



Low-Power, Single/Dual-Voltage Window Detectors

MAX6754-MAX6764

General Description

The MAX6754–MAX6764 low-power window detectors monitor undervoltage/overvoltage conditions on system power supplies. These devices assert when the monitored voltage is under the undervoltage and/or over the overvoltage thresholds.

The MAX6754–MAX6759/MAX6763/MAX6764 monitor a single voltage. The MAX6760/MAX6761/MAX6762 monitor dual-voltage systems. The MAX6754/MAX6755/MAX6756 provide a single undervoltage/overvoltage output and the MAX6757–MAX6764 provide independent undervoltage and overvoltage outputs. The outputs are available in push-pull or open-drain configurations.

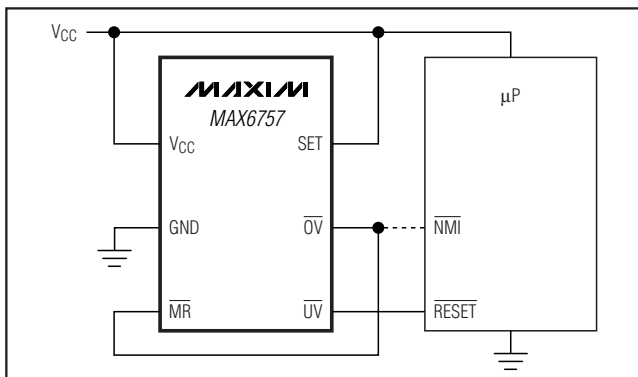
The MAX6754–MAX6762 offer factory-fixed voltage thresholds for monitoring system voltages from 0.9V to 5V with a selectable $\pm 5\%$, $\pm 10\%$, or $\pm 15\%$ window voltage. The MAX6763/MAX6764 allow for externally adjustable thresholds. The MAX6754–MAX6762 are available in two delay timing options (20 μ s, typ or 100ms, min). The MAX6760/MAX6761/MAX6762 also include a latched overvoltage output function and the MAX6754–MAX6762 include a manual reset input.

The family of products is available in small SOT23 and TDFN packages and is specified over the extended temperature range of -40°C to $+125^{\circ}\text{C}$.

Applications

| | |
|--------------------|-------------------------|
| Telecommunications | Power Metering |
| Networking | DC-DC Converter Modules |
| Computers/Servers | Automotive |
| Data Storage | |

Typical Application Circuit



Features

- ◆ Single- or Dual-Supply Voltage Monitors
- ◆ Factory-Trimmed Window Threshold Options for 5V, 3.3V, 3V, 2.5V, 1.8V, 1.5V, 1.2V, and 0.9V Supplies
- ◆ Externally Adjustable Window Monitoring Options for Supplies Down to 0.5V
- ◆ Selectable Window Threshold Options ($\pm 5\%$, $\pm 10\%$, $\pm 15\%$)
- ◆ Single (Combined UV/OV) or Dual (Separate UV and OV) Outputs
- ◆ 20 μ s (typ) or 100ms (min) Timeout Period Options (MAX6754–MAX6762)
- ◆ Manual Reset Input (MAX6754–MAX6762)
- ◆ Latched Overvoltage Output Function (MAX6760/MAX6761/MAX6762)
- ◆ Immune to Short Voltage Transients
- ◆ Low 10 μ A Supply Current
- ◆ Low-Voltage Operation (Outputs Valid for V_{CC} Down to 1V)
- ◆ -40°C to $+125^{\circ}\text{C}$ Operating Temperature Range
- ◆ Small SOT23 and TDFN Packages

Ordering Information

| PART* | TEMP RANGE | PIN-PACKAGE |
|----------------|---|-------------|
| MAX6754UK_D_-T | -40°C to $+125^{\circ}\text{C}$ | 5 SOT23-5 |
| MAX6755UK_D_-T | -40°C to $+125^{\circ}\text{C}$ | 5 SOT23-5 |
| MAX6756UK_D_-T | -40°C to $+125^{\circ}\text{C}$ | 5 SOT23-5 |
| MAX6757UT_D_-T | -40°C to $+125^{\circ}\text{C}$ | 6 SOT23-6 |
| MAX6758UT_D_-T | -40°C to $+125^{\circ}\text{C}$ | 6 SOT23-6 |

*Note: Insert the threshold level suffixes for V_{CC} and V_{CC2} (Tables 1 and 2) after UK, UT, or TA. For the MAX6754–MAX6759, insert only the V_{CC} threshold suffix after the UK or UT. Insert the reset timeout delay (Table 3) after D to complete the part number. For example, the MAX6760TALTD3-T provides a V_{CC} threshold of 5V, a V_{CC2} threshold of 3.3V, and a 100ms minimum reset timeout period. Sample stock is generally held on standard versions only (see the Standard Versions table). Standard versions have an order increment requirement of 2500 pieces. Nonstandard versions have an order increment requirement of 10,000 pieces. Contact factory for availability.

Ordering Information continued at end of data sheet.

Pin Configurations appear at end of data sheet.



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ABSOLUTE MAXIMUM RATINGS

(Voltages with respect to GND)

| | |
|--|-----------------------------------|
| V _{CC} , V _{CC2} | -0.3V to +6.5V |
| SET, OVLATCH, MR, UVIN, OVIN | -0.3V to (V _{CC} + 0.3V) |
| UV, RESET, OV (open drain) | -0.3V to +6.5V |
| RESET, OV, UV, UV, RESET (push-pull) | -0.3V to (V _{CC} + 0.3V) |
| Input/Output Current (all pins) | 20mA |

Continuous Power Dissipation (T_A = +70°C)

| | |
|---|-----------------|
| 5-Pin SOT23-5 (derate 7.1mW/°C above T _A = +70°C)..... | 571mW |
| 6-Pin SOT23-6 (derate 8.7mW/°C above T _A = +70°C)..... | 696mW |
| 8-Pin TDFN (derate 24.4mW/°C above T _A = +70°C)..... | 1951mW |
| Operating Temperature Range | -40°C to +125°C |
| 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} = 1.0V to 6.0V, V_{CC2} = 0 to 6.0V (MAX6760-MAX6762), T_A = -40°C to +125°C, unless otherwise noted. Typical values are at T_A = +25°C.) (Note 1)

| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNITS | | |
|---------------------------------------|------------------|--|---------|------------------------------------|-------|-------|-------|---|
| POWER REQUIREMENTS | | | | | | | | |
| Operating Voltage Range | V _{CC} | (Note 2) | 1.0 | | 6.0 | V | | |
| | | MAX6760TAAA/MAX6761TAAA/ MAX6762TAAA/MAX6763/MAX6764UT-T | 1.4 | | 6.0 | | | |
| V _{CC} Supply Current | I _{CC} | V _{CC} = 3.6V, MAX6754-MAX6759, no load | | 13 | 30 | μA | | |
| | | V _{CC} = 3.6V, MAX6763/MAX6764, no load | | 10 | 23 | | | |
| | | V _{CC} = 3.6V, V _{CC} ≥ V _{CC2} , MAX6760/MAX6761/MAX6762, no load | | 13 | 30 | | | |
| V _{CC2} Supply Current | I _{CC2} | V _{CC2} = 1.8V, V _{CC} ≥ V _{CC2} , MAX6760/MAX6761/MAX6762 | | 1 | 1.5 | μA | | |
| Adjustable Bias Current | | V _{CC2} (MAX6760-MAX6762TA_AD_) (Note 3) | -20 | | +20 | nA | | |
| V_{CC} THRESHOLD | | | | | | | | |
| V _{CC} Overvoltage Threshold | OV _{TH} | T _A = -40°C to +125°C, rising V _{CC} | L, 5V | V _{SET} = V _{SB} | 5.750 | 5.875 | 6.000 | V |
| | | | | SET = V _{CC} | 5.500 | 5.625 | 5.750 | |
| | | | | SET = GND | 5.250 | 5.375 | 5.500 | |
| | | | T, 3.3V | V _{SET} = V _{SB} | 3.795 | 3.878 | 3.960 | |
| | | | | SET = V _{CC} | 3.630 | 3.713 | 3.795 | |
| | | | | SET = GND | 3.465 | 3.548 | 3.630 | |
| | | | R, 3.0V | V _{SET} = V _{SB} | 3.450 | 3.525 | 3.600 | |
| | | | | SET = V _{CC} | 3.300 | 3.375 | 3.450 | |
| | | | | SET = GND | 3.150 | 3.225 | 3.300 | |
| | | | Z, 2.5V | V _{SET} = V _{SB} | 2.875 | 2.938 | 3.000 | |
| | | | | SET = V _{CC} | 2.750 | 2.813 | 2.875 | |
| | | | | SET = GND | 2.625 | 2.688 | 2.750 | |
| | | | W, 1.8V | V _{SET} = V _{SB} | 2.070 | 2.115 | 2.160 | |
| | | | | SET = V _{CC} | 1.980 | 2.025 | 2.070 | |
| | | | | SET = GND | 1.890 | 1.935 | 1.980 | |

Low-Power, Single/Dual-Voltage Window Detectors

MAX6754-MAX6764

ELECTRICAL CHARACTERISTICS (continued)

