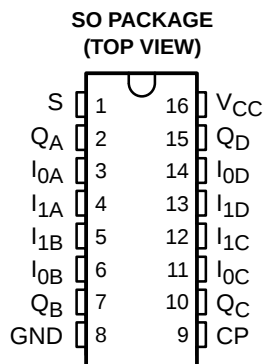


- Function, Pinout, and Drive Compatible With FCT and F Logic
- Reduced V_{OH} (Typically = 3.3 V) Versions of Equivalent FCT Functions
- Edge-Rate Control Circuitry for Significantly Improved Noise Characteristics
- I_{off} Supports Partial-Power-Down Mode Operation
- Matched Rise and Fall Times
- ESD Protection Exceeds JESD 22
 - 2000-V Human-Body Model (A114-A)
 - 200-V Machine Model (A115-A)
 - 1000-V Charged-Device Model (C101)
- Fully Compatible With TTL Input and Output Logic Levels
- 64-mA Output Sink Current
32-mA Output Source Current



description

The CY74FCT399T is a high-speed quad 2-input register that selects four bits of data from either of two sources (ports) under control of a common select (S) input. Selected data are transferred to a 4-bit output register synchronous with the low-to-high transition of the clock (CP) input. The 4-bit D-type output register is fully edge triggered. The data inputs (I_{0X} , I_{1X}) and S input must be stable only one setup time prior to, and hold time after, the low-to-high transition of CP for predictable operation. The CY74FCT399T has noninverted outputs.

This device is fully specified for partial-power-down applications using I_{off} . The I_{off} circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.

PIN DESCRIPTION

NAME	DESCRIPTION
S	Common select input
CP	Clock-pulse input (active rising edge)
I_0	Data inputs from source 0
I_1	Data inputs from source 1
Q	Register noninverted outputs

ORDERING INFORMATION

T_A	PACKAGE [†]		SPEED (ns)	ORDERABLE PART NUMBER	TOP-SIDE MARKING
–40°C to 85°C	SOIC – SO	Tube	6.1	CY74FCT399CTSOC	FCT399C
		Tape and reel	6.1	CY74FCT399CTSOCT	
	SOIC – SO	Tube	7	CY74FCT399ATSOC	FCT399A
		Tape and reel	7	CY74FCT399ATSOCT	

[†] Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

TEXAS
INSTRUMENTS

POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

Copyright © 2001, Texas Instruments Incorporated

CY74FCT399T
QUAD 2-INPUT REGISTER

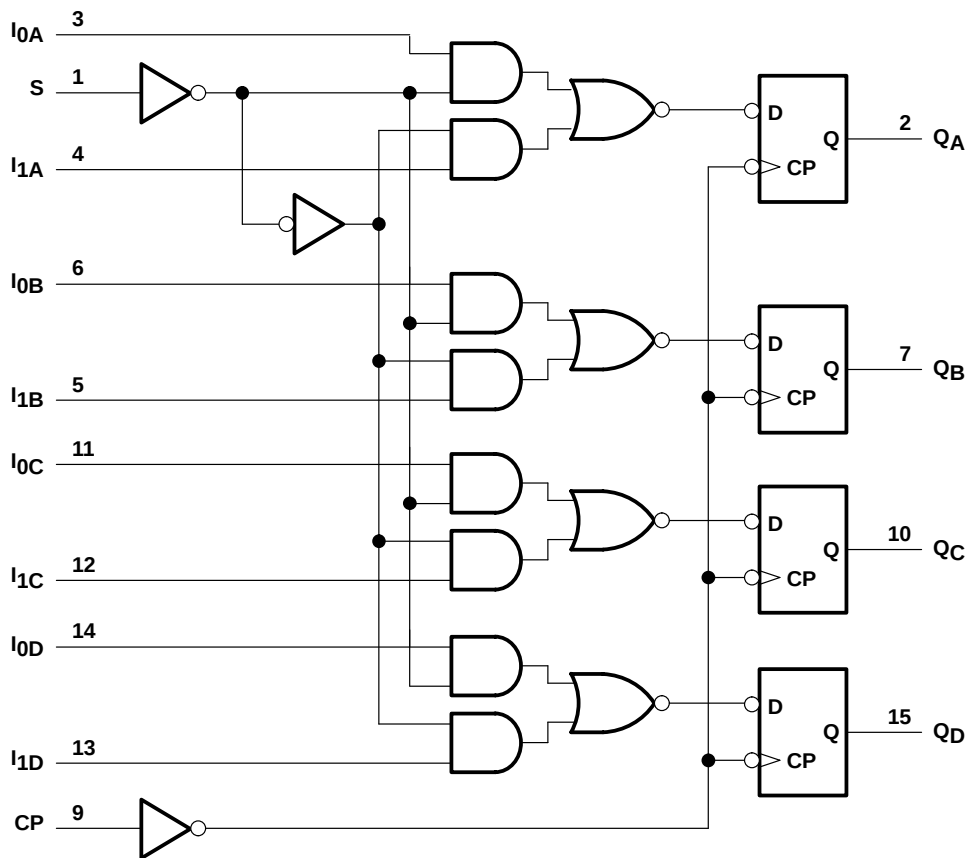
SCCS024A – MARCH 1994 – REVISED OCTOBER 2001

