

TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

## TA48018F, TA4802F, TA48025F, TA4803F, TA48033F, TA4805F, TA48018S, TA4802S, TA48025S, TA4803S, TA48033S, TA4805S

1.8 V, 2 V, 2.5 V, 3 V, 3.3 V, 5 V

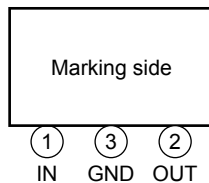
Three-Terminal Low Dropout Voltage Regulator with Output Current of 1 A

The TA48\*\*F/S 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 which are used in consumer electronics and industrial appliances, the series offers devices with low output voltages: 1.8 V, 2 V, 2.5 V, 3 V, 3.3 V, 5 V.

### Features

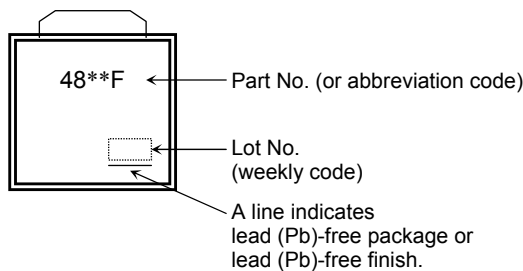
- Maximum output current: 1 A
- Output voltage accuracy:  $V_{OUT} \pm 3\%$  (@ $T_j = 25^\circ\text{C}$ )
- Low standby current: 800  $\mu\text{A}$  (typ.) (@ $I_{OUT} = 0\text{ A}$ )
- Low starting quiescent current
- Low-dropout voltage:  $V_D = 0.5\text{ V}$  (max) (@ $I_{OUT} = 0.5\text{ A}$ )
- Protection function: overheat/overcurrent
- Package type: PW-MOLD (TA48\*\*F Series)  
TO-220NIS (TA48\*\*S Series)
- TA48\*\*F Series has a lead bending type package which is a surface-mountable package and can be used for reflow soldering.

### Pin Assignment

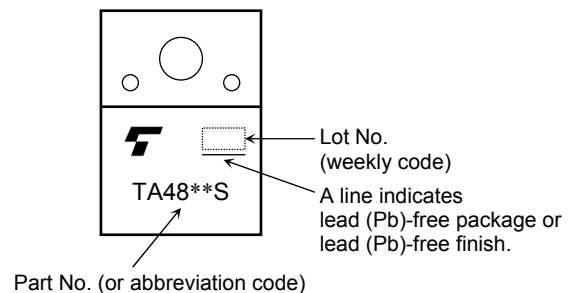


### Marking

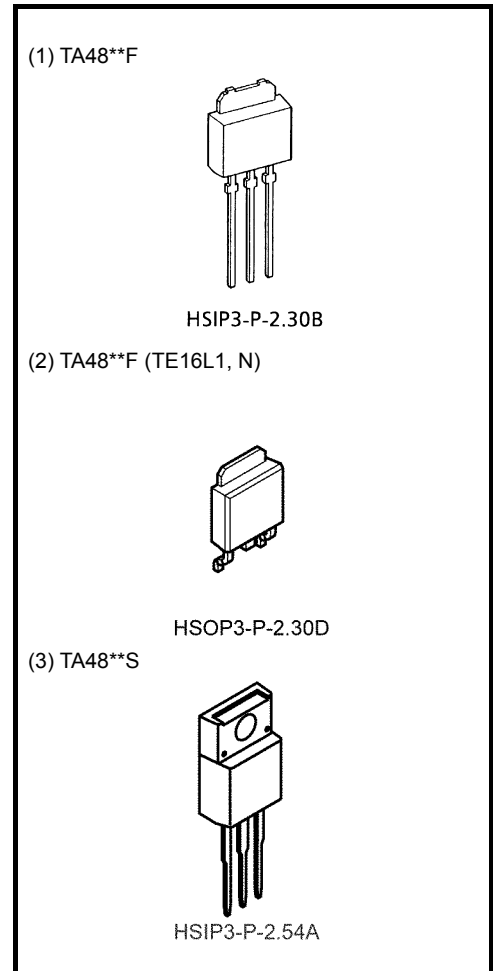
(1) (2) TA48F\*\* Series



(3) TA48\*\*S Series



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



Weight

HSIP3-P-2.30B : 0.36 g (typ.)

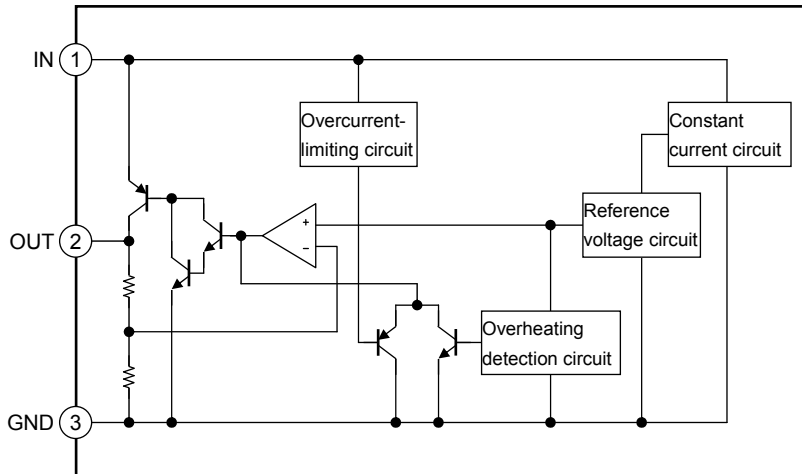
HSOP3-P-2.30D : 0.36 g (typ.)

HSIP3-P-2.54A : 1.7 g (typ.)

## How to Order

	Product No.	Package	Packing Type and Unit for Orders
(1)	TA48**F	PW-MOLD: Straight-lead package	Loose in bag: 200 (1 bag)
(2)	TA48**F (TE16L1, N)	PW-MOLD: Surface-mount package	Embossed-tape packing: 2000 (1 tape)
(3)	TA48**S	TO-220NIS	Loose in bag: 50 (1 bag)

## 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 temperature		$T_{a (opr)}$	-40~85	°C
Junction temperature		$T_j$	150	°C
Storage temperature		$T_{stg}$	-55~150	°C
Power dissipation (Ta = 25°C)	TA48**F	$P_D$	1	W
	TA48**S		2	
Power dissipation (Tc = 25°C)	TA48**F	$P_D$	10	W
	TA48**S		20	
Thermal resistance (junction to ambient)	TA48**F	$R_{th (j-a)}$	125	°C/W
	TA48**S		62.5	
Thermal resistance (junction to case)	TA48**F	$R_{th (j-c)}$	12.5	°C/W
	TA48**S		6.25	

Note 1: External current and voltage ((including negative voltage) should not be applied to pins not specified.

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).

## Protection Function (reference)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Thermal shutdown	$T_{SD} (T_j)$	—	—	160	—	°C
Peak circuit current	$I_{PEAK}$	$V_{IN} = V_{OUT} + 2 V, T_j = 25^\circ C$	—	1.7	—	A
		$V_{IN} = 12 V, T_j = 25^\circ C$	—	1.8	—	
Short circuit current	$I_{SC}$	$V_{IN} = V_{OUT} + 2 V, T_j = 25^\circ C$	—	1.7	—	A
		$V_{IN} = 12 V, T_j = 25^\circ C$	—	1.8	—	

Note 3: The maximum ratings should not be exceeded when the IC is actually used.

## TA48018F/S

### Electrical Characteristics

(Unless otherwise specified  $C_{IN} = 0.33 \mu F$ ,  $C_{OUT} = 10 \mu F$ ,  $T_j = 25^\circ C$ )

Characteristics	Symbol	Test Conditions	Min	Typ.	Max	Unit
Output voltage	$V_{OUT}$	$V_{IN} = 3.8 V, I_{OUT} = 0.5 A$	1.746	1.8	1.854	V
		$2.8 V \leq V_{IN} \leq 12 V, 5 mA \leq I_{OUT} \leq 1 A, 0^\circ C \leq T_j \leq 125^\circ C$	1.72	1.8	1.88	
Line regulation	Reg·line	$2.8 V \leq V_{IN} \leq 12 V, I_{OUT} = 0.5 A$	—	5	20	mV
Load regulation	Reg·load	$V_{IN} = 3.8 V, 5 mA \leq I_{OUT} \leq 1 A$	—	5	20	mV
Quiescent current	$I_B$	$2.8 V \leq V_{IN} \leq 12 V, I_{OUT} = 0 A$	—	0.8	1.8	mA
		$2.8 V \leq V_{IN} \leq 12 V, I_{OUT} = 1 A$	—	10	20	
Starting quiescent current	$I_{Bstart}$	$V_{IN} = 2.1 V, I_{OUT} = 0 A$	—	0.7	5	mA
		$V_{IN} = 2.5 V, I_{OUT} = 1 A$	—	10	30	
Output noise voltage	$V_{NO}$	$V_{IN} = 3.8 V, I_{OUT} = 50 mA$ $10 Hz \leq f \leq 100 kHz$	—	75	—	$\mu V_{rms}$
Ripple rejection	R.R.	$2.8 V \leq V_{IN} \leq 12 V, I_{OUT} = 50 mA$ $f = 120 Hz$	54	70	—	dB
Dropout voltage	$V_D$	$I_{OUT} = 0.5 A$	—	0.3	0.5	V
		$I_{OUT} = 1 A$	—	0.7	—	
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/°C

## TA4802F/S

### Electrical Characteristics

(Unless otherwise specified,  $C_{IN} = 0.33 \mu\text{F}$ ,  $C_{OUT} = 10 \mu\text{F}$ ,  $T_j = 25^\circ\text{C}$ )

Characteristics	Symbol	Test Conditions	Min	Typ.	Max	Unit
Output voltage	$V_{OUT}$	$V_{IN} = 4.0 \text{ V}$ , $I_{OUT} = 0.5 \text{ A}$	1.94	2.0	2.06	V
		$3.0 \text{ V} \leq V_{IN} \leq 12 \text{ V}$ , $5 \text{ mA} \leq I_{OUT} \leq 1 \text{ A}$ , $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	1.91	2.0	2.09	
Line regulation	Reg·line	$3.0 \text{ V} \leq V_{IN} \leq 12 \text{ V}$ , $I_{OUT} = 0.5 \text{ A}$	—	5	20	mV
Load regulation	Reg·load	$V_{IN} = 4.0 \text{ V}$ , $5 \text{ mA} \leq I_{OUT} \leq 1 \text{ A}$	—	5	20	mV
Quiescent current	$I_B$	$3.0 \text{ V} \leq V_{IN} \leq 12 \text{ V}$ , $I_{OUT} = 0 \text{ A}$	—	0.8	1.8	mA
		$3.0 \text{ V} \leq V_{IN} \leq 12 \text{ V}$ , $I_{OUT} = 1 \text{ A}$	—	10	20	
Starting quiescent current	$I_{Bstart}$	$V_{IN} = 2.1 \text{ V}$ , $I_{OUT} = 0 \text{ A}$	—	0.7	5	mA
		$V_{IN} = 2.6 \text{ V}$ , $I_{OUT} = 1 \text{ A}$	—	10	30	
Output noise voltage	$V_{NO}$	$V_{IN} = 4.0 \text{ V}$ , $I_{OUT} = 50 \text{ mA}$ $10 \text{ Hz} \leq f \leq 100 \text{ kHz}$	—	80	—	$\mu\text{Vrms}$
Ripple rejection	R.R.	$3.0 \text{ V} \leq V_{IN} \leq 12 \text{ V}$ , $I_{OUT} = 50 \text{ mA}$ $f = 120 \text{ Hz}$	52	68	—	dB
Dropout voltage	$V_D$	$I_{OUT} = 0.5 \text{ A}$	—	0.3	0.5	V
		$I_{OUT} = 1 \text{ A}$	—	0.6	—	
Average temperature coefficient of output voltage	$T_{CVO}$	$V_{IN} = 4.0 \text{ V}$ , $I_{OUT} = 5 \text{ mA}$ , $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	—	0.18	—	$\text{mV}/^\circ\text{C}$

## TA48025F/S

### Electrical Characteristics

(Unless otherwise specified,  $C_{IN} = 0.33 \mu\text{F}$ ,  $C_{OUT} = 10 \mu\text{F}$ ,  $T_j = 25^\circ\text{C}$ )

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	2.5	2.575	V
		$3.5 \text{ V} \leq V_{IN} \leq 12 \text{ V}$ , $5 \text{ mA} \leq I_{OUT} \leq 1 \text{ A}$ , $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	2.388	2.5	2.612	
Line regulation	Reg·line	$3.5 \text{ V} \leq V_{IN} \leq 12 \text{ V}$ , $I_{OUT} = 0.5 \text{ A}$	—	5	20	mV
Load regulation	Reg·load	$V_{IN} = 4.5 \text{ V}$ , $5 \text{ mA} \leq I_{OUT} \leq 1 \text{ A}$	—	5	20	mV
Quiescent current	$I_B$	$3.5 \text{ V} \leq V_{IN} \leq 12 \text{ V}$ , $I_{OUT} = 0 \text{ A}$	—	0.8	1.8	mA
		$3.5 \text{ V} \leq V_{IN} \leq 12 \text{ V}$ , $I_{OUT} = 1 \text{ A}$	—	10	20	
Starting quiescent current	$I_{Bstart}$	$V_{IN} = 2.1 \text{ V}$ , $I_{OUT} = 0 \text{ A}$	—	0.9	5	mA
		$V_{IN} = 2.65 \text{ V}$ , $I_{OUT} = 1 \text{ A}$	—	12	30	
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	—	$\mu\text{Vrms}$
Ripple rejection	R.R.	$3.5 \text{ V} \leq V_{IN} \leq 12 \text{ V}$ , $I_{OUT} = 50 \text{ mA}$ $f = 120 \text{ Hz}$	52	68	—	dB
Dropout voltage	$V_D$	$I_{OUT} = 0.5 \text{ A}$	—	0.3	0.5	V
		$I_{OUT} = 1 \text{ A}$	—	0.4	—	
Average temperature coefficient of output voltage	$T_{CVO}$	$V_{IN} = 4.5 \text{ V}$ , $I_{OUT} = 5 \text{ mA}$ , $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	—	0.24	—	$\text{mV}/^\circ\text{C}$

## TA4803F/S

### Electrical Characteristics

(Unless otherwise specified,  $C_{IN} = 0.33 \mu\text{F}$ ,  $C_{OUT} = 10 \mu\text{F}$ ,  $T_j = 25^\circ\text{C}$ )

Characteristics	Symbol	Test Conditions	Min	Typ.	Max	Unit
Output voltage	$V_{OUT}$	$V_{IN} = 5.0 \text{ V}$ , $I_{OUT} = 0.5 \text{ A}$	2.91	3.0	3.09	V
		$4.0 \text{ V} \leq V_{IN} \leq 12 \text{ V}$ , $5 \text{ mA} \leq I_{OUT} \leq 1 \text{ A}$ , $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	2.865	3.0	3.135	
Line regulation	Reg·line	$4.0 \text{ V} \leq V_{IN} \leq 12 \text{ V}$ , $I_{OUT} = 0.5 \text{ A}$	—	5	20	mV
Load regulation	Reg·load	$V_{IN} = 5.0 \text{ V}$ , $5 \text{ mA} \leq I_{OUT} \leq 1 \text{ A}$	—	5	20	mV
Quiescent current	$I_B$	$4.0 \text{ V} \leq V_{IN} \leq 12 \text{ V}$ , $I_{OUT} = 0 \text{ A}$	—	0.8	1.8	mA
		$4.0 \text{ V} \leq V_{IN} \leq 12 \text{ V}$ , $I_{OUT} = 1 \text{ A}$	—	10	20	
Starting quiescent current	$I_{Bstart}$	$V_{IN} = 2.1 \text{ V}$ , $I_{OUT} = 0 \text{ A}$	—	1.1	5	mA
		$V_{IN} = 2.8 \text{ V}$ , $I_{OUT} = 1 \text{ A}$	—	13	30	
Output noise voltage	$V_{NO}$	$V_{IN} = 5.0 \text{ V}$ , $I_{OUT} = 50 \text{ mA}$ $10 \text{ Hz} \leq f \leq 100 \text{ kHz}$	—	110	—	$\mu\text{Vrms}$
Ripple rejection	R.R.	$4.0 \text{ V} \leq V_{IN} \leq 12 \text{ V}$ , $I_{OUT} = 50 \text{ mA}$ $f = 120 \text{ Hz}$	50	66	—	dB
Dropout voltage	$V_D$	$I_{OUT} = 0.5 \text{ A}$	—	0.3	0.5	V
		$I_{OUT} = 1 \text{ A}$	—	0.4	—	
Average temperature coefficient of output voltage	$T_{CVO}$	$V_{IN} = 5.0 \text{ V}$ , $I_{OUT} = 5 \text{ mA}$ , $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	—	0.28	—	$\text{mV}/^\circ\text{C}$

## TA48033F/S

### Electrical Characteristics

(Unless otherwise specified,  $C_{IN} = 0.33 \mu\text{F}$ ,  $C_{OUT} = 10 \mu\text{F}$ ,  $T_j = 25^\circ\text{C}$ )

Characteristics	Symbol	Test Conditions	Min	Typ.	Max	Unit
Output voltage	$V_{OUT}$	$V_{IN} = 5.3 \text{ V}$ , $I_{OUT} = 0.5 \text{ A}$	3.2	3.3	3.4	V
		$4.3 \text{ V} \leq V_{IN} \leq 12 \text{ V}$ , $5 \text{ mA} \leq I_{OUT} \leq 1 \text{ A}$ , $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	3.152	3.3	3.448	
Line regulation	Reg·line	$4.3 \text{ V} \leq V_{IN} \leq 12 \text{ V}$ , $I_{OUT} = 0.5 \text{ A}$	—	5	20	mV
Load regulation	Reg·load	$V_{IN} = 5.3 \text{ V}$ , $5 \text{ mA} \leq I_{OUT} \leq 1 \text{ A}$	—	5	20	mV
Quiescent current	$I_B$	$4.3 \text{ V} \leq V_{IN} \leq 12 \text{ V}$ , $I_{OUT} = 0 \text{ A}$	—	0.8	1.8	mA
		$4.3 \text{ V} \leq V_{IN} \leq 12 \text{ V}$ , $I_{OUT} = 1 \text{ A}$	—	10	20	
Starting quiescent current	$I_{Bstart}$	$V_{IN} = 2.1 \text{ V}$ , $I_{OUT} = 0 \text{ A}$	—	1.1	5	mA
		$V_{IN} = 2.8 \text{ V}$ , $I_{OUT} = 1 \text{ A}$	—	13	30	
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	—	$\mu\text{Vrms}$
Ripple rejection	R.R.	$4.3 \text{ V} \leq V_{IN} \leq 12 \text{ V}$ , $I_{OUT} = 50 \text{ mA}$ $f = 120 \text{ Hz}$	50	66	—	dB
Dropout voltage	$V_D$	$I_{OUT} = 0.5 \text{ A}$	—	0.3	0.5	V
		$I_{OUT} = 1 \text{ A}$	—	0.4	—	
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	—	$\text{mV}/^\circ\text{C}$

## TA4805F/S

### Electrical Characteristics

(Unless otherwise specified,  $C_{IN} = 0.33 \mu\text{F}$ ,  $C_{OUT} = 10 \mu\text{F}$ ,  $T_j = 25^\circ\text{C}$ )

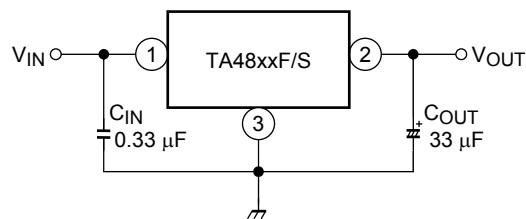
Characteristics	Symbol	Test Conditions	Min	Typ.	Max	Unit
Output voltage	$V_{OUT}$	$V_{IN} = 7 \text{ V}$ , $I_{OUT} = 0.5 \text{ A}$	4.85	5.0	5.15	V
		$6.0 \text{ V} \leq V_{IN} \leq 12 \text{ V}$ , $5 \text{ mA} \leq I_{OUT} \leq 1 \text{ A}$ , $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	4.775	5.0	5.225	
Line regulation	Reg·line	$6.0 \text{ V} \leq V_{IN} \leq 12 \text{ V}$ , $I_{OUT} = 0.5 \text{ A}$	—	5	20	mV
Load regulation	Reg·load	$V_{IN} = 7.0 \text{ V}$ , $5 \text{ mA} \leq I_{OUT} \leq 1 \text{ A}$	—	5	20	mV
Quiescent current	$I_B$	$6.0 \text{ V} \leq V_{IN} \leq 12 \text{ V}$ , $I_{OUT} = 0 \text{ A}$	—	0.8	1.8	mA
		$6.0 \text{ V} \leq V_{IN} \leq 12 \text{ V}$ , $I_{OUT} = 1 \text{ A}$	—	10	20	
Starting quiescent current	$I_{Bstart}$	$V_{IN} = 2.1 \text{ V}$ , $I_{OUT} = 0 \text{ A}$	—	1.3	5	mA
		$V_{IN} = 3.0 \text{ V}$ , $I_{OUT} = 1 \text{ A}$	—	14	30	
Output noise voltage	$V_{NO}$	$V_{IN} = 7.0 \text{ V}$ , $I_{OUT} = 50 \text{ mA}$ $10 \text{ Hz} \leq f \leq 100 \text{ kHz}$	—	150	—	$\mu\text{Vrms}$
Ripple rejection	R.R.	$6.0 \text{ V} \leq V_{IN} \leq 12 \text{ V}$ , $I_{OUT} = 50 \text{ mA}$ $f = 120 \text{ Hz}$	50	64	—	dB
Dropout voltage	$V_D$	$I_{OUT} = 0.5 \text{ A}$	—	0.3	0.5	V
		$I_{OUT} = 1 \text{ A}$	—	0.4	—	
Average temperature coefficient of output voltage	$T_{CVO}$	$V_{IN} = 7.0 \text{ V}$ , $I_{OUT} = 5 \text{ mA}$ , $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	—	0.45	—	$\text{mV}/^\circ\text{C}$

### Electrical Characteristics for All Products

Generally, the characteristics of power supply ICs change according to temperature fluctuations.

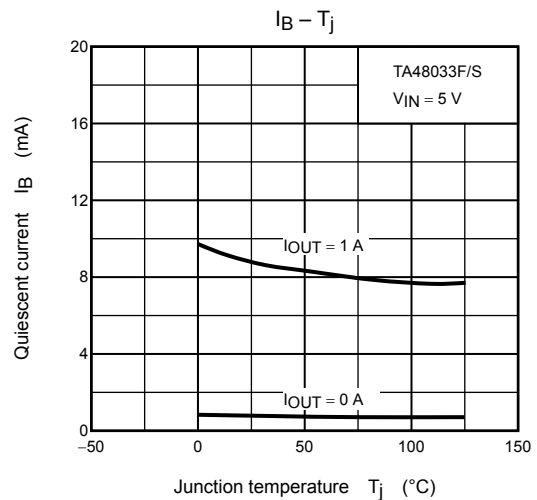
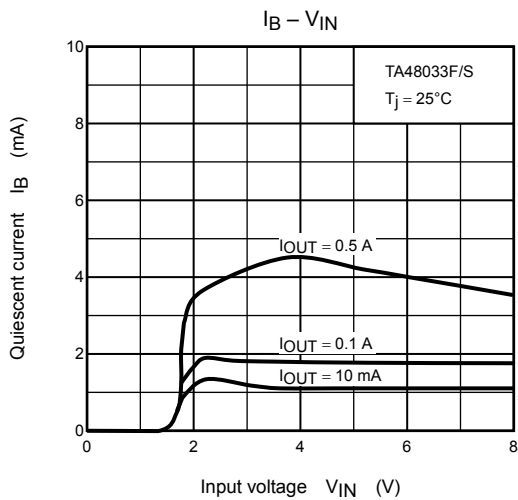
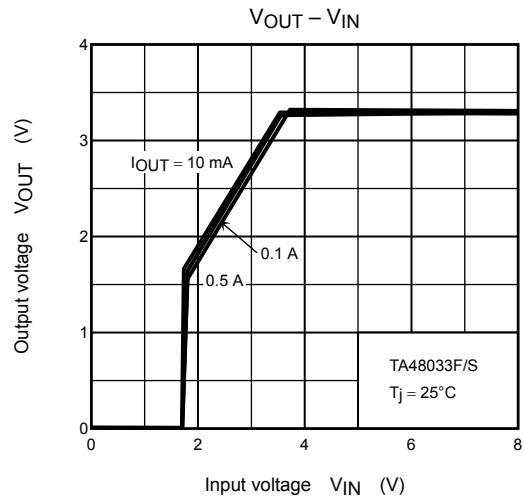
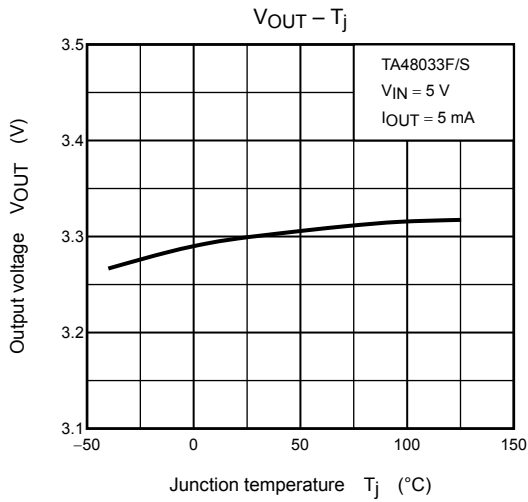
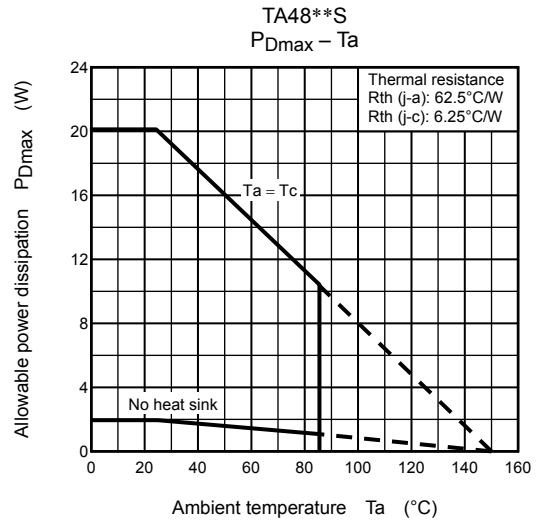
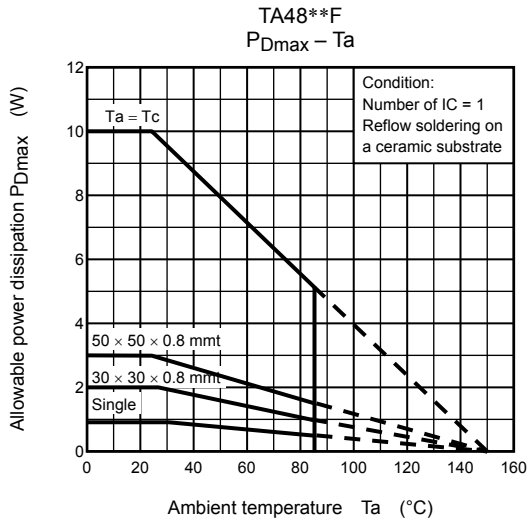
The specification  $T_j = 25^\circ\text{C}$  is based on a state where temperature increase has no effect (assuming no fluctuation in the characteristics) as ascertained by pulse tests.

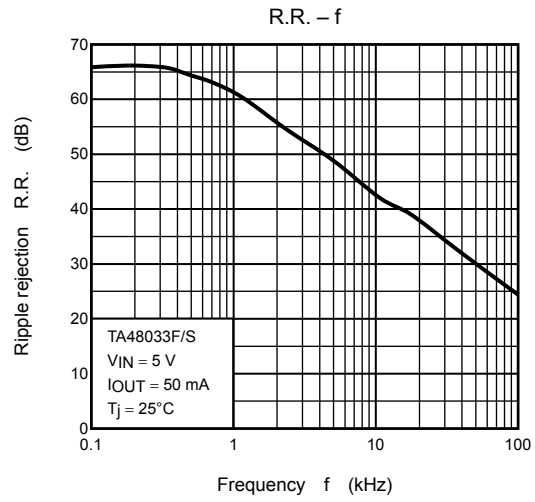
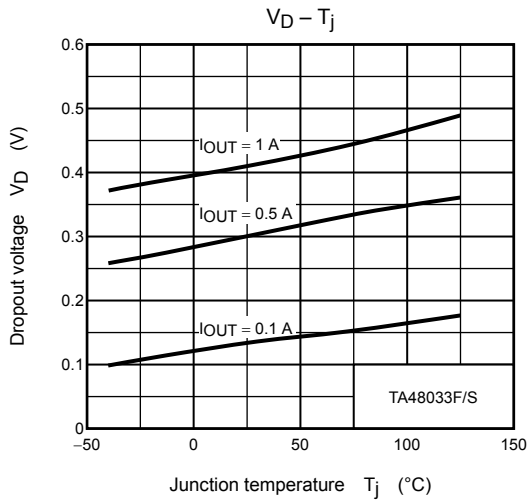
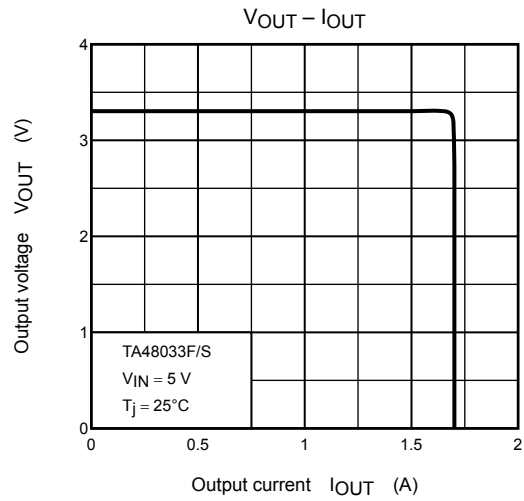
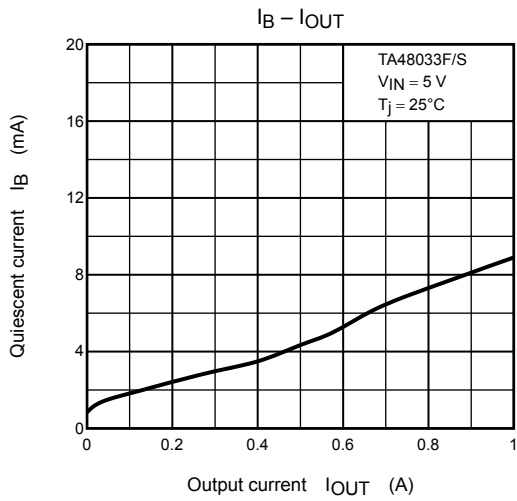
### Standard Application Circuit



Be sure to connect a capacitor near the input terminal and output terminal between both terminals and GND.

The capacitances should be determined experimentally. In particular, adequate investigation should be made so that there is no problem even in high or low temperature.



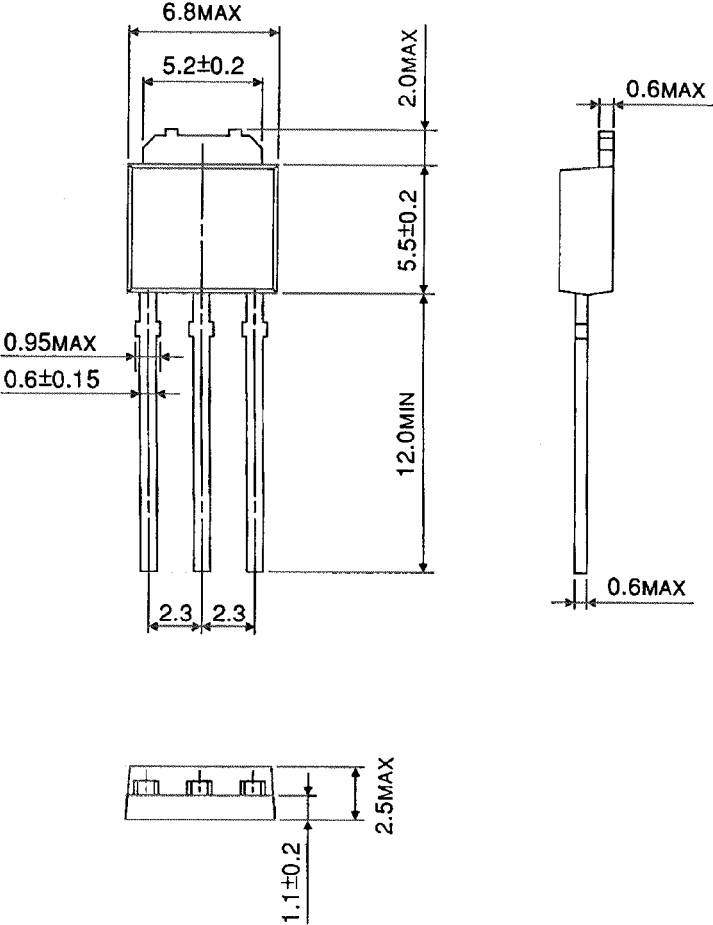




**Package Dimensions**

HSIP3-P-2.30B

Unit : mm

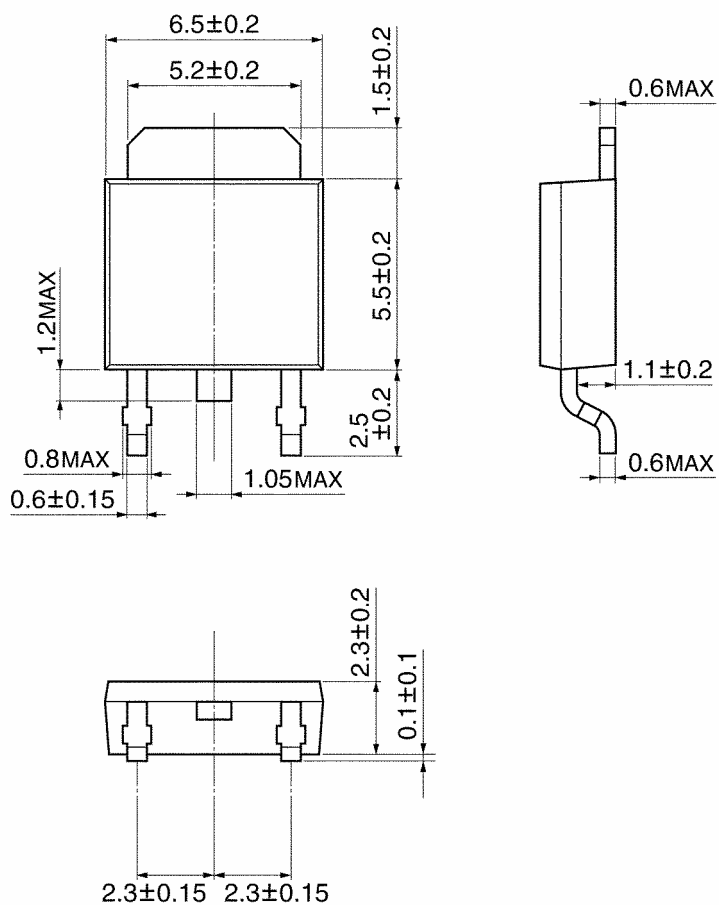


Weight: 0.36 g (typ.)

## Package Dimensions

HSOP3-P-2.30D

Unit: mm

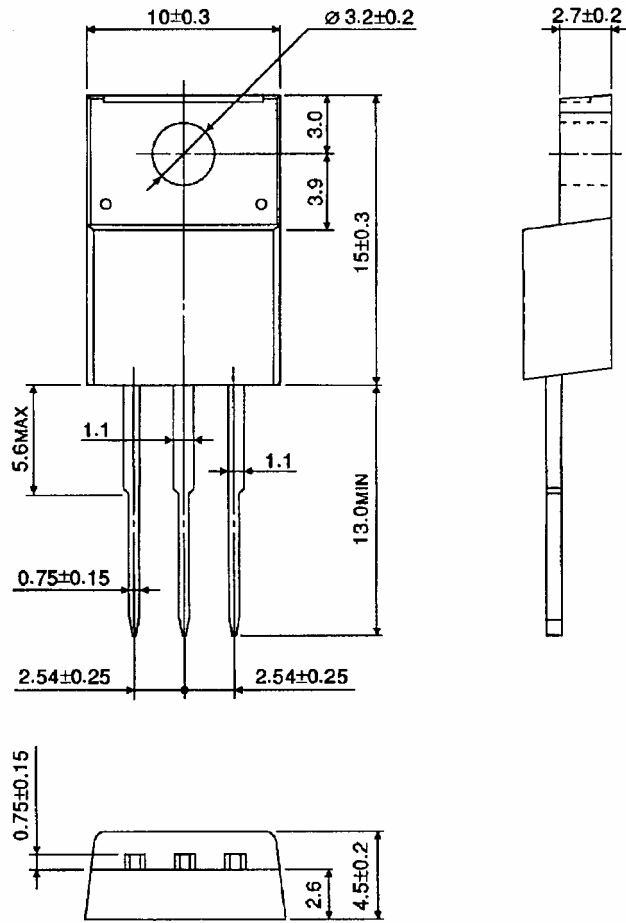


Weight: 0.36 g (typ.)

## Package Dimensions

HSIP3-P-2.54A

Unit: mm



Weight: 1.7 g (typ.)

**RESTRICTIONS ON PRODUCT USE**

20070701-EN

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