SN74LV8154 Dual 16-Bit Binary Counters With 3-State Output Registers

Check for Samples: SN74LV8154

1 Features

- Can Be Used as Two 16-Bit Counters or a Single 32-Bit Counter
- 8 bit counter read bus
- 2-V to 5.5-V V_{CC} Operation
- Maximum t_{pd} of 25 ns at 5 V (RCLK to Y)
- Typical V_{OLP} (Output Ground Bounce)
  < 0.7 V at V_{CC} = 5 V, T_A = 25°C
- Typical V_{OHV} (Output V_{OH} Undershoot)
  > 4.4 V at V_{CC} = 5 V, T_A = 25°C
- 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)

2 Applications

- Up Counters
- Dual Up Counters

3 Description

The SN74LV8154 device is a dual 16-bit binary counter with 3-state output registers, designed for 2-V to 5.5-V V_{CC} operation.

The counters have dedicated clock inputs. The counters share a clocked storage register to sample and save the counter contents. Both counters share an asynchronous clear input. The 32-bit storage register can be mapped on the output bus 8-bits at a time. Four bus reads are needed to access the contents of both stored counts. The two counters can be chained by connecting $\overline{CLKBEN}$ to $\overline{RCOA}$. All clocks are positive edge triggered. All other inputs are active low.

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.

Device Information(1)

PART NUMBER	PACKAGE	BODY SIZE (NOM)
SN74LV8154N	PDIP (20)	6.50 mm x 4.40 mm
SN74LV8154PW	TSSOP (20)	26.92 mm x 6.35 mm

(1) For all available packages, see the orderable addendum at the end of the data sheet.

Simplified Schematic

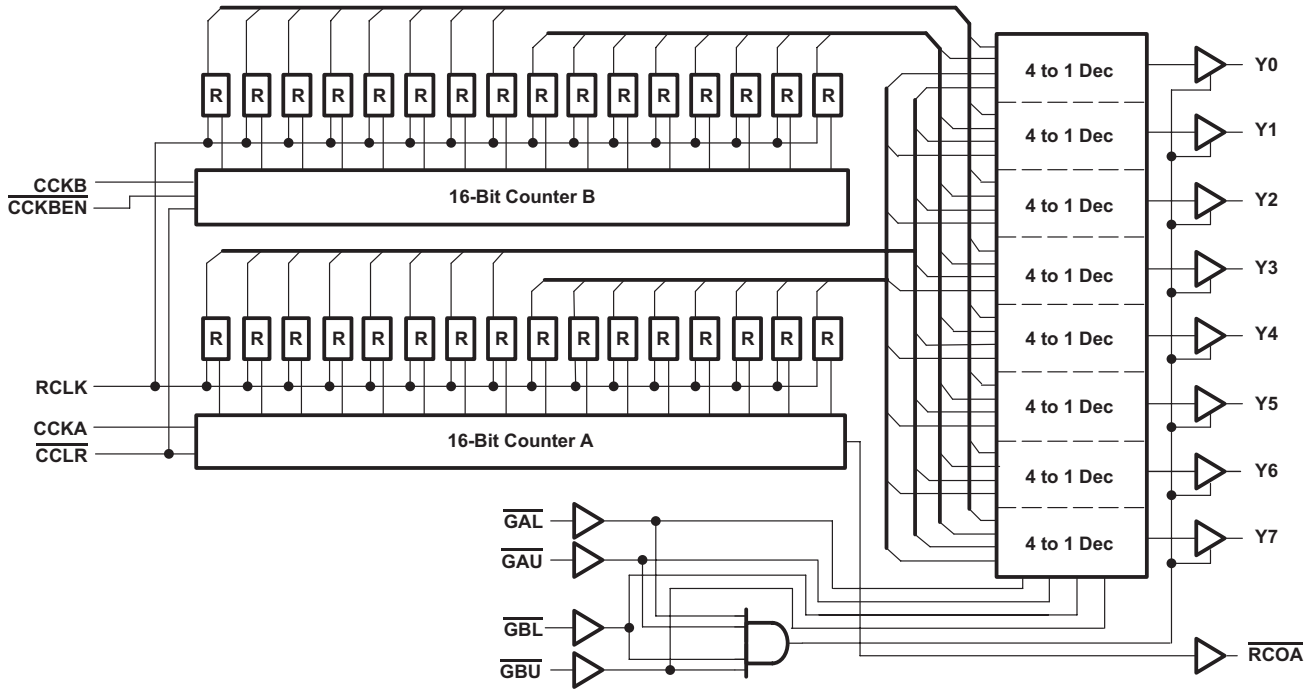


Table of Contents

1 Features ... 1
2 Applications ... 1
3 Description ... 1
4 Revision History ... 2
5 Pin Configuration and Functions ... 3
6 Specifications ... 4
6.1 Absolute Maximum Ratings ... 4
6.2 ESD Ratings ... 4
6.3 Recommended Operating Conditions ... 4
6.4 Thermal Information ... 5
6.5 Electrical Characteristics ... 5
6.6 Timing Requirements ... 5
6.7 Switching Characteristics - V_{CC} = 3.3 V ± 0.3 V ... 6
6.8 Switching Characteristics V_{CC} = 5 V ± 0.5 V ... 6
6.9 Noise Characteristics ... 6
6.10 Typical Characteristics ... 7
7 Parameter Measurement Information ... 8
8 Detailed Description ... 9
8.1 Overview ... 9
8.2 Functional Block Diagram ... 9
8.3 Feature Description ... 9
8.4 Device Functional Modes ... 10
9 Application and Implementation ... 11
9.1 Application Information ... 11
9.2 Typical Application ... 11
10 Power Supply Recommendations ... 13
11 Layout ... 13
11.1 Layout Guidelines ... 13
11.2 Layout Example ... 13
12 Device and Documentation Support ... 14
12.1 Documentation Support ... 14
12.2 Community Resources ... 14
12.3 Trademarks ... 14
12.4 Electrostatic Discharge Caution ... 14
12.5 Glossary ... 14
13 Mechanical, Packaging, and Orderable Information ... 14

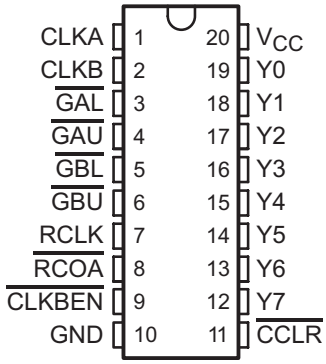
4 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Original (August 2004) to Revision A	Page
• Added *Pin Configuration and Functions* section, *Storage Conditions* table, *ESD Ratings* table, *Feature Description* section, *Device Functional Modes*, *Application and Implementation* section, *Power Supply Recommendations* section, *Layout* section, *Device and Documentation Support* section, and *Mechanical, Packaging, and Orderable Information* section	1
• Removed *Ordering Information* table	1

5 Pin Configuration and Functions

N or PW Package
20-Pin PDIP or TSSOP
Top View



Pin Functions

PIN		I/O	DESCRIPTION
NAME	NO.		
$\overline{CCLR}$	11	I	Clock clear, asyncrounous active-low clear for both counters
CLKA	1	I	Clock A, rising edge count clock
CLKB	2	I	Clock B, rising edge count clock
$\overline{CLKBEN}$	9	I	Clock B enable, acitive-low allows clocking for counter B; connect to $\overline{RCOA}$ for 32-bit counter.
$\overline{GAL}$	3	I	Gate A lower byte, acitve-low puts lower byte of stored counter A on the Y bus.
$\overline{GAU}$	4	I	Gate A upper byte, acitve-low puts upper byte of stored counter A on the Y bus.
$\overline{GBL}$	5	I	Gate B lower byte, acitve-low puts lower byte of stored counter B on the Y bus.
$\overline{GBU}$	6	I	Gate B upper byte, acitve-low puts upper byte of stored counter B on the Y bus.
GND	10	—	Ground
RCLK	7	I	Register Clock, rising edge stores counters into an internal storage register
$\overline{RCOA}$	8	O	Ready case overflow A, active low when counter A is full count and ready to overflow on next clock A
V_{CC}	20	—	Power supply pin
Y0	19	O	Data output bit 0 (LSB)
Y1	18	O	Data output bit 1
Y2	17	O	Data output bit 2
Y3	16	O	Data output bit 3
Y4	15	O	Data output bit 4
Y5	14	O	Data output bit 5
Y6	13	O	Data output bit 6
Y7	12	O	Data output bit 7 (MSB)

