



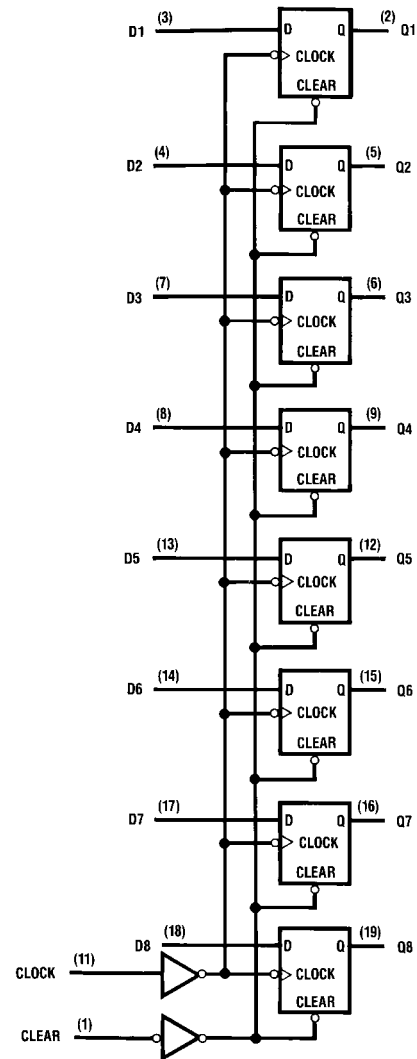
# MM74HC273

**TRUTH TABLE** (Each Flip-Flop)

| Inputs |       |   | Outputs        |
|--------|-------|---|----------------|
| Clear  | Clock | D | Q              |
| L      | X     | X | L              |
| H      | ↑     | H | H              |
| H      | ↑     | L | L              |
| H      | L     | X | Q <sub>0</sub> |

**NOTES:**

- H = HIGH Level (Steady State)
- L = LOW Level (Steady State)
- X = Don't Care
- ↑ = Transition from LOW-to-HIGH level
- Q<sub>0</sub> = The level of Q before the indicated steady state input conditions were established.



**Figure 2. Logic Diagram**

**ABSOLUTE MAXIMUM RATINGS** (Note 1)

| Symbol                            | Rating                                     |       | Value                          | Unit |
|-----------------------------------|--------------------------------------------|-------|--------------------------------|------|
| V <sub>CC</sub>                   | Supply Voltage                             |       | -0.5 to +6.5 V                 | V    |
| V <sub>IN</sub>                   | DC Input Voltage                           |       | -0.5 to V <sub>CC</sub> +0.5 V | V    |
| V <sub>OUT</sub>                  | DC Output Voltage                          |       | -0.5 to V <sub>CC</sub> +0.5 V | V    |
| I <sub>IK</sub> , I <sub>OK</sub> | Clamp Diode Current                        |       | ±20                            | mA   |
| I <sub>OUT</sub>                  | DC Output Current, per pin                 |       | ±25                            | mA   |
| I <sub>CC</sub>                   | DC V <sub>CC</sub> or GND Current, per pin |       | ±50                            | mA   |
| T <sub>STG</sub>                  | Storage Temperature Range                  |       | -65 to +150                    | °C   |
| P <sub>D</sub>                    | Power Dissipation                          | SOIC  | 1302                           | mW   |
|                                   |                                            | TSSOP | 833                            | mW   |
| T <sub>L</sub>                    | Lead Temperature (Soldering 10 seconds)    |       | 260                            | °C   |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Unless otherwise specified all voltages are referenced to ground.

