

February 1992
 Preliminary

**CMOS LSI
 PLL FREQUENCY SYNTHESIZER**

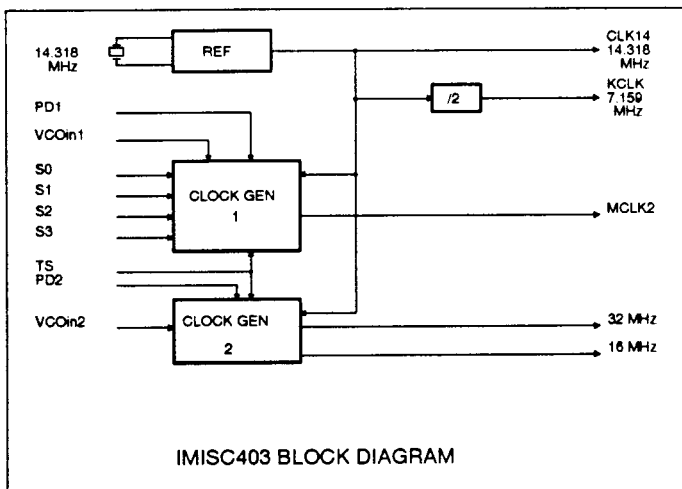
PRODUCT FEATURES

- Generates all Essential Clock Signals for the Motherboards.
- 3V to 7V Operating Supply Range.
- Supports 80286, 80386 and 80486 based designs.
- Integrates Keyboard Clock, CPU Clocks and Buffered 14.318 MHz output.
- Wide Range of Selectable Output Frequencies Including 88, 80, 66.6, 50, 40, 32, 24, 16 and 8 MHz.
- Tri- State Outputs
- Single Low Cost Crystal (14.318 MHz) Used as Reference Frequency.
- Two Independent Clock Generators.
- Glitch Free Switching for both Clock Generators.
- 50% Duty Cycle
- Power Down Mode for Low Power Consumption.
- TTL or CMOS compatible outputs with 12 mA drive capability
- Low, Short and Long Term Jitter
- 28 PDIP and 28SO(209 Mil Body) Package Options.

PRODUCT DESCRIPTION

The IMISC403 is a Clock chip for Motherboards. The IMISC403 includes two independent VCO's and uses a single 14.318 MHz external crystal to generate all essential clock signals. The IMISC403 is designed to generate CPU clock options of 88 MHz, 80 MHz, 66.6 MHz, 50 MHz, 40 MHz, 32 MHz, 24 MHz, 16 MHz and 8 MHz, giving flexibility to the user. The frequency selection on the CPU clock outputs is determined by the S0-S3 pins. The user can use the 32 MHz and 16 MHz as fixed frequencies and select the variable frequencies using S0-S3 pins for the CPU clock. S3 pin selects single or double frequency on the MCLK2 output determined by S0-S2.

Both VCO's can be turned off in the stand by mode, reducing the current consumption to a few micro amperes. In the stand by mode all outputs except 14.318 MHz output are low and both Phase Detectors are Tri-States.



APPLICATIONS

IMISC403 eliminates the need for multiple oscillators, and generates all the essential clock signals for the Personal Computer Motherboards. Supports 8086, 80286, 80386SX, 80386DX and 80486 based designs. IMISC403 can be used with Laptop or Notebook computers to save power by running the system slower than normal CPU speeds or completely disabling the clocks in stand by mode.

PIN DESCRIPTION

Xin, Xout - These pins form an on-chip reference oscillator when connected to terminals of an external parallel resonant crystal (nominally 14.31818 MHz). Xin may also serve as input for an externally generated reference signal.

S0, S1, S2, and S3 - Frequency select inputs. These inputs control the MCLK2 frequency selection. S0-S2 inputs control the CPU clock frequencies. S3 selects single or double frequency determined by S0-S2. All these inputs have internal pull-ups.

Table 1 shows the output frequency selection conditions.

TS - Tri-State input pin. When high, all outputs are Tri-States. When low outputs are enabled. This pin has an internal pull-down.

