STRUCTURE Silicon Monolithic Integrated Circuit

PRODUCT SERIES Super High Accuracy Current Detection Amp

TYPE BD3180FV

FEATURES
1. Low-current-consumption design with a maximum current consumption of 1 μA during standby operation
2. 50×/100× switchable voltage gain
3. High accuracy output voltage gain (±2%)

○ Absolute Maximum Ratings (Ta=25℃)

Parameter	Symbol	Limit	Unit
Power supply voltage	VCC	30	V
Power dissipation	Pd	350 *1	mW
Operating temperature range	Topr	-30～+85	℃
Storage temperature range	Tstg	-55～+125	℃
Junction temperature	Tjmax	125	℃

* : Derated at 3.5 mW/°C for temperature above Ta = 25°C, when mounted on a glass epoxy PCB (50 mm × 50 mm × 1.6 mm).

○ Recommended Operating Ranges

Parameter	Symbol	Limit			Unit
		Min.	Typ.	Max.	
Power supply voltage range	VCC	3	5	28	V
In-phase input voltage range	Vicm	1.8	-	28	V
Differential input voltage range	Vidf	-200	-	200	mV
BIAS pin set voltage range	Vbias	1.2	-	Vcc-1.2	V
OUT pin current range	Iout	-	-	10	mA

This product is not designed for protection against radioactive rays.

Status of this document

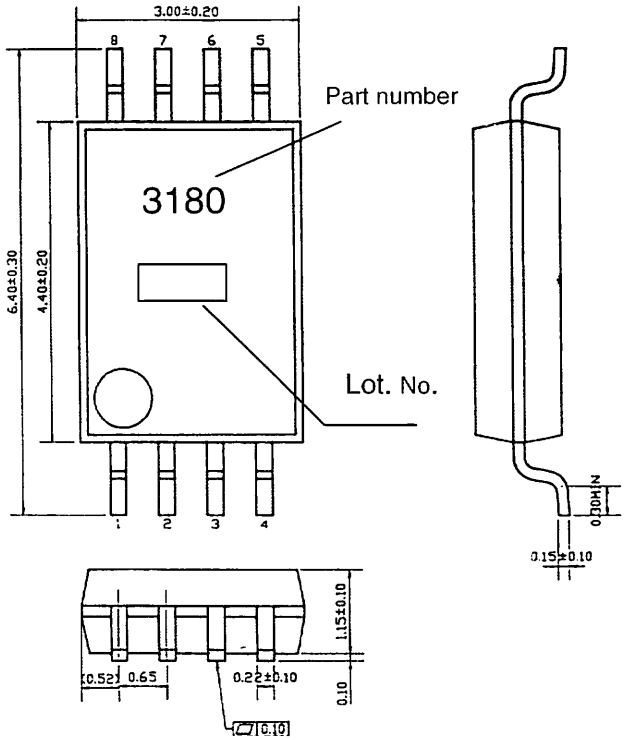
The Japanese version of this document is the official specification.

Please use the translation version of this document as a reference to expedite understanding of the official version. If there is any uncertainty in translation version of this document, official version takes priority.

○ Electrical Characteristics
(Unless otherwise specified, Ta = 25°C; VCC = 5 V; Vbias = 2.5 V; Vmode = 5 V)

