NCP300, NCP301

Voltage Detector Series

The NCP300 and NCP301 series are second generation ultra−low current voltage detectors. These devices are specifically designed for use as reset controllers in portable microprocessor based systems where extended battery life is paramount.

Each series features a highly accurate undervoltage detector with hysteresis which prevents erratic system reset operation as the comparator threshold is crossed.

The NCP300 series consists of complementary output devices that are available with either an active high or active low reset output. The NCP301 series has an open drain N−Channel output with either an active high or active low reset output.

The NCP300 and NCP301 device series are available in the Thin TSOP−5 package with standard undervoltage thresholds. Additional thresholds that range from 0.9 V to 4.9 V in 100 mV steps can be manufactured.

Features

- Quiescent Current of 0.5 μA Typical
- High Accuracy Undervoltage Threshold of 2.0%
- Wide Operating Voltage Range of 0.8 V to 10 V
- Complementary or Open Drain Reset Output
- Active Low or Active High Reset Output
- Specified Over the −40°C to +125°C Temperature Range (Except for Voltage Options from 0.9 to 1.1 V)
- Pb−Free Packages are Available

Typical Applications

- Microprocessor Reset Controller
- Low Battery Detection
- Power Fail Indicator
- Battery Backup Detection

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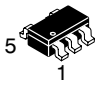
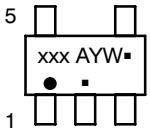


THIN SOT23−5/ TSOP−5/SC59−5 CASE 483

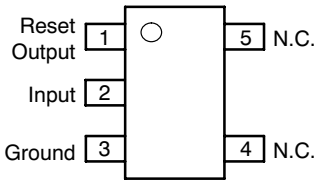
MARKING DIAGRAM



xxx	= Specific Device Code
A	= Assembly Location
Y	= Year
W	= Work Week
▪	= Pb−Free Package

(Note:Microdot may be in either location)

PIN CONNECTIONS

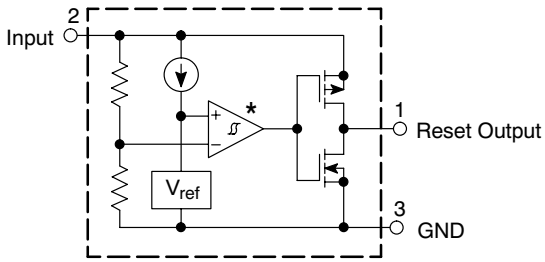


(Top View)

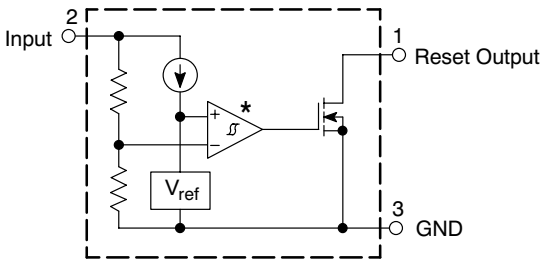
ORDERING INFORMATION

See detailed ordering and shipping information in the ordering information section on page 21 of this data sheet.

NCP300xSNxxT1
Complementary Output Configuration



NCP301xSNxxT1
Open Drain Output Configuration



* The representative block diagrams depict active low reset output 'L' suffix devices. The comparator inputs are interchanged for the active high output 'H' suffix devices.

This device contains 25 active transistors.

Figure 1. Representative Block Diagrams

MAXIMUM RATINGS

Rating		Symbol	Value	Unit
Input Power Supply Voltage (Pin 2)		V_{in}	12	V
Output Voltage (Pin 1) Complementary, NCP300 N−Channel Open Drain, NCP301		V_{OUT}	 −0.3 to V_{in} +0.3 −0.3 to 12	V
Output Current (Pin 1) (Note 2)		I_{OUT}	70	mA
Thermal Resistance Junction−to−Air		$R_{\theta JA}$	250	°C/W
Maximum Junction Temperature	All NCP Options All NCV Options	T_J	+125 +150	°C
Operating Ambient Temperature Range All Voltage Options: 0.9 V to 1.1 V All Voltage Options: 1.2 V to 4.9 V		 T_A T_A	 −40 to +85 −40 to +125	 °C °C
Storage Temperature Range		T_{stg}	−55 to +150	°C
Moisture Sensitivity Level		MSL	1	
Latchup Performance (Note 3) Positive Negative		$I_{LATCHUP}$	 200 200	mA

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. This device series contains ESD protection and exceeds the following tests:
   Human Body Model 2000 V per MIL−STD−883, Method 3015.
   Machine Model Method 200 V.
2. The maximum package power dissipation limit must not be exceeded.

$$P_D = \frac{T_{J(max)} - T_A}{R_{\theta JA}}$$

3. Maximum ratings per JEDEC standard JESD78.

ELECTRICAL CHARACTERISTICS (For all values T_A = −40°C to +125°C, unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
NCP300/1 − 0.9 / NCV300/1 − 0.9 (T_A = 25°C for voltage options from 0.9 to 1.1 V)					
Detector Threshold (Pin 2, V_{in} Decreasing)	V_{DET-}	0.882	0.900	0.918	V
Detector Threshold Hysteresis (Pin 2, V_{in} Increasing)	V_{HYS}	0.027	0.045	0.063	V
Supply Current (Pin 2) (V_{in} = 0.8 V) (V_{in} = 2.9 V)	I_{in}	 – –	 0.20 0.45	 0.6 1.2	μA
Maximum Operating Voltage (Pin 2)	$V_{in(max)}$	–	–	10	V
Minimum Operating Voltage (Pin 2) (T_A = −40°C to 85°C)	$V_{in(min)}$	– –	0.55 0.65	0.70 0.80	V
Reset Output Current (Pin 1, Active Low 'L' Suffix Devices)	I_{OUT}				mA
N−Channel Sink Current, NCP300, NCP301 (V_{OUT} = 0.05 V, V_{in} = 0.70 V) (V_{OUT} = 0.50 V, V_{in} = 0.85 V)		 0.01 0.05	 0.05 0.50	 – –	
P−Channel Source Current, NCP300 (V_{OUT} = 2.4 V, V_{in} = 4.5 V)		 1.0	 6.0	 –	
Reset Output Current (Pin 1, Active High 'H' Suffix Devices)	I_{OUT}				mA
N−Channel Sink Current, NCP300, NCP301 (V_{OUT} = 0.5 V, V_{in} = 1.5 V)		 1.05	 2.5	 –	
P−Channel Source Current, NCP300 (V_{OUT} = 0.4 V, V_{in} = 0.7 V) (V_{OUT} = GND, V_{in} = 0.8 V)		 0.011 0.014	 0.04 0.08	 – –	
Propagation Delay Input to Output (Figure 2)					μs
Complementary Output NCP300 Series Output Transition, High to Low Output Transition, Low to High	 t_{pHL} t_{pLH}	 – –	 97 77	 – 300	
N−Channel Open Drain NCP301 Series Output Transition, High to Low Output Transition, Low to High	 t_{pHL} t_{pLH}	 – –	 97 –	 – 300	
NCP300/1 − 1.8 / NCV300/1 − 1.8					
Detector Threshold (Pin 2, V_{in} Decreasing) (T_A = 25°C) (T_A = −40°C to 125°C)	V_{DET-}	1.764 1.746	1.80 –	1.836 1.854	V
Detector Threshold Hysteresis (Pin 2, V_{in} Increasing)	V_{HYS}	0.054	0.090	0.126	V
Supply Current (Pin 2) (V_{in} = 1.7 V) (V_{in} = 3.8 V)	I_{in}	 – –	 0.23 0.48	 0.7 1.3	μA
Maximum Operating Voltage (Pin 2)	$V_{in(max)}$	–	–	10	V
Minimum Operating Voltage (Pin 2) (T_A = 25°C) (T_A = −40°C to 125°C)	$V_{in(min)}$	– –	0.55 0.65	0.70 0.80	V
Reset Output Current (Pin 1, Active Low 'L' Suffix Devices)	I_{OUT}				mA
N−Channel Sink Current, NCP300, NCP301 (V_{OUT} = 0.05V, V_{in} = 0.70 V) (V_{OUT} = 0.50V, V_{in} = 1.5 V)		 0.01 1.0	 0.05 2.0	 – –	
P−Channel Source Current, NCP300 (V_{OUT} = 2.4 V, V_{in} = 4.5 V)		 1.0	 6.0	 –	
Reset Output Current (Pin 1, Active High 'H' Suffix Devices)	I_{OUT}				mA
N−Channel Sink Current, NCP300, NCP301 (V_{OUT} = 0.5 V, V_{in} = 5.0 V)		 6.3	 11	 –	
P−Channel Source Current, NCP300 (V_{OUT} = 0.4 V, V_{in} = 0.7 V) (V_{OUT} = GND, V_{in} = 1.5 V)		 0.011 0.525	 0.04 0.6	 – –	
Propagation Delay Input to Output (Figure 2)					μs

ELECTRICAL CHARACTERISTICS (continued) (For all values T_A = −40°C to +125°C, unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
NCP300/1 − 1.8 / NCV300/1 − 1.8					
Complementary Output NCP300 Series					
Output Transition, High to Low	t_{pHL}	−	73	−	
Output Transition, Low to High	t_{pLH}	−	94	300	
N−Channel Open Drain NCP301 Series					
Output Transition, High to Low	t_{pHL}	−	73	−	
Output Transition, Low to High	t_{pLH}	−	−	300	
NCP300/1 − 2.0 / NCV300/1 − 2.0					
Detector Threshold (Pin 2, V_{in} Decreasing) (T_A = 25°C)	V_{DET-}	1.96	2.00	2.04	V
(T_A = −40°C to 125°C)		1.94	−	2.06	
Detector Threshold Hysteresis (Pin 2, V_{in} Increasing)	V_{HYS}	0.06	0.10	0.14	V
Supply Current (Pin 2)	I_{in}				μA
(V_{in} = 1.9 V)		−	0.23	0.8	
(V_{in} = 4.0 V)		−	0.48	1.3	
Maximum Operating Voltage (Pin 2)	$V_{in(max)}$	−	−	10	V
Minimum Operating Voltage (Pin 2) (T_A = 25°C)	$V_{in(min)}$	−	0.55	0.70	V
(T_A = −40°C to 125°C)		−	0.65	0.80	
Reset Output Current (Pin 1, Active Low 'L' Suffix Devices)	I_{OUT}				mA
N−Channel Sink Current, NCP300, NCP301					
(V_{OUT} = 0.05V, V_{in} = 0.70V)		0.01	0.14	−	
(V_{OUT} = 0.50V, V_{in} = 1.5V)		1.0	3.5	−	
P−Channel Source Current, NCP300					
(V_{OUT} = 2.4V, V_{in} = 4.5V)		1.0	9.7	−	
Reset Output Current (Pin 1, Active High 'H' Suffix Devices)	I_{OUT}				mA
N−Channel Sink Current, NCP300, NCP301					
(V_{OUT} = 0.5 V, V_{in} = 5.0 V)		6.3	11	−	
P−Channel Source Current, NCP300					
(V_{OUT} = 0.4 V, V_{in} = 0.7 V)		0.011	0.04	−	
(V_{OUT} = GND, V_{in} = 1.5 V)		0.525	0.6	−	
Propagation Delay Input to Output (Figure 2)					μs
Complementary Output NCP300 Series					
Output Transition, High to Low	t_{pHL}	−	55	−	
Output Transition, Low to High	t_{pLH}	−	108	300	
N−Channel Open Drain NCP301 Series					
Output Transition, High to Low	t_{pHL}	−	55	−	
Output Transition, Low to High	t_{pLH}	−	−	300	
NCP300/1 − 2.2 / NCV300/1 − 2.2					
Detector Threshold (Pin 2, V_{in} Decreasing) (T_A = 25°C)	V_{DET-}	2.156	2.2	2.244	V
(T_A = −40°C to 125°C)		2.134	−	2.266	
Detector Threshold Hysteresis (Pin 2, V_{in} Increasing)	V_{HYS}	0.066	0.110	0.154	V
Supply Current (Pin 2)	I_{in}				μA
(V_{in} = 2.1 V)		−	0.23	0.8	
(V_{in} = 4.2 V)		−	0.48	1.3	
Maximum Operating Voltage (Pin 2)	$V_{in(max)}$	−	−	10	V
Minimum Operating Voltage (Pin 2) (T_A = 25°C)	$V_{in(min)}$	−	0.55	0.70	V
(T_A = −40°C to 125°C)		−	0.65	0.80	
Reset Output Current (Pin 1, Active Low 'L' Suffix Devices)	I_{OUT}				mA
N−Channel Sink Current, NCP300, NCP301					
(V_{OUT} = 0.05V, V_{in} = 0.70V)		0.01	0.14	−	
(V_{OUT} = 0.50V, V_{in} = 1.5V)		1.0	3.5	−	
P−Channel Source Current, NCP300					
(V_{OUT} = 2.4V, V_{in} = 4.5V)		1.0	9.7	−	

