



## RE46C160

### CMOS Alarm ASIC

Preliminary Product Specification

### General Description

The RE46C160 is a low power CMOS general purpose alarm detector IC which provides an interface to a piezoelectric horn and LED for signaling and notification. With a few external components this IC can provide many features for a variety of alarm applications. In addition low standby current makes this circuit ideal in battery powered applications.

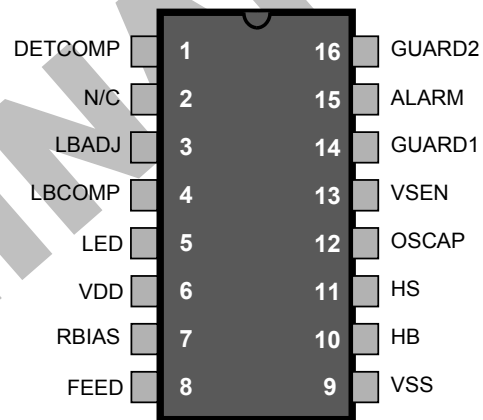
Typical applications include personal, home and auto anti-theft type alarms and liquid level or temperature sensing alarms.

An internal oscillator strobes power to the detection circuitry for 10.5mS every 1.66 seconds to keep standby current to a minimum. A check for a low battery condition is performed every 40 seconds when in standby.

### Features

- Guard Outputs for Detect Input
- Low leakage MOSFET input comparator
- Internal Reverse Battery Protection
- Internal Low Battery Detection
- Low Quiescent Current Consumption (<6uA)
- Available in 16L PDIP or 16L N SOIC
- ESD Protection on all Pins
- Compatible with MC14600

### Pin Configuration



### ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	UNITS
Supply Voltage	$V_{DD}$	15	V
Input Voltage Range Except FEED	$V_{in}$	$-.3$ to $V_{dd} + .3$	V
FEED Input Voltage Range	$V_{infd}$	$-10$ to $+22$	V
Reverse Battery Time	$T_{RB}$	5	S
Input Current except FEED	$I_{in}$	10	mA
Operating Temperature	$T_A$	$-40$ to $85$	$^{\circ}C$
Storage Temperature	$T_{STG}$	$-55$ to $125$	$^{\circ}C$
Maximum Junction Temperature	$T_J$	150	$^{\circ}C$

Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only and operation at these conditions for extended periods may affect device reliability.

This product utilizes CMOS technology with static protection; however proper ESD prevention procedures should be used when handling this product. Damage can occur when exposed to extremely high static electrical charge



**DC Electrical Characteristics at TA = 25°C, VDD=9V, VSS=0V (unless otherwise noted)**

Parameter	Symbol	Test Pin	Test Conditions	Limits			
				Min	Typ	Max	Units
Supply Voltage	V <sub>DD</sub>	6	Operating	6		12	V
Supply Current	I <sub>DD1</sub>	6	RBIAS=8.2MΩ, OSCAP=.1uF		4.5	6	uA
	I <sub>DD2</sub>	6	RBIAS=8.2MΩ, OSCAP=.1uF;Vdd=12V			9	uA
Input Voltage High	V <sub>IH</sub>	8	FEED input	6.2			V
Input Voltage Low	V <sub>IL</sub>	8	FEED input			2.7	V
Input Leakage Low	IL <sub>DET1</sub>	15	VDD=9V, ALARM=VSS			-100	nA
	IL <sub>FD</sub>	8	FEED=-10V			-50	uA
Input Leakage High	IH <sub>DET1</sub>	15	VDD=9V, DETECT=VDD, 0-40% RH			100	nA
	IH <sub>FD</sub>	8	FEED=22V			50	uA
Output Off Leakage High	I <sub>OHZ</sub>	5	LED Off			1	uA
Output Voltage High	V <sub>OH1</sub>	10,11	IOH=-16mA, VDD=7.2V	6.3			V
	V <sub>OH2</sub>	1,4	IOH=-30ua	8.5			V
Output Voltage Low	V <sub>OL1</sub>	10,11	IOL=16mA, VDD=7.2V			.9	V
	V <sub>OL2</sub>	1,4	IOL=30ua			.5	V
	V <sub>OL3</sub>	5	IOL=10mA, VDD=7.2V			3	V
Low Battery Voltage	V <sub>LB</sub>	6	TA=-10 to 60°C, Note 3	7.2	7.5	7.8	V
Internal Sensitivity Set Voltage	V <sub>SET2</sub>	3			65.5		%V <sub>DD</sub>
Offset Voltage	VG <sub>OS1</sub>	14,15	Guard Amplifier	-50		50	mV
	VG <sub>OS2</sub>	15,16	Guard Amplifier	-50		50	mV
	VG <sub>OS3</sub>	13,15	Alarm Comparator	-50		50	mV
Common Mode Voltage	V <sub>CM1</sub>	14,15	Guard Amplifier, Note 2	2		V <sub>DD</sub> -5	V
	V <sub>CM2</sub>	13,15	Alarm Comparator, Note 2	.5		V <sub>DD</sub> -2	V
Output Impedance	Z <sub>OUT</sub>	6,8	Guard Amplifier Outputs, Note 2	10			kΩ

