

# MXD1810–MXD1813/ MXD1815–MXD1818

# Low-Power $\mu$ P Reset Circuits in 3-Pin SC70/SOT23

## General Description

The MXD1810–MXD1813/MXD1815–MXD1818 family of microprocessor ( $\mu$ P) reset circuits monitor power supplies in  $\mu$ P and digital systems. These devices provide excellent circuit reliability and low cost by eliminating external components and adjustments when used with +2.5V/+3.0V/+3.3V (MXD1815–MXD1818), and +5V (MXD1810–MXD1813) systems.

These circuits assert a reset signal whenever the  $V_{CC}$  supply voltage declines below a preset threshold, keeping reset asserted for at least 100ms after  $V_{CC}$  rises above the reset threshold. The MXD1813/MXD1818 also keep reset asserted for at least 100ms after the output is momentarily pulled to GND by an external pushbutton switch.

The MXD1812/MXD1817 have an active-high push-pull RESET output. The MXD1810/MXD1815 (push-pull) and MXD1811/MXD1813/MXD1816/MXD1818 (open-drain) have an active-low RESET output. The open-drain devices (MXD1811/MXD1813/MXD1816/MXD1818) have an internal pullup resistor to  $V_{CC}$ . The MXD1813/MXD1818 feature a debounced manual-reset feature that asserts a reset if the RESET pin is pulled low for more than 1.5 $\mu$ s. When used to initiate manual reset, RESET debounces signals from devices such as mechanical switches. For devices with this feature, the release of the external switch triggers the reset period.

The MXD1810–MXD1813/MXD1815–MXD1818 are guaranteed to output the correct logic state for  $V_{CC}$  down to +1V. These ICs provide a reset comparator designed to ignore fast transients on  $V_{CC}$ . Reset thresholds are available between +2.18V and +4.62V. These small, low-power (4 $\mu$ A) devices are ideal for use in portable equipment. All are available in space-saving 3-pin SC70 and SOT23 packages, and are specified from -40°C to +105°C.

## Applications

- Computers and Controllers
- Intelligent Instruments
- Set-Top Boxes
- Printers
- Critical  $\mu$ P and  $\mu$ C Monitoring
- Portable/Battery-Powered Equipment

## Features

- Precision Monitoring of +2.5V, +3V, +3.3V, and +5V Power-Supply Voltages
- Available in Four Reset Output Configurations
- Factory-Set Reset Threshold Voltages: 2.18V, 2.31V, 2.55V, 2.88V, 3.06V, 4.12V, 4.37V, 4.62V
- $\pm 2.5\%$  Reset Threshold Accuracy Over Temperature
- Fixed Reset Timeout Period: 100ms (min)
- Guaranteed RESET/RESET Valid to  $V_{CC} = +1V$
- Debounced Manual-Reset Detect (MXD1813/MXD1818)
- Power-Supply Transient Immunity
- No External Components
- Low Power Consumption (4 $\mu$ A)
- Pin Compatible with DS181\_ Products (SOT23)
- 3-Pin SC70 and SOT23 Packages

## Ordering Information

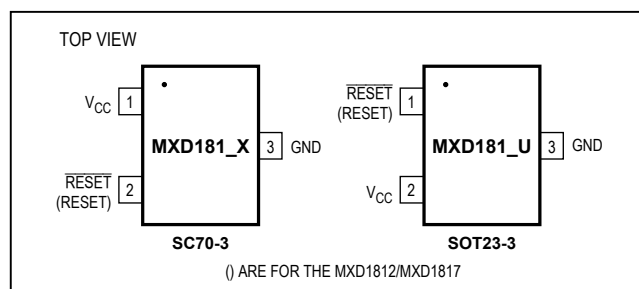
| PART†          | TEMP RANGE      | PIN-PACKAGE |
|----------------|-----------------|-------------|
| MXD1810UR_ _-T | -40°C to +105°C | 3 SOT23     |
| MXD1810XR_ _-T | -40°C to +105°C | 3 SC70      |

†The MXD1810–MXD1813/MXD1815–MXD1818 are available with factory-set  $V_{CC}$  reset thresholds from +2.18V to +3.06V (MXD1815–MXD1818) and +4.12V to +4.62V (MXD1810–MXD1813). Choose the desired reset-threshold suffix from the Reset Threshold Table and insert it in place of the “\_ \_” following “R” in the part number. All devices are available in tape-and-reel only in 2500 unit increments. Other threshold voltages may be available. Contact factory for availability.

Devices are available in both leaded and lead(Pb)-free packaging. Specify lead-free by replacing “-T” with “+T” when ordering.

Ordering Information continued at end of data sheet.

## Pin Configurations



## Absolute Maximum Ratings

|                                                                                              |                              |                                                                 |                 |
|----------------------------------------------------------------------------------------------|------------------------------|-----------------------------------------------------------------|-----------------|
| $V_{CC}$ to GND .....                                                                        | -0.3V to +6.0V               | Output Current ( $\overline{\text{RESET}}$ , RESET) .....       | 20mA            |
| Push-Pull $\overline{\text{RESET}}$ (MXD1810/MXD1815),<br>RESET (MXD1812/MXD1817) to GND ... | -0.3V to ( $V_{CC} + 0.3$ V) | Continuous Power Dissipation ( $T_A = +70^\circ\text{C}$ )..... | 174mW           |
| Open-Drain $\overline{\text{RESET}}$ (MXD1811/MXD1816)<br>to GND .....                       | -0.3V to +6.0V               | 3-Pin SC70 (derate 2.17mW above $+70^\circ\text{C}$ ).....      | 320mW           |
| Open-Drain RESET (MXD1813/MXD1818)<br>to GND .....                                           | -0.3V to ( $V_{CC} + 0.3$ V) | Operating Temperature Range .....                               | -40°C to +105°C |
| Input Current ( $V_{CC}$ , $\overline{\text{RESET}}$ ) .....                                 | 20mA                         | Junction Temperature .....                                      | +150°C          |
|                                                                                              |                              | Storage Temperature Range .....                                 | -65°C to +150°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.

