

## POWER MANAGEMENT

### Dual 5V and 3.3V $\mu$ P Power Supply Supervisors w/Manual Reset

- Push-Pull and Open-Drain Outputs
- Selectable Trip Point Tolerance

The IMP1834 supervisors simultaneously monitor both 3.3V and 5V power sources and issue 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.

The IMP1834 supervisors are pin-compatible with devices from Dallas Semiconductor and require up to 40% less current.

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

The IMP1834 and IMP1834D have push-pull reset output stages. The IMP1834A active LOW reset outputs are open drain devices that can both be connected to either 5 volt or 3.3 volt supply. The IMP1834 and IMP1834A have active LOW reset outputs. The IMP1834D has active HIGH reset outputs.

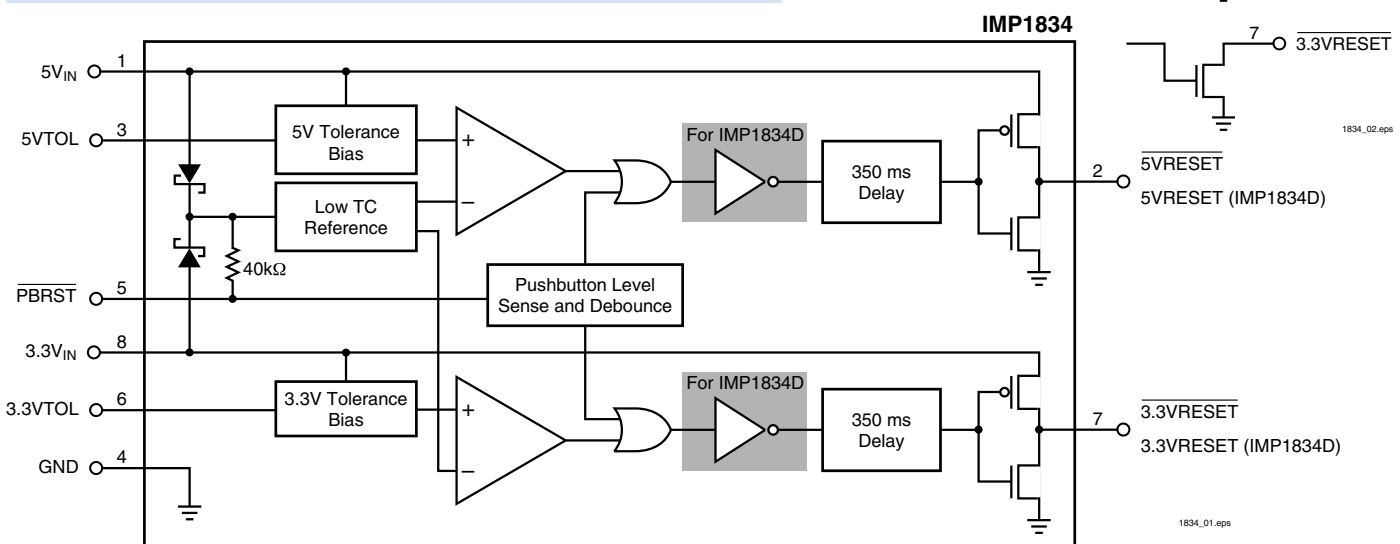
All devices can issue reset signals through an internally debounced pushbutton reset input that affects both reset outputs.

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

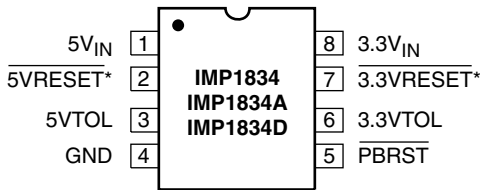
- ◆ Lower power, pin-compatible replacements for the Dallas DS1834
  - 40% lower maximum supply current: 30 $\mu$ A vs 50 $\mu$ A
- ◆ Monitor 5V and 3.3V supplies simultaneously
- ◆ 5V and 3.3V power-on reset
- ◆ 350ms reset time
- ◆ Debounced pushbutton reset input
- ◆ Push-Pull CMOS output
  - IMP1834, IMP1834D
  - Eliminates external pull-up resistors
  - Active LOW (IMP1834), HIGH (IMP1834D)
- ◆ Open drain output
  - IMP1834A
  - 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

### Block Diagram



## Pin Configuration

### DIP/SO/MicroSO



\* IMP1834D reset outputs are active HIGH (5VRESET and 3.3VRESET).

