Backlight Game Keyboard Series

IST83010 Datasheet

USB Game Keyboard IC

Version 1.00

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1. General Description

IST83010 is a USB game keyboard chip with backlight. The chip supports the keyboard array 20X8, which is divided into IST83010-01/IST83010-02/IST83010-03/... according to the different functions of keyboard array. [See IST83010_Matrix for details].

In the application of backlight, IST83010 has its own characteristics. It can automatically identify the types of light colors (monochrome/trichrome/seven colors). At the same time, five backlight modes are supported under seven colors. Support combination keys Fn + Scr switch backlight mode, Fn + Ins switch color, etc.

It has a built-in LED driver and internal oscillator to minimize the external components.

2. Feature

- Keyboard Array 20X8, Various Array Types for Selection
- Film keyboard arrays have a maximum of 26 keys without punching, 19 keys without punching, etc
- Keyboard Key Conflict Detection
- Encoder adjusts volume
- Compliant with USB2.0 and USB HID Specification V1.1.
- Supports different versions of Windows, MAC OS, Linux systems
- Supports RGB backlight; realizes a variety of backlight modes, supports synchronization and response modes
- Automatic Recognition of Monochrome, Tri-color and Seven-color Lamps
- Fn+F1~F12 combination key function (multimedia, full key lock, etc.)
- It has a built-in LED driver and internal oscillator to minimize the external components.

Typical applications: ordinary film keyboard, light-emitting film keyboard, game keyboard, etc

