

CMOS 4-bit Single Chip Microcontroller

- High Performance 4-bit Core CPU S1C63000
- LCD Driver (32 SEG × 6 COM)
- R/f Converter to Measure Temperature and Humidity
- Low Current Consumption
- Low Voltage Operation

■ DESCRIPTIONS

The S1C63653 is a microcomputer which has a high-performance 4-bit CPU S1C63000 as the core CPU, ROM (4,096 words × 13 bits), RAM (512 words × 4 bits), watchdog timer, programmable timer, time base counter, an LCD driver that can drive a maximum 32 segments × 6 commons, sound generator and R/f converter built-in. The S1C63653 features low current consumption, this makes it suitable for battery driven portable equipment with R/f converter.

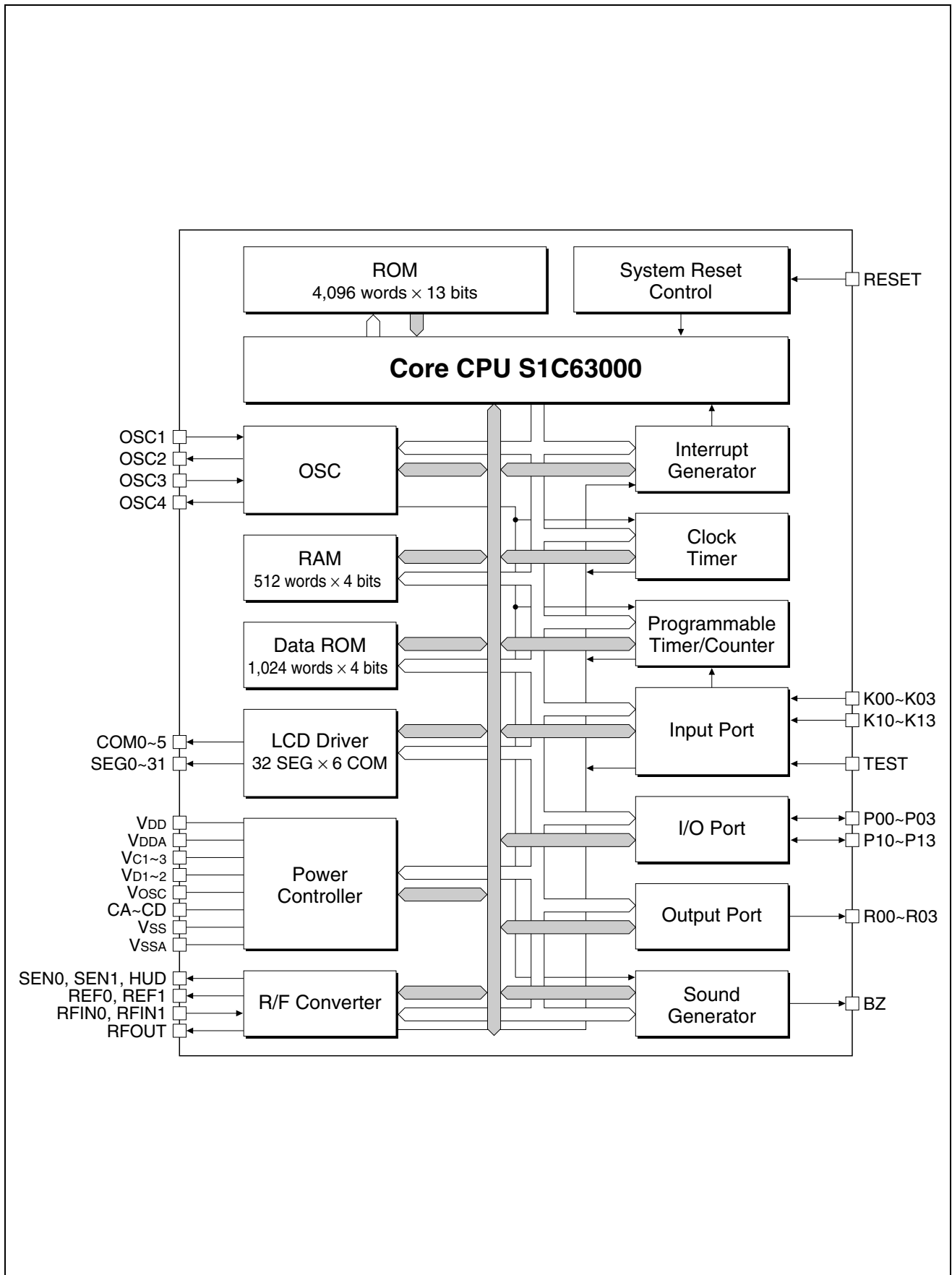
■ FEATURES

- Core CPU.....4-bit CMOS core CPU S1C63000
- OSC1 oscillation circuit32.768 kHz (Typ.) crystal oscillation circuit
- OSC3 oscillation circuit4 MHz (Max.) ceramic (2 MHz Max. when OSC3 is used as the R/f converter operating clock) or 1.1 MHz (Typ.) CR oscillation circuit (*1)
- Instruction setBasic instruction: 46 types (411 instructions with all)
Addressing mode: 8 types
- Instruction execution time.....During operation at 32.768 kHz: 61 μsec 122 μsec 183 μsec
During operation at 4 MHz: 0.5 μsec 1.0 μsec 1.5 μsec
- ROM capacityCode ROM: 4,096 words × 13 bits
Data ROM: 1,024 words × 4 bits
- RAM capacity.....Data memory: 512 words × 4 bits
Display memory: 48 words × 4 bits
- Input port.....8 bits (Pull-down resistors may be supplemented *1)
- Output port.....4 bits (It is possible to switch the 2 bits to special output *2)
- I/O port.....8 bits
- LCD driver32 segments × 6, 5, 4 or 3 commons (*2)
- Time base counterClock timer
- Programmable timer.....16-bit PWM × 1 ch. or 8-bit PWM × 2 ch. (*2)
- Watchdog timer.....Built-in
- Sound generator.....With envelope and 1-shot output functions
- R/f converter.....2 channels, CR oscillation type, 20-bit counter
Supports resistive humidity sensors.
- External interrupt.....Input port interrupt: 2 systems
- Internal interrupt.....Clock timer interrupt: 4 systems
Programmable timer interrupt: 4 systems
R/f converter interrupt: 2 systems
- Power supply voltage.....2.4 to 3.6 V: Max. 4 MHz operation in normal mode
2.4 to 3.6 V: 32 kHz operation in halver mode
1.8 to 3.6 V: 32 kHz operation in normal mode
- Operating temperature range-20 to 70°C
- Current consumption (Typ.)Low-speed operation (OSC1 = 32 kHz crystal oscillation):
During HALT 3.0 V (LCD ON, halver mode) 0.65 μA
During operation 3.0 V (LCD ON, halver mode) 2.5 μA
High-speed operation (OSC3 = 4 MHz ceramic oscillation):
During operation 3.0 V (LCD ON) 800 μA
- Shipping form.....Chip (no polyimide)