## Electrical Characteristics

( $V_{CC}$  = full range,  $T_A = -40^\circ\text{C}$  to  $+105^\circ\text{C}$ , unless otherwise specified. Typical values are at  $T_A = +25^\circ\text{C}$ .) (Note 1)

| PARAMETER                                       | SYMBOL      | CONDITIONS                                                                                                                          | MIN                                               | TYP  | MAX  | UNITS         |
|-------------------------------------------------|-------------|-------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|------|------|---------------|
| Supply Voltage Range                            | $V_{CC}$    | $T_A = 0^\circ\text{C}$ to $+105^\circ\text{C}$                                                                                     | 1.0                                               |      | 5.5  | V             |
|                                                 |             | $T_A = -40^\circ\text{C}$ to $+105^\circ\text{C}$                                                                                   | 1.2                                               |      | 5.5  |               |
| Supply Current                                  | $I_{CC}$    | $V_{CC} = +5.5\text{V}$ , $V_{CC} > V_{TH}$ , no load                                                                               |                                                   | 9    | 16   | $\mu\text{A}$ |
|                                                 |             | $V_{CC} = +3.6\text{V}$ , $V_{CC} > V_{TH}$ , no load                                                                               |                                                   | 4    | 10   |               |
| Reset Threshold                                 | $V_{TH}$    | MXD181__ R46                                                                                                                        | 4.50                                              | 4.62 | 4.75 | V             |
|                                                 |             | MXD181__ R44                                                                                                                        | 4.25                                              | 4.37 | 4.49 |               |
|                                                 |             | MXD181__ R41                                                                                                                        | 4.00                                              | 4.12 | 4.24 |               |
|                                                 |             | MXD181__ R31                                                                                                                        | 2.98                                              | 3.06 | 3.15 |               |
|                                                 |             | MXD181__ R29                                                                                                                        | 2.80                                              | 2.88 | 2.97 |               |
|                                                 |             | MXD181__ R26                                                                                                                        | 2.47                                              | 2.55 | 2.64 |               |
|                                                 |             | MXD181__ R23                                                                                                                        | 2.25                                              | 2.31 | 2.37 |               |
|                                                 |             | MXD181__ R22                                                                                                                        | 2.12                                              | 2.18 | 2.25 |               |
| Active Reset-Timeout Period                     | $t_{RP}$    | $V_{CC}$ rising                                                                                                                     | 100                                               | 150  | 250  | ms            |
| $V_{CC}$ to Reset Delay                         | $t_{RD}$    | $V_{CC} = (V_{TH} + 100\text{mV})$ falling to $(V_{TH} - 200\text{mV})$                                                             |                                                   | 2    | 5    | $\mu\text{s}$ |
|                                                 |             | $V_{CC}$ rising, $t_R = 5\mu\text{s}$                                                                                               | 100                                               | 150  | 250  | ms            |
| Push-Button Detect to Reset                     | $t_{PB}$    | MXD1813/MXD1818 only                                                                                                                | 1.5                                               |      |      | $\mu\text{s}$ |
| Push-Button Reset-Timeout Period                | $t_{PBRST}$ | MXD1813/MXD1818 only                                                                                                                | 100                                               | 150  | 250  | ms            |
| Input Low Voltage                               | $V_{IL}$    | MXD1813/MXD1818 only                                                                                                                | $T_A = +25^\circ\text{C}$ to $+105^\circ\text{C}$ |      | 0.34 | V             |
|                                                 |             |                                                                                                                                     | $T_A = -40^\circ\text{C}$ to $+25^\circ\text{C}$  |      | 0.15 |               |
| Input High Voltage                              | $V_{IH}$    | MXD1813/MXD1818 only                                                                                                                | $0.7 \times V_{CC}$                               |      |      | V             |
| $\overline{\text{RESET}}$ Output Source Current | $I_{OH}$    | $V_{CC} \geq V_{TH(\text{MAX})}$ , reset not asserted,<br>MXD1810/MXD1815                                                           |                                                   | 350  |      | $\mu\text{A}$ |
| RESET Output Source Current                     | $I_{OH}$    | $V_{CC} \geq V_{TH(\text{MAX})}$ , reset asserted,<br>MXD1812/MXD1817                                                               |                                                   | 350  |      | $\mu\text{A}$ |
| $\overline{\text{RESET}}$ Output Sink Current   | $I_{OL}$    | $V_{CC} \geq 2.7\text{V}$ , reset asserted, $V_{OUT} = 0.4\text{V}$<br>MXD1810/MXD1811/MXD1813/MXD1815/<br>MXD1816/MXD1818 (Note 2) | 10                                                |      |      | mA            |
| RESET Output Sink Current                       | $I_{OL}$    | $V_{CC} \geq 2.7\text{V}$ , reset not asserted, $V_{OUT} = 0.4\text{V}$<br>MXD1812/MXD1817                                          | 10                                                |      |      | mA            |

## Electrical Characteristics (continued)

( $V_{CC}$  = full range,  $T_A$  =  $-40^{\circ}\text{C}$  to  $+105^{\circ}\text{C}$ , unless otherwise specified. Typical values are at  $T_A = +25^{\circ}\text{C}$ .) (Note 1)

| PARAMETER                               | SYMBOL    | CONDITIONS                    | MIN            | TYP            | MAX | UNITS      |
|-----------------------------------------|-----------|-------------------------------|----------------|----------------|-----|------------|
| Output High Voltage                     | $V_{OH}$  | $0 < I_{OH} < 500\mu\text{A}$ | $V_{CC} - 0.5$ | $V_{CC} - 0.1$ |     | V          |
| Output Capacitance (Note 2)             | $C_{OUT}$ |                               |                |                | 10  | pF         |
| Internal Pullup Resistor,<br>Open-Drain | $R_P$     | MXD1811/MXD1816               | 3.5            | 5.5            | 7.5 | k $\Omega$ |
|                                         |           | MXD1813/MXD1818               | 3.1            | 5.5            | 7.5 |            |

