

# DATA SHEET

## **74F804, 74F1804** Hex 2-input NAND drivers

Product specification

1990 Sep 14

IC15 Data Handbook

# Hex 2-input NAND drivers

# 74F804/1804

## FEATURES

- High capacitive drive capability
- Choice of configuration  
 Corner  $V_{CC}$  and GND – 74F804  
 Center  $V_{CC}$  and GND – 74F1804
- Typical propagation delay of 2.5ns

## INPUT AND OUTPUT

### LOADING AND FAN OUT TABLE

PINS	DESCRIPTION	74F (U.L.) HIGH/LOW	LOAD VALUE HIGH/LOW
Dna – Dnb	Data inputs	1.0/0.033	20 $\mu$ A/20 $\mu$ A
$\bar{Q}0 – \bar{Q}5$	Data outputs	2400/80	48mA/48mA

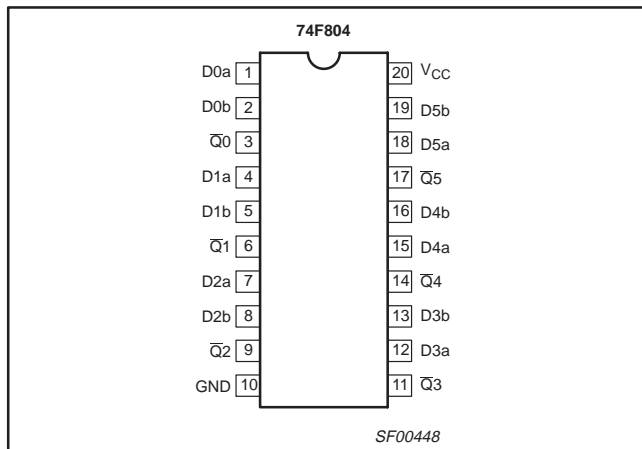
NOTE: One (1.0) FAST unit load is defined as: 20 $\mu$ A in the high state and 0.6mA in the low state.

TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
74F804	2.5ns	9mA
74F1804	2.5ns	9mA

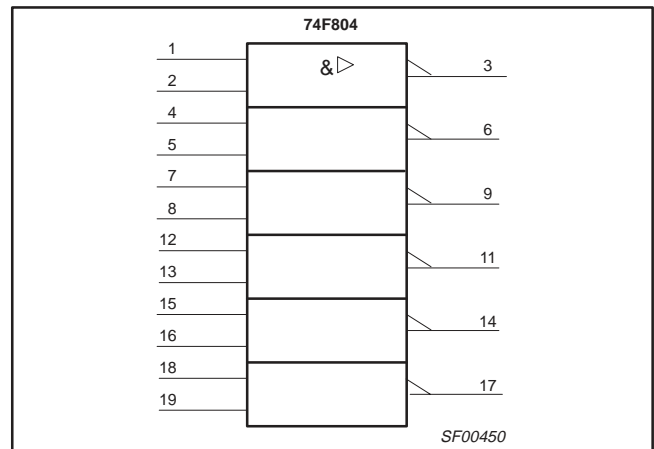
## ORDERING INFORMATION

DESCRIPTION	ORDER CODE	PKG DWG #
	COMMERCIAL RANGE $V_{CC} = 5V \pm 10\%$ , $T_{amb} = 0^{\circ}C$ to $+70^{\circ}C$	
20-pin plastic DIP	N74F804N, N74F1804N	SOT146-1
20-pin plastic SOL	N74F804D, N74F1804D	SOT163-1

