

CY54FCT646T, CY74FCT646T 8-BIT REGISTERED TRANSCEIVERS WITH 3-STATE OUTPUTS

SCCS031A – JULY 1994 – REVISED OCTOBER 2001

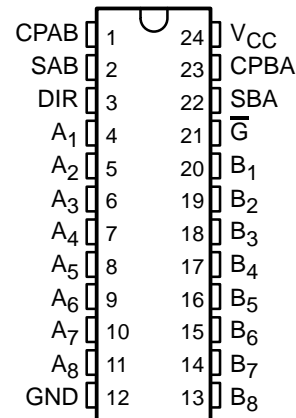
- Function, Pinout, and Drive Compatible With FCT and F Logic
- Reduced V_{OH} (Typically = 3.3 V) Versions of Equivalent FCT Functions
- Edge-Rate Control Circuitry for Significantly Improved Noise Characteristics
- I_{off} Supports Partial-Power-Down Mode Operation
- Matched Rise and Fall Times
- Fully Compatible With TTL Input and Output Logic Levels
- ESD Protection Exceeds JESD 22
 - 2000-V Human-Body Model (A114-A)
 - 200-V Machine Model (A115-A)
 - 1000-V Charged-Device Model (C101)
- Independent Register for A and B Buses
- CY54FCT646T
 - 48-mA Output Sink Current
 - 12-mA Output Source Current
- CY74FCT646T
 - 64-mA Output Sink Current
 - 32-mA Output Source Current
- 3-State Outputs

description

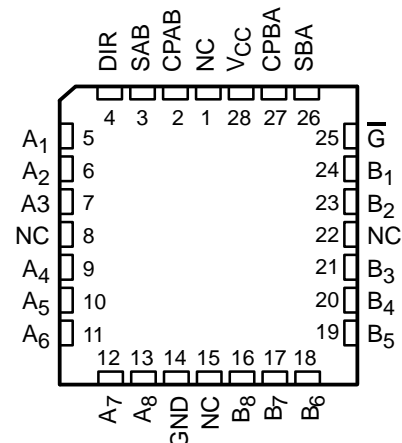
The 'FCT646T devices consist of a bus transceiver circuit with 3-state, D-type flip-flops, and control circuitry arranged for multiplexed transmission of data directly from the input bus or from the internal registers. Data on the A or B bus is clocked into the registers as the appropriate clock pin goes to a high logic level. Output-enable (\overline{G}) and direction (DIR) inputs control the transceiver function. In the transceiver mode, data present at the high-impedance port can be stored in either the A or B register, or in both. Select controls (SAB, SBA) can multiplex stored and real-time (transparent mode) data. DIR determines which bus receives data when \overline{G} is low. In the isolation mode (\overline{G} is high), A data can be stored in the B register and/or B data can be stored in the A register.

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 device when it is powered down.

CY54FCT646T . . . D PACKAGE
CY74FCT646T . . . Q OR SO PACKAGE
(TOP VIEW)



CY54FCT646T . . . L PACKAGE
(TOP VIEW)



NC – No internal connection



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.

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

**TEXAS
INSTRUMENTS**

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On products compliant to MIL-PRF-38535, all parameters are tested unless otherwise noted. On all other products, production processing does not necessarily include testing of all parameters.

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PIN DESCRIPTION

| NAME | DESCRIPTION |
|---------------------|---|
| A | Data register A inputs, data register B outputs |
| B | Data register B inputs, data register A outputs |
| CPAB, CPBA | Clock-pulse inputs |
| SAB, SBA | Output data-source-select inputs |
| DIR, \overline{G} | Output-enable inputs |

ORDERING INFORMATION

| T _A | PACKAGE† | | SPEED (ns) | ORDERABLE PART NUMBER | TOP-SIDE MARKING |
|----------------|-----------|---------------|------------|-----------------------|------------------|
| –40°C to 85°C | QSOP – Q | Tape and reel | 5.4 | CY74FCT646CTQCT | FCT646C |
| | SOIC – SO | Tube | 5.4 | CY74FCT646CTSOC | FCT646C |
| | | Tape and reel | 5.4 | CY74FCT646CTSOCT | |
| | QSOP – Q | Tape and reel | 6.3 | CY74FCT646ATQCT | FCT646A |
| | SOIC – SO | Tube | 6.3 | CY74FCT646ATSOC | FCT646A |
| | | Tape and reel | 6.3 | CY74FCT646ATSOCT | |
| | QSOP – Q | Tape and reel | 9 | CY74FCT646TQCT | FCT646 |
| | SOIC – SO | Tube | 9 | CY74FCT646TSOC | FCT646 |
| | | Tape and reel | 9 | CY74FCT646TSOCT | |
| –55°C to 125°C | LCC – L | Tube | 6 | CY54FCT646CTLMB | |
| | CDIP – D | Tube | 7.7 | CY54FCT646ATDMB | |
| | LCC – L | Tube | 7.7 | CY54FCT646ATLMB | |
| | | Tube | 11 | CY54FCT646TLMB | |