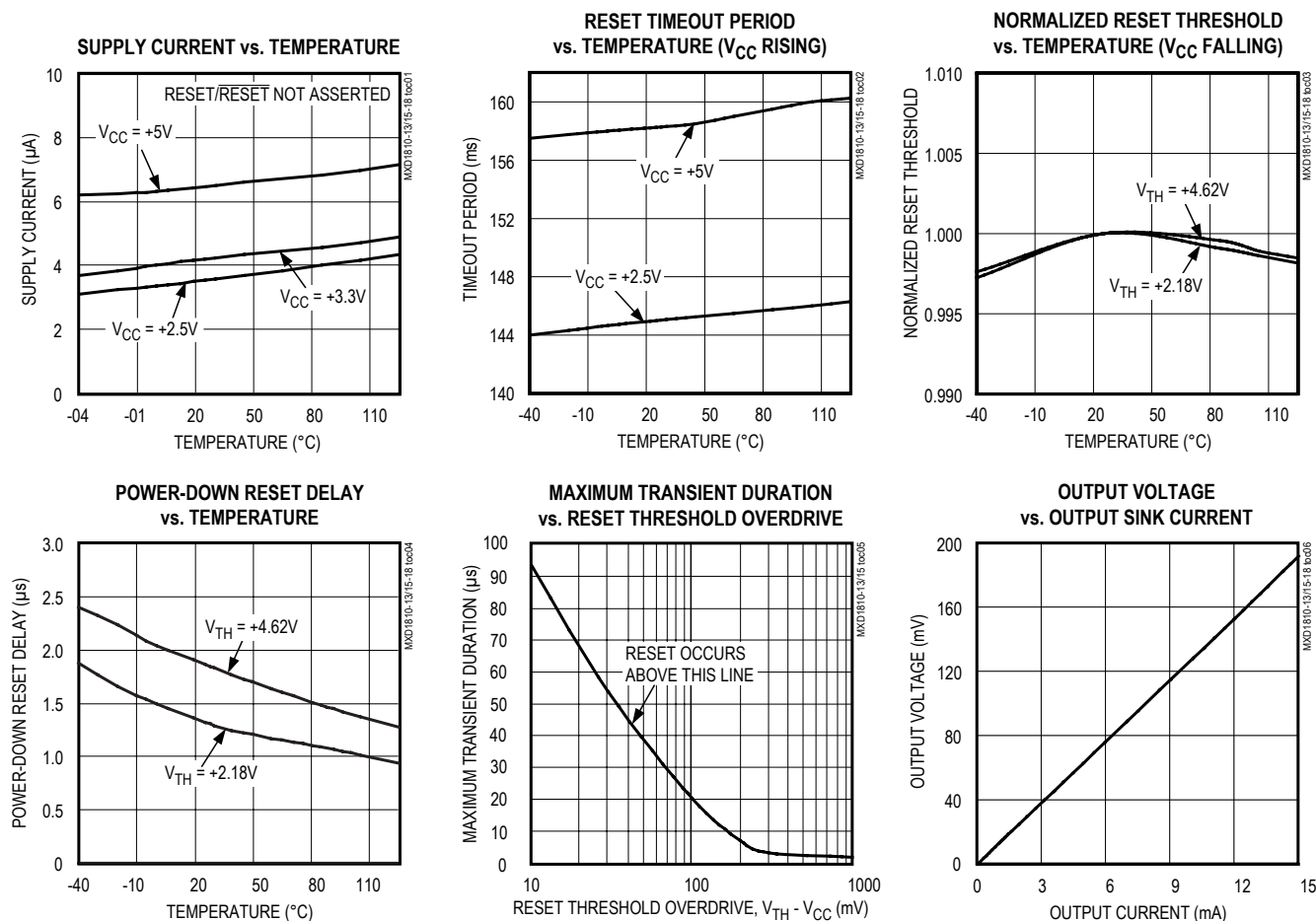
**Note 1:** Production testing done at  $T_A = +25^{\circ}\text{C}$ ; limits over temperature guaranteed by design.

**Note 2:** The MXD1811/MXD1813/MXD1816/MXD1818 have an internal pullup resistor which may deliver 1mA of sink current.

**Note 3:** Guaranteed by design.

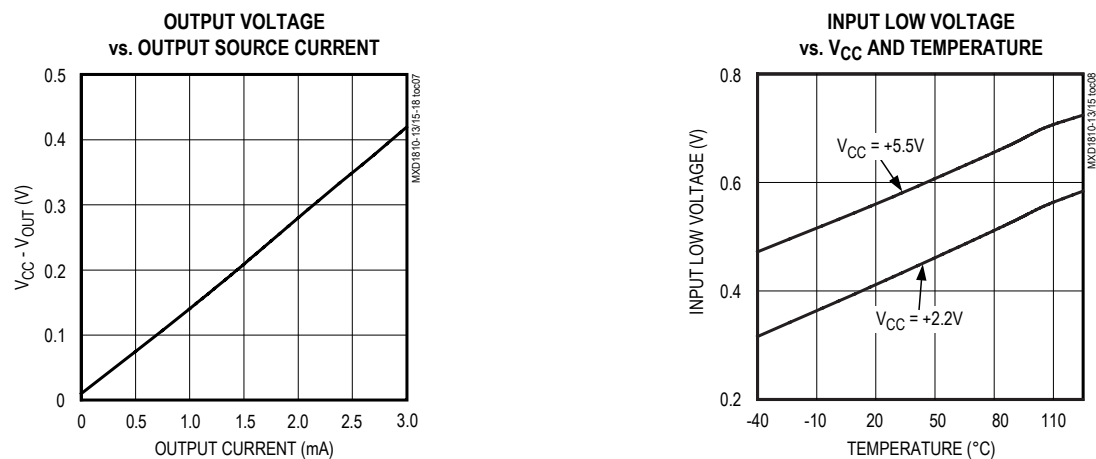
## Typical Operating Characteristics

( $T_A = +25^{\circ}\text{C}$ , unless otherwise noted.)



