No.				
1	1.0	2018-08-10		YES
2	1.1	2018-10-11		YES
3	1.2	2019-03-21		YES
4	1.3	2024-07-29		YES

[1]
[2]

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“ ”

1

VK2C22A LCD ,
176 44SEGx4COM LCD
I2C
,

2

- 2.4-5.5V
- 32 kHz RC
- BIAS 1/2 1/3
- COM DUTY 1/4
- RAM 44x4
- 80Hz 160Hz
-
- I2C
- 44x4
- 3
- LCD
- 1
- VLCD LCD ≤VDD
- 16 LCD
- (POR)
-
-

LQFP52(14.0mm x 14.0mm PP=1.0mm)
DICE
COG

3

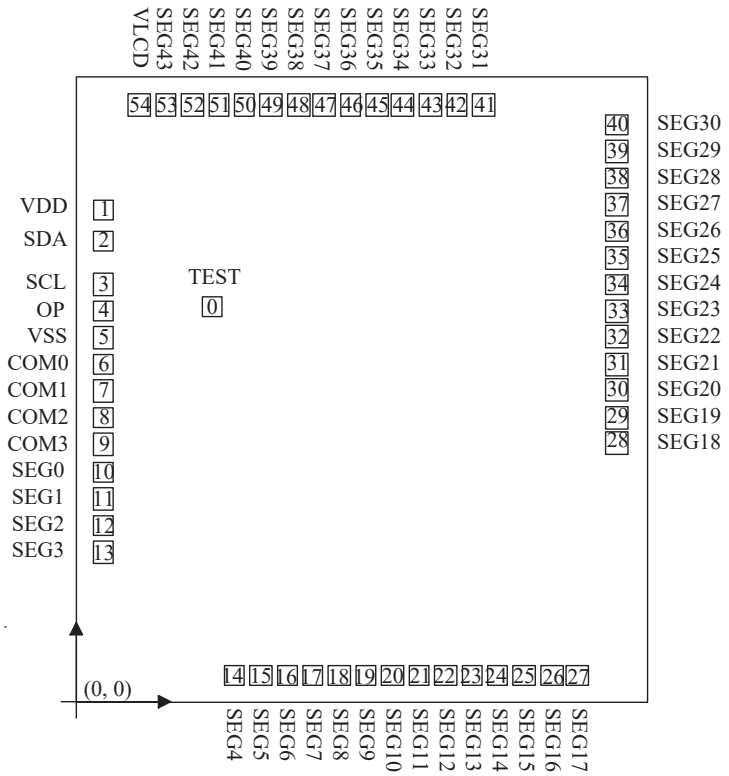
	SEG/COM				
VK2C22A	44×4	1/2 1/3	1/4	LQFP52	
VK2C22B	40×4	1/2 1/3	1/4	LQFP48	
VK2C23A	55×4 51×8	1/3 1/4	1/4 1/8	LQFP64	
VK2C23B	35×8	1/3 1/4	1/4	LQFP48	
VK2C23C	35×8	1/3 1/4	1/4	SSOP48	
VK2C24A	72×4, 68×8, 60×16	1/3 1/4 1/5	1/4 1/8 1/16	LQFP80	
VK2C24B	56×4, 52×8, 44×16	1/3 1/4 1/5	1/4 1/8 1/16	LQFP64	

4

			( )				
VK2C22A	LQFP52		1 /90	1 /900	/5400		
VK2C22B	LQFP48		1 /250	1 /2500	/15000		
VK2C23A	LQFP64		1 /250	1 /2500	/15000		
VK2C23B	LQFP48		1 /250	1 /2500	/15000		
VK2C23C	SSOP48	1 /30		1 /2400	/24000		
VK2C24A	LQFP80		1 /90	1 /900	/5400		
VK2C24B	LQFP64		1 /250	1 /2500	/15000		

5 COB

5.1 COB /PAD



1645×1610 um², 衬底电位：VSS　　OP脚：悬空或者接地

PAD　　80×80 um

（VLCD≤VDD）

(IVA)		VLCD	SEG43	
DE	VE			
0	0		Null	• VLCD　　VDD
0	1		Null	• VLCD • VLCD　　*1
1	0	Null		• VDD
1	1	Null		•

