

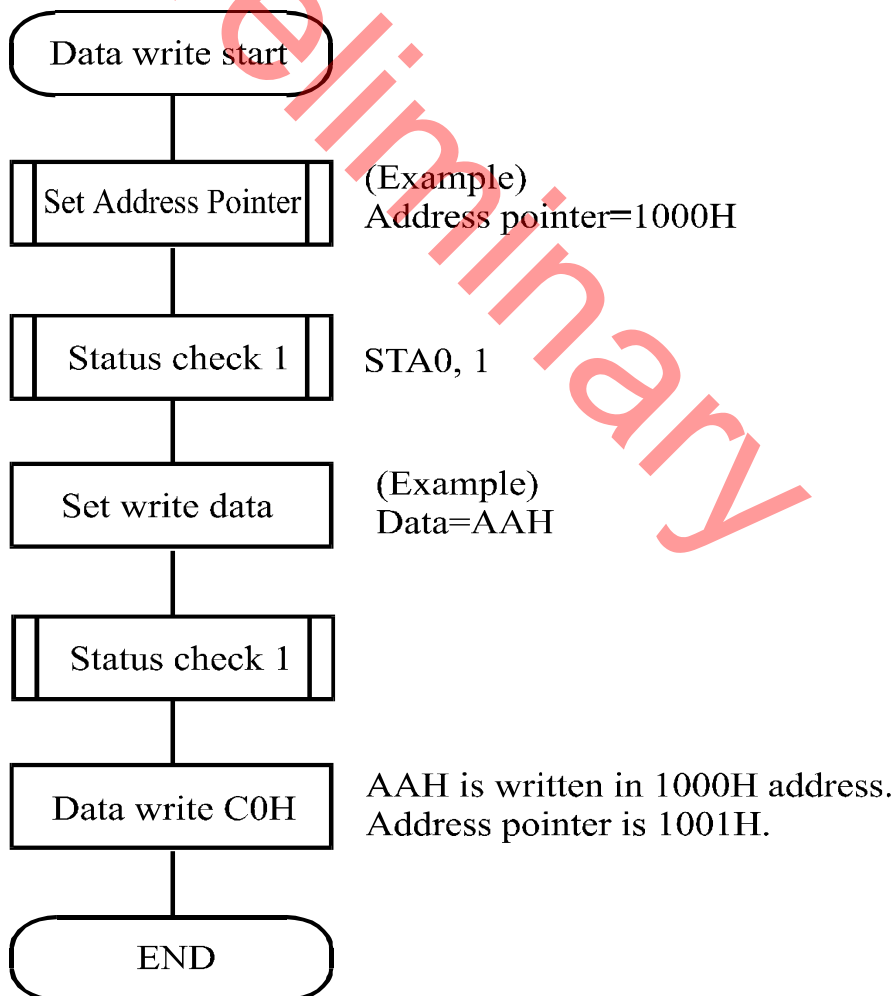
·Date Read/Write

CODE	HEX.	FUNCTION	OPERAND
11000000	C0H	Data Write and Increment ADP	Data
11000001	C1H	Data Read and Increment ADP	—
11000010	C2H	Data Write and Decrement ADP	Data
11000011	C3H	Data Read and Decrement ADP	—
11000100	C4H	Data Write and Non variable ADP	Data
11000101	C5H	Data Read and Non variable ADP	—

This command is used for writing data from the MPU to external display RAM, and reading data from external display RAM to the MPU. Data Write/Data Read should be executed after setting address using Set Address Pointer command. The address pointer can be automatically incremented or decremented using this command.

(Note) This command is necessary for each 1-byte datum.

Refer to the following flowchart.



