

acut^echnology

AQ105

Secondary V/I amplifier SOT23-5 and SC70-5 Package

Product Specification

Revision 1.3

July 17, 2006

General Description

The AQ105 is a low cost secondary control circuit for low power applications needing constant voltage and constant current control. It implements a simple single-loop control by modifying the internal reference level as a function of current above the current limit threshold. The current loop reduces the reference by 40 mV per mV change at the current sense input. The error amp provides high gain and bandwidth under low voltage operation.

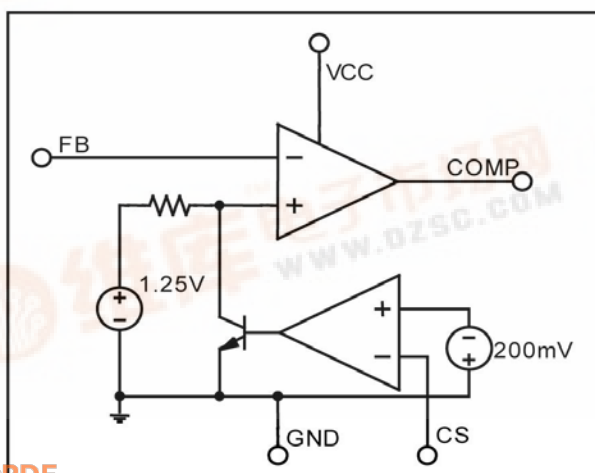
Applications

- Offline Battery Chargers
- Constant V/ Constant I supplies

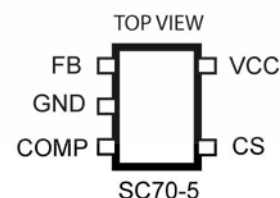
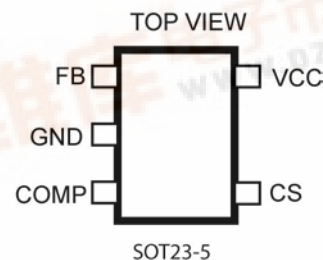
Features

- 1.25V reference
- 200mV current limit threshold
- Error amp output swings near ground for low voltage operation
- High PSRR and line regulation
- Low current consumption
- Offered in ultra small SC70-5 package
- Open collector output
- Low voltage operation 2.2V
- 10mA current sink
- 50 ppm/°C typical temperature deviation
- **RoHS compliant** available

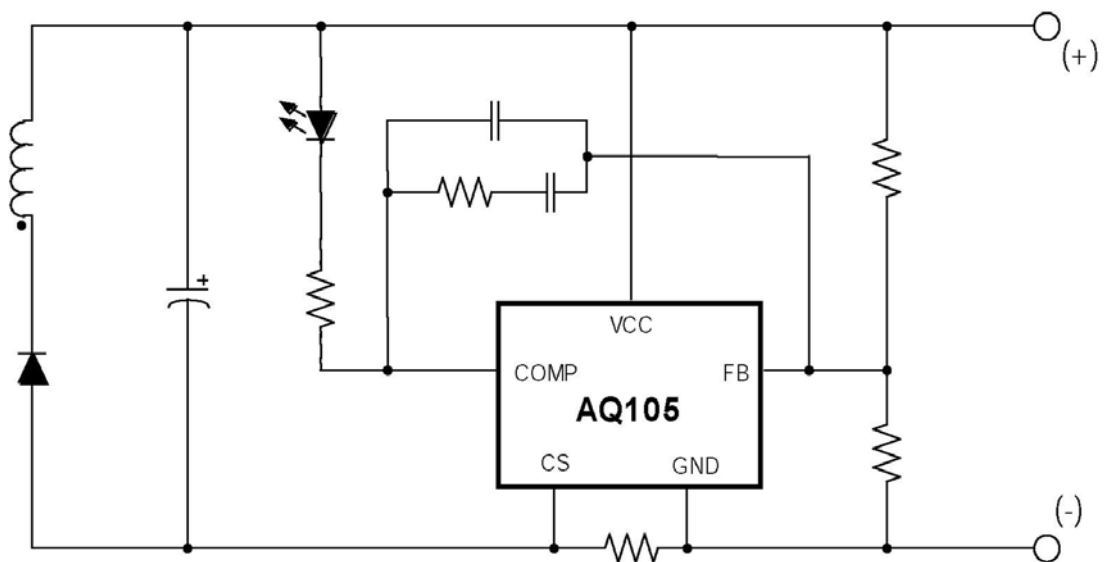
Block Diagram



Pin Configuration



Typical Application



Pin Descriptions

Pin	Pin Name	Function
1	VCC	Positive supply
2	GND	Ground
3	COMP	Output of error amplifier; 10 mA source/sink capability
4	FB	Inverting input to error amplifier; will have threshold of 1.25V.
5	CS	Current sense input

