

# LCD Controller Manual

## MMS2412KC Version 1.01

3 48-6

110002

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Special Font

## 1. MMS2412KC

### ◆ MMS2412KC

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

### ◆ MMS2412KC

- ◆ CPU : 16Bit micro controller
- ◆ Display Type : FSTN Mono 240\*128 dots
- ◆ : DC 5[V]
- ◆ : RS-232C 9600, 19200, 57600,115200 [bps]  
Default 57600 [bps]

### ◆ MMS2412KC

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

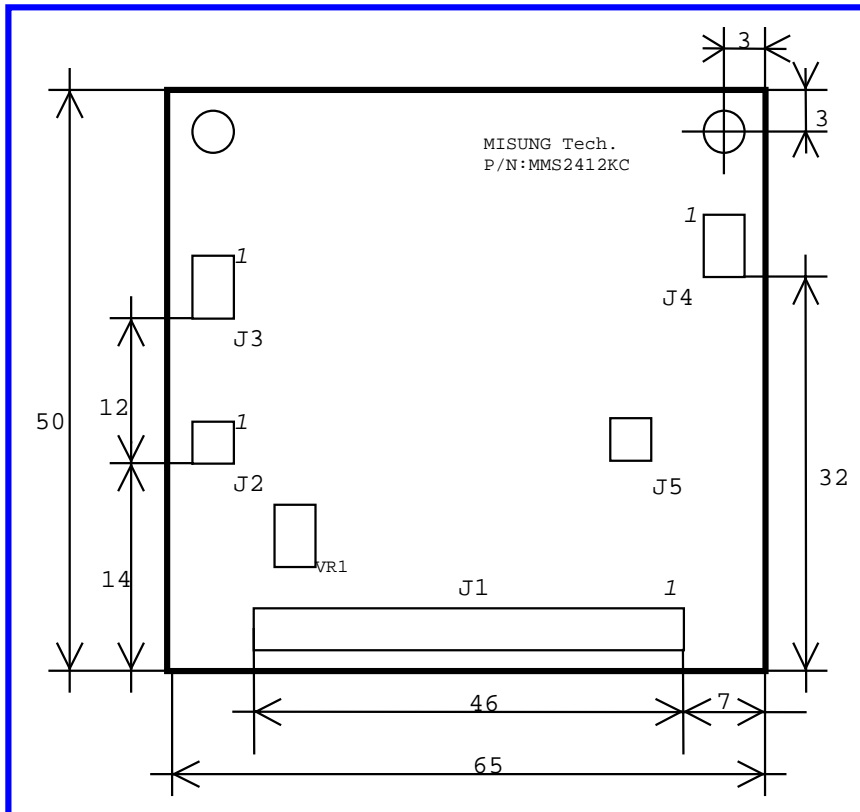
## 2. MMS2412KC Connector

2 MMS2412KC Dimensions Connector

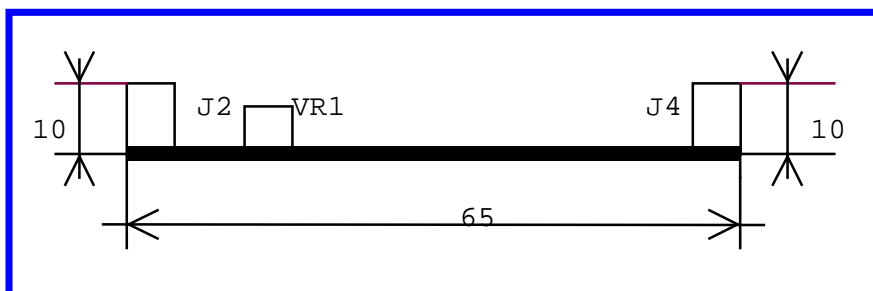
### MMS2412KC



### MMS2412KC Dimensions



## MMS2412KC



## 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'		3-1-0
		'0x02'	KS5601	
'Esc'	'J'	'0x01'	GB2312-80	3-1-1
'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	3-1-5
		'0x06'	Text Layer Font 가 ON	
		'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'
'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
		'0x06'	(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 <b>MMS2412KC Rebooting</b>	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	
		'0x03'	(X1,Y1,X2,Y2) Graphic <b>Line</b> X1,X2:0x000 0x13f Y1,Y2:0x00 0xEf	3-1-13

