

Micro MINI S1C60N01

4-bit Single Chip Microcomputer



- S1C6200B Core CPU
- Low Voltage and Low Power
- Built-in LCD Driver
- Low Cost Performance

DESCRIPTION

Micro MINI "S1C60N01" is a single chip microcomputer for battery-driven products with 7-segment LCD display. It achieves low cost performance, and is suitable for a product added some feature instead of standard IC. It consists that Seiko Epson's original core CPU S1C6200B, LCD driver (20 segments × 4 commons), 80 words RAM, 1K words ROM, clock timer and so on.

CONFIGURATION

The S1C60N01 Series are configured as follows, depending on the supply voltage.

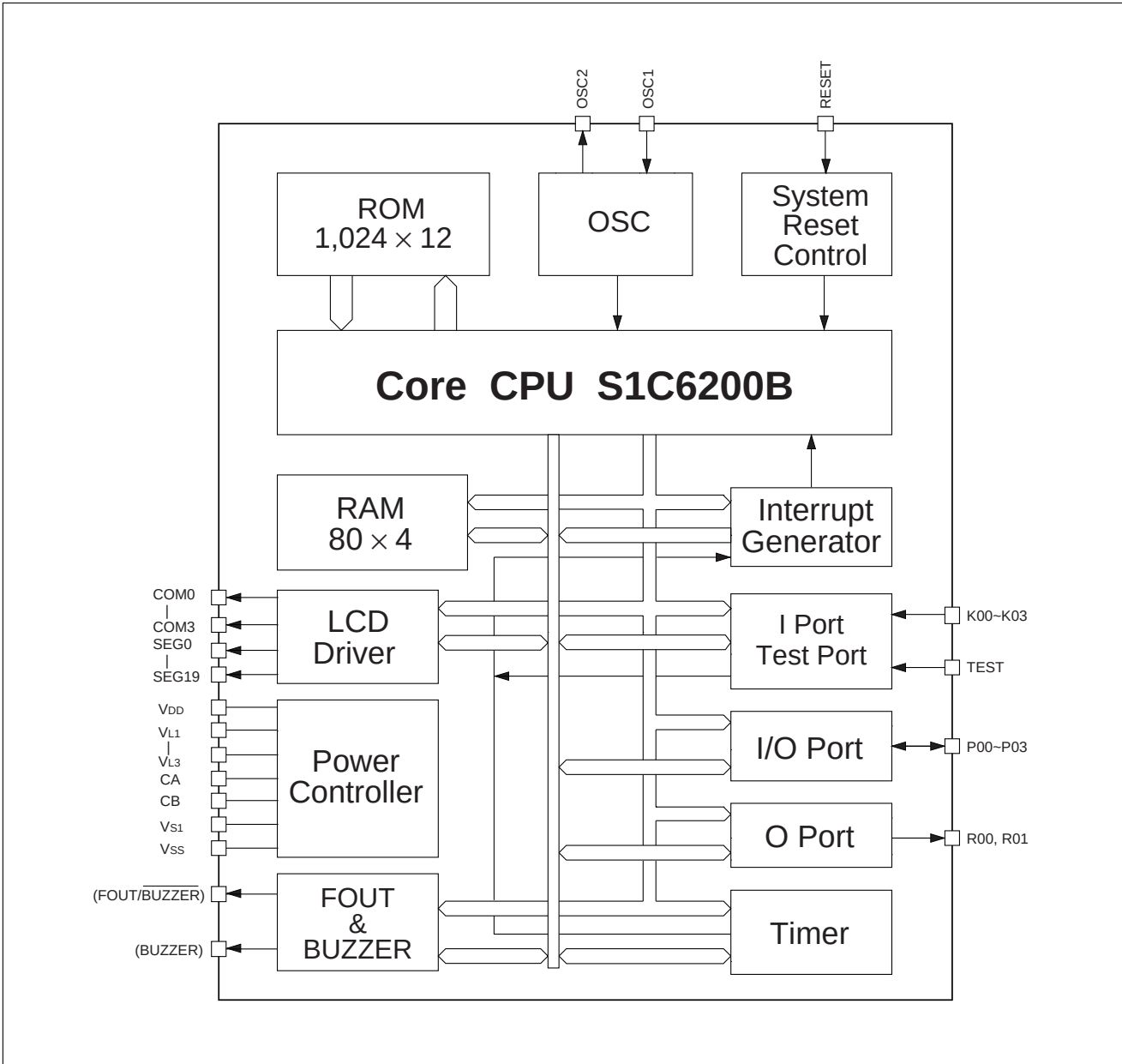
Model	Supply Voltage	Supply Voltage Range	Oscillation Circuits
S1C60N01	3.0 V	1.8–3.6 V	Crystal or CR
S1C60L01	1.5 V	1.2–2.0 V	Crystal or CR

