

TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

JT7579A-AS

CALCULATOR ALARM FUNCTION WRIST WATCH

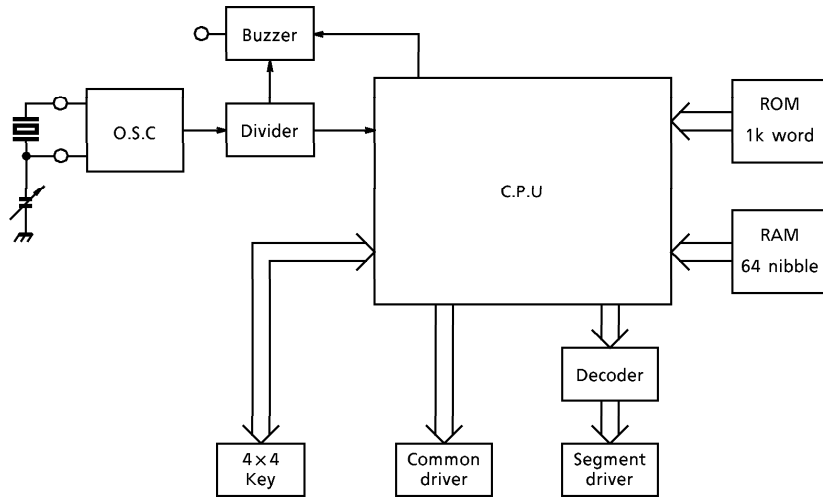
FEATURES

- Calculator function with 4 standard functions by 8 digits.
- Alarm function with buzzer direct drive.
- Chime function to beep the buzzer at every hour.
- 12 hour/24 hour cycle are selectable by wearer with switch.
- Month-Day-Year/Day-Month-Year display are selectable by the switch operation.
- Direct interface to 1/2-duty L.C.D : 8 digits, 8 points and 8 flags.
- 7 watch function : Hour, Minute, Second, Year, Month, Day of the Month and Day of the Week.
- Day of the month and day of week can be calculated from year and month.
- 4 blocks of switch operation for the watch function with 16 keys operation for the calculator function.
- Buzzer beep short for announcing sure calculator operation.
- Single 1.55V power supply (Lithium battery optional).
- Voltage doubler (Two external capacitor).

980910EBA1

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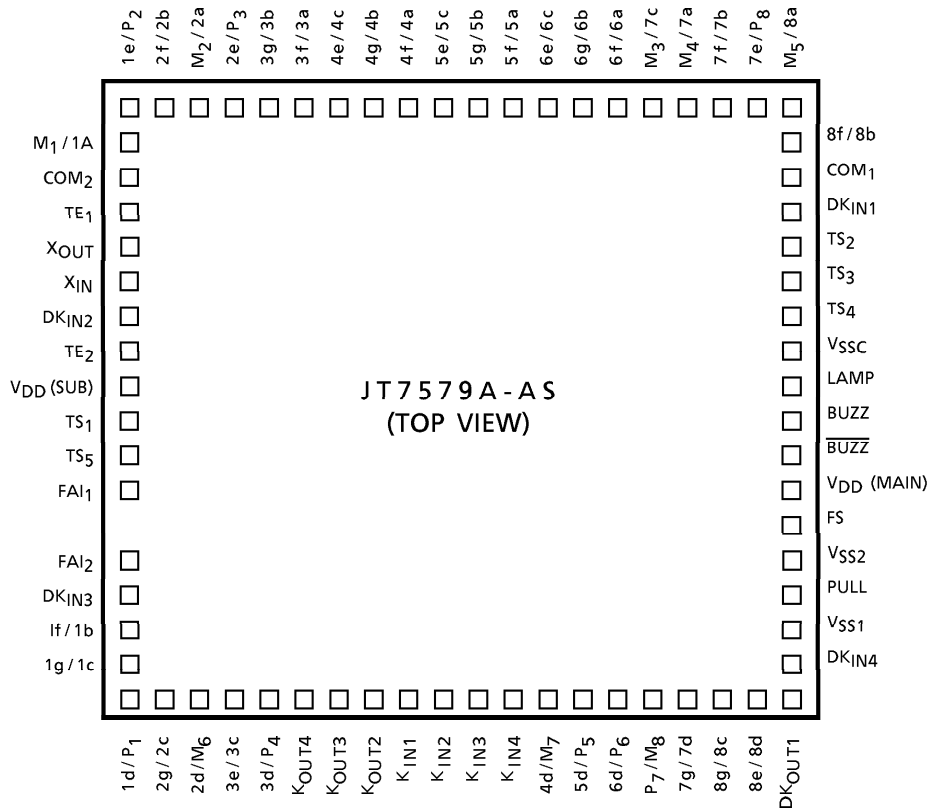
BLOCK DIAGRAM



PIN DESCRIPTION (58 pins)

PIN NAME	SYMBOL	No. OF PINS
Power Supply Pins	V _{DD} , V _{SS1} , V _{SS2} , V _{SSC} , PULL	5
Oscillator Pins	X _{IN} , X _{OUT}	2
Input Pins	K _{IN1~4} , DK _{IN1~4} , FS	9
Output Pins	K _{OUT1~4} , DK _{OUT1~4} , BUZZ, $\overline{\text{BUZZ}}$, LAMP	11
Display Pins	M1 / 1a~8e / 8d COM _{1, 2}	38
Test Pins	TE ₁ , TS _{1~5}	6
DOUBLER / HALVER	FAI ₁ , FAI ₂	2

PAD LAYOUT



Chip size : 3.78 × 3.58 (mm)
 Chip thickness : 300 ± 30 (μm)

PAD LOCATION TABLE

(μm)

PIN NAME	X POINT	Y POINT	PIN NAME	X POINT	Y POINT
1d / P ₁	- 1751	- 1619	8f / 8b	1751	1439
1g / 1c	- 1751	- 1439	COM ₁	1751	1258
1f / 1b	- 1751	- 1258	DK _{IN1}	1751	1078
DK _{IN3}	- 1751	- 1078	TS ₂	1751	898
FA _{I2}	- 1751	- 871	TS ₃	1751	717
FA _{I1}	- 1751	- 607	TS ₄	1751	537
TS ₅	- 1751	- 405	V _{SSC}	1751	356
TS ₁	- 1751	- 216	LAMP	1751	106
V _{DD}	- 1751	- 31	BUZZ	1751	- 101
TE ₂	- 1751	154	BUZZ	1751	- 356
DK _{IN2}	- 1751	339	V _{DD} (MAIN)	1751	- 537
X _{IN}	- 1751	568	FS	1751	- 717
X _{OUT}	- 1751	796	V _{SS2}	1751	- 898
TE ₁	- 1751	1025	PULL	1751	- 1078
COM ₂	- 1751	1258	V _{SS1}	1751	- 1258
M ₁ / 1a	- 1751	1439	DK _{IN4}	1751	- 1439
1e / P ₂	- 1751	1619	DK _{OUT1}	1751	- 1619
2f / 2b	- 1536	1619	8e / 8d	1536	- 1619
M ₂ / 2a	- 1351	1619	8g / 8c	1355	- 1619
2e / P ₃	- 1170	1619	7g / 7d	1175	- 1619
3g / 3b	- 990	1619	P ₇ / M ₈	994	- 1619
3f / 3a	- 810	1619	6d / P ₆	814	- 1619
4e / 4c	- 629	1619	5d / P ₅	634	- 1619
4g / 4b	- 449	1619	4d / M ₇	453	- 1619
4f / 4a	- 268	1619	K _{IN4}	273	- 1619
5e / 5c	- 88	1619	K _{IN3}	92	- 1619
5g / 5b	92	1619	K _{IN2}	- 88	- 1619
5f / 5a	273	1619	K _{IN1}	- 268	- 1619
6e / 6c	453	1619	K _{OUT2}	- 449	- 1619
6g / 6b	634	1619	K _{OUT3}	- 629	- 1619
6f / 6a	814	1619	K _{OUT4}	- 810	- 1619
M ₃ / 7c	994	1619	3d / P ₄	- 990	- 1619
M ₄ / 7a	1175	1619	3e / 3c	- 1170	- 1619
7f / 7b	1355	1619	2d / M ₆	- 1351	- 1619
7e / P ₈	1536	1619	2g / 2c	- 1536	- 1619
M ₅ / 8a	1751	1619			

(Note) Each coordinate shows the center of each pad.

