

TC4007UBP/UBF

C²MOS DIGITAL INTEGRATED CIRCUIT
SILICON MONOLITHIC

TC4007UBP/TC4007UBF DUAL COMPLEMENTARY PAIR PLUS INVERTER

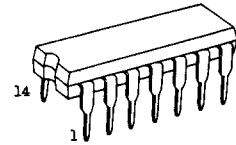
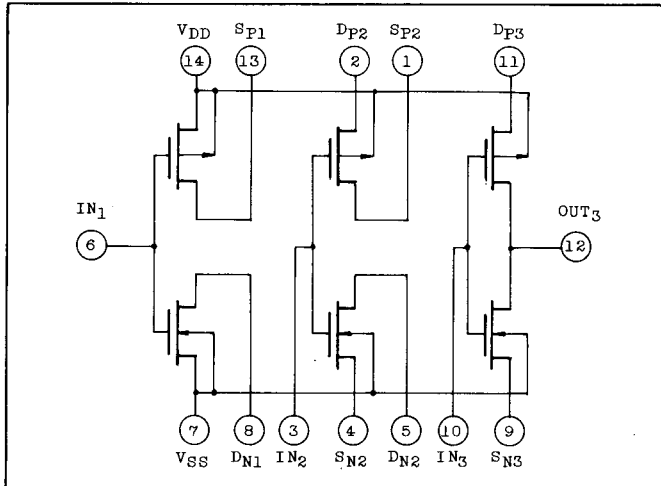
TC4007UBP/UBF contains three elements of P-channel enhancement type MOS FET and three elements of N-channel enhancement type MOS FET. One pair of P-channel and N-channel functions as inverter and remaining two pairs provide the respective outputs of source and drain separately. Depending on how connections are made, the versatile applications such as inverter, waveform shaping circuits, NAND(NOR) gates, linear amplifiers, clocked gates, transmission gates and high fan-out buffers are easily obtainable.

MAXIMUM RATINGS

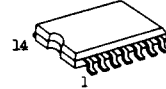
| CHARACTERISTIC | SYMBOL | RATING | UNIT |
|-------------------------------------|------------------|---|------|
| DC Supply Voltage | V _{DD} | V _{SS} -0.5 ~ V _{SS} +20 | V |
| Input Voltage | V _{IN} | V _{SS} -0.5 ~ V _{DD} +0.5 | V |
| Output Voltage * | V _{OUT} | V _{SS} -0.5 ~ V _{DD} +0.5 | V |
| DC Input Current | I _{IN} | ±10 | mA |
| Power Dissipation | P _D | 300(DIP)/180(MFP) | mW |
| Operating Ambient Temperature Range | T _A | -40 ~ 85 | °C |
| Storage Temperature Range | T _{stg} | -65 ~ 150 | °C |
| Lead Temp./Time | T _{sol} | 260°C · 10 sec | |

* Applicable for D_p, D_N, S_P, S_N and OUT terminals.

LOGIC DIAGRAM

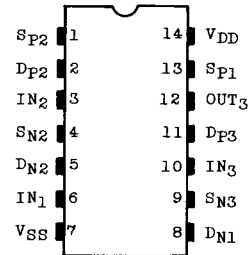


DIP14 (SD14A-P)



MFP14 (F14GB-P)

PIN ASSIGNMENT



(TOP VIEW)

RECOMMENDED OPERATING CONDITIONS (V_{SS}=0V)

| CHARACTERISTIC | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|-------------------|-----------------|----------------|------|------|-----------------|------|
| DC Supply Voltage | V _{DD} | | 3 | - | 18 | V |
| Input Voltage | V _{IN} | | 0 | - | V _{DD} | V |

