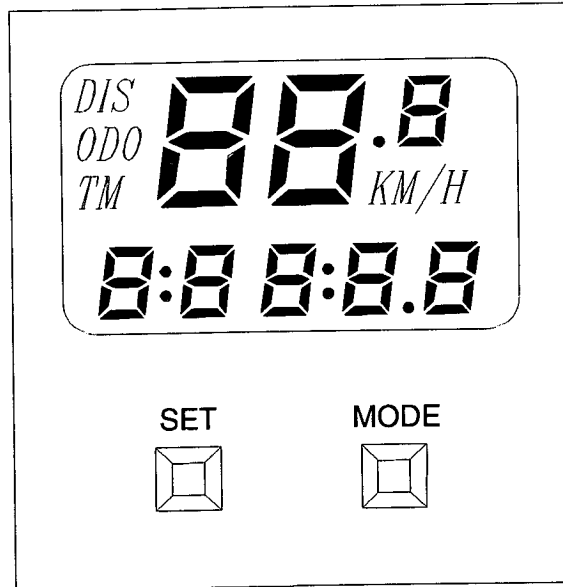# SS0302

CYCLOCOMPUTER
0.0 ~ 99.9 KM/H (MILE/H)

Features:

1. 1.5 Volts operating voltage
2. Dual-line display
3. Current speed in Kilometer per Hour (KM/H) or Mile per Hour (M/H)
4. Speedometer (0.0 to 99.9 km/h or mile/h) with a resolution of 0.5 km/h or mile/h
5. Tripmeter (0.00 to 999.99 km or mile) measuring elapsed distance
6. Odometer (0.0 to 9999.9 km or mile) measuring cumulated elapsed distance
7. Timer (0:00:00 to 9:59:59) started/stopped automatically by the wheel rotation or manually by pressing 'Set' key
8. Wheel size selection (in circumference ranging from 0 to 2999 mm) with a default value of 2124 mm at system reset
9. Blank display (power saving function) if no key pressed or wheel rotation for longer than 4 minutes
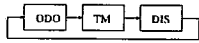
I.   General Description

The SS0302   is a low-power CMOS single chip microcontroller specially programmed to be used in a cyclometer, which requires low power operation. There are totally four functions available on this chip, speedometer for measuring the current speed of a bicycle, tripmeter for measuring elapsed distance, odometer for cumulatively measuring the total distance travelled since the last system reset and timer for measuring the elapsed time (Stopwatch) or the riding time when the bicycle being in motion (Auto-timer). The speedometer has a range of 0.0 to 99.9 km/h or mile/h with a resolution up to 0.5 km/h or mile/h. The SS0302   displays two functions simultaneously -- one is the real-time speedometer while the other one is selected by the 'mode' toggle input state.

II.   Key Functions

Key	Terminal	Level	Functions
Mode	P61	Toggle	• Confirm unit setting • Confirm timer operating mode setting • Confirm individual digit setting of wheel size and switch to the next higher significant digit if any; otherwise confirm wheel size setting • Change mode [ODO]─[TM]─[DIS]
Set	P60	Toggle	• Held for 3 seconds to reset timer in TM mode • Held for 3 seconds to reset distance in DIS mode • Held for 3 seconds to enter unit, timer operating mode and wheel size settings in ODO mode • Alternate display of flashing 'KM/H' or 'M/H' in unit setting • Alternate display of 'AUTO' or blank in timer operating mode setting • Advance flashing digit in wheel size setting • Held for automatically advance flashing digit in wheel size setting • Start/Stop timer in manual mode (Stopwatch)

Hold both the keys down for 3 seconds at any time to enter the initial setting mode that prompts inputs of unit setting, timer operating mode setting and wheel size setting, as that occurs after initial power up.