6 Specifications

6.1 Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted)(1)

			MIN	MAX	UNIT
V_{CC}	Supply voltage		–0.5	7	V
V_I	Input voltage(2)		–0.5	7	V
V_O	Voltage applied to any output in the high-impedance or power-off state(2)		–0.5	7	V
V_O	Output voltage(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
T_J	Junction Temperature			150	°C
T_{stg}	Storage temperature		–65	150	°C

(1) Stresses beyond those listed under *Absolute Maximum Ratings* may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions*. 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.

6.2 ESD Ratings

			VALUE	UNIT
$V_{(ESD)}$	Electrostatic discharge	Human body model (HBM), per ANSI/ESDA/JEDEC JS-001, all pins(1)	±2000	V
		Charged device model (CDM), per JEDEC specification JESD22-C101, all pins(2)	±1000	

(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.
(2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

6.3 Recommended Operating Conditions(1)

			V_{CC}	MIN	MAX	UNIT
V_{CC}	Supply voltage			2	5.5	V
V_{IH}	High-level input voltage		2 V	1.5		V
			3 V to 3.6 V	V_{CC} × 0.7		
			4.5 V to 5.5 V	V_{CC} × 0.7		
V_{IL}	Low-level input voltage		2 V		0.5	V
			3 V to 3.6 V		V_{CC} × 0.3	
			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		2 V		–50	µA
			3 V to 3.6 V		–6	mA
			4.5 V to 5.5 V		–12	
I_{OL}	Low-level output current		2 V		50	µA
			3 V to 3.6 V		6	mA
			4.5 V to 5.5 V		12	
$\Delta t/\Delta v$	Input transition rise and fall rate		3 V to 3.6 V		100	ns/V
			4.5 V to 5.5 V		20	
T_A	Operating free-air temperature			–40	85	°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*, SCBA004.

6.4 Thermal Information

THERMAL METRIC[1]		SN74LV8154N N (PDIP) 20 PINS	SN74LV8154PW PW (TSSOP) 20 PINS	UNIT
$R_{\theta JA}$	Junction-to-ambient thermal resistance	54.9	100.2	°C/W
$R_{\theta JC(top)}$	Junction-to-case (top) thermal resistance	46.5	30.9	°C/W
$R_{\theta JB}$	Junction-to-board thermal resistance	35.9	47.1	°C/W
ψ_{JT}	Junction-to-top characterization parameter	23.5	1.5	°C/W
ψ_{JB}	Junction-to-board characterization parameter	35.7	46.6	°C/W

(1) For more information about traditional and new thermal metrics, see the *Semiconductor and IC Package Thermal Metrics* application report (SPRA953).

6.5 Electrical Characteristics

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

PARAMETER		TEST CONDITIONS		V_{CC}	MIN	TYP	MAX	UNIT
V_{OH}	Output high voltage	I_{OH} = –50 µA		2 V	1.9			V
		I_{OH} = –6 mA		3 V	2.48			
		I_{OH} = –12 mA		4.5 V	3.8			
V_{OL}	Output low voltage	I_{OL} = 50 µA		2 V			0.1	V
		I_{OL} = 6 mA		3 V			0.44	
		I_{OL} = 12 mA		4.5 V			0.55	
I_I	Input current	V_I = 5.5 V or GND		0 to 5.5 V			±1	µA
I_{OZ}	Output off current	$V_O = V_{CC}$ or GND		5.5 V			±5	µA
I_{CC}	Supply current	$V_I = V_{CC}$ or GND,	I_O = 0	5.5 V			20	µA
I_{off}	Off current	V_I or V_O = 0 to 5.5 V		0			5	µA
C_I	Input capacitance	$V_I = V_{CC}$ or GND		5 V		3		pF
C_o	Output capacitance	$V_O = V_{CC}$ or GND		5 V		5		pF
C_{pd}	Power dissipation capacitance	C_L = No load,	CCLK = 10 MHz RCLK = 1 MHz	5 V		56		pF

6.6 Timing Requirements

over recommended operating free-air temperature range, V_{CC} = 5 V ± 0.5 V (unless otherwise noted) (see Figure 3)

			MIN	UNIT
t_w	Pulse duration	CLKA, CLKB, RCLK high or low	10	ns
		$\overline{CCLR}$ low	20	
t_{su}	Set-up time	$\overline{CLKBEN}$ low before CLKB↑	10	ns
		$\overline{CCLR}$ high (inactive) before CLKA↑or CLKB↑	10	
		CLKA↑ or CLKB↑ before RCLK↑	10	
		RCLK↑ before $\overline{GAL}$ or $\overline{GAU}$ or $\overline{GBL}$ or $\overline{GBU}$ low	10	
		$\overline{GAL}$ or $\overline{GAU}$ or $\overline{GBL}$ or $\overline{GBU}$ high (inactive) before RCLK↑	10	
t_h	Hold time	$\overline{CLKBEN}$ low after CLKB↑	0	ns
		CLKA or CLKB after RCLK	0	
t_z[1]	Z-period	$\overline{GAL}$, $\overline{GAU}$, $\overline{GBL}$, $\overline{GBU}$ all high before one of them switches low	200	ns

(1) t_z condition: C_L = 50 pF, R_L = 1 kΩ

6.7 Switching Characteristics - V_{CC} = 3.3 V ± 0.3 V

over recommended operating free-air temperature range, V_{CC} = 3.3 V ± 0.3 V (unless otherwise noted) (see Figure 3)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	MIN	TYP	MAX	UNIT
f_{MAX}			C_L = 15 pF	40			MHz
			C_L = 50 pF	25			
t_{pd}	RCLK	Y	C_L = 15 pF	1	22	38	ns
	CLKA	$\overline{RCOA}$		1	26	44	
t_{PLH}	$\overline{CCLR}$	$\overline{RCOA}$		1	18	32	ns
t_{en}	$\overline{GAL}$, $\overline{GAU}$, $\overline{GBL}$, $\overline{GBU}$	Y		1	27	46	ns
t_{dis}	$\overline{GAL}$, $\overline{GAU}$, $\overline{GBL}$, $\overline{GBU}$	Y		1	12	21	ns
t_{pd}	RCLK	Y	C_L = 50 pF	1	25	42	ns
	CLKA	$\overline{RCOA}$		1	28	46	
t_{PLH}	$\overline{CCLR}$	$\overline{RCOA}$		1	20	35	ns
t_{en}	$\overline{GAL}$, $\overline{GAU}$, $\overline{GBL}$, $\overline{GBU}$	Y		1	30	50	ns
t_{dis}	$\overline{GAL}$, $\overline{GAU}$, $\overline{GBL}$, $\overline{GBU}$	Y		1	14	24	ns

