Low-Noise Charge Pump Boost DC-DC Converter

OV3571TR is a low-noise charge pump boost DC-DC converter with an input voltage range of 1.8V-5.5V and a constant frequency of 650KHz. It can handle a load current of up to 250mA without the need for an external inductor for boosting. The high integration, low noise, low EMI, and low ripple characteristics are achieved with minimal external components (one FLY capacitor and two bypass capacitors at the VIN and VOUT terminals) and a small package, making it suitable for small battery-powered applications. It features internal thermal shutdown and output short-circuit protection functions, and a soft-start circuit reduces the startup surge current, with a low shutdown current of less than 0.1uA.

Features

- ✧ Output Voltage Accuracy: ±3%
- ✧ Input Voltage Range: 1.8V-5.5V (VOUT=3.3V); 2.7V-5.5V (VOUT=5.0V)
- ✧ Output Current: Up to
  250mA (VIN=3.0V, VOUT=3.3V)
  300mA (VIN=3.6V, VOUT=5.0V)
- ✧ Operating Frequency: 650KHz
- ✧ Shutdown Current: <0.1uA
- ✧ No Inductor Application
- ✧ Short-Circuit Protection
- ✧ Soft Start
- ✧ 6-pin SOT23-6

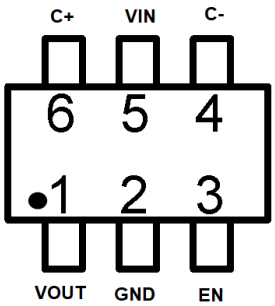
Applications

- ✧ White LED driving
- ✧ Lithium battery-powered applications
- ✧ 3V to 5V conversion applications
- ✧ 2AA battery to 3.3V conversion applications
- ✧ Smart card reading

Mechanical Data

- ✧ UL Flame Rating : UL94V-0
- ✧ Reel Size : 7 inch
- ✧ RoHS/WEEE Compliant

Pin Assignment



Pin Number	Pin Name	Function
1	VOUT	Output Voltage
2	GND	Common Ground
3	EN	Chip Enable
4	C-	Flying Capacitor Negative Terminal
5	VIN	Power Input
6	C+	Flying Capacitor Positive Terminal

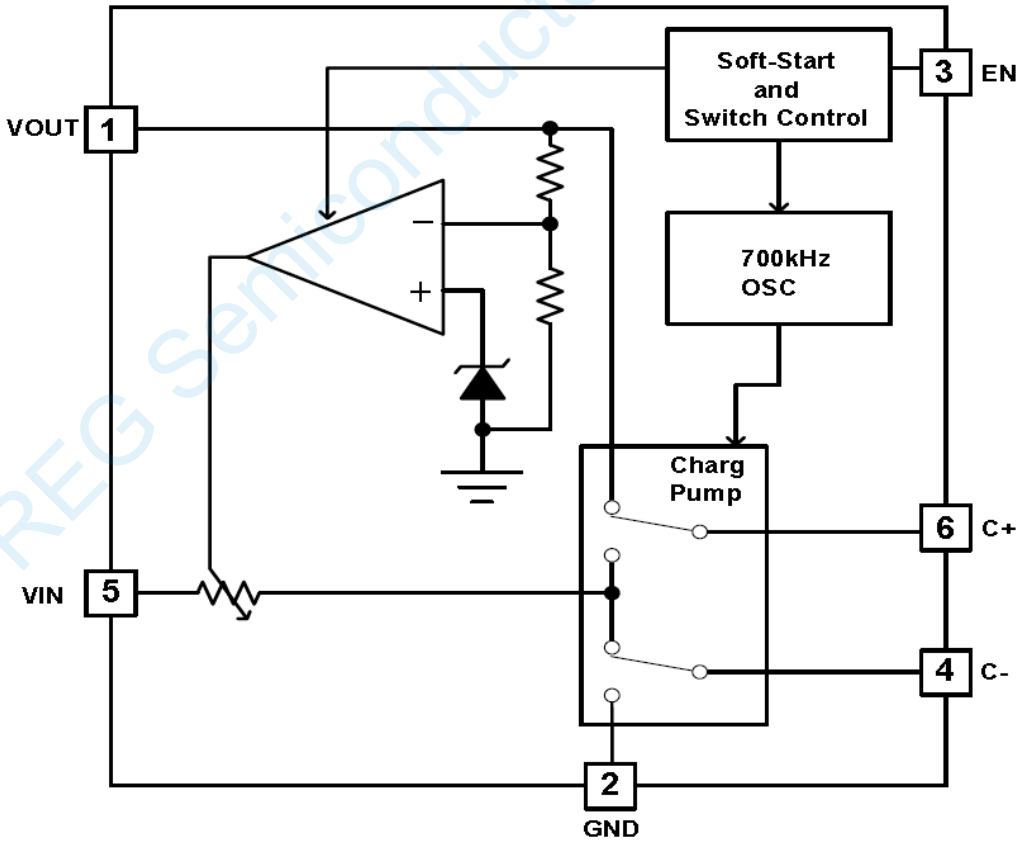
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Absolute Maximum Rating at T_A = 25 °C, unless otherwise specified

