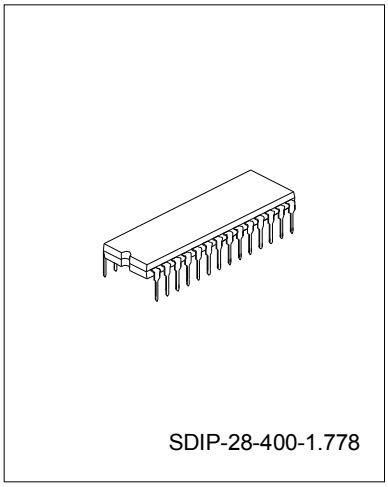
DIGITAL ALARM CLOCK WITH LED DRIVER

DESCRIPTION

The SC8562 is alarm equipped digital clock IC with built-in drivers capable of directly driving LED display equipment.SC8562 has features such as easy setting, two alarms and can be used at a wide operating voltage range.



SDIP-28-400-1.778

FEATURES

* Duplex LED display (SC8560-use LED panel usable)
* Two alarms on chip (600Hz, 1200Hz)
* Up, down /fast, slow time setting available (easy setting)
* 12/24-hour mode, 50/60 Hz selectable (provided that it is impossible to select the combination of 24-hour mode and 60 Hz)
* On–chip CR oscillator for backup use at the time of power failure
* Power failure indicator
* 59-minute alarm/sleep timer
* 6-minute snooze function
* Radio output function
* P-channel ED MOS
* Pin 28 dual-in-line shrink package
* Wide operating voltage/operating temperature range
  V_{DD}=-14 to -8V/ -20 to +70°C

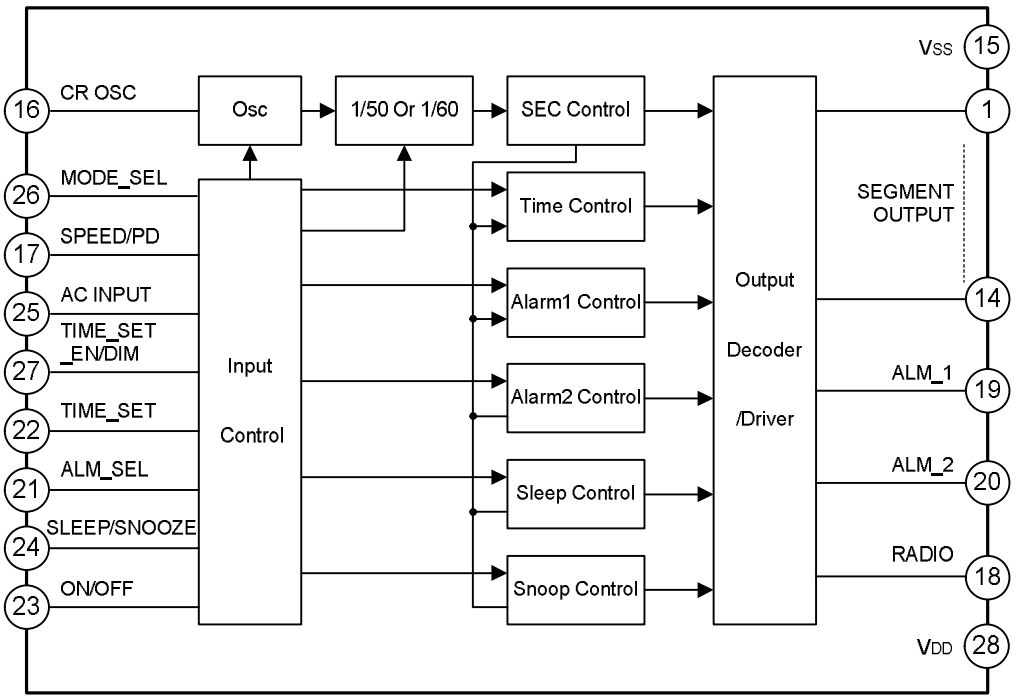
ORDERING INFORMATION

Device	Package
SC8562	SDIP-28-400-1.778

APPLICATIONS

* Alarm clocks
* Clock-radios

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS (Tamb =25°C, Vss =0V)

