

3.3-V DUAL PLL MULTICLOCK GENERATOR

FEATURES

- 27-MHz Master Clock Input
- Generated Audio System Clock:
 - SCKO0: $768 f_S$ ($f_S = 44.1$ kHz)
 - SCKO1: $384 f_S$, $768 f_S$ ($f_S = 44.1$ kHz)
 - SCKO2: $256 f_S$ ($f_S = 32, 44.1, 48, 64, 88.2, 96$ kHz)
 - SCKO3: $384 f_S$ ($f_S = 32, 44.1, 48, 64, 88.2, 96$ kHz)
- Zero PPM Error Output Clocks
- Low Clock Jitter: 50 ps (Typical)
- Multiple Sampling Frequencies:
 - $f_S = 32, 44.1, 48, 64, 88.2, 96$ kHz
- 3.3-V Single Power Supply
- PLL1705: Parallel Control
PLL1706: Serial Control
- Package: 20-Pin SSOP (150 mil), Lead-Free Product

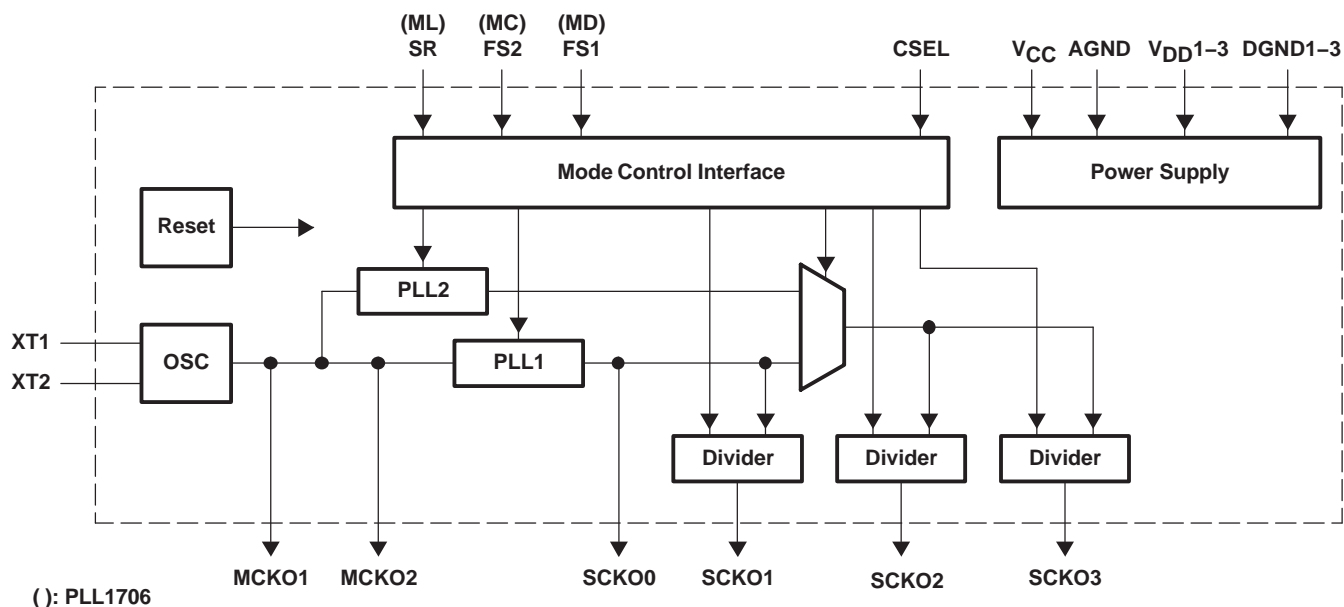
APPLICATIONS

- DVD Players
- DVD Add-On Cards for Multimedia PCs
- Digital HDTV Systems
- Set-Top Boxes

DESCRIPTION

The PLL1705† and PLL1706† are low cost, phase-locked loop (PLL) multiclock generators. The PLL1705 and PLL1706 can generate four system clocks from a 27-MHz reference input frequency. The clock outputs of the PLL1705 can be controlled by sampling frequency-control pins and those of the PLL1706 can be controlled through serial-mode control pins. The device gives customers both cost and space savings by eliminating external components and enables customers to achieve the very low-jitter performance needed for high performance audio DACs and/or ADCs. The PLL1705 and PLL1706 are ideal for MPEG-2 applications which use a 27-MHz master clock such as DVD players, DVD add-on cards for multimedia PCs, digital HDTV systems, and set-top boxes.

FUNCTIONAL BLOCK DIAGRAM



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

†The PLL1705 and PLL1706 use the same die and they are electrically identical except for mode control.



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

PACKAGE/ORDERING INFORMATION

| PRODUCT | PACKAGE | PACKAGE CODE | OPERATION TEMPERATURE RANGE | PACKAGE MARKING | ORDERING NUMBER | TRANSPORT MEDIA |
|------------|---------|--------------|-----------------------------|-----------------|-----------------|-----------------|
| PLL1705DBQ | SSOP 20 | 20DBQ | -25°C to 85°C | PLL1705 | PLL1705DBQ | Tube |
| | | | | | PLL1705DBQR | Tape and reel |
| PLL1706DBQ | SSOP 20 | 20DBQ | -25°C to 85°C | PLL1706 | PLL1706DBQ | Tube |
| | | | | | PLL1706DBQR | Tape and reel |

ABSOLUTE MAXIMUM RATINGS

over operating free-air temperature range unless otherwise noted⁽¹⁾

| | PLL1705 AND PLL1706 |
|--|---------------------------------|
| Supply voltage: V_{CC} , V_{DD1-3} | 4 V |
| Supply voltage differences: V_{CC} , V_{DD1-3} | ± 0.1 V |
| Ground voltage differences: AGND, DGND1-3 | ± 0.1 V |
| Digital input voltage: FS1 (MD), FS2 (MC), SR (ML), CSEL | - 0.3 V to ($V_{DD} + 0.3$) V |
| Analog input voltage, XT1, XT2 | - 0.3 V to ($V_{CC} + 0.3$) V |
| Input current (any pins except supplies) | ± 10 mA |
| Ambient temperature under bias | -40°C to 125°C |
| Storage temperature | -55°C to 150°C |
| Junction temperature | 150°C |
| Lead temperature (soldering) | 260°C, 5 s |
| Package temperature (IR reflow, peak) | 260°C |

⁽¹⁾ Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

ELECTRICAL CHARACTERISTICS

all specifications at $T_A = 25^\circ\text{C}$, $V_{DD1}-V_{DD3} (= V_{DD}) = V_{CC} = 3.3\text{ V}$, $f_M = 27\text{ MHz}$, crystal oscillation, $f_S = 48\text{ kHz}$ (unless otherwise noted)

