

POWER MANAGEMENT

Low Power, 5V μ P Reset

- Active LOW, Open-Drain Output
- 350ms Reset Period

The IMP1233D supply voltage monitor is an improved, low-power replacement for the Dallas Semiconductor DS1233D. Maximum supply current over temperature is a low 20 μ A, representing over 60 percent lower power as compared to the DS1233D.

The IMP1233D issues an active LOW reset signal whenever the monitored supply is out-of-tolerance. A precision reference and comparator circuit monitor power supply (V_{CC}) level. Tolerance level options are 5-, 10- and 15-percent. When an out-of-tolerance condition is detected, an internal power-fail signal is generated which forces an active LOW reset signal. After V_{CC} returns to an in-tolerance condition, the reset signal remains active for 350ms to allow the power supply and system microprocessor to stabilize.

The IMP1233D is designed with a open-drain output stage and operates over the extended industrial temperature range. Devices are available in compact surface mount SOT-223 packages and 3-lead TO-92 packages.

Other low power products in this family include the IMP1810/11/12/15/16/17 and IMP1233M.

Key Features

- ◆ Improved Dallas DS1233D replacement
 - Over 60% lower maximum supply current
- ◆ Low Supply Current
 - 20 μ A maximum (5.5V)
 - 15 μ A maximum (3.6V)
- ◆ Automatically restarts a microprocessor after power failure
- ◆ 350ms reset delay after V_{CC} returns to an in-tolerance condition
- ◆ Active LOW power-up reset, 5k Ω internal pull-up
- ◆ Precision temperature-compensated voltage reference and comparator
- ◆ Eliminates external components
- ◆ Motorola 68xxx and HC16 compatible
- ◆ Low-cost TO-92 package
- ◆ Compact surface mount SOT-223 package
- ◆ Operating temperature -40°C to $+85^{\circ}\text{C}$

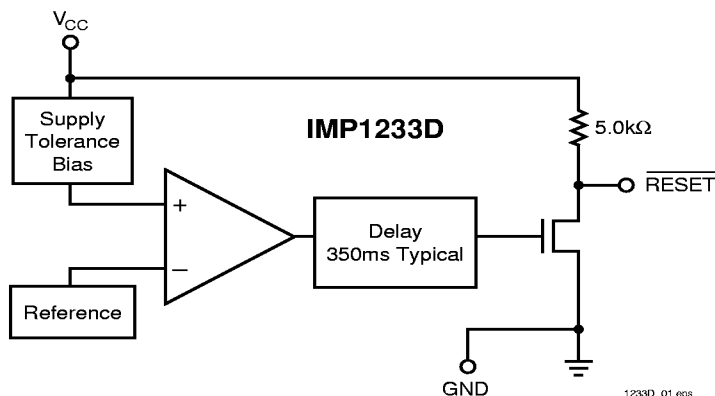
Family Selection Guide

Part	RESET Voltage (V)	RESET Time (ms)	Output Stage	RESET Polarity
IMP1810	4.620, 4.370, 4.120	150	Push-Pull	LOW
IMP1811	4.620, 4.350, 4.130	150	Open-Drain	LOW
IMP1812	4.620, 4.350, 4.130	150	Push-Pull	HIGH
IMP1815	3.060, 2.880, 2.550	150	Push-Pull	LOW
IMP1816	3.060, 2.880, 2.550	150	Open-Drain	LOW
IMP1817	3.060, 2.880, 2.550	150	Push-Pull	HIGH
IMP1233D	4.625, 4.375, 4.125	350	Open-Drain	LOW
IMP1233M	4.625, 4.375, 2.720	350	Open-Drain	LOW