Parameter	Symbol	Maximum Rating	Unit
Input voltage	VIN	-0.3～6.0	V
Output voltage	VOUT	-0.3～6.0	
EN voltage	VEN	-0.3～6.0	
Output Current	IOUT	300	mA
Power Dissipation	PD	300	mW
Operating ambient temperature	Topr	-40～＋125	℃
Storage ambient temperature	Tstg	-50～＋150	

Caution:
The absolute maximum ratings are rated values exceeding which the product could suffer physical damage. These values must therefore not be exceeded under any conditions.

Block Diagram



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Electrical Characteristics at T_A = 25 °C, VIN =VEN,CIN=COUT=CFLY= 10uF,unless otherwise specified

OV3571TR33 (VOUT=3.3V)

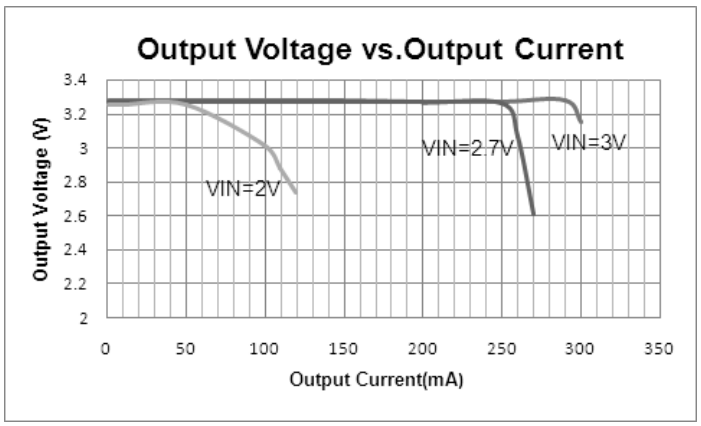
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Input voltage	VIN		1.8	-	5.5	V
Output voltage	VOUT	1.8V<VIN<3.0V,IOUT<10mA	3.201	3.3	3.399	V
Shutdown Current	ISHDN	VEN=0		0		uA
Supply Current	ISS	VIN=2.7V，IOUT=0mA		0.4		mA
Output Ripple	VRIPPLE	VIN=2.7V，IOUT=80mA		20		mV_{P-P}
Oscillator Frequency	f_{OSC}	VIN=2.7V，IOUT=80mA		650		kHz
Enable voltage	VEN			VIN/2		V

