深圳市普恩科技有限公司

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XT0033

4-DIGIT COUNTDOWN/UP TIMER

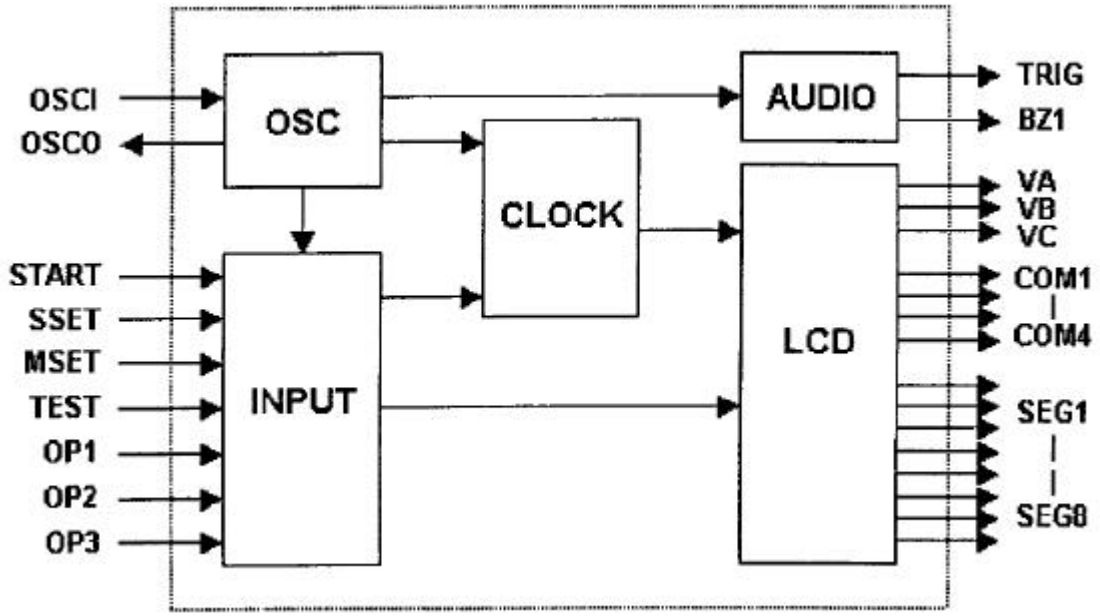
1. General Descriptions

XT0033 is an UP/DOWN timer IC. It can directly drive a standard 4 digit 1/4 duty cycle LCD. Maximum countdown time is 59:59 or 99:59. Count up cycle time is 60 or 100 minutes by bonding option. Also bonding option is for alarm time 32 or 64 seconds, 2kHz, and up/down or just down function. Feasible input options and universal functions give this chip many uses such as parking alarm timer, pillbox timer, kitchen timer, etc.

2. Features

- ◆Special alarm trigger output for switch control or for driving another melody IC
- ◆Internal voltage doubler
- ◆32,768Hz quartz crystal time base
- ◆Single 1.5V battery operation
- ◆Direct drive buzzer
- ◆4 digit LCD display
- ◆Maximum count 59:59 min or 99:59 min (bonding option OPT3)
- ◆Just count-down timer repeat function by bonding option (OPT2)
- ◆Minutes and Seconds set independently
- ◆Timer reset when depressing MSET and SSET simultaneously
- ◆ Alarm sound 2kHz, 32 or 64 seconds (bonding option OPT1)

