

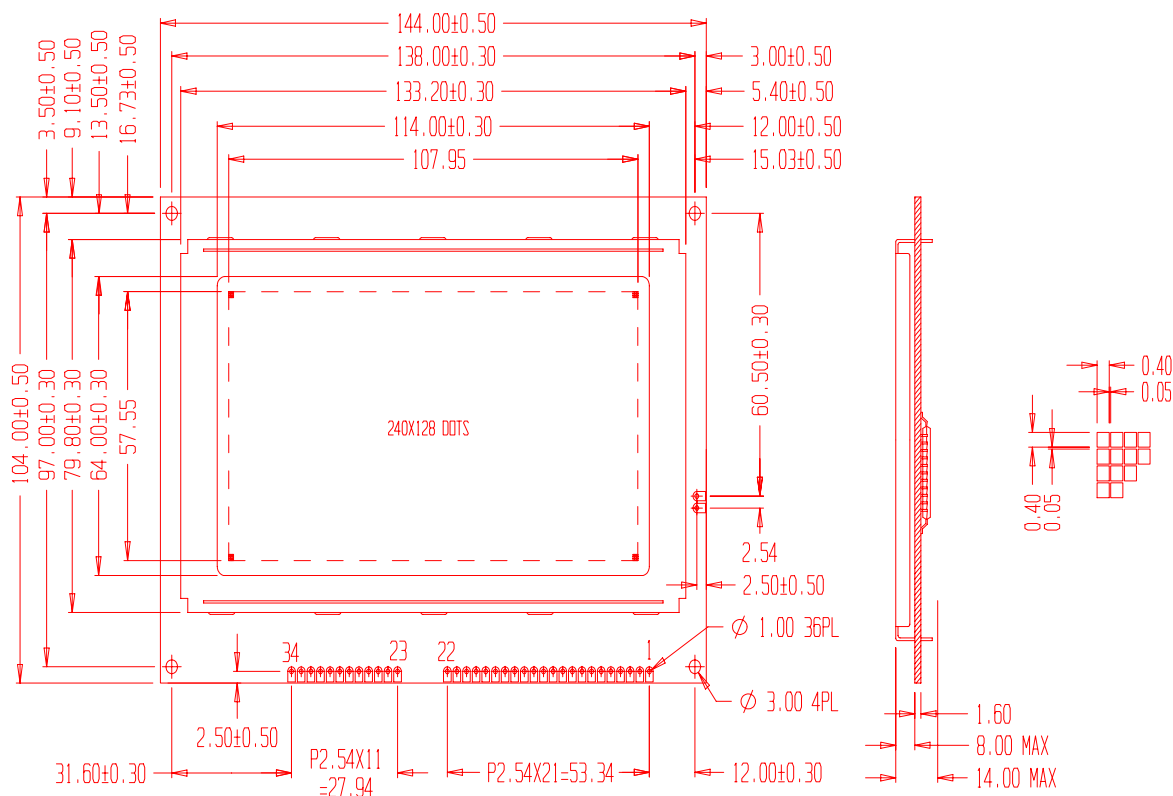
图形点阵液晶显示模块使用手册

CM240128-6SLYB

CM240128-1 是一种图形点阵液晶显示器, 它由控制器 T6963C、行驱动器/列驱动器及 240×128 全点阵液晶显示器组成. 可完成图形显示, 也可以显示 15×8 个 (16×16 点阵) 汉字主要技术参数和性能:

1. 电源: VDD: +5V±10%; 模块内自带-15V 负压, 用于 LCD 的驱动电压。
2. 显示内容: 240(列)×128(行)点
3. 全屏幕点阵
4. 带 8K 外部数据存储器(其地址由软件设定)
5. 其接口适配 8080 系列和 Z80 系列 MPU 的控制时序
6. 驱动方式: 1/128 DUTY, 1/9 BIAS
7. 工作温度: -10℃~+60℃, 存储温度: -20℃~+70℃
8. 显示模式: STN 黄绿膜
9. 背光特性: LED 背光或 EL 背光 (黄绿色)
10. 模块封装方式: SMT
11. 视角方向: 6:00
12. 功耗: 模块自带负压

二、外形尺寸图



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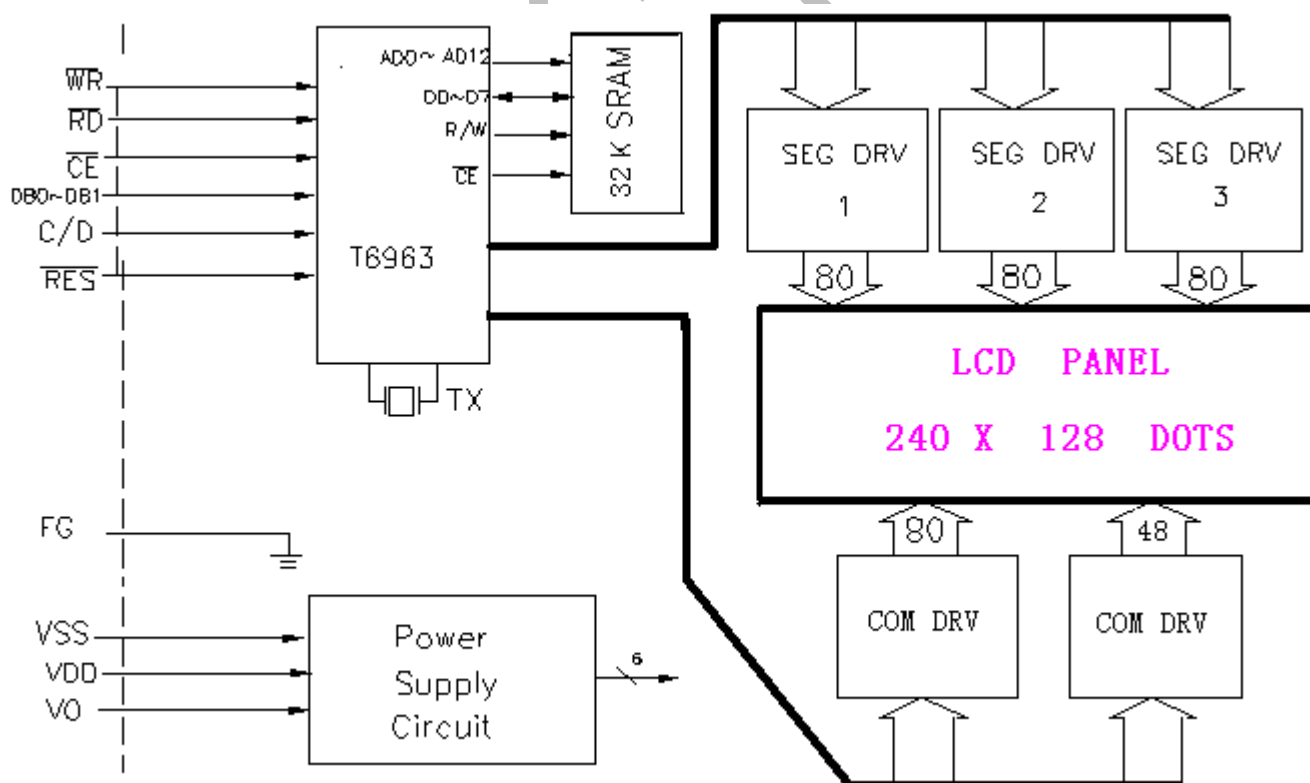
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外形尺寸一览

ITEM	NOMINAL DIMEN	UNIT
模块体积	144×104×9.5/13.2	mm
视域	114.0×64.0	mm
行列点阵数	240×128	DOTS
点距离	0.05×0.05	mm
点大小	0.4×0.4	mm

