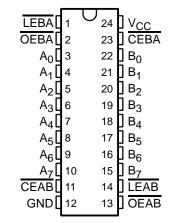
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- Function, Pinout, and Drive Compatible With FCT and F Logic
- Reduced V_{OH} (Typically = 3.3 V) Versions of Equivalent FCT Functions
- **Edge-Rate Control Circuitry for** Significantly Improved Noise Characteristics
- I_{off} Supports Partial-Power-Down Mode Operation
- **Matched Rise and Fall Times**
- Fully Compatible With TTL Input and **Output Logic Levels**
- 3-State Outputs
- **ESD Protection Exceeds JESD 22**
 - 2000-V Human-Body Model (A114-A)
 - 200-V Machine Model (A115-A)
 - 1000-V Charged-Device Model (C101)
- **Separation Controls for Data Flow in Each** Direction
- **Back-to-Back Latches for Storage**
- CY54FCT543T
 - 48-mA Output Sink Current
 - 12-mA Output Source Current
- CY74FCT543T
 - 64-mA Output Sink Current
 - 32-mA Output Source Current

CY54FCT543T . . . D PACKAGE CY74FCT543T...Q OR SO PACKAGE (TOP VIEW)



description

The 'FCT543T octal latched transceivers contain two sets of eight D-type latches with separate latch-enable (LEAB, LEBA) and output-enable (OEAB, OEBA) inputs for each set to permit independent control of input and output in either direction of data flow. For data flow from A to B, for example, the A-to-B enable (CEAB) input must be low in order to enter data from A or to take data from B, as indicated in the function table. With CEAB low, a low signal on the A-to-B latch-enable (LEAB) input makes the A-to-B latches transparent; a subsequent low-to-high transition of the LEAB signal puts the A latches in the storage mode and their outputs no longer change with the A inputs. With CEAB and OEAB low, the 3-state B-output buffers are active and reflect the data present at the output of the A latches. Control of data from B to A is similar, but uses CEBA, LEBA, and OEBA inputs.

These devices are fully specified for partial-power-down applications using Ioff. The Ioff circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.



testing of all parameters.

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.



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PIN DESCRIPTION

NAME	DESCRIPTION
OEAB	A-to-B output-enable input (active low)
OEBA	B-to-A output-enable input (active low)
CEAB	A-to-B enable input (active low)
CEBA	B-to-A enable input (active low)
LEAB	A-to-B latch-enable input (active low)
LEBA	B-to-A latch-enable input (active low)
Α	A-to-B data inputs or B-to-A 3-state outputs
В	B-to-A data inputs or A-to-B 3-state outputs

ORDERING INFORMATION

TA	PACI	KAGEŤ	SPEED (ns)	ORDERABLE PART NUMBER	TOP-SIDE MARKING
	QSOP - Q	Tape and reel	5.3	CY74FCT543CTQCT	FCT543C
	SOIC - SO	Tube	5.3	CY74FCT543CTSOC	FCT543C
	3010 - 30	Tape and reel	5.3	CY74FCT543CTSOCT	FC1543C
	QSOP - Q	Tape and reel	6.5	CY74FCT543ATQCT	FCT543A
–40°C to 85°C	SOIC - SO	Tube	6.5	CY74FCT543ATSOC	FCT543A
	3010 - 30	Tape and reel	6.5	CY74FCT543ATSOCT	FC1343A
	QSOP - Q	Tape and reel	8.5	CY74FCT543TQCT	FCT543
	SOIC - SO	Tube	8.5	CY74FCT543TSOC	FCT543
	3010 - 30	Tape and reel	8.5	CY74FCT543TSOCT	FC1543
–55°C to 125°C	CDIP – D	Tube	10	CY54FCT543TDMB	
-33 C to 125 C	CDIF - D	Tube	10	CY54FCT543TLMB	

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

FUNCTION TABLE‡

	INPUTS		LATCH	OUTPUT
CEAB	LEAB	OEAB	А ТО В§	В
Н	Х	Х	Storing	Z
Х	Н	X	Storing	Х
Х	Χ	Н	X	Z
L	L	L	Transparent	Current A inputs
L	Н	L	Storing	Previous A inputs