# MM74HC273

## RECOMMENDED OPERATING CONDITIONS

| Symbol            | Parameter                   | Min                     | Max      | Unit |
|-------------------|-----------------------------|-------------------------|----------|------|
| $V_{CC}$          | Supply Voltage              | 2                       | 6        | V    |
| $V_{IN}, V_{OUT}$ | DC Input or Output Voltage  | 0                       | $V_{CC}$ | V    |
| $T_A$             | Operating Temperature Range | -55                     | 125      | °C   |
| $t_r, t_f$        | Input Rise or Fall Times    | $V_{CC} = 2.0\text{ V}$ | 1000     | ns   |
|                   |                             | $V_{CC} = 4.5\text{ V}$ | 500      | ns   |
|                   |                             | $V_{CC} = 6.0\text{ V}$ | 400      | ns   |

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

## DC ELECTRICAL CHARACTERISTICS (Note 2)

| Symbol          | Parameter                         | Conditions                                                                                                           | V <sub>CC</sub> | T <sub>A</sub> = 25°C |                   | T <sub>A</sub> = -40 to 85°C | T <sub>A</sub> = -55 to 125°C | Unit |
|-----------------|-----------------------------------|----------------------------------------------------------------------------------------------------------------------|-----------------|-----------------------|-------------------|------------------------------|-------------------------------|------|
|                 |                                   |                                                                                                                      |                 | Typ                   | Guaranteed Limits |                              |                               |      |
| V <sub>IH</sub> | Minimum HIGH Level Input Voltage  |                                                                                                                      | 2.0 V           |                       | 1.5               | 1.5                          | 1.5                           | V    |
|                 |                                   |                                                                                                                      | 4.5 V           |                       | 3.15              | 3.15                         | 3.15                          | V    |
|                 |                                   |                                                                                                                      | 6.0 V           |                       | 4.2               | 4.2                          | 4.2                           | V    |
| V <sub>IL</sub> | Maximum LOW Level Input Voltage   |                                                                                                                      | 2.0 V           |                       | 0.5               | 0.5                          | 0.5                           | V    |
|                 |                                   |                                                                                                                      | 4.5 V           |                       | 1.35              | 1.35                         | 1.35                          | V    |
|                 |                                   |                                                                                                                      | 6.0 V           |                       | 1.8               | 1.8                          | 1.8                           | V    |
| V <sub>OH</sub> | Minimum HIGH Level Output Voltage | V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub><br> I <sub>OUT</sub>   ≤ 20 μA                                  | 2.0 V           | 2.0                   | 1.9               | 1.9                          | 1.9                           | V    |
|                 |                                   |                                                                                                                      | 4.5 V           | 4.5                   | 4.4               | 4.4                          | 4.4                           | V    |
|                 |                                   |                                                                                                                      | 6.0 V           | 6.0                   | 5.9               | 5.9                          | 5.9                           | V    |
|                 |                                   | V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub><br> I <sub>OUT</sub>   ≤ 4.0 mA<br> I <sub>OUT</sub>   ≤ 5.2 mA | 4.5 V           | 4.2                   | 3.98              | 3.84                         | 3.7                           | V    |
|                 |                                   |                                                                                                                      | 6.0 V           | 5.7                   | 5.48              | 5.34                         | 5.2                           | V    |
|                 |                                   |                                                                                                                      |                 |                       |                   |                              |                               |      |
| V <sub>OL</sub> | Maximum LOW Level Output Voltage  | V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub><br> I <sub>OUT</sub>   ≤ 20 μA                                  | 2.0 V           | 0                     | 0.1               | 0.1                          | 0.1                           | V    |
|                 |                                   |                                                                                                                      | 4.5 V           | 0                     | 0.1               | 0.1                          | 0.1                           | V    |
|                 |                                   |                                                                                                                      | 6.0 V           | 0                     | 0.1               | 0.1                          | 0.1                           | V    |
|                 |                                   | V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub><br> I <sub>OUT</sub>   ≤ 4.0 mA<br> I <sub>OUT</sub>   ≤ 5.2 mA | 4.5 V           | 0.2                   | 0.26              | 0.33                         | 0.4                           | V    |
|                 |                                   |                                                                                                                      | 6.0 V           | 0.2                   | 0.26              | 0.33                         | 0.4                           | V    |
|                 |                                   |                                                                                                                      |                 |                       |                   |                              |                               |      |
| I <sub>IN</sub> | Maximum Input Current             | V <sub>IN</sub> = V <sub>CC</sub> or GND                                                                             | 6.0 V           |                       | ±0.1              | ±1.0                         | ±1.0                          | μA   |
| I <sub>CC</sub> | Maximum Quiescent Supply Current  | V <sub>IN</sub> = V <sub>CC</sub> or GND<br>I <sub>OUT</sub> = 0 μA                                                  | 6.0 V           |                       | 8                 | 80                           | 160                           | μA   |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

