



**CY54/74FCT157T**  
**CY54/74FCT158T**

**Quad 2-Input Multiplexers**

**Features**

- Function, pinout, and drive compatible with FCT and F logic
- FCT-C speed at 4.3 ns max. (Com'l)  
FCT-A speed at 5.0 ns max. (Com'l)
- Reduced  $V_{OH}$  (typically = 3.3V) versions of equivalent FCT functions
- Edge-rate control circuitry for significantly improved noise characteristics
- Power-off disable feature
- Matched rise and fall times
- Fully compatible with TTL input and output logic levels
- ESD > 2000V

- Sink current 64 mA (Com'l), 32 mA (Mil)
- Source current 32 mA (Com'l), 12 mA (Mil)

**Functional Description**

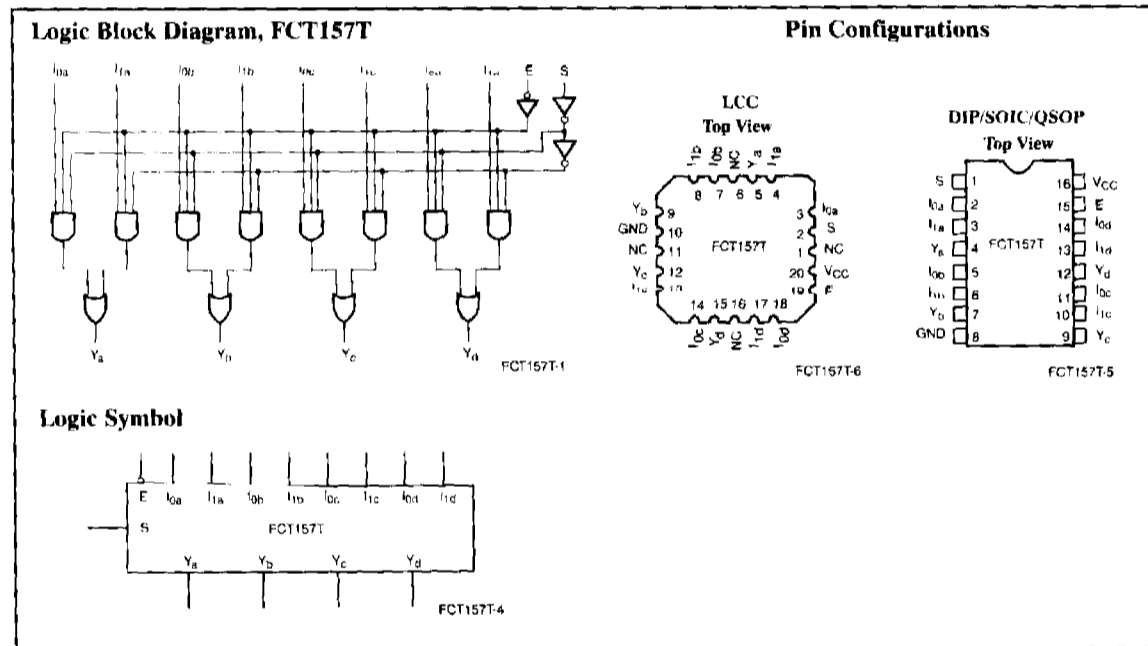
The FCT157T and FCT158T are quad two-input multiplexers that select four bits of data from two sources under the control of a common data Select input (S). The Enable input (E) is Active LOW. When (E) is HIGH, all of the outputs (Y) are forced LOW regardless of all other input conditions.

Moving data from two groups of registers to four common output buses is a common use of the FCT157T and FCT158T. The state of the Select input

determines the particular register from which the data comes. It can also be used as a function generator. The device is useful for implementing highly irregular logic by generating any four of the sixteen different functions of two variables with one variable common.

These devices are logic implementation of a four-pole, two-position switch where the position of the switch is determined by the logic levels supplied to the Select input. The outputs of the FCT157T are non-inverting whereas the FCT158T has inverting outputs.

The outputs are designed with a power-off disable feature to allow for live insertion of boards.





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**Maximum Ratings**<sup>[2, 3]</sup>

(Above which the useful life may be impaired. For user guidelines, not tested.)

