SS215X Brief Datasheet

High Efficiency MCU with 2A DC-DC Charger and Boost

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Reversion 1.2

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Contents

1. Introduction

SS215X is a high efficiency MCU Family integrated with 5V DC-DC charger and boost, it also has power path management unit, high resolution ADC build in, and rich of IO pins.

SS215X Family includes SS2153 and SS2156, it is suitable for several kinds of smart products charging through USB port. It is highly integrated, flexible, simplified BOM. It is easy for PCB layout and for embedded system development

1.1. Feature

- MCU
    - high efficiency MCU with single instruction cycle supported
    - 8K Byte Flash memory and 1K Byte RAM
    - Max Freq: 16MHz

- Synchronous DCDC Charger and Boost
    - One inductor on PCB can support the integrated 2A synchronous Charger and Boost unit.
    - 5V voltage output from VOUT pin, and it can offer up to 2A current
    - The frequency of DCDC PWM is 500KHz, and the efficiency of the synchronous DCDC is up to 90%.

- Charger
    - The IC offers a completely charge cycle control, include trickle charge, constant-current charge, constant-voltage charge and Re-charge
    - 4.2V~4.4V Li-Battery are supported
    - 200mA~2.4A charge current are configurable.

- Power path management
    - Automatically distribution the power supply from the adapter or the battery
    - Simultaneously charging and discharging

- High resolution ADC
    - 8 channel of 12bit ADC
    - use for voltage, current and temperature measurement

- Timer
    - One 20-bit timer
    - One 16-bit timer
    - Support PWM output

- - One Watchdog timer

- 16 IOs
  - Integrated IOs, UART, I2C, PWM, SIRQ unit
  - Constant current supported on 9 of the IOs
  - Internal pull-up and pull-down resistors can be configurable

- Protection
  - Over voltage protection,
  - Over current and protection
  - Over temperature protection

