

# LCD Controller Manual

## MSMF320240-2 V5.00B Version 1.0

84-2

305

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## 2. MSMF320240-2 V5.00B Connector

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- 2-2 Backlight Power Connector
- 2-3 RS-232C Connector
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[ 1.] MSMF320240-2 V5.00B

Special Font

## 1. MSMF320240-2 V5.00B

### ◆ MSMF320240-2 V5.00B

◆ LCD Resolution : FSTN Mono 320\*240 dots

◆

KS5601

◆ LCD Bias Voltage 가

◆ LCD Back Light : Inverter \_On/Off 가

◆ Font : 16\*16 dots

16\*16 dots

8\*16 dots

8\*16 dots

16\*16

◆ Touch Panel Interface

◆ Image Memory Built-in

320\*240 BMP 53 [Page] 가

(Serial overwrite program )

Font

,

/

,

/

### ◆ MSMF320240-2 V5.00B

◆ CPU : Atmega128-16AI

◆ Display Type : FSTN Mono 320\*240 dots

◆ : DC 5[V]

◆ LCD Backlight Inverter

◆ : RS-232C

=> 4800, 9600, 19200, 57600, 115200 [bps]

(Default 57600[bps]) : Software

=> 9600, 19200, 57600, 115200 [bps] : Hardware

## ◆ MSMF320240-2 V5.00B

- ◆ Text Layer, Graphic Layer : Layer ON/OFF
- ◆ , : 가 2 , 2 , 가 2
- ◆ Graphic : , Line, Rectangle, ,
- ◆ LCD Bias Voltage
- ◆ / Font
- ◆ 320\*240 Mono BMP Image display 가 ( 53 [Page] )
- ◆ Image display Text/Graphic Layer 가 (default Text Layer)
- ◆
- ◆ Cursor , Cursor ,Cursor Off
- ◆ : Enter
- ◆ Backspace
- ◆
- ◆ Clear : Block Clear , Clear
- ◆
- ◆ Rectangle : Text Layer, Graphic Layer

