

High Speed Dual-Channel, Bi-Directional Ceramic Digital Isolator

NCID9210 / NCID9216

Description

The NCID9210 and NCID9216 are galvanically isolated full duplex, bi directional, high speed dual channel digital isolators. These devices support isolated communications thereby allowing digital signals to communicate between systems without conducting ground loops or hazardous voltages.

They utilize **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): 0.5 mm Maximum Working Insulation Voltage: 2000 V_{peak}

Full Duplex, Bi directional Communication 100 kV/ μs Minimum Common Mode Rejection

High Speed:

50 Mbit/s Data Rate (NRZ)

25 ns Maximum Propagation Delay

10 ns Maximum Pulse Width Distortion

8 mm Creepage and Clearance Distance to Achieve Reliable High Voltage Insulation.

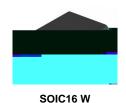
Specifications Guaranteed Over 2.5 V to 5.5 V Supply Voltage and 40 C to 125 C Extended Temperature Range

Over Temperature Detection

NCIV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC Q100 Qualified and PPAP Capable (Pending)

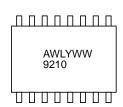
Safety and Regulatory Approvals

UL1577, 5000 V_{RMS} for 1 Minute DIN EN/IEC 60747 17 (Pending)



MARKING DIAGRAM

CASE 751EN



= Assembly Location

WL = Wafer Lot Y = Year

WW = Work Week

9210/9216 = Specific Device Code

ORDERING INFORMATION

See detailed ordering and shipping information on page 11 of this data sheet.

Typical Applications

Isolated PWM Control

Industrial Fieldbus Communications

Microprocessor System Interface (SPI, I²C, etc.)

Programmable Logic Control Isolated Data Acquisition System Voltage Level Translator

PIN CONFIGURATION

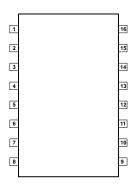


Figure 1. Pin and Channel Configuration

PIN DEFINITIONS

NC	15	15	No Connect
GND2	16	16	Ground, Secondary Side

TRUTH TABLE (Note 1)

V _{INX}	V _{DDI}	V_{DDO}	V _{OX}	Comment
Н	Power Up	Power Up	Н	Normal Operation
L	Power Up	Power Up	L	Normal Operation
NC	Power Up	Power Up	L	Default Low
Х	Power Down	Power Up	L	Default low; V_{OX} return to normal operation when V_{DDI} change to Power Up
Х	Power Up	Power Down	Undetermined(Note 2)	V _{OX} return to normal operation when V _{DDO} change to Power Up

V_{INX} = Input signal of a given channel (A or B). V_{OX} = Output signal of a given channel (A or B). V_{DDI} = Input-side V_{DD}. V_{DDO} = Output-side V_{DD}. X = Irrelevant. H = High level. L = Low level. NC = No Connection.
 The outputs are in undetermined state when V_{DDO} < V_{UVLO}.

SAFETY AND INSULATION RATINGS

As per DIN EN/IEC 60747–17, this digital isolator is suitable for "safe electrical insulation" only within the safety limit data. Compliance with the safety ratings must be ensured by means of protective circuits.

Symbol	Parameter	Min	Тур	Max	Unit

ABSOLUTE MAXIMUM RATINGS ($T_A = 25$ C unless otherwise specified)

Symbol	Parameter	Value	Unit
T _{STG}	Storage Temperature	-55 to +150	С
T _{OPR}	Operating Temperature	-40 to +125	С
T _J	Junction Temperature	-40 to +150	С
T _{SOL}	Lead Solder Temperature (Refer to Reflow Temperature Profile)	260 for 10sec	С
V _{DD}	Supply Voltage (V _{DDx})	-0.5 to 6	V
V	Voltage (V _{INx} , V _{Ox})	-0.5 to 6	V
I _O	Average Output Current	15	mA
PD	Power Dissipation	210	mW

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.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
T _A	Ambient Operating Temperature	-40	+125	С
V _{DD1} V _{DD2}	Supply Voltage (Notes 3, 4)	2.5	5.5	V
V _{INH}	High Level Input Voltage	0.7 x V _{DDI}	V_{DDI}	V
V _{INL}	Low Level Input Voltage	0	0.1 x V _{DDI}	V
V _{UVLO+}	Supply Voltage UVLO Rising Threshold	2.2		V
V _{UVLO} _	Supply Voltage UVLO Falling Threshold	2.0		V
UVLO _{HYS}	Supply Voltage UVLO Hysteresis	0.1		V
I _{OH}	High Level Output Current	-2	-	mA
l _{OL}	Low Level Output Current	-	2	mA
DR	Signaling Rate	0	50	Mbps

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

^{3.} During power up or down, ensure that both the input and output supply voltages reach the proper recommended operating voltages to avoid any momentary instability at the output state.

For reliable operation at recommended operating conditions, V_{DD} supply pins require at least a pair of external bypass capacitors, placed within 2 mm from V_{DD} pins 3 and 14 and GND pins 1 and 16. Recommended values are 0.1 μF and 1 μF.

SUPPLY CURRENT CHARACTERISTICS Apply over all recommended conditions, T _A =-40 C to +125	

SWITCHING CHARACTERISTICS Apply over all recommended conditions, T _A =-40 C to +125 C unless otherw to +125				

TEST CIRCUITS



Figure 9. $\rm V_{IN}$ to $\rm V_{O}$ Propagation Delay Test Circuit and Waveform

ORDERING INFORMATION

Part Number	Grade	Package	Shipping [†]
NCID9210	Industrial	SOIC16 W	50 Units / Tube
NCID9210R2	Industrial	SOIC16 W	750 / Tape & Reel
NCID9216 (pending)	Industrial	SOIC16 W	50 Units / Tube
NCID9216R2 (pending)	Industrial	SOIC16 W	750 / Tape & Reel
NCIV9210* (pending)	Automotive	SOIC16 W	50 Units / Tube
NCIV9210R2* (pending)	Automotive	SOIC16 W	750 / Tape & Reel
NCIV9216* (pending)	Automotive	SOIC16 W	50 Units / Tube
NCIV9216R2* (pending)	Automotive	SOIC16 W	750 / Tape & Reel

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

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