



CONSTANT VOLTAGE AND CONSTANT CURRENT CONTROLLER

AP4305

General Description

The AP4305 is a highly integrated solution for a constant voltage/constant current mode SMPS application.

The AP4305 contains one 1.21V voltage reference with $\pm 0.5\%$ accuracy, one current sensing circuit and two operational amplifiers. Combining the voltage reference with one operational amplifier makes AP4305 an ideal voltage controller for use in adapters and battery chargers. The other low voltage reference combined with the other operational amplifier makes it an ideal current limiter for output low side current sensing.

The AP4305 is available in SOT-23-6 package.

Features

- Constant Voltage and Constant Current Control
- Precision Internal Voltage Reference
- Few External Components
- Easy Compensation

Applications

- Adapters
- Battery Chargers



Figure 1. Package Type of AP4305



CONSTANT VOLTAGE AND CONSTANT CURRENT CONTROLLER AP4305

Pin Configuration

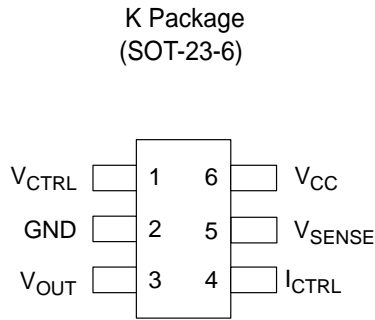


Figure 2. Pin Configuration of AP4305 (Top View)

Pin Description

Pin Number	Pin Name	Function
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



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Functional Block Diagram

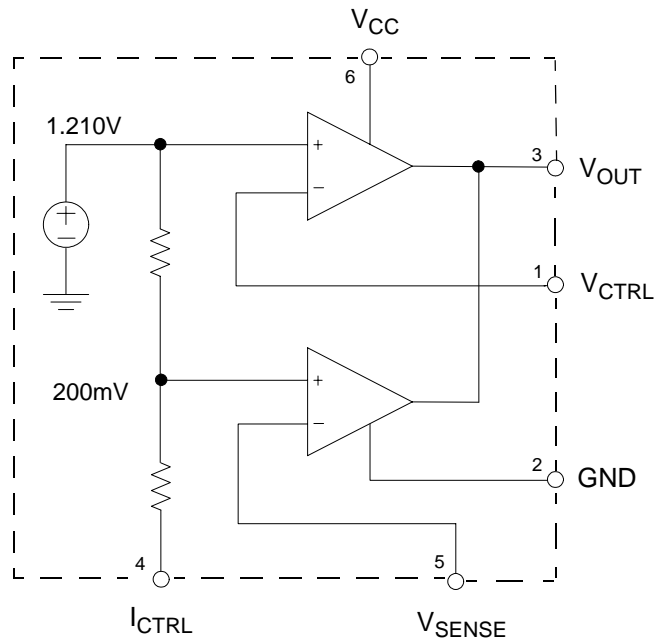
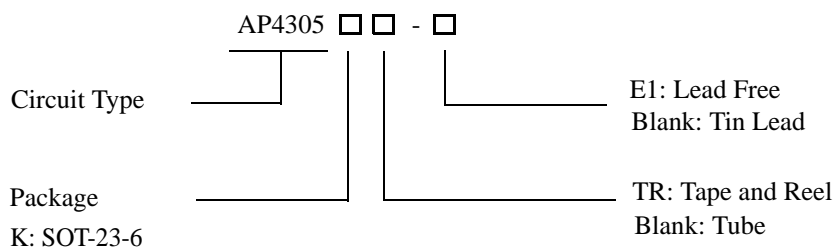


Figure 3. Functional Block Diagram of AP4305

Ordering Information



Package	Temperature Range	Part Number		Marking ID		Packing Type
		Tin Lead	Lead Free	Tin Lead	Lead Free	
SOT-23-6	-40 to 105°C	AP4305KTR	AP4305KTR-E1	K2B	E2B	Tape & Reel

BCD Semiconductor's Pb-free products, as designated with "E1" suffix in the part number, are RoHS compliant.

**CONSTANT VOLTAGE AND CONSTANT CURRENT CONTROLLER AP4305****Absolute Maximum Ratings (Note 1)**

Parameter	Symbol	Value	Unit
Power Supply Voltage	V_{CC}	20	V
Input Voltage	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
Package Thermal Resistance (Junction to Case)	θ_{JC}	92	°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.

Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Power Supply Voltage	V_{CC}	2.5	18	V
Operating Temperature Range	T_A	-40	105	°C



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Electrical Characteristics

($V_{CC}=5V$, $T_A=25^{\circ}C$, unless otherwise specified.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit	
TOTAL CURRENT CONSUMPTION							
Total Supply Current Not Including the Output Sinking Current	I_{CC}	$T_A=25^{\circ}C$		0.5	1	mA	
		$-40^{\circ}C < T_A < 105^{\circ}C$		0.6			
VOLTAGE CONTROL LOOP							
Transconduction Gain (V_{CTRL}). Sink Current Only	G_{mv}	$T_A=25^{\circ}C$	1	3.5		mA/mV	
		$-40^{\circ}C < T_A < 105^{\circ}C$		2.5			
Voltage Control Loop Reference	V_{REF}	$T_A=25^{\circ}C$	1.204	1.21	1.216	V	
		$-40^{\circ}C < T_A < 105^{\circ}C$	1.186		1.234		
Input Bias Current (V_{CTRL})	I_{IBV}	$T_A=25^{\circ}C$		50		nA	
		$-40^{\circ}C < T_A < 105^{\circ}C$		100			
CURRENT CONTROL LOOP							
Transconduction Gain (I_{CTRL}). Sink Current Only	G_{mi}	$T_A=25^{\circ}C$	1.5	7		mA/mV	
Current Control Loop Reference	V_{SENSE}	$I_{OUT}=2.5$ mA	$T_A=25^{\circ}C$	198	200	202	mV
			$-40^{\circ}C < T_A < 105^{\circ}C$	192		208	
Current Out of Pin I_{CTRL} at 200mV	I_{IBI}	$T_A=25^{\circ}C$		25		μA	
		$-40^{\circ}C < T_A < 105^{\circ}C$		50			
OUTPUT STAGE							
Low Output Voltage at 10mA Sinking Current	V_{OL}	$T_A=25^{\circ}C$		200		mV	
Output Short Circuit Current. Output to V_{CC} . Sink Current Only	I_{OS}	$T_A=25^{\circ}C$		27	50	mA	
		$-40^{\circ}C < T_A < 105^{\circ}C$		35			



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Typical Performance Characteristics

