"C²MOS" DIGITAL INTEGRATED CIRCUIT

# TCP4620AF
# TCP4630AF

SILICON MONOLITHIC

## CMOS 4-BIT SINGLE CHIP MICROCOMPUTER

This is the specification for TCP4620AF/TCP4630AF in the TLCS-46A family.

TCP4620AF/TCP4630AF is a flat package version of TCP4620AP/TCP4630AP. There are some differences in electrical characteristics between TCP4620AF/TCP4630AF and TCP4620AP/TCP4630AP; however, their function, instruction, and pin description are compatible.
When using and examining TCP4620AF/TCP4630AF, therefore, it is recommended that this specification be used together with the technical data on TCP4620AP/TCP4630AP.

The differences in electrical characteristics between the two are as follows:

1. Power Dissipation

   $P_D$ = 400 mW MAX

2. Operating Temperature and Ambient Temperature

   $T_{opr}$ = -20 to 70°C

   $T_a$ = -20 to 70°C

## TCP4620AF /TCP4630AF ELECTRICAL CHARACTERISTICS

### ABSOLUTE MAXIMUM RATINGS

| SYMBOL | ITEM | Rating |
|---|---|---|
| $V_{DD}$ | Supply Voltage | -0.3V to +7.0V |
| $V_{IN}$ | Input Voltage | -0.3V to $V_{DD}$+0.3V |
| $V_{OUT}$ | Output Voltage | -0.3V to $V_{DD}$+0.3V |
| $P_D$ | Power Dissipation | 400mw |
| $T_{sol}$ | Soldering Temperature | 260°C(10 SEC) |
| $T_{stg}$ | Storage Temperature | -55°C to +125°C |
| $T_{opr}$ | Operating Temperature | -20°C to +70°C |

### ALLOWABLE OPARATING CONDITION

| SYMBOL | ITEM | Condition | |
|---|---|---|---|
| | | $V_{DD}$=3V to 6V | $V_{DD}$=4V to 6V |
| Ta | Ambient Temperature | -20°C to +70°C | -20°C to +70°C |
| $V_{OH}$ | Output High Voltage | Min. $V_{DD}$ -3.5V(>1.5V) | Min. $V_{DD}$ -3.5V(>1.5V) |
| $V_{OL}$ | Output Low Voltage | Max. 3V | Max. 3V |
| fx | Xtal Operating Frequency | 20KHz to 2MHz | 20KHz to 4.2MHz |
| tcy | Cycle Time | 40μs to 100μs | 10μs to 100μs |

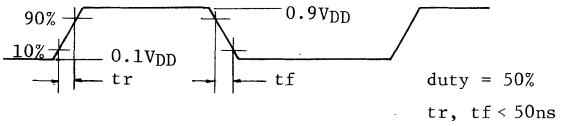
DC CHARACTERISTICS (Ta=-20°C to 70°C, $V_{DD}$=3V to 6V)