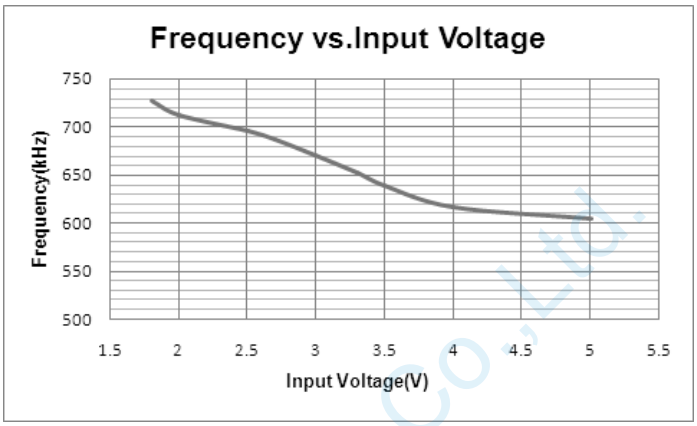
OV3571TR50 (VOUT=5.0V)

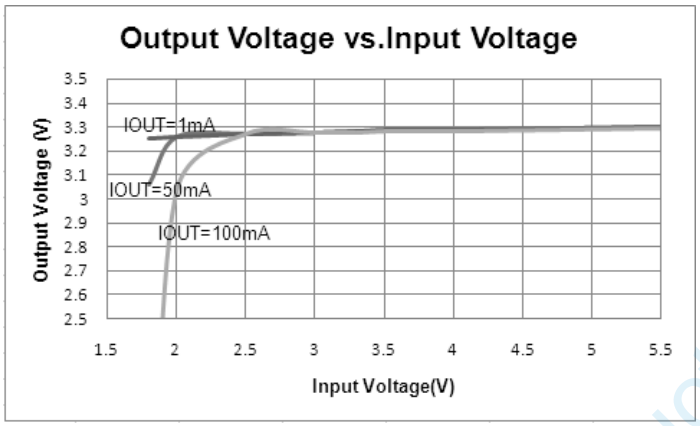
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Input voltage	VIN		2.7	-	5.5	V
Output voltage	VOUT	2.7V<VIN<5.5V,IOUT<65mA	4.85	5	5.15	V
Shutdown Current	ISHDN	VEN=0		0		uA
Supply Current	ISS	VIN=3.6V，IOUT=0mA		0.8		mA
Output Ripple	VRIPPLE	VIN=3.6V，IOUT=80mA		20		mV_{P-P}
Efficiency	EFFI	VIN=3V，IOUT=80mA		81		%
Oscillator Frequency	f_{OSC}	VIN=3.6V，IOUT=80mA		650		kHz
Enable voltage	VEN			VIN/2		V

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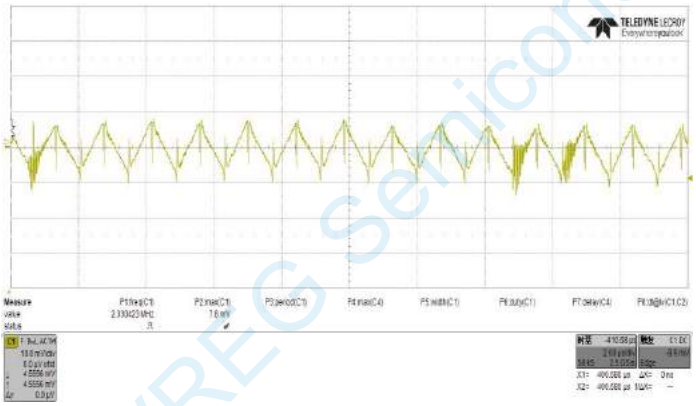
Typical Performance Characteristics(VOUT=3.3V)



