

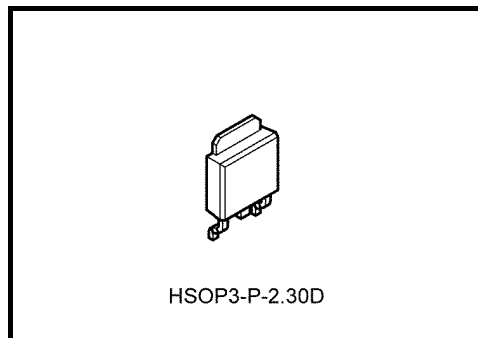
TA48015BF,TA48018BF,TA48025BF TA48033BF,TA4805BF,TA4808BF,TA4809BF

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

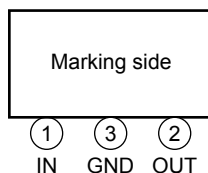
- Maximum output current: 1 A
- Low output voltage : 1.5 / 1.8 / 2.5 / 3.3 / 5.0 / 8.0 / 9.0 V
- Output voltage accuracy : $V_{OUT} \pm 3\%$ (@ $T_j = 25^\circ\text{C}$)
- Low standby current : 850 μA (typ.) (@ $I_{OUT} = 0\text{ A}$)
- Low starting quiescent current
- Low-dropout voltage : $V_D = 0.5\text{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



HSOP3-P-2.30D

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

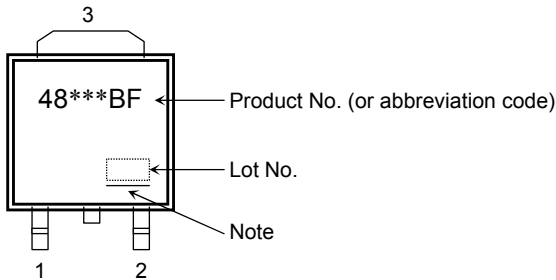
Pin Assignment



The product(s) in this document ("Product") contain functions intended to protect the Product from temporary small overloads such as minor short-term overcurrent or overheating. The protective functions do not necessarily protect Product under all circumstances. When incorporating Product into your system, please design the system (1) to avoid such overloads upon the Product, and (2) to shut down or otherwise relieve the Product of such overload conditions immediately upon occurrence. For details, please refer to the notes appearing below in this document and other documents referenced in this document.

Marking

TA48***BF Series



Note: A line under a Lot No. identifies the indication of product Labels.
[[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product.
The RoHS is the Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

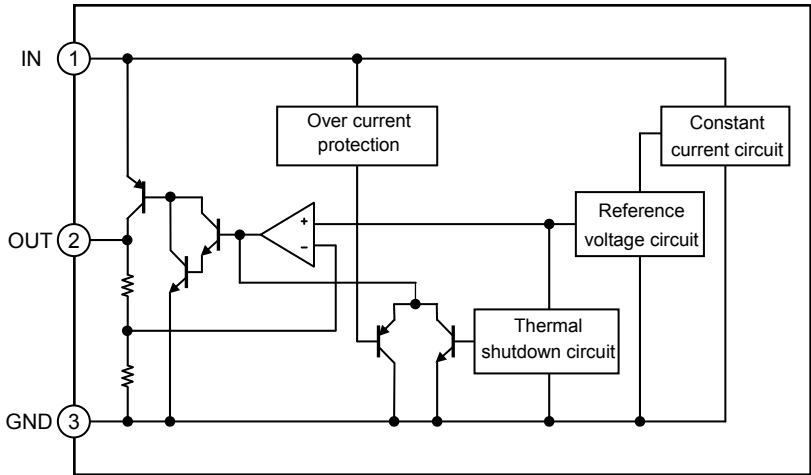
Note1: The “***” part of each product number varies according to the output voltage of the product.

How to Order

Product No.	Package	Packing Type and Unit for Orders
TA48***BF (T6L1, NQ) (Note2)	New PW-Mold: Surface-mount	Tape (2000 pcs/reel)

Note 2: The “***” in each product number is replaced with the output voltage of each product.

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 _{jopr}	−40 to 150	°C
Junction temperature		T _j	150	°C
Storage temperature		T _{stg}	−55 to 150	°C
Power dissipation	T _a = 25°C	P _D	1	W
	T _c = 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 V (015 to 018BF) / 3.5 V (025BF)	150	175	—	°C
Thermal shutdown hysteresis width	T _{SD(hys)}	4.3 V (033BF) / 6.0 V (05BF) / 9.0 V (08BF) / 10.0 V (09BF)	—	20	—	°C
Peak circuit current	I _{PEAK}	V _{IN} = V _{OUT} + 2 V, T _j = 25°C	—	1.7	—	A
		V _{IN} = 12 V, T _j = 25°C	—	1.8	—	
Short circuit current	I _{SC}	V _{IN} = V _{OUT} + 2 V, T _j = 25°C	—	1.2	—	A
		V _{IN} = 12 V, T _j = 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 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} = 3.5 V, I _{OUT} = 0.5 A	1.455	1.500	1.545	V
		3.4 V ≤ V _{IN} ≤ 6.5 V, 5 mA ≤ I _{OUT} ≤ 1 A, 0°C ≤ T _j ≤ 125°C	1.44	1.50	1.56	
Line regulation	Reg·line	3.4 V ≤ V _{IN} ≤ 6.5 V, I _{OUT} = 0.5 A	—	4.5	20.0	mV
Load regulation	Reg·load	V _{IN} = 3.5 V, 5 mA ≤ I _{OUT} ≤ 1 A	—	2	20	mV
Quiescent current	I _B	3.4 V ≤ V _{IN} ≤ 6.5 V, I _{OUT} = 0 A	—	0.85	1.70	mA
		3.4 V ≤ V _{IN} ≤ 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 ≤ f ≤ 100 kHz	—	75	—	μV _{rms}
Ripple rejection	R.R.	3.5 V ≤ V _{IN} ≤ 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°C ≤ T _j ≤ 125°C	—	0.14	—	mV/°C

TA48018BF
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} = 3.8 V, I _{OUT} = 0.5 A	1.746	1.800	1.854	V
		3.4 V ≤ V _{IN} ≤ 6.8 V, 5 mA ≤ I _{OUT} ≤ 1 A, 0°C ≤ T _j ≤ 125°C	1.728	1.800	1.872	
Line regulation	Reg·line	3.4 V ≤ V _{IN} ≤ 6.8 V, I _{OUT} = 0.5 A	—	5.6	20.0	mV
Load regulation	Reg·load	V _{IN} = 3.8 V, 5 mA ≤ I _{OUT} ≤ 1 A	—	2.4	20.0	mV
Quiescent current	I _B	3.4 V ≤ V _{IN} ≤ 6.8 V, I _{OUT} = 0 A	—	0.85	1.70	mA
		3.4 V ≤ V _{IN} ≤ 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 ≤ f ≤ 100 kHz	—	75	—	μV _{rms}
Ripple rejection	R.R.	3.4 V ≤ V _{IN} ≤ 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°C ≤ T _j ≤ 125°C	—	0.15	—	mV/°C

TA48025BF
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}	$V_{IN} = 4.5 V$, $I_{OUT} = 0.5 A$	2.425	2.500	2.575	V
		$3.5 V \leq V_{IN} \leq 7.5 V$, $5 mA \leq I_{OUT} \leq 1 A$, $0^\circ C \leq T_j \leq 125^\circ C$	2.4	2.5	2.6	
Line regulation	Reg·line	$3.5 V \leq V_{IN} \leq 7.5 V$, $I_{OUT} = 0.5 A$	—	6.7	20.0	mV
Load regulation	Reg·load	$V_{IN} = 4.5 V$, $5 mA \leq I_{OUT} \leq 1 A$	—	2.9	20.0	mV
Quiescent current	I_B	$3.5 V \leq V_{IN} \leq 7.5 V$, $I_{OUT} = 0 A$	—	0.85	1.70	mA
		$3.5 V \leq V_{IN} \leq 7.5 V$, $I_{OUT} = 1 A$	—	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}	$V_{IN} = 4.5 V$, $I_{OUT} = 50 mA$, $10 Hz \leq f \leq 100 kHz$	—	95	—	μV_{rms}
Ripple rejection	R.R.	$3.5 V \leq V_{IN} \leq 7.5 V$, $I_{OUT} = 50 mA$, $f = 120 Hz$	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}	$V_{IN} = 4.5 V$, $I_{OUT} = 5 mA$, $0^\circ C \leq T_j \leq 125^\circ C$	—	0.2	—	mV/ $^\circ C$

TA48033BF
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}	$V_{IN} = 5.3 V$, $I_{OUT} = 0.5 A$	3.201	3.300	3.399	V
		$4.3 V \leq V_{IN} \leq 8.8 V$, $5 mA \leq I_{OUT} \leq 1 A$, $0^\circ C \leq T_j \leq 125^\circ C$	3.168	3.300	3.432	
Line regulation	Reg·line	$4.3 V \leq V_{IN} \leq 8.8 V$, $I_{OUT} = 0.5 A$	—	8.3	20.0	mV
Load regulation	Reg·load	$V_{IN} = 5.3 V$, $5 mA \leq I_{OUT} \leq 1 A$	—	3.7	20.0	mV
Quiescent current	I_B	$4.3 V \leq V_{IN} \leq 8.8 V$, $I_{OUT} = 0 A$	—	0.85	1.70	mA
		$4.3 V \leq V_{IN} \leq 8.8 V$, $I_{OUT} = 1 A$	—	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}	$V_{IN} = 5.3 V$, $I_{OUT} = 50 mA$, $10 Hz \leq f \leq 100 kHz$	—	115	—	μV_{rms}
Ripple rejection	R.R.	$4.3 V \leq V_{IN} \leq 8.8 V$, $I_{OUT} = 50 mA$, $f = 120 Hz$	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}	$V_{IN} = 5.3 V$, $I_{OUT} = 5 mA$, $0^\circ C \leq T_j \leq 125^\circ C$	—	0.3	—	mV/ $^\circ C$

TA4805BF
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}	$V_{IN} = 7 V$, $I_{OUT} = 0.5 A$	4.85	5.00	5.15	V
		$6 V \leq V_{IN} \leq 10 V$, , $5 mA \leq I_{OUT} \leq 1 A$, $0^\circ C \leq T_j \leq 125^\circ C$	4.8	5.0	5.2	
Line regulation	Reg·line	$6 V \leq V_{IN} \leq 10 V$, $I_{OUT} = 0.5 A$	—	10	20	mV
Load regulation	Reg·load	$V_{IN} = 7 V$, $5 mA \leq I_{OUT} \leq 1 A$	—	4.2	20.0	mV
Quiescent current	I_B	$6 V \leq V_{IN} \leq 10 V$, $I_{OUT} = 0 A$	—	0.85	1.70	mA
		$6 V \leq V_{IN} \leq 10 V$, $I_{OUT} = 1 A$	—	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}	$V_{IN} = 7 V$, $I_{OUT} = 50 mA$, $10 Hz \leq f \leq 100 kHz$	—	150	—	μV_{rms}
Ripple rejection	R.R.	$6 V \leq V_{IN} \leq 10 V$, $I_{OUT} = 50 mA$, $f = 120 Hz$	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}	$V_{IN} = 7 V$, $I_{OUT} = 5 mA$, $0^\circ C \leq T_j \leq 125^\circ C$	—	0.45	—	mV/ $^\circ C$

TA4808BF
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}	$V_{IN} = 10 V$, $I_{OUT} = 0.5 A$	7.76	8.00	8.24	V
		$9 V \leq V_{IN} \leq 13 V$, $5 mA \leq I_{OUT} \leq 1 A$, $0^\circ C \leq T_j \leq 125^\circ C$	7.68	8.00	8.32	
Line regulation	Reg·line	$9 V \leq V_{IN} \leq 13 V$, $I_{OUT} = 0.5 A$	—	12.5	20.0	mV
Load regulation	Reg·load	$V_{IN} = 10 V$, $5 mA \leq I_{OUT} \leq 1 A$	—	9.4	30.0	mV
Quiescent current	I_B	$9 V \leq V_{IN} \leq 13 V$, $I_{OUT} = 0 A$	—	0.9	1.7	mA
		$9 V \leq V_{IN} \leq 13 V$, $I_{OUT} = 1 A$	—	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}	$V_{IN} = 10 V$, $I_{OUT} = 50 mA$, $10 Hz \leq f \leq 100 kHz$	—	225	—	μV_{rms}
Ripple rejection	R.R.	$9 V \leq V_{IN} \leq 13 V$, $I_{OUT} = 50 mA$, $f = 120 Hz$	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}	$V_{IN} = 10 V$, $I_{OUT} = 5 mA$, $0^\circ C \leq T_j \leq 125^\circ C$	—	0.7	—	mV/ $^\circ C$

TA4809BF
Electrical Characteristics

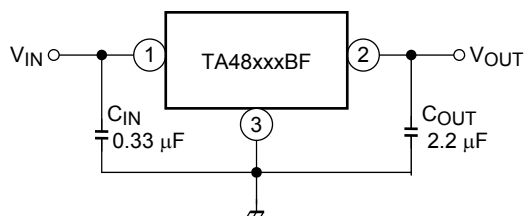
 (C_{IN} = 0.33 µF, C_{OUT} = 2.2 µF, T_J = 25°C, unless otherwise specified)

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.

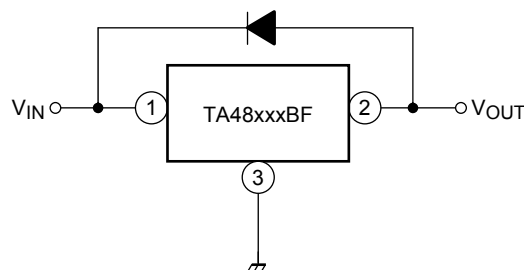
Standard Application Circuit



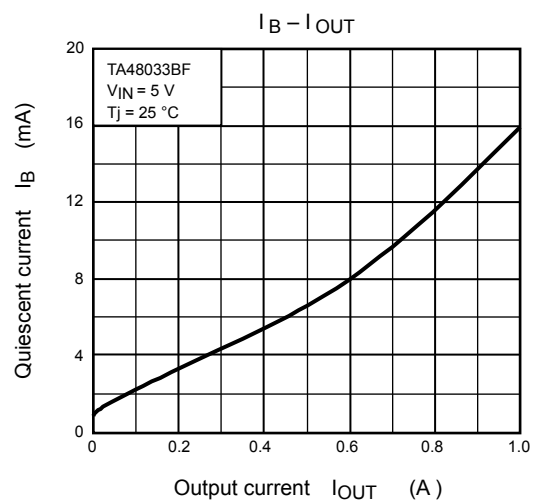
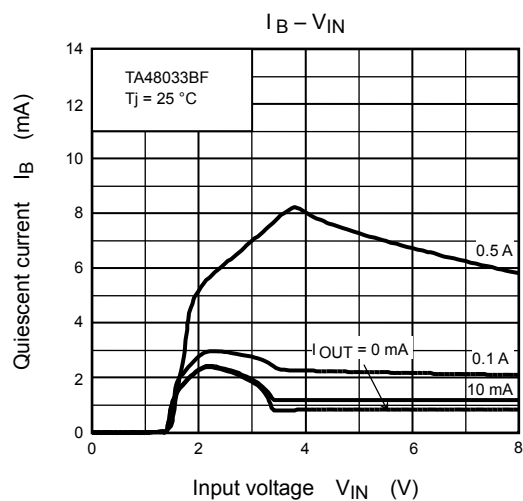
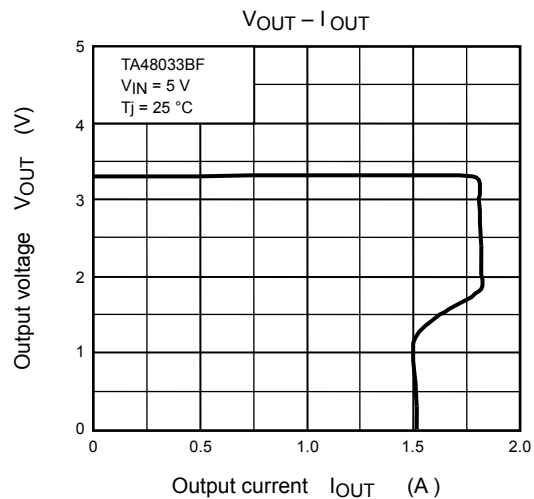
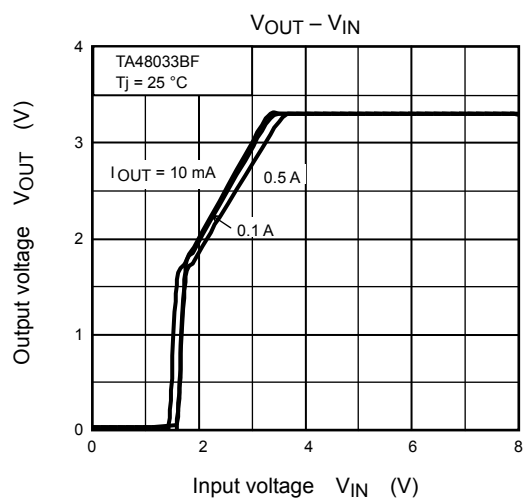
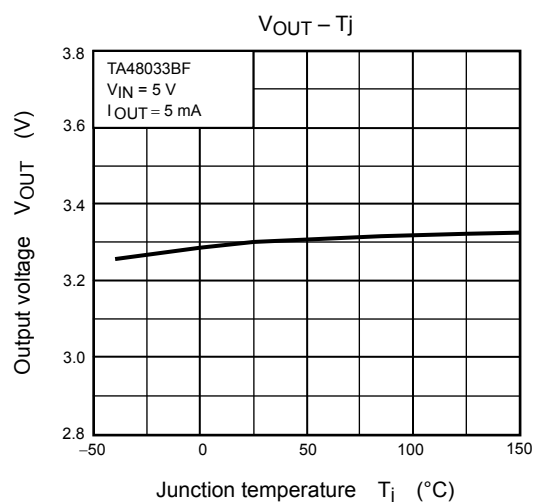
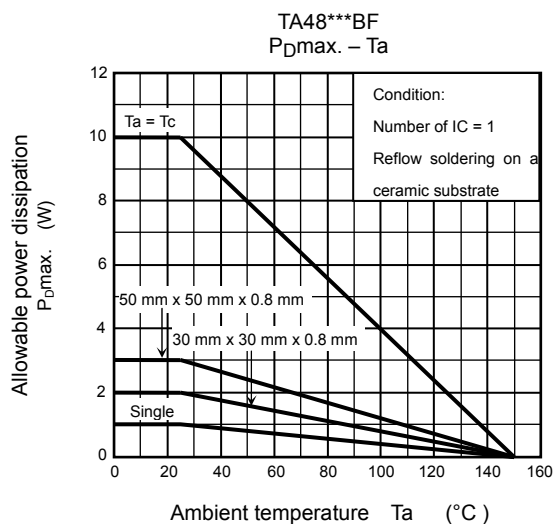
- Be sure to connect a capacitor near the input terminal and output terminal between both terminals and GND. The use of a monolithic ceramic capacitor (B Characteristic or X7R) of low ESR (equivalent series resistance) is recommended. The IC may oscillate due to external conditions (output current, temperature,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

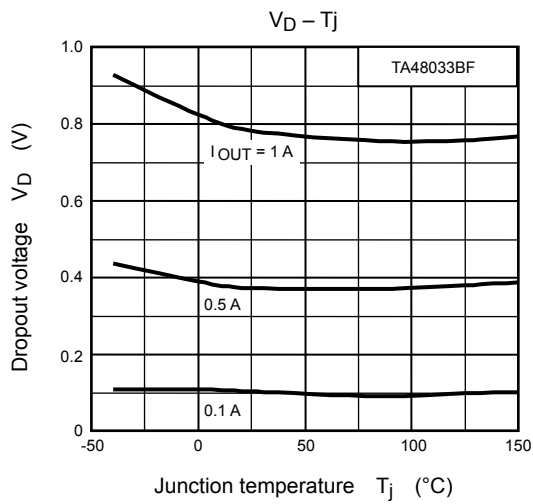
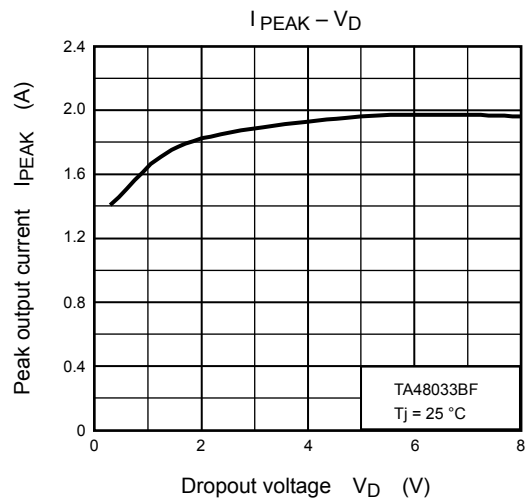
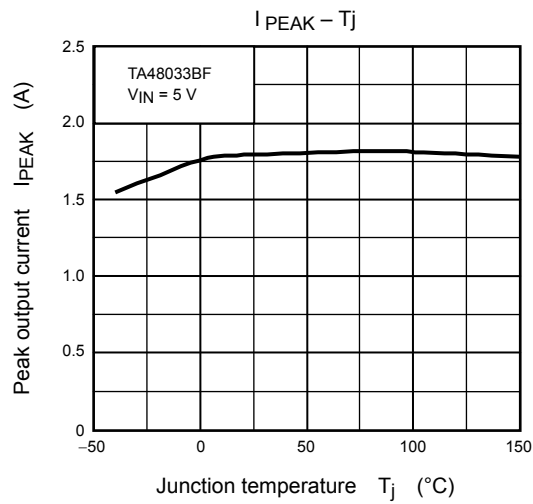
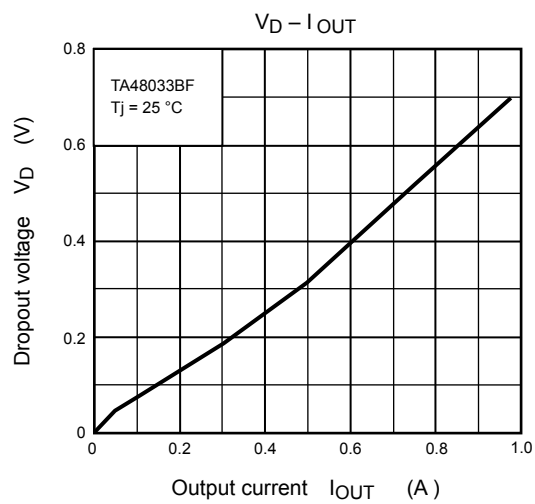
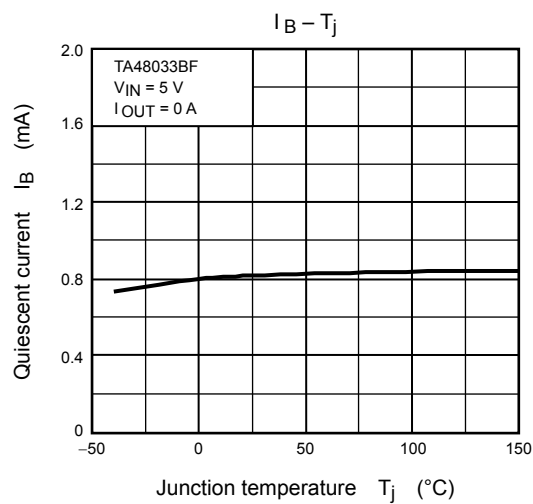
Usage Precautions

- 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.



- Low voltage
Do not apply voltage to the Product that is lower than the minimum operating voltage, or the Product's protective functions will not operate properly and the Product may be permanently damaged.
- Overcurrent Protection
The overcurrent protection circuits in the Product are designed to temporarily protect Product from minor overcurrent of brief duration. When the overcurrent protective function in the Product activates, immediately cease application of overcurrent to Product. Improper usage of Product, such as application of current to Product exceeding the absolute maximum ratings, could cause the overcurrent protection circuit not to operate properly and/or damage Product permanently even before the protection circuit starts to operate.
- Overheating Protection
The thermal shutdown circuits in the Product are designed to temporarily protect Product from minor overheating of brief duration. When the overheating protective function in the Product activates, immediately correct the overheating situation. Improper usage of Product, such as the application of heat to Product exceeding the absolute maximum ratings, could cause the overheating protection circuit not to operate properly and/or damage Product permanently even before the protection circuit starts to operate.

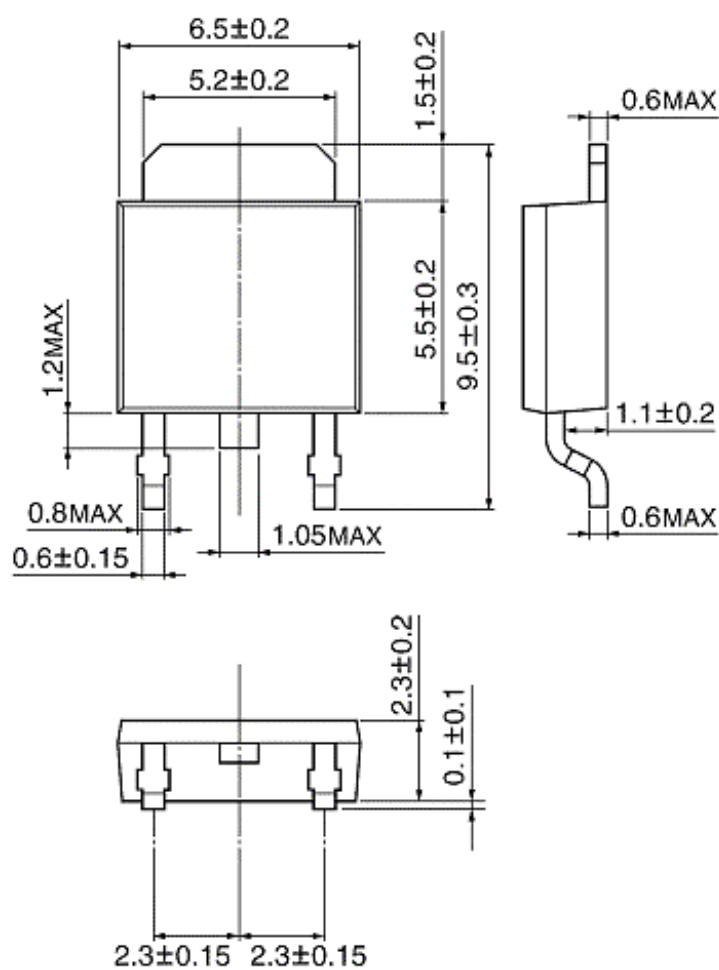




Package Dimensions (TA48xxxBF)

HSOP-3-P-2.30D

Unit: mm



Weight: 0.36 g (typ.)

RESTRICTIONS ON PRODUCT USE

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