■ DESCRIPTION

The AA1850 is a high side current sense monitor. It takes a high side voltage developed across a current shunt resistor and translates it into a proportional output current. A customer defined output resistor converts the output current into a reference voltage.

It operates over a wide input voltage range, from 2.5V to 20V and makes it suitable for many applications. A minimum operating current of 4uA, combined with its SOT23 package make it a right solution for portable equipment.
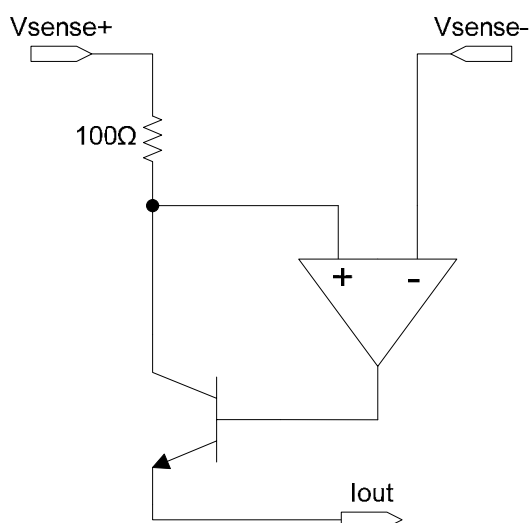
■ FEATURES

• Low cost and accurate high-side current monitor.

• Up to 2.5V sense voltage.

• 2.5V – 20V supply range.

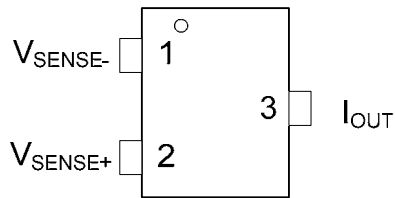• 4uA quiescent current.

• 1% typical accuracy.

■ APPLICATIONS

• Battery chargers

• DC motor control

• Over current monitor

• Power management

• Programmable current source

■ BLOCK DIAGRAM

■ PIN DESCRIPTIONS

V_{SENSE-} — 1

3 — I_{OUT}

V_{SENSE+} — 2

TOP VIEW

PIN NO.	PIN NAME	PIN FUNCTION
1	V_{SENSE-}	Connect load
2	V_{SENSE+}	Supply voltage
3	I_{OUT}	Output current, proportional to VIN — VLOAD

■ ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATING	UNIT
Voltage on any pin	V_{OP}	-0.6~+ 20 (relative to I_{OUT})	V
Continuous output current	I_{OUT}	25	mA
Continuous sense voltage (*2)	V_{SENSE}	-0.5 ~ +5	V
Operating temperature	T_{OPR}	-40 ~+ 85	°C
Storage temperature	T_{STG}	-55~+125	°C
Package power dissipation SOT23	P_d	450 (TA = 25°C，derate to zero at 125°C)	mW

Operation above the absolute maximum rating may cause device failure. Operation at the absolute maximum ratings for extended periods may reduce device reliability.

■ ELECTRICAL CHARACTERISTICS

$T_A = 25°C$, $V_{IN} = 5V$, $R_{out} = 100Ω$.

| SYMBOL	PARAMETER	CONDITIONS	LIMITS			UNIT
			MIN	**TYP**	**MAX**	
V_{IN}	VCC range		2.5		20	V
I_{out} (*1)	Output current	$V_{SENSE} = 0V$	1	4	15	µA
		$V_{SENSE} = 10mV$	90	104	120	µA
		$V_{SENSE} = 100mV$	0.975	1.002	1.025	mA
		$V_{SENSE} = 200mV$	1.95	2.0	2.05	mA
		$V_{SENSE} = 1V$	9.6	9.98	10.2	mA
V_{SENSE} (*2)	Sense voltage		0		2500	mV
I_{sense-}	V_{SENSE-} input current				100	nA
Acc	Accuracy	$R_{SENSE} = 0.1Ω$ $V_{SENSE} = 200mV$	-2.5		2.5	%
Gm	Tran conductance, I_{OUT} / V_{SENSE}			10000		µA/V
BW	Bandwidth	$V_{SENSE} = 10mV$, $P_{IN} = -40dBm$ (*3) $V_{SENSE} = 100mV$, $P_{IN} = -20dBm$ (*3)		300 2		kHz MHz

*1 Includes input offset voltage contribution

*2 V_{SENSE} is defined as the differential voltage between V_{SENSE+} and V_{SENSE-}

