



Maxim > Products > [Supervisors, Voltage Monitors, Sequencers] [Military/Aerospace]

## MAX1232

Microprocessor Monitor

### Improved MAX1232 Cuts Power Consumption by 10X

#### Description

The MAX1232 microprocessor ( $\mu$ P) supervisory circuit provides  $\mu$ P housekeeping and power-supply supervision functions while consuming only 1/10th the power of the DS1232. The MAX1232 enhances circuit reliability in  $\mu$ P systems by monitoring the power supply, monitoring the software execution, and providing a debounced manual reset input. The MAX1232 is a plug-in upgrade of the Dallas DS1232.

A reset pulse of at least 250ms duration is supplied on power-up, power-down, and low-voltage brownout conditions (5% or 10% supply tolerances can be selected digitally). Also featured is a debounced manual reset input that forces the reset outputs to their active states for a minimum of 250ms. A digitally programmable watchdog timer monitors software execution and can be programmed for timeout settings of 150ms, 600ms, or 1.2s. The MAX1232 requires no external components.

#### Key Features

- Consumes 1/10th the Power of the DS1232
- Precision Voltage Monitor—Adjustable +4.5V or +4.75V
- Power-OK/Reset Pulse Width—250ms Min
- No External Components
- Adjustable Watchdog Timer—150ms, 600ms, or 1.2s
- Debounced Manual Reset Input for External Override
- Available in 8-Pin PDIP/SO and 16-Pin Wide SO Packages

#### Applications/Uses

Automotive Systems  
Computers  
Controllers  
Critical  $\mu$ P Power Monitoring  
Intelligent Instruments

Key Specifications: Supervisors (1 Monitored Voltage)

Part Number	Reset Threshold Range (V)	Active-Low Reset Output	Active-High Reset Output	Min. Reset Timeout Range	Watchdog Feature	Nom. Watchdog Timeout Range	Supervisor Features	Reset Thresh. Acc. (% @+25°C)	Max. I <sub>CC</sub> (μA)	
MAX1232	3.3 to 5.5	Open Drain	Open Drain	85ms to 300ms	Input (WDI)	1s to 2s <1s Adjustable	Manual Reset	2.5	200	

[See All Supervisors \(1 Monitored Voltage\) \(268\)](#)

#### 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.

#### Evaluation Kits

none

#### Design Guides

[Interface \(PDF\)](#)

#### Reliability Reports

Show FIT data for:

Request Reliability Report for:

