

EXAMINED BY :	EMERGING DISPLAY TECHNOLOGIES CORPORATION	FILE NO . CAS-10304
<i>Vincent Wu</i>		ISSUE : FEB.20,2003
APPROVED BY:		TOTAL PAGE : 7
<i>MS Huang</i>		VERSION : 3

CUSTOMER ACCEPTANCE SPECIFICATIONS

MODEL NO. :

16290(WHITE LED TYPES)

FOR MESSRS :

CUSTOMER'S APPROVAL

DATE :

BY :

EMERGING DISPLAY
TECHNOLOGIES CORPORATION

MODEL NO. 16290(WHITE LED TYPES)	VERSION 3
-------------------------------------	--------------

RECORDS OF REVISION	DOC . FIRST ISSUE	OCT.29,2002
---------------------	-------------------	-------------

DATE	REVISED PAGE NO.	SUMMARY																																																																				
NOV.07,2002	3	4. ELECTRICAL CHARACTERISTICS POWER SUPPLY FOR LED B/L : IF = 40 mA → IF = 20 mA 5. OPTICAL CHARACTERISTICS THE BRIGHTNESS OF MODULE : IF = 40 mA → IF = 20 mA (5) → (2) cd/m ² , (8) → (4) cd/m ²																																																																				
FEB.20,2003	3	4. ELECTRICAL CHARACTERISTICS <table border="1"> <thead> <tr> <th>PARAMETER</th> <th>SYMBOL</th> <th>CONDITION</th> <th>MIN.</th> <th>TYP.</th> <th>MAX.</th> <th>UNIT</th> </tr> </thead> <tbody> <tr> <td>POWER SUPPLY FOR LED B/L</td> <td>VLED - VLSS</td> <td>IF = 20 mA</td> <td>—</td> <td>5</td> <td>—</td> <td>V</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>PARAMETER</th> <th>SYMBOL</th> <th>CONDITION</th> <th>MIN.</th> <th>TYP.</th> <th>MAX.</th> <th>UNIT</th> </tr> </thead> <tbody> <tr> <td>POWER SUPPLY FOR LED B/L</td> <td>VLED - VLSS</td> <td>IF = 40 mA</td> <td>—</td> <td>5</td> <td>—</td> <td>V</td> </tr> </tbody> </table> 5. OPTICAL CHARACTERISTICS <table border="1"> <thead> <tr> <th>I T E M</th> <th>SYMBOL</th> <th>CONDITION</th> <th>MIN.</th> <th>TYP.</th> <th>MAX.</th> <th>UNIT</th> <th>NOTE</th> </tr> </thead> <tbody> <tr> <td rowspan="2">THE BRIGHTNESS OF MODULE</td> <td rowspan="2">L</td> <td rowspan="2">IF = 20 mA</td> <td>(2)</td> <td>—</td> <td>—</td> <td rowspan="2">cd/m²</td> <td>1, 2</td> </tr> <tr> <td>(4)</td> <td>—</td> <td>—</td> <td>1, 3</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>I T E M</th> <th>SYMBOL</th> <th>CONDITION</th> <th>MIN.</th> <th>TYP.</th> <th>MAX.</th> <th>UNIT</th> <th>NOTE</th> </tr> </thead> <tbody> <tr> <td rowspan="2">THE BRIGHTNESS OF MODULE</td> <td rowspan="2">L</td> <td rowspan="2">IF = 40 mA</td> <td>(5)</td> <td>—</td> <td>—</td> <td rowspan="2">cd/m²</td> <td>1, 2</td> </tr> <tr> <td>(8)</td> <td>—</td> <td>—</td> <td>1, 3</td> </tr> </tbody> </table>	PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	POWER SUPPLY FOR LED B/L	VLED - VLSS	IF = 20 mA	—	5	—	V	PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	POWER SUPPLY FOR LED B/L	VLED - VLSS	IF = 40 mA	—	5	—	V	I T E M	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE	THE BRIGHTNESS OF MODULE	L	IF = 20 mA	(2)	—	—	cd/m ²	1, 2	(4)	—	—	1, 3	I T E M	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE	THE BRIGHTNESS OF MODULE	L	IF = 40 mA	(5)	—	—	cd/m ²	1, 2	(8)	—	—	1, 3
PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT																																																																
POWER SUPPLY FOR LED B/L	VLED - VLSS	IF = 20 mA	—	5	—	V																																																																
PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT																																																																
POWER SUPPLY FOR LED B/L	VLED - VLSS	IF = 40 mA	—	5	—	V																																																																
I T E M	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE																																																															
THE BRIGHTNESS OF MODULE	L	IF = 20 mA	(2)	—	—	cd/m ²	1, 2																																																															
			(4)	—	—		1, 3																																																															
I T E M	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE																																																															
THE BRIGHTNESS OF MODULE	L	IF = 40 mA	(5)	—	—	cd/m ²	1, 2																																																															
			(8)	—	—		1, 3																																																															