3. Function Block Diagram



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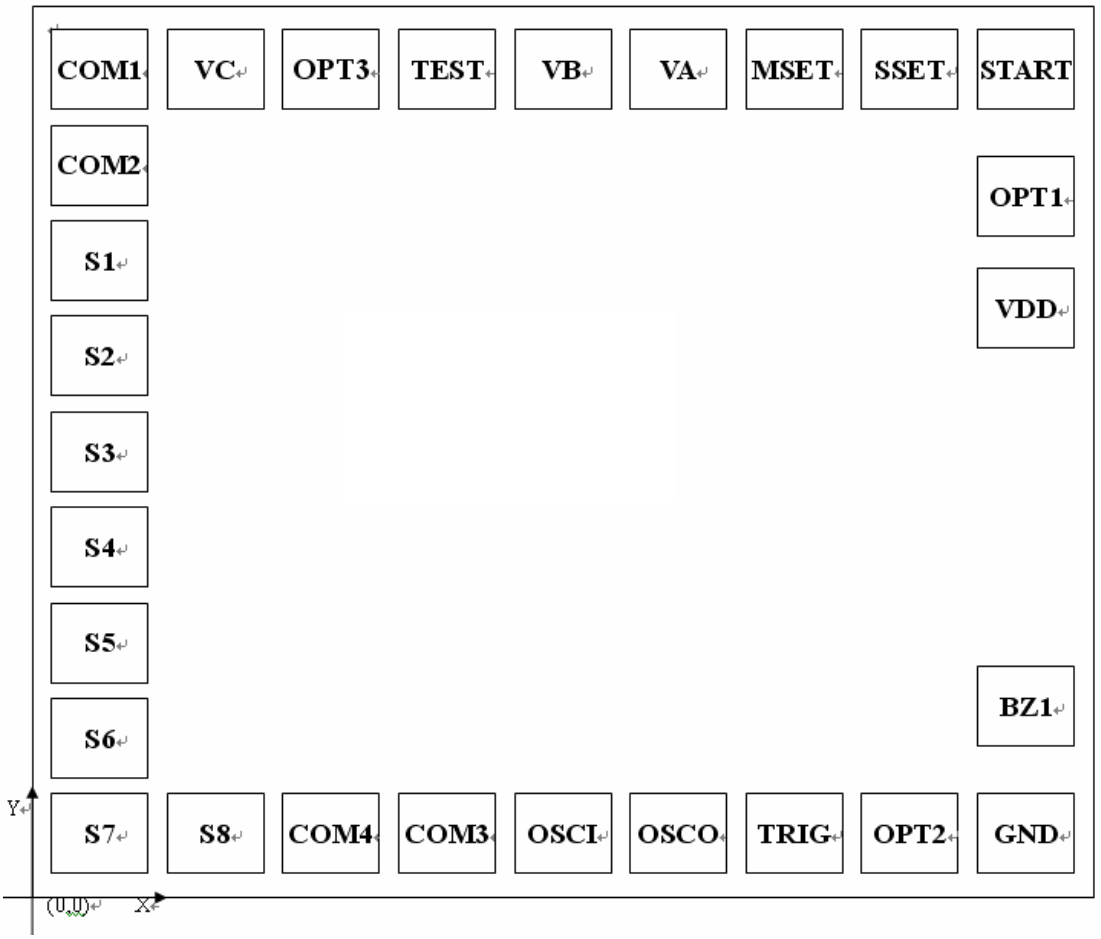
4. Pad Diagram

(Unit：um)



Chip Size (1330*1210)

Notice：The substrate must be connected to VDD

NO.	Name	X	Y	NO.	Name	X	Y
1	S7	70	70	15	MSET	968	1140
2	S8	309	70	16	VA	836	1140
3	COM4	441	70	17	VB	705	1140
4	COM3	573	70	18	TEST	586	1145
5	OSCI	706	70	19	OPT3	467	1140
6	OSCO	837	70	20	VC	337	1140
7	TRIG	969	70	21	COM1	70	1140
8	OPT2	1101	70	22	COM2	70	998
9	GND	1260	70	23	S1	70	886
10	BZ1	1260	230	24	S2	70	733
11	VDD	1260	865	25	S3	70	602
12	OPT1	1260	998	26	S4	70	470
13	START	1260	1140	27	S5	70	338
14	SSET	1100	1140	28	S6	70	206

5. Pin Descriptions

NO.	Name	I/O	Function
1	VDD	P	Power pins for positive power supply
2	OSCI	I	Oscillator Input
3	OSCO	O	Oscillator Output
4	GND	P	Ground
5	VC	O	voltage doubler supply for LCD driving
6	SSET	I	Second Setting Input
7	MSET	I	Minute Setting Input
8	START/STOP	I	Start or Stop Input
9	BZ1	O	Alarm Output
10	TRIG	O	Trigger Output
11	VA&VB	O	Voltage Doubler Capacitor
12	SEG1/SEG8	O	LCD Segments Driving Pins
13	COM1/COM4	O	LCD Backplane Pins
14	TEST	I	Test Input Pins
15	OPT1	I	Bonding option for alarm time
16	OPT2	I	Bonding option for up/down or input down
17	OPT3	I	Bonding option for maximum count

