

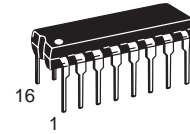


MC145018

**Low-Power CMOS
 Ionization Smoke Detector IC
 with Interconnect and
 Temporal Horn Driver**

The MC145018, 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.

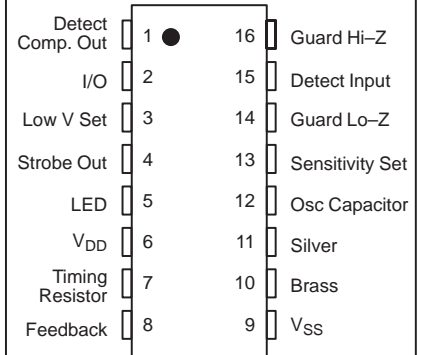
- Ionization Type with On-Chip FET Input Comparator
- Piezoelectric Horn Driver
- Guard Outputs on Both Sides of Detect Input
- Input-Protection Diodes on the Detect Input
- Low-Battery Trip Point, Internally Set, can be Altered Via External Resistor
- Detect Threshold, Internally Set, can be Altered 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
- Supports NFPA 72, ANSi 53.41, and ISO 8201 Audible Emergency Evacuation Signals
- Power-On Reset Places IC in Standby Mode



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

**ORDERING INFORMATION
 MC145018P PLASTIC DIP**

**PIN ASSIGNMENT
 (16 PIN DIP)**



MAXIMUM RATINGS* (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 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_{in} and V_{out} be constrained to the range V_{SS} ≤ (V_{in} or V_{out}) ≤ V_{DD}.



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

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

ELECTRICAL CHARACTERISTICS (Voltages referenced to V_{SS} , $T_A = 25^\circ\text{C}$)

Characteristic	Symbol	V_{DD} V_{dc}	Min	Typ	Max	Unit
Operating Voltage	V_{DD}	—	6.0	—	12	V
Output Voltage Piezoelectric Horn Drivers ($I_{OH} = -16$ mA)	V_{OH}	7.2	6.3	—	—	V
Comparators ($I_{OH} = -30$ μA)		9.0	8.5	8.8	—	
Piezoelectric Horn Drivers ($I_{OL} = +16$ mA)	V_{OL}	7.2	—	—	0.9	V
Comparators ($I_{OL} = +30$ μA)		9.0	—	0.1	0.5	
Output Voltage — LED Driver, $I_{OL} = 10$ 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 Sensitivity	V_{low} V_{set}	9.0 —	7.2 47	— 50	7.8 53	V % V_{DD}
Hysteresis	v_{hys}	9.0	75	100	150	mV
Offset Voltage (measured at $V_{in} = V_{DD}/2$) Active Guard Detect Comparator	V_{OS}	9.0 9.0	— —	— —	± 100 ± 50	mV
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, $V_{IH} = V_{DD} - 2$ Output, $V_{OH} = V_{DD} - 2$	I_{IH} I_{OH}	— —	25 -4.0	— —	100 -16	μA 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 μ F, R_{bias} = 8.2 M Ω , V_{DD} = 9.0 V, T_A = 25°C, See Figure 6)

Characteristics		Symbol	Min	Max	Units
Oscillator Period	No Smoke	t_{Cl}	1.46	1.85	s
	Smoke		37.5	45.8	ms
Oscillator Rise Time		t_r	10.1	12.3	ms
Horn Output (During Smoke)	On Time	PW _{on}	450	550	ms
	Off Time	PW _{off}	450	550	ms
LED Output Pulses	Between	t_{LED}	35.0	44.5	s
	On Time	PW _{on}	10.1	12.3	ms
Horn Output (During Low Battery) Pulses	On Time	t_{on}	10.1	12.3	ms
	Between	t_{off}	35.0	44.5	s

Freescale Semiconductor, Inc.