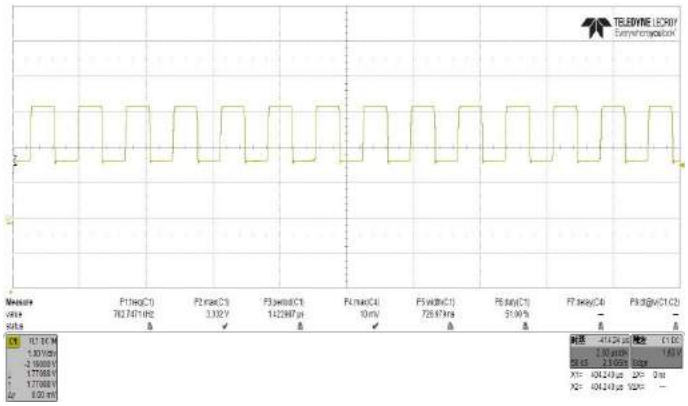




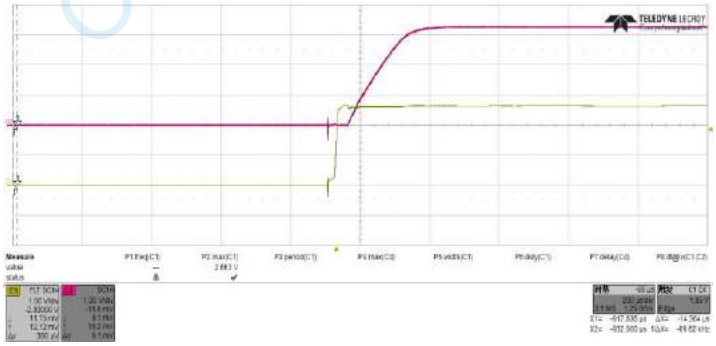
Output Noise(VIN=2.4V,IOUT=100mA)



C+ Noise(VIN=2.4V,IOUT=100mA)

