

Undervoltage Sensing Circuit

The MC34064 is an undervoltage sensing circuit specifically designed for use as a reset controller in microprocessor-based systems. It offers the designer an economical solution for low voltage detection with a single external resistor. The MC34064 features a trimmed-in-package bandgap reference, and a comparator with precise thresholds and built-in hysteresis to prevent erratic reset operation. The open collector reset output is capable of sinking in excess of 10 mA, and operation is guaranteed down to 1.0 V input with low standby current. These devices are packaged in 3-pin TO-226AA, 8-pin SO-8 and Micro-8 surface mount packages.

Applications include direct monitoring of the 5.0 V MPU/logic power supply used in appliance, automotive, consumer and industrial equipment.

- Trimmed-In-Package Temperature Compensated Reference
- Comparator Threshold of 4.6 V at 25°C
- Precise Comparator Thresholds Guaranteed Over Temperature
- Comparator Hysteresis Prevents Erratic Reset
- Reset Output Capable of Sinking in Excess of 10 mA
- Internal Clamp Diode for Discharging Delay Capacitor
- Guaranteed Reset Operation with 1.0 V Input
- Low Standby Current
- Economical TO-226AA, SO-8 and Micro-8 Surface Mount Packages

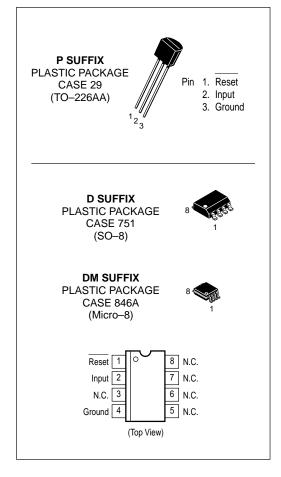
Representative Block Diagram Input 2 (2) Reset 1 (1) 1.2 Vref Gnd 3 (4) Sink Only Positive True Logic Pin numbers adjacent to terminals are for the 3-pin TO-226AA package. Pin numbers in parenthesis are for the 8-lead packages.

This device contains 21 active transistors.

MC34064 MC33064

UNDERVOLTAGE SENSING CIRCUIT

SEMICONDUCTOR TECHNICAL DATA



ORDERING INFORMATION

Device	Operating Temperature Range	Package
MC34064D-5	T _A = 0° to +70°C	SO-8
MC34064DM-5		Micro-8
MC34064P-5		TO-226AA
MC33064D-5	$T_A = -40^{\circ} \text{ to } +85^{\circ}\text{C}$	SO-8
MC33064DM-5		Micro-8
MC33064P-5		TO-226AA

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Power Input Supply Voltage	Vin	-1.0 to 10	V
Reset Output Voltage	٧o	10	V
Reset Output Sink Current (Note 1)	^I Sink	Internally Limited	mA
Clamp Diode Forward Current, Pin 1 to 2 (Note 1)	lF	100	mA
Power Dissipation and Thermal Characteristics P Suffix, Plastic Package			
Maximum Power Dissipation @ T _A = 25°C Thermal Resistance, Junction–to–Air D Suffix, Plastic Package	P _D R _θ JA	625 200	mW °C/W
Maximum Power Dissipation @ T _A = 25°C Thermal Resistance, Junction–to–Air DM Suffix, Plastic Package	P _D R _θ JA	625 200	mW °C/W
Maximum Power Dissipation @ T _A = 25°C Thermal Resistance, Junction–to–Air	P _D R _{θJA}	520 240	mW °C/W
Operating Junction Temperature	TJ	+150	°C
Operating Ambient Temperature MC34064 MC33064	ТА	0 to +70 -40 to +85	°C
Storage Temperature Range	T _{stg}	-65 to +150	°C

NOTE: ESD data available upon request.

ELECTRICAL CHARACTERISTICS (For typical values $T_A = 25$ °C, for min/max values T_A is the operating ambient temperature range that applies [Notes 2 and 3] unless otherwise noted.)