FUNCTION TABLE

INPUTS			OUTPUT Q
S	I ₀	I ₁	
l	l	X	L
l	h	X	H
h	X	l	L
h	X	h	H

H = High logic level, h = High logic level
one setup time prior to the low-to-high
clock transition, L = Low logic level,
l = Low logic level one setup time prior
to the low-to-high clock transition,
X = Don't care

logic diagram



absolute maximum ratings over operating free-air temperature range (unless otherwise noted)[†]

Supply voltage range to ground potential	–0.5 V to 7 V
DC input voltage range	–0.5 V to 7 V
DC output voltage range	–0.5 V to 7 V
DC output current (maximum sink current/pin)	120 mA
Package thermal impedance, θ_{JA} (see Note 1)	57°C/W
Ambient temperature range with power applied, T_A	–65°C to 135°C
Storage temperature range, T_{stg}	–65°C to 150°C

[†] Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTE 1: The package thermal impedance is calculated in accordance with JESD 51-7.

recommended operating conditions (see Note 2)

	MIN	NOM	MAX	UNIT
V_{CC} Supply voltage	4.75	5	5.25	V
V_{IH} High-level input voltage	2			V
V_{IL} Low-level input voltage			0.8	V
I_{OH} High-level output current			–32	mA
I_{OL} Low-level output current			64	mA
T_A Operating free-air temperature	–40		85	°C

NOTE 2: All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation.

CY74FCT399T

QUAD 2-INPUT REGISTER

SCCS024A – MARCH 1994 – REVISED OCTOBER 2001

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST CONDITIONS		MIN	TYP [†]	MAX	UNIT
V _{IK}	V _{CC} = 4.75,	I _{IN} = −18 mA		−0.7	−1.2	V
V _{OH}	V _{CC} = 4.75	I _{OH} = −32 mA	2			V
		I _{OH} = −15 mA	2.4	3.3		
V _{OL}	V _{CC} = 4.75,	I _{OL} = 64 mA		0.3	0.55	V
V _H	All inputs			0.2		V
I _I	V _{CC} = 5.25 V,	V _{IN} = V _{CC}			5	μA
I _{IH}	V _{CC} = 5.25 V,	V _{IN} = 2.7 V			±1	μA
I _{IL}	V _{CC} = 5.25 V,	V _{IN} = 0.5 V			±1	μA
I _{OS} [‡]	V _{CC} = 5.25 V,	V _{OUT} = 0 V	−60	−120	−225	mA
I _{off}	V _{CC} = 0 V,	V _{OUT} = 4.5 V			±1	μA
I _{CC}	V _{CC} = 5.25 V,	V _{IN} ≤ 0.2 V, V _{IN} ≥ V _{CC} − 0.2 V		0.1	0.2	mA
ΔI _{CC}	V _{CC} = 5.25 V, V _{IN} = 3.4 V [§] , f ₁ = 0, Outputs open			0.5	2	mA
I _{CCD} [¶]	V _{CC} = 5.25 V, One input switching at 50% duty cycle, Outputs open, V _{IN} ≤ 0.2 V or V _{IN} ≥ V _{CC} − 0.2 V			0.06	0.12	mA/MHz
I _C [#]	V _{CC} = 5.25 V, f ₀ = 10 MHz, Outputs open, S = Steady state	One input switching at f ₁ = 5 MHz at 50% duty cycle	V _{IN} ≤ 0.2 V or V _{IN} ≥ V _{CC} − 0.2 V	0.7	1.4	mA
			V _{IN} = 3.4 V or GND	1.2	3.4	
		Four inputs switching at f ₁ = 5 MHz at 50% duty cycle	V _{IN} ≤ 0.2 V or V _{IN} ≥ V _{CC} − 0.2 V	1.6	3.2	
			V _{IN} = 3.4 V or GND	2.9	8.2	
C _i				5	10	pF
C ₀				9	12	pF

