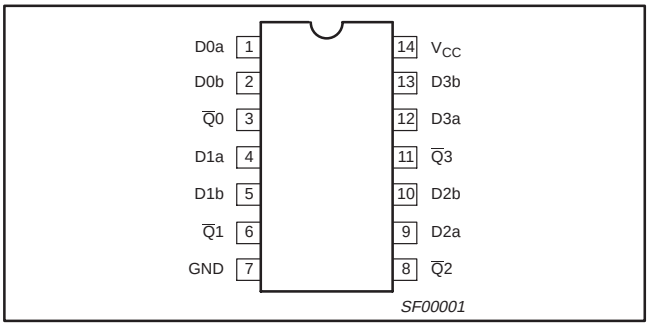
Quad 2-input NAND buffer (open collector) 74F38

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

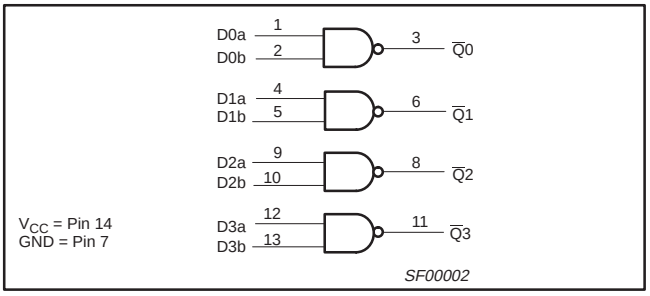
DESCRIPTION	ORDER CODE		PKG DWG #
	COMMERCIAL RANGE V_{CC} = 5V ±10%, T_{amb} = 0°C to +70°C	INDUSTRIAL RANGE V_{CC} = 5V ±10%, T_{amb} = –40°C to +85°C	
14-pin plastic DIP	N74F38N	I74F38N	SOT27-1
14-pin plastic SO	N74F38D	I74F38D	SOT108-1

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
$\overline{Q}$n	Data output	OC/106.7	OC/64mA

NOTES:
1 One (1.0) FAST unit load is defined as: 20µA in the high state and 0.6mA in the low state.
2 OC = open collector

LOGIC DIAGRAM

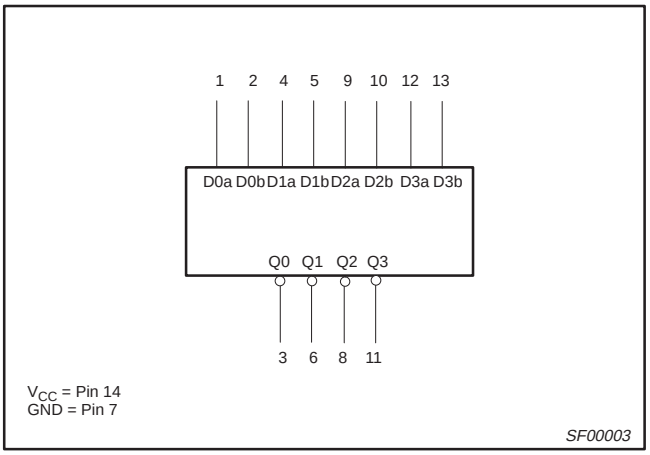


FUNCTION TABLE

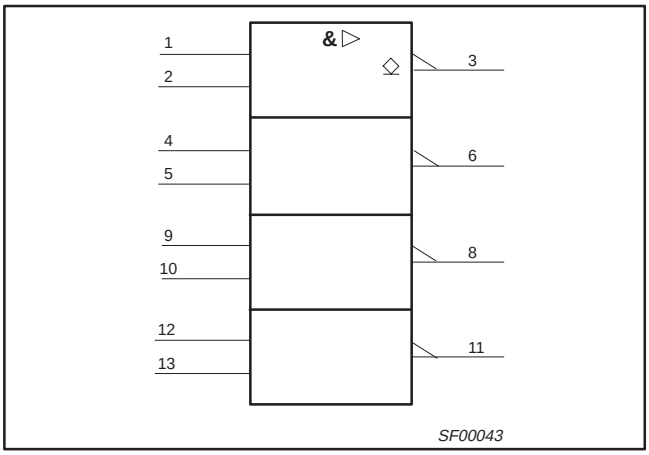
INPUTS		OUTPUT
Dna	Dnb	$\overline{Q}$n
L	L	H
L	H	H
H	L	H
H	H	L

