



Maxim > Products > [Supervisors, Voltage Monitors, Sequencers]

## DS1231

Power Monitor

### Description

With precise, temperature-compensated comparators, the DS1231 Power Monitor Chip monitors input power and a 5V system power supply. If unsafe voltages are detected, a nonmaskable interrupt sends a warning signal to the processor in advance of power failure. Processing is unconditionally halted when power falls below a user-selectable 5% or 10% threshold level, with time to shutdown proportional to the available hold-up time of the power supply. Upon return of power, the DS1231 maintains reset until power conditions stabilize.

The DS1231 enhances system reliability by closely monitoring both processor and upstream power levels, warning of impending failure, and automatically suspending and restarting processor operation. An input sense also supports a connection to switched inputs such as an opto-isolator for LED function. All external reset components (i.e., pull-up resistor and delay timing capacitor) are contained in one package, saving space and cost.

### Key Features

- Monitors input and power supply and warns of impending failure
- Provides orderly shutdown
- Initiates and holds processor reset until levels are unsafe
- Tolerance threshold levels can be set for 5% or 10%
- Automatically restarts processor on power-up
- Pauses restart until system stabilizes
- Operating range: 0°C to +70°C (DS1231 and DS1231S)  
-40°C to +85°C (DS1231-N and DS1231S-N)
- Optional active-low NMI Hysteresis (200mV = "-20", 350mV = "-35", 500mV = "-50")

### Key Specifications: Supervisors (1 Monitored Voltage)

Part Number	Reset Threshold Range (V)	Active-Low Reset Output	Min. Reset Timeout Range	Watchdog Feature	Supervisor Features	Reset Thresh. Acc. (% @+25°C)	Max. I <sub>CC</sub> (μA)	
-------------	---------------------------	-------------------------	--------------------------	------------------	---------------------	-------------------------------	---------------------------	--

DS1231	3.3 to 5.5	Open Drain	85ms to 300ms	No Watchdog	Power Fail Comparator	2.5	2000	
<a href="#">See All Supervisors (1 Monitored Voltage) (268)</a>								

**Notes:**

\*\*This pricing is BUDGETARY, for comparing similar parts. Prices are in U.S. dollars and subject to change. Quantity pricing may vary substantially and international prices may differ due to local duties, taxes, fees, and exchange rates. For volume-specific prices and delivery, please see the [price and availability page](#) or contact an authorized distributor.

**Application Notes**

- [Application Note 245: Adding Hysteresis to CPU Supervisor Voltage Sense Inputs Monitoring Upstream Voltage Supplies for Power-Fail Warnings - DS1231](#)
- [Application Note 3316: Dallas Semiconductor Microprocessor Supervisor Selection Guide - DS1231](#)

**Evaluation Kits**

none

**Reliability Reports**

- [Reliability Report: DS1231.pdf](#)

**Software/Models**

none

**Ordering Information**

Notes:

1. Other options and links for purchasing parts are listed at:
2. [Didn't Find What You Need?](#) Ask our applications engineers. Expert assistance in finding parts, usually within one business day.
3. Part number suffixes: T or T&R = tape and reel; + = RoHS/lead-free; # = RoHS/lead-exempt. More: See [Full Data Sheet](#) or [Part Naming Conventions](#).
4. \* Some packages have variations, listed on the drawing. "PkgCode/Variation" tells which variation the product uses. Note that "+", "#", "-" in the part number suffix describes RoHS status. Package drawings may show a different suffix character.

