

DS1674/DS3674 Quad TTL to MOS Clock Drivers

General Description

The DS1674/DS3674 is a quad bipolar-to-MOS clock driver with TTL compatible inputs. It is designed to provide high output current and voltage capabilities necessary for optimum driving of high capacitance N-channel MOS memory systems.

The device features two common enable inputs, a refresh input, and a clock control input for simplified system designs. The circuit was designed for driving highly capacitive loads at high speeds and uses Schottky-clamped transistors. PNP transistors are used on all inputs thereby minimizing input loading.

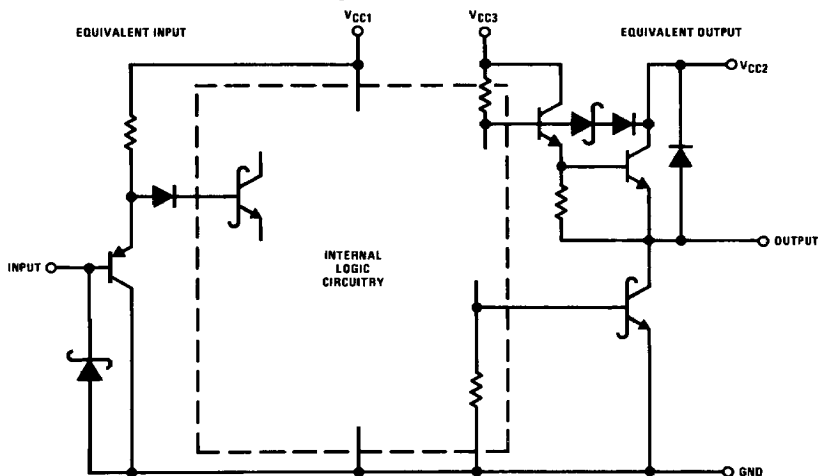
The circuit may be connected to provide a 12V clock output amplitude as required by 4k RAMs or a 5V clock output amplitude as required by 16k RAMs.

The DS1674/DS3674 has a direct, low impedance output for use with or without an external damping resistor.

Features

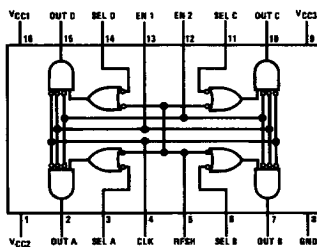
- TTL compatible inputs
- 12V clock or 5V clock driver
- Operates from standard bipolar and MOS supplies
- PNP inputs minimize loading
- High voltage/current outputs
- Input and output clamping diodes
- Control logic optimized for use with MOS memory systems
- Pin and function compatible with MC3460 and 3235

Schematic and Connection Diagrams



TL/F/5876-1

Dual-In-Line Package



TL/F/5876-2

Top View

Order Number DS3674J or DS3674N
See NS Package Number J16A or N16A

Absolute Maximum Ratings (Note 1)

If Military/Aerospace specified devices are required, contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage	
V_{CC1}	7V
V_{CC2}	13.5V
V_{CC3}	16V
Input Voltage	-1.0V to +7V
Output Voltage	-1.0V to +16V
Storage Temperature Range	-65°C to +150°C
Maximum Power Dissipation* at 25°C	
Cavity Package	1509 mW
Molded Package	1476 mW
Lead Temperature (Soldering, 10 sec.)	300°C

* Derate cavity package 10.1 mW/°C above 25°C; derate molded package 11.8 mW/°C above 25°C.