FEATURES

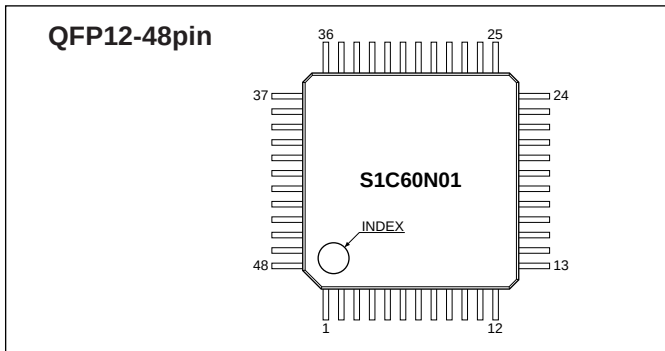
- Core CPU S1C6200B
- Built-in oscillation circuit..... Crystal or CR oscillation circuit, 32.768 kHz (typ.)
- Instruction set 100 instructions
- ROM capacity 1,024 words × 12 bits
- RAM capacity 80 words × 4 bits
- Input port 4 bits (Supplementary pull-down resistors may be used)
- Output port 2 bits (Piezo buzzer and programmable frequency output can be driven directly by mask option)
- Input/output port 4 bits
- LCD driver 20 segments × 4, 3 or 2 common duty
- Timer 1 system: clock timer
- Interrupts:
 - External interrupt Input port interrupt 1 system
 - Internal interrupt Timer interrupt 1 system
- Supply voltage 1.5 V (1.2–2.0 V) S1C60L01
3.0 V (1.8–3.6 V) S1C60N01
- Current consumption (typ.) 1.0 μA (Crystal oscillation CLK = 32.768 kHz, when halted)
2.5 μA (Crystal oscillation CLK = 32.768 kHz, when executing)
- Supply form QFP12-48pin (plastic) or chip

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■ BLOCK DIAGRAM



■ PIN CONFIGURATION



No.	Pin name	No.	Pin name	No.	Pin name	No.	Pin name
1	OSC2	13	R01	25	TEST	37	COM0
2	Vs1	14	R00	26	RESET	38	COM1
3	N.C.	15	SEG19	27	SEG9	39	COM2
4	P00	16	SEG18	28	SEG8	40	COM3
5	P01	17	SEG17	29	SEG7	41	VL3
6	P02	18	SEG16	30	SEG6	42	VL2
7	P03	19	SEG15	31	SEG5	43	VL1
8	K00	20	SEG14	32	SEG4	44	CA
9	K01	21	SEG13	33	SEG3	45	CB
10	K02	22	SEG12	34	SEG2	46	VSS
11	K03	23	SEG11	35	SEG1	47	VDD
12	N.C.	24	SEG10	36	SEG0	48	OSC1

N.C. = No Connection

PIN DESCRIPTION

Pin name	Pin No.	In/Out	Function
VDD	47	(I)	Power source (+) terminal
VSS	46	(I)	Power source (-) terminal
Vs1	2	O	Oscillation and internal logic system regulated voltage output terminal
VL1	43	O	LCD system reducer output terminal ($V_{L2} \times 1/2$) / LCD system reducer output terminal ($V_{L3} \times 1/3$)
VL2	42	O	LCD system booster output terminal ($V_{L1} \times 2$) / LCD system reducer output terminal ($V_{L3} \times 2/3$)
VL3	41	O	LCD system booster output terminal ($V_{L1} \times 3$) / LCD system booster output terminal ($V_{L2} \times 3/2$)
CA, CB	44, 45	–	Booster capacitor connecting terminal
OSC1	48	I	Crystal or CR oscillation input terminal
OSC2	1	O	Crystal or CR oscillation output terminal
K00–K03	8–11	I	Input terminal
P00–P03	4–7	I/O	I/O terminal
R00, R01	14, 13	O	Output terminal
SEG0–19	36–27 24–15	O	LCD segment output terminal (convertible to DC output terminal by mask option)
COM0–3	37–40	O	LCD common output terminal
RESET	26	I	Initial setting input terminal
TEST	25	I	Test input terminal

OPTION LIST

1. DEVICE TYPE AND LCD VOLTAGE

- ☐ 1. E0C6001 (Normal Type <S1C60N01>) LCD 3 V
☐ 2. E0C6001 (Normal Type <S1C60N01>) LCD 4.5 V
☐ 3. E0C60L01 (Low Power Type <S1C60L01>) LCD 3 V
☐ 4. E0C60L01 (Low Power Type <S1C60L01>) LCD 4.5 V

2. MULTIPLE KEY ENTRY RESET

- COMBINATION ☐ 1. Not Use
☐ 2. Use K00, K01
☐ 3. Use K00, K01, K02
☐ 4. Use K00, K01, K02, K03

3. INTERRUPT NOISE REJECTOR

- K00–K03 ☐ 1. Use ☐ 2. Not Use

4. INPUT PORT PULL DOWN RESISTOR

- K00 ☐ 1. With Resistor ☐ 2. Gate Direct
 • K01 ☐ 1. With Resistor ☐ 2. Gate Direct
 • K02 ☐ 1. With Resistor ☐ 2. Gate Direct
 • K03 ☐ 1. With Resistor ☐ 2. Gate Direct

5. R00 SPECIFICATION

- OUTPUT TYPE ☐ 1. DC Output
☐ 2. Buzzer Inverted Output (R00 Control)
☐ 3. Buzzer Inverted Output (R01 Control)
☐ 4. FOUT Output
- FOUT OUTPUT SPECIFICATION
- | | | | |
|----------|---------------------------------------|----------|---------------------------------------|
| F1 | ☐ 1. 256[Hz] | F2 | ☐ 1. 512[Hz] |
| | ☐ 2. 512[Hz] | | ☐ 2. 1,024[Hz] |
| | ☐ 3. 1,024[Hz] | | ☐ 3. 2,048[Hz] |
| | ☐ 4. 2,048[Hz] | | ☐ 4. 4,096[Hz] |
| | ☐ 5. 4,096[Hz] | | ☐ 5. 8,192[Hz] |