MCLK2 - Master clock output. Programmable output frequencies can be selected using S0-S3 inputs shown on Table 1.

32 MHz - 32 MHz ISA clock output.

16 MHz - 16 MHz AT Bus Clock output.

14.318 MHz - 14.31818 MHz output. Buffered output of on-chip reference oscillator or externally provided reference.

7.159 MHz - 7.159 MHz output. This output is the divided by 2 result of 14.318 MHz output. It can be used as keyboard clock.

VCOin1 and VCOin2 - VCO inputs for the internal VCO's. For typical applications, these inputs are shorted to the respective PD outputs to form the Loop filters.

PD1 and PD2 - These are the phase detector outputs for the clock generators. They are single-ended, tri-state

outputs for use as loop error signal. A 0.1uF capacitor to Ground should be connected from each pin to form the loop filter.

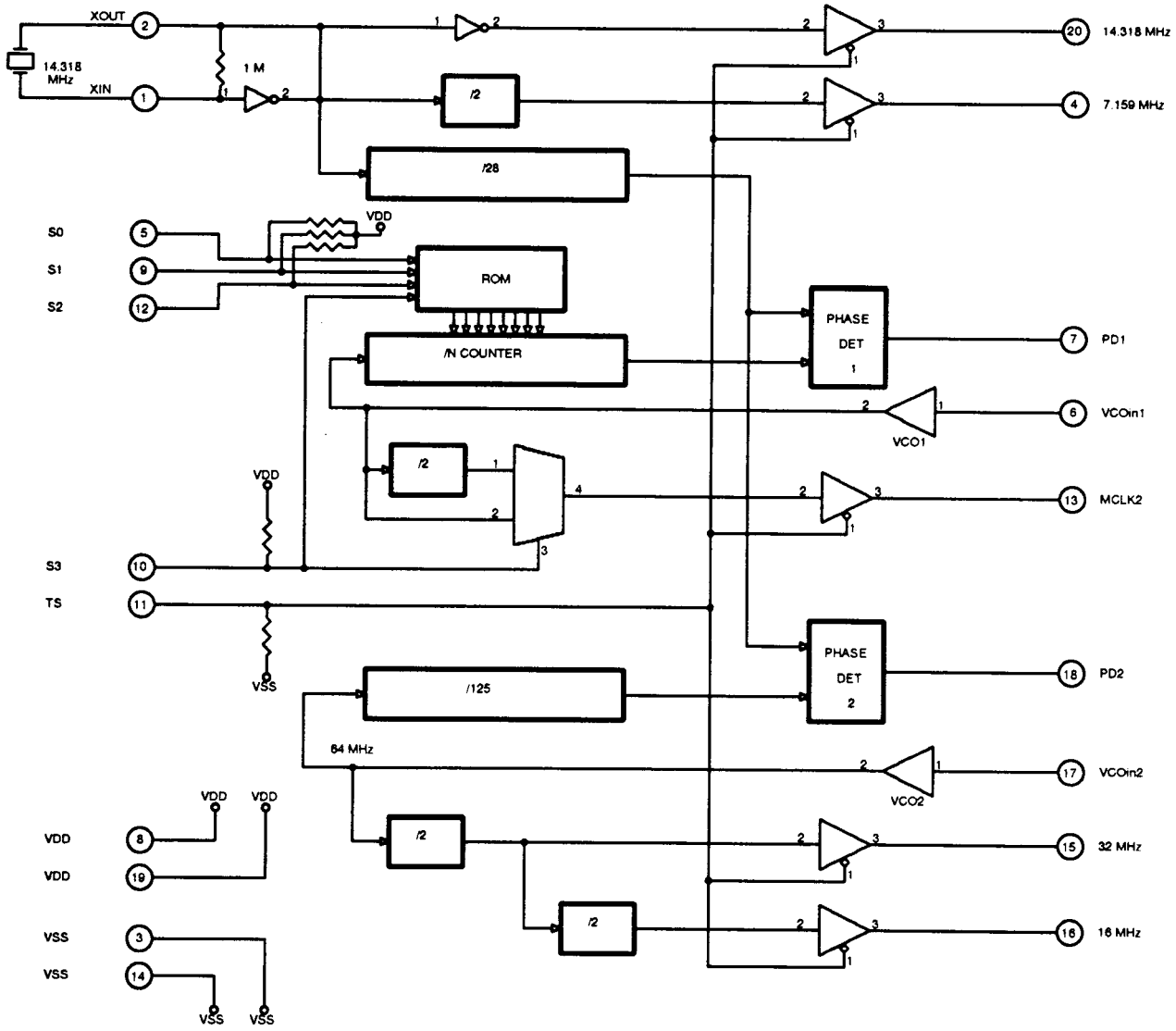
VSS - Circuit ground.

