rev 1.3

Dual 5V and 3.3V µP Power Supply Supervisor with Manual Reset

General Description

The ASM1834 supervisors simultaneously monitor both 3.3V and 5V power sources and generate reset signals when either supply is out of tolerance. When an out-of-tolerance condition is detected, the output-reset signal of the affected supply becomes active and resets the system microprocessor/ microcontroller. On power-up and after the supply voltage returns to an in-tolerance condition, the reset signal remains active for approximately 350ms. This allows the power supply and system microprocessor to stabilize.

Tolerance levels are independently selectable for both supplies. Tolerance options are 5% and 10% percent for the 5V supply and 10% and 20% percent for the 3.3V supply.

The ASM1834 and ASM1834D have push-pull reset output stages. The ASM1834A reset outputs are open drain devices that can both be connected to either 5V or 3.3V supply. The ASM1834 and ASM1834A have active LOW reset outputs. The ASM1834D has active HIGH reset outputs.

All devices can generate reset signals through an internally debounced pushbutton reset input that affects both reset outputs.

All devices operate over the extended industrial temperature range. Devices are available in 8-pin DIP, surface mount 8-pin SO and 8-Pin MicroSO packages. Die are also available.

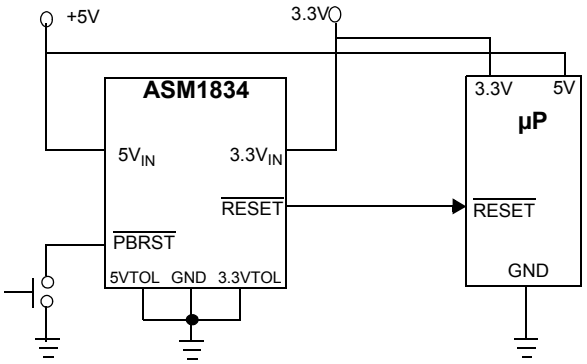
Key Features

- Monitors 5V and 3.3V supplies simultaneously
- 5V and 3.3V power-on reset
- 350ms reset time
- Debounced pushbutton reset input
- Push-pull CMOS output
  - ASM1834, ASM1834D
  - Eliminates external pull-up resistors
  - Active LOW (ASM1834), HIGH (ASM1834D)
- Open Drain Output
  - ASM1834A
  - Active LOW
- Selectable 5V and 3.3V trip point tolerance
- Internal power drawn from highest input voltage, 5V or 3.3V
- Precision temperature-compensated voltage reference and comparator
- Low cost surface mount SO, compact MicroSO and DIP packages.
- Wide operating temperature, -40°C to +85°C

Applications

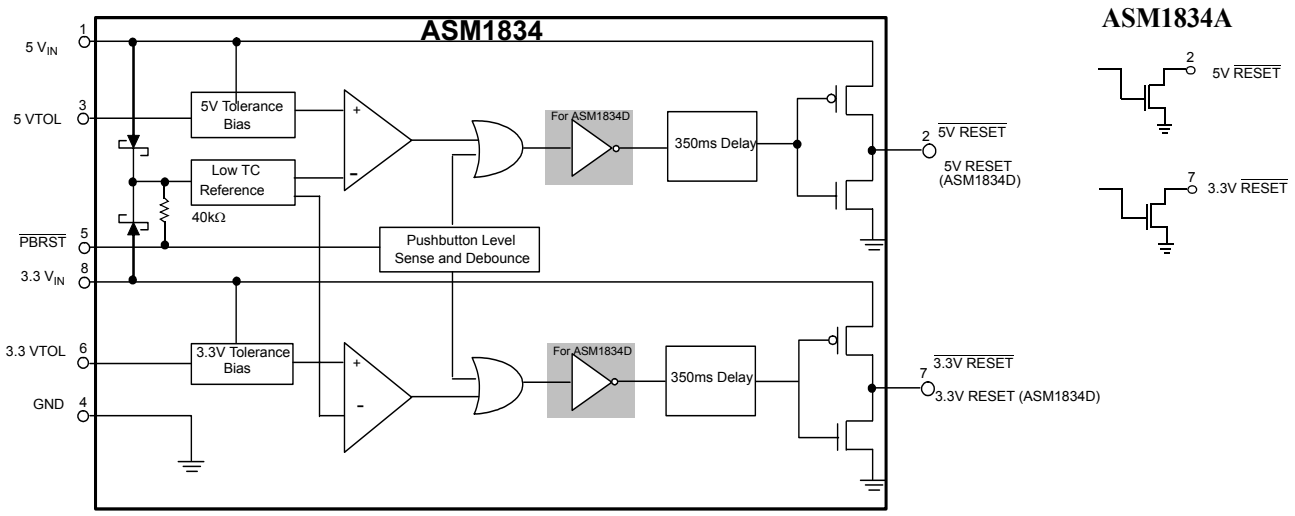
- Microprocessors
- PDAs, Hand-held PCs
- Embedded Controllers
- Telecommunication Systems
- Power Supplies
- Wireless / Cellular Systems
- Networking Hardware

