MM54C906,MM54C907,MM74C906,MM74C907

MM54C906 MM74C906 Hex Open Drain N-Channel Buffers MM54C907 MM74C907 Hex Open Drain P-Channel Buffers

Literature Number: SNOS342A

National Semiconductor

March 1988

MM54C906/MM74C906
Hex Open Drain N-Channel Buffers
MM54C907/MM74C907
Hex Open Drain P-Channel Buffers

General Description

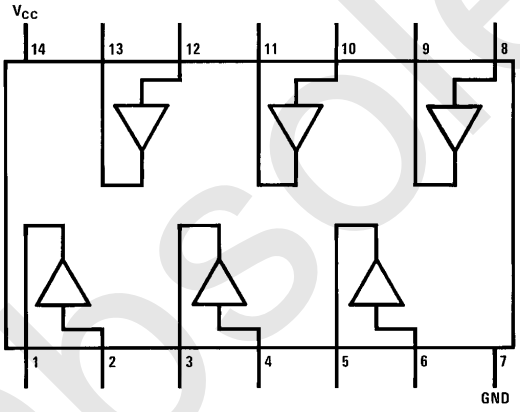
These buffers employ monolithic CMOS technology in achieving open drain outputs. The MM54C906/MM74C906 consists of six inverters driving six N-channel devices; and the MM54C907/MM74C907 consists of six inverters driving six P-channel devices. The open drain feature of these buffers makes level shifting or wire AND and wire OR functions by just the addition of pull-up or pull-down resistors. All inputs are protected from static discharge by diode clamps to V_{CC} and to ground.

Features

- Wide supply voltage range — 3V to 15V
- Guaranteed noise margin — 1V
- High noise immunity — 0.45 V_{CC} (typ.)
- High current sourcing and sinking open drain outputs

Connection and Logic Diagrams

Dual-In-Line Package

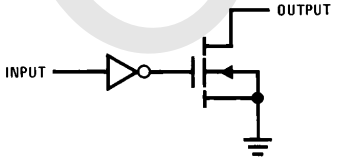


TL/F/5911–1

Top View

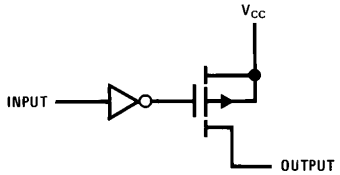
Order Number MM54C906, MM54C907, MM74C906 or MM74C907

MM54C906/MM74C906



TL/F/5911–2

MM54C907/MM74C907



TL/F/5911–3

RRD-B30M105/Printed in U. S. A.

Absolute Maximum Ratings (Note 1)

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

Voltage at Any Input Pin	$-0.3V$ to $V_{CC} + 0.3V$
Voltage at Any Output Pin	
MM54C906/MM74C906	$-0.3V$ to $+18V$
MM54C907/MM74C907	$V_{CC} - 18$ to $V_{CC} + 0.3V$
Operating Temperature Range	
MM54C906/MM54C907	$-55°C$ to $+125°C$
MM74C906/MM74C907	$-40°C$ to $+85°C$
Storage Temperature Range	$-65°C$ to $+150°C$
Power Dissipation	
Dual-In-Line	700 mW
Small Outline	500 mW
Operating V_{CC} Range	3V to 15V
Absolute Maximum V_{CC}	18V
Lead Temperature (T_L) (Soldering, 10 seconds)	260°C

DC Electrical Characteristics Min/Max limits apply across temperature range unless otherwise noted

