TEXAS INSTRUMENTS

Data sheet acquired from Harris Semiconductor
SCHS174B

February 1998 - Revised May 2003

CD54HC273, CD74HC273, CD54HCT273, CD74HCT273

High-Speed CMOS Logic Octal D-Type Flip-Flop with Reset

Features

- **Common Clock and Asynchronous Master Reset**
- **Positive Edge Triggering**
- **Buffered Inputs**
- **Fanout (Over Temperature Range)**
  - **Standard Outputs . . . . . 10 LSTTL Loads**
  - **Bus Driver Outputs . . . . . 15 LSTTL Loads**
- **Wide Operating Temperature Range . . . -55^{o}C to 125^{o}C**
- **Balanced Propagation Delay and Transition Times**
- **Significant Power Reduction Compared to LSTTL Logic ICs**
- **HC Types**
  - **2V to 6V Operation**
  - **High Noise Immunity: N_{IL} = 30%, N_{IH} = 30% of V_{CC} at V_{CC} = 5V**
- **HCT Types**
  - **4.5V to 5.5V Operation**
  - **Direct LSTTL Input Logic Compatibility, V_{IL}= 0.8V (Max), V_{IH} = 2V (Min)**
  - **CMOS Input Compatibility, $I_I \leq 1\mu A$ at V_{OL}, V_{OH}**

Description

The 'HC273 and 'HCT273 high speed octal D-Type flip-flops with a direct clear input are manufactured with silicon-gate CMOS technology. They possess the low power consumption of standard CMOS integrated circuits.

Information at the D inputis transferred to the Q outputs on the positive-going edge of the clock pulse. All eight flip-flops are controlled by a common clock (CP) and a common reset ($\overline{MR}$). Resetting is accomplished by a low voltage level independent of the clock. All eight Q outputs are reset to a logic 0.

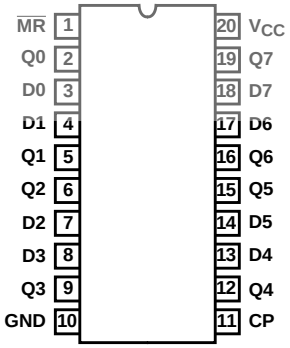
Ordering Information

PART NUMBER	TEMP. RANGE (^{o}C)	PACKAGE
CD54HC273F3A	-55 to 125	20 Ld CERDIP
CD74HC273E	-55 to 125	20 Ld PDIP
CD74HC273M	-55 to 125	20 Ld SOIC
CD74HC273M96	-55 to 125	20 Ld SOIC
CD54HCT273F3A	-55 to 125	20 Ld CERDIP
CD74HCT273E	-55 to 125	20 Ld PDIP
CD74HCT273M	-55 to 125	20 Ld SOIC
CD74HCT273M96	-55 to 125	20 Ld SOIC

NOTE: When ordering, use the entire part number. The suffix 96 denotes tape and reel.

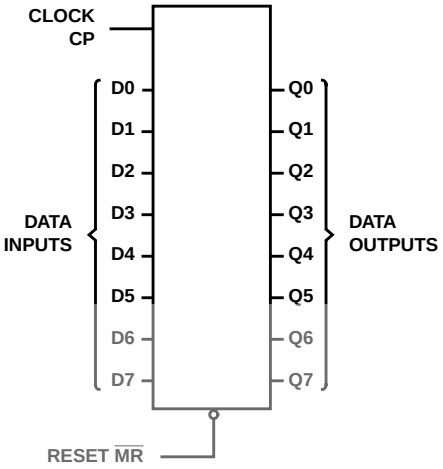
Pinout

CD54HC273, CD54HCT273
(CERDIP)
CD74HC273, CD74HCT273
(PDIP, SOIC)
TOP VIEW



CAUTION: These devices are sensitive to electrostatic discharge. Users should follow proper IC Handling Procedures.

Functional Diagram



TRUTH TABLE

INPUTS			OUTPUT
RESET ($\overline{MR}$)	CLOCK CP	DATA D_n	Q
L	X	X	L
H	↑	H	H
H	↑	L	L
H	L	X	Q_0

H = High Voltage Level, L = Low Voltage Level, X = Don't Care, ↑ = Transition from Low to High Level, Q_0 = Level Before the Indicated Steady-State Input Conditions Were Established.

Absolute Maximum Ratings

DC Supply Voltage, V_{CC} . . . . . -0.5V to 7V
DC Input Diode Current, I_{IK}
For V_I < -0.5V or V_I > V_{CC} + 0.5V . . . . . ±20mA
DC Output Diode Current, I_{OK}
For V_O < -0.5V or V_O > V_{CC} + 0.5V . . . . . ±20mA
DC Drain Current, per Output, I_O
For -0.5V < V_O < V_{CC} + 0.5V . . . . . ±25mA
DC Output Source or Sink Current per Output Pin, I_O
For V_O > -0.5V or V_O < V_{CC} + 0.5V . . . . . ±25mA
DC V_{CC} or Ground Current, I_{CC} . . . . . ±50mA

Operating Conditions

Temperature Range, T_A . . . . . -55^oC to 125^oC
Supply Voltage Range, V_{CC}
HC Types . . . . . 2V to 6V
HCT Types . . . . . 4.5V to 5.5V
DC Input or Output Voltage, V_I, V_O . . . . . 0V to V_{CC}
Input Rise and Fall Time
2V . . . . . 1000ns (Max)
4.5V . . . . . 500ns (Max)
6V . . . . . 400ns (Max)