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

FUNCTION TABLE

| INPUTS | | | | | | DATA I/O‡ | | OPERATION OR FUNCTION |
|----------------|-----|--------|--------|-----|-----|--------------------------------|--------------------------------|---------------------------|
| \overline{G} | DIR | CPAB | CPBA | SAB | SBA | A ₁ –A ₈ | B ₁ –B ₈ | |
| H | X | H or L | H or L | X | X | Input | Input | Isolation |
| H | X | ↑ | ↑ | X | X | Input | Input | Store A and B data |
| L | L | X | X | X | L | Output | Input | Real-time B data to A bus |
| L | L | X | H or L | X | H | Output | Input | Stored B data to A bus |
| L | H | X | X | L | X | Input | Output | Real-time A data to B bus |
| L | H | H or L | X | H | X | Input | Output | Stored A data to B bus |

H = High logic level, L = Low logic level, ↑ = Low-to-high transition, X = Don't care

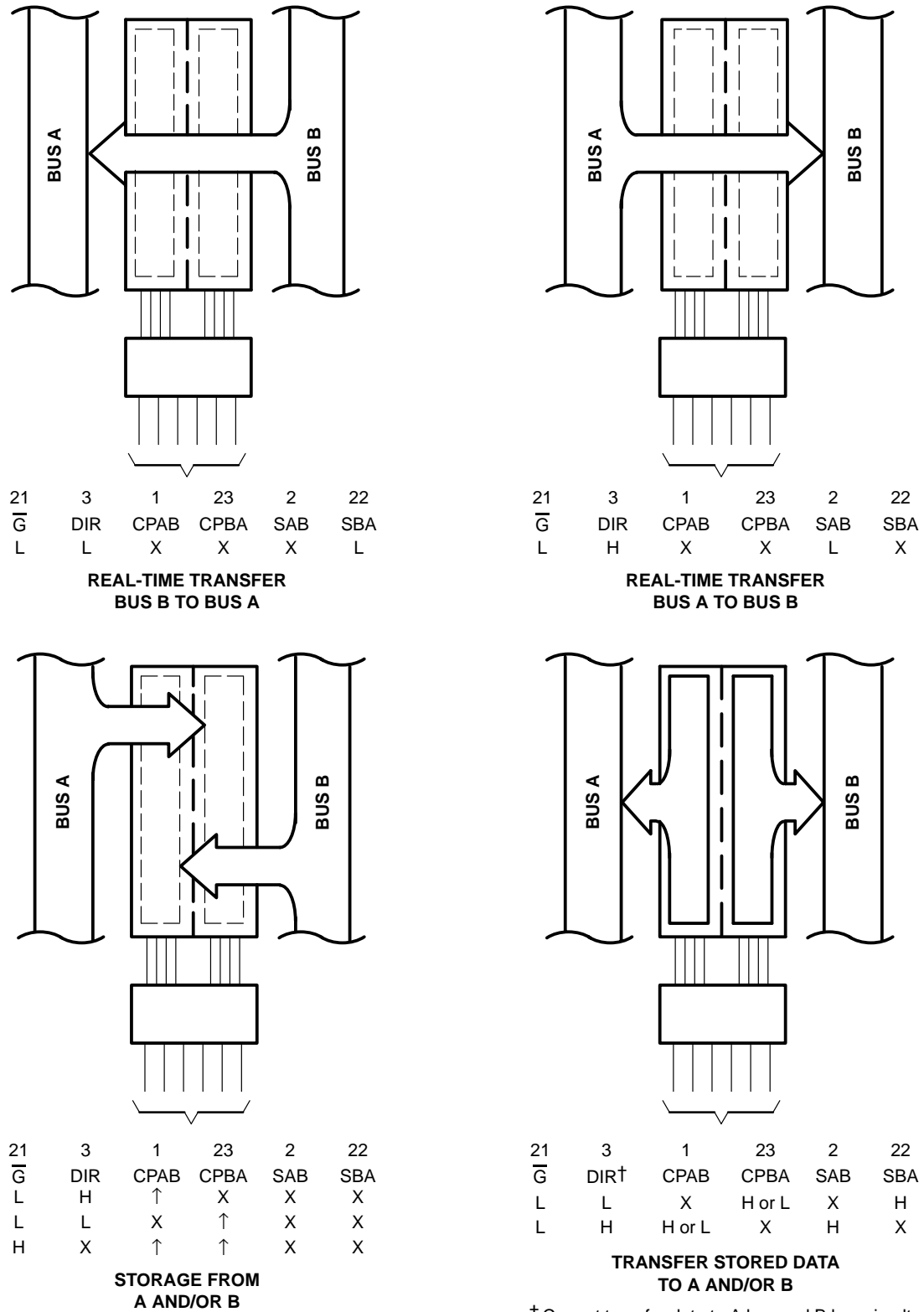
‡ The data output functions can be enabled or disabled by various signals at the \overline{G} or DIR inputs. Data input functions always are enabled, i.e., data at the bus pins is stored on every low-to-high transition of the clock inputs.



