HTG1395
3-in-1 LCD Game

Features

- Operating voltage: 1.2V~1.5V
- 27 segment×3 common, 1/3 duty, 1/2 bias LCD driver

- RC oscillator 400kHz

General Description

HTG1395 is a 3-in-1 LCD game designed by HOLTEK. Customers can select three kinds of game by using 2 Pad Bounding options, namely; Car racing, Soccer and the Eagle Preys on the chickens. Each game has its own characteristics. Car racing has two kinds of game mode, GAME I and GAME II. Those two games have different number of cars. The longer the user plays, the speed increases.

The Soccer game controls the movement of the goalie either to the left or to the right in an attempt to block the football. Contact with the cup that simultaneously appears at the upper left of the screen, could add 50 points to the score. When the opponent makes a goal, the score adds to three times and the game is over. The Eagle preys on the chickens is played by making the mother hen protect her young chicks from the attacks of the eagle.
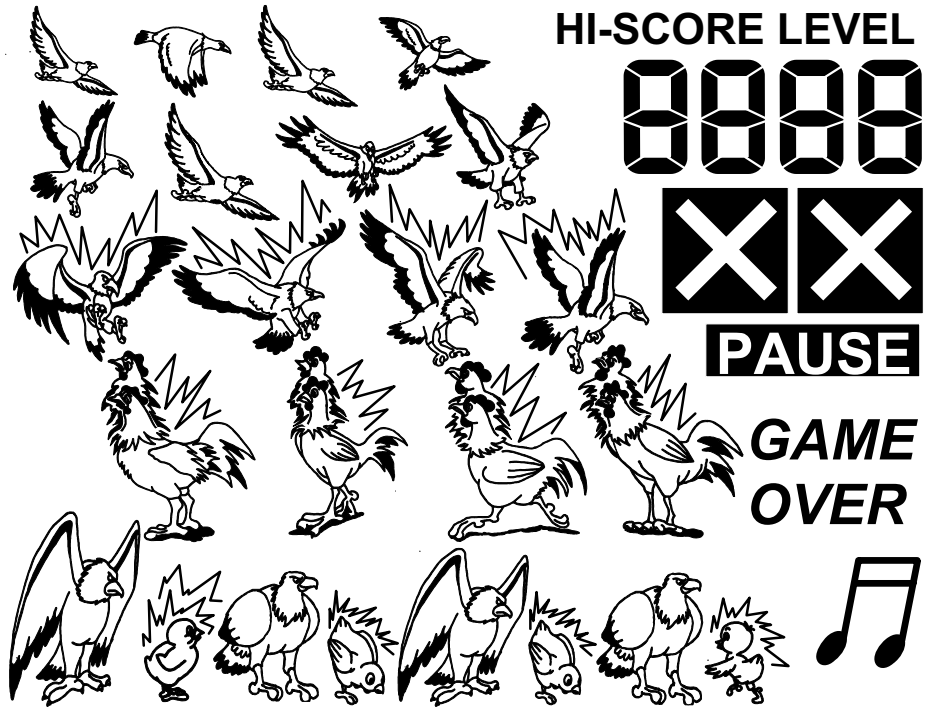
LCD Pattern

Car racing

August 18, 2000
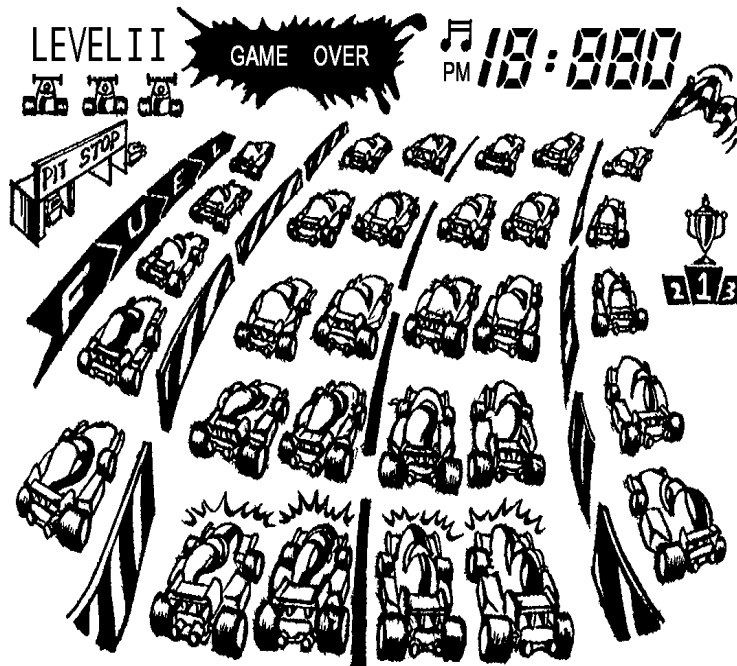
Soccer
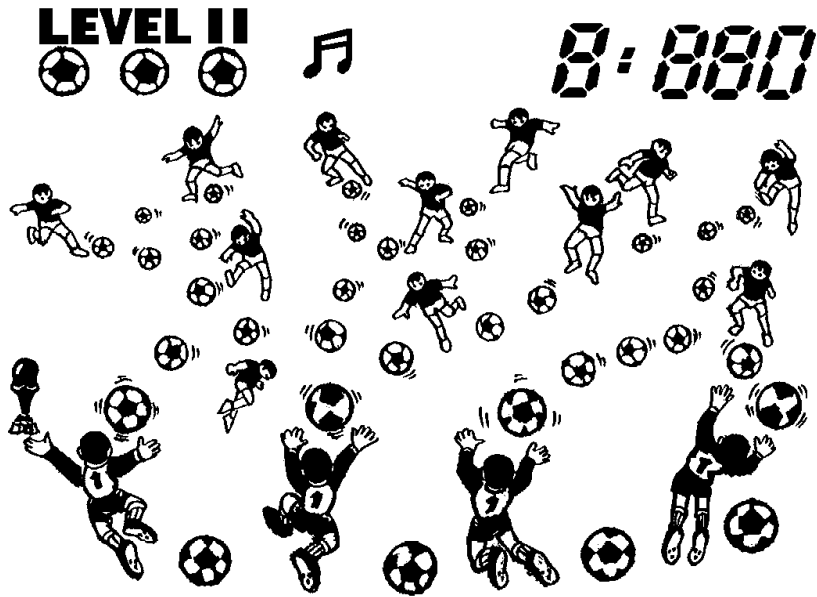
The eagle preys on the chicken