III.   Functional Description

3.1   Initial Setting Mode (System Reset)

When the system is first powered or both 'Set' and 'Mode' keys are held down for 3 seconds, the initial setting mode is entered. In this mode, all LCD segments are first turned on for a second and then turned off. Then, the system enters [1]unit setting (with 'M/H' displayed), followed by [2]timer operating mode setting (with 'AUTO' displayed) and [3]wheel size setting (with '2124' displayed). After all settings have been completed, the speedometer starts and the odometer mode is initially entered. In addition, the values of all functions are reset to zero.

3.2   Speedometer Function

This function is displayed at any time after the wheel size setting is completed. The speed of the bicycle is shown on the upper line of the display. The displayed value has a range of 0.0 to 99.9 km/h or mile/h with a resolution of 0.5 km/h or mile/h. The measurable range depends on the wheel size selected. For the default wheel size of 2124 mm, it is ranging from 4 to 80 km/h (or 2.5 to 50 mile/h). The speedometer is activated by the wheel rotation automatically and cannot be disabled or reset manually by the user.

3.3   Odometer Mode (ODO)

Odometer mode is indicated by 'ODO' icon. In this mode, the cyclometer accumulates the distance travelled in each trip since the last system reset. The value is shown on the lower line of the display. It can only be reset after system reset. When 'Set' key is held down for 3 seconds, [2]timer operating mode setting (with the current mode displayed) and [3]wheel size setting (with the current size displayed) will be entered. The values of other functions are retained before entering these settings. The maximum cumulated value is limited to 9999.9 km or mile. Once if this value is exceeded, the odometer will be restarted from zero.

3.4   Timer Mode (TM)

Timer mode is indicated by 'TM' icon. There are two operations (auto-timer and stopwatch) with the timer, which have exclusively been selected in timer operating mode setting. When the timer functions as an auto-timer, it is started/stopped automatically by the wheel rotation. When the timer functions as a stop watch, it can be started/stopped manually by pressing the 'Set' key. By holding down the 'Set' key for 3 seconds, the timer and the tripmeter will both be reset to zero. At system reset, the timer is intrinsically reset to zero. The range of the timer in either operation is from 0:00:00 to 9:59:59. Once if the upper bound is exceeded, the timer will be restarted from 0:00:00.

3.5   Tripmeter Mode (DIS)

Tripmeter mode is indicated by 'DIS' icon. In this mode, the distance elapsed by the bicycle is recorded. By holding down the 'Set' key for 3 seconds, the tripmeter and the timer will both be reset to zero. At system reset, the tripmeter is intrinsically reset to zero. The distance measurement starts only when the timer is running in either operating mode. When the timer is stopped, the distance measurement will also be stopped with the last measured distance retained. The range of displayed value is from 0.00 to 999.99 km or mile. Once if the upper bound is exceeded, the tripmeter will be restarted from zero.

3.6   Blank Display Mode (Power Saving Function)

Blank display mode is entered automatically when there is no key pressed or wheel rotation for longer than 4 minutes. At this time, all the display segments are turned off and the CPU enters halt mode for power saving purpose. At the same time, the values of all functions are retained. Press any button or spin the wheel to release from this mode. Then, the retained values are restored and the odometer mode is initially entered.

[1]   The 'M/H' or 'KM/H' icon indicates the unit used in the whole speed measurement. Press the 'Set' key to toggle blinking of either 'M/H' or 'KM/H'. Press the 'Mode' key to confirm the selection and exit the setting. The selected icon will be constantly shown on the display.

[2]   The presence or absence of an 'AUTO' icon indicates the timer functioning as auto-timer or stopwatch respectively. Press the 'Set' key to alternate the display of this icon. Press the 'Mode' key to confirm the selection and exit the setting.

[3]   The value with the least significant digit blinking indicates the wheel circumference in mm. Press the 'Set' key to advance the blinking digit or hold it down for advancing the digit automatically. The ranges for the lower three digits are from 0 to 9 while that for the upper one is from 0 to 2. Press the 'Mode' key to confirm the digit setting and switch to the setting of the next higher significant digit if any; otherwise confirm the set value and exit the setting.