Operating Conditions

	Min	Max	Units
Supply Voltage			
V_{CC1}			
DS1674	4.5	5.5	V
DS3674	4.75	5.25	V
V_{CC2}			
DS1674	4.5	13.2	V
DS3674	4.75	12.6	V
V_{CC3}			
DS1674	V_{CC2}	16.5	V
DS3674	V_{CC2}	15.75	V
Temperature, T_A			
DS1674	-55	+125	°C
DS3674	0	+70	°C

Electrical Characteristics

5V operation, ($V_{CC1} = V_{CC2} = 5V$, $V_{CC3} = 12V$); 12V operation, ($V_{CC1} = 5V$, $V_{CC2} = 12V$, $V_{CC3} = V_{CC2} + (3V \pm 10\%)$); DS1674, $\pm 10\%$ power supply tolerances; DS3674, $\pm 5\%$ power supply tolerances, unless otherwise noted. (Notes 2, 3 and 4).

Symbol	Parameter	Conditions	Min	Typ	Max	Units
V_{IH}	Logical "1" Input Voltage		2			V
V_{IL}	Logical "0" Input Voltage				0.8	V
I_{IH}	Logical "1" Input Current	$V_{IN} = 5.5V$	Select Inputs	0.01	10	μA
			All Other Inputs	0.04	40	μA
I_{IL}	Logical "0" Input Current	$V_{IN} = 0.4V$	Select Inputs	-40	-250	μA
			All Other Inputs	-0.16	-1.0	mA
V_{CD}	Input Clamp Voltage	$I_I = -12\text{ mA}$		-0.8	-1.5	V
V_{OH}	Logical "1" Output Voltage	$I_{OH} = -1\text{ mA}$, $V_{IL} = 0.8V$	$V_{CC2} - 0.5$	$V_{CC2} - 0.2$		V
V_{OL}	Logical "0" Output Voltage	$I_{OL} = 5\text{ mA}$, $V_{IH} = 2.0V$		0.3	0.5	V
V_{OC}	Output Clamp Voltage	$I_{OC} = 5\text{ mA}$, $V_{IL} = 0.8V$		$V_{CC2} + 0.8$	$V_{CC2} + 1.5$	V
I_{CCH}	Supply Current Output High					
I_{CC1}		All Inputs $V_{IN} = 0V$ Outputs Open	$V_{CC1} = \text{Max}$	18	27	mA
I_{CC2}			12V Operation	-2	-4	mA
I_{CC3}				2	4	mA
I_{CC2}			5V Operation	-8	-16	mA
I_{CC3}				8	16	mA
I_{CCL}	Supply Currents Outputs Low					
I_{CC1}		All Inputs $V_{IN} = 5V$ Outputs Open	$V_{CC1} = 5.25V$	25	40	mA
I_{CC2}			$V_{CC2} = 12.6V$		3	mA
I_{CC3}			$V_{CC3} = 15.75V$	16	25	mA

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 -55°C to +125°C temperature range for the DS1674 and across the 0°C to +70°C range for the DS3674. All typicals are given for $T_A = 25^\circ\text{C}$.

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: For AC measurements, a 10 Ω resistor must be placed in series with the output of the DS1674/DS3674.

Switching Characteristics $T_A = 25^\circ\text{C}$ unless otherwise noted, (Note 4), (Figures 1, 2, 3 and 4)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
t_{s-}	Storage Delay Negative Edge	$R_D = 10\Omega$	$C_L = 100\text{ pF}$	8	11	ns
			$C_L = 400\text{ pF}$	12	16	ns
t_{s+}	Storage Delay Positive Edge	$R_D = 10\Omega$	$C_L = 100\text{ pF}$	10	13	ns
			$C_L = 400\text{ pF}$	13	16	ns
t_F	Fall Time	$R_D = 10\Omega$	$C_L = 100\text{ pF}$	9	16	ns
			$C_L = 400\text{ pF}$	17	24	ns
t_R	Rise Time	$R_D = 10\Omega$	$C_L = 100\text{ pF}$	8	12	ns
			$C_L = 400\text{ pF}$	13	19	ns
t_{pd0}	Propagation Delay to a Logical "0"	$R_D = 10\Omega$	$C_L = 100\text{ pF}$	17	27	ns
			$C_L = 400\text{ pF}$	29	40	ns
t_{pd1}	Propagation Delay to a Logical "1"	$R_D = 10\Omega$	$C_L = 100\text{ pF}$	18	25	ns
			$C_L = 400\text{ pF}$	26	35	ns

