

R3134x SERIES

LOW VOLTAGE DETECTOR WITH BUILT-IN DELAY CIRCUIT

NO.EA-209-160316

OUTLINE

R3134x Series are CMOS-based voltage detector ICs with built-in delay circuit, high detector threshold accuracy, and ultra low supply current, which can operate at low voltage.

These ICs can be used as system reset generators, and each of these ICs consists of a voltage reference, a comparator, resistors for setting voltage detector threshold, an output driver transistor, manual reset circuit, and an output delay generator.

Detector threshold is fixed internally with high accuracy and requires no adjustment. When a supply voltage crosses a setting detector threshold voltage from a high value to a lower value, this IC generates reset signal.

R3134x Series output "L" at its detect.

Since each of R3134x Series embeds an output delay generator, during a setting 240ms delay time, which is fixed in the IC, this IC keeps the reset condition after they are released. Released conditions will be kept for the delay time from when a supply voltage crosses a setting detector threshold voltage from a low value to a higher value, or from when the manual reset signal is released.

Two output types, Nch open drain type and CMOS type, are available.

Since the packages for these ICs are DFN(PLP)1212-6, SOT-23-5, and SC-88A, high density mounting of the ICs on board is possible.

FEATURES

| Supply Current | Τyp. 0.8μA (R3134x27Ex, V _{DD} =3.0V) |
|---|---|
| Operating Voltage Range | 0.75V to 6.0V (Topt=25°C) |
| Detector Threshold Range | 1.0V to 5.0V (0.1V steps) |
| | Further, 2.32V, 2.63V, 2.93V, 3.08V, 4.38V, and |
| | 4.63V can be provided as standard. |
| Detector Threshold Accuracy | ±1.8% |
| Temperature-Drift Coefficient of Detector Threshold | Typ. ±100ppm/°C |
| Built-in Delay Time Circuit | Typ. 240ms |
| Output Delay Time Accuracy | ±15% |
| Output Types | Nch Open Drain and CMOS |
| Packages | DFN(PLP)1212-6, SC-88A, SOT-23-5 |

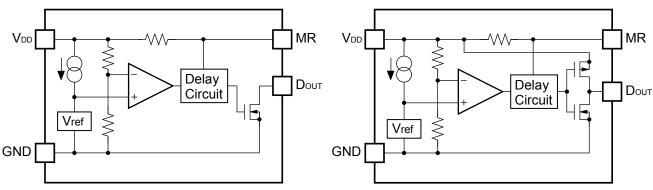
APPLICATIONS

- CPU and Logic Circuit Reset
- · Battery Checker
- Window Comparator
- Wave Shaping Circuit
- · Battery Back-up Circuit
- · Power Failure Detector

BLOCK DIAGRAMS

Nch Open Drain Output (R3134xxxEA)

CMOS Output (R3134xxxEC)



SELECTION GUIDE

The package type, the detector threshold, the output type and the taping type for the ICs can be selected at the users' request.

| Product Name | Package | Quantity per Reel | Pb Free | Halogen Free |
|---------------------|----------------|----------------------|---------|--------------|
| R3134KxxE*(y)-TR | DFN(PLP)1212-6 | 5,000 pcs | Yes | Yes |
| R3134QxxE*(y)-TR-FE | SC-88A | 3,000 pcs | Yes | Yes |
| R3134NxxE*(y)-TR-FE | SOT-23-5 | 3,000 pcs | Yes | Yes |

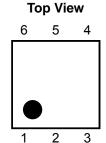
xx: The detector threshold can be designated in the range from 1.0V(10) to 5.0V(50) in 0.1V steps.

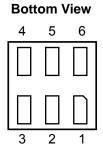
- * : Designation of Output Type
 - (A) Nch Open Drain
 - (C) CMOS

y: If the detector threshold includes the 3rd digit, indicate the digit of 0.01V. (Example) If the detector threshold is 2.63V, R3134x26E*3-TR-x

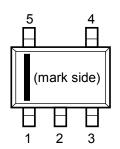
PIN CONFIGURATIONS

• DFN(PLP)1212-6

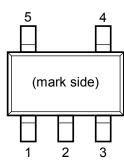




• SC-88A







PIN DESCRIPTIONS

• DFN(PLP)1212-6

| Pin No. | Symbol | Description |
|---------|--------------|-------------------------------|
| 1 | V_{DD} | Input Pin |
| 2 | NC | No Connection |
| 3 | GND | Ground Pin |
| 4 | D оит | Output Pin ("L" at detection) |
| 5 | NC | No Connection |
| 6 | MR | Manual Reset Input Pin* |

• SC-88A

| Pin No. | Symbol | Description |
|---------|--------------|-------------------------------|
| 1 | V_{DD} | Input Pin |
| 2 | GND | Ground Pin |
| 3 | MR | Manual Reset Input Pin* |
| 4 | D оит | Output Pin ("L" at detection) |
| 5 | NC | No Connection |

• SOT-23-5

| Pin No. | Symbol | Description |
|---------|--------------|-------------------------------|
| 1 | D оит | Output Pin ("L" at detection) |
| 2 | V_{DD} | Input Pin |
| 3 | GND | Ground Pin |
| 4 | MR | Manual Reset Input Pin* |
| 5 | NC | No Connection |

^{*)} MR pin is active at "L" input. Pulled up via $1M\Omega$ (Typ.). If MR pin is not necessary, open this node, or connect it to V_{DD} .

ABSOLUTE MAXIMUM RATINGS

| Symbol | Item | Rating | Unit |
|-----------------|--|--------------------|------|
| V _{DD} | Supply Voltage | 6.5 | V |
| Vout | Output Voltage (Nch Open Drain Output) | Vss-0.3 to 6.5 | V |
| V 001 | Output Voltage (CMOS Output) | Vss-0.3 to VDD+0.3 | V |
| V _{MR} | Input Voltage | Vss-0.3 to VDD+0.3 | V |
| Іоит | Output Current | 20 | mA |
| | Power Dissipation (DFN(PLP)1212-6)* | 400 | |
| PD | Power Dissipation (SC-88A)* | 380 | mW |
| | Power Dissipation (SOT-23-5)* | 420 | |
| Topt | Operating Temperature Range | -40 to 85 | °C |
| Tstg | Storage Temperature Range | -55 to 125 | °C |

^{*)} For Power Dissipation, please refer to PACKAGE INFORMATION.

ABSOLUTE MAXIMUM RATINGS

Electronic and mechanical stress momentarily exceeded absolute maximum ratings may cause the permanent damages and may degrade the life time and safety for both device and system using the device in the field. The functional operation at or over these absolute maximum ratings is not assured.