[†] Typical values are at $V_{CC} = 5 \text{ V}$, $T_A = 25^\circ\text{C}$.

[‡] Not more than one output should be shorted at a time. Duration of short should not exceed one second. The use of high-speed test apparatus and/or sample-and-hold techniques are preferable to minimize internal chip heating and more accurately reflect operational values. Otherwise, prolonged shorting of a high output can raise the chip temperature well above normal and cause invalid readings in other parametric tests. In any sequence of parameter tests, I_{OS} tests should be performed last.

^{\S} Per TTL-driven input ($V_{IN} = 3.4 \text{ V}$); all other inputs at V_{CC} or GND

^{\parallel} This parameter is derived for use in total power-supply calculations.

^{\#} $I_C = I_{CC} + \Delta I_{CC} \times D_H \times N_T + I_{CCD} (f_0/2 + f_1 \times N_1)$

Where:

I_C = Total supply current

I_{CC} = Power-supply current with CMOS input levels

ΔI_{CC} = Power-supply current for a TTL high input ($V_{IN} = 3.4 \text{ V}$)

D_H = Duty cycle for TTL inputs high

N_T = Number of TTL inputs at D_H

I_{CCD} = Dynamic current caused by an input transition pair (HLH or LHL)

f_0 = Clock frequency for registered devices, otherwise zero

f_1 = Input signal frequency

N_1 = Number of inputs changing at f_1

All currents are in milliamperes and all frequencies are in megahertz.

|| Values for these conditions are examples of the I_{CC} formula.

CY74FCT399T QUAD 2-INPUT REGISTER

SCCS024A – MARCH 1994 – REVISED OCTOBER 2001

timing requirement over recommended operating free-air temperature range (unless otherwise noted) (see Figure 1)

			CY74FCT399AT		CY74FCT399CT		UNIT
			MIN	MAX	MIN	MAX	
t _w	Pulse duration, CP high or low		5		5		ns
t _{su}	Setup time, high or low	I _n before CP↑	3.5		3.5		ns
		S before CP↑	8.5		8.5		
t _h	Hold time, high or low	I _n after CP↑	1		1		ns
		S after CP↑	0		0		

switching characteristics over operating free-air temperature range (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	CY74FCT399AT		CY74FCT399CT		UNIT
			MIN	MAX	MIN	MAX	
t_{PLH}	CP	Q	2.5	7	2.5	6.1	ns
t_{PHL}			2.5	7	2.5	6.1	

