ADPL62935

Low-Voltage µP Supervisor with Manual Reset

General Description

The ADPL62935 is a low-voltage microprocessor (µP) supervisory circuit that combines voltage monitoring and manual reset input functions in a 5-pin SOT23 package. Microprocessor supervisory circuits significantly improve the system's reliability and accuracy compared to separate ICs or discrete components. These devices assert a reset signal whenever the monitored voltage drops below its preset threshold, keeping it asserted for a minimum timeout period after V_{CC} rises above the threshold. In addition, a debounced manual reset is also available. The ADPL62935 monitors voltages from +1.8V to +5.0V. These outputs are guaranteed to be in the correct state for V_{CC} down to +1.0V.

Nine preprogrammed reset threshold voltages are available (see the *Threshold Suffix Guide*). The ADPL62935 has a manual reset input and both push-pull $\overline{\text{RESET}}$ and push-pull RESET.

Key Applications

- Set-Top Boxes
- Computers and Controllers
- Embedded Controllers
- Intelligent Instruments
- Critical µP Monitoring
- Portable/Battery-Powered Equipment

Features

- Monitors +1.8V, +2.5V, +3.0V, +3.3V, +5.0V Supplies
- 140ms (min) Reset Timeout Delay
- Manual Reset Input
- Two Reset Output Options
  - Push-Pull $\overline{\text{RESET}}$
  - Push-Pull RESET
- Guaranteed Reset Valid to V_{CC} = +1.0V
- Immune to Short Negative V_{CC} Transients
- No External Components
- Small 5-Pin SOT23 Packages

Threshold Suffix Guide

SUFFIX	RESET THRESHOLD (V)
L	4.63
M	4.38
T	3.08
S	2.93
R	2.63
Z	2.32
Y	2.19
W	1.67
V	1.58

Note: *Bold indicates standard versions. Samples are typically available for standard versions only. All parts require a 2.5k minimum order increment. Contact factory for availability.*

Selector Guide appears at end of data sheet.

Ordering Information appears at end of data sheet.

19-101820; Rev 1; 01/24

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Absolute Maximum Ratings

V_{CC} to GND ..... -0.3V to +6.0V

Push-Pull $\overline{RESET}$, RESET, $\overline{MR}$ ..... -0.3V to (V_{CC} + 0.3V)

Input Current (V_{CC}) 20mA

Output Current ($\overline{RESET}$, RESET) 20mA

Continuous Power Dissipation (T_A = +70°C) 5-Pin SOT23 (derate 7.1mW/°C above +70°C) 571mW

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.

Package Information

5 SOT23

Package Code	U5-1
Outline Number	*21-0057*
Land Pattern Number	*91-0174*

For the latest package outline information and land patterns (footprints), go to http://www.analog.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 thermal resistances were obtained using the method described in JEDEC specification JESD51-7, using a four-layer board. For detailed information on package thermal considerations, refer to http://www.analog.com/thermal-tutorial.

Electrical Characteristics

(V_{CC} = +4.5V to +5.5V for ADPL62935L/M, V_{CC} = +2.7V to +3.6V for ADPL62935T/S/R, V_{CC} = +2.1V to +2.75V for ADPL62935Z/Y, V_{CC} = +1.53V to +2.0V for ADPL62935W/V, T_A = -40°C to +125°C, unless otherwise specified. Typical values are at T_A = +25°C.) (*Note 1*))