			Parameter		
		'0x04'	(X1, Y1, X2, Y2)	Graphic X1, X2: 0x000 0x13f Y1, Y2: 0x00 0xEf <u>Line</u>	3-1-14
		'0x05'	(X1, Y1, X2, Y2)	Graphic X1, X2: 0x000 0x13f Y1, Y2: 0x00 0xEf <u>Rectangle</u>	
		'0x06'	(X1, Y1, X2, Y2)	Graphic X1, X2: 0x000 0x13f Y1, Y2: 0x00 0xEf <u>Rectangle</u>	
		'0x07'	(X1, Y1, X2, Y2)	Graphic X1, X2: 0x000 0x13f Y1, Y2: 0x00 0xEf <u>Rectangle</u>	
		'0x08'	(X1, Y1, X2, Y2)	Graphic X1, X2: 0x000 0x13f Y1, Y2: 0x00 0xEf <u>Rectangle</u>	
		'0x09'	(X, Y, radius)	Graphic X Y X: 0x000 0x13f Y: 0x00 0xEf Radius : 0x00 0x3f	
'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			
'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'	'G'				

3-1.

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

Graphic X MMS2412KC byte(Hex)

3-1-0.

	'ESC'+ 'K'
	'0x01' or '0x02'
Parameter	
	'ESC'+ 'K'+ '0x01' => 'ESC'+ 'K'+ '0x02' => KS5601

3-1-1.

	'ESC'+ 'J'
	'0x01'
Parameter	
	'ESC'+ 'J'+ '0x01' [ 2] 1byte 'ESC'+ 'J'+ '0x01'+ '0x86' 中 가 display .

3-1-2.

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

3-1-3. Text Layer

	'ESC'+ 'P'
	'0x01' or '0x02'
Parameter	
	'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 'ESC'+ 'P'+ '0x04' => Text Layer OFF



**3-1-5. Text Layer**

	'ESC'+ 'P'
	'0x04' or '0x05' or '0x06' or '0x07'
<b>Parameter</b>	
	'ESC'+ 'P'+ '0x04' => Text Layer    Font 8*16 dots => 16*32 dots 16*16 dots => 32*32 dots 'ESC'+ 'P'+ '0x05' => Text Layer    Font 가 8*16 dots => 16*16 dots 16*16 dots => 32*16 dots 'ESC'+ 'P'+ '0x06' => Text Layer    Font 8*16 dots => 8*32 dots 16*16 dots => 16*32 dots 'ESC'+ 'P'+ '0x07' => Text Layer    Font                                   OFF

**3-1-6. Serial Baud Rate**

	J5    Header pin												
<b>Parameter</b>													
	MMS2412KC    J5    Header pin .(default:57600)												
	<table border="0"> <tr> <td>NO.1 [115200]</td> <td>NO.2 [19200]</td> </tr> <tr> <td>1번 </td> <td>1번 </td> </tr> <tr> <td>2번 </td> <td>2번 </td> </tr> <tr> <td>NO.3 [57600]</td> <td>NO.4 [9600]</td> </tr> <tr> <td>1번 </td> <td>1번 </td> </tr> <tr> <td>2번 </td> <td>2번 </td> </tr> </table>	NO.1 [115200]	NO.2 [19200]	1번	1번	2번	2번	NO.3 [57600]	NO.4 [9600]	1번	1번	2번	2번
NO.1 [115200]	NO.2 [19200]												
1번	1번												
2번	2번												
NO.3 [57600]	NO.4 [9600]												
1번	1번												
2번	2번												