NUMBERING SYSTEM

Polarizer Mode	Backlight	Code value
Transflective	LED	L
Transmissive	LED	M

E W 1 6 2 9 0 Y L W

LCD type + LCD color	Code Value
STN + Yellow-Green	Y
STN + Gray	G
STN + Blue	B

TABLE OF CONTENTS

NO.	ITEM	PAGE
1.	GENERAL SPECIFICATIONS -----	1
2.	MECHANICAL SPECIFICATIONS -----	1
3.	ABSOLUTE MAXIMUM RATINGS -----	2
4.	ELECTRICAL CHARACTERISTICS -----	3
5.	OPTICAL CHARACTERISTICS -----	3
6.	OUTLINE DIMENSION -----	4
7.	DETAIL DRAWING OF DOT MATRIX -----	5
8.	BLOCK DIAGRAM -----	5
9.	INTERFACE SIGNALS -----	6
10.	POWER SUPPLY -----	7
11.	DISPLAY DATA RAM ADDRESS -----	7

1. GENERAL SPECIFICATIONS

1.1 GENERAL SPECIFICATIONS

PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :

E U - 0 0 2 A

1.2 APPLICATION NOTES FOR CONTROLLER / DRIVER : KS0066

PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :

E U - K S 0 0 6 6

1.3 THIS INDIVIDUAL SPECIFICATIONS IS PRIOR TO GENERAL SPECIFICATIONS .

2. MECHANICAL SPECIFICATIONS

- (1) NUMBER OF CHARACTER ----- 16 CH * 2 LINES
- (2) MODULE SIZE ----- 122.0W * 44.0H * 11.5D (max.) mm
- (3) EFFECTIVE AREA ----- 99.0W * 24.0H mm
- (4) CHARACTER FONT ----- 5 * 7 DOTS + CURSOR
- (5) CHARACTER SIZE ----- 4.84W * 9.66H mm
- (6) CHARACTER PITCH ----- 6.0W * 10.34H mm
- (7) DOT SIZE ----- 0.92W * 1.10H mm
- (8) DOT PITCH ----- 0.98W * 1.16H mm
- (9) LCD TYPE *
- (10) DRIVING METHOD ----- 1 / 16 DUTY MULTIPLEX DRIVE
- (11) VIEWING DIRECTION ----- 6 O'CLOCK
- (12) BACK - LIGHT ----- LED , COLOR : WHITE

* PLEASE REFER TO NUMBERING SYSTEM

3. ABSOLUTE MAXIMUM RATINGS

3.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS . (AT Ta = 25 °C)

PARAMETER	SYMBOL	MIN .	MAX .	UNIT	REMARK
POWER SUPPLY FOR LOGIC	VDD - VSS	0	7.0	V	
POWER SUPPLY FOR LCD DRIVE	VDD - VO	0	13.0	V	
INPUT VOLTAGE	VI	VSS	VDD	V	
STATIC ELECTRICITY	—	—	100	V	NOTE (1)
POWER SUPPLY FOR LED B/L	VLED-VLSS	—	5	V	

NOTE (1) : TEST METHOD AND CONDITIONS :
AFTER CHARGING UP 200 PF CAPACITOR BY STATED VOLTAGE ,
THE CAPACITOR IS CONNECTED WITH INTERFACE PINS OF THE
MODULE .