Devices: 1-30 of 30

DS1231	Notes	Free Sample	Buy	Package: TYPE PINS FOOTPRINT DRAWING CODE/VAR *	Temp	RoHS/Lead-Free? Materials Analysis
DS1231-50+				PDIP; 8 pin; Dwg: <a href="#">21-0043</a> (PDF) Use pkgcode/variation: P8+7*	0°C to +70°C	RoHS/Lead-Free: <a href="#">Lead Free</a> <a href="#">Materials Analysis</a>
DS1231-20N+				PDIP; 8 pin; Dwg: <a href="#">21-0043</a> (PDF) Use pkgcode/variation: P8+7*	-40°C to +85° C	RoHS/Lead-Free: <a href="#">Lead Free</a> <a href="#">Materials Analysis</a>
DS1231-35N+				PDIP; 8 pin; Dwg: <a href="#">21-0043</a> (PDF) Use pkgcode/variation: P8+7*	-40°C to +85° C	RoHS/Lead-Free: <a href="#">Lead Free</a> <a href="#">Materials Analysis</a>
DS1231-50N+				PDIP; 8 pin; Dwg: <a href="#">21-0043</a> (PDF) Use pkgcode/variation: P8+7*	-40°C to +85° C	RoHS/Lead-Free: <a href="#">Lead Free</a> <a href="#">Materials Analysis</a>
DS1231-35+				PDIP; 8 pin; Dwg: <a href="#">21-0043</a> (PDF) Use pkgcode/variation: P8+7*	0°C to +70°C	RoHS/Lead-Free: <a href="#">Lead Free</a> <a href="#">Materials Analysis</a>
DS1231-20+	200mV Hysteresis			PDIP; 8 pin; Dwg: <a href="#">21-0043</a> (PDF) Use pkgcode/variation: P8+7*	0°C to +70°C	RoHS/Lead-Free: <a href="#">Lead Free</a> <a href="#">Materials Analysis</a>
DS1231-50	500mV Hysteresis			PDIP; 8 pin; Dwg: <a href="#">21-0043</a> (PDF) Use pkgcode/variation: P8-7*	0°C to +70°C	RoHS/Lead-Free: <a href="#">No</a> <a href="#">Materials Analysis</a>
DS1231-20	200mV Hysteresis			PDIP; 8 pin; Dwg: <a href="#">21-0043</a> (PDF) Use pkgcode/variation: P8-7*	0°C to +70°C	RoHS/Lead-Free: <a href="#">No</a> <a href="#">Materials Analysis</a>
DS1231-35	350mV Hysteresis			PDIP; 8 pin; Dwg: <a href="#">21-0043</a> (PDF) Use pkgcode/variation: P8-7*	0°C to +70°C	RoHS/Lead-Free: <a href="#">No</a> <a href="#">Materials Analysis</a>
DS1231-50/G				PDIP; 8 pin; Dwg: <a href="#">21-0043</a> (PDF) Use pkgcode/variation: P8-7*	0°C to +70°C	RoHS/Lead-Free: <a href="#">No</a> <a href="#">Materials Analysis</a>
DS1231-35N	350mV Hysteresis			PDIP; 8 pin; Dwg: <a href="#">21-0043</a> (PDF) Use pkgcode/variation: P8-7*	-40°C to +85° C	RoHS/Lead-Free: <a href="#">No</a> <a href="#">Materials Analysis</a>
DS1231-20N	200mV Hysteresis			PDIP; 8 pin; Dwg: <a href="#">21-0043</a> (PDF) Use pkgcode/variation: P8-7*	-40°C to +85° C	RoHS/Lead-Free: <a href="#">No</a> <a href="#">Materials Analysis</a>