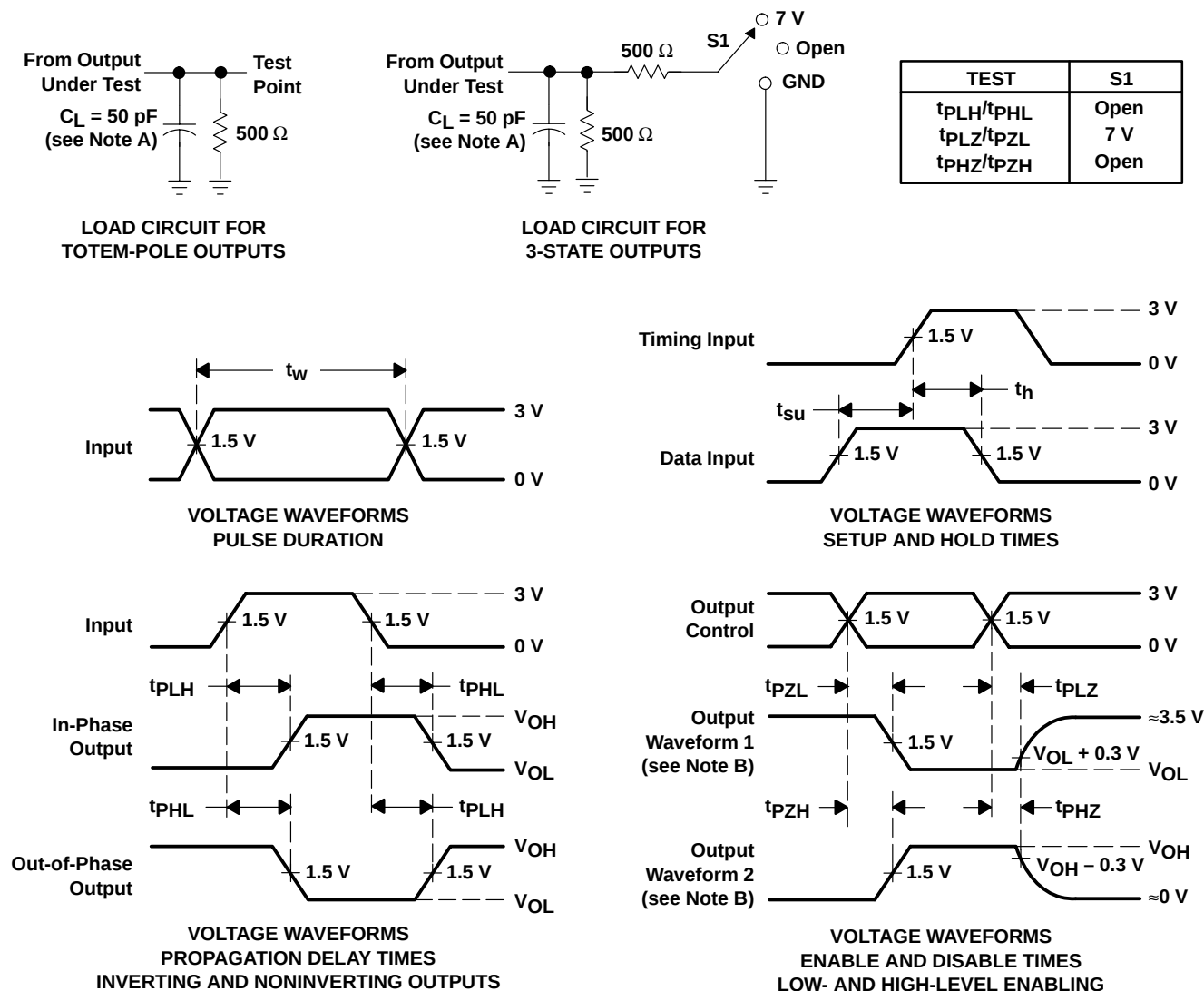


CY74FCT399T

QUAD 2-INPUT REGISTER

SCCS024A – MARCH 1994 – REVISED OCTOBER 2001

PARAMETER MEASUREMENT INFORMATION



- NOTES: A. C_L includes probe and jig capacitance.
- B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
- C. The outputs are measured one at a time with one input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms

PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
CY74FCT399ATSOC	Active	Production	SOIC (DW) 16	40 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT399A
CY74FCT399ATSOC.B	Active	Production	SOIC (DW) 16	40 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT399A
CY74FCT399ATSOCT	Active	Production	SOIC (DW) 16	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT399A
CY74FCT399ATSOCT.B	Active	Production	SOIC (DW) 16	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT399A
CY74FCT399CTSOC	Active	Production	SOIC (DW) 16	40 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT399C
CY74FCT399CTSOC.B	Active	Production	SOIC (DW) 16	40 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT399C

⁽¹⁾ **Status:** For more details on status, see our [product life cycle](#).