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

Thermal Information

Thermal Resistance (Typical, Note 1)	θ_{JC} ($^oC/W$)
E (PDIP) Package	69
M (SOIC) Package	58
Maximum Junction Temperature	150^oC
Maximum Storage Temperature Range	-65^oC to 150^oC
Maximum Lead Temperature (Soldering 10s) (SOIC - Lead Tips Only)	300^oC

NOTE:

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

DC Electrical Specifications

PARAMETER	SYMBOL	TEST CONDITIONS V_I (V)	I_O (mA)	V_{CC} (V)	25°C MIN	25°C TYP	25°C MAX	-40°C TO 85°C MIN	-40°C TO 85°C MAX	-55°C TO 125°C MIN	-55°C TO 125°C MAX	UNITS
HC TYPES												
High Level Input Voltage	V_{IH}	-	-	2	1.5	-	-	1.5	-	1.5	-	V
				4.5	3.15	-	-	3.15	-	3.15	-	V
				6	4.2	-	-	4.2	-	4.2	-	V
Low Level Input Voltage	V_{IL}	-	-	2	-	-	0.5	-	0.5	-	0.5	V
				4.5	-	-	1.35	-	1.35	-	1.35	V
				6	-	-	1.8	-	1.8	-	1.8	V
High Level Output Voltage CMOS Loads	V_{OH}	V_{IH} or V_{IL}	-0.02	2	1.9	-	-	1.9	-	1.9	-	V
			-0.02	4.5	4.4	-	-	4.4	-	4.4	-	V
			-0.02	6	5.9	-	-	5.9	-	5.9	-	V
High Level Output Voltage TTL Loads			-4	4.5	3.98	-	-	3.84	-	3.7	-	V
			-5.2	6	5.48	-	-	5.34	-	5.2	-	V
Low Level Output Voltage CMOS Loads	V_{OL}	V_{IH} or V_{IL}	0.02	2	-	-	0.1	-	0.1	-	0.1	V
			0.02	4.5	-	-	0.1	-	0.1	-	0.1	V
			0.02	6	-	-	0.1	-	0.1	-	0.1	V
Low Level Output Voltage TTL Loads			4	4.5	-	-	0.26	-	0.33	-	0.4	V
			5.2	6	-	-	0.26	-	0.33	-	0.4	V
Input Leakage Current	I_I	V_{CC} or GND	-	6	-	-	±0.1	-	±1	-	±1	µA
Quiescent Device Current	I_{CC}	V_{CC} or GND	0	6	-	-	8	-	80	-	160	µA

DC Electrical Specifications (Continued)

PARAMETER	SYMBOL	TEST CONDITIONS V_I (V)	TEST CONDITIONS I_O (mA)	V_{CC} (V)	25°C MIN	25°C TYP	25°C MAX	-40°C TO 85°C MIN	-40°C TO 85°C MAX	-55°C TO 125°C MIN	-55°C TO 125°C MAX	UNITS
HCT TYPES												
High Level Input Voltage	V_{IH}	-	-	4.5 to 5.5	2	-	-	2	-	2	-	V
Low Level Input Voltage	V_{IL}	-	-	4.5 to 5.5	-	-	0.8	-	0.8	-	0.8	V
High Level Output Voltage CMOS Loads	V_{OH}	V_{IH} or V_{IL}	-0.02	4.5	4.4	-	-	4.4	-	4.4	-	V
High Level Output Voltage TTL Loads			-4	4.5	3.98	-	-	3.84	-	3.7	-	V
Low Level Output Voltage CMOS Loads	V_{OL}	V_{IH} or V_{IL}	0.02	4.5	-	-	0.1	-	0.1	-	0.1	V
Low Level Output Voltage TTL Loads			4	4.5	-	-	0.26	-	0.33	-	0.4	V
Input Leakage Current	I_I	V_{CC} to GND	0	5.5	-	-	±0.1	-	±1	-	±1	µA
Quiescent Device Current	I_{CC}	V_{CC} or GND	0	5.5	-	-	8	-	80	-	160	µA
Additional Quiescent Device Current Per Input Pin: 1 Unit Load	ΔI_{CC} (Note 2)	V_{CC} -2.1	-	4.5 to 5.5	-	100	360	-	450	-	490	µA

NOTE:

2. For dual-supply systems theoretical worst case (V_I = 2.4V, V_{CC} = 5.5V) specification is 1.8mA.

HCT Input Loading Table

INPUT	UNIT LOADS
$\overline{MR}$	1.5
Data	0.4
CP	1.5

NOTE: Unit Load is ΔI_{CC} limit specified in DC Electrical Specifications table, e.g., 360µA max at 25°C.

Prerequisite For Switching Specifications

PARAMETER	SYMBOL	TEST CONDITIONS	V_{CC} (V)	25°C MIN	25°C TYP	25°C MAX	-40°C TO 85°C MIN	-40°C TO 85°C MAX	-55°C TO 125°C MIN	-55°C TO 125°C MAX	UNITS
HC TYPES											
Maximum Clock Frequency (Figure 1)	f_{MAX}	-	2	6	-	-	5	-	4	-	MHz
			4.5	30	-	-	25	-	20	-	MHz
			6	35	-	-	29	-	23	-	MHz
$\overline{MR}$ Pulse Width (Figure 1)	t_W	-	2	60	-	-	75	-	90	-	ns
			4.5	12	-	-	15	-	18	-	ns
			6	10	-	-	13	-	15	-	ns

Prerequisite For Switching Specifications (Continued)