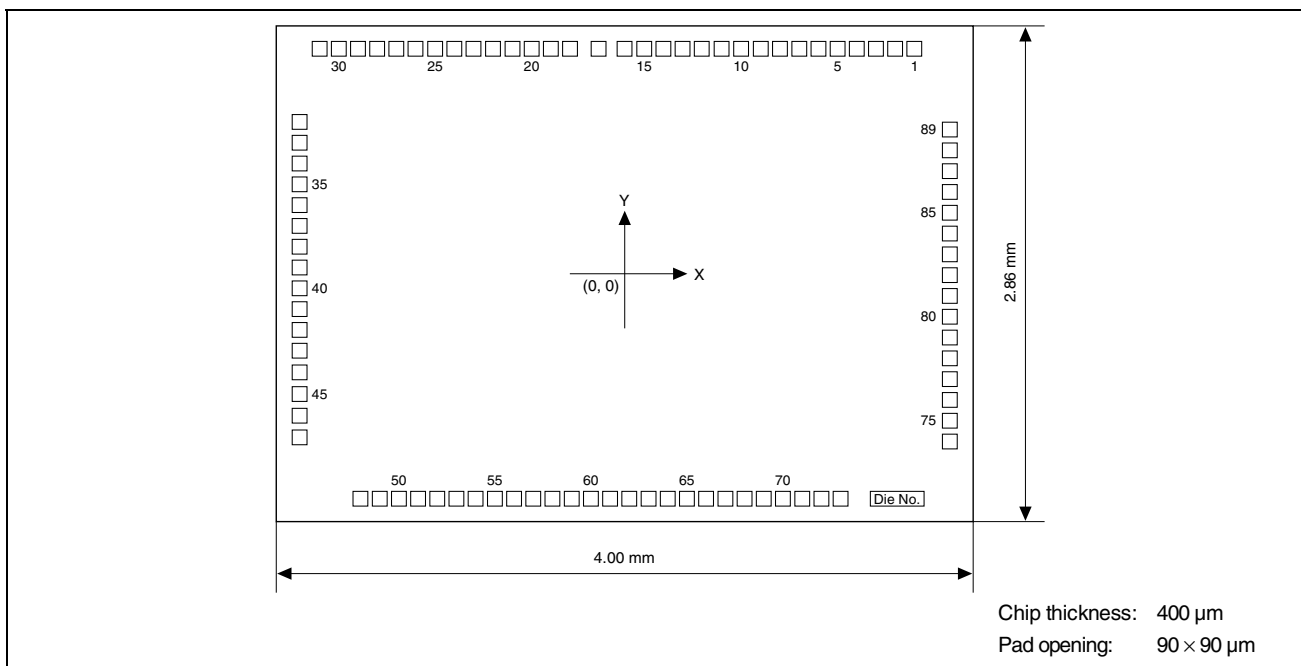
*1: Can be selected with mask option *2: Can be selected with software

