



ABCEDEFGHIJKLMNOP
abcdeefghijklmnop

This image shows a yellow LCD module with a green PCB. The top edge features a row of gold pins. The text is displayed in a pixelated font. A red circle highlights the top edge of the module.



ABCEDEFGHIJKLMNOP
UWVXYZ0123456789

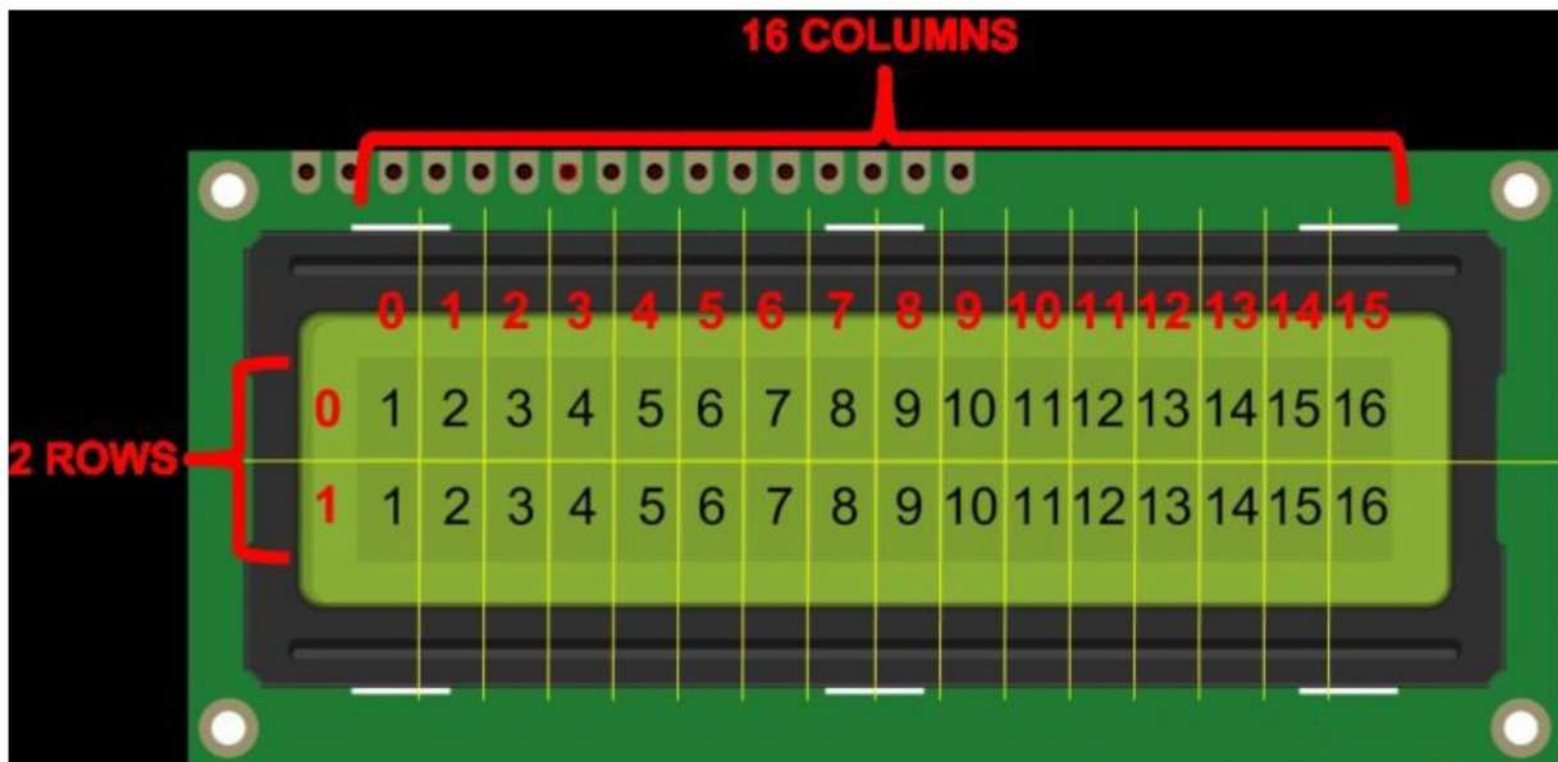
This image shows a blue LCD module with a green PCB. The top edge features a row of gold pins. The text is displayed in a pixelated font. A red circle highlights the top edge of the module.



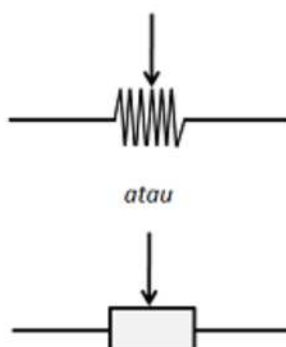
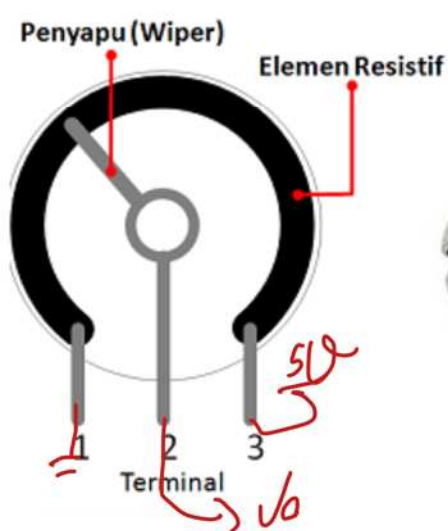
5MM CHARACTERS
2X16 MIDAS LCDs

