

# SPECIFICATIONS

Version: 1.0



# **CONTENTS**

- 1. Mechanical Specifications**
- 2. Backlight Characteristic**
- 3. Absolute Maximum Ratings**
- 4. Optical Characteristics**
- 5. Interface Pin Description**
- 6. Reliability**
- 7. Display Command**
- 8. LCM Dimension**

## 1. Mechanical Specifications

Item	Value	Unit
Number of Characters	20X2	Character
Character Format	5 X 8 Dots	-
Character Pitch	4.75 (W) X 9.00(H)	mm
Character Size	3.85(W) X 8.00(H)	mm
Dot size	0.73(W) X 0.9(H)	mm
Dot pitch	0.78(W) X 0.95(H)	mm
Module dimension	146 (W) X 49.2(H) X 14.5MAX(T)	mm
Active Area	94.1(W) X 17.0(H)	mm
Viewing Area	99.0(W) X 24.0(H)	mm
Lcd type	STN BLUE Negative Transmissive	
Viewing direction	6 O'clock	-
Backlight	WHITE	-

## 2. Backlight Characteristic

### 2.1 Electrical / optical specifications

Ta = 25°C

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Forward voltage	V <sub>f</sub>	If=120mA, White	3.0	3.2	3.4	V
LED *Luminous Intensity	I <sub>v</sub>	If=120mA, White	--	--	--	Cd/m2
Chromaticity Coordinate	x	If=120mA, White	0.26	0.31	0.36	
	y		0.25	0.32	0.37	
Reverse Current	I <sub>R</sub>	VR=5V, White	--	--	0.1	mA

Note: \* Measured at the bare LED back-light unit.

### 2.2 LED Maximum Operating Range

Item	Symbol	White	Unit
Power Dissipation	P <sub>AD</sub>	408	mW
Forward Current	I <sub>F</sub>	120	mA
Reverse Voltage	V <sub>R</sub>	5	V

## 3. Absolute Maximum Ratings

Item	Symbol	Conditions	Min.	Max.	Unit
Power supply Voltage	VDD	-	-0.3	7.0	V
Operating temperature	TOPR	-	-20	70	°C
Storage temperature	TSTG	-	-30	80	°C
Static electricity	Be sure that you are grounded when handing LCM				

**Notes:** 1. Exceeding the absolute maximum ratings may cause permanent damage to the

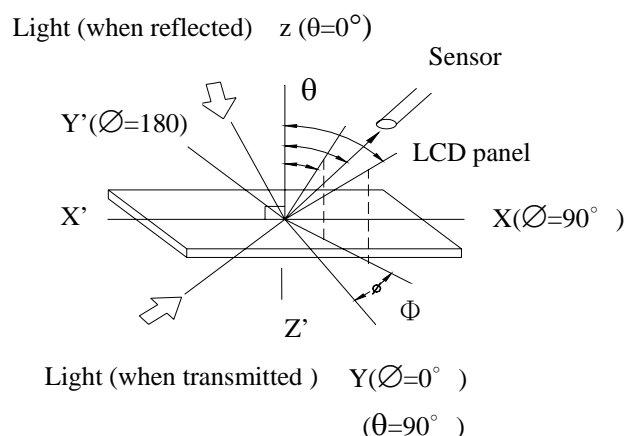
device. Functional operation under these conditions is not implied.

## 4.Optical Characteristics

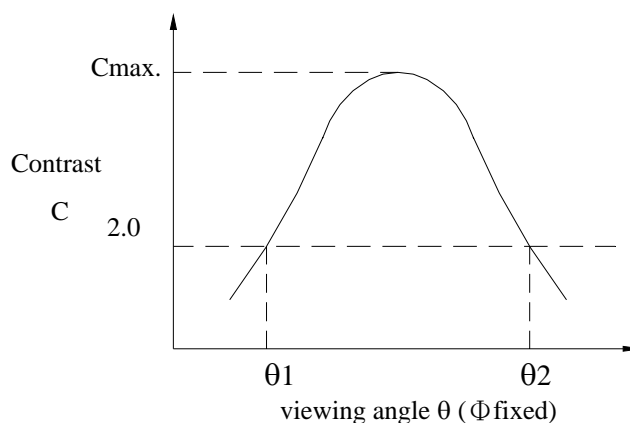
1/16 duty, 1/5 bias,  $V_{op}=4.5V$ ,  $T_a=25^{\circ}C$

Item	Symbol	Conditions	Min.	Typ.	Max	Reference
Driving voltage	$V_{op}=V_{DD}-V_O$		-	4.5	-	
Viewing angle	$\theta$	$C \geq 2.0, \phi = 25^{\circ}C$	$30^{\circ}$	-	-	Notes 1 & 2
Contrast	C	$\theta = 5^{\circ}, \phi = 25^{\circ}$	3.0	-	-	Note 3
Response time(rise)	$t_{on}$	$\theta = 5^{\circ}, \phi = 25^{\circ}$	-		223ms	Note 4
Response time(fall)	$t_{off}$	$\theta = 5^{\circ}, \phi = 25^{\circ}$	-	-	200ms	Note 4

Note 1: Definition of angles  $\theta$  and  $\phi$



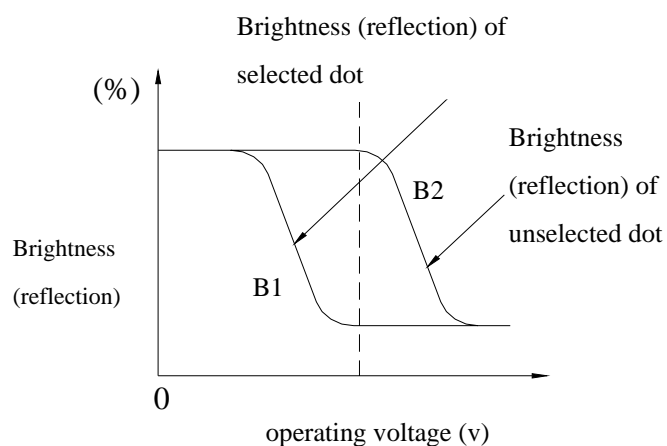
Note 2: Definition of viewing angles  $\theta_1$  and  $\theta_2$



