

SN54LV393A, SN74LV393A DUAL 4-BIT BINARY COUNTERS

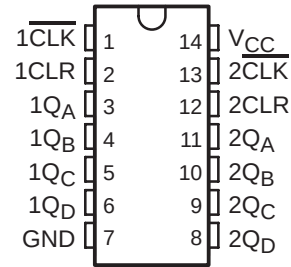
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- 2-V to 5.5-V V_{CC} Operation
- Max t_{pd} of 10 ns at 5 V
- Typical V_{OLP} (Output Ground Bounce)
<0.8 V at $V_{CC} = 3.3$ V, $T_A = 25^\circ\text{C}$
- Typical V_{OHV} (Output V_{OH} Undershoot)
>2.3 V at $V_{CC} = 3.3$ V, $T_A = 25^\circ\text{C}$
- I_{off} Supports Partial-Power-Down-Mode Operation
- Dual 4-Bit Binary Counters With Individual Clocks
- Direct Clear for Each 4-Bit Counter
- Can Significantly Improve System Densities by Reducing Counter Package Count by 50 Percent
- Latch-Up Performance Exceeds 100 mA Per JESD 78, Class II
- ESD Protection Exceeds JESD 22
 - 2000-V Human-Body Model (A114-A)
 - 200-V Machine Model (A115-A)
 - 1000-V Charged-Device Model (C101)

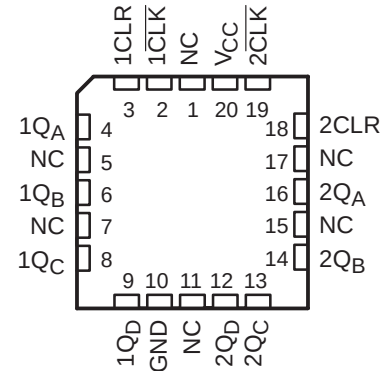
description/ordering information

The 'LV393A devices contain eight flip-flops and additional gating to implement two individual 4-bit counters in a single package. These devices are designed for 2-V to 5.5-V V_{CC} operation.

SN54LV393A . . . J OR W PACKAGE
SN74LV393A . . . D, DB, DGV, NS, OR PW PACKAGE
(TOP VIEW)



SN54LV393A . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

ORDERING INFORMATION

T_A	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
–40°C to 85°C	SOIC – D	Tube of 50	SN74LV393AD	LV393A
		Reel of 2500	SN74LV393ADR	
	SOP – NS	Reel of 2000	SN74LV393ANSR	74LV393A
	SSOP – DB	Reel of 2000	SN74LV393ADBR	LV393A
	TSSOP – PW	Tube of 90	SN74LV393APW	LV393A
		Reel of 2000	SN74LV393APWR	
		Reel of 250	SN74LV393APWT	
–55°C to 125°C	TVSOP – DGV	Reel of 2000	SN74LV393ADGVR	LV393A
	CDIP – J	Tube of 25	SNJ54LV393AJ	SNJ54LV393AJ
	CFP – W	Tube of 150	SNJ54LV393AW	SNJ54LV393AW
	LCCC – FK	Tube of 55	SNJ54LV393AFK	SNJ54LV393AFK

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



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**TEXAS
INSTRUMENTS**

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DUAL 4-BIT BINARY COUNTERS

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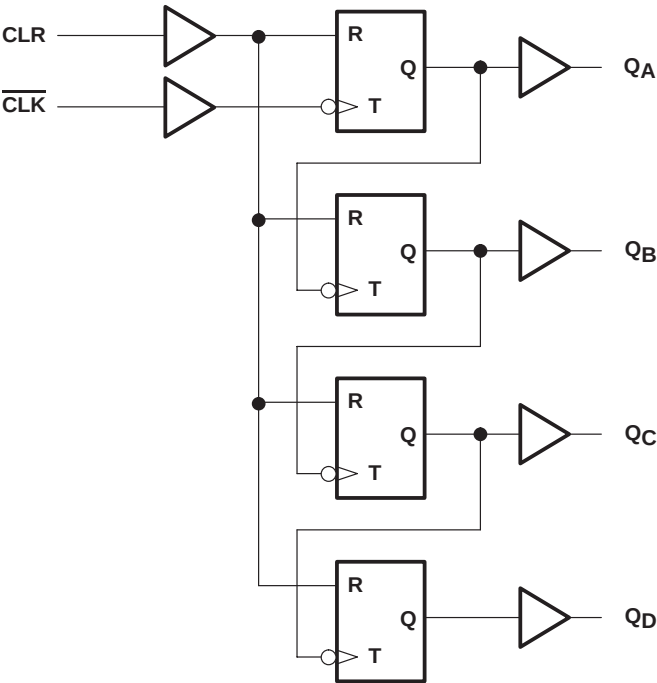
description/ordering informaton (continued)

These devices comprise two independent 4-bit binary counters, each having a clear (CLR) and a clock ($\overline{\text{CLK}}$) input. These devices change state on the negative-going transition of the $\overline{\text{CLK}}$ pulse. N-bit binary counters can be implemented with each package, providing the capability of divide by 256. The 'LV393A devices have parallel outputs from each counter stage so that any submultiple of the input count frequency is available for system timing signals.