Typical Operating Circuit

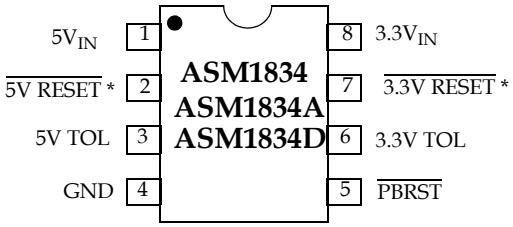


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Block Diagram



Pin Configuration



* AS1834D reset outputs are active HIGH (5V RESET and 3.3V RESET)
Outputs are open-drain for AS1834A.

Pin Description

Pin #	Pin Name	Function
1	5V_{IN}	5V power supply input.
2	$\overline{5V\ RESET}$ 5V RESET	5V reset output (Active LOW, ASM1834, ASM1834A. Open drain outputs for ASM1834A). 5V reset output (Active HIGH, AS1834D).
3	5V TOL	5V input tolerance select: 10% tolerance for 5VTOL= 5V_{IN} and 5% tolerance for 5VTOL = GND
4	GND	Ground.
5	$\overline{PBRST}$	Debounced manual pushbutton reset input (40kΩ internal pull-up).
6	3.3V TOL	3.3V input tolerance select: 20% tolerance for 3.3VTOL = 3.3V_{IN} and 10% tolerance for 3.3VTOL=GND.
7	$\overline{3.3V\ RESET}$ 3.3V RESET	3.3V reset output (Active LOW, ASM1834, ASM1834A. Open drain outputs for ASM1834A). 3.3V reset output (Active HIGH, AS1834D).
8	3.3V_{IN}	3.3V power supply input.

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Detailed Description

Operation Power Monitor

The ASM1834 supervisors simultaneously detect out-of-tolerance power supply conditions on both 3.3V and 5V power supplies. If the voltages at 5VIN or 3.3VIN are outside the tolerance band, the reset for the falling supply voltage becomes active. When the monitored supply returns to an in-tolerance state, the reset remains active for approximately 350ms before returning to the inactive state.

On power-up, the reset signals are kept active for approximately 350ms after the power supply voltages have reached the selected tolerance. This allows the power supply and microprocessor to stabilize before the reset is removed.

All supply current for the ASM1834 devices is drawn from the input ($5V_{IN}$ or $3.3V_{IN}$) with the highest voltage level. The outputs draw current from their input supplies $5V_{IN}$ and $3.3V_{IN}$.

