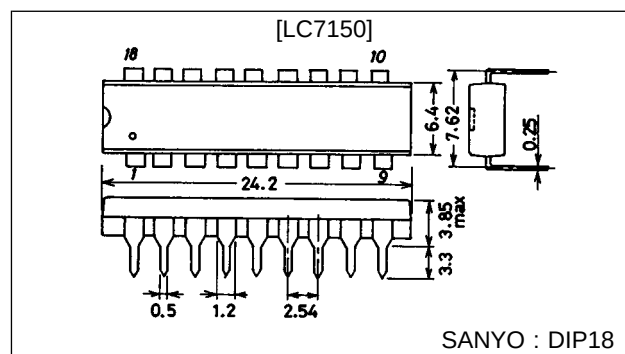


**LC7150****FCC 10-Channel Standard PLL For Cordless Telephone****Functions**

- On-chip PLL for transmission/reception
- On-chip digital unlock detector (only PLL for transmission)
- 5.0 kHz/4.4 kHz output pins for guard tone
- Standby function
- Pull-down resistance at channel select pins (D1 to D4)  
LC7150: With (for mechanical switch)  
LC7151: Without (for microcontroller)

**Package Dimensions**

unit : mm

**3007A-DIP18**

SANYO : DIP18

**Specifications****Absolute Maximum Ratings at Ta = 25°C, V<sub>SS</sub> = 0 V**

| Parameter                   | Symbol              | Conditions                                | Ratings                      | Unit |
|-----------------------------|---------------------|-------------------------------------------|------------------------------|------|
| Maximum supply voltage      | V <sub>DD</sub> max |                                           | -0.3 to +6.5                 | V    |
| Maximum input voltage       | V <sub>I</sub> max  | All input pins                            | -0.3 to V <sub>DD</sub> +0.3 | V    |
| Maximum output voltage      | V <sub>O1</sub> max | $\overline{F1}, \overline{F2}$ Output OFF | -0.3 to +6.5                 | V    |
|                             | V <sub>O2</sub> max | Output pins other than V <sub>O1</sub>    | -0.3 to V <sub>DD</sub> +0.3 | V    |
| Output current              | I <sub>OUT</sub>    | $\overline{F1}, \overline{F2}$ , LDT      | 0 to 3.0                     | mA   |
| Allowable power dissipation | Pd max              | Ta ≤ 75°C                                 | 350                          | mW   |
| Operating temperature       | Topr                |                                           | -30 to +75                   | °C   |
| Storage temperature         | Tstg                |                                           | -40 to +125                  | °C   |

**Allowable Operating Conditions at Ta = 25°C, V<sub>SS</sub> = 0 V**

| Parameter                | Symbol           | Conditions                       | min                 | typ   | max                | Unit |
|--------------------------|------------------|----------------------------------|---------------------|-------|--------------------|------|
| Supply voltage           | V <sub>DD</sub>  |                                  | 3.0                 |       | 5.5                | V    |
| Input high-level voltage | V <sub>IH1</sub> | D1 to D4, $\overline{SB}$        | 0.7 V <sub>DD</sub> |       | V <sub>DD</sub>    | V    |
| Input low-level voltage  | V <sub>IL1</sub> | D1 to D4, $\overline{SB}$        | 0                   |       | 0.3V <sub>DD</sub> | V    |
| Input high-level voltage | V <sub>IH2</sub> | $\overline{R/B}$                 | 0.9 V <sub>DD</sub> |       | V <sub>DD</sub>    | V    |
| Input low-level voltage  | V <sub>IL2</sub> | $\overline{R/B}$                 | 0                   |       | 0.1V <sub>DD</sub> | V    |
| Input frequency          | f <sub>IN1</sub> | PIT; V <sub>IN</sub> = 0.15 Vrms | 10                  |       | 27                 | MHz  |
|                          | f <sub>IN2</sub> | PIR; V <sub>IN</sub> = 0.15 Vrms | 30                  |       | 42                 | MHz  |
|                          | f <sub>IN3</sub> | XIN; V <sub>IN</sub> = 0.3 Vrms  | 5.0                 | 10.24 | 11.0               | MHz  |
| Input amplitude          | V <sub>IN1</sub> | PIT; f <sub>IN</sub> = 27 MHz    | 0.15                |       | 0.3V <sub>DD</sub> | Vrms |
|                          | V <sub>IN2</sub> | PIR; f <sub>IN</sub> = 42 MHz    | 0.15                |       | 0.3V <sub>DD</sub> | Vrms |
|                          | V <sub>IN3</sub> | XIN; f <sub>IN</sub> = 11 MHz    | 0.3                 |       | 0.3V <sub>DD</sub> | Vrms |

