HT1132A
SPACE WAR LCD Game

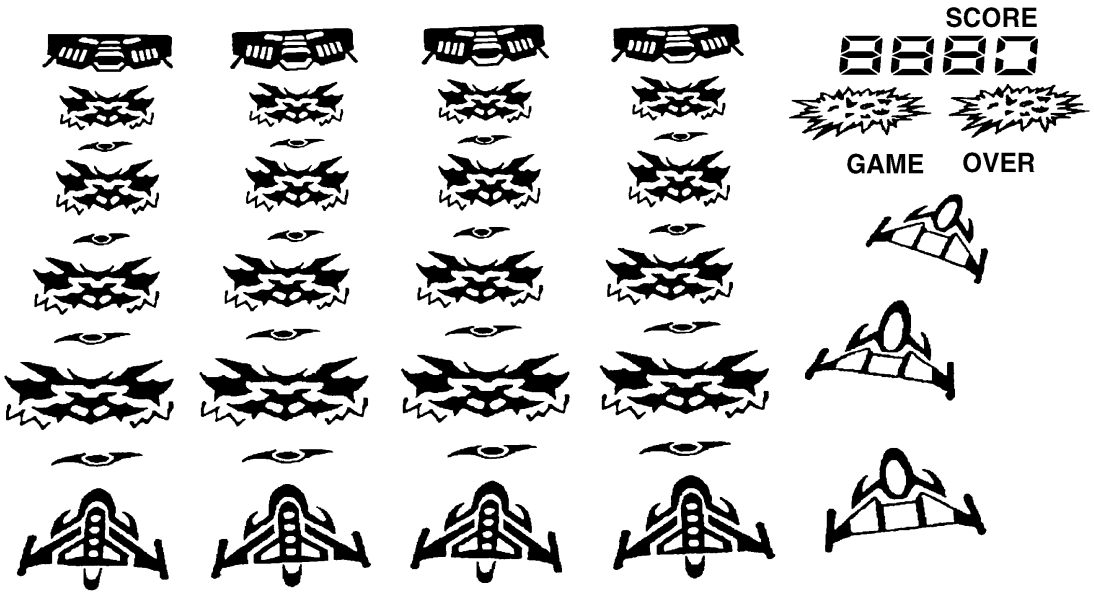
Features

- 1/3 bias, 1/4 duty, 32 × 4 pattern, 3.0V LCD driver
- Built-in sound generator
- RC oscillator

General Description

The HT1132A is a single chip Space War LCD Game designed by HOLTEK. This LCD Game has two modes (mode 1 and mode 2) of playing. In mode 1, enemy's space shuttle appears with two types of musical accompaniment at different stages and shoots α, β, or γ laser beams at the player's space shuttle. The player's space shuttle then immediately shifts right or left to avoid the attack and fires back with his own laser beams. In mode 2, enemy's space shuttle can quickly shift from up to down or from left to right, but it can not fire laser beams. The player's space shuttle can move right or left to the best position for firing laser beams. If it hits the target, a 50 bonus point is awarded and a HAPPY melody is played. If no target is hit, then no score is added and a sad melody is played.

LCD Pattern



Functional Description

Key description

- RESET

  This key can clear the memory and registers to zero or restore the default value in the system. The internal program can be reinitiated.

- START/ON

  This key can restart the game at any time. However, the highest score record will be saved.

- PAUSE

  Pressing this key at any time temporarily stops the on-going game. The screen will remain still and the sound effects will be switched off. If it is pressed again, the game continues.

- MUSIC

  This key can turn off the melody sound effects without influence on the game. Press it again, and the music resumes.

- ATTACK

  This key is to fire the player's laser beam. It has no effect when player's laser beam does not hit enemy's space shuttle or before it disappears.

- JOINT

  When force enhancement machine is shifted to the bottom, move the player's space shuttle to the extreme right, and then press this key. The player's space shuttle is with enhanced power.

- OFF

  Pressing this key at any time will stop the system and remain in the HALT condition. However, the highest score recorded will be saved.

- LEFT

  Pressing this key moves the player's space shuttle to the left.

- RIGHT

  Pressing this key moves the player's space shuttle to the right.