Outputs are open drain for IMP1834A.

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## Pin Descriptions

Pin Number	Name	Function
1	5V <sub>IN</sub>	5V power supply input.
2	5VRESET 5VRESET	5V reset output (Active LOW, IMP1834, IMP1834A. Open drain outputs for IMP1834A). 5V reset output (Active HIGH, IMP1834D).
3	5VTOL	5V input tolerance select: 10% tolerance for 5VTOL 5V <sub>IN</sub> and 5% tolerance for 5VTOL = GND.
4	GND	Ground.
5	PBRST	Debounced manual pushbutton reset input (40kΩ internal pull up).
6	3.3VTOL	3.3V input tolerance select: 20% tolerance for 3.3VTOL = 3.3V <sub>IN</sub> , and 10% tolerance for 3.3VTOL = GND.
7	3.3VRESET 3.3VRESET	3.3V reset output (Active LOW, IMP1834, IMP1834A. Open drain outputs for IMP1834A). 3.3V reset output (Active HIGH, IMP1834D).
8	3.3V <sub>IN</sub>	3.3V power supply input.

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## Ordering Information

Part Number	Package	Operating Temperature Range	Reset Polarity	Output Stage
IMP1834	8-DIP	-40°C to 85°C	LOW	Push-Pull
IMP1834EMA	MicroSO	-40°C to 85°C	LOW	Push-Pull
IMP1834S	8-SO	-40°C to 85°C	LOW	Push-Pull
IMP1834/D	DICE	25°C	LOW	Push-Pull
IMP1834A	8-DIP	-40°C to 85°C	LOW	Open Drain
IMP1834AEMA	MicroSO	-40°C to 85°C	LOW	Open Drain
IMP1834AS	8-SO	-40°C to 85°C	LOW	Open Drain
IMP1834A/D	DICE	25°C	LOW	Open Drain
IMP1834D	8-DIP	-40°C to 85°C	HIGH	Push-Pull
IMP1834DEMA	MicroSO	-40°C to 85°C	HIGH	Push-Pull
IMP1834DS	8-SO	-40°C to 85°C	HIGH	Push-Pull
IMP1834D/D	DICE	25°C	HIGH	Push-Pull

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## Absolute Maximum Ratings

Voltage on  $\overline{V_{IN}}$  pins ..... -0.5V to 7V  
 Voltage on  $\overline{5V_{RESET}}$  ..... -0.5V to (+5V<sub>IN</sub> +0.5V)  
 (IMP1834, IMP1834D)  
 Voltage on  $\overline{3.3V_{RESET}}$  ..... -0.5V to (+3.3V<sub>IN</sub> +0.5V)  
 (IMP1834, IMP1834D)  
 Voltage on  $\overline{PBRST}$  and reset outputs .. -0.5V to the greater of  
 5V<sub>IN</sub> +0.5V or 3.3V<sub>IN</sub> +0.5V  
 (IMP1834A)

Operating Temperature Range ..... -40°C to 85°C  
 Storage Temperature ..... -55°C to 125°C  
 Soldering Temperature ..... 260°C for 10 seconds

*Voltages measured with respect to ground.  
 These are stress ratings only and functional operation is not implied.*

## Electrical Characteristics

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	Units
5V Supply Voltage (5V <sub>IN</sub> )	5V <sub>IN</sub>		1.2		5.5	V
3.3V Supply Voltage (3.3V)	3.3V <sub>IN</sub>		1.2		5.5	V
$\overline{PBRST}$ Input High Level	V <sub>IH</sub>	Both 3.3V <sub>IN</sub> and 5V <sub>IN</sub> ≥ 2.7V	2		V <sub>INMAX</sub> +0.3V	V
$\overline{PBRST}$ Input High Level	V <sub>IH</sub>	Both 3.3V <sub>IN</sub> and 5V <sub>IN</sub> ≤ 2.7V	V <sub>INMAX</sub> -0.4V			V
$\overline{PBRST}$ Input Low Level	V <sub>IL</sub>		-0.3		0.5	V

