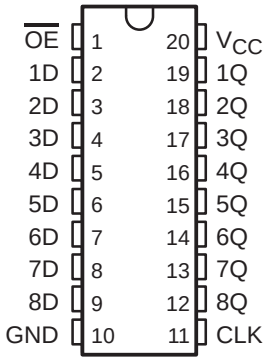
- **Eight D-Type Flip-Flops in a Single Package**
- **3-State Bus-Driving True Outputs**
- **Full Parallel Access for Loading**
- **Buffered Control Inputs**
- **Package Options Include Plastic Small-Outline Packages and Standard Plastic 300-mil DIPs**

DW OR N PACKAGE
(TOP VIEW)



description

This 8-bit flip-flop features 3-state outputs designed specifically for driving highly capacitive or relatively low-impedance loads. It is particularly suitable for implementing buffer registers, I/O ports, bidirectional bus drivers, and working registers.

The eight flip-flops of the SN74F574 are edge-triggered D-type flip-flops. On the positive transition of the clock (CLK) input, the Q outputs will be set to the logic levels that were set up at the data (D) inputs.

A buffered output enable ($\overline{OE}$) input can be used to place the eight outputs in either a normal logic state (high or low logic levels) or a high-impedance state. In the high-impedance state, the outputs neither load nor drive the bus lines significantly. The high-impedance state and increased drive provide the capability to drive bus lines without need for interface or pullup components.

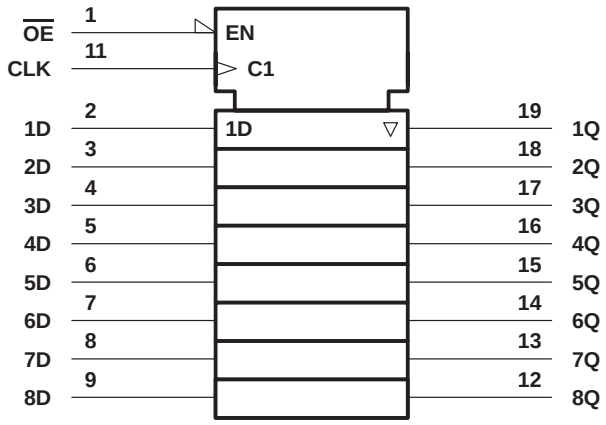
The output enable ($\overline{OE}$) does not affect the internal operations of the flip-flops. Old data can be retained or new data can be entered while the outputs are in the high-impedance state.

The SN74F574 is characterized for operation from 0°C to 70°C.

FUNCTION TABLE
(each flip-flop)

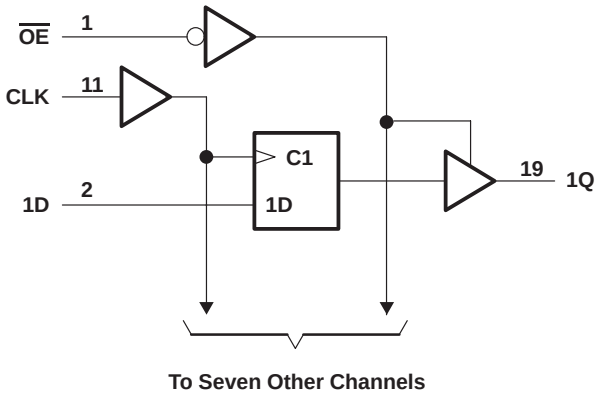
INPUTS			OUTPUT
$\overline{OE}$	CLK	D	Q
L	↑	H	H
L	↑	L	L
L	L	X	Q_0
H	X	X	Z

logic symbol†



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

logic diagram (positive logic)



absolute maximum ratings over operating free-air temperature range (unless otherwise noted)‡

