DL9603　　　　　2功能3.5/4位LCD时钟IC

FUNCTIONS

◆ 4 Digit 2 Function Display (hour, minute)
◆ 30s / 60s alarm sound selectable
◆ Chime on every hour
◆ Snooze function selectable
◆ 12H / 24H cycle selectable
◆ Trimmer capacitor selectable
◆ LCD test

功能

◆ 3.5 / 4 位 2 功能顯示 (時、分)
◆ 30 / 60 秒鬧鈴選擇
◆ 整點響鬧
◆ 貪睡功能選擇
◆ 12 / 24 小時制選擇
◆ 晶振微調電容選擇
◆ LCD 測試

FEATURES

◆ Drive 4-digit duplexes LCD with PM/AL Time, alarm mark, chime mark and snooze mark
◆ Low power dissipation
◆ On-Chip capacitive voltage doubler
◆ Debounce circuitry on switch inputs
◆ Protection against static discharge

特點

◆ 3.5 / 4 位 LCD 顯示帶下午、鬧鈴標誌、整點鬧標誌、貪睡標誌
◆ 低功耗
◆ 內置倍壓電路
◆ 開關輸入防彈跳
◆ 帶靜電保護

ELECTRICAL CHARACTERISTICS 電特性

Characteristics		SYMBOL	Min	Typ	Max	Unit	REMARKS
Operating Voltage	工作電壓	V_{DD}	1.2	1.5	1.8	V	–
Quiescent Current	靜態電流	I_{SB}	–	1	2	uA	No Load
Operating Current	工作電流	I_{OP}	–	–	9	uA	–
Input High Voltage	輸入出高電流	V_{IH}	VDD-0.3	–	VDD	V	–
Input Low Voltage	輸入出低電流	V_{IL}	VSS1	–	VSS1+0.3	V	–
Switch Activated Current	按鍵開關消耗電流	I_{SW}	–	–	3	uA	$Vin = V_{DD}$
Alarm Drive Current	鬧鈴輸出電流	I_{ALA}	0.5	2	–	mA	$V_{ALA} = 0.5V$
Oscillator Input Frequency	振蕩頻率	F_{OSC}	–	32768	–	Hz	30% Tol
LCD Frequency	LCD 頻率	F_{LCD}	–	32	–	Hz	–
Time Stability	時間穩定度	Tstb	–	1	–	ppm	$V_{DD}=3.0V$

BONDING OPTION 邦定選項

1. Alarm Option 響鬧選項

	OPT1	OPT2	OPT3
VDD	4096 Hz 鬧鈴信號	由 OPT1 決定響鬧頻率	60 秒響鬧
VSS1	2048 Hz 鬧鈴信號	漸進式響鬧	30 秒響鬧

＊：OPT1、2、3 不可空接

2. Display Option 顯示模式選項

S1224	接 VSS2	24 小時模式
S1224	接 VDD	12 小時模式

3. Trimmer Capacitor Option 微調電容選項

晶振接 CG 及 XI	使用內置微調電容
晶振接 XI 及 XO	XO 外接微調電容

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FUNCTION DESCRIPTION	功能說明

Normal Mode　　　　　　　　　　計時方式

* Hour and minute are displayed in 3.5 or 4 digits (By Bonding options)
* 3.5 / 4 位時、分顯示

* PM mark is on during the afternoon and evening (PM mark is not displayed under 24H cycle)
* PM 標誌在下午顯示 (24 小時模式不會顯示 PM 標誌)

* Colon flashes at 1 Hz
* "："顯示頻率為 1Hz

* Alarm time is display while HR or MIN switch is on
* 按下 HR 或 MIN 鍵顯示響鬧時間

* AL mode mark is on for alarm display
* 響鬧時間顯示 AL 標誌，"："不閃動

* While the HR and MIN switches are on simultaneously, all segments are displayed and sound monitor is available (LCD, Alarm Test)
* 同時按下 HR 和 MIN 鍵，LCD 全段顯示，並有響鬧輸出 (LCD、響鬧測試)

