

### General Description:

This product is a general-purpose counter fabricated with CMOS technology. It is designed to drive 1/2 bias, 1/3 duty cycle LCD with a 1.5V battery as its power supply. The IC can be used in many applications, such as step-counter.

### Features:

- Single 1.5V battery operation
- Count from 00000 up to 99999
- Advance by 1 for each trigger
- Debounce circuitry
- Bonding selection for 3-digit / 5-digit application
- All digits are displayed, including leading zeros
- Hold on the maximum count, i.e. 99999(5-digit application) or 999(3-digit application)
- Direct continuous multiplexed LCD drive capability
- Built-in RC oscillator
- Built-in voltage doubler
- Automatic power-off after 2 minutes from the last trigger
- Awake by a new trigger with the display advanced by 1
- Reset function: During working, after pressing RESET for more than 2 sec, it will display 88888 or 888 for 1 second, then reset the count to 00000 or 000. Reset function will not work after auto power-off
- Power on LCD test by displaying 88888 or 888 for 1 sec
- Error Display for SEL bonding failure

### Block diagram:

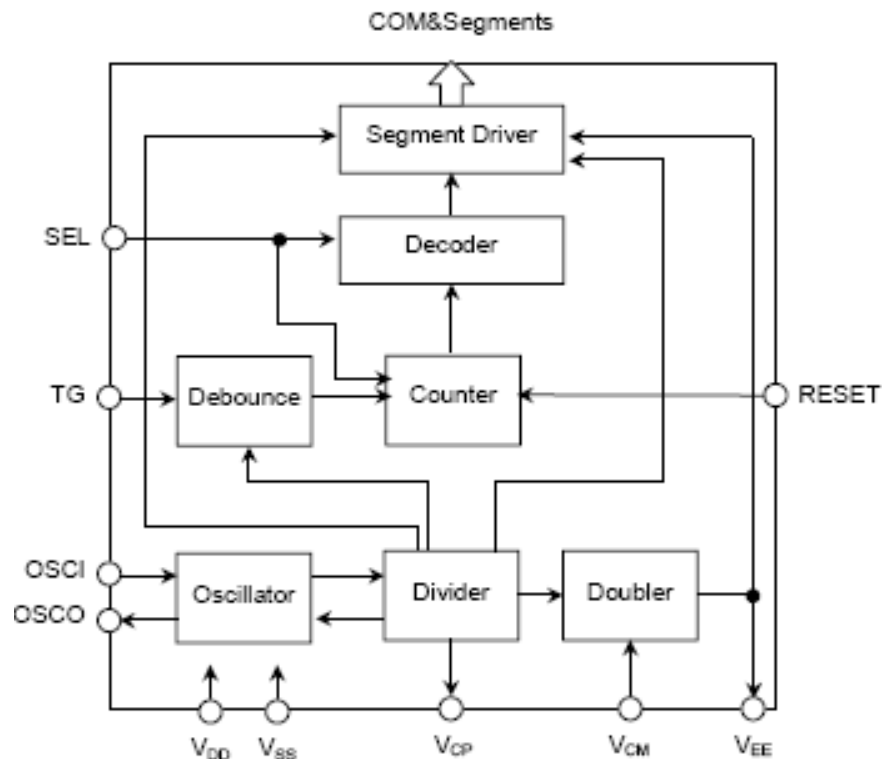


Figure 1: Block Diagram

**LCD Format:**

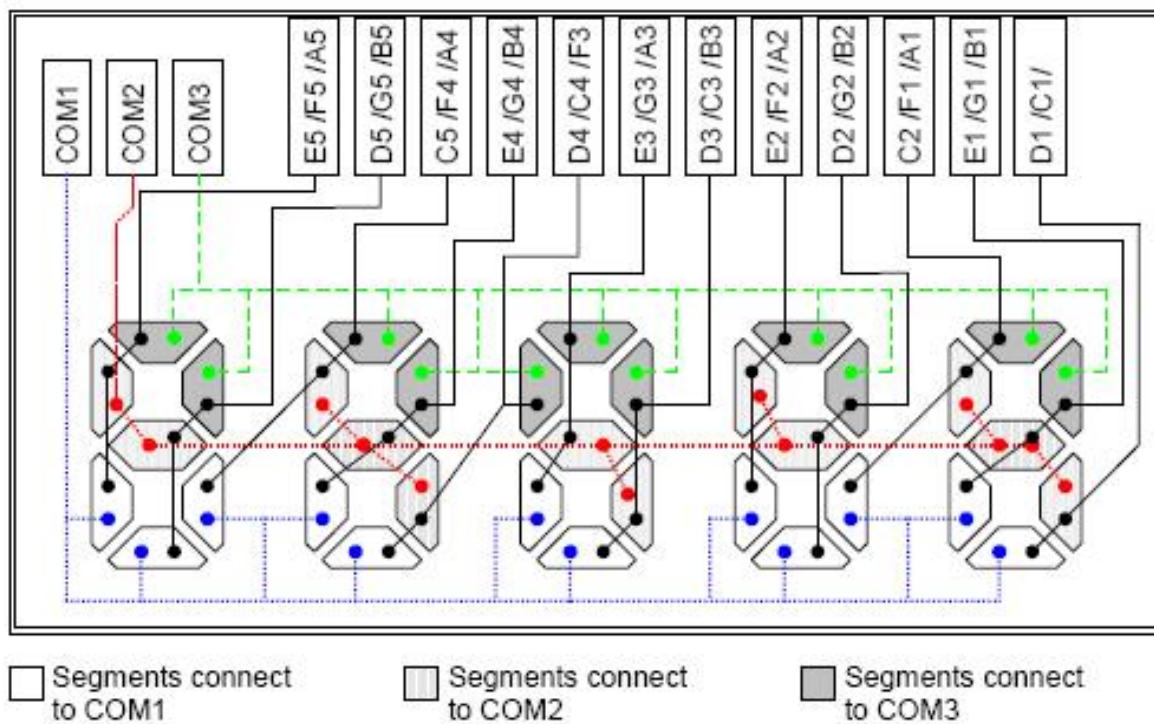


Figure 2: LCD Format

**Pad Layout & Location**

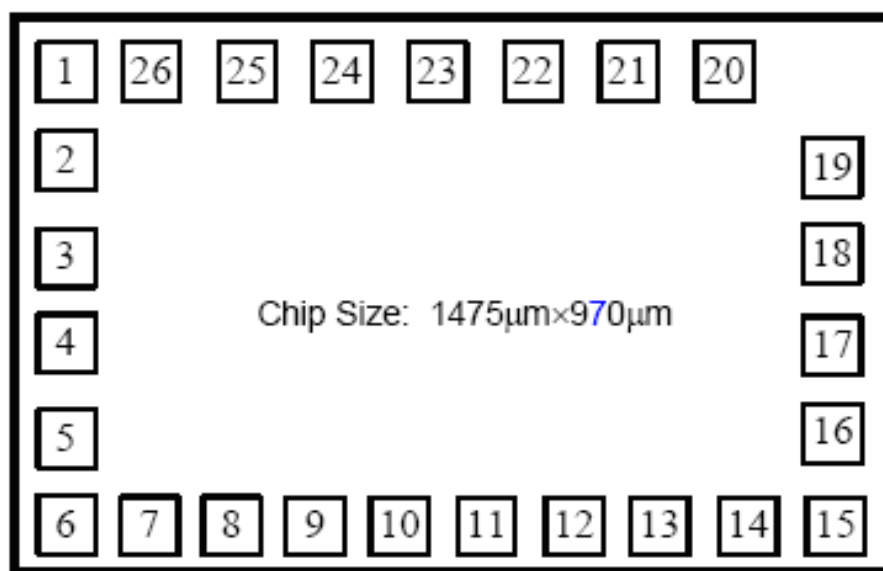


Figure 3: Pad Layout

No.	Name	X(μm)	Y(μm)	No.	Name	X(μm)	Y(μm)	No.	Name	X(μm)	Y(μm)
1	VDD	72	827	10	D4C4F3	632	72	19	OSCI	1332	706
2	VEE	72	687	11	E3G3A3	772	72	20	T	1058	832
3	COM1	72	547	12	D3C3B3	912	72	21	OSCO	923	827
4	COM2	72	407	13	E2F2A2	1052	72	22	SEL	783	827
5	COM3	72	267	14	D2G2B2	1192	72	23	TG	643	827
6	E5F5A5	72	72	15	C2F1A1	1332	72	24	RESET	503	827
7	D5G5B5	212	72	16	E1G1B1	1332	254	25	V <sub>CP</sub>	363	827
8	C5F4A4	352	72	17	D1C1	1332	399	26	V <sub>CM</sub>	223	827
9	E4G4B4	492	72	18	VSS	1332	545				