NOTES:
H = High voltage level
L = Low voltage level

LOGIC SYMBOL



IEC/IEEE SYMBOL



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_{CC}	Supply voltage		–0.5 to +7.0	V
V_{IN}	Input voltage		–0.5 to +7.0	V
I_{IN}	Input current		–30 to +5	mA
V_{OUT}	Voltage applied to output in high output state		–0.5 to V_{CC}	V
I_{OUT}	Current applied to output in low output state		128	mA
T_{amb}	Operating free air temperature range	Commercial range	0 to +70	°C
		Industrial range	–40 to +85	°C
T_{stg}	Storage temperature range		–65 to +150	°C

RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER		LIMITS			UNIT
			MIN	NOM	MAX	
V_{CC}	Supply voltage		4.5	5.0	5.5	V
V_{IH}	High-level input voltage		2.0			V
V_{IL}	Low-level input voltage				0.8	V
I_{Ik}	Input clamp current				–18	mA
V_{OH}	High-level output voltage				4.5	V
I_{OL}	Low-level output current				64	mA
T_{amb}	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.)

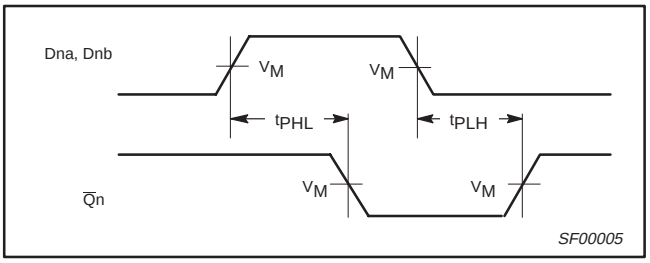
SYMBOL	PARAMETER		TEST CONDITIONS[1]		LIMITS			UNIT
					MIN	TYP[2]	MAX	
I_{OH}	High-level output current		V_{CC} = MIN, V_{IL} = MAX, V_{IH} = MIN, V_{OH} = MAX				250	µA
V_{OL}	Low-level output voltage		V_{CC} = MIN, V_{IL} = MAX	±10%V_{CC}			0.55	V
			V_{IH} = MIN, I_{OL} = MAX	±5%V_{CC}		0.42	0.55	V
V_{IK}	Input clamp voltage		V_{CC} = MIN, I_I = I_{IK}			-0.73	-1.2	V
I_I	Input current at maximum input voltage		V_{CC} = MAX, V_I = 7.0V				100	µA
I_{IH}	High-level input current		V_{CC} = MAX, V_I = 2.7V				20	µA
I_{IL}	Low-level input current		V_{CC} = MAX, V_I = 0.5V				-1.2	mA
I_{CC}	Supply current (total)	I_{CCH}	V_{CC} = MAX	V_{IN} = GND		4.0	7.0	mA
		I_{CCL}	V_{CC} = MAX	V_{IN} = 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°C.

AC ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITION	LIMITS							UNIT
			V_{CC} = +5.0V T_{amb} = +25°C C_L = 50pF, R_L = 500Ω			V_{CC} = +5.0V ± 10% T_{amb} = 0°C to +70°C C_L = 50pF, R_L = 500Ω		V_{CC} = +5.0V ± 10% T_{amb} = –40°C to +85°C C_L = 50pF, R_L = 500Ω		
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{PLH} t_{PHL}	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

