SCAS515C - JUNE 1995 - REVISED OCTOBER 2002

- 4.5-V to 5.5-V V_{CC} Operation
- Inputs Accept Voltages to 5.5 V

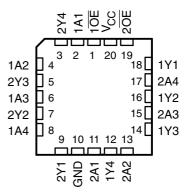
Max t_{pd} of 8.5 ns at 5 V

• Inputs Are TTL Compatible

SN54ACT240 ... J OR W PACKAGE SN74ACT240 ... DB, DW, N, NS, OR PW PACKAGE (TOP VIEW)

1 <u>0E</u> [1	\bigcup_{20}] v _{cc}
1A1 [2	19] 2 0E
2Y4 [3	18] 1Y1
1A2 [4	17] 2A4
2Y3 [5	16] 1Y2
1A3 [6	15] 2A3
2Y2 [7	14] 1Y3
1A4 [8	13] 2A2
2Y1 [9	12] 1Y4
GND [10	11] 2A1

SN54ACT240 . . . FK PACKAGE (TOP VIEW)



description/ordering information

These octal buffers and line drivers are designed specifically to improve the performance and density of 3-state memory address drivers, clock drivers, and bus-oriented receivers and transmitters.

The 'ACT240 devices are organized as two 4-bit buffers/drivers with separate output-enable (\overline{OE}) inputs. When \overline{OE} is low, the device passes inverted data from the A inputs to the Y outputs. When \overline{OE} is high, 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.

ORDERING INFORMATION

T _A	PACKAGI	Εt	ORDERABLE PART NUMBER	TOP-SIDE MARKING
	PDIP – N	Tube	SN74ACT240N	SN74ACT240N
4000 44 0500	COIC DW	Tube	SN74ACT240DW	ACT040
	SOIC - DW	Tape and reel	SN74ACT240DWR	ACT240
-40°C to 85°C	SOP - NS	Tape and reel	SN74ACT240NSR	ACT240
	SSOP – DB	Tape and reel	SN74ACT240DBR	AD240
	TSSOP - PW	Tape and reel	SN74ACT240PWR	AD240
	CDIP – J	Tube	SNJ54ACT240J	SNJ54ACT240J
–55°C to 125°C	CFP – W	Tube	SNJ54ACT240W	SNJ54ACT240W
	LCCC - FK	Tube	SNJ54ACT240FK	SNJ54ACT240FK

[†] Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.



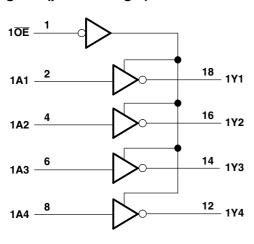
Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

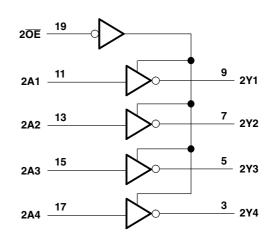


FUNCTION TABLE (each buffer)

INPU	JTS	OUTPUT
OE	Α	Υ
L	Н	L
L	L	Н
Н	Χ	Z

logic diagram (positive logic)





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

Supply voltage range, V_{CC}		
Output voltage range, V _O (see Note 1)		
Input clamp current, I_{IK} ($V_I < 0$ or $V_I > V_{CC}$)		
Output clamp current, I_{OK} ($V_O < 0$ or $V_O > V_{CC}$		
Continuous output current, $I_O(V_O = 0 \text{ to } V_{CC})$		±50 mA
Continuous current through V _{CC} or GND		±200 mA
Package thermal impedance, θ _{JA} (see Note 2):	: DB package	70°C/W
	DW package	58°C/W
	N package	69°C/W
	NS package	60°C/W
	PW package	83°C/W
Storage temperature range, T _{stg}		–65°C to 150°C

[†] Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTES: 1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

2. The package thermal impedance is calculated in accordance with JESD 51-7.



recommended operating conditions (see Note 3)

		SN54A	CT240	SN74A	CT240	
		MIN	MAX	MIN	MAX	UNIT
V _{CC}	Supply voltage	4.5	5.5	4.5	5.5	V
V _{IH}	High-level input voltage	2		2		V
V _{IL}	Low-level input voltage		0.8		8.0	V
VI	Input voltage	0	V_{CC}	0	V_{CC}	٧
V _O	Output voltage	0	V_{CC}	0	V_{CC}	V
I _{OH}	High-level output current		-24		-24	mA
I _{OL}	Low-level output current		24		24	mA
Δt/Δν	Input transition rise or fall rate		8		8	ns/V
T _A	Operating free-air temperature	-55	125	-40	85	°C

NOTE 3: 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)

