

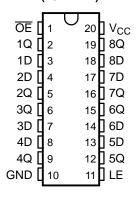
SN74LV373AT



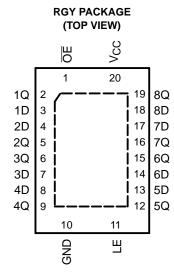
FEATURES

- Inputs Are TTL-Voltage Compatible
- 4.5-V to 5.5-V V_{CC} Operation
- Typical t_{pd} of 5.1 ns at 5 V
- Typical V_{OLP} (Output Ground Bounce) <0.8 V at $V_{CC} = 5 \text{ V}, T_A = 25^{\circ}\text{C}$
- Typical V_{OHV} (Output V_{OH} Undershoot) >2.3 V at V_{CC} = 5 V, T_A = 25°C
- **Supports Mixed-Mode Voltage Operation on All Ports**

DB, DW, NS, OR PW PACKAGE (TOP VIEW)



- I_{off} Supports Partial-Power-Down Mode Operation
- 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/ORDERING INFORMATION

The SN74LV373AT is an octal transparent D-type latch. While the latch-enable (LE) input is high, the Q outputs follow the data (D) inputs. When LE is taken low, the Q outputs are latched at the logic levels set up at the D inputs.

ORDERING INFORMATION

T _A	PACKA	GE ⁽¹⁾	ORDERABLE PART NUMBER	TOP-SIDE MARKING
−40°C to 125°C	QFN – RGY	Reel of 1000	SN74LV373ATRGYR	VV373
	SOIC - DW	Tube of 25	SN74LV373ATDW	LV373AT
	SOIC - DW	Reel of 2500	SN74LV373ATDWR	LV3/3AT
	SOP - NS	Reel of 2000	SN74LV373ATNSR	74LV373AT
-40 C to 125 C	SSOP - DB	Reel of 2000	SN74LV373ATDBR	LV373AT
		Tube of 70	SN74LV373ATPW	
	TSSOP - PW	Reel of 2000	SN74LV373ATPWR	LV373AT
		Reel of 250	SN74LV373ATPWT	

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



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DESCRIPTION/ORDERING INFORMATION (CONTINUED)

A buffered output-enable (\overline{OE}) input can be used to place the eight outputs in either a normal logic state (high or low) or the 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.

OE does not affect the internal operations of the latches. Old data can be retained or new data can be entered while the outputs are in the high-impedance state.

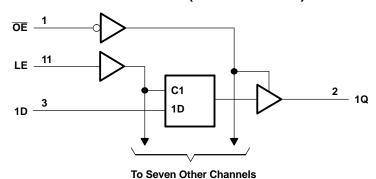
To ensure the high-impedance state during power up or power down, \overline{OE} should be tied to V_{CC} through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

This device is fully specified for partial-power-down applications using I_{off} . The I_{off} circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.

FUNCTION TABLE (EACH LATCH)

	INPUTS		OUTPUT
ŌĒ	LE	D	Q
1	Н	Н	Н
L	Н	L	L
L	L	X	Q_0
Н	X	Χ	Z

LOGIC DIAGRAM (POSITIVE LOGIC)





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Absolute Maximum Ratings⁽¹⁾

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

			MIN	MAX	UNIT		
V_{CC}	Supply voltage range		-0.5	7	V		
VI	Input voltage range ⁽²⁾		-0.5	7	V		
Vo	Voltage range applied to any output in th	e high-impedance or power-off state ⁽²⁾	-0.5	7	V		
Vo	Output voltage range ⁽²⁾⁽³⁾		-0.5	V _{CC} + 0.5	V		
I _{IK}	Input clamp current	V ₁ < 0		-20	mA		
I _{OK}	Output clamp current	$V_O < 0$ or $V_O > V_{CC}$		±50	mA		
Io	Continuous output current	$V_O < 0 \text{ or } V_O > V_{CC}$ $V_O = 0 \text{ to } V_{CC}$		±35			
	Continuous current through V _{CC} or GND			±70	mA		
		DB package ⁽⁴⁾		70			
		DW package ⁽⁴⁾		58			
θ_{JA}	Package thermal impedance	NS package (4)		60	°C/W		
		PW package ⁽⁴⁾		83			
		RGY package ⁽⁵⁾		37			
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 negative-voltage and output voltage ratings may be exceeded if the input and output current ratings are observed.
- 3) This value is limited to 5.5 V maximum.
- (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⁾

			MIN	MAX	UNIT
V_{CC}	Supply voltage		4.5	5.5	V
V_{IH}	High-level input voltage	V _{CC} = 4.5 V to 5.5 V	2		V
V_{IL}	Low-level input voltage	V _{CC} = 4.5 V to 5.5 V		0.8	V
VI	Input voltage		0	5.5	V
\/	Output valtage	High or low state	0	V_{CC}	V
Vo	Output voltage	3-state	0	5.5	V
I _{OH}	High-level output current	V _{CC} = 4.5 V to 5.5 V		-16	mA
I _{OL}	Low-level output current	V _{CC} = 4.5 V to 5.5 V		16	mA
Δt/Δν	Input transition rise or fall rate	V _{CC} = 4.5 V to 5.5 V		20	ns/V
T _A	Operating free-air temperature		-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.