6. Functional Description

6.1 Countdown Timer Mode

6.1.1 After power-on, LCD will display 00:00.

6.1.2 Time is set by the SSET and MSET pins. Time setting is only effective in this mode and the timer must be in the stop or reset state. Each depression of these pins will make the timer count advance one digit and if it is depressed more than one second, the timer will count one digit for every 1/8 second. The second and minute setting are independent. Colon will be on but not flash during the setting.

6.1.3 The timer will reset to 00:00, if SSET and MSET are depressed simultaneously.

6.1.4 After the time has been set, triggering the START/STOP pin will start the timer and colon will begin to flash(0.5 sec on, 0.5 sec off).

6.1.5 When the timer is counting, it will be stopped by triggering off any key pin. When the timer is stopped by pressing MSET or SSET key, the preset time will be the time of last pressing one of this keys. In this stop state, the colon will be on, but not flash. The timer can also be set during this state. An additional trigger to START/STOP will terminate this state and start to count from the time which it displays.

6.1.6 When countdown time is reached, the LCD displays 00:00 and the colon will be on but not flash. At this moment, BZ1 will send out a 2048 x 8 X 1 Hz signal for 32 second (or 64 sec by bonding option). During this alarm period, depress any pin will stop the output.

6.1.7 When the countdown timer reaches zero and the alarm signal ends(32 or 64 sec), the LCD will be returned to preset time. If alarm signal is stopped by depressing START/STOP, the LCD will be returned to preset time. If alarm is stopped by the SSET or MSET pin, the LCD displays 00:00 and then depressing START/STOP pin will be returned the LCD to preset time.

6.2 Count-up Timer Mode

6.2.1 The count-up timer will be triggering START/ STOP start only when the chip has been reset and powered on without a set time. The count-up timer will start by triggering Start / Stop after reset.

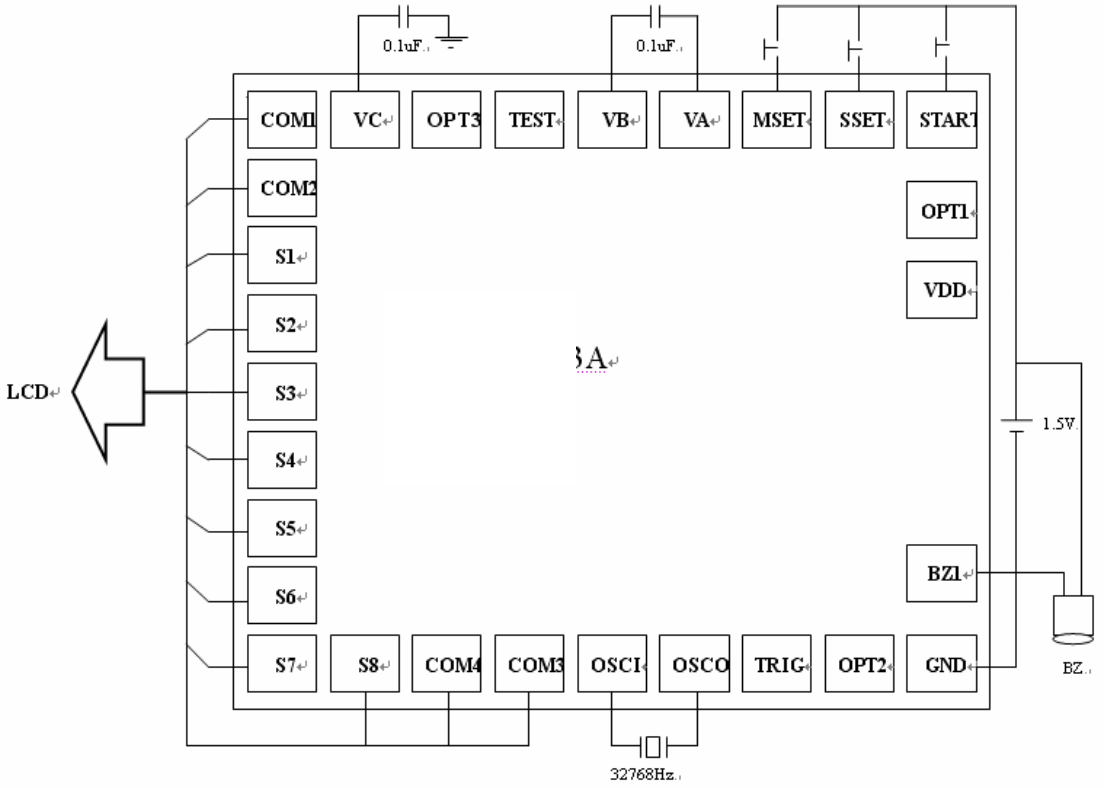
6.2.2 The count-up timer has a cyclical count of 59 minutes(or 99 minutes by bonding option) after being started.