IV.　LCD Information

4.1　LCD Pin Assignment
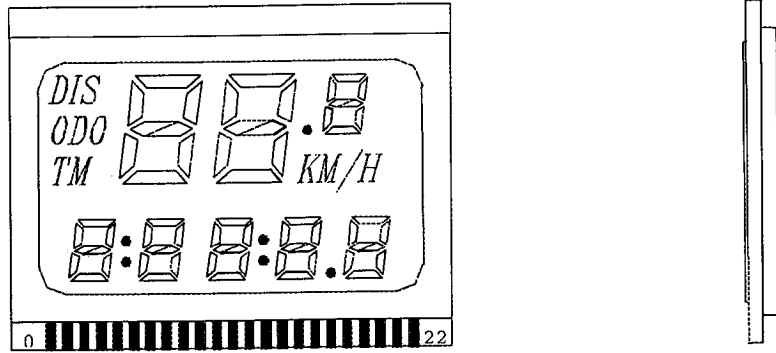
4.2　LCD Segment Assignment
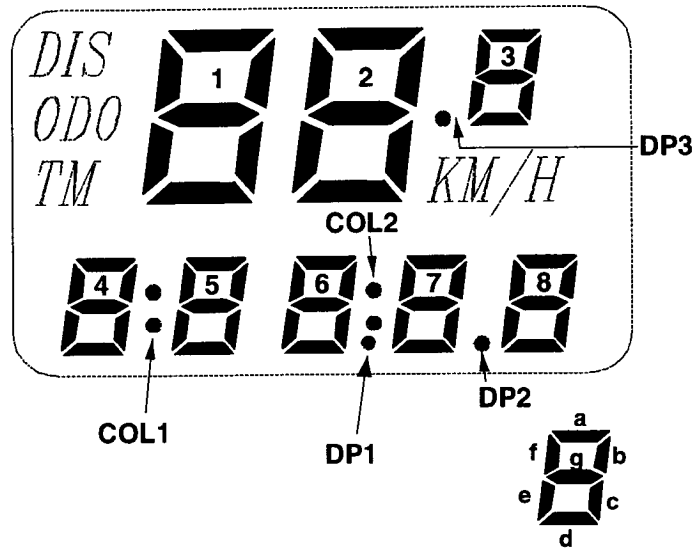
4.3   LCD Segment Assignment Table

LCD Pin No.	Chip Pin Name	COM1	COM2	COM3	COM4
1	COM1	COM1	—	—	—
2	COM2	—	COM2	—	—
3	COM3	—	—	COM3	—
4	COM4	—	—	—	COM4
5	SEG0	—	ODO	COL1	DIS
6	SEG1	1f	1e	1d	TM
7	SEG2	1a	1b	1g	1c
8	SEG3	2f	2e	2d	—
9	SEG4	2a	2g	2c	—
10	SEG5	2b	3e	DP3	—
11	SEG6	3f	3g	3d	K
12	SEG7	3a	3b	3c	M
13	SEG8	8c	8g	8b	/H
14	SEG9	8d	8e	8f	8a
15	SEG10	DP2	7c	7b	7a
16	SEG11	7d	7e	7g	7f
17	SEG12	DP1	6c	COL2	6b
18	SEG13	6d	6e	6g	6f
19	SEG14	5c	5g	5b	6a
20	SEG15	5d	5e	5f	5a
21	SEG16	4c	4g	4b	4a
22	SEG17	4d	4e	4f	—

