

Low-Power CMOS Ionization Smoke Detector IC with Interconnect

The MC14468, when used with an ionization chamber and a small number of external components, will detect smoke. When smoke is sensed, an alarm is sounded via an external piezoelectric transducer and internal drivers. This circuit is designed to operate in smoke detector systems that comply with UL217 and UL268 specifications.

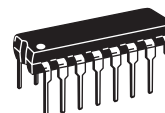
Features

- Ionization Type with On-Chip FET Input Comparator
- Piezoelectric Horn Driver
- Guard Outputs on Both Sides of Detect Input
- Input-Production Diodes on the Detect Input
- Low-Battery Trip Point, Internally Set, can be Altered Via External Resistor
- Detect Threshold, Internally Set, can be Altered Via External Resistor
- Pulse Testing for Low Battery Uses LED for Battery Loading
- Comparator Output for Detect
- Internal Reverse Battery Protection
- Strobe Output for External Trim Resistors
- I/O Pin Allows Up to 40 Units to be Connected for Common Signaling
- Power-On Reset Prevents False Alarms on Battery Change
- Pb-Free Packaging Designated by Suffix Code ED

ORDERING INFORMATION			
Device	Temperature Range	Case No.	Package
MC14468P	-10° to 60°C	648-08	Plastic Dip
MC14468ED			