VDD - Positive power supply.

| MCLK2 FREQUENCY SELECTION | | | | |
|---------------------------|----|----|--------------|----------|
| INPUTS | | | MCLK2 OUTPUT | |
| S2 | S1 | S0 | S3=0 | S3=1 |
| 0 | 0 | 0 | 12 MHz | 24 MHz |
| 0 | 0 | 1 | 16 MHz | 32 MHz |
| 0 | 1 | 0 | 20 MHz | 40 MHz |
| 0 | 1 | 1 | 25 MHz | 50 MHz |
| 1 | 0 | 0 | 33.3 MHz | 66.6 MHz |
| 1 | 0 | 1 | 40 MHz | 80 MHz |
| 1 | 1 | 0 | 44 MHz | 88 MHz |
| 1 | 1 | 1 | Power Down | TEST |

TABLE 1: When Power Down address is selected, all VCO's are turned off and the device goes to stand-by mode. All outputs except 14.318MHz output are set to low. Phase detectors are in tri-state mode.

BLOCK DIAGRAM



IMI SC403 BLOCK DIAGRAM

1/17/92

MAXIMUM RATINGS

Voltage relative to VSS : . -0.3V TO 7 V
 Voltage relative to VDD : 0.3V
 Storage temperature : -65°C TO 150°C
 Ambient temperature : -55°C TO 125°C
 Recommended Operating Range: 3V - 7V

This device contains circuitry to protect the inputs against damage due to high static voltages or electric field; however, precautions should be taken to avoid application of any voltage higher than the maximum rated voltages to this circuit. For proper operation, V_{in} and V_{out} should be constrained to the range:

$$V_{SS} < (V_{in} \text{ or } V_{out}) < V_{DD}$$

Unused inputs must always be tied to an appropriate logic voltage level (either VSS or VDD).

ELECTRICAL CHARACTERISTICS

| Characteristic | Symbol | Min | Typ | Max | Units |
|-------------------------------------------------|-----------------|-----|-----|----------------|-----------------|
| Input Low Voltage | V _{IL} | - | - | 0.8 | V _{dc} |
| Input High Voltage | V _{IH} | 2.0 | - | - | V _{dc} |
| Input Low Current With Pul-up or Pull-down | I _{IL} | - | - | 5 | μA |
| | | | | ±50 | |
| Input High Current With pull-up or pull-down | I _{IH} | - | - | 5 | μA |
| | | | | ±50 | |
| Output Low Voltage I _{OL} = 12mA | V _{OL} | - | - | 0.4 | V _{dc} |
| Output High Voltage I _{OH} = 12mA | V _{OH} | 2.4 | - | - | V _{dc} |
| Tri-State Leakage Current | I _{oz} | - | - | 10 | μA |
| Static Supply Current | I _{DD} | - | - | 10 | μA |
| Dynamic Supply Current | I _{CC} | - | - | 0.3 mA/MHz/VCO | mA |
| Short Circuit Current | I _{sc} | 25 | - | - | mA |

