

1. Description

The uP7320BK is a highly integrated solution for a constant voltage/constant current mode SMPS application.

The uP7320BK contains one 2.5V voltage reference and two operational amplifiers. The 2.5V 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 uP7320BK is available in SOT23-6L package.

2. Applications

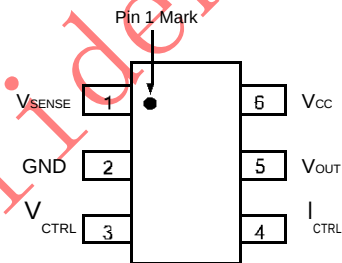
- AC/DC Adapters
- Battery Chargers
- LED Drivers

3. Features

- Constant Voltage and Constant Current Control
- Low External Component Count
- Easy Compensation
- Low Supply Current: 190uA
- Precision Internal Voltage Reference: 2.5V
- Operating Supply Voltage: 3.5V to 36V
- Low Current Sense Threshold: 50mV

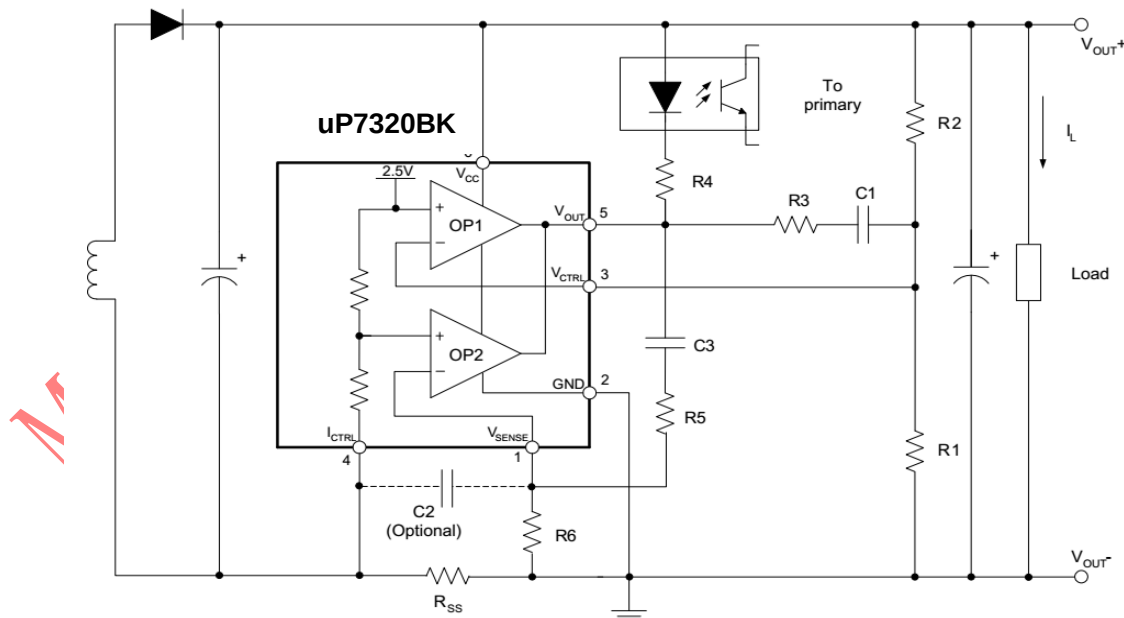
4. Pin Assignments

(Top View)



SOT23-6L (K6 Package)

