NCP304, NCP305

Voltage Detector Series

The NCP304 and NCP305 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 under voltage detector with hysteresis which prevents erratic system reset operation as the comparator threshold is crossed.

The NCP304 series consists of complementary output devices that are available with either an active high or active low reset output. The NCP305 series has an open drain N–channel output with an active low reset output.

The NCP304 and NCP305 device series are available in the SC–82AB package with seven standard under voltage thresholds. Additional thresholds that range from 0.9 V to 4.9 V in 100 mV steps can be manufactured.

Features

- Quiescent Current of 1 μA Typical
- High Accuracy Under Voltage 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

Typical Applications

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

ON Semiconductor

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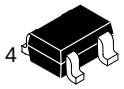
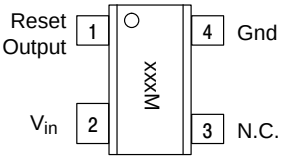


SC–82AB
SQ SUFFIX
CASE 419C

PIN CONNECTIONS AND MARKING DIAGRAM



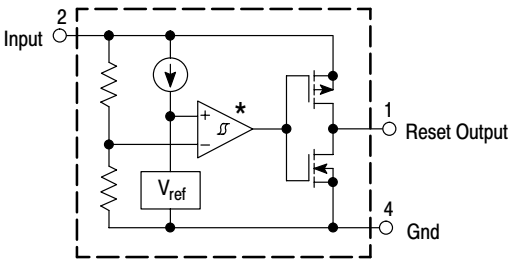
xxx = 304 or 305
M = Date Code
(Top View)

ORDERING INFORMATION

See detailed ordering and shipping information in the ordering information section on page 2 of this data sheet.

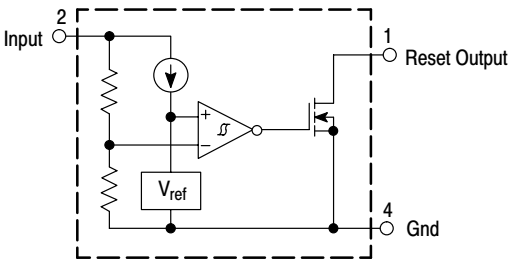
Representative Block Diagrams

NCP304xSQxxT1
Complementary Output Configuration



This device contains 38 active transistors.

NCP305LSQxxT1
Open Drain Output Configuration



This device contains 37 active transistors.

* The representative block diagram depicts active low reset output ‘L’ suffix devices. The comparator input is interchanged for the active high output ‘H’ suffix devices.

ORDERING INFORMATION

Device	Threshold Voltage	Output Type	Reset	Marking	Package (Qty/Reel)
NCP304LSQ09T1	0.9	CMOS	Active Low	SFO	3000 Units on 7 inch Reel
NCP304LSQ18T1	1.8			SFY	
NCP304LSQ20T1	2.0			SGA	
NCP304LSQ27T1	2.7			SGI	
NCP304LSQ30T1	3.0			SGL	
NCP304LSQ45T1	4.5			SHC	
NCP304LSQ47T1	4.7			SHE	
NCP304HSQ09T1	0.9		Active High	SNQ	
NCP304HSQ18T1	1.8			SNZ	
NCP304HSQ20T1	2.0			SOB	
NCP304HSQ27T1	2.7			SOI	
NCP304HSQ30T1	3.0			SOL	
NCP304HSQ45T1	4.5			SPA	
NCP304HSQ47T1	4.7			SPC	
NCP305LSQ09T1	0.9	Open Drain	Active Low	SHH	
NCP305LSQ18T1	1.8			SHR	
NCP305LSQ20T1	2.0			SHT	
NCP305LSQ27T1	2.7			SIB	
NCP305LSQ30T1	3.0			SIE	
NCP305LSQ45T1	4.5			SIV	
NCP305LSQ47T1	4.7			SIX	

NOTE: The ordering information lists seven standard under voltage thresholds with active low outputs. Additional active low threshold devices, ranging from 0.9 V to 4.9 V in 100 mV increments and NCP304 active high output devices, ranging from 0.9 V to 4.9 V in 100 μV increments can be manufactured. Contact your ON Semiconductor representative for availability. The electrical characteristics of these additional devices are shown in Tables 1 and 2.

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Input Power Supply Voltage (Pin 2)	V_{in}	12	V
Output Voltage (Pin 1) Complementary, NCP304 N–Channel Open Drain, NCP305	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	$R_{\theta JA}$	285	°C/W
Operating Junction Temperature Range	T_J	–40 to +125	°C
Storage Temperature Range	T_{stg}	–55 to +150	°C

NOTES:
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.

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

ELECTRICAL CHARACTERISTICS (For all values T_A = 25°C, unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
NCP304/5 – 0.9					
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}	 – –	 0.8 –	 2.4 –	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) Nch Sink Current, NCP304, NCP305 (V_{OUT} = 0.05V, V_{in} = 0.70V) (V_{OUT} = 0.50V, V_{in} = 0.85V) Pch Source Current, NCP304 (V_{OUT} = 2.4V, V_{in} = 4.5V)	I_{OUT}	 0.01 0.05 1.0	 0.05 0.50 2.0	 – – –	mA
Propagation Delay Input to Output (Figure 1) Complementary Output NCP304 Series Output Transition, High to Low Output Transition, Low to High N–Channel Open Drain NCP305 Series Output Transition, High to Low	 t_{pHL} t_{pLH} t_{pHL}	 – – –	 18 6.0 18	 – – –	µs

ELECTRICAL CHARACTERISTICS (For all values T_A = 25°C, unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
NCP304/5 – 1.8					
Detector Threshold (Pin 2, V_{in} Decreasing)	V_{DET-}	1.764	1.80	1.836	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}	 – –	 0.8 1.0	 2.4 3.0	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) Nch Sink Current, NCP304, NCP305 (V_{OUT} = 0.05V, V_{in} = 0.70V) (V_{OUT} = 0.50V, V_{in} = 1.5V) Pch Source Current, NCP304 (V_{OUT} = 2.4V, V_{in} = 4.5V)	I_{OUT}	 0.01 1.0 1.0	 0.05 2.0 2.0	 – – –	mA
Propagation Delay Input to Output (Figure 1) Complementary Output NCP304 Series Output Transition, High to Low Output Transition, Low to High N–Channel Open Drain NCP305 Series Output Transition, High to Low	 t_{pHL} t_{pLH} t_{pHL}	 – – –	 14 15 14	 – – –	µs