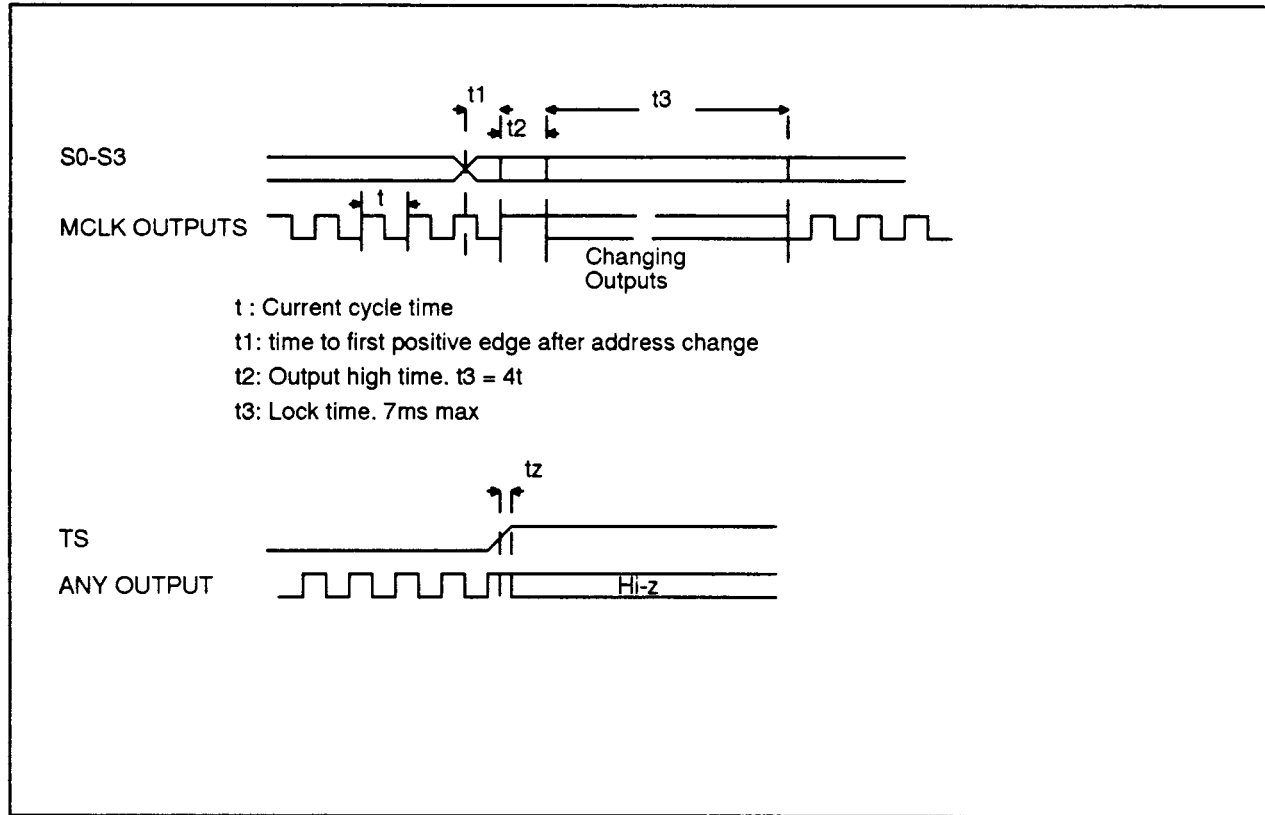
VDD = 5V ±10%, TA = -55°C to 125°C, CL = 50 pF

SWITCHING CHARACTERISTICS

| Characteristic | Symbol | Min | Typ | Max | Units |
|------------------------------------|-------------------------------------|-------|-------|-------|-------|
| Output Rise and Fall Time | t _{TLH} , t _{THL} | - | - | 5 | ns |
| Output Enable TS to All Outputs | t _z | - | - | 35 | ns |
| Duty Cycle All Outputs | | 48/52 | 50/50 | 48/52 | % |
| Jitter one sigma | | | | 100 | ps |
| Input Rise and Fall Times OSCIN | t _{TLH} , t _{THL} | - | 3 | 1 | us |

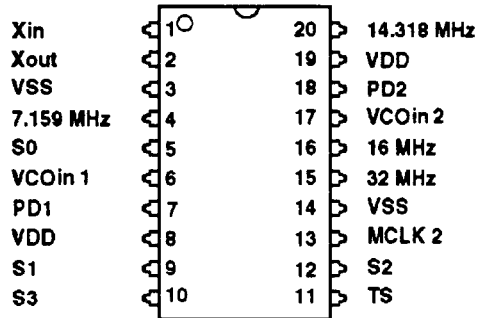
VDD = 5V ±10%, TA = -55°C to 125°C, CL = 50 pF

