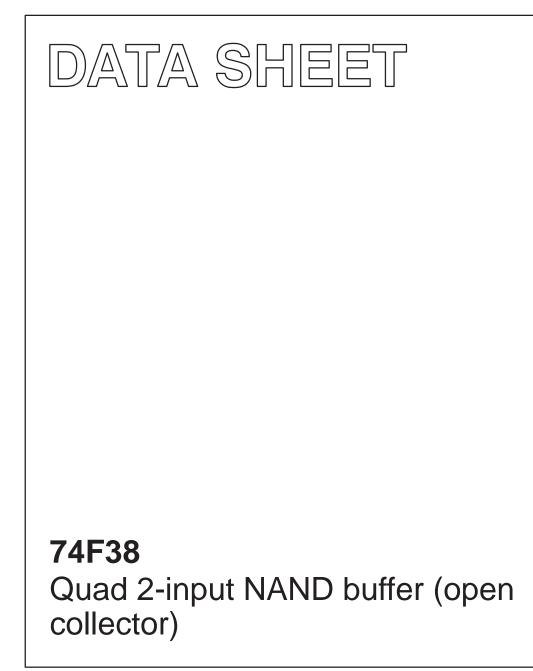
# INTEGRATED CIRCUITS



Product specification

1990 Oct 04

IC15 Data Handbook



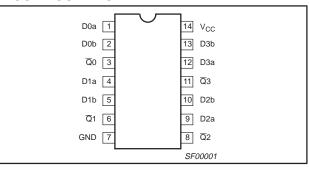


### FEATURE

Industrial temperature range available (-40°C to +85°C)

TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
74F38	7.0ns	13mA

#### **PIN CONFIGURATION**



#### **ORDERING INFORMATION**

	(	DRDER CODE	
DESCRIPTION	COMMERCIAL RANGE V <sub>CC</sub> = 5V $\pm$ 10%, T <sub>amb</sub> = 0°C to +70°C	INDUSTRIAL RANGE $V_{CC}$ = 5V ±10%, T <sub>amb</sub> = -40°C to +85°C	PKG DWG #
14-pin plastic DIP	N74F38N	I74F38N	SOT27-1
14-pin plastic SO	N74F38D	I74F38D	SOT108-1

### INPUT AND OUTPUT LOADING AND FAN OUT TABLE

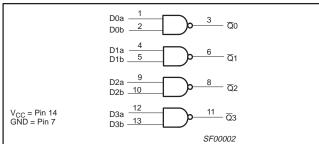
PINS	DESCRIPTION	74F (U.L.) HIGH/LOW	LOAD VALUE HIGH/LOW
Dna, Dnb	Data inputs	1.0/2.0	20µA/1.2mA
Qn	Data output	OC/106.7	OC/64mA

#### NOTES:

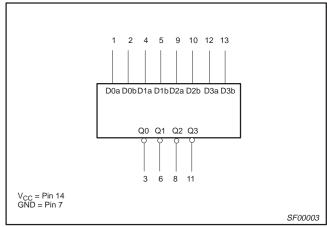
1 One (1.0) FAST unit load is defined as:  $20\mu A$  in the high state and 0.6mA in the low state.

2 OC = open collector

#### LOGIC DIAGRAM



### LOGIC SYMBOL



#### **FUNCTION TABLE**

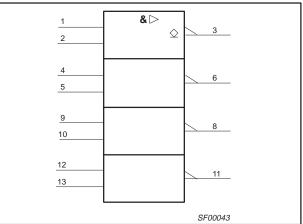
INP	UTS	OUTPUT
Dna	Dnb	Qn
L	L	Н
L	Н	Н
Н	L	Н
Н	Н	L

NOTES:

H = High voltage level

L = Low voltage level

#### **IEC/IEEE SYMBOL**



## Product specification

74F38

#### **ABSOLUTE MAXIMUM RATINGS**

(Operation beyond the limit set forth in this table may impair the useful life of the device.

Unless otherwise noted these limits are over the operating free air temperature range.)

SYMBOL	PARAMETER		RATING	UNIT
V <sub>CC</sub>	Supply voltage		-0.5 to +7.0	V
V <sub>IN</sub>	Input voltage		-0.5 to +7.0	V
I <sub>IN</sub>	Input current		-30 to +5	mA
V <sub>OUT</sub>	Voltage applied to output in high output state		–0.5 to $V_{CC}$	V
I <sub>OUT</sub>	Current applied to output in low output state	-	128	mA
T <sub>amb</sub>	Operating free air temperature range	Commercial range	0 to +70	°C
		Industrial range	-40 to +85	°C
T <sub>stg</sub>	Storage temperature range		-65 to +150	°C

### **RECOMMENDED OPERATING CONDITIONS**

SYMBOL	PARAMETER			UNIT		
			MIN	NOM	MAX	
V <sub>CC</sub>	Supply voltage	4.5	5.0	5.5	V	
V <sub>IH</sub>	High-level input voltage	2.0			V	
V <sub>IL</sub>	Low-level input voltage				0.8	V
l <sub>lk</sub>	Input clamp current				-18	mA
V <sub>OH</sub>	High-level output voltage				4.5	V
I <sub>OL</sub>	Low-level output current				64	mA
T <sub>amb</sub>	Operating free air temperature range	Commercial range	0		+70	°C
		Industrial range	-40		+85	°C

### **DC ELECTRICAL CHARACTERISTICS**

(Over recommended operating free-air temperature range unless otherwise noted.)

