XC2055, XC4055

The BrightSign XC2055 and XC4055 media players can be used to decode images, audio, and video (at video resolutions up to 7680×4320×60p) for digital-signage and kiosk applications. These players dramatically increase HTML performance compared to our older models, with full support for OpenGL. They also support multi-headed output and other applications. In addition to driving audio/video devices, these players can be controlled with various networked and built-in interfaces. The XC2055 and XC4055 include a Real Time Clock (RTC) with a supercapacitor that backs up the clock settings when it is power cycled.

Interfaces

XC2055

Front	Back
MicroSD card slot	WiFi antenna connector (1 of 2)
4 Status LEDs, also visible on the top case	Audio out (3.5 mm)
2 HDMI® outputs	USB-A 3.0 port
USB-C/DP 3.0 port	Serial (3.5mm)
Ethernet	IR in/out (3.5mm)
	GPIO (12 pins)
	Service button (SVC)
	Reset button (Reset)
	Locking power connector to 19V power supply
	WiFi antenna connector (2 of 2)

XC4055

Front	Back
MicroSD card slot	WiFi antenna connector (1 of 2)
4 Status LEDs, also visible on the top case	Audio out (3.5 mm)
4 HDMI outputs	USB-A 3.0 port
USB-C/DP 3.0 port	Serial (3.5 mm)
Ethernet	IR in/out (3.5 mm)
	GPIO (12 pins)
	Service button (SVC)
	Reset button (Reset)
	Locking power connector to 19V power supply
	WiFi antenna connector (2 of 2)

XC5 Hardware Interfaces

This section describes the characteristics and operation of all connectors on the XC2055 and XC4055.

Ethernet

A single RJ45 jack is provided for connection to a local network conforming to IEEE 802.3 at up to 1000Mbps full duplex. 10/100/1000 Base-T operation is supported.

Power Connector

The power connector for the XC2055 and XC4055, which connects the power cord to the device, is rated for 19V. It uses a locking connector to prevent inadvertent disconnections.

HDMI Output

The HDMI®-out connector is used to send digital video to HDMI-enabled sink devices. XC2055 has two HDMI outputs and the XC4055 has four HDMI outputs. One of the HDMI outputs on each device type is HDMI 2.1. CEC control is supported over each HDMI interface independently, and it can maintain the configured multiscreen layout if one of the HDMI outputs loses sync.

The XC2055 connector can output a maximum video resolution of 7680×4320×60p, decoding up to 8-bit.

The XC4055 connector can output a maximum video resolution of 7680×4320×60p, decoding up to 10-bit

The XC2055 and XC4055 support HDR10 video, HLG, video rotation at 2160×3840×60p, and at least four 3840×2160×60p decodes simultaneously.

GPIO

The XC2055 and XC4055 have a 12-pin GPIO switch and LED connector, which allows the player to control external LEDs or other devices. The port can supply 3.3V@300mA to PWR pins (available in Rev G and higher) and sink or source 24mA on each button pin. Auxiliary power is 1A.

The GPIO port is a standard design manufactured by Phoenix Contact, Wurth Electronics, and others. Pluggable GPIO terminal blocks can be inserted into the GPIO connector to make bare-wire contacts (see **here** for an example part). These terminal blocks can be purchased from the **BrightSign Store**. If you wish to source your own terminal blocks, make sure to use 4-pin or 6-pin blocks (12-pin blocks are extremely difficult to remove from the GPIO port).

Connect the LED outputs to the LED ANODE and connect the LED CATHODE to the ground. If you want to connect another device, then the output is capable of sourcing or sinking up to 3.3V at 24mA, but there is a series resistor of 100Ω in each line.

The GPIO also allows for connecting of external contact closures to the ground. In order to connect a switch, connect one side of the switch to the switch input, and connect the other side to one of the ground pins on the GPIO connector.