STATIC ELECTRICAL CHARACTERISTICS (V_{SS}=0V)

| CHARACTERISTIC | SYM-BOL | TEST CONDITION | V _{DD} (V) | -40°C | | 25°C | | | 85°C | | UNIT | |
|---------------------------|-----------------|---|------------------------|-------|------|-------|-------|-------------------|-------|------|------|----|
| | | | | MIN. | MAX. | MIN. | TYP. | MAX. | MIN. | MAX. | | |
| High-Level Output Voltage | V _{OH} | I _{OUT} < 1μA V _{IN} =V _{SS} | 5 | 4.95 | - | 4.95 | 5.00 | - | 4.95 | - | V | |
| | | | 10 | 9.95 | - | 9.95 | 10.00 | - | 9.95 | - | | |
| | | | 15 | 14.95 | - | 14.95 | 15.00 | - | 14.95 | - | | |
| Low-Level Output Voltage | V _{OL} | I _{OUT} < 1μA V _{IN} =V _{DD} | 5 | - | 0.05 | - | 0.00 | 0.05 | - | 0.05 | V | |
| | | | 10 | - | 0.05 | - | 0.00 | 0.05 | - | 0.05 | | |
| | | | 15 | - | 0.05 | - | 0.00 | 0.05 | - | 0.05 | | |
| Output High Current | I _{OH} | V _{OH} =4.6V V _{OH} =2.5V V _{OH} =9.5V V _{OH} =13.5V V _{IN} =V _{SS} | 5 | -0.61 | - | -0.51 | -1.0 | - | -0.42 | - | mA | |
| | | | 5 | -2.5 | - | -2.1 | -4.0 | - | -1.7 | - | | |
| | | | 10 | -1.5 | - | -1.3 | -2.2 | - | -1.1 | - | | |
| | | | 15 | -4.0 | - | -3.4 | -9.0 | - | -2.8 | - | | |
| Output Low Current | I _{OL} | V _{OL} =0.4V V _{OL} =0.5V V _{OL} =1.5V V _{IN} =V _{DD} | 5 | 0.61 | - | 0.51 | 1.5 | - | 0.42 | - | mA | |
| | | | 10 | 1.5 | - | 1.3 | 3.8 | - | 1.1 | - | | |
| | | | 15 | 4.0 | - | 3.4 | 15.0 | - | 2.8 | - | | |
| | | | | | | | | | | | | |
| Input High Voltage | V _{IH} | V _{OUT} =0.5V V _{OUT} =1.0V V _{OUT} =1.5V I _{OUT} < 1μA | 5 | 4.0 | - | 4.0 | 3.0 | - | 4.0 | - | V | |
| | | | 10 | 8.0 | - | 8.0 | 6.5 | - | 8.0 | - | | |
| | | | 15 | 12.0 | - | 12.0 | 9.5 | - | 12.0 | - | | |
| | | | | | | | | | | | | |
| Input Low Voltage | V _{IL} | V _{OUT} =4.5V V _{OUT} =9.0V V _{OUT} =13.5V I _{OUT} < 1μA | 5 | - | 1.0 | - | 3.0 | 1.0 | - | 1.0 | V | |
| | | | 10 | - | 2.0 | - | 3.5 | 2.0 | - | 2.0 | | |
| | | | 15 | - | 3.0 | - | 5.5 | 3.0 | - | 3.0 | | |
| | | | | | | | | | | | | |
| Input Current | "H" Level | I _{IH} | V _{IH} =18V | 18 | - | 0.1 | - | 10 ⁻⁵ | 0.1 | - | 1.0 | μA |
| | "L" Level | I _{IL} | V _{IL} =0V | 18 | - | -0.1 | - | -10 ⁻⁵ | -0.1 | - | -1.0 | |
| Quiescent Device Current | I _{DD} | V _{IN} =V _{SS} , V _{DD} * | 5 | - | 0.25 | - | 0.001 | 0.25 | - | 7.5 | μA | |
| | | | 10 | - | 0.5 | - | 0.001 | 0.5 | - | 15 | | |
| | | | 15 | - | 1.0 | - | 0.002 | 1.0 | - | 30 | | |