DS1231-50N	500mV Hysteresis			PDIP; 8 pin; Dwg: <a href="#">21-0043 (PDF)</a> Use pkgcode/variation: P8-7*	-40°C to +85° C	RoHS/Lead-Free: <a href="#">No Materials Analysis</a>
DS1231S-20+T&R				SOIC; 16 pin; Dwg: <a href="#">21-0042 (PDF)</a> Use pkgcode/variation: W16 +11*	0°C to +70°C	RoHS/Lead-Free: <a href="#">Lead Free Materials Analysis</a>
DS1231S-35+				SOIC; 16 pin; Dwg: <a href="#">21-0042 (PDF)</a> Use pkgcode/variation: W16 +11*	0°C to +70°C	RoHS/Lead-Free: <a href="#">Lead Free Materials Analysis</a>
DS1231S-35N/T&R				SOIC; 16 pin; Dwg: <a href="#">21-0042 (PDF)</a> Use pkgcode/variation: W16-11*	-40°C to +85° C	See data sheet <a href="#">Materials Analysis</a>
DS1231S-50N/T&R				SOIC; 16 pin; Dwg: <a href="#">21-0042 (PDF)</a> Use pkgcode/variation: W16-11*	-40°C to +85° C	RoHS/Lead-Free: <a href="#">No Materials Analysis</a>
DS1231S-50N+				SOIC; 16 pin; Dwg: <a href="#">21-0042 (PDF)</a> Use pkgcode/variation: W16 +11*	-40°C to +85° C	RoHS/Lead-Free: <a href="#">Lead Free Materials Analysis</a>
DS1231S-20N+				SOIC; 16 pin; Dwg: <a href="#">21-0042 (PDF)</a> Use pkgcode/variation: W16 +11*	-40°C to +85° C	RoHS/Lead-Free: <a href="#">Lead Free Materials Analysis</a>
DS1231S-50+				SOIC; 16 pin; Dwg: <a href="#">21-0042 (PDF)</a> Use pkgcode/variation: W16 +11*	0°C to +70°C	RoHS/Lead-Free: <a href="#">Lead Free Materials Analysis</a>
DS1231S-500+T&R				SOIC; 16 pin; Dwg: <a href="#">21-0042 (PDF)</a> Use pkgcode/variation: W16 +11*	0°C to +70°C	See data sheet <a href="#">Materials Analysis</a>
DS1231S-20+				SOIC; 16 pin; Dwg: <a href="#">21-0042 (PDF)</a> Use pkgcode/variation: W16 +11*	0°C to +70°C	RoHS/Lead-Free: <a href="#">Lead Free Materials Analysis</a>
DS1231S-20	200mV Hysteresis			SOIC; 16 pin; Dwg: <a href="#">21-0042 (PDF)</a> Use pkgcode/variation: W16-11*	0°C to +70°C	RoHS/Lead-Free: <a href="#">No Materials Analysis</a>
DS1231S-20/T&R	200mV Hysteresis			SOIC; 16 pin; Dwg: <a href="#">21-0042 (PDF)</a> Use pkgcode/variation: W16-11*	0°C to +70°C	RoHS/Lead-Free: <a href="#">No Materials Analysis</a>

DS1231S-35	350mV Hysteresis			SOIC; 16 pin; Dwg: <a href="#">21-0042 (PDF)</a> Use pkgcode/variation: W16-11*	0°C to +70°C	RoHS/Lead-Free: <a href="#">No Materials Analysis</a>
DS1231S-35/T&R	350mV Hysteresis			SOIC; 16 pin; Dwg: <a href="#">21-0042 (PDF)</a> Use pkgcode/variation: W16-11*	0°C to +70°C	RoHS/Lead-Free: <a href="#">No Materials Analysis</a>
DS1231S-50	500mV Hysteresis			SOIC; 16 pin; Dwg: <a href="#">21-0042 (PDF)</a> Use pkgcode/variation: W16-11*	0°C to +70°C	RoHS/Lead-Free: <a href="#">No Materials Analysis</a>
DS1231S-500/T&R				SOIC; 16 pin; Dwg: <a href="#">21-0042 (PDF)</a> Use pkgcode/variation: W16-11*	0°C to +70°C	See data sheet <a href="#">Materials Analysis</a>
DS1231S-20N	200mV Hysteresis			SOIC; 16 pin; Dwg: <a href="#">21-0042 (PDF)</a> Use pkgcode/variation: W16-11*	-40°C to +85° C	RoHS/Lead-Free: <a href="#">No Materials Analysis</a>
DS1231S-50N	500mV Hysteresis			SOIC; 16 pin; Dwg: <a href="#">21-0042 (PDF)</a> Use pkgcode/variation: W16-11*	-40°C to +85° C	RoHS/Lead-Free: <a href="#">No Materials Analysis</a>