Functional Description

Key description — Car racing

Pad Bonding: PS2, PS3 connect to Ground

- RESET

  This key will restart the entire system, reset the score to zero and clear the memory. To test the LCD, simultaneously press RESET and START/PAUSE, then release the RESET key. All the patterns used by the game will be displayed.

- ON/OFF

  This is the power on and power off key. Pressing once, turns the power on (i.e. initializes the game), pressing again turns the power off, and so on.

- START/PAUSE

  Pressing this button starts or suspends the game. Pressing once upon initialization starts the game. Pressing the button again, after the game has started, suspends the action in its current state. The action will resume upon pressing the key again. The action will be enabled alternately between suspension and activity on each depression of the key.

- A

  Selection key. Pressing this key while in the demo mode can choose LEVEL I.

- B

  Selection key. Pressing this key while in the demo mode can choose LEVEL II.

- UP

  Speed up key.

- Down

  Speed down key.

- LEFT

  Direction key. Pressing this key moves the car towards the left.

- RIGHT

  Direction key. Pressing this moves the car towards the right.

- MUTE

  This key switches off or switches on the sound. When the game is switched on, the sound effects and music are automatically enabled. Pressing the MUTE key once switches off the sound. Pressing the MUTE again switches on the sound. The sound effects and music will be enabled alternately between OFF and ON states on each depression of the key.

  ◆ Operational description

    - Press RESET and START/PAUSE, then release the RESET key. All the pattern dots are shown on the screen. Press any key if you choose to operate or play a game, if not, the demonstration will go on.

    - Press A or B key in the demo mode to select a game, either LEVEL I or LEVEL II. Pressing the START/PAUSE key will start the game.

    - There are two kinds of game modes. Each mode represents successive increase in game speed. When the game starts, press the LEFT or the RIGHT key to control the movement of the car while moving forward to the left or to the right to avoid collision with the other cars. When the score reaches 500, an icon symbolizing a gasoline station is shown at the upper left and a cup is shown at the upper right portion of the screen. While these icons are alternately flashing, a special mode can be activated wherein the other cars could not move. At that instant, pressing the left or the right key could make the car move up and thus increase the score. Those other cars that were momentarily at halt could now move. Continue to play by pressing again the left or the right key.

    - Colliding with the opponent's car could lose one chance and when this happens three times, the game is over and the demo may be replayed. If no key is pressed in two minutes, the device will auto power off, or if the START/PAUSE key is pressed, the game restarts. If the

START/PAUSE key is pressed in the play mode, the game goes into the PAUSE mode.

 - If the game is not resumed within two minutes, power is automatically turned off.

 - When the power is turned off in the ″PAUSE″ mode (either automatically or manually) and then turned on again, the image remains frozen in the PAUSE mode. Press the START/PAUSE key to continue the game .

 - In the PAUSE mode, if no key is pressed in two minutes, power is automatically turned off.

 - When a game is finished or momentarily at power off, the highest recent score and difficulty level are updated.

 ⬧ Counting methods

 - For each instance that an opponent′s car is avoided, add 10 points to the score.

 - To get an award once will obtain 10~70 points (In random mode)

 Note: The highest score is 9990. Once this score has been reached, it restarts counting from 0.

 ⬧ Sound effects

 - Game starting music

 - Car forward sound

 - Game over music

 - The prize appear on the screen sound

 - Increase point sound

 - Speed up sound

 - Break sound

Key description — **Soccer**

Pad Bonding: PS2,PS3 connect to VDD

• RESET

This key will restart the entire system, reset the score to zero and clear the memory. To test the LCD, simultaneously press RESET and START/PAUSE, then release the RESET key. All the patterns used by game will be displayed.

• ON/OFF

This is the power on and power off key. Pressing once turns the power on (i.e. initialize the game), pressing again turns the power off.

• START/PAUSE

Pressing this button starts or suspends the game. Pressing once upon initialization starts the game. Pressing the button again, after the game has started, suspends the action in its current state. The action will resume upon pressing the key again. The action will be enabled alternately between suspension and activity on each depression of the key.

• A

Selection key. Pressing this key in the demo mode can choose LEVEL I.

• B

Selection key. Pressing this key in the demo mode can choose LEVEL II.

• LEFT

Direction key. Pressing this key can make the goalie move to the left.

• RIGHT

Direction key. Pressing this key can make the goalie move to the right.

• MUTE

This key switches off or switches on the sound. When the game is switches on, the sound effects and music are automatically enabled. Pressing the MUTE key once switches off the sound. Pressing the MUTE again switches on the sound.

The sound effects and music will be enabled alternately between OFF and ON states on each depression of the key.

 ⬧ Operational description

 - Press RESET and START/PAUSE, then release the RESET key. All the pattern dots are shown on the screen. Press any key if you choose to operate or play a game, if not, the demonstration will go on.

