

图形点阵液晶显示模块使用手册

CM240128-2SLYB

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广州新赛格电子城三楼B 3 3 1 3 档

T E L : 0 2 0 - 8 8 4 0 3 2 6 8

F A X : 0 2 0 - 8 7 5 8 0 4 8 0

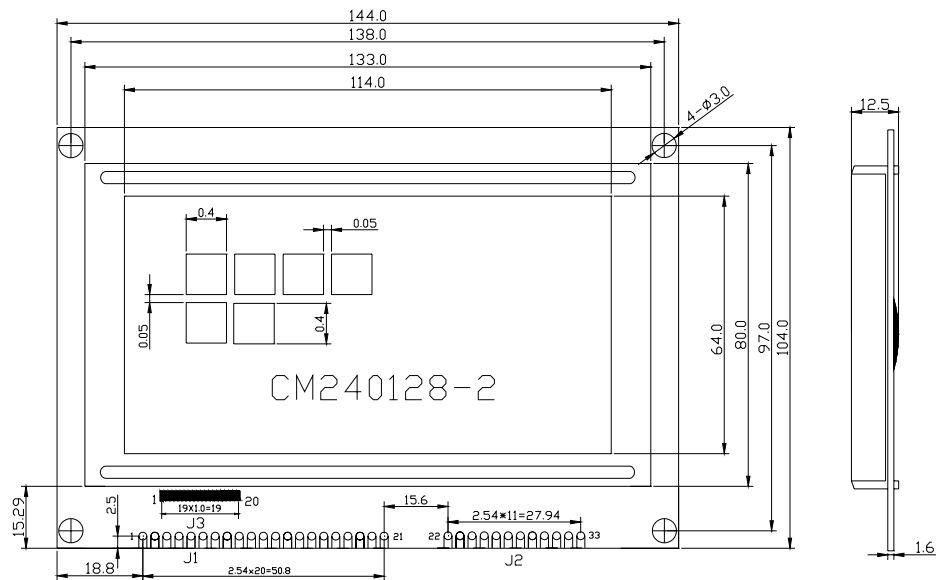
[h t t p : w w w . r t l c d . c o m](http://www.rtlcd.com)

E - m a i l : x i e z h o n g 2 @ 1 6 3 . c o m

CM240128-2 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

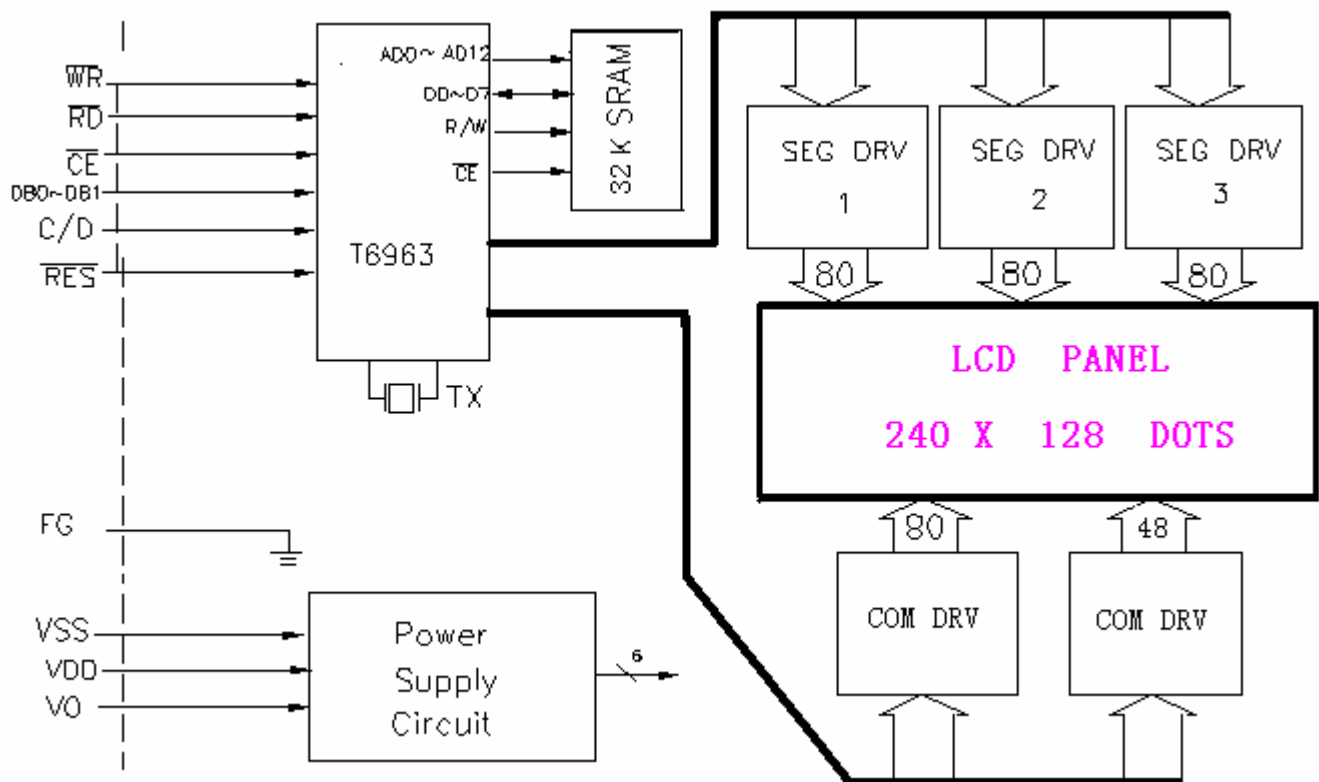
二、外形尺寸图



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



四、J1 模块的外部接口：

Pin no	Symbol	Level	Function
1	FG	0V	Frame ground
2	VSS	0V	Ground
3	VDD	5.0V	Supply voltage for logic
4	V0	-12V~-15V	Operating voltage for LCD drive
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	/RESET	L	Reset signal
10	DB0	H/L	Data bit 0
11	DB1	H/L	Data bit 1
12	DB2	H/L	Data bit 2
13	DB3	H/L	Data bit 3
14	DB4	H/L	Data bit 4
15	DB5	H/L	Data bit 5
16	DB6	H/L	Data bit 6
17	DB7	H/L	Data bit 7
18	FS	H/L	Font select signal (H:5X8 dots; L:8X8 dots)
19	LED+	+5V	LED Backlight
20	LED-	0V	LED Backlight
21	NC		