FUNCTION SPECIFICATIONS

1. Display configuration

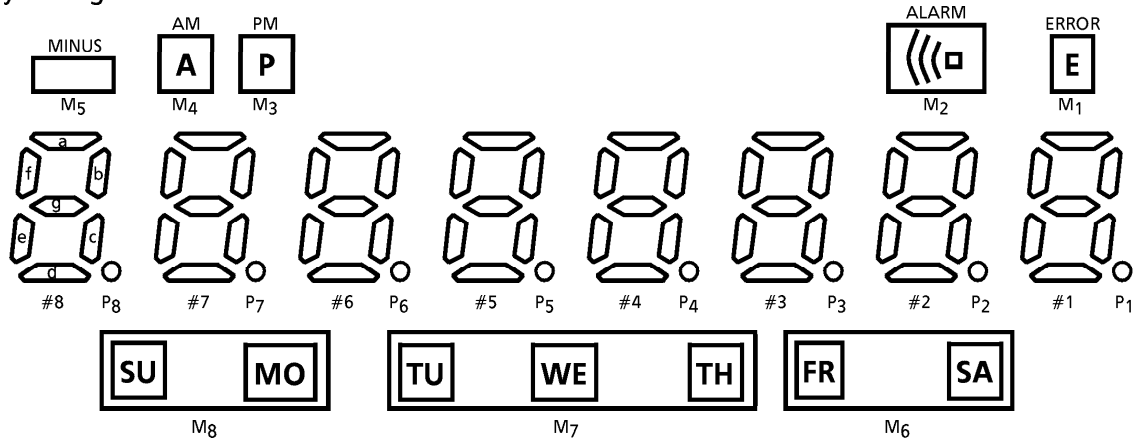


Fig.1 Recommended L.C.D., layout

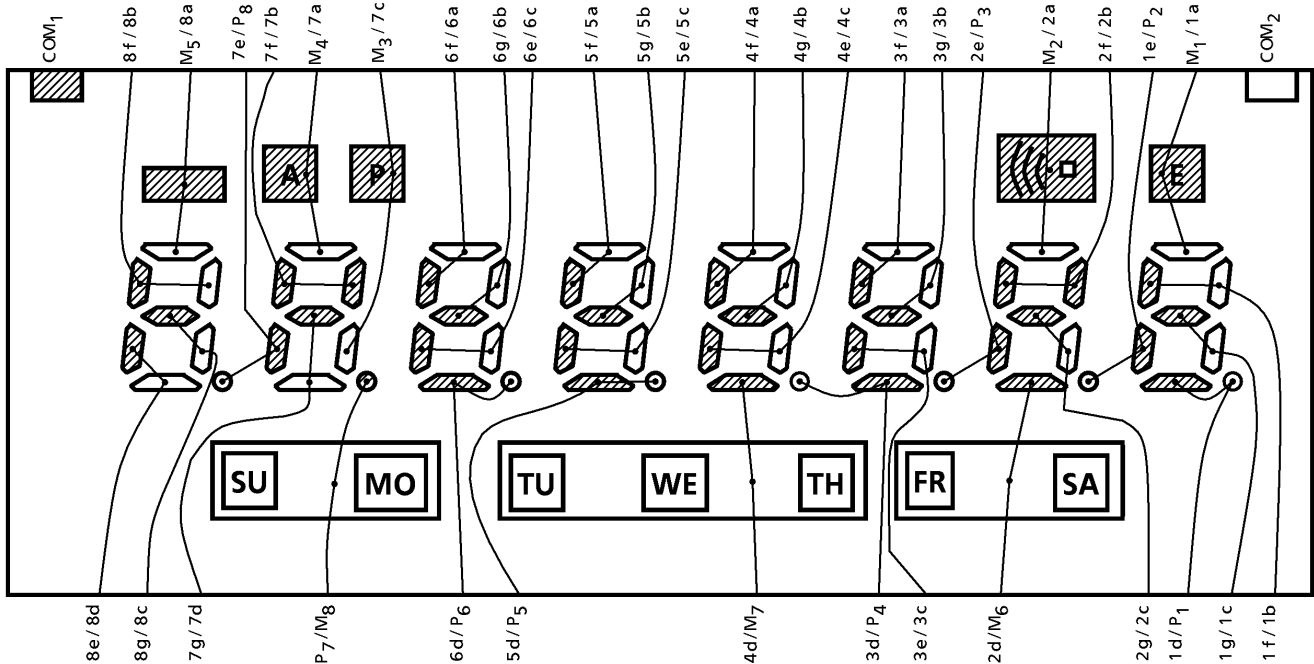


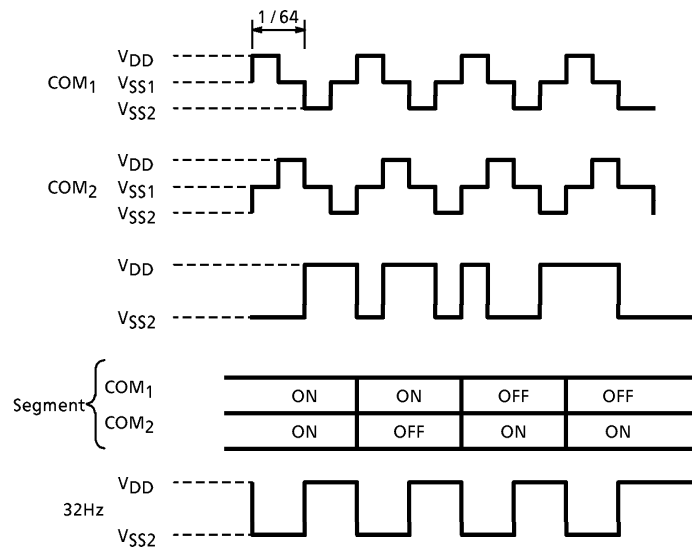
Fig.2 Recommended L.C.D., pattern (Segments, common)