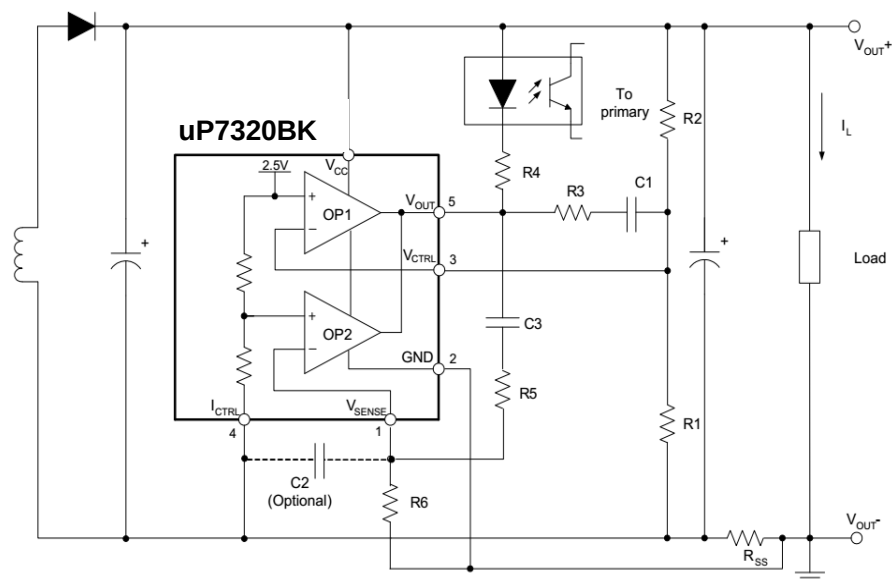
5. Typical Application



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

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

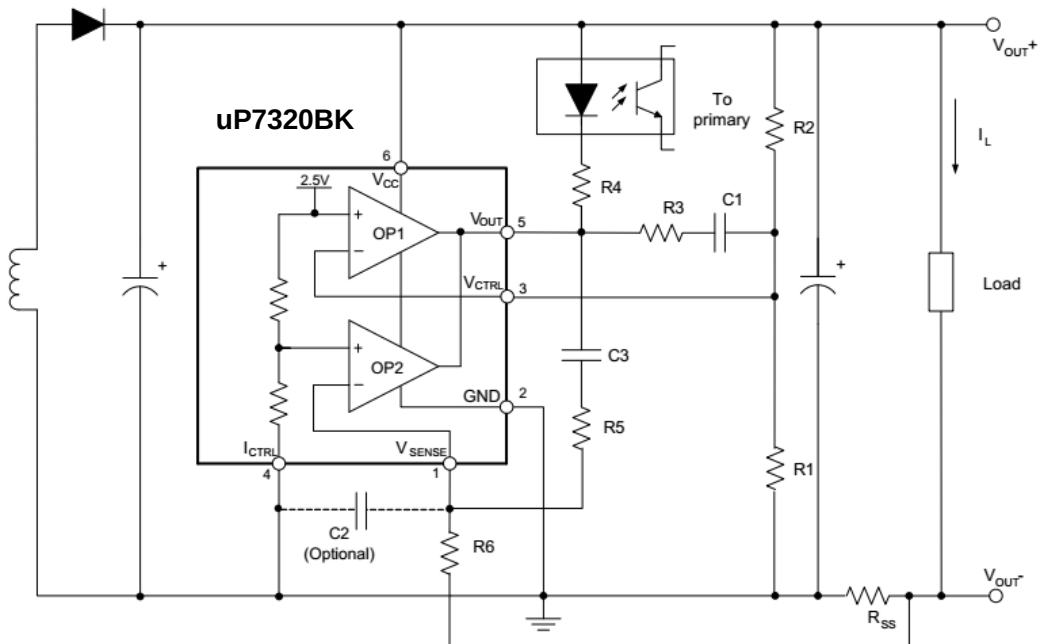
Typical Application 1



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

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

Typical Application 2



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

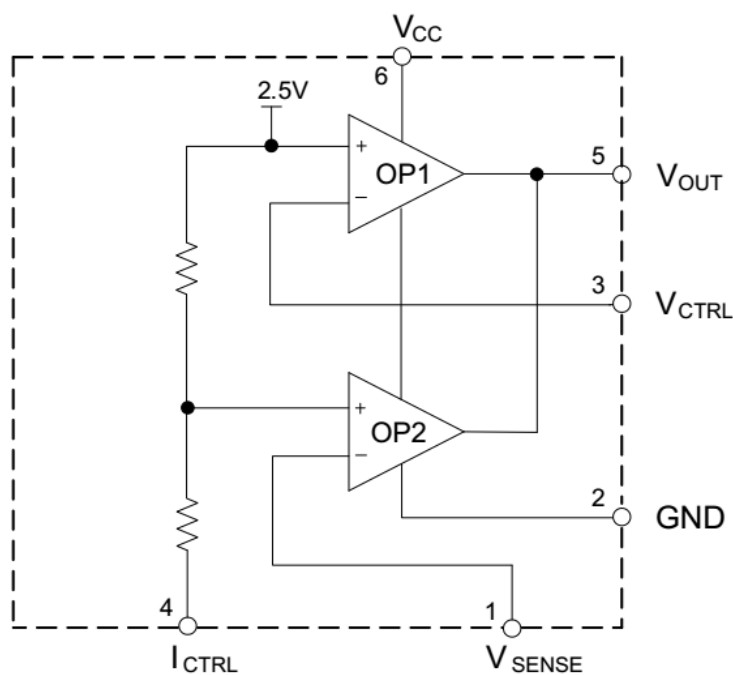
$$CurrentLimit = \frac{V_{SENSE} \times V_{REF}}{(V_{SENSE} + V_{REF}) \times R_{SS}}$$