  - LCD test pattern

    First, press the ATTACK Key and hold it, then press RESET or the START/ON Key. All the pattern dots are shown on the screen. When the ATTACK Key is released, the game program is executed.

  - Auto off function key

    When PPO of Port P is connected to VDD, it automatically turns off after two minutes of no activity. When PPO is connected to GND, it automatically turns off after four minutes of no activity. (*PPO cannot be floating)

Operational description

- MODE

  There are two modes: MODE 1 and MODE 2. When the RIGHT Key is pressed and then the RESET or START/ON Key is pressed, it gets into MODE2, otherwise MODE1.

- MODE1

  - START/ON Key is pressed and MODE1 is on. Highest stage and highest score are shown on the screen. The game starts from level 1-1; the score is counting from 0000; and the player's space shuttle appears.

- The player's space shuttles consist of three types. In accordance with the different weapon equipments, there are three kinds of laser beams (α, β, γ). The energy proportion is 1:2:4. Enemy's space shuttles are also equipped with α, β, γ laser beams. Their energy proportion is 1:2:4. For example, destroying the enemy's space shuttle " " needs to fire either β once or α twice, while γ could penetrate it. Energy contrast table is shown as follows:

	Laser beam energy		
	1	2	4
	2	1	2
	4	X	1

" X " Indicates the penetration

Figure (1)

- At the major stage, if the space shuttle is hit three times, then the game is over. In such circumstances, if the START/ON or OFF key is not pressed within 4 seconds, the game goes into free-run mode. The free-run mode's auto power-off timer can be set by adjusting the PPO switch of port P to 1 for a 4-minute time-out or to 0 for a 2-minute time-out.
- During the game, the enemy's spacecraft, the player's laser fire, and destructive sounds are all accompanied by their corresponding sound effects. A melody is played to celebrate the rise to a new level when the the last level has been successfully completed. When the game is finally over, there is finale.
- The highest score can always be saved unless the power is turned off. Pressing the RESET key can clear the highest score.)

- MODE2
  - To enter mode 2 press the RIGHT key and hold it down, and then press the START/ON key.
  - Once in MODE 2, the highest score is shown and a START melody is played. At this moment, the Enemy's space shuttle will quickly shift from left to right, up to down. The player can shift the space shuttle and fire laser beams. When the target is hit, 50 bonus points are awarded and a jubilant music is played. When the target has been missed, regret music is on.
  - There are sixteen opportunities to shoot. Each shot is worth 50 points, hence the maximum score is 800. The highest score can be saved. After the 16th shot, the game ends and goes into free run mode. At this time, power is automatically switched off after 16 DEMO MODE.

The path of the enemy's space shuttle

- X2P
  - X3P— X4P— X5P
  - W3P—Y4P— Z5P
  - W3P—X4P— W5P
  - W3P—Y4P— W5P
- X2P
  - X3P— W4P— W5P
  - X3P— W4P— X5P
  - Y3P— W4P— X5P
  - Y3P— W4P— Y5P
- X2P
  - Y3P— Y4P— Y5P
  - W3P— X4P— W5P
  - Z3P— Y4P— W5P
  - Z3P— Y4P— Z5P
- X2P
  - Z3P— Z4P— Z5P
  - Y3P— W4P— X5P
  - Y3P— W4P— Y5P