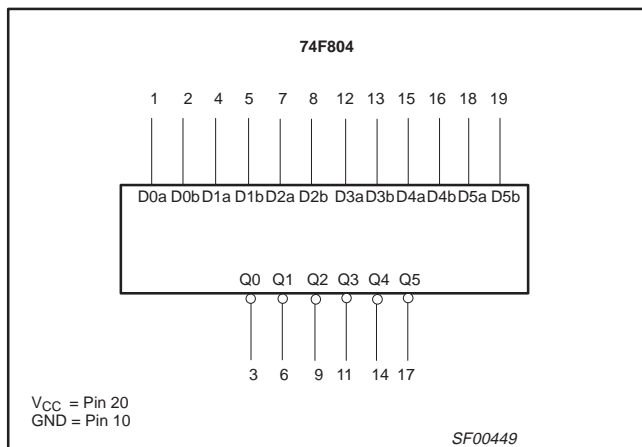
## PIN CONFIGURATION



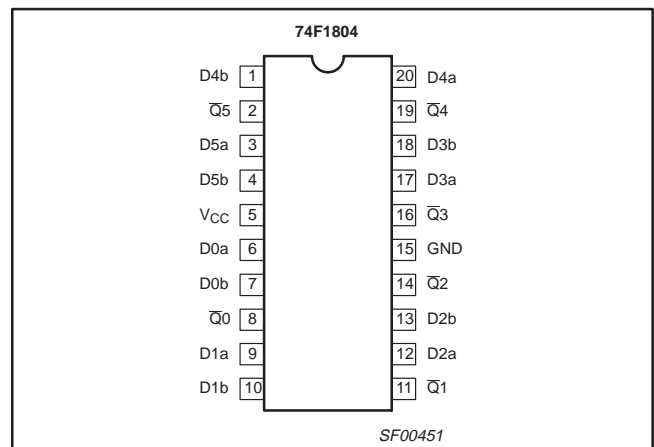
## IEC/IEEE SYMBOL



## LOGIC SYMBOL



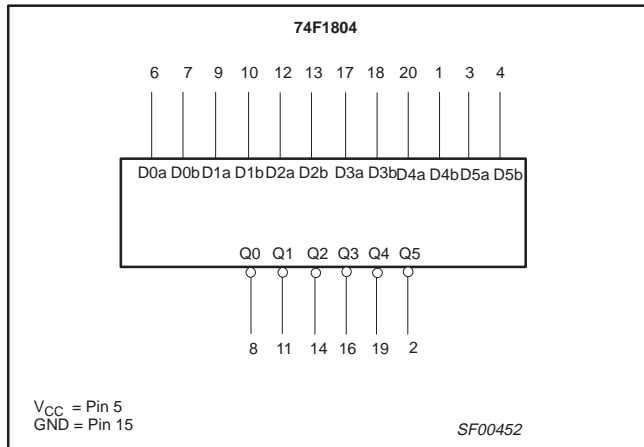
## PIN CONFIGURATION



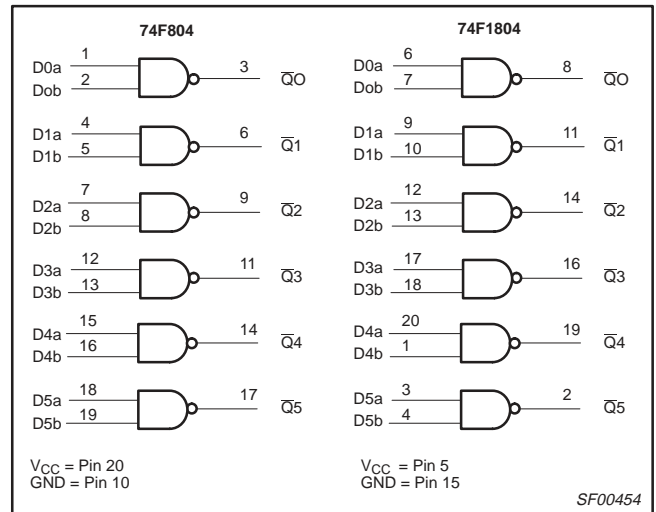
# Hex 2-input NAND drivers

## 74F804/1804

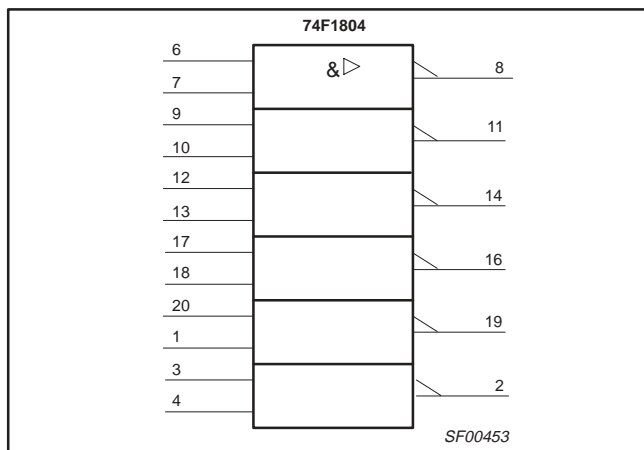
### LOGIC SYMBOL



### LOGIC DIAGRAM



### IEC/IEEE SYMBOL



### FUNCTION TABLE

INPUTS		OUTPUT
Da	Db	$\bar{Q}$
H	H	L
L	X	H
X	L	H

#### NOTES:

- H = High voltage level
- L = Low voltage level
- X = Don't care

### 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	96	mA
$T_{amb}$	Operating free-air temperature range	0 to +70	°C
$T_{stg}$	Storage temperature range	-65 to +150	°C

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## RECOMMENDED OPERATING CONDITIONS

SYMBOL UNIT	PARAMETER	LIMITS			$T_A =$ -40 to +85°C
		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
$I_{OH}$	High-level output current			-48	mA
$I_{OL}$	Low-level output current			48	mA
$T_{amb}$	Operating free air temperature range	0		+70	°C

## DC ELECTRICAL CHARACTERISTICS

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

SYMBOL	PARAMETER	TEST CONDITIONS <sup>1</sup>	LIMITS			UNIT	
			MIN	TYP <sup>2</sup>	MAX		
$V_{OH}$	High-level output voltage	$V_{CC} = \text{MIN}, V_{IL} = \text{MAX}$	$\pm 10\%V_{CC}$	2.0		V	
		$V_{IH} = \text{MIN}, I_{OH} = \text{MAX}$	$\pm 5\%V_{CC}$	2.0		V	