If one BrightSign player is driving the inputs on another BrightSign player, then you can drive at most three inputs from one output. The following calculations explain this limitation:

The GPIO outputs have 100Ω series resistors; the GPIO inputs have 1K pullup resistors to 3.3V; and the input threshold is 2V high and .8V low. The high voltage is not problematic, but the low voltage can be if there are too many inputs connected to one output.

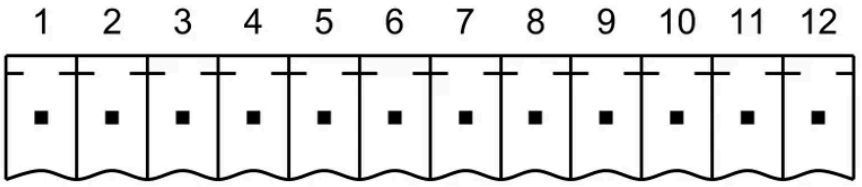
1 out driving 1 in	V=3.3*100/(100+1,000)=0.3
1 out driving 2 in	V=3.3*100/(100+500)=0.55
1 out driving 3 in	V=3.3*100/(100+333.3)=0.76
1 out driving 4 in	V=3.3*100/(100+250)=.94 (This is too high, so 1 output driving 3 inputs is the maximum)

GPIO Pinout

The following table illustrates the pinout of the GPIO on the XC5:

Pin	Primary	Secondary	Tertiary
1	GND		
2	3.3V PWR		
3	Button0	UART1_RXD	
4	Button1	I.R_IN	
5	Button2	SPDIF1_OUT	
6	Button3	PWM	
7	GND		
8	3.3V PWR		
9	Button4	UART0_RXD	I2C_SCL
10	Button5	UART0_TXD	I2C_SDA
11	Button6	UART1_TXD	
12	Button7	I.R_OUT	

The following schematic illustrates the pinout of the GPIO connector:



IR Input / Output

The IR blaster can transmit and receive a variety of common Consumer-IR formats including NEC and RC5. RC5 encoding is also supported. The two transported bit values of the signal (0

and 1) are encoded using differing lengths of low-time IR pulses.

The 3.5mm IR in/out port has the following pinout:

- **Tip**: 3V@50mA
- **Ring**: IR Input
- **Sleeve**: IR Output

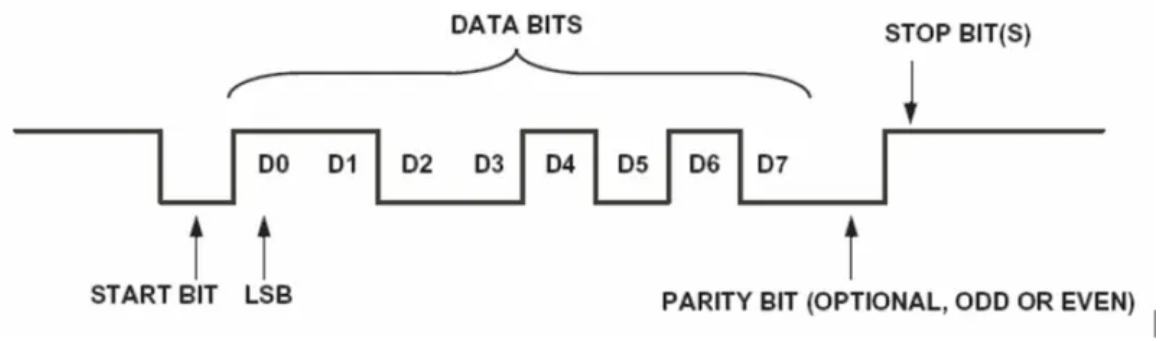
The sleeve is used as a ground during input operations.

- : Receive
- **Sleeve**: Ground

Serial

The XC5 contains an UART (asynchronous serial) interface. It is a 3.5mm (⅛") jack that connects a serial modem or other devices that use a serial connector, and it uses TTL for communication. This 3.5mm serial connector has a driver/receiver which converts TIA/RS-232-F voltage levels for the processor. The port is tolerant up to ±30-V inputs.