TIMING DIAGRAMS

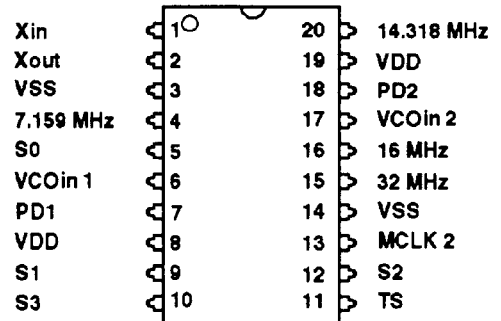


CONNECTION DIAGRAMS

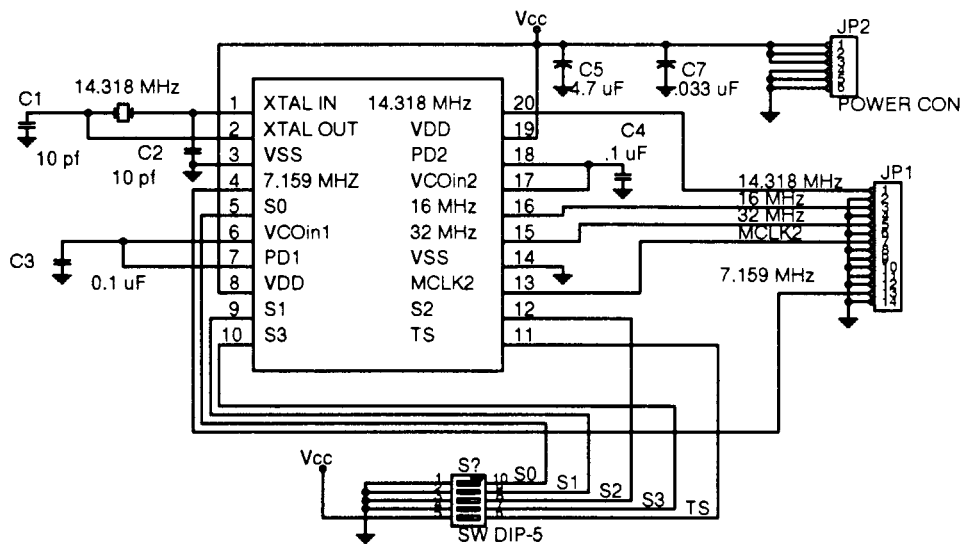
PLASTIC DIP PACKAGE



SOIC PACKAGE



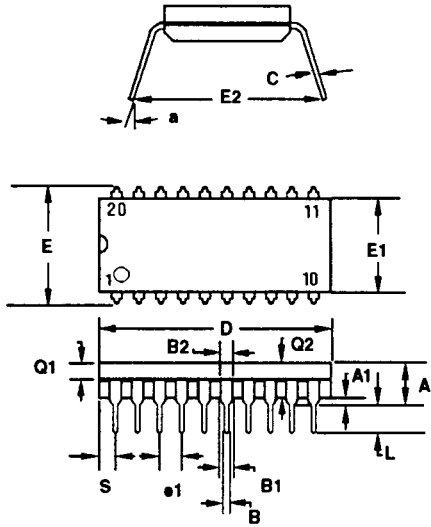
EXTERNAL CONNECTIONS



12/31/91

IMISC403

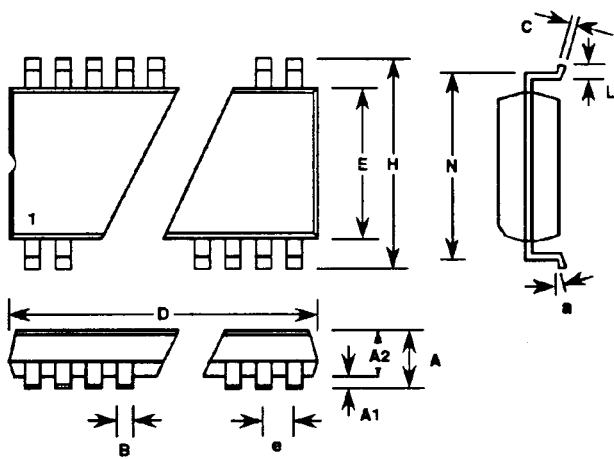
PACKAGE DRAWINGS AND DIMENSIONS



**20 PLASTIC SKINNY DIP
(300 mil narrow body)**

20 PIN SKINNY PLASTIC DIP DIMENSIONS

| SYMBOL | INCHES | | | MILLIMETERS | | |
|--------|-----------|-------|-------|-------------|-------|-------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.145 | - | 0.155 | 3.68 | - | 3.93 |
| A1 | 0.020 | - | - | 0.51 | - | - |
| B | 0.016 | 0.018 | 0.020 | 0.40 | 0.45 | 0.50 |
| B1 | 0.056 | 0.059 | 0.062 | 1.47 | 1.52 | 1.57 |
| B2 | 0.046 | 0.049 | 0.052 | 1.17 | 1.24 | 1.32 |
| C | 0.008 | 0.010 | 0.012 | 0.20 | 0.25 | 0.30 |
| D | 1.028 | 1.030 | 1.032 | 26.11 | 26.16 | 26.21 |
| E | 0.298 | - | 0.302 | 7.57 | - | 7.67 |
| E1 | 0.248 | 0.250 | 0.252 | 6.30 | 6.35 | 6.40 |
| E2 | 0.335 | 0.345 | 0.355 | 8.51 | 8.76 | 9.01 |
| e1 | 0.100 BSC | | | 2.54 BSC | | |
| L | 0.128 | 0.130 | 0.132 | 3.25 | 3.30 | 3.35 |
| a | 0° | 7° | 15° | 0° | 7° | 15° |
| Q1 | 0.059 | 0.060 | 0.061 | 1.50 | 1.53 | 1.55 |
| Q2 | 0.128 | 0.130 | 0.132 | 3.25 | 3.30 | 3.35 |