⁽²⁾ **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

⁽³⁾ **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

⁽⁴⁾ **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

⁽⁵⁾ **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

⁽⁶⁾ **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

TAPE AND REEL INFORMATION



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
CY74FCT399ATSOCT	SOIC	DW	16	2000	330.0	16.4	10.75	10.7	2.7	12.0	16.0	Q1

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
CY74FCT399ATSOCT	SOIC	DW	16	2000	350.0	350.0	43.0

TUBE



*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
CY74FCT399ATSOC	DW	SOIC	16	40	506.98	12.7	4826	6.6
CY74FCT399ATSOC.B	DW	SOIC	16	40	506.98	12.7	4826	6.6
CY74FCT399CTSOC	DW	SOIC	16	40	506.98	12.7	4826	6.6
CY74FCT399CTSOC.B	DW	SOIC	16	40	506.98	12.7	4826	6.6

GENERIC PACKAGE VIEW

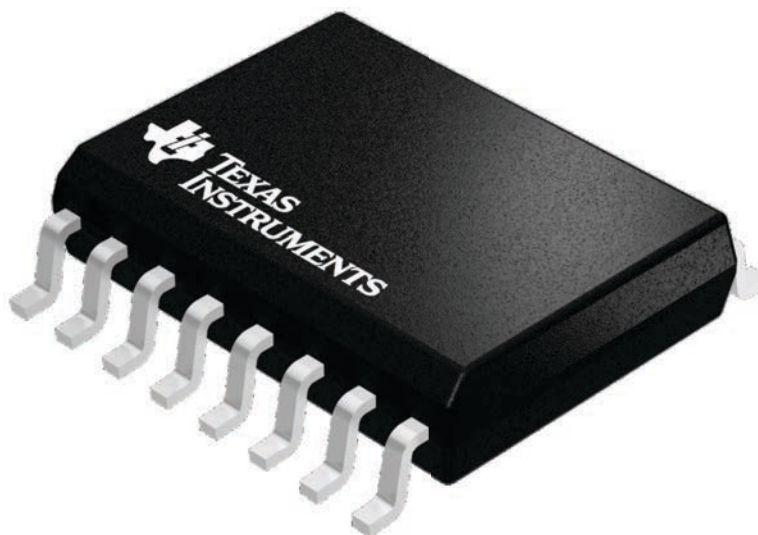
DW 16

SOIC - 2.65 mm max height

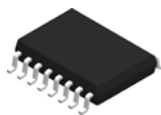
7.5 x 10.3, 1.27 mm pitch

SMALL OUTLINE INTEGRATED CIRCUIT

This image is a representation of the package family, actual package may vary.
Refer to the product data sheet for package details.