### Typical Application Circuit

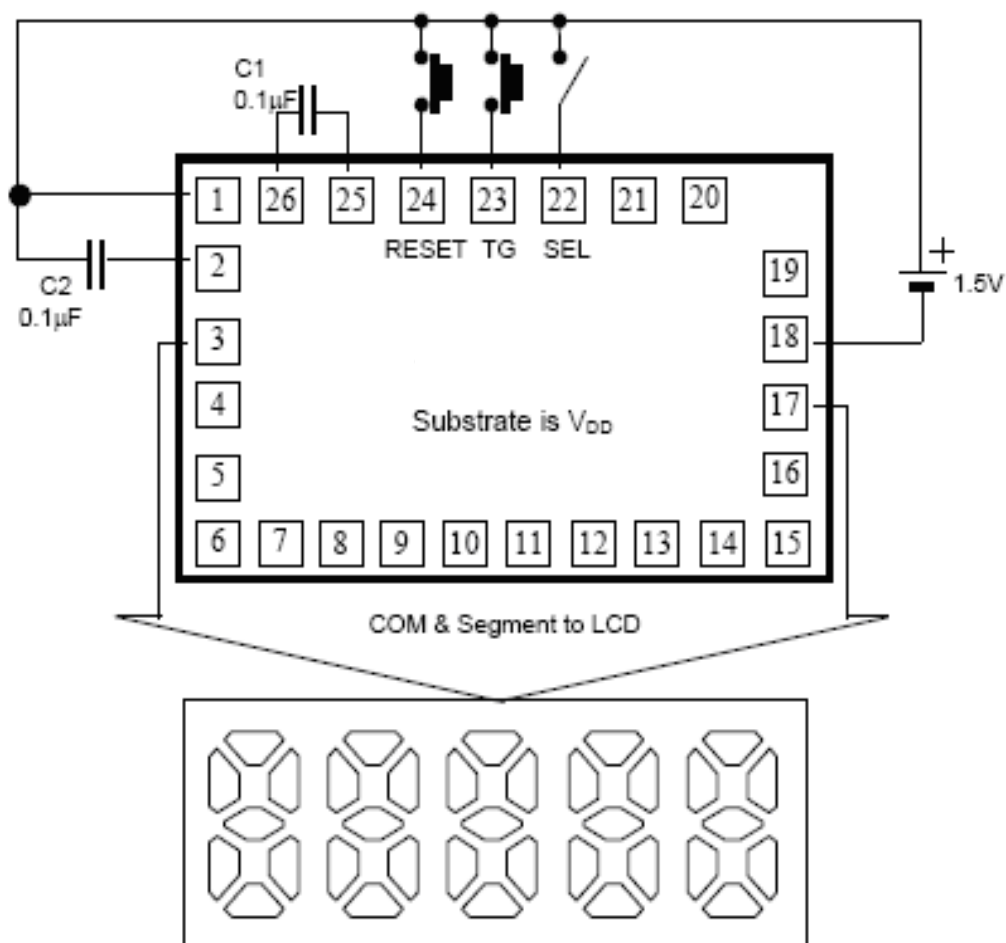


Figure 4: Typical Application circuit

Note: SEL=V<sub>DD</sub>, 5-digit  
 SEL open, 3-digit

### Absolute Maximum Rating

Parameter	Symbol	Test conditions	Limits	Units
Supply Voltage 1	V <sub>DD</sub> -V <sub>SS</sub>	T <sub>a</sub> = 25°C	-0.3 to 2	V
Supply Voltage 2	V <sub>DD</sub> -V <sub>EE</sub>	T <sub>a</sub> = 25°C	-0.3 to 4	V
Input Voltage	V <sub>in</sub>	T <sub>a</sub> = 25°C (OSCI, OSCO, TG, SEL, T)	V <sub>SS</sub> -0.3 to V <sub>DD</sub> +0.3	V
Operation Temperature	T <sub>op</sub>		-10 to 70	° C
Storage Temperature	T <sub>stg</sub>		-55 to 125	° C

### Electrical Characteristics

(T<sub>a</sub> = 25 °C, V<sub>DD</sub>=1.5V, V<sub>SS</sub>=0V, unless otherwise specified)

Parameter	Symbol	Test Condition	Limit			Unit
			Min.	Typ.	Max.	
Operation Voltage 1	V <sub>DD</sub>		1.2	1.5	1.8	V
Operation Voltage 2	V <sub>EE</sub>		-1.2	-1.5	-1.8	V
Power Supply Current	I <sub>DD</sub>	No load	-	10	50	μA
OSC. Start Voltage	V <sub>OSC</sub>	Within 5 sec.	1.4	-	-	V
OSC. Hold Voltage	V <sub>HLD</sub>		1.2	-	-	V
Input Debounce time (TG)	t <sub>DB1</sub>	Fosc=32KHz	16		32	ms