| PARAMETER | | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|--|-------------------------------|-------------------------------------|-------------------------|---------|--------------|---------------|
| DIGITAL INPUT/OUTPUT | | | | | | |
| Logic input | | | CMOS compatible | | | |
| $V_{IH}^{(1)}$ | Input logic level | | 0.7 V_{DD} | | 3.6 | Vdc |
| $V_{IL}^{(1)}$ | | | | | 0.3 V_{DD} | |
| $I_{IH}^{(1)}$ | Input logic current | $V_{IN} = V_{DD}$ | | 65 | 100 | μA |
| $I_{IL}^{(1)}$ | | $V_{IN} = 0\text{ V}$ | | | ± 10 | |
| Logic output | | | CMOS | | | |
| $V_{OH}^{(2)}$ | Output logic level | $I_{OH} = -4\text{ mA}$ | $V_{DD} - 0.4\text{ V}$ | | | Vdc |
| $V_{OL}^{(2)}$ | | $I_{OL} = 4\text{ mA}$ | | | 0.4 | Vdc |
| Sampling frequency | | Standard f_S | 32 | 44.1 | 48 | kHz |
| | | Double f_S | 64 | 88.2 | 96 | |
| MASTER CLOCK (MCKO1, 2) CHARACTERISTICS ($f_M = 27\text{ MHz}$, $C_1 = C_2 = 15\text{ pF}$, $C_L = 20\text{ pF}$ on measurement pin) | | | | | | |
| Master clock frequency | | | 26.73 | 27 | 27.27 | MHz |
| V_{IH} | Input level(3) | | 0.7 V_{CC} | | | V |
| V_{IL} | | | | | 0.3 V_{CC} | |
| I_{IH} | Input current(3) | $V_{IN} = V_{CC}$ | | | ± 10 | μA |
| I_{IL} | | $V_{IN} = 0\text{ V}$ | | | ± 10 | |
| Output voltage (4) | | | | 3.5 | | Vp-p |
| Output rise time | | 20% to 80% of V_{DD} | | 2.0 | | ns |
| Output fall time | | 80% to 20% of V_{DD} | | 2.0 | | ns |
| Duty cycle | | For crystal oscillation | 45% | 48% | 55% | |
| | | For external clock | | 50% | | |
| Clock jitter (5) | | | | 50 | | ps |
| Power-up time (6) | | | | 0.5 | 1.5 | ms |
| PLL AC CHARACTERISTICS (SCKO0-3) ($f_M = 27\text{ MHz}$, $C_L = 20\text{ pF}$ on measurement pin) | | | | | | |
| SCKO0 | Output system clock frequency | Fixed | | 33.8688 | | MHz |
| SCKO1 | | Selectable for 44.1 kHz | 16.9344 | | 33.8688 | |
| SCKO2 | | 256 f_S | 8.192 | 12.288 | 24.576 | |
| SCKO3 | | 384 f_S | 12.288 | 18.432 | 36.864 | |
| Output rise time | | 20% to 80% of V_{DD} | | 2.0 | | ns |
| Output fall time | | 80% to 20% of V_{DD} | | 2.0 | | ns |
| Output duty cycle | | | 45 | 50 | 55 | % |
| Output clock jitter (5) | | | | 50 | 100 | ps |
| Frequency Settling Time(7) | | PLL1705, to stated output frequency | | 50 | 150 | ns |
| | | PLL1706, to stated output frequency | | 80 | 200 | ns |
| Power-up time (8) | | To stated output frequency | | 3 | 6 | ms |

(1) Pins 5, 6, 7, 12: FS1/MD, FS2/MC, SR/ML, CSEL (Schmitt-trigger input with internal pulldown, 3.3-V tolerant)

(2) Pins 2, 3, 14, 15, 18, 19: SCKO2, SCKO3, MCKO1, MCKO2, SCKO1, SCKO0

(3) Pin 10: XT1

(4) Pin 11: XT2

(5) Jitter performance is specified as standard deviation of jitter for 27-MHz crystal oscillation and default SCKO frequency setting. Jitter performance varies with master clock mode, SCKO frequency setting and load capacitance on each clock output.

(6) The delay time from power on to oscillation

(7) The settling time when the sampling frequency is changed

(8) The delay time from power on to lockup

(9) $f_M = 27\text{-MHz}$ crystal oscillation, no load on MCKO1, MCKO2, SCKO0, SCKO1, SCKO2, SCKO3. Power supply current varies with sampling frequency selection and load condition.

(10) While all bits of CE[6:1] are 0, the PLL1706 goes into power-down mode.

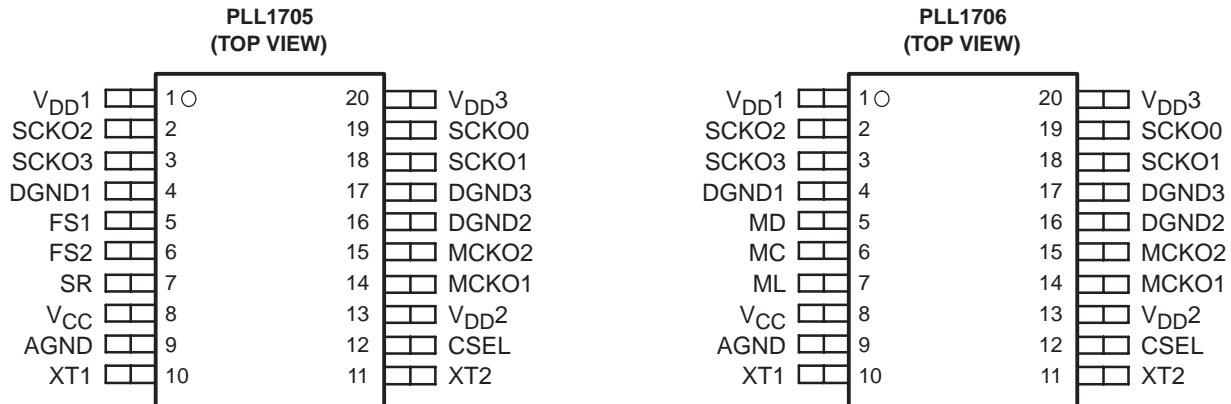
ELECTRICAL CHARACTERISTICS(continued)

all specifications at $T_A = 25^\circ\text{C}$, $V_{DD1}\text{--}V_{DD3} (= V_{DD}) = V_{CC} = 3.3\text{ V}$, $f_M = 27\text{ MHz}$, crystal oscillation, $f_S = 48\text{ kHz}$ (unless otherwise noted)

| PARAMETER | TEST CONDITIONS | MIN | TYP | MAX | UNIT | |
|----------------------------------|----------------------|---|-----|-----|--------------------|---------------|
| POWER SUPPLY REQUIREMENTS | | | | | | |
| V_{CC}, V_{DD} | Supply voltage range | 2.7 | 3.3 | 3.6 | Vdc | |
| $I_{DD} + I_{CC}$ | Supply current (9) | $V_{DD} = V_{CC} = 3.3\text{ V}, f_S = 48\text{ kHz}$ | | 19 | 25 | mA |
| | | Power down(10) | | 320 | 500 | μA |
| Power dissipation | | $V_{DD} = V_{CC} = 3.3\text{ V}, f_S = 48\text{ kHz}$ | | 63 | 90 | mW |
| TEMPERATURE RANGE | | | | | | |
| Operating temperature | | -25 | | 85 | $^\circ\text{C}$ | |
| θ_{JA} | Thermal resistance | PLL1705/6DBQ: 20-pin SSOP (150 mil) | | 150 | $^\circ\text{C/W}$ | |

- (1) Pins 5, 6, 7, 12: FS1/MD, FS2/MC, SR/ML, CSEL (Schmitt-trigger input with internal pulldown, 3.3-V tolerant)
- (2) Pins 2, 3, 14, 15, 18, 19: SCKO2, SCKO3, MCKO1, MCKO2, SCKO1, SCKO0
- (3) Pin 10: XT1
- (4) Pin 11: XT2
- (5) Jitter performance is specified as standard deviation of jitter for 27-MHz crystal oscillation and default SCKO frequency setting. Jitter performance varies with master clock mode, SCKO frequency setting and load capacitance on each clock output.
- (6) The delay time from power on to oscillation
- (7) The settling time when the sampling frequency is changed
- (8) The delay time from power on to lockup
- (9) $f_M = 27\text{-MHz}$ crystal oscillation, no load on MCKO1, MCKO2, SCKO0, SCKO1, SCKO2, SCKO3. Power supply current varies with sampling frequency selection and load condition.
- (10) While all bits of CE[6:1] are 0, the PLL1706 goes into power-down mode.

