

SCALE: 15/1



PIN NO.	SIGNAL
1	FG
2	VSS
3	VDD
4	Vo
5	WR
6	RD
7	CE
8	C/D
9	Vee
10	RESET
11	DB0
12	DB1
13	DB2
14	DB3
15	DB4
16	DB5
17	DB6
18	DB7
19	FS
20	N.C

POWERTIP TECHNOLOG

SCALE: 1/1.25
 MODEL NAME: PG-24064PRM-ETA-
 UNIT: mm
 TITLE: COUNTER DRAWING
 EDI: PAGE: 0
 DRAWN NO.: PG-95010-060
 APPROVED: [Signature]
 CHECKER: [Signature]

The tolerance unless classified ±0.3mm

■ 2.Features

Item	Specifications
Number of dots	240(W) * 64(H) DOTS
Duty	1 / 64
BIAS	1 / 9
Type	STN-Negative
Display mode	Transmissive-Blue
Viewing direction	6H
Input data	Parallel
Backlight	CCFL

■ 3.Mechanical specifications

Item	Specifications	Unit
Outline dimension	180.0(W) * 65.0(H) * 9.1 MAX(T)	mm
Viewing area	134.0(W) * 40.4(H)	mm
Active area	127.16(W) * 33.88(H)	mm
Dot size	0.49(W) * 0.49(H)	mm
Dot pitch	0.53(W) * 0.53(H)	mm

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■ 4. Maximum rating

Item		Symbol	Min	Max	Unit	Note
Supply voltage	Logic	Vdd-Vss	-0.3	7.0	V	—
	LCD drive	Vdd-Vee	0	20	V	—
Input voltage		Vi	-0.3	Vdd+0.3	V	—
Operating temperature		Topr	-20	70	°C	—
Storage temperature		Tstg	-30	80	°C	—
Humidity		Hd	—	90	%RH	1

Note:1.No dew to be found.

■ 5. Dc Electrical characteristics

(Vdd=+5V±10%,Vss=0V,Ta=25°C)

Item		Symbol	Condition	Min.	Typ	Max.	Unit
Supply voltage	Logic	Vdd	—	4.75	—	5.25	V
"H" input voltage		Vih	—	Vdd-2.2	—	Vdd	V
"L" input voltage		Vil	—	0	—	0.8	V
"H" output voltage		Voh	—	Vdd-0.3	—	Vdd	V
"L" output voltage		Vol	—	0	—	0.3	V
Supply current		Iop	Vdd=5v	—	11.7	—	mA
LCD driving voltage		Vlcd	Vdd-Vo	9.9	—	10.6	V

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■ 6.Ac Electrical characteristics

(V_{dd}=+5V±10%,V_{ss}=0V,T_a=25°C)

Read cycle

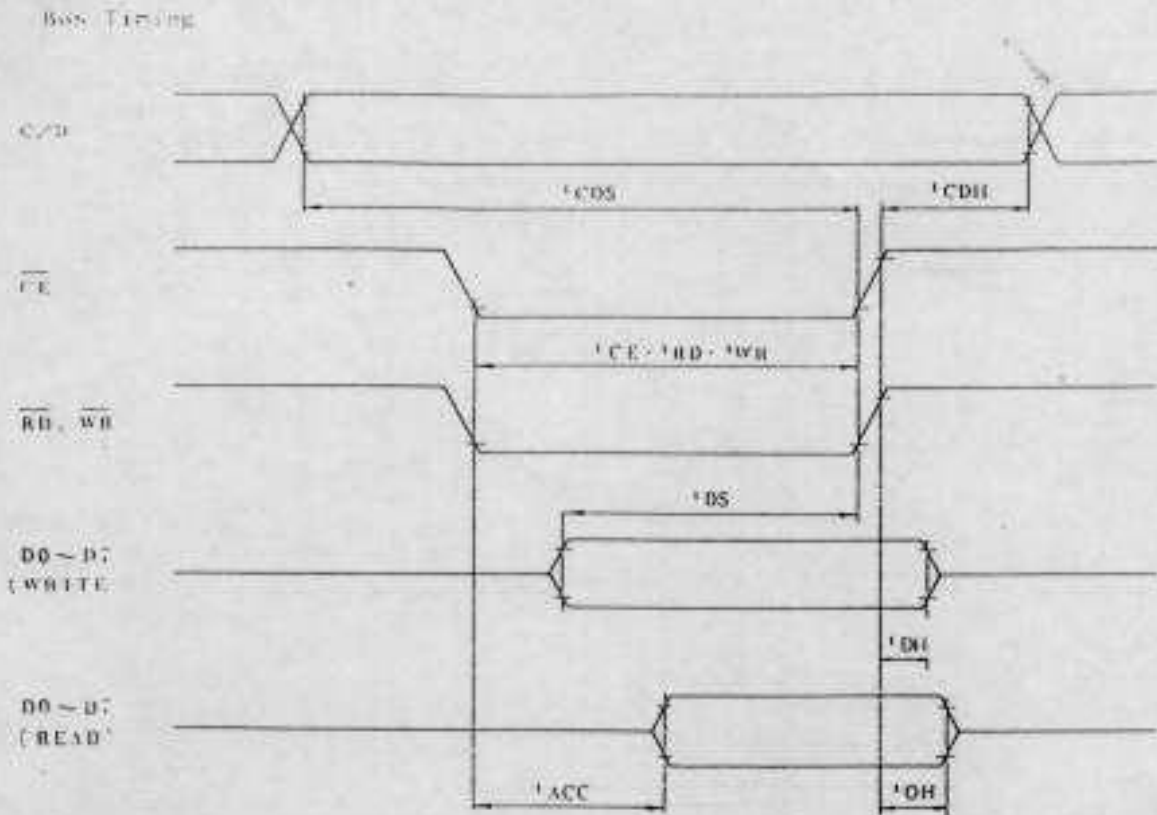
Item	Symbol	Conditions	Min.	Max.	Unit
C/D Set up time	t _{CDS}	—	100	—	ns
C/d Hold time	t _{CDH}	—	10	—	ns
CE,RD,WR Pulse width	t _{CE} ,t _{RD} ,t _{WR}	—	80	—	ns
Access time	t _{ACC}	—	—	150	ns
Output hold time	t _{OH}	—	10	50	ns