ELECTRICAL CHARACTERISTICS

• R3134x

The specification in ____ is checked and guaranteed by design engineering at $-40^{\circ}\text{C} \le \text{Topt} \le 85^{\circ}\text{C}$.

Topt=25°C

| Symbol | Item | Co | onditions | Min. | Тур. | Max. | Unit |
|------------------------------------|---|--|-------------------------|----------------------------|---------|----------------------------|-------------|
| VDET | Detector Threshold | | | V _{DET} ×0.982 | | V _{DET} ×1.018 | > |
| lss1 | Supply Current1 | VDD=VDET-0 | 0.1V, IOUT=0A | | | 2.0 | μΑ |
| lss2 | Supply Current2 | V _{DD} =V _{DET} +0 | .1V, Іоит=0A | | | 2.0 | μΑ |
| | | | V _{DET} < 1.6V | | | 3.6 | |
| lss3 | Supply Current3 | Vdd=6V, Iout=0A | 1.6 ≤ VDET < 2.7V | | | 3.0 | μΑ |
| | | | 2.7V ≤ V _{DET} | | | 2.5 | |
| \/ | Operating Voltage | Topt=25°C | | 0.75 | | 6.00 | W |
| VDD | Operating Voltage | $-40^{\circ}C \leq Topt \leq 85^{\circ}C$ | | 0.85 | | 6.00 | V |
| Vон | "H" Output Voltage | | Refer to | the followin | g table | | |
| Vol | "L" Output Voltage | | Refer to | the followin | g table | | |
| VIH | MR pin "H" Input Voltage | $V_{DD} \ge V_{DET} +$ | -0.1V | 0.75×V _{DD} | | | V |
| VIL | MR pin "L" Input Voltage | $V_{DD} \ge V_{DET} +$ | -0.1V | | | 0.2×V _{DD} | V |
| RMR | MR pin pull-up Resistance | Topt=25°C | | 0.5 | 1.0 | 4.0 | MΩ |
| $\Delta V_{DET}/$ ΔT_{Opt} | Detector Threshold Temperature Coefficient | $-40^{\circ}C \le T_{opt} \le 85^{\circ}C$ | | | ±100 | | ppm /°C |
| treset | Output Delay Time for detect * | $V_{DD}=V_{DET} \rightarrow V_{DET}=0.1V$ | | | 15 | | μS |
| tdelay | Output Delay Time for release | V _{DD} =0.8V→ | V DET+1.0 | 204 | 240 | 276 | ms |

^{*)} Guaranteed by design, not mass production tested.

RECOMMENDED OPERATING CONDITIONS (ELECTRICAL CHARACTERISTICS)

All of electronic equipment should be designed that the mounted semiconductor devices operate within the recommended operating conditions. The semiconductor devices cannot operate normally over the recommended operating conditions, even if when they are used over such conditions by momentary electronic noise or surge. And the semiconductor devices may receive serious damage when they continue to operate over the recommended operating conditions.

• "H" Output Voltage (Vон) table

Topt=25°C

| Products | Detector Threshold | "H" Output Voltage Vон (V) | | | | | | |
|------------|--------------------------------|---|---------------------|------|------|--|--|--|
| | V _{DET} (V) | Conditions | Min. | Тур. | Max. | | | |
| | V _{DET} < 1.2V | V _{DD} =V _{DET} +0.1V, I _{OH} =50μA | | | | | | |
| D2424xavEC | 1.2V ≤ V _{DET} < 2.0V | V _{DD} =V _{DET} +0.1V, I _{OH} =150μA | 00.1/ | | | | | |
| R3134xxxEC | 2.0V ≤ V _{DET} < 3.1V | V _{DD} =V _{DET} +0.1V, I _{OH} =500μA | 0.8×V _{DD} | | | | | |
| | 3.1V ≤ VDET | V _{DD} =V _{DET} +0.1V, I _{OH} =800μA | | | | | | |

V_{DET} is a set value.

• "L" Output Voltage (VoL) table

Topt=25°C

| Products | Detector Threshold | "L" Output Voltage Vol (V) | | | | | | |
|------------|--------------------------------|---|------|------|------|--|--|--|
| Products | V _{DET} (V) | Conditions | Min. | Тур. | Max. | | | |
| | V _{DET} < 1.2V | Vdd=Vdet-0.1V, Iol=200μA | | | 0.04 | | | |
| D2124vovEv | $1.2V \le V_{DET} \le 2.0V$ | $V_{DD}=V_{DET}-0.1V$, $I_{OL}=750\mu A$ | | | 0.06 | | | |
| R3134xxxEx | 2.0V ≤ V _{DET} < 3.1V | VDD=VDET-0.1V, IOL=1.2mA | | | 0.05 | | | |
| | 3.1V ≤ V _{DET} | VDD=VDET-0.1V, IOL=3.2mA | | | 0.06 | | | |

VDET is a set value.

