- Operate From 1.65 V to 3.6 V
- Specified From –40°C to 85°C, –40°C to 125°C, and –55°C to 125°C
- Inputs Accept Voltages to 5.5 V
- Max t_{pd} of 6.4 ns at 3.3 V
- Typical V_{OLP} (Output Ground Bounce) <0.8 V at V_{CC} = 3.3 V, T_A = 25°C

- Typical V_{OHV} (Output V_{OH} Undershoot) >2 V at V_{CC} = 3.3 V, T_A = 25°C
- 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)

SN54LVC14A . . . J OR W PACKAGE
SN74LVC14A . . . D, DB, DGV, NS, OR PW PACKAGE
(TOP VIEW)

1A	1	14	V_{CC}
1Y	2	13	6A
2A	3	12	6Y
2Y	4	11	5A
3A	5	10	5Y
3Y	6	9	4A
GND	7	8	4Y
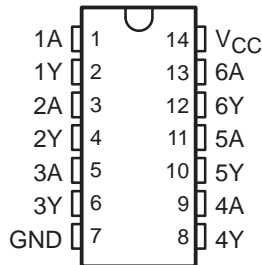
SN74LVC14A . . . RGY PACKAGE
(TOP VIEW)

1A / V_{CC} (pins 1, 14)

1Y	2	13	6A
2A	3	12	6Y
2Y	4	11	5A
3A	5	10	5Y
3Y	6	9	4A

GND / 4Y (pins 7, 8)

SN54LVC14A . . . FK PACKAGE
(TOP VIEW)

1Y 1A NC V_{CC} 6A (pins 3 2 1 20 19)

2A	4	18	6Y
NC	5	17	NC
2Y	6	16	5A
NC	7	15	NC
3A	8	14	5Y

3Y GND NC 4Y 4A (pins 9 10 11 12 13)

NC – No internal connection

description/ordering information

The SN54LVC14A hex Schmitt-trigger inverter is designed for 2.7-V to 3.6-V V_{CC} operation, and the SN74LVC14A hex Schmitt-trigger inverter is designed for 1.65-V to 3.6-V V_{CC} operation.
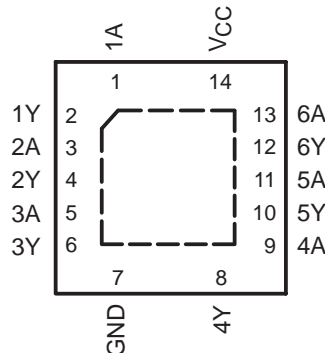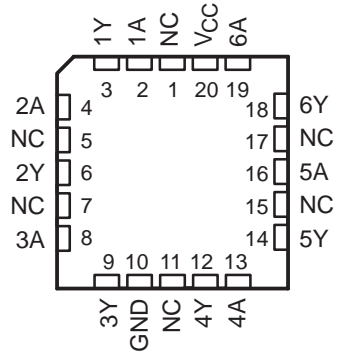
ORDERING INFORMATION

T_A	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
–40°C to 85°C	QFN – RGY	Reel of 1000	SN74LVC14ARGYR	LC14A
–40°C to 125°C	SOIC – D	Tube of 50	SN74LVC14AD	LVC14A
		Reel of 2500	SN74LVC14ADR	
		Reel of 250	SN74LVC14ADT	
	SOP – NS	Reel of 2000	SN74LVC14ANSR	LVC14A
	SSOP – DB	Reel of 2000	SN74LVC14ADBR	LC14A
	TSSOP – PW	Tube of 90	SN74LVC14APW	LC14A
		Reel of 2000	SN74LVC14APWR	
		Reel of 250	SN74LVC14APWT	
	TVSOP – DGV	Reel of 2000	SN74LVC14ADGVR	LC14A
–55°C to 125°C	CDIP – J	Tube of 25	SNJ54LVC14AJ	SNJ54LVC14AJ
	CFP – W	Tube of 150	SNJ54LVC14AW	SNJ54LVC14AW
	LCCC – FK	Tube of 55	SNJ54LVC14AFK	SNJ54LVC14AFK

† 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.

TEXAS INSTRUMENTS

description/ordering information (continued)

The devices contain six independent inverters and perform the Boolean function $Y = \overline{A}$.

Inputs can be driven from either 3.3-V or 5-V devices. This feature allows the use of these devices as translators in a mixed 3.3-V/5-V system environment.

FUNCTION TABLE
(each inverter)

INPUT A	OUTPUT Y
H	L
L	H

logic diagram, each inverter (positive logic)

A ———▷●— Y

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

Supply voltage range, V_{CC} . . . . –0.5 V to 6.5 V
Input voltage range, V_I (see Note 1) . . . . –0.5 V to 6.5 V
Output voltage range, V_O (see Notes 1 and 2) . . . . –0.5 V to V_{CC} + 0.5 V
Input clamp current, I_{IK} (V_I < 0) . . . . –50 mA
Output clamp current, I_{OK} (V_O < 0) . . . . –50 mA
Continuous output current, I_O . . . . ±50 mA
Continuous current through V_{CC} or GND . . . . ±100 mA
Package thermal impedance, θ_{JA} (see Note 3): D package . . . . 86°C/W
(see Note 3): DB package . . . . 96°C/W
(see Note 3): DGV package . . . . 127°C/W
(see Note 3): NS package . . . . 76°C/W
(see Note 3): PW package . . . . 113°C/W
(see Note 4): RGY package . . . . 47°C/W
Storage temperature range, T_{stg} . . . . –65°C to 150°C
Power dissipation, P_{tot} (T_A = –40°C to 125°C) (see Notes 5 and 6) . . . . 500 mW

† 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 negative-voltage and output voltage ratings may be exceeded if the input and output current ratings are observed.
2. The value of V_{CC} is provided in the recommended operating conditions table.
3. The package thermal impedance is calculated in accordance with JESD 51-7.
4. The package thermal impedance is calculated in accordance with JESD 51-5.
5. For the D package: above 70°C, the value of P_{tot} derates linearly with 8 mW/K.
6. For the DB, DGV, NS, and PW packages: above 60°C, the value of P_{tot} derates linearly with 5.5 mW/K.

