

TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

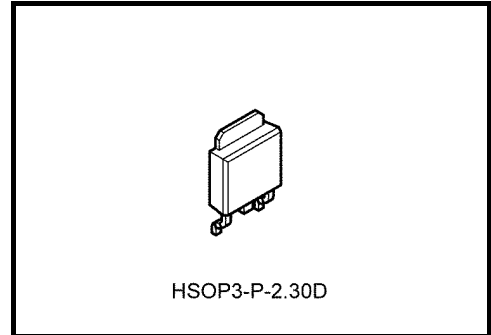
## TA48015BF, TA48018BF, TA48025BF, TA48033BF, TA4805BF, TA4808BF, TA4809BF

### 1 A Three-Terminal Low-Dropout Voltage Regulator

The TA48\*\*\*BF series consists of fixed-positive-output, low-dropout regulators with an output current of 1 A (max) that utilize V-PNP transistors for the output stage. In response to the need for low-voltage and low-power dissipation devices for use in consumer electronics and industrial appliances, the series offers devices with low output voltages: 1.5 V, 1.8 V, 2.5 V, 3.3 V, 5 V, 8 V, 9 V

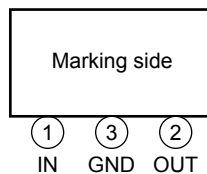
#### Features

- Maximum output current: 1 A
- Low output voltage : 1.5 / 1.8 / 2.5 / 3.3 / 5.0 / 8.0 / 9.0 V
- Output voltage accuracy:  $V_{OUT} \pm 3\%$  (@ $T_j = 25^\circ\text{C}$ )
- Low standby current: 850  $\mu\text{A}$  (typ.) (@ $I_{OUT} = 0\text{ A}$ )
- Low starting quiescent current
- Low-dropout voltage:  $V_D = 0.5\text{ V}$  (max) (@ $I_{OUT} = 0.5\text{ A}$ )  
(1.1V only for TA48015BF)
- $C_{OUT}$  (reference): 2.2 $\mu\text{F}$ (multi-layer ceramic type)
- Protection function: Over current protection / Thermal shutdown / SOA
- Package type: Surface-mount New PW-Mold



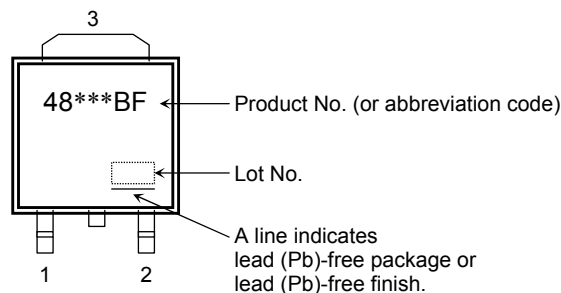
Weight  
HSOP3-P-2.30D : 0.36 g (typ.)

#### Pin Assignment



#### Marking

TA48\*\*\*BF Series

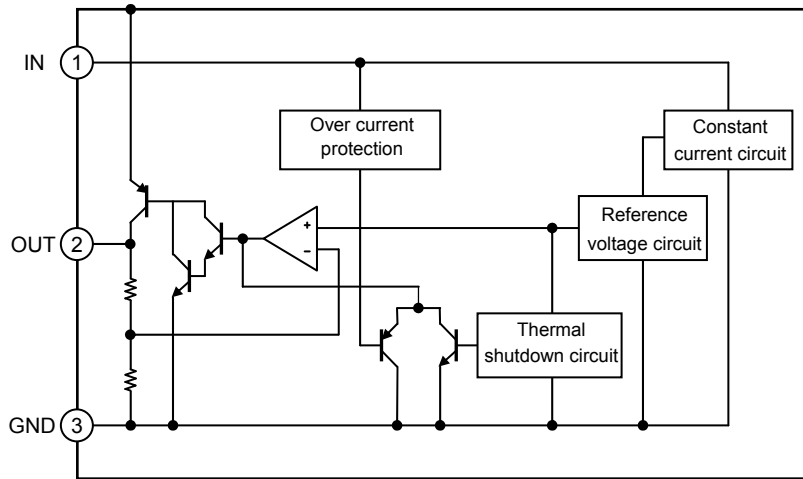


Note: The “\*\*\*” part of each product number varies according to the output voltage of the product. Be careful of static electricity when handling.

#### How to Order

Product No.	Package	Packing Type and Unit for Orders
TA48***BF (T6L1, NQ)	New PW-MOLD: Surface-mount	Tape (2000 pcs/reel)

## Block Diagram



## Absolute Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit	
Input voltage	V <sub>IN</sub>	16	V	
Output current	I <sub>OUT</sub>	1	A	
Operating junction temperature	T <sub>j(opr)</sub>	-40~150	°C	
Junction temperature	T <sub>j</sub>	150	°C	
Storage temperature	T <sub>stg</sub>	-55~150	°C	
Power dissipation	P <sub>D</sub>	Ta = 25°C	1	W
		Tc = 25°C	10	

Note 1: Do not apply external current and voltage (including negative voltage) to non-specified pins.