Typical Application 3

6. Pin descriptions

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

7. Functional Block Diagram



8. Absolute Maximum Ratings (Note 1)

Parameter	Name	Range	Unit
Power Supply Voltage	V _{CC}	-0.3 to 38	V
Input Voltage (V _{OUT} Pin)	V _{OUT}	-0.3 to V _{CC}	V
Input Voltage (I _{CTRL} Pin)	V _{CTRL}	-0.3 to 18	V
Input Voltage (V _{SENSE} Pin)	V _{SENSE}	-0.3 to 18	V
Input Voltage (V _{CTRL} Pin)	V _{CTRL}	-0.3 to 18	V
Junction Temperature	T _J	+150	°C
Storage Temperature	T _{STG}	-55 to +150	°C
Lead Temperature (Soldering, 5sec)	T _{LEAD}	+260	°C
Thermal Resistance (Junction to Ambient)	θ _{JA}	250	°C/W
ESD Rating per ANSI/STM5.1-2001 : class 2	HBM	+/-3000	V
ESD Rating per JEDEC EIA/JESD22-C101F : class C3	CDM	+/-1000	V

Note1: 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. Recommended Operating Conditions

Symbol	Parameter	Range	Unit
V _{CC}	Power Voltage Supply	3.5~36	V

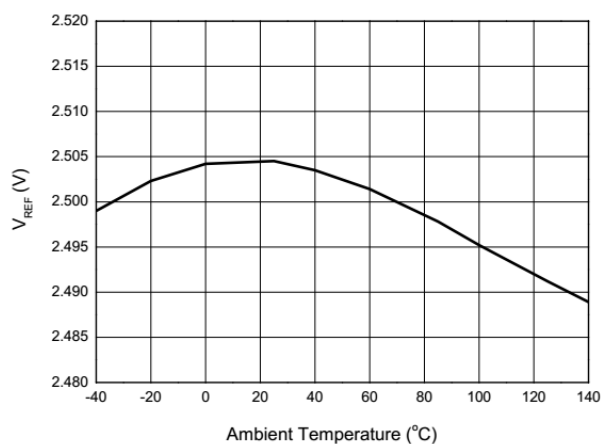
10. Electrical Parameter

(@V_{CC}=20V, -25 °C <T_A<+125 °C, unless otherwise specified.)

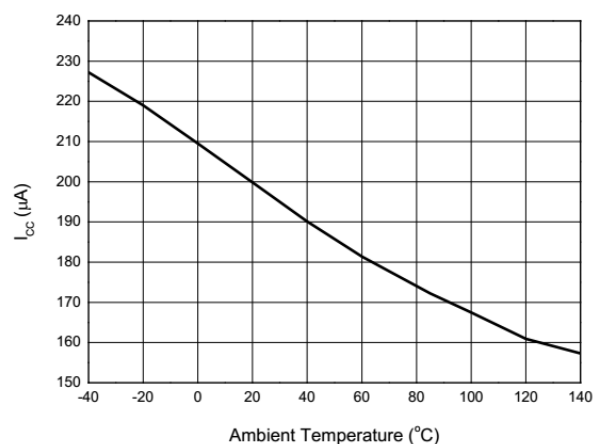
Parameter	Symbol	Condition	Min	Typ	Max	Unit
TOTAL CURRENT CONSUMPTION						
Total Supply Current Not Including the Output Sinking Current	I _{CC}	V _{CTRL} =V _{SENSE} =0V, V _{OUT} =Open	–	190	–	μA
VOLTAGE CONTROL LOOP						
Transconduction Gain (V _{CTRL}). Sink Current Only	G _{mv}	–	1	3.5	–	mA/mV
Voltage Control Loop Reference	V _{REF}	T _A =+25°C	2.488	2.50	2.512	V
		–	2.48	–	2.52	V
Input Bias Current (V _{CTRL})	I _{IBV}	–	–	25	–	nA
CURRENT CONTROL LOOP						
Transconduction Gain (I _{CTRL}). Sink Current Only	G _{mi}	–	1.5	7	–	mA/mV
Current Control Loop Reference	V _{SENSE}	uP7320BK, T _A =+25°C	48.5	50	51.5	mV
		–	46	50	54	
Current Out of Pin I _{CTRL} at V _{SENSE}	I _{IBI}	uP7320BK, V _{CTRL} =-50mV	–	16	–	μA
OUTPUT STAGE						
Low Output Voltage at 2mA Sinking Current	V _{OL}	–	–	30	100	mV
Output Short Circuit Current. Sink Current Only	I _{OS}	V _{OUT} =4V	–	30	–	mA

