



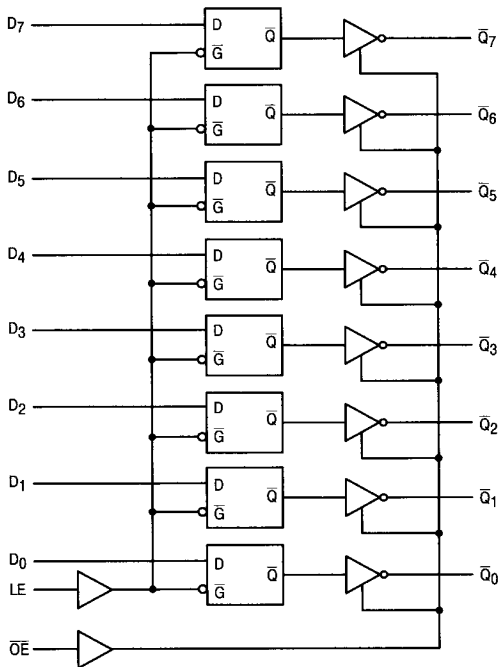
# Octal D-Type Transparent Latch With Active Low Enable 3-State Inverted Outputs

**ELECTRICALLY TESTED PER:  
MIL-M-38510/34602**

The 54F533 consists of eight latches with 3-state outputs for bus organized system applications. The flip-flops appear transparent to the data when Latch Enable (LE) is HIGH. When LE is LOW, the data that meets setup times is latched. Data appears on the bus when the Output Enable ( $\overline{OE}$ ) is LOW. When  $\overline{OE}$  is HIGH the bus output is in the high impedance state.

- Eight Latches in a Single Package
- 3-State Outputs for Bus Interfacing

**LOGIC DIAGRAM**



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**Military 54F533**



**AVAILABLE AS:**

- 1) JAN: JM38510/34602BXA
- 2) SMD: N/A
- 3) 883: 54F533/BXAJC

**X = CASE OUTLINE AS FOLLOWS:  
PACKAGE: CERDIP: R  
CERFLAT: S  
LCC: 2**

**THE LETTER "M" APPEARS  
BEFORE THE / ON LCC.**

**PIN ASSIGNMENTS**

FUNCT.	DIL 732-03	FLATS 737-02	LCC 756A-02	BURN-IN (COND. A)
$\overline{OE}$	1	1	1	VCC
$\overline{Q_0}$	2	2	2	OPEN
$D_0$	3	3	3	VCC
$D_1$	4	4	4	VCC
$\overline{Q_1}$	5	5	5	OPEN
$\overline{Q_2}$	6	6	6	OPEN
$D_2$	7	7	7	VCC
$D_3$	8	8	8	VCC
$\overline{Q_3}$	9	9	9	OPEN
GND	10	10	10	GND
LE	11	11	11	VCC
$\overline{Q_4}$	12	12	12	OPEN
$D_4$	13	13	13	VCC
$D_5$	14	14	14	VCC
$\overline{Q_5}$	15	15	15	OPEN
$\overline{Q_6}$	16	16	16	OPEN
$D_6$	17	17	17	VCC
$D_7$	18	18	18	VCC
$\overline{Q_7}$	19	19	19	OPEN
VCC	20	20	20	VCC

**BURN-IN CONDITIONS:  
VCC = 5.0 V MIN/6.0 V MAX**

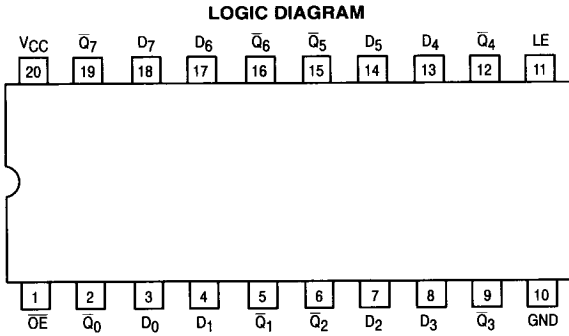
MOTOROLA MILITARY FAST/LS/TTL DATA

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# 54F533

TRUTH TABLE			
Inputs		Outputs	
$D_n$	LE	$\overline{O}E$	$\overline{Q}_n$
H		L	H
L		L	L
X	X	H	Z

H = HIGH Voltage Level  
 L = LOW Voltage Level  
 X = Immaterial  
 Z = HIGH Impedance