Note 2: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings and the operating ranges.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/Derating Concept and Methods) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

## Thermal Characteristics

Characteristic	Symbol	Max	Unit
Thermal resistance, junction to ambient	R <sub>th(j-a)</sub>	125	°C/W
Thermal resistance, junction to case	R <sub>th(j-c)</sub>	12.5	°C/W

## Protection Function (reference)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Thermal shutdown	T <sub>SD</sub>	V <sub>IN</sub> = 3.4 V (015~018BF) / 3.5 V (025BF)	150	175	—	°C
Thermal shutdown hysteresis width	T <sub>SD(hys)</sub>	4.3 V (033BF) / 6.0 V (05BF) / 9.0 V (08BF) / 10.0 V (09BF)	—	20	—	°C
Peak circuit current	I <sub>PEAK</sub>	V <sub>IN</sub> = V <sub>OUT</sub> + 2 V, T <sub>j</sub> = 25°C	—	1.7	—	A
		V <sub>IN</sub> = 12 V, T <sub>j</sub> = 25°C	—	1.8	—	
Short circuit current	I <sub>SC</sub>	V <sub>IN</sub> = V <sub>OUT</sub> + 2 V, T <sub>j</sub> = 25°C	—	1.2	—	A
		V <sub>IN</sub> = 12 V, T <sub>j</sub> = 25°C	—	1.3	—	

Note 3: Ensure that the devices operate within the limits of the maximum rating when in actual use.

## TA48015BF

### Electrical Characteristics

( $C_{IN} = 0.33 \mu\text{F}$ ,  $C_{OUT} = 2.2 \mu\text{F}$ ,  $T_j = 25^\circ\text{C}$ , unless otherwise specified)

Characteristics	Symbol	Test Conditions	Min	Typ.	Max	Unit
Output voltage	$V_{OUT}$	$V_{IN} = 3.5 \text{ V}$ , $I_{OUT} = 0.5 \text{ A}$	1.455	1.500	1.545	V
		$3.4 \text{ V} \leq V_{IN} \leq 6.5 \text{ V}$ , $5 \text{ mA} \leq I_{OUT} \leq 1 \text{ A}$ , $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	1.44	1.50	1.56	
Line regulation	Reg·line	$3.4 \text{ V} \leq V_{IN} \leq 6.5 \text{ V}$ , $I_{OUT} = 0.5 \text{ A}$	—	4.5	20.0	mV
Load regulation	Reg·load	$V_{IN} = 3.5 \text{ V}$ , $5 \text{ mA} \leq I_{OUT} \leq 1 \text{ A}$	—	2	20	mV
Quiescent current	$I_B$	$3.4 \text{ V} \leq V_{IN} \leq 6.5 \text{ V}$ , $I_{OUT} = 0 \text{ A}$	—	0.85	1.70	mA
		$3.4 \text{ V} \leq V_{IN} \leq 6.5 \text{ V}$ , $I_{OUT} = 1 \text{ A}$	—	10	20	
Starting quiescent current	$I_{Bstart}$	$V_{IN} = 2.1 \text{ V}$ , $I_{OUT} = 0 \text{ A}$	—	0.7	2.3	mA
		$V_{IN} = 3.4 \text{ V}$ , $I_{OUT} = 1 \text{ A}$	—	13.0	28.5	
Output noise voltage	$V_{NO}$	$V_{IN} = 3.5 \text{ V}$ , $I_{OUT} = 50 \text{ mA}$ , $10 \text{ Hz} \leq f \leq 100 \text{ kHz}$	—	75	—	$\mu\text{V}_{rms}$
Ripple rejection	R.R.	$3.5 \text{ V} \leq V_{IN} \leq 6.5 \text{ V}$ , $I_{OUT} = 50 \text{ mA}$ , $f = 120 \text{ Hz}$	54	65	—	dB
Dropout voltage	$V_D$	$I_{OUT} = 0.5 \text{ A}$	—	0.95	1.10	V
		$I_{OUT} = 1 \text{ A}$	—	1.9	—	
Average temperature coefficient of output voltage	$T_{CVO}$	$V_{IN} = 3.5 \text{ V}$ , $I_{OUT} = 5 \text{ mA}$ , $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	—	0.14	—	$\text{mV}/^\circ\text{C}$

## TA48018BF

### Electrical Characteristics

( $C_{IN} = 0.33 \mu\text{F}$ ,  $C_{OUT} = 2.2 \mu\text{F}$ ,  $T_j = 25^\circ\text{C}$ , unless otherwise specified)

