

## SSI • GATES, BUFFERS AND INVERTERS

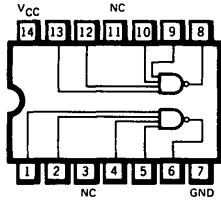
	LOW POWER	STANDARD	
	$t_{pd} = 20 \text{ ns}$ $P_d = 2 \text{ mW per Gate}$	$t_{pd} = 10 \text{ ns}$ $P_d = 10 \text{ mW per Gate}$	
	$0^\circ \text{C to } +70^\circ \text{C}$ $-55^\circ \text{ to } +125^\circ \text{C}$	$0^\circ \text{ to } +70^\circ \text{C}$	$-55^\circ \text{ to } +125^\circ \text{C}$
<b>NAND GATES</b>			
Quad 2-Input Positive NAND Gate	9L00	9N00/7400	9N00/5400
Quad 2-Input Positive NAND Gate with Open-Collector Output		9N01/7401 9N03/7403	9N01/5401 9N03/5403
Quad 2-Input Positive NAND Gate (15 Volts)		9N26/7426	9N26/5426
Triple 3-Input Positive NAND Gate		9N10/7410	9N10/5410
Triple 3-Input Positive NAND (Open Collector)		9N12/7412	9N12/5412
Dual 4-Input Positive NAND Gate		9N20/7420	9N20/5420
8-Input Positive NAND Gate		9N30/7430	9N30/5430
<b>NOR GATES</b>			
Quad 2-Input Positive NOR Gate		9N02/7402	9N02/5402
Quad 2-2-2-4-Input Positive NOR Gate			
Triple 3-Input Positive NOR Gate		9N27/7427	9N27/5427
Dual 4-Input Positive NOR Gate (with strobe)		9N23,25/7423,25	9N23,25/5423,25
<b>AND GATES</b>			
Quad 2-Input Positive AND Gate		9N08/7408	9N08/5408
Quad 2-Input Positive AND Gate (Open Collector)		9N09/7409	9N09/5409
Triple 3-Input Positive AND Gate		9N11/7411	9N11/5411
Dual 4-Input Positive AND Gate			
<b>OR GATES</b>			
Quad 2-Input Positive OR Gate		9N32/7432	9N32/5432
<b>EXCLUSIVE-OR GATES</b>			
Quad Exclusive-OR Gate	9L86	9N86/7486	9N86/5486
Quad Exclusive-OR Gate with Inverted Outputs			
<b>AND-OR, AND-OR-INVERT GATES AND EXPANDERS</b>			
Expandable 2-2-2-3 Input AND-OR Gate			
Dual 2-Wide 2-Input AND-OR-INVERT Gate		9N51/7451	9N51/5451
Expandable Dual 2-Wide 2-Input AND-OR-INVERT Gate		9N50/7450	9N50/5450
Expandable 2-Wide, 4-Input AND-OR-INVERT Gate			
4-Wide 2-Input AND-OR-INVERT Gate	9L54	9N54/7454	9N54/5454
4-2-3-2-Input AND OR-INVERT Gate			
4-2-3-2-Input AND-OR-INVERT Gate (Open Collector)			
Expandable 4-Wide 2-Input AND-OR-INVERT Gate		9N53/7453	9N53/5453
Expandable 4-Wide 2-2 2-3-Input AND-OR-INVERT Gate			
Triple 3-Input Expander			
Dual 4-Input Expander		9N60/7460	9N60/5460
3-2-2-3-Input AND-OR Expander			
<b>INVERTERS AND BUFFERS</b>			
Hex Inverter	9L04	9N04/7404	9N04/5404
Hex Inverter with Open-Collector Output		9N05/7405	9N05/5405
Hex Inverter Buffer/Driver (30 Volts)		9N06/7406	9N06/5406
Hex Inverter Buffer/Driver (15 Volts)		9N16/7416	9N16/5416
Hex Buffer/Drivers (30 Volts)		9N07/7407	9N07/5407
Hex Buffer/Drivers (15 Volts)		9N17/7417	9N17/5417
Quad 2-Input Positive NAND Buffer		9N37/7437	9N37/5437
Quad 2-Input Positive NAND Buffer (Open Collector)		9N38/7438	9N38/5438
Quad 2-Input Positive NAND Buffer (Open Collector - 15 Volts)		9N39/7439	
Dual 4-Input Positive NAND Buffer		9N40/7440	9N40/5440
Dual 4-Input Positive NAND 50 $\Omega$ Driver			
<b>SCHMITT TRIGGER</b>			
Dual NAND Schmitt Trigger		9N13/7413	9N13/5413