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■ BLOCK DIAGRAM



■ PAD DIAGRAM



■ PAD COORDINATES

Unit: mm

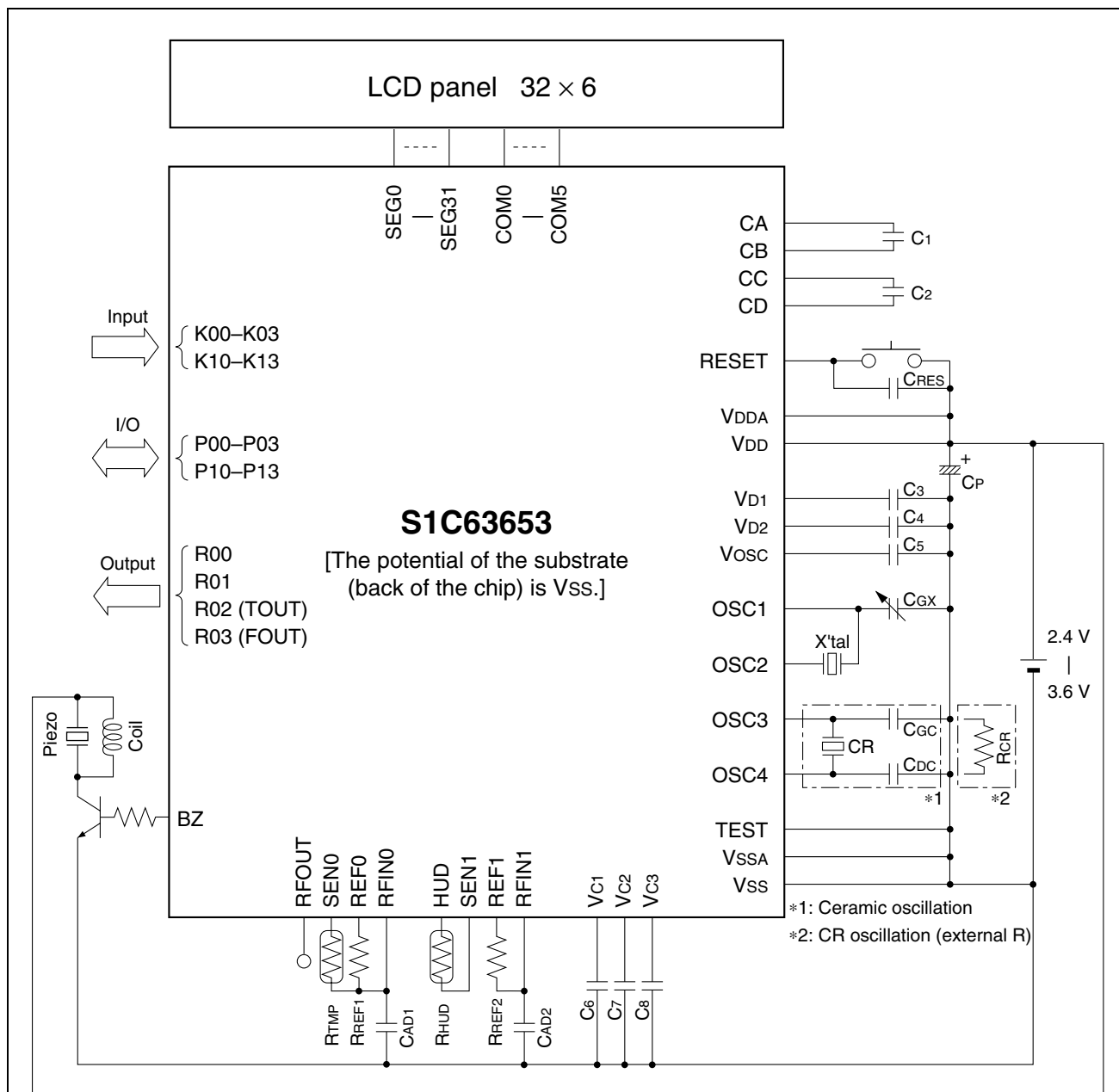
No.	Pad name	X	Y	No.	Pad name	X	Y	No.	Pad name	X	Y
1	COM0	1.662	1.298	31	RESET	-1.751	1.298	61	P01	-0.084	-1.298
2	COM1	1.552	1.298	32	SEG16	-1.866	0.876	62	P02	0.026	-1.298
3	COM2	1.442	1.298	33	SEG17	-1.866	0.756	63	P03	0.137	-1.298
4	CA	1.332	1.298	34	SEG18	-1.866	0.636	64	P10	0.247	-1.298
5	CB	1.222	1.298	35	SEG19	-1.866	0.516	65	P11	0.357	-1.298
6	Vc1	1.112	1.298	36	SEG20	-1.866	0.396	66	P12	0.467	-1.298
7	Vc2	1.002	1.298	37	SEG21	-1.866	0.276	67	P13	0.578	-1.298
8	Vc3	0.891	1.298	38	SEG22	-1.866	0.156	68	R00	0.688	-1.298
9	VSSA	0.781	1.298	39	SEG23	-1.866	0.036	69	R01	0.798	-1.298
10	RFOUT	0.668	1.298	40	SEG24	-1.866	-0.084	70	R02	0.908	-1.298
11	RFIN0	0.556	1.298	41	SEG25	-1.866	-0.204	71	R03	1.019	-1.298
12	RFIN1	0.442	1.298	42	SEG26	-1.866	-0.324	72	BZ	1.129	-1.298
13	REF0	0.332	1.298	43	SEG27	-1.866	-0.444	73	Vss	1.239	-1.298