DETECTOR THRESHOLD SPECIFICATIONS BY PART NUMBER

• R3134x

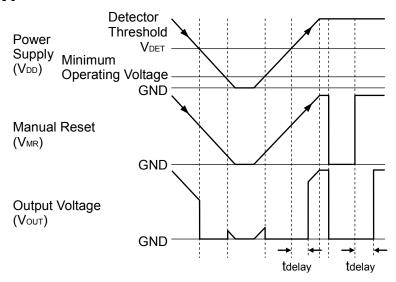
| | | Operat | ing Voltage | | Detec | tor Thre | shold | Supply C | Supply Current 1 | |
|-------------|------------|--------|---------------------|-------|-------|----------|-------|---------------|------------------|------|
| Part Number | | ٧ | DD [V] | | | VDET [V] | | Iss1 [| μΑ] | |
| | Conditions | Min. | Conditions | Min. | Min. | Тур. | Max. | Conditions | Тур. | Max. |
| R3134x23Ex2 | | | | | 2.278 | 2.320 | 2.362 | | 0.8 | |
| R3134x26Ex3 | | | | | 2.583 | 2.630 | 2.677 | | 0.0 | |
| R3134x29Ex3 | Topt=25°C | 0.75 | -40°C ≤ Topt ≤ 85°C | 0.85 | 2.877 | 2.930 | 2.983 | VDD=VDET-0.1V | | 2.0 |
| R3134x30Ex8 | Τορι=25 Ο | 0.75 | -40 O 3 Topt 3 00 O | 0.00 | 3.025 | 3.080 | 3.135 | Iout=0A | 0.9 | 2.0 |
| R3134x43Ex8 | | | | | 4.301 | 4.380 | 4.459 | | 0.5 | |
| R3134x46Ex3 | | | | | 4.547 | 4.630 | 4.713 | | | |
| R3134x10Ex | | | | | 0.982 | 1.000 | 1.018 | | | |
| R3134x11Ex | | | | | 1.080 | 1.100 | 1.120 | | | |
| R3134x12Ex | | | | | 1.178 | 1.200 | 1.222 | | | |
| R3134x13Ex | | | | | 1.277 | 1.300 | 1.323 | | | |
| R3134x14Ex | | | | | 1.375 | 1.400 | 1.425 | | | |
| R3134x15Ex | | | | | 1.473 | 1.500 | 1.527 | | | |
| R3134x16Ex | | | | | 1.571 | 1.600 | 1.629 | | | |
| R3134x17Ex | | | | | 1.669 | 1.700 | 1.731 | | | |
| R3134x18Ex |] | | | | 1.768 | 1.800 | 1.832 | | 0.8 | |
| R3134x19Ex | | | | | 1.866 | 1.900 | 1.934 | | | |
| R3134x20Ex | | | | | 1.964 | 2.000 | 2.036 | | | |
| R3134x21Ex | | | | | 2.062 | 2.100 | 2.138 | | | |
| R3134x22Ex | 1 | | | | 2.160 | 2.200 | 2.240 | | | |
| R3134x23Ex | 1 | | | | 2.259 | 2.300 | 2.341 | | | |
| R3134x24Ex | 1 | | | | 2.357 | 2.400 | 2.443 | | | |
| R3134x25Ex | | | | | 2.455 | 2.500 | 2.545 | - | | |
| R3134x26Ex | | | | 2.553 | 2.600 | 2.647 | 1 | | | |
| R3134x27Ex | | | | | 2.651 | 2.700 | 2.749 | | | |
| R3134x28Ex | | | | | 2.750 | 2.800 | 2.850 | | | |
| R3134x29Ex | | | | | 2.848 | 2.900 | 2.952 | | | |
| R3134x30Ex | Topt=25°C | 0.75 | -40°C ≤ Topt ≤ 85°C | 0.85 | 2.946 | 3.000 | 3.054 | VDD=VDET-0.1V | | 2.0 |
| R3134x31Ex | | | | | 3.044 | 3.100 | 3.156 | lout=0A | | |
| R3134x32Ex | | | | | 3.142 | 3.200 | 3.258 | | | |
| R3134x33Ex | | | | | 3.241 | 3.300 | 3.359 | | | |
| R3134x34Ex | | | | | 3.339 | 3.400 | 3.461 | | | |
| R3134x35Ex | | | | | 3.437 | 3.500 | 3.563 | | | |
| R3134x36Ex | | | | | 3.535 | 3.600 | 3.665 | | | |
| R3134x37Ex | | | | | 3.633 | 3.700 | 3.767 | | | |
| R3134x38Ex | | | | | 3.732 | 3.800 | 3.868 | | | |
| R3134x39Ex | 1 | | | | 3.830 | 3.900 | 3.970 | 1 | 0.9 | |
| R3134x40Ex | | | | | 3.928 | 4.000 | 4.072 | | | |
| R3134x41Ex | | | | | 4.026 | 4.100 | 4.072 | | | |
| R3134x42Ex | 1 | | | | 4.124 | 4.200 | 4.174 | 1 | | |
| R3134x43Ex | | | | | 4.223 | 4.300 | 4.377 | | | |
| R3134x44Ex | | | | | 4.321 | 4.400 | 4.479 | | | |
| R3134x45Ex | | | | | 4.419 | 4.500 | 4.581 | | | |
| R3134x46Ex | | | | 4.517 | | | | | | |
| | 1 | | | | | 4.600 | 4.683 | 1 | | |
| R3134x47Ex | 1 | | | | 4.615 | 4.700 | 4.785 | | | |
| R3134x48Ex | | | | | 4.714 | 4.800 | 4.886 | | | |
| R3134x49Ex | | | | | 4.812 | 4.900 | 4.988 | | | |
| R3134x50Ex | | 1 | 1 | | 4.910 | 5.000 | 5.090 | I | l | 1 |

| Supply Cu | urrent 2 | | Supply C | urrent 3 | ļ | "H" Output Volt | age |
|--------------------------|--------------------------|------|---------------------|----------------------------|----------------------------|--|-------------|
| ISS2 [µ | ιA] | | Issa [| Isss [μA] | | Vон [V] | |
| Conditions | Тур. | Max. | Conditions | Тур. | Max. | Conditions | Min. |
| VDD=VDET+0.1V | 0.8 | 2.0 | VDD=6.0V | 1.2 | 3.0 | Vdd=Vdet+0.1V Ioн=500µA | 0.8× |
| Iout=0A | 10111=UA 1 1 1011=UA 1 1 | 2.0 | 2.5 | VDD=VDET+0.1V IOH=800μA | VDD | | |
| | | | | | | Vdd=Vdet+0.1V Ioh=50μA | |
| | | | | 1.4 | 3.6 | Vdd=Vdet+0.1V | |
| | | | | 1.4 | | VDD=VDET+U.TV Іон=150μА | |
| | | | | | 3.0 | | - |
| | | | | 1.2 | | V _{DD=} V _{DET+} 0.1V IOH=500μA | |
| VDD=VDET+0.1V IOUT=0A | 0.8 | 2.0 | Vdd=6.0V Iout=0A | | | | 0.8× VDD |
| 1501-01 | | | 1001-0/1 | 1.0 2.5 VDI | Vdd=Vdet+0.1V Ioн=800μA | VSD | |
| | | | | 0.8 | | | |

