

74F656A

Octal buffer/driver with parity; non-inverting; 3-state

Rev. 6 — 14 December 2011

Product data sheet

1. General description

The 74F656A is an octal buffer and line driver with parity generation/checking. The 74F656A can be used as memory address driver, clock driver and bus-oriented transmitter/receiver. The inclusion of parity generation/checking improves PCB density.

2. Features and benefits

- Combines 74F244 and 74F280A functions in one device
- High impedance NPN base inputs for reduced input current (40 μ A in HIGH and LOW states)
- $I_{IL} = 20 \mu$ A compared to 600 μ A in FAST family specification
- For applications with high output drive and light bus loading
- Non-inverting
- 3-state output sink capability $I_{OL} = 64$ mA and source $I_{OH} = 15$ mA
- Inputs and outputs on separate sides simplifies board layout
- Combined functions reduce part count and enhance system performance
- Industrial temperature range available (-40 °C to $+85$ °C)

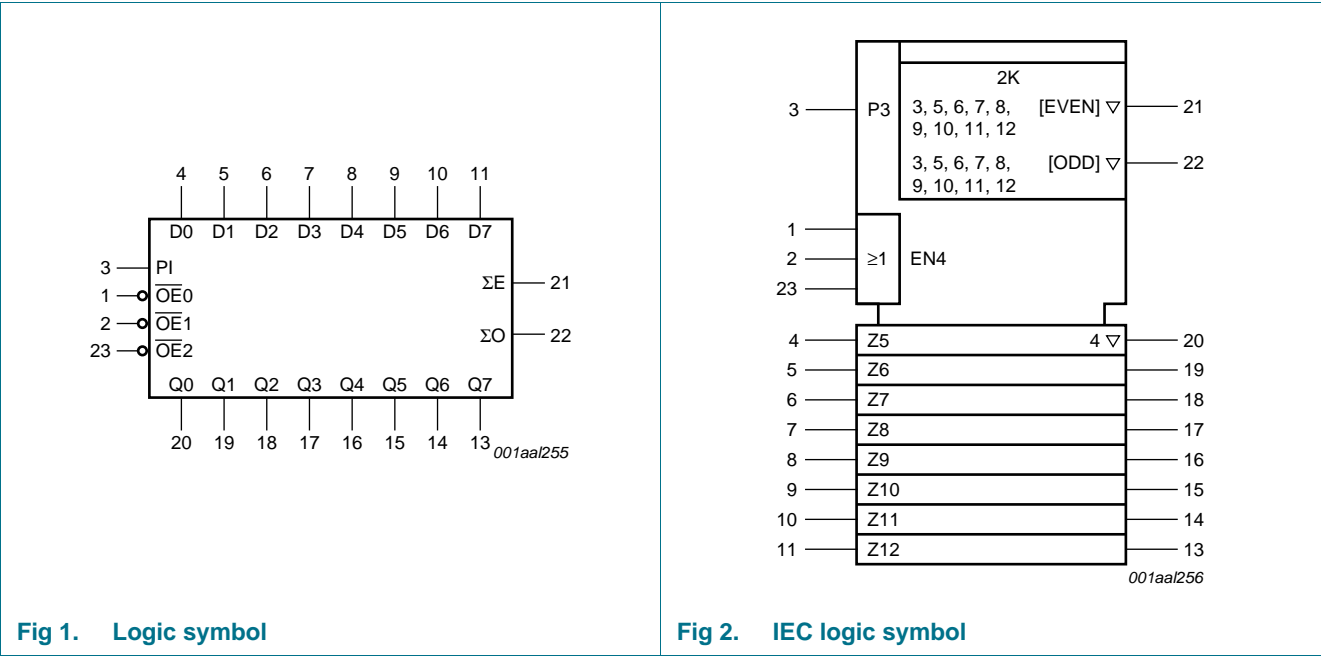
3. Ordering information

Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
N74F656AD	0 °C to 70 °C	SO24	plastic small outline package; 24 leads; body width 7.5 mm	SOT137-1
I74F656AD	-40 °C to $+85$ °C			



