



Data sheet acquired from Harris Semiconductor  
SCHS270A

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# CD54/74FCT240, CD54/74FCT240AT, CD54/74FCT241, CD54/74FCT244, CD54/74FCT244AT

## FCT Interface Logic Octal Buffers/Line Drivers, Three-State

### Features

- CD54/74FCT240, CD54/74FCT240AT - Inverting
- CD54/74FCT241, CD54/74FCT244, CD54/74FCT244AT - Non-Inverting
- Buffered Inputs
- Typical Propagation Delay:  
4.1ns at VCC = 5V, TA = 25°C (FCT240AT, FCT244AT)
- SCR-Latchup-Resistant BiCMOS Process and Circuit Design
- FCTXXX Types - Speed of Bipolar FAST®/AS/S;  
FCTXXXAT Types - 30% Faster Than FAST/AS/S with  
Significantly Reduced Power Consumption
- 48mA to 64mA Output Sink Current (Commercial/Extended Industrial)
- Output Voltage Swing Limited to 3.7V at VCC = 5V
- Controlled Output-Edge Rates
- Input/Output Isolation to VCC
- BiCMOS Technology with Low Quiescent Power

### Ordering Information

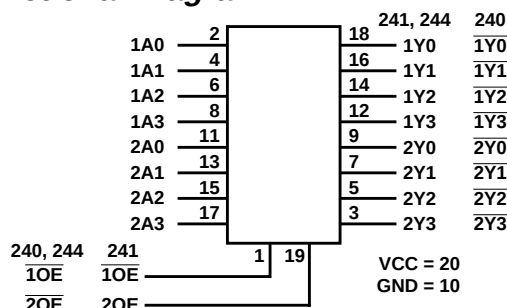
| PART NUMBER      | TEMP. RANGE (°C)    | PACKAGE    |
|------------------|---------------------|------------|
| CD54/74FCT240E   | -55 to 125, 0 to 70 | 20 Ld PDIP |
| CD54/74FCT240ATE | -55 to 125, 0 to 70 | 20 Ld PDIP |
| CD54/74FCT241E   | -55 to 125, 0 to 70 | 20 Ld PDIP |
| CD54/74FCT244E   | -55 to 125, 0 to 70 | 20 Ld PDIP |
| CD54/74FCT244ATE | -55 to 125, 0 to 70 | 20 Ld PDIP |
| CD54/74FCT240M   | -55 to 125, 0 to 70 | 20 Ld SOIC |
| CD54/74FCT240ATM | -55 to 125, 0 to 70 | 20 Ld SOIC |
| CD54/74FCT241M   | -55 to 125, 0 to 70 | 20 Ld SOIC |
| CD54/74FCT244M   | -55 to 125, 0 to 70 | 20 Ld SOIC |
| CD54/74FCT244ATM | -55 to 125, 0 to 70 | 20 Ld SOIC |
| CD54/74FCT240SM  | -55 to 125, 0 to 70 | 20 Ld SSOP |
| CD54/74FCT241SM  | -55 to 125, 0 to 70 | 20 Ld SSOP |
| CD54/74FCT244SM  | -55 to 125, 0 to 70 | 20 Ld SSOP |
| CD54FCT240H      | -55 to 125          |            |
| CD54FCT241H      | -55 to 125          |            |
| CD54FCT244H      | -55 to 125          |            |

### Description

The CD54/74FCT240, 240AT, 241, 244 and 244AT three-state octal buffers/line drivers use a small-geometry BiCMOS technology. The output stage is a combination of bipolar and CMOS transistors that limits the output-HIGH level to two diode drops below VCC. This resultant lowering of output swing (0V to 3.7V) reduces power bus ringing (a source of EMI) and minimizes VCC bounce and ground bounce and their effects during simultaneous output switching. The output configuration also enhances switching speed and is capable of sinking 48mA to 64mA.

The CD54/74FCT240, 240AT, 244 and 244AT have active-LOW output enables ( $\overline{1OE}$ ,  $\overline{2OE}$ ). The CD54/74FCT241 and CD54/74FCT241AT have one active-LOW ( $\overline{1OE}$ ) and one active-HIGH (2OE) output enable.

