

## General Description

The MC14011BDR2G is a quad 2 - input NAND gate. The outputs are fully buffered for the highest noise immunity and pattern insensitivity to output impedance.

It operates over a recommended VDD power supply range of 3 V to 15 V referenced to VSS ( usually ground) . Unused inputs must be connected to VDD, VSS, or another input.

## Features

- Wide supply voltage range from 3 V to 15 V
- Fully static operation
- 5V, 10V, and 15V parametric ratings
- Standardized symmetrical output characteristics
- Inputs and outputs are protected against electrostatic effects
- Specified from -40° C to + 105° C
- Packaging information: SOP14

## Ordering Information

Product Model	Package Type	Marking	Packing	Packing Qty
XBLW MC14011BDR2G	SOP-14	14011	Tape	2500Pcs/Reel

## Block Diagram And Pin Description

### Block Diagram



Figure 1 . Functional diagram

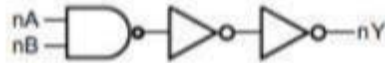
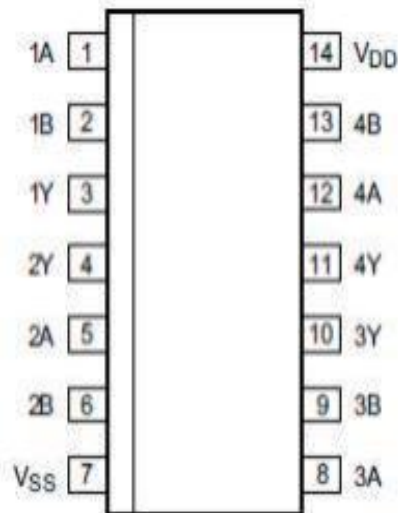


Figure 2 . Logic diagram ( one gate)

### Pin Configurations



**Pin Description**

Pin No.	Pin Name	Description
1	1A	data input
2	1B	data input
3	1Y	data output
4	2Y	data output
5	2A	data input
6	2B	data input
7	V <sub>SS</sub>	ground ( 0 V)
8	3A	data input
9	3B	data input
10	3Y	data output
11	4Y	data output
12	4A	data input
13	4B	data input
14	V <sub>DD</sub>	supply voltage

**Function Table**

Input		Output
nA	nB	nY
L	L	H
L	H	H
H	L	H
H	H	L

Note: H= HIGH voltage level; L= LOW voltage level.

**ElectricalParameter**

**Absolute Maximum Ratings**

( Voltages are referenced to V<sub>SS</sub> ( ground=0 V ) , unless otherwise specified. )

Parameter	Symbol	Conditions	Min	Max	Unit
supply voltage	V <sub>DD</sub>		-0.5	+ 18	V
DC input current	I <sub>IK</sub>	any one input	-	± 10	mA
input voltage	V <sub>I</sub>	all inputs	-0.5	V <sub>DD</sub> +0.5	V
storage temperature	T <sub>stg</sub>		-65	+ 150	C
total power dissipation	P <sub>tot</sub>		-	500	mW
device dissipation	P	per output transistor	-	100	mW
Soldering temperature	T <sub>L</sub>	10s	DIP	245	C
			SOP	250	

Note:

[ 1 ] For DIP14 packages: above 70 C the value of P<sub>tot</sub> derates linearly with 12 mW/K. [ 2 ] For SOP14 packages: above 70 C the value of P<sub>tot</sub> derates linearly with 8 mW/ K.

[ 3 ] For ( T ) SSOP14 packages: above 60C the value of P<sub>tot</sub> derates linearly with 5 . 5mW/ K.

**Recommended Operating Conditions**

Parameter	Symbol	Conditions	Min	Typ.	Max	Unit
supply voltage	$V_{DD}$	-	3	-	15	V
ambient temperature	$T_{amb}$	in free air	-40	-	+ 105	C

**Electrical Characteristics**
**DC Characteristics 1**

 (  $T_{amb}=25^{\circ}C$ , voltages are referenced to  $V_{SS}$  ( ground= 0 V) , unless otherwise specified. )