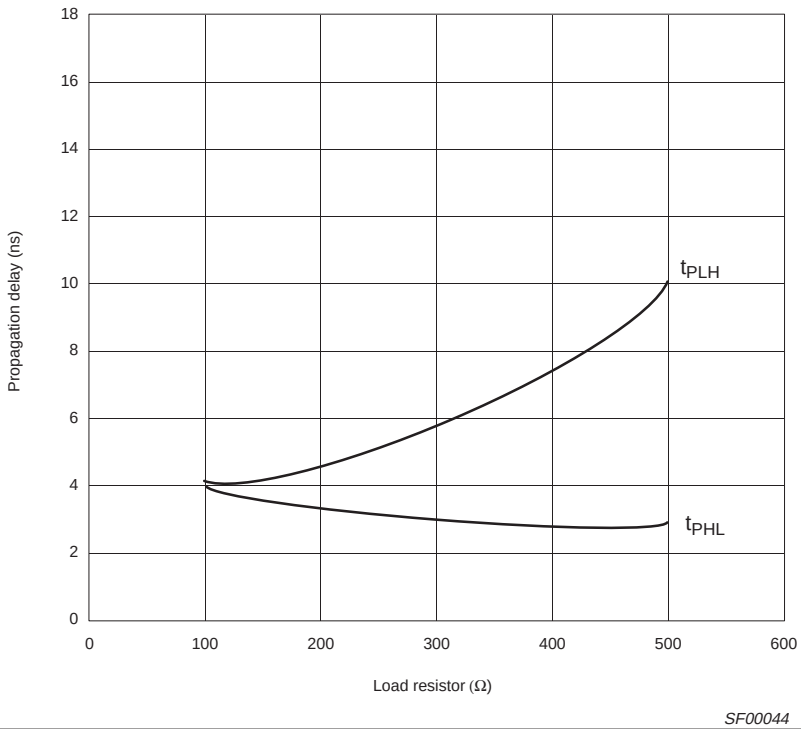
AC WAVEFORMS



Waveform 1. Propagation delay for inverting outputs

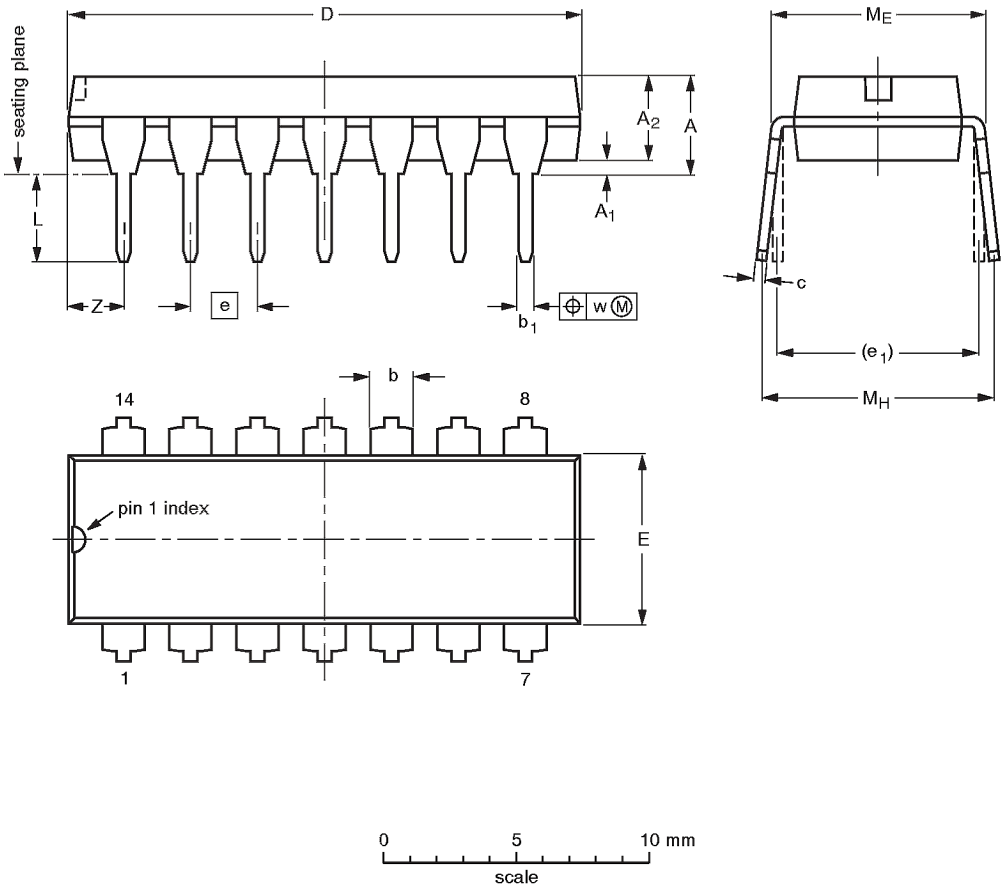
NOTE:
For all waveforms, V_M = 1.5V.

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 500Ω to 100Ω 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.