# FAIRCHILD TTL/SSI • 9N40/5440, 7440

## DUAL 4-INPUT NAND BUFFER

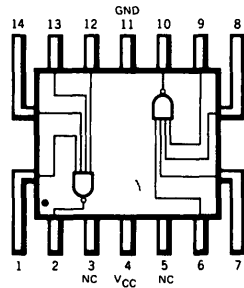
### LOGIC AND CONNECTION DIAGRAM

DIP (TOP VIEW)



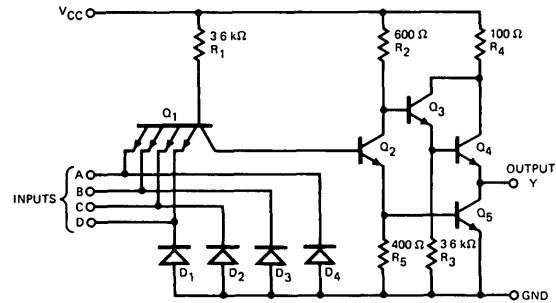
Positive logic:  $Y = \overline{ABCD}$

FLATPAK (TOP VIEW)



NC — No internal connection.

### SCHMATIC DIAGRAM (EACH GATE)



Component values shown are typical.

### RECOMMENDED OPERATING CONDITIONS

PARAMETER	9N40XM/5450XM			9N40XC/7440XC			UNITS
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
Supply Voltage $V_{CC}$	4.5	5.0	5.5	4.75	5.0	5.25	Volts
Operating Free-Air Temperature Range	-55	25	125	0	25	70	$^{\circ}C$
Normalized Fan Out from Each Output, N			30			30	U.L.

X = package type; F for Flatpak, D for Ceramic Dip, P for Plastic Dip. See Packaging Information Section for packages available on this product.

### ELECTRICAL CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE (Unless Otherwise Noted)

SYMBOL	PARAMETER	LIMITS			UNITS	TEST CONDITIONS (Note 1)	TEST FIGURE
		MIN.	TYP. (Note 2)	MAX.			
$V_{IH}$	Input HIGH Voltage	2.0			Volts	Guaranteed Input HIGH Voltage	1
$V_{IL}$	Input LOW Voltage			0.8	Volts	Guaranteed Input LOW Voltage	2
$V_{OH}$	Output HIGH Voltage	2.4	3.3		Volts	$V_{CC} = \text{MIN.}, I_{OH} = -1.2 \text{ mA}, V_{IN} = 0.8 \text{ V}$	2
$V_{OL}$	Output LOW Voltage		0.28	0.4	Volts	$V_{CC} = \text{MIN.}, I_{OL} = 48 \text{ mA}, V_{IN} = 2.0 \text{ V}$	1
$I_{IH}$	Input HIGH Current			40	$\mu A$	$V_{CC} = \text{MAX.}, V_{IN} = 2.4 \text{ V}$	Each Input
				1.0	mA	$V_{CC} = \text{MAX.}, V_{IN} = 5.5 \text{ V}$	
$I_{IL}$	Input LOW Current			-1.6	mA	$V_{CC} = \text{MAX.}, V_{IN} = 0.4 \text{ V}$ , Each Input	3
$I_{OS}$	Output Short Circuit Current (Note 3)	-20		-70	mA	9N40/5440	$V_{CC} = \text{MAX.}$
		-18		-70	mA	9N40/7440	
$I_{CCH}$	Supply Current HIGH		4.0	8.0	mA	$V_{CC} = \text{MAX.}, V_{IN} = 0 \text{ V}$	6
$I_{CCL}$	Supply Current LOW		17	27	mA	$V_{CC} = \text{MAX.}, V_{IN} = 5.0 \text{ V}$	6

### SWITCHING CHARACTERISTICS ( $T_A = 25^{\circ}C$ )

SYMBOL	PARAMETER	LIMITS			UNITS	TEST CONDITIONS	TEST FIGURE
		MIN.	TYP.	MAX.			
$t_{PLH}$	Turn Off Delay Input to Output		13	22	ns	$V_{CC} = 5.0 \text{ V}$ $C_L = 15 \text{ pF}$ $R_L = 133 \Omega$	A
$t_{PHL}$	Turn On Delay Input to Output		8.0	15	ns		