PARAMETER	SYMBOL	TEST CONDITIONS	V_{CC} (V)	25°C			-40°C TO 85°C		-55°C TO 125°C		UNITS
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
Clock Pulse Width (Figure 1)	t_W	-	2	80	-	-	100	-	120	-	ns
			4.5	16	-	-	20	-	24	-	ns
			6	14	-	-	17	-	20	-	ns
Set-up Time Data to Clock (Figure 5)	t_{SU}	-	2	60	-	-	75	-	70	-	ns
			4.5	12	-	-	15	-	18	-	ns
			6	10	-	-	13	-	15	-	ns
Hold Time, Data to Clock (Figure 5)	t_H	-	2	3	-	-	3	-	3	-	ns
			4.5	3	-	-	3	-	3	-	ns
			6	3	-	-	3	-	3	-	ns
Removal Time, $\overline{MR}$ to Clock	t_{REM}	-	2	50	-	-	65	-	75	-	ns
			4.5	10	-	-	13	-	15	-	ns
			6	9	-	-	11	-	13	-	ns
HCT TYPES											
Maximum Clock Frequency (Figure 2)	f_{MAX}	-	4.5	25	-	-	20	-	16	-	MHz
$\overline{MR}$ Pulse Width (Figure 2)	t_w	-	4.5	12	-	-	15	-	18	-	ns
Clock Pulse Width (Figure 2)	t_w	-	4.5	20	-	-	25	-	30	-	ns
Set-up Time Data to Clock (Figure 6)	t_{SU}	-	4.5	12	-	-	15	-	18	-	ns
Hold Time, Data to Clock (Figure 6)	t_H	-	4.5	3	-	-	3	-	3	-	ns
Removal Time, $\overline{MR}$ to Clock	t_{REM}	-	4.5	10	-	-	13	-	15	-	ns

Switching Specifications Input t_r, t_f = 6ns

PARAMETER	SYMBOL	TEST CONDITIONS	V_{CC} (V)	25°C		-40°C TO 85°C	-55°C TO 125°C	UNITS
				TYP	MAX	MAX	MAX	
HC TYPES								
Propagation Delay, Clock to Output (Figure 3)	t_{PLH}, t_{PHL}	C_L = 50pF	2	-	150	190	225	ns
			4.5	-	30	38	45	ns
			6	-	26	30	38	ns
		C_L = 15pF	5	12	-	-	-	ns
Propagation Delay, $\overline{MR}$ to Output (Figure 3)	t_{PHL}	C_L = 50pF	2	-	150	190	225	ns
			4.5	-	30	38	45	ns
			6	-	26	30	38	ns
Output Transition Time (Figure 3)	t_{TLH}, t_{THL}	C_L = 50pF	2	-	75	95	110	ns
			4.5	-	15	19	22	ns
			6	-	13	16	19	ns
Input Capacitance	C_I	-	-	-	10	10	10	pF
Maximum Clock Frequency	f_{MAX}	C_L = 15pF	5	60	-	-	-	MHz

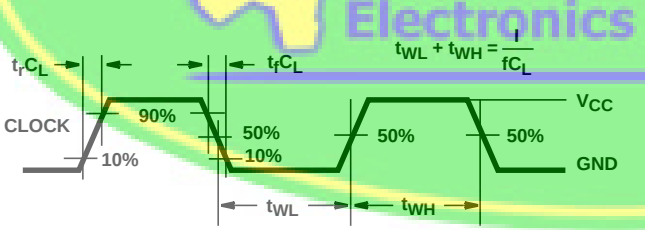
Switching Specifications Input t_r, t_f = 6ns (Continued)

PARAMETER	SYMBOL	TEST CONDITIONS	V_{CC} (V)	25°C TYP	25°C MAX	-40°C TO 85°C MAX	-55°C TO 125°C MAX	UNITS
Power Dissipation Capacitance (Notes 3, 4)	C_{PD}	-	5	25	-	-	-	pF
HCT TYPES								
Propagation Delay, Clock to Output (Figure 4)	t_{PLH}, t_{PHL}	C_L = 50pF	4.5	-	30	38	45	ns
		C_L = 15pF	5	12	-	-	-	ns
Propagation Delay, $\overline{MR}$ to Output (Figure 4)	t_{PHL}	C_L = 50pF	4.5	-	32	40	48	ns
Output Transition Time	t_{TLH}, t_{THL}	C_L = 50pF	4.5	-	15	19	22	ns
Input Capacitance	C_{IN}	-	-	-	10	10	10	pF
Maximum Clock Frequency	f_{MAX}	C_L = 15pF	5	50	-	-	-	MHz
Power Dissipation Capacitance (Notes 3, 4)	C_{PD}	-	5	25	-	-	-	pF

NOTES:

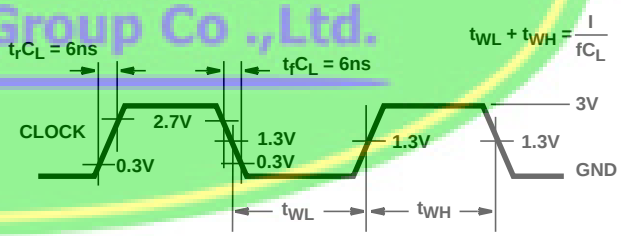
3. C_{PD} is used to determine the dynamic power consumption, per flip-flop.
4. $P_D = C_{PD} V_{CC}^2 f_i + \sum (C_L V_{CC}^2 f_O)$ where f_i = Input Frequency, f_O = Output Frequency, C_L = Output Load Capacitance, V_{CC} = Supply Voltage.

Test Circuits and Waveforms



NOTE: Outputs should be switching from 10% V_{CC} to 90% V_{CC} in accordance with device truth table. For f_{MAX}, input duty cycle = 50%.