DIP14: plastic dual in-line package; 14 leads (300 mil) SOT27-1



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

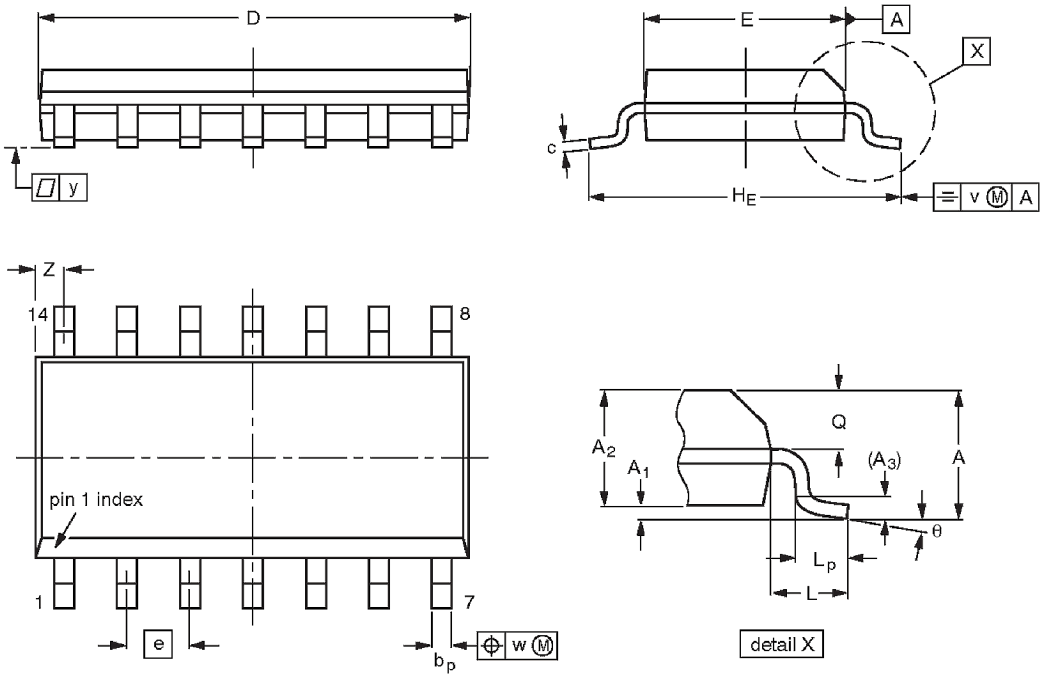
UNIT	A max.	A_1 min.	A_2 max.	b	b_1	c	D (1)	E (1)	e	e_1	L	M_E	M_H	w	Z (1) max.
mm	4.2	0.51	3.2	1.73 1.13	0.53 0.38	0.36 0.23	19.50 18.55	6.48 6.20	2.54	7.62	3.60 3.05	8.25 7.80	10.0 8.3	0.254	2.2
inches	0.17	0.020	0.13	0.068 0.044	0.021 0.015	0.014 0.009	0.77 0.73	0.26 0.24	0.10	0.30	0.14 0.12	0.32 0.31	0.39 0.33	0.01	0.087

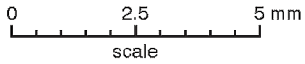
Note

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

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	
	IEC	JEDEC	EIAJ			
SOT27-1	050G04	MO-001AA				

SO14: plastic small outline package; 14 leads; body width 3.9 mm **SOT108-1**





DIMENSIONS (inch dimensions are derived from the original mm dimensions)

UNIT	A max.	A_1	A_2	A_3	b_p	c	$D^{(1)}$	$E^{(1)}$	e	H_E	L	L_p	Q	v	w	y	$Z^{(1)}$	θ
mm	1.75	0.25 0.10	1.45 1.25	0.25	0.49 0.36	0.25 0.19	8.75 8.55	4.0 3.8	1.27	6.2 5.8	1.05	1.0 0.4	0.7 0.6	0.25	0.25	0.1	0.7 0.3	8° 0°
inches	0.069	0.010 0.004	0.057 0.049	0.01	0.019 0.014	0.0100 0.0075	0.35 0.34	0.16 0.15	0.050	0.244 0.228	0.041	0.039 0.016	0.028 0.024	0.01	0.01	0.004	0.028 0.012	

Note

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	
	IEC	JEDEC	EIAJ			
SOT108-1	076E06S	MS-012AB				