3.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS .

I T E M	OPERATING		STORAGE		REMARK
	MIN .	MAX .	MIN .	MAX .	
AMBIENT TEMPERATURE	-20 °C	70 °C	-30 °C	80 °C	NOTE (2) , (3)
HUMIDITY	—	90 % RH	—	90 % RH	WITHOUT CONDENSATION
VIBRATION	—	4.9 m/s ² (0.5 G)	—	19.6 m/s ² (2 G)	
SHOCK	—	29.4 m/s ² (3 G)	—	490.0 m/s ² (50 G)	XYZ DIRECTIONS
CORROSIVE GAS	NOT ACCEPTABLE		NOT ACCEPTABLE		

NOTE (2) : Ta AT -20°C (-30°C FOR W.T.) : 48HR MAX .

70°C (80°C FOR W.T.) : 168HR MAX .

NOTE (3) : BACKGROUND COLOR CHANGES SLIGHTLY DEPENDING ON AMBIENT
TEMPERATURE THIS PHENOMENON IS REVERSIBLE .

4. ELECTRICAL CHARACTERISTICS

Ta = 25 °C

VDD = 5.0V ± 0.25 V

PARAMETER	SYMBOL	CONDITION	MIN .	TYP .	MAX .	UNIT
H LEVEL INPUT VOLTAGE	VIH	—	2.2	—	—	V
L LEVEL INPUT VOLTAGE	VIL	—	—	—	0.6	V
H LEVEL OUTPUT VOLTAGE	VOH	-IOH = 0.2 mA	2.4	—	—	V
L LEVEL OUTPUT VOLTAGE	VOL	IOL = 1.2 mA	—	—	0.4	V
POWER SUPPLY CURRENT (LOGIC)	IDD	VDD = 5.0 V	—	2.0	5.0	mA
RECOMMENDED LCD DRIVING VOLTAGE	VDD - VO θ = 0° Ø = 10° DUTY = 1/16	Ta = -20 °C	4.1	4.4	4.7	V
		Ta = 25 °C	4.1	4.4	4.7	V
		Ta = 70 °C	4.1	4.4	4.7	V
CLOCK OSCILLATION FREQUENCY	FOSC	Ta = 25 °C	—	270	—	KHZ
POWER SUPPLY FOR LED B/L	VLED - VLSS	IF = 40 mA	—	5	—	V

5. OPTICAL CHARACTERISTICS .

Ta = 25 °C

VDD = 5.0 V

I T E M	SYMBOL	CONDITION	MIN .	TYP .	MAX .	UNIT	NOTE	
VIEWING AREA	Ø 2 - Ø 1	K ≥ 1.4	30	—	—	deg.	1	
CONTRAST RATIO	K	Ø = 10° θ = 0°	5	—	—		1	
RESPONSE TIME	tr (rise)	Ø = 10° θ = 0°	Ta = -20°C	—	1790	—	ms	1
			Ta = 25°C	—	110	—		
			Ta = 70°C	—	50	—		
	tf (fall)		Ta = -20°C	—	1770	—		
			Ta = 25°C	—	100	—		
			Ta = 70°C	—	40	—		
THE BRIGHTNESS OF MODULE	L	IF = 40 mA	(5)	—	—	cd/m ²	1, 2	
			(8)	—	—		1, 3	