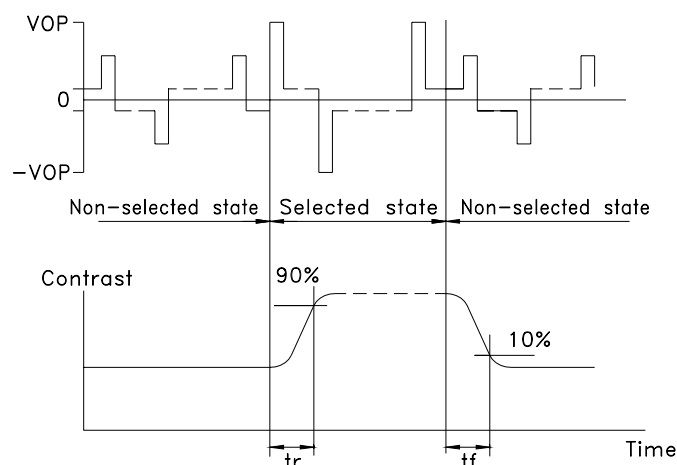
Note : Optimum viewing angle with the naked eye and viewing angle  $\theta$  at  $C_{max}$ . Above are not always the same

Note 3: Definition of contrast C

$$C = \frac{\text{Brightness (reflection) of unselected dot (B2)}}{\text{Brightness (reflection) of selected dot (B1)}}$$



Note 4: Definition of response time



Note: Measured with a transmissive LCD panel which is displayed  $1 \text{ cm}^2$

$V_{OPR}$  : Operating voltage

$f_{FRM}$  : Frame frequency

$t_{ON}$  : Response time (rise)

$t_{OFF}$  : Response time (fall)

## 5. Interface Pin Description

1	Vin	Power 5 Vdc
2	Vin	Power 5 Vdc
3	GND	Signal ground
4	GND	Signal ground
5	CTS	-
6	RTS	-
7	RXD	-
8	TXD	-

## 6. RELIABILITY

Test item	Test condition	Evaluation and assessment
Operation at high temperature and humidity	40 °C±2 °C 90%RH for 500hours	No abnormalities in functions* and appearance**
Operation at high temperature	60 °C±2 °C for 500 hours	No abnormalities in functions* and appearance**
Heat shock	-20± ~ +60 °C Left for 1 hour at each temperature, transition time 5 min, repeated 10times	No abnormalities in functions* and appearance**
Low temperature	-20±2 °C for 500 hours	No abnormalities in functions* and appearance**
Vibration	Sweep for 1 min at 10 Hz, 55Hz, 10Hz, amplitude 1.5mm 2 hrs each in the X,Y and Z directions	No abnormalities in functions* and appearance**
Drop shock	Dropped onto a board from a height of 10cm	No abnormalities in functions* and appearance**

\* Dissipation current, contrast and display functions

\*\* Polarizing filter deterioration, other appearance defects

### 6.1 Liquid crystal panel service life

100,000 hours minimum at 25 °C±10 °C

### 6.2 Definition of panel service life

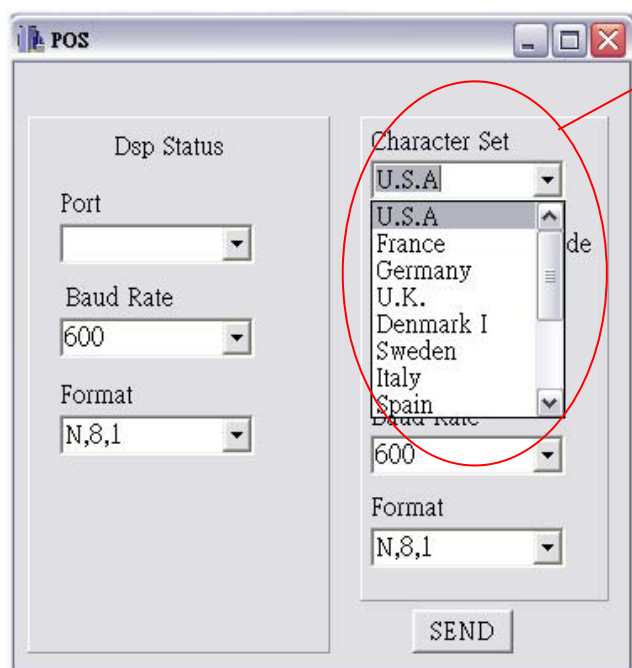
- Contrast becomes 30% of initial value
- Current consumption becomes three times higher than initial value
- Remarkable alignment deterioration occurs in LCD cell layer

- Unusual operation occurs in display functions

## 7. Display Command



- Character select



Character Set Selection	
Character (20h – 7Fh)	Code Table (80h – FFh)
U.S.A	PC-437
France	PC-858
Germany	PC-858
U.K.	PC-858
Denmark I	PC-858
Sweden	PC-858
Italy	PC-858
Spain	PC-858
Japan	Katakana
Norway	PC-858
Denmark II	PC-858
Slavonic	
Russia	
Hebrew	PC-437
Greek	PC-437
User-Define	

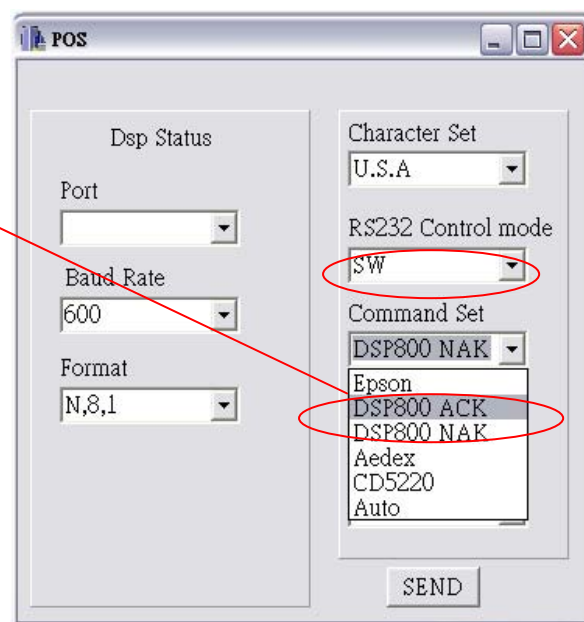




- We suggest to use DSP800 NAK SW, and DSP800 ACK is not suitable in this case.

