

DATA SHEET

74F399

Quad 2-port register

Product specification
Supersedes data of 1999 Jan 08
IC15 Data Handbook

2000 Jun 30

Quad 2-port register

74F399

FEATURES

- Select inputs from two data sources
- Fully positive edge-triggered

DESCRIPTION

The 74F399 is the logical equivalent of a quad 2-input multiplexer feeding into four edge-triggered flip-flops. A common Select input determines which of two 4-bit words is accepted. The selected data enters the flip-flops on the rising edge of the clock.

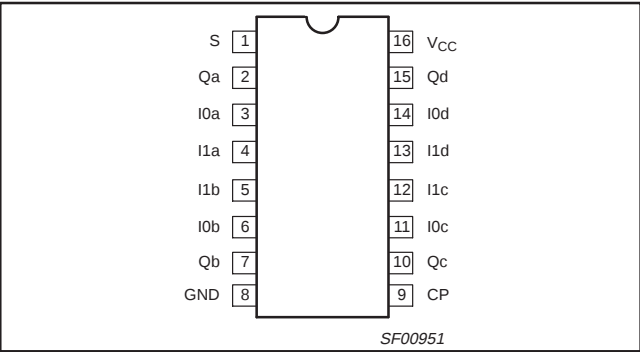
The 74F399 is a high speed quad 2-port register. They select 4 bits of data from either of two sources (Ports) under control of a common select input (S). The selected data is transferred to a 4-bit output register synchronous with the Low-to-High transition of the Clock input (CP). The 4-bit D-type output register is fully edge-triggered. The Data inputs (I0n, I1n) and Select input (S) must be stable only a setup time prior to and hold time after the Low-to-High transition of the Clock input for predictable operation.

TYPE	TYPICAL f _{MAX}	TYPICAL SUPPLY CURRENT (TOTAL)
74F399	120MHz	22mA

ORDERING INFORMATION

DESCRIPTION	COMMERCIAL RANGE V _{CC} = 5V ±10%, T _{amb} = 0°C to +70°C	PKG DWG #
16-pin plastic DIP	N74F399N	SOT38-4
16-pin plastic SO	N74F399D	SOT109-1

PIN CONFIGURATION

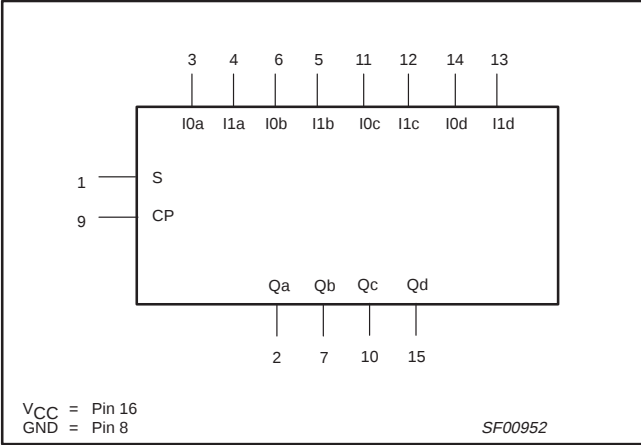


INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

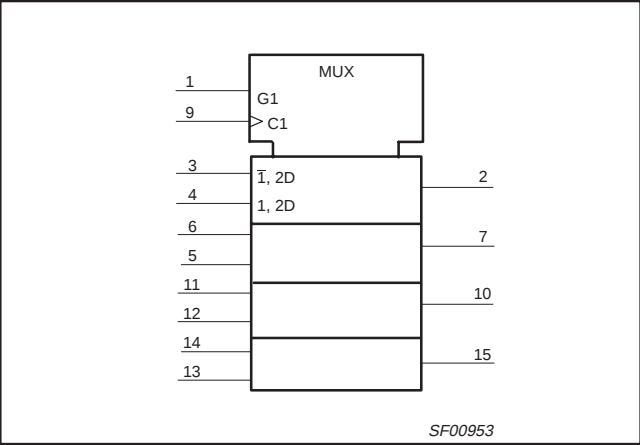
PINS	DESCRIPTION	74F (U.L.) HIGH/LOW	LOAD VALUE HIGH/LOW
I0a, I0b, I0c, I0d	Data inputs from source 0	1.0/1.0	20µA/0.6mA
I1a, I1b, I1c, I1d	Data inputs from source 1	1.0/1.0	20µA/0.6mA
S	Common Select input	1.0/1.0	20µA/0.6mA
CP	Clock input (active rising edge)	1.0/1.0	20µA/0.6mA
Qa, Qb, Qc, Qd	Register true outputs	50/33	1.0mA/20mA

NOTE:
One (1.0) FAST unit load is defined as: 20µA in the High state and 0.6mA in the Low state.