Parameter	Symbol	Conditions ( V )			$T_{amb}=25^{\circ}C$			Unit
		$V_o$	$V_{IN}$	$V_{DD}$	Min.	Typ.	Max.	
supply current	$I_{DD}$	-	0, 5	5	-	0.01	0.25	uA
		-	0, 10	10	-	0.01	0.5	uA
		-	0, 15	15	-	0.01	1	uA
LOW- level output current	$I_{OL}$	0.4	0, 5	5	0.51	1	-	mA
		0.5	0, 10	10	1.3	2.6	-	mA
		1.5	0, 15	15	3.4	6.8	-	mA
HIGH- level output current	$I_{OH}$	4.6	0, 5	5	-0.51	- 1	-	mA
		2.5	0, 5	5	- 1.6	-3.2	-	mA
		9.5	0, 10	10	- 1.3	-2.6	-	mA
		13.5	0, 15	15	-3.4	-6.8	-	mA
LOW- level output voltage	$V_{OL}$	-	0, 5	5	-	0	0.05	V
		-	0, 10	10	-	0	0.05	V
		-	0, 15	15	-	0	0.05	V
HIGH- level output voltage	$V_{OH}$	-	0, 5	5	4.95	5	-	V
		-	0, 10	10	9.95	10	-	V
		-	0, 15	15	14.95	15	-	V
LOW- level input voltage	$V_{IL}$	4.5	-	5	-	-	1.5	V
		9	-	10	-	-	3	V
		13.5	-	15	-	-	4	V
HIGH- level input voltage	$V_{IH}$	0.5, 4.5	-	5	3.5	-	-	V
		1, 9	-	10	7	-	-	V
		1.5, 13.5	-	15	11	-	-	V
input leakage current	$I_I$	-	0, 15	15	-	$\pm 10^{-5}$	$\pm 0.1$	uA

**DC Characteristics 2**

(  $T_{amb} = -40^{\circ}C$  to  $+105^{\circ}C$ , voltages are referenced to  $V_{SS}$  ( ground=0 V ), unless otherwise specified. )

Parameter	Symbol	Conditions ( V )			$T_{amb} = -40^{\circ}C$		$T_{amb} = +85^{\circ}C$		$T_{amb} = +105^{\circ}C$		Unit
		$V_O$	$V_{IN}$	$V_{DD}$	Min.	Max.	Min.	Max.	Min.	Max.	
supply current	$I_{DD}$	-	0, 5	5	-	0.25	-	7.5	-	7.5	$\mu A$
		-	0, 10	10	-	0.5	-	15	-	15	$\mu A$
		-	0, 15	15	-	1	-	30	-	30	$\mu A$
LOW- level output current	$I_{OL}$	0.4	0, 5	5	0.61	-	0.42	-	0.36	-	mA
		0.5	0, 10	10	1.5	-	1.1	-	0.9	-	mA
		1.5	0, 15	15	4	-	2.8	-	2.4	-	mA
HIGH- level output current	$I_{OH}$	4.6	0, 5	5	-0.61	-	-0.42	-	-0.36	-	mA
		2.5	0, 5	5	- 1.8	-	- 1.3	-	- 1.15	-	mA
		9.5	0, 10	10	- 1.5	-	- 1.1	-	-0.9	-	mA
		13.5	0, 15	15	-4	-	-2.8	-	-2.4	-	mA
LOW- level output voltage	$V_{OL}$	-	0, 5	5	-	0.05	-	0.05	-	0.05	V
		-	0, 10	10	-	0.05	-	0.05	-	0.05	V
		-	0, 15	15	-	0.05	-	0.05	-	0.05	V
HIGH- level output voltage	$V_{OH}$	-	0, 5	5	4.95	-	4.95	-	4.95	-	V
		-	0, 10	10	9.95	-	9.95	-	9.95	-	V
		-	0, 15	15	14.95	-	14.95	-	14.95	-	V
LOW- level input voltage	$V_{IL}$	4.5	-	5	-	1.5	-	1.5	-	1.5	V
		9	-	10	-	3	-	3	-	3	V
		13.5	-	15	-	4	-	4	-	4	V
HIGH- level input voltage	$V_{IH}$	0.5, 4.5	-	5	3.5	-	3.5	-	3.5	-	V
		1, 9	-	10	7	-	7	-	7	-	V
		1.5, 13.5	-	15	11	-	11	-	11	-	V
input leakage current	$I_i$	-	0, 15	15	-	$\pm 0.1$	-	$\pm 1$	-	$\pm 1$	$\mu A$

**AC Characteristics**

(  $T_{amb} = 25^{\circ}C$ ,  $V_{SS} = 0V$ ,  $t_r, t_f = 20ns$ ,  $C_L = 50pF$ ,  $R_L = 200k\Omega$ , unless otherwise specified. )