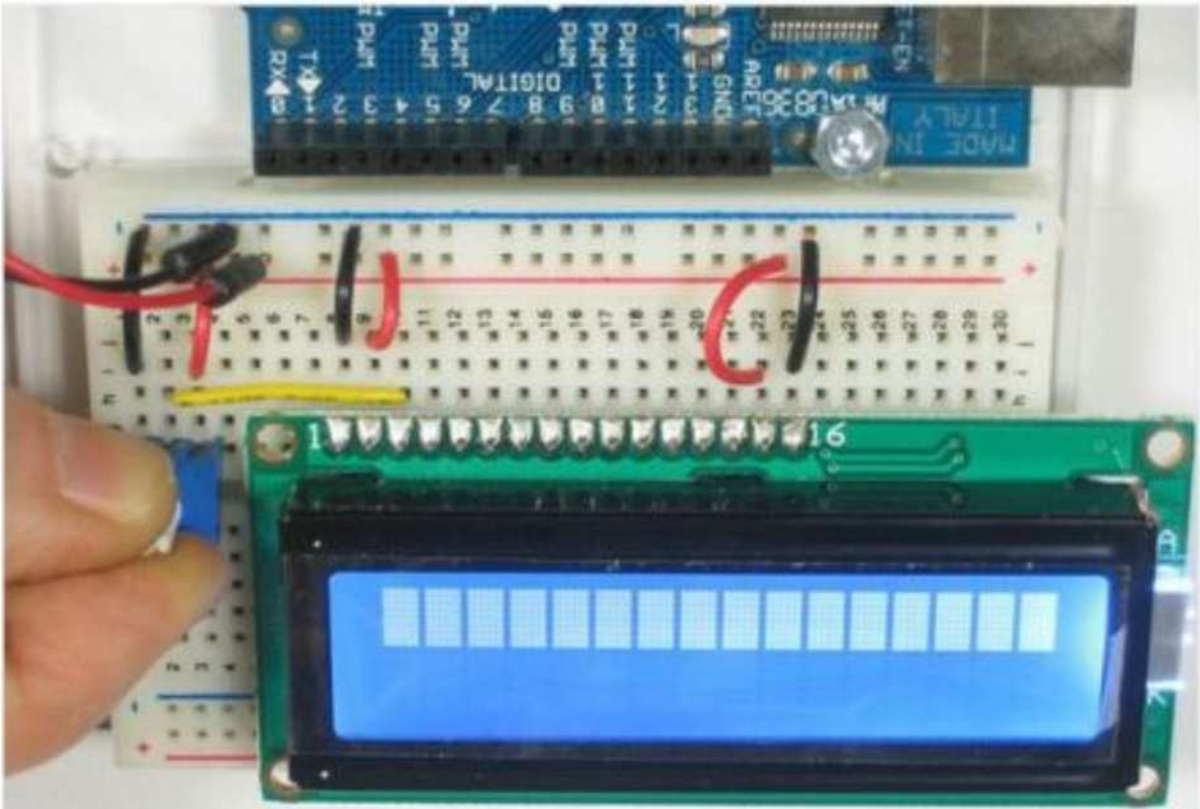
This image shows a blue LCD module with a green PCB. The top edge features a row of gold pins. The text is displayed in a pixelated font. A red circle highlights the top edge of the module.





No	Symbol	Function
1	VSS	Ground
2	VDD	5V +
3	V0	Contrast
4	RS	Register
5	RW	Read/Write
6	E	Enable
7	D0	Data bus
8	D1	Data bus
9	D2	Data bus
10	D3	Data bus
11	D4	Data bus
12	D5	Data bus
13	D6	Data bus
14	D7	Data bus
15	A	Anode (5V+)
16	K	Cathode (GND)