- Average 50uA power consumption in Power-Save mode

- Two-wire SSD debugger and program supported

- ESD over 4KV level

- Package
 - eSOP16 for SS2153
  - QFN32 for SS2156

1.2. System Diagram
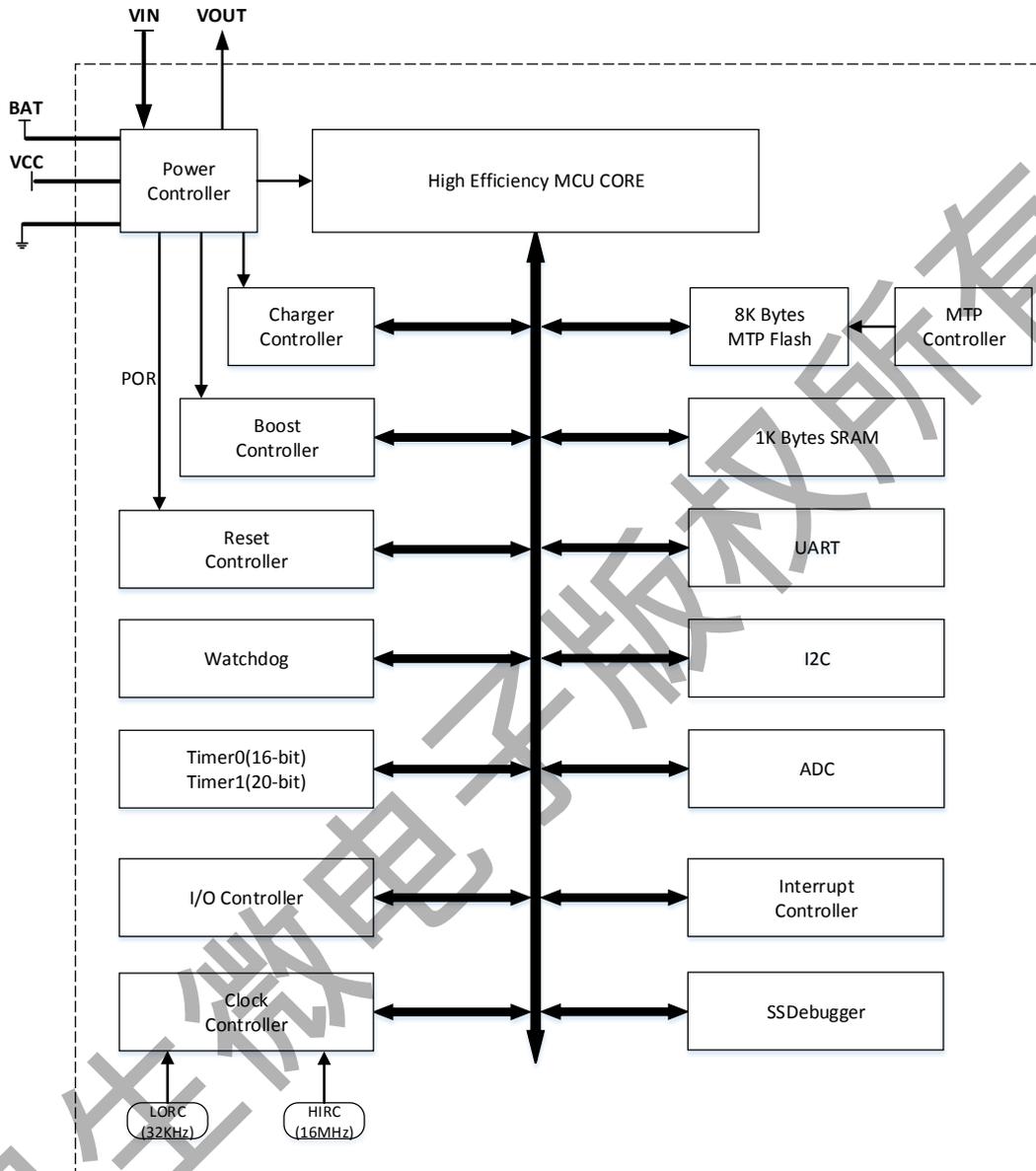
Figure 1 SS215X System Diagram

1.3. Typical Application
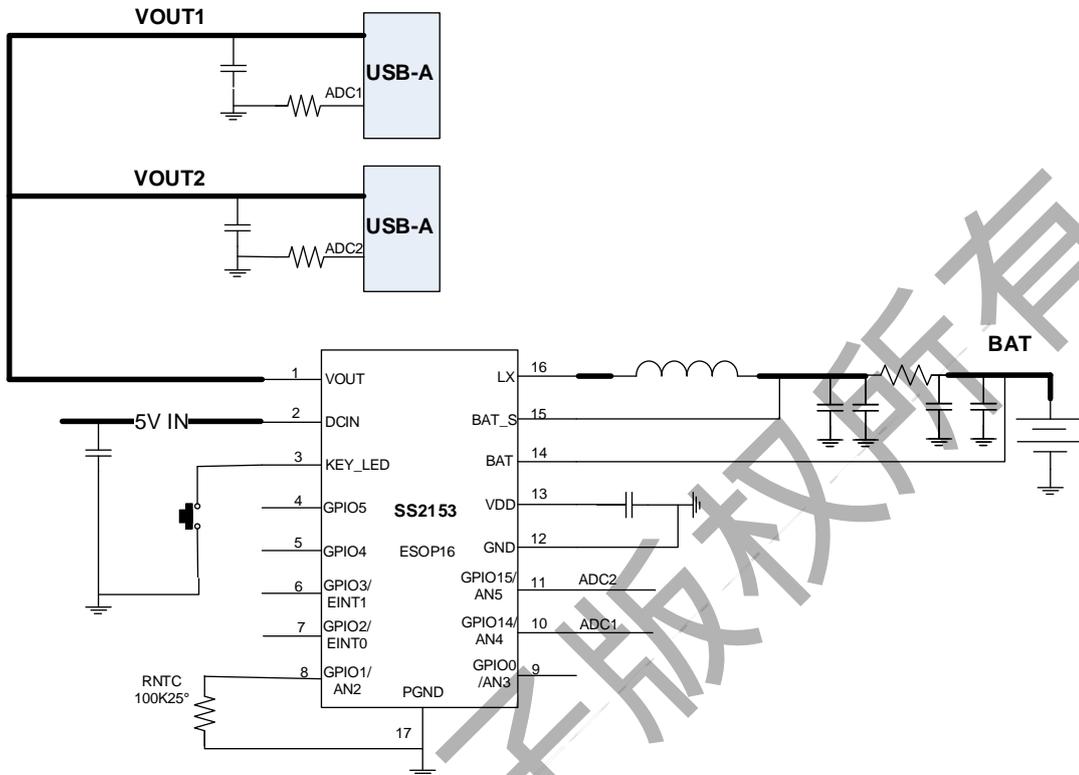
Figure 2 SS2153 Application Diagram

1.4. Ordering Information

Product Num.	Package Type
SS2153	eSOP16
SS2156	QFN32

	SS2153	SS2156
Flash	8KB	8KB
RAM	1KB	1KB
I/O	8	16
EINT	2	2
Timer	2	2
PWM	2	2

UART	1	1
I2C	1	1