$V_{OL}$	Low-level output voltage	$V_{CC} = \text{MIN}, V_{IL} = \text{MAX}$	$\pm 10\%V_{CC}$		0.38	0.55	V
		$V_{IH} = \text{MIN}, I_{OL} = \text{MAX}$	$\pm 5\%V_{CC}$		0.38	0.55	V
$V_{IK}$	Input clamp voltage	$V_{CC} = \text{MIN}, I_I = I_{IK}$		-0.73	-1.2	V	
$I_I$	Input current at maximum input voltage	$V_{CC} = \text{MAX}, V_I = 7.0V$			100	$\mu\text{A}$	
$I_{IH}$	High-level input current	$V_{CC} = \text{MAX}, V_I = 2.7V$			20	$\mu\text{A}$	
$I_{IL}$	Low-level input current	$V_{CC} = \text{MAX}, V_I = 0.5V$			-20	$\mu\text{A}$	
$I_O$	Output current <sup>3</sup>	$V_{CC} = \text{MAX}$	-60		-160	mA	
$I_{CC}$	Supply current (total)	$I_{CCH}$ $V_{CC} = \text{MAX}$	$V_{IN} = \text{GND}$		2.0	3.0	mA
		$I_{CCL}$ $V_{CC} = \text{MAX}$	$V_{IN} = 4.5V$		15	20	mA

## NOTES:

- For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable type.
- All typical values are at  $V_{CC} = 5V$ ,  $T_{amb} = 25^\circ\text{C}$ .
- The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current,  $I_{OS}$ .

## AC ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITION	LIMITS					UNIT
			$T_{amb} = +25^\circ\text{C}$			$T_{amb} = 0^\circ\text{C to } +70^\circ\text{C}$		
			MIN	TYP	MAX	MIN	MAX	
$t_{PLH}$ $t_{PHL}$	Propagation delay Dna, Dnb to Qn	Waveform 1	1.0 1.0	2.0 3.0	4.0 4.5	1.0 1.0	4.0 5.0	ns
$t_{sk(o)}$	Output skew <sup>1,2</sup>	Waveform 2			1.5		1.5	ns