(V_{CC} = 1.0V to 6.0V, V_{CC2} = 0 to 6.0V (MAX6760-MAX6762), T_A = -40°C to +125°C, unless otherwise noted. Typical values are at T_A = +25°C.) (Note 1)

| PARAMETER | SYMBOL | CONDITIONS | | | MIN | TYP | MAX | UNITS |
|--|-------------------|---|---------|---|-------|-------|-------|-------|
| V _{CC} Undervoltage Threshold | UV _{TH} | T _A = -40°C to +125°C, falling V _{CC} | L, 5V | V _{SET} = V _{SB} | 4.000 | 4.125 | 4.250 | V |
| | | | | SET = V _{CC} | 4.250 | 4.375 | 4.500 | |
| | | | | SET = GND | 4.500 | 4.625 | 4.750 | |
| | | | T, 3.3V | V _{SET} = V _{SB} | 2.640 | 2.723 | 2.805 | |
| | | | | SET = V _{CC} | 2.805 | 2.888 | 2.970 | |
| | | | | SET = GND | 2.970 | 3.053 | 3.135 | |
| | | | R, 3.0V | V _{SET} = V _{SB} | 2.400 | 2.475 | 2.550 | |
| | | | | SET = V _{CC} | 2.550 | 2.625 | 2.700 | |
| | | | | SET = GND | 2.700 | 2.775 | 2.850 | |
| | | | Z, 2.5V | V _{SET} = V _{SB} | 2.000 | 2.063 | 2.125 | |
| | | | | SET = V _{CC} | 2.125 | 2.188 | 2.250 | |
| | | | | SET = GND | 2.250 | 2.313 | 2.375 | |
| | | | W, 1.8V | V _{SET} = V _{SB} | 1.440 | 1.485 | 1.530 | |
| | | | | SET = V _{CC} | 1.530 | 1.575 | 1.620 | |
| | | | | SET = GND | 1.620 | 1.665 | 1.710 | |
| V _{CC2} Overvoltage Threshold | OV _{TH2} | T _A = -40°C to +125°C, rising V _{CC2} | T, 3.3V | V _{SET} = V _{SB} | 3.795 | 3.878 | 3.960 | V |
| | | | | SET = V _{CC} | 3.630 | 3.713 | 3.795 | |
| | | | | SET = GND | 3.465 | 3.548 | 3.630 | |
| | | | R, 3.0V | V _{SET} = V _{SB} | 3.450 | 3.525 | 3.600 | |
| | | | | SET = V _{CC} | 3.300 | 3.375 | 3.450 | |
| | | | | SET = GND | 3.150 | 3.225 | 3.300 | |
| | | | Z, 2.5V | V _{SET} = V _{SB} | 2.875 | 2.938 | 3.000 | |
| | | | | SET = V _{CC} | 2.750 | 2.813 | 2.875 | |
| | | | | SET = GND | 2.625 | 2.688 | 2.750 | |
| | | | W, 1.8V | V _{SET} = V _{SB} | 2.070 | 2.115 | 2.160 | |
| | | | | SET = V _{CC} | 1.980 | 2.025 | 2.070 | |
| | | | | SET = GND | 1.890 | 1.935 | 1.980 | |
| | | | I, 1.5V | V _{SET} = V _{SB} (Note 2) | 1.725 | 1.763 | 1.800 | |
| | | | | SET = V _{CC} (Note 2) | 1.650 | 1.688 | 1.725 | |
| | | | | SET = GND (Note 2) | 1.575 | 1.613 | 1.650 | |
| | | | G, 1.2V | V _{SET} = V _{SB} (Note 2) | 1.380 | 1.410 | 1.440 | |
| | | | | SET = V _{CC} (Note 2) | 1.320 | 1.350 | 1.380 | |
| | | | | SET = GND (Note 2) | 1.260 | 1.290 | 1.320 | |
| | | | E, 0.9V | V _{SET} = V _{SB} (Note 2) | 1.035 | 1.058 | 1.080 | |
| | | | | SET = V _{CC} (Note 2) | 0.990 | 1.013 | 1.035 | |
| | | | | SET = GND (Note 2) | 0.945 | 0.968 | 0.990 | |
| | | | ADJ | V _{SET} = V _{SB} | 0.489 | 0.500 | 0.511 | |
| | | | | SET = V _{CC} | 0.468 | 0.479 | 0.489 | |
| | | | | SET = GND | 0.447 | 0.457 | 0.468 | |

Low-Power, Single/Dual-Voltage Window Detectors

ELECTRICAL CHARACTERISTICS (continued)

($V_{CC} = 1.0V$ to $6.0V$, $V_{CC2} = 0$ to $6.0V$ (MAX6760-MAX6762), $T_A = -40^{\circ}C$ to $+125^{\circ}C$, unless otherwise noted. Typical values are at $T_A = +25^{\circ}C$.) (Note 1)

| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNITS | | |
|---|--------------------|--|---------|---|-------|-------|-------|---|
| V _{CC2} Undervoltage Threshold | UV _{TH2} | T _A = -40°C to +125°C, falling V _{CC2} | T, 3.3V | V _{SET} = V _{SB} | 2.640 | 2.723 | 2.805 | V |
| | | | | SET = V _{CC} | 2.805 | 2.888 | 2.970 | |
| | | | | SET = GND | 2.970 | 3.053 | 3.135 | |
| | | | R, 3.0V | V _{SET} = V _{SB} | 2.400 | 2.475 | 2.550 | |
| | | | | SET = V _{CC} | 2.550 | 2.625 | 2.700 | |
| | | | | SET = GND | 2.700 | 2.775 | 2.850 | |
| | | | Z, 2.5V | V _{SET} = V _{SB} | 2.000 | 2.063 | 2.125 | |
| | | | | SET = V _{CC} | 2.125 | 2.188 | 2.250 | |
| | | | | SET = GND | 2.250 | 2.313 | 2.375 | |
| | | | W, 1.8V | V _{SET} = V _{SB} | 1.440 | 1.485 | 1.530 | |
| | | | | SET = V _{CC} | 1.530 | 1.575 | 1.620 | |
| | | | | SET = GND | 1.620 | 1.665 | 1.710 | |
| | | | I, 1.5V | V _{SET} = V _{SB} (Note 2) | 1.200 | 1.238 | 1.275 | |
| | | | | SET = V _{CC} (Note 2) | 1.275 | 1.313 | 1.350 | |
| | | | | SET = GND (Note 2) | 1.350 | 1.388 | 1.425 | |
| | | | G, 1.2V | V _{SET} = V _{SB} (Note 2) | 0.960 | 0.990 | 1.020 | |
| | | | | SET = V _{CC} (Note 2) | 1.020 | 1.050 | 1.080 | |
| | | | | SET = GND (Note 2) | 1.080 | 1.110 | 1.140 | |
| | | | E, 0.9V | V _{SET} = V _{SB} (Note 2) | 0.720 | 0.743 | 0.765 | |
| | | | | SET = V _{CC} (Note 2) | 0.765 | 0.788 | 0.810 | |
| | | | | SET = GND (Note 2) | 0.810 | 0.833 | 0.855 | |
| | | | ADJ | V _{SET} = V _{SB} | 0.340 | 0.351 | 0.362 | |
| | | | | SET = V _{CC} | 0.362 | 0.372 | 0.383 | |
| | | | | SET = GND | 0.383 | 0.394 | 0.404 | |
| Threshold Hysteresis | V _{HYST} | V _{CC} , V _{CC2} | 0.7 | | | % | | |
| UNDERVOLTAGE/OVERVOLTAGE INPUTS (UVIN, OVIN) (MAX6763/MAX6764) | | | | | | | | |
| UVIN, OVIN Threshold Voltage | V _{TH-IN} | | 0.485 | 0.5 | 0.515 | V | | |
| UVIN, OVIN Input Bias Current | I _{IN} | (Note 3) | -20 | | +20 | nA | | |
| UVIN, OVIN Threshold Hysteresis | V _{HYST} | | 0.7 | | | % | | |

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MAX6754-MAX6764

ELECTRICAL CHARACTERISTICS (continued)

($V_{CC} = 1.0V$ to $6.0V$, $V_{CC2} = 0$ to $6.0V$ (MAX6760-MAX6762), $T_A = -40^{\circ}C$ to $+125^{\circ}C$, unless otherwise noted. Typical values are at $T_A = +25^{\circ}C$.) (Note 1)

| PARAMETER | SYMBOL | CONDITIONS | | MIN | TYP | MAX | UNITS |
|---|---------------|--|----------------------------------|---------------------|-----|----------------------|-----------|
| TIMING CHARACTERISTICS | | | | | | | |
| Reset and UV Timeout Period | t_{RP} | Figure 7 | D0 | | 20 | | μs |
| | | | D3 | 100 | 185 | 320 | ms |
| V_{CC} to Reset Delay | $t_{D-RESET}$ | V_{CC}/V_{CC2} falling at $10mV/\mu s$ from $UV_{TH} + 100mV$ to $UV_{TH} - 100mV$ | | | 20 | | μs |
| V_{CC} to UV Delay | t_{D-UV} | V_{CC}/V_{CC2} rising at $10mV/\mu s$ from $OV_{TH} - 100mV$ to $OV_{TH} + 100mV$ | | | 20 | | μs |
| V_{CC} to OV Delay | t_{D-OV} | V_{CC}/V_{CC2} rising at $10mV/\mu s$ from $OV_{TH} - 100mV$ to $OV_{TH} + 100mV$ (MAX6757-MAX6762 only) | | | 20 | | μs |
| UVIN to UV Delay | | (MAX6763/MAX6764) | | | 20 | | μs |
| OVIN to OV Delay | | (MAX6763/MAX6764) | | | 20 | | μs |
| Startup Delay Time | t_{START} | D0 options only, \overline{OV} output (Note 4) | | | 2 | | ms |
| THRESHOLD WINDOW SELECT INPUT (SET) | | | | | | | |
| Input Voltage Low | | | | 0 | | 0.1 | V |
| Input Bias Voltage (Note 5) | V_{SB} | $V_{CC} = 1.4V$ | | 0.65 | | 0.75 | V |
| | | $V_{CC} = 3.0V$ | | 0.81 | | 2.19 | |
| | | $V_{CC} = 6.0V$ | | 1.10 | | 4.90 | |
| Input Voltage High | | | | $V_{CC} - 0.1$ | | V_{CC} | V |
| Input Current | I_{SET} | | | -1 | | +1 | μA |
| MANUAL RESET (\overline{MR}) | | | | | | | |
| Input Voltage Low | | | | | | $0.23 \times V_{CC}$ | V |
| Input Voltage High | | | | $0.6 \times V_{CC}$ | | | V |
| Pullup Resistance to V_{CC} | | | | | 26 | | $k\Omega$ |
| Minimum Pulse Width | | | | 4 | | | μs |
| Transient Immunity | | | | | 300 | | ns |
| Propagation Delay | t_{D-MR} | \overline{MR} falling, Figure 7 | | | 300 | | ns |
| | | t_{MR_P} | \overline{MR} rising, Figure 7 | D0 | 40 | | |
| | D3 | | | 100 | 185 | 320 | ms |
| OVERVOLTAGE OUTPUT LATCH CONTROL INPUT (OVLATCH) | | | | | | | |
| Input Voltage Low | | | | | | $0.3 \times V_{CC}$ | V |
| Input Voltage High | | | | $0.7 \times V_{CC}$ | | | V |

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ELECTRICAL CHARACTERISTICS (continued)

