



# ELM365 Security System Controller

## Description

The ELM365 provides all of the logic necessary for a complete security system in an 8 pin package.

The circuit is capable of monitoring two normally closed input loops and one normally open panic circuit, provides a constant level and a pulsing alarm output, and the logic to drive a status LED.

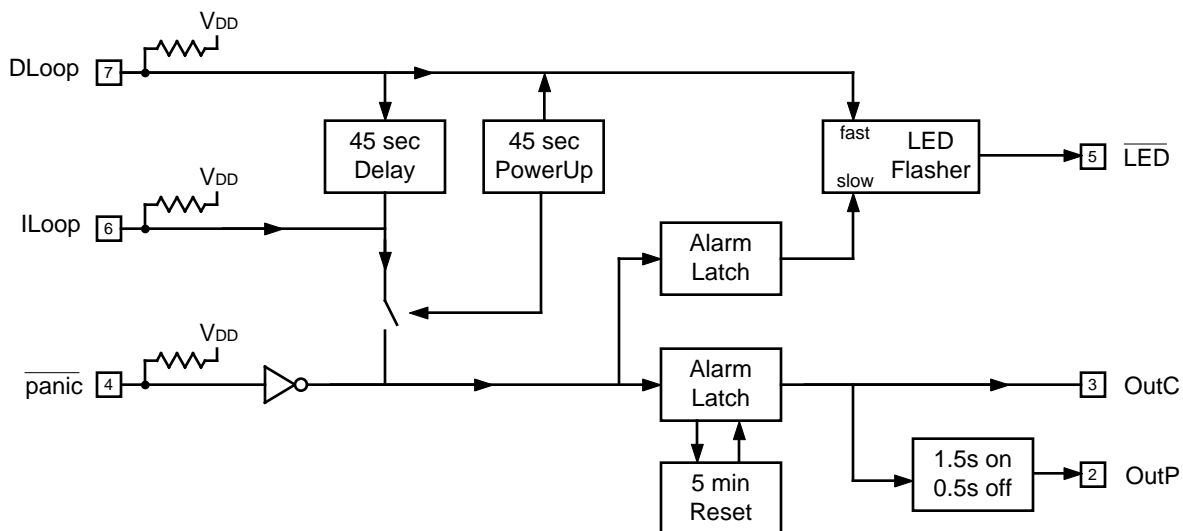
Internal timers are provided for alarm blocking during zone entry and exit as well as circuit resetting, should alarms go unacknowledged. Debouncing of all of the inputs is also provided internally, to allow for the direct interfacing to mechanical switches.

Due to the digital techniques employed, no external support components are required for any of the timing functions, resulting in considerable cost savings over other designs.

## Applications

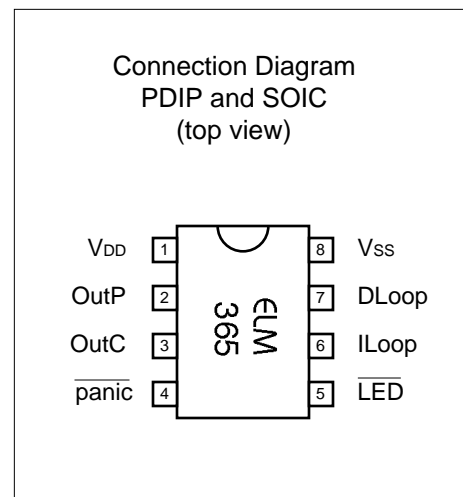
- Home or cottage security systems
- Auto or RV security systems
- Individual zone monitoring in a multizone system
- High or low limit warning alarms

## Block Diagram



## Features

- Low power CMOS design - typically 1mA at 5V
- Wide supply range - 3.0 to 5.5 volt operation
- Simultaneous monitoring of three circuits
- 45 second delay for entry and exit
- Automatic reset of alarm outputs after 5 minutes
- Status LED output driver
- High current drive outputs - up to 25 mA
- Panic input for instant triggering of the alarm





## Pin Descriptions

### V<sub>DD</sub> (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.

### OutP (pin 2)

This is the (active high) pulsed alarm output. When in an alarm state, it alternates between a logic high level (V<sub>DD</sub>) for 1.5 seconds and a low level (V<sub>SS</sub>) for 0.5 seconds. This output automatically resets after 5 minutes.