Write cycle

Item	Symbol	Conditions	Min.	Max.	Unit
C/D Set up time	t _{CDS}	—	100	—	ns
C/D Hold time	t _{CDH}	—	10	—	ns
CE,RD,WR Pulse width	t _{CE} ,t _{RD} ,t _{WR}	—	80	—	ns
Data set up time	t _{DS}	—	80	—	ns
Data hold time	t _{DH}	—	40	—	ns

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7. Timing characteristics



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8. Display command

1. REGISTER SET

CODE	HEX.	FUNCTION	DI	OZ
00100001	21H	CURSOR POINTER SET	X ADRS	Y ADRS
00100010	22H	OFFSET REGISTER SET	DATA	00H
00100100	24H	ADDRESS POINTER SET	LOW ADRS	HIGH ADRS

(1) CURSOR POINTER SET

The position of cursor is specified by X ADRS, Y ADRS. The cursor position is moved only by this command. The cursor pointer doesn't have the function of increment and decrement. The shift of cursor are set by this command. X ADRS, Y ADRS are specified following.

X ADRS 00H-4FH (Lower 7bits are valid)

Y ADRS 00H-1FH (Lower 5bits are valid)

1. 1 screen drive

X ADRS 00-4FH

Y ADRS 00H-0FH

2. 2 screens drive

X ADRS 00-4FH

Y ADRS 00H-0FH
Upper screen

Y ADRS 10H-1FH
Lower screen

(2) OFFSET REGISTER SET

The offset register is used to determine external character generator RAM area. T6963C has 16 bit address lines as follow.

MSB											LSB				
ad15	ad14	ad13	ad12	ad11	ad10	ad9	ad8	ad7	ad6	ad5	ad4	ad3	ad2	ad1	ad0

The upper 5 bit (ad15-ad11) are determined by offset register. The middle 8 bit (ad10-ad3) are determined by character code. The lower 3 bit (ad2-ad0) are determined by vertical counter. The lower 5 bit of DI (data) are valid. The data format of external character generator RAM.

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The relationship of display RAM address and offset register

Data of offset register	CG RAM HEX. address(start-end)
0000	0000-07FFH
0001	0800-0FFFH
0010	1000-17FFH
11100	E000-E7FFH
11101	E800-EFFFH
11110	F000-F7FFH
11111	F800-FFFFH

(EXAMPLE 1)

Offset register	02H
Character code	80H
Character generator RAM start address	0001 0100 0000 0000
	1 4 0 0 H

	(Address)	(Data)
	1400H	00H
	1401H	1FH
	1402H	04H
	1403H	04H
	1404H	04H
	1405H	04H
	1406H	04H
	1407H	00H

(EXAMPLE 2) The relationship of display RAM data and display character

	(RAM DATA)	(Character)
A B y D E z G H I J K L M	21H	A
⋮	22H	B
⋮	83H	y
⋮	24H	D
⋮	25H	E
⋮	86H	z

Display character

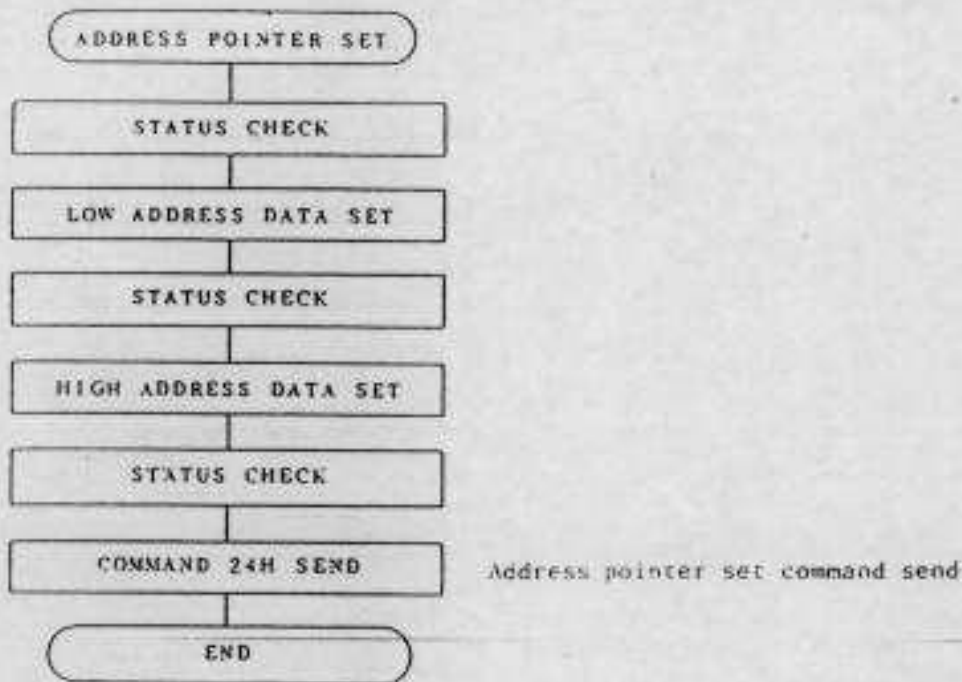
y and z are displayed by character generator RAM.

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1. ADDRESS POINTER SET

The address pointer set command is used to indicate the start address for writing (or reading) to external RAM.