J2 模块的外部接口:

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

J3 模块的外部接口:

Pin no	Symbol	Level	Function
1	VSS	0V	Ground
2	VDD	5.0V	Supply voltage for logic
3	V0	-12V~-15V	Operating voltage for LCD drive
4	/WR	L	Write signal
5	/RD	L	Read signal
6	/CE	L	Chip enable signal
7	C/D	H/L	H: Instruction code L: Data
8	/RESET	L	Reset signal
9	DB0	H/L	Data bit 0
10	DB1	H/L	Data bit 1
11	DB2	H/L	Data bit 2
12	DB3	H/L	Data bit 3
13	DB4	H/L	Data bit 4
14	DB5	H/L	Data bit 5
15	DB6	H/L	Data bit 6
16	DB7	H/L	Data bit 7
17	FS	H/L	Font select signal (H:5X8 dots; L:8X8 dots)
18	VOOUT		-15V
19	LED+	+5V	LED Backlight
20	LED-	0V	LED Backlight

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 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
	10000xxx	-	-	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
	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

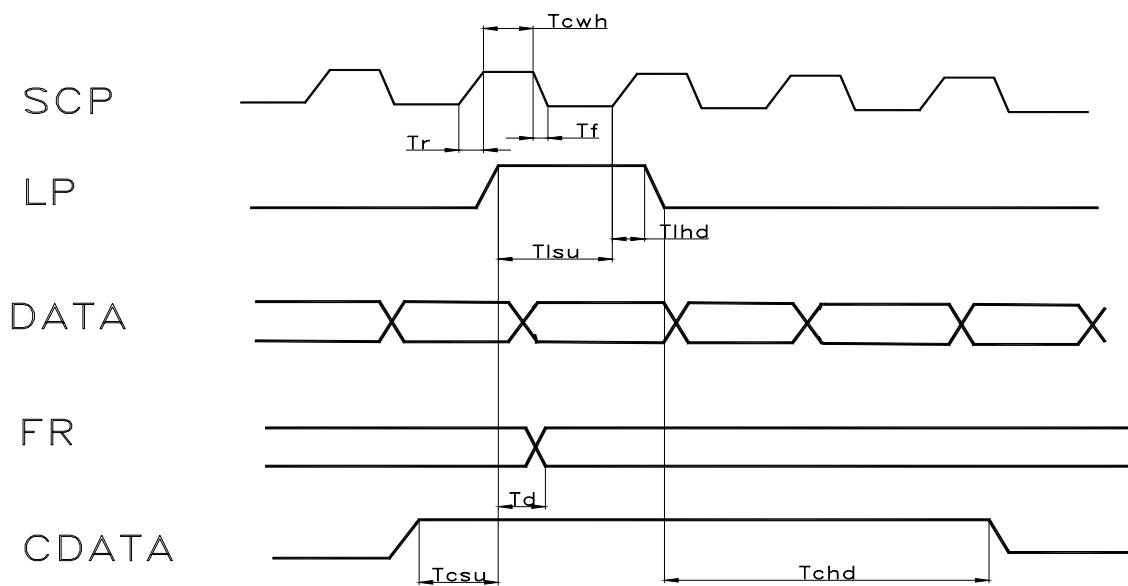
NOTE 1: Required time for blackening ratio of segment goes up from 0% to 90% when Wave from is switched from one selected one (θ =10° , φ =90°)

Note 2: Required time for blackening ratio of segment goes down from 100% to 10% When wave from is switched from one selected one (θ =10° , φ =90°)

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	Tdhhd	80	-	ns
FR delay time	Td	0	90	ns
CDATA set up time	Tcsu	450	850	ns
CDATA hold time	Tchd	450	950	ns

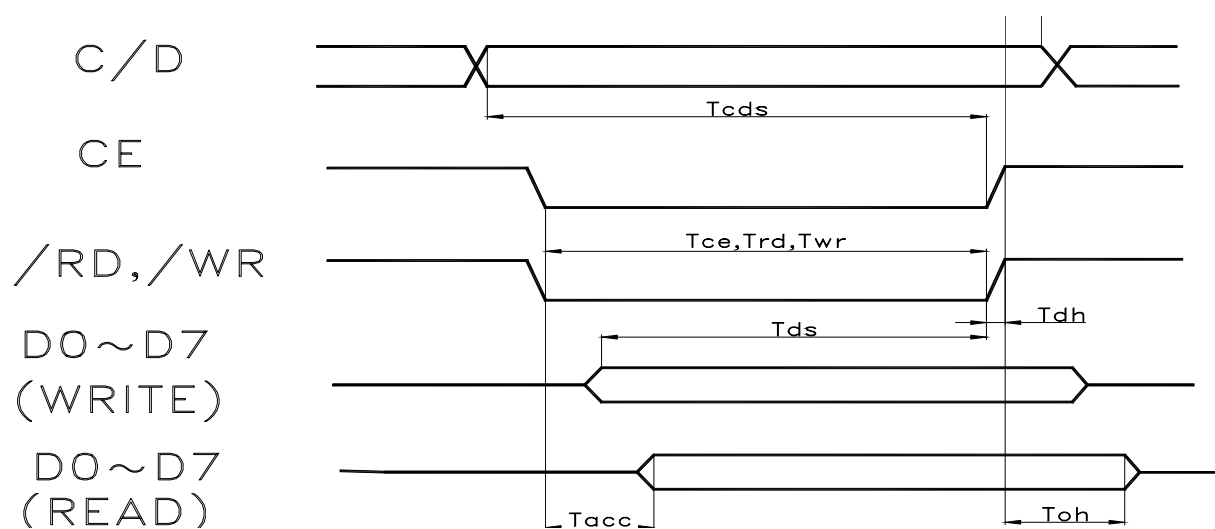
Condition: DV=+5.0V ± 10%, Ta=-10~+70° C