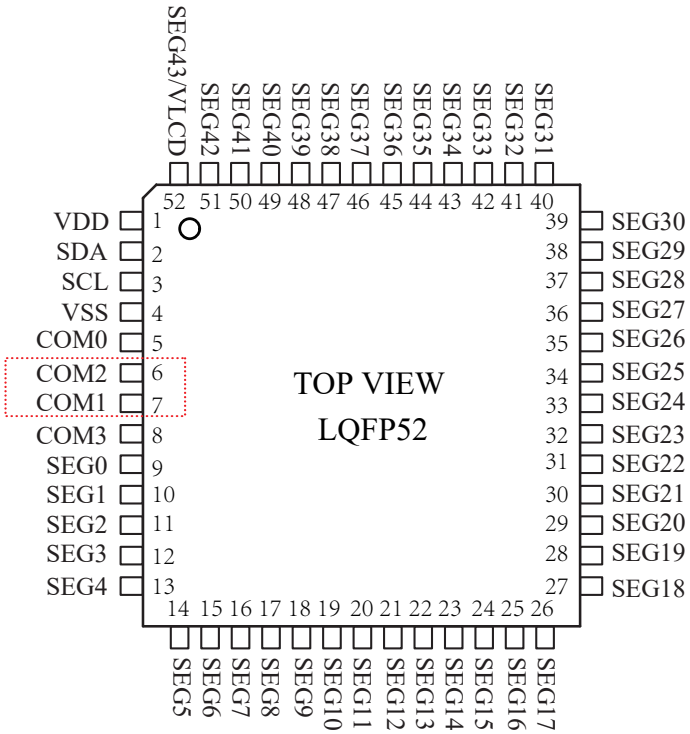
1 LCD　　VLCD

5.2 COB/PAD

μm

		X	Y			X	Y
1	VDD	93.11	1158.4	29	SEG19	1551.89	571.86
2	SDA	93.11	1073.9	30	SEG20	1551.89	656.36
3	SCL	93.11	964.42	31	SEG21	1551.89	740.86
4	OP	93.11	879.92	32	SEG22	1551.89	825.36
5	VSS	93.11	795.42	33	SEG23	1551.89	909.86
6	COM0	93.11	710.92	34	SEG24	1551.89	994.36
7	COM1	93.11	626.42	35	SEG25	1551.89	1078.86
8	COM2	93.11	541.92	36	SEG26	1551.89	1163.36
9	COM3	93.11	457.42	37	SEG27	1551.89	1247.86
10	SEG0	93.11	362.42	38	SEG28	1551.89	1332.36
11	SEG1	93.11	277.92	39	SEG29	1551.89	1416.86
12	SEG2	93.11	193.42	40	SEG30	1551.89	1501.36
13	SEG3	93.11	108.92	41	SEG31	1260.87	1516.89
14	SEG4	437.83	93.11	42	SEG32	1176.37	1516.89
15	SEG5	522.33	93.11	43	SEG33	1091.87	1516.89
16	SEG6	606.83	93.11	44	SEG34	1007.37	1516.89
17	SEG7	691.33	93.11	45	SEG35	922.87	1516.89
18	SEG8	775.83	93.11	46	SEG36	838.37	1516.89
19	SEG9	860.33	93.11	47	SEG37	753.87	1516.89
20	SEG10	944.83	93.11	48	SEG38	669.37	1516.89
21	SEG11	1029.33	93.11	49	SEG39	584.87	1516.89
22	SEG12	1113.83	93.11	50	SEG40	500.37	1516.89
23	SEG13	1198.33	93.11	51	SEG41	415.87	1516.89
24	SEG14	1282.83	93.11	52	SEG42	318.87	1516.89
25	SEG15	1367.33	93.11	53	SEG43	228.87	1516.89
26	SEG16	1451.83	93.11	54	VLCD	136.26	1516.89
27	SEG17	1536.33	93.11				
28	SEG18	1551.89	487.36	0	TEST	443.31	1079.73