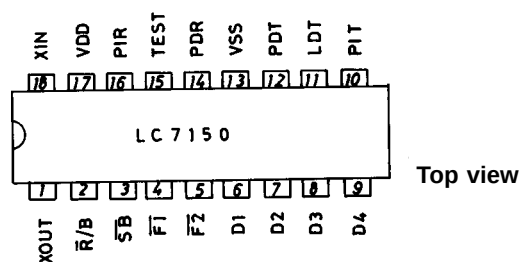
### Electrical Characteristics at Ta = 25°C, under Allowable Operating Conditions

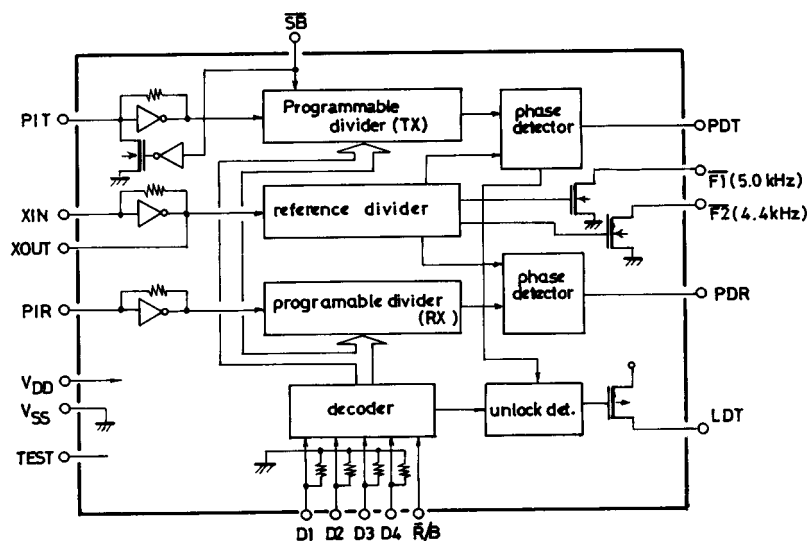
| Parameter                  | Symbol            | Conditions                                                  | min                  | typ  | max                | Unit |
|----------------------------|-------------------|-------------------------------------------------------------|----------------------|------|--------------------|------|
| Input high-level current   | I <sub>IH1</sub>  | XIN; V <sub>I</sub> = V <sub>DD</sub>                       |                      |      | 20                 | μA   |
| Input low-level current    | I <sub>IL1</sub>  | XIN; V <sub>I</sub> = V <sub>SS</sub>                       |                      |      | 20                 | μA   |
| Input high-level current   | I <sub>IH2</sub>  | PIT, PIR; V <sub>I</sub> = V <sub>DD</sub>                  |                      |      | 40                 | μA   |
| Input low-level current    | I <sub>IL2</sub>  | PIT, PIR; V <sub>I</sub> = V <sub>SS</sub>                  |                      |      | 40                 | μA   |
| Input high-level current   | I <sub>IH3</sub>  | SB, R/B; V <sub>I</sub> = V <sub>DD</sub>                   |                      |      | 10                 | μA   |
| Input low-level current    | I <sub>IL3</sub>  | SB, R/B; V <sub>I</sub> = V <sub>SS</sub>                   |                      |      | 10                 | μA   |
| Input pull-down resistance | R <sub>d</sub>    | D1 to D4                                                    | 10                   | 20   | 40                 | kΩ   |
| Input floating voltage     | V <sub>IF</sub>   | D1 to D4; Open                                              |                      |      | 0.1V <sub>DD</sub> | V    |
| Feedback resistance        | R <sub>f1</sub>   | XIN; V <sub>DD</sub> = 4.3 V                                |                      | 1.0  |                    | MΩ   |
|                            | R <sub>f2</sub>   | PIT, PIR; V <sub>DD</sub> = 4.3 V                           |                      | 0.5  |                    | MΩ   |
| Output high-level voltage  | V <sub>OH1</sub>  | PDT, PDR; I <sub>O</sub> = 0.5mA                            | V <sub>DD</sub> -1.0 |      |                    | V    |
| Output low-level voltage   | V <sub>OL1</sub>  | PDT, PDR; V <sub>O</sub> = 0.5 mA                           |                      |      | 1.0                | V    |
| Output OFF leak current    | I <sub>off1</sub> | PDT, PDR; V <sub>O</sub> = V <sub>DD</sub> /V <sub>SS</sub> |                      | 0.01 | 1.0                | nA   |
| Output high-level voltage  | V <sub>OH2</sub>  | LDT; I <sub>O</sub> = 1 mA                                  | V <sub>DD</sub> -1.0 |      |                    | V    |
| Output OFF leak current    | I <sub>off2</sub> | LDT; Output OFF V <sub>O</sub> = V <sub>SS</sub>            |                      |      | 5.0                | μA   |
| Output low-level voltage   | V <sub>OL2</sub>  | F1, F2; I <sub>O</sub> = 1 mA                               |                      |      | 1.0                | V    |
| Output OFF leak current    | I <sub>off3</sub> | F1, F2; Output OFF V <sub>O</sub> = 5.5 V                   |                      |      | 5.0                | μA   |
| Supply current             | I <sub>DD1</sub>  | (C3) V <sub>DD</sub> = 3.0 V                                |                      | 4    |                    | mA   |
|                            | I <sub>DD2</sub>  | (C3) V <sub>DD</sub> = 4.5 V                                |                      | 7    |                    | mA   |
|                            | I <sub>DD3</sub>  | (C3) V <sub>DD</sub> = 5.5 V                                |                      | 13   |                    | mA   |
|                            | I <sub>DD4</sub>  | (C2) V <sub>DD</sub> = 3.0 V                                |                      | 3    |                    | mA   |
|                            | I <sub>DD5</sub>  | (C2) V <sub>DD</sub> = 4.5 V                                |                      | 5    |                    | mA   |
|                            | I <sub>DD6</sub>  | (C2) V <sub>DD</sub> = 5.5 V                                |                      | 10   |                    | mA   |

