AUK Semiconductor

SL71053

CC, CV Control for Battery Charger & Adaptor

Description

SL71053 is a highly integrated solution for SMPS applications requiring CV (constant voltage) and CC (constant current) mode. SL71053 integrates one voltage reference, two operational amplifiers (with ORed outputs-common collectors), and a current sensing circuit. The voltage reference combined with one operational amplifier makes it an ideal voltage controller, and the other low voltage reference combined with the other operational amplifier makes it an ideal current limiter for output low side current sensing. the current threshold is fixed, and precise. the only external components are :

-. a resistor bridge to be connected to the output of the power supply (adapter, battery charger) to set the voltage regulation by dividing the desired output voltage to match the internal voltage reference value.

-. a sense resistor having a value and allowable dissipation power which need to be chosen according to the internal voltage threshold.

-. optional compensation components. SL71053, housed in one of the smallest package available, is ideal for space shrink applications such as adapters and battery chargers.

Features

- Constant voltage & constant current control
- Wide operating voltage range (2.2V to 14V)
- Precision internal voltage reference (1.21V ±1.0%)
- Precision internal CC AMP reference (80mV Typ.)
- Low external component count
- Current sink output stage
- Easy compensation

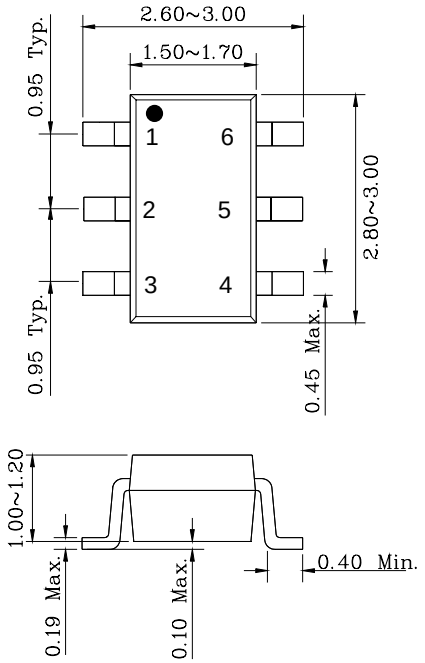
Applications

- Adapters
- Battery chargers

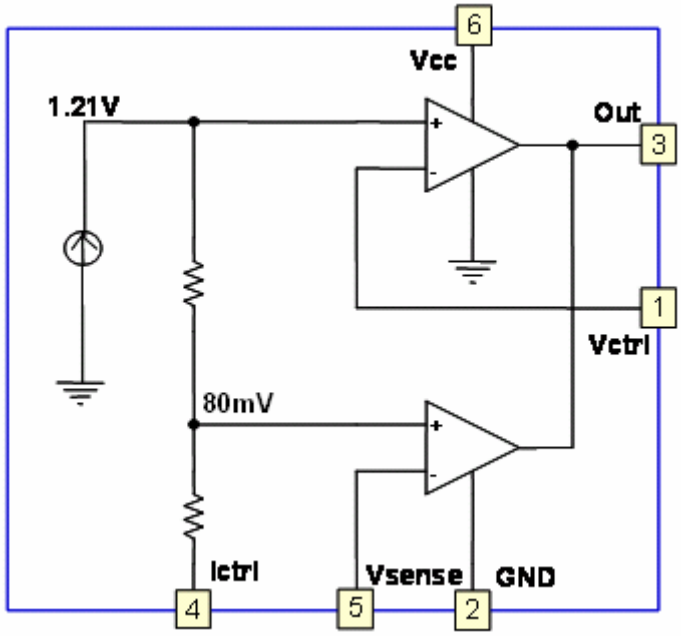
Ordering Information

Type NO.	Marking	Package Code
SL71053	703	SOT - 26

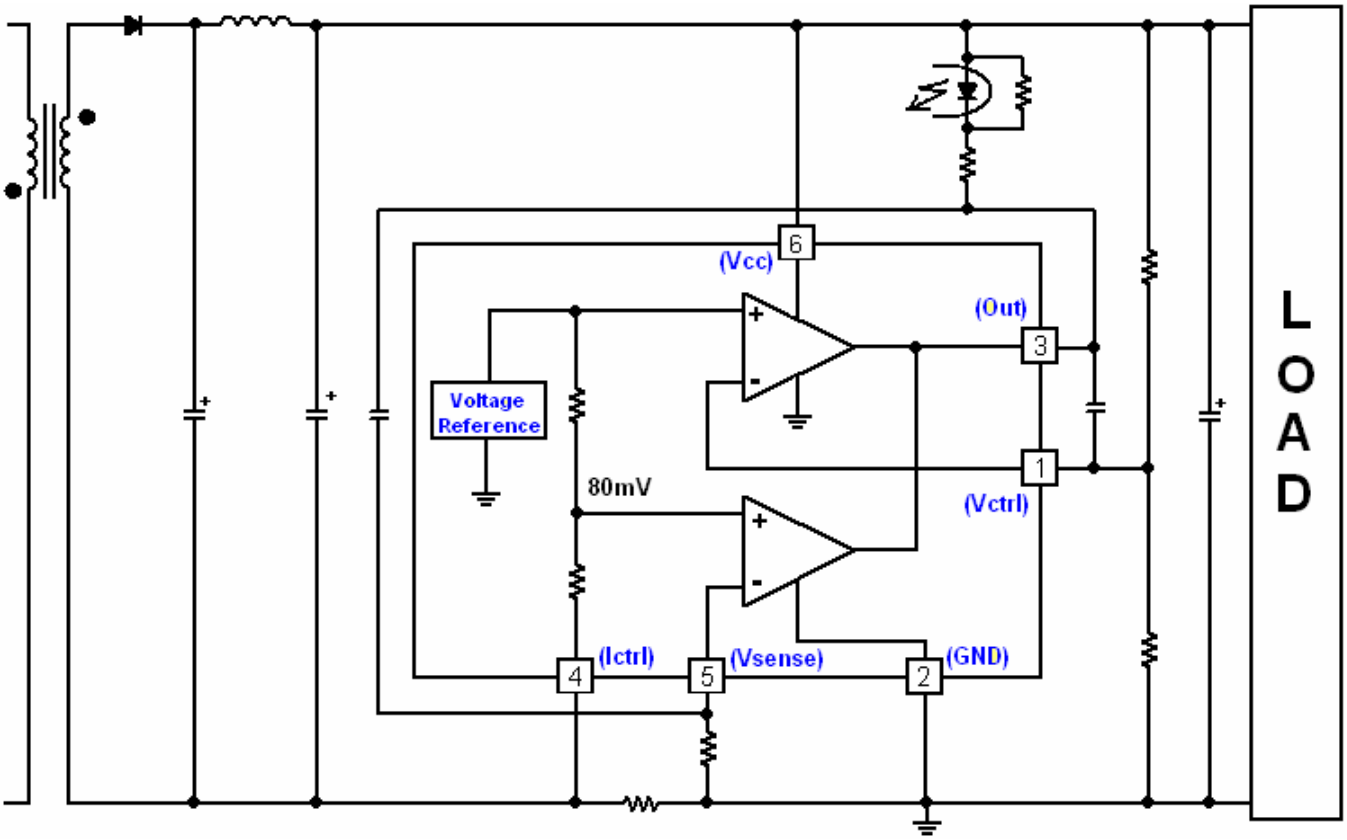
Outline Dimensions unit : mm



Internal Block



Typical Application : Adapter or Battery Charger Application Using SL71053



In the above application schematic, the SL71053 is used on the secondary side of a flyback adapter (or battery charger) to provide an accurate control of voltage and current. The above feedback loop is made with an optocoupler.

Pin Description

Name	Pin No.	Type	Function
Vctrl	1	Analog Input	Input Pin of the Voltage Control Loop
Gnd	2	Power Supply	Ground Line. 0V Reference For All Voltages
Out	3	Current Sink Output	Output Pin. Sinking Current Only
Ictrl	4	Analog Input	Input Pin of the Current Control Loop
Vsense	5	Analog Input	Input Pin of the Current Control Loop
V_{CC}	6	Power Supply	DC Supply Line

Absolute Maximum Ratings

Characteristic	Symbol	Value	Unit
DC Supply Voltage	Vcc	14	V
Power Dissipation	Pd *	500	mW
Operating Ambient Temperature Range	Topr	0 to 85	℃
Storage Temperature Range	Tstg	-55 to 150	℃