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
Operating Voltage Range	V_{CC}	Reset output is guaranteed to be in a known state		1.2		5.5	V
		T_A = -40°C to +125°C		1.7		5.5	
V_{CC} Supply Current ($\overline{MR}$ Unconnected)	I_{CC}	V_{CC} = +5.5V, no load	T_A = -40°C to +85°C		11	30	µA
			T_A = -40°C to +125°C			30	
		V_{CC} = +3.6V, no load	T_A = -40°C to +85°C		7	20	
			T_A = -40°C to +125°C			20	
V_{CC} Reset Threshold (V_{CC} Falling)	V_{TH}	ADPL62935L	T_A = -40°C to +85°C	4.50	4.63	4.75	V
			T_A = -40°C to +125°C	4.47	4.63	4.78	
		ADPL62935M	T_A = -40°C to +85°C	4.25	4.38	4.50	
			T_A = -40°C to +125°C	4.22	4.38	4.53	
		ADPL62935T	T_A = -40°C to +85°C	3.00	3.08	3.15	
			T_A = -40°C to +125°C	2.97	3.08	3.17	
		ADPL62935S	T_A = -40°C to +85°C	2.85	2.93	3.00	
			T_A = -40°C to +125°C	2.83	2.93	3.02	
		ADPL62935R	T_A = -40°C to +85°C	2.55	2.63	2.70	
			T_A = -40°C to +125°C	2.53	2.63	2.72	
		ADPL62935Z	T_A = -40°C to +85°C	2.25	2.32	2.38	
			T_A = -40°C to +125°C	2.24	2.32	2.40	
		ADPL62935Y	T_A = -40°C to +85°C	2.12	2.19	2.25	
			T_A = -40°C to +125°C	2.11	2.19	2.27	
		ADPL62935W	T_A = -40°C to +85°C	1.62	1.67	1.71	

(V_{CC} = +4.5V to +5.5V for ADPL62935L/M, V_{CC} = +2.7V to +3.6V for ADPL62935T/S/R, V_{CC} = +2.1V to +2.75V for ADPL62935Z/Y, V_{CC} = +1.53V to +2.0V for ADPL62935W/V, T_A = -40°C to +125°C, unless otherwise specified. Typical values are at T_A = +25°C.) (*Note 1*))

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
			T_A = -40°C to +125°C	1.61	1.67	1.72	
		ADPL62935V	T_A = -40°C to +125°C	1.52	1.58	1.62	
Reset Threshold Temperature Coefficient					60		ppm/°C
Reset Threshold Hysteresis					2 × V_{TH}		mV
V_{CC} to Reset Output Delay	t_{RD}	V_{CC} = V_{TH} to (V_{TH} - 100mV)			20		µs
Reset Timeout Period	t_{RP}	T_A = -40°C to +85°C		140	200	280	ms
		T_A = -40°C to +125°C		100		320	
$\overline{RESET}$ Output LOW	V_{OL}	V_{CC} ≥ 1.0V, I_{SINK} = 50µA, reset asserted, T_A = 0°C to +85°C				0.3	V
		V_{CC} ≥ 1.2V, I_{SINK} = 100µA, reset asserted				0.3	
		V_{CC} ≥ 2.55V, I_{SINK} = 1.2mA, reset asserted				0.3	
		V_{CC} ≥ 4.25V, I_{SINK} = 3.2mA, reset asserted				0.4	
$\overline{RESET}$ Output HIGH	V_{OH}	V_{CC} ≥ 1.8V, I_{SOURCE} = 200µA, reset not asserted		0.8 × V_{CC}			V
		V_{CC} ≥ 3.15V, I_{SOURCE} = 500µA, reset not asserted		0.8 × V_{CC}			
		V_{CC} ≥ 4.75V, I_{SOURCE} = 800µA, reset not asserted		0.8 × V_{CC}			
RESET Output LOW	V_{OL}	V_{CC} ≥ 1.8V, I_{SINK} = 500µA, reset not asserted				0.3	V
		V_{CC} ≥ 3.15V, I_{SINK} = 1.2mA, reset not asserted				0.3	
		V_{CC} ≥ 4.75V, I_{SINK} = 3.2mA, reset not asserted				0.4	
RESET Output HIGH	V_{OH}	V_{CC} ≥ 1.0V, I_{SOURCE} = 1µA, reset asserted, T_A = 0°C to +85°C		0.8 × V_{CC}			V
		V_{CC} ≥ 1.50V, I_{SOURCE} = 100µA, reset asserted		0.8 × V_{CC}			
		V_{CC} ≥ 2.55V, I_{SOURCE} = 500µA, reset asserted		0.8 × V_{CC}			
		V_{CC} ≥ 4.25V, I_{SOURCE} = 800µA, reset asserted		0.8 × V_{CC}			
MANUAL RESET INPUT							

