

TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

## TA48M025F, TA48M03F, TA48M033F, TA48M0345F, TA48M04F, TA48M05F

2.5 V, 3 V, 3.3 V, 3.45 V, 4 V, 5 V

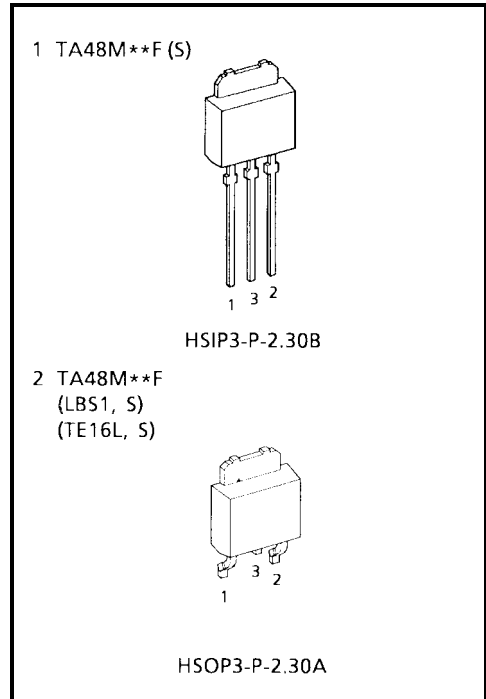
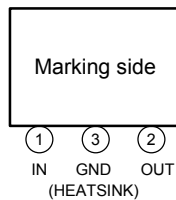
Three-Terminal Low Dropout Voltage Regulator

The TA48M\*\*F series consists of fixed-positive-output, low dropout regulators with an output current of 500 mA (max). In response to the need for low voltage devices, the series offers devices with low output voltages: 2.5 V, 3 V, 3.3 V, 3.45 V, 4 V which are not included in the existing TA78DM\*\*S series (0.5 A low dropout).

### Features

- Maximum output current of 0.5 A
- Low standby current: 0.8 mA (typ.)
- Low dropout voltage: 0.65 V (max) @ $I_{OUT} = 0.5 A$
- Protection function: overheat/overcurrent/overvoltage/reversed power supply connections.
- Power mold package: Surface-mount type for reflow soldering is also supported.

### Pin Assignment



Weight

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

HSOP3-P-2.30A: 0.36 g (Typ.)

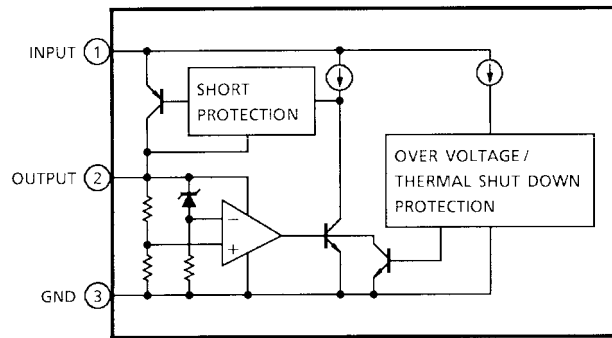
### Ordering Method (Note 1)

	Product Name	Package (Lead Type)	Packing Form
1	TA48M**F (S)	PW-MOLD: Straight lead	Sack (200 pcs./sack)
2	TA48M**F (LBS1, S)	PW-MOLD: Surface-mount	Stick (100 pcs. max)
	TA48M**F (TE16L, S)	PW-MOLD: Surface-mount	Tape (700 pcs./reel)

Note 1: The “\*\*” in each proforma product name is replaced with the output voltage of each product.

Example: For 3 V. TA48M03F

## Block Diagram



## Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Input voltage	$V_{IN}$	29	V
Output current	$I_{OUT}$	0.5	A
Power dissipation	$P_D$	(Ta = 25°C)	1
		(Tc = 25°C)	10
Operating temperature	$T_{opr}$	-40~85	°C
Storage temperature	$T_{stg}$	-55~150	°C
Junction temperature	$T_j$	150	°C
Thermal resistance	$R_{th(j-c)}$	12.5	°C/W
	$R_{th(j-a)}$	125	

## Protection Function

Characteristics	Symbol	Min	Typ.	Max	Unit
Overvoltage	$V_{IN}$	29	33	—	V
Overheat	$T_j$	—	175	—	°C

## TA48M025F

### Electrical Characteristics

( $V_{IN} = 4.5\text{ V}$ ,  $I_{OUT} = 250\text{ mA}$ ,  $T_j = 25^\circ\text{C}$ ,  $C_{IN} = 0.1\ \mu\text{F}$ ,  $C_{OUT} = 10\ \mu\text{F}$ , unless otherwise specified)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Output voltage	$V_{OUT}$	—	—	2.4	2.5	2.6	V
		—	$3.5\text{ V} \leq V_{IN} \leq 16\text{ V}$ , $5\text{ mA} \leq I_{OUT} \leq 500\text{ mA}$ , $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	2.375	2.5	2.625	
Line regulation	Reg-line	—	$3.5\text{ V} \leq V_{IN} \leq 16\text{ V}$	—	7	18	mV
Load regulation	Reg-load	—	$5\text{ mA} \leq I_{OUT} \leq 500\text{ mA}$	—	45	90	mV
Quiescent current	$I_B$	—	$3.5\text{ V} \leq V_{IN} \leq 16\text{ V}$ , $I_{OUT} = 0\text{ mA}$	—	0.8	1.4	mA
		—	$3.5\text{ V} \leq V_{IN} \leq 16\text{ V}$ , $I_{OUT} = 250\text{ mA}$	—	12	25	
Output noise voltage	$V_{NO}$	—	$10\text{ Hz} \leq f \leq 100\text{ kHz}$ , $I_{OUT} = 50\text{ mA}$	—	72	—	$\mu\text{V}_{\text{rms}}$
Ripple rejection	R.R.	—	$f = 120\text{ Hz}$ , $3.5\text{ V} \leq V_{IN} \leq 16\text{ V}$ , $I_{OUT} = 50\text{ mA}$	62	72	—	dB
Dropout voltage	$V_D$	—	$I_{OUT} = 250\text{ mA}$	—	0.17	0.35	V
		—	$I_{OUT} = 500\text{ mA}$	—	0.35	0.65	
Peak circuit current	$I_{PEAK}$	—	—	0.60	1.15	1.40	A
Short circuit current	$I_{SC}$	—	—	0.60	1.15	1.40	A

## TA48M03F

### Electrical Characteristics

( $V_{IN} = 5\text{ V}$ ,  $I_{OUT} = 250\text{ mA}$ ,  $T_j = 25^\circ\text{C}$ ,  $C_{IN} = 0.1\ \mu\text{F}$ ,  $C_{OUT} = 10\ \mu\text{F}$ , unless otherwise specified)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Output voltage	$V_{OUT}$	—	—	2.88	3.0	3.12	V
		—	$4\text{ V} \leq V_{IN} \leq 16\text{ V}$ , $5\text{ mA} \leq I_{OUT} \leq 500\text{ mA}$ , $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	2.85	3.0	3.15	
Line regulation	Reg-line	—	$4\text{ V} \leq V_{IN} \leq 16\text{ V}$	—	8	21	mV
Load regulation	Reg-load	—	$5\text{ mA} \leq I_{OUT} \leq 500\text{ mA}$	—	45	95	mV
Quiescent current	$I_B$	—	$4\text{ V} \leq V_{IN} \leq 16\text{ V}$ , $I_{OUT} = 0\text{ mA}$	—	0.8	1.4	mA
		—	$4\text{ V} \leq V_{IN} \leq 16\text{ V}$ , $I_{OUT} = 250\text{ mA}$	—	12	25	
Output noise voltage	$V_{NO}$	—	$10\text{ Hz} \leq f \leq 100\text{ kHz}$ , $I_{OUT} = 50\text{ mA}$	—	90	—	$\mu\text{V}_{\text{rms}}$
Ripple rejection	R.R.	—	$f = 120\text{ Hz}$ , $4\text{ V} \leq V_{IN} \leq 16\text{ V}$ , $I_{OUT} = 50\text{ mA}$	60	70	—	dB
Dropout voltage	$V_D$	—	$I_{OUT} = 250\text{ mA}$	—	0.17	0.35	V
		—	$I_{OUT} = 500\text{ mA}$	—	0.35	0.65	
Peak circuit current	$I_{PEAK}$	—	—	0.60	1.20	1.45	A
Short circuit current	$I_{SC}$	—	—	0.60	1.20	1.45	A

## TA48M033F

### Electrical Characteristics

( $V_{IN} = 5.3 \text{ V}$ ,  $I_{OUT} = 250 \text{ mA}$ ,  $T_j = 25^\circ\text{C}$ ,  $C_{IN} = 0.1 \mu\text{F}$ ,  $C_{OUT} = 10 \mu\text{F}$ , unless otherwise specified)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Output voltage	$V_{OUT}$	—	—	3.168	3.3	3.432	V
		—	$4.3 \text{ V} \leq V_{IN} \leq 16 \text{ V}$ , $5 \text{ mA} \leq I_{OUT} \leq 500 \text{ mA}$ , $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	3.135	3.3	3.465	
Line regulation	Reg-line	—	$4.3 \text{ V} \leq V_{IN} \leq 16 \text{ V}$	—	10	23	mV
Load regulation	Reg-load	—	$5 \text{ mA} \leq I_{OUT} \leq 500 \text{ mA}$	—	45	105	mV
Quiescent current	$I_B$	—	$4.3 \text{ V} \leq V_{IN} \leq 16 \text{ V}$ , $I_{OUT} = 0 \text{ mA}$	—	0.8	1.4	mA
		—	$4.3 \text{ V} \leq V_{IN} \leq 16 \text{ V}$ , $I_{OUT} = 250 \text{ mA}$	—	12	25	
Output noise voltage	$V_{NO}$	—	$10 \text{ Hz} \leq f \leq 100 \text{ kHz}$ , $I_{OUT} = 50 \text{ mA}$	—	90	—	$\mu\text{V}_{rms}$
Ripple rejection	R.R.	—	$f = 120 \text{ Hz}$ , $4.3 \text{ V} \leq V_{IN} \leq 16 \text{ V}$ , $I_{OUT} = 50 \text{ mA}$	60	70	—	dB
Dropout voltage	$V_D$	—	$I_{OUT} = 250 \text{ mA}$	—	0.17	0.35	V
		—	$I_{OUT} = 500 \text{ mA}$	—	0.35	0.65	
Peak circuit current	$I_{PEAK}$	—	—	0.60	1.20	1.45	A
Short circuit current	$I_{SC}$	—	—	0.60	1.20	1.45	A

## TA48M0345F

### Electrical Characteristics

( $V_{IN} = 5.45 \text{ V}$ ,  $I_{OUT} = 250 \text{ mA}$ ,  $T_j = 25^\circ\text{C}$ ,  $C_{IN} = 0.1 \mu\text{F}$ ,  $C_{OUT} = 10 \mu\text{F}$ , unless otherwise specified)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Output voltage	$V_{OUT}$	—	—	3.312	3.45	3.588	V
		—	$4.45 \text{ V} \leq V_{IN} \leq 16 \text{ V}$ , $5 \text{ mA} \leq I_{OUT} \leq 500 \text{ mA}$ , $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	3.278	3.45	3.622	
Line regulation	Reg-line	—	$4.45 \text{ V} \leq V_{IN} \leq 16 \text{ V}$	—	12	25	mV
Load regulation	Reg-load	—	$5 \text{ mA} \leq I_{OUT} \leq 500 \text{ mA}$	—	45	110	mV
Quiescent current	$I_B$	—	$4.45 \text{ V} \leq V_{IN} \leq 16 \text{ V}$ , $I_{OUT} = 0 \text{ mA}$	—	0.8	1.4	mA
		—	$4.45 \text{ V} \leq V_{IN} \leq 16 \text{ V}$ , $I_{OUT} = 250 \text{ mA}$	—	12	25	
Output noise voltage	$V_{NO}$	—	$10 \text{ Hz} \leq f \leq 100 \text{ kHz}$ , $I_{OUT} = 50 \text{ mA}$	—	90	—	$\mu\text{V}_{rms}$
Ripple rejection	R.R.	—	$f = 120 \text{ Hz}$ , $4.45 \text{ V} \leq V_{IN} \leq 16 \text{ V}$ , $I_{OUT} = 50 \text{ mA}$	60	70	—	dB
Dropout voltage	$V_D$	—	$I_{OUT} = 250 \text{ mA}$	—	0.17	0.35	V
		—	$I_{OUT} = 500 \text{ mA}$	—	0.35	0.65	
Peak circuit current	$I_{PEAK}$	—	—	0.60	1.20	1.45	A
Short circuit current	$I_{SC}$	—	—	0.60	1.20	1.45	A

## TA48M04F

### Electrical Characteristics

( $V_{IN} = 6\text{ V}$ ,  $I_{OUT} = 250\text{ mA}$ ,  $T_j = 25^\circ\text{C}$ ,  $C_{IN} = 0.1\ \mu\text{F}$ ,  $C_{OUT} = 10\ \mu\text{F}$ , unless otherwise specified)

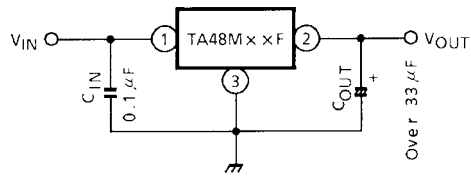
Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Output voltage	$V_{OUT}$	—	—	3.84	4.0	4.16	V
		—	$5\text{ V} \leq V_{IN} \leq 16\text{ V}$ , $5\text{ mA} \leq I_{OUT} \leq 500\text{ mA}$ , $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	3.8	4.0	4.2	
Line regulation	Reg-line	—	$5\text{ V} \leq V_{IN} \leq 16\text{ V}$	—	11	28	mV
Load regulation	Reg-load	—	$5\text{ mA} \leq I_{OUT} \leq 500\text{ mA}$	—	45	115	mV
Quiescent current	$I_B$	—	$5\text{ V} \leq V_{IN} \leq 16\text{ V}$ , $I_{OUT} = 0\text{ mA}$	—	0.9	1.4	mA
		—	$5\text{ V} \leq V_{IN} \leq 16\text{ V}$ , $I_{OUT} = 250\text{ mA}$	—	13	25	
Output noise voltage	$V_{NO}$	—	$10\text{ Hz} \leq f \leq 100\text{ kHz}$ , $I_{OUT} = 50\text{ mA}$	—	110	—	$\mu\text{V}_{rms}$
Ripple rejection	R.R.	—	$f = 120\text{ Hz}$ , $5\text{ V} \leq V_{IN} \leq 16\text{ V}$ , $I_{OUT} = 50\text{ mA}$	58	68	—	dB
Dropout voltage	$V_D$	—	$I_{OUT} = 250\text{ mA}$	—	0.17	0.35	V
		—	$I_{OUT} = 500\text{ mA}$	—	0.35	0.65	
Peak circuit current	$I_{PEAK}$	—	—	0.60	1.25	1.50	A
Short circuit current	$I_{SC}$	—	—	0.60	1.25	1.50	A

## TA48M05F

### Electrical Characteristics

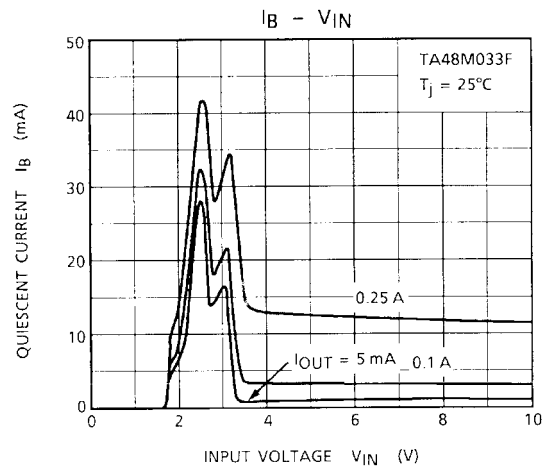
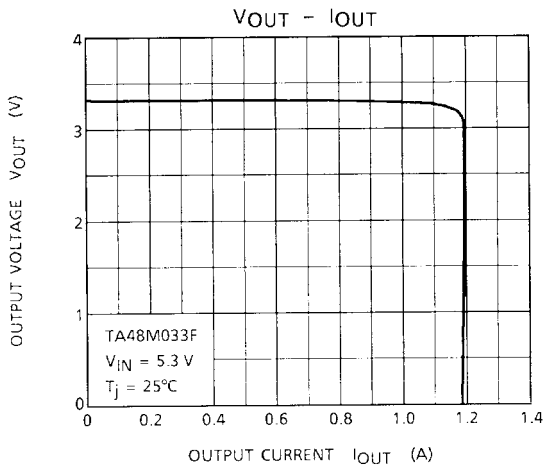
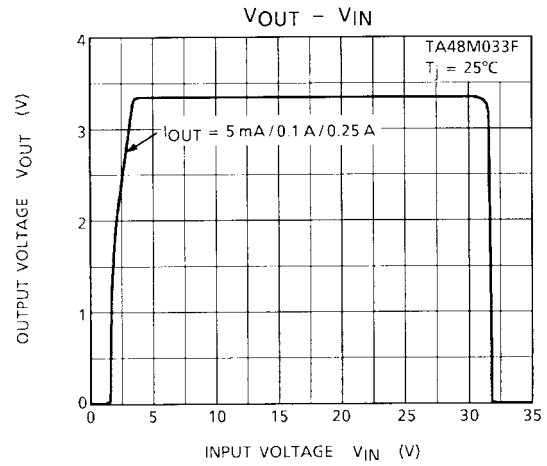
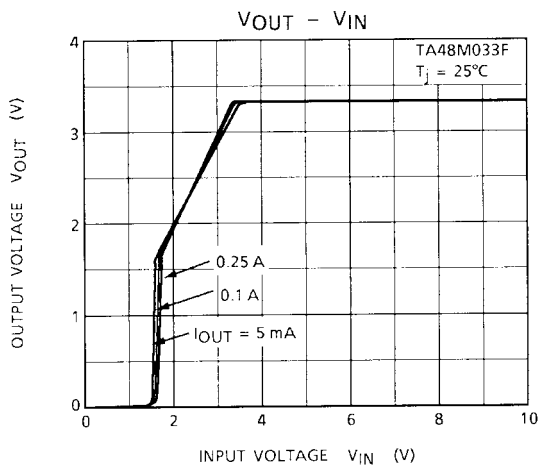
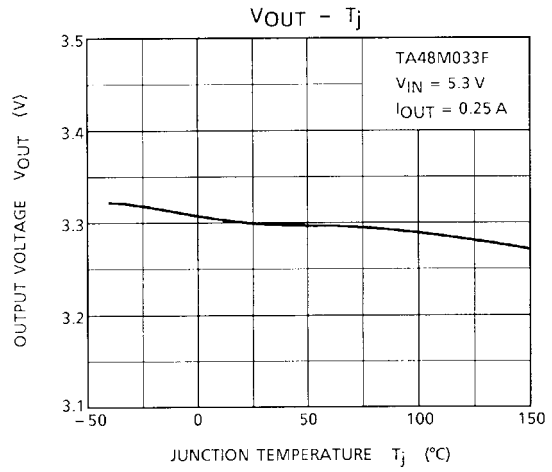
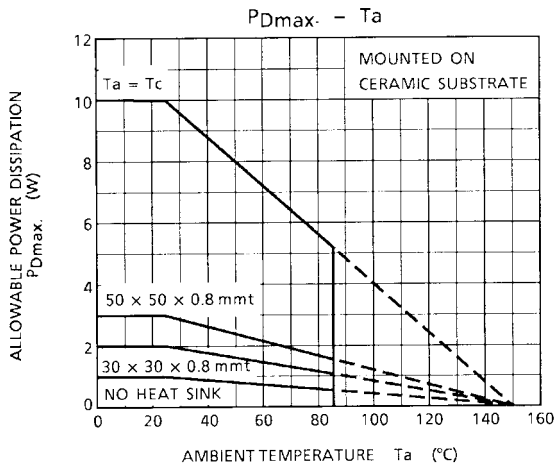
( $V_{IN} = 7\text{ V}$ ,  $I_{OUT} = 250\text{ mA}$ ,  $T_j = 25^\circ\text{C}$ ,  $C_{IN} = 0.1\ \mu\text{F}$ ,  $C_{OUT} = 10\ \mu\text{F}$ , unless otherwise specified)

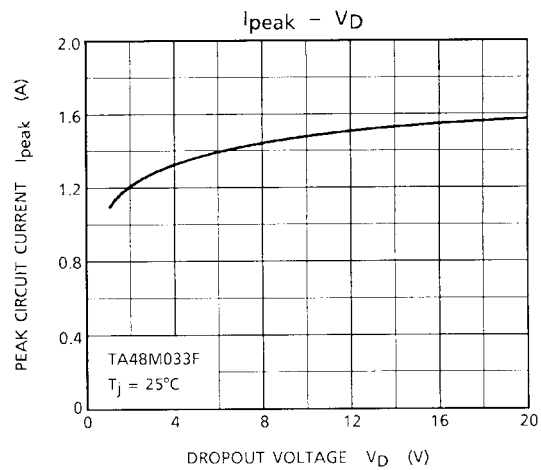
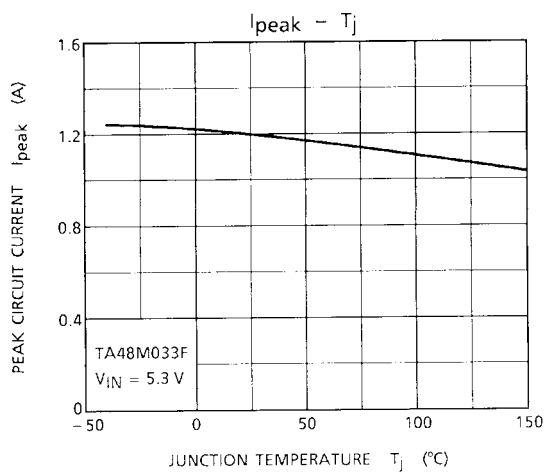
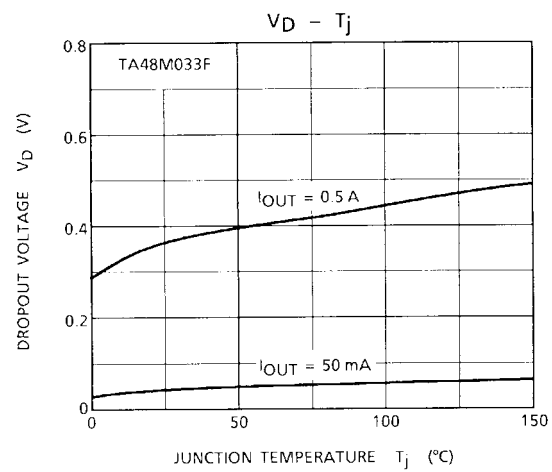
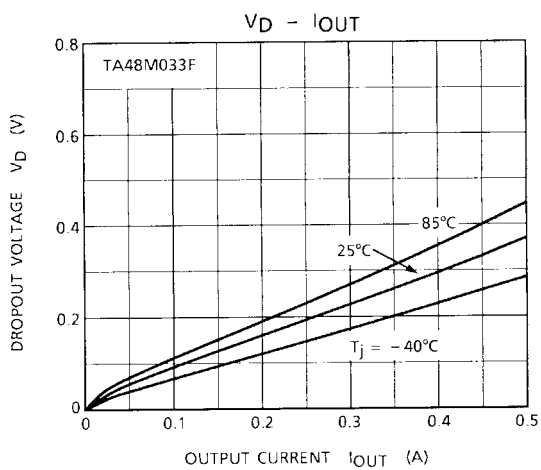
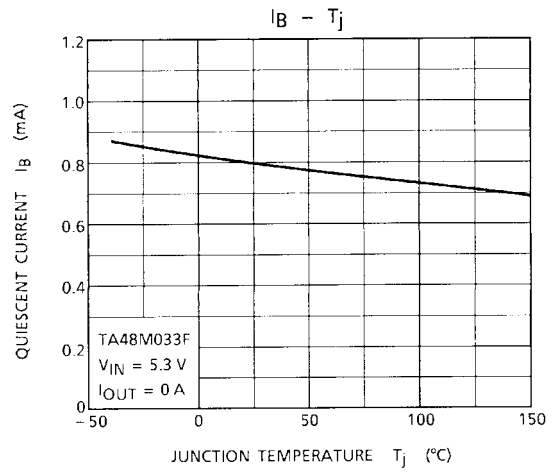
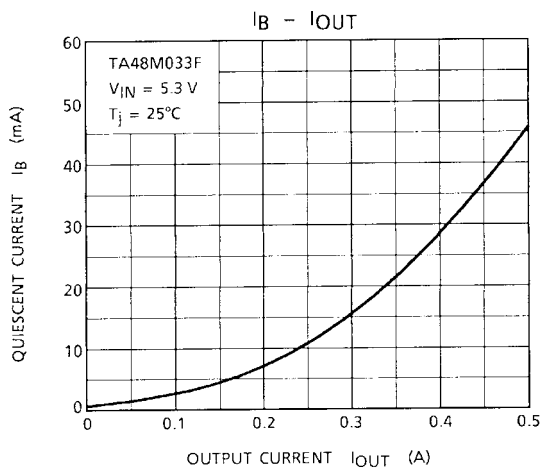
Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Output voltage	$V_{OUT}$	—	—	4.8	5.0	5.2	V
		—	$6\text{ V} \leq V_{IN} \leq 18\text{ V}$ , $5\text{ mA} \leq I_{OUT} \leq 500\text{ mA}$ , $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	4.75	5.0	5.25	
Line regulation	Reg-line	—	$6\text{ V} \leq V_{IN} \leq 18\text{ V}$	—	15	35	mV
Load regulation	Reg-load	—	$5\text{ mA} \leq I_{OUT} \leq 500\text{ mA}$	—	50	135	mV
Quiescent current	$I_B$	—	$6\text{ V} \leq V_{IN} \leq 18\text{ V}$ , $I_{OUT} = 0\text{ mA}$	—	1.0	1.4	mA
		—	$6\text{ V} \leq V_{IN} \leq 18\text{ V}$ , $I_{OUT} = 250\text{ mA}$	—	13	25	
Output noise voltage	$V_{NO}$	—	$10\text{ Hz} \leq f \leq 100\text{ kHz}$ , $I_{OUT} = 50\text{ mA}$	—	125	—	$\mu\text{V}_{rms}$
Ripple rejection	R.R.	—	$f = 120\text{ Hz}$ , $6\text{ V} \leq V_{IN} \leq 18\text{ V}$ , $I_{OUT} = 50\text{ mA}$	58	68	—	dB
Dropout voltage	$V_D$	—	$I_{OUT} = 250\text{ mA}$	—	0.17	0.35	V
		—	$I_{OUT} = 500\text{ mA}$	—	0.35	0.65	
Peak circuit current	$I_{PEAK}$	—	—	0.60	1.30	1.55	A
Short circuit current	$I_{SC}$	—	—	0.60	1.30	1.55	A

**Standard Application Circuit**

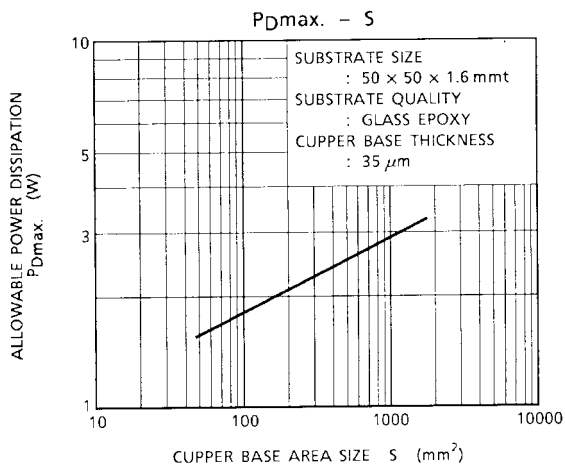
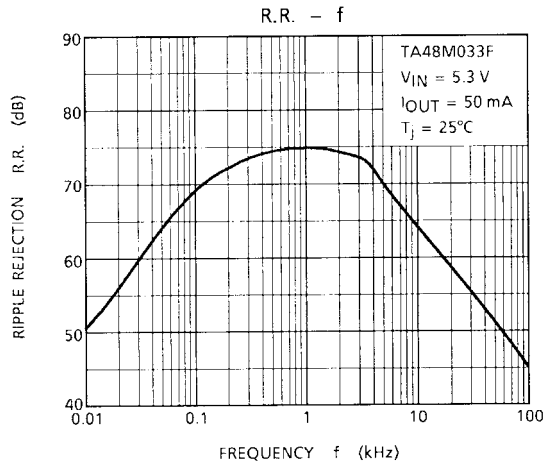
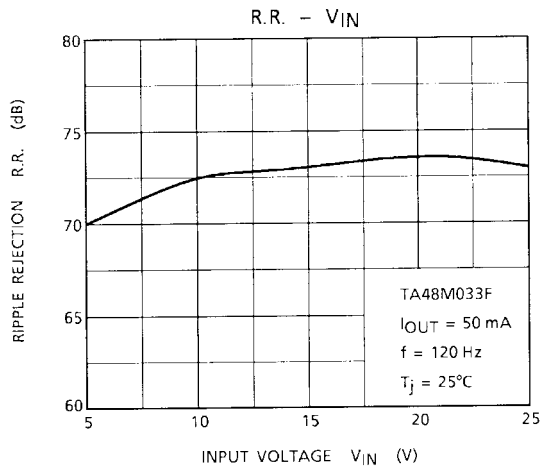
Connect the input terminal and GND, and the output terminal and GND, by capacitor respectively. The capacitances should be determined experimentally. In particular, adequate investigation should be made so that there is no problem even at time of high or low temperature.

Note: Depending on a using capacitor that connects to the output, characteristics (capacitance, frequency and others) may decline and the output may oscillate. To prevent this, Toshiba recommend a tantalum electrolytic capacitor that as a small fluctuation in capacitance characteristics.





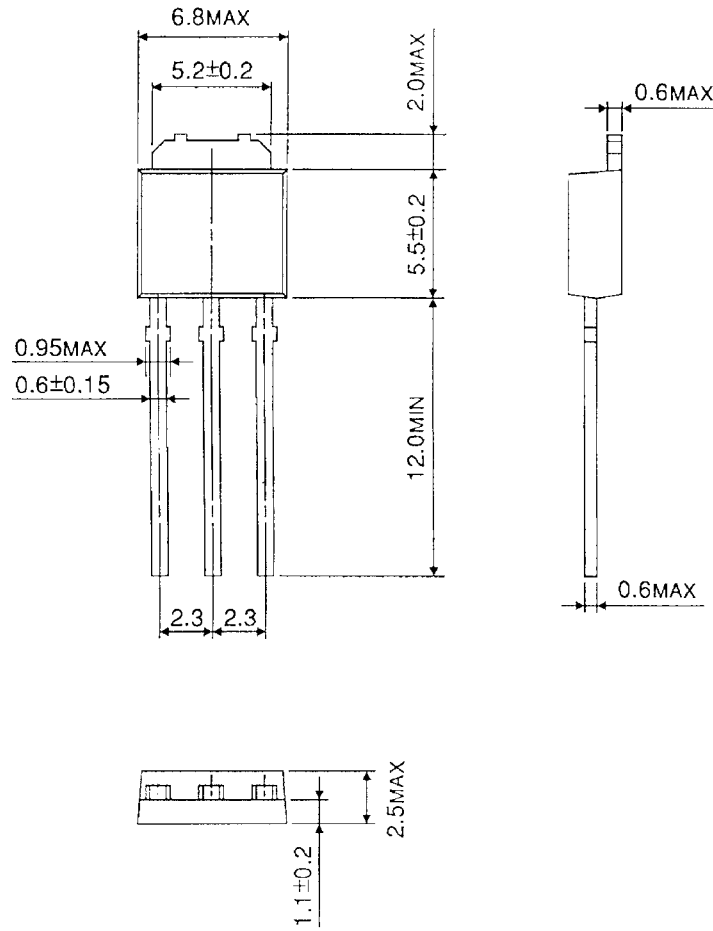




## Package Dimensions

HSIP3-P-2.30B

Unit : mm

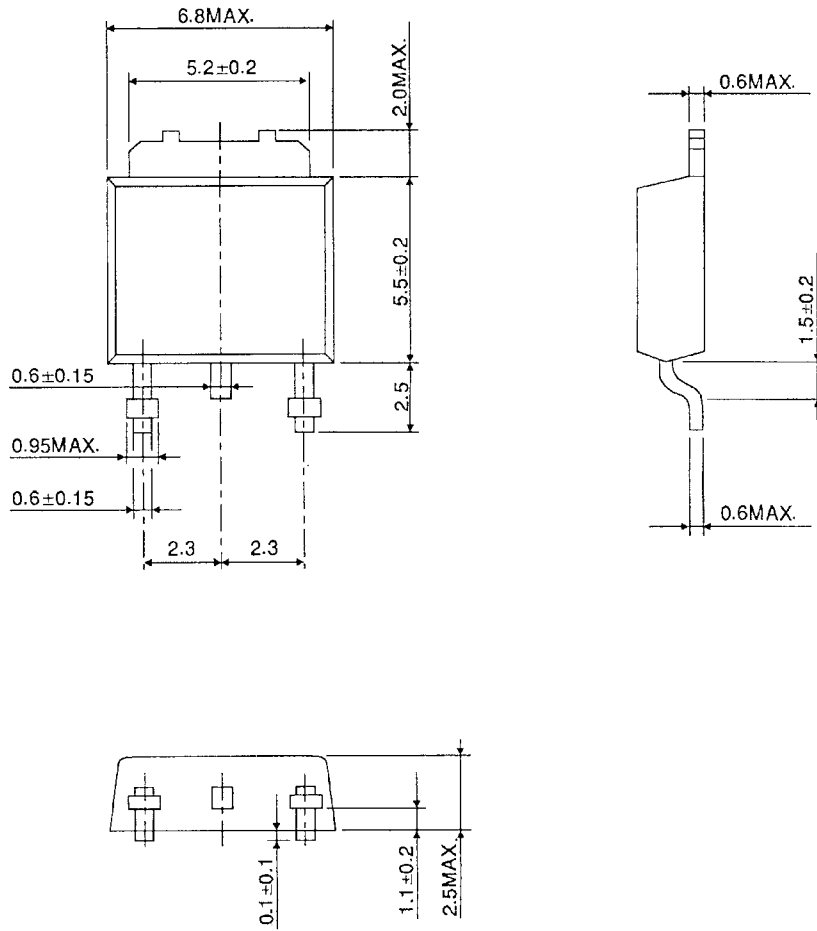


Weight : 0.36 g (Typ.)

## Package Dimensions

HSOP3-P-2.30A

Unit : mm



Weight : 0.36 g (Typ.)

**RESTRICTIONS ON PRODUCT USE**

000707EBA

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