3. Block Diagram

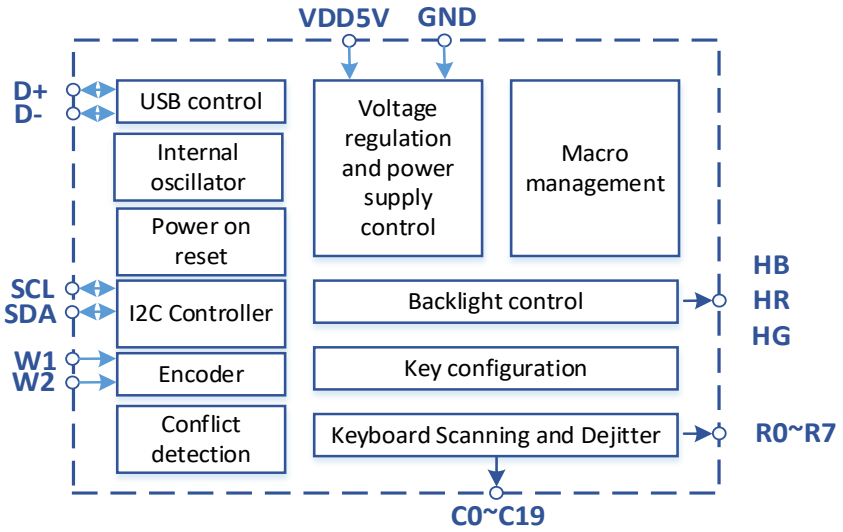


Figure 3-1 Block Diagram

4. PAD

4.1 PAD Assignment

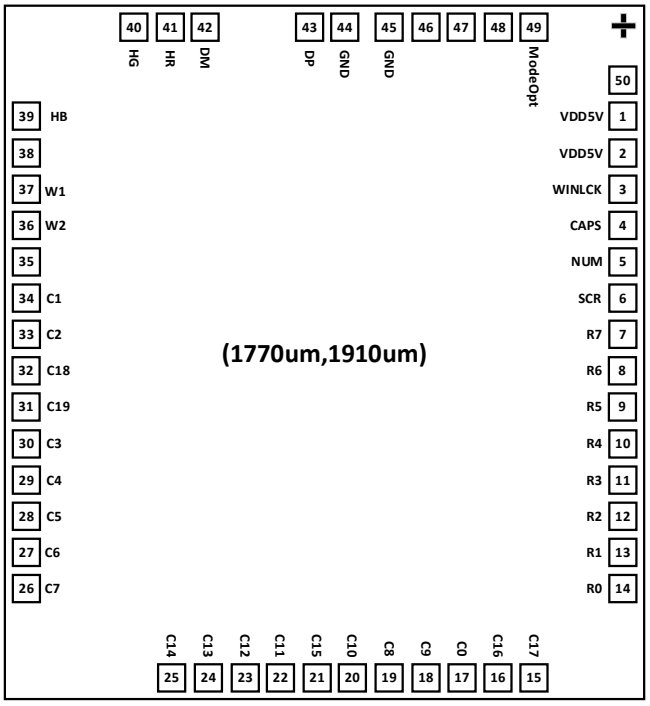


Figure 4-1. PAD Assignment

4.2 PAD Defination

PAD No.	Pin Name	Type	Function deccription
1~2	VDD5V	POWER	5V power input
3	WINLCK	OUT	Win Lock or game mode indicator light
4	CAPS	OUT	Caps Lock indicator light
5	NUM	OUT	Num Lock indicator light
6	SCR	OUT	Scroll Lock indicator light
7~14	R0~R7	IN	Keyboard Scanning Input
15~34	C0~C19	OUT	Keyboard Scanning Output
35			Undefined
36	W2	IN	Volume Encoder Input
37	W1	IN	Volume Encoder Input
38			Undefined
39	HB	OUT	Primary blue output
40	HG	OUT	Primary green output
41	HR	OUT	Primary red output
42	DM	IN/OUT	USB D-
43	DP	IN/OUT	USB D+
44~45	GND	GROUND	GROUND
46~48			Undefined
49	ModeOpt	IN	Selection of "Carbon Film/Silver Size Film"

Table 4-1 PAD definition

5. Application Note

5.1 ModeOpt Note

ModeOpt is used to select conductive film components for keyboard arrays. There are two choices [see Table 5-1 for details]. The carbon film can support up to 300K contact resistance.

ModeOpt	Keyboard Type
VDD5V	Carbon Film
HI-Z	Silver Size Film

Table 5-1 ModeOpt Note

5.2 Keyboard and Keyboard Indicator lamp

5.2.1 Keyboard Array function

IST83010 Keyboard Array has many choices, which can be divided into different array functions and the number of keys without punching, such as IST83010-01、IST83010-02、IST83010-03、….

5.2.2 IST83010-01 Array

	R0	R1	R2	R3	R4	R5	R6	R7
C0	Tab	`~	F7	Y	End	7&	:;	LedSpd+
	16	1	118	22	81	8	40	
C1	Caps							
	30							
C2	X	2@	MyComputer	Play/Pause	Media	Shift-R	Mute	CD Stop
	47	3				57		
C3	F	F1	F5	WWWBack	KeyLck	WWWForward	WWWStop	WWWSearch
	34	112	116					
C4	Shift-L	U	F6	F2	WinLck	Enter-L	LedMode	LedColor
	44	23	117	113		43		
C5	Ctrl-L	K	P	LedBrt+	LedBrt-	KeyExchg	Esc	Mail
	58	38	26				110	
C6	APP	G	↑	←	↓	M	Alt-L	→
		35	83	79	84	52	60	89
C7	T	F3		KeyPad(-)	KeyPad(+)	K107	KeyPad(Ent)	Rec
	21	114		105	106	107	108	
C8	D	=+	F9	LedOnOff	]}	9(	' "	Fn
	33	13	120		28	10	41	
C9	S	- _	F8	4$	[{	8*	Insert	N
	32	12	119	5	27	9	75	51
C10	W	BackSpace	F11	PrintScr	Home	Del	H	.>
	18	15	122	124	80	76	36	54
C11	Q	J	F10	K14	|	0)	PageDown	,<
	17	37	121	14	29	11	86	53
C12	B	KeyPad(0 0)	KeyPad(0 0 0)	NumLck	KeyPad(7)	KeyPad(4)	KeyPad(1)	LedSpd-
	50			90	91	92	93	
C13	V	5%	Boss	KeyPad(/)	KeyPad(8)	KeyPad(5)	KeyPad(2)	KeyPad(0)
	49	6		95	96	97	98	99
C14	R	6^	¥	KeyPad(*)	KeyPad(9)	KeyPad(6)	KeyPad(3)	KeyPad(.)
	20	7		100	101	102	103	104
C15	E	L	F12	ScrollLck	Pause	PageUp	K42	/?
	19	39	123	125	126	85	42	55
C16	A	F4	O	Calculator	K45	K150	K151	Win-R
	31	115	25		45	150	151	
C17	Space	I	K56	Win-L	WWWHome	N-Chg	Chg	Roma
	61	24	56			131	132	133
C18	Z	1!	Power	PreTrack	ALT-R	NextTrack	Sleep	WakeUp
	46	2			62			
C19	C	3#	€	Vol+	Vol-	WWWRefresh	Ctrl-R	WWWFavorite
	48	4					64	