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F3	☐ 1. 1,024[Hz]	F4.....	☐ 1. 2,048[Hz]
	☐ 2. 2,048[Hz]		☐ 2. 4,096[Hz]
	☐ 3. 4,096[Hz]		☐ 3. 8,192[Hz]
	☐ 4. 8,192[Hz]		☐ 4. 16,384[Hz]
	☐ 5. 16,384[Hz]		☐ 5. 32,768[Hz]
• OUTPUT SPECIFICATION...	☐ 1. Complementary	☐ 2. Pch-Open Drain	
6. R01 SPECIFICATION			
• OUTPUT TYPE	☐ 1. DC Output	☐ 2. Buzzer Output	
• OUTPUT SPECIFICATION...	☐ 1. Complementary	☐ 2. Pch-Open Drain	
7. I/O PORT SPECIFICATION			
• P00	☐ 1. Complementary	☐ 2. Pch-Open Drain	
• P01	☐ 1. Complementary	☐ 2. Pch-Open Drain	
• P02	☐ 1. Complementary	☐ 2. Pch-Open Drain	
• P03	☐ 1. Complementary	☐ 2. Pch-Open Drain	
8. LCD COMMON DUTY AND BIAS			
	☐ 1. 1/4 Duty 1/3 Bias		
	☐ 2. 1/3 Duty 1/3 Bias		
	☐ 3. 1/2 Duty 1/3 Bias		
	☐ 4. 1/4 Duty 1/2 Bias		
	☐ 5. 1/3 Duty 1/2 Bias		
	☐ 6. 1/2 Duty 1/2 Bias		
9. OSC1 SYSTEM CLOCK			
	☐ 1. Crystal		
	☐ 2. CR		

■ ELECTRICAL CHARACTERISTICS

● Absolute Maximum Ratings

(V_{DD}=0V)

Rating	Symbol	Value	Unit
Power voltage	V _{SS}	-5.0 to 0.5	V
Input voltage (1)	V _I	V _{SS} - 0.3 to 0.5	V
Input voltage (2)	V _{IOsc}	V _{SS} - 0.3 to 0.5	V
Permissible total output current *1	ΣI _{VSS}	10	mA
Operating temperature	T _{opr}	-20 to 70	°C
Storage temperature	T _{stg}	-65 to 150	°C
Soldering temperature / Time	T _{sol}	260°C, 10sec (lead section)	—
Allowable dissipation *2	P _D	250	mW

*1: The permissible total output current is the sum total of the current (average current) that simultaneously flows from the output pins (or is draw in).

*2: In case of plastic package (QFP12-48pin).

● Recommended Operating Conditions

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(T_a=-20 to 70°C)

Condition	Symbol	Remark	Min.	Typ.	Max.	Unit
Power voltage	V _{SS}	V _{DD} =0V	-3.6	-3.0	-1.8	V
Oscillation frequency	fosc1	Crystal oscillation		32.768		kHz
	fosc2	CR oscillation, R=470kΩ	50	65	80	kHz
Booster capacitor	C1		0.1			μF
Capacitor between V _{DD} and V _{L1}	C2		0.1			μF
Capacitor between V _{DD} and V _{L2}	C3		0.1			μF
Capacitor between V _{DD} and V _{L3}	C4		0.1			μF
Capacitor between V _{DD} and V _{S1}	C5		0.1			μF

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(Ta=-20 to 70°C)

Condition	Symbol	Remark	Min.	Typ.	Max.	Unit
Power voltage	VSS	VDD=0V	-2.0	-1.5	-1.2	V
Oscillation frequency	fosc1	Crystal oscillation		32.768	80	kHz
	fosc2	CR oscillation, R=470kΩ	50	65		kHz
Booster capacitor	C1		0.1			μF
Capacitor between VDD and VL1	C2		0.1			μF
Capacitor between VDD and VL2	C3		0.1			μF
Capacitor between VDD and VL3	C4		0.1			μF
Capacitor between VDD and VS1	C5		0.1			μF

● DC Characteristics

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(Unless otherwise specified: VDD=0V, VSS=-3.0V, fosc=32.768kHz, Ta=25°C, VS1/VL1-VL3 are internal voltage, C1-C5=0.1μF)

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
High level input voltage (1)	VIH1	K00-K03, P00-P03	0.2•VSS		0	V
High level input voltage (2)	VIH2	RESET	0.15•VSS		0	V
Low level input voltage (1)	VIL1	K00-K03, P00-P03	VSS		0.8•VSS	V
Low level input voltage (2)	VIL2	RESET	VSS		0.85•VSS	V
High level input current (1)	IIH1	VIH1=0V, No pull down resistor	0		0.5	μA
High level input current (2)	IIH2	VIH2=0V, With pull down resistor	10		40	μA
High level input current (3)	IIH3	VIH3=0V, With pull down resistor	30		100	μA
Low level input current	IIL	VIL=VSS	-0.5		0	μA
High level output current (1)	IOH1	VOH1=0.1•VSS			-1.0	mA
High level output current (2)	IOH2	VOH2=0.1•VSS (built-in protection resistance)			-1.0	mA
Low level output current (1)	IOL1	VOL1=0.9•VSS	3.0			mA
Low level output current (2)	IOL2	VOL2=0.9•VSS (built-in protection resistance)	3.0			mA
Common output current	IOH3	VOH3=-0.05V			-3	μA
	IOL3	VOL3=VL3+0.05V	3			μA
Segment output current (during LCD output)	IOH4	VOH4=-0.05V			-3	μA
	IOL4	VOL4=VL3+0.05V	3			μA
Segment output current (during DC output)	IOH5	VOH5=0.1•VSS			-300	μA
	IOL5	VOL5=0.9•VSS	300			μA