Unless otherwise noted, V<sub>IN</sub> = 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	Units
Output Voltage	V <sub>OH</sub>			V <sub>IN</sub> - 0.1V		V
Input Leakage	I <sub>IL</sub>		-1.0		+1.0	μA
Output Current	I <sub>OH</sub>	Output = 2.4V. Either 3.3V <sub>IN</sub> or 5V <sub>IN</sub> ≥ 2.7V. (IMP1834/1834D only)		350		μA
Output Current	I <sub>OL</sub>	Output = 0.4V. Either 3.3V <sub>IN</sub> or 5V <sub>IN</sub> ≥ 2.7V. (IMP1834/1834D only)	+10			mA
5V Operating Current	I <sub>CC</sub>	3.3V <sub>IN</sub> and 5V <sub>IN</sub> ≤ 5.5V, RESET outputs open.		16	30	μA
3.3V Operating Current	I <sub>CC</sub>	3.3V <sub>IN</sub> and 5V <sub>IN</sub> ≤ 3.6V, RESET outputs open.		12	25	μA
5V Trip Point	V <sub>INTP</sub>	5VTOL = GND	4.50	4.63	4.75	V
5V Trip Point	V <sub>INTP</sub>	5VTOL = 5V <sub>IN</sub>	4.25	4.38	4.49	V
3.3V Trip Point	V <sub>INTP</sub>	3.3VTOL = GND	2.80	2.88	2.97	V
3.3V Trip Point	V <sub>INTP</sub>	3.3VTOL = 3.3V <sub>IN</sub>	2.47	2.55	2.64	V
Output Capacitance	C <sub>OUT</sub>				10	pF
$\overline{PBRST}$ Manual Reset Minimum Low Time	t <sub>PB</sub>		2			ms
$\overline{PBRST}$ Stable LOW to Reset Active	t <sub>PDLY</sub>				2	ms
Reset Active Time	t <sub>RST</sub>		200	350	500	ms
V <sub>CC</sub> Detect Noise Immunity	t <sub>RPD</sub>				2	μs
V <sub>CC</sub> Slew Rate	t <sub>F</sub>	V <sub>INTP</sub> (MAX) to V <sub>INTP</sub> (MIN)	300			μs
V <sub>CC</sub> Slew Rate	t <sub>R</sub>	V <sub>INTP</sub> (MIN) to V <sub>INTP</sub> (MAX)	0			ns
V <sub>CC</sub> Detect to $\overline{RESET}$ or $\overline{RESET}$	t <sub>RPU</sub>	t <sub>rise</sub> = 5μs	200	350	500	ms

## Application Information

### Operation – Power Monitor

The IMP1834 supervisors simultaneously detect out-of-tolerance power supply conditions on both 3.3V and 5V power supplies. If the voltages at  $5V_{IN}$  or  $3.3V_{IN}$  are outside the tolerance band, the reset for the failing 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 IMP1834 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  $3.3V_{IN}$ .