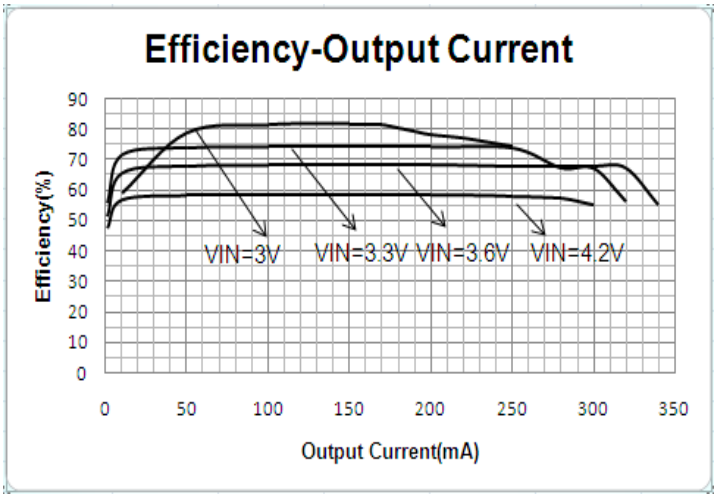


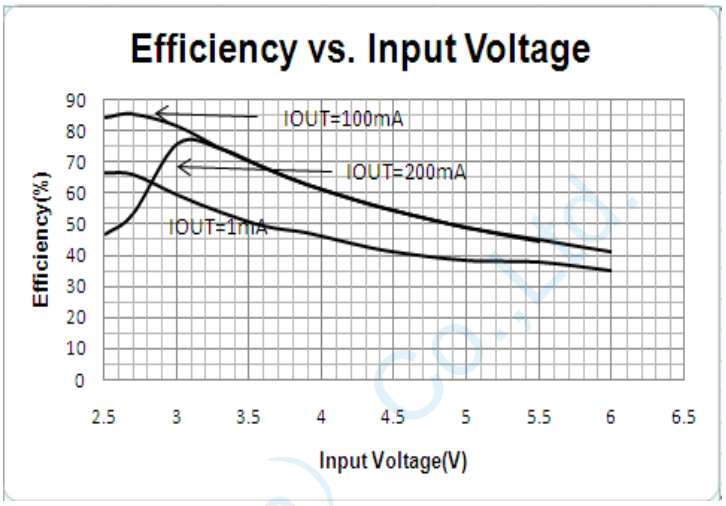
Soft Start

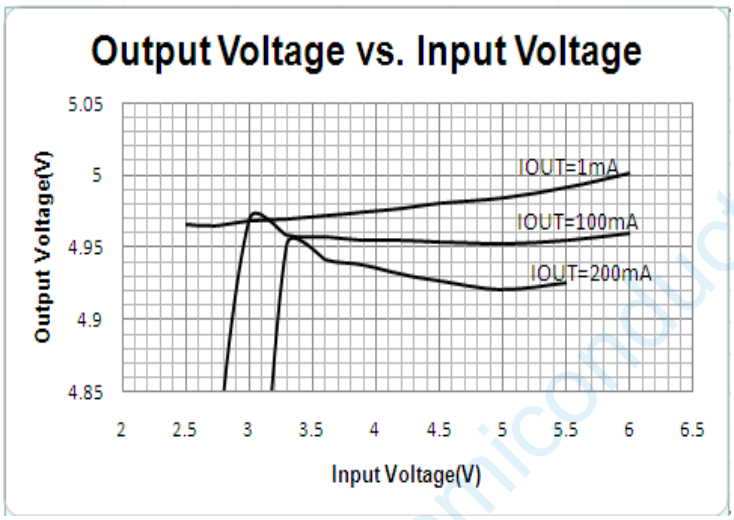


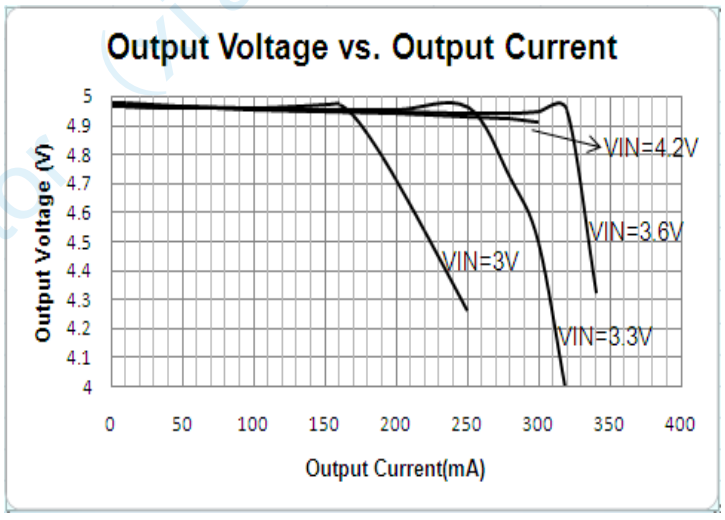
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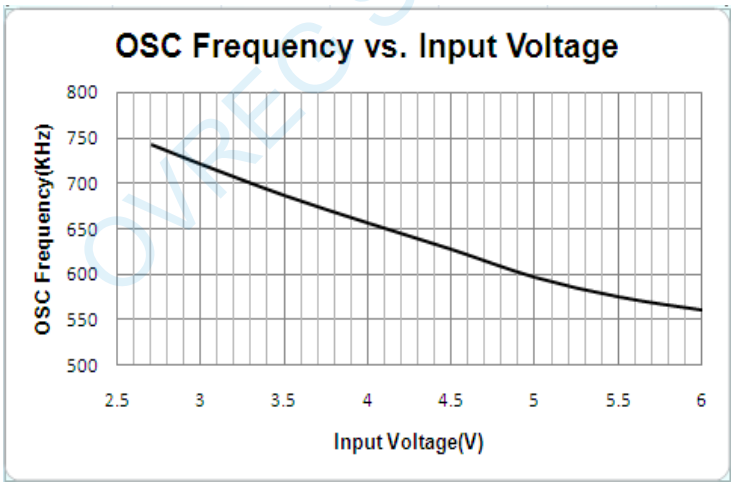
Typical Performance Characteristics(VOUT=5.0V)

