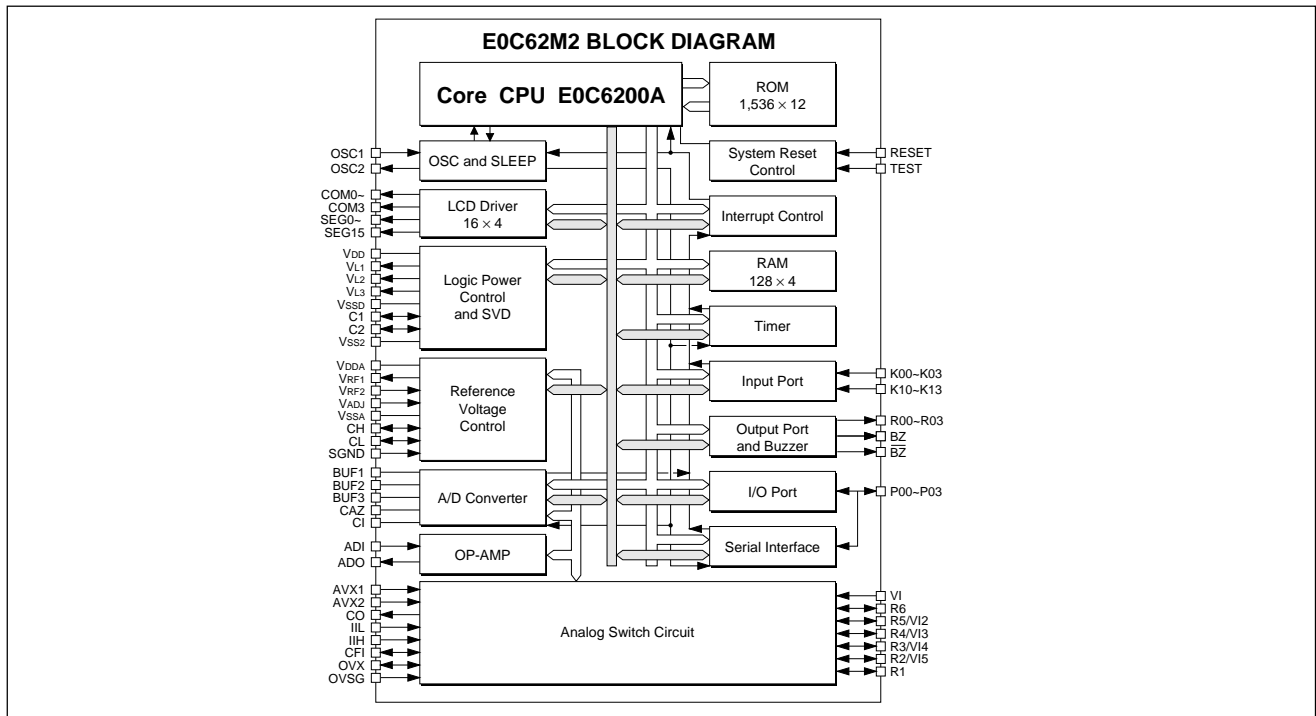


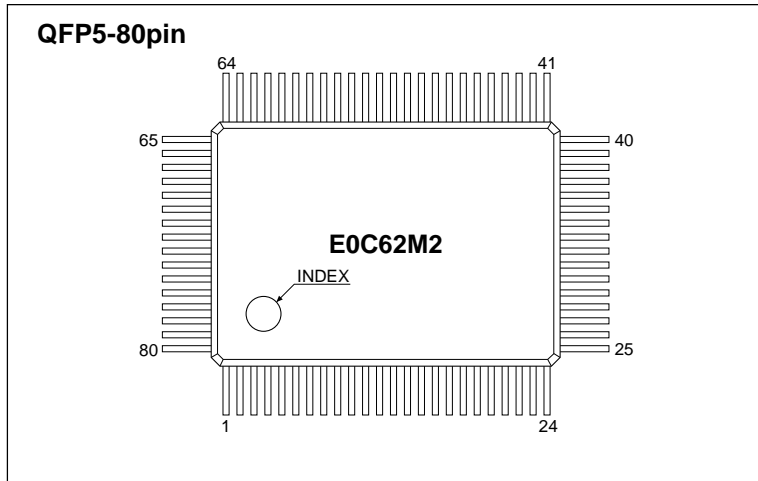


# E0C62M2

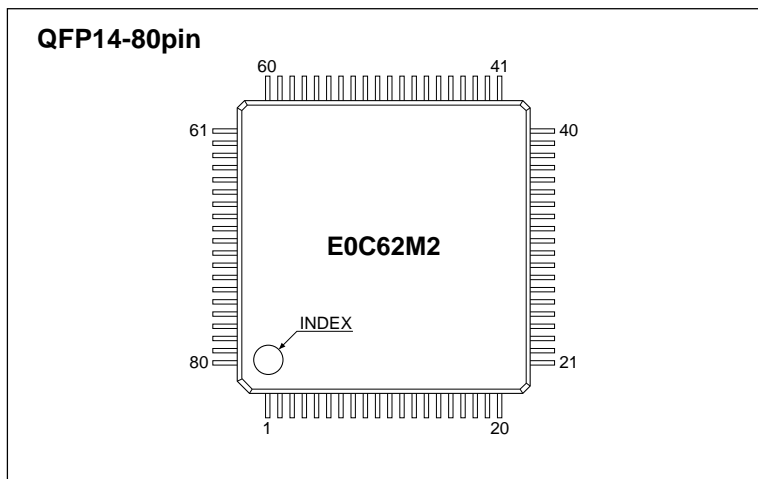
## ■ BLOCK DIAGRAM



## ■ PIN CONFIGURATION



No.	Pin name	No.	Pin name	No.	Pin name	No.	Pin name
1	SEG15	21	VRF1	41	OVSG	61	BZ
2	COM0	22	VRF2	42	R1	62	P00/SIN
3	COM1	23	CH	43	R2/VI5	63	P01/SOUT
4	COM2	24	CL	44	R3/VI4	64	P02/SCLK
5	COM3	25	ADI	45	R4/VI3	65	P03/SRDY
6	VL1	26	ADO	46	R5/VI2	66	SEG0
7	VL2	27	AVX1	47	R6	67	SEG1
8	VL3	28	AVX2	48	K00	68	SEG2
9	VDD	29	CO	49	K01	69	SEG3
10	OSC1	30	CAZ	50	K02	70	SEG4
11	OSC2	31	CI	51	K03	71	SEG5
12	RESET	32	BUF1	52	K10	72	SEG6
13	TEST	33	BUF2	53	K11	73	SEG7
14	VSSD	34	BUF3	54	K12	74	SEG8
15	C1	35	IIL	55	K13	75	SEG9
16	C2	36	IIH	56	R00	76	SEG10
17	VSS2	37	CFI	57	R01	77	SEG11