V.　　Chip Pad Information

5.1　　Pad Layout
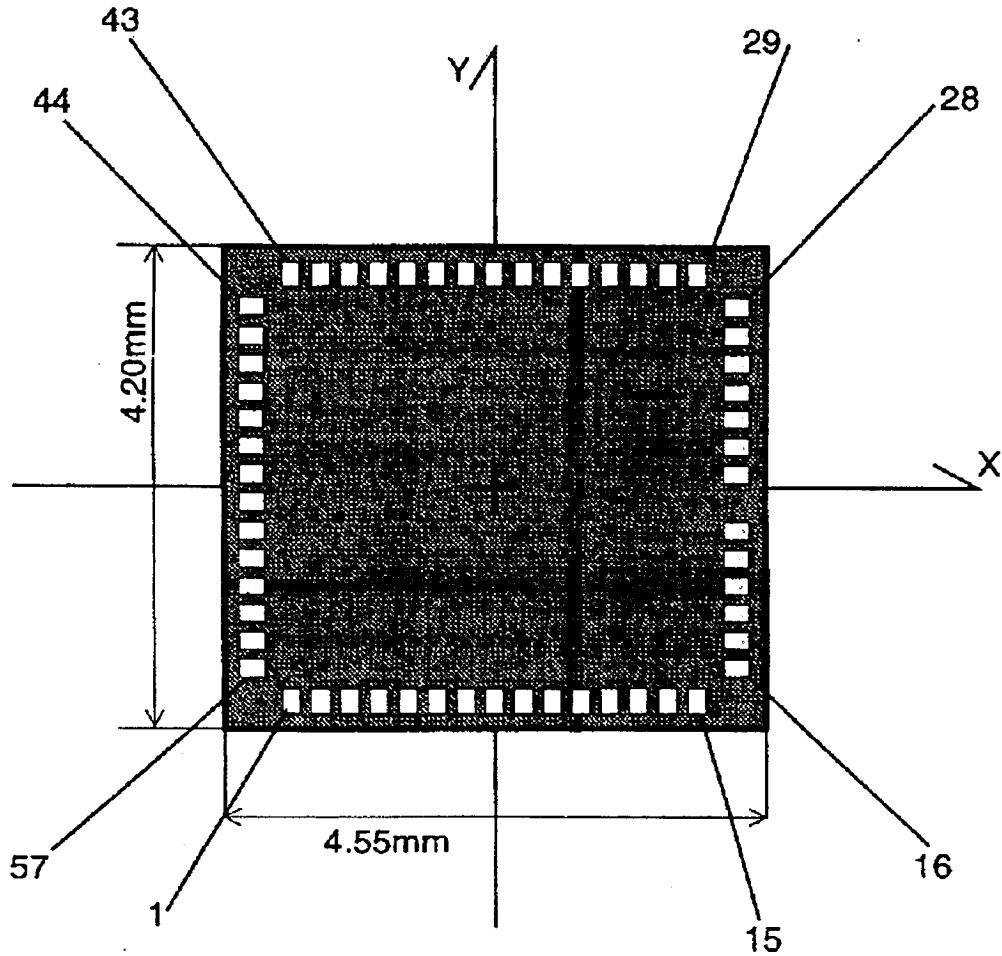
5.2 Pad Coordinates

PAD No.	PAD NAME	X(μm)	Y(μm)
1	P63	-1856	-1944
2	P62	-1587	-1944
3	P61	-1317	-1944
4	P60	-1047	-1944
5	MDO	-777	-1944
6	$\overline{MD0}$	-507	-1944
7	VDD	-238	-1944
8	SEG25	32	-1944
9	SEG24	294	-1944
10	SEG23	556	-1944
11	SEG22	819	-1944
12	SEG21	1082	-1944
13	SEG20	1345	-1944
14	SEG19	1607	-1944
15	SEG18	1870	-1944
16	SEG17	2119	-1667
17	SEG16	2119	-1412
18	SEG15	2119	-1157
19	SEG14	2119	-903
20	SEG13	2119	-648
21	SEG12	2119	-394
22	SEG11	2119	115
23	SEG10	2119	370
24	SEG9	2119	625
25	SEG8	2119	879
26	SEG7	2119	1134
27	SEG6	2119	1389
28	SEG5	2119	1643
29	SEG4	1870	1944
30	SEG3	1607	1944
31	SEG2	1345	1944
32	SEG1	1082	1944
33	SEG0	819	1944
34	COM4	556	1944
35	COM3	294	1944
36	COM2	32	1944
37	COM1	-238	1944
38	C2	-507	1944
39	C1	-777	1944
40	VSS3	-1047	1944
41	VSS2	-1317	1944
42	VSS1	-1587	1944
43	VSSL	-1856	1944
44	OSC0	-2119	1648
45	$\overline{OSC1}$	-2119	1392
46	P23	-2119	1136
47	P22	-2119	880
48	P21	-2119	624
49	P20	-2119	367
50	TST3	-2119	111
51	TST2	-2119	-145