TEXAS
INSTRUMENTS

POST OFFICE BOX 655303 ● DALLAS, TEXAS 75265

recommended operating conditions (see Note 7)

			SN54LVC14A		UNIT
			−55 TO 125°C		
			MIN	MAX	
V_{CC}	Supply voltage	Operating	2	3.6	V
		Data retention only	1.5		
V_I	Input voltage		0	5.5	V
V_O	Output voltage		0	V_{CC}	V
I_{OH}	High-level output current	V_{CC} = 2.7 V		−12	mA
		V_{CC} = 3 V		−24	
I_{OL}	Low-level output current	V_{CC} = 2.7 V		12	mA
		V_{CC} = 3 V		24	

NOTE 7: 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.

recommended operating conditions (see Note 7)

			SN74LVC14A						UNIT
			T_A = 25°C		−40 TO 85°C		−40 TO 125°C		
			MIN	MAX	MIN	MAX	MIN	MAX	
V_{CC}	Supply voltage	Operating	1.65	3.6	1.65	3.6	1.65	3.6	V
		Data retention only	1.5		1.5		1.5		
V_I	Input voltage		0	5.5	0	5.5	0	5.5	V
V_O	Output voltage		0	V_{CC}	0	V_{CC}	0	V_{CC}	V
I_{OH}	High-level output current	V_{CC} = 1.65 V		−4		−4		−4	mA
		V_{CC} = 2.3 V		−8		−8		−8	
		V_{CC} = 2.7 V		−12		−12		−12	
		V_{CC} = 3 V		−24		−24		−24	
I_{OL}	Low-level output current	V_{CC} = 1.65 V		4		4		4	mA
		V_{CC} = 2.3 V		8		8		8	
		V_{CC} = 2.7 V		12		12		12	
		V_{CC} = 3 V		24		24		24	

NOTE 7: 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}	SN54LVC14A −55 TO 125°C MIN	TYP	MAX	UNIT
V_{T+} Positive-going threshold		2.7 V	0.8		2	V
		3 V	0.9		2	
		3.6 V	1.1		2	
$V_{T−}$ Negative-going threshold		2.7 V	0.4		1.4	V
		3 V	0.6		1.5	
		3.6 V	0.8		1.7	
ΔV_T Hysteresis $(V_{T+} − V_{T−})$		2.7 V	0.3		1.1	V
		3 V	0.3		1.2	
		3.6 V	0.3		1.2	
V_{OH}	$I_{OH} = −100$ μA	2.7 V to 3.6 V	V_{CC}–0.2			V
	$I_{OH} = −12$ mA	2.7 V	2.2			
		3 V	2.4			
	$I_{OH} = −24$ mA	3 V	2.2			
V_{OL}	$I_{OL} = 100$ μA	2.7 V to 3.6 V			0.2	V
	$I_{OL} = 12$ mA	2.7 V			0.4	
	$I_{OL} = 24$ mA	3 V			0.55	
I_I	$V_I = 5.5$ V or GND	3.6 V			±5	μA
I_{CC}	$V_I = V_{CC}$ or GND, $I_O = 0$	3.6 V			10	μA
ΔI_{CC}	One input at $V_{CC} − 0.6$ V, Other inputs at V_{CC} or GND	2.7 V to 3.6 V			500	μA
C_i	$V_I = V_{CC}$ or GND	3.3 V		5[†]		pF

† $T_A = 25$°C

TEXAS
INSTRUMENTS

POST OFFICE BOX 655303 ● DALLAS, TEXAS 75265

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

PARAMETER	TEST CONDITIONS	V_{CC}	SN74LVC14A							UNIT
			T_A = 25°C			−40 TO 85°C		−40 TO 125°C		
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V_{T+} Positive-going threshold		1.65 V	0.4		1.3	0.4	1.3	0.4	1.3	V
		1.95 V	0.6		1.5	0.6	1.5	0.6	1.5	
		2.3 V	0.8		1.7	0.8	1.7	0.8	1.7	
		2.5 V	0.8		1.7	0.8	1.7	0.8	1.7	
		2.7 V	0.8		2	0.8	2	0.8	2	
		3 V	0.9		2	0.9	2	0.9	2	
		3.6 V	1.1		2	1.1	2	1.1	2	
V_{T-} Negative-going threshold		1.65 V	0.15		0.85	0.15	0.85	0.15	0.85	V
		1.95 V	0.25		0.95	0.25	0.95	0.25	0.95	
		2.3 V	0.4		1.2	0.4	1.2	0.4	1.2	
		2.5 V	0.4		1.2	0.4	1.2	0.4	1.2	
		2.7 V	0.4		1.4	0.4	1.4	0.4	1.4	
		3 V	0.6		1.5	0.6	1.5	0.6	1.5	
		3.6 V	0.8		1.7	0.8	1.7	0.8	1.7	
ΔV_T Hysteresis ($V_{T+} - V_{T-}$)		1.65 V	0.1		1.15	0.1	1.15	0.1	1.15	V
		1.95 V	0.15		1.25	0.15	1.25	0.15	1.25	
		2.3 V	0.25		1.3	0.25	1.3	0.25	1.3	
		2.5 V	0.25		1.3	0.25	1.3	0.25	1.3	
		2.7 V	0.3		1.1	0.3	1.1	0.3	1.1	
		3 V	0.3		1.2	0.3	1.2	0.3	1.2	
		3.6 V	0.3		1.2	0.3	1.2	0.3	1.2	
V_{OH}	I_{OH} = −100 µA	1.65 V to 3.6 V	V_{CC}–0.2			V_{CC}–0.2		V_{CC}–0.3		V
	I_{OH} = −4 mA	1.65 V	1.29			1.2		1.05		
	I_{OH} = −8 mA	2.3 V	1.9			1.7		1.65		
	I_{OH} = −12 mA	2.7 V	2.2			2.2		2.05		
		3 V	2.4			2.4		2.25		
	I_{OH} = −24 mA	3 V	2.3			2.2		2		
V_{OL}	I_{OL} = 100 µA	1.65 V to 3.6 V			0.1		0.2		0.3	V
	I_{OL} = 4 mA	1.65 V			0.24		0.45		0.6	
	I_{OL} = 8 mA	2.3 V			0.3		0.7		0.75	
	I_{OL} = 12 mA	2.7 V			0.4		0.4		0.6	
	I_{OL} = 24 mA	3 V			0.55		0.55		0.8	
I_I	V_I = 5.5 V or GND	3.6 V			±1		±5		±20	µA
I_{CC}	V_I = V_{CC} or GND, I_O = 0	3.6 V			1		10		40	µA
ΔI_{CC}	One input at V_{CC} − 0.6 V, Other inputs at V_{CC} or GND	2.7 V to 3.6 V			500		500		5000	µA
C_i	V_I = V_{CC} or GND	3.3 V		5						pF

TEXAS
INSTRUMENTS

POST OFFICE BOX 655303 ● DALLAS, TEXAS 75265

SN54LVC14A, SN74LVC14A
## HEX SCHMITT-TRIGGER INVERTERS

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

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC}	SN54LVC14A −55 TO 125°C		UNIT
				MIN	MAX	
t_{pd}	A	Y	2.7 V		7.5	ns
			3.3 V ± 0.3 V	1	6.4	

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

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC}	SN74LVC14A						UNIT
				$T_A = 25°C$			−40 TO 85°C		−40 TO 125°C	
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{pd}	A	Y	1.8 V ± 0.15 V	1	5	10.5	1	11	1	13	ns
			2.5 V ± 0.2 V	1	3.4	7.3	1	7.8	1	10	
			2.7 V	1	3.6	7.3	1	7.5	1	9.5	
			3.3 V ± 0.3 V	1	3.2	6.2	1	6.4	1	8	
$t_{sk(o)}$			3.3 V ± 0.3 V			1		1		1.5	ns

operating characteristics, $T_A = 25°C$

PARAMETER		TEST CONDITIONS	V_{CC}	TYP	UNIT
C_{pd}	Power dissipation capacitance per inverter	f = 10 MHz	1.8 V	11	pF
			2.5 V	12	
			3.3 V	15	

![Texas Instruments logo]

POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

PARAMETER MEASUREMENT INFORMATION
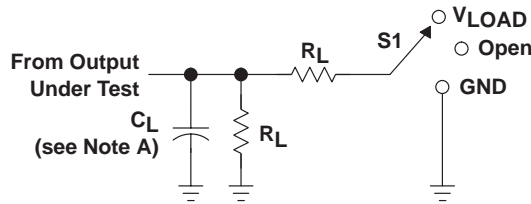
LOAD CIRCUIT

TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	V_{LOAD}
t_{PHZ}/t_{PZH}	GND

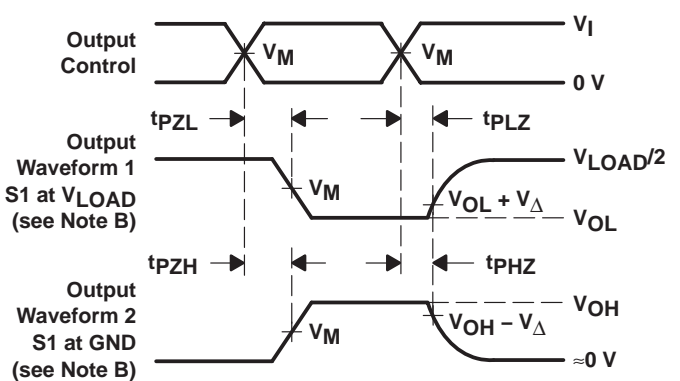| V_{CC}	INPUTS		V_M	V_{LOAD}	C_L	R_L	V_Δ
	V_I	t_r/t_f					
1.8 V ± 0.15 V	V_{CC}	≤2 ns	$V_{CC}/2$	$2 \times V_{CC}$	30 pF	1 kΩ	0.15 V
2.5 V ± 0.2 V	V_{CC}	≤2 ns	$V_{CC}/2$	$2 \times V_{CC}$	30 pF	500 Ω	0.15 V
2.7 V	2.7 V	≤2.5 ns	1.5 V	6 V	50 pF	500 Ω	0.3 V
3.3 V ± 0.3 V	2.7 V	≤2.5 ns	1.5 V	6 V	50 pF	500 Ω	0.3 V
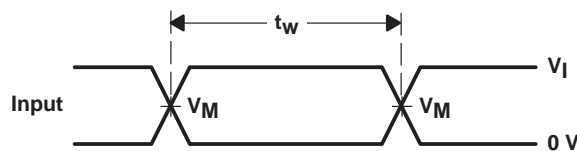
VOLTAGE WAVEFORMS
PULSE DURATION
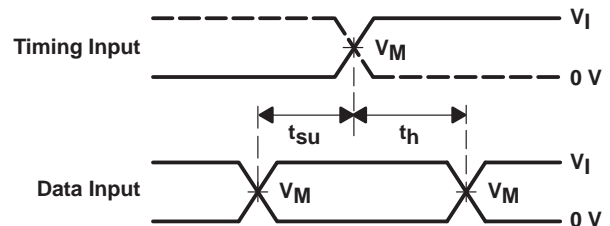
VOLTAGE WAVEFORMS
SETUP AND HOLD TIMES
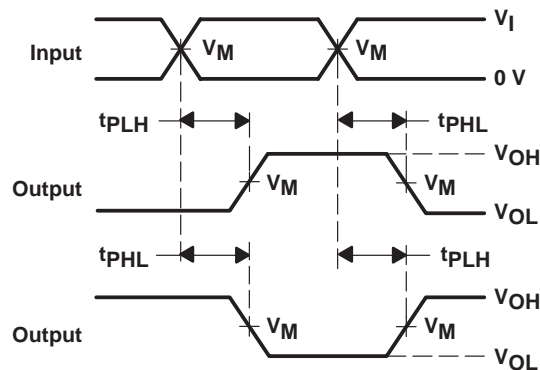
VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES
INVERTING AND NONINVERTING OUTPUTS

VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES
LOW- AND HIGH-LEVEL ENABLING

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. All input pulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz, Z_O = 50 Ω.
  D. The outputs are measured one at a time, with one transition per measurement.
  E. t_{PLZ} and t_{PHZ} are the same as t_{dis}.
  F. t_{PZL} and t_{PZH} are the same as t_{en}.
  G. t_{PLH} and t_{PHL} are the same as t_{pd}.
  H. All parameters and waveforms are not applicable to all devices.

Figure 1. Load Circuit and Voltage Waveforms

TEXAS
INSTRUMENTS

PACKAGING INFORMATION

Orderable Device	Status [1]	Package Type	Package Drawing	Pins	Package Qty	Eco Plan [2]	Lead/Ball Finish	MSL Peak Temp [3]
5962-9761501Q2A	ACTIVE	LCCC	FK	20	1	None	Call TI	Level-NC-NC-NC
5962-9761501QCA	ACTIVE	CDIP	J	14	1	None	Call TI	Level-NC-NC-NC
5962-9761501QDA	ACTIVE	CFP	W	14	1	None	Call TI	Level-NC-NC-NC
5962-9761501VCA	ACTIVE	CDIP	J	14	1	None	Call TI	Level-NC-NC-NC
5962-9761501VDA	ACTIVE	CFP	W	14	1	None	Call TI	Level-NC-NC-NC
SN74LVC14AD	ACTIVE	SOIC	D	14	50	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74LVC14ADBLE	OBSOLETE	SSOP	DB	14		None	Call TI	Call TI
SN74LVC14ADBR	ACTIVE	SSOP	DB	14	2000	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74LVC14ADGVR	ACTIVE	TVSOP	DGV	14	2000	Pb-Free (RoHS)	CU NIPDAU	Level-1-250C-UNLIM
SN74LVC14ADR	ACTIVE	SOIC	D	14	2500	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74LVC14ADT	ACTIVE	SOIC	D	14	250	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74LVC14ANSR	ACTIVE	SO	NS	14	2000	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74LVC14APW	ACTIVE	TSSOP	PW	14	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVC14APWLE	OBSOLETE	TSSOP	PW	14		None	Call TI	Call TI
SN74LVC14APWR	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVC14APWT	ACTIVE	TSSOP	PW	14	250	Pb-Free (RoHS)	CU NIPDAU	Level-1-250C-UNLIM
SN74LVC14ARGYR	ACTIVE	QFN	RGY	14	1000	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR
SNJ54LVC14AFK	ACTIVE	LCCC	FK	20	1	None	Call TI	Level-NC-NC-NC
SNJ54LVC14AJ	ACTIVE	CDIP	J	14	1	None	Call TI	Level-NC-NC-NC
SNJ54LVC14AW	ACTIVE	CFP	W	14	1	None	Call TI	Level-NC-NC-NC

[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 - May not be currently available - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.
None: Not yet available Lead (Pb-Free).
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.
Green (RoHS & no Sb/Br): TI defines "Green" to mean "Pb-Free" and in addition, uses package materials that do not contain halogens, including bromine (Br) or antimony (Sb) above 0.1% of total product weight.

[3] MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDECindustry standard classifications, and peak solder temperature.