The flow chart address pointer set command



2. CONTROL WORD SET

CODE	HEX	FUNCTION	D1	D2
01000000	40H	Text home address set	Low address	High address
01000001	41H	Text area set	Columns	00H
01000010	42H	Graphic home address set	Low address	High address
01000011	43H	Graphic area set	Columns	00H

The home address and column size are defined by this command.

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(1) TEXT HOME ADDRESS SET

The starting address of external display RAM for text display is defined by this command. The text home address shows the left end and most upper position.

The relationship of external display RAM address and display position

TH		TH+CL
TH+TA		TH+TA+CL
(TH+TA)+TA		TH+2TA+CL
(TH+2TA)+TA		TH+3TA+CL
TH+(n-1)TA		TH+(n-1)TA+CL

TH : Text home address

TA : Text area number (columns)

CL : Columns are fixed by hardware. (pin-programmable)

(EXAMPLE)

Text home address : 0000H
Text area : 0020H
ND2=H, ND3=H : 32 columns
DUAL=H, ND5=L, ND0=L, ND1=H : 4 lines

0000H	0001H		001EH	001FH
0020H	0021H		003EH	003FH
0040H	0041H		005EH	005FH
0060H	0061H		007EH	007FH

(2) GRAPHIC HOME ADDRESS SET

The starting address of external display RAM for Graphic display is defined by this command. The graphic home address shows the left end most upper line.

The relationship of external display RAM address and display position

GH		GH+CL
GH+GA		GH+GA+CL
(GH+GA)+GA		GH+2GA+CL
(GH+2GA)+GA		GH+3GA+CL
GH+(n-1)GA		GH+(n-1)GA+CL

GH : Graphic home address

GA : Graphic area number (columns)

CL : Columns are fixed by hardware. (pin-programmable)

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(EXAMPLE)

Graphic home address : 0000H
 Graphic area : 0020H
 MD2=H, MD3=H : 32 columns
 DUAL=H, NDS=L, MD0=H, MD1=H : 2 lines

0000H	0001H		001EH	001FH
0020H	0021H		003EH	003FH
0040H	0041H		005EH	005FH
0060H	0061H		007EH	007FH
0080H	0081H		009EH	009FH
00A0H	00A1H		00BEH	00BFH
00C0H	00C1H		00DEH	00DFH
00E0H	00E1H		00FEH	00FFH
0100H	0101H		011EH	011FH
0120H	0121H		013EH	013FH
0140H	0141H		015EH	015FH
0160H	0161H		017EH	017FH
0180H	0181H		019EH	019FH
01A0H	01A1H		01BEH	01BFH
01C0H	01C1H		01DEH	01DFH
01E0H	01E1H		01FEH	01FFH

(3) TEXT AREA SET

The columns of display are defined by the hardware setting. This command can be used to adjust columns of display.

(EXAMPLE)

LCD size : 20 columns, 4 lines
 Text home address : 0000H
 Text area : 0014H
 MD2=H, MD3=H : 32 columns
 DUAL=H, NDS=L, MD0=L, MD1=H : 4 lines

0000	0001	.....	0013	0014	.....	001F
0014	0015	0027	0028	0033
0028	0029	003B	003C	0047
003C	003D	004F	0050	005B

← LCD →

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(4) GRAPHIC AREA SET

The columns of display are defined by the hardware setting. This command can be used to adjust columns of graphic display.

(EXAMPLE)

LCD size : 20 columns, 2 lines
 Text home address : 0000H
 Text area : 0014H
 MD2=H, MD3=H : 32 columns
 DGAL=H, MDS=L, MD0=H, MD1=H : 2 lines

0000	0001	.....	0013	0014	.....	001F
0014	0015	.....	0027	0028	.....	0033
0028	0029	.....	003B	003C	.....	0047
003C	003D	.....	004F	0050	.....	005B
0050	0051	.....	0063	0064	.....	006F
0064	0065	.....	0077	0078	.....	0083
0078	0079	.....	008B	008C	.....	0097
008C	008D	.....	009F	00A0	.....	00AB
00A0	00A1	.....	00B3	00B4	.....	00BF
00B4	00B5	.....	00C7	00C8	.....	00D3
00C8	00C9	.....	00DB	00DC	.....	00E7
00DC	00DD	.....	00EF	00F0	.....	00FD
00F0	00F1	.....	0103	0104	.....	011F
0104	0105	.....	0127	0128	.....	0123
0128	0129	.....	013B	013C	.....	0147
013C	013D	.....	014F	0150	.....	015B

← LCD →

The address in graphic area can be continuous and RMT area can be used without ineffective area, if graphic area is defined the same number as the actual column number of LCD display.

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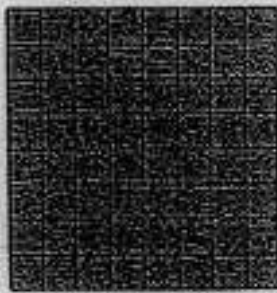
3. MODE SET

CODE	FUNCTION	OPERAND
1000X000	"OR" Mode	-
1000X001	"EXOR" Mode	-
1000X011	"AND" Mode	-
1000X100	"TEXT ATTRIBUTE" Mode	-
10000XXX	Internal Character Generator Mode	-
10001XXX	External Character Generator Mode	-

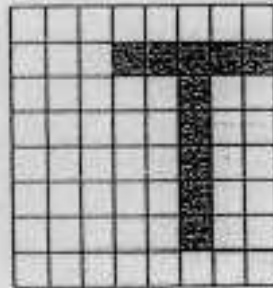
The display mode is defined by this command. The display mode don't have changed until to send next this command. Logically "OR", "EXOR", "AND" of text and graphic display can be displayed.

When internal character generator mode is selected, character code 00H-7FH are selected from built-in character generator ROM. The character code 80H-FFH are automatically selected external character generator RAM.