PAD No.	PAD NAME	X(μm)	Y(μm)
52	TST1	-2119	-401
53	RESET	-2119	-657
54	P43	-2119	-913
55	P42	-2119	-1169
56	P41	-2119	-1425
57	P40	-2119	-1681

CHIP SIZE - 4.68 X 4.23 [mm]

PAD SIZE - 110 X 110 [μm]

ORG. - X = 0, Y = 0

UNIT - μm

VI. Pin Description

Designation	Function
V_{DD}	Digital 0V power supply
V_{SS1}	Power source (-1.5V)
V_{SS2}	Bias output for LCD drive (-3.0V)
V_{SS3}	Bias output for LCD drive (-4.5V)
V_{SSL}	Minus side power supply pin for internal logic (internally generated constant voltage)
C_1, C_2	Capacitor connection pin for LCD drive bias generation
OSC, $\overline{OSC}$	Input and output terminals of oscillator inverter, 32.768kHz crystal is connected to these terminals.
Reset	Terminal to clear internal logic connet to V_{DD}. After power is turned on, the SS0302 A must be reset by this terminal.

VII. Reference Circuit Diagram
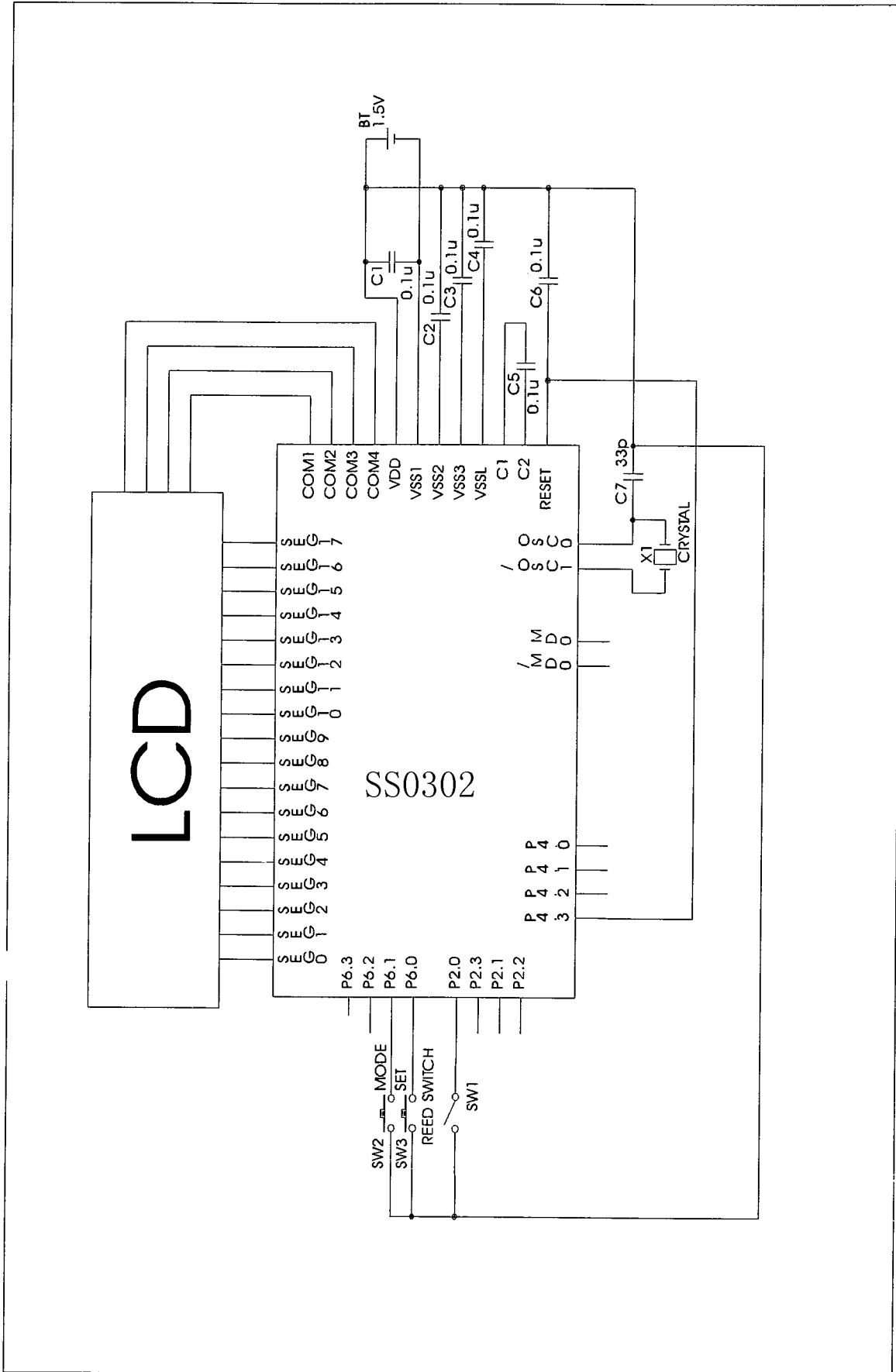
VIII. Electrical Characteristics

