OSD CIRCUIT

MS6459 is CMOS LSIs for on-screen character display that control various display systems (such as tape counters) including the program screens of deck-type VCRs and LD players. These LSIs are used in combination with a microcomputer.

SSOP-24-300-0.65

FEATURE

- * Video signal input/output: Composite video signal
- * Number of display characters: 12 lines, 24 columns (288 characters)
- * Number of character types: 480(ROM)+32(RAM)
- * Character size: 1 dot/1 line. 2 lines (field) can be displayed in line units.
- * Character color: White (single color)
- * Background: No background, black framing, black-on-white, and black filling .
- * Dot matrix: 12 (horizontal) × 18 (vertical) dots without gap between adjacent charactes .
- * Blinking: Blinking can be turned ON/OFF in character units. Blinking ratio is 1:1. Blinking frequency is selectable from about 0.5 Hz, 1 Hz, and 2 Hz in screen units.
- * Character signal output: Can support VCRs with S pins if external mixer is connected because character signal and blanking signal output pins are provided.
- * Video RAM data clear: Video RAM data are cleared by video RAM clear command and power-ON clear function.
- * Supported video signal method: NTSC/PAL/PAL-M/SECAM/PAL-N
- * Internal circuit: Synchronization separation circuit for composite synchronizing signal and ×4 multiplier.
- * Detect external video signal in and auto internal/external mode select.
- * Interface with microcomputer: Serial input type of 8-bit variable word length.
- * Supply voltage: +5 V, single power supply.

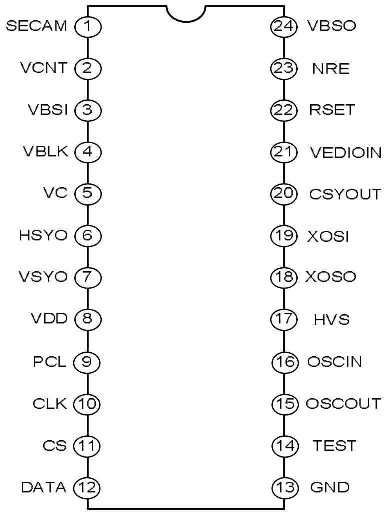
ORDERING INFORMATION

Device	Package
MS6459	SSOP-24-300-0.65

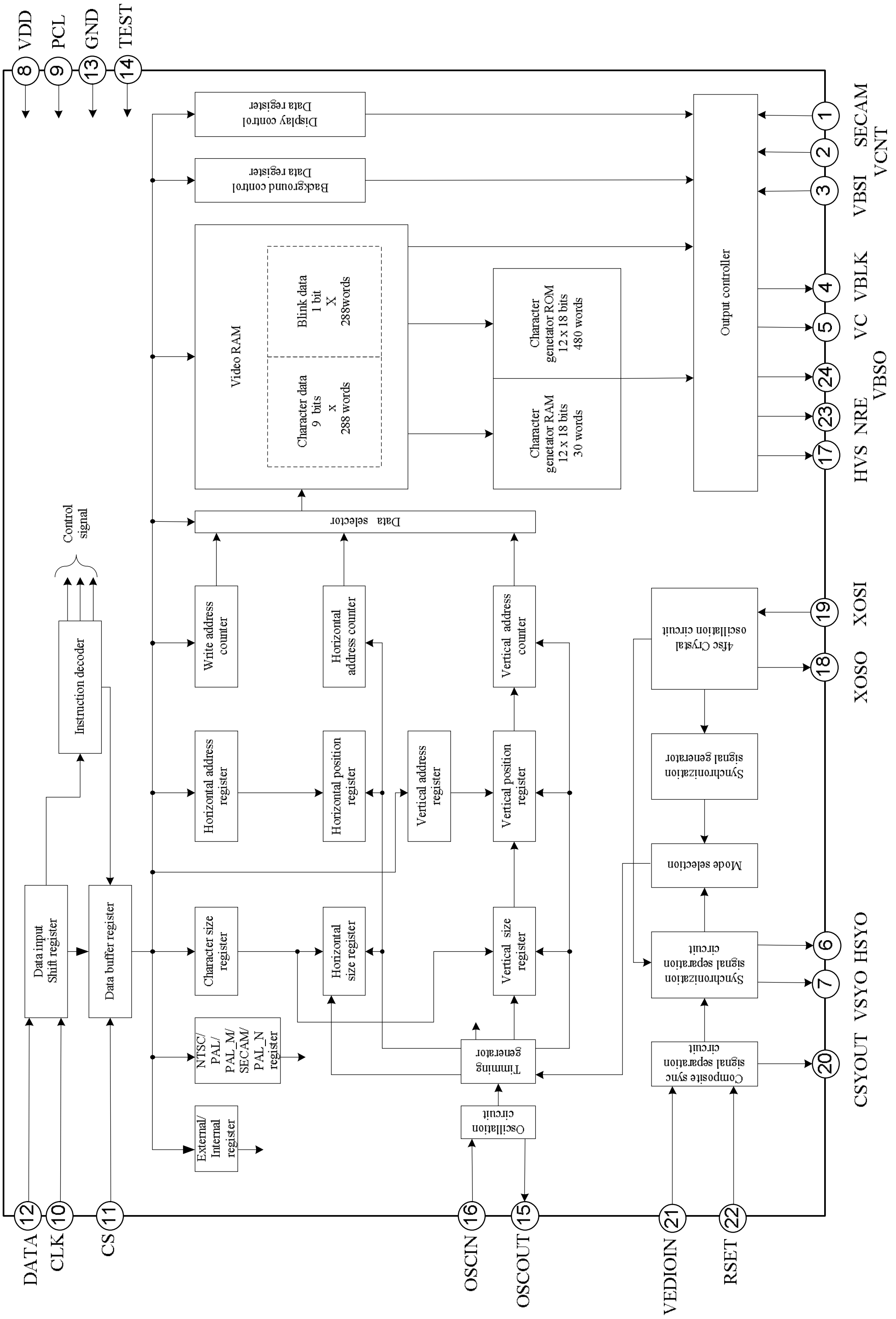
APPLICATIONS

- * on-screen character display systems

PIN CONFIGURATIONS



BLOCK DIAGRAM


8 VDD
9 PCL
13 GND
14 TEST
1 SECAM
2 VCNT
3 VBSI
4 VBLK
5 VC
24 VBSO
23 NRE
17 HVS
19 XOSI
18 XOSO
6 HSYO
7 VSYO
20 CSYOUT
12 DATA
10 CLK
11 CS
16 OSCIN
15 OSCOUT
21 VEDIOIN
22 RSET
Display control Data register
Background control Data register
Video RAM
Blink data 1 bit X 288words
Character data 9 bits x 288 words
Character generator ROM 12 x 18 bits 480 words
Character generator RAM 12 x 18 bits 30 words
Output controller
Data selector
Control signal
Instruction decoder
Write address counter
Horizontal address counter
Vertical address counter
4fsc Crystal oscillation circuit
Horizontal address register
Horizontal position register
Vertical address register
Vertical position register
Synchronization signal generator
Mode selection
Data input Shift register
Data buffer register
Character size register
Horizontal size register
Vertical size register
Synchronization signal separation circuit
NTSC/ PAL/ PAL_M/ SECAM/ PAL_N register
Timing generator
Composite sync signal separation circuit
External/ Internal register
Oscillation circuit

ABSOLUTE MAXIMUM RATING

Parameter	**Symbol**	SSOP24	UNIT
Supply voltage	VDD	7	V
Input pin voltage	VIN	-0.3—VDD+0.3	V
Output pin voltage	VOUT	-0.3—VDD+0.3	V
Operating ambient temperature	TA	–20 to +75	°C
Storage temperature	Tstg	–40 to +125	°C
Output current	Ic	±5	mA

ELECTRICAL CHARACTERISTICS (Unless otherwise stated, T_{amb}=25°C)

Parameter	Symbol	Conditions	MIN	TYP	MAX	Unit
Supply voltage	VDD		2.8	5.0	5.5	V
LC oscillation frequency	Fosc		4	7	8	MHz
Control input high level voltage	VOH	DATA, CLK, $\overline{\text{CS}}$, $\overline{\text{PCL}}$	3.5			V
Control input low level voltage	VOL	DATA, CLK, $\overline{\text{CS}}$, $\overline{\text{PCL}}$			1.5	V
Internal signal level setting voltage	VVL	VCNT	2.5		VDD	V
External video signal input voltage	VI	VBSI	0		VDD	V
Current consumption	IDD	Fosc=8M			20	mA
Signal output high level voltage	VSOH	VDD=5.0V, ISOH=-1mA	4.5			V
Signal output low level voltage	VSOL	VDD=5.0V, ISOL=1mA			0.5	V
Crystal oscillation frequency 1	FXON1	NTSC	14.31818			MHz
Crystal oscillation frequency 2	FXON2	PAL, SECAM	17.734475			
Crystal oscillation frequency 3	FXON3	PAL-M	14.302446			
Crystal oscillation frequency 4	FXON4	PAL-N	14.328225			

PIN DESCRIPTIONS

No.	Symbol	Function
1	SECAM	SECAM sub-carrier signal mixing pin. In cases of any system except for SECAM, this pin should be open.
2	VCNT	Adjusts the output level of the composite video signal and luminance signal.
3	VBSI	Inputs a composite video signal. Inputs a signal with the leading edge clamped, consisting of a negative synchronization signal and a positive video signal.
4	VBLK	This pin outputs a blanking signal that cuts the video signal. It corresponds to the output of V_C. Positive signal output.
5	VC	Character signal output pin. Positive signal output.
6	$\overline{\text{HSYO}}$	Outputs a horizontal synchronization signal separated from a composite synchronization signal.

