Solid State System Co., Ltd.

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SSS1530A3-QBC

Single Chip Type-C USB Audio Controller

I. Product Overview

SSS1530 is 3S highly integrated single chip TYPE-C USB audio controller with on chip oscillator to save the external 12MHz crystal component, QFN-32(4*4) package. SSS1530 features stereo 16 bits ADC, stereo 16 bits DAC, earphone driver, 5-band hardware EQ, audio PLL, TYPE-C clock oscillator, and TYPE-C FS controller plus PHY. External 24C02~16 EEPROM connection provides flexibility for TYPE-C USB VID/PID/product string, default gain settings, and other customized features. SSS1530 provides a minimum BOM solution for featured TYPE-C audio solutions, in Widows/MAC/ Android OS X , and most of Type-C mobile phone.
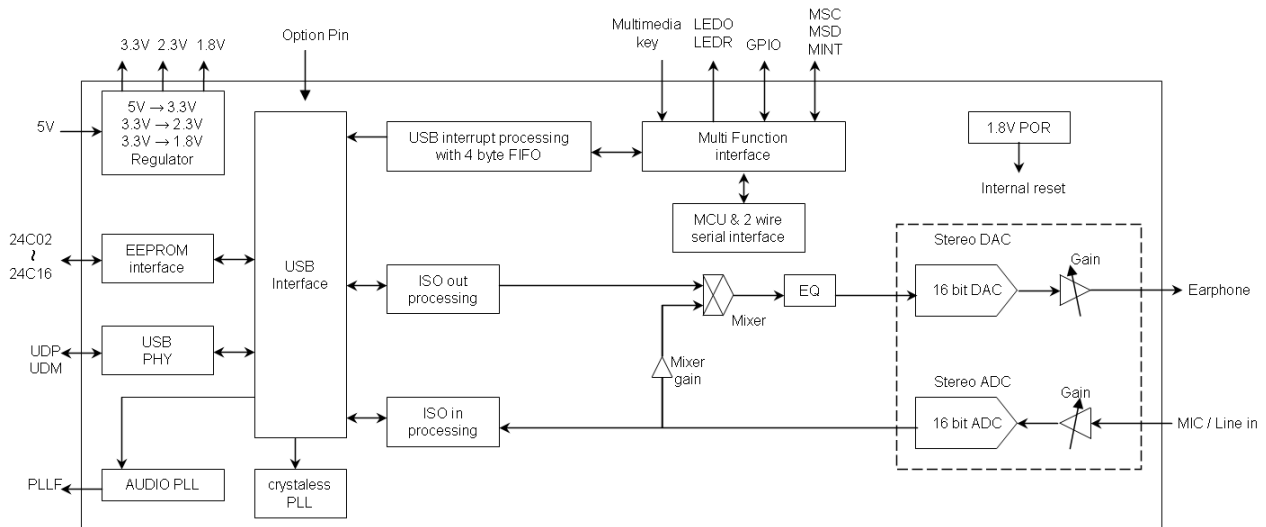
II. Product features