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† Cannot transfer data to A bus and B bus simultaneously.

Figure 1. Bus-Management Functions

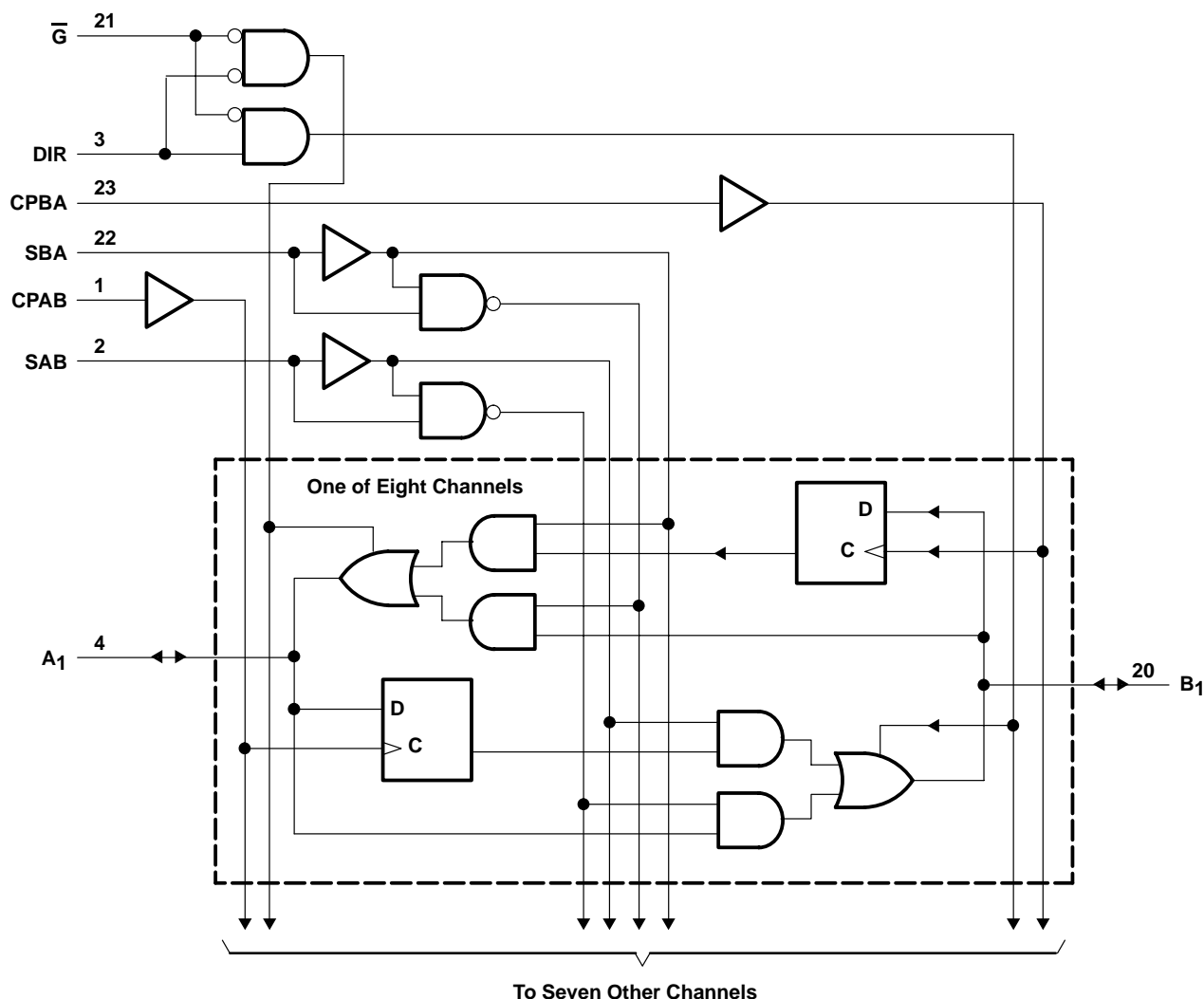
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logic diagram (positive logic)



Pin numbers shown are for the Q and SO packages.

