

# High Speed Dual-Channel, Ceramic Digital Isolator

## *Product Preview* **NCID9200**

### Description

The NCID9200 is a galvanically isolated high-speed dual-channel digital isolator. This device supports isolated communications thereby allowing digital signals to communicate between systems without conducting ground loops or hazardous voltages.

It utilizes **onsemi**'s patented galvanic off-chip capacitor isolation technology and optimized IC design to achieve high insulation and high noise immunity, characterized by high common mode rejection and power supply rejection specifications. The thick ceramic substrate yields capacitors with ~25 times the thickness of thin film on-chip capacitors and coreless transformers. The result is a combination of the electrical performance benefits that digital isolators offer with the safety reliability of a >0.5 mm insulator barrier similar to what has historically been offered by optocouplers.

The device is housed in a 16-pin wide body small outline package.

### Features

- € Off-Chip Capacitive Isolation to Achieve Reliable High Voltage Insulation
  - ↓ DTI (Distance Through Insulation): Ø 0.5 mm
  - ↓ Maximum Working Insulation Voltage: 2000 V<sub>peak</sub>
- € 100 kV/ s Minimum Common Mode Rejection
- € 8 mm Creepage and Clearance Distance to Achieve Reliable High Voltage Insulation
- € Specifications Guaranteed Over 2.5 V to 5.5 V Supply Voltage and -40°C to 125°C Extended Temperature Range
- € Over Temperature Detection
- € NCIV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP Capable (Pending)

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## PIN CONFIGURATION

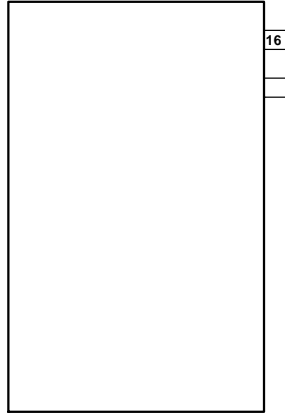


Figure 1. Pin and Channel Configuration

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## SPECIFICATIONS

**TRUTH TABLE** (Note 1)

$V_{INX}$	$V_{DDI}$	$V_{DDO}$	$V_{OX}$	Comment
H	Power Up	Power Up	H	Normal Operation
L	Power Up	Power Up	L	

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## ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Value	Unit
$T_{\text{STG}}$	Storage Temperature	-55 to +150	$^\circ\text{C}$
$T_{\text{OPR}}$	Operating Temperature	-40 to +125	$^\circ\text{C}$
$T_{\text{J}}$	Junction Temperature	-40 to +150	$^\circ\text{C}$
$T_{\text{SOL}}$	Lead Solder Temperature (Refer to Reflow Temperature Profile)	260 for 10 s	$^\circ\text{C}$
$V_{\text{DD}}$	Supply Voltage ( $V_{\text{DDX}}$ )		

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## ELECTRICAL CHARACTERISTICS

Apply over all recommended conditions,  $T_A = -40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ ,  $V_{DD1} = V_{DD2} = 2.5\text{ V}$  to  $5.5\text{ V}$ , unless otherwise specified. All typical values are measured at  $T_A = 25^{\circ}\text{C}$ .

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	Figure
$V_{OH}$	High Level Output Voltage	$V_{DD} = 5\text{ V}$ , $I_{OH} = -4\text{ mA}$	$V_{DDO} - 0.4$	$V_{DDO} - 0.1$	-	V	7
		$V_{DD} = 3.3\text{ V}$ , $I_{OH} = -2\text{ mA}$					
		$V_{DD} = 2.5\text{ V}$ , $I_{OH} = -1\text{ mA}$					
$V_{OL}$	Low Level Output Voltage	$V_{DD} = 5\text{ V}$ , $I_{OL} = 4\text{ mA}$	-	0.1	0.4	V	8
		$V_{DD} = 3.3\text{ V}$ , $I_{OL} = 2\text{ mA}$					
		$V_{DD} = 2.5\text{ V}$ , $I_{OL} = 1\text{ mA}$					
$V_{INT+}$	Rising Input Voltage Threshold		-	-	$0.7 \Delta V_{DD1}$	V	
$V_{INT-}$							

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### SUPPLY CURRENT CHARACTERISTICS (continued)

Apply over all recommended conditions,  $T_A = -40^\circ\text{C}$  to  $+125^\circ\text{C}$  unless otherwise specified. All typical values are measured at  $T_A = 25^\circ\text{C}$ .