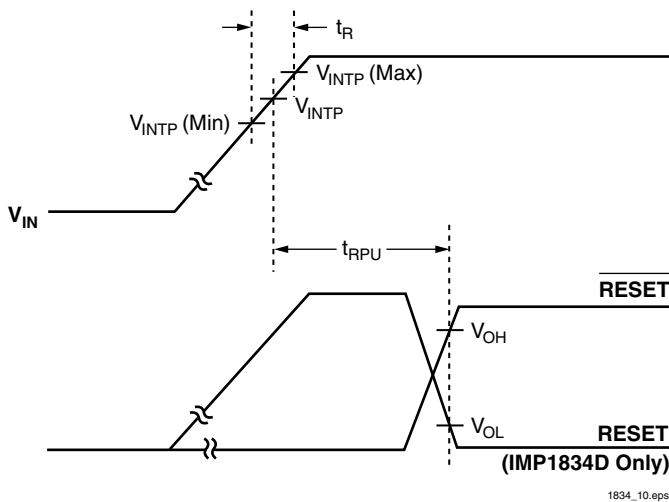


Figure 1. Timing Diagram: Power Up

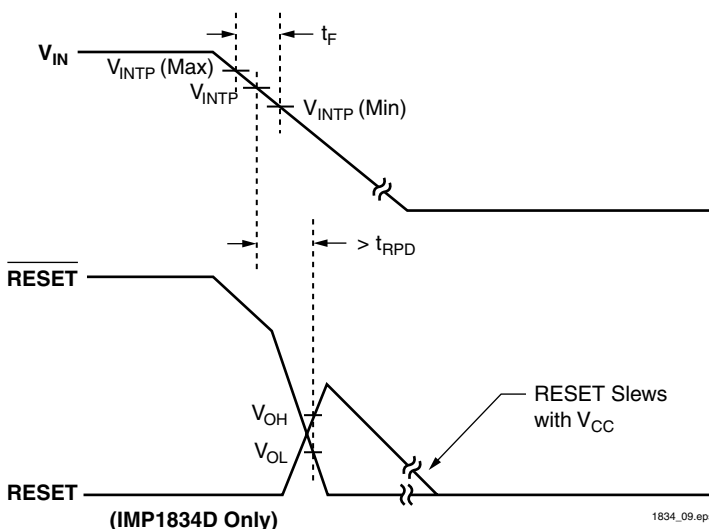


Figure 2. Timing Diagram: Power Down

### Reset Signal Polarity and Output Stage Structure

The IMP1834 and IMP1834A supervisors have active LOW reset signals. The IMP1834D reset outputs are active HIGH.

The IMP1834 and IMP1834D have CMOS push-pull output stages. The IMP1834A has open drain reset outputs.

IMP Part	RESET Polarity	Output Stage Configuration
IMP1834	LOW	Push-Pull
IMP1834EMA	LOW	Push-Pull
IMP1834S	LOW	Push-Pull
IMP1834A	LOW	Open Drain
IMP1834AEMA	LOW	Open Drain
IMP1834AS	LOW	Open Drain
IMP1834D	HIGH	Push-Pull
IMP1834DEMA	HIGH	Push-Pull
IMP1834DS	HIGH	Push-Pull

### 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. See Table 1.

The 3.3VTOL and 5VTOL tolerance select inputs should be tied to ground or to the respective input supply voltage pin,  $3.3V_{IN}$  or  $5V_{IN}$ .

**Table 1. Threshold Selection**

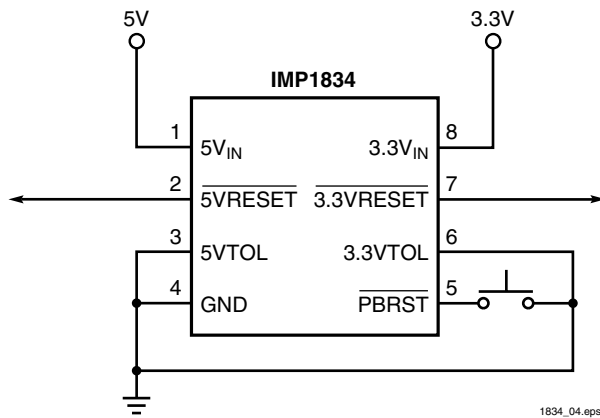
Tolerance Select	3.3V Input				5V Input			
	3.3V Tolerance	TRIP Point (V)			5V Tolerance	TRIP Point (V)		
		MIN	Nominal	MAX		MIN	Nominal	MAX
5VTOL = 5V <sub>IN</sub>	—	—	—	—	10%	4.25	4.38	4.49
5VTOL = GND	—	—	—	—	5%	4.5	4.63	4.75
3.3VTOL = 3.3V <sub>IN</sub>	20%	2.47	2.55	2.64	—	—	—	—
3.3VTOL = GND	10%	2.80	2.88	2.97	—	—	—	—

