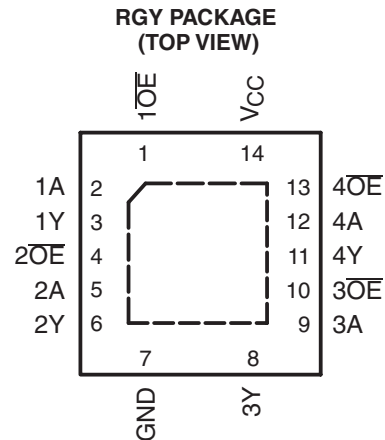


QUADRUPLE BUS BUFFER GATE WITH 3-STATE OUTPUTS

Check for Samples: [SN74LV125A-Q1](#)

FEATURES

- Qualified for Automotive Applications
- 2-V to 5.5-V V_{CC} Operation
- 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, $T_A = 25^\circ\text{C}$
- Support Mixed-Mode Voltage Operation on All Ports
- I_{off} Supports Partial-Power-Down Mode Operation



DESCRIPTION

The SN74LV125A-Q1 quadruple bus buffer gate is designed for 2-V to 5.5-V V_{CC} operation.

This device features independent line drivers with 3-state outputs. Each output is disabled when the associated output-enable ($\overline{OE}$) input is high.

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.

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.

ORDERING INFORMATION

T_A	PACKAGE ⁽¹⁾		ORDERABLE PART NUMBER	TOP-SIDE MARKING
-40°C to 125°C	QFN – RGY	Reel of 3000	SN74LV125AQRGRQ1	LV125Q

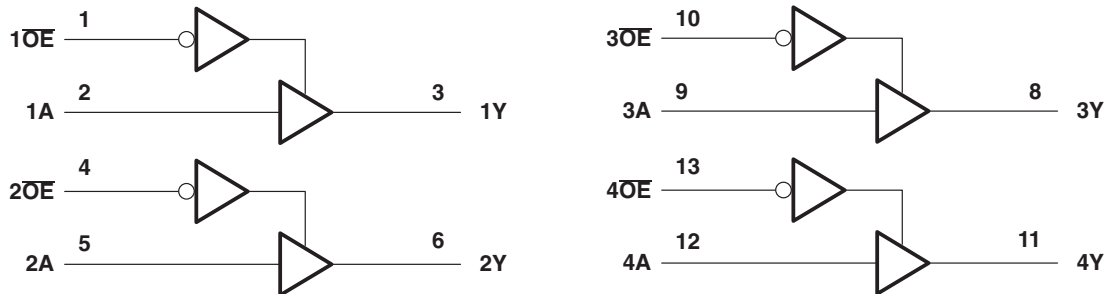
(1) Package drawings, thermal data, and symbolization are available at www.ti.com/packaging.



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**FUNCTION TABLE
(EACH BUFFER)**

INPUTS		OUTPUT Y
$\overline{\text{OE}}$	A	
L	H	H
L	L	L
H	X	Z

LOGIC DIAGRAM (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	7	V
V_I	Input voltage range ⁽²⁾	–0.5	7	V
V_O	Voltage range applied to any output in the high-impedance or power-off state ⁽²⁾	–0.5	7	V
V_O	Output voltage range ⁽²⁾ ⁽³⁾	–0.5	$V_{CC} + 0.5$	V
I_{IK}	Input clamp current	$V_I < 0$		–20 mA
I_{OK}	Output clamp current	$V_O < 0$		–50 mA
I_O	Continuous output current	$V_O = 0$ to V_{CC}		±35 mA
	Continuous current through V_{CC} or GND			±70 mA
θ_{JA}	Package thermal impedance ⁽⁴⁾	RGY package		47 °C/W
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 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 51-5.

RECOMMENDED OPERATING CONDITIONS⁽¹⁾

			MIN	MAX	UNIT
V _{CC}	Supply voltage		4.5	5.5	V
V _{IH}	High-level input voltage	V _{CC} = 2 V	1.5		V
		V _{CC} = 2.3 V to 2.7 V	V _{CC} × 0.7		
		V _{CC} = 3 V to 3.6 V	V _{CC} × 0.7		
		V _{CC} = 4.5 V to 5.5 V	V _{CC} × 0.7		
V _{IL}	Low-level input voltage	V _{CC} = 2 V		0.5	V
		V _{CC} = 2.3 V to 2.7 V		V _{CC} × 0.3	
		V _{CC} = 3 V to 3.6 V		V _{CC} × 0.3	
		V _{CC} = 4.5 V to 5.5 V		V _{CC} × 0.3	
V _I	Input voltage		0	5.5	V
V _O	Output voltage	High or low state	0	V _{CC}	V
		3-state	0	5.5	
I _{OH}	High-level output current	V _{CC} = 2 V		–50	mA
		V _{CC} = 2.3 V to 2.7 V		–2	
		V _{CC} = 3 V to 3.6 V		–8	
		V _{CC} = 4.5 V to 5.5 V		–16	
I _{OL}	Low-level output current	V _{CC} = 2 V		50	mA
		V _{CC} = 2.3 V to 2.7 V		2	
		V _{CC} = 3 V to 3.6 V		8	
		V _{CC} = 4.5 V to 5.5 V		16	
Δt/Δv	Input transition rise or fall rate	V _{CC} = 2.3 V to 2.7 V		200	ns/V
		V _{CC} = 3 V to 3.6 V		100	
		V _{CC} = 4.5 V to 5.5 V		20	
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](#).