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



读写时序图

5. EL Backlight Electrical Characteristics

Ta=25° C VDD=5V

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	° 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

D0 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

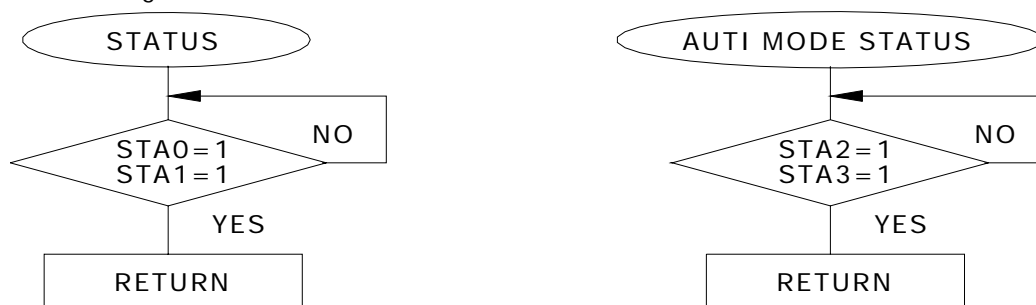
STA0	Check capability of command execution	0: Disable 1: Enable
STA1	Check capability of data read/write	0: Disable 1: Enable
STA2	Check capability of auto mode data read	0: Disable 1: Enable
STA3	Check capability of auto mode data write	0: Disable 1: Enable
STA4	Not use	
STA5	Check capability of controller 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.

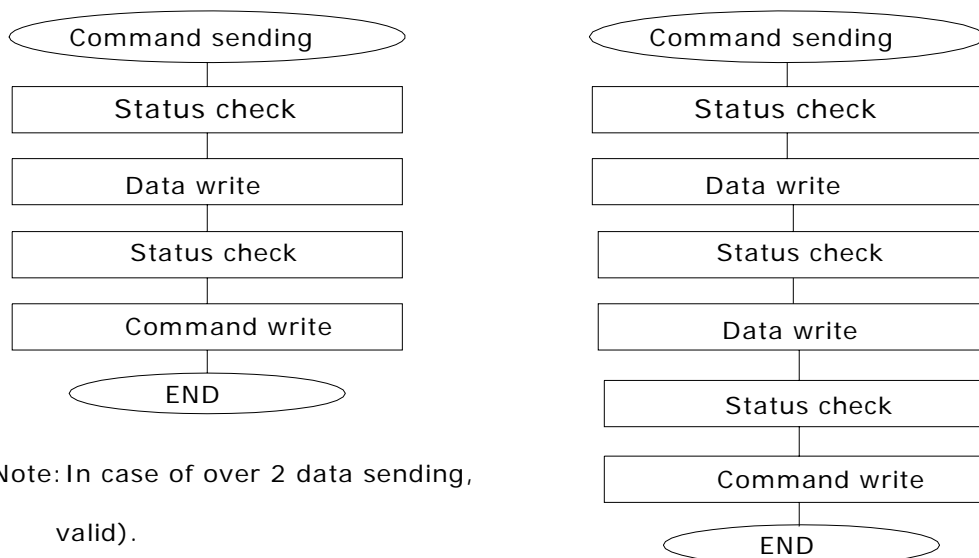
3: STA2/STA3 are valid in auto mode STA0/STA1 are invalid.

Status checking flow:



7.2 DATA SET

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



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)

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

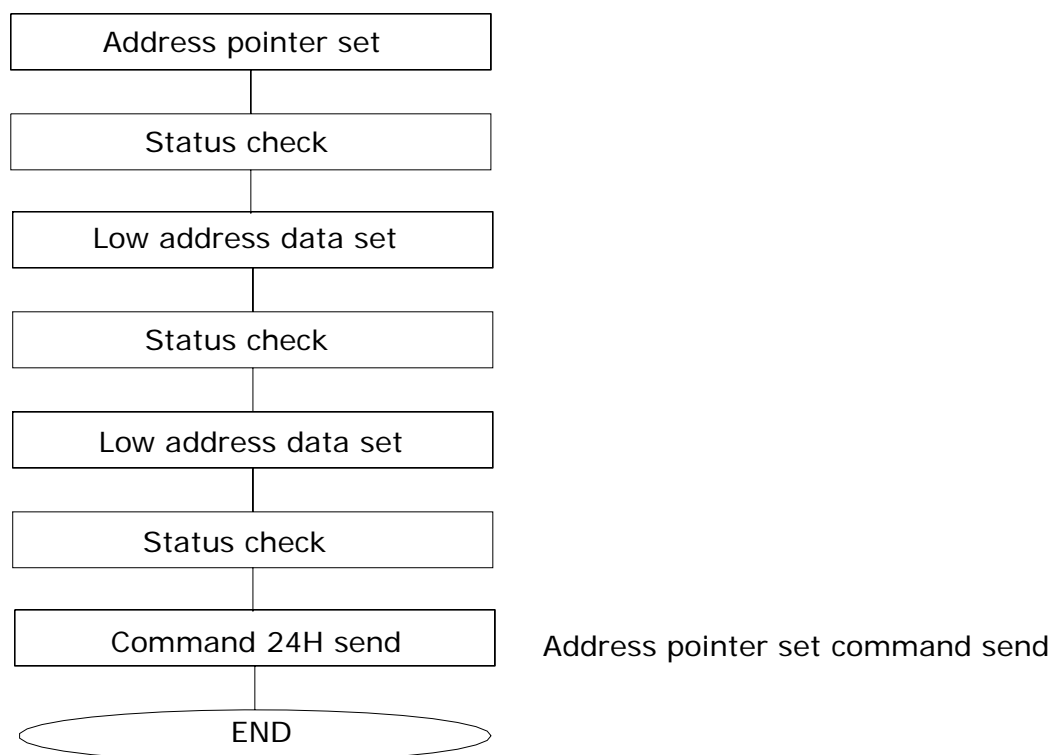
Lower 3 bit (ad2 - ad0) are determined by vertical counter. The

