

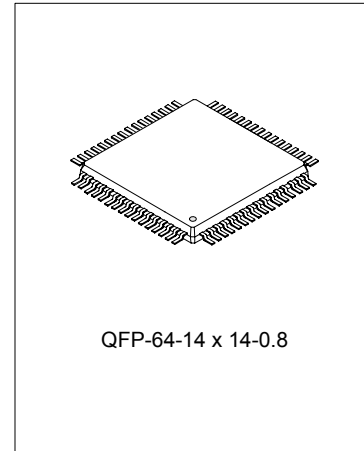
CD SERVO CONTROLLER WITH MCU (WITH CLOCK AND RADIO FREQUENCY DISPLAY)

DESCRIPTION

SC9638FP is a kind of mature function CD with clock. It incorporates CD play, radio display, clock display, automatic sleep power off and two alarm power on functions. This IC includes CD digital servo controller, CD signal processor, radio frequency display, digital audio DAC output, LED static display. it has few external components, is a low cost product.

FEATURES

- * CD play function
 - Compatible with CD/CD-R/CD-RW
 - Support CD play/pause
 - Support CD previous /next track
 - Support CD fast forward/backward
 - Support CD single track, whole disk play repeatedly
 - Support CD random play
 - Support CD random play display
 - Support 20 songs program play
- * Clock function
 - Support clock display
 - Support two alarms, and can select CD play, radio or alarm.
 - Support snooze function(6 minutes)
 - Support sleep function
- * Radio function
 - Support FM/AM frequency display



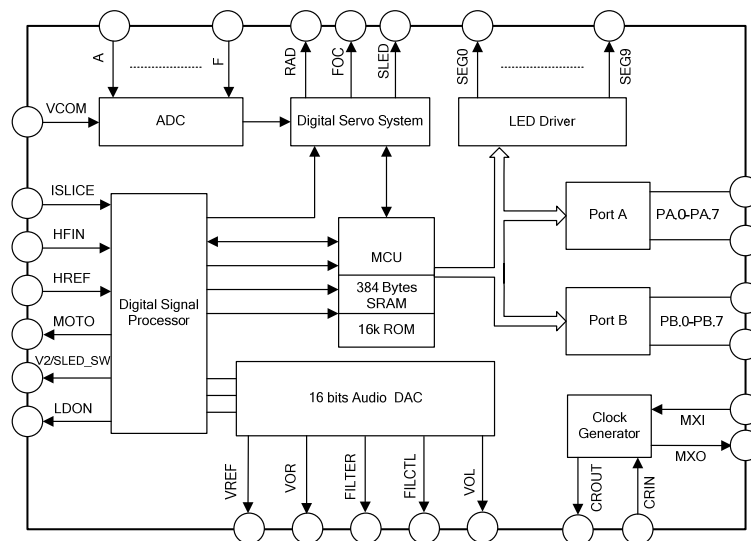
ORDERING INFORMATION

Device	Package
SC9638FP	QFP-64-14X14-0.8

APPLICATIONS

- * Desktop CD audio

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS ($T_{amb}=25^{\circ}\text{C}$)

Characteristics	Symbol	Rating	Unit
Power Supply Voltage	VDD	-0.5 ~ +5.5	V
Input Voltage	VIN	-0.5 ~VDD + 0.5	V
Operating Temperature	Topr	-20 ~ +75	$^{\circ}\text{C}$

ELECTRICAL CHARACTERISTICS ($V_{DD}=4.5\sim 5.5\text{V}$; $V_{SS}=0\text{V}$; $T_{amb}=-10\sim +50^{\circ}\text{C}$)