7	$\overline{\text{VSYO}}$	Outputs a vertical synchronization signal separated from a composite synchronization signal.
8	VDD	Power supply
9	$\overline{\text{PCL}}$	Power-ON clear pin. Make this pin high on power application. It initializes the internal circuitry of the IC.
10	CLK	Inputs clock for data read. Data input to the DATA pin is read at the rising edge of the clock input to this pin.
11	$\overline{\text{CS}}$	Serial transfer can be acknowledged by making this $\overline{\text{CS}}$ pin low
12	DATA	nputs control data. Data is read in synchronization with the clock input to the CLK pin.
13	GND	Ground
14	TEST	Test mode select pin. Connect this pin to GND.
15	OSCOUT	These are input and output pins of an oscillator that generates dot clocks. Connect a coil and a capacitor to these pins for oscillation.
16	OSCIN	
17	HVS	Video in detect pin
18	XOSO	A quadruple oscillation LC for internal video signal generation is connected to these pins. A crystal oscillator can also be connected.
19	XOSI	
20	CSYOUT	Composite synchronization signal output
21	VEDIOIN	Vedio input
22	REST	External resistance and capacitor
23	NRE	Constant append pin for noise reduction.
24	VBSO	Outputs a composite video signal mixing a character signal.

FUNCTION DESCRIPTION

1. Command Format

Control commands are of variable length in 8-bit units and are input in serial.

Three types of commands are available: 1-byte commands consisting of 8 bits of instruction and data in combination, 2-byte commands of 16 bits of instruction and data in combination, and a 2-byte contiguous command that can be abbreviated for input.

Input command data from the MSB first.

2. Command List

1-byte commands

Function	D7	D6	D5	D4	D3	D2	D1	D0
Video RAM batch clear	0	0	0	0	0	0	0	0
Display control	0	0	0	1	D0	LC	BL1	BL0
Internal video signal color control	0	0	1	0	R	G	B	0
Background control	0	0	1	1	0	BS1	BS0	0
Internal/external mode control, crystal oscillation control	0	1	0	0	0	E/I	EI_A	XOSC
Video signal method control	0	1	0	0	1	N/P2	N/P1	N/P0

2-byte commands

	D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
L1	1	0	0	0	0	0	V4	V3	V2	V1	V0	H4	H3	H2	H1	H0
L2	1	0	0	0	0	1	0	AR3	AR2	AR1	AR0	AC4	AC3	AC2	AC1	AC0
L3	1	0	0	0	1	0	RW4	RW3	RW2	RW1	RW0	RL4	RL3	RL2	RL1	RL0
L4	1	0	0	1	0	0	0	VPD	0	0	0	0	0	1	VC1	VC0
L5	1	0	0	1	1	0	0	0	0	S0	0	0	AR3	AR2	AR1	AR0
L6	1	0	1	0	CR11	CR10	CR9	CR8	CR7	CR6	CR5	CR4	CR3	CR2	CR1	CR0
L7	1	0	1	1	0	0	0	0	T7	T6	T5	T4	T3	T2	T1	T0

L1：Display position control；

L2：Write address control；

L3：RAM write address control；

L4：Output level control；

L5：Character size control；

L6：RAM write data control；

L7：Test mode [Note]；

Note Must not be used.

2-byte contiguous command

	D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
L8	1	1	0	0	0	0	BL	C8	C7	C6	C5	C4	C3	C2	C1	C0

L8：Display character control；

3. Power-ON Clear Function

Because the internal status of the IC is unstable on power application, initialize the IC by making the $\overline{\text{PCL}}$ pin high and executing a clear operation. When the clear operation has been performed, the following setting is made:

- Test mode is cleared.
- All the character data of the video RAM (12 lines, 24 columns) are set to display OFF data (7EH) and the blinking data are set to OFF.
- Video RAM write address (line 0, column 0) is set.
- Character size is set to ×1 (minimum) on all lines.
- Display is turned OFF and LC oscillation is turned ON.

The time required for the power-ON clear operation can be calculated by the following expression:

t = tPCLL [Note] + {video RAM clear time} = 10 (μs) + {10 (μs) + 12/fOSC (MHz) × 288 [μs]}

Note Refer to **7. ELECTRICAL SPECIFICATIONS Power-ON Clear Specification**.

Remark fOSC: LC oscillation frequency (dot clock frequency)

4. COMMAND DETAILS

4.1 Video RAM Batch Clear Command

D7	D6	D5	D4	D3	D2	D1	D0
0	0	0	0	0	0	0	0

The video RAM batch clear command performs the following setting:

- Sets all the character data of the video RAM (12 lines, 24 columns) to display OFF data (7EH) and blinking data to OFF.
- Sets a video RAM write address (line 0, column 0).
- Sets the character size to ×1 (minimum) on all lines.
- Turns display OFF and LC oscillation ON.

The time required for clearing the video RAM can be calculated by the following expression:

t = video RAM clear time = 10 (μs) + 12/fOSC (MHz) × 288 [μs]

Remark fOSC: LC oscillation frequency (dot clock frequency)

4.2 Display Control Command

D7	D6	D5	D4	D3	D2	D1	D0
0	0	0	1	D0	LC	BL1	BL0

Blinking control bits		
BL1	BL0	Function
0	0	Blinking OFF
0	1	Blinking frequency: about 2 Hz
1	0	Blinking frequency: about 1 Hz
1	1	Blinking frequency: about 0.5 Hz

- Blinking control bits

These bits blink the character that is specified by the display character control command.

The blinking ratio is 1:1, and three blinking frequencies can be selected.
Blinking in character units can be specified by the display character control command.

LC oscillation control bit	
LC	Function
0	LC oscillation OFF
1	LC oscillation ON

- LC oscillation control bit

This bit controls LC oscillation and can turn ON/OFF the oscillation circuit. While no character is displayed, oscillation can be stopped to reduce the power dissipation.
Data cannot be written to the video RAM with oscillation stopped. To write data to the video RAM, be sure to turn ON oscillation.

Display ON/OFF control bit	
D0	Function
0	Display OFF
1	Display ON

4.3 Internal Video Signal Color Control Command

This command sets the color of an internal video signal.

D7	D6	D5	D4	D3	D2	D1	D0
0	0	1	0	R	G	B	0

Internal video signal color control bits			
R	G	B	Black
0	0	0	Blue
0	0	1	Green
0	1	0	Setting prohibited
0	1	1	Setting prohibited
1	0	0	Setting prohibited
1	0	1	Setting prohibited
1	1	0	White
1	1	1	Black

- Internal video signal color control bits
  These bits can select four colors as the color of the internal video signal.

4.4 Background Control Command

This command selects the background of the displayed character.

D7	D6	D5	D4	D3	D2	D1	D0
0	0	1	1	0	BS1	BS0	0

Background control bits		
BS1	BS0	Function
0	0	No background
0	1	Black framing
1	0	Black-on-white
1	1	Black filling

- Background control bits
  These bits select the type of background in screen units from none, black-framed, black-on-white, or black-filled background

4.5 Internal/external Mode Control, Crystal Oscillation Control Command

This command selects the video signal with which a character signal overlaps (internal mode/external mode) and controls ON/OFF of crystal oscillation.

D7	D6	D5	D4	D3	D2	D1	D0
0	1	0	0	0	E/I	EI-A	Xosc

Crystal oscillation control bit	
Xosc	Function
0	Oscillation OFF
1	Oscillation ON

- Crystal oscillation control bit

This bit controls oscillation of the crystal for internal video signal generation. When crystal oscillation is turned ON and the mode is changed from the external video signal mode to the internal video signal mode, the internal video signal is selected without the screen disturbed.
When crystal oscillation is turned OFF, the synchronization separation circuit does not operate. Be sure to turn ON crystal oscillation

Internal/external mode control bit	
E/I	Function
0	External video signal mode
1	Internal video signal mode

★ • Internal/external mode control bit

Auto internal/external mode select control bit	
EI-A	Function
0	Auto select
1	Not auto select

NOTE: HVS=1 No external video signal in; HVS=0 External video signal in

4.6 Video Signal Method Control Command

The MS6459 can select the NTSC, PAL, PAL-N and PAL-M methods for the internal video signal.

When the SECAM method is selected, the internal video signal is output by the PAL method.