LOGIC SYMBOL



IEC/IEEE SYMBOL (IEEE/IEC)



Quad 2-port register

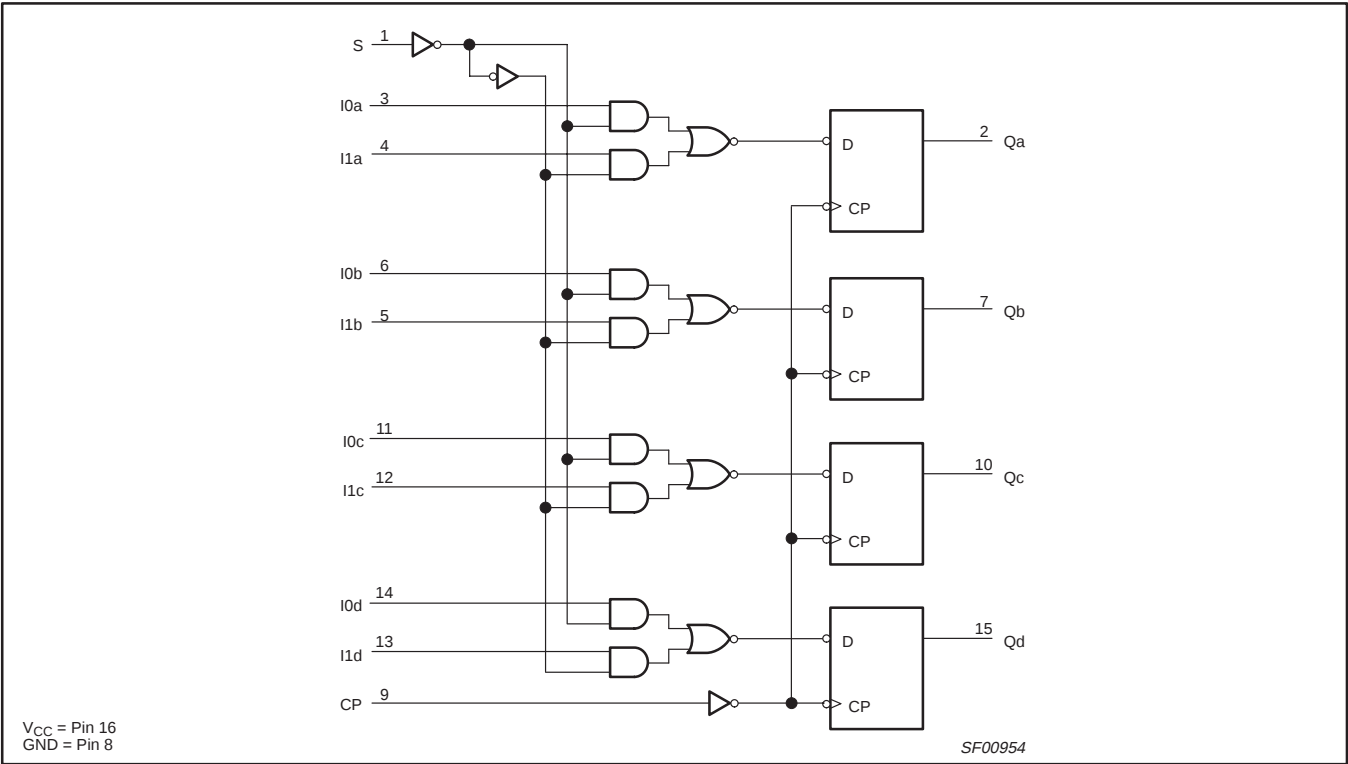
74F399

FUNCTION TABLE

INPUTS				OUTPUTS
CP	S	I0n	I1n	Qn
↑	l	l	X	L
↑	l	h	X	H
↑	h	X	l	L
↑	h	X	h	H

H = High voltage level
h = High voltage level one setup time prior to the High-to-Low clock transition
L = Low voltage level
l = Low voltage level one setup time prior to the High-to-Low clock transition
X = Don't care
↑ = Low-to-High clock transition

