

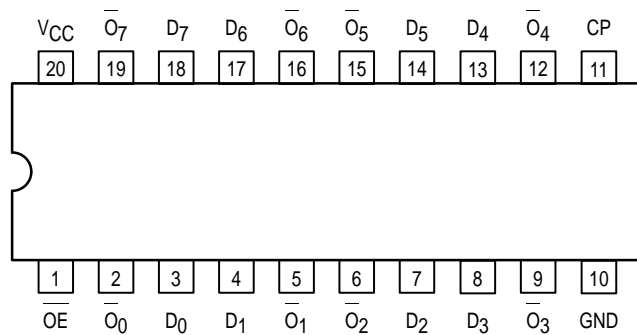


# MC74AC534 MC74ACT534

## Octal D-Type Flip-Flop With 3-State Outputs

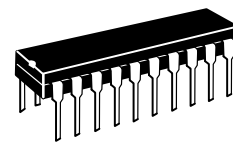
The MC74AC534/74ACT534 is a high-speed, low-power octal D-type flip-flop featuring separate D-type inputs for each flip-flop and 3-state outputs for bus oriented applications. A buffered Clock (CP) and Output Enable (OE) are common to all flip flops. The 'AC/ACT534 is the same as the 'AC/ACT374 except that the outputs are inverted.

- Edge-Triggered D-Type Inputs
- Buffered Positive Edge-Triggered Clock
- 3-State Outputs for Bus Oriented Applications

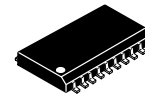


### PIN NAMES

- D<sub>0</sub>-D<sub>7</sub> Data Inputs
- CP Clock Pulse Input
- OE 3-State Output Enable Input
- O<sub>0</sub>-O<sub>7</sub> Complementary 3-State Outputs

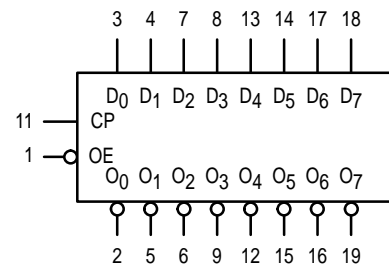


N SUFFIX  
CASE 738-03  
PLASTIC



DW SUFFIX  
CASE 751D-04  
PLASTIC

### LOGIC SYMBOL



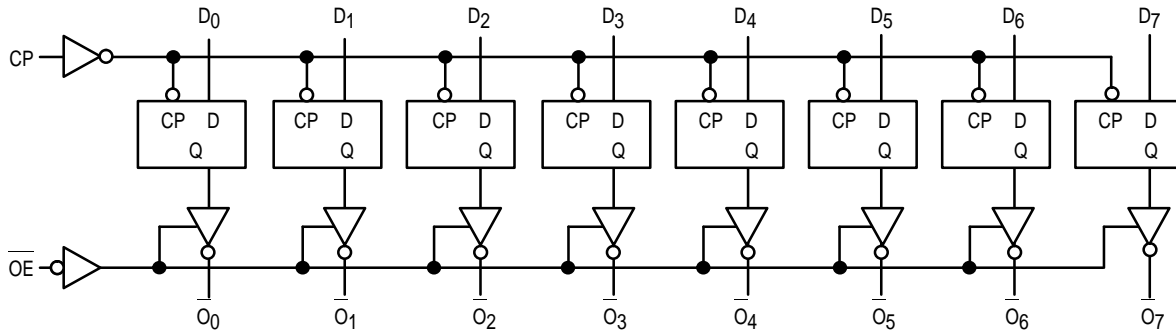
# MC74AC534 MC74ACT534

## FUNCTIONAL DESCRIPTION

The MC74AC534/74ACT534 consists of eight edge-triggered flip-flops with individual D-type inputs and 3-state true outputs. The buffered clock and buffered Output Enable are common to all flip-flops. The eight flip-flops will store the state of their individual D inputs that meet the setup and hold times

requirements on the LOW-to-HIGH Clock (CP) transition. With the Output Enable (OE) LOW, the contents of the eight flip-flops are available at the outputs. When the OE is HIGH, the outputs go to the high impedance state. Operation of the OE input does not affect the state of the flip-flops.

