# LC7431,7431M,7432

CMOS IC

## VHS VTR CHROMA SIGNAL RECORDING/PLAYBACK PROCESSOR

The LC7431 is a VHS VTR chroma signal processor LSI that can be used in conjunction with the LA7315 to perform all the signal processing functions required for recording/playback. The LC7432 is an RF switch pulse input polarity-reversed version of the LC7431. The LC7431M is a miniflat package version of the LC7431.

**Functions**

- Burst gate pulse generator
- 4-phase shift circuit
- PB side lock detector
- ID phase select circuit (NTSC: Inversion, PAL: 90° phase shift)
- 1/2H killer
- REC AFC
- 320(321) $f_H$ VCO autmatic adjust system

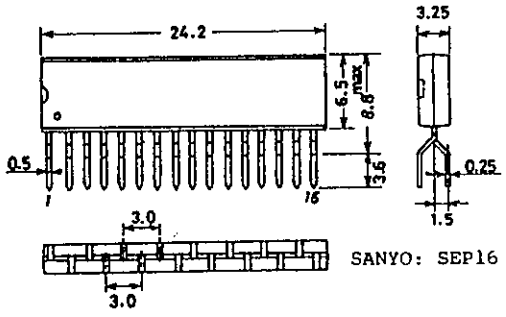
**Features**

- Adjustment-free 320/321$f_H$ VCO
- On-chip REC/PB low-pass filter and its automatic adjust system
- CCD delay clock pulse generator ($2f_{sc}$)
- Adjustment-free 3.58/4.43MHz VCO, PB output level
  (No adjustment required for other than REC chroma level)
- NTSC/PAL/SECAM use
- Minimum number of external parts required
- Low power dissipation

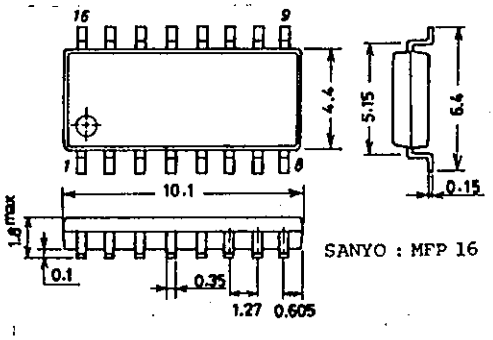
**Absolute Maximum Ratings** at Ta=25°C

| | | | | unit |
|---|---|---|---|---|
| Maximum Supply Voltage | $V_{DD}$ max | | -0.3 to +7.0 | V |
| Input Voltage | $V_I$ | | -0.3 to $V_{DD}$+0.3 | V |
| Output Voltage | $V_O$ | | -0.3 to $V_{DD}$+0.3 | V |
| Allowable Power Dissipation | Pd max | Ta≦75°C | 150 | mW |
| Operating Temperature | Topg | | -30 to +75 | °C |
| Storage Temperature | Tstg | | -55 tp +125 | °C |

**Case Outline** 3020A-S16IC (unit:mm) [LC7431,7432]




**Case Outline** 3035A-M16IC (unit:mm) [LC7431M]




Specifications and information herein are subject to change without notice.

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**Allowable Operating Conditions** at Ta=-30°C to +75°C, $V_{SS}$=0V