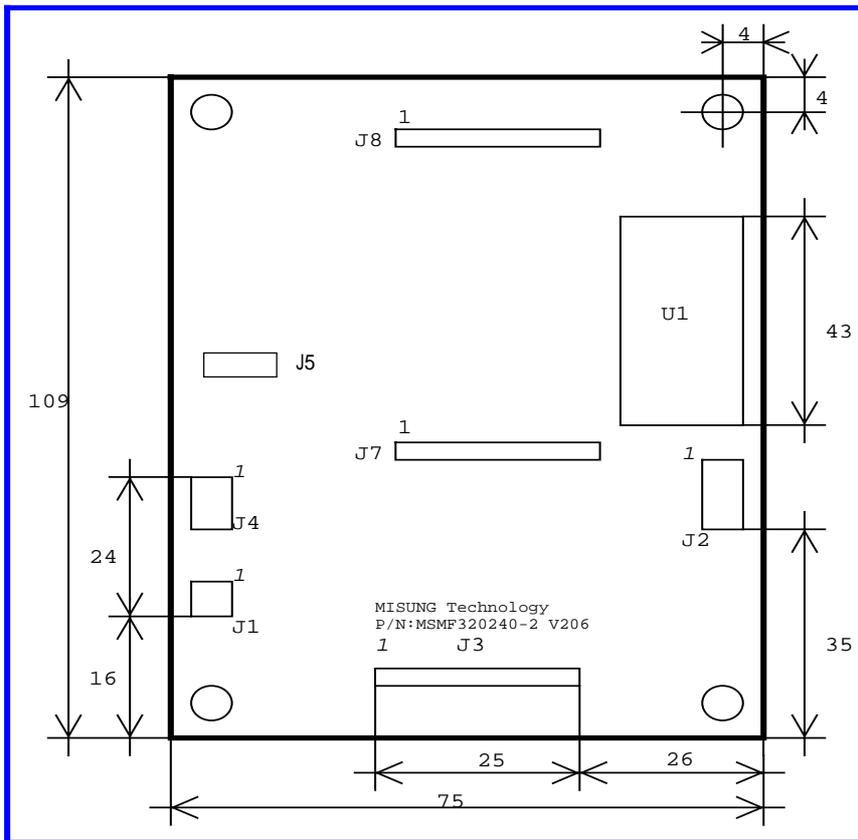
2. MSMF320240-2 V5.00B Connector

2 MSMF320240-2 V5.00B Dimensions Connector .

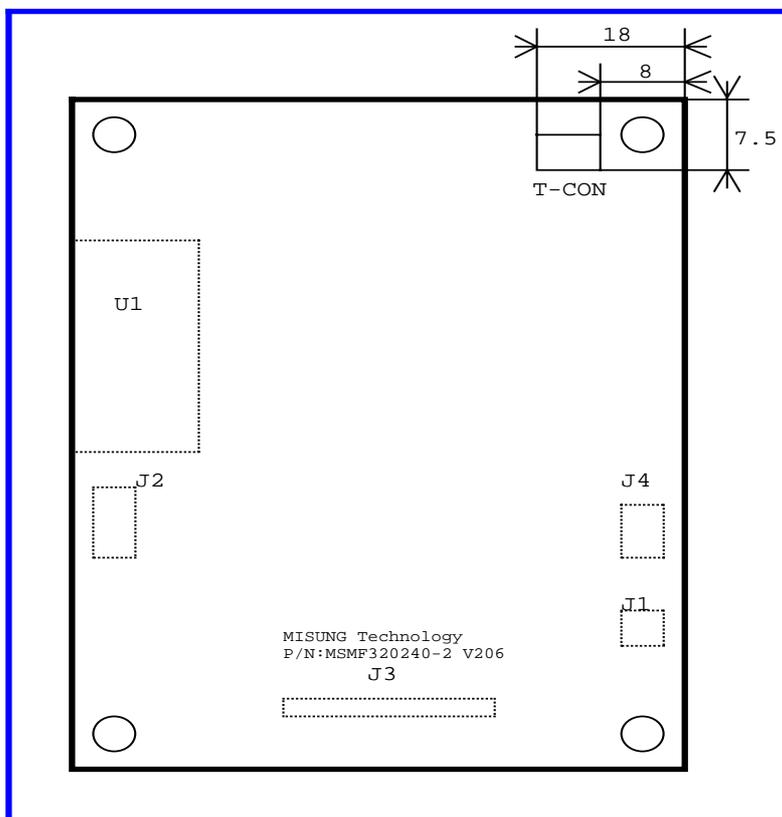
MSMF320240-2 V5.00B



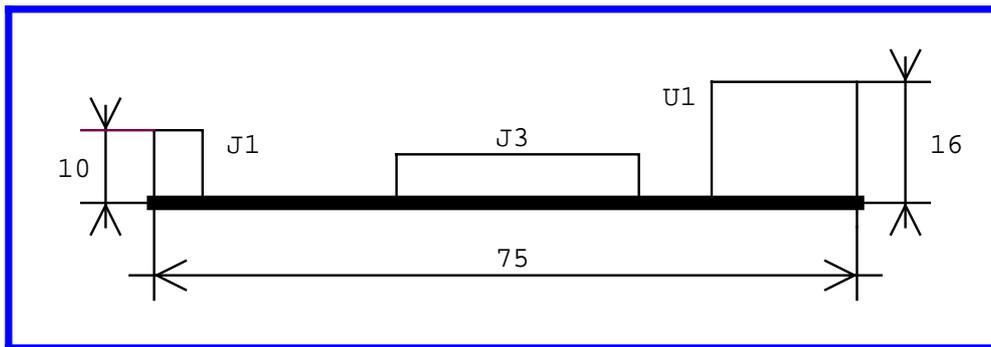
**MSMF320240-2 V5.00B Dimensions**



**MSMF320240-2 V5.00B Dimensions**



## MSMF320240-2 V5.00B



## 2-1. LCD Module Interface Connector : J3

Pin Number	Symbol	Description
1	VSS	GND
2	VDD	+5 VDC
3	VO	Voltage for LCD Logic
4	A0	Data
5	/WR	Data write signal
6	/RD	Data read signal
7	D0	Data
8	D1	Data
9	D2	Data
10	D3	Data
11	D4	Data
12	D5	Data
13	D6	Data
14	D7	Data
15	/CS	Chip select signal
16	/RST	Reset
17	VEE	Voltage for LCD Drive
18	SEL1	Data
19	NC	Not use
20	NC	Not use
21	NC	Not use
22	NC	Not use

**2-2. Backlight Power Connector : J2**

Pin Number	Symbol	Description
1	OUT	CCFL OUT
2	OPEN	OPEN
3	OPEN	OPEN
4	OUT_COM	CCFL_COM OUT

**2-3. RS-232C Connector : J4**

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

**2-4. Power Connector : J1**

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

**2-5. Touch Connector : T-CON**

Pin Number	Symbol	Description
1	X+	
2	Y-	
3	X-	
4	Y+	

**2-6. Expansion Memory Interface : J7**

Pin Number	Symbol	Description
1	VCC	+5 [VDC]
2	Open	Not use
3	Data	use
4	Data	use
5	Date	use
6	Date	use
7	Open	Not use
8	GND	GND

**2-6-1. Expansion Memory Interface : J8**

Pin Number	Symbol	Description
1	D0	Data
2	D1	Data
3	D2	Data
4	D3	Data
5	D4	Data
6	D5	Data
7	D6	Data
8	D7	Data

## 3.

'Esc' = 0x1b [hex]

			Parameter	
'Esc'	'K'	'0x01'		3-1-1
		'0x02'	KS5601	
		'0x03'	(default)	
		'0x04'		
'Esc'	'E'	'0x01'		3-1-2
		'0x02'		
		'0x03'	(default)	
		'0x04'		
'Esc'	'P'	'0x01'	Text Layer ON	3-1-3
		'0x02'	Text Layer ON	
		'0x03'	Graphic Layer ON	3-1-4
		'0x04'	Graphic Layer ON	
		'0x05'	Text Layer ON	3-1-5
		'0x06'	Text Layer OFF	
		'0x07'	Text Layer Font ON	3-1-6
		'0x08'	Text Layer Font 가 ON	
		'0x09'	Text Layer Font ON	
		'0x0a'	Text Layer Font OFF	3-1-7
		'0x0b'	Serial baud rate 4800 [bps]	
		'0x0c'	Serial baud rate 9600 [bps]	
		'0x0d'	Serial baud rate 19200 [bps]	
'0x0e'	Serial baud rate 57600 [bps] (default)	3-1-8		
'0x0f'	Text Layer ON			
'0x10'	Text Layer OFF			
'0x11'	Graphic Layer ON			
'0x12'	Graphic Layer OFF			
'0x13'	Serial baud rate 115200 [bps]			
'Esc'	'D'	'0x01'	Text Layer clear	3-1-9
		'0x02'	(X1,Y1,X2,Y2) Text Layer clear (X1,Y1,X2,Y2 hex 가 :0x00 ~ 0x27 :0x00 ~ 0x0e)	
		'0x03'	Graphic Layer clear	
		'0x04'	(X1,Y1,X2,Y2) Graphic Layer clear (X1, Y1, X2, Y2 hex 가 :0x000 ~ 0x13f :0x00 ~ 0xEf)	

