BL59A66 datasheet

1. Introduction:

The BL59A66 is a low-current BiCMOS circuit providing all of the features for a photoelectric type smoke detector. BL59A66 can be used in conjunction with an infrared photoelectric chamber to sense scattered light from smoke particles. Special features are incorporated in the design to facilitate calibration and testing of the finished detector.
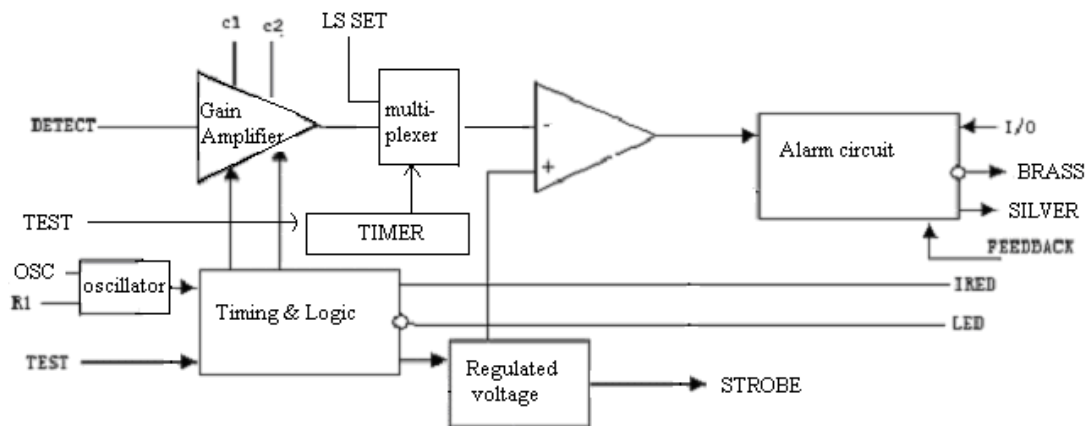
2.1 Applied Area:

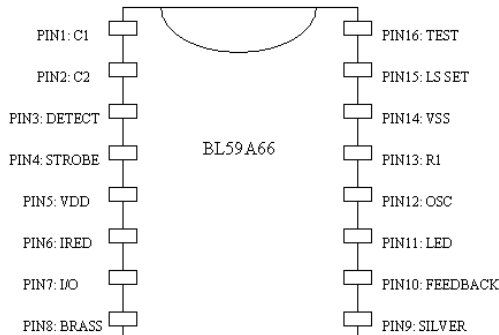Photoelectric Type Smoke Detector System。

2.2 Features:

2.2.1 6 V to 12 V Operating Voltage Range

2.2.2 Internal Timer & Control for Reduced Sensitivity

2.2.3 Supply Voltage current：0~10uA

2.2.4 Operating Temperature Range：－25～75℃

2.2.5 Power-ON Reset

2.2.6 ESD and Latch-up Protection Circuitry on All Pins

2.2.7 Piezoelectric Horn Driver

2.2.8 Interconnect Up to 50 Detectors

2.2.9 Continuous Modulated Tone Output For a Local or Remote Alarm Condition

2.3 FUNCTIONAL BLOCK DIAGRAM

2.4 Pin Description

2.5 Pin function

Pin No.	Pin symbol	Input/Output	Function Description	
1 ,2	C1 , C2		Exterior capacitor connected to the pins	A capacitor connected to the pins determines the gain of the photo amplifier.
3	DETECT	Input	Input to the photo amplifier	This pin connects the cathode of the photo diode. The photo diode is operated at zero bias.
4	STROBE	Output	Regulated voltage Output	The pin is the Regulated voltage Output. The value is Vdd-5V.
5 ,14	Vdd , V_{SS}		Power/Gnd	Power supply
6	IRED	Output	Signal output	This pin is a output, which provides a pulsed base current for the external npn transistor, which drives the IR emitter.
7	I/O			A connection at this pin allows multiple smoke detectors (less than 50) to be interconnected.
8 ,9	BRASS, SILVER	Output	Piezoelectric Transducer Output	These TWO pins are used in conjunction with a piezoelectric transducer.
10	FEEDBACK	Inuput	Piezoelectric Transducer Input	The pin is used in conjunction with a piezoelectric transducer feedback electrode.
11	LED	Output	Signal output	This open-drain NMOS output is used to directly drive a visible LED. The LED also indicates detector status as follows (with component values as in the typical application, all times nominal)
12	OSC	Input	OSC Input	The pin connects with exterior capacitor and resistor, sets the internal clock low time.
13	R1		Exterior capacitor and resistor connected to the pins	The pin connects with exterior capacitor and resistor, sets the internal IRED output pulse period.
15	LS SET	Intput	Low sensitive set	This input pin serves two purposes in normal operation. This reference is established by a resistive divider between VDD and STROBE. This allows the detector to have a different sensitivity set point during the timer mode.
16	TEST	Input	Test Input	This pin has an internal pull-down device and is used to manually invoke two test modes and a Timer Mode.

