

CMOS 4-bit Single Chip Microcontroller

- High Performance 4-bit Core CPU S1C63000
- LCD Driver (56 SEG × 8 COM)
- R/f Converter to Measure Temperature and Humidity
- Low Current Consumption
- Low Voltage Operation

■ DESCRIPTIONS

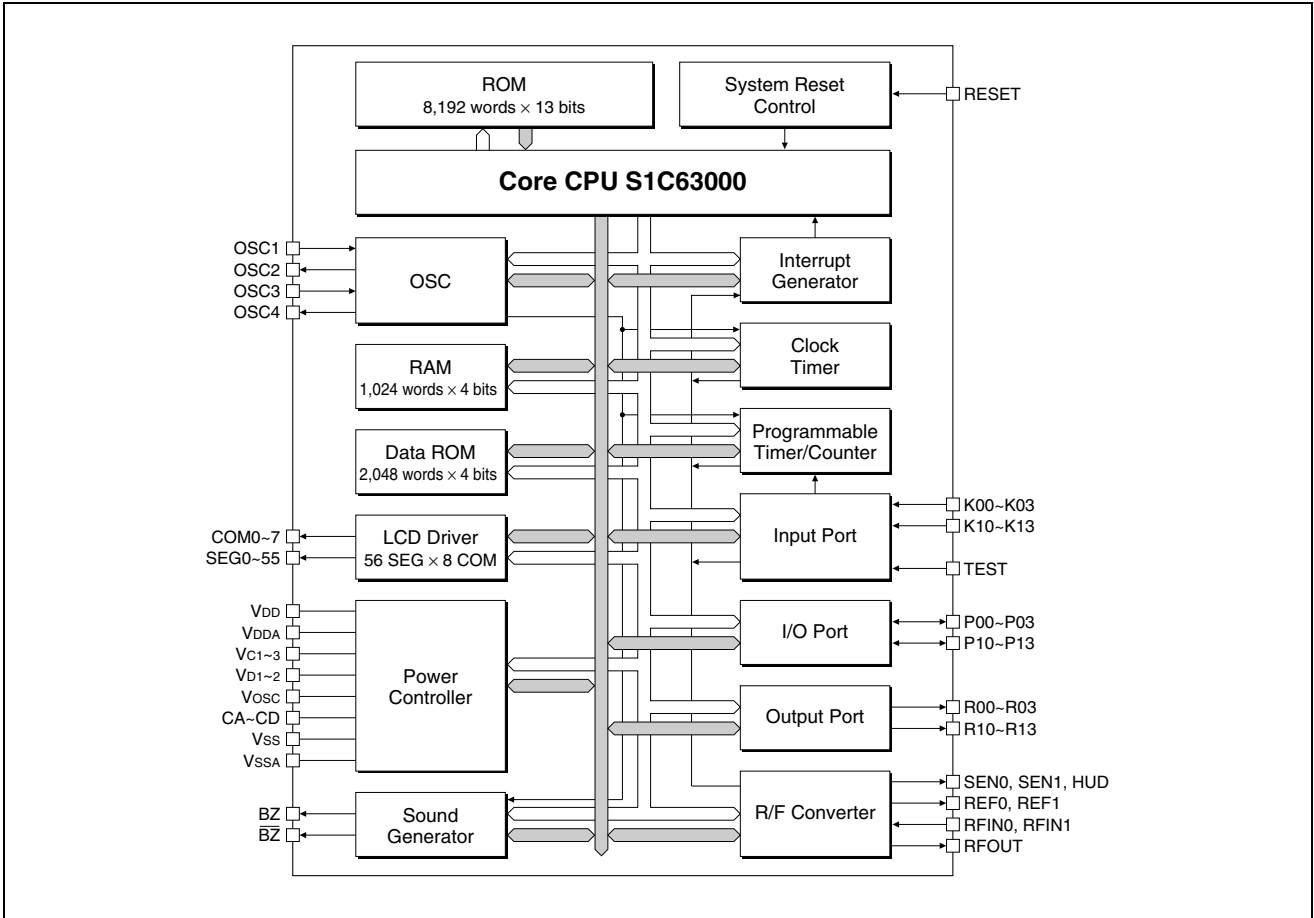
The S1C63657 is a microcomputer which has a high-performance 4-bit CPU S1C63000 as the core CPU, ROM (8,192 words × 13 bits), RAM (1,024 words × 4 bits), multiply-divide circuit, watchdog timer, programmable timer, time base counter, an LCD driver that can drive a maximum 56 segments × 8 commons, sound generator and R/f converter built-in. The S1C63657 features low current consumption, this makes it suitable for battery driven portable equipment with R/f converter.