Ordering Information

Device	Operating Tj	%Tol	Pkg Type	VOUT	Wrap	Ordering Number
AQ105	-20C° ≤ 105C°	1.0	SOT-23-5	1.25V	T&R	AQ105DY-M5-12-TR
AQ105	-20C° ≤ 105C°	1.0	SOT-23-5	1.25V	T&R	AQ105DY-M5-12-TRL
AQ105	-20C° ≤ 105C°	1.0	SC70-5	1.25V	T&R	AQ105DY-C5-12-TR
AQ105	-20C° ≤ 105C°	1.0	SC70-5	1.25V	T&R	AQ105DY-C5-12-TRL

Note: The TRL parts are Lead Free and RoHS compliant.

Absolute Maximum Ratings

Parameter	Value	Units
V _{CC} Voltage	20	V
COMP Voltage	20	V
REF Voltage	20	V
CS Voltage (Self limiting diodes)	±1	V
VCC, COMP, REF, CS Current	50	mA
Operating Junction Temperature	150	°C
Lead Temperature (soldering 10 seconds)	260	°C
Storage Temperature Range	-65 to +150	°C
ESD Rating (HBM)	2	KV

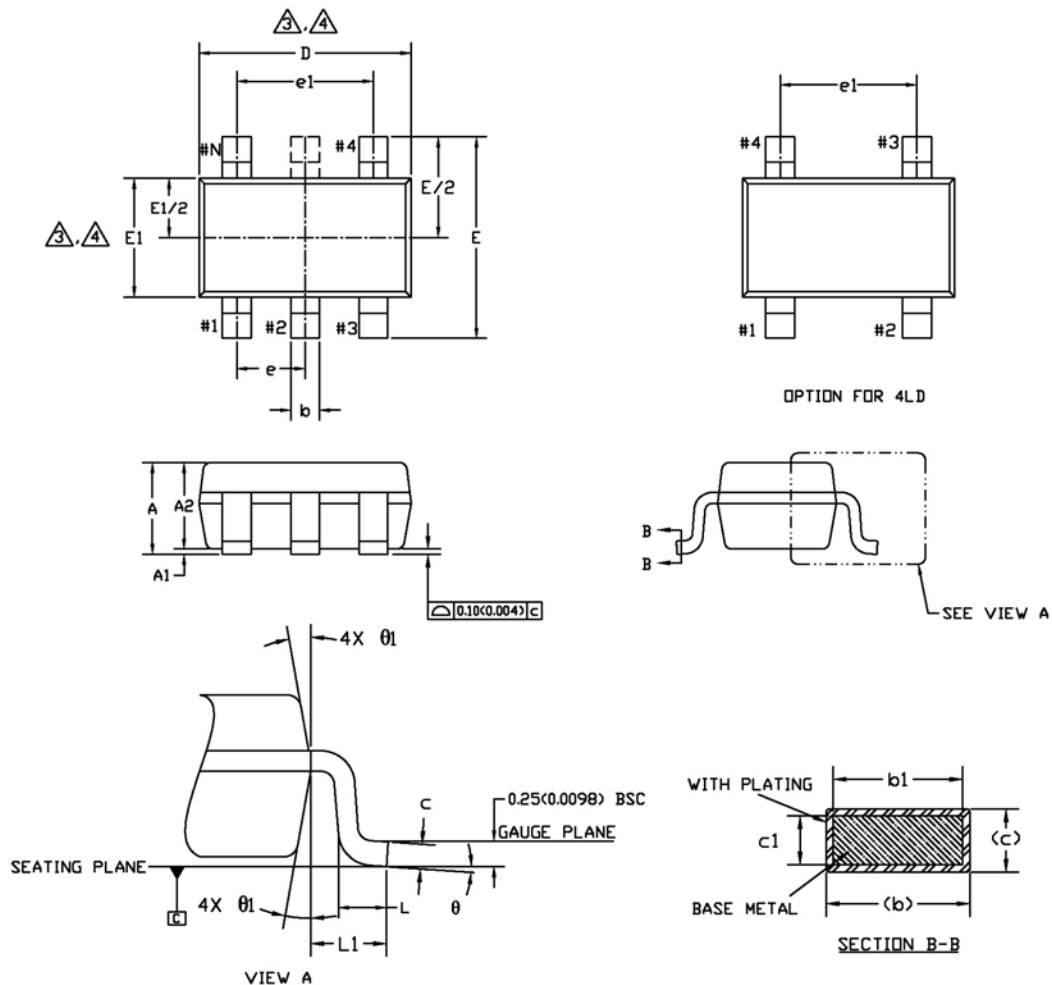
Electrical Specifications

Electrical characteristics are guaranteed over the full temperature range $-20^{\circ}\text{C} < T_j < 105^{\circ}\text{C}$. Ambient temperature must be de-rated based upon power dissipation and package thermal characteristics. Unless otherwise stated, test conditions are VCC = 3V, VCOMP = VFB, ICOMP = 1mA.

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Vcc	Supply Voltage		2.2		18	V
Icc	Quiescent Supply Current	VCOMP=1V VCC=15V		0.2	0.5	mA
Vref	Reference Voltage	Ta=25°C	1.238	1.250	1.263	V
DVcc	Line regulation	VCC=2.5V to VCC=18V		0.2	1	mV
DVload	Load Regulation	ICOMP=1mA to 5mA		1	2	mV
Tcref	Reference Temperature Deviation	$-20^{\circ}\text{C} < T_j < 105^{\circ}\text{C}$		0.5	1	%