(EXAMPLE)



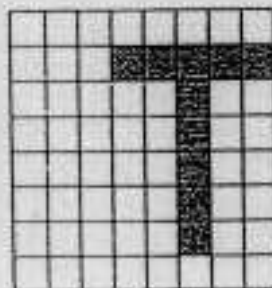
GRAPHIC



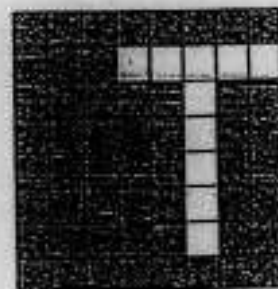
TEXT



"OR"



"AND"



"EXOR"

Note: Only text display is attributed, because attribute data is located in graphic RAM area.

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Attribute function

"Reverse display", "Character blink" and "Inhibit" are called "Attribute". The attribute data is written in the graphic area defined by control word set command. The mode set command selects text display only and graphic display cannot be displayed.

The attribute data of the 1st character in text area is written at the 1st byte in graphic area, and attribute data of n-th character is written at the n-th byte in graphic area. Attribute function is defined as follow.

Attribute RAM 1byte

X	X	X	X	d3	d2	d1	d0
---	---	---	---	----	----	----	----

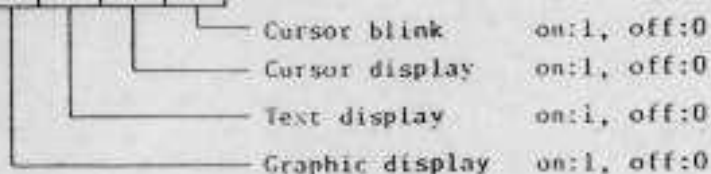
d3	d2	d1	d0	FUNCTION
0	0	0	0	Normal display
0	1	0	1	Reverse display
0	0	1	1	Inhibit display
1	0	0	0	Blink of normal display
1	1	0	1	Blink of reverse display
1	0	1	1	Blink of inhibit display

X: Don't care

4. DISPLAY MODE

CODE	FUNCTION	OPERAND
10010000	Display off	-
1001XX10	Cursor on, blink off	-
1001XX11	Cursor on, blink on	-
100101XX	Text on, graphic off	-
100110XX	Text off, graphic on	-
100111XX	Text on, graphic on	-

1	0	0	1	d3	d2	d1	d0
---	---	---	---	----	----	----	----

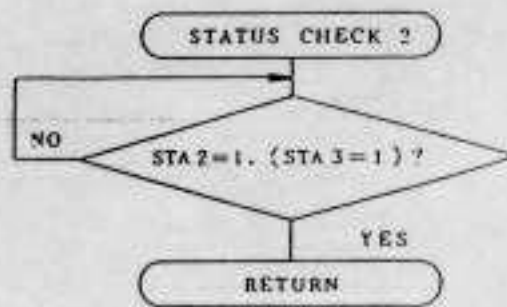
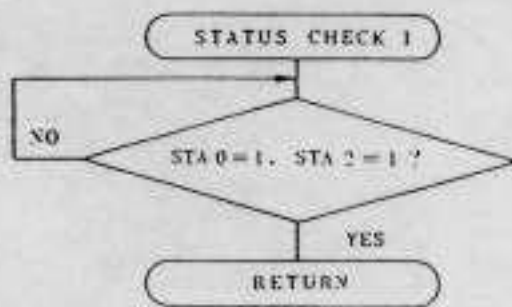
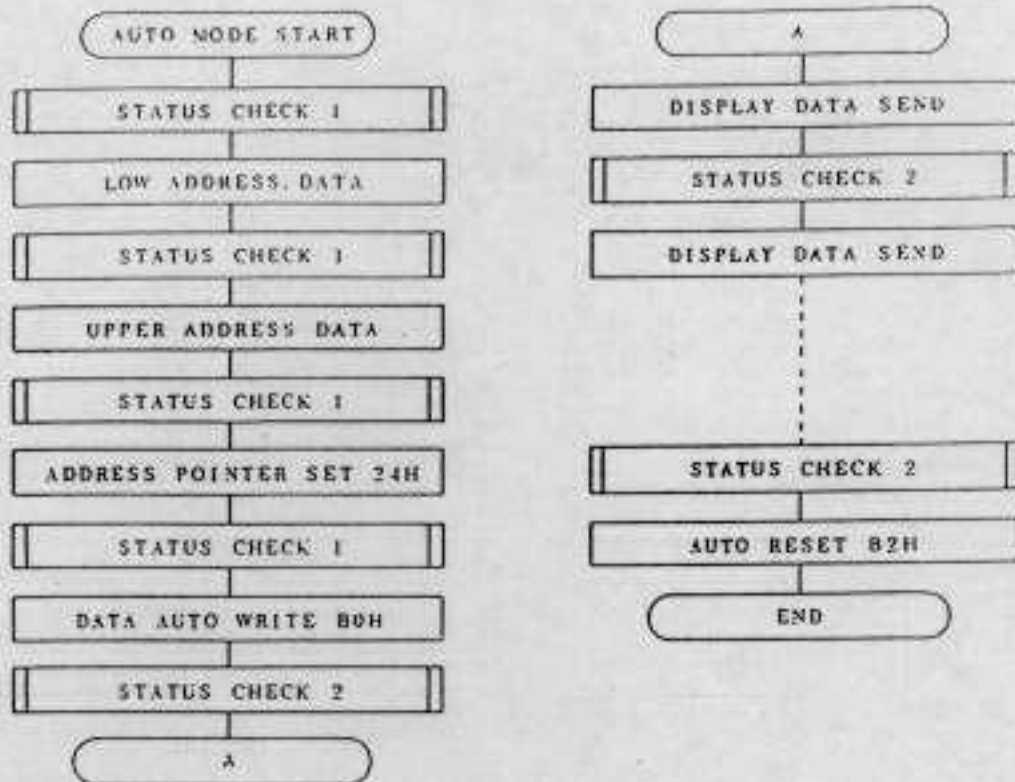


Note: It is necessary to turn on "Text display" and "Graphic display" in following case.