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 indicate 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

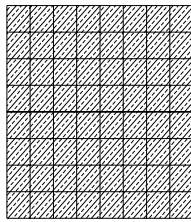
DUAL=0, MDS=1, MD0=1, MD1=0: 28 LINES

Display plane:

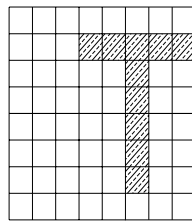
0000H	0001H	- - - - -	004EH	004FH	1 Line
00A0H	00A1H	- - - - -	00EEH	00EFH	2 Line
:	:	:	:	:	:
:	:	:	:	:	:
:	:	:	:	:	:
10E0H	10E1H	- - - - -	112EH	112FH	28 Lines

(2) Graphic home address and area set

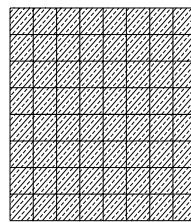
The starting address of external display RAM for Graphic display is



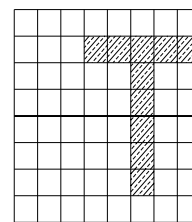
GRAPHIC



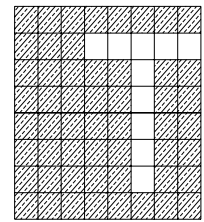
TEXT



"OR"



"AND"



"EXOR"

7.34 DATA AUTO READ/WRITE

CODE	HEX	FUNCTION	OPERAND
10110000	BOH	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.

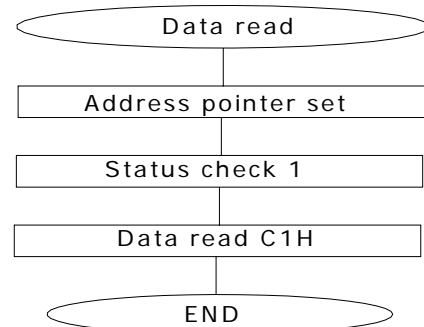
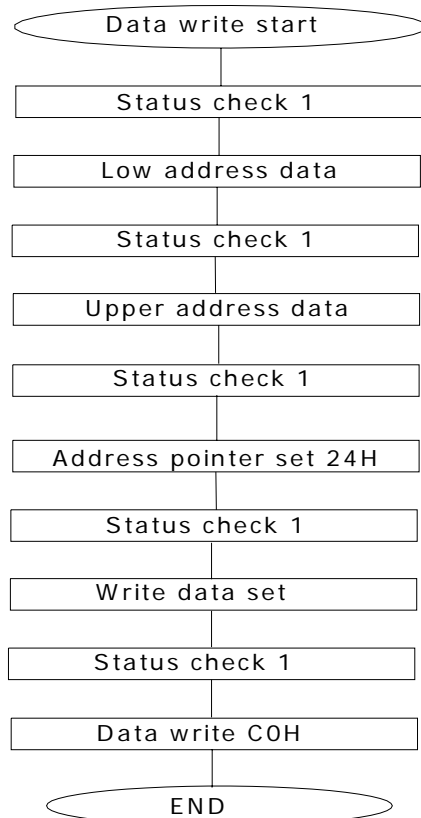
Note: status check for auto mode(STA2, STA3 should be checked between each Data. Auto reset should be performed after checking (STA3=1 STA2=1)

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.

TERMI NAL	HALT	RESET
DO-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

H: Level H

L: Level L

F: Floating (High impedance)

K0: Internal state (TEXT data access) normally open

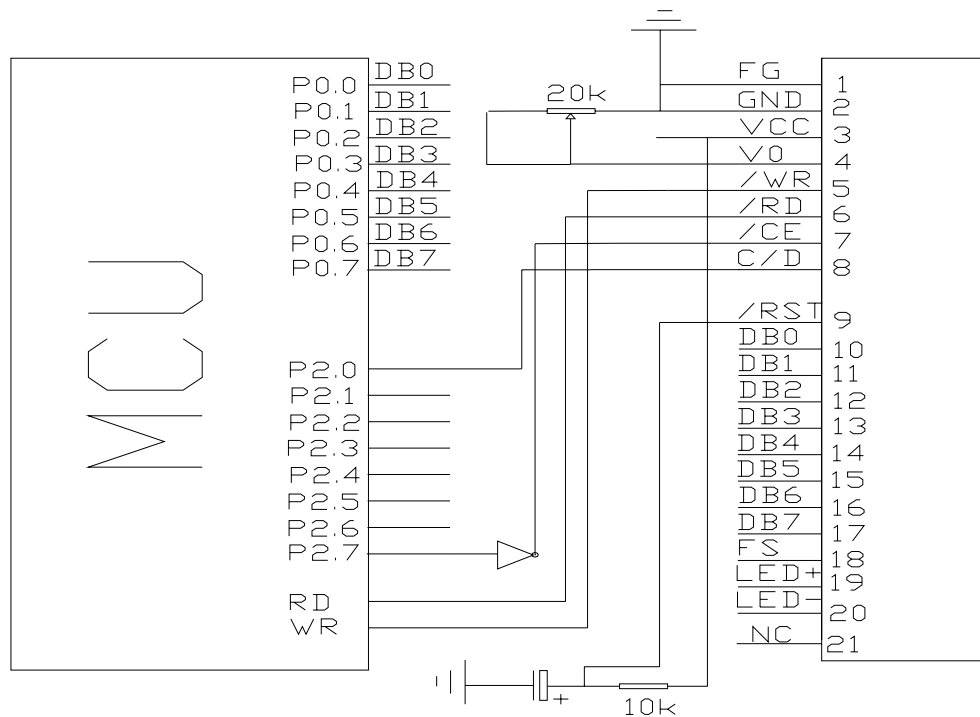
VEND: End signal of V-counter(Line count) if MDS=H, T2=L,
HEND (end signal of H-count) normally open.