($V_{CC} = 1.0V$ to $6.0V$, $V_{CC2} = 0$ to $6.0V$ (MAX6760–MAX6762), $T_A = -40^{\circ}C$ to $+125^{\circ}C$, unless otherwise noted. Typical values are at $T_A = +25^{\circ}C$.) (Note 1)

| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNITS |
|--|-----------------------|--|-------|-----|-----------------|-------|
| Input Bias Current | I _{OV} LATCH | | -1 | | +1 | μA |
| RESET, RESET, UV, UV, OV | | | | | | |
| RESET, UV Output Low (Open Drain or Push-Pull) | V _{OL} | Any $V_{CC} \geq 1.0V$, I _{SINK} = 100μA, output asserted | | | 0.3 | V |
| | | Any $V_{CC} \geq 1.2V$, I _{SINK} = 200μA, output asserted | | | 0.3 | |
| | | Any $V_{CC} \geq 1.71V$, I _{SINK} = 1.0mA, output asserted | | | 0.3 | |
| | | Any $V_{CC} \geq 2.85V$, I _{SINK} = 2.0mA, output asserted | | | 0.3 | |
| | | Any $V_{CC} \geq 4.75V$, I _{SINK} = 4.0mA, output asserted | | | 0.3 | |
| RESET, UV Output High (Push-Pull) | V _{OH} | Any $V_{CC} \geq 1.71V$, I _{SOURCE} = 0.8mA, output deasserted | 0.8 x | | V _{CC} | V |
| | | Any $V_{CC} \geq 2.85V$, I _{SOURCE} = 2.0mA, output deasserted | 0.8 x | | V _{CC} | |
| | | Any $V_{CC} \geq 4.75V$, I _{SOURCE} = 4.0mA, output deasserted | 0.8 x | | V _{CC} | |
| RESET, UV Output Low (Push-Pull) | V _{OL} | Any $V_{CC} \geq 1.71V$, I _{SINK} = 1.0mA, output deasserted | | | 0.3 | V |
| | | Any $V_{CC} \geq 2.85V$, I _{SINK} = 2.0mA, output deasserted | | | 0.3 | |
| | | Any $V_{CC} \geq 4.75V$, I _{SINK} = 4.0mA, output deasserted | | | 0.3 | |
| RESET, UV Output High (Push-Pull) | V _{OH} | Any $V_{CC} \geq 1.0V$, I _{SOURCE} = 50μA, output asserted | 0.8 x | | V _{CC} | V |
| | | Any $V_{CC} \geq 1.2V$, I _{SOURCE} = 100μA, output asserted | 0.8 x | | V _{CC} | |
| | | Any $V_{CC} \geq 1.71V$, I _{SOURCE} = 0.8mA, output asserted | 0.8 x | | V _{CC} | |
| | | Any $V_{CC} \geq 2.85V$, I _{SOURCE} = 2.0mA, output asserted | 0.8 x | | V _{CC} | |
| | | Any $V_{CC} \geq 4.75V$, I _{SOURCE} = 4.0mA, output asserted | 0.8 x | | V _{CC} | |

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ELECTRICAL CHARACTERISTICS (continued)

($V_{CC} = 1.0V$ to $6.0V$, $V_{CC2} = 0$ to $6.0V$ (MAX6760–MAX6762), $T_A = -40^{\circ}C$ to $+125^{\circ}C$, unless otherwise noted. Typical values are at $T_A = +25^{\circ}C$.) (Note 1)

| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNITS |
|--|--------|--|----------------|-----|-----|---------|
| \overline{OV} Output Low (Open-Drain or Push-Pull) | VOL | Any $V_{CC} \geq 1.98V$, $I_{SINK} = 1.4mA$, output asserted | | | 0.3 | V |
| | | Any $V_{CC} \geq 2.75V$, $I_{SINK} = 2.0mA$, output asserted | | | 0.3 | |
| | | Any $V_{CC} \geq 3.63V$, $I_{SINK} = 3.0mA$, output asserted | | | 0.3 | |
| | | Any $V_{CC} \geq 5.5V$, $I_{SINK} = 4.0mA$, output asserted | | | 0.3 | |
| \overline{OV} Output High (Push-Pull) | VOH | Any $V_{CC} \geq 1.0V$, $I_{SOURCE} = 50\mu A$, output deasserted | 0.8 x V_{CC} | | | V |
| | | Any $V_{CC} \geq 1.2V$, $I_{SOURCE} = 100\mu A$, output deasserted | 0.8 x V_{CC} | | | |
| | | Any $V_{CC} \geq 1.98V$, $I_{SOURCE} = 1.4mA$, output deasserted | 0.8 x V_{CC} | | | |
| | | Any $V_{CC} \geq 2.75V$, $I_{SOURCE} = 2.0mA$, output deasserted | 0.8 x V_{CC} | | | |
| | | Any $V_{CC} \geq 3.63V$, $I_{SOURCE} = 3.0mA$, output deasserted | 0.8 x V_{CC} | | | |
| | | Any $V_{CC} \geq 5.5V$, $I_{SOURCE} = 4.5mA$, output deasserted | 0.8 x V_{CC} | | | |
| RESET, \overline{UV} , \overline{OV} Output Open-Drain Leakage Current | ILKG | Output not asserted | | | 1 | μA |

Note 1: Devices are production tested at $+25^{\circ}C$. Overtemperature limits are guaranteed by design.

Note 2: Voltage monitoring requires that V_{CC} must be greater than or equal to $1.4V$, but outputs remain asserted in the correct state for V_{CC} down to $1.0V$.

Note 3: Guaranteed by design.

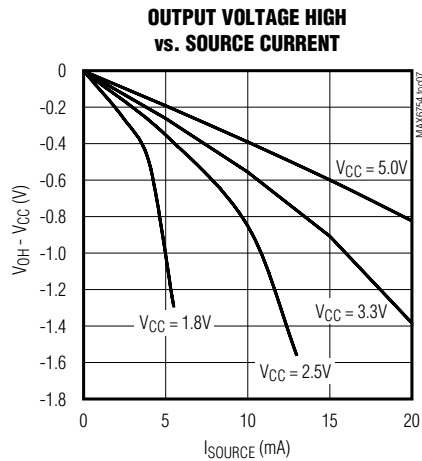
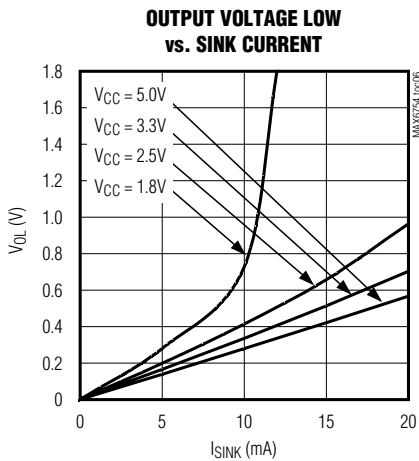
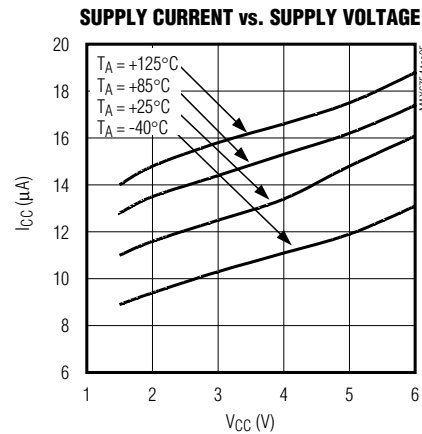
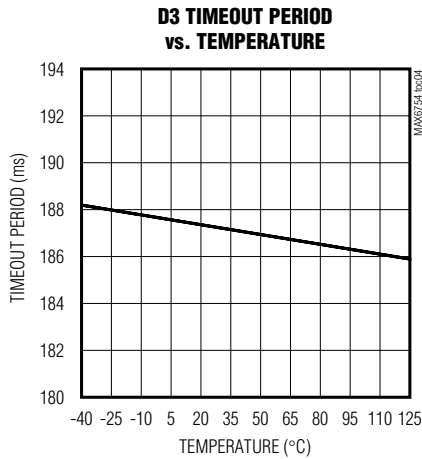
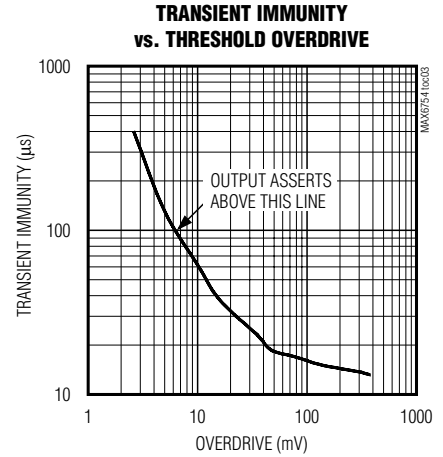
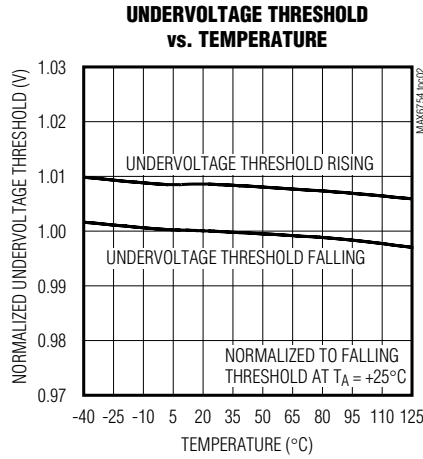
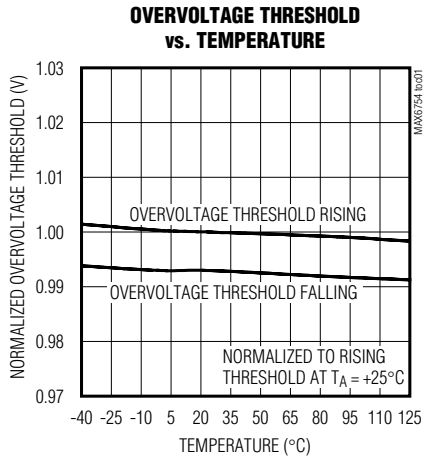
Note 4: For D0 window detector options and \overline{OV} outputs, startup delay time is the time required for the internal reference/circuitry to reach specified accuracy after the monitor is powered up from GND.

Note 5: The input bias voltage is based off of V_{CC} . The minimum value is given by the equation $(0.1 \times V_{CC} + 0.51)V$ and the maximum value is given by $(0.9 \times V_{CC} - 0.51)V$.

Low-Power, Single/Dual-Voltage Window Detectors

Typical Operating Characteristics

($V_{CC} = 5V$, $V_{CC2} = 3.3V$, $T_A = +25^\circ C$, unless otherwise noted.)



