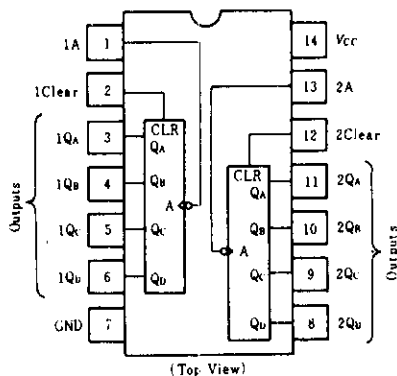


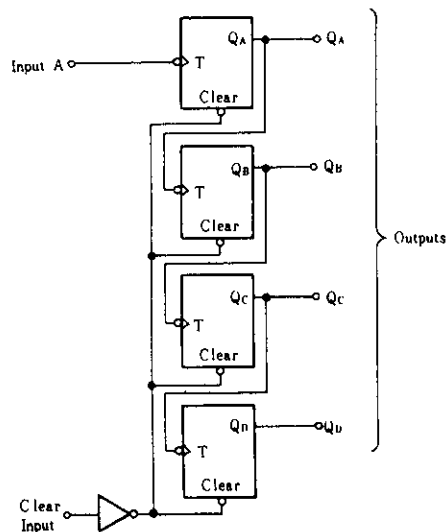
HD74LS393 ● Dual 4-bit Binary Counters

This circuit contains eight master-slave flip-flops and additional gating to implement two individual four-bit counters. The HD74LS393 comprises two independent four-bit binary counters each having a clear and a clock input. N-bit binary counter can be implemented with each package providing the capability of divide-by-256.

■ PIN ARRANGEMENT



■ BLOCK DIAGRAM (1/2)



■ RECOMMENDED OPERATING CONDITIONS

| Item | Symbol | min | typ | max | Unit |
|-----------------|---------------------|-------|-----|------|---------|
| Output current | I_{OH} | — | — | -400 | μA |
| Output current | I_{OL} | — | — | 8 | mA |
| Count frequency | A input f_{COUNT} | 0 | — | 25 | MHz |
| Pulse width | A input high or low | t_w | 20 | — | ns |
| | Clear high | t_w | 20 | — | ns |
| Setup time | t_{su} | 25↓ | — | — | ns |

↓: The arrow indicates that the falling edge of the clock pulse is used for reference.

■ ABSOLUTE MAXIMUM RATINGS

| Item | Symbol | Rating | Unit |
|-----------------------------|-----------|------------|------|
| Supply voltage | V_{CC} | 7 | V |
| Input voltage | Clear | 7 | V |
| | A | 5.5 | V |
| Operating temperature range | T_{OP} | -20 ~ +75 | °C |
| Storage temperature range | T_{STG} | -65 ~ +150 | °C |

■ FUNCTION TABLE

| Count | Output | | | |
|-------|--------|-------|-------|-------|
| | Q_D | Q_C | Q_B | Q_A |
| 0 | L | L | L | L |
| 1 | L | L | L | H |
| 2 | L | L | H | L |
| 3 | L | L | H | H |
| 4 | L | H | L | L |
| 5 | L | H | L | H |
| 6 | L | H | H | L |
| 7 | L | H | H | H |
| 8 | H | L | L | L |
| 9 | H | L | L | H |
| 10 | H | L | H | L |
| 11 | H | L | H | H |
| 12 | H | H | L | L |
| 13 | H | H | L | H |
| 14 | H | H | H | L |
| 15 | H | H | H | H |

H: high level, L: low level.

■ ELECTRICAL CHARACTERISTICS ($T_a = -20 \sim +75^\circ\text{C}$)