MC14468

**LOW-POWER CMOS
IONIZATION SMOKE
DETECTOR IC
WITH INTERCONNECT**



**P SUFFIX
ED SUFFIX (PB-FREE)
16-LEAD PLASTIC DIP
CASE 648-08**

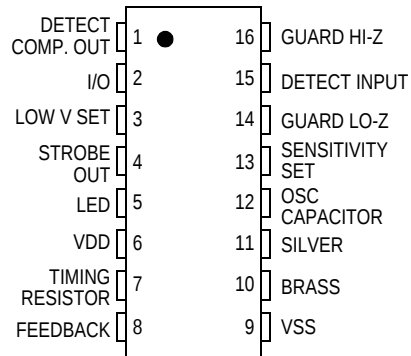


Figure 1. Pin Connections

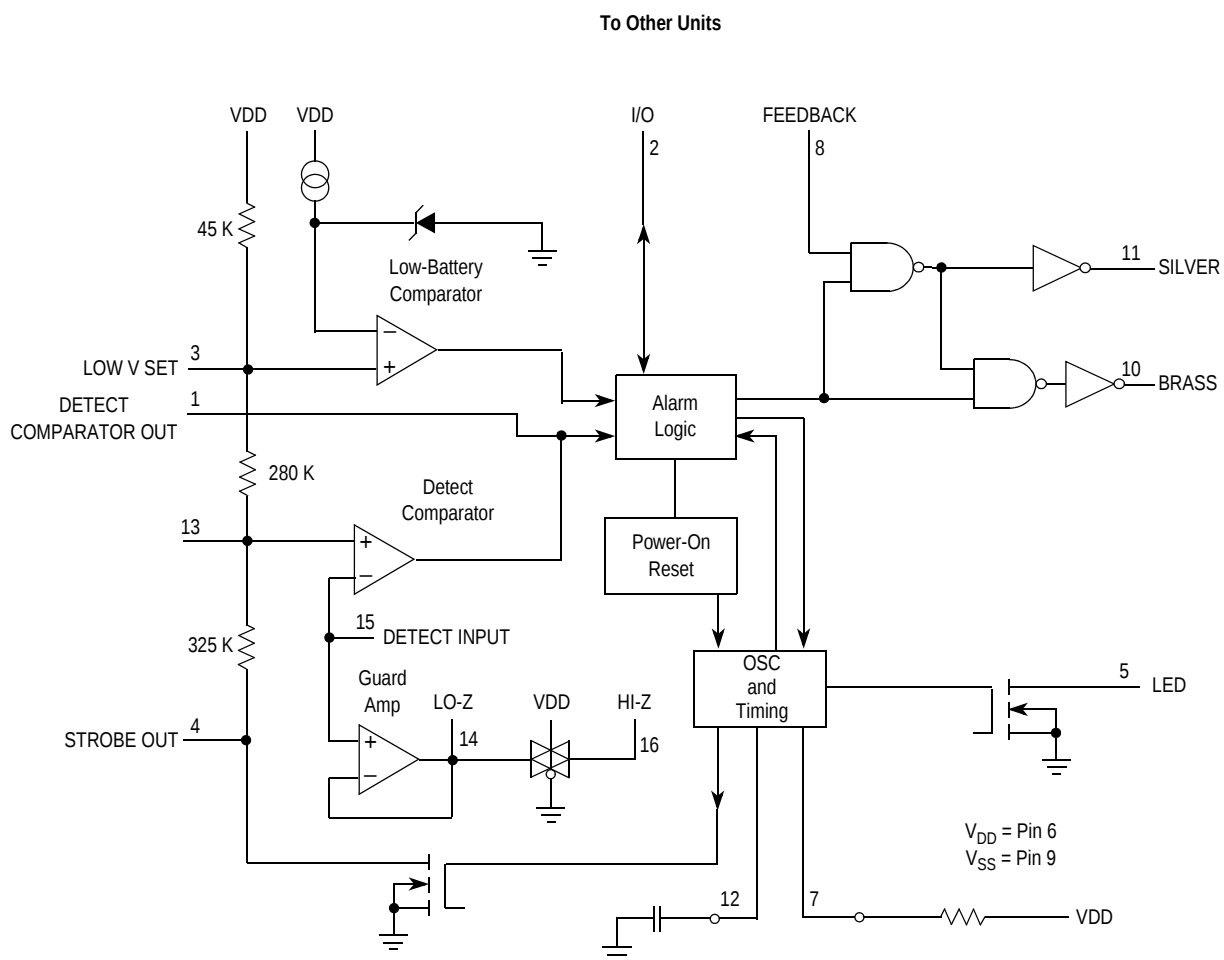


Figure 2. Block Diagram

Table 1. Maximum Ratings⁽¹⁾
(Voltages referenced to V_{SS})

Rating	Symbol	Value	Unit
DC Supply Voltage	V _{DD}	-0.5 to +15	V
Input Voltage, All Inputs Except Pin 8	V _{IN}	-0.25 to V _{DD} + 0.25	V
DC Current Drain per Input Pin, Except Pin 15 = 1 mA	I	10	mA
DC Current Drain per Output Pin	I	30	mA
Operating Temperature Range	T _A	-10 to +60	°C
Storage Temperature Range	T _{STG}	-55 to +125	°C
Reverse Battery Time	t _{RB}	5.0	s

- Maximum Ratings are those values beyond which damage to the device may occur. This device contains circuitry to protect the inputs against damage due to high static voltages or electric fields; however, it is advised normal precautions be taken to avoid application of any voltage higher than maximum rated voltages to this high impedance circuit. For proper operation it is recommended V_{IN} and V_{OUT} be constrained to the range V_{SS} ≤ (V_{IN} or V_{OUT}) ≤ V_{DD}.

Table 2. Recommended Operating Conditions
(Voltages Referenced to VSS)

Parameter	Symbol	Value	Unit
Supply Voltage	V_{DD}	9.0	V
Timing Capacitor	—	0.1	μF
Timing Resistor	—	8.2	$\text{M}\Omega$
Battery Load (Resistor or LED)	—	10	mA

Table 3. Electrical Characteristics
($T_A = 25^\circ\text{C}$)