ELECTRICAL CHARACTERISTICS (For all values T_A = 25°C, unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
NCP304/5 – 2.0					
Detector Threshold (Pin 2, V_{in} Decreasing)	V_{DET-}	1.960	2.00	2.040	V
Detector Threshold Hysteresis (Pin 2, V_{in} Increasing)	V_{HYS}	0.06	0.10	0.14	V
Supply Current (Pin 2) (V_{in} = 1.9 V) (V_{in} = 4.0 V)	I_{in}	 – –	 0.9 1.1	 2.7 3.3	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) Nch Sink Current, NCP304, NCP305 (V_{OUT} = 0.05V, V_{in} = 0.70V) (V_{OUT} = 0.50V, V_{in} = 1.5V) Pch Source Current, NCP304 (V_{OUT} = 2.4V, V_{in} = 4.5V)	I_{OUT}	 0.01 1.0 1.0	 0.05 2.0 2.0	 – – –	mA
Propagation Delay Input to Output (Figure 1) Complementary Output NCP304 Series Output Transition, High to Low Output Transition, Low to High N–Channel Open Drain NCP305 Series Output Transition, High to Low	 t_{pHL} t_{pLH} t_{pHL}	 – – –	 13 15 13	 – – –	µs

ELECTRICAL CHARACTERISTICS (For all values T_A = 25°C, unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
NCP304/5 – 2.7					
Detector Threshold (Pin 2, V_{in} Decreasing)	V_{DET-}	2.646	2.700	2.754	V
Detector Threshold Hysteresis (Pin 2, V_{in} Increasing)	V_{HYS}	0.081	0.135	0.189	V
Supply Current (Pin 2) (V_{in} = 2.6 V) (V_{in} = 4.7 V)	I_{in}	 – –	 0.9 1.1	 2.7 3.3	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) Nch Sink Current, NCP304, NCP305 (V_{OUT} = 0.05V, V_{in} = 0.70V) (V_{OUT} = 0.50V, V_{in} = 1.5V) Pch Source Current, NCP304 (V_{OUT} = 2.4V, V_{in} = 4.5V)	I_{OUT}	 0.01 1.0 1.0	 0.05 2.0 2.0	 – – –	mA
Propagation Delay Input to Output (Figure 1) Complementary Output NCP304 Series Output Transition, High to Low Output Transition, Low to High N–Channel Open Drain NCP305 Series Output Transition, High to Low	 t_{pHL} t_{pLH} t_{pHL}	 – – –	 12 19 12	 – – –	µs

ELECTRICAL CHARACTERISTICS (For all values T_A = 25°C, unless otherwise noted.)

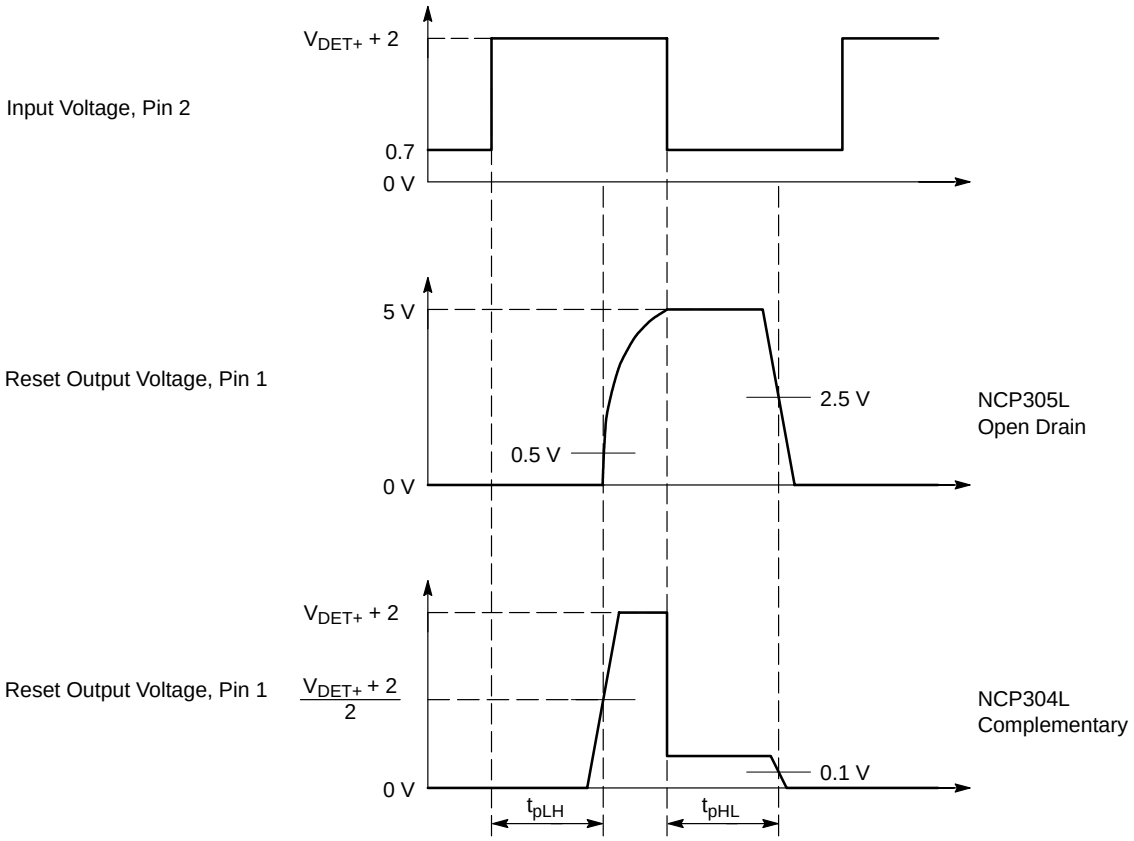
Characteristic	Symbol	Min	Typ	Max	Unit
NCP304/5 – 3.0					
Detector Threshold (Pin 2, V_{in} Decreasing)	V_{DET-}	2.94	3.00	3.06	V
Detector Threshold Hysteresis (Pin 2, V_{in} Increasing)	V_{HYS}	0.09	0.15	0.21	V
Supply Current (Pin 2) (V_{in} = 2.87 V) (V_{in} = 5.0 V)	I_{in}	 – –	 1.0 1.2	 3.0 3.6	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) Nch Sink Current, NCP304, NCP305 (V_{OUT} = 0.05V, V_{in} = 0.70V) (V_{OUT} = 0.50V, V_{in} = 1.5V) Pch Source Current, NCP304 (V_{OUT} = 2.4V, V_{in} = 4.5V)	I_{OUT}	 0.01 1.0 1.0	 0.05 2.0 2.0	 – – –	mA
Propagation Delay Input to Output (Figure 1) Complementary Output NCP304 Series Output Transition, High to Low Output Transition, Low to High N–Channel Open Drain NCP305 Series Output Transition, High to Low	 t_{pHL} t_{pLH} t_{pHL}	 – – –	 12 19 12	 – – –	µs

ELECTRICAL CHARACTERISTICS (For all values T_A = 25°C, unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
NCP304/5 – 4.5					
Detector Threshold (Pin 2, V_{in} Decreasing)	V_{DET-}	4.410	4.500	4.590	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}	 – –	 – –	 – 3.9	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) Nch Sink Current, NCP304, NCP305 (V_{OUT} = 0.05V, V_{in} = 0.70V) (V_{OUT} = 0.50V, V_{in} = 1.5V) Pch Source Current, NCP304 (V_{OUT} = 5.9V, V_{in} = 8.0V)	I_{OUT}	 0.01 1.0 1.5	 0.05 2.0 3.0	 – – –	mA
Propagation Delay Input to Output (Figure 1) Complementary Output NCP304 Series Output Transition, High to Low Output Transition, Low to High N–Channel Open Drain NCP305 Series Output Transition, High to Low	 t_{pHL} t_{pLH} t_{pHL}	 – – –	 10 21 10	 – – –	µs

