



MOTOROLA

Advance Information

Micropower Undervoltage Sensing Circuits

The MC33464 series are micropower undervoltage sensing circuits that are specifically designed for use with battery powered microprocessor based systems, where extended battery life is required. A choice of several threshold voltages from 0.9 V to 4.5 V are available. These devices feature a very low quiescent bias current of 0.8 μ A typical.

The MC33464 series features a highly accurate voltage reference, a comparator with precise thresholds and built-in hysteresis to prevent erratic reset operation, a choice of output configurations between open drain or complementary MOS, and guaranteed operation below 1.0 V with extremely low standby current. These devices are available in either SOT-89 3-pin or SOT-23 5-pin surface mount packages.

Applications include direct monitoring of the MPU/logic power supply used in portable, appliance, automotive and industrial equipment.

MC33464 Features:

- Extremely Low Standby Current of 0.8 μ A at $V_{in} = 1.5$ V
- Wide Input Voltage Range (0.7 V to 10 V)
- Monitors Power Supply Voltages from 1.1 V to 5.0 V
- High Accuracy Detector Threshold ($\pm 2.5\%$)
- Two Reset Output Types (Open Drain or Complementary Drive)
- Two Surface Mount Packages (SOT-89 or SOT-23 5-Pin)

ORDERING INFORMATION

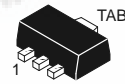
Device	Threshold Voltage	Type	Operating Temperature Range	Package (Qty/Reel)		
MC33464H-09AT1	0.9	Open Drain Reset	$T_A = -30^\circ$ to $+80^\circ\text{C}$	SOT-89 (1000)		
MC33464H-20AT1	2.0					
MC33464H-27AT1	2.7					
MC33464H-30AT1	3.0					
MC33464H-45AT1	4.5					
MC33464H-09CT1	0.9	Compl. MOS Reset			$T_A = -30^\circ$ to $+80^\circ\text{C}$	SOT-23 (3000)
MC33464H-20CT1	2.0					
MC33464H-27CT1	2.7					
MC33464H-30CT1	3.0					
MC33464H-45CT1	4.5					
MC33464N-09ATR	0.9	Open Drain Reset	$T_A = -30^\circ$ to $+80^\circ\text{C}$	SOT-23 (3000)		
MC33464N-20ATR	2.0					
MC33464N-27ATR	2.7					
MC33464N-30ATR	3.0					
MC33464N-45ATR	4.5					
MC33464N-09CTR	0.9	Compl. MOS Reset			$T_A = -30^\circ$ to $+80^\circ\text{C}$	SOT-23 (3000)
MC33464N-20CTR	2.0					
MC33464N-27CTR	2.7					
MC33464N-30CTR	3.0					
MC33464N-45CTR	4.5					

Other voltages from 0.9 to 6.0 V, in 0.1 V increments, are available. Consult factory for information.

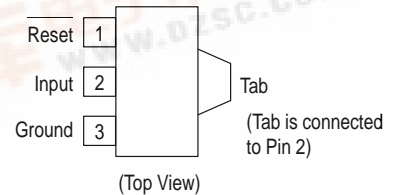
MC33464

MICROPOWER UNDERTHRESHOLD SENSING CIRCUITS

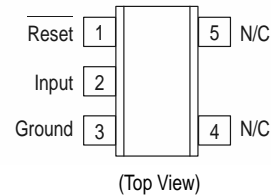
SEMICONDUCTOR TECHNICAL DATA



H SUFFIX
PLASTIC PACKAGE
CASE 1213
(SOT-89)



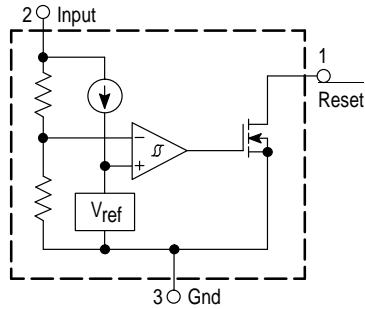
N SUFFIX
PLASTIC PACKAGE
CASE 1212
(SOT-23)



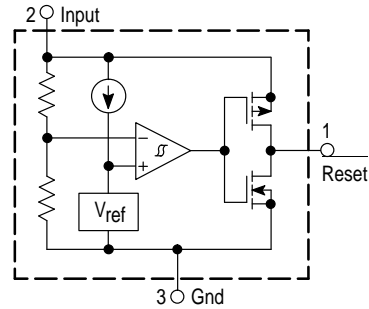
MC33464

Representative Block Diagrams

MC33464X–YYATZ
Open Drain Configuration



MC33464X–YYCTZ
Complementary Drive Configuration



X Denotes Package Type
YY Denotes Threshold Voltage
TZ Denotes Taping Type

This device contains 25 active transistors.

MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$, unless otherwise noted.)

Rating	Symbol	Value	Unit
Power Input Supply Voltage	V_{in}	0 to 10	V
Reset Output Voltage	V_O	-0.3 to 10	V
Reset Output Current (Source or Sink)	I_O	70	mA
Power Dissipation and Thermal Characteristics			
Maximum Power Dissipation			
Case 1212 (SOT-23) N Suffix	P_D	150	mW
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	667	$^\circ\text{C/W}$
Maximum Power Dissipation			
Case 1213 (SOT-89) H suffix	P_D	300	mW
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	333	$^\circ\text{C/W}$
Operating Junction Temperature	T_J	+125	$^\circ\text{C}$
Operating Ambient Temperature	T_A	-30 to +80	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-40 to +125	$^\circ\text{C}$
Lead Temperature (Soldering)	T_{solder}	260 $^\circ\text{C}$, 10 s	-

MC33464

ELECTRICAL CHARACTERISTICS (For all values $T_A = 25^\circ\text{C}$ (Note 1), unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
----------------	--------	-----	-----	-----	------

COMPARATOR

Threshold Voltage High State Output (V_{in} Decreasing)	V_{IH}				V
09 Suffix		0.878	0.9	0.922	
20 Suffix		1.95	2.0	2.05	
27 Suffix		2.633	2.7	2.768	
30 Suffix		2.925	3.0	3.075	
45 Suffix		4.388	4.5	4.613	
Threshold Hysteresis	V_H	0.027	0.045	0.063	V
Threshold Voltage Temperature Coefficient	T_C	–	± 100	–	PPM/ $^\circ\text{C}$

RESET OUTPUT

Output Voltage High State (Complementary Output: $I_{source} = 1.0\text{ mA}$) Low State (Complementary or Open Drain: $I_{sink} = 1.0\text{ mA}$)	V_{OH} V_{OL}	$V_{in} - 2.1$ –	$V_{in} - 1.0$ 0.025	V_{in} 0.05	V
Output Sink Current ($V_{in} = 1.5\text{ V}$, $V_{OL} = 0.5\text{ V}$)	I_{OL}	1.0	2.0	–	mA
Output Source Current ($V_{in} = 4.5\text{ V}$, $V_{OL} = 2.4\text{ V}$)	I_{OH}	1.0	2.0	–	mA

TOTAL DEVICE

Operating Input Voltage Range	V_{in}	0.7 to 10	–	–	V
Quiescent Input Current $V_{in} = 2.9\text{ V}$ $V_{in} = 5.6\text{ V}$	I_{in}	– –	0.9 1.2	2.7 3.6	μA
Propagation Delay Time (Note 2)	t_p	–	–	100	μs

- NOTES:** 1. Low duty pulse techniques are used during test to maintain junction temperature as close to ambient as possible.
2. Propagation delay time is measured from the rising or falling edge of the input voltage to the point where the output voltage has transitioned to 50% of its final value.