- 1) Combination of text/graphic display
- 2) Attribute function

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Note: Status check for auto mode (STA2, STA3) should be checked between each data.
 Auto reset should be performed after checking STA3=1 (STA2=1).
 Please refer following flow chart.



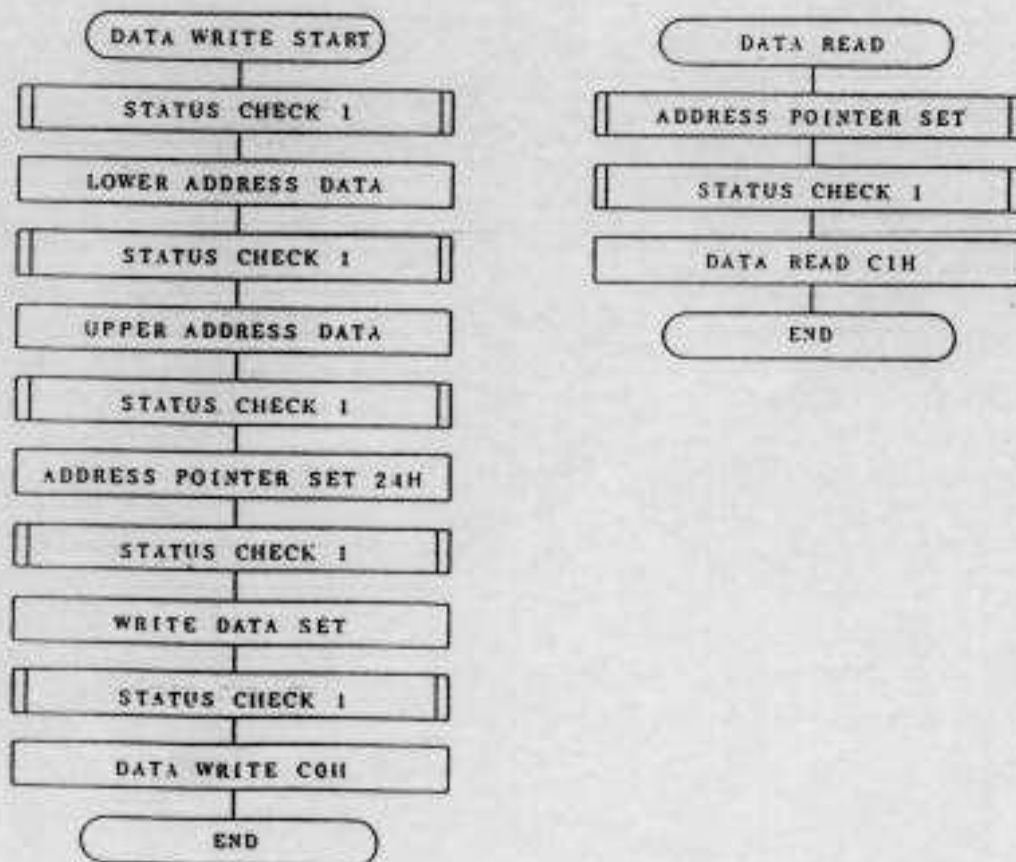
7. DATA READ WRITE

CODE	HEX.	FUNCTION	OPERAND
11000000	C0H	Data write and ADP increment	Data
11000001	C1H	Data read and ADP increment	-
11000010	C2H	Data write and ADP decrement	Data
11000011	C3H	Data read and ADP decrement	-
11000100	C4H	Data write and ADP nonvariable	Data
11000101	C5H	Data read and ADP nonvariable	-

This command is used for data write from MPU to external display RAM, and data read from external display RAM to MPU. Data write/data read should be executed after setting address by address pointer set command. Address pointer can be automatically increment or decrement by setting this command.

Note: This command is necessary for each 1 byte data.

Please refer following flow chart.



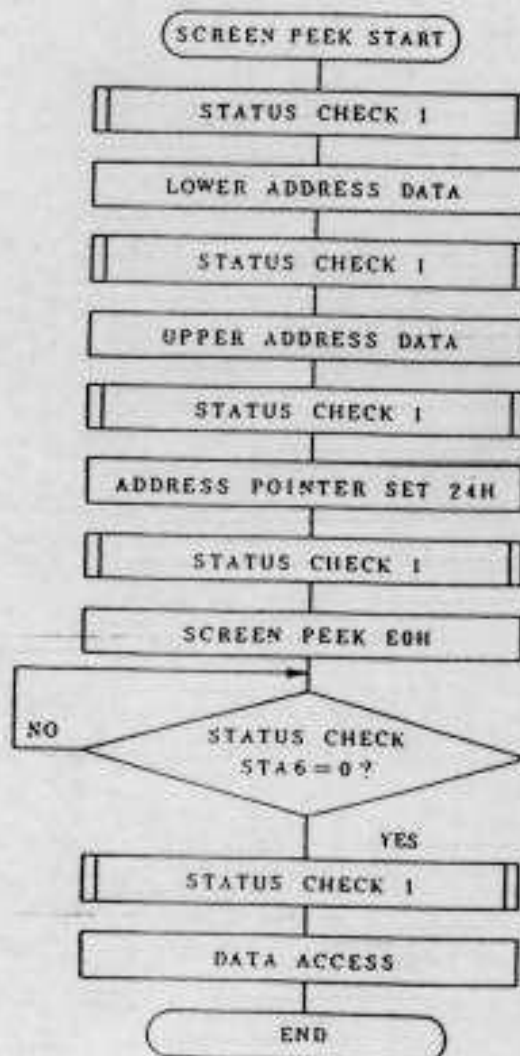
8. SCREEN PEEK

CODE	HEX.	FUNCTION	OPERAND
11100000	E0H	Screen peek	-

This command is used to transfer displayed 1 byte data to data stack, and this 1 byte data can be read from MPU by data access. The logical combination data of text and graphic display on LCD screen can be read by this command.