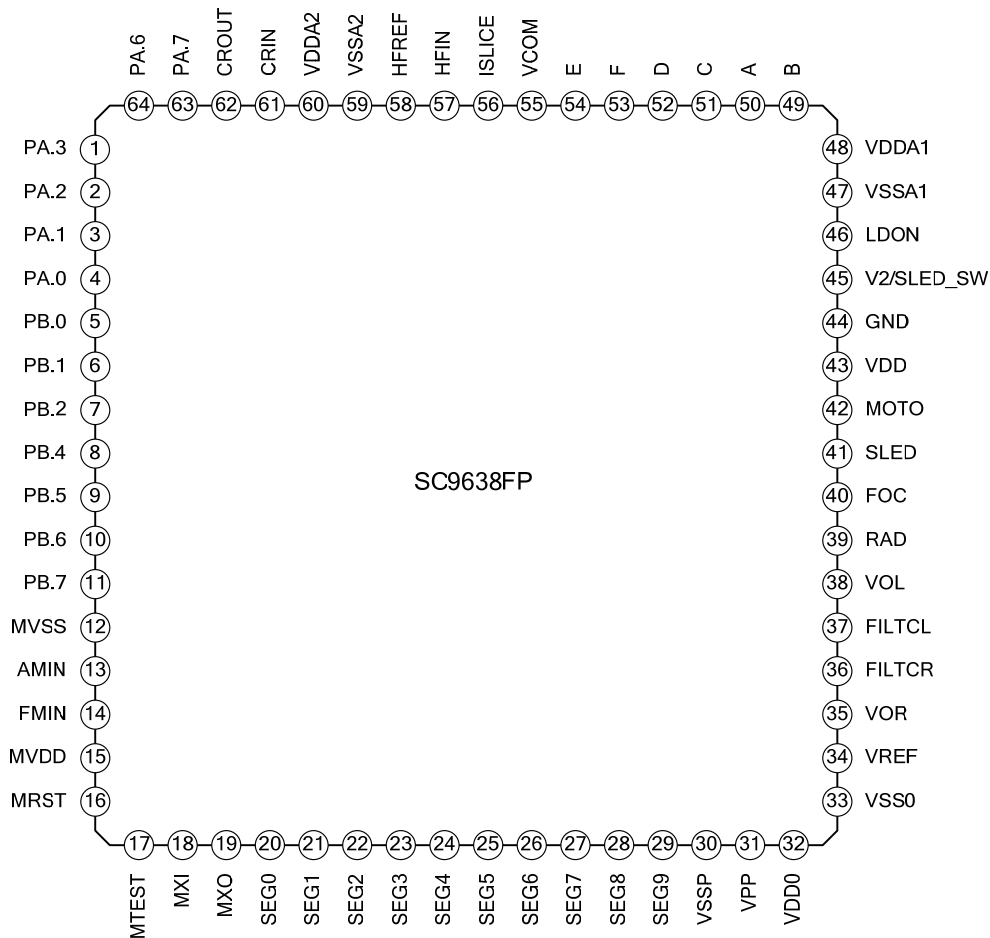
Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Supply Voltage	VDD		4.5	5.0	5.5	V
Supply Current	IDD	5V(CD is working)	—	50	—	mA
RFIN Input Signal Voltage	VRFIN		—	1	—	V
Reference Voltage	V _{Ir}		—	0.5VDD	—	
Bias Input Voltage Of Diode	V _{com}		—	2.5	—	V
Input Current Of Central Diode B	IDB		0	—	9	μA
Input Current Of Central Diode A	IDA		0	—	9	μA
Input Current Of Central Diode C	IDC		0	—	9	μA
Input Current Of Central Diode D	IDD		0	—	9	μA
Input Current Of Satellite Diode F	IRF		0	—	4.5	μA
Input Current Of Satellite Diode E	IRE		0	—	4.5	μA
PA Port Low Level Input Current	IIL(A)		—	10	—	mA
PA Port High Level Output Current	IOH(A)		—	10	—	mA
PB Port Low Level Input Current	IIL(B)		—	10	—	mA
PB Port High Level Output Current	IOH(B)		—	10	—	mA
LDON Low Level Input Current	ILDON		0	—	2	mA
Audio Load Resistor	RL	The left/right channel is same	5	—	—	$\text{K}\Omega$
The Max. Audio Voltage	VFS	The left/right channel is same	0.9	1.1	1.2	V
RAD Current	IRAD	The high/low level is same	0	1	—	mA
FOC Current	I _{FOC}	The high/low level is same	0	1	—	mA
SLED Current	ISLED	The high/low level is same	0	1	—	mA
MOTO Current	IMOTO	The high/low level is same	0	5	10	mA
Drive Signal Low Level Voltage	VOLDRIVE1	RAD, FOC, SELD	0	—	0.4	V
Drive Signal High Level Voltage	VOHDRIVE1	RAD, FOC, SELD	VDD-0.4	—	VDD	V
Moto Low Level Output Voltage	VOLmoto		0	—	1.0	V
Moto High Level Output Voltage	VOHmoto		VDD-1	—	VDD	V

(To be continued)

