MOS INTEGRATED CIRCUIT
μPD1704C-023

PLL FREQUENCY SYNTHESIZER AND CONTROLLER FOR MOBILE FM AND MW RADIO

The μPD1704C-023 (42-pin DIP) is a CMOS LSI with a built-in PLL frequency synthesizer and controller which can receive FM and MW broadcasts in the U.S.A., Australia, and Japan. It is possible to construct a multi-function, high performance FM/MW digital tuning system for car stereos, home stereos, radio cassettes, etc., by combining this unit with the special prescaler μPB553AC.

FEATURES

- LED/FIP dynamic display
- Preset memory: FM 6 channels, MW 6 channels
- Read-out and write-in keys are independent (6 keys + 6 keys)
- Auto-tuning (Seek action), manual tuning, plus scan function with 5 second hold
- Control output can be used for LOC/DX, LOUDNESS, METAL, Dolby NR*, STEREO, AMS, etc.
- $\overline{\text{AGCCUT}}$ signal output to prevent erroneous action during auto-tuning
- Complete leading mute effectuated by band switching signal output from controller side as countermeasure against pop noise
- Realizing feather-touch operation of all switches as well as band switching.
- Check sound output when keys operated (connected to external oscillator)
- Dimmer function
- 12-hour display clock function

* Dolby® and the double-D symbol are registered trademarks of Dolby Laboratories Licensing Corporation.

FUNCTION

Receiving frequency, Channel spacing, Reference frequency, Intermediate frequency

DISTRICT / ITEM	BAND	RECEIVING FREQUENCY	CHANNEL SPACING	REFERENCE FREQUENCY	INTERMEDIATE FREQUENCY
U.S.A.	FM	87.7 to 107.9 MHz	200 kHz	25 kHz	10.700, 10.725 MHz
	MW	530 to 1620 kHz	10 kHz	10 kHz	450 kHz
Australia	FM	87.7 to 107.9 MHz	100 kHz	25 kHz	107.00, 10.725 MHz
	MW	531 to 1602 kHz	9 kHz	9 kHz	450 kHz
Japan	FM	76.1 to 89.9 MHz	100 kHz	25 kHz	−10.700, −10.675 MHz
	MW	531 to 1602 kHz	9 kHz	9 kHz	450 kHz

Radio Function

(1) SEEK UP, SEEK DOWN (Sawtooth wave mode)
(2) MANUAL UP, MANUAL DOWN (Sawtooth wave mode)
(3) SCAN (UP direction only)
(4) Preset memory: FM 6 channels, MW 6 channels
(5) Last station memory: FM 1 channel, MW 1 channel
(6) LOC/DX control output
(7) LOUDNESS control output
(8) STEREO control output (effective for both FM, MW)
(9) $\overline{\text{AGCCUT}}$ signal output during auto-tuning
(10) Preset memory display (dot display)
(11) Preset memory write-in — 6 independent keys (ME1 to ME6)

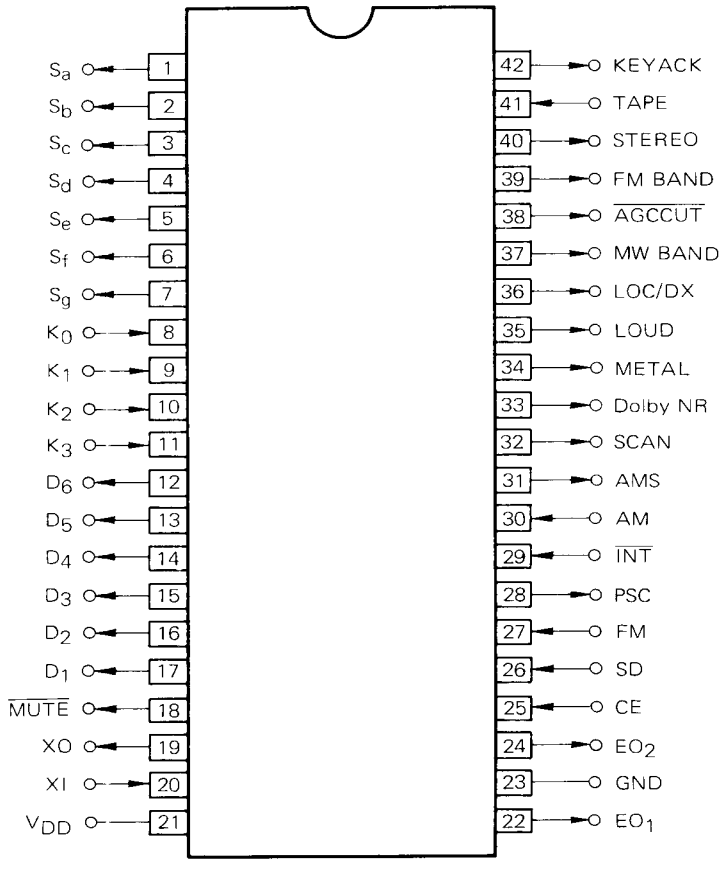
Cassette Tape Function

(1) METAL control output
(2) Dolby NR control output
(3) AMS control output
(4) LOUDNESS control output

Clock Function

(1) 12-hour display (no AM/PM display)
(2) Hours and minutes can be adjusted independnetly (HRADJ, MINADJ)

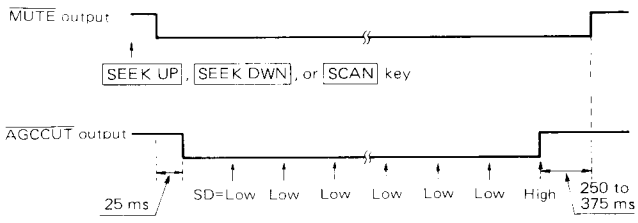
PIN CONFIGURATION (Top View)