ELECTRICAL CHARACTERISTICS (continued) (For all values T_A = −40°C to +125°C, unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
NCP300/1 − 2.2 / NCV300/1 − 2.2					
Reset Output Current (Pin 1, Active High 'H' Suffix Devices)	I_{OUT}				mA
N−Channel Sink Current, NCP300, NCP301 (V_{OUT} = 0.5 V, V_{in} = 5.0 V)		6.3	11	−	
P−Channel Source Current, NCP300 (V_{OUT} = 0.4 V, V_{in} = 0.7 V)		0.011	0.04	−	
(V_{OUT} = GND, V_{in} = 1.5 V)		0.525	0.6	−	
Propagation Delay Input to Output (Figure 2)					μs
Complementary Output NCP300 Series					
Output Transition, High to Low	t_{pHL}	−	55	−	
Output Transition, Low to High	t_{pLH}	−	108	300	
N−Channel Open Drain NCP301 Series					
Output Transition, High to Low	t_{pHL}	−	55	−	
Output Transition, Low to High	t_{pLH}	−	−	300	
NCP300/1− 2.7 / NCV300/1− 2.7					
Detector Threshold (Pin 2, V_{in} Decreasing) (T_A = 25°C)	V_{DET-}	2.646	2.700	2.754	V
(T_A = −40°C to 125°C)		2.619	−	2.781	
Detector Threshold Hysteresis (Pin 2, V_{in} Increasing)	V_{HYS}	0.081	0.135	0.189	V
Supply Current (Pin 2)	I_{in}				μA
(V_{in} = 2.6 V)		−	0.25	0.8	
(V_{in} = 4.7 V)		−	0.50	1.3	
Maximum Operating Voltage (Pin 2)	$V_{in(max)}$	−	−	10	V
Minimum Operating Voltage (Pin 2) (T_A = 25°C)	$V_{in(min)}$	−	0.55	0.70	V
(T_A = −40°C to 125°C)		−	0.65	0.80	
Reset Output Current (Pin 1, Active Low 'L' Suffix Devices)	I_{OUT}				mA
N−Channel Sink Current, NCP300, NCP301 (V_{OUT} = 0.05V, V_{in} = 0.70V)		0.01	0.14	−	
(V_{OUT} = 0.50V, V_{in} = 1.5V)		1.0	3.5	−	
P−Channel Source Current, NCP300 (V_{OUT} = 2.4V, V_{in} = 4.5V)		1.0	9.7	−	
Reset Output Current (Pin 1, Active High 'H' Suffix Devices)	I_{OUT}				mA
N−Channel Sink Current, NCP300, NCP301 (V_{OUT} = 0.5 V, V_{in} = 5.0 V)		6.3	11	−	
P−Channel Source Current, NCP300 (V_{OUT} = 0.4 V, V_{in} = 0.7 V)		0.011	0.04	−	
(V_{OUT} = GND, V_{in} = 1.5 V)		0.525	0.6	−	
Propagation Delay Input to Output (Figure 2)					μs
Complementary Output NCP300 Series					
Output Transition, High to Low	t_{pHL}	−	55	−	
Output Transition, Low to High	t_{pLH}	−	115	300	
N−Channel Open Drain NCP301 Series					
Output Transition, High to Low	t_{pHL}	−	55	−	
Output Transition, Low to High	t_{pLH}	−	−	300	
NCP300/1− 2.8 / NCV300/1− 2.8					
Detector Threshold (Pin 2, V_{in} Decreasing) (T_A = 25°C)	V_{DET-}	2.744	2.8	2.856	V
(T_A = −40°C to 125°C)		2.716	−	2.884	
Detector Threshold Hysteresis (Pin 2, V_{in} Increasing)	V_{HYS}	0.084	0.14	0.196	V
Supply Current (Pin 2)	I_{in}				μA
(V_{in} = 2.7 V)		−	0.25	0.8	
(V_{in} = 4.8 V)		−	0.5	1.3	
Maximum Operating Voltage (Pin 2)	$V_{in(max)}$	−	−	10	V

ELECTRICAL CHARACTERISTICS (continued) (For all values T_A = −40°C to +125°C, unless otherwise noted.)

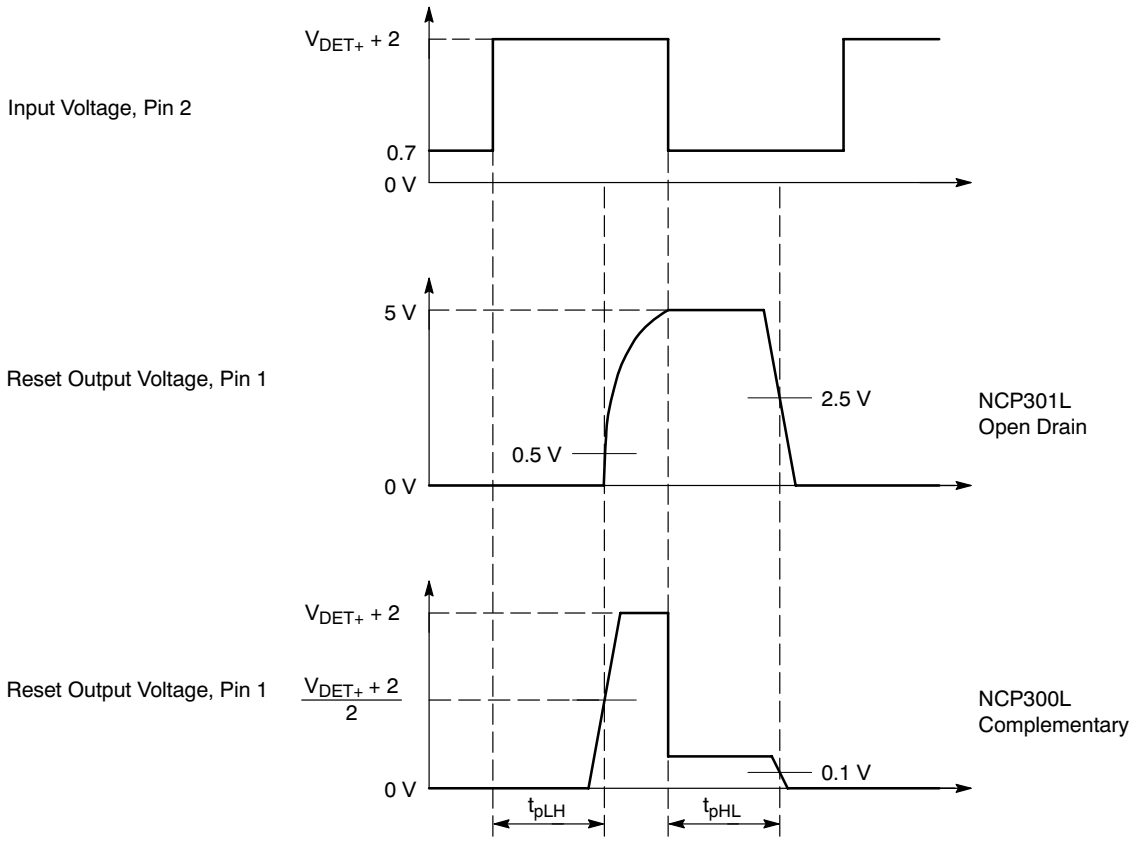
Characteristic	Symbol	Min	Typ	Max	Unit
NCP300/1− 2.8 / NCV300/1− 2.8					
Minimum Operating Voltage (Pin 2) (T_A = 25°C) (T_A = −40°C to 125°C)	$V_{in(min)}$	− −	0.55 0.65	0.7 0.8	V
Reset Output Current (Pin 1, Active Low 'L' Suffix Devices)	I_{OUT}				mA
N−Channel Sink Current, NCP300, NCP301 (V_{OUT} = 0.05V, V_{in} = 0.70V) (V_{OUT} = 0.50V, V_{in} = 1.5V)		 0.01 1.0	 0.14 3.5	 − −	
P−Channel Source Current, NCP300 (V_{OUT} = 2.4V, V_{in} = 4.5V)		 1.0	 9.7	 −	
Reset Output Current (Pin 1, Active High 'H' Suffix Devices)	I_{OUT}				mA
N−Channel Sink Current, NCP300, NCP301 (V_{OUT} = 0.5 V, V_{in} = 5.0 V)		 6.3	 11	 −	
P−Channel Source Current, NCP300 (V_{OUT} = 0.4 V, V_{in} = 0.7 V) (V_{OUT} = GND, V_{in} = 1.5 V)		 0.011 0.525	 0.04 0.6	 − −	
Propagation Delay Input to Output (Figure 2)					μs
Complementary Output NCP300 Series Output Transition, High to Low Output Transition, Low to High	 t_{pHL} t_{pLH}	 − −	 55 115	 − 300	
N−Channel Open Drain NCP301 Series Output Transition, High to Low Output Transition, Low to High	 t_{pHL} t_{pLH}	 − −	 55 −	 − 300	
NCP300/1 − 3.0 / NCV300/1 − 3.0					
Detector Threshold (Pin 2, V_{in} Decreasing) (T_A = 25°C) (T_A = −40°C to 125°C)	V_{DET-}	2.94 2.91	3.00 −	3.06 3.09	V
Detector Threshold Hysteresis (Pin 2, V_{in} Increasing)	V_{HYS}	0.09	0.15	0.21	V
Supply Current (Pin 2) (V_{in} = 2.87 V) (V_{in} = 5.0 V)	I_{in}	 − −	 0.25 0.50	 0.9 1.3	μA
Maximum Operating Voltage (Pin 2)	$V_{in(max)}$	−	−	10	V
Minimum Operating Voltage (Pin 2) (T_A = 25°C) (T_A = −40°C to 125°C)	$V_{in(min)}$	− −	0.55 0.65	0.70 0.80	V
Reset Output Current (Pin 1, Active Low 'L' Suffix Devices)	I_{OUT}				mA
N−Channel Sink Current, NCP300, NCP301 (V_{OUT} = 0.05V, V_{in} = 0.70V) (V_{OUT} = 0.50V, V_{in} = 1.5V)		 0.01 1.0	 0.14 3.5	 − −	
P−Channel Source Current, NCP300 (V_{OUT} = 2.4V, V_{in} = 4.5V)		 1.0	 9.7	 −	
Reset Output Current (Pin 1, Active High 'H' Suffix Devices)	I_{OUT}				mA
N−Channel Sink Current, NCP300, NCP301 (V_{OUT} = 0.5 V, V_{in} = 5.0 V)		 6.3	 11	 −	
P−Channel Source Current, NCP300 (V_{OUT} = 0.4 V, V_{in} = 0.7 V) (V_{OUT} = GND, V_{in} = 1.5 V)		 0.011 0.525	 0.04 0.6	 − −	
Propagation Delay Input to Output (Figure 2)					μs
Complementary Output NCP300 Series Output Transition, High to Low Output Transition, Low to High	 t_{pHL} t_{pLH}	 − −	 49 115	 − 300	
N−Channel Open Drain NCP301 Series Output Transition, High to Low Output Transition, Low to High	 t_{pHL} t_{pLH}	 − −	 49 −	 − 300	
NCP300/1 − 4.5 / NCV300/1 − 4.5					