- Press A or B key in the demo mode to select a game: LEVEL I or LEVEL II. Pressing START/PAUSE key will start the game.
- There are two kinds of game modes. Each mode represents successive increases in game speed.
- Upon starting, press the LEFT or the RIGHT key to control the goalie's movement, either to the left or to the right, in order to block or to prevent the football from entering. To be able to touch the cup that simultaneously appear on the left of the screen could add 50 points to the score. When the opponent gets a goal three times, the game is over and the device enters the demo mode. If no key is pressed in 1 min, power is turned off automatically. Pressing the START/PAUSE key will restart the game. If the START/PAUSE key is pressed in the play mode, the game goes into the PAUSE mode.
- If the game is not resumed within two minutes, power is automatically turned off.
- In the ″PAUSE″ mode, when power is turned off (either automatically or manually) and then turned on again, the image remains frozen in the PAUSE mode. Press the START/PAUSE key to continue the game.
- When a game is finished or at power off, the highest recent score and difficulty level are updated.
- In the PAUSE mode, if no key is pressed in two minutes, power is automatically turned off.

⬧ Counting methods
- Blocking one football adds 10 points to the score.
- Touching the cup adds 50 points to the score.

⬧ Sound effects
- Game starting music

- Football moving sound
- Football that blocks sound
- Game over sound

Key description — **The eagle preys on the chickens**

Pad Bonding: connect PS2 to VDD and PS3 to Ground

- RESET
  This key will restart the entire system, reset the score to zero and clear the memory. To test the LCD, simultaneously press RESET and START/PAUSE, then release the RESET key. All the patterns used by the game will be displayed.

- ON/OFF
  This is the power on and power off key. Pressing once, switches the power on (i.e. initializes the game), pressing again switches the power off, and so on.

- START/PAUSE
  Pressing this button starts or suspends the game. Pressing once upon initialization starts the game. Pressing the button again, after the game has started, suspends the action in its current state. The action will resume upon pressing the key again. The action will be enabled alternately between suspension and activity on each depression of the key.

- MUTE
  This key switches off or switches on the sound. When the game is switched on, the sound effects and music are automatically enabled. Pressing the MUTE key once switches off the sound. Pressing the MUTE again switches on the sound. The sound effects and music will be enabled alternately between OFF and ON states on each depression of the key.

- ←
  Directional key. Pressing this key moves the hen and her chicks towards the left. Upon reaching the left-most portion, the hen will no longer move.

• →

Directional key. Pressing this key moves the hen and her chicks towards the right. Upon reaching the right-most portion, the hen will no longer move.

• A

This is the attack key. The key directs the hen to peck the preying eagle to death.

• B

This is the attack key. The key directs the hen to peck the preying eagle to death.

⬧ Operational description

‑ Pressing the ON/OFF key (or the HIT key) starts the game of ″The eagle preying on the chickens″. A short demonstration game is played showing the battle between the attacking eagle and the defending mother hen who is trying to protect her chicks. At this time, ″0000″ is the initial score.

‑ During the short demonstration only the ON/OFF, START/PAUSE and MUTE keys are enabled. The remaining keys are disabled.

‑ Upon pressing the START/PAUSE key once during the demonstration period or when a game finishes, the highest number of rounds achieved from the previous games are displayed on the right hand side of the screen, accompanied by a short fanfare. Next, the highest recorded score is displayed, again accompanied by a short fanfare. Next, the cumulative total for the coming game (1-1) is displayed, also accompanied by a short fanfare. Finally the current score for the first game will be displayed (0000). The game begins immediately upon display of this score. During the initialization period when the scores and performances are displayed, the keys are temporarily disabled.

‑ The maximum number of rounds is nine. A round is divided into four innings. Each inning represents successive increments in the number of eagles attacking the hen,

hence an increase in level of difficulty. The first inning represents one eagle attacking the hen. The second inning represents two eagles attacking the hen and so on.

‑ Each round represents successive increase in game speed. The first round is the slowest, the ninth round is the fastest.

‑ The player can use the arrow keys (L,R) to control the movement of the hen, or press the HIT key to attack the eagle.

‑ Each time a hen pecks an eagle to death, 10 points are awarded. If 15 eagles are pecked to death, the next game skips a set (it is not necessary to move through each innings consecutively). If neither the hen nor any of her chicks have been eaten at the beginning of a new inning, 50 points are awarded.

‑ The highest score is 9990. Once this score has been reached, no more points will be awarded.

‑ A round is achieved after four innings are completed. Nine rounds is the maximum number of rounds achievable. When all innings in all nine rounds have been completed, a new game will start from the beginning.

‑ If the eagle lands right on the hen, the demise of the hen is denoted by an ″X″.

‑ If the eagle, upon reaching the ground, fails to eat the hen, the eagle remains motionless for a moment before disappearing. However, if the eagle lands on the chick′s right, the chick will be eaten. An ″X″ denotes the demise of a chick.

‑ Once the hen and her chicks have all been eaten by the eagle three times, ″GAME OVER″ flashes on the LCD, accompanied by a little musical finale. The image will be frozen until ″START″ is pressed.

‑ If the game is not resumed within two minutes, ″GAME OVER″ will be flashed on the screen and the power will be automatically turned off (Auto power off).

‑ To temporarily freeze the image, press the ″PAUSE″ key anytime during the course

of the game. To continue the game just press the ″PAUSE″ key again.