Bit4

DSP800 command enable ACK/NAK	CODE
Disable(no ACK)	NAK
Enable(ACK/NACK))	ACK



- **RS232 control mode**

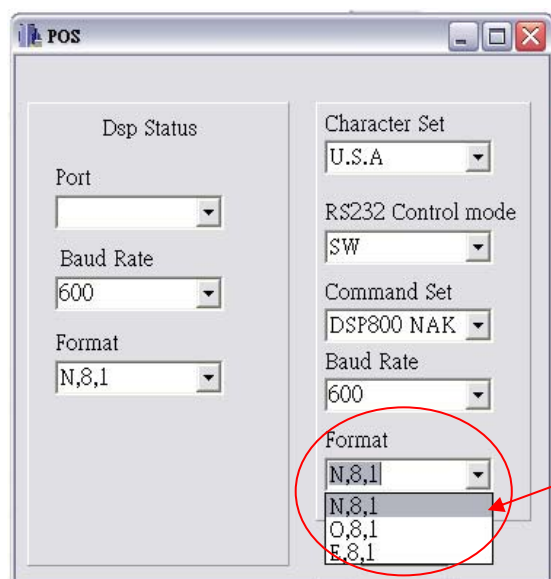
Bit5



RS232 control mode	CODE
CD5220	F
DSP865	H

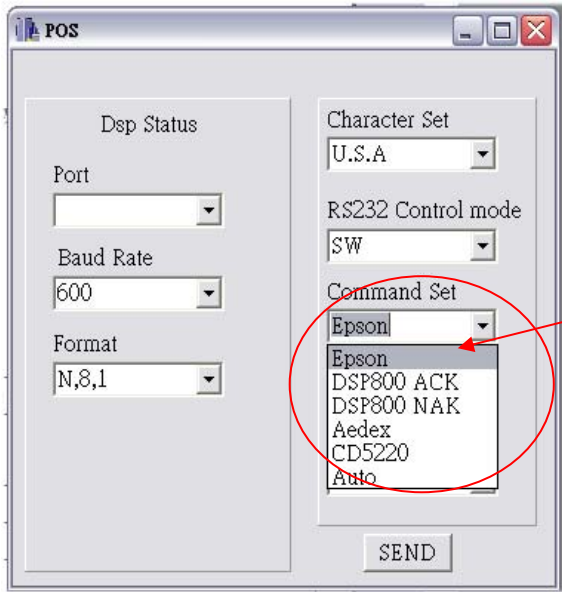
Bit6/7

UART Parity	CODE
Non-parity	N
Odd	O
Even	E



### Bit0/1/2: Command Set Select

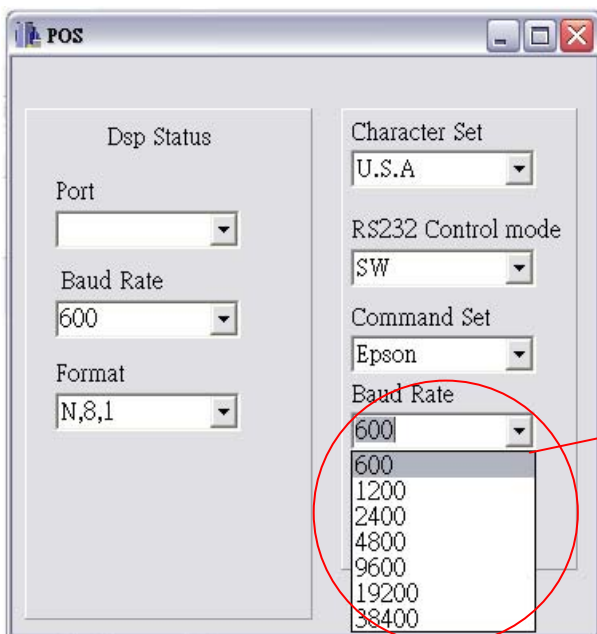
Command Set	MODE
EPSON	E
DSP800	D
Aedex	X
CD5220	C
Auto	A



#### Bit4/5/6 Uart Baud Rate Select

- **Command Set**

Command Set
600
1200
2400
4800
9600
19200
38400



## Command List

Command	Hex Coe	Description
<b>ESC Dc1</b>	<b>1B 11</b>	overwrite mode
<b>ESC Dc2</b>	<b>1B 12</b>	vertical scroll mode
<b>Esc Dc3</b>	<b>1B 13</b>	horizontal scroll mode
<b>ESC QA d1...dn CR</b>	<b>1B 51 41 d1...dn 0D</b> <b>1&lt;=n&lt;=20</b>	set string display mode, write string to upper line
<b>ESC QB d1...dn CR</b>	<b>1B 51 42 d1...dn 0D</b> <b>1&lt;=n&lt;=20</b>	set string display mode, write string to lower line
<b>ESC QD d1...dn CR</b>	<b>1B 51 44 d1...dn 0D</b> <b>1&lt;=n&lt;=20</b>	set string display mode, write string to upper line and scroll the message continuously
<b>ESC [ A</b>	<b>1B 5B 41</b>	move cursor up
<b>ESC [ B</b>	<b>1B 5B 42</b>	move cursor down
<b>LF</b>	<b>0A</b>	move cursor down
<b>ESC [ C</b>	<b>1B 5B 43</b>	move cursor right
<b>HT</b>	<b>09</b>	move cursor right
<b>ESC [ D</b>	<b>1B 5B 44</b>	move cursor left
<b>DS</b>	<b>08</b>	move cursor left
<b>ESC { H</b>	<b>1B 5B 48</b>	move cursor home
<b>HOM</b>	<b>0B</b>	move cursor home
<b>ESC [ L</b>	<b>1B 5B 4C</b>	move cursor to left-end
<b>CR</b>	<b>0D</b>	move cursor to left-end
<b>ESC [ R</b>	<b>1B 5B 52</b>	move cursor to right-end

<b>ESC [ K</b>	<b>1B 5B 4B</b>	move cursor to bottom
<b>ESC I X Y</b>	<b>1B 6C X Y</b> <b>01h&lt;=X,=14h</b> <b>Y=01h, 02h</b>	move cursor to specified position
<b>ESC @</b>	<b>1B 40</b>	initialize display

<b>Command</b>	<b>Hex Coe</b>	<b>Description</b>
<b>CLR</b>	<b>0C</b>	clear display, clear string mode
<b>CAN</b>	<b>18</b>	clear cursor line, clear string mode
<b>ESC _ n</b>	<b>1B 5F n</b> <b>n=00h, 01h</b>	set cursor on/off
<b>ESC W s x1 x2 y</b>	<b>1B 57 s x1 x2 y</b> <b>s=00h, 01h</b> <b>01h&lt;=x1&lt;=x2&lt;=14h</b> <b>y=01h, 02h</b>	set/cancel the window range in horizontal scroll mode
<b>ESC f n</b>	<b>1B 66 n</b>	select international font set. Codes 00h-7Fh
<b>ESC c n</b>	<b>1B 63 n</b>	select code table. Codes 80h-FFh
<b>ESC &amp; n m [a(p1..pa)] x(m-n+1)</b>	<b>1B 26 n m</b> <b>20h&lt;=n&lt;=m&lt;=FFh</b> <b>00h&lt;=a&lt;=05h</b> <b>00&lt;=pn&lt;=FFh</b> <b>m-n&lt;=12</b>	define user defined characters and store in Flash-ROM
<b>ESC ?</b>	<b>1B 3F n</b> <b>20h &lt;= n &lt;= FFh</b>	delete user defined characters
<b>ESC %</b>	<b>1B 25 n</b> <b>n:0 disable</b> <b>n:1 enable</b>	select/cancel download character set
<b>ESC s 1</b>	<b>1B 73 01</b>	store user defined character in EEPROM
<b>SEC d 1</b>	<b>1B 64 01</b>	restore user defined character from EEPROM

<b>ESC S n</b>	<b>1B 53 n</b> <b>31h&lt;=n&lt;=35h</b>	save current display data as n'th layer in EEPROM
<b>ESC D n m</b>	<b>1B 44 n m</b> <b>01&lt;=n&lt;=1Fh</b> <b>31h&lt;=m&lt;=33h</b>	display saved data from EEPROM as animated message. Bit position in <i>n</i> selects the layer to be displayed.
<b>ESC * n</b>	<b>1B 2A n</b> <b>01h&lt;=n&lt;=04h</b>	brightness adjustment
<b>ESC = n</b>	<b>1B 3D n</b>	select peripheral device

## CD5220 DISPLAY MODES DESCRIPTION

There are basically four display modes for the Customer Display. The user may choose the mode that is most appropriate for the application.

