

MOTHERBOARD CLOCK GENERATOR

FEATURES

- Clock generator for 486, Pentium™, and Cyrix 6x86 based systems
- Support ISA-, VESA-, and PCI- based designs
- Support independent PCI bus clock and 1/2 CPU clock, and 48 MHz USB clock
- Support 24 MHz clock
- Built-in on-chip one 1 to 3, two 1 to 2 buffers, with minimum pin-to-pin output skew below 500ps

- Under 0.1% CPU clock period change while switching frequency
- Skew-controlled 1/2 CPU and 1X CPU clocks to within 500ps
- On-chip loop filter components
- Smooth and glitch-free switching for programmable clock generators
- 28-PIN(300 mil)SOP

FUNCTIONAL DESCRIPTION

The MX8325-1 is a CMOS motherboard clock generator used in portable or desktop computers. The chip includes an oscillator circuitry and three PLLs to provide 14.318 MHz, CPUCLK, 1/2 CPUCLK, PCI bus CLK, and 24 MHz clocks. This chip is built with low skew clock drivers that provide the needed buffering for PCI applications. The desired CPUCLK is selected by S0, S1 and S2. This chip provides selectable 75 MHz, 66.6 MHz, 60 MHz, 55 MHz, 33.3 MHz, 50 MHz, 40 MHz, 33.3 MHz, and 25 MHz CPUCLK. It is suitable for 80486DX, 80486DX2, 80486DX4, 80486S series, Pentium-based and Cyrix 6x86 series designs.

Independent PCI bus clock and 1/2 CPUCLK make this chip mostly suitable for asynchronous PCI or synchronous PCI design.

