

74LVC573A

Low-Voltage CMOS Octal Transparent Latch

With 5 V-Tolerant Inputs and Outputs (3-State, Non-Inverting)

The 74LVC573A is a high performance, non-inverting octal transparent latch operating from a 1.2 to 3.6 V supply. High impedance TTL compatible inputs significantly reduce current loading to input drivers while TTL compatible outputs offer improved switching noise performance. A V_I specification of 5.5 V allows 74LVC573A inputs to be safely driven from 5 V devices.

The 74LVC573A contains 8 D-type latches with 3-state outputs. When the Latch Enable (LE) input is HIGH, data on the D_n inputs enters the latches. In this condition, the latches are transparent, i.e., a latch output will change state each time its D input changes. When LE is LOW, the latches store the information that was present on the D inputs a setup time preceding the HIGH-to-LOW transition of LE. The 3-state standard outputs are controlled by the Output Enable (\overline{OE}) input. When \overline{OE} is LOW, the standard outputs are enabled. When \overline{OE} is HIGH, the standard outputs are in the high impedance state, but this does not interfere with new data entering into the latches.

Features

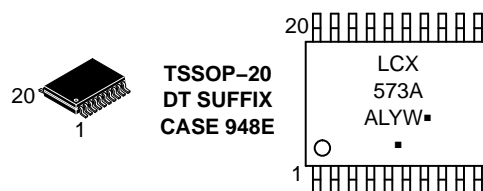
- Designed for 1.2 to 3.6 V V_{CC} Operation
- 5 V Tolerant – Interface Capability With 5 V TTL Logic
- Supports Live Insertion and Withdrawal
- I_{OFF} Specification Guarantees High Impedance When $V_{CC} = 0$ V
- 24 mA Output Sink and Source Capability
- Near Zero Static Supply Current in all Three Logic States (10 μ A) Substantially Reduces System Power Requirements
- ESD Performance:
 - ◆ Human Body Model >2000 V
 - ◆ Machine Model >200 V
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant



ON Semiconductor®

www.onsemi.com

MARKING DIAGRAM



A = Assembly Location
L, WL = Wafer Lot
Y, YY = Year
W, WW = Work Week
G or ■ = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

See detailed ordering and shipping information on page 8 of this data sheet.

74LVC573A

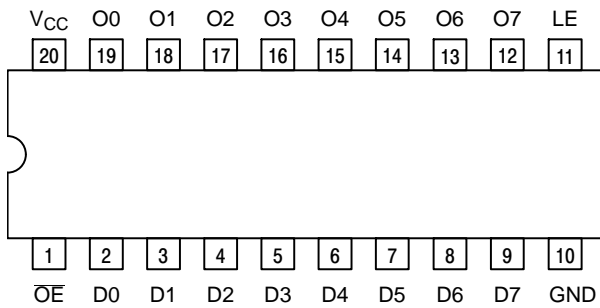


Figure 1. Pinout (Top View)

PIN NAMES

Pins	Function
OE	Output Enable Input
LE	Latch Enable Input
D0–D7	Data Inputs
O0–O7	3–State Latch Outputs

