | 2 | GND | | | | |
| | | | | VIN (+3.3V) | 3 | 4 | VIN (+3.3V) | | | | |
| | | | | VIN (+3.3V) | 5 | 6 | VIN (+3.3V) | | | | |
| | | | | GND | 7 | 8 | GND | | | | |
| | | | | VIN (+1.2V) | 9 | 10 | VIN (+1.2V) | | | | |
| | | | | VIN (+1.2V) | 11 | 12 | VIN (+1.2V) | | | | |
| | | | | GND | 13 | 14 | GND | | | | |
| | | | | VIN_OUTSIDE (+1.9V) | 15 | 16 | VIN_OUTSIDE (+1.9V) | | | | |
| | | | | GND | 17 | 18 | GND | | | | |
| | | | F4 | 3V3RTC | 19 | 20 | GND | | | | |
| | | | | GND | 21 | 22 | | B20 | TMS | JTAG | |
| | | | | GND | 23 | 24 | | A20 | TCK | | |
| SPI | | SPI_DOUT | E17 | | 25 | 26 | | B19 | TDI | | |
| | | SPI_DIN | F17 | | 27 | 28 | | A19 | TDO | | |
| | | SPI_CLK | D17 | | 29 | 30 | | D16 | SPI_NCS0 | SPI | |
| | | TXD0 | C17 | | 31 | 32 | | D15 | SPI_NCS1 | | |
| | | RXD0 | A18 | | 33 | 34 | | | NRESET_MOD | | |
| Debug UART | | RXD1 | B17 | | 35 | 36 | | B16 | SSMD6 | GPIO-10 | SPI_E_CLK |
| | | TXD1 | A17 | | 37 | 38 | | C15 | SSMD4 | GPIO-08 | SPI_E_SDO |
| | | | | GND | 39 | 40 | | A15 | SSMD2 | | |
| SPI_E_NCS | GPIO-11 | SSMD7 | C16 | | 41 | 42 | | C14 | SSMD1 | | |
| SPI_E_SDI | GPIO-09 | SSMD5 | A16 | | 43 | 44 | | A14 | SSMCMD | | |
| | | SSMD3 | B15 | | 45 | 46 | | C11 | SSMWP | | |
| | | SSMD0 | B14 | | 47 | 48 | | M18 | NCS3 | GPIO-17 | BIST activate |
| | | SSMCLK | C13 | | 49 | 50 | | L18 | NCS2 | GPIO-19 | |
| | | SSMCP | C12 | | 51 | 52 | GND | | | | |
| | | | | GND | 53 | 54 | | | USB_VBUS | USB | |
| USB | | USB_DN | A1 | | 55 | 56 | GND | | | | |
| | | USB_DP | B1 | | 57 | 58 | | K2 | AOUTRN | | |
| | | USBVBUSDRV | | | 59 | 60 | | J2 | AOUTRP | | |
| | | | | GND | 61 | 62 | GND | | | | |
| | | AOUTLP | H3 | | 63 | 64 | | L1 | PDOUT1 | GPIO-06 | |
| | | AOUTLN | J3 | | 65 | 66 | | L2 | VCO1 | GPIO-07 | |
| | | | | GND | 67 | 68 | | M1 | PDOUT0 | GPIO-04 | Factory reset |
| | GPIO-16 | A23 | K20 | | 69 | 70 | | M2 | VCO0 | GPIO-05 | IR input |
| IRQ input | GPIO-18 | A22 | K19 | | 71 | 72 | | U3 | AV3CLK | GPIO-12 | ETH NRESET |
| I2C SDA | GPIO-14 | AV3CTRL1 | V1 | | 73 | 74 | | M3 | AV0CTRL0 | | |
| I2C SCL | GPIO-13 | AV3CTRL0 | V2 | | 75 | 76 | | P3 | AV1DATA3 | | |
| | | AV0CTRL2 | K3 | | 77 | 78 | | R1 | AV1DATA2 | Video Output | |
| | | AV0CTRL1 | L3 | | 79 | 80 | | R2 | AV1DATA1 | | |
| | | AV0CLK | N1 | | 81 | 82 | | R3 | AV1DATA0 | | |
| Video Output | | AV0DATA3 | N2 | | 83 | 84 | GND | | | | |
| | | AV0DATA2 | N3 | | 85 | 86 | | T1 | AV2CTRL1 | | MCLK |
| | | AV0DATA1 | P1 | | 87 | 88 | GND | | | | |
| | | AV0DATA0 | P2 | | 89 | 90 | | R4 | AV2CLK | | SCLK |
| | | | | GND | 91 | 92 | GND | | | | |
| LRCK | | AV2CTRL0 | T2 | | 93 | 94 | | W2 | AV4DATA1 | | SPDIF output |
| A/D data 1 | | AV2DATA3 | T3 | | 95 | 96 | | Y1 | AV4DATA0 | | SPDIF input |
| A/D data 0 | | AV2DATA2 | T4 | | 97 | 98 | GND | | | | |
| D/A data 1 | | AV2DATA1 | U1 | | 99 | 100 | | | ETH_LED_ACT | Ethernet | |
| D/A data 0 | | AV2DATA0 | U2 | | 101 | 102 | | | ETH_LED_SPEED | | |
| | | | | GND | 103 | 104 | | Y14 | MIICRS | GPIO-00 | |
| | | ETH_RX- | | | 105 | 106 | | W14 | MIICOL | GPIO-01 | |
| Ethernet | | ETH_RX+ | | | 107 | 108 | | V10 | MIITXER | GPIO-02 | |
| | | ETH_CT | | | 109 | 110 | | V11 | MIITXCLK | GPIO-03 | |
| | | ETH_TX- | | | 111 | 112 | | W10 | MIITXD0 | | |
| | | ETH_TX+ | | | 113 | 114 | | Y10 | MIITXD1 | | |
| | | | | GND | 115 | 116 | | W12 | MIIRXD0 | | |
| | GPIO-15 | NWAIT | N18 | | 117 | 118 | | Y12 | MIIRXD1 | | |
| | | NPD_RF | | | 119 | 120 | GND | | | | |