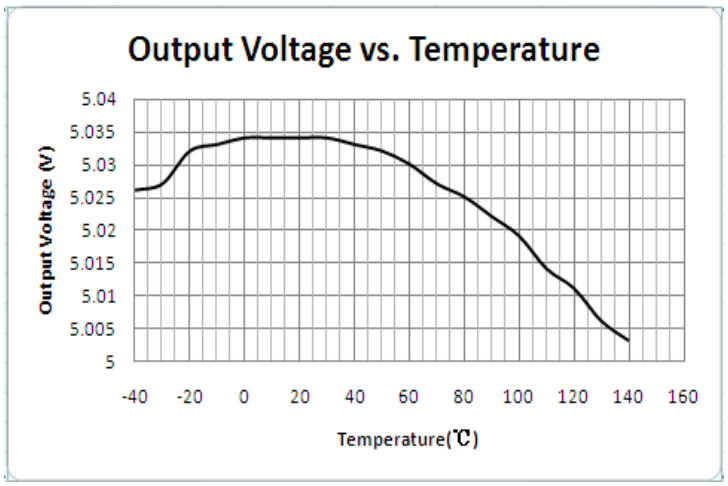








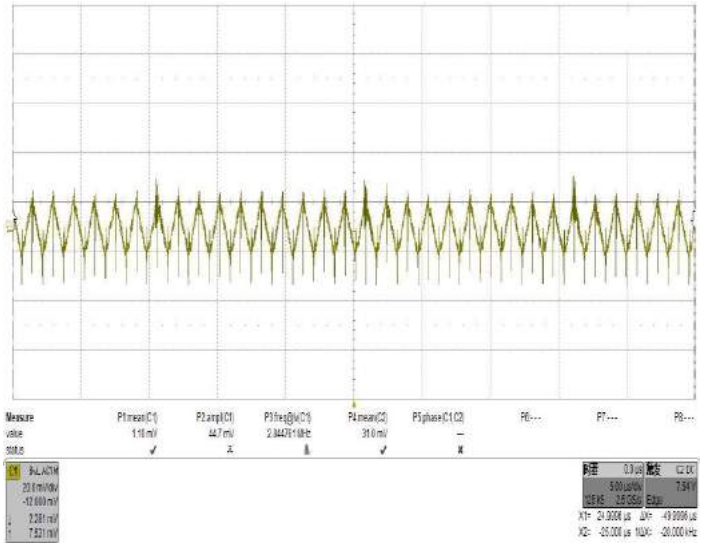




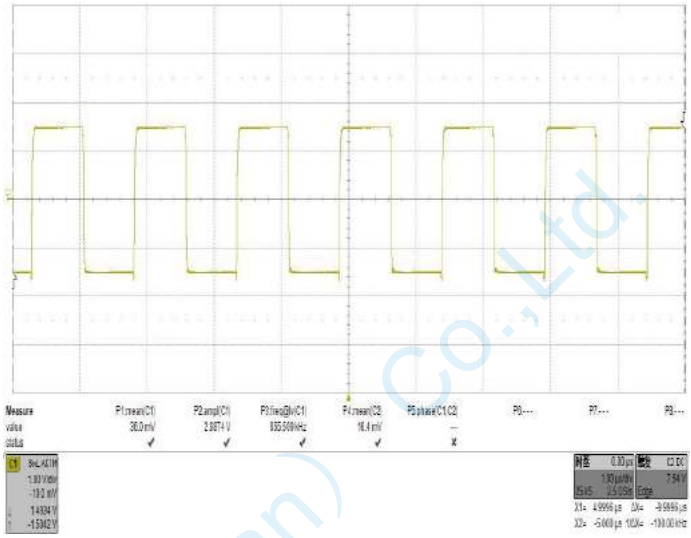
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Typical Performance Characteristics