- Embedded TYPE-C USB FS transceiver and controller
- Embedded TYPE-C USB 48MHz on chip oscillator without external crystal component need
- Embedded 16 bit stereo ADC with dB linear PGA
- Embedded 16 bit stereo DAC
- Earphone amplifier with variable gain adjustment
- Embedded 5V to 3.3V and 1.8V output regulator for single external 5V operation
- Embedded 1.8V power on reset
- Compliant with TYPE-C USB specification v2.0 full speed operation
- Compliant with TYPE-C USB audio device class specification v1.0
- Supports TYPE-C USB suspend/resume mode
- Support one control endpoint, one isochronous out endpoint, one isochronous in endpoint, and one interrupt in endpoint
- Alternate zero bandwidth setting for releasing TYPE-C USB bus bandwidth during inactive
- Two wire serial bus for external MCU control
- Phone Call and Hang Up,Music Play/Pause, volume up, volume down, playback mute, recording mute, next track, previous track, and stop pin for direct user control
- Volume up, volume down, playback mute, next track, previous track, stop and play/pause support TYPE-C USB HID for host control synchronization
- Support digital encoder interface for volume control by EEPROM setting
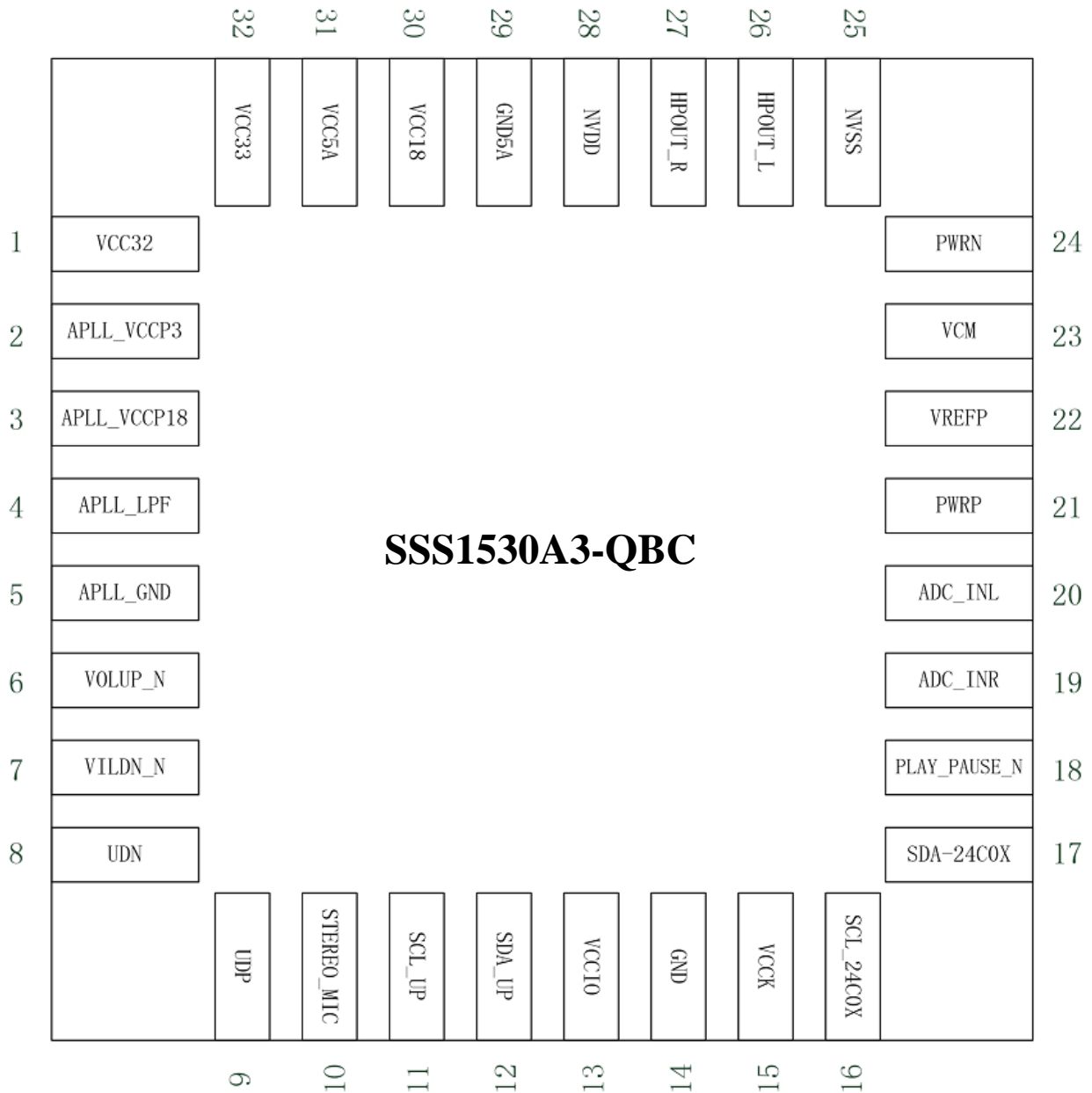
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- External 24C02~C16 serial EEPROM interface for vendor specific USB VID, PID, product string, serial number, default gain, default EQ setting, playback/record enable.
- EEPROM write function via HID for mass production convenience
- Support HID pin change to GPIO pin, setting with EEPROM
- Whole EEPROM space can be accessed via MCU
- Embedded 5 band H/W EQ with preset mode selection from IO pins
- Playback and record function can be independently enabled for product feature
- GPIO and MCU interface register read/write via HID
- Embedded digital mixer for application need
- Default support 48KHz for both ADC and DAC enable
- support I2S interface with fixed sampling rate
- 1.8 V for digital core and audio PLL operation
- 3.3V for oscillator, ADC/DAC operation
- Compatible with Win XP, Vista, Win 7, Mac OS X ,Linux OS X and Android OS X without additional driver, and most of Type-C mobile phone
- Some function support by EEPROM additional, Please contact with 3S AE
- Shipping QFN-32(4*4) package by Type & Reel