- If the game has not been resumed within two minutes, the game will be automatically turned off. (Auto power off)
- The game can be turned off any time by pressing the ″ON/OFF″ button.
- Press the ″MUTE″ key to suppress any sounds generated.
- In the ″PAUSE″ mode, when the power is turned off (either automatically or manually) and then turned on again, the image remains frozen in the PAUSE mode. Press the ″PAUSE″ button to continue the game.
- When a game is finished or at power off, the highest recent score and difficulty level are updated.

• Counting methods
- For each eagle killed by the hen 10 points is added to the score.
- When the hen has killed 15 eagles, the player is promoted to the next set in the array.
- Once the next LEVEL has been achieved, if neither the hen nor any of her chicks have been eaten at the beginning of a new inning, 50 points is added to the score.
- Limitations on the LCD score board prevents the score to be increased beyond 9990 points.

• Sound effects
This IC can produce four different types of sound.

The sounds are categorized as follows:
- Movement between sets
Each time the game is increased to a higher level of difficulty a short fanfare is played.
- LEVEL music
Played to indicate the best score achieved so far. The music is exactly the same as that for movement between sets.
- GAME OVER
When a game finishes, a short fanfare will be played.
- Score music
Played when a score which is higher than a previously recorded score is achieved. This music is the same as that in GAME OVER.
- The eagle swooping down
Played when the eagle swoops down out of the sky. ′Bleep!,Bleep!′ sound.
- The hen walking
Played when the hen moves left or right or while the eagle is swooping toward the hen and her chicks.

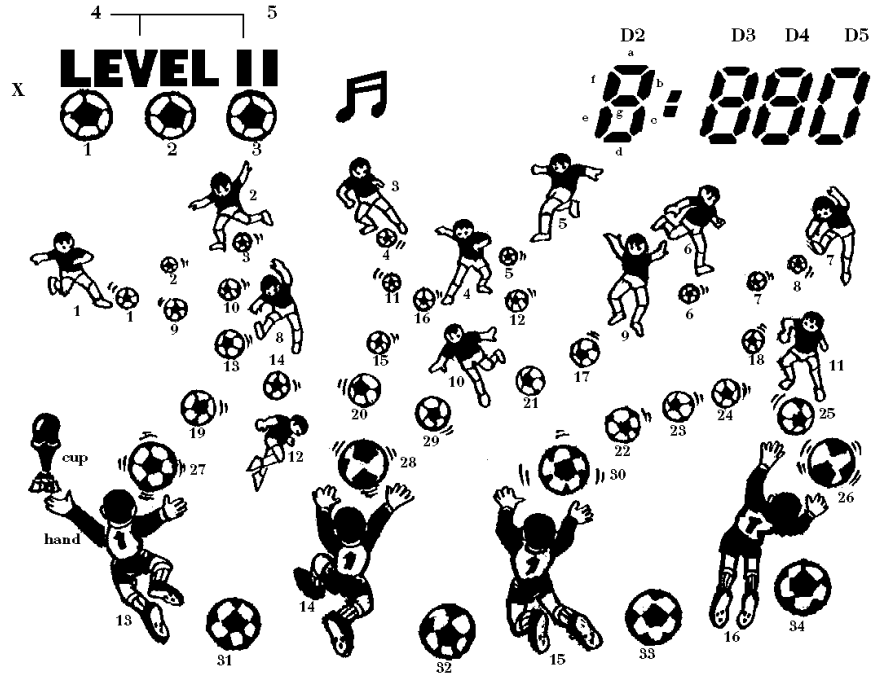• When one of the four types of sound, described above (see section 2), is played the keys are temporarily disabled.
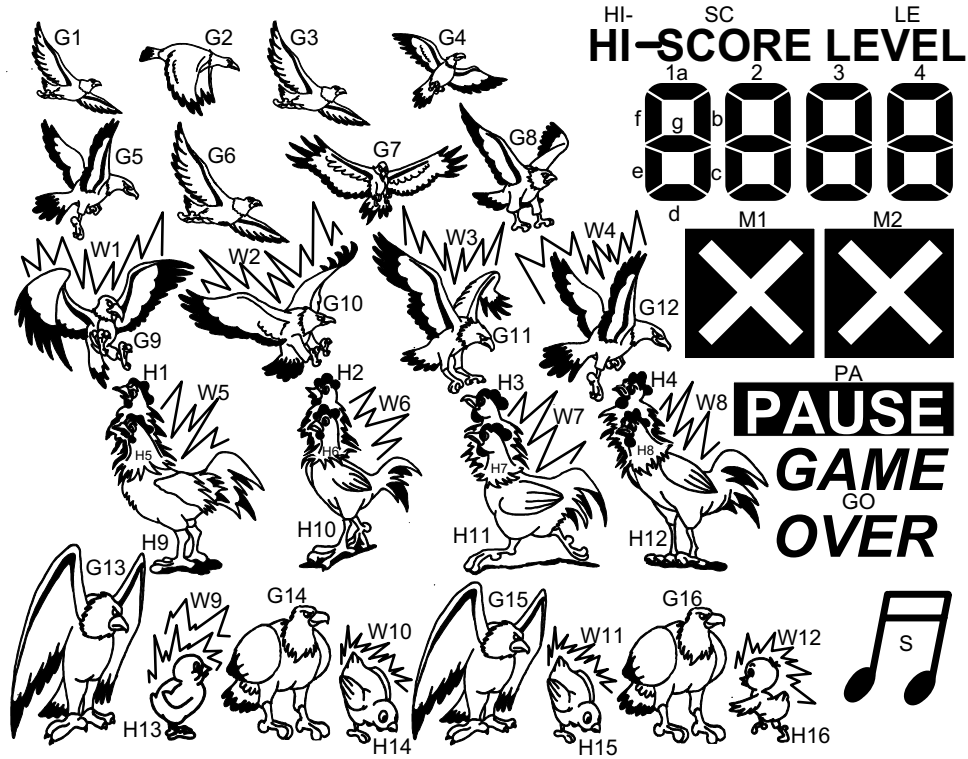
LCD Display Label