## J1 – LCD Connector

| Function | GPIO | Signal | IC PIN | Power | PIN Number | | Power | IC PIN | Signal | GPIO | Function |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | GND | 1 | 2 | GND | | | | |
| LCD Interface | | LCDD0 | Y7 | | 3 | 4 | | W7 | LCDD1 | LCD Interface | |
| | | LCDD2 | V7 | | 5 | 6 | | Y6 | LCDD3 | | |
| | | LCDD4 | W6 | | 7 | 8 | | V6 | LCDD5 | | |
| | | LCDD6 | U6 | | 9 | 10 | | Y5 | LCDD7 | | |
| | | LCDD8 | W5 | | 11 | 12 | | V5 | LCDD9 | | |
| | | LCDD10 | U5 | | 13 | 14 | | Y4 | LCDD11 | | |
| | | LCDD12 | W4 | | 15 | 16 | | V4 | LCDD13 | | |
| | | LCDD14 | U4 | | 17 | 18 | | Y3 | LCDD15 | | |
| | | LCDD16 | W3 | | 19 | 20 | | Y2 | LCDD17 | | |
| | | | | GND | 21 | 22 | GND | | | | |
| LCD Interface | | LCDCLK | Y9 | | 23 | 24 | | W9 | LCDCTRL0 | LCD Interface | |
| | | LCDCTRL1 | Y8 | | 25 | 26 | | W8 | LCDCTRL2 | | |
| | | LCDCTRL3 | V8 | | 27 | 28 | GND | | | | |
| | | | | GND | 29 | 30 | GND | | | | |

