

DS1611/DS3611, DS1612/DS3612, DS1613/DS3613, DS1614/DS3614 Dual Peripheral Drivers

General Description

The DS1611 series of dual peripheral drivers was designed for those applications where a higher breakdown voltage is required than that provided by the DS75451 series. The pin outs for the circuits are identical to those of the DS75451 through DS75454. The DS1611 series parts feature high voltage outputs (80V breakdown in the "OFF" state) as well as high current (300 mA in the "ON" state). Typical applications include power drivers, relay drivers, lamp drivers, MOS drivers, and memory drivers.

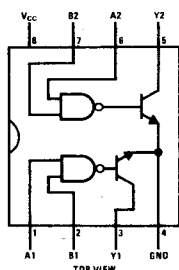
Features

- 300 mA output current capability per driver
- High voltage outputs (80V)
- TTL compatible
- Input clamping diodes
- Choice of logic function

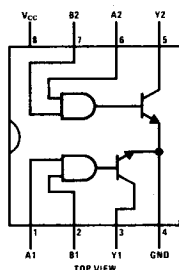
**DS1611/DS3611, DS1612/DS3612,
DS1613/DS3613, DS1614/DS3614**

3

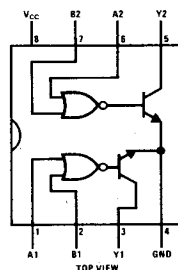
Connection Diagrams (Dual-In-Line and Metal Can Packages)



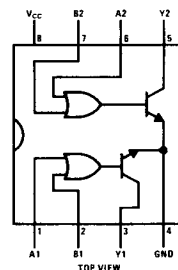
**Order Number DS1611J-8,
DS3611J-8 or DS3611N**



**Order Number DS1612J-8,
DS3612J-8 or DS3612N**

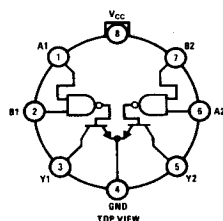


**Order Number DS1613J-8,
DS3613J-8 or DS3613N**

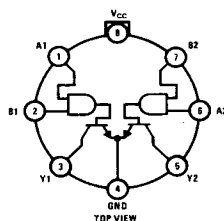


**Order Number DS1614J-8,
DS3614J-8 or DS3614N**

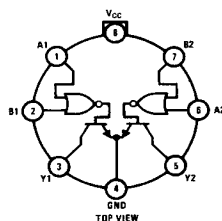
See NS Package J08A or N08A



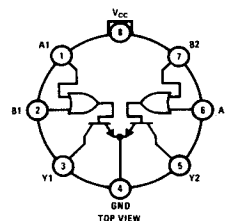
**Order Number
DS1611H or DS3611H**



**Order Number
DS1612H or DS3612H**



**Order Number
DS1613H or DS3613H**



**Order Number
DS1614H or DS3614H**

See NS Package H08C

Absolute Maximum Ratings (Note 1)

Supply Voltage, V_{CC}	7.0V
Input Voltage	5.5V
Output Voltage (Note 5)	80V
Continuous Output Current	300 mA
Storage Temperature Range	-65°C to +150°C
Maximum Power Dissipation* at 25°C	
Cavity Package	1133 mW
Molded Package	1022 mW
TO-5 Package	787 mW
Lead Temperature (Soldering, 10 seconds)	300°C

Operating Conditions

	MIN	MAX	UNITS
Supply Voltage (V_{CC})			
DS161X	4.5	5.5	V
DS361X	4.75	5.25	V
Temperature (T_A)			
DS161X	-55	+125	°C
DS361X	0	+70	°C

*Derate cavity package 7.6 mW/°C above 25°C; derate molded package 8.2 mW/°C above 25°C; derate TO-5 package 5.25 mW/°C above 25°C.