| Part Number | | "L" Output Vo | oltage | MR pin "H" Voltage | | MR pin "L" Voltage | | MR pin p | MR pin pull-up resistanc | | | | | | | |
|---|-------------|----------------|---------------|-----------------------|-------|-------------------------|---------|------------|--------------------------|------|------|--|--|--|--|--|
| R3134x29Ex3 | Part Number | Vol [V] | | ViH [V] | | Vı∟[V] | Vı∟ [V] | | RMR [MΩ |] | | | | | | |
| R3134429Ex3 | | Conditions | Max. | Conditions | Min. | Conditions | Max. | Conditions | Min. | Тур. | Max. | | | | | |
| R3134429Ex3 | R3134x23Ex2 | | | | | | | | | | | | | | | |
| R3134x29Ex3 | R3134x26Ex3 | VDD=VDET-0.1V | VDD=VDET-0.1V | VDD=VDET-0.1V | | | | | | | | | | | | |
| R3134x30Ex8 Vob_Vobet_0.1V Vob Vobet_0.1V Vob Vobet_0.1X Vob Vobet_0.1V Vob Vobet_0.1X Vob Vo | R3134x29Ex3 | IoL=1.2mA | 0.05 | ., ., ., | 0.75× | ., ,, ,, | 0.2× | | | 4.0 | | | | | | |
| R3134x46Ex3 | R3134x30Ex8 | | | VDD ≥ VDET+0.1 | | VDD ≥ VDET+U.1 | VDD | Topt=25°C | 0.5 | 1.0 | 4.0 | | | | | |
| R3134x40Ex Vob-Vber-0.1V ol200µA R3134x11Ex R3134x13Ex R3134x13Ex R3134x13Ex R3134x13Ex R3134x13Ex Vbo-Vber-0.1V ol750µA R3134x14Ex R3134x12Ex Vbo-Vber-0.1V ol200µA R3134x2Ex R3134x3Ex R313 | R3134x43Ex8 | VDD=VDET-0.1V | 0.00 | | | | | | | | | | | | | |
| R3134x11Ex Iou=200µA 0.04 | R3134x46Ex3 | lol=3.2mA | 0.06 | | | | | | | | | | | | | |
| R3134X1EX R3134X2EX R3134X3EX R3134X4EX R3134 | R3134x10Ex | VDD=VDET-0.1V | 0.04 | | | | | | | | | | | | | |
| R3134x13Ex R3134x16Ex R3134x16Ex R3134x16Ex R3134x16Ex R3134x16Ex R3134x10Ex R3134x21Ex R3134x21Ex R3134x22Ex R3134x23Ex R3134x32Ex R3134x3Ex R3134x3Ex R3134x42Ex R3134x42Ex R3134x42Ex R3134x44Ex | R3134x11Ex | IoL=200μA | 0.04 | | | | | | | | | | | | | |
| R3134x14Ex R3134x16Ex R3134x16Ex R3134x16Ex R3134x19Ex R3134x19Ex R3134x29Ex R3134x22Ex R3134x32Ex R3134x3Ex R3134x4Ex | R3134x12Ex | | | | | | | | | | | | | | | |
| R3134x15EX R3134x17EX R3134x17EX R3134x17EX R3134x19EX R3134x20EX R3134x30EX R3134x40EX | R3134x13Ex | | | | | | | | | | | | | | | |
| R3134x16EX R3134x1FEX R3134x19EX R3134x21EX R3134x22EX R3134x32EX R3 | R3134x14Ex | | | | | | | | | | | | | | | |
| R3134x16EX R3134x1FEX R3134x19EX R3134x21EX R3134x22EX R3134x32EX R3 | R3134x15Ex | VDD=VDET-0.1V | 0.00 | | | | | | | | | | | | | |
| R3134x17Ex R3134x19Ex R3134x19Ex R3134x20Ex R3134x20Ex R3134x23Ex R3134x24Ex R3134x25Ex R3134x26Ex R3134x27Ex R3134x20Ex R3134x20Ex R3134x20Ex R3134x20Ex R3134x20Ex R3134x20Ex R3134x30Ex R3134x40Ex | | - | 0.06 | | | | | | | | | | | | | |
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| R3134x21Ex R3134x22Ex R3134x22Ex R3134x25Ex R3134x25Ex R3134x25Ex R3134x26Ex R3134x26Ex R3134x29Ex R3134x29Ex R3134x30Ex R3134x30Ex R3134x31Ex R3134x32Ex R3134x35Ex R3134x35Ex R3134x36Ex R3134x46Ex R3134x46Ex R3134x46Ex R3134x46Ex R3134x47Ex R3134x48Ex | R3134x19Ex | | | | | | | | | | | | | | | |
| R3134x22Ex R3134x23Ex R3134x26Ex R3134x26Ex R3134x26Ex R3134x26Ex R3134x20Ex R3134x20Ex R3134x20Ex R3134x30Ex R3134x30Ex R3134x30Ex R3134x30Ex R3134x36Ex R3134x40Ex R3134x40Ex R3134x40Ex R3134x41Ex R3134x46Ex R3134x46Ex R3134x46Ex R3134x46Ex R3134x46Ex R3134x47Ex R3134x47Ex R3134x47Ex R3134x47Ex R3134x47Ex R3134x47Ex R3134x47Ex R3134x48Ex | | | | | | | | | | | | | | | | |
| R3134x22Ex R3134x23Ex R3134x26Ex R3134x26Ex R3134x26Ex R3134x26Ex R3134x20Ex R3134x20Ex R3134x20Ex R3134x30Ex R3134x30Ex R3134x30Ex R3134x30Ex R3134x36Ex R3134x40Ex R3134x40Ex R3134x40Ex R3134x41Ex R3134x46Ex R3134x46Ex R3134x46Ex R3134x46Ex R3134x46Ex R3134x47Ex R3134x47Ex R3134x47Ex R3134x47Ex R3134x47Ex R3134x47Ex R3134x47Ex R3134x48Ex | | | | | | | | | | | | | | | | |
| R3134x23Ex R3134x26Ex R3134x25Ex R3134x26Ex R3134x27Ex R3134x29Ex R3134x30Ex R3134x30Ex R3134x31Ex R3134x32Ex R3134x33Ex R3134x35Ex R3134x35Ex R3134x36Ex R3134x40Ex R3134x40Ex R3134x42Ex R3134x45Ex R3134x45Ex R3134x45Ex R3134x47Ex | | | | | | | | | | | | | | | | |
| R3134x24Ex R3134x26Ex R3134x26Ex R3134x26Ex R3134x26Ex R3134x29Ex R3134x30Ex R3134x30Ex R3134x31Ex R3134x32Ex R3134x32Ex R3134x35Ex R3134x35Ex R3134x36Ex R3134x40Ex R3134x41Ex R3134x42Ex R3134x42Ex R3134x45Ex R3134x45Ex R3134x45Ex R3134x45Ex R3134x47Ex | | _ | | | | | | | | | | | | | | |