PIN DESCRIPTION

PIN NO.	SYMBOL	NAME	DESCRIPTION	OUTPUT TYPE
1 to 7	S_a to S_g	Segment Output	Active-high pins for dynamic display segment signal output and key return signal source.	P-ch open drain
8 to 11	K_0 to K_3	Key-return Signal Input	These are the input pins for the key-return signal from the key matrix. In order to reliably carry out a low-level read, use about a 33 kΩ pull-down resistor at these pins.	Input
12 to 17	D_6 to D_1	Digit Output	Active-high pins for dynamic display column signal output. D_1, D_2, and D_3 aer also used as the key-return signal source.	CMOS push-pull
18	$\overline{MUTE}$	Mute Output	Active-low pin for MUTE output to eliminate pop noise when unlocking PLL and turning TAPE pin ON and OFF. When the CE pin is at low level (back-up status), low level occurs unconditionally. For details, refer to MUTE output timing chart.	CMOS push-pull
19 20	XO XI	X'tal	4.5 MHz is used at the connection pins for the quartz oscillator.	Input (XI), CMOS push-pull (XO)
21	V_{DD}	Power Supply	5 V ±10 % is supplied through this device power source pin during operation. When the clock is not being used (NOCLOCK is ON), a voltage drop of up to 2.5 V can occur on back-up. V_{DD} rise time must be less than 500 ms, and if the rising is extremely long the internal power-ON reset circuit may not be activated normally. In addition, malfunction may also occur when the voltage is raised from medium potential though it is required to rise from 0 V.	–
22 24	EO_1 EO_2	Error Output	These are charge pump outputs for a phase comparator which constructs PLL. The same signal is output simultaneously at EO_1 and EO_2, so it is immaterial whether the connection is made to the FM or MW low pass filter (LPF).	CMOS 3-state
23	GND	Ground	Connect to system GND.	–
25	CE	Chip Enable	This is a device selection sigal input pin. Normally high level when device is operated; low level when device is not being used. High level . . . . Normal operation Low level . . . . (With clock; when NOCLOCK = OFF) Memory maintenance, display OFF, PLL action halted, only clock function operating internally. (No clock; when NOCLOCK = ON) Memory maintenance, display OFF, all internal operations halted, 10 μA MAX. back-up current at that time. However, high level below 134 μs and low level are not received. Also, when rising, always rise from 0 V. From the medium level, it is possible for the internal reset circuit to be incorrectly activated.	Input

<table>
<tr><th>PIN NO.</th><th>SYMBOL</th><th>NAME</th><th>DESCRIPTION</th><th>OUTPUT TYPE</th></tr>
<tr><td>26</td><td>SD</td><td>Station detector</td><td>Active-high input pin for which detects whether broadcasting station is received during auto-tuning (SEEK UP, SEEK DOWN, SCAN).
High level voltage must be input within 40 ms after PLL lock.</td><td>Input</td></tr>
<tr><td>27</td><td>FM</td><td>FM VCO
Signal Input</td><td>Input pin for Local FM output signal divided into 1/16, 1/17 by prescaler μPB553AC. Cut and input DC current with condenser since AC amplifier is incorporated.</td><td>Input</td></tr>
<tr><td>28</td><td>PSC</td><td>Pulse swallowing control</td><td>This is a pulse swallow control pin connected to PSC pin for speical prescaler μPB553AC through C and R.</td><td>CMOS
push-pull</td></tr>
<tr><td>29</td><td>$\overline{INT}$</td><td>Interrupt</td><td>This is an external interrupt input pin. However, because it is not used, apply a pull-up at V_{DD}.</td><td>Input</td></tr>
<tr><td>30</td><td>AM</td><td>AM VCO
Signal Input</td><td>Inputs a local MW output. Cut and input DC current with condenser since AC amplifier is incorporated.</td><td>Input</td></tr>
<tr><td>31
33
34
35
36
40</td><td>AMS
Dolby NR
METAL
LOUD
LOC/DX
STEREO</td><td>AMS
Dolby NR
METAL
LOUD
LOC/DX
STEREO</td><td>Reverses the output for every corresponding key input at this optional function output pins. However, the possible key input and the effective output obtained vary according to the mode, as shown in the following table.
<table>
<tr><th>TAPE Input / Output</th><th>TAPE input High</th><th colspan="2">TAPE Input Low</th></tr>
<tr><td></td><td></td><td>FM</td><td>MW</td></tr>
<tr><td>LOUD</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>LOC/DX</td><td>×</td><td>○</td><td>○</td></tr>
<tr><td>STEREO</td><td>×</td><td>○</td><td>○</td></tr>
<tr><td>METAL</td><td>○</td><td>×</td><td>×</td></tr>
<tr><td>Dolby NR</td><td>○</td><td>×</td><td>×</td></tr>
<tr><td>AMS</td><td>○</td><td>×</td><td>×</td></tr>
</table>
○ : possible key input, output also effective
× : key input ignored, output low
Original output is recovered status when TAPE input is switched. Also, at the time of power ON, these outputs are all low level.
Because this optional function has only a conditional latch function according to the mode, objects other than those with the above titles can be used.</td><td>CMOS
push-pull (I/O)</td></tr>
<tr><td>32</td><td>SCAN</td><td>SCAN signal output</td><td>During SCAN action only, high-level output occurs so can be used as a SCAN indicator.</td><td>CMOS
push-pull</td></tr>
<tr><td>37</td><td>MW BAND</td><td>MW control output</td><td>MW tuner control output pin. High-level is output only when low-level (radio mode) at the TAPE pin and MW selection. Other than this, signal is low-level.</td><td>CMOS
push-pull (I/O)</td></tr>
</table>