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

CM240128-2 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:

```

```
PUSH    DPH
PUSH    DPL
LCALL   BUSY
MOV     A, DATA2
MOV     DPTR, #D_ADD
MOVBX   @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
          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, #0FFH
MOV    DATA2, A
LCALL  WRITE_DATA
DJNZ   R3, YY
DJNZ   R4, YY1
MOV    COMMAND, #0B2H
LCALL  WRITE_COMMAND
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, #0FFH
        MOV     COMMAND, #0B0H
        LCALL   WRITE_COMMAND
        MOV     DPTR, #TEST
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, #0B0H

LCALL WRITE_COMMAND

MOV R2, #2

TIA01: MOV R1, #255

MMM: MOV DATA2, #80H

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, #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
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, #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
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, #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
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, #0B0H    ;自动写入
        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, #0B0H

```

```

        LCALL  WRITE_COMMAND
        MOV    R2, #10H
        MOV    R1, #000H
        MOV    DPTR, #TIANSHI
SSS:    NOP
SSS1:   CLR    A
        MOVC   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

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, 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, 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, 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

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

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

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

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

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

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

DB
020H, 020H, 00FH, 0F0H, 01FH, 0F0H, 01FH, 0F8H, 021H, 000H, 013H, 000H, 092H, 013H
, 0C2H, 021H

DB
082H, 004H, 002H, 012H, 004H, 008H, 01FH, 0FFH, 0A4H, 082H, 003H, 020H, 000H, 004H
, 027H, 0FEH

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

DB
002H, 012H, 03FH, 07FH, 080H, 080H, 024H, 0FEH, 002H, 020H, 000H, 004H, 009H, 020H
, 00FH, 0F0H

DB
01FH, 0F0H, 000H, 000H, 009H, 008H, 027H, 0FCH, 092H, 053H, 0C5H, 044H, 002H, 004H
, 03FH, 082H

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

, 010H, 010H

DB

000H, 000H, 0FFH, 0FCH, 044H, 008H, 0F2H, 023H, 0C4H, 088H, 083H, 0FCH, 006H, 022H
, 005H, 008H

DB

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

DB

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

DB

024H, 0FEH, 008H, 00CH, 000H, 004H, 052H, 044H, 008H, 010H, 004H, 040H, 001H, 000H
, 002H, 008H

DB

0D0H, 080H, 093H, 0F3H, 0DFH, 0F1H, 000H, 000H, 00AH, 092H, 00CH, 042H, 00AH, 004H
, 022H, 0A0H

DB

011H, 007H, 03FH, 0C4H, 016H, 0A8H, 000H, 000H, 004H, 040H, 001H, 000H, 003H, 009H
, 044H, 0A0H

DB

0F3H, 013H, 0C1H, 002H, 09FH, 09FH, 08AH, 003H, 0B4H, 022H, 013H, 0FCH, 022H, 092H
, 021H, 082H

DB

020H, 044H, 02BH, 098H, 07EH, 07EH, 044H, 048H, 011H, 020H, 002H, 088H, 046H, 090H
, 093H, 013H

DB

0C3H, 084H, 0D0H, 090H, 092H, 01EH, 004H, 024H, 022H, 004H, 02AH, 094H, 001H, 000H
, 020H, 044H

DB

022H, 050H, 042H, 042H, 024H, 048H, 011H, 010H, 004H, 048H, 044H, 090H, 092H, 0A3H
, 0C3H, 040H

DB

