

TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

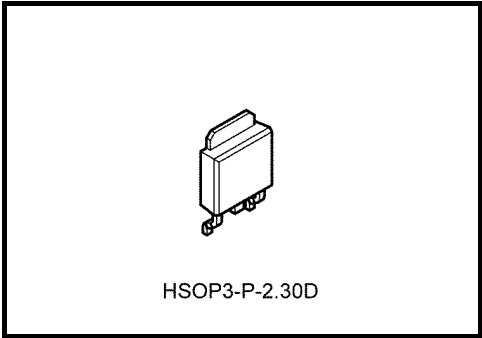
**TA48015BF,TA48018BF,TA48025BF,
TA48033BF,TA4805BF,TA4808BF,TA4809BF**

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

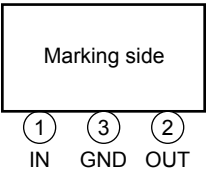
Features

- 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 μA (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 μF (multi-layer ceramic type)
- Protection function: Over current protection / Thermal shutdown / SOA
- Package type: Surface-mount New PW-Mold

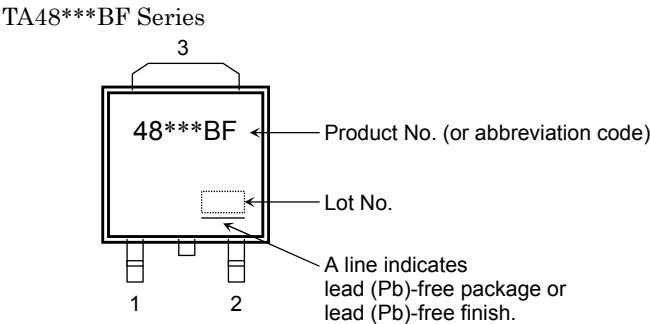


Weight
HSOP3-P-2.30D : 0.36 g (typ.)

Pin Assignment



Marking

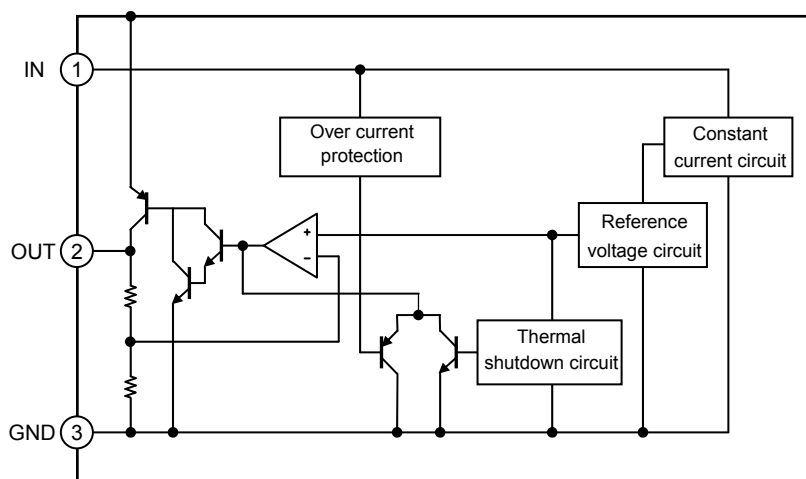


Note: The “***” part of each product number varies according to the output voltage of the product.
Be careful of static electricity when handling.

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 _{IN}	16	V
Output current		I _{OUT}	1	A
Operating junction temperature		T _{J(opr)}	-40~150	°C
Junction temperature		T _j	150	°C
Storage temperature		T _{stg}	-55~150	°C
Power dissipation	Ta = 25°C	P _D	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	$R_{th(j-a)}$	125	°C/W
Thermal resistance, junction to case	$R_{th(j-c)}$	12.5	°C/W

Protection Function (reference)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Thermal shutdown	T_{SD}	$V_{IN} = 3.4\text{ V (015-018BF)} / 3.5\text{ V (025BF)}$	150	175	—	°C
Thermal shutdown hysteresis width	$T_{SD(hys)}$	$4.3\text{ V (033BF)} / 6.0\text{ V (05BF)} / 9.0\text{ V (08BF)} / 10.0\text{ V (09BF)}$	—	20	—	°C
Peak circuit current	I_{PEAK}	$V_{IN} = V_{OUT} + 2\text{ V}, T_j = 25^\circ\text{C}$	—	1.7	—	A
		$V_{IN} = 12\text{ V}, T_j = 25^\circ\text{C}$	—	1.8	—	
Short circuit current	I_{SC}	$V_{IN} = V_{OUT} + 2\text{ V}, T_j = 25^\circ\text{C}$	—	1.2	—	A
		$V_{IN} = 12\text{ V}, T_j = 25^\circ\text{C}$	—	1.3	—	