Supply voltage range, V_{CC} . . . . . –0.5 V to 7 V
Input voltage range, V_I (see Note 1) . . . . . –1.2 V to 7 V
Input current range . . . . . –30 mA to 5 mA
Voltage range applied to any output in the disabled or power-off state . . . . . –0.5 V to 5.5 V
Voltage range applied to any output in the high state . . . . . –0.5 V to V_{CC}
Current into any output in the low state . . . . . 48 mA
Operating free-air temperature range . . . . . 0°C to 70°C
Storage temperature range . . . . . –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 input-voltage ratings may be exceeded provided the input-current ratings are observed.

recommended operating conditions

		MIN	NOM	MAX	UNIT
V_{CC}	Supply voltage	4.5	5	5.5	V
V_{IH}	High-level input voltage	2			V
V_{IL}	Low-level input voltage			0.8	V
I_{IK}	Input clamp current			– 18	mA
I_{OH}	High-level output current			– 3	mA
I_{OL}	Low-level output current			24	mA
T_A	Operating free-air temperature	0		70	°C

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

PARAMETER	TEST CONDITIONS		MIN	TYP†	MAX	UNIT
V_{IK}	V_{CC} = 4.5 V,	I_I = – 18 mA			– 1.2	V
V_{OH}	V_{CC} = 4.5 V	I_{OH} = – 1 mA	2.5	3.4		V
		I_{OH} = – 3 mA	2.4	3.3		
	V_{CC} = 4.75 V,	I_{OH} = – 1 mA to – 3 mA	2.7			
V_{OL}	V_{CC} = 4.5 V,	I_{OL} = 24 mA		0.35	0.5	V
I_{OZH}	V_{CC} = 5.5 V,	V_O = 2.7 V			50	µA
I_{OZL}	V_{CC} = 5.5 V,	V_O = 0.5 V			–50	µA
I_I	V_{CC} = 5.5 V,	V_I = 7 V			0.1	mA
I_{IH}	V_{CC} = 5.5 V,	V_I = 2.7 V			20	µA
I_{IL}	V_{CC} = 5.5 V,	V_I = 0.5 V			– 0.6	mA
I_{OS}‡	V_{CC} = 5.5 V,	V_O = 0	– 60		– 150	mA
I_{CCZ}	V_{CC} = 5.5 V,	See Note 2		55	86	mA

† All typical values are at V_{CC} = 5 V, T_A = 25°C.
‡ Not more than one output should be shorted at a time, and the duration of the short circuit should not exceed one second.
NOTE 2: I_{CCZ} is measured with $\overline{OE}$ at 4.5 V and all other inputs grounded.

timing requirements

			V_{CC} = 5 V, T_A = 25°C		V_{CC} = 4.5 V to 5.5 V, T_A = MIN to MAX§		UNIT
			MIN	MAX	MIN	MAX	
f_{clock}	Clock frequency		0	100	0	100	MHz
t_w	Pulse duration	CLK high	7		7		ns
		CLK low	6		6		
t_{su}	Setup time before CLK↑	Data high	2		2		ns
		Data low	2		2		
t_h	Hold time after CLK↑	Data high	2		2		ns
		Data low	2		2		

switching characteristics (see Note 3)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 5 V, C_L = 50 pF, R_L = 500 Ω, T_A = 25°C			V_{CC} = 4.5 V to 5.5 V, C_L = 50 pF, R_L = 500 Ω, T_A = MIN to MAX§		UNIT
			MIN	TYP	MAX	MIN	MAX	
f_{max}			100			100		MHz
t_{PLH}	CLK	Any Q	3.2	6.1	8.5	3.2	10	ns
t_{PHL}			3.2	6.1	8.5	3.2	10	
t_{PZH}	$\overline{OE}$	Any Q	1.2	8.6	11.5	1.2	12.5	ns
t_{PZL}			1.2	4.9	7.5	1.2	8.5	
t_{PHZ}	$\overline{OE}$	Any Q	1.2	4.9	7	1.2	8	ns
t_{PLZ}			1.2	3.9	5.5	1.2	6.5	

§ For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.
NOTE 3: Load circuits and waveforms are shown in Section 1.