### OutC (pin 3)

This is the constant level alarm output. It is switched to a high level (V<sub>DD</sub>) during an alarm condition, and is otherwise at a logic low level. This output automatically resets to a low level after 5 minutes.

### panic (pin 4)

This active low input is debounced and used to immediately trigger an alarm from normally open inputs such as panic pushbuttons or tamper switches. If unused, this input can be left open circuited, as there is an internal pullup resistor on the pin (see the specs).

### LED (pin 5)

This is an active low LED drive output. It will pulse rapidly to warn that the system is in a 45 second delayed alarm period, or will pulse slowly (about 1.5 seconds on, 0.5 seconds off) if an alarm is in progress or has previously occurred. By adding a suitable series resistor, an LED can be directly driven from this pin.

### ILoop (pin 6)

This pin is used for monitoring a normally closed loop, connected between the pin and V<sub>SS</sub>. To reduce the possibility of nuisance triggers, a 0.5 second debounce period is provided on this input. An alarm will be initiated immediately after the loop is determined to be open, but will not retrigger an alarm if the loop remains open, after the five minute timeout. This pin is not enabled for the first 45 seconds after the system is first turned on.

### DLoop (pin 7)

This pin is similar to pin 6, with the one exception being that the alarm is delayed by 45 seconds to allow time for entry or exit.

### V<sub>SS</sub> (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..... ELM365P

200 mil SOIC..... ELM365SM

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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<sub>DD</sub> with respect to V<sub>SS</sub>..... 0 to +7.5V  
 Voltage on any other pin with  
 respect to V<sub>SS</sub>..... -0.6V to (V<sub>DD</sub> + 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 <sub>DD</sub>	3.0	5.0	5.5	V	
V <sub>DD</sub> rate of rise	0.05			V/ms	see note 2
Average Supply Current, I <sub>DD</sub>		1.0	2.4	mA	V <sub>DD</sub> = 5V, see note 3
Internal pullup resistances	300 20	500 30	600 50	K K	Panic input, see note 4 Loop inputs, see note 4
Output Pulse Duration- High - Low		1.5 0.5		sec sec	OutP and LED outputs, see note 5
Auto Reset Time Period		5		min	see note 6
Input low voltage - reset pin	V <sub>SS</sub>		0.15 V <sub>DD</sub>	V	
Input high voltage - reset pin	0.85 V <sub>DD</sub>		V <sub>DD</sub>	V	
Output low voltage			0.6	V	Current (sink) = 8.7mA
Output high voltage	V <sub>DD</sub> - 0.7			V	Current (source) = 5.4mA

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. Pullup resistor currents are not included in this figure.
4. The value of the internal pullup resistance is both supply and temperature dependent.
5. Times are approximate. LED output can only be reset by powering down.
6. Both the OutP and OutC outputs will be internally reset after this time. If a loop continues to remain open, it will not retrigger an alarm. In contrast, the panic input will always retrigger an alarm if it remains closed.

## Example Application

Figure 1 shows the ELM365 as the controller in a typical home security system.

Series connected magnetic switches monitor door positions, and connect to the delayed loop input. Several window switches are connected in series to the instant loop input, and panic switches are provided in the bedrooms to cause an alarm when pressed.

Four LEDs are included in the circuit to show power on (circuit armed), alarm, and loop status. In addition to status, these LEDs also provide loop current for switch wetting, and assist with the input pullup function. Although not essential, it is recommended that the LEDs be installed.

The series resistors on pins 4, 6, and 7 have been included in this design for protection from electrostatic discharge, or induced currents. Although the circuit will function correctly without them, they are recommended for the added protection that they afford.

The circuit supports two outputs, and both have been included with this design. The pulsed output drives an alarm buzzer, while the constant output can drive yard lights, etc. Both outputs use a conventional transistor circuit to energize a 12V relay coil.