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

TA48015BF
Electrical Characteristics

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

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

TA48018BF
Electrical Characteristics

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

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

TA48025BF
Electrical Characteristics

 (C_{IN} = 0.33 μF, C_{OUT} = 2.2 μF, T_J = 25°C, unless otherwise specified)

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

TA48033BF
Electrical Characteristics

 (C_{IN} = 0.33 μF, C_{OUT} = 2.2 μF, T_J = 25°C, unless otherwise specified)

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

TA4805BF
Electrical Characteristics

 (C_{IN} = 0.33 μF, C_{OUT} = 2.2 μF, T_j = 25°C, unless otherwise specified)

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

TA4808BF
Electrical Characteristics

 (C_{IN} = 0.33 μF, C_{OUT} = 2.2 μF, T_j = 25°C, unless otherwise specified)

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

TA4809BF
Electrical Characteristics

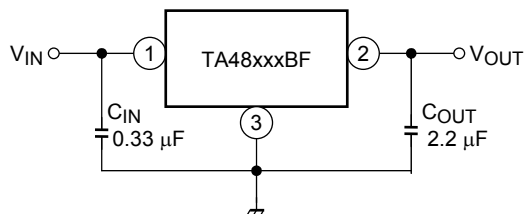
 (C_{IN} = 0.33 μF, C_{OUT} = 2.2 μF, T_J = 25°C, unless otherwise specified)

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

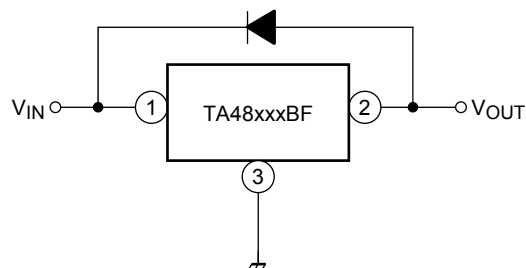
Standard Application Circuit

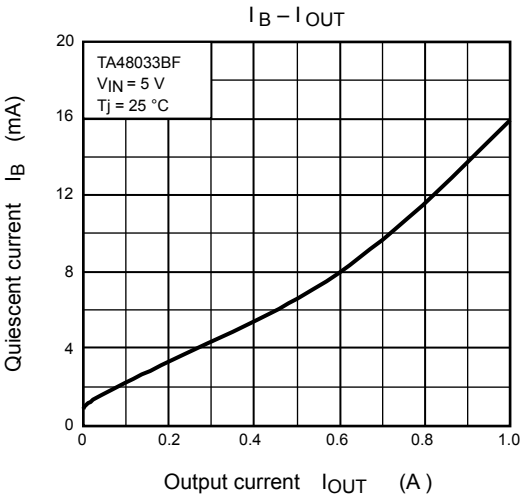
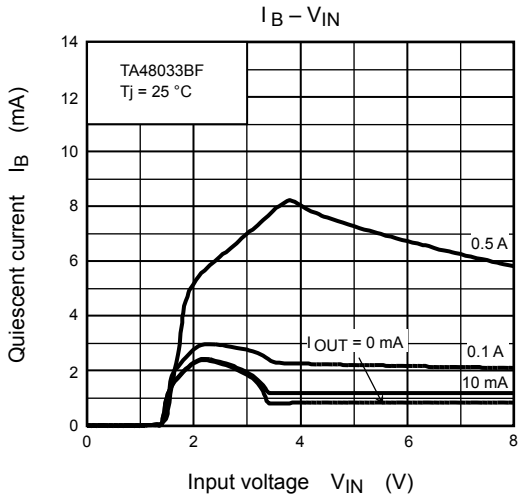
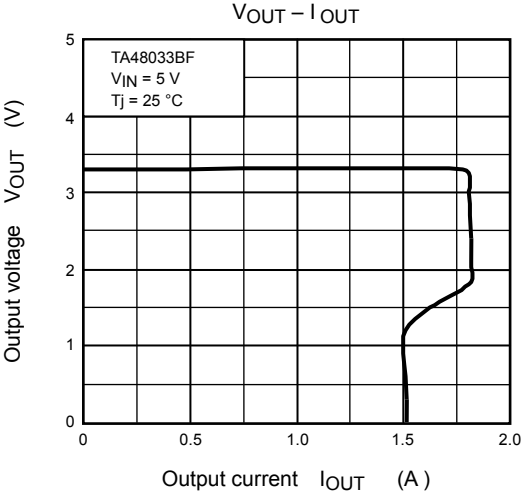
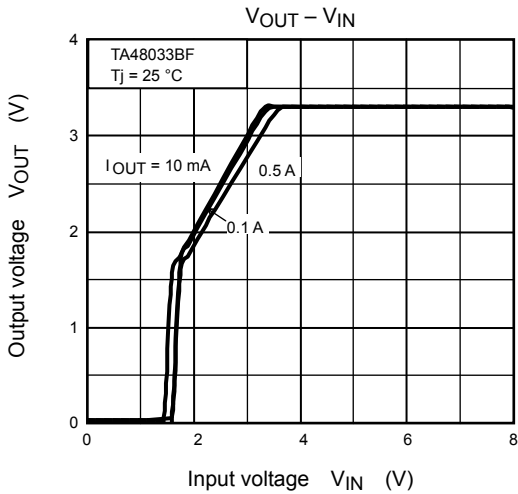
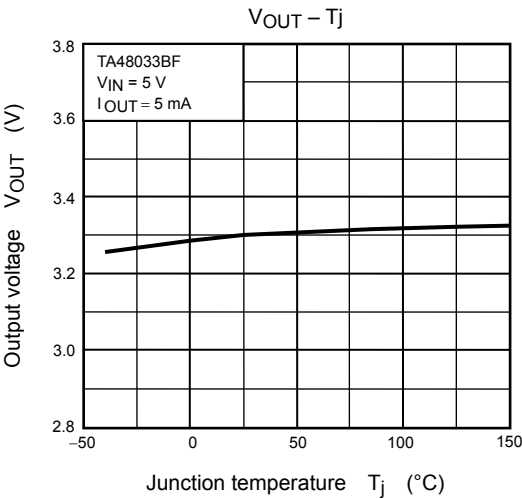
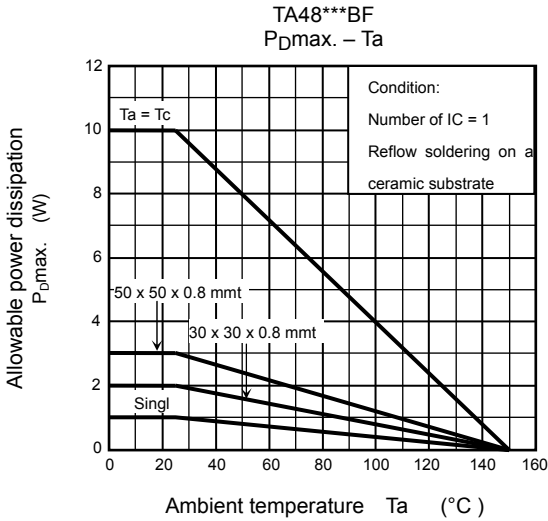