#### 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: 1-24 of 24

MAX1232	Free Sample	Buy	Package: TYPE PINS FOOTPRINT DRAWING CODE/VAR *	Temp	RoHS/Lead-Free? Materials Analysis
MAX1232MJA/883B			Ceramic DIP; 8 pin; Dwg: <a href="#">21-0045</a> (PDF) Use pkgcode/variation: J8-2*	-55°C to +125°C	RoHS/Lead-Free: <a href="#">No Materials Analysis</a>
MAX1232MJA			Ceramic DIP; 8 pin; Dwg: <a href="#">21-0045</a> (PDF) Use pkgcode/variation: J8-2*	-55°C to +125°C	RoHS/Lead-Free: <a href="#">No Materials Analysis</a>
MAX1232C/D					See data sheet
MAX1232MLP/883B			LCC; 20 pin; Dwg: <a href="#">21-0658</a> (PDF) Use pkgcode/variation: L20-3*	-55°C to +125°C	RoHS/Lead-Free: <a href="#">No Materials Analysis</a>
MAX1232CPA+			PDIP; 8 pin; Dwg: <a href="#">21-0043</a> (PDF) Use pkgcode/variation: P8+2*	0°C to +70°C	RoHS/Lead-Free: <a href="#">Lead Free Materials Analysis</a>
MAX1232CPA			PDIP; 8 pin; Dwg: <a href="#">21-0043</a> (PDF) Use pkgcode/variation: P8-2*	0°C to +70°C	RoHS/Lead-Free: <a href="#">No Materials Analysis</a>
MAX1232EPA			PDIP; 8 pin; Dwg: <a href="#">21-0043</a> (PDF) Use pkgcode/variation: P8-2*	-40°C to +85°C	RoHS/Lead-Free: <a href="#">No Materials Analysis</a>
MAX1232EPA+			PDIP; 8 pin; Dwg: <a href="#">21-0043</a> (PDF) Use pkgcode/variation: P8+2*	-40°C to +85°C	RoHS/Lead-Free: <a href="#">Lead Free Materials Analysis</a>
MAX1232CWE-T			SOIC; 16 pin; Dwg: <a href="#">21-0042</a> (PDF) Use pkgcode/variation: W16-1*	0°C to +70°C	RoHS/Lead-Free: <a href="#">No Materials Analysis</a>
MAX1232CWE+			SOIC; 16 pin; Dwg: <a href="#">21-0042</a> (PDF) Use pkgcode/variation: W16+1*	0°C to +70°C	RoHS/Lead-Free: <a href="#">Lead Free Materials Analysis</a>
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MAX1232CSA+			SOIC; 8 pin; Dwg: <a href="#">21-0041</a> (PDF) Use pkgcode/variation: S8+4*	0°C to +70°C	RoHS/Lead-Free: <a href="#">Lead Free Materials Analysis</a>
MAX1232CSA			SOIC; 8 pin; Dwg: <a href="#">21-0041</a> (PDF) Use pkgcode/variation: S8-4*	0°C to +70°C	RoHS/Lead-Free: <a href="#">No Materials Analysis</a>
MAX1232CSA+T			SOIC; 8 pin; Dwg: <a href="#">21-0041</a> (PDF) Use pkgcode/variation: S8+4*	0°C to +70°C	RoHS/Lead-Free: <a href="#">Lead Free Materials Analysis</a>
MAX1232CSA-T			SOIC; 8 pin; Dwg: <a href="#">21-0041</a> (PDF) Use pkgcode/variation: S8-4*	0°C to +70°C	RoHS/Lead-Free: <a href="#">No Materials Analysis</a>
MAX1232ESA+T			SOIC; 8 pin; Dwg: <a href="#">21-0041</a> (PDF) Use pkgcode/variation: S8+4*	-40°C to +85°C	RoHS/Lead-Free: <a href="#">Lead Free Materials Analysis</a>
MAX1232ESA+			SOIC; 8 pin; Dwg: <a href="#">21-0041</a> (PDF) Use pkgcode/variation: S8+4*	-40°C to +85°C	RoHS/Lead-Free: <a href="#">Lead Free Materials Analysis</a>
MAX1232ESA-T			SOIC; 8 pin; Dwg: <a href="#">21-0041</a> (PDF) Use pkgcode/variation: S8-4*	-40°C to +85°C	RoHS/Lead-Free: <a href="#">No Materials Analysis</a>
MAX1232ESA			SOIC; 8 pin; Dwg: <a href="#">21-0041</a> (PDF) Use pkgcode/variation: S8-4*	-40°C to +85°C	RoHS/Lead-Free: <a href="#">No Materials Analysis</a>

#### Notes and Comments

Microprocessor Monitor with Watchdog



# Microprocessor Monitor

MAX1232

## General Description

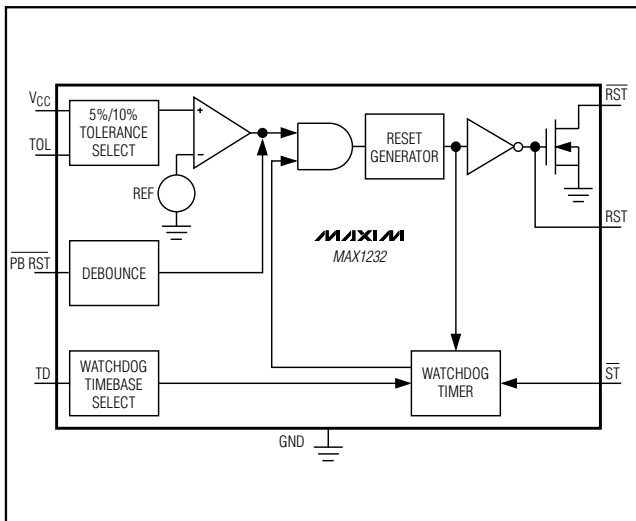
The MAX1232 microprocessor ( $\mu$ P) supervisory circuit provides  $\mu$ P housekeeping and power-supply supervision functions while consuming only 1/10th the power of the DS1232. The MAX1232 enhances circuit reliability in  $\mu$ P systems by monitoring the power supply, monitoring the software execution, and providing a debounced manual reset input. The MAX1232 is a plug-in upgrade of the Dallas DS1232.