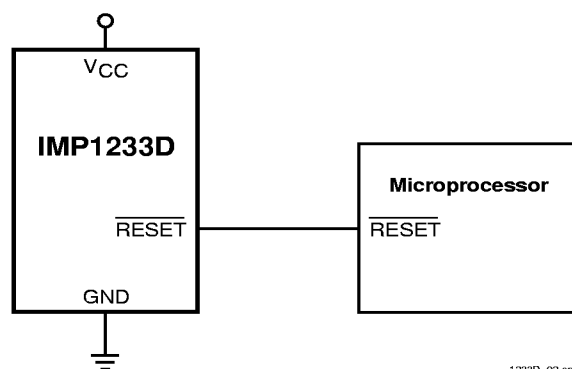
Applications

- ◆ Set-top boxes
- ◆ Cellular phones
- ◆ PDAs
- ◆ Energy management systems
- ◆ Embedded control systems
- ◆ Printers
- ◆ Single board computers

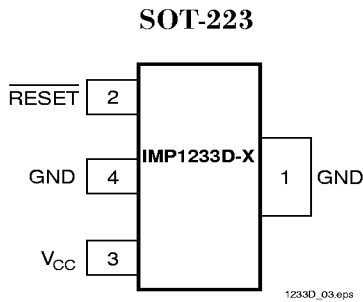
Block Diagram



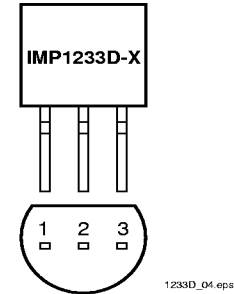
Typical Application



Pin Configuration



TO-92*

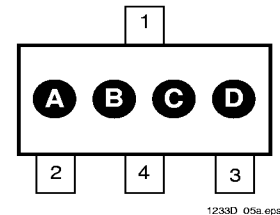


Pin Descriptions

Pin Numbers		Name	Function
SOT-223	TO-92		
1	1	GND	Ground
2	2	RESET	Active LOW reset output
3	3	V _{CC}	Power supply input
4	—	GND	Ground (SOT-223 Only)

Package Marking Code

Package Letter Code			Part Type	Package Letter Code	Reset Tolerance
A	B	C			
3	3	D	IMP1233D	D	
				A	5%
				B	10%
				C	15%



Ordering Information

Device Summary									Package Marking			
Part Number	RESET Output Voltage (V)	RESET Tolerance (%)	RESET Time (ms)	Output Stage		TO-92* Package	SOT-223** Package	RESET Polarity	A	B	C	D
				*** Open-Drain	Push-Pull							A = 5% B = 10% C = 15%
IMP1233D-5	4.625	5	350	X		X		LOW				
IMP1233D-10	4.375	10	350	X		X		LOW				
IMP1233D-15	4.125	15	350	X		X		LOW				
IMP1233DZ-5	4.625	5	350	X			X	LOW	3	3	D	A
IMP1233DZ-10	4.375	10	350	X			X	LOW	3	3	D	B
IMP1233DZ-15	4.125	15	350	X			X	LOW	3	3	D	C

* Add /S to Part Number for straight (unformed) leads. (ie. IMP18xx-x/S)

** Add /T to Part Number for Tape and Reel. (ie. IMP18xx-x/T)

*** Internal 5kΩ resistor pull up.

1233D_103.eps

Absolute Maximum Ratings

Voltage on V_{CC} -0.5V to 7V
 Voltage on $\overline{RESET}$ -0.5V to $V_{CC} + 0.5V$
 Operating Temperature Range -40°C to 85°C

Soldering Temperature 260°C for 10 seconds
 Storage Temperature -55°C to 125°C

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

Electrical Characteristics

Unless otherwise noted, $V_{CC} = 1.2V$ to $5.5V$ and specifications are over the operating temperature range of -40°C to +85°C.
 All voltages are referenced to ground.