| R3134x25Ex R3134x26Ex R3134x26Ex R3134x29Ex R3134x29Ex R3134x30Ex R3134x40Ex R3 | | . 1002 | | | | | | | | | | | | | | |
| R3134x26Ex R3134x27Ex R3134x29Ex R3134x30Ex R3134x30Ex R3134x31Ex R3134x31Ex R3134x36Ex R3134x35Ex R3134x36Ex R3134x40Ex R3134x40Ex R3134x44Ex R3134x44Ex R3134x44Ex R3134x44Ex R3134x46Ex | | | _ | _ | - | | 0.05 | | | | | | | | | |
| R3134x27Ex R3134x28Ex R3134x30Ex R3134x30Ex R3134x31Ex R3134x33Ex R3134x33Ex R3134x33Ex R3134x36Ex R3134x39Ex R3134x39Ex R3134x39Ex R3134x39Ex R3134x39Ex R3134x39Ex R3134x30Ex R3134x40Ex R3134x40Ex R3134x44Ex R3134x44Ex R3134x44Ex R3134x45Ex R3134x45Ex R3134x45Ex R3134x46Ex | | | | | | | | | | | | | | | | |
| R3134x28Ex R3134x29Ex R3134x30Ex R3134x31Ex R3134x33Ex R3134x33Ex R3134x33Ex R3134x33Ex R3134x35Ex R3134x36Ex R3134x37Ex R3134x39Ex R3134x39Ex R3134x40Ex R3134x42Ex R3134x42Ex R3134x44Ex R3134x46Ex R3134x46Ex R3134x46Ex R3134x46Ex R3134x48Ex | | | | | | | | | | | | | | | | |
| R3134x29Ex R3134x30Ex R3134x31Ex R3134x32Ex R3134x33Ex R3134x33Ex R3134x33Ex R3134x35Ex R3134x35Ex R3134x36Ex R3134x39Ex R3134x39Ex R3134x40Ex R3134x41Ex R3134x42Ex R3134x44Ex R3134x44Ex R3134x46Ex R3134x47Ex R3134x48Ex | | | | | | | | | | | | | | | | |
| R3134x30Ex R3134x31Ex R3134x32Ex R3134x35Ex R3134x35Ex R3134x37Ex R3134x37Ex R3134x39Ex R3134x40Ex R3134x40Ex R3134x45Ex R3134x44Ex R3134x45Ex | | | | | | | | | | | | | | | | |
| R3134x31Ex R3134x32Ex R3134x35Ex R3134x35Ex R3134x36Ex R3134x39Ex R3134x39Ex R3134x40Ex R3134x41Ex R3134x42Ex R3134x42Ex R3134x44Ex R3134x45Ex R3134x44Ex R3134x45Ex R3134x46Ex R3134x46Ex R3134x47Ex R3134x48Ex | | | | VDD > VDET+0.1 | | VDD > VDET+0.1 | | Topt=25°C | 0.5 | 1.0 | 4.0 | | | | | |
| R3134x32Ex R3134x33Ex R3134x34Ex R3134x35Ex R3134x36Ex R3134x37Ex R3134x38Ex R3134x39Ex R3134x40Ex R3134x41Ex R3134x41Ex R3134x42Ex R3134x44Ex R3134x44Ex R3134x44Ex R3134x45Ex R3134x45Ex R3134x46Ex R3134x47Ex R3134x48Ex | | | | | VDD | | VDD | | | | | | | | | |
| R3134x33Ex R3134x34Ex R3134x35Ex R3134x36Ex R3134x37Ex R3134x38Ex R3134x39Ex R3134x40Ex R3134x41Ex R3134x41Ex R3134x44Ex R3134x44Ex R3134x44Ex R3134x45Ex R3134x45Ex R3134x46Ex R3134x47Ex R3134x48Ex | | _ | | | | | | | | | | | | | | |
| R3134x34Ex R3134x35Ex R3134x36Ex R3134x37Ex R3134x39Ex R3134x49Ex R3134x40Ex R3134x41Ex R3134x42Ex R3134x45Ex R3134x45Ex R3134x45Ex R3134x45Ex R3134x45Ex R3134x47Ex R3134x48Ex | | | | | | | | | | | | | | | | |
| R3134x35Ex R3134x36Ex R3134x38Ex R3134x39Ex R3134x40Ex R3134x41Ex R3134x41Ex R3134x42Ex R3134x44Ex R3134x45Ex R3134x45Ex R3134x45Ex R3134x45Ex R3134x47Ex R3134x48Ex | | | | | | | | | | | | | | | | |
| R3134x36Ex R3134x37Ex R3134x38Ex R3134x39Ex R3134x40Ex R3134x41Ex R3134x42Ex R3134x44Ex R3134x44Ex R3134x44Ex R3134x45Ex R3134x45Ex R3134x47Ex R3134x47Ex R3134x48Ex | | | | | | | | | | | | | | | | |
| R3134x37Ex R3134x38Ex R3134x40Ex R3134x41Ex R3134x42Ex R3134x44Ex R3134x44Ex R3134x44Ex R3134x45Ex R3134x45Ex R3134x47Ex R3134x47Ex R3134x47Ex R3134x47Ex | | _ | | | | | | | | | | | | | | |
| R3134x38Ex R3134x49Ex R3134x41Ex R3134x42Ex R3134x44Ex R3134x44Ex R3134x45Ex R3134x45Ex R3134x47Ex R3134x47Ex R3134x47Ex R3134x47Ex R3134x48Ex | | | | | | | | | | | | | | | | |
| R3134x49Ex R3134x41Ex R3134x42Ex R3134x44Ex R3134x45Ex R3134x45Ex R3134x45Ex R3134x47Ex R3134x47Ex R3134x48Ex | | † | | | | | | | | | | | | | | |
| R3134x40Ex R3134x41Ex R3134x42Ex R3134x44Ex R3134x45Ex R3134x45Ex R3134x46Ex R3134x47Ex R3134x48Ex | | 1 | | | | | | | | | | | | | | |
| R3134x41Ex R3134x42Ex R3134x43Ex R3134x44Ex R3134x45Ex R3134x46Ex R3134x47Ex R3134x48Ex | | VDD-VDET_0 1\/ | | | | | | | | | | | | | | |
| R3134x42Ex R3134x43Ex R3134x44Ex R3134x45Ex R3134x46Ex R3134x47Ex R3134x48Ex | | - | 0.06 | | | | | | | | | | | | | |
| R3134x43Ex R3134x44Ex R3134x45Ex R3134x46Ex R3134x47Ex R3134x48Ex | | - | | | | | | | | | | | | | | |
| R3134x44Ex R3134x45Ex R3134x46Ex R3134x47Ex R3134x48Ex | | 1 | | | | | | | | | | | | | | |
| R3134x45Ex R3134x46Ex R3134x47Ex R3134x48Ex | | 1 | | | | | | | | | | | | | | |
| R3134x46Ex R3134x47Ex R3134x48Ex | | 1 | | | | | | | | | | | | | | |
| R3134x47Ex R3134x48Ex | | | | | | | | | | | | | | | | |
| R3134x48Ex | | | | | | | | | | | | | | | | |
| | | + | | | | | | | | | | | | | | |
| IN INTATULA | | + | | | | | | | | | | | | | | |
| R3134x50Ex | | + | | | | | | | | | | | | | | |