1 2 3 4 5 6 7 8 9 0 A L P H C E U

Fig.3 The font of alphanumerics

	COM ₁	COM ₂		COM ₁	COM ₁
8f / 8b	8f	8b	M ₂ / 2a	M ₂	2a
M ₅ / 8a	M ₅	8a	2f / 2b	2f	2b
7e / P ₈	7e	P ₈	1e / P ₂	1e	P ₂
7f / 7b	7f	7b	M ₁ / 1a	M ₁	1a
M ₄ / 7a	M ₄	7a	8e / 8d	8e	8d
M ₃ / 7c	M ₃	7c	8g / 8c	8g	8c
6f / 6a	6f	6a	7g / 7d	7g	7d
6g / 6b	6g	6b	P ₇ / M ₈	P ₇	M ₈
6e / 6c	6e	6c	6d / P ₆	6d	P ₆
5f / 5a	5f	5a	5d / P ₅	5d	P ₅
5g / 5b	5g	5b	4d / M ₇	4d	M ₇
5e / 5c	5e	5c	3d / P ₄	3d	P ₄
4f / 4a	4f	4a	3e / 3c	3e	3c
4g / 4b	4g	4b	2d / M ₆	2d	M ₆
4e / 4c	4e	4c	2g / 2c	2g	2c
3f / 3a	3f	3a	1d / P ₁	1d	P ₁
3g / 3b	3g	3b	1g / 1c	1g	1c
2e / P ₃	2e	P ₃	1f / 1b	1f	1b

2. Timing chart for 1/2 duty LCD driving



3. Mode flow and switch operation

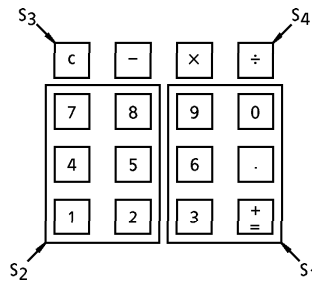


Fig.4 Assignment of switches

(Note) S₁ is brock of 3, +, 6, -, 9, 0.

S₁ is brock of 1, 2, 4, 5, 7, 8.

S₃ is C.

S₄ is ÷.

- and × are no operation switches except in the calculator mode.