ADC	8	8
KEY_LED	1	1
SWD	1	2
Package	eSOP16	QFN32
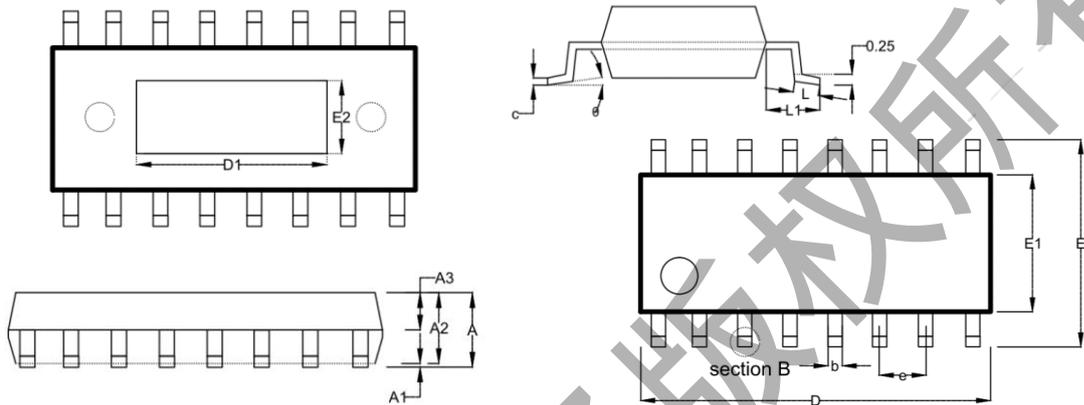
SYMBOL	MILLIMETER		
	MIN	**NOM**	**MAX**
A	-	-	1.75
A1	0.05	-	0.15
A2	1.30	1.40	1.50
A3	0.60	0.65	0.70
b	0.39	-	0.48
b1	0.38	0.41	0.43
c	0.21	-	0.26
c1	0.19	0.20	0.21
D	9.70	9.90	10.10
E	5.80	6.00	6.20
E1	3.70	3.90	4.10
e	1.27BSC		
h	0.25	-	0.5
L	0.50	-	0.80
L1	1.05BSC		
D1		4.57	
E2		2.41	

Figure 3.   SS2153 Package Schematic Diagram

Top View   Side View

Bottom View
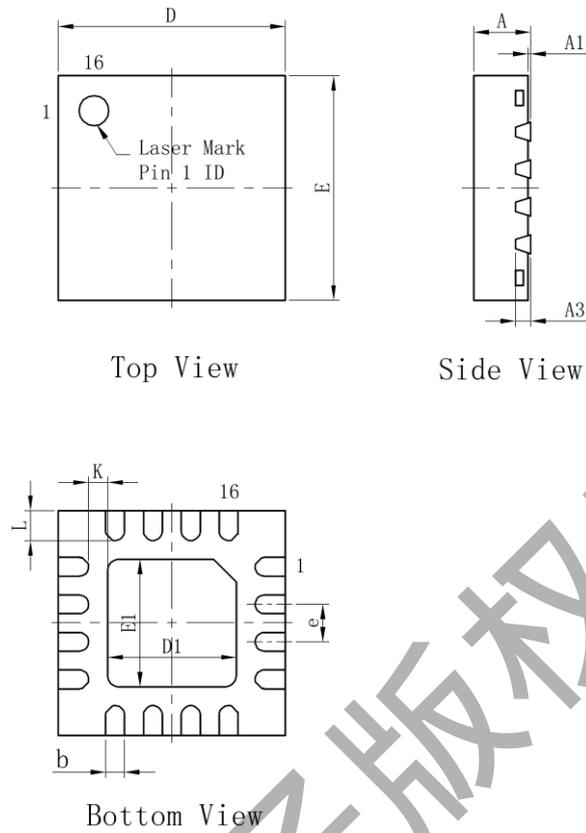
Figure 4.   SS2156 Package Schematic Diagram