### Functional Diagram



CD54/74FCT240, CD54/74FCT240AT TRUTH TABLE

| INPUT                               | INPUT | OUTPUT         |
|-------------------------------------|-------|----------------|
| $\overline{1OE}$ , $\overline{2OE}$ | A     | $\overline{Y}$ |
| L                                   | L     | H              |
| L                                   | H     | L              |
| H                                   | X     | Z              |

CD54/74FCT244, CD54/74FCT244AT TRUTH TABLE

| INPUT                               | INPUT | OUTPUT |
|-------------------------------------|-------|--------|
| $\overline{1OE}$ , $\overline{2OE}$ | A     | Y      |
| L                                   | L     | H      |
| L                                   | H     | L      |
| H                                   | X     | Z      |

CD54/74FCT241 TRUTH TABLE

| INPUT |    | OUTPUT | INPUT |    | OUTPUT |
|-------|----|--------|-------|----|--------|
| 1OE   | 1A | 1Y     | 2OE   | 2A | 2Y     |
| L     | L  | L      | L     | X  | Z      |
| L     | H  | H      | H     | L  | L      |
| H     | X  | Z      | H     | H  | H      |

NOTE: H = High Voltage Level, L = LOW Voltage Level  
X = Immaterial, Z = HIGH Impedance

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**CD54/74FCT540, CD54/74FCT540AT, CD54/74FCT241, CD54/74FCT244, CD54/74FCT244AT**