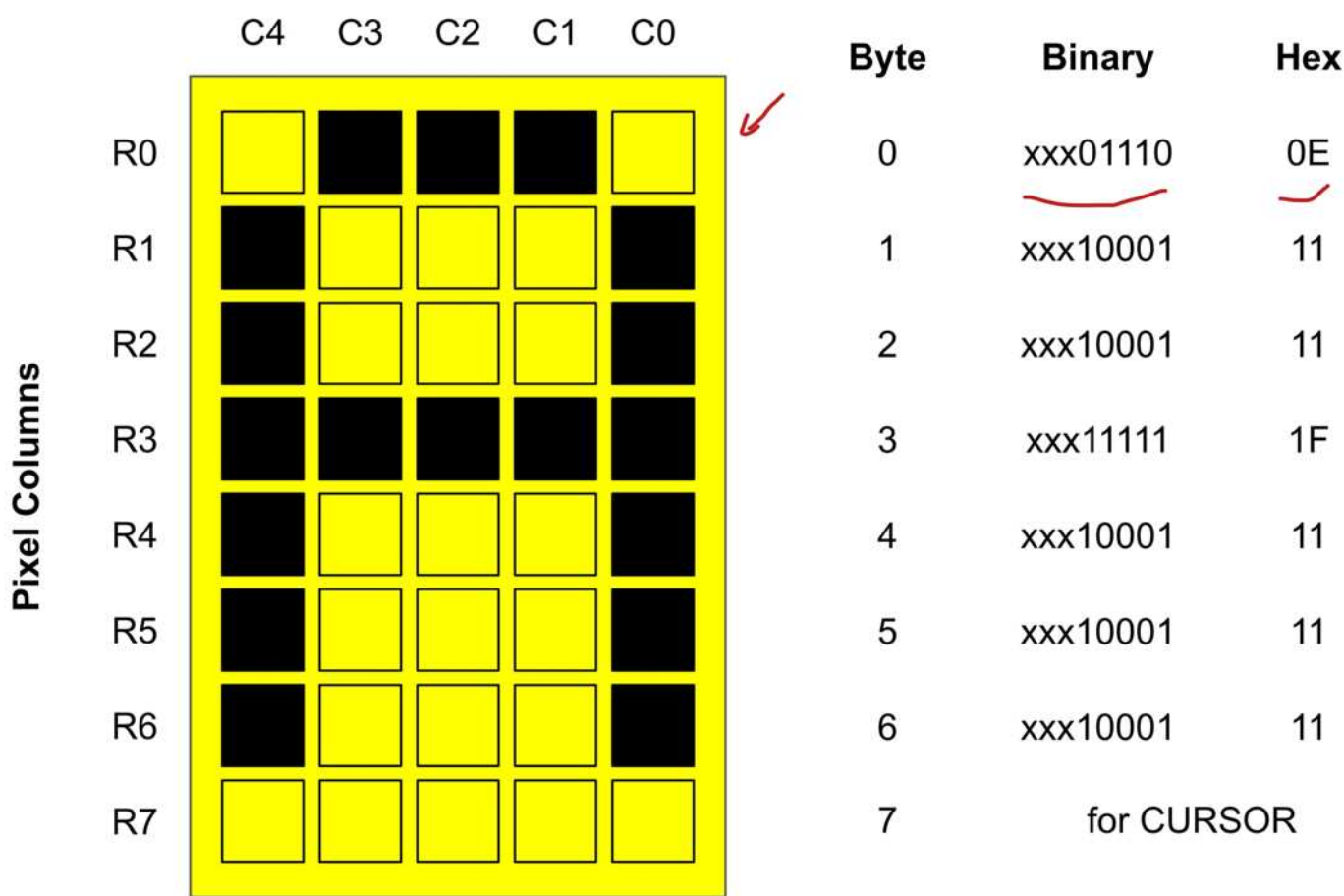






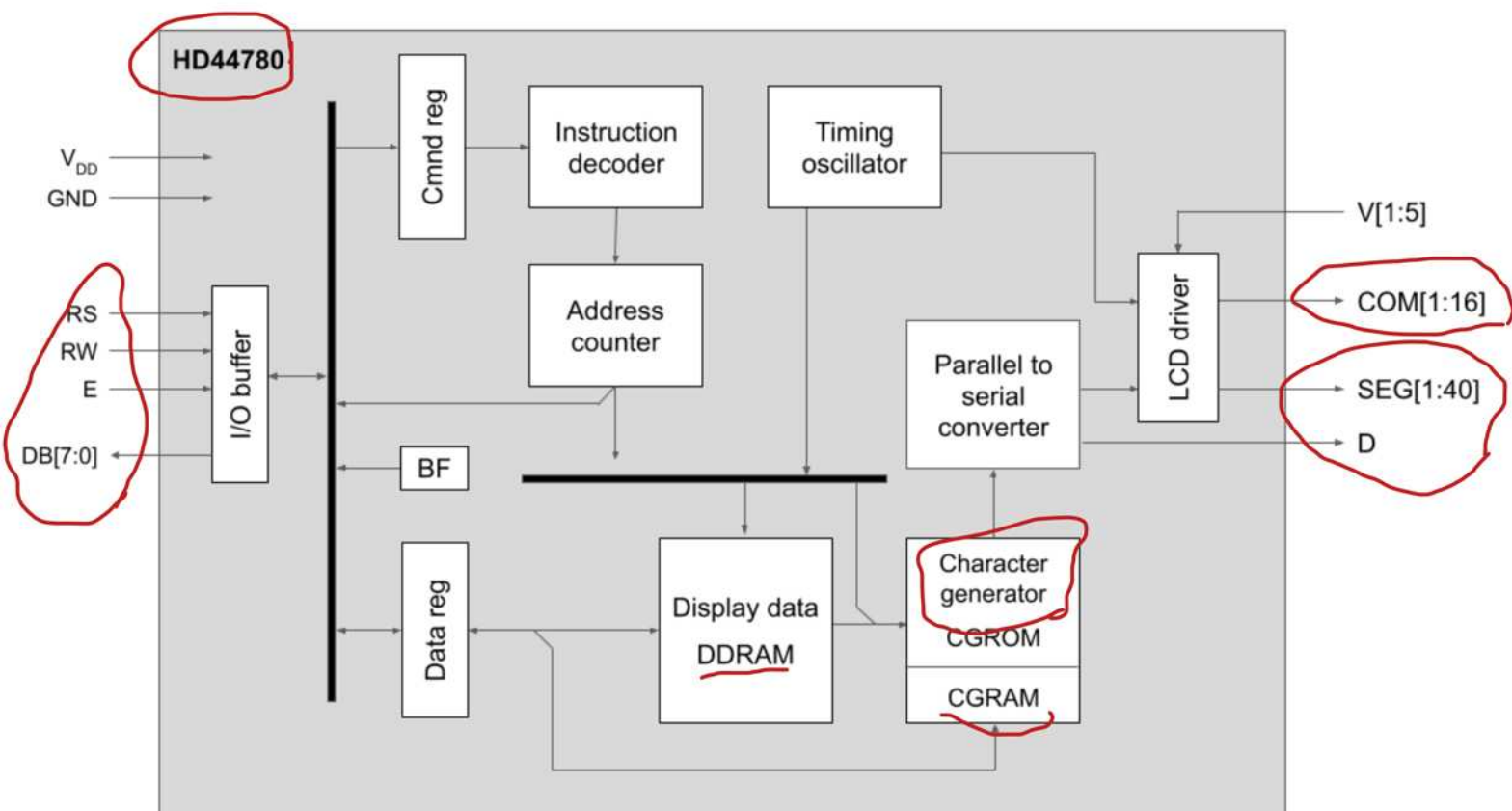
$2 \times 16 \times 5 \times 8$





Pixel Rows

CGROM Address



0x41

Upper 4 Bits Lower 4 Bits	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
xxxx0000	CG RAM (1)			0	1	P	`	P				-	9	3	α	p
xxxx0001	(2)		!	1	A	Q	a	9			。	ア	チ	△	ä	q
xxxx0010	(3)		"	2	B	R	b	r			「	イ	ツ	×	β	θ
xxxx0011	(4)		#	3	C	S	c	s			」	ウ	テ	モ	ε	∞
xxxx0100	(5)		\$	4	D	T	d	t			、	エ	ト	ト	μ	Ω
xxxx0101	(6)		%	5	E	U	e	u			・	オ	ナ	1	ε	Ü
xxxx0110	(7)		&	6	F	V	f	v			ヲ	カ	ニ	ヨ	ρ	Σ
xxxx0111	(8)		'	7	G	W	g	w			ア	キ	ヌ	ラ	g	π
xxxx1000	(1)		(	8	H	X	h	x			イ	ク	ネ	リ	γ	×
xxxx1001	(2)		)	9	I	Y	i	y			ウ	ケ	ル	ル	ˆ	υ
xxxx1010	(3)		*	:	J	Z	j	z			エ	コ	ン	レ	j	≠
xxxx1011	(4)		+	;	K	[	k	{			オ	サ	ヒ	ロ	*	π
xxxx1100	(5)		,	<	L	¥	l	l			ヤ	シ	フ	ワ	Φ	円
xxxx1101	(6)		-	=	M	]	m	}			ユ	ズ	ハ	ン	も	÷
xxxx1110	(7)		.	>	N	^	n	÷			ヨ	セ	ホ	”	ん	
xxxx1111	(8)		/	?	O	_	o	+			ッ	リ	マ	”	ö	■