H = High logic level, L = Low logic level, X = Don't care,

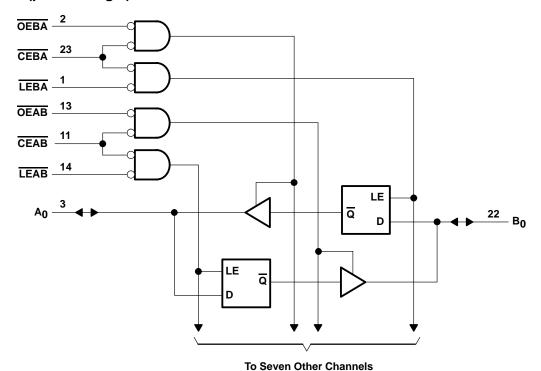


Z = High-impedance state

^{‡ &}lt;u>A-to-B</u> data flow shown; <u>B-</u>to-A flow control is the same, except uses CEBA, <u>LEBA</u>, and OEBA.

[§] Before LEAB low-to-high transition

logic diagram (positive logic)



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

Supply voltage range to ground potential	\dots -0.5 V to 7 V
DC input voltage range	\dots -0.5 V to 7 V
DC output voltage range	0.5 V to 7 V
DC output current (maximum sink current/pin)	120 mA
Package thermal impedance, θ _{JA} (see Note 1): Q package	61°C/W
SO package	46°C/W
Ambient temperature range with power applied, T _A	-65°C to 135°C
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.

NOTE 1: The package thermal impedance is calculated in accordance with JESD 51-7.

recommended operating conditions (see Note 2)

		CY54FCT543T CY74FCT543T						UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	UNII
Vcc	Supply voltage	4.5	5	5.5	4.75	5	5.25	V
VIH	High-level input voltage	2			2			V
V _{IL}	Low-level input voltage			0.8			0.8	V
ЮН	High-level output current			-12			-32	mA
lOL	Low-level output current			48			64	mA
TA	Operating free-air temperature	-55		125	-40		85	°C

NOTE 2: All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation.