ELECTRICAL CHARACTERISTICS (For all values T_A = 25°C, unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
NCP304/5 – 4.7					
Detector Threshold (Pin 2, V_{in} Decreasing)	V_{DET-}	4.606	4.70	4.794	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}	 – –	 1.1 1.3	 3.3 3.9	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) Nch Sink Current, NCP304, NCP305 (V_{OUT} = 0.05V, V_{in} = 0.70V) (V_{OUT} = 0.50V, V_{in} = 1.5V) Pch Source Current, NCP304 (V_{OUT} = 5.9V, V_{in} = 8.0V)	I_{OUT}	 0.01 1.0 1.5	 0.05 2.0 3.0	 – – –	mA
Propagation Delay Input to Output (Figure 1) Complementary Output NCP304 Series Output Transition, High to Low Output Transition, Low to High N–Channel Open Drain NCP305 Series Output Transition, High to Low	 t_{pHL} t_{pLH} t_{pHL}	 – – –	 10 21 10	 – – –	μs



NCP304 and NCP305 series are measured with 10 pF capacitive load. NCP305 has an additional 470 k pullup resistor connected from the reset output to +5.0 V. Reset output voltage waveforms are shown for the active low 'L' devices. For active high 'H' devices, the reset output voltage waveforms are inverted. The upper detector threshold, V_{DET+} is the sum of the lower detector threshold, V_{DET-} plus the input hysteresis, V_{HYS}.

Figure 1. Propagation Delay Measurement Conditions

Table 1. ELECTRICAL CHARACTERISTIC TABLE FOR 0.9 – 4.9 V

NCP304 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)			V_{HYS} (V)			I_{in} (μA) (1)	I_{in} (μA) (2)	I_{OUT} (mA) (3)	I_{OUT} (mA) (4)	I_{OUT} (mA) (5)
Part Number	Min	Typ	Max	Min	Typ	Max	Typ	Typ	Typ	Typ	Typ
NCP304(L/H)SQ09T1	0.882	0.9	0.918	0.027	0.045	0.063	0.8	0.9	0.05	0.5	2.0
NCP304(L/H)SQ10T1	0.980	1.0	1.020	0.030	0.050	0.070		1.0			
NCP304(L/H)SQ11T1	1.078	1.1	1.122	0.033	0.055	0.077				1.0	
NCP304(L/H)SQ12T1	1.176	1.2	1.224	0.036	0.060	0.084					
NCP304(L/H)SQ13T1	1.274	1.3	1.326	0.039	0.065	0.091					
NCP304(L/H)SQ14T1	1.372	1.4	1.428	0.042	0.070	0.098					
NCP304(L/H)SQ15T1	1.470	1.5	1.530	0.045	0.075	0.105					
NCP304(L/H)SQ16T1	1.568	1.6	1.632	0.048	0.080	0.112				2.0	
NCP304(L/H)SQ17T1	1.666	1.7	1.734	0.051	0.085	0.119					
NCP304(L/H)SQ18T1	1.764	1.8	1.836	0.054	0.090	0.126					
NCP304(L/H)SQ19T1	1.862	1.9	1.938	0.057	0.095	0.133					
NCP304(L/H)SQ20T1	1.960	2.0	2.040	0.060	0.100	0.140	0.9	1.1			
NCP304(L/H)SQ21T1	2.058	2.1	2.142	0.063	0.105	0.147					
NCP304(L/H)SQ22T1	2.156	2.2	2.244	0.066	0.110	0.154					
NCP304(L/H)SQ23T1	2.254	2.3	2.346	0.069	0.115	0.161					
NCP304(L/H)SQ24T1	2.352	2.4	2.448	0.072	0.120	0.168					
NCP304(L/H)SQ25T1	2.450	2.5	2.550	0.075	0.125	0.175					
NCP304(L/H)SQ26T1	2.548	2.6	2.652	0.078	0.130	0.182					
NCP304(L/H)SQ27T1	2.646	2.7	2.754	0.081	0.135	0.189					
NCP304(L/H)SQ28T1	2.744	2.8	2.856	0.084	0.140	0.196					
NCP304(L/H)SQ29T1	2.842	2.9	2.958	0.087	0.145	0.203					
NCP304(L/H)SQ30T1	2.940	3.0	3.060	0.090	0.150	0.210	1.0	1.2			
NCP304(L/H)SQ31T1	3.038	3.1	3.162	0.093	0.155	0.217					
NCP304(L/H)SQ32T1	3.136	3.2	3.264	0.096	0.160	0.224					
NCP304(L/H)SQ33T1	3.234	3.3	3.366	0.099	0.165	0.231					
NCP304(L/H)SQ34T1	3.332	3.4	3.468	0.102	0.170	0.238					
NCP304(L/H)SQ35T1	3.430	3.5	3.570	0.105	0.175	0.245					
NCP304(L/H)SQ36T1	3.528	3.6	3.672	0.108	0.180	0.252					
NCP304(L/H)SQ37T1	3.626	3.7	3.774	0.111	0.185	0.259					
NCP304(L/H)SQ38T1	3.724	3.8	3.876	0.114	0.190	0.266					
NCP304(L/H)SQ39T1	3.822	3.9	3.978	0.117	0.195	0.273					
NCP304(L/H)SQ40T1	3.920	4.0	4.080	0.120	0.200	0.280	1.1	1.3			3.0
NCP304(L/H)SQ41T1	4.018	4.1	4.182	0.123	0.205	0.287					
NCP304(L/H)SQ42T1	4.116	4.2	4.284	0.126	0.210	0.294					
NCP304(L/H)SQ43T1	4.214	4.3	4.386	0.129	0.215	0.301					
NCP304(L/H)SQ44T1	4.312	4.4	4.488	0.132	0.220	0.308					
NCP304(L/H)SQ45T1	4.410	4.5	4.590	0.135	0.225	0.315					
NCP304(L/H)SQ46T1	4.508	4.6	4.692	0.138	0.230	0.322					
NCP304(L/H)SQ47T1	4.606	4.7	4.794	0.141	0.235	0.329					
NCP304(L/H)SQ48T1	4.704	4.8	4.896	0.144	0.240	0.336					
NCP304(L/H)SQ49T1	4.802	4.9	4.998	0.147	0.245	0.343					

(1) 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
(2) Condition 2: 0.9 — 4.9 V, $V_{in} = V_{DET-} + 2.0$ V
(3) Condition 3: 0.9 — 4.9 V, $V_{in} = 0.7$ V, $V_{OUT} = 0.05$ V, Active Low ‘L’ Suffix Devices
(4) 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
(5) 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