Display position 0x41 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

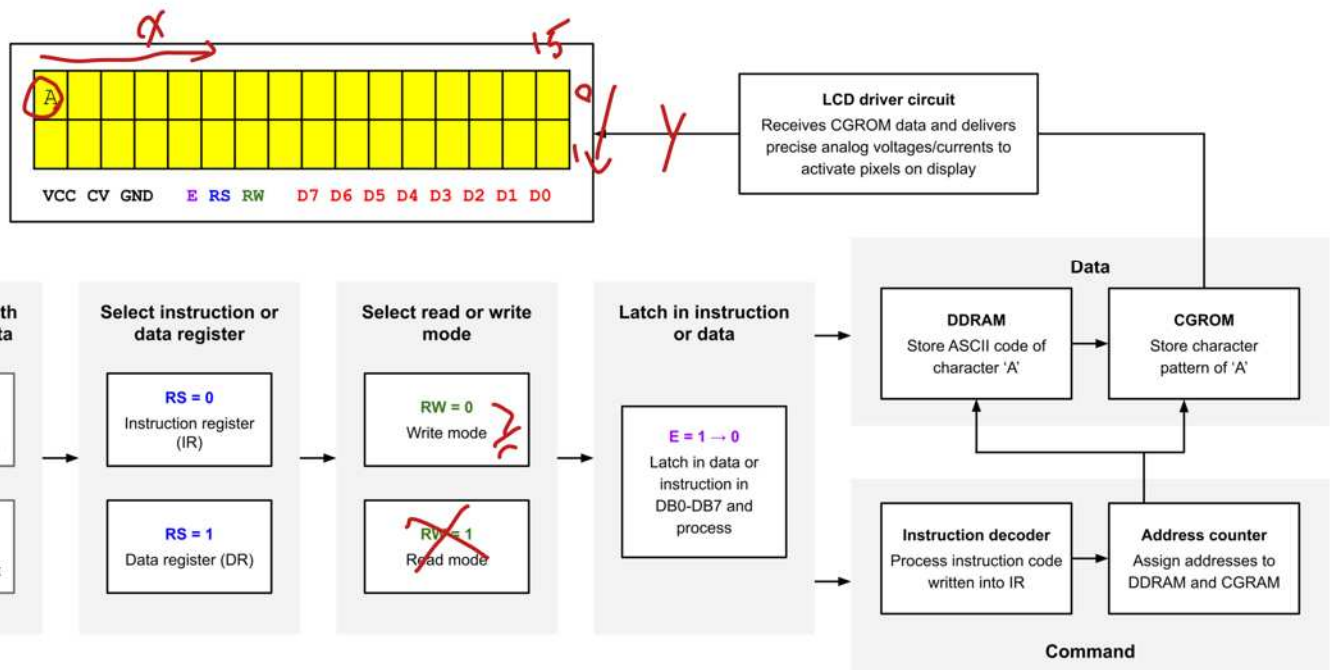
DDRAM address

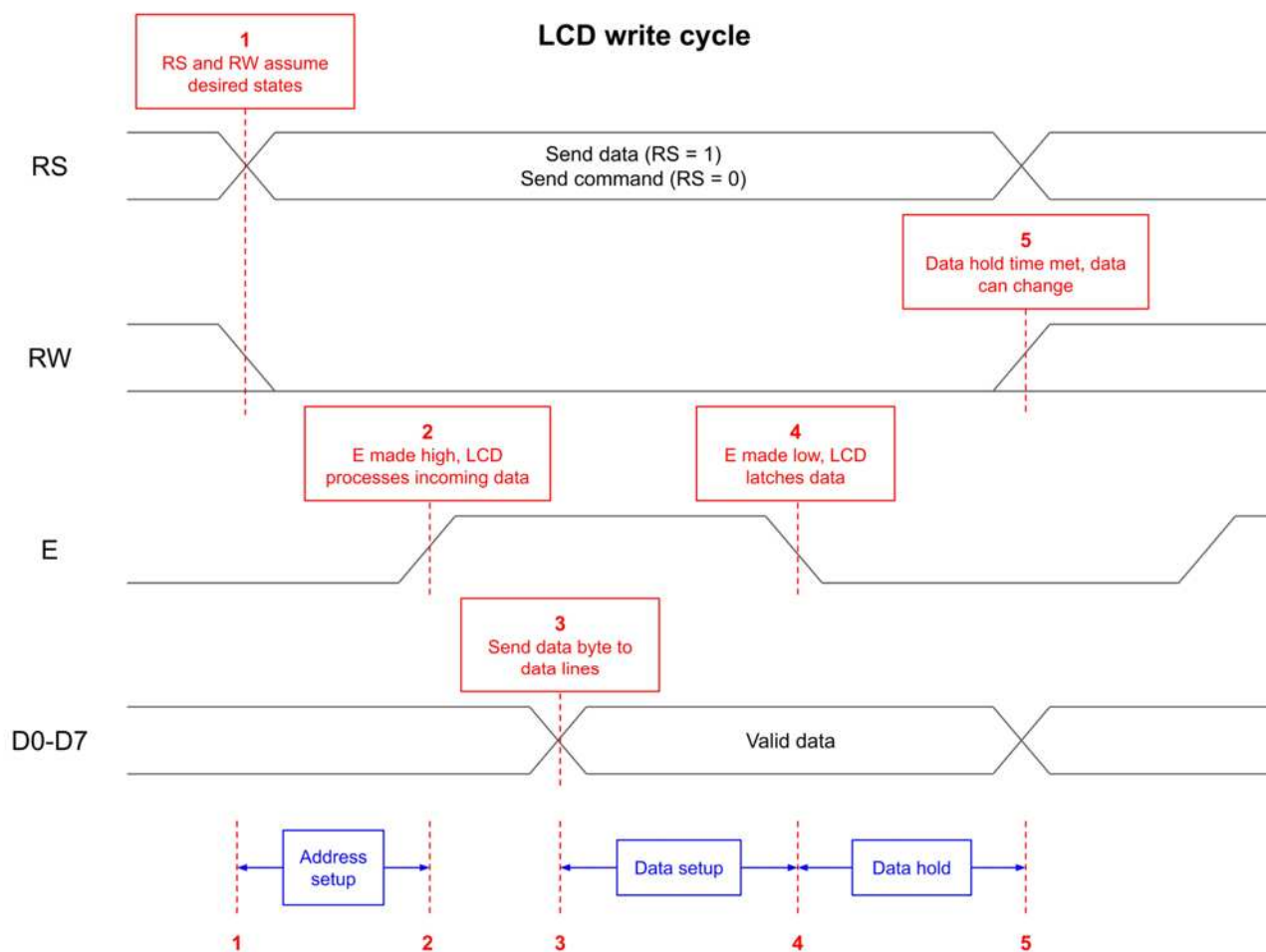
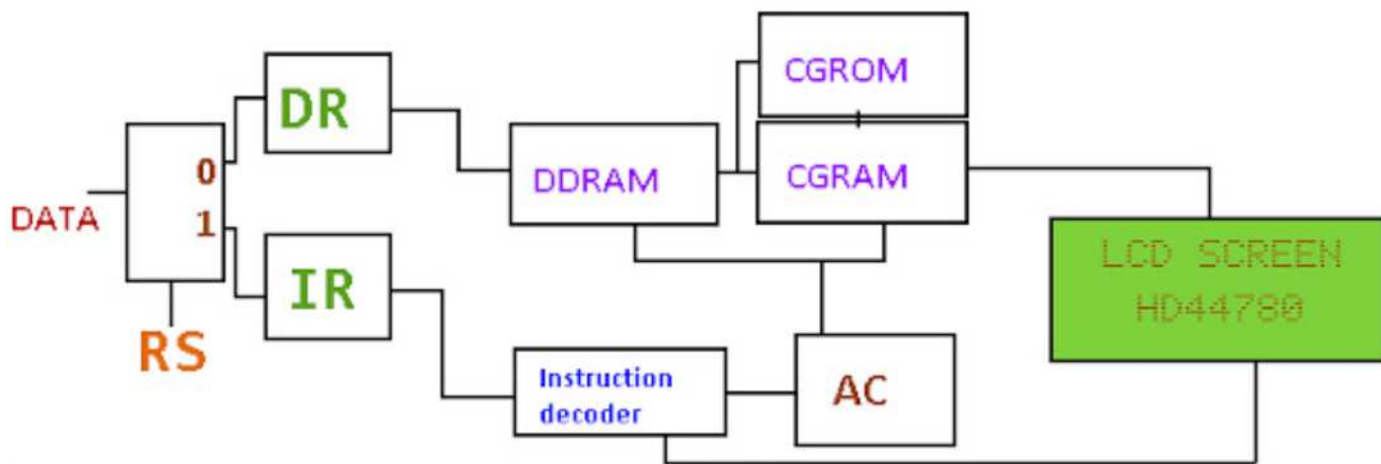
00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F