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.
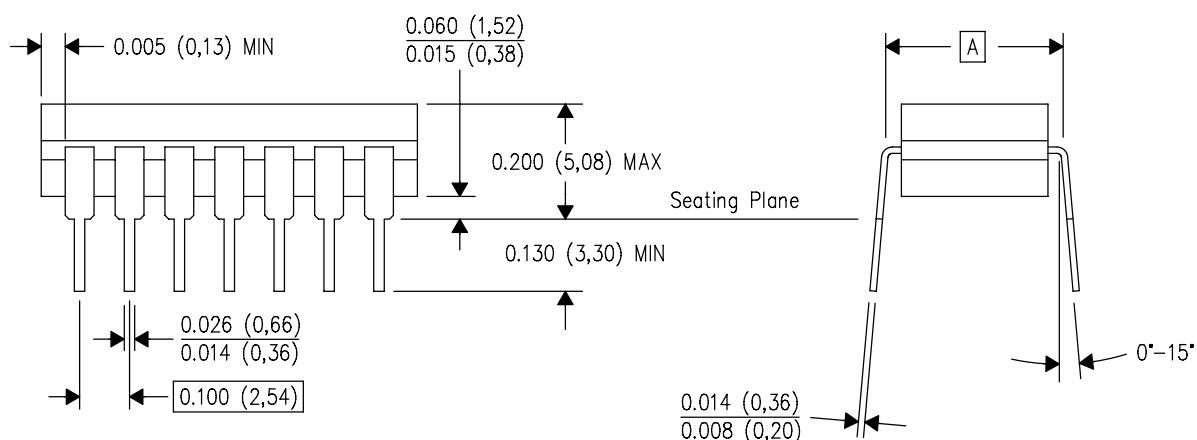
J (R−GDIP−T**)   CERAMIC DUAL IN−LINE PACKAGE
14 LEADS SHOWN
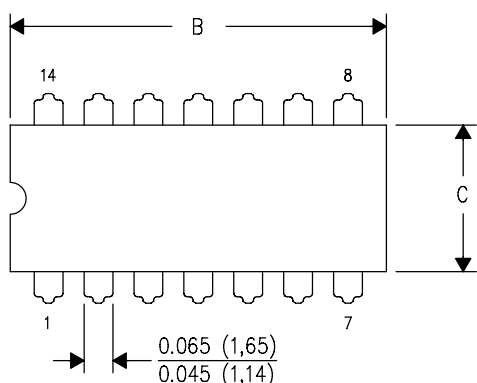
DIM \ PINS **	14	16	18	20
A	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC
B MAX	0.785 (19,94)	.840 (21,34)	0.960 (24,38)	1.060 (26,92)
B MIN	——	——	——	——
C MAX	0.300 (7,62)	0.300 (7,62)	0.310 (7,87)	0.300 (7,62)
C MIN	0.245 (6,22)	0.245 (6,22)	0.220 (5,59)	0.245 (6,22)

B

14   8

0.065 (1,65)
0.045 (1,14)

1   7

C

0.005 (0,13) MIN

0.060 (1,52)
0.015 (0,38)

0.200 (5,08) MAX

Seating Plane

0.130 (3,30) MIN

0.026 (0,66)
0.014 (0,36)

0.100 (2,54)
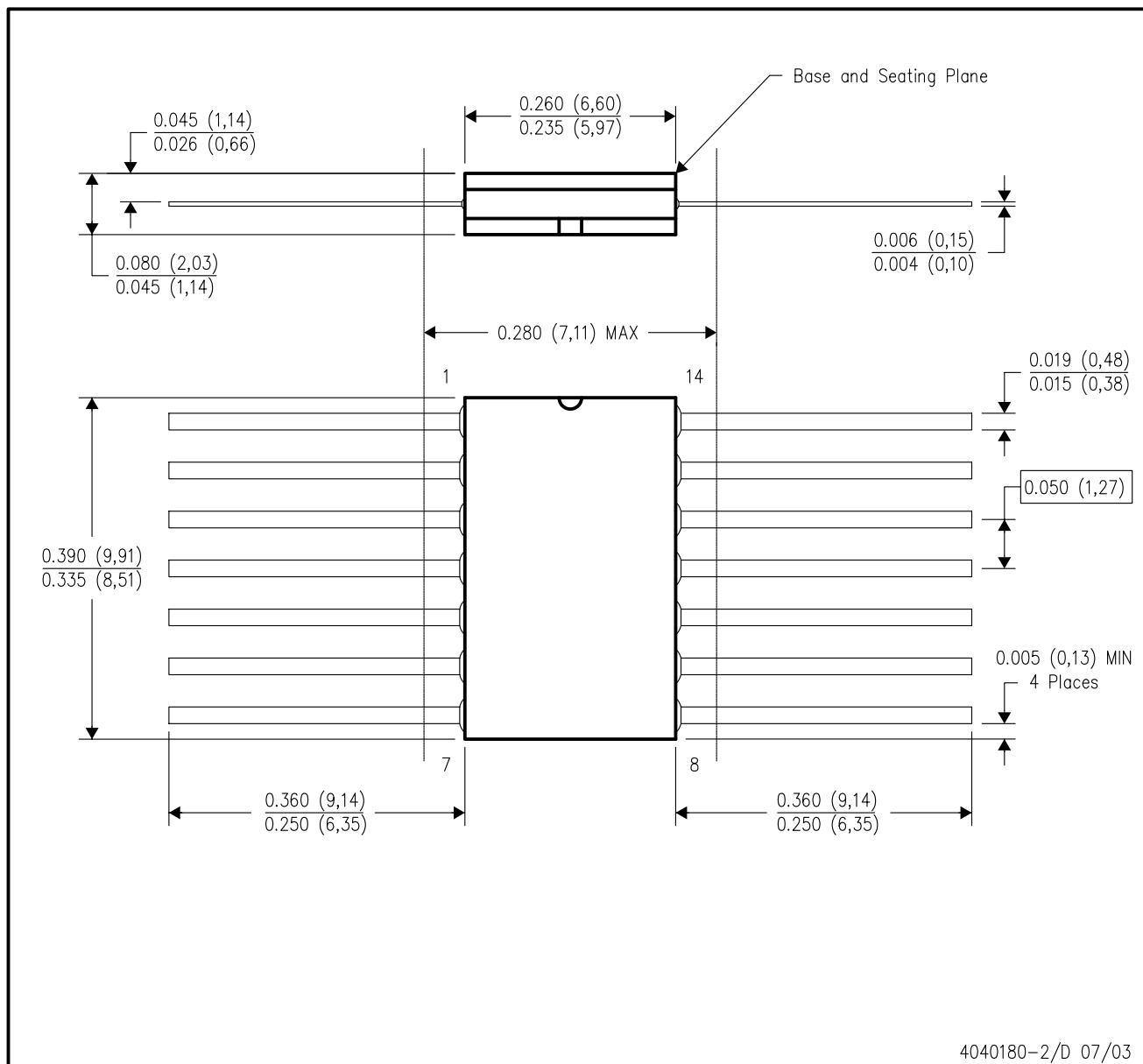
A

0°−15°

0.014 (0,36)
0.008 (0,20)

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.