Table 2. ELECTRICAL CHARACTERISTIC TABLE FOR 0.9 – 4.9 V

NCP305 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)			V_{HYS} (V)			I_{in} (μA) (1)	I_{in} (μA) (2)	I_{OUT} (mA) (3)	I_{OUT} (mA) (4)
Part Number	Min	Typ	Max	Min	Typ	Max	Typ	Typ	Typ	Typ
NCP305LSQ09T1	0.882	0.9	0.918	0.027	0.045	0.063	0.8	0.9	0.05	0.5
NCP305LSQ10T1	0.980	1.0	1.020	0.030	0.050	0.070		1.0		
NCP305LSQ11T1	1.078	1.1	1.122	0.033	0.055	0.077				1.0
NCP305LSQ12T1	1.176	1.2	1.224	0.036	0.060	0.084				
NCP305LSQ13T1	1.274	1.3	1.326	0.039	0.065	0.091				
NCP305LSQ14T1	1.372	1.4	1.428	0.042	0.070	0.098				
NCP305LSQ15T1	1.470	1.5	1.530	0.045	0.075	0.105				
NCP305LSQ16T1	1.568	1.6	1.632	0.048	0.080	0.112				2.0
NCP305LSQ17T1	1.666	1.7	1.734	0.051	0.085	0.119				
NCP305LSQ18T1	1.764	1.8	1.836	0.054	0.090	0.126				
NCP305LSQ19T1	1.862	1.9	1.938	0.057	0.095	0.133				
NCP305LSQ20T1	1.960	2.0	2.040	0.060	0.100	0.140	0.9	1.1		
NCP305LSQ21T1	2.058	2.1	2.142	0.063	0.105	0.147				
NCP305LSQ22T1	2.156	2.2	2.244	0.066	0.110	0.154				
NCP305LSQ23T1	2.254	2.3	2.346	0.069	0.115	0.161				
NCP305LSQ24T1	2.352	2.4	2.448	0.072	0.120	0.168				
NCP305LSQ25T1	2.450	2.5	2.550	0.075	0.125	0.175				
NCP305LSQ26T1	2.548	2.6	2.652	0.078	0.130	0.182				
NCP305LSQ27T1	2.646	2.7	2.754	0.081	0.135	0.189				
NCP305LSQ28T1	2.744	2.8	2.856	0.084	0.140	0.196				
NCP305LSQ29T1	2.842	2.9	2.958	0.087	0.145	0.203				
NCP305LSQ30T1	2.940	3.0	3.060	0.090	0.150	0.210	1.0	1.2		
NCP305LSQ31T1	3.038	3.1	3.162	0.093	0.155	0.217				
NCP305LSQ32T1	3.136	3.2	3.264	0.096	0.160	0.224				
NCP305LSQ33T1	3.234	3.3	3.366	0.099	0.165	0.231				
NCP305LSQ34T1	3.332	3.4	3.468	0.102	0.170	0.238				
NCP305LSQ35T1	3.430	3.5	3.570	0.105	0.175	0.245				
NCP305LSQ36T1	3.528	3.6	3.672	0.108	0.180	0.252				
NCP305LSQ37T1	3.626	3.7	3.774	0.111	0.185	0.259				
NCP305LSQ38T1	3.724	3.8	3.876	0.114	0.190	0.266				
NCP305LSQ39T1	3.822	3.9	3.978	0.117	0.195	0.273				
NCP305LSQ40T1	3.920	4.0	4.080	0.120	0.200	0.280	1.1	1.3		
NCP305LSQ41T1	4.018	4.1	4.182	0.123	0.205	0.287				
NCP305LSQ42T1	4.116	4.2	4.284	0.126	0.210	0.294				
NCP305LSQ43T1	4.214	4.3	4.386	0.129	0.215	0.301				
NCP305LSQ44T1	4.312	4.4	4.488	0.132	0.220	0.308				
NCP305LSQ45T1	4.410	4.5	4.590	0.135	0.225	0.315				
NCP305LSQ46T1	4.508	4.6	4.692	0.138	0.230	0.322				
NCP305LSQ47T1	4.606	4.7	4.794	0.141	0.235	0.329				
NCP305LSQ48T1	4.704	4.8	4.896	0.144	0.240	0.336				
NCP305LSQ49T1	4.802	4.9	4.998	0.147	0.245	0.343				

(1) 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
(2) Condition 2: 0.9 — 4.9 V, $V_{in} = V_{DET-} + 2.0$ V
(3) Condition 3: 0.9 — 4.9 V, $V_{in} = 0.7$ V, $V_{OUT} = 0.05$ V, Active Low ‘L’ Suffix Devices
(4) 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