ELECTRICAL CHARACTERISTICS (continued) (For all values T_A = −40°C to +125°C, unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
NCP300/1 − 4.5 / NCV300/1 − 4.5					
Detector Threshold (Pin 2, V_{in} Decreasing) (T_A = 25°C) (T_A = −40°C to 125°C)	V_{DET-}	4.410 4.365	4.500 –	4.590 4.635	V
Detector Threshold Hysteresis (Pin 2, V_{in} Increasing)	V_{HYS}	0.135	0.225	0.315	V
Supply Current (Pin 2) (V_{in} = 4.34 V) (V_{in} = 6.5 V)	I_{in}	 – –	 0.33 0.52	 1.0 1.4	μA
Maximum Operating Voltage (Pin 2)	$V_{in(max)}$	–	–	10	V
Minimum Operating Voltage (Pin 2) (T_A = 25°C) (T_A = −40°C to 125°C)	$V_{in(min)}$	– –	0.55 0.65	0.70 0.80	V
Reset Output Current (Pin 1, Active Low 'L' Suffix Devices)	I_{OUT}				mA
N−Channel Sink Current, NCP300, NCP301 (V_{OUT} = 0.05V, V_{in} = 0.70V) (V_{OUT} = 0.50V, V_{in} = 1.5V)		 0.01 1.0	 0.05 2.0	 – –	
P−Channel Source Current, NCP300 (V_{OUT} = 5.9V, V_{in} = 8.0V)		 1.5	 10.5	 –	
Reset Output Current (Pin 1, Active High 'H' Suffix Devices)	I_{OUT}				mA
N−Channel Sink Current, NCP300, NCP301 (V_{OUT} = 0.5 V, V_{in} = 5.0 V)		 6.3	 11	 –	
P−Channel Source Current, NCP300 (V_{OUT} = 0.4 V, V_{in} = 0.7 V) (V_{OUT} = GND, V_{in} = 1.5 V)		 0.011 0.525	 0.04 0.6	 – –	
Propagation Delay Input to Output (Figure 2)					μs
Complementary Output NCP300 Series Output Transition, High to Low Output Transition, Low to High	 t_{pHL} t_{pLH}	 – –	 49 130	 – 300	
N−Channel Open Drain NCP301 Series Output Transition, High to Low Output Transition, Low to High	 t_{pHL} t_{pLH}	 – –	 49 –	 – 300	
NCP300/1 − 4.7 / NCV300/1 − 4.7					
Detector Threshold (Pin 2, V_{in} Decreasing) (T_A = 25°C) (T_A = −40°C to 125°C)	V_{DET-}	4.606 4.559	4.700 –	4.794 4.841	V
Detector Threshold Hysteresis (Pin 2, V_{in} Increasing)	V_{HYS}	0.141	0.235	0.329	V
Supply Current (Pin 2) (V_{in} = 4.54 V) (V_{in} = 6.7 V)	I_{in}	 – –	 0.34 0.53	 1.0 1.4	μA
Maximum Operating Voltage (Pin 2)	$V_{in(max)}$	–	–	10	V
Minimum Operating Voltage (Pin 2) (T_A = 25°C) (T_A = −40°C to 125°C)	$V_{in(min)}$	– –	0.55 0.65	0.70 0.80	V
Reset Output Current (Pin 1, Active Low 'L' Suffix Devices)	I_{OUT}				mA
N−Channel Sink Current, NCP300, NCP301 (V_{OUT} = 0.05V, V_{in} = 0.70V) (V_{OUT} = 0.50V, V_{in} = 1.5V)		 0.01 1.0	 0.05 2.0	 – –	
P−Channel Source Current, NCP300 (V_{OUT} = 5.9V, V_{in} = 8.0V)		 1.5	 10.5	 –	
Reset Output Current (Pin 1, Active High 'H' Suffix Devices)	I_{OUT}				mA
N−Channel Sink Current, NCP300, NCP301 (V_{OUT} = 0.5 V, V_{in} = 5.0 V)		 6.3	 11	 –	
P−Channel Source Current, NCP300 (V_{OUT} = 0.4 V, V_{in} = 0.7 V) (V_{OUT} = GND, V_{in} = 1.5 V)		 0.011 0.525	 0.04 0.6	 – –	

ELECTRICAL CHARACTERISTICS (continued) (For all values T_A = −40°C to +125°C, unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
NCP300/1 − 4.7 / NCV300/1 − 4.7					
Propagation Delay Input to Output (Figure 2)					µs
Complementary Output NCP300 Series					
Output Transition, High to Low	t_{pHL}	−	45	−	
Output Transition, Low to High	t_{pLH}	−	130	300	
N−Channel Open Drain NCP301 Series					
Output Transition, High to Low	t_{pHL}	−	45	−	
Output Transition, Low to High	t_{pLH}	−	−	300	



NCP300 and NCP301 series are measured with a 10 pF capacitive load. NCP301 has an additional 470 k pull−up resistor connected from the reset output to +5.0 V. The reset output voltage waveforms are shown for the active low 'L' devices. The upper detector threshold, V_{DET+} is the sum of the lower detector threshold, V_{DET-} plus the input hysteresis, V_{HYS}.

Figure 2. Propagation Delay Measurement Conditions

Table 1. ELECTRICAL CHARACTERISTIC TABLE FOR 0.9 – 4.9 V

NCP300 Series	Detector Threshold			Detector Threshold Hysteresis			Supply Current		Nch Sink Current		Pch Source Current
							V_{in} Low	V_{in} High	V_{in} Low	V_{in} High	
	V_{DET-} (V) (Note 4)			V_{HYS} (V)			I_{in} (μA) (Note 5)	I_{in} (μA) (Note 6)	I_{OUT} (mA) (Note 7)	I_{OUT} (mA) (Note 8)	I_{OUT} (mA) (Note 9)
Part Number	Min	Typ	Max	Min	Typ	Max	Typ	Typ	Typ	Typ	Typ
NCP300LSN09T1	0.882	0.9	0.918	0.027	0.045	0.063	0.20	0.45	0.05	0.5	2.0
NCP300LSN18T1	1.764	1.8	1.836	0.054	0.090	0.126	0.23	0.48			
NCP300LSN185T1	1.813	1.85	1.887	0.056	0.093	0.130					
NCP300LSN20T1	1.960	2.0	2.040	0.060	0.100	0.140					
NCP300LSN27T1	2.646	2.7	2.754	0.081	0.135	0.189	0.25	0.50			
NCP300LSN28T1	2.744	2.8	2.856	0.084	0.140	0.196					
NCP300LSN30T1	2.940	3.0	3.060	0.090	0.150	0.210					
NCP300LSN33T1	3.234	3.3	3.366	0.099	0.165	0.231					
NCP300LSN34T1	3.332	3.4	3.468	0.102	0.170	0.238					
NCP300LSN44T1	4.312	4.4	4.488	0.132	0.220	0.308					
NCP300LSN45T1	4.410	4.5	4.590	0.135	0.225	0.315	0.33	0.52			
NCP300LSN46T1	4.508	4.6	4.692	0.138	0.230	0.322					
NCP300LSN47T1	4.606	4.7	4.794	0.141	0.235	0.329	0.34	0.53			

4. Values shown apply at +25°C only. For voltage options greater than 1.1 V, V_{DET-} limits over operating temperature range (−40°C to +125°C) are V_{NOM} ±3%. For voltage options < 1.2 V, V_{DET-} is guaranteed only at +25°C.
5. Condition 1: 0.9 − 2.9 V, $V_{in} = V_{DET-} - 0.10$ V; 3.0 − 3.9 V, $V_{in} = V_{DET-} - 0.13$ V; 4.0 − 4.9 V, $V_{in} = V_{DET-} - 0.16$ V
6. Condition 2: 0.9 − 4.9 V, $V_{in} = V_{DET-} + 2.0$ V
7. Condition 3: 0.9 − 4.9 V, V_{in} = 0.7 V, V_{OUT} = 0.05 V, Active Low 'L' Suffix Devices
8. Condition 4: 0.9 − 1.0 V, V_{in} = 0.85 V, V_{OUT} = 0.5 V; 1.1 − 1.5 V, V_{in} = 1.0 V, V_{OUT} = 0.5 V; 1.6 − 4.9 V, V_{in} = 1.5 V, V_{OUT} = 0.5 V, Active Low 'L' Suffix Devices
9. Condition 5: 0.9 − 3.9 V, V_{in} = 4.5 V, V_{OUT} = 2.4 V; 4.0 − 4.9 V, V_{in} = 8.0 V, V_{OUT} = 5.9 V, Active Low 'L' Suffix Devices

Table 2. ELECTRICAL CHARACTERISTIC TABLE FOR 0.9 – 4.9 V

NCP300 Series	Detector Threshold			Detector Threshold Hysteresis			Supply Current		Nch Sink Current	Pch Source Current	
							V_{in} Low	V_{in} High		V_{in} Low	V_{in} High
	V_{DET-} (V) (Note 10)			V_{HYS} (V)			I_{in} (μA) (Note 11)	I_{in} (μA) (Note 12)	I_{OUT} (mA) (Note 13)	I_{OUT} (mA) (Note 14)	I_{OUT} (mA) (Note 15)
Part Number	Min	Typ	Max	Min	Typ	Max	Typ	Typ	Typ	Typ	Typ
NCP300HSN09T1	0.882	0.9	0.918	0.027	0.045	0.063	0.20	0.45	2.5	0.04	0.08
NCP300HSN18T1	1.764	1.8	1.836	0.054	0.090	0.126	0.23	0.48			
NCP300HSN27T1	2.646	2.7	2.754	0.081	0.135	0.189	0.25	0.50			
NCP300HSN30T1	2.940	3.0	3.060	0.090	0.150	0.210					
NCP300HSN45T1	4.410	4.5	4.590	0.135	0.225	0.315	0.33	0.52			
NCP300HSN47T1	4.606	4.7	4.794	0.141	0.235	0.329	0.34	0.53			

10. Values shown apply at +25°C only. For voltage options greater than 1.1 V, V_{DET-} limits over operating temperature range (−40°C to +125°C) are V_{NOM} ±3%. For voltage options < 1.2 V, V_{DET-} is guaranteed only at +25°C.
11. Condition 1: 0.9 − 2.9 V, $V_{in} = V_{DET-} - 0.10$ V; 3.0 − 3.9 V, $V_{in} = V_{DET-} - 0.13$ V; 4.0 − 4.9 V, $V_{in} = V_{DET-} - 0.16$ V
12. Condition 2: 0.9 − 4.9 V, $V_{in} = V_{DET-} + 2.0$ V
13. Condition 3: 0.9 − 1.4 V, V_{in} = 1.5 V, V_{OUT} = 0.5 V; 1.5 − 4.9 V, V_{in} = 5.0 V, V_{OUT} = 0.5 V, Active High 'H' Suffix Devices
14. Condition 4: 0.9 − 4.9 V, V_{in} = 0.7 V, V_{OUT} = 0.4 V, Active High 'H' Suffix Devices
15. Condition 5: 0.9 − 1.0 V, V_{in} = 0.8 V, V_{OUT} = GND; 1.1 − 1.5 V, V_{in} = 1.0 V, V_{OUT} = GND; 1.6 − 4.9 V, V_{in} = 1.5 V, V_{OUT} = GND, Active High 'H' Suffix Devices