**3-1-7. Text Layer                                    ON/OFF**

	'ESC'+ 'P'
	'0x0d' or '0xe'
<b>Parameter</b>	
	'ESC'+ 'P'+ '0x0d' => Text Layer                                    ON 'ESC'+ 'P'+ '0x0e' => Text Layer                                    OFF

**3-1-8. Text Layer                                    Clear**

	'ESC'+ 'D'
	'0x01' or '0x02' or '0x03'
<b>Parameter</b>	'X1'+ 'Y1'+ 'X2'+ 'Y2'

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

**3-1-9. Text Layer Cursor**

	'ESC'+ 'C'
	'0x01' or '0x06'
<b>Parameter</b>	'X'+ 'Y'
	'ESC'+ 'C'+ '0x01'+ 'X'+ 'Y' => Text Layer (X, Y) Cursor
	'ESC'+ 'C'+ '0x02'+ 'X'+ 'Y' => Text Layer (X, Y) Cursor
	_____ (Text Layer) : X 0x00 ~ 0xef, Y 0x00 ~ 0x7f

**3-1-10. CCFL Power ON/OFF**

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

**3-1-11. MMS2412KC Rebooting**

	'ESC'+ 'S'
<b>Parameter</b>	
	'ESC'+ 'S' => MMS2412KC Rebooting
	Serial Baud Rate
Baud Rate	Default 57,600[bps]
MMS2412KC	LCD 20

## 3-1-12. Graphic /

	'ESC'+ 'G'
	'0x01' or '0x02'
<b>Parameter</b>	'X'+ 'Y'
	<p>'ESC'+ 'G'+ '0x01'+ 'X'+ 'Y' =&gt; (X, Y) .</p> <p>) Graphic (50, 80)</p> <p>=&gt; 'ESC'+ 'G'+ '0x01'+ '<u>0x32</u>'+'0x50'</p> <p>'ESC'+ 'G'+ '0x02'+ 'X'+ 'Y' =&gt; (X, Y) .</p> <p>) Graphic Layer (50, 80)</p> <p>=&gt; 'ESC'+ 'G'+ '0x02'+ '<u>0x32</u>'+'0x50'</p> <p style="text-align: center;"><b>X</b></p> <p>_____ (Graphic Layer) : X      0x00 ~ 0xef, Y      0x00 ~ 0x7f</p>

## 3-1-13. Graphic Line /

	'ESC'+ 'G'
	'0x03' or '0x04'
<b>Parameter</b>	'X1'+ 'Y1'+ 'X2'+ 'Y2'
	<p>'ESC'+ 'G'+ '0x03'+ 'X1'+ 'Y1'+ 'X2'+ 'Y2'</p> <p>=&gt; (X1,Y1,X2,Y2) Line .</p> <p>) Graphic (0, 10, 210, 120) Line</p> <p>=&gt; 'ESC'+ 'G'+ '0x03'+ '<u>0x00</u>'+'0x0a'+ '<u>0xd2</u>'+'0x78'</p> <p>'ESC'+ 'G'+ '0x04'+ 'X1'+ 'Y1'+ 'X2'+ 'Y2'</p> <p>=&gt; (X1,Y1,X2,Y2) Line .</p> <p>) Graphic (0, 10, 210, 120) Line</p> <p>=&gt; 'ESC'+ 'G'+ '0x04'+ '<u>0x00</u>'+'0x0a'+ '<u>0xd2</u>'+'0x78'</p> <p style="text-align: center;"><b>X1, X2</b></p> <p>_____ (Graphic Layer) : X      0x00 ~ 0xef, Y      0x00 ~ 0x7f</p>