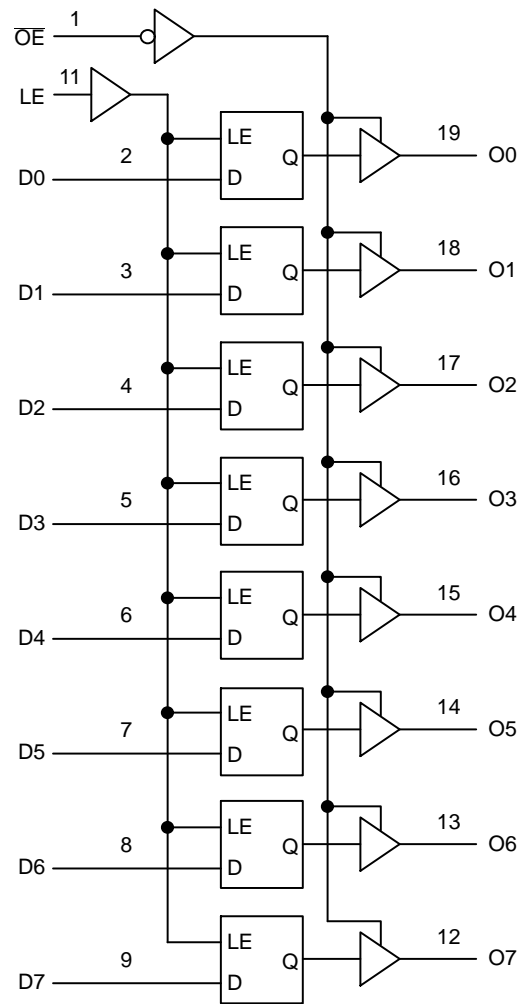


Figure 2. Logic Diagram

TRUTH TABLE

Inputs			Outputs	Operating Mode
OE	LE	Dn	On	
L	H	H	H	Transparent (Latch Disabled); Read Latch
L	H	L	L	
L	L	h	H	Latched (Latch Enabled) Read Latch
L	L	l	L	
L	L	X	NC	Hold; Read Latch
H	L	X	Z	Hold; Disabled Outputs
H	H	H	Z	Transparent (Latch Disabled); Disabled Outputs
H	H	L	Z	
H	L	h	Z	Latched (Latch Enabled); Disabled Outputs
H	L	l	Z	

H = High Voltage Level

h = High Voltage Level One Setup Time Prior to the Latch Enable High-to-Low Transition

L = Low Voltage Level

l = Low Voltage Level One Setup Time Prior to the Latch Enable High-to-Low Transition

NC = No Change, State Prior to the Latch Enable High-to-Low Transition

X = High or Low Voltage Level or Transitions are Acceptable

Z = High Impedance State

For I_{CC} Reasons DO NOT FLOAT Inputs

74LVC573A

MAXIMUM RATINGS

Symbol	Parameter	Condition	Value	Unit
V _{CC}	DC Supply Voltage		-0.5 to +6.5	V
V _I	DC Input Voltage		-0.5 ≤ V _I ≤ +6.5	V
V _O	DC Output Voltage	Output in 3-State	-0.5 ≤ V _O ≤ +6.5	V
		Output in HIGH or LOW State (Note 1)	-0.5 ≤ V _O ≤ V _{CC} + 0.5	V
I _{IK}	DC Input Diode Current	V _I < GND	-50	mA
I _{OK}	DC Output Diode Current	V _O < GND	-50	mA
		V _O > V _{CC}	+50	mA
I _O	DC Output Source/Sink Current		±50	mA
I _{CC}	DC Supply Current Per Supply Pin		±100	mA
I _{GND}	DC Ground Current Per Ground Pin		±100	mA
T _{STG}	Storage Temperature Range		-65 to +150	°C
T _L	Lead Temperature, 1 mm from Case for 10 Seconds		T _L = 260	°C
T _J	Junction Temperature Under Bias		T _J = 135	°C
θ _{JA}	Thermal Resistance (Note 2)		110.7	°C/W
MSL	Moisture Sensitivity	Level 1		

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. I_O absolute maximum rating must be observed.
2. Measured with minimum pad spacing on an FR4 board, using 10 mm-by-1 inch, 2 ounce copper trace no air flow.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Typ	Max	Unit
V _{CC}	Supply Voltage Operating Functional	1.65 1.2		3.6 3.6	V
V _I	Input Voltage	0		5.5	V
V _O	Output Voltage HIGH or LOW State 3-State	0 0		V _{CC} 5.5	V
I _{OH}	HIGH Level Output Current V _{CC} = 3.0 V – 3.6 V V _{CC} = 2.7 V – 3.0 V			-24 -12	mA
I _{OL}	LOW Level Output Current V _{CC} = 3.0 V – 3.6 V V _{CC} = 2.7 V – 3.0 V			24 12	mA
T _A	Operating Free-Air Temperature	-40		+125	°C
Δt/ΔV	Input Transition Rise or Fall Rate, V _{CC} = 1.65 to 2.7 V V _{CC} = 2.7 to 3.6 V	0 0		20 10	ns/V