Electrical Characteristics DS1611/DS3611, DS1612/DS3612, DS1613/DS3613, DS1614/DS3614 (Notes 2 and 3)

PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
V_{IH} High Level Input Voltage	(Figure 1)		2			V
V_{IL} Low Level Input Voltage	(Figure 2)				0.8	V
V_I Input Clamp Voltage	$V_{CC} = \text{Min}$, $I_I = -12 \text{ mA}$, (Figure 3)			-1.2	-1.5	V
V_{OL} Low Level Output Voltage	$V_{CC} = \text{Min}$, (Figure 1)	DS1611, $V_{IL} = 0.8V$	$I_{OL} = 100 \text{ mA}$	0.2	0.5	V
			$I_{OL} = 300 \text{ mA}$	0.45	0.8	V
		DS1612, $V_{IH} = 2V$	$I_{OL} = 100 \text{ mA}$	0.2	0.5	V
			$I_{OL} = 300 \text{ mA}$	0.45	0.8	V
		DS1613, $V_{IL} = 0.8V$	$I_{OL} = 100 \text{ mA}$	0.2	0.5	V
			$I_{OL} = 300 \text{ mA}$	0.45	0.8	V
		DS1614, $V_{IH} = 2V$	$I_{OL} = 100 \text{ mA}$	0.2	0.5	V
			$I_{OL} = 300 \text{ mA}$	0.45	0.8	V
		DS3611, $V_{IL} = 0.8V$	$I_{OL} = 100 \text{ mA}$	0.2	0.4	V
			$I_{OL} = 300 \text{ mA}$	0.45	0.7	V
		DS3612, $V_{IH} = 2V$	$I_{OL} = 100 \text{ mA}$	0.2	0.4	V
			$I_{OL} = 300 \text{ mA}$	0.45	0.7	V
V_{OH} Output Breakdown Voltage	$V_{CC} = \text{Min}$, (Figure 1)	$V_{IH} = 2V$, $I_{OH} = 300 \mu A$	DS1611, DS1613	80		V
		$V_{IH} = 2V$, $I_{OH} = 100 \mu A$	DS3611, DS3613	80		V
		$V_{IL} = 0.8V$, $I_{OH} = 300 \mu A$	DS1612, DS1614	80		V
		$V_{IL} = 0.8V$, $I_{OH} = 100 \mu A$	DS3612, DS3614	80		V
I_I Input Current at Maximum Input Voltage	$V_{CC} = \text{Max}$, $V_I = 5.5V$, (Figure 2)				1	mA
I_{IH} High Level Input Current	$V_{CC} = \text{Max}$, $V_I = 2.4V$, (Figure 2)				40	μA
I_{IL} Low Level Input Current	$V_{CC} = \text{Max}$, $V_I = 0.4V$, (Figure 3)			-1	-1.6	mA
I_{CCH} Supply Current	$V_{CC} = \text{Max}$, Outputs High, (Figures 4 and 5)	$V_I = 5V$	DS1611/ DS3611		11	mA
			DS1613/ DS3613		14	mA
		$V_I = 0V$	DS1612/ DS3612		14	mA
			DS1614/ DS3614		17	mA
I_{CCL} Supply Current	$V_{CC} = \text{Max}$, Outputs Low, (Figures 4 and 5)	$V_I = 0V$	DS1611/ DS3611		69	mA
			DS1613/ DS3613		73	mA
		$V_I = 5V$	DS1612/ DS3612		71	mA
			DS1614/ DS3614		79	mA

Switching Characteristics $V_{CC} = 5.0V, T_A = 25^{\circ}C$
DS1611/DS3611, DS1612/DS3612, DS1613/DS3613, DS1614/DS3614

PARAMETER		CONDITIONS		MIN	TYP	MAX	UNITS
t _{PD1}	Propagation Delay Time, Low-To-High Level Output	$I_O \approx 200\text{ mA}, C_L = 15\text{ pF}, R_L = 50\Omega,$ (Figure 6)	DS1611/ DS3611		130		ns
			DS1612/ DS3612		110		ns
			DS1613/ DS3613		125		ns
			DS1614/ DS3614		220		ns
t _{PD0}	Propagation Delay Time, High-To-Low Level Output	$I_O \approx 200\text{ mA}, C_L = 15\text{ pF}, R_L = 50\Omega,$ (Figure 6)	DS1611/ DS3611		125		ns
			DS1612/ DS3612		110		ns
			DS1613/ DS3613		125		ns
			DS1614/ DS3614		150		ns

Note 1: "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. Except for "Operating Temperature Range" they are not meant to imply that the devices should be operated at these limits. The table of "Electrical Characteristics" provides conditions for actual device operation.