(Continued)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Drive Signal High Impedance Current	IZODRIVE	RAD, FOC, SELD, MOTO	-10	0	+10	μA
DAC Total Harmonic Distortion Plus Noise	(THD+N)/S		60	65	70	dB
DA Filter Attenuation	Filter_DA	0 ~ 19 KHz	-	-	0.001	dB
		19 ~20 KHz	1	-	2	dB
		24KHz	25	-	-	dB
		25~35 KHz	40	-	-	dB
		35~64 KHz	50	-	-	dB
		64~68 KHz	31	-	-	dB
		68KHz	35	-	-	dB
69~88KHz	40	-	-	dB		
The System Oscillation Frequency	Fsystem		—	8.4672	—	MHz

PIN CONFIGURATION



PIN DESCRIPTIONS

Pin no.	Pin name	I/O	Descriptions
1	PA.3	I	I/O port
2	PA.2	I	I/O port
3	PA.1	I	I/O port
4	PA.0	I	I/O port
5	PB.0	I	I/O port
6	PB.1	I	I/O port
7	PB.2	O	I/O port
8	PB.4	O	I/O port
9	PB.5	O	I/O port
10	PB.6	O	I/O port
11	PB.7	O	I/O port
12	MVSS	--	The special analog ground.
13	AMIN	--	AM local oscillation signal input pin.
14	FMIN	--	FM local oscillation signal input pin.
15	MVDD	--	MCU power
16	MRST	--	MCU reset
17	MTEST	--	MCU test pin, connect with ground.
18	MXI	I	MCU clock input pin using 75kHz crystal oscillator.
19	MXO	O	MCU clock output pin using 75kHz crystal oscillator.
20	SEG0	--	LCD SEG0
21	SEG1	--	LCD SEG1
22	SEG2	--	LCD SEG2
23	SEG3	--	LCD SEG3
24	SEG4	--	LCD SEG4
25	SEG5	--	LCD SEG5
26	SEG6	--	LCD SEG6
27	SEG7	--	LCD SEG7
28	SEG8	--	LCD SEG8
29	SEG9	--	LCD SEG9
30	VSSP	--	Digital ground
31	VPP	--	OTP power
32	VDD0	--	+5V DAC power
33	VSS0	--	DAC ground
34	VREF	--	Reference voltage output, the typical value is 0.5VDD.
35	VOR	--	DAC right channel audio output.
36	FILTCR	--	DAC right channel filter capacitance
37	FILTCL	--	DAC left channel filter capacitance
38	VOL	--	DAC left channel audio output

(To be continued)

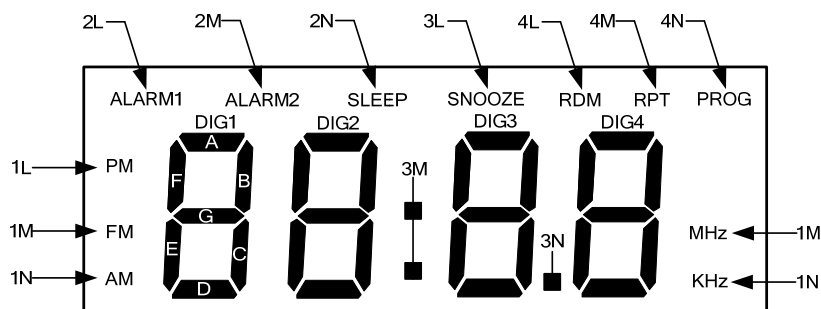
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Pin no.	Pin name	I/O	Descriptions
39	RAD	--	Tracking drive output
40	FOC	--	Focus drives output.
41	SLED	--	Sled drive output.
42	MOTO	--	Spindle drive output.
43	VDD	--	Servo power.
44	GND	--	Servo ground, I/O port ground
45	V2/SLED_SW	--	Sled motor position monitor signal input, with pull-up resistor.
46	LDON	--	Laser control signal.
47	VSSA1	--	Servo module ADC analog ground.
48	VDDA1	--	Servo module ADC analog power.
49	B	--	Central diode B signal input
50	A	--	Central diode A signal input
51	C	--	Central diode C signal input
52	D	--	Central diode D signal input
53	F	--	Satellite diode F signal input
54	E	--	Satellite diode E signal input
55	VCOM	--	Common voltage input.
56	ISLICE	--	Data signal feedback current output
57	HFIN	--	Disk data pick up signal input
58	HFREF	--	Reference signal
59	VSSA2	--	Servo HF and PLL analog ground
60	VDDA2	--	Servo HF and PLL analog power
61	CRIN	I	8.4672MHz input
62	CROUT	O	8.4672MHz output
63	PA.7	--	I/O port
64	PA.6	--	I/O port