09FH, 09FH, 0A2H, 0E2H, 004H, 018H, 002H, 004H, 024H, 088H, 002H, 010H, 03FH, 0C4H
, 0E2H, 020H

DB

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

DB

082H, 002H, 004H, 018H, 003H, 0FCH, 020H, 088H, 004H, 008H, 020H, 044H, 022H, 030H
, 042H, 042H

DB
014H, 060H, 041H, 00CH, 008H, 008H, 048H, 08CH, 092H, 043H, 0C9H, 022H, 010H, 090H
, 082H, 002H

DB
004H, 024H, 002H, 004H, 020H, 084H, 008H, 0FCH, 020H, 004H, 022H, 050H, 042H, 042H
, 004H, 040H

DB
081H, 004H, 010H, 088H, 050H, 089H, 012H, 0A3H, 0D1H, 00CH, 01FH, 09FH, 082H, 002H
, 004H, 043H

DB
082H, 024H, 020H, 0A3H, 09FH, 08CH, 000H, 014H, 022H, 088H, 07EH, 07EH, 0FFH, 0FEH
, 001H, 000H

DB
020H, 050H, 042H, 081H, 053H, 03BH, 0C1H, 030H, 010H, 090H, 082H, 002H, 015H, 081H
, 002H, 01CH

DB
020H, 0C1H, 008H, 008H, 000H, 008H, 023H, 00EH, 042H, 042H, 000H, 000H, 005H, 000H
, 040H, 020H

DB
041H, 002H, 022H, 013H, 0C1H, 000H, 000H, 000H, 002H, 002H, 008H, 000H, 002H, 008H
, 020H, 080H

DB
000H, 000H, 000H, 000H, 022H, 004H, 000H, 000H, 000H, 000H, 002H, 000H, 000H, 000H
, 000H, 000H

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

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

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

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

DB
00FH, 0F0H, 01FH, 0F0H, 01FH, 0F8H, 021H, 000H, 013H, 000H, 092H, 013H, 0C2H, 021H

, 082H, 004H

DB

002H, 012H, 004H, 008H, 01FH, 0FFH, 0A4H, 082H, 003H, 020H, 000H, 004H, 027H, 0FEH
, 008H, 010H

DB

010H, 010H, 000H, 000H, 019H, 000H, 022H, 008H, 092H, 013H, 0C9H, 032H, 003H, 0FCH
, 002H, 012H

DB

03FH, 07FH, 080H, 080H, 024H, 0FEH, 002H, 020H, 000H, 004H, 009H, 020H, 00FH, 0F0H
, 01FH, 0F0H

DB

000H, 000H, 009H, 008H, 027H, 0FCH, 092H, 053H, 0C5H, 044H, 002H, 004H, 03FH, 082H
, 004H, 008H

DB

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

DB

0FFH, 0FCH, 044H, 008H, 0F2H, 023H, 0C4H, 088H, 083H, 0FCH, 006H, 022H, 005H, 008H
, 003H, 0FCH

DB

028H, 082H, 004H, 008H, 000H, 004H, 052H, 07CH, 00FH, 0F0H, 01FH, 0F0H, 07FH, 0FEH
, 002H, 008H

DB

068H, 090H, 092H, 003H, 0C1H, 000H, 0C2H, 004H, 007H, 012H, 006H, 07FH, 006H, 004H
, 024H, 0FEH

DB

008H, 00CH, 000H, 004H, 052H, 044H, 008H, 010H, 004H, 040H, 001H, 000H, 002H, 008H
, 0D0H, 080H

DB

093H, 0F3H, 0DFH, 0F1H, 000H, 000H, 00AH, 092H, 00CH, 042H, 00AH, 004H, 022H, 0A0H
, 011H, 007H

DB

03FH, 0C4H, 016H, 0A8H, 000H, 000H, 004H, 040H, 001H, 000H, 003H, 009H, 044H, 0A0H
, 0F3H, 013H

DB

0C1H, 002H, 09FH, 09FH, 08AH, 003H, 0B4H, 022H, 013H, 0FCH, 022H, 092H, 021H, 082H
, 020H, 044H

DB

02BH, 098H, 07EH, 07EH, 044H, 048H, 011H, 020H, 002H, 088H, 046H, 090H, 093H, 013H
, 0C3H, 084H

DB
0D0H, 090H, 092H, 01EH, 004H, 024H, 022H, 004H, 02AH, 094H, 001H, 000H, 020H, 044H
, 022H, 050H

DB
042H, 042H, 024H, 048H, 011H, 010H, 004H, 048H, 044H, 090H, 092H, 0A3H, 0C3H, 040H
, 09FH, 09FH

DB
0A2H, 0E2H, 004H, 018H, 002H, 004H, 024H, 088H, 002H, 010H, 03FH, 0C4H, 0E2H, 020H
, 07EH, 07EH

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

DB
004H, 018H, 003H, 0FCH, 020H, 088H, 004H, 008H, 020H, 044H, 022H, 030H, 042H, 042H
, 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

DB
022H, 013H, 0C1H, 000H, 000H, 000H, 002H, 002H, 008H, 000H, 002H, 008H, 020H, 080H
, 000H, 000H

DB
000H, 000H, 022H, 004H, 000H, 000H, 000H, 000H, 002H, 000H, 000H, 000H, 000H, 000H
, 000H, 003H

DB
0C0H, 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, 000H, 000H, 000H, 003H
, 0C3H, 0C0H