6.2.3 While the count-up timer is counting, depressing the any key will stop it. Another trigger of START/STOP will start the timer continuously counting.

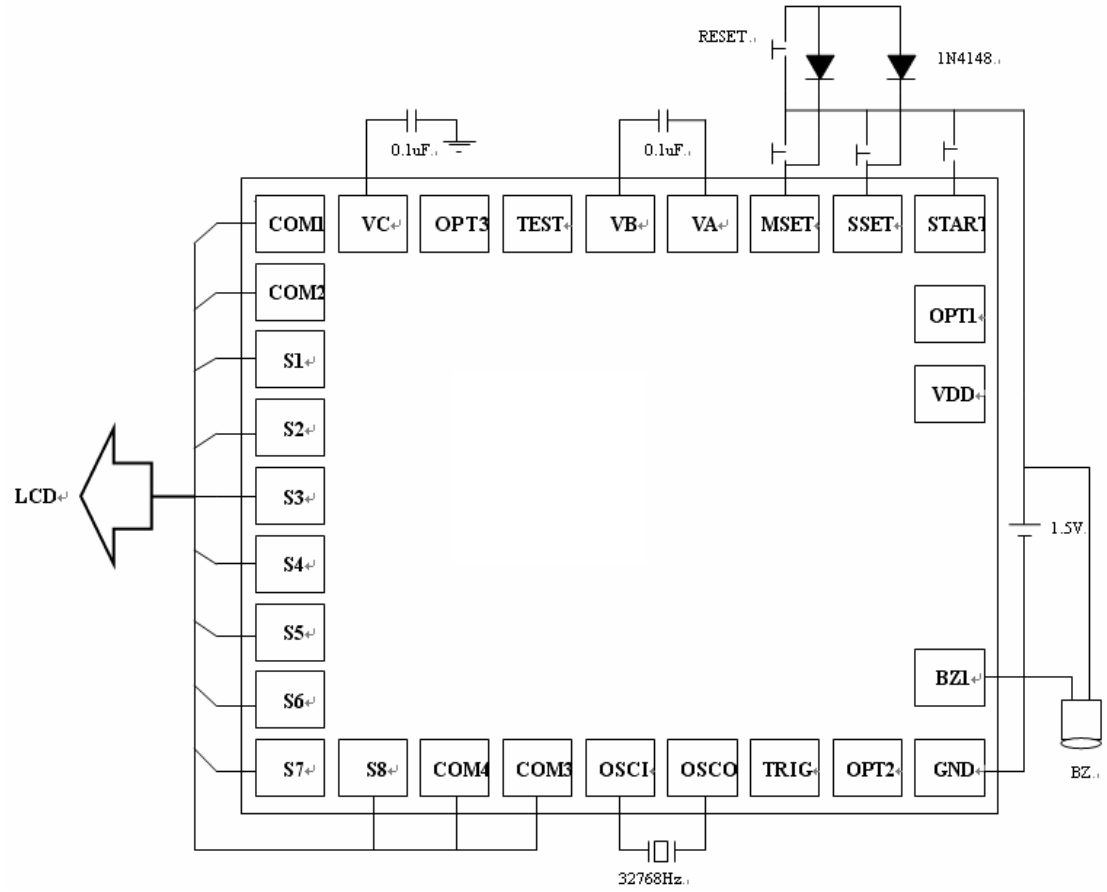
6.2.4 When the chip is in count up timer mode, the chip can change to count down timer mode after the count-up timer is stopped by any key and then preset by MSET and SSET.