14	SEN0	0.222	1.298	44	SEG28	-1.866	-0.569	74	SEG0	1.866	-0.968
15	REF1	0.112	1.298	45	SEG29	-1.866	-0.694	75	SEG1	1.866	-0.848
16	SEN1	-0.001	1.298	46	SEG30	-1.866	-0.819	76	SEG2	1.866	-0.728
17	HUD	-0.150	1.298	47	SEG31	-1.866	-0.944	77	SEG3	1.866	-0.608
18	VDDA	-0.314	1.298	48	COM3	-1.517	-1.298	78	SEG4	1.866	-0.488
19	CC	-0.424	1.298	49	COM4	-1.406	-1.298	79	SEG5	1.866	-0.368
20	CD	-0.534	1.298	50	COM5	-1.296	-1.298	80	SEG6	1.866	-0.248
21	VD2	-0.644	1.298	51	VDD	-1.186	-1.298	81	SEG7	1.866	-0.128
22	VDD	-0.756	1.298	52	K00	-1.076	-1.298	82	SEG8	1.866	-0.008
23	VOsc	-0.868	1.298	53	K01	-0.966	-1.298	83	SEG9	1.866	0.112
24	OSC1	-0.978	1.298	54	K02	-0.856	-1.298	84	SEG10	1.866	0.232
25	OSC2	-1.088	1.298	55	K03	-0.745	-1.298	85	SEG11	1.866	0.352
26	VD1	-1.201	1.298	56	K10	-0.635	-1.298	86	SEG12	1.866	0.472
27	OSC3	-1.311	1.298	57	K11	-0.525	-1.298	87	SEG13	1.866	0.592
28	OSC4	-1.421	1.298	58	K12	-0.415	-1.298	88	SEG14	1.866	0.712
29	Vss	-1.531	1.298	59	K13	-0.304	-1.298	89	SEG15	1.866	0.832
30	TEST	-1.641	1.298	60	P00	-0.194	-1.298	-	-	-	-