PACKAGING INFORMATION

Orderable Device	Status [1]	Package Type	Package Drawing	Pins	Package Qty	Eco Plan [2]	Lead/Ball Finish	MSL Peak Temp [3]
SN74F574DW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74F574DWE4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74F574DWG4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74F574DWR	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74F574DWRE4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74F574DWRG4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74F574N	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN74F574NE4	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN74F574NSR	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74F574NSRE4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74F574NSRG4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

[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.

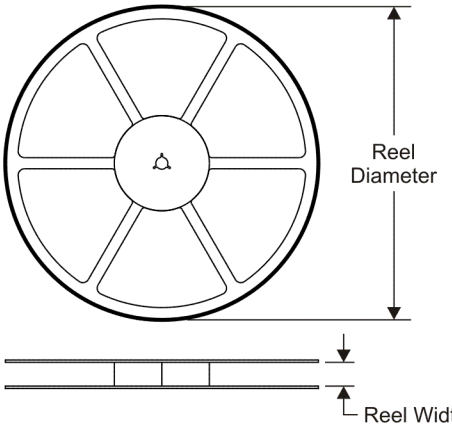
[2] Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.
TBD: The Pb-Free/Green conversion plan has not been 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.

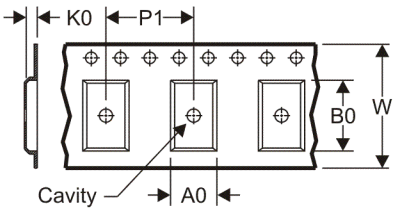
to Customer on an annual basis.

TAPE AND REEL INFORMATION

REEL DIMENSIONS

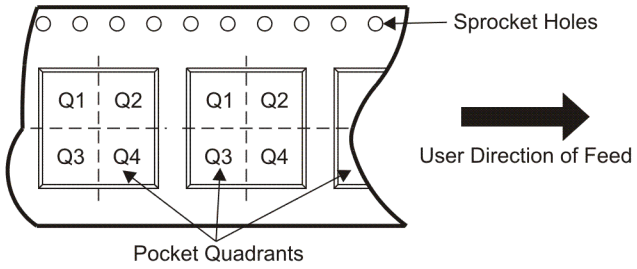


TAPE DIMENSIONS



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

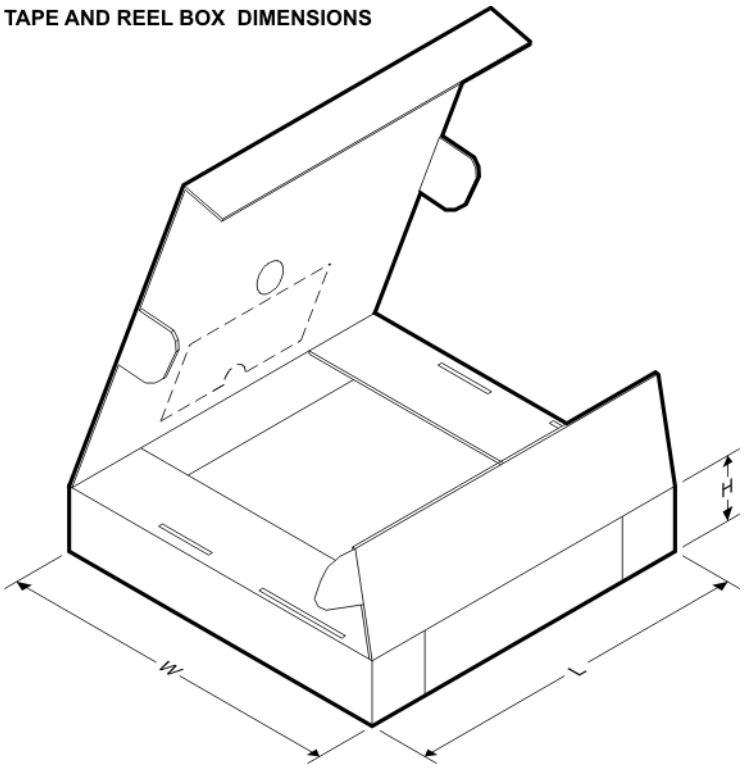
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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
SN74F574DWR	SOIC	DW	20	2000	330.0	24.4	10.8	13.0	2.7	12.0	24.0	Q1
SN74F574NSR	SO	NS	20	2000	330.0	24.4	8.2	13.0	2.5	12.0	24.0	Q1

