

DUAL POSITIVE-EDGE-TRIGGERED D-TYPE FLIP-FLOPS WITH CLEAR AND PRESET

Check for Samples: [SN54LVC74A](#), [SN74LVC74A](#)

FEATURES

- Operate From 1.65 V to 3.6 V
- Inputs Accept Voltages to 5.5 V
- Max t_{pd} of 5.2 ns at 3.3 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 V at $V_{CC} = 3.3$ V, $T_A = 25^\circ\text{C}$
- Latch-Up Performance Exceeds 250 mA Per JESD 17
- ESD Protection Exceeds JESD 22
 - 2000-V Human-Body Model (A114-A)
 - 200-V Machine Model (A115-A)
 - 1000-V Charged-Device Model (C101)

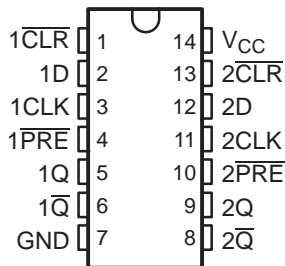
DESCRIPTION

The SN54LVC74A dual positive-edge-triggered D-type flip-flop is designed for 2.7-V to 3.6-V V_{CC} operation, and the SN74LVC74A dual positive-edge-triggered D-type flip-flop is designed for 1.65-V to 3.6-V V_{CC} operation.

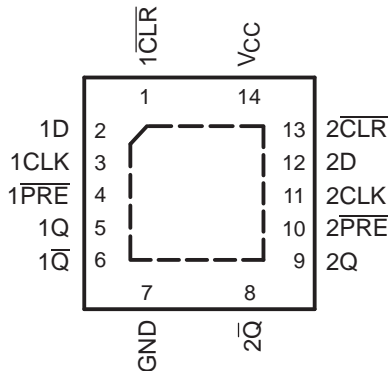
A low level at the preset ($\overline{\text{PRE}}$) or clear ($\overline{\text{CLR}}$) inputs sets or resets the outputs, regardless of the levels of the other inputs. When $\overline{\text{PRE}}$ and $\overline{\text{CLR}}$ are inactive (high), data at the data (D) input meeting the setup time requirements is transferred to the outputs on the positive-going edge of the clock pulse. Clock triggering occurs at a voltage level and is not directly related to the rise time of the clock pulse. Following the hold-time interval, data at the D input can be changed without affecting the levels at the outputs.

The data I/Os and control inputs are overvoltage tolerant. This feature allows the use of these devices for down-translation in a mixed-voltage environment.

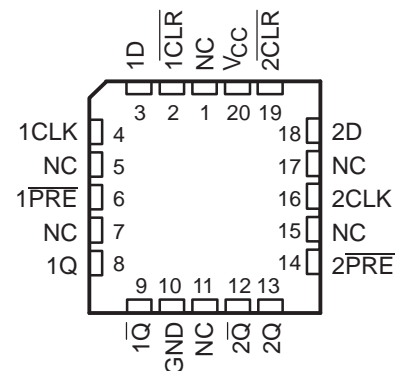
SN54LVC74A ... J OR W PACKAGE
SN74LVC74A ... D, DB, NS, OR PW PACKAGE
(TOP VIEW)



SN74LVC74A ... RGY PACKAGE
(TOP VIEW)



SN54LVC74A ... FK PACKAGE
(TOP VIEW)



NC - No internal connection



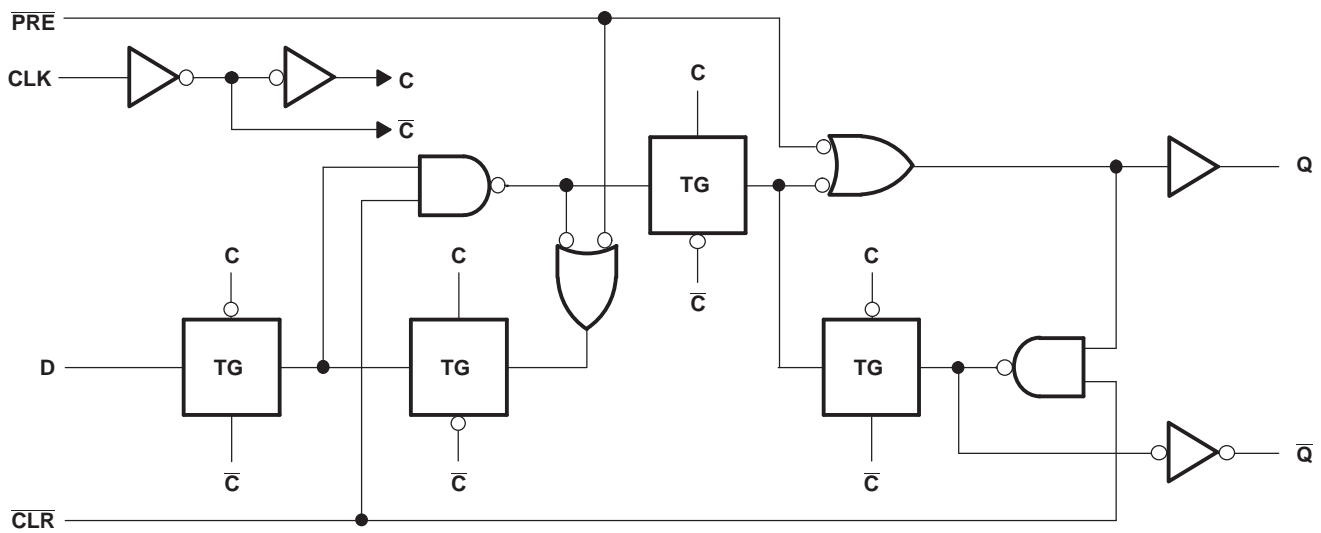
Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

FUNCTION TABLE

INPUTS				OUTPUTS	
$\overline{\text{PRE}}$	$\overline{\text{CLR}}$	CLK	D	Q	$\overline{\text{Q}}$
L	H	X	X	H	L
H	L	X	X	L	H
L	L	X	X	H ⁽¹⁾	H ⁽¹⁾
H	H	↑	H	H	L
H	H	↑	L	L	H
H	H	L	X	Q ₀	$\overline{\text{Q}}_0$

(1) This configuration is nonstable; that is, it does not persist when $\overline{\text{PRE}}$ or $\overline{\text{CLR}}$ returns to its inactive (high) level.