			Parameter		
'Esc'	'C'	'0x01'	(X,Y)	Text Layer X,Y cursor Text Display (X,Y hex 가 :0x00 ~ 0x27 :0x00 ~ 0x0e)	3-1-10
		'0x02'		Text Layer cursor	
		'0x03'		Text Layer cursor 8bit Line	
		'0x04'		Text Layer cursor 8 x 16 dot	
		'0x05'		Cursor off	
'Esc'	'R'	'0x01'	(X1,Y1,X2,Y2)	Text Layer 1 Line Rectangle (X1,Y1,X2,Y2 hex 가 :0x00 ~ 0x27 :0x00 ~ 0x0e)	3-1-11
		'0x02'	(X1,Y1,X2,Y2)	Text Layer 2 Line Rectangle (X1,Y1,X2,Y2 hex 가 :0x00 ~ 0x27 :0x00 ~ 0x0e)	
'Esc'	'B'	'0x01'		Text Layer ON	3-1-12
		'0x02'		Text Layer OFF	
		'0x03'		Graphic Layer ON	
		'0x04'		Graphic Layer OFF	
'Esc'	'L'	'0x01'		CCFL Power ON	3-1-13
		'0x02'		CCFL Power OFF	
'Esc'	'V'	'0x01'		LCD Bias Voltage UP	3-1-14
		'0x02'		LCD Bias Voltage DOWN	
		'0x03'		LCD Bias Voltage 0~1023 2Byte ex) 385 'Esc' 'V' '0x03' '385/256' '385%256'	
'Esc'	'S'		LCD Bias Voltage Serial Baud rate <b>MSMF320240-2 Rebooting</b>	3-1-15	
'Esc'	'G'	'0x01'	(X,Y)	Graphic Layer _____ X:0x000 ~ 0x13f Y:0x00 ~ 0xEf	3-1-16
		'0x02'	(X,Y)	Graphic Layer _____ X:0x000 ~ 0x13f Y:0x00 ~ 0xEf	
'Esc'	'G'	'0x03'	(X1,Y1,X2,Y2)	Graphic Layer <u>Line</u> X1,X2:0x000 ~ 0x13f Y1,Y2:0x00 ~ 0xEf	3-1-17
		'0x04'	(X1,Y1,X2,Y2)	Graphic Layer <u>Line</u> X1,X2:0x000 ~ 0x13f Y1,Y2:0x00 ~ 0xEf	
'Esc'	'G'	'0x05'	(X1,Y1,X2,Y2)	Graphic Layer <u>Rectangle</u> X1,X2:0x000 ~ 0x13f Y1,Y2:0x00 ~ 0xEf	3-1-18
		'0x06'	(X1,Y1,X2,Y2)	Graphic Layer <u>Rectangle</u> X1,X2:0x000 ~ 0x13f Y1,Y2:0x00 ~ 0xEf	
		'0x07'	(X1,Y1,X2,Y2)	Graphic Layer <u>Rectangle</u> X1,X2:0x000 ~ 0x13f Y1,Y2:0x00 ~ 0xEf	
		'0x08'	(X1,Y1,X2,Y2)	Graphic Layer <u>Rectangle</u> X1,X2:0x000 ~ 0x13f Y1,Y2:0x00 ~ 0xEf	

			Parameter		
		'0x09'	(X,Y,radius)	Graphic Layer _____ X Y X:0x000 ~ 0x13f Y:0x00 ~ 0xEf Radius :0x00 ~ 0x78	3-1-19
		'0x0a'	(X,Y,radius)	Graphic Layer _____ X Y X:0x000 ~ 0x13f Y:0x00 ~ 0xEf Radius :0x00 ~ 0x78	
		'0x0b'	(X,Y,radius)	Graphic Layer _____ X Y X:0x000 ~ 0x13f Y:0x00 ~ 0xEf Radius :0x00 ~ 0x78	
		'0x0c'	(X,Y,radius)	Graphic Layer _____ X Y X:0x000 ~ 0x13f Y:0x00 ~ 0xEf Radius :0x00 ~ 0x78	
		'0x0d'	(X,Y,a,b)	Graphic Layer _____ X Y X:0x000 ~ 0x13f Y:0x00 ~ 0xEf a :320/2 b :240/2	3-1-20
		'0x0e'	(X,Y,a,b)	Graphic Layer _____ X Y X:0x000 ~ 0x13f Y:0x00 ~ 0xEf a :320/2 b :240/2	
		'0x0f'	(X,Y,a,b)	Graphic Layer _____ X Y X:0x000 ~ 0x13f Y:0x00 ~ 0xEf a :320/2 b :240/2	
		'0x10'	(X,Y,a,b)	Graphic Layer _____ X Y X:0x000 ~ 0x13f Y:0x00 ~ 0xEf a :320/2 b :240/2	
'Esc'	'A'	'0x01'		Reset (MSMF320240-2 Rebooting)	3-1-21
		'0x02'		LCD Bias Voltage Serial Baudrate	
		'0x03'		Echo '0x06' Send	
'Esc'	'I'	'0x01'	(X)	Image One page draw (X 0x00~0x34)	3-1-22
		'0x02'		Select Text Layer (default)	
		'0x03'		Select Graphic Layer	
'Esc'	'T'	'0x01'		Touch start	3-1-23
		'0x02'		Touch end	
		'0x03'		Touch start -> Touch input -> Send to serial X,Y value coordinate -> Touch end	

3-1.

Parameter	'+'
'Esc' = 0x1b	
Graphic Layer	X
	MSMF320240-2 V5.00B
	byte
	X 가 1 byte
	( byte
	Graphic Layer
X(X1 X2)	.)

3-1-1.

	'ESC'+ 'K'
	'0x01' or '0x02' or '0x03' or '0x04'
Parameter	
	'ESC'+ 'K'+ '0x01' => 'ESC'+ 'K'+ '0x02' => KS5601 'ESC'+ 'K'+ '0x03' => (default) 'ESC'+ 'K'+ '0x04' =>

3-1-2.

