

LCD Controller Manual

MM21CE Version 1.02

3 48-6

110002

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1. MM21CE

2. MM21CE Connector

2-1. Backlight Power Connector

2-2. RS-232C Connector

2-3. Power Connector

3.

3-1.

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3-1-2.

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[1.] MM21CE

Special Font

1. MM21CE

◆ MM21CE

- ◆ LCD Resolution : FSTN Mono 240*128 dots
- ◆ : (GB2132-80)
- ◆ LCD Back Light : Inverter On/Off 가 (CCFL Backlight)
- ◆ Font : (GB2312-80) 16*16 dots
8*16 dots
16*16 dots

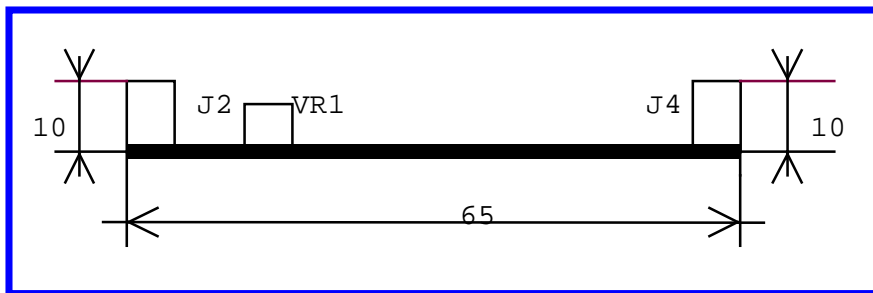
◆ MM21CE

- ◆ CPU : 8BIT micro controller
- ◆ Display Type : FSTN Mono 240*128 dots
- ◆ : DC 5[V]
- ◆ : RS-232C 9600, 19200, 57600,115200 [bps]
Default 57600 [bps]

◆ MM21CE

- ◆ Text Layer : Text Layer ON/OFF
- ◆ , :가 2 , 2 , 가 2
- ◆ Graphic : , Line, Rectangle, ,
- ◆ / Font
- ◆
- ◆ Cursor
- ◆ : Enter
- ◆ Backspace
- ◆ Clear : Block Clear , Clear
- ◆

MM21CE



2-1. Backlight Power Connector : J4

Pin Number	Symbol	Description
1	IN	CCFL Power VDC
2	IN	CCFL Power

2-2. RS-232C Connector : J3

Pin Number	Symbol	Description
1	RXD	Receive Data : LCD Controller
2	TXD	Transmit Data : LCD Controller
3	GND	Ground

2-3. Power Connector : J2

Pin Number	Symbol	Description
1	VCC	+5[VDC]
2	GND	Ground

3.

'Esc' = 0x1b [hex]

			Parameter	
'Esc'	'K'	'0x01'		3-1-1
		'0x02'	KS5601	
'Esc'	'J'	'0x01'	GB2312-80	
'Esc'	'E'	'0x01'		3-1-2
		'0x02'		
'Esc'	'P'	'0x01'	Text Layer ON	3-1-3
		'0x02'	Text Layer ON	
		'0x03'	Text Layer ON	
		'0x04'	Text Layer OFF	3-1-4
		'0x05'	Text Layer Font ON	
		'0x06'	Text Layer Font 가 ON	3-1-5
		'0x07'	Text Layer Font ON	
		'0x08'	Text Layer Font OFF	
		'0x09'	Reserved	
		'0x0a'	Reserved	
		'0x0b'	Reserved	
		'0x0c'	Reserved	
		'0x0d'	Text Layer ON	3-1-7
		'0x0e'	Text Layer OFF	
'Esc'	'D'	'0x01'	Text Layer clear	3-1-8
		'0x02'	(X1,Y1,X2,Y2) Text Layer clear (X1,Y1,X2,Y2 hex 가 :0x00 ~ 0x1d :0x00 ~ 0x07)	
		'0x03'	(X1,Y1,X2,Y2) Graphic clear (X1, Y1, X2, Y2 hex 가 :0x000 ~ 0xef :0x00 ~ 0x7f)	
'Esc'	'C'	'0x01'	(X,Y) Text Layer X,Y cursor (X,Y hex 가 :0x00 ~ 0x1d :0x00 ~ 0x07)	3-1-9
		'0x02'	(X,Y) Text Layer X,Y cursor (X,Y hex 가 :0x00 ~ 0xef :0x00 ~ 0x7f)	
'Esc'	'L'	'0x01'	CCFL Power ON	3-1-10
		'0x02'	CCFL Power OFF	
'Esc'	'S'		Serial Baud rate MM21CE Rebooting	3-1-11
'Esc'	'G'	'0x01'	(X,Y) Graphic X:0x000 ~ 0xef Y:0x00 ~ 0x7e	3-1-12
		'0x02'	(X,Y) Graphic X:0x000 ~ 0x13f Y:0x00 ~ 0xEf	