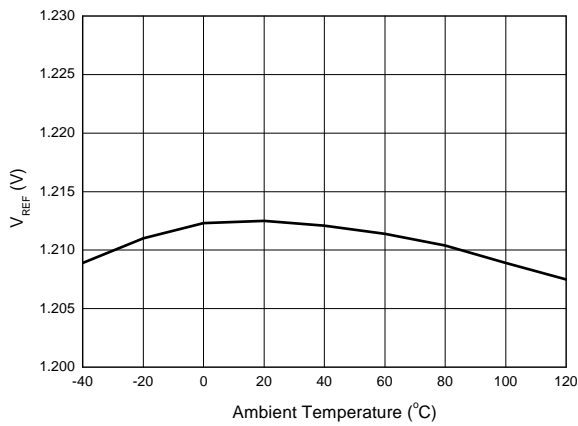


Figure 4. V_{REF} vs. Ambient Temperature

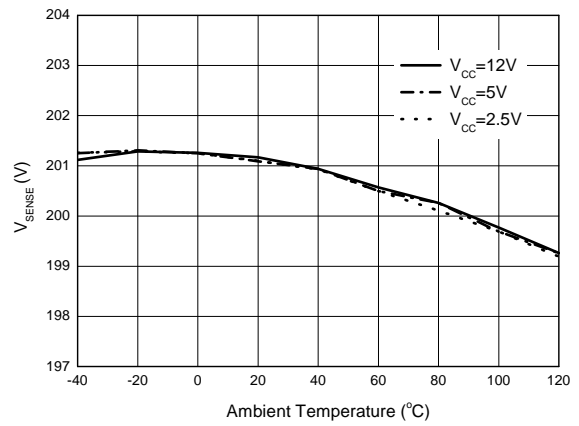


Figure 5. V_{SENSE} vs. Ambient Temperature

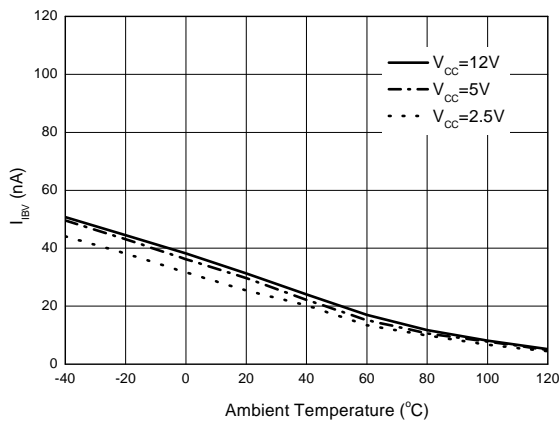


Figure 6. I_{IBV} vs. Ambient Temperature

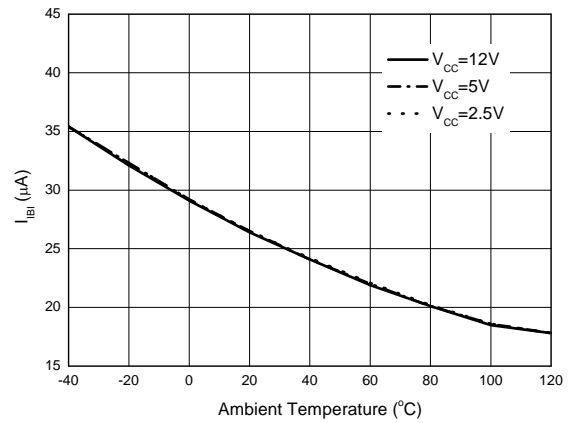


Figure 7. I_{IBI} vs. Ambient Temperature



CONSTANT VOLTAGE AND CONSTANT CURRENT CONTROLLER AP4305

Typical Performance Characteristics (Continued)