- For a power supply of  $5\text{ V} \pm 10\%$  the worst case output voltages ( $V_{OH}$ , and  $V_{OL}$ ) occur for HC at 4.5 V. Thus the 4.5 V values should be used when designing with this supply. Worst case  $V_{IH}$  and  $V_{IL}$  occur at  $V_{CC} = 5.5\text{ V}$  and  $4.5\text{ V}$  respectively. (The  $V_{IH}$  value at 5.5 V is 3.85 V.) The worst case leakage current ( $I_{IN}$ ,  $I_{CC}$ , and  $I_{OZ}$ ) occur for CMOS at the higher voltage and so the 6.0 V values should be used.

# MM74HC273

## AC ELECTRICAL CHARACTERISTICS

( $V_{CC} = 5\text{ V}$ ,  $T_A = 25^\circ\text{C}$ ,  $C_L = 15\text{ pF}$ ,  $t_r = t_f = 6\text{ ns}$ )

| Symbol             | Parameter                                     | Conditions | Typ | Guaranteed Limit | Unit |
|--------------------|-----------------------------------------------|------------|-----|------------------|------|
| $f_{MAX}$          | Maximum Operating Frequency                   |            | 50  | 30               | MHz  |
| $t_{PHL}, t_{PLH}$ | Maximum Propagation Delay,<br>Clock to Output |            | 18  | 27               | ns   |
| $t_{PHL}$          | Maximum Propagation Delay,<br>Clear to Output |            | 18  | 27               | ns   |
| $t_{REM}$          | Minimum Removal Time,<br>Clear to Clock       |            | 10  | 20               | ns   |
| $t_s$              | Minimum Setup Time,<br>Data to Clock          |            | 10  | 20               | ns   |
| $t_H$              | Minimum Hold Time,<br>Clock to Data           |            | -2  | 0                | ns   |
| $t_W$              | Minimum Pulse Width,<br>Clock to Clear        |            | 10  | 16               | ns   |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

## AC ELECTRICAL CHARACTERISTICS

( $C_L = 50\text{ pF}$ ,  $t_r = t_f = 6\text{ ns}$ , unless otherwise specified)