The status (STA6) should be checked just after "Screen peek" command. If the address determined by "Address pointer set" command is not in graphic area, this command ignored and status flag (STA6) is set.

Please refer following flow chart.



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9. SCREEN COPY

CODE	HEX.	FUNCTION	OPERAND
11101000	E8H	Screen copy	-

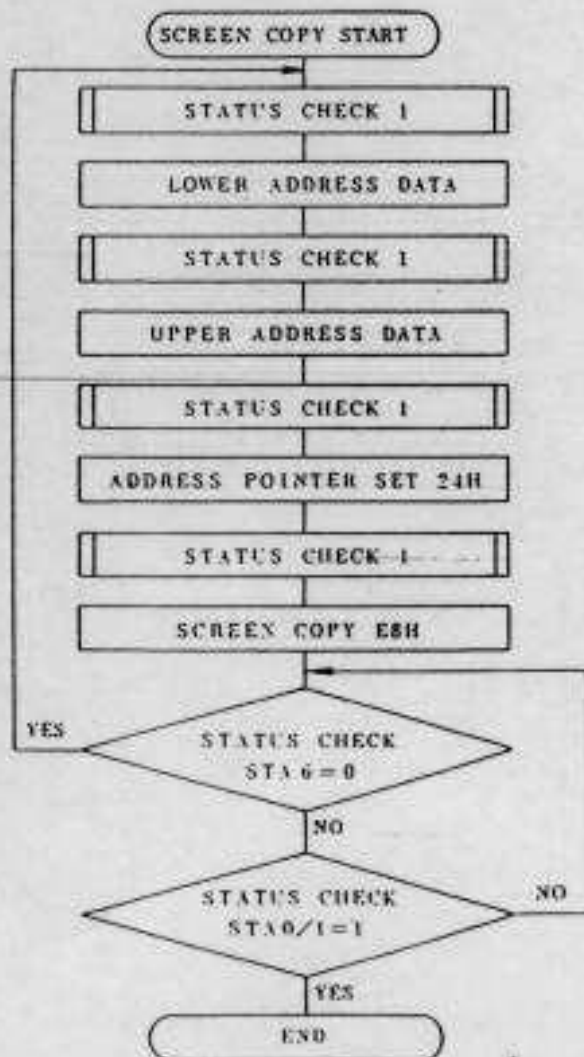
This command is used to copy displayed 1 line data to graphic area. The start point of 1 line data in the screen is determined by the address pointer.

Note: (1) In attribute function, this command is invalid.

(Because attribute data is in the graphic area.)

(2) In case of 2 screen drive, this command is invalid. (Because T6963C cannot separate upper screen data and lower screen data.)

Please refer following flow chart.

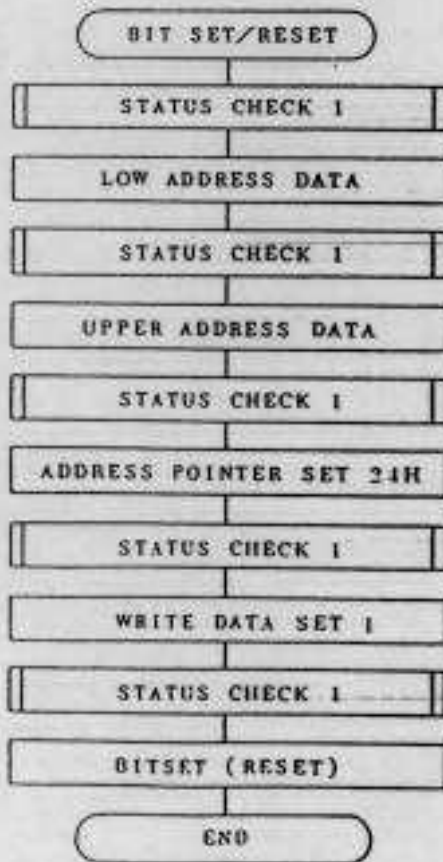


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10. BIT SET/RESET

CODE	FUNCTION	OPERAND
11110XXX	bit reset	-
11111XXX	bit set	-
1111X000	bit 9 (LSB)	-
1111X001	bit 1	-
1111X010	bit 2	-
1111X011	bit 3	-
1111X100	bit 4	-
1111X101	bit 5	-
1111X110	bit 6	-
1111X111	bit 7 (MSB)	-

This command is used to set or reset a bit of 1 byte is specified by address pointer. Plural bits in the 1 byte data cannot be set/reset at a time. Please refer following flow chart.



CURAND LIST

CURAND	CODE	D1	D2	FUNCTION
REGISTER SET	00100001	X address	Y address	Cursor pointerset
	00100010	Data	00H	Offset register set
	00100100	Low address	High address	Address pointer set
CONTROL WORD SET	01000000	Low address	High address	Text home address set
	01000001	Columns	00H	Text area set
	01000010	Low address	High address	Graphic home address set
	01000011	Columns	00H	Graphic area set
MODE SET	1000X000	-	-	"OR" mode
	1000X001	-	-	"EXOR" mode
	1000X011	-	-	"AND" mode
	1000X100	-	-	"Text attribute" mode
	1000XXX	-	-	Internal CG ROM mode
	1000LXXX	-	-	External CG RAM mode
DISPLAY MODE	10010000	-	-	Display off
	1001XX10	-	-	Cursor on, blink off
	1001XX11	-	-	Cursor on, blink on
	100101XX	-	-	Text on, graphic off
	100110XX	-	-	Text off, graphic on
	100111XX	-	-	Text on, graphic on
CURSOR PATTERN SELECT	10100000	-	-	1 line cursor
	10100001	-	-	2 lines cursor
	10100010	-	-	3 lines cursor
	10100011	-	-	4 lines cursor
	10100100	-	-	5 lines cursor
	10100101	-	-	6 lines cursor
	10100110	-	-	7 lines cursor
	10100111	-	-	8 lines cursor
DATA AUTO READ/WRITE	10110000	-	-	Data auto write set
	10110001	-	-	Data auto read set
	10110010	-	-	Auto reset
DATA READ WRITE	11000000	Data	-	Data write and ADP increment
	11000001	-	-	Data read and ADP increment
	11000010	Data	-	Data write and ADP decrement
	11000011	-	-	Data read and ADP decrement
	11000100	Data	-	Data write and ADP nonvariable
	11000101	-	-	Data read and ADP nonvariable
SCREEN PEEK	11100000	-	-	Screen peek
SCREEN COPY	11101000	-	-	Screen copy
BIT SET/RESET	11110XXX	-	-	bit reset
	11111XXX	-	-	bit set
	1111X000	-	-	bit0(LSB)
	1111X001	-	-	bit1
	1111X010	-	-	bit2
	1111X011	-	-	bit3
	1111X100	-	-	bit4
	1111X101	-	-	bit5
	1111X110	-	-	bit6
	1111X111	-	-	bit7(MSB)