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(Unless otherwise specified: VDD=0V, VSS=-1.5V, fosc=32.768kHz, Ta=25°C, VS1/VL1-VL3 are internal voltage, C1-C5=0.1μF)

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
High level input voltage (1)	VIH1	K00-K03, P00-P03	0.2•VSS		0	V
High level input voltage (2)	VIH2	RESET	0.15•VSS		0	V
Low level input voltage (1)	VIL1	K00-K03, P00-P03	VSS		0.8•VSS	V
Low level input voltage (2)	VIL2	RESET	VSS		0.85•VSS	V
High level input current (1)	IIH1	VIH1=0V, No pull down resistor	0		0.5	μA
High level input current (2)	IIH2	VIH2=0V, With pull down resistor	5.0		20	μA
High level input current (3)	IIH3	VIH3=0V, With pull down resistor	9.0		100	μA
Low level input current	IIL	VIL=VSS	-0.5		0	μA
High level output current (1)	IOH1	VOH1=0.1•VSS			-200	μA
High level output current (2)	IOH2	VOH2=0.1•VSS (built-in protection resistance)			-200	μA
Low level output current (1)	IOL1	VOL1=0.9•VSS	700			μA
Low level output current (2)	IOL2	VOL2=0.9•VSS (built-in protection resistance)	700			μA
Common output current	IOH3	VOH3=-0.05V			-3	μA
	IOL3	VOL3=VL3+0.05V	3			μA
Segment output current (during LCD output)	IOH4	VOH4=-0.05V			-3	μA
	IOL4	VOL4=VL3+0.05V	3			μA
Segment output current (during DC output)	IOH5	VOH5=0.1•VSS			-100	μA
	IOL5	VOL5=0.9•VSS	130			μA

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● Analog Circuit Characteristics and Current Consumption

S1C60N01 (Normal Operating Mode)

(Unless otherwise specified: $V_{DD}=0V$, $V_{SS}=-3.0V$, $f_{osc}=32.768kHz$ (crystal oscillation), $T_a=25^{\circ}C$, $C_G=25pF$, $V_{S1}/V_{L1}-V_{L3}$ are internal voltage, $C_1-C_5=0.1\mu F$)

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
Internal voltage	V_{L1}	Connect $1M\Omega$ load resistor between V_{DD} and V_{L1} (without panel load)	$1/2 \cdot V_{L2}$ -0.1		$1/2 \cdot V_{L2}$ $\times 0.9$	V
	V_{L2}	Connect $1M\Omega$ load resistor between V_{DD} and V_{L2} (without panel load)		V_{SS}		V
	V_{L3}	Connect $1M\Omega$ load resistor between V_{DD} and V_{L3} (without panel load)	$3/2 \cdot V_{L2}$ -0.1		$3/2 \cdot V_{L2}$ $\times 0.9$	V
Power current consumption	IOP	During HALT	Without panel load	1.0	2.5	μA
		During execution		2.5	5.0	μA

S1C60N01 (Heavy Load Protection Mode)

(Unless otherwise specified: $V_{DD}=0V$, $V_{SS}=-3.0V$, $f_{osc}=32.768kHz$ (crystal oscillation), $T_a=25^{\circ}C$, $C_G=25pF$, $V_{S1}/V_{L1}-V_{L3}$ are internal voltage, $C_1-C_5=0.1\mu F$)

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
Internal voltage	V_{L1}	Connect $1M\Omega$ load resistor between V_{DD} and V_{L1} (without panel load)	$1/2 \cdot V_{L2}$ -0.1		$1/2 \cdot V_{L2}$ $\times 0.85$	V
	V_{L2}	Connect $1M\Omega$ load resistor between V_{DD} and V_{L2} (without panel load)		V_{SS}		V
	V_{L3}	Connect $1M\Omega$ load resistor between V_{DD} and V_{L3} (without panel load)	$3/2 \cdot V_{L2}$ -0.1		$3/2 \cdot V_{L2}$ $\times 0.85$	V
Power current consumption	IOP	During HALT	Without panel load	2.0	5.5	μA
		During execution		5.5	10.0	μA

S1C60L01 (Normal Operating Mode)

(Unless otherwise specified: $V_{DD}=0V$, $V_{SS}=-1.5V$, $f_{osc}=32.768kHz$ (crystal oscillation), $T_a=25^{\circ}C$, $C_G=25pF$, $V_{S1}/V_{L1}-V_{L3}$ are internal voltage, $C_1-C_5=0.1\mu F$)

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
Internal voltage	V_{L1}	Connect $1M\Omega$ load resistor between V_{DD} and V_{L1} (without panel load)		V_{SS}		V
	V_{L2}	Connect $1M\Omega$ load resistor between V_{DD} and V_{L2} (without panel load)	$2 \cdot V_{L1}$ -0.1		$2 \cdot V_{L1}$ $\times 0.9$	V
	V_{L3}	Connect $1M\Omega$ load resistor between V_{DD} and V_{L3} (without panel load)	$3 \cdot V_{L1}$ -0.1		$3 \cdot V_{L1}$ $\times 0.9$	V
Power current consumption	IOP	During HALT	Without panel load	1.0	2.5	μA
		During execution		2.5	5.0	μA

S1C60L01 (Heavy Load Protection Mode)

(Unless otherwise specified: $V_{DD}=0V$, $V_{SS}=-1.5V$, $f_{osc}=32.768kHz$ (crystal oscillation), $T_a=25^{\circ}C$, $C_G=25pF$, $V_{S1}/V_{L1}-V_{L3}$ are internal voltage, $C_1-C_5=0.1\mu F$)