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

| | |
|--|----------------|
| Supply voltage range to ground potential | –0.5 V to 7 V |
| DC input voltage range | –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.



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recommended operating conditions (see Note 2)

| | | CY54FCT646T | | | CY74FCT646T | | | UNIT |
|-----------------|--------------------------------|-------------|-----|-----|-------------|-----|------|------|
| | | MIN | NOM | MAX | MIN | NOM | MAX | |
| V _{CC} | Supply voltage | 4.5 | 5 | 5.5 | 4.75 | 5 | 5.25 | V |
| V _{IH} | High-level input voltage | 2 | | | 2 | | | V |
| V _{IL} | Low-level input voltage | | | 0.8 | | | 0.8 | V |
| I _{OH} | High-level output current | | | –12 | | | –32 | mA |
| I _{OL} | Low-level output current | | | 48 | | | 64 | mA |
| T _A | 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)

| PARAMETER | TEST CONDITIONS | CY54FCT646T | | | CY74FCT646T | | | UNIT |
|-------------------|--|-------------|------|---------|-------------|------|---------|---------------|
| | | MIN | TYP† | MAX | MIN | TYP† | MAX | |
| V_{IK} | $V_{CC} = 4.5\text{ V}$, $I_{IN} = -18\text{ mA}$ | -0.7 | -1.2 | | | | | V |
| | $V_{CC} = 4.75\text{ V}$, $I_{IN} = -18\text{ mA}$ | | | | -0.7 | -1.2 | | |
| V_{OH} | $V_{CC} = 4.5\text{ V}$, $I_{OH} = -12\text{ mA}$ | 2.4 | 3.3 | | | | | V |
| | $V_{CC} = 4.75\text{ V}$, $I_{OH} = -32\text{ mA}$ | | | | 2 | | | |
| | $I_{OH} = -15\text{ mA}$ | | | | 2.4 | 3.3 | | |
| V_{OL} | $V_{CC} = 4.5\text{ V}$, $I_{OL} = 48\text{ mA}$ | 0.3 | 0.55 | | | | | V |
| | $V_{CC} = 4.75\text{ V}$, $I_{OL} = 64\text{ mA}$ | | | | 0.3 | 0.55 | | |
| V_{hys} | All inputs | 0.2 | | | 0.2 | | | V |
| I_I | $V_{CC} = 5.5\text{ V}$, $V_{IN} = V_{CC}$ | | | 5 | | | | μA |
| | $V_{CC} = 5.25\text{ V}$, $V_{IN} = V_{CC}$ | | | | | | 5 | |
| I_{IH} | $V_{CC} = 5.5\text{ V}$, $V_{IN} = 2.7\text{ V}$ | | | ± 1 | | | | μA |
| | $V_{CC} = 5.25\text{ V}$, $V_{IN} = 2.7\text{ V}$ | | | | | | ± 1 | |
| I_{IL} | $V_{CC} = 5.5\text{ V}$, $V_{IN} = 0.5\text{ V}$ | | | ± 1 | | | | μA |
| | $V_{CC} = 5.25\text{ V}$, $V_{IN} = 0.5\text{ V}$ | | | | | | ± 1 | |
| I_{OZH} | $V_{CC} = 5.5\text{ V}$, $V_{OUT} = 2.7\text{ V}$ | | | 10 | | | | μA |
| | $V_{CC} = 5.25\text{ V}$, $V_{OUT} = 2.7\text{ V}$ | | | | | | 10 | |
| I_{OZL} | $V_{CC} = 5.5\text{ V}$, $V_{OUT} = 0.5\text{ V}$ | | | -10 | | | | μA |
| | $V_{CC} = 5.25\text{ V}$, $V_{OUT} = 0.5\text{ V}$ | | | | | | -10 | |
| I_{OS}^\ddagger | $V_{CC} = 5.5\text{ V}$, $V_{OUT} = 0\text{ V}$ | -60 | -120 | -225 | | | | mA |
| | $V_{CC} = 5.25\text{ V}$, $V_{OUT} = 0\text{ V}$ | | | | -60 | -120 | -225 | |
| I_{off} | $V_{CC} = 0\text{ V}$, $V_{OUT} = 4.5\text{ V}$ | | | ± 1 | | | ± 1 | μA |
| I_{CC} | $V_{CC} = 5.5\text{ V}$, $V_{IN} \leq 0.2\text{ V}$, $V_{IN} \geq V_{CC} - 0.2\text{ V}$ | 0.1 | 0.2 | | | | | mA |
| | $V_{CC} = 5.25\text{ V}$, $V_{IN} \leq 0.2\text{ V}$, $V_{IN} \geq V_{CC} - 0.2\text{ V}$ | | | | 0.1 | 0.2 | | |
| ΔI_{CC} | $V_{CC} = 5.5\text{ V}$, $V_{IN} = 3.4\text{ V}^\S$, $f_1 = 0$, Outputs open | 0.5 | 2 | | | | | mA |
| | $V_{CC} = 5.25\text{ V}$, $V_{IN} = 3.4\text{ V}^\S$, $f_1 = 0$, Outputs open | | | | 0.5 | 2 | | |
| I_{CCD}^\P | $V_{CC} = 5.5\text{ V}$, One input switching at 50% duty cycle, Outputs open, $\overline{G} = \text{DIR} = \text{GND}$, $\text{SAB} = \overline{\text{SBA}} = \text{GND}$, $V_{IN} \leq 0.2\text{ V}$ or $V_{IN} \geq V_{CC} - 0.2\text{ V}$ | 0.06 | 0.12 | | | | | mA/ MHz |
| | $V_{CC} = 5.25\text{ V}$, One input switching at 50% duty cycle, Outputs open, $\overline{G} = \text{DIR} = \text{GND}$, $\text{SAB} = \overline{\text{SBA}} = \text{GND}$, $V_{IN} \leq 0.2\text{ V}$ or $V_{IN} \geq V_{CC} - 0.2\text{ V}$ | | | | 0.06 | 0.12 | | |