Characteristics	Symbol	Condition	Value	Unit
Supply Voltage	VDD max.		-17.0 ~ + 0.3	V
Input Voltage	VIN		-17.0 ~ + 0.3	V
Output Voltage	VOUT		-17.0 ~ + 0.3	V
Allowable Power Dissipation	Pd max	Tamb=70°C	700	mW
Operating Temperature	Topr		-20 ~ +70	°C
Storage Temperature	Tstg		-55～+125	°C

ALLOWABLE OPERATING CONDITIONS (Tamb=-20 to 70°C, VSS=0V)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Supply Voltage	VDD		-14.0		-8	V
Standby Voltage	VST				-7.5	V
Input High-Level Voltage 1	VIH1	AC input pin	VSS-1		VSS	V
Input Low-Level Voltage 1	VIL1				VDD+2	V
Input High-Level Voltage 2	VIH2	CR OSC pin	VSS-1		VSS	V
Input Low-Level Voltage 2	VIL2				VDD+2	V
Input High-Level Voltage 3	VIH3	3-level input pins	VSS-0.7		VSS	V
Input Mid-Level Voltage	VIM		1/2 VDD-1		1/2 VDD+1	V
Input Low-Level Voltage 3	VIL3		VDD		VDD+1	V

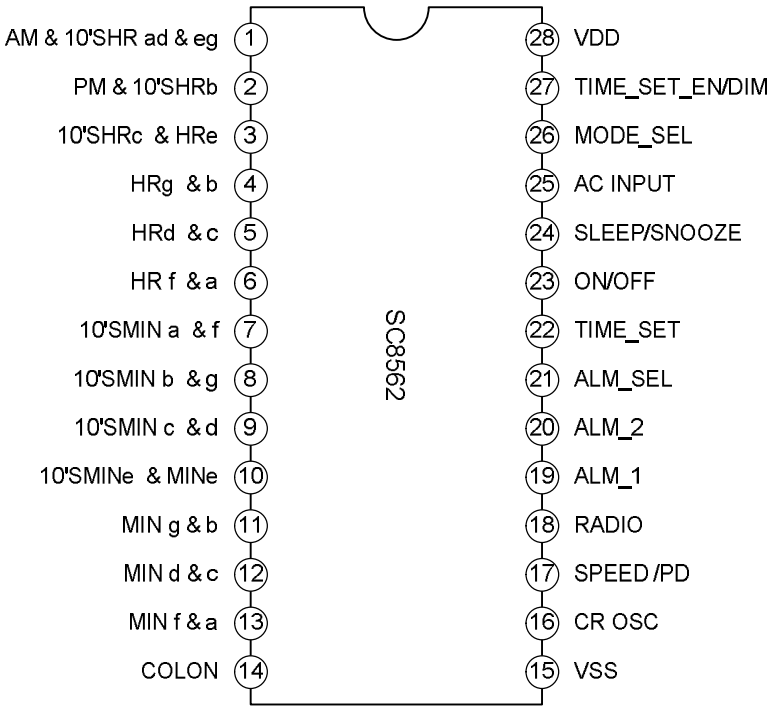
Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Input High-Level Voltage 4	V_{IH4}	Input pins other than the above	V_{SS}-2		V_{SS}	V
Input Low-Level Voltage 4	V_{IL4}				V_{DD}+2	V
Input Level Hold Time	t_H		10			ms
Input Chattering Time	t_C		10			ms