LOGIC DIAGRAM, EACH FLIP-FLOP (POSITIVE LOGIC)



Absolute Maximum Ratings⁽¹⁾

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

		MIN	MAX	UNIT
V _{CC}	Supply voltage range	–0.5	6.5	V
V _I	Input voltage range ⁽²⁾	–0.5	6.5	V
V _O	Output voltage range ⁽²⁾ ⁽³⁾	–0.5	V _{CC} + 0.5	V
I _{IK}	Input clamp current		–50	mA
I _{OK}	Output clamp current		–50	mA
I _O	Continuous output current		±50	mA
	Continuous current through V _{CC} or GND		±100	mA
θ _{JA}	Package thermal impedance	D package ⁽⁴⁾	86	°C/W
		DB package ⁽⁴⁾	96	
		NS package ⁽⁴⁾	76	
		PW package ⁽⁴⁾	113	
		RGY package ⁽⁵⁾	47	
T _{stg}	Storage temperature range	–65	150	°C

- (1) 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.
- (2) The input and output negative-voltage ratings may be exceeded if the input and output current ratings are observed.
- (3) The value of V_{CC} is provided in the recommended operating conditions table.
- (4) The package thermal impedance is calculated in accordance with JESD 51-7.
- (5) The package thermal impedance is calculated in accordance with JESD 51-5.

Recommended Operating Conditions⁽¹⁾

		SN54LVC74A		SN74LVC74A		UNIT	
		MIN	MAX	MIN	MAX		
V _{CC}	Supply voltage	Operating	2	3.6	1.65	3.6	V
		Data retention only	1.5		1.5		
V _{IH}	High-level input voltage	V _{CC} = 1.65 V to 1.95 V			0.65 × V _{CC}		V
		V _{CC} = 2.3 V to 2.7 V			1.7		
		V _{CC} = 2.7 V to 3.6 V	2		2		
V _{IL}	Low-level input voltage	V _{CC} = 1.65 V to 1.95 V			0.35 × V _{CC}		V
		V _{CC} = 2.3 V to 2.7 V			0.7		
		V _{CC} = 2.7 V to 3.6 V		0.8	0.8		
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} = 1.65 V			–4	mA	
		V _{CC} = 2.3 V			–8		
		V _{CC} = 2.7 V		–12	–12		
		V _{CC} = 3 V		–24	–24		
I _{OL}	Low-level output current	V _{CC} = 1.65 V			4	mA	
		V _{CC} = 2.3 V			8		
		V _{CC} = 2.7 V		12	12		
		V _{CC} = 3 V		24	24		
Δt/Δv	Input transition rise or fall rate		10		10	ns/V	
T _A	Operating free-air temperature	–55	125	–40	125	°C	

- (1) 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}	–55°C TO 125°C ⁽¹⁾			–40°C TO 85°C ⁽¹⁾			–40°C TO 125°C			UNIT
			SN54LVC74A			SN74LVC74A			Recommended			
			MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
V _{OH}	I _{OH} = –100 μA	1.65 V to 3.6 V				V _{CC} – 0.2				V _{CC} – 0.2	V	
		2.7 V to 3.6 V	V _{CC} – 0.2									
	I _{OH} = –4 mA	1.65 V				1.2			1.2			
	I _{OH} = –8 mA	2.3 V				1.7			1.7			
	I _{OH} = –12 mA	2.7 V	2.2			2.2			2.2			
		3 V	2.4			2.4			2.4			
I _{OH} = –24 mA	3 V	2.2			2.2			2.2				
V _{OL}	I _{OL} = 100 μA	1.65 V to 3.6 V					0.2			0.2	V	
		2.7 V to 3.6 V			0.2							
	I _{OL} = 4 mA	1.65 V				0.45			0.45			
	I _{OL} = 8 mA	2.3 V				0.7			0.7			
	I _{OL} = 12 mA	2.7 V			0.4		0.4			0.4		
3 V				0.55		0.55			0.55			
I _I	V _I = 5.5 V or GND	3.6 V			±5			±5		±5	μA	
I _{CC}	V _I = V _{CC} or GND, I _O = 0	3.6 V			10			10		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			500		500	μA	
C _i	V _I = V _{CC} or GND	3.3 V			5			5		5	pF	

(1) All typical values are at V_{CC} = 3.3 V, T_A = 25°C.

Timing Requirements

over recommended operating free-air temperature range (unless otherwise noted) (see [Figure 1](#))

		SN54LVC74A				UNIT
		V _{CC} = 2.7 V		V _{CC} = 3.3 V ± 0.3 V		
		MIN	MAX	MIN	MAX	
f _{clock}	Clock frequency		83		100	MHz
t _w	Pulse duration	PRE or CLR low		3.3	3.3	ns
		CLK high or low		3.3	3.3	
t _{su}	Setup time before CLK↑	Data		3.4	3	ns
		PRE or CLR inactive		2.2	2	
t _h	Hold time, data after CLK↑		1		1	ns

Timing Requirements

 over recommended operating free-air temperature range (unless otherwise noted) (see [Figure 1](#))

		SN74LVC74A								UNIT
		–40°C to 85°C		–40°C to 125°C		–40°C to 85°C		–40°C to 125°C		
				Recommended				Recommended		
		$V_{CC} = 1.8\text{ V} \pm 0.15\text{ V}$		$V_{CC} = 1.8\text{ V} \pm 0.15\text{ V}$		$V_{CC} = 2.5\text{ V} \pm 0.2\text{ V}$		$V_{CC} = 2.5\text{ V} \pm 0.2\text{ V}$		
		MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
f_{clock}	Clock frequency	83		83		83		83		MHz
t_w	Pulse duration	PRE or CLR low		4.1		4.1		3.3		ns
		CLK high or low		4.1		4.1		3.3		
t_{su}	Setup time before CLK↑	Data		3.6		3.6		2.3		ns
		PRE or CLR inactive		2.7		2.7		1.9		
t_h	Hold time, data after CLK↑	1		1		1		1		ns

Timing Requirements

 over recommended operating free-air temperature range (unless otherwise noted) (see [Figure 1](#))

		SN74LVC74A								UNIT
		–40°C to 85°C		–40°C to 125°C		–40°C to 85°C		–40°C to 125°C		
				Recommended				Recommended		
		$V_{CC} = 2.7\text{ V}$		$V_{CC} = 2.7\text{ V}$		$V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$		$V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$		
		MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
f_{clock}	Clock frequency	83		83		150		100		MHz
t_w	Pulse duration	PRE or CLR low		3.3		3.3		3.3		ns
		CLK high or low		3.3		3.3		3.3		
t_{su}	Setup time before CLK↑	Data		3.4		3		3		ns
		PRE or CLR inactive		2.2		2		2		
t_h	Hold time, data after CLK↑	1		1		0		1		ns