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## Applications

- Computers
- Controllers
- Intelligent Instruments
- Automotive Systems
- Critical  $\mu$ P Power Monitoring

## Typical Operating Circuit



## Features

- ◆ Consumes 1/10th the Power of the DS1232
- ◆ Precision Voltage Monitor—Adjustable +4.5V or +4.75V
- ◆ Power-OK/Reset Pulse Width—250ms Min
- ◆ No External Components
- ◆ Adjustable Watchdog Timer—150ms, 600ms, or 1.2s
- ◆ Debounced Manual Reset Input for External Override
- ◆ Available in 8-Pin PDIP/SO and 16-Pin Wide SO Packages

## Ordering Information

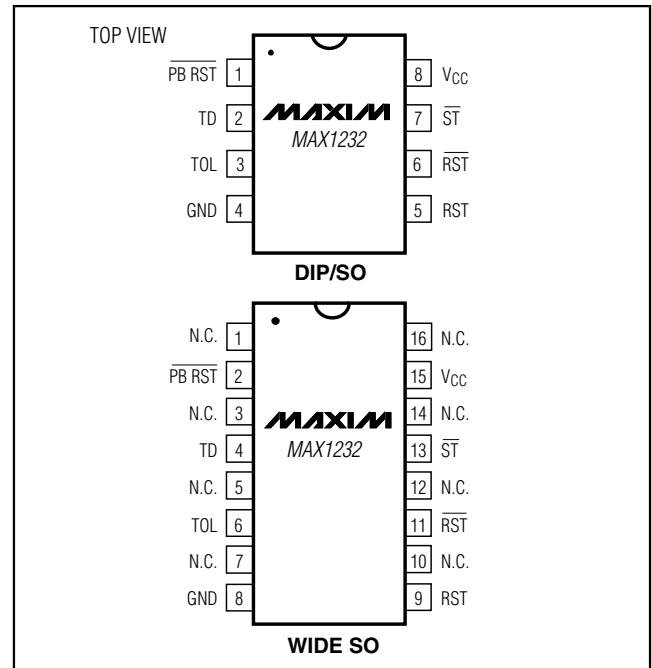
PART	TEMP RANGE	PIN-PACKAGE
MAX1232C/D	0°C to +70°C	Dice*
MAX1232CPA	0°C to +70°C	8 PDIP
MAX1232CSA	0°C to +70°C	8 SO

Ordering Information continued on last page.

\*Contact factory for dice specifications.

Devices in PDIP and SO packages are available in both leaded and lead-free packaging. Specify lead free by adding the + symbol at the end of the part number when ordering. Lead free not available for CERDIP package.

## Pin Configurations



# Microprocessor Monitor

## ABSOLUTE MAXIMUM RATINGS

Voltage on Any Pin (with respect to GND).....-1V to +7V  
 Operating Temperature Range  
 C Suffix .....0°C to +70°C  
 E Suffix.....-40°C to +85°C  
 M Suffix .....-55°C to +125°C

Storage Temperature Range.....-65°C to +160°C  
 Lead Temperature (soldering, 10s).....+300°C

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

## Recommended DC Operating Conditions

( $T_A = T_{MIN}$  to  $T_{MAX}$ )

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Supply Voltage	$V_{CC}$		4.5	5.0	5.5	V
$\overline{ST}$ and $\overline{PBRST}$ Input High Level (Note 1)	$V_{IH}$		2.0		$V_{CC} + 0.3$	V
$\overline{ST}$ and $\overline{PBRST}$ Input Low Level	$V_{IL}$		-0.3		+0.8	V

## DC Electrical Characteristics

( $V_{CC} = +4.5V$  to  $+5.5V$ ,  $T_A = T_{MIN}$  to  $T_{MAX}$ )