ELECTRICAL CHARACTERISTICS (T_{amb}=25±2°C, V_{SS}=0V, V_{DD}=-12V)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Output High-Level Current 1	I_{OH1}	AM&10'SHR ad & eg pin, V_{OUT} =V_{SS}-2.0V	32		(Note1)	mA
Output OFF-State Leakage Current 1	I_{OF1}	V_{OUT} = V_{DD}			20	μA
Output High-Level Current 2	I_{OH2}	Segment output pins other than the above, V_{OUT}=V_{SS}-2.0V	16		(Note1)	mA
Output OFF-State Leakage Current 2	I_{OF2}	V_{OUT} = V_{DD}			20	μA
Output High-Level Current 3	I_{OH3}	ALM-1, ALM-2, RADIO pin, V_{OUT}=V_{SS}-2.0V	2			mA
Output OFF-State Leakage Current 3	I_{OF3}	V_{OUT} = V_{DD}			10	μA
Operating Frequency	f_{op}	AC INPUT pin	DC		2000	Hz
Input High Level Current 1	I_{IH1}	V_{IH}=V_{SS}			10	μA
Input Low Level Current 1	I_{IL1}	V_{IL}=V_{DD}	-10			μA
Input High Level Current 2	I_{IH2}	CR OSC pin, V_{IH}=V_{SS}			10	μA
Input Low Level Current 2	I_{IL2}	V_{IL}=V_{DD}		60		μA
Input High Level Current 3	I_{IH3}	3-level input pins, V_{IH}=V_{SS}	20		120	μA
Input Low Level Current 3	I_{IL3}	V_{IL}=V_{DD}	-120		-20	μA
Pull-Down Resistance	RPD	3-level input pins, V_{IN}=1/2V_{DD}		1.0		MΩ
Pull-Up Resistance	RPU	V_{IN}=1/2V_{DD}		0.8		MΩ
Operating Current	I_{DD}	Output :no load	2	8	15	mA
Power Failure Detect Circuit	V_{BU}		-7.5	-5.0		V
OSC Stability	f_S	V_{DD}=-9V±10%	-10		10	%
OSC Accuracy	f_A	V_{DD}=-9V	-10		10	%
OSC Frequency	f_{OSC}	R=180KΩ, C=3300pF		3600		Hz
		R=260KΩ, C=3300pF		2400		

Note1: The allowable segment current drain is 78mA max. for AM & 10'SHR ad & eg and 39mA max. For other than AM & 10'SHR ad & dg in the range of power dissipation 700 mW.

PIN CONFIGURATIONS



PIN DESCRIPTION

No.	Pin Name	Description
1	AM & 10’ SHR ad & eg	Drive AM 10’sSHR segment and 10’SHR segment.
2	PM & 10’ SHR b	Drive PM and 10’SHR b segment.
3	10’SHR c & HR e	Drive HR e and 10’SHR c segment.
4	HR g & b	Drive HR g and HR b segment.
5	HR d & c	Drive HR d and HR c segment.
6	HR f & a	Drive HR f and HR a segment.
7	10’ SMIN a & f	Drive 10’SMIN a and 10’SMIN f segment.
8	10’ SMIN b & g	Drive 10’SMIN b and 10’SMIN g segment
9	10’ SMIN c & d	Drive 10’SMIN c and 10’SMIN d segment.
10	10’ SMIN e & MIN e	Drive MIN e and 10’ SMIN e segment.
11	MIN g& b	Drive MIN g and MIN b segment.
12	MIN d & c	Drive MIN d and MIN c segment.
13	MIN f & a	Drive MIN f and MIN a segment.
14	COLON	Colon output
15	VSS	VSS=0V
16	CR OSC	Oscillator input/output port, connected external capacitor and resistor.
17	SPEED/PD	SPEED/Power down control pin. When connect to VDD, select power-down mode; and if connect to VSS, test mode is selected. Select normal mode in open state.
18	RADIO	Radio output pin.