Switching Characteristics

 over recommended operating free-air temperature range (unless otherwise noted) (see [Figure 1](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	SN54LVC74A				UNIT
			$V_{CC} = 2.7\text{ V}$		$V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$		
			MIN	MAX	MIN	MAX	
f_{max}			83		100		MHz
t_{pd}	CLK	Q or \bar{Q}	6		1	5.2	ns
	PRE or CLR		6.4		1	5.4	

Switching Characteristics

 over recommended operating free-air temperature range (unless otherwise noted) (see [Figure 1](#))

		SN74LVC74A								UNIT	
		–40°C to 85°C		–40°C to 125°C		–40°C to 85°C		–40°C to 125°C			
				Recommended				Recommended			
		$V_{CC} = 1.8\text{ V} \pm 0.15\text{ V}$		$V_{CC} = 1.8\text{ V} \pm 0.15\text{ V}$		$V_{CC} = 2.5\text{ V} \pm 0.2\text{ V}$		$V_{CC} = 2.5\text{ V} \pm 0.2\text{ V}$			
		MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX		
f_{max}		83		83		83		83		MHz	
t_{pd}	CLK	Q or \bar{Q}	1	7.1	1	7.1	1	4.4	1	4.4	ns
	PRE or CLR		1	6.9	1	6.9	1	4.6	1	4.6	
$t_{\text{sk}(o)}$										ns	

Switching Characteristics

over recommended operating free-air temperature range (unless otherwise noted) (see [Figure 1](#))

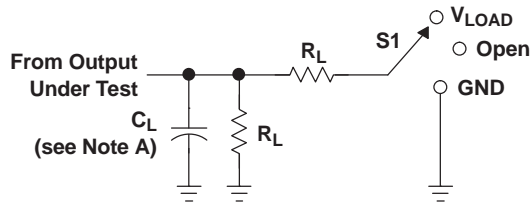
PARAMETER	FROM (INPUT)	TO (OUTPUT)	SN74LVC74A								UNIT
			–40°C to 85°C		–40°C to 125°C		–40°C to 85°C		–40°C to 125°C		
					Recommended				Recommended		
			$V_{CC} = 2.7\text{ V}$		$V_{CC} = 2.7\text{ V}$		$V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$		$V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$		
MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX				
f_{\max}			83		83		150		100	MHz	
t_{pd}	CLK	Q or \bar{Q}	1	6		6	1	5.2		5.2	ns
	$\overline{\text{PRE}}$ or $\overline{\text{CLR}}$		1	6.4		6.4	1	5.4		5.4	
$t_{sk(o)}$							1			ns	

Operating Characteristics

$T_A = 25^\circ\text{C}$

PARAMETER	TEST CONDITIONS	$V_{CC} = 1.8\text{ V}$	$V_{CC} = 2.5\text{ V}$	$V_{CC} = 3.3\text{ V}$	UNIT
		TYP	TYP	TYP	
C_{pd} Power dissipation capacitance per flip-flop	$f = 10\text{ MHz}$	24	24	26	pF

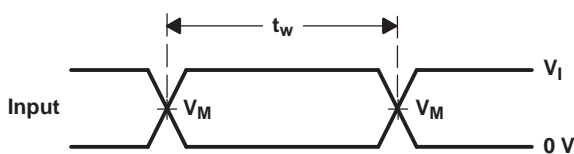
PARAMETER MEASUREMENT INFORMATION



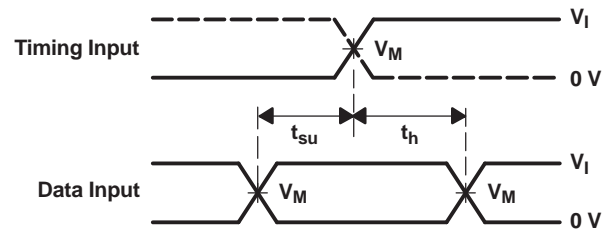
LOAD CIRCUIT

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

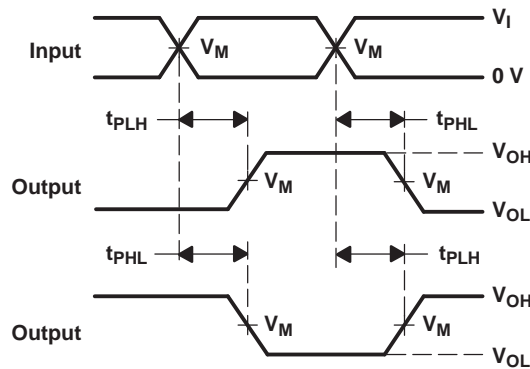
V_{CC}	INPUTS		V_M	V_{LOAD}	C_L	R_L	V_{Δ}
	V_I	t_r/t_f					
$1.8\text{ V} \pm 0.15\text{ V}$	V_{CC}	$\leq 2\text{ ns}$	$V_{CC}/2$	$2 \times V_{CC}$	30 pF	1 k Ω	0.15 V
$2.5\text{ V} \pm 0.2\text{ V}$	V_{CC}	$\leq 2\text{ ns}$	$V_{CC}/2$	$2 \times V_{CC}$	30 pF	500 Ω	0.15 V
2.7 V	2.7 V	$\leq 2.5\text{ ns}$	1.5 V	6 V	50 pF	500 Ω	0.3 V
$3.3\text{ V} \pm 0.3\text{ V}$	2.7 V	$\leq 2.5\text{ ns}$	1.5 V	6 V	50 pF	500 Ω	0.3 V



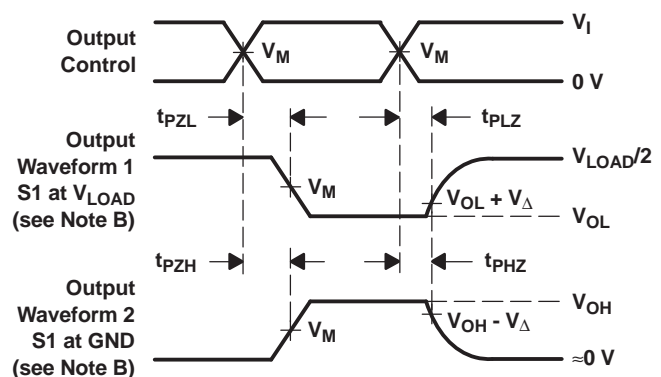
VOLTAGE WAVEFORMS PULSE DURATION



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: $PRR \leq 10\text{ MHz}$, $Z_O = 50\ \Omega$.
 - 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

REVISION HISTORY

Changes from Revision S (May 2005) to Revision T	Page
• Extended maximum temperature operating range from 85°C to 125°C.	3