### LOGIC DIAGRAM



Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

### MAXIMUM RATINGS\*

Symbol	Parameter	Value	Unit
$V_{CC}$	DC Supply Voltage (Referenced to GND)	-0.5 to +7.0	V
$V_{in}$	DC Input Voltage (Referenced to GND)	-0.5 to $V_{CC} + 0.5$	V
$V_{out}$	DC Output Voltage (Referenced to GND)	-0.5 to $V_{CC} + 0.5$	V
$I_{in}$	DC Input Current, per Pin	$\pm 20$	mA
$I_{out}$	DC Output Sink/Source Current, per Pin	$\pm 50$	mA
$I_{CC}$	DC $V_{CC}$ or GND Current per Output Pin	$\pm 50$	mA
$T_{stg}$	Storage Temperature	-65 to +150	$^{\circ}C$

\* Maximum Ratings are those values beyond which damage to the device may occur. Functional operation should be restricted to the Recommended Operating Conditions.

### RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Typ	Max	Unit	
$V_{CC}$	Supply Voltage	'AC	2.0	5.0	6.0	V
		'ACT	4.5	5.0	5.5	
$V_{in}, V_{out}$	DC Input Voltage, Output Voltage (Ref. to GND)	0		$V_{CC}$	V	
$t_r, t_f$	Input Rise and Fall Time (Note 1) 'AC Devices except Schmitt Inputs	$V_{CC} @ 3.0 V$		150		ns/V
		$V_{CC} @ 4.5 V$		40		
		$V_{CC} @ 5.5 V$		25		
$t_r, t_f$	Input Rise and Fall Time (Note 2) 'ACT Devices except Schmitt Inputs	$V_{CC} @ 4.5 V$		10		ns/V
		$V_{CC} @ 5.5 V$		8.0		
$T_J$	Junction Temperature (PDIP)			140	$^{\circ}C$	
$T_A$	Operating Ambient Temperature Range	-40	25	85	$^{\circ}C$	
$I_{OH}$	Output Current — High			-24	mA	
$I_{OL}$	Output Current — Low			24	mA	

1.  $V_{in}$  from 30% to 70%  $V_{CC}$ ; see individual Data Sheets for devices that differ from the typical input rise and fall times.

2.  $V_{in}$  from 0.8 V to 2.0 V; see individual Data Sheets for devices that differ from the typical input rise and fall times.