三、硬件结构图



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四、模块的外部接口

Pin No.	Symbol	Level	Description
1	FG	0V	Frame ground
2	VSS	0V	Ground
3	VDD	5.0V	Supply voltage for logic
4	VO	-12V~-15V	Input voltage for LCD
5	WR	L	Write signal
6	RD	L	Read signal
7	CE	L	Chip enable signal
8	C/D	H/L	H : Instruction Code, L : Data
9	NC	---	No connection
10	RST	L	Reset signal
11	DB0	H/L	Data bit 0
12	DB1	H/L	Data bit 1
13	DB2	H/L	Data bit 2
14	DB3	H/L	Data bit 3
15	DB4	H/L	Data bit 4
16	DB5	H/L	Data bit 5
17	DB6	H/L	Data bit 6
18	DB7	H/L	Data bit 7
19	FS	H/L	Font select signal (H : 6 x 8 dots, L : 8 x 8 dots)
20	VOUT	-15V	Output voltage for LCD
21	SLA	5V	Side light anode
22	SLK	0V	Side light cathode

23	ED	H/L	Serial data
24	CDATA	H	Synchronus signal for row driver
25	FR	H/L	Frame signal
26	LP	H/L	Latch pulse for column driver. Shift clock pulse for row driver
27	HSCP	H/L	Shift clock pulse for column driver
28	NC	---	No connection
29	VDD	5.0V	Supply voltage for logic
30	VSS	0V	Ground
31	VO	---	Input voltage for LCD
32	VOUT	-15V	Output voltage for LCD
33	SLA	5V	Side light anode
34	SLK	0V	Side light cathode

五、IC 说明及指令表

T6963C is LCD controller designed to be used for control LCD driver LCD driver LSIs and display data Memory, It has an 8 bit parallel data

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bus

And control lines for reading or writing through a MPU I/F.

It has 128 words character generator ROM with the capability to control External display RAM of up to 128K bytes. Allocation of text, graphics And external generator RAM can be easily made and the display window can Be freely moved within the allocated memory range.

It supports a very board range of LCD formats by selecting different Combinations on a set of programmable inputs. It can be used in text, graphic

Modes and has various attribute functions.

指令表:

COMMAND	CODE	D1	D2	FUNCTION
Register Set	00100001	X address	Y address	Cursor pointer set
	00100010	Data	00H	Off register
	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 CGROM mode
	10001xxx	-	-	External CGRAM 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 line cursor
	10100010	-	-	3 line cursor
	10100011	-	-	4 line cursor
	10100100	-	-	5 line cursor
	10100101	-	-	6 line cursor
	10100110	-	-	7 line cursor
	10100111	-	-	8 line 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 no variable

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	11000101	-	-	Data read and ADP no variable
Screen peek	11100000	-	-	Screen peek
Screen copy	11101000	-	-	Screen copy
Bit Set/Reset	11110XX	-	-	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)

六、电气参数

1. ABSOLUTE MAXIMUM RATING

Item	Symbol	Condition	Min	Typ	Max	Unit
Supply Voltage(logic)	VDD-VSS	-	-0.3	-	7	V
Supply Voltage(LCD Drive)	VDD-VO	-	VDD+0.3	-	VDD-0.3	V
Input Voltage	VI	-	-0.3	-	VDD+0.3	V
Operating Temperature	Topr	-	-10	-	+55	° C
Storage Temperature	Tstg	-	-20	-	+60	° C

2. OPTICAL DATA Ta=25° C

Item	Symbol	Condition	Standard Value			Unit	
			min	typ	max		
Supply voltage(Logic)	VDD-VSS	-	4.75	5	5.25	V	
Supply voltage(LCD Drive)	VDD-VO	-	-	-	-	V	
Supply current	IDD	-	-	12.0	17.0	mA	
	IO	-	-	1.8	2.5	mA	
EL Backlight current	IEL	-	-	100	-	mA	
Input high voltage	VIH	High level	0.7VDD	-	VDD	V	
Input low voltage	VIL	Low level	0	-	0.3VDD	V	
Supply voltage for LCD Drive (1/80 duty)	VDD-VO	Ta=0° C	14.2	14.5	14.8	V	
		Ta=25° C	13.3	13.6	13.9	V	
		Ta=50° C	12.3	12.6	12.9	V	
Contrast Ratio	CR		-	4	-	-	
Viewing Angle	-	CR ≥ 2	θ	-10	-	20	deg
			θ	60	-	120	deg
Response Time (rise)	Tr	Note 1	Ta=25°	-	130	200	ms
Response Time (delay)	Td	Note 2	Ta=25°	-	150	230	ms

NOTE 1: Required time for blackening ratio of segment goes up from 0% to 90% when Wave from is switched from one selected one ($\theta = 10^\circ$, $\phi = 90^\circ$)

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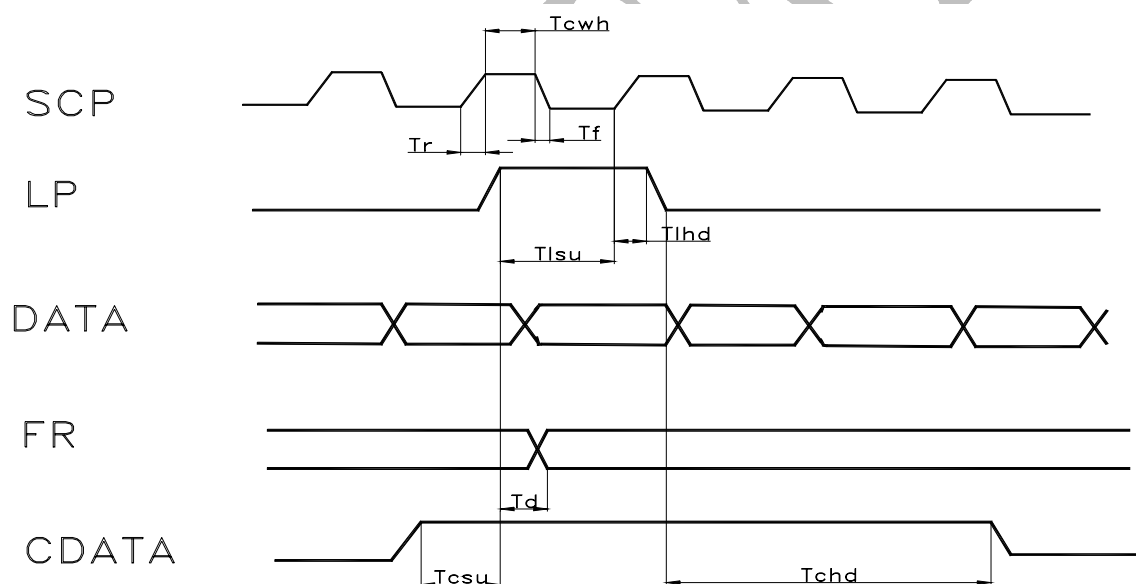
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Note 2: Required time for blackening ratio of segment goes down from 100% to 10%
When wave from is switched from one selected one ($\theta = 10^\circ$, $\phi = 90^\circ$)

3. TIMING CHARACTERISTICS

Item	Symbol	Min	Max	Unit
Operating frequency	fSCP	-	2.75	MHZ
SCP pulse width	Tcwh, Tcwl	150		ns
SCP rise/fall time	Tr	-	30	ns
LP set up time	Tlsu	150	290	ns
LP hold time	Tlhd	5	40	ns
Data set up time	Tdsu	170	-	ns
Data hold time	Tdhd	80	-	ns
FR delay time	Td	0	90	ns
CDATA set up time	Tcsu	450	850	ns
CDATA hold time	Tchd	450	950	ns