18	VDDA	38	SGND	58	R02	78	SEG12
19	VSSA	39	VI	59	R03	79	SEG13
20	VADJ	40	OVX	60	BZ	80	SEG14



No.	Pin name	No.	Pin name	No.	Pin name	No.	Pin name
1	COM2	21	CL	41	R3/VI4	61	P02/SCLK
2	COM3	22	ADI	42	R4/VI3	62	P03/SRDY
3	VL1	23	ADO	43	R5/VI2	63	SEG0
4	VL2	24	AVX1	44	R6	64	SEG1
5	VL3	25	AVX2	45	K00	65	SEG2
6	VDD	26	CO	46	K01	66	SEG3
7	OSC1	27	CAZ	47	K02	67	SEG4
8	OSC2	28	CI	48	K03	68	SEG5
9	RESET	29	BUF1	49	K10	69	SEG6
10	TEST	30	BUF2	50	K11	70	SEG7
11	VSSD	31	BUF3	51	K12	71	SEG8
12	C1	32	IIL	52	K13	72	SEG9
13	C2	33	IIH	53	R00	73	SEG10
14	VSS2	34	CFI	54	R01	74	SEG11
15	VDDA	35	SGND	55	R02	75	SEG12
16	VSSA	36	VI	56	R03	76	SEG13
17	VADJ	37	OVX	57	BZ	77	SEG14
18	VRF1	38	OVSG	58	BZ	78	SEG15
19	VRF2	39	R1	59	P00/SIN	79	COM0
20	CH	40	R2/VI5	60	P01/SOUT	80	COM1