Fn+F1	Player	Fn+F7	Play/pasue
Fn+F2	Volume-	Fn+F8	Stop
Fn+F3	Volume+	Fn+F9	Brower
Fn+F4	Mute	Fn+F10	Mail
Fn+F5	Next Song	Fn+F11	My computer
Fn+F6	Last Song	Fn+F12	Full key Lock

【26key without punching】IST83010-01 array and Fn combination Key function compatible with SX83091、HK9705

Table 5-2 IST83010-01 Array

5.2.3 IST83010-02 Array

	R0	R1	R2	R3	R4	R5	R6	R7
C0	Z	1!	Power	PreTrack	ALT-R	NextTrack	Sleep	WakeUp
	46	2			62			
C1	C	3#	€	Vol+	Vol-	WWWRefresh	Ctrl-R	WWWFavorite
	48	4					64	
C2	V	5%	F5	WWWBack	Alt-L	WWWForward	WWWStop	WWWSearch
	49	6%	116		60			
C3	F	F3	Pause	LedSpd+	LedSpd-	LedColor	Ctrl-L	Mail
	34	114	126				58	
C4	K56	4$	Space	Win-L	WWWHome	N-Chg	Chg	Roma
	56	5	61			131	132	133
C5	K14	F4	A	Calculator	WinLck	K150	K151	LedOnOff
	14	115	31			150	151	
C6	F7	`~	S	Y	P	7&	LedMode	Win-R
	118	1	32	22	26	8		
C7	T	BackSpace	→	KeyPad(-)	KeyPad(+)	K107	KeyPad(Ent)	Caps
	21	15	89	105	106	107	108	30
C8	F10	F2	Q	O	|	0)	K42	,<
	121	113	17	25	29	11	42	53
C9	F9	=+	D	I	]}	9(	' "	Fn
	120	13	33	24	28	10	41	
C10	F11	F1	W	PrintScr	Home	Del	Insert	.>
	122	112	18	124	80	76	75	54
C11	F12	L	E	ScrollLck	End	PageUp	PageDown	/?
	123	39	19	125	81	85	86	55
C12	App	;:	↑	NumLck	KeyPad(7)	KeyPad(4)	KeyPad(1)	K45
		40	83	90	91	92	93	45
C13	Esc	K	←	KeyPad(/)	KeyPad(8)	KeyPad(5)	KeyPad(2)	KeyPad(0)
	110	38	79	95	96	97	98	99
C14	R	J	↓	KeyPad(*)	KeyPad(9)	KeyPad(6)	KeyPad(3)	KeyPad(.)
	20	37	84	100	101	102	103	104
C15	F8	-_	Tab	U	[{	8*	H	N
	119	12	16	23	27	9	36	51
C16	X	2@	My Computer	Play/Pause	Media	Shift-R	Mute	CD Stop
	47	3				57		
C17	G	KeyLck	LedBrt+	LedBrt-	KeyExchg		B	M
	35						50	52
C18	Enter	6^	F6	KeyPad(0 0)	KeyPad(0 0 0)	Shift-L	¥	Boss
	43	7	117			44		
C19								

Fn+F1	Player	Fn+F7	Play/pasue
Fn+F2	Volume-	Fn+F8	Stop
Fn+F3	Volume+	Fn+F9	Brower
Fn+F4	Mute	Fn+F10	Mail
Fn+F5	Next Song	Fn+F11	My computer
Fn+F6	Last Song	Fn+F12	Full key Lock

【19key without punching】IST83010-02 array and Fn combination Key function compatible with SX83089-035D、HCT-303E