MC33464

Figure 1. Quiescent Current versus Input Voltage

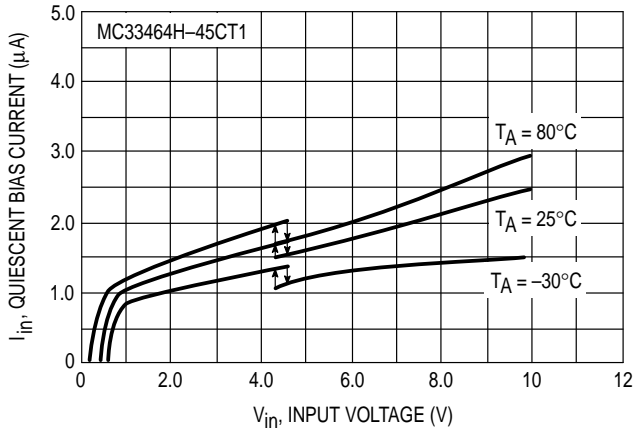


Figure 2. Detector Threshold versus Temperature

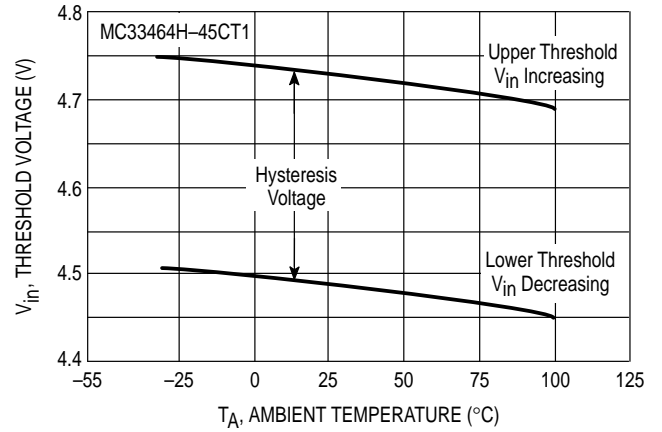


Figure 3. Reset Output Voltage versus Input Voltage

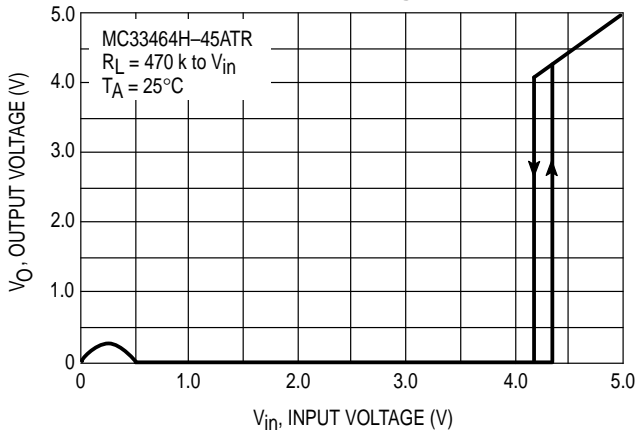


Figure 4. Reset Output Voltage versus Sink Current

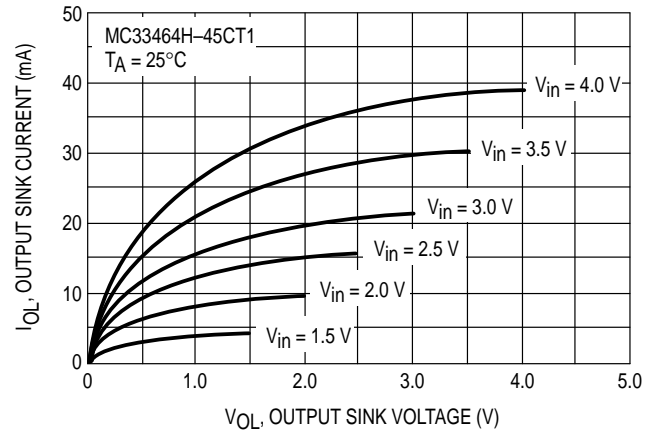


Figure 5. Output Delay Time versus Load Capacitance

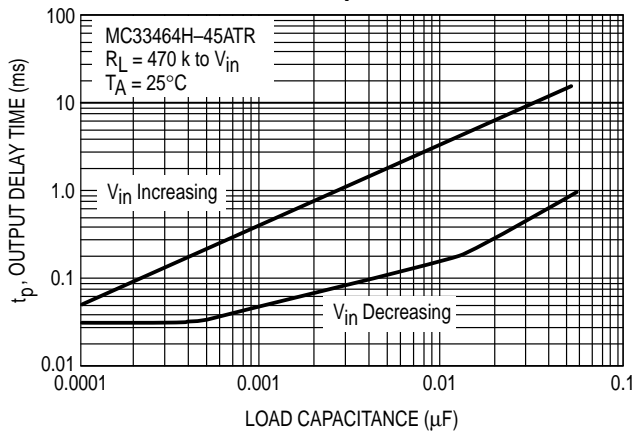
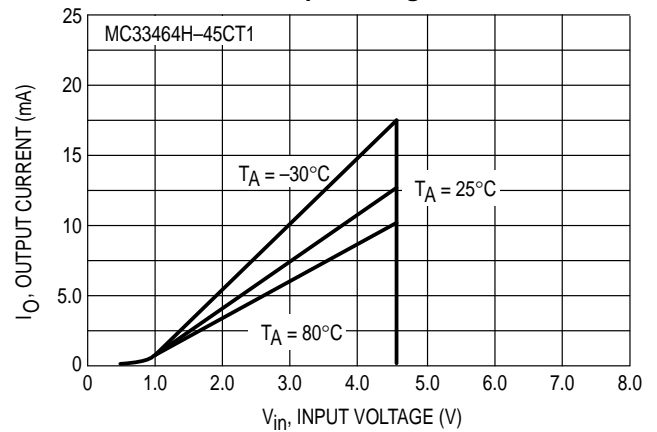
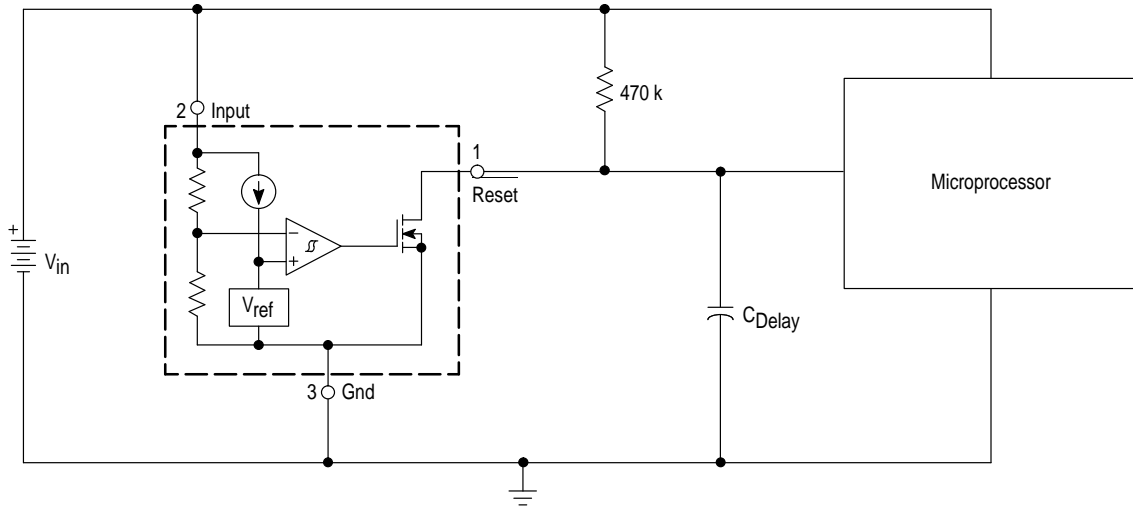


Figure 6. Output Sink Current versus Input Voltage



MC33464