FIGURE 1. HC CLOCK PULSE RISE AND FALL TIMES AND PULSE WIDTH



NOTE: Outputs should be switching from 10% V_{CC} to 90% V_{CC} in accordance with device truth table. For f_{MAX}, input duty cycle = 50%.

FIGURE 2. HCT CLOCK PULSE RISE AND FALL TIMES AND PULSE WIDTH

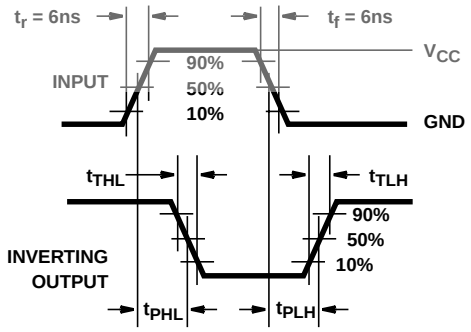


FIGURE 3. HC AND HCU TRANSITION TIMES AND PROPAGATION DELAY TIMES, COMBINATION LOGIC

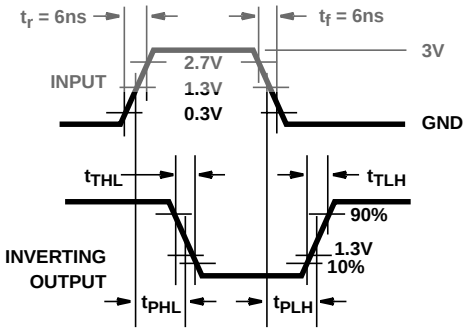


FIGURE 4. HCT TRANSITION TIMES AND PROPAGATION DELAY TIMES, COMBINATION LOGIC

Test Circuits and Waveforms (Continued)

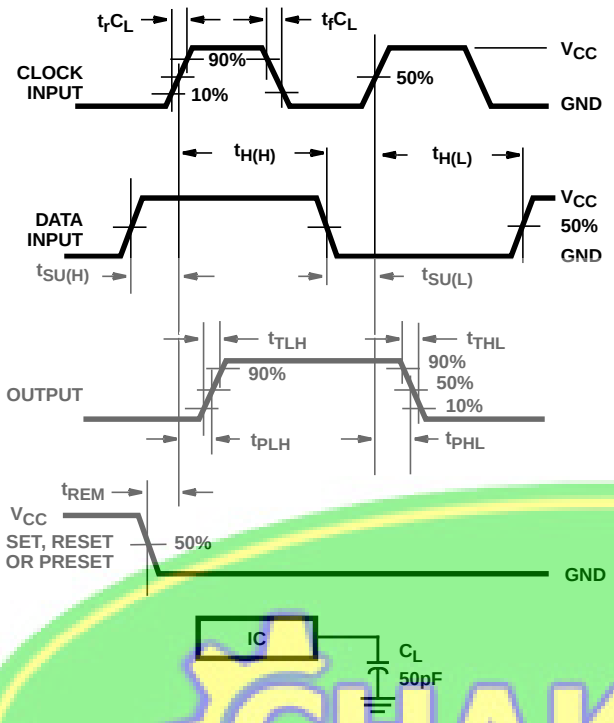


FIGURE 5. HC SETUP TIMES, HOLD TIMES, REMOVAL TIME, AND PROPAGATION DELAY TIMES FOR EDGE TRIGGERED SEQUENTIAL LOGIC CIRCUITS

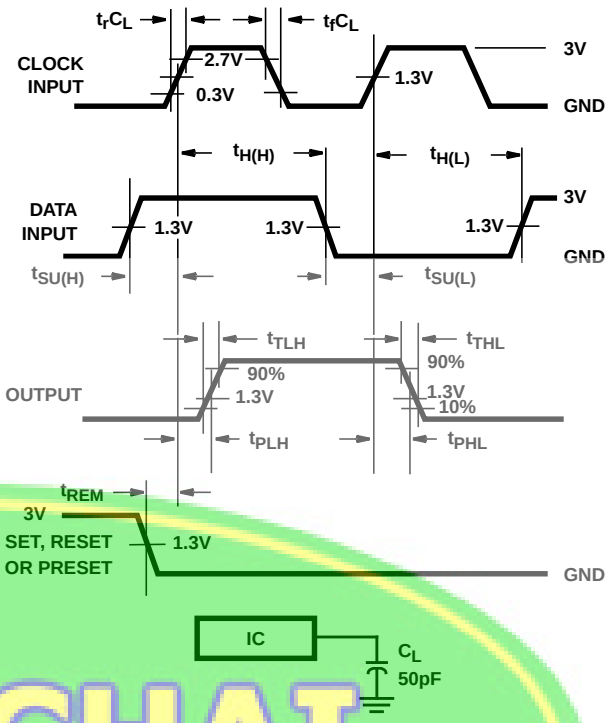


FIGURE 6. HCT SETUP TIMES, HOLD TIMES, REMOVAL TIME, AND PROPAGATION DELAY TIMES FOR EDGE TRIGGERED SEQUENTIAL LOGIC CIRCUITS

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
5962-8772501RA	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-8772501RA CD54HCT273F3A	Samples
CD54HC273F	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	CD54HC273F	Samples
CD54HC273F3A	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	8409901RA CD54HC273F3A	Samples
CD54HCT273F	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	CD54HCT273F	Samples
CD54HCT273F3A	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-8772501RA CD54HCT273F3A	Samples
CD74HC273E	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	-55 to 125	CD74HC273E	Samples
CD74HC273M	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC273M	Samples
CD74HC273M96	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC273M	Samples
CD74HC273M96E4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC273M	Samples
CD74HC273M96G4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC273M	Samples
CD74HC273ME4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC273M	Samples
CD74HC273MG4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC273M	Samples
CD74HCT273E	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	-55 to 125	CD74HCT273E	Samples
CD74HCT273EE4	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	-55 to 125	CD74HCT273E	Samples
CD74HCT273M	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	HCT273M	Samples
CD74HCT273M96	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	HCT273M	Samples
CD74HCT273M96G4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	HCT273M	Samples