Low-Power, Single/Dual-Voltage Window Detectors

Pin Description

MAX6754-MAX6764

| PIN | | | | NAME | FUNCTION |
|---------------------------------|---------------------------------|---------------------------------|---------------------|-------------------------------------|--|
| MAX6754/ MAX6755/ MAX6756 | MAX6757/ MAX6758/ MAX6759 | MAX6760/ MAX6761/ MAX6762 | MAX6763/ MAX6764 | | |
| 1 | 1 | 1 | — | V _{CC} | Power Voltage Input. V _{CC} powers the device. V _{CC} is the monitored voltage. |
| — | — | — | 1 | | Power Input. V _{CC} powers the device. |
| 2 | 2 | 2 | 2 | GND | Ground |
| 3 | 3 | 8 | — | $\overline{\text{MR}}$ | Active-Low Manual Reset Input. Drive $\overline{\text{MR}}$ low to assert undervoltage and reset outputs. The asserted output remains asserted for the specified propagation delay period after $\overline{\text{MR}}$ goes high. $\overline{\text{MR}}$ is internally pulled up to V _{CC} through a 26k Ω resistor. |
| 4 | — | — | — | RESET/ $\overline{\text{RESET}}$ | Reset Output. The Reset Output asserts when V _{CC} is below the selected UV _{TH} threshold or above the selected OV _{TH} threshold. Reset output deasserts after the specified timeout period after V _{CC} rises above the UV _{TH} threshold or drops below the OV _{TH} threshold. MAX6754: Active-low push-pull output ($\overline{\text{RESET}}$). MAX6755: Active-high push-pull output (RESET). MAX6756: Active-low open-drain output ($\overline{\text{RESET}}$). |
| 5 | 6 | 4 | — | SET | Threshold Window Select Input. SET configures the undervoltage and overvoltage window range for the internal detectors. Connect SET to GND for $\pm 5\%$ window, or to V _{CC} for $\pm 10\%$ window. Bias SET to V _{CC} /2 for a $\pm 15\%$ window. |
| — | 4 | 6 | — | UV/ $\overline{\text{UV}}$ | Undervoltage Output. UV/ $\overline{\text{UV}}$ asserts when the monitored supply/supplies are below the UV _{TH} thresholds or $\overline{\text{MR}}$ is low. UV/ $\overline{\text{UV}}$ deasserts after the specified timeout period when the monitored supply/supplies rise above the UV _{TH} thresholds or for the specified propagation delay after $\overline{\text{MR}}$ goes high. MAX6757/MAX6760: Active-low push-pull output ($\overline{\text{UV}}$). MAX6758/MAX6761: Active-high push-pull output (UV). MAX6759/MAX6762: Active-low open-drain output ($\overline{\text{UV}}$). |
| — | — | 3 | — | V _{CC2} | V _{CC2} Voltage Input. Input for the second window voltage monitor, and device output power supply when V _{CC2} > V _{CC} . |
| — | 5 | 5 | 5 | $\overline{\text{OV}}$ | Active-Low Overvoltage Output. $\overline{\text{OV}}$ asserts low when the monitored supply/supplies are above their overvoltage threshold (OV _{TH}). $\overline{\text{OV}}$ goes high impedance immediately when the monitored supply/supplies drop below OV _{TH} . There is no timeout delay period for the $\overline{\text{OV}}$ output. For MAX6763/MAX6764, $\overline{\text{OV}}$ is low when OVIN is above the internal 0.5V threshold. $\overline{\text{OV}}$ is high when OVIN is below the internal 0.5V threshold. MAX6757-MAX6762: Active-low open-drain output. MAX6763: Active-low push-pull output. MAX6764: Active-low open-drain output. |

Low-Power, Single/Dual-Voltage Window Detectors

Pin Description (continued)

| PIN | | | | NAME | FUNCTION |
|---------------------------------|---------------------------------|---------------------------------|---------------------|-----------------|---|
| MAX6754/ MAX6755/ MAX6756 | MAX6757/ MAX6758/ MAX6759 | MAX6760/ MAX6761/ MAX6762 | MAX6763/ MAX6764 | | |
| | | 7 | — | OVLATCH | Overvoltage Output Latch Control Input. Drive OVLATCH high to latch the overvoltage output for any V _{CC} or V _{CC2} overvoltage condition. Drive OVLATCH low to clear the latch after overvoltage conditions have been removed. The latch is transparent when OVLATCH is connected to GND. OVLATCH is a high-impedance input. Use external pullup or pulldown. |
| — | — | — | 3 | UVIN | Undervoltage Input. \overline{UV} is low when UVIN is below the internal 0.5V threshold. \overline{UV} is high when UVIN is above the internal 0.5V threshold. |
| — | — | — | 4 | \overline{UV} | Undervoltage Output. \overline{UV} is low when UVIN is below the internal 0.5V threshold. \overline{UV} is high when UVIN is above the internal 0.5V threshold. There is no timeout delay period for the \overline{UV} output. |
| — | — | — | 6 | OVIN | Overvoltage Input. \overline{OV} is low when OVIN is above the internal 0.5V threshold. \overline{OV} is high when OVIN is below the internal 0.5V threshold. |
| — | — | EP | — | EP | Exposed Pad. EP is internally connected to GND. Leave EP unconnected or connect to GND. |

Functional Diagrams

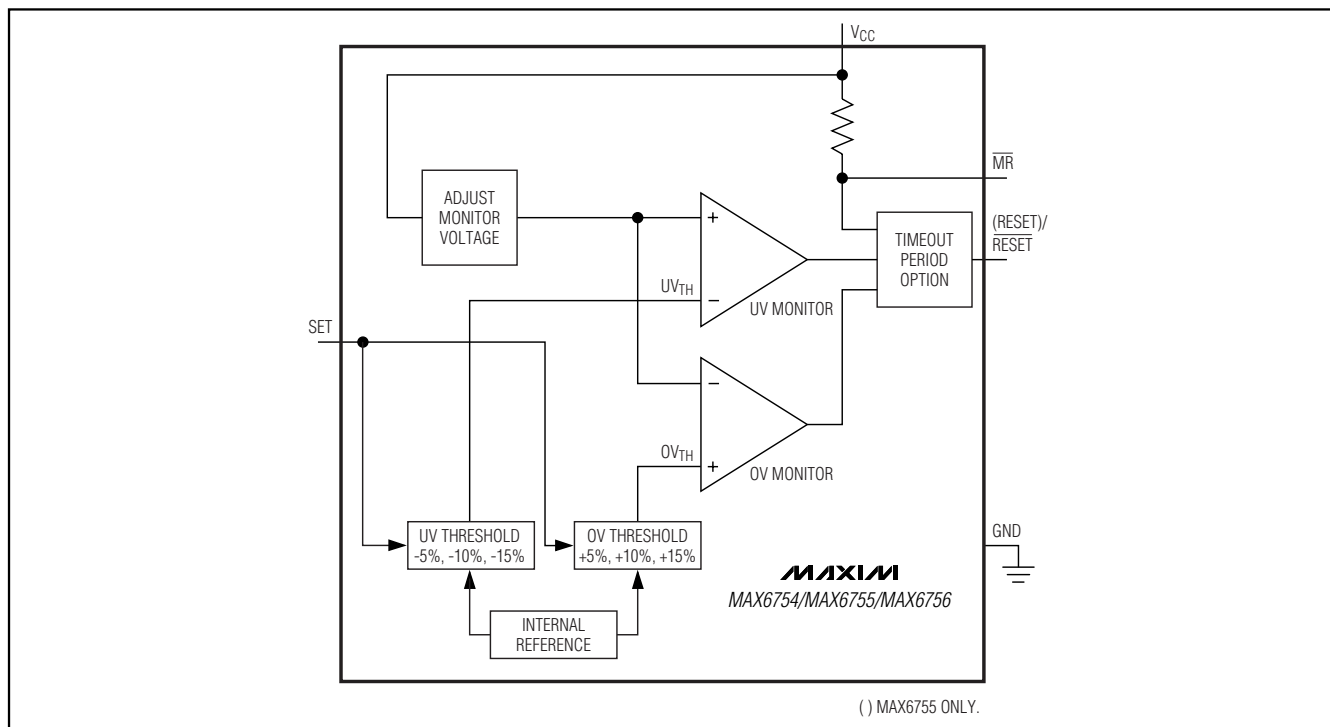


Figure 1. MAX6754/MAX6755/MAX6756 Functional Diagram

Low-Power, Single/Dual-Voltage Window Detectors

Functional Diagrams (continued)

MAX6754-MAX6764

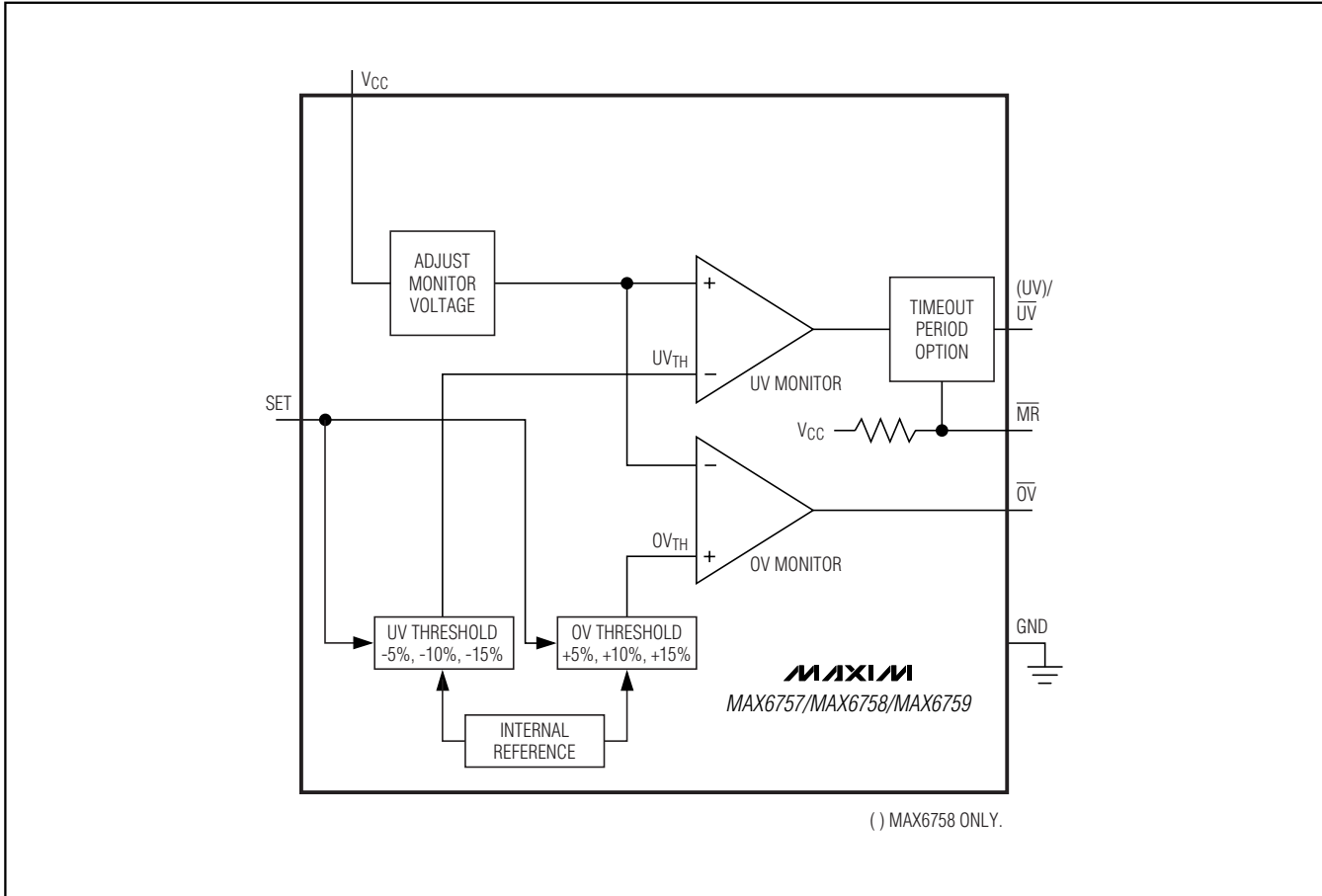


Figure 2. MAX6757/MAX6758/MAX6759 Functional Diagram

Low-Power, Single/Dual-Voltage Window Detectors

Functional Diagrams (continued)