Parameter	Symbol	Conditions	Min	Typ.	Max	Unit	
propagation delay time	$t_{PHL}, t_{PLH}$	see Figure 4	$V_{DD} = 5V$	-	125	250	ns
			$V_{DD} = 10V$	-	60	120	ns
			$V_{DD} = 15V$	-	45	90	ns
transition time	$t_{THL}, t_{TLH}$	see Figure 4	$V_{DD} = 5V$	-	100	200	ns
			$V_{DD} = 10V$	-	50	100	ns
			$V_{DD} = 15V$	-	40	80	ns
input capacitance	$C_i$	any input	-	5	7.5	pF	

## Testing Circuit

### AC Testing Circuit

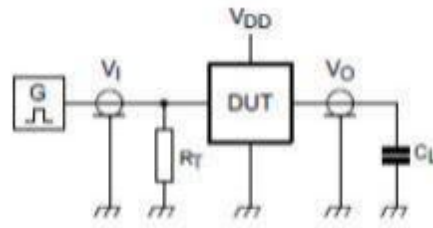


Figure 3 . Test circuit for switching times

Definitions for test circuit:

DUT= Device Under Test.

$C_L$ = Load capacitance including jig and probe capacitance.

$R_T$ = Termination resistance should be equal to the output impedance  $Z_o$  of the pulse generator.

### AC Testing Waveforms

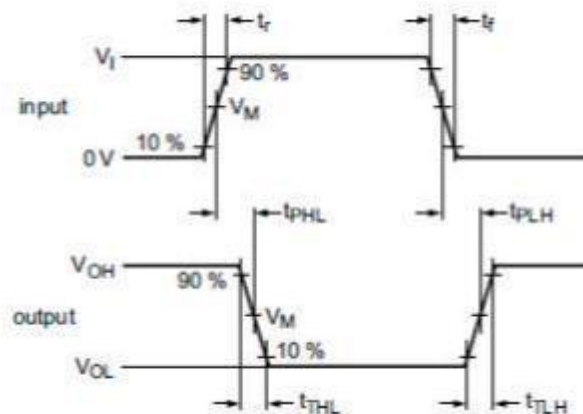


Figure 4 . Propagation delay, output transition time

### Measurement Points

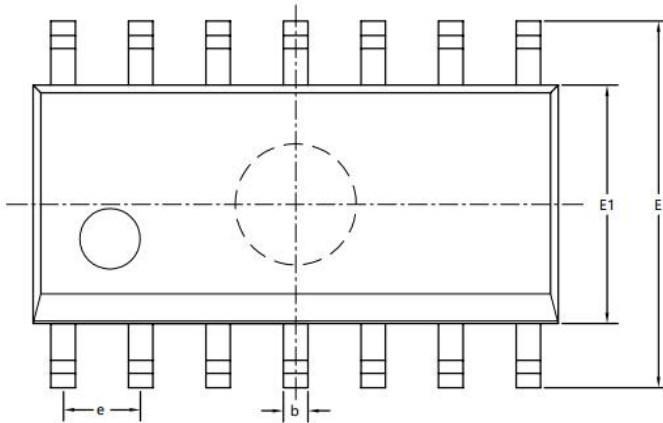
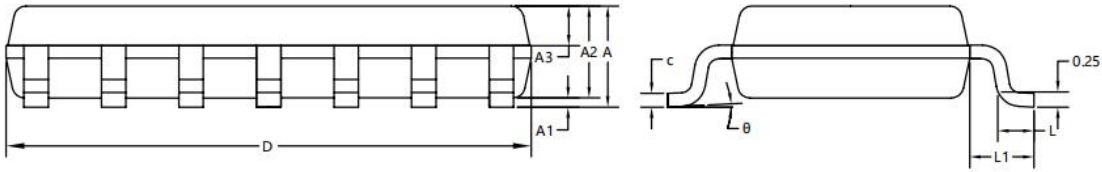
Supply voltage	Input	Output
$V_{DD}$	$V_M$	$V_M$
5V to 15V	$0.5 \times V_{DD}$	$0.5 \times V_{DD}$

### Test Data

Supply voltage	Input		Load
$V_{DD}$	$V_I$	$t_r, t_f$	$C_L$
5V to 15V	$V_{SS}$ or $V_{DD}$	$\leq 20ns$	50pF

**Package Information**

SOP14



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	1.50	1.60	1.70
A1	0.10	0.15	0.25
A2	1.40	1.45	1.50
A3	0.60	0.65	0.70
b	0.35	0.40	0.45
c	0.15	0.20	0.25
D	8.50	8.60	8.70
E	5.80	6.00	6.20
E1	3.85	3.90	3.95
e	1.27BSC		
L	0.50	0.60	0.70
L1	1.05REF		
$\theta$	0°	4°	8°

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