FUNCTION DESCRIPTIONS

1. LED

The LED panel as follows:



2. Jumper

Function descriptions

Mark	Function descriptions		
24/12CLK	<i>12/24 hours selection</i>		
	24/12CLK	Functions	
	0	24 hours	
	1	12 hours	
DIS_RAND	<i>DISPLAY share with RANDOM selection</i>		
	DIS_RAND	Functions	
	0	Not compatible	
	1	DISPLAY share with RANDOM, press the DISPLAY key for a long time is RANDOM mode.	
OPTION1/OPTION2	<i>Pick up head selection</i>		
	OPTION1	OPTION2	Functions
	0	0	Sony KSS213C, Samsung B31
	0	1	Sanyo DA11
	1	0	Thomson TCP11
	1	1	JiangHai GM9350
IF_DECINC	<i>IF selection</i>		
	IF_DECINC	Functions	
	0	FM IF -10.7M	
	1	FM IF +10.7M	
SLEEP_POW	<i>SLEEP light share with POWER light selection</i>		
	SLEEP_POW	Functions	
	0	Not share with	
	1	In normal power on, SLEEP light on, when turn on sleep, SLEEP light flashes, and SLEEP light turn off when power shutdown.	

Note: the 1 in this table means jumper is connected.

3. Keyboard

Keyboard arrangement

KIN1	KIN2
PLAY/PAUSE	POWER
STOP	DISPLAY
UP/FF	CLOCK
DOWN/REW	ALARM1
RROG	ALARM2
RAND	SLEEP
RPT	SNOOZE
PROG/RPT	DIMMER

4. Mode switch

- 4.1 AUTO/BUZZ: when the alarm power on is active, select alarm mode. The normal power on or off won't affect the current state;
- 4.2 CD/RADIO (FM, AM): Switch CD and radio mode (FM, AM) in power on (FM, AM);
- 4.3 In power on mode, press the DISPLAY key, switch time and current state display, if there are no operations during the state display for 5 seconds, it will return to the time display.

5. CD mode

5.1 CD key function

1) STOP

If STOP key is pressed during the CD play mode, the system stops playing.

2) PLAY/PAUSE

- ◇ When CD stops, press this key to play CD and display CD music
- ◇ When CD plays, press this key to pause, and display flashes

3) NEXT/FF

- ◇ Press this key less than 1 second: next music
Jump to the next music, if the current is the last music, then jump to the first music.
- ◇ Press this key more than 1 second: fast forward
Fast forward until release the key, if FF to the last music, then jump to the first music and play normally.

4) PREV/FW

- ◇ Press the key less than 1s: previous music.
If the current music play time is less than 1s, jump to the previous music; if the current music is the first music, then jump to the last music.
- ◇ Press the key more than 1s: fast backward
Fast backward until release the key, if it is to the first music, then play normally.

5) RDM

Switch RDM mode, if this function active, display "RDM".

6) RPT

Switch single music or whole disk play state, press the RPT key will repeat play the current music and "RPT" flashes; press the RPT again, play the whole disk and display "RPT".

7) PROG

Enter program state (active in STOP mode), "PROG" flashes.

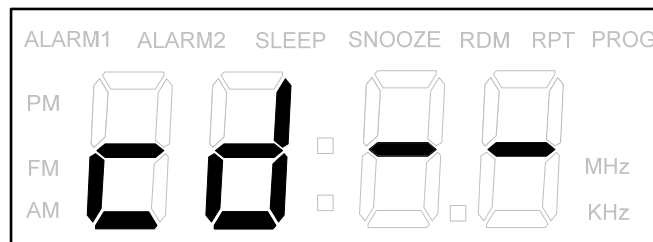
- ◇ Press the REW/FF key can select music, PROG stores the music, and then the program number increase 1, the maximum capacitance is 20 music. If there is no operation in 8 seconds, the system exit the program state, but the music is remained; press the PLAY key after program will enter program playing state, and "PROG" light on.
- ◇ Press the STOP key will clear the music and exit the program state.

8) PROG/RPT

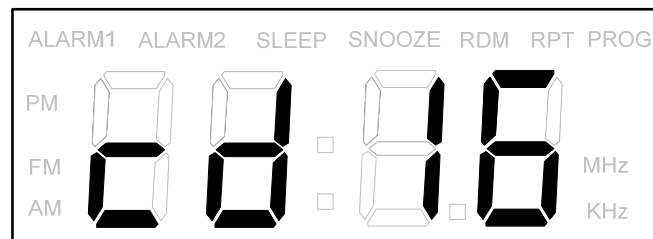
- ✧ When CD is in the stop mode, press this key will enter program state, and “PROG” flashes.
- ✧ When CD is in the play state, press this key will enter RPT function.