The default baud rate of the interface is 115200, with no parity, 8 data bits, and 1 stop bit. These settings can be configured in the software. The serial interface supports TX, RX, and ground only—RTS/CTS hardware flow control is not supported. The following diagram illustrates the behavior of the TX and RX signal:



This 3.5mm serial port has the following configuration (from the perspective of the player):

- **Tip**: Receive
- **Ring**: Transmit
- **Sleeve**: Ground

BrightSign players are DTE devices, so communication with another DTE device that uses a 3.5mm port would require a null-modem cable or converter that transposes the TX/RX signals. If the device communicating with the player uses a DE9 serial port, the serial cable should be wired as shown in the following diagram:

Audio Connector

The XC2055 and XC4055 have a 3.5mm analog audio jack.

The analog audio connector has the following pinout:

- **Tip**: Left audio
- **Ring**: Right audio
- **Sleeve**: Ground for audio signal

USB

The XC2055 and XC4055 have one USB-A and one USB-C 3.0 port to connect USB-compatible devices.

These devices provide 5V 1A over each USB port for peripheral devices.

WiFi & Antennas

The XC2055 and XC4055 models come equipped with an M.2 connector slot and two SMT-mounted SMA connectors. The M.2 slot supports M.2 PCIe cards for WiFi and Bluetooth connectivity (sold separately), while the SMA connectors facilitate the connection of external antennas.

microSD card / SSD

The µSD card supports UHS-1 SDR-104.

The SSD interface is NVMe, PCIe 3.0 4x.

XC5 players will accept NVMe SSDs in M.2 2242 or 2280 (but not 2260) form factors of SX id type (single-sided form factor). Double-sided drives (DX id type)* will not fit because the back side of the SSD is essentially flush against the motherboard. For example, a 2280-S1 module will fit a BrightSign player but a 2280-D2 module would not.

NVMe drives with heat sinks are not compatible with our players.

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*D4 drives may fit but have not been tested

XC5 Environmental & Power

Environmental

The XC4055 and XC2055 are designed for sustained ambient temperatures between 0°C and 40°C, , with transients up to 50°C (at 90% maximum relative humidity, non-condensing). Non-operational (transportation or storage) temperatures can range from -20°C to 85°C. Units should be allowed time to acclimate before being powered up.

Operating the players above 40°C ambient for prolonged periods may reduce the operational life of the product and result in intermittent resetting of the device.

> Exposing a cold player to warm air at high relative humidity may cause water to condense inside the player, leading to component failure. Damage due to such internal condensation is not covered by warranty. If a player is cold, allow several hours for it to acclimatize to ambient conditions before applying power.

Power

Power Adapter

The XC4055 and XC2055 is supplied with a 90W (19V@4.7A) power adapter. The device will use approximately:

18W of power when playing a 3840×2160×60p H.265 (HEVC) source file.

27W of power when playing a (8K) 7680×4320×60p H.265 (HEVC) source file.

3V3 power is available on the m.2 expansion ports for peripherals (Wi-Fi module, SSD module) the power to each port it not restricted but the combined power consumption should not exceed 3.5A.

If more than 3.5Amps is drawn the power supply may shut down due to over-current conditions. The unit will not be damaged, but it may reboot or not operate properly until the overload is removed.

Ports Supplying Power

Connector	Maximum Power Usage
RJ-45	180mA (when transferring data)
USB 2.0 (Type C)	500mA, 900mA, and 1.5A modes
USB 2.0 (Type A)	5V @ 1.5A
GPIO Port	3.3V @ 1.0A
HDMI® Ports	5V @ 300mA per port. Ports are protected above 400mA
IR Blaster (output)	3V3 @ 85mA (current limited with 39R)
M.2 Wi-Fi Module*	3V3
M.2 SSD Module*	3V3

* The combined power of the M.2 ports should not exceed 3.5A.