DB

000H, 000H, 001H, 082H, 004H, 008H, 000H, 040H, 000H, 000H, 000H, 000H, 000H
, 040H, 040H

DB

000H, 000H, 000H, 000H, 000H, 000H, 001H, 000H, 012H, 000H, 0F3H, 0F3H, 0DFH, 001H
, 003H, 0FCH

DB

01EH, 022H, 004H, 008H, 000H, 040H, 03EH, 0FEH, 002H, 020H, 03FH, 0FCH, 020H, 020H
, 00FH, 0F0H

DB

01FH, 0F0H, 01FH, 0F8H, 021H, 000H, 013H, 000H, 092H, 013H, 0C2H, 021H, 082H, 004H
, 002H, 012H

DB

004H, 008H, 01FH, 0FFH, 0A4H, 082H, 003H, 020H, 000H, 004H, 027H, 0FEH, 008H, 010H
, 010H, 010H

DB

000H, 000H, 019H, 000H, 022H, 008H, 092H, 013H, 0C9H, 032H, 003H, 0FCH, 002H, 012H
, 03FH, 07FH

DB

080H, 080H, 024H, 0FEH, 002H, 020H, 000H, 004H, 009H, 020H, 00FH, 0F0H, 01FH, 0F0H
, 000H, 000H

DB

009H, 008H, 027H, 0FCH, 092H, 053H, 0C5H, 044H, 002H, 004H, 03FH, 082H, 004H, 008H
, 001H, 000H

DB

028H, 082H, 004H, 010H, 07FH, 0E4H, 089H, 020H, 008H, 010H, 010H, 010H, 000H, 000H
, 0FFH, 0FCH

DB

044H, 008H, 0F2H, 023H, 0C4H, 088H, 083H, 0FCH, 006H, 022H, 005H, 008H, 003H, 0FCH
, 028H, 082H

DB

004H, 008H, 000H, 004H, 052H, 07CH, 00FH, 0F0H, 01FH, 0F0H, 07FH, 0FEH, 002H, 008H
, 068H, 090H

DB

092H, 003H, 0C1H, 000H, 0C2H, 004H, 007H, 012H, 006H, 07FH, 006H, 004H, 024H, 0FEH
, 008H, 00CH

DB
000H, 004H, 052H, 044H, 008H, 010H, 004H, 040H, 001H, 000H, 002H, 008H, 0D0H, 080H
, 093H, 0F3H

DB
0DFH, 0F1H, 000H, 000H, 00AH, 092H, 00CH, 042H, 00AH, 004H, 022H, 0A0H, 011H, 007H
, 03FH, 0C4H

DB
016H, 0A8H, 000H, 000H, 004H, 040H, 001H, 000H, 003H, 009H, 044H, 0A0H, 0F3H, 013H
, 0C1H, 002H

DB
09FH, 09FH, 08AH, 003H, 0B4H, 022H, 013H, 0FCH, 022H, 092H, 021H, 082H, 020H, 044H
, 02BH, 098H

DB
07EH, 07EH, 044H, 048H, 011H, 020H, 002H, 088H, 046H, 090H, 093H, 013H, 0C3H, 084H
, 0D0H, 090H

DB
092H, 01EH, 004H, 024H, 022H, 004H, 02AH, 094H, 001H, 000H, 020H, 044H, 022H, 050H
, 042H, 042H

DB
024H, 048H, 011H, 010H, 004H, 048H, 044H, 090H, 092H, 0A3H, 0C3H, 040H, 09FH, 09FH
, 0A2H, 0E2H

DB
004H, 018H, 002H, 004H, 024H, 088H, 002H, 010H, 03FH, 0C4H, 0E2H, 020H, 07EH, 07EH
, 014H, 050H

DB
021H, 008H, 004H, 048H, 048H, 088H, 092H, 0A3H, 0C5H, 031H, 010H, 090H, 082H, 002H
, 004H, 018H

DB
003H, 0FCH, 020H, 088H, 004H, 008H, 020H, 044H, 022H, 030H, 042H, 042H, 014H, 060H
, 041H, 00CH

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

DB
020H, 084H, 008H, 0FCH, 020H, 004H, 022H, 050H, 042H, 042H, 004H, 040H, 081H, 004H
, 010H, 088H

DB
050H, 089H, 012H, 0A3H, 0D1H, 00CH, 01FH, 09FH, 082H, 002H, 004H, 043H, 082H, 024H
, 020H, 0A3H

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

, 042H, 081H

DB

053H, 03BH, 0C1H, 030H, 010H, 090H, 082H, 002H, 015H, 081H, 002H, 01CH, 020H, 0C1H
, 008H, 008H

DB

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, 022H, 013H

DB

0C1H, 000H, 000H, 000H, 002H, 002H, 008H, 000H, 002H, 008H, 020H, 080H, 000H, 000H
, 000H, 000H

DB

022H, 004H, 000H, 000H, 000H, 000H, 002H, 000H, 000H, 000H, 000H, 000H, 003H
, 0C0H, 000H

DB

000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H
, 000H, 000H

DB

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, 000H, 000H

DB

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, 000H, 000H

DB

000H, 000H, 000H, 000H, 001H, 000H, 012H, 000H, 0F3H, 0F3H, 0DFH, 001H, 003H, 0FCH
, 01EH, 022H

DB

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, 01FH, 0F0H

DB

01FH, 0F8H, 021H, 000H, 013H, 000H, 092H, 013H, 0C2H, 021H, 082H, 004H, 002H, 012H
, 004H, 008H

DB

01FH, 0FFH, 0A4H, 082H, 003H, 020H, 000H, 004H, 027H, 0FEH, 008H, 010H, 010H, 010H
, 000H, 000H

DB

019H, 000H, 022H, 008H, 092H, 013H, 0C9H, 032H, 003H, 0FCH, 002H, 012H, 03FH, 07FH
, 080H, 080H

DB

024H, 0FEH, 002H, 020H, 000H, 004H, 009H, 020H, 00FH, 0F0H, 01FH, 0F0H, 000H, 000H
, 009H, 008H

DB
027H, 0FCH, 092H, 053H, 0C5H, 044H, 002H, 004H, 03FH, 082H, 004H, 008H, 001H, 000H
, 028H, 082H

DB
004H, 010H, 07FH, 0E4H, 089H, 020H, 008H, 010H, 010H, 010H, 000H, 000H, 0FFH, 0FCH
, 044H, 008H

DB
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, 004H, 008H

DB
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, 092H, 003H

DB
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, 000H, 004H

DB
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, 0DFH, 0F1H

DB
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, 016H, 0A8H

DB
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, 09FH, 09FH

DB
08AH, 003H, 0B4H, 022H, 013H, 0FCH, 022H, 092H, 021H, 082H, 020H, 044H, 02BH, 098H
, 07EH, 07EH

DB
044H, 048H, 011H, 020H, 002H, 088H, 046H, 090H, 093H, 013H, 0C3H, 084H, 0D0H, 090H
, 092H, 01EH

DB
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, 024H, 048H

DB
011H, 010H, 004H, 048H, 044H, 090H, 092H, 0A3H, 0C3H, 040H, 09FH, 09FH, 0A2H, 0E2H
, 004H, 018H

DB
002H, 004H, 024H, 088H, 002H, 010H, 03FH, 0C4H, 0E2H, 020H, 07EH, 07EH, 014H, 050H
, 021H, 008H

DB
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DB

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, 008H, 008H

DB

048H, 08CH, 092H, 043H, 0C9H, 022H, 010H, 090H, 082H, 002H, 004H, 024H, 002H, 004H
, 020H, 084H

DB

008H, 0FCH, 020H, 004H, 022H, 050H, 042H, 042H, 004H, 040H, 081H, 004H, 010H, 088H
, 050H, 089H

DB

012H, 0A3H, 0D1H, 00CH, 01FH, 09FH, 082H, 002H, 004H, 043H, 082H, 024H, 020H, 0A3H
, 09FH, 08CH

DB

000H, 014H, 022H, 088H, 07EH, 07EH, 0FFH, 0FEH, 001H, 000H, 020H, 050H, 042H, 081H
, 053H, 03BH

DB

0C1H, 030H, 010H, 090H, 082H, 002H, 015H, 081H, 002H, 01CH, 020H, 0C1H, 008H, 008H
, 000H, 008H

DB

023H, 00EH, 042H, 042H, 000H, 000H, 005H, 000H, 040H, 020H, 041H, 002H, 022H, 013H
, 0C1H, 000H

DB

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

DB

000H, 000H, 000H, 000H, 002H, 000H, 000H, 000H, 000H, 000H, 000H, 003H, 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, 0C3H, 0C0H, 000H, 000H
, 001H, 082H