11. Performance Characteristics

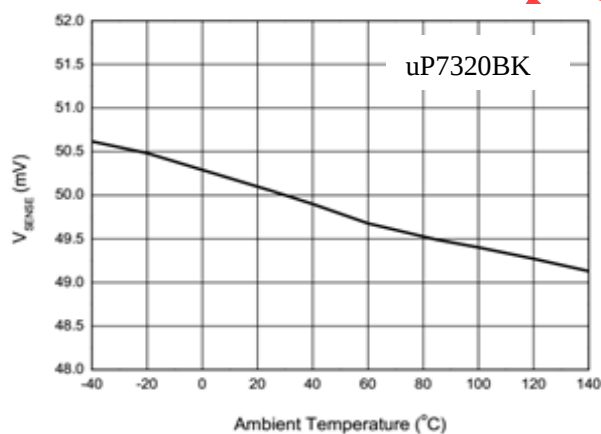
V_{REF} vs. Ambient Temperature



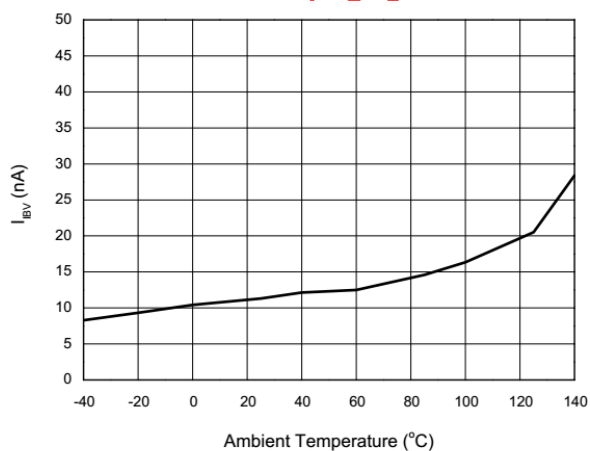
I_{CC} vs. Ambient Temperature



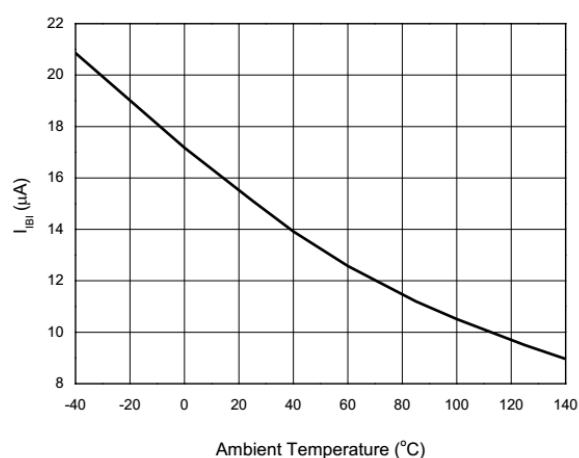
V_{SENSE} vs. Ambient Temperature



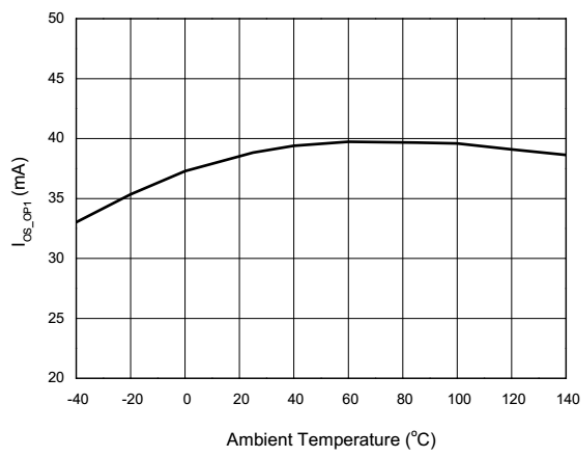
I_{IBV} vs. Ambient Temperature



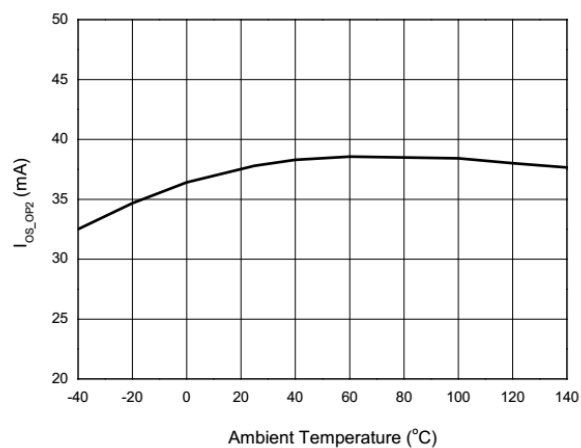
I_{IBI} vs. Ambient Temperature



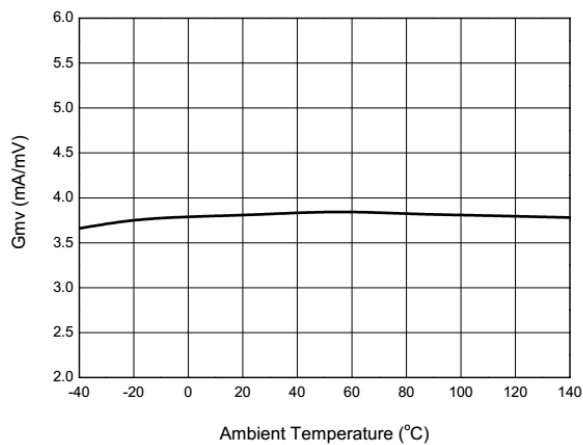