			Parameter		
		'0x03'	(X1,Y1,X2,Y2)	Graphic <u>Line</u> X1,X2:0x000 ~ 0x13f Y1,Y2:0x00 ~ 0xEf	3-1-13
		'0x04'	(X1,Y1,X2,Y2)	Graphic <u>Line</u> X1,X2:0x000 ~ 0x13f Y1,Y2:0x00 ~ 0xEf	
		'0x05'	(X1,Y1,X2,Y2)	Graphic <u>Rectangle</u> X1,X2:0x000 ~ 0x13f Y1,Y2:0x00 ~ 0xEf	3-1-14
		'0x06'	(X1,Y1,X2,Y2)	Graphic <u>Rectangle</u> X1,X2:0x000 ~ 0x13f Y1,Y2:0x00 ~ 0xEf	
		'0x07'	(X1,Y1,X2,Y2)	Graphic <u>Rectangle</u> X1,X2:0x000 ~ 0x13f Y1,Y2:0x00 ~ 0xEf	
		'0x08'	(X1,Y1,X2,Y2)	Graphic <u>Rectangle</u> X1,X2:0x000 ~ 0x13f Y1,Y2:0x00 ~ 0xEf	
		'0x09'	(X,Y,radius)	Graphic X Y X:0x000 ~ 0x13f Y:0x00 ~ 0xEf Radius :0x00 ~ 0x3f	3-1-15
		'0x0a'	(X,Y,radius)	Graphic X Y X:0x000 ~ 0x13f Y:0x00 ~ 0xEf Radius :0x00 ~ 0x3f	
		'0x0b'	(X,Y,radius)	Graphic X Y X:0x000 ~ 0x13f Y:0x00 ~ 0xEf Radius :0x00 ~ 0x3f	
		'0x0c'	(X,Y,radius)	Graphic X Y X:0x000 ~ 0x13f Y:0x00 ~ 0xEf Radius :0x00 ~ 0x3f	
'Esc'	'G'	'0x0d'	(X,Y,a,b)	Graphic X Y X:0x000 ~ 0x13f Y:0x00 ~ 0xEf a :240/2 b :128/2	3-1-16
		'0x0e'	(X,Y,a,b)	Graphic X Y X:0x000 ~ 0x13f Y:0x00 ~ 0xEf a :240/2 b :128/2	
		'0x0f'	(X,Y,a,b)	Graphic X Y X:0x000 ~ 0x13f Y:0x00 ~ 0xEf a :240/2 b :128/2	
		'0x10'	(X,Y,a,b)	Graphic X Y X:0x000 ~ 0x13f Y:0x00 ~ 0xEf a :240/2 b :128/2	
'Esc'	'I'	'0x01'		Nawon Logo display (Size : 0,0 ~ 239,31)	

3-1.

Parameter '+'
 'Esc' = 0x1b (Hex)

Graphic X MM21CE byte(Hex)

3-1-1.

	'ESC'+ 'J'
	'0x01'
Parameter	
	'ESC'+ 'J' '0x01'
	'ESC'+ 'J'+ '0x01' => GB2312-80 ' GB2312-80 2byte 'ESC'+ 'J'+ '0xB0'+ '0xA2' [阿] 가 display

3-1-2.