Typical Operating Characteristics (continued)

(T<sub>A</sub> = +25°C, unless otherwise noted.)



Pin Descriptions

MXD1810/MXD1815

| PIN  |       | NAME                      | FUNCTION                                                                                                                                                                                                                                                             |
|------|-------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SC70 | SOT23 |                           |                                                                                                                                                                                                                                                                      |
| 2    | 1     | $\overline{\text{RESET}}$ | Push-Pull, Active-Low Reset Output. $\overline{\text{RESET}}$ changes from high to low when $V_{CC}$ drops below the selected reset threshold. $\overline{\text{RESET}}$ remains low for the reset timeout period after $V_{CC}$ exceeds the device reset threshold. |
| 1    | 2     | $V_{CC}$                  | Supply Voltage and Input for Reset-Threshold Monitor                                                                                                                                                                                                                 |
| 3    | 3     | GND                       | Ground                                                                                                                                                                                                                                                               |

MXD1811/MXD1816

| PIN  |       | NAME                      | FUNCTION                                                                                                                                                                                                                                                                                                                                       |
|------|-------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SC70 | SOT23 |                           |                                                                                                                                                                                                                                                                                                                                                |
| 2    | 1     | $\overline{\text{RESET}}$ | Open-Drain, Active-Low Reset Output. $\overline{\text{RESET}}$ changes from high to low when $V_{CC}$ drops below the selected reset threshold. $\overline{\text{RESET}}$ remains low for the reset timeout period after $V_{CC}$ exceeds the device reset threshold. $\overline{\text{RESET}}$ has an internal 5.5k $\Omega$ pullup resistor. |
| 1    | 2     | $V_{CC}$                  | Supply Voltage and Input for Reset-Threshold Monitor                                                                                                                                                                                                                                                                                           |
| 3    | 3     | GND                       | Ground                                                                                                                                                                                                                                                                                                                                         |

## Pin Description (continued)

### MXD1812/MXD1817

| PIN  |       | NAME     | FUNCTION                                                                                                                                                                                                                       |
|------|-------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SC70 | SOT23 |          |                                                                                                                                                                                                                                |
| 2    | 1     | RESET    | Push-Pull, Active-High Reset Output. RESET changes from low to high when $V_{CC}$ drops below the selected reset threshold. RESET remains high for the reset timeout period after $V_{CC}$ exceeds the device reset threshold. |
| 1    | 2     | $V_{CC}$ | Supply Voltage and Input for Reset- Threshold Monitor                                                                                                                                                                          |
| 3    | 3     | GND      | Ground                                                                                                                                                                                                                         |

### MXD1813/MXD1818

| PIN  |       | NAME                      | FUNCTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|------|-------|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SC70 | SOT23 |                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 2    | 1     | $\overline{\text{RESET}}$ | Open-Drain, Active-Low Reset Output with Manual Reset Detect. $\overline{\text{RESET}}$ changes from high to low when $V_{CC}$ drops below the selected reset threshold, or $\overline{\text{RESET}}$ is externally pulled low for at least 1.5 $\mu$ s. $\overline{\text{RESET}}$ remains low for the reset timeout period after $V_{CC}$ exceeds the device reset threshold or after the external manual reset is released. $\overline{\text{RESET}}$ has an internal 5.5k $\Omega$ pullup resistor. |
| 1    | 2     | $V_{CC}$                  | Supply Voltage and Input for Reset-Threshold Monitor                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 3    | 3     | GND                       | Ground                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

## Detailed Description

### $\overline{\text{RESET}}$ /RESET Output

A microprocessor's ( $\mu$ P's) reset input starts the microprocessor in a known state. The MXD1810–MXD1813/MXD1815–MXD1818  $\mu$ P supervisory circuits assert reset to prevent code-execution errors during power-up, power-down, and brownout conditions (Figure 4). Whenever  $V_{CC}$  falls below the reset threshold, the reset output asserts. Once  $V_{CC}$  exceeds the reset threshold, an internal timer keeps the reset output asserted for the specified reset timeout period ( $t_{RP}$ ). Reset is also triggered by an externally initiated rising edge on the  $\overline{\text{RESET}}$  pin (MXD1813/MXD1818), following a low signal of 1.5 $\mu$ s minimum duration.

### Push-Button Reset (MXD1813/MXD1818)

Many  $\mu$ P-based products require push-button reset capability (Figure 5), allowing the operator, a test technician, or external logic circuitry to initiate reset. On the MXD1813/MXD1818, a logic-low on  $\overline{\text{RESET}}$  held for greater than 1.5 $\mu$ s asserts a reset.  $\overline{\text{RESET}}$  deasserts following a 100ms minimum reset timeout

delay ( $t_{PBRST}$ ). A manual-reset input shorter than 1.5 $\mu$ s may release RESET without the 100ms minimum reset timeout delay. To facilitate use with mechanical switches, the MXD1813/MXD1818 contain internal debouncing circuitry. A debounced waveform is shown in Figure 6.