Table 3. ELECTRICAL CHARACTERISTIC TABLE FOR 0.9 – 4.9 V

NCP301 Series	Detector Threshold			Detector Threshold Hysteresis			Supply Current		Nch Sink Current	
							V_{in} Low	V_{in} High	V_{in} Low	V_{in} High
	V_{DET-} (V) (Note 16)			V_{HYS} (V)			I_{in} (μA) (Note 16)	I_{in} (μA) (Note 18)	I_{OUT} (mA) (Note 19)	I_{OUT} (mA) (Note 20)
Part Number	Min	Typ	Max	Min	Typ	Max	Typ	Typ	Typ	Typ
NCP301LSN09T1	0.882	0.9	0.918	0.027	0.045	0.063	0.20	0.45	0.05	0.5
NCP301LSN12T1	1.176	1.2	1.224	0.036	0.060	0.084				
NCP301LSN16T1	1.568	1.6	1.632	0.048	0.080	0.112				2.0
NCP301LSN18T1	1.764	1.8	1.836	0.054	0.090	0.126	0.23	0.48		
NCP301LSN20T1	1.960	2.0	2.040	0.060	0.100	0.140				
NCP301LSN22T1	2.156	2.2	2.244	0.066	0.110	0.154				
NCP301LSN25T1	2.450	2.5	2.550	0.075	0.125	0.175				
NCP301LSN26T1	2.548	2.6	2.652	0.078	0.130	0.182				
NCP301LSN27T1	2.646	2.7	2.754	0.081	0.135	0.189	0.25	0.50		
NCP301LSN28T1	2.744	2.8	2.856	0.084	0.140	0.196				
NCP301LSN30T1	2.940	3.0	3.060	0.090	0.150	0.210				
NCP301LSN31T1	3.038	3.1	3.162	0.093	0.155	0.217				
NCP301LSN32T1	3.136	3.2	3.264	0.096	0.160	0.224				
NCP301LSN33T1	3.234	3.3	3.366	0.099	0.165	0.231				
NCP301LSN34T1	3.332	3.4	3.468	0.102	0.170	0.238				
NCP301LSN36T1	3.528	3.6	3.672	0.108	0.180	0.252				
NCP301LSN40T1	3.920	4.0	4.080	0.120	0.200	0.280				
NCP301LSN42T1	4.116	4.2	4.284	0.126	0.210	0.294				
NCP301LSN45T1	4.410	4.5	4.590	0.135	0.225	0.315	0.33	0.52		
NCP301LSN46T1	4.508	4.6	4.692	0.138	0.230	0.322				
NCP301LSN47T1	4.606	4.7	4.794	0.141	0.235	0.329	0.34	0.53		

16. Values shown apply at +25°C only. For voltage options greater than 1.1 V, V_{DET-} limits over operating temperature range (−40°C to +125°C) are V_{NOM} ±3%. For voltage options < 1.2 V, V_{DET-} is guaranteed only at +25°C.
17. Condition 1: 0.9 − 2.9 V, V_{in} = V_{DET-} − 0.10 V; 3.0 − 3.9 V, V_{in} = V_{DET-} − 0.13 V; 4.0 − 4.9 V, V_{in} = V_{DET-} − 0.16 V
18. Condition 2: 0.9 − 4.9 V, V_{in} = V_{DET-} + 2.0 V
19. Condition 3: 0.9 − 4.9 V, V_{in} = 0.7 V, V_{OUT} = 0.05 V, Active Low 'L' Suffix Devices
20. Condition 4: 0.9 − 1.0 V, V_{in} = 0.85 V, V_{OUT} = 0.5 V; 1.1 − 1.5 V, V_{in} = 1.0 V, V_{OUT} = 0.5 V; 1.6 − 4.9 V, V_{in} = 1.5 V, V_{OUT} = 0.5 V, Active Low 'L' Suffix Devices

Table 4. ELECTRICAL CHARACTERISTIC TABLE FOR 0.9 – 4.9 V

NCP301 Series	Detector Threshold			Detector Threshold Hysteresis			Supply Current		Nch Sink Current
							V_{in} Low	V_{in} High	
	V_{DET-} (V) (Note 21)			V_{HYS} (V)			I_{in} (μA) (Note 22)	I_{in} (μA) (Note 23)	I_{OUT} (mA) (Note 24)
Part Number	Min	Typ	Max	Min	Typ	Max	Typ	Typ	Typ
NCP301HSN09T1	0.882	0.9	0.918	0.027	0.045	0.063	0.20	0.45	2.5
NCP301HSN18T1	1.764	1.8	1.836	0.054	0.090	0.126			
NCP301HSN22T1	2.156	2.2	2.244	0.066	0.110	0.154			
NCP301HSN27T1	2.646	2.7	2.754	0.081	0.135	0.189	0.25	0.50	
NCP301HSN30T1	2.940	3.0	3.060	0.090	0.150	0.210			
NCP301HSN45T1	4.410	4.5	4.590	0.135	0.225	0.315	0.33	0.52	

21. Values shown apply at +25°C only. For voltage options greater than 1.1 V, V_{DET-} limits over operating temperature range (−40°C to +125°C) are V_{NOM} ±3%. For voltage options < 1.2 V, V_{DET-} is guaranteed only at +25°C.
22. Condition 1: 0.9 − 2.9 V, V_{in} = V_{DET-} − 0.10 V; 3.0 − 3.9 V, V_{in} = V_{DET-} − 0.13 V; 4.0 − 4.9 V, V_{in} = V_{DET-} − 0.16 V
23. Condition 2: 0.9 − 4.9 V, V_{in} = V_{DET-} + 2.0 V
24. Condition 3: 0.9 − 1.4 V, V_{in} = 1.5 V, V_{OUT} = 0.5 V; 1.5 − 4.9 V, V_{in} = 5.0 V, V_{OUT} = 0.5 V, Active High 'H' Suffix Devices