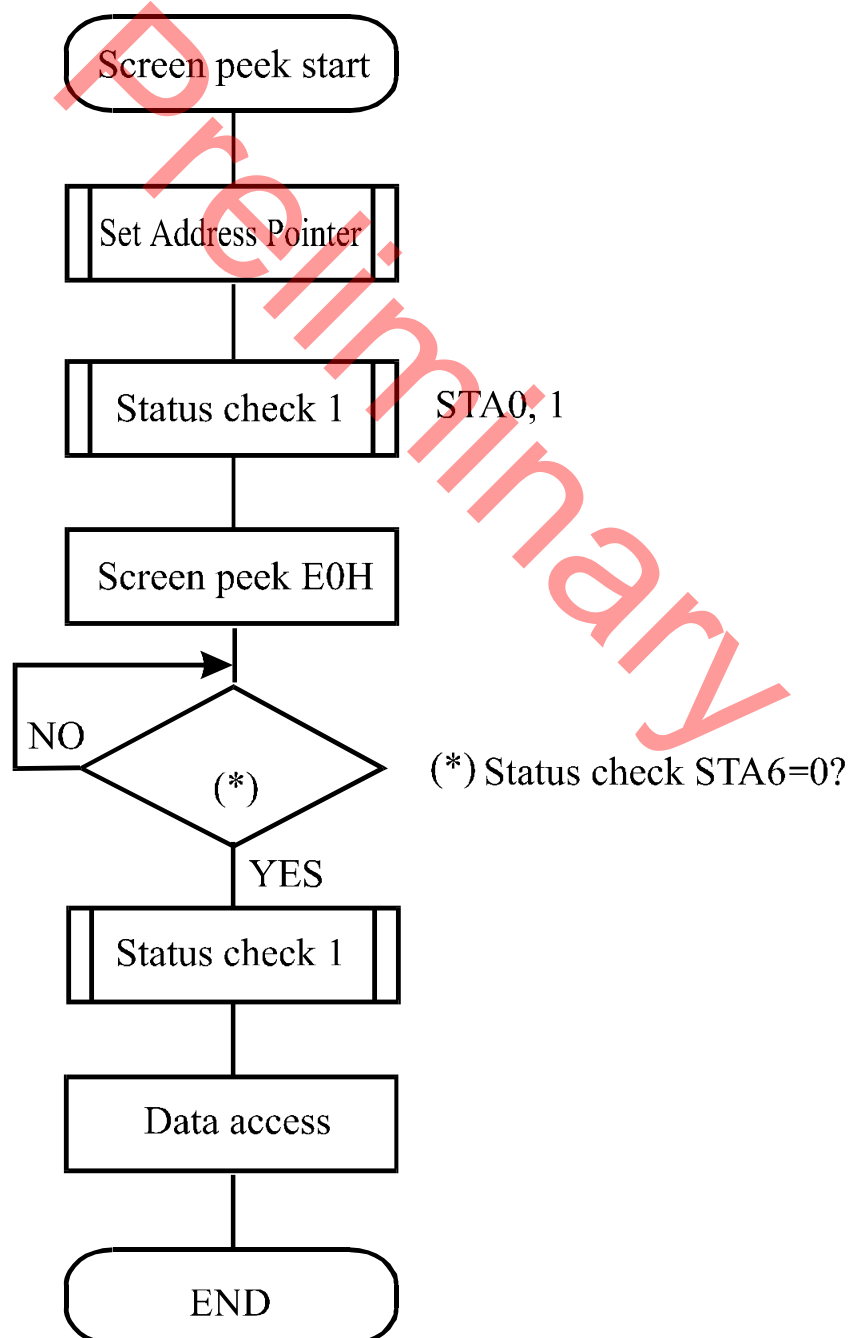
·Screen Peek

CODE	HEX.	FUNCTION	OPERAND
11100000	E0H	Screen Peek	-e

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

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

Refer to the following flowchart.