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
Internal voltage	V_{L1}	Connect $1M\Omega$ load resistor between V_{DD} and V_{L1} (without panel load)		V_{SS}		V
	V_{L2}	Connect $1M\Omega$ load resistor between V_{DD} and V_{L2} (without panel load)	$2 \cdot V_{L1}$ -0.1		$2 \cdot V_{L1}$ $\times 0.85$	V
	V_{L3}	Connect $1M\Omega$ load resistor between V_{DD} and V_{L3} (without panel load)	$3 \cdot V_{L1}$ -0.1		$3 \cdot V_{L1}$ $\times 0.85$	V
Power current consumption	IOP	During HALT	Without panel load	2.0	5.5	μA
		During execution		5.5	10.0	μA

S1C60N01 (CR, Normal Operating Mode)

(Unless otherwise specified: $V_{DD}=0V$, $V_{SS}=-3.0V$, $f_{osc}=65kHz$, $T_a=25^{\circ}C$, $C_G=25pF$, $V_{S1}/V_{L1}-V_{L3}$ are internal voltage, $C_1-C_5=0.1\mu F$, Recommended external resistance for CR oscillation=470k Ω)

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
Internal voltage	V_{L1}	Connect 1M Ω load resistor between V_{DD} and V_{L1} (without panel load)	$1/2 \cdot V_{L2}$ -0.1		$1/2 \cdot V_{L2}$ $\times 0.9$	V
	V_{L2}	Connect 1M Ω load resistor between V_{DD} and V_{L2} (without panel load)		V_{SS}		V
	V_{L3}	Connect 1M Ω load resistor between V_{DD} and V_{L3} (without panel load)	$3/2 \cdot V_{L2}$ -0.1		$3/2 \cdot V_{L2}$ $\times 0.9$	V
Power current consumption	IOP	During HALT	Without panel load	8.0	15.0	μA
		During execution		15.0	20.0	μA

S1C60N01 (CR, Heavy Load Protection Mode)

(Unless otherwise specified: $V_{DD}=0V$, $V_{SS}=-3.0V$, $f_{osc}=65kHz$, $T_a=25^{\circ}C$, $C_G=25pF$, $V_{S1}/V_{L1}-V_{L3}$ are internal voltage, $C_1-C_5=0.1\mu F$, Recommended external resistance for CR oscillation=470k Ω)

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
Internal voltage	V_{L1}	Connect 1M Ω load resistor between V_{DD} and V_{L1} (without panel load)	$1/2 \cdot V_{L2}$ -0.1		$1/2 \cdot V_{L2}$ $\times 0.85$	V
	V_{L2}	Connect 1M Ω load resistor between V_{DD} and V_{L2} (without panel load)		V_{SS}		V
	V_{L3}	Connect 1M Ω load resistor between V_{DD} and V_{L3} (without panel load)	$3/2 \cdot V_{L2}$ -0.1		$3/2 \cdot V_{L2}$ $\times 0.85$	V
Power current consumption	IOP	During HALT	Without panel load	16.0	30.0	μA
		During execution		30.0	40.0	μA

S1C60L01 (CR, Normal Operating Mode)

(Unless otherwise specified: $V_{DD}=0V$, $V_{SS}=-1.5V$, $f_{osc}=65kHz$, $T_a=25^{\circ}C$, $C_G=25pF$, $V_{S1}/V_{L1}-V_{L3}$ are internal voltage, $C_1-C_5=0.1\mu F$, Recommended external resistance for CR oscillation=470k Ω)

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
Internal voltage	V_{L1}	Connect 1M Ω load resistor between V_{DD} and V_{L1} (without panel load)		V_{SS}		V
	V_{L2}	Connect 1M Ω load resistor between V_{DD} and V_{L2} (without panel load)	$2 \cdot V_{L1}$ -0.1		$2 \cdot V_{L1}$ $\times 0.9$	V
	V_{L3}	Connect 1M Ω load resistor between V_{DD} and V_{L3} (without panel load)	$3 \cdot V_{L1}$ -0.1		$3 \cdot V_{L1}$ $\times 0.9$	V
Power current consumption	IOP	During HALT	Without panel load	8.0	15.0	μA
		During execution		15.0	20.0	μA

S1C60L01 (CR, Heavy Load Protection Mode)

(Unless otherwise specified: $V_{DD}=0V$, $V_{SS}=-1.5V$, $f_{osc}=65kHz$, $T_a=25^{\circ}C$, $C_G=25pF$, $V_{S1}/V_{L1}-V_{L3}$ are internal voltage, $C_1-C_5=0.1\mu F$, Recommended external resistance for CR oscillation=470k Ω)

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
Internal voltage	V_{L1}	Connect 1M Ω load resistor between V_{DD} and V_{L1} (without panel load)		V_{SS}		V
	V_{L2}	Connect 1M Ω load resistor between V_{DD} and V_{L2} (without panel load)	$2 \cdot V_{L1}$ -0.1		$2 \cdot V_{L1}$ $\times 0.85$	V
	V_{L3}	Connect 1M Ω load resistor between V_{DD} and V_{L3} (without panel load)	$3 \cdot V_{L1}$ -0.1		$3 \cdot V_{L1}$ $\times 0.85$	V
Power current consumption	IOP	During HALT	Without panel load	16.0	30.0	μA
		During execution		30.0	40.0	μA

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● Oscillation Characteristics

Oscillation characteristics will vary according to different conditions. Use the following characteristics as reference values.

