

High Speed 3-Channel Digital Isolator

NCID9301, NCID9311

Description

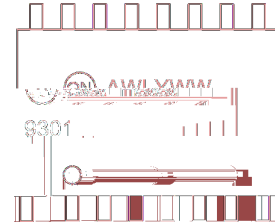
The NCID9301 and NCID9311 are galvanically isolated high speed 3 channel digital isolator with output enable. This device supports isolated communications thereby allowing digital signals to communicate between systems without conducting ground loops or hazardous voltages.

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

SOIC16 W
CASE 751EN

MARKING DIAGRAM



A	= Assembly Location
WL	= Wafer Lot / Assembly Lot
Y	= Year
WW	= Work Week
9301 / 9311	= Specific Device Code

ORDERING INFORMATION

See detailed ordering and shipping information on page 14 of this data sheet.

Microprocessor System Interface (SPI, I²C, etc.)
Programmable Logic Control
Isolated Data Acquisition System
Voltage Level Translator

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BLOCK DIAGRAM

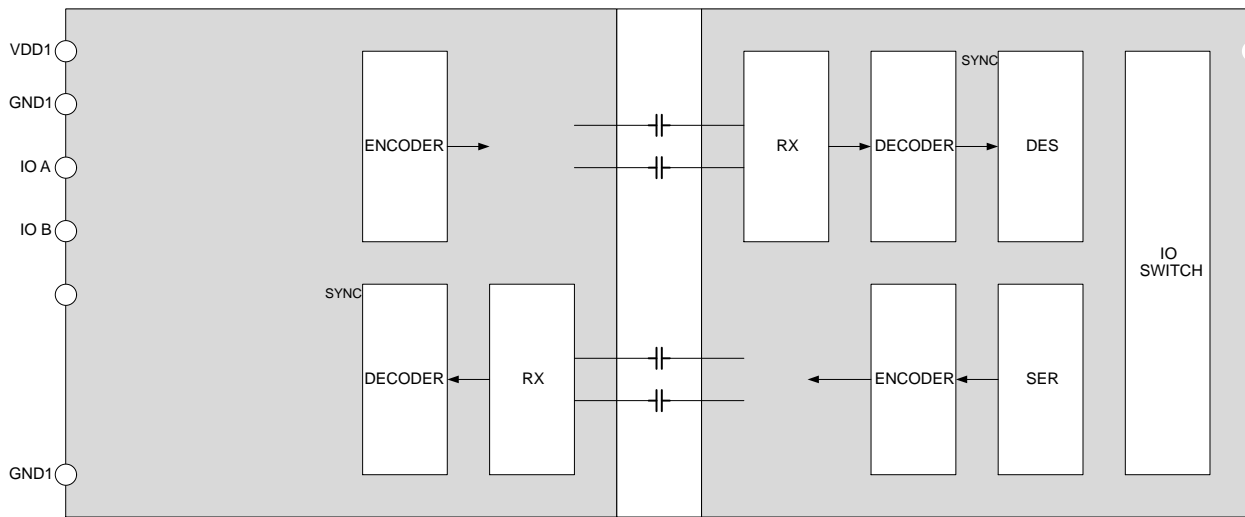


Figure 1. Functional Block Diagram

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PIN CONFIGURATION

NCID9301		NCID9311	
V _{DD1}	V _{DD2}	V _{DD1}	V _{DD2}
GND1	GND2	GND1	GND2
V _{INA}	V _{OA}	V _{INA}	V _{OA}
V _{INB}	V _{OB}	V _{INB}	V _{OB}
V _{INC}	V _{INC}		
NC	NC		
NC	EN2		
GND1	GND2		

Figure 2. Pin and Channel Configuration

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SPECIFICATIONS

TRUTH TABLE (Note 1)

V_{INX}	EN_x	V_{DDI}	V_{DDO}	V_{OX}	Comment
H	H/NC	Power Up	Power Up	H	Normal Operation
L	H/NC	Power Up	Power Up	L	Normal Operation
NC	H/NC	Power Up	Power Up	L	Default low
X	L	Power Up	Power Up	Hi-Z	
X	H/NC	Power Down	Power Up	L	Default low; V_{OX} return to normal operation when V_{DDIL}