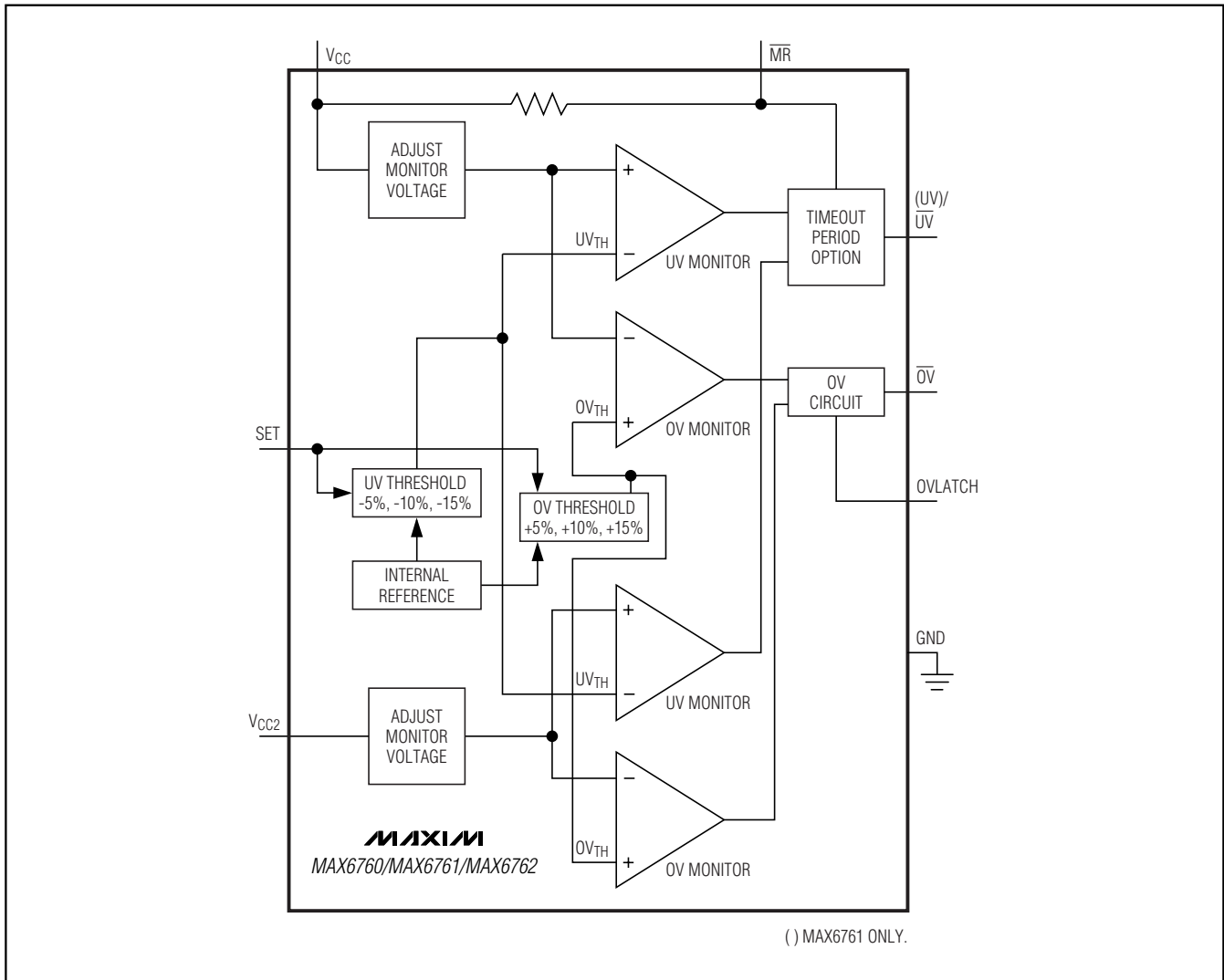


Figure 3. MAX6760/MAX6761/MAX6762 Functional Diagram

Low-Power, Single/Dual-Voltage Window Detectors

MAX6754-MAX6764

Functional Diagrams (continued)

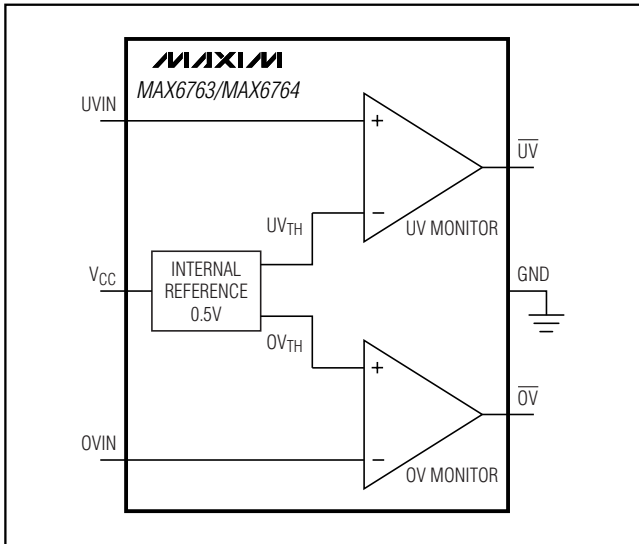


Figure 4. MAX6763/MAX6764 Functional Diagram

Detailed Description

The MAX6754–MAX6764 are low-power window voltage detectors capable of monitoring undervoltage and overvoltage conditions on system power supplies. Whenever a monitored voltage falls below its undervoltage threshold or exceeds its overvoltage threshold, these devices assert their outputs to notify the system (see *Functional Diagrams*).

The MAX6754/MAX6755/MAX6756 are single-voltage window detectors with internally fixed nominal voltage, externally adjustable set window, single reset under/overvoltage output, and a manual reset input.

The MAX6757/MAX6758/MAX6759 are single-voltage window detectors with internally set nominal voltage, externally adjustable set window, separate under/overvoltage outputs, and manual reset input.

The MAX6760/MAX6761/MAX6762 are dual-voltage window detectors with internally/externally set nominal voltages, externally adjustable set window, separate under/overvoltage outputs, manual reset input, and overvoltage latch functions.

The MAX6763/MAX6764 are single adjustable window detectors with separate under/overvoltage outputs.

The MAX6754–MAX6762 offer factory-fixed voltage thresholds for monitoring system voltages from 0.9V to 5V. The MAX6754–MAX6762 include a SET function to select the window voltage to $\pm 5\%$, $\pm 10\%$, or $\pm 15\%$. The MAX6763/MAX6764 allow for externally adjustable upper and lower voltage thresholds to be set externally (down to 0.5V). The MAX6754–MAX6762 are available with two timing options (20 μ s propagation delay or 100ms minimum reset timeout).

Supply Voltages

V_{CC} is the power-supply input and the monitored voltage of the MAX6754–MAX6762. These devices feature a factory-trimmed V_{CC} and V_{CC2} divider that sets the nominal input range (see Tables 1 and 2). V_{CC} for the MAX6763/MAX6764 is the power supply of the device and not the monitored voltage. For noisy systems, bypass V_{CC} and V_{CC2} each with a 0.1 μ F capacitor to GND.

Setting the Adjustable Nominal Voltage Threshold

The MAX6760/MAX6761/MAX6762 (versions with suffixes LA, TA, RA, ZA, WA, and AA) offer adjustable nominal voltage threshold to monitor V_{CC2}. Use an external voltage-divider to set the voltage at V_{CC2} to 0.4255V. Configure SET to select a monitor window of $\pm 5\%$, $\pm 10\%$, or $\pm 15\%$ (see Figure 5). The MAX6760/MAX6761/MAX6762 suffix AA monitor only V_{CC2} and do not monitor V_{CC}.