D7	D6	D5	D4	D3	D2	D1	D0
0	1	0	0	1	N/P2	N/P1	N/P0

Video signal method control bits			
N/P2	N/P1	N/P0	Function
0	0	0	NTSC
0	0	1	PAL
0	1	0	PAL-M
0	1	1	SECAM
1	0	0	PAL-N
Setting prohibited			

4.7 Oscillation Method Control Command

D7	D6	D5	D4	D3	D2	D1	D0
0	1	0	1	0	0	Xfc	0

Oscillation method control bi	
Xfc	Function
0	Quadruple oscillation
1	4fsc crystal oscillation

★ • Oscillation method control bit

In the MS6459, the oscillation method can be selected from ×4 multiplication oscillation and 4fSC crystal oscillation with the oscillation

method control command.
When ×4 multiplication oscillation is selected, the fSC signal must be input from the FSCI pin. The 4fSC signal isgenerated from an external LC resonator and an internal circuit of the MS6459. The phase of four- divided 4fSC signal generated via LC oscillation is compared with that of the fSC signal that is input to the FSCI pin. The obtained phase error is converted to a voltage value, and then output from the FSCO pin. In the circuit shown in **8. APPLICATION CIRCUIT DIAGRAM (1) In ×4 multiplication oscillation**, the 4fSC signal synchronizing with the external fSC signal is generated by changing the capacitance of varactor diodes with this voltage that is based on a phase error.

When 4fSC crystal oscillation is selected, the FSCI and FSCO pins are not used.

Remark The scanning method in the internal video signal mode is non-interlacing. With the NTSC and PAL-M methods, the number of scanning lines is 263. With the PAL and PAL-N method, it is 312.

4.8 Display Position Control Command

This command can set the display start position; Because this command is a 2-byte command, it must be input in 16-bit units even when the command is successively input

D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
1	0	0	0	0	0	V4	V3	V2	V1	V0	H4	H3	H2	H1	H0

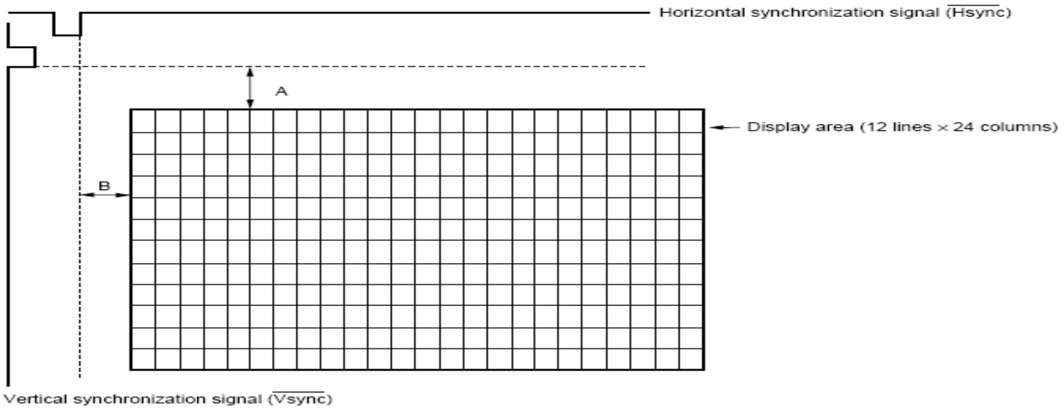
Horizontal display start position control bit					
H4	H3	H2	H1	H0	Function
0	0	0	0	0	Form rising of HS (12*1)/fosc+4/fosc(us)
0	0	0	0	1	Form rising of HS (12*2)/fosc+4/fosc(us)
……………………………………………………………………………………					
1	1	1	1	1	Form rising of HS (12*32)/fosc+4/fosc(us)

Vertical display start position control bit					
V4	V3	V2	V1	V0	Function
0	0	0	0	0	Form rising of VS 9H*0
0	0	0	0	1	Form rising of VS 9H*1
……………………………………………………………………………………					
1	1	1	1	1	Form rising of VS 9H*31

- Horizontal display start position control bits

  The horizontal display start position can be set in 12-dot units and 32 steps, 16 clocks after the rising of the horiz ontal synchronization signal (Hsync) (16/fOSC (MHz)).
- Vertical display start position control bits

  The vertical display start position can be set in 9-line units and 32 steps, from the rising of the vertical synchronization signal (Vsync).


Horizontal synchronization signal ($\overline{Hsync}$)
A
Display area (12 lines × 24 columns)
B
Vertical synchronization signal ($\overline{Vsync}$)

A: $9H\ (\text{line}) \times (2^4V_4 + 2^3V_3 + 2^2V_2 + 2^1V_1 + 2^0V_0)$

B: $\frac{12}{f_{osc}\ (\text{MHz})} \times (2^4H_4 + 2^3H_3 + 2^2H_2 + 2^1H_1 + 2^0H_0) + \frac{16}{f_{osc}\ (\text{MHz})}$

4.9 Write Address Control Command

This command specifies a write address when a character is written to the display area (video RAM) of 12 lines by 24 columns. Because this command is a 2-byte command, it must be input in 16-bit units even when input successively.

D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
1	0	0	0	1	0	0	AR3	AR2	AR1	AR0	AC4	AC3	AC2	AC1	AC0

Write column address control bits					
AC4	AC3	AC2	AC1	AC0	Function
0	0	0	0	0	Sets column 0
0	0	0	0	1	Sets column 1
……………………………………………………………………………………					
1	0	1	1	1	Sets column 23

Write line address control bits				
AR3	AR2	AR1	AR0	Function
0	0	0	0	Sets line 0
0	0	0	1	Sets line 1
……………………………………………………………………………………				
1	0	1	1	Sets line 11

4.10 Ram write data Control Command

D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
1	0	0	0	1	0	RW4	RW3	RW2	RW1	RW0	RL4	RL3	RL2	RL1	RL0

Character address control bits						
	RW4	RW3	RW2	RW1	RW0	Function
	0	0	0	0	0	Sets character 1
	0	0	0	0	1	Sets character 2
………………………………						
	1	1	1	1	1	Sets character 32

Line address control bits					
RL	RL	RL	RL	RL	Function
0	0	0	0	0	Sets line 1
0	0	0	0	1	Sets line 2
………………………………					
1	0	0	0	1	Sets line 18

4.11 Output Level Control Command

D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
1	0	0	1	0	0	0	VPD	0	0	0	0	0	1	VC1	VC0

Character level control bits		
VC1	VC0	Function

0	0	Setting Prohibited
0	1	75 I.R.E
1	0	Setting Prohibited
1	1	90 I.R.E

Internal video signal amplitude control bit	
VPD	Function
0	1 Vp_p amplitude
1	2 Vp_p amplitude

- Character level control bits

  These bits can select two character luminance levels: 75 or 90 I.R.E.

  If these bits are not set, the character level is set to 75 I.R.E.

  Remark The background (frame) level is fixed to 0 I.R.E.

- Internal video signal amplitude control bit

  This bit sets the amplitude of the internal video signal to 1 or 2 Vp-p (this amplitude must match the amplitude of the signal input in the external video signal mode). When the amplitude is set to 1 Vp-p, the voltage applied to the VCNT pin must be 2.5 V. When the amplitude is set to 2 Vp-p, apply 5 V to the VCNT pin.

4.12 Character Size Control Command

This command can set the character size in line units (in both the horizontal and vertical directions). Because this is a 2-byte command, it must be input in 16-bit units even when successively input

D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
1	0	0	1	1	0	0	0	0	S0	0	0	AR3	AR2	AR1	AR0

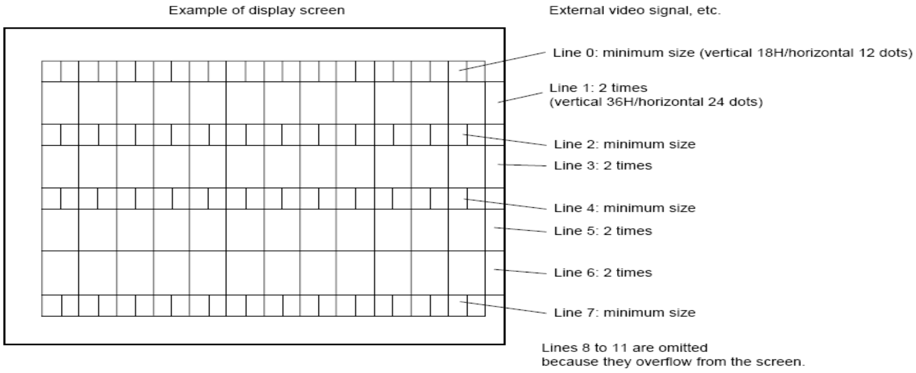
Line specification control bits				
AR3	AR2	AR1	AR0	Function
0	0	0	0	Sets line 0
0	0	0	1	Sets line 1
………………………………………………………………………………				
1	0	1	1	Sets line 11

Character size control bit	
S0	Function
0	Vertical 1 dot:1H, horizontal 1 dot: 1t dot
1	Vertical 1 dot:2H, horizontal 1 dot: 2t dot

1 dot = 1us/fosc(MHZ)

fOSC: LC oscillation frequency

Display with two character size specified


Example of display screen
External video signal, etc.
Line 0: minimum size (vertical 18H/horizontal 12 dots)
Line 1: 2 times
(vertical 36H/horizontal 24 dots)
Line 2: minimum size
Line 3: 2 times
Line 4: minimum size
Line 5: 2 times
Line 6: 2 times
Line 7: minimum size
Lines 8 to 11 are omitted
because they overflow from the screen.

4.13 Character ram write data control bits

D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
1	0	1	0	CR11	CR10	CR9	CR8	CR7	CR6	CR5	CR4	CR3	CR2	CR1	CR0

Character ram write data control bits	
CRXX	Function
0	Without dots
1	With dots

4.14 Test Mode Command

D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
1	0	1	1	0	0	0	0	T7	T6	T5	T4	T3	T2	T1	T0

This command is for testing the IC. Do not set this command.