	Min (mm)	Max (mm)		Min (mm)	Max (mm)
A	0.70	0.80	D1	3.30	3.50
A1	0.00	0.05	E1	3.30	3.50
A3	0.203 REF		e	0.50 TYP	
b	0.20	0.30	k	0.20	-
D	4.924	5.076	L	0.324	0.476
E	4.924	5.076			

1.5. Pin Description
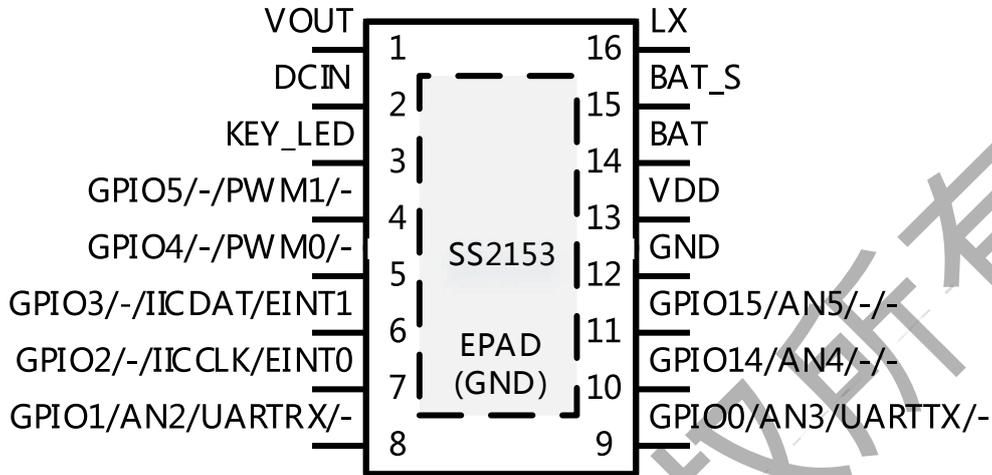
Figure 3 SS2153 Pin Diagram

SS2153 Pin Description

Pin Name	Pin No.	Pin Functions				
		F0	F1	F2	F3	EXT*
GPIO0	9	GPIO0	AN3	UARTTX	-	-
GPIO1	8	GPIO1	AN2	UARTRX	-	-
GPIO2	7	GPIO2	-	IICCLK	EINT0	-
GPIO3	6	GPIO3	-	IICDAT	EINT1	-
GPIO4	5	GPIO4	-	PWM0	-	SWDCLK
GPIO5	4	GPIO5	-	PWM1	-	SWDIO
GPIO14	10	GPIO14	AN4	-	-	-
GPIO15	11	GPIO15	AN5	-	-	-
KEY_LED	3					Key Detect and LED Control
GND	12					System Ground
VDD	13	-	-	-	-	Chip Power supply
BAT	14	-	-	-	-	Battery pin
BAT_S	15	-	-	-	-	Battery sensor pin
LX	16					DCDC inductor pin
VOUT	1					5V voltage output
DCIN	2					Adapter input power