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Supply Voltage	V_{CC}		1.2		5.5	V
Output Voltage	V_{OH}	$I_{OUT} < 500\mu A$	$V_{CC} - 0.5V$	$V_{CC} - 0.1V$		V
Output Current	I_{OL}	Output = 0.4V, $V_{CC} \geq 2.7V$	+8			mA
Operating Current	I_{CC}	$V_{CC} < 5.5V$, $\overline{RESET}$ output open		8	20	μA
Operating Current	I_{CC}	$V_{CC} \leq 3.6V$, $\overline{RESET}$ output open		6	15	μA
V_{CC} Trip Point (IMP1233D-5)	V_{CCTP}		4.50	4.625	4.74	V
V_{CC} Trip Point (IMP1233D-10)	V_{CCTP}		4.25	4.375	4.49	V
V_{CC} Trip Point (IMP1233D-15)	V_{CCTP}		4.00	4.125	4.24	V
Internal Pull-Up Resistor	R_P		3.5	5.0	7.5	k Ω
Output Capacitance	C_{OUT}				10	pF
RESET Active Time	t_{RESET}		250	350	450	ms
V_{CC} Detect to $\overline{RESET}$ Low	t_{RPD}			2	5	μs
V_{CC} Slew Rate ($V_{HTL} - V_{LTL}$)	t_F		300			μs
V_{CC} Slew Rate ($V_{LTL} - V_{HTL}$)	t_R		0			ns
V_{CC} Detect to $\overline{RESET}$ High	t_{RPU}	$t_R = 5\mu s$	250	350	450	ms

Application Information

Operation – Power Monitor

The IMP1233D detects out-of-tolerance power supply conditions. It resets a processor during power-up and issues a reset to the system processor when the monitored power supply voltage is below the reset threshold (power-down). When an out-of-tolerance V_{CC} voltage is detected, the $\overline{\text{RESET}}$ signal is asserted. On power-up, $\overline{\text{RESET}}$ is kept active (LOW) for approximately 350ms after the power supply voltage has reached the selected tolerance. This allows the power supply and microprocessor to stabilize before $\overline{\text{RESET}}$ is released.

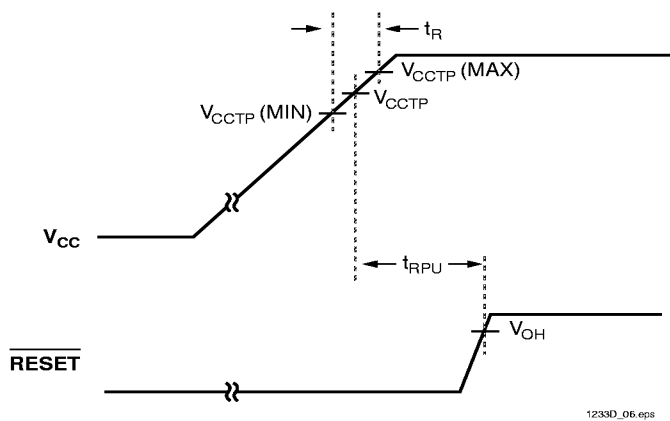


Figure 1. Timing Diagram: Power-Up

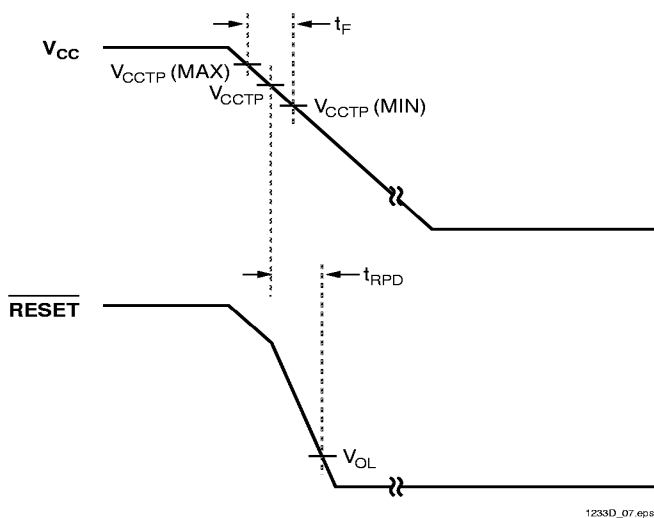
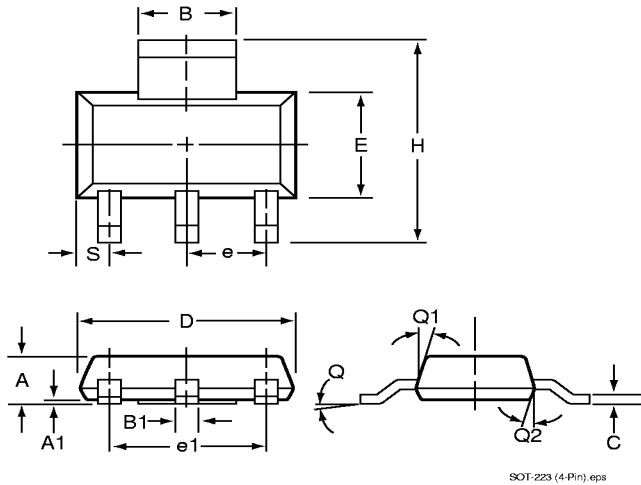