**DALLAS**  
SEMICONDUCTOR

## DS1231/S Power Monitor Chip

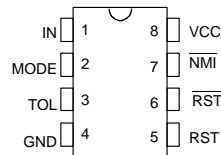
### FEATURES

- Warns processor of an impending power failure
- Provides time for an orderly shutdown
- Prevents processor from destroying nonvolatile memory during power transients
- Automatically restarts processor after power is restored
- Suitable for linear or switching power supplies
- Adjusts to hold time of the power supply
- Supplies necessary signals for processor interface
- Accurate 5% or 10%  $V_{CC}$  monitoring
- Replaces power-up reset circuitry
- No external capacitors required
- Optional 16-pin SOIC surface mount package

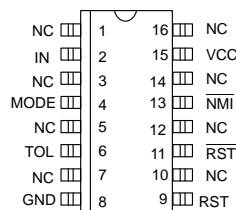
### DESCRIPTION

The DS1231 Power Monitor Chip uses a precise temperature-compensated reference circuit which provides an orderly shutdown and an automatic restart of a processor-based system. A signal warning of an impending power failure is generated well before regulated DC voltages go out of specification by monitoring high voltage inputs to the power supply regulators. If line isolation is required a UL-approved opto-isolator can be directly interfaced to the DS1231. The time for processor

### PIN ASSIGNMENT



DS1231 8-Pin DIP  
(300 MIL)  
See Mech. Drawings  
Section



DS1231S 16-Pin SOIC  
(300 MIL)  
See Mech. Drawings  
Section

### PIN DESCRIPTION

IN	– Input
MODE	– Selects input pin characteristics
TOL	– Selects 5% or 10% $V_{CC}$ detect
GND	– Ground
RST	– Reset (Active High)
$\overline{\text{RST}}$	– Reset (Active Low, open drain)
$\overline{\text{NMI}}$	– Non-Maskable Interrupt
$V_{CC}$	– +5V Supply
NC	– No Connections

shutdown is directly proportional to the available hold-up time of the power supply. Just before the hold-up time is exhausted, the Power Monitor unconditionally halts the processor to prevent spurious cycles by enabling Reset as  $V_{CC}$  falls below a selectable 5 or 10 percent threshold. When power returns, the processor is held inactive until well after power conditions have stabilized, safeguarding any nonvolatile memory in the system from inadvertent data changes.

**ABSOLUTE MAXIMUM RATINGS\***

Voltage on $V_{CC}$ Pin Relative to Ground	-0.5V to +7.0V
Voltage on I/O Relative to Ground	-0.5V to $V_{CC} + 0.5V$
Operating Temperature	0°C to 70°C
Operating Temperature (Industrial Version)	-40°C to +85°C
Storage Temperature	-55°C to +125°C
Soldering Temperature	260°C for 10 seconds

\* This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operation sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods of time may affect reliability.

**RECOMMENDED DC OPERATING CONDITIONS**

(0°C to 70°C)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
Supply Voltage	$V_{CC}$	4.5	5.0	5.5	V	1
Input Pin 1	$V_{IN}$			$V_{CC}$	V	1

**DC ELECTRICAL CHARACTERISTICS**(0°C to 70°C;  $V_{CC} = 4.5$  to 5.5V)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
Low Level @ RST	$V_{OL}$			0.4	V	1
Output Voltage @ -500 $\mu$ A	$V_{OH}$	$V_{CC}-0.5V$	$V_{CC}-0.1V$		V	1, 6
Input Leakage	$I_{IL}$	-10		+10	$\mu$ A	2
Output Current @2.4V	$I_{OH}$	1.0	2.0		mA	5
Output Current @0.4V	$I_{OL}$	2.0	3.0		mA	
Operating Current	$I_{CC}$		0.5	2.0	mA	3
Input Pin 1 (Mode=GND)	$I_C$	15	25	50	$\mu$ A	
Input Pin 1 (Mode= $V_{CC}$ )	$I_C$			0.1	$\mu$ A	
IN Trip Point (Mode=GND)	$V_{TP}$	See Figure 3				1
IN Trip Point (Mode= $V_{CC}$ )	$V_{TP}$					1
$V_{CC}$ Trip Point (TOL=GND)	$V_{CCTP}$	4.50	4.62	4.74	V	1
$V_{CC}$ Trip Point (TOL= $V_{CC}$ )	$V_{CCTP}$	4.25	4.37	4.49	V	1