SYMBOL	PARAMETER		TEST CONDITIO	NS <sup>1</sup>		LIMITS		UNIT
					MIN	TYP <sup>2</sup>	MAX	1
I <sub>OH</sub>	High-level output current		$V_{CC} = MIN, V_{IL} = MAX, V$ $V_{OH} = MAX$			250	μΑ	
V <sub>OL</sub>	Low-level output voltage		$V_{CC} = MIN, V_{IL} = MAX$	±10%V <sub>CC</sub>			0.55	V
			$V_{IH} = MIN, I_{OL} = MAX$	±5%V <sub>CC</sub>		0.42	0.55	V
V <sub>IK</sub>	Input clamp voltage		$V_{CC} = MIN, \ I_I = I_{IK}$			-0.73	-1.2	V
l <sub>l</sub>	Input current at maximum voltage	input	V <sub>CC</sub> = MAX, V <sub>I</sub> = 7.0V				100	μΑ
I <sub>IH</sub>	High-level input current		$V_{CC} = MAX, V_I = 2.7V$				20	μΑ
IIL	Low-level input current		$V_{CC} = MAX, V_I = 0.5V$				-1.2	mA
I <sub>CC</sub>	Supply current (total)	I <sub>CCH</sub>	V <sub>CC</sub> = MAX V <sub>IN</sub> = GND			4.0	7.0	mA
		I <sub>CCL</sub>	$V_{CC} = MAX$	V <sub>IN</sub> = 4.5V		22	30	mA

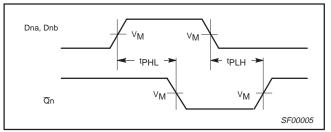
#### NOTES:

1 For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable type. 2 All typical values are at  $V_{CC} = 5V$ ,  $T_{amb} = 25^{\circ}C$ .

### AC ELECTRICAL CHARACTERISTICS

						LIM	ITS			
SYMBOL	PARAMETER	TEST CONDITION	Tai	<sub>CC</sub> = +5.0 <sub>mb</sub> = +25 0pF, R <sub>L</sub> =	°C	T <sub>amb</sub> = 0°0	0V ± 10% C to +70°C R <sub>L</sub> = 500Ω		0V ± 10% °C to +85°C R <sub>L</sub> = 500Ω	UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation delay Dna, Dnb to $\overline{Q}n$	Waveform 1	7.5 1.5	10.0 3.0	12.5 5.0	7.5 1.5	13.0 5.5	7.5 1.5	14.5 6.0	ns

#### **AC WAVEFORMS**

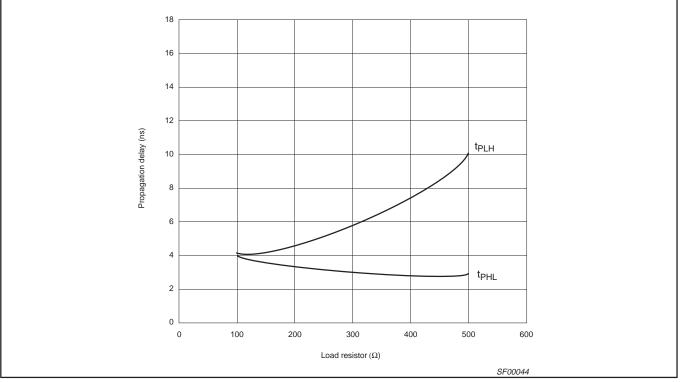


#### Waveform 1. Propagation delay for inverting outputs

NOTE:

For all waveforms,  $V_M = 1.5V$ .