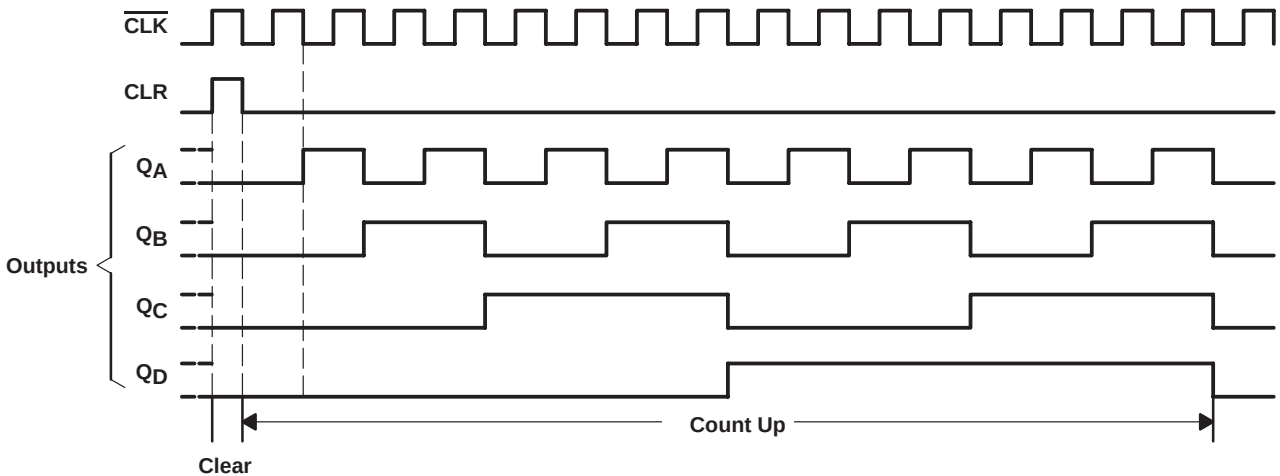
These devices are fully specified for partial-power-down applications using I_{off} . The I_{off} circuitry disables the outputs, preventing damaging current backflow through the devices when they are powered down.

FUNCTION TABLE		
INPUTS		FUNCTION
$\overline{\text{CLK}}$	CLR	
↑	L	No change
↓	L	Advance to next stage
X	H	All outputs L

logic diagram, each counter (positive logic)



timing diagram



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)	–0.5 V to 7 V
Output voltage range applied in high or low state, V_O (see Notes 1 and 2)	–0.5 V to $V_{CC} + 0.5$ V
Output voltage range applied in power-off state, V_O (see Note 1)	–0.5 V to 7 V
Input clamp current, I_{IK} ($V_I < 0$)	–20 mA
Output clamp current, I_{OK} ($V_O < 0$)	–50 mA
Continuous output current, I_O ($V_O = 0$ to V_{CC})	±25 mA
Continuous current through V_{CC} or GND	±50 mA
Package thermal impedance, θ_{JA} (see Note 3): D package	86°C/W
DB package	96°C/W
DGV package	127°C/W
NS package	76°C/W
PW package	113°C/W
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.

- NOTES: 1. The input and output negative-voltage ratings may be exceeded if the input and output current ratings are observed.
2. This value is limited to 7 V maximum.
3. The package thermal impedance is calculated in accordance with JESD 51-7.

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recommended operating conditions (see Note 4)

			SN54LV393A		SN74LV393A		UNIT
			MIN	MAX	MIN	MAX	
V _{CC}	Supply voltage		2	5.5	2	5.5	V
V _{IH}	High-level input voltage	V _{CC} = 2 V	1.5		1.5		V
		V _{CC} = 2.3 V to 2.7 V	V _{CC} × 0.7		V _{CC} × 0.7		
		V _{CC} = 3 V to 3.6 V	V _{CC} × 0.7		V _{CC} × 0.7		
		V _{CC} = 4.5 V to 5.5 V	V _{CC} × 0.7		V _{CC} × 0.7		
V _{IL}	Low-level input voltage	V _{CC} = 2 V	0.5		0.5		V
		V _{CC} = 2.3 V to 2.7 V	V _{CC} × 0.3		V _{CC} × 0.3		
		V _{CC} = 3 V to 3.6 V	V _{CC} × 0.3		V _{CC} × 0.3		
		V _{CC} = 4.5 V to 5.5 V	V _{CC} × 0.3		V _{CC} × 0.3		
V _I	Input voltage		0	5.5	0	5.5	V
V _O	Output voltage		0	V _{CC}	0	V _{CC}	V
I _{OH}	High-level output current	V _{CC} = 2 V	−50		−50		μA
		V _{CC} = 2.3 V to 2.7 V	−2		−2		mA
		V _{CC} = 3 V to 3.6 V	−6		−6		
		V _{CC} = 4.5 V to 5.5 V	−12		−12		
I _{OL}	Low-level output current	V _{CC} = 2 V	50		50		μA
		V _{CC} = 2.3 V to 2.7 V	2		2		mA
		V _{CC} = 3 V to 3.6 V	6		6		
		V _{CC} = 4.5 V to 5.5 V	12		12		
Δt/Δv	Input transition rise or fall rate	V _{CC} = 2.3 V to 2.7 V	200		200		ns/V
		V _{CC} = 3 V to 3.6 V	100		100		
		V _{CC} = 4.5 V to 5.5 V	20		20		
T _A	Operating free-air temperature		−55	125	−40	85	°C

NOTE 4: All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

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

PARAMETER	TEST CONDITIONS	V _{CC}	SN54LV393A			SN74LV393A			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
V _{OH}	I _{OH} = -50 μA	2 V to 5.5 V	V _{CC} -0.1			V _{CC} -0.1			V
	I _{OH} = -2 mA	2.3 V	2			2			
	I _{OH} = -6 mA	3 V	2.48			2.48			
	I _{OH} = -12 mA	4.5 V	3.8			3.8			
V _{OL}	I _{OL} = 50 μA	2 V to 5.5 V	0.1			0.1			V
	I _{OL} = 2 mA	2.3 V	0.4			0.4			
	I _{OL} = 6 mA	3 V	0.44			0.44			
	I _{OL} = 12 mA	4.5 V	0.55			0.55			
I _I	V _I = 5.5 V or GND	0 to 5.5 V	±1			±1			μA
I _{CC}	V _I = V _{CC} or GND, I _O = 0	5.5 V	20			20			μA
I _{off}	V _I or V _O = 0 to 5.5 V	0	5			5			μA
C _i	V _I = V _{CC} or GND	3.3 V	1.8			1.8			pF

PRODUCT PREVIEW information concerns products in the formative or design phase of development. Characteristic data and other specifications are design goals. Texas Instruments reserves the right to change or discontinue these products without notice.