Symbol	Parameter	Conditions	Min	Typ	Max	Units
CMOS TO CMOS						
$V_{IN(1)}$	Logical "1" Input Voltage	$V_{CC} = 5V$ $V_{CC} = 10V$	3.5 8.0			V V
$V_{IN(0)}$	Logical "0" Input Voltage	$V_{CC} = 5V$ $V_{CC} = 10V$			1.5 2	V V
$I_{IN(1)}$	Logical "1" Input Current	$V_{CC} = 15V$, $V_{IN} = 15V$		0.005	1	μA
$I_{IN(0)}$	Logical "0" Input Current	$V_{CC} = 15V$, $V_{IN} = 0V$	-1.0	-0.005		μA
I_{CC}	Supply Current	$V_{CC} = 15V$, Output Open		0.05	15	μA
	Output Leakage MM54C906	$V_{CC} = 4.5V$, $V_{IN} = V_{CC} - 1.5V$ $V_{CC} = 4.5V$, $V_{OUT} = 18V$		0.005	5	μA
	MM74C906	$V_{CC} = 4.75V$, $V_{IN} = V_{CC} - 1.5V$ $V_{CC} = 4.75V$, $V_{OUT} = 18V$		0.005	5	μA
	MM54C907	$V_{CC} = 4.5V$, $V_{IN} = 1V + 0.1\ V_{CC}$ $V_{CC} = 4.5V$, $V_{OUT} = V_{CC} - 18V$		0.005	5	μA
	MM74C907	$V_{CC} = 4.75V$, $V_{IN} = 1V + 0.1\ V_{CC}$ $V_{CC} = 4.75V$, $V_{OUT} = V_{CC} - 18V$		0.005	5	μA
CMOS/LPTTL INTERFACE						
$V_{IN(1)}$	Logical "1" Input Voltage	54C, $V_{CC} = 4.5V$ 74C, $V_{CC} = 4.75V$	$V_{CC} - 1.5V$ $V_{CC} - 1.5V$			V V
$V_{IN(0)}$	Logical "0" Input Voltage	54C, $V_{CC} = 4.5V$ 74C, $V_{CC} = 4.75V$			0.8 0.8	V V
OUTPUT DRIVE CURRENT						
	MM54C906	$V_{CC} = 4.5V$, $V_{IN} = 1V + 0.1\ V_{CC}$ $V_{CC} = 4.5V$, $V_{OUT} = 0.5V$ $V_{CC} = 4.5V$, $V_{OUT} = 1.0V$	 2.1 4.2	 8.0 12.0		 mA mA
	MM74C906	$V_{CC} = 4.75V$, $V_{IN} = 1V + 0.1\ V_{CC}$ $V_{CC} = 4.75V$, $V_{OUT} = 0.5V$ $V_{CC} = 4.75V$, $V_{OUT} = 1.0V$	 2.1 4.2	 8.0 12.0		 mA mA
	MM54C907	$V_{CC} = 4.5V$, $V_{IN} = V_{CC} - 1.5V$ $V_{CC} = 4.5V$, $V_{OUT} = V_{CC} - 0.5V$ $V_{CC} = 4.5V$, $V_{OUT} = V_{CC} - 1V$	 -1.05 -2.1	 -1.5 -3.0		 mA mA
	MM74C907	$V_{CC} = 4.75V$, $V_{IN} = V_{CC} - 1.5V$ $V_{CC} = 4.75V$, $V_{OUT} = V_{CC} - 0.5V$ $V_{CC} = 4.75V$, $V_{OUT} = V_{CC} - 1V$	 -1.05 -2.1	 -1.5 -3.0		 mA mA
	MM54C906/MM74C906	$V_{CC} = 10V$, $V_{IN} = 2V$ $V_{CC} = 10V$, $V_{OUT} = 0.5V$ $V_{CC} = 10V$, $V_{OUT} = 1V$	 4.2 8.4	 -20 -30		 mA mA
	MM54C907/MM74C907	$V_{CC} = 10V$, $V_{IN} = 8V$ $V_{CC} = 10V$, $V_{OUT} = 9.5V$ $V_{CC} = 10V$, $V_{OUT} = 9V$	 -2.1 -4.2	 -4.0 -8.0		 mA mA

AC Electrical Characteristics* $T_A = 25°C$, $C_L = 50$ pF, unless otherwise specified