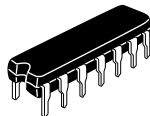
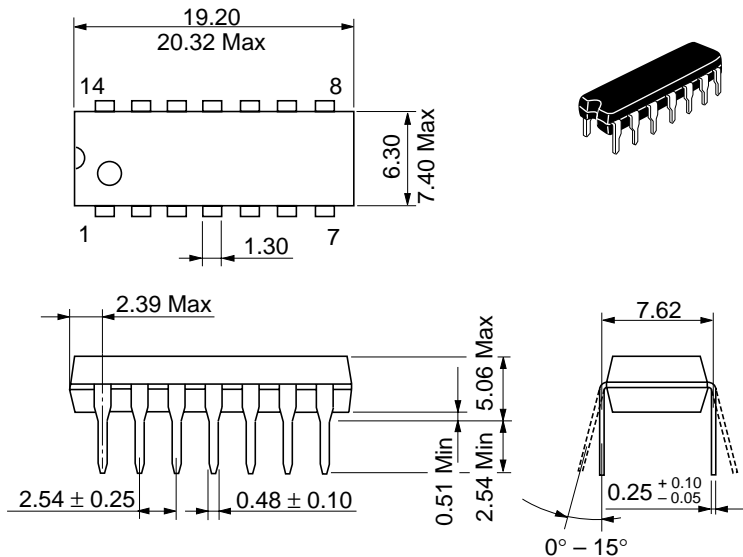
| Item | | Symbol | Test Conditions | min | typ* | max | Unit |
|------------------------------|---------|---------------|----------------------------------------------------------------------------------------------|---------------------|------|------|---------------|
| Input voltage | | V_{IH} | | 2.0 | — | — | V |
| | | V_{IL} | | — | — | 0.8 | |
| Output voltage | | V_{OH} | $V_{CC}=4.75\text{V}$, $V_{IH}=2\text{V}$, $V_{IL}=0.8\text{V}$, $I_{OH}=-400\mu\text{A}$ | 2.7 | — | — | V |
| | | V_{OL} | $V_{CC}=4.75\text{V}$, $V_{IH}=2\text{V}$, $V_{IL}=0.8\text{V}$ | $I_{OL}=4\text{mA}$ | — | 0.4 | V |
| | | | | $I_{OL}=8\text{mA}$ | — | 0.5 | |
| Input current | Clear | I_i | $V_{CC}=5.25\text{V}$ | $V_i=7\text{V}$ | — | 0.1 | mA |
| | Input A | | | $V_i=5.5\text{V}$ | — | 0.2 | |
| | Clear | I_{IH} | $V_{CC}=5.25\text{V}$, $V_i=2.7\text{V}$ | — | — | 20 | μA |
| | Input A | | | — | — | 100 | |
| | Clear | I_{iL} | $V_{CC}=5.25\text{V}$, $V_i=0.4\text{V}$ | — | — | -0.4 | mA |
| | Input A | | | — | — | -1.6 | |
| Short-circuit output current | | I_{OS} | $V_{CC}=5.25\text{V}$ | -20 | — | -100 | mA |
| Supply current | | I_{CC}^{**} | $V_{CC}=5.25\text{V}$ | — | 15 | 26 | mA |
| Input clamp voltage | | V_{IK} | $V_{CC}=4.75\text{V}$, $I_{IK}=-18\text{mA}$ | — | — | -1.5 | V |

* $V_{CC}=5\text{V}$, $T_a=25^\circ\text{C}$

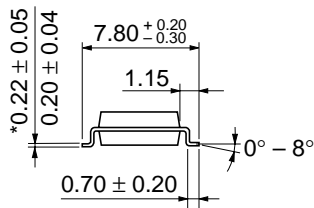
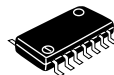
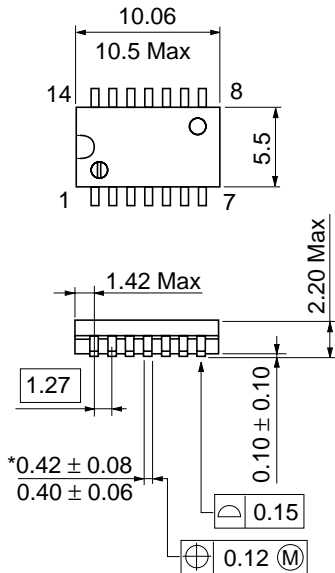
** I_{CC} is measured with all outputs open, both clear inputs grounded following momentary connection to 4.5V, and all other inputs grounded.

■ SWITCHING CHARACTERISTICS ($V_{CC}=5\text{V}$, $T_a=25^\circ\text{C}$)

| Item | Symbol | Inputs | Outputs | Test Conditions | min | typ | max | Unit |
|-------------------------|-----------|--------|---------|----------------------------------------------|-----|-----|-----|------|
| Maximum count frequency | f_{max} | A | Q_A | $C_L=15\text{pF}$, $R_L=2\text{k}\Omega$ | 25 | 35 | — | MHz |
| Propagation delay time | t_{PLH} | A | Q_A | | — | 12 | 20 | ns |
| | t_{PHL} | | | | — | 13 | 20 | |
| | t_{PLH} | A | Q_B | | — | 40 | 60 | |
| | t_{PHL} | | | | — | 40 | 60 | |
| | t_{PHL} | Clear | Any | | — | 24 | 39 | |

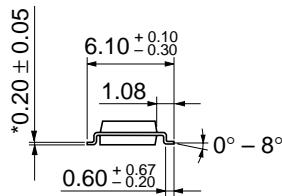
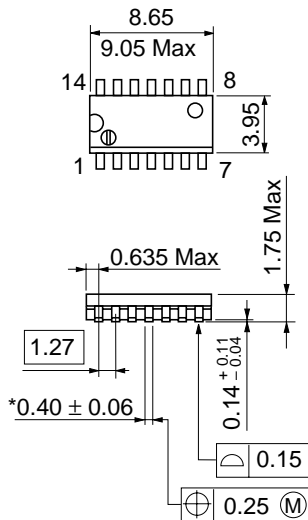


| | |
|--------------------------|----------|
| Hitachi Code | DP-14 |
| JEDEC | Conforms |
| EIAJ | Conforms |
| Weight (reference value) | 0.97 g |



*Dimension including the plating thickness
Base material dimension

| | |
|--------------------------|----------|
| Hitachi Code | FP-14DA |
| JEDEC | — |
| EIAJ | Conforms |
| Weight (reference value) | 0.23 g |



| | |
|--------------------------|----------|
| Hitachi Code | FP-14DN |
| JEDEC | Conforms |
| EIAJ | Conforms |
| Weight (reference value) | 0.13 g |

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