6.8 Switching Characteristics V_{CC} = 5 V ± 0.5 V

over recommended operating free-air temperature range, V_{CC} = 5 V ± 0.5 V (unless otherwise noted) (see Figure 3)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	MIN	TYP	MAX	UNIT
f_{MAX}			C_L = 15 pF	40			MHz
			C_L = 50 pF	25			
t_{pd}	RCLK	Y	C_L = 15 pF	1	14	25	ns
	CLKA	$\overline{RCOA}$		1	16	27	
t_{PLH}	$\overline{CCLR}$	$\overline{RCOA}$		1	12	20	ns
t_{en}	$\overline{GAL}$, $\overline{GAU}$, $\overline{GBL}$, $\overline{GBU}$	Y		1	16	28	ns
t_{dis}	$\overline{GAL}$, $\overline{GAU}$, $\overline{GBL}$, $\overline{GBU}$	Y		1	8	15	ns
t_{pd}	RCLK	Y	C_L = 50 pF	1	16	27	ns
	CLKA	$\overline{RCOA}$		1	17	28	
t_{PLH}	$\overline{CCLR}$	$\overline{RCOA}$		1	13	21	ns
t_{en}	$\overline{GAL}$, $\overline{GAU}$, $\overline{GBL}$, $\overline{GBU}$	Y		1	18	30	ns
t_{dis}	$\overline{GAL}$, $\overline{GAU}$, $\overline{GBL}$, $\overline{GBU}$	Y		1	9	16	ns

6.9 Noise Characteristics

V_{CC} = 5 V, C_L = 50 pF

PARAMETER		MIN	TYP	MAX	UNIT
$V_{OL(P)}$	Quiet output, maximum dynamic V_{OL}		0.7		V
$V_{OL(V)}$	Quiet output, minimum dynamic V_{OL}		–0.75		V
$V_{OH(V)}$	Quiet output, minimum dynamic V_{OH}		4.4		V

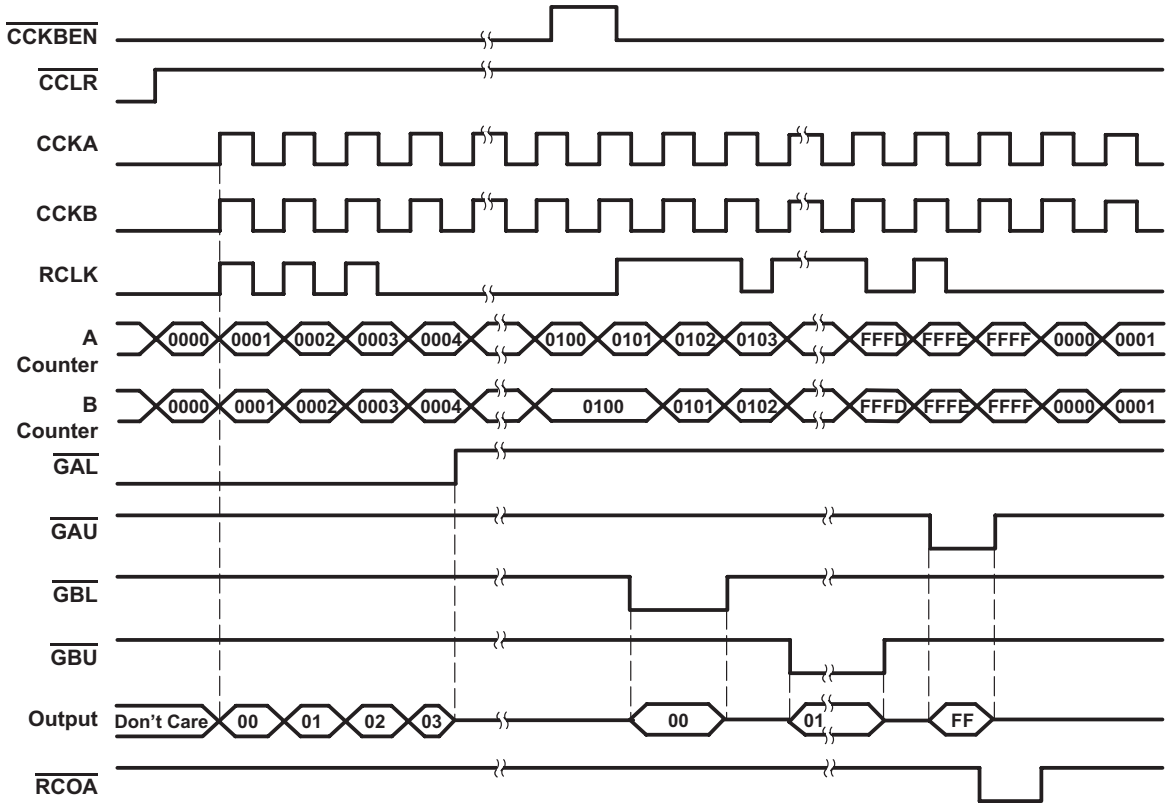
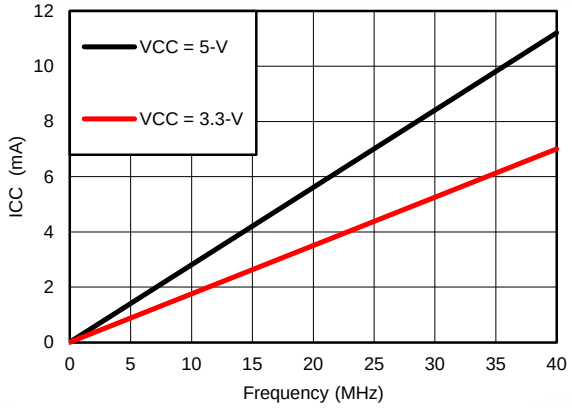


Figure 1. Timing Diagram

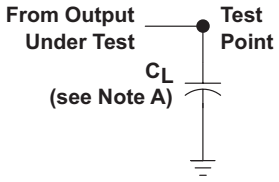
6.10 Typical Characteristics



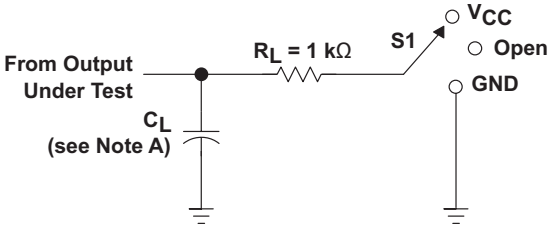
RCLK = CLKA,B / 10; No load

Figure 2. ICC vs CLKA, CLKB Frequency

7 Parameter Measurement Information

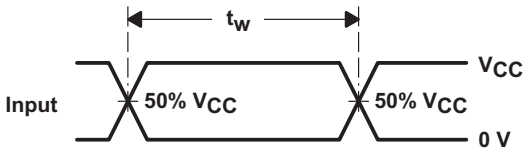


LOAD CIRCUIT FOR
TOTEM-POLE OUTPUTS

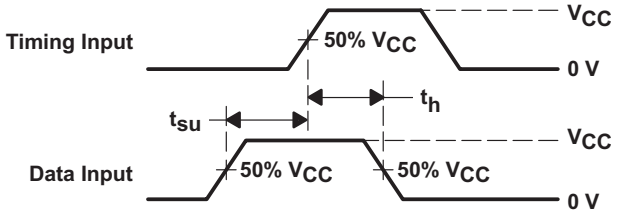


LOAD CIRCUIT FOR
3-STATE AND OPEN-DRAIN OUTPUTS

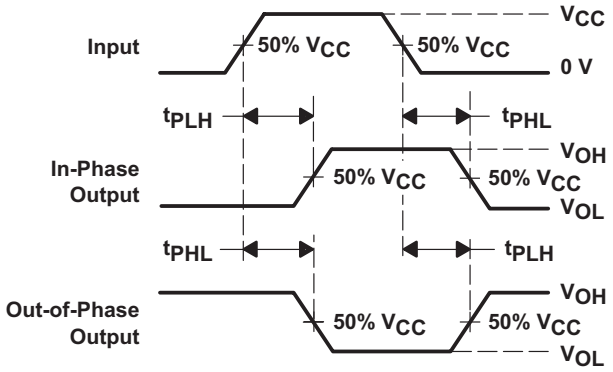
TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	V_{CC}
t_{PHZ}/t_{PZH}	GND
Open Drain	V_{CC}