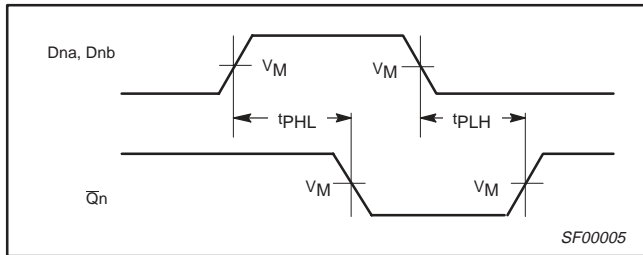
## NOTES:

- $[t_{PN} \text{ actual} - t_{PM} \text{ actual}]$  for any output compared to any other output where N and M are either LH or HL.
- Skew times are valid only under same test conditions (temperature,  $V_{CC}$ , loading, etc.).

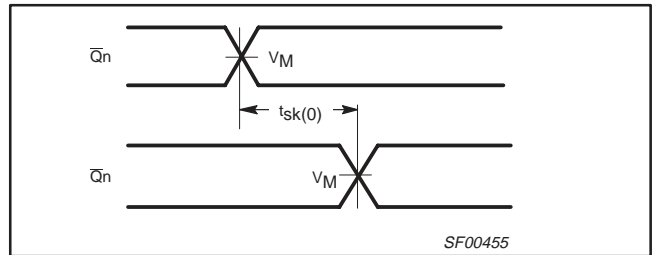
# Hex 2-input NAND drivers

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## AC WAVEFORMS



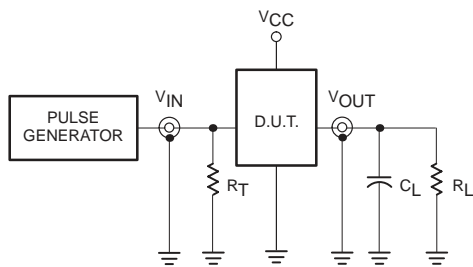
Waveform 1. Propagation delay for inverting outputs



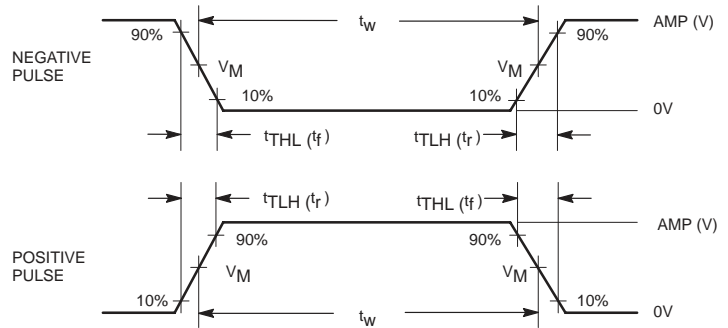
Waveform 2. Output skew

NOTE: For all waveforms,  $V_M = 1.5V$ .

## TEST CIRCUIT AND WAVEFORMS



Test Circuit for Totem-Pole Outputs



Input Pulse Definition

**DEFINITIONS:**

- $R_L$  = Load resistor; see AC ELECTRICAL CHARACTERISTICS for value.
- $C_L$  = Load capacitance includes jig and probe capacitance; see AC ELECTRICAL CHARACTERISTICS for value.
- $R_T$  = Termination resistance should be equal to  $Z_{OUT}$  of pulse generators.

family	INPUT PULSE REQUIREMENTS					
	amplitude	$V_M$	rep. rate	$t_w$	$t_{TLH}$	$t_{THL}$
74F	3.0V	1.5V	1MHz	500ns	2.5ns	2.5ns