### Overwrite Mode

This is the default mode. **ESC DC1** and **ESC @** commands would also put the display into this mode. The cursor moves from left to right, if it is at the end of the line, it moves to the beginning of the other line. Characters are displayed at the current cursor position, overwriting what is originally there, the cursor is then moved to the next position.

### Vertical Scroll Mode

If the cursor is at the upper line it behaves like the **overwrite mode**. When it is at the end of the lower line, the next character would scroll the content of the lower line to upper line, the lower line is cleared and the cursor is moved to the beginning of the lower line.

### Horizontal Scroll Mode

In this mode the cursor stays in what ever line it is at, unless changed by cursor movement commands. When the cursor is not at the end of the line, the input character is displayed at current cursor position, the cursor is then moved right. Once at the end of the line, subsequent character input would scroll the current line left one position, and the new character is displayed at the end position. There is also a command, **ESC W**, to set display window in this mode. The effective display line would be limited within the window as defined by the command.

### String Mode

This mode is perhaps the simplest used. The two display lines are treated independently. Only two commands, **ESC QA** and **ESC QB**, are needed. **ESC QA** followed by a string of no more than twenty characters would display the

string on the upper line, left aligned. A **CR** (0Dh) character terminates the command. If the string is less than twenty characters in length, the rest of the display line is padded with blank. **ESC QB** does the same for the lower display line. The only other commands active in this mode are **CLR** and **CAN**. **CLR** would clear the display and change the Customer Display into **overwrite mode**. **CAN** clears the last line that was changed and change the Customer Display into **overwrite mode**. The initialization command, **Esc @**, has no effect in this mode.

## CD5220 COMMAND SET DESCRIPTION

**ESC DC1** /Set overwrite mode/

Dec. Format [027] [017]

Hex. Format: [1Bh] [11h]

Description: Set the display to overwrite mode. This is the default power on display mode.

**ESC DC2** /Set vertical scroll mode/

Dec. Format [027] [018]

Hex. Format: [1Bh] [12h]

Description: Set the display to vertical scroll mode.

**ESC DC3** /Set horizontal scroll mode/

Dec. Format [027] [019]

Hex. Format: [1Bh] [13h]

Description: Set the display to horizontal scroll mode.

**ESC QA** *d1d2d3 . . . dn* **CR** /Set string display mode, write string to upper line/

Dec.Format [027] [081] [065] *d1d2d3 . . . dn* [013]

Hex. Format: [1Bh] [51h] [41h] *d1d2d3 . . . dn* [0Dh]  
{ 20h <= *dn* <= FFh, 1 <= *n* <= 20 }

Description: Set string display mode, write to the upper line. The string display mode can be cancelled with **CLR** or **CAN**.

**ESC QB** *d1d2d3 . . . dn* **CR** /Set string display mode, write string to lower line/

Dec.Format [027] [081] [066] *d1d2d3 . . . dn* [013]

Hex. Format: [1Bh] [51h] [42h] *d1d2d3 . . . dn* [0Dh]

{ 20h <= *dn* <= FFh, 1 <= *n* <= 20 }

Description: Set string display mode, write to the lower line. The string display mode can be cancelled with **CLR** or **CAN**

### **ESC QD *d1d2d3 . . . dn* CR**

/Write string to the upper line and scroll the message continuously/

Dec.Format [027] [081] [068] *d1d2d3 . . . dn* [013]

Hex. Format: [1Bh] [51h] [44h] *d1d2d3 . . . dn* [0Dh]

{ 20h <= *dn* <= FFh, 1 <= *n* <= 20 }

Description: Scroll message continuously on the upper line. Upon receiving a new command, the upper line is cleared and the cursor is moved to the upper left end.

### **ESC [ A /Move cursor up/**

Dec. Format: [027] [091] [065]

Hex. Format: [1Bh] [5Bh] [41h]

Description: Move the cursor up one line.

When the cursor is at the upper line, this command operates differently depending on the display mode:

1. Overwrite mode: The cursor is moved to the same column on the lower line.
2. Vertical scroll mode: The characters displayed on the upper line are scrolled to the lower line, and the upper line is cleared. The cursor remains at the same position.
3. Horizontal scroll mode: The cursor is not moved.

### **ESC [ B /Move cursor down/**

#### **LF**

Dec. Format: [027] [091] [066]

[010]

Hex. Format: [1Bh] [5Bh] [42h]

[0Ah]

Description: Move the cursor down one line. When the cursor is at the lower line, this command operates differently depending on the display mode:

1. Overwrite mode:

The cursor is moved to the same column on the upper line.

2. Vertical scroll mode:

The characters displayed on the lower line are scrolled to the upper line, and the lower line is cleared. The cursor remains at the same position.

3. Horizontal scroll mode:

The cursor is not moved.



**ESC [ C** /Move cursor right/

**HT**

Dec. Format: [027] [091] [067]

[009]

Hex. Format: [1Bh] [5Bh] [43h]

[09h]

Description: Move the cursor one position to the right. When the cursor is at the right end, this command operates differently depending on the display mode:

1. Overwrite mode:

The cursor moves to the left end of the other line.

2. Vertical scroll mode:

When the cursor is at the upper right end, it is moved to the lower left end. When the cursor is at the lower right end, the lower line message is moved to the upper line. The lower line is cleared, and the cursor moves to the lower left end.

3. Horizontal scroll mode:

All characters on the current line are scrolled one to the left in the window. The cursor is not moved but the character area at the right end of the window is cleared.

**ESC [ D** /Move cursor left/

**BS**

Dec. Format [027] [091] [068]

[008]

Hex. Format: [1Bh] [5Bh] [44h]

[08h]

Description: Move the cursor one position to the left. When the cursor is at the left end, this command operates differently depending on the display mode:

1. Overwrite mode:

The cursor moves to the right end of the other line.

