



ELM307 Camera Control

Description

The ELM307 is a retriggerable one-shot circuit that has been designed for electronically controlling the shutter of a film or digital still camera. The circuit provides a variable pulse width timer, a variable delay reset timer, power control, and an LED status drive all in an 8 pin package.

In operation, a monitored signal (alarm contact, audio signal, oscillator signal, etc.) is applied to the circuit's Trigger input. A low level at this input immediately causes an output at the Camera pin (controlling the shutter) that lasts for the duration set by PW. Further triggering is inhibited until an additional period (set by Delay) passes, allowing time for the film to advance or for the digital image to be stored.

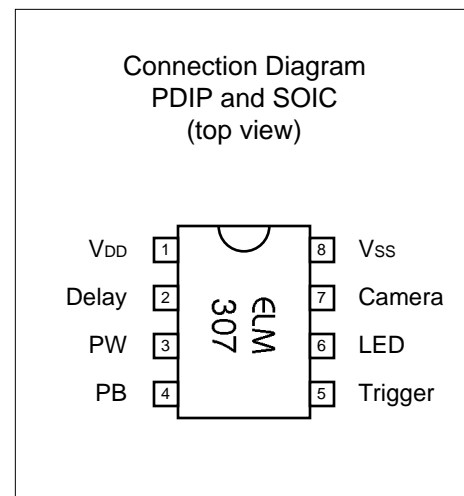
To help with setup, the circuit has a test mode in which the Camera output is blocked, and the LED is instead energized. Toggling between the test mode and the run mode is accomplished with the single pushbutton input, as is the power on and off.

Features

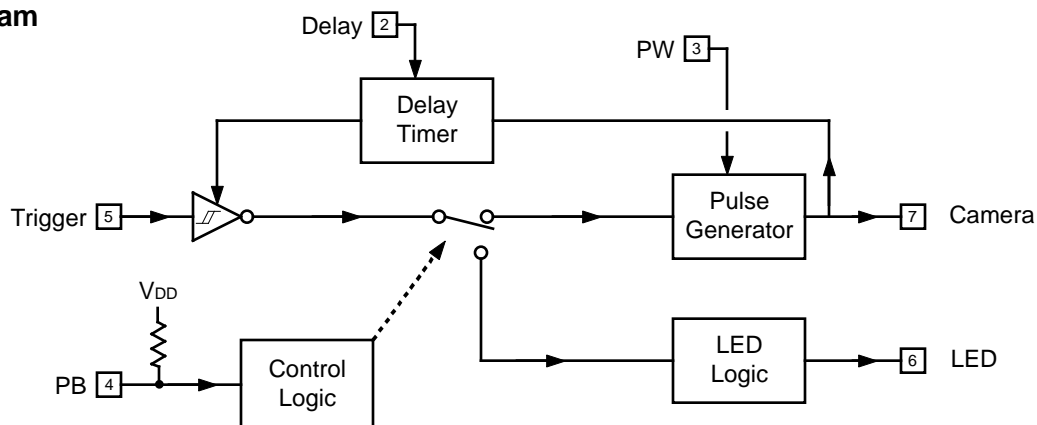
- Low power CMOS design - typically 1mA at 5V
- No external timing elements required
- Test mode assists with setup
- Single pushbutton control
- Auto power off saves batteries
- LED output shows status
- High current drive outputs - up to 25mA

Applications

- Security camera control
- Candid shots of animals or people
- Time lapse photography
- Remote triggering of cameras



Block Diagram





Pin Descriptions

VDD (pin 1)

This pin is the positive supply pin, and should always be the most positive point in the circuit. Internal circuitry connected to this pin is used to provide power on reset of the microprocessor, so an external reset signal is not required. Refer to the Electrical Characteristics section for further information.

Delay (pin 2)

The logic level at this input pin determines the minimum time between Camera outputs. A high level sets a nominal delay of 5 seconds while a low level gives 1/2 of a second. This delay is provided to ensure that the camera has time to prepare for the next picture, before another cycle is allowed.

PW (pin 3)

The digital level at this pin sets the pulse width of the output at Camera (pin 7). When at a logic low level, the time will nominally be 1/4 of a second, while a high level provides 1 second.