242445	TTOT COMPLETIONS	.,	Т	_A = 25°C	;	SN54A	CT240	SN74A	CT240	
PARAMETER	TEST CONDITIONS	V _{CC}	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT
		4.5 V	4.4	4.49		4.4		4.4		
	$I_{OH} = -50 \mu A$	5.5 V	5.4	5.49		5.4		5.4		
V	1 24 m 1	4.5 V	3.86			3.7		3.76		V
V _{OH}	I _{OH} = -24 mA	5.5 V	4.86			4.7		4.76		V
	$I_{OH} = -50 \text{ mA}^{\dagger}$	5.5 V				3.85				
	$I_{OH} = -75 \text{ mA}^{\dagger}$	5.5 V						3.85		
	I 50 A	4.5 V		0.001	0.1		0.1		0.1	V
	$I_{OL} = 50 \mu A$	5.5 V		0.001	0.1		0.1		0.1	
V	1 - 24 mA	4.5 V			0.36		0.5		0.44	
V _{OL}	I _{OL} = 24 mA	5.5 V			0.36		0.5		0.44	
	$I_{OL} = 50 \text{ mA}^{\dagger}$	5.5 V					1.65			
	$I_{OL} = 75 \text{ mA}^{\dagger}$	5.5 V							1.65	
I_{OZ}	V _O = V _{CC} or GND	5.5 V			±0.25		±5		±2.5	μΑ
l _l	V _I = V _{CC} or GND	5.5 V			±0.1		±1		±1	μА
I _{CC}	$V_I = V_{CC}$ or GND, $I_O = 0$	5.5 V			4		80		40	μА
Δl _{CC} [‡]	One input at 3.4 V, Other inputs at GND or V _{CC}	5.5 V	_	0.6	_		1.6		1.5	mA
C _i	V _I = V _{CC} or GND	5 V		2.5						pF
Co	V _I = V _{CC} or GND	5 V		8						pF

 $^{^{\}dagger}$ Not more than one output should be tested at a time, and the duration of the test should not exceed 2 ms.



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

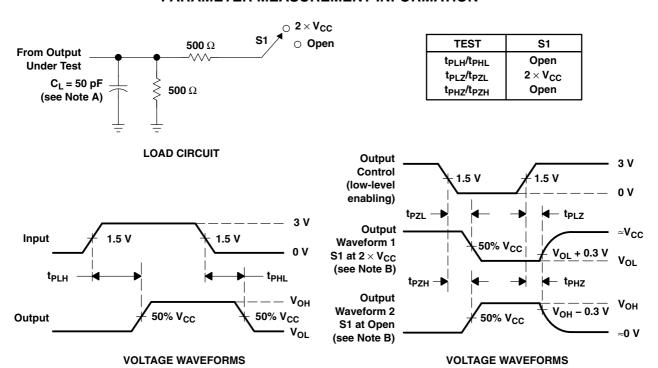
switching characteristics over recommended operating free-air temperature range, $V_{CC} = 5 \text{ V} \pm 0.5 \text{ V}$ (unless otherwise noted) (see Figure 1)

DADAMETED	FROM	то	T _A = 25°C			SN54A	CT240	SN74A		
PARAMETER	(INPUT)	(OUTPUT)	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT
t _{PLH}	•	V	1.5	6	8.5	1	9.5	1.5	9.5	
t _{PHL}	Α	Y	1.5	5.5	7.5	1	9	1.5	8.5	ns
t _{PZH}	<u> </u>	V	1.5	7	8.5	1	10	1	9.5	
t _{PZL}	ŌĒ	Y	2	7	9.5	1	11.5	1.5	10.5	ns
t _{PHZ}	ŌĒ	V	2	8	9.5	1	11	2	10.5	no
t _{PLZ}	OE	ĭ	2.5	6.5	10	1	11.5	2	10.5	ns

operating characteristics, V_{CC} = 5 V, T_A = 25°C

	PARAMETER	TEST CON	TYP	UNIT	
C _{pd}	Power dissipation capacitance per buffer/driver	$C_L = 50 pF$,	f = 1 MHz	45	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, $Z_O = 50~\Omega$, $t_f \leq$ 2.5 ns. $t_f \leq$ 2.5 ns.
- D. The outputs are measured one at a time with one input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms







6-Feb-2020

PACKAGING INFORMATION

Orderable Device	Status	Package Type	Package Drawing	Pins	Package Qty	Eco Plan	Lead/Ball Finish (6)	MSL Peak Temp	Op Temp (°C)	Device Marking (4/5)	Samples
5962-8775901M2A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	5962- 8775901M2A SNJ54ACT 240FK	Sample
5962-8775901MRA	ACTIVE	CDIP	J	20	1	TBD	Call TI	N / A for Pkg Type	-55 to 125	5962-8775901MR A SNJ54ACT240J	Sample
5962-8775901MSA	ACTIVE	CFP	W	20	1	TBD	Call TI	N / A for Pkg Type	-55 to 125	5962-8775901MS A SNJ54ACT240W	Samples
SN74ACT240DBR	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AD240	Samples
SN74ACT240DW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ACT240	Samples
SN74ACT240DWG4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ACT240	Sample
SN74ACT240DWR	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ACT240	Sample
SN74ACT240DWRE4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ACT240	Samples
SN74ACT240N	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	NIPDAU	N / A for Pkg Type	-40 to 85	SN74ACT240N	Sample
SN74ACT240NSR	ACTIVE	so	NS	20	2000	Green (RoHS & no Sb/Br)	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ACT240	Samples
SN74ACT240PW	ACTIVE	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AD240	Samples
SN74ACT240PWG4	ACTIVE	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AD240	Sample
SN74ACT240PWR	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	NIPDAU SN	Level-1-260C-UNLIM	-40 to 85	AD240	Sample
SN74ACT240PWRG4	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AD240	Sample
SNJ54ACT240FK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	5962- 8775901M2A SNJ54ACT	Sample