PIN ASSIGNMENTS



Terminal Functions

| TERMINAL | | I/O | DESCRIPTION |
|------------------|-----|-----|---|
| NAME | NO. | | |
| AGND | 9 | – | Analog ground |
| CSEL | 12 | IN | SCKO1 frequency selection control ⁽¹⁾ |
| DGND1 | 4 | – | Digital ground 1 |
| DGND2 | 16 | – | Digital ground 2 |
| DGND3 | 17 | – | Digital ground 3 |
| FS1(MD) | 5 | IN | Sampling frequency group control in PLL1705, data input for serial control in PLL1706 ⁽¹⁾ |
| FS2(MC) | 6 | IN | Sampling frequency group control in PLL1705, bit clock input for serial control in PLL1706 ⁽¹⁾ |
| MCKO1 | 14 | OUT | 27-MHz master clock output 1 |
| MCKO2 | 15 | OUT | 27-MHz master clock output 2 |
| SCKO0 | 19 | OUT | System clock output 0 (33.8688 MHz fixed) |
| SCKO1 | 18 | OUT | System clock output 1 (selectable for 44.1 kHz) |
| SCKO2 | 2 | OUT | System clock output 2 (256 f _S) |
| SCKO3 | 3 | OUT | System clock output 3 (384 f _S) |
| SR(ML) | 7 | IN | Sampling rate control in PLL1705, load strobe input for serial control in PLL1706 ⁽¹⁾ |
| V _{CC} | 8 | – | Analog power supply, 3.3 V |
| V _{DD1} | 1 | – | Digital power supply 1, 3.3 V |
| V _{DD2} | 13 | – | Digital power supply 2, 3.3 V |
| V _{DD3} | 20 | – | Digital power supply 3, 3.3 V |
| XT1 | 10 | IN | 27-MHz crystal oscillator, or external clock input |
| XT2 | 11 | OUT | 27-MHz crystal oscillator, must be OPEN for external clock input mode |

⁽¹⁾ Schmitt-trigger input with internal pulldown.

TYPICAL PERFORMANCE CURVES

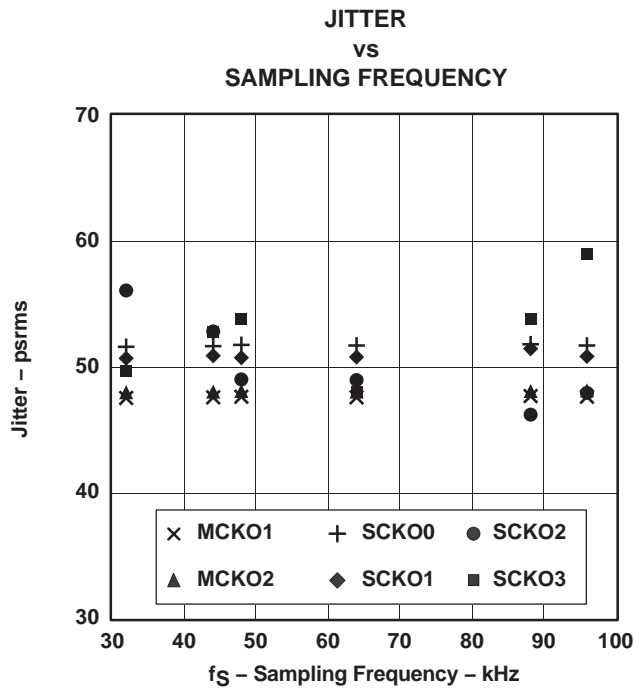


Figure 1

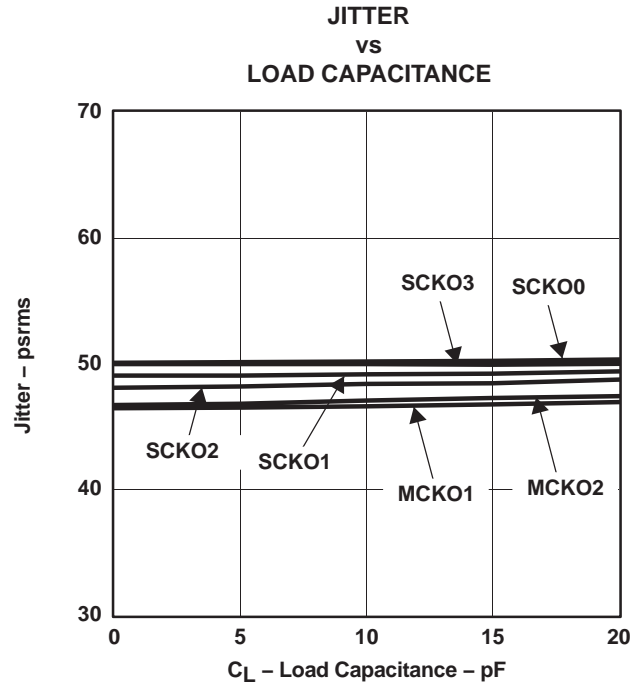


Figure 2

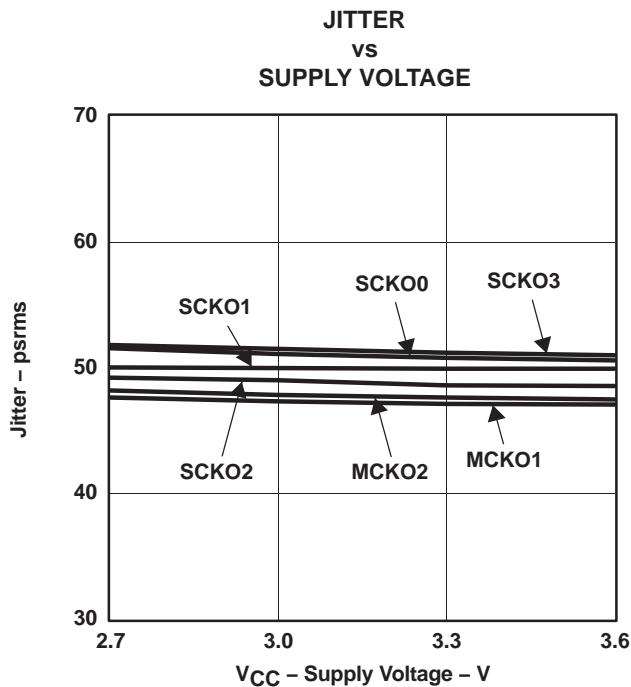


Figure 3

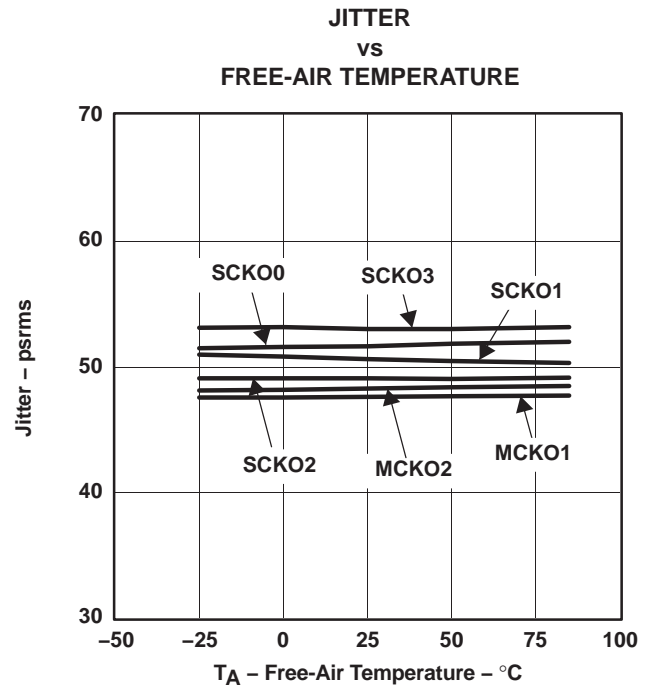


Figure 4

NOTE: All specifications at $T_A = 25^\circ\text{C}$, $V_{DD1-3} (= V_{DD}) = V_{CC} = +3.3\text{ V}$, $f_M = 27\text{ MHz}$, crystal oscillation, $C_1, C_2 = 15\text{ pF}$, default frequency (33.8688 MHz for SCKO0, 33.8688 MHz for SCKO1, 256 f_S and 384 f_S of 48 kHz for SCKO2 and SCKO3), $C_L = 20\text{ pF}$ on measurement pin, unless otherwise noted.