(C3): XIN = 10.24 MHz, xtal connected  
 PIT = 27 MHz 150 mVrms  
 PIR = 42 MHz 150 mVrms  
 R/B= V<sub>DD</sub>, SB = V<sub>DD</sub>, Other pin open  
 (C2): XIN = 10.24 MHz, xtal connected  
 PIR = 42 MHz, 150 mVrms  
 R/B= V<sub>DD</sub>, SB = V<sub>SS</sub>, Other pin open

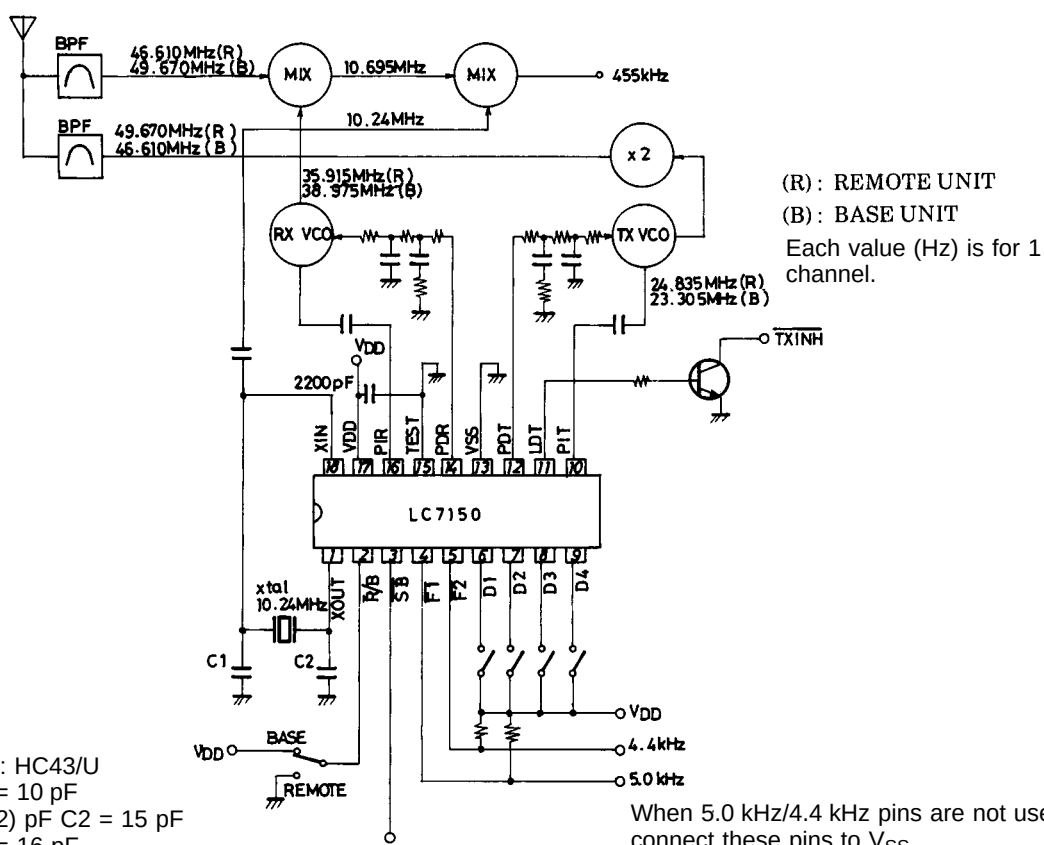
(Note) Power supply V<sub>DD</sub> – V<sub>SS</sub>: Insert a capacitor of 2000 pF or greater.