## Applications Information

### Interfacing to $\mu$ Ps with Bidirectional Reset Pins

Since the  $\overline{\text{RESET}}$  output on the MXD1811/MXD1816 is open drain, these devices interface easily with  $\mu$ Ps that have bidirectional reset pins, such as the Motorola 68HC11. Connecting the  $\mu$ P supervisor's  $\overline{\text{RESET}}$  output directly to the microcontroller's ( $\mu$ C's)  $\overline{\text{RESET}}$  pin allows either device to assert reset (Figure 7). No external pullup resistor is required, as it is contained within the MXD1811/MXD1816.

### Negative-Going $V_{CC}$ Transients

In addition to issuing a reset to the  $\mu$ P during power-up, power-down, and brownout conditions, these devices are relatively immune to short-duration, negative-going  $V_{CC}$  transients (glitches).

## Functional Diagram

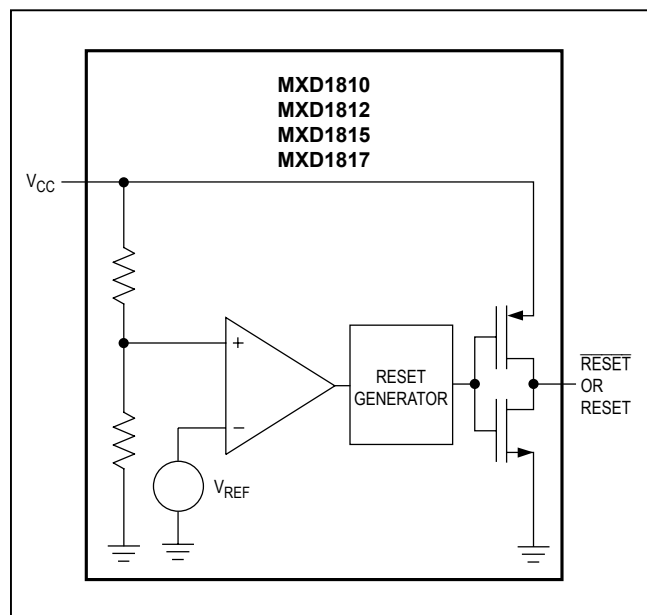


Figure 1. Functional Diagram, Push-Pull Output

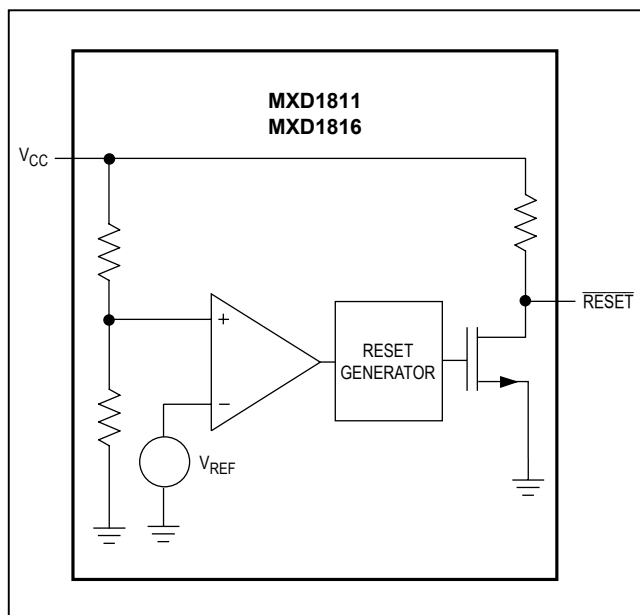


Figure 2. Functional Diagram, Open-Drain Active-Low Output

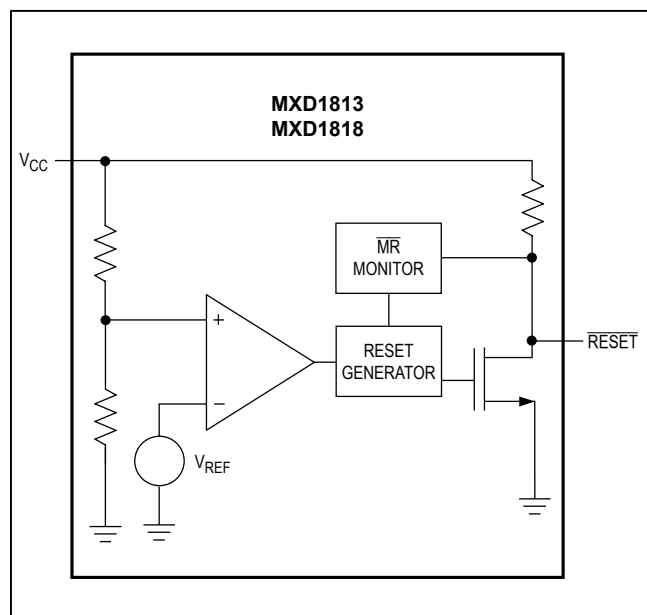


Figure 3. Functional Diagram, Open-Drain Active-Low Output with Manual Reset Detection

The *Typical Operating Characteristics* show the Maximum Transient Duration vs. Reset Threshold Overdrive for which reset pulses are **not** generated. The graph shows the maximum pulse width that a negative-going  $V_{CC}$  transient may typically have without issuing a reset signal. As the amplitude of the transient increases, the maximum allowable pulse width decreases.