Figure 7. Microprocessor Reset Circuit with Delay

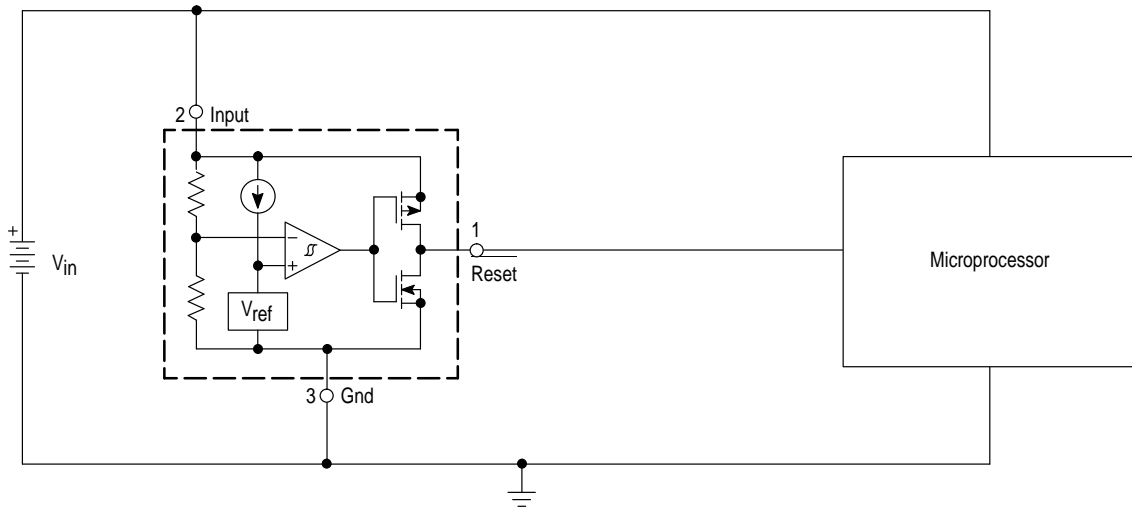


A time delayed reset can be accomplished with the addition of C_{Delay} . Figure 5 provides a graph of time delays, for both rising and falling output waveform edges, as a function of C_{Delay} . If another value of pullup resistance is used, the time delay can be calculated by using the equation:

$$t_{Delay} = R C_{Delay} \left[\frac{1}{\left(1 - \frac{V_{th(MPU)}}{V_{in}} \right)} \right] + t_p$$

where V_{thMPU} is the microprocessor reset input threshold voltage and t_p is the propagation delay internal to the MC33464.