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
5962-9761601Q2A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	5962-9761601Q2A SNJ54LVC74AFK	Samples
5962-9761601QCA	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-9761601QC A SNJ54LVC74AJ	Samples
5962-9761601QDA	ACTIVE	CFP	W	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-9761601QD A SNJ54LVC74AW	Samples
5962-9761601VDA	ACTIVE	CFP	W	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-9761601VD A SNV54LVC74AW	Samples
SN74LVC74AD	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	LVC74A	Samples
SN74LVC74ADBLE	OBSOLETE	SSOP	DB	14		TBD	Call TI	Call TI	-40 to 125		
SN74LVC74ADBR	ACTIVE	SSOP	DB	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	LC74A	Samples
SN74LVC74ADBRG4	ACTIVE	SSOP	DB	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	LC74A	Samples
SN74LVC74ADE4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	LVC74A	Samples
SN74LVC74ADG4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	LVC74A	Samples
SN74LVC74ADR	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	LVC74A	Samples
SN74LVC74ADRE4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	LVC74A	Samples
SN74LVC74ADRG4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	LVC74A	Samples
SN74LVC74ADT	ACTIVE	SOIC	D	14	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	LVC74A	Samples
SN74LVC74ADTG4	ACTIVE	SOIC	D	14	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	LVC74A	Samples

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
SN74LVC74ANSR	ACTIVE	SO	NS	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	LVC74A	Samples
SN74LVC74APW	ACTIVE	TSSOP	PW	14	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	LC74A	Samples
SN74LVC74APWG4	ACTIVE	TSSOP	PW	14	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	LC74A	Samples
SN74LVC74APWLE	OBSOLETE	TSSOP	PW	14		TBD	Call TI	Call TI	-40 to 125		
SN74LVC74APWR	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU CU SN	Level-1-260C-UNLIM	-40 to 125	LC74A	Samples
SN74LVC74APWRE4	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	LC74A	Samples
SN74LVC74APWRG4	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	LC74A	Samples
SN74LVC74APWT	ACTIVE	TSSOP	PW	14	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	LC74A	Samples
SN74LVC74APWTG4	ACTIVE	TSSOP	PW	14	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	LC74A	Samples
SN74LVC74ARGYR	ACTIVE	VQFN	RGY	14	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 125	LC74A	Samples
SN74LVC74ARGYRG4	ACTIVE	VQFN	RGY	14	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 125	LC74A	Samples
SNJ54LVC74AFK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	5962-9761601Q2A SNJ54LVC74AFK	Samples
SNJ54LVC74AJ	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-9761601QC A SNJ54LVC74AJ	Samples
SNJ54LVC74AW	ACTIVE	CFP	W	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-9761601QD A SNJ54LVC74AW	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 SN54LVC74A, SN54LVC74A-SP, SN74LVC74A :

- Catalog: [SN74LVC74A](#), [SN54LVC74A](#)
- Automotive: [SN74LVC74A-Q1](#), [SN74LVC74A-Q1](#)
- Enhanced Product: [SN74LVC74A-EP](#), [SN74LVC74A-EP](#)
- Military: [SN54LVC74A](#)
- Space: [SN54LVC74A-SP](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects
- Enhanced Product - Supports Defense, Aerospace and Medical Applications
- Military - QML certified for Military and Defense Applications
- Space - Radiation tolerant, ceramic packaging and qualified for use in Space-based application

TAPE AND REEL INFORMATION

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
SN74LVC74ADBR	SSOP	DB	14	2000	330.0	16.4	8.2	6.6	2.5	12.0	16.0	Q1
SN74LVC74ADR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
SN74LVC74ADT	SOIC	D	14	250	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
SN74LVC74ANSR	SO	NS	14	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1
SN74LVC74APWR	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74LVC74APWR	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74LVC74APWRG4	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74LVC74APWT	TSSOP	PW	14	250	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74LVC74ARGYR	VQFN	RGY	14	3000	330.0	12.4	3.75	3.75	1.15	8.0	12.0	Q1

TAPE AND REEL BOX DIMENSIONS


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74LVC74ADBR	SSOP	DB	14	2000	367.0	367.0	38.0
SN74LVC74ADR	SOIC	D	14	2500	367.0	367.0	38.0
SN74LVC74ADT	SOIC	D	14	250	367.0	367.0	38.0
SN74LVC74ANSR	SO	NS	14	2000	367.0	367.0	38.0
SN74LVC74APWR	TSSOP	PW	14	2000	364.0	364.0	27.0
SN74LVC74APWR	TSSOP	PW	14	2000	367.0	367.0	35.0
SN74LVC74APWRG4	TSSOP	PW	14	2000	367.0	367.0	35.0
SN74LVC74APWT	TSSOP	PW	14	250	367.0	367.0	35.0
SN74LVC74ARGYR	VQFN	RGY	14	3000	367.0	367.0	35.0

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)