6

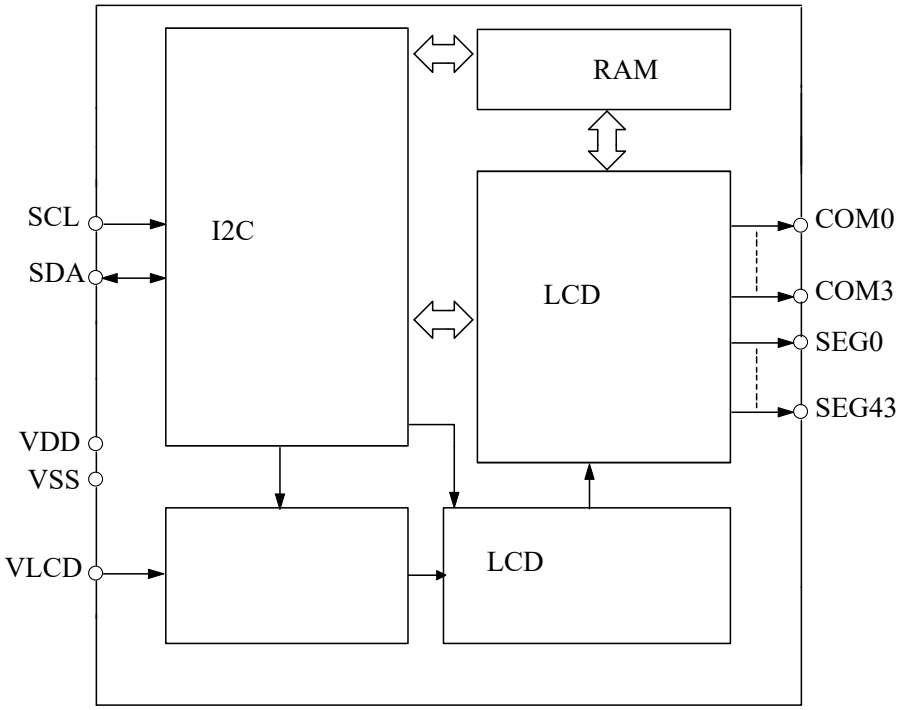

SEG43/VLCD
SEG42
SEG41
SEG40
SEG39
SEG38
SEG37
SEG36
SEG35
SEG34
SEG33
SEG32
SEG31
52 51 50 49 48 47 46 45 44 43 42 41 40
VDD 1
SDA 2
SCL 3
VSS 4
COM0 5
COM2 6
COM1 7
COM3 8
SEG0 9
SEG1 10
SEG2 11
SEG3 12
SEG4 13
39 SEG30
38 SEG29
37 SEG28
36 SEG27
35 SEG26
34 SEG25
33 SEG24
32 SEG23
31 SEG22
30 SEG21
29 SEG20
28 SEG19
27 SEG18
TOP VIEW
LQFP52
14 15 16 17 18 19 20 21 22 23 24 25 26
SEG5
SEG6
SEG7
SEG8
SEG9
SEG10
SEG11
SEG12
SEG13
SEG14
SEG15
SEG16
SEG17

6.1 VK2C22A/LQFP52

		/	
1	VDD		
2	SDA	/	I2C /
3	SCL		I2C
4	VSS		
5-8	COM0-COM3		LCD COM1 COM2
9-51	SEG4-SEG42		LCD
52	SEG43/VLCD	/	VLCD VLCD VLCD VDD VLCD VDD VLCD VLCD VLCD SEG VDD

7

7.1



7.2 RAM-

RAM 44×4 4COM 44×4 ,
RAM LCD I2C
RAM

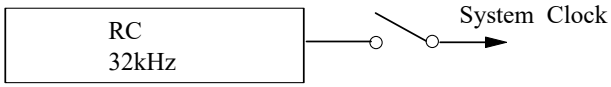
RAM LCD

	COM3	COM2	COM1	COM0		COM3	COM2	COM1	COM0	
SEG1					SEG0					0x00
SEG3					SEG2					0x01
SEG5					SEG4					0x02
SEG7					SEG6					0x03
SEG9					SEG8					0x04
SEG11					SEG10					0x05
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
SEG43					SEG42					0x15
	bit7	bit6	bit5	bit4		bit3	bit2	bit1	bit0	