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timing requirements over recommended operating free-air temperature range, $V_{CC} = 2.5\text{ V} \pm 0.2\text{ V}$ (unless otherwise noted) (see Figure 1)

			T _A = 25°C		SN54LV393A		SN74LV393A		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	
t _w	Pulse duration	CLK high or low	5		5		5		ns
		CLR high	5		5		5		
t _{su}	Setup time	CLR inactive before CLK↓	6		6		6		ns

timing requirements over recommended operating free-air temperature range, $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$ (unless otherwise noted) (see Figure 1)

		T _A = 25°C		SN54LV393A		SN74LV393A		UNIT
		MIN	MAX	MIN	MAX	MIN	MAX	
t _w	Pulse duration	CLK high or low		5	5	5		ns
		CLR high		5	5	5		
t _{su}	Setup time	CLR inactive before CLK↓		5	5	5		ns

timing requirements over recommended operating free-air temperature range, $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$ (unless otherwise noted) (see Figure 1)

			T _A = 25°C		SN54LV393A		SN74LV393A		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	
t _w	Pulse duration	CLK high or low	5		5		5		ns
		CLR high	5		5		5		
t _{su}	Setup time	CLR inactive before CLK↓	4		4		4		ns

switching characteristics over recommended operating free-air temperature range, $V_{CC} = 2.5\text{ V} \pm 0.2\text{ V}$ (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	$T_A = 25^\circ\text{C}$			SN54LV393A		SN74LV393A		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
f_{max}			$C_L = 15\text{ pF}$	50*	90*		40*		40		MHz
			$C_L = 50\text{ pF}$	30	70		25		25		
t_{pd}	CLK	QA	$C_L = 15\text{ pF}$	7.1*	17.7*		1*	20.5*	1	20.5	ns
		QB		8.5*	20.3*		1*	23.5*	1	23.5	
		QC		10*	22.5*		1*	26*	1	26	
		QD		11.1*	24.2*		1*	28*	1	28	
t_{PHL}	CLR	Qn		6.7*	14.8*		1*	17*	1	17	
t_{pd}	CLK	QA	$C_L = 50\text{ pF}$	9.3	21.3		1	24.5	1	24.5	ns
		QB		10.9	23.9		1	27.5	1	27.5	
		QC		12.3	26.1		1	30	1	30	
		QD		13.4	27.8		1	32	1	32	
t_{PHL}	CLR	Qn		9.1	17.4		1	20	1	20	

* On products compliant to MIL-PRF-38535, this parameter is not production tested.

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switching characteristics over recommended operation free-air temperature range,
 $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$ (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	$T_A = 25^\circ\text{C}$			SN54LV393A		SN74LV393A		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
f_{max}			$C_L = 15\text{ pF}$	75*	130*		65*		65		MHz
			$C_L = 50\text{ pF}$	45	105		35		35		
t_{pd}	$\overline{\text{CLK}}$	Q_A	$C_L = 15\text{ pF}$	5.1*	13.2*		1*	15.5*	1	15.5	ns
		Q_B		6*	15.8*		1*	18.5*	1	18.5	
		Q_C		7*	18*		1*	21*	1	21	
		Q_D		7.7*	19.7*		1*	23*	1	23	
t_{PHL}	CLR	Q_n		5.1*	12.3*		1*	14.5*	1	14.5	
t_{pd}	$\overline{\text{CLK}}$	Q_A	$C_L = 50\text{ pF}$	6.7	16.7		1	19	1	19	ns
		Q_B		7.8	19.3		1	22	1	22	
		Q_C		8.7	21.5		1	24.5	1	24.5	
		Q_D		9.5	23.2		1	26.5	1	26.5	
t_{PHL}	CLR	Q_n		6.8	15.8		1	18	1	18	

* On products compliant to MIL-PRF-38535, this parameter is not production tested.

switching characteristics over recommended operating free-air temperature range,
 $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$ (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	$T_A = 25^\circ\text{C}$			SN54LV393A		SN74LV393A		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
f_{max}			$C_L = 15\text{ pF}$	125*	185*		105*		105		MHz
			$C_L = 50\text{ pF}$	85	150		75		75		
t_{pd}	$\overline{\text{CLK}}$	Q_A	$C_L = 15\text{ pF}$	3.7*	8.5*		1*	10*	1	10	ns
		Q_B		4.3*	9.8*		1*	11.5*	1	11.5	
		Q_C		4.9*	11.2*		1*	13*	1	13	
		Q_D		5.3*	12.5*		1*	14.5*	1	14.5	
t_{PHL}	CLR	Q_n		3.9*	8.1*		1*	9.5*	1	9.5	
t_{pd}	$\overline{\text{CLK}}$	Q_A	$C_L = 50\text{ pF}$	4.9	10.5		1	12	1	12	ns
		Q_B		5.6	11.8		1	13.5	1	13.5	
		Q_C		6.2	13.2		1	15	1	15	
		Q_D		6.6	14.5		1	16.5	1	16.5	
t_{PHL}	CLR	Q_n		5.2	10.1		1	11.5	1	11.5	

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noise characteristics, $V_{CC} = 3.3\text{ V}$, $C_L = 50\text{ pF}$, $T_A = 25^\circ\text{C}$ (see Note 5)

PARAMETER	SN74LV393A			UNIT
	MIN	TYP	MAX	
$V_{OL(P)}$ Quiet output, maximum dynamic V_{OL}		0.3	0.8	V
$V_{OL(V)}$ Quiet output, minimum dynamic V_{OL}		-0.2	-0.8	V
$V_{OH(V)}$ Quiet output, minimum dynamic V_{OH}		2.8		V
$V_{IH(D)}$ High-level dynamic input voltage	2.31			V
$V_{IL(D)}$ Low-level dynamic input voltage			0.99	V

NOTE 5: Characteristics are for surface-mount packages only.