III. Block Diagram

IV. Pin Description

➤ **Pin Out Chart for QFN-32(4*4)**

32	31	30	29	28	27	26	25
VCC33	VCC5A	VCC18	GND5A	NVDD	HPOUT_R	HPOUT_L	NVSS

	SSS1530A3-QBC	
1	VCC32	PWRN	24
2	APLL_VCCP3	VCM	23
3	APLL_VCCP18	VREFP	22
4	APLL_LPF	PWRP	21
5	APLL_GND	ADC_INL	20
6	VOLUP_N	ADC_INR	19
7	VILDN_N	PLAY_PAUSE_N	18
8	UDN	SDA-24C0X	17

UDP	STEREO_MIC	SCL_UP	SDA_UP	VCCIO	GND	VCCK	SCL_24C0X
9	10	11	12	13	14	15	16

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> **Pin List Table**

QFN 32	PAD# SYMBOL	NORMAL MODE	PD MODE	DESCRIPTION
1	VCC23	PO	PO	2.3V output for regulator
2	APLL_VCCP3	PI	PI	3.3V power for audio PLL
3	APLL_VCCP18	PO	PO	1.8V output from PLL regulator
4	APLL_LPF	AIO	AIO	Low pass filter for audio PLL
5	APLL_GND	PI	PI	Audio PLL ground
6	VOLUP_N	I	I	Volume up
7	VOLDN_N	I	I	Volume down
8	UDN	AIO	AIO	USB data D-
9	UDP	AIO	AIO	USB data D+
10	STEREO_MIC	I	I	MIC Select 1: stereo 0: mono
11	SCL_UP	I	I	External MCU serial bus clock pin
12	SDA_UP	IO	I	External MCU serial bus data pin
13	VCCIO	PI	PI	3.3V power
14	GND	PI	PI	Ground
15	VCCK	PI	PI	1.8V power
16	SCL_24C0X	O	I	External (24C0X) NOR serial bus clock pin
17	SDA_24C0X	IO	I	External (24C0X) NOR serial bus data pin
18	PLAY_PAUSE_N	I	I	Play/pause
19	ADC_INR	AI	AI	Right channel inputs of Audio
20	ADC_INL	AI	AI	Left channel inputs of Audio
21	PWRP	PI	PI	Analog power (3.3V)
22	VREFP	AI	AI	Codec reference high voltage
23	VCM	AI	AI	Codec reference middle voltage
24	PWRN	PI	PI	Analog Ground
25	NVSS	PI	PI	Earphone driver ground
26	HPOUT_L	AO	Z	Earphone driver output
27	HPOUT_R	AO	Z	Earphone driver output
28	NVDD	PI	PI	Earphone driver power
29	GND5A	PI	PI	Analog ground for regulator
30	VCC18	PO	PO	1.8V output for regulator
31	VCC5A	PI	PI	5V input for regulator
32	VCC33	PO	PO	3.3V output for regulator

V. Electric Characteristics

➢ **Absolute Maximum Rating**

SYMBOL	PARAMETER	VALUE	UNIT
Vmin	Min supply voltage	– 0.3	V
Vmax	Max supply voltage	VDD + 4	V
Vinout	Voltage on 3.3V input or output	–0.3 to +3.6	V
T_{stg}	Storage temperature range	-20 to +120	^0C
ESD (HBM)	ESD human body mode	2000	V
ESD (MM)	ESD machine mode	200	V

➢ **Headphone Output (A-Weighted)**

PARAMETER	CONDITION	MIN.	TYP.	MAX.	UNIT
Pmax Output power @1% THD+N	RL = 32 Ω, VCC33A = 3.3 V	--	15	--	mW
SNR (Signal-to-noise ratio)	Idle channel	--	84	--	dB
	mute	--	94	--	dB
THD+N Total harmonic distortion	1KHz @ -3dB; 32Ω load	--	-71	--	dB