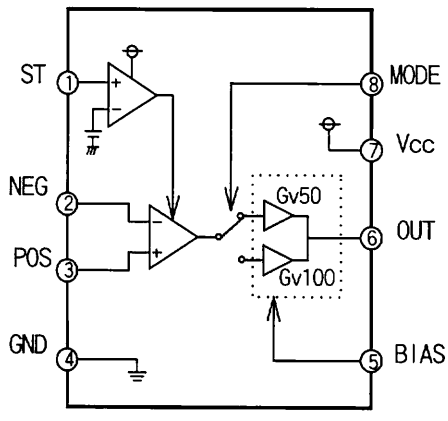
Parameter	Symbol	Limit			Unit	Conditions
		Min.	Typ.	Max.		
[Overall]						
Power supply voltage range	Vcc	3	5	28	V	
Current consumption (STBY)	ISC	-	0	1.0	μA	VST=0V
Current consumption (Normal)	Icc	-	60	100	μA	ΔVin=0V
Voltage gain (100×)	Gv1	98	100	102	mV/mV	※Ta=-30～85℃
Voltage gain (50×)	Gv2	49	50	51	mV/mV	※Ta=-30～85℃
[NEG, POS pins]						
Input conversion offset voltage	Voff	-0.5	0	0.5	mV	ΔVin=0V
In-phase input voltage range	Vicm	1.8	-	28	V	
Differential input voltage range	Vidf	-200	-	200	mV	
Input bias current	Ib1	-	1.2	1.6	μA	ΔVin=0V、POS,Neg=2.5V
Input impedance	Zi	100	-	-	kΩ	
[BIAS pin]						
BIAS pin set voltage range	Vbias	1.2	-	Vcc-1.2	V	
BIAS pin sinking current	Ibias	-	0	0.1	uA	Vbias=2.5V
[ST pin]						
ST pin sinking current	IST	-	1.5	10	uA	VST=5V
ST pin threshold	VST	0.3	1.0	2.7	V	
[MODE pin] (BD3180FV only)						
MODE pin sinking current	Imode	-	0	1.0	uA	Vmode=5V
MODE pin set voltage range 1 (100×)	Vmode1	2.2	-	VCC	V	
MODE pin set voltage range 2 (50×)	Vmode2	0	-	1.0	V	
[OUT pin]						
High output voltage	VoutH	VCC-0.1	Vcc	-	V	
Low output voltage	VoutL	-	0	0.1	V	VCC=3V,Vbias=1.2V
Output source current	Isrc	0.5	1.0	-	mA	Vout=Vcc-0.1V
Output sinking current	Isink	-0.5	-1.0	-	mA	Vout=0.1V

○ PACKAGE



SSOP-B8 (UNIT : mm)

○ Block Diagram



○ Pin No.

Pin No.	Pin Name	Function
1	ST	Standby pin
2	NEG	Inverted input pin
3	POS	Non-inverted input pin
4	GND	Ground pin
5	BIAS	Reference voltage input pin
6	OUT	Output pin
7	Vcc	Power supply pin
8	MODE	Gain selection pin

○ Operation Notes

1. Absolute maximum ratings
   Use of the IC in excess of absolute maximum ratings such as the applied voltage or operating temperature range may result in IC deterioration or damage. Assumptions should not be made regarding the state of the IC (short mode or open mode) when such damage is suffered. A physical safety measure such as a fuse should be implemented when use of the IC in a special mode where the absolute maximum ratings may be exceeded is anticipated.

2. GND potential
   Ensure a minimum GND pin potential in all operating conditions. In addition, ensure that no pins other than the GND pin carry a voltage less than or equal to the GND pin, including during actual transient phenomena.

3. Setting of heat
   Use a thermal design that allows for a sufficient margin in light of the power dissipation (Pd) in actual operating conditions.

4. Protection circuit
   The IC does not incorporate built-in malfunction protection such as overcurrent protection, short detection, or thermal shutdown circuitry. For this reason, the IC may be damaged if it is shorted or subjected to a load that exceeds the package power. The design of peripheral application circuits should reflect these potential risks.

5. Pin short and mistake fitting
   Use caution when orienting and positioning the IC for mounting on PCBs. Improper mounting may result in damage to the IC. Shorts between output pins or between output pins and the power supply and GND pin caused by the presence of a foreign object may result in damage to the IC.

6. Mutual impedance
   Power supply and ground wiring should reflect consideration of the need to lower mutual impedance and minimize ripple as much as possible (by making wiring as short and thick as possible or rejecting ripple by incorporating inductance and capacitance).

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