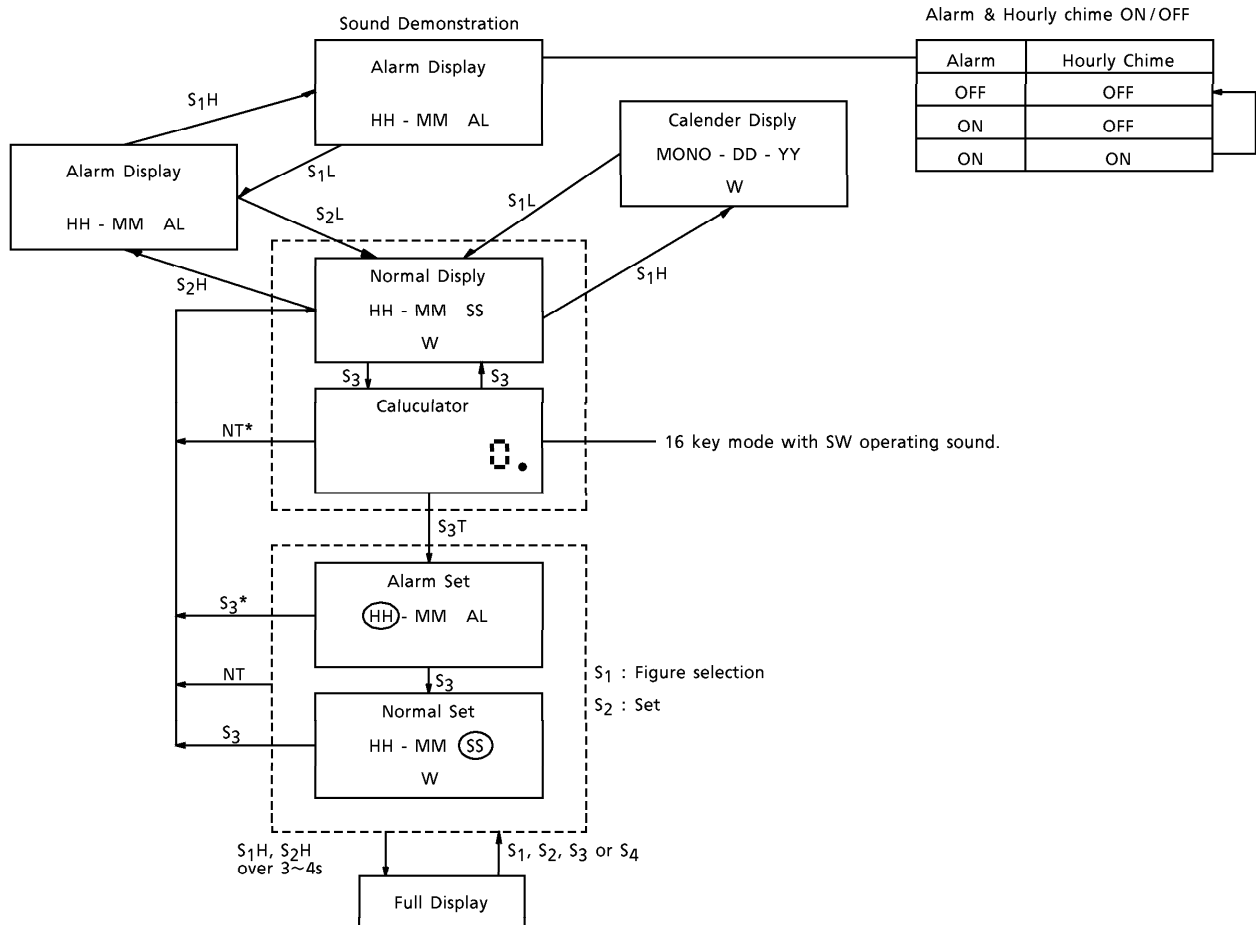


Fig.5 Mode flow chart

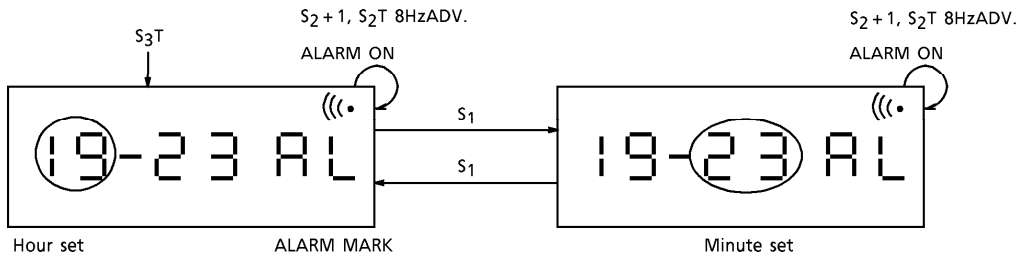


Fig.6 Alarm set mode

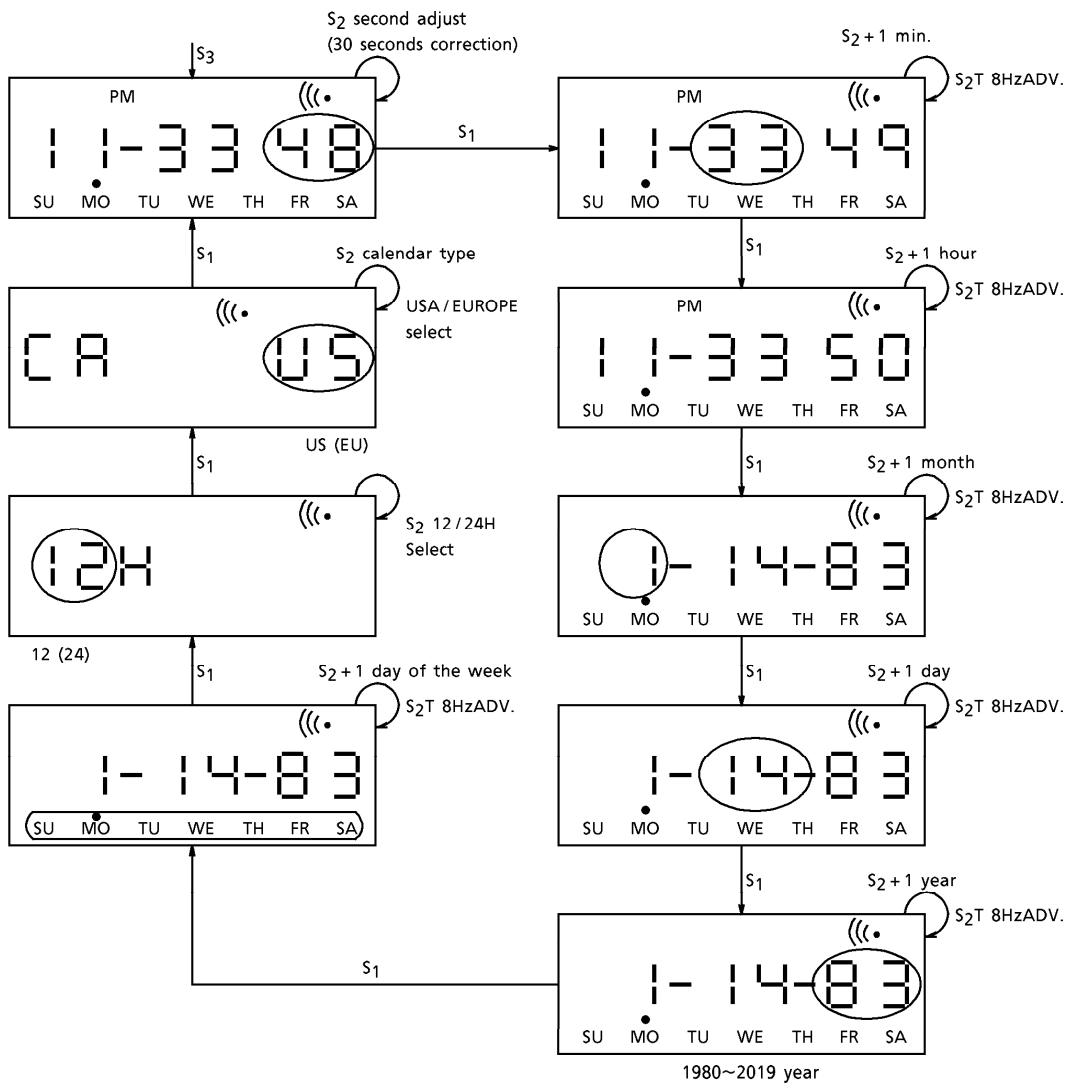


Fig.7 Normal set mode

Symbol of switch operation

SYMBOL	SWITCH OPERATION
S ₁ , S ₂ , S ₃ , S ₄	Momentary depression
S ₃ *	Momentary depression after S ₁ or S ₂
S ₁ L, S ₂ L	Holding switch to V _{SS} level
S ₁ H, S ₂ H	Holding switch to V _{DD} level
S ₂ T	Depressing S ₂ for more than 2 to 3 seconds
S ₃ T	Depressing S ₃ for more than 3 to 4 seconds
NT	None of S ₁ , S ₂ and S ₃ is depressed for 1 to 2 minutes. (Auto Return)
NT*	None of S ₁ , S ₂ and S ₃ is depressed for 10 to 20 minutes. (Auto Return)

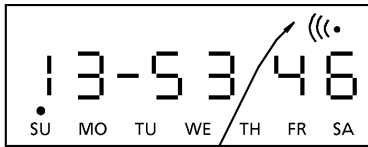
(Note 1) The switch S₄ is for the lamp.

(Note 2)  shows 2Hz flashing.

(Note 3) By depressing the switch S₂ in the Alarm set mode the Alarm function is set to be on duty.

4. Display format in each mode

① Normal Display (24H)
ex. PM. 1 : 53 46", Sunday



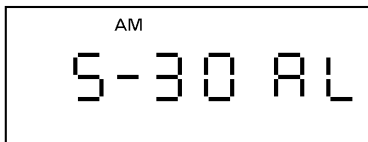
Alarm ON, Hourly Chime OFF

② Calendar Display (U.S.A type)
ex. 1983, Dec. 30, Monday



Alarm ON, Hourly Chime ON

③ Alarm Display (12H)
ex. AM 5 : 30



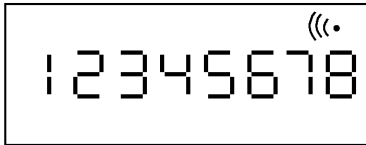
Alarm OFF, Hourly Chime OFF

④ Calendar Display (Europe type)
ex. 1983, Dec. 30, Monday



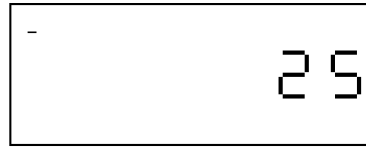
Alarm ON, Hourly Chime ON
Stopwatch : run or split

③ Calculator
ex. 12345678

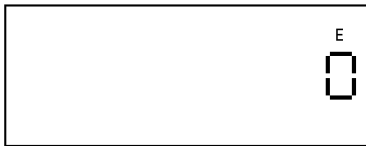


Alarm ON, Hourly Chime OFF

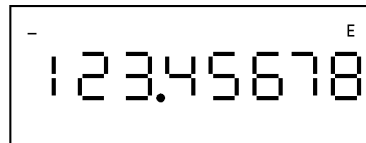
⑥ Calculator
Minus



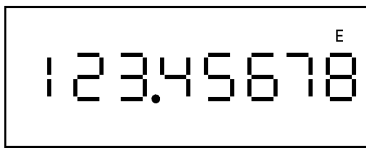
④ Calculator
Error



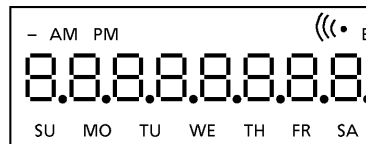
⑦ Calculator
Minus Error



⑤ Calculator
Error



⑧ Full Display

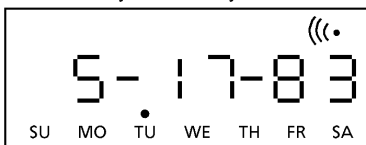


(Note 1) "AL" is displayed at the 1st and 2nd digits in the Alarm Display mode or Alarm Set mode.

5. Calendar display function

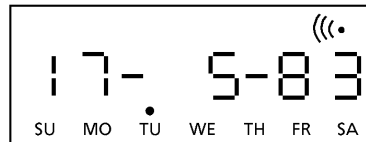
- 5.1 While S₁ is depressed in the Normal Display mode, it becomes Calendar Display mode. By releasing S₁ in the Calendar Display mode, the Normal Display mode can be selected again.
- 5.2 The Calendar Display has two types. One of these in U.S.A. type, the other is Europe type like Fig.8. The selection of these types by depressing S₂ is as Fig.9.