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

74LVC573A

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	-40 to +85°C			-40 to +125°C			Unit
			Min	Typ (Note 3)	Max	Min	Typ (Note 3)	Max	
V _{IH}	HIGH-level input voltage	V _{CC} = 1.2 V	1.08	–	–	1.08	–	–	V
		V _{CC} = 1.65 V to 1.95 V	0.65 x V _{CC}	–	–	0.65 x V _{CC}	–	–	
		V _{CC} = 2.3 V to 2.7 V	1.7	–	–	1.7	–	–	
		V _{CC} = 2.7 V to 3.6 V	2.0	–	–	2.0	–	–	
V _{IL}	LOW-level input voltage	V _{CC} = 1.2 V	–	–	0.12	–	–	0.12	V
		V _{CC} = 1.65 V to 1.95 V	–	–	0.35 x V _{CC}	–	–	0.35 x V _{CC}	
		V _{CC} = 2.3 V to 2.7 V	–	–	0.7	–	–	0.7	
		V _{CC} = 2.7 V to 3.6 V	–	–	0.8	–	–	0.8	
V _{OH}	HIGH-level output voltage	V _I = V _{IH} or V _{IL}							V
		I _O = –100 μA; V _{CC} = 1.65 V to 3.6 V	V _{CC} – 0.2	–	–	V _{CC} – 0.3	–	–	
		I _O = –4 mA; V _{CC} = 1.65 V	1.2	–	–	1.05	–	–	
		I _O = –8 mA; V _{CC} = 2.3 V	1.8	–	–	1.65	–	–	
		I _O = –12 mA; V _{CC} = 2.7 V	2.2	–	–	2.05	–	–	
		I _O = –18 mA; V _{CC} = 3.0 V	2.4	–	–	2.25	–	–	
		I _O = –24 mA; V _{CC} = 3.0 V	2.2	–	–	2.0	–	–	
V _{OL}	LOW-level output voltage	V _I = V _{IH} or V _{IL}							V
		I _O = 100 μA; V _{CC} = 1.65 V to 3.6 V	–	–	0.2	–	–	0.3	
		I _O = 4 mA; V _{CC} = 1.65 V	–	–	0.45	–	–	0.65	
		I _O = 8 mA; V _{CC} = 2.3 V	–	–	0.6	–	–	0.8	
		I _O = 12 mA; V _{CC} = 2.7 V	–	–	0.4	–	–	0.6	
		I _O = 24 mA; V _{CC} = 3.0 V	–	–	0.55	–	–	0.8	
I _I	Input leakage current	V _I = 5.5 V or GND; V _{CC} = 3.6 V	–	±0.1	±5	–	±0.1	±20	μA
I _{OZ}	OFF-state output current	V _I = V _{IH} or V _{IL} ; V _O = 5.5 V or GND; V _{CC} = 3.6 V	–	±0.1	±5	–	±0.1	±20	μA
I _{OFF}	Power-off leakage current	V _I or V _O = 5.5 V; V _{CC} = 0.0 V	–	±0.1	±10	–	±0.1	±20	μA
I _{CC}	Supply current	V _I = V _{CC} or GND; I _O = 0 A; V _{CC} = 3.6 V	–	0.1	10	–	0.1	40	μA
ΔI _{CC}	Additional supply current	per input pin; V _I = V _{CC} – 0.6 V; I _O = 0 A; V _{CC} = 2.7 V to 3.6 V	–	5	500	–	5	5000	μA

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

3. All typical values are measured at T_A = 25°C and V_{CC} = 3.3 V, unless stated otherwise.

74LVC573A

AC ELECTRICAL CHARACTERISTICS ($t_R = t_F = 2.5$ ns)