EPAD	17					System Ground
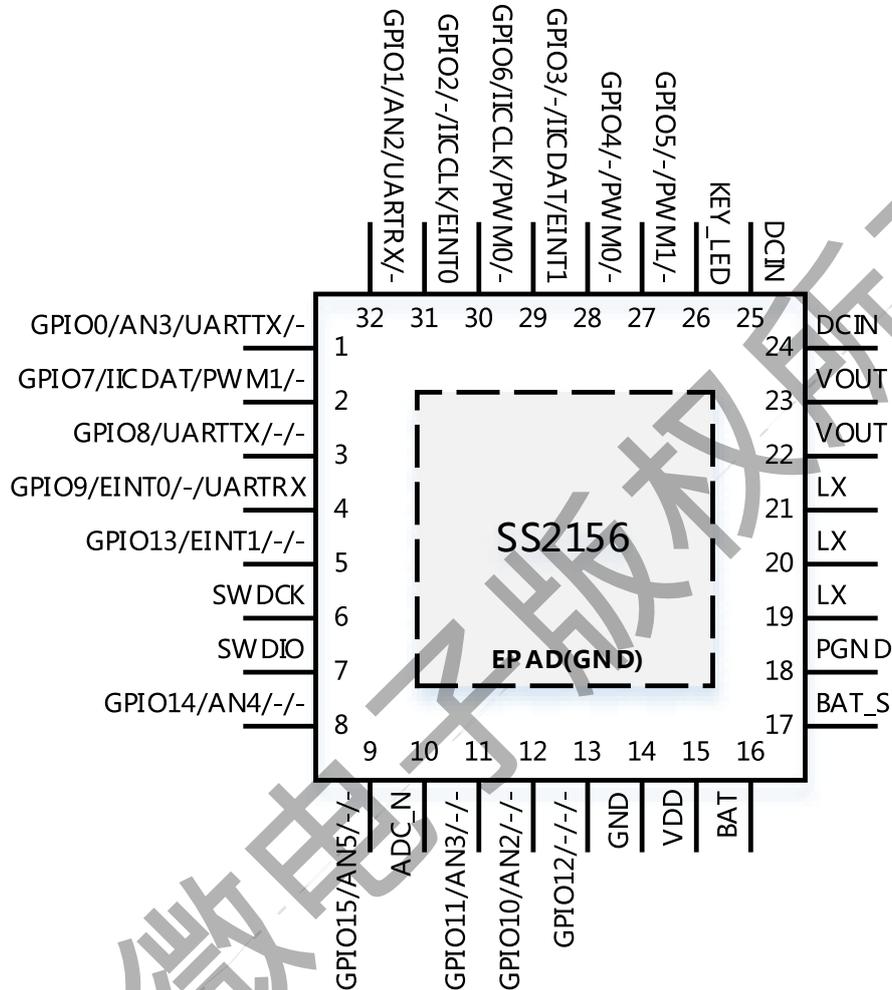
Figure 4 SS2156 Pin Diagram

SS2156 Pin Description

Pin Name	Pin No.	Pin Functions				
		F0	F1	F2	F3	EXT*
GPIO0	1	GPIO0	AN3	UARTTX	-	-
GPIO1	32	GPIO1	AN2	UARTRX	-	-
GPIO2	31	GPIO2	-	IICCLK	EINT0	-
GPIO3	29	GPIO3	-	IICDAT	EINT1	-
GPIO4	28	GPIO4	-	PWM0	-	SWDCLK while startup
GPIO5	27	GPIO5	-	PWM1	-	SWDIO while startup

GPIO6	30	GPIO6	IICCLK	PWM0	-	-
GPIO7	2	GPIO7	IICDAT	PWM1	-	-
GPIO8	3	GPIO8	UARTTX	-	-	-
GPIO9	4	GPIO9	EINT0	-	UARTRX	-
GPIO10	12	GPIO10	AN2	-	-	-
GPIO11	11	GPIO11	AN3	-	-	-
GPIO12	13	GPIO12	-	-	-	-
GPIO13	5	GPIO13	EINT1	-	-	-
GPIO14	8	GPIO14	AN4	-	-	-
GPIO15	9	GPIO15	AN5	-	-	-
DP	6					SWDCLK2 while startup
DM	7					SWDIO2 while startup
KEY_LED	26					Key Detect and LED Control
ADC_N	10	-	-	-	-	ADC power ground
GND	14					System ground
PGND	18					DCDC ground
VDD	15	-	-	-	-	Chip Power supply
BAT	16	-	-	-	-	Battery pin
BAT_S	17	-	-	-	-	Battery sensor pin
LX	19/20/21					DCDC inductor pin
VOUT	22/23					5V voltage output
DCIN	24/25					Adapter input power
EPAD	33					System ground