4.13 Display Character Control Command (2-byte contiguous command)

This command is a 2-byte contiguous command

D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
1	1	0	0	0	0	BL	C8	C7	C6	C5	C4	C3	C2	C1	C0

Blink control bit	
BL	Function
0	Does not blink character
1	Blinks character

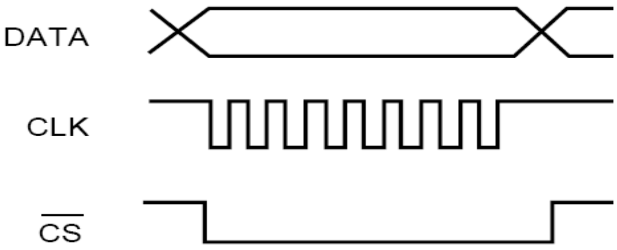
Character specidication bits								
C7	C6	C5	C4	C3	C2	C1	C0	Function
0	0	0	0	0	0	0	0	Output data of 00H
0	0	0	0	0	0	0	1	Output data of 01H
……………………………………………………………………								
1	1	1	1	1	1	1	0	Output data of FEH

1	1	1	1	1	1	1	1	Output data of FFH

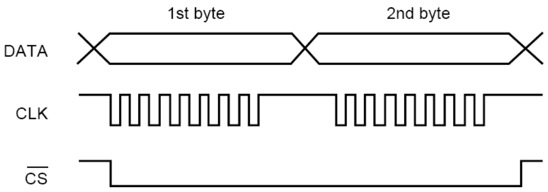
000H--1DEH：CROM； 1E0H--1FFH：CRAM； 1DFH：Display off data

5. TRANSFERRING COMMANDS

5.1 1-Byte Command



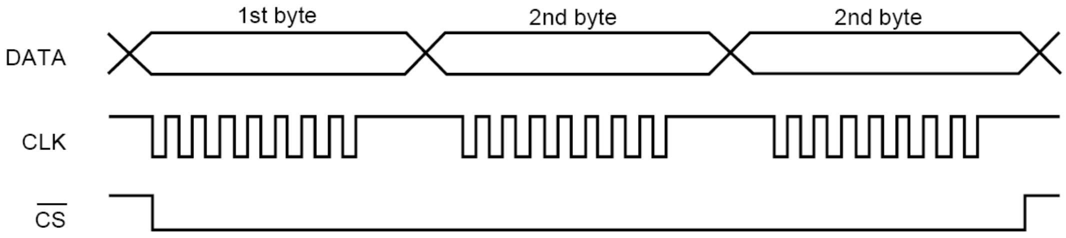
5.2 2-Byte Command



1st byte: D15-D8
2nd byte: D7-D0

When transferring a 2-byte command, keep $\overline{CS}$ low between the first byte and second byte

5.3 2-Byte Contiguous Command



The 2-byte contiguous command writes a character to the video RAM. To write characters in succession without changing the blink data, first transfer the first byte and then transfer the second bytes (character addresses) in succession.

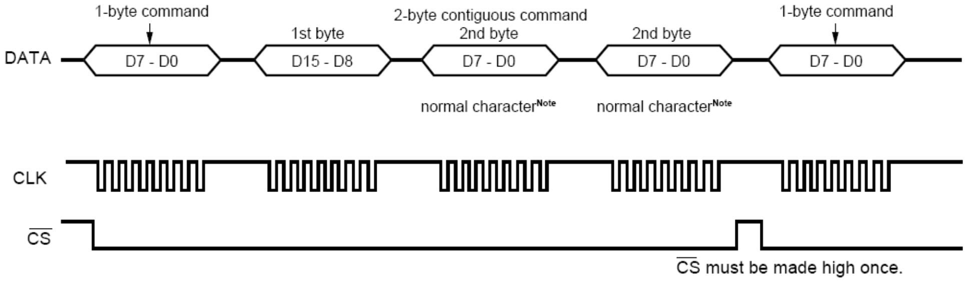
5.4 Successive Command Input

Transfer each of the 1-byte, 2-byte, and 2-byte contiguous commands from a microcomputer to the MS6459 as described below.

When transferring a 1-byte command, 2-byte command, or a 2-byte contiguous command with the blink data changed after a 2-byte contiguous command has been transferred, either make $\overline{CS}$ high once, or transfer end code of the 2-byte contiguous command at the end of the 2-byte contiguous command. In the latter case, $\overline{CS}$ needs not to be made high.

5.4.1 When 2-byte contiguous command end code is not used

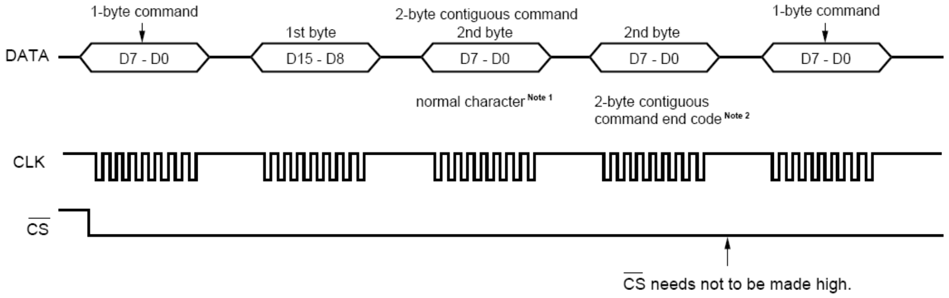
Example 1-byte command → 2-byte contiguous command → 1-byte command


1-byte command
1st byte
2-byte contiguous command
2nd byte
2nd byte
1-byte command
DATA
D7 - D0
D15 - D8
D7 - D0
D7 - D0
D7 - D0
normal character^Note
normal character^Note
CLK
CS
CS must be made high once.

Note 00H-7EH

5.4.2 When 2-byte contiguous command end code is used

Example 1-byte command → 2-byte contiguous command → 1-byte command


1-byte command
1st byte
2-byte contiguous command
2nd byte
2nd byte
1-byte command
DATA
D7 - D0
D15 - D8
D7 - D0
D7 - D0
D7 - D0
normal character Note 1
2-byte contiguous command end code Note 2
CLK
CS
CS needs not to be made high.

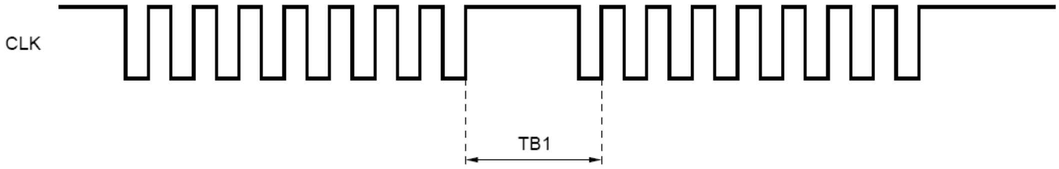
Notes 1. 00H-7EH

2. 7FH

5.5 BUSY Period for Command Input

The BUSY period for command input is distinguished depending on whether a 1-byte, 2-byte, or 2-byte contiguous command is used.

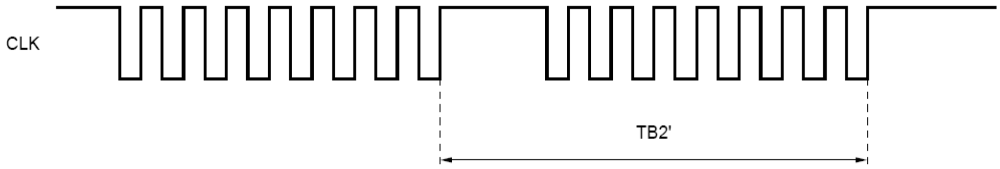
5.5.1 When inputting 1-byte or 2-byte command



Parameter	Symbol	Condition	MIN.	TYP.	MAX.	Unit
TB1	TB1	1-byte or 2-byte command	2.0			us

5.5.2 When inputting 2-byte contiguous command

(1) Not transferring 2-byte contiguous command in Vsync period with detecting Vsync (command continuous input enable time 2 = TB2)

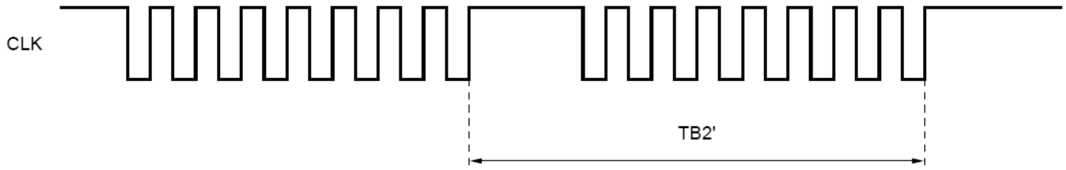


Symbol	Condition	MIN	UNIT

TB2	2-byte contiguous command	Display ON	TB1' +(21/fosc)×S1+Thwl1	us
		Display OFF	TB1' +(21/fosc)×S1	us

Remark f_{OSC} : clock frequency of LC oscillation
S_1 : character size
T_{HWL1} : Hsync width
TB1' ≥ 2.0 us