### Ensuring a Valid Reset Output Down to $V_{CC} = 0$

When  $V_{CC}$  falls below the minimum operating voltage, push-pull-structured reset sinking (or sourcing) capabilities decrease dramatically. High-impedance CMOS logic inputs connected to the RESET/RESET pin can drift to indeterminate voltages. This does not present a problem in most cases, since most  $\mu$ Ps and circuitry do not operate at  $V_{CC}$  below +1V. For MXD1810/MXD1815 applications where RESET must be valid down to  $V_{CC} = 0$ , adding a pulldown resistor between RESET and GND removes stray leakage currents, holding RESET low (Figure 8). The pulldown resistor value is not critical; 100k $\Omega$  is large enough not to load RESET and small enough to pull RESET low. For MXD1812/ MXD1817 applications where

MXD1810–MXD1813/  
MXD1815–MXD1818

Low-Power  $\mu$ P Reset Circuits in 3-Pin  
SC70/SOT23

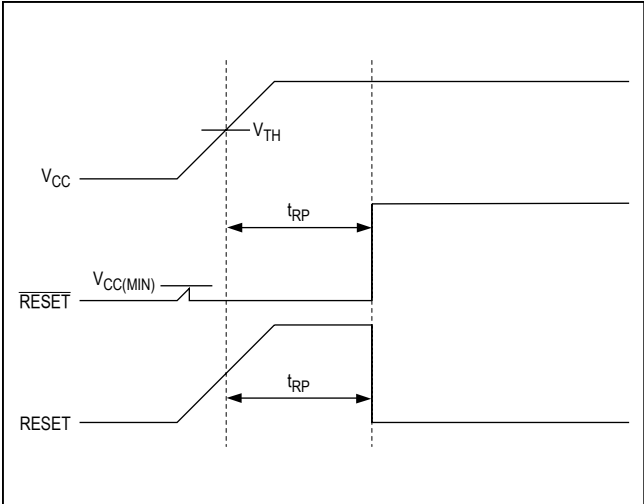


Figure 4. Power-Up Reset Timing Diagram

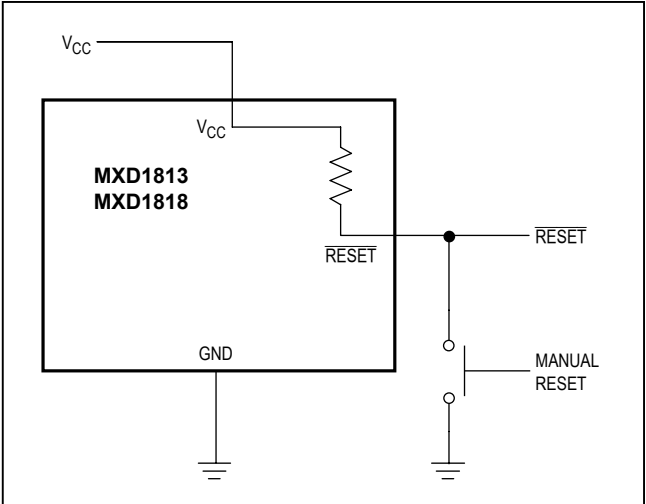


Figure 5. Push-Button Manual Reset

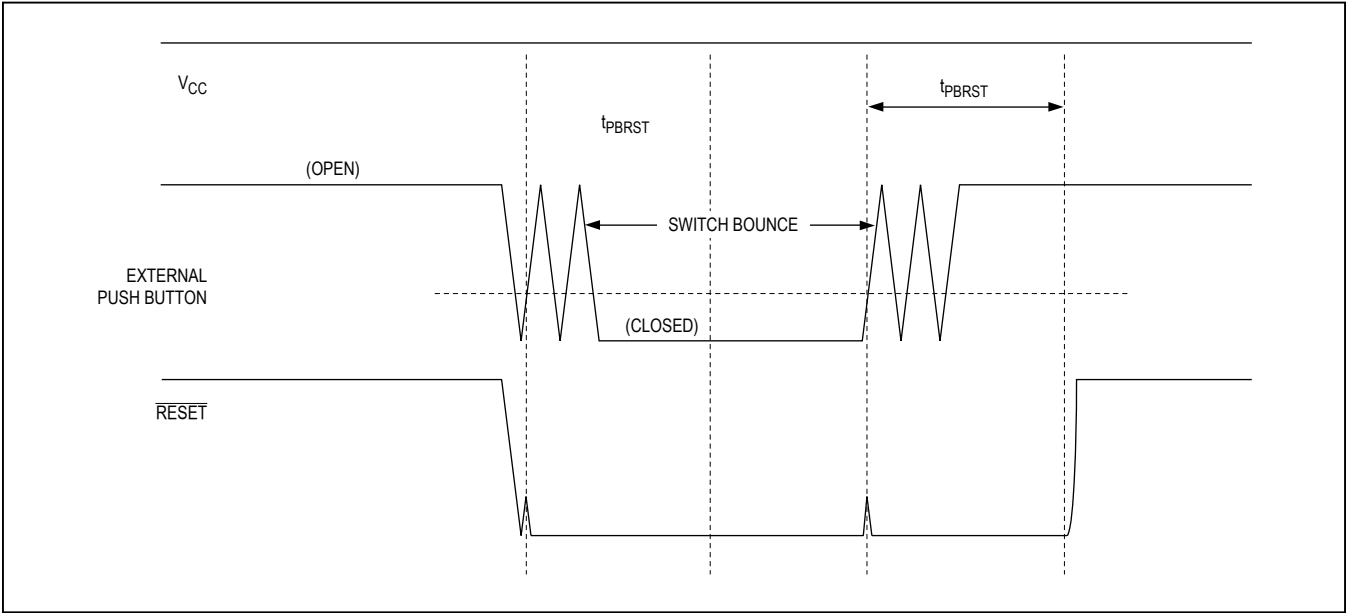


Figure 6. Manual Reset Timing Diagram

RESET must be valid to  $V_{CC} = 0$ , a 100k $\Omega$  pullup resistor between RESET and  $V_{CC}$  holds RESET high when  $V_{CC}$  falls below the minimum operating voltage (Figure 9).