(V_{CC} = +4.5V to +5.5V for ADPL62935L/M, V_{CC} = +2.7V to +3.6V for ADPL62935T/S/R, V_{CC} = +2.1V to +2.75V for ADPL62935Z/Y, V_{CC} = +1.53V to +2.0V for ADPL62935W/V, T_A = -40°C to +125°C, unless otherwise specified. Typical values are at T_A = +25°C.) (*Note 1*))

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
$\overline{MR}$ Input Voltage	V_{IL}				0.2 × V_{CC}	V
	V_{IH}		0.8 × V_{CC}			
$\overline{MR}$ Minimum Input Pulse			1			µs
$\overline{MR}$ Glitch Rejection				100		ns
$\overline{MR}$ to Reset Delay				200		ns
$\overline{MR}$ Pullup Resistance			25	50	75	kΩ

Note 1: Overtemperature limits are guaranteed by design and not production tested. Devices tested at T_A = +25°C.

Typical Operating Characteristics

(T_A = +25°C, unless otherwise noted.)

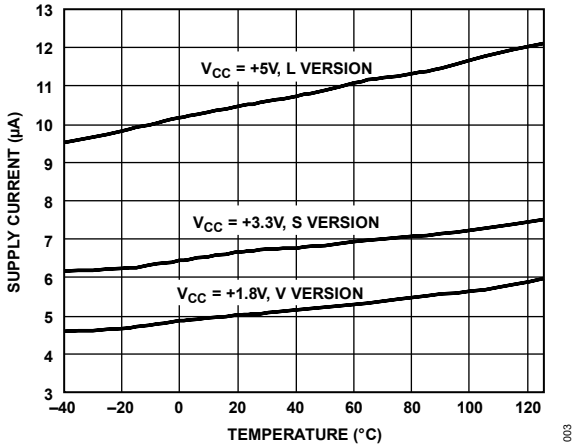


Figure 1. Supply Current vs. Temperature

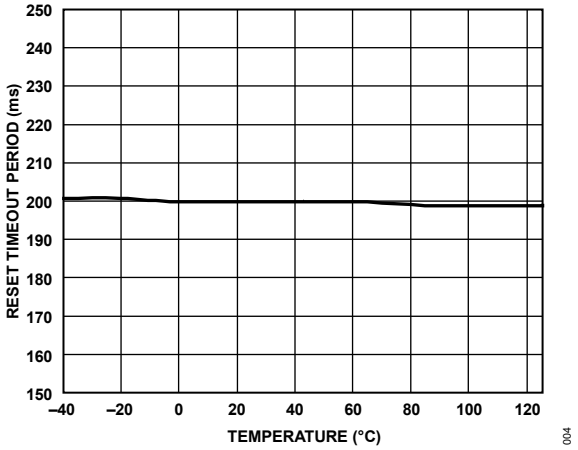


Figure 2. Reset Timeout Period vs. Temperature

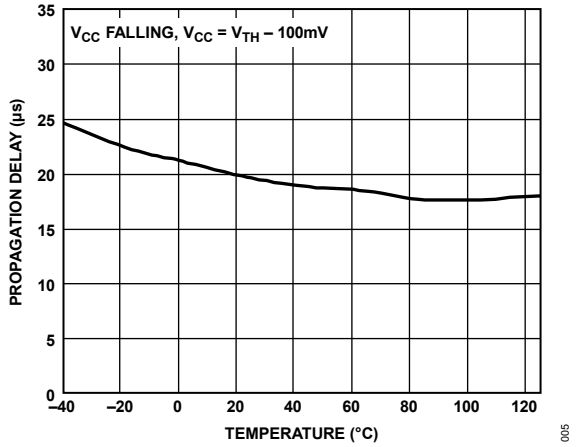


Figure 3. V_{cc} To Reset Output delay vs. Temperature

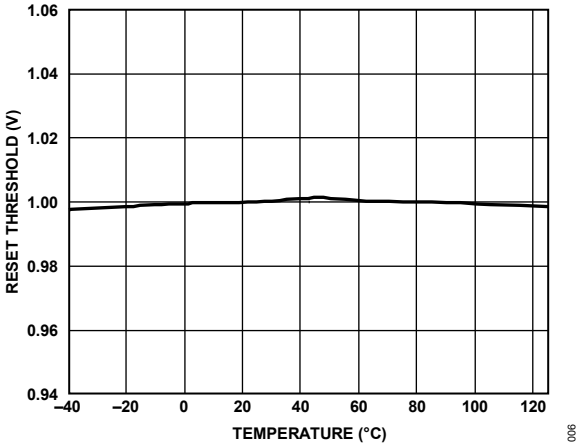


Figure 4. Normalized Reset Threshold Delay vs. Temperature

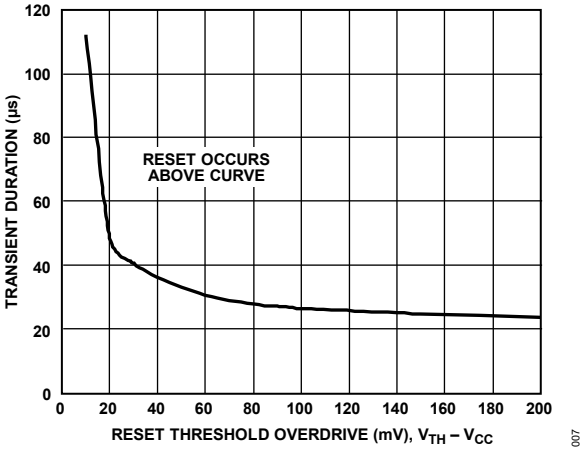


Figure 5. Maximum V_{cc} Transient Duration vs. Reset Threshold Overdrive

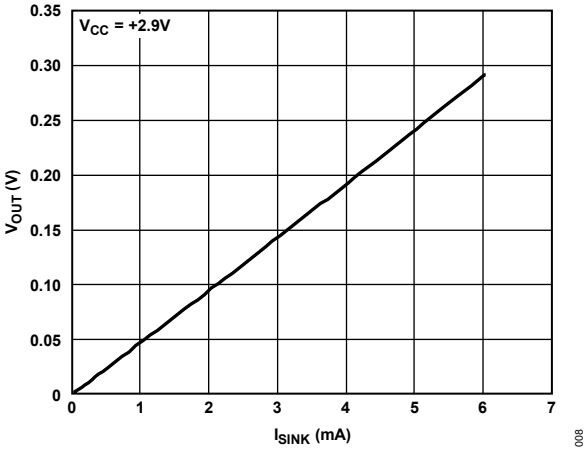


Figure 6. Voltage Output Low vs. Sink Current

(T_A = +25°C, unless otherwise noted.)