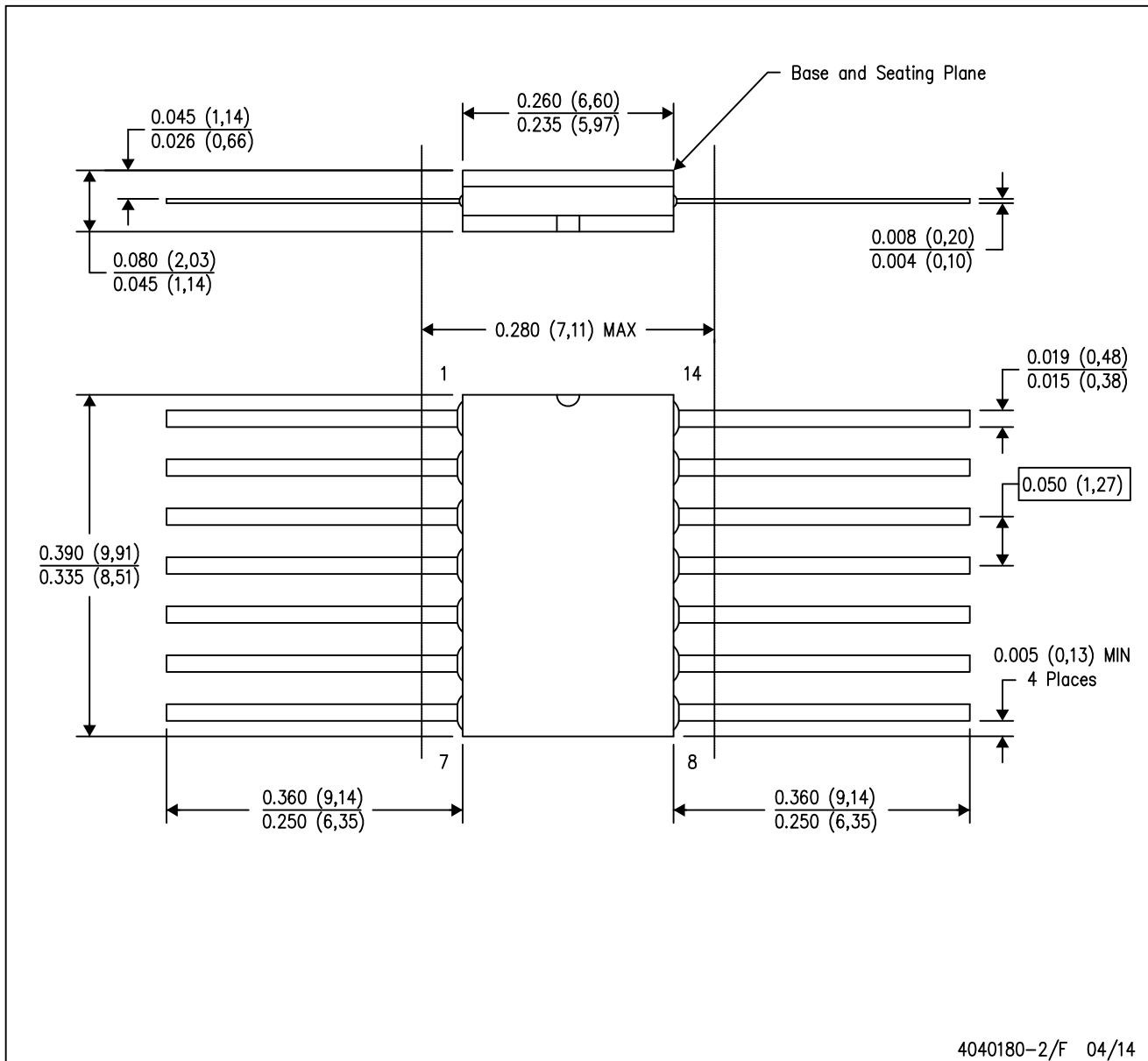


4040083/F 03/03

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

W (R-GDFP-F14)

CERAMIC DUAL FLATPACK

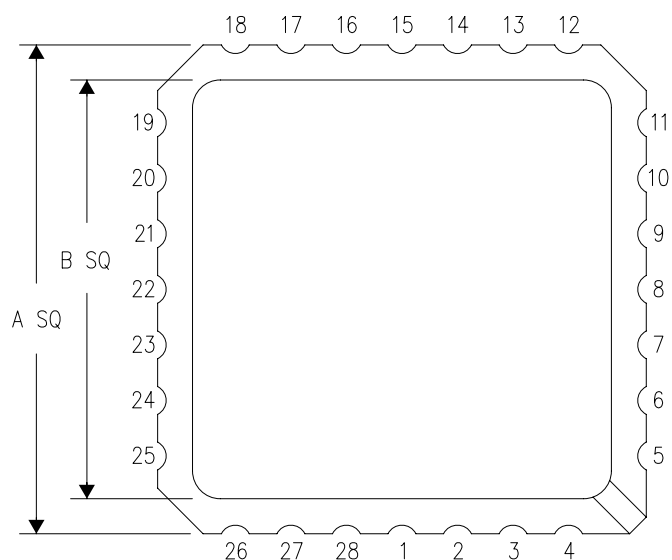


- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. This package can be hermetically sealed with a ceramic lid using glass frit.
 - D. Index point is provided on cap for terminal identification only.
 - E. Falls within MIL STD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

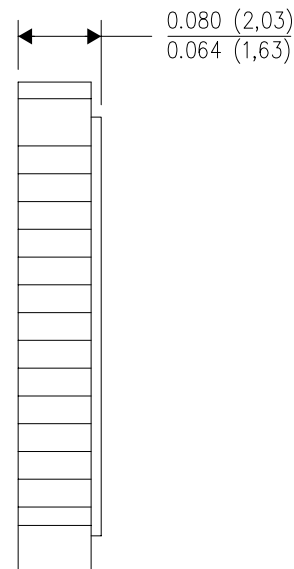
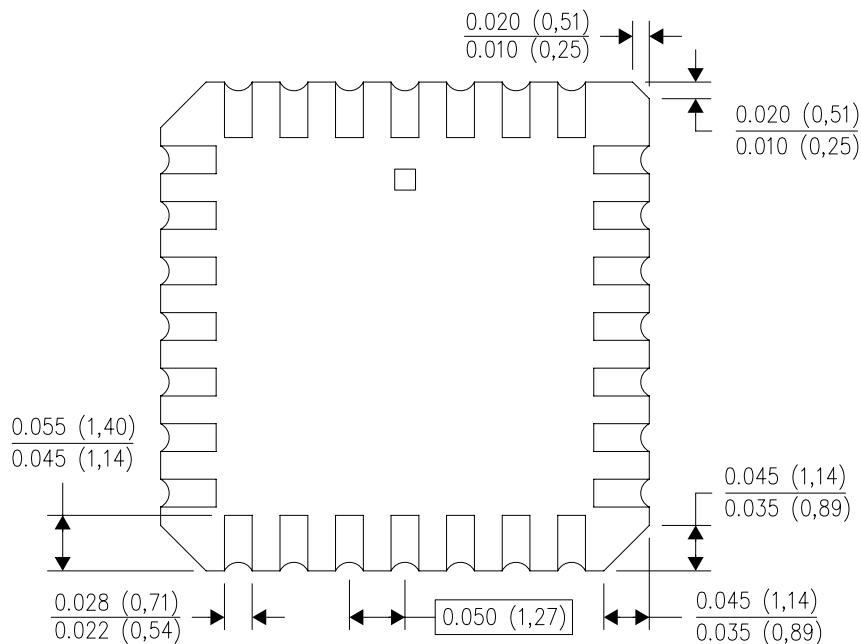
FK (S-CQCC-N**)

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	0.740 (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)