$V_{SENSE} = V_{SENSE+} - V_{SENSE-}$

$= V_{IN} - V_{LOAD}$

$= I_{LOAD} \times R_{SENSE}$

*3 -20dBm=63mVp-p into 50Ω

■ **APPLICATION CIRCUIT**
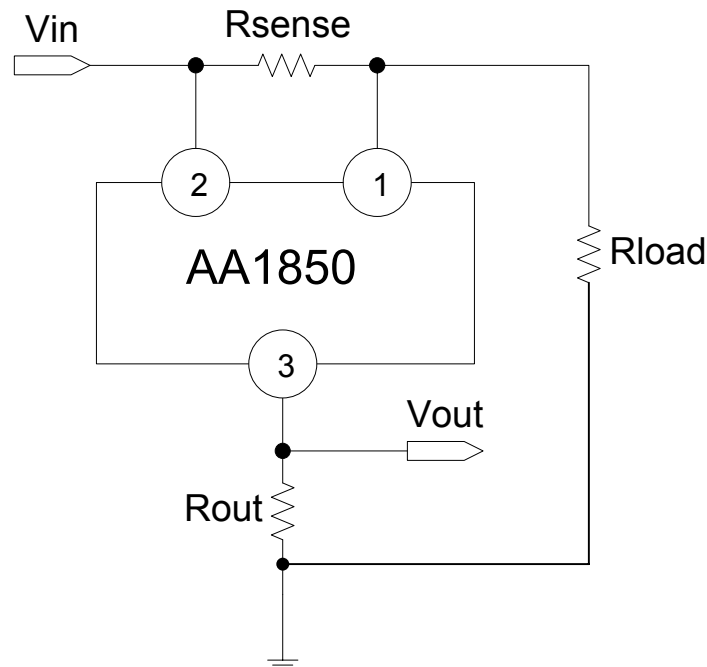
Where R_{LOAD} represents any load including DC motors, a charging battery or further circuitry that requires monitoring, V_{SENSE} can be selected on specific requirements of accuracy, size and power rating.

The following lines describe how to scale a load current to an output voltage.

$$V_{SENSE} = V_{IN} - V_{LOAD}$$
$$\mathbf{V_{OUT} = 0.01 \ x \ V_{SENSE} \ x \ R_{OUT}}$$
$$\mathbf{(E1)}$$

E.g.

A 1A current is to be represented by a 100mV output voltage:

A. Choose the value of R_{SENSE} to give 50mV > V_{SENSE} > 500mV at full load.

For example V_{SENSE} = 100mV at 1.0A. R_{SENSE} = 0.1/1.0 => 0.1Ω.

B. Choose R_{OUT} to give V_{OUT} = 100mV, when V_{SENSE} = 100mV.

Rearranging **E1** for R_{OUT} gives: R_{OUT} = V_{OUT} /(V_{SENSE} x 0.01)
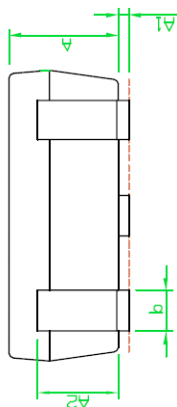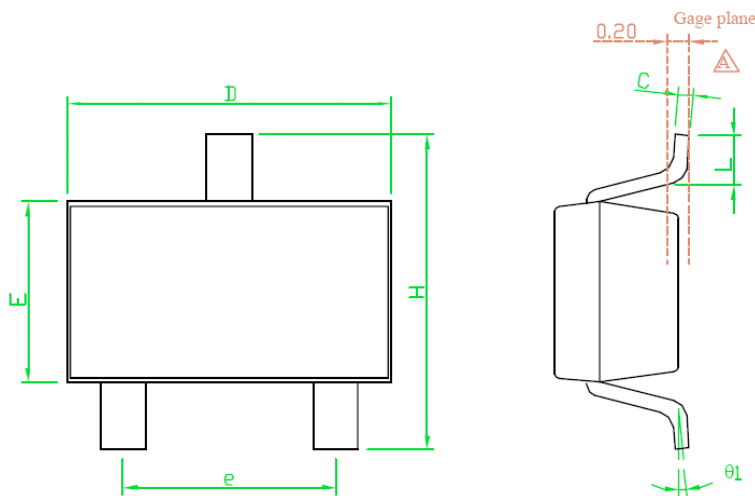
R_{OUT} = 0.1 / (0.1 x 0.01) = 100Ω

PRELIMINARY   **HIGH-SIDE CURRENT MONITOR**

■ ORDERING INFORMATION

ORDER NO.	PACKAGE	PACKING	ONE REEL Q'TY	MARK CHART
AA1850S	SOT23L	Tape & Reel	3,000ea	1850 XXXS

■ PACKAGE DIMENSIONS

NOTE
1. PACKAGE BODY SIZES EXCLUDE MOLD FLASH PROTRUSIONS OR GATE BURRS
2. TOLERANCE ±0.1000 mm (4 mil) UNLESS OTHERWISE SPECIFIED
3. COPLANARITY : 0.1000 mm
4. DIMENSION L IS MEASURED IN GAGE PLANE

SYMBOLS	DIMENSIONS IN MILLIMETERS		
	MIN	NOM	MAX
A	1.00	1.10	1.30
A1	0.00	---	0.10
A2	0.70	0.80	0.90
b	0.35	0.40	0.50
C	0.10	0.15	0.25
D	2.70	2.90	3.10
E	1.40	1.60	1.80
e	---	1.90(TYP)	---
H	2.60	2.80	3.00
L	0.37	---	---
θ1	1°	5°	9°

■NOTES ON USE

- The specifications for the product described in this document are for reference only. Upon actual use, therefore, please request that specifications to be separately delivered.

- The application circuit examples explain typical applications of the products, and do not guarantee the success of any specific mass-production design.

- Application circuit diagrams and circuit constants contained herein are shown as examples of standard use and operation. Please pay careful attention to the peripheral conditions when designing circuits and deciding upon circuit constants in the set.

- Take account of common impedance when designing the earth line on a printed wiring board.