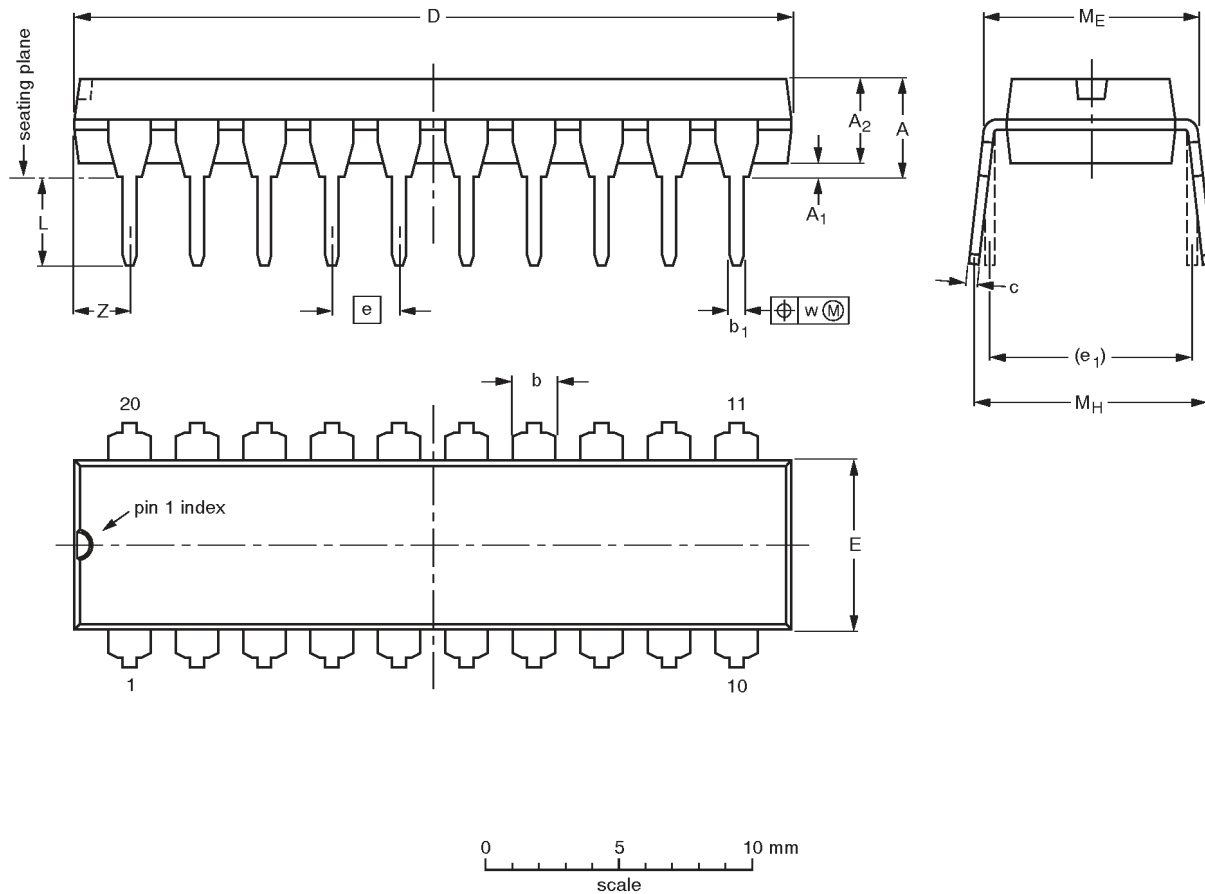
SF00006

# Hex 2-input NAND drivers

74F804, 74F1804

DIP20: plastic dual in-line package; 20 leads (300 mil)

SOT146-1



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

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 1.30	0.53 0.38	0.36 0.23	26.92 26.54	6.40 6.22	2.54	7.62	3.60 3.05	8.25 7.80	10.0 8.3	0.254	2.0
inches	0.17	0.020	0.13	0.068 0.051	0.021 0.015	0.014 0.009	1.060 1.045	0.25 0.24	0.10	0.30	0.14 0.12	0.32 0.31	0.39 0.33	0.01	0.078