Characteristics	Symbol	Test Conditions	Min	Typ.	Max	Unit
Output voltage	$V_{OUT}$	$V_{IN} = 3.8 \text{ V}$ , $I_{OUT} = 0.5 \text{ A}$	1.746	1.800	1.854	V
		$3.4 \text{ V} \leq V_{IN} \leq 6.8 \text{ V}$ , $5 \text{ mA} \leq I_{OUT} \leq 1 \text{ A}$ , $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	1.728	1.800	1.872	
Line regulation	Reg·line	$3.4 \text{ V} \leq V_{IN} \leq 6.8 \text{ V}$ , $I_{OUT} = 0.5 \text{ A}$	—	5.6	20.0	mV
Load regulation	Reg·load	$V_{IN} = 3.8 \text{ V}$ , $5 \text{ mA} \leq I_{OUT} \leq 1 \text{ A}$	—	2.4	20.0	mV
Quiescent current	$I_B$	$3.4 \text{ V} \leq V_{IN} \leq 6.8 \text{ V}$ , $I_{OUT} = 0 \text{ A}$	—	0.85	1.70	mA
		$3.4 \text{ V} \leq V_{IN} \leq 6.8 \text{ V}$ , $I_{OUT} = 1 \text{ A}$	—	10	20	
Starting quiescent current	$I_{Bstart}$	$V_{IN} = 2.1 \text{ V}$ , $I_{OUT} = 0 \text{ A}$	—	0.7	2.3	mA
		$V_{IN} = 3.4 \text{ V}$ , $I_{OUT} = 1 \text{ A}$	—	14.0	28.5	
Output noise voltage	$V_{NO}$	$V_{IN} = 3.8 \text{ V}$ , $I_{OUT} = 50 \text{ mA}$ , $10 \text{ Hz} \leq f \leq 100 \text{ kHz}$	—	75	—	$\mu\text{V}_{rms}$
Ripple rejection	R.R.	$3.4 \text{ V} \leq V_{IN} \leq 6.8 \text{ V}$ , $I_{OUT} = 50 \text{ mA}$ , $f = 120 \text{ Hz}$	54	66	—	dB
Dropout voltage	$V_D$	$I_{OUT} = 0.5 \text{ A}$	—	0.41	0.50	V
		$I_{OUT} = 1 \text{ A}$	—	1.6	—	
Average temperature coefficient of output voltage	$T_{CVO}$	$V_{IN} = 3.8 \text{ V}$ , $I_{OUT} = 5 \text{ mA}$ , $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	—	0.15	—	$\text{mV}/^\circ\text{C}$

## TA48025BF

### Electrical Characteristics

( $C_{IN} = 0.33 \mu\text{F}$ ,  $C_{OUT} = 2.2 \mu\text{F}$ ,  $T_j = 25^\circ\text{C}$ , unless otherwise specified)

Characteristics	Symbol	Test Conditions	Min	Typ.	Max	Unit
Output voltage	$V_{OUT}$	$V_{IN} = 4.5 \text{ V}$ , $I_{OUT} = 0.5 \text{ A}$	2.425	2.500	2.575	V
		$3.5 \text{ V} \leq V_{IN} \leq 7.5 \text{ V}$ , $5 \text{ mA} \leq I_{OUT} \leq 1 \text{ A}$ , $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	2.4	2.5	2.6	
Line regulation	Reg·line	$3.5 \text{ V} \leq V_{IN} \leq 7.5 \text{ V}$ , $I_{OUT} = 0.5 \text{ A}$	—	6.7	20.0	mV
Load regulation	Reg·load	$V_{IN} = 4.5 \text{ V}$ , $5 \text{ mA} \leq I_{OUT} \leq 1 \text{ A}$	—	2.9	20.0	mV
Quiescent current	$I_B$	$3.5 \text{ V} \leq V_{IN} \leq 7.5 \text{ V}$ , $I_{OUT} = 0 \text{ A}$	—	0.85	1.70	mA
		$3.5 \text{ V} \leq V_{IN} \leq 7.5 \text{ V}$ , $I_{OUT} = 1 \text{ A}$	—	10	20	
Starting quiescent current	$I_{Bstart}$	$V_{IN} = 2.1 \text{ V}$ , $I_{OUT} = 0 \text{ A}$	—	2.2	3.5	mA
		$V_{IN} = 3.4 \text{ V}$ , $I_{OUT} = 1 \text{ A}$	—	16.0	28.5	
Output noise voltage	$V_{NO}$	$V_{IN} = 4.5 \text{ V}$ , $I_{OUT} = 50 \text{ mA}$ , $10 \text{ Hz} \leq f \leq 100 \text{ kHz}$	—	95	—	$\mu\text{V}_{rms}$
Ripple rejection	R.R.	$3.5 \text{ V} \leq V_{IN} \leq 7.5 \text{ V}$ , $I_{OUT} = 50 \text{ mA}$ , $f = 120 \text{ Hz}$	52	64	—	dB
Dropout voltage	$V_D$	$I_{OUT} = 0.5 \text{ A}$	—	0.32	0.50	V
		$I_{OUT} = 1 \text{ A}$	—	0.88	—	
Average temperature coefficient of output voltage	$T_{CVO}$	$V_{IN} = 4.5 \text{ V}$ , $I_{OUT} = 5 \text{ mA}$ , $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	—	0.2	—	$\text{mV}/^\circ\text{C}$

## TA48033BF

### Electrical Characteristics

( $C_{IN} = 0.33 \mu\text{F}$ ,  $C_{OUT} = 2.2 \mu\text{F}$ ,  $T_j = 25^\circ\text{C}$ , unless otherwise specified)