LOGIC DIAGRAM



Quad 2-port register

74F399

ABSOLUTE MAXIMUM RATINGS

(Operation beyond the limits 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	40	mA
T_{amb}	Operating free-air temperature range	0 to +70	°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
I_{OH}	High-level output current			−1	mA
I_{OL}	Low-level output current			20	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 ¹	LIMITS			UNIT
			MIN	TYP ²	MAX	
V_{OH}	High-level output voltage	$V_{CC} = \text{MIN}, V_{IL} = \text{MAX}, V_{IH} = \text{MIN}, I_{OH} = \text{MAX}$	$\pm 10\%V_{CC}$	2.5		V
			$\pm 5\%V_{CC}$	2.7	3.4	V
V_{OL}	Low-level output voltage	$V_{CC} = \text{MIN}, V_{IL} = \text{MAX}, V_{IH} = \text{MIN}, I_{OL} = \text{MAX}$	$\pm 10\%V_{CC}$		0.30	0.50
			$\pm 5\%V_{CC}$		0.30	0.50
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	$V_{CC} = \text{MAX}, V_I = 7.0\text{V}$			100	μA
I_{IH}	High-level input current	$V_{CC} = \text{MAX}, V_I = 2.7\text{V}$			20	μA
I_{IL}	Low-level input current	$V_{CC} = \text{MAX}, V_I = 0.5\text{V}$			−0.6	mA
I_{OS}	Short-circuit output current ³	$V_{CC} = \text{MAX}$	−60		−150	mA
I_{CC}	Supply current (total)	$V_{CC} = \text{MAX}$		22	34	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 $V_{CC} = 5\text{V}$, $T_{amb} = 25^\circ\text{C}$.
- Not more than one output should be shorted at a time. For testing I_{OS} , the use of high-speed test apparatus and/or sample-and-hold techniques are preferable in order to minimize internal heating and more accurately reflect operational values. Otherwise, prolonged shorting of a High output may raise the chip temperature well above normal and thereby cause invalid readings in other parameter tests. In any sequence of parameter tests, I_{OS} tests should be performed last.

Quad 2-port register

74F399

AC ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITION	LIMITS					UNIT
			V _{CC} = +5V T _{amb} = +25°C C _L = 50pF, R _L = 500Ω			V _{CC} = +5V ± 10% T _{amb} = 0°C to +70°C C _L = 50pF, R _L = 500Ω		
			MIN	TYP	MAX	MIN	MAX	
f _{MAX}	Maximum clock frequency	Waveform 1	100	120		90		MHz
t _{PLH} t _{PHL}	Propagation delay CP to Qn or Q̄n	Waveform 1	3.0 3.0	5.7 6.5	7.5 8.5	3.0 3.0	8.5 9.0	ns

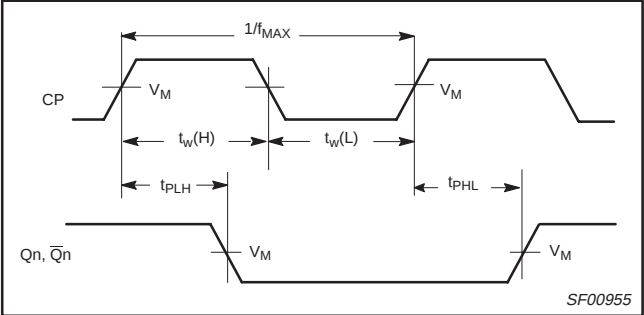
AC SETUP REQUIREMENTS

SYMBOL	PARAMETER	TEST CONDITION	LIMITS					UNIT
			V _{CC} = +5V T _{amb} = +25°C C _L = 50pF, R _L = 500Ω			V _{CC} = +5V ± 10% T _{amb} = 0°C to +70°C C _L = 50pF, R _L = 500Ω		
			MIN	TYP	MAX	MIN	MAX	
t _s (H) t _s (L)	Setup time, High or Low I0n, I1n to CP	Waveform 2	3.0 3.0			3.0 3.0		ns
t _h (H) t _h (L)	Hold time, High or Low I0n, I1n to CP	Waveform 2	1.0 1.0			1.0 1.0		ns
t _s (H) t _s (L)	Setup time, High or Low S to CP	Waveform 2	7.5 7.5			8.5 8.5		ns
t _h (H) t _h (L)	Hold time, High or Low S to CP	Waveform 2	0 0			0 0		ns
t _W (H) t _W (L)	CP Pulse width High or Low	Waveform 1	4.0 6.0			4.0 6.0		ns