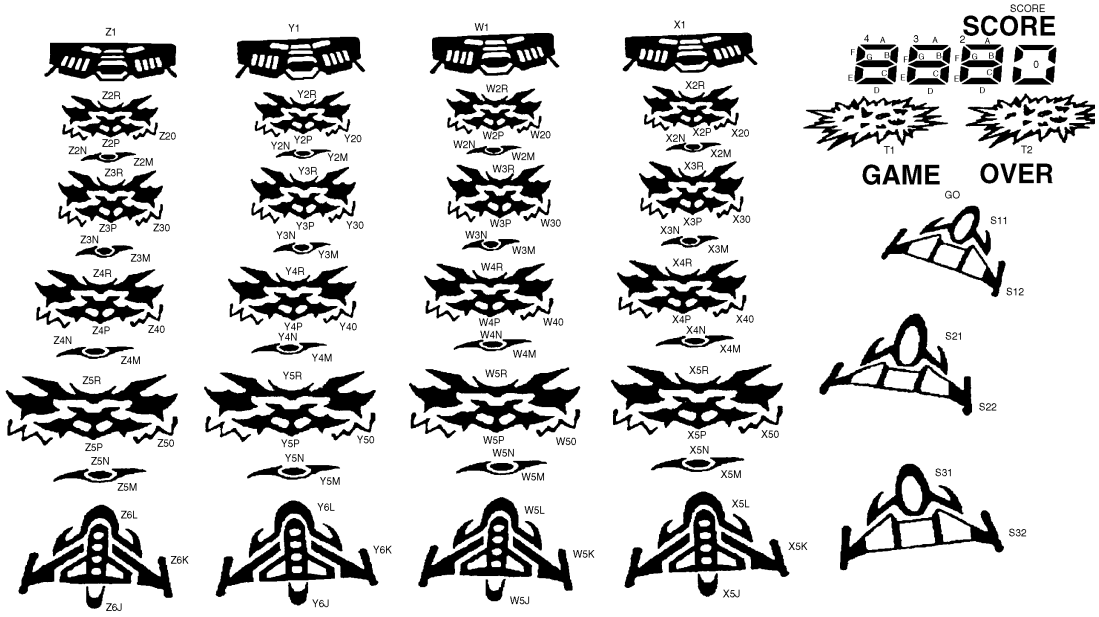
Counting method

- 10 bonus points are awarded when the enemy's space shuttle is hit. When the score reaches 100, the enemy's mother space shuttle appears from the upper left. When 50 points are scored by hitting the mother space shuttle or the score exceeds 150, an opportunity for force enhancement appears in the corner. When moving the to bottom right, shifting player's space shuttle to the extreme right and pressing JOIN key, the extra force is added to the player's space shuttle.
- This game consists of 9 major stages. Each major stage contains 3 minor stages. When the score reaches 300, it goes into next stage. There are three LUCK PLAY opportunities between each stage. 50 bonus points are awarded when each enemy's space shuttle is hit. 9990 is the highest score and the highest stage is 9-3. When the game is over, the highest score achieved is recorded.

Sound effects

- There are 15 kinds of sound effects in this LCD GAME.
  - POWER ON music
  - Starting music
  - Completing a stage music
  - GAME OVER music
  - Enemy's space shuttle flying sound
  - Enemy's space shuttle explosion sound
  - Player's firing α laser beam sound
  - Player's firing β laser beam sound
  - Player's firing γ laser beam sound
  - Player's explosion sound
  - Missile collision sound
  - Ship's appearance sound
  - Ship's attack sound
  - Force enhancement machine appearance sound
  - Force enhancement machine joining sound