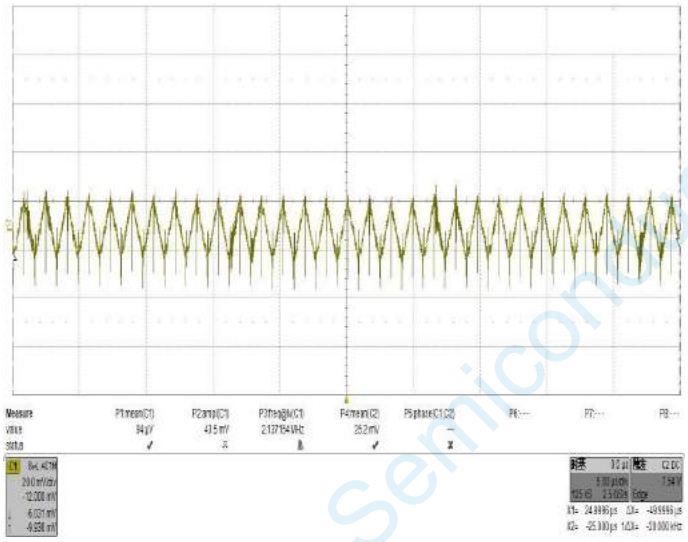
Output Noise(VIN=3.6V,IOUT=100mA)



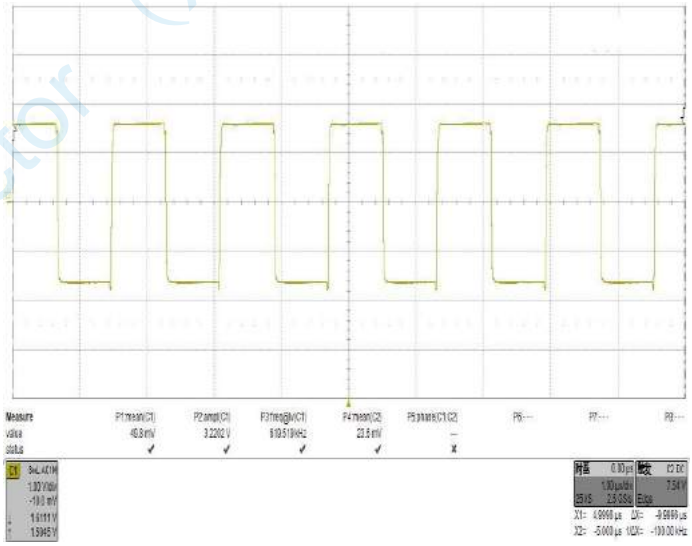
C+ Noise(VIN=3.6V,IOUT=100mA)



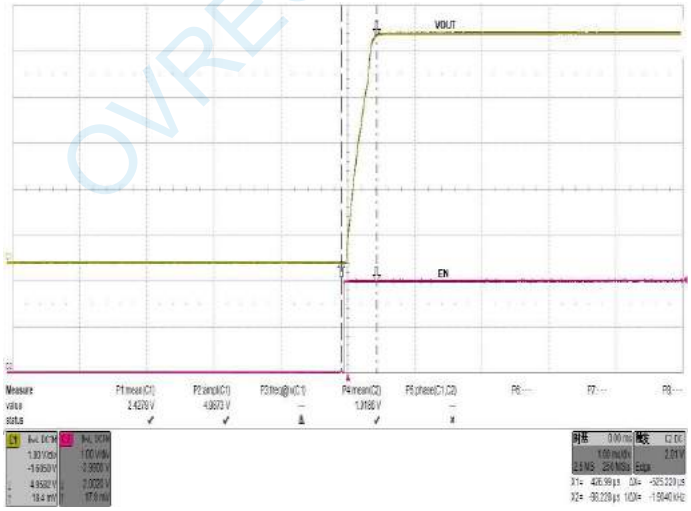
Output Noise(VIN=4.2V,IOUT=100mA)



C+ Noise(VIN=4.2V,IOUT=100mA)