3. Circuit characteristic:

3.1 The gain is determined by exterior capacitor C1 and C2. A capacitor connected to C2 determines the gain of the photo amplifier during standby. A typical value for this low-gain mode is 4700 pF but should be selected based on a specific photo chamber and the desired level of sensitivity to smoke. $AV \tilde{=} 1+(C2/10)$ where C2 is in pF. This gain increases by a nominal 10% after a local alarm is detected (three consecutive detections).

3.2 I/O pin allows multiple smoke detectors to be interconnected. If a local smoke condition occurs, this pin is driven high. As an input, this pin is sampled nominally every 1.35 seconds during standby. Any local alarm condition causes I/O to be ignored as an input.

3.3 LED pin is a output pin, which is used to directly drive a visible LED. The load for the low-battery test is applied to this output. The low-battery test does not occur coincident with any other test or alarm signal. The LED also indicates detector status as follows (with component values as in the typical application, all times nominal):

Standby - Pulses every 43 seconds.

Local Smoke - Pulses every 0.67 second.

Remote Alarm - No pulses.

Test Mode - Pulses every 0.67 second.

Timer Mode - Pulses every 10 seconds.

4. **Circuit characteristic parameter**:

4.1 Absolute Maximum Rating

(Voltages are referenced to VSS)

Symbol	Parameter	Range	Unit
VDD	Supply Voltage	-0.5～＋15	V
VIN	Input Voltage	-0.3～VDD＋0.3	V
IIN	Input Current	10	mA
T_A	Operating Temperature	-25 ～ +75	℃
T stg	Storage Temperature	-55 ～ +125	℃
TL	Welding Temperature	260	℃

4.2 DC **characteristic** (Voltages are referenced to VSS)

Symbol	Parameter	Conditions	VDD	Min.	Max.	Unit
VDD	Supply Voltage Range		-	6.0	12	V
VTH	Low VDD(th) threshold		—	6.9	7.5	V
IDD	Operating Supply Current	Standby	12	—	10	uA
iDD	Operating Supply Current	Strobe on IRED off	12	-	2.0	mA
VIL	Low-Level Input Voltage					V
	I/O		9.0		1.5	
	Feedback		9.0		2.7	
	Test		9.0		7.0	
	LS SET		9.0		0.5	
VIH	High-Level Input Voltage		9.0			V
	I/O		9.0	3.2		
	Feedback		9.0	6.3		
	Test		9.0	8.5		
	LS SET		9.0	1.6		
IIH	Input Leakage High					nA
	C1，C2	Vin=VDD，Strobe active Pin 12=Vdd	12		100	
	Detect, Feedback, OSC	Vin=VDD	12		100	
IIL	Input Leakage Low					
	C1, C2, Detect	Vin=VST，Strobe active, Pin 12=Vdd	12		-100	nA
	Feedback, OSC	Vin=VSS	12		-100	nA
	LS SET, TEST	Vin=VSS	12		-1.0	uA
IIN	Input Pull-Down Current					uA
	Test, LS SET	Vin=VDD	9.0	0.25	10	
	I/O	No Local Alarm， Vin=VDD	12	20	80	
	I/O	No Local Alarm， Vin=17V	12	—	140	
VOL	Low-Level Output Voltage					V
	LED	Io=10mA	6.5		0. 6	
	BRASS,SILVER	Io=16mA	6.5		1. 0	
	R1	Io=5mA	6.5		0.5(typ)	
VOH	High-Level Output Voltage BRASS, SILVER	Io=-16mA	6.5	5.5	-	V
VST	Strobe Output Voltage					V
	Strobe	Inactive, Iout=-1uA	12	VDD-0.1	-	
		Inactive, I out=100uA to 500uA	9.0	VDD-5.25	Vdd-4.75	
IOH	High-Level Output Current I/O	Any Alarm Condition , Vo=VDD-2V	9.0	-4	-	mA
IOZ	OFF Leakage Current High LED,R1	Vout=Vss	12	-	-1	uA

VIC	Common Mode Voltage C1，C2，Detect	Any Alarm Condition	—	VDD-4	VDD-2	V
Vref	Smoke Comparator Ref. Volt.	Any Alarm Condition	—	VDD-3.7	VDD-3.3	V