TAPE AND REEL BOX DIMENSIONS



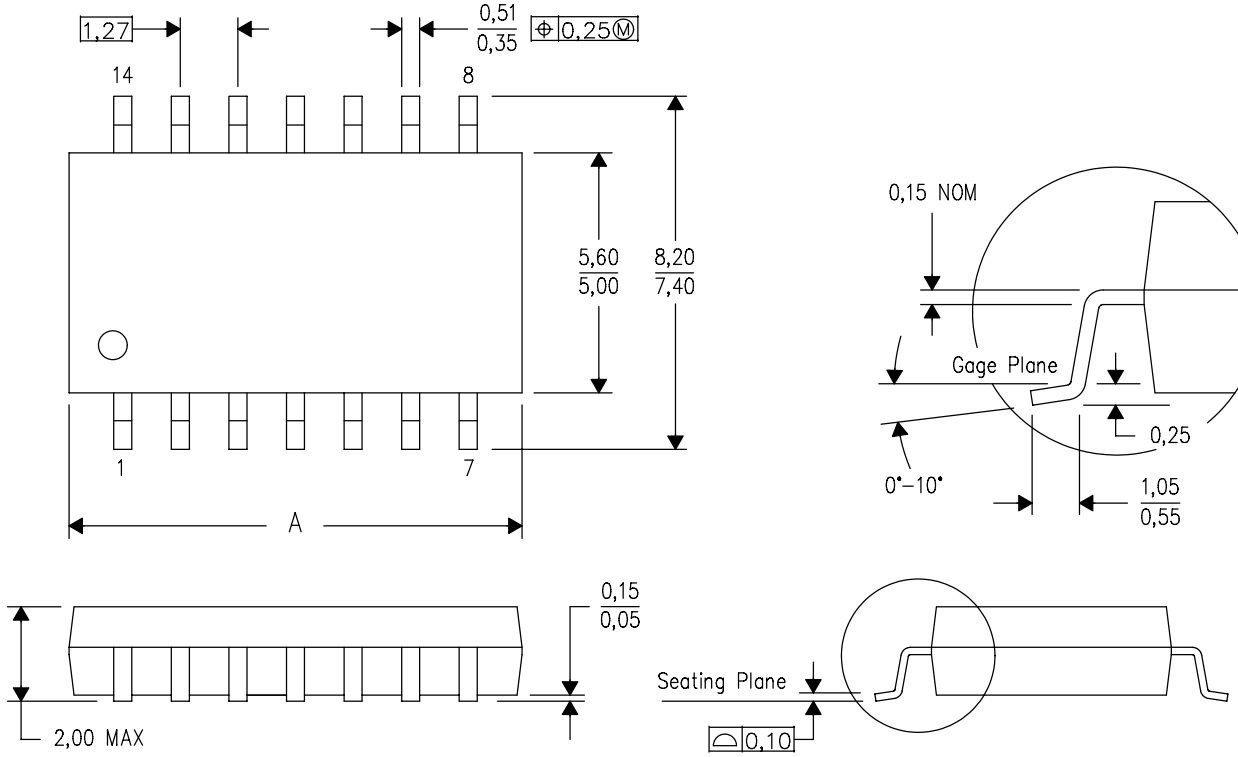
*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74F574DWR	SOIC	DW	20	2000	346.0	346.0	41.0
SN74F574NSR	SO	NS	20	2000	346.0	346.0	41.0