2. Vertical scroll mode:

When the cursor is at the lower left end, it is moved to the upper right end. When the cursor is at the upper left end, the upper line message is moved to the lower line. The upper line is cleared, and the cursor moves to the upper right end.

3. Horizontal scroll mode:

All characters on the current line are scrolled one to the right in the window. The cursor is not moved but the character area at the left end of the window is cleared.

**ESC [ H** /Move cursor to home position/

**HOM**

Dec. Format: [027] [091] [072]

[011]

Hex. Format: [1Bh] [5Bh] [48h]  
[0Bh]

Description: Move the cursor to the left-most position on the upper line.

**ESC [ L** /Move cursor to left-most position/

**CR**

Dec. Format: [027] [091] [076]  
[013]

Hex. Format: [1Bh] [5Bh] [4Ch]  
[0Dh]

Description: Move the cursor to the left-most position on the current line.

**ESC [ R** /Move cursor to the right-most position/

Dec. Format: [027] [091] [082]

Hex. Format: [1Bh] [5Bh] [52h]

Description: Move the cursor to the right-most position on the current line.

**ESC [ K** /Move cursor to the bottom position/

Dec. Format: [027] [091] [075]

Hex. Format: [1Bh] [5Bh] [4Bh]

Description: Move the cursor to the right-most position on the lower line.

**ESC I**  $x\ y$  /Move cursor to the specified position/

Dec. Format: [027] [108]  $x\ y$  {01h  $\leq x \leq$  14h, 01h  $\leq y \leq$  02h}

Hex. Format: [1Bh] [6Ch]  $x\ y$

Description: Move the cursor to the  $x$ -th column on the  $y$ -th line.

**ESC @** /Initialize display/

Dec. Format: [027] [064]

Hex. Format: [1Bh] [40h]

Description: Clear the data in the input buffer and reset settings to power on defaults.

**CLR** /Clear display screen, and clear string mode/

Dec. Format: [012]

Hex. Format: [0Ch]

Description: Clear all the characters displayed, clear string mode.

**CAN** /Clear cursor line, and clear string mode/

Dec. Format: [024]

Hex. Format: [18h]

Description: Clear the line where the cursor is at, clear string mode.

**ESC \_ n** /Set cursor ON or OFF /

Dec. Format: [027] [095] *n* {00h <= *n* <= 01h}

Hex. Format: [1Bh] [5Fh] *n*

Description: Set cursor ON or OFF.

When *n* = 00h, cursor is set to OFF

When *n* = 01h, cursor is set to ON

**ESC W S XI X2 Y** /Set or cancel the window range at horizontal scroll mode/

Dec. Format: [027] [087] [000] [027] [087] [001] *x1 x2 y*

Hex. Format: [1Bh] [57h] [00h] [1Bh] [57h] [01h] *x1 x2 y*  
{01h <= *x1* <= *x2* <= 14h, 01h <= *y* <= 02h}

Description: Set or cancel the window on the display screen.

When *s* = 00h, window is cancelled.

When *s* = 01h, window is set, where *x1* and *x2* set the position of the left-most and the right-most columns of the window. *y* sets the upper or lower line. The window is effective in the horizontal scroll mode.

**ESC f n** /Select International font set/

Dec. Format: [027] [102] *n*

Hex. Format: [1Bh] [66h] *n*

Description: Select international font. Character codes 00h - 7Fh.

n	International Font Set	n	International Font Set
'A'	U.S.A	'L'	Slavonic
'D'	Denmark I	'N'	Norway
'E'	Denmark II	'R'	Russia
'F'	France	'S'	Spain
'G'	Germany	'U'	U.K.
'I'	Italy	'W'	Sweden
'J'	Japan		

**ESC c** *n* /Select code set /

Dec. Format: [027] [099] *n*

Hex. Format: [1Bh] [63h] *n*

Description: Select international code set. Character codes 80h – FFh

n	International Code Set
‘A’	Comply with ASCII code: PC437
‘J’	Comply with JIS code: Katkana
‘L’	Comply with Slavonic code
‘R’	Comply with Russia code

**ESC &** *n m a(pl..pa)x(m-n+1)* /Define user-defined characters and store in Flash-ROM/

Dec. Format: [027] [038] *n m [a(pl..pa)x(m-n+1)]*

Hex. Format: [1Bh] [26h] *n m [a(pl..pa)x(m-n+1)]*

{ 20h <= *n* <= *m* <= FFh }

{ 00h <= *a* <= 05h }

{ 00h <= *p* <= FFh }

{ (*m-n+1*) <= 12 }

Description: Define user-defined characters.

*n*: Starting character code to be defined

*m*: Final character code to be defined

*a*: Numbers of columns in a character font, if *a* < 05h then the undefined columns at right side are filled with off.

*p*: Pattern data. Each byte represents the font pattern of one column.

**ESC ?** *n* /Undefine user-defined character /

Dec. Format: [027] [063]  $n$  {20h<= $n$ <=FFh}

Hex. Format: [1Bh] [3Fh]  $n$

Description: Undefine character code  $n$  previously defined by user. Built-in font is used subsequently.

**ESC %  $n$**  /Select/cancel user-defined character set/

Dec. Format: [027] [037]  $n$

Hex. Format: [1Bh] [25h]  $n$

Description:

$n$  = 00h: Cancel user-defined character set. Built-in character set is used.

$n$  = 01h: Enable user-defined character set.

**ESC s 1** /Store user-defined character in EEPROM/

Dec. Format: [027] [115] [001]

Hex. Format: [1Bh] [73h] [01h]

Description: This command is valid only if the display is in enable mode, as set by Esc = command.

**ESC d 1** /Restore user-defined character from EEPROM/

Dec. Format: [027] [100] [001]

Hex. Format: [1Bh] [64h] [01h]

Description: Restore user-defined character pattern that was previously stored by **Esc s 1** command.

**ESC S  $n$**  /Save current display data in EEPROM/

Dec. Format: [027] [083]  $n$  {31h<= $n$ <=35h}

Hex. Format: [1Bh] [53h]  $n$

Description: Store the current display image for future demo display.  $n$ =31h: save image in layer 1.

$n$ =32h: save image in layer 2.

...

$n$ =35h: save image in layer 5.

**ESC D  $n m$**  /Display saved data from EEPROM/

Dec. Format: [027] [068]  $n m$  {01h <=  $n$  <= 1Fh}

Hex. Format: [1Bh] [44h]  $n m$  {31h <=  $m$  <= 33h}

Description: The data saved by **ESC S  $n$**  can be displayed by this command. The layer to be displayed is selected by the bit position within the byte of  $n$ . For example,  $n$ =01h selects layer 1,  $n$ =02h selects layer 2,  $n$ =10h selects layer 5. More than one layer can be selected by specifying more than one bit to one in  $n$ , ie.  $n$ =05h selects layers one and three. When more than one layer is selected, they will be displayed in sequence. The parameter, **M**, sets the message animation method. There are two types,

$m=31h$  and  $m=32h$ . If  $m=33h$ , the two methods will be applied alternately.