| Output Delay Time for Release | | | | Detector Threshold Temperature Coefficient | | |
|-------------------------------------|------------|------------|----------------------|---|------|--|
| | tdelay [ms | i] | ΔVDET/ΔTopt [ppm/°C] | | | |
| Conditions | Min. | Тур. | Max. | Conditions | Тур. | |
| VDD=0.8V- VDET+1.0V Topt=25°C | 204 | 240 | 276 | –40°C ≤ Topt ≤ 85°C | ±100 | |
| VDD=0.8V- VDET+1.0V Topt=25°C | 204 | 240 | 276 | -40°C ≤ Topt ≤ 85°C | ±100 | |

TIMING CHART



R3134x Operating Diagram

DEFINITION OF OUTPUT DELAY TIME

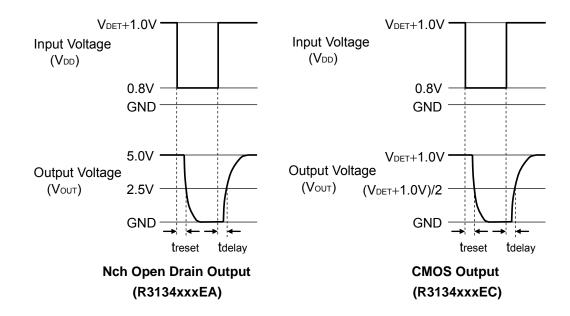
Output Delay Time (tdelay) is specified as follows:

1. In the case of Nch Open Drain Output:

The time interval from rising edge of V_{DD} pulse 0.8V to V_{DET} +1.0V to the time at which the output reaches 2.5V under the condition that the output pin (D_{OUT}) is pulled up to 5V through a 470k Ω resistor.

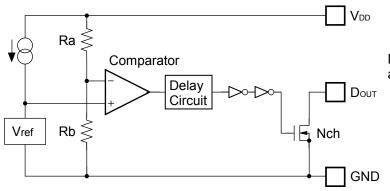
2. In the case of CMOS Output:

The time interval from rising edge of V_{DD} pulse 0.8V to $V_{DET}+1.0V$ to the time at the output reaches $(V_{DET}+1.0V)/2$.



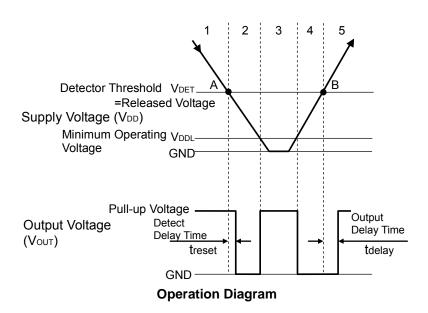
OPERATION

Operation of R3134xxxEA



Dout pin should be pulled-up to an external voltage level.

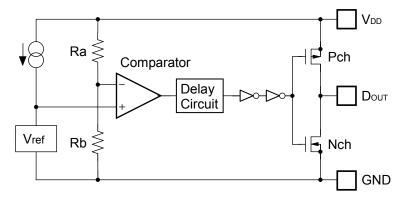
Block Diagram



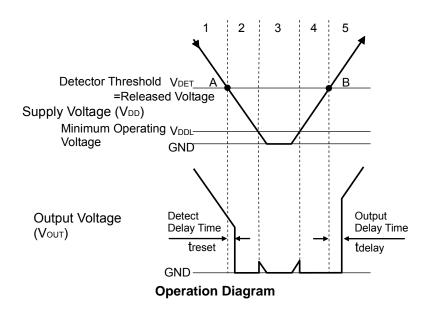
Explanation of operation

- Step 1. The output voltage is equal to the pull-up voltage.
- Step 2. At Point "A", Vref ≥ V_{DD}×Rb/(Ra+Rb) is true, as a result, the output of comparator is reversed from "L" to "H", therefore the output voltage becomes the GND level. The voltage level of Point A means a detector threshold voltage (V_{DET}).
- Step 3. When the supply voltage is lower than the minimum operating voltage, the operation of the output transistor becomes indefinite. The output voltage is equal to the pull-up voltage.
- Step 4. The output voltage is equal to the GND level.
- Step 5. At Point "B", Vref ≤ Vdd×Rb/(Ra+Rb) is true, as a result, the output of comparator is reversed from "H" to "L", then the output voltage is equal to the pull-up voltage. The voltage level of Point B means a released voltage (Vdet).
- *) There is no hysteresis range between the detector threshold and the released voltage.

Operation of R3134xxxEC



Block Diagram

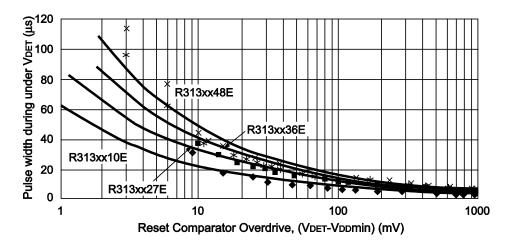


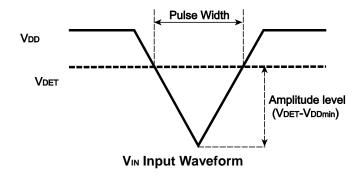
Explanation of operation

- Step 1. The output voltage is equal to the supply voltage (VDD).
- Step 2. At Point "A", Vref ≥ VDD×Rb/(Ra+Rb) is true, as a result, the output of comparator is reversed from "L" to "H", therefore the output voltage becomes the GND level. The voltage level of Point A means a detector threshold voltage (VDET).
- Step 3. When the supply voltage is lower than the minimum operating voltage, the operation of the output transistor becomes indefinite.
- Step 4. The output voltage is equal to the GND level.
- Step 5. At Point "B", Vref ≤ V_{DD}×Rb/(Ra+Rb) is true, as a result, the output of comparator is reversed from "H" to "L", then the output voltage is equal to the supply voltage (V_{DD}). The voltage level of Point B means a released voltage (V_{DET}).
- *) There is no hysteresis range between the detector threshold and the released voltage.