**CAPACITANCE**(T<sub>A</sub> = 25°C)

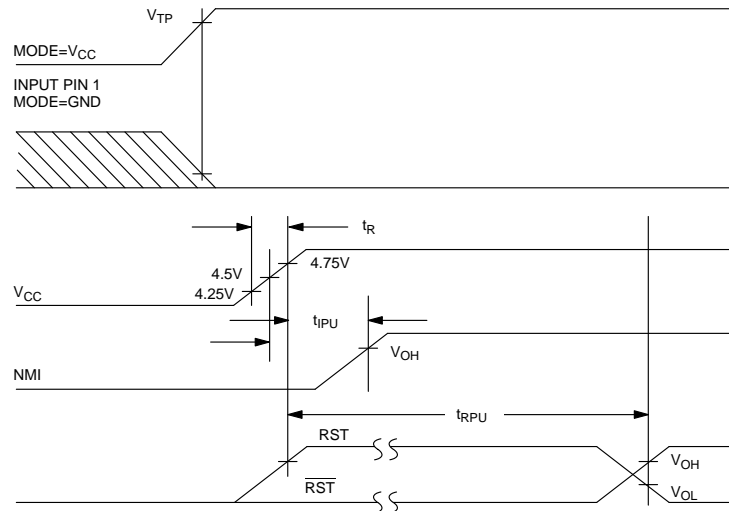
PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
Input Capacitance	$C_{IN}$			5	pF	
Output Capacitance	$C_{OUT}$			7	pF	

**AC ELECTRICAL CHARACTERISTICS**(0°C to 70°C;  $V_{CC} = 5V \pm 10\%$ )

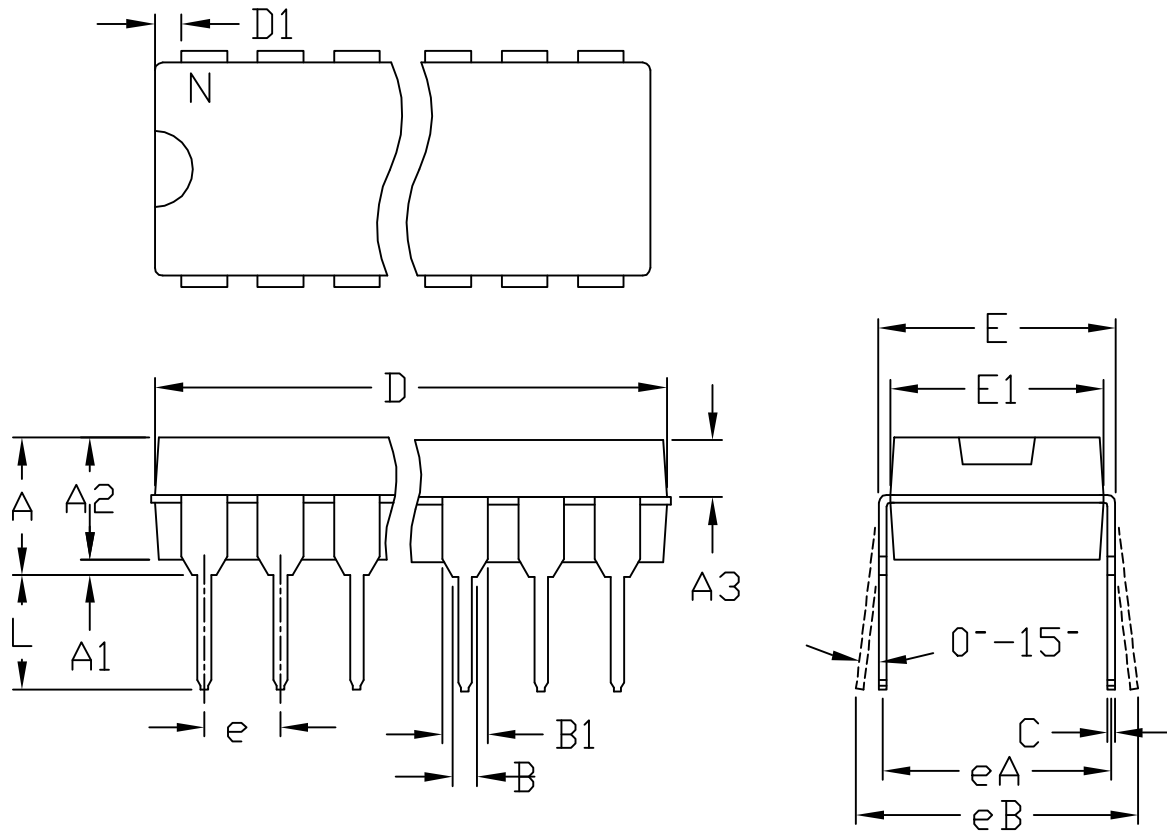
PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
$V_{TP}$ to $\overline{NMI}$ Delay	$t_{IPD}$			1.1	$\mu s$	
$V_{CC}$ Slew Rate 4.75-4.25V	$t_F$	300			$\mu s$	
$V_{CC}$ Detect to RST and $\overline{RST}$	$t_{RPD}$			100	ns	
$V_{CC}$ Detect to $\overline{NMI}$	$t_{IPU}$			200	$\mu s$	4
$V_{CC}$ Detect to RST and $\overline{RST}$	$t_{RPU}$	150	500	1000	ms	4
$V_{CC}$ Slew Rate 4.25-4.75V	$t_R$	0			ns	