Characteristics	Symbol	Test Conditions	Min	Typ.	Max	Unit
Output voltage	$V_{OUT}$	$V_{IN} = 5.3 \text{ V}$ , $I_{OUT} = 0.5 \text{ A}$	3.201	3.300	3.399	V
		$4.3 \text{ V} \leq V_{IN} \leq 8.8 \text{ V}$ , $5 \text{ mA} \leq I_{OUT} \leq 1 \text{ A}$ , $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	3.168	3.300	3.432	
Line regulation	Reg·line	$4.3 \text{ V} \leq V_{IN} \leq 8.8 \text{ V}$ , $I_{OUT} = 0.5 \text{ A}$	—	8.3	20.0	mV
Load regulation	Reg·load	$V_{IN} = 5.3 \text{ V}$ , $5 \text{ mA} \leq I_{OUT} \leq 1 \text{ A}$	—	3.7	20.0	mV
Quiescent current	$I_B$	$4.3 \text{ V} \leq V_{IN} \leq 8.8 \text{ V}$ , $I_{OUT} = 0 \text{ A}$	—	0.85	1.70	mA
		$4.3 \text{ V} \leq V_{IN} \leq 8.8 \text{ V}$ , $I_{OUT} = 1 \text{ A}$	—	10	20	
Starting quiescent current	$I_{Bstart}$	$V_{IN} = 2.1 \text{ V}$ , $I_{OUT} = 0 \text{ A}$	—	3.3	4.0	mA
		$V_{IN} = 3.5 \text{ V}$ , $I_{OUT} = 1 \text{ A}$	—	17.0	28.5	
Output noise voltage	$V_{NO}$	$V_{IN} = 5.3 \text{ V}$ , $I_{OUT} = 50 \text{ mA}$ , $10 \text{ Hz} \leq f \leq 100 \text{ kHz}$	—	115	—	$\mu\text{V}_{rms}$
Ripple rejection	R.R.	$4.3 \text{ V} \leq V_{IN} \leq 8.8 \text{ V}$ , $I_{OUT} = 50 \text{ mA}$ , $f = 120 \text{ Hz}$	50	62	—	dB
Dropout voltage	$V_D$	$I_{OUT} = 0.5 \text{ A}$	—	0.32	0.50	V
		$I_{OUT} = 1 \text{ A}$	—	0.69	—	
Average temperature coefficient of output voltage	$T_{CVO}$	$V_{IN} = 5.3 \text{ V}$ , $I_{OUT} = 5 \text{ mA}$ , $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	—	0.3	—	$\text{mV}/^\circ\text{C}$

## TA4805BF

### Electrical Characteristics

( $C_{IN} = 0.33 \mu\text{F}$ ,  $C_{OUT} = 2.2 \mu\text{F}$ ,  $T_j = 25^\circ\text{C}$ , unless otherwise specified)

Characteristics	Symbol	Test Conditions	Min	Typ.	Max	Unit
Output voltage	$V_{OUT}$	$V_{IN} = 7 \text{ V}$ , $I_{OUT} = 0.5 \text{ A}$	4.85	5.00	5.15	V
		$6 \text{ V} \leq V_{IN} \leq 10 \text{ V}$ , $5 \text{ mA} \leq I_{OUT} \leq 1 \text{ A}$ , $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	4.8	5.0	5.2	
Line regulation	Reg·line	$6 \text{ V} \leq V_{IN} \leq 10 \text{ V}$ , $I_{OUT} = 0.5 \text{ A}$	—	10	20	mV
Load regulation	Reg·load	$V_{IN} = 7 \text{ V}$ , $5 \text{ mA} \leq I_{OUT} \leq 1 \text{ A}$	—	4.2	20.0	mV
Quiescent current	$I_B$	$6 \text{ V} \leq V_{IN} \leq 10 \text{ V}$ , $I_{OUT} = 0 \text{ A}$	—	0.85	1.70	mA
		$6 \text{ V} \leq V_{IN} \leq 10 \text{ V}$ , $I_{OUT} = 1 \text{ A}$	—	10	20	
Starting quiescent current	$I_{Bstart}$	$V_{IN} = 2.1 \text{ V}$ , $I_{OUT} = 0 \text{ A}$	—	2.5	4.2	mA
		$V_{IN} = 4.5 \text{ V}$ , $I_{OUT} = 1 \text{ A}$	—	18.0	28.5	
Output noise voltage	$V_{NO}$	$V_{IN} = 7 \text{ V}$ , $I_{OUT} = 50 \text{ mA}$ , $10 \text{ Hz} \leq f \leq 100 \text{ kHz}$	—	150	—	$\mu\text{V}_{rms}$
Ripple rejection	R.R.	$6 \text{ V} \leq V_{IN} \leq 10 \text{ V}$ , $I_{OUT} = 50 \text{ mA}$ , $f = 120 \text{ Hz}$	48	60	—	dB
Dropout voltage	$V_D$	$I_{OUT} = 0.5 \text{ A}$	—	0.32	0.50	V
		$I_{OUT} = 1 \text{ A}$	—	0.69	—	
Average temperature coefficient of output voltage	$T_{CVO}$	$V_{IN} = 7 \text{ V}$ , $I_{OUT} = 5 \text{ mA}$ , $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	—	0.45	—	$\text{mV}/^\circ\text{C}$