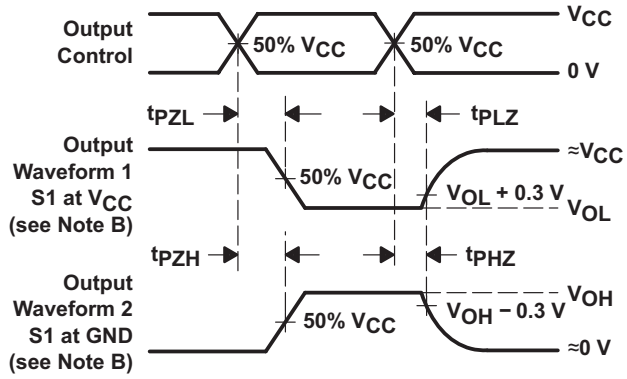
VOLTAGE WAVEFORMS
PULSE DURATION



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 ≤ 1 MHz, Z_O = 50 Ω, t_r ≤ 3 ns, t_f ≤ 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 3. Load Circuit and Voltage Waveforms

8 Detailed Description

8.1 Overview

The SN74LV8154 device is a dual 16-bit binary counter with 3-state output registers, designed for 2-V to 5.5-V V_{CC} operation. The counters have dedicated clock inputs. The counters share a storage register clock and an asynchronous clear input. The 32-bit storage register can be mapped on the output bus 8-bit at a time. Four bus reads are needed to access the contents of both counters. The two counters can be chained by connecting $\overline{CLKBEN}$ to $\overline{RCOA}$

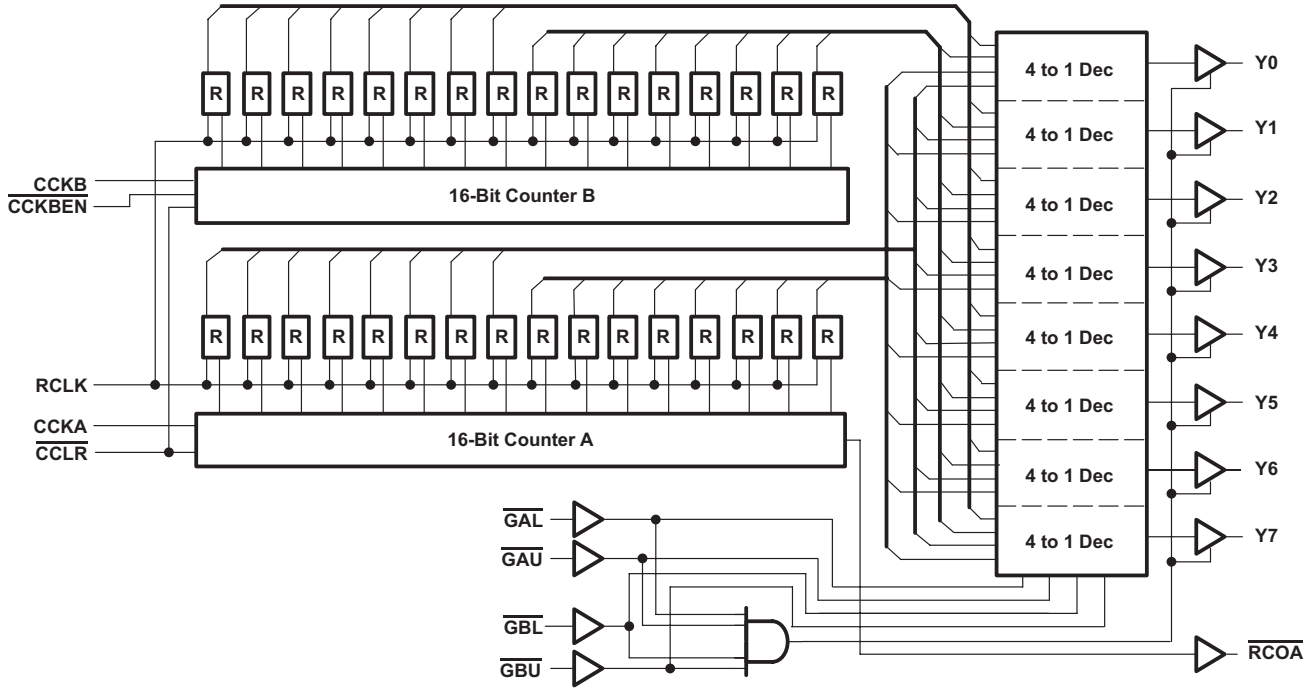
This 16-bit counter (A or B) feeds a 16-bit storage register, and each storage register is further divided into an upper byte and lower byte. The $\overline{GAL}$, $\overline{GAU}$, $\overline{GBL}$, $\overline{GBU}$ inputs are used to select the byte that needs to be output at Y0−Y7. CLKA is the clock for A counter, and CLKB is the clock for B counter. RCLK is the clock for the A and B storage registers. All three clock signals are positive-edge triggered.

A 32-bit counter can be realized by connecting CLKA and CLKB together and by connecting $\overline{RCOA}$ to $\overline{CLKBEN}$.

To ensure the high-impedance state during power up or power down, $\overline{GAL}$, $\overline{GAU}$, $\overline{GBL}$, and $\overline{GBU}$ 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.

8.2 Functional Block Diagram



8.3 Feature Description

Two 16-bit counters count up on each positive edge of the respective clock input. $\overline{RCOA}$ is set low when counter A is full count. Counter B clock is gated by the $\overline{CCKBEN}$ input. Connecting $\overline{RCOA}$ to $\overline{CCKBEN}$ together chains the counters to make one 32-bit counter.

Asynchronous $\overline{CCLR}$ input resets both counter to zero.

One 32-bit storage register records the contents of both counters on the rising edge of RCLK. The contents of the storage register are saved until the next rising edge of the RCLK.

Mapped output bus can be set to high impedance or output 8-bits of the 32-bit storage register.

8.4 Device Functional Modes

Table 1 lists the functional modes of the SN74LV8154.

Table 1. Function Table

INPUTS				OUTPUT Yn
$\overline{GAL}$	$\overline{GAU}$	$\overline{GBL}$	$\overline{GBU}$	
L	H	H	H	Lower byte in A storage register
H	L	H	H	Upper byte in A storage register
H	H	L	H	Lower byte in B storage register
H	H	H	L	Upper byte in B storage register
H	H	H	H	Z