Characteristic	Symbol	V_{DD} V_{DC}	Min	Type ⁽¹⁾	Max	Unit
Operating Voltage	V_{DD}	—	6.0	—	12	V
Output Voltage Piezoelectric Horn Drivers ($I_{OH} = -16\text{ mA}$)	V_{OH}	7.2	6.3	—	—	V
Comparators ($I_{OH} = -30\text{ }\mu\text{A}$)		9.0	8.5	8.8	—	
Piezoelectric Horn Drivers ($I_{OL} = +16\text{ mA}$)	V_{OL}	7.2	—	—	0.9	V
Comparators ($I_{OL} = +30\text{ }\mu\text{A}$)		9.0	—	0.1	0.5	
Output Voltage — LED Driver, $I_{OL} = 10\text{ mA}$	V_{OL}	7.2	—	—	3.0	V
Output Impedance, Active Guard Pin 14	LO-Z	9.0	—	—	10	$\text{k}\Omega$
Pin 16	HI-Z	9.0	—	—	1000	
Operating Current ($R_{BIAS} = 8.2\text{ M}\Omega$)	I_{DD}	9.0 12.0	— —	5.0 —	9.0 12.0	μA
Input Current — Detect (40% R.H.)	I_{IN}	9.0	—	—	± 1.0	pA
Input Current, Pin 8	I_{IN}	9.0	—	—	± 0.1	μA
Input Current @ 50°C , Pin 15	I_{IN}	—	—	—	± 6.0	pA
Internal Set Voltage Low Battery	V_{LOW}	9.0	7.2	—	7.8	V
Sensitivity	V_{SET}	—	47	50	53	$\%V_{DD}$
Hysteresis	V_{HYS}	9.0	75	100	150	mV
Offset Voltage (Measured at $V_{IN} = V_{DD}/2$) Active Guard	V_{OS}	9.0	—	—	± 100	mV
Detect Comparator		9.0	—	—	± 50	
Input Voltage Range, Pin 8	V_{IN}	—	$V_{SS} - 10$	—	$V_{DD} + 10$	V
Input Capacitance	C_{IN}	—	—	5.0	—	pF
Common Mode Voltage Range, Pin 15	V_{CM}	—	0.6	—	$V_{DD} - 2$	V
I/O Current, Pin 2 Input, $V_{IH} = V_{DD} - 2$	I_{IH}	—	25	—	100	μA
Output, $V_{OH} = V_{DD} - 2$	I_{OH}	—	-4.0	—	-16	mA

1. Data labelled "Typ" is not to be used for design purposes, but is intended as an indication of the IC's potential performance.

Table 4. Timing Parameters

($C = 0.1 \mu\text{F}$, $R_{\text{bias}} = 8.2 \text{ M}\Omega$, $V_{\text{DD}} = 9.0 \text{ V}$, $T_A = 25^\circ\text{C}$, See Figure 7)

Characteristics		Symbol	Min	Typ ⁽¹⁾	Max	Units
Oscillator Period	No Smoke	t_{CI}	1.34	1.67	20	s
	Smoke		32	40	48	ms
Oscillator Rise Time		t_{R}	8.0	10	12	ms
Horn Output (During Smoke)	On Time	PW_{ON}	120	160	208	ms
	Off Time	PW_{OFF}	60	80	104	ms
LED Output	Between Pulses	t_{LED}	32	40	48	s
	On time	PW_{ON}	8.0	10	12	ms
Horn Output (During Low Battery)	On Time	t_{ON}	8.0	10	12	ms
	Between Pulses	t_{OFF}	32	40	48	s

1. Data labelled "Typ" is not to be used for design purposes, but is intended as an indication of the IC's potential performance.

