

1. Description

The uP7313K is a highly integrated solution for a constant voltage/constant current mode SMPS application.

The uP7313K contains one 1.21V voltage reference, one low voltage reference used in current sensing circuit and two operational amplifiers. The 1.21V voltage reference, combined with one operational amplifier, makes of an ideal voltage controller for use in adapters and battery chargers. The low voltage reference, combined with another operational amplifier, makes of an ideal current limiter for output low side current sensing.

The uP7313K has lower reference voltage for current control loop, thus higher power efficiency is achieved in SMPS applications such as low power charger

The uP7313K is available in SOT26 package.

2. Applications

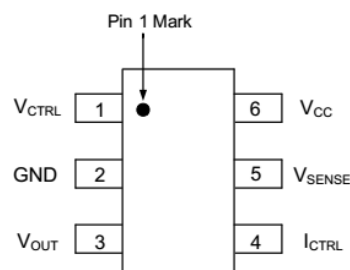
- AC/DC Adapters
- Battery Chargers

3. Features

- Both Constant Voltage and Current
- Precision Internal Voltage Reference
- Low External Component Count
- Easy Compensation
- Low Supply Current: 180uA
- Current Control Loop Reference: 200mV
- Operating Supply Voltage: 1.7V to 40V

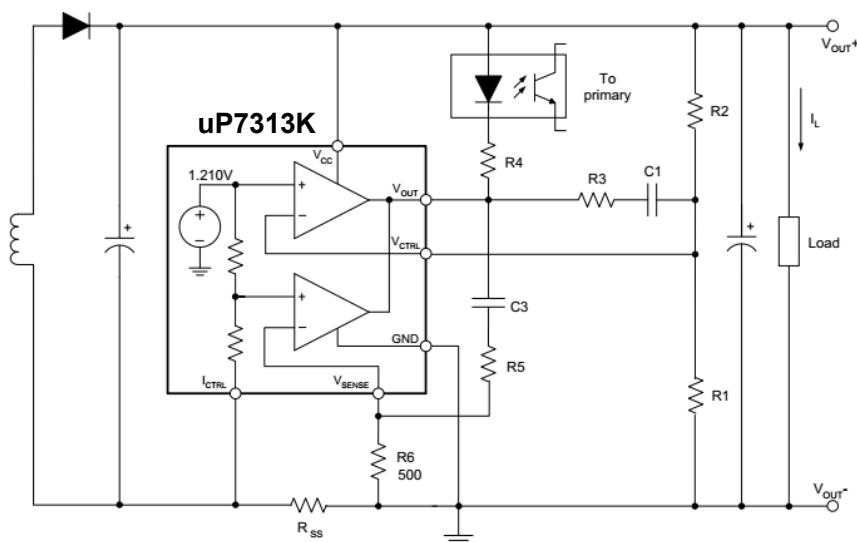
4. Pin Assignments

(Top View)



SOT26 (K6 Package)