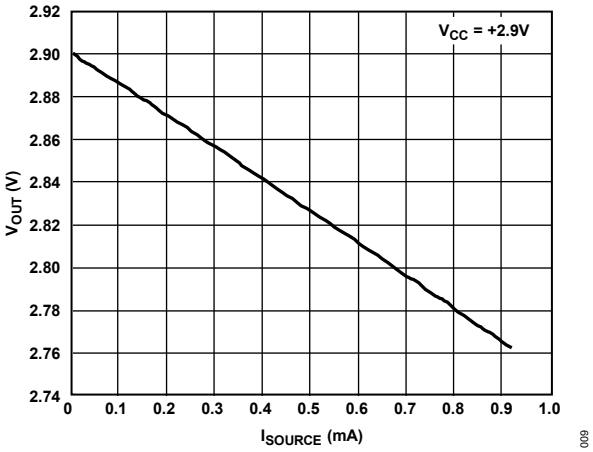
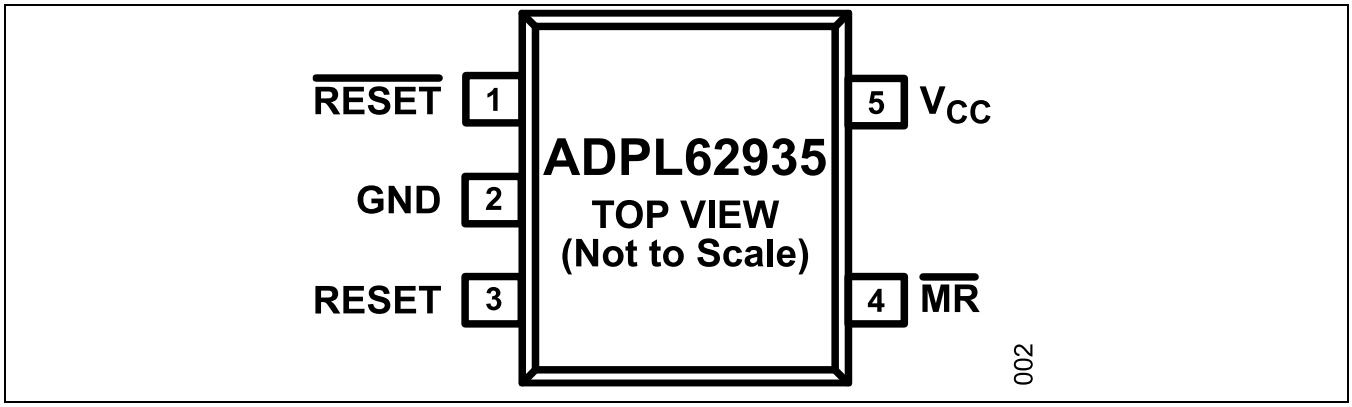