I_{OS_OP1} vs. Ambient Temperature



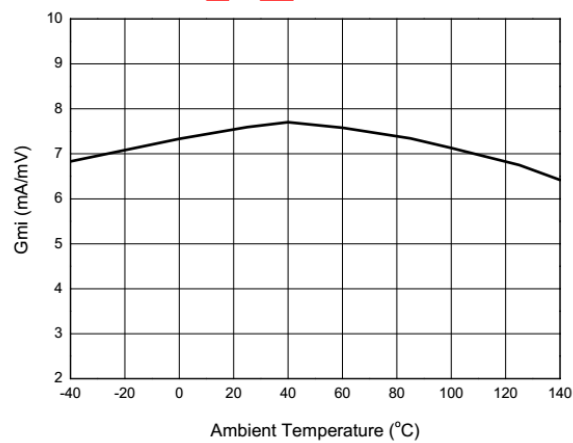
I_{OS_OP2} vs. Ambient Temperature



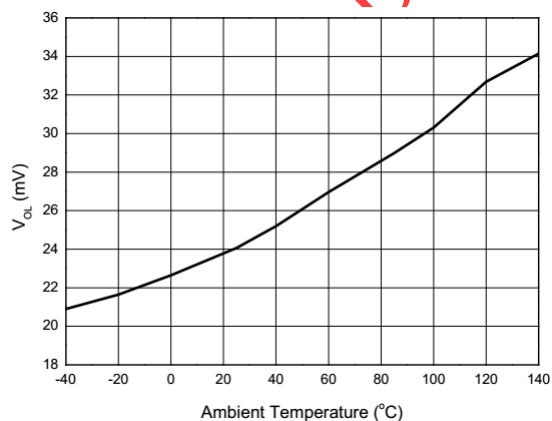
G_{mv} vs. Ambient Temperature



G_{mi} vs. Ambient Temperature



V_{OL} vs. Ambient Temperature



12. Ordering Information

Package	Version	Part Number	Marking ID	Packing
SOT23-6L	50mV V _{SENSE}	uP7320BK	20B	3000/Tape and Reel

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

(1) Package Type: SOT23-6L