Car racing

Soccer

The eagle preys on the chickens

LCD Pattern Contrast Table

Car racing

Pad No.	LCD Pin No.	COM0	COM1	COM2	SEGMENT
5	1	—	—	COM2	COM2
26	2	52b	11	52c	SEG0
27	3	52a	52d	52g	SEG1
28	4	52F	3	52e	SEG2
29	5	LAB	2	PM	SEG3
30	6	M1	i	LEVEL I	SEG4
31	7	M2	MUTE	M3	SEG5
32	8	31	PITSTOP	1	SEG6
33	9	32	—	7	SEG7
34	10	33	19	13	SEG8
35	11	34	9	8	SEG9
36	12	25	15	14	SEG10
37	13	26	20	35	SEG11
38	14	27	21	36	SEG12
39	15	14	12	13	SEG13
40	16	28	22	37	SEG14
41	17	29	23	38	SEG15
42	18	30	16	17	SEG16
43	19	24	10	11	SEG17
44	20	39	41	40	SEG18
45	21	18	6	12	SEG19
46	22	123	U	0	SEG20
47	23	54b	42	54c	SEG21
48	24	54a	54d	54g	SEG22
49	25	54f	5	54e	SEG23
50	26	53b	4	53c	SEG24
51	27	53a	53d	53g	SEG25
52	28	53f	COL	53e	SEG26
7	29	COM0	—	—	COM0
6	30	—	COM1	—	COM1

Soccer

Pad No.	LCD Pin No.	COM0	COM1	COM2	SEGMENT
5	1	—	—	COM2	COM2
26	2	music	p3	—	SEG0
27	3	x1	x5	x4	SEG1
28	4	b2	—	x2	SEG2
29	5	p1b1	x3	p2	SEG3
30	6	cup	b3	b9	SEG4
31	7	hand	b4	b10	SEG5
32	8	p13	b11	p8b13	SEG6
33	9	s27	p4b16	b19	SEG7
34	10	b27	b15	b14	SEG8
35	11	b31	b12	p12b20	SEG9
36	12	p14	p6b6	p10b21	SEG10
37	13	s28	p9b17	b29	SEG11
38	14	b28	b18	b22	SEG12
39	15	b32	b23	b30	SEG13
40	16	s30	—	p11b24	SEG14
41	17	b33	b25	p15	SEG15
42	18	b34	s26	p16	SEG16
43	19	—	b26	d5	SEG17
44	20	d4b	b7	d4c	SEG18
45	21	d4a	d4d	d4g	SEG19
46	22	d4f	b8	d4e	SEG20
47	23	d3b	p7	d3c	SEG21
48	24	d3a	d3d	d3g	SEG22
49	25	d3f	—	d3e	SEG23
50	26	d2d	b5	d2c	SEG24
51	27	d2a	d2d	d2g	SEG25
52	28	d2f	p5	d2e	SEG26
7	29	COM0	—	—	COM0
6	30	—	COM1	—	COM1

The eagle preys on the chickens

Pad No.	LCD Pin No.	COM0	COM1	COM2	SEGMENT
5	1	—	—	COM2	COM2
26	2	4d	4a	4g	SEG0
27	3	M2	4f	4e	SEG1
28	4	M1	3b	3c	SEG2
29	5	3d	3a	3g	SEG3
30	6	3e	le	3f	SEG4
31	7	2e	SC	2f	SEG5
32	8	1c	HI-	1b	SEG6
33	9	1d	1a	1g	SEG7
34	10	—	1f	1e	SEG8
35	11	2d	2a	2g	SEG9
36	12	G4	2b	2c	SEG10
37	13	G3	H3	W3	SEG11
38	14	G2	H2	W2	SEG12
39	15	G1	H1	G9	SEG13
40	16	S	4b	4c	SEG14
41	17	G8	GO	PA	SEG15
42	18	H16	W12	W4	SEG16
43	19	G16	H12	W8	SEG17
44	20	H15	H8	W11	SEG18
45	21	G15	H4	G12	SEG19
46	22	W10	H11	W7	SEG20
47	23	H14	H7	G14	SEG21
48	24	H13	W9	G11	SEG22
49	25	G7	H10	W6	SEG23
50	26	G13	H6	G10	SEG24
51	27	G6	H9	W5	SEG25
52	28	G5	H5	W1	SEG26
7	29	COM0	—	—	COM0
6	30	—	COM1	—	COM1