PIN NO.	SYMBOL	NAME	DESCRIPTION	OUTPUT TYPE
38	$\overline{\text{AGCCUT}}$	$\overline{\text{AGCCUT}}$ signal output	Only when SEEK UP, SEEK DWN, and SCAN keys are depressed (during auto-tuning), the $\overline{\text{AGCCUT}}$ signal indicated below is output (active-low). As a result, STOP becomes more reliable during auto-tuning.  This signal can also be used as the auto-tuning indicator output.	CMOS push-pull (I/O)
39	FM BAND	FM control output	FM tuner control output pin. High-level is output only when low-level (radio mode) at TAPE pin and FM selection. Other than this, signal is low-level.	CMOS push-pull (I/O)
41	TAPE	Tape mode signal input	This input pin is for setting tape mode (high-level) or radio mode (low-level).	CMOS push-pull (I/O)
42	KEYACK	Key input signal output	Only when the controller receives key input, high-level is output for about 40 ms. It is possible to get a confirming sound during key input by connecting to an external generator.	CMOS push-pull (I/O)

CONTENTS

1. KEY MATRIX

1.1 CONFIGURATION OF KEY MATRIX

Input / Output	K_3 (11)	K_2 (10)	K_1 (9)	K_0 (8)
S_a (1)	MAN UP	MAN DWN	HRADJ	MINADJ
S_b (2)	SEEK UP	SEEK DWN	SCAN	DISP
S_c (3)	M1	M2	M3	M4
S_d (4)	M5	M6	ME5	ME6
S_e (5)	ME1	ME2	ME3	ME4
S_f (6)	LDC/DX	LOUD	METAL	Dolby NR
S_g (7)	ST	AMS	BAND	–
D_1 (17)	–	–	DIM	PRIO
D_2 (16)	FMSEL1	FMSEL2	MWSEL	NOCLOCK
D_3 (15)	IF	M/R	BLANK	–

( ) : Pin No.

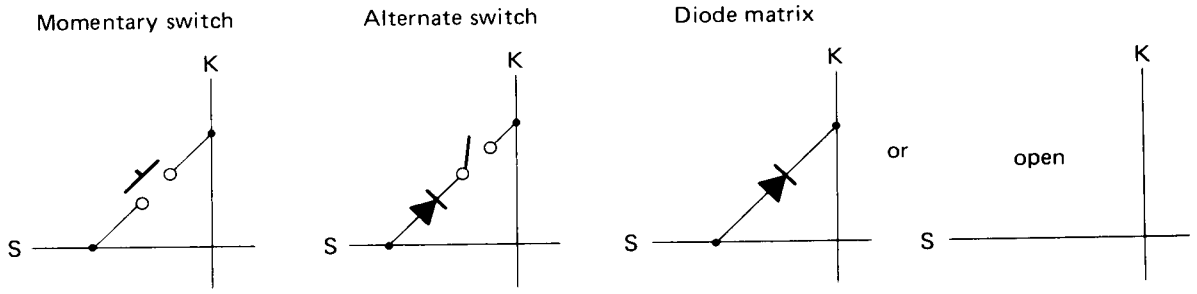
Momentary switch

Alternate switch

Diode matrix

– Open

1.2 SWITCH CONNECTION



Note: The signal from the diode switch is read only when power is first fed to V_{DD}, or when voltage at the CE pin goes from low to high. In other cases, it is ignored. Momentary and Alternate switches can be changed at anytime.

1.3 DESCRIPTION OF KEY MATRIX

1.3.1 Initialization Diode Switch

There are a total of seven initialization switches. Their signals are read only when power is first fed to the V_{DD} pin (Power-ON Reset), and when voltage at the CE pin changes from low to high (CE reset). At any other time the status of these switches is ignored.

The switch setting is determined by whether the diode at the matrix nodal point is closed (ON) or open (OFF).

(1) Area setting switches for FM band
FMSEL1, FMSEL2

(2) Channel spacing setting switch for MW band
MWSEL

(3) Switch for setting whether or not the clock will be used.
NOCLOCK

(4) Switch for setting the FM IF
IF

(5) Selection switch that either the momentary switch or the rotary switch to be used as the manual UP/DOWN key.
M/R