Storage Temperature ..... -65°C to +150°C  
 Ambient Temperature with Power Applied ..... -65°C to +135°C  
 Supply Voltage to Ground Potential ..... -0.5V to +7.0V  
 DC Input Voltage ..... -0.5V to +7.0V  
 DC Output Voltage ..... 0.5V to +7.0V  
 DC Output Current (Maximum Sink Current/Pin) ..... 120 mA  
 Power Dissipation ..... 0.5W

Static Discharge Voltage ..... >2001V  
 (per MIL-STD-883, Method 3015)

**Operating Range**

Range	Range	Ambient Temperature	V <sub>CC</sub>
Commercial	CT	0°C to +70°C	5V ± 5%
Commercial	I, AI	-40°C to +85°C	5V ± 5%
Military <sup>[4]</sup>	All	-55°C to +125°C	5V ± 10%

**Electrical Characteristics Over the Operating Range**

Parameter	Description	Test Conditions	Min.	Typ. <sup>[5]</sup>	Max.	Unit	
V <sub>OH</sub>	Output HIGH Voltage	V <sub>CC</sub> = Min., I <sub>OH</sub> = -32 mA	Com'l	2.0		V	
		V <sub>CC</sub> = Min., I <sub>OH</sub> = -15 mA	Com'l	2.4	3.3	V	
		V <sub>CC</sub> = Min., I <sub>OH</sub> = -12 mA	Mil	2.4	3.3	V	
V <sub>OL</sub>	Output LOW Voltage	V <sub>CC</sub> = Min., I <sub>OL</sub> = 64 mA	Com'l		0.3	0.55	V
		V <sub>CC</sub> = Min., I <sub>OL</sub> = 32 mA	Mil		0.3	0.55	V
V <sub>IH</sub>	Input HIGH Voltage		2.0			V	
V <sub>IL</sub>	Input LOW Voltage				0.8	V	
V <sub>TC</sub>	Hysteresis <sup>[6]</sup>	All inputs		0.2		V	
V <sub>IK</sub>	Input Clamp Diode Voltage	V <sub>CC</sub> = Min., I <sub>IN</sub> = -18 mA		-0.7	-1.2	V	
I <sub>I</sub>	Input HIGH Current	V <sub>CC</sub> = Max., V <sub>IN</sub> = V <sub>CC</sub>			5	μA	
I <sub>IH</sub>	Input HIGH Current	V <sub>CC</sub> = Max., V <sub>IN</sub> = 2.7V			±1	μA	
I <sub>IL</sub>	Input LOW Current	V <sub>CC</sub> = Max., V <sub>IN</sub> = 0.5V			±1	μA	
I <sub>OZH</sub>	Off State HIGH-Level Output Current	V <sub>CC</sub> = Max., V <sub>OUT</sub> = 2.7V			10	μA	
I <sub>OZL</sub>	Off State LOW-Level Output Current	V <sub>CC</sub> = Max., V <sub>OUT</sub> = 0.5V			-10	μA	
I <sub>OS</sub>	Output Short Circuit Current <sup>[7]</sup>	V <sub>CC</sub> = Max., V <sub>OUT</sub> = 0.0V	-60	-120	-225	mA	
I <sub>OFF</sub>	Power-Off Disable	V <sub>CC</sub> = 0V, V <sub>OUT</sub> = 4.5V			±1	μA	

**Capacitance**<sup>[6]</sup>

Parameter	Description	T <sub>vp</sub> <sup>[5]</sup>	Max.	Unit
C <sub>IN</sub>	Input Capacitance	5	10	pF
C <sub>OUT</sub>	Output Capacitance	9	12	pF

**Notes:**

- Unless otherwise noted, these limits are over the operating free-air temperature range.
- Unused inputs must always be connected to an appropriate logic voltage level, preferably either V<sub>CC</sub> or ground.
- T<sub>A</sub> is the "instant on" case temperature.
- Typical values are at V<sub>CC</sub> = 5.0V, I<sub>A</sub> = +25°C ambient.
- This parameter is guaranteed but not tested.
- 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 in order to minimize internal chip heating and more accurately reflect operational values. Otherwise prolonged shorting of a high output may cause the chip temperature well above normal and thereby cause invalid readings in other parametric tests. In any sequence of parameter tests, I<sub>OS</sub> tests should be performed last.



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Switching Characteristics Over the Operating Range

Parameter	Description	FCT157T				FCT157AT				Unit	Fig. No. <sup>[13]</sup>
		Military		Commercial		Military		Commercial			
		Min. <sup>[12]</sup>	Max.	Min. <sup>[12]</sup>	Max.	Min. <sup>[12]</sup>	Max.	Min. <sup>[12]</sup>	Max.		
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay I to Y	1.5	7.0	1.5	6.0	1.5	5.8	1.5	5.0	ns	1, 3
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay E to Y	1.5	12.0	1.5	10.5	1.5	7.4	1.5	6.0	ns	1, 5
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay S to Y	1.5	12.0	1.5	10.5	1.5	8.1	1.5	7.0	ns	1, 3