† 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, I_{OS} tests should be performed last.

§ Per TTL-driven input ($V_{IN} = 3.4\text{ V}$); 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)

| PARAMETER | TEST CONDITIONS | | | CY54FCT646T | | | CY74FCT646T | | | UNIT |
|-----------------------------|---|--|---|-------------|------|-----|-------------|------|-----|------|
| | | | | MIN | TYP† | MAX | MIN | TYP† | MAX | |
| I _C [#] | V _{CC} = 5.5 V, f ₀ = 10 MHz, Outputs open, <u>G</u> = <u>DIR</u> = <u>GND</u> , SAB = <u>SBA</u> = <u>GND</u> | One bit switching at f ₁ = 5 MHz at 50% duty cycle | V _{IN} ≤ 0.2 V or V _{IN} ≥ V _{CC} − 0.2 V | 0.7 | 1.4 | | | | mA | |
| | | | V _{IN} = 3.4 V or GND | 1.2 | 3.4 | | | | | |
| | | Eight bits switching at f ₁ = 5 MHz at 50% duty cycle | V _{IN} ≤ 0.2 V or V _{IN} ≥ V _{CC} − 0.2 V | 2.8 | 5.6 | | | | | |
| | | | V _{IN} = 3.4 V or GND | 5.1 | 14.6 | | | | | |
| | V _{CC} = 5.25 V, f ₀ = 10 MHz, Outputs open, <u>G</u> = <u>DIR</u> = <u>GND</u> , SAB = <u>SBA</u> = <u>GND</u> | One bit switching at f ₁ = 5 MHz at 50% duty cycle | V _{IN} ≤ 0.2 V or V _{IN} ≥ V _{CC} − 0.2 V | | | | 0.7 | 1.4 | mA | |
| | | | V _{IN} = 3.4 V or GND | | | | 1.2 | 3.4 | | |
| | | Eight bits switching at f ₁ = 5 MHz at 50% duty cycle | V _{IN} ≤ 0.2 V or V _{IN} ≥ V _{CC} − 0.2 V | | | | 2.8 | 5.6 | | |
| | | | V _{IN} = 3.4 V or GND | | | | 5.1 | 14.6 | | |
| C _i | | | | 6 | 10 | | 6 | 10 | pF | |
| C _o | | | | 8 | 12 | | 8 | 12 | pF | |

$I_C^{\#} = I_{CC} + \Delta I_{CC} \times D_H \times N_T + I_{CCD}(f_0/2 + f_1 \times N_1)$

Where:

I_C = Total supply current

I_{CC} = Power-supply current with CMOS input levels

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)

f_0 = Clock frequency for registered devices, otherwise zero

f_1 = Input signal frequency

N_1 = Number of inputs changing at f_1

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

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

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timing requirements over recommended operating free-air temperature range (unless otherwise noted) (see Figure 2)

| | | CY54FCT646T | | CY54FCT646AT | | CY54FCT646CT | | UNIT |
|----------|--|-------------|-----|--------------|-----|--------------|-----|------|
| | | MIN | MAX | MIN | MAX | MIN | MAX | |
| t_W | Pulse duration | 6 | | 5 | | 5 | | ns |
| t_{SU} | Setup time, data before CPAB \uparrow or CPBA \uparrow | 4.5 | | 2 | | 2 | | ns |
| t_h | Hold time, data after CPAB \uparrow or CPBA \uparrow | 2 | | 1.5 | | 1.5 | | ns |

timing requirements over recommended operating free-air temperature range (unless otherwise noted) (see Figure 2)

| | | CY74FCT646T | | CY74FCT646AT | | CY74FCT646CT | | UNIT |
|----------|--|-------------|-----|--------------|-----|--------------|-----|------|
| | | MIN | MAX | MIN | MAX | MIN | MAX | |
| t_W | Pulse duration | 6 | | 5 | | 5 | | ns |
| t_{SU} | Setup time, data before CPAB \uparrow or CPBA \uparrow | 4 | | 2 | | 2 | | ns |
| t_h | Hold time, data after CPAB \uparrow or CPBA \uparrow | 2 | | 1.5 | | 1.5 | | ns |

switching characteristics over operating free-air temperature range (see Figure 2)

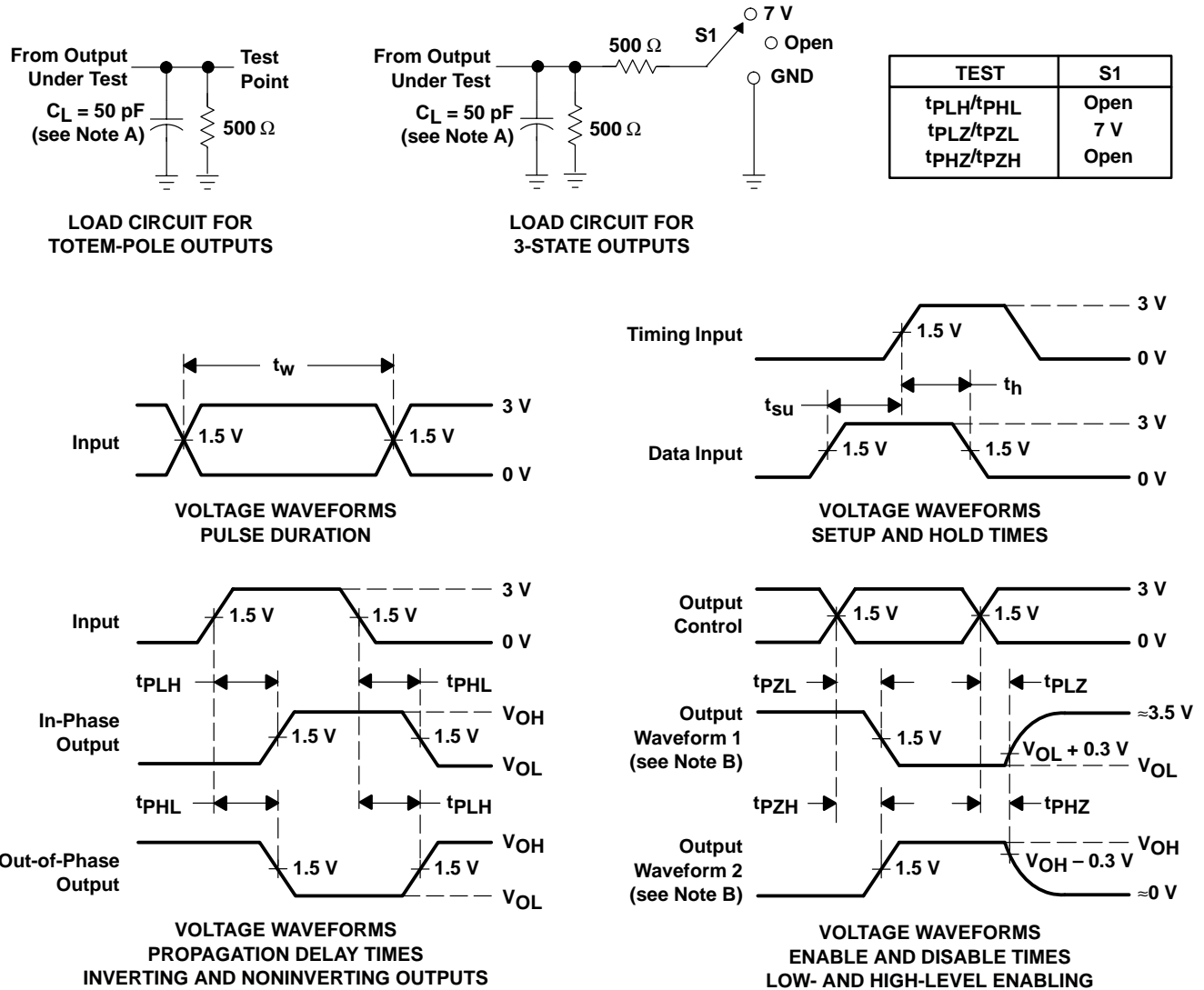
| PARAMETER | FROM (INPUT) | TO (OUTPUT) | CY54FCT646T | | CY54FCT646AT | | CY54FCT646CT | | UNIT |
|-----------|------------------------|-------------|-------------|-----|--------------|------|--------------|-----|------|
| | | | MIN | MAX | MIN | MAX | MIN | MAX | |
| t_{PLH} | A or B | B or A | 2 | 11 | 2 | 7.7 | 1.5 | 6 | ns |
| t_{PHL} | | | 2 | 11 | 2 | 7.7 | 1.5 | 6 | |
| t_{PZH} | DIR | A or B | 2 | 15 | 2 | 10.5 | 1.5 | 8.9 | ns |
| t_{PZL} | | | 2 | 15 | 2 | 10.5 | 1.5 | 8.9 | |
| t_{PHZ} | \overline{G} and DIR | A or B | 2 | 11 | 2 | 7.7 | 1.5 | 7.7 | ns |
| t_{PLZ} | | | 2 | 11 | 2 | 7.7 | 1.5 | 7.7 | |
| t_{PLH} | CPAB or CPBA | A or B | 2 | 10 | 2 | 7 | 1.5 | 6.3 | ns |
| t_{PHL} | | | 2 | 10 | 2 | 7 | 1.5 | 6.3 | |
| t_{PLH} | SBA or SAB | A or B | 2 | 12 | 2 | 8.4 | 1.5 | 7 | ns |
| t_{PHL} | | | 2 | 12 | 2 | 8.4 | 1.5 | 7 | |