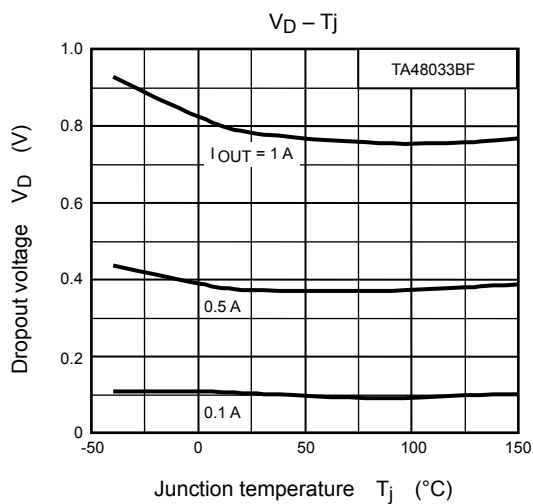
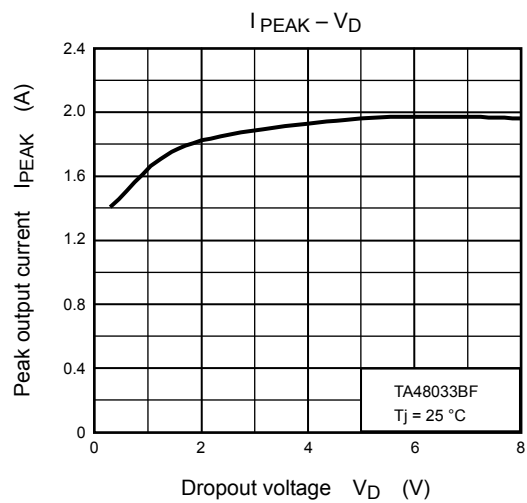
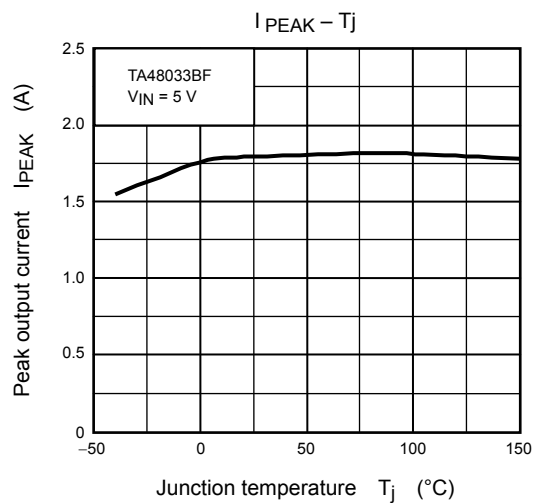
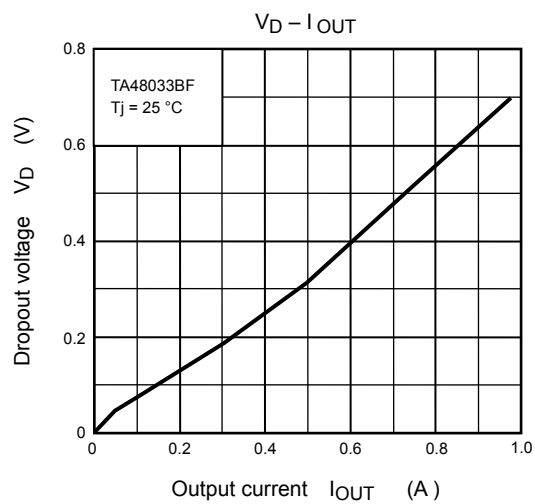
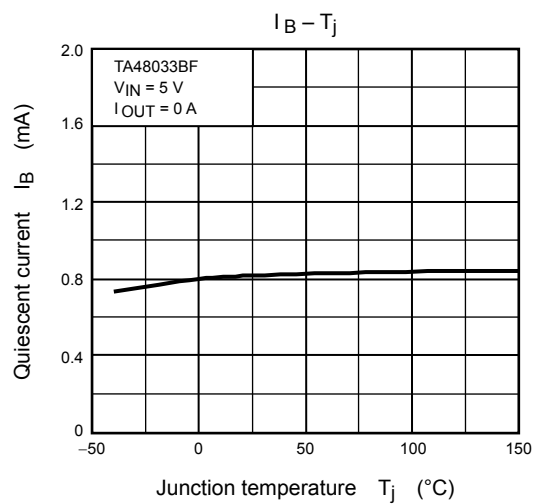
- Be sure to connect a capacitor near the input terminal and output terminal between both terminals and GND. The use of a monolithic ceramic capacitor (B Characteristic or X7R) of low ESR (equivalent series resistance) is recommended. The IC may oscillate due to external conditions (output current, temperature, 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.