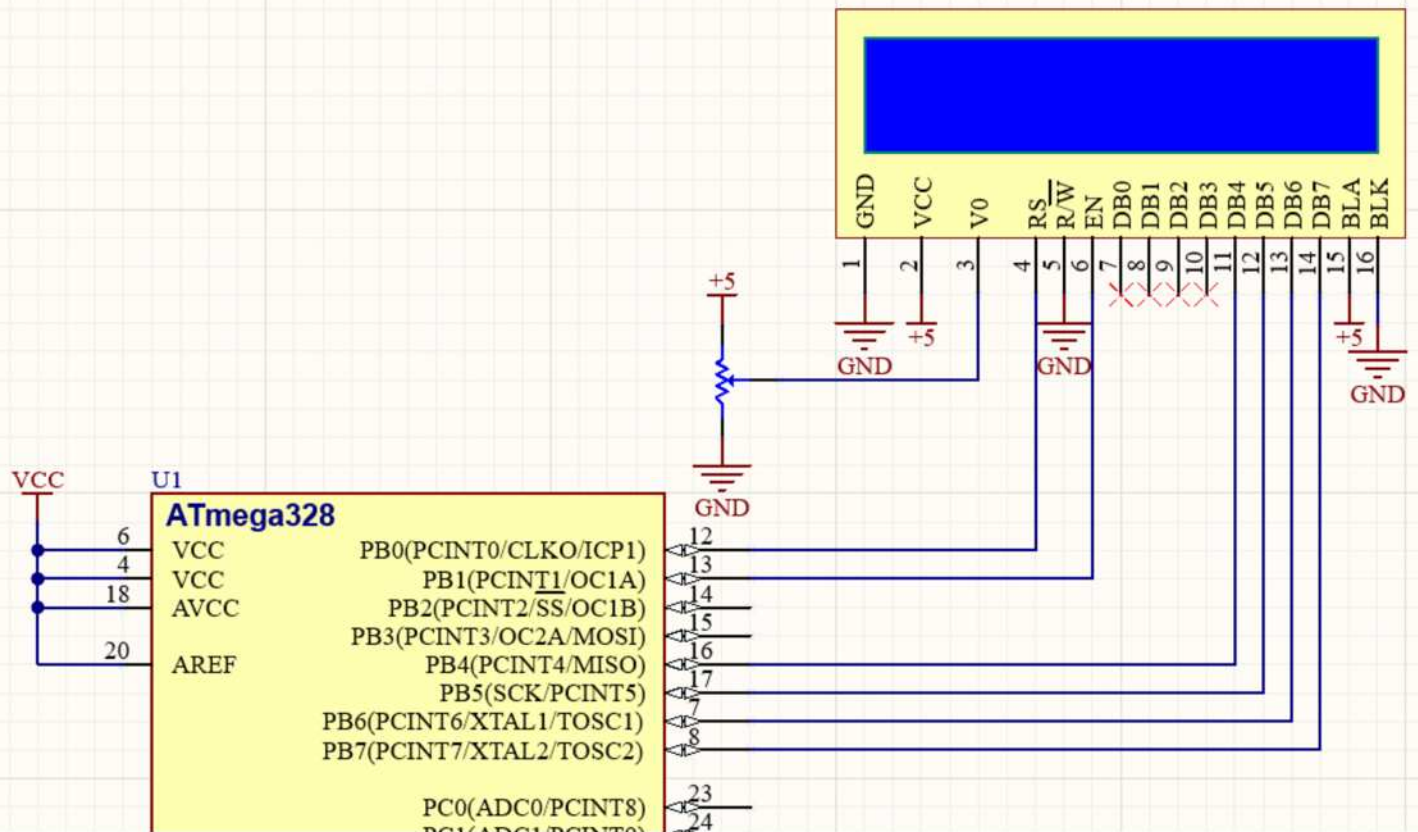
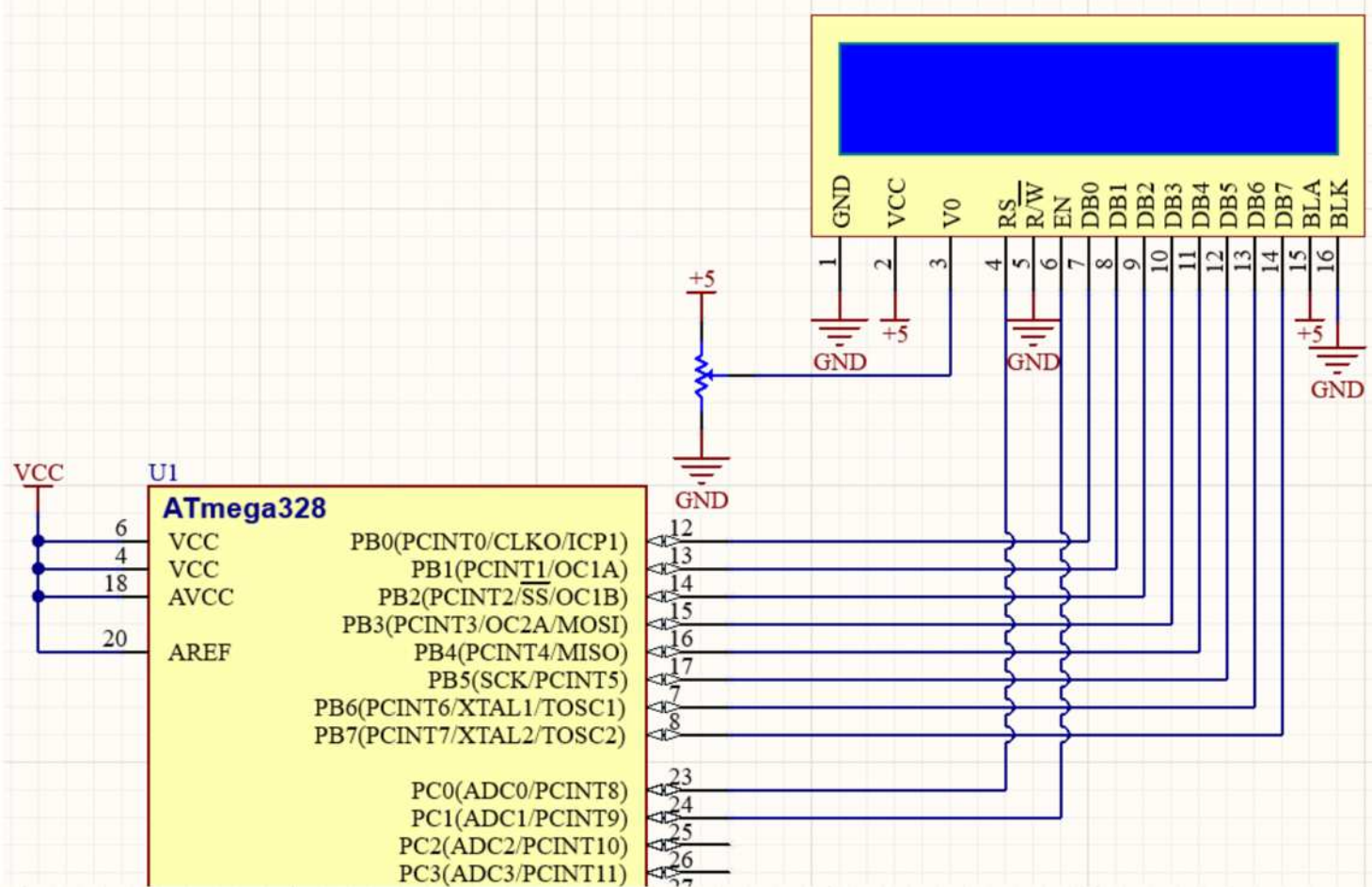
}2