LCD Display Label



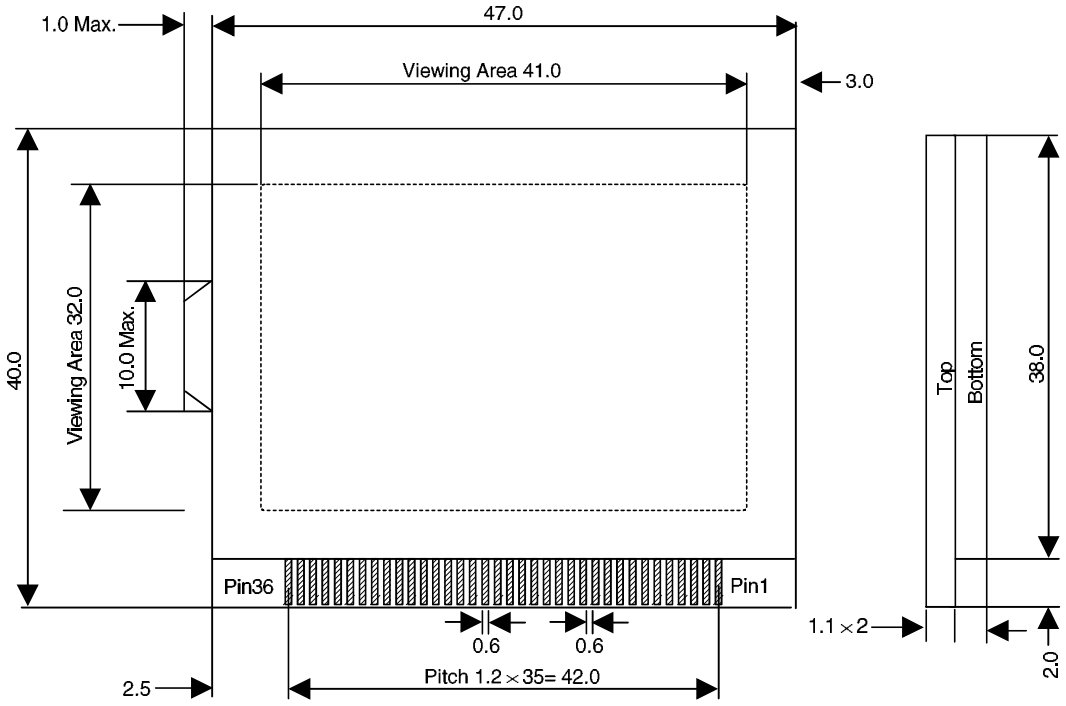
LCD Pattern Contrast Table

Pad No.	Pin No.	COM3	COM2	COM1	COM0	SEGMENT
5	1	COM3	—	—	—	COM3
6	2	—	COM2	—	—	COM2
7	3	—	—	COM1	—	COM1
8	4	—	—	—	COM0	COM0
65	5	0	2C	2D	S11	SEG31
64	6	2B	2G	2E	S12	SEG30
63	7	2A	2F	T2	S21	SEG29
62	8	3B	3C	3D	S22	SEG28
61	9	G0	3G	3E	S31	SEG27
60	10	3A	3F	4C	S32	SEG26
59	11	4A	4B	4G	4D	SEG25
58	12	SCORE	4F	4E	T1	SEG24

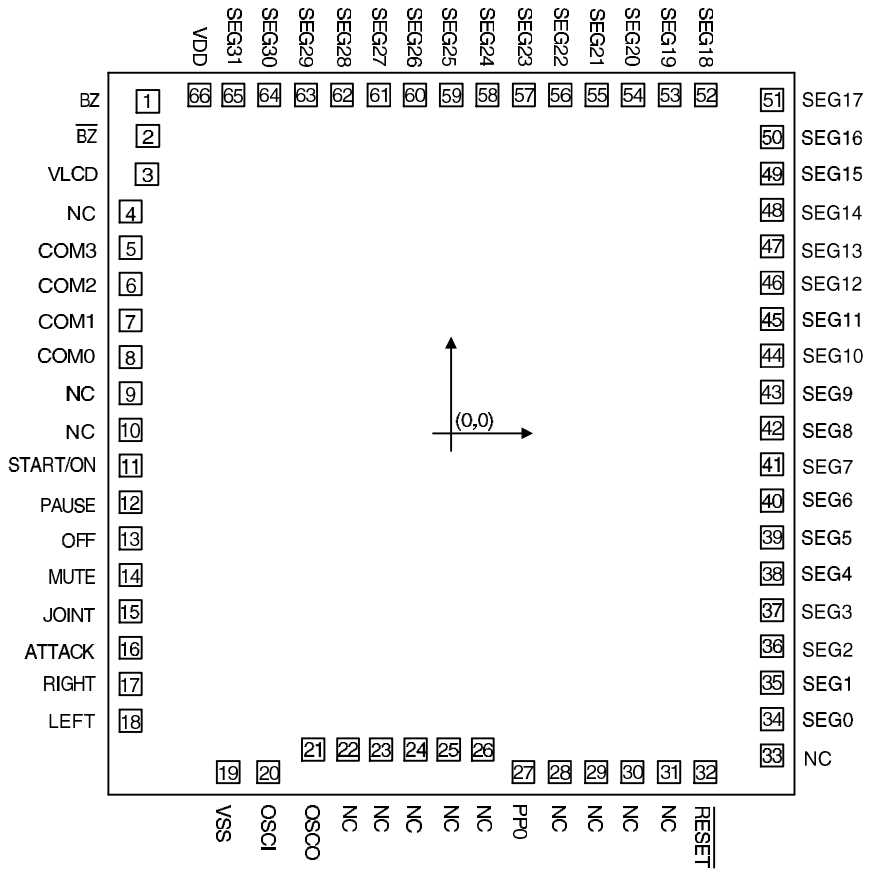
Pad No.	Pin No.	COM3	COM2	COM1	COM0	SEGMENT
57	13	Z4R	Y4R	W4R	X4R	SEG23
56	14	Z4P	Y4P	W4P	X4P	SEG22
55	15	Z40	Y40	W40	X40	SEG21
54	16	Z4N	Y4N	W4N	X4N	SEG20
53	17	Z4M	Y4M	W4M	X4M	SEG19
52	18	Z5R	Y5R	W5R	X5R	SEG18
51	19	Z5P	Y5P	W5P	X5P	SEG17
50	20	Z50	Y50	W50	X50	SEG16
49	21	Z5N	Y5N	W5N	X5N	SEG15
48	22	Z5M	Y5M	W5M	X5M	SEG14
47	23	Z6L	Y6L	W6L	X6L	SEG13
46	24	Z6K	Y6K	W6K	X6K	SEG12
45	25	Z6J	Y6J	W6J	X6J	SEG11
44	26	Z3M	Y3M	W3M	X3M	SEG10
43	27	Z3N	Y3N	W3N	X3N	SEG9
42	28	Z30	Y30	W30	X30	SEG8
41	29	Z3P	Y3P	W3P	X3P	SEG7
40	30	Z3R	Y3R	W3R	X3R	SEG6
39	31	Z2M	Y2M	W2M	X2M	SEG5
38	32	Z2N	Y2N	W2N	X2N	SEG4
37	33	Z20	Y20	W20	X20	SEG3
36	34	Z2P	Y2P	W2P	X2P	SEG2
35	35	Z2R	Y2R	W2R	X2R	SEG1
34	36	Z1	Y1	W1	X1	SEG0