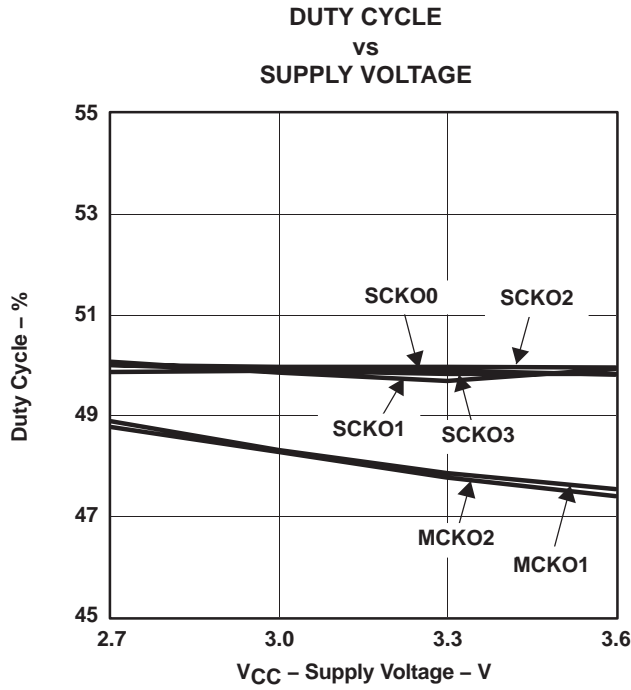


Figure 5

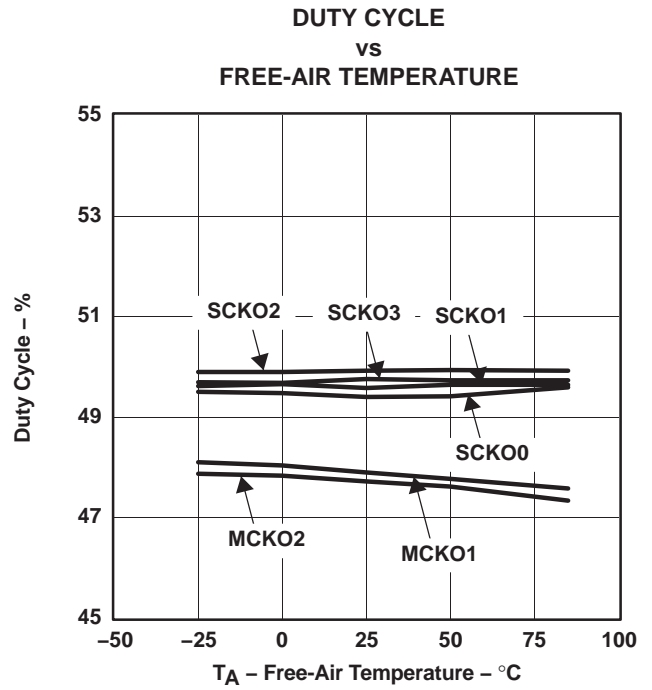


Figure 6

NOTE: All specifications at T_A = 25°C, V_{DD1-3} (= V_{DD}) = V_{CC} = +3.3 V, f_M = 27 MHz, crystal oscillation, C₁, C₂ = 15 pF, default frequency (33.8688 MHz for SCKO0, 33.8688 MHz for SCKO1, 256 f_S and 384 f_S of 48 kHz for SCKO2 and SCKO3), C_L = 20 pF on measurement pin, unless otherwise noted.

THEORY OF OPERATION

MASTER CLOCK AND SYSTEM CLOCK OUTPUT

The PLL1705/6 consists of a dual PLL clock and master clock generator which generates four system clocks and two buffered 27-MHz clocks from a 27-MHz master clock. Figure 7 shows the block diagram of the PLL1705/6. The PLL is designed to accept a 27-MHz master clock.

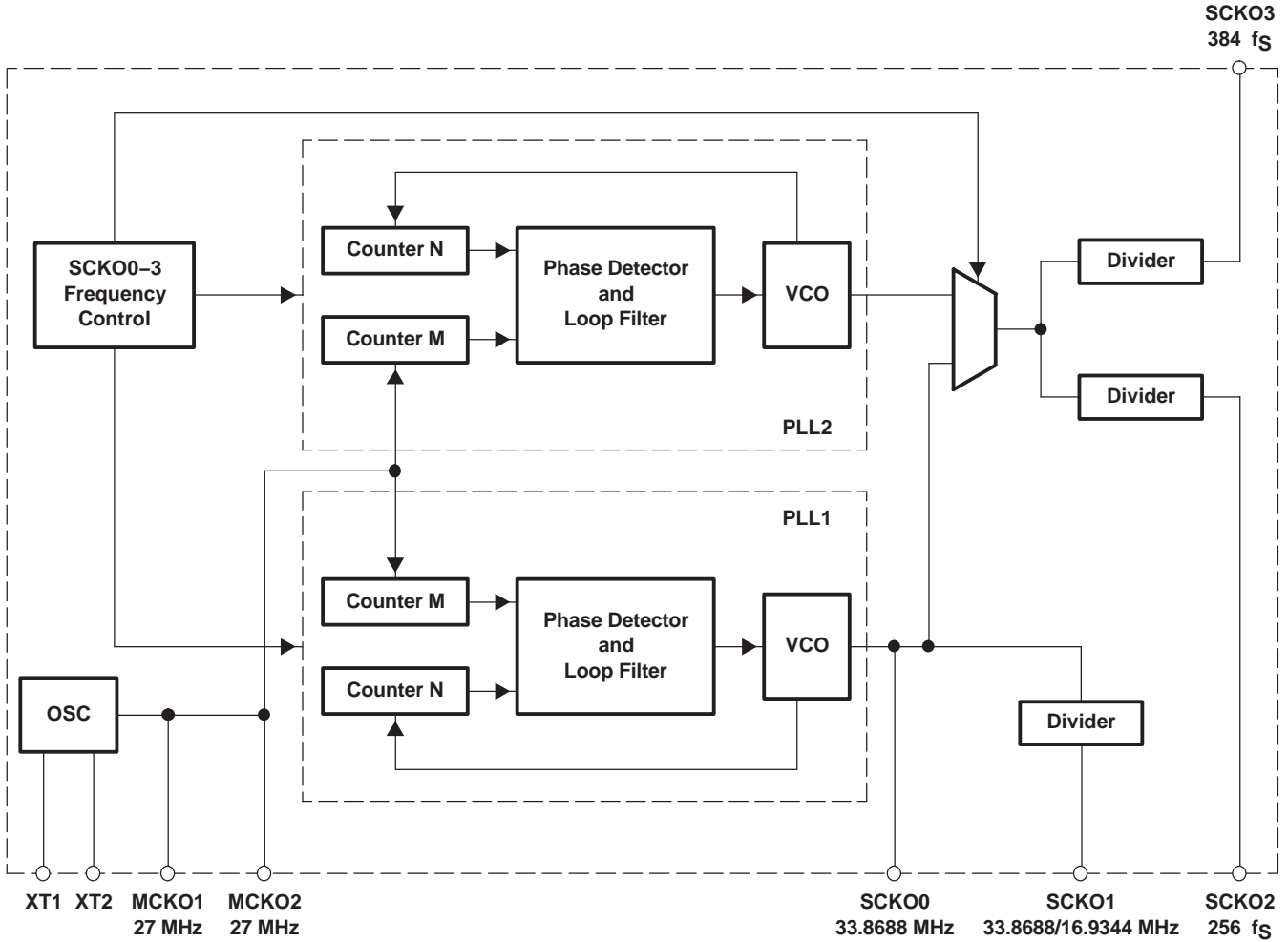


Figure 7. Block Diagram

The master clock can be either a crystal oscillator placed between XT1 (pin 10) and XT2 (pin 11), or an external input to XT1. If an external master clock is used, XT2 must be open. Figure 8 illustrates possible system clock connection options, and Figure 9 illustrates the 27-MHz master clock timing requirement.