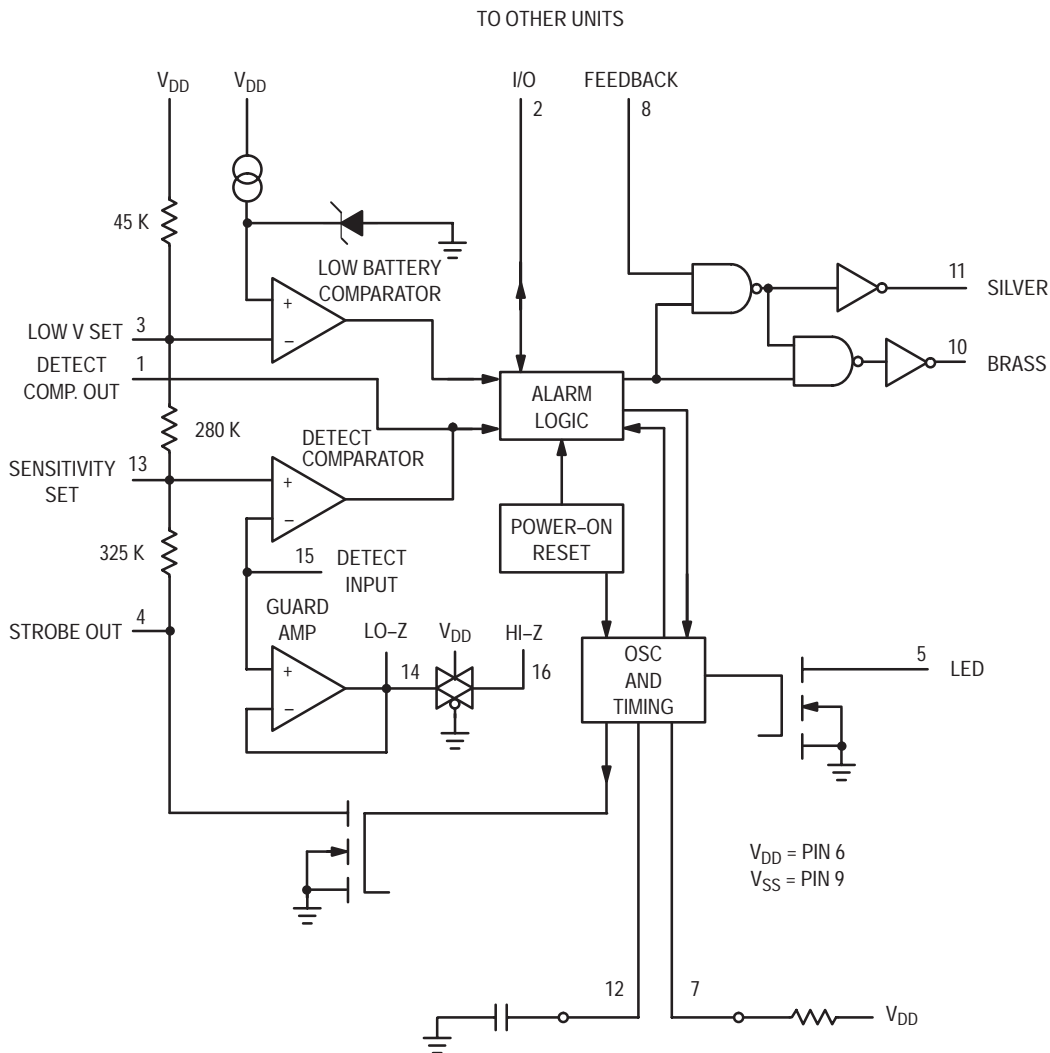


Figure 1. Block Diagram

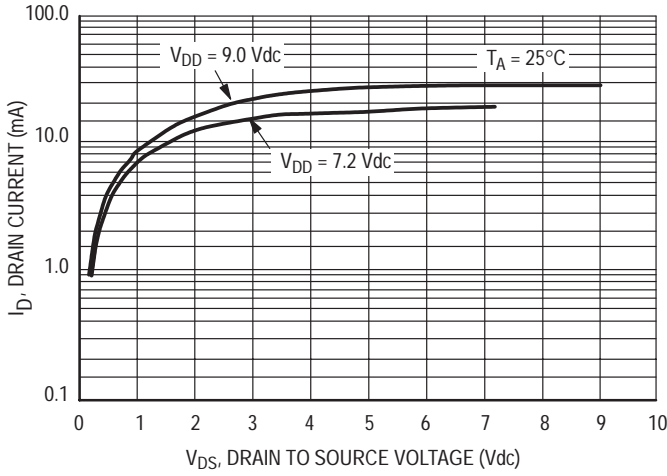


Figure 2. Typical LED Output I-V Characteristic