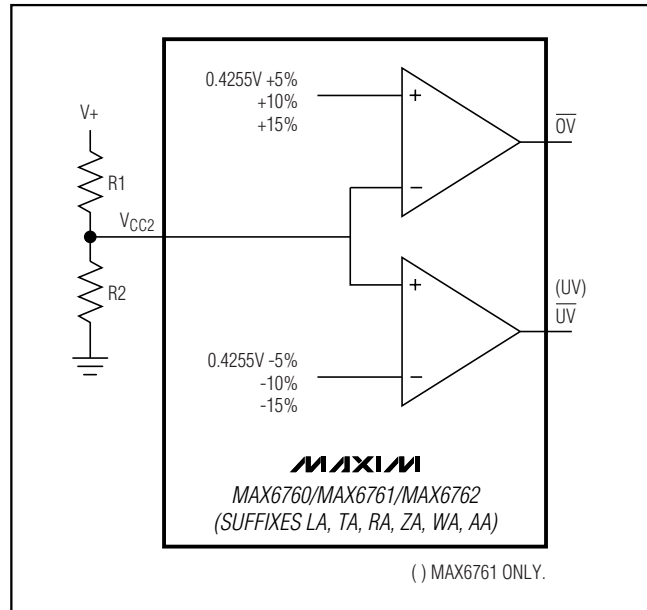


Figure 5. Setting the Threshold Voltage of V_{CC2}

Low-Power, Single/Dual-Voltage Window Detectors

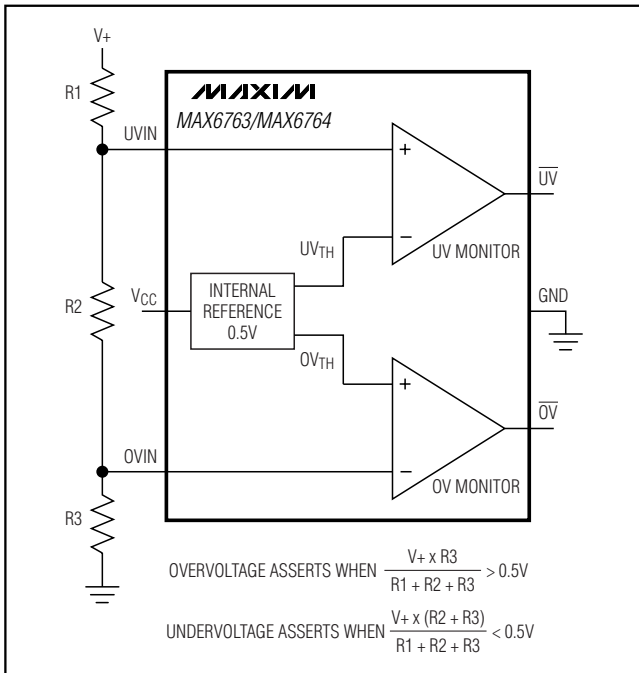


Figure 6. Setting the Under/Overvoltage Window

Choose R2 to have a resistance of up to 500kΩ. Calculate R1 by:

$$R1 = ((V_+ - 0.4255V) \times R2) / 0.4255V$$

The MAX6763/MAX6764 provide inputs to a window detector allowing the programming of the threshold voltage to within VCC (see Figure 6).

Choose R1, R2, and R3 such that:

$$(V_+ / (R1 + R2 + R3)) \geq 1\mu A$$

SET

The MAX6754-MAX6762 allow the setting of the window voltage range of the voltage detector. Connect SET to GND to set a ±5% window. Connect SET to VCC for a ±10% window. Bias SET to VCC/2 for a ±15% window.

Manual Reset (\overline{MR})

The MAX6754-MAX6762 include an active-low manual reset input. Drive \overline{MR} low to assert a reset output (MAX6754/MAX6755/MAX6756) or an undervoltage output (MAX6757/MAX6758/MAX6759). The output remains asserted for the specified propagation delay time (see Figure 7) after \overline{MR} goes high. \overline{MR} is internally pulled to VCC with a 26kΩ resistor.

Overvoltage Latch Control Input (OVLATCH)

The MAX6760/MAX6761/MAX6762 provide an overvoltage latch control input (OVLATCH). Drive OVLATCH high to latch the overvoltage output for any VCC or VCC2 overvoltage condition. Drive OVLATCH low to clear the latch after overvoltage conditions have been removed. The latch is transparent when OVLATCH is connected to GND. OVLATCH is a high impedance input. Use external pullup or pulldown.

Reset, Undervoltage, and Overvoltage Outputs (RESET, \overline{RESET} , UV, \overline{UV} , OV)

RESET, \overline{RESET} , UV, \overline{UV} , and OV outputs assert when the monitored supply is below the selected UVTH threshold or above the selected OVTH threshold. The reset output deasserts after the specified timeout period when the monitored supply rises above the UVTH threshold or drops below the OVTH threshold. The push-pull versions are referenced to VCC.

The MAX6760/MAX6761/MAX6762 monitor both VCC and VCC2. An under/overvoltage condition on either voltage supply asserts the corresponding output. \overline{RESET} and \overline{UV} are guaranteed to be in the correct logic state when VCC or VCC2 > 1V.

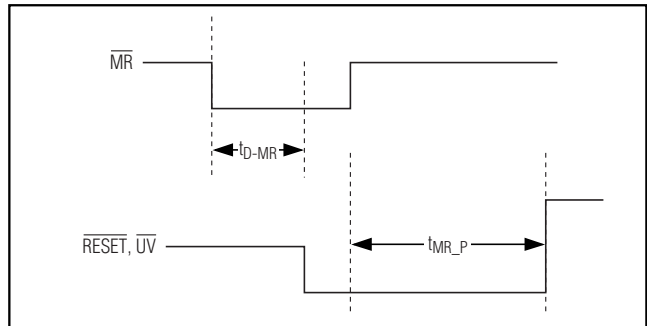


Figure 7a. Manual Reset/Reset Timing Diagram

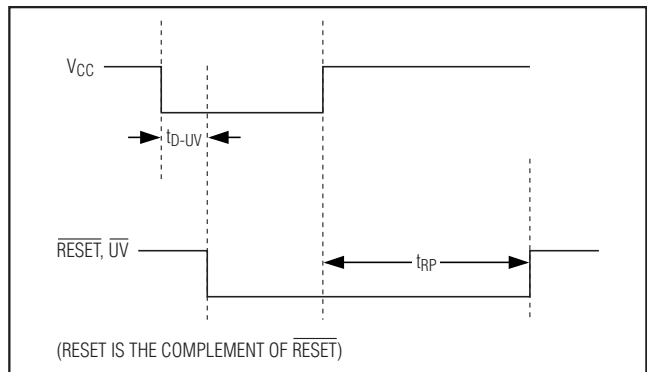


Figure 7b. VCC/RESET, \overline{UV} Timing Diagram

Low-Power, Single/Dual-Voltage Window Detectors

Applications Information

Microprocessor Monitoring

Figure 8 shows a microprocessor monitoring circuit. An overvoltage condition on either the core or I/O supply

turns the SCR on, blowing the fuse to disconnect the circuit from the power source. An optional capacitor (C1) on the gate of the SCR provides additional transient immunity against nuisance trips.

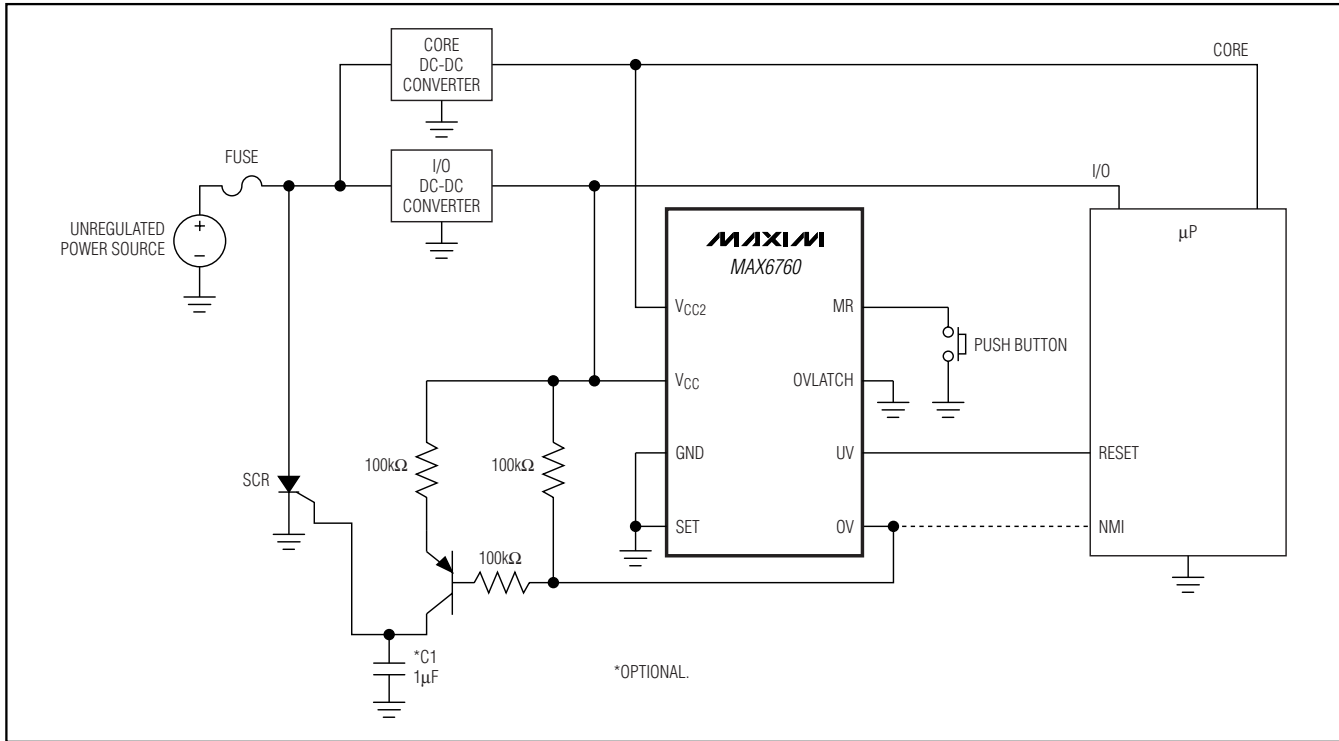


Figure 8. Microprocessor Monitoring

Selector Guide

| | PUSH-PULL RESET | PUSH-PULL RESET | OPEN-DRAIN RESET | PUSH-PULL UV | PUSH-PULL UV | OPEN-DRAIN UV | PUSH-PULL OV | OPEN-DRAIN OV |
|---------|--------------------|--------------------|---------------------|-----------------|-----------------|------------------|-----------------|------------------|
| MAX6754 | X | — | — | — | — | — | — | — |
| MAX6755 | — | X | — | — | — | — | — | — |
| MAX6756 | — | — | X | — | — | — | — | — |
| MAX6757 | — | — | — | X | — | — | — | X |
| MAX6758 | — | — | — | — | X | — | — | X |
| MAX6759 | — | — | — | — | — | X | — | X |
| MAX6760 | — | — | — | X | — | — | — | X |
| MAX6761 | — | — | — | — | X | — | — | X |
| MAX6762 | — | — | — | — | — | X | — | X |
| MAX6763 | — | — | — | X | — | — | X | — |
| MAX6764 | — | — | — | — | X | — | — | X |

Low-Power, Single/Dual-Voltage Window Detectors

Table 1. Window Threshold Voltage Suffix Guide Single Fixed V_{CC} (MAX6754—MAX6759)

| PART NO. SUFFIX | V _{CC} NOMINAL SYSTEM VOLTAGE (V) |
|-----------------|--|
| L | 5.0 |
| T | 3.3 |
| R | 3.0 |
| Z | 2.5 |
| W | 1.8 |

Table 2. Window Threshold Voltage Suffix Guide Dual Fixed/Adjustable (MAX6760/MAX6761/MAX6762)

| PART NO. SUFFIX | V _{CC} NOMINAL SYSTEM VOLTAGE (V) | V _{CC2} NOMINAL SYSTEM VOLTAGE (V) |
|-----------------|--|---|
| LT | 5 | 3.3 |
| LR | 5 | 3.0 |
| LA | 5 | ADJ* |
| TZ | 3.3 | 2.5 |
| TW | 3.3 | 1.8 |
| TI | 3.3 | 1.5 |
| TG | 3.3 | 1.2 |
| TE | 3.3 | 0.9 |
| TA | 3.3 | ADJ* |
| RZ | 3.0 | 2.5 |
| RW | 3.0 | 1.8 |
| RI | 3.0 | 1.5 |
| RG | 3.0 | 1.2 |
| RE | 3.0 | 0.9 |
| RA | 3.0 | ADJ* |
| ZW | 2.5 | 1.8 |
| ZI | 2.5 | 1.5 |
| ZG | 2.5 | 1.2 |
| ZE | 2.5 | 0.9 |
| ZA | 2.5 | ADJ* |
| WI | 1.8 | 1.5 |
| WG | 1.8 | 1.2 |
| WE | 1.8 | 0.9 |
| WA | 1.8 | ADJ* |
| AA | — | ADJ* |

*See Setting the Adjustable Nominal Voltage Threshold Section.