Condition: DV=+5.0V \pm 10%, Ta=-10 \sim +70 $^\circ$ C



驱动波形图

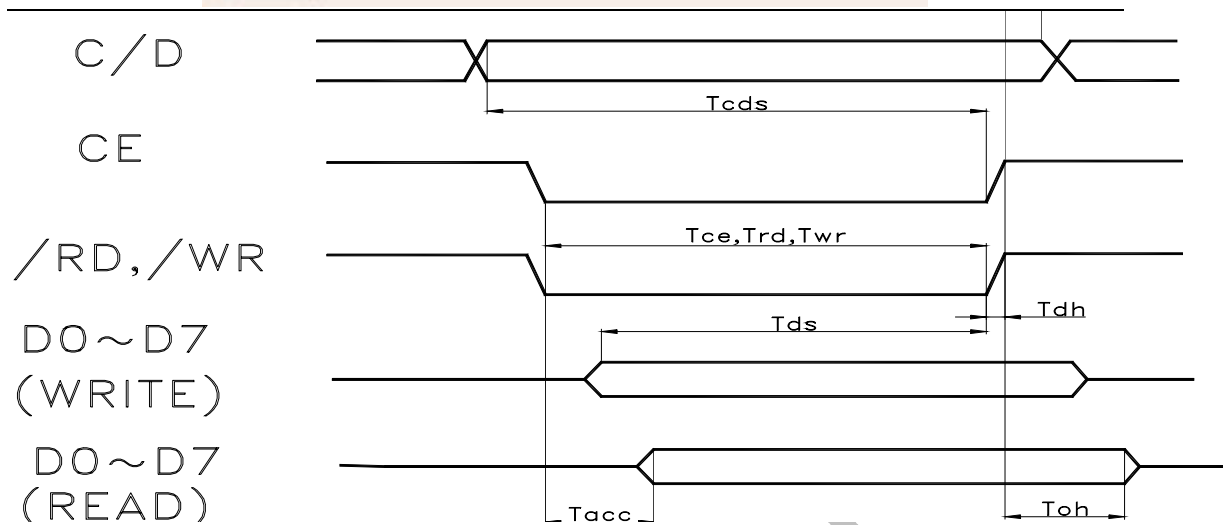
4. INTERFACE TIMING

Item	Symbol	Min	Max	Unit
C/D set up time	Tcds	100	-	ns
C/D hold time	Tcdh	10	-	ns
CE,RD,WR pulse width	Tce,Trd,Twr	80	-	ns
DATA set up time	Tds	80	-	ns
DATA hold time	Tdh	40	-	ns
Access time	Tacc	-	150	ns
Output hold time	Toh	10	50	ns

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读写时序图

5. EL Backlight Electrical Characteristics
 $T_a=25^{\circ}\text{C}$ $V_{DD}=5\text{V}$

Symbol	Parameter	Min	Type	Max	Units
IIN	VDD supply current	10		150	mA
VA-B	Output voltage across lamp	37	40	43	V
		75	80	85	V
FEL	VA-B output drive frequency	600	800	1000	V
VDD	Supply voltage	4.5		12	V
CL	Load capacitance	0		25	nF
TA	Operating temperature	0		50	$^{\circ}\text{C}$

Note: EL Backlight with white lamp.

七、功能描述

7.1 STATUS READ

Before sending data(read/write), command it is necessary to check the Status.

Status check

Status of T6963c can read from data lines.

/RD L
 /WR H
 /CE L
 C/D H

DO D7 Status word

T6963C status word format is following

MSB				LSB			
STA7	STA6	STA5	STA4	STA3	STA2	STA1	STA0
D7	D6	D5	D4	D3	D2	D1	D0
STA0	Check capability of command execution					0: Disable 1: Enable	
STA1	Check capability of data read/write					0: Disable 1: Enable	
STA2	Check capability of auto mode data read					0: Disable 1: Enable	
STA3	Check capability of auto mode data write					0: Disable 1: Enable	
STA4	Not use						

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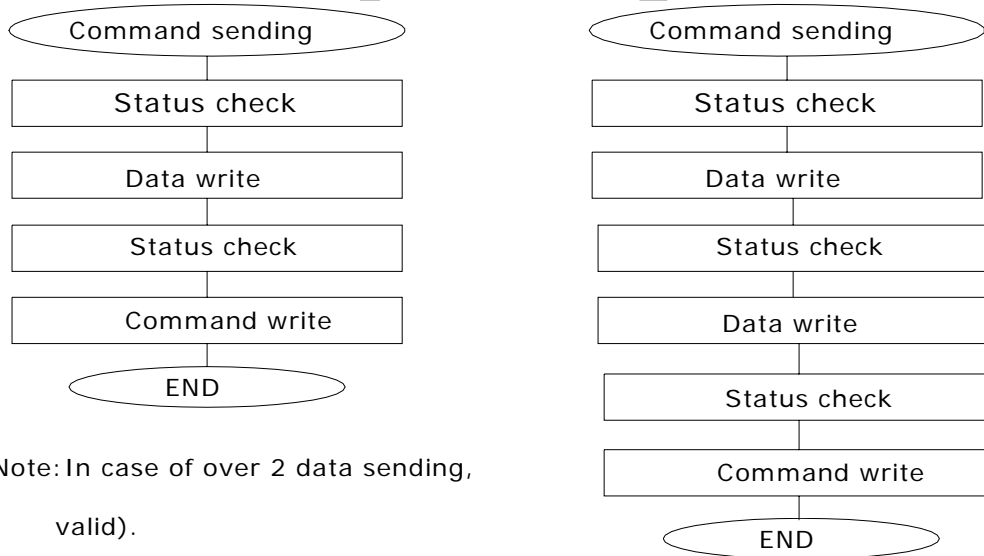
STA5	Check capability of controller operation	0: Disable 1: Enable
STA6	Error flag. Using screen peek/copy command	0: No error 1: error
STA7	Check the condition blink	0: Disable 1: Enable

Note 1: It is necessary to check STA0 and STA1 at the same time, The error is happened by sending data at executing command.
 2: The status check will be enough to check STA0/STA1.
 3: STA2/STA3 are valid in auto mode STA0/STA1 are invalid.
 Status checking flow:



7.2 DATA SET

In T6963C, the data have been set and command executes. The order of procedure of command sending



Note: In case of over 2 data sending, (valid).

7.31 Description of command

1. Register set

CODE	HEX	FUNCTION	D1	D2
00100001	21H	Cursor pointer set	X address	Y address
00100010	22H	Offset register set	Data	00H
00100100	24H	Address pointer set	Low address	High address

(1) Cursor pointer set

The position of cursor is specified by X address. 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 set by this command. X address, Y address are specified following.
 X address 00H - - - - 4FH (Low 7bits are valid)

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Y address 00H - - - - 1FH(Low 5bits are valid)
 1 Screen drive
 X address 00H - - - - 4FH
 Y address 00H - - - - 0FH

(2) Offset register set

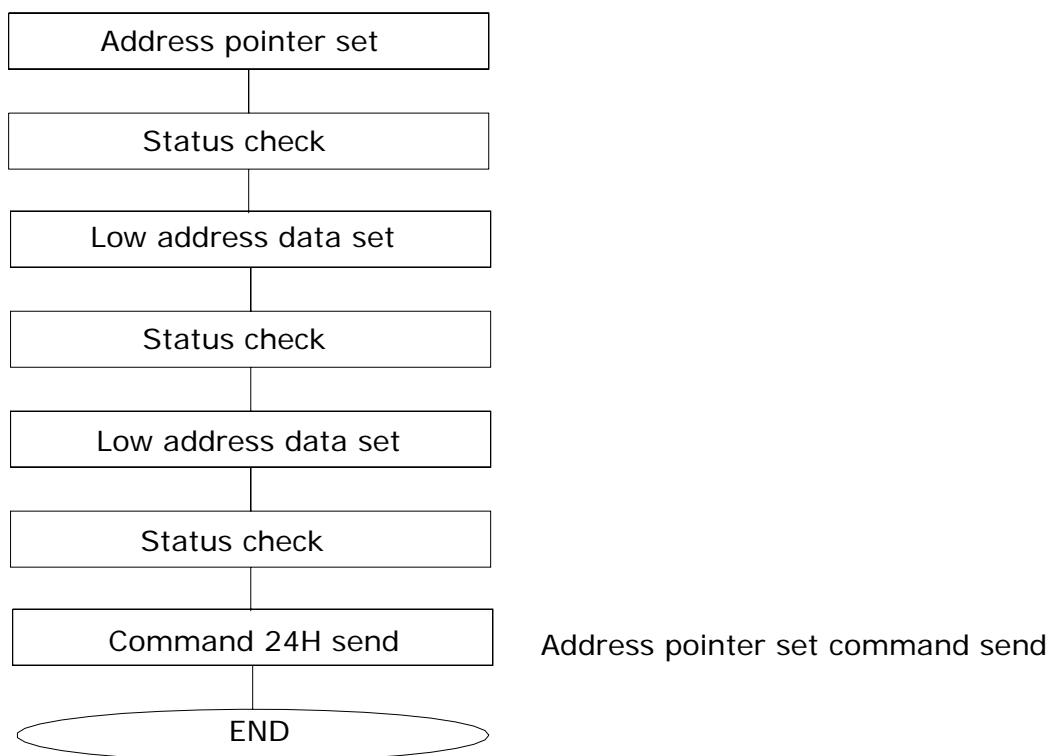
The offset register is used to determine external character generator RAM area.
 T6963C has 16 bits address lines as follow:

MSB											LSB				
Ad15	Ad14	Ad13	Ad12	Ad11	Ad10	Ad9	Ad8	Ad7	Ad6	Ad5	Ad4	Ad3	Ad2	Ad1	Ad0

The upper 5 bits (ad15 - ad11) are determined by offset register. The Middle 8 bits (ad10 - ad3) are determined by character code. The Lower 3 bit (ad2 - ad0) are determined by vertical counter. The Lower 5 bit of D1(data) are valid. The data format of external character Generator RAM.