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### Manual Reset Operation

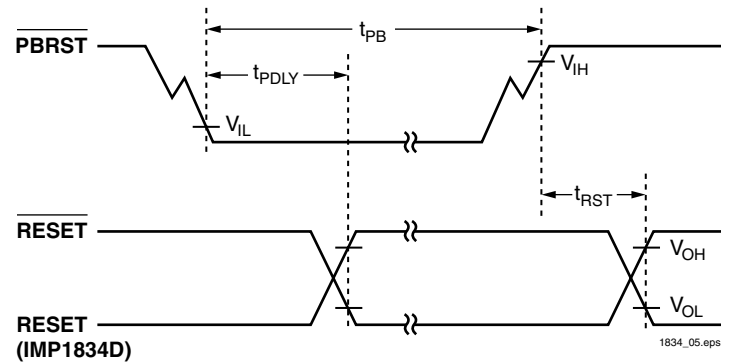
Pushbutton switch input,  $\overline{\text{PBRST}}$ , allows the user to override the internal trip point detection circuits and issue reset signals. The pushbutton input is debounced and is pulled HIGH through a 40k $\Omega$ , internal pull-up resistor.

When at least one of the reset outputs is not asserted, a pushbutton 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 *Figure 3* and *Figure 4*.



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*Figure 3. Pushbutton Reset*



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*Figure 4. Timing Diagram: Pushbutton Reset*

## Application Information

### 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 IMP1834 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 reset output to ground. This resistor guarantees a valid reset signal down to 0V. A  $100k\Omega$  value is suggested.

The IMP1834A 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  $10k\Omega$  is suggested. See *Figure 5* and *Figure 6*.

The IMP1834A 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 outputs are pulled-up to different voltages, the reset outputs (pin 2 and pin 7) should not be connected. See *Figure 7*.