Parameter	Description	FCT157CT				Unit	Fig. No. <sup>[13]</sup>
		Military		Commercial			
		Min. <sup>[12]</sup>	Max.	Min. <sup>[12]</sup>	Max.		
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay I to Y	1.5	5.0	1.5	4.3	ns	1, 3
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay E to Y	1.5	5.9	1.5	4.8	ns	1, 5
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay S to Y	1.5	6.0	1.5	5.2	ns	1, 3

Switching Characteristics Over the Operating Range

Parameter	Description	FCT158T				FCT158AT				Unit	Fig. No. <sup>[13]</sup>
		Military		Commercial		Military		Commercial			
		Min. <sup>[12]</sup>	Max.	Min. <sup>[12]</sup>	Max.	Min. <sup>[12]</sup>	Max.	Min. <sup>[12]</sup>	Max.		
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay I to Y	1.5	7.5	1.5	6.5	1.5	6.3	1.5	5.5	ns	1, 2
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay E to Y	1.5	12.5	1.5	11.0	1.5	7.9	1.5	6.5	ns	1, 5
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay S to Y	1.5	12.5	1.5	11.0	1.5	8.6	1.5	7.5	ns	1, 2

Parameter	Description	FCT158CT				Unit	Fig. No. <sup>[13]</sup>
		Military		Commercial			
		Min. <sup>[12]</sup>	Max.	Min. <sup>[12]</sup>	Max.		
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay I to Y	1.5	5.5	1.5	4.3	ns	1, 2
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay E to Y	1.5	6.4	1.5	4.8	ns	1, 5
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay S to Y	1.5	6.5	1.5	5.2	ns	1, 2

Notes:

12. Minimum limits are guaranteed but not tested on Propagation Delays.

13. See "Parameter Measurement Information" in the General Information Section.



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**Ordering Information—FCT157T**

Speed (ns)	Ordering Code	Package Name	Package Type	Operating Range
4.3	CY74FCT157CTPC	P1	16-Lead (300-Mil) Molded DIP	Commercial
	CY74FCT157CTQC	Q1	16-Lead (150-Mil) QSOP	
	CY74FCT157CTSOC	S1	16-Lead (300-Mil) Molded SOIC	
5.0	CY74FCT157ATPC	P1	16-Lead (300-Mil) Molded DIP	Commercial
	CY74FCT157ATQC	Q1	16-Lead (150-Mil) QSOP	
	CY74FCT157ATSOC	S1	16-Lead (300-Mil) Molded SOIC	
5.0	CY54FCT157CTDMB	D2	16-Lead (300-Mil) CerDIP	Military
	CY54FCT157CTLMB	L61	20-Pin Square Leadless Chip Carrier	
5.8	CY54FCT157ATDMB	D2	16-Lead (300-Mil) CerDIP	Military
	CY54FCT157ATLMB	L61	20-Pin Square Leadless Chip Carrier	
6.0	CY74FCT157TPC	P1	16-Lead (300-Mil) Molded DIP	Commercial
	CY74FCT157TQC	Q1	16-Lead (150-Mil) QSOP	
	CY74FCT157TSOC	S1	16-Lead (300-Mil) Molded SOIC	
7.0	CY54FCT157TDMB	D2	16-Lead (300-Mil) CerDIP	Military
	CY54FCT157TLMB	L61	20-Pin Square Leadless Chip Carrier	

**Ordering Information—FCT158T**

Speed (ns)	Ordering Code	Package Name	Package Type	Operating Range
4.3	CY74FCT158CTPC	P1	16-Lead (300-Mil) Molded DIP	Commercial
	CY74FCT158CTQC	Q1	16-Lead (150-Mil) QSOP	
	CY74FCT158CTSOC	S1	16-Lead (300-Mil) Molded SOIC	
5.5	CY74FCT158ATPC	P1	16-Lead (300-Mil) Molded DIP	Commercial
	CY74FCT158ATQC	Q1	16-Lead (150-Mil) QSOP	
	CY74FCT158ATSOC	S1	16-Lead (300-Mil) Molded SOIC	
5.5	CY54FCT158CTDMB	D2	16-Lead (300-Mil) CerDIP	Military
	CY54FCT158CTLMB	L61	20-Pin Square Leadless Chip Carrier	
6.3	CY54FCT158ATDMB	D2	16-Lead (300-Mil) CerDIP	Military
	CY54FCT158ATLMB	L61	20-Pin Square Leadless Chip Carrier	
6.5	CY74FCT158TPC	P1	16-Lead (300-Mil) Molded DIP	Commercial
	CY74FCT158TQC	Q1	16-Lead (150-Mil) QSOP	
	CY74FCT158TSOC	S1	16-Lead (300-Mil) Molded SOIC	
7.5	CY54FCT158TDMB	D2	16-Lead (300-Mil) CerDIP	Military
	CY54FCT158TLMB	L61	20-Pin Square Leadless Chip Carrier	