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(Unless otherwise specified: V_{DD}=0V, V_{SS}=-3.0V, Crystal: Q13MC146, C_G=25pF, C_D=built-in, Ta=25°C)

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
Oscillation start voltage	V _{sta}	t _{sta} ≤5sec (V _{ss})	-1.8			V
Oscillation stop voltage	V _{stp}	t _{stp} ≤10sec (V _{ss})	-1.8			V
Built-in capacitance (drain)	C _D	Including the parasitic capacity inside the IC		20		pF
Frequency/voltage deviation	∂f/∂V	V _{ss} =-1.8 to -3.6V			5	ppm
Frequency/IC deviation	∂f/∂IC		-10		10	ppm
Frequency adjustment range	∂f/∂C _G	C _G =5 to 25pF	40			ppm
Harmonic oscillation start voltage	V _{hho}	C _G =5pF (V _{ss})			-3.6	V
Allowable leak resistance	R _{leak}	Between OSC1 and V _{DD}	200			MΩ

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(Unless otherwise specified: V_{DD}=0V, V_{SS}=-1.5V, Crystal: Q13MC146, C_G=25pF, C_D=built-in, Ta=25°C)

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
Oscillation start voltage	V _{sta}	t _{sta} ≤5sec (V _{ss})	-1.2			V
Oscillation stop voltage	V _{stp}	t _{stp} ≤10sec (V _{ss})	-1.2			V
Built-in capacitance (drain)	C _D	Including the parasitic capacity inside the IC		20		pF
Frequency/voltage deviation	∂f/∂V	V _{ss} =-1.2 to -2.0V			5	ppm
Frequency/IC deviation	∂f/∂IC		-10		10	ppm
Frequency adjustment range	∂f/∂C _G	C _G =5 to 25pF	40			ppm
Harmonic oscillation start voltage	V _{hho}	C _G =5pF (V _{ss})			-2.0	V
Allowable leak resistance	R _{leak}	Between OSC1 and V _{DD}	200			MΩ

S1C60N01 (CR)

(Unless otherwise specified: V_{DD}=0V, V_{SS}=-3.0V, R_{CR}=470kΩ, Ta=25°C)

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
Oscillation frequency dispersion	fosc		-20	65kHz	20	%
Oscillation start voltage	V _{sta}		-1.8			V
Oscillation start time	t _{sta}	V _{ss} =-1.8 to -3.6V		3		mS
Oscillation stop voltage	V _{stp}		-1.8			V

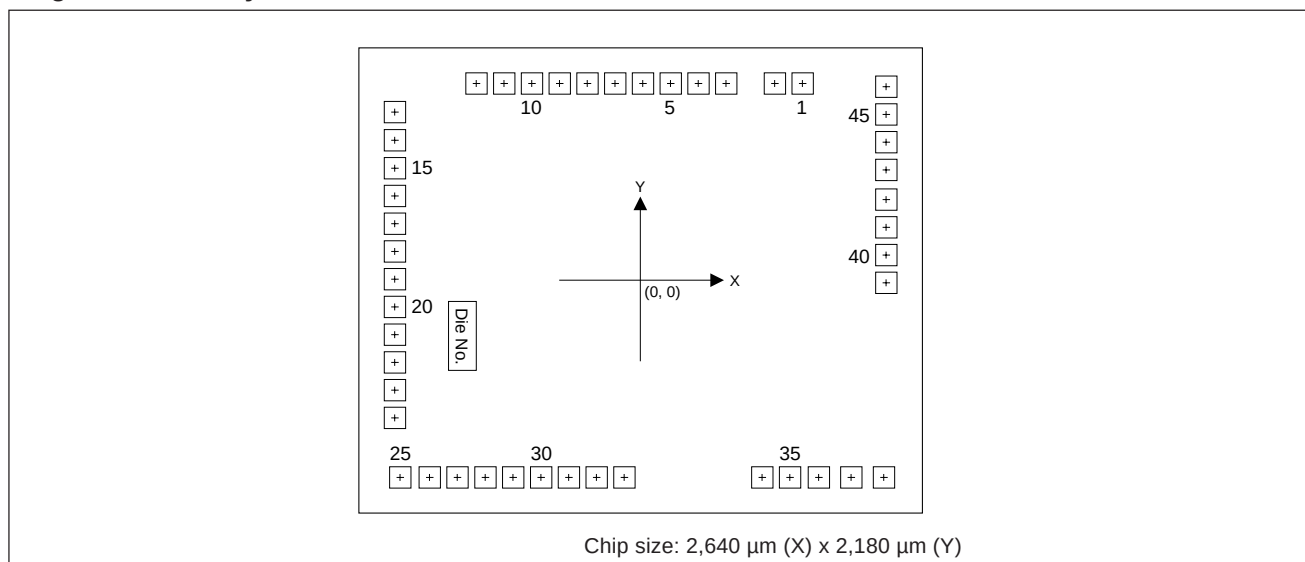
S1C60L01 (CR)

(Unless otherwise specified: V_{DD}=0V, V_{SS}=-1.5V, R_{CR}=470kΩ, Ta=25°C)

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
Oscillation frequency dispersion	fosc		-20	65kHz	20	%
Oscillation start voltage	V _{sta}		-1.2			V
Oscillation start time	t _{sta}	V _{ss} =-1.2 to -2.0V		3		mS
Oscillation stop voltage	V _{stp}		-1.2			V