Time Setting Mode　　　　　　　　時間設定方式

* Hour and minute are displayed in 3.5 or 4 digits (By Bonding options)
* 4 位時、分設定

* Hour digit advanced +1/push when HR switch is on, and Minute digit advanced +1/push when MIN switch is on
* 按 HR 鍵一次，小時位加 1，按 MIN 鍵一次，分鐘位加 1

* When the HR or MIN switch inputs are run over 1~2 seconds, the number advances automatically at a rate of 2 Hz
* 當按下 HR 或 MIN 鍵超過 1~2 秒時，小時位或分鐘位以每秒 +2 的速率增加

* When the HR and MIN switched are on simultaneously, hour digit and minute digit advances simultaneously too
* 同時按下 HR 和 NIN 鍵，小時位與分鐘位同時遞增

* Colon flashes at 1 Hz rate
* "："以 1Hz 速度閃動

* When MIN is adjusted, the colon stops, and the second counter is reset (hold state)
* 設定分鐘時，"："停止閃動

* Time is start after exit from time setting mode (TMS is off)
* 計時在離開時間設定模式後開始

Alarm Setting Mode　　　　　　　響鬧時間設定方式

* Alarm hour and minute are displayed in 3.5 or 4 digits (By Bonding options)
* 3.5 / 4 位響鬧時、分設定

* Colon is on
* "："停止閃動

* AL mode mark is on
* 顯示 AL 標誌

* Alarm hour digit advanced +1/push when HR switch is on, and Alarm Minute digit advanced +1/push when MIN switch is on
* 按 HR 鍵一次，響鬧小時位加 1，按 MIN 鍵一次，響鬧分鐘位加 1

* When the HR or MIN switch inputs are run over 1~2 seconds, the number advances automatically at a rate of 2 Hz
* 當按下 HR 或 MIN 鍵超過 1.2 秒時，響鬧小時位或分鐘位以每秒 +2 的速率增加

* When the HR and MIN switched are on simultaneously, hour digit and minute digit advances simultaneously too
* 同時按下 HR 和 NIN 鍵，小時位與分鐘位同時遞增

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Alarm Mode Functions

Alarm mode is controlled by AL OFF and SNZ switches

響鬧模式說明

響鬧模式由 AL OFF 及 SNZ 鍵控制

Switch		Alarm Mode	響鬧模式	Mark	
AL OFF	SNZ			AL	SNZ
OFF	OFF	Alarm Standby 　When the time corresponds to the alarm time, alarm sound is output 　Snooze timer does not operate	啟動響鬧功能 　當時鐘到達響鬧時間時，會有鬧鈴 　貪睡計時器不會啟動	*	--
OFF	ON	Snooze Standby 　When the time corresponds to the alarm time, alarm sound is output 　Snooze timer operates also	啟動貪睡功能 　當時鐘到達響鬧時間時，會有鬧鈴 　貪睡計時器啟動	*	#
ON		Alarm Off 　No alarm sound output 　Snooze timer does not operate	關閉響鬧功能 　時鐘沒有鬧鈴 　貪睡計時器不會啟動	--	--

* -　AL Mark is on

\# -　SNZ mark is on, it flashes at the rate of 1Hz if the snooze timer is operated.

AL 標誌亮起

SNZ 標誌亮起，如貪睡計時器啟用則以 1Hz 速度閃動

Alarm Function

Alarm signal is output from ALO pins, when the time corresponds to the alarm time when alarm function is enabled.

Alarm Signal Output Specifications :

