

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

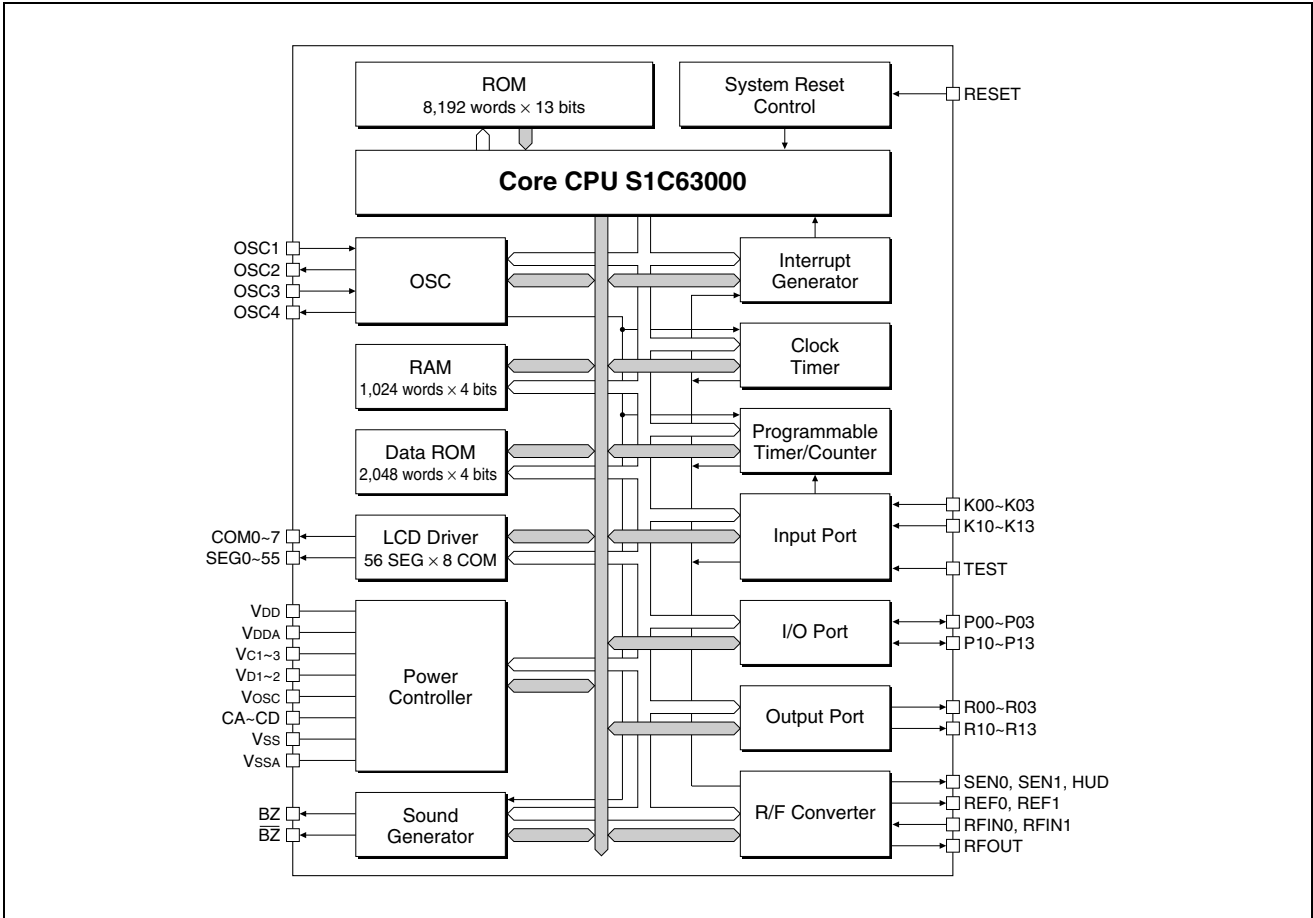
The S1C63657 is a microcomputer which has a high-performance 4-bit CPU S1C63000 as the core CPU, ROM (8,192 words × 13 bits), RAM (1,024 words × 4 bits), multiply-divide circuit, watchdog timer, programmable timer, time base counter, an LCD driver that can drive a maximum 56 segments × 8 commons, sound 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