ELECTRICAL CHARACTERISTICS

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

PARAMETER	TEST CONDITIONS	V _{CC}	MIN	TYP	MAX	UNIT
V _{OH}	I _{OH} = –50 μA	2 V to 5.5 V	V _{CC} –0.1			V
	I _{OH} = –2 mA	2.3 V	2			
	I _{OH} = –8 mA	3 V	2.48			
	I _{OH} = –16 mA	4.5 V	3.8			
V _{OL}	I _{OL} = 50 μA	2 V to 5.5 V			0.1	V
	I _{OH} = 2 mA	2.3 V			0.4	
	I _{OH} = 8 mA	3 V			0.44	
	I _{OL} = 16 mA	4.5 V			0.55	
I _I	V _I = 5.5 V or GND	0 to 5.5 V			±1	μA
I _{OZ}	V _O = V _{CC} or GND	5.5 V			±5	μA
I _{CC}	V _I = V _{CC} or GND, I _O = 0	5.5 V			20	μA
I _{off}	V _I or V _O = 0 to 5.5 V	0			5	μA
C _i	V _I = V _{CC} or GND	3.3 V		1.6		pF
		5 V		1.6		

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	$T_A = 25^\circ\text{C}$			$T_A = -40^\circ\text{C to } 125^\circ\text{C}$		UNIT
				MIN	TYP	MAX	MIN	MAX	
t_{pd}	A	Y	$C_L = 50\text{ pF}$	8.7	16.5		1	18.5	ns
t_{en}	$\overline{OE}$	Y		8.8	16.5		1	18.5	ns
t_{dis}	$\overline{OE}$	Y		7.3	18.2		1	20.5	ns
$t_{sk(o)}$					2				ns

SWITCHING CHARACTERISTICS

over recommended operating 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	$T_A = 25^\circ\text{C}$			$T_A = -40^\circ\text{C to } 125^\circ\text{C}$		UNIT
				MIN	TYP	MAX	MIN	MAX	
t_{pd}	A	Y	$C_L = 50\text{ pF}$	6.1	11.5		1	13	ns
t_{en}	$\overline{OE}$	Y		6.2	11.5		1	13	ns
t_{dis}	$\overline{OE}$	Y		5.5	13.2		1	15	ns
$t_{sk(o)}$					1.5				ns

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	$T_A = 25^\circ\text{C}$			$T_A = -40^\circ\text{C to } 125^\circ\text{C}$		UNIT
				MIN	TYP	MAX	MIN	MAX	
t_{pd}	A	Y	$C_L = 50\text{ pF}$	4.3	7.5			10	ns
t_{en}	$\overline{OE}$	Y		4.4	7.1			10	ns
t_{dis}	$\overline{OE}$	Y		4	8.8			11	ns
$t_{sk(o)}$					1				ns

NOISE CHARACTERISTICS⁽¹⁾

 $V_{CC} = 3.3\text{ V}$, $C_L = 50\text{ pF}$, $T_A = 25^\circ\text{C}$

		MIN	TYP	MAX	UNIT
$V_{OL(P)}$	Quiet output, maximum dynamic V_{OL}		0.4	0.8	V
$V_{OL(V)}$	Quiet output, minimum dynamic V_{OL}		–0.3	–0.8	V
$V_{OH(V)}$	Quiet output, minimum dynamic V_{OH}		3		V
$V_{IH(D)}$	High-level dynamic input voltage	2.31			V
$V_{IL(D)}$	Low-level dynamic input voltage			0.99	V