Note 2: Not 100% production tested

Note 3: Production test at room with temperature guardbanded limits.



**AC Electrical Characteristics at TA = 25°C, VDD=9V, OSCAP=.1uF, RBIAS=8.2MΩ, VSS=0V (unless otherwise noted)**

Parameter	Symbol	Test Pin	Test Conditions	Limits			
				Min	Typ	Max	Units
Oscillator Period	T <sub>PER1</sub>	12	No Alarm Condition	1.34	1.67	2	S
	T <sub>PER2</sub>	12	Alarm Condition	37.5	41.5	45.8	mS
Oscillator Pulse Width	T <sub>PW</sub>	5	Operating	9.1	10.5	12.5	mS
LED On Time	T <sub>LON</sub>	5	Operating	9.1	10.5	12.5	mS
LED Off Time	T <sub>LOF1</sub>	5	Standby, No Alarm	32	40	48	S
	T <sub>LOF2</sub>	5	Alarm Condition	.9	1	1.1	S
Horn On Time	T <sub>HON1</sub>	10,11	Operating, Alarm Condition	141	166	190	mS
	T <sub>HON2</sub>	10,11	Low Battery, No Alarm	9.1	10.5	12.5	mS
Horn Off Time	T <sub>HOF1</sub>	10,11	Operating, Alarm Condition	71	83	95	mS
	T <sub>HOF3</sub>	10,11	Low Battery, No Alarm	32	40	48	S