#### TYPICAL PROPAGATION DELAYS VERSUS LOAD FOR OPEN COLLECTOR OUTPUTS

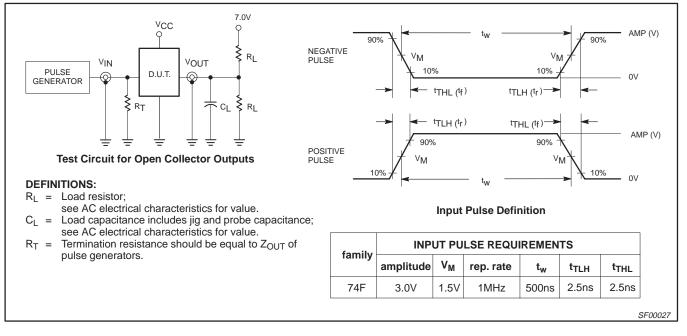


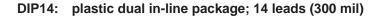
NOTE:

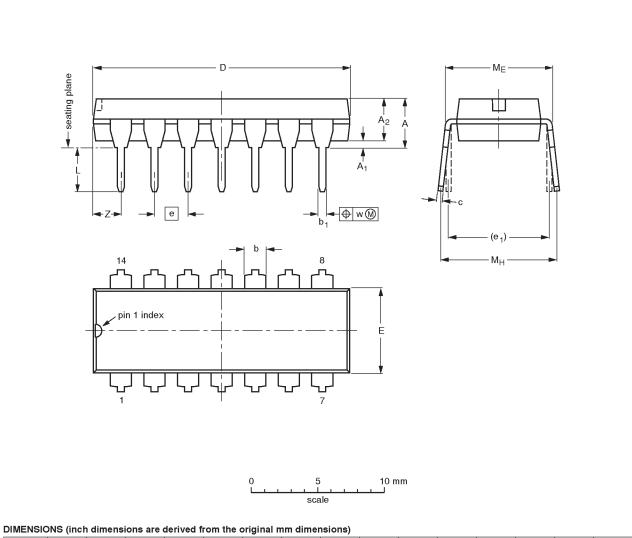
1 When using open collector parts, the value of the pull-up resistor greatly affects the value of the  $t_{PLH}$ . For example, changing the specified pull-up resistor value from 500 $\Omega$  to 100 $\Omega$  will improve the  $t_{PLH}$  up to 50% with only a slight increase in the  $t_{PHL}$ . However, if the value of the pull-up resistor is changed, the user must make certain that the total  $I_{OL}$  current through the resistor and the total  $I_{IL}$ 's of the receivers does not exceed the  $I_{OL}$  minimum specification.

### 74F38

#### **TEST CIRCUIT AND WAVEFORM**







UNIT	A max.	A <sub>1</sub> min.	A <sub>2</sub> max.	b	b <sub>1</sub>	c	D <sup>(1)</sup>	E <sup>(1)</sup>	e	e <sub>1</sub>	L	M <sub>E</sub>	M <sub>H</sub>	w	Z <sup>(1)</sup> max.
mm	4.2	0.51	3.2	1.73 1.13	0.53 0.38	0.36 0.23	19.50 18.55	6.48 6.20	2.54	7.62	3.60 3.05	8.25 7.80	10.0 8.3	0.254	2.2
inches	0.17	0.020	0.13	0.068 0.044	0.021 0.015	0.014 0.009	0.77 0.73	0.26 0.24	0.10	0.30	0.14 0.12	0.32 0.31	0.39 0.33	0.01	0.087

#### Note

1. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

OUTLINE		REFER	EUROPEAN	ISSUE DATE	
VERSION	IEC	JEDEC	EIAJ	PROJECTION	ISSUE DATE
SOT27-1	050G04	MO-001AA			<del>-92-11-17</del> 95-03-11

### Product specification

#### SO14: plastic small outline package; 14 leads; body width 3.9 mm SOT108-1 D А Х ٩Ę v (M) A Ζ Q Α2 (A 3 A pin 1 index · p Н е $\Phi \times \mathbb{M}$ detail X bp 5 mm 0 2.5 scale DIMENSIONS (inch dimensions are derived from the original mm dimensions) А z <sup>(1)</sup> D<sup>(1)</sup> E<sup>(1)</sup> bp $\mathsf{L}_\mathsf{p}$ UNIT A<sub>1</sub> A<sub>2</sub> A<sub>3</sub> с е ΗE L Q v w у θ max. 8.75 0.7 0.25 1.45 0.49 0.25 4.0 6.2 1.0 0.7 mm 1.75 0.25 1.27 1.05 0.25 0.25 0.1 0.10 1.25 0.36 0.19 8.55 3.8 5.8 0.4 0.6 0.3 8° 00 0.028 0.010 0.057 0.019 0.0100 0.35 0.16 0.244 0.039 0.028 0.069 0.01 0.050 0.041 0.01 0.01 0.004 inches 0.004 0.049 0.014 0.0075 0.34 0.15 0.228 0.016 0.024 0.012 Note 1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.

OUTLINE		REFER	EUROPEAN	ISSUE DATE	
VERSION	IEC	JEDEC	EIAJ	PROJECTION	1550E DATE
SOT108-1	076E06S	MS-012AB			<del>-95-01-23</del> 97-05-22

### 74F38

#### Data sheet status

Data sheet status	Product status	Definition [1]
Objective specification	Development	This data sheet contains the design target or goal specifications for product development. Specification may change in any manner without notice.
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