***** Mount on a glass epoxy circuit board of 30x30mm Pad dimension of $50mm^2$

Operating Conditions

Characteristic	Symbol	Value	Unit
DC Supply Voltage	V_{CC}	2.2 ~ 14V	V

Electrical Characteristics

Ta = 25℃ and V_{CC} = 5V (unless otherwise specified)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
[Total Current Consumption]						
Total Supply Current – not taking the output sinking current into account	I_{cc}	Ta = 25℃	-	1.2	2	mA
		0 < Ta < 85℃	-	1.5	-	

Electrical Characteristics

Ta = 25℃ and V_{CC} = 5V (unless otherwise specified)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
[Voltage Control Loop]						
Transconduction Gain (Vctrl). Sink Current Only [1]	G_{mv}	Ta = 25℃	1	3.5	-	mA/mV
		0 < Ta < 85℃	-	2.5	-	
Voltage Control Loop Reference [2]	V_{ref}	Ta = 25℃	1.198	1.210	1.222	V
		0 < Ta < 85℃	1.186	1.210	1.234	
Input Bias Current (Vctrl)	I_{ibv}	Ta = 25℃	-	50	-	nA
		0 < Ta < 85℃	-	100	-	
[Current Control Loop]						
Transconduction Gain (Ictrl). sink Current Only [3]	G_{mi}	Ta = 25℃	1.5	7.0	-	mA/mV
		0 < Ta < 85℃	-	-	-	
Current Control Loop Reference [4]	V_{sense}	Iout = 2.5 mA, Ta = 25℃	77	80	83	mV
		0 < Ta < 85℃	75	-	85	
Current out of pin ICTRL at -200mV	I_{ibi}	Ta = 25℃	-	25	-	μA
		0 < Ta < 85℃	-	30	-	
[Output Stage]						
Low output Voltage at 10mA Sinking current	V_{ol}	-	-	200	-	mV
Output Short Circuit Current. Output to V_{CC}. Sink Current Only	I_{os}	-	-	35	70	mA

1) If the voltage on VCTRL (the negative input of the amplifier) is higher than the positive amplifier input (Vref = 1.210V), and it is increased by 1mV, the sinking current at the output OUT will be increased by 3.5mA.

2) The internal voltage reference is set at 1.210V (bandgap reference). The voltage control loop precision takes into account the cumulative effects of the internal voltage reference deviation as well as the input offset voltage of the trans-conductance operational amplifier. The internal voltage reference is fixed by bandgap, and trimmed to 0.5% accuracy at room temperature.

3) When the positive input at ICTRL is lower than -80mV, and the voltage is decreased by 1mV, the sinking current at the output OUT will be increased by 7mA.

4) The internal current sense threshold is set to -80mV. The current control loop precision takes into account the cumulative effects of the internal voltage reference deviation as well as the input offset voltage of the trans-conduction operational amplifier.