## TA4808BF

### Electrical Characteristics

( $C_{IN} = 0.33 \mu\text{F}$ ,  $C_{OUT} = 2.2 \mu\text{F}$ ,  $T_j = 25^\circ\text{C}$ , unless otherwise specified)

Characteristics	Symbol	Test Conditions	Min	Typ.	Max	Unit
Output voltage	$V_{OUT}$	$V_{IN} = 10 \text{ V}$ , $I_{OUT} = 0.5 \text{ A}$	7.76	8.00	8.24	V
		$9 \text{ V} \leq V_{IN} \leq 13 \text{ V}$ , $5 \text{ mA} \leq I_{OUT} \leq 1 \text{ A}$ , $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	7.68	8.00	8.32	
Line regulation	Reg·line	$9 \text{ V} \leq V_{IN} \leq 13 \text{ V}$ , $I_{OUT} = 0.5 \text{ A}$	—	12.5	20.0	mV
Load regulation	Reg·load	$V_{IN} = 10 \text{ V}$ , $5 \text{ mA} \leq I_{OUT} \leq 1 \text{ A}$	—	9.4	30.0	mV
Quiescent current	$I_B$	$9 \text{ V} \leq V_{IN} \leq 13 \text{ V}$ , $I_{OUT} = 0 \text{ A}$	—	0.9	1.7	mA
		$9 \text{ V} \leq V_{IN} \leq 13 \text{ V}$ , $I_{OUT} = 1 \text{ A}$	—	10	20	
Starting quiescent current	$I_{Bstart}$	$V_{IN} = 2.1 \text{ V}$ , $I_{OUT} = 0 \text{ A}$	—	2.6	4.4	mA
		$V_{IN} = 7.2 \text{ V}$ , $I_{OUT} = 1 \text{ A}$	—	20.0	28.5	
Output noise voltage	$V_{NO}$	$V_{IN} = 10 \text{ V}$ , $I_{OUT} = 50 \text{ mA}$ , $10 \text{ Hz} \leq f \leq 100 \text{ kHz}$	—	225	—	$\mu\text{V}_{rms}$
Ripple rejection	R.R.	$9 \text{ V} \leq V_{IN} \leq 13 \text{ V}$ , $I_{OUT} = 50 \text{ mA}$ , $f = 120 \text{ Hz}$	45	56	—	dB
Dropout voltage	$V_D$	$I_{OUT} = 0.5 \text{ A}$	—	0.32	0.50	V
		$I_{OUT} = 1 \text{ A}$	—	0.69	—	
Average temperature coefficient of output voltage	$T_{CVO}$	$V_{IN} = 10 \text{ V}$ , $I_{OUT} = 5 \text{ mA}$ , $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	—	0.7	—	$\text{mV}/^\circ\text{C}$

## TA4809BF

### Electrical Characteristics

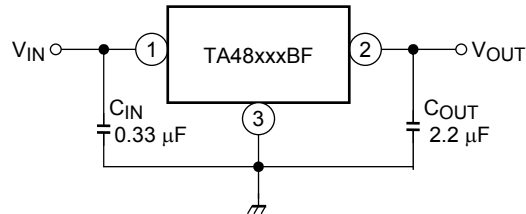
( $C_{IN} = 0.33 \mu\text{F}$ ,  $C_{OUT} = 2.2 \mu\text{F}$ ,  $T_j = 25^\circ\text{C}$ , unless otherwise specified)

Characteristics	Symbol	Test Conditions	Min	Typ.	Max	Unit
Output voltage	$V_{OUT}$	$V_{IN} = 11 \text{ V}$ , $I_{OUT} = 0.5 \text{ A}$	8.73	9.00	9.27	V
		$10 \text{ V} \leq V_{IN} \leq 14 \text{ V}$ , $5 \text{ mA} \leq I_{OUT} \leq 1 \text{ A}$ , $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	8.64	9.00	9.36	
Line regulation	Reg·line	$10 \text{ V} \leq V_{IN} \leq 14 \text{ V}$ , $I_{OUT} = 0.5 \text{ A}$	—	12.5	20.0	mV
Load regulation	Reg·load	$V_{IN} = 11 \text{ V}$ , $5 \text{ mA} \leq I_{OUT} \leq 1 \text{ A}$	—	9.4	30.0	mV
Quiescent current	$I_B$	$10 \text{ V} \leq V_{IN} \leq 14 \text{ V}$ , $I_{OUT} = 0 \text{ A}$	—	0.9	1.7	mA
		$10 \text{ V} \leq V_{IN} \leq 14 \text{ V}$ , $I_{OUT} = 1 \text{ A}$	—	10	20	
Starting quiescent current	$I_{Bstart}$	$V_{IN} = 2.1 \text{ V}$ , $I_{OUT} = 0 \text{ A}$	—	2.6	4.4	mA
		$V_{IN} = 8.2 \text{ V}$ , $I_{OUT} = 1 \text{ A}$	—	20.0	28.5	
Output noise voltage	$V_{NO}$	$V_{IN} = 11 \text{ V}$ , $I_{OUT} = 50 \text{ mA}$ , $10 \text{ Hz} \leq f \leq 100 \text{ kHz}$	—	250	—	$\mu\text{V}_{rms}$
Ripple rejection	R.R.	$10 \text{ V} \leq V_{IN} \leq 14 \text{ V}$ , $I_{OUT} = 50 \text{ mA}$ , $f = 120 \text{ Hz}$	44	55	—	dB
Dropout voltage	$V_D$	$I_{OUT} = 0.5 \text{ A}$	—	0.32	0.50	V
		$I_{OUT} = 1 \text{ A}$	—	0.69	—	
Average temperature coefficient of output voltage	$T_{CVO}$	$V_{IN} = 11 \text{ V}$ , $I_{OUT} = 5 \text{ mA}$ , $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	—	0.8	—	$\text{mV}/^\circ\text{C}$