COMMAND	COMMAND CODE										COMMAND CODE
	RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	
SCREEN CLEAR	0	0	0	0	0	0	0	0	0	1	Screen Clear, Set AC to 0 Cursor Reposition
CURSOR RETURN	0	0	0	0	0	0	0	0	1	*	DDRAM AD=0, Return, Content Changeless
INPUT SET	0	0	0	0	0	0	0	1	I/D	S	Set moving direction of cursor, Appoint if move
DISPLAY SWITCH	0	0	0	0	0	0	1	D	C	B	Set display on/off,cursor on/off, blink on/off
SHIFT	0	0	0	0	0	1	S/C	R/L	*	*	Remove cursor and whole display,DDRAM changeless
FUNCTION SET	0	0	0	0	1	DL	N	F	*	*	Set DL,display line,font
CGRAM AD SET	0	0	0	1	5 4 3 2 1 0						Set CGRAM AD, send receive data
DDRAM AD SET	0	0	1	ADD							Set DDRAM AD, send receive data
BUSY/AD READ CT	0	1	BF	AC							Executing internal function, reading AD of CT
CGRAM/ DDRAM DATA WRITE	1	0	DATA WRITE								Write data from CGRAM or DDRAM
CGRAM/ DDRAM DATA READ	1	1	DATA READ								Read data from CGRAM or DDRAM
<div>I/D=1: Increment Mode; I/D=0: Decrement Mode S=1: Shift S/C=1: Display Shift; S/C=0: Cursor Shift R/L=1: Right Shift; R/L=0: Left Shift DL=1: 8D DL=0: 4D N=1: 2R N=0: 1R F=1: 5x10 Style; F=0: 5x7 Style BF=1: Execute Internal Function; BF=0: Command Received</div> <div>DDRAM: Display data RAM CGRAM: Character Generator RAM ACG: CGRAM AD ADD: DDRAM AD & Cursor AD AC: Address counter for DDRAM & CGRAM</div>											

1	Function Set: 8 – bit Mode, 1 Line, 5×7 Dots	0x30
2	Function Set: 8 – bit Mode, <u>2 Line</u> , <u>5×7 Dots</u>	<u>0x38</u>
3	Function Set: 4 – bit Mode, 1 Line, 5×7 Dots	0x20
4	Function Set: 4 – bit Mode, 2 Line, 5×7 Dots	0x28
5	Entry Mode	0x06
6	Display off Cursor off	0x08
7	Display on Cursor on	0x0E
8	Display on Cursor off	0x0C
9	Display on Cursor blinking	0x0F
10	Shift entire display left	0x18
11	Shift entire display right	0x1C
12	Move cursor left by one character	0x10
13	Move cursor right by one character	0x14
14	<u>Clear Display</u> (also clear DDRAM content)	0x01
15	Set <u>DDRAM address or cursor position on display</u>	0x80 + address
16	Set <u>CGRAM address or set pointer to CGRAM location</u>	0x40 + address







CMD	RS	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Initialize	0	0	0	1	1	1	0	x	x
Display On	0	0	0	0	0	1	1	1	0
Inc AC	0	0	0	0	0	0	1	1	0
"a"	1	0	1	1	0	0	0	0	1
"K"	1	0	1	0	0	1	0	1	1
"a"	1	0	1	1	0	0	0	0	1
"R"	1	0	1	0	1	0	0	1	0
"e"	1	0	1	1	0	0	1	0	1
"Z"	1	0	1	0	1	1	0	1	0
"a"	1	0	1	1	0	0	0	0	1
Cursor 0,0	0	1	0	0	0	0	0	0	0
Cursor 0,15	0	1	0	0	0	1	1	1	1
Cursor 0,1	0	1	1	0	0	0	0	0	0
Cursor 1,15	0	1	1	0	0	1	1	1	1
Clear	0	0	0	0	0	0	0	0	1
Cursor Off	0	0	0	0	0	1	1	0	0
Cursor On	0	0	0	0	0	1	1	1	0
Blinky Cursor	0	0	0	0	0	1	1	1	1