(6) Blank display setting switch (PRIO = OFF, TAPE input pin = High)
BLANK

<table>
<tr><th>SYMBOL</th><th>DESCRIPTION</th></tr>
<tr><td>FMSEL1
FMSEL2</td><td>These switches are for setting the FM band for the particular territory.
<table>
<tr><th>FMSEL1</th><th>FMSEL2</th><th>Area</th><th>Frequency Range</th><th>Channel Spacing</th></tr>
<tr><td>0</td><td>0</td><td>U.S.A.</td><td>87.7 to 107.9 MHz</td><td>200 kHz</td></tr>
<tr><td>1</td><td>0</td><td>Japan</td><td>76.1 to 89.9 MHz</td><td>100 kHz</td></tr>
<tr><td>0</td><td>1</td><td>Australia</td><td>87.7 to 107.9 MHz</td><td>100 kHz</td></tr>
<tr><td>*1</td><td>1</td><td>–</td><td>–</td><td>–</td></tr>
</table>
* Do not turn both FMSEL1 and FMSEL2 ON simultaneously. The territory cannot be properly set.</td></tr>
<tr><td>MWSEL</td><td>This switch is for setting the MW band channel spacing.
<table>
<tr><th>MWSEL</th><th>Frequency Range</th><th>Channel Spacing</th></tr>
<tr><td>0</td><td>530 to 1 620 kHz</td><td>10 kHz</td></tr>
<tr><td>1</td><td>531 to 1 602 kHz</td><td>9 kHz</td></tr>
</table></td></tr>
<tr><td>NOCLOCK</td><td>This switch is for setting whether or not the clock will be used.
<table>
<tr><th>NOCLOCK</th><th>Clock Function</th></tr>
<tr><td>0</td><td>Present</td></tr>
<tr><td>1</td><td>Absent</td></tr>
</table>
When the clock is used (NOCLOCK = OFF), the setting of the display switching mode is carried out by a combination of the PRIO and BLANK switches.</td></tr>
<tr><td>IF</td><td>This switch is for setting the FM IF.
(MHz)
<table>
<tr><th>IF</th><th>U.S.A.</th><th>Japan</th><th>Australia</th></tr>
<tr><td>0</td><td>10.700</td><td>–10.700</td><td>10.700</td></tr>
<tr><td>1</td><td>10.725</td><td>–10.675</td><td>10.725</td></tr>
</table></td></tr>
<tr><td>M/R</td><td>This switch is used to select either the momentary switch or the rotary switch to be used as the manual UP/DOWN key.
<table>
<tr><th>M/R</th><th>Manual UP/DOWN</th></tr>
<tr><td>0</td><td>Rotary Switch</td></tr>
<tr><td>1</td><td>Momentary Switch</td></tr>
</table></td></tr>
<tr><td>BLANK</td><td>This switch is used to set whether the display is blank or shows the clock when the tape is loaded (TAPE input pin = high), when not in clock priority display mode (PRIO = OFF).
When PRIO = OFF and TAPE input = high
<table>
<tr><th>BLANK</th><th>Display status</th></tr>
<tr><td>0</td><td>Clock Display</td></tr>
<tr><td>1</td><td>Display OFF (blank)</td></tr>
</table>
When in clock priority display mode (PRIO = ON) and when the tape is loaded (TAPE input pin = high), the clock is displayed unconditionally, regardless of the status of the BLANK switch.</td></tr>
</table>

1.3.2 Alternate Switch

There are two alternate switches – DIM and PRIO. Unlike the initializing switches, it is always possible to change these switches.

<table>
<tr><th>SYMBOL</th><th>DESCRIPTION</th></tr>
<tr><td>DIM</td><td>This switch changes the brightness of the display
<table>
<tr><th>DIM</th><th>Display Brightness</th></tr>
<tr><td>0</td><td>Bright</td></tr>
<tr><td>1</td><td>Dark</td></tr>
</table></td></tr>
<tr><td>PRIO</td><td>This switch is used to set the display priority mode.
<table>
<tr><th>PRIO</th><th>Display Mode</th></tr>
<tr><td>0</td><td>Frequency display priority</td></tr>
<tr><td>1</td><td>Clock display priority</td></tr>
</table></td></tr>
</table>

1.3.3 Momentary Switch

There are a total of 27 momentary switches.