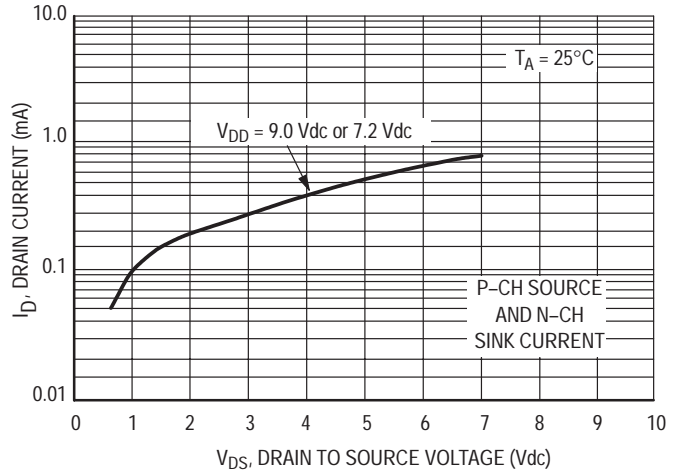


Figure 3. Typical Comparator Output I-V Characteristic

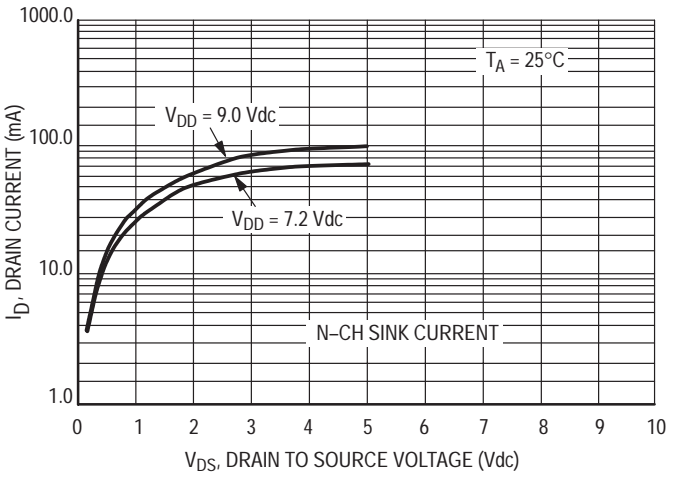
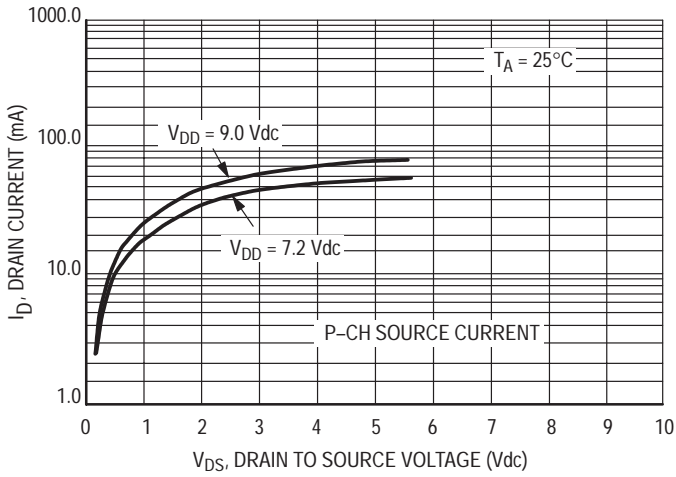