Symbol	Parameter	Conditions	Min	Typ	Max	Units
t_{pd}	Propagation Delay Time to a Logical "0"					
	MM54C906/MM74C906	$V_{CC} = 5.0V$, R = 10k			150	ns
		$V_{CC} = 10V$, R = 10k			75	ns
	MM54C907/MM74C907	$V_{CC} = 5.0V$ (Note 4)			150 + 0.7 RC	ns
		$V_{CC} = 10V$ (Note 4)			75 + 0.7 RC	ns
t_{pd}	Propagation Delay Time to a Logical "1"					
	MM54C906/MM74C906	$V_{CC} = 5.0V$ (Note 4)			150 + 0.7 RC	ns
		$V_{CC} = 10V$ (Note 4)			75 + 0.7 RC	ns
	MM54C907/MM74C907	$V_{CC} = 5.0V$, R = 10k			150	ns
		$V_{CC} = 10V$, R = 10k			75	ns
C_{IN}	Input Capacitance	(Note 2)		5.0		pF
C_{OUT}	Output Capacity	(Note 2)		20		pF
C_{PD}	Power Dissipation Capacity	(Note 3) Per Buffer		30		pF

*AC Parameters are guaranteed by DC correlated testing.

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.

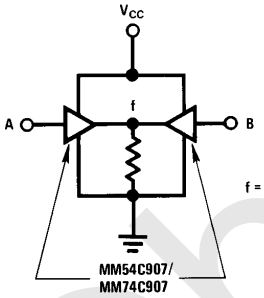
Note 2: Capacitance is guaranteed by periodic testing.

Note 3: C_{PD} determines the no load AC power consumption of any CMOS device. For complete explanation see 54C/74C Family Characteristics Application Note, AN-90. (Assumes outputs are open).

Note 4: "C" used in calculating propagation includes output load capacity (C_L) plus device output capacity (C_{OUT}).

Typical Applications

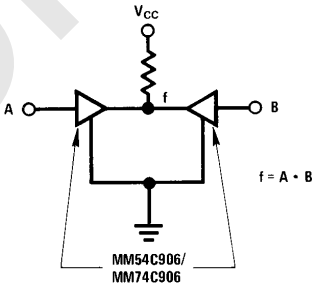
Wire OR Gate



TL/F/5911–4

Note: Can be extended to more than 2 inputs.

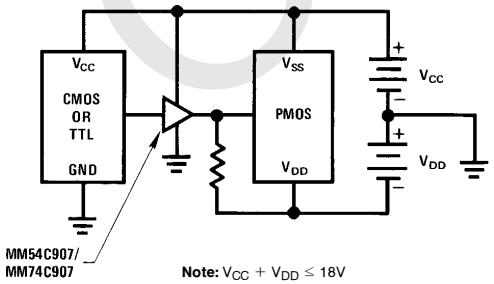
Wire AND Gate



TL/F/5911–5

Note: Can be extended to more than 2 inputs.