9 Application and Implementation

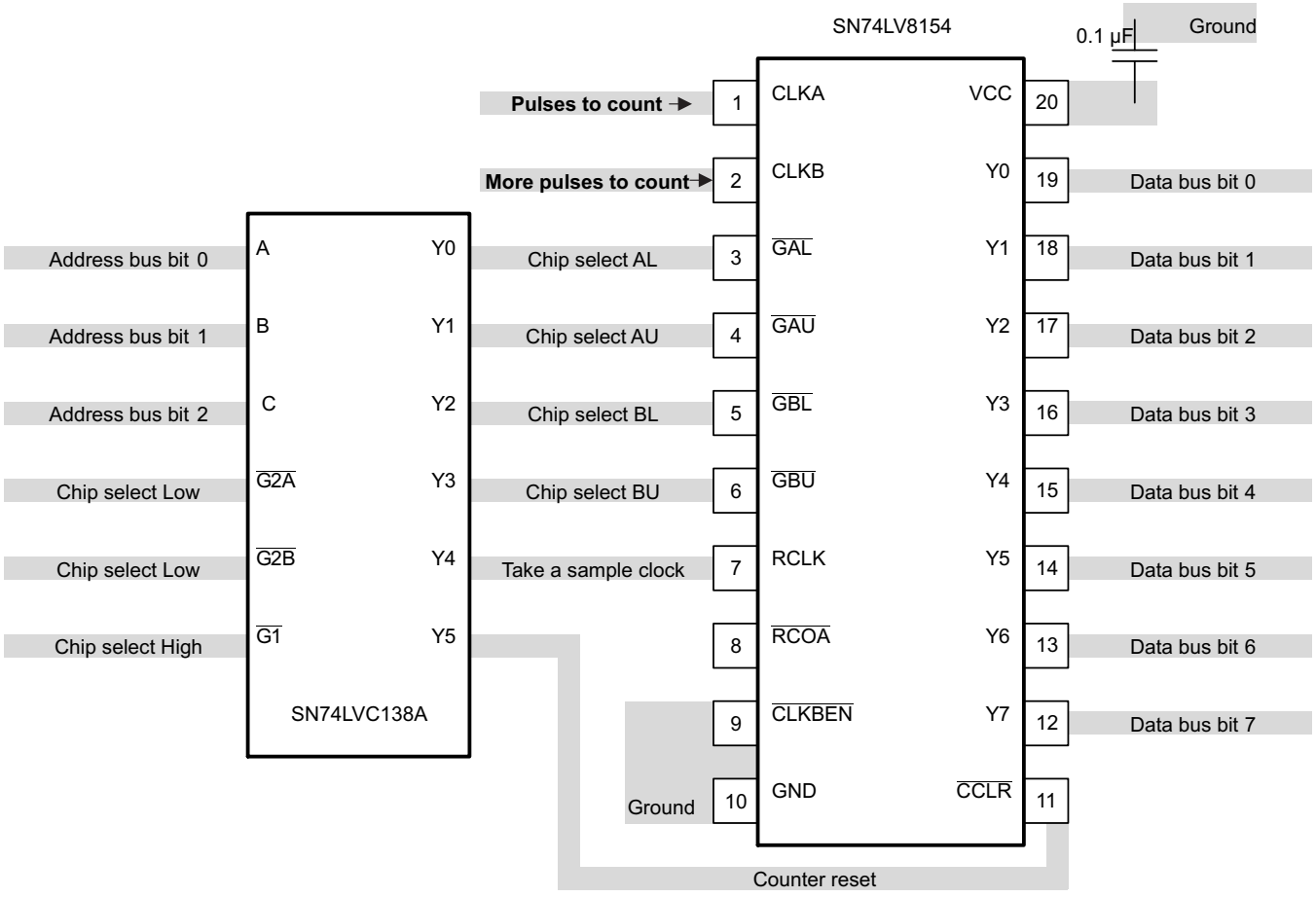
NOTE

Information in the following applications sections is not part of the TI component specification, and TI does not warrant its accuracy or completeness. TI's customers are responsible for determining suitability of components for their purposes. Customers should validate and test their design implementation to confirm system functionality.

9.1 Application Information

The SN74LV8154 can count any two events up to a count of 65,535 per storage register read. It can also count one event up to a count of 4,294,967,295 per storage register read.

9.2 Typical Application



Dual Counter With Address Mapping

9.2.1 Design Requirements

- V_{CC} must be acceptable for both SN74LV8154 and SN74LVC138A.
- $\overline{CCLR}$ low time must be greater than 20 ns.
- 8 bytes of unique address space are needed.
- CLKA and CLKB inputs must have input transition rate specified in *Recommended Operating Conditions*.
- RCLK and $\overline{CCLR}$ inputs must be free of glitches to prevent accidental register saves or counter clears.

Typical Application (continued)

9.2.2 Detailed Design Procedure

- Connect Y0 through Y7 to the data bus.
- Connect A, B, and C to lower address bus lines.
- Connect $\overline{G2A}$, $\overline{G2B}$, and G1 to decoded addresses to provide 8 or more unique memory locations.
- Connect two pulse sources to CLKA and CLKB inputs. If sources have noise or slow edges then pass the signal through a Schmitt trigger buffer first.
- If only one counter is needed, connect the single pulse source to both CLKA and CLKB.
- Also connect $\overline{CLKBEN}$ to $\overline{RCOA}$ instead of ground.

Table 2. Function Table

INPUTS(1)						OUTPUT(1)	RESULT
G1	$\overline{G2A}$	$\overline{G2B}$	C	B	A	Yn	
L	X	X	X	X	X	Z	No action
X	H	X	X	X	X	Z	No action
X	X	H	X	X	X	Z	No action
H	L	L	L	L	L	A lower byte	Read lower byte of counter A storage register
H	L	L	L	L	H	A upper byte	Read upper byte of counter A storage register
H	L	L	L	H	L	B lower byte	Read lower byte of counter B storage register
H	L	L	L	H	H	B upper byte	Read upper byte of counter B storage register
H	L	L	H	L	L	Z	Save counters into storage register after changing any input
H	L	L	H	L	H	Z	Reset both counters to zero
H	L	L	H	H	L	Z	No action
H	L	L	H	H	H	Z	No action

(1) L = low, H = high, X = don't care, Z = high Impedance.

9.2.3 Application Curve

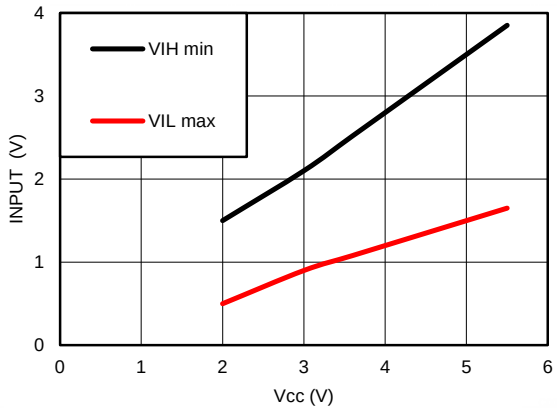


Figure 4. Input Voltage Range vs $\overline{VCC}$

10 Power Supply Recommendations

The power supply can be any voltage between the minimum and maximum supply voltage rating located in *Recommended Operating Conditions* table.

Each V_{CC} terminal should have a good bypass capacitor to prevent power disturbance. For devices with a single supply, a 0.1-µF capacitor is recommended. If there are multiple V_{CC} terminals then 0.01-µF or 0.022-µF capacitors are recommended for each power terminal. It is ok to parallel multiple bypass capacitors to reject different frequencies of noise. Multiple bypass capacitors may be paralleled to reject different frequencies of noise. The bypass capacitor should be installed as close to the power terminal as possible for the best results.

11 Layout

11.1 Layout Guidelines

When using multiple bit logic devices, inputs should not float. In many cases, functions or parts of functions of digital logic devices are unused. Some examples are when only two inputs of a triple-input AND gate are used, or when only 3 of the 4-buffer gates are used. Such input pins should not be left unconnected because the undefined voltages at the outside connections result in undefined operational states.

Specified in Figure 5 are rules that must be observed under all circumstances. All unused inputs of digital logic devices must be connected to a high or low bias to prevent them from floating. The logic level that should be applied to any particular unused input depends on the function of the device. Generally they will be tied to GND or V_{CC}, whichever makes more sense or is more convenient.

11.2 Layout Example

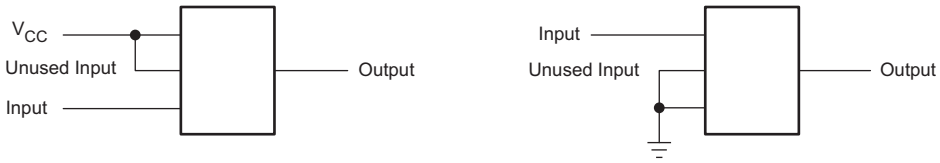


Figure 5. Layout Diagram

12 Device and Documentation Support

12.1 Documentation Support

12.1.1 Related Documentation

For related documentation, see the following:

Implications of Slow or Floating CMOS Inputs, SCBA004

12.2 Community Resources

The following links connect to TI community resources. Linked contents are provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's Terms of Use.