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	Figure
$I_{DD1}$	AC Supply Current 20 Mbps	$V_{DD} = 5\text{ V}$ , $EN = 5\text{ V}$ , $C_L = 15\text{ pF}$ , $V_{IN} = 5\text{ V}$ Square Wave	-	8.3	13.6	mA	3, 4
$I_{DD2}$				14.2	15.2		
$I_{DD1}$		$V_{DD} = 3.3\text{ V}$ , $EN = 3.3\text{ V}$ , $C_L = 15\text{ pF}$ , $V_{IN} = 3.3\text{ V}$ Square Wave		8.2	12.2		
$I_{DD2}$				11.9	13.2		
$I_{DD1}$		$V_{DD} = 2.5\text{ V}$ , $EN = 2.5\text{ V}$ , $C_L = 15\text{ pF}$ , $V_{IN} = 2.5\text{ V}$ Square Wave		8.1	11.6		
$I_{DD2}$				11.1	12.7		

### SWITCHING CHARACTERISTICS

Apply over all recommended conditions,  $T_A = -40^\circ\text{C}$  to  $+125^\circ\text{C}$  unless otherwise specified. All typical values are measured at  $T_A = 25^\circ\text{C}$ .

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	Figure
$t_{PHL}$							

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## TYPICAL PERFORMANCE CHARACTERISTICS

Figure 3. Supply Current vs. Data Rate (No Load)

Figure 4. Supply Current vs. Data Rate  
(Load = 15 pF)

Figure 5. Supply Voltage UVLO Threshold vs.  
Ambient Temperature

Figure 6. Propagation Delay vs. Ambient  
Temperature

TEST CIRCUITS

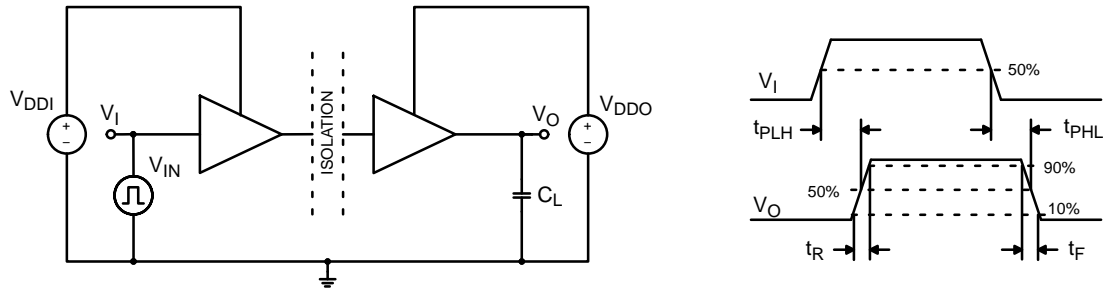


Figure 9.  $V_{IN}$  to  $V_O$  Propagation Delay Test Circuit and Waveform

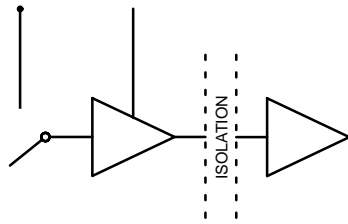


Figure 10. Common Mode Transient Immunity Test Circuit



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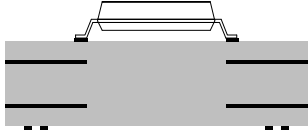
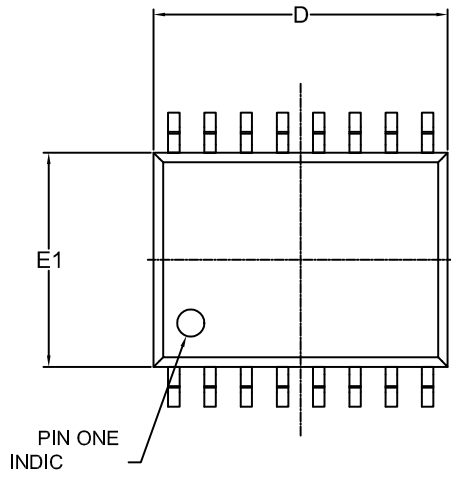


Figure 14. 4-Layer PCB for Digital Isolator

Figure 15. Placement of Bypass Capacitors

SOIC16 W



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