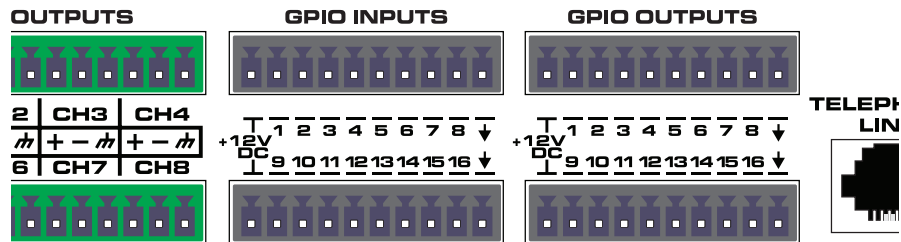




Technical Notes

Q-SYS Core 110f



Using the GPIO inputs and outputs

The Q-SYS Core 110f features General Purpose Input/Output (GPIO) connections that allow the core to interface with miscellaneous outside devices, such as LED indicators, switches, relays, and potentiometers, and with custom or third-party controls. The GPIO allotment on the Core 110f totals 16 inputs and 16 outputs. Use Q-SYS Designer to select the type of input or output and configure it. Each GPIO input and output is independent of the others.

Flanking each row of eight GPIO inputs and outputs is a +12 V DC terminal (up to 200 mA available on each, protected by a self-resetting fuse) and a ground or reference terminal. This can be used for potentiometers (input), relay coils and LEDs (output), and other uses.

GPIO configurations

These are the various ways that GPIO inputs and outputs can be configured.

Type	Conceptual schematic	Control pins	Notes
Input Digital Input (TTL 3.3 V) —The input is fed by a 3.3 V TTL digital source. The two states are logic high (1) and logic low (0).		None	
Contact Closure Input —This setting enables an internal pull-up resistor, allowing actuation by a contact closure to ground. This can be through a switch, set of relay contacts, etc.		None	Internal pull-up resistor to +12 V. When contacts are closed, GPIO In = 0 V; when open, GPIO In = +12 V.
Potentiometer (10 kΩ, 12 V) —In this setting, the external potentiometer acts as a variable voltage divider. The GPIO input reads the voltage delivered. The ground terminal is the reference. The GPIO interprets the voltage as a proportion between the minimum and maximum pot positions, with better resolution and accuracy than the two-wire potentiometer configuration offers. This configuration requires calibration of the pot's minimum and maximum positions.		Calibrate Maximum Calibrate Minimum Maximum Position Minimum Position	Calibrate the minimum and maximum positions of the pot.

Type	Conceptual schematic	Control pins	Notes
Input Potentiometer (2-wire) —In this setting, the external potentiometer is connected merely as a rheostat—a variable resistor. The internal pullup resistor is enabled, so the variable resistor delivers a variable voltage to the GPIO input; the GPIO circuitry interprets the voltage as a proportion between minimum and maximum. This configuration also requires calibration of the pot's minimum and maximum positions.		Calibrate Maximum Calibrate Minimum Maximum Position Minimum Position	Calibrate the minimum and maximum positions of the pot.
Analog Input (0–24 V, low Z) —In this setting the GPIO reads the positive analog voltage presented to its input terminal.			
Raw —Combines features of both analog and digital inputs.		Pullup enable	See the tech note pertaining to the Raw input.
Output Digital Output (TTL 3.3 V) —The output feeds a 3.3 V TTL digital input or its equivalent. The two states are logic high (1) and logic low (0).			
Open Collector (200 mA) —In this setting each output can sink up to 200 mA of current, making it suitable to actuate the low side of a relay (shown), LED, or other device. A relay, for example, can be used to switch higher levels of voltage or current. CAUTION: The GPIO output is not fused. Current greater than 200 mA can damage it.			For 12 V relays or other loads, use the +12 V source provided. For high-voltage relays or loads, use an external DC supply (up to 24 V).
Raw —Similar to the Digital Output setting, except it offers an “invert” option.		Invert	See the tech note pertaining to the Raw output.

Application Examples

Shure MX396/C Microphone Button/Light	Clockaudio CH32 Touch Sensitive Switch
<p>Purpose: To convey switch actuations to the Core and turn the mic's status light either red or green (the LED cannot be turned off), as directed by the Core's GPIO output.</p> <p>The mic receives phantom power from the Core 110f. The Core 110f can accommodate as many as 16 MX396/C mics.</p> <p>Set the GPIO input and output both to Digital.</p> <p>Mic DIP switch settings: 1 Down 2 Either (does not matter) 3 Up</p>	<p>Purpose: To convey switch actuations to the Core and turn the LED ring of the Clockaudio CH32 touch sensitive switch either red or green.</p> <p>As many as three CH32 switches can share the same +12 V and GND pins. A Core 110f can only power as many as six CH32 switches; a suitable external 12 V power supply, though, may allow as many as eight switches.</p> <p>Set GPIO input to Contact Closure. Set both GPIO outputs to Digital.</p>