## Electrical Characteristics for All Products

- $T_j = 25^\circ\text{C}$  in the measurement conditions of each item is the standard condition when a pulse test is carried out, and any drift in the electrical characteristic due to a rise in the junction temperature of the chip may be disregarded.

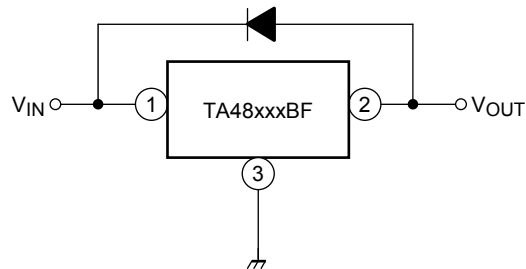
## Standard Application Circuit

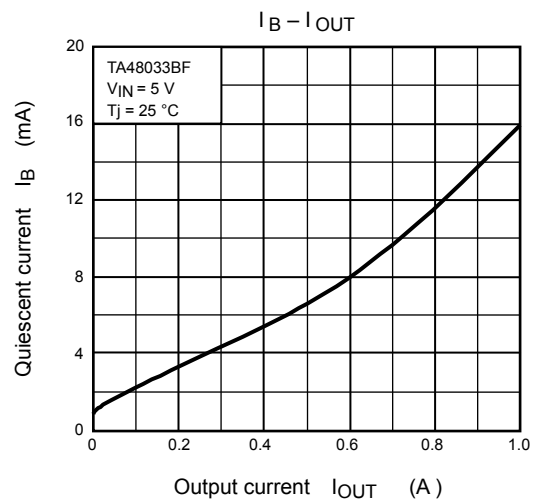
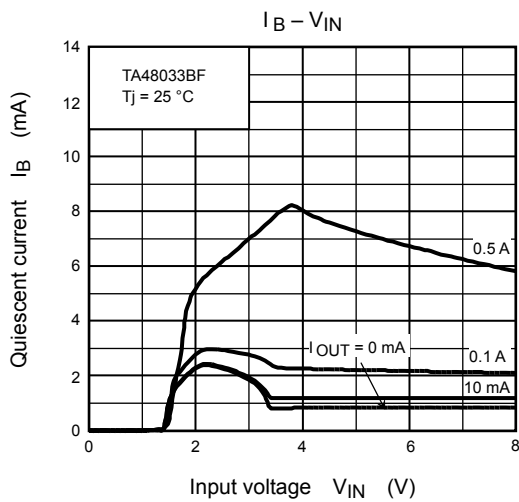
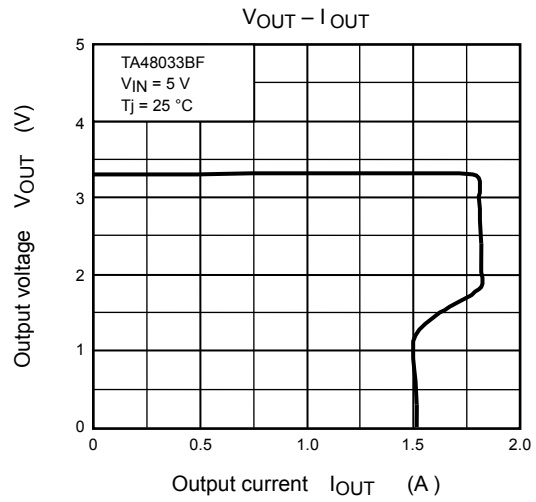
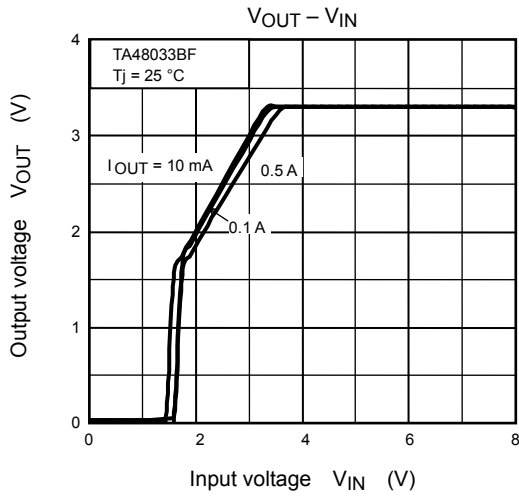
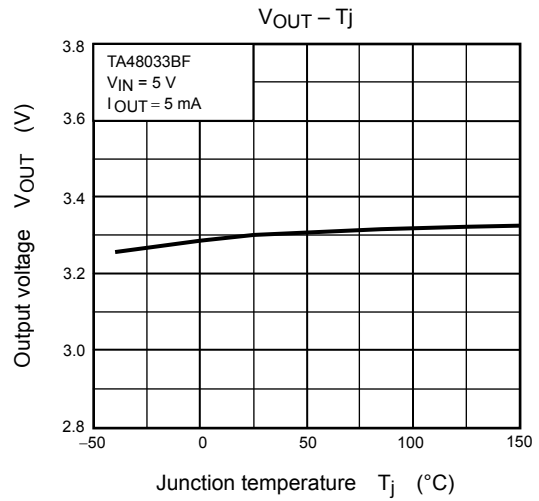
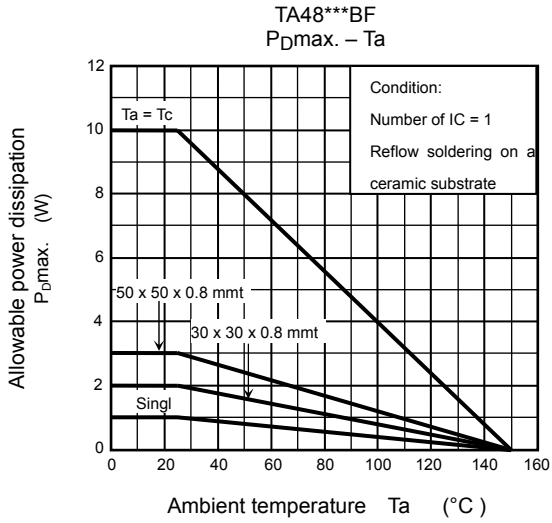


