SD45215SA/6JA/7JA

High Efficiency
Step-down DC/DC Converter
Adjustable Current Limit
Car Charger

Content

1. Description

The SD45215SA/6JA/7JA (SD4521X series for short below) is a step-down PWM-controlled DC-DC converter used in car charger.

SD4521X series adopts CV/CC mode which provides stable output voltage in wide load range, and the limit value can be externally adjusted by sample resistor. SD45215 has high efficiency up to 90%, with the current accuracy within 5%. Built-in line loss compensation, temperature protection and short-circuit protection are provided.

SD4521X Series Comparison

IC	Maximal output current	Input Voltage	Package
SD45215SA	1.2A	8V-40V	SOP8
SD45216JA	2.1A	8V-40V	ESOP8
SD45217JA	2.1A	8V-60V	ESOP8

Typical applications:

Car charger/Chargers for NiCd, NiMH batteries/step-down DC-DC converters with adjustable current limit

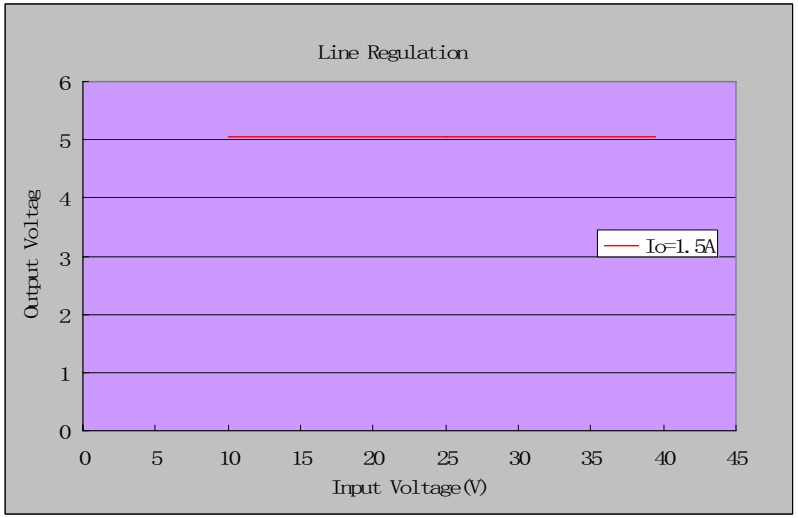
Features:

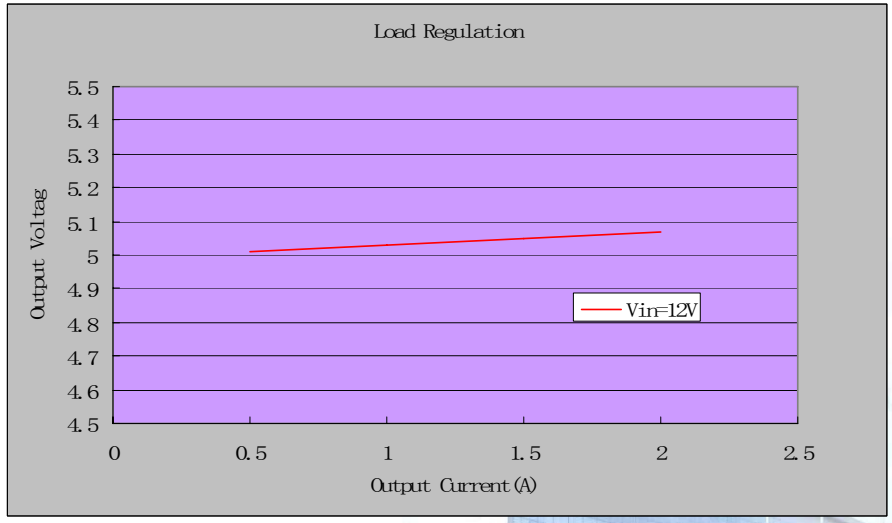
1. ***CC/CV mode***
2. ***Frequency Jittering***
3. ***Excellent constant current accuracy 5%***
4. ***Line loss compensation***
5. Short-circuit protection, during which the current is lower than 10mA

2. High CV/CC Accuracy

High CC/CV accuracy!