	'ESC'+ 'E'
	'0x01' or '0x02' or '0x03' or '0x04'
Parameter	
	'ESC'+ 'E'+ '0x01' => ASCII 256 'ESC'+ 'E'+ '0x02' => 'ESC'+ 'E'+ '0x03' => (default) 'ESC'+ 'E'+ '0x04' =>

3-1-3. Text Layer

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

3-1-4. Graphic Layer

	'ESC'+ 'P'
	'0x03' or '0x04'
Parameter	
	'ESC'+ 'P'+ '0x03' => Graphic Layer 'ESC'+ 'P'+ '0x04' => Graphic Layer

3-1-5. Text Layer ON/OFF

	'ESC'+ 'P'
	'0x05' or '0x06'
Parameter	
	'ESC'+ 'P'+ '0x05' => Text Layer ON 'ESC'+ 'P'+ '0x06' => Text Layer OFF

### 3-1-6. Text Layer

	'ESC'+ 'P'
	'0x07' or '0x08' or '0x09' or '0x0a'
<b>Parameter</b>	
	'ESC'+ 'P'+ '0x07' => Text Layer Font 8*16 dots => 16*32 dots 16*16 dots => 32*32 dots 'ESC'+ 'P'+ '0x08' => Text Layer Font 가 8*16 dots => 16*16 dots 16*16 dots => 32*16 dots 'ESC'+ 'P'+ '0x09' => Text Layer Font 8*16 dots => 8*32 dots 16*16 dots => 16*32 dots 'ESC'+ 'P'+ '0x0a' => Text Layer Font OFF

### 3-1-7. Serial Baud Rate

	'ESC'+ 'P' (Software )																								
	'0x0b' or '0x0c' or '0x0d' or '0x0e'																								
<b>Parameter</b>																									
	'ESC'+ 'P'+ '0x0b' => Serial Baud Rate 4800[bps] 'ESC'+ 'P'+ '0x0c' => Serial Baud Rate 9600[bps] 'ESC'+ 'P'+ '0x0d' => Serial Baud Rate 19200[bps] 'ESC'+ 'P'+ '0x0e' => Serial Baud Rate 57600[bps] <b>115200[bps] =&gt; 3-1-8</b>																								
	S2 Head pin (Hardware )																								
	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="4">S2 Head pin</th> </tr> <tr> <th>NO</th> <th>3</th> <th>4</th> <th>(baudrate)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>0</td> <td>0</td> <td>9600</td> </tr> <tr> <td>2</td> <td>0</td> <td>1</td> <td>19200</td> </tr> <tr> <td>3</td> <td>1</td> <td>0</td> <td>57600</td> </tr> <tr> <td>4</td> <td>1</td> <td>1</td> <td>115200</td> </tr> </tbody> </table>	S2 Head pin				NO	3	4	(baudrate)	1	0	0	9600	2	0	1	19200	3	1	0	57600	4	1	1	115200
S2 Head pin																									
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1	0	0	9600																						
2	0	1	19200																						
3	1	0	57600																						
4	1	1	115200																						
	<table style="width: 100%; text-align: center;"> <tr> <td style="width: 33%;">                     NO.1 [9600]  </td> <td style="width: 33%;">                     NO.2 [19200]  </td> <td style="width: 33%;">                     NO.3 [57600] -&gt;default  </td> </tr> <tr> <td>                     NO.4 [115200]  </td> <td>                     Software Buadrate 1                      open .(2,3 )  </td> <td></td> </tr> <tr> <td>                      logo on mode                      Lcd Controller Booting 0 display .                 </td> <td></td> <td></td> </tr> <tr> <td>                      logo off mode                 </td> <td></td> <td></td> </tr> </table>	NO.1 [9600] 	NO.2 [19200] 	NO.3 [57600] ->default 	NO.4 [115200] 	Software Buadrate 1 open .(2,3 ) 		logo on mode Lcd Controller Booting 0 display .			logo off mode														
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logo off mode																									

**3-1-8. Text Layer, Graphic Layer ON/OFF**

	'ESC'+ 'P'
	'0x0f' or '0x10' or '0x11' or '0x12' or '0x13'
<b>Parameter</b>	
	'ESC'+ 'P'+ '0x0f' => Text Layer ON 'ESC'+ 'P'+ '0x10' => Text Layer OFF 'ESC'+ 'P'+ '0x11' => Graphic Layer ON 'ESC'+ 'P'+ '0x12' => Graphic Layer OFF 'ESC'+ 'P'+ '0x13' => Serial Baud Rate 115200[bps]

