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SOIC-8 NB  
CASE 751-07

## Product Preview

# NCS7030, NCS7031, NC 7030, NC 7031

The NCS7030 and NCS7031 are high voltage, current sense amplifiers. They are available with gain options of 14 V/V and 20 V/V, with a maximum  $\pm 0.3\%$  gain error over the entire temperature range. Each part consists of a preamplifier and buffer with access to output and input via A1 and A2 pins for an intermediate filter network or modified gain. The current sense amplifiers offer excellent input common-mode rejection from  $-6$  V to 80 V. They can perform unidirectional current measurements across a sense resistor in a variety of applications. Automotive qualified options are available under NCV prefix. All versions operate over the extended temperature range from  $-40^{\circ}\text{C}$  to  $150^{\circ}\text{C}$ .

### Features

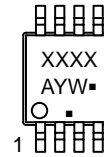
- Bandwidth: 100 kHz
- Input Offset Voltage:  $\pm 300$   $\mu\text{V}$  Max Over Temp
- Offset Drift over Temperature:  $\pm 3$   $\mu\text{V}/^{\circ}\text{C}$  max
- Gain Error:  $\pm 0.3$  % Max Over Temp
- Quiescent Current: 1.5 mA Typ
- Supply Voltage: 3 V to 5.5 V
- Common-Mode Input Voltage Range:  $-6$  V to 80 V Operating,  $-14$  V to 85 V Survival
- CMRR: 85 dB Min
- PSRR: 75 dB Min
- Low-Pass Filter (1-pole or 2-pole)
- This is a Pb-Free Device

### Typical Applications

- Telecom Equipment
- Power Supply Designs
- Diesel Injection Control
- Automotive
- Motor Control

This document contains information on a product under development. **onsemi** reserves the right to change or discontinue this product without notice.

### MARKING DIAGRAM



### ORDERING INFORMATION

See detailed ordering and shipping information on page 15 of this data sheet.

# NCS7030, NCS7031, NCV7030, NCV7031

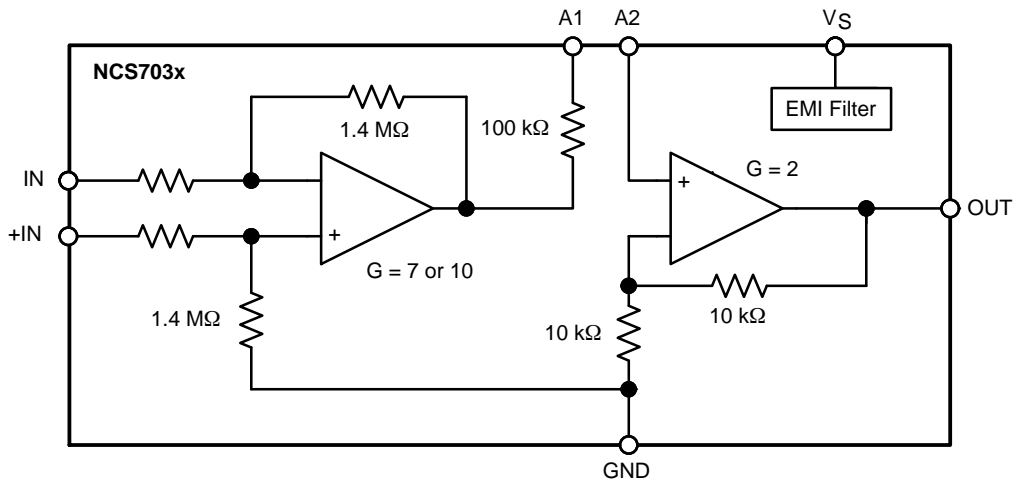


Figure 1. Simplified Block Diagram

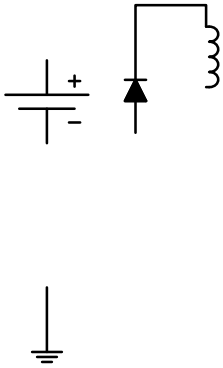


Figure 2. Application Schematic

# NCS7030, NCS7031, NCV7030, NCV7031

## ABSOLUTE MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Supply Voltage Range (Note 1)	$V_S$	0.3 to 7	V
Input Common Mode Range	$V_{CM}$	14 to 85	V
Differential Input Voltage	$V_{ID}$	$\pm V_S$	V
Maximum Input Current	$I_I$	$\pm 10$	mA
Maximum Output Current	$I_O$	$\pm 50$	mA
Continuous Total Power Dissipation	$P_D$	200	mW
Maximum Junction Temperature	$T_{J(max)}$	150	$^{\circ}C$
Storage Temperature Range	$T_{STG}$	65 to 150	$^{\circ}C$
ESD Capability (Note 2)			V
Human Body Model, Input pins	HBM	$\pm 7000$	
Human Body Model, All other pins	HBM	$\pm 4000$	
Charged Device Model	CDM	$\pm 1000$	
Latch Up Current (Note 3)		$\pm 100$	mA
Moisture Sensitivity Level	MSL	Level 1	
Lead Temperature Soldering Reflow (SMD Styles Only), Pb Free Versions (Note 4)	$T_{SLD}$	260	$^{\circ}C$