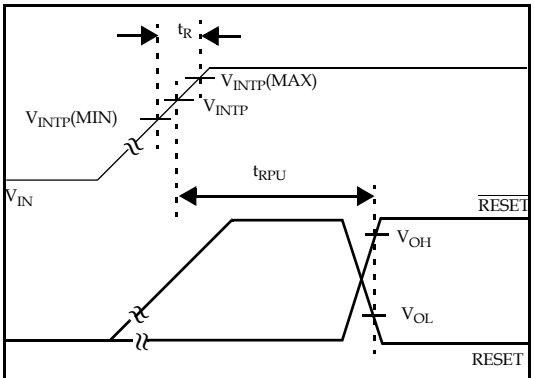


Figure 1: Timing Diagram: Power Up (ASM1834D only)

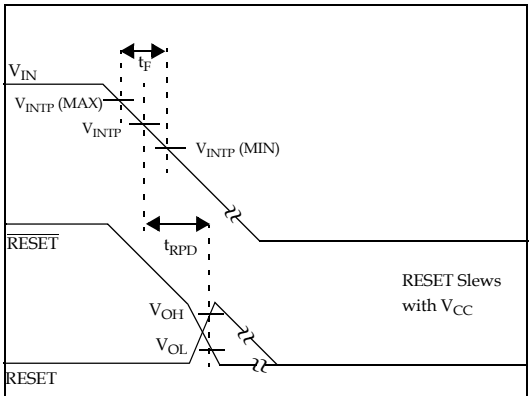


Figure 2: Timing Diagram: Power Down (ASM1834D only)

Reset Signal Polarity and Output Stage Structure

The ASM1834 and the ASM1834A supervisors have active LOW reset signals. The ASM1834D reset outputs are active HIGH.

The ASM1834 and the ASM1834D have CMOS push-pull output stages. The ASM1834A has open drain reset outputs.

Part #	RESET Polarity	Output Stage Configuration
ASM1834	LOW	Push-Pull
ASM1834U	LOW	Push-Pull
ASM1834S	LOW	Push-Pull
ASM1834A	LOW	Open Drain
ASM1834AU	LOW	Open Drain
ASM1834AS	LOW	Open Drain
ASM1834D	HIGH	Push-Pull
ASM1834DU	HIGH	Push-Pull
ASM1834DS	HIGH	Push-Pull

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Manual Reset Operation

Push-button switch input, $\overline{\text{PBRST}}$, allows the user to override the internal trip point detection circuits and issue reset signals. The pushbutton input is debounced and is pulled HIGH through an internal 40kΩ resistor.

When at least one of the reset outputs is not asserted, a push button initiated reset signal can be issued by holding $\overline{\text{PBRST}}$ LOW for at least 2ms. When $\overline{\text{PBRST}}$ is held LOW, both resets become active and remain active for approximately 350ms after $\overline{\text{PBRST}}$ returns HIGH. (See figures 3 and 4).