MECHANICAL DATA

NS (R-PDSO-G)** **PLASTIC SMALL-OUTLINE PACKAGE**

14-PINS SHOWN

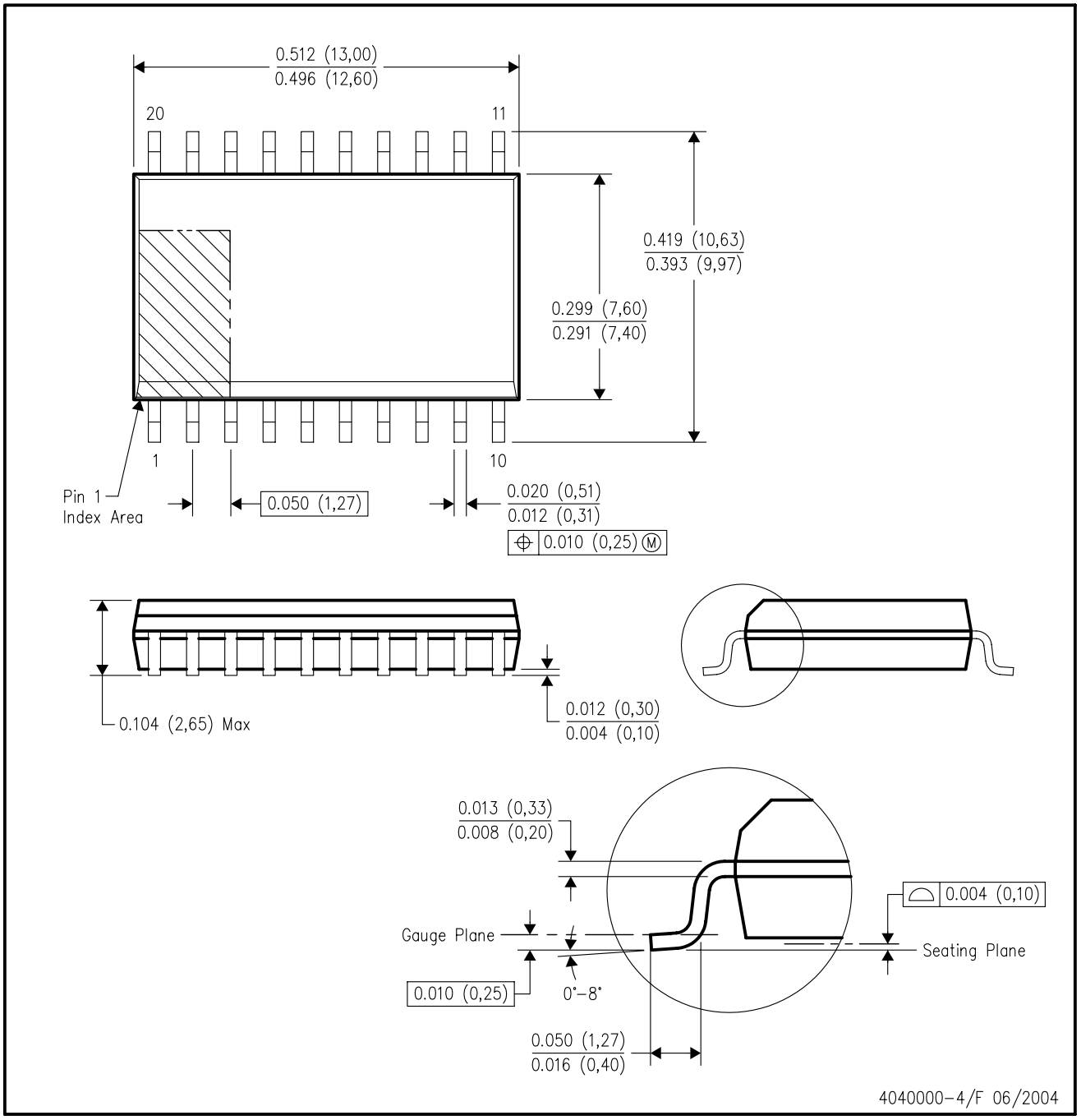


DIM \ PINS **	14	16	20	24
A MAX	10,50	10,50	12,90	15,30
A MIN	9,90	9,90	12,30	14,70

4040062/C 03/03

NOTES:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

DW (R–PDSO–G20) PLASTIC SMALL–OUTLINE PACKAGE

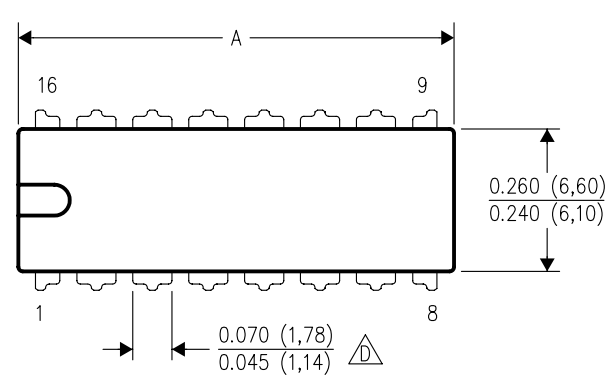


NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
D. Falls within JEDEC MS–013 variation AC.

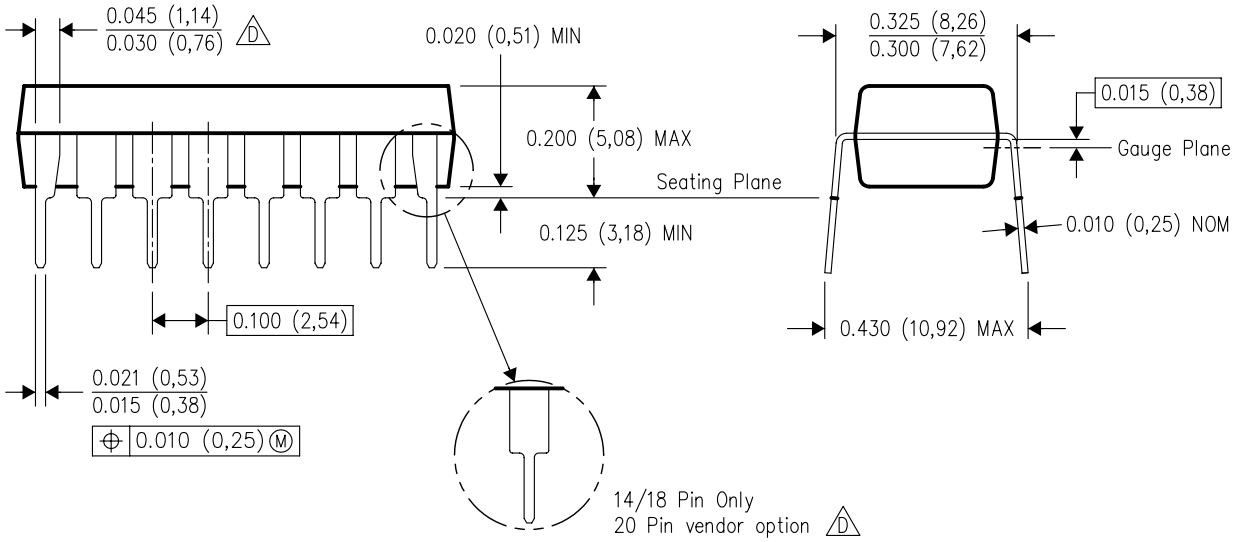
N (R–PDIP–T**)

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)
MS–001 VARIATION (C)	AA	BB	AC	AD



4040049/E 12/2002

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.

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