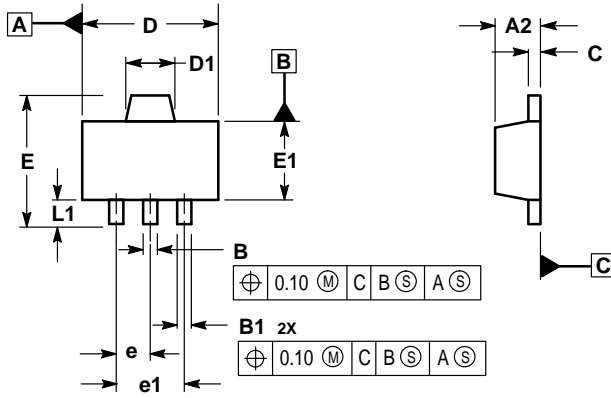
Figure 8. Microprocessor Reset Circuit



MC33464

OUTLINE DIMENSIONS

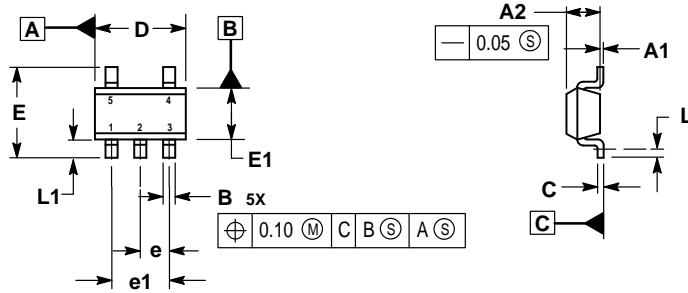
H SUFFIX
 PLASTIC PACKAGE
 CASE 1213-01
 (SOT-89)
 ISSUE O



- NOTES:
1. DIMENSIONS ARE IN MILLIMETERS.
 2. INTERPRET DIMENSIONS AND TOLERANCING PER ASME Y14.5M, 1994.
 3. DATUM C IS A SEATING PLANE.

DIM	MILLIMETERS	
	MIN	MAX
A2	1.40	1.60
B	0.37	0.57
B1	0.32	0.52
C	0.30	0.50
D	4.40	4.60
D1	1.50	1.70
E	—	4.25
E1	2.40	2.60
e	1.50 BSC	
e1	3.00 BSC	
L1	0.80	—


N SUFFIX
 PLASTIC PACKAGE
 CASE 1212-01
 (SOT-23)
 ISSUE O



- NOTES:
1. DIMENSIONS ARE IN MILLIMETERS.
 2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.
 3. DATUM C IS A SEATING PLANE.

DIM	MILLIMETERS	
	MIN	MAX
A1	0.00	0.10
A2	1.00	1.30
B	0.30	0.50
C	0.10	0.25
D	2.80	3.00
E	2.50	3.10
E1	1.50	1.80
e	0.95 BSC	
e1	1.90 BSC	
L	0.20	—
L1	0.45	0.75

MC33464

Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters which may be provided in Motorola data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Motorola was negligent regarding the design or manufacture of the part. Motorola and  are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

MC33464

How to reach us:

USA/EUROPE/Locations Not Listed: Motorola Literature Distribution;
P.O. Box 5405, Denver, Colorado 80217. 303-675-2140 or 1-800-441-2447

Mfax™: RMFAX0@email.sps.mot.com – TOUCHTONE 602-244-6609
INTERNET: <http://Design-NET.com>

Mfax is a trademark of Motorola, Inc.

JAPAN: Nippon Motorola Ltd.; Tatsumi-SPD-JLDC, 6F Seibu-Butsuryu-Center,
3-14-2 Tatsumi Koto-Ku, Tokyo 135, Japan. 81-3-3521-8315

ASIA/PACIFIC: Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,
51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852-26629298