8.1 Absolute Maximum Ratings

Parameter	Symbol	Conditions	Rating	Unit
Power Supply Voltage 1	VSS1	Ta = 25°C	-2.0 - +0.3	V
Power Supply Voltage 2	VSS2	Ta = 25°C	-4.0 - +0.3	V
Power Supply Voltage 3	VSS3	Ta = 25°C	-5.5 - +0.3	V
Power Supply Voltage 4	VSSL	Ta = 25°C	-2.0 - +0.3	V
Input Voltage 1	VIN1	Ta = 25°C	VSS1 -0.3 - +0.3	V
Input Voltage 2	VIN2	Ta = 25°C	VSSL -0.3 - +0.3	V
Output Voltage 1	VOUT1	Ta = 25°C	VSS1 -0.3 - +0.3	V
Output Voltage 2	VOUT2	Ta = 25°C	VSS2 -0.3 - +0.3	V
Output Voltage 3	VOUT3	Ta = 25°C	VSS3 -0.3 - +0.3	V
Output Voltage 4	VOUT4	Ta = 25°C	VSSL -0.3 - +0.3	V
Storage Temperature	TSTG	—	-55 to 125	°C

8.2 Operating Conditions

Parameter	Symbol	Condition	Rating	Unit
Operating Voltage	VSS1	BUPF=0	-1.7 - -1.25	V
	VSS1	BUPF=1	-1.7 - -1.25	V
Operating Temperature	TOPE	-	-40 - +85	°C
Crystal OSC oscillation frequency	fXT	-	30-35	kHz

8.2 DC Characteristics

(VDD=0V, VSS=-1.5V, Ta=-40-+85°C unless otherwise specified)