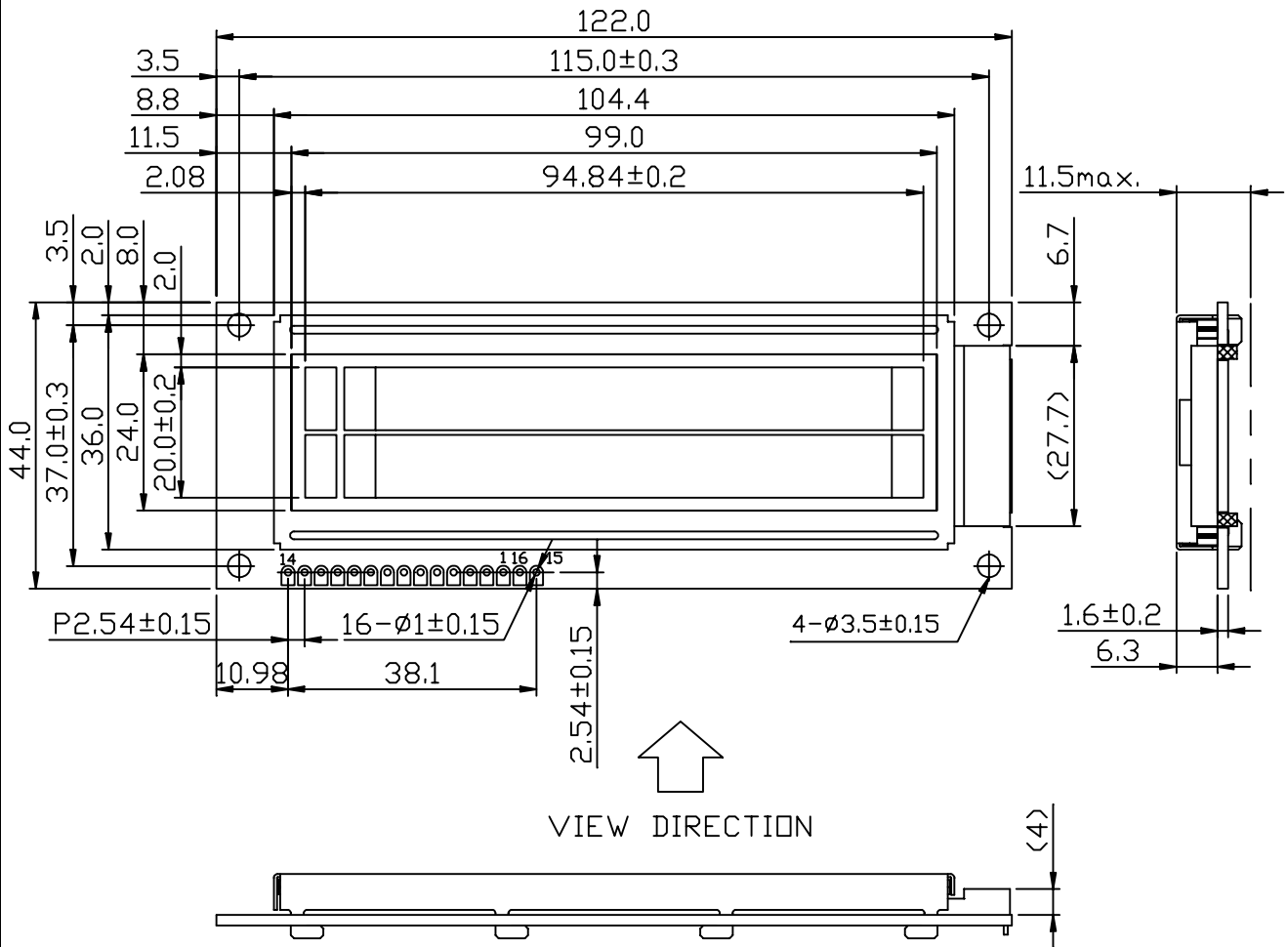
NOTE (1) : PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATION : EU-002A