4224780/A

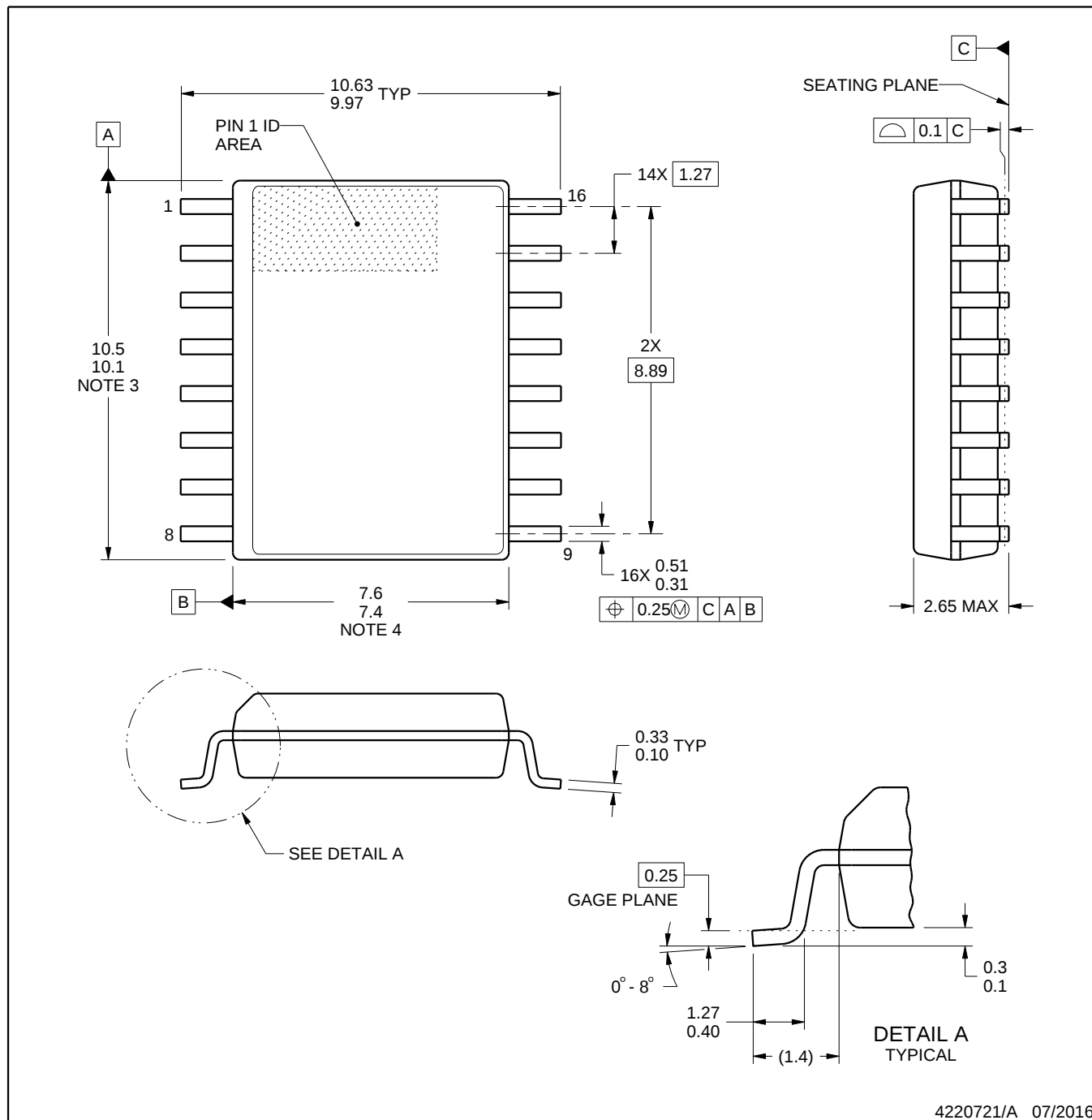


DW0016A

PACKAGE OUTLINE

SOIC - 2.65 mm max height

SOIC



4220721/A 07/2016

NOTES:

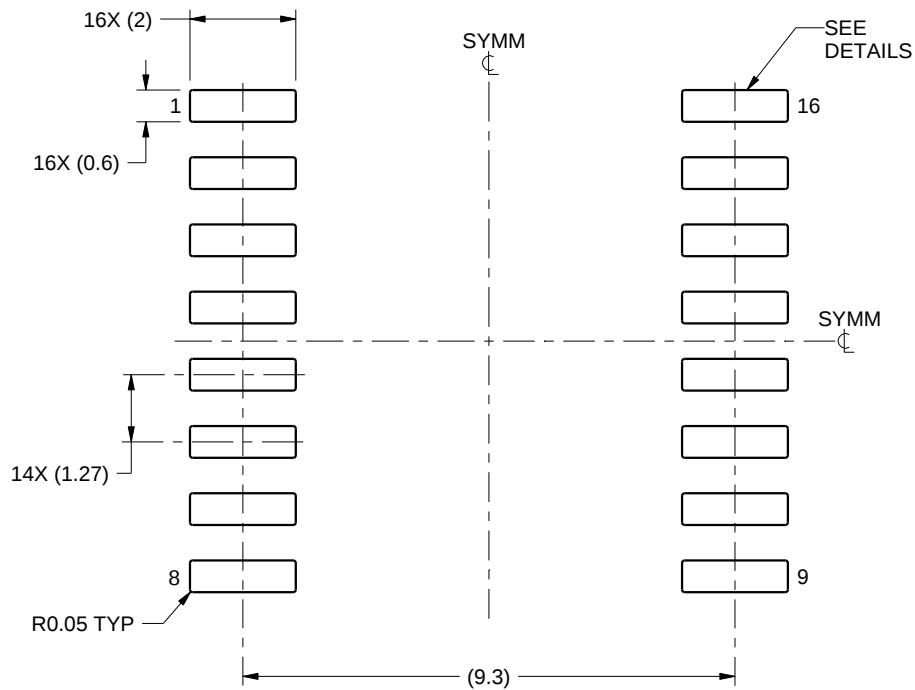
1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm, per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm, per side.
5. Reference JEDEC registration MS-013.