# MC74AC534 MC74ACT534

## DC CHARACTERISTICS

Symbol	Parameter	V <sub>CC</sub> (V)	74AC		74AC		Unit	Conditions
			T <sub>A</sub> = +25°C		T <sub>A</sub> = -40°C to +85°C			
			Typ	Guaranteed Limits				
V <sub>IH</sub>	Minimum High Level Input Voltage	3.0	1.5	2.1	2.1	V	V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> - 0.1 V	
		4.5	2.25	3.15	3.15			
		5.5	2.75	3.85	3.85			
V <sub>IL</sub>	Maximum Low Level Input Voltage	3.0	1.5	0.9	0.9	V	V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> - 0.1 V	
		4.5	2.25	1.35	1.35			
		5.5	2.75	1.65	1.65			
V <sub>OH</sub>	Minimum High Level Output Voltage	3.0	2.99	2.9	2.9	V	I <sub>OUT</sub> = -50 μA	
		4.5	4.49	4.4	4.4			
		5.5	5.49	5.4	5.4			
		3.0		2.56	2.46	V	*V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> -12 mA I <sub>OH</sub> -24 mA -24 mA	
		4.5		3.86	3.76			
		5.5		4.86	4.76			
V <sub>OL</sub>	Maximum Low Level Output Voltage	3.0	0.002	0.1	0.1	V	I <sub>OUT</sub> = 50 μA	
		4.5	0.001	0.1	0.1			
		5.5	0.001	0.1	0.1			
		3.0		0.36	0.44	V	*V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> 12 mA I <sub>OL</sub> 24 mA 24 mA	
		4.5		0.36	0.44			
		5.5		0.36	0.44			
I <sub>IN</sub>	Maximum Input Leakage Current	5.5		±0.1	±1.0	μA	V <sub>I</sub> = V <sub>CC</sub> , GND	
I <sub>OZ</sub>	Maximum 3-State Current	5.5		±0.5	±5.0	μA	V <sub>I</sub> (OE) = V <sub>IL</sub> , V <sub>IH</sub> V <sub>I</sub> = V <sub>CC</sub> , GND V <sub>O</sub> = V <sub>CC</sub> , GND	
I <sub>OLD</sub>	†Minimum Dynamic Output Current	5.5			75	mA	V <sub>OLD</sub> = 1.65 V Max	
I <sub>OHD</sub>		5.5			-75	mA	V <sub>OHD</sub> = 3.85 V Min	
I <sub>CC</sub>	Maximum Quiescent Supply Current	5.5		8.0	80	μA	V <sub>IN</sub> = V <sub>CC</sub> or GND	

\* All outputs loaded; thresholds on input associated with output under test.

† Maximum test duration 2.0 ms, one output loaded at a time.

Note: I<sub>IN</sub> and I<sub>CC</sub> @ 3.0 V are guaranteed to be less than or equal to the respective limit @ 5.5 V V<sub>CC</sub>.

# MC74AC534 MC74ACT534

## AC CHARACTERISTICS (For Figures and Waveforms — See Section 3)

Symbol	Parameter	V <sub>CC</sub> * (V)	74AC			74AC		Unit	Fig. No.
			T <sub>A</sub> = +25°C C <sub>L</sub> = 50 pF			T <sub>A</sub> = -40°C to +85°C C <sub>L</sub> = 50 pF			
			Min	Typ	Max	Min	Max		
f <sub>max</sub>	Maximum Clock Frequency	3.3 5.0	70 150		70 150	70 140	70 140	MHz	3-3
t <sub>PLH</sub>	Propagation Delay CP to O <sub>N</sub>	3.3 5.0	3.0 2.5		14.0 10.5	2.5 2.0	16.0 12.0	ns	3-6
t <sub>PHL</sub>	Propagation Delay CP to O <sub>N</sub>	3.3 5.0	3.0 2.5		13.0 9.5	2.5 2.0	15.0 11.0	ns	3-6
t <sub>PZH</sub>	Output Enable Time OE to O <sub>N</sub>	3.3 5.0	3.0 2.5		12.5 10.0	2.5 2.0	14.0 11.5	ns	3-7
t <sub>PZL</sub>	Output Enable Time OE to O <sub>N</sub>	3.3 5.0	3.0 2.5		12.5 10.0	2.5 2.0	14.0 11.5	ns	3-8
t <sub>PHZ</sub>	Output Disable Time OE to O <sub>N</sub>	3.3 5.0	2.0 1.5		13.5 11.5	1.5 1.0	15.0 12.5	ns	3-7
t <sub>PLZ</sub>	Output Disable Time OE to O <sub>N</sub>	3.3 5.0	2.0 1.5		12.0 10.0	1.5 1.0	13.5 11.0	ns	3-8

\* Voltage Range 3.3 V is 3.3 V ±0.3 V.  
Voltage Range 5.0 V is 5.0 V ±0.5 V.