U.S.A. type calendar
ex. 1983, May, 17, Tuesday



Alarm ON

Europe type calendar
ex. 1983, May, 17, Tuesday



Alarm ON

Fig.8 Calendar display

5.3 The sequence of the year count is as follows.

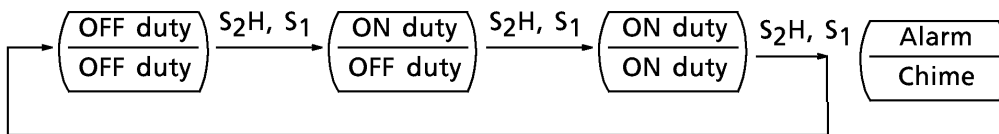
1980→1981~1999→2000→2001~2019

Display : 80→81~99→00→01~19

6. Alarm function and chime function

6.1 The selection of alarm and chime function

By every momentary depression of the switch S_1 with depressing the switch S_2 in the Alarm Display mode, one of three states shown below is selected sequentially.



6.2 Display of the alarm function and chime function

In every mode the state of the selection of the Alarm function and the Chime function is displayed by the mark "⊂•".

- (1) In case that only the Alarm function is an duty the mark "⊂•" appears.
- (2) In case that both the Alarm function and the Chime function are on duty the mark "⊂•" flashes at 2Hz rate.
- (3) In case that both of the Alarm function and the Chime function are off duty the mark "⊂•" doesn't appear.
- (4) Pushing S_2 in the Alarm set mode makes the Alarm function on duty so the mark "⊂•" appears.

6.3 Alarm sound demonstration

The Alarm Demo Sound is activated by depressing the switch S_1 during the S_2 depressed in the Alarm Display mode.

6.4 Alarm function

On condition that the Alarm function is on duty and the Normal time coincides with the Alarm Time, the Alarm sound signal is activated for 20 seconds in any mode. The timing chart of the Alarm sound signal is as follows.

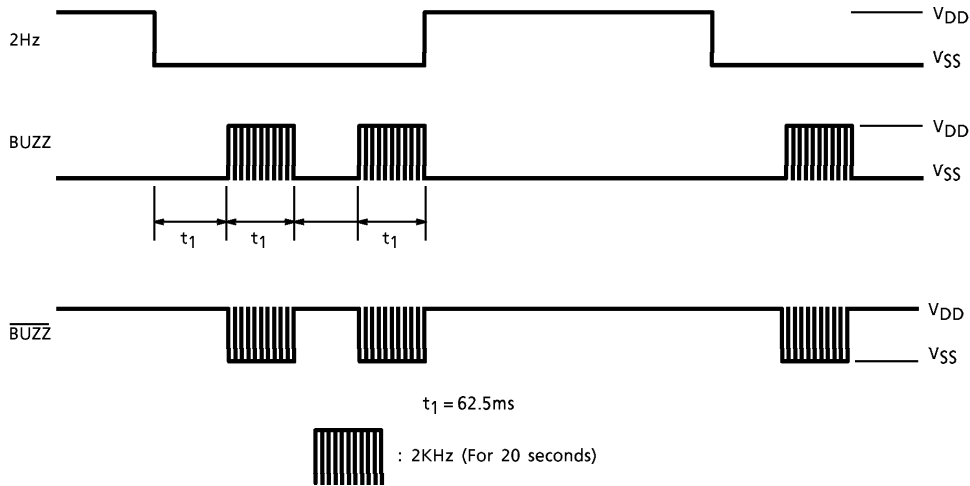


Fig.9 Alarm sound signal

When the Alarm sounds, by hitting any key the Alarm sound signal can be stopped.

6.5 Chime function

On condition that the chime function is on duty the chime sound signal is activated every hour in any mode. The timing chart of the chime sound signal is as follows.

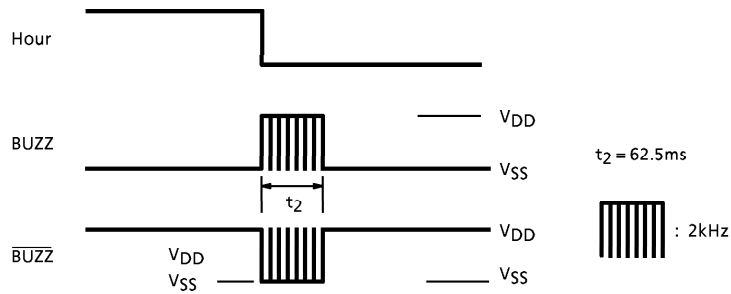


Fig.10 Chime sound signal

As for the drive circuit of the buzzer, see the system block diagram (Fig.2).

7. Switch operating sound

Switch operating sound is activated by the key operation only in the calculator mode. It is the same signal as the chime sound signal.

8. Lamp control

The output level of the pin LAMP becomes V_{DD} V (0V) by depressing the switch S_4 (\div) except in the calculator mode. This output level is 0V while S_4 is depressed and returns to V_{SS} V (Low Level) by the release of S_4 . The output level of the pin LAMP is as follows.

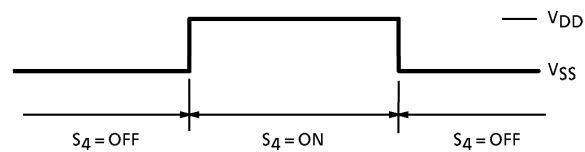


Fig.11

The lamp drive is shown the system block diagram.

9. Notes on the watch function

- 9.1 The Day of the month is calculated automatically by the year including a leap year and the month.
- 9.2 The nonexistent date is able to be set in the Normal Set mode. If the nonexistent date is set in the Normal Set mode, the day of the month is reset to the 1st by returning to the Normal Display mode.
- 9.3 The timing of the 2Hz flashing is as follows.

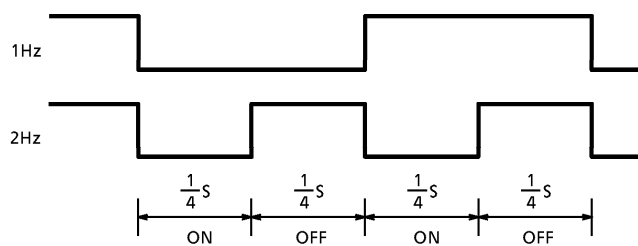


Fig.12

- 9.4 When the mode is Alarm Set or Normal Set, pushing both S_1 and S_2 , over 3 to 4 seconds, makes the Full Display mode be selected. In the Full Display mode, by depressing S_1 , S_2 , S_3 or S_4 , the mode returns to Alarm Set or Normal Set before.

10. Specification of calculator

10.1 Operational features

- (1) Eight digits of data
- (2) Algebraic mode
- (3) Full floating point
- (4) Standard four functions +, -, ×, ÷
- (5) Constant calculation ×, ÷ (Automatic constant)
- (6) Chain calculation
- (7) Leading zero suppression
- (8) The key operation with the beep sound to confirm the sure operation.

10.2 Capacity of calculation

- (1) Numeral entry
8 digits. The numeral entry over 8 digits is not excuted.
- (2) When the result is positive and the integer part of it does not exceed 8 digits it is displayed as the result of the normal operation. (See the description on the error condition.)
- (3) When the result is negative and the integer part of it does not exceed 8 digits, the minus symbol " - " and it are displayed as the result of the normal operation. (See the description on the error condition.)