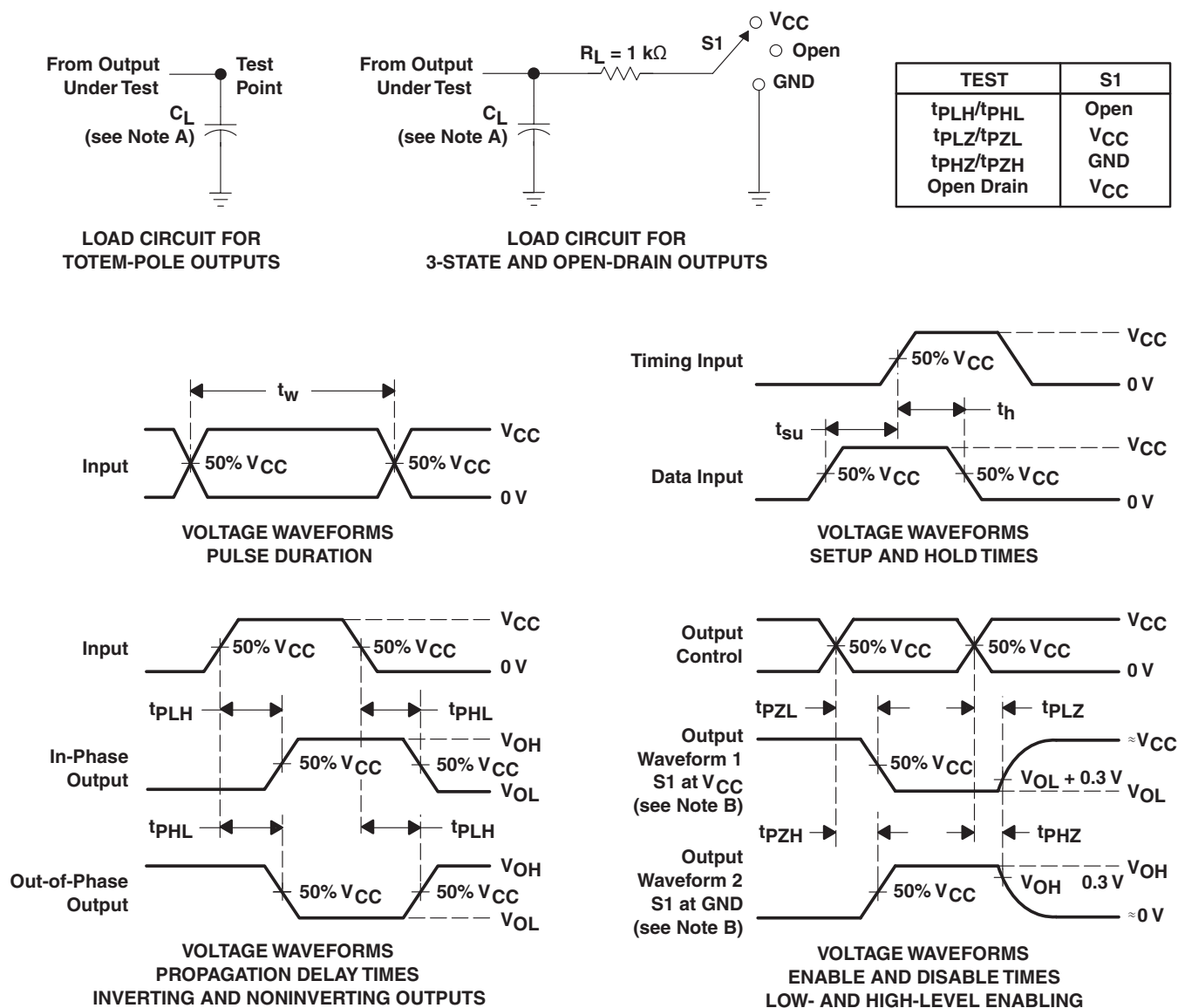
(1) Characteristics are for surface-mount packages only.

OPERATING CHARACTERISTICS

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

PARAMETER			TEST CONDITIONS	V_{CC}	TYP	UNIT
C_{pd}	Power dissipation capacitance	Outputs enabled	$C_L = 50\text{ pF}$, $f = 10\text{ MHz}$	3.3 V	15.5	pF
				5 V	17.6	

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: $PRR \leq 1\text{ MHz}$, $Z_O = 50\ \Omega$, $t_r \leq 3\text{ ns}$, $t_f \leq 3\text{ ns}$.
 - 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

PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
SN74LV125AQRGYSRQ1	Active	Production	VQFN (RGY) 14	2000 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 125	LV125Q
SN74LV125AQRGYSRQ1.A	Active	Production	VQFN (RGY) 14	2000 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 125	LV125Q
SN74LV125AQRGYSRQ1.B	Active	Production	VQFN (RGY) 14	2000 LARGE T&R	-	Call TI	Call TI	-40 to 125	

⁽¹⁾ **Status:** For more details on status, see our [product life cycle](#).