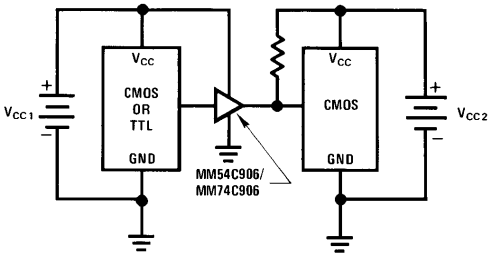
CMOS or TTL to PMOS Interface



Note: $V_{CC} + V_{DD} \leq 18V$
$V_{CC} \leq 15V$

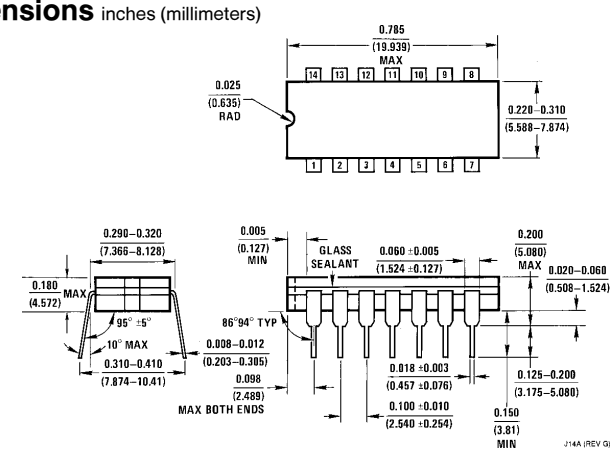
TL/F/5911–6

CMOS or TTL to CMOS at a Higher V_{CC}

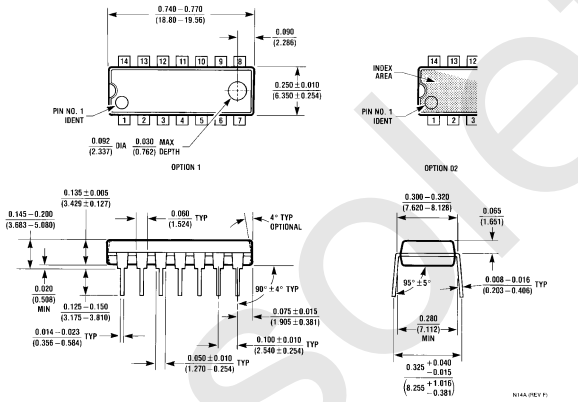


TL/F/5911–7

Physical Dimensions inches (millimeters)



Ceramic Dual-In-Line Package (J)
Order Number MM54C906J, MM54C907J, MM74C906J, MM74C907J
NS Package Number J14A



Molded Dual-In-Line Package (N)
Order Number MM54C906N, MM54C907N, MM74C906N or MM74C907N
NS Package Number N14A

LIFE SUPPORT POLICY

NATIONAL'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF NATIONAL SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

National Semiconductor Corporation
1111 West Bardin Road
Arlington, TX 76017
Tel: 1(800) 272-9959
Fax: 1(800) 737-7018

National Semiconductor Europe
Fax: (+49) 0-180-530 85 86
Email: cnjwge@tevm2.nsc.com
Deutsch Tel: (+49) 0-180-530 85 85
English Tel: (+49) 0-180-532 78 32
Français Tel: (+49) 0-180-532 93 58
Italiano Tel: (+49) 0-180-534 16 80

National Semiconductor Hong Kong Ltd.
13th Floor, Straight Block,
Ocean Centre, 5 Canton Rd.
Tsimshatsui, Kowloon
Hong Kong
Tel: (852) 2737-1600
Fax: (852) 2736-9960

National Semiconductor Japan Ltd.
Tel: 81-043-299-2309
Fax: 81-043-299-2408

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products		**Applications**	
Audio	www.ti.com/audio	Communications and Telecom	www.ti.com/communications
Amplifiers	amplifier.ti.com	Computers and Peripherals	www.ti.com/computers
Data Converters	dataconverter.ti.com	Consumer Electronics	www.ti.com/consumer-apps
DLP® Products	www.dlp.com	Energy and Lighting	www.ti.com/energy
DSP	dsp.ti.com	Industrial	www.ti.com/industrial
Clocks and Timers	www.ti.com/clocks	Medical	www.ti.com/medical
Interface	interface.ti.com	Security	www.ti.com/security
Logic	logic.ti.com	Space, Avionics and Defense	www.ti.com/space-avionics-defense
Power Mgmt	power.ti.com	Transportation and Automotive	www.ti.com/automotive
Microcontrollers	microcontroller.ti.com	Video and Imaging	www.ti.com/video
RFID	www.ti-rfid.com		
OMAP Mobile Processors	www.ti.com/omap		
Wireless Connectivity	www.ti.com/wirelessconnectivity		
	TI E2E Community Home Page		e2e.ti.com

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265