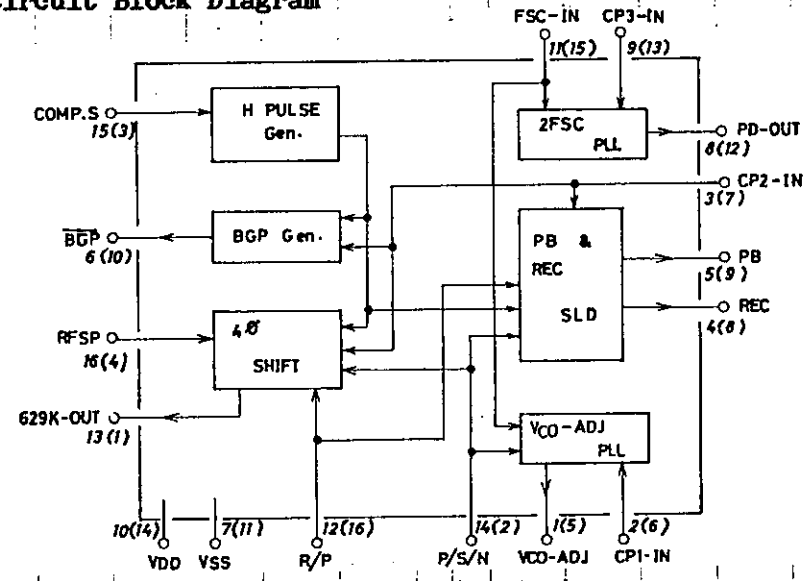
| | | | min | typ | max | unit |
|---|---|---|---|---|---|---|
| Supply Voltage | $V_{DD}$ | $V_{DD}$ | 4.5 | 5.0 | 5.6 | V |
| "H"-Level Input Voltage | $V_{IH}(1)$ | COMP.S | $0.7V_{DD}$ | | $V_{DD}$ | V |
| | $V_{IH}(2)$ | R/P;P/S/N | $0.8V_{DD}$ | | $V_{DD}$ | V |
| | $V_{IH}(3)$ | REC | $0.6V_{DD}$ | | $V_{DD}$ | V |
| | $V_{IH}(4)$ | RFSP | 2 | | $V_{DD}$ | V |
| "L"-Level Input Voltage | $V_{IH}(1)$ | REC,COMP.S | $V_{SS}$ | | $0.2V_{DD}$ | V |
| | $V_{IH}(2)$ | P/S/N | $V_{SS}$ | | 0.5 | V |
| | $V_{IH}(3)$ | R/P | $V_{SS}$ | | $0.2V_{DD}$ | V |
| | $V_{IH}(4)$ | RFSP | $V_{SS}$ | | 0.5 | V |
| "M"-Level Input Voltage | $V_{IM}$ | P/S/N | 1.5 | | 2.6 | V |
| Hysteresis Width | $V_{HYS}$ | COMP.S | | $0.2V_{DD}$ | | V |
| Allowable Operating Frequency | *$F_{IN}(1)$ | CP3-IN | 1 | | 20 | MHz |
| | $F_{IN}(2)$ | CP1-IN,CP2-IN,FSC-IN | 1 | | 7 | MHz |
| Input Amplitude | $V_{IN}$p-p | CP1-IN,CP2-IN, CP3-IN,FSC-IN | 0.3 | | $V_{DD}$ | Vp-p |