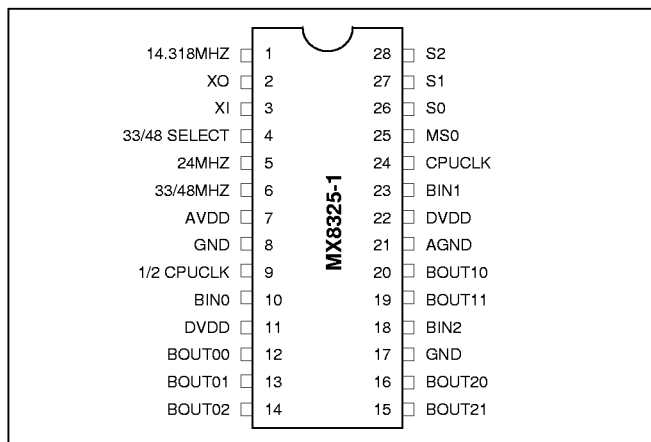
GENERAL DESCRIPTION

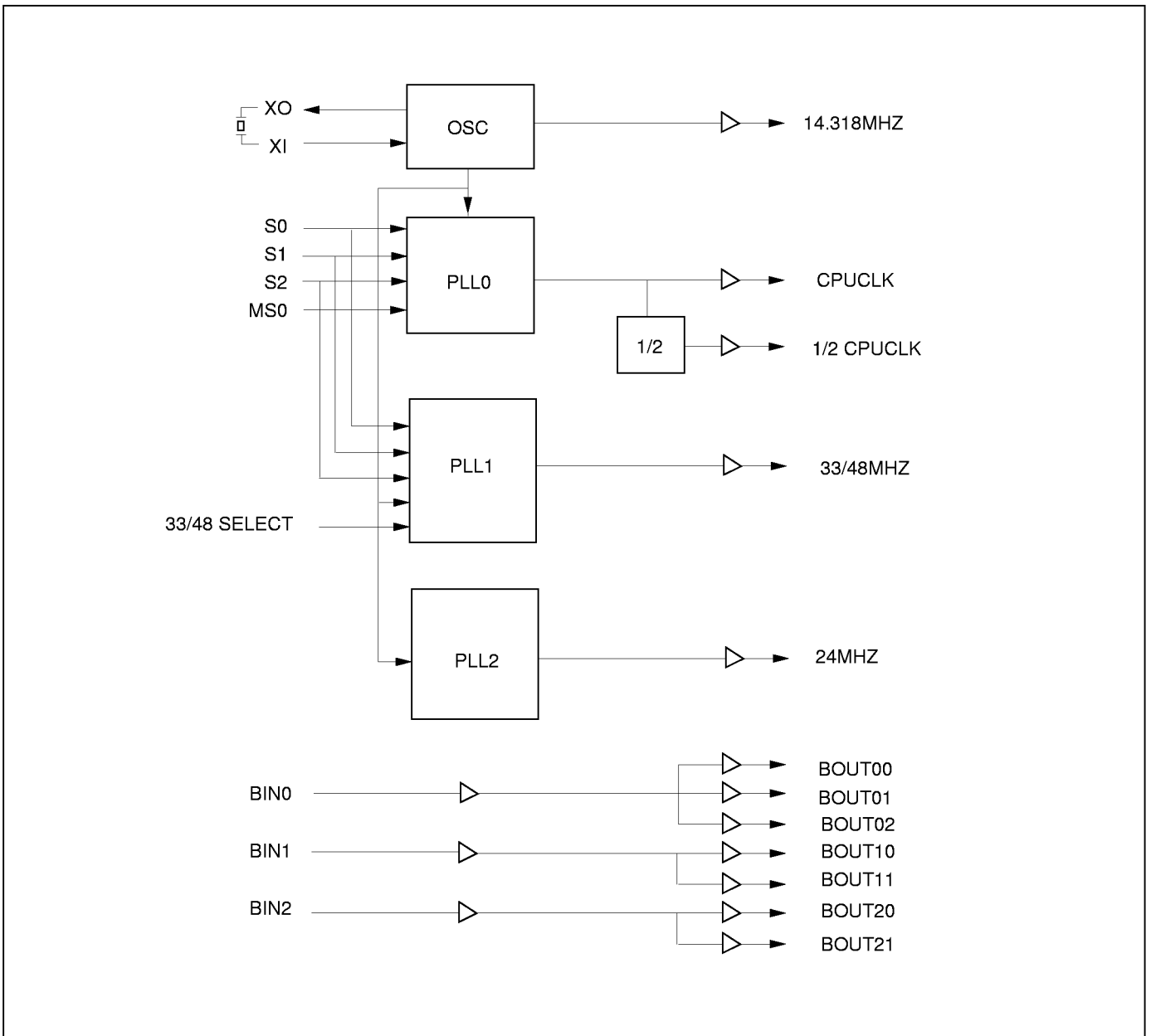
There are three PLLs in the MX8325-1 to support smooth transition and glitch-free CPU clock, 24 MHz and PCI bus clock. It can be suited for synchronous PCI design (1/2 CPU clock) and asynchronous PCI design (PCICLK clock). In addition, the MX8325-1 supports one 1-to-3 and two 1-to-2 buffers for motherboard applications. The output pin-to-pin clock skews of the buffers are controlled below 500 ps. The only external components are a 14.318 MHz crystal and decoupling capacitors.

The frequency select pins (S2, S1 and S0) determine the CPU output frequency, which is shown in next page. The CPU clock offers the feature of smooth and glitch-free frequency transition when the frequency modes are changed. The chip meets the 486 and Pentium™ specifications of subsequent clock period changed under 0.1%. The simultaneous 1X and 1/2 CPU clocks offer controlled skew within 500ps (TPY).