■ FEATURES

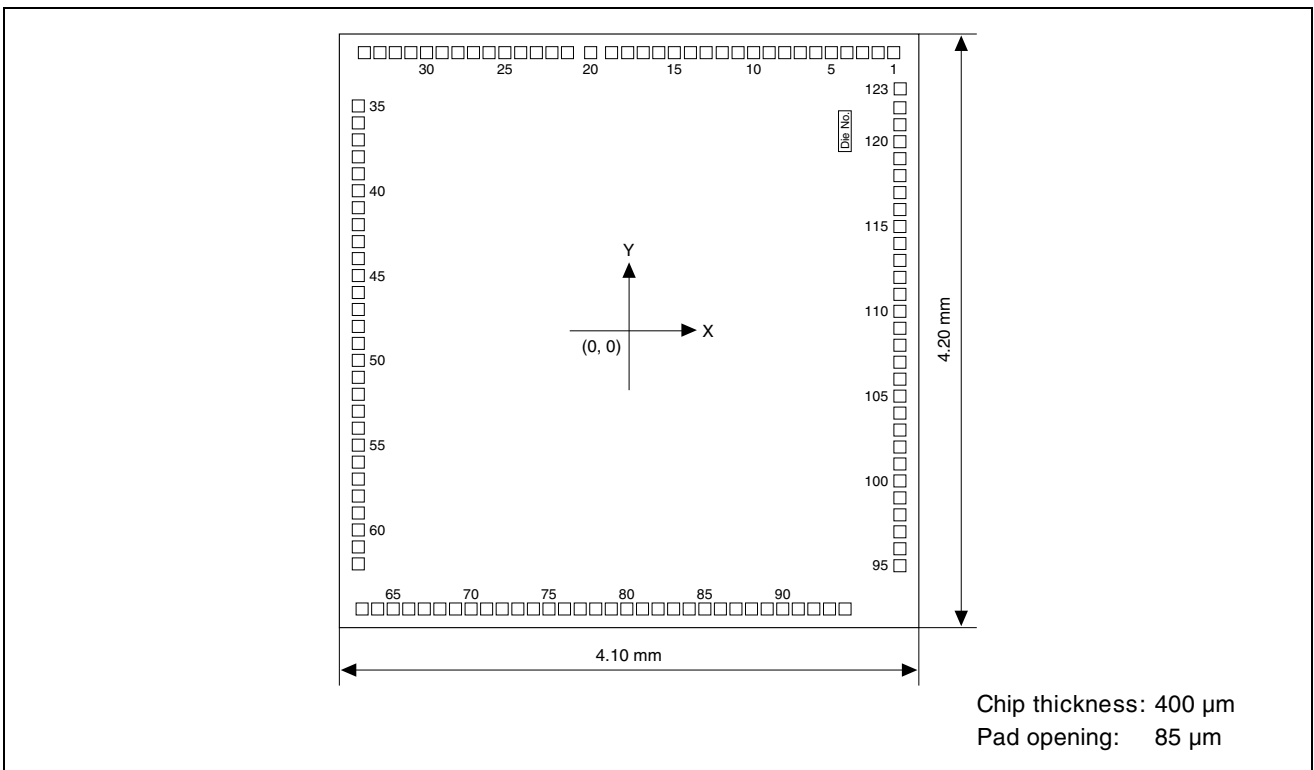
- Core CPU.....4-bit CMOS core CPU S1C63000
 - OSC1 oscillation circuit32.768 kHz (Typ.) crystal oscillation circuit
 - OSC3 oscillation circuit4 MHz (Max.) ceramic (2 MHz Max. when OSC3 is used as the R/f converter operating clock) or 1.1 MHz (Typ.) CR oscillation circuit (*1)
 - Instruction setBasic 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: 8,192 words × 13 bits
Data ROM: 2,048 words × 4 bits
 - RAM capacityData memory: 1,024 words × 4 bits
Display memory: 160 words × 4 bits
 - Input port.....8 bits (Pull-down resistors may be supplemented *1)
 - Output port.....8 bits (It is possible to switch the 2 bits to special output *2)
 - I/O port.....8 bits
 - LCD driver56 segments × 4, 5 or 8 commons (*2)
 - Time base counterClock timer
 - Programmable timer8-bit timer × 3 ch., 16-bit timer × 1 ch. + 8-bit timer × 1 ch.,
8-bit PWM × 2 ch. + 8-bit timer × 1 ch.
or 16-bit PWM × 1 ch. + 8-bit timer × 1 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.
 - Multiply-divide circuit8-bit accumulator × 1 ch.
Multiplication: 8 bits × 8 bits → 16-bit product
Division: 16 bits ÷ 8 bits → 8-bit quotient and 8-bit remainder
 - External interrupt.....Input interrupt: 2 systems
 - Internal interrupt.....Clock timer interrupt: 4 systems
Programmable timer interrupt: 5 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