(Note 1)

KEY OPERATION	DISPLAY
1	1
2	1 2
3	1 2 3
4	1 2 3 4
5	1 2 3 4 5
6	1 2 3 4 5 6
7	1 2 3 4 5 6 7
8	1 2 3 4 5 6 7 8
9	1 2 3 4 5 6 7 8

(Note 2)
8267 × 3594

2	9	7	1	1	5	9	8
---	---	---	---	---	---	---	---

(Note 3)
49276312 - 61438976

1	2	1	6	2	6	6	4
---	---	---	---	---	---	---	---

10.3 Error condition

- (1) When the division by zero is attempted the error symbol "E" and a zero are displayed.
- (2) When the result is positive and the integer part of it exceeds 8 digits the error symbol "E" and the upper 8 digits of the value obtained by the division of it by 10⁸ are displayed.
- (3) When the result is negative and integer part of it exceeds 8 digits the error symbol "E", the minus symbol "-" and the upper 8 digits of the value obtained by the division of it by 10⁸ are displayed.

(Note 1)

	5
--	---

 ÷

	0
--	---

 =

	0	E
--	---	---

(Note 2)

9	8	7	6	5	4	3	2
---	---	---	---	---	---	---	---

 ×

	2
--	---

 =

1.	9	7	5	3	0	8	6	E
----	---	---	---	---	---	---	---	---

(197530864)

4	0	0	0	0	0	0	0
---	---	---	---	---	---	---	---

 ×

3	0	0	0	0	0	0	0
---	---	---	---	---	---	---	---

 =

1	2	0	0	0	0	0	0	E
---	---	---	---	---	---	---	---	---

(1.2 × 10¹⁵)

(Note 3)

1	2	3	4	5	6	7	8
---	---	---	---	---	---	---	---

 ×

9	9
---	---

 =

1	2.	2	2	2	2	2	1	E
---	----	---	---	---	---	---	---	---

(1.222222122 × 10⁹)

4	0	0	0	0	0	0	0
---	---	---	---	---	---	---	---

 ×

3	0	0	0	0	0	0	0
---	---	---	---	---	---	---	---

 =

1	2	0	0	0	0	0	0	E
---	---	---	---	---	---	---	---	---

10.4 Clearing the error condition

While the error occurs the numeral entry and the operation are inhibited. The error condition can be cleared by depressing C twice. In this case by the first depression the mark "E" is disappeared. By the second depression "0" is displayed as follows.

(Note 1)

1	2	0	0	0	0	0	0	E
---	---	---	---	---	---	---	---	---

C

1

1	2	0	0	0	0	0	0
---	---	---	---	---	---	---	---

C

2

	0
--	---

10.5 Keys for calculator

(1) Data keys

The data keys consist of the numeral keys

0

 through

9

 and a decimal point key

.

.

(2) Arithmetic operation keys

They consist of $\boxed{-}$, $\boxed{\times}$, $\boxed{\div}$ and $\boxed{+}$.

- $\boxed{-}$, $\boxed{\times}$, $\boxed{\div}$
- (i) By depressing one of these keys after the numeral entry the operation instruction memorized just before is executed and the new operation instruction by these keys is memorized.
 - (ii) By depressing one of these keys after the depression of $\boxed{-}$, $\boxed{\times}$, $\boxed{\div}$ or $\boxed{+}$ the operation instruction is not executed and the new operation instruction by these keys.
 - (iii) By depressing one of these keys in the constant calculation mode this mode is canceled and the operation instruction by these keys is memorized.
- $\boxed{+}$
- (i) By depressing this key after the first numeral entry the addition instruction is memorized.
 - (ii) By depressing this key after the second numeral entry the operation instruction memorized just before is executed. In case that the operation instruction executed is the addition or the subtraction instruction, the addition instruction is memorized. In case that the operation instruction executed is the multiplication or the division instruction, the constant calculation mode is selected.

(3) Command function key

- \boxed{C}
- (i) By depressing this key without depressing any other key after the calculator mode is selected, the normal mode is selected.
 - (ii) If the calculator is not error condition, by depressing this key after depressing $\boxed{+}$, $\boxed{-}$, $\boxed{\times}$, $\boxed{\div}$, all registers for the calculator are cleared. (All clear)
 - (iii) By depressing this key after the data keys the calculator returns to the state that is one state previous to the state where these data keys are depressed. In this case "0" is displayed. (Clear Enter)
 - (iv) By depressing $\boxed{+}$, $\boxed{-}$, $\boxed{\times}$ or $\boxed{\div}$ just after All Clear or Clear Enter start, the state turns to the same state as $\boxed{+}$, $\boxed{-}$, $\boxed{\times}$ or $\boxed{\div}$ is depressed after $\boxed{0}$. So "0" is displayed and the operation instruction correspond to $\boxed{+}$, $\boxed{-}$, $\boxed{\times}$ or $\boxed{\div}$ is memorized.
 - (v) By depressing \boxed{C} in the All Clear state the Normal Display mode is selected.

(Note 1)

KEY OPERATION	DISPLAY	KEY OPERATION	DISPLAY	KEY OPERATION	DISPLAY	KEY OPERATION	DISPLAY
a	a	a	a	a	a	a	a
$\boxed{\times}$	a	$\boxed{\div}$	a	$\boxed{+}$ $\boxed{=}$	a	$\boxed{-}$	a
b	b	b	b	b	b	b	b
\boxed{C}	0	\boxed{C}	0	\boxed{C}	0	\boxed{C}	0
d	d	d	d	d	d	d	d
$\boxed{+}$ $\boxed{=}$	a x d	$\boxed{+}$ $\boxed{=}$	a ÷ d	$\boxed{+}$ $\boxed{=}$	a + d	$\boxed{+}$ $\boxed{=}$	a - d

(Note 2)

KEY OPERATION	DISPLAY	KEY OPERATION	DISPLAY	KEY OPERATION	DISPLAY	KEY OPERATION	DISPLAY
a	a	a	a	a	a	a	a
$\boxed{\times}$ ($\boxed{\div}$, $\boxed{+}$, $\boxed{-}$)	a	$\boxed{\times}$ ($\boxed{\div}$, $\boxed{+}$, $\boxed{-}$)	a	$\boxed{\times}$ ($\boxed{\div}$, $\boxed{+}$, $\boxed{-}$)	a	$\boxed{\times}$ ($\boxed{\div}$, $\boxed{+}$, $\boxed{-}$)	a
b	b	b	b	b	b	b	b
\boxed{C}	0	\boxed{C}	0	\boxed{C}	0	\boxed{C}	0
$\boxed{\times}$	0	$\boxed{\div}$	0	$\boxed{+}$ $\boxed{=}$	0	$\boxed{-}$	0
d	d	d	d	d	d	d	d
$\boxed{+}$ $\boxed{=}$	a x 0 x d (a ÷ 0 x d) (Error 0), (a + 0) x d, (a - 0) x d	$\boxed{+}$ $\boxed{=}$	a x 0 ÷ d (a ÷ 0 ÷ d) (Error 0), (a + 0) ÷ d, (a - 0) ÷ d	$\boxed{+}$ $\boxed{=}$	a x 0 + d (a ÷ 0 + d) (Error 0), a + 0 + d, a - 0 + d	$\boxed{+}$ $\boxed{=}$	a x 0 - d (a ÷ 0 - d) (Error 0), a + 0 - d, a - 0 - d