Symbol	Parameter	Conditions	-40 to +85°C			-40 to +125°C			Unit
			Min	Typ (Note 4)	Max	Min	Typ (Note 4)	Max	
t _{pd}	Propagation Delay (Note 5) Dn to On	V _{CC} = 1.2 V	–	16.0	–	–	–	–	ns
		V _{CC} = 1.65 V to 1.95 V	2.1	7.8	16.3	2.1	–	18.8	
		V _{CC} = 2.3 V to 2.7 V	1.5	4.1	8.0	1.5	–	9.2	
		V _{CC} = 2.7 V	1.5	4.1	7.2	1.5	–	9.0	
		V _{CC} = 3.0 V to 3.6 V	1.5	3.4	6.2	1.5	–	8.0	
t _{pd}	Propagation Delay LE to On	V _{CC} = 1.2 V	–	16.0	–	–	–	–	ns
		V _{CC} = 1.65 V to 1.95 V	2.0	7.7	16.0	2.0	–	18.4	
		V _{CC} = 2.3 V to 2.7 V	1.5	4.1	7.8	1.5	–	9.1	
		V _{CC} = 2.7 V	1.5	3.7	7.5	1.5	–	9.5	
		V _{CC} = 3.0 V to 3.6 V	1.5	3.4	6.5	1.5	–	8.5	
t _{en}	Enable Time (Note 6) OE to On	V _{CC} = 1.2 V	–	18.0	–	–	–	–	ns
		V _{CC} = 1.65 V to 1.95 V	1.7	7.5	17.5	1.7	–	20.2	
		V _{CC} = 2.3 V to 2.7 V	1.5	4.2	9.2	1.5	–	10.6	
		V _{CC} = 2.7 V	1.5	4.2	8.5	1.5	–	11.0	
		V _{CC} = 3.0 V to 3.6 V	1.5	3.4	7.5	1.5	–	9.5	
t _{dis}	Disable Time (Note 7) OE to On	V _{CC} = 1.2 V	–	8.0	–	–	–	–	ns
		V _{CC} = 1.65 V to 1.95 V	1.0	3.3	10.1	1.0	–	11.6	
		V _{CC} = 2.3 V to 2.7 V	0.3	1.8	5.7	0.3	–	6.6	
		V _{CC} = 2.7 V	1.5	3.0	6.5	1.5	–	8.5	
		V _{CC} = 3.0 V to 3.6 V	1.5	2.5	6.0	1.5	–	7.5	
t _w	Pulse Width LE HIGH	V _{CC} = 1.65 V to 1.95 V	5.0	–	–	5.0	–	–	ns
		V _{CC} = 2.3 V to 2.7 V	4.0	–	–	4.0	–	–	
		V _{CC} = 2.7 V	3.2	–	–	3.2	–	–	
		V _{CC} = 3.0 V to 3.6 V	3.2	1.6	–	3.2	–	–	
t _{su}	Set-up Time Dn to LE	V _{CC} = 1.65 V to 1.95 V	4.0	–	–	4.0	–	–	ns
		V _{CC} = 2.3 V to 2.7 V	2.5	–	–	2.5	–	–	
		V _{CC} = 2.7 V	1.7	–	–	1.7	–	–	
		V _{CC} = 3.0 V to 3.6 V	1.7	–	–	1.7	–	–	
t _h	Hold Time Dn to LE	V _{CC} = 1.65 V to 1.95 V	3.0	–	–	3.0	–	–	ns
		V _{CC} = 2.3 V to 2.7 V	1.9	–	–	1.9	–	–	
		V _{CC} = 2.7 V	1.5	–	–	1.5	–	–	
		V _{CC} = 3.0 V to 3.6 V	1.4	–	–	1.4	–	–	
t _{sk(0)}	Output Skew Time (Note 8)		–	–	1.0	–	–	1.5	ns

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

4. Typical values are measured at T_A = 25°C and V_{CC} = 3.3 V, unless stated otherwise.

5. t_{pd} is the same as t_{PLH} and t_{PHL}.

6. t_{en} is the same as t_{PZL} and t_{PZH}.

7. t_{dis} is the same as t_{PLZ} and t_{PHZ}.

8. Skew between any two outputs of the same package switching in the same direction. This parameter is guaranteed by design.

74LVC573A

DYNAMIC SWITCHING CHARACTERISTICS

Symbol	Characteristic	Condition	T _A = +25°C			Unit
			Min	Typ	Max	
VOLP	Dynamic LOW Peak Voltage (Note 9)	V _{CC} = 3.3 V, C _L = 50 pF, V _{IH} = 3.3 V, V _{IL} = 0 V V _{CC} = 2.5 V, C _L = 30 pF, V _{IH} = 2.5 V, V _{IL} = 0 V		0.8 0.6		V
VOLV	Dynamic LOW Valley Voltage (Note 9)	V _{CC} = 3.3 V, C _L = 50 pF, V _{IH} = 3.3 V, V _{IL} = 0 V V _{CC} = 2.5 V, C _L = 30 pF, V _{IH} = 2.5 V, V _{IL} = 0 V		-0.8 -0.6		V

9. Number of outputs defined as "n". Measured with "n-1" outputs switching from HIGH-to-LOW or LOW-to-HIGH. The remaining output is measured in the LOW state.