S1C63657

■ BLOCK DIAGRAM



■ PAD DIAGRAM



■ PAD COORDINATES

Unit: mm

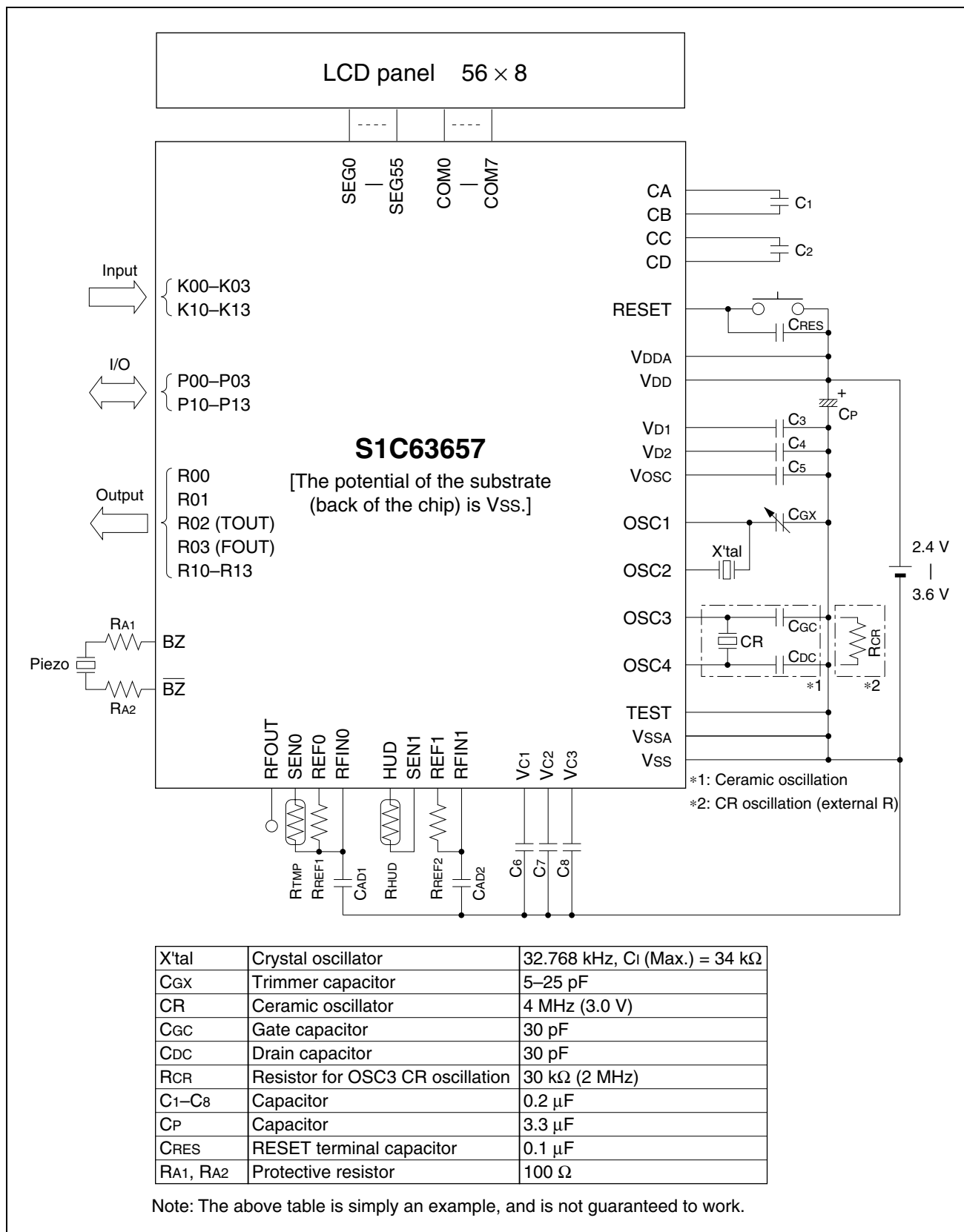
No.	Pad name	X	Y	No.	Pad name	X	Y	No.	Pad name	X	Y
1	COM1	1.872	1.968	42	SEG35	-1.916	0.751	83	P13	0.315	-1.968
2	COM2	1.762	1.968	43	SEG36	-1.916	0.631	84	R00	0.425	-1.968
3	COM3	1.652	1.968	44	SEG37	-1.916	0.511	85	R01	0.536	-1.968
4	CA	1.541	1.968	45	SEG38	-1.916	0.391	86	R02	0.646	-1.968
5	CB	1.431	1.968	46	SEG39	-1.916	0.271	87	R03	0.756	-1.968
6	Vc1	1.321	1.968	47	SEG40	-1.916	0.151	88	R10	0.866	-1.968
7	Vc2	1.211	1.968	48	SEG41	-1.916	0.031	89	R11	0.977	-1.968
8	Vc3	1.101	1.968	49	SEG42	-1.916	-0.089	90	R12	1.087	-1.968
9	N.C.	0.991	1.968	50	SEG43	-1.916	-0.209	91	R13	1.197	-1.968
10	N.C.	0.881	1.968	51	SEG44	-1.916	-0.329	92	BZ	1.307	-1.968
11	N.C.	0.771	1.968	52	SEG45	-1.916	-0.449	93	\overline{BZ}	1.418	-1.968
12	VSSA	0.659	1.968	53	SEG46	-1.916	-0.569	94	Vss	1.528	-1.968
13	RFOUT	0.545	1.968	54	SEG47	-1.916	-0.689	95	SEG0	1.916	-1.662
14	RFIN0	0.434	1.968	55	SEG48	-1.916	-0.809	96	SEG1	1.916	-1.542
15	RFIN1	0.320	1.968	56	SEG49	-1.916	-0.929	97	SEG2	1.916	-1.422
16	REF0	0.210	1.968	57	SEG50	-1.916	-1.049	98	SEG3	1.916	-1.302
17	SEN0	0.100	1.968	58	SEG51	-1.916	-1.169	99	SEG4	1.916	-1.182
18	REF1	-0.010	1.968	59	SEG52	-1.916	-1.289	100	SEG5	1.916	-1.062
19	SEN1	-0.124	1.968	60	SEG53	-1.916	-1.409	101	SEG6	1.916	-0.942