LCD Package Outline

Unit : mm



Pad Assignment



Chip size: 2790×3000 $(\mu m)^2$

* This 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	–1192.10	1305.20	34	1261.10	–1122.30
2	–1192.10	1169.80	35	1261.10	–979.80
3	–1196.70	1019.80	36	1261.10	–836.30
4	–1261.10	873.70	37	1261.10	–693.80
5	–1261.10	731.20	38	1261.10	–550.30
6	–1261.10	587.70	39	1261.10	–407.80
7	–1261.10	445.20	40	1261.10	–264.30
8	–1261.10	301.70	41	1261.10	–121.80
9	–1261.10	159.20	42	1261.10	21.70
10	–1261.10	15.70	43	1261.10	164.20
11	–1261.10	–126.80	44	1261.10	307.70
12	–1261.10	–270.30	45	1261.10	450.20
13	–1261.10	–412.80	46	1261.10	593.70
14	–1261.10	–556.30	47	1261.10	736.20
15	–1261.10	–698.80	48	1261.10	879.70
16	–1261.10	–842.30	49	1261.10	1022.20
17	–1261.10	–984.80	50	1261.10	1165.70
18	–1261.10	–1128.30	51	1261.10	1311.20
19	–876.70	–1331.40	52	1001.00	1331.40
20	–719.70	–1331.40	53	858.50	1331.40
21	–542.10	–1241.00	54	715.00	1331.40
22	–406.70	–1241.00	55	572.50	1331.40
23	–276.30	–1241.00	56	429.00	1331.40
24	–140.90	–1241.00	57	286.50	1331.40
25	–10.50	–1241.00	58	143.00	1331.40
26	124.90	–1241.00	59	0.50	1331.40
27	284.90	–1331.40	60	–143.00	1331.40
28	427.40	–1331.40	61	–285.50	1331.40
29	570.90	–1331.40	62	–429.00	1331.40
30	713.40	–1331.40	63	–571.50	1331.40
31	856.90	–1331.40	64	–715.00	1331.40
32	999.40	–1331.40	65	–857.50	1331.40
33	1261.10	–1265.80	66	–990.50	1331.40