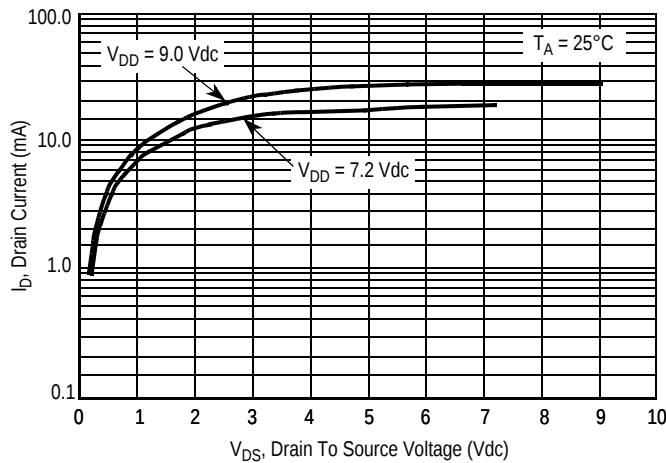


Figure 3. Typical LED Output I-V Characteristic

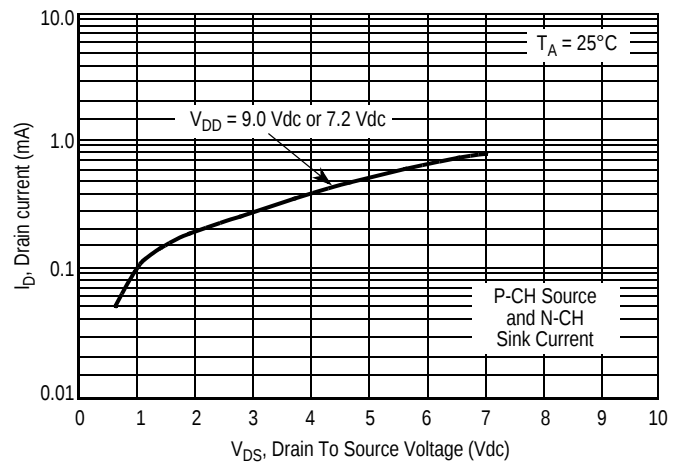