## ■ PIN DESCRIPTION

Pin name	Pin No.		I/O	Function
	QFP5-80	QFP14-80		
VDD	9	6	(I)	Digital system power supply pin (+)
VDDA	18	15	(I)	Analog system power supply pin (+)
VSSD	14	11	(I)	Digital system power supply pin (-)
VSSA	19	16	(I)	Analog system GND pin (same voltage with VSSD)
VSS2	17	14	(O)	Analog system power supply pin (boosted voltage)
C1, C2	15, 16	12, 13	O	Booster capacitor connecting pins for analog system power supply (VSS2)
OSC1	10	7	I	Crystal oscillation input pin: 32.768 kHz
OSC2	11	8	O	Crystal oscillation output pin
K00-K13	48-55	45-52	I	Input pins
R00-R03	56-59	53-56	O	Output pins
BZ, BZ	60, 61	57, 58	O	Buzzer signal output pins
P00-P03	62-65	59-62	I/O	I/O pins
VL1-VL3	6-8	3-5	O	LCD system voltage output pin
COM0-3	2-5	79, 80, 1, 2	O	LCD common output pins (1/3, 1/4 duty, programmable)
SEG0-15	66-80, 1	63-78	O	LCD segment output pin (DC output may be selected by mask option)
VADJ	20	17	-	Reference voltage adjustment pin
VRF1	21	18	-	Reference voltage output pin
VRF2	22	19	-	Reference voltage output pin
ADI	25	22	I	OP-AMP inverted input pin for AC-DC conversion
ADO	26	23	O	OP-AMP output pin for AC-DC conversion
AVX1	27	24	-	AC-DC converted voltage input pin
AVX2	28	25	-	AC-DC converted voltage input pin
IIL, IIH	35, 36	32, 33	-	Input pins for current measurement
VI	39	36	-	Input pin for voltage measurement
R1	42	39	-	Reference resistor connecting pin (100 Ω)
R2/VI5	43	40	-	Reference resistor connecting pin (1 kΩ)
R3/VI4	44	41	-	Reference resistor connecting pin (10 kΩ)
R4/VI3	45	42	-	Reference resistor connecting pin (101 kΩ)
R5/VI2	46	43	-	Reference resistor connecting pin (1.11 MΩ)
R6	47	44	-	Reference resistor connecting pin (10 MΩ)
OVX	40	37	-	Reference resistor voltage input pin for resistance measurement
OVSG	41	38	-	Reference resistor voltage input pin for resistance measurement
SGND	38	35	-	GND for measurement
CO	29	26	-	Dummy pad
CAZ	30	27	-	Capacitor connecting pin for offset voltage zero adjustment
CI	31	28	-	Integral capacitor connecting pin
BUF1-3	32-34	29-31	-	Buffer AMP output, integral resistor connecting pin
CFI	37	34	-	Noise rejection filter connecting pin
CH	23	20	-	Capacitor connecting pin for reference voltage control
CL	24	21	-	Capacitor connecting pin for reference voltage control
TEST	13	10	I	Testing input pin
RESET	12	9	I	Initial reset input pin

# E0C62M2

## ■ ELECTRICAL CHARACTERISTICS

### ● Absolute Maximum Ratings

(V<sub>DD</sub>/V<sub>DDA</sub>=0V)

Rating	Symbol	Value	Unit
Supply voltage	V <sub>DD</sub> /V <sub>DDA</sub>	0	V
	V <sub>SSD</sub> /V <sub>SSA</sub>	-3.5	V
	V <sub>SS2</sub>	-7.0	V
Input voltage	V <sub>SSD</sub> system	V <sub>I1</sub>	(V <sub>SSD</sub> /V <sub>SSA</sub> - 0.3) to (V <sub>DD</sub> /V <sub>DDA</sub> + 0.3)
	V <sub>SS2</sub> system	V <sub>I2</sub>	(V <sub>SS2</sub> - 0.3) to (V <sub>DD</sub> /V <sub>DDA</sub> + 0.3)
Permissible total output current *1	ΣI	10	mA
Operating temperature (1)	T <sub>opr1</sub>	-20 to 70	°C
Operating temperature (2) *2	T <sub>opr2</sub>	0 to 40	°C
Storage temperature	T <sub>stg</sub>	-65 to 150	°C
Soldering temperature / Time	T <sub>sol</sub>	260°C, 10sec (lead section)	—
Permissible dissipation *3	P <sub>D</sub>	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 drawn in).

\*2: The A/D converter is ON status.

\*3: In case of plastic package (QFP5-80pin, QFP14-80pin).