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Condition	Typical	Unit
CIN	Input Capacitance	V _{CC} = 3.3 V, V _I = 0 V or V _{CC}	5.0	pF
COUT	Output Capacitance	V _{CC} = 3.3 V, V _I = 0 V or V _{CC}	6.0	pF
CPD	Power Dissipation Capacitance (Note 10)	Per flip-flop; V _I = GND or V _{CC}		pF
		V _{CC} = 1.65 V to 1.95 V	7.1	
		V _{CC} = 2.3 V to 2.7 V	10.3	
		V _{CC} = 3.0 V to 3.6 V	13.2	

10. CPD is used to determine the dynamic power dissipation (PD in μW).

$$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o) \text{ where:}$$

f_i = input frequency in MHz; f_o = output frequency in MHz

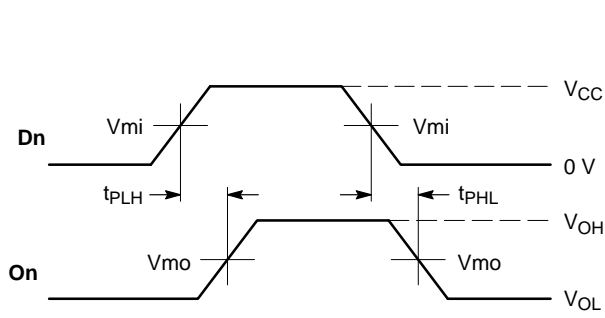
C_L = output load capacitance in pF

V_{CC} = supply voltage in Volts

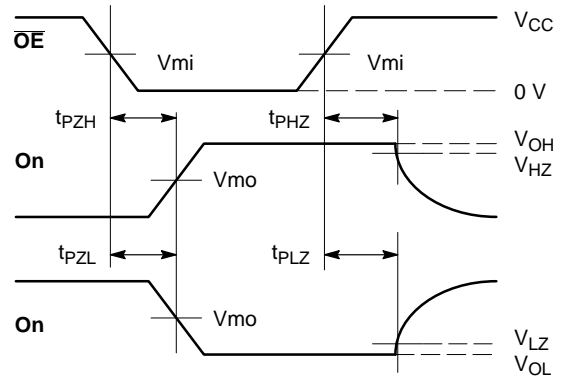
N = number of outputs switching

Σ(C_L × V_{CC}² × f_o) = sum of the outputs

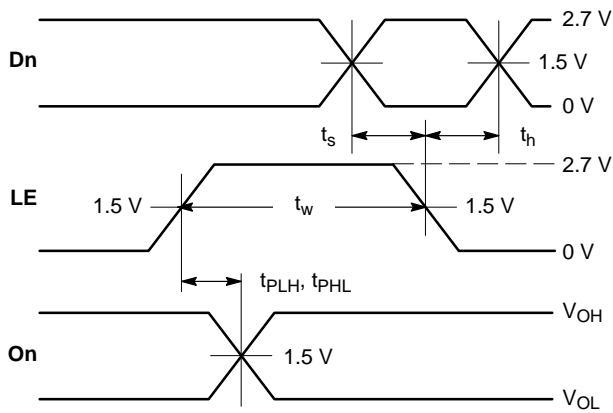
74LVC573A



WAVEFORM 1 – PROPAGATION DELAYS
 $t_R = t_F = 2.5 \text{ ns}$, 10% to 90%; $f = 1 \text{ MHz}$; $t_W = 500 \text{ ns}$



WAVEFORM 2 – OUTPUT ENABLE AND DISABLE TIMES
 $t_R = t_F = 2.5 \text{ ns}$, 10% to 90%; $f = 1 \text{ MHz}$; $t_W = 500 \text{ ns}$

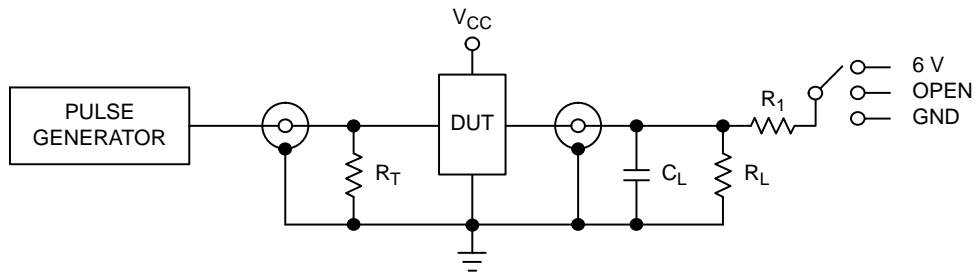


WAVEFORM 3 – LE to On PROPAGATION DELAYS, LE MINIMUM PULSE WIDTH, Dn to LE SETUP AND HOLD TIMES
 $t_R = t_F = 2.5 \text{ ns}$, 10% to 90%; $f = 1 \text{ MHz}$; $t_W = 500 \text{ ns}$ except when noted