20	HUD	-0.272	1.968	61	SEG54	-1.916	-1.529	102	SEG7	1.916	-0.822
21	VDDA	-0.436	1.968	62	SEG55	-1.916	-1.649	103	SEG8	1.916	-0.702
22	CC	-0.546	1.968	63	COM4	-1.889	-1.968	104	SEG9	1.916	-0.582
23	CD	-0.656	1.968	64	COM5	-1.779	-1.968	105	SEG10	1.916	-0.462
24	Vd2	-0.767	1.968	65	COM6	-1.669	-1.968	106	SEG11	1.916	-0.342
25	VDD	-0.879	1.968	66	COM7	-1.559	-1.968	107	SEG12	1.916	-0.222
26	VOSC	-0.991	1.968	67	VDD	-1.449	-1.968	108	SEG13	1.916	-0.102
27	OSC1	-1.101	1.968	68	K00	-1.339	-1.968	109	SEG14	1.916	0.018
28	OSC2	-1.211	1.968	69	K01	-1.228	-1.968	110	SEG15	1.916	0.138
29	Vd1	-1.323	1.968	70	K02	-1.118	-1.968	111	SEG16	1.916	0.258
30	OSC3	-1.433	1.968	71	K03	-1.008	-1.968	112	SEG17	1.916	0.378
31	OSC4	-1.544	1.968	72	K10	-0.898	-1.968	113	SEG18	1.916	0.498
32	Vss	-1.654	1.968	73	K11	-0.787	-1.968	114	SEG19	1.916	0.618
33	TEST	-1.763	1.968	74	K12	-0.677	-1.968	115	SEG20	1.916	0.738
34	RESET	-1.873	1.968	75	K13	-0.567	-1.968	116	SEG21	1.916	0.858
35	SEG28	-1.916	1.591	76	P00	-0.457	-1.968	117	SEG22	1.916	0.978
36	SEG29	-1.916	1.471	77	P01	-0.346	-1.968	118	SEG23	1.916	1.098
37	SEG30	-1.916	1.351	78	P02	-0.236	-1.968	119	SEG24	1.916	1.218
38	SEG31	-1.916	1.231	79	P03	-0.126	-1.968	120	SEG25	1.916	1.338
39	SEG32	-1.916	1.111	80	P10	-0.016	-1.968	121	SEG26	1.916	1.458
40	SEG33	-1.916	0.991	81	P11	0.095	-1.968	122	SEG27	1.916	1.578
41	SEG34	-1.916	0.871	82	P12	0.205	-1.968	123	COM0	1.918	1.712