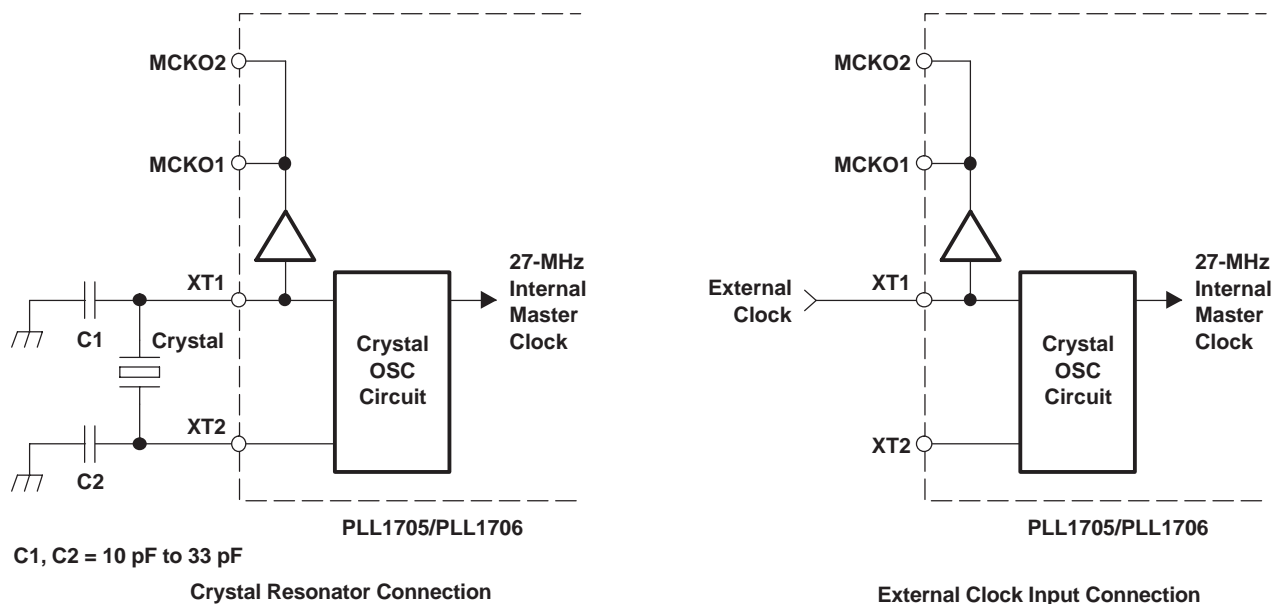
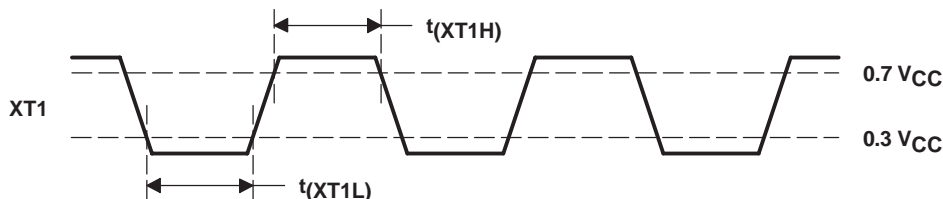


Figure 8. Master Clock Generator Connection Diagram



| DESCRIPTION | SYMBOL | MIN | MAX | UNIT |
|----------------------------------|------------|-----|-----|------|
| Master clock pulse duration HIGH | t_{XT1H} | 10 | | ns |
| Master clock pulse duration LOW | t_{XT1L} | 10 | | ns |

Figure 9. External Master Clock Timing Requirement

The PLL1705/6 provides a very low-jitter, high-accuracy clock. SCKO0 outputs a fixed 33.8688-MHz clock, SCKO1 outputs $384 f_S$ or $768 f_S$ ($f_S = 44.1$ kHz) which is selected by CSEL (pin 12) for a CD-DA DSP. The output frequency of the remaining clocks is determined by the sampling frequency (f_S) under hardware or software control. SCKO2 and SCKO3 output $256\text{-}f_S$ and $384\text{-}f_S$ system clocks, respectively. Table 2 shows each sampling frequency, which can be programmed. The system clock output frequencies for programmed sampling frequencies are shown in Table 3.

Table 1. Generated System Clock SCKO1 Frequency

| CSEL | SCKO1 FREQUENCY |
|------|-----------------|
| LOW | 33.8688 MHz |
| HIGH | 16.9344 MHz |

Table 2. Sampling Frequencies

| SAMPLING RATE | SAMPLING FREQUENCY (kHz) | | |
|-------------------------------|--------------------------|------|----|
| Standard sampling frequencies | 32 | 44.1 | 48 |
| Double sampling frequencies | 64 | 88.2 | 96 |

Table 3. Sampling Frequencies and System Clock Output Frequencies

| SAMPLING FREQUENCY (kHz) | SAMPLING RATE | SCKO2 (MHZ) | SCKO3 (MHZ) |
|--------------------------|---------------|-------------|-------------|
| 32 | Standard | 8.192 | 12.288 |
| 44.1 | Standard | 11.2896 | 16.9344 |
| 48 | Standard | 12.288 | 18.432 |
| 64 | Double | 16.384 | 24.576 |
| 88.2 | Double | 22.5792 | 33.8688 |
| 96 | Double | 24.576 | 36.864 |

Response time from power on (or applying the clock to XT1) to SCKO settling time is typically 3 ms. Delay time from sampling frequency change to SCKO settling is 200 ns maximum. This clock transient timing is not synchronized with the SCKOx signals. Figure 10 illustrates SCKO transient timing in the PLL1706. External buffers are recommended on all output clocks in order to avoid degrading the jitter performance of the PLL1705/6.

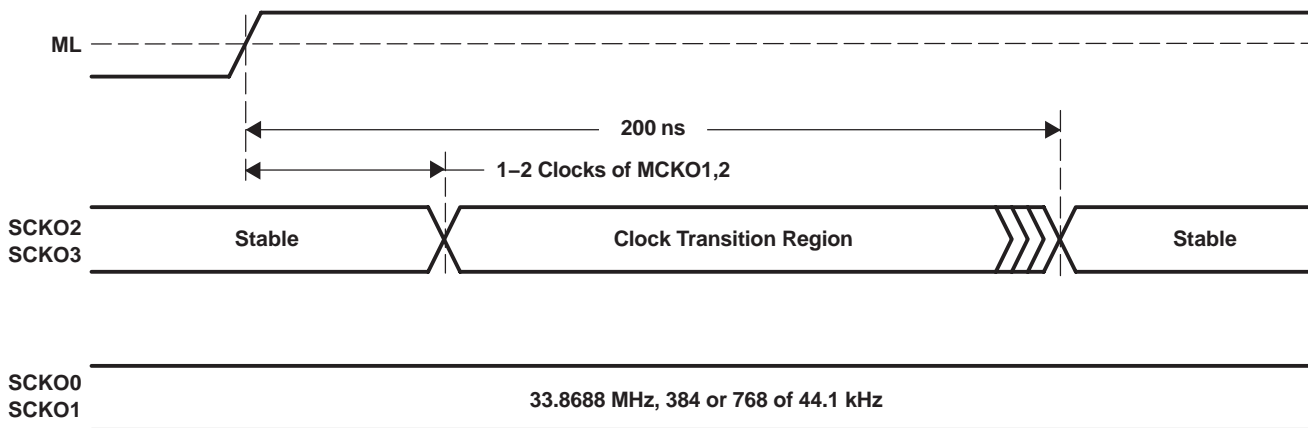


Figure 10. System Clock Transient Timing

POWER-ON RESET

The PLL1705/6 has an internal power-on reset circuit. The mode register of PLL1706 is initialized with default settings by power-on reset. Throughout the reset period, all clock outputs are enabled with the default settings after power up time. Initialization by internal power-on reset is done automatically during 1024 master clocks at $V_{DD} > 2.0$ V (TYP). Power-on reset timing is shown in Figure 11.