PIN CONFIGURATIONS

28 SOP



BLOCK DIAGRAM

PIN DESCRIPTION (For MX8355-03)

| SYMBOL | PIN TYPE | PIN NUMBER | DESCRIPTION |
|---------------|-----------------|-------------------|--|
| 14.318MHz | O | 1 | 14.318 MHz output (8mA) |
| XO | I | 2 | X'tal output. No connection when clock input |
| XI | I | 3 | X'tal input or reference clock input |
| 33/48 SELECT | I | 4 | 33 MHZ/48 MHZ select pin internal pull-high. |
| 24 MHz | O | 5 | 24 MHz clock output (8mA) |
| 33/48 MHZ | O | 6 | 33 or 48 MHZ output depends on pin4. |
| AVDD | -- | 7 | Analog power supply |
| GND | -- | 8 | Ground |
| 1/2 CPUCLK | O | 9 | 1/2 CPU clock output (12mA) |
| BIN0 | I | 10 | Buffer (0) input, internal pull high |
| DVDD | -- | 11 | Digital power supply |
| BOUT00 | O | 12 | Buffer (0) output (0) |
| BOUT01 | O | 13 | Buffer (0) output (1) |
| BOUT02 | O | 14 | Buffer (0) output (2) |
| BOUT21 | O | 15 | Buffer (2) output (1) |
| BOUT20 | O | 16 | Buffer (2) output (0) |
| DGND | -- | 17 | Digital ground |
| BIN2 | I | 18 | Buffer (2) input, internal pull high |
| BOUT11 | O | 19 | Buffer (1) output (1) |
| BOUT10 | O | 20 | Buffer (1) output (0) |
| AGND | -- | 21 | Analog ground |
| DVDD | -- | 22 | Digital power supply |
| BIN1 | I | 23 | Buffer (1) input, internal pull high |
| CPUCLK | O | 24 | CPU clock output (12mA) |
| MS0 | I | 25 | CPU clock output mode select pin, internal pull high |
| S0 | I | 26 | CPU clock select pin (0), internal pull high (20mA) |
| S1 | I | 27 | CPU clock select pin (1), internal pull high (20mA) |
| S2 | I | 28 | CPU clock select pin (2), internal pull high (20mA) |

FREQUENCY TABLE

| S(2:0) | MS0=1, 33/48 SELECT=H | | | MS0=1, 33/48 SELECT=L | | |
|--------|-----------------------|------------|-----------|-----------------------|------------|-----------|
| | CPU | 1/2 CPUCLK | 33/48 MHZ | CPU | 1/2 CPUCLK | 33/48 MHZ |
| 0 | 66.6 | 33.3 | 33.3 | 66.6 | 33.3 | 48 |
| 1 | 75.0 | 37.5 | 33.3 | 75.0 | 37.5 | 48 |
| 2 | 60.0 | 30.0 | 33.3 | 60.0 | 30.0 | 48 |
| 3 | 55.0 | 27.5 | 33.3 | 55.0 | 27.5 | 48 |
| 4 | 50.0 | 25 | 33.3 | 50.0 | 25 | 48 |
| 5 | 40.0 | 20.0 | 33.3 | 40.0 | 20.0 | 48 |
| 6 | 33.3 | 16.65 | 33.3 | 33.3 | 16.65 | 48 |
| 7 | 25.0 | 12.5 | 25.0 | 25.0 | 12.5 | 48 |

"1" means High.

"0" means Low.

The mode (S (2:0)=(0, 0, 1)) is not supported.