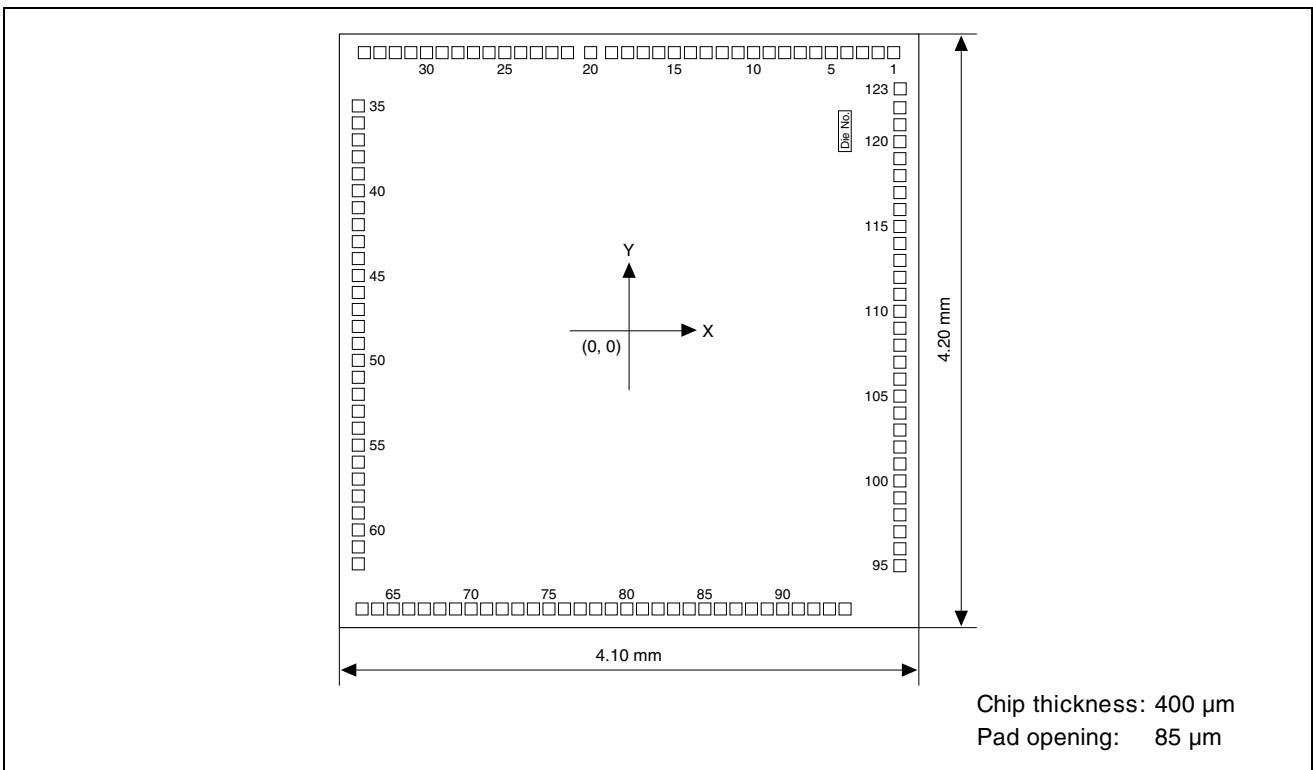
- Core CPU.....4-bit CMOS core CPU S1C63000
 - OSC1 oscillation circuit32.768 kHz (Typ.) crystal oscillation circuit
 - OSC3 oscillation circuit4 MHz (Max.) ceramic (2 MHz Max. when OSC3 is used as the R/f converter operating clock) or 1.1 MHz (Typ.) CR oscillation circuit (*1)
 - Instruction setBasic 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