44×4 RAM

7.3

VK2C22A LCD
RC 32kHz (f_{SYS}) LCD



7.4 LCD

LCD VLCD≤VDD VLCD VDD ,
16

16 4

Bias / DA3~DA0	1/2	1/3	
0x00	1.000×VDD	1.000×VDD	
0x01	0.937×VDD	0.957×VDD	
0x02	0.882×VDD	0.918×VDD	
0x03	0.833×VDD	0.882×VDD	
0x04	0.789×VDD	0.849×VDD	
0x05	0.750×VDD	0.818×VDD	
0x06	0.714×VDD	0.789×VDD	
0x07	0.682×VDD	0.763×VDD	
0x08	0.652×VDD	0.738×VDD	
0x09	0.625×VDD	0.714×VDD	
0x0A	0.600×VDD	0.692×VDD	
0x0B	0.577×VDD	0.672×VDD	
0x0C	0.556×VDD	0.652×VDD	
0x0D	0.536×VDD	0.634×VDD	
0x0E	0.517×VDD	0.616×VDD	
0x0F	0.500×VDD	0.600×VDD	

7.5

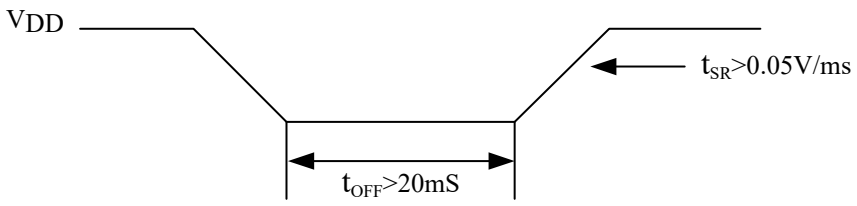
1ms I2C

- COM/SEG VDD
- 1/4 duty 1/3 bias
- LCD bias
- LCD
-
- SEG/VLCD SEG
- VLCD
- 80Hz
-