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

BARAMETER	TEST COMPLETIONS	CY54F	CT543T	CY	74FCT54	I3T	
PARAMETER	TEST CONDITIONS	MIN TY	PT MAX	MIN	TYP [†]	MAX	UNIT
Viiis	$V_{CC} = 4.5 \text{ V}, \qquad I_{IN} = -18 \text{ mA}$	-	-0.7 -1.2				V
VIK	$V_{CC} = 4.75 \text{ V}, \qquad I_{IN} = -18 \text{ mA}$				-0.7	-1.2	V
	$V_{CC} = 4.5 \text{ V}, \qquad I_{OH} = -12 \text{ mA}$	2.4	3.3				
Vон	V _{CC} = 4.75 V			2			V
	$I_{OH} = -15 \text{ mA}$			2.4	3.3		
VOL	$V_{CC} = 4.5 \text{ V}, \qquad I_{OL} = 48 \text{ mA}$		0.3 0.55				V
VOL	$V_{CC} = 4.75 \text{ V}, \qquad I_{OL} = 64 \text{ mA}$				0.3	0.55	V
V_{hys}	All inputs		0.2		0.2		V
II	$V_{CC} = 5.5 \text{ V}, \qquad V_{IN} = V_{CC}$		5				μА
'1	$V_{CC} = 5.25 \text{ V}, \qquad V_{IN} = V_{CC}$					5	μΛ
l	$V_{CC} = 5.5 \text{ V}, \qquad V_{IN} = 2.7 \text{ V}$		±1				μА
IH	$V_{CC} = 5.25 \text{ V}, \qquad V_{IN} = 2.7 \text{ V}$					±1	μΛ
l _{IL}	$V_{CC} = 5.5 \text{ V}, \qquad V_{IN} = 0.5 \text{ V}$		±1				μА
'IL	$V_{CC} = 5.25 \text{ V}, \qquad V_{IN} = 0.5 \text{ V}$					±1	μΛ
IOZH	$V_{CC} = 5.5 \text{ V}, \qquad V_{OUT} = 2.7 \text{ V}$		10				μA
'UZH	$V_{CC} = 5.25 \text{ V}, \qquad V_{OUT} = 2.7 \text{ V}$					10	μπ
lozL	$V_{CC} = 5.5 \text{ V}, \qquad V_{OUT} = 0.5 \text{ V}$		-10				μА
1OZL	$V_{CC} = 5.25 \text{ V}, \qquad V_{OUT} = 0.5 \text{ V}$					-10	μΛ
los‡	$V_{CC} = 5.5 \text{ V}, \qquad V_{OUT} = 0 \text{ V}$	-60 -	120 –225				mA
108+	$V_{CC} = 5.25 \text{ V}, \qquad V_{OUT} = 0 \text{ V}$			-60	-120	-225	IIIA
l _{off}	$V_{CC} = 0 \text{ V}, \qquad V_{OUT} = 4.5 \text{ V}$		±1			±1	μΑ
Icc	$V_{CC} = 5.5 \text{ V}, \qquad V_{IN} \le 0.2 \text{ V}, \qquad V_{IN} \ge V_{CC} - 0.2 \text{ V}$		0.1 0.2				mA
.00	$V_{CC} = 5.25 \text{ V}, \qquad V_{IN} \le 0.2 \text{ V}, \qquad V_{IN} \ge V_{CC} - 0.2 \text{ V}$				0.1	0.2	1117 \
Δlcc	$V_{CC} = 5.5 \text{ V}, V_{IN} = 3.4 \text{ V}$, $f_1 = 0$, Outputs open		0.5 2				mA
±100	$V_{CC} = 5.25 \text{ V}, V_{IN} = 3.4 \text{ V}$, $f_1 = 0$, Outputs open				0.5	2	1117 \
I _{CCD} ¶	$\begin{array}{l} V_{CC} = 5.5 \text{ V, Outputs open,} \\ \underline{\text{One input switching at } 50\% \text{ duty cycle,}} \\ \overline{\text{CEAB and OEAB}} = \text{low, CEBA} = \text{high,} \\ V_{IN} \leq 0.2 \text{ V or } V_{IN} \geq V_{CC} - 0.2 \text{ V} \\ \end{array}$	0	.06 0.12				mA/
"CCD"	V_{CC} = 5.25 V, Outputs open, One input switching at 50% duty cycle, \overline{CEAB} and \overline{OEAB} = low, \overline{CEBA} = high, $V_{IN} \le 0.2$ V or $V_{IN} \ge V_{CC} - 0.2$ V				0.06	0.12	MHz

[†] Typical values are at $V_{CC} = 5 \text{ V}$, $T_A = 25^{\circ}\text{C}$.



Not more than one output should be shorted at a time. Duration of short should not exceed one second. The use of high-speed test apparatus and/or sample-and-hold techniques are preferable to minimize internal chip heating and more accurately reflect operational values. Otherwise, prolonged shorting of a high output can raise the chip temperature well above normal and cause invalid readings in other parametric tests. In any sequence of parameter tests, IOS tests should be performed last.

[§] Per TTL-driven input (V_{IN} = 3.4 V); all other inputs at V_{CC} or GND

[¶] This parameter is derived for use in total power-supply calculations.