**NOTES:**

- All voltages referenced to ground.
- $V_{CC} = +5.0$  volts with outputs open.
- Measured with outputs open.
- $t_R = 5 \mu s$ .
- $\overline{RST}$  is an open drain output and requires a pull-up resistor.
- RST remains within 0.5V of  $V_{CC}$  on power-down until  $V_{CC}$  drops below 2.0V.  $\overline{RST}$  remains within 0.5V of GND on power-down until  $V_{CC}$  drops below 2.0V.

**TIMING DIAGRAM: POWER-UP**





	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	---	0.180	---	4.572
A1	0.015	---	0.38	---
A2	0.125	0.175	3.18	4.45
A3	0.055	0.080	1.40	2.03
B	0.015	0.022	0.381	0.56
B1	0.045	0.065	1.14	1.65
C	0.008	0.014	0.2	0.355
D1	0.005	0.080	0.13	2.03
E	0.300	0.325	7.62	8.26
E1	0.240	0.310	6.10	7.87
e	0.100	BSC.	2.54	BSC.
eA	0.300	BSC.	7.62	BSC.
eB	0.400	BSC.	10.16	BSC.
L	0.115	0.150	2.921	3.81

	INCHES		MILLIMETERS		N	MS001
	MIN	MAX	MIN	MAX		
D	0.348	0.390	8.84	9.91	8	AB
D	0.735	0.765	18.67	19.43	14	AC
D	0.745	0.765	18.92	19.43	16	AA
D	0.885	0.915	22.48	23.24	18	AD
D	1.015	1.045	25.78	26.54	20	AE
D	1.14	1.265	28.96	32.13	24	AF
D	1.360	1.380	34.54	35.05	28	*5

- NOTES:
1. D&E DO NOT INCLUDE MOLD FLASH
  2. MOLD FLASH OR PROTRUSIONS NOT TO EXCEED .15mm (.006")
  3. CONTROLLING DIMENSION: MILLIMETER
  4. MEETS JEDEC MS001-XX AS SHOWN IN ABOVE TABLE
  5. SIMILIAR TO JEDEC MO-058AB
  6. N = NUMBER OF PINS



PACKAGE FAMILY OUTLINE: PDIP .300" TITLE

1/1

21-0043 D DOCUMENT CONTROL NUMBER REV