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Input Leakage $\overline{ST}$ , TOL	$I_{IL}$		-1.0		+1.0	$\mu A$
Output Current RST	$I_{OH}$	$V_{OH} = 2.4V$	-1.0	-12		mA
Output Current RST, $\overline{RST}$	$I_{OL}$	$V_{OL} = 0.4V$	2.0	10		mA
Operating Current (Note 2)	$I_{CC}$			50	200	$\mu A$
$V_{CC}$ 5% Trip Point (Note 3)	$V_{CCTP}$	TOL = GND	4.50	4.62	4.74	V
$V_{CC}$ 10% Trip Point (Note 3)	$V_{CCTP}$	TOL = $V_{CC}$	4.25	4.37	4.49	V

## Capacitance (Note 4)

( $T_A = +25^\circ C$ )

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Input Capacitance $\overline{ST}$ , TOL	$C_{IN}$				5	pF
Output Capacitance RST, $\overline{RST}$	$C_{OUT}$				7	pF

# Microprocessor Monitor

## AC Electrical Characteristics

( $V_{CC} = +5V \pm 10\%$ ,  $T_A = T_{MIN}$  to  $T_{MAX}$ )

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
$\overline{PBRST}$ (Note 5)	$t_{PB}$	Figure 3	20			ms
$\overline{PBRST}$ Delay	$t_{PBD}$	Figure 3	1	4	20	ms
Reset Active Time	$t_{RST}$		250	610	1000	ms
$\overline{ST}$ Pulse Width	$t_{ST}$	Figure 4	75			ns
$\overline{ST}$ Timeout Period	$t_{TD}$	Figure 4, TD pin = 0V	62.5	150	250	ms
		TD pin = open	250	600	1000	
		TD pin = $V_{CC}$	500	1200	2000	
$V_{CC}$ Fall Time (Note 4)	$t_F$	Figure 5	10			$\mu$ s
$V_{CC}$ Rise Time (Note 4)	$t_B$	Figure 6	0			$\mu$ s
$V_{CC}$ Detect to RST High and $\overline{RST}$ Low	$t_{BPD}$	Figure 7, $V_{CC}$ falling			100	ns
$V_{CC}$ Detect to RST Low and $\overline{RST}$ Open (Note 6)	$t_{BPU}$	Figure 8, $V_{CC}$ rising	250	610	1000	ms

**Note 1:**  $\overline{PBRST}$  is internally pulled up to  $V_{CC}$  with an internal impedance of typically 40k $\Omega$ .

**Note 2:** Measured with outputs open.

**Note 3:** All voltages referenced to GND.

**Note 4:** Guaranteed by desing.

**Note 5:**  $\overline{PBRST}$  must be held low for a minimum of 20ms to guarantee a reset.

**Note 6:**  $t_R = 5\mu$ s.

## Pin Description

PIN		NAME	FUNCTION
WIDE SO	DIP/SO		
1, 3, 5, 7, 10, 12, 14, 16	—	N.C.	No Connection
2	1	$\overline{PBRST}$	Pushbutton Reset Input. A debounced active-low input that ignores pulses less than 1ms in duration and is guaranteed to recognize inputs of 20ms or greater.
4	2	TD	Time Delay Set. The watchdog timebase select input ( $t_{TD} = 150$ ms for TD = 0V, $t_{TD} = 600$ ms for TD = open, $t_{TD} = 1.2$ s for TD = $V_{CC}$ ).
6	3	TOL	Tolerance Input. Connect to GND for 5% tolerance or to $V_{CC}$ for 10% tolerance.
8	4	GND	Ground
9	5	RST	Reset Output (Active High). Goes active: (1) If $V_{CC}$ falls below the selected reset voltage threshold (2) If $\overline{PBRST}$ is forced low (3) If $\overline{ST}$ is not strobed within the minimum timeout period (4) During power-up
11	6	$\overline{RST}$	Reset Output (Active Low, Open-Drain). See RST.
13	7	$\overline{ST}$	Strobe Input. Input for watchdog timer.
15	8	$V_{CC}$	The +5V Power-Supply Input