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MODEL NO.

PG 240G4 FRM - ETA - I

VER.

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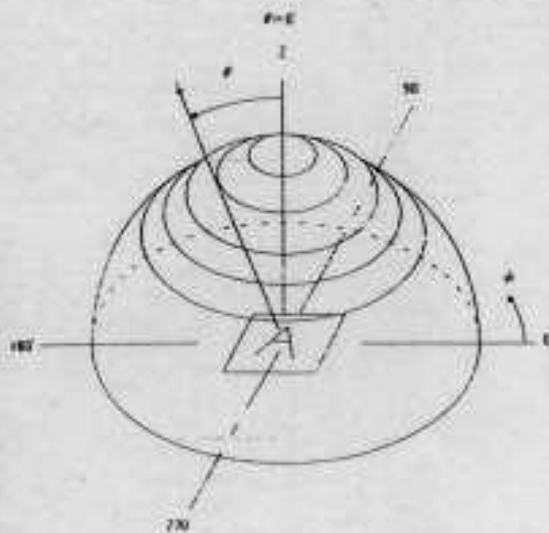
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9. Optical characteristics

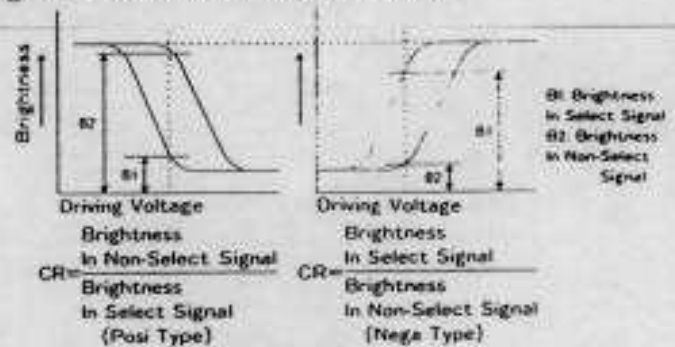
Parameter	Symbol	Temperature (°C)	Standard			Unit
			Min	Typ	Max	
Driving Voltage V _{DD-VLCD}	V _{op}	-20	14.3	14.7	15.1	V
		25	13.2	13.6	14.0	
		70	12.0	12.4	12.8	
Response time	T _r	-20		2600	3900	ms
		25		140	200	
	T _f	25		6900	10400	
		70		300	500	
Frame frequency	F _f			64		Hz
Viewing angle range	θ _{y1}	25	30			Degree
	θ _{y2}		30			
	θ _{x1}		30			
	θ _{x2}		30			
Contrast	K	25		3		

Ⓐ Definition of Viewing Angle θ and φ

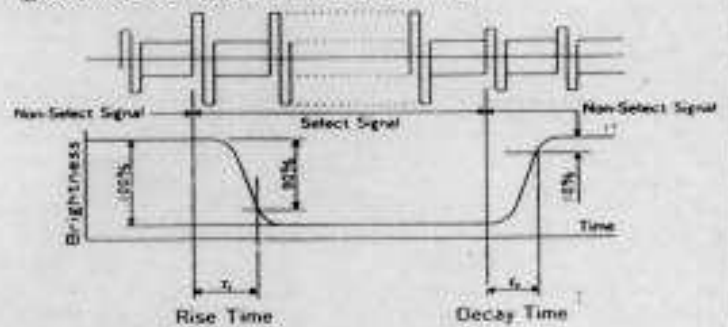


Definition of the viewing direction by the elevation (θ) and the azimuth (φ) (For reference axis see sub-clause 4.1 of Essential Ratings and characteristics.)

Ⓑ Definition of Contrast Ratio (CR)



Ⓒ Definition of Optical Response Time



In case of Negative type, wave form of changing brightness becomes reverse. (Non-Select Signals: 9%, Select Signals: 100%)

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10. CCFT Backlight characteristics

10-1. Maximum ratings

Item	Condition	Spec.	Unit
Tube current	f1:40 KHZ Ta:25 °C	6	mArms Max.
Power consumption	f1:40 KHZ Ta:25 °C	1.5	W

10-2. Electrical characteristics

Item	Condition	Spec.	Unit
Start voltage	Ta:0 °C	600	Vrms
Start voltage	Ta:25°C	375	Vrms
Tube voltage	Ta:25°C	250	Vrms
Tube current	Ta:25°C	5	mArms
Drive frequency	Ta:25°C	40	KHZ

10-3. Optical characteristics

Item	Condition	Min	Typ.	Max.	Unit
Average brightness	Invertor output current=5 mArms	400	450	—	cd/m ²
Brightness uniformity		70%	—	—	
Chromaticity		X	0.30	0.32	0.34
	Y	0.36	0.38	0.40	

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■ 1.1. Description of terminals