NOTE (2) : POLARIZER MODE : TRANSFLECTIVE

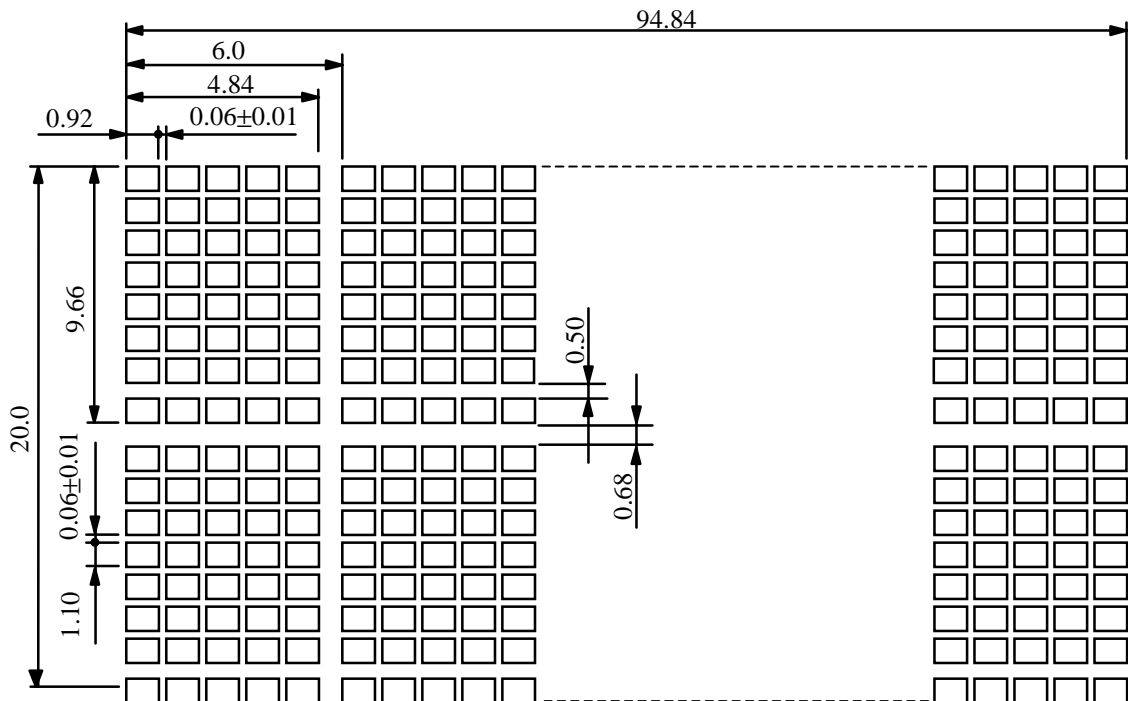
NOTE (3) : POLARIZER MODE : TRANSMISSIVE

6. OUTLINE DIMENSION



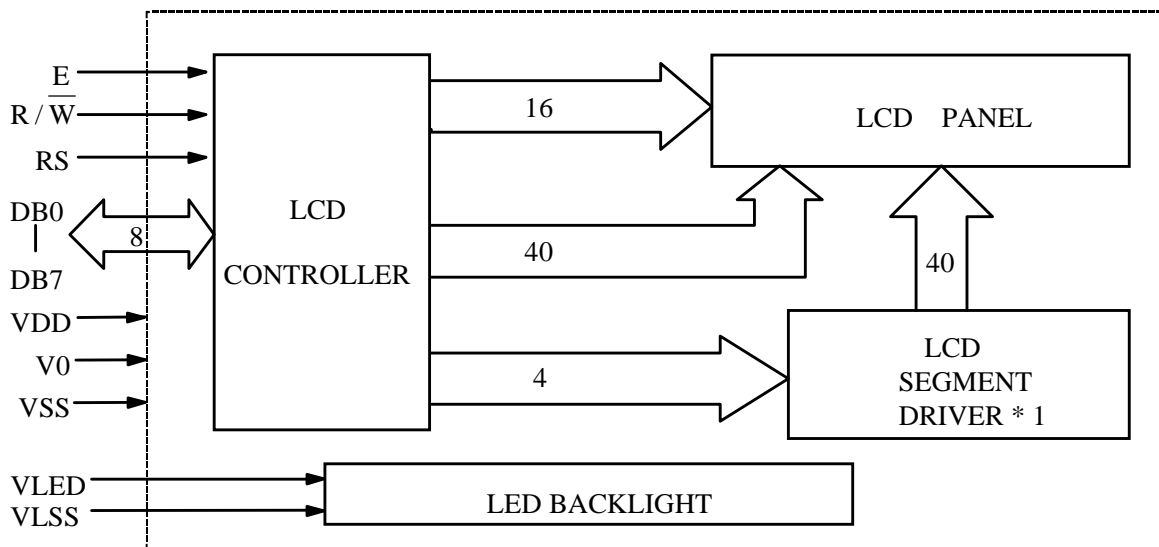
UNIT : mm
SCALE : NTS
NOT SPECIFIED TOLERANCE IS ± 0.5mm