XC5 Theory of Operation

This section describes how specific components operate on the XC2055 and XC4055

On-Board LEDs

The four on-board LEDs have the following indicators:

LED	Indication
Green power (**Pwr**)	Displays when the board is powered up and not in reset mode. Flashes during firmware update process.
Green file-system activity (**Bsy**)	Flashes any time there is file-system activity (on any storage device)
Blue (**WiFi**)	Illuminates when WiFi is connected and flashes when searching for a connection
Red status (**Err**)	Flashes a certain number of times to indicate which error is occurring. The flash codes are described below: 2: Unspecified error 3: Network recovery script is preparing to run on a device configured for network recovery 4: No upgrade file found 5: Failed to load kernel module - 6: Board is not capable of running the current firmware version - 7: A piece of on-board hardware is not working correctly - 8: Problem related to the storage device (either the USB drive or MicroSD card) - 9: Problem related to the registry/NAND - 10: The autorun script encountered a load/run error - 11: WiFi-related error - 12: Unable to find bootable image
A solid error light is displayed during the micro-controller update in BOS 9.0.36. Updating from an earlier OS version to BOS 9.0.36 or later will trigger this light.	

On-Board Switch / SVC Button

The SVC button is connected to the GPP_D6 GPIO on the processor. The RESET button is also sent to the PMIC (support micro), which when the button is asserted for four seconds will initiate a hard reset.

Reset Switch / GPIO Button

The RESET button is connected to the GPP_D5 GPIO on the processor. The RESET button is also sent to the PMIC (support micro), which when the button is asserted for four seconds will initiate a hard reset.