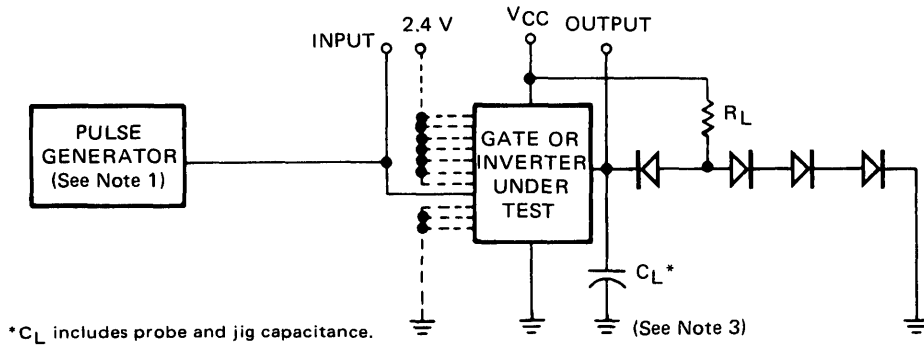
#### NOTES:

- (1) For conditions shown as MIN. or MAX., use the appropriate value specified under recommended operating conditions for the applicable device type.
- (2) Typical limits are at  $V_{CC} = 5.0 \text{ V}, 25^{\circ}C$ .
- (3) Not more than one output should be shorted at a time.

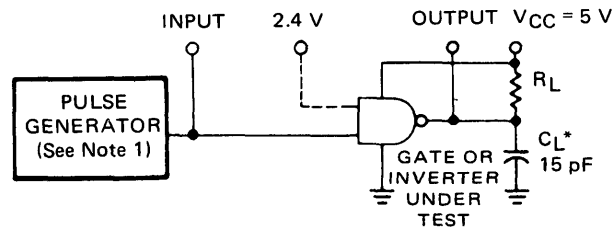
# FAIRCHILD SERIES TTL/SSI

## PARAMETER MEASUREMENT INFORMATION

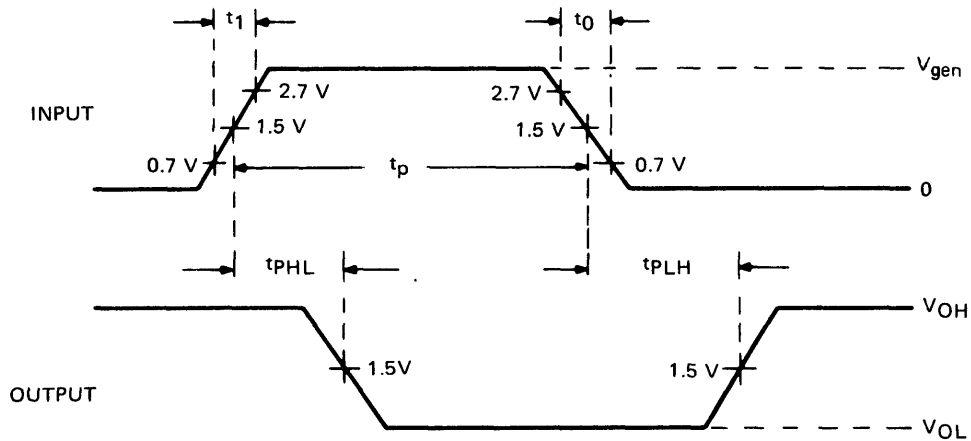
### SWITCHING CHARACTERISTICS



TEST CIRCUIT FOR 9N00/5400, 7400; 9N02/5402, 7402; 9N04/5404, 7404; 9N10/5410, 7410; 9N20/5420, 7420; 9N30/5430, 7430; 9N40/5440, 7440; 9N50/5450, 7450; 9N51/5451, 7451; 9N53/5453, 7453 and 9N54/5454, 7454



TEST CIRCUIT FOR 9N01/5401, 7401; 9N03/5403, 7403; 9N05/5405, 7405; 9N39/5439, 7439



### VOLTAGE WAVEFORMS

#### NOTES:

- The generator has the following characteristics:  $V_{gen} = 3.5\text{ V}$ ,  $t_0 = 5\text{ ns}$ ,  $t_1 = 10\text{ ns}$ ,  $t_p = 0.5\text{ }\mu\text{s}$ ,  $PRR = 1\text{ MHz}$ ,  $Z_{out} \approx 50\text{ }\Omega$ .
- Propagation Delay =  $\frac{t_{PHL} + t_{PLH}}{2}$
- When testing 9N00/5400, 7400 through 9N40/5440, 7440 (except 9N02/5402, 7402), connect all unused inputs to 2.4 V. When testing the 9N02/5402, 7402 or 9N50/5450, 7450 through 9N54/5454, 7454, apply the input pulse to one input of one AND section and 2.4 V to all unused inputs of that AND section. All inputs or unused AND sections are grounded.