- Input voltage changes between 8~40V and output voltage accuracy is within ***2%***.
- Output current changes in the limit range and output voltage accuracy is within ***2%***.
- Good consistency because of advanced BCD technology and high precision trimming. ***Only ±2% change in output current between different batches.***

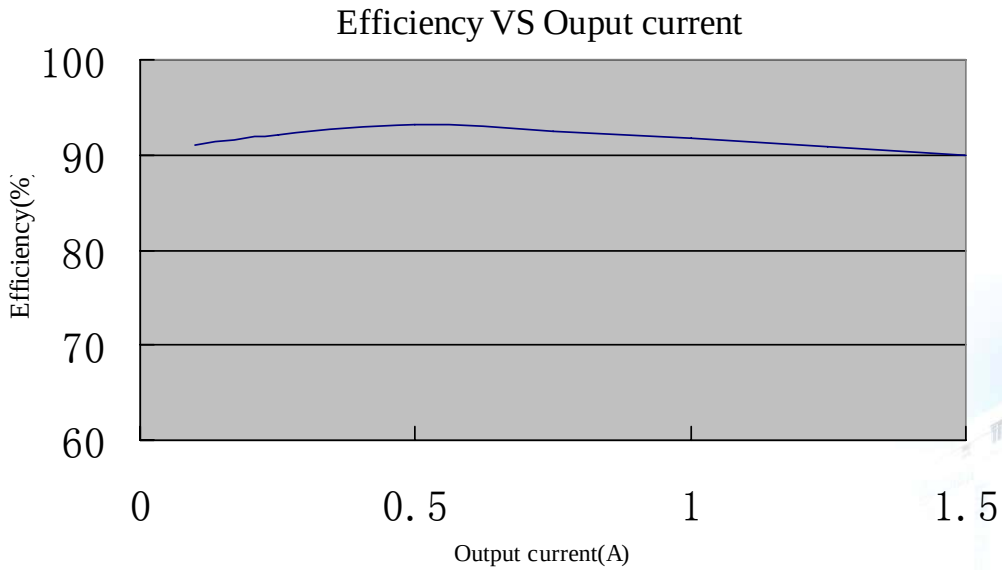




3. High System efficiency

Lowest on-resistance !

1. Advanced BCD technology, internal integrated PMOS.
2. On resistance ***0.2 Ω for SD45215SA/6JA***.
3. Adopts excellent system frame and the sample voltage is only ***75mV.***
4. High efficiency, SOP8 package, good heat dissipation performance, low heating of pipe core.



Conversion efficiency curve (VIN=12V, VOUT=5V)

4. Line loss Compensation

The output voltage of the switching regulator (VOUT) can be set with Equation following ：

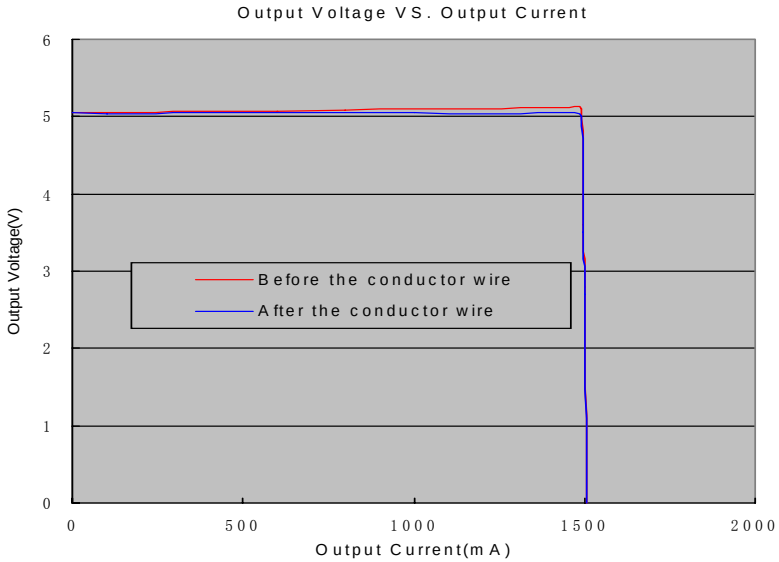
$$V_{OUT} = (1+\frac{R3}{R4})X0.835V$$

The limit current is set by the external resistor R2: $I_{LIMIT} = \frac{75mV}{R2}$

The SD4521X series uses a patent-pending output voltage compensation scheme for the line loss by properly selecting the value of R3、R4, if the conductor resistance is Rline, then:

$$R3 = \frac{Rline}{160\mu \cdot R2} \qquad R4 = \frac{0.835 \cdot R3}{V_{OUT} - 0.835}$$