AC/DC CHARACTERISTICS
DC CHARACTERISTICS TA = 0°C to 70°C, VCC = 5V ± 10%

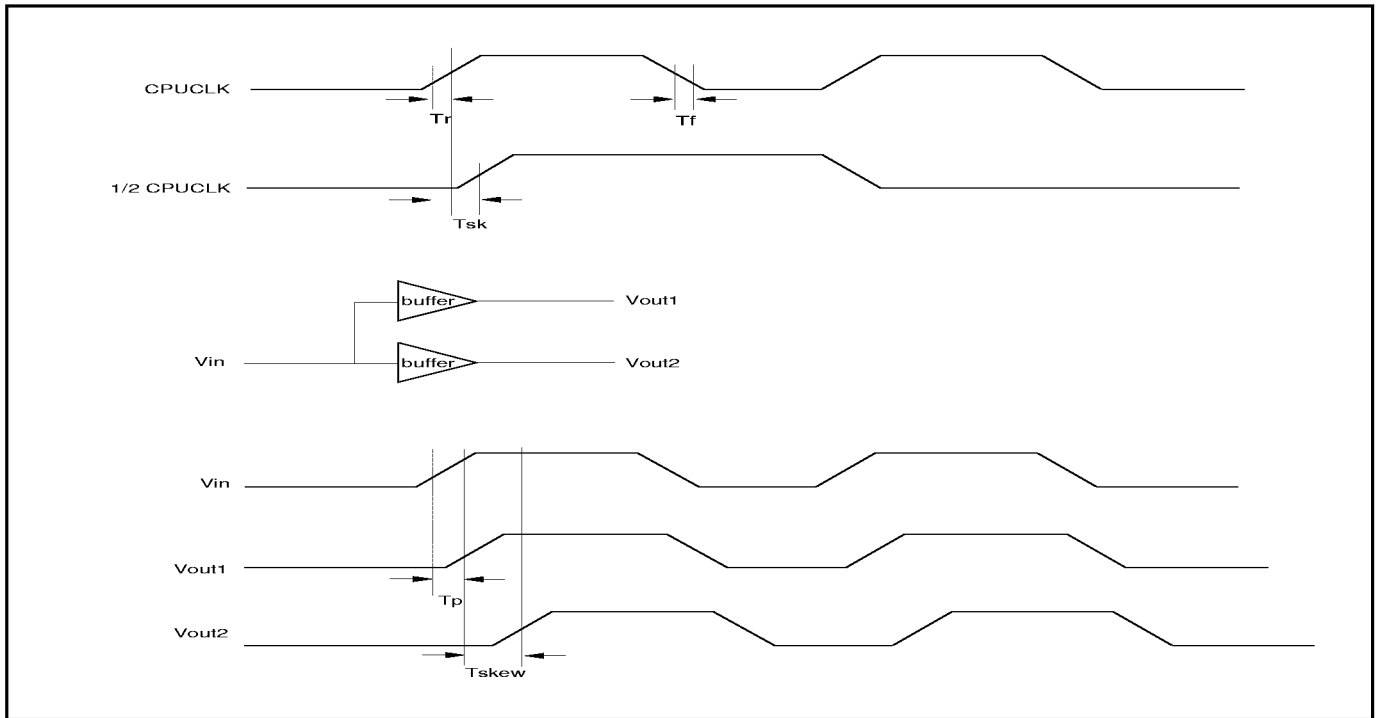
| SYMBOL | PARAMETER | MIN. | TYP. | MAX. | UNIT | CONDITIONS |
|-----------------|---------------------|------|------|------|------|---|
| DVDD, AVDD | Supply Voltage | 4.5 | 5 | 5.5 | V | |
| IDD | Supply Current | | 35 | | mA | No load, running at 50 MHz |
| I _{IH} | Input High Current | | 5 | | uA | |
| V _{OL} | Output Low Voltage | | | 0.4 | V | I _{OL} =20mA, V _{DD} =5V |
| V _{OH} | Output High Voltage | 2.4 | | | V | I _{OH} =-40mA, V _{DD} =5V |
| V _{IL} | Input LOW Voltage | | | 0.8 | V | for buffers only |
| V _{IH} | Input High Voltage | 2.0 | | | V | for buffers only |
| R _{PU} | Pull-up Resistor | | | 100K | Ohms | |

CAPACITANCE TA = 25°C, f = 1.0 MHz (Sampled only)