■ PAD LAYOUT

● Diagram of Pad Layout



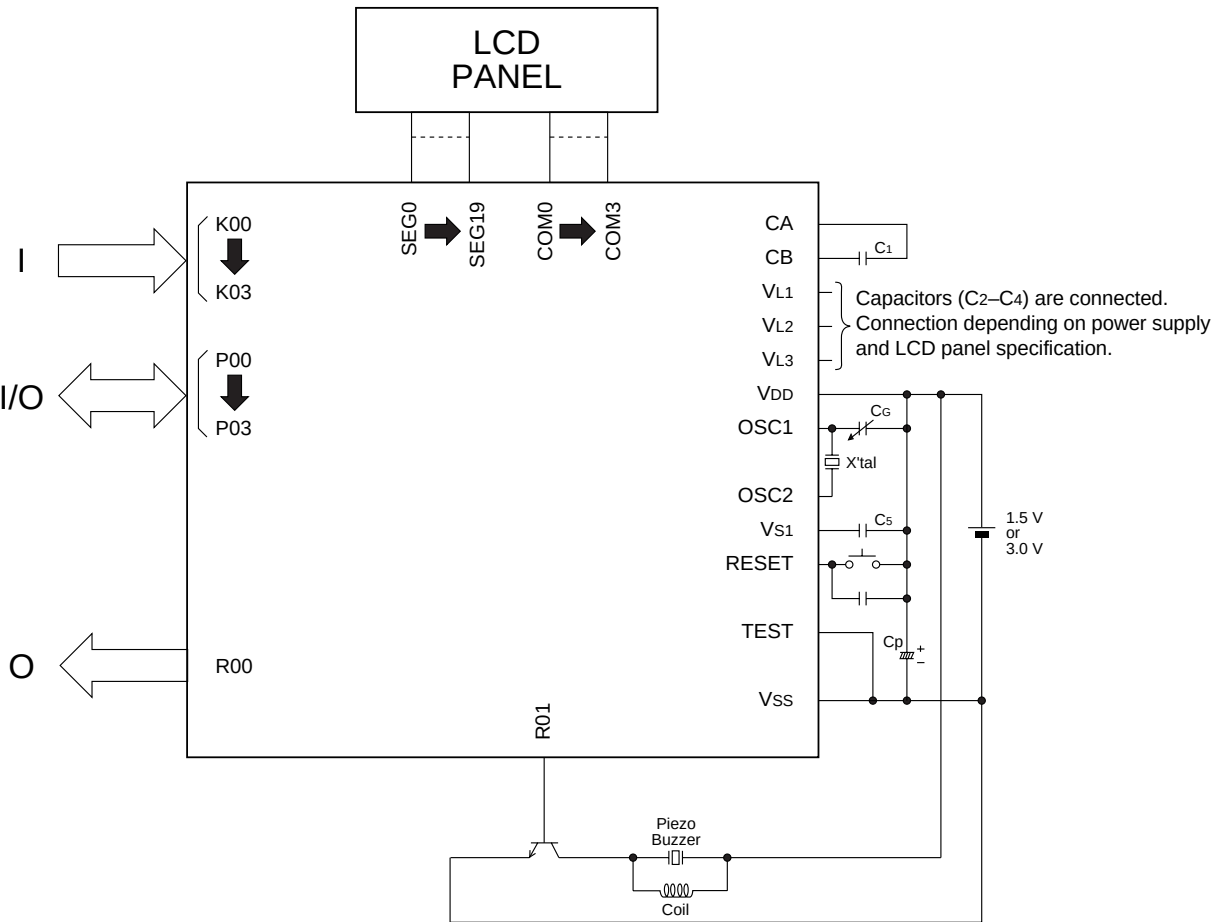
● Pad Coordinates

Pad No.	Pad name	X	Y	Pad No.	Pad name	X	Y
1	R01	759	923	24	SEG0	-1,151	-644
2	R00	629	923	25	COM0	-1,126	-923
3	SEG19	401	923	26	COM1	-988	-923
4	SEG18	271	923	27	COM2	-858	-923
5	SEG17	141	923	28	COM3	-727	-923
6	SEG16	11	923	29	VL3	-597	-923
7	SEG15	-119	923	30	VL2	-466	-923
8	SEG14	-249	923	31	VL1	-336	-923
9	SEG13	-379	923	32	CA	-206	-923
10	SEG12	-509	923	33	CB	-76	-923
11	SEG11	-639	923	34	VSS	570	-923
12	SEG10	-769	923	35	VDD	700	-923
13	TEST	-1,151	789	36	OSC1	835	-923
14	RESET	-1,151	657	37	OSC2	987	-923
15	SEG9	-1,151	526	38	Vs1	1,140	-923
16	SEG8	-1,151	396	39	P00	1,151	-11
17	SEG7	-1,151	266	40	P01	1,151	119
18	SEG6	-1,151	136	41	P02	1,151	249
19	SEG5	-1,151	6	42	P03	1,151	379
20	SEG4	-1,151	-124	43	K00	1,151	518
21	SEG3	-1,151	-254	44	K01	1,151	648
22	SEG2	-1,151	-384	45	K02	1,151	778
23	SEG1	-1,151	-514	46	K03	1,151	908

(Unit: μm)