EXAMPLE BOARD LAYOUT

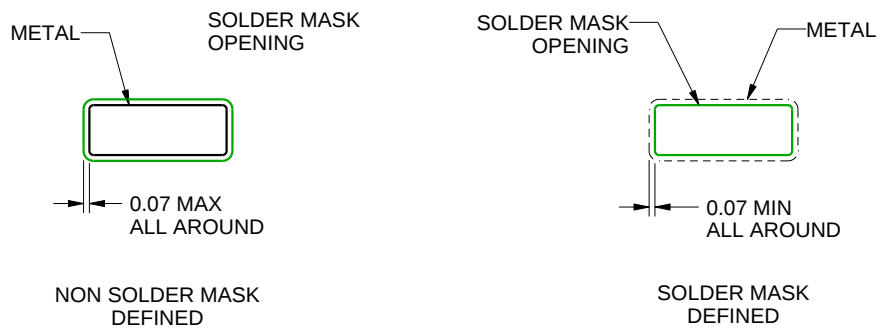
DW0016A

SOIC - 2.65 mm max height

SOIC



LAND PATTERN EXAMPLE
SCALE:7X



SOLDER MASK DETAILS

4220721/A 07/2016

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

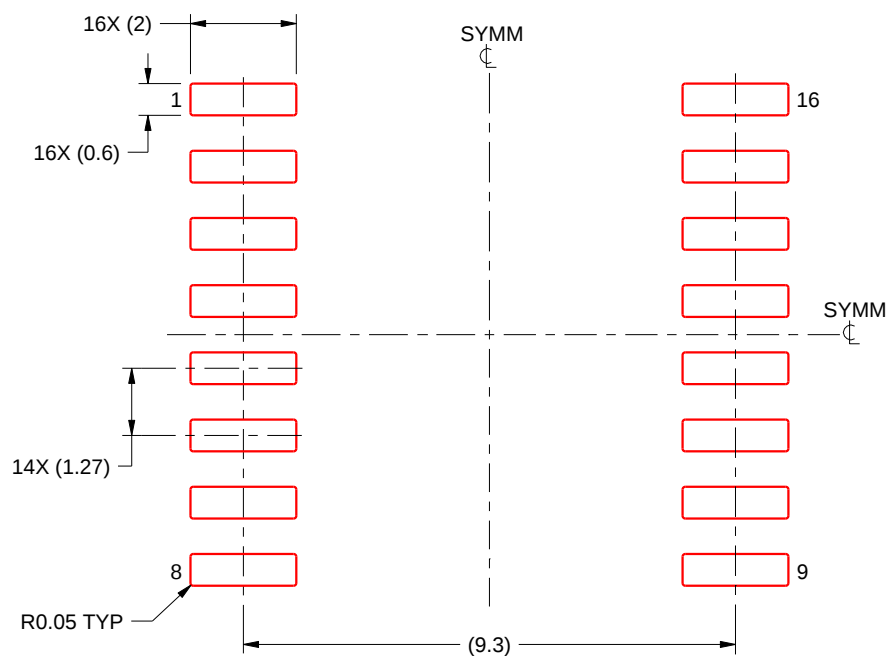
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

DW0016A

SOIC - 2.65 mm max height

SOIC



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE:7X

4220721/A 07/2016

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES "AS IS" AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, regulatory or other requirements.

These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you fully indemnify TI and its representatives against any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI's products are provided subject to [TI's Terms of Sale](#), [TI's General Quality Guidelines](#), or other applicable terms available either on [ti.com](#) or provided in conjunction with such TI products. TI's provision of these resources does not expand or otherwise alter TI's applicable warranties or warranty disclaimers for TI products. Unless TI explicitly designates a product as custom or customer-specified, TI products are standard, catalog, general purpose devices.

TI objects to and rejects any additional or different terms you may propose.

Copyright © 2026, Texas Instruments Incorporated

Last updated 10/2025