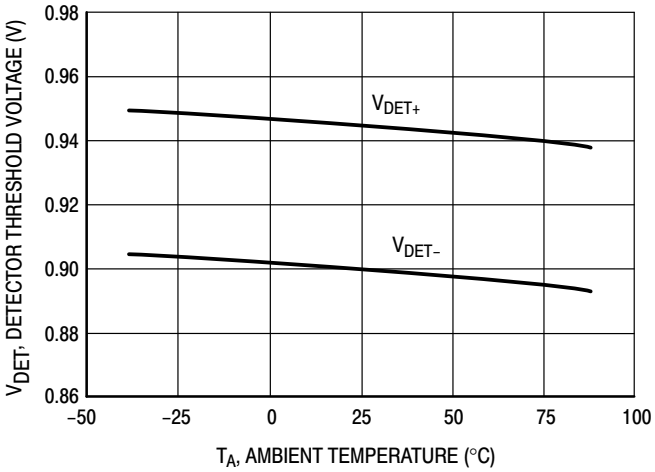


Figure 2. NCP304/5 Series 0.9 V Detector Threshold Voltage versus Temperature

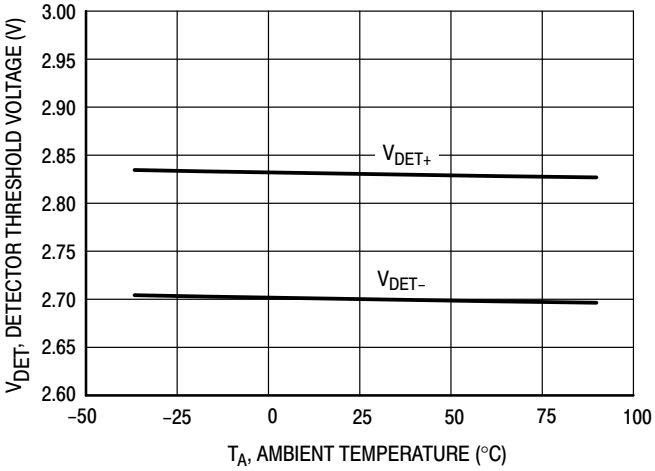


Figure 3. NCP304/5 Series 2.7 V Detector Threshold Voltage versus Temperature

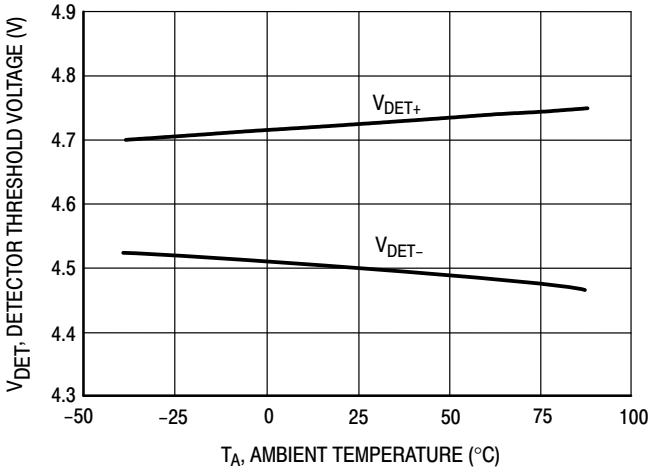


Figure 4. NCP304/5 Series 4.5 V Detector Threshold Voltage versus Temperature

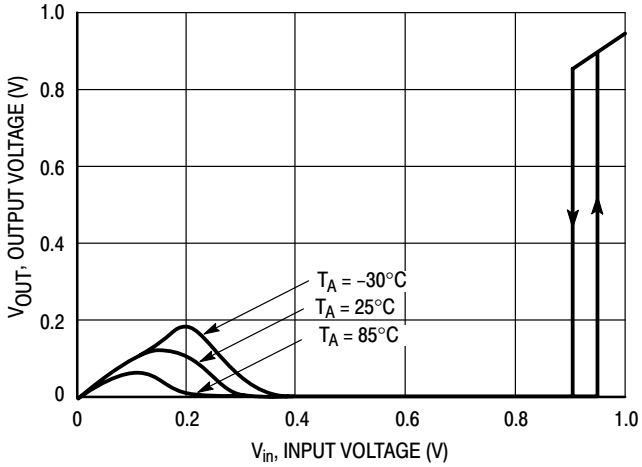


Figure 5. NCP304L/5L Series 0.9 V Reset Output Voltage versus Input Voltage

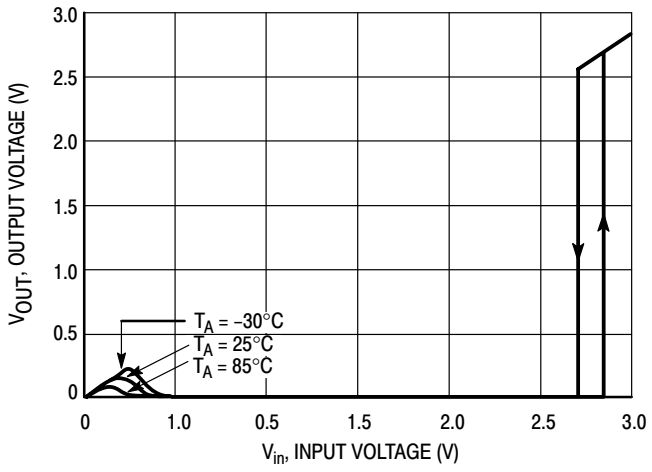


Figure 6. NCP304L/5L Series 2.7 V Reset Output Voltage versus Input Voltage

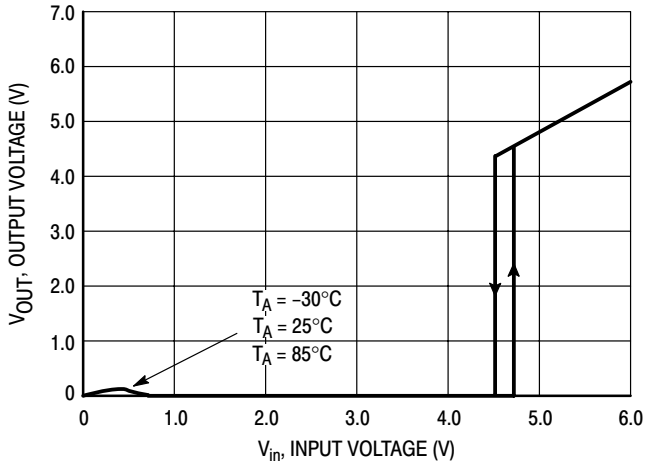


Figure 7. NCP304L/5L Series 4.5 V Reset Output Voltage versus Input Voltage

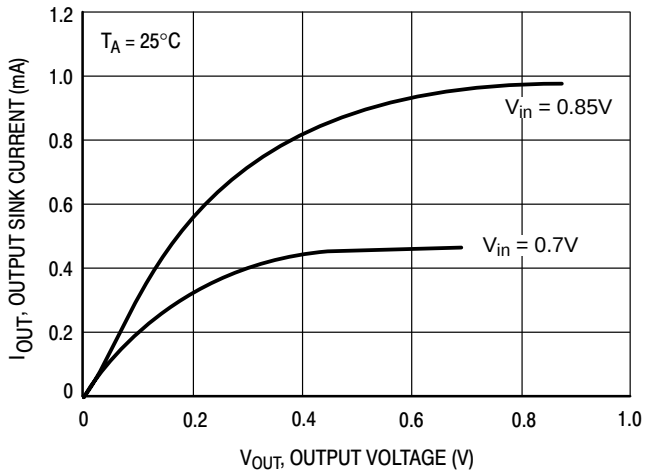


Figure 8. NCP304L/5L Series 0.9 V Reset Output Sink Current versus Output Voltage

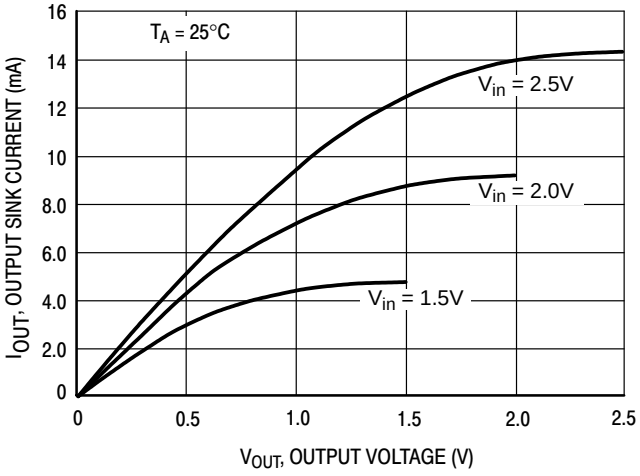


Figure 9. NCP304L/5L Series 2.7 V Reset Output Sink Current versus Output Voltage