No.	Pin Name	Description
19	ALM_1	Alarm output pin, when connect to VDD, alarm is turned off.
20	ALM_2	
21	ALM_SEL	LED Display mode select pin 1
22	TIME_SET	Time set pin.
23	ON/OFF	Pin controlling alarm and radio output state
24	SLEEP/SNOOZE	LED Display mode select pin 2
25	AC INPUT	Built-in Schmidt circuit enables noise elimination at 50/60Hz commercial frequencies with use of a simple CR filter, Built-in pull-up resistor.
26	MODE_SEL	Mode select pin. If connect to VDD, select 12H &60Hz mode; if connect to VSS, select 24H&50Hz mode; if open, then select 12H &50Hz.
27	TIME_SET_EN/DIM	Time setting enable and dimmer display control pin. If connect to VDD, time setting enable and LED display normally; If connect to VSS, time setting inhibit (except alarm setting) and LED dimmer display; if open, time setting inhibit and LED display normally.
28	VDD	Negative power supply.

DISPLAY MODE

Select Pin		Display Mode	Digit No,			
ALM_SEL	SLEEP/SNOOZE		1	2	3	4
OPEN	OPEN	Time display	AM/PM 10's hour	Hour	10's minutes	Minutes
VDD	OPEN	Alarm 1	AM/PM 10's hour	Hour	10's minutes	Minutes
VSS	OPEN	Alarm 2	AM/PM 10's hour	Hour	10's minutes	Minutes
OPEN(VDD,VSS)	VSS	Sleep	Unlit	0	10's minutes	Minutes
OPEN(VDD,VSS)	VDD	Second display	Unlit	Minutes	10's seconds	Seconds

FUNCTION DESCRIPTION

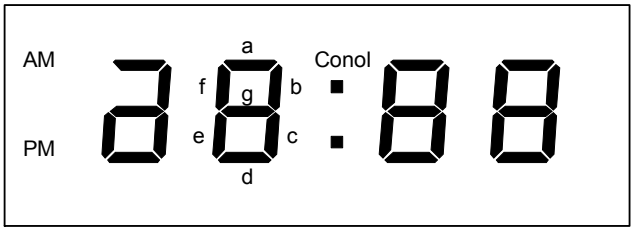
1. Segment Output

The duplex LED panel can be direct driven by 13 segment output pins.

Compatible with SC8560-use LED panel)

2. Colon Output

LED panel



The drive phase 1. The colon always flashes at 1 Hz rate.

3. OSC circuit

By connecting a resistor and a capacitor with the CR INPUT pin, a 2.4 kHz OSC circuit is formed, The clock signal generated by the 2.4 kHz OSC circuit is used in the following cases.

(1) Used as the clock signal for the time counter, instead of 50/60 Hz INPUT, when the power-down mode is entered.

(2) Alarm sound (1200Hz or 600 Hz) at the alarm signal output mode.

(3) 1/25 duty clock signal while the dimmer is in operation.

4. Power-Down Mode

(1) Since the backup OSC circuit holds the current time, the SC8562 starts operating immediately.

(2) The snooze function stops operating.

(3) The RADIO pin is brought to the OFF state.

(4) The control input is inhibited (except the following).

- OFF INPUT
- ALARM/SLEEP TIME SET INPUT at the time setting enable mode

5. Alarm

The SC8562 contains two alarms on a 24-hour basis.

Alarm 1….. Superposition of 600 Hz and 1 Hz

Alarm 2 …. Superposition of 1200 Hz and 1 Hz

6-minutes snooze

The alarm output duration time is 59 minutes. The 59-minute duration counter is common to the alarm 1, alarm 2, and sleep timer.

6. Time Setting, Dimmer

The 3-level input TIME_SET pin provides the following operations.

TIME_SET pin Input		Operations
V_{DD}	AC(50/60 Hz or more)	Fast-up
	DC(20 ms min.)	Slow-up
OPEN		No operation
V_{SS}	AC(50/60 Hz or more)	Fast-down
	DC(20 ms min.)	Slow-down

Setting Contents

① Fast-up/down 50/60 Hz rate

② Slow-up/down Immediately incremented/decremented ± 1 and counted up/down at a 2 Hz rate 0.5 to 1.0 second later

7. ON/OFF Pin

The 3-level input ON/OFF pin acts on the ALM-1, 2 RADIO pins as shown below.