VDD

VDD 0V

20ms 0V



8 LCD

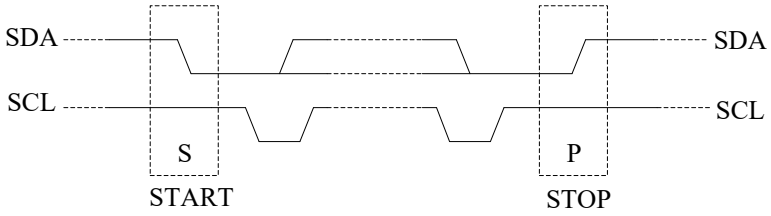
LCD 44SEG x 4COM SEG COM
80Hz 160Hz

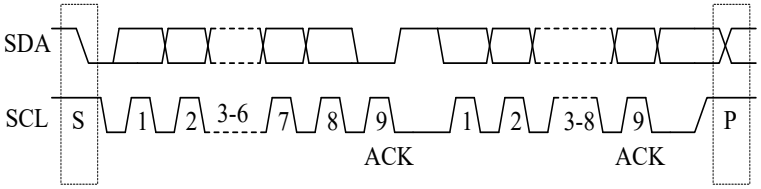
8.1 I2C

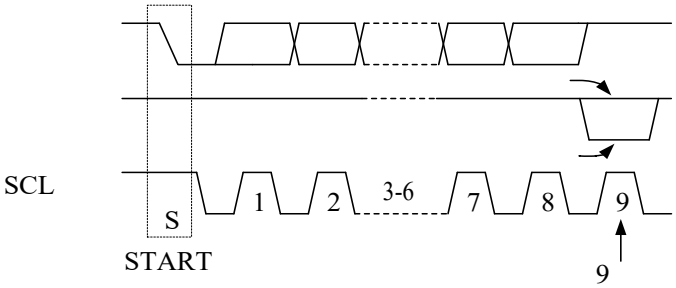
VK2C22A 2 I2C

SCL SDA / 2
VDD I2C 2

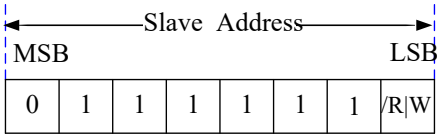
START STOP



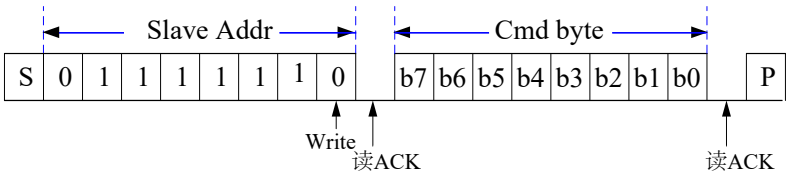




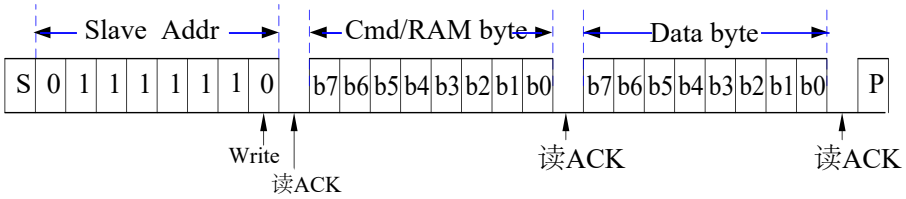
0x7e bit0-



9 I2C

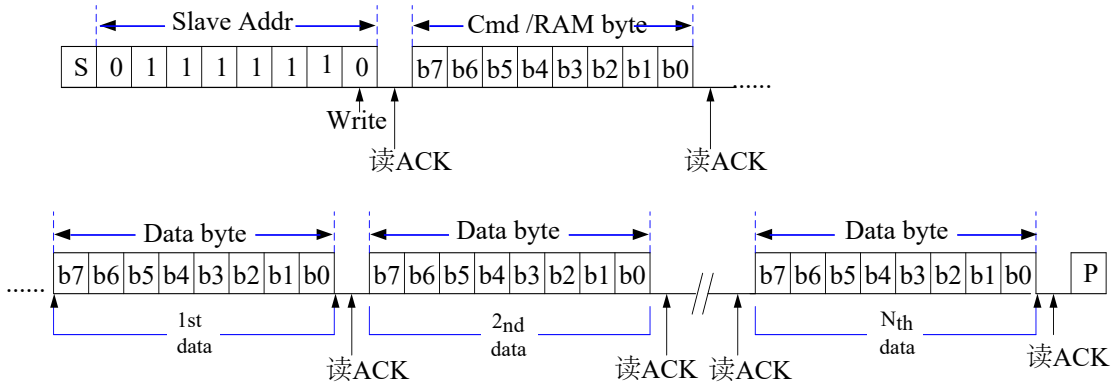


RAM

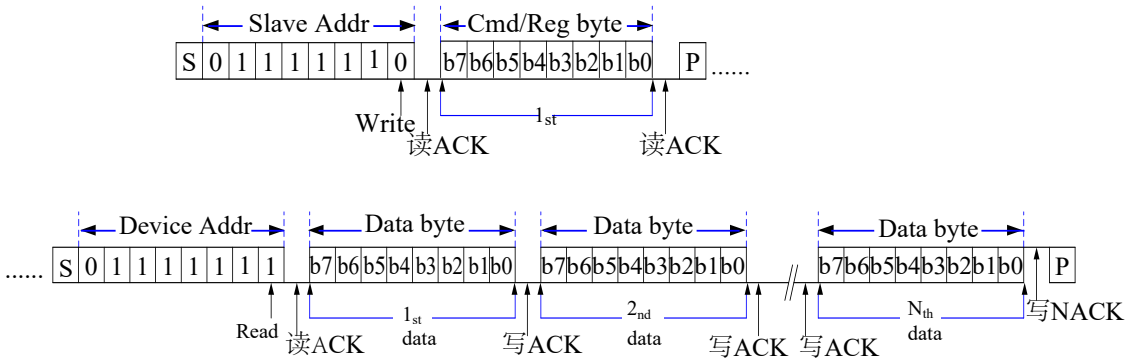


Slave

RAM

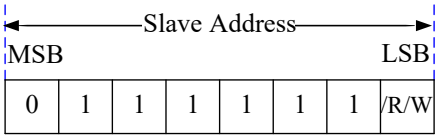


RAM



10

0x7e bit0-



10.1

RAM

		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0		R/W	Def
	1	0	0	0	A4	A3	A2	A1	A0	RAM	W	00H