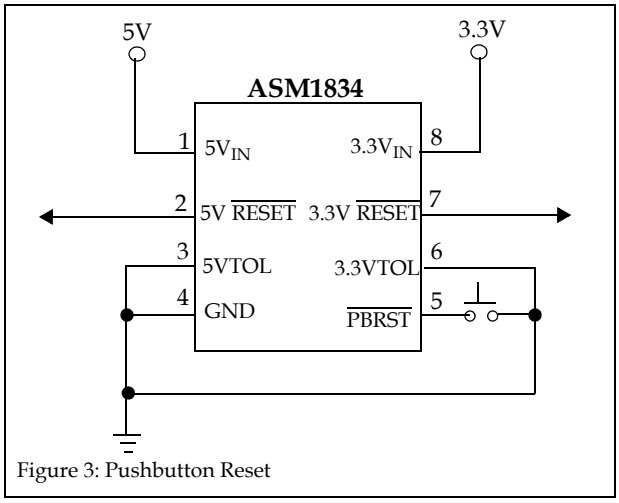


Figure 3: Pushbutton Reset

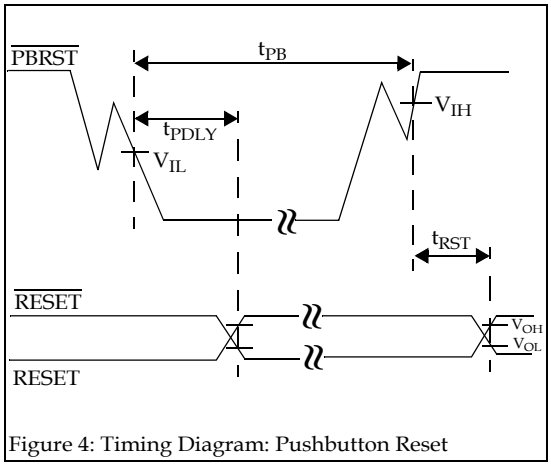


Figure 4: Timing Diagram: Pushbutton Reset

Reset Output Signal

Reset output signals are valid as long as either voltage at $5V_{IN}$ or $3.3V_{IN}$ is above 1.2V. In addition, the ASM1834 has push-pull outputs that can remain valid below a 1.2V input level. To sink current below 1.2V, a resistor should be connected from the $\overline{\text{RESET}}$ output to ground. This resistor guarantees a valid reset signal down to 0V. A 100kΩ value is suggested.

The AS1834A open drain reset outputs require pull-up resistors and must be low enough in value to pull the output into a HIGH state. Resistor value is not critical in most applications and a value of 10kΩ is suggested. (See Figures 5 and 6).

The ASM1834A open drain reset outputs can be connected to the same potential through a single pull-up resistor. In this configuration a failure on either supply will generate an active LOW reset. If the inputs are pulled-up to different voltages, the reset outputs (pin 2 and pin 7) cannot be connected to form a wired “AND” (see figure 7).

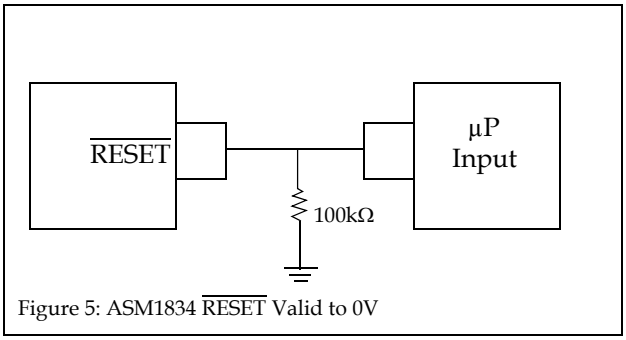


Figure 5: ASM1834 $\overline{\text{RESET}}$ Valid to 0V

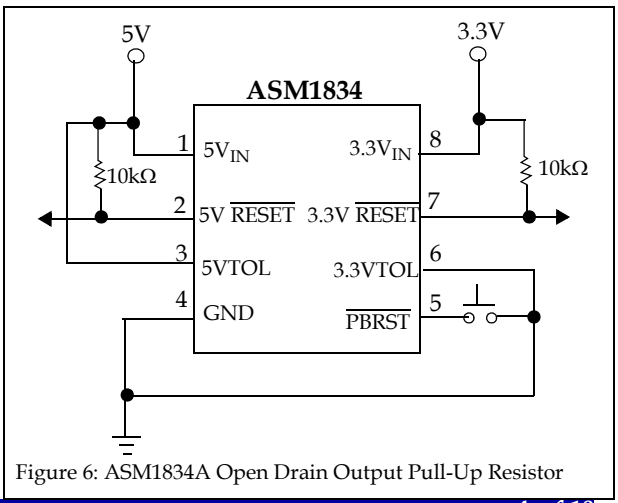


Figure 6: ASM1834A Open Drain Output Pull-Up Resistor

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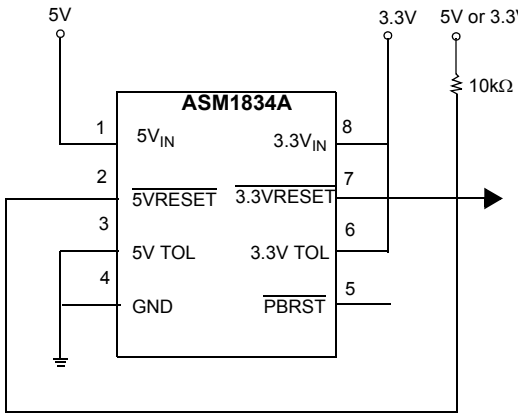


Figure 7: ASM1834A Wired "OR" Connection

Trip Point Tolerance Selection

The 3.3VTOL and 5VTOL inputs allow independent selection of the reset trip points. If 5VTOL is connected to the 5V supply input, a 10% tolerance is selected. If 5VTOL is grounded, a 5% tolerance is selected.