# Microprocessor Monitor

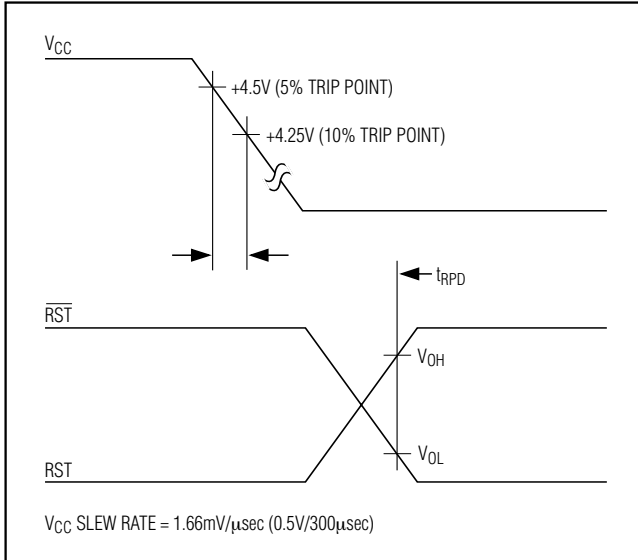


Figure 7. VCC Detect Reset Output Delay (Power-Down)

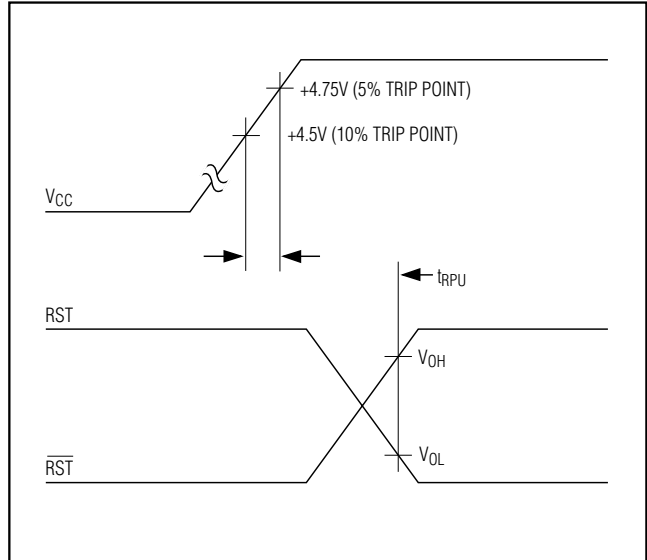
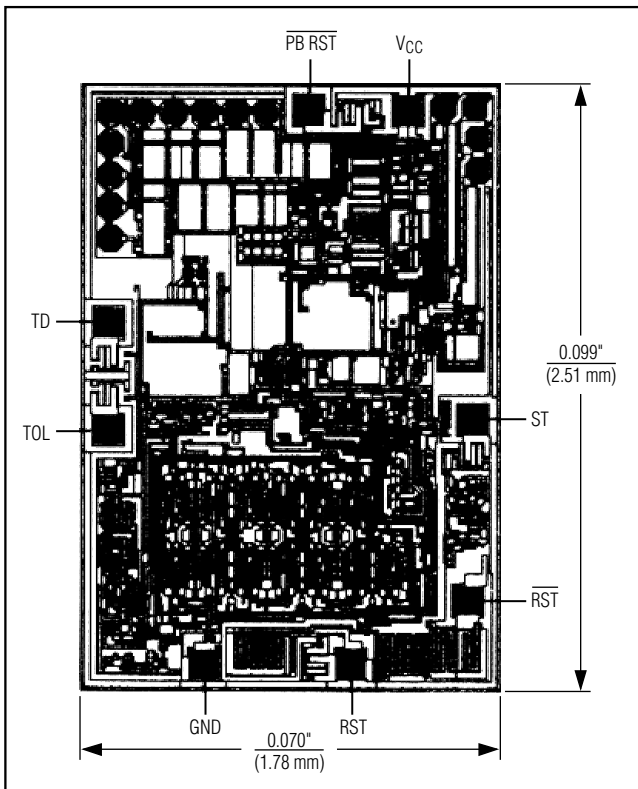


Figure 8. VCC Detect Reset Output Delay (Power-Up)

## Chip Topography



Maxim cannot assume responsibility for use of any circuitry other than circuitry entirely embodied in a Maxim product. No circuit patent licenses are implied. Maxim reserves the right to change the circuitry and specifications without notice at any time.