| Symbol                              | Parameter                                  | Conditions | V <sub>CC</sub> | T <sub>A</sub> = 25°C |                   | T <sub>A</sub> = −40 to 85°C | T <sub>A</sub> = −55 to 125°C | Unit |
|-------------------------------------|--------------------------------------------|------------|-----------------|-----------------------|-------------------|------------------------------|-------------------------------|------|
|                                     |                                            |            |                 | Typ                   | Guaranteed Limits |                              |                               |      |
| f <sub>MAX</sub>                    | Maximum Operating Frequency                |            | 2.0 V           | 16                    | 5                 | 4                            | 3                             | MHz  |
|                                     |                                            |            | 4.5 V           | 74                    | 27                | 21                           | 18                            | MHz  |
|                                     |                                            |            | 6.0 V           | 78                    | 31                | 24                           | 20                            | MHz  |
| t <sub>PHL</sub> , t <sub>PLH</sub> | Maximum Propagation Delay, Clock to Output |            | 2.0 V           | 38                    | 135               | 170                          | 205                           | ns   |
|                                     |                                            |            | 4.5 V           | 14                    | 27                | 34                           | 41                            | ns   |
|                                     |                                            |            | 6.0 V           | 12                    | 23                | 29                           | 35                            | ns   |
| t <sub>PHL</sub>                    | Maximum Propagation Delay, Clear to Output |            | 2.0 V           | 42                    | 135               | 170                          | 205                           | ns   |
|                                     |                                            |            | 4.5 V           | 19                    | 27                | 34                           | 41                            | ns   |
|                                     |                                            |            | 6.0 V           | 18                    | 23                | 29                           | 35                            | ns   |
| t <sub>REM</sub>                    | Minimum Removal Time, Clear to Clock       |            | 2.0 V           | 0                     | 25                | 32                           | 37                            | ns   |
|                                     |                                            |            | 4.5 V           | 0                     | 5                 | 6                            | 7                             | ns   |
|                                     |                                            |            | 6.0 V           | 0                     | 4                 | 5                            | 6                             | ns   |
| t <sub>S</sub>                      | Minimum Setup Time, Data to Clock          |            | 2.0 V           | 26                    | 100               | 125                          | 150                           | ns   |
|                                     |                                            |            | 4.5 V           | 7                     | 20                | 25                           | 30                            | ns   |
|                                     |                                            |            | 6.0 V           | 5                     | 17                | 21                           | 25                            | ns   |
| t <sub>H</sub>                      | Minimum Hold Time, Clock to Clock          |            | 2.0 V           | −15                   | 0                 | 0                            | 0                             | ns   |
|                                     |                                            |            | 4.5 V           | −6                    | 0                 | 0                            | 0                             | ns   |
|                                     |                                            |            | 6.0 V           | −4                    | 0                 | 0                            | 0                             | ns   |
| t <sub>W</sub>                      | Minimum Pulse Width, Clock or Clear        |            | 2.0 V           | 34                    | 80                | 100                          | 120                           | ns   |
|                                     |                                            |            | 4.5 V           | 11                    | 16                | 20                           | 24                            | ns   |
|                                     |                                            |            | 6.0 V           | 10                    | 14                | 18                           | 20                            | ns   |
| t <sub>r</sub> , t <sub>f</sub>     | Maximum Input Rise and Fall Time, Clock    |            | 2.0 V           | –                     | 1000              | 1000                         | 1000                          | ns   |
|                                     |                                            |            | 4.5 V           | –                     | 500               | 500                          | 500                           | ns   |
|                                     |                                            |            | 6.0 V           | –                     | 400               | 400                          | 400                           | ns   |
| t <sub>THL</sub> , t <sub>TLH</sub> | Maximum Output Rise and Fall Time          |            | 2.0 V           | 28                    | 75                | 95                           | 110                           | ns   |
|                                     |                                            |            | 4.5 V           | 11                    | 15                | 19                           | 22                            | ns   |
|                                     |                                            |            | 6.0 V           | 9                     | 13                | 16                           | 19                            | ns   |

# MM74HC273

## AC ELECTRICAL CHARACTERISTICS (continued)

( $C_L = 50 \text{ pF}$ ,  $t_r = t_f = 6 \text{ ns}$ , unless otherwise specified)

| Symbol          | Parameter                              | Conditions      | V <sub>CC</sub> | T <sub>A</sub> = 25°C |                   | T <sub>A</sub> = −40 to 85°C | T <sub>A</sub> = −55 to 125°C | Unit |
|-----------------|----------------------------------------|-----------------|-----------------|-----------------------|-------------------|------------------------------|-------------------------------|------|
|                 |                                        |                 |                 | Typ                   | Guaranteed Limits |                              |                               |      |
| C <sub>PD</sub> | Power Dissipation Capacitance (Note 3) | (per flip–flop) |                 | 45                    |                   |                              |                               | pF   |
| C <sub>IN</sub> | Maximum Input Capacitance              |                 |                 | 7                     | 10                | 10                           | 10                            | pF   |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

3.  $C_{PD}$  determines the no load dynamic power consumption,  $P_D = C_{PD} V_{CC}^2 f + I_{CC} V_{CC}$ , and the no load dynamic current consumption,  $I_S = C_{PD} V_{CC} f + I_{CC}$ .

