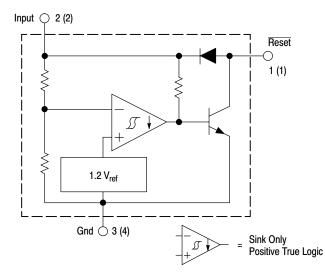
Undervoltage Sensing Circuit

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. The MC devices are packaged in 3–pin TO-226AA, 8–pin SO–8 and Micro8 surface mount packages. The NCV device is packaged in SO–8 and TO–226AA.

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

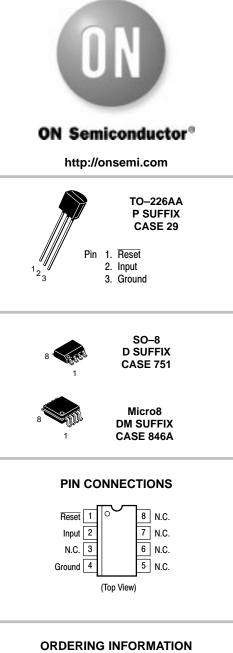
- Trimmed-In-Package Temperature Compensated Reference
- Comparator Threshold of 4.6 V at 25°C
- Precise Comparator Thresholds Guaranteed Over Temperature
- Comparator Hysteresis Prevents Erratic Reset
- Reset Output Capable of Sinking in Excess of 10 mA
- Internal Clamp Diode for Discharging Delay Capacitor
- Guaranteed Reset Operation with 1.0 V Input
- Low Standby Current
- Economical TO-226AA, SO-8 and Micro8 Surface Mount Packages



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.

Figure 1. Representative Block Diagram



See detailed ordering and shipping information in the package dimensions section on page 6 of this data sheet.

DEVICE MARKING INFORMATION

See general marking information in the device marking section on page 6 of this data sheet.

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Power Input Supply Voltage	V _{in}	-1.0 to 10	V
Reset Output Voltage	Vo	10	V
Reset Output Sink Current (Note 2)	I _{Sink}	Internally Limited	mA
Clamp Diode Forward Current, Pin 1 to 2 (Note 2)	١ _F	100	mA
Power Dissipation and Thermal Characteristics P Suffix, Plastic Package Maximum Power Dissipation @ $T_A = 25^{\circ}C$ Thermal Resistance, Junction-to-Air D Suffix, Plastic Package Maximum Power Dissipation @ $T_A = 25^{\circ}C$ Thermal Resistance, Junction-to-Air DM Suffix, Plastic Package Maximum Power Dissipation @ $T_A = 25^{\circ}C$ Thermal Resistance, Junction-to-Air	Ρ _D R _{θJA} Ρ _D R _{θJA} Ρ _D R _{θJA}	625 200 625 200 520 240	mW °C/W °C/W °C/W ∞C/W
Operating Junction Temperature	TJ	+150	°C
Operating Ambient Temperature MC34064 MC33064 NCV33064	T _A	0 to +70 -40 to +85 -40 to +125	°C
Storage Temperature Range	T _{stg}	-65 to +150	°C

1. ESD data available upon request.

ELECTRICAL CHARACTERISTICS (For typical values $T_A = 25^{\circ}C$, for min/max values T_A is the operating ambient temperature range that applies [Notes 3 and 4] 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	V _{IH} V _{IL} V _H	4.5 4.5 0.01	4.61 4.59 0.02	4.7 4.7 0.05	V
RESET OUTPUT				•	
Output Sink Saturation $(V_{in} = 4.0 \text{ V}, I_{Sink} = 8.0 \text{ mA})$ $(V_{in} = 4.0 \text{ V}, I_{Sink} = 2.0 \text{ mA})$ $(V_{in} = 1.0 \text{ V}, I_{Sink} = 0.1 \text{ mA})$	V _{OL}		0.46 0.15 -	1.0 0.4 0.1	V
Output Sink Current (V_{in} , Reset = 4.0 V)	I _{Sink}	10	27	60	mA
Output Off-State Leakage (V_{in} , Reset = 5.0 V)	I _{ОН}	-	0.02	0.5	μΑ
Clamp Diode Forward Voltage, Pin 1 to 2 (I _F = 10 mA) TOTAL DEVICE	V _F	0.6	0.9	1.2	V
	N	4.045.05			N