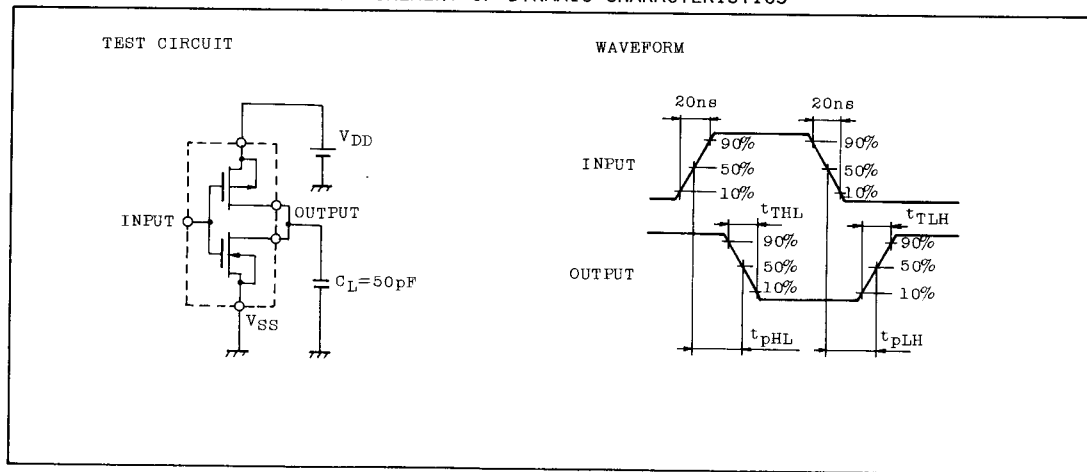
* All valid input combinations.

TC4007UBP/UBF

DYNAMIC ELECTRICAL CHARACTERISTICS (Ta=25°C, VSS=0V, CL=50pF, INVERTER)

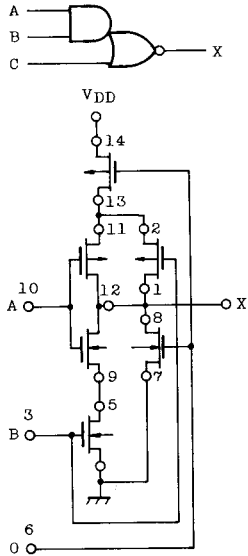
| CHARACTERISTIC | SYMBOL | TEST CONDITION | VDD (V) | MIN. | TYP. | MAX. | UNIT |
|---|------------------|----------------|---------|------|------|------|------|
| | | | | | | | |
| Output Transition Time (Low to High) | t _{TLH} | | 5 | - | 80 | 180 | ns |
| | | | 10 | - | 50 | 90 | |
| | | | 15 | - | 40 | 70 | |
| Output Transition Time (High to Low) | t _{THL} | | 5 | - | 80 | 150 | |
| | | | 10 | - | 50 | 80 | |
| | | | 15 | - | 40 | 60 | |
| Propagation Delay Time (Low to High) | t _{pLH} | | 5 | - | 55 | 110 | ns |
| | | | 10 | - | 25 | 60 | |
| | | | 15 | - | 20 | 50 | |
| Propagation Delay Time (High to Low) | t _{pHL} | | 5 | - | 40 | 110 | |
| | | | 10 | - | 20 | 60 | |
| | | | 15 | - | 15 | 50 | |
| Input Capacitance | C _{IN} | | | - | 5 | 7.5 | pF |

CIRCUIT AND WAVEFORM FOR MEASUREMENT OF DYNAMIC CHARACTERISTICS

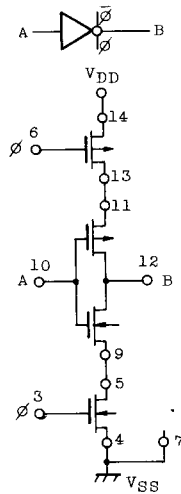


TYPICAL APPLICATION

1. TREE LOGIC



2. CLOCKED INVERTER



3. ANALOG DATA SELECTOR