### ● Recommended Operating Conditions

Condition	Symbol	Remark	Min.	Typ.	Max.	Unit
Supply voltage	V <sub>SSD</sub> /V <sub>SSA</sub>	V <sub>DD</sub> /V <sub>DDA</sub> =0V	-3.5	-3.0	-2.15	V
Oscillation frequency	f <sub>OSC1</sub>		—	32.768	—	kHz
Measurement system operating temperature	T <sub>mes</sub>	During measurement by the A/D converter	15	25	35	°C

### ● DC Characteristics

(Unless otherwise specified: V<sub>DD</sub>/V<sub>DDA</sub>=0V, V<sub>SSD</sub>/V<sub>SSA</sub>=-3.0V, f<sub>OSC1</sub>=32.768kHz, T<sub>a</sub>=25°C, V<sub>L1</sub>–V<sub>L3</sub> are internal voltage)

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
High level input voltage (1)	V <sub>IH1</sub>	K00–K03, K10–K13 RESET, TEST	0.1•V <sub>SSD</sub>		V <sub>DD</sub>	V
High level input voltage (2)	V <sub>IH2</sub>	P00–P03	0.1•V <sub>SSD</sub>		V <sub>DD</sub>	V
Low level input voltage (1)	V <sub>IL1</sub>	K00–K03, K10–K13 RESET, TEST	V <sub>SSD</sub>		0.9•V <sub>SSD</sub>	V
Low level input voltage (2)	V <sub>IL2</sub>	P00–P03	V <sub>SSD</sub>		0.9•V <sub>SSD</sub>	V
High level input current (1)	I <sub>IH1</sub>	V <sub>IH1</sub> =V <sub>DD</sub> , V <sub>SSD</sub> =-3.0V Without pull down resistor	0		0.5	μA
High level input current (2)	I <sub>IH2</sub>	V <sub>IH2</sub> =V <sub>DD</sub> , V <sub>SSD</sub> =-3.0V With pull down resistor	5	10	20	μA
Low level input current	I <sub>IL</sub>	V <sub>IL</sub> =V <sub>SSD</sub> =-3.0V	-0.5		0	μA
High level output current (1)	I <sub>OH1</sub>	V <sub>OH1</sub> =0.1•V <sub>SSD</sub> , V <sub>SSD</sub> =-3.0V			-0.9	mA
High level output current (2)	I <sub>OH2</sub>	V <sub>OH2</sub> =0.1•V <sub>SSD</sub> , V <sub>SSD</sub> =-3.0V			-1.2	mA
Low level output current (1)	I <sub>OL1</sub>	V <sub>OL1</sub> =0.9•V <sub>SSD</sub> , V <sub>SSD</sub> =-3.0V	3.0			mA
Low level output current (2)	I <sub>OL2</sub>	V <sub>OL2</sub> =0.9•V <sub>SSD</sub> , V <sub>SSD</sub> =-3.0V	3.5			mA
Common output current	I <sub>OH3</sub>	V <sub>OH3</sub> =V <sub>DD</sub> -0.05V			-3.0	μA
	I <sub>OL3</sub>	V <sub>OL3</sub> =V <sub>L3</sub> +0.05V	3.0			μA
Segment output current (during LCD output)	I <sub>OH4</sub>	V <sub>OH4</sub> =V <sub>DD</sub> -0.05V			-3.0	μA
	I <sub>OL4</sub>	V <sub>OL4</sub> =V <sub>L3</sub> +0.05V	3.0			μA
Segment output current (during DC output)	I <sub>OH5</sub>	V <sub>OH5</sub> =0.1•V <sub>SSD</sub>			50	mA
	I <sub>OL5</sub>	V <sub>OL5</sub> =0.9•V <sub>SSD</sub>	-70			mA

## ● Analog Circuit Characteristics and Current Consumption

(Unless otherwise specified:  $V_{DD}/V_{DDA}=0V$ ,  $V_{SSD}/V_{SSA}=-3.0V$ ,  $f_{OSC1}=32.768kHz$ ,  $T_a=25^{\circ}C$ ,  $V_{L1}-V_{L3}$  are internal voltage)