Table 5-3 IST83010-02 Array

5.2.4 IST83010-03 Array

	R0	R1	R2	R3	R4	R5	R6	R7
C0	Z	1!	Power	PreTrack	ALT-R	NextTrack	Sleep	WakeUp
	46	2			62			
C1	C	3#	€	Vol+	Vol-	WWWRefresh	Ctrl-R	WWWFavorite
	48	4					64	
C2	V	5%	F5	WWWBack	Alt-L	WWWForward	WWWStop	WWWSearch
	49	6%	116		60			
C3	F	F3	Pause	LedSpd+	LedSpd-	LedColor	Ctrl-L	Mail
	34	114	126				58	
C4	K56	4$	Space	Win-L	WWWHome	N-Chg	Chg	Roma
	56	5	61			131	132	133
C5	K14	F4	A	Calculator	WinLck	K150	K151	LedOnOff
	14	115	31			150	151	
C6	F7	`~	S	Y	P	7&	LedMode	Win-R
	118	1	32	22	26	8		
C7	T	BackSpace	→	KeyPad(-)	KeyPad(+)	K107	KeyPad(Ent)	Caps
	21	15	89	105	106	107	108	30
C8	F10	F2	Q	O	|	0)	K42	,<
	121	113	17	25	29	11	42	53
C9	F9	=+	D	I	]}	9(	' "	Fn
	120	13	33	24	28	10	41	
C10	F11	F1	W	PrintScr	Home	Del	Insert	.>
	122	112	18	124	80	76	75	54
C11	F12	L	E	ScrollLck	End	PageUp	PageDown	/?
	123	39	19	125	81	85	86	55
C12	App	;:	↑	NumLck	KeyPad(7)	KeyPad(4)	KeyPad(1)	K45
		40	83	90	91	92	93	45
C13	Esc	K	←	KeyPad(/)	KeyPad(8)	KeyPad(5)	KeyPad(2)	KeyPad(0)
	110	38	79	95	96	97	98	99
C14	R	J	↓	KeyPad(*)	KeyPad(9)	KeyPad(6)	KeyPad(3)	KeyPad(.)
	20	37	84	100	101	102	103	104
C15	F8	-_	Tab	U	[{	8*	H	N
	119	12	16	23	27	9	36	51
C16	X	2@	My Computer	Play/Pause	Media	Shift-R	Mute	CD Stop
	47	3				57		
C17	G	KeyLck	LedBrt+	LedBrt-	KeyExchg		B	M
	35						50	52
C18	Enter	6^	F6	KeyPad(0 0)	KeyPad(0 0 0)	Shift-L	¥	Boss
	43	7	117			44		
C19								

Fn+F1	Player	Fn+F7	Play/pasue
Fn+F2	Volume-	Fn+F8	Stop
Fn+F3	Volume+	Fn+F9	Brower
Fn+F4	Mute	Fn+F10	Mail
Fn+F5	Next Song	Fn+F11	My computer
Fn+F6	Last Song	Fn+F12	Full key Lock

【19key without punching】IST83010-03 array and Fn combination Key function compatible with SX83089-035E、HK9708

Table 5-4 IST83010-03 Array

5.2.5 Num.Scroll,Caps,WinLck

IST83010 has three standard indicators, Num, Scroll and Caps. The corresponding key operation will indicate the corresponding state. WinLck indicator light is to lock the Win and App keys. After locking the Win and App keys through the combination key Fn+Win-L, the WinLck indicator light will be on, otherwise it will be extinguished.

5.3 Backlight LED

Backlight mode supports synchronous backlight mode and reaction mode; automatic recognition of backlight color types (monochrome/trichrome/seven colors).

5.3.1 Synchronous Backlight Mode

Backlight Mode		Breathing	Constantly Bright	Mute	Neon
RGB Lamp	RGB primary color	Seven species: Blue/Red/Green/Cyan/Yellow/Pink/ White	Seven species: Blue/Red/Green/Cyan/Yellow/Pink/ White	√	√
	RB primary color	Three species Blue/Red/Pink	Three species Blue/Red/Pink	√	
	RG primary color	Three species Green/Red/Yellow	Three species Green/Red/Yellow	√	
	GB primary color	Three species Blue/Green/Cyan	Three species Blue/Green/Cyan	√	
	Single Color	One Species	One Species	√	

Note: √ indicates support for this function, Table 5-8 Synchronous Backlight Mode

5.3.2 Reaction Mode

The default backlight is turned off. When the button is pressed, the backlight mode will perform a period of cyclic breathing and then turn off the light. Each time the key triggers the response mode, the color is changed.