·Screen Copy

CODE	HEX.	FUNCTION	OPERAND
11101000	E8H	Screen Copy	—

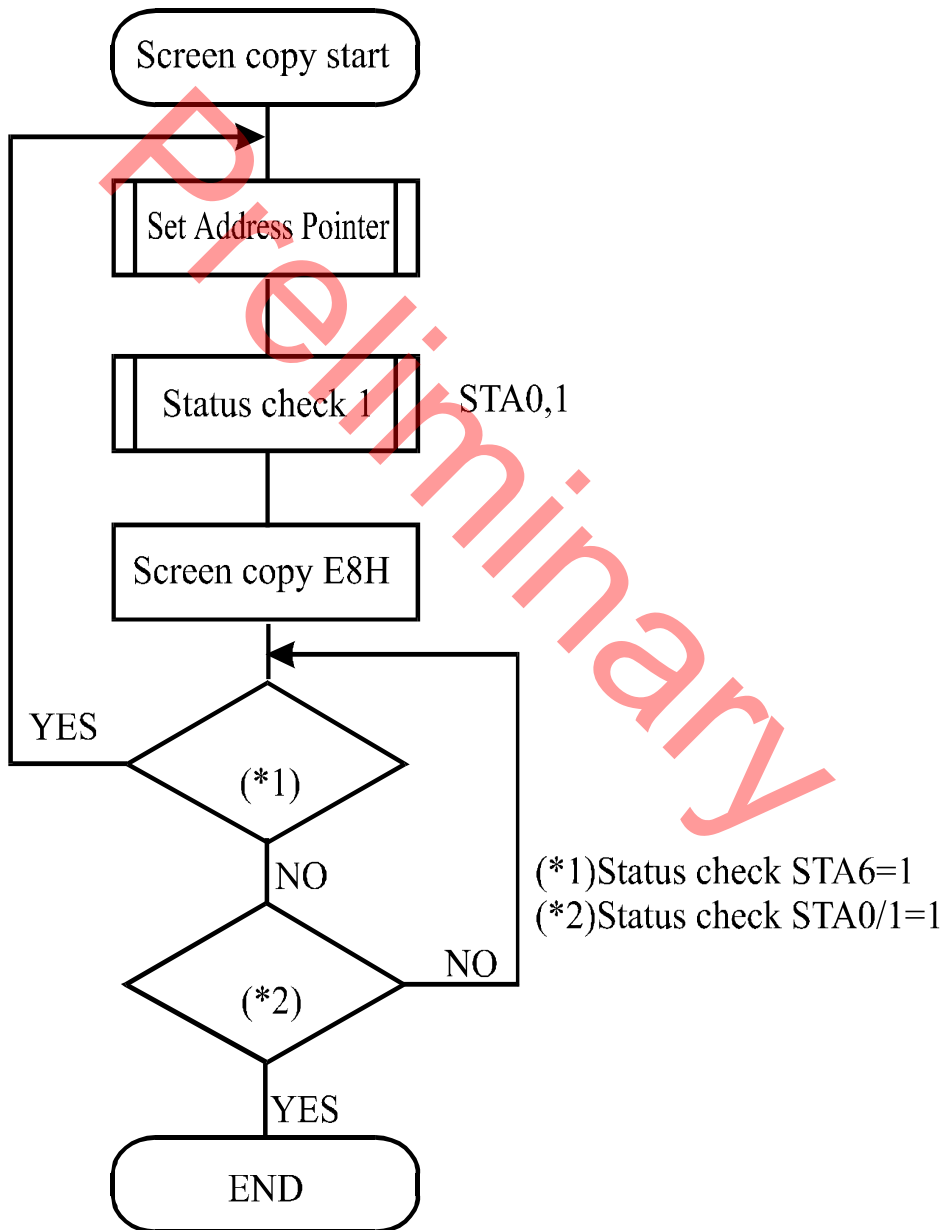
This command copies a single raster line of data to the graphic area.

The start point must be set using the Set Address Pointer command.

(Note 1) If the attribute function is being used, this command is not available.

(With Attribute data is graphic area data.)

Refer to the following flowchart.

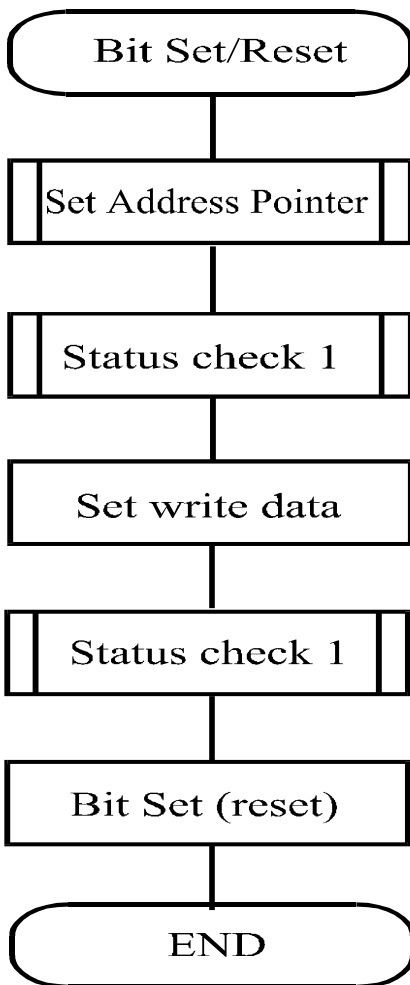


• Bit Set/Reset

CODE	FUNCTION	OPERAND
11110xxx	Bit Reset	—
11111xxx	Bit Set	—
1111x000	Bit 0 (LSB)	—
1111x001	Bit 1	—
1111x010	Bit 2	—
1111x011	Bit 3	—
1111x100	Bit 4	—
1111x101	Bit 5	—
1111x110	Bit 6	—
1111x111	Bit 7 (MSB)	—

X: invalid

This command use to set or reset a bit of the byte specified by the address pointer.
 Only one bit can be set/reset at a time.
 Refer to the following flowchart.