## J3 – DAB Connector

| Function | GPIO | Signal | PNM3030E PIN | Power | PIN Number | | Power | PNM3030E PIN | Signal | GPIO | Function |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | GND | 1 | 2 | GND | | | | |
| | | RESETB | 30 | | 3 | 4 | VIN (+1.8V) | | | | |
| | | RF_I2C_CK | 39 | | 5 | 6 | VIN (+1.8V) | | | | |
| | | I2C_SDA_DAB | 3 | | 7 | 8 | | 40 | RF_I2C_DT | | |
| | | I2C_SCL_DAB | 46 | | 9 | 10 | VIN (+3.3V) | | | | |
| | | | | GND | 11 | 12 | VIN (+1.5V) | | | | |
| | | TEST_1 | 79 | | 13 | 14 | | 80 | TEST_2 | | |
| SPI | | DAB_SPI_MOSI | 19 | | 15 | 16 | | 78 | TEST_0 | | |
| | | DAB_SPI_CSB | 17 | | 17 | 18 | | 18 | DAB_SPI_CLK | SPI | |
| | | | | GND | 19 | 20 | | 16 | DAB_SPI_MISO | | |
| | | | | GND | 21 | 22 | GND | | | | |
| | | | | GND | 23 | 24 | | 14 | INT_0 | | |
| | | | | GND | 25 | 26 | | 15 | INT_1 | | |
| | | MPEG_ERR | 4 | | 27 | 28 | | 47 | MPEG_CLK | | |
| | | MPEG_SYNC | 5 | | 29 | 30 | | 48 | MPEG_VAL | | |
| | | MPEG_DAT7 | 6 | | 31 | 32 | | 7 | MPEG_DAT6 | | |
| | | MPEG_DAT5 | 51 | | 33 | 34 | | 8 | MPEG_DAT4 | | |
| | | MPEG_DAT3 | 52 | | 35 | 36 | | 9 | MPEG_DAT2 | | |
| | | MPEG_DAT1 | 10 | | 37 | 38 | | 53 | MPEG_DAT0 | | |
| | | | | GND | 39 | 40 | GND | | | | |

## Revision Control

| Revision | Date / Author | Remarks |
|---|---|---|
| | | |
| V2.5 | Feb. 10, 2010 / SHs | • Updated "Ordering Guide" table<br>• Added new coaxial text in "WLAN Antenna Connectors" section<br>• Added manufacturer name to "Module Connectors" table |
| V2.4 | Feb. 08, 2010 / SHs | • Updated Rx Sensitivity description in "WiFi Specification" table |
| V2.3 | Feb. 03, 2010 / SHs | • "Key Connectors" table title changed to "Key Connections"<br>• Updated entries in "Key Connections" table<br>• Updated pins 1, 2, 25, 27, 58 & 60 in "J2 – Media Connector" table |
| V2.2 | Feb. 02, 2010 / SHs | • Added new items to "WiFi Specification" table<br>• Amended Block Diagram to show input of 1.2V instead of 1.8V |
| V2.1 | Jan. 04, 2010 / SHs | • Updated header layout<br>• Removed "CR860/CR870" from data sheet title<br>• Left justified Key Features list on front page<br>• New Ordering Guide table<br>• Updated Module Weights |
| V2.0 | Jan. 02, 2010 / JWs and SHs | • New header and footer layout<br>• Fit front and back Overview images onto one page<br>• Bulletise Revision Control table |
| V1.1 | Dec. 18, 2009 / SHs | • Changed Core Module name to "JukeBlox Networked Media Module(CR Series)"<br>• Front page revisions: removed front and back images of board; inserted angled image of board; moved Key Features list to front page<br>• Moved Disclaimers page to end of document<br>• Replaced previous board images (front and back) in Overview section with better quality images<br>• Added box and label to BridgeCo processor in Overview images<br>• Revised Ordering Guide<br>• Reduced Board Dimension drawings to fit on one page<br>• Added mating connector part numbers to Module Connectors section. |
| V1.0 | Dec. 9, 2009 / SHs | Initial version |



## Trademarks

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## Warranty Limitations

BridgeCo assumes no responsibility for inaccuracies, errors, or omissions in this document. BridgeCo assumes no responsibility for the use of this information, and all use of such information shall be entirely at the user's own risk. Prices and specifications are subject to change without notice.

## Module Revision History

To be determined.

## CAUTION

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications not expressly approved by the party responsible for compliance could void the authority to operate equipment.

## Information for the OEMs and Integrators

The following statement must be included with all versions of this document supplied to an OEM or integrator, but should not be distributed to the end user.

This device is intended for OEM integrators only.
Please See the full Grant of Equipment document for other restrictions.
This device must be operated and used with a locally approved access point.

## Information To Be Supplied to the End User by the OEM or Integrator

The following regulatory and safety notices must be published in documentation supplied to the end user of the product or system incorporating an adapter in compliance with local regulations. Host system must be labeled with "Contains FCCID:PPQ-CR8702G“, FCC ID displayed on label.

## Warning

"Industry Canada regulatory information Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device. ""The user is cautioned that this device should be used only as specified within this manual to meet RF exposure requirements. Use of this device in a manner inconsistent with this manual could lead to excessive RF exposure conditions."

**FEDERAL COMMUNICATIONS COMMISSION**
**INTERFERENCE STATEMENT**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.