The MXD1811/MXD1813/MXD1816/MXD1818 have open-drain, active-low outputs with a pullup resistor included internal to the devices. While using these devices, RESET will most likely not maintain an active

condition when the supply voltage drops below the minimum  $V_{CC}$ , but will drift to a nonactive level due to the pullup resistor and the reduced sinking capability of the open-drain output. Therefore, these devices are not recommended for applications where the RESET pin is required to be valid at  $V_{CC} = 0$ .

MXD1810–MXD1813/  
MXD1815–MXD1818

Low-Power  $\mu$ P Reset Circuits in 3-Pin  
SC70/SOT23

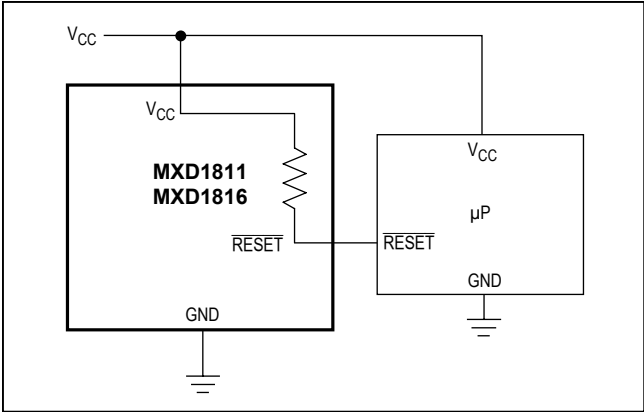


Figure 7. Interfacing to Microprocessors with Bidirectional Reset Pins

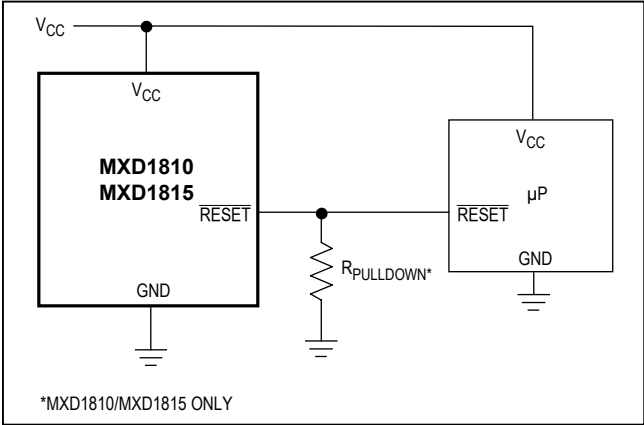


Figure 8. Ensuring Valid  $\overline{\text{RESET}}$  Output Down to  $V_{CC} = 0$  (MXD1810/MXD1815 only)

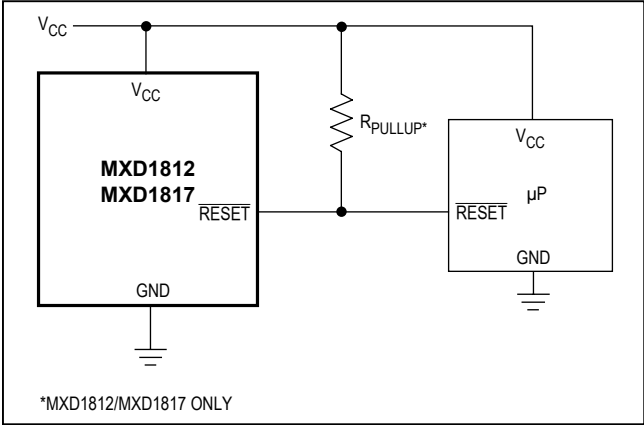


Figure 9. Ensuring Valid  $\overline{\text{RESET}}$  Output Down to  $V_{CC} = 0$  (MXD1812/MXD1817 only)

Table 1. Device Marking Codes

| PART               | TOP MARK |      |
|--------------------|----------|------|
|                    | SOT23    | SC70 |
| <b>MXD1810_R46</b> | FZIV     | AEK  |
| MXD1810_R44        | FZKD     | AHU  |
| MXD1810_R41        | FZKC     | AHT  |
| <b>MXD1811_R46</b> | FZKF     | AHW  |
| MXD1811_R44        | FZIW     | AEL  |
| MXD1811_R41        | FZKE     | AHV  |
| <b>MXD1812_R46</b> | FZKH     | AHY  |
| MXD1812_R44        | FZKG     | AHX  |
| MXD1812_R41        | FZIX     | AEM  |
| <b>MXD1813_R46</b> | FZII     | AEN  |
| MXD1813_R44        | FZKJ     | AIA  |
| MXD1813_R41        | FZKI     | AHZ  |
| <b>MXD1815_R31</b> | FZKN     | AIE  |
| MXD1815_R29        | FZIZ     | AEO  |
| MXD1815_R26        | FZKM     | AID  |
| MXD1815_R23        | FZKL     | AIC  |
| MXD1815_R22        | FZKK     | AIB  |
| <b>MXD1816_R31</b> | FZKR     | AIL  |
| MXD1816_R29        | FZKQ     | AIH  |
| MXD1816_R26        | FZKP     | AIG  |
| MXD1816_R23        | FZKO     | AIF  |
| MXD1816_R22        | FZJA     | AEP  |
| <b>MXD1817_R31</b> | FZJB     | AEQ  |
| MXD1817_R29        | FZKV     | AIM  |
| MXD1817_R26        | FZKU     | AIL  |
| MXD1817_R23        | FZKT     | AIK  |
| MXD1817_R22        | FZKS     | AIJ  |
| <b>MXD1818_R31</b> | FZKY     | AIP  |
| MXD1818_R29        | FZKX     | AIO  |
| MXD1818_R26        | FZJC     | AER  |
| MXD1818_R23        | FZKW     | AIN  |
| MXD1818_R22        | FZJE     | AEV  |