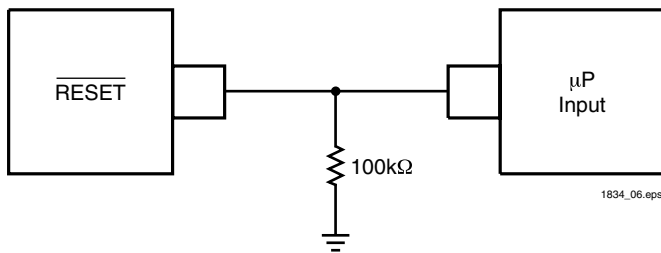


Figure 5. IMP1834  $\overline{RESET}$  Valid to 0V

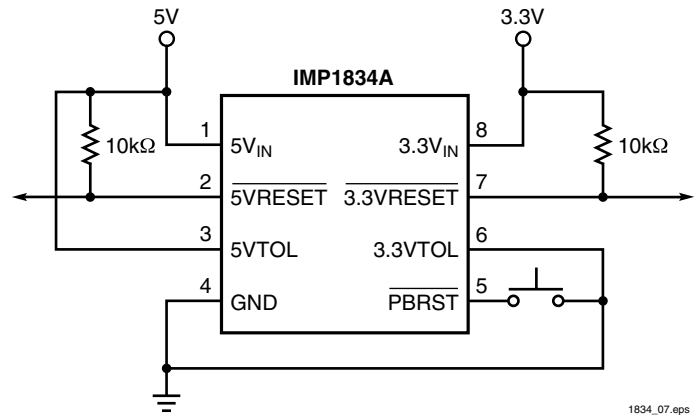


Figure 6. IMP1834A Open Drain Output Pull-Up Resistor

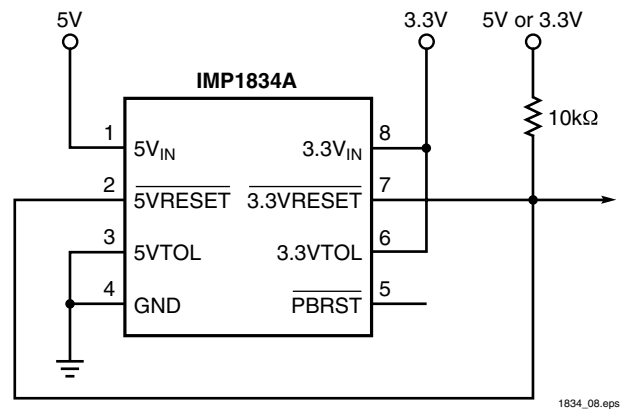
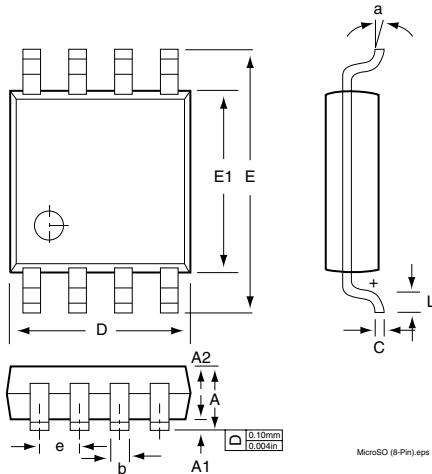


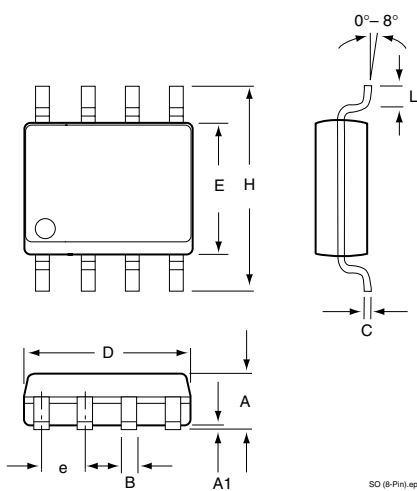
Figure 7. IMP1834A Wired "OR" Connection

## Package Dimensions

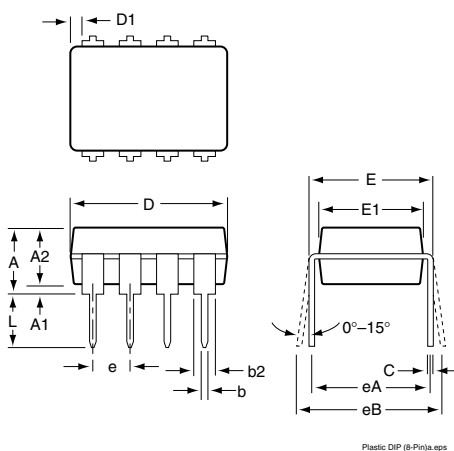
### MicroSO (8-Pin)



### SO (8-Pin)



### Plastic DIP (8-Pin)



	Inches		Millimeters	
	Min	Max	Min	Max
<b>MicroSO (8-Pin)*</b>				
A	—	0.0433	—	1.10
A1	0.0020	0.0059	0.050	0.15
A2	0.0295	0.0374	0.75	0.95
b	0.0098	0.0157	0.25	0.40
C	0.0051	0.0091	0.13	0.23
D	0.1142	0.1220	2.90	3.10
e	0.0256 BSC		0.65 BSC	
E	0.193 BSC		4.90 BSC	
E1	0.1142	0.1220	2.90	3.10
L	0.0157	0.0276	0.40	0.70
a	0°	6°	0°	6°
<b>SO (8-Pin)**</b>				
A	0.053	0.069	1.35	1.75
A1	0.004	0.010	0.10	0.25
B	0.013	0.020	0.33	0.51
C	0.007	0.010	0.19	0.25
e	0.050		1.27	
E	0.150	0.157	3.80	4.00
H	0.228	0.244	5.80	6.20
L	0.016	0.050	0.40	1.27
D	0.189	0.197	4.80	2.00
<b>Plastic DIP (8-Pin)***</b>				
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
b3	0.030	0.045	0.80	1.14
D	0.355	0.400	9.02	10.16
D1	0.005	—	0.13	—
E	0.300	0.325	7.62	8.26
E1	0.240	0.280	6.10	7.11
e	0.100	—	2.54	
eA	0.300	—	7.62	
eB	—	0.430	—	10.92
eC	—	0.060	—	—
L	0.115	0.150	2.92	3.81

\* JEDEC Drawing MO-187AA

\*\* JEDEC Drawing MS-112AA

\*\*\* JEDEC Drawing MS-001BA

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