switching characteristics over operating free-air temperature range (see Figure 2)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | CY74FCT646T | | CY74FCT646AT | | CY74FCT646CT | | UNIT |
|-----------|------------------------|-------------|-------------|-----|--------------|-----|--------------|-----|------|
| | | | MIN | MAX | MIN | MAX | MIN | MAX | |
| t_{PLH} | A or B | B or A | 1.5 | 9 | 1.5 | 6.3 | 1.5 | 5.4 | ns |
| t_{PHL} | | | 1.5 | 9 | 1.5 | 6.3 | 1.5 | 5.4 | |
| t_{PZH} | DIR | A or B | 1.5 | 14 | 1.5 | 9.8 | 1.5 | 7.8 | ns |
| t_{PZL} | | | 1.5 | 14 | 1.5 | 9.8 | 1.5 | 7.8 | |
| t_{PHZ} | \overline{G} and DIR | A or B | 1.5 | 9 | 1.5 | 6.3 | 1.5 | 6.3 | ns |
| t_{PLZ} | | | 1.5 | 9 | 1.5 | 6.3 | 1.5 | 6.3 | |
| t_{PLH} | CPAB or CPBA | A or B | 1.5 | 9 | 1.5 | 6.3 | 1.5 | 5.7 | ns |
| t_{PHL} | | | 1.5 | 9 | 1.5 | 6.3 | 1.5 | 5.7 | |
| t_{PLH} | SBA or SAB | A or B | 1.5 | 11 | 1.5 | 7.7 | 1.5 | 6.2 | ns |
| t_{PHL} | | | 1.5 | 11 | 1.5 | 7.7 | 1.5 | 6.2 | |



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 2. Load Circuit and Voltage Waveforms