5.2 CD display

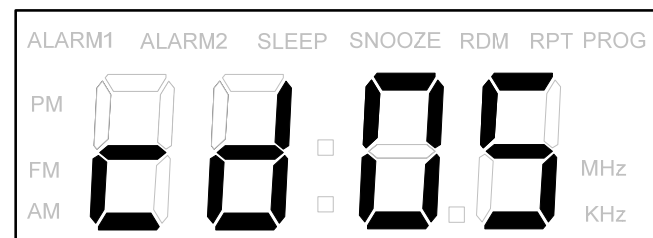
1) Read TOC



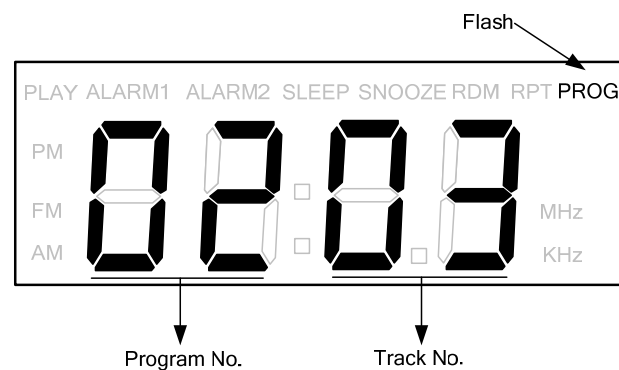
- 2) When CD closed, it begins to read TOC. It will enter STOP state after read over, if there is no operation in 5s, and then return to time display.



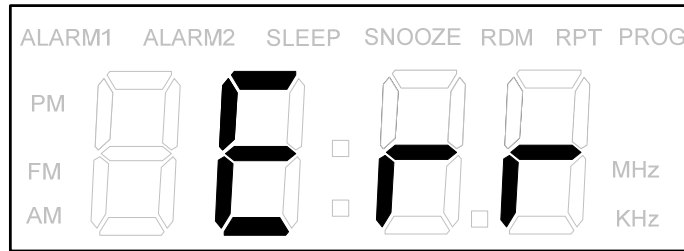
3) CD play



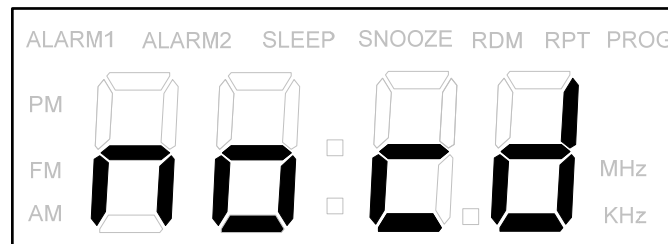
4) Program



5) CD play error



6) No disk in CD



If there is no operation in 5s, then return to time display.

6. Clock mode

Key function illustration

1) CLOCK

- ✧ Press this key less than 1 second, it will display time, and return to previous state if no operation in 5 seconds;
- ✧ Press this key more than 1 second, it will enter clock setting mode, HOUR flashes, and it can be adjustable through UP, DN key. Press the CLOCK key again confirms the clock setting. It will return to previous state if no operation in 5 seconds;
- ✧ Power on reset, before time setting, the COLON does not flash, only flashes after clock setting.

2) ALARM1/ALARM2

- ✧ When ALARM closed, press this key less than 1 second, the ALARM1 or ALARM2 turns on, display the ALARM time. If the boot-strap is set in CD mode at this time, it will switch to display CD music number from alarm time displayed if no operation in 5 seconds, and it will return to previous state after 5s. "ALARM" is light when alarm function on;
- ✧ When ALARM1 or ALARM2 turn on, press this key can cancel ALARM function, and the "ALARM" light off.
- ✧ Press the ALARM1 or ALARM2 more than 1 second, enter alarm setting mode, ALARM hour flashes. The time can be adjusted through UP, DN keys, press the ALARM again confirm the alarm function; If the boot-strap is set in CD mode at this time, it will enter alarm power on music selection function, and CD flag flashes, the power on music can be adjusted through UP, DN key. If there is no operation in 5 seconds, it will return to previous state and clear the ALARM symbol. Music selection range: 1-30, if the selected music No. is more than the MAX number, then play the first one;
- ✧ In the power off mode, alarm will ring if time to the set value: if it is in the AUTO step, it will play CD in

CD mode; if there is no disk, CD open, or read fail, it will output BUZZ sound; if it is in TUNER step, it will play radio and display time; if in the BUZZ step, then output BUZZ.