### Pin Assignment





## Sample Application Circuit



Crystal resonator: HC43/U  
2114-85501: CL = 10 pF  
C1 = 15 (10 to 22) pF C2 = 15 pF  
2114-85502: CL = 16 pF  
C1 = 22 (15 to 33) pF C2 = 33 pF  
KINSEKI, LTD.

$V_{DD}$ : TX, RX and PLL are operated.  
 $V_{SS}$ : Only RX and PLL are operated.

When 5.0 kHz/4.4 kHz pins are not used, connect these pins to  $V_{SS}$ .

## Pin Description

| Pin                 | Description                                                                                                                                                                                                                                                                                         |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $\overline{F1}$     | 5.0 kHz output. When not used, connect to $V_{SS}$ .                                                                                                                                                                                                                                                |
| $\overline{F2}$     | 4.4 kHz output (10.24 MHz $\div$ 2304). When not used, connect to $V_{SS}$ .                                                                                                                                                                                                                        |
| $V_{DD}$ , $V_{SS}$ | Power supply.                                                                                                                                                                                                                                                                                       |
| XIN, XOUT           | Crystal resonator (10.24 MHz).                                                                                                                                                                                                                                                                      |
| D1 to D4            | Channel select pin.                                                                                                                                                                                                                                                                                 |
| $\overline{R/B}$    | Base unit/remote unit select pin.<br>$\overline{R/B}$ = "0" ( $V_{SS}$ ) ..... Remote unit<br>$\overline{R/B}$ = "1" ( $V_{DD}$ ) ..... Base unit                                                                                                                                                   |
| $\overline{SB}$     | Used to stop the TX PLL at the standby mode to minimize current dissipation.<br>$\overline{SB}$ = "0" ( $V_{SS}$ ) ..... Standby mode. Only the RX and PLL are operated. The charge pump enters a high-impedance mode.<br>$\overline{SB}$ = "1" ( $V_{DD}$ ) ..... The TX, RX and PLL are operated. |
| PIT                 | TX programmable divider input pin.                                                                                                                                                                                                                                                                  |
| PIR                 | RX programmable divider input pin.                                                                                                                                                                                                                                                                  |
| PDT                 | TX charge pump output pin.                                                                                                                                                                                                                                                                          |
| PDR                 | RX charge pump output pin.                                                                                                                                                                                                                                                                          |
| TEST                | LSI test input pin. Connected to $V_{SS}$ .                                                                                                                                                                                                                                                         |
| LDT                 | TX PLL unlock signal output pin.                                                                                                                                                                                                                                                                    |

When the phase difference becomes  $t_D$  ( $= 6.25 \mu s$ .) or more, 5.6 ms. output pulse is delivered at the LDT pin.