TI E2E™ Online Community ***TI's Engineer-to-Engineer (E2E) Community.*** Created to foster collaboration among engineers. At e2e.ti.com, you can ask questions, share knowledge, explore ideas and help solve problems with fellow engineers.

Design Support ***TI's Design Support*** Quickly find helpful E2E forums along with design support tools and contact information for technical support.

12.3 Trademarks

E2E is a trademark of Texas Instruments.
All other trademarks are the property of their respective owners.

12.4 Electrostatic Discharge Caution

These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

12.5 Glossary

SLYZ022 — *TI Glossary*.

This glossary lists and explains terms, acronyms, and definitions.

13 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
SN74LV8154N	ACTIVE	PDIP	N	20	20	RoHS & Non-Green	NIPDAU	N / A for Pkg Type	-40 to 85	SN74LV8154N	Samples
SN74LV8154NE4	ACTIVE	PDIP	N	20	20	RoHS & Non-Green	NIPDAU	N / A for Pkg Type	-40 to 85	SN74LV8154N	Samples
SN74LV8154PW	LIFEBUY	TSSOP	PW	20	70	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	LV8154	
SN74LV8154PWR	ACTIVE	TSSOP	PW	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	LV8154	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) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".
RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.
Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(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 finish/Ball material - Orderable Devices 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.

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.

OTHER QUALIFIED VERSIONS OF SN74LV8154 :

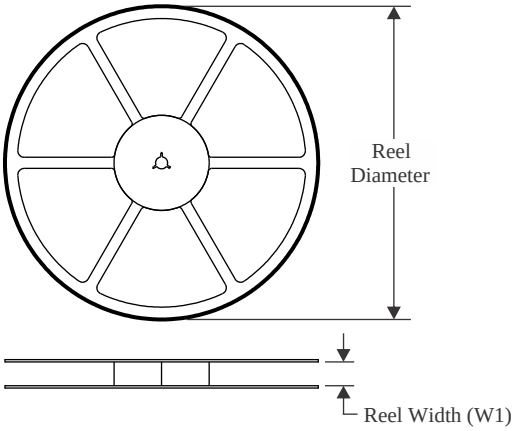
- Enhanced Product : SN74LV8154-EP

NOTE: Qualified Version Definitions:

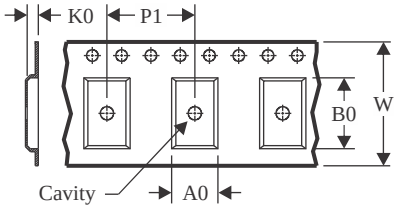
- Enhanced Product - Supports Defense, Aerospace and Medical Applications

TAPE AND REEL INFORMATION

REEL DIMENSIONS

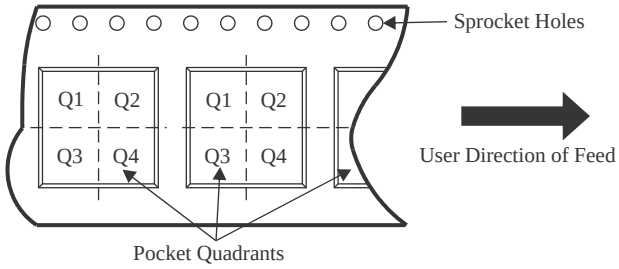


TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
B0	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

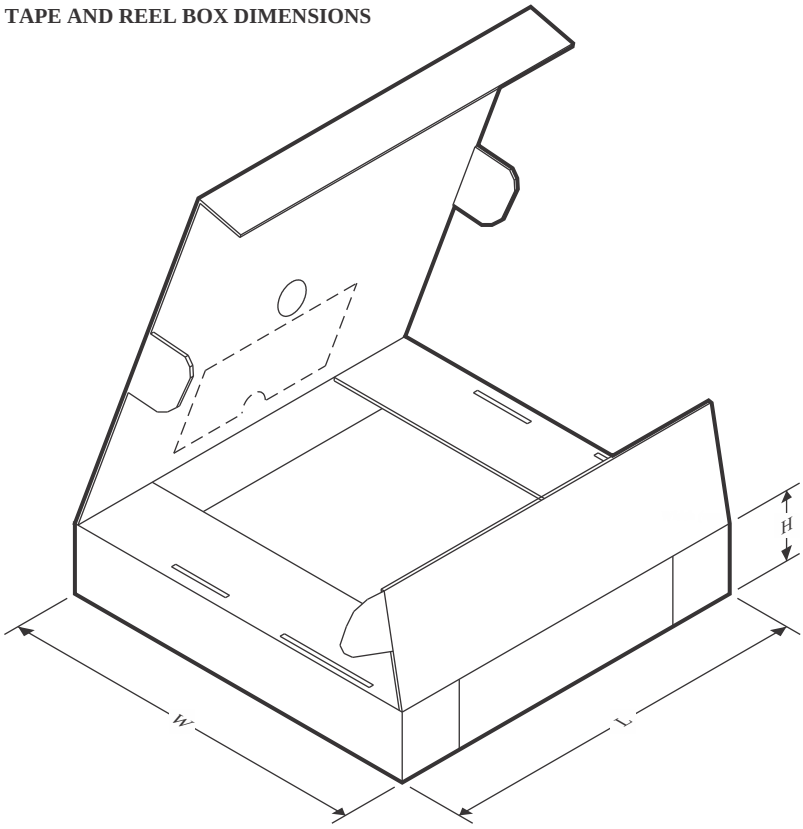
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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
SN74LV8154PWR	TSSOP	PW	20	2000	330.0	16.4	6.95	7.0	1.4	8.0	16.0	Q1

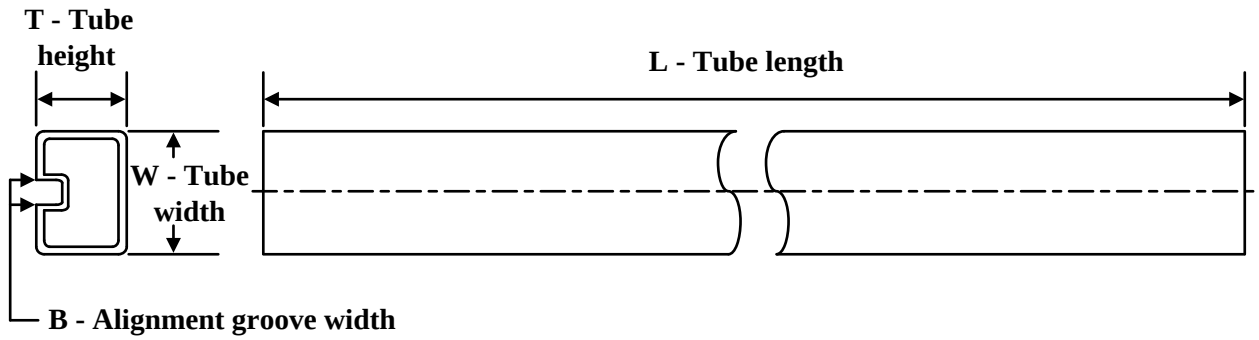
TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74LV8154PWR	TSSOP	PW	20	2000	356.0	356.0	35.0

TUBE



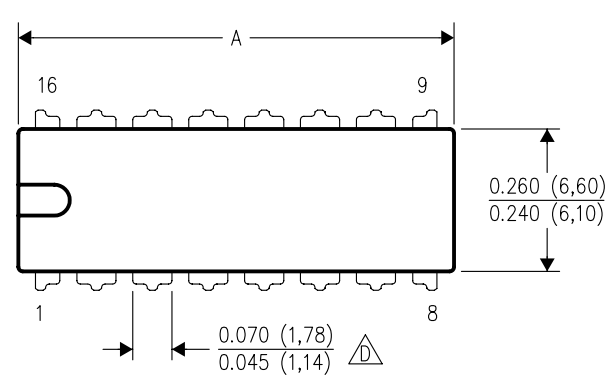
*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (µm)	B (mm)
SN74LV8154N	N	PDIP	20	20	506	13.97	11230	4.32
SN74LV8154NE4	N	PDIP	20	20	506	13.97	11230	4.32
SN74LV8154PW	PW	TSSOP	20	70	530	10.2	3600	3.5