SN74LV373AT OCTAL TRANSPARENT D-TYPE LATCH WITH 3-STATE OUTPUTS

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Electrical Characteristics

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

PARAMETER	TEST CONDITIONS	V _{cc}	T _A = 25°C			T _A = -40°C to 85°C		T _A = -40°C to 125°C		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V	$I_{OH} = -50 \mu A$	4.5 V	4.4	4.5		4.4		4.4		V
V _{OH}	I _{OH} = -16 mA	4.5 V	3.8			3.8		3.8		V
V/	I _{OL} = 100 μA	4.5 V		0	0.1		0.1		0.1 V	
V_{OL}	I _{OL} = 16 mA	4.5 V			0.55		0.55		0.55	V
I _I	$V_I = 5.5$ or GND	0 to 5.5 V			±0.1		±1		±1	μΑ
I _{OZ}	$V_O = V_{CC}$ or GND	5.5 V			±0.25		±2.5		±2.5	μΑ
I _{CC}	$V_I = V_{CC}$ or GND, $I_O = 0$	5.5 V			2		20		20	μΑ
ΔI _{CC} ⁽¹⁾	One input at 3.4 V, Other inputs at V _{CC} or GND	5.5 V			40		50		50	μΑ
I _{off}	V_I or $V_O = 0$ to 5.5 V	0			0.5		5		5	μΑ
C _i	$V_I = V_{CC}$ or GND			4	10		10		10	pF
C _o	V _O = V _{CC} or GND			7.5						pF

⁽¹⁾ This is the increase in supply current for each input at one of the specified TTL voltage levels, rather than 0 V or V_{CC}.

Timing Requirements

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

			T _A = 2	25°C	T _A = -	T _A = -40°C to 125°C		UNIT	
			MIN	MAX	MIN	MAX	MIN	MAX	
t _w	Pulse duration, LE high		6.5		8.5		8.5		ns
t _{su}	Setup time, data before LE↓	High or low	1.5		1.5		1.5		ns
t _h	Hold time, data after LE \downarrow	High or low	3.5		3.5		3.5		ns

Switching Characteristics

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

PARAMETER	FROM (INPUT)	TO (OUTBUT)	LOAD CAPACITANCE	T _A = 25°C			T _A = -40°C to 85°C		T _A = -40°C to 125°C		UNIT
	(INPUT)	(OUTPUT)	CAPACITANCE	MIN	TYP	MAX	MIN	MAX	MIN	MAX	
4	D	Q	C ₁ = 15 pF	2.9	5.1	8.5	1	9.5	1	10	
t _{pd}	LE	Q		3.5	7.7	12.3	1	13.5	1	14	ns
t _{en}	ŌĒ	Q		3.5	6.3	10.9	1	12.5	1	13	115
t _{dis}	ŌĒ	Q		1.7	3.3	7.2	1	8.5	1	9	
4	D	Q		4.4	5.9	9.5	1	10.5	1	11	
t _{pd}	LE	Q		4.8	8.5	13.3	1	14.5	1	15	
t _{en}	ŌĒ	Q	C _L = 50 pF	5	7.1	11.9	1	13.5	1	14	ns
t _{dis}	ŌĒ	Q		3	8.8	11.2	1	12	1	12.5	
t _{sk(o)}	·							1		1	





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Noise Characteristics⁽¹⁾

 V_{CC} = 5 V, C_L = 50 pF, T_A = 25°C

	PARAMETER	MIN	TYP	MAX	UNIT
$V_{OL(P)}$	Quiet output, maximum dynamic V _{OL}		0.8	1	V
V _{OL(V)}	Quiet output, minimum dynamic V _{OL}		-0.6	-0.8	V
V _{OH(V)}	Quiet output, minimum dynamic V _{OH}		2.9		V
V _{IH(D)I}	High-level dymanic input voltage	2.31			V
$V_{IL(D)}$	Low-level dynamic input voltage			0.99	V

⁽¹⁾ Characteristics are for surface-mount packages only.