AC Test Circuits and Switching Time Waveforms

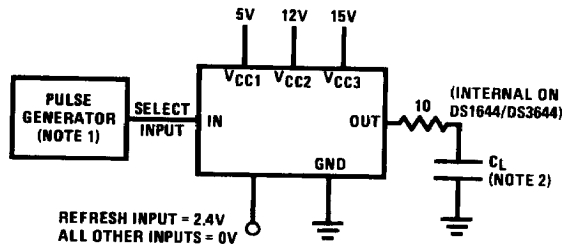


FIGURE 1. 12V Operation

TL/F/5876-3

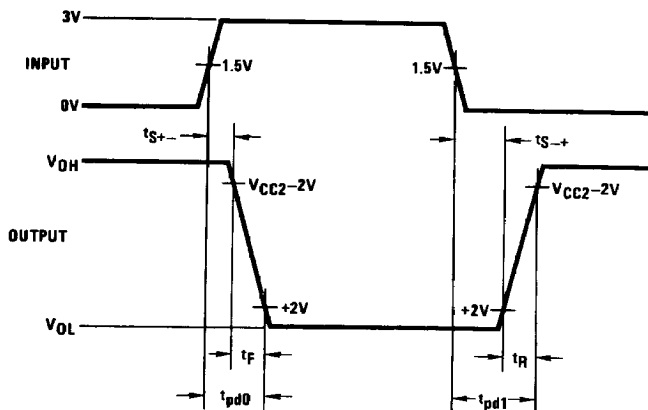


FIGURE 2. 12V Operation

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AC Test Circuits and Switching Time Waveforms (Continued)

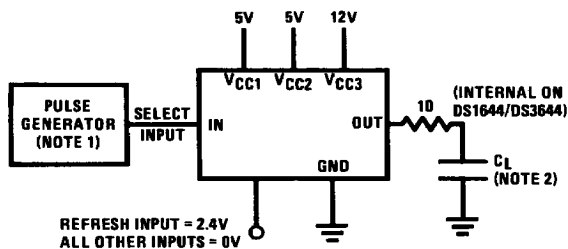


FIGURE 3. 5V Operation

TL/F/5876-5

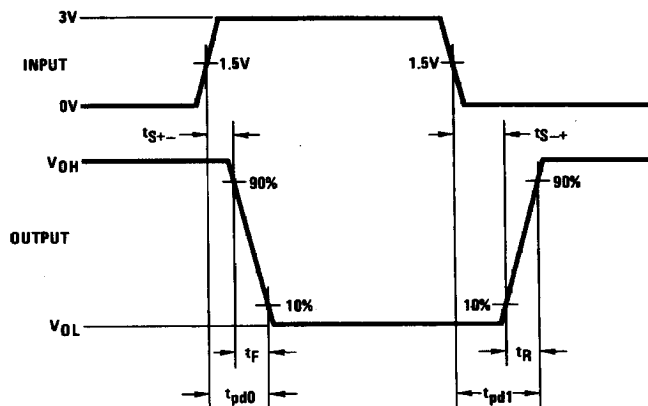


FIGURE 4. 5V Operation

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Note 1: The pulse generator has the following characteristics. PPR = 1 MHz, $t_R \leq 10$ ns, $Z_{OUT} = 50\Omega$.

Note 2: C_L includes probe and jig capacitance.

Truth Table

Input					Output
Enable 1	Enable 2	Select Input	Clock Input	Refresh Input	
1	X	X	X	X	0
X	1	X	X	X	0
X	X	X	1	X	0
X	X	1	X	1	0
0	0	0	0	X	1
0	0	X	0	0	1