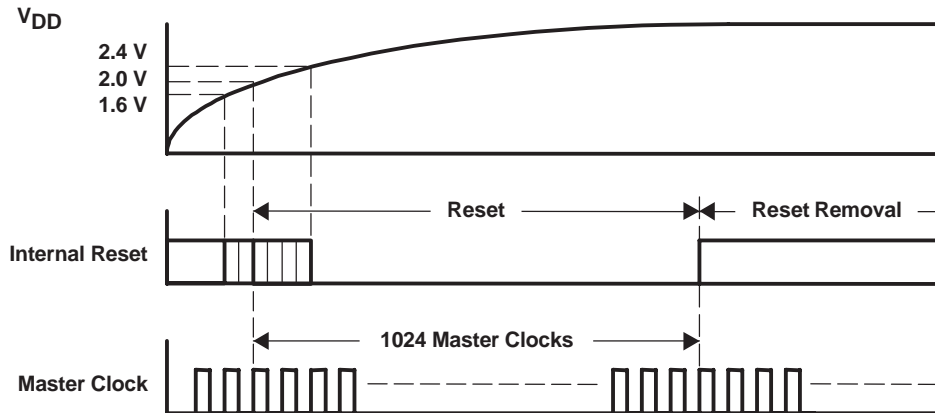


Figure 11. Power-On Reset Timing

FUNCTION CONTROL

The built-in functions of the PLL1705 can be controlled in the parallel mode (hardware mode), which uses SR (pin 7), FS1 (pin 5) and FS2 (pin 6). The PLL1706 can be controlled in the serial mode (software mode), which uses a three-wire interface by ML (pin 7), MC (pin 6), and MD (pin 5). The selectable functions are shown in Table 4.

Table 4. Selectable Functions

| SELECTABLE FUNCTION | PARALLEL MODE | SERIAL MODE |
|--|---------------|-------------|
| Sampling frequency select (32 kHz, 44.1 kHz, 48 kHz) | Yes | Yes |
| Sampling rate select (standard/double) | Yes | Yes |
| Each clock output enable/disable | No | Yes |
| Power down | No | Yes |

PLL1705 (Parallel Mode)

In the parallel mode, the following functions can be selected:

Sampling Frequency Group Select

The sampling frequency group can be selected by FS1 (pin 5) and FS2 (pin 6).

| FS2 (PIN 6) | FS1 (PIN 5) | SAMPLING FREQUENCY |
|-------------|-------------|--------------------|
| LOW | LOW | 48 kHz |
| LOW | HIGH | 44.1 kHz |
| HIGH | LOW | 32 kHz |
| HIGH | HIGH | Reserved |

Sampling Rate Select

The sampling rate can be selected by SR (pin 7)

| SR (PIN 7) | SAMPLING RATE |
|------------|---------------|
| LOW | Standard |
| HIGH | Double |

PLL1706 (Serial Mode)

The built-in functions of the PLL1706 are shown in Table 5. These functions are controlled using the ML, MC, and MD serial control signals.

Table 5. Selectable Functions

| SELECTABLE FUNCTION | DEFAULT |
|--|--------------|
| Sampling frequency select (32 kHz, 44.1 kHz, 48 kHz) | 48-kHz group |
| Sampling rate select (standard/double) | Standard |
| Each clock output enable/disable | Enabled |
| Power down | Disabled |

Program-Register Bit Mapping

The built-in functions of the PLL1706 are controlled through a 16-bit program register. This register is loaded using MD, MC and ML. After the 16 data bits are clocked in using the rising edge of MC, ML is used to latch the data into the register. Table 6 shows the bit mapping of the register. The serial mode control format and control data input timing are shown in Figure 12 and Figure 13, respectively.

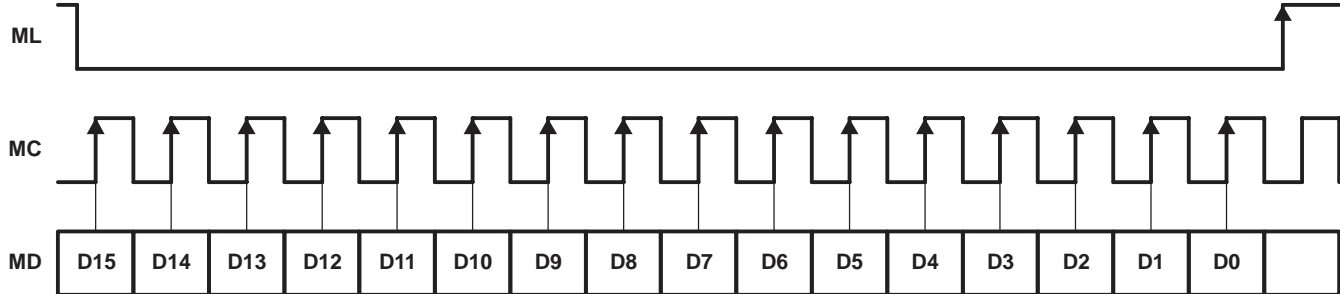
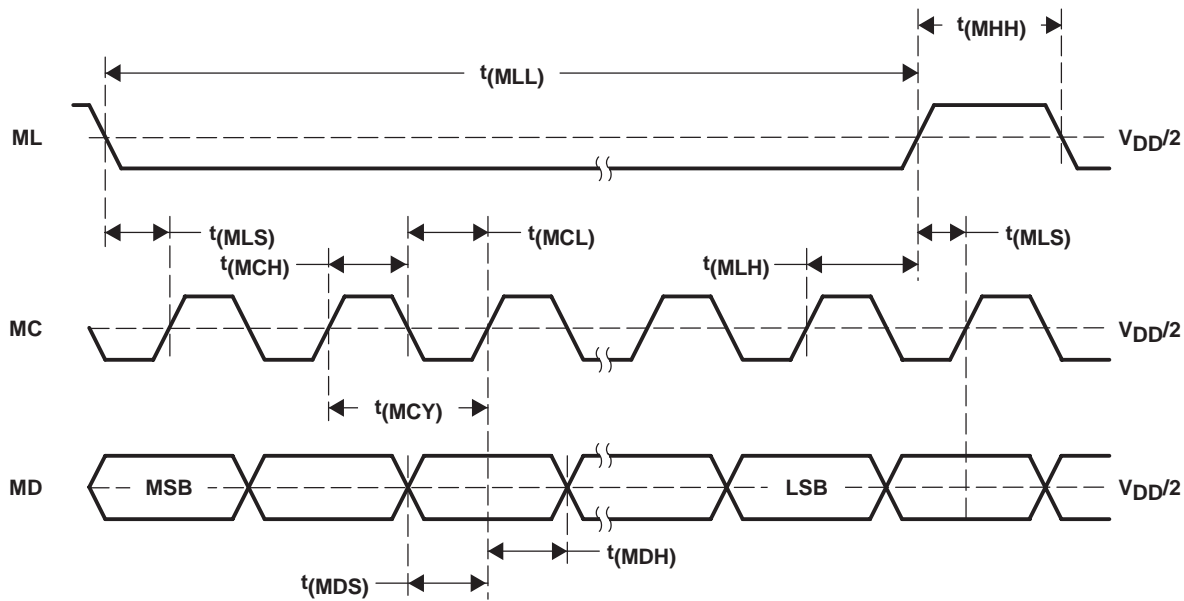


Figure 12. Serial Mode Control Format



| DESCRIPTION | SYMBOL | MIN | TYP | MAX | UNIT |
|------------------------------|------------------|-----|-----|-----|--------------------------|
| MC pulse cycle time | t _{MCY} | 100 | | | ns |
| MC pulse duration LOW | t _{MCL} | 40 | | | ns |
| MC pulse duration HIGH | t _{MCH} | 40 | | | ns |
| MD hold time | t _{MDH} | 40 | | | ns |
| MD setup time | t _{MDS} | 40 | | | ns |
| ML low-level time | t _{MLL} | 16 | | | MC clocks ⁽¹⁾ |
| ML high-level time | t _{MHH} | 200 | | | ns |
| ML hold time ⁽²⁾ | t _{MLH} | 40 | | | ns |
| ML setup time ⁽³⁾ | t _{MLS} | 40 | | | ns |

(1) MC clocks: MC clock period

(2) MC rising edge for LSB to ML rising edge

(3) ML rising edge to the next MC rising edge. If the MC clock is stopped after the LSB, any ML rise time is accepted.