<table>
<tr><th>SYMBOL</th><th>DESCRIPTION</th></tr>
<tr><td>MAN UP
MAN DWN</td><td>This key is used for manual tuning. The momentary switch and the rotary switch can be selected by the diode switch M/R used for initialization.
Momentary Switch (M/R = ON)
Each time the switch is depressed the frequency moves one step UP or DOWN. If continuously depressed for more than 0.5 seconds, fast forwarding is performed until the key is released (sawtooth wave mode). The speed of the fast forwarding is 40 ms per one step.
Rotary Switch (M/R = OFF)
The frequency moves one step UP or DOWN for each pulse. A pulse of up to about 4 ms can be received. If a long pulse is input the fast forwarding does not occur.</td></tr>
<tr><td>SEEK UP
SEEK DWN</td><td>This key is used for auto-tuning. In the sawtooth wave mode, a continuous search is made for the station in the UP or DOWN direction until the SD pin reaches high level. When the SD pin once reaches the high level, that frequency is maintained.
The auto-tuning action can be halted by depressing this key twice, regardless of the status of the SD pin. The auto-tuning speed is about 40 ms per one step.</td></tr>
<tr><td>SCAN</td><td>This key is used for auto-scanning. A continuous search is made for the station in the UP direction in the sawtooth wave mode until the SD pin reaches the high level. With the SD pin at the high level frequency, there is about a 5 second HOLD, then the search continues for the next station.
This action continues until any key is operated, with the exception of SCAN and ME1 to ME6. When the SCAN key is once again depressed, the auto-SCAN action halts. Also, during about 5 seconds of HOLD, ME1 to ME6 are activated to write in memory without interrupting auto-SCAN action. It is then possible to write into memory. In this case, after the M1 to M6 keys are released and after that frequency is held for about 5 seconds, the auto-SCAN, action resumes. During SCAN action outside of the HOLD period, the ME1 to ME6 keys are ineffective.</td></tr>
<tr><td>M1
M2
M3
M4
M5
M6</td><td>This key is used to access preset memory. One key corresponds to FM and MW independently, and each band can contain 6 stations with different frequencies, making a total of 12 stations.
When power is first fed to V_{DD} the following frequencies are automatically recorded.
<table>
<tr><th>BAND</th><th>AREA</th><th>M1</th><th>M2</th><th>M3</th><th>M4</th><th>M5</th><th>M6</th></tr>
<tr><td rowspan="3">FM (MHz)</td><td>U.S.A.</td><td>87.7</td><td>88.1</td><td>98.1</td><td>107.9</td><td>87.7</td><td>87.7</td></tr>
<tr><td>Australia</td><td>87.7</td><td>88.1</td><td>98.1</td><td>107.9</td><td>87.7</td><td>87.7</td></tr>
<tr><td>Japan</td><td>76.1</td><td>76.1</td><td>83.0</td><td>89.9</td><td>76.1</td><td>76.1</td></tr>
<tr><td rowspan="3">MW (kHz)</td><td>U.S.A.</td><td>530</td><td>600</td><td>1 000</td><td>1 400</td><td>1 602</td><td>530</td></tr>
<tr><td>Australia</td><td>531</td><td>594</td><td>954</td><td>1 314</td><td>1 602</td><td>531</td></tr>
<tr><td>Japan</td><td>531</td><td>594</td><td>954</td><td>1 314</td><td>1 620</td><td>531</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>SYMBOL</th><th>DESCRIPTION</th></tr>
<tr><td>ME1
ME2
ME3
ME4
ME5
ME6</td><td>This key is used for writing in to preset memory. One key corresponds to FM and MW indenpendently, and each band can contain 6 stations with different frequencies, making a total of 12 stations. Call key M1 corresponds to write-in key ME1
There are respectively 6 independent write-in keys.</td></tr>
<tr><td>BAND</td><td>These keys are used to switch bands. They switch the display and power source control signals (FM, MW output). Each time the key is depressed, the FM and MW bands are switched. FM is selected when V_{DD} is initially powered on.</td></tr>
<tr><td>DISP</td><td>This key is used to switch the frequency and clock displays.</td></tr>
<tr><td>HRADJ
MINADJ</td><td>These keys are used to adjust the time while the clock is being displayed. Hours and minutes can be adjusted independently. Each time the MINADJ key is pressed the figure in the minutes column moves up once, and at the same time the internal second counter is reset. Carry to the hours column does not occur. Each time the HRADJ key is pressed the hours column moves up. This is a 12 hour display clock. AM and PM are not differentiated.</td></tr>
<tr><td>LOUD
LOC/DX
ST
METAL
Dolby NR
AMS</td><td>These are the option function keys. Each time a key is depressed the corresponding output pin voltage reverses. When first powered on these output pins are all at the low level.
As shown in the following table, the key which is effective in each mode (and the output) varies.
<table>
<tr><th rowspan="2">Key and Output</th><th>TAPE input</th><th colspan="2">TAPE input Low</th></tr>
<tr><th>High</th><th>FM</th><th>MW</th></tr>
<tr><td>LOUD</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>LOC/DX</td><td>×</td><td>○</td><td>○</td></tr>
<tr><td>ST</td><td>×</td><td>○</td><td>○</td></tr>
<tr><td>METAL</td><td>○</td><td>×</td><td>×</td></tr>
<tr><td>Dolby NR</td><td>○</td><td>×</td><td>×</td></tr>
<tr><td>AMS</td><td>○</td><td>×</td><td>×</td></tr>
</table>
○ : key input possible, output also effective
× : key input ignored, output low
Because this accessory function only has a conditional latch function according to the mode, objects other than the titles shown above can be used.</td></tr>
</table>

1.4 INITIALIZATION

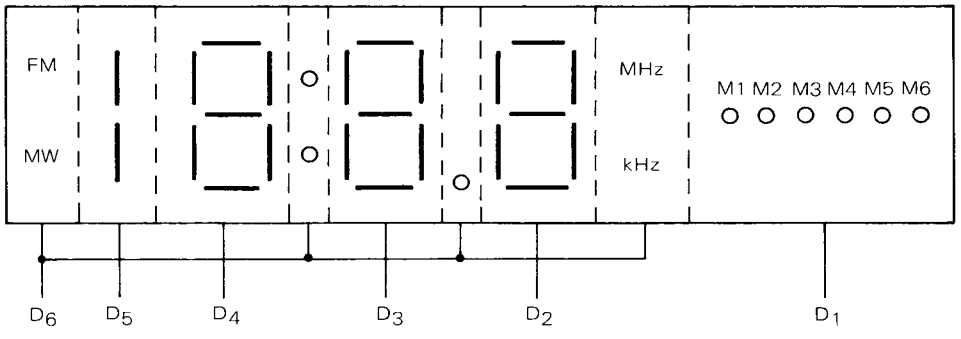
1. The following status results when power is first fed to V_{DD}.
   (1) The frequencies for tracking adjustment, represented in keys [M1] to [M6] are stored in preset memory. The lowest frequency for the band is stored in the last station memory.
   (2) In TAPE eject status (TAPE input pin = low), FM mode results (FM output pin = high), and the contents of the FM last station memory, that is, the lowest FM frequency, are accessed.
   (3) The output corresponding to the option key is always low-level.
   ([LOUD] , [LOC/DX] , [ST] , [METAL] , [Dolby NR] , [AMS])
   (4) The clock setting is 1:00.
2. Without cutting power to V_{DD}, when only the CE pin goes from low to high, the following status occurs.
   (1) The contents of preset memory, last station memory, last preset memory, and last band memory are maintained. The contents of the last station memory for the last band received are accessed. In the case where the contents of finally preset memory is received, its indicator is also returned.
   (2) The option key status is maintained and the output reverts to the previous status.
   ([LOUD] , [LOC/DX] , [ST] , [METAL] , [Dolby NR] , [AMS])

2. DISPLAY

	D_6	D_5	D_4	D_3	D_2	D_1
S_a	FM	–	a	a	a	M1
S_b	D.P. MHz	b	b	b	b	M2
S_c	–	c	c	c	c	M3
S_d	–	–	d	d	d	M4
S_e	MW	–	e	e	e	M5
S_f	COLON	–	f	f	f	M6
S_g	kHz	–	g	g	g	–