Output length

　When the time corresponds to the alarm time, alarm signal start and stops automatically after 30 / 60 seconds. The alarm signal can be stopped by triggering the BZ STO switch.
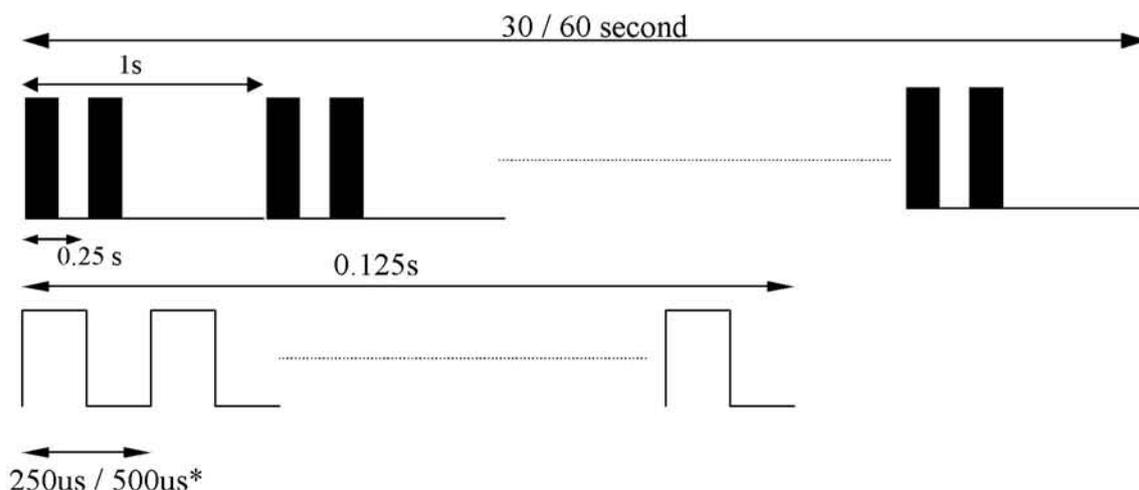
Alarm Output Waveform

響鬧功能

當啟用響鬧功能後，時鐘到達響鬧時間，響鬧訊號由 ALO 腳位輸出

響鬧訊號說明

響鬧時間

　時鐘到達響鬧時間，ALO 腳會輸出 30 / 60 秒訊號，響鬧時可按 BZ STO 鍵終止響鬧

響鬧輸出訊號

註：　Alarm Output can be chosen by bonding options
　　　　(OPT1, OPT2 and OPT3 cannot be opened)

響鬧訊號按 Bonding Option 選擇
　　(OPT1、OPT2、OPT3 不可空接)

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Chime Function

Alarm buzzer sounds for 0.25 second in chime enable mode when the minute of normal time reaches zero. In other words, the chime function generates a 0.25 second burst of sound for every hour on the hour.
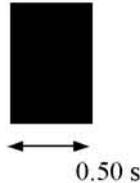
While alarm signal is output, it can be stopped by turning on BZ STO switch. However, the alarm signal starts when the time and the alarm time correspond again.

Chime Signal

整點響鬧功能

當開啓整點報時功能時(CHIME = On)，分鐘到達 00 時，會輸出 0.25 秒的響鬧訊號

整點響鬧訊號輸出

0.50 s

Snooze Function

Snooze standby mode is enabled by
　　AL OFF = off, SNZ = on
The snooze mark is on during this mode.

Alarm signal is output from ALO pins, when the time corresponds to the alarm time. If BZ STO switch is triggered, alarm sound will be suspended once. The snooze mark flashes at 1 Hz rate and the snooze operation is on, the buzzer sound will start 8 minutes later.

Alarm signal output is stopped automatically after 30 / 60 seconds when the BZ STO switch is not triggered, and snooze operation is released and the system goes back to snooze standby mode.