operating characteristics, $T_A = 25^\circ\text{C}$

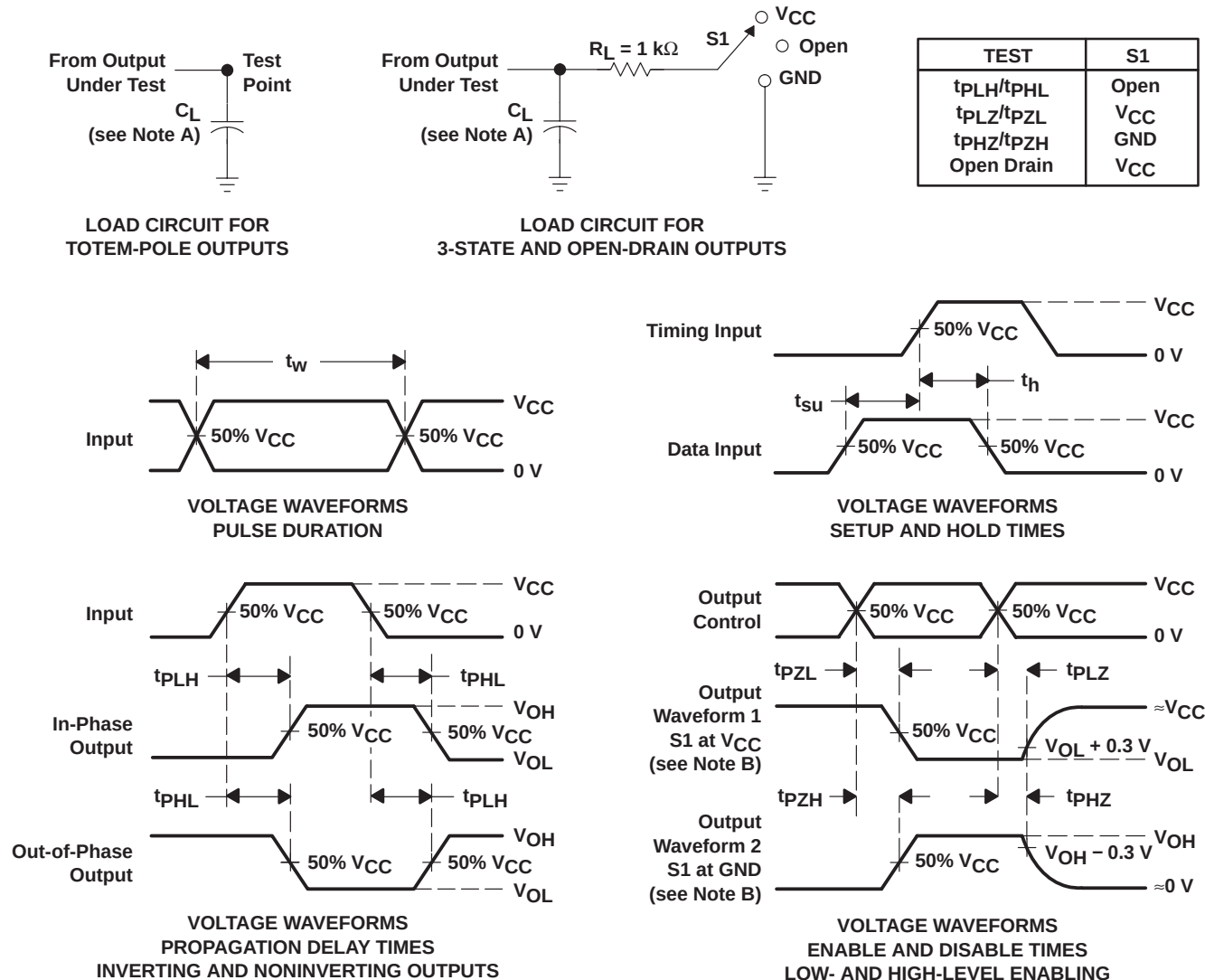
PARAMETER	TEST CONDITIONS	V_{CC}	TYP	UNIT
C_{pd} Power dissipation capacitance	$C_L = 50\text{ pF}$, $f = 10\text{ MHz}$	3.3 V	15.2	pF
		5 V	17.3	



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PARAMETER MEASUREMENT INFORMATION



- NOTES:
- C_L includes probe and jig capacitance.
 - 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.
 - All input pulses are supplied by generators having the following characteristics: $PRR \leq 1\text{ MHz}$, $Z_O = 50\ \Omega$, $t_r \leq 3\text{ ns}$, $t_f \leq 3\text{ ns}$.
 - The outputs are measured one at a time, with one input transition per measurement.
 - t_{PLZ} and t_{PHZ} are the same as t_{dis} .
 - t_{PZL} and t_{PZH} are the same as t_{en} .
 - t_{PHL} and t_{PLH} are the same as t_{pd} .
 - All parameters and waveforms are not applicable to all devices.

Figure 1. Load Circuit and Voltage Waveforms

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
SN74LV393AD	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV393ADB	PREVIEW	SSOP	DB	14	80	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV393ADBR	ACTIVE	SSOP	DB	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV393ADBRE4	ACTIVE	SSOP	DB	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV393ADBRG4	ACTIVE	SSOP	DB	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV393ADE4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV393ADG4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV393ADGVR	ACTIVE	TVSOP	DGV	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV393ADGVRE4	ACTIVE	TVSOP	DGV	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV393ADGVRG4	ACTIVE	TVSOP	DGV	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV393ADR	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV393ADRE4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV393ADRG4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV393ANSR	ACTIVE	SO	NS	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV393ANSRE4	ACTIVE	SO	NS	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV393ANSRG4	ACTIVE	SO	NS	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV393APW	ACTIVE	TSSOP	PW	14	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV393APWE4	ACTIVE	TSSOP	PW	14	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV393APWG4	ACTIVE	TSSOP	PW	14	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV393APWR	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV393APWRE4	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV393APWRG4	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV393APWT	ACTIVE	TSSOP	PW	14	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV393APWTE4	ACTIVE	TSSOP	PW	14	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV393APWTG4	ACTIVE	TSSOP	PW	14	250	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.