10.6 Arithmetic operation

(1) Entry

	KEY OPERATION	DISPLAY
(1)	1	1
	2	1 2
	3	1 2 3
	4	1 2 3 4
	5	1 2 3 4 5
	6	1 2 3 4 5 6
	7	1 2 3 4 5 6 7
	8	1 2 3 4 5 6 7 8

	KEY OPERATION	DISPLAY
(2)	1	1
	2	1 2
	.	1 2
	3	1 2. 3
	4	1 2. 3 4

(2) Four fundamental arithmetic calculation

	KEY OPERATION	DISPLAY
(1)	a + =	a
	b + =	a b a + b
(2)	a - =	a
	b + =	a b a - b

	KEY OPERATION	DISPLAY
(3)	a × =	a
	b + =	a b a · b
(4)	a ÷ =	a
	b + =	a b a / b

(3) Constant calculation

	KEY OPERATION	DISPLAY
(1)	K × =	K
	b + =	K b K · b
	C + =	C K · C

	KEY OPERATION	DISPLAY
(2)	a ÷ =	a
	K + =	a K a / K
	C + =	C C / K

(4) Power calculation

	KEY OPERATION	DISPLAY
(1)	a × =	a
	+ =	a a ²
	× =	a ²
	+ =	a ⁴

	KEY OPERATION	DISPLAY
(2)	a ÷ + =	a a a ⁻¹

(5) Mixed calculation

	KEY OPERATION	DISPLAY
(1)	a	a
	$\frac{+}{=}$	a
	b	a + b
	\times	a + b
	c	c
	\div	(a + b) · c
	d	d
	$-$	(a + b) · c / d
	e	e
	$\frac{+}{=}$	(a + b) · c / d - e
(2)	a	a
	\times	a
	b	b
	$\frac{+}{=}$	a · b
	$\frac{+}{=}$	a · b
	c	c
$\frac{+}{=}$	a · b + c	

	KEY OPERATION	DISPLAY
(3)	a	a
	\div	a
	b	b
	$\frac{+}{=}$	a / b
	$\frac{+}{=}$	a / b
	c	c
	$\frac{+}{=}$	a / b + c

11. All clear function

When all of switch inputs S_1 , S_2 , S_3 and S_4 are ON at the same time in the Normal display mode, displays become Normal time = AM 12 : 00 00, 1983 January 1st Saturday, Alarm time = AM 12 : 00, 12 / 24H = 12H cycle, Calendar type = U.S.A. type and Alarm / Hourly chime = OFF / OFF.

When power is applied or when the supply of power is interrupted (e.g. if the battery is changed), the internal state of the IC may become unstable, even though it appears to be operating normally. For this reason it is vital to verify that the crystal oscillation circuit is oscillating normally and stably (at 32 kHz) and then to use the system reset pin to initialize the IC (i.e. clear it) before use.

Note that a clear operation using the built-in power-on clear circuit should not be used in this case.

MAXIMUM RATINGS

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage (1)	$V_{SS1}-V_{DD}$	-3.0~0.2	V
Supply Voltage (2)	$V_{SS2}-V_{DD}$	-4.0~0.2	V
Operating Temperature	T_{opr}	-10~60	°C
Storage Temperature	T_{stg}	-40~125	°C

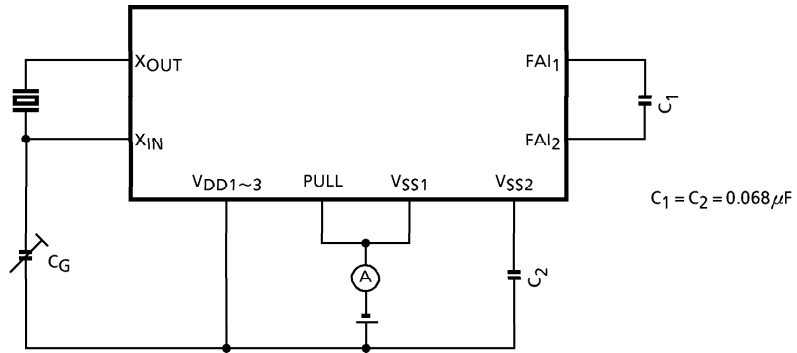
ELECTRICAL CHARACTERISTICS

(V_{DD} = 0V, V_{SS1} = -1.55V, V_{SS2} = -3.00V, Ta = 25°C, unless otherwise noticed)

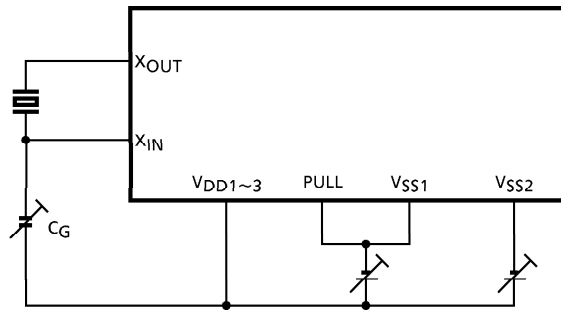
PARAMETER	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Operating Voltage (1)	V _{SS1}	1	C _G = 15pF	1.25	1.55	1.80	V	
Operating Voltage (2)	V _{SS2}	2	C _G = 15pF	2.30	3.00	3.60	V	
Current Consumption	I _{SUP}	1	C _G = 15pF	—	—	2.5	μA	
OSC Starting Voltage	V _{SAT}	1	C _G = 20pF	—	—	1.45	V	
Output Current (1) (Segment COM) V _{SS1}	I _{OH1}	3	V _{OH1} = -0.30V	—	—	-140	μA	
	I _{OL1}		V _{OL1} = -2.70V	140	—	—		
Output Current (2) (Segment COM) V _{SS1}	I _{OH2}	3	V _{OH2} = -1.75V	—	—	-70	μA	
	I _{OL2}		V _{OL2} = -1.35V	70	—	—		
Output Current (3) (Segment)	I _{OH3}	3	V _{OH3} = -0.30V	—	—	-6.0	μA	
	I _{OL3}		V _{OL3} = -2.70V	6.0	—	—		
Output Current (4) (BUZZ, BUZZ, Lamp)	I _{OH4}	3	V _{OH4} = -0.5V	—	—	-300	μA	
	I _{OL4}		—	—	—	—		
Output Current (5) (DKOUT1, KOUT2~4)	I _{OH5}	3	PULL = V _{SS1}	V _{OH5} = -0.2V	—	—	-30	μA
	I _{OL5}			—	—	—	—	
Input Current (1) (DKIN1~4, KIN1~4)	I _{IH1}	3	PULL = V _{SS1}	V _{IH1} = 0.00V	0.2	—	4.4	μA
	I _{IL1}			V _{IL1} = -1.55V	-0.1	—	—	
Input Current (2) (Test Input)	I _{IH2}	3	PULL = V _{SS1}	V _{IH2} = 0.00V	8	—	120	μA
	I _{IL2}			V _{IL2} = -1.55V	-0.1	—	—	

TEST CIRCUIT

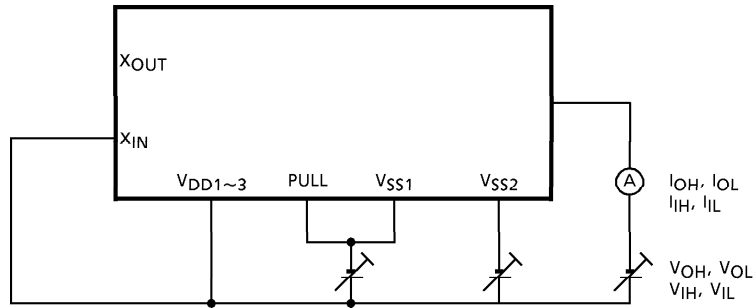
1.



2.

