

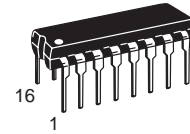


## Low-Power CMOS Ionization Smoke Detector IC with Interconnect

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.

- 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

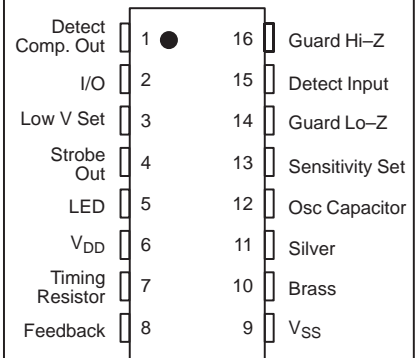
**MC14468**



**P SUFFIX  
PLASTIC DIP  
CASE 648-08**

**ORDERING INFORMATION  
MC14468P PLASTIC DIP**

### PIN ASSIGNMENT (16 PIN DIP)



### MAXIMUM RATINGS\* (Voltages referenced to V<sub>SS</sub>)

Rating	Symbol	Value	Unit
DC Supply Voltage	V <sub>DD</sub>	-0.5 to +15	V
Input Voltage, All Inputs Except Pin 8	V <sub>in</sub>	-0.25 to V <sub>DD</sub> + 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 <sub>A</sub>	-10 to +60	°C
Storage Temperature Range	T <sub>stg</sub>	-55 to +125	°C
Reverse Battery Time	t <sub>RB</sub>	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 that 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 that V<sub>in</sub> and V<sub>out</sub> be constrained to the range V<sub>SS</sub> ≤ (V<sub>in</sub> or V<sub>out</sub>) ≤ V<sub>DD</sub>.



**RECOMMENDED OPERATING CONDITIONS** (Voltages referenced to  $V_{SS}$ )

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

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$ )

Characteristic	Symbol	$V_{DD}$ $V_{dc}$	Min	Typ#	Max	Unit
Operating Voltage	$V_{DD}$	—	6.0	—	12	V
Output Voltage	$V_{OH}$	7.2	6.3	—	—	V
Piezoelectric Horn Drivers ( $I_{OH} = -16 \text{ mA}$ )		9.0	8.5	8.8	—	
Comparators ( $I_{OH} = -30 \mu\text{A}$ )		—	—	—	—	
Piezoelectric Horn Drivers ( $I_{OL} = +16 \text{ mA}$ )	$V_{OL}$	7.2	—	—	0.9	V
Comparators ( $I_{OL} = +30 \mu\text{A}$ )		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						$\text{k}\Omega$
Pin 14	Lo-Z	9.0	—	—	10	
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	$\mu\text{A}$
Input Current — Detect (40% R.H.)	$I_{in}$	9.0	—	—	$\pm 1.0$	pA
Input Current, Pin 8	$I_{in}$	9.0	—	—	$\pm 0.1$	$\mu\text{A}$
Input Current @ $50^\circ\text{C}$ , Pin 15	$I_{in}$	—	—	—	$\pm 6.0$	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 $V_{in} = V_{DD}/2$ )	$V_{OS}$					mV
Active Guard		9.0	—	—	$\pm 100$	
Detect Comparator		9.0	—	—	$\pm 50$	
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	$\mu\text{A}$
Output, $V_{OH} = V_{DD} - 2$	$I_{OH}$	—	-4.0	—	-16	mA

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

**TIMING PARAMETERS** (C = 0.1 μF, R<sub>bias</sub> = 8.2 MΩ, V<sub>DD</sub> = 9.0 V, T<sub>A</sub> = 25°C, See Figure 6)