STA0,1

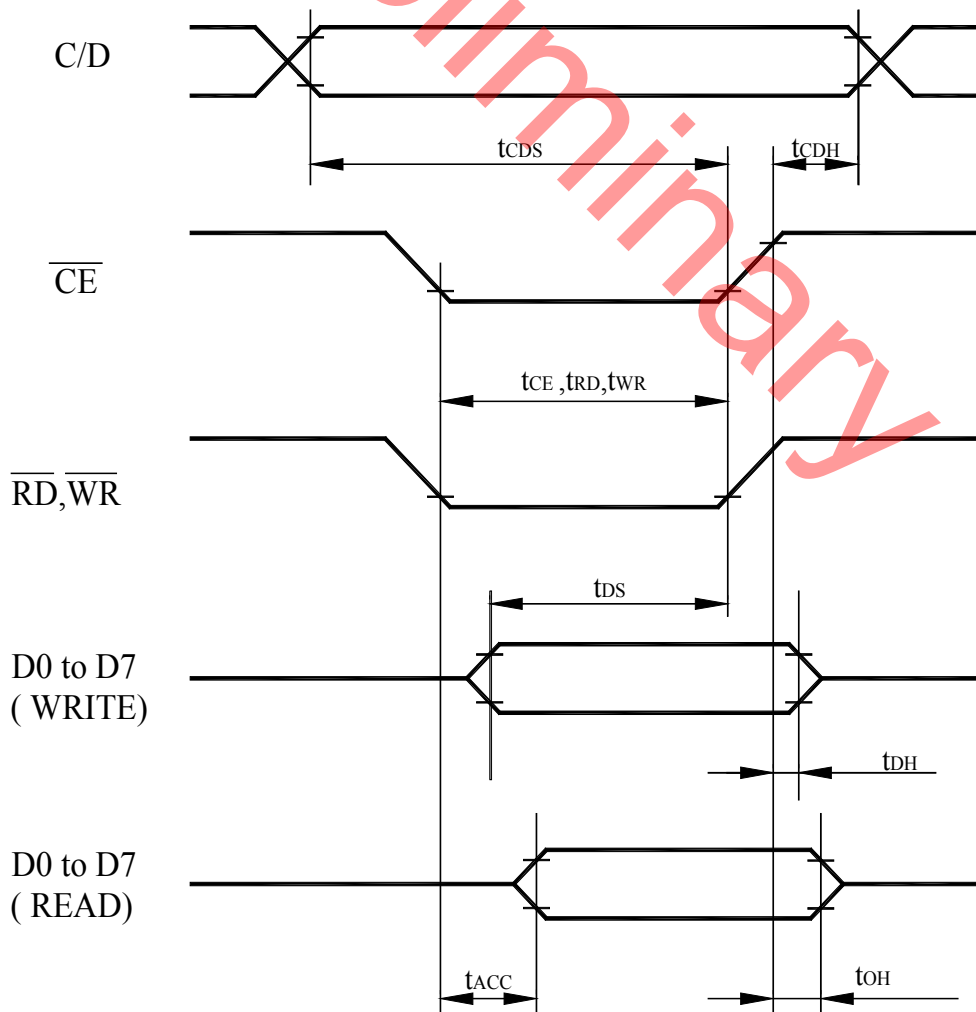
Upper 4 bit Lower 4 bit	LLLL	LLLH	LLHL	LLHH	LHLL	LHLH	LHHL	LHHH
LLLL		0	1	2	3	4	5	6
LLLH	.	7	8	9	A	B	C	D
LLHL	"	E	F	G	H	I	J	K
LLHH	#	L	M	N	O	P	Q	R
LHLL	\$	S	T	U	V	W	X	Y
LHLH	%	Z	[\]	^	_	`
LHHL	&	a	b	c	d	e	f	g
LHHH	'	h	i	j	k	l	m	n
HLLL	o	p	q	r	s	t	u	v
HLLH	w	x	y	z	{		}	~
HLHL	*	+	=	>	?@	[\]
HLHH	^	_	`	a	b	c	d	e
HHLL	f	g	h	i	j	k	l	m
HHLH	n	o	p	q	r	s	t	u
HHHL	v	w	x	y	z	{		}
HHHH	~	`	a	b	c	d	e	f