## 3-1-14. Graphic / Rectangle /

	'ESC'+ 'G'
	'0x05' or '0x06' or '0x07' or '0x08'
<b>Parameter</b>	'X1'+ 'Y1'+ 'X2'+ 'Y2'
	<p>'ESC'+ 'G'+ '0x05'+ 'X1'+ 'Y1'+ 'X2'+ 'Y2'</p> <p>=&gt; (X1,Y1,X2,Y2) Rectangle .</p> <p>) Graphic (10, 10, 100, 100) Rectangle</p> <p>=&gt; 'ESC'+ 'G'+ '0x05'+ '<u>0x0a</u>'+'0x0a'+ '<u>0x64</u>'+'0x64'</p> <p>'ESC'+ 'G'+ '0x06'+ 'X1'+ 'Y1'+ 'X2'+ 'Y2'</p> <p>=&gt; (X1,Y1,X2,Y2) Rectangle .</p> <p>) Graphic (10, 10, 100, 100) Rectangle</p> <p>=&gt; 'ESC'+ 'G'+ '0x06'+ '<u>0x0a</u>'+'0x0a'+ '<u>0x64</u>'+'0x64'</p> <p>'ESC'+ 'G'+ '0x07'+ 'X1'+ 'Y1'+ 'X2'+ 'Y2'</p> <p>=&gt; (X1,Y1,X2,Y2) Rectangle .</p> <p>) Graphic (10, 10, 100, 100) Rectangle</p> <p>=&gt; 'ESC'+ 'G'+ '0x07'+ '<u>0x0a</u>'+'0x0a'+ '<u>0x64</u>'+'0x64'</p> <p>'ESC'+ 'G'+ '0x08'+ 'X1'+ 'Y1'+ 'X2'+ 'Y2'</p> <p>=&gt; (X1,Y1,X2,Y2) Rectangle .</p> <p>) Graphic (10, 10, 100, 100) Rectangle</p> <p>=&gt; 'ESC'+ 'G'+ '0x08'+ '<u>0x0a</u>'+'0x0a'+ '<u>0x64</u>'+'0x64'</p> <p style="text-align: center;"><b>X1, X2</b></p> <p>_____ (Graphic Layer) : X      0x00 ~ 0xef, Y      0x00 ~ 0x7f</p>

## 3-1-15. Graphic / /

	'ESC'+ 'G'
	'0x09' or '0x0a' or '0x0b' or '0x0c'
<b>Parameter</b>	'X'+ 'Y'+ radius
	<p>'ESC'+ 'G'+ '0x09'+ 'X'+ 'Y'+ 'radius'</p> <p>=&gt; (X,Y) 'radius'</p> <p>) Graphic (100, 100) radius = 50</p> <p>=&gt; 'ESC'+ 'G'+ '0x09'+ '<b>0x64</b>'+'0x64'+ '0x32'</p> <p>'ESC'+ 'G'+ '0x0a'+ 'X'+ 'Y'+ 'radius'</p> <p>=&gt; (X,Y) 'radius'</p> <p>) Graphic (100, 100) radius = 50</p> <p>=&gt; 'ESC'+ 'G'+ '0x0a'+ '<b>0x64</b>'+'0x64'+ '0x32'</p> <p>'ESC'+ 'G'+ '0x0b'+ 'X'+ 'Y'+ 'radius'</p> <p>=&gt; (X,Y) 'radius'</p> <p>) Graphic (100, 100) radius = 50</p> <p>=&gt; 'ESC'+ 'G'+ '0x0b'+ '<b>0x64</b>'+'0x64'+ '0x32'</p> <p>'ESC'+ 'G'+ '0x0c'+ 'X'+ 'Y'+ 'radius'</p> <p>=&gt; (X,Y) 'radius'</p> <p>) Graphic (100, 100) radius = 50</p> <p>=&gt; 'ESC'+ 'G'+ '0x0c'+ '<b>0x64</b>'+'0x64'+ '0x32'</p> <p>X</p> <hr/> <p>(Graphic Layer) : X 0x00 ~ 0xef, Y 0x00 ~ 0x7f</p> <hr/> <p>radius '0x01' ~ '0x3f'</p>