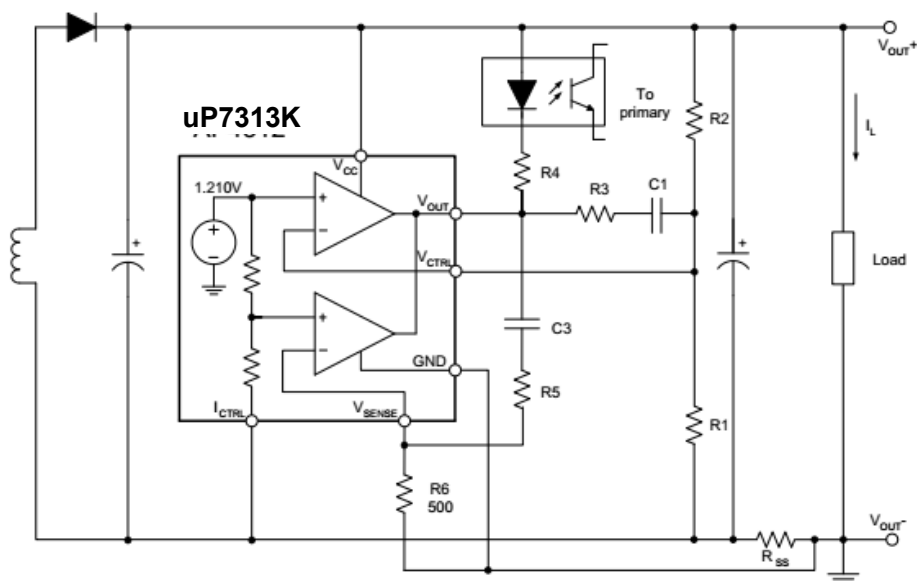
5. Typical Application



$$V_{OUT} = V_{REF} \times \frac{R1 + R2}{R1}$$

$$CurrentLimit = \frac{V_{SENSE}}{R_{SS}}$$

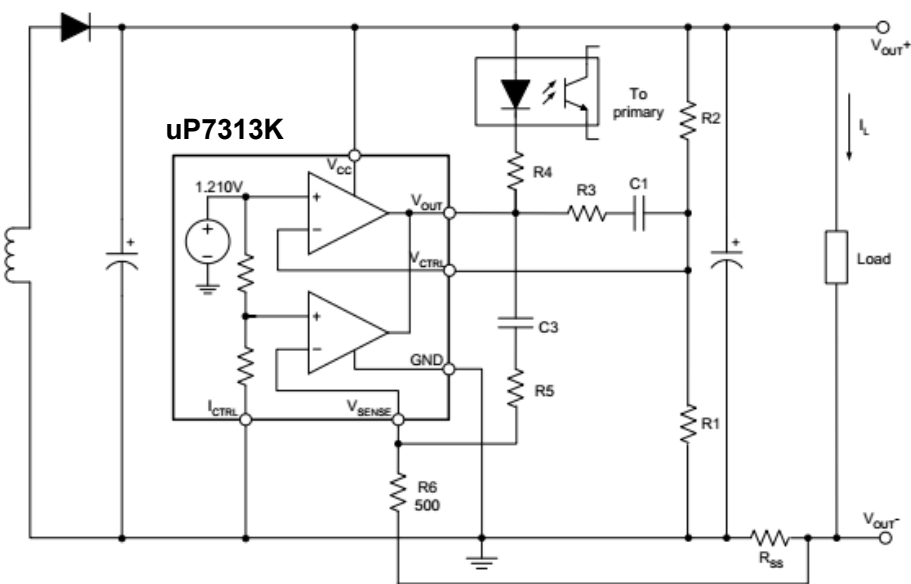
Typical Application 1



$$V_{OUT} = [V_{REF} + (I_L \times R_{SS})] \times \frac{R1 + R2}{R1} - (I_L \times R_{SS})$$