PACKAGING INFORMATION

| Orderable Device | Status (1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan (2) | Lead/Ball Finish (6) | MSL Peak Temp (3) | Op Temp (°C) | Device Marking (4/5) | Samples |
|--------------------|---------------|--------------|--------------------|------|----------------|----------------------------|-------------------------|----------------------|--------------|--|-------------------------|
| 5962-9222301M3A | ACTIVE | LCCC | FK | 28 | 1 | TBD | POST-PLATE | N / A for Pkg Type | -55 to 125 | 5962-9222301M3A | Samples |
| 5962-9222303M3A | ACTIVE | LCCC | FK | 28 | 1 | TBD | POST-PLATE | N / A for Pkg Type | -55 to 125 | 5962-9222303M3A CY54FCT 646ATLMB | Samples |
| 5962-9222303MLA | ACTIVE | CDIP | JT | 24 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | 5962-9222303ML A CY54FCT646ATDM B | Samples |
| 5962-9222305M3A | ACTIVE | LCCC | FK | 28 | 1 | TBD | POST-PLATE | N / A for Pkg Type | -55 to 125 | 5962-9222305M3A CY54FCT 646CTLMB | Samples |
| CY54FCT646ATDMB | ACTIVE | CDIP | JT | 24 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | 5962-9222303ML A CY54FCT646ATDM B | Samples |
| CY54FCT646ATLMB | ACTIVE | LCCC | FK | 28 | 1 | TBD | POST-PLATE | N / A for Pkg Type | -55 to 125 | 5962-9222303M3A CY54FCT 646ATLMB | Samples |
| CY54FCT646CTLMB | ACTIVE | LCCC | FK | 28 | 1 | TBD | POST-PLATE | N / A for Pkg Type | -55 to 125 | 5962-9222305M3A CY54FCT 646CTLMB | Samples |
| CY74FCT646ATQCT | ACTIVE | SSOP | DBQ | 24 | 2500 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR | -40 to 85 | FCT646A | Samples |
| CY74FCT646ATSOC | ACTIVE | SOIC | DW | 24 | 25 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 85 | FCT646A | Samples |
| CY74FCT646ATSOCT | ACTIVE | SOIC | DW | 24 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 85 | FCT646A | Samples |
| CY74FCT646ATSOCTE4 | ACTIVE | SOIC | DW | 24 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 85 | FCT646A | Samples |
| CY74FCT646CTQCT | ACTIVE | SSOP | DBQ | 24 | 2500 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR | -40 to 85 | FCT646C | Samples |

| Orderable Device | Status (1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan (2) | Lead/Ball Finish (6) | MSL Peak Temp (3) | Op Temp (°C) | Device Marking (4/5) | Samples |
|--------------------|---------------|--------------|--------------------|------|----------------|----------------------------|-------------------------|----------------------|--------------|-------------------------|-------------------------|
| CY74FCT646CTSOC | ACTIVE | SOIC | DW | 24 | 25 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 85 | FCT646C | Samples |
| CY74FCT646CTSOCT | ACTIVE | SOIC | DW | 24 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 85 | FCT646C | Samples |
| CY74FCT646CTSOCTE4 | ACTIVE | SOIC | DW | 24 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 85 | FCT646C | Samples |
| CY74FCT646TSOC | ACTIVE | SOIC | DW | 24 | 25 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 85 | FCT646 | Samples |
| CY74FCT646TSOCT | ACTIVE | SOIC | DW | 24 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 85 | FCT646 | 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) 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.

(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.

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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 |

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 |
|------------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| CY74FCT646ATQCT | SSOP | DBQ | 24 | 2500 | 330.0 | 16.4 | 6.5 | 9.0 | 2.1 | 8.0 | 16.0 | Q1 |
| CY74FCT646ATSOCT | SOIC | DW | 24 | 2000 | 330.0 | 24.4 | 10.75 | 15.7 | 2.7 | 12.0 | 24.0 | Q1 |
| CY74FCT646CTQCT | SSOP | DBQ | 24 | 2500 | 330.0 | 16.4 | 6.5 | 9.0 | 2.1 | 8.0 | 16.0 | Q1 |
| CY74FCT646CTSOCT | SOIC | DW | 24 | 2000 | 330.0 | 24.4 | 10.75 | 15.7 | 2.7 | 12.0 | 24.0 | Q1 |
| CY74FCT646TSOCT | SOIC | DW | 24 | 2000 | 330.0 | 24.4 | 10.75 | 15.7 | 2.7 | 12.0 | 24.0 | Q1 |

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Length (mm) | Width (mm) | Height (mm) |
|------------------|--------------|-----------------|------|------|-------------|------------|-------------|
| CY74FCT646ATQCT | SSOP | DBQ | 24 | 2500 | 367.0 | 367.0 | 38.0 |
| CY74FCT646ATSOCT | SOIC | DW | 24 | 2000 | 367.0 | 367.0 | 45.0 |
| CY74FCT646CTQCT | SSOP | DBQ | 24 | 2500 | 367.0 | 367.0 | 38.0 |
| CY74FCT646CTSOCT | SOIC | DW | 24 | 2000 | 367.0 | 367.0 | 45.0 |
| CY74FCT646TSOCT | SOIC | DW | 24 | 2000 | 367.0 | 367.0 | 45.0 |

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