	'ESC'+ 'E'
	'0x01' or '0x02'
Parameter	
	'ESC'+ 'E' '0x01' '0x02'
	'ESC'+ 'E'+ '0x01' => ASCII 256 'ESC'+ 'E'+ '0x02' =>

3-1-3. Text Layer

	'ESC'+ 'P'
	'0x01' or '0x02'
Parameter	
	'ESC'+ 'P' '0x01' Text Layer '0x02' Text Layer
	'ESC'+ 'P'+ '0x01' => Text Layer 'ESC'+ 'P'+ '0x02' => Text Layer

3-1-4. Text Layer ON/OFF

	'ESC'+ 'P'
	'0x03' or '0x04'
Parameter	
	'ESC'+ 'P' '0x03' Text Layer ON '0x04' OFF
	'ESC'+ 'P'+ '0x03' => Text Layer ON 'ESC'+ 'P'+ '0x04' => Text Layer OFF

3-1-8. Text Layer Clear

	'ESC'+ 'D'
	'0x01' or '0x02' or '0x03'
Parameter	'X1'+ 'Y1'+ 'X2'+ 'Y2'
	<p>'ESC'+ 'D' '0x01' Text Layer Clear , '0x02'</p> <p>Parameter Text Layer가 Clear .</p> <p>'0x03' Parameter Graphic</p> <p>Clear .</p> <p>, Text Layer X1 X2 0x00 ~ 0x1d</p> <p>Text Layer Y1 Y2 0x00 ~ 0x07</p> <p>, Graphic X1 X2 0x00 ~ 0xef</p> <p>Graphic Y1 Y2 0x00 ~ 0x7f</p> <p>Graphic X1 X2 1 byte(0x00~0xef)</p> <hr/> <p>(Hex)</p> <p>, Text Layer 8*16 .</p> <p>Text Layer X 240/8</p> <p>0x00 ~ 0x1d가 . Y 128/16</p> <p>0x00 ~ 0x07 .</p>
	<p>'ESC'+ 'D'+ '0x01' => Text Layer Clear</p> <p>Text Layer (5, 0, 20, 11) Clear</p> <p>=> 'ESC'+ 'D'+ '0x02'+ '0x05'+ '0x00'+ '0x14'+ '0x0b'</p> <p>'ESC'+ 'D'+ '0x03' => Graphic Layer Clear</p> <p>Graphic Layer (10, 25, 200, 110) Clear</p> <p>=> 'ESC'+ 'D'+ '0x03'+ '0x0a'+ '0x19'+ '0xc8'+ '0x6e'</p> <p>Graphic Layer Clear</p> <p style="text-align: center;">X1 X2</p>

3-1-9. Text Layer Cursor

	'ESC'+ 'C'
	'0x01'
Parameter	'X'+ 'Y'
	<p>'ESC'+ 'C' '0x01' Parameter</p> <p>Cursor가 . Text Layer X</p> <p>0x00 ~ 0x1d , Y 0x00 ~ 0x07 .</p>
	'ESC'+ 'C'+ '0x01'+ 'X'+ 'Y' => Text Layer (X, Y) Cursor

3-1-10. CCFL Power ON/OFF

	'ESC'+ 'L'
	'0x01' or '0x02'
Parameter	
	<p>'ESC'+ 'L' '0x01' CCFL Power OFF.</p> <p>'0x02' CCFL Power ON.</p>
	<p>'ESC'+ 'L'+ '0x01' => CCFL Power OFF.</p> <p>'ESC'+ 'L'+ '0x02' => CCFL Power ON.</p>

3-1-11. MM21CE Rebooting

	'ESC'+ 'S'
Parameter	
	'ESC'+ 'S' MM21CE Rebooting . Serial Baud Rate . Baud Rate Default 57,600[bps] . MM21CE LCD 20[] .
	'ESC'+ 'S' => MM21CE Rebooting

3-1-12. Graphic /

	'ESC'+ 'G'
	'0x01' or '0x02'
Parameter	'X'+ 'Y'
	'ESC'+ 'G' '0x01' Parameter Graphic . '0x02'가 Parameter Graphic . _____ Graphic X _____ 0x00 ~ 0xef , Y _____ 0x00 ~ 0x7f .
	'ESC'+ 'G'+ '0x01'+ 'X'+ 'Y' => (X, Y) .) Graphic (50, 80) => 'ESC'+ 'G'+ '0x01'+ '0x32'+ '0x50' 'ESC'+ 'G'+ '0x02'+ 'X'+ 'Y' => (X, Y) .) Graphic Layer (50, 80) => 'ESC'+ 'G'+ '0x02'+ '0x32'+ '0x50' X