(3) Address pointer set

The address pointer set command is used to indication the start address For writing (or reading) to external RAM.
 The flow chart address pointer set command



7.32 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

(1) Text home address and area 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

Example:

Text home address: 0000H
Text area: 00A0H
MD2=0, MD3=0: 80 COLUMN
DUAL=0, MDS=1, MDO=1, MD1=0: 28 LINES

Display plane:

0000H	0001H	- - - - -	004EH	004FH	1 Line
00A0H	00A1H	- - - - -	00EEH	00EFH	2 Line
⋮	⋮	⋮	⋮	⋮	⋮
⋮	⋮	⋮	⋮	⋮	⋮
10E0H	10E1H	- - - - -	112EH	112FH	28 Lines

(2) Graphic home address and area 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.

Example:

Graphic home address: 0000H
Graphic area: 0020H
MD2=H, MD3=H: 32 COLUMNS
DUAL=H, MDS=L, MDO=H, MD1=H: 2 LINES

Example:

Display plane:

0000H	0001H	- - - - -	001EH	001FH
0020H	0021H	- - - - -	003EH	003FH
⋮	⋮	⋮	⋮	⋮
⋮	⋮	⋮	⋮	⋮
01E0H	01E1H		01FEH	01FFH

7.33 MODE SET

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.

NOTE: Only text display is attributed, because attributed data is located.

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 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 1byte in graphic area. Attribute function is defined as follow.

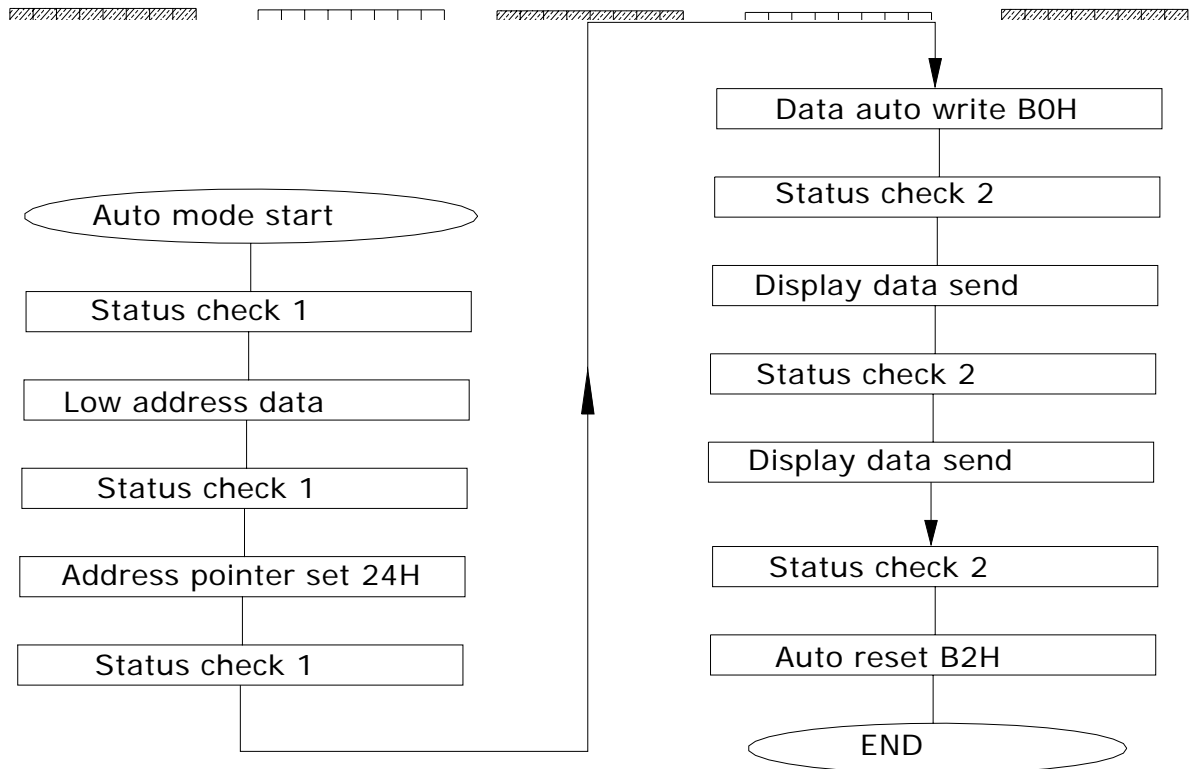
Attribute RAM 1byte

X	X	X	X	D3	D2	D1	D0
---	---	---	---	----	----	----	----

X: don't care

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	0	Blink of reverse display
1	0	1	1	Blink of inhibit display



7.34 DATA AUTO READ/WRITE

CODE	HEX	FUNCTION	OPERAND
10110000	B0H	Data auto write set	-
10110001	B1H	Data auto read set	-
10110010	B2H	Auto reset	-

This command is convenient to send full screen data from external display RAM. After setting auto mode, "Data write(or read)" command is not necessary between each data. "Data auto write (or read)" command should follow the "Address pointer set" and address pointer is automatically increment by + 1 after each data. After sending (or receiving) all data "Auto reset" is necessary to return normal operation because all data is regarded "Display data" and no command can be accepted in the auto mode.

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)

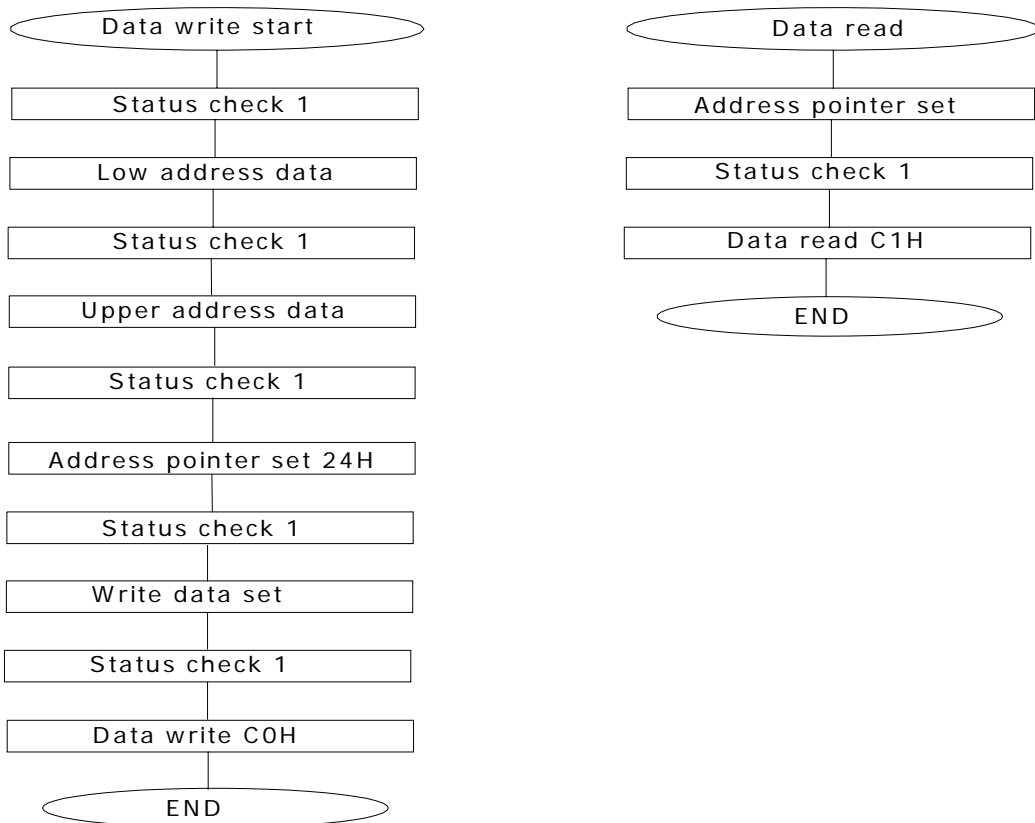
7.35 DATA READ WRITE

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

This command is used for data write from MPU to external display RAM, AND data read 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 by setting this command.