W (R−GDFP−F14)   CERAMIC DUAL FLATPACK

Base and Seating Plane

0.045 (1,14)
0.026 (0,66)

0.260 (6,60)
0.235 (5,97)

0.080 (2,03)
0.045 (1,14)

0.006 (0,15)
0.004 (0,10)

0.280 (7,11) MAX

1   14

0.019 (0,48)
0.015 (0,38)

0.050 (1,27)

0.390 (9,91)
0.335 (8,51)

0.005 (0,13) MIN
4 Places

7   8

0.360 (9,14)
0.250 (6,35)

0.360 (9,14)
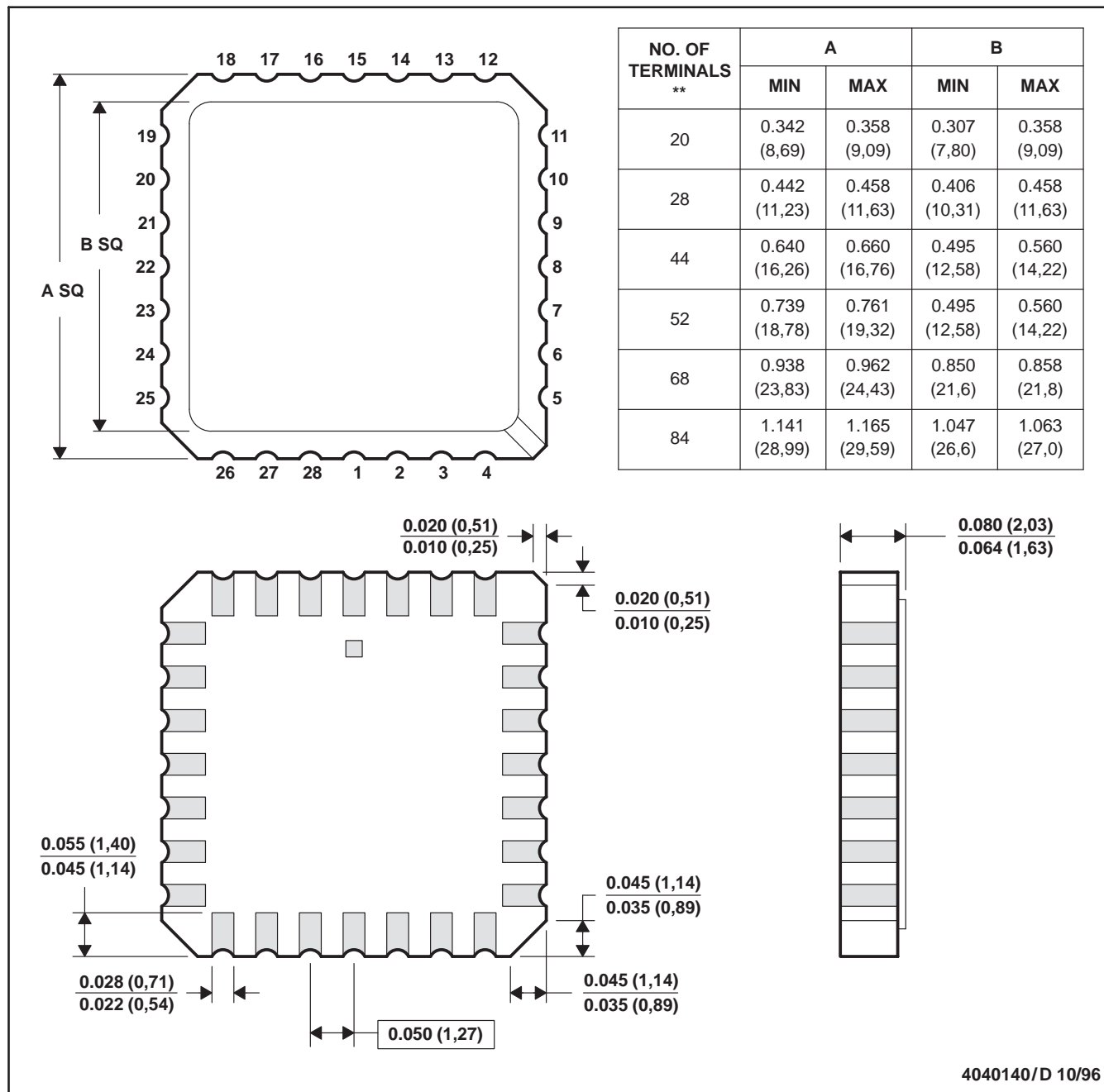0.250 (6,35)

4040180−2/D 07/03

NOTES: A.   All linear dimensions are in inches (millimeters).
         B.   This drawing is subject to change without notice.
         C.   This package can be hermetically sealed with a ceramic lid using glass frit.
         D.   Index point is provided on cap for terminal identification only.
         E.   Falls within MIL STD 1835 GDFP1−F14 and JEDEC MO−092AB

MECHANICAL DATA

MLCC006B – OCTOBER 1996

FK (S-CQCC-N**) **LEADLESS CERAMIC CHIP CARRIER**

28 TERMINAL SHOWN

NO. OF TERMINALS **	A		B	
	MIN	MAX	MIN	MAX
20	0.342 (8,69)	0.358 (9,09)	0.307 (7,80)	0.358 (9,09)
28	0.442 (11,23)	0.458 (11,63)	0.406 (10,31)	0.458 (11,63)
44	0.640 (16,26)	0.660 (16,76)	0.495 (12,58)	0.560 (14,22)
52	0.739 (18,78)	0.761 (19,32)	0.495 (12,58)	0.560 (14,22)
68	0.938 (23,83)	0.962 (24,43)	0.850 (21,6)	0.858 (21,8)
84	1.141 (28,99)	1.165 (29,59)	1.047 (26,6)	1.063 (27,0)

4040140/D 10/96

NOTES: A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. This package can be hermetically sealed with a metal lid.
D. The terminals are gold plated.
E. Falls within JEDEC MS-004