Characteristics	Symbol	Min	Тур	Max	Unit
COMPARATOR		•	•	•	•
Threshold Voltage High State Output (V _{in} Increasing) Low State Output (V _{in} Decreasing) Hysteresis	VIH VIL VH	4.5 4.5 0.01	4.61 4.59 0.02	4.7 4.7 0.05	V
RESET OUTPUT	•		•		•
Output Sink Saturation $ \begin{aligned} &(\text{V}_{\text{in}} = 4.0 \text{ V}, \text{I}_{\text{Sink}} = 8.0 \text{ mA}) \\ &(\text{V}_{\text{in}} = 4.0 \text{ V}, \text{I}_{\text{Sink}} = 2.0 \text{ mA}) \\ &(\text{V}_{\text{in}} = 1.0 \text{ V}, \text{I}_{\text{Sink}} = 0.1 \text{ mA}) \end{aligned} $	VoL	- - -	0.46 0.15 -	1.0 0.4 0.1	V
Output Sink Current (V _{in} , Reset = 4.0 V)	lSink	10	27	60	mA
Output Off-State Leakage (Vin, Reset = 5.0 V)	ЮН	-	0.02	0.5	μΑ
Clamp Diode Forward Voltage, Pin 1 to 2 (I _F = 10 mA)	VF	0.6	0.9	1.2	V
TOTAL DEVICE		•	•	•	•
Operating Input Voltage Range	V _{in}	1.0 to 6.5	-	-	V
Quiescent Input Current (Vin = 5.0 V)	l _{in}	_	390	500	μА