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

Please refer following flow chart.



NOTE:

- (1) After power on, it is necessary to reset. /RESET is kept "L" between 5 CLOCK up(oscillation clock).
- (2) When /HALT has been "L", the oscillation is stopped. It is necessary To turn off power supply for LCD, because LCD goes down by DC bias.
- (3) The HALF function contains the RESET function.
- (4) After state of RESET/HALT.

TERMINAL	HALT	RESET
D0-D7	F	F
D0-d7	F	F
R/w	H	H
/ce	H (NOTE 1)	H (NOTE 1)
Ad0-ad15	H (NOTE 2)	H (NOTE 2)
/ce0, /ce1	H (NOTE 1)	H (NOTE 1)
ED, HOD	Final Data	Final Data
HSCP	L	L
LP	L	L
CDATA	H	H
FR	H	H
CH1	L	K0
CH2	L	VEND
DSPON	L	L
X0	H	OSC CLOCK

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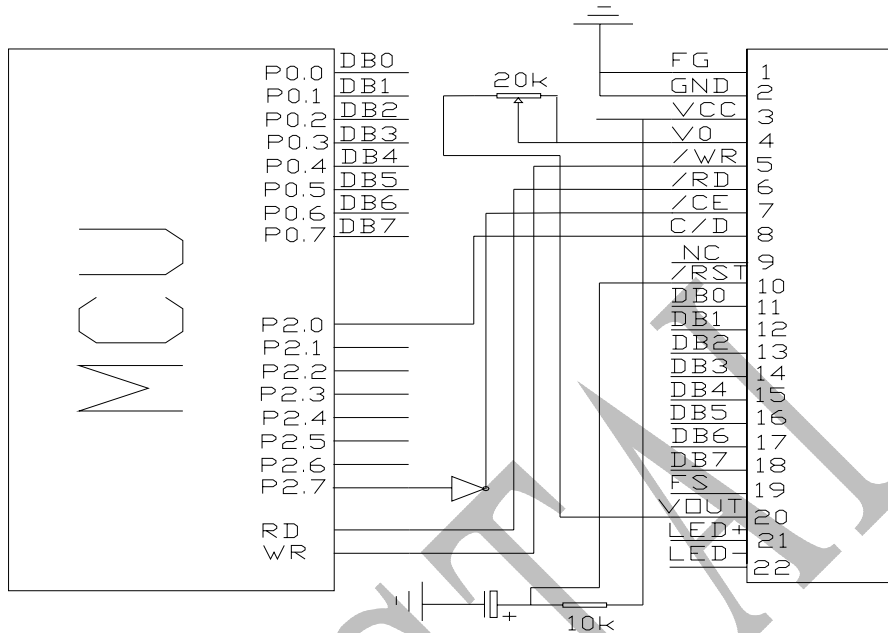
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H: Level H
L: Level L
F: Floating (High impedance)
KO: Internal state (TEXT data access) normally open
VEND: End signal of V-counter(Line count) if MDS=H, T2=L,
HEND (end signal of H-count) normally open.
Note 1: In Attribute mode, H or L by state of Graphinc pointer.
Note 2: In Attribute mode, DATA of Graphinc pointer.

八、应用举例

CM240128-6 与单片机 8031 的一种接口如下图. 所示:
注:V0 为液晶驱动电压。此图为模块内自带负压的示例



```

    ORG    0000H
    AJMP   MAIN
    ORG    0003H
    AJMP   ZHONGDUAN
    ORG    0035H
ZHONGDUAN:
    HERE:  SJMP  HERE
    RET
  
```

```

    DATA1 EQU    30H    ;第一参数单元
    DATA2 EQU    31H    ;第二参数/数据单元
    COMMAND EQU    32H    ;指令代码单元
    C_ADD EQU    8100H    ;指令通道地址
  
```

D_ADD EQU 8000H ;数据通道地址

LI1 EQU 33H

LI2 EQU 34H

BUSY1:

PUSH DPH

PUSH DPL

MOV DPTR, #C_ADD

MOVX A, @DPTR

POP DPL

POP DPH

RET

BUSY: LCALL BUSY1

JNB ACC. 0, BUSY1

JNB ACC. 1, BUSY1

RET

WRITE_COMMAND: PUSH DPH

PUSH DPL

LCALL BUSY

MOV A, COMMAND

MOV DPTR, #C_ADD

MOVX @DPTR, A

POP DPL

POP DPH

RET

WRITE_DATA:

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```

PUSH    DPH
PUSH    DPL
LCALL   BUSY
MOV     A, DATA2
MOV     DPTR, #D_ADD
MOVX    @DPTR, A
POP     DPL
POP     DPH
RET

```

```
MS40:   MOV     R7, #0E8H
```

```
MS2:   MOV     R6, #0FFH
```

```
MS1:   DJNZ   R6, MS1
```

```
        DJNZ   R7, MS2
```

```
        RET
```

```
DELAY: MOV     R5, #05H
```

```
DELAY1: LCALL  MS40
```

```
        DJNZ   R5, DELAY1
```

```
        RET
```

```
;*****
```

```
MAIN:
```

```
        MOV     SP, #20H
```

```
        MOV     P3, #0FFH
```

```
        SETB   EA
```

```
        SETB   EX0
```

```
        SETB   IT0
```

```
        MOV     COMMAND, #90H
```

```
        LCALL  WRITE_COMMAND
```

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```
LCALL MS40
MOV DATA2, #00H
LCALL WRITE_DATA
MOV DATA2, #00H
LCALL WRITE_DATA
MOV COMMAND, #40H ;文本显示区首地址设置
LCALL WRITE_COMMAND
MOV DATA2, #20H
LCALL WRITE_DATA
MOV DATA2, #00H
LCALL WRITE_DATA
MOV COMMAND, #41H ;文本显示区宽度设置
LCALL WRITE_COMMAND

MOV DATA2, #00H
LCALL WRITE_DATA
MOV DATA2, #08H
LCALL WRITE_DATA
MOV COMMAND, #42H ;图形显示区首地址设置
LCALL WRITE_COMMAND

MOV DATA2, #1EH
LCALL WRITE_DATA
MOV DATA2, #00H
LCALL WRITE_DATA
MOV COMMAND, #43H ;图形显示宽度设置
LCALL WRITE_COMMAND
```

MOV COMMAND, #80H ;逻辑或, 用 CGROM

LCALL WRITE_COMMAND

MOV COMMAND, #9CH ; 启动文本. 图形. 光标显示

LCALL WRITE_COMMAND

;*****888

;显示全屏

MOV DATA2, #00H

LCALL WRITE_DATA

MOV DATA2, #00H

LCALL WRITE_DATA

MOV COMMAND, #24H

LCALL WRITE_COMMAND

MOV R3, #00H

MOV COMMAND, #0B0H

LCALL WRITE_COMMAND

MOV R4, #20H

YY1:

NOP

YY: MOV A, #OFFH

MOV DATA2, A

LCALL WRITE_DATA

DJNZ R3, YY

DJNZ R4, YY1

MOV COMMAND, #0B2H

LCALL WRITE_COMMAND

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LCALL MS40

;*****

CLEAR1:

MOV DATA2, #00H

LCALL WRITE_DATA

MOV DATA2, #00H

LCALL WRITE_DATA

MOV COMMAND, #24H ;显示地址设置

LCALL WRITE_COMMAND

MOV R3, #00H

MOV R4, #20H

MOV COMMAND, #0B0H ;自动写入

LCALL WRITE_COMMAND

M1:

NOP

M: MOV A, #00H

MOV DATA2, A

LCALL WRITE_DATA

DJNZ R3, M

DJNZ R4, M1

MOV COMMAND, #0B2H ;推出自动写入

LCALL WRITE_COMMAND

;*****

MOV DATA2, #00H

LCALL WRITE_DATA

```
MOV DATA2, #00H
LCALL WRITE_DATA
MOV COMMAND, #24H ;显示地址设置
LCALL WRITE_COMMAND
```

```
MOV COMMAND, #9CH
LCALL WRITE_COMMAND
MOV DATA2, #05H
LCALL WRITE_DATA
MOV DATA2, #03H
LCALL WRITE_DATA
MOV COMMAND, #21H
LCALL WRITE_COMMAND
```

;显示字库

```
MOV R3, #00H
MOV R4, #7FH
MOV COMMAND, #0B0H ;自动写入
LCALL WRITE_COMMAND
MOV A, #0FFH ;写入英文字库
L: INC A
MOV DATA2, A
LCALL WRITE_DATA
DJNZ R4, L
MOV COMMAND, #0B2H ;退出自动写入
```

LCALL WRITE_COMMAND

LCALL DELAY

;#####

; 写 CGROM 80H

MOV DATA2, #03H

LCALL WRITE_DATA

MOV DATA2, #00H

LCALL WRITE_DATA

MOV COMMAND, #22H

LCALL WRITE_COMMAND

MOV DATA2, #00H

LCALL WRITE_DATA

MOV DATA2, #1CH

LCALL WRITE_DATA

MOV COMMAND, #24H

LCALL WRITE_COMMAND

MOV R2, #2

MOV R0, #OFFH

MOV COMMAND, #0BOH

LCALL WRITE_COMMAND

MOV DPTR, #TEST

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```

LL2:  NOP

LL:   CLR  A

      MOVC A, @A+DPTR

      MOV  DATA2, A

      LCALL WRITE_DATA

      INC  DPTR

      SETB P1.5

      DJNZ R0, LL

      DJNZ R2, LL2

      MOV  DATA2, #0B2H

      LCALL WRITE_DATA

      SETB P1.4

;#####

      MOV  DATA2, #00H

      LCALL WRITE_DATA

      MOV  DATA2, #00H

      LCALL WRITE_DATA

      MOV  COMMAND, #24H      ;显示地址设置€

      LCALL WRITE_COMMAND

      MOV  COMMAND, #0BOH

      LCALL WRITE_COMMAND

      MOV  R2, #2

TIA01: MOV  R1, #255

MMM:   MOV  DATA2, #80H

```

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```
LCALL WRITE_DATA  
DJNZ R1, MMM  
DJNZ R2, TIA01  
MOV COMMAND, #0B2H  
LCALL WRITE_COMMAND  
LCALL DELAY
```

```
MOV COMMAND, #0B0H  
LCALL WRITE_COMMAND  
MOV DATA2, #00H  
LCALL WRITE_DATA  
MOV DATA2, #00H  
LCALL WRITE_DATA  
MOV COMMAND, #24H ;显示地址设置€  
LCALL WRITE_COMMAND  
MOV R2, #2  
TIA02: MOV R1, #255  
MMM1: MOV DATA2, #81H  
LCALL WRITE_DATA  
DJNZ R1, MMM1  
DJNZ R2, TIA02  
MOV COMMAND, #0B2H  
LCALL WRITE_COMMAND  
LCALL DELAY
```

```
MOV    COMMAND, #0BOH
LCALL  WRITE_COMMAND
MOV    DATA2, #00H
LCALL  WRITE_DATA
MOV    DATA2, #00H
LCALL  WRITE_DATA
MOV    COMMAND, #24H      ;显示地址设置€
LCALL  WRITE_COMMAND
MOV    R2, #2
TIA03: MOV    R1, #255
MMM2:  MOV    DATA2, #82H
LCALL  WRITE_DATA
DJNZ   R1, MMM2
DJNZ   R2, TIA03
MOV    COMMAND, #0B2H
LCALL  WRITE_COMMAND
LCALL  DELAY
MOV    COMMAND, #0BOH
LCALL  WRITE_COMMAND
MOV    DATA2, #00H
LCALL  WRITE_DATA
MOV    DATA2, #00H
LCALL  WRITE_DATA
MOV    COMMAND, #24H      ;显示地址设置€
LCALL  WRITE_COMMAND
MOV    R2, #2
```

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```
TIA04: MOV    R1, #255

NN:  MOV    DATA2, #83H

      LCALL  WRITE_DATA

      DJNZ   R1, NN

      DJNZ   R2, TIA04

      MOV    COMMAND, #0B2H

      LCALL  WRITE_COMMAND

      LCALL  DELAY

      MOV    COMMAND, #0B0H

      LCALL  WRITE_COMMAND

      MOV    DATA2, #00H

      LCALL  WRITE_DATA

      MOV    DATA2, #00H

      LCALL  WRITE_DATA

      MOV    COMMAND, #24H      ;显示地址设置€

      LCALL  WRITE_COMMAND

      MOV    R2, #2

TIA05: MOV    R1, #255

NN1:  MOV    DATA2, #84H

      LCALL  WRITE_DATA

      DJNZ   R1, NN1

      DJNZ   R2, TIA05

      MOV    COMMAND, #0B2H

      LCALL  WRITE_COMMAND

      LCALL  DELAY
```

```
MOV    COMMAND, #0BOH
LCALL  WRITE_COMMAND
MOV    DATA2, #00H
LCALL  WRITE_DATA
MOV    DATA2, #00H
LCALL  WRITE_DATA
MOV    COMMAND, #24H      ;显示地址设置€
LCALL  WRITE_COMMAND
MOV    R2, #2
TIA06: MOV    R1, #255
NN2:   MOV    DATA2, #85H
LCALL  WRITE_DATA
DJNZ  R1, NN2
DJNZ  R2, TIA06
MOV    COMMAND, #0B2H
LCALL  WRITE_COMMAND
LCALL  DELAY
MOV    DATA2, #00H
LCALL  WRITE_DATA
MOV    DATA2, #00H
LCALL  WRITE_DATA
MOV    COMMAND, #24H      ;显示地址设置
LCALL  WRITE_COMMAND
MOV    R3, #00H
MOV    R4, #20H
MOV    COMMAND, #0BOH      ;自动写入
```

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```

LCALL WRITE_COMMAND
MM1: MOV R4, #20H
MM:  MOV A, #00H
      MOV DATA2, A
      LCALL WRITE_DATA
      DJNZ R4, MM
      DJNZ R3, MM1
      MOV COMMAND, #0B2H ;推出自动写入
      LCALL WRITE_COMMAND

```

;#####

```

TIAN:
      MOV DATA2, #00H ;显示地址
      LCALL WRITE_DATA
      MOV DATA2, #08H
      LCALL WRITE_DATA
      MOV COMMAND, #24H
      LCALL WRITE_COMMAND

      MOV COMMAND, #0BOH
      LCALL WRITE_COMMAND
      MOV R2, #10H
      MOV R1, #000H
      MOV DPTR, #TIANSHI

SSS:  NOP
SSS1: CLR A

```

```
MOV C A, @A+DPTR  
MOV DATA2, A  
LCALL WRITE_DATA  
INC DPTR  
DJNZ R1, SSS1  
DJNZ R2, SSS  
MOV COMMAND, #0B2H  
LCALL WRITE_COMMAND  
LCALL DELAY  
LJMP MAIN
```