4. Functional diagram



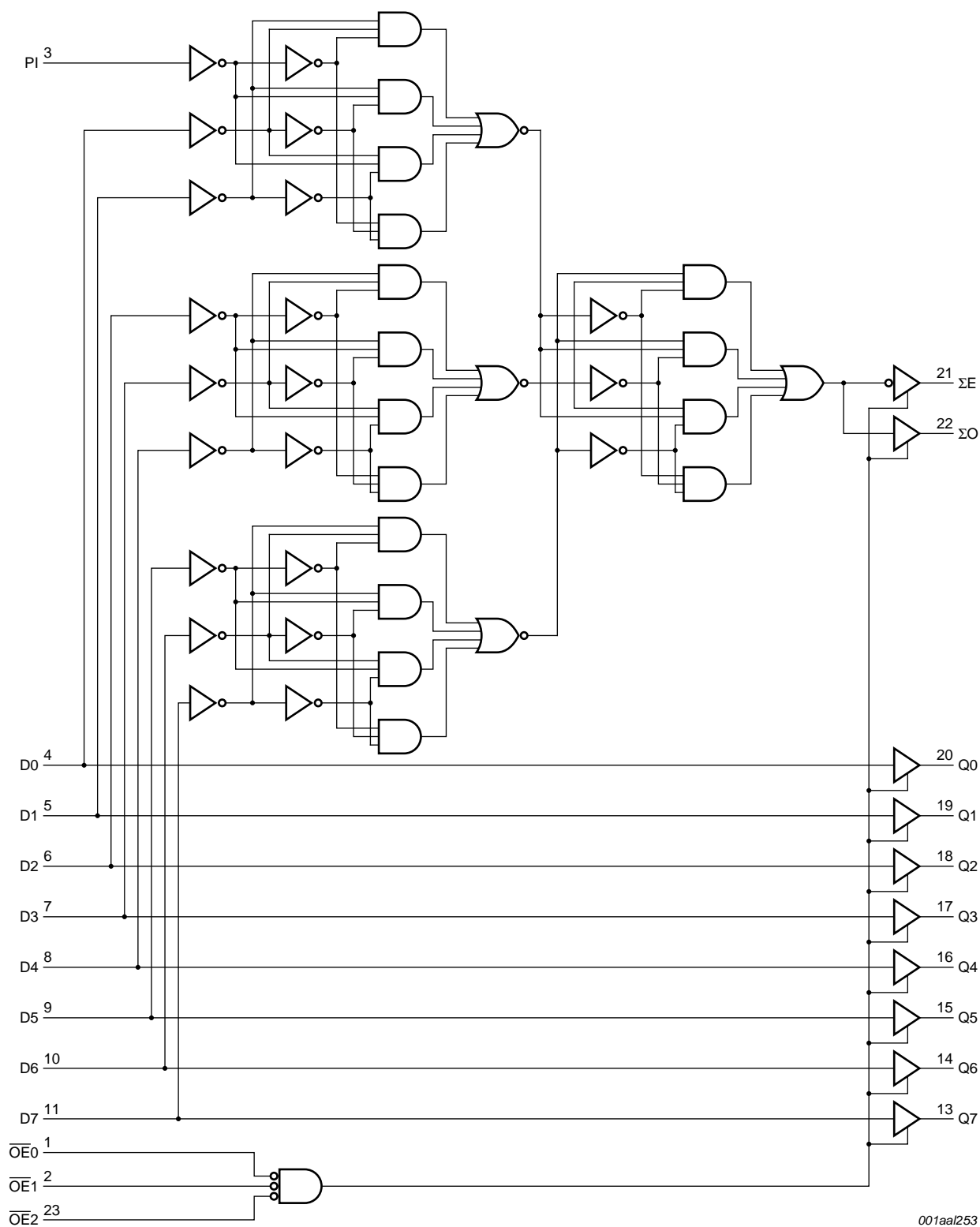


Fig 3. Logic diagram

5. Pinning information

5.1 Pinning

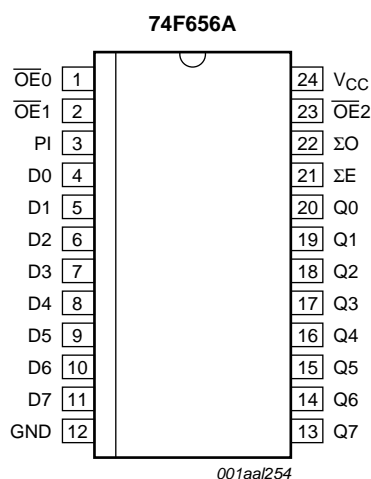


Fig 4. Pin configuration

5.2 Pin description

Table 2. Pin description

Symbol	Pin	Description	Unit load HIGH/LOW	Load value ^[1] HIGH/LOW
$\overline{OE}0$	1	output enable input (active LOW)	1.0/0.033	20 μ A/20 μ A
$\overline{OE}1$	2	output enable input (active LOW)	1.0/0.033	20 μ A/20 μ A
PI	3	parity input	1.0/0.033	20 μ A/20 μ A
D0 to D7	4, 5, 6, 7, 8, 9, 10, 11	data input	2.0/0.066	40 μ A/40 μ A
GND	12	ground (0 V)		
Q0 to Q7	20, 19, 18, 17, 16, 15, 14, 13	data output	750/106.7	15 mA/64 mA
ΣE	21	even parity output	750/106.7	15 mA/64 mA
ΣO	22	odd parity output	750/106.7	15 mA/64 mA
$\overline{OE}2$	23	output enable input (active LOW)	1.0/0.033	20 μ A/20 μ A
V_{CC}	24	supply voltage		

[1] One FAST Unit Load (UL) is defined as 20 μ A in HIGH state, 0.6 μ A in LOW state.

6. Functional description

6.1 Function table

Table 3. Function selection^[1]

Input				Output	Status
OE0	OE1	OE2	Dn	Qn	
L	L	L	L	L	transparent
L	L	L	H	H	
H	X	X	X	Z	disabled
X	H	X	X	Z	
X	X	H	X	Z	

[1] H = HIGH voltage level;
 L = LOW voltage level;
 X = don't care;
 Z = high-impedance OFF-state.

Table 4. Function parity outputs^[1]

Inputs	State	Parity output	
		ΣE	ΣO
Even number of inputs (0, 2, 4, 6, 8)	H	H	L
Odd number of inputs (1, 3, 5, 7, 9)	H	L	H
Any \overline{OEn}	H	Z	Z

[1] H = HIGH voltage level;
 L = LOW voltage level;
 Z = high-impedance OFF-state.

7. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CC}	supply voltage		-0.5	+7.0	V
V_I	input voltage		[1] -0.5	+7.0	V
V_O	output voltage	output in HIGH-state	[1] -0.5	V_{CC}	V
I_{IK}	input clamping current	$V_I < 0$ V	-30	+5	mA
I_O	output current	output in LOW-state	-	128	mA
T_{amb}	ambient temperature	in free-air	[2]		
		commercial	0	70	°C
		industrial	-40	+85	°C
T_{stg}	storage temperature		-65	+150	°C

[1] The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

[2] The performance capability of a high-performance integrated circuit in conjunction with its thermal environment can create junction temperatures which are detrimental to reliability. The maximum junction temperature of this integrated circuit should not exceed 150 °C.

8. Recommended operating conditions

Table 6. Recommended operating conditions

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
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 clamping current		-	-	-18	mA
I_{OH}	HIGH-level output current		-15	-	-	mA
I_{OL}	LOW-level output current		-	-	64	mA

9. Static characteristics

Table 7. Static characteristics

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		Unit
			Min	Typ[1]	Max	Min	Max	
V_{IK}	input clamping voltage	$V_{CC} = 4.5$ V; $I_{IK} = -18$ mA	-1.2	-0.73	-	-1.2	-	V
V_{OH}	HIGH-level output voltage	$V_{CC} = 4.5$ V; $V_{IL} = 0.8$ V; $V_{IH} = 2.0$ V						
		$I_{OH} = -3$ mA						
		$V_{CC} = \pm 10$ %	-	-	-	2.4	-	V
		$V_{CC} = \pm 5$ %	-	3.3	-	2.7	-	V
		$I_{OH} = -15$ mA						
		$V_{CC} = \pm 10$ %	-	-	-	2.0	-	V