(1) The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
OBSOLETE: TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.
TBD: The Pb-Free/Green conversion plan has not been defined.
Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.
Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.
Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

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

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OTHER QUALIFIED VERSIONS OF CD54HC273, CD54HCT273, CD74HC273, CD74HCT273 :

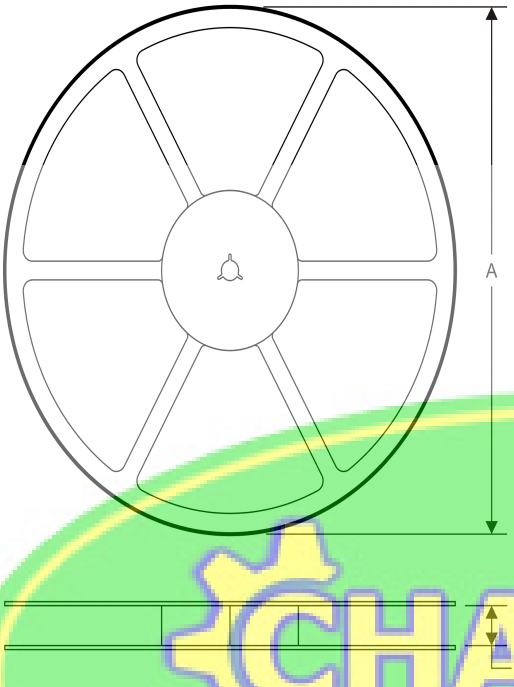
- Catalog: CD74HC273, CD74HCT273
- Military: CD54HC273, CD54HCT273

NOTE: Qualified Version Definitions:

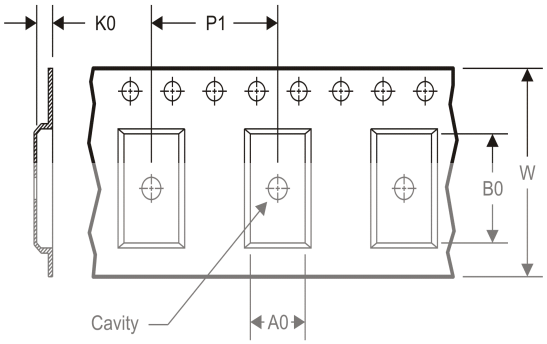
- Catalog - TI's standard catalog product
- Military - QML certified for Military and Defense Applications

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



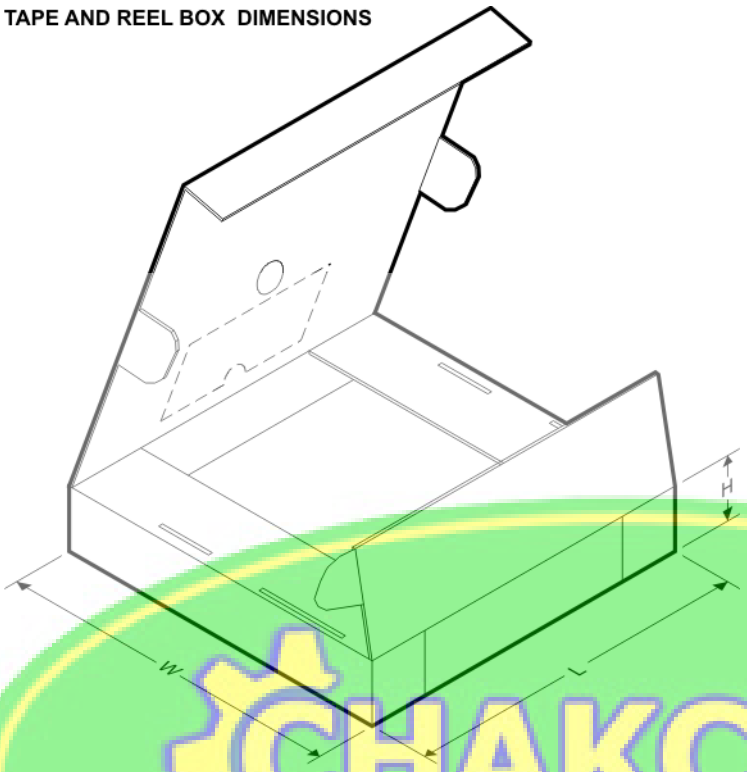
A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

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
CD74HC273M96	SOIC	DW	20	2000	330.0	24.4	10.8	13.0	2.7	12.0	24.0	Q1
CD74HCT273M96	SOIC	DW	20	2000	330.0	24.4	10.8	13.0	2.7	12.0	24.0	Q1