| SYMBOL | PARAMETER | | TEST CONDITION | MIN. | TYP. (Note 1) | MAX. | UNIT |
|---|---|---|---|---|---|---|---|
| $V_{IH}$ | Input High Voltage | | | $V_{DD}$x0.75 | - | $V_{DD}$ | V |
| | | | $V_{DD} \geq$ 4V | $V_{DD}$x0.7 | $V_{DD}$x0.55 | $V_{DD}$ | |
| $V_{IHS}$ | Input High Voltage (Schmitt) | | | $V_{DD}$x0.9 | $V_{DD}$x0.75 | $V_{DD}$ | |
| | | | $V_{DD} \geq$ 4V | $V_{DD}$x0.85 | - | $V_{DD}$ | |
| $V_{IHC}$ | Input High Voltage ($X_{IN}$ Input) | | | $V_{DD}$x0.75 | - | $V_{DD}$ | |
| $V_{IL}$ | Input Low Voltage | | | 0 | $V_{DD}$x0.45 | $V_{DD}$x0.3 | |
| $V_{ILS}$ | Input Low Voltage (Schmitt) | | | 0 | $V_{DD}$x0.35 | $V_{DD}$x0.1 | |
| | | | $V_{DD} \geq$ 4V | 0 | - | $V_{DD}$x0.15 | |
| $V_{ILC}$ | Input Low Voltage ($X_{IN}$ Input) | | | 0 | - | $V_{DD}$x0.25 | |
| $I_{IH}$ | Input High Current | | $V_{DD}$=6V, $V_{IN}$=6V | - | - | 20 | µA |
| $I_{IL}$ | Input Low Current | | $V_{DD}$=6V, $V_{IN}$=0V | - | - | -20 | |
| $R_{IN}$ | Input Resistance ($PI_5$) | | $V_{DD}$=5V | 75 | 150 | 350 | KΩ |
| $V_{OH}$ | Output High Voltage | | $V_{DD}$=5V, Output Open | 4.7 | 4.9 | - | V |
| $V_{OL}$ | Output Low Voltage | | | - | 0.1 | 0.3 | |
| $I_{OH}$ | Output High Current | | $V_{DD}$=4.5V, $V_{OH}$=2.4V | -0.7 | -2 | - | mA |
| $I_{OH1}$ | Output High Current ($PO_5$, $PO_6$) | | | -2.5 | -6 | - | |
| | | | $V_{DD}$=5V, $V_{OH}$=4.2V | -1.1 | -2.5 | - | |
| $I_{OL}$ | Output Low Current | | $V_{DD}$=4.5V, $V_{OL}$=0.45V | 1.6 | 4 | - | |
| $I_{OL1}$ | Output Low Current ($PO_5$, $PO_6$) | | | 3.5 | 8 | - | |
| $I_{DDO}$ | $V_{DD}$ Supply Current in Normal Operation | (fx=32.8 KHz) | $V_{DD}$=6V<br>$V_{IN}$=5.9V/0.1V (all valid)<br>$PI_5$ Open<br>$C_L$ = 50pF<br>(Note 3) | - | 50 | 300 | µA |
| | | (fx=100 KHz) | | - | 150 | 450 | |
| | | (fx=400 KHz) | | - | 400 | 1200 | |
| | | (fx=4.19 MHz) | | - | 1000 | 3000 | |
| $I_{DDH}$ | $V_{DD}$ Supply Current in Hold Operation | (fx=32.8 KHz) | | - | 15 | 80 | |
| | | (fx=100 KHz) | | - | 40 | 120 | |
| | | (fx=400 KHz) | | - | 150 | 450 | |

Note 1: Typical values are at Ta=25°C and $V_{DD}$=5V.

Note 2: Output characteristic excludes $X_{OUT}$ terminal.

Note 3: $X_{IN}$ input waveform at the time of measuring $V_{DD}$ Supply Current.

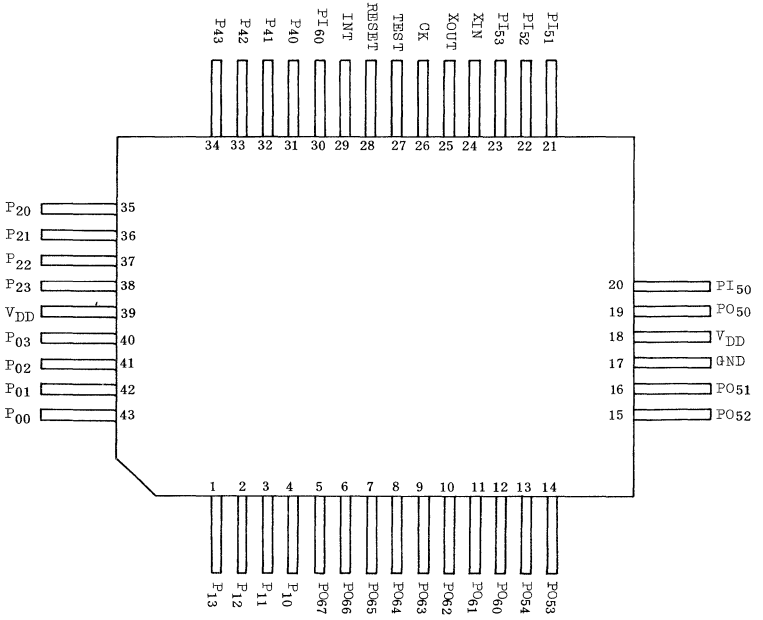


AC CHARACTERISTICS (Ta=-20°C to +70°C, $V_{DD}$=3V to 6V)

| SYMBOL | PARAMETER | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| $t_{WXIN}$ | XIN Pluse Width | External Input $V_{IN}=V_{IHC}/V_{ILC}$ | 0.4/fx | - | $0.6/f_x$ | SEC |
| $t_{WRESET}$ | $\overline{RESET}$ Pulse Width | $V_{IN}=V_{IHS}/V_{ILS}$ | 2 tcy | - | - | μs |
| $t_{WINT}$ | $\overline{INT}$ Pulse Width | | 2 tcy | - | - | |
| $t_{WPI60}$ | P160 Pulse Width | | 2 tcy | - | - | |

Note: Flat packages have a merit in assembly space, but they should be installed in better humidity and temperature environment than DIP's.

PIN CONNECTIONS (TOP VIEW)




Note) Pins 18 and 39, power supply terminals, are connected in the package.

OUTLINE DRAWINGS

Unit in mm