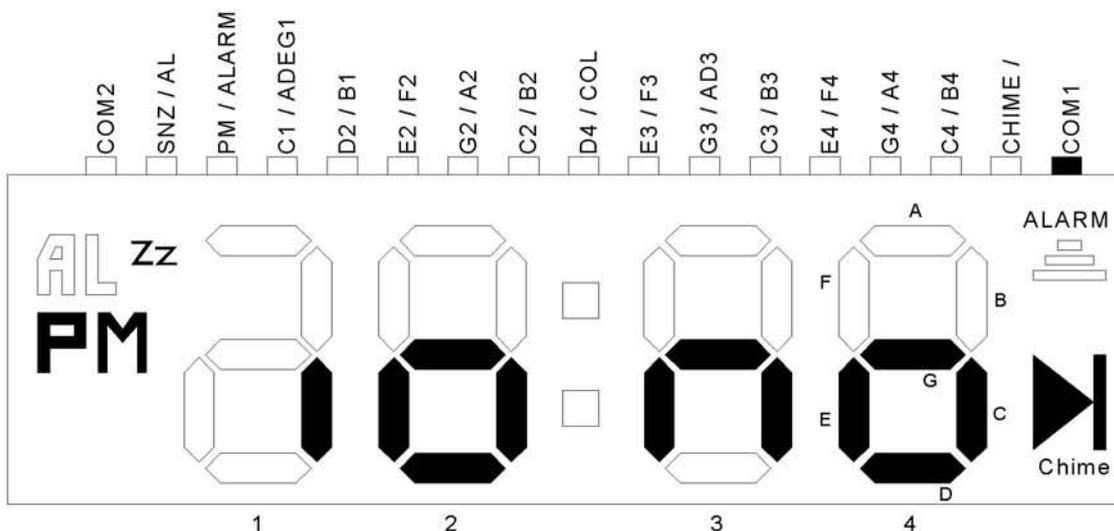Snooze function can be canceled by disconnected the SNZ switch.

貪睡功能

AL OFF = off、SNZ = on，貪睡功能生效，顯示 Snooze 貪睡標誌

當 IC 輸出響鬧訊號時按下 BZ STO 鍵，響鬧停止，同時啓動貪睡計時器，貪睡標誌以 1Hz 的頻率閃動，8 分鐘後再次自動響鬧，如此反覆

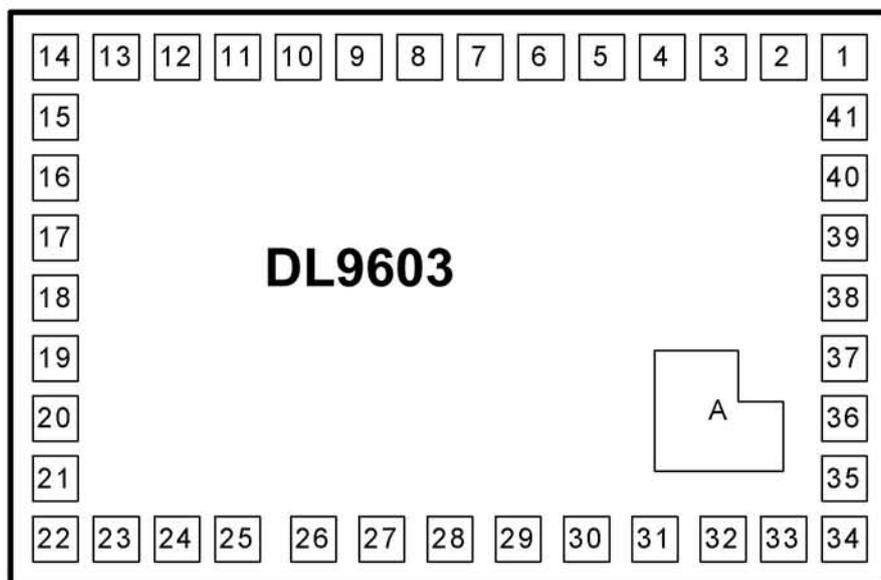如到 30 / 60 秒 響鬧訊號輸出完結沒有按 BZ STO 鍵，貪睡計時器會關閉，直到下次響鬧

貪睡功能可關閉 SNZ 鍵取消

LCD FORMAT

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PAD DIAGRAM

IC 底部接 VDD

Pad No	Name	X	Y
1	CHIME_Mark	895	594
2	C4/B4	758	594
3	G4/A4	621	594
4	E4/F4	484	594
5	C3/B3	347	594
6	G3/AD3	210	594
7	E3/F3	73	594
8	D4/COL	-64	594
9	C2/B2	-201	594
10	G2/A2	-338	594
11	E2/F2	-475	594
12	D2/B1	-612	594
13	C1/ADEG1	-749	594
14	PM/ALARM	-895	594
15	SNZ/AL	-895	454
16	COM2	-895	305
17	XI	-895	156
18	CG	-895	7
19	XO	-895	-142
20	CAP1	-895	-291
21	CAP2	-895	-440