Pin No.	Symbol	F u n c t i o n
1	FG	Frame ground (connected to metal bezel)
2	Vss	Signal ground(GND)
3	Vdd	Power supply for logic(+5v)
4	V _o	Operating voltage for LCD (variable)
5	WR	Data write (write data to the module at "L")
6	R \bar{D}	Data read(read data from the module at "L")
7	CE	Chip enable for the module(active at "L")
8	C/D	WR="L";C/D="H":command write,C/D="L":data write WR="H";C/D="H":command read,C/D="L":data read
9	Vee	Power supply for lcd drive (should be variable)
10	RESET	Controller reset(module reset)
11~18	D0~D7	Data bus (D0=MSB, D7=LSB)
19	FS	Font select:open or connect to Vdd:6x8 Dots font connect to Vss :8x8 Dots font
20	NC	Not connection

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12.Character pattern

CHARACTER CODE MAP

ROM code 0101

15B 15A	0	1	2	3	4	5	6	7
0	.	1	2	3	4	5	6	7
1	.	2	3	4	5	6	7	8
2	.	3	4	5	6	7	8	9
3	.	4	5	6	7	8	9	A
4	.	5	6	7	8	9	A	B
5	.	6	7	8	9	A	B	C
6	.	7	8	9	A	B	C	D
7	.	8	9	A	B	C	D	E
8	.	9	A	B	C	D	E	F
9	.	A	B	C	D	E	F	
A	.	B	C	D	E	F		
B	.	C	D	E	F			
C	.	D	E	F				
D	.	E	F					
E	.	F						
F	.							

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Out Going Inspection Specification

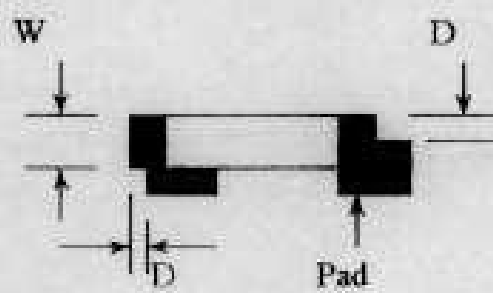
5-1. Inspection Standard : MIL-STD-105E Table Normal Inspection Single Sampling Level II

5-2. Defect Level : Major Defect AQL 1.0 ; Minor Defect AQL 2.5

5-3. Equipment : Gauge : MIL-STD : Powertip Tester : Sample

5-4. Specification :

N O	Item	Specification	Judge	Level
1	Part Number	Inconsistent with the P/N on the flow chart of production	N.G.	Major
2	Quantity	Inconsistent Q'TY with the flow chart of production	N.G.	Major
3	Electronic characteristics $A=(L+W) \div 2$	Display short	N.G.	Major
		Missing line	N.G.	Major
		Dot missing $A > 1/2$ Dot size	N.G.	Major
		No function	N.G.	Major
		Out put data error	N.G.	Major
4	Appearance $A=(L+W) \div 2$ Dirty particle (Include scratch , bubble)	Material difference with flow chart	N.G.	Major
		LCD Assembled in opposite direction	N.G.	Major
		Bezel assembled in opposite direction	N.G.	Major
		Shadow within LCD $V/A + 1.0$ mm	N.G.	Major
		Dirty particle $A > 0.4$ mm	N.G.	Minor
		Dirty particle length > 3.0 mm And $0.01\text{mm} < \text{Width} \leq 0.05\text{mm}$ (Width $> 0.05\text{mm}$ Measure by area)	N.G.	Minor
		Without protective film	N.G.	Minor
		Conductive rubber over bezel	N.G.	Minor
5	PCB Appearance $A=(L+W) \div 2$	Burned PCB	N.G.	Major
		Green paint stripped & visible circuit $A > 1.0$ mm (Finish coat not counted in)	N.G.	Minor
		A particle across the circuit	N.G.	Minor
		Circuit split $> 1/2$ Circuit width	N.G.	Minor
		Any circuit risen	N.G.	Minor
		$0.2\text{mm} < \text{Tin ball area } A \leq 0.4\text{mm}$ And Q'TY > 4 Pieces	N.G.	Minor
		Tin ball area $A > 0.4\text{mm}$	N.G.	Minor

N O	Item	Specification	Judge	Level	
6	Molding appearance $A=(L+W) \div 2$	Too soft : Shape by touch changed	N.G.	Major	
		Insufficient epoxy : IC circuit or IC pad visible	N.G.	Minor	
		Excessive epoxy : Diameter $> 20mm$ Or High $> 2.5mm$	N.G.	Minor	
		Pin hole through to IC and $A > 0.2mm$	N.G.	Minor	
7	Bezel appearance $A=(L+W) \div 2$	Angle between frame and TAB $> 45^\circ + 10^\circ$	N.G.	Minor	
		Electroplate strip $A > 1.0mm$ (Top view only)	N.G.	Minor	
		Rust (Top view only)	N.G.	Minor	
		Crack	N.G.	Minor	
8	Backlight electric characteristics $A=(L+W) \div 2$	Error backlight color	N.G.	Major	
		No function	N.G.	Major	
		Any LED dot no function	N.G.	Major	
		PIN soldering without tin $A > 1/2$ solder pad	N.G.	Minor	
		Solder PIN high $> 1.5mm$	N.G.	Minor	
9	LCD Appearance $A=(L+W) \div 2$	Polarize rise over V/A	N.G.	Minor	
		Rainbow $A > 1/3$ bezel V/A	N.G.	Minor	
10	Assembly parts $A=(L+W) \div 2$	Components mark unclearly	N.G.	Minor	
		Components' distance more than 0.7mm firm the PCB	N.G.	Minor	
		Error position not in center $D > 1/2W$	N.G.	Minor	
					
		Non- solder area $>$ Twice solder area	N.G.	Minor	
		Flux area $A > 1/3$ solder area	N.G.	Minor	
		Component broken	N.G.	Minor	