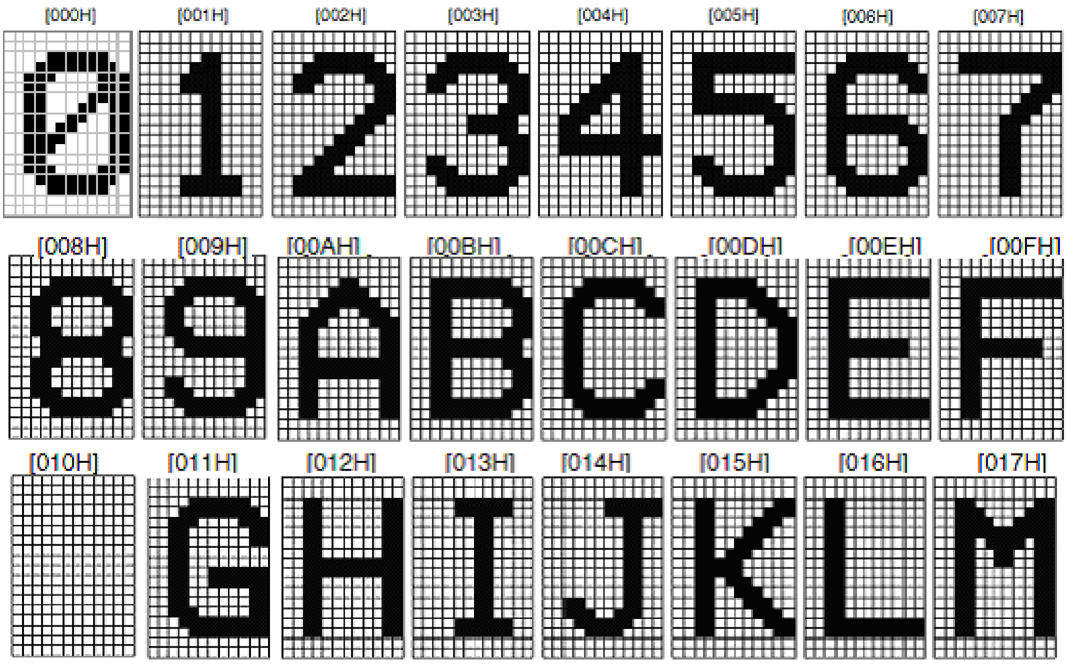
(2) Transferring 2-byte contiguous command in Vsync period without detecting Vsync (command continuous input enable time 2' = TB2')



Symbol	Condition	MIN	TYP	MAX	Unit
TB2'	2-byte contiguous command (= video RAM write command), Display ON	(21/fosc)×S2+Thwl2			us

Remark f_{OSC} : clock frequency of LC oscillation
S_1 : character size of the first line
T_{HWL2} : Hsync period

6. Standard Character Patterns of the MS6459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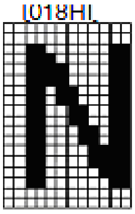
[001H]
[002H]
[003H]
[004H]
[005H]
[006H]
[007H]
[008H]
[009H]
[00AH]
[00BH]
[00CH]
[00DH]
[00EH]
[00FH]
[010H]
[011H]
[012H]
[013H]
[014H]
[015H]
[016H]
[017H]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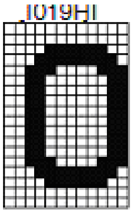
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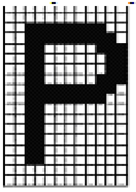
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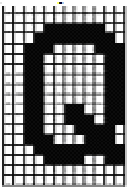
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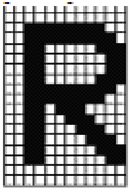
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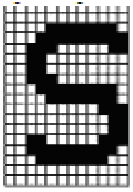
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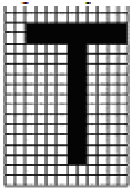
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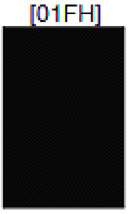
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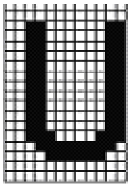
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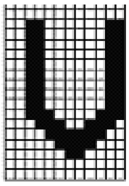
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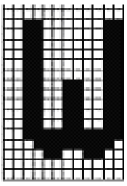
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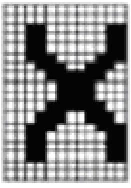
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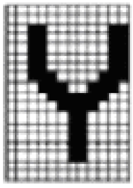
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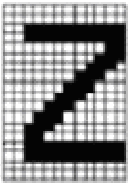
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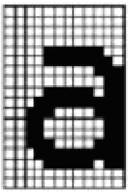
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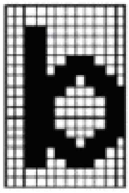
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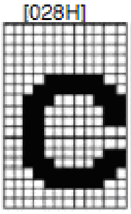
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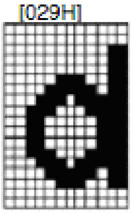
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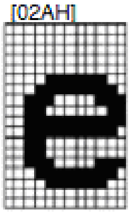
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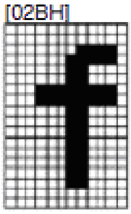
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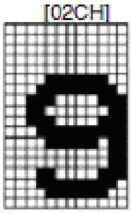
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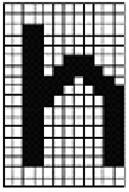
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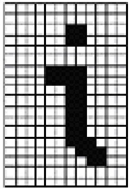
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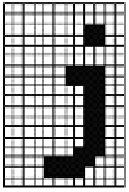
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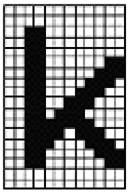
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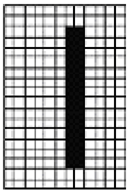
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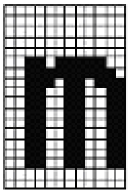
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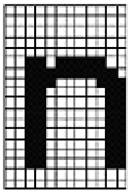
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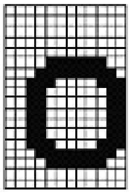
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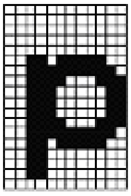
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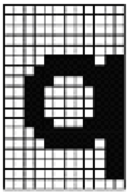
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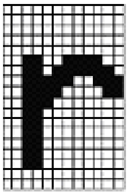
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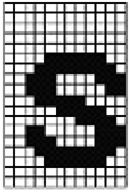
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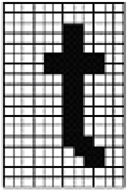
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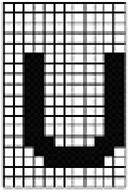
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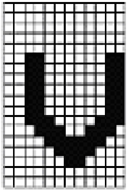
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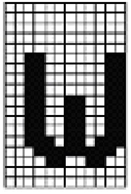
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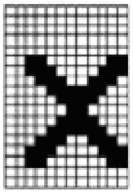
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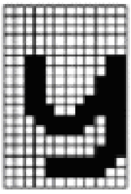
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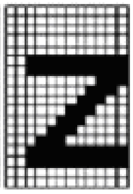
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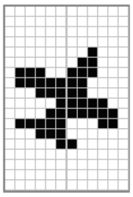
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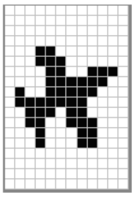
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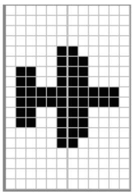
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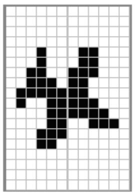
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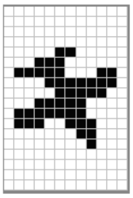
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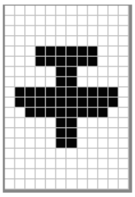
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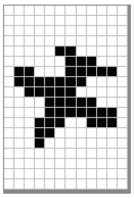
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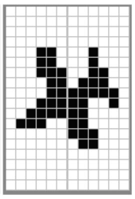
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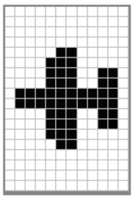
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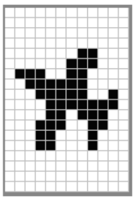
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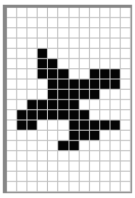
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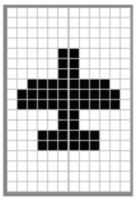
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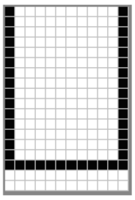
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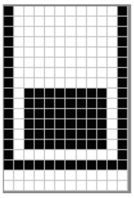
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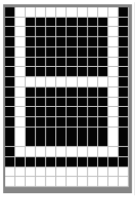
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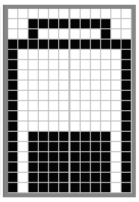
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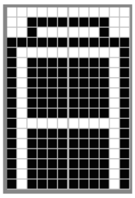
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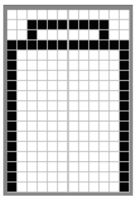
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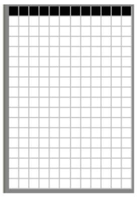
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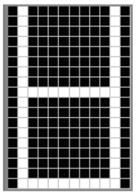
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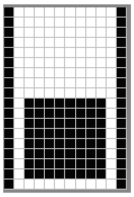
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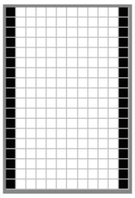
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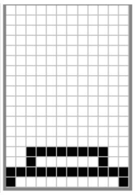
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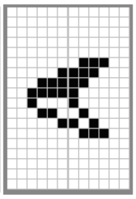