Pad No	Name	X	Y
22	TEST	-895	-594
23	AC	-744	-594
24	CHIME	-595	-594
25	TMS	-446	-594
26	ALS	-297	-594
27	SNZ	-148	-594
28	AL OFF	1	-594
29	HR	150	-594
30	MI	229	-594
31	BZ STO	448	-594
32	VSS1	597	-594
33	VDD	746	-594
34	S1224	895	-594
35	VSS2	895	-434
36	ALO1	895	-286
37	ALO2	895	-138
38	OPT1	895	10
39	OPT2	895	158
40	OPT3	895	306
41	COM1	895	454

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2功能3.5/4位LCD时钟IC

APPLICATION CIRCUIT　　應用電路圖

1) **Buzzer Drived By External Transistor** 外接三極管驅動蜂鳴片
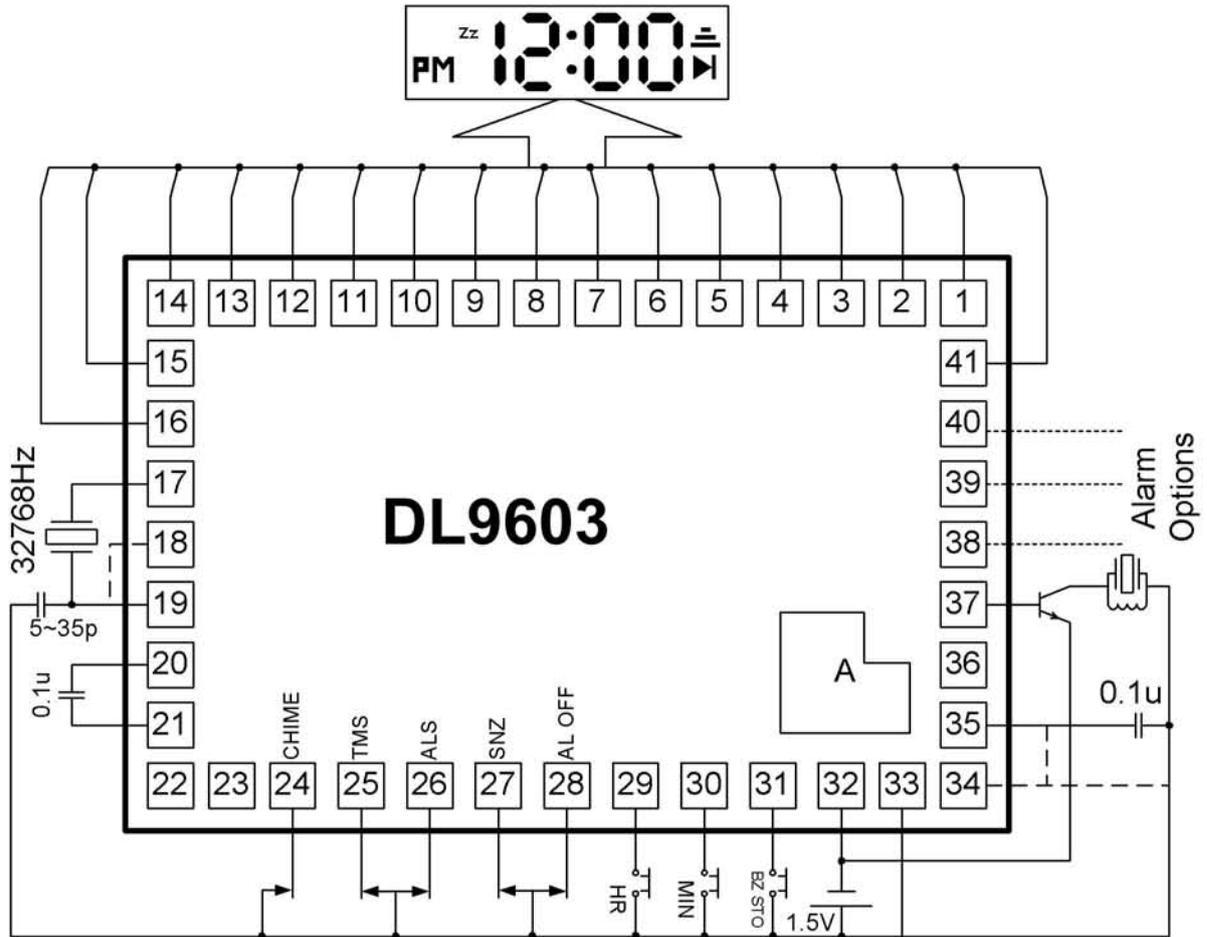
註： 1. IC 底接 VDD
2. 聲音線圈約 30mH