Output Pin	ON-State Condition	Pause Conditions	OFF-State Conditions
ALM-1	Alarm 1 setting time = Current time	Snooze-in	• ON/OFF =VSS • ON/OFF = VDD • Sleep-in • 59 minutes after the alarm 2 is turned ON • ALM-1 =VDD
ALM-2	Alarm 2 setting time = Current time	Snooze-in	• ON/OFF = VSS • ON/OFF =VDD • Sleep-in • 59 minutes after the alarm 2 turned ON • ALM-2 =VDD
RADIO	ON/OFF = VDD (ON-state indicator: ON state)	-	• ON/OFF =VDD • Power –down mode • Sleep-in (On-state indicator: OFF state)
	Sleep-in (Sleep indicator : ON state)	-	• ON/OFF =VSS • ON/OFF =VDD • Power-down mode (Sleep indicator : OFF state)

8. Sleep, Snooze Timer

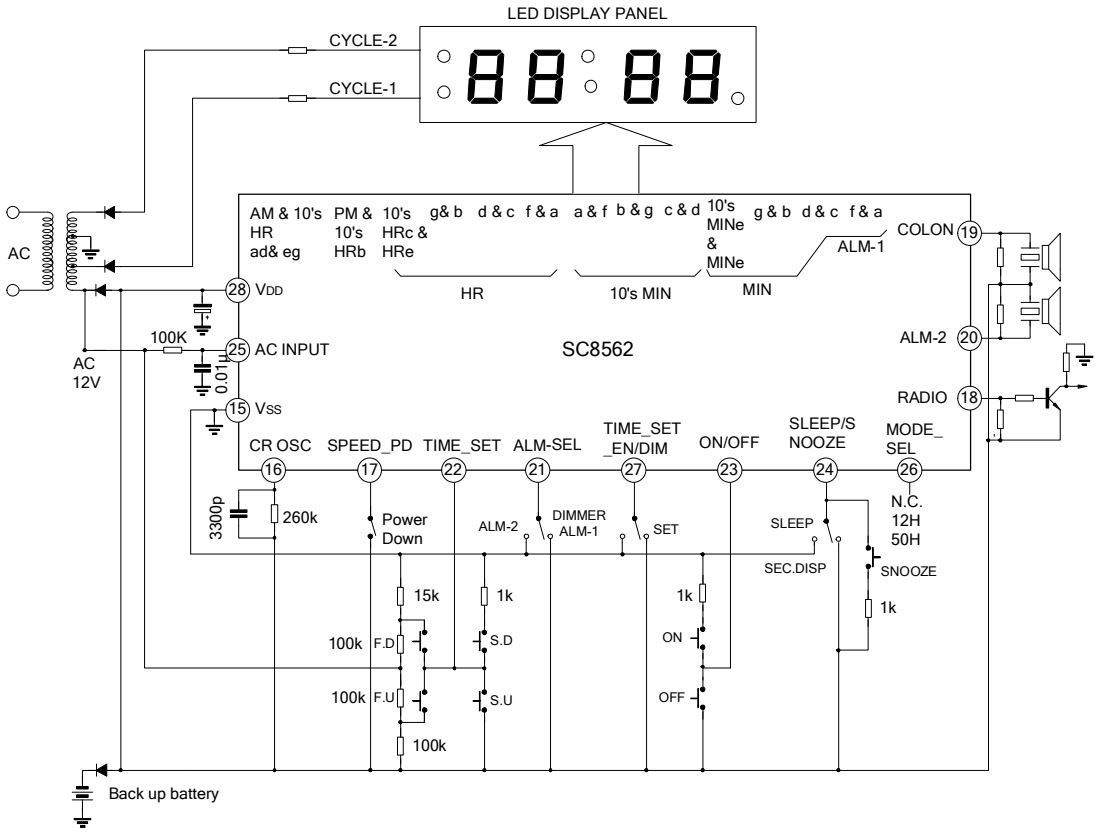
The 3-level input SLEEP/SNOOZE pin operates as shown below.