10. Timing Characteristics

Bus Timing

($V_{SS} = 0\text{ V}$, $V_{DD} = 5\text{ V}$)

Item	Symbol	Min	Typ	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_{CDS} , t_{RD} , t_{WR}	80	—	—	ns
Data Set-up Time	t_{DS}	80	—	—	ns
Data Hold Time	t_{DH}	40	—	—	ns
Access Time	t_{ACC}	—	—	150	ns
Output Hold Time	t_{OH}	10	—	50	ns



11. Reliability

Content of Reliability Test (wide temperature, -20°C~70°C)

Environmental Test			
Test Item	Content of Test	Test Condition	Note
High Temperature storage	Endurance test applying the high storage temperature for a long time.	80°C 200hrs	2
Low Temperature storage	Endurance test applying the high storage temperature for a long time.	-30°C 200hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	70°C 200hrs	—
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-20°C 200hrs	1
High Temperature/ Humidity Operation	The module should be allowed to stand at 60°C,90%RH max For 96hrs under no-load condition excluding the polarizer, Then taking it out and drying it at normal temperature.	60°C,90%RH 96hrs	1,2
Thermal shock resistance	The sample should be allowed stand the following 10 cycles of operation -20°C 25°C 70°C 30min 5min 30min 1 cycle	-20°C/70°C 10 cycles	—
Vibration test	Endurance test applying the vibration during transportation and using.	Total fixed amplitude : 1.5mm Vibration Frequency : 10~55Hz One cycle 60 seconds to 3 directions of X,Y,Z for Each 15 minutes	3
Static electricity test	Endurance test applying the electric stress to the terminal.	VS=800V,RS=1.5kΩ CS=100pF 1 time	—

Note1: No dew condensation to be observed.

Note2: The function test shall be conducted after 4 hours storage at the normal Temperature and humidity after remove from the test chamber.

Note3: Vibration test will be conducted to the product itself without putting it in a container.

12. Backlight Information

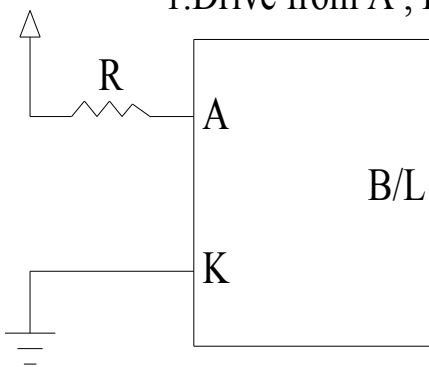
Specification

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	TEST CONDITION
Supply Current	I _{LED}	528	660	990	mA	V=4.2V
Supply Voltage	V	4.0	4.2	4.4	V	—
Reverse Voltage	V _R	—	—	10	V	—
Luminous Intensity	I _V	139.6	174.5	—	CD/M ²	I _{LED} =660mA
Wave Length	λ _p	—	570	—	nm	I _{LED} =660mA
Life Time	—	—	100000	—	Hr.	I _{LED} =660mA
Color	Yellow Green					

Note: The LED of B/L is drive by current only, drive voltage is for reference only. drive voltage can make driving current under safety area (current between minimum and maximum).

LED B\L Drive Method

1. Drive from A , K



13. Material List of Components for RoHS

1. Crystalfontz America, Inc. hereby declares that all of or part of products (with the mark “#” in code), including, but not limited to, the LCM, accessories or packages, manufactured and/or delivered to your company (including your subsidiaries and affiliated company) directly or indirectly by our company (including our subsidiaries or affiliated companies) do not intentionally contain any of the substances listed in all applicable EU directives and regulations, including the following substances.

Exhibit A: The Harmful Material List

Material	(Cd)	(Pb)	(Hg)	(Cr6+)	PBBs	PBDEs
Limited Value	100 ppm	1000 ppm	1000 ppm	1000 ppm	1000 ppm	1000 ppm
Above limited value is set up according to RoHS.						

2. Process for RoHS requirement:

- (1) Use the Sn/Ag/Cu soldering surface: the surface of Pb-free solder is rougher than we used before.
- (2) Heat-resistance temp.:
Reflow: 250°C, 30 seconds Max.
Connector soldering wave or hand soldering: 320°C, 10 seconds max.
- (3) Temp. curve of reflow, max. Temp.: 235±5°C
Recommended customer’s soldering temp. of connector: 280°C, 3 seconds.