- Be sure to connect a capacitor near the input terminal and output terminal between both terminals and GND. The use of a monolithic ceramic capacitor (B Characteristic or X7R) of low ESR (equivalent series resistance) is recommended. The IC may oscillate due to external conditions (output current, temperature, or the type of the capacitor used). The type of capacitor required must be determined by the actual application circuit in which the IC is used.

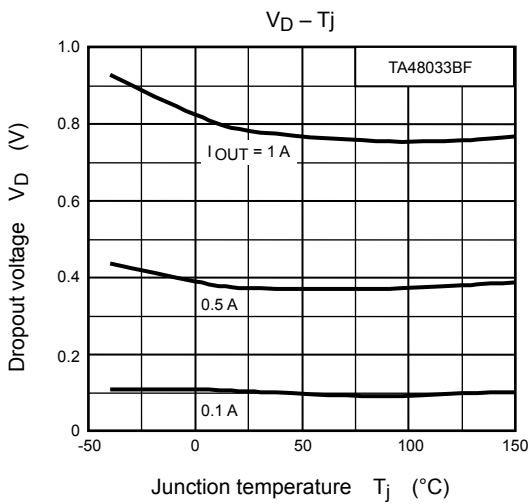
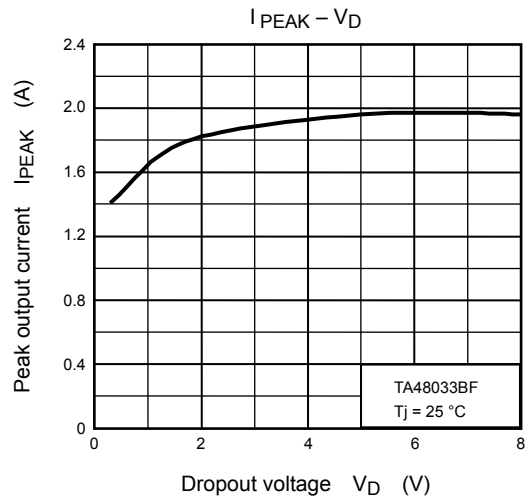
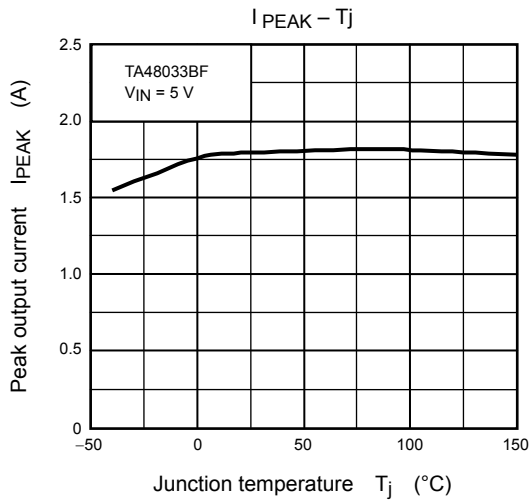
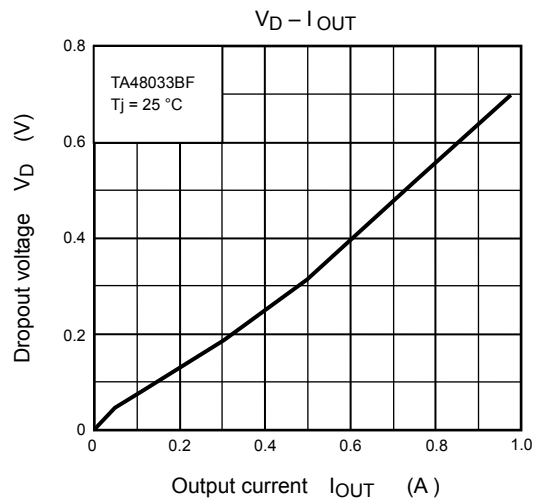
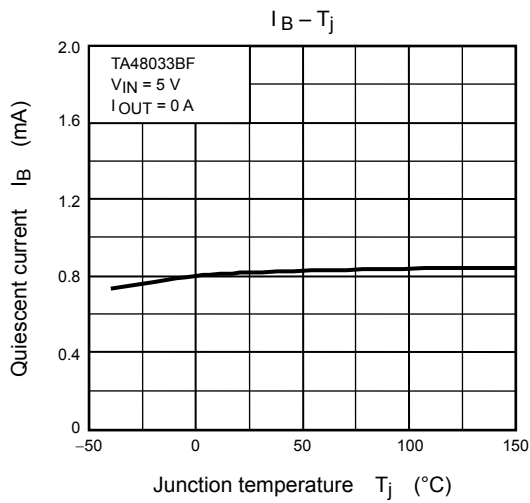
## Precautions in application