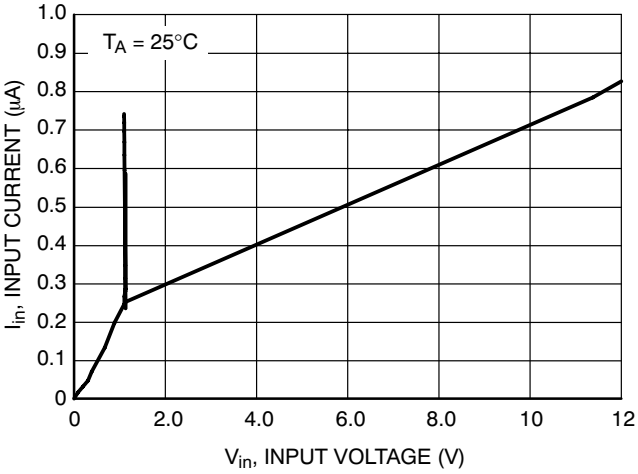


Figure 3. NCP300/1 Series 0.9 V Input Current versus Input Voltage

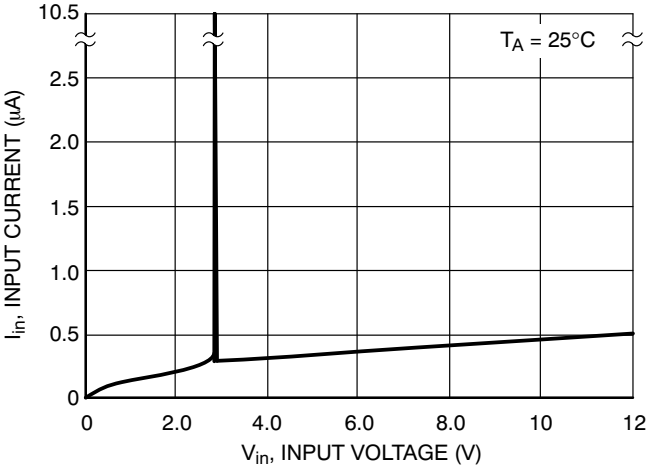


Figure 4. NCP300/1 Series 2.7 V Input Current versus Input Voltage

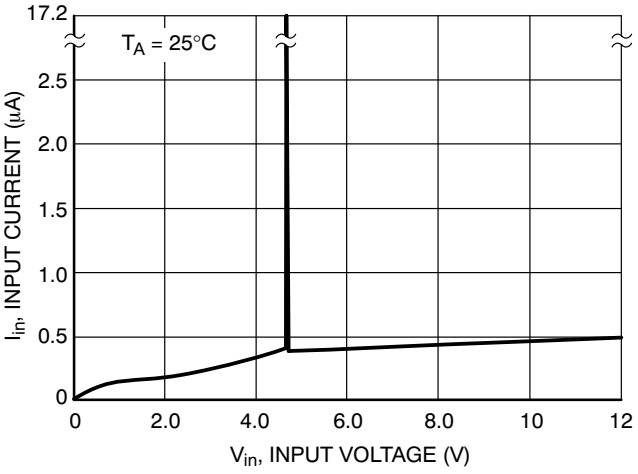


Figure 5. NCP300/1 Series 4.5 V Input Current versus Input Voltage

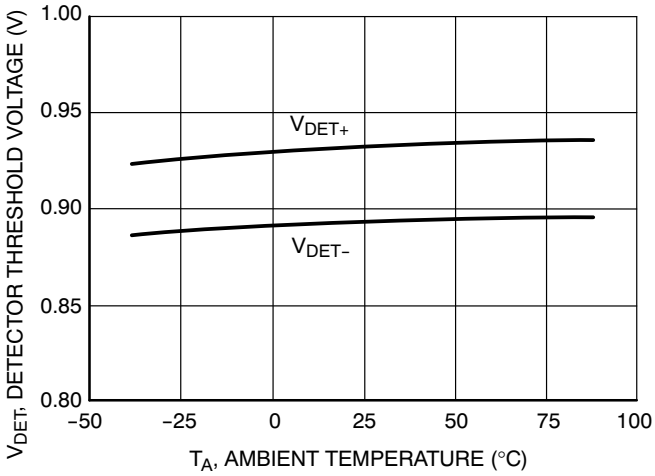


Figure 6. NCP300/1 Series 0.9 V Detector Threshold Voltage versus Temperature

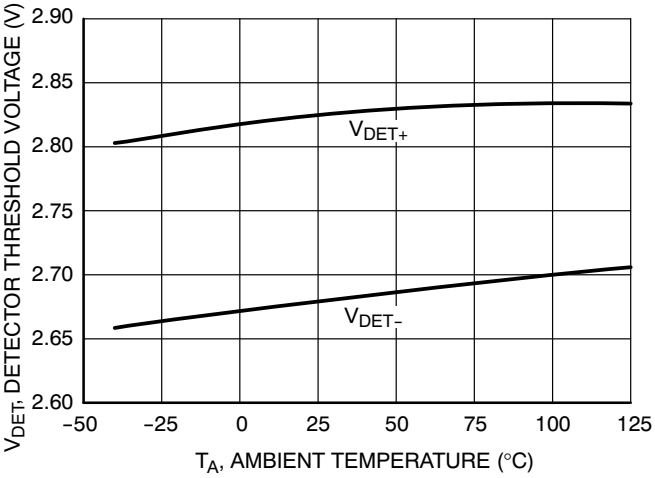


Figure 7. NCP300/1 Series 2.7 V Detector Threshold Voltage versus Temperature

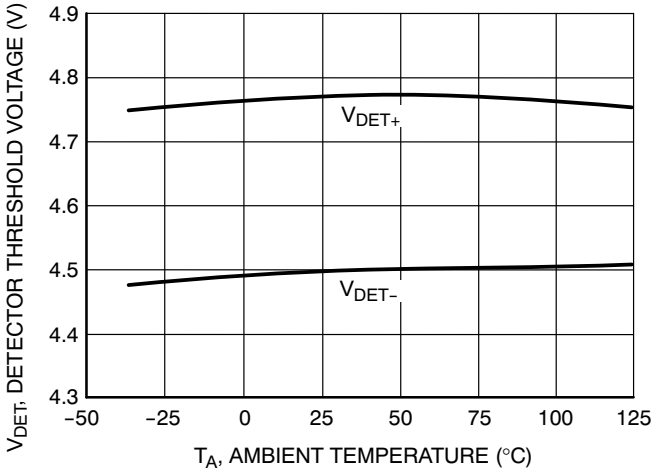


Figure 8. NCP300/1 Series 4.5 V Detector Threshold Voltage versus Temperature

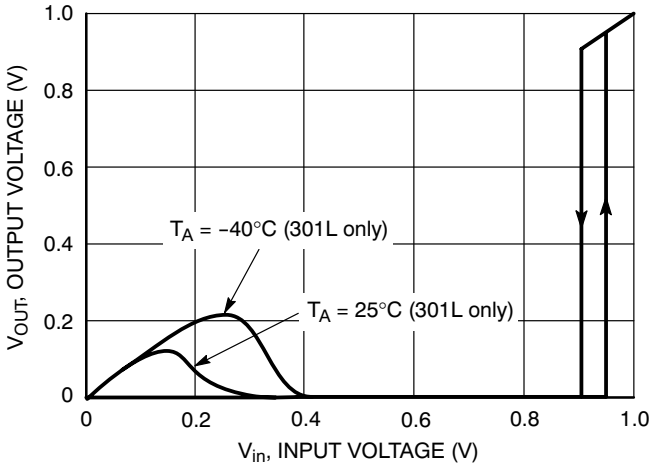


Figure 9. NCP300L/1L Series 0.9 V Reset Output Voltage versus Input Voltage

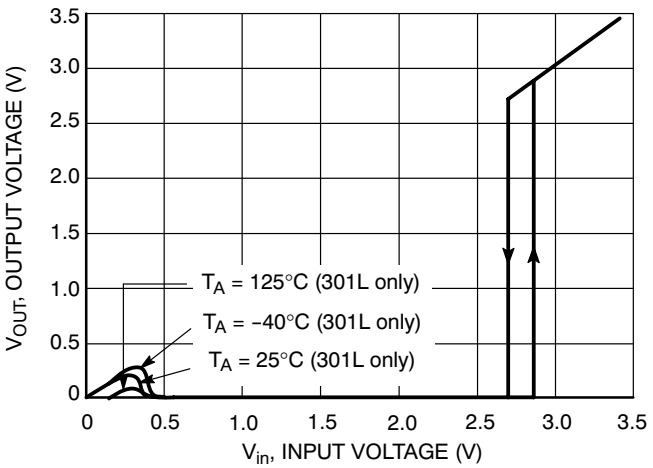


Figure 10. NCP300L/1L Series 2.7 V Reset Output Voltage versus Input Voltage

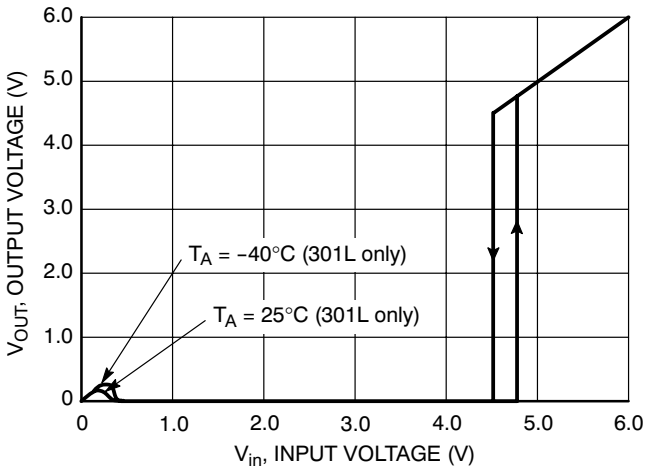


Figure 11. NCP300L/1L Series 4.5 V Reset Output Voltage versus Input Voltage

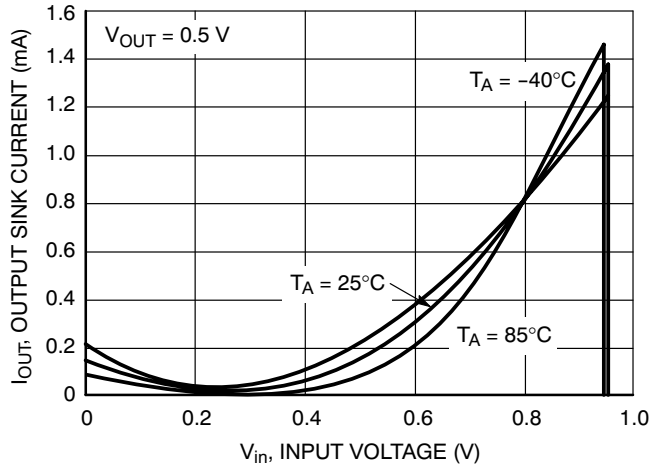


Figure 12. NCP300H/1L Series 0.9 V Reset Output Sink Current versus Input Voltage

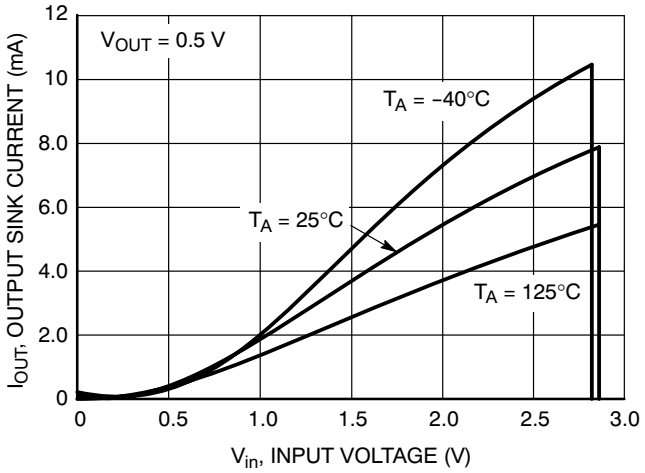


Figure 13. NCP300H/1L Series 2.7 V Reset Output Sink Current versus Input Voltage

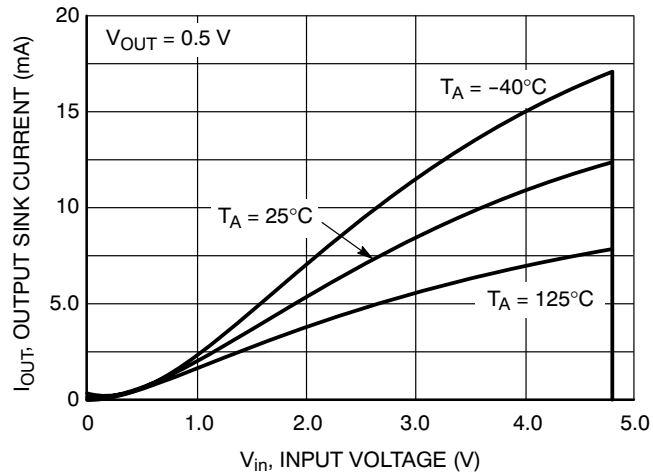


Figure 14. NCP300H/1L Series 4.5 V Reset Output Sink Current versus Input Voltage

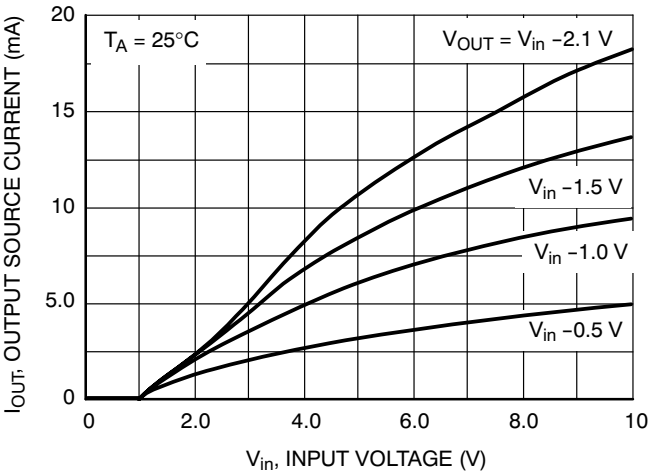


Figure 15. NCP300L Series 0.9 V Reset Output Source Current versus Input Voltage

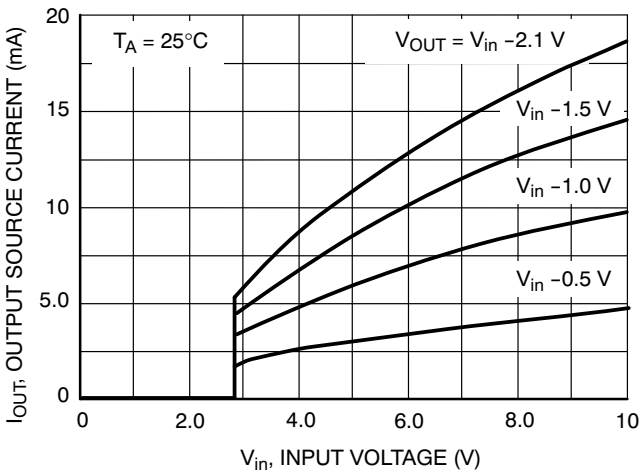


Figure 16. NCP300L Series 2.7 V Reset Output Source Current versus Input Voltage

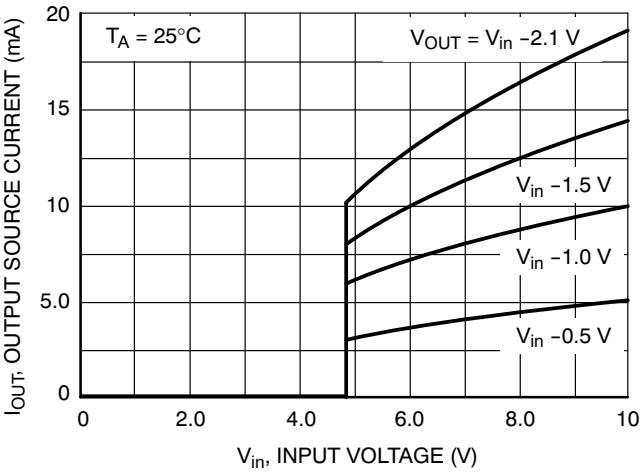


Figure 17. NCP300L Series 4.5 V Reset Output Source Current versus Input Voltage

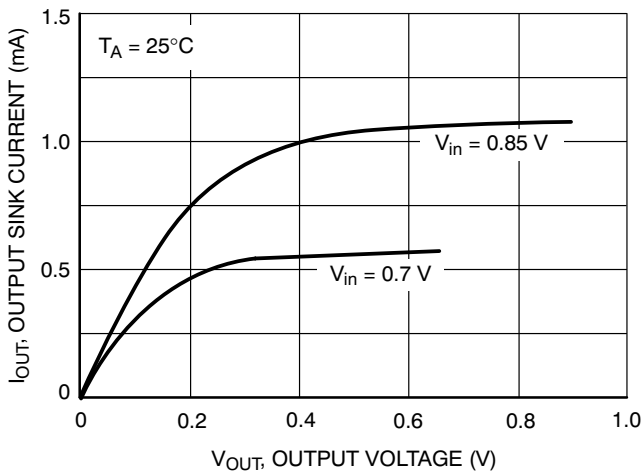


Figure 18. NCP300H/1L Series 0.9 V Reset Output Sink Current versus Output Voltage

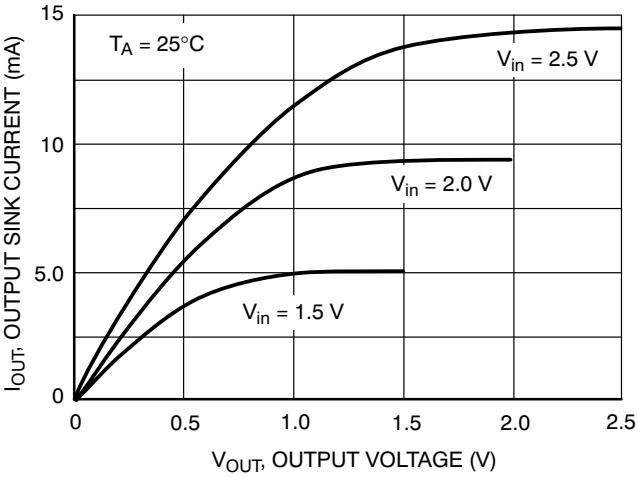


Figure 19. NCP300H/1L Series 2.7 V Reset Output Sink Current versus Output Voltage

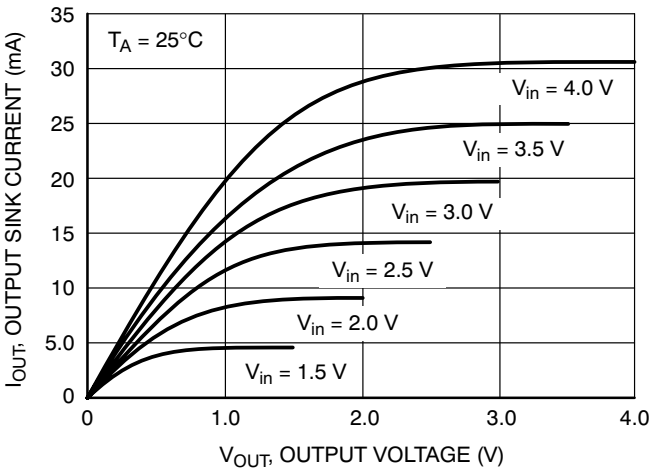


Figure 20. NCP300H/1L Series 4.5 V Reset Output Sink Current versus Output Voltage

OPERATING DESCRIPTION

The NCP300 and NCP301 series devices are second generation ultra−low current voltage detectors. Figures 20 and 21 show a timing diagram and a typical application. Initially consider that input voltage V_{in} is at a nominal level and it is greater than the voltage detector upper threshold (V_{DET+}), and the reset output (Pin 1) will be in the high state for active low devices, or in the low state for active high devices. If there is a power interruption and V_{in} becomes significantly deficient, it will fall below the lower detector threshold (V_{DET-}). This sequence of events causes the Reset output to be in the low state for active low devices, or in the high state for active high devices. After completion of the power interruption, V_{in} will again return to its nominal level and become greater than the V_{DET+}. The voltage detector has built−in hysteresis to prevent erratic reset operation as the comparator threshold is crossed.