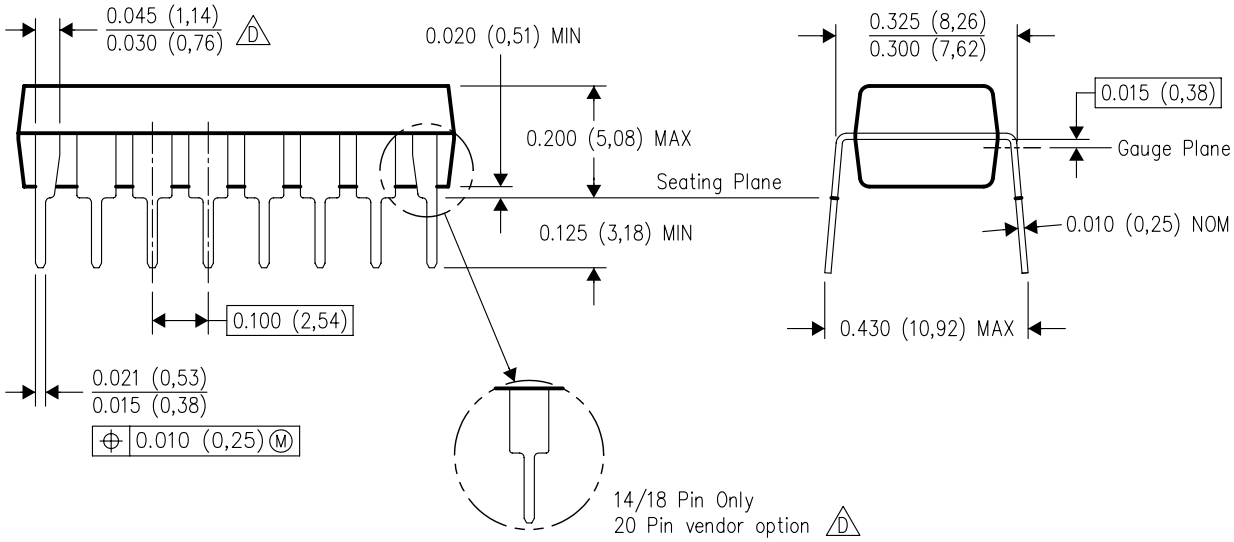
N (R–PDIP–T**)

PLASTIC DUAL–IN–LINE PACKAGE

16 PINS SHOWN



DIM \ PINS **	14	16	18	20
A MAX	0.775 (19,69)	0.775 (19,69)	0.920 (23,37)	1.060 (26,92)
A MIN	0.745 (18,92)	0.745 (18,92)	0.850 (21,59)	0.940 (23,88)
MS–001 VARIATION (C)	AA	BB	AC	AD



4040049/E 12/2002

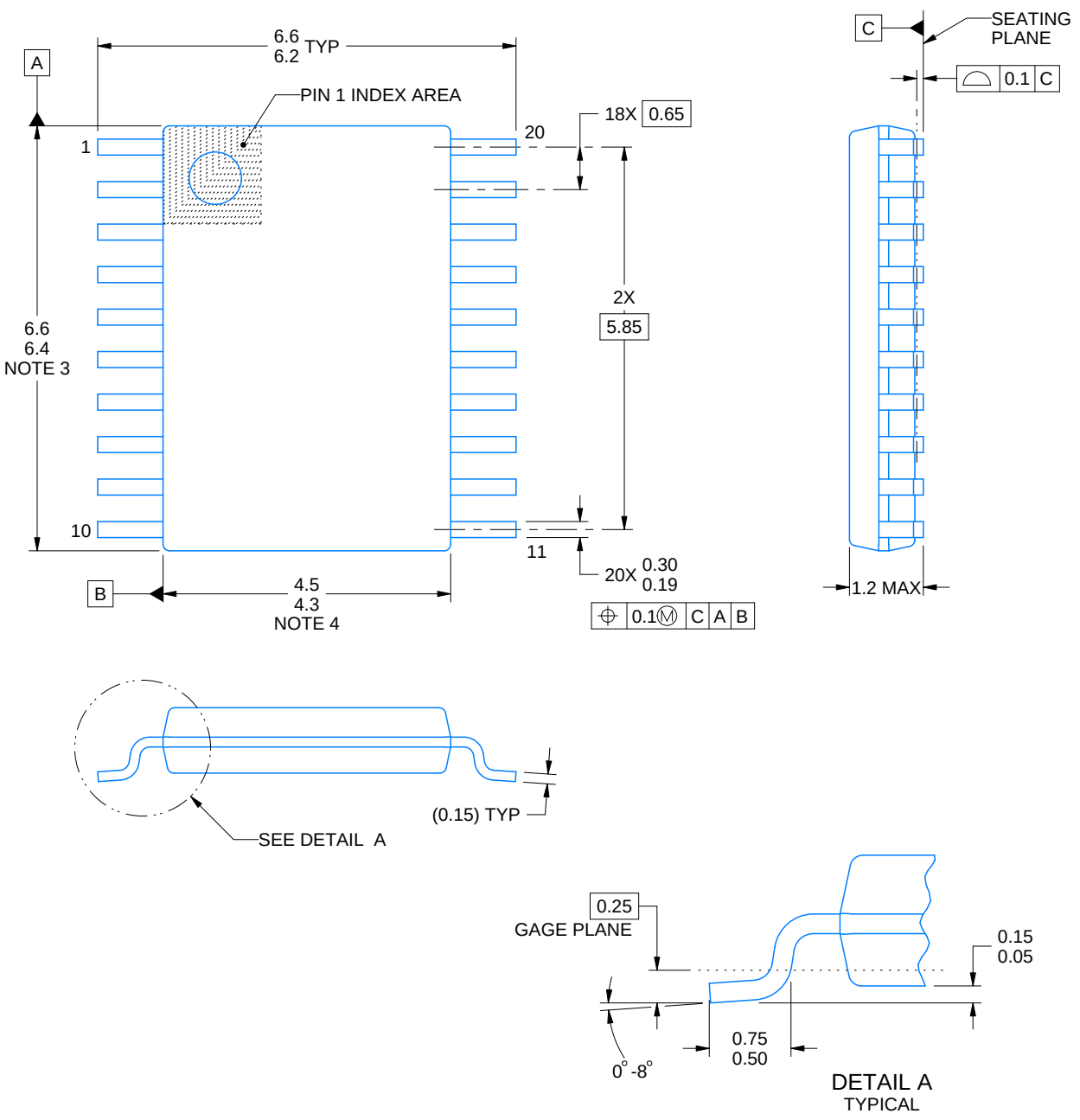
NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Falls within JEDEC MS–001, except 18 and 20 pin minimum body length (Dim A).
D. The 20 pin end lead shoulder width is a vendor option, either half or full width.