- The IC might be destroyed if a voltage greater than the input terminal voltage is applied to the output terminal, or if the input terminal is connected to GND during operation. To prevent such an occurrence, connect a diode as in the following diagram.





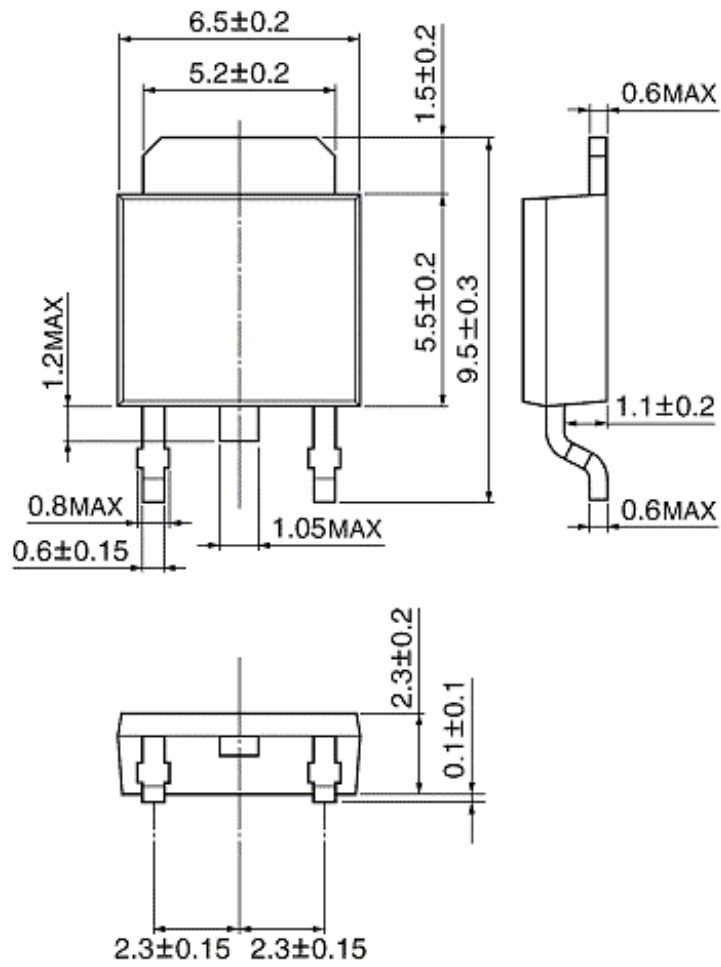




## Package Dimensions (TA48xxxBF)

HSOP-3-P-2.30D

Unit : mm



Weight: 0.36 g (typ.)

**RESTRICTIONS ON PRODUCT USE**

20070701-EN

- The information contained herein is subject to change without notice.
- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property.  
In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the "Handling Guide for Semiconductor Devices," or "TOSHIBA Semiconductor Reliability Handbook" etc.
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury ("Unintended Usage"). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in this document shall be made at the customer's own risk.
- The products described in this document shall not be used or embedded to any downstream products of which manufacture, use and/or sale are prohibited under any applicable laws and regulations.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA for any infringements of patents or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any patents or other rights of TOSHIBA or the third parties.
- Please contact your sales representative for product-by-product details in this document regarding RoHS compatibility. Please use these products in this document in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances. Toshiba assumes no liability for damage or losses occurring as a result of noncompliance with applicable laws and regulations.