| S | 0.063 | 0.065 | 0.067 | 1.60 | 1.65 | 1.70 |



SOIC PACKAGE

20 PIN SOIC OUTLINE DIMENSIONS

| SYMBOL | INCHES | | | MILLIMETERS | | |
|--------|------------|-------|-------|-------------|------|------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.068 | 0.073 | 0.078 | 1.73 | 1.86 | 1.99 |
| A1 | 0.002 | 0.005 | 0.008 | 0.05 | 0.13 | 0.21 |
| A2 | 0.066 | 0.068 | 0.070 | 1.68 | 1.73 | 1.78 |
| B | 0.010 | 0.012 | 0.015 | 0.25 | 0.30 | 0.38 |
| C | 0.005 | 0.006 | 0.009 | 0.13 | 0.15 | 0.22 |
| D | 0.278 | 0.284 | 0.289 | 7.07 | 7.20 | 7.33 |
| E | 0.205 | 0.209 | 0.212 | 5.20 | 5.30 | 5.38 |
| e | 0.0256 BSC | | | 0.65 BSC | | |
| H | 0.301 | 0.307 | 0.311 | 7.65 | 7.80 | 7.90 |
| a | 0° | 4° | 8° | 0° | 4° | 8° |
| L | 0.022 | 0.030 | 0.037 | 0.55 | 0.75 | 0.95 |

ORDERING INFORMATION

| Part Number | Package Type | Production Flow |
|--------------------|---------------------|---------------------------------------------|
| IMISC403APB | Plastic DIP | Commercial, -40 °C to +85 °C |
| IMISC403AXB | SOIC | Commercial, -40 °C to +85 °C |
| IMISC403ACT | CERDIP | Military Operating Range, -55 °C to +125 °C |
| IMISC403ACK | CERDIP | Military Screening, -55 °C to +125 °C |

Marking:

Example: IMISC403APB

Date Code, Lot #