## AC OPERATING REQUIREMENTS

Symbol	Parameter	V <sub>CC</sub> * (V)	74AC		74AC		Unit	Fig. No.
			T <sub>A</sub> = +25°C C <sub>L</sub> = 50 pF		T <sub>A</sub> = -40°C to +85°C C <sub>L</sub> = 50 pF			
			Typ	Guaranteed Minimum				
t <sub>s</sub>	Setup Time, HIGH or LOW D <sub>N</sub> to CP	3.3 5.0		5.0 3.5	6.5 4.0		ns	3-9
t <sub>h</sub>	Hold Time, HIGH or LOW D <sub>N</sub> to CP	3.3 5.0		1.0 1.0	1.5 1.5		ns	3-9
t <sub>w</sub>	CP Pulse Width HIGH or LOW	3.3 5.0		5.0 3.5	6.5 4.0		ns	3-6

\* Voltage Range 3.3 V is 3.3 V ±0.3 V.  
Voltage Range 5.0 V is 5.0 V ±0.5 V.

# MC74AC534 MC74ACT534

## DC CHARACTERISTICS

Symbol	Parameter	V <sub>CC</sub> (V)	74ACT		74ACT		Unit	Conditions
			T <sub>A</sub> = +25°C		T <sub>A</sub> = -40°C to +85°C			
			Typ	Guaranteed Limits				
V <sub>IH</sub>	Minimum High Level Input Voltage	4.5	1.5	2.0	2.0	V	V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> - 0.1 V	
		5.5	1.5	2.0	2.0			
V <sub>IL</sub>	Maximum Low Level Input Voltage	4.5	1.5	0.8	0.8	V	V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> - 0.1 V	
		5.5	1.5	0.8	0.8			
V <sub>OH</sub>	Minimum High Level Output Voltage	4.5	4.49	4.4	4.4	V	I <sub>OUT</sub> = -50 μA	
		5.5	5.49	5.4	5.4			
		4.5		3.86	3.76	V	*V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> -24 mA I <sub>OH</sub> -24 mA	
5.5		4.86	4.76					
V <sub>OL</sub>	Maximum Low Level Output Voltage	4.5	0.001	0.1	0.1	V	I <sub>OUT</sub> = 50 μA	
		5.5	0.001	0.1	0.1			
		4.5		0.36	0.44	V	*V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> 24 mA I <sub>OL</sub> 24 mA	
5.5		0.36	0.44					
I <sub>IN</sub>	Maximum Input Leakage Current	5.5		±0.1	±1.0	μA	V <sub>I</sub> = V <sub>CC</sub> , GND	
ΔI <sub>CCT</sub>	Additional Max. I <sub>CC</sub> /Input	5.5	0.6		1.5	mA	V <sub>I</sub> = V <sub>CC</sub> - 2.1 V	
I <sub>OZ</sub>	Maximum 3-State Current	5.5		±0.5	±5.0	μA	V <sub>I</sub> (OE) = V <sub>IL</sub> , V <sub>IH</sub> V <sub>I</sub> = V <sub>CC</sub> , GND V <sub>O</sub> = V <sub>CC</sub> , GND	
I <sub>OLD</sub>	†Minimum Dynamic Output Current	5.5			75	mA	V <sub>OLD</sub> = 1.65 V Max	
I <sub>OHD</sub>		5.5			-75	mA	V <sub>OHD</sub> = 3.85 V Min	
I <sub>CC</sub>	Maximum Quiescent Supply Current	5.5		8.0	80	μA	V <sub>IN</sub> = V <sub>CC</sub> or GND	

\* All outputs loaded; thresholds on input associated with output under test.

† Maximum test duration 2.0 ms, one output loaded at a time.