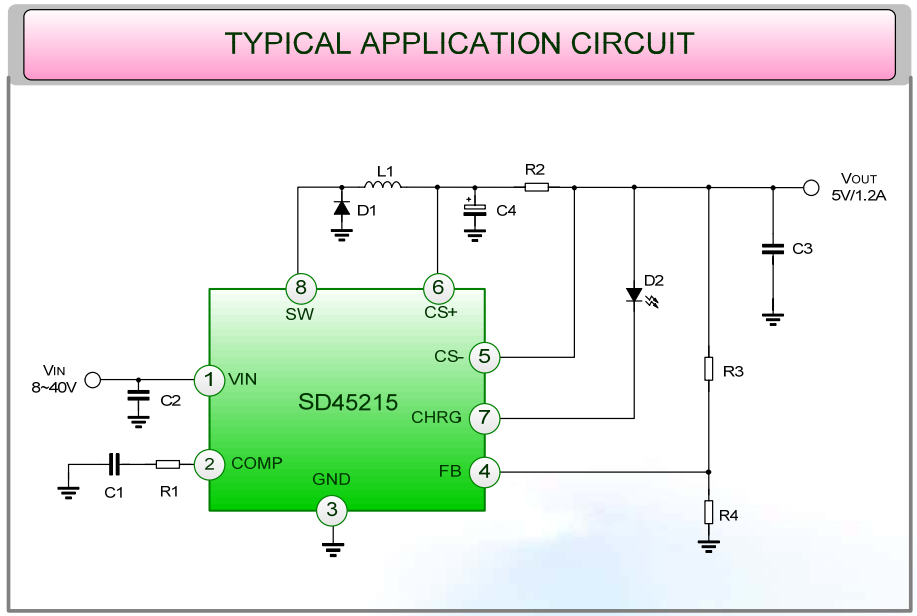
Given Rline=80mΩ, R2=50mΩ (current limit: 1.5A), VOUT=5V, So, R3=10k，R4=2k



Line loss compensation guarantees the loadside voltage is equal to the output voltage

5. Typical application of 45215SA/6JA

1. Wide input voltage range: 8V~40Vdc
2. Maximum 1.2A/***2.1A*** output current
3. CC/CV mode
4. Excellent constant current accuracy 5%
5. Line loss compensation
6. Short-circuit protection, during which the current is lower than 10mA



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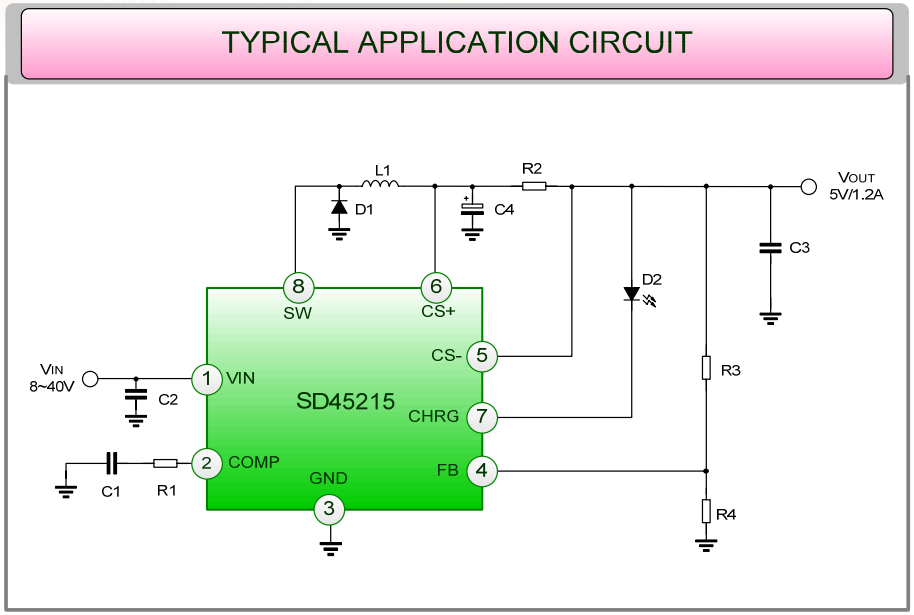
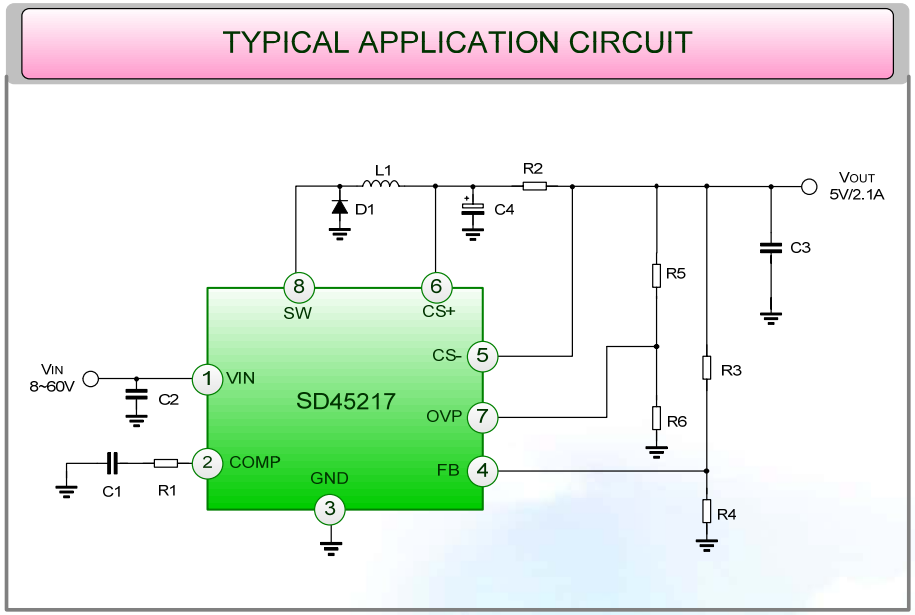