Symbol	V _{CC}		
	3.3 V ± 0.3 V	2.7 V	V _{CC} < 2.7 V
V _{mi}	1.5 V	1.5 V	V _{CC} /2
V _{mo}	1.5 V	1.5 V	V _{CC} /2
V _{HZ}	V _{OL} + 0.3 V	V _{OL} + 0.3 V	V _{OL} + 0.15 V
V _{LZ}	V _{OH} - 0.3 V	V _{OH} - 0.3 V	V _{OH} - 0.15 V

Figure 3. AC Waveforms

74LVC573A



C_L includes jig and probe capacitance
 $R_T = Z_{OUT}$ of pulse generator (typically 50 Ω)
 $R_1 = R_L$

Supply Voltage	Input		Load		VEXT		
V_{CC} (V)	V_I	t_r, t_f	C_L	R_L	tPLH, tPHL	tPLZ, tPZL	tPHZ, tPZH
1.2	V_{CC}	≤ 2 ns	30 pF	1 k Ω	Open	2 x V_{CC}	GND
1.65 – 1.95	V_{CC}	≤ 2 ns	30 pF	1 k Ω	Open	2 x V_{CC}	GND
2.3 – 2.7	V_{CC}	≤ 2 ns	30 pF	500 Ω	Open	2 x V_{CC}	GND
2.7	2.7 V	≤ 2.5 ns	50 pF	500 Ω	Open	2 x V_{CC}	GND
3.0 – 3.6	2.7 V	≤ 2.5 ns	50 pF	500 Ω	Open	2 x V_{CC}	GND

Figure 4. Test Circuit

ORDERING INFORMATION

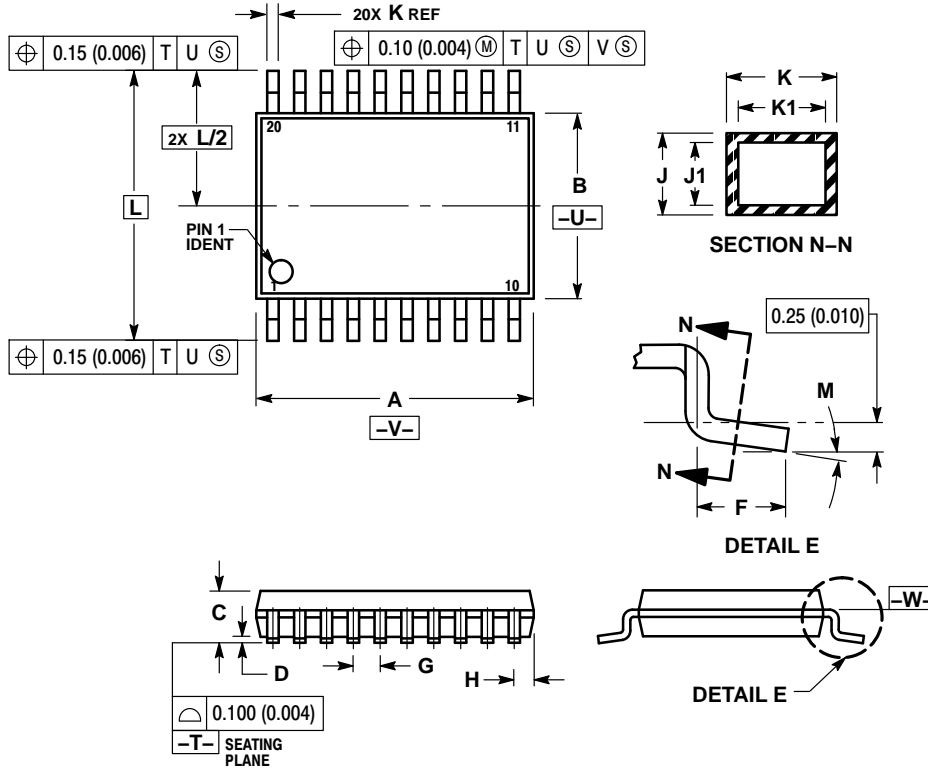
Device	Package	Shipping [†]
74LVC573ADTR2G	TSSOP-20 (Pb-Free)	2500 / Tape & Reel