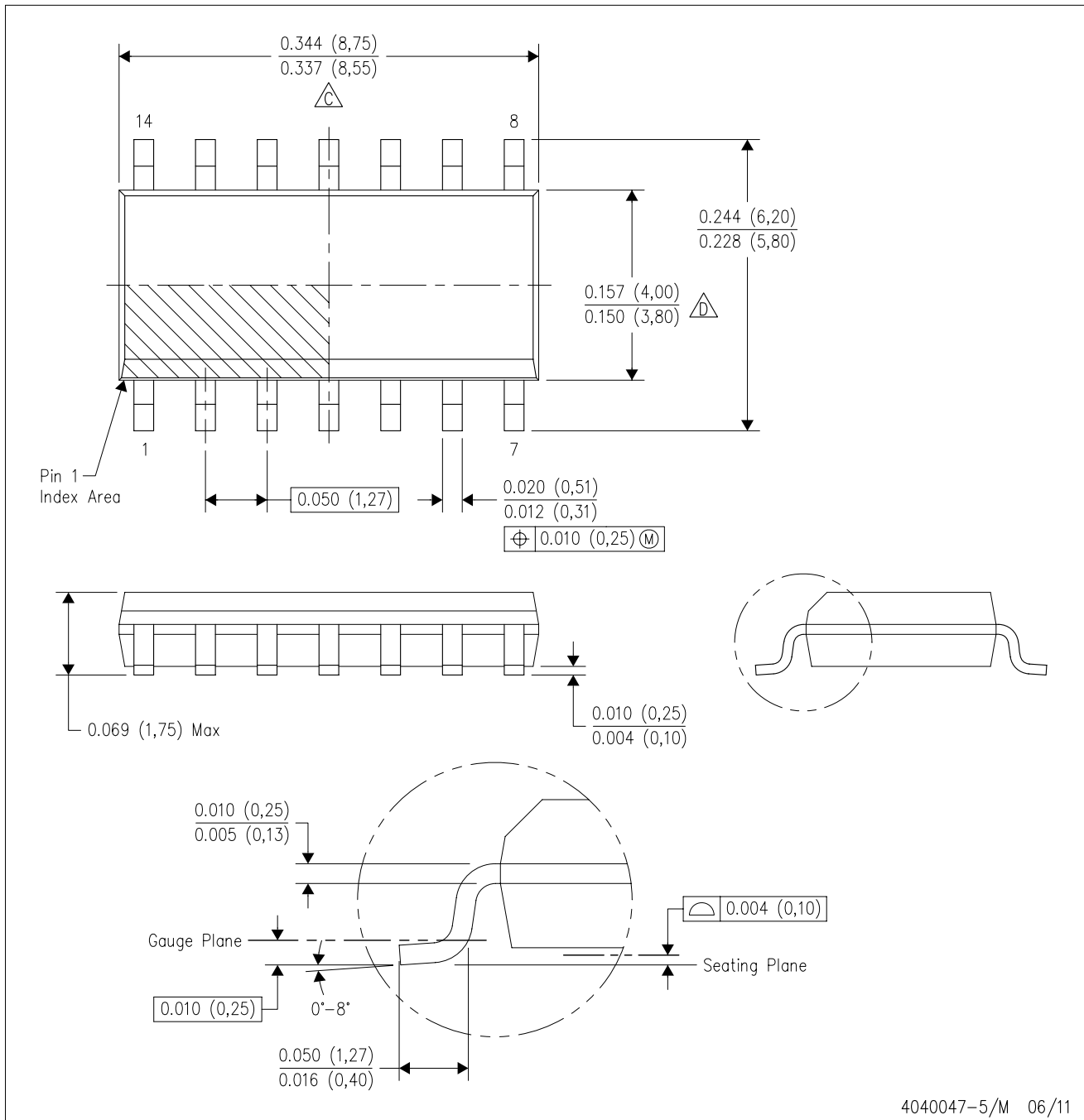


4040140/D 01/11

- NOTES:
- All linear dimensions are in inches (millimeters).
 - This drawing is subject to change without notice.
 - This package can be hermetically sealed with a metal lid.
 - Falls within JEDEC MS-004

D (R-PDSO-G14)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - $\triangle C$ Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
 - $\triangle D$ Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
 - E. Reference JEDEC MS-012 variation AB.

D (R-PDSO-G14)

PLASTIC SMALL OUTLINE



4211283-3/E 08/12

- NOTES:
- All linear dimensions are in millimeters.
 - This drawing is subject to change without notice.
 - Publication IPC-7351 is recommended for alternate designs.
 - 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 for other stencil recommendations.
 - Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

PW (R-PDSO-G14)