Detector Operation vs. glitch input voltage to the VDD pin

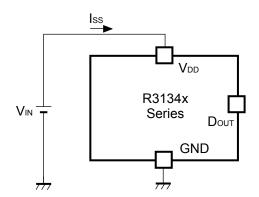
When the IC is released and a large pulse (glitch) crosses the detector threshold is forced, the IC may not maintain the released condition. The amplitude of the pulse (V_{DET}-V_{DD}min) and the pulse width the IC can maintain the released level is described in the graph as follows:



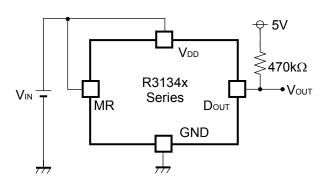


The graph above shows the condition for the maximum transient duration without generating a reset. If the larger amplitude or larger pulse width noise than the graph may be on the V_{DD}, the reset signal may be generated.

TEST CIRCUITS

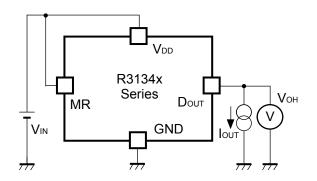


Supply Current Test Circuit

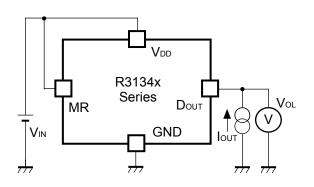


Detector Threshold Test Circuit

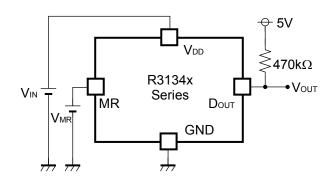
(Pull-up circuit is not necessary for CMOS Output type.)



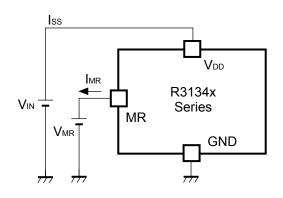
"H" Output Voltage Test Circuit (CMOS Output Type only)



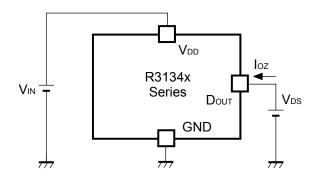
"L" Output Voltage Test Circuit



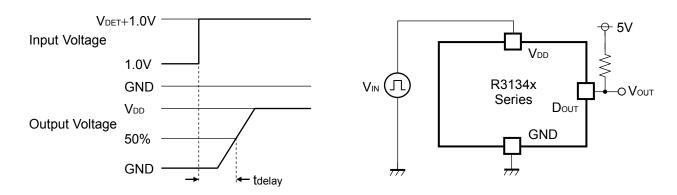
MR pin Input Voltage Test Circuit (Pull-up circuit is not necessary for CMOS Output type.)



MR pin Pull-up Resistance Test Circuit



Off Leakage Current Test Circuit

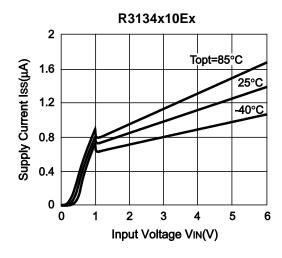


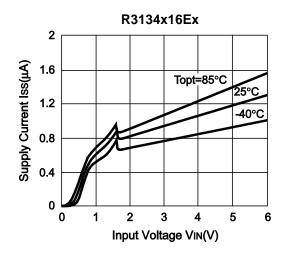
Output Delay Time Test Circuit

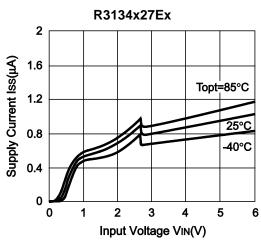
(Pull-up circuit is not necessary for CMOS Output type.)

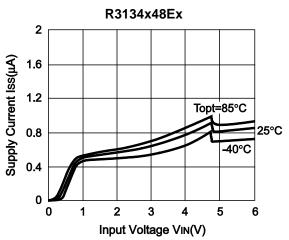
TYPICAL CHARACTERISTICS

1) Supply Current vs. Input Voltage

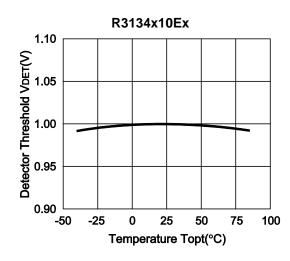


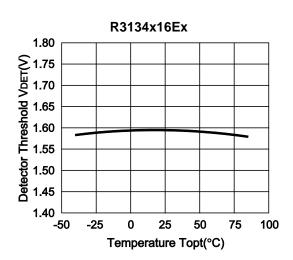


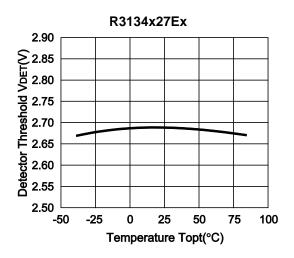


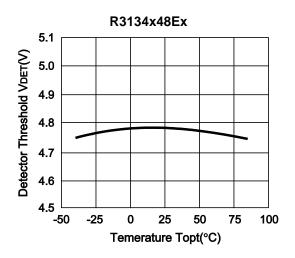


2) Detector Threshold vs. Temperature

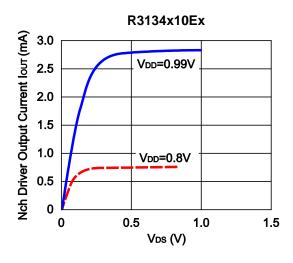


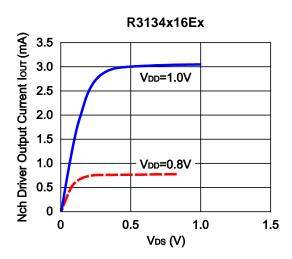


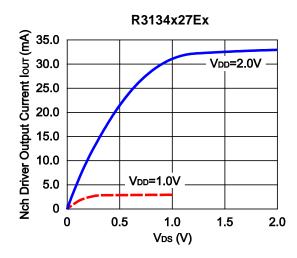


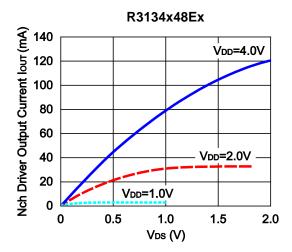


3) Nch Driver Output Current vs. VDS (Topt=25°C)