Table 7. Static characteristics ...continued

Symbol	Parameter	Conditions	25 °C			–40 °C to +85 °C		Unit
			Min	Typ ^[1]	Max	Min	Max	
V _{OL}	LOW-level output voltage	V _{CC} = 4.5 V; V _{IL} = 0.8 V; V _{IH} = 2.0 V						
		I _{OL} = 64 mA						
		V _{CC} = ±10 %	-	-	-	-	0.55	V
		V _{CC} = ±5 %	-	0.42	-	-	0.55	V
I _I	input leakage current	V _{CC} = 0 V; V _I = 7.0 V	-	-	-	-	100	μA
I _{IH}	HIGH-level input current	V _{CC} = 5.5 V; V _I = 2.7 V; commercial						
		pin Dn	-	-	-	-	40	μA
		pin PI, $\overline{\text{OEn}}$	-	-	-	-	20	μA
		V _{CC} = 5.5 V; V _I = 2.7 V; industrial						
		pin Dn	-	-	-	-	80	μA
		pin PI, $\overline{\text{OEn}}$	-	-	-	-	40	μA
I _{IL}	LOW-level input current	V _{CC} = 5.5 V; V _I = 0.5 V						
		pin Dn	-	-	-	-	–40	μA
		pin PI, $\overline{\text{OEn}}$	-	-	-	-	–20	μA
I _{OZ}	OFF-state output current	V _{CC} = 5.5 V						
		V _O = 2.7 V	-	-	-	-	50	μA
		V _O = 0.5 V	-	-	-	-	–50	μA
I _O	output current	V _{CC} = 5.5 V ^[2]	-	-	-	–100	–225	mA
I _{CC}	supply current	V _{CC} = 5.5 V; V _I = GND or V _{CC}						
		outputs HIGH-state	-	50	-	-	80	mA
		outputs LOW-state	-	78	-	-	110	mA
		outputs OFF-state	-	83	-	-	90	mA

[1] All typical values are measured at V_{CC} = 5 V.

[2] Not more than one output should be tested at a time, and the duration of the test should not exceed one second.

10. Dynamic characteristics

Table 8. Dynamic characteristics

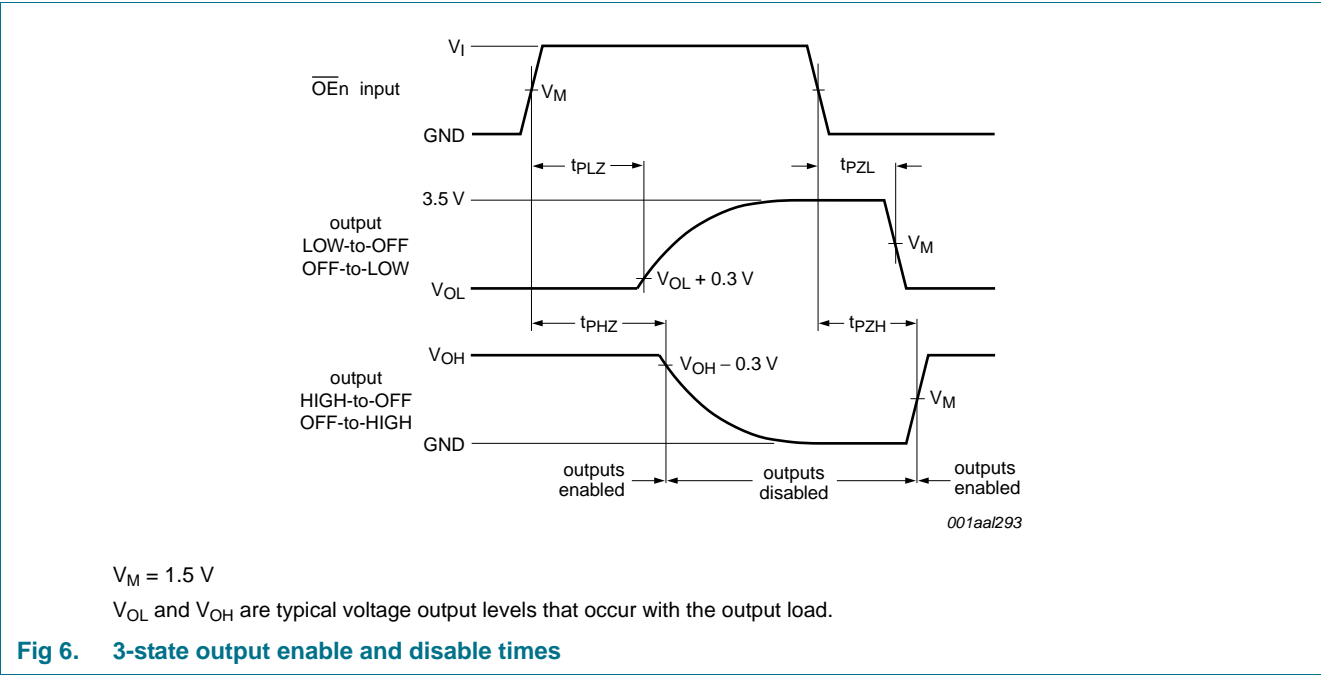
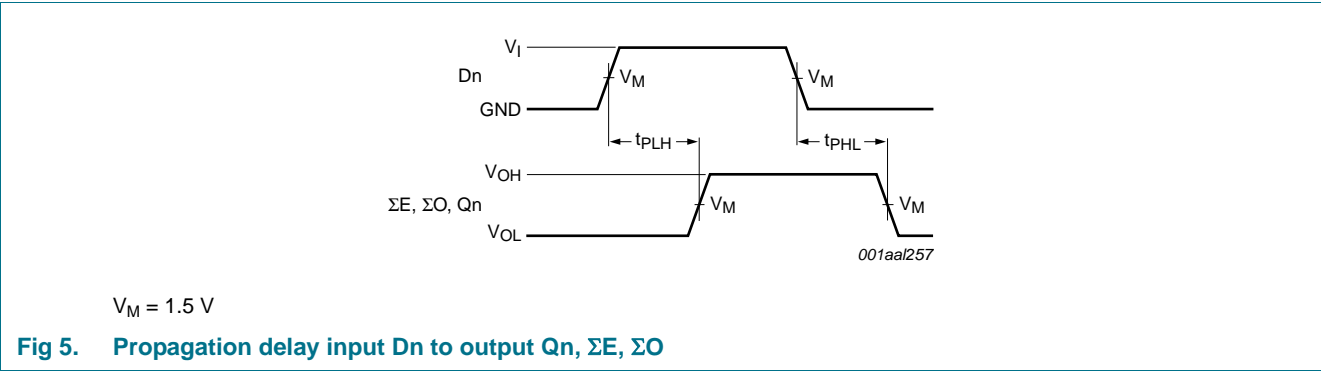
GND = 0 V; for test circuit, see [Figure 7](#).