Although these device series are specifically designed for use as reset controllers in portable microprocessor based systems, they offer a cost−effective solution in numerous applications where precise voltage monitoring is required. Figure 25 through Figure 32 shows various application examples.

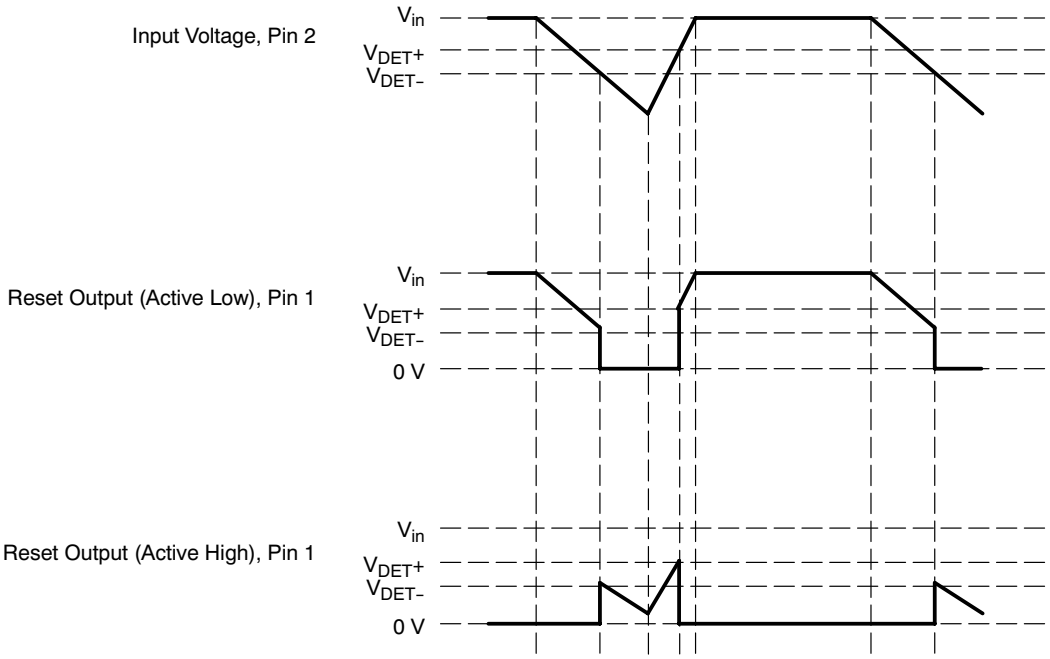


Figure 21. Timing Waveforms

V_{CC} TRANSIENT REJECTION

The NCP300 and NCP301 series provides accurate V_{CC} monitoring and reset timing during power−up, power−down, and brownout/sag conditions, and rejects negative glitches on the power supply line. Figure 22 shows the maximum transient duration vs. maximum negative excursion (overdrive) for glitch rejection. Any combination of duration and overdrive which lies under the curve will not generate a reset signal. A below−V_{CC} condition (on the right) is detected as a brownout or power−down. Typically, any transient that goes 100 mV below the reset threshold and lasts 5.0 μs or less will not cause a reset pulse.

Transient immunity can be improved by adding a capacitor in close proximity to the V_{CC} pin of the NCP30x.

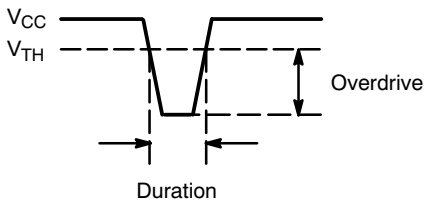


Figure 22. Max Transient Duration vs. Max Overdrive

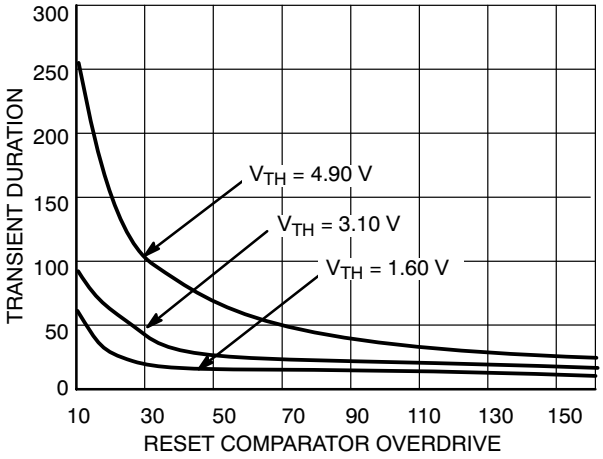


Figure 23.

PROPAGATION DELAY VARIATION

On the other hand (see above paragraph), a minimum overdrive value from $V_{threshold}$ to V_{CC} must be respected. That means V_{in} (minimum value of V_{CC}) must be higher enough than V_{DET}^+ (V_{DET}^- + hysteresis) at the risk of significantly increasing propagation delay. (Figure 24) This propagation delay is temperature sensitive.

To avoid acceptable time response, a minimum 100 mV difference between V_{in} and V_{DET}^+ must be selected.

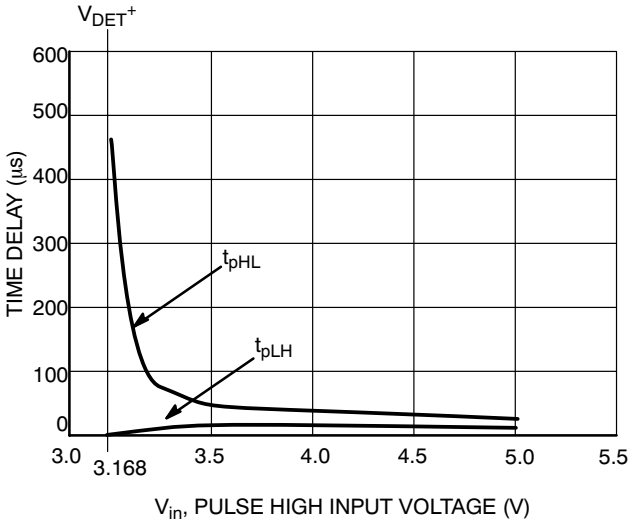


Figure 24. t_{pLH} and t_{pHL} vs. Input Voltage for the NCP301SNT1

APPLICATION CIRCUIT INFORMATION

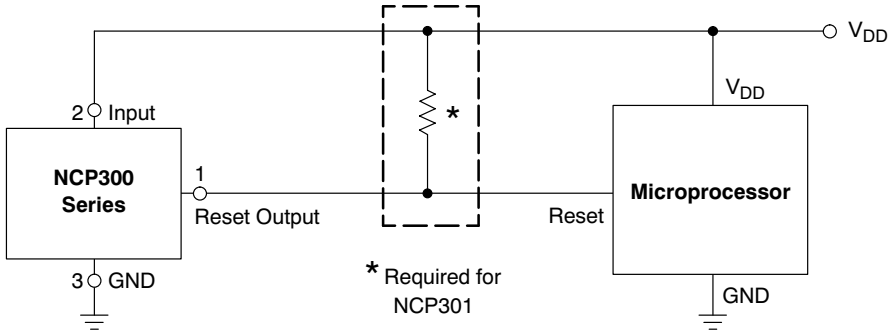


Figure 25. Microprocessor Reset Circuit

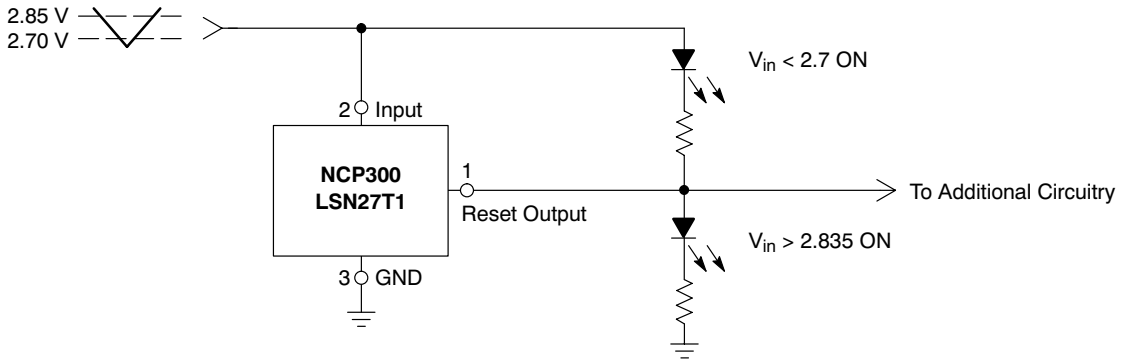
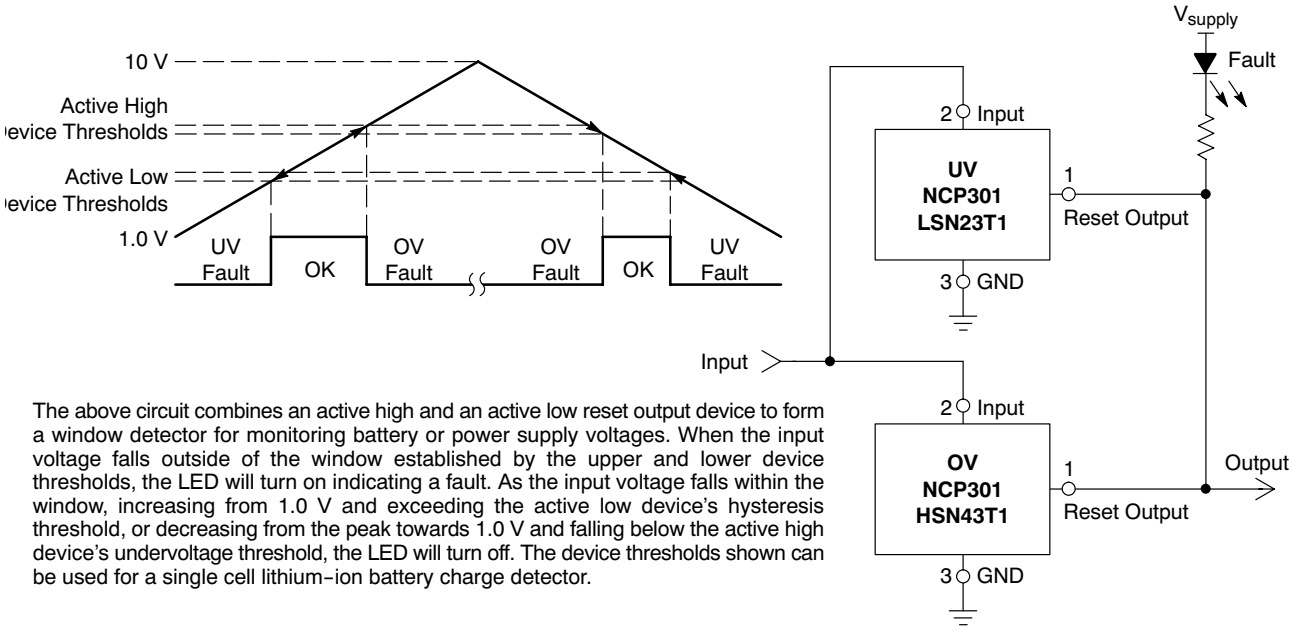


Figure 26. Battery Charge Indicator



The above circuit combines an active high and an active low reset output device to form a window detector for monitoring battery or power supply voltages. When the input voltage falls outside of the window established by the upper and lower device thresholds, the LED will turn on indicating a fault. As the input voltage falls within the window, increasing from 1.0 V and exceeding the active low device's hysteresis threshold, or decreasing from the peak towards 1.0 V and falling below the active high device's undervoltage threshold, the LED will turn off. The device thresholds shown can be used for a single cell lithium−ion battery charge detector.