**3-1-9. Text, Graphic Layer Clear**

	'ESC'+ 'D'																																																				
	'0x01' or '0x02' or '0x03' or '0x04'																																																				
<b>Parameter</b>	'X1'+ 'Y1'+ 'X2'+ 'Y2'																																																				
	'ESC'+ 'D'+ '0x01' => Text Layer Clear 'ESC'+ 'D'+ '0x02' => Parameter Text Layer가 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, 300, 210) Clear => 'ESC'+ 'D'+ '0x04'+ ' <u>0x00'+ '0x0a'+ '0x19'+ '0x01'+ '0x2c'+ '0xd2'</u> Graphic Layer Clear <div style="text-align: center;"> <table border="0"> <tr> <td></td> <td>X1</td> <td>X2</td> <td></td> </tr> <tr> <td>, Text Layer</td> <td>X1</td> <td>X2</td> <td>0x00 ~ 0x27</td> </tr> <tr> <td>Text Layer</td> <td>Y1</td> <td>Y2</td> <td>0x00 ~ 0x0e</td> </tr> <tr> <td>, Graphic Layer</td> <td>X1</td> <td>X2</td> <td>0x00 ~ 0x13f</td> </tr> <tr> <td>Graphic Layer</td> <td>Y1</td> <td>Y2</td> <td>0x00 ~ 0xef</td> </tr> <tr> <td>Graphic Layer</td> <td>X1</td> <td>X2</td> <td>MSMF320240-2 Board</td> </tr> </table> </div> <hr/> byte ) X2 = 0x136(310 decimal) byte <hr/> 0x01 , 0x36 <hr/> <div style="text-align: center;"> <table border="0"> <tr> <td>, Text Layer</td> <td></td> <td>8*16 dots</td> </tr> <tr> <td>Text Layer</td> <td>X</td> <td>320/8</td> </tr> <tr> <td>0x00 ~ 0x27</td> <td>Y</td> <td>240/16</td> </tr> <tr> <td>0x00 ~ 0x0e가</td> <td></td> <td></td> </tr> </table> </div> <hr/> <table border="0" style="width: 100%;"> <tr> <td><u>Graphic Layer</u></td> <td>X</td> <td><u>MSMF320240-2</u></td> </tr> <tr> <td>byte</td> <td></td> <td></td> </tr> <tr> <td></td> <td>(10, 25, 300, 210)</td> <td>X1 가 1 byte</td> </tr> <tr> <td></td> <td>byte</td> <td></td> </tr> </table> <hr/> <div style="text-align: center;"> <table border="0"> <tr> <td>byte</td> <td>Graphic Layer</td> </tr> <tr> <td>X( X1 X2 )</td> <td></td> </tr> </table> </div>		X1	X2		, Text Layer	X1	X2	0x00 ~ 0x27	Text Layer	Y1	Y2	0x00 ~ 0x0e	, Graphic Layer	X1	X2	0x00 ~ 0x13f	Graphic Layer	Y1	Y2	0x00 ~ 0xef	Graphic Layer	X1	X2	MSMF320240-2 Board	, Text Layer		8*16 dots	Text Layer	X	320/8	0x00 ~ 0x27	Y	240/16	0x00 ~ 0x0e가			<u>Graphic Layer</u>	X	<u>MSMF320240-2</u>	byte				(10, 25, 300, 210)	X1 가 1 byte		byte		byte	Graphic Layer	X( X1 X2 )	
	X1	X2																																																			
, Text Layer	X1	X2	0x00 ~ 0x27																																																		
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	byte																																																				
byte	Graphic Layer																																																				
X( X1 X2 )																																																					

**3-1-10. Text Layer Cursor**

	'ESC'+ 'C'
	'0x01' or '0x02' or '0x03' or '0x04' or '0x05'
<b>Parameter</b>	'X'+ 'Y' or 'None'
	'ESC'+ 'C'+ '0x01'+ 'X'+ 'Y' => Text Layer (X, Y) Cursor (Graphic Layer Cursor .) (Text Layer) : X 0x00 ~ 0x27, Y 0x00 ~ 0x0e 'ESC'+ 'C'+ '0x02' => Cursor 'ESC'+ 'C'+ '0x03' => Cursor Line 'ESC'+ 'C'+ '0x04' => Cursor Block 'ESC'+ 'C'+ '0x05' => Cursor OFF

**3-1-11. Text Layer Rectangle**

	'ESC'+ 'R'
	'0x01' or '0x02'
<b>Parameter</b>	'X1'+ 'Y1'+ 'X2'+ 'Y2'
	'ESC'+ 'R'+ '0x01'+ 'X1'+ 'Y1'+ 'X2'+ 'Y2' => Text Layer (X1, Y1, X2, Y2) 1 Line Rectangle ) (5, 3, 35, 12) 1 Line Rectangle => 'ESC'+ 'R'+ '0x01'+ '0x05'+ '0x03'+ '0x23'+ '0x0c' 'ESC'+ 'R'+ '0x02'+ 'X1'+ 'Y1'+ 'X2'+ 'Y2' => Text Layer (X1, Y1, X2, Y2) 2 Line Rectangle ) (5, 3, 35, 12) 2 Line Rectangle => 'ESC'+ 'R'+ '0x02'+ '0x05'+ '0x03'+ '0x23'+ '0x0c' (Text Layer) : X 0x00 ~ 0x27, Y 0x00 ~ 0x0e

**3-1-12. Blink**

	'ESC'+ 'B'
	'0x01' or '0x02' or '0x03' or '0x04'
<b>Parameter</b>	
	'ESC'+ 'B'+ '0x01' => Text Layer ON 'ESC'+ 'B'+ '0x02' => Text Layer OFF 'ESC'+ 'B'+ '0x03' => Graphic Layer ON 'ESC'+ 'B'+ '0x04' => Graphic Layer OFF

**3-1-13. CCFL Power ON/OFF**

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

**3-1-14. LCD Bias Voltage UP/DOWN**

	'ESC'+ 'V'
	'0x01' or '0x02'
<b>Parameter</b>	
	'ESC'+ 'V'+ '0x01' => LCD Bias Voltage UP 'ESC'+ 'V'+ '0x02' => LCD Bias Voltage DOWN