Input Debounce time (Reset)	t <sub>DB2</sub>	Fosc=32KHz	1		2	sec.
Input Current	I <sub>IH1a</sub>	SEL=V <sub>DD</sub> , while working		1	5	μA
	I <sub>IH1b</sub>	SEL=V <sub>DD</sub> , after power-off		0.01	1	μA
	I <sub>IH2</sub>	TG=V <sub>DD</sub>		1	5	μA
	I <sub>IH3</sub>	RESET=V <sub>DD</sub>		1	5	μA
Input High Voltage	V <sub>IH</sub>		V <sub>DD</sub> -0.3	-	V <sub>DD</sub>	V
Input High Voltage	V <sub>IH</sub>		V <sub>DD</sub> -0.3	-	V <sub>DD</sub>	V
Input High Voltage	V <sub>IH</sub>		V <sub>DD</sub> -0.3	-	V <sub>DD</sub>	V
Output Low Voltage 1	V <sub>OL1</sub>	I <sub>OL</sub> =0.1μA (Segments)	-	-	V <sub>EE</sub> +0.05	V
Output High Voltage 1	V <sub>OH1</sub>	I <sub>OH</sub> =-0.1μA (Segments)	V <sub>DD</sub> -0.05	-	-	V
Output Low Voltage 2	V <sub>OL2</sub>	I <sub>OL</sub> =1μA (COM output)	-	-	V <sub>EE</sub> +0.05	V
Output High Voltage 2	V <sub>OH2</sub>	I <sub>OH</sub> =-1μA (COM output)	V <sub>DD</sub> -0.05	-	-	V
Output Middle Voltage	V <sub>om</sub>	I <sub>om</sub> =±1μA (COM output)	V <sub>SS</sub> -0.05	V <sub>SS</sub>	V <sub>SS</sub> +0.05	V
OSC. Frequency	Fosc	No external components connected	22	32	42	KHz