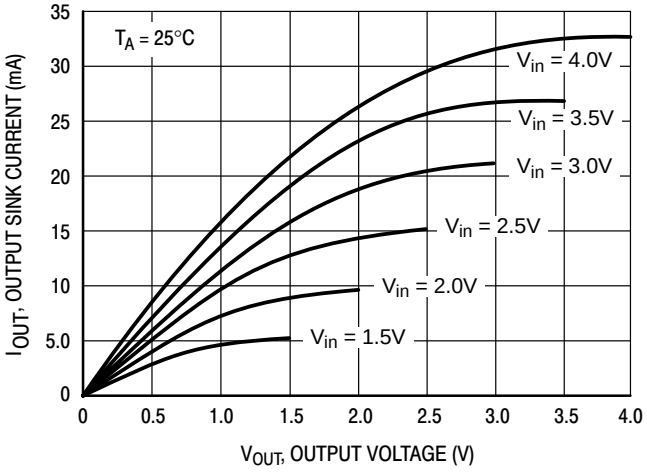


Figure 10. NCP304L/5L Series 4.5 V Reset Output Sink Current versus Output Voltage

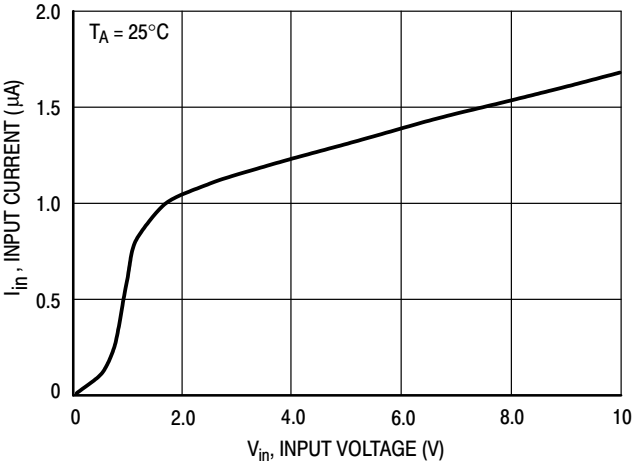


Figure 11. NCP304/5 Series 0.9 V Input Current versus Input Voltage

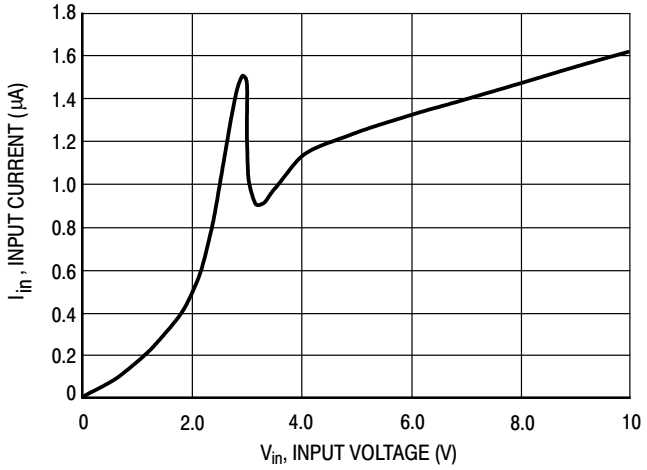


Figure 12. NCP304/5 Series 2.7 V Input Current versus Input Voltage

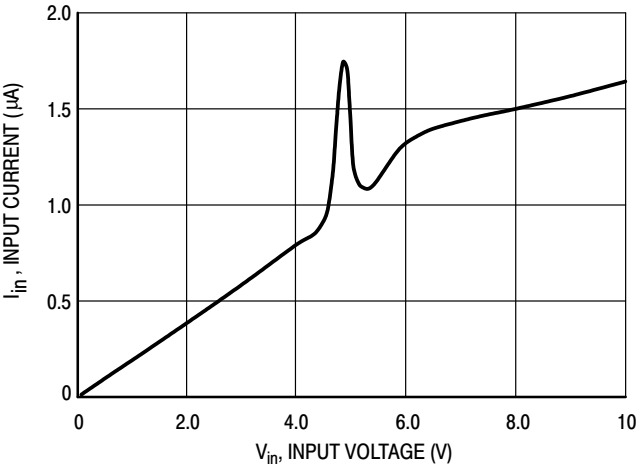


Figure 13. NCP304/5 Series 4.5 V Input Current versus Input Voltage

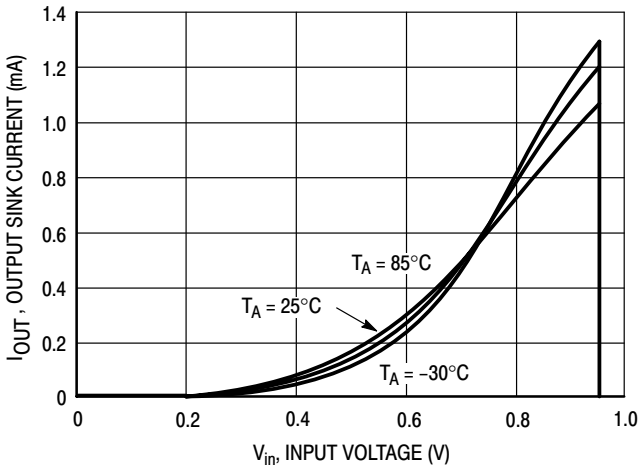


Figure 14. NCP304L/5L Series 0.9 V Reset Output Sink Current versus Input Voltage

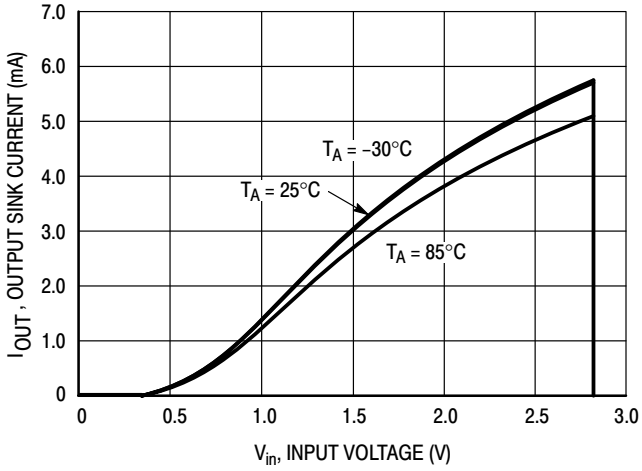


Figure 15. NCP304L/5L Series 2.7 V Reset Output Sink Current versus Input Voltage

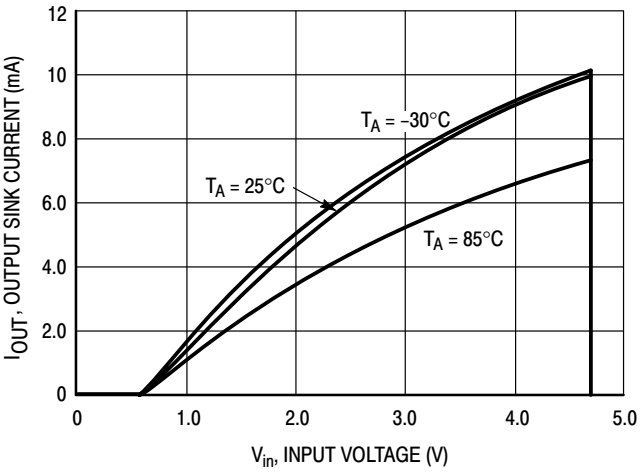


Figure 16. NCP304L/5L Series 4.5 V Reset Output Sink Current versus Input Voltage