August 18, 2000

LCD Package Outline

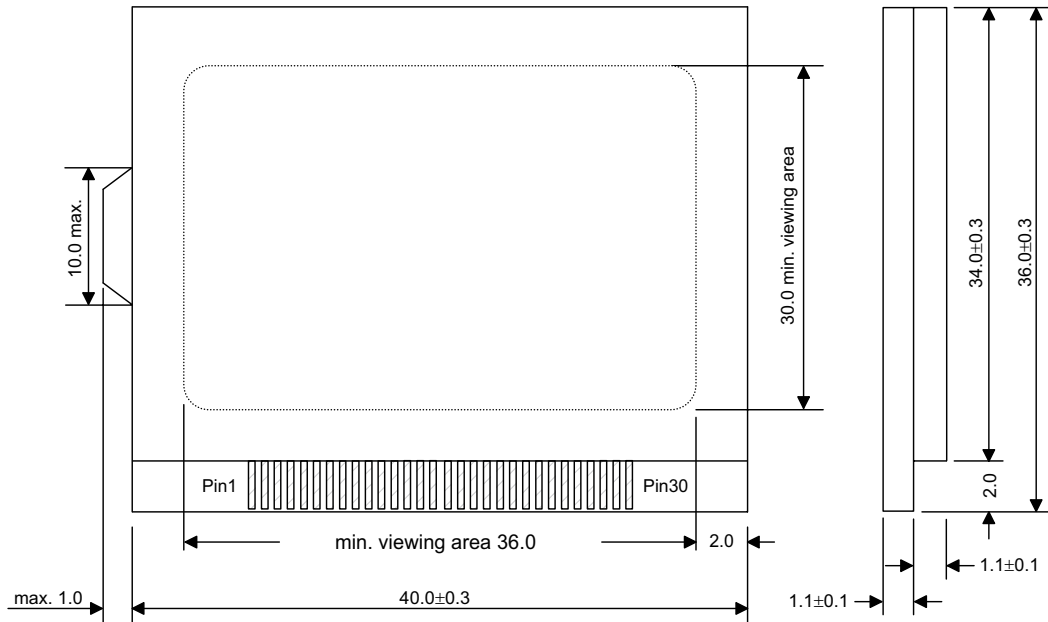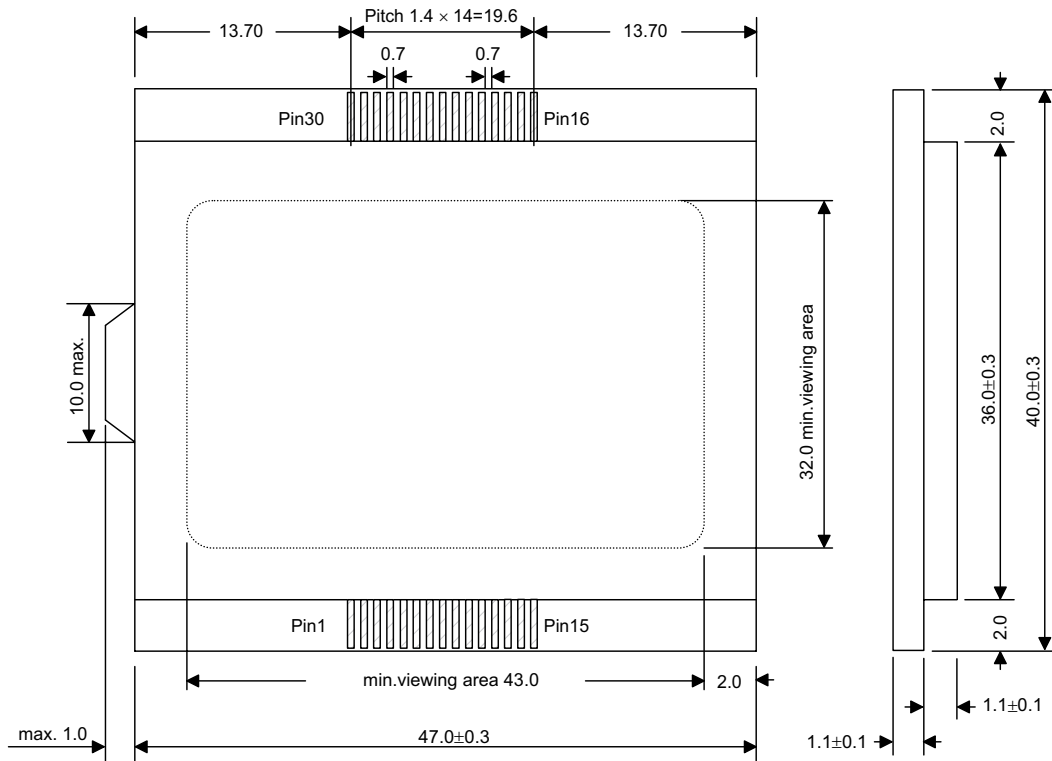**Car racing**   Unit : mm
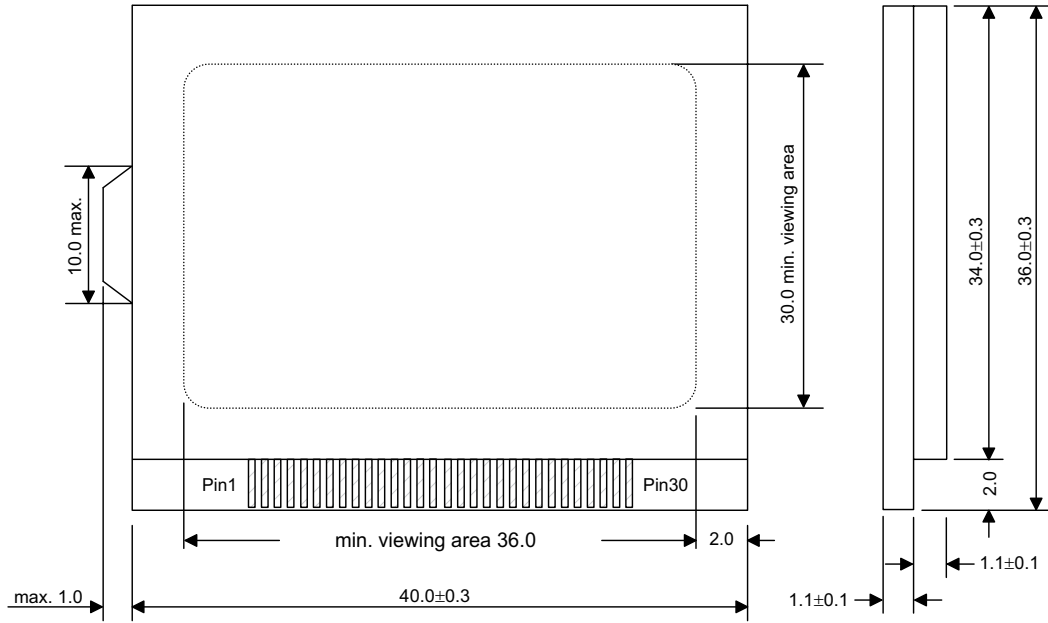
- Specifications