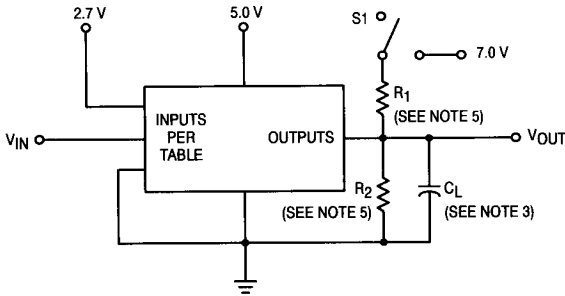


## FUNCTIONAL DESCRIPTION

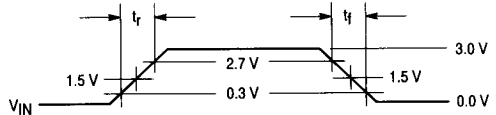
The 54F533 contains eight D-type latches with 3-state output buffers. When the Latch Enable (LE) input is HIGH, data on the  $D_n$  inputs enter the latches. In this condition the latches are transparent, i. e., a latch output will change state each time its D inputs at setup time preceding the HIGH-to-

LOW transition of LE. The 3-state buffers are controlled by the Output Enable ( $\overline{O}E$ ) input. When  $\overline{O}E$  is LOW, the buffers are in the bi-state mode. When  $\overline{O}E$  is HIGH the buffers are in the high impedance mode but this does not interfere with entering new data into the latches.

## AC TEST CIRCUIT



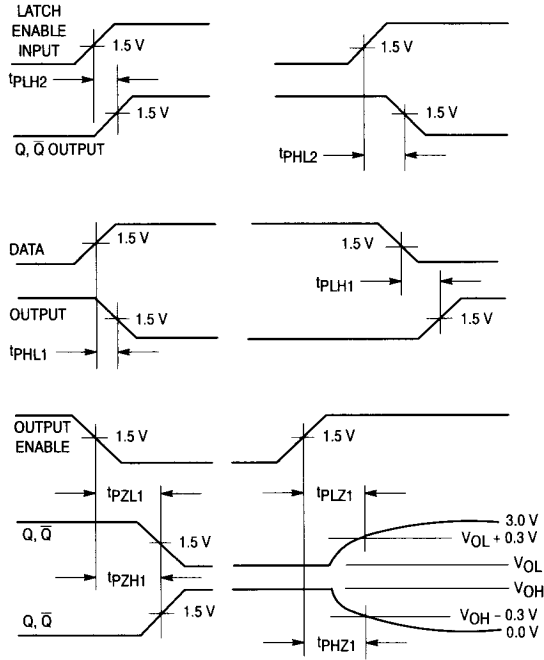
Test Type	S1
$t_{PLH}$	open
$t_{PHL}$	open
$t_{PHZ}$	open
$t_{PZH}$	open
$t_{PLZ}$	closed
$t_{PZL}$	closed