## 3-1-18. Graphic Layer / Rectangle /

	'ESC'+ 'G'
	'0x05' or '0x06' or '0x07' or '0x08'
Parameter	'X1'+ 'Y1'+ 'X2'+ 'Y2'
	<pre>'ESC'+ 'G'+ '0x05'+ 'X1'+ 'Y1'+ 'X2'+ 'Y2' =&gt; (X1,Y1,X2,Y2) Rectangle ) Graphic Layer (10, 10, 100, 100) Rectangle =&gt; 'ESC'+ 'G'+ '0x05'+ '0x00'+ '0x0a'+ '0x0a'+ '0x00'+ '0x64'+ '0x64'</pre> <pre>'ESC'+ 'G'+ '0x06'+ 'X1'+ 'Y1'+ 'X2'+ 'Y2' =&gt; (X1,Y1,X2,Y2) Rectangle ) Graphic Layer (10, 10, 100, 100) Rectangle =&gt; 'ESC'+ 'G'+ '0x06'+ '0x00'+ '0x0a'+ '0x0a'+ '0x00'+ '0x64'+ '0x64'</pre> <pre>'ESC'+ 'G'+ '0x07'+ 'X1'+ 'Y1'+ 'X2'+ 'Y2' =&gt; (X1,Y1,X2,Y2) Rectangle ) Graphic Layer (10, 10, 100, 100) Rectangle =&gt; 'ESC'+ 'G'+ '0x07'+ '0x00'+ '0x0a'+ '0x0a'+ '0x00'+ '0x64'+ '0x64'</pre> <pre>'ESC'+ 'G'+ '0x08'+ 'X1'+ 'Y1'+ 'X2'+ 'Y2' =&gt; (X1,Y1,X2,Y2) Rectangle ) Graphic Layer (10, 10, 100, 100) Rectangle =&gt; 'ESC'+ 'G'+ '0x08'+ '0x00'+ '0x0a'+ '0x0a'+ '0x00'+ '0x64'+ '0x64'</pre> <p style="text-align: center;"><b>X1, X2</b></p> <hr/> <p style="text-align: center;">(Graphic Layer) : X      0x000 ~ 0x13f, Y      0x00 ~ 0xef</p>

## 3-1-19. Graphic Layer / /

	'ESC'+ 'G'
	'0x09' or '0x0a' or '0x0b' or '0x0c'
Parameter	'X'+ 'Y'+ radius
	<pre>'ESC'+ 'G'+ '0x09'+ 'X'+ 'Y'+ 'radius' =&gt; (X,Y) 'radius' ) Graphic Layer (100, 100) radius = 50 =&gt; 'ESC'+ 'G'+ '0x09'+ '0x00'+ '0x64'+ '0x64'+ '0x32'</pre> <pre>'ESC'+ 'G'+ '0x0a'+ 'X'+ 'Y'+ 'radius' =&gt; (X,Y) 'radius' ) Graphic Layer (100, 100) radius = 50 =&gt; 'ESC'+ 'G'+ '0x0a'+ '0x00'+ '0x64'+ '0x64'+ '0x32'</pre> <pre>'ESC'+ 'G'+ '0x0b'+ 'X'+ 'Y'+ 'radius' =&gt; (X,Y) 'radius' ) Graphic Layer (100, 100) radius = 50 =&gt; 'ESC'+ 'G'+ '0x0b'+ '0x00'+ '0x64'+ '0x64'+ '0x32'</pre> <pre>'ESC'+ 'G'+ '0x0c'+ 'X'+ 'Y'+ 'radius' =&gt; (X,Y) 'radius' ) Graphic Layer (100, 100) radius = 50 =&gt; 'ESC'+ 'G'+ '0x0c'+ '0x00'+ '0x64'+ '0x64'+ '0x32'</pre> <p style="text-align: center;"><b>X</b></p> <hr/> <p style="text-align: center;">(Graphic Layer) : X      0x000 ~ 0x13f, Y      0x00 ~ 0xef radius      '0x01' ~ '0x78'</p>

## 3-1-20. Graphic Layer / /

	'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>) Graphic Layer (150, 120) 'a'= 50, 'b'= 20</p> <p>=&gt; 'ESC'+ 'G'+ '0x0d'+ <u>'0x00'+ '0x96'</u>+ '0x78'+ '0x32'+ '0x14'</p> <p>'ESC'+ 'G'+ '0x0e'+ 'X'+ 'Y'+ 'a'+ 'b'</p> <p>=&gt; (X,Y) 가 'a', 'b'</p> <p>) Graphic Layer (150, 120) 'a'= 50, 'b'= 20</p> <p>=&gt; 'ESC'+ 'G'+ '0x0e'+ <u>'0x00'+ '0x96'</u>+ '0x78'+ '0x32'+ '0x14'</p> <p>'ESC'+ 'G'+ '0x0f'+ 'X'+ 'Y'+ 'a'+ 'b'</p> <p>=&gt; (X,Y) 가 'a', 'b'</p> <p>) Graphic Layer (150, 120) 'a'= 50, 'b'= 20</p> <p>=&gt; 'ESC'+ 'G'+ '0x0f'+ <u>'0x00'+ '0x96'</u>+ '0x78'+ '0x32'+ '0x14'</p> <p>'ESC'+ 'G'+ '0x10'+ 'X'+ 'Y'+ 'a'+ 'b'</p> <p>=&gt; (X,Y) 가 'a', 'b'</p> <p>) Graphic Layer (150, 120) 'a'= 50, 'b'= 20</p> <p>=&gt; 'ESC'+ 'G'+ '0x10'+ <u>'0x00'+ '0x96'</u>+ '0x78'+ '0x32'+ '0x14'</p> <p style="text-align: center;">X</p> <hr/> <p style="text-align: center;">(Graphic Layer) : X      0x000 ~ 0x13f, Y      0x00 ~ 0xef</p> <p style="text-align: center;">   'a'      '0x01' ~ '0xa0', 'b'      '0x01 ~ 0x78'</p>

## 3-1-21. Reset

	'ESC'+ 'A'
	'0x01' or '0x02' or '0x03'
<b>Parameter</b>	
	<p>'ESC'+ 'A'+ '0x01' =&gt; Rebooting</p> <p>'ESC'+ 'A'+ '0x02' =&gt; LCD Bias Voltage      Serial Baudrate</p> <p style="text-align: center;"><b>Rebooting</b></p> <p>'ESC'+ 'A'+ '0x03' =&gt; MSMF320240-2      System      check</p> <p style="text-align: center;">Serial '0x06'</p> <p style="text-align: center;">MSMF320240-2 V5.00B</p>