Fig. A GATE PROPAGATION DELAY TIMES

## NATIONAL DEVICE ORDER NUMBER FORMAT

**DM 8213 D**

MANUFACTURER IDENTIFICATION    TEMPERATURE RANGE    DEVICE TYPE    PACKAGE TYPE

### PACKAGE CROSS REFERENCE

PACKAGE	NATIONAL	FAIRCHILD
Dual In-Line Ceramic	D	D
Dual In-Line Plastic	N	P
Flatpak	F	F

### TEMPERATURE RANGE CROSS REFERENCE

TEMPERATURE RANGE	NATIONAL	FAIRCHILD
COMMERCIAL 0°C to +70°C/75°C	8,74	C
MILITARY -50°C to +125°C	7,54	M

NATIONAL	FAIRCHILD PIN FOR PIN REPLACEMENT	FAIRCHILD FUNCTIONAL EQUIVALENT	NATIONAL	FAIRCHILD PIN FOR PIN REPLACEMENT	FAIRCHILD FUNCTIONAL EQUIVALENT	NATIONAL	FAIRCHILD PIN FOR PIN REPLACEMENT	FAIRCHILD FUNCTIONAL EQUIVALENT	
5400	See T.I. Cross Reference		8290	93196		8533	9393		
54H00			8291	93197		8550	9375		
7400			8300	9300		8551			9314
74H00			8309	9309		8560	9360		
8200			9324	8310		9310	8563		9366
8210		9312	8311	9311	8570	93164			
8211		9312	8312	9312	8580	9395			
8213	9311		8316	9316	8582		93410		
8220		9348	8322	9322	8588	93434			
8223		9321	8520		9305	8590	93165		
8280	93176		8530	9390		8601	9601		
8281	93177		8532	9392		8602	9602		
8283	9383								

## PHILIPS DEVICE ORDER NUMBER FORMAT

**FJH 341**

TTL FAMILY DESIGNATION    CIRCUIT FUNCTION    DEVICE NUMBER    TEMPERATURE RANGE

### PACKAGE CROSS REFERENCE

PACKAGE	PHILIPS	FAIRCHILD
Dual In-Line Ceramic	-	D
Dual In-Line Plastic	A, B	P
Flatpak	-	F

### TEMPERATURE RANGE CROSS REFERENCE

TEMPERATURE RANGE	PHILIPS	FAIRCHILD
COMMERCIAL 0°C to +70°C/75°C	1	C
MILITARY -55°C to +125°C	2	M

PHILIPS	FAIRCHILD PIN FOR PIN REPLACEMENT	FAIRCHILD FUNCTIONAL EQUIVALENT	PHILIPS	FAIRCHILD PIN FOR PIN REPLACEMENT	FAIRCHILD FUNCTIONAL EQUIVALENT	PHILIPS	FAIRCHILD PIN FOR PIN REPLACEMENT	FAIRCHILD FUNCTIONAL EQUIVALENT		
FJH101	9N30, 7430		FJH261	9352, 7442		FJJ131	9N74, 7474			
FJH111	9N20, 7420		FJH291	9N03, 7463		FJJ141	9390, 7490		9350	
FJH121	9N10, 7410		FJH301	9N26, 7426		FJJ151	9391, 7491			
FJH131	9N00, 7400		FJH311			9N01, 7401	FJJ181		9375, 7475	
FJH141	9N40, 7440		FJH321			9N05, 7405	FJJ191		9N76, 7476	
FJH151	9N50, 7450		FJH331			9348	FJJ211		9393, 7493	9356
FJH161	9N51, 7451		FJH341	9311			FJJ251		9392, 7492	
FJH171	9N53, 7453		FJH351	9312			FJJ261		9N107, 74107	
FJH181	9N54, 7454		FJH391	9322			FJJ321		9300	
FJH191	9380, 7480		FJH401	9309			FJJ401		93191	
FJH201	9382, 7482		FJH431			9311	FJJ411		9366	
FJH211	9383, 7483		FJH441	93151		9312	FJK101		9603, 74121	
FJH221	9N02, 7402		FJH451	9341			FJL101		9315, 7441	
FJH231	9N01, 7401		FJH491			9321	FJY101		9N60, 7460	
FJH241	9N04, 7404		FJJ101	9N70, 7470			FJQ101			9338
FJH251	9N05, 7405		FJJ111	9N72, 7472			FJQ111		93403	
			FJJ121	9N73, 7473			FJR101		93434	