# MC74AC534 MC74ACT534

## AC CHARACTERISTICS (For Figures and Waveforms — See Section 3)

Symbol	Parameter	V <sub>CC</sub> * (V)	74ACT			74ACT		Unit	Fig. No.
			T <sub>A</sub> = +25°C C <sub>L</sub> = 50 pF			T <sub>A</sub> = -40°C to +85°C C <sub>L</sub> = 50 pF			
			Min	Typ	Max	Min	Max		
f <sub>max</sub>	Maximum Clock Frequency	5.0		100		120		MHz	3-3
t <sub>PLH</sub>	Propagation Delay CP to O <sub>n</sub>	5.0	2.5	6.5	11.5	2.0	12.5	ns	3-6
t <sub>PHL</sub>	Propagation Delay CP to O <sub>n</sub>	5.0	2.0	6.0	10.5	2.0	12	ns	3-6
t <sub>PZH</sub>	Output Enable Time OE to O <sub>n</sub>	5.0	2.5	6.5	12	2.0	12.5	ns	3-7
t <sub>PZL</sub>	Output Enable Time OE to O <sub>n</sub>	5.0	2.0	6.0	11	2.0	11.5	ns	3-8
t <sub>PHZ</sub>	Output Disable Time OE to O <sub>n</sub>	5.0	1.5	7.0	12.5	1.0	13.5	ns	3-7
t <sub>PLZ</sub>	Output Disable Time OE to O <sub>n</sub>	5.0	1.5	5.5	10.5	1.0	10.5	ns	3-8

\* Voltage Range 5.0 V is 5.0 V ±0.5 V.

## AC OPERATING REQUIREMENTS

Symbol	Parameter	V <sub>CC</sub> * (V)	74ACT		74ACT		Unit	Fig. No.
			T <sub>A</sub> = +25°C C <sub>L</sub> = 50 pF		T <sub>A</sub> = -40°C to +85°C C <sub>L</sub> = 50 pF			
			Typ	Guaranteed Minimum				
t <sub>s</sub>	Setup Time, HIGH or LOW D <sub>n</sub> to CP	5.0	1.0	3.5	4.0		ns	3-9
t <sub>h</sub>	Hold Time, HIGH or LOW D <sub>n</sub> to CP	5.0	-1.0	1.0	1.5		ns	3-9
t <sub>w</sub>	CP Pulse Width HIGH or LOW	5.0	2.0	3.5	3.5		ns	3-6

\* Voltage Range 5.0 V is 5.0 V ±0.5 V.

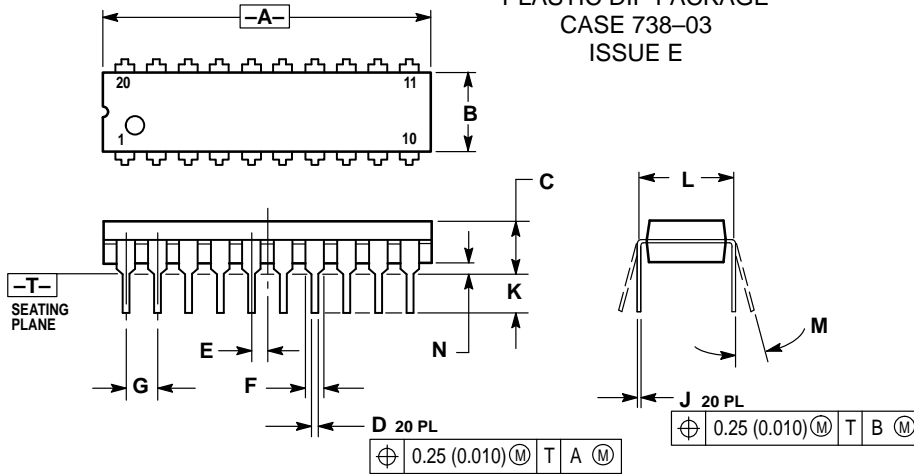
## CAPACITANCE

Symbol	Parameter	Value Typ	Unit	Test Conditions
C <sub>IN</sub>	Input Capacitance	4.5	pF	V <sub>CC</sub> = 5.0 V
C <sub>PD</sub>	Power Dissipation Capacitance	40	pF	V <sub>CC</sub> = 5.0 V