IFB	REF input current		-500		500	nA
PSRR	Power Supply Rejection	Freq.=300KHz		40		dB
Av	Error Amplifier Open Loop Gain	ICOMP=2mA, COMP=1V		80		dB
BW	Unity Gain Frequency	ICOMP=2mA, COMP=1V		2.5		MHz
VCOMP	Output Saturation Voltage	ICOMP=10mA, VFB=HIGH		200	250	mV
TRANSC	Output Transconductance	ICOMP=1mA to 20mA		2.5		mA/mV
Ileak	Output Leakage Current	VCOMP=16 VFB=0		200	400	nA
Vcs	Current sense threshold voltage	Tj=25°C	197		203	mV
		$-20 < T_j < 105^{\circ}\text{C}$	195		205	
Gain	Current sense gain to reference	$-20 < T_j < 105^{\circ}\text{C}$	36	40	44	mV/mV
Ics	Bias current	Vcs=-200 mV		150		μA
		Vcs=-250 mV		220		

Package Dimensions

SOT23-3, SOT23-4, SOT23-5, SOT23-6



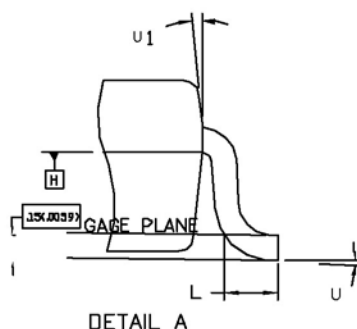
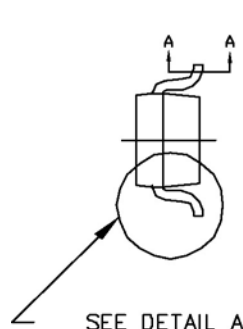
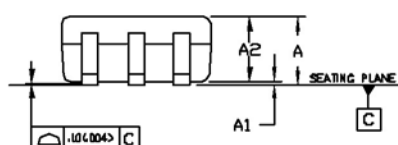
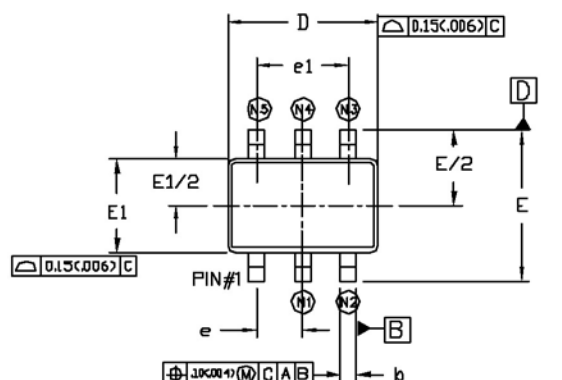
SYMBOL	COMMON					
	DIMENSIONS MILLIMETER			DIMENSIONS INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	1.20	1.30	1.40	0.047	0.051	0.055
A1	0.05	-	0.15	0.002	-	0.006
A2	0.90	1.15	1.30	0.035	0.045	0.051
b	0.35	-	0.50	0.013	-	0.020
b1	0.35	0.40	0.45	0.013	0.015	0.017
c	0.08	-	0.22	0.003	-	0.008
c1	0.08	0.13	0.20	0.003	0.005	0.007
D	2.90 BSC			0.114 BSC		
E	2.80 BSC			0.110 BSC		
E1	1.60 BSC			0.062 BSC		
e	0.95 BSC			0.037 BSC		
e1	1.90 BSC			0.074 BSC		
L	0.35	0.45	0.55	0.013	0.017	0.021
L1	0.60 REF.			0.023 REF.		
Ø	0*	4*	8*	0*	4*	8*
Øl	10* TYP			10* TYP		

