

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

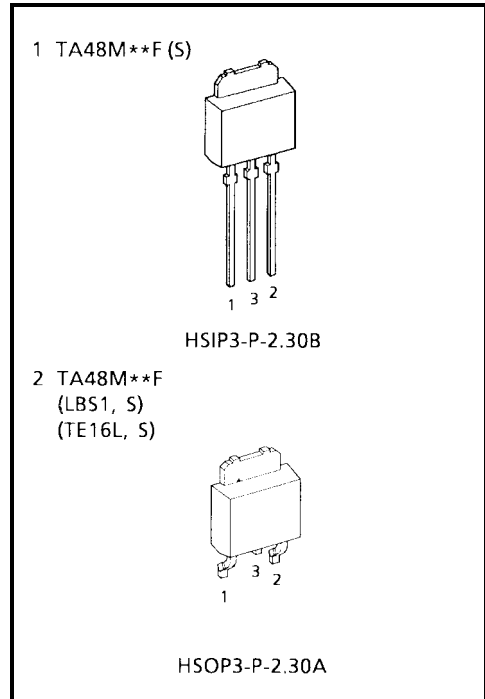
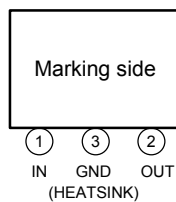
Three-Terminal Low Dropout Voltage Regulator

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.)

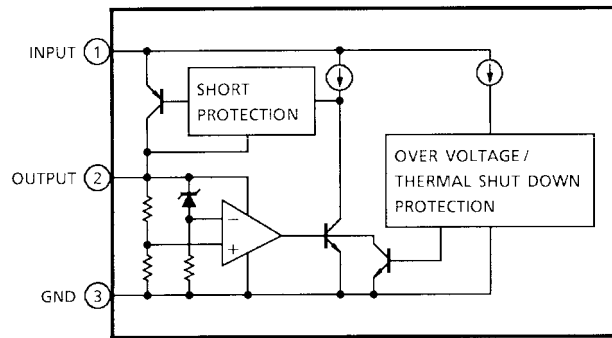
### Ordering Method (Note 1)

	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	—	$\mu\text{V}_{rms}$
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	—	$\mu\text{V}_{rms}$
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)

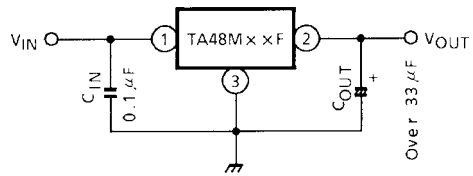
Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Output voltage	$V_{OUT}$	—	—	3.84	4.0	4.16	V
		—	$5\text{ V} \leq V_{IN} \leq 16\text{ V}$ , $5\text{ mA} \leq I_{OUT} \leq 500\text{ mA}$ , $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	3.8	4.0	4.2	
Line regulation	Reg-line	—	$5\text{ V} \leq V_{IN} \leq 16\text{ V}$	—	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

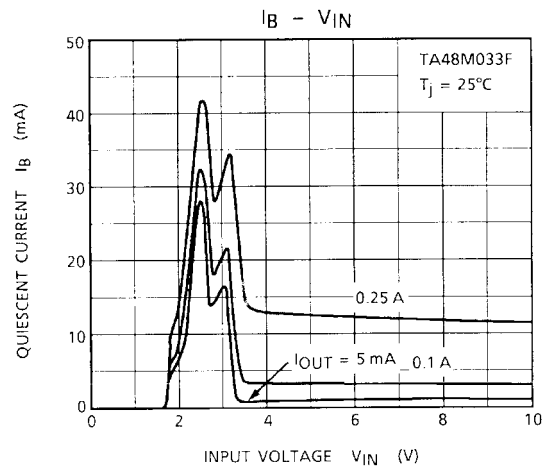
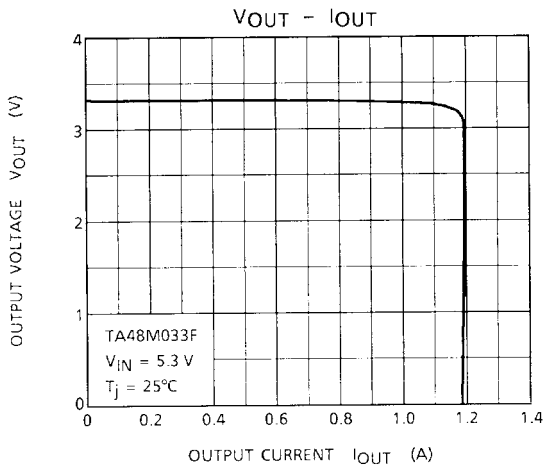
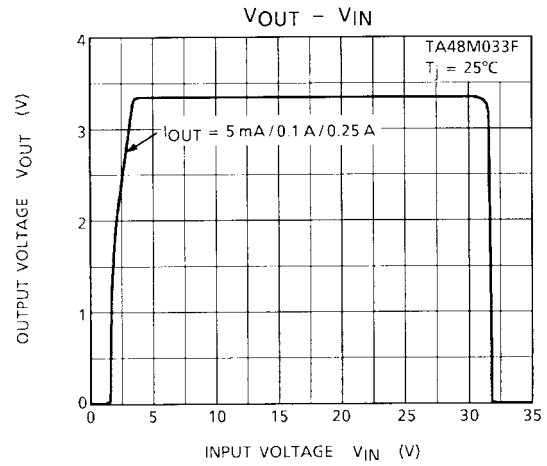
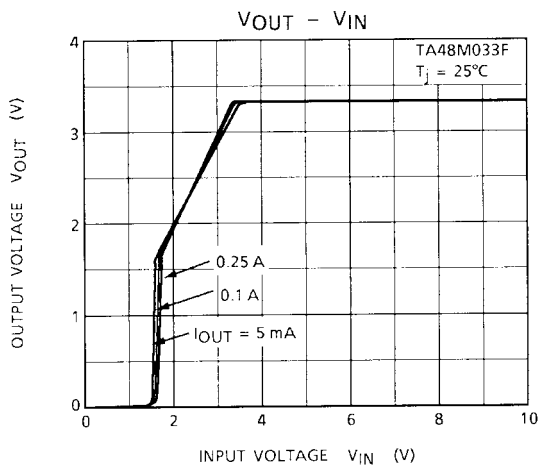
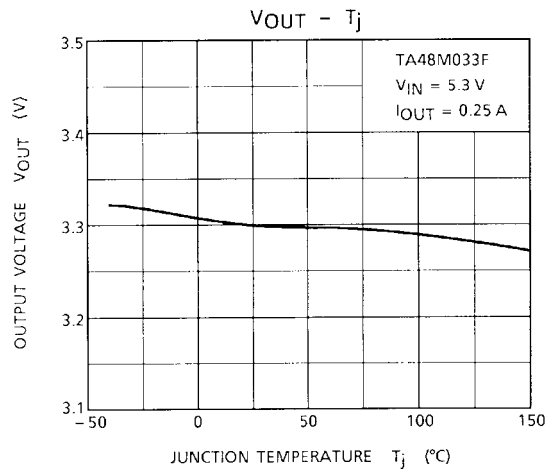
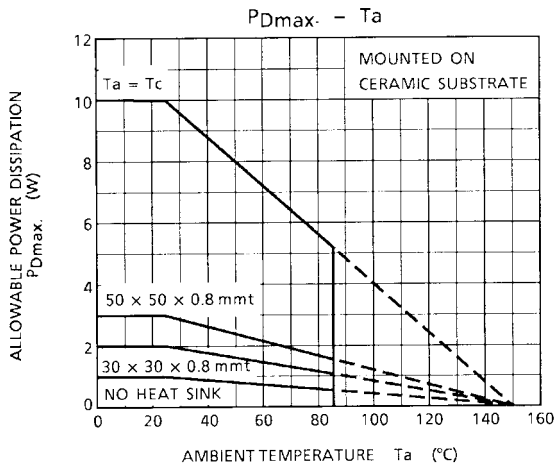
( $V_{IN} = 7\text{ V}$ ,  $I_{OUT} = 250\text{ mA}$ ,  $T_j = 25^\circ\text{C}$ ,  $C_{IN} = 0.1\ \mu\text{F}$ ,  $C_{OUT} = 10\ \mu\text{F}$ , unless otherwise specified)

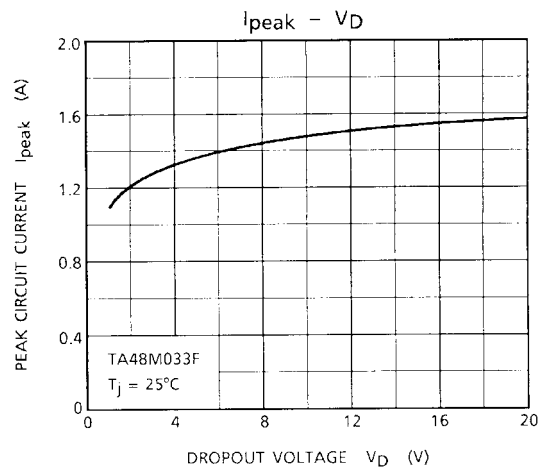
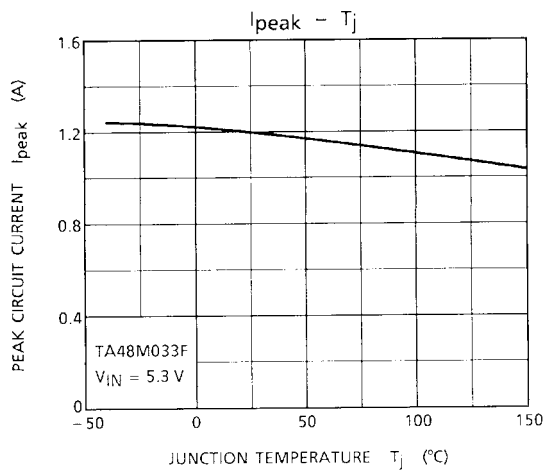
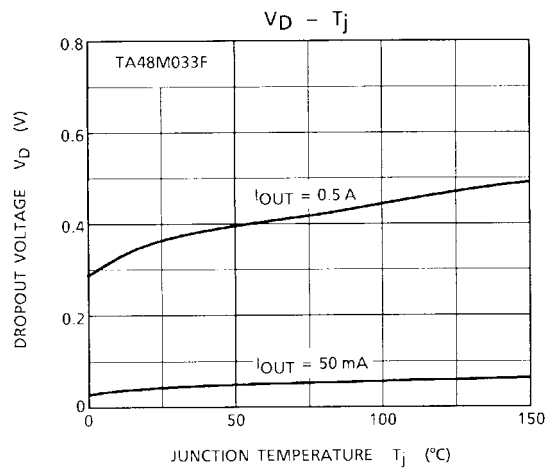
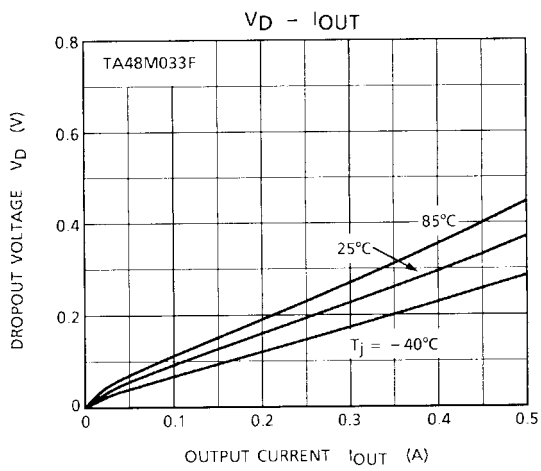