S1C63657

■ PIN DESCRIPTION

Pin name	Pad No.	I/O	Function
VDD	25, 67	–	Power (+) supply pin
VSS	32, 94	–	Power (–) supply pin
VDDA	21	–	Analog system power (+) supply pin (=VDD)
VSSA	12	–	Analog system power (–) supply pin (=Vss)
Vd1	29	–	Internal logic system regulated voltage output pin
Vd2	24	–	1/2VDD voltage halver output pin
Vosc	26	–	Oscillation system regulated voltage output pin
Vc1–Vc3	6–8	–	LCD system power supply pin
CA, CB	4, 5	–	LCD system voltage booster capacitor connecting pin
CC, CD	22, 23	–	Voltage halver capacitor connecting pin
OSC1	27	I	Crystal oscillation input pin
OSC2	28	O	Crystal oscillation output pin
OSC3	30	I	Ceramic or CR oscillation input pin (selected by mask option)
OSC4	31	O	Ceramic or CR oscillation output pin (selected by mask option)
K00–K03	68–71	I	Input port pins
K10–K13	72–75	I	Input port pins
P00–P03	76–79	I/O	I/O port pins
P10–P13	80–83	I/O	I/O port pins
R00	84	O	Output port pin
R01	85	O	Output port pin
R02	86	O	Output port or TOUT output pin (selected by software)
R03	87	O	Output port or FOUT output pin (selected by software)
R10–R13	88–91	O	Output port pins
COM0–COM7	123, 1–3, 63–66	O	LCD common output pin (1/4, 1/5 or 1/8 duty is selectable by software)
SEG0–SEG55	95–122, 35–62	O	LCD segment output pin
SEN0	17	O	R/f converter Ch. 0 CR oscillation output pin
SEN1	19	O	R/f converter Ch. 1 CR oscillation output pin
REF0	16	O	R/f converter Ch. 0 reference resistor CR oscillation output pin
REF1	18	O	R/f converter Ch. 1 reference resistor CR oscillation output pin
HUD	20	O	R/f converter AC-bias oscillation output pin for humidity sensor
RFIN0	14	I	R/f converter Ch. 0 CR oscillation input pin
RFIN1	15	I	R/f converter Ch. 1 CR oscillation input pin
RFOUT	13	O	R/f converter oscillation frequency output pin
BZ	92	O	Sound output pin
BZ	93	O	Sound inverted output pin
RESET	34	I	Initial reset input pin
TEST	33	I	Testing input pin

■ BASIC EXTERNAL CONNECTION DIAGRAM



S1C63657

NOTICE:

No part of this material may be reproduced or duplicated in any form or by any means without the written permission of Seiko Epson. Seiko Epson reserves the right to make changes to this material without notice. Seiko Epson does not assume any liability of any kind arising out of any inaccuracies contained in this material or due to its application or use in any product or circuit and, further, there is no representation that this material is applicable to products requiring high level reliability, such as, medical products. Moreover, no license to any intellectual property rights is granted by implication or otherwise, and there is no representation or warranty that anything made in accordance with this material will be free from any patent or copyright infringement of a third party. This material or portions thereof may contain technology or the subject relating to strategic products under the control of the Foreign Exchange and Foreign Trade Law of Japan and may require an export license from the Ministry of Economy, Trade and Industry or other approval from another government agency.

© SEIKO EPSON CORPORATION 2007, All right reserved.

SEIKO EPSON CORPORATION

SEMICONDUCTOR OPERATIONS DIVISION

IC Sales Dept.

IC International Sales Group

421-8, Hino, Hino-shi, Tokyo 191-8501, JAPAN
Phone: +81-42-587-5814 FAX: +81-42-587-5117

■ EPSON Electronic Devices Website

http://www.epson.jp/device/semicon_e

Document code: 411220500

Issue September, 2007

Printed in Japan ㊞