Characteristics		Symbol	Min	Typ#	Max	Units
Oscillator Period	No Smoke	t <sub>Cl</sub>	1.34	1.67	2.0	s
	Smoke		32	40	48	ms
Oscillator Rise Time		t <sub>r</sub>	8.0	10	12	ms
Horn Output (During Smoke)	On Time	PW <sub>on</sub>	120	160	208	ms
	Off Time	PW <sub>off</sub>	60	80	104	ms
LED Output	Between Pulses	t <sub>LED</sub>	32	40	48	s
	On Time	PW <sub>on</sub>	8.0	10	12	ms
Horn Output (During Low Battery)	On Time	t <sub>on</sub>	8.0	10	12	ms
	Between Pulses	t <sub>off</sub>	32	40	48	s

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

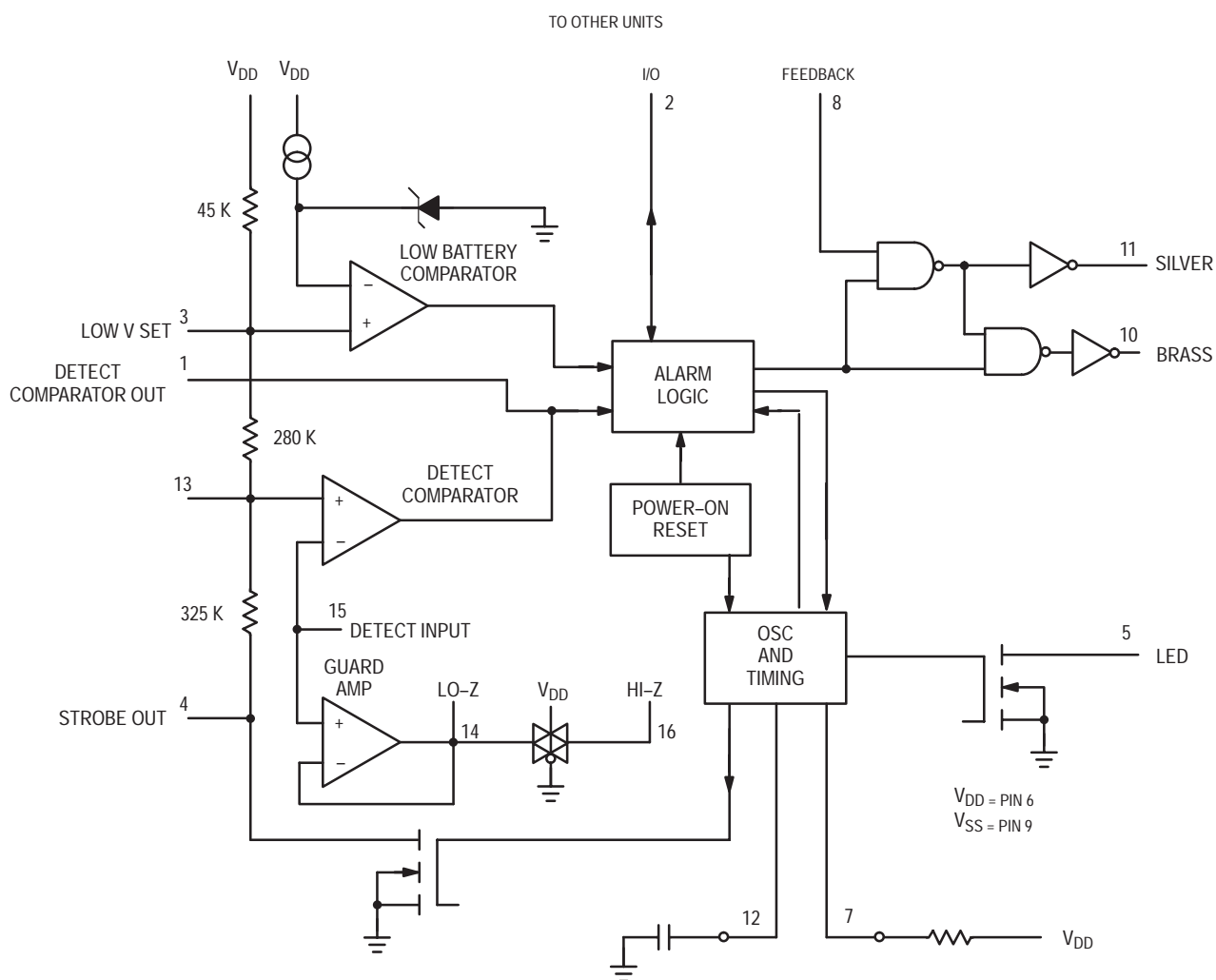


Figure 1. Block Diagram