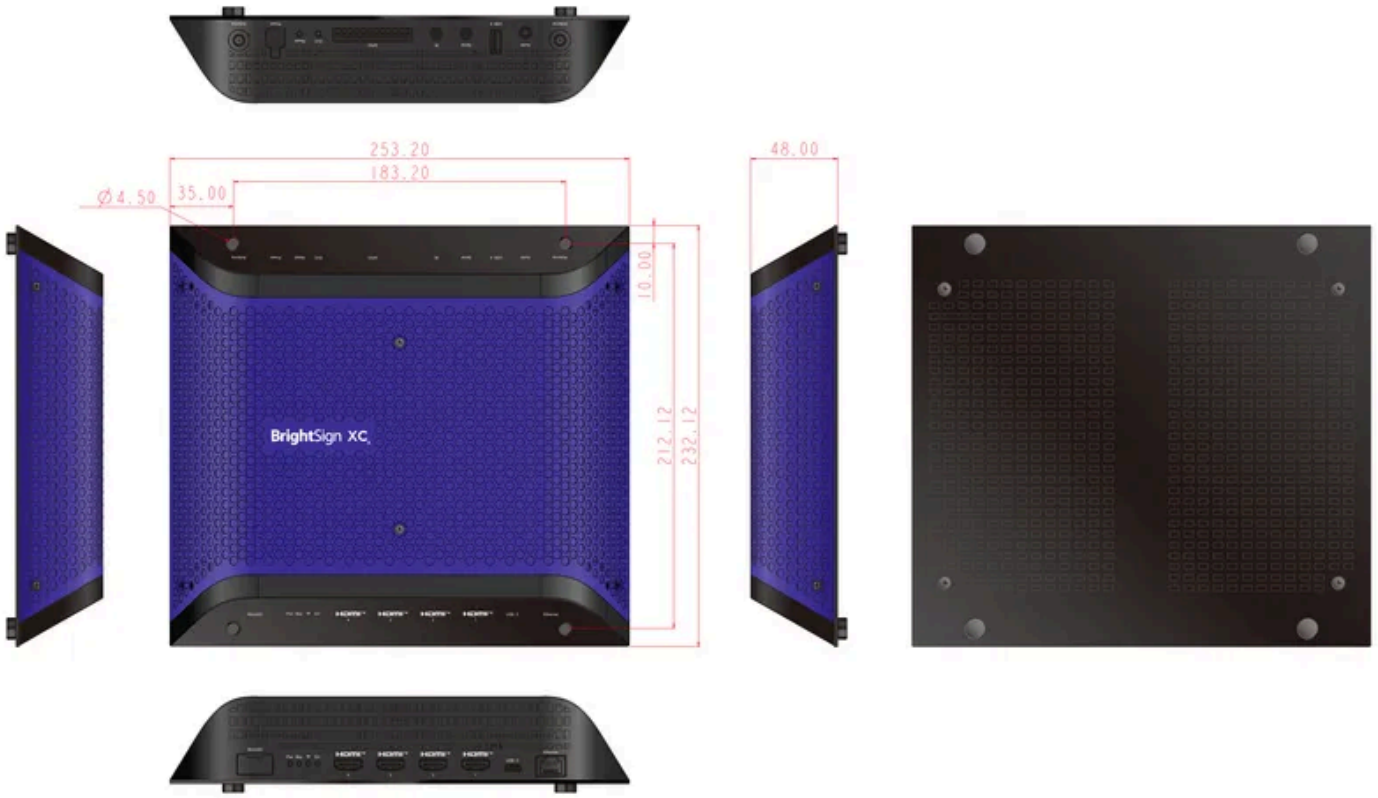
microSD Slot

The XC2055 and XC4055 have one MicroSD slot. High density memory cards with a capacity of up to 2TB, and SDR104 and microSC3.0 UHS-I ultra-high speed memory cards, are supported

Wireless Module

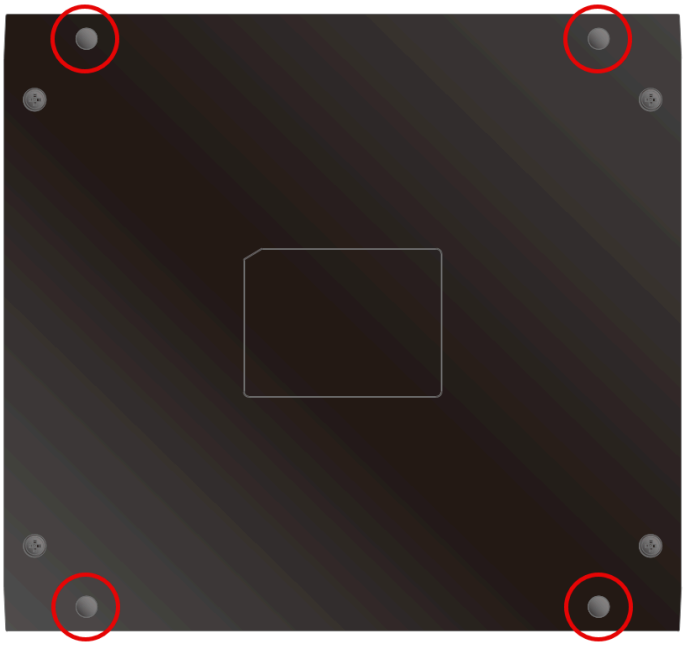
The XC2055 and XC4055 both have a dual antenna connection to allow users to install a BrightSign wireless module without disassembling the unit. BrightSign modules are configured to work with 802.11.N or 802.11.AC access points. This connection has a Bluetooth option.

XC5 Dimensions



XC5 Mounting

Players can be mounted using the player's four mounting holes. Note that the player may have rubber plugs inserted in the mounting holes which must be removed before mounting.



Remove the rubber plugs to access the mounting holes.

The mounting holes are compatible with the following screw sizes:

- Metric / ISO: M3.5 or M4
- US / Imperial: #6 or #8

> Nails should not be used to mount the player.