NOTE :

1. Dimensioning and tolerancing per ASME Y 14.5 M - 1994.
2. Dimensions are in millimeters. Converted inch dimension are not necessarily exact.
3. Dimension D does not include mold flash, protrusions or gate burrs. Mold flash, protrusion or gate burrs shall not exceed 0.15 mm per side.
Dimension E1 does not include interlead flash or protrusion. Interlead flash or protrusion shall not exceed 0.15 mm per side.
4. Top package may be smaller than the bottom package
Dimension D and E1 are determine at the outermost extremes of the plastic body exclusive of mold flash gate burrs and interlead flash.
5. Terminal numbers are shown for reference only.
Die is facing up for molding. Die is facing down for trim/form.

Package Dimensions (contd.)

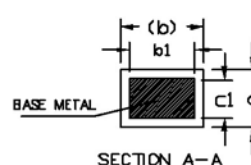
SC70-3, SC70-4, SC70-5, SC70-6



NOTE :

1. CONTROLLING DIMENSION : MILLIMETER, CONVERTED INCH DIMENSION ARE NOT NECESSARILY EXACT.
2. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M-1994.
3. DIMENSION 'D' DOES NOT INCLUDE MOLD FLASH, PROTRUSION OR GATE BURR, MOLD FLASH, PROTRUSION OR GATE BURR SHALL NOT EXCEED 0.15MM(0.006") PER END. DIMENSION E1 DO NOT INCLUDE INTER-LEAD FLASH OR PROTRUSION, INTER-LEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.15MM (0.006") PER SIDE.
4. THE PACKAGE TOP BE SMALLER THAN THE PACKAGE BOTTOM. DIMENSION D AND E1 ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY EXCLUSIVE OF MOLD FLASH, TIE BAR BURRS, GATE BURRS AND INTERLEAD FLASH, BUT INCLUDING ANY MISMATCH BETWEEN THE TOP AND BOTTOM OF THE PLASTIC BODY

SYMBOL	COMMON					
	DIMENSIONS MILLIMETER			DIMENSIONS INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.80	-	1.10	0.031	-	0.043
A1	0	-	0.10	0	-	0.004
A2	0.80	0.90	1.00	0.031	0.035	0.040
b	0.15	-	0.30	0.006	-	0.012
b1	0.15	0.20	0.25	0.006	0.008	0.010
c	0.08	-	0.25	0.003	-	0.010
c1	0.08	0.13	0.20	0.003	0.005	0.008
D	1.90	2.10	2.15	0.074	0.082	0.084
E	2.00	2.10	2.20	0.078	0.082	0.086
E1	1.15	1.25	1.35	0.045	0.050	0.055
e	0.65 BSC			0.0255 BSC		
e1	1.30 BSC			0.0512 BSC		
L	0.26	0.36	0.46	0.010	0.014	0.018
U	0°	-	8°	0°	-	8°
U1	4°	-	10°	4°	-	10°



PIN CODE	3	4	5	6
N1	-	-	2	2
N2	2	2	3	3
N3	-	3	4	4
N4	3	-	-	5
N5	-	4	5	6

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