**ESC \*  $n$**  /Adjust brightness/

Dec. Format: [027] [042]  $n$  {01h  $\leq n \leq$  04h}

Hex. Format: [1Bh] [2Ah]  $n$

Description: Adjust display brightness

**ESC =  $n$**  /Set output device mode/

Dec. Format: [027] [061]  $n$  {01h  $\leq n \leq$  03h}

Hex. Format: [1Bh] [3Dh]  $n$

Description: Set output device mode

$n = 01h$ , display disable, next device enable

$n = 02h$ , display enable, next device disable

$n = 03h$ , display enable, next device enable

## AEDEX COMMAND SET TABLE

Command	Hex Code	Description
<b>! # 1 d1...d20 CR</b>	<b>21 23 31 d1...d20 0D</b>	<b>Display string on upper line</b>
<b>! # 2 d1...d20 CR</b>	<b>21 23 32 d1...d20 0D</b>	<b>Display string on lower line</b>
<b>! # 4 d1...d20 CR</b>	<b>21 23 34 d1...d20 0D</b>	<b>Display string on upper line and scroll continuously</b>
<b>! # 5 hh mm CR</b>	<b>21 23 35 hh mm 0D</b>  <b>h,m <math>\leq</math> 9</b> <b>00h<math>\leq</math>hh<math>\leq</math>23h</b> <b>00h<math>\leq</math>mm<math>\leq</math>59h</b>	<b>Display time</b>
<b>! # 6 d1...d20 CR</b>	<b>21 23 36 d1...d20 0D</b>	<b>Display string on upper line and scroll once</b>
<b>! # 8 n m CR</b>	<b>21 23 38 n m 0D</b>  <b>20h<math>\leq</math> n,m</b>	<b>Change attention code</b>
<b>! # 9 d1...d40 CR</b>	<b>21 23 39 d1...d40 0D</b>	<b>Display string on two lines</b>

## DSP800 COMMAND SET TABLE

Command	Hex Code	Description
EOT SOH P <i>n</i> ETB	04 01 50 <i>n</i> 17 31h<= <i>n</i> <=58h	move cursor to specified position
EOT SOH C <i>n m</i> ETB	04 01 43 <i>n m</i> 17 31h<= <i>n</i> <= <i>m</i> <=58h	clear display range from position <i>n</i> to position <i>m</i> and move cursor to position <i>n</i>
EOT SOH S <i>n</i> ETB	04 01 53 <i>n</i> 17 31h<= <i>n</i> <=35h	save current display data to <i>n</i> 'th layer in EEPROM
EOT SOH D <i>n m</i> ETB	04 01 44 <i>n m</i> 17 01h<= <i>n</i> <=1Fh 31h<= <i>m</i> <=37h Or 1<= <i>m</i> <= 7	display data saved in EEPROM. Bit position in <i>n</i> selects the layers to be displayed. Please see note below.
EOT SOH A <i>n</i> ETB	04 01 41 <i>n</i> 17 31h<= <i>n</i> <=34h	adjust brightness
EOT SOH F <i>n</i> ETB	04 01 46 <i>n</i> 17 00h<= <i>n</i> <=FFh	blink display 0:disable Others: <i>n</i> *50mS
EOT SOH I <i>n</i> ETB	04 01 49 <i>n</i> 17	select international character set <i>n</i> =0Fh, select user-define others: hi-nibble select 80-ff Char. lo-nibble select 00-7f Char.
EOT SOH & <i>n p1...p5</i> ETB	04 01 26 <i>n p1..p5</i> 17 20h<= <i>n</i>	define user-defined character
EOT SOT ? <i>n</i> ETB	04 01 3F <i>n</i> 17 20h<= <i>n</i>	delete user-defined character

<b>EOT SOH = n ETB</b>	04 01 3D <i>n</i> 17 <i>n</i> =1,2	select peripheral device. <i>n</i> =1: next device <i>n</i> =2: display
<b>EOT SOH % ETB</b>	04 01 25 17	initialize display
<b>EOT SOH @ ETB</b>	04 01 40 17	self test
<b>ESC G</b>	1B 47	Enable AUX-DEVICE
<b>ESC S</b>	1B 53	Disable AUX-DEVICE

\* When using **display data saved in EEPROM** command (**EOT SOH D**), the data layer is selected by the bit position within a byte in *n*. For example *n*=01h selects layer one, *n*=04h selects layer three, whereas *n*=05h selects both layer one and three. When more than one layer is selected, they will be displayed in sequence.

## EPSON COMMAND SET TABLE

Command	Hex Code	Description
<b>HT</b>	09	move cursor right
<b>BS</b>	08	move cursor left
<b>US LF</b>	1F 0A	move cursor up
<b>LF</b>	0A	move cursor down
<b>US CR</b>	1F 0D	move cursor to right-end
<b>CR</b>	0D	move cursor to left-end
<b>HOM</b>	0B	move cursor to home position
<b>US B</b>	1F 42	move cursor to bottom position
<b>US \$ x y</b>	1F 24 x y 01h<=x<=14h y=01h, 02h	move cursor to position specified
<b>CLR</b>	0C	clear display
<b>CAN</b>	18	clear cursor line
<b>US C n</b>	1F 43 n n=00h, 01h	set/cancel cursor display. n=0 hides cursor, n=1 displays cursor
<b>ESC t n</b>	1B 74 n 00h<=n<=07h	select code table for character range 80h-FFh
<b>ESC R n</b>	1B 52 n 00h<=n<=0Fh	select international character set for character range 20h-7Fh
<b>US r n</b>	1F 72 n n=00h, 01h	set/cancel reverse character
<b>US MD1</b>	1F 01	set overwrite mode
<b>US MD2</b>	1F 02	set vertical scroll mode



<b>US MD3</b>	1F 03	set horizontal scroll mode
<b>ESC W n s x1 y1 x2 y2</b>	1B 57 n s x1 y1 x2 y2 01h<=n<=02h S=00,01h 01h<=x1<=x2<=14h 01h<=y1<=y2<=14h	set/cancel window range but It only support Horizontal scroll mode, n=1 X1/Y1 be used for up-line N=2 X2/Y2 be used for low-line S=0 cancel range; S=1 set range