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

DADAMETED	_	EST CONDITION:	c	CY	54FCT54	I3T	CY	74FCT54	3T	LINUT
PARAMETER	1	MIN	TYP [†]	MAX	MIN	TYP [†]	MAX	UNIT		
	V _{CC} = 5.5 V,	One bit switching at f ₁ = 5 MHz	$V_{IN} \le 0.2 \text{ V or}$ $V_{IN} \ge V_{CC} - 0.2 \text{ V}$		0.7	1.4				
	f ₀ = 10 MHz, Outputs open,	at 50% duty cycle	V _{IN} = 3.4 V or GND		1.2	3.4				
	CEAB and OEAB = low, CEBA = high, f ₀ = LEAB = 10 MHz	Eight bits switching at f ₁ = 5 MHz	$V_{IN} \le 0.2 \text{ V or}$ $V_{IN} \ge V_{CC} - 0.2 \text{ V}$		2.8	5.6				
IC#		at 50% duty cycle	V _{IN} = 3.4 V or GND		5.1	14.6				mA
	V _{CC} = 5.25 V,	One bit switching at f ₁ = 5 MHz	$V_{IN} \le 0.2 \text{ V or}$ $V_{IN} \ge V_{CC} - 0.2 \text{ V}$					0.7	1.4	IIIA
	f ₀ = 10 MHz, Outputs open,	at 50% duty cycle	V _{IN} = 3.4 V or GND					1.2	3.4	
	CEAB and OEAB = low, CEBA = high, f ₀ = LEAB = 10 MHz	Eight bits switching at f ₁ = 5 MHz	$V_{IN} \le 0.2 \text{ V or}$ $V_{IN} \ge V_{CC} - 0.2 \text{ V}$					2.8	5.6	
		at 50% duty cycle	V _{IN} = 3.4 V or GND					5.1	14.6	
Ci					5	10		5	10	pF
Co					9	12		9	12	pF

[†] Typical values are at $V_{CC} = 5 \text{ V}$, $T_A = 25^{\circ}\text{C}$.

 ΔI_{CC} = Power-supply current for a TTL high input ($V_{IN} = 3.4 \text{ V}$)

D_H = Duty cycle for TTL inputs high N_T = Number of TTL inputs at D_H

I_{CCD} = Dynamic current caused by an input transition pair (HLH or LHL)

f₀ = Clock frequency for registered devices, otherwise zero

f₁ = Input signal frequency

N₁ = Number of inputs changing at f₁

All currents are in milliamperes and all frequencies are in megahertz.

Values for these conditions are examples of the I_{CC} formula.

timing requirements over recommended operating free-air temperature range (unless otherwise noted) (see Figure 1)

	PARAMETER	CY54FC	CY54FCT543T		CY74FCT543T		7543AT	CY74FCT	UNIT	
	FARAMETER	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	UNIT
t _W	Pulse duration, LEAB or LEBA	5		5		5		5		ns
t _{su}	Setup time, data before $\overline{LEAB}\ \downarrow\ or\ \overline{LEBA}\ \downarrow$	3		2		2		2		ns
t _h	Hold time, data after LEAB↓ or LEBA↓	2		2		2		2		ns



[#] IC = ICC + Δ ICCDH \overline{N} T + ICCD(f0/2 + f1 \overline{N} 1) = Quiescent current with CMOS input levels

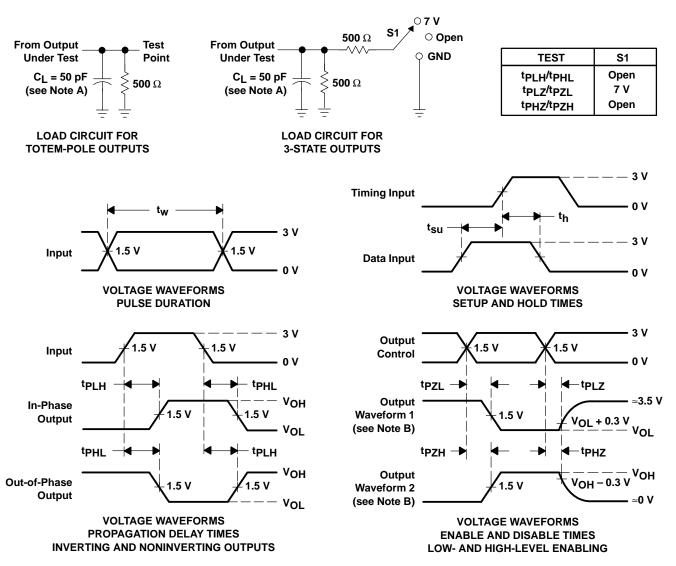
CY54FCT543T, CY74FCT543T 8-BIT LATCHED REGISTERED TRANSCEIVERS WITH 3-STATE OUTPUTS SCCS030A – MAY 1994 – REVISED OCTOBER 2001

switching characteristics over operating free-air temperature range (see Figure 1)