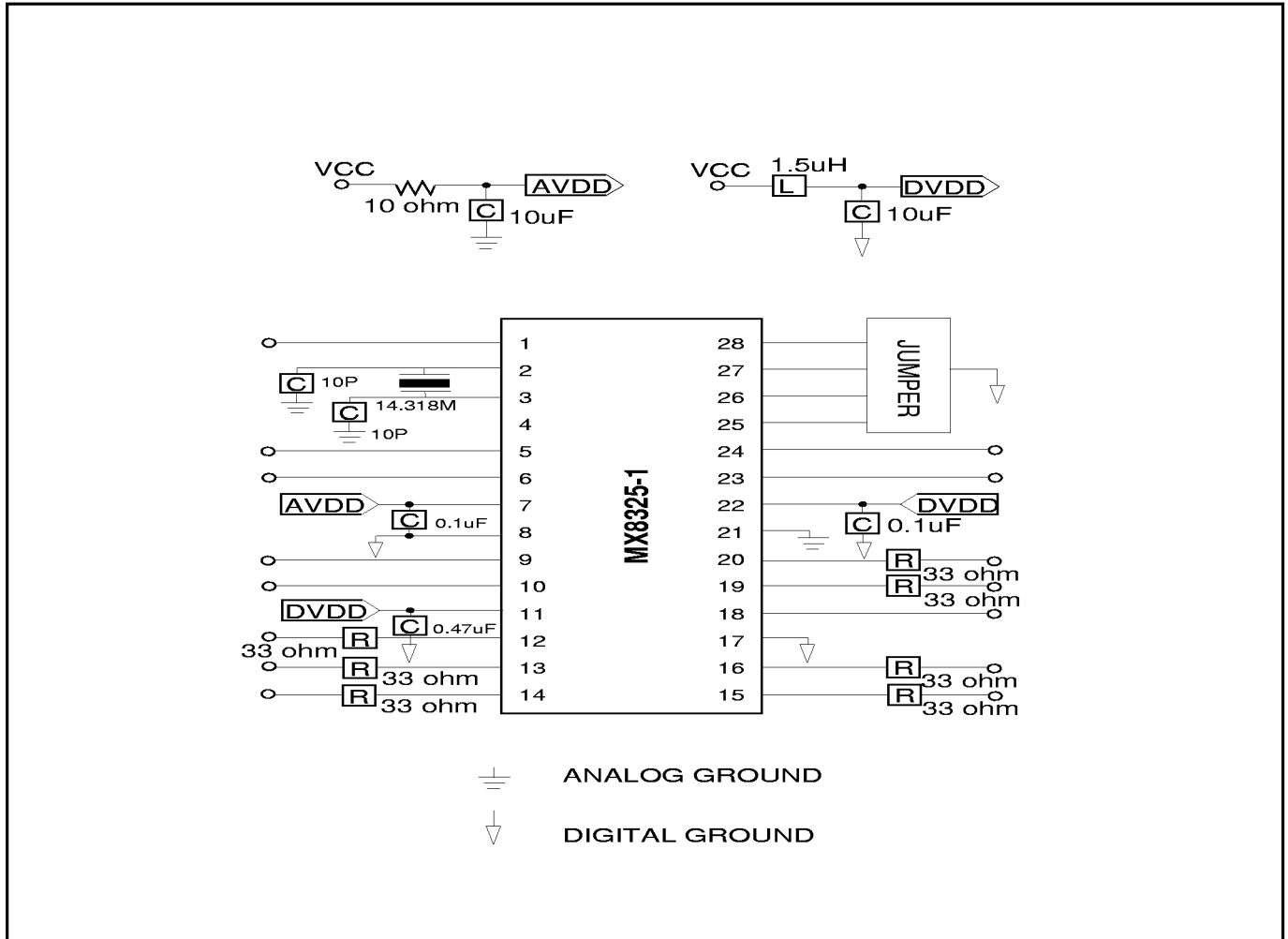
| SYMBOL | PARAMETER | MIN. | TYP. | MAX. | UNIT | CONDITIONS |
|--------|--------------------|------|------|------|------|------------|
| CIN | Input Capacitance | | 8 | | pF | |
| COUT | Output Capacitance | | 8 | | pF | |