## 3-1-16. Graphic / /

	'ESC'+ 'G'
	'0x0d' or '0x0e' or '0x0f' or '0x10'
<b>Parameter</b>	'X'+ 'Y'+ 'a'+ 'b'
	<p>'ESC'+ 'G'+ '0x0d'+ 'X'+ 'Y'+ 'a'+ 'b'</p> <p>=&gt; (X,Y) 가 'a', 'b'</p> <p>) (150, 120) 'a'= 50, 'b'= 20</p> <p>=&gt; 'ESC'+ 'G'+ '0x0d'+ '<b>0x96</b>'+'0x78'+ '0x32'+ '0x14'</p> <p>'ESC'+ 'G'+ '0x0e'+ 'X'+ 'Y'+ 'a'+ 'b'</p> <p>=&gt; (X,Y) 가 'a', 'b'</p> <p>) (150, 120) 'a'= 50, 'b'= 20</p> <p>=&gt; 'ESC'+ 'G'+ '0x0e'+ '<b>0x96</b>'+'0x78'+ '0x32'+ '0x14'</p> <p>'ESC'+ 'G'+ '0x0f'+ 'X'+ 'Y'+ 'a'+ 'b'</p> <p>=&gt; (X,Y) 가 'a', 'b'</p> <p>) (150, 120) 'a'= 50, 'b'= 20</p> <p>=&gt; 'ESC'+ 'G'+ '0x0f'+ '<b>0x96</b>'+'0x78'+ '0x32'+ '0x14'</p> <p>'ESC'+ 'G'+ '0x10'+ 'X'+ 'Y'+ 'a'+ 'b'</p> <p>=&gt; (X,Y) 가 'a', 'b'</p> <p>) (150, 120) 'a'= 50, 'b'= 20</p> <p>=&gt; 'ESC'+ 'G'+ '0x10'+ '<b>0x96</b>'+'0x78'+ '0x32'+ '0x14'</p> <p>X</p> <hr/> <p>(Graphic Layer) : X 0x00 ~ 0xef, Y 0x00 ~ 0x7f</p> <hr/> <p>'a' '0x01' ~ '0x3f', 'b' '0x01' ~ 0x77'</p>

[ 1 ] MMS2412KC

Special Font

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(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.		FM.	Tel.
0x10	I	II	III	IV	V	VI	VII	VIII	IX	X	ℓℓ	mℓ	dℓ	ℓ	kℓ	cc
0x20	mm <sup>3</sup>	cm <sup>3</sup>	m <sup>3</sup>	km <sup>3</sup>	fm	nm	μm	mm	cm	km	mm <sup>2</sup>	cm <sup>2</sup>	m <sup>2</sup>	km <sup>2</sup>	ha	ℓg
0x30	m <sup>g</sup>	k <sup>g</sup>	kt	cal	kcal	dB	m <sup>3</sup> /s	m <sup>3</sup> /s	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 <sup>2</sup> /s	rad <sup>3</sup> /s	sr	Pa	kPa
0x60	MPa	GPa	Wb	Im	lx	Bq	Gy	Sv	% <sub>kg</sub>	㉿	㊀	㊁	㊂	㊃	㊄	㊅
0x70	㊆	㊇	㊈	㊉	㊊	㊋	㊌	㊍	㊎	㊏	㊑	㊒	㊓	㊔	㊕	㊖
0x80	㊗	㊘	㊙	㊚	㊛	㊜	㊝	㊞	㊟	㊠	㊡	㊢	㊣	㊤	㊥	㊦
0x90	㊧	㊨	㊩	㊪	㊫	㊬	㊭	㊮	㊯	㊰	㊱	㊲	㊳	㊴	㊵	㊶
0xA0	㊷	㊸	㊹	㊺	㊻	㊼	㊽	㊾	㊿	①	②	③	④	⑤	⑥	⑦
0xB0	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮	⑯	⑰	⑱	⑲	⑳	㉑	㉒	㉓
0xC0	㉔	㉕	㉖	㉗	㉘	㉙	㉚	㉛	㉜	㉝	㉞	㉟	㊀	㊁	㊂	㊃
0xD0	㊄	㊅	㊆	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)
0xE0	(n)	(o)	(p)	(q)	(r)	(s)	(t)	(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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