Quantity	Value/Part Number	Part Reference
1	SD45215SA/6JA	U1
1	Inductor,100uH	L1
1	2.2nF/10V	C1
1	10uF/50V	C2
1	10uF/16V	C3
1	220uF/16V	C4
1	5k	R1
1	0.05	R2
1	10k	R3
1	2k	R4
1	Diode,SS36	D1
1	Green LED	D2

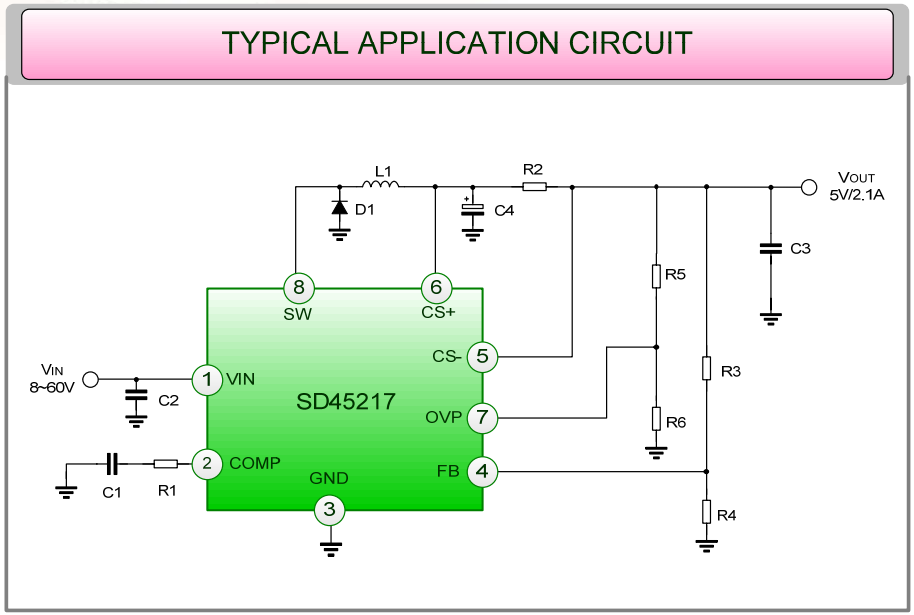
Only 11 components

6. Typical application of 45217JA

1. Wide input voltage range: ***8V~60***Vdc
2. Maximum ***2.1A*** output current
3. CC/CV mode
4. Excellent constant current accuracy 5%
5. Line loss compensation
6. **Over voltage Protection**
7. **Short-circuit protection, Auto recovery**



6. Typical application of 45217JA



Only 12 components

Quantity	Value/Part Number	Part Reference
1	SD45217JA	U1
1	Inductor,100uH	L1
1	2.2nF/10V	C1
1	10uF/100V	C2
1	10uF/16V	C3
1	220uF/16V	C4
1	10nF/16V	C5
1	5.1k	R1
1	0.033	R2
1	10k	R3
1	2k	R4
1	10k	R5
1	2k	R6
1	Diode,SS3100	D1