PB (pin 4)

This input is to be connected to a momentary action spst pushbutton switch. Holding the switch closed for more than 5 seconds will cause the power to toggle on (if off), or off (if presently on). If the switch is released after 2 seconds, but before 4 seconds pass, the mode will toggle between run and test. Power up is always to the test mode. While the switch is being pressed, the LED output

will pulse briefly every second, to assist in counting time. Once a command is acknowledged, a long LED pulse will be provided so that you know a change is to occur.

Trigger (pin 5)

A low level at this input initiates one cycle of circuit operation. The use of a schmitt trigger on the input means there are no restrictions on the rise or fall time of the waveform. If no trigger pulse occurs after 8 minutes in the test mode or 32 minutes in the run mode, the circuit will automatically power itself off.

LED (pin 6)

This output is periodically driven to a high level to show the various states. If in the test mode, LED will output a double pulse every 4 seconds, while in the run mode, a single output occurs every 8 seconds. A Camera output will always blank the LED output, so the LED cannot affect the picture.

Camera (pin 7)

This output is used to control the camera's shutter. Usually a transistor provides the actual interface between the camera and the ELM307 (see the Example Applications).

Vss (pin 8)

Circuit common is connected to this pin. This is the most negative point in the circuit.

Ordering Information

These integrated circuits are available in either the 300 mil plastic DIP format, or in the 200 mil SOIC surface mount type of package. To order, add the appropriate suffix to the part number:

300 mil Plastic DIP..... ELM307P 200 mil SOIC..... ELM307SM

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Absolute Maximum Ratings

Storage Temperature..... -65°C to +150°C
 Ambient Temperature with
 Power Applied.....-40°C to +85°C
 Voltage on V_{DD} with respect to V_{SS}..... 0 to +7.5V
 Voltage on any other pin with
 respect to V_{SS}..... -0.6V to (V_{DD} + 0.6V)

Note:

Stresses beyond those listed here will likely damage the device. These values are given as a design guideline only. The ability to operate to these levels is neither inferred nor recommended.

Electrical Characteristics

All values are for operation at 25°C and a 5V supply, unless otherwise noted. For further information, refer to note 1 below.

Characteristic	Minimum	Typical	Maximum	Units	Conditions
Supply voltage, V _{DD}	3.0	5.0	5.5	V	
V _{DD} rate of rise	0.05			V/ms	see note 2
Average supply current, I _{DD}		1.0	2.4	mA	see note 3
Input low voltage	V _{SS}		0.15 V _{DD}	V	
Input high voltage	0.85 V _{DD}		V _{DD}	V	
Internal pullup resistance (pin 4)	300	500	600	K	see note 4
Output low voltage			0.6	V	Current (sink) = 8.7mA
Output high voltage	V _{DD} - 0.7			V	Current (source) = 5.4mA
LED Current		8		mA	no resistor, V _{DD} = 3V
Output PW	pin 3 = L pin 3 = H	0.26 1.05		sec sec	see note 4 "
Delay after PW	pin 2 = L pin 2 = H	0.52 5.2		sec sec	see note 4 "

Notes:

1. This integrated circuit is produced with a Microchip Technology Inc.'s PIC12C5XX as the core embedded microcontroller. For further device specifications, and possibly clarification of those given, please refer to the appropriate Microchip documentation.
2. This spec must be met in order to ensure that a correct power on reset occurs. It is quite easily achieved using most common types of supplies, but may be violated if one uses a slowly varying supply voltage, as may be obtained through direct connection to solar cells, or some charge pump circuits.
3. Active current. When powered down, requirements are reduced to much less than 1µA.
4. All internal resistances and oscillators are affected to some extent by both temperature and supply voltage variations. Timers slow down as voltages are reduced, and speed up as temperatures decrease. The times shown above will typically be 5% longer for circuits operated at room temperature and a 3V supply.

Example Applications

Figures 1 and 2 show two typical circuits that the ELM307 can be used in. The first is labelled 'Party Camera' but really applies to any candid situation where a switch is used to initiate the picture being taken.

Although both circuits show a 3V battery for a supply, this is only for portability. Any convenient supply that is between 3V and 5.5V could just as easily be used. Note that both supplies are bypassed with 0.1µF capacitors. This is good practice, but could be eliminated if cost is a concern, and the battery is electrically close to the ELM307.