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Refer to ELECTRICAL CHARACTERISTICS and APPLICATION INFORMATION for Safe Operating Area.
2. This device series incorporates ESD protection and is tested by the following methods:  
 ESD Human Body Model tested per JS 001 2017 (AEC Q100 002)  
 ESD Charged Device Model tested per JS 002 2014 (AEC Q100 011)
3. Latch up current maximum rating:  $\pm 100$  mA per JEDEC standard JESD78E (AEC Q100 004).
4. For information, please refer to our Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

## THERMAL CHARACTERISTICS (Note 5)

Symbol	Parameter	Package	Value (Note 6)	Unit
$\theta_{JA}$	Thermal Resistance, Junction to Air	Micro8	163	$^{\circ}C/W$
		SOIC 8	128	$^{\circ}C/W$
$\Psi_{JT}$	Thermal Characteristic, Junction to Case Top	Micro8	24.4	$^{\circ}C/W$
		SOIC 8	28.5	$^{\circ}C/W$
$\Psi_{JB}$	Thermal Characteristic, Junction to Board	Micro8	137.3	$^{\circ}C/W$
		SOIC 8	103.5	$^{\circ}C/W$

5. Refer to ELECTRICAL CHARACTERISTICS and APPLICATION INFORMATION for Safe Operating Area.
6. Values based on copper area of  $645 \text{ mm}^2$  (or  $1 \text{ in}^2$ ) of 1 oz copper thickness and FR4 PCB substrate.

## OPERATING RANGES (Note 7)

Rating	Symbol	Min	Max	Unit
Supply Voltage	$V_S$	3	5.5	V

Common Mode Input Voltage Range Common

# NCS7030, NCS7031, NCV7030, NCV7031

**ELECTRICAL CHARACTERISTICS** (At  $V_S = 5\text{ V}$ ,  $T_A = +25^\circ\text{C}$ ,  $V_{CM} = 12\text{ V}$ ,  $R_L \geq 10\text{ k}\Omega$ , unless otherwise noted. **Boldface** limits apply over the specified temperature range, guaranteed by characterization and/or design.)

Symbol	Parameter	Conditions	Temp ( $^\circ\text{C}$ )	Min	Typ	Max	Unit
<b>GAIN</b>							
G	Total Gain, Preamp and Buffer	G = 14 V/V G = 20 V/V	25		14 20		V/V
G <sub>e</sub>	Gain Error		40 to 125			<b>±0.3</b>	%
			40 to 150			<b>±0.5</b>	
ΔG/ΔT	Gain Drift		40 to 150	0.0325	0.0325	0.0325	ref6V

**NCS7030, NCS7031, NCV7030, NCV7031**



# NCS7030, NCS7031, NCV7030, NCV7031

## TYPICAL CHARACTERISTICS

At  $T_A = 25^\circ$

**NCS7030, NCS7031, NCV7030, NCV7031**

**NCS7030, NCS7031, NCV7030, NCV7031**







# NCS7030, NCS7031, NCV7030, NCV7031

## APPLICATION INFORMATION

The NCS7030 and NCS7031 are current sense amplifiers featuring a wide common mode voltage up to 80 V independent of the supply voltage. The NCS703x current-sense amplifiers can be configured for both low-side and high-side current sensing.

### Current Sensing Techniques

Low-side sensing appears to have the advantage of being straightforward, inexpensive, and can be implemented with

a simple op amp circuit. However, the NCS703x series of devices provides the full differential input necessary to get accurate shunt connections, while also providing a built-in gain network with precision difficult to obtain with external resistors. The NCS703x is shown in a low-side

**Unidirectional Operation**

In unidirectional current sensing, the measured load current always flows in the same direction. Common





**NCS7030, NCS7031, NCV7030, NCV7031**

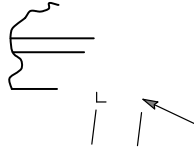
# NCS7030, NCS7031, NCV7030, NCV7031

## ORDERING INFORMATION

Gain	Device	Marking	Package	Shipping†
14	NCS7030D2G014R2G	7030014	SOIC 8 (Pb Free)	2500 / Tape & Reel
	NCS7030DM2G014R2G	3014	Micro8 (Pb Free)	

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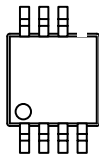




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Micro8

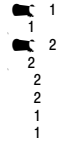
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