DB

004H, 008H, 000H, 040H, 000H, 000H, 000H, 000H, 000H, 000H, 040H, 040H, 000H, 000H
, 000H, 000H

DB

000H, 000H, 001H, 000H, 012H, 000H, 0F3H, 0F3H, 0DFH, 001H, 003H, 0FCH, 01EH, 022H
, 004H, 008H

DB
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, 01FH, 0F8H

DB
021H, 000H, 013H, 000H, 092H, 013H, 0C2H, 021H, 082H, 004H, 002H, 012H, 004H, 008H
, 01FH, 0FFH

DB
0A4H, 082H, 003H, 020H, 000H, 004H, 027H, 0FEH, 008H, 010H, 010H, 010H, 000H, 000H
, 019H, 000H

DB
022H, 008H, 092H, 013H, 0C9H, 032H, 003H, 0FCH, 002H, 012H, 03FH, 07FH, 080H, 080H
, 024H, 0FEH

DB
002H, 020H, 000H, 004H, 009H, 020H, 00FH, 0F0H, 01FH, 0F0H, 000H, 000H, 009H, 008H
, 027H, 0FCH

DB
092H, 053H, 0C5H, 044H, 002H, 004H, 03FH, 082H, 004H, 008H, 001H, 000H, 028H, 082H
, 004H, 010H

DB
07FH, 0E4H, 089H, 020H, 008H, 010H, 010H, 010H, 000H, 000H, 0FFH, 0FCH, 044H, 008H
, 0F2H, 023H

DB
0C4H, 088H, 083H, 0FCH, 006H, 022H, 005H, 008H, 003H, 0FCH, 028H, 082H, 004H, 008H
, 000H, 004H

DB
052H, 07CH, 00FH, 0F0H, 01FH, 0F0H, 07FH, 0FEH, 002H, 008H, 068H, 090H, 092H, 003H
, 0C1H, 000H

DB
0C2H, 004H, 007H, 012H, 006H, 07FH, 006H, 004H, 024H, 0FEH, 008H, 00CH, 000H, 004H
, 052H, 044H

DB
008H, 010H, 004H, 040H, 001H, 000H, 002H, 008H, 0D0H, 080H, 093H, 0F3H, 0DFH, 0F1H
, 000H, 000H

DB
00AH, 092H, 00CH, 042H, 00AH, 004H, 022H, 0A0H, 011H, 007H, 03FH, 0C4H, 016H, 0A8H
, 000H, 000H

DB
004H, 040H, 001H, 000H, 003H, 009H, 044H, 0A0H, 0F3H, 013H, 0C1H, 002H, 09FH, 09FH
, 08AH, 003H

DB
0B4H, 022H, 013H, 0FCH, 022H, 092H, 021H, 082H, 020H, 044H, 02BH, 098H, 07EH, 07EH

, 044H, 048H

DB

011H, 020H, 002H, 088H, 046H, 090H, 093H, 013H, 0C3H, 084H, 0D0H, 090H, 092H, 01EH
, 004H, 024H

DB

022H, 004H, 02AH, 094H, 001H, 000H, 020H, 044H, 022H, 050H, 042H, 042H, 024H, 048H
, 011H, 010H

DB

004H, 048H, 044H, 090H, 092H, 0A3H, 0C3H, 040H, 09FH, 09FH, 0A2H, 0E2H, 004H, 018H
, 002H, 004H

DB

024H, 088H, 002H, 010H, 03FH, 0C4H, 0E2H, 020H, 07EH, 07EH, 014H, 050H, 021H, 008H
, 004H, 048H

DB

048H, 088H, 092H, 0A3H, 0C5H, 031H, 010H, 090H, 082H, 002H, 004H, 018H, 003H, 0FCH
, 020H, 088H

DB

004H, 008H, 020H, 044H, 022H, 030H, 042H, 042H, 014H, 060H, 041H, 00CH, 008H, 008H
, 048H, 08CH

DB

092H, 043H, 0C9H, 022H, 010H, 090H, 082H, 002H, 004H, 024H, 002H, 004H, 020H, 084H
, 008H, 0FCH

DB

020H, 004H, 022H, 050H, 042H, 042H, 004H, 040H, 081H, 004H, 010H, 088H, 050H, 089H
, 012H, 0A3H

DB

0D1H, 00CH, 01FH, 09FH, 082H, 002H, 004H, 043H, 082H, 024H, 020H, 0A3H, 09FH, 08CH
, 000H, 014H

DB

022H, 088H, 07EH, 07EH, 0FFH, 0FEH, 001H, 000H, 020H, 050H, 042H, 081H, 053H, 03BH
, 0C1H, 030H

DB

010H, 090H, 082H, 002H, 015H, 081H, 002H, 01CH, 020H, 0C1H, 008H, 008H, 000H, 008H
, 023H, 00EH

DB

042H, 042H, 000H, 000H, 005H, 000H, 040H, 020H, 041H, 002H, 022H, 013H, 0C0H, 000H
, 000H, 000H

DB

000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H, 000H
, 000H, 000H

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 , 000H, 000H

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[illegible]

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[illegible]

OFFH, OFFH, OFFH, OFFH, OFFH, OFFH, OFFH, OFFH, OFFH, OFFH, OFFH, OFFH, OFFH, OFFH, OFFH, OFFH	P0.0 DB0	1	FG	OFFH, OFFH, OFFH, OFFH, OFFH, OFFH, OFFH, OFFH, OFFH, OFFH, OFFH, OFFH, OFFH, OFFH, OFFH, OFFH
, OFFH, OFFH	P0.1 DB1	2	GND	
	P0.2 DB2	3	VCC	

[illegible]