Electrical Characteristic Curves

Fig.1 Supply current vs Ambient Temperature

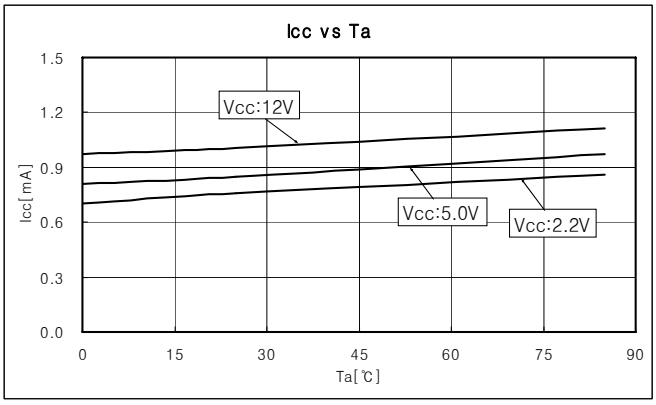


Fig.2 Vref vs Ambient Temperature

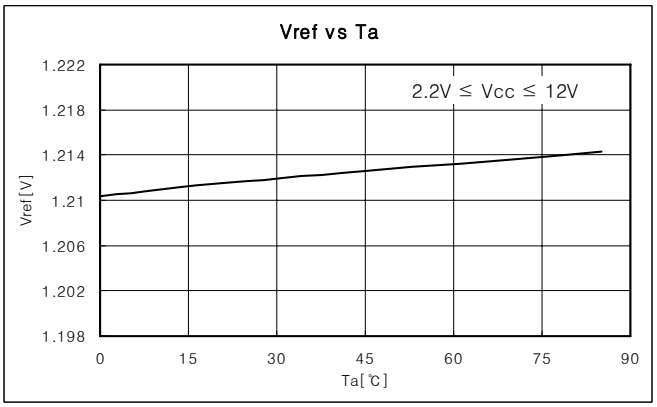


Fig.3 Vsense vs Ambient Temperature

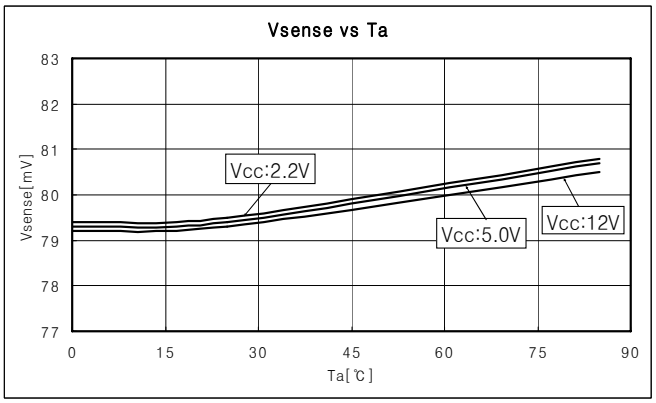


Fig.4 Vsense pin input bias current vs Ambient Temperature

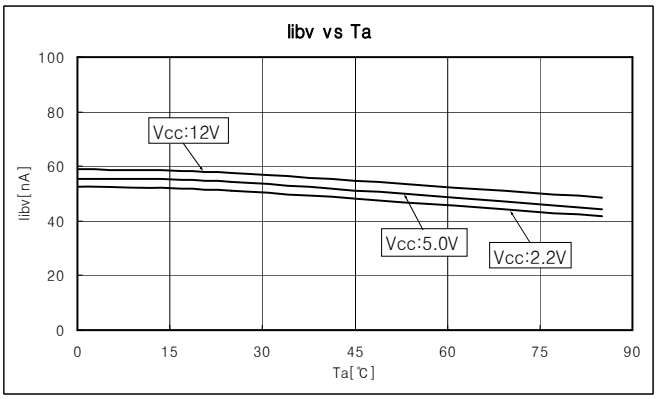


Fig.5 Ictrl pin input bias current vs Ambient Temperature

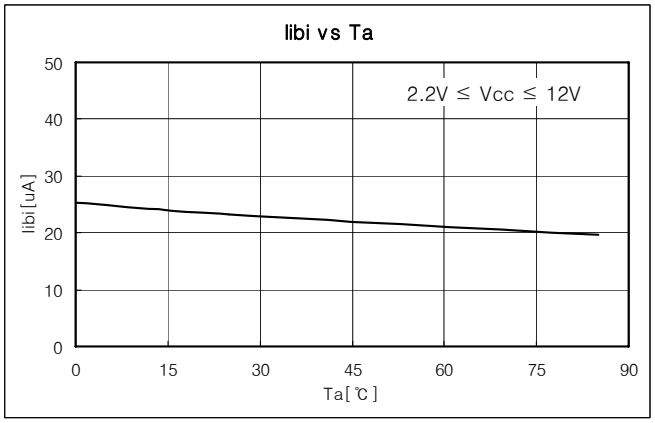
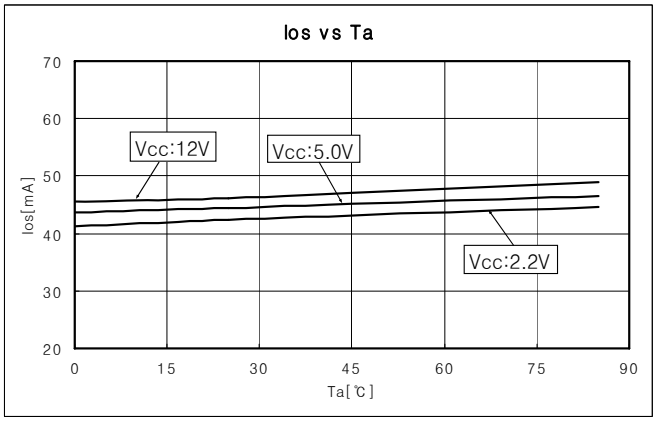


Fig.6 Output Short circuit current vs Ambient Temperature



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