**Switching Specifications** FCT Series  $t_r, t_f = 2.5\text{ns}$ ,  $C_L = 50\text{pF}$ ,  $R_L$  - See Figure 2

| PARAMETER                                                                                                  |           | SYMBOL                                 | V <sub>CC</sub><br>(V) | +25 <sup>o</sup><br>C             | 0 <sup>o</sup> C to<br>+70 <sup>o</sup> C |     | -55 <sup>o</sup> C to<br>+125 <sup>o</sup> C |      | +25 <sup>o</sup><br>C | 0 <sup>o</sup> C to<br>+70 <sup>o</sup> C |     | -55 <sup>o</sup> C to<br>+125 <sup>o</sup> C |     | UNITS |
|------------------------------------------------------------------------------------------------------------|-----------|----------------------------------------|------------------------|-----------------------------------|-------------------------------------------|-----|----------------------------------------------|------|-----------------------|-------------------------------------------|-----|----------------------------------------------|-----|-------|
|                                                                                                            |           |                                        |                        | TYP                               | MIN                                       | MAX | MIN                                          | MAX  | TYP                   | MIN                                       | MAX | MIN                                          | MAX |       |
| Propagation Delays                                                                                         |           |                                        |                        |                                   |                                           |     |                                              |      |                       |                                           |     |                                              |     |       |
| Data to Outputs                                                                                            | FCT240/AT | t <sub>PLH</sub> ,<br>t <sub>PHL</sub> | 5†                     | 5                                 | 1.5                                       | 8   | 1.5                                          | 9    | 4.4                   | 1.5                                       | 5.6 | 1.5                                          | 6.7 | ns    |
|                                                                                                            | FCT241    | t <sub>PLH</sub> ,<br>t <sub>PHL</sub> | 5                      | 4                                 | 1.5                                       | 6.5 | 1.5                                          | 7    | -                     | -                                         | -   | -                                            | -   | ns    |
|                                                                                                            | FCT244/AT | t <sub>PLH</sub> ,<br>t <sub>PHL</sub> | 5                      | 4.5                               | 1.5                                       | 6.5 | 1.5                                          | 7    | 3.8                   | 1.5                                       | 5.3 | 1.5                                          | 6.2 | µs    |
| Output Enable<br>Times                                                                                     | FCT240/AT | t <sub>PZL</sub> ,<br>t <sub>PZH</sub> | 5                      | 7                                 | 1.5                                       | 10  | 1.5                                          | 10.5 | 4.7                   | 1.5                                       | 6.2 | 1.5                                          | 7.7 | µs    |
|                                                                                                            | FCT241    | t <sub>PZL</sub> ,<br>t <sub>PZH</sub> | 5                      | 5.5                               | 1.5                                       | 8   | 1.5                                          | 8.5  | -                     | -                                         | -   | -                                            | -   | ns    |
|                                                                                                            | FCT244/AT | t <sub>PZL</sub> ,<br>t <sub>PZH</sub> | 5                      | 6                                 | 1.5                                       | 8   | 1.5                                          | 8.5  | 4.8                   | 1.5                                       | 6.5 | 1.5                                          | 7.8 | ns    |
| Output Disable<br>Times                                                                                    | FCT240/AT | t <sub>PLZ</sub> ,<br>t <sub>PHZ</sub> | 5                      | 6                                 | 1.5                                       | 9.5 | 1.5                                          | 10   | 4                     | 1.5                                       | 5.6 | 1.5                                          | 6.5 | µs    |
|                                                                                                            | FCT241    | t <sub>PLZ</sub> ,<br>t <sub>PHZ</sub> | 5                      | 4.5                               | 1.5                                       | 7   | 1.5                                          | 7.5  | -                     | -                                         | -   | -                                            | -   | ns    |
|                                                                                                            | FCT244/AT | t <sub>PLZ</sub> ,<br>t <sub>PHZ</sub> | 5                      | 5                                 | 1.5                                       | 7   | 1.5                                          | 7.5  | 4.5                   | 1.5                                       | 5.8 | 1.5                                          | 6.8 | µs    |
| Power Dissipation<br>Capacitance                                                                           | FCT240/AT | C <sub>PD</sub> §                      | -                      | 38 Typical                        |                                           |     |                                              |      | 38 Typical            |                                           |     |                                              |     | pF    |
|                                                                                                            | FCT241    | C <sub>PD</sub> §                      | -                      | 33 Typical                        |                                           |     |                                              |      | -                     |                                           |     |                                              |     | pF    |
|                                                                                                            | FCT244/AT | C <sub>PD</sub> §                      |                        | 35 Typical                        |                                           |     |                                              |      | 35 Typical            |                                           |     |                                              |     | pF    |
| Min. (Valley) V <sub>OHV</sub> During Switch-<br>ing of Other Outputs (Output Under<br>Test Not Switching) |           | V <sub>OHV</sub><br>See<br>Figure 1    | 5                      | 0.5 Typical at +25 <sup>o</sup> C |                                           |     |                                              |      |                       |                                           |     |                                              |     | V     |
| Max. (Peak) V <sub>OLP</sub> During Switch-<br>ing of Other Outputs (Output Under<br>Test Not Switching)   |           | V <sub>OLP</sub><br>See<br>Figure 1    | 5                      | 1 Typical at +25 <sup>o</sup> C   |                                           |     |                                              |      |                       |                                           |     |                                              |     | V     |
| Input Capacitance                                                                                          |           | C <sub>I</sub>                         | -                      | -                                 | -                                         | 10  | -                                            | 10   | -                     | -                                         | 10  | -                                            | 10  | pF    |
| 3-State Output Capacitance                                                                                 |           | C <sub>O</sub>                         | -                      | -                                 | -                                         | 15  | -                                            | 15   | -                     | -                                         | 15  | -                                            | 15  | pF    |

† 5V: min. is at 5.5V, max. is at 4.5V.

5V: min. is at 5.25V for 0°C to +70°C, max. is at 4.75V for 0°C to +70°C, typ. is at 5V

§  $C_{PD}$ , measured per function, is used to determine the dynamic power consumption.  $P_D$  (per package) =  $V_{CC} I_{CC} + \sum (V_{CC}^2 f_i C_{PD} + V_O^2 f_o C_L + V_{CC} \Delta I_{CC} D)$  where:

$V_{CC}$  = supply voltage

$\Delta I_{CC}$  = flow through current x unit load

$C_L$  = output load capacitance

$D$  = duty cycle of input high

$f_o$  = output frequency

$f_i$  = input frequency

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