## ORDERING INFORMATION

| Device        | Marking    | Package                                        | Shipping <sup>†</sup> |
|---------------|------------|------------------------------------------------|-----------------------|
| MM74HC273WM   | HC273A     | SOIC-20 WB<br>(Pb-Free and Halide Free)        | 38 Units / Tube       |
| MM74HC273WMX  | HC273A     | SOIC-20, 300 mils<br>(Pb-Free and Halide Free) | 1000 / Tape & Reel    |
| MM74HC273MTC  | HC<br>273A | TSSOP-20 WB<br>(Pb-Free)                       | 75 Units / Tube       |
| MM74HC273MTCX | HC<br>273A | TSSOP-20 WB<br>(Pb-Free)                       | 2500 / Tape & Reel    |

<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, [BRD8011/D](#).

**SOIC-20, 300 mils**  
**CASE 751BJ**  
**ISSUE O**

DATE 19 DEC 2008



**TOP VIEW**

| SYMBOL     | MIN      | NOM   | MAX   |
|------------|----------|-------|-------|
| A          | 2.36     | 2.49  | 2.64  |
| A1         | 0.10     |       | 0.30  |
| A2         | 2.05     |       | 2.55  |
| b          | 0.31     | 0.41  | 0.51  |
| c          | 0.20     | 0.27  | 0.33  |
| D          | 12.60    | 12.80 | 13.00 |
| E          | 10.01    | 10.30 | 10.64 |
| E1         | 7.40     | 7.50  | 7.60  |
| e          | 1.27 BSC |       |       |
| h          | 0.25     |       | 0.75  |
| L          | 0.40     | 0.81  | 1.27  |
| $\theta$   | 0°       |       | 8°    |
| $\theta 1$ | 5°       |       | 15°   |



**SIDE VIEW**



**END VIEW**

**Notes:**

- (1) All dimensions are in millimeters. Angles in degrees.
- (2) Complies with JEDEC MS-013.

|                         |                          |                                                                                                                                                                                     |
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| <b>DESCRIPTION:</b>     | <b>SOIC-20, 300 MILS</b> | <b>PAGE 1 OF 1</b>                                                                                                                                                                  |

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SCALE 1:1

SOIC-20 WB  
CASE 751D-05  
ISSUE H

DATE 22 APR 2015



NOTES:

1. DIMENSIONS ARE IN MILLIMETERS.
2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.
3. DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
5. DIMENSION B DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS OF B DIMENSION AT MAXIMUM MATERIAL CONDITION.

| DIM | MILLIMETERS |       |
|-----|-------------|-------|
|     | MIN         | MAX   |
| A   | 2.35        | 2.65  |
| A1  | 0.10        | 0.25  |
| b   | 0.35        | 0.49  |
| c   | 0.23        | 0.32  |
| D   | 12.65       | 12.95 |
| E   | 7.40        | 7.60  |
| e   | 1.27 BSC    |       |
| H   | 10.05       | 10.55 |
| h   | 0.25        | 0.75  |
| L   | 0.50        | 0.90  |
| θ   | 0°          | 7°    |

GENERIC  
MARKING DIAGRAM\*



XXXXXX = Specific Device Code  
A = Assembly Location  
WL = Wafer Lot  
YY = Year  
WW = Work Week  
G = Pb-Free Package

RECOMMENDED  
SOLDERING FOOTPRINT\*



DIMENSIONS: MILLIMETERS

\*For additional information on our Pb-Free strategy and soldering details, please download the **onsemi** Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.

|                  |             |                                                                                                                                                                                     |
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