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■ BLOCK DIAGRAM



■ PAD DIAGRAM



■ PAD COORDINATES

Unit: mm

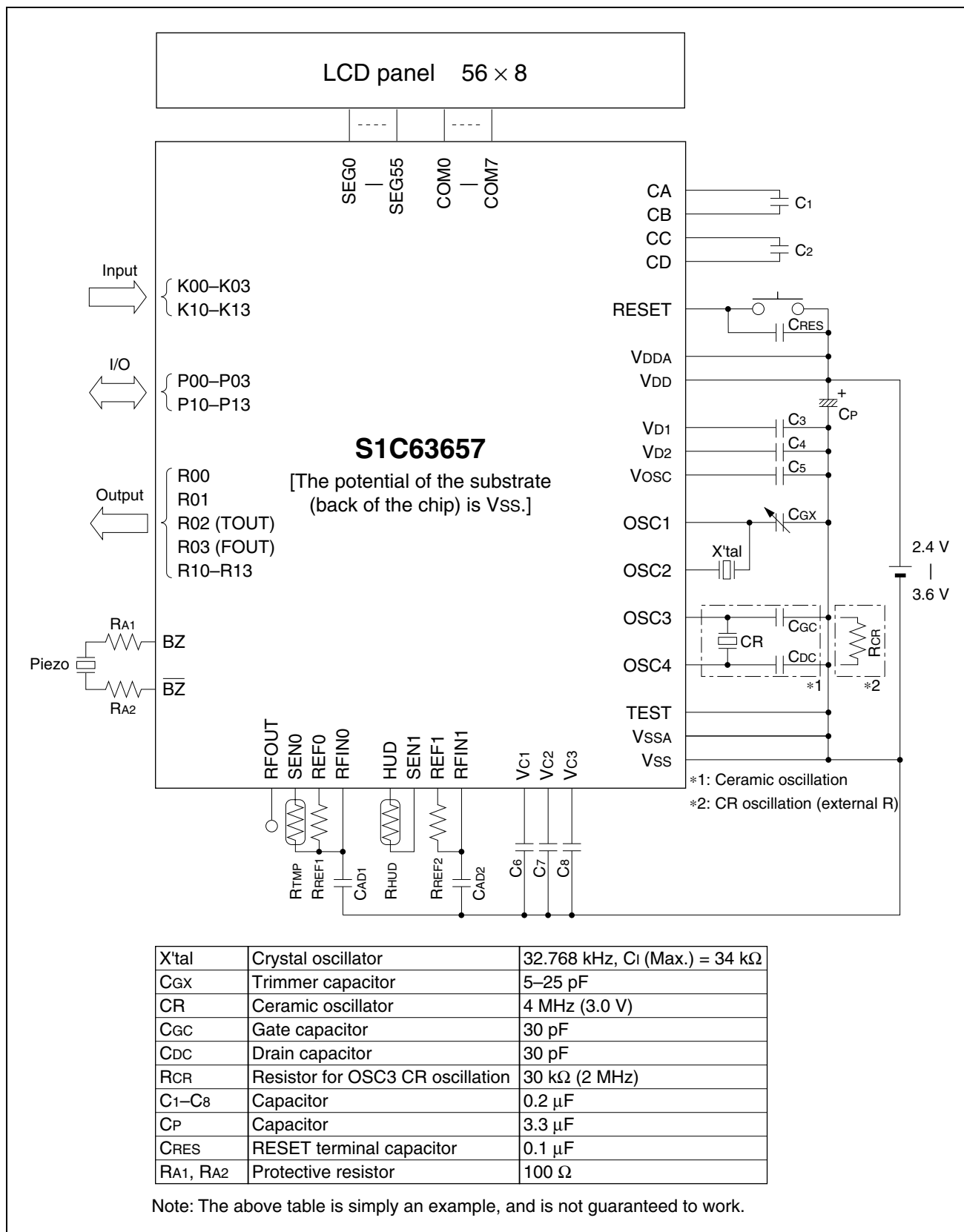
No.	Pad name	X	Y	No.	Pad name	X	Y	No.	Pad name	X	Y
1	COM1	1.872	1.968	42	SEG35	-1.916	0.751	83	P13	0.315	-1.968
2	COM2	1.762	1.968	43	SEG36	-1.916	0.631	84	R00	0.425	-1.968
3	COM3	1.652	1.968	44	SEG37	-1.916	0.511	85	R01	0.536	-1.968
4	CA	1.541	1.968	45	SEG38	-1.916	0.391	86	R02	0.646	-1.968
5	CB	1.431	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

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■ 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



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