Parameter	Symbol	Condition		Rating			Unit
				Min.	Typ.	Max.	
Current consumptin 1	IDD1	CPU in halt state BUPF = 0	Ta=-40 - +40°C	—	2	6	μA
			Ta=+40 - +85°C	—	2	40	
Current consumptin 2	IDD1	CPU in halt state BUPF = 1	Ta=-40 - +40°C	—	3	10	μA
			Ta=+40 - +85°C	—	3	50	
Current consumptin 3	IDD2	CPU in operation state BUPF = 0	Ta=-40 - +40°C	—	6	15	μA
			Ta=+40 - +85°C	—	6	50	
Current consumptin 4	IDD2	CPU in operation state BUPF = 1	Ta=-40 - +40°C	—	10	25	μA
			Ta=+40 - +85°C	—	10	60	
XTOSC Oscillation start voltage	VSTA	Within 5 seconds after oscillatin starts after rest		—	—	-1.45	V
XTOSC Oscillation hold voltage	VHOLD	—		—	—	-1.25	V
XTOSC external capacitance	CG	—		10	—	30	pF
XTOSC internal capacitance	CD	—		10	15	20	pF
Output current 1 (P 4.0 – P4.3) (P 6.0 – P6.3) (MDO, MDO)	IOH1	VOH1 = -0.5V		-2.0	-0.6	-0.1	mA
	IOL1	VOL1 = VSS1 + 0.5V		0.1	0.6	2.0	mA
Output current 2 (COM) (SEG0 ~ SEG25) (COM1 ~ COM4)	IOH2	VOH2 =-0.2V (VDD level)		—	—	-4	μA
	IOMH2	VOMH2 =VSS1 + 0.2V (VSS1 level)		4	—	—	μA
	IOMH2S	VOMH2 =VSS1 – 0.2V (VSS1 level)		—	—	-4	μA
	IOML2	VOML2 = VSS2 + 0.2V (VSS2 level)		4	—	—	μA
	IOML2S	Voml2S = VSS2 – 0.2V (VSS2 level)		—	—	-4	μA
	IOL2	VOL2 = VSS3 + 0.2V (VSS3 level)		4	—	—	μA

Output leak (P 6.0 ~ P 6.3)	IOOH	VOH = VDD	—	—	0.3	μA
	IOOL	VOL = VSS1	-0.3	—	—	μA
Input current 1 (P2.0 ~ P2.3) (P6.0 ~ P6.3)	IIH1	VIH1 = VDD (pull-down)	1	20	100	μA
	IIH1Z	VIH1 = VDD (high-impedance)	0	—	1	μA
	IIL1	VIL1 = VSS1	-1	—	0	μA
Input current 2 (TST1, TST2, TST3)	IIH2	VIH2 = VDD	0.3	0.75	1.5	mA
	IIL2	VIL2 =VSS1	-1	—	0	μA
Input current 3 (RESET)	IIH3	VIH3 = VDD	15	40	100	μA
	IIL3	VIL3 =VSS1	-1	—	0	μA
Input voltage 1 (P2.0 ~ P2.3) (P6.0 ~ P6.3) (TST1, TST2, TST3) (RESET)	IIH3	VIH3 = VDD	15	40	100	μA
	IIL3	VIL3 =VSS1	-1	—	0	μA

HTTP //WWW.SENSOR-IC.COM/
HTTP //WWW.PC-PS.NET/
HTTP://WWW.SUNSTARE.COM/
E-MAIL xjr5@163.com szss20@163.com
MSN: suns8888@hotmail.com
QQ: 195847376

1602
0755-83376549 83376489 83387030 83387016
0755-83376182 83338339 518033 (0)13902971329
2583 TEL/FAX
0755-83665529 25059422
132 3097
TEL 010-81159046 82615020 13501189838 FAX 010-82613476
668 2B35
TEL 021-28311762 56703037 13701955389 FAX 021-56703037
20 ( )
88 D23
TEL 029-81022619 13072977981 FAX:029-88789382
TEL: (0)13717066236
0755-83394033 13501568376