Functional Block Diagram

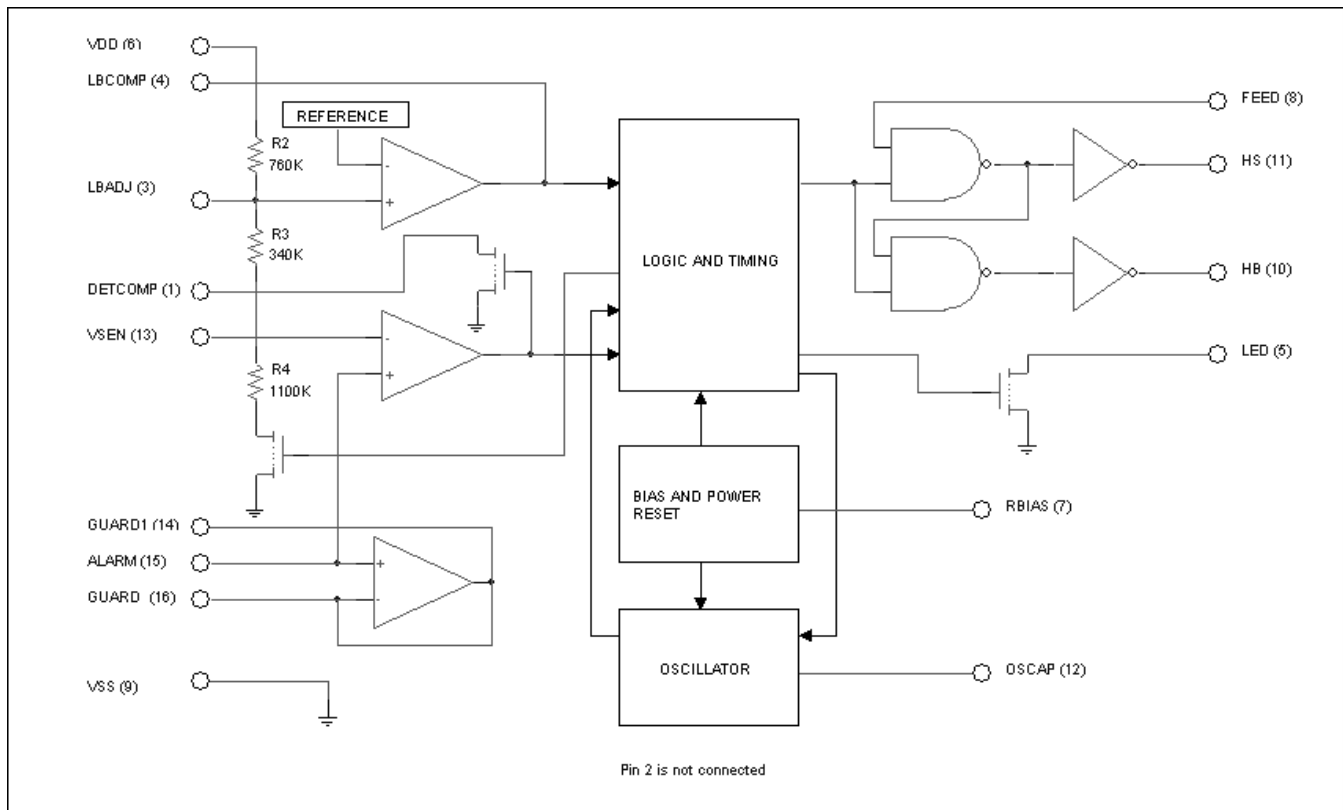


Figure 1



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## DEVICE DESCRIPTION and APPLICATION NOTES

Note: All timing references are nominal values. Refer to the electrical specifications for limits

Internal Timing – With external components as indicated on the application drawing the period of the oscillator is 1.67 seconds in standby. Every 1.66 seconds the detection circuitry is powered up for 10.5mS and the status of the detect comparator is latched. In addition every 40 seconds the LED driver is turned on for 10.5mS and the status of the low battery comparator is latched. The detect comparator status is not checked during the low battery test, during the low battery horn warning chirp, or when the horn is on due to an alarm condition.

If an alarm condition is detected the oscillator period increases to 41.5mS.

Due to the low currents used in the oscillator the capacitor on pin 12 should be a low leakage type. Oscillator accuracy will depend mainly on the tolerance of the RBIAS resistor and OSCAP capacitor.

Alarm Circuit – The alarm comparator compares the alarm voltage to a voltage derived from a resistor divider across VDD. . This divider voltage must be provided externally on pin 13 (VSEN). See the application drawing (FIG 2). In an alarm condition the horn is turned on for 167mS and turned off for 87ms.

The guard amplifier and outputs are always active and will be within 50mV of the DETECT input. The guard outputs also allow for measurement of the DETECT input without loading the sensing element.

Low Battery Detection – An internal reference is compared to the voltage divided VDD supply. The battery can be checked under load via the LED low side driver output since low battery status is latched at the end of the 10mS LED pulse. Pin 3 (LBADJ) can be used to modify the low battery set point by placing a resistor to VDD or VSS.

LED Pulse – The LED is pulsed on for 10.5mS every 40S in standby. In alarm the LED is pulsed on for 10.5mS every 1S.