Command	Hex Code	Description
<b>ESC % n</b>	1B 25 n n=00h, 01h	select/cancel user-defined character set
<b>ESC &amp; s n m</b> <b>[a(p1..pa)]x(m-n)</b>	1B 26 01 n m ... 20h<n<=m<=FFh 01h<=a<=05h 00h<=p<=FFh	define user-defined character
<b>ESC ?</b>	1B 3F	delete user-defined character
<b>ESC s 1</b>	1B 73 01	store user-defined characters in EEPROM
<b>ESC d 1</b>	1B 64 01	load user-defined characters from EEPROM
<b>US :</b>	1F 3A	set start/ending position of macro definition
<b>US ^ n m</b>	1F 5E n m 00h<=n<=FFh 00h<=m<=FFh	execute then quit macro n: Char. delay-time x50mS m: replay delay-time x50mS
<b>US T h m</b>	1F 54 h m 00h<=h<=23h 00h<=m<=59H	set and display time counter. The time is in <i>hh:mm:ss</i> format, displayed on the bottom right corner. Any command moving the cursor to the bottom line would disable the time display,
<b>US U</b>	1F 55	display the time counter at the bottom right corner. If the counter was not set previously with Us T command, its containt starts from the last time the display was initialized.
<b>US E n</b>	1F 45 n 01h<=n<=FFh	blink display in n x 50mS interval.
<b>US X n</b>	1F 58 n 01h<=n<=04h	adjust brightness
<b>ESC @</b>	1B 40	initialize display
<b>US @</b>	1F 40	self test
<b>ESC = n</b>	1B 3D n N=01h, 02h, 03h	select preipheral device n=01h: select next device n=02h: select display

		<i>n</i> =03h: select display and next device
<b>US ,</b>	1F 2C <i>n</i>	This command displays a comma mark (CM) at the position of the cursor. <b>n=0x0a, mark ON; others OFF</b>
<b>US .</b>	1F 2E <i>n</i>	This command displays a period mark (PM) at the position of the cursor. <b>n=0x0a, mark ON; others OFF</b>
<b>US ;</b>	1F 3B <i>n</i>	This command displays a semicolon mark (comma and period marks, CM + PM) at the position of the cursor. <b>n=0x0a, mark ON; others OFF</b>
<b>US &lt;</b>	1F 3C	This command clears marks (a comma mark, a period mark or comma and period marks; CM, PM or CM + PM) at the position of the cursor.

### International Font Set for Epson (20h-7Fh)

<b>n</b>	<b>International Font Set</b>	<b>n</b>	<b>International Font Set</b>
<b>00h</b>	<b>U.S.A</b>	<b>08h</b>	<b>Japan</b>
<b>01h</b>	<b>France</b>	<b>09h</b>	<b>Norway</b>
<b>02h</b>	<b>Germany</b>	<b>0Ah</b>	<b>Denmark II</b>
<b>03h</b>	<b>U.K.</b>	<b>0Bh</b>	<b>Slavonic</b>
<b>04h</b>	<b>Denmark I</b>	<b>0Ch</b>	<b>Russia</b>
<b>05h</b>	<b>Sweden</b>	<b>0Dh</b>	<b>Hebrew</b>
<b>06h</b>	<b>Italy</b>	<b>0Eh</b>	<b>Greek</b>
<b>07h</b>	<b>Spain</b>	<b>0Fh</b>	<b>Reserved</b>

### Code Table for Epson

<b>n</b>	<b>International Font Set (80h - FFh)</b>
<b>00h</b>	Page 0: PC437: U.S.A., standard Europe
<b>01h</b>	Page 1: Katakana for Japan
<b>02h</b>	Page 2: PC858: multilingual
<b>03h</b>	Page 3: PC860: Portuguese
<b>04h</b>	Page 4: PC863: Canadian-French
<b>05h</b>	Page 5: PC865: Nordic
<b>06h</b>	Page 6: Russia
<b>07h</b>	Page 7: Slavonic

## Font

## FONT TABLES

	0	1	2	3	4	5	6	7
0				0	@	P	`	p
1			!	1	A	Q	a	q
2			"	2	B	R	b	r
3			#	3	C	S	c	s
4			\$	4	D	T	d	t
5			%	5	E	U	e	u
6			&	6	F	V	f	v
7			'	7	G	W	g	w
8			(	8	H	X	h	x
9			)	9	I	Y	i	y
A			*	:	J	Z	j	z
B			+	;	K	[	k	{
C			,	<	L	\	l	!
D			-	=	M	]	m	}
E			.	>	N	^	n	~
F			/	?	O	_	o	

USA Font Set (00h - 7Fh)

n	Country	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
0	USA	#	\$	@	[	\	]	^	`	{		}	~
1	France	#	\$	£	°	ç	è	é	ê	ë	ü	û	ü
2	Germany	#	\$	€	À	Á	Â	Ã	Ä	Å	Ö	Ø	Ù
3	U.K.	#	\$	@	[	\	]	^	`	{		}	~
4	Denmark I	#	\$	@	Æ	Ø	Å	Ä	Å	Ö	Ø	Å	Ü
5	Sweden	#	Ö	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
6	Italy	#	\$	@	°	\	é	è	ù	à	ò	è	ì
7	Spain	Ñ	\$	@	¡	Ñ	¿	^	`	~	Ñ	}	~
8	Japan	#	\$	@	[	*]	^	`	{		}	~	
9	Norway	#	Ö	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
10	Denmark II	#	\$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
11	Slavonic	#	\$	@	[	\	]	^	`	{		}	~
12	Russia	#	\$	@	[	\	]	^	`	{		}	~

Font Variations (00h - 7Fh)

	8	9	A	B	C	D	E	F
0	0	1	2	3	4	5	6	7
1	8	9	A	B	C	D	E	F
2	G	H	I	J	K	L	M	N
3	O	P	Q	R	S	T	U	V
4	W	X	Y	Z	[	\	]	^
5	_	`	a	b	c	d	e	f
6	g	h	i	j	k	l	m	n
7	o	p	q	r	s	t	u	v
8	w	x	y	z	{		}	~
9								
A								
B		¡	¢	£	¤	¥	¦	§
C	¨	©	ª	«	¬	­	®	¯
D	°	±	²	³	´	µ	¶	·
E	¸	¹	º	»	¼	½	¾	¿
F								

PC-437 Font Set

	8	9	A	B	C	D	E	F
0	0	1	2	3	4	5	6	7
1	8	9	A	B	C	D	E	F
2	G	H	I	J	K	L	M	N
3	O	P	Q	R	S	T	U	V
4	W	X	Y	Z	[	\	]	^
5	_	`	a	b	c	d	e	f
6	g	h	i	j	k	l	m	n
7	o	p	q	r	s	t	u	v
8	w	x	y	z	{		}	~
9								
A								
B		¡	¢	£	¤	¥	¦	§
C	¨	©	ª	«	¬	­	®	¯
D	°	±	²	³	´	µ	¶	·
E	¸	¹	º	»	¼	½	¾	¿
F								