TAPE AND REEL BOX DIMENSIONS



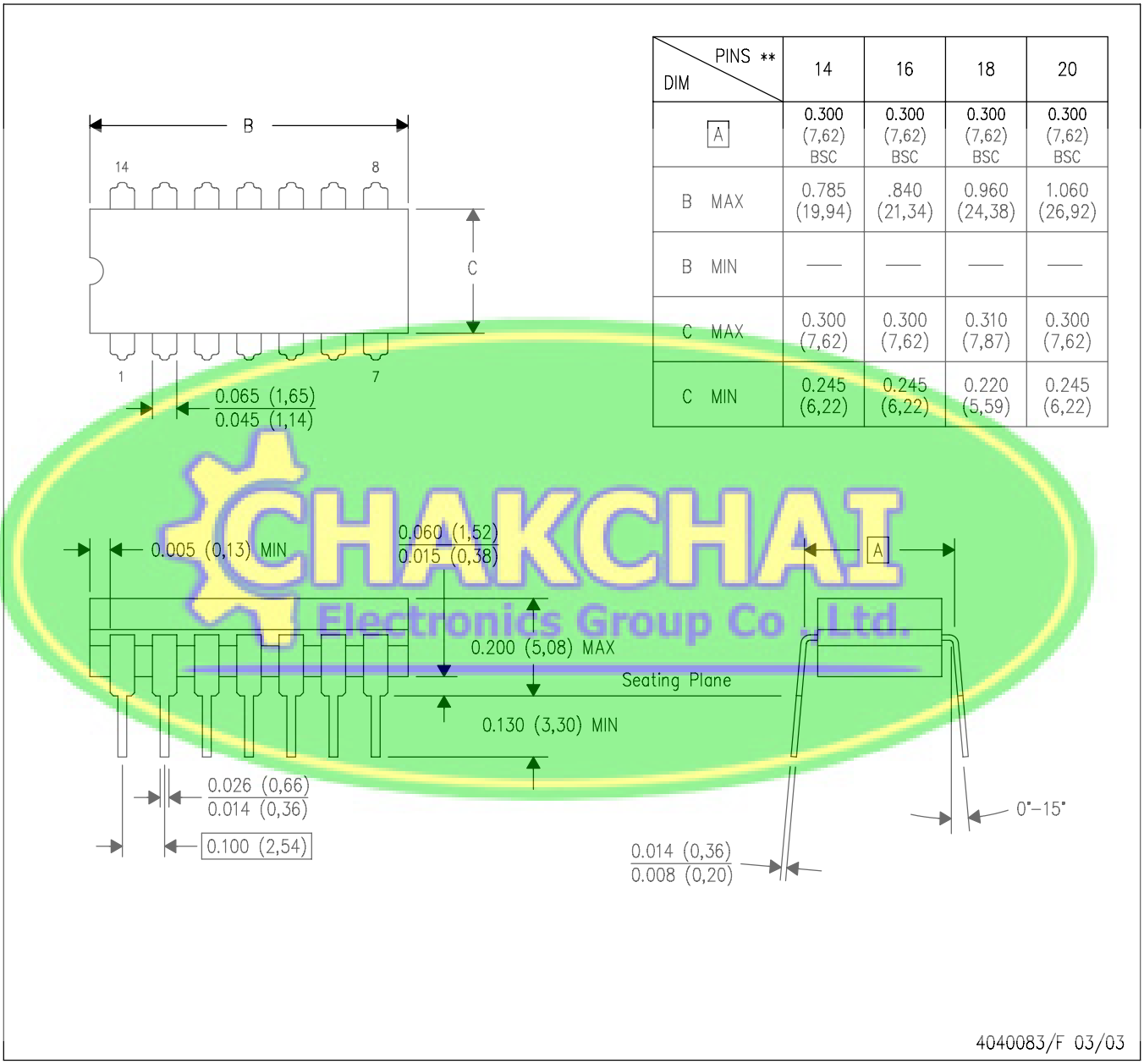
*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
CD74HC273M96	SOIC	DW	20	2000	367.0	367.0	45.0
CD74HCT273M96	SOIC	DW	20	2000	367.0	367.0	45.0

J (R–GDIP–T**)

14 LEADS SHOWN

CERAMIC DUAL IN–LINE PACKAGE



DIM \ PINS **	14	16	18	20
A	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC
B MAX	0.785 (19,94)	.840 (21,34)	0.960 (24,38)	1.060 (26,92)
B MIN	——	——	——	——
C MAX	0.300 (7,62)	0.300 (7,62)	0.310 (7,87)	0.300 (7,62)
C MIN	0.245 (6,22)	0.245 (6,22)	0.220 (5,59)	0.245 (6,22)