Soft Start



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Application Information

Input and Output Capacitor

Selecting the appropriate capacitor type and capacitance is crucial for determining key performance parameters of the OV3571TR, such as loop temperature characteristics, output ripple, charging capability, and minimum startup time. To minimize noise and ripple, it is recommended to use low ESR (<0.1 Ω) ceramic capacitors for the input and output applications, with a capacitance greater than 0.47uF. Due to the higher ESR, tantalum capacitors or aluminum electrolytic capacitors are not recommended. The output capacitor directly affects the output voltage ripple, and increasing the output capacitor COUT can reduce the output ripple. The expression for output ripple is as follows:

$$V_{RIPPLEP-P} \cong \frac{I_{OUT}}{2f_{OSC} \times C_{OUT}}$$

fosc is the oscillator frequency of the OV3571TR, and COUT is the capacitance of the output capacitor. The capacitance and type of the output capacitor affect the overall stability. It is recommended to use ceramic capacitors with a capacitance greater than 0.45uF for the output of the OV3571TR.

Just as the output capacitor affects the output voltage ripple, the input capacitor affects the input power ripple. It is recommended to use low ESR ceramic capacitors.

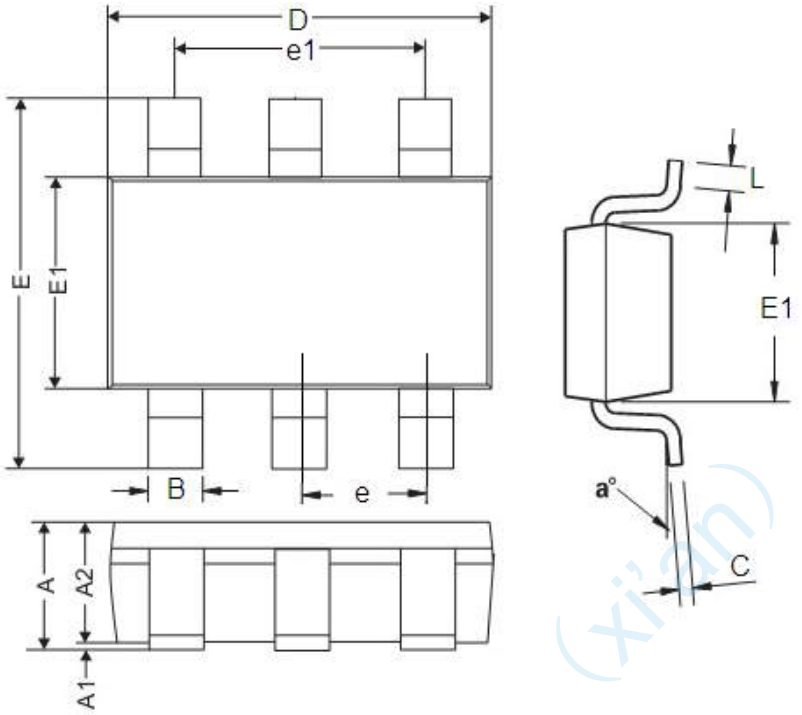
FLY Capacitor

Note: Polarized capacitors like tantalum capacitors and aluminum capacitors cannot be used for the FLY capacitor. Low ESR ceramic capacitors should be used here.

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Package Information

SOT23-6



Symbol	Dimensions (mm)		Dimensions (Inch)	
	min	max	min	max
A	0.9	1.45	0.0354	0.0570
A1	0	0.15	0	0.0059
A2	0.9	1.3	0.0354	0.0511
B	0.2	0.5	0.0078	0.0196
C	0.09	0.26	0.0035	0.0102
D	2.7	3.10	0.1062	0.1220
E	2.2	3.2	0.0866	0.1181
E1	1.30	1.80	0.0511	0.0708
e	0.95REF		0.0374REF	
e1	1.90REF		0.0748REF	
L	0.10	0.60	0.0039	0.0236
a^0	0^0	30^0	0^0	30^0

Ordering Information

Part number	Material	Type	Reel size	MOQ
OV3571TR33	GREEN	T/R	7 inch	3K
OV3571TR50				

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