

## Advance Information

# Multiple Output Clock Synthesizer

The MPC9108 is a multiple CMOS output clock synthesizer targeted for disk drive applications. The device interfaces to a 20MHz crystal as its frequency source. From this source the device provides a buffered copy of the 20MHz clock as well as synthesized 40MHz and 50MHz output clocks.

- Fully Integrated PLL
- Fully Integrated Crystal Oscillator
- Low cost, low jitter design
- Low cost 8-lead SOIC packaging

In addition to the output clock frequencies, the MPC9108 also offers a lock indicator output. When the internal PLL achieves phase and frequency lock the CLK\_LOCK signal will go HIGH. The pin will remain HIGH unless the PLL loses lock due to input clock or power supply disturbances.

The XTALIN pin (pin 1) can be over-driven with a standard 5V CMOS signal. When an externally generated reference is used the XTALOUT pin should be left open.

The MPC9108 operates from a 5.0V supply across the commercial temperature range of 0°C to 70°C. The 8-lead SOIC package is used to optimize board space efficiency as well as minimizing cost.

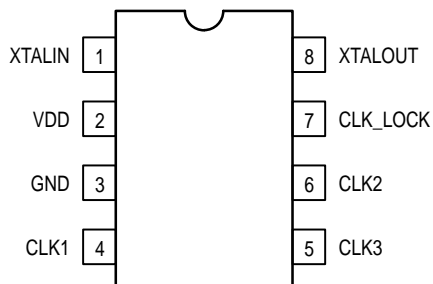
**MPC9108**

**MULTIPLE OUTPUT  
CLOCK SYNTHESIZER**



**D SUFFIX**  
PLASTIC SOIC  
CASE 751-03

**Pinout: 8-Lead SOIC**  
(Top View)



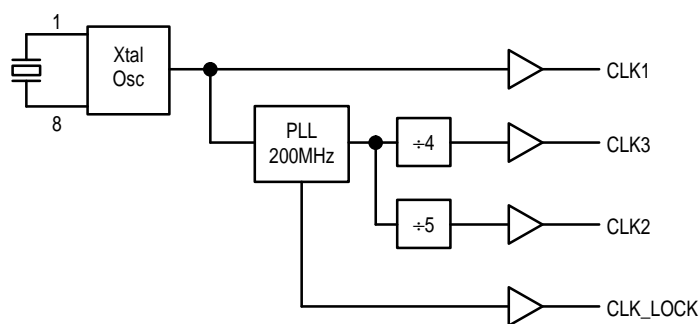
### Pin Descriptions

| Pin Name | Pin Number | I/O | Function   |
|----------|------------|-----|--|
| XTALIN   | 1          | I   | 20MHz Crystal Connection, External Reference Point |
| VDD      | 2          | —   | +5V Power Supply                                   |
| GND      | 3          | —   | Ground   |
| CLK1     | 4          | O   | 20MHz Output, Buffer Xtal Output                   |
| CLK2     | 5          | O   | 50MHz Output, PLL Controlled                       |
| CLK3     | 6          | O   | 40MHz Output, PLL Controlled                       |
| CLK_LOCK | 7          | O   | HIGH When PLL is Locked                            |
| XTALOUT  | 8          | O   | Crystal Oscillator Connection                      |

This document contains information on a new product. Specifications and information herein are subject to change without notice.



## BLOCK DIAGRAM



## MAXIMUM RATINGS\*

| Symbol    | Parameter                                 | Value        | Unit |
|-----------|---|--------------|------|
| $V_{CC}$  | DC Supply Voltage (Referenced to GND)     | -0.5 to +7.0 | V    |
| $V_{IN}$  | Input Voltage                             | -0.5 to +7.0 | V    |
| $T_A$     | Operating Temperature Range (In Free-Air) | 0 to +70     | °C   |
| $T_A$     | Ambient Temperature Range (Under Bias)    | -55 to +125  | °C   |
| $T_{STG}$ | Storage Temperature Range                 | -65 to +150  | °C   |

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

DC CHARACTERISTICS (0°C <  $T_A$  < 70°C;  $V_{DD}$  = 5V ±10%; Unless Otherwise Stated)