3-1-13. Graphic Line /

	'ESC'+ 'G'
	'0x03' or '0x04'
Parameter	'X1'+ 'Y1'+ 'X2'+ 'Y2'
	'ESC'+ 'G' '0x03' Parameter Graphic Line . '0x04'가 Parameter Graphic Line . _____ Graphic X _____ 0x00 ~ 0xef , Y _____ 0x00 ~ 0x7f .
	'ESC'+ 'G'+ '0x03'+ 'X1'+ 'Y1'+ 'X2'+ 'Y2' => (X1,Y1,X2,Y2) Line .) Graphic (0, 10, 210, 120) Line => 'ESC'+ 'G'+ '0x03'+ '0x00'+ '0x0a'+ '0xd2'+ '0x78' 'ESC'+ 'G'+ '0x04'+ 'X1'+ 'Y1'+ 'X2'+ 'Y2' => (X1,Y1,X2,Y2) Line .) Graphic (0, 10, 210, 120) Line => 'ESC'+ 'G'+ '0x04'+ '0x00'+ '0x0a'+ '0xd2'+ '0x78' X1, X2

3-1-14. Graphic / Rectangle /

	'ESC'+ 'G'
	'0x05' or '0x06' or '0x07' or '0x08'
Parameter	'X1'+ 'Y1'+ 'X2'+ 'Y2'
	<p>'ESC'+ 'G' '0x05'가 Parameter</p> <p>Graphic Rectangle .</p> <p>'0x06' Parameter Graphic</p> <p>Rectangle .</p> <p>, '0x07' Parameter</p> <p>Graphic Rectangle .</p> <p>'0x08' Parameter Graphic</p> <p>Rectangle .</p> <p>_____ Graphic <u>X</u> <u>0x00 ~ 0xef</u> , <u>Y</u></p> <p><u>0x00 ~ 0x7f</u> .</p>
	<p>'ESC'+ 'G'+ '0x05'+ 'X1'+ 'Y1'+ 'X2'+ 'Y2'</p> <p>=> (X1,Y1,X2,Y2) Rectangle .</p> <p>) Graphic (10, 10, 100, 100) Rectangle</p> <p>=> 'ESC'+ 'G'+ '0x05'+ '<u>0x0a</u>'+'0x0a'+ '<u>0x64</u>'+'0x64'</p> <p>'ESC'+ 'G'+ '0x06'+ 'X1'+ 'Y1'+ 'X2'+ 'Y2'</p> <p>=> (X1,Y1,X2,Y2) Rectangle .</p> <p>) Graphic (10, 10, 100, 100) Rectangle .</p> <p>=> 'ESC'+ 'G'+ '0x06'+ '<u>0x0a</u>'+'0x0a'+ '<u>0x64</u>'+'0x64'</p> <p>'ESC'+ 'G'+ '0x07'+ 'X1'+ 'Y1'+ 'X2'+ 'Y2'</p> <p>=> (X1,Y1,X2,Y2) Rectangle .</p> <p>) Graphic (10, 10, 100, 100) Rectangle .</p> <p>=> 'ESC'+ 'G'+ '0x07'+ '<u>0x0a</u>'+'0x0a'+ '<u>0x64</u>'+'0x64'</p> <p>'ESC'+ 'G'+ '0x08'+ 'X1'+ 'Y1'+ 'X2'+ 'Y2'</p> <p>=> (X1,Y1,X2,Y2) Rectangle .</p> <p>) Graphic (10, 10, 100, 100) Rectangle .</p> <p>=> 'ESC'+ 'G'+ '0x08'+ '<u>0x0a</u>'+'0x0a'+ '<u>0x64</u>'+'0x64'</p> <p><u>X1, X2</u></p>

3-1-15. Graphic / /

	'ESC'+ 'G'
	'0x09' or '0x0a' or '0x0b' or '0x0c'
Parameter	'X'+ 'Y'+ radius
	<p>'ESC'+ 'G' '0x09'가 Parameter</p> <p>Graphic radius .</p> <p>'0x0a'가 Parameter Graphic</p> <p>radius .</p> <p>'0x0b'가 Parameter Graphic</p> <p>radius .</p> <p>'0x0c' Parameter Graphic</p> <p>radius .</p> <p>_____ Graphic <u>X</u> <u>0x00 ~ 0xef</u> , <u>Y</u></p> <p><u>0x00 ~ 0x7f</u> . <u>radius</u> <u>'0x01' ~ '0x3f'</u> .</p>