PARAMETER	FROM	то	CY54FC	T543T	CY74FC	T543T	CY74FC1	543AT	CY74FCT	UNIT	
FARAMETER	(INPUT)	(OUTPUT)	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	Oitii
^t PLH	A or B	B or A	2	10	2.5	8.5	2.5	6.5	2.5	5.3	ns
^t PHL	AOIB	BOLA	2	10	2.5	8.5	2.5	6.5	2.5	5.3	115
^t PLH	LEBA or LEAB	A or B	2.5	14	2.5	12.5	2.5	8	2.5	7	ns
^t PHL	LEBA OI LEAD	AOIB	2.5	14	2.5	12.5	2.5	8	2.5	7	115
^t PZH	OEBA or OEAB	A or B	2	14	2	12	2	9	2	8	ns
t _{PZL}	OEBA OI OEAB	AUIB	2	14	2	12	2	9	2	8	115
^t PZH	CEBA or CEAB	A or B	2	14	2	12	2	9	2	8	ns
^t PZL	CEBA OI CEAB	A or B	2	14	2	12	2	9	2	8	115
^t PHZ	OEBA or OEAB	A or P	2	13	2	9	2	7.5	2	6.5	ns
t _{PLZ}	OEDA OF OEAB	A or B	2	13	2	9	2	7.5	2	6.5	115
^t PHZ	CEBA or CEAB	A or B	2	13	2	9	2	7.5	2	6.5	20
t _{PLZ}	CEDA UI CEAB	AUID	2	13	2	9	2	7.5	2	6.5	ns



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. The outputs are measured one at a time with one input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms





9-Mar-2021

PACKAGING INFORMATION

Orderable Device	Status	Package Type	Package Drawing	Pins	Package Qty	Eco Plan	Lead finish/ Ball material	MSL Peak Temp	Op Temp (°C)	Device Marking (4/5)	Samples
5962-9222101M3A	ACTIVE	LCCC	FK	28	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962- 9222101M3A CY54FCT 543TLMB	Samples
5962-9222101MLA	ACTIVE	CDIP	JT	24	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-9222101ML A CY54FCT543TDMB	Samples
CY54FCT543TDMB	ACTIVE	CDIP	JT	24	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-9222101ML A CY54FCT543TDMB	Samples
CY54FCT543TLMB	ACTIVE	LCCC	FK	28	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962- 9222101M3A CY54FCT 543TLMB	Samples
CY74FCT543ATQCT	ACTIVE	SSOP	DBQ	24	2500	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-40 to 85	FCT543A	Samples
CY74FCT543ATSOC	ACTIVE	SOIC	DW	24	25	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT543A	Samples
CY74FCT543TQCT	ACTIVE	SSOP	DBQ	24	2500	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-40 to 85	FCT543	Samples
CY74FCT543TSOC	ACTIVE	SOIC	DW	24	25	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT543	Samples
CY74FCT543TSOCT	ACTIVE	SOIC	DW	24	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT543	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.

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.

⁽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".



PACKAGE OPTION ADDENDUM

9-Mar-2021

- (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.

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PACKAGE MATERIALS INFORMATION

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TAPE AND REEL INFORMATION





	Dimension designed to accommodate the component width
	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
CY74FCT543ATQCT	SSOP	DBQ	24	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
CY74FCT543TQCT	SSOP	DBQ	24	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
CY74FCT543TSOCT	SOIC	DW	24	2000	330.0	24.4	10.75	15.7	2.7	12.0	24.0	Q1

PACKAGE MATERIALS INFORMATION

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*All dimensions are nominal

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Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
CY74FCT543ATQCT	SSOP	DBQ	24	2500	853.0	449.0	35.0
CY74FCT543TQCT	SSOP	DBQ	24	2500	853.0	449.0	35.0
CY74FCT543TSOCT	SOIC	DW	24	2000	350.0	350.0	43.0

PACKAGE MATERIALS INFORMATION

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TUBE



*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (µm)	B (mm)
CY74FCT543ATSOC	DW	SOIC	24	25	506.98	12.7	4826	6.6
CY74FCT543TSOC	DW	SOIC	24	25	506.98	12.7	4826	6.6

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