⁽²⁾ **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

⁽³⁾ **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

⁽⁴⁾ **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

⁽⁵⁾ **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

⁽⁶⁾ **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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OTHER QUALIFIED VERSIONS OF SN74LV125A-Q1 :

- Catalog : [SN74LV125A](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product

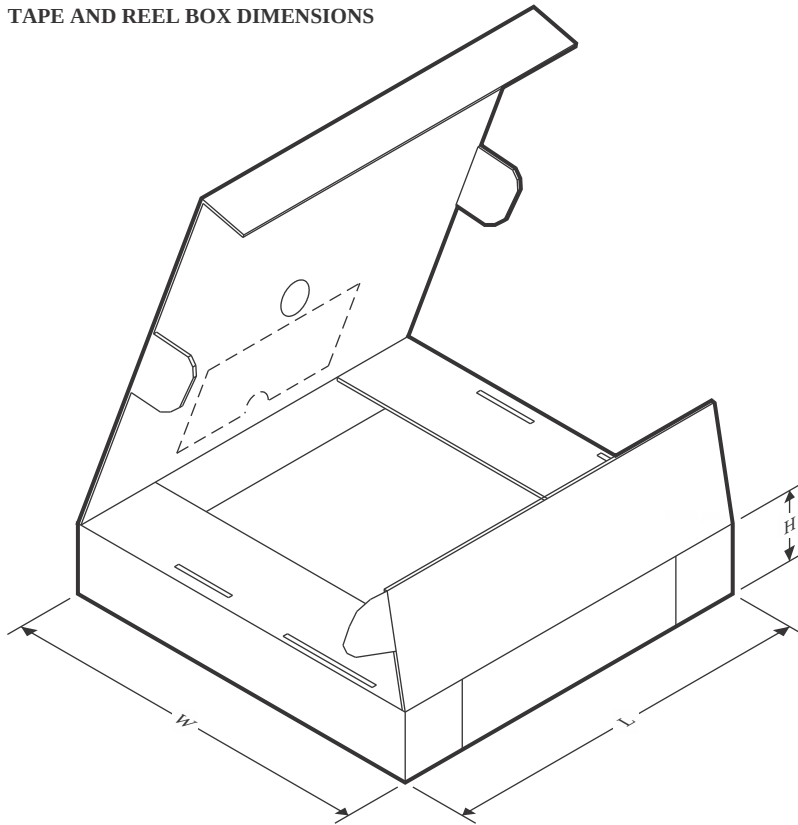
TAPE AND REEL INFORMATION



*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
SN74LV125AQRGYRQ1	VQFN	RGY	14	2000	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)
SN74LV125AQRGYRQ1	VQFN	RGY	14	2000	353.0	353.0	32.0

GENERIC PACKAGE VIEW

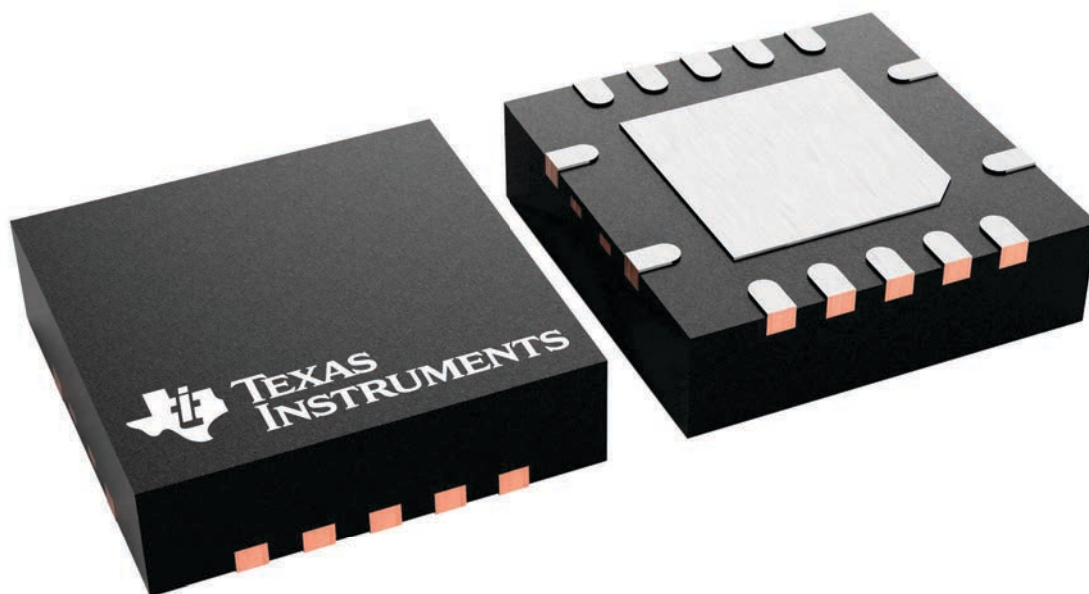
RGY 14

VQFN - 1 mm max height

3.5 x 3.5, 0.5 mm pitch

PLASTIC QUAD FLATPACK - NO LEAD

This image is a representation of the package family, actual package may vary.
Refer to the product data sheet for package details.



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