AC CHARACTERISTICS TA = 0°C to 70°C, VCC = 5V ± 10%

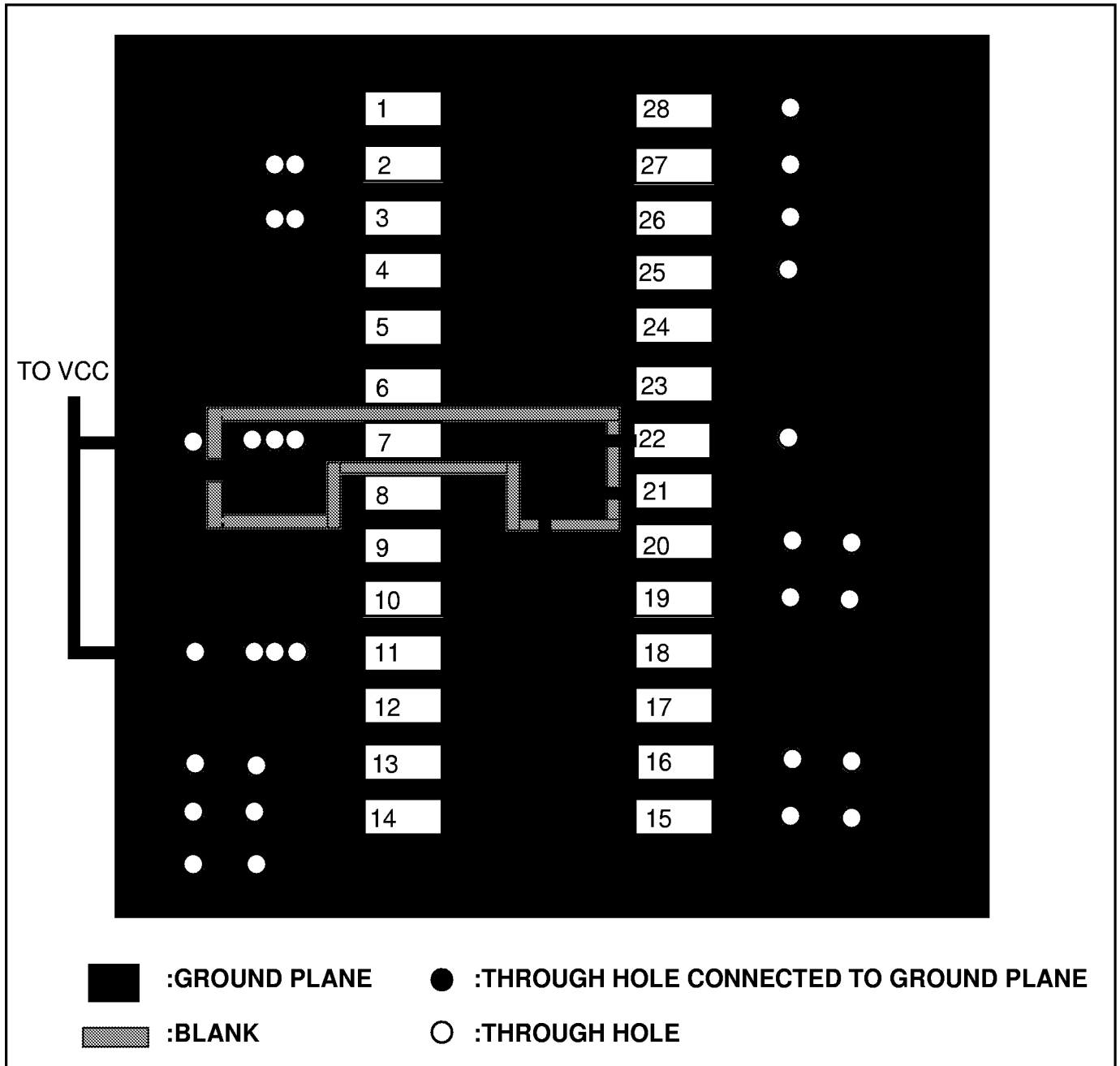
| SYMBOL | PARAMETER | MIN. | TYP. | MAX. | UNIT | CONDITIONS |
|-------------------|-------------------------------|--------|--------|--------|------|--------------------------------|
| Tr | Output Rise Time 0.8V to 2.0V | | | 1.5 | ns | 25 pF load |
| Tf | Output Fall Time 2.0V to 0.8V | | | 1.5 | ns | 25 pF load |
| Tsk | Clock skew CPU and 1/2 CPU | | 0.5 | 1 | ns | 25 pF load |
| D _t | Output Duty Cycle | 40/60 | 48/52 | 60/40 | % | 25 pF load |
| Tp | Propagation Delay Bin to Bout | 2 | 3 | 5 | ns | 15 pF load Measured at 1.4V |
| T _{jis} | CPUCLK, 1/2 CPUCLK Out Sigma | | 250 | 500 | ps | |
| T _{skew} | Buffer Out skew | | | 500 | ps | 15 pF load Measured at 1.4V |
| Fref | Reference Clock Frequency | 14.318 | 14.318 | 14.318 | MHz | |