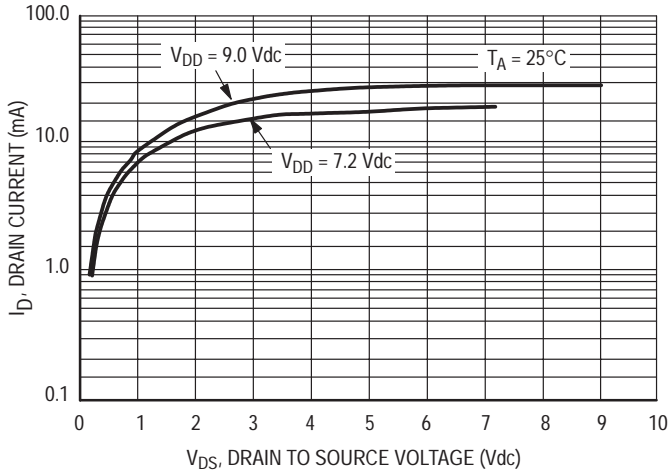


Figure 2. Typical LED Output I-V Characteristic

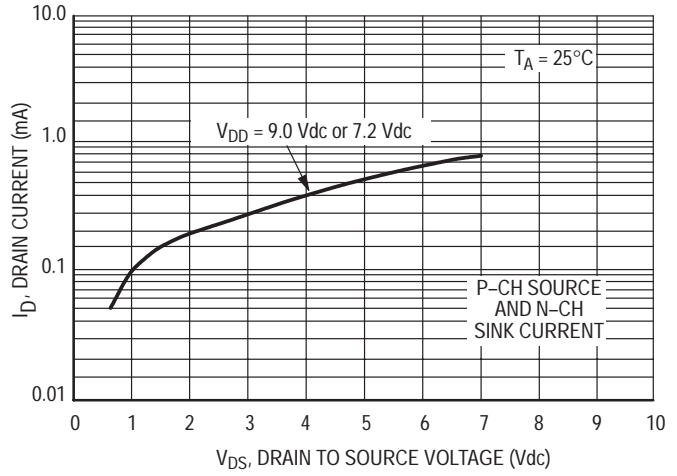


Figure 3. Typical Comparator Output I-V Characteristic

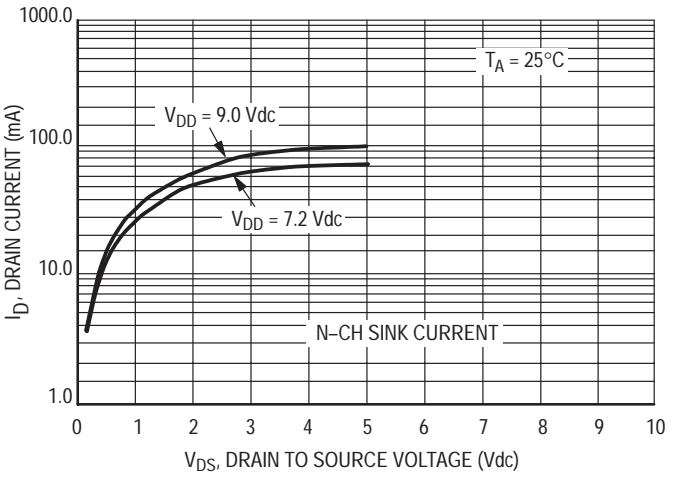
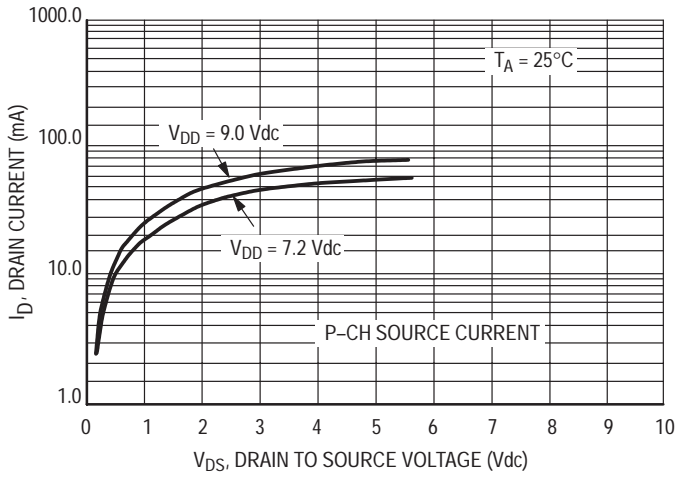
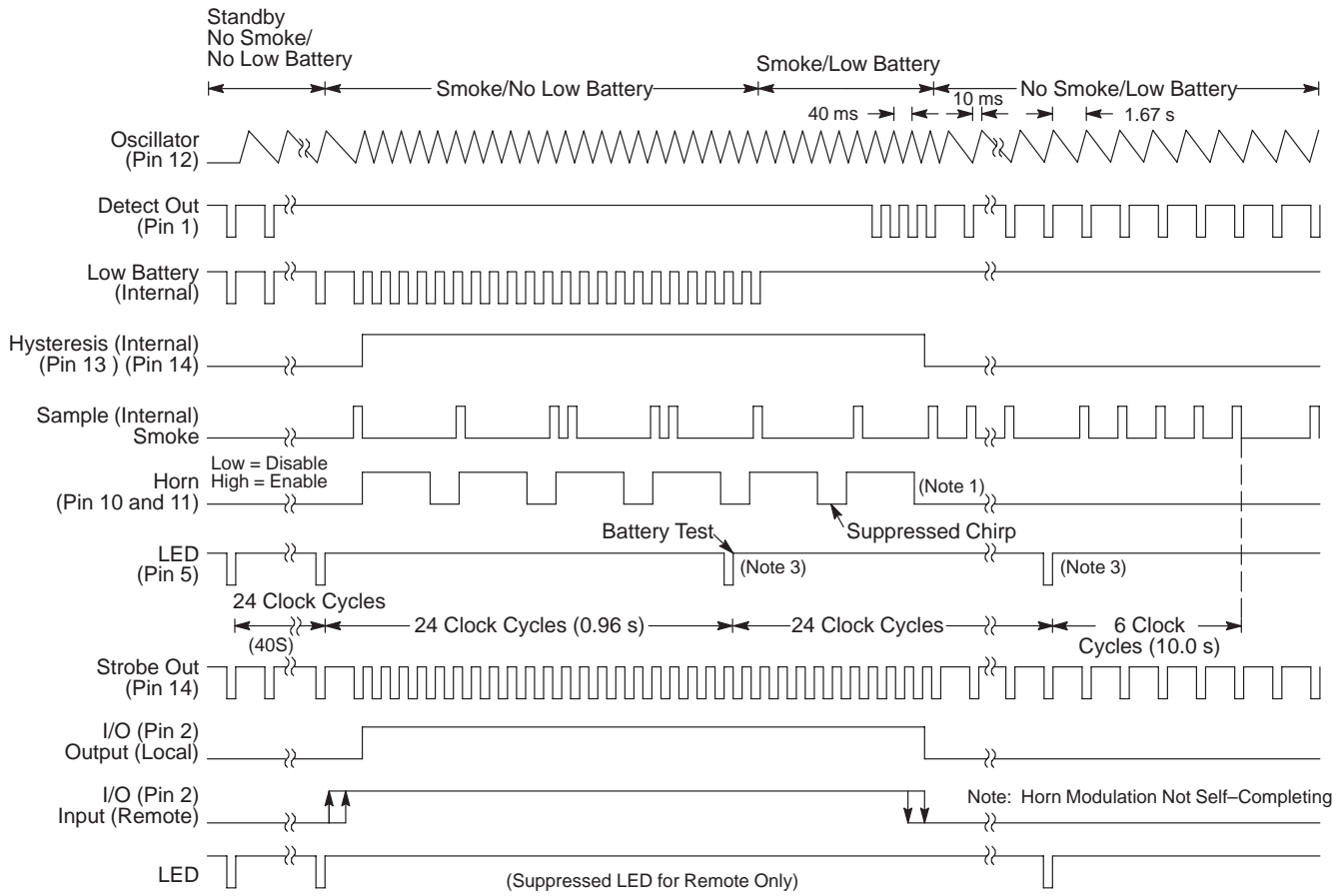