5．TYPICAL APPLICATION
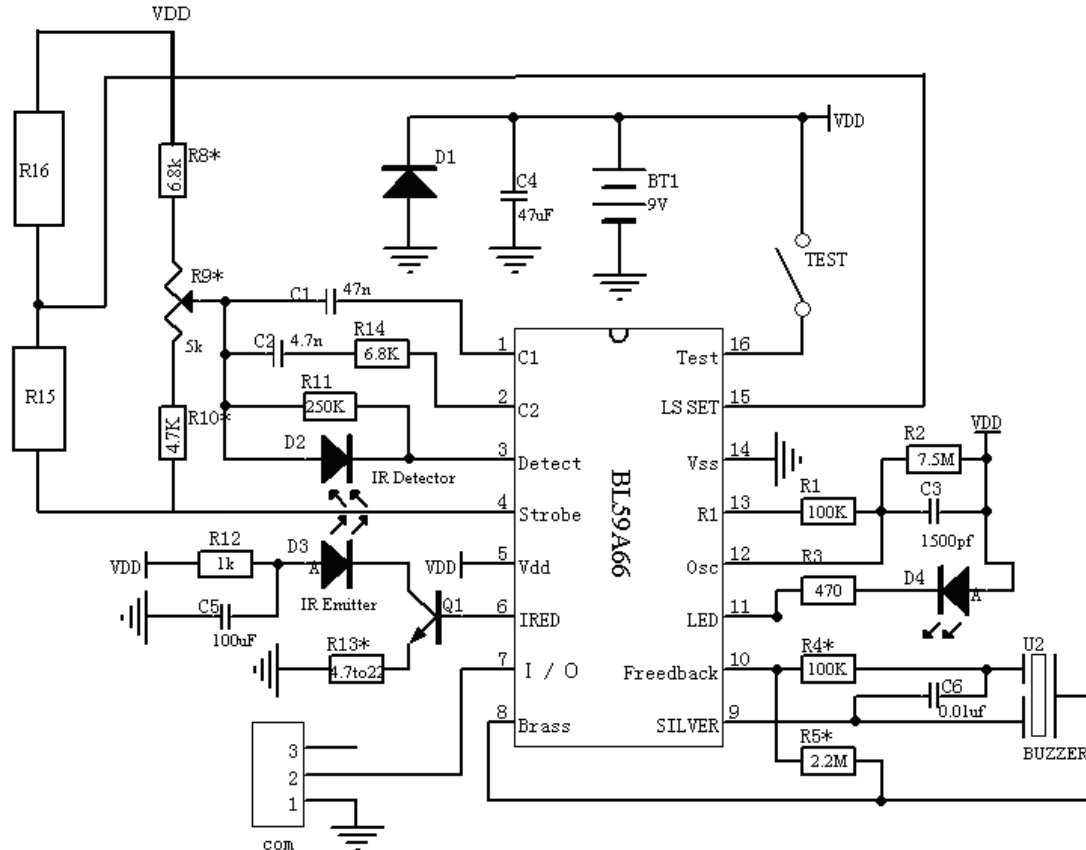
6． Calibration Mode Description

For sensitive detecting and calibrating smoke system, BL59A66 could set calibration Mode. If TEST=V_{SS}-1V, and draining 100uA current from the pin. After one period, BL59A66 is in calibration Mode。If TEST pin is high impedance condition with one period, Bl59A66 exit calibration Mode. The following table is shown the relative descriptions of calibration Mode.

PIN Symbol	Function
7:I/O	This pin is disabled as an output. A logic high on this pin places the photo amplifier output on pin 1 or pin 2 as determined by pin 15. The amplifier output appears as pulses.
15:LS SET	If the I/O pin is high, this pin controls the amplifier gain capacitor. If pin 15 is low, normal gain is selected and the amplifier output is on pin 1. If pin 15 is high, supervisory gain is selected and the amplifier output is on pin 2.
10:FEEDBACK	If pin 7 is high and pin 15 is low (normal gain), taking this pin to a high logic level increases the amplifier gain by ~10% (hysteresis).
12:OSC	This pin may be driven by an external clock source.
8:BRASS	This pin is reconfigured as the smoke integrator output. Three consecutive smoke detections will cause this pin to go high and three consecutive no smoke detections cause this pin to go low.
11:LED	This pin becomes a low-battery indicator. The open-drain NMOS output is normally OFF. If VDD falls below the low battery threshold, the output turns on.