PC-858 Font Set

	8	9	A	B	C	D	E	F
0	☺	☹	☼	☼	☼	☼	☼	☼
1	☹	☹	☹	☼	☼	☼	☼	☼
2	☹	☹	☼	☼	☼	☼	☼	☼
3	☹	☹	☼	☼	☼	☼	☼	☼
4	☹	☹	☼	☼	☼	☼	☼	☼
5	☹	☹	☼	☼	☼	☼	☼	☼
6	☹	☹	☼	☼	☼	☼	☼	☼
7	☹	☹	☼	☼	☼	☼	☼	☼
8	☹	☹	☼	☼	☼	☼	☼	☼
9	☹	☹	☼	☼	☼	☼	☼	☼
A	☹	☹	☼	☼	☼	☼	☼	☼
B	☹	☹	☼	☼	☼	☼	☼	☼
C	☹	☹	☼	☼	☼	☼	☼	☼
D	☹	☹	☼	☼	☼	☼	☼	☼
E	☹	☹	☼	☼	☼	☼	☼	☼
F	☹	☹	☼	☼	☼	☼	☼	☼

PC-860 Font Set

	8	9	A	B	C	D	E	F
0	☺	☹	☼	☼	☼	☼	☼	☼
1	☹	☹	☼	☼	☼	☼	☼	☼
2	☹	☹	☼	☼	☼	☼	☼	☼
3	☹	☹	☼	☼	☼	☼	☼	☼
4	☹	☹	☼	☼	☼	☼	☼	☼
5	☹	☹	☼	☼	☼	☼	☼	☼
6	☹	☹	☼	☼	☼	☼	☼	☼
7	☹	☹	☼	☼	☼	☼	☼	☼
8	☹	☹	☼	☼	☼	☼	☼	☼
9	☹	☹	☼	☼	☼	☼	☼	☼
A	☹	☹	☼	☼	☼	☼	☼	☼
B	☹	☹	☼	☼	☼	☼	☼	☼
C	☹	☹	☼	☼	☼	☼	☼	☼
D	☹	☹	☼	☼	☼	☼	☼	☼
E	☹	☹	☼	☼	☼	☼	☼	☼
F	☹	☹	☼	☼	☼	☼	☼	☼

PC-863 Font Set

	8	9	A	B	C	D	E	F
0	Ɔ	é	á	⊗	Ł	μ	α	Ξ
1	Ü	æ	í	⊗	±	τ	β	±
2	é	E	ó	■	τ	π	Γ	≥
3	á	ó	ó	l	†	μ	Π	≤
4	ä	ö	ñ	†	—	Ł	Σ	†
5	ä	ö	ñ	†	+	F	Ö	J
6	ä	ö	æ	†	†	π	μ	÷
7	Ɔ	ó	ó	π	†	†	τ	⊗
8	æ	ó	ó	†	Ł	+	⊗	°
9	é	ö	—	†	†	†	⊗	°
A	é	ö	—	†	Ł	†	⊗	°
B	í	⊗	ξ	π	τ	■	ξ	Γ
C	í	E	⊗	μ	†	■	⊗	°
D	í	⊗	í	μ	=	■	⊗	2
E	ä	⊗	⊗	†	†	■	E	■
F	ä	†	⊗	†	±	■	†	

PC-865 Font Set

	8	9	A	B	C	D	E	F
0	Ɔ	é	á	⊗		†	ó	—
1	Ü	Ł	í	⊗		†	β	°
2	é	í	ó	⊗		ä	ö	.
3	ä	ö	ó	l		é	ñ	°
4	ä	ö	æ	†	—	ä	ñ	°
5	ö	Ł	æ	á	+	ñ	ñ	ξ
6	é	í	ξ	ä	ä	í	ξ	÷
7	Ɔ	ξ	ξ	é	ä	í	ξ	—
8	í	ξ	é	ξ		é	†	°
9	é	ö	æ				ó	°
A	ö	ö				†		
B	ö	†	ξ			■	ó	ó
C	í	†	é			■	ó	ξ
D	ξ	í	é	ä	=	†	ó	ξ
E	ä	×	⊗	ä		ó	†	■
F	é	é	⊗		⊗	■	°	

Slavonic Font Set



	8	9	A	B	C	D	E	F
0	А	Р	а				Р	а
1	Б	С	Е				С	Е
2	В	Т	В				Т	К
3	Г	У	Г				У	Н
4	О	Ф	а				Ф	Ө
5	Е	Х	е				Х	У
6	Ж	Ч	ж				Ч	У
7	З	4	з				4	н
8	И	У	И				У	э
9	Й	У	Й				У	Р
A	К	б	к				б	К
B	Л	М	л				М	Н
C	М	Ь	м				Ь	Ө
D	Н	Э	Н				Э	У
E	О	М	о				М	У
F	П	Я	п				Я	

Russia Font Set

	8	9	A	B	C	D	E	F
0	ㇰ	ㇱ		ㇲ	ㇳ	ㇴ	ㇵ	ㇶ
1	ㇷ	ㇸ	ㇹ	ㇺ	ㇻ	ㇼ	ㇽ	ㇾ
2	ㇿ	㈀	㈁	㈂	㈃	㈄	㈅	㈆
3	㈇	㈈	㈉	㈊	㈋	㈍	㈎	㈏
4	㈐	㈑	㈒	㈓	㈔	㈕	㈖	㈗
5	㈙	㈚	㈛	㈜	㈝	㈞	㈟	㈠
6	㈡	㈢	㈣	㈤	㈦	㈧	㈨	㈩
7	㈪	㈫	㈬	㈭	㈮	㈯	㈰	㈱
8	㈲	㈳	㈴	㈵	㈶	㈷	㈸	㈹
9	㈺	㈻	㈼	㈽	㈾	㈿	㉀	㉁
A	㉂	㉃	㉄	㉅	㉆	㉇	㉈	㉉
B	㊀	㊁	㊂	㊃	㊄	㊅	㊆	㊇
C	㊈	㊉	㊊	㊋	㊌	㊍	㊎	㊏
D	㊑	㊒	㊓	㊔	㊕	㊖	㊗	㊘
E	㊙	㊚	㊛	㊜	㊝	㊞	㊟	㊠
F	㊡	㊢	㊣	㊤	㊥	㊦	㊧	㊨

Katakana Font Set

RoHS

				GIR2002A-BNFE				PAGE : 1 / 1	
				Product :		Donlin		CHECKED :	
				Hazel		DRAWN :			
				DATE		2011.02.11		REV 02	
				UNIT : mm		SCALE : 1 / 1		SHEET : 1 / 1	
				修改内容					
日期				版本					
110315				01		修改connect位置，(原在中間，現在往左移)。			
110720				02		修改connect位置，(原在左邊，現在改回中間)。			