If 3.3VTOL is connected to the 3.3V supply input, a 20% tolerance is selected. If 3.3VTOL is grounded, a 10% tolerance is selected. (Refer table below). The 3.3VTOL and 5VTOL tolerance select inputs should be tied to the ground or to the respective input supply voltage pin, $3.3V_{IN}$ or $5V_{IN}$.

Tolerance Select	3.3V Input				5V Input			
	3.3V Tolerance	TRIP Point (V)			5V Tolerance	TRIP Point (V)		
		MIN	NOM	MAX		MIN	NOM	MAX
5VTOL = $5V_{IN}$	-	-	-	-	10%	4.25	4.38	4.49
5VTOL = GND	-	-	-	-	5%	4.5	4.63	4.75
3.3VTOL = $3.3V_{IN}$	20%	2.47	2.55	2.64	-	-	-	-
3.3VTOL = GND	10%	2.80	2.88	2.97	-	-	-	-

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Absolute Maximum Ratings

Parameter	Min	Max	Unit
Voltage on VCC	-0.5	7	V
Voltage on $\overline{\text{5V RESET}}$	-0.5	$+5V_{IN}$ + 0.5V	V
Voltage on $\overline{\text{3.3V RESET}}$	-0.5	$+3.3V_{IN}$ + 0.5V	V
Voltage on $\overline{\text{PBRST}}$ and reset outputs	-0.5	($+5V_{IN}$ + 0.5V) or ($+3.3V_{IN}$ + 0.5V) whichever is greater	V
Operating Temperature Range	-40	+85	°C
Soldering Temperature (for 10 sec)	-	260	°C
Storage Temperature	-55	+125	°C
ESD rating HBM MM		 2 200	 KV V

Note:
1. Voltages are measured with respect to ground
2. These are stress ratings only and functional implication is not implied. Exposure to absolute maximum ratings for extended periods may affect device reliability.

Recommended DC Operating Conditions

Recommended DC operating condition over the operating temperature range of -40°C to +85°C. All voltages are referenced to ground.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
5V Supply Voltage	$5V_{IN}$		1.2		5.5	V
3.3V Supply Voltage	$3.3V_{IN}$		1.2		5.5	V
$\overline{\text{PBRST}}$ Input High Level	V_{IH}	Both $3.3V_{IN}$ and $5V_{IN}$ >=2.7V	2		V_{INMAX} + 0.3	V
$\overline{\text{PBRST}}$ Input High Level	V_{IH}	Both $3.3V_{IN}$ and $5V_{IN}$ <=2.7V	V_{INMAX} - 0.4			V
$\overline{\text{PBRST}}$ Input Low Level	V_{IL}		-0.3		0.5	V

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DC Electrical Characteristics

Unless otherwise noted, V_{IN} = 1.2V to 5.5V and specifications are over the operating temperature range of -40°C to 85°C.