## Selector Guide

| PART    | 5V SYSTEMS | 2.5V/3.0V/3.3V SYSTEMS | PUSH-PULL RESET | OPEN-DRAIN RESET | PUSH-PULL RESET | OPEN-DRAIN RESET WITH PUSHBUTTON DETECT |
|---------|------------|------------------------|-----------------|------------------|-----------------|-----------------------------------------|
| MXD1810 | ✓          | —                      | ✓               | —                | —               | —                                       |
| MXD1811 | ✓          | —                      | —               | ✓                | —               | —                                       |
| MXD1812 | ✓          | —                      | —               | —                | ✓               | —                                       |
| MXD1813 | ✓          | —                      | —               | —                | —               | ✓                                       |
| MXD1815 | —          | ✓                      | ✓               | —                | —               | —                                       |
| MXD1816 | —          | ✓                      | —               | ✓                | —               | —                                       |
| MXD1817 | —          | ✓                      | —               | —                | ✓               | —                                       |
| MXD1818 | —          | ✓                      | —               | —                | —               | ✓                                       |

## Ordering Information (continued)

| PART†                 | TEMP RANGE      | PIN-PACKAGE |
|-----------------------|-----------------|-------------|
| <b>MXD1811UR</b> __-T | -40°C to +105°C | 3 SOT23     |
| MXD1811XR__-T         | -40°C to +105°C | 3 SC70      |
| <b>MXD1812UR</b> __-T | -40°C to +105°C | 3 SOT23     |
| MXD1812XR__-T         | -40°C to +105°C | 3 SC70      |
| <b>MXD1813UR</b> __-T | -40°C to +105°C | 3 SOT23     |
| MXD1813XR__-T         | -40°C to +105°C | 3 SC70      |
| <b>MXD1815UR</b> __-T | -40°C to +105°C | 3 SOT23     |
| MXD1815XR__-T         | -40°C to +105°C | 3 SC70      |
| <b>MXD1816UR</b> __-T | -40°C to +105°C | 3 SOT23     |
| MXD1816XR__-T         | -40°C to +105°C | 3 SC70      |
| <b>MXD1817UR</b> __-T | -40°C to +105°C | 3 SOT23     |
| MXD1817XR__-T         | -40°C to +105°C | 3 SC70      |
| <b>MXD1818UR</b> __-T | -40°C to +105°C | 3 SOT23     |
| MXD1818XR__-T         | -40°C to +105°C | 3 SC70      |

†The MXD1810–MXD1813/MXD1815–MXD1818 are available with factory-set  $V_{CC}$  reset thresholds from +2.18V to +3.06V (MXD1815–MXD1818) and +4.12V to +4.62V (MXD1810–MXD1813). Choose the desired reset-threshold suffix from the Reset Threshold Table and insert it in place of the “\_\_” following “R” in the part number. All devices are available in tape-and-reel only in 2500 unit increments. Other threshold voltages may be available. Contact factory for availability.

Devices are available in both leaded and lead(Pb)-free packaging. Specify lead-free by replacing “-T” with “+T” when ordering.

## Reset Threshold Table

| PART            | SUFFIX ( __ ) | TYP. RESET THRESHOLD (V)* |
|-----------------|---------------|---------------------------|
| MXD1810–MXD1813 | 46            | 4.62                      |
| MXD1810–MXD1813 | 44            | 4.37                      |
| MXD1810–MXD1813 | 41            | 4.12                      |
| MXD1815–MXD1818 | 31            | 3.06                      |
| MXD1815–MXD1818 | 29            | 2.88                      |
| MXD1815–MXD1818 | 26            | 2.55                      |
| MXD1815–MXD1818 | 23            | 2.31                      |
| MXD1815–MXD1818 | 22            | 2.18                      |

\*Factory-trimmed reset thresholds are nominally  $\pm 1.5\%$  at room temperature.

## Chip Information

PROCESS TECHNOLOGY: BiCMOS

## Package Information

For the latest package outline information and land patterns (footprints), go to [www.maximintegrated.com/packages](http://www.maximintegrated.com/packages). Note that a “+”, “#”, or “-” in the package code indicates RoHS status only. Package drawings may show a different suffix character, but the drawing pertains to the package regardless of RoHS status.

| PACKAGE TYPE | PACKAGE CODE | OUTLINE NO.             | LAND PATTERN NO.        |
|--------------|--------------|-------------------------|-------------------------|
| 3 SC70       | X3-2         | <a href="#">21-0075</a> | <a href="#">90-0208</a> |
| 3 SOT23      | U3-1         | <a href="#">21-0051</a> | <a href="#">90-0179</a> |

MXD1810–MXD1813/  
MXD1815–MXD1818

Low-Power  $\mu$ P Reset Circuits in 3-Pin  
SC70/SOT23

## Revision History

| REVISION<br>NUMBER | REVISION<br>DATE | DESCRIPTION                                                                                                                                            | PAGES<br>CHANGED |
|--------------------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| 1                  | 12/05            | Miscellaneous updates                                                                                                                                  | 1,9–11           |
| 2                  | 11/14            | No <i>I</i> V OPN in <i>Ordering Information</i> , removed automotive reference from <i>Applications</i> section; updated <i>Packaging Information</i> | 1, 10, 11        |

For pricing, delivery, and ordering information, please contact Maxim Direct at 1-888-629-4642, or visit Maxim Integrated's website at [www.maximintegrated.com](http://www.maximintegrated.com).

*Maxim Integrated cannot assume responsibility for use of any circuitry other than circuitry entirely embodied in a Maxim Integrated product. No circuit patent licenses are implied. Maxim Integrated reserves the right to change the circuitry and specifications without notice at any time. The parametric values (min and max limits) shown in the Electrical Characteristics table are guaranteed. Other parametric values quoted in this data sheet are provided for guidance.*

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Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: [ocean@oceanchips.ru](mailto:ocean@oceanchips.ru)

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А