Figure 27. Window Voltage Detector

APPLICATION CIRCUIT INFORMATION

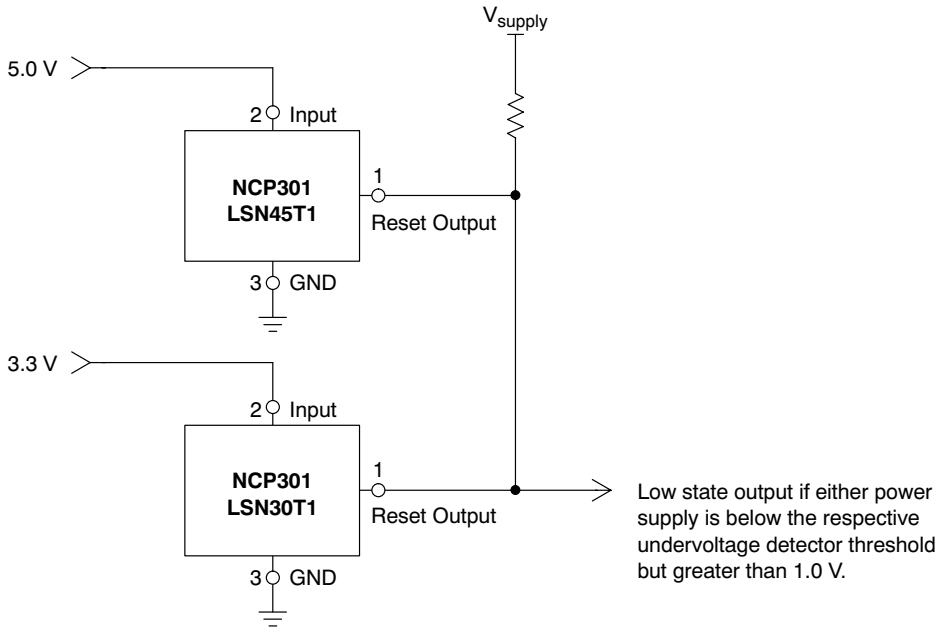


Figure 28. Dual Power Supply Undervoltage Supervision

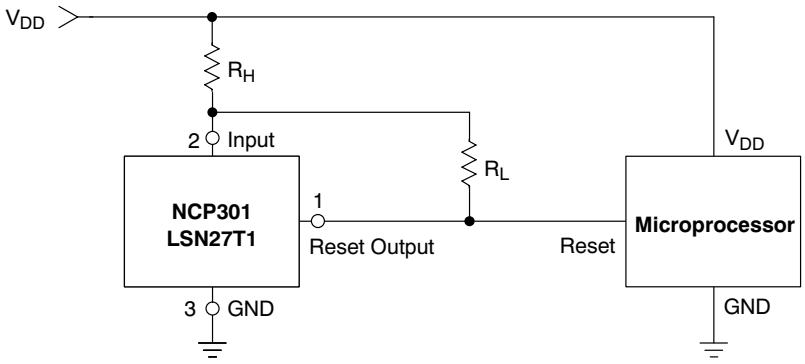


Figure 29. Microprocessor Reset Circuit with Additional Hysteresis

Comparator hysteresis can be increased with the addition of resistor R_H. The hysteresis equations have been simplified and do not account for the change of input current I_{in} as V_{in} crosses the comparator threshold. The internal resistance, R_{in} is simply calculated using I_{in} = 0.26 μA at 2.6 V.

V_{in} Decreasing:

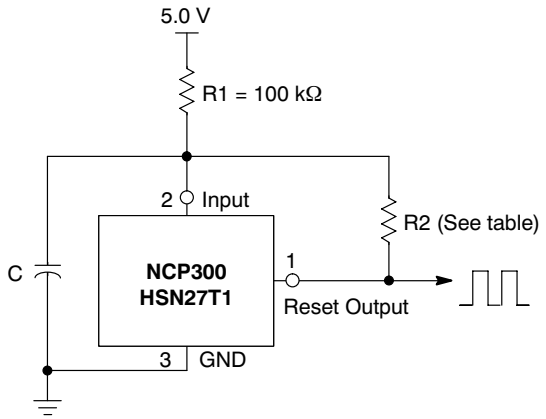
$$V_{th} = \left(\frac{R_H}{R_{in}} + 1\right)(V_{DET-})$$

V_{in} Increasing:

$$V_{th} = \left(\frac{R_H}{R_{in} \parallel R_L} + 1\right)(V_{DET-} + V_{HYS})$$

$V_{HYS} = V_{in}$ Increasing – V_{in} Decreasing

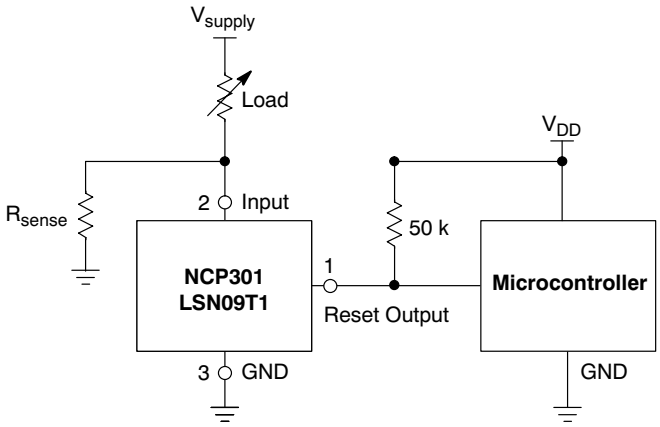
Test Data				
V_{th} Decreasing (V)	V_{th} Increasing (V)	V_{HYS} (V)	R_H (Ω)	R_L (kΩ)
2.70	2.84	0.135	0	–
2.70	2.87	0.17	100	10
2.70	2.88	0.19	100	6.8
2.70	2.91	0.21	100	4.3
2.70	2.90	0.20	220	10
2.70	2.94	0.24	220	6.8
2.70	2.98	0.28	220	4.3
2.70	2.70	0.27	470	10
2.70	3.04	0.34	470	6.8
2.70	3.15	0.35	470	4.3



Test Data				
	R2 = 82 kΩ		R2 = 8.2 kΩ	
C (nF)	f_{OSC} (kHz)	I_Q (μA)	f_{OSC} (kHz)	I_Q (μA)
0.01	10.4	18	6.0	30
0.068	9.8	18	5.7	30
1.0	6.18	21	3.6	29
10	1.41	21	1.34	25
100	0.27	22	0.356	23
1000	0.045	22	0.077	22

Table values are for information only.

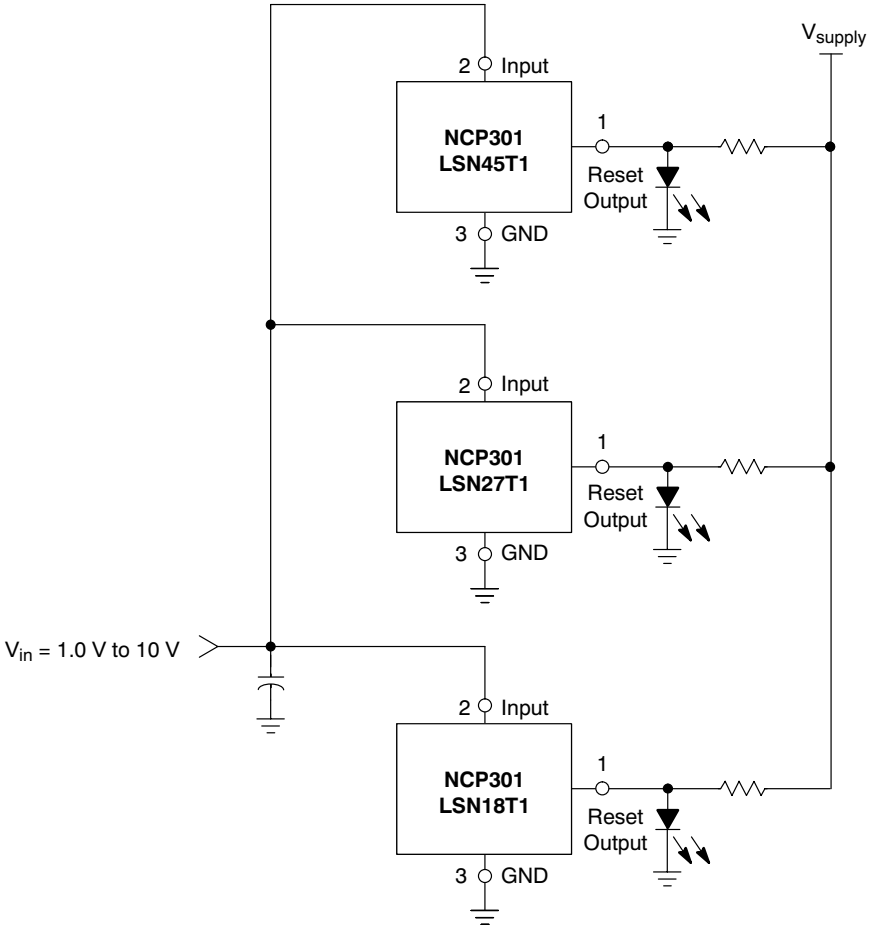
Figure 30. Simple Clock Oscillator



This circuit monitors the current at the load. As current flows through the load, a voltage drop with respect to ground appears across R_{sense} where $V_{sense} = I_{load} * R_{sense}$. The following conditions apply:

If:	Then:
$I_{Load} < V_{DET-}/R_{sense}$	Reset Output = 0 V
$I_{Load} \geq (V_{DET-}+V_{HYS})/R_{sense}$	Reset Output = V_{DD}

Figure 31. Microcontroller System Load Sensing



A simple voltage monitor can be constructed by connecting several voltage detectors as shown above. Each LED will sequentially turn on when the respective voltage detector threshold (V_{DET-} +V_{HYS}) is exceeded. Note that detector thresholds (V_{DET-}) that range from 0.9 V to 4.9 V in 100 mV steps can be manufactured.