**3-1-22. Image display**

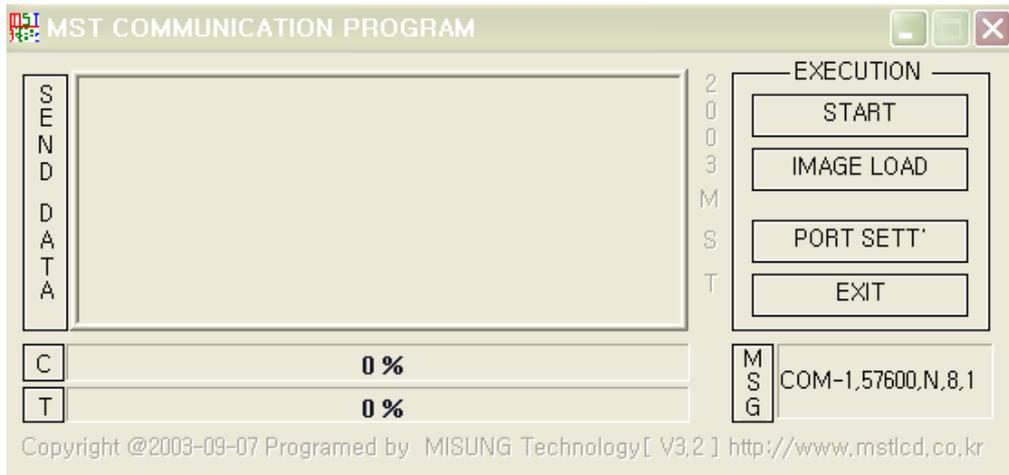
	'ESC'+ 'I'
	'0x01' or '0x02' or '0x03'
<b>Parameter</b>	'X'
	<p>'ESC'+ 'I'+ '0x01'+ 'X' =&gt; Image display  x (page number) Memory Image  display . 'X' [0x00 ~ 0x34]  * Display default가 Text Layer Graphic Layer  가 .  ) Image Text Layer(default) Display  'ESC'+ 'I'+ '0x01'+ '0x02'  =&gt; 320*240 Text Layer .  'ESC'+ 'I'+ '0x02' =&gt; Image display at Text Layer (default)  'ESC'+ 'I'+ '0x03' =&gt; Image display at Graphic Layer</p>

**3-1-23. Touch**

	'ESC'+ 'T'
	'0x01' or '0x02' or '0x03'
<b>Parameter</b>	
	<p>'ESC'+ 'T'+ '0x01' =&gt; Touch end Touch Panel X,Y  Touch Panel X (1~319 decimal), Y (1~239) Touch  end RS-232C ASCII "xxx,yyy" format  . (Touch event )  'ESC'+ 'T'+ '0x02' =&gt; Touch End  'ESC'+ 'T'+ '0x03' =&gt; Touch Panel X,Y ASCII format  (xxx,yyy) Touch .  (Touch event )</p>

4. MSMF320240-2 V5.00B Image Overwrite

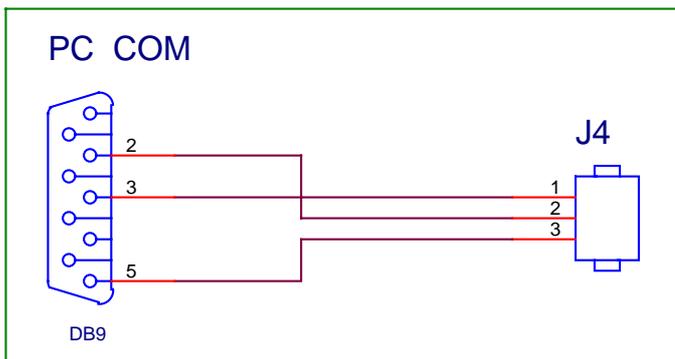
Image Overwrite Application Program



Overwrite Application Program

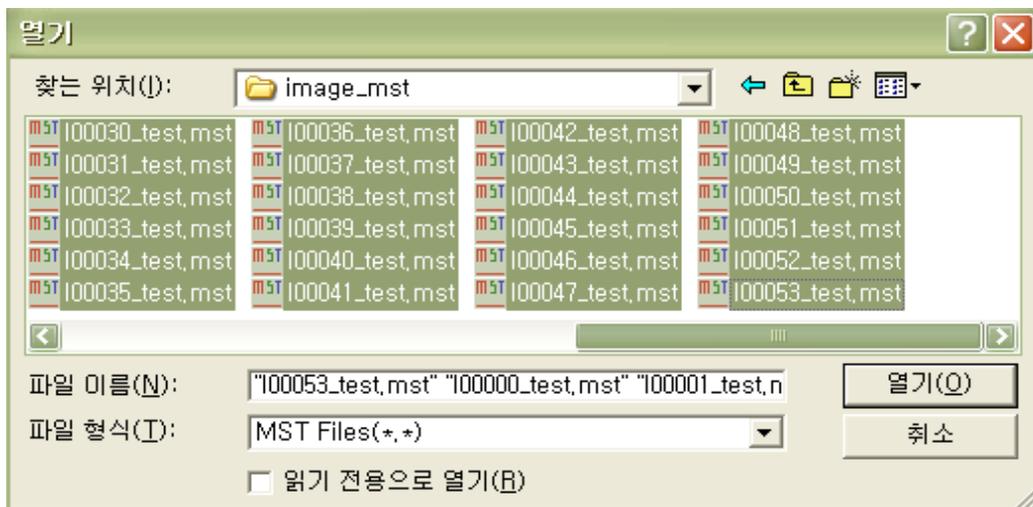
MSMF320240-2 V5.00B가 Image display  
Image page Overwrite