  Top Polarizer: Transmission (40.00 mm × 36.00 mm)

  Bottom Polarizer: Transmission (40.00 mm × 34.00mm)

  Storage Temp: –50°C to 125 C

  Operating Temp: –0°C to 70°C

  Viewing Angle: 6 o'clock

  Drive Condition: 3V, 1/3 Duty, 1/2 Bias

  Display Mode: Tn, Positive Mode

Soccer   Unit : mm

- Specifications

   Top Polarizer: Transmission (40.00 mm × 36.00 mm)

   Bottom Polarizer: Transmission (40.00 mm × 34.00mm)

   Storage Temp: –50°C to 125 C

   Operating Temp: –0°C to 70°C

   Viewing Angle: 6 o'clock

   Drive Condition: 3V, 1/3 Duty, 1/2 Bias

   Display Mode: Tn, Positive Mode

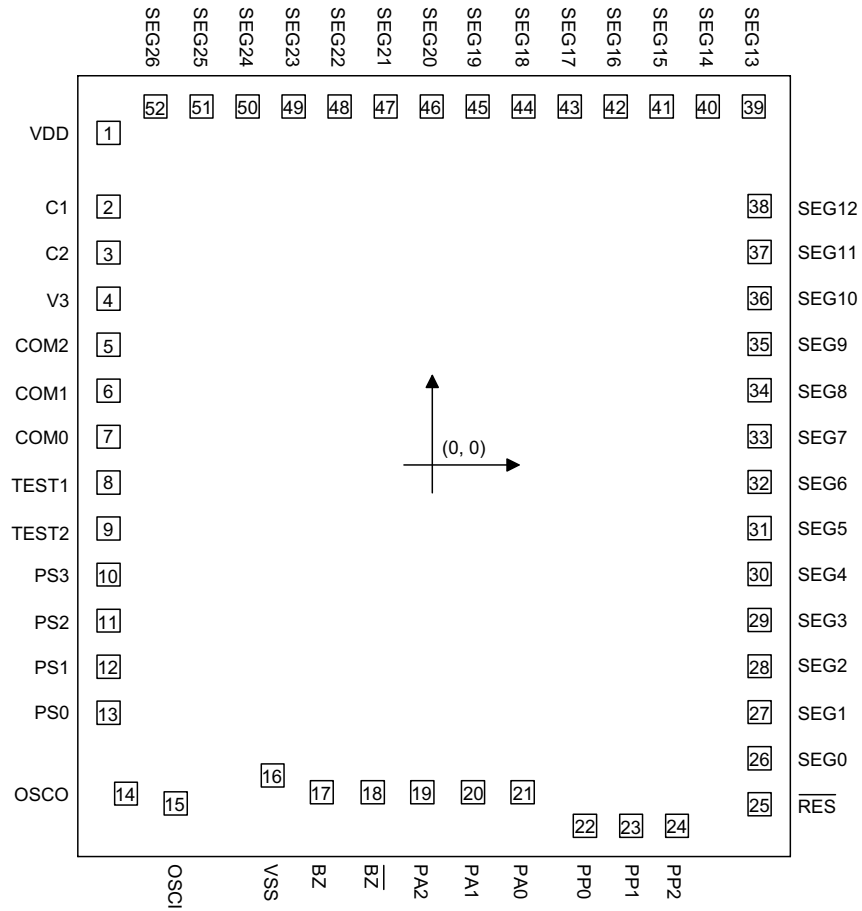**The eagle preys on the chickens**   Unit : mm

- Specifications

  Top Polarizer: Transmission (46.00 mm × 39.00 mm)

  Bottom Polarizer: Transmission (46.00 mm × 35.00mm)

  Storage Temp: –20°C to 70 C

  Operating Temp: –10°C to 60°C

  Viewing Angle: 6 o′clock

  Drive Condition: 3V, 1/3 Duty, 1/2 Bias

  Display Mode: Tn, Positive Mode

Pad Assignment

* The IC substrate should be connected to VSS in the PCB layout artwork.

Pad Coordinates

Unit : μm

Pad No.	X	Y	Pad No.	X	Y
1	−843.74	886.29	27*	853.56	−644.11
2	−843.74	674.39	28*	853.56	−524.11
3*	−843.74	554.39	29*	853.56	−404.11
4*	−843.74	434.39	30*	853.56	−284.11
5	−843.74	314.39	31*	853.56	−164.11
6	−843.74	194.39	32*	853.56	−44.11
7	−843.74	74.39	33	853.56	75.89
8	−843.74	−45.61	34*	853.56	195.89
9*	−843.74	−165.61	35*	853.56	315.89
10*	−843.74	−285.61	36*	853.56	435.89
11	−843.74	-405.61	37*	853.56	555.89
12	−843.74	-525.61	38*	853.56	675.89
13	−843.74	−645.61	39*	838.76	935.89
14	−798.04	−856.71	40*	718.76	935.89
15	−668.04	−882.11	41*	598.76	935.89
16	−415.94	−809.01	42*	478.76	935.89
17	−287.94	−853.41	43*	358.76	935.89
18	−154.74	−853.41	44*	238.76	935.89
19*	−25.94	−853.41	45*	118.76	935.89
20*	107.26	−853.41	46*	−1.24	935.89
21*	236.26	−853.41	47*	−121.24	935.89
22*	398.66	−940.91	48*	−241.24	935.89
23	518.66	−940.91	49*	−361.24	935.89
24	638.66	−940.91	50*	−481.24	935.89
25	853.56	−884.11	51*	−601.24	935.89
26	853.56	−764.11	52*	−721.24	935.89

* These pins must be bonded out for functional testing.