Figure 32. LED Bar Graph Voltage Monitor

ORDERING INFORMATION

Device	Threshold Voltage	Output Type	Reset	Marking	Package	Shipping†
NCP300LSN09T1	0.9	CMOS	Active Low	SEJ	TSOP−5	3000 / Tape & Reel (7 in. Reel)
NCP300LSN09T1G	0.9			SEJ	TSOP−5 (Pb−Free)	
NCP300LSN18T1	1.8			SFK	TSOP−5	
NCP300LSN18T1G	1.8			SFK	TSOP−5 (Pb−Free)	
NCP300LSN20T1	2.0			SHE	TSOP−5	
NCP300LSN20T1G	2.0			SHE	TSOP−5 (Pb−Free)	
NCP300LSN27T1	2.7			SEE	TSOP−5	
NCP300LSN27T1G	2.7			SEE	TSOP−5 (Pb−Free)	
NCP300LSN28T1	2.8			SED	TSOP−5	
NCP300LSN28T1G	2.8			SED	TSOP−5 (Pb−Free)	
NCV300LSN28T1*	2.8			SSL	TSOP−5	
NCV300LSN28T1G*	2.8			SSL	TSOP−5 (Pb−Free)	
NCP300LSN30T1	3.0			SEC	TSOP−5	
NCP300LSN30T1G	3.0			SEC	TSOP−5 (Pb−Free)	
NCP300LSN33T1	3.3			SKV	TSOP−5	
NCP300LSN33T1G	3.3			SKV	TSOP−5 (Pb−Free)	
NCP300LSN34T1	3.4			SKU	TSOP−5	
NCP300LSN34T1G	3.4			SKU	TSOP−5 (Pb−Free)	
NCP300LSN44T1	4.4			SKK	TSOP−5	
NCP300LSN44T1G	4.4			SKK	TSOP−5 (Pb−Free)	
NCP300LSN45T1	4.5			SEA	TSOP−5	
NCP300LSN45T1G	4.5			SEA	TSOP−5 (Pb−Free)	
NCP300LSN46T1	4.6			SKJ	TSOP−5	
NCP300LSN46T1G	4.6			SKJ	TSOP−5 (Pb−Free)	
NCP300LSN47T1	4.7			SDZ	TSOP−5	
NCP300LSN47T1G	4.7			SDZ	TSOP−5 (Pb−Free)	
NCP300LSN185T1	1.815			SRA	TSOP−5	
NCP300LSN185T1G	1.815			SRA	TSOP−5 (Pb−Free)	

NOTE: The ordering information lists standard undervoltage thresholds with active low outputs. Additional active low threshold devices, ranging from 0.9 V to 4.9 V in 100 mV increments and NCP300/NCP301 active high output devices, ranging from 0.9 V to 4.9 V in 100 mV increments can be manufactured. Contact your ON Semiconductor representative for availability. The electrical characteristics of these additional devices are shown in Tables 1 through 4.

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

*NCV prefix for automotive and other applications requiring site and control changes.
NCVxxx: T_{low} = −40°C, T_{high} = +125°C. Guaranteed by design.

ORDERING INFORMATION

Device	Threshold Voltage	Output Type	Reset	Marking	Package	Shipping†
NCP300HSN09T1	0.9	CMOS	Active High	SDY	TSOP−5	3000 / Tape & Reel (7 in. Reel)
NCP300HSN09T1G	0.9			SDY	TSOP−5 (Pb−Free)	
NCP300HSN18T1	1.8			SFJ	TSOP−5	
NCP300HSN18T1G	1.8			SFJ	TSOP−5 (Pb−Free)	
NCP300HSN27T1	2.7			SDU	TSOP−5	
NCP300HSN27T1G	2.7			SDU	TSOP−5 (Pb−Free)	
NCP300HSN30T1	3.0			SDS	TSOP−5	
NCP300HSN30T1G	3.0			SDS	TSOP−5 (Pb−Free)	
NCP300HSN45T1	4.5			SDQ	TSOP−5	
NCP300HSN45T1G	4.5			SDQ	TSOP−5 (Pb−Free)	
NCP300HSN47T1	4.7			SDP	TSOP−5	
NCP300HSN47T1G	4.7			SDP	TSOP−5 (Pb−Free)	
NCP301LSN09T1	0.9	Open Drain	Active Low	SFF	TSOP−5	3000 / Tape & Reel (7 in. Reel)
NCP301LSN09T1G	0.9			SFF	TSOP−5 (Pb−Free)	
NCP301LSN12T1	1.2			SNN	TSOP−5	
NCP301LSN12T1G	1.2			SNN	TSOP−5 (Pb−Free)	
NCV301LSN12T1*	1.2			SRK	TSOP−5	
NCV301LSN12T1G*	1.2			SRK	TSOP−5 (Pb−Free)	
NCP301LSN16T1	1.6			SNJ	TSOP−5	
NCP301LSN16T1G	1.6			SNJ	TSOP−5 (Pb−Free)	
NCV301LSN16T1*	1.6			SRL	TSOP−5	
NCV301LSN16T1G*	1.6			SRL	TSOP−5 (Pb−Free)	
NCP301LSN18T1	1.8			SFN	TSOP−5	
NCP301LSN18T1G	1.8			SFN	TSOP−5 (Pb−Free)	
NCP301LSN20T1	2.0			SFD	TSOP−5	
NCP301LSN20T1G	2.0			SFD	TSOP−5 (Pb−Free)	
NCP301LSN22T1	2.2			SNG	TSOP−5	
NCP301LSN22T1G	2.2			SNG	TSOP−5 (Pb−Free)	
NCV301LSN22T1*	2.2			SUA	TSOP−5	
NCP301LSN25T1	2.5			SNF	TSOP−5	
NCP301LSN25T1G	2.5			SNF	TSOP−5 (Pb−Free)	
NCP301LSN26T1	2.6			SNE	TSOP−5	
NCP301LSN26T1G	2.6			SNE	TSOP−5 (Pb−Free)	

NOTE: The ordering information lists standard undervoltage thresholds with active low outputs. Additional active low threshold devices, ranging from 0.9 V to 4.9 V in 100 mV increments and NCP300/NCP301 active high output devices, ranging from 0.9 V to 4.9 V in 100 mV increments can be manufactured. Contact your ON Semiconductor representative for availability. The electrical characteristics of these additional devices are shown in Tables 1 through 4.

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ORDERING INFORMATION

Device	Threshold Voltage	Output Type	Reset	Marking	Package	Shipping†
NCP301LSN27T1	2.7	Open Drain	Active Low	SFA	TSOP−5	3000 / Tape & Reel (7 in. Reel)
NCP301LSN27T1G	2.7			SFA	TSOP−5 (Pb−Free)	
NCP301LSN28T1	2.8			SEZ	TSOP−5	
NCP301LSN28T1G	2.8			SEZ	TSOP−5 (Pb−Free)	
NCV301LSN28T1*	2.8			SRO	TSOP−5	
NCV301LSN28T1G*	2.8			SRO	TSOP−5 (Pb−Free)	
NCP301LSN30T1	3.0			SEY	TSOP−5	
NCP301LSN30T1G	3.0			SEY	TSOP−5 (Pb−Free)	
NCP301LSN31T1	3.1			SEW	TSOP−5	
NCP301LSN31T1G	3.1			SEW	TSOP−5 (Pb−Free)	
NCP301LSN32T1	3.2			SNC	TSOP−5	
NCP301LSN32T1G	3.2			SNC	TSOP−5 (Pb−Free)	
NCP301LSN33T1	3.3			SNB	TSOP−5	
NCP301LSN33T1G	3.3			SNB	TSOP−5 (Pb−Free)	
NCP301LSN34T1	3.4			SNA	TSOP−5	
NCP301LSN34T1G	3.4			SNA	TSOP−5 (Pb−Free)	
NCP301LSN36T1G	3.6			SMY	TSOP−5 (Pb−Free)	
NCP301LSN39T1G	3.4			SNA	TSOP−5 (Pb−Free)	
NCP301LSN40T1	4.0			SMU	TSOP−5	
NCP301LSN40T1G	4.0			SMU	TSOP−5 (Pb−Free)	
NCV301LSN40T1*	4.0			SRP	TSOP−5	
NCV301LSN40T1G*	4.0			SRP	TSOP−5 (Pb−Free)	
NCP301LSN42T1	4.2			SMS	TSOP−5	
NCP301LSN42T1G	4.2			SMS	TSOP−5 (Pb−Free)	
NCP301LSN45T1	4.5			SEV	TSOP−5	
NCP301LSN45T1G	4.5			SEV	TSOP−5 (Pb−Free)	
NCP301LSN46T1	4.6			SMP	TSOP−5	
NCP301LSN46T1G	4.6			SMP	TSOP−5 (Pb−Free)	
NCP301LSN47T1	4.7			SEU	TSOP−5	
NCP301LSN47T1G	4.7			SEU	TSOP−5 (Pb−Free)	

NOTE: The ordering information lists standard undervoltage thresholds with active low outputs. Additional active low threshold devices, ranging from 0.9 V to 4.9 V in 100 mV increments and NCP300/NCP301 active high output devices, ranging from 0.9 V to 4.9 V in 100 mV increments can be manufactured. Contact your ON Semiconductor representative for availability. The electrical characteristics of these additional devices are shown in Tables 1 through 4.

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

*NCV prefix for automotive and other applications requiring site and control changes.
NCVxxx: T_{low} = −40°C, T_{high} = +125°C. Guaranteed by design.

ORDERING INFORMATION

Device	Threshold Voltage	Output Type	Reset	Marking	Package	Shipping†
NCP301HSN09T1	0.9	Open Drain	Active High	SET	TSOP−5	3000 / Tape & Reel (7 in. Reel)
NCP301HSN09T1G	0.9			SET	TSOP−5 (Pb−Free)	
NCP301HSN18T1	1.8			SFM	TSOP−5	
NCP301HSN18T1G	1.8			SFM	TSOP−5 (Pb−Free)	
NCP301HSN22T1	2.2			SMD	TSOP−5	
NCP301HSN22T1G	2.2			SMD	TSOP−5 (Pb−Free)	
NCP301HSN27T1	2.7			SEP	TSOP−5	
NCP301HSN27T1G	2.7			SEP	TSOP−5 (Pb−Free)	
NCP301HSN30T1	3.0			SEN	TSOP−5	
NCP301HSN30T1G	3.0			SEN	TSOP−5 (Pb−Free)	
NCP301HSN45T1	4.5			SEL	TSOP−5	
NCP301HSN45T1G	4.5			SEL	TSOP−5 (Pb−Free)	

NOTE: The ordering information lists standard undervoltage thresholds with active low outputs. Additional active low threshold devices, ranging from 0.9 V to 4.9 V in 100 mV increments and NCP300/NCP301 active high output devices, ranging from 0.9 V to 4.9 V in 100 mV increments can be manufactured. Contact your ON Semiconductor representative for availability. The electrical characteristics of these additional devices are shown in Tables 1 through 4.

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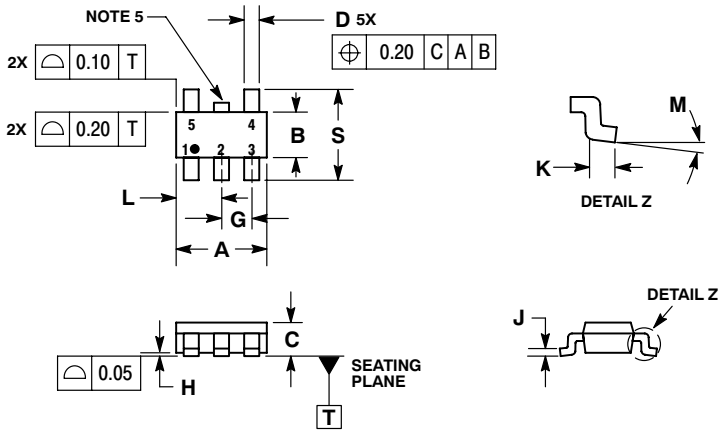
PACKAGE DIMENSIONS

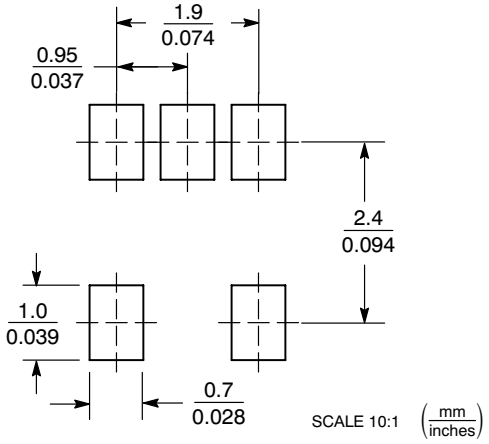
TSOP−5
CASE 483−02
ISSUE F



NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.
5. OPTIONAL CONSTRUCTION: AN ADDITIONAL TRIMMED LEAD IS ALLOWED IN THIS LOCATION. TRIMMED LEAD NOT TO EXTEND MORE THAN 0.2 FROM BODY.

	MILLIMETERS	
DIM	MIN	MAX
A	3.00 BSC	
B	1.50 BSC	
C	0.90	1.10
D	0.25	0.50
G	0.95 BSC	
H	0.01	0.10
J	0.10	0.26
K	0.20	0.60
L	1.25	1.55
M	0 °	10 °
S	2.50	3.00

SOLDERING FOOTPRINT*



*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

PUBLICATION ORDERING INFORMATION

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