;#####

```
TEST: DB 0FFH, 00H, 0FFH, 00H, 0FFH, 00H, 0FFH, 00H  
DB 00H, 0FFH, 00H, 0FFH, 00H, 0FFH, 00H, 0FFH  
DB 0AAH, 0AAH, 0AAH, 0AAH, 0AAH, 0AAH, 0AAH, 0AAH  
DB 55H, 55H, 55H, 55H, 55H, 55H, 55H, 55H  
DB 0AAH, 55H, 0AAH, 55H, 0AAH, 55H, 0AAH, 55H  
DB 55H, 0AAH, 55H, 0AAH, 55H, 0AAH, 55H, 0AAH
```

TIANSHI:

```
DB  
0FFH, 0FFH, 0FFH, 0FFH, 0FFH, 0FFH, 0FFH, 0FFH, 0FFH, 0FFH, 0FFH, 0FFH, 0FFH, 0FFH,  
, 0FFH, 0FFH
```

```
DB  
0FFH, 0FFH, 0FFH, 0FFH, 0FFH, 0FFH, 0FFH, 0FFH, 0FFH, 0FFH, 0FFH, 0FFH, 0FFH, 0FFH,  
, 0FFH, 0FFH
```

```
DB  
0FFH, 0FFH, 0FFH, 0FFH, 0FFH, 0FFH, 0FFH, 0FFH, 0FFH, 0FFH, 0FFH, 0FFH, 0FFH, 0FFH,  
, 0FFH, 0FFH
```

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DB
OFFH, OFFH, OFFH, OFFH, OFFH, OFFH, OFFH, OFFH, OFFH, OFFH, OFFH, OFFH, 0C0H, 000H
, 000H, 000H

DB
000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H
, 000H, 000H

DB
000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H, 003H, 0C0H, 000H, 000H, 000H
, 000H, 000H