Operating Input Voltage Range	V _{in}	1.0 to 6.5	-	-	V
Quiescent Input Current (V _{in} = 5.0 V)	l _{in}	-	390	500	μΑ

2. Maximum package power dissipation limits must be observed.

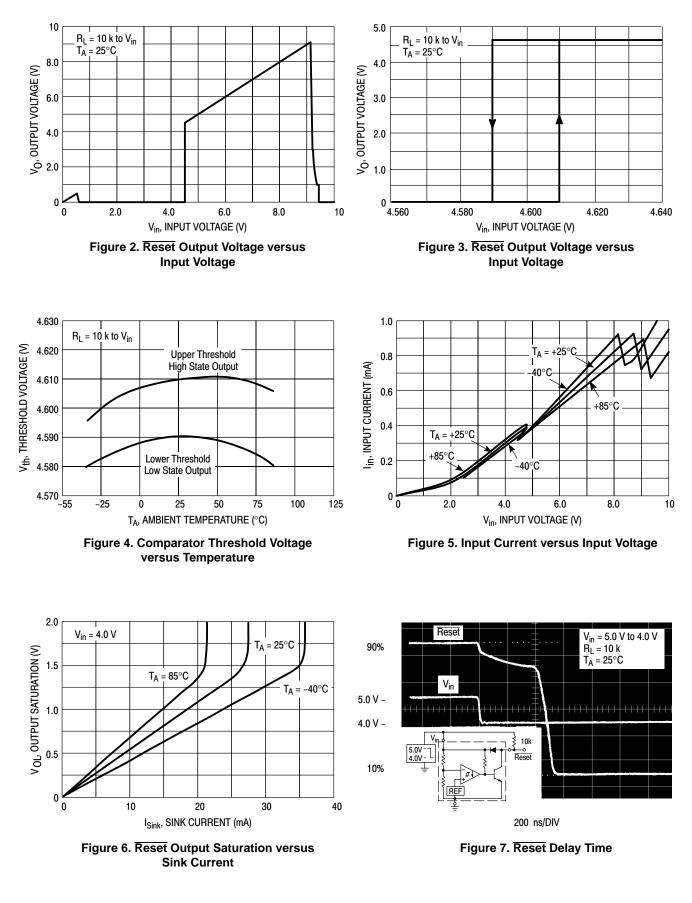
3. Low duty cycle pulse techniques are used during test to maintain junction temperature as close to ambient as possible. 4. $T_{low} = 0^{\circ}C$ for MC34064 $T_{high} = +70^{\circ}C$ for MC34064

-40°C for MC33064

+85°C for MC33064

-40°C for NCV33064 +125°C for NCV33064

5. NCV prefix is for automotive and other applications requiring site and change control.



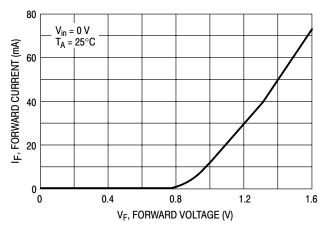


Figure 8. Clamp Diode Forward Current versus Voltage

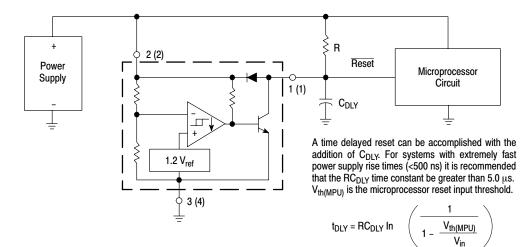
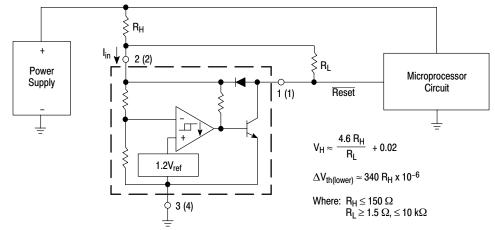