10.2

DUTY

		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0		R/W	Def
Duty Bias	1	1	0	0	F	S	E	0	M0		W	80H

Bit 4	
F	
0	80Hz
1	160Hz

Bit 3	Bit 2	RC	LCD
S	E		
0	0	OFF	OFF
0	1	OFF	OFF
1	0	ON	OFF
1	1	ON	ON

Bit 0	
M0	
0	1/3 bias
1	1/2 bias

10.3

LCD

		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0		R/W	Def
	1	1	1	0	0	0	0	BK1	BK0		W	C0H

Bit 1	Bit 0	
BK1	BK0	
0	0	
0	1	2Hz
1	0	1Hz
1	1	0.5Hz

11

IVA 16 LCD

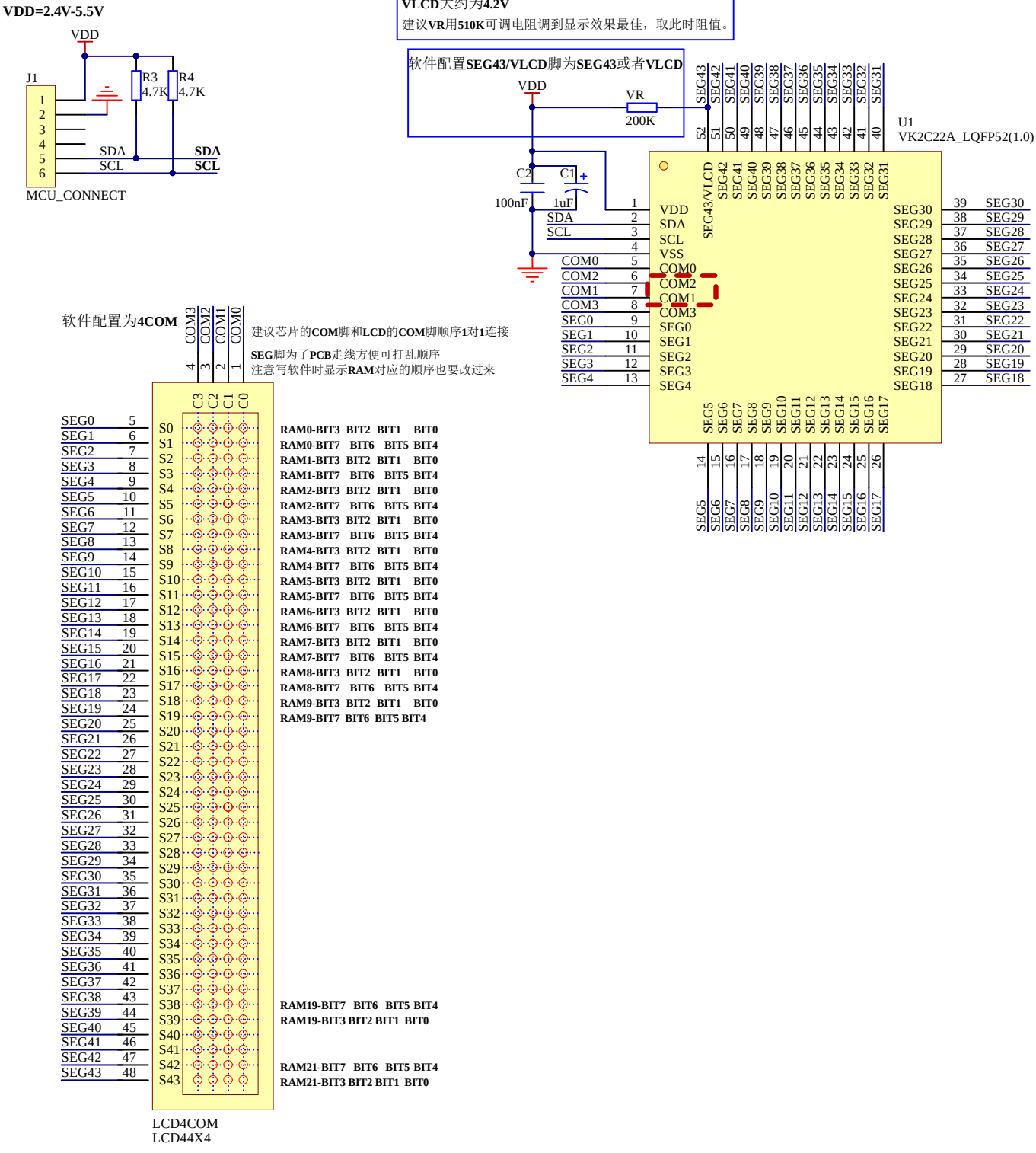
		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0		R/W	Def
IVA	1	0	1	DE	VE	DA3	DA2	DA1	DA0	SEG/VLCD DE VE DA3~DA0 VLCD	W	70H