Symbol	Parameter	Conditions	25 °C; V _{CC} = 5.0 V			0 °C to 70 °C; V _{CC} = 5.0 V ± 0.5 V		–40 °C to +85 °C; V _{CC} = 5.0 V ± 0.5 V		Unit
			Min	Typ	Max	Min	Max	Min	Max	
t _{PLH}	LOW to HIGH propagation delay	Dn to Qn; see Figure 5	2.0	4.0	6.5	2.0	7.0	2.0	8.0	ns
		Dn to ΣE, ΣO; see Figure 5	5.5	10.0	13.0	5.5	14.0	4.5	16.5	ns
t _{PHL}	HIGH to LOW propagation delay	Dn to Qn; see Figure 5	2.5	5.5	7.0	2.5	7.5	2.5	9.0	ns
		Dn to ΣE, ΣO; see Figure 5	5.5	11.0	14.5	5.5	16.5	5.5	18.0	ns
t _{PZH}	OFF-state to HIGH propagation delay	$\overline{\text{OEn}}$ to Qn; see Figure 6	3.5	7.0	10.5	3.5	11.5	3.0	13.0	ns

Table 8. Dynamic characteristics ...continued
GND = 0 V; for test circuit, see Figure 7.

Symbol	Parameter	Conditions	25 °C; V _{CC} = 5.0 V			0 °C to 70 °C; V _{CC} = 5.0 V ± 0.5 V		–40 °C to +85 °C; V _{CC} = 5.0 V ± 0.5 V		Unit
			Min	Typ	Max	Min	Max	Min	Max	
t _{PZL}	OFF-state to LOW propagation delay	$\overline{\text{OEn}}$ to Qn; see Figure 6	4.0	8.0	11.0	4.5	12.0	4.0	13.5	ns
t _{PHZ}	HIGH to OFF-state propagation delay	$\overline{\text{OEn}}$ to Qn; see Figure 6	1.5	4.5	8.0	1.5	9.0	1.5	10.0	ns
t _{PLZ}	LOW to OFF-state propagation delay	$\overline{\text{OEn}}$ to Qn; see Figure 6	2.0	5.0	8.0	2.0	9.0	1.5	10.0	ns