PLASTIC SMALL OUTLINE

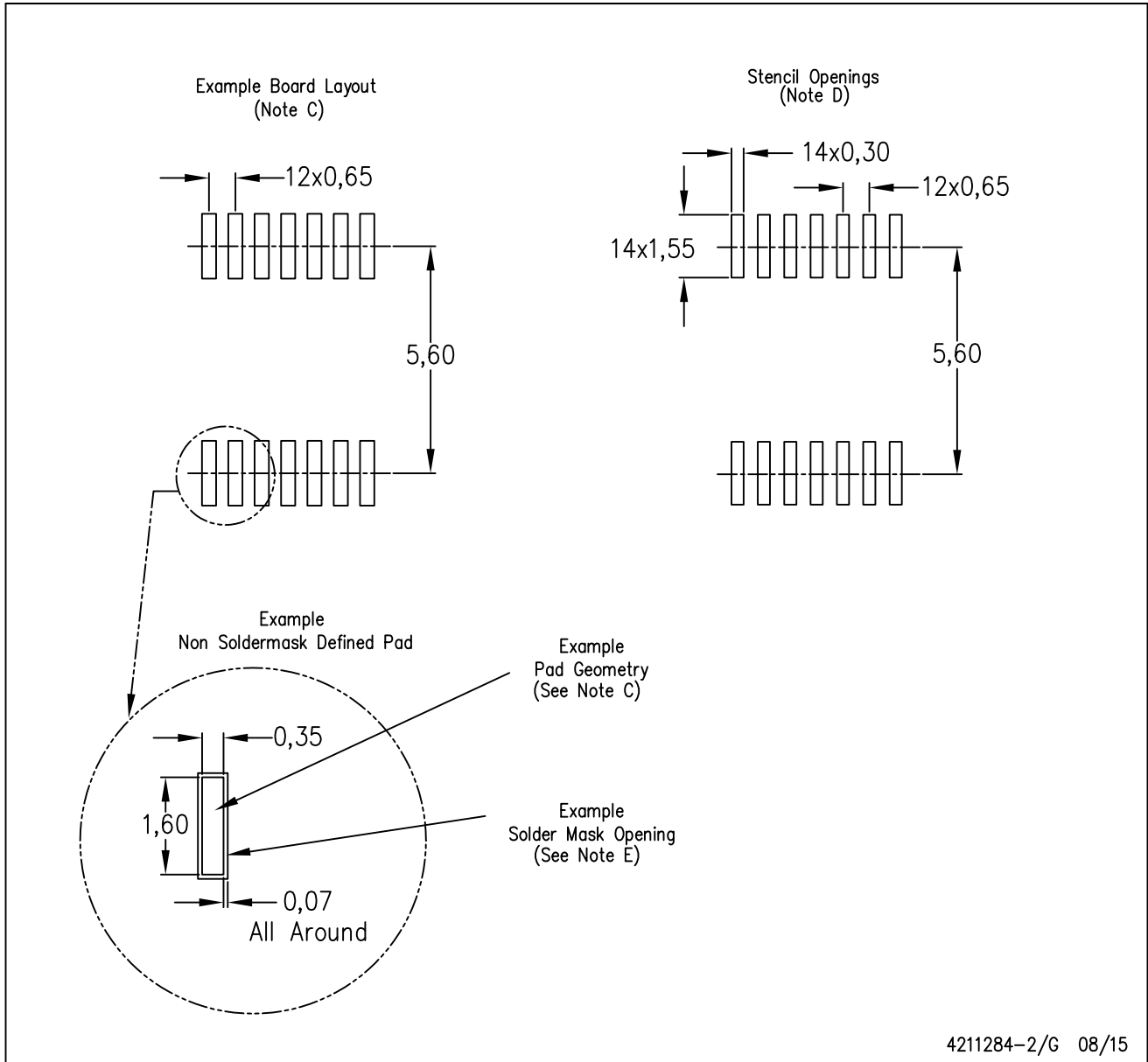


4040064-3/G 02/11

- 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. Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0,15 each side.
 - D. Body width does not include interlead flash. Interlead flash shall not exceed 0,25 each side.
 - E. Falls within JEDEC MO-153

PW (R-PDSO-G14)

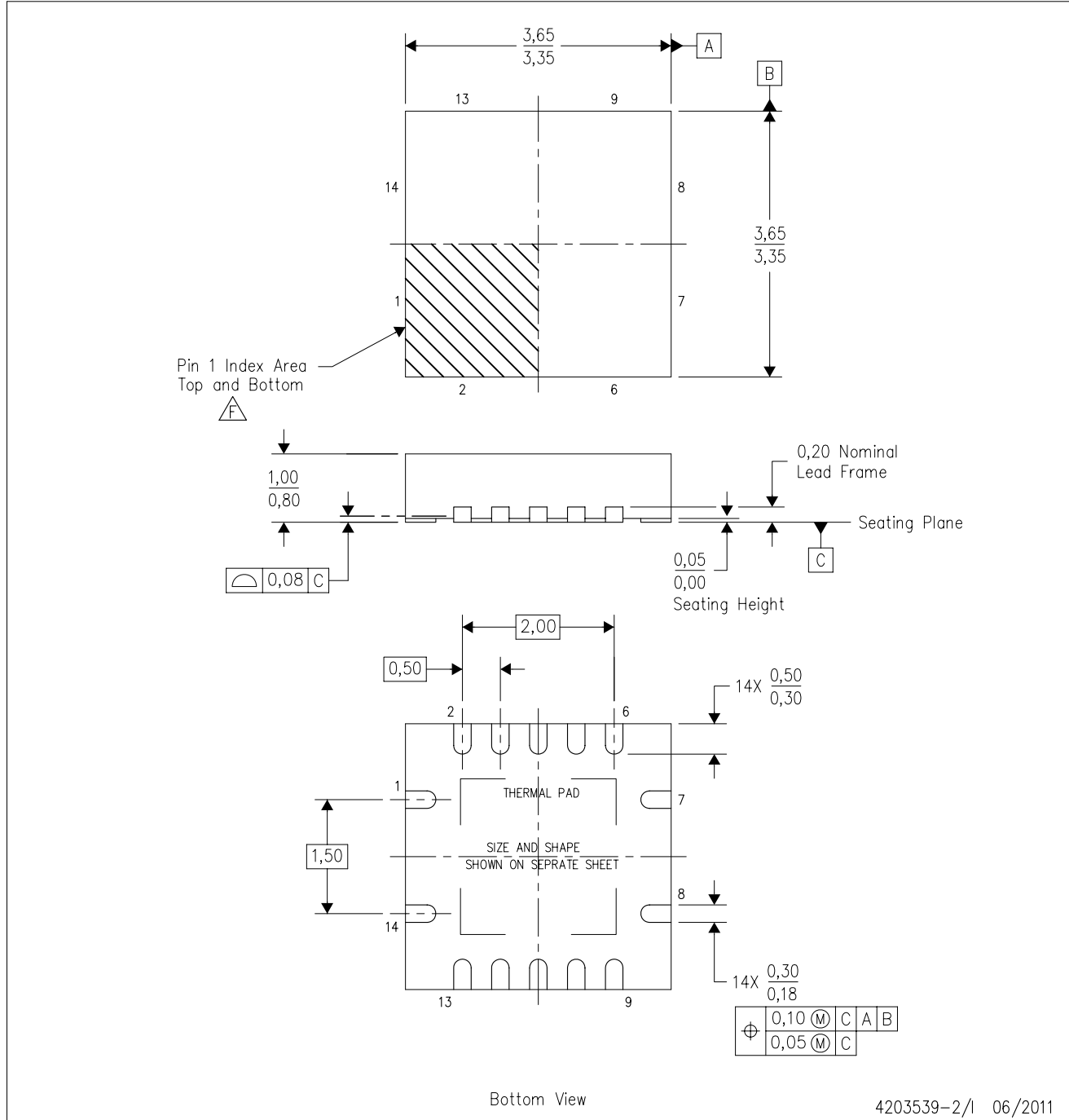
PLASTIC SMALL OUTLINE



- NOTES:
- All linear dimensions are in millimeters.
 - This drawing is subject to change without notice.
 - Publication IPC-7351 is recommended for alternate designs.
 - 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 for other stencil recommendations.
 - Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

RGY (S-PVQFN-N14)

PLASTIC QUAD FLATPACK NO-LEAD



- 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.
 - E. See the additional figure in the Product Data Sheet for details regarding the exposed thermal pad features and dimensions.
 - F. 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.
 - G. Package complies to JEDEC MO-241 variation BA.