$$CurrentLimit = \frac{V_{SENSE}}{R_{cc}}$$

Typical Application 2



$$V_{OUT} = V_{REF} \times \frac{R1 + R2}{R1} - (I_L \times R_{SS})$$

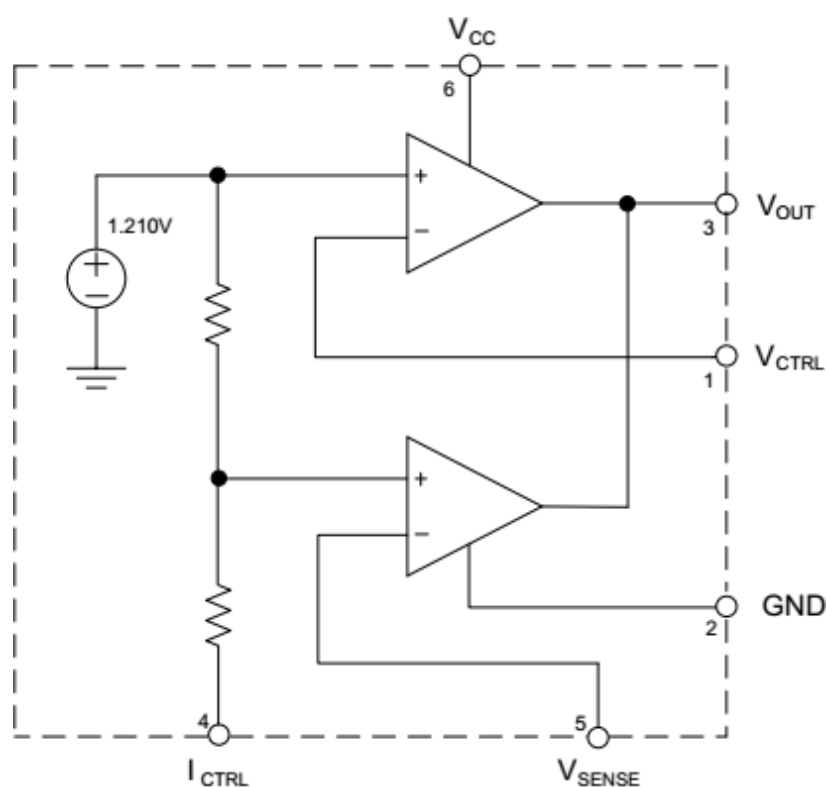
$$CurrentLimit = \frac{V_{SENSE} \times V_{REF}}{(V_{SENSE} + V_{REF}) \times R_{SS}}$$

Typical Application 3

6. Pin descriptions

Pin number	Pin Name	Pin Functions
1	V _{CTRL}	Input pin of the voltage control loop
2	GND	Ground
3	V _{OUT}	Output pin. Sinking current only
4	I _{CTRL}	Input pin of the current control loop
5	V _{SENSE}	Input pin of the current control loop
6	V _{CC}	Power Supply

7. Functional Block Diagram



8. Absolute Maximum Ratings (Note 1)

Parameter	Name	Range	Unit
Power Supply Voltage	V_{CC}	40	V
Input Voltage (V_{IN} Pin)	V_{IN}	-0.3 to V_{CC}	V
Junction Temperature	T_J	+150	°C
Storage Temperature	T_{STG}	-65 to +150	°C
Lead Temperature (Soldering, 5sec)	T_{LEAD}	+260	°C
Thermal Resistance (Junction to Ambient)	θ_{JA}	250	°C/W

Note 1: Stresses greater than those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “Recommended Operating Conditions” is not implied. Exposure to “Absolute Maximum Ratings” for extended periods may affect device reliability.

9. Thermal Impedance

Symbol	Parameter	Value	Unit
θ_{JC}	Thermal Resistance (Junction to Case)	84	°C/W

10. Recommended Operating Conditions

Symbol	Parameter	Min	Max	Unit
VCC	Power Voltage Supply	1.7	40	V

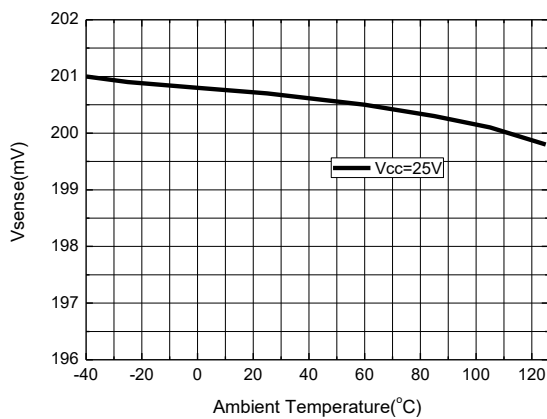
11. Electrical Parameter

(@V_{CC}=20V, T_A=25 °C, unless otherwise specified.)