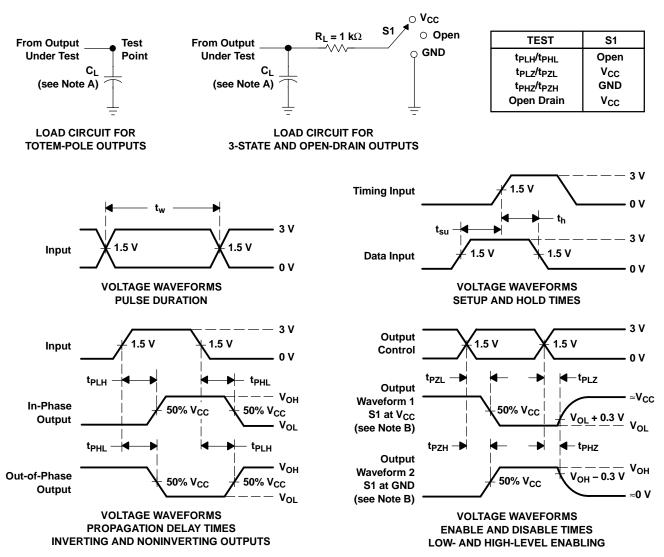
Operating Characteristics

 $V_{CC} = 5 \text{ V}, T_A = 25^{\circ}\text{C}$

	PARAMETE	TEST CO	ONDITIONS	TYP	UNIT	
C_{pd}	Power dissipation capacitance	Outputs enabled	$C_L = 50 \text{ pF},$	f = 10 MHz	15.5	pF



PARAMETER MEASUREMENT INFORMATION



- 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 1 MHz, $Z_O = 50~\Omega$, $t_f \leq$ 3 ns, $t_f \leq$ 3 ns.
 - D. The outputs are measured one at a time, with one input 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_{PHL} and t_{PLH} are the same as t_{pd}.
 - H. All parameters and waveforms are not applicable to all devices.

Figure 1. Load Circuits and Voltage Waveforms



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PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	e Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
SN74LV373ATDB	ACTIVE	SSOP	DB	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV373ATDBE4	ACTIVE	SSOP	DB	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV373ATDBG4	ACTIVE	SSOP	DB	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV373ATDBR	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV373ATDBRE4	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV373ATDBRG4	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV373ATDW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV373ATDWG4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV373ATDWR	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV373ATDWRG4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV373ATNSR	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV373ATNSRG4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV373ATPW	ACTIVE	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV373ATPWE4	ACTIVE	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV373ATPWG4	ACTIVE	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV373ATPWR	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV373ATPWRE4	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV373ATPWRG4	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV373ATPWT	ACTIVE	TSSOP	PW	20	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV373ATPWTE4	ACTIVE	TSSOP	PW	20	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV373ATPWTG4	ACTIVE	TSSOP	PW	20	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LV373ATRGYR	ACTIVE	VQFN	RGY	20	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR
SN74LV373ATRGYRG4	ACTIVE	VQFN	RGY	20	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR

(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.



PACKAGE OPTION ADDENDUM

www.ti.com 8-Dec-2009

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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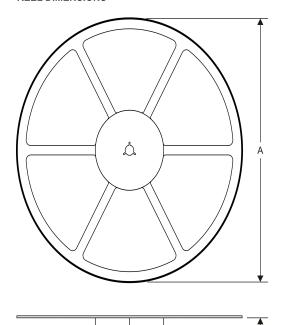
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PACKAGE MATERIALS INFORMATION

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TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
В0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

TAPE AND REEL INFORMATION

*All dimensions are nominal

Device	Package Type	Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74LV373ATDBR	SSOP	DB	20	2000	330.0	16.4	8.2	7.5	2.5	12.0	16.0	Q1
SN74LV373ATDWR	SOIC	DW	20	2000	330.0	24.4	10.8	13.0	2.7	12.0	24.0	Q1
SN74LV373ATNSR	SO	NS	20	2000	330.0	24.4	8.2	13.0	2.5	12.0	24.0	Q1
SN74LV373ATPWR	TSSOP	PW	20	2000	330.0	16.4	6.95	7.1	1.6	8.0	16.0	Q1
SN74LV373ATPWT	TSSOP	PW	20	250	330.0	16.4	6.95	7.1	1.6	8.0	16.0	Q1
SN74LV373ATRGYR	VQFN	RGY	20	3000	330.0	12.4	3.8	4.8	1.6	8.0	12.0	Q1

PACKAGE MATERIALS INFORMATION

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*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74LV373ATDBR	SSOP	DB	20	2000	367.0	367.0	38.0
SN74LV373ATDWR	SOIC	DW	20	2000	367.0	367.0	45.0
SN74LV373ATNSR	SO	NS	20	2000	367.0	367.0	45.0
SN74LV373ATPWR	TSSOP	PW	20	2000	367.0	367.0	38.0
SN74LV373ATPWT	TSSOP	PW	20	250	367.0	367.0	38.0
SN74LV373ATRGYR	VQFN	RGY	20	3000	367.0	367.0	35.0

DW (R-PDSO-G20)

PLASTIC SMALL OUTLINE



NOTES: A. All linear dimensions are in inches (millimeters). Dimensioning and tolerancing per ASME Y14.5M-1994.