➢ **Microphone Input Characteristics**

SYMBOL	PARAMETER	MIN	TYP	MAX	UNIT
AMP	Microphone gain amplification	-7.5		+39	dB
GSTEP	ADC gain step		1.5		dB
DR	Dynamic range @ 997Hz -60dB FS gain = 0dB		83		dB
SNR	SNR @ idle channel gain = 0dB		82		dB
THD+N	THD+N @ 997Hz -3dB FS gain = 0dB		-77		dB
FS	Signal full scale input gain = 0dB		0.95*VCC33A		V
OFF	DC offset @gain = 0dB			±14	mV
RIN	Input impedance	15K	20K		ohm

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➢ **On Chip Regulator**

SYMBOL	PARAMETER	MIN	TYP	MAX	UNIT
In Rang	Input voltage range	3.8		5.5	V
REGdrv33	Driving capability of 3.3V output			250	mA
REGdrv18	Driving capability of 1.8V output			70	mA
REGdrv23	Driving capability of 2.3V output			1	mA
REGload33	3.3V load regulation	-	0.02	0.05	%/mA
REGline33	3.3V line regulation	-	0.2	0.4	%/V
REGload18	1.8V load regulation	-	0.02	0.05	%/mA
REGlin18	1.8V line regulation	-	0.2	0.4	%/V
OVR33	3.3V output voltage	3.0	3.3	3.6	V
OVR18	1.8V output voltage	1.62	1.8	1.98	V
OVR23	2.3V output voltage	2.07	2.3	2.53	V

Note：MULTI FUNCTION KEY (4 Key)

SSS1530 support maximum 4 multifunction keys. By EEPROM settings, each multifunction key can have up to four different button operation manners. Four kinds of different button operation are "a short press", "consecutive two short press", "a short and a long press" and "a long press". Each multifunction key corresponds to different control manner for different function demand, so that can achieve the purpose of streamlining the key number of requirements. Setting diagram is as follows:

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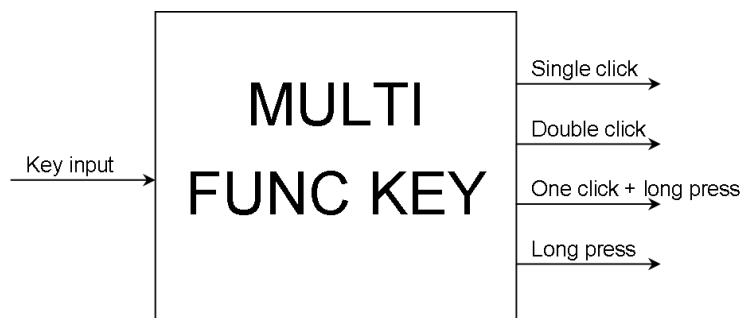
Key input can be set from :   **Function output can be assign to :**

ON.	Key input
1	VOLUP_IN
2	VOLDN_IN
3	MUTEP_IN
4	MUTER_IN
5	NEXT_TRACK_IN
6	PRE_TRACK_IN
7	STOP_IN
8	PLAY_PAUSE_IN
9	EQ_NEXT_IN
10	USER_KEY_IN
11	GPI5
12	GPI6
13	GPI7
14	GPI8
15	GPI9

ON.	Function output
1	VOLUP
2	VOLDN
3	MUTEP
4	MUTER
5	NEXT_TRACK
6	PRE_TRACK
7	STOP
8	PLAY_PAUSE
9	EQ_NEXT
10	USER_KEY
11	S3D_NEXT
12	GPO9
13	GPO8
14	GPO7
15	GPO6
16	GPO5

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VI. Reference Application Circuit