➢ LCD 字段分配

COM1	SNZ	PM	C1	D2	E2	G2	C2	D4
	/	/	/	/	/	/	/	/
COM2	ALmode	ALmark	ADEG1	B1	F2	A2	B2	CO
COM1	E3	G3	C3	E4	G4	C4	ME	
	/	/	/	/	/	/	/	
COM2	F3	AD	B3	F4	A4	B4		

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2) Buzzer Drived By Built-in Transistor　　內置三極管驅動蜂鳴片
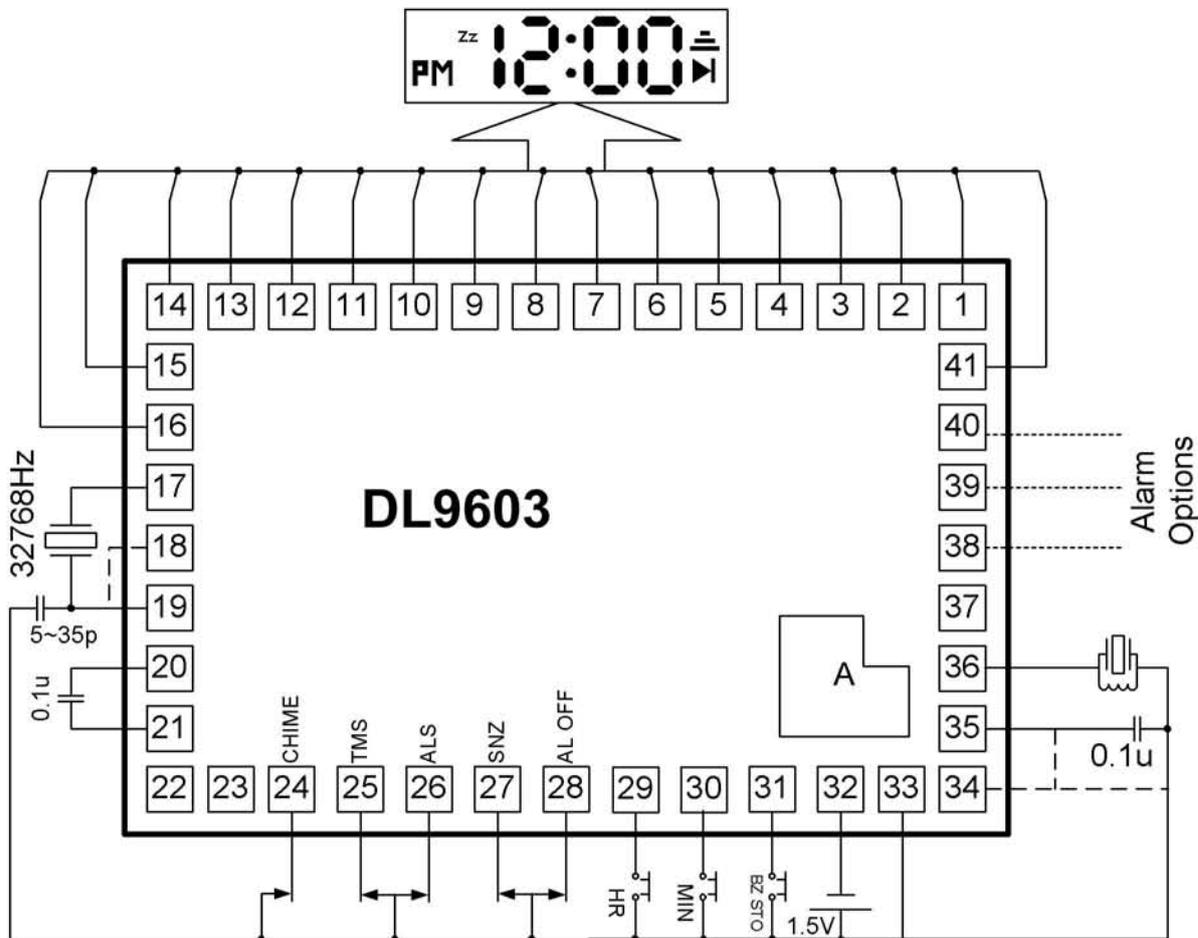
註：　1. IC 底接 VDD
　　　2. 聲音線圈約 30mH