## Ordering Information (continued)

PART	TEMP RANGE	PIN-PACKAGE
MAX1232CWE	0°C to +70°C	16 Wide SO
MAX1232EPA	-40°C to +85°C	8 PDIP
MAX1232ESA	-40°C to +85°C	8 SO
MAX1232EWE	-40°C to +85°C	16 Wide SO
MAX1232MJA	-55°C to +125°C	8 CERDIP

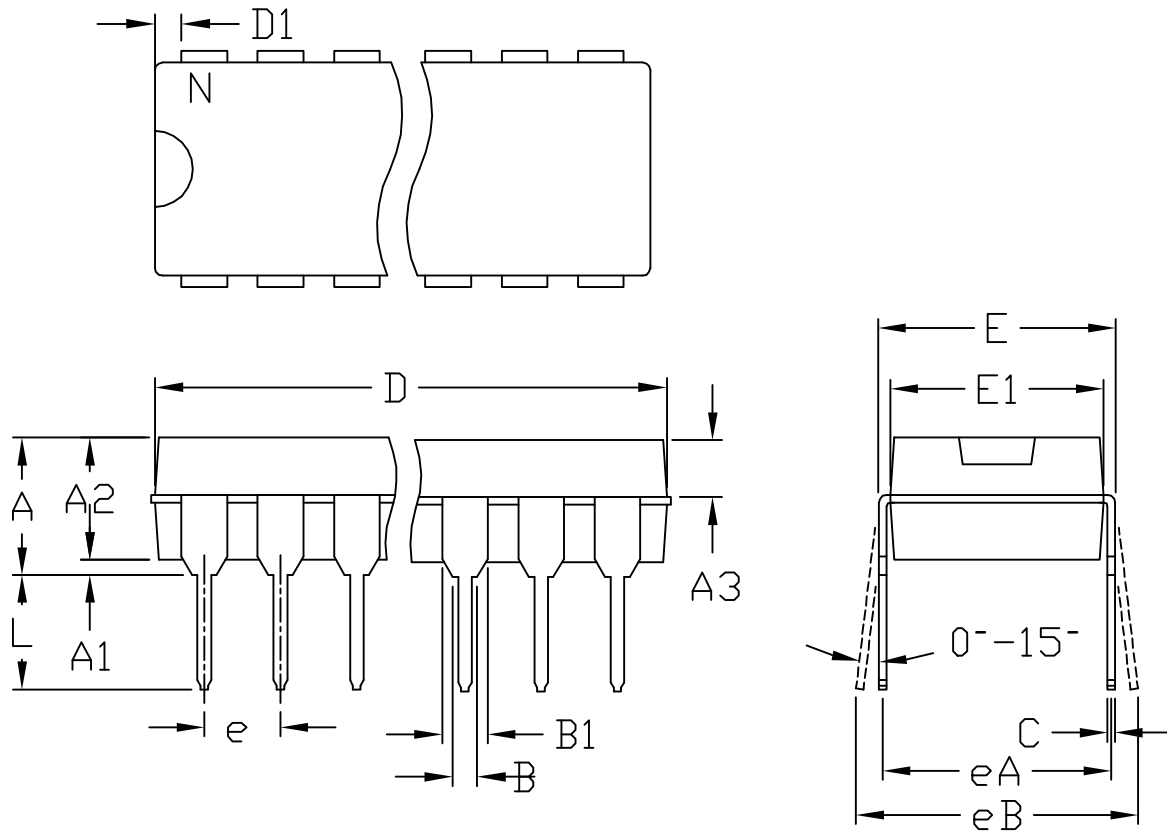
Ordering information continued on last page.

\*Contact factory for dice specifications.

Devices in PDIP and SO packages are available in both leaded and lead-free packaging. Specify lead free by adding the + symbol at the end of the part number when ordering. Lead free not available for CERDIP package.

## Package Information





	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