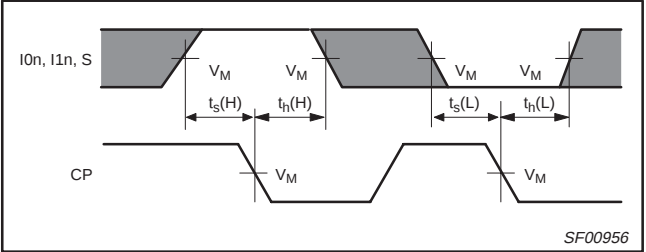
AC WAVEFORMS

For all waveforms, $V_M = 1.5V$.

The shaded areas indicate when the input is permitted to change for predictable output performance.



Waveform 1. Propagation Delay, Clock Input to Output, Clock Pulse Width, and Maximum Clock Frequency

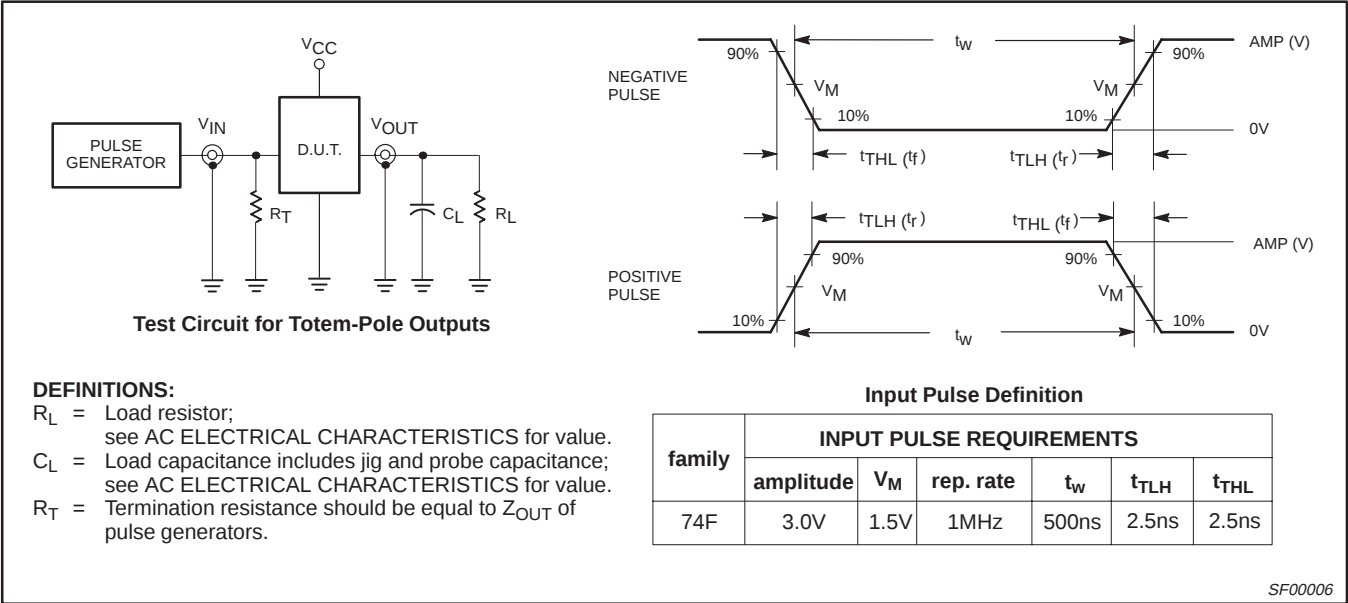


Waveform 2. Data and Select Setup and Hold Times

Quad 2-port register

74F399

TEST CIRCUIT AND WAVEFORMS

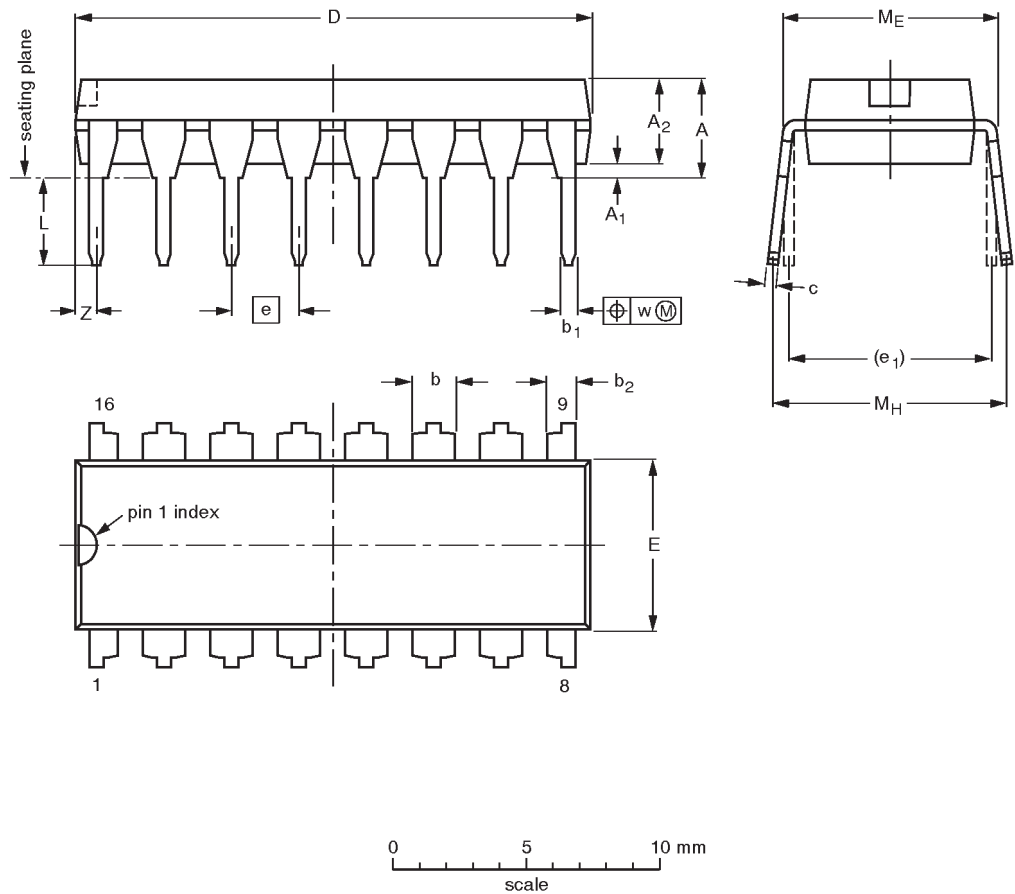


Quad 2-port register

74F399

DIP16: plastic dual in-line package; 16 leads (300 mil)

SOT38-4



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

UNIT	A max.	A ₁ min.	A ₂ max.	b	b ₁	b ₂	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 1.30	0.53 0.38	1.25 0.85	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	0.76
inches	0.17	0.020	0.13	0.068 0.051	0.021 0.015	0.049 0.033	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	0.030