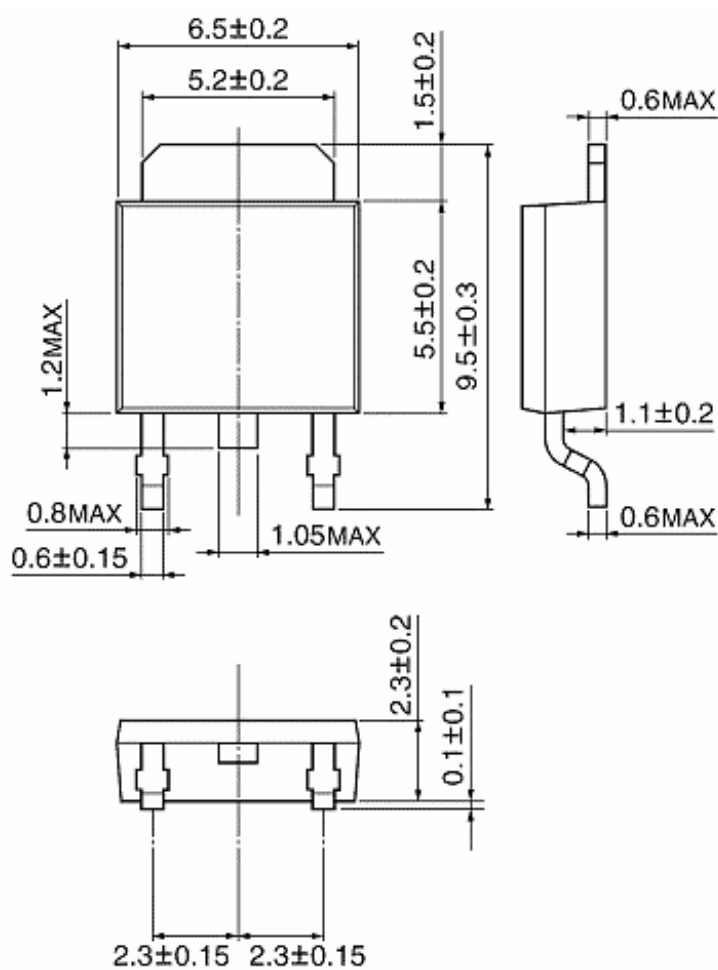




Package Dimensions (TA48xxxBF)

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.
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