Figure 4. Typical Comparator Output I-V Characteristic

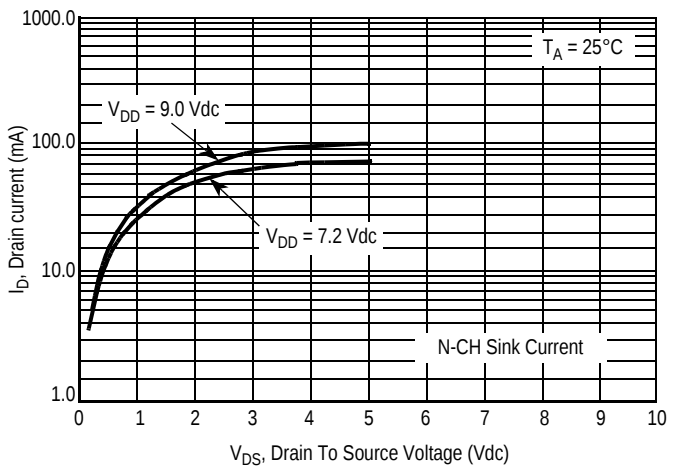
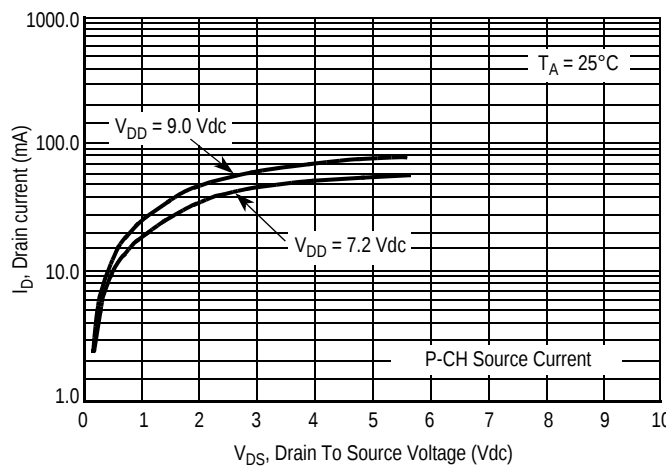
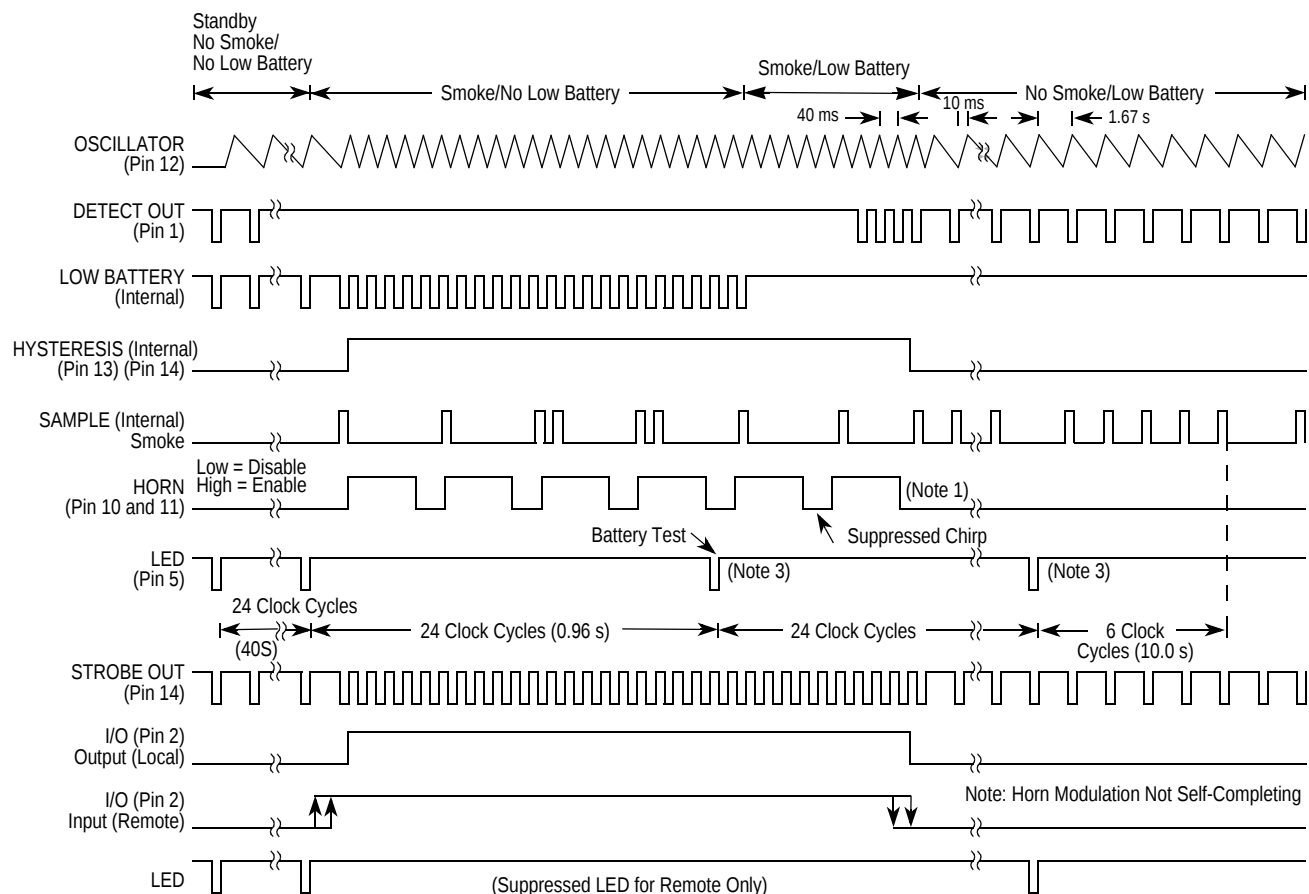