2. Electrical Characteristics

2.1. Absolute Maximum

Parameter	Symbol	Value	Unit
DCIN input voltage	DCIN	-0.3 ~ 12	**V**

Junction Temperature	T$_J$	-40 ~ 150	℃
Storage Temperature	Tstg	-60 ~ 150	℃
Working Temperature	T$_A$	-40~150	℃
ESD Level（HBM）	ESD	4	KV

* Exceeding these ratings may damage the device

2.2. Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit
DCIN input voltage	DCIN	4.5	5	5.5	V
Voltage of BAT	VBAT	3	3.7	4.4	V
Working Temperature	TA				

DC Characteristics

（unless otherwise noted TA=25℃，L=1uH）

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Charger						
DCIN input voltage	DCIN	Vbat=3.7V	4.5	5	5.5	V
CV voltage	CV4.2V	CV=4.2V	4.18	4.21	4.24	V
	CV4.30V	CV=4.3V	4.28	4.31	4.34	V
	CV4.35V	CV=4.35V	4.33	4.36	4.4	V
	CV4.4V	CV=4.4	4.38	4.41	4.44	V
Charge stop current	Ivinstop	DCin=5V	50	Configu-rable	200	mA
Constant charge current	IVIN	Ich =2A , Vbat=3.7V	1.7	2	2.3	A
Trickle charge current	ITRKL	DCIN=5v Vbat =2.7v	50	80	120	mA
Trickle stop voltage	VTRKL		2.9	3	3.1	V
Charge stop time	TEND		20	24	28	Hour
Over voltage protection input	Vovp		5.6	5.8	6	V

Under Voltage protection input	VLVP		4.4	4.5	4.6	V
Boost						
Voltage of BAT	VBAT		3	3.7	4.4	V
Low BAT shutoff voltage	VBATLOW	Iout=2A	2.9	2.95	3.0	V
DCDC Current from Battery	IBAT	Vbat=3.7V, Vout=5.1V, fs=500KHz		2	6	mA
VOUT output voltage	VOUT	Vbat=3.7V@0A	5.0	5.12	5.25	V
		Vbat=3.7V@2A	4.85	5	5.35	V
VOUT voltage ripple	ΔVOUT	Vbat=3.0V~4.4V	50	100	150	mV
Current load capacity of VOUT	Ivout	Vbat=3.0V~4.4V	0	1	1.2	A
VOUT Over current shutoff threshold	Ivout	Vbat=3.0V~4.4V	1.2	1.4	1.6	A
DCDC Frequency	fs	Boost	450	500	550	KHz
		Charger	450	500	550	KHz
PMOS on impedance	Rdson			45		mΩ
NMOS on impedance				35		mΩ
Over current threshold	Iidocp	DCIN =5V		3		A
Vref voltage	Vref	Vbat=3.7V	3.05	3.1	3.15	V
Standby current	Istb	DCIN =0V Vbat=3.7V		50	100	uA
Drive current of IOs	Igpio		4	5	8	mA
Under loading current threshold	Iplout	Vbat=3.7V	20	45	70	mA
Over temperature threshold	Totp		130		150	℃

*The device is not guaranteed to function outside of its operating conditions

AC Characteristics

Symbol	Parameter	Condition 条件	Min	Typ	Max	Unit
F_{HIRC}	High frequency clock	Ta=25℃	-3%	16	+3%	MHz
F_{LORC}	Low frequency clock	Ta=25℃	-5%	32	+5%	KHz
T_{STT}	Setup Time	From power supply	50	-	-	mS

	（1st power on）	to the 1st instruction				
	Setup Time（wakeup from power-save mode）	be executed	50	-	-	mS
T_{RST}	Power on reset time		50	-	-	mS
	Watchdog reset time	to the 1st instruction	10	-	-	mS
	Low power reset time	be executed	2	-	-	mS

Responsibility Statement

Revision Modification Record

2017-12-16	Rev 1.00	initial
2018-01-23	Rev1.01	MFP modify
2018-03-20	Rev1.1	MFP modify
2019-09-06	Rev1.2	Merge SS2153 & SS2156

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