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■ PIN DESCRIPTION

Pin name	Pad No.	I/O	Function
VDD	22, 51	–	Power (+) supply pin
VSS	29, 73	–	Power (–) supply pin
VDDA	18	–	Analog system power (+) supply pin (=VDD)
VSSA	9	–	Analog system power (–) supply pin (=VSS)
VD1	26	–	Internal logic system regulated voltage output pin
Vb2	21	–	1/2VDD voltage halver output pin
Vosc	23	–	Oscillation system regulated voltage output pin
VC1~VC3	6–85	–	LCD system power supply pin
CA, CB	4, 5	–	LCD system voltage booster capacitor connecting pin
CC, CD	19, 20	–	Voltage halver capacitor connecting pin
OSC1	24	I	Crystal oscillation input pin
OSC2	25	O	Crystal oscillation output pin
OSC3	27	I	Ceramic or CR oscillation input pin (selected by mask option)
OSC4	28	O	Ceramic or CR oscillation output pin (selected by mask option)
K00–K03	52–55	I	Input port pins
K10–K13	56–59	I	Input port pins
P00–P03	60–63	I/O	I/O port pins
P10–P13	64–67	I/O	I/O port pins
R00	68	O	Output port pin
R01	69	O	Output port pin
R02	70	O	Output port or TOUT output pin (selected by software)
R03	71	O	Output port or FOUT output pin (selected by software)
COM0–COM5	1–3, 48–50	O	LCD common output pin (1/3, 1/4, 1/5 or 1/6 duty is selectable by software)
SEG0–SEG31	74–89, 32–47	O	LCD segment output pin
SEN0	14	O	R/f converter Ch. 0 CR oscillation output pin
SEN1	16	O	R/f converter Ch. 1 CR oscillation output pin
REF0	13	O	R/f converter Ch. 0 reference resistor CR oscillation output pin
REF1	15	O	R/f converter Ch. 1 reference resistor CR oscillation output pin
HUD	17	O	R/f converter AC-bias oscillation output pin for humidity sensor
RFIN0	11	I	R/f converter Ch. 0 CR oscillation input pin
RFIN1	12	I	R/f converter Ch. 1 CR oscillation input pin
RFOUT	10	O	R/f converter oscillation frequency output pin
BZ	72	O	Sound output pin
RESET	31	I	Initial reset input pin
TEST	30	I	Testing input pin

■ BASIC EXTERNAL CONNECTION DIAGRAM



X'tal	Crystal oscillator	32.768 kHz, C _l (Max.) = 34 kΩ
CGX	Trimmer capacitor	5–25 pF
CR	Ceramic oscillator	4 MHz (3.0 V)
Cgc	Gate capacitor	30 pF
Cdc	Drain capacitor	30 pF
RCR	Resistor for OSC3 CR oscillation	30 kΩ (2 MHz)
C ₁ –C ₈	Capacitor	0.2 μF
CP	Capacitor	3.3 μF
CRES	RESET terminal capacitor	0.1 μF

Note: The above table is simply an example, and is not guaranteed to work.

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