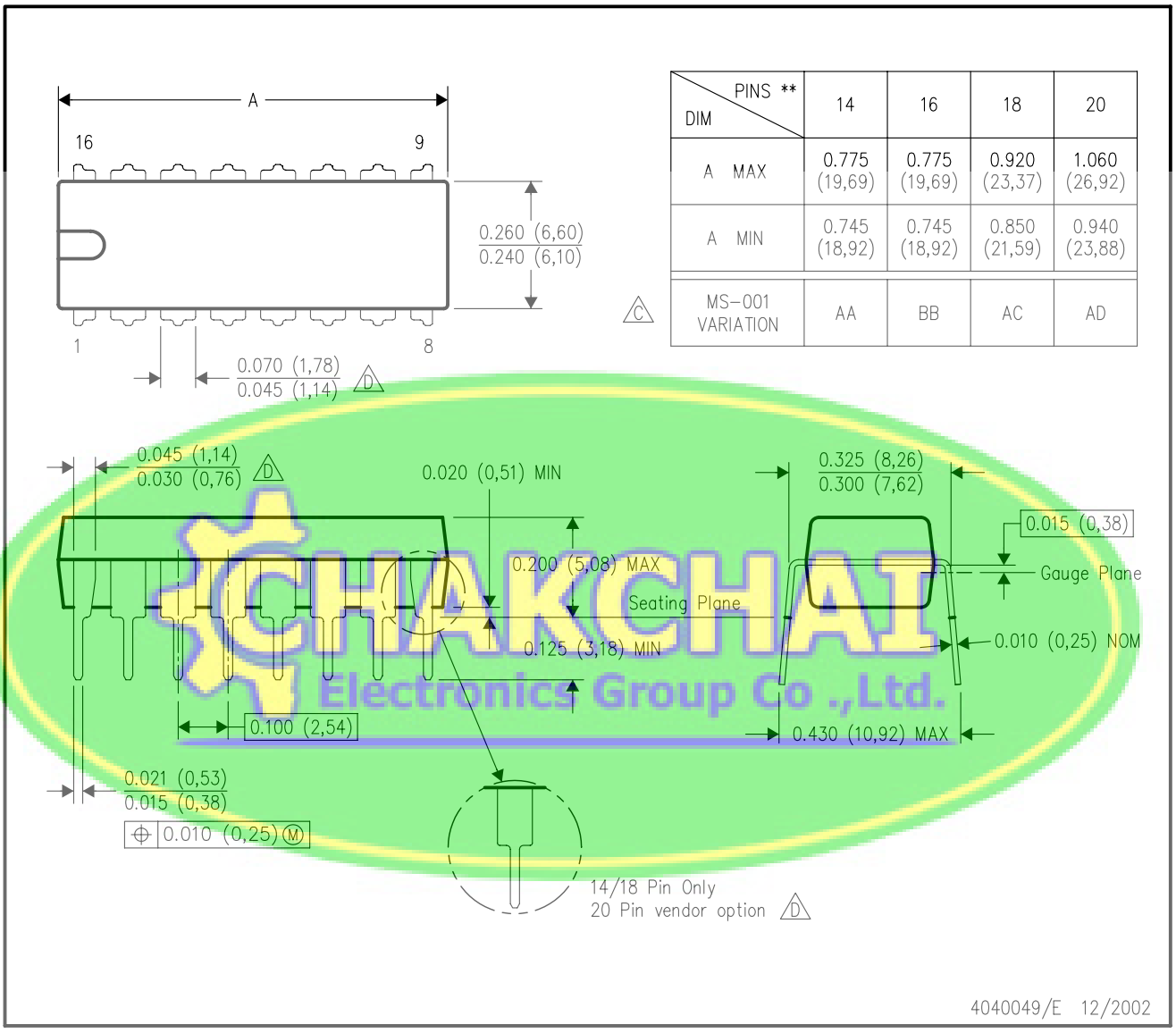
4040083/F 03/03

NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. This package is hermetically sealed with a ceramic lid using glass frit.
D. Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
E. Falls within MIL STD 1835 GDIP1–T14, GDIP1–T16, GDIP1–T18 and GDIP1–T20.

N (R–PDIP–T**)