Figure 13. Control Data Input Timing

Mode Register

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|-----|-----|
| D15 | D14 | D13 | D12 | D11 | D10 | D9 | D8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
| 0 | 1 | 1 | 1 | 0 | 0 | CE6 | CE5 | CE4 | CE3 | CE2 | CE1 | RSV | SR | FS2 | FS1 |

Table 6. Register Mapping

| REGISTER | BIT NAME | DESCRIPTION |
|--------------|----------|-----------------------------|
| Mode control | CE6 | MCKO2 output enable/disable |
| | CE5 | MCKO1 output enable/disable |
| | CE4 | SCKO1 output enable/disable |
| | CE3 | SCKO3 output enable/disable |
| | CE2 | SCKO2 output enable/disable |
| | CE1 | SCKO0 output enable/disable |
| | RSV | Reserved, must be 0 |
| | SR | Sampling rate select |
| | FS[2:1] | Sampling frequency select |

FS[2:1]: Sampling Frequency Group Select

| FS2 | FS1 | SAMPLING FREQUENCY | DEFAULT |
|-----|-----|--------------------|---------|
| 0 | 0 | 48 kHz | 0 |
| 0 | 1 | 44.1 kHz | |
| 1 | 0 | 32 kHz | |
| 1 | 1 | Reserved | |

SR: Sampling Rate Select

| SR | SAMPLING RATE | DEFAULT |
|----|---------------|---------|
| 0 | Standard | 0 |
| 1 | Double | |

CE [6:1]: Clock Output Control

| CE1–CE6 | CLOCK OUTPUT CONTROL | DEFAULT |
|---------|----------------------|---------|
| 0 | Clock output disable | |
| 1 | Clock output enable | 0 |

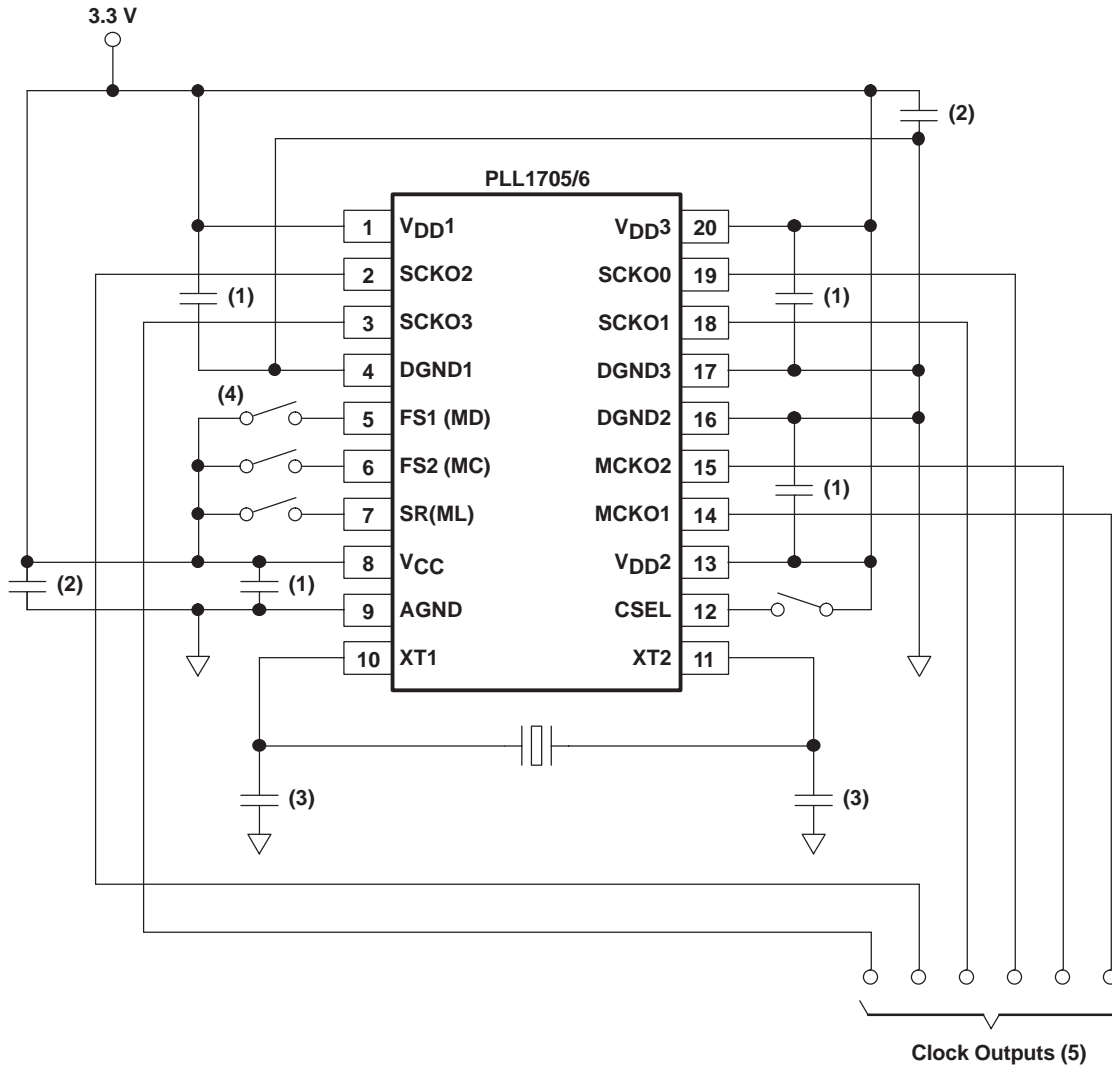
While all the bits of CE [6:1] are 0, the PLL1706 goes into the power-down mode, all dynamic operation including PLLs and the oscillator halt, but serial mode control is enabled for resumption.

CONNECTION DIAGRAM

Figure 14 shows the typical connection circuit for the PLL1705. There are four grounds for digital and analog power supplies. However, the use of one common ground connection is recommended to avoid latch-up or other power-supply-related troubles. Power supplies should be bypassed as close as possible to the device.

MPEG-2 APPLICATIONS

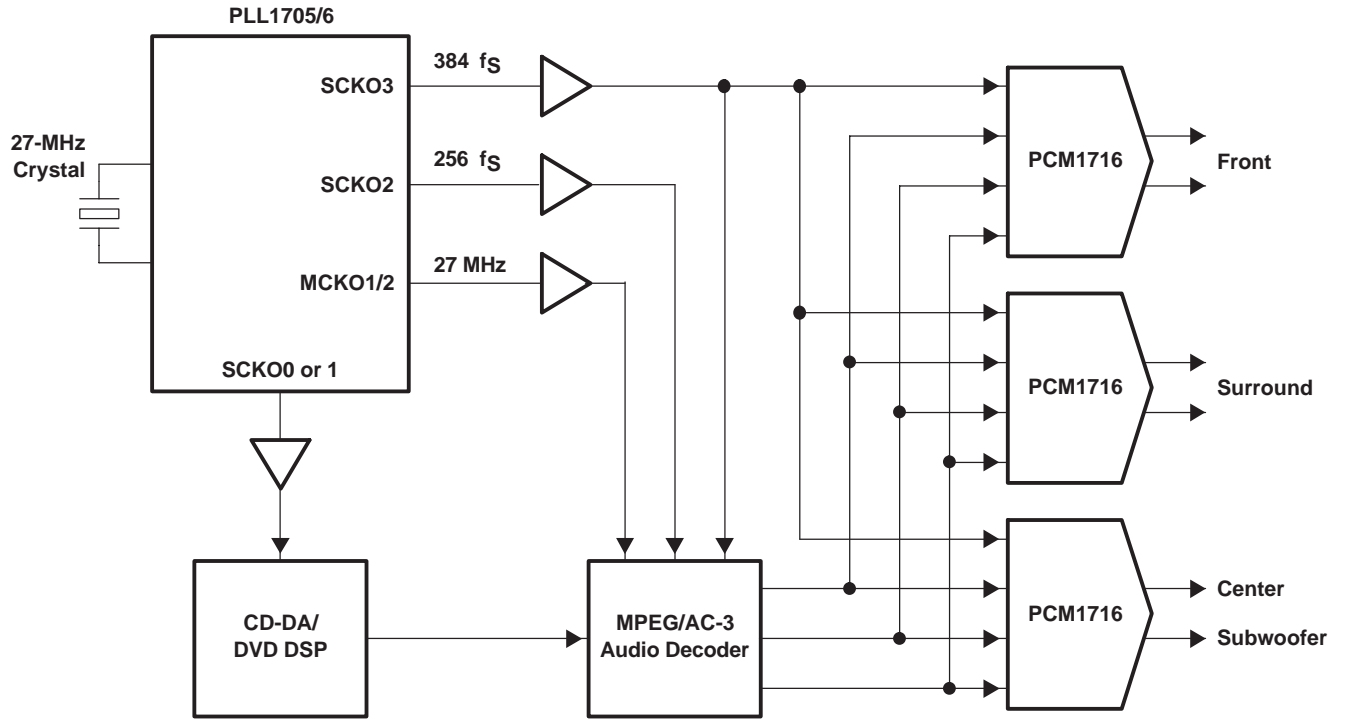
Typical applications for the PLL1705/6 are MPEG-2 based systems such as DVD players, DVD add-on cards for multimedia PCs, digital HDTV systems, and set-top boxes. The PLL1705/6 provides audio system clocks for a CD-DA DSP, DVD DSP, Karaoke DSP, and DAC(s) from a 27-MHz video clock.