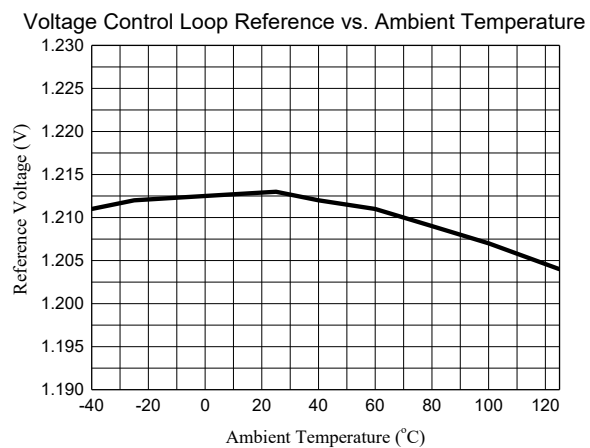
Parameter	Symbol	Condition	Min	Typ	Max	Unit
TOTAL CURRENT CONSUMPTION						
Total Supply Current Not Including the Output Sinking Current	I _{CC}	V _{CTRL} =V _{SENSE} =0V, V _{OUT} =Open	–	160	–	μA
VOLTAGE CONTROL LOOP						
Transconduction Gain (V _{CTRL}). Sink Current Only	G _{mv}	–	1	3.5	–	mA/mV
Voltage Control Loop Reference	V _{REF}	T _A =+25°C	1.198	1.21	1.222	V
Input Bias Current (V _{CTRL})	I _{IBV}	–	–	18	–	nA
CURRENT CONTROL LOOP						
Transconduction Gain (I _{CTRL}). Sink Current Only	G _{mi}	–	1.5	7	–	mA/mV
Current Control Loop Reference	V _{SENSE}	I _{out} =-2.5mA	196	200	204	mV
Current Out of Pin I _{CTRL} at V _{SENSE}	I _{IBI}	–	–	25	–	μA
OUTPUT STAGE						
Low Output Voltage at 10mA Sinking Current	V _{OL}	–	–	200	–	mV
Output Short Circuit Current. Sink Current Only	I _{OS}	–	–	27	–	mA

12. Performance Characteristics

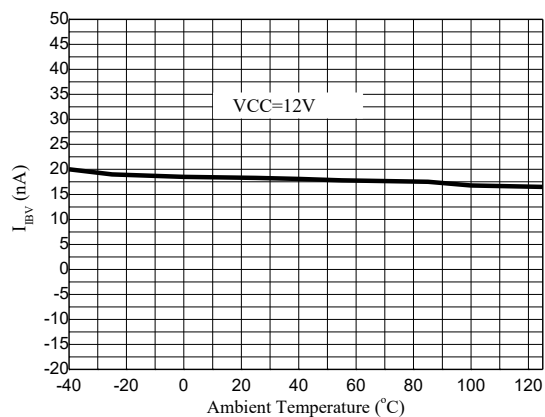
Voltage Control Loop Reference
vs. Ambient Temperature



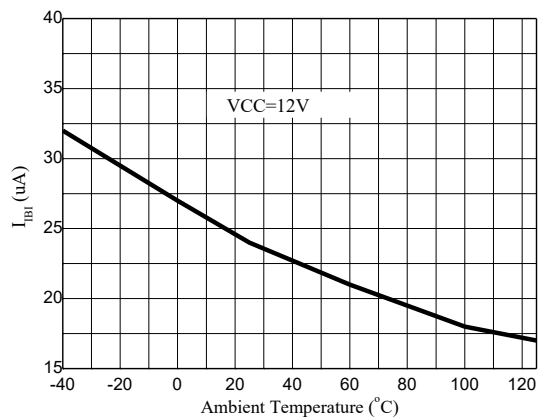
Current Control Loop Reference vs. Ambient
Temperature



V_{CTRL} Pin Input Bias Current vs. Temperature



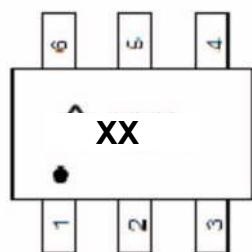
I_{CTRL} Pin Input Bias Current vs. Temperature