Figure 4. Typical P Horn Driver Output I-V Characteristic



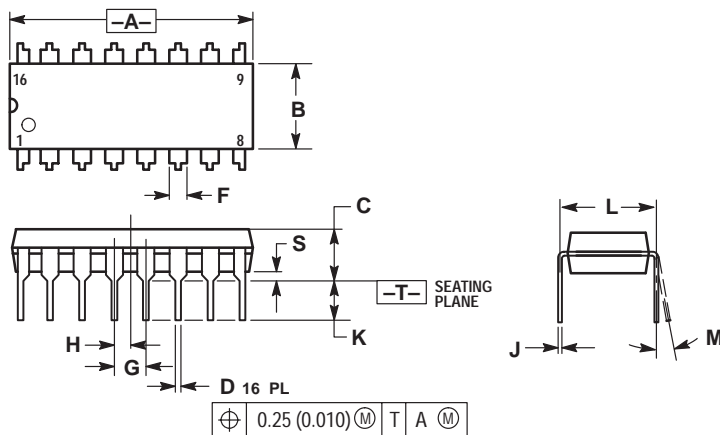


**Figure 6. Timing Diagram**

**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.

**PACKAGE DIMENSIONS**




- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
  4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.
  5. ROUNDED CORNERS OPTIONAL.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.740	0.770	18.80	19.55
B	0.250	0.270	6.35	6.85
C	0.145	0.175	3.69	4.44
D	0.015	0.021	0.39	0.53
F	0.040	0.70	1.02	1.77
G	0.100 BSC		2.54 BSC	
H	0.050 BSC		1.27 BSC	
J	0.008	0.015	0.21	0.38
K	0.110	0.130	2.80	3.30
L	0.295	0.305	7.50	7.74
M	0°	10°	0°	10°
S	0.020	0.040	0.51	1.01

- |   |   |
|---|---|
| <p>STYLE 1:</p> <ul style="list-style-type: none"> <li>PIN 1. CATHODE</li> <li>2. CATHODE</li> <li>3. CATHODE</li> <li>4. CATHODE</li> <li>5. CATHODE</li> <li>6. CATHODE</li> <li>7. CATHODE</li> <li>8. CATHODE</li> <li>9. ANODE</li> <li>10. ANODE</li> <li>11. ANODE</li> <li>12. ANODE</li> <li>13. ANODE</li> <li>14. ANODE</li> <li>15. ANODE</li> <li>16. ANODE</li> </ul> | <p>STYLE 2:</p> <ul style="list-style-type: none"> <li>PIN 1. COMMON DRAIN</li> <li>2. COMMON DRAIN</li> <li>3. COMMON DRAIN</li> <li>4. COMMON DRAIN</li> <li>5. COMMON DRAIN</li> <li>6. COMMON DRAIN</li> <li>7. COMMON DRAIN</li> <li>8. COMMON DRAIN</li> <li>9. GATE</li> <li>10. SOURCE</li> <li>11. GATE</li> <li>12. SOURCE</li> <li>13. GATE</li> <li>14. SOURCE</li> <li>15. GATE</li> <li>16. SOURCE</li> </ul> |
|---|---|

**CASE 648-08  
ISSUE R**

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