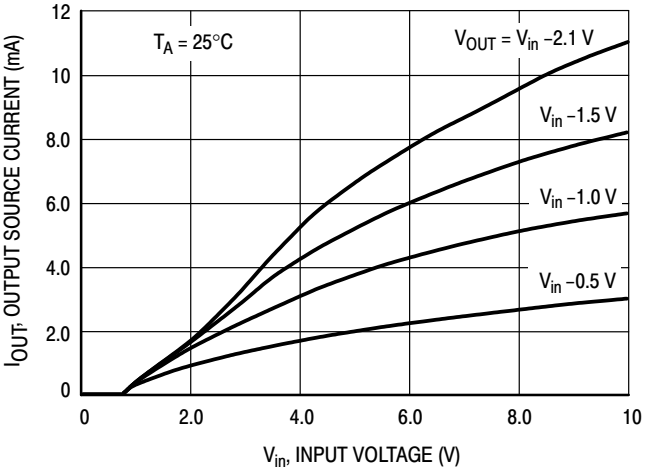


Figure 17. NCP304L Series 0.9 V Reset Output Source Current versus Input Voltage

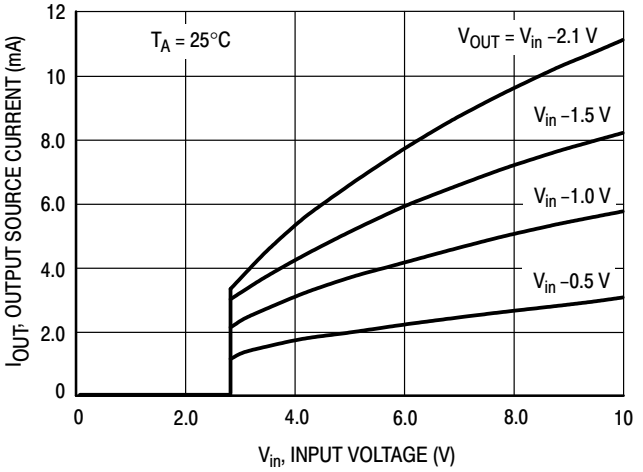


Figure 18. NCP304L Series 2.7 V Reset Output Source Current versus Input Voltage

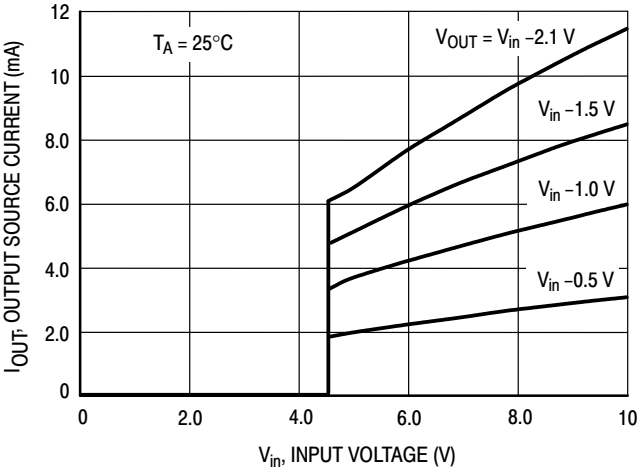


Figure 19. NCP304L Series 4.5 V Reset Output Source Current versus Input Voltage

OPERATING DESCRIPTION

The NCP304 and NCP305 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 21 through Figure 23 shows various application examples.

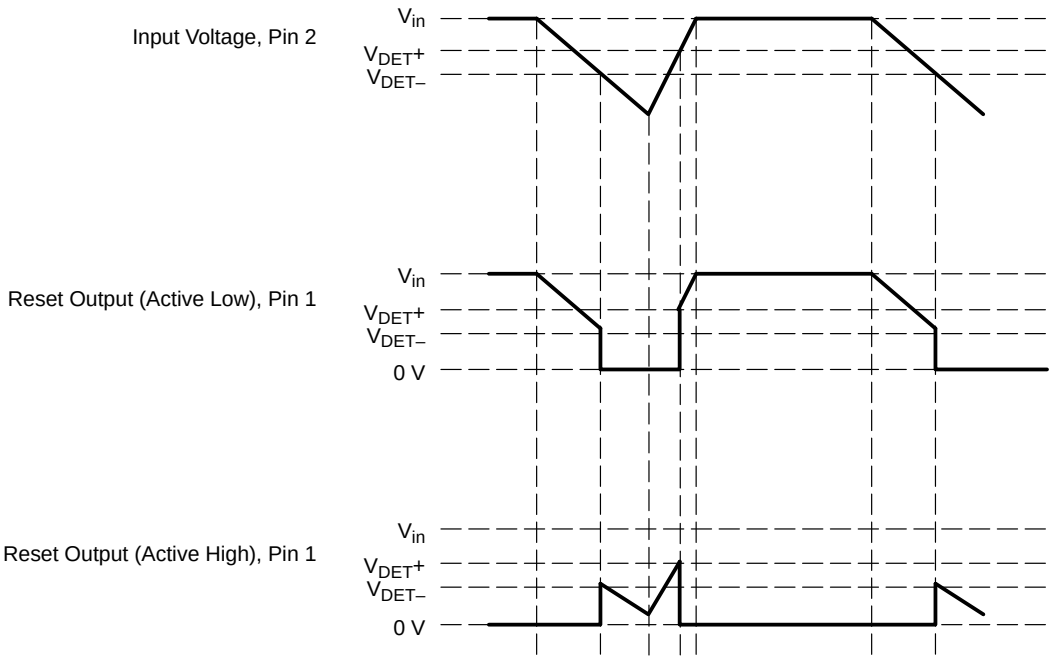


Figure 20. Timing Waveforms

APPLICATION CIRCUIT INFORMATION

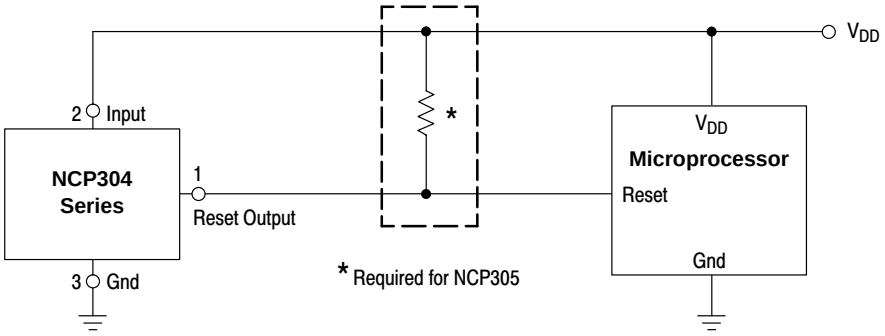


Figure 21. Microprocessor Reset Circuit (NCP304 and NCP305 Series)