11. Waveforms



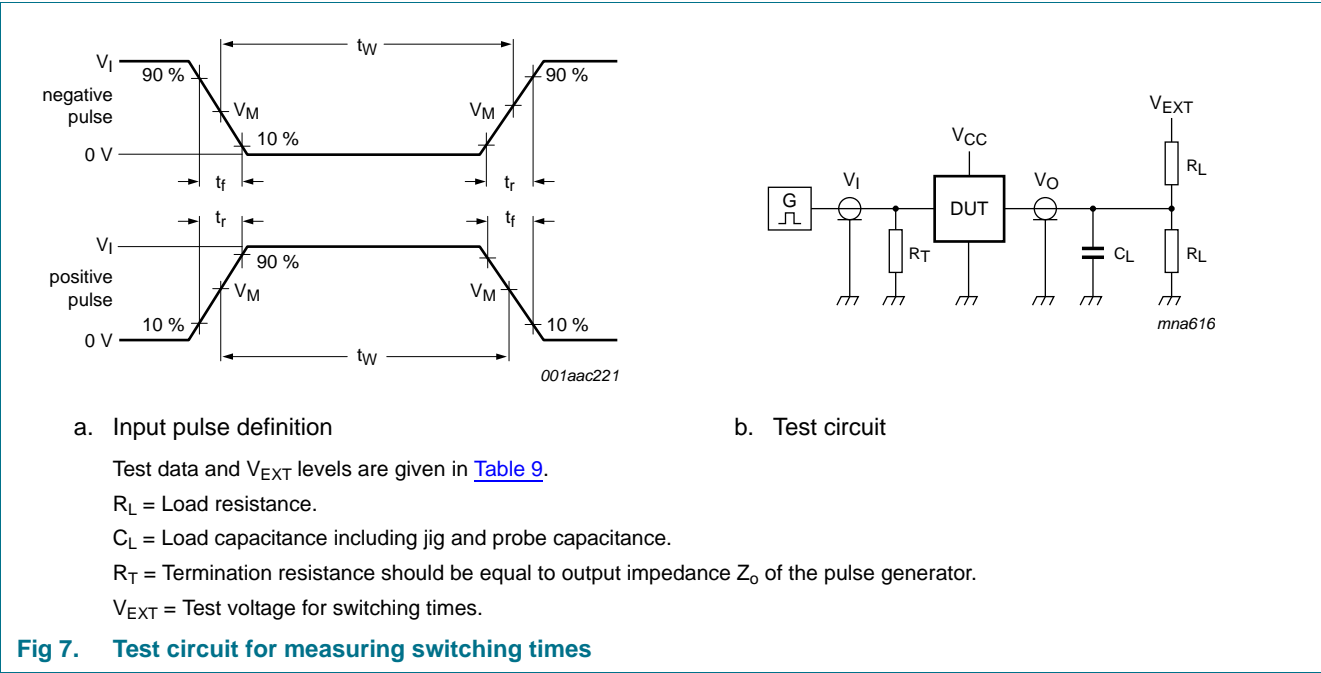


Fig 7. Test circuit for measuring switching times

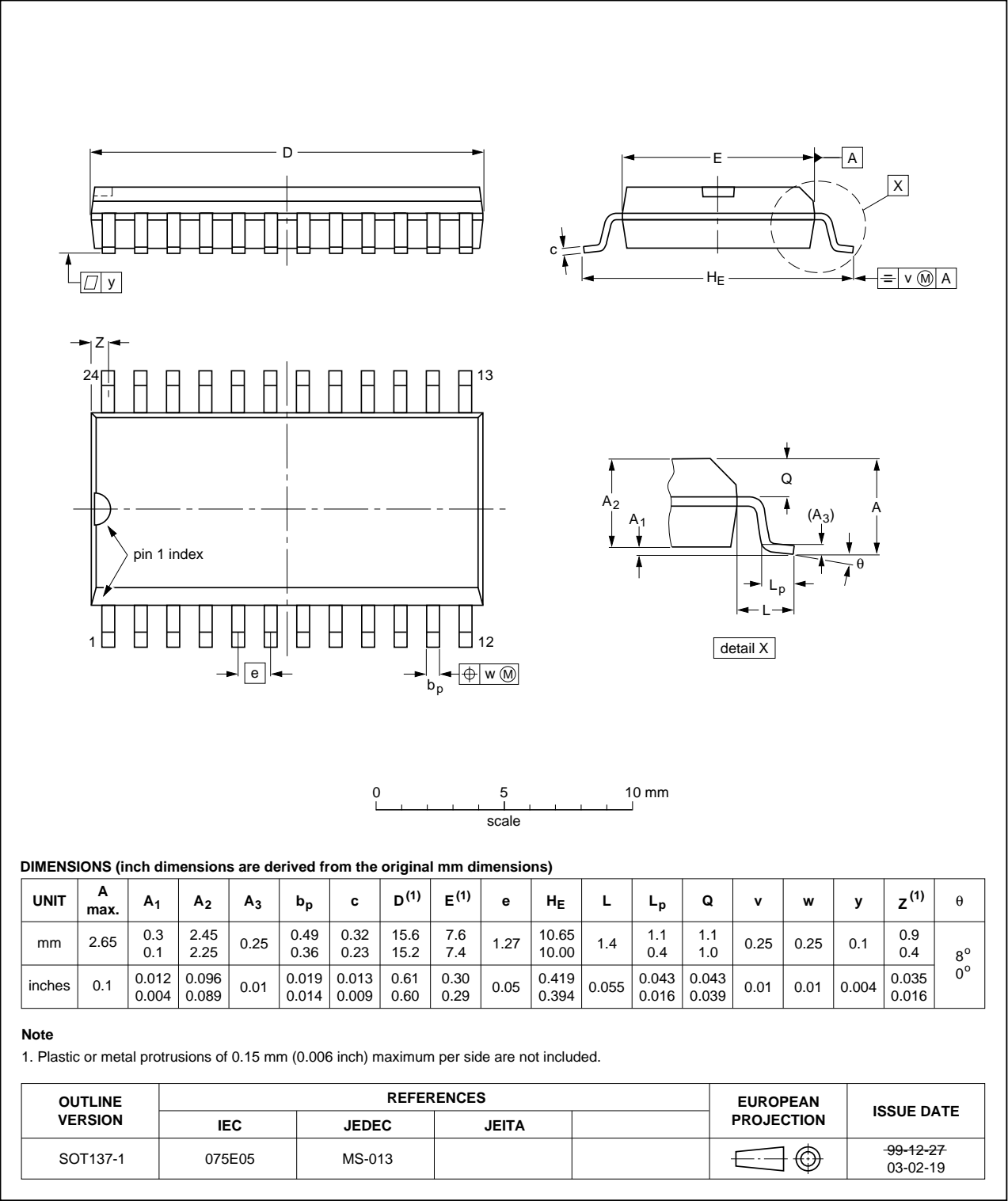
Table 9. Test data

Input				Load		V_{EXT}		
V_I	f_I	t_W	t_r, t_f	C_L	R_L	t_{PHL}, t_{PLH}	t_{PZH}, t_{PHZ}	t_{PZL}, t_{PLZ}
3.0 V	1 MHz	500 ns	≤ 2.5 ns	50 pF	500 Ω	open	open	7.0 V

12. Package outline

SO24: plastic small outline package; 24 leads; body width 7.5 mm

SOT137-1



13. Abbreviations

Table 10. Abbreviations

Acronym	Description
DUT	Device Under Test
ESD	ElectroStatic Discharge
HBM	Human Body Model
MM	Machine Model
PCB	Printed-Circuit Board

14. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74F656A v.6	20111214	Product data sheet	-	74F656A v.5
Modifications:	• Legal pages updated.			
74F656A v.5	20100325	Product data sheet	-	74F656A v.4
74F656A v.4	20100205	Product data sheet	-	74F656A v.3
74F656A v.3	20000630	Product specification	-	74F656A v.2
74F656A v.2	19910717	Product specification	-	-

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Document status ^{[1][2]}	Product status ^[3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

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[2] The term 'short data sheet' is explained in section "Definitions".

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