Figure 7. Voltage Output High vs. Source Current

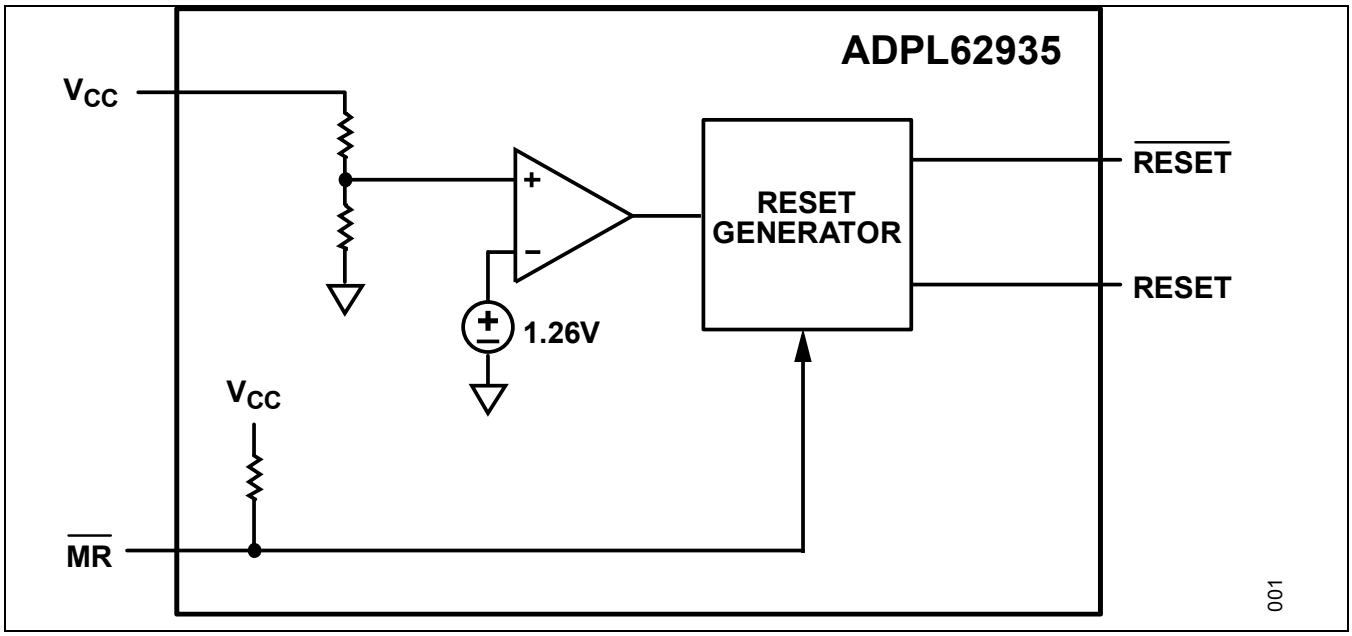
Pin Configurations



Pin Descriptions

PIN	NAME	FUNCTION
1	$\overline{\text{RESET}}$	Active-Low Push-Pull Reset Output. $\overline{\text{RESET}}$ changes from high to low when the V_{CC} input drops below the selected reset threshold or $\overline{\text{MR}}$ is pulled low. $\overline{\text{RESET}}$ remains low for the reset timeout period after V_{CC} exceeds the device reset threshold or $\overline{\text{MR}}$ goes low to high.
2	GND	Ground
3	RESET	Active-High Push-Pull Reset Output. RESET changes from low to high when the V_{CC} input drops below the selected reset threshold or $\overline{\text{MR}}$ is pulled low. RESET remains high for the reset timeout period after V_{CC} exceeds the device reset threshold or $\overline{\text{MR}}$ goes low to high.
4	$\overline{\text{MR}}$	Active-Low Manual Reset Input. Internal 50kW pullup to V_{CC}. Pull low to force a reset. Reset remains active as long as $\overline{\text{MR}}$ is low and for the reset timeout period after $\overline{\text{MR}}$ goes high. Leave unconnected or connect to V_{CC} if unused.
5	V_{CC}	Supply Voltage and Input for Reset Threshold Monitor

Functional Diagrams



Detailed Description

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

A µP's reset input starts the µP in a known state. The ADPL62935 µP supervisory circuits assert a reset to prevent code-execution errors during power-up, power-down, and brownout conditions. Whenever V_{CC} falls below the reset threshold, the reset output asserts low for $\overline{\text{RESET}}$ and high for RESET. Once V_{CC} exceeds the reset threshold, an internal timer keeps the reset output asserted for the specified reset timeout period (t_{RP}); after this interval, reset output returns to its original state (see *Figure 8*).

Manual Reset Input

Many µP-based products require manual reset capability, allowing the operator, a test technician, or external logic circuitry to initiate a reset. On the ADPL62935, a logic low on $\overline{\text{MR}}$ asserts a reset. Reset remains asserted while $\overline{\text{MR}}$ is low, and for the timeout period (140ms min) after it returns high. $\overline{\text{MR}}$ has an internal 50kΩ pull-up resistor, so it can be left open if not used. This input can be driven with CMOS logic levels or with open-drain/collector outputs. Connect a normally open momentary switch from $\overline{\text{MR}}$ to GND to create a manual reset function; external debounce circuitry is not required. If $\overline{\text{MR}}$ is driven from long cables or the device is used in a noisy environment, connect a 0.1µF capacitor from $\overline{\text{MR}}$ to GND to provide additional noise immunity.

Applications Information

Negative-Going V_{CC} Transients

These supervisors are relatively immune to short-duration, negative-going V_{CC} transients (glitches), which usually do not require the entire system to shut down. Resets are issued to the µP during power-up, power-down, and brownout conditions. The *Typical Operating Characteristics* show a graph of the ADPL62935 Maximum V_{CC} Transient Duration vs. Reset Threshold Overdrive, for which reset pulses are not generated. The graph was produced using negative-going V_{CC} pulses, starting at the standard monitored voltage and ending below the reset threshold by the magnitude indicated (reset threshold overdrive). The graph shows the maximum pulse width that a negative-going V_{CC} transient can typically have without triggering a reset pulse. As the amplitude of the transient increases (that is, goes farther below the reset threshold), the maximum allowable pulse width decreases. Typically, a V_{CC} transient that goes 100mV below the reset threshold and lasts for 20µs or less will not trigger a reset pulse.