Bit 5 DE	Bit 4 VE	SEG /VLCD		
0	0	VLCD	off	● SEG/VLCD VLCD ● ● VLCD VDD DA3~DA0 “0000” ● VLCD VDD DA3~DA0 “0000”
0	1	VLCD	on	● SEG/VLCD VLCD ● ● VLCD
1	0	SEG	off	● SEG/VLCD SEG ● ● VDD ● DA3~DA0
1	1	SEG	on	● SEG/VLCD SEG ●

- SEG/VLCD SEG
- DA0~DA3 “0000”
- DA0~DA3 “0000”

12

周围干扰比较大时可以在通讯脚上串**10R**到**1k**电阻和**pF**级对地小电容单片机**(3.3V)**和驱动芯片**(5V)**供电不一致时，通讯脚建议加电平转换电路



13

13.1

	VDD	-0.3 6.5	V
	VIN	V_{SS}-0.3 V_{DD}+0.3	V
	T_{STG}	-50 +125	℃
	T_{OTG}	-40 +85	℃

13.2

						VDD	
	VDD	2.4	—	5.5	V	—	—
	I_{DD1}	—	18	27	μA	3V	VLCD=VDD 1/3 bias 80Hz DA0~DA3="0000" LCD RC
		—	25	40		5V	
	I_{DD2}	—	2	5	μA	3V	VLCD=VDD 1/3 bias 80Hz DA0~DA3="0000" LCD RC
		—	4	10		5V	
	I_{STB}	—	—	1	μA	3V	VLCD=VDD LCD RC
		—	—	2		5V	
	V_{IL}	0	—	0.3	VDD	3V	SCL, SDA
						5V	
	V_{IH}	0.7	—	1.0	VDD	3V	SCL, SDA
						5V	
	I_{OL}	3.0	—	—	mA	3V	V_{OL}=0.4V SDA
		6.0	—	—		5V	
LCD COM	I_{OL1}	250	400	—	μA	3V	V_{OL}=0.3V
		500	800	—		5V	V_{OL}=0.5V
LCD COM	I_{OH1}	-140	-230	—	μA	3V	V_{OH}=2.7V
		-300	-500	—		5V	V_{OH}=4.5V
LCD SEG	I_{OL2}	250	400	—	μA	3V	V_{OL}=0.3V
		500	800	—		5V	V_{OL}=0.5V
LCD SEG	I_{OH2}	-140	-230	—	μA	3V	V_{OH}=2.7V
		-300	-500	—		5V	V_{OH}=4.5V