Power for the circuit is from an AC supplied 12V DC source, with only temporary backup provided by a 9V battery. Both inputs are diode coupled, passed through the key switch, and reduced by the 78L05 regulator to 5V for the logic.

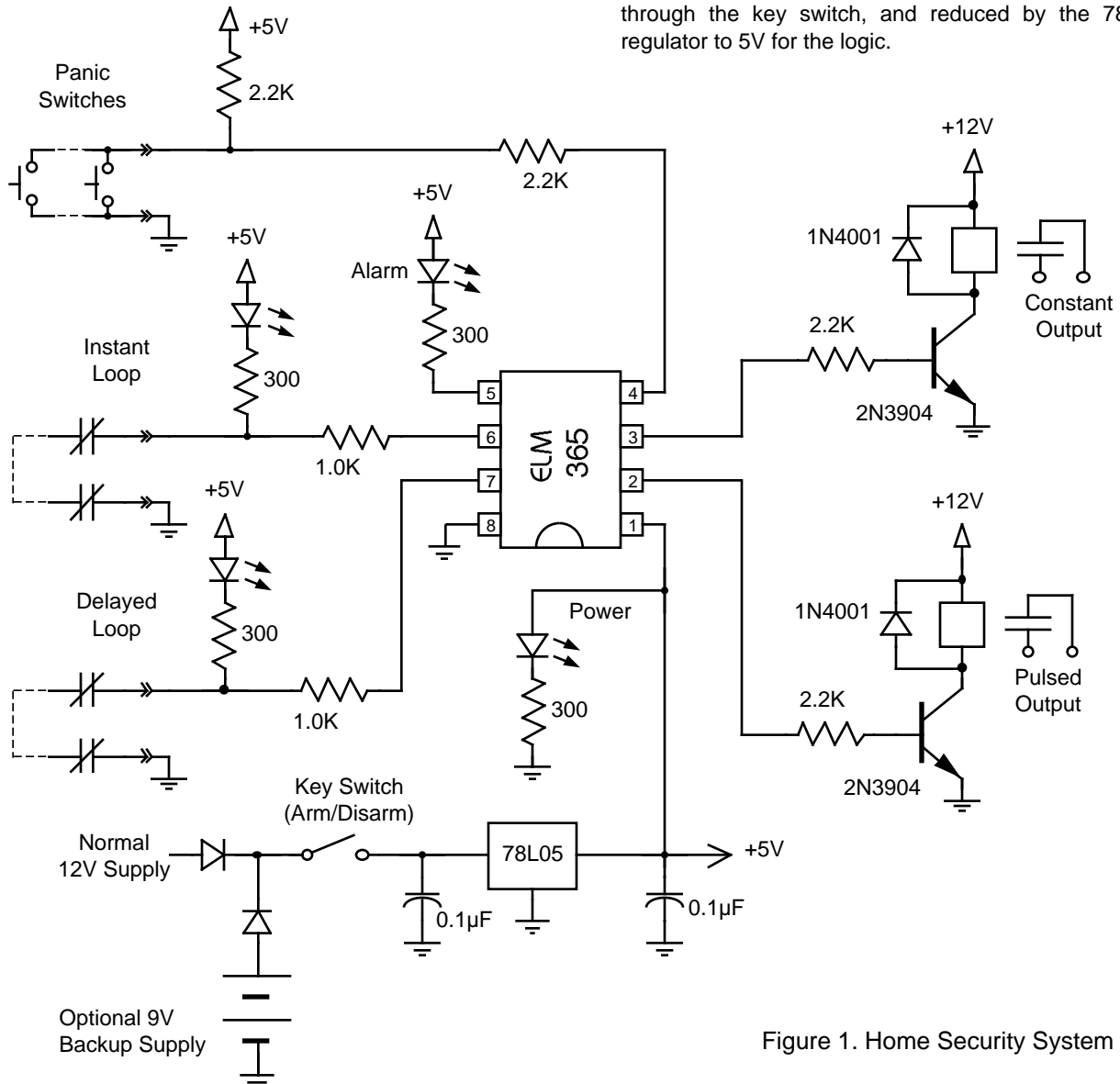


Figure 1. Home Security System