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Absolute Maximum Ratings

Supply Voltage ....V_{DD}–0.3V to 5.5V

Input Voltage ....V_{SS}–0.3V to V_{DD}+0.3V

Storage Temperature.................–50°C to 125°C

Operating Temperature ....0°C to 70°C

Note: These are stress ratings only. Stresses exceeding the range specified under ″Absolute Maximum Ratings″ may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.

Electrical Characteristics

Ta=25°C

| Symbol | Parameter | Test Conditions | | Min. | Typ. | Max. | Unit |
		V_{DD}	Conditions				
V_{DD}	Operating Voltage	1.5V	—	1.3	1.5	1.8	V
I_{DD}	Operating Current	1.5V	No load, f_{SYS}=400kHz	—	20	—	μA
I_{STB}	Standby Current	1.5V	No load, HALT mode	—	—	0.1	μA
f_{LCD}	LCD Clock	1.5V	—	—	128*	—	V
f_{SYS}	Operating Frequency	1.5V	R= 620kΩ~36kΩ	32	—	400	kHz

August 18, 2000

Application Circuits
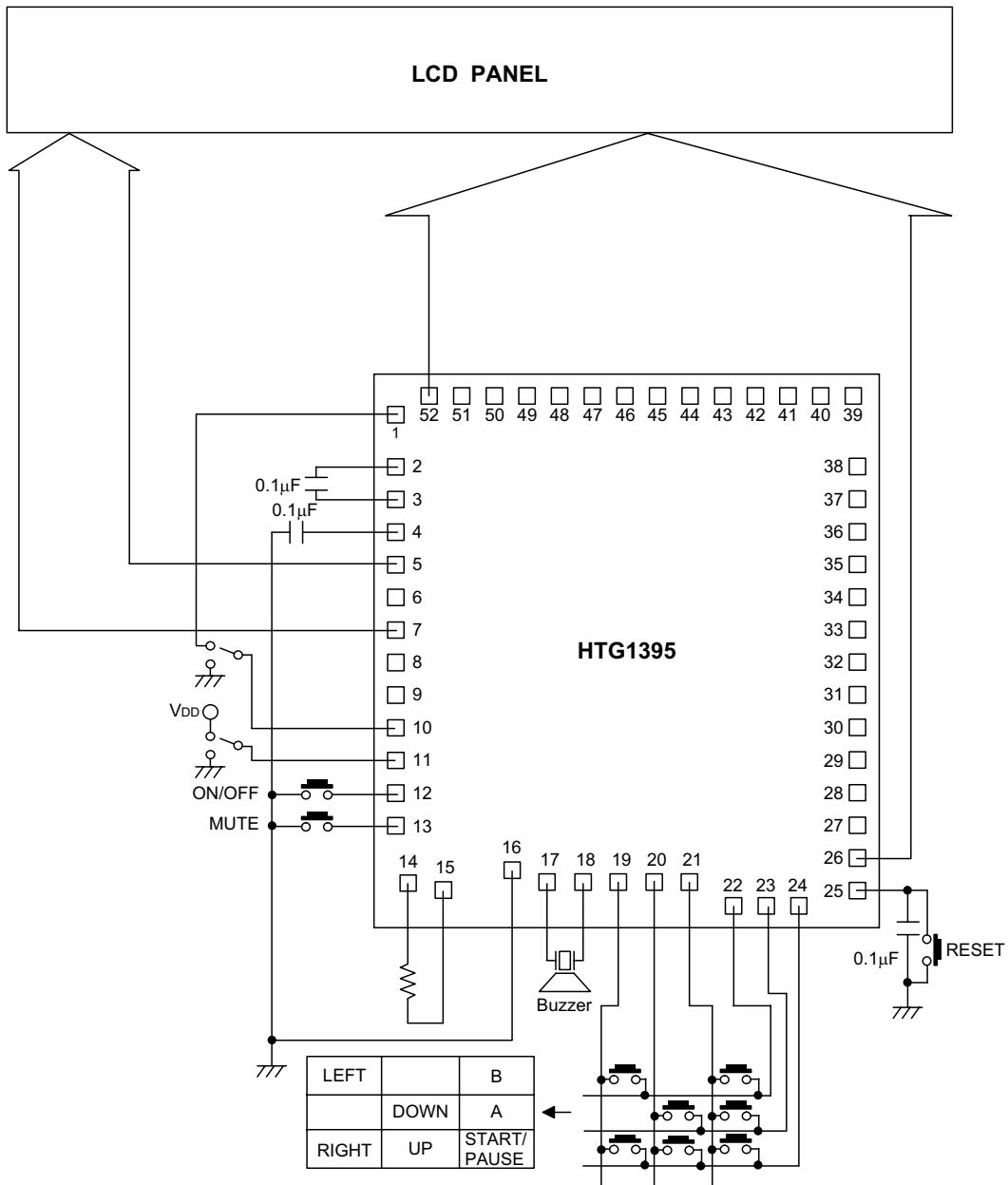
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