■ BASIC EXTERNAL CONNECTION DIAGRAM

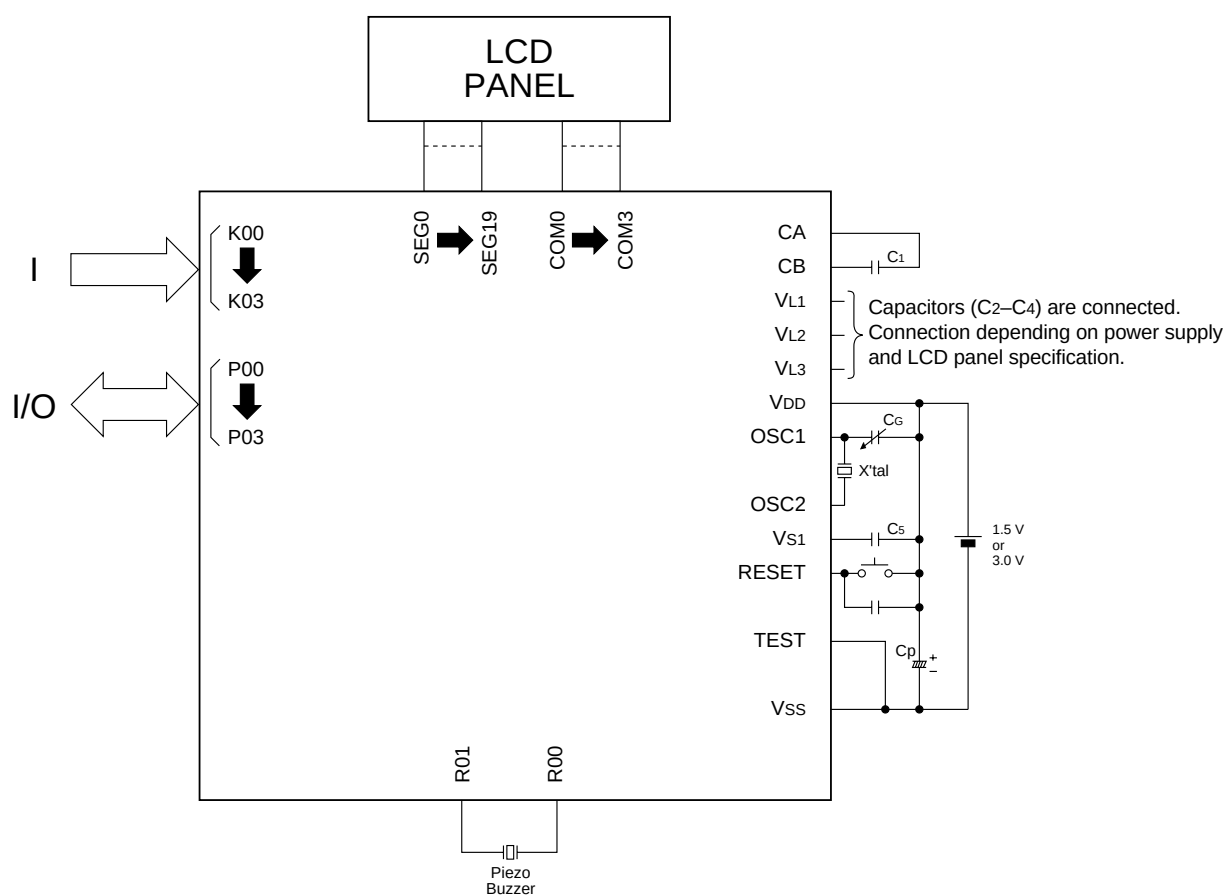
Piezo Buzzer Single Terminal Driving



X'tal	Crystal oscillator	32.768 kHz	CI(MAX) = 35 kΩ
CG	Trimmer capacitor	5–25 pF	
C1–C5	Capacitor	0.1 μF	
Cp	Capacitor	3.3 μF	

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

Piezo Buzzer Direct Driving



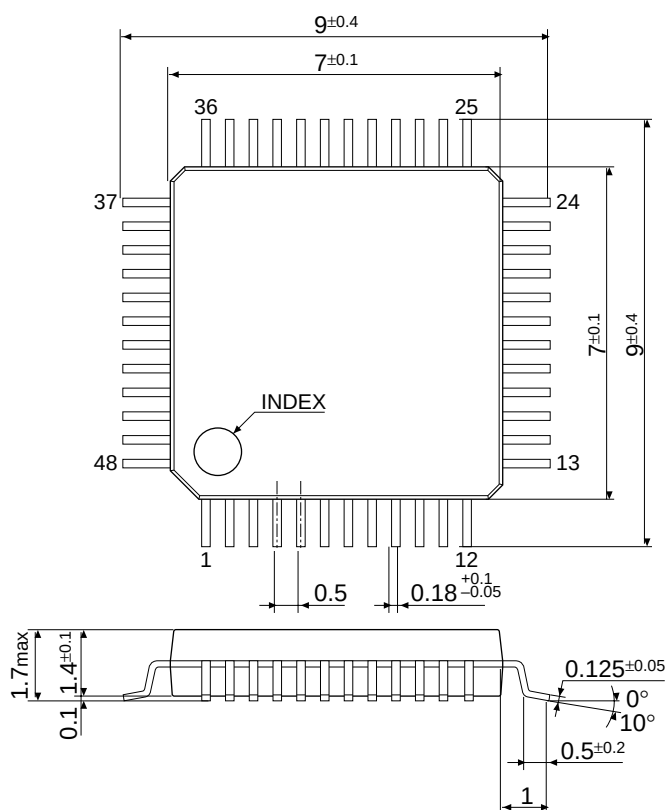
X'tal	Crystal oscillator	32.768 kHz CI(MAX) = 35 kΩ
CG	Trimmer capacitor	5–25 pF
C1–C5	Capacitor	0.1 μF
Cp	Capacitor	3.3 μF

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

S1C60N01

■ PACKAGE

Plastic QFP12-48pin



(Unit: mm)

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