WAVEFORMS

**ORDERING INFORMATION
PLASTIC PACKAGE**

| PART NO. | PACKAGE |
|------------|-------------------------|
| MX8325-1MC | 28-PIN SOP (5V Version) |

RECOMMENDED EXTERNAL CIRCUIT


- Note :
1. Pin26, pin27, pin28, and pin25 (S0, S1, S2, MS0) are with internal pull high resistor.
 2. For 5V and 3.3V mixed application (MX8325-1). If DVDD(pin11 and pin22) is connected to 3.3V power source, and AVDD(pin7) is connected to 5V power source, then all outputs are 3.3V level.

LAYOUT GUIDE


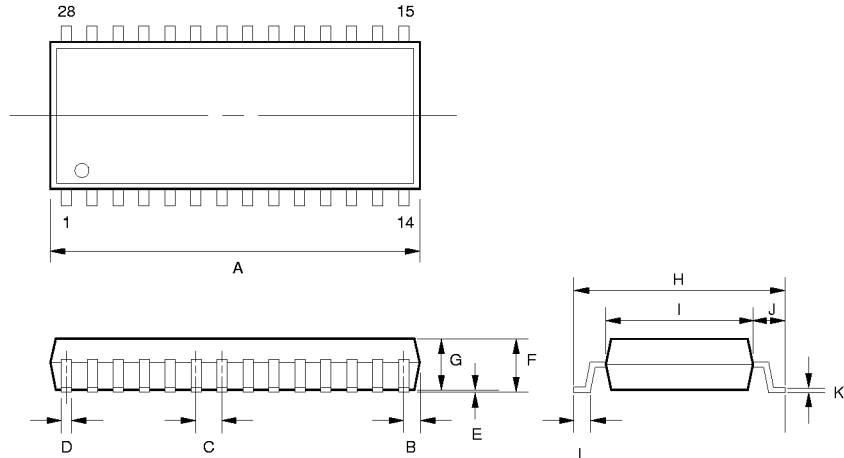
This is the recommended layout guide for the MX8325-1 to maximize the clock performance. The most important feature is the isolated ground plane of the MX8325-1.

The reason it needs an isolated ground plane is explained in the following paragraph. The power supply fluctuation induced from the ripple of switching power supply, and the switching between the heavy circuit activity and little circuit activity on the board will couple into the clock generators and appear as jitters on the clock outputs. To alleviate jitters, special care should be taken on the power source of clock generator to prevent the power source from interacting with the system noise.

28-PIN PLASTIC SOP (300 mil)

| ITEM | MILLIMETERS | INCHES |
|------|-------------|--------|
| A | 17.83 | 0.702 |
| B | 0.66 | 0.026 |
| C | 1.27 | 0.050 |
| D | 0.41 | 0.061 |
| E | 0.20 | 0.008 |
| F | 2.54 | 0.1 |
| G | 2.34 | 0.092 |
| H | 10.31 | 0.406 |
| I | 7.59 | 0.299 |
| J | 1.35 | 0.053 |
| K | 0.25 | 0.010 |
| L | 0.76 | 0.030 |

NOTE: Each lead centerline is located within .25 mm[.01 inch] of its true position [TP] at maximum material condition.



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