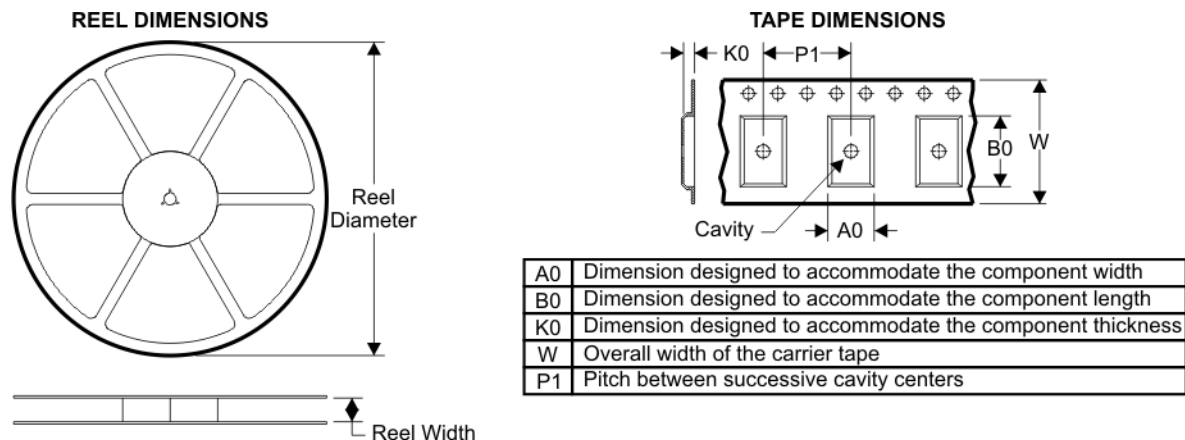
Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

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

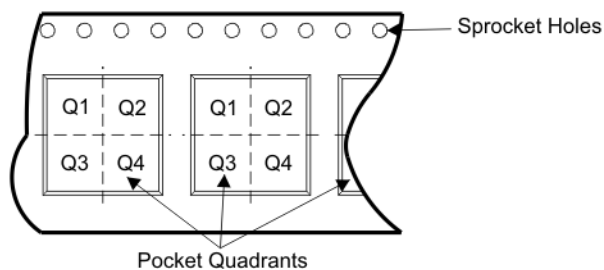
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TAPE AND REEL BOX INFORMATION

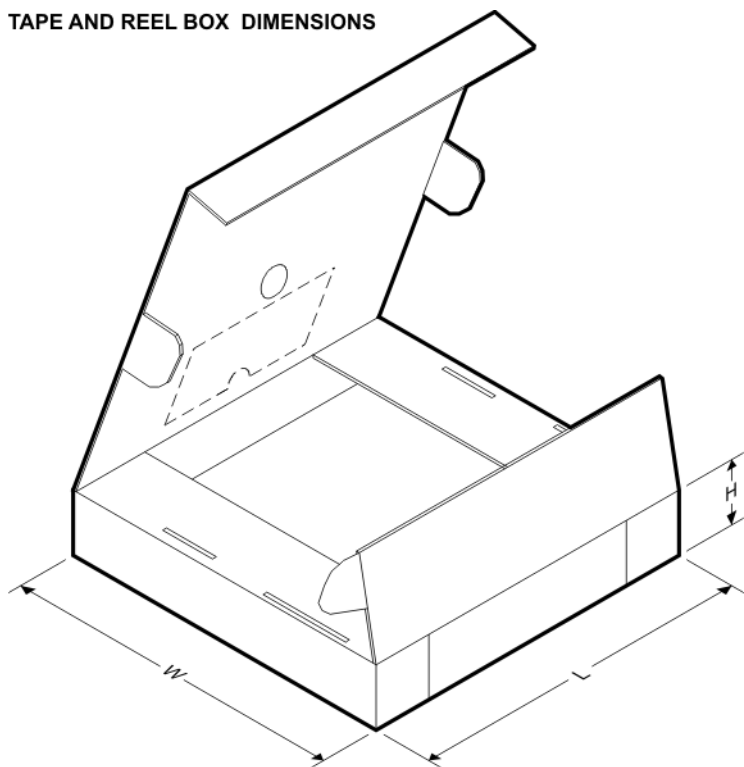


QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



Device	Package	Pins	Site	Reel Diameter (mm)	Reel Width (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74LV393ADBR	DB	14	SITE 41	330	16	8.2	6.6	2.5	12	16	Q1
SN74LV393ADGVR	DGV	14	SITE 41	330	12	6.8	4.0	1.6	8	16	Q1
SN74LV393ADR	D	14	SITE 41	330	16	6.5	9.0	2.1	8	16	Q1
SN74LV393ANSR	NS	14	SITE 41	330	16	8.2	10.5	2.5	12	16	Q1
SN74LV393APWR	PW	14	SITE 41	330	12	7.0	5.6	1.6	8	12	Q1

TAPE AND REEL BOX DIMENSIONS

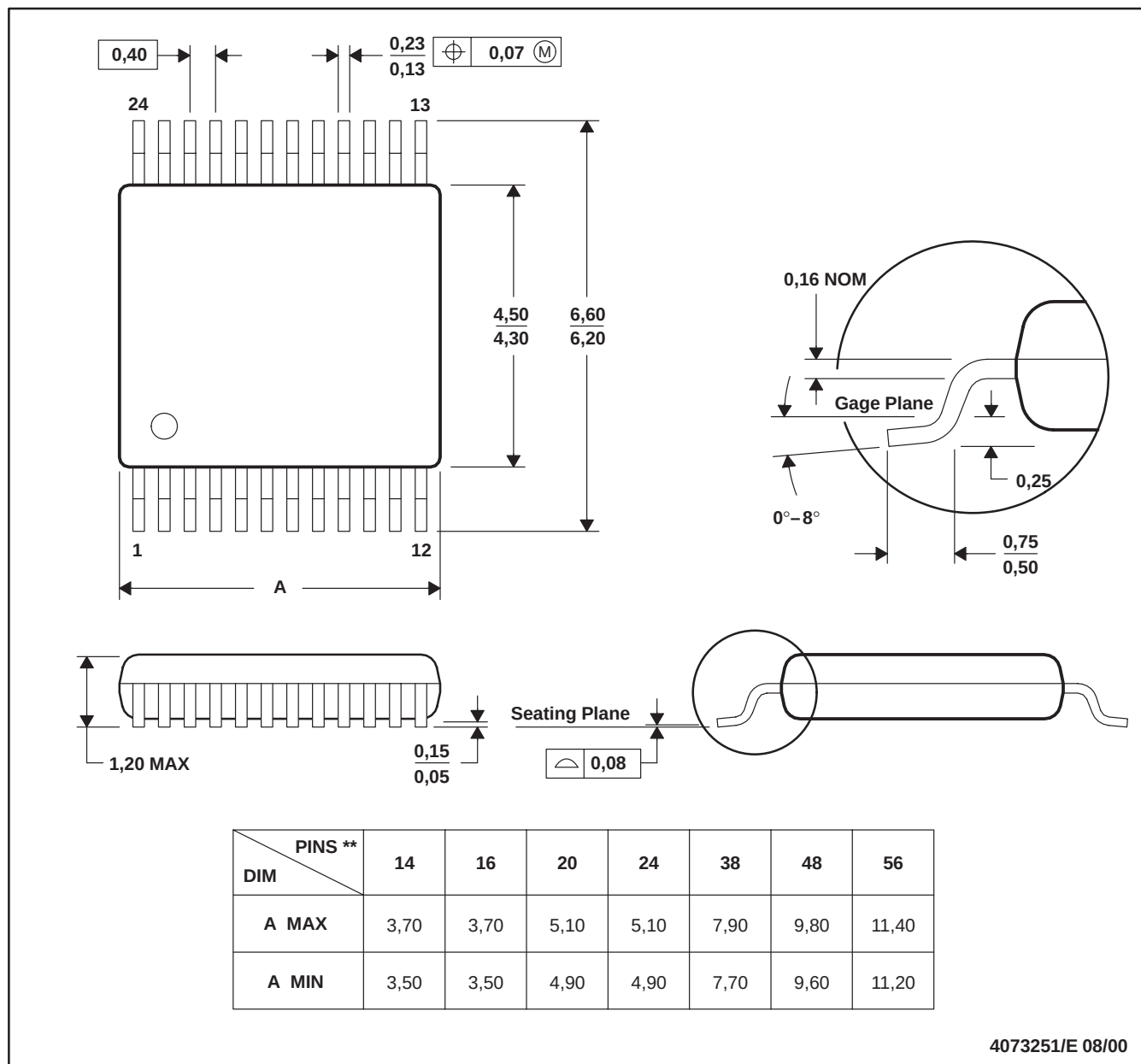


Device	Package	Pins	Site	Length (mm)	Width (mm)	Height (mm)
SN74LV393ADBR	DB	14	SITE 41	346.0	346.0	33.0
SN74LV393ADGVR	DGV	14	SITE 41	346.0	346.0	29.0
SN74LV393ADR	D	14	SITE 41	346.0	346.0	33.0
SN74LV393ANSR	NS	14	SITE 41	346.0	346.0	33.0
SN74LV393APWR	PW	14	SITE 41	346.0	346.0	29.0

DGV (R-PDSO-G**)

PLASTIC SMALL-OUTLINE

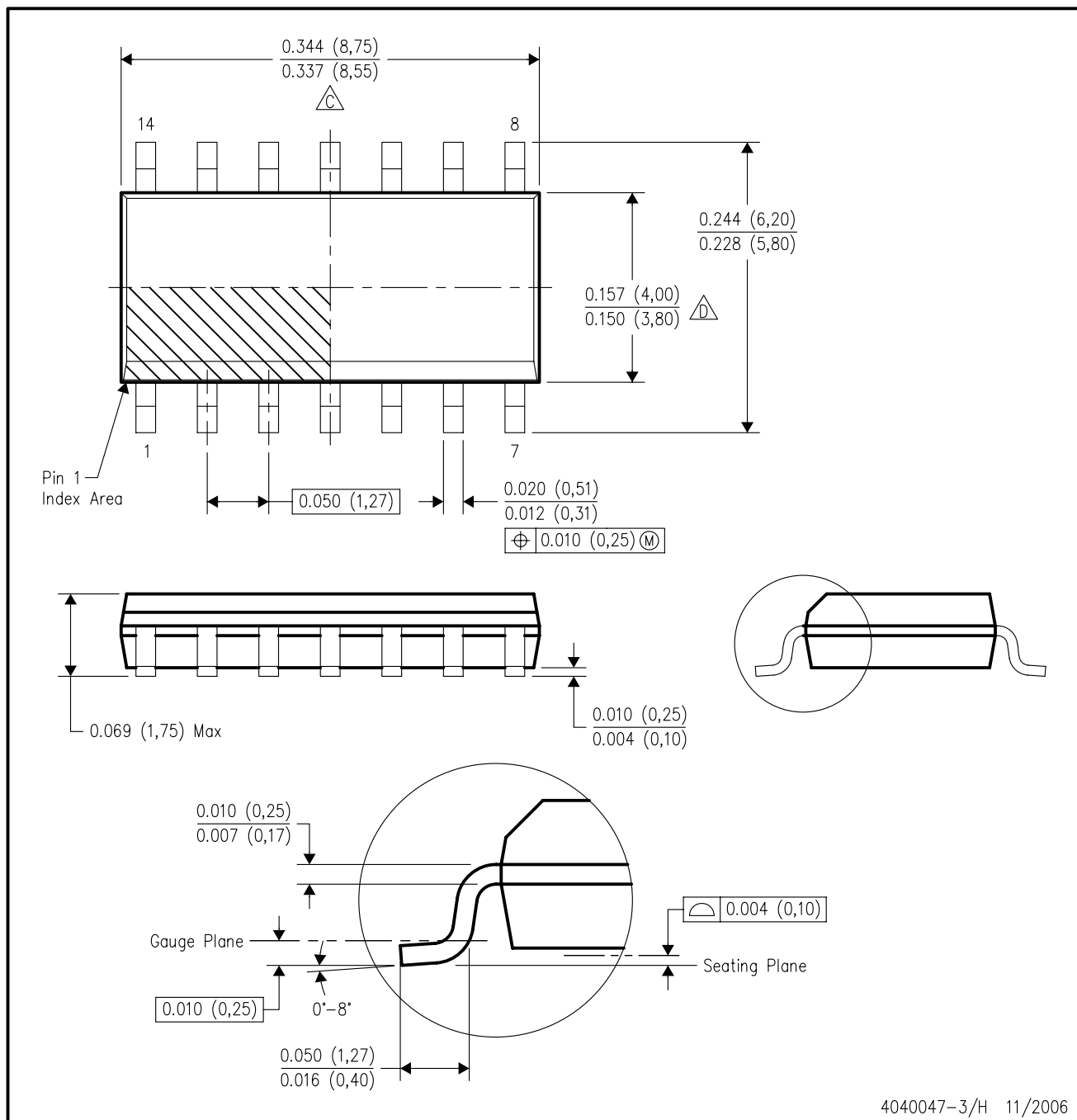
24 PINS SHOWN



- 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 per side.
 D. Falls within JEDEC: 24/48 Pins – MO-153
 14/16/20/56 Pins – MO-194

D (R-PDSO-G14)

PLASTIC SMALL-OUTLINE PACKAGE



NOTES:

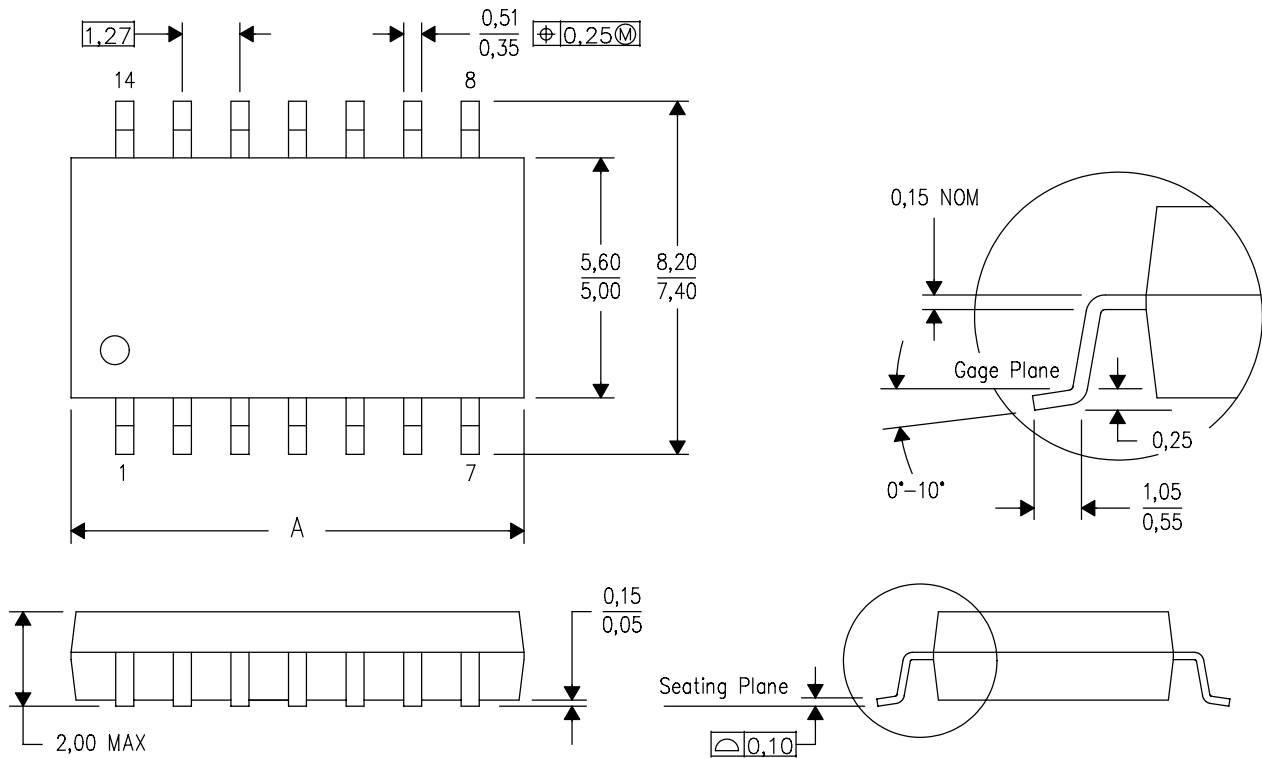
- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- C. Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed .006 (0,15) per end.
- D. Body width does not include interlead flash. Interlead flash shall not exceed .017 (0,43) per side.
- E. Reference JEDEC MS-012 variation AB.

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

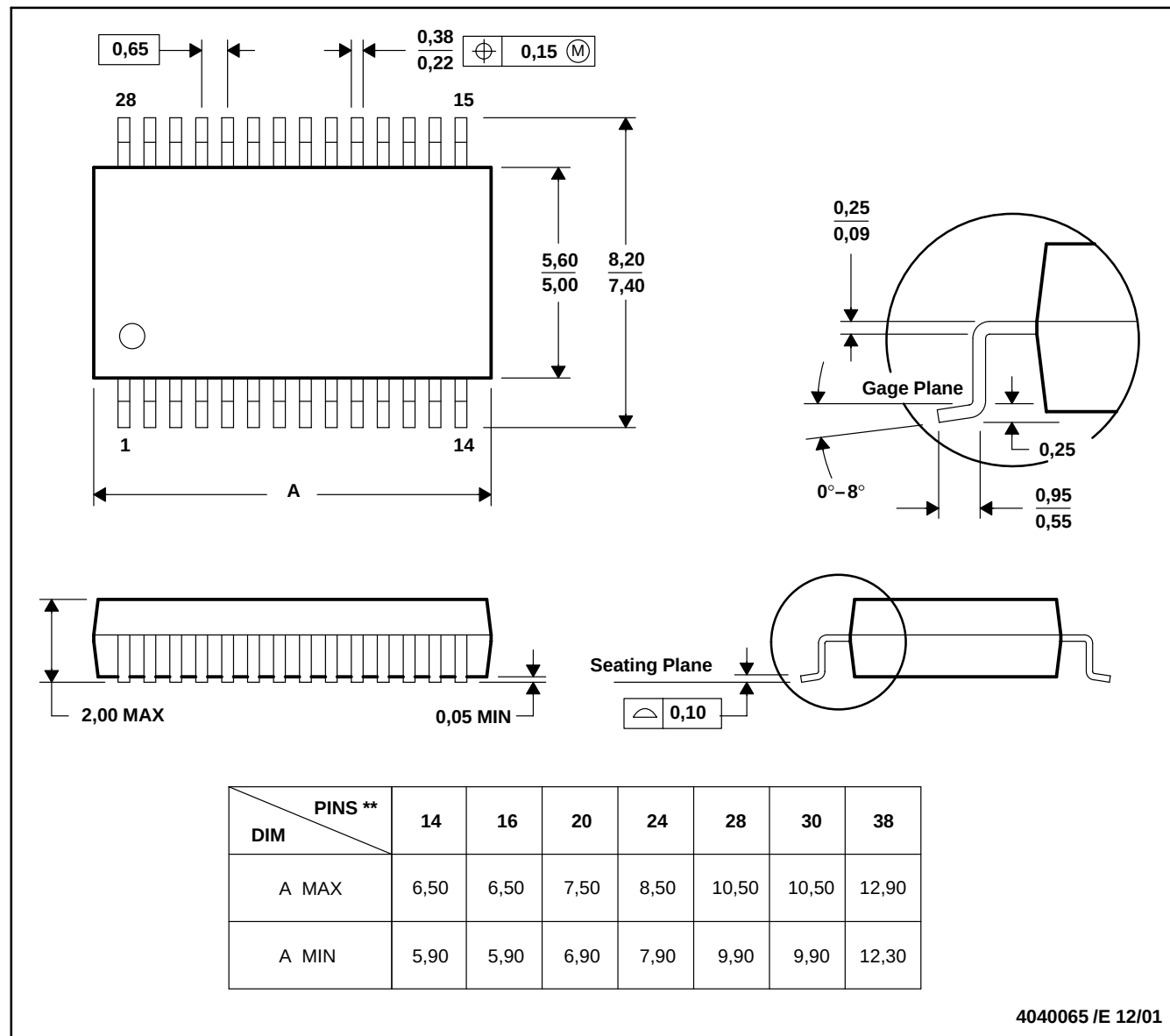
4040062/C 03/03

- 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.

DB (R-PDSO-G**)

PLASTIC SMALL-OUTLINE

28 PINS SHOWN

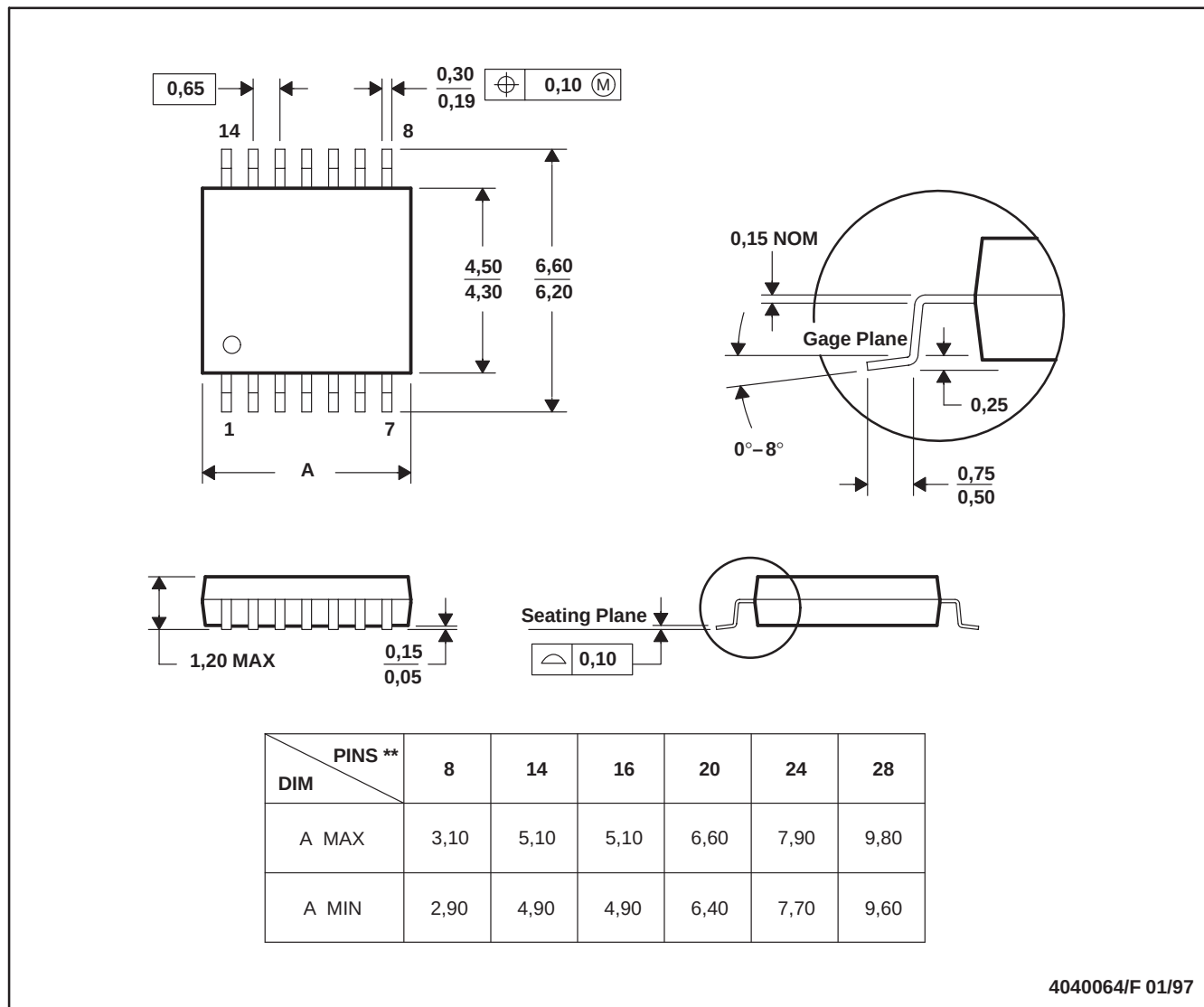


- NOTES: A. All linear dimensions are in millimeters.
 B. This drawing is subject to change without notice.
 C. Body dimensions do not include mold flash or protrusion not to exceed 0,15.
 D. Falls within JEDEC MO-150

PW (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14 PINS SHOWN



- 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.
 D. Falls within JEDEC MO-153

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