24至28脚为拨动开关选项,TMS这个键是进入设置模式,选项全做的话一共8个
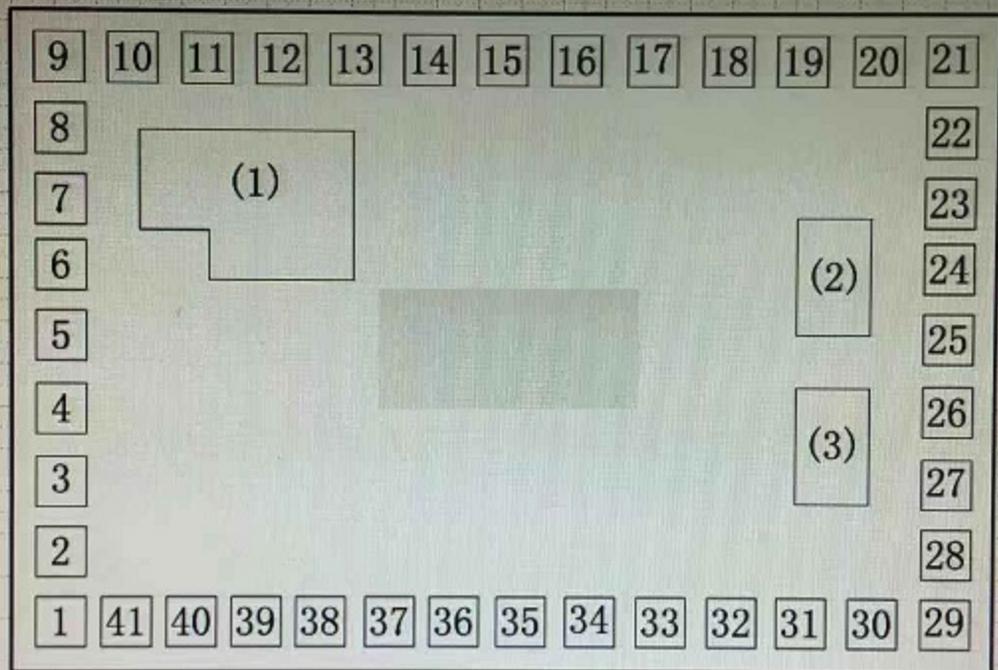拨到那边就进入那个模式,最好拨动开关，不然要一直按住才能设置。但正常显
示模式是不能按住的，否则就会容易误触发

PIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
COM2	COM2		ALARM	ADEG1	B1	F2	A2	B2	COL	F3	AD3	B3	F4	A4	B4		
COM1		SNZ	PM	C1	D2	E2	G2	C2	D4	E3	G3	C3	E4	G4	C4		COM1

标记说明

| 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 |

| 8 | | | | | | | | | | | | 22 |

(1)

| 7 | | | | | | | | | | | | 23 |

| 6 | | | | | | | | | | | | 24 |

(2)

| 5 | | | | | | | | | | | | 25 |

| 4 | | | | | | | | | | | | 26 |

(3)

| 3 | | | | | | | | | | | | 27 |

| 2 | | | | | | | | | | | | 28 |

| 1 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 | 31 | 30 | 29 |

注: * 图案(1)为有规则性的图形;
  * 图案(2)、(3)分别为长方形图形。