- (1) 0.1- μ F ceramic capacitor typical, depending on quality of power supply and pattern layout
- (2) 10- μ F aluminum electrolytic capacitor typical, depending on quality of power supply and pattern layout
- (3) 27-MHz quartz crystal and 10–33 pF \times 2 ceramic capacitors, which generate the appropriate amplitude of oscillation on XT1/XT2
- (4) This connection is for PLL1705 (parallel mode); when PLL1706 (serial mode) is to be used, control pins must be connected to serial interfaced controller.
- (5) For good jitter performance, minimize the load capacitance on the clock output.

Figure 14. Typical Connection Diagram

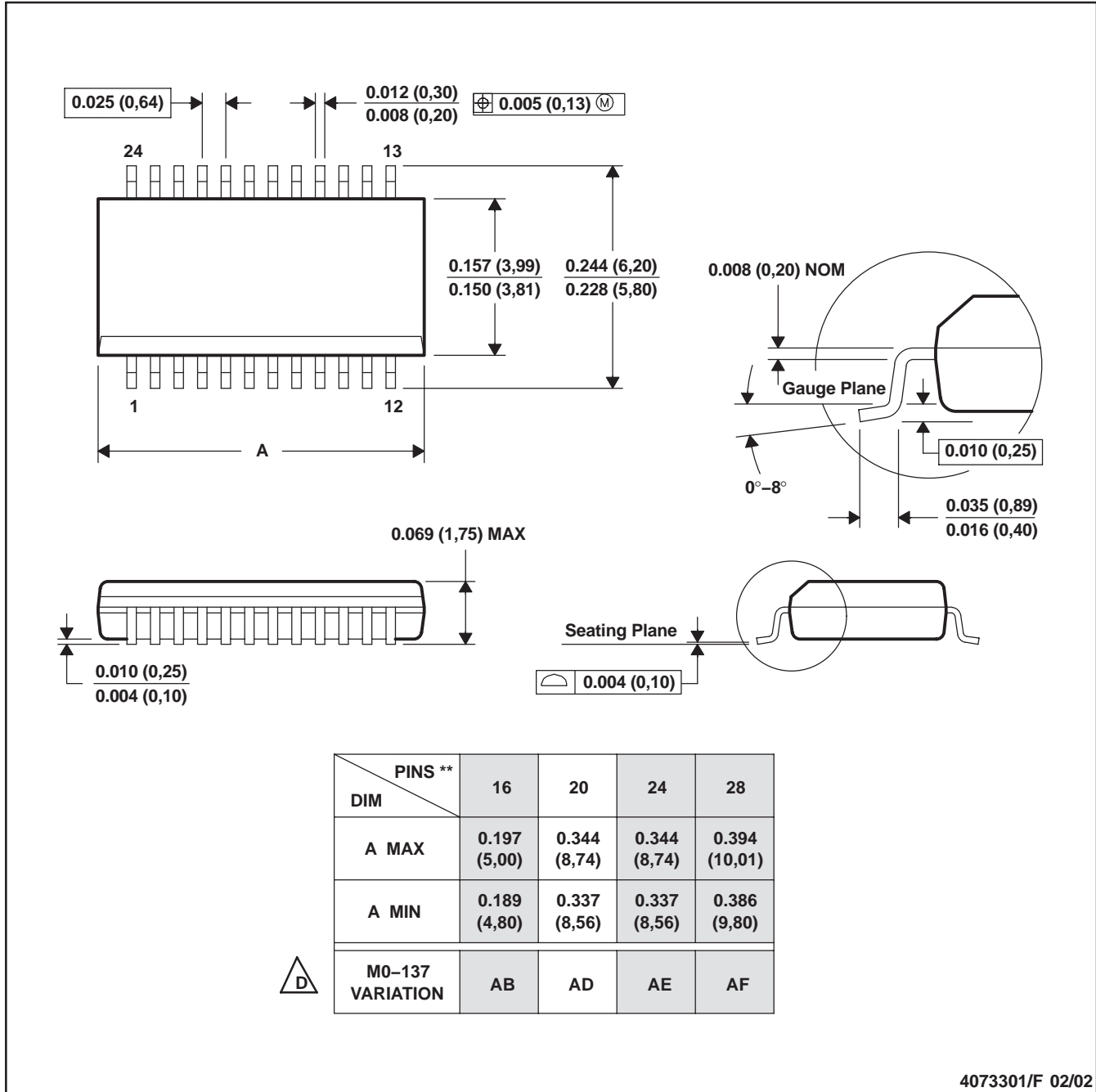
BLOCK DIAGRAM OF MPEG-2 BASED SYSTEM APPLICATION



MECHANICAL DATA

DBQ (R-PDSO-G)**

PLASTIC SMALL-OUTLINE PACKAGE



- NOTES: A. All linear dimensions are in millimeters.
 B. This drawing is subject to change without notice.
 C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
 D. Falls within JEDEC MO-137.

PACKAGING INFORMATION

| Orderable Device | Status ⁽¹⁾ | Package Type | Package Drawing | Pins | Package Qty | Eco Plan ⁽²⁾ | Lead/Ball Finish | MSL Peak Temp ⁽³⁾ |
|------------------|-----------------------|---------------|-----------------|------|-------------|-------------------------|------------------|------------------------------|
| PLL1705DBQ | ACTIVE | SSOP/ QSOP | DBQ | 20 | 50 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| PLL1705DBQG4 | ACTIVE | SSOP/ QSOP | DBQ | 20 | 50 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| PLL1705DBQR | ACTIVE | SSOP/ QSOP | DBQ | 20 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| PLL1705DBQRG4 | ACTIVE | SSOP/ QSOP | DBQ | 20 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| PLL1706DBQ | ACTIVE | SSOP/ QSOP | DBQ | 20 | 50 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| PLL1706DBQG4 | ACTIVE | SSOP/ QSOP | DBQ | 20 | 50 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| PLL1706DBQR | ACTIVE | SSOP/ QSOP | DBQ | 20 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| PLL1706DBQRG4 | ACTIVE | SSOP/ QSOP | DBQ | 20 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |

⁽¹⁾ The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

⁽²⁾ Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

⁽³⁾ MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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TAPE AND REEL INFORMATION



QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Reel Diameter (mm) | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|-------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| PLL1705DBQR | SSOP/QSOP | DBQ | 20 | 2000 | 330.0 | 16.4 | 6.5 | 9.0 | 2.1 | 8.0 | 16.0 | Q1 |
| PLL1706DBQR | SSOP/QSOP | DBQ | 20 | 2000 | 330.0 | 16.4 | 6.5 | 9.0 | 2.1 | 8.0 | 16.0 | Q1 |

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Length (mm) | Width (mm) | Height (mm) |
|-------------|--------------|-----------------|------|------|-------------|------------|-------------|
| PLL1705DBQR | SSOP/QSOP | DBQ | 20 | 2000 | 346.0 | 346.0 | 33.0 |
| PLL1706DBQR | SSOP/QSOP | DBQ | 20 | 2000 | 346.0 | 346.0 | 33.0 |

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