PLASTIC DUAL–IN–LINE PACKAGE

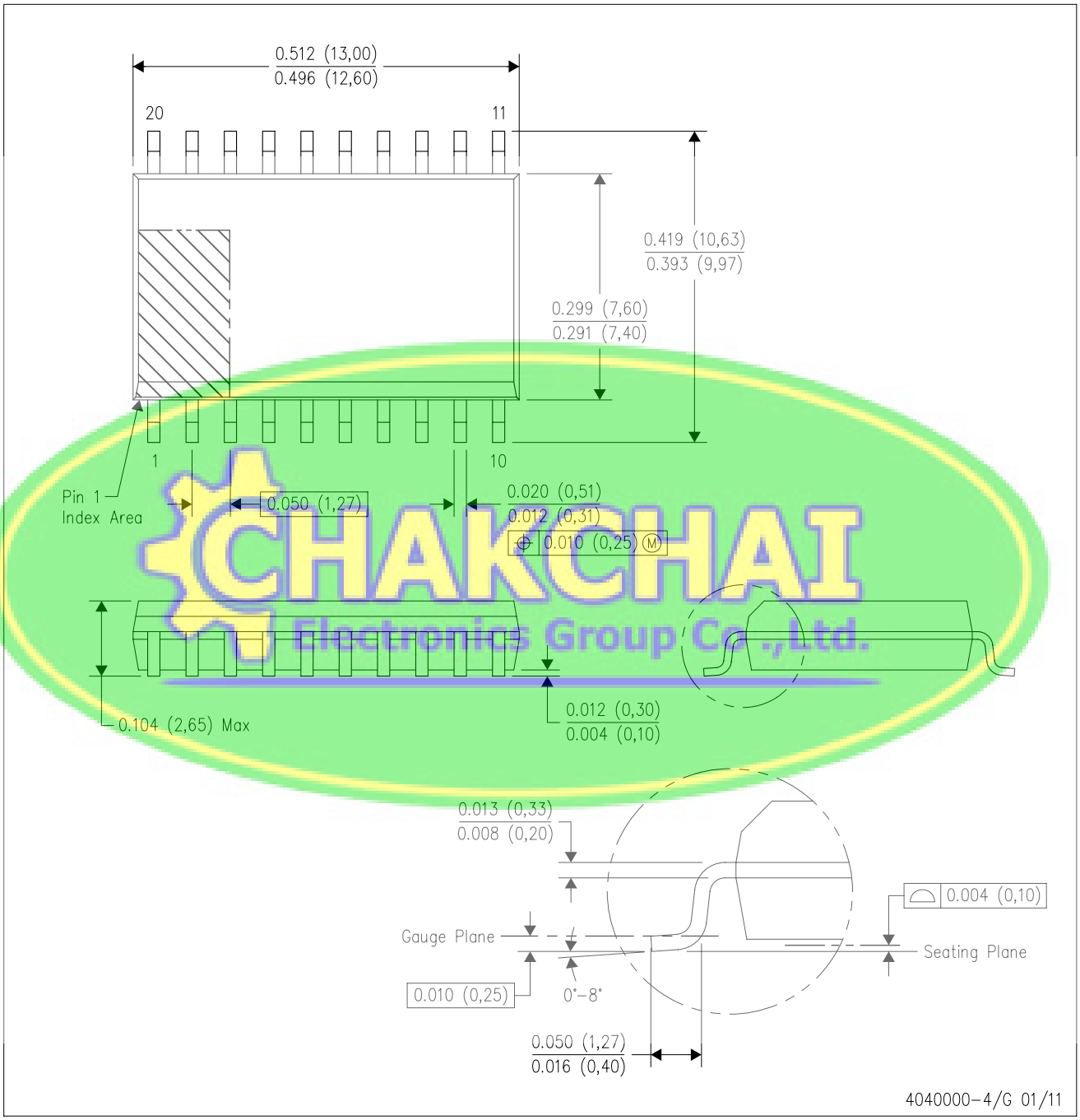
16 PINS SHOWN



DIM \ PINS **	14	16	18	20
A MAX	0.775 (19,69)	0.775 (19,69)	0.920 (23,37)	1.060 (26,92)
A MIN	0.745 (18,92)	0.745 (18,92)	0.850 (21,59)	0.940 (23,88)
C MS–001 VARIATION	AA	BB	AC	AD

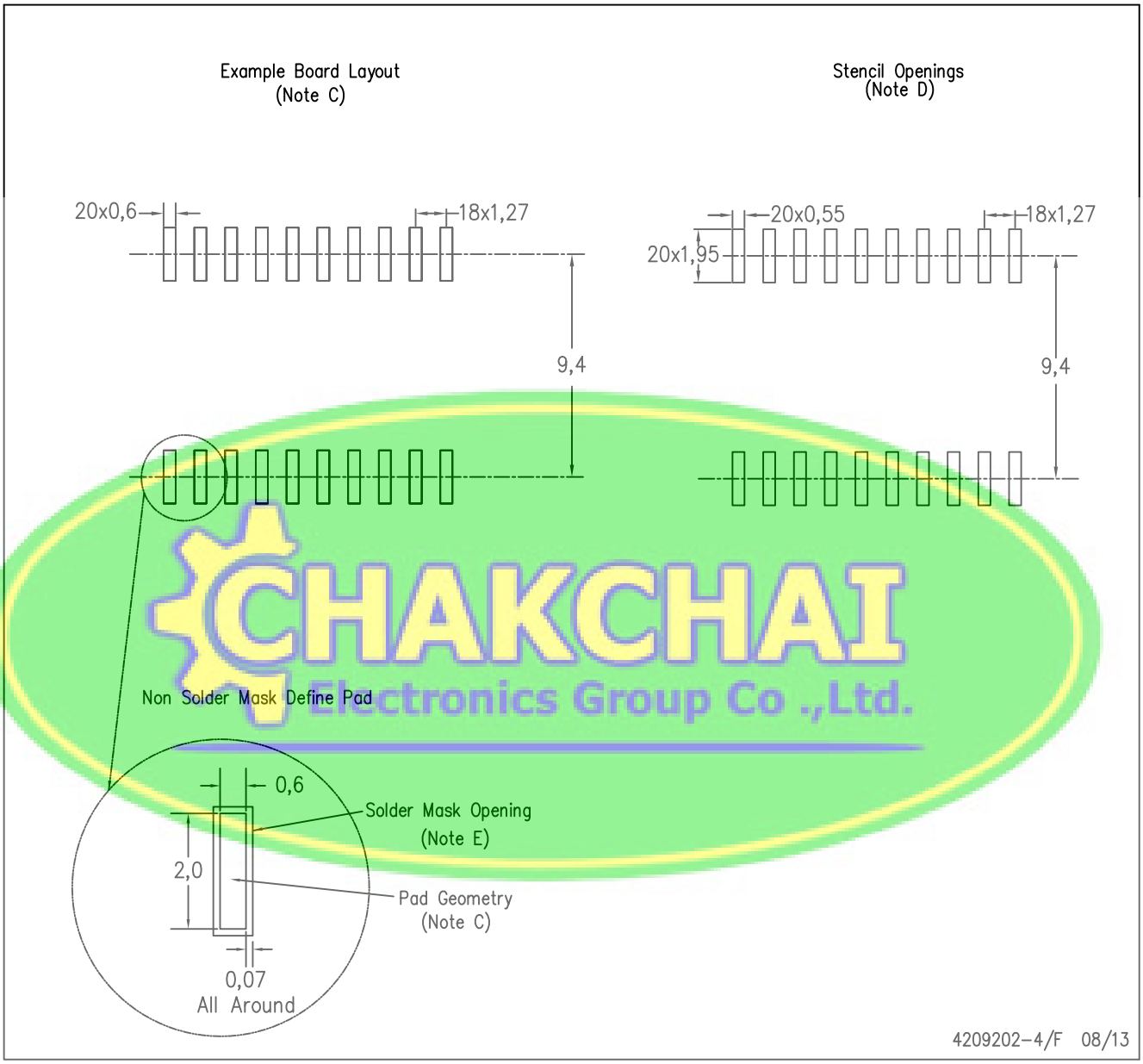
NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Falls within JEDEC MS–001, except 18 and 20 pin minimum body length (Dim A).
D. The 20 pin end lead shoulder width is a vendor option, either half or full width.

DW (R–PDSO–G20) PLASTIC SMALL OUTLINE



NOTES:
A. All linear dimensions are in inches (millimeters). Dimensioning and tolerancing per ASME Y14.5M–1994.
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
D. Falls within JEDEC MS–013 variation AC.

DW (R–PDSO–G20) PLASTIC SMALL OUTLINE



NOTES:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Refer to IPC7351 for alternate board design.
D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC–7525
E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

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