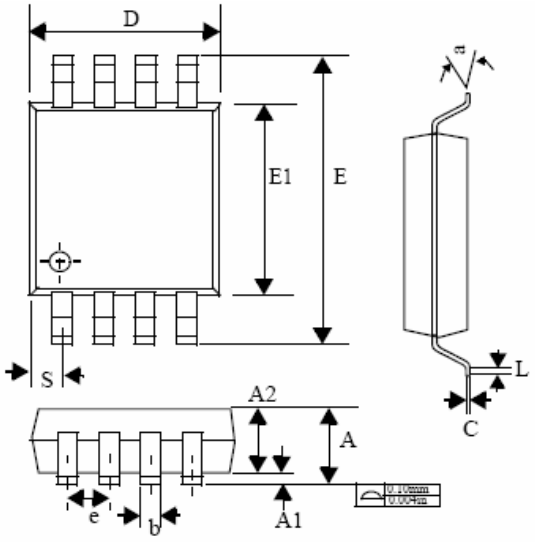
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output Current	I_{OH}	Output = 2.4V. Either 3.3V_{IN} or 5.5V_{IN} >=2.7V (ASM1834/1834D only)		350		µA
Output Current	I_{OL}	Output = 0.4V. Either 3.3V_{IN} or 5.5V_{IN} >=2.7V (ASM1834/1834D only)	10			mA
Output Voltage	V_{OH}			V_{IN} - 0.1V		V
Input Leakage	I_{IL}		-1.0		+1.0	µA
5V Operating Current	I_{CC}	3.3V_{IN} and 5V_{IN}<=5.5V, RESET outputs open.		16	30	µA
3.3V Operating Current	I_{CC}	3.3V_{IN} and 5V_{IN}<=3.6V, RESET outputs open.		12	25	µA
5V Trip Point	V_{INTP}	5VTOL = GND	4.50	4.63	4.75	V
5V Trip Point	V_{INTP}	5VTOL = 5V_{IN}	4.25	4.38	4.49	V
3.3V Trip Point	V_{INTP}	3.3VTOL = GND	2.80	2.88	2.97	V
3.3V Trip Point	V_{INTP}	3.3VTOL = 3.3V_{IN}	2.47	2.55	2.64	V
Output Capacitance	C_{OUT}				10	pF
$\overline{\text{PBRST}}$ Manual Reset Minimum Low Time	t_{PB}		2			ms
$\overline{\text{PBRST}}$ Stable LOW to reset Active	t_{PDLY}				2	ms
Reset Active Time	t_{RST}		200	350	500	ms
V_{CC} Slew Rate	t_F	V_{INTP}(MAX) to V_{INTP}(MIN)	300			µs
V_{CC} Slew Rate	t_R	V_{INTP}(MIN) to V_{INTP}(MAX)	0			ns
V_{CC} Detect to RESET or $\overline{\text{RESET}}$	t_{RPU}	t_{rise} = 5µs	200	350	500	ms
V_{CC} Detect Noise Immunity	t_{RPD}				2	µs

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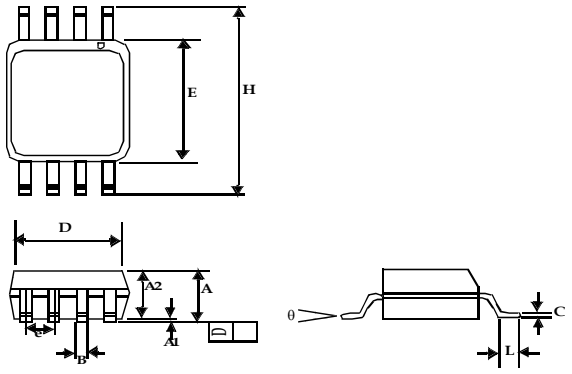
Package Information

MicroSO (8-Pin)



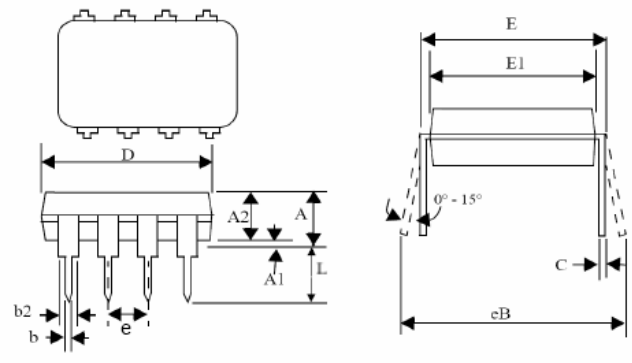
Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	0.032	0.044	0.81	1.10
A1	0.002	0.006	0.05	0.15
A2	0.030	0.038	0.76	0.97
b	0.012 BSC		0.30 BSC	
C	0.004	0.008	0.10	0.20
D	0.114	0.122	2.90	3.10
e	0.0256 BSC		0.65 BSC	
E1	0.114	0.122	2.90	3.10
E	0.184	0.200	4.67	5.08
L	0.016	0.026	0.41	0.66
a	0°	6°	0°	6°
S	0.0206 BSC		0.52 BSC	