PACKAGE OPTION ADDENDUM

6-Feb-2020

Orderable Device	Status	Package Type		Pins	Package	Eco Plan	Lead/Ball Finish	MSL Peak Temp	Op Temp (°C)	Device Marking	Samples
	(1)		Drawing		Qty	(2)	(6)	(3)		(4/5)	
										240FK	
SNJ54ACT240J	ACTIVE	CDIP	J	20	1	TBD	Call TI	N / A for Pkg Type	-55 to 125	5962-8775901MR A	Samples
										SNJ54ACT240J	
SNJ54ACT240W	ACTIVE	CFP	W	20	1	TBD	Call TI	N / A for Pkg Type	-55 to 125	5962-8775901MS	Samples
										SNJ54ACT240W	-

(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 (CI) 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/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.

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.



PACKAGE OPTION ADDENDUM

6-Feb-2020

OTHER QUALIFIED VERSIONS OF SN54ACT240, SN74ACT240:

• Military: SN54ACT240

NOTE: Qualified Version Definitions:

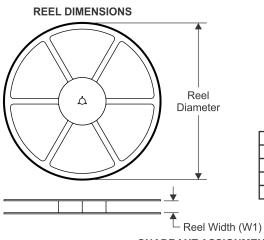
• Catalog - TI's standard catalog product

• Military - QML certified for Military and Defense Applications

PACKAGE MATERIALS INFORMATION

www.ti.com 14-May-2020

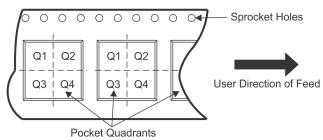
TAPE AND REEL INFORMATION





Α0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
	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		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74ACT240DBR	SSOP	DB	20	2000	330.0	16.4	8.2	7.5	2.5	12.0	16.0	Q1
SN74ACT240DWR	SOIC	DW	20	2000	330.0	24.4	10.8	13.3	2.7	12.0	24.0	Q1
SN74ACT240NSR	SO	NS	20	2000	330.0	24.4	8.4	13.0	2.5	12.0	24.0	Q1
SN74ACT240PWR	TSSOP	PW	20	2000	330.0	16.4	6.95	7.0	1.4	8.0	16.0	Q1
SN74ACT240PWR	TSSOP	PW	20	2000	330.0	16.4	6.95	7.1	1.6	8.0	16.0	Q1
SN74ACT240PWRG4	TSSOP	PW	20	2000	330.0	16.4	6.95	7.0	1.4	8.0	16.0	Q1

PACKAGE MATERIALS INFORMATION

www.ti.com 14-May-2020



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74ACT240DBR	SSOP	DB	20	2000	367.0	367.0	38.0
SN74ACT240DWR	SOIC	DW	20	2000	367.0	367.0	45.0
SN74ACT240NSR	SO	NS	20	2000	367.0	367.0	45.0
SN74ACT240PWR	TSSOP	PW	20	2000	367.0	367.0	38.0
SN74ACT240PWR	TSSOP	PW	20	2000	364.0	364.0	27.0
SN74ACT240PWRG4	TSSOP	PW	20	2000	367.0	367.0	38.0

14 LEADS SHOWN



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

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



- 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.



N (R-PDIP-T**)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



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





SOIC



- 1. All linear dimensions are in millimeters. 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 0.43 mm per side.
- 5. Reference JEDEC registration MS-013.



SOIC



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.



SOIC



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.



W (R-GDFP-F20)

CERAMIC DUAL FLATPACK



- A. All linear dimensions are in inches (millimeters).
- 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 GDFP2—F20



FK (S-CQCC-N**)

LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



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





SMALL OUTLINE PACKAGE



- 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-150.



SMALL OUTLINE PACKAGE



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.



SMALL OUTLINE PACKAGE



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.



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.



IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATASHEETS), 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, 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.

Tl's products are provided subject to Tl's Terms of Sale (www.ti.com/legal/termsofsale.html) or other applicable terms available either on ti.com or provided in conjunction with such Tl products. Tl's provision of these resources does not expand or otherwise alter Tl's applicable warranties or warranty disclaimers for Tl products.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265 Copyright © 2020, Texas Instruments Incorporated