Uppermost column … Lowermost column

Frequency and clock display | Preset memory display

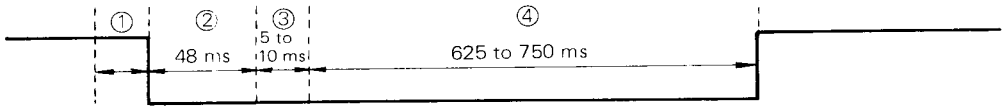


3. TIMING CHARTS

MUTE Output (Active-Low) Timing Chart

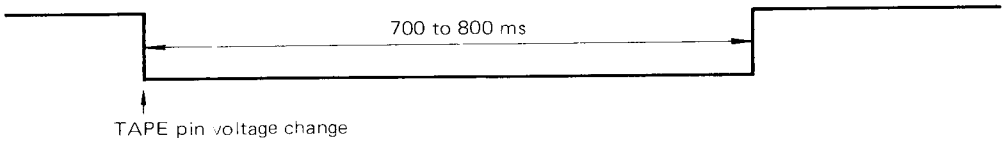
① Key ON chattering prevention time (about 15 ms)
② Mute leading time
③ Setting dividing ratio and display contents renewal time
④ Mute trailing time
⑤ Wait time until SD terminal signal detected
⑥ Wait time until PLL locked (changes according to the constant of externally connected LPF)

(1) Receiving band change (FM, MW)

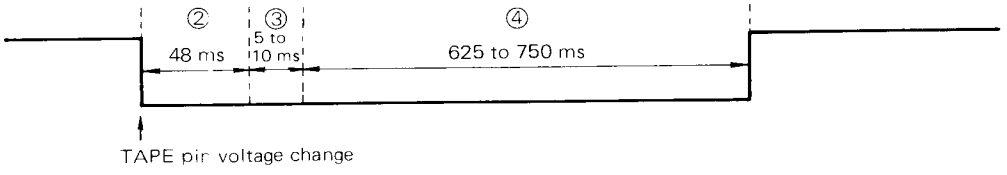


(2) TAPE pin voltage change

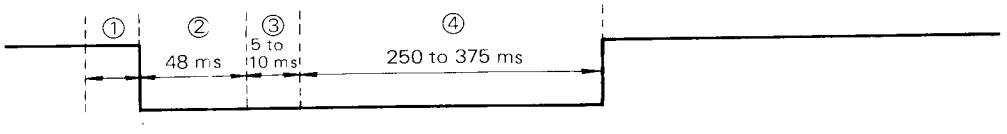
(i) Low (RADIO) → High (TAPE)



(ii) High (TAPE) → Low (RADIO)

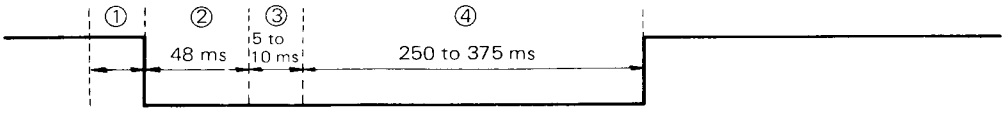


(3) Preset memory access

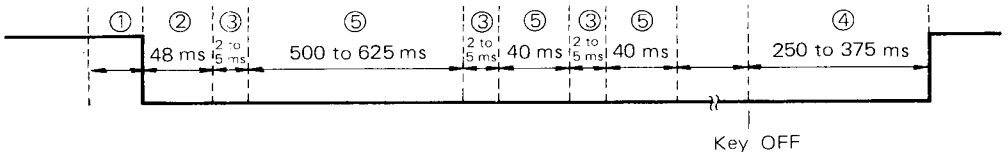


(4) MAN UP , MAN DWN key depressed

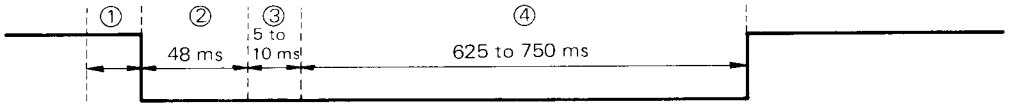
(i) Key ON less than 500 ms (step feed)



(ii) Key ON more than 500 ms (fast forwarding)

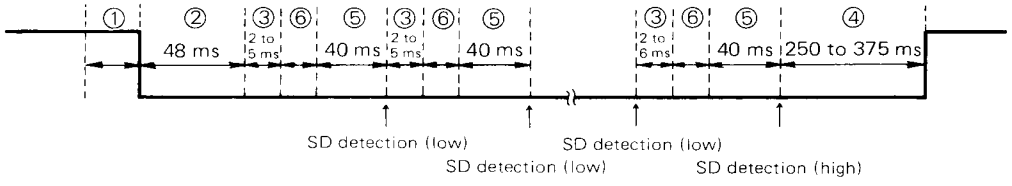


(iii) Band edge (upper limit → lower limit, lower limit → upper limit)