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
LCD drive voltage	$V_{L1}$	Connect 1M $\Omega$ load resistor between $V_{DD}$ and $V_{L1}$ , $C_{L1}=0.047\mu F$	-1.15	-1.05	-0.95	V
	$V_{L2}$	Connect 1M $\Omega$ load resistor between $V_{DD}$ and $V_{L2}$ , $C_{L2}=0.047\mu F$	-2.20	-2.10	-2.00	V
	$V_{L3}$	Connect 1M $\Omega$ load resistor between $V_{DD}$ and $V_{L3}$ , $C_{L3}=0.047\mu F$	-3.25	-3.15	-3.05	V
SVD voltage	$V_{SVD}$		-2.45	-2.30	-2.15	V
SVD circuit response time	$t_{SVD}$				100	$\mu S$
Power current consumption	IOP	During SLEEP	$V_{SSD}/V_{SSA}=-3.0V$	1.5	4.0	$\mu A$
		During HALT	$V_{SSD}/V_{SSA}=-3.0V$	3.0	6.0	$\mu A$
		During A/D operation *1	$V_{SSD}/V_{SSA}=-3.0V$	0.9	2.0	mA
		During A/D operation *2	$V_{SSD}/V_{SSA}=-3.0V$	1.1	2.2	mA

\*1: DCV and DCA measurement mode

\*2: DCV and ACV measurement mode (The general AMP is ON status.)

## A/D Converter

(Unless otherwise specified:  $V_{DD}/V_{DDA}=0V$ ,  $V_{SSD}/V_{SSA}=-3.0V$ ,  $f_{OSC1}=32.768kHz$ ,  $T_a=25^{\circ}C$ ,  $V_{L1}-V_{L3}$  are internal voltage)

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
Sampling time	$S_{t1}$	A/D conversion in normal mode		100		mS
	$S_{t2}$	A/D conversion in high speed mode		10		mS
Sampling rate	$S_{r1}$	A/D conversion in normal mode		2.5		/S
	$S_{r2}$	A/D conversion in high speed mode		10		/S
Linearity error	$L_{IN}$	A/D conversion in normal mode	-0.2		0.2	%FS
Porality error	EP	A/D conversion in normal mode	-2		+2	dgt
Zero point error	$Z_{OFF}$	A/D conversion in normal mode	-2		+2	dgt
Voltage range	$V_{SSD}/V_{SSA}$	$V_{DD}=V_{DDA}=0V$	-3.5		$V_{SVD}$ *1	V

\*1:  $V_{SVD}$ : SVD judgment voltage

## Reference Voltage Generator

(Unless otherwise specified:  $V_{DD}/V_{DDA}=0V$ ,  $V_{SSD}/V_{SSA}=-3.0V$ ,  $f_{OSC1}=32.768kHz$ ,  $T_a=25^{\circ}C$ ,  $V_{L1}-V_{L3}$  are internal voltage)

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
Temperature characteristics	$V_{refT}$	0 to 40 $^{\circ}C$	-300	0	300	ppm/deg
Supply voltage characteristics	$V_{refV}$	$V_{SSA}$ ( $V_{SSD}$ )=-2.15 to -3.5V	-0.1		0.1	%
Reference voltage output	$V_{ref1}$	Short-circuit between $V_{RF1}$ and $V_{ADJ}$ terminals Voltage between $V_{RF1}$ and $V_{SSA}$ Connect 70 k $\Omega$ load resistor between $V_{RF1}$ and $V_{SSA}$	400		780	mV
Output voltage during resistance measurement	$V_{rmes}$	$V_{RF1}-V_{SSA}=1.0V$	400 $\Omega$ range	$V_{DDA}$		V
		(Output voltages are values in case of $V_{SSA}$ standard)	4k $\Omega$ range	0.7		V
		40k $\Omega$ range	0.47		V	
		400k $\Omega$ range	0.47		V	
		4M $\Omega$ range	0.47		V	
		40M $\Omega$ range	0.47		V	