Figure 1. Reset Output Voltage versus Input Voltage

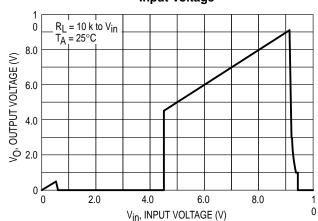


Figure 2. Reset Output Voltage versus Input Voltage

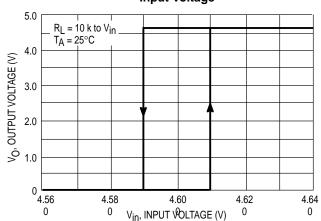


Figure 3. Comparator Threshold Voltage versus Temperature

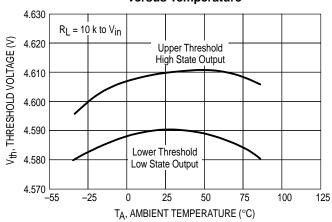


Figure 4. Input Current versus Input Voltage

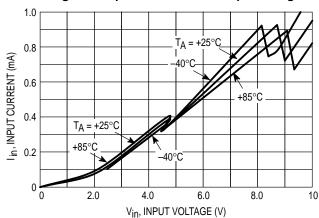


Figure 5. Reset Output Saturation versus

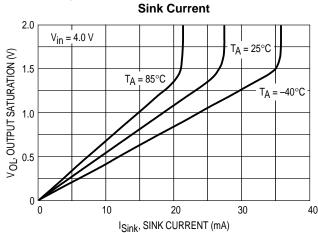


Figure 6. Reset Delay Time

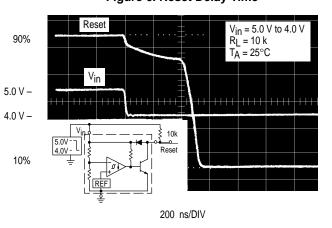


Figure 7. Clamp Diode Forward Current versus Voltage

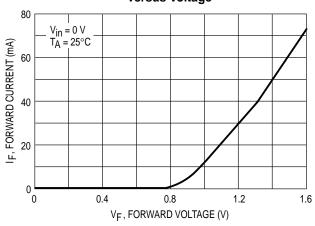


Figure 8. Low Voltage Microprocessor Reset

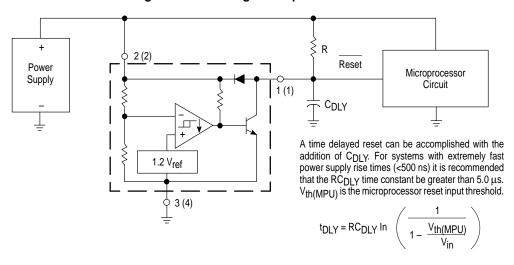
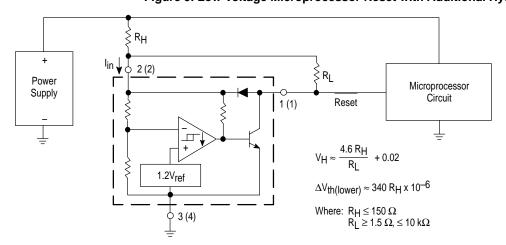


Figure 9. Low Voltage Microprocessor Reset with Additional Hysteresis

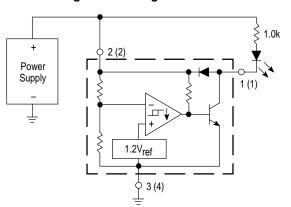


Comparator hysteresis can be increased with the addition of resistor R_H . The hysteresis equation has been simplified and does not account for the change of input current l_{in} as V_{CC} crosses the comparator threshold (Figure 4). An increase of the lower threshold $\Delta V_{th(lower)}$ will be observed due to l_{in} which is typically 340 μA at 4.59 V. The equations are accurate to $\pm 10\%$ with R_H less than 150 Ω and R_L between 1.5 $k\Omega$ and 10 $k\Omega$.

Test Data					
V _H (mV)	ΔV _{th} (mV)	R _H (Ω)	RL (kΩ)		
20	0	0	0		
51	3.4	10	1.5		
40	6.8	20	4.7		
81	6.8	20	1.5		
71	10	30	2.7		
112	10	30	1.5		
100	16	47	2.7		
164	16	47	1.5		
190	34	100	2.7		
327	34	100	1.5		
276	51	150	2.7		
480	51	150	1.5		

Figure 10. Voltage Monitor

Figure 11. Solar Powered Battery Charger



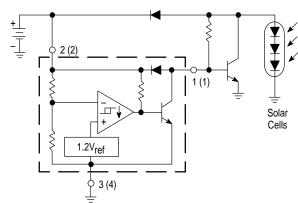


Figure 12. Low Power Switching Regulator

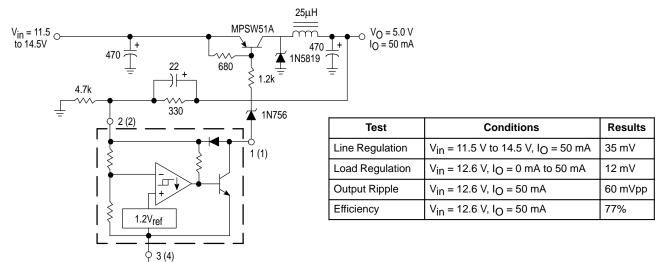
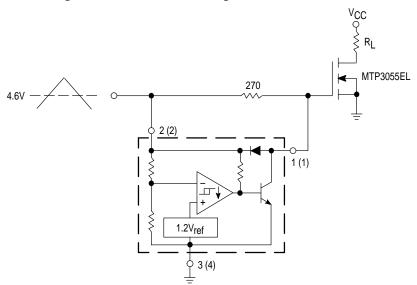


Figure 13. MOSFET Low Voltage Gate Drive Protection



Overheating of the logic level power MOSFET due to insufficient gate voltage can be prevented with the above circuit. When the input signal is below the $4.6\,\mathrm{V}$ threshold of the MC34064, its output grounds the gate of the L² MOSFET.