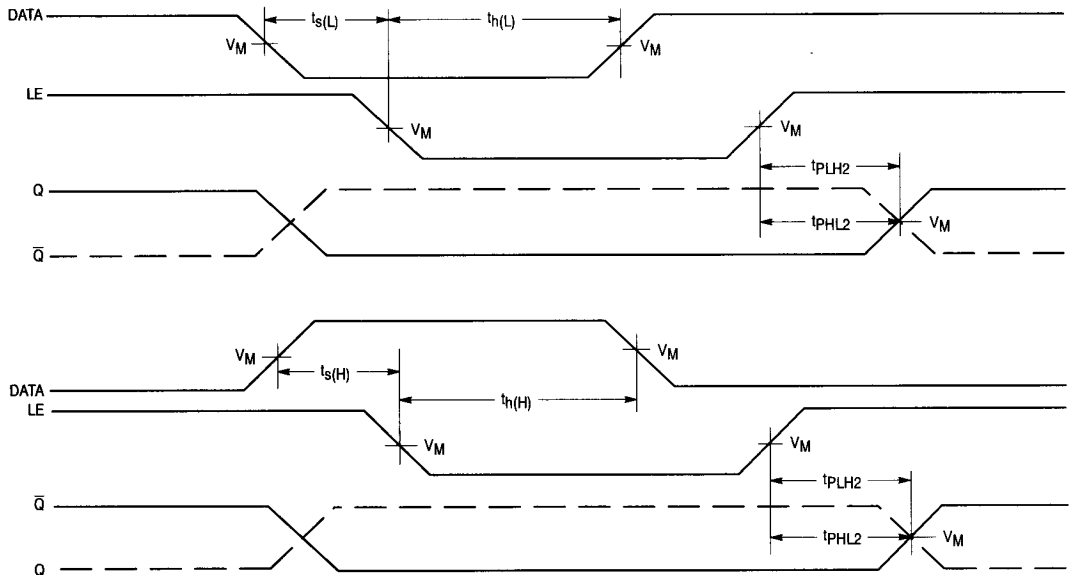
REFERENCE NOTES ON PAGE 4-214

MOTOROLA MILITARY FAST/LS/TTL DATA  
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**54F533**  
**WAVEFORMS**



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\* $t_{s(H,L)} = 2.0\text{ ns}$ .

\* $t_{h(H,L)} = 3.0\text{ ns}$ .

\*Setup and Hold times are for information only. No testing required.

MOTOROLA MILITARY FAST/LS/TTL DATA

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## 54F533

Symbol	Parameter	Limits						Unit	Test Condition (Unless Otherwise Specified)
		+ 25°C		+ 125°C		- 55°C			
		Subgroup 1		Subgroup 2		Subgroup 3			
		Min	Max	Min	Max	Min	Max		
V <sub>OH</sub>	Logical "1" Output Voltage	2.5		2.5		2.5		V	V <sub>CC</sub> = 4.5 V, I <sub>OH</sub> = -1.0 mA, V <sub>IL</sub> = 0.8 V, other inputs are open, $\overline{OE}$ = 0.8 V, LE = 2.0 V.
V <sub>OL</sub>	Logical "0" Output Voltage		0.5		0.5		0.5	V	V <sub>CC</sub> = 4.5 V, I <sub>OL</sub> = 20 mA, V <sub>IH</sub> = 2.0 V, other inputs are open, LE = 2.0 V, $\overline{OE}$ = 0.8 V.
V <sub>IC</sub>	Input Clamping Voltage		-1.2					V	V <sub>CC</sub> = 4.5 V, I <sub>IN</sub> = -18 mA, other inputs are open.
I <sub>IH</sub>	Logical "1" Input Current		20		20		20	μA	V <sub>CC</sub> = 5.5 V, V <sub>IH</sub> = 2.7 V, other inputs are open.
I <sub>IHH</sub>	Logical "1" Input Current		100		100		100	μA	V <sub>CC</sub> = 5.5 V, V <sub>IHH</sub> = 7.0 V, other inputs are open.
I <sub>OD</sub>	Diode Current	35		35		35		mA	V <sub>CC</sub> = 4.5 V, V <sub>IN</sub> = 5.5 V, other inputs are open, LE = 5.5 V, $\overline{OE}$ = 0 V, V <sub>OUT</sub> = 2.5 V.
I <sub>IL</sub>	Logical "0" Input Current	-0.03	-0.6	-0.03	-0.6	-0.03	-0.6	mA	V <sub>CC</sub> = 5.5 V, V <sub>IN</sub> = 0.5 V, other inputs are open.
I <sub>OS</sub>	Output Short Circuit Current	-60	-150	-60	-150	-60	-150	mA	V <sub>CC</sub> = 5.5 V, V <sub>IN</sub> = 0 V, other inputs are open, V <sub>OUT</sub> = 0 V, LE = 5.5 V, $\overline{OE}$ = 0 V.
I <sub>IOZH</sub>	Output Off Current High		50		50		50	μA	V <sub>CC</sub> = 5.5 V, V <sub>IN</sub> = 5.5 V, other inputs are open, V <sub>OUT</sub> = 2.4 V, $\overline{OE}$ = 2.0 V, LE = 5.5 V.
I <sub>IOZL</sub>	Output Off Current Low		-50		-50		-50	μA	V <sub>CC</sub> = 5.5 V, V <sub>IN</sub> = 0 V, other inputs are open, V <sub>OUT</sub> = 0.5 V, $\overline{OE}$ = 2.0 V, LE = 5.5 V.
I <sub>CCH</sub>	Power Supply Current Off		50		50		50	mA	V <sub>CC</sub> = 5.5 V, V <sub>IN</sub> = 0 V (all inputs), LE = 5.5 V, $\overline{OE}$ = 0 V.
I <sub>CCL</sub>	Power Supply Current Off		70		70		70	mA	V <sub>CC</sub> = 5.5 V, V <sub>IN</sub> = 5.5 V (all inputs), LE = 5.5 V, $\overline{OE}$ = 0 V.
I <sub>CCZ</sub>	Power Supply Current Off		61		61		61	mA	V <sub>CC</sub> = 5.5 V, all inputs are open, LE & $\overline{OE}$ = 5.5 V.
V <sub>IH</sub>	Logical "1" Input Voltage	2.0		2.0		2.0		V	V <sub>CC</sub> = 4.5 V.
V <sub>IL</sub>	Logical "0" Input Voltage		0.8		0.8		0.8	V	V <sub>CC</sub> = 4.5 V.
	Functional Tests	Subgroup 7		Subgroup 8A		Subgroup 8B			per Truth Table with V <sub>CC</sub> = 4.5 V, (Repeat at) V <sub>CC</sub> = 5.5 V, V <sub>INL</sub> = 0.5 V, and V <sub>INH</sub> = 2.5 V.

