HD225, HD1025

Last updated 12 December, 2024

BrightSign HD225 and HD1025 media players can be used to decode images, audio, and video for digital-signage and kiosk applications. The HD225 has gigabit ethernet, GPIO, optional WiFi and IR ports, while the HD1025 extended I/O version also has USB and serial ports for added interactive functionality. In addition to driving audio/video devices, these players can be controlled with various networked and built-in interfaces. These players also include a Real Time Clock (RTC) with supercapacitor that backs up the clock settings when it is power cycled.

These pages specify the hardware interfaces and operational theory of the HD5 series.

Interfaces

HD225

Front	Back
WiFi antenna connector (1 of 2)	12V 3A power supply
Audio out (combo 3.5 mm and SPDIF)	Service button (SVC)
IR in/out	Reset button (Reset)
GPIO	HDMI® out
4 Status LEDs	MicroSD card slot

WiFi antenna connector (2 of 2)	Ethernet 10/100/1000

HD1025

Front	Back
WiFi antenna connector (1 of 2)	12V 3A power supply
Audio out (3.5mm analog and SPDIF)	Service button (SVC)
IR in/out	Reset button (Reset)
Serial	HDMI® out
GPIO	USB-A 2.0 port
4 status LEDs	MicroSD card slot
WiFi antenna connector (2 of 2)	Ethernet 10/100/1000

HD5 Hardware Interfaces

Last updated 11 December, 2024

This section describes the characteristics and operation of all connectors on the HD225 and HD1025.

Ethernet

This connection is used to connect an ethernet cable for internet access. The HD225 and HD1025 wired ethernet connection is capable of 10/100/1000 Mbps. The maximum length for Cat 5E cable is 100 meters; the allowed length can be higher or lower depending on the quality of the cable.

Power Connector

The power connector for the HD225 and HD1025, which connects the power cord to the device, is rated for 12V@3A. It uses a locking connector to prevent inadvertent disconnections.

HDMI Output

The HDMI®-out connector on the HD225 and HD1025 is used to send digital video and audio to HDMI-enabled sink devices. CEC control and AVI are supported over each HDMI interface independently, and it can maintain the configured multiscreen layout if one of the HDMI outputs loses sync.

The HD225 and HD1025 support at least two simultaneous 1920x1080x60p decodes.

GPIO

The HD225 and HD1025 have a 12-pin GPIO switch and LED connector, which allows the player to control external LEDs or other devices requiring 24mA of current or less.

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. The connector can also supply 3.3V at up to 500mA to an external device (available in Rev G and higher). The 3.3V output is polyfuse-protected and can source up to 500mA.

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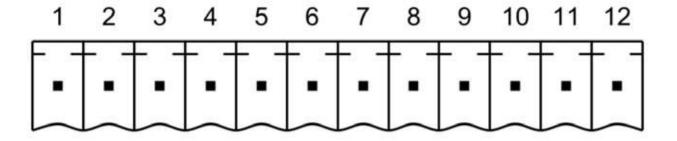
1 out driving 1 in	$V=3.3*100/(100+1,000)=0.3$
1 out driving 2 in	$V=3.3*100/(100+500)=0.55$
1 out driving 3 in	$V=3.3*100/(100+333.3)=0.76$
1 out driving 4 in	$V=3.3*100/(100+250)=.94$ (This is too high, so 1 output driving 3 inputs is the maximum)

GPIO Pinout

The following table illustrates the pinout of the GPIO on the HD225 and HD1025:

Pin	Function	Pin	Function
1	GND	7	GND
2	3.3V	8	3.3V
3	BUTTON 0	9	BUTTON 4
4	BUTTON 1	10	BUTTON 5
5	BUTTON 2	11	BUTTON 6
6	BUTTON 3	12	BUTTON 7

The following schematic illustrates the pinout of the GPIO connector:

IR Input/Output

The IR blaster generates or receives a space-encoded NEC or Pronto Hex signal. 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
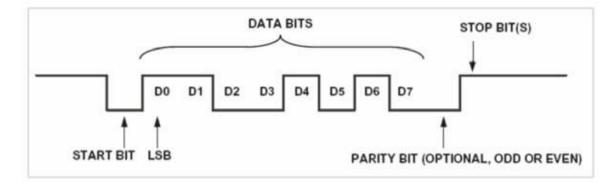
- **Ring**: IR Input

- **Sleeve**: IR Output

> The sleeve is used as a ground during input operations.

Serial

The HD1025 contains an UART (asynchronous serial) interface. It is a 3.5mm (1/8") jack that connects a serial modem or other devices that use a serial connector, and it uses TTL for communication. The receiver will tolerate input voltages between -30V and +30V, with anything below 3V interpreted as a logical 1. The output signalling voltage output is +15V or -15V.

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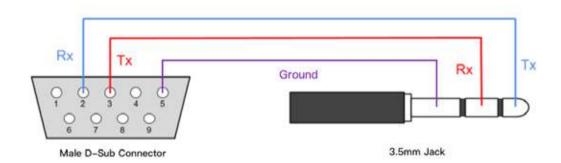
This 3.5mm serial port has the following configuration (from the perspective of the player):

- **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 (also known as DB9) serial port, the serial cable should be wired as shown in the following diagram:

Audio Connector 🔗

The HD225 and HD1025 have a dedicated 3.5mm stereo audio port and a combination analog/optical audio jack. To transmit a digital audio signal, use an optical audio cable. Analog and digital audio cannot be transmitted simultaneously. Dolby audio is supported as a paid license.

The full-scale voltage output of the analog audio is 2V RMS. The minimum load impedance is 32Ω.

The analog audio connector has the following pinout:

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

USB

The HD1025 has one USB-A 2.0 port to connect USB-compatible devices. This device provides 5V 1A over each USB port for peripheral devices.

WiFi & Antennas

The HD225 and HD1025 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.

HD5 Environmental and Power Usage

Last updated 15 January, 2025 · 1 min read

The HD225 and HD1025 are designed for sustained ambient temperatures between 0°C and 50°C, , with transients up to 60°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 50°C ambient for prolonged periods may reduce the operational life of the product and result in intermittent resetting of the device.

> ⚠ **Important**
>
> 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 Adaptor

The HD225 and HD1025 are supplied with 12V@3A power supply.

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 the firmware update process.		
Green file-system activity (**Bsy**)	Flashes any time there is file-system activity (on any storage device)		
Blue WiFi (📶)	Flashes when the board is being updated		
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 a bootable image

On-Board Switch / SVC Button

The on-board switch is connected to the GPIO02, which is pulled low when the service (SVC) button is pressed. Conversely, a pull-up on the button normally sets the GPIO02 to be pulled high.

Reset Switch / GPIO Button

The on-board switch is connected to the reset circuit. Pressing down the reset button will send an initial signal to the system software and holding the reset button low for approximately 4 seconds will cause a hard reset.

MicroSD Slot

The HD225 and HD1025 have one MicroSD slot. There is a 2TB limit on the storage capacity of microSD cards used with the player.

Wireless Module

The HD225 and HD1025 both have a dual antenna connection. This allows users to install a compatible wireless module without disassembling the unit. This connection has a Bluetooth option.

HD5 Dimensions

Last updated 24 May, 2023

The HD225 and HD1025 can be mounted on a wall using the sealed mounting holes on the front and back. It is recommended that you mount the device using four screws (one for each hole). The screws should have a major diameter between 3.5mm and 4.2mm.

⚠ **Important**

Nails should not be used to mount the device.