- ✧ In boot-strap mode, alarm will ring if time to the set value: if it is in the AUTO step, it will play CD according the ALARM set music in CD mode; if there is no disk, CD open, or read fail, it will output alarm; if in the BUZZ step, then output BUZZ, at this time press AUTO/BUZZ key can switch to output MUSIC or BUZZ; press POWE or ALARM can shut down power after alarm, and cancel the alarm function;
- ✧ When alarm ring, the corresponding ALARM1 or ALARM2 flashes, and press the corresponding key can cancel the alarm function, ALARM light on and power off;
- ✧ It will power off after ALARM ring in CD mode, and close BUZZ output after 5 minutes in BUZZ mode. Unless pressing the ALARM or POWER key, the one hour timing can be cleared.
- ✧ ALARM has memory function, and it can be cleared after power on again.
- ✧ ALARM1 operating frequency is 600Hz;
- ✧ ALARM2 operating frequency is 1200Hz.

3) SLEEP

Press SLEEP to power on and play the CD automatically.

After set SLEEP, the first press SLEEP key will display the time, press this key again will set the SLEEP time over again. SLEEP sets the time as 90-80-70-60-50-40-30-20-10-0; After 0 minute it will cancel SLEEP mode. The SLEEP flashes when set the time, and after the timer is open, display SLEEP.

4) SNOOZE

When the alarm rings, press this key to enter SNOOZE mode, and after 6 minutes, the alarm clock will ring again.

5) UP

Time increases 1, and it will continue increase when press the key continually.

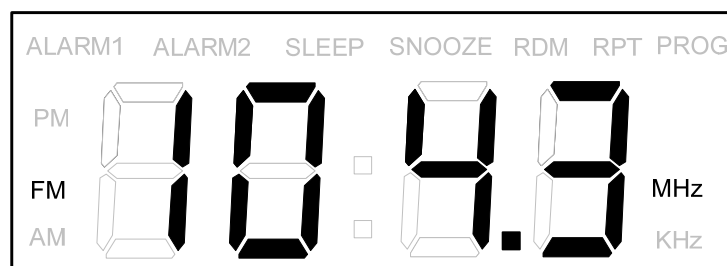
6) DN

Time decrease 1, and it will continue decrease when press the key continually.

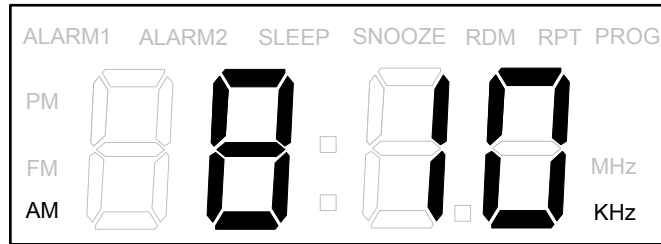
7. Radio mode

In radio mode, display the frequency, and it will return to time display if no operation in 5s; when the frequency is changed, switch to frequency display automatically.

1) FM frequency display



2) AM frequency display



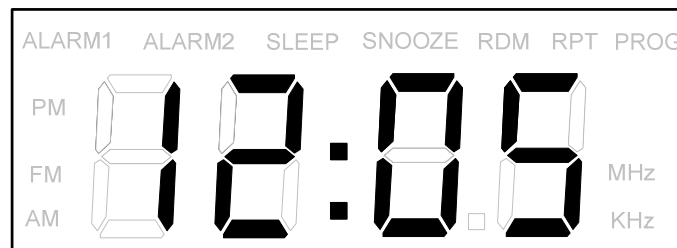
8. BUZZ mode

In power on mode, judge the AUTO/BUZZ state first, if it is in BUZZ state, then output buzz; In AUTO state, if it is in CD state, then interrupts the CD state, and jump to play the setting music; if it is in radio state, it is remained. In power off mode, judge the AUTO/BUZZ state first, if it is in AUTO state, power on automatically; if it is in CD state, then jump to the setting music and play automatically; if it is in BUZZ state, output buzz. After alarm, press ALARM or POWER will return to power off state.



9. POWER OFF

Display clock in power off mode



TYPICAL APPLICATION CIRCUIT