* Capacitive coupling $V_{IN}$=0.3Vp-p

**Electrical Characteristics** at Ta=25°C, $V_{DD}$=4.5 to 5.6V

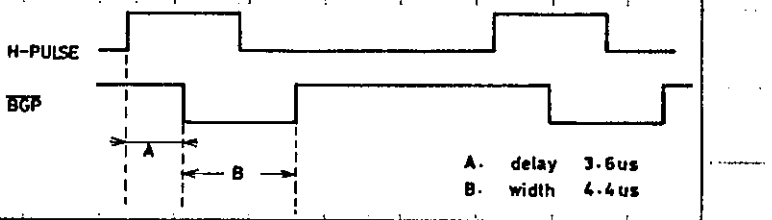
| | | | min | typ | max | unit |
|---|---|---|---|---|---|---|
| "H"-Level Input Current | $I_{IH}(1)$ | REC,R/P,P/S/N,COMP.S,RFSP: $V_{IN}=V_{DD}$ | | | 1.0 | uA |
| | $I_{IH}(2)$ | CP1-IN,CP2-IN,CP3-IN,FSC-IN: $V_{IN}=V_{DD}$ | | 5.0 | | uA |
| "L"-Level Input Current | $I_{IL}(1)$ | Same as $I_{IH}(1)$, $V_{IN}=V_{SS}$ | -1.0 | | | uA |
| | $I_{IL}(2)$ | Same as $I_{IH}(2)$, $V_{IN}=V_{SS}$ | | -5.0 | | uA |
| "H"-Level Output Voltage | $V_{OH}(1)$ | $\overline{BGP}$,PD-out,629K-out : $I_{OH}$=-0.5mA | $V_{DD}$-0.5 | | | V |
| | $V_{OH}(2)$ | VCO-ADJ: $I_{OH}$=-0.1mA | $V_{DD}$-0.65 | $V_{DD}$-0.5 | $V_{DD}$-0.35 | V |
| | $V_{OH}(3)$ | REC,PB: $I_{OH}$=-0.5mA | $V_{DD}$-0.25 | | | V |
| "L"-Level Output Voltage | $V_{OL}(1)$ | Same as $V_{OH}(1)$, $I_{OL}$=0.5mA | | | 0.5 | V |
| | $V_{OL}(2)$ | Same as $V_{OH}(2)$, $I_{OL}$=0.1mA | 0.35 | 0.5 | 0.65 | V |
| | $V_{OL}(3)$ | Same as $V_{OH}(3)$, $I_{OL}$=0.5mA | | | 0.25 | V |
| Output OFF-State Leakage Current | $I_{OFF}$ | VCO-ADJ,REC,PD-out,PB | -0.1 | | 0.1 | uA |
| Current Dissipation | $I_{DD}$ | $V_{DD}$: $F_{IN}(1)$=7MHz, $F_{IN}(2)$=20MHz, $V_{IN}$=0.3Vp-p, $V_{DD}$=5.0V | | 2.5 | 7 | mA |

**Equivalent Circuit Block Diagram**




( ): Pin No. of the LC7431M

**Pin Description**

| Pin Name | Pin No. | I/O | Functions |
|---|---|---|---|
| $V_{DD}$<br>$V_{SS}$ | 10(14)<br>7(11) | | Power supply $V_{DD}$=4.5V to 5.6V<br>$V_{SS}$=0V |
| P/S/N | 14(2) | I | "H"-level=PAL, "M"-level=SECAM, "L"-level=NTSC. |
| CP1-IN | 2(6) | I | The ref VCO-out signal of the LA7315 is applied. When locked, 5.369MHz is provided for NTSC and 5.320MHz for PAL, SECAM. |
| CP2-IN | 3(7) | I | The $320f_h$ VCO-out signal of the LA7315 is applied. NTSC $320f_h$, PAL, SECAM $321f_h$ |
| CP3-IN | 9(13) | I | The 2fscVCO-out signal of the LA7315 is applied. |
| FSC-IN | 11(15) | I | The VXO(Fsc) of the LA7315 is applied. Provides the reference clock for internal control. |
| COMP.S | 15(3) | I | The composite sync signal is applied. |
| RFSP | 16(4) | I | The channel select signal of the cylinder head is applied. |
| VCO-ADJ | 1(5) | O | Output pin for $320/321f_h$ VCO adjust phase comparison signal. When the CP1-IN is locked, the output is brought to a high-impedance state. |
| $\overline{BGP}$ | 6(10) | O | Gate pulse used to take out the burst signal sychronously with the H-PULSE signal.   |
| 629K-out | 13(1) | O | The CP2-IN signal is divided by 8 and the signal being 90° phase shifted is output. In the PLAY mode, receives the ID pulse from the REC pin to shift the phase. |
| PD-out | 8(12) | O | Configures the PLL with the 2fscVCO in the LA7315. |
| PB | 5(9) | O | Connected to the PB-AFC pin of the LA7315. Prevents side lock of the $320/321f_h$ VCO in the P.B. mode. |
| REC | 4(8) | I/O | Connected to the REC-AFC pin of the LA7315. Configures the PPL of the $320/321f_h$ VCO in the REC mode. The output is the AND of the CP2-IN signal divided by 320(321) and the H-PULSE signal. Used as the input pin for the ID pulse in the P.B. mode. |

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