Testing – By holding pin 12 (OSCAP) low the internal power strobe is active and pins 1 (DETCOMP) and 4 (LBCOMP) can be used to check for alarm and low battery respectively. Please refer to the timing diagrams.

Typical Application

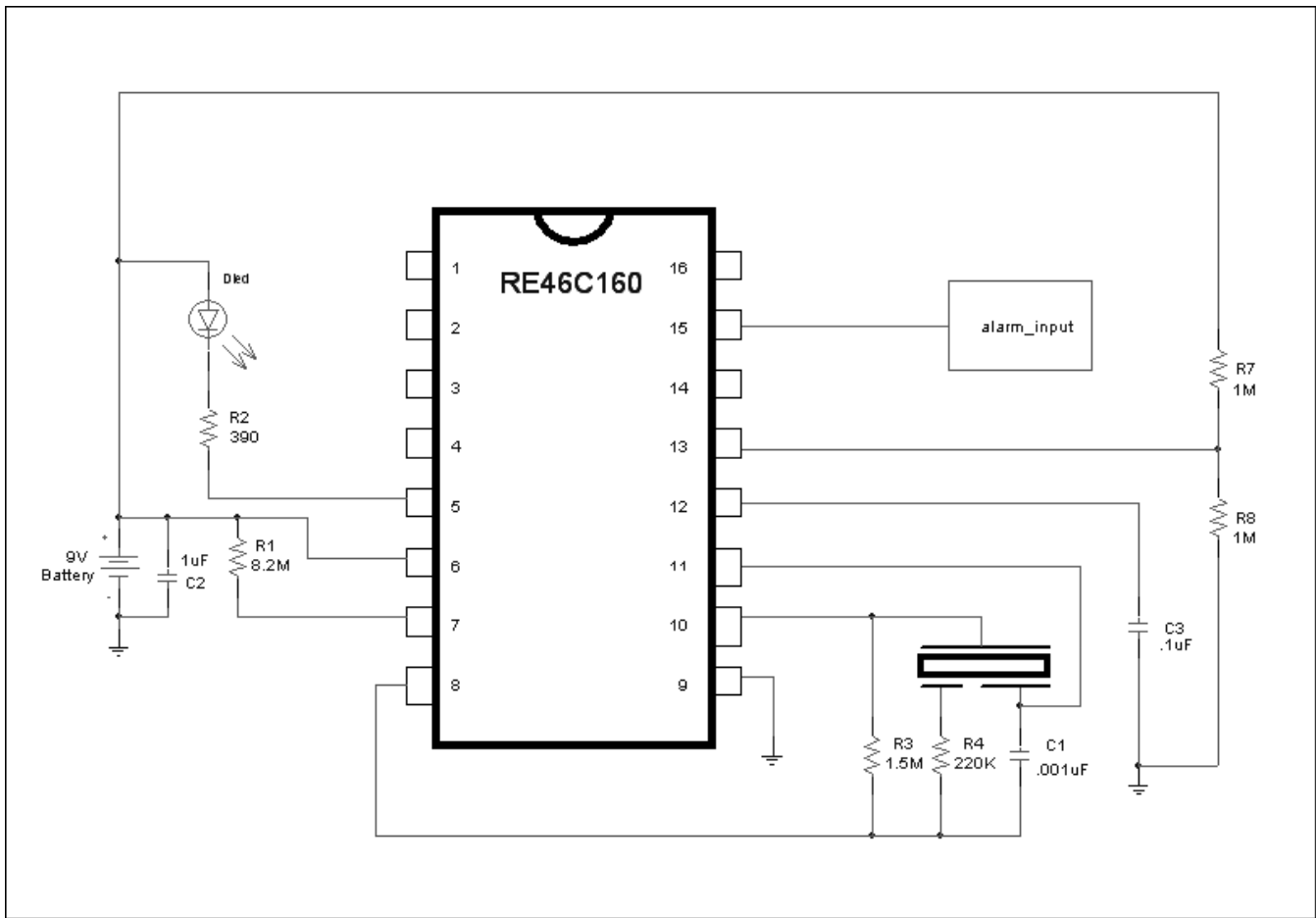


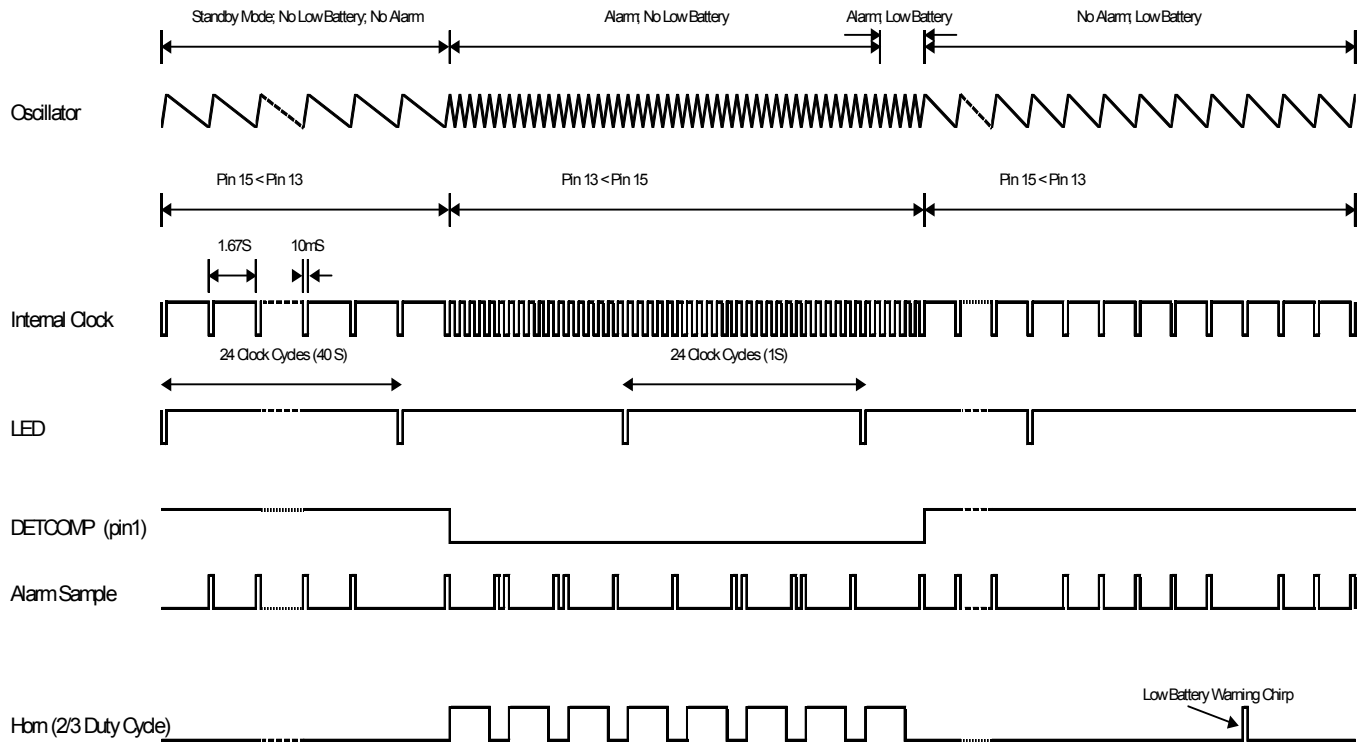
Figure 2

Notes:

- 1) C2 should be located as close as possible to the device power pins.
- 2) The value of R2 should be selected to maintain proper battery loading during the low battery test.



Timing Diagram



Notes:

1. Smoke is not sampled when the horn is active so the horn cycle is self completing
2. Low battery warning chirp is suppressed in alarm



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