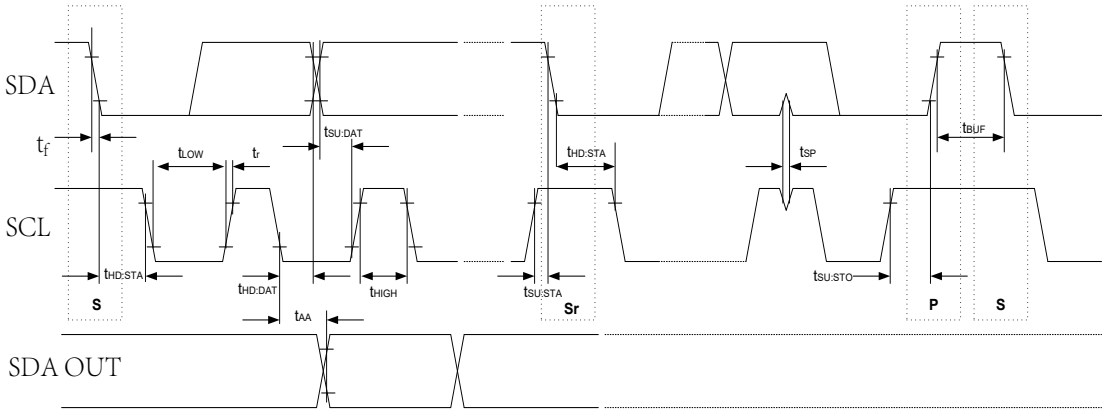
13.3

						VDD	
LCD	f_{LCD1}	72	80	88	Hz	4.0V	1/4 duty,25℃
LCD	f_{LCD2}	144	160	176	Hz	4.0V	1/4 duty,25℃
LCD	f_{LCD3}	52	80	124	Hz	4.0V	1/4 duty,-40～+85℃
LCD	f_{LCD4}	104	160	248	Hz	4.0V	1/4 duty,-40～+85℃

I2C

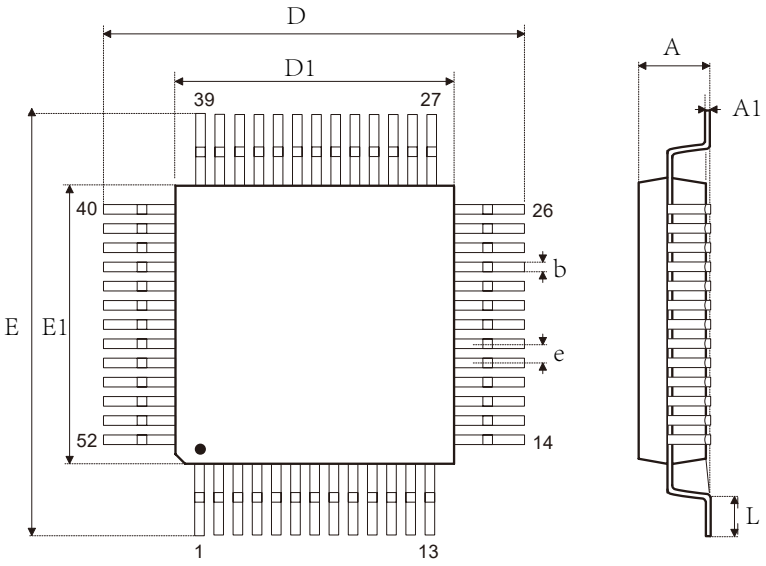
						VDD	
	f_{SCL}	—	—	400	kHz	3.0-5.5V	—
	t_{BUF}	1.3	—	—	μs	3.0-5.5V	
Start	$t_{HD: STA}$	0.6	—	—	μs	3.0-5.5V	1
SCL	t_{LOW}	1.3	—	—	μs	3.0-5.5V	—
SCL	t_{HIGH}	0.6	—	—	μs	3.0-5.5V	—
Start	$t_{SU: STA}$	0.6	—	—	μs	3.0-5.5V	START
	$t_{HD: DAT}$	0	—	—	ns	3.0-5.5V	—
	$t_{SU: DAT}$	100	—	—	ns	3.0-5.5V	—
SDA SCL	t_R	—	—	0.3	μs	3.0-5.5V	
SDA SCL	t_F	—	—	0.3	μs	3.0-5.5V	
Stop	$t_{SU: STO}$	0.6	—		μs	3.0-5.5V	—
	t_{AA}	—	—	0.9	μs	3.0-5.5V	—
(SDA SCL)	t_{SP}	—	—	50	ns	3.0-5.5V	

I²C


SDA
SCL
SDA OUT
tf
tLOW
tr
tSU:DAT
tHD:STA
tHD:DAT
tHIGH
tAA
tSU:STA
tHD:STA
tSP
tSU:STO
tBUF
S
Sr
P
S

14

14.1 LQFP52(14.0mm × 14.0mm PP=1.0mm)



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	--	--	1.60
A1	0.05	--	0.15
b	0.38	--	0.46
b1	0.37	0.40	0.43
c	0.13	--	0.17
c1	0.12	0.13	0.14
D	15.80	16.00	16.20
D1	13.90	14.00	14.10
E	15.80	16.00	16.20
E1	13.90	14.00	14.10
e	1.00BSC		
L	0.45	--	0.75
L1	1.00REF		

15

( )

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