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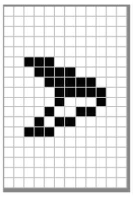
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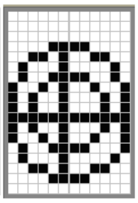
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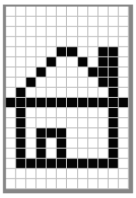
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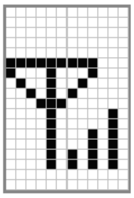
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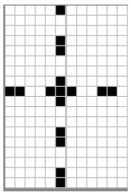
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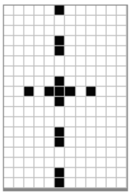
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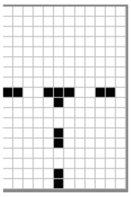
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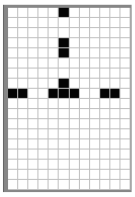

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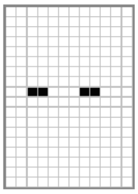
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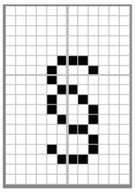
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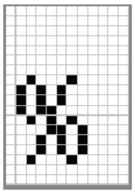
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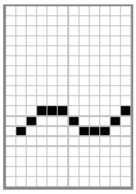
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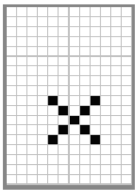
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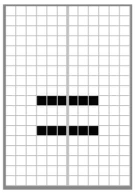
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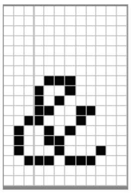
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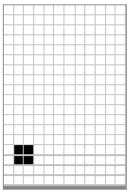

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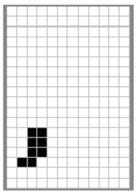
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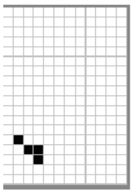
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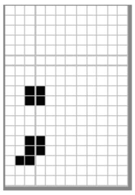
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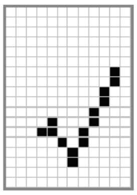
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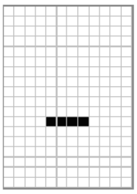
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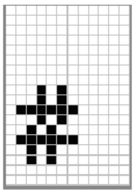
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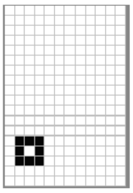
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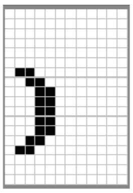

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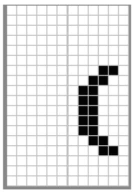
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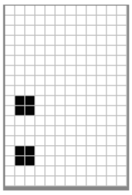
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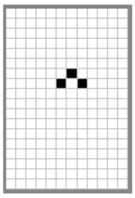
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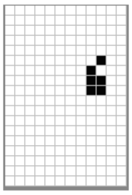
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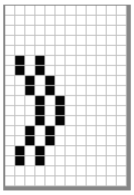
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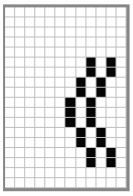
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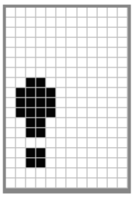
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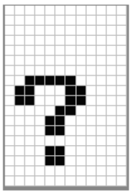

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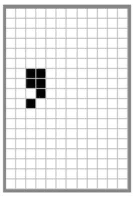
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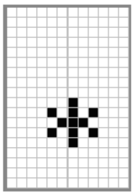
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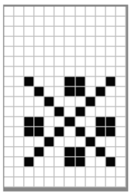
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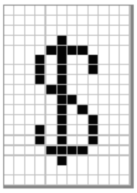
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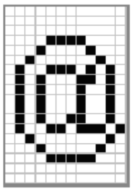
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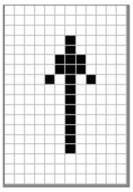
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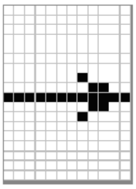
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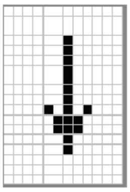