Figure 5. Typical P Horn Driver Output I-V Characteristic

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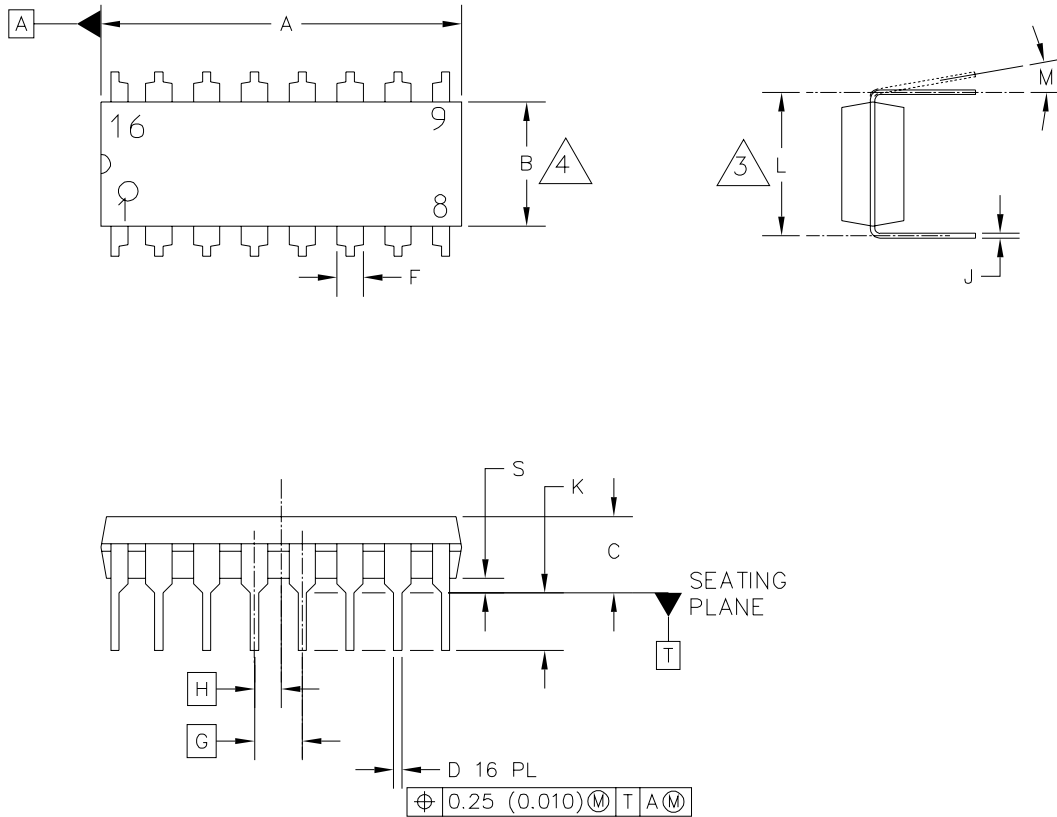


Notes:

1. Horn modulation is self-completing. When going from smoke to no smoke, the alarm condition will terminate only when horn is off.
2. Comparators are strobed on once per clock cycle (1.67 s for no smoke, 40 ms for smoke).
3. Low battery comparator information is latched only during LED pulse.
4. ~ 100 mV p-p swing.

Figure 7. Timing Diagram

PACKAGE DIMENSIONS



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TITLE: 16 LD PDIP		DOCUMENT NO: 98ASB42431B	REV: T
		CASE NUMBER: 648-08	19 MAY 2005
		STANDARD: NON-JEDEC	

**CASE 648-08
ISSUE T
16-LEAD PLASTIC DIP**

MC14468

REVISION HISTORY

REVISION	DATE	DESCRIPTION OF CHANGES
5.0	11/2006	• Implemented Revision History page • Converted to Freescale format • Added part number MC14468ED to Ordering Information.

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