7. Comparison between SD4521X series and XX3015B

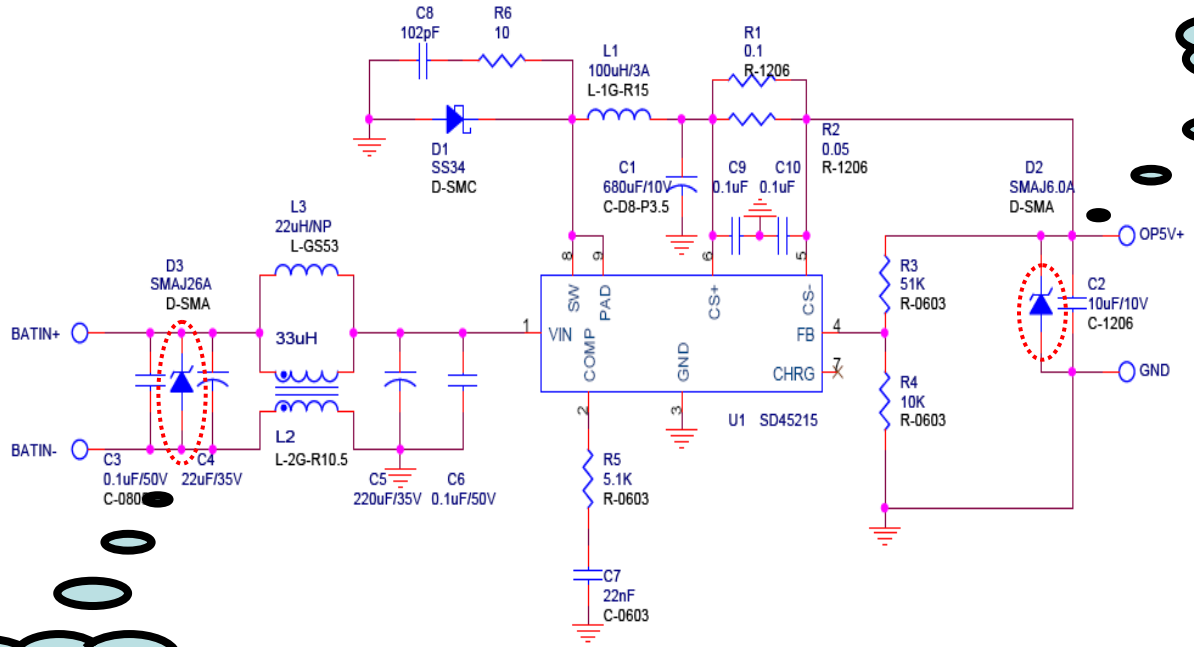
Part No.	SD45215SA	SD45216JA	SD45217JA	XX3015B
Power Supply	8～40V	8~40V	8～60V(2)	8～40V
MAX Output Current	1.2A(1)	2.1A	2.1A	2A
Power MOSFET	0.2Ω	0.2Ω(3)	0.25Ω	Vsat=1.1V
Sense voltage	75mV	75mV	75mV	140mV
Feedback voltage	835mV	835mV	835mV	1V
Switching frequency	120kHz	120kHz	120kHz	50kHz
Efficiency Vin=12V 5V/1.2A	91%	/	/	81%
Efficiency Vin=12V 5V/2.1A	/	88%	87%	/
Line loss compensation	Y	Y	Y	Y
Frequency jitter	Y	Y	Y	N
Peripheral components	11	11	12	14

(1) Current is limited due to the package

(2) Higher withstand input voltage could help to system cost down with deleting component such as TVS diodes

(3) Lower conduction resistance is the key reason for higher efficiency compared to XX3015B

The system can withstand higher transient voltage compared with 40V system so it is obvious that D3 could use lower dissipation TVS diode and D2 could be removed for cost down. And importantly it can work with 48V DC input.



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Use low power!

Summary

1. ***Efficiency*** of SD4521X series is higher than XX3015B ***by 5~10％***
2. Max. operating voltage: SD45217: ***60V***, XX3015B : ***40V***
3. ***Switching frequency*** of SD4521X series is faster than XX3015B
4. Less sense voltage and feedback voltage cause ***less power loss***
5. SD4521X series adopt fixed-frequency control with ***frequency jitter, have better anti-EMI performance*** than XX3015B.
6. SD45216JA/7JA have ***better heat dissipation performance***, which ensure larger output current.
7. Less peripheral components, ***Lower system cost.***

Thank you!

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