In Figure 1, PW and Delay are both at a high level, so the circuit is configured for a 1 second output with a minimum delay of 5 seconds between outputs. An NPN transistor (2N3904 or similar) provides the interface to the camera. Fortunately most cameras these days (including disposables) use a momentary contact for the shutter control, and this transistor can simply be connected across that button to initiate a picture. You may have to experiment a little to get the polarity correct, though. An additional 33K resistor is shown connected in series with pin 5 to provide some protection from electrostatic discharges. This is a good idea if the initiating contact is located more than a few feet from the ELM307. Note that there is no

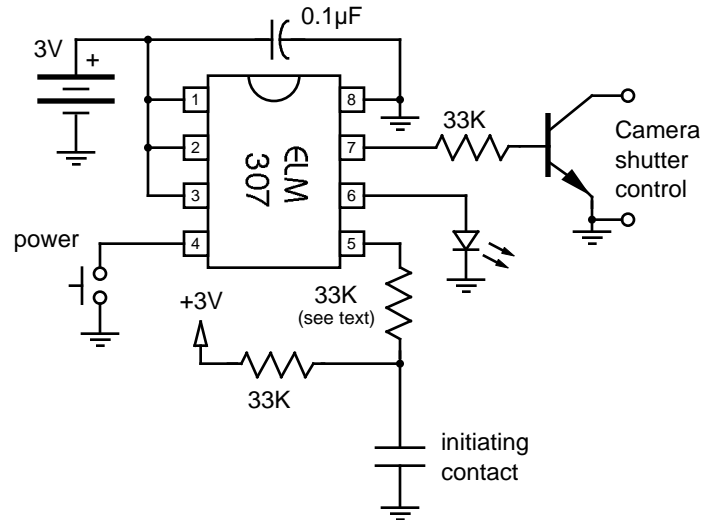


Figure 1. Party Camera

resistor required in series with the LED in this circuit, as internal circuitry limits the current to a safe value. If a higher supply level is used, a small value resistor (220 Ω) should be connected in series with the LED.

The circuit shown in Figure 2 can be used to capture photos of lightning (as long as the camera's inherent delay in responding is not so great that the flash has dissipated). Some cameras have a considerable delay in opening the shutter after the button is pressed, and may not be acceptable for this use.

The circuit shown is virtually identical to that of figure 1, except that an additional NPN transistor has been connected to amplify the output of an AM radio and trigger the circuit.

In operation, the ELM307 is placed in the test mode, the AM radio is tuned between stations, and its volume is adjusted to trigger the LED only on lightning flashes. When ready, the pushbutton is held for 3 seconds then released, switching the circuit to the run mode. Hopefully the camera is pointing in the right direction when a flash is detected.

Many variations on these circuits can be used to trigger a camera, only limited by your imagination. Why not connect an ELM460 for a 200sec period, feed it into the ELM307 trigger, then put everything on a kite and go fly it...

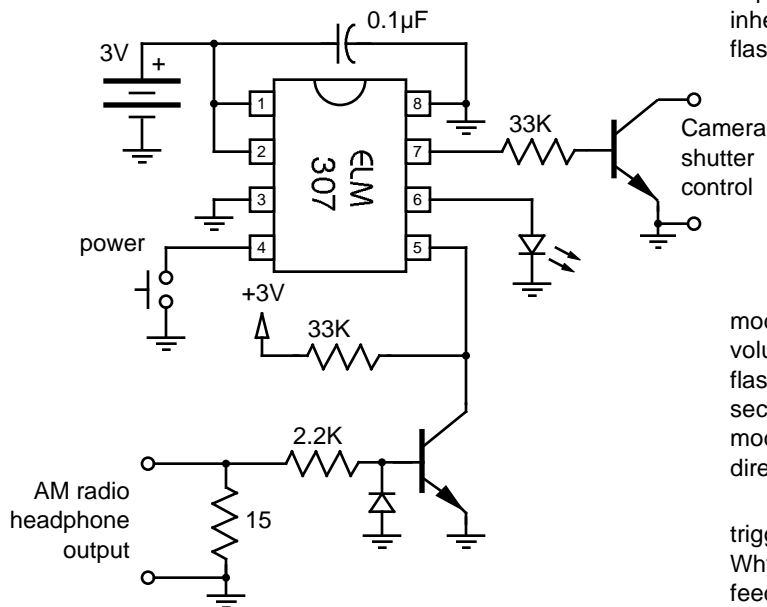


Figure 2. Lightning Detector