TEXAS INSTRUMENTS
POST OFFICE BOX 655303 ● DALLAS, TEXAS 75265

DGV (R-PDSO-G)**　　　　　　　　　　　　　　　　　　**PLASTIC SMALL-OUTLINE**

24 PINS SHOWN

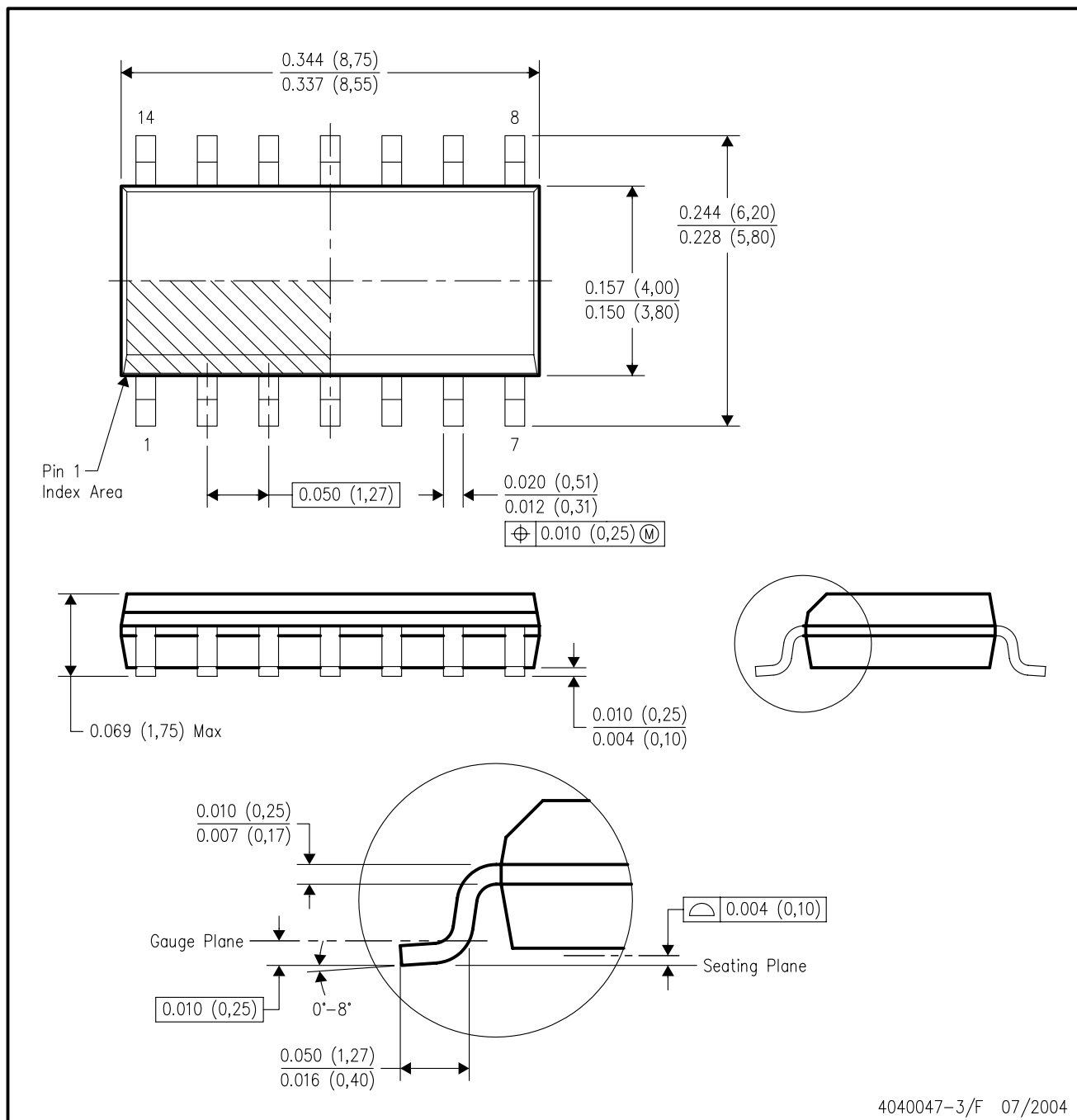| PINS ** DIM	14	16	20	24	38	48	56
A MAX	3,70	3,70	5,10	5,10	7,90	9,80	11,40
A MIN	3,50	3,50	4,90	4,90	7,70	9,60	11,20

4073251/E 08/00

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
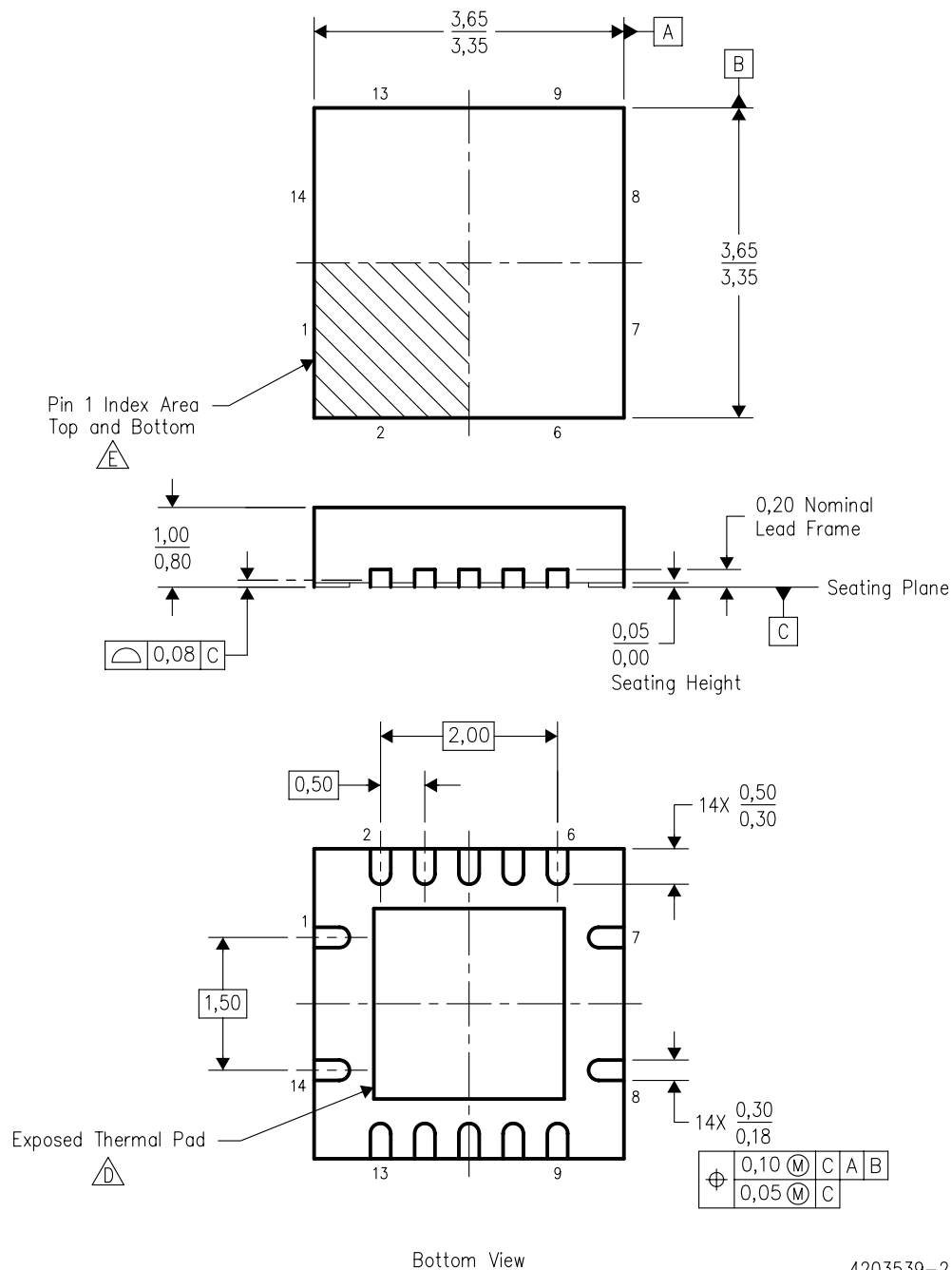　　　　　　　　　　　　　　　14/16/20/56 Pins – MO-194

D (R−PDSO−G14) PLASTIC SMALL−OUTLINE PACKAGE

0.344 (8,75)
0.337 (8,55)

14   8

0.244 (6,20)
0.228 (5,80)

0.157 (4,00)
0.150 (3,80)

1   7

Pin 1
Index Area

0.050 (1,27)

0.020 (0,51)
0.012 (0,31)

⊕ | 0.010 (0,25) Ⓜ

0.069 (1,75) Max

0.010 (0,25)
0.004 (0,10)

0.010 (0,25)
0.007 (0,17)

Gauge Plane

0.004 (0,10)

Seating Plane

0.010 (0,25)   0°−8°

0.050 (1,27)
0.016 (0,40)

4040047−3/F   07/2004

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−012 variation AB.