DB
000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H
, 000H, 000H

DB
000H, 000H, 000H, 000H, 000H, 000H, 000H, 003H, 0C0H, 000H, 000H, 000H, 000H, 000H
, 000H, 000H

DB
000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H
, 000H, 000H

DB
000H, 000H, 000H, 000H, 000H, 003H, 0C3H, 0C0H, 000H, 000H, 001H, 082H, 004H, 008H
, 000H, 040H

DB
000H, 000H, 000H, 000H, 000H, 000H, 040H, 040H, 000H, 000H, 000H, 000H, 000H, 000H
, 001H, 000H

DB
012H, 000H, 0F3H, 0F3H, 0DFH, 001H, 003H, 0FCH, 01EH, 022H, 004H, 008H, 000H, 040H
, 03EH, 0FEH

DB
002H, 020H, 03FH, 0FCH, 020H, 020H, 00FH, 0F0H, 01FH, 0F0H, 01FH, 0F8H, 021H, 000H
, 013H, 000H

DB
092H, 013H, 0C2H, 021H, 082H, 004H, 002H, 012H, 004H, 008H, 01FH, 0FFH, 0A4H, 082H
, 003H, 020H

DB
000H, 004H, 027H, 0FEH, 008H, 010H, 010H, 010H, 000H, 000H, 019H, 000H, 022H, 008H
, 092H, 013H

DB
0C9H, 032H, 003H, 0FCH, 002H, 012H, 03FH, 07FH, 080H, 080H, 024H, 0FEH, 002H, 020H
, 000H, 004H

DB
009H, 020H, 00FH, 0F0H, 01FH, 0F0H, 000H, 000H, 009H, 008H, 027H, 0FCH, 092H, 053H
, 0C5H, 044H

DB
002H, 004H, 03FH, 082H, 004H, 008H, 001H, 000H, 028H, 082H, 004H, 010H, 07FH, 0E4H
, 089H, 020H

DB
008H, 010H, 010H, 010H, 000H, 000H, 0FFH, 0FCH, 044H, 008H, 0F2H, 023H, 0C4H, 088H
, 083H, 0FCH

DB
006H, 022H, 005H, 008H, 003H, 0FCH, 028H, 082H, 004H, 008H, 000H, 004H, 052H, 07CH
, 00FH, 0F0H

DB
01FH, 0F0H, 07FH, 0FEH, 002H, 008H, 068H, 090H, 092H, 003H, 0C1H, 000H, 0C2H, 004H
, 007H, 012H

DB
006H, 07FH, 006H, 004H, 024H, 0FEH, 008H, 00CH, 000H, 004H, 052H, 044H, 008H, 010H
, 004H, 040H

DB
001H, 000H, 002H, 008H, 0D0H, 080H, 093H, 0F3H, 0DFH, 0F1H, 000H, 000H, 00AH, 092H
, 00CH, 042H

DB
00AH, 004H, 022H, 0A0H, 011H, 007H, 03FH, 0C4H, 016H, 0A8H, 000H, 000H, 004H, 040H
, 001H, 000H

DB
003H, 009H, 044H, 0A0H, 0F3H, 013H, 0C1H, 002H, 09FH, 09FH, 08AH, 003H, 0B4H, 022H
, 013H, 0FCH

DB
022H, 092H, 021H, 082H, 020H, 044H, 02BH, 098H, 07EH, 07EH, 044H, 048H, 011H, 020H
, 002H, 088H

DB
046H, 090H, 093H, 013H, 0C3H, 084H, 0D0H, 090H, 092H, 01EH, 004H, 024H, 022H, 004H
, 02AH, 094H

DB
001H, 000H, 020H, 044H, 022H, 050H, 042H, 042H, 024H, 048H, 011H, 010H, 004H, 048H
, 044H, 090H

DB
092H, 0A3H, 0C3H, 040H, 09FH, 09FH, 0A2H, 0E2H, 004H, 018H, 002H, 004H, 024H, 088H
, 002H, 010H

DB
03FH, 0C4H, 0E2H, 020H, 07EH, 07EH, 014H, 050H, 021H, 008H, 004H, 048H, 048H, 088H
, 092H, 0A3H

DB
0C5H, 031H, 010H, 090H, 082H, 002H, 004H, 018H, 003H, 0FCH, 020H, 088H, 004H, 008H
, 020H, 044H

DB
022H, 030H, 042H, 042H, 014H, 060H, 041H, 00CH, 008H, 008H, 048H, 08CH, 092H, 043H
, 0C9H, 022H

DB
010H, 090H, 082H, 002H, 004H, 024H, 002H, 004H, 020H, 084H, 008H, 0FCH, 020H, 004H
, 022H, 050H

DB
042H, 042H, 004H, 040H, 081H, 004H, 010H, 088H, 050H, 089H, 012H, 0A3H, 0D1H, 00CH
, 01FH, 09FH

DB
082H, 002H, 004H, 043H, 082H, 024H, 020H, 0A3H, 09FH, 08CH, 000H, 014H, 022H, 088H
, 07EH, 07EH

DB
0FFH, 0FEH, 001H, 000H, 020H, 050H, 042H, 081H, 053H, 03BH, 0C1H, 030H, 010H, 090H
, 082H, 002H

DB
015H, 081H, 002H, 01CH, 020H, 0C1H, 008H, 008H, 000H, 008H, 023H, 00EH, 042H, 042H
, 000H, 000H

DB
005H, 000H, 040H, 020H, 041H, 002H, 022H, 013H, 0C1H, 000H, 000H, 000H, 002H, 002H
, 008H, 000H

DB
002H, 008H, 020H, 080H, 000H, 000H, 000H, 000H, 022H, 004H, 000H, 000H, 000H, 000H
, 002H, 000H

DB
000H, 000H, 000H, 000H, 000H, 000H, 003H, 0C0H, 000H, 000H, 000H, 000H, 000H, 000H, 000H
, 000H, 000H

DB
000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H
, 000H, 000H

DB
000H, 000H, 000H, 003H, 0C3H, 0C0H, 000H, 000H, 001H, 082H, 004H, 008H, 000H, 040H
, 000H, 000H

DB
000H, 000H, 000H, 000H, 040H, 040H, 000H, 000H, 000H, 000H, 000H, 000H, 001H, 000H
, 012H, 000H

DB
0F3H, 0F3H, 0DFH, 001H, 003H, 0FCH, 01EH, 022H, 004H, 008H, 000H, 040H, 03EH, 0FEH
, 002H, 020H

DB
03FH, 0FCH, 020H, 020H, 00FH, 0F0H, 01FH, 0F0H, 01FH, 0F8H, 021H, 000H, 013H, 000H
, 092H, 013H

DB
0C2H, 021H, 082H, 004H, 002H, 012H, 004H, 008H, 01FH, 0FFH, 0A4H, 082H, 003H, 020H
, 000H, 004H

DB
027H, 0FEH, 008H, 010H, 010H, 010H, 000H, 000H, 019H, 000H, 022H, 008H, 092H, 013H
, 0C9H, 032H

DB
003H, 0FCH, 002H, 012H, 03FH, 07FH, 080H, 080H, 024H, 0FEH, 002H, 020H, 000H, 004H
, 009H, 020H

DB
00FH, 0F0H, 01FH, 0F0H, 000H, 000H, 009H, 008H, 027H, 0FCH, 092H, 053H, 0C5H, 044H
, 002H, 004H

DB
03FH, 082H, 004H, 008H, 001H, 000H, 028H, 082H, 004H, 010H, 07FH, 0E4H, 089H, 020H
, 008H, 010H

DB
010H, 010H, 000H, 000H, 0FFH, 0FCH, 044H, 008H, 0F2H, 023H, 0C4H, 088H, 083H, 0FCH
, 006H, 022H

DB
005H, 008H, 003H, 0FCH, 028H, 082H, 004H, 008H, 000H, 004H, 052H, 07CH, 00FH, 0F0H
, 01FH, 0F0H

DB
07FH, 0FEH, 002H, 008H, 068H, 090H, 092H, 003H, 0C1H, 000H, 0C2H, 004H, 007H, 012H
, 006H, 07FH

DB
006H, 004H, 024H, 0FEH, 008H, 00CH, 000H, 004H, 052H, 044H, 008H, 010H, 004H, 040H
, 001H, 000H

DB
002H, 008H, 0D0H, 080H, 093H, 0F3H, 0DFH, 0F1H, 000H, 000H, 00AH, 092H, 00CH, 042H
, 00AH, 004H

DB
022H, 0A0H, 011H, 007H, 03FH, 0C4H, 016H, 0A8H, 000H, 000H, 004H, 040H, 001H, 000H
, 003H, 009H

DB
044H, 0A0H, 0F3H, 013H, 0C1H, 002H, 09FH, 09FH, 08AH, 003H, 0B4H, 022H, 013H, 0FCH
, 022H, 092H

DB
021H, 082H, 020H, 044H, 02BH, 098H, 07EH, 07EH, 044H, 048H, 011H, 020H, 002H, 088H
, 046H, 090H

DB
093H, 013H, 0C3H, 084H, 0D0H, 090H, 092H, 01EH, 004H, 024H, 022H, 004H, 02AH, 094H
, 001H, 000H

DB
020H, 044H, 022H, 050H, 042H, 042H, 024H, 048H, 011H, 010H, 004H, 048H, 044H, 090H
, 092H, 0A3H

DB
0C3H, 040H, 09FH, 09FH, 0A2H, 0E2H, 004H, 018H, 002H, 004H, 024H, 088H, 002H, 010H
, 03FH, 0C4H

DB
0E2H, 020H, 07EH, 07EH, 014H, 050H, 021H, 008H, 004H, 048H, 048H, 088H, 092H, 0A3H
, 0C5H, 031H

DB
010H, 090H, 082H, 002H, 004H, 018H, 003H, 0FCH, 020H, 088H, 004H, 008H, 020H, 044H
, 022H, 030H

DB
042H, 042H, 014H, 060H, 041H, 00CH, 008H, 008H, 048H, 08CH, 092H, 043H, 0C9H, 022H
, 010H, 090H

DB
082H, 002H, 004H, 024H, 002H, 004H, 020H, 084H, 008H, 0FCH, 020H, 004H, 022H, 050H
, 042H, 042H

DB
004H, 040H, 081H, 004H, 010H, 088H, 050H, 089H, 012H, 0A3H, 0D1H, 00CH, 01FH, 09FH
, 082H, 002H

DB
004H, 043H, 082H, 024H, 020H, 0A3H, 09FH, 08CH, 000H, 014H, 022H, 088H, 07EH, 07EH
, 0FFH, 0FEH

DB
001H, 000H, 020H, 050H, 042H, 081H, 053H, 03BH, 0C1H, 030H, 010H, 090H, 082H, 002H
, 015H, 081H

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DB
002H, 01CH, 020H, 0C1H, 008H, 008H, 000H, 008H, 023H, 00EH, 042H, 042H, 000H, 000H
, 005H, 000H

DB
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, 000H, 000H

DB
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, 000H, 000H

DB
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DB
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, 000H, 000H

DB
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DB
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DB
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DB
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DB
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DB
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DB
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DB
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DB
07EH, 07EH, 014H, 050H, 021H, 008H, 004H, 048H, 048H, 088H, 092H, 0A3H, 0C5H, 031H
, 010H, 090H

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DB
082H, 002H, 004H, 018H, 003H, 0FCH, 020H, 088H, 004H, 008H, 020H, 044H, 022H, 030H
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DB
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, 000H, 000H

DB
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, 000H, 000H

DB
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DB
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DB
040H, 040H, 000H, 000H, 000H, 000H, 000H, 000H, 001H, 000H, 012H, 000H, 0F3H, 0F3H
, 0DFH, 001H

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DB
003H, 0FCH, 01EH, 022H, 004H, 008H, 000H, 040H, 03EH, 0FEH, 002H, 020H, 03FH, 0FCH
, 020H, 020H

DB
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DB
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, 008H, 010H

DB
010H, 010H, 000H, 000H, 019H, 000H, 022H, 008H, 092H, 013H, 0C9H, 032H, 003H, 0FCH
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DB
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, 000H, 000H

DB
0FFH, 0FCH, 044H, 008H, 0F2H, 023H, 0C4H, 088H, 083H, 0FCH, 006H, 022H, 005H, 008H
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DB
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DB
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, 0F3H, 013H

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DB
0C1H, 002H, 09FH, 09FH, 08AH, 003H, 0B4H, 022H, 013H, 0FCH, 022H, 092H, 021H, 082H
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DB
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DB
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, 07EH, 07EH

DB
014H, 050H, 021H, 008H, 004H, 048H, 048H, 088H, 092H, 0A3H, 0C5H, 031H, 010H, 090H
, 082H, 002H

DB
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, 014H, 060H

DB
041H, 00CH, 008H, 008H, 048H, 08CH, 092H, 043H, 0C9H, 022H, 010H, 090H, 082H, 002H
, 004H, 024H

DB
002H, 004H, 020H, 084H, 008H, 0FCH, 020H, 004H, 022H, 050H, 042H, 042H, 004H, 040H
, 081H, 004H

DB
010H, 088H, 050H, 089H, 012H, 0A3H, 0D1H, 00CH, 01FH, 09FH, 082H, 002H, 004H, 043H
, 082H, 024H

DB
020H, 0A3H, 09FH, 08CH, 000H, 014H, 022H, 088H, 07EH, 07EH, 0FFH, 0FEH, 001H, 000H
, 020H, 050H

DB
042H, 081H, 053H, 03BH, 0C1H, 030H, 010H, 090H, 082H, 002H, 015H, 081H, 002H, 01CH
, 020H, 0C1H

DB
008H, 008H, 000H, 008H, 023H, 00EH, 042H, 042H, 000H, 000H, 005H, 000H, 040H, 020H
, 041H, 002H

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DB
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, 000H, 000H

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DB
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, 000H, 000H

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, 003H, 0FCH

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DB
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DB
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, 03FH, 07FH

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, 008H, 00CH

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, 02BH, 098H

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, 042H, 042H

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DB
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DB
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DB
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DB
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DB
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DB
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, 000H, 000H

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DB
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, 092H, 003H

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, 000H, 004H

DB
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, 0DFH, 0F1H

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DB
000H, 000H, 002H, 002H, 008H, 000H, 002H, 008H, 020H, 080H, 000H, 000H, 000H, 000H
, 022H, 004H

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DB
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, 000H, 000H

DB
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