	<pre>'ESC'+ 'G'+ '0x09'+ 'X'+ 'Y'+ 'radius' => (X,Y) 'radius') Graphic (100, 100) radius = 50 => 'ESC'+ 'G'+ '0x09'+ '0x64'+ '0x64'+ '0x32'</pre> <pre>'ESC'+ 'G'+ '0x0a'+ 'X'+ 'Y'+ 'radius' => (X,Y) 'radius') Graphic (100, 100) radius = 50 => 'ESC'+ 'G'+ '0x0a'+ '0x64'+ '0x64'+ '0x32'</pre> <pre>'ESC'+ 'G'+ '0x0b'+ 'X'+ 'Y'+ 'radius' => (X,Y) 'radius') Graphic (100, 100) radius = 50 => 'ESC'+ 'G'+ '0x0b'+ '0x64'+ '0x64'+ '0x32'</pre> <pre>'ESC'+ 'G'+ '0x0c'+ 'X'+ 'Y'+ 'radius' => (X,Y) 'radius') Graphic (100, 100) radius = 50 => 'ESC'+ 'G'+ '0x0c'+ '0x64'+ '0x64'+ '0x32'</pre> <p style="text-align: center;">X</p>
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3-1-16. Graphic / /

	'ESC'+ 'G'																																												
	'0x0d' or '0x0e' or '0x0f' or '0x10'																																												
Parameter	'X'+ 'Y'+ 'a'+ 'b'																																												
	<table border="0" style="width: 100%;"> <tr> <td style="width: 25%;">'ESC'+ 'G'</td> <td style="width: 25%;">'0x0d'가</td> <td style="width: 25%;"></td> <td style="width: 25%;">Parameter</td> </tr> <tr> <td>Graphic 가</td> <td>'a' ,</td> <td>'b'</td> <td>Graphic 가 'a'</td> </tr> <tr> <td>'0x0e'가</td> <td></td> <td>Parameter</td> <td>Graphic 가 'a'</td> </tr> <tr> <td>,</td> <td>'b'</td> <td></td> <td></td> </tr> <tr> <td>'0x0f'가</td> <td></td> <td>Parameter</td> <td>Graphic 가 'a'</td> </tr> <tr> <td>,</td> <td>'b'</td> <td></td> <td></td> </tr> <tr> <td>'0x10'</td> <td></td> <td>Parameter</td> <td>Graphic 가 'a'</td> </tr> <tr> <td>,</td> <td>'b'</td> <td></td> <td></td> </tr> <tr> <td colspan="2" style="text-align: center;">Graphic Layer</td> <td style="text-align: center;"><u>X</u></td> <td style="text-align: center;"><u>0x00 ~ 0xef</u> , <u>Y</u></td> </tr> <tr> <td colspan="2" style="text-align: center;"><u>0x00 ~ 0x7f</u> , 'a'</td> <td style="text-align: center;"><u>'0x01' ~ '0x3f'</u> ,</td> <td style="text-align: center;"><u>'b'</u></td> </tr> <tr> <td colspan="4"><u>'0x01 ~ 0x77'</u></td> </tr> </table>	'ESC'+ 'G'	'0x0d'가		Parameter	Graphic 가	'a' ,	'b'	Graphic 가 'a'	'0x0e'가		Parameter	Graphic 가 'a'	,	'b'			'0x0f'가		Parameter	Graphic 가 'a'	,	'b'			'0x10'		Parameter	Graphic 가 'a'	,	'b'			Graphic Layer		<u>X</u>	<u>0x00 ~ 0xef</u> , <u>Y</u>	<u>0x00 ~ 0x7f</u> , 'a'		<u>'0x01' ~ '0x3f'</u> ,	<u>'b'</u>	<u>'0x01 ~ 0x77'</u>			
'ESC'+ 'G'	'0x0d'가		Parameter																																										
Graphic 가	'a' ,	'b'	Graphic 가 'a'																																										
'0x0e'가		Parameter	Graphic 가 'a'																																										
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,	'b'																																												
'0x10'		Parameter	Graphic 가 'a'																																										
,	'b'																																												
Graphic Layer		<u>X</u>	<u>0x00 ~ 0xef</u> , <u>Y</u>																																										
<u>0x00 ~ 0x7f</u> , 'a'		<u>'0x01' ~ '0x3f'</u> ,	<u>'b'</u>																																										
<u>'0x01 ~ 0x77'</u>																																													