# MC74AC534 MC74ACT534

## OUTLINE DIMENSIONS

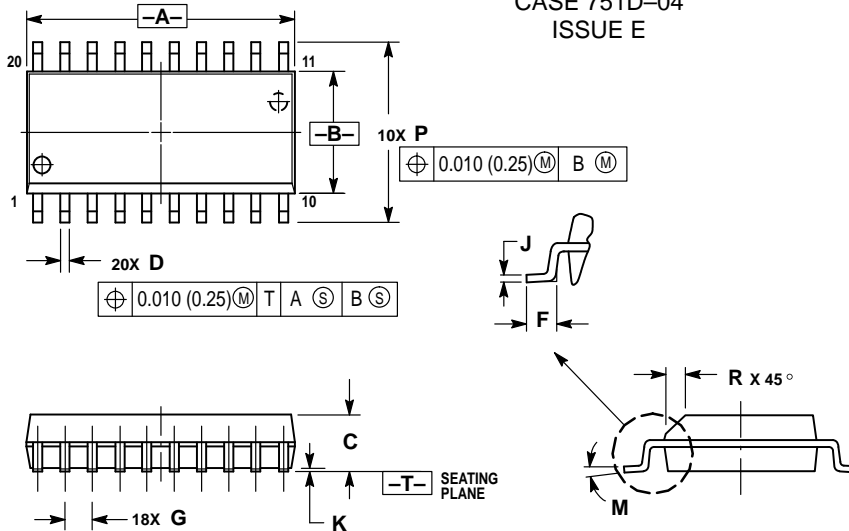
### N SUFFIX PLASTIC DIP PACKAGE CASE 738-03 ISSUE E



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
  4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.


DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	1.010	1.070	25.66	27.17
B	0.240	0.260	6.10	6.60
C	0.150	0.180	3.81	4.57
D	0.015	0.022	0.39	0.55
E	0.050 BSC		1.27 BSC	
F	0.050	0.070	1.27	1.77
G	0.100 BSC		2.54 BSC	
J	0.008	0.015	0.21	0.38
K	0.110	0.140	2.80	3.55
L	0.300 BSC		7.62 BSC	
M	0° 15°		0° 15°	
N	0.020	0.040	0.51	1.01

### DW SUFFIX PLASTIC SOIC PACKAGE CASE 751D-04 ISSUE E



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: MILLIMETER.
  3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
  4. MAXIMUM MOLD PROTRUSION 0.150 (0.006) PER SIDE.
  5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.13 (0.005) TOTAL IN EXCESS OF D DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	12.65	12.95	0.499	0.510
B	7.40	7.60	0.292	0.299
C	2.35	2.65	0.093	0.104
D	0.35	0.49	0.014	0.019
F	0.50	0.90	0.020	0.035
G	1.27 BSC		0.050 BSC	
J	0.25	0.32	0.010	0.012
K	0.10	0.25	0.004	0.009
M	0° 7°		0° 7°	
P	10.05	10.55	0.395	0.415
R	0.25	0.75	0.010	0.029

Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters can and do vary in different applications. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Motorola was negligent regarding the design or manufacture of the part. Motorola and  are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

#### How to reach us:

USA/EUROPE: Motorola Literature Distribution;  
P.O. Box 20912; Phoenix, Arizona 85036. 1-800-441-2447

JAPAN: Nippon Motorola Ltd.; Tatsumi-SPD-JLDC, Toshikatsu Otsuka,  
6F Seibu-Butsuryu-Center, 3-14-2 Tatsumi Koto-Ku, Tokyo 135, Japan. 03-3521-8315

MFAX: RMFAX0@email.sps.mot.com -TOUCHTONE (602) 244-6609  
INTERNET: <http://Design-NET.com>

HONG KONG: Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,  
51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852-26629298



MC74AC534/D