Note 2: Unless otherwise specified min/max limits apply across the 0°C to +70°C temperature range for the DS3611, DS3612, DS3613, DS3614, and -55°C to +125°C temperature range for the DS1611, DS1612, DS1613 and DS1614. All typical values are for $T_A = 25^{\circ}C$ and $V_{CC} = 5V$.

Note 3: All currents into device pins shown as positive, out of device pins as negative, all voltages referenced to ground unless otherwise noted. All values shown as max or min on absolute value basis.

Note 4: Maximum junction temperature is 150°C.

Note 5: Maximum voltage to be applied to either output in the "OFF" state.

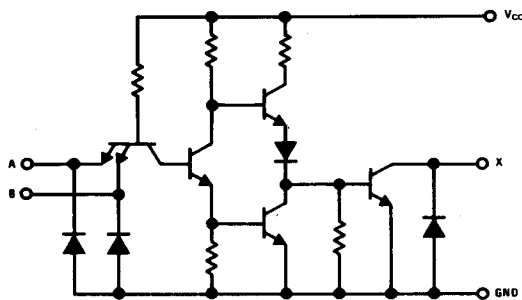
Note 6: Delay is measured with a 50Ω load to 10V, 15 pF load capacitance, measured from 1.5V input to 50% point on output.

DS1611/DS3611, DS1612/DS3612,
DS1613/DS3613, DS1614/DS3614

3

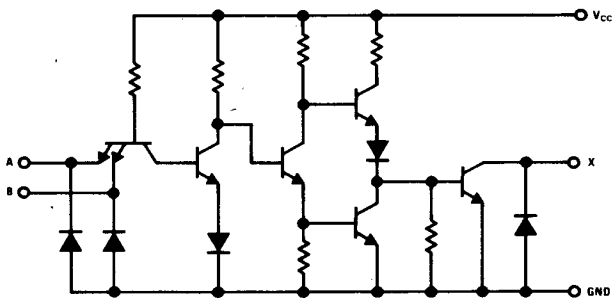
Schematic Diagrams (each driver)

DS3611 Dual AND Peripheral Driver



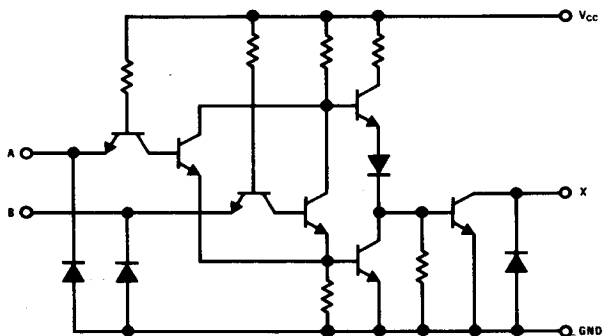
Note: 1/2 of unit shown.

DS3612 Dual NAND Peripheral Driver



Note: 1/2 of unit shown.

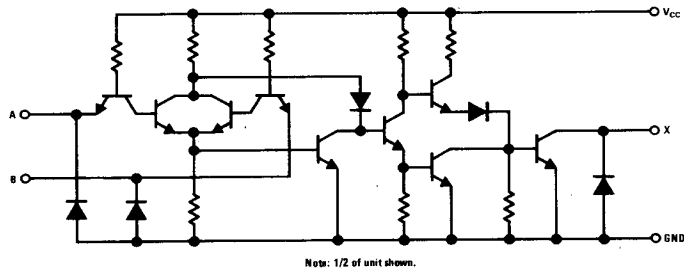
DS3613 Dual OR Peripheral Driver



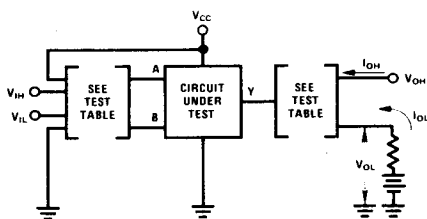
Note: 1/2 of unit shown.