5.3.3 Backlight Control method

- Combine keys Fn + Scr to switch lighting mode (excluding silence), Customizable switchable backlight mode.
- Combination of keys Fn + Ins, switch the light color, such as breathing cycle, then cycle by cycle to switch monochrome, if bright, then switch monochrome by monochrome.
- Combination of keys Fn + PrtScr, switching lights on/off, from the light on, mute, light on (the previous mode).
- Combination button Fn+ ↑ ↓, adjust backlight brightness under constant light (8 gears)
- Combination keys Fn+←→, adjust backlight speed in other backlight modes (6 gears)

5.4 Fn Composite Key Function

	Button	Function
Fn+	F1~F12	Ordinary mode/game mode can be customized to multimedia/full-key locking, etc
	W	WASD and ↑←↓→exchange
	Win-L	Lock Win and App
	↑	Increase backlight brightness（8 gear）
	↓	Decrease backlight brightness（8 gear）
	←	Decrease backlight speed（6 gears）
	→	Increase backlight speed（6 gears）
	Scr	Swtich backlight mode（Up to 8 species）
	Ins	Switch backlight color（Up to 7 species）
	PrtScr	Turn on/off backlight

Table 5-9 Fn Composite key function

5.5 Encoder

Encoder supports volume+/-.

6. Electrical Characteristics

6.1 Absolute Maximum Rating

Parameters	Symbol	Min	Max	Unit	Notes
Supply Voltage	V_{DD}	-0.5	5.5	V	
Operating Temperature	T_O	-20	70	℃	
Storage Temperature	T_S	-50	125	℃	
Lead Solder Temperature	T_{SOLDER}	-	260	℃	
Input Voltage	V_{in}	-0.5	5.5	V	
ESD	V_{ESD}	2		KV	All pins, human body model

6.2 DC Electrical Characteristic (VDD = 5.0V, Temperature = 25℃)

Parameter	Symbol	Min	Typical	Max	Units	Notes
Operating Voltage	V_{DD}	4.5	5	5.5	V	
Operating Current	I_{OP}	-	3.6	-	mA	F_{OSC}=48MHz, excluding Backlight
Input Voltage High	V_{IH}	2	-	-	V	
Input Voltage Low	V_{IL}	-	-	0.8	V	
Output Voltage High	V_{OH}	2.8	-	3.6	V	
Output Voltage Low	V_{OL}	0	-	0.4	V	
LED Current (CAPS、NUM、SCR、WINLCK/GAME)	I_{LED}	-	10	-	mA	

