

GPIO Pinout App Note

This application note describes the GPIO of the Lumenera cameras for both the dual board and single board cameras.

LuCam Dual Board GPIO Pinout

For board-level cameras, the External Interface Header can be found in the corner of the PCB next to the silver USB connector. For enclosed cameras, it is found on the side of the camera near the USB connector. It is a male, 2 mm pitch, 16-pin (2 x 8) header. The pin numbering can be seen in Figure 1.

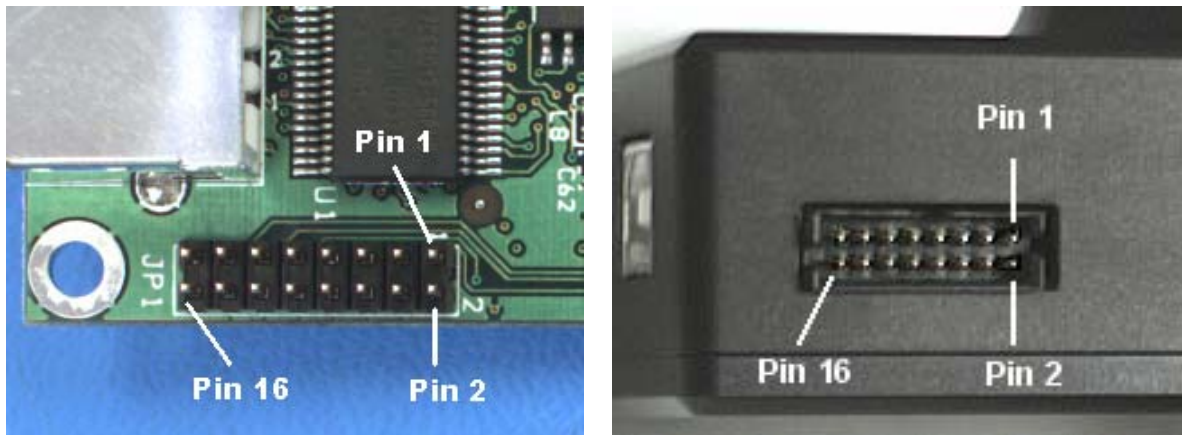


Figure 1 – Dual Board External Header Location and Pin Numbering

This header pinout is defined as follows:

SIGNAL	PIN #	PIN #	SIGNAL
GPO1 / Strobe Out (AL)	1	2	GND
GPO2 / Strobe Out (AH)	3	4	GND
GPO3	5	6	GND
GPO4 / Video SOF	7	8	GND
GPI1 / Trigger In	9	10	GND
GPI2	11	12	GND
GPI3	13	14	GND
GPI4	15	16	GND

LuCam Single Board GPIO Pinout

For board-level cameras, the External Interface Header can be found in the corner of the PCB next to the silver USB connector. For enclosed cameras, it is found on the side of the camera near the USB connector. It is a male, 2 mm pitch, 16-pin (2 x 8) header. The pin numbering can be seen in Figure 2.

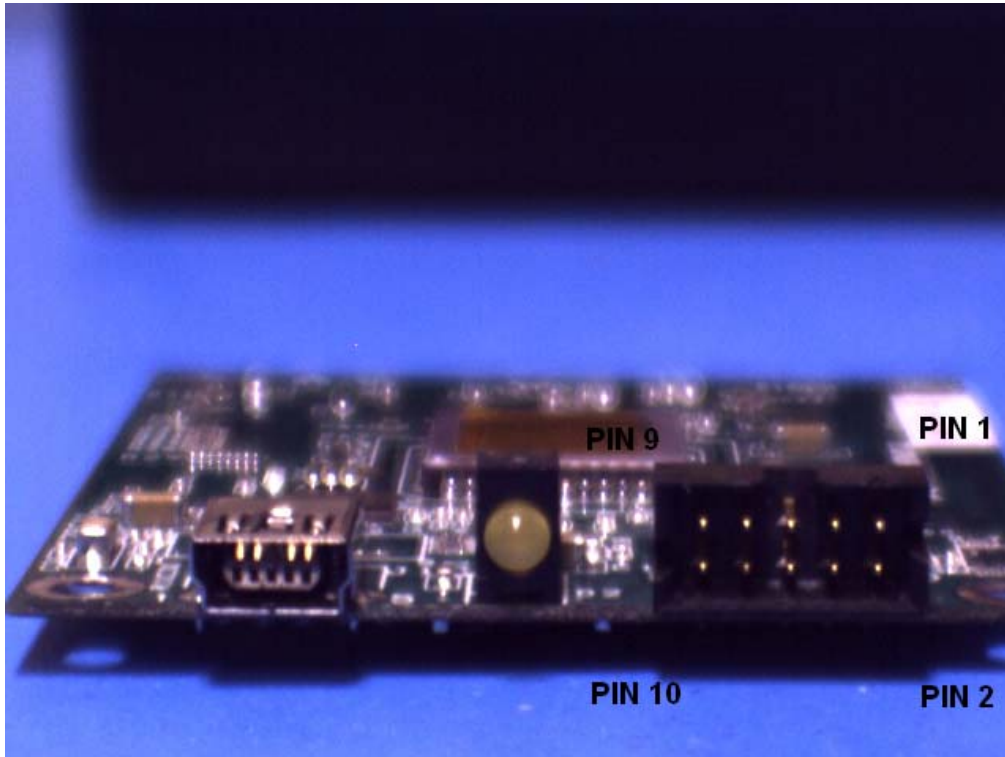


Figure 2 – Single Board External Header Location and Pin Numbering

This header pinout is defined as follows:

SIGNAL	PIN #	PIN #	SIGNAL
GND	1	2	GND
GPI1 / Trigger In	3	4	GPO4 / Video SOF
GPI2	5	6	GPO3
GPI3	7	8	GPO2 / Strobe Out (AH)
GPI4	9	10	GPO1 / Strobe Out (AL)

Signal Definitions

GPO1 / Strobe Out: Pin 1, LVTTL output ($V_{oh} \sim 3.0V$, $V_{ol} \sim 0V$). This signal can be toggled using the LucamGPIOWrite function of the API.

This signal serves double duty and is also used to provide an ACTIVE LOW, 5.5 ms pulse (suitable for triggering a strobe unit) when any of the “Take Snapshot” API functions are used with the “useStrobe” option enabled. This strobe pulse can be delayed with respect to the start of frame exposure by a user selectable amount (see API documentation for further details).

GPO2 / Strobe Out: Pin 3, LVTTL output ($V_{oh} \sim 3.0V$, $V_{ol} \sim 0V$). This signal can be toggled using the LucamGPIOWrite function of the API.

This signal serves double duty and is also used to provide an ACTIVE HIGH, 5.5 ms pulse (suitable for triggering a strobe unit) when any of the “Take Snapshot” API functions are used with the “useStrobe” option enabled. This strobe pulse can be delayed with respect to the start of frame exposure by a user selectable amount (see API documentation for further details).

GPO3: Pin 5, LVTTL output ($V_{oh} \sim 3.0V$, $V_{ol} \sim 0V$). This signal can be toggled using the LucamGPIOWrite API function.

GPO4: Pin 7, LVTTL output ($V_{oh} \sim 3.0V$, $V_{ol} \sim 0V$). This signal can be toggled using the LucamGPIOWrite API function.

GPI1 / Trigger In: Pin 9, LVTTL input ($V_{in} \text{ min} = 0V$, $V_{in} \text{ max} = 3.3V$). This signal is floating and MUST be driven at all times when being used. The signal status can be obtained by using the LucamGPIORead API function.

This signal serves double duty and is also used to receive an ACTIVE HIGH, LVTTL input ($V_{in} \text{ min} = 0V$, $V_{in} \text{ max} = 3.3V$) pulse which will trigger the taking of a snapshot, when any of the “Take Snapshot” API functions are used with the “useHwTrigger” option enabled. The active high pulse must have a minimum width of 0.5 us. There is no maximum limit to the trigger pulse width.

GPI2: Pin 11, LVTTL input ($V_{in} \text{ min} = 0V$, $V_{in} \text{ max} = 3.3V$). This signal is floating and MUST be driven at all times when being used. The signal status can be obtained by using the LucamGPIORead API function.

GPI3: Pin 13, LVTTL input ($V_{in} \text{ min} = 0V$, $V_{in} \text{ max} = 3.3V$). This signal is floating and MUST be driven at all times when being used. The signal status can be obtained by using the LucamGPIORead API function.

GPI4: Pin 15, LVTTL input ($V_{in} \text{ min} = 0V$, $V_{in} \text{ max} = 3.3V$). This signal is floating and MUST be driven at all times when being used. The signal status can be obtained by using the LucamGPIORead API function.

Taking a Single Frame Snapshot with the Camera

The Lumenera API makes use of several of the External Interface Header pins automatically, when the “Take Snapshot” related functions (those that use the LUCAM_SNAPSHOT structure) are called with certain options (see the API documentation for more details.) The LUCAM_SNAPSHOT structure allows the setting of the following parameters that control the taking of a snapshot and the timing of triggers:

Trigger Mode (useHwTrigger): There are two types of snapshot triggering, hardware and software. When enabled, the snapshot will be triggered when the trigger input signal is detected after a “Take Snapshot” API is called (the API blocks until it times out or until the trigger occurs and the frame of data is returned). When disabled, the API function itself triggers the snapshot and returns the frame of data. The hardware trigger is expected on Pin 9 of the External Interface Header as described above. The software trigger is initiated from within the API “Take Snapshot” functions (for more details see the API documentation.)

Trigger Delay (exposureDelay): A delay in milliseconds from the trigger (hardware or software) to the start of frame exposure can be set from 0 to 10.8 ms, in 42.6 us increments. The minimum delay from the trigger input, to the start of exposure, is 0.8 us, with an error of ± 0.25 us.

Strobe Mode (useStrobe): In concert with either triggering mode, a user may also trigger an external strobe light synchronized to the frame exposure. When this parameter is enabled, the strobe signal pulse will be initiated on Pins 1 and 3 as described above. In this case, a strobe delay should be defined.

Strobe Delay (strobeDelay): A delay in milliseconds from the trigger (hardware or software) to the strobe pulse (rising edge for ACTIVE HIGH, falling edge for ACTIVE LOW) can be set from 0 to 10.8 ms, in 42.6 us increments.

Exposure Time (exposure): The length of time in milliseconds to expose the image before readout begins.

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