7. Application Circuit

7.1 Three Keys Application: MSET SSET START/STOP

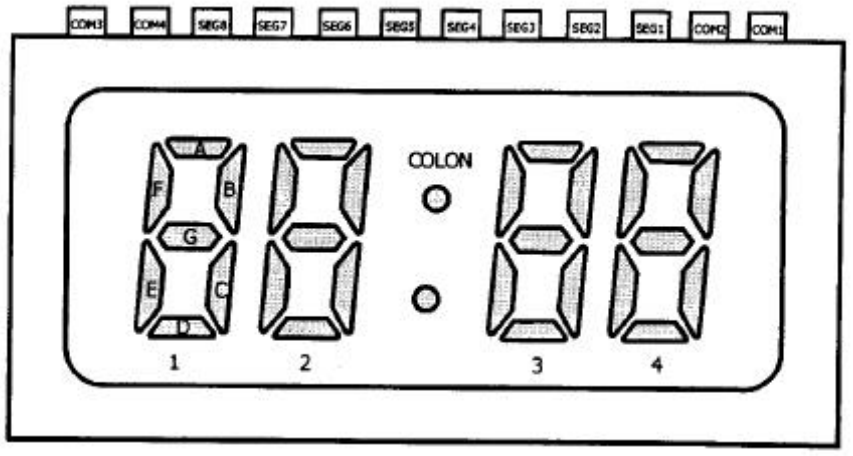


7.2 Four Keys Application: MSET SSET START/ STOP RESET



NOTE: The chip substrate must be connected to VDD

8. LCD Format



LCD Voltage：3.0V, 1／2Bias，and l／4Duty

	SEG8	SEG7	SEG6	SEG5	SEG4	SEG3	SEG2	SEG1
COM1	A1	B1	A2	B2	A3	B3	A4	B4
COM2	F1	G1	F2	G2	F3	G3	F4	G4
COM3	E1	C1	E2	C2	E3	C3	E4	C4
COM4	-	D1	-	D2	COLON	D3	-	D4

9. Electrical Characteristics

(Ta = 25? , GND = 0V, VDD=1.5V, Fosc=32768 Hz, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Operating Voltage	V_{DD}	--	1.25	1.5	1.70	V
Display Voltage	VC	--	2.4	3.0	3.4	V
Supply Current	I_{CC}	Without Load		3.0	5.0	μA
Output Drive Current (BZ1,TRIG Output)	I_{OH}	V_{OH}=1V (BZ Output)	-25	-50	--	mA
		V_{OH}=1.35V (TRIG Output)	-500	--		μA
	I_{OL}	V_{OL}=0.15V (TRIG Output)	500	--	--	
Frequency Stability	? f/f	V_{CC}=1.25Vto 1.70V			10	ppm
Oscillator Built-in Capacitor	CD	--		10		pF
Alarm Output Frequency	F_{BZ}	--	2048x4x1	--	--	Hz
Oscillator Start up Time	T_{OS}	V_{CC}=1.30V		--	2	sec

10. Absolute Maximum Ratings

Parameter	Symbol	Limits	Unit
Supply Voltage	V_{DD}	-0.3~5	V
Input Voltage	V_I	GND-0.3~VDD+0.3	V
Output Voltage	V_O	GND-0.3~VDD+0.3	V
Operating Temperature	T_{OPR}	0~70	?
Storage Temperature	T_{STG}	-20~125	?

11. Notices

1. The information contained herein could be changed without notice owing to product and/ or technical improvements. Please make sure before using the product that the information you are referring to is up-to-date.

2. No responsibility is assumed by us for any consequence resulting from any wrong or improper operation, etc.of the product.