13. Ordering Information

Package	Part Number	Marking ID	Packing
SOT26	uP7313K	13	3000/Tape & Reel

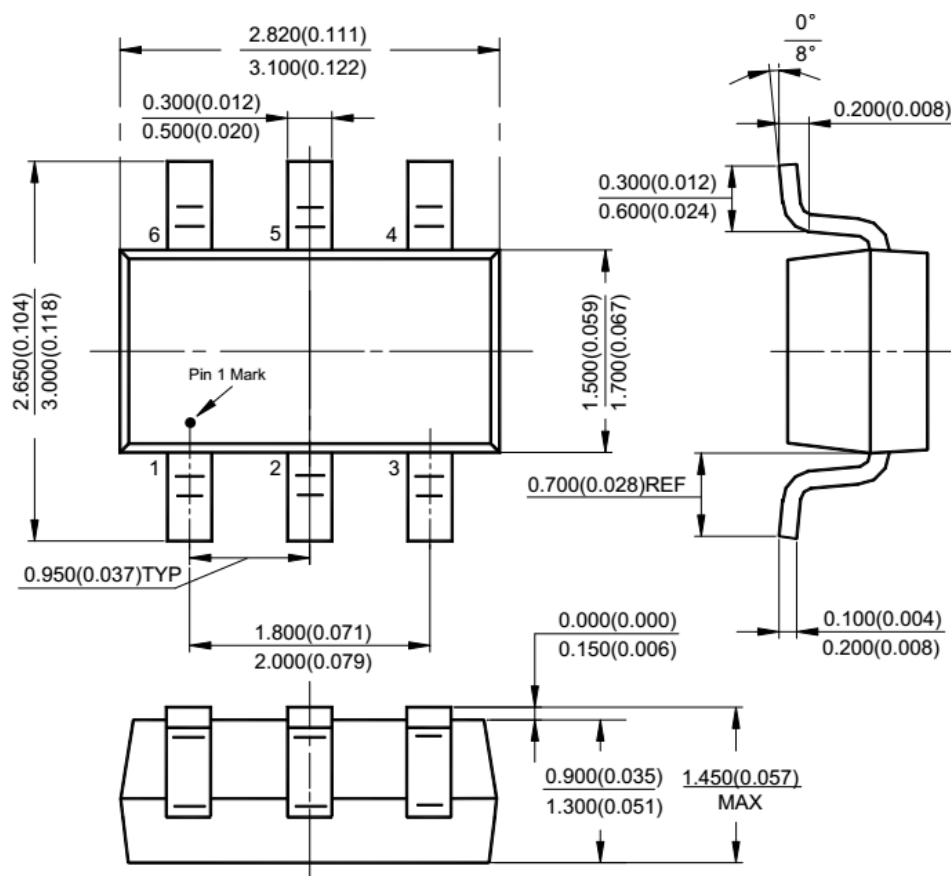
14. Marking Information



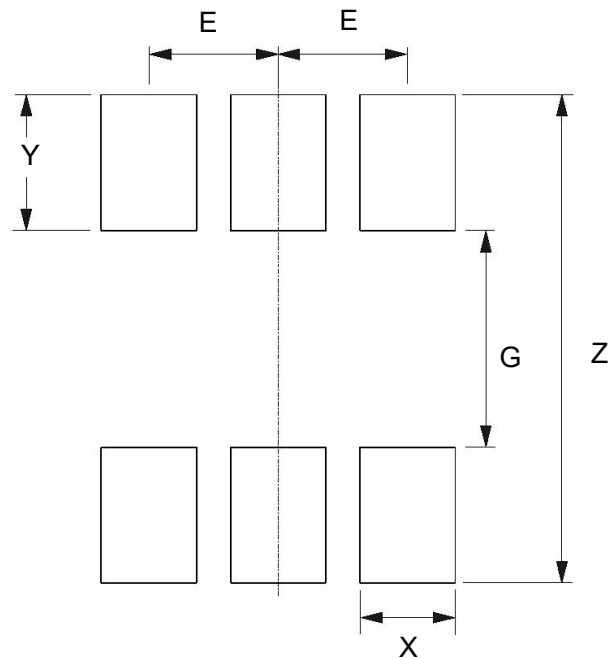
XX: Marking ID (See ordering information)

15. Mechanical dimensions(All dimensions in mm(inch).)

(1) Package Type: SOT26



16. Suggested Pad Layout



Dimensions	Z (mm)/(inch)	G (mm)/(inch)	X (mm)/(inch)	Y (mm)/(inch)	E (mm)/(inch)
Value	3.600/0.142	1.600/0.063	0.700/0.028	1.000/0.039	0.950/0.037