MSMF320240-2 V5.00B PC Serial Cable

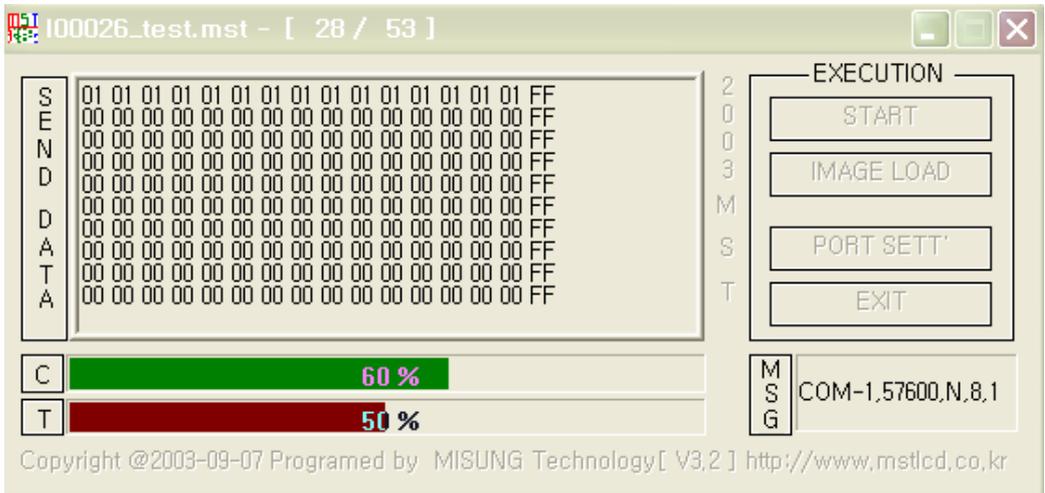


'IMAGE LOAD'

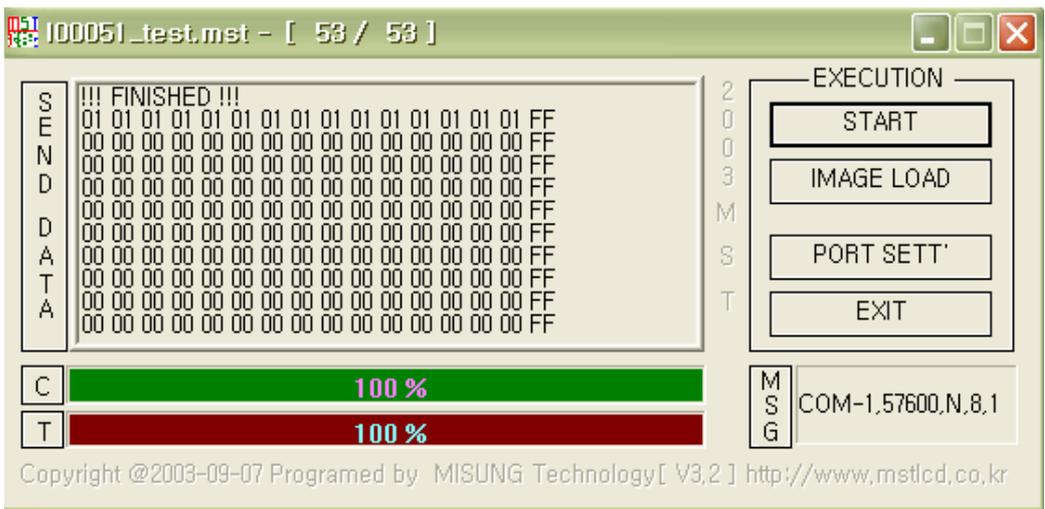
image



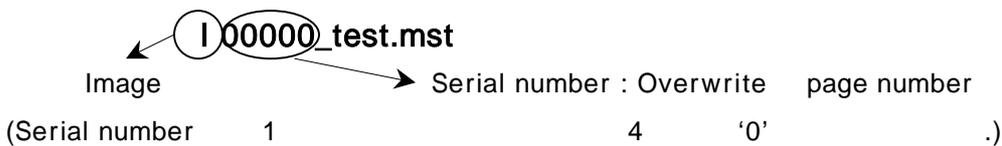
, 'START' MSMF320240-2 V5.00B Overwrite



Bar Bar Download  
, Bar  
Bar 가 '100%' Image Overwrite



'IMAGE LOAD' Image



Ex) 1 page Overwrite file I00001\_test.mst

[ 1.] MSMF320240-2 V5.00B

Special Font

< 1- 1 > MSMF320240-2 V5.00B

(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	μl	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	μg
0x30	mg	kg	kt	cal	kcal	dB	m/s	m/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/s	rad/s	sr	Pa	kPa
0x60	MPa	GPa	Wb	Im	lx	Bq	Gy	Sv	°/kg	㉿	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	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ	Ⓕ	Ⓖ
0xB0	Ⓗ	Ⓘ	Ⓚ	Ⓛ	Ⓜ	Ⓝ	Ⓞ	Ⓟ	Ⓠ	Ⓡ	Ⓢ	Ⓣ	Ⓤ	Ⓥ	Ⓦ	Ⓧ
0xC0	Ⓨ	Ⓩ	ⓐ	ⓑ	ⓒ	ⓓ	ⓔ	ⓕ	ⓖ	ⓗ	ⓘ	ⓙ	ⓚ	ⓛ	ⓜ	ⓞ
0xD0	ⓟ	ⓠ	ⓡ	ⓢ	ⓣ	ⓤ	ⓥ	ⓦ	ⓧ	ⓨ	ⓩ	⓪	⓫	⓬	⓭	⓮
0xE0	⓯	⓰	⓱	⓲	⓳	⓴	⓵	⓶	⓷	⓸	⓹	⓺	⓻	⓼	⓽	⓿
0xF0	⓾	⓿	Ⓚ	Ⓛ	Ⓜ	Ⓝ	Ⓞ	Ⓟ	Ⓠ	Ⓡ	Ⓢ	Ⓣ	Ⓤ	Ⓥ	Ⓦ	Ⓧ

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