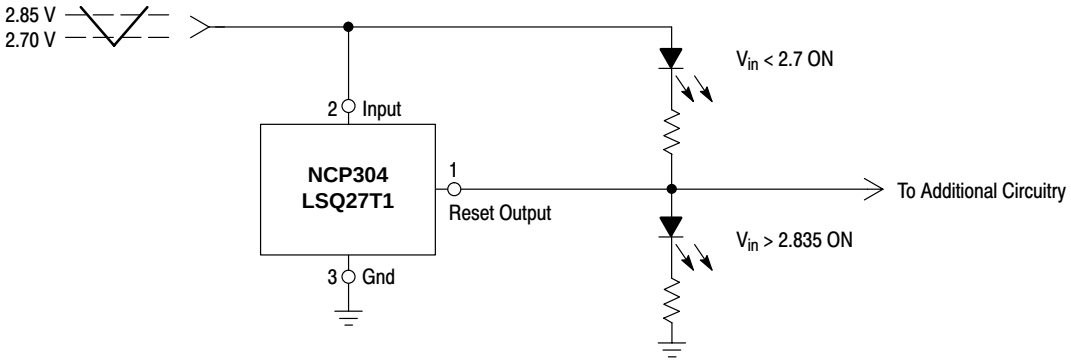


Figure 22. Battery Charge Indicator (NCP304 Series)

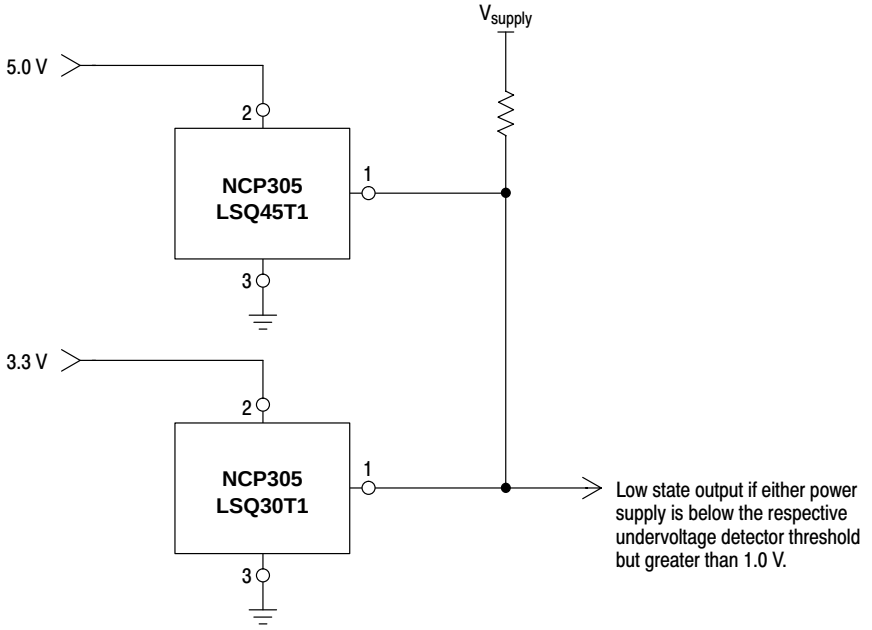
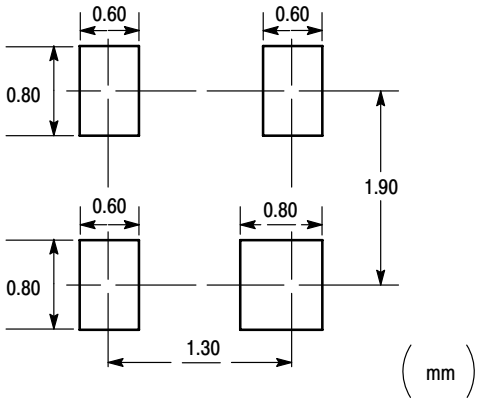


Figure 23. Dual Power Supply Undervoltage Supervision

INFORMATION FOR USING THE SC−82AB SURFACE MOUNT PACKAGE

MINIMUM RECOMMENDED FOOTPRINT FOR SURFACE MOUNTED APPLICATIONS

Surface mount board layout is a critical portion of the total design. The footprint for the semiconductor packages must be the correct size to insure proper solder connection interface between the board and the package. With the correct pad geometry, the packages will self align when subjected to a solder reflow process.



SC−82AB

SOLDERING PRECAUTIONS

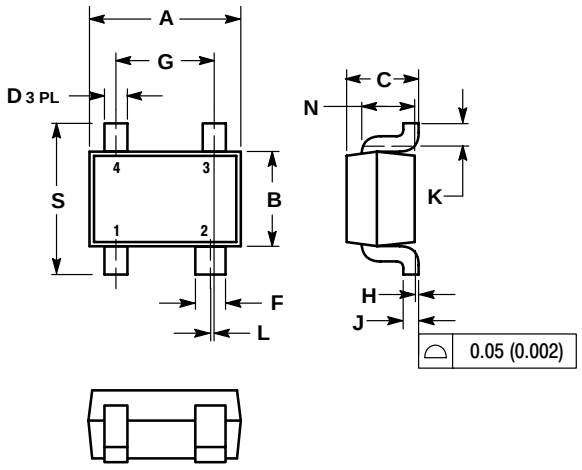
The melting temperature of solder is higher than the rated temperature of the device. When the entire device is heated to a high temperature, failure to complete soldering within a short time could result in device failure. Therefore, the following items should always be observed in order to minimize the thermal stress to which the devices are subjected.

- Always preheat the device.
- The delta temperature between the preheat and soldering should be 100°C or less.*
- When preheating and soldering, the temperature of the leads and the case must not exceed the maximum temperature ratings as shown on the data sheet. When using infrared heating with the reflow soldering method, the difference shall be a maximum of 10°C.
- The soldering temperature and time shall not exceed 260°C for more than 10 seconds.
- When shifting from preheating to soldering, the maximum temperature gradient shall be 5°C or less.
- After soldering has been completed, the device should be allowed to cool naturally for at least three minutes. Gradual cooling should be used as the use of forced cooling will increase the temperature gradient and result in latent failure due to mechanical stress.
- Mechanical stress or shock should not be applied during cooling.

* Soldering a device without preheating can cause excessive thermal shock and stress which can result in damage to the device.

PACKAGE DIMENSIONS

(SC−82AB)
SQ SUFFIX
PLASTIC PACKAGE
CASE 419C−01
ISSUE O



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	1.8	2.2	0.071	0.087
B	1.15	1.45	0.045	0.057
C	0.8	1.1	0.031	0.043
D	0.2	0.4	0.008	0.016
F	0.3	0.5	0.012	0.020
G	1.1	1.5	0.043	0.059
H	0.0	0.1	0.000	0.004
J	0.10	0.26	0.004	0.010
K	0.1	---	0.004	---
L	0.05 BSC		0.002 BSC	
N	0.7 REF		0.028 REF	
S	1.8	2.4	0.07	0.09

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