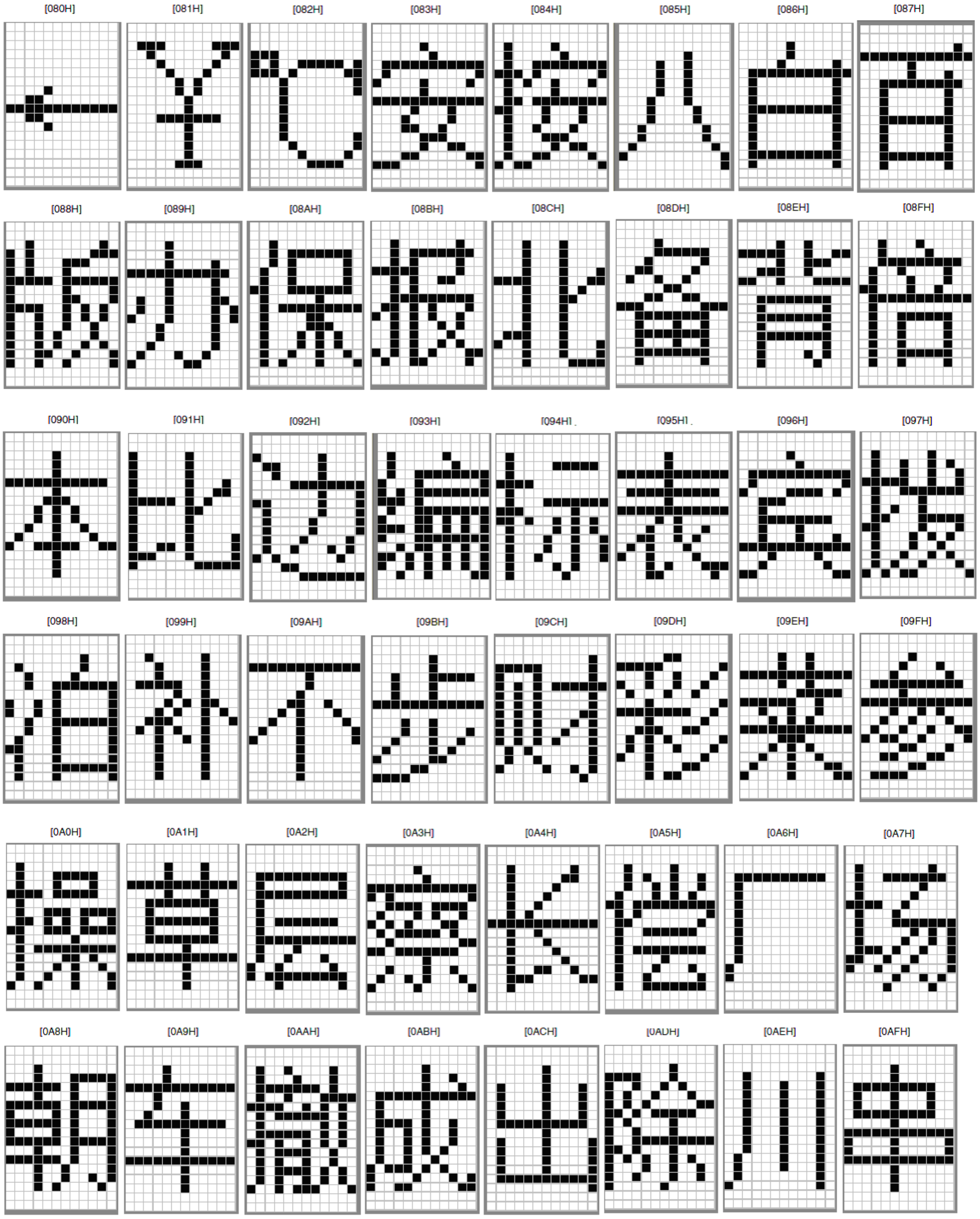
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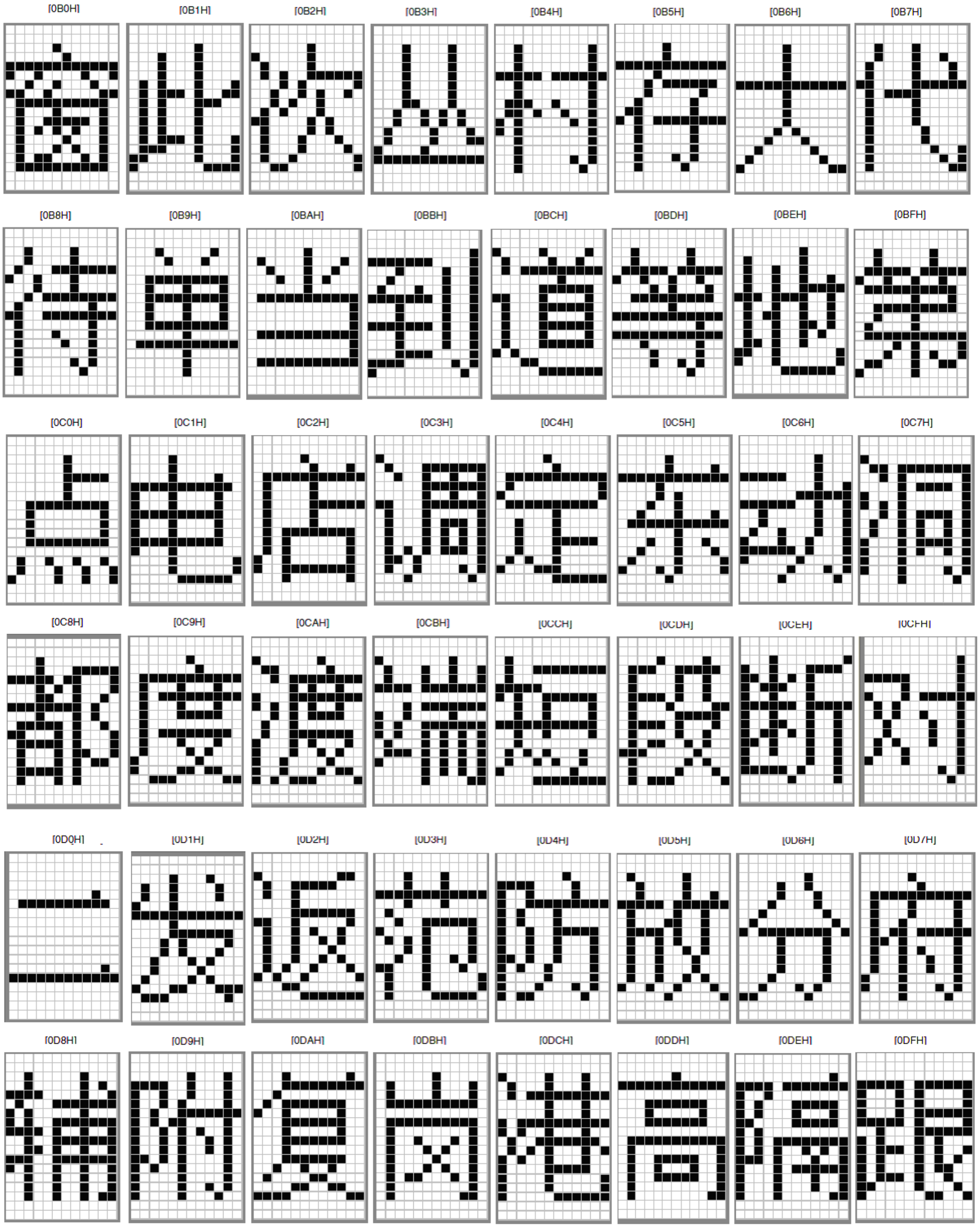
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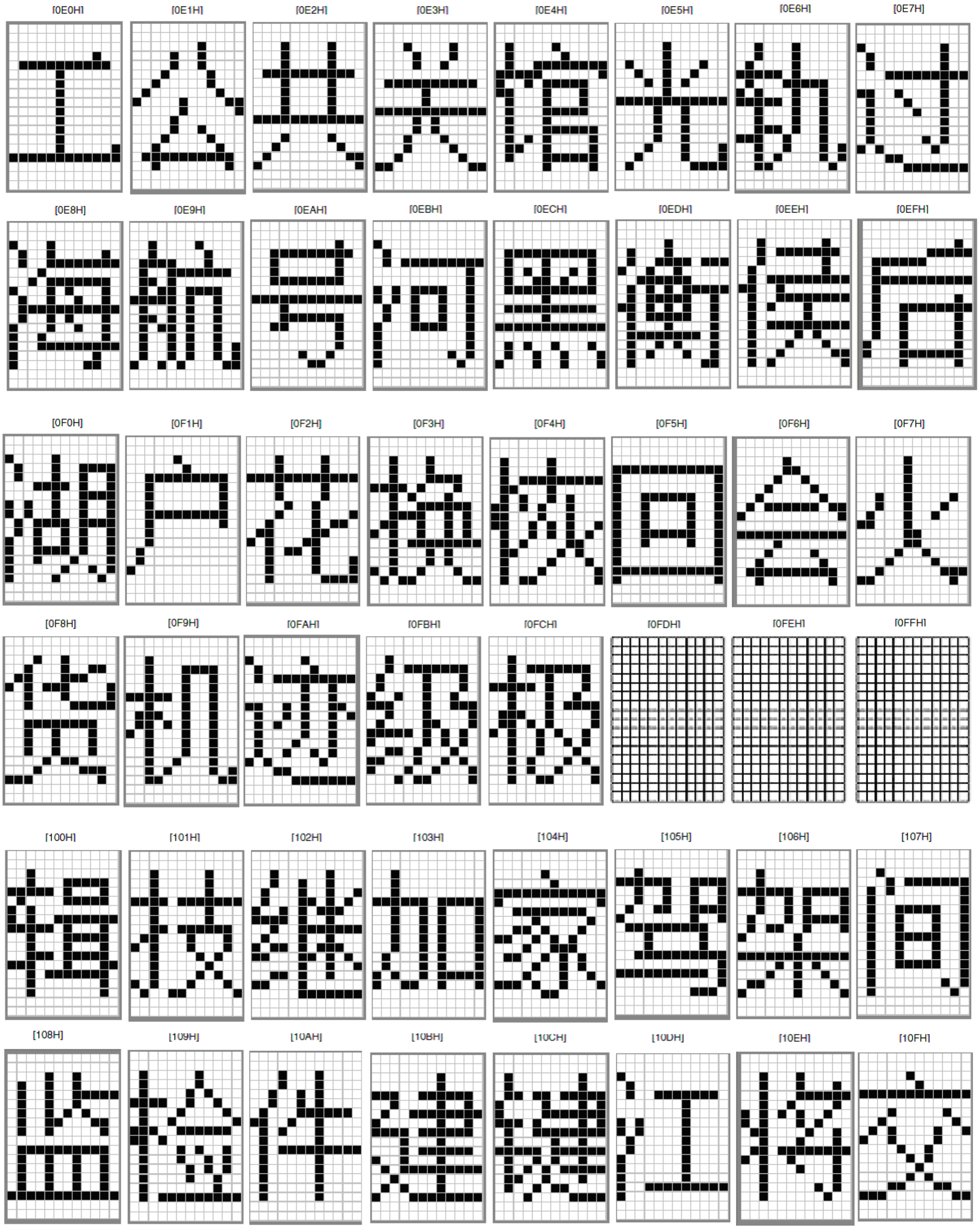
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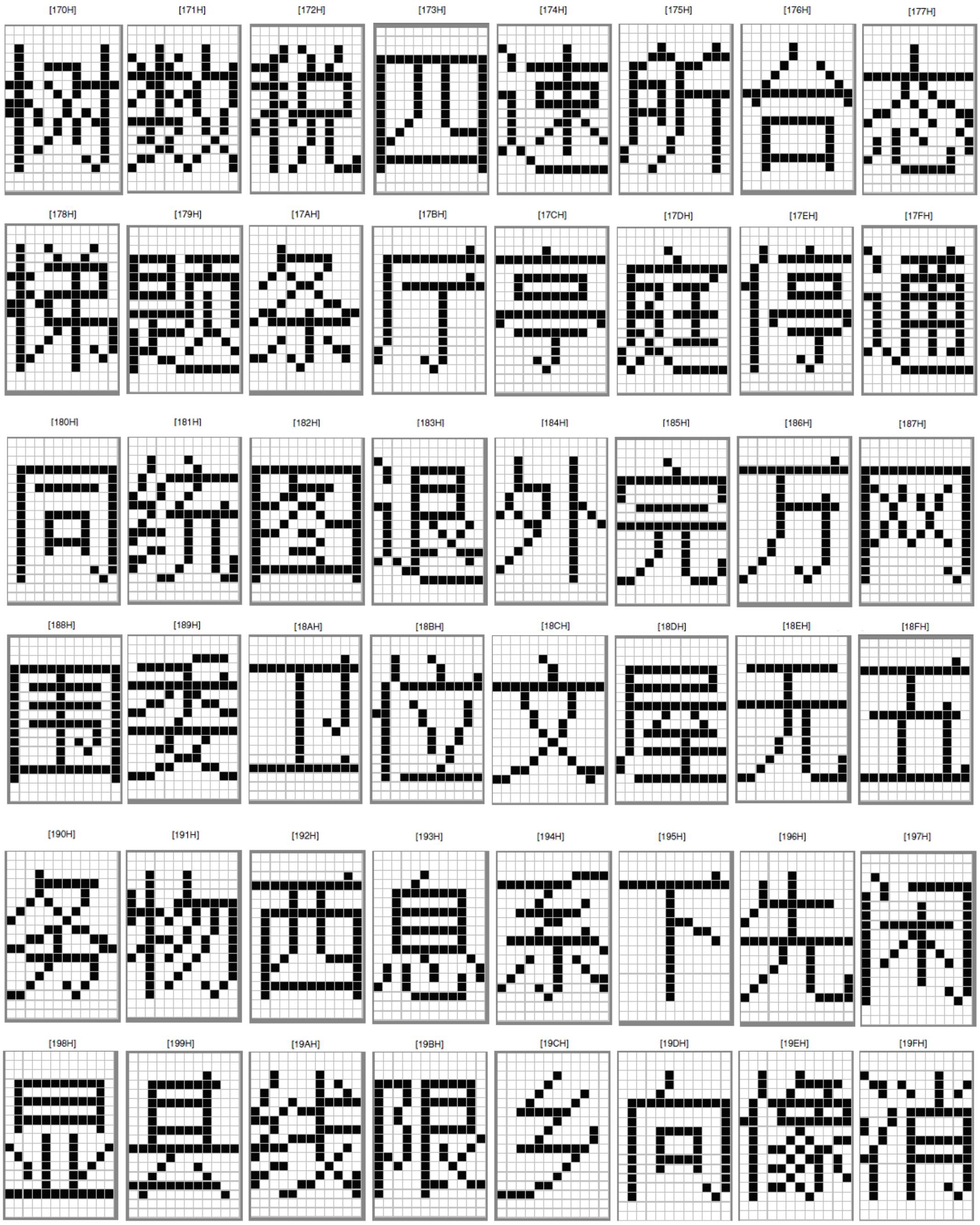