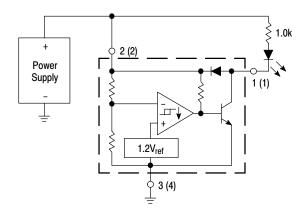
Figure 9. Low Voltage Microprocessor Reset



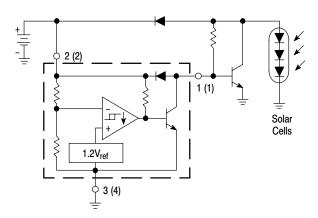
	Test Data					
V _H (mV)	ΔV_{th} (mV)	R _H (Ω)	R _L (kΩ)			
20	0	0	0			
51	3.4	10	1.5			
40	6.8	20	4.7			
81	6.8	20	1.5			
71	10	30	2.7			
112	10	30	1.5			
100	16	47	2.7			
164	16	47	1.5			
190	34	100	2.7			
327	34	100	1.5			
276	51	150	2.7			
480	51	150	1.5			

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 $k\Omega$.

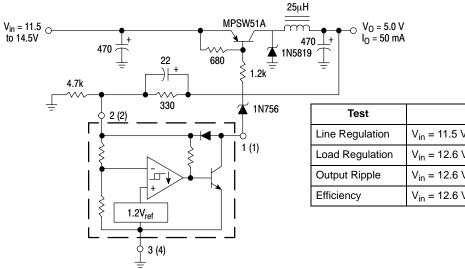






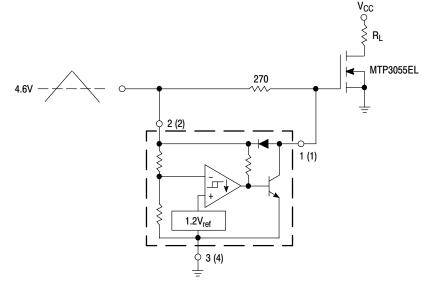






Test	Conditions	Results
Line Regulation	V_{in} = 11.5 V to 14.5 V, I _O = 50 mA	35 mV
Load Regulation	V_{in} = 12.6 V, I_O = 0 mA to 50 mA	12 mV
Output Ripple	V _{in} = 12.6 V, I _O = 50 mA	60 mVpp
Efficiency	V _{in} = 12.6 V, I _O = 50 mA	77%

Figure 13. Low Power Switching Regulator



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 V threshold of the MC34064, its output grounds the gate of the L^2 MOSFET.

Figure 14. MOSFET Low Voltage Gate Drive Protection

ORDERING INFORMATION

Device	Operating Temperature Range	Package	Shipping
MC34064D-5		SO–8	98 Units / Rail
MC34064D-5R2		SO–8	2500 Units/ Tape & Reel
MC34064DM-5R2	T 000 to 17000	Micro8	4000 Units / Tape & Reel
MC34064P-5	$T_A = 0^{\circ}C \text{ to } +70^{\circ}C$	TO-226AA	2000 Units / Bag
MC34064P-5RA		TO-226AA	2000 Units / Tape & Reel
MC34064P-5RP		TO-226AA	2000 Units / Ammo Pack
MC33064D-5		SO–8	98 Units / Rail
MC33064D-5R2		SO–8	2500 Units / Tape & Reel
MC33064DM-5R2	T 4000 to 10500	Micro8	4000 Units / Tape & Reel
MC33064P-5	$T_{\rm J} = -40^{\circ}{\rm C} \text{ to } +85^{\circ}{\rm C}$	TO-226AA	2000 Units / Bag
MC33064P-5RA		TO-226AA	2000 Units / Tape & Reel
MC33064P-5RP		TO-226AA	2000 Units / Ammo Pack
NCV33064D-5R2*		SO–8	2500 Units / Tape & Reel
NCV33064P-5RA*	$T_{A} = -40^{\circ}C \text{ to } +125^{\circ}C$	TO-226AA	2000 Units / Tape & Reel
NCV33064P-5RP*		TO-226AA	2000 Units / Ammo Pack

*NCV33064: $T_{low} = -40^{\circ}C$, $T_{high} = +125^{\circ}C$. Guaranteed by design. NCV prefix is for automotive and other applications requiring site and change control.