7. Application Circuit

7.1 Typical Application Circuit

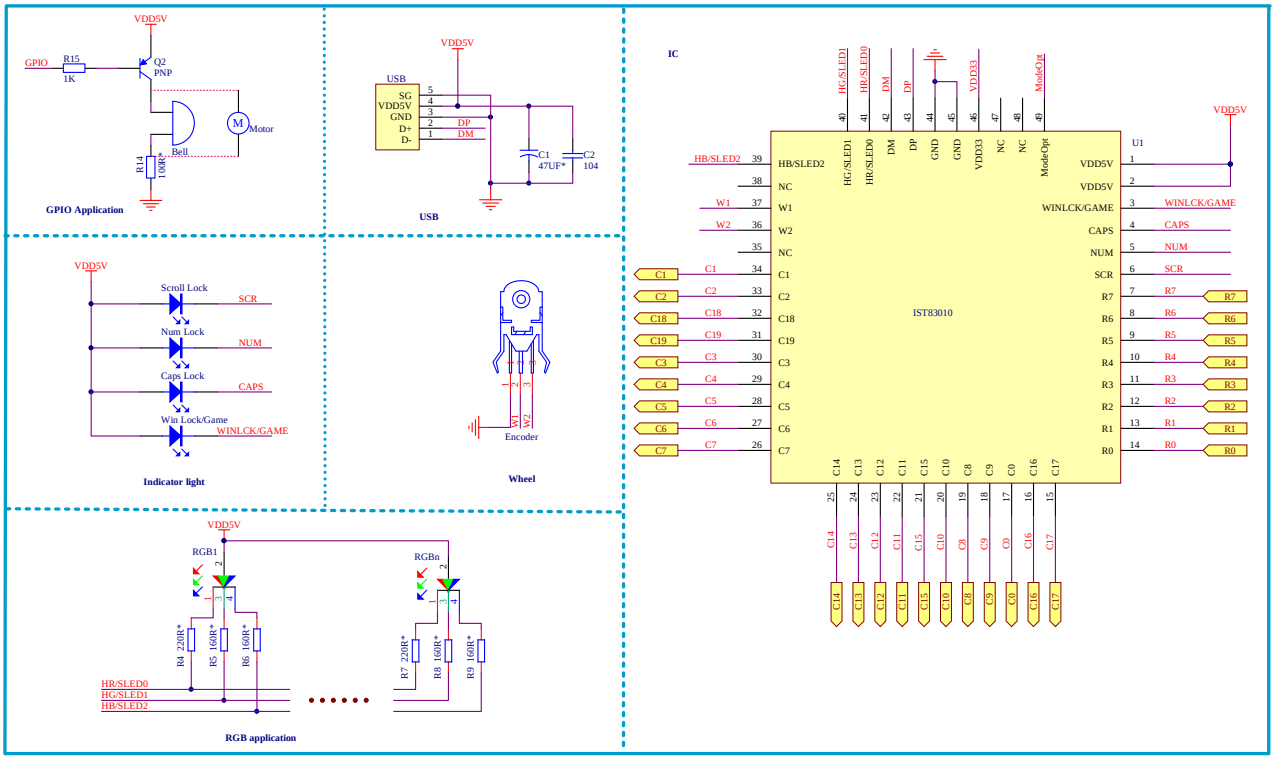


Figure 7-1 Typical Application Circuit

7.2 Keyboard Array Circuit

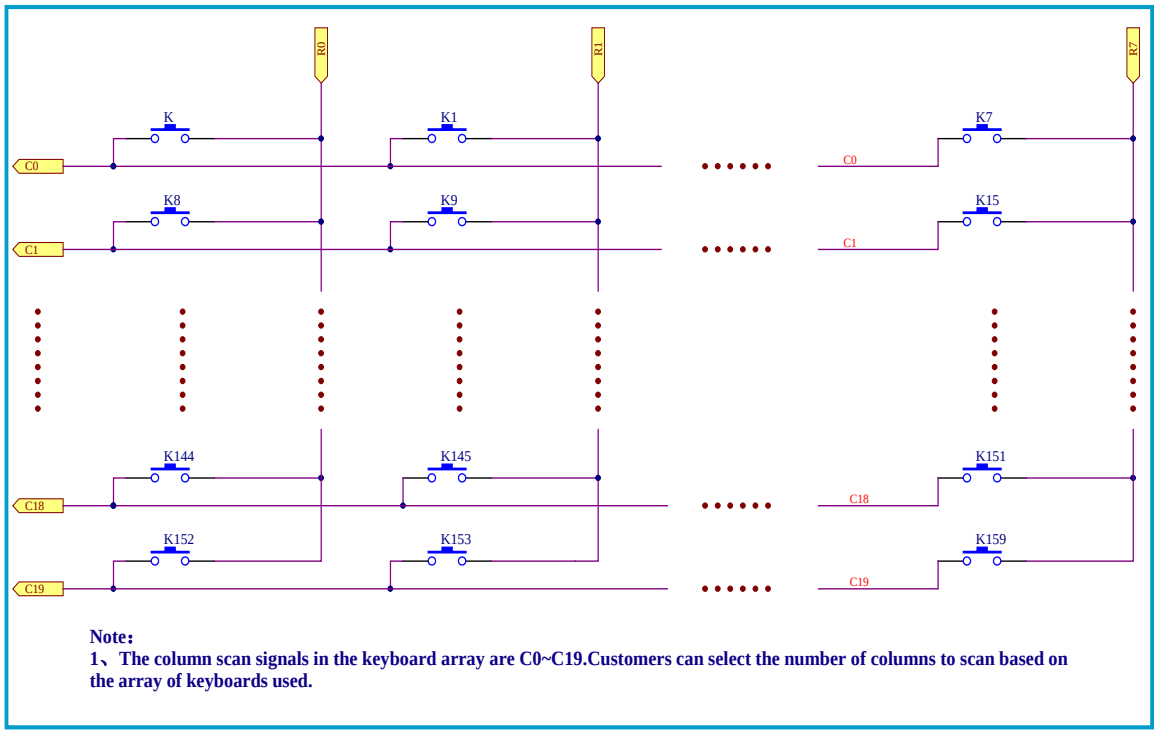


Figure 7-2. Keyboard Array Circuit

8. PAD Location

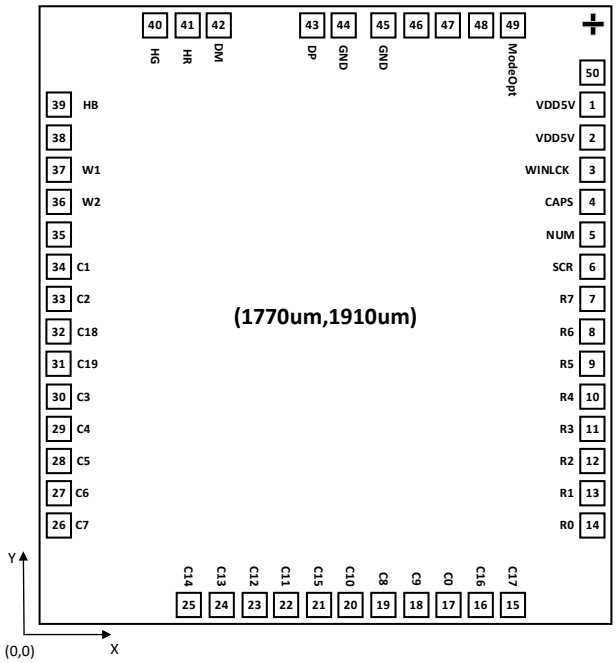
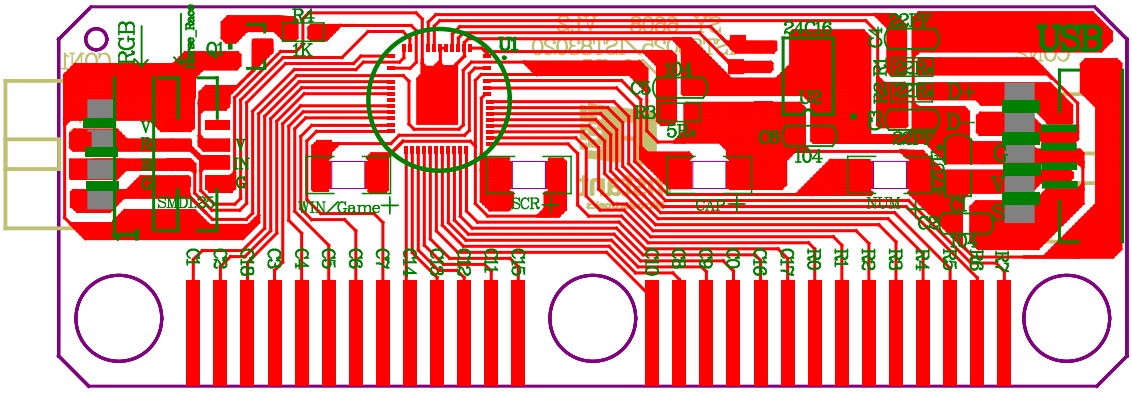


Figure 8-1. PAD Location

PAD NO.	NAME	X	Y	PAD NO.	NAME	X	Y
1	VDD5V	1709.65	1604.24	26	C7	60.34	304.24
2	VDD5V	1709.65	1504.24	27	C6	60.34	404.24
3	WINLCK	1709.65	1404.24	28	C5	60.34	504.24
4	CAPS	1709.65	1304.24	29	C4	60.34	604.24
5	NUM	1709.65	1204.24	30	C3	60.34	704.24
6	SCR	1709.65	1104.24	31	C19	60.34	804.24
7	R7	1709.65	1004.24	32	C18	60.34	904.24
8	R6	1709.65	904.24	33	C2	60.34	1004.24
9	R5	1709.65	804.24	34	C1	60.34	1104.24
10	R4	1709.65	704.24	35			
11	R3	1709.65	604.24	36	W2	60.34	1304.24
12	R2	1709.65	504.24	37	W1	60.34	1404.24
13	R1	1709.65	404.24	38			
14	R0	1709.65	304.24	39	HB	60.34	1604.24
15	C17	1464.72	60.31	40	HG	356.5	1849.69
16	C16	1364.72	60.31	41	HR	456.5	1849.69
17	C0	1264.72	60.31	42	DM	556.5	1849.69
18	C9	1164.72	60.31	43	DP	843.5	1849.69
19	C8	1064.72	60.31	44	GND	943.5	1849.69
20	C10	964.72	60.31	45	GND	1064.72	1849.69
21	C15	864.72	60.31	46			
22	C11	764.72	60.31	47			
23	C12	664.72	60.31	48			
24	C13	564.72	60.31	49	ModeOpt	1464.72	1849.69
25	C14	464.72	60.31				