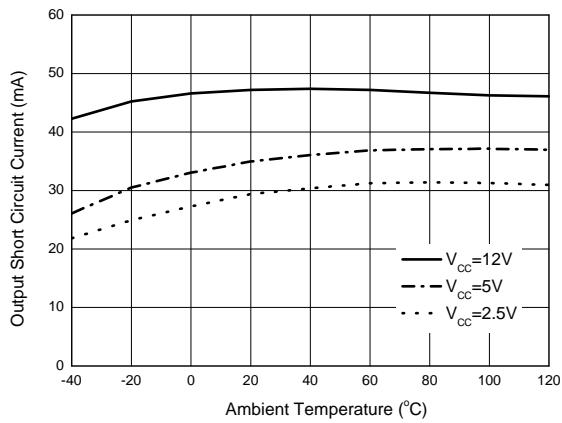


Figure 8. Output Short Circuit Current vs. Ambient Temperature

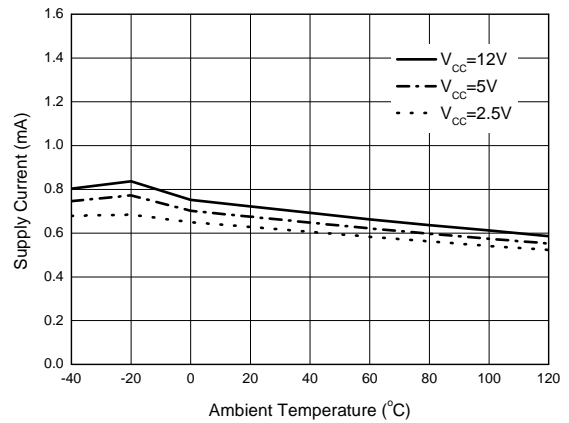


Figure 9. Supply Current vs. Ambient Temperature



CONSTANT VOLTAGE AND CONSTANT CURRENT CONTROLLER AP4305

Typical Application

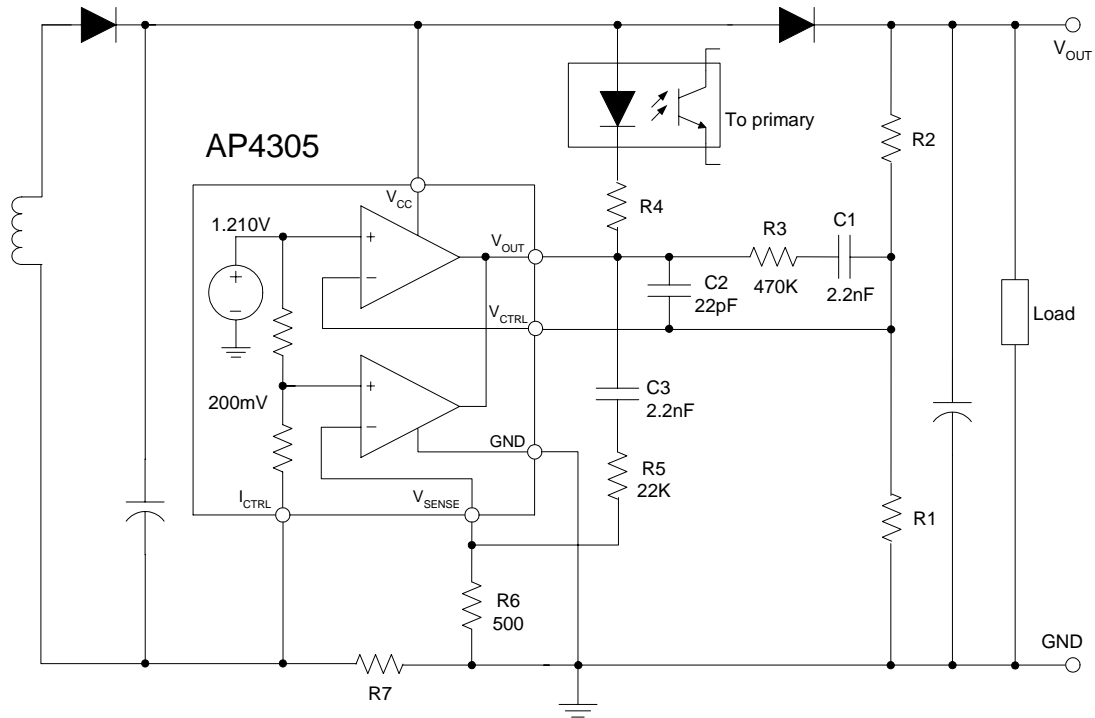


Figure 10. Typical Application of AP4305

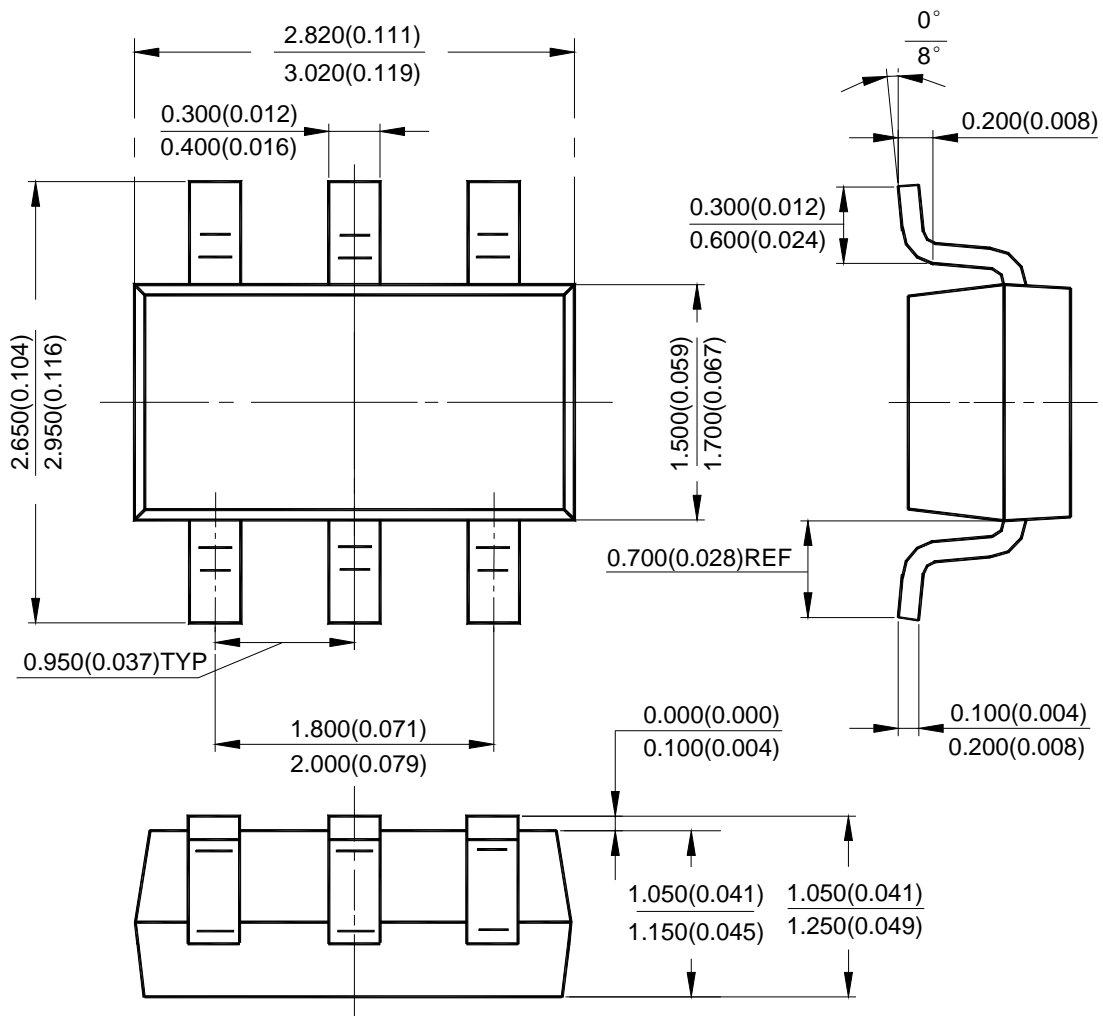


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Mechanical Dimensions

SOT-23-6

Unit: mm(inch)





BCD Semiconductor Manufacturing Limited

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