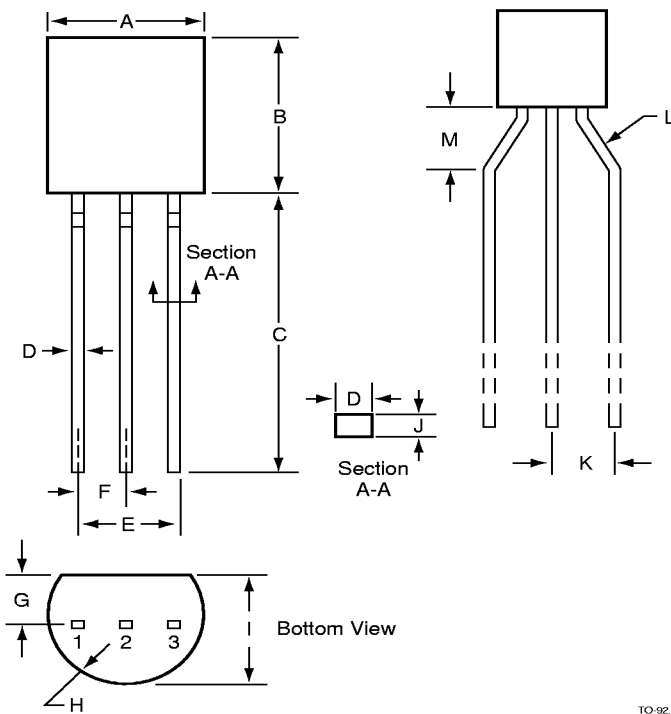
Figure 2. Timing Diagram: Power-Down

Package Dimensions

Plastic SOT-223 (4-Pin)



TO-92 (3-Pin)



	Inches		Millimeters	
	Min	Max	Min	Max
Plastic SOT-223* (4-Pin)				
A	0.067	0.060	1.70	1.50
A1	0.004	0.0008	0.10	0.02
B	0.124	0.116	3.15	2.95
B1	0.033	0.026	0.85	0.65
C	0.014	0.010	0.35	0.25
D	0.264	0.248	6.70	6.30
e	0.0905 NOM		2.30 NOM	
e1	0.181 NOM		4.50 NOM	
E	0.146	0.130	3.70	3.30
h	0.287	0.264	7.30	6.70
S	0.041	0.033	1.05	0.85
t	0.051	0.043	1.30	1.10
Q	10° MAX		10° MAX	
Q1	16°	10°	16°	10°
Q2	16°	10°	16°	10°
TO-92* (3-Pin)				
A	0.175	0.195	4.45	4.95
B	0.170	0.192	4.32	4.96
C	0.500	0.610	12.70	15.49
D	0.016	0.022	0.406	0.559
E	0.095	0.105	2.41	2.67
F	0.045	0.60	1.14	1.52
G	0.45	0.060	1.14	1.52
H	0.085	0.095	2.16	2.41
I	0.130	0.155	3.30	3.94
J	0.014	0.020	0.35	0.51
K	0.093	0.115	2.36	2.92
L	45°	60°	45°	60°
M	0.118 Typical		3.00	

* Formed leads are standard. Add /S to Part Number for straight leads.

** Add /T to Part Number for Tape and Reel.

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