Figure 4. Typical P Horn Driver Output I-V Characteristic

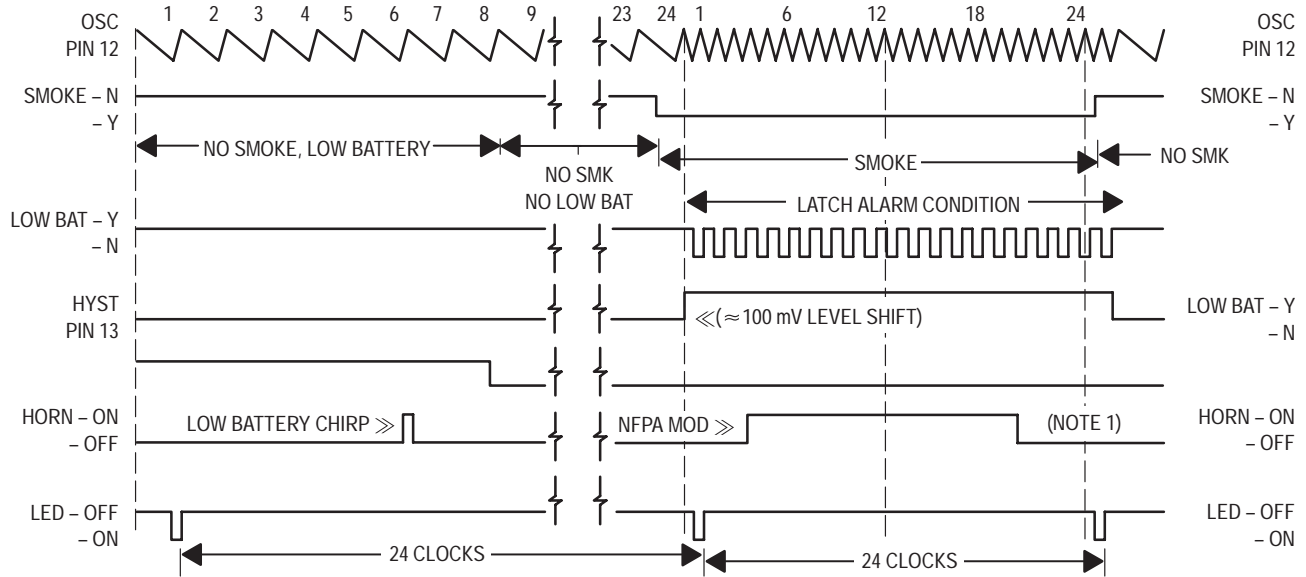


Figure 6. MC145018 Timing Diagram

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 once per cycle (1.65 sec for no smoke, 40 msec for smoke).
3. For timing under remote conditions, refer to MC14468 data sheet.

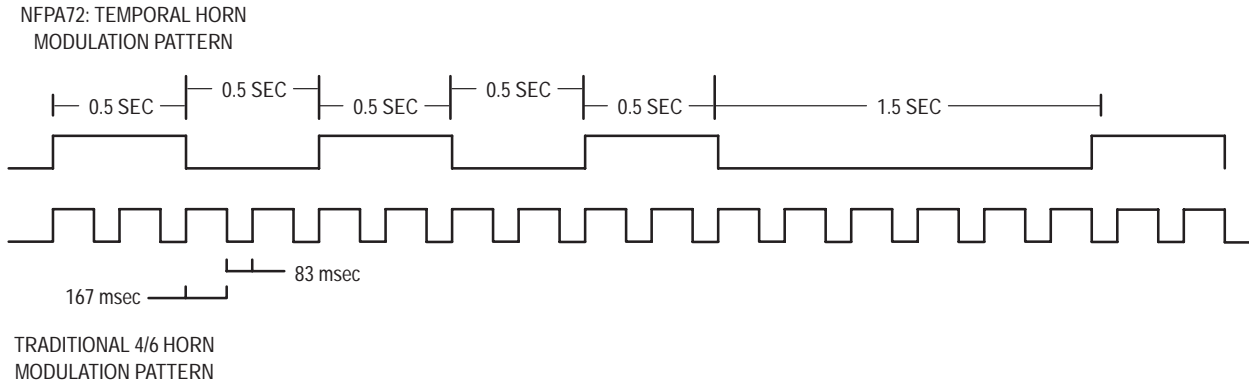
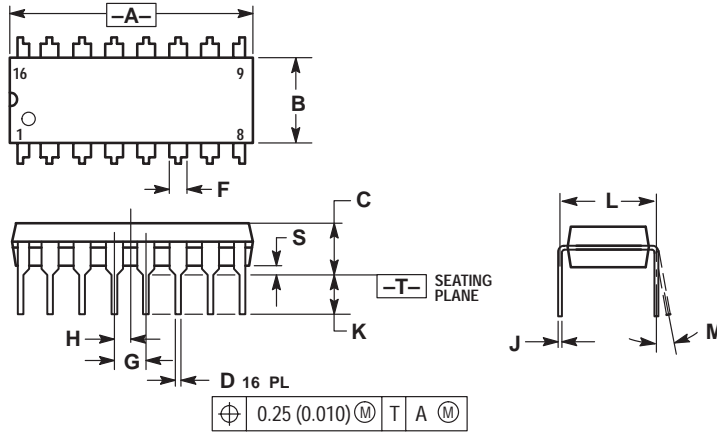


Figure 7. Horn Modulation

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

- | | |
|----------------|---------------------|
| STYLE 1: | STYLE 2: |
| PIN 1. CATHODE | PIN 1. COMMON DRAIN |
| 2. CATHODE | 2. COMMON DRAIN |
| 3. CATHODE | 3. COMMON DRAIN |
| 4. CATHODE | 4. COMMON DRAIN |
| 5. CATHODE | 5. COMMON DRAIN |
| 6. CATHODE | 6. COMMON DRAIN |
| 7. CATHODE | 7. COMMON DRAIN |
| 8. CATHODE | 8. COMMON DRAIN |
| 9. ANODE | 9. GATE |
| 10. ANODE | 10. SOURCE |
| 11. ANODE | 11. GATE |
| 12. ANODE | 12. SOURCE |
| 13. ANODE | 13. GATE |
| 14. ANODE | 14. SOURCE |
| 15. ANODE | 15. GATE |
| 16. ANODE | 16. SOURCE |

CASE 648-08
ISSUE R

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