Schematic Diagrams (Continued)

DS3614 Dual NOR Peripheral Driver



Test Circuits



CIRCUIT	INPUT UNDER TEST	OTHER INPUT	OUTPUT	
			APPLY	MEASURE
DS3611	V_{IH} V_{IL}	V_{IH} V_{CC}	I_{OH} I_{OL}	V_{OH} V_{OL}
DS3612	V_{IH} V_{IL}	V_{IH} V_{CC}	I_{OL} I_{OH}	V_{OL} V_{OH}
DS3613	V_{IH} V_{IL}	GND	I_{OH} I_{OL}	V_{OH} V_{OL}
DS3614	V_{IH} V_{IL}	GND	I_{OL} I_{OH}	V_{OL} V_{OH}

NOTE: Each input is tested separately.

FIGURE 1. V_{IH} , V_{IL} , V_{OH} , V_{OL}

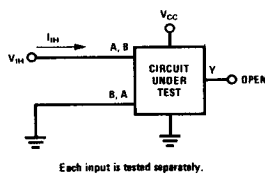
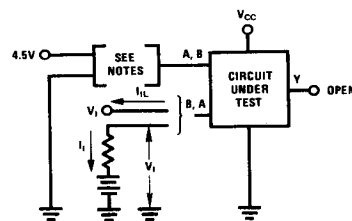


FIGURE 2. I_{IH} , I_{IL}



Note 1: Each input is tested separately.

Note 2: When testing DS3613 and DS3614 input not under test is grounded. For all other circuits it is at 4.5V.

FIGURE 3. V_I , I_I

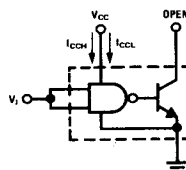


FIGURE 4. I_{CCH} , I_{CCL} for AND, NAND Circuits

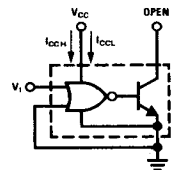
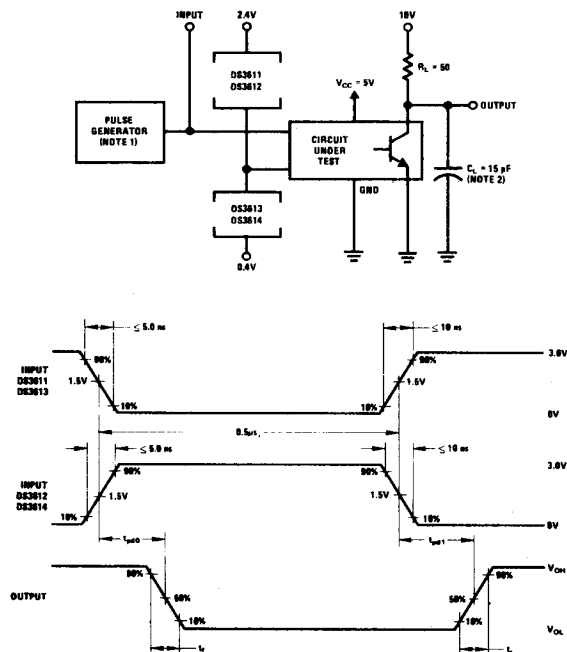


FIGURE 5. I_{CCH} , I_{CCL} for OR, NOR Circuits

Test Circuit and Switching Time Waveforms



Note 1: The pulse generator has the following characteristics: PRR = 1.0 MHz, $Z_{OUT} = 50 \Omega$.
Note 2: C_L includes probe and jig capacitance.

FIGURE 6. Switching Times of Complete Drivers