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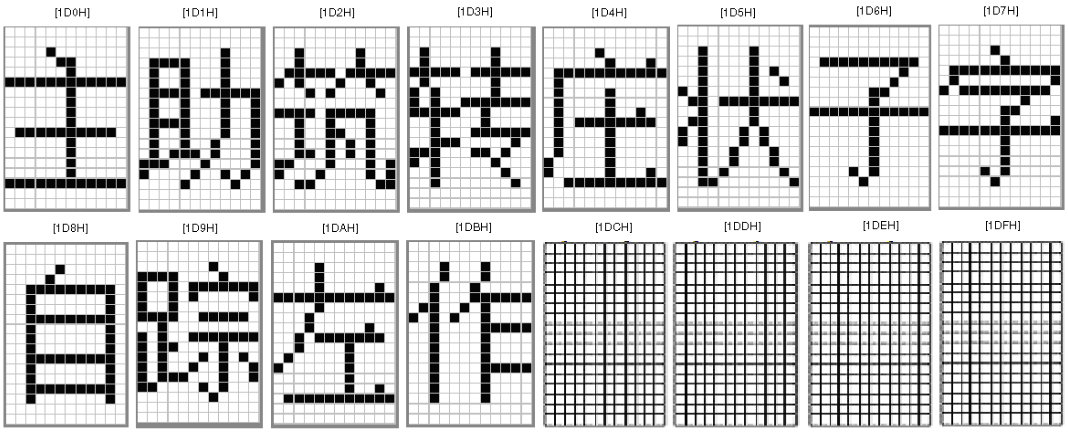
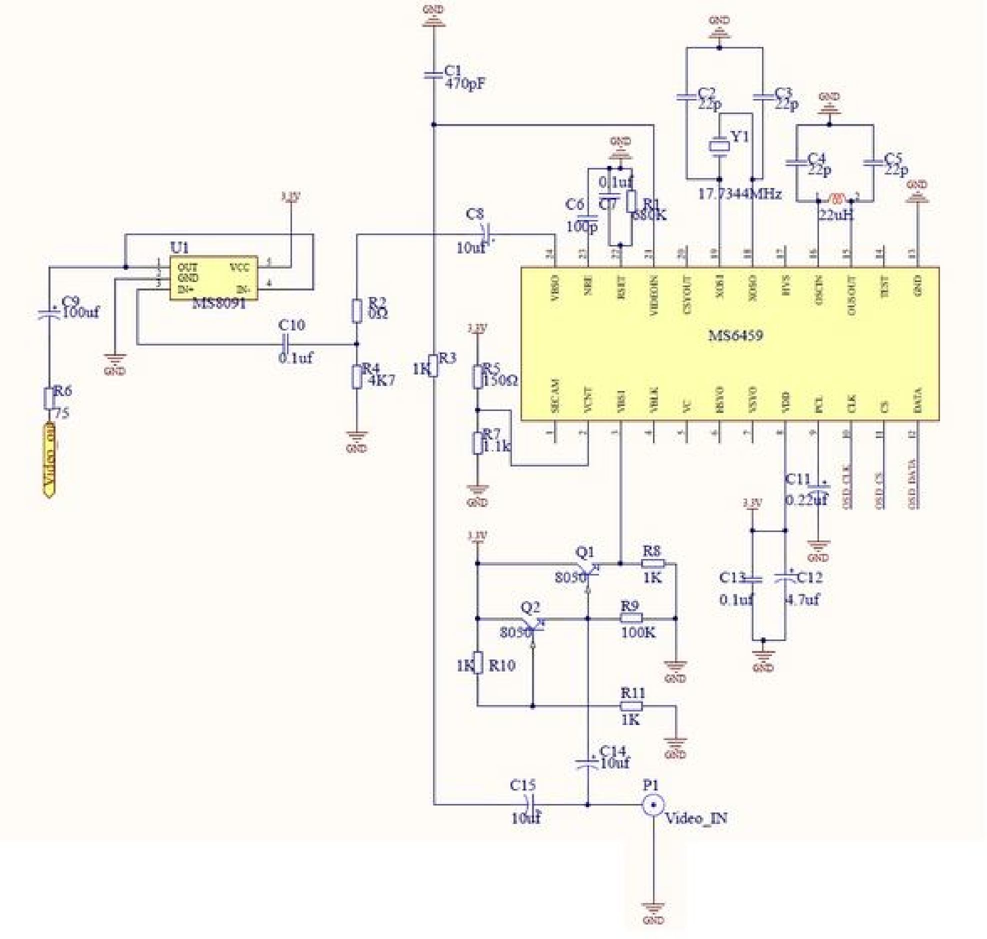
[1B0H]	[1B1H]	[1B2H]	[1B3H]	[1B4H]	[1B5H]	[1B6H]	[1B7H]
议	银	英	营	硬	优	邮	油
[1B8H]	[1B9H]	[1BAH]	[1BBH]	[1BCH]	[1BDH]	[1BEH]	[1BFH]
有	右	预	域	元	员	园	远
[1C0H]	[1C1H]	[1C2H]	[1C3H]	[1C4H]	[1C5H]	[1C6H]	[1C7H]
院	月	云	站	镇	整	政	支
[1C8H]	[1C9H]	[1CAH]	[1CBH]	[1CCH]	[1CDH]	[1CEH]	[1CFH]
值	址	制	治	置	中	州	周


[1D0H]
[1D1H]
[1D2H]
[1D3H]
[1D4H]
[1D5H]
[1D6H]
[1D7H]
[1D8H]
[1D9H]
[1DAH]
[1DBH]
[1DCH]
[1DDH]
[1DEH]
[1DFH]

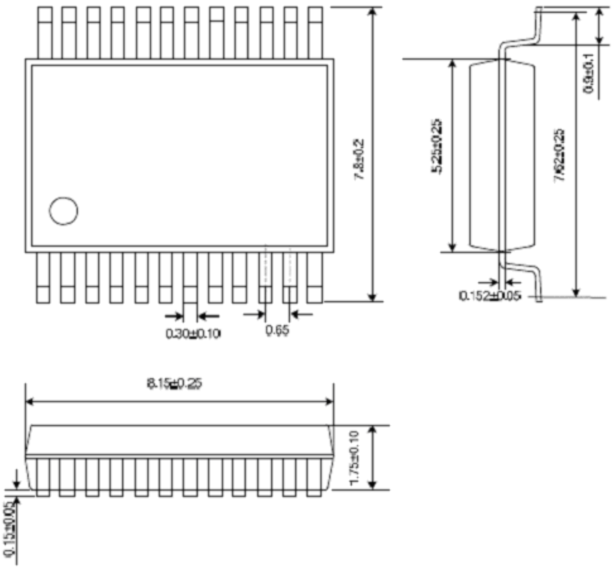
NOTE: 1E0—1FF by character ram address

TYPICAL APPLICATION CIRCUIT


GND
C1
470pF
3.3V
U1
OUT
GND
IN+
VCC
IN-
MS8091
C9
100uf
GND
R6
75
Video_out
C8
10uf
R2
0Ω
C10
0.1uf
R4
4K7
GND
1K
R3
3.3V
R5
150Ω
R7
1.1k
GND
C6
100p
0.1uf
C7
R1
680K
C2
22p
C3
22p
Y1
17.7344MHz
C4
22p
C5
22p
22uH
VBSO
NRE
RSET
VIDEOIN
CSYOUT
XOSI
XOSO
HVS
OSCIN
OUSOUT
TEST
GND
MS6459
SECAM
VCNT
VBSI
VBLK
VC
HSYO
VSYO
VDD
PCL
CLK
CS
DATA
C11
0.22uf
OSD CLK
OSD CS
OSD DATA
3.3V
C13
0.1uf
C12
4.7uf
3.3V
Q1
8050
R8
1K
Q2
8050
R9
100K
1K
R10
R11
1K
C14
10uf
C15
10uf
P1
Video_IN
GND

Physical Dimensions

SSOP24-300-0.65 UNIT: mm


7.8±0.2
5.2±0.25
0.9±0.1
7.62±0.25
0.152±0.05
0.30±0.10
0.65
8.15±0.25
1.75±0.10
0.15±0.05