## 54F533

Symbol	Parameter	Limits						Unit	Test Condition (Unless Otherwise Specified)
		+ 25°C		+ 125°C		- 55°C			
		Subgroup 9		Subgroup 10		Subgroup 11			
		Min	Max	Min	Max	Min	Max		
t <sub>PHL1</sub>	Propagation Delay /Data-Output D <sub>n</sub> to $\bar{Q}_n$	3.0	7.0	3.0	9.0	3.0	9.0	ns	V <sub>CC</sub> = 5.0 V, C <sub>L</sub> = 50 pF, R <sub>1</sub> = R <sub>2</sub> = 499 Ω.
t <sub>PLH1</sub>	Propagation Delay /Data-Output D <sub>n</sub> to $\bar{Q}_n$	4.0	9.0	4.0	12	4.0	12	ns	V <sub>CC</sub> = 5.0 V, C <sub>L</sub> = 50 pF, R <sub>1</sub> = R <sub>2</sub> = 499 Ω.
t <sub>PHL2</sub>	Propagation Delay /Data-Output LE to $\bar{Q}_n$	3.0	7.0	3.0	9.0	3.0	9.0	ns	V <sub>CC</sub> = 5.0 V, C <sub>L</sub> = 50 pF, R <sub>1</sub> = R <sub>2</sub> = 499 Ω.
t <sub>PLH2</sub>	Propagation Delay /Data-Output LE to $\bar{Q}_n$	5.0	11	4.0	14	4.0	14	ns	V <sub>CC</sub> = 5.0 V, C <sub>L</sub> = 50 pF, R <sub>1</sub> = R <sub>2</sub> = 499 Ω.
t <sub>PLZ1</sub>	Output Disable Time, $\bar{O}\bar{E}$ to $\bar{Q}_n$	2.0	5.5	2.0	7.5	2.0	7.5	ns	V <sub>CC</sub> = 5.0 V, C <sub>L</sub> = 50 pF, R <sub>1</sub> = R <sub>2</sub> = 499 Ω.
t <sub>PHZ1</sub>	Output Disable Time, $\bar{O}\bar{E}$ to $\bar{Q}_n$	2.0	6.0	2.0	8.5	2.0	8.5	ns	V <sub>CC</sub> = 5.0 V, C <sub>L</sub> = 50 pF, R <sub>1</sub> = R <sub>2</sub> = 499 Ω.
t <sub>PZL1</sub>	Output Enable Time, OE to $\bar{Q}_n$	2.0	6.5	2.0	9.0	2.0	9.0	ns	V <sub>CC</sub> = 5.0 V, C <sub>L</sub> = 50 pF, R <sub>1</sub> = R <sub>2</sub> = 499 Ω.
t <sub>PZH1</sub>	Output Enable Time, OE to $\bar{Q}_n$	2.0	10	2.0	12.5	2.0	12.5	ns	V <sub>CC</sub> = 5.0 V, C <sub>L</sub> = 50 pF, R <sub>1</sub> = R <sub>2</sub> = 499 Ω.

**NOTES:**

1. Input pulse has the following characteristics:  $t_r = t_f \leq 2.5$  ns, PRR  $\leq 1.0$  MHz, Z<sub>OUT</sub> = 50 Ω.
2. Terminal conditions (pins not designated may be high  $\geq 2.0$  V, low  $\leq 0.8$  V, or open).
3. C<sub>L</sub> = 50 pF  $\pm 10\%$  including scope probe, wiring and stray capacitance, without package in test fixture.
4. Voltage measurements are to be made with respect to network ground terminal.
5. R<sub>1</sub> = R<sub>2</sub> = 499 Ω  $\pm 5.0\%$ .