| Symbol   | Characteristic                             | Min          | Typ   | Max  | Unit | Condition                |
|----------|--|--------------|-------|------|------|--------------------------|
| $V_{IL}$ | Input Low Voltage                          |              |       | 0.8  | V    | $V_{DD}$ = 5V            |
| $V_{IH}$ | Input High Voltage                         | 2.0          |       |      | V    | $V_{DD}$ = 5V            |
| $I_{IL}$ | Input Low Current                          |              |       | -5   | μA   | $V_{IN}$ = 0.5V          |
| $I_{IH}$ | Input High Current                         |              |       | 5    | μA   | $V_{IN}$ = $V_{DD}$      |
| $V_{OL}$ | Output Low Voltage                         |              |       | 0.4  | V    | $I_{OL}$ = 4mA           |
| $V_{OL}$ | Output Low Voltage                         |              |       | 0.4  | V    | $I_{OL}$ = 10mA          |
| $V_{OH}$ | Output High Voltage                        | 0.8 $V_{DD}$ |       |      | V    | $I_{OH}$ = -30mA         |
| $I_{DD}$ | Supply Current                             |              | 25    | 40   | mA   | No Load; Note 1.         |
| $F_D$    | Output Frequency Change Over Supply & Temp |              | 0.002 | 0.01 | %    | With Respect to Typ Freq |
| $I_{SC}$ | Short Circuit Current                      | 25           | 40    |      | mA   | Each Output Clock        |
| $C_I$    | Input Capacitance                          |              |       | 10   | pF   | Except X1, X2            |
| $C_L$    | Xtal Load Capacitance                      |              | 20    |      | pF   | Pins X1, X2              |

1. All clocks operating at highest frequencies.

**AC CHARACTERISTICS** ( $0^{\circ}\text{C} < T_A < 70^{\circ}\text{C}$ ;  $V_{DD} = 5\text{V} \pm 10\%$ ; Unless Otherwise Stated)

| Symbol     | Characteristic                   | Min   | Typ   | Max   | Unit | Condition |
|------------|----------------------------------|-------|-------|-------|------|-----------|
| $t_{ICr}$  | Input Clock Rise Time            |       |       | 20    | ns   |           |
| $t_{ICf}$  | Input Clock Fall Time            |       |       | 20    | ns   |           |
| $t_r$      | Output Rise Time<br>0.8 to 2.0V  |       | 1.0   | 2.0   | ns   | 30pf Load |
| $t_r$      | Rise Time<br>20% to 80% $V_{DD}$ |       | 2.0   | 4.0   | ns   | 30pf Load |
| $t_f$      | Output Fall Time<br>2.0 to 0.8V  |       | 1.0   | 2.0   | ns   | 30pf Load |
| $t_f$      | Fall Time<br>20% to 80% $V_{DD}$ |       | 2.0   | 4.0   | ns   | 30pf Load |
| $d_t$      | Duty Cycle<br>Pins 4, 6, 5       | 45/55 | 48/52 | 55/45 | %    | 30pf Load |
| $f_i$      | Input Frequency                  |       | 20    |       | MHz  |           |
| $t_{jab}$  | Jitter Absolute<br>Pins 4, 6, 5  | -500  |       | 500   | ps   |           |
| $t_{lock}$ | Output Lock Time                 | 0.02  | 3.0   | 4.0   | ms   |           |

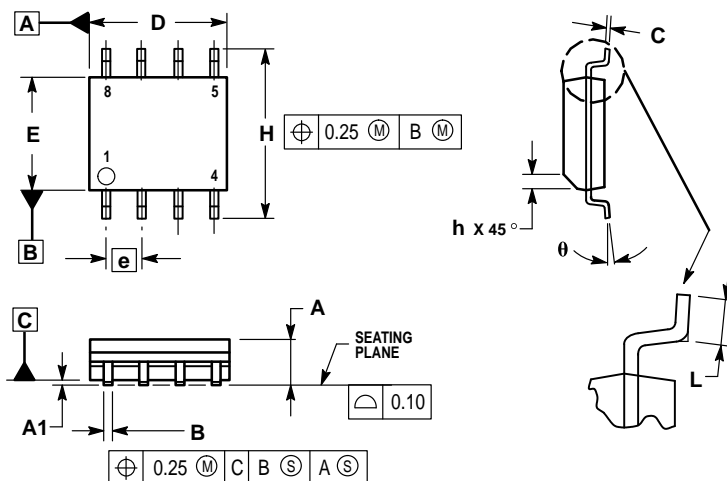
## OUTLINE DIMENSIONS

## D SUFFIX

### PLASTIC SOIC PACKAGE

CASE 751-05


ISSUE R



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. DIMENSIONS ARE IN MILLIMETERS.
3. DIMENSION D AND E DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
5. DIMENSION B DOES NOT INCLUDE MOLD PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 TOTAL IN EXCESS OF THE B DIMENSION AT MAXIMUM MATERIAL CONDITION.

| DIM | MILLIMETERS |      |
|-----|-------------|------|
|     | MIN         | MAX  |
| A   | 1.35        | 1.75 |
| A1  | 0.10        | 0.25 |
| B   | 0.35        | 0.49 |
| C   | 0.18        | 0.25 |
| D   | 4.80        | 5.00 |
| E   | 3.80        | 4.00 |
| e   | 1.27 BSC    |      |
| H   | 5.80        | 6.20 |
| h   | 0.25        | 0.50 |
| L   | 0.40        | 1.25 |
| θ   | 0°          | 7°   |

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