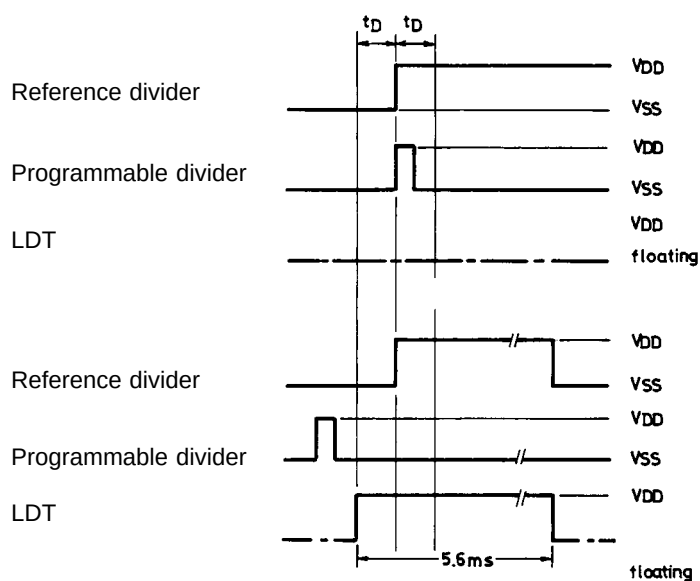


Table of Frequency Division

| INPUT<br>D1 D2 D3 D4 |   |   |   | C<br>H | REMOTE ( $\bar{R}/B = "0"$ ) |                    |      |                    |      | BASE ( $\bar{R}/B = "1"$ ) |                    |      |                    |      |
|----------------------|---|---|---|--------|------------------------------|--------------------|------|--------------------|------|----------------------------|--------------------|------|--------------------|------|
|                      |   |   |   |        | TX (fref = 2.5 kHz)          |                    |      | RX (fref = 5 kHz)  |      | TX (fref = 2.5 kHz)        |                    |      | RX (fref = 5 kHz)  |      |
|                      |   |   |   |        | $f_{TX}$<br>(MHz)            | $f_{VCO}$<br>(MHz) | N    | $f_{VCO}$<br>(MHz) | N    | $f_{TX}$<br>(MHz)          | $f_{VCO}$<br>(MHz) | N    | $f_{VCO}$<br>(MHz) | N    |
| 1                    | 0 | 0 | 0 | 1      | 49.670                       | 24.8350            | 9934 | 35.915             | 7183 | 46.610                     | 23.305             | 9322 | 38.975             | 7795 |
| 0                    | 1 | 0 | 0 | 2      | 49.845                       | 24.9225            | 9969 | 35.935             | 7187 | 46.630                     | 23.315             | 9326 | 39.150             | 7830 |
| 1                    | 1 | 0 | 0 | 3      | 49.860                       | 24.9300            | 9972 | 35.975             | 7195 | 46.670                     | 23.335             | 9334 | 39.165             | 7833 |
| 0                    | 0 | 1 | 0 | 4      | 49.770                       | 24.8850            | 9954 | 36.015             | 7203 | 46.710                     | 23.355             | 9342 | 39.075             | 7815 |
| 1                    | 0 | 1 | 0 | 5      | 49.875                       | 24.9375            | 9975 | 36.035             | 7207 | 46.730                     | 23.365             | 9346 | 39.180             | 7836 |
| 0                    | 1 | 1 | 0 | 6      | 49.830                       | 24.9150            | 9966 | 36.075             | 7215 | 46.770                     | 23.385             | 9354 | 39.135             | 7827 |
| 1                    | 1 | 1 | 0 | 7      | 49.890                       | 24.9450            | 9978 | 36.135             | 7227 | 46.830                     | 23.415             | 9366 | 39.195             | 7839 |
| 0                    | 0 | 0 | 1 | 8      | 49.930                       | 24.9650            | 9986 | 36.175             | 7235 | 46.870                     | 23.435             | 9374 | 39.235             | 7847 |
| 1                    | 0 | 0 | 1 | 9      | 49.990                       | 24.9950            | 9998 | 36.235             | 7247 | 46.930                     | 23.465             | 9386 | 39.295             | 7859 |
| 0                    | 1 | 0 | 1 | 10     | 49.970                       | 24.9850            | 9994 | 36.275             | 7255 | 46.970                     | 23.485             | 9394 | 39.275             | 7855 |
| 1                    | 1 | 0 | 1 | 10     | 49.970                       | 23.9850            | 9994 | 36.275             | 7255 | 46.970                     | 23.485             | 9394 | 39.275             | 7855 |
| 0                    | 0 | 1 | 1 | 10     | 49.970                       | 23.9850            | 9994 | 36.275             | 7255 | 46.970                     | 23.485             | 9394 | 39.275             | 7855 |
| 1                    | 0 | 1 | 1 | 10     | 49.970                       | 23.9850            | 9994 | 36.275             | 7255 | 46.970                     | 23.485             | 9394 | 39.275             | 7855 |
| 0                    | 1 | 1 | 1 | 10     | 49.970                       | 23.9850            | 9994 | 36.275             | 7255 | 46.970                     | 23.485             | 9394 | 39.275             | 7855 |
| 1                    | 1 | 1 | 1 | 10     | 49.970                       | 23.9850            | 9994 | 36.275             | 7255 | 46.970                     | 23.485             | 9394 | 39.275             | 7855 |
| 0                    | 0 | 0 | 0 | 10     | 49.970                       | 23.9850            | 9994 | 36.275             | 7255 | 46.970                     | 23.485             | 9394 | 39.275             | 7855 |

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