PACKAGE OUTLINE

PW0020A

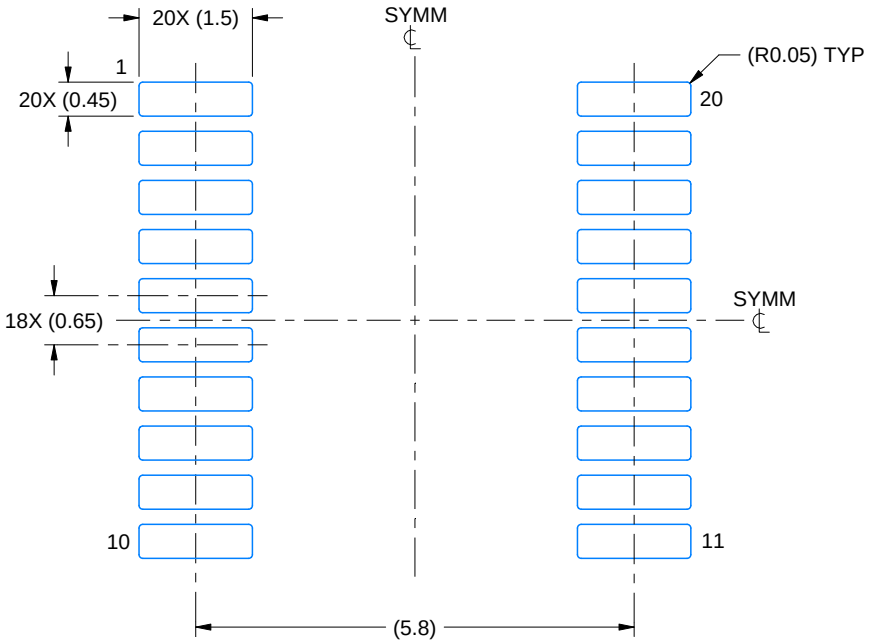
TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



NOTES:

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
5. Reference JEDEC registration MO-153.



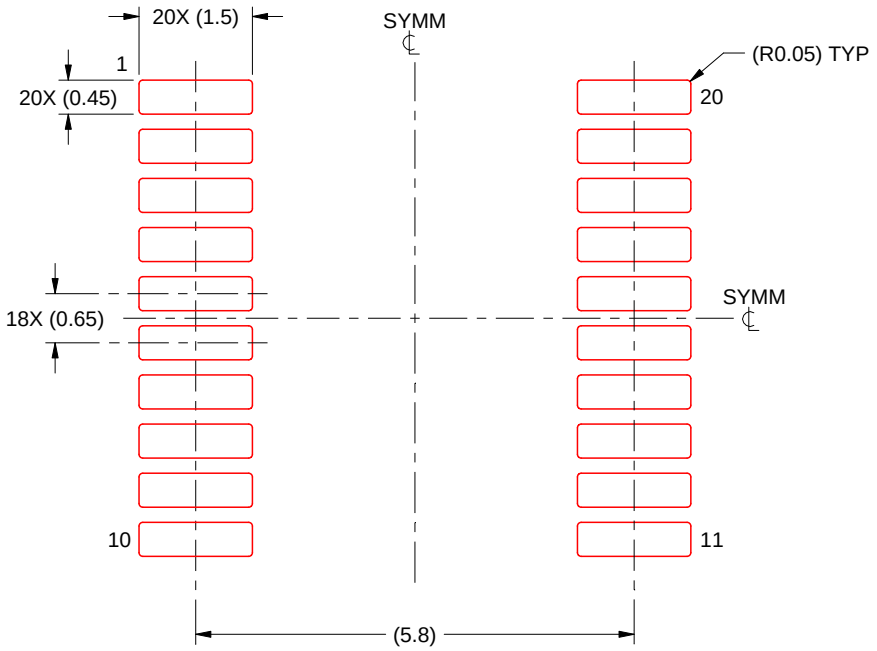
LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 10X

SOLDER MASK DETAILS

4220206/A 02/2017

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.



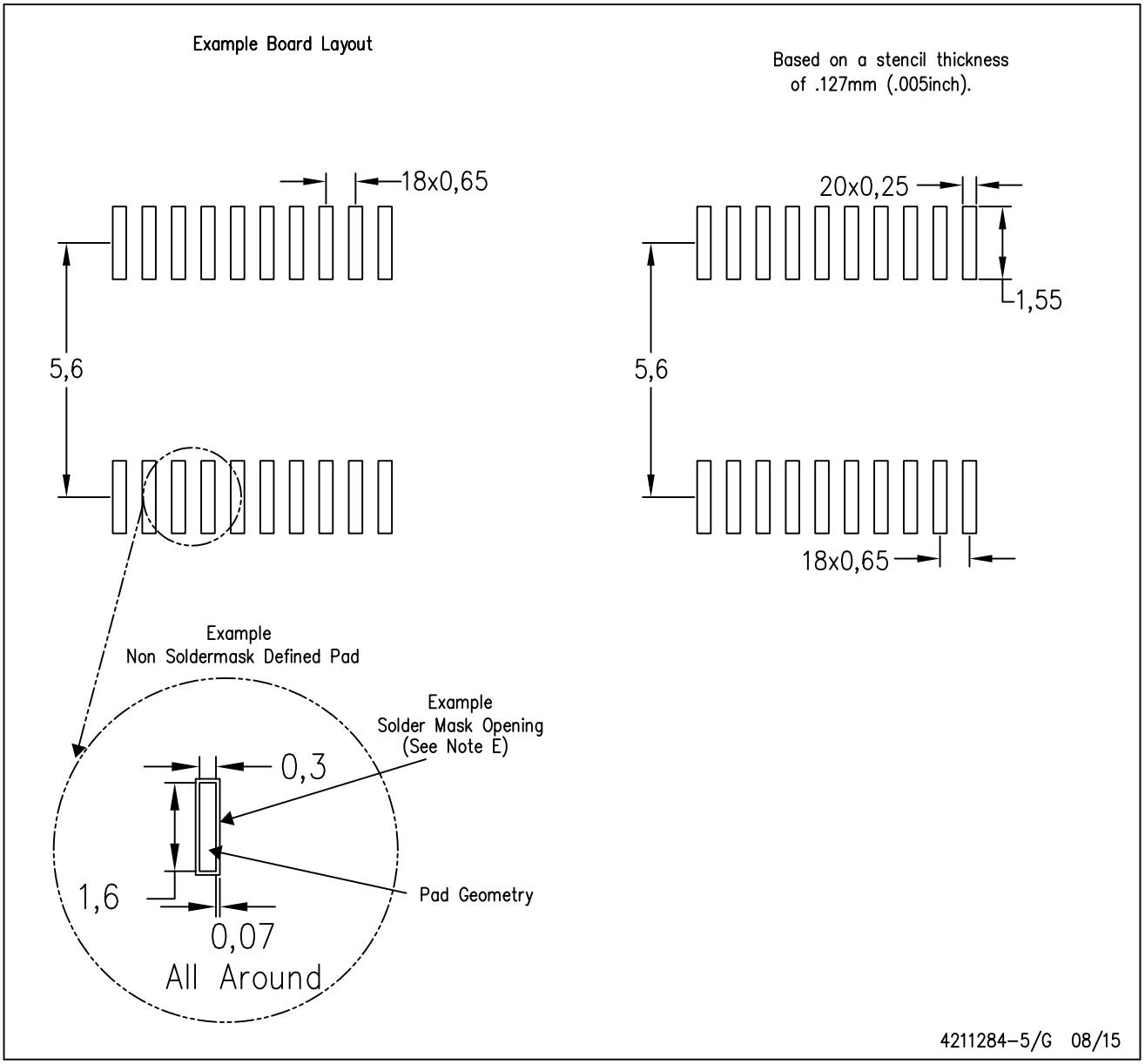
SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE: 10X

4220206/A 02/2017

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

PW (R–PDSO–G20) PLASTIC SMALL OUTLINE



NOTES:
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.

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATA SHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES “AS IS” AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, regulatory or other requirements.

These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you will fully indemnify TI and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI’s products are provided subject to TI’s Terms of Sale or other applicable terms available either on ti.com or provided in conjunction with such TI products. TI’s provision of these resources does not expand or otherwise alter TI’s applicable warranties or warranty disclaimers for TI products.

TI objects to and rejects any additional or different terms you may have proposed.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265