SLEEP/SNOOZE Pin Input	Operation
VDD (20 ms min.)	Snooze-in & seconds display mode. • Time alarm stops functioning for 6 to 7 minutes. • Seconds display
OPEN	No operation
VSS (20 ms min.)	Sleep mode • The sleep counter is set to operate for 59 minutes. • Counted down automatically at a 2 Hz rate 1.5 to 2.0 seconds later • Fast/slow, up/down time setting available

9. 50/60HZ Input

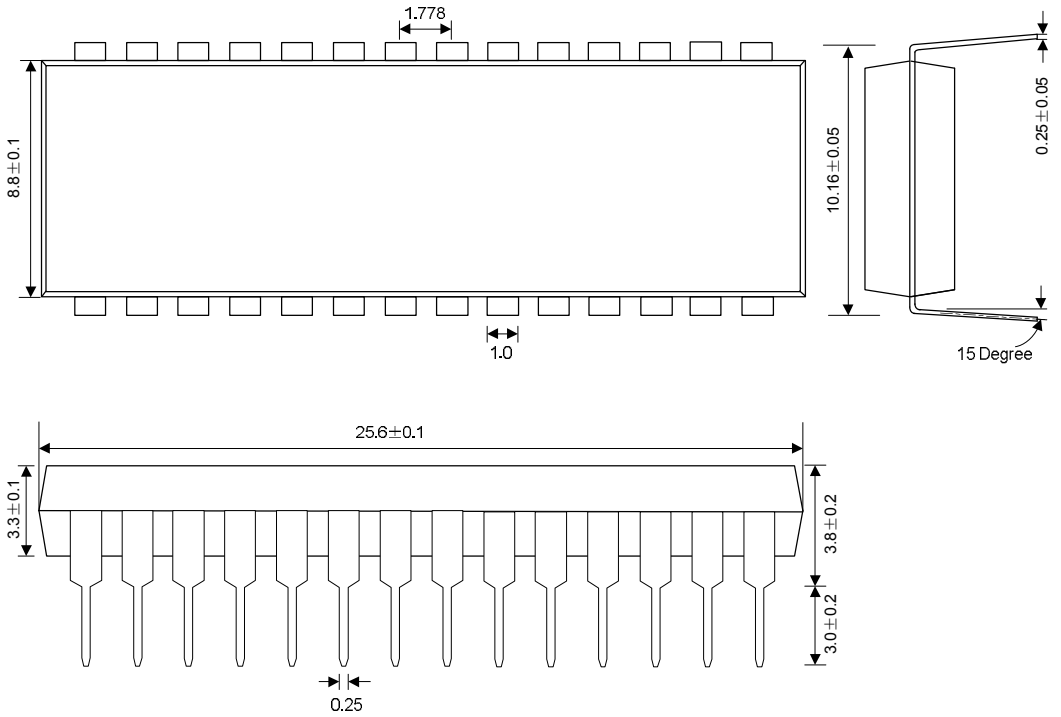
Internal Schmitt flip-flop can remove the noise in AC.

TYPICAL APPLICATION CIRCUIT



PACKAGE OUTLINE

SDIP-28-400-1.778 UNIT: mm



HANDLING MOS DEVICES:

Electrostatic charges can exist in many things. All of our MOS devices are internally protected against electrostatic discharge but they can be damaged if the following precautions are not taken:

- Persons at a work bench should be earthed via a wrist strap.
- Equipment cases should be earthed.
- All tools used during assembly, including soldering tools and solder baths, must be earthed.
- MOS devices should be packed for dispatch in antistatic/conductive containers.

Attachment

Revision History

Data	REV	Description	Page
2004.08.03	1.0	Original	
2008.04.29	1.1	Modify the “ELECTRICAL CHARACTERISTICS”	

Note：Silan reserves the right to make changes without notice in this specification for the improvement of the design and performance. Silan will supply the best possible product for customers.