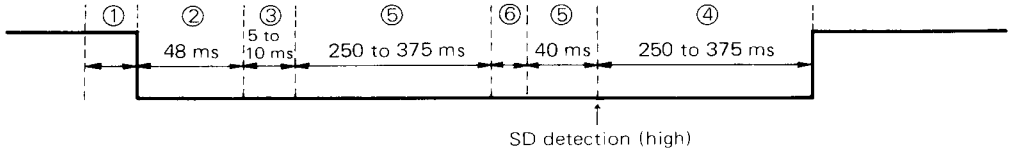


(5) SEEK UP , SEEK DWN key depressed

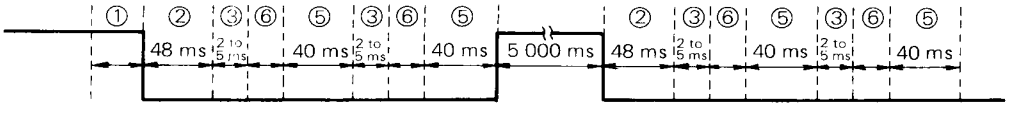
(i) Normal



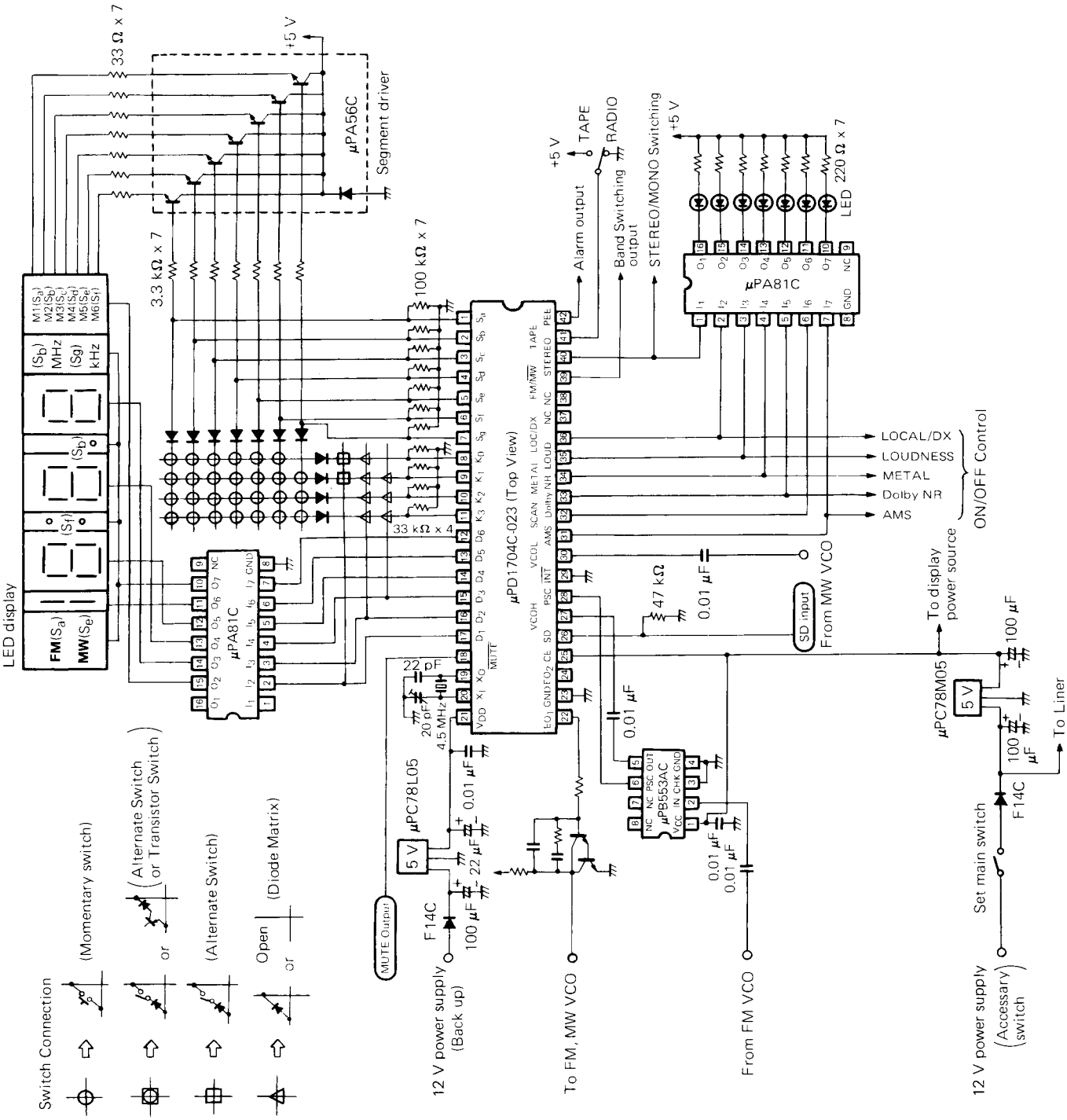
(ii) Band edge (upper limit → lower limit, lower limit → upper limit)



(6) SCAN key depressed



4. APPLICATION CIRCUIT



5. ELECTRICAL CHARACTERISTICS

5.1 ABSOLUTE MAXIMUM RATINGS

Supply Voltage	V_{DD}	−0.3 to +6.0	V
Input Voltage	V_I	−0.3 to V_{DD}	V
Output Voltage	V_O	−0.3 to V_{DD}	V
Output Sink Current	I_O	10	mA
Operating Temperature	T_{opt}	−35 to +75	°C
Storage Temperature	T_{stg}	−55 to +125	°C

5.2 RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITION
Supply Voltage	V_{DD}	4.5	5.0	5.5	V	
Data Retention Voltage	V_{DR}	2.5		5.5	V	CE=0, NOCLOCK = ON
Oscillation Stop Voltage	V_{DDS}		3.2	3.8	V	
Supply Voltage Rise Time	T_{rise}			500	ms	V_{DD}=0 → 4.5 V