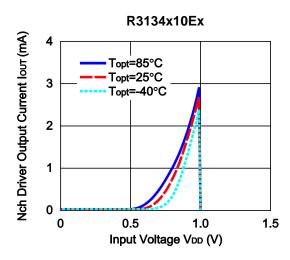


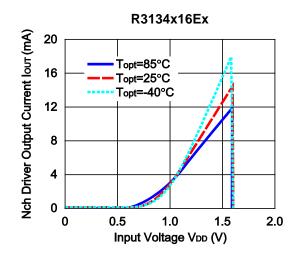


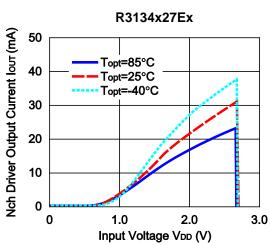


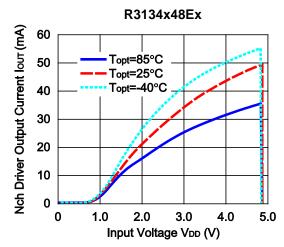


4) Nch Driver Output Current vs. Input Voltage

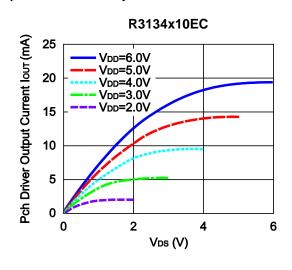


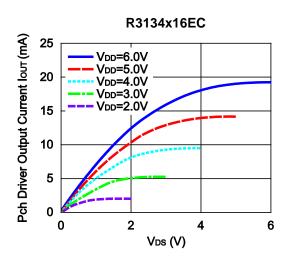


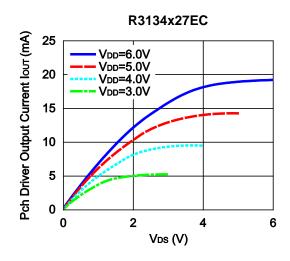


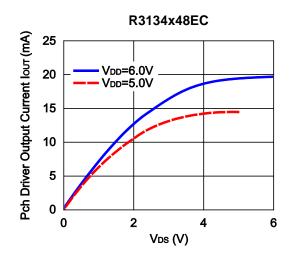


5) Pch Driver Output Current vs. VDS

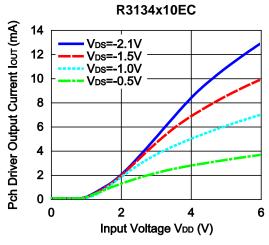


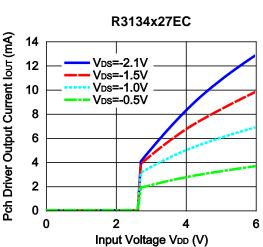


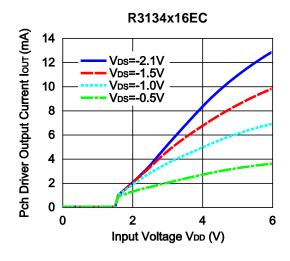


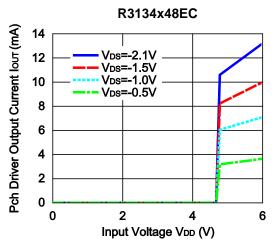


6) Pch Driver Output Current vs. Input Voltage

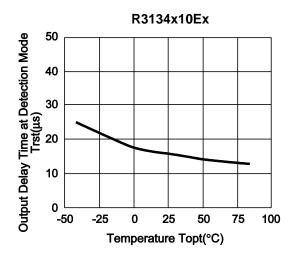


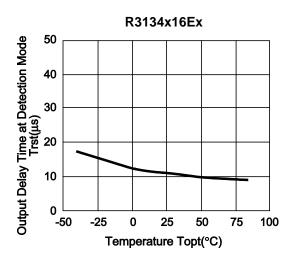


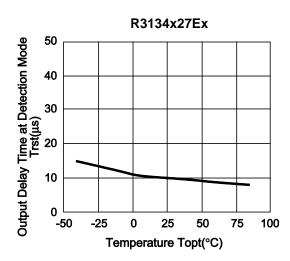


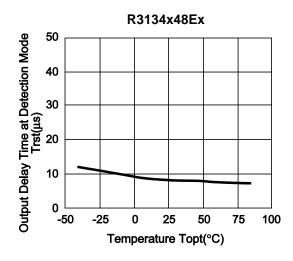


7) Output Delay Time at Detection Mode vs. Temperature

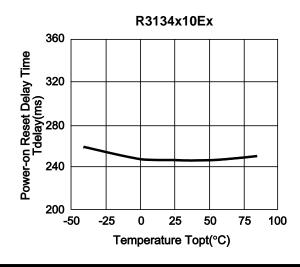


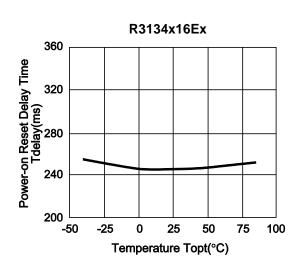


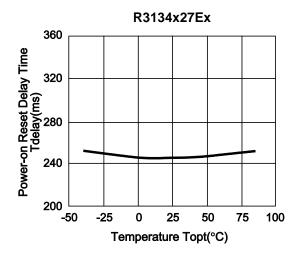


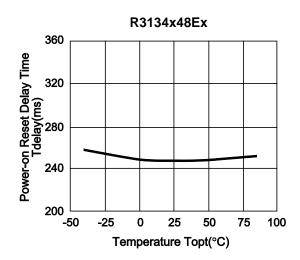


8) Power-on Reset Delay Time vs. Temperature









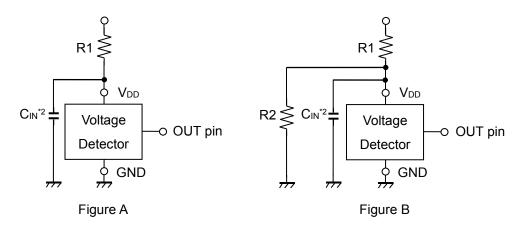
TECHNICAL NOTES

When connecting resistors to the device's input pin

When connecting a resistor (R1) to an input of this device, the input voltage decreases by [Device's Consumption Current] x [Resistance Value] only. And, the cross conduction current*1, which occurs when changing from the detecting state to the release state, is decreased the input voltage by [Cross Conduction Current] x [Resistance Value] only. And then, this device will enter the re-detecting state if the input voltage reduction is larger than the difference between the detector voltage and the released voltage.

When the input resistance value is large and the VDD is gone up at mildly in the vicinity of the released voltage, repeating the above operation may result in the occurrence of output.

As shown in Figure A/B, set R1 to become 100 k Ω or less as a guide, and connect C_{IN} of 0.1 μ F and more to between the input pin and GND. Besides, make evaluations including temperature properties under the actual usage condition, with using the evaluation board like this way. As a result, make sure that the cross conduction current has no problem.



^{*1} In the CMOS output type, a charging current for OUT pin is included.

^{*2} Note the bias dependence of capacitors.



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