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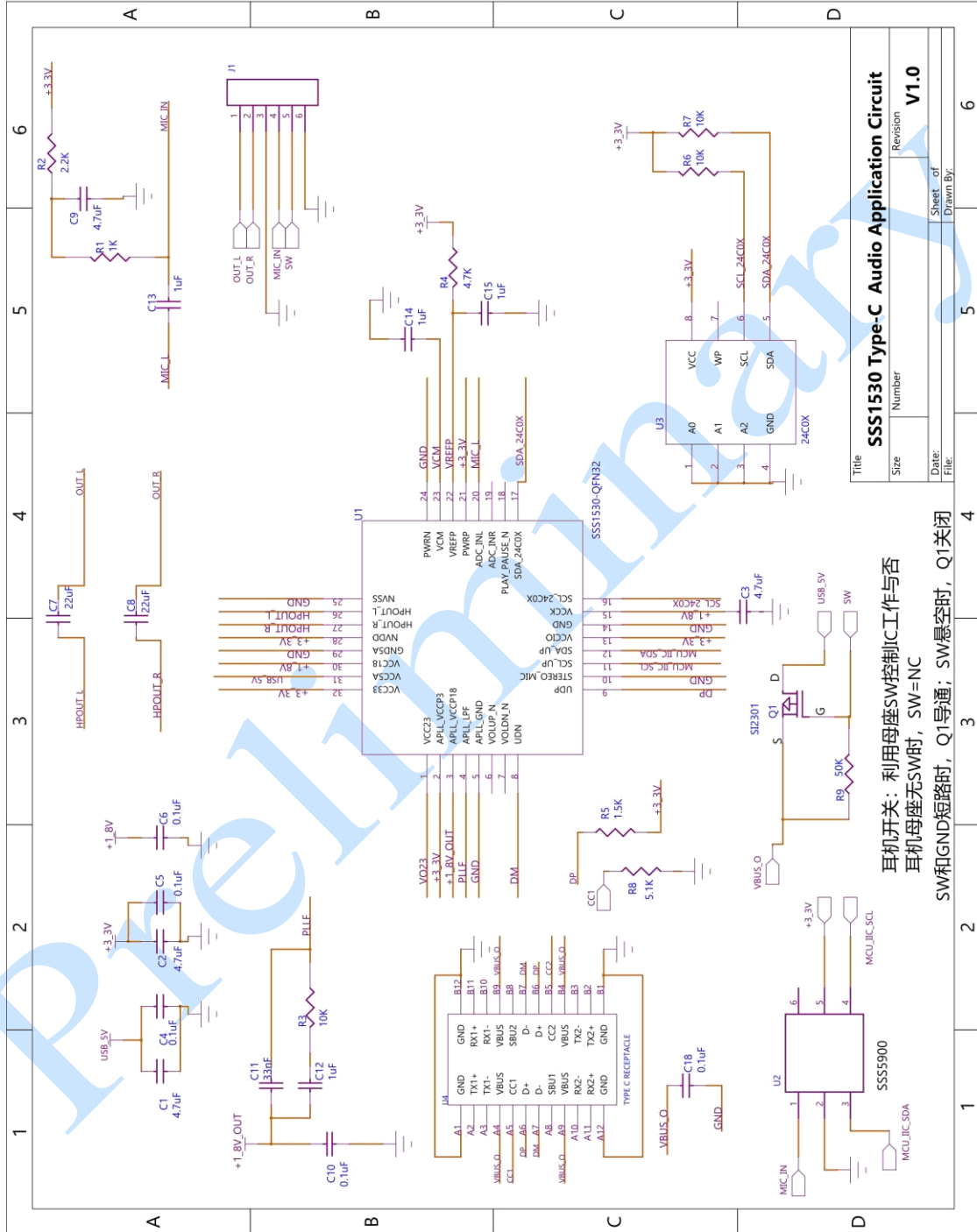
VII. Mechanical Data

➢ **Package for QFN-32**

SYMBOL	DIMENSION IN MM			DIMENSION IN INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.70	0.75	0.80	0.028	0.030	0.031
A1	0.00	0.02	0.05	0.000	0.001	0.002
A2	0.50	0.53	0.56	0.020	0.021	0.022
A3	0.20 REF.			0.008 REF.		
D	3.95	4.00	4.05	0.156	0.157	0.159
E	3.95	4.00	4.05	0.156	0.157	0.159

N	b			D2			E2			e	L		
	MIN	NOM	MAX	MIN	NOM	MAX	MIN	NOM	MAX		MIN	NOM	MAX
32L	0.15	0.20	0.25	2.65	2.70	2.75	2.65	2.70	2.75	0.400 BSC	0.25	0.30	0.35

Revision History

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Revision	Date	Description
1.0	2018/12/19	Initial Specification
1.1	2019/07/26	Modify Mechanical data size