- B. This drawing is subject to change without notice.
- C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
- D. Falls within JEDEC MS-013 variation AC.



DW (R-PDSO-G20)

PLASTIC SMALL OUTLINE



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



PW (R-PDSO-G20)

PLASTIC SMALL OUTLINE

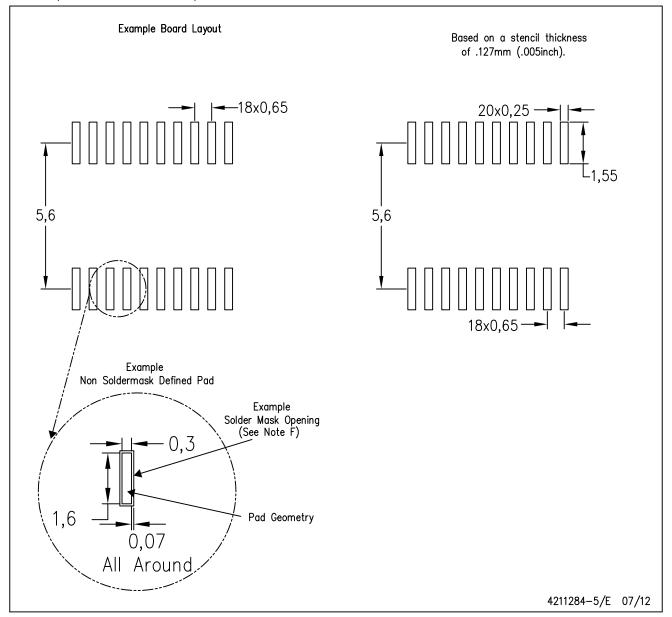


- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M—1994.
- B. This drawing is subject to change without notice.
- Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0,15 each side.
- Body width does not include interlead flash. Interlead flash shall not exceed 0,25 each side.
- E. Falls within JEDEC MO-153



PW (R-PDSO-G20)

PLASTIC SMALL OUTLINE



- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Publication IPC-7351 is recommended for alternate design.
- D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
- E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.





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.
- 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 (R-PVQFN-N20)

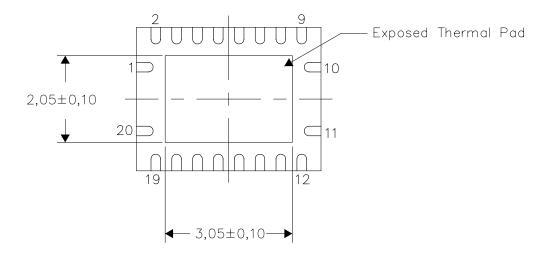
PLASTIC QUAD FLATPACK NO-LEAD

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

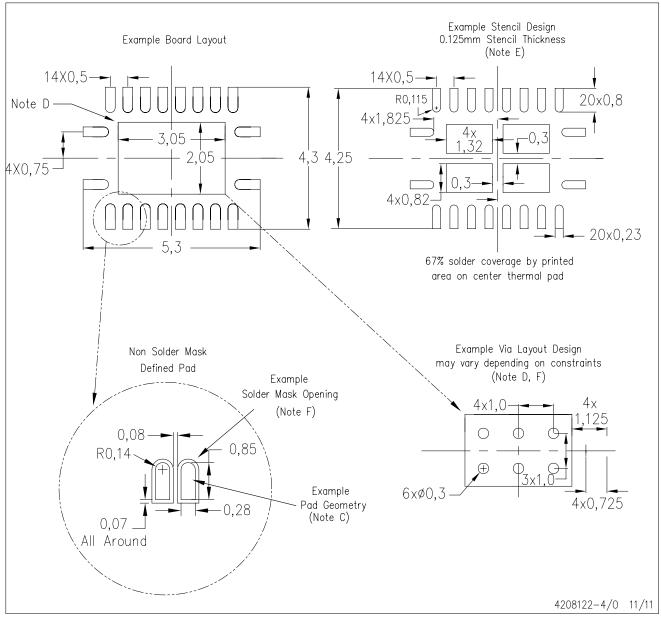
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NOTE: All linear dimensions are in millimeters



RGY (R-PVQFN-N20)

PLASTIC QUAD FLATPACK NO-LEAD



- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Publication IPC-7351 is recommended for alternate designs.
- D. 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.
- E. 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.
- F. Customers should contact their board fabrication site for minimum solder mask web tolerances between signal pads.



MECHANICAL DATA

NS (R-PDSO-G**)

14-PINS SHOWN

PLASTIC SMALL-OUTLINE PACKAGE



- 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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