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

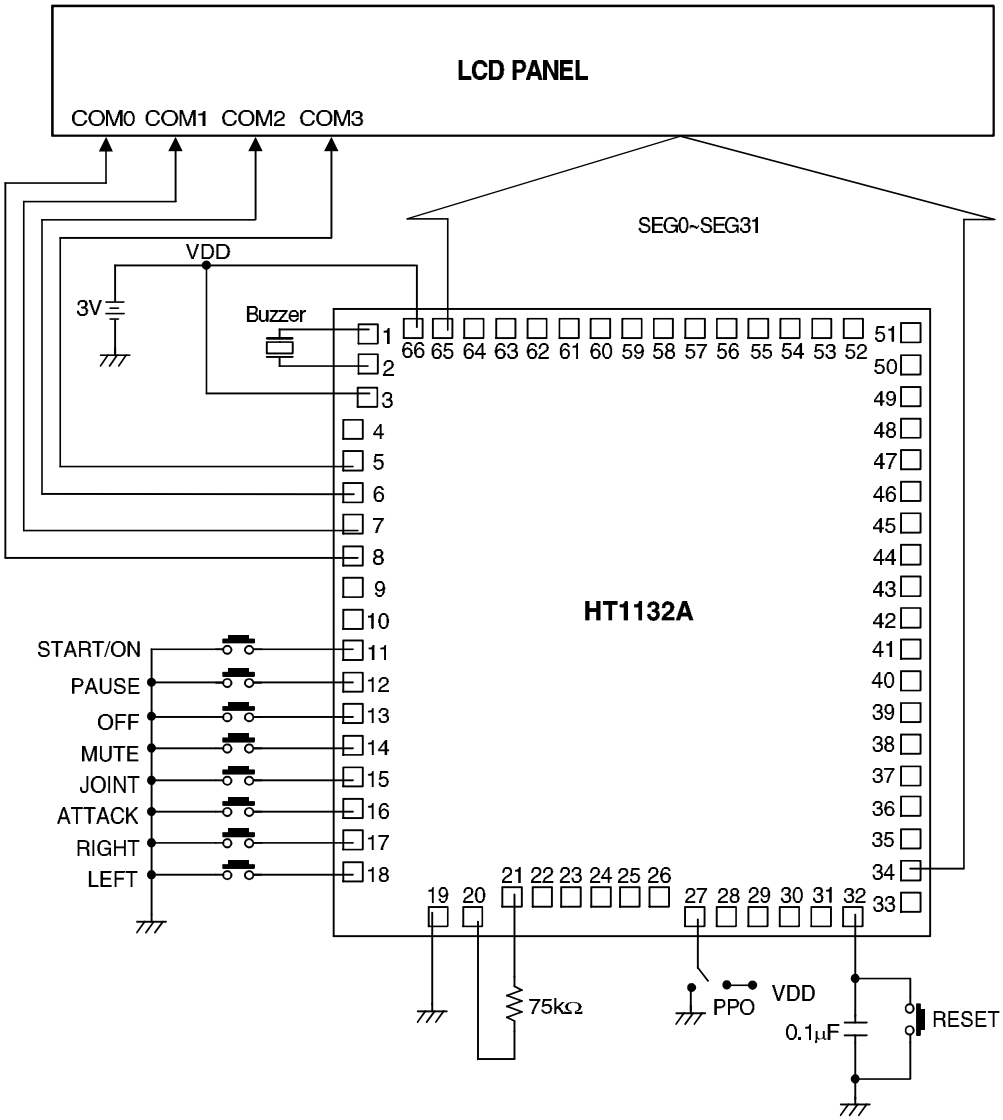
*Note: These are stress ratings only. Stresses exceeding the range specified under "Absolute Maximum Ratings" may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions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

Electrical Characteristics

Ta=25°C

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{DD}	Conditions				
V_{DD}	Operating Voltage	—	—	2.5	3	—	V
I_{DD}	Operating Current	3V	No load, f_{SYS}= 256kHz	—	400	560	μA
V_{LCD}	LCD Supply Voltage	3V	—	—	3	—	V
I_{STB}	Standby Current	3V	No load	—	—	2	μA
f_{SYS}	Operating Frequency	3V	—	—	256	—	kHz

Application Circuits



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