	<pre>'ESC'+ 'G'+ '0x0d'+ 'X'+ 'Y'+ 'a'+ 'b' => (X,Y) 가 'a', 'b') Graphic (150, 120) 'a'= 50, 'b'= 20 => 'ESC'+ 'G'+ '0x0d'+ '<u>0x96</u>'+'0x78'+ '0x32'+ '0x14' 'ESC'+ 'G'+ '0x0e'+ 'X'+ 'Y'+ 'a'+ 'b' => (X,Y) 가 'a', 'b') Graphic (150, 120) 'a'= 50, 'b'= 20 => 'ESC'+ 'G'+ '0x0e'+ '<u>0x96</u>'+'0x78'+ '0x32'+ '0x14' 'ESC'+ 'G'+ '0x0f'+ 'X'+ 'Y'+ 'a'+ 'b' => (X,Y) 가 'a', 'b') Graphic (150, 120) 'a'= 50, 'b'= 20 => 'ESC'+ 'G'+ '0x0f'+ '<u>0x96</u>'+'0x78'+ '0x32'+ '0x14' 'ESC'+ 'G'+ '0x10'+ 'X'+ 'Y'+ 'a'+ 'b' => (X,Y) 가 'a', 'b') Graphic (150, 120) 'a'= 50, 'b'= 20 => 'ESC'+ 'G'+ '0x10'+ '<u>0x96</u>'+'0x78'+ '0x32'+ '0x14' X</pre>
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[1.] MM21CE Special Font

< 1- 1 > MM21CE (Special Font)

Special < 1- 1 >

	0x00	0x01	0x02	0x03	0x04	0x05	0x06	0x07	0x08	0x09	0x0A	0x0B	0x0C	0x0D	0x0E	0x0F
0x00		☎	☎	☎	☎	☎	☎	☎		No.	Co.	TM.	am.		PM.	Tel.
0x10	I	II	III	IV	V	VI	VII	VIII	IX	X	μ	m	d	l	k	cc
0x20	mm ³	cm ³	m ³	km ³	fm	nm	μm	mm	cm	km	mm ²	cm ²	m ²	km ²	ha	μg
0x30	mg	kg	kt	cal	kcal	dB	‰	‰	ps	ns	μs	ms	pV	nV	μV	mV
0x40	kV	MV	PA	nA	μA	mA	KA	PW	nW	μW	mW	kW	MW	Hz	kHz	MHz
0x50	GHz	THz	Ω	kΩ	MΩ	PF	nF	μF	mol	cd	rad	rad/s	rad/s ²	sr	Pa	kPa
0x60	MPa	GPa	Wb	lm	lx	Bq	Gy	Sv	‰	㊦	㊧	㊨	㊩	㊪	㊫	㊬
0x70	㊭	㊮	㊯	㊰	㊱	㊲	㊳	㊴	㊵	㊶	㊷	㊸	㊹	㊺	㊻	㊼
0x80	㊽	㊾	㊿	㊿	㊿	a	b	c	d	e	f	g	h	i	j	k
0x90	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮	⑯
0xA0	⑰	⑱	⑲	⑳	㉑	㉒	㉓	㉔	㉕	㉖	㉗	㉘	㉙	㉚	㉛	㉜
0xB0	㉝	㉞	㉟	㊱	㊲	㊳	㊴	㊵	㊶	㊷	㊸	㊹	㊺	㊻	㊼	㊽
0xC0	㊾	㊿	㊿	㊿	㊿	㊿	㊿	㊿	㊿	㊿	㊿	㊿	㊿	㊿	㊿	㊿
0xD0	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)	(O)	(P)	(Q)	(R)	(S)	(T)
0xE0	(U)	(V)	(W)	(X)	(Y)	(Z)	(1)	(2)	(3)							
0xF0	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	@	°C		

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