7. DETAIL DRAWING OF DOT MATRIX



UNIT : mm
SCALE : NTS
NOT SPECIFIED TOLERANCE IS ±0.1

8. BLOCK DIAGRAM

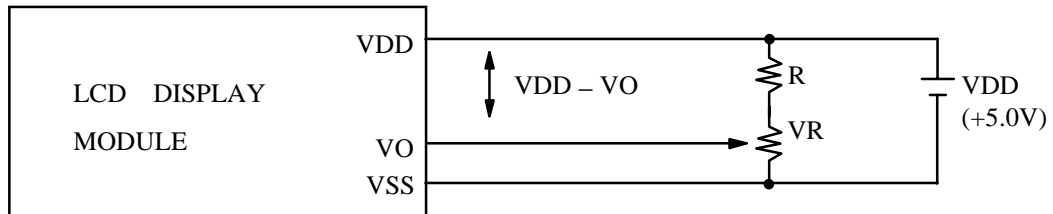


9. INTERFACE SIGNALS

PIN NO.	SYMBOL	DESCRIPTION	FUNCTION
1	VSS	GROUND	0V (GND)
2	VDD	POWER SUPPLY FOR LOGIC CIRCUIT	+5V
3	VO	LCD CONTRAST ADJUSTMENT	
4	RS	INSTRUCTION/DATA REGISTER SELECTION	RS = 0 : INSTRUCTION REGISTER RS = 1 : DATA REGISTER
5	R / \overline{W}	READ/WRITE SELECTION	R / \overline{W} = 0 : REGISTER WRITE R / \overline{W} = 1 : REGISTER READ
6	E	ENABLE INPUT	
7	DB0	DATA INPUT/OUTPUT LINES	4 BIT/8BIT SELECTABLE 4 BIT : DB4 - DB7 8 BIT : DB0 - DB7
8	DB1		
9	DB2		
10	DB3		
11	DB4		
12	DB5		
13	DB6		
14	DB7		
15	VLED	POWER SUPPLY FOR LED BACKLIGHT (ANODE)	
16	VLSS	POWER SUPPLY FOR LED BACKLIGHT (CATHODE)	0V (GND)

10. POWER SUPPLY

10.1 POWER SUPPLY FOR LCD MODULE

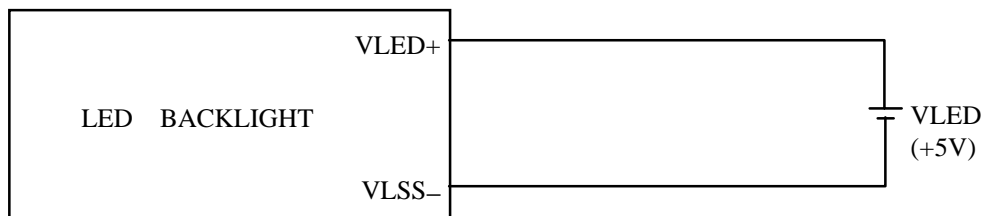


VDD - VO: LCD DRIVING VOLTAGE

VR : 10K Ω ~ 20K Ω

RECOMMENDED RESISTOR R : VDD - VO \geq 1.5 V

10.2 POWER SUPPLY FOR LED BACK-LIGHT



11. DISPLAY DATA RAM ADDRESS

CHARACTER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
LINE 1	80	81	82	83	84	85	86	87	88	89	8A	8B	8C	8D	8E	8F
LINE 2	C0	C1	C2	C3	C4	C5	C6	C7	C8	C9	CA	CB	CC	CD	CE	CF