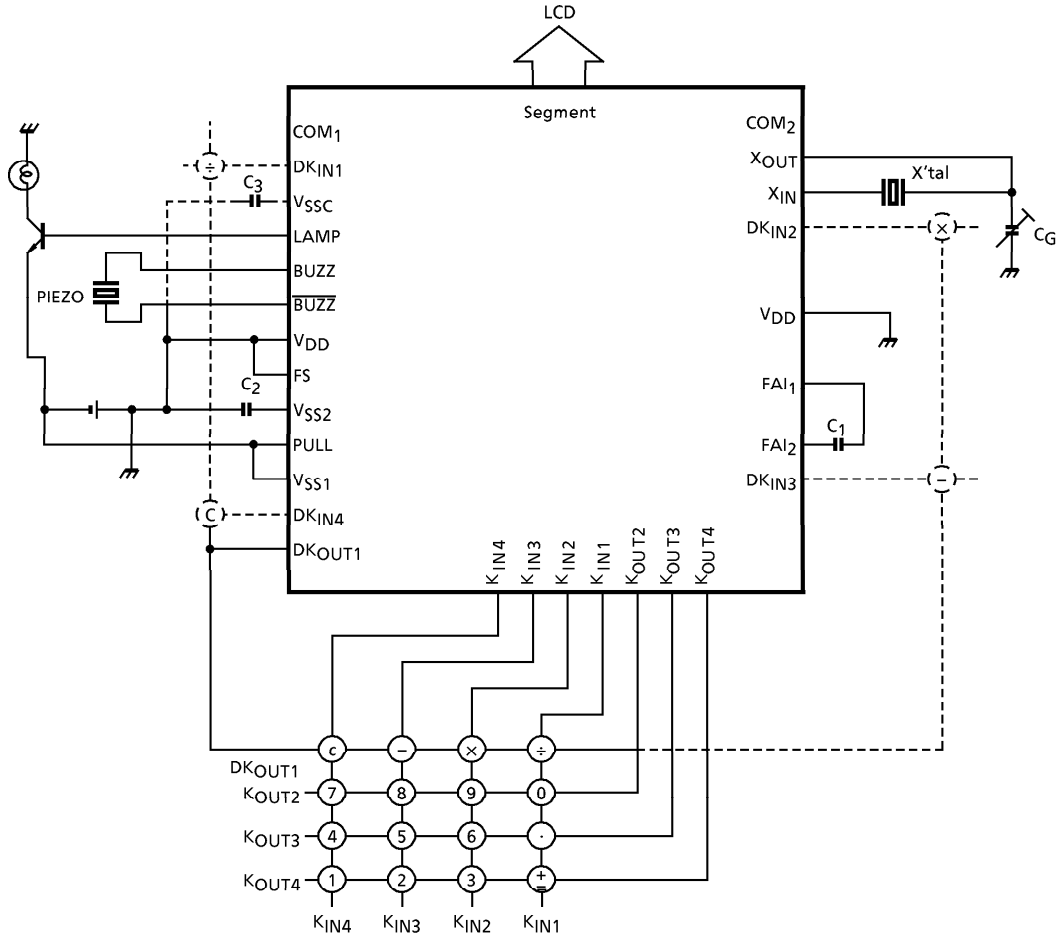


3.



APPLICATION CIRCUIT

1. Ago battery operate



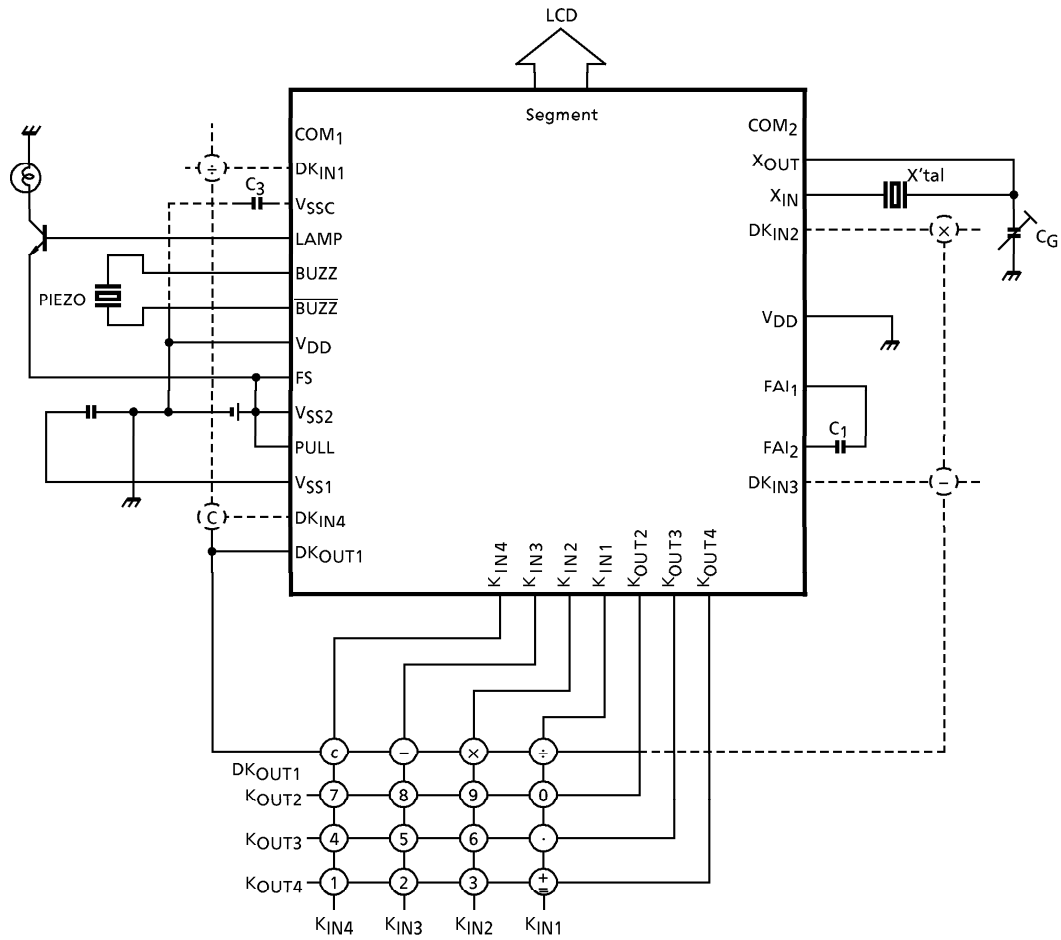
(Note 1) $C_1 \sim C_3 = 0.068 \mu\text{F}$

(Note 2) $C_G = 5 \sim 30 \text{pF}$

(Note 3) Switch \odot , \ominus , \otimes and \oplus are to be connected $K_{IN1} \sim 4$ or $DK_{IN1} \sim 4$ with DK_{OUT1} .

(Note 4) The pad V_{SSC} had better to be connected the capacitor C_3 with V_{DD} .

2. Lithium battery operate



(Note 1) $C_1 \sim C_3 = 0.068 \mu\text{F}$

(Note 2) $C_G = 5 \sim 30 \text{pF}$

(Note 3) Switch (c), (-), (x) and (÷) are to be connected $K_{IN1} \sim 4$ or $DK_{IN1} \sim 4$ with DK_{OUT1} .

(Note 4) The pad V_{SSC} had better to be connected the capacitor C_3 with V_{DD} .

3. Buzzer drive application