Table 3. Timeout Period Suffix Guide

| TIMEOUT PERIOD SUFFIX | ACTIVE TIMEOUT PERIOD | | |
|-----------------------|-----------------------|----------|----------|
| | MIN (ms) | TYP (MS) | MAX (ms) |
| D0 | — | 0.02 | — |
| D3 | 100 | 185 | 320 |

Ordering Information (continued)

| PART* | TEMP RANGE | PIN-PACKAGE |
|------------------|-----------------|-------------|
| MAX6759UT_D_-T | -40°C to +125°C | 6 SOT23-6 |
| MAX6760TA_ _D_-T | -40°C to +125°C | 8 TDFN-8 |
| MAX6761TA_ _D_-T | -40°C to +125°C | 8 TDFN-8 |
| MAX6762TA_ _D_-T | -40°C to +125°C | 8 TDFN-8 |
| MAX6763UT-T | -40°C to +125°C | 6 SOT23-6 |
| MAX6764UT-T | -40°C to +125°C | 6 SOT23-6 |

*Note: Insert the threshold level suffixes for V_{CC} and V_{CC2} (Tables 1 and 2) after UK, UT, or TA. For the MAX6754–MAX6759, insert only the V_{CC} threshold suffix after the UK or UT. Insert the reset timeout delay (Table 3) after D to complete the part number. For example, the MAX6760TALTD3-T provides a V_{CC} threshold of 5V, a V_{CC2} threshold of 3.3V, and a 100ms minimum reset timeout period. Sample stock is generally held on standard versions only (see the Standard Versions table). Standard versions have an order increment requirement of 2500 pieces. Nonstandard versions have an order increment requirement of 10,000 pieces. Contact factory for availability.

Low-Power, Single/Dual-Voltage Window Detectors

Standard Versions Table

| PART | TOP MARK |
|----------------------|----------|
| MAX6754 UKLD0 | AEOC |
| MAX6754UKLD3 | AEJN |
| MAX6754UKTD0 | AEOD |
| MAX6754UKTD3 | AEJO |
| MAX6754UKZD0 | AEJQ |
| MAX6754UKZD3 | AEOF |
| MAX6754UKWD0 | AEOG |
| MAX6754UKWD3 | AEJR |
| MAX6755 UKLD0 | AEOH |
| MAX6755UKLD3 | AEJS |
| MAX6755UKTD0 | AEOI |
| MAX6755UKTD3 | AEJT |
| MAX6755UKZD0 | AEKV |
| MAX6755UKZD3 | AEOK |
| MAX6755UKWD0 | AEOL |
| MAX6755UKWD3 | AEJW |
| MAX6756 UKLD0 | AEJX |
| MAX6756UKLD3 | AEOM |
| MAX6756UKTD0 | AEJY |
| MAX6756UKTD3 | AEON |
| MAX6756UKZD0 | AEOP |
| MAX6756UKZD3 | AEKA |
| MAX6756UKWD0 | AEKB |
| MAX6756UKWD3 | AEOQ |
| MAX6757 UTTD0 | ABST |
| MAX6757UTTD3 | ABRB |
| MAX6757UTLD0 | ABSO |
| MAX6757UTLD3 | ABRC |
| MAX6757UTZD0 | ABRE |
| MAX6757UTZD3 | ABSW |
| MAX6757UTWD0 | ABSX |
| MAX6757UTWD3 | ABRF |

| PART | TOP MARK |
|-----------------------|----------|
| MAX6758 UTLD0 | ABSY |
| MAX6758UTLD3 | ABRG |
| MAX6758UTTD0 | ABSZ |
| MAX6758UTTD3 | ABRH |
| MAX6758UTZD0 | ABRJ |
| MAX6758UTZD3 | ABTB |
| MAX6758UTWD0 | ABTC |
| MAX6758UTWD3 | ABRK |
| MAX6759 UTLD0 | ABRL |
| MAX6759UTLD3 | ABTD |
| MAX6759UTTD0 | ABRM |
| MAX6759UTTD3 | ABTE |
| MAX6759UTZD0 | ABTG |
| MAX6759UTZD3 | ABRO |
| MAX6759UTWD0 | ABRP |
| MAX6759UTWD3 | ABTH |
| MAX6760 TALTD3 | AIO |
| MAX6760TALAD3 | AHI |
| MAX6760TATZD3 | AIR |
| MAX6760TATWD3 | AHJ |
| MAX6760TATAD3 | AIT |
| MAX6760TARAD3 | AIV |
| MAX6760TAZWD3 | AIX |
| MAX6760TAZAD3 | AIZ |
| MAX6760TAWED3 | AJB |
| MAX6760TAWAD3 | AHL |

MAX6754-MAX6764

Low-Power, Single/Dual-Voltage Window Detectors

Standard Versions Table (continued)

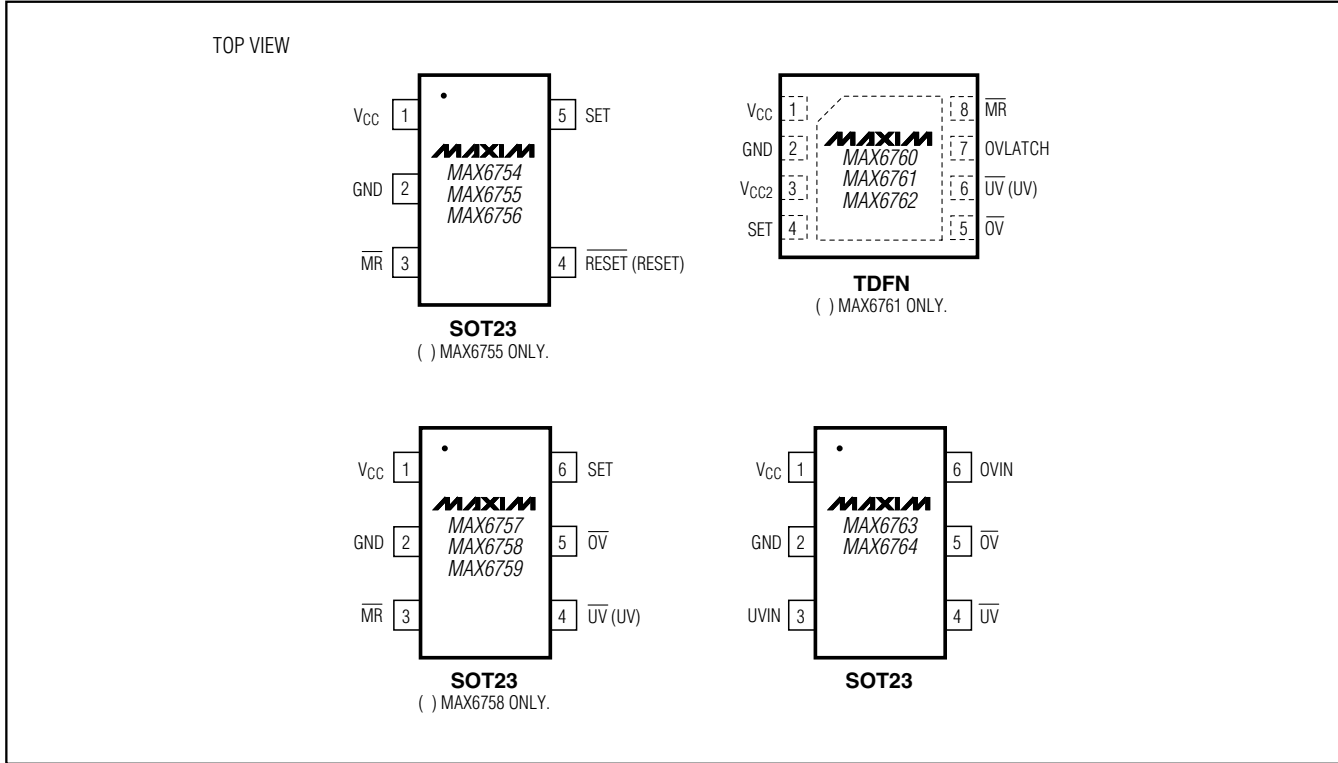
| PART | TOP MARK |
|-----------------------|----------|
| MAX6761 TALTD3 | AJD |
| MAX6761TALAD3 | AHN |
| MAX6761TATZD3 | AJG |
| MAX6761TATWD3 | AHO |
| MAX6761TATAD3 | AJI |
| MAX6761TARAD3 | AJK |
| MAX6761TAZWD3 | AJM |
| MAX6761TAZAD3 | AJO |
| MAX6761TAWED3 | AJQ |
| MAX6761TAWAD3 | AHQ |

| PART | TOP MARK |
|-----------------------|----------|
| MAX6762 TALTD3 | AJT |
| MAX6762TALAD3 | AHR |
| MAX6762TATZD3 | AJW |
| MAX6762TATWD3 | AJY |
| MAX6762TATAD3 | AKA |
| MAX6762TARAD3 | AKB |
| MAX6762TAZWD3 | AHT |
| MAX6762TAZAD3 | AKE |
| MAX6762TAWED3 | AKF |
| MAX6762TAWAD3 | AKH |
| MAX6763 UT | ABRQ |
| MAX6764 UT | ABRR |