CMD	RS	DB7	DB6	DB5	DB4
Initialize	0	0	0	1	0
	0	0	0	1	0
	0	1	0	x	x
Display On	0	0	0	0	0
	0	1	1	1	0
Inc AC	0	0	0	0	0
	0	0	1	1	0
"a"	1	0	1	1	0
	1	0	0	0	1
"K"	1	0	1	0	0
	1	1	0	1	1
"a"	1	0	1	1	0
	1	0	0	0	1
"R"	1	0	1	0	1
	1	0	0	1	0
"e"	1	0	1	1	0
	1	0	1	0	1
"Z"	1	0	1	0	1
	1	1	0	1	0
"a"	1	0	1	1	0
	1	0	0	0	1

```

lcd16x2_init();
lcd16x2_clear();
lcd16x2_gotoxy(0,0);
lcd16x2_puts("aKaReZa");

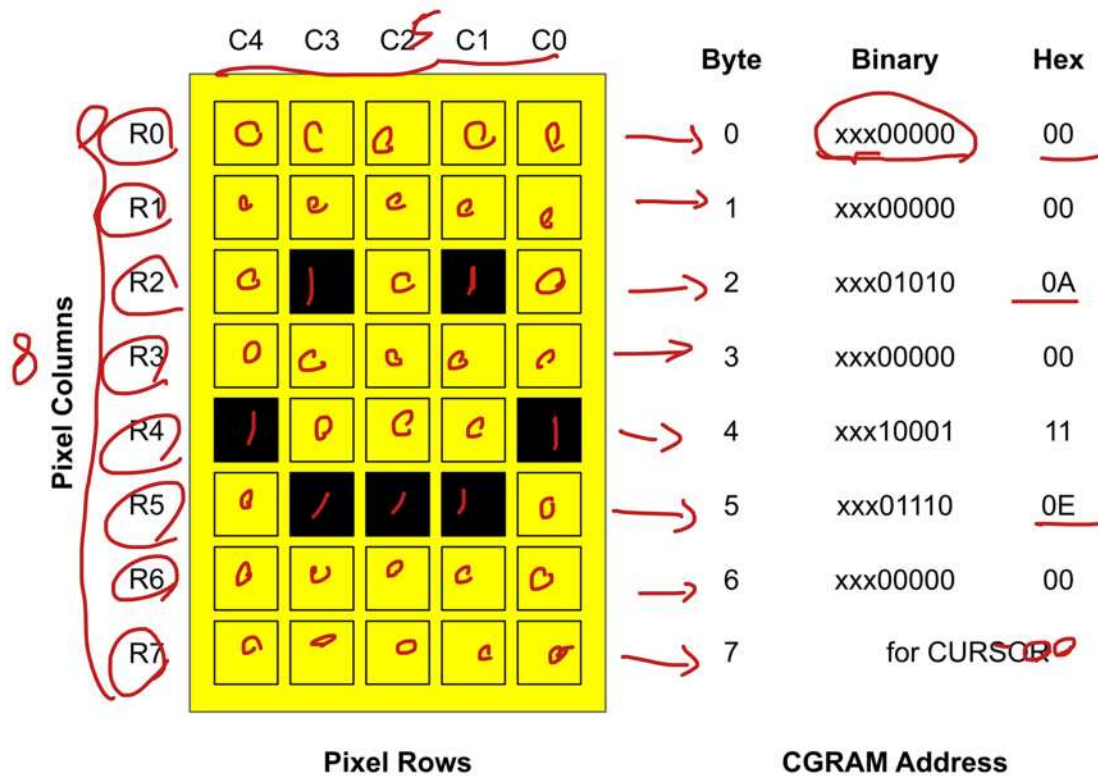
```




Lower 4 Bits	Upper 4 Bits	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
xxxx0000	CG RAM (1)		0	@	P	`	P					-	9	=	α	p	
xxxx0001	(2)		!	1	A	Q	a	4				°	7	4	ä	q	
xxxx0010	(3)		"	2	B	R	b	r				「	イ	ツ	×	β	θ
xxxx0011	(4)		#	3	C	S	c	s				」	ウ	テ	ε	≈	
xxxx0100	(5)		\$	4	D	T	d	t				、	エ	ト	μ	Ω	
xxxx0101	(6)		%	5	E	U	e	u				・	オ	ナ	1	σ	Ü
xxxx0110	(7)		&	6	F	V	f	v				ヲ	カ	ニ	ヨ	ρ	Σ
xxxx0111	(8)		'	7	G	W	g	w				フ	キ	ヌ	5	q	π
xxxx1000	(1)		<	8	H	X	h	x				イ	ク	ネ	リ	フ	×
xxxx1001	(2)		>	9	I	Y	i	y				ッ	ケ	ル	リ	ユ	
xxxx1010	(3)		*	:	J	Z	j	z				エ	コ	ハ	レ	j	〒
xxxx1011	(4)		+	;	K	L	k	l				オ	サ	ヒ	ロ	*	斤
xxxx1100	(5)		,	<	L	¥	1	l				ハ	シ	フ	ワ	Φ	円
xxxx1101	(6)		-	=	M	J	m	j				ユ	ズ	ハ	ン	ト	÷
xxxx1110	(7)		.	>	N	^	n	^				ヨ	セ	ホ	°	ñ	
xxxx1111	(8)		/	?	O	_	o	€				ッ	ソ	マ	°	ö	■

Lower 4 Bits	Upper 4 Bits	0000	0001
xxxx0000	CG RAM (1)		
xxxx0001	(2)		
xxxx0010	(3)		
xxxx0011	(4)		
xxxx0100	(5)		
xxxx0101	(6)		
xxxx0110	(7)		
xxxx0111	(8)		

0x00
 0x01
 0x02
 0x03
 0x04
 0x05
 0x06
 0x07



For 5 × 8 dot character patterns

Character Codes (DDRAM data)	CGRAM Address	Character Patterns (CGRAM data)
7 6 5 4 3 2 1 0 High Low	5 4 3 2 1 0 High Low	7 6 5 4 3 2 1 0 High Low
0 0 0 0 * 0 0 0 <i>0x00</i>	0 0 0 <i>0</i>	* * * 1 1 1 1 0 Character pattern (1)
0 0 0 0 * 0 0 1 <i>0x01</i>	0 0 1 <i>1</i>	* * * 1 0 0 0 1 Character pattern (2)
0 0 0 0 * 1 1 1 <i>0x08</i>	1 1 1 <i>8</i>	* * * 0 0 0 0 0 Cursor position

Code											Execution Time (max) (when f_{op} or f_{osc} is 270 kHz)
Instruction	RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	
Set CGRAM address	0	0	0	1	ACG	ACG	ACG	ACG	ACG	ACG	37 μ s

Description: Sets CGRAM address. CGRAM data is sent and received after this setting.