SO (8-PIN)



Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A1	0.004	0.010	0.10	0.25
A	0.053	0.069	1.35	1.75
A2	0.049	0.059	1.25	1.50
B	0.012	0.020	0.31	0.51
C	0.007	0.010	0.18	0.25
D	0.193 BSC		4.90 BSC	
E	0.154 BSC		3.91 BSC	
e	0.050 BSC		1.27 BSC	
H	0.236 BSC		6.00 BSC	
L	0.016	0.050	0.41	1.27
θ	0°	8°	0°	8°

PLASTIC DIP (8-PIN)



Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	….	0.210	…..	5.33
A1	0.015	…..	0.38	…..
A2	0.115	0.195	2.92	4.95
b	0.014	0.022	0.36	0.56
b2	0.045	0.070	1.14	1.78
C	0.008	0.014	0.20	0.36
D	0.355	0.400	9.02	10.16
E	0.300	0.325	7.62	8.26
E1	0.240	0.280	6.10	7.11
e	0.10 BSC		2.54 BSC	
eB	…..	0.430	…..	10.92
L	0.115	0.150	2.92	3.81

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Ordering Information

Part Number	Reset Polarity	Operating Temperature Range	Output Stage	Package	Package Marking
TIN - LEAD DEVICES					
ASM1834	LOW	-40°C TO 85°C	Push-Pull	8-DIP	ASM1834
ASM1834U	LOW	-40°C TO 85°C	Push-Pull	MicroSO	ASM1834U
ASM1834S	LOW	-40°C TO 85°C	Push-Pull	8-SO	ASM1834S
ASM1834A	LOW	-40°C TO 85°C	Open Drain	8-DIP	ASM1834A
ASM1834AU	LOW	-40°C TO 85°C	Open Drain	MicroSO	ASM1834AU
ASM1834AS	LOW	-40°C TO 85°C	Open Drain	8-SO	ASM1834AS
ASM1834D	HIGH	-40°C TO 85°C	Push-Pull	8-DIP	ASM1834D
ASM1834DU	HIGH	-40°C TO 85°C	Push-Pull	MicroSO	ASM1834DU
ASM1834DS	HIGH	-40°C TO 85°C	Push-Pull	8-SO	ASM1834DS
LEAD FREE DEVICES					
ASM1834F	LOW	-40°C TO 85°C	Push-Pull	8-DIP	ASM1834F
ASM1834UF	LOW	-40°C TO 85°C	Push-Pull	MicroSO	ASM1834UF
ASM1834SF	LOW	-40°C TO 85°C	Push-Pull	8-SO	ASM1834SF
ASM1834AF	LOW	-40°C TO 85°C	Open Drain	8-DIP	ASM1834AF
ASM1834AUF	LOW	-40°C TO 85°C	Open Drain	MicroSO	ASM1834AUF
ASM1834ASF	LOW	-40°C TO 85°C	Open Drain	8-SO	ASM1834ASF
ASM1834DF	HIGH	-40°C TO 85°C	Push-Pull	8-DIP	ASM1834DF
ASM1834DUF	HIGH	-40°C TO 85°C	Push-Pull	MicroSO	ASM1834DUF
ASM1834DSF	HIGH	-40°C TO 85°C	Push-Pull	8-SO	ASM1834DSF

Note:
For parts to be packed in Tape and Reel, add “-T” at the end of the part number.

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