	Unit
50	C
25	C
50	C
s	C
	V
	V
	mA
	mW

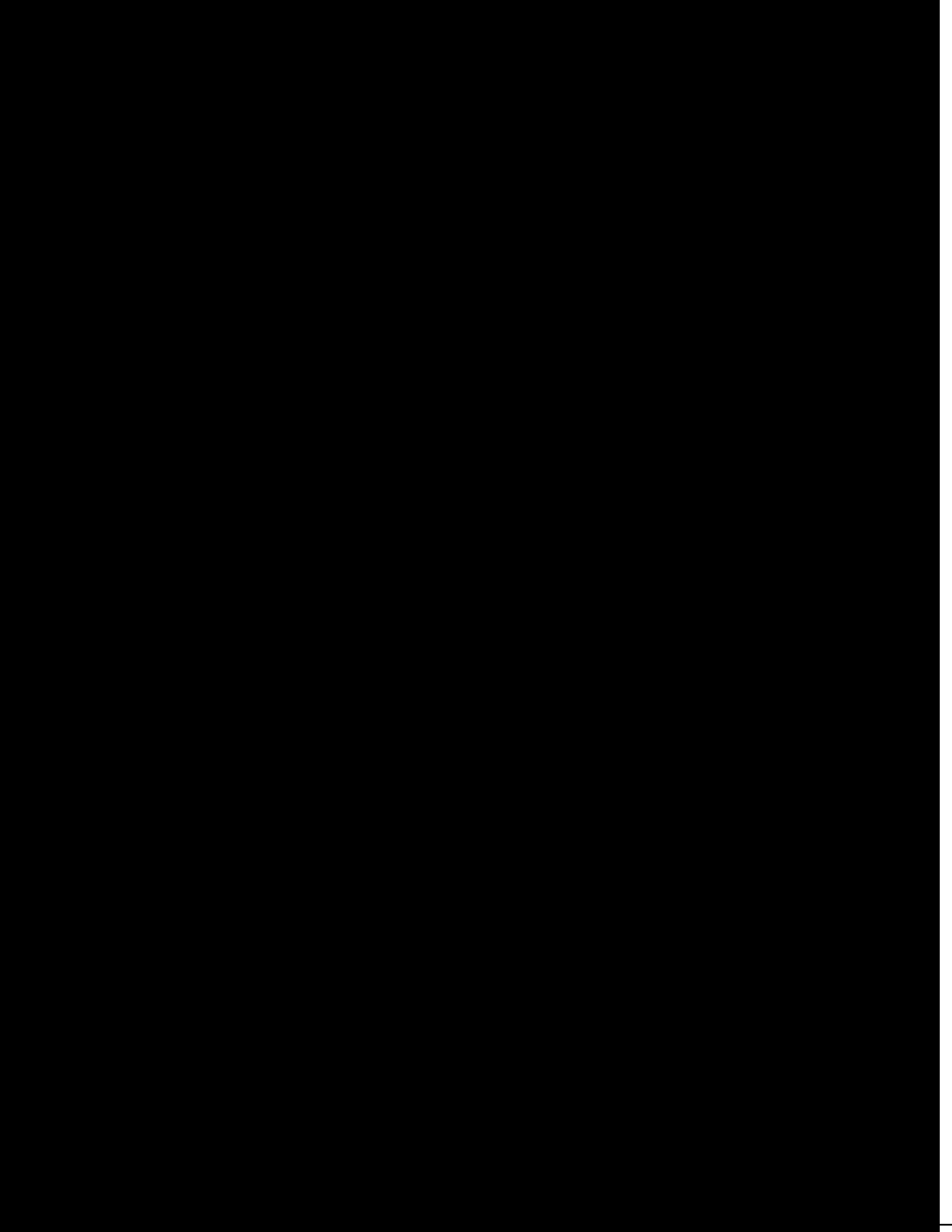
eeded, device functionality

Max	Unit
+125	C
5.5	V
V_{DDI}	V
$0.1 V_{DDI}$	V
-	V
-	V

ELECTRICAL

Apply over all re
are measured at

Symbol							
V _{OH}							
V _{OL}							
V _{INT+}							
V _{INT-}							
V _{INT(HYS)}							
I _{INH}	High Level Input Current	V _{IH} = V _{DDI}	-	-	1	μA	
I _{INL}	Low Level Input Current	V _{IL} = 0 V	-1	-	-	μA	
CMTI	Common Mode Transient Immunity	V _I = V _{DDI} or 0 V, V _{CM} = 1500 V	100	150	-	kV/μs	16
C _{IN}							



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SWITCHING CHARACTERISTICS – NCID9311

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

Symbol	Parameter	Ch	Conditions	Min	Typ	Max	Unit	Figure
t_{PHL}	Propagation Delay to Logic Low Output (Note 8)	A, B	$V_{DD} = 5$ V, $C_L = 15$ pF	–	95	140		

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TYPICAL PERFORMANCE CHARACTERISTICS (CONTINUED)

t_p – Propagation Delay (ns)

T_A – Ambient Temperature (°C)

Figure 9. NCID9311 Channel A/B Propagation Delay vs. Ambient Temperature

t_p – Propagation Delay (ns)

T_A – Ambient Temperature (°C)

Figure 10. NCID9311 Channel C Propagation Delay vs. Ambient Temperature

V_{OH} – High Level Output
VI

I_{OH} – High Level Output Current (mA)

Figure 11. High Level Output Voltage vs. Current

Figure 12. Low Level Output Voltage vs. Current

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TEST CIRCUITS



APPLICATION INFORMATION

Theory of Operation

NCID9301 and NCID9311 are 3 channel digital isolators. The chip to chip galvanic isolation are provided by a pair of off chip capacitors. Digital circuits are used for processing signals through the 0.5 mm thick isolation barrier.

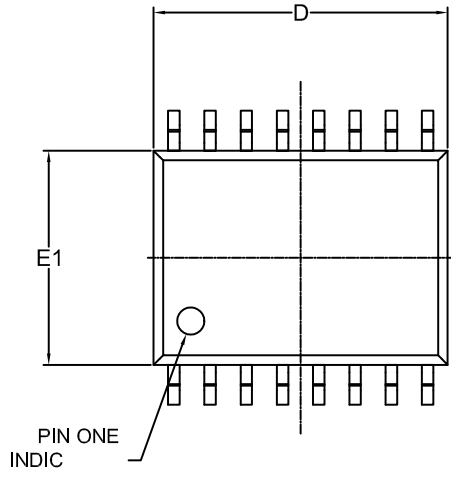
Pins are trimmed internally as input or output at IO Switch. Each direction of communication between two isolated circuits are achieved by implementing a pair of Serializer/Deserializer and Manchester Encoder/Decoder functional blocks as shown in Figure 17. The Serializer circuit converts the parallel data from the IO Switch into a serial (one bit) stream and the Manchester Encoder converts this data stream into coded data making it more robust, efficient and accurate for transmission. After encoding, all inputs signals are coded as V_{ITX} and transmitted across the isolation barrier via Transceiver.

The off chip ceramic capacitors that serve both as the isolation barrier and as the medium of transmission for signal switching using On Off keying (OOK) technique, illustrated in the transceiver block diagram in Figure 18

and Figure 19. At

Figure 20. 4-

SOIC16 W



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