9. Typical Application PCB and Bonding

9.1 Typical Application PCB



Note: 1. Safety Circuit, PCB compatible with IST83010、IST83020

2.19-key non-punching, four indicator lamp, SLED0 single-line dazzling lights

Figure 9-1 Typical Application PCB

9.2 Typical Application Bonding

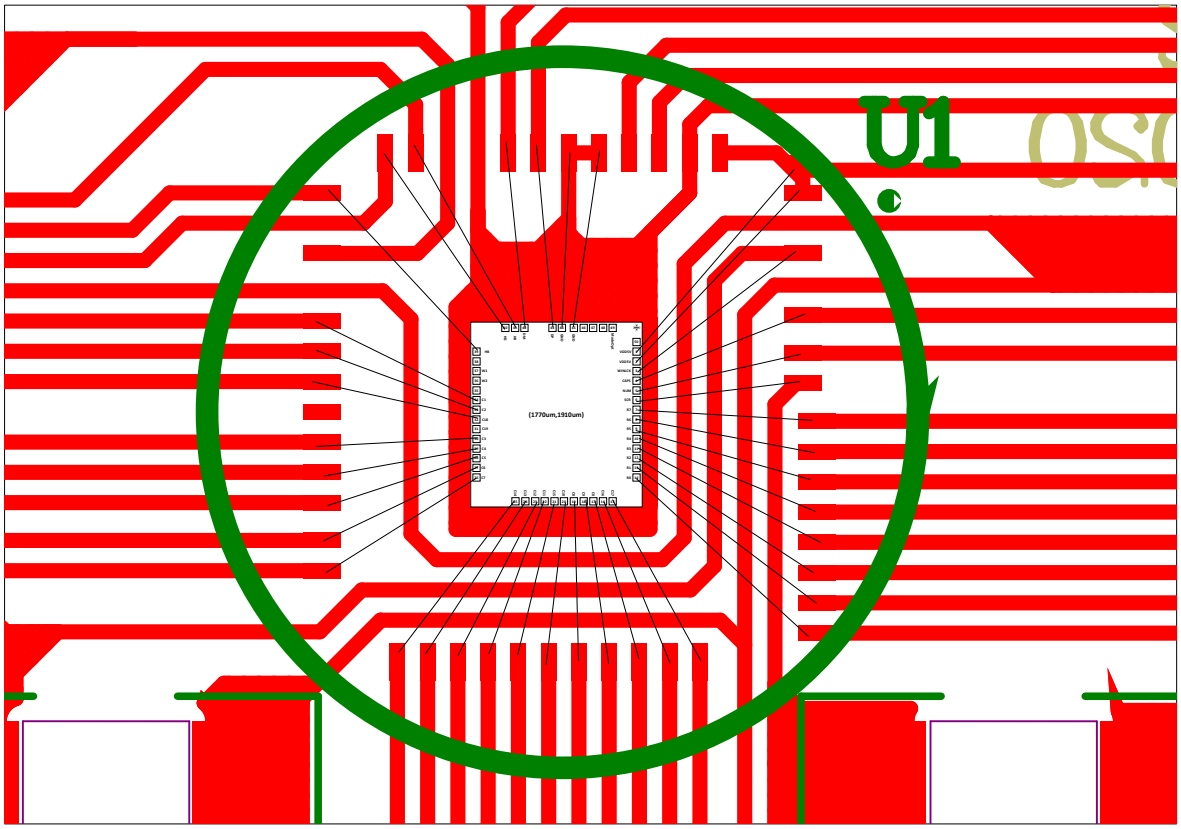


Figure 9-2 Typical Application Bonding

10. Revision History

Version	Date	Reviser	Description
IST83010_Spec_EN.V1.00	2019/03/22	Jimmy	Create Preliminary Version