5.3 DC CHARACTERISTICS (V_{DD} = +4.5 to 5.5 V, T_a = −35 to +75 °C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITION
High Level Input Voltage	V_{IH1}	0.8 V_{DD}		V_{DD}	V	SD pin
High Level Input Voltage	V_{IH2}	0.7 V_{DD}		V_{DD}	V	I/O port, CE pin (Note)
High Level Input Voltage	V_{IH3}	0.6 V_{DD}		V_{DD}	V	K_0 to K_3 pins
Low Level Input Voltage	V_{IL1}	0		0.3 V_{DD}	V	I/O port, CE pin (Note)
Low Level Input voltage	V_{IL2}	0		0.2 V_{DD}	V	K_0 to K_3, SD pins
High Level Output Voltage	V_{OH1}	4.0			V	EO_1, EO_2 pins I_{OH}=−0.5 mA
High Level Output Voltage	V_{OH2}	4.0			V	D_1 to D_6, $\overline{MUTE}$, I/O port (Note) I_{OH}=−0.2 mA
High Level Output Voltage	V_{OH3}	4.0			V	PSC pin I_{OH}=−0.1 mA
High Level Output Voltage	V_{OH4}	3.0			V	S_a to S_g pins I_{OH}=−0.5 mA
Low Level Output Voltage	V_{OL1}			0.5	V	EO_1, EO_2 pins, I/O port (Note) I_{OL}=0.5 mA
Low Level Output Voltage	V_{OL2}			0.5	V	D_1 to D_6, $\overline{MUTE}$, PSC pins I_{OL}=0.2 mA
High Level Input Current	$+I_{IH1}$	10	40	100	μA	K_0 to K_3 pins V_{IN}=V_{DD}=5.5 V
High Level Input Current	$+I_{IH2}$		300		μA	XI pin (when Pull Down) V_{IN}=V_{DD}=5.0 V
Low Level Input Current	$-I_{IL1}$		300		μA	AM, FM pins (when Pull Down) V_{IN}=0, V_{DD}=5.0 V
Output Leakage Current	I_L		10^{-3}	1	μA	EO_1, EO_2 pin, T_a=25 °C $V_{p\text{-}p(MIN.)}$
Supply Current	I_{DD1}		3		mA	Without input output current from input output pin
Supply Current	I_{DD2}		0.6		mA	CE=0 at NOCLOCK = OFF V_{DD}=5.0 V
Data Retention Current	I_{DR}			10	μA	CE=0 at NOCLOCK = ON, T_a=25 °C, V_{DD}=5.0 V

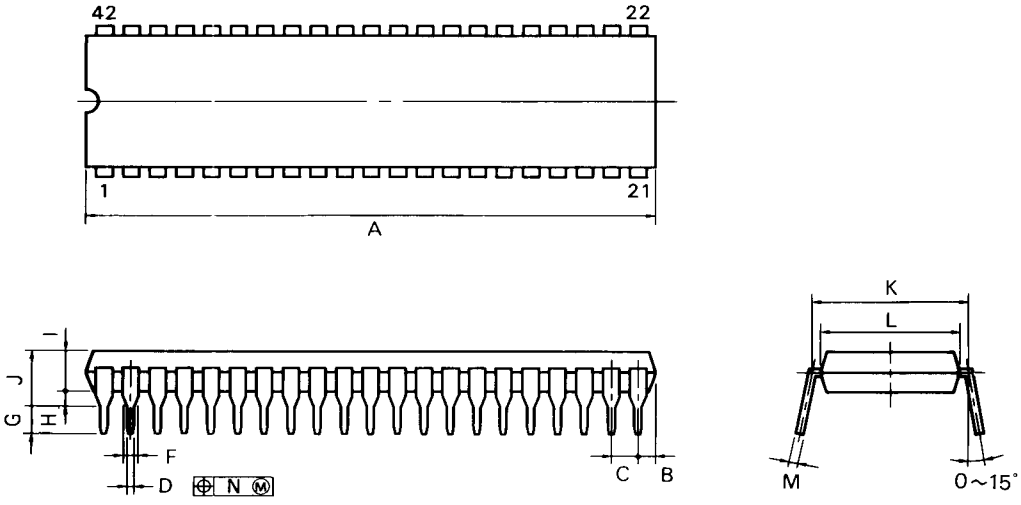
(Note) I/O ports means the KEYACK, TAPE, STEREO, FM BAND, $\overline{AGCCUT}$, MW BAND, LOC/DX, LOUD, METAL, Dolby NR, SCAN, AMS pins.

5.4 AC CHARACTERISTICS (V_{DD} = +4.5 to 5.5 V, T_a = −35 to +75 °C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITION
Operating Frequency	f_{in1}	0.5		2.5	MHz	AM pin, V_{in}=1.0 $V_{p\text{-}p(MIN.)}$, DC cut
Operating Frequency	f_{in2}	0.5		8.8	MHz	FM pin, V_{in}=0.8 $V_{p\text{-}p(MIN.)}$, square wave form, DC cut

6. PACKAGE DIMENSIONS (Unit: mm)

42 pin plastic DIP (600 mil)



P42C-100-600A,B

NOTES

1) Each lead centerline is located within 0.25 mm (0.01 inch) of its true position (T.P.) at maximum material condition.

2) Item "K" to center of leads when formed parallel.

ITEM	MILLIMETERS	INCHES
A	55.88 MAX.	2.200 MAX.
B	2.54 MAX.	0.100 MAX.
C	2.54 (T.P.)	0.100 (T.P.)
D	$0.50^{\pm 0.10}$	$0.020^{+0.004}_{-0.005}$
F	1.2 MIN.	0.047 MIN.
G	$3.6^{\pm 0.3}$	$0.142^{\pm 0.012}$
H	0.51 MIN.	0.020 MIN.
I	4.31 MAX.	0.170 MAX.
J	5.72 MAX.	0.226 MAX.
K	15.24 (T.P.)	0.600 (T.P.)
L	13.2	0.520
M	$0.25^{+0.10}_{-0.05}$	$0.010^{+0.004}_{-0.003}$
N	0.25	0.01