RGY (S-PVQFN-N14)

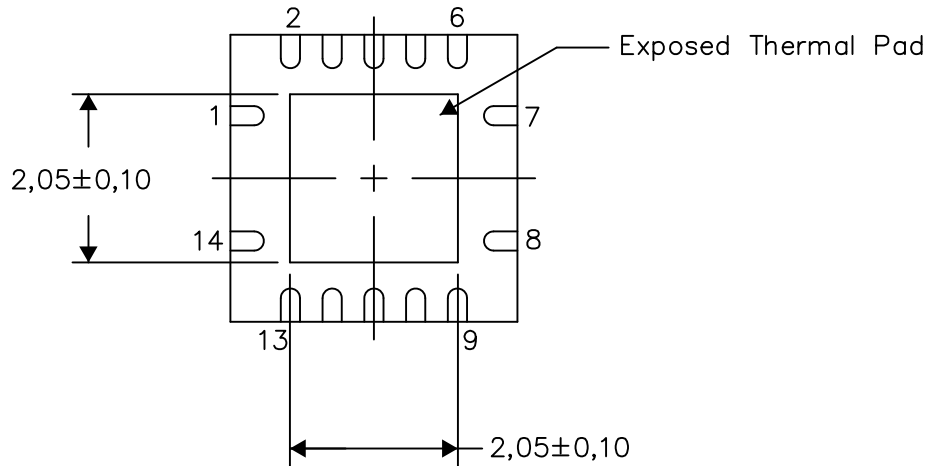
PLASTIC QUAD FLATPACK NO-LEAD

THERMAL INFORMATION

This package incorporates an exposed thermal pad that is designed to be attached directly to an external heatsink. The thermal pad must be soldered directly to the printed circuit board (PCB). After soldering, the PCB can be used as a heatsink. In addition, through the use of thermal vias, the thermal pad can be attached directly to the appropriate copper plane shown in the electrical schematic for the device, or alternatively, can be attached to a special heatsink structure designed into the PCB. This design optimizes the heat transfer from the integrated circuit (IC).

For information on the Quad Flatpack No-Lead (QFN) package and its advantages, refer to Application Report, QFN/SON PCB Attachment, Texas Instruments Literature No. SLUA271. This document is available at www.ti.com.

The exposed thermal pad dimensions for this package are shown in the following illustration.



Bottom View

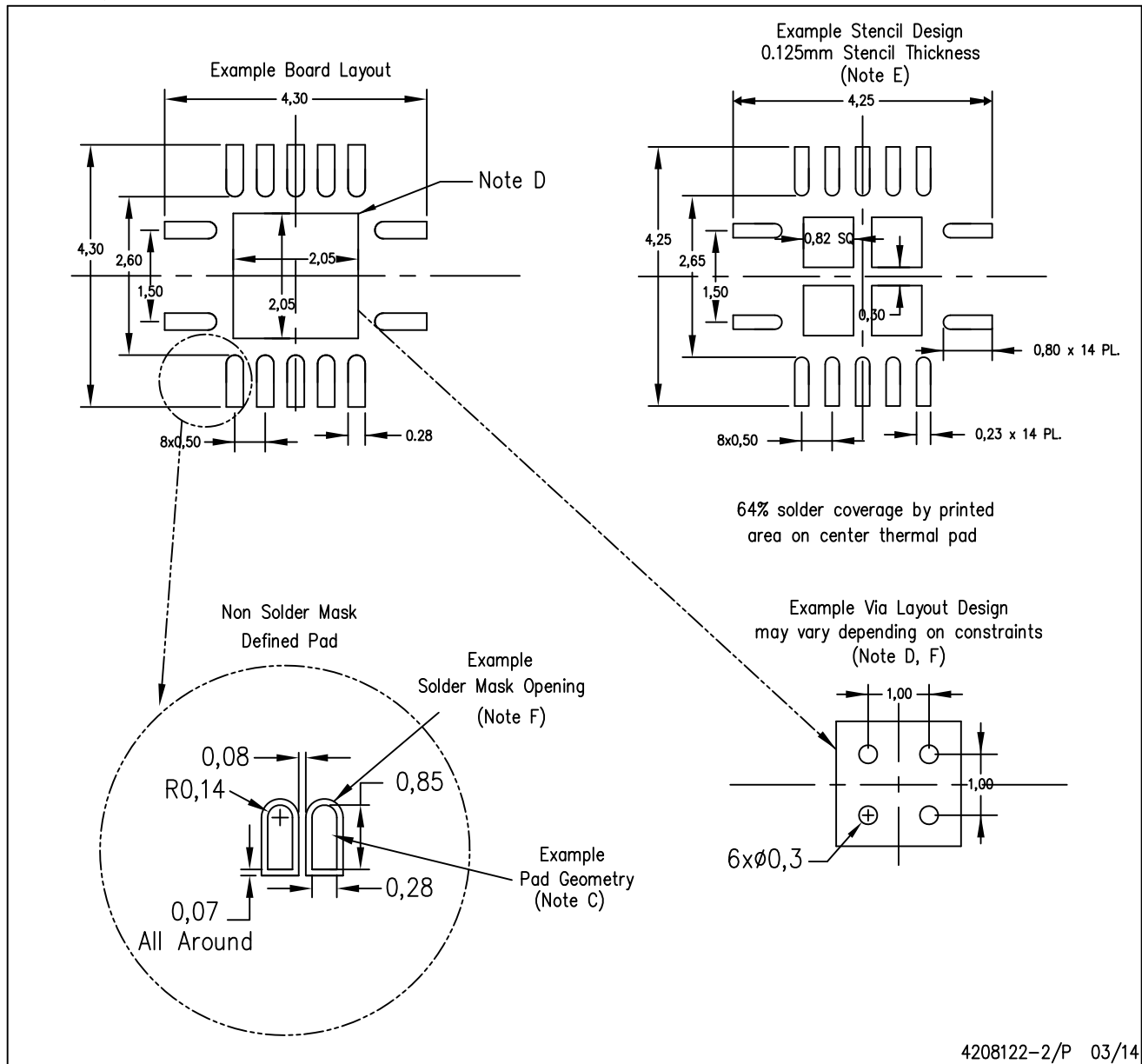
Exposed Thermal Pad Dimensions

4206353-2/P 03/14

NOTE: All linear dimensions are in millimeters

RGY (S-PVQFN-N14)

PLASTIC QUAD FLATPACK NO-LEAD



4208122-2/P 03/14

- NOTES:
- All linear dimensions are in millimeters.
 - This drawing is subject to change without notice.
 - Publication IPC-7351 is recommended for alternate designs.
 - This package is designed to be soldered to a thermal pad on the board. Refer to Application Note, Quad Flat-Pack QFN/SON PCB Attachment, Texas Instruments Literature No. SLUA271, and also the Product Data Sheets for specific thermal information, via requirements, and recommended board layout. These documents are available at www.ti.com <<http://www.ti.com>>.
 - 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 for stencil design considerations.
 - Customers should contact their board fabrication site for minimum solder mask web tolerances between signal pads.

MECHANICAL DATA

NS (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.

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

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