## ● Oscillation Characteristics

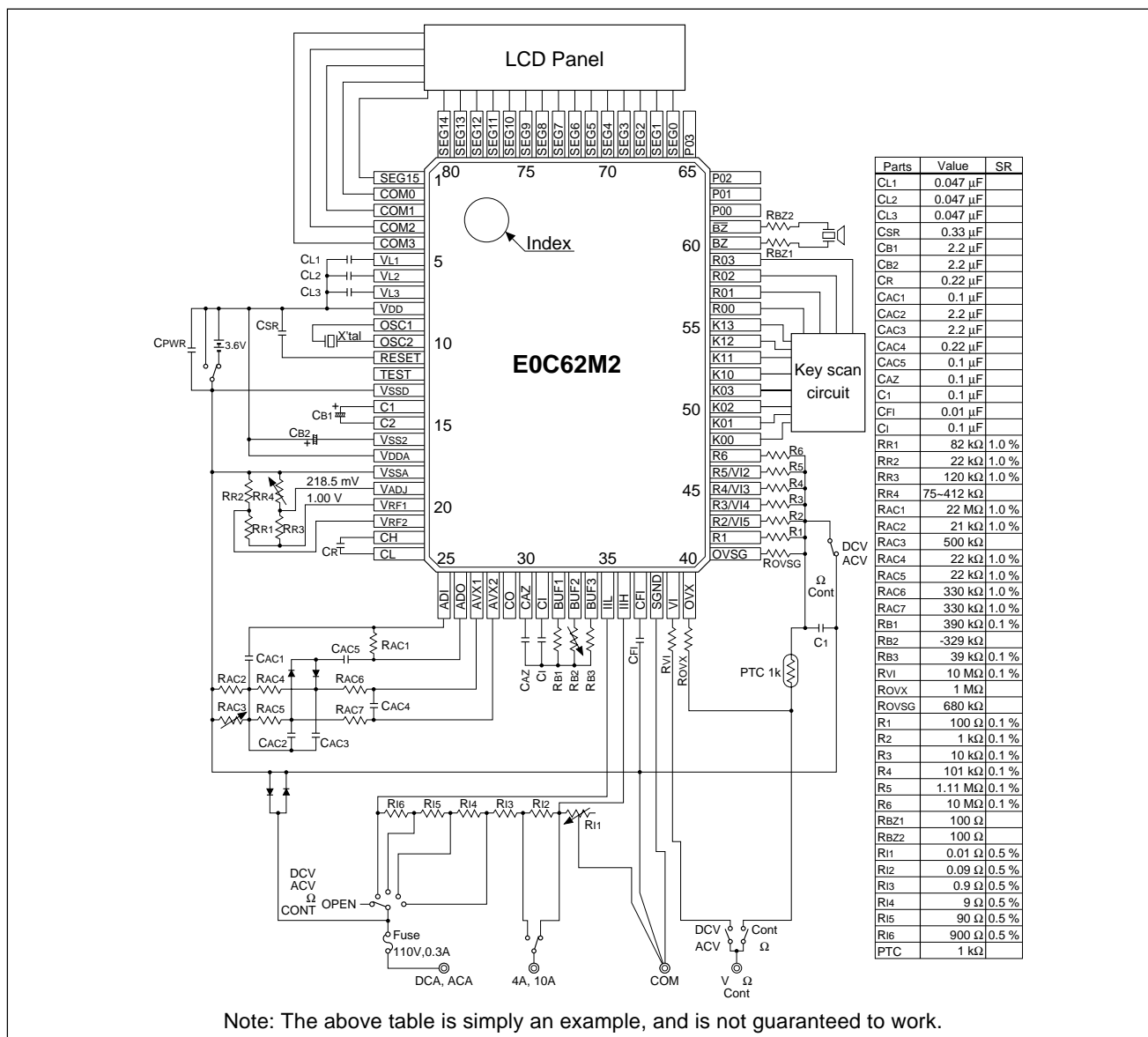
The oscillation characteristics change depending on the conditions (components used, board pattern, etc.). Use the following characteristics as reference values.

(Unless otherwise specified:  $V_{DD}/V_{DDA}=0V$ ,  $V_{SSD}/V_{SSA}=-3.0V$ , Crystal: C-002R ( $C_I=35k\Omega$ ),  $C_G=C_D$ =built-in,  $f_{OSC1}=32.768kHz$ ,  $T_a=25^{\circ}C$ )

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
Oscillation start voltage	$V_{sta}$	$t_{sta} \leq 3sec$			-2.15	V
Oscillation stop voltage	$V_{stp}$	$t_{stp} \leq 10sec$			-1.8	V
Built-in capacitance (gate)	$C_G$			20		pF
Built-in capacitance (drain)	$C_D$			15		pF
Harmonic oscillation start voltage	$V_{hho}$				-3.5	V
Permitted leak resistance	$R_{leak}$		200			M $\Omega$

# E0C62M2

## ■ BASIC EXTERNAL CONNECTION DIAGRAM



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