MARKING DIAGRAMS

SO-8 Micro8 TO-226AA **D SUFFIX DM SUFFIX CASE 751** CASE 846A ⁸AAAA 3x064 Ly50 ALYW5 AYW \cap 88 Н 1T HHHF 1 = 3 or 4 х = I or C у А = Assembly Location WL, L = Wafer Lot

YY, Y = Year

WW, W = Work Week

*This marking diagram also applies to NCV33064P.

P SUFFIX

CASE 29

MC3x0

64P-5

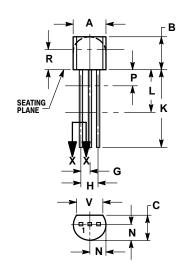
ALYWW

Ш

123

PACKAGE DIMENSIONS

P SUFFIX PLASTIC PACKAGE CASE 29-11 (TO-226AA) **ISSUE AL**



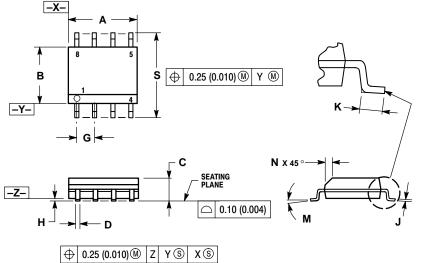


NOTES:

- NOTES: 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982. 2. CONTROLLING DIMENSION: INCH. 3. CONTOUR OF PACKAGE BEYOND DIMENSION R
- IS UNCONTROLLED. LEAD DIMENSION IS UNCONTROLLED IN P AND
- 4. BEYOND DIMENSION K MINIMUM.

	INCHES		INCHES	MILLIMETER	
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	0.021	0.407	0.533	
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	
К	0.500		12.70		
L	0.250		6.35		
Ν	0.080	0.105	2.04	2.66	
Р		0.100		2.54	
R	0.115		2.93		
٧	0.135		3.43		

D SUFFIX PLASTIC PACKAGE CASE 751-07 (SO-8) ISSUE W



- NOTES: 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982. 2. CONTROLLING DIMENSION: MILLIMETER. 3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.

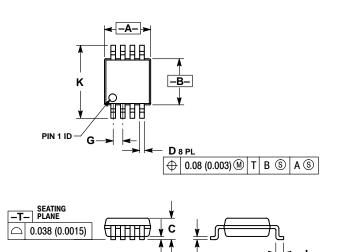
- 4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER

MAXIMUM MULD PHOTHOGONOUS (Sector): Englishing the sector):
 SIDE:
 DIMENSION D DOES NOT INCLUDE DAMBAR
 PROTRUSION: ALLOWABLE DAMBAR
 PROTRUSION SHALL BE 0.127 (DOS) TOTAL IN
 EXCESS OF THE D DIMENSION AT MAXIMUM
 MATERIAL CONDITION.

	MILLIMETERS		INC	HES
DIM	MIN	MAX	MIN	MAX
Α	4.80	5.00	0.189	0.197
В	3.80	4.00	0.150	0.157
C	1.35	1.75	0.053	0.069
D	0.33	0.51	0.013	0.020
G	1.27 BSC		0.050 BSC	
н	0.10	0.25	0.004	0.010
J	0.19	0.25	0.007	0.010
K	0.40	1.27	0.016	0.050
Μ	0 °	8 °	0 °	8 °
N	0.25	0.50	0.010	0.020
S	5.80	6.20	0.228	0.244

PACKAGE DIMENSIONS

DM SUFFIX PLASTIC PACKAGE CASE 846A–02 (Micro8) ISSUE E



NOTES:

- 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- CONTROLLING DIMENSION: MILLIMETER.
 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.
- EXCEED 0.13 (0.000) FEB SIDE. 4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) 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	6 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

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