OUTLINE DIMENSIONS

SEATING PLANE

P SUFFIX PLASTIC PACKAGE CASE 29-04 (TO-226AA) ISSUE AD



SECTION X-X

- NOTES:

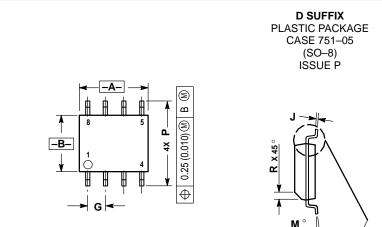
 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

 2. CONTROLLING DIMENSION: INCH.

 3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.

 4. DIMENSION F APPLIES BETWEEN P AND L. DIMENSION D AND J APPLY BETWEEN L AND K MINIMUM. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION HIMMIMM. IN P AND BEYOND DIMENSION K MINIMUM.

	INCHES		MILLIN	IETERS
DIM	MIN	MAX	MIN	MAX
Α	0.175	0.205	4.45	5.20
В	0.170	0.210	4.32	5.33
С	0.125	0.165	3.18	4.19
D	0.016	0.022	0.41	0.55
F	0.016	0.019	0.41	0.48
G	0.045	0.055	1.15	1.39
Н	0.095	0.105	2.42	2.66
J	0.015	0.020	0.39	0.50
K	0.500		12.70	_
L	0.250		6.35	
N	0.080	0.105	2.04	2.66
Р		0.100		2.54
R	0.115		2.93	
V	0.135		3.43	



SEATING PLANE

0.25 (0.010) M T B S A S

- VOIES.

 1. DIMENSIONS A AND B ARE DATUMS AND T IS A DATUM SURFACE.

 2. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- Y14.5M, 1982.

 3. DIMENSIONS ARE IN MILLIMETER.

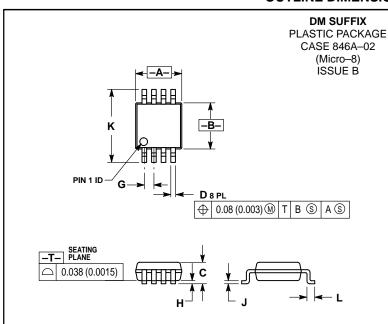
 4. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.

 5. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
- DIMENSION D DOES NOT INCLUDE MOLD PROTRUSION. ALLOWABLE DAMBAR
- PROTRUSION SHALL BE 0.127 TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

	MILLIMETERS			
DIM	MIN	MAX		
Α	4.80	5.00		
В	3.80	4.00		
С	1.35	1.75		
D	0.35	0.49		
F	0.40	1.25		
G	1.27	1.27 BSC		
J	0.18	0.25		
K	0.10	0.25		
M	0°	7 °		
Р	5.80	6.20		
R	0.25	0.50		

-T-

OUTLINE DIMENSIONS



- NOTES:

 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

 2. CONTROLLING DIMENSION: MILLIMETER.

 3. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.

 4. DIMENSION D DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE. PER SIDE.

	MILLIMETERS		INC	HES
DIM	MIN	MAX	MIN	MAX
Α	2.90	3.10	0.114	0.122
В	2.90	3.10	0.114	0.122
С		1.10		0.043
D	0.25	0.40	0.010	0.016
G	0.65	BSC	0.026	BSC
Н	0.05	0.15	0.002	0.006
J	0.13	0.23	0.005	0.009
K	4.75	5.05	0.187	0.199
L	0.40	0.70	0.016	0.028

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 manufacture of the part. Motor

How to reach us:

USA/EUROPE/Locations Not Listed: Motorola Literature Distribution; P.O. Box 20912; Phoenix, Arizona 85036. 1–800–441–2447 or 602–303–5454

MFAX: RMFAX0@email.sps.mot.com – TOUCHTONE 602–244–6609 INTERNET: http://Design=NET.com

JAPAN: Nippon Motorola Ltd.; Tatsumi–SPD–JLDC, 6F Seibu–Butsuryu–Center, 3–14–2 Tatsumi Koto–Ku, Tokyo 135, Japan. 03–81–3521–8315

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