[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

74LVC573A

PACKAGE DIMENSIONS

TSSOP-20
DT SUFFIX
CASE 948E-02
ISSUE C

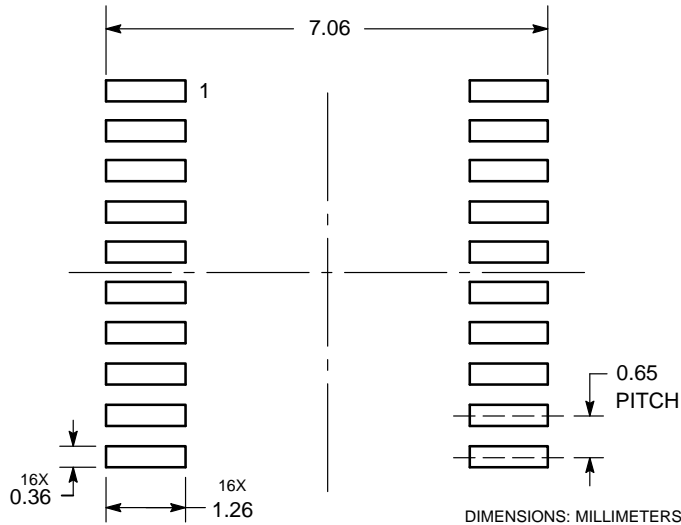


NOTES:


1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.
5. DIMENSION K DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE K DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
7. DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE -W-.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	6.40	6.60	0.252	0.260
B	4.30	4.50	0.169	0.177
C	---	1.20	---	0.047
D	0.05	0.15	0.002	0.006
F	0.50	0.75	0.020	0.030
G	0.65 BSC		0.026 BSC	
H	0.27	0.37	0.011	0.015
J	0.09	0.20	0.004	0.008
J1	0.09	0.16	0.004	0.006
K	0.19	0.30	0.007	0.012
K1	0.19	0.25	0.007	0.010
L	6.40 BSC		0.252 BSC	
M	0°	8°	0°	8°

SOLDERING FOOTPRINT*



*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

ON Semiconductor and the  are registered trademarks of Semiconductor Components Industries, LLC (SCILLC) or its subsidiaries in the United States and/or other countries. SCILLC owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of SCILLC's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free
USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81-3-5817-1050

ON Semiconductor Website: www.onsemi.com
Order Literature: <http://www.onsemi.com/orderlit>
For additional information, please contact your local
Sales Representative

Компания «Life Electronics» занимается поставками электронных компонентов импортного и отечественного производства от производителей и со складов крупных дистрибьюторов Европы, Америки и Азии.

С конца 2013 года компания активно расширяет линейку поставок компонентов по направлению коаксиальный кабель, кварцевые генераторы и конденсаторы (керамические, пленочные, электролитические), за счёт заключения дистрибьюторских договоров

Мы предлагаем:

- Конкурентоспособные цены и скидки постоянным клиентам.
- Специальные условия для постоянных клиентов.
- Подбор аналогов.
- Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.
- Приемлемые сроки поставки, возможна ускоренная поставка.
- Доставку товара в любую точку России и стран СНГ.
- Комплексную поставку.
- Работу по проектам и поставку образцов.
- Формирование склада под заказчика.
- Сертификаты соответствия на поставляемую продукцию (по желанию клиента).
- Тестирование поставляемой продукции.
- Поставку компонентов, требующих военную и космическую приемку.
- Входной контроль качества.
- Наличие сертификата ISO.

В составе нашей компании организован Конструкторский отдел, призванный помогать разработчикам, и инженерам.

Конструкторский отдел помогает осуществить:

- Регистрацию проекта у производителя компонентов.
- Техническую поддержку проекта.
- Защиту от снятия компонента с производства.
- Оценку стоимости проекта по компонентам.
- Изготовление тестовой платы монтаж и пусконаладочные работы.



Тел: +7 (812) 336 43 04 (многоканальный)

Email: org@lifeelectronics.ru