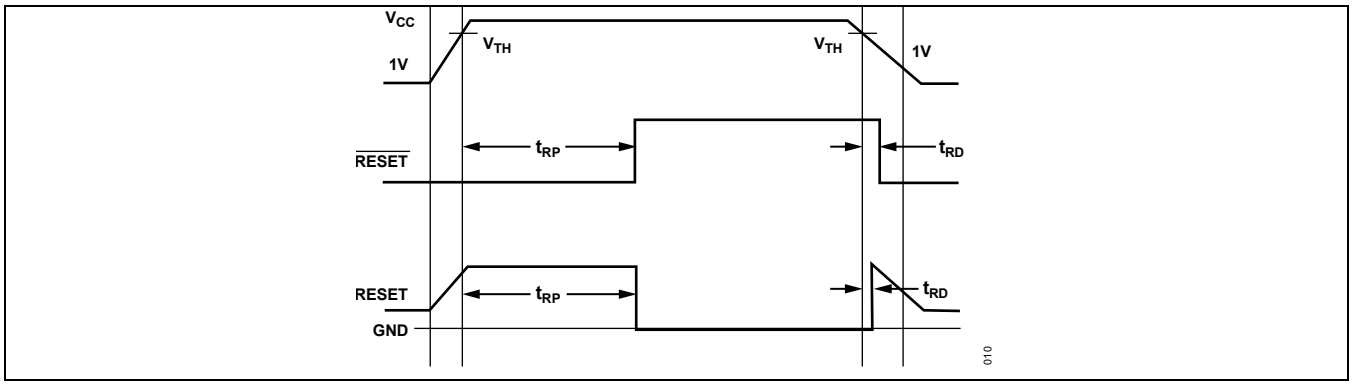
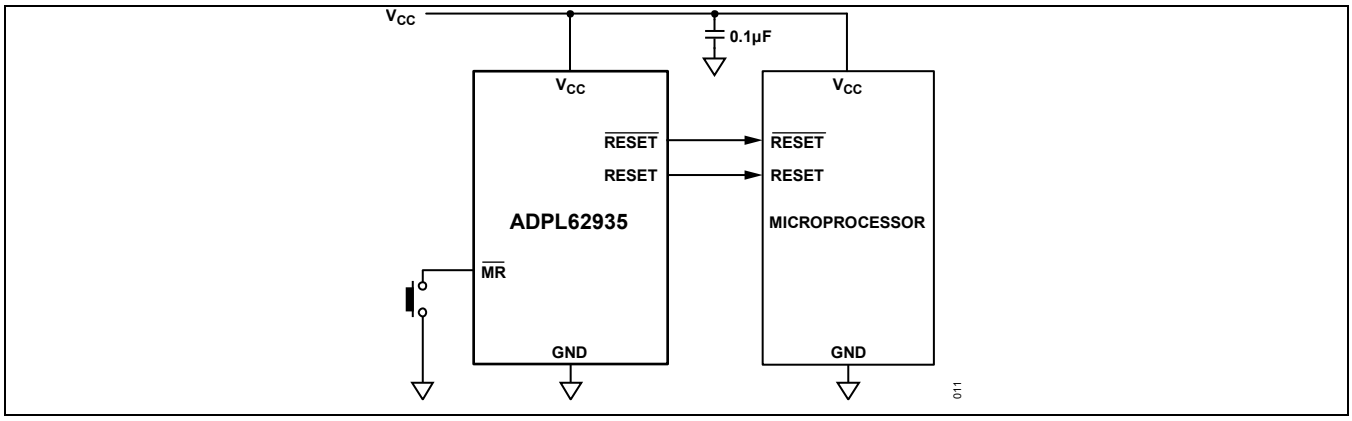


Figure 8. Reset Timing Diagram

Typical Operating Circuit



Ordering Information

PART*	TEMP RANGE	PIN-PACKAGE
ADPL62935SUK+	-40°C to +125°C	5 SOT23-5
ADPL62935SUK+T	-40°C to +125°C	5 SOT23-5
ADPL62935_UK+	-40°C to +125°C	5 SOT23-5
ADPL62935_UK+T	-40°C to +125°C	5 SOT23-5

**Insert the desired suffix letter (from the Threshold Suffix Guide) into the blank to complete the part number*

+T Tape and Reel

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	01/24	Release to market intro	—

Mouser Electronics

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ADPL62935SUK+T