Note

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

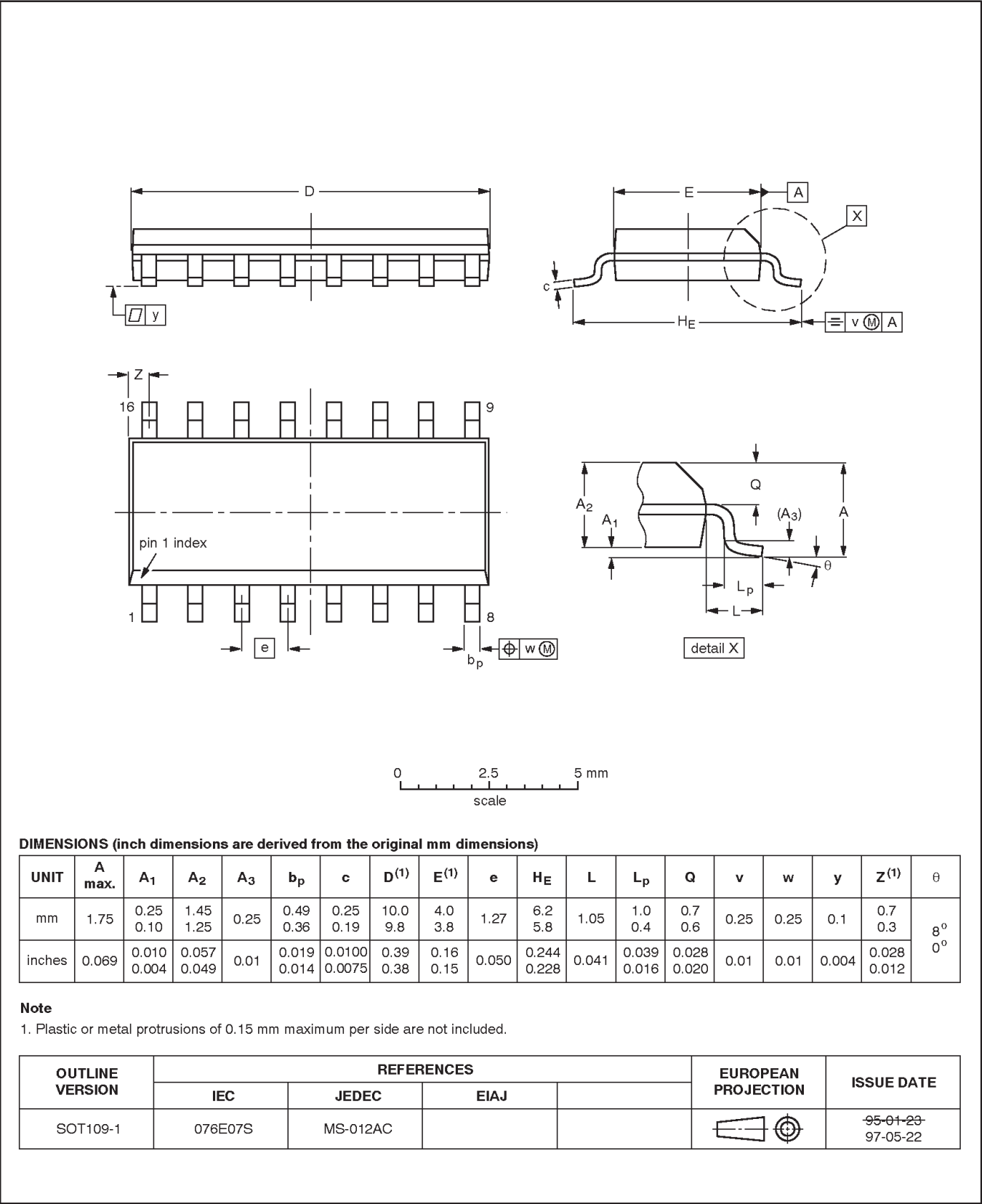
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT38-4						92-11-17 95-01-14

Quad 2-port register

74F399

SO16: plastic small outline package; 16 leads; body width 3.9 mm

SOT109-1



Quad 2-port register	74F399
----------------------	--------

NOTES

Quad 2-port register

74F399

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.
Preliminary specification	Qualification	This data sheet contains preliminary data, and supplementary data will be published at a later date. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.
Product specification	Production	This data sheet contains final specifications. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.

[1] Please consult the most recently issued datasheet before initiating or completing a design.

Definitions

Short-form specification — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

Application information — Applications that are described herein for any of these products are for illustrative purposes only. Philips Semiconductors make no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Disclaimers

Life support — These products are not designed for use in life support appliances, devices or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips Semiconductors customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips Semiconductors for any damages resulting from such application.

Right to make changes — Philips Semiconductors reserves the right to make changes, without notice, in the products, including circuits, standard cells, and/or software, described or contained herein in order to improve design and/or performance. Philips Semiconductors assumes no responsibility or liability for the use of any of these products, conveys no license or title under any patent, copyright, or mask work right to these products, and makes no representations or warranties that these products are free from patent, copyright, or mask work right infringement, unless otherwise specified.

Philips Semiconductors
811 East Arques Avenue
P.O. Box 3409
Sunnyvale, California 94088-3409
Telephone 800-234-7381

© Copyright Philips Electronics North America Corporation 2000
All rights reserved. Printed in U.S.A.

Date of release: 06-00

Document order number:

9397-750 07282

Let's make things better.