Low-Power, Single/Dual-Voltage Window Detectors

Pin Configurations

MAX6754-MAX6764



Chip Information

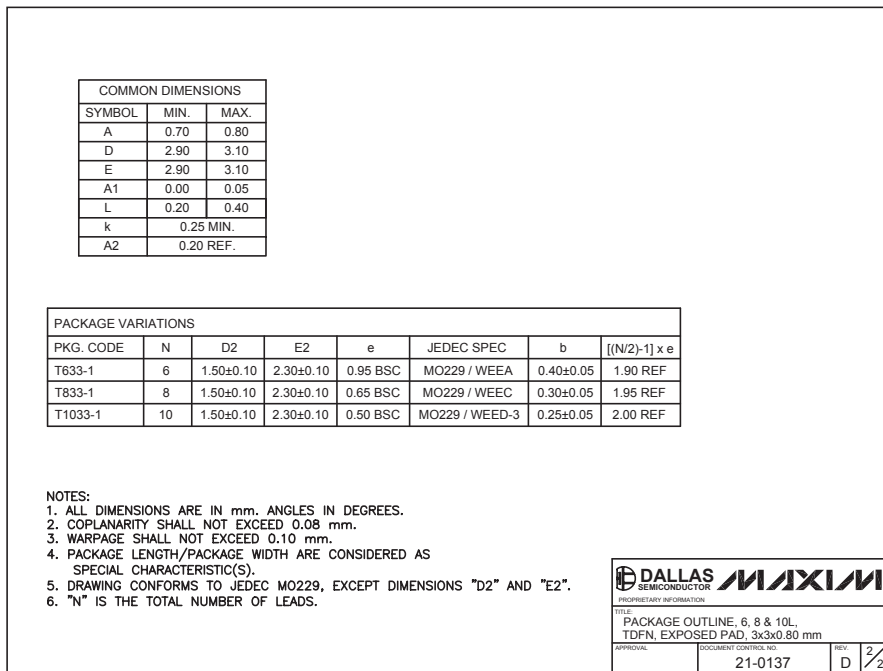
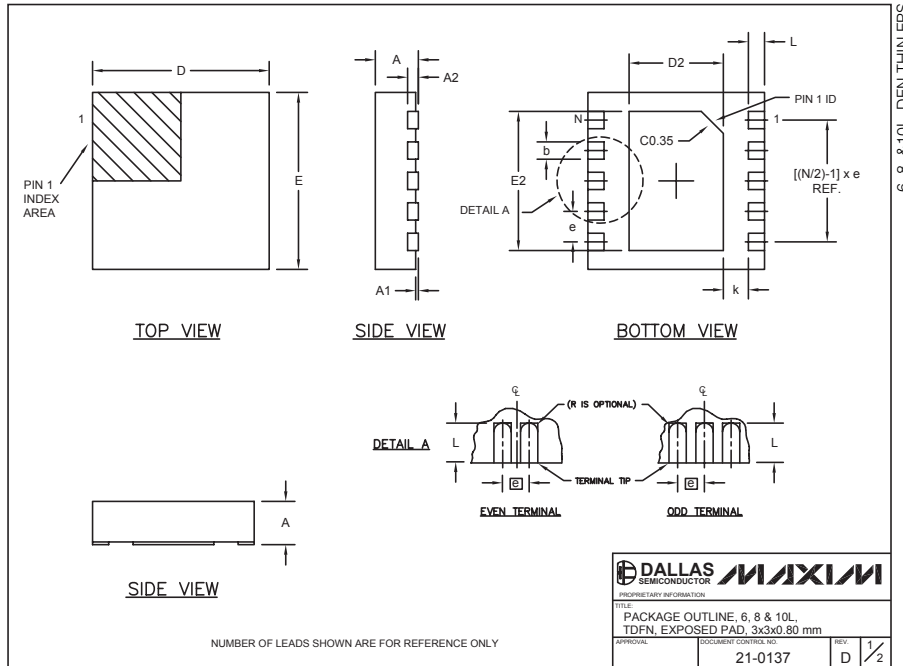
TRANSISTOR COUNT: 726

PROCESS: BiCMOS

Low-Power, Single/Dual-Voltage Window Detectors

Package Information

(The package drawing(s) in this data sheet may not reflect the most current specifications. For the latest package outline information, go to www.maxim-ic.com/packages.)

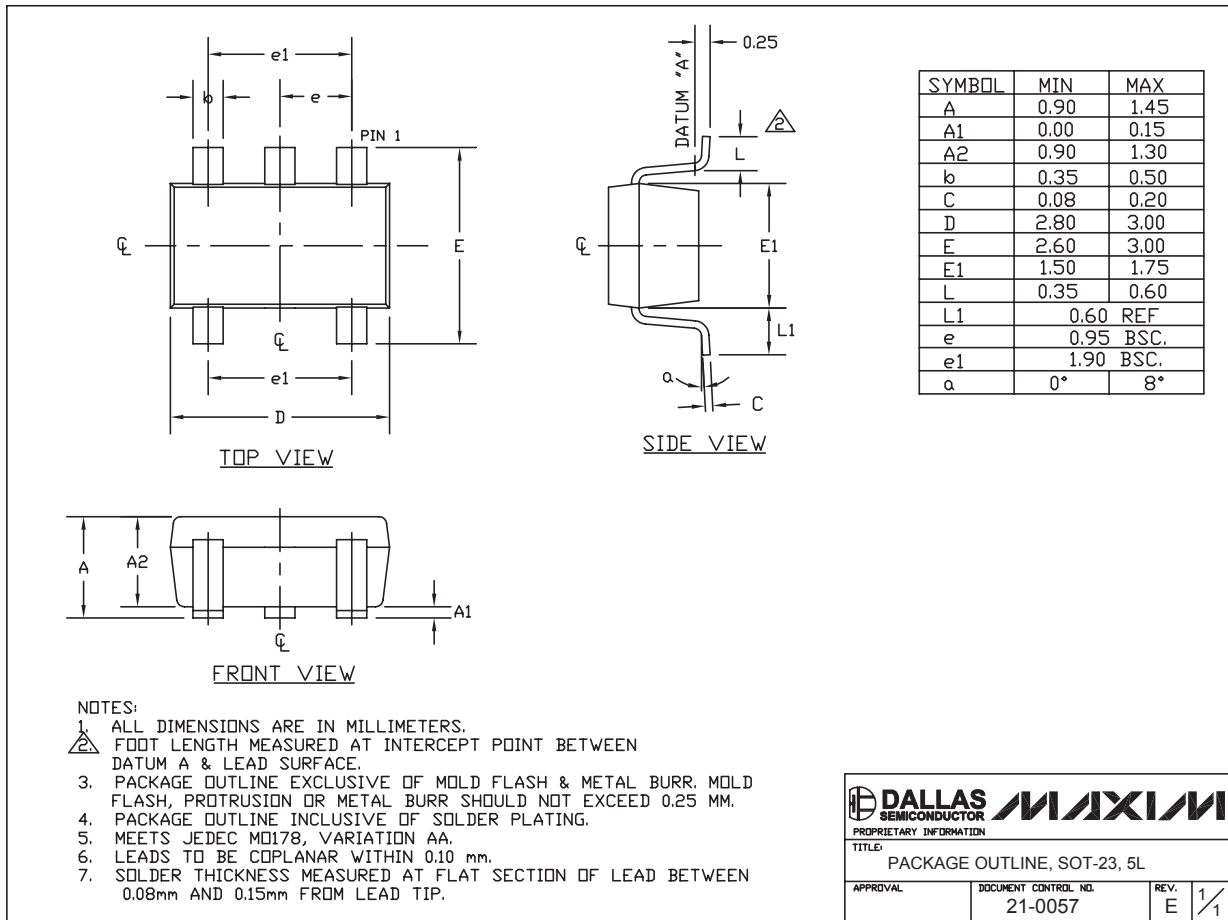


Low-Power, Single/Dual-Voltage Window Detectors

Package Information (continued)

(The package drawing(s) in this data sheet may not reflect the most current specifications. For the latest package outline information, go to www.maxim-ic.com/packages.)

MAX6754-MAX6764



SOT-23, 5L, EPS

| | | |
|---------------------------------------|---------------------------------|-----------|
| | | |
| PROPRIETARY INFORMATION | | |
| TITLE: PACKAGE OUTLINE, SOT-23, 5L | | |
| APPROVAL | DOCUMENT CONTROL NO. 21-0057 | REV. E |
| | | 1/1 |

Low-Power, Single/Dual-Voltage Window Detectors

Package Information (continued)

(The package drawing(s) in this data sheet may not reflect the most current specifications. For the latest package outline information, go to www.maxim-ic.com/packages.)

| SYMBOL | MIN | MAX |
|--------|------|------|
| A | 0.90 | 1.45 |
| A1 | 0.00 | 0.15 |
| A2 | 0.90 | 1.30 |
| b | 0.35 | 0.50 |
| C | 0.08 | 0.20 |
| D | 2.80 | 3.00 |
| E | 2.60 | 3.00 |
| E1 | 1.50 | 1.75 |
| L | 0.35 | 0.60 |
| L1 | 0.60 | REF. |
| e1 | 1.90 | BSC. |
| e | 0.95 | BSC. |
| α | 0° | 10° |

NOTES:

- ALL DIMENSIONS ARE IN MILLIMETERS.
- FOOT LENGTH MEASURED AT INTERCEPT POINT BETWEEN DATUM A & LEAD SURFACE.
- PACKAGE OUTLINE EXCLUSIVE OF MOLD FLASH & METAL BURR. MOLD FLASH, PROTRUSION OR METAL BURR SHOULD NOT EXCEED 0.25 MM.
- PACKAGE OUTLINE INCLUSIVE OF SOLDER PLATING.
- PIN 1 IS LOWER LEFT PIN WHEN READING TOP MARK FROM LEFT TO RIGHT. (SEE EXAMPLE TOP MARK)
- PIN 1 I.D. DOT IS 0.3 MM Ø MIN. LOCATED ABOVE PIN 1.
- MEETS JEDEC MO178, VARIATION AB.
- SOLDER THICKNESS MEASURED AT FLAT SECTION OF LEAD BETWEEN 0.08mm AND 0.15mm FROM LEAD TIP.
- LEAD TO BE COPLANAR WITHIN 0.1 MM.

6LSOT.EPS

| | | |
|------------------------------------|---------------------------------|------------|
| | | |
| PROPRIETARY INFORMATION | | |
| TITLE: PACKAGE OUTLINE, SOT-23, 6L | | |
| APPROVAL | DOCUMENT CONTROL NO. 21-0058 | REV. F 1/1 |

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