**Note**

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

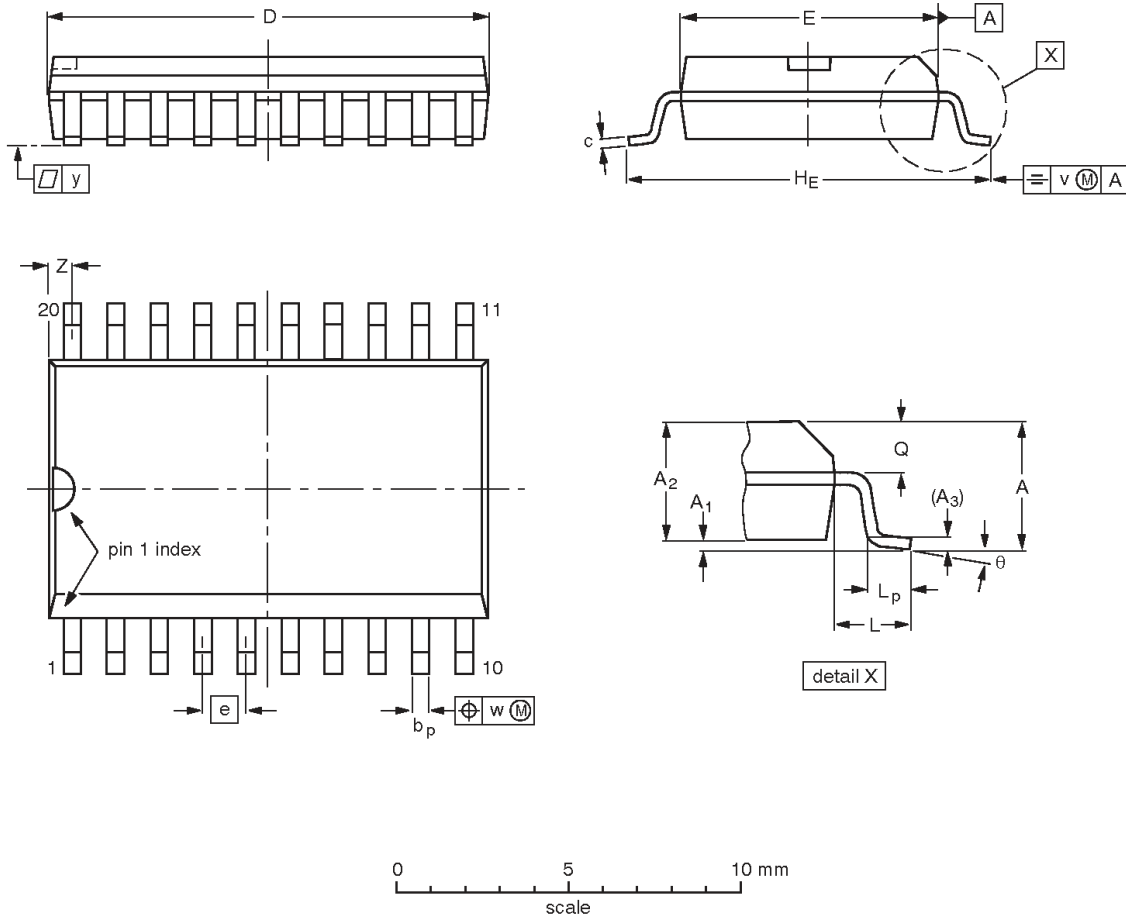
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT146-1			SC603			92-11-17 95-05-24

# Hex 2-input NAND drivers

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**SO20:** plastic small outline package; 20 leads; body width 7.5 mm

**SOT163-1**



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

UNIT	A max.	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	b <sub>p</sub>	c	D <sup>(1)</sup>	E <sup>(1)</sup>	e	H <sub>E</sub>	L	L <sub>p</sub>	Q	v	w	y	z <sup>(1)</sup>	θ
mm	2.65	0.30 0.10	2.45 2.25	0.25	0.49 0.36	0.32 0.23	13.0 12.6	7.6 7.4	1.27	10.65 10.00	1.4	1.1 0.4	1.1 1.0	0.25	0.25	0.1	0.9 0.4	8° 0°
inches	0.10	0.012 0.004	0.096 0.089	0.01	0.019 0.014	0.013 0.009	0.51 0.49	0.30 0.29	0.050	0.419 0.394	0.055	0.043 0.016	0.043 0.039	0.01	0.01	0.004	0.035 0.016	

**Note**

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

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT163-1	075E04	MS-013AC				95-01-24 97-05-22

## Hex 2-input NAND drivers

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## 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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