RGY (S–PQFP–N14)   **PLASTIC QUAD FLATPACK**

$\frac{3,65}{3,35}$ A

B

$\frac{3,65}{3,35}$

Pin 1 Index Area
Top and Bottom
E

$\frac{1,00}{0,80}$

0,20 Nominal
Lead Frame

Seating Plane

⌓ 0,08 C

$\frac{0,05}{0,00}$
Seating Height

C

2,00

0,50

14X $\frac{0,50}{0,30}$

1,50

Exposed Thermal Pad
D

14X $\frac{0,30}{0,18}$

⌖	0,10 Ⓜ	C	A	B
	0,05 Ⓜ	C		

Bottom View

4203539–2/F 02/2005

NOTES: A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M–1994.
        B. This drawing is subject to change without notice.
        C. QFN (Quad Flatpack No–Lead) package configuration.

        D. The package thermal pad must be soldered to the board for thermal and mechanical performance.
           See the Product Data Sheet for details regarding the exposed thermal pad dimensions.

        E. Pin 1 identifiers are located on both top and bottom of the package and within the zone indicated.
           The Pin 1 identifiers are either a molded, marked, or metal feature.
        F. Package complies to JEDEC MO–241 variation BA.

TEXAS INSTRUMENTS
www.ti.com

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

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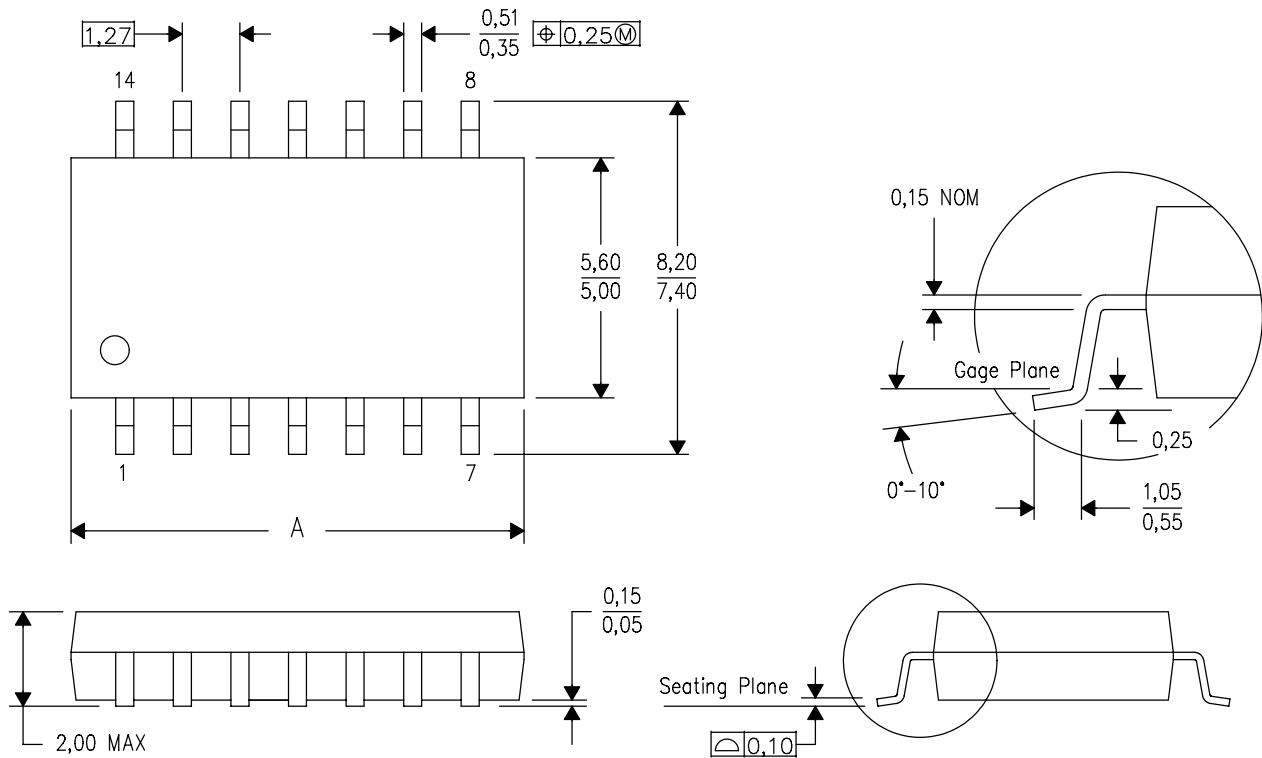
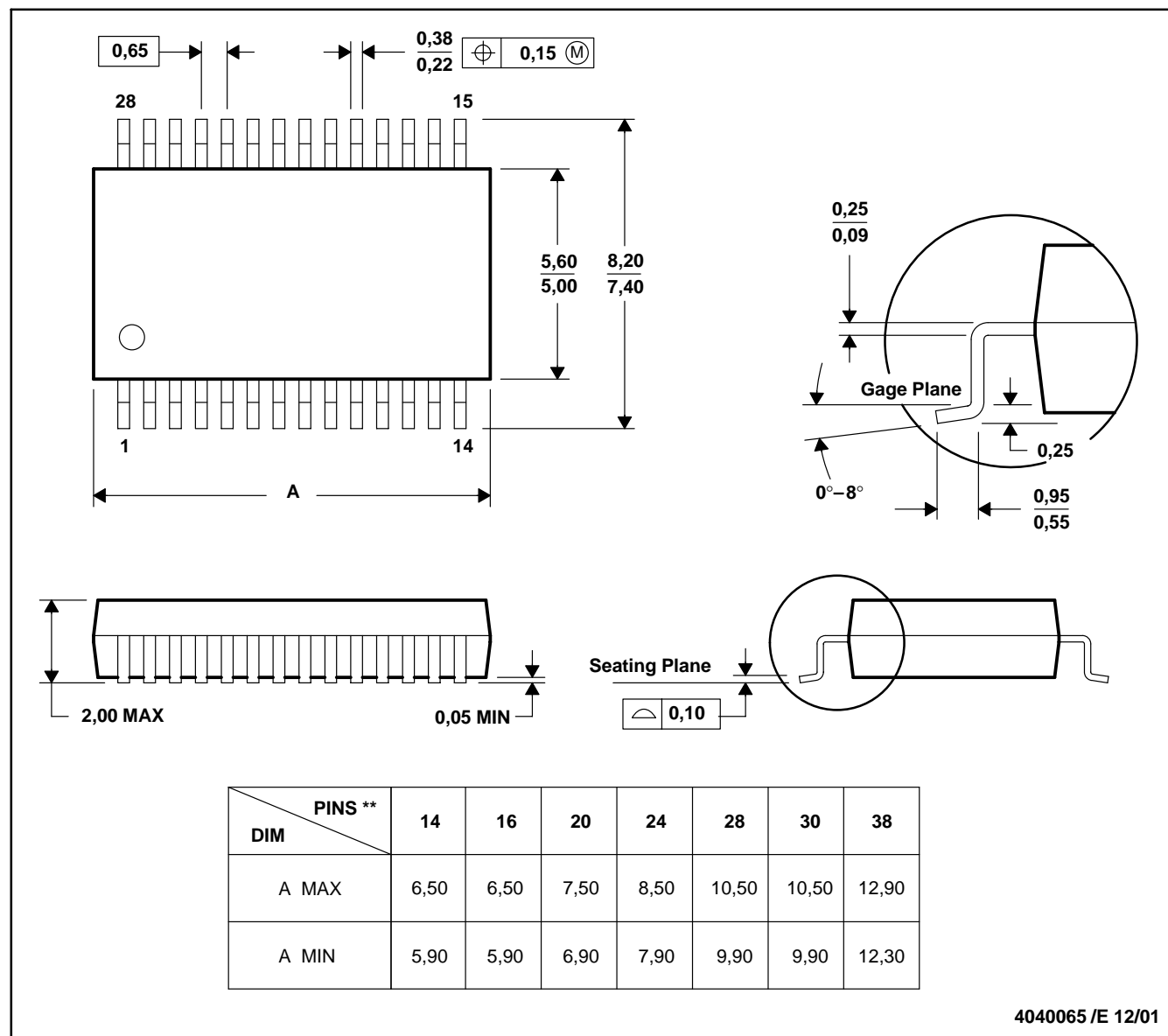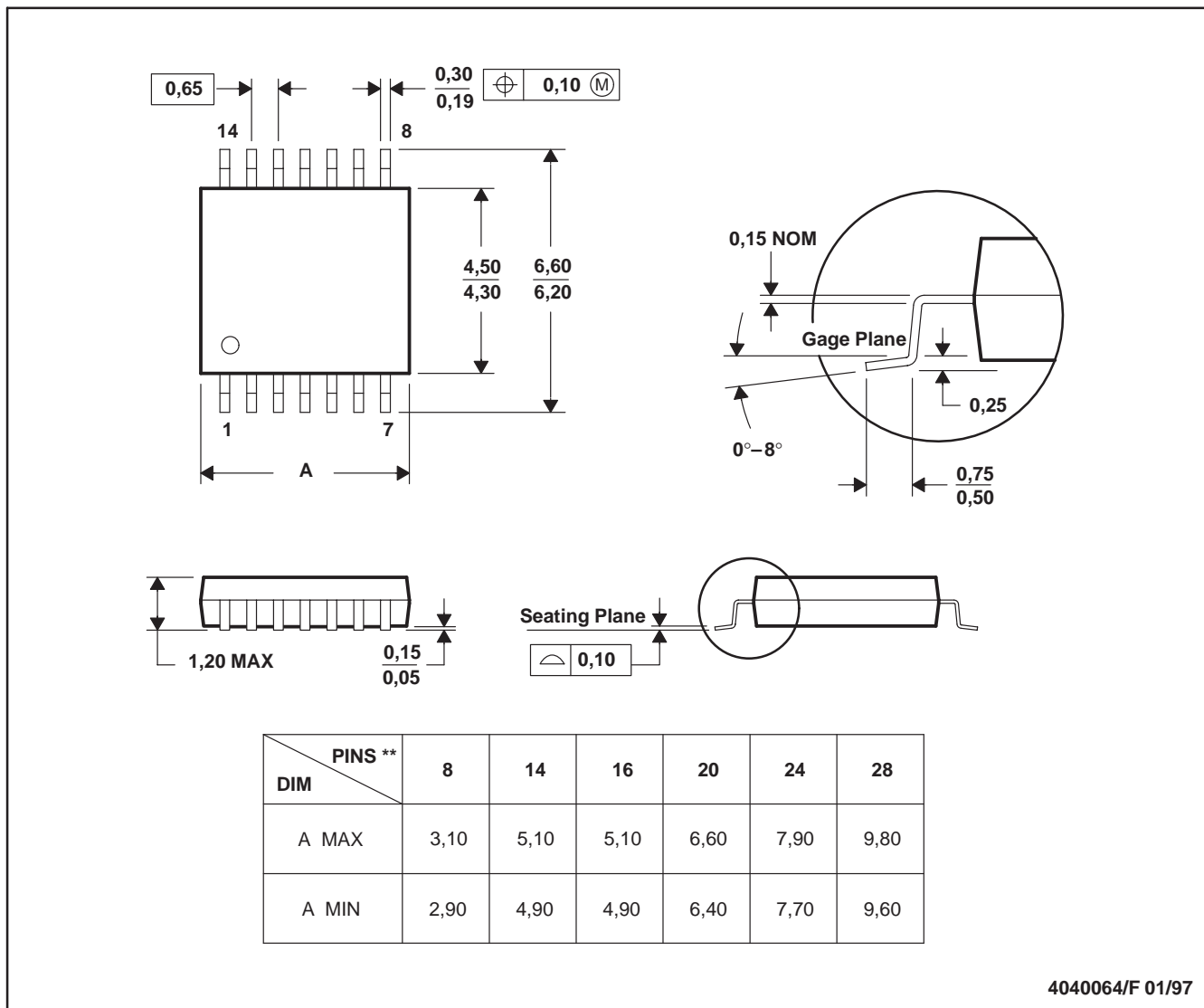| DIM \ PINS **	14	16	20	24
A MAX	10,50	10,50	12,90	15,30
A MIN	9,90	9,90	12,30	14,70

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

PINS ** DIM	14	16	20	24	28	30	38
A MAX	6,50	6,50	7,50	8,50	10,50	10,50	12,90
A MIN	5,90	5,90	6,90	7,90	9,90	9,90	12,30

4040065 /E 12/01

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

	PINS **	8	14	16	20	24	28
DIM							
A MAX		3,10	5,10	5,10	6,60	7,90	9,80
A MIN		2,90	4,90	4,90	6,40	7,70	9,60

4040064/F 01/97

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

![Texas Instruments logo]

TEXAS INSTRUMENTS

POST OFFICE BOX 655303 ● DALLAS, TEXAS 75265

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products		**Applications**	
Amplifiers	amplifier.ti.com	Audio	www.ti.com/audio
Data Converters	dataconverter.ti.com	Automotive	www.ti.com/automotive
DSP	dsp.ti.com	Broadband	www.ti.com/broadband
Interface	interface.ti.com	Digital Control	www.ti.com/digitalcontrol
Logic	logic.ti.com	Military	www.ti.com/military
Power Mgmt	power.ti.com	Optical Networking	www.ti.com/opticalnetwork
Microcontrollers	microcontroller.ti.com	Security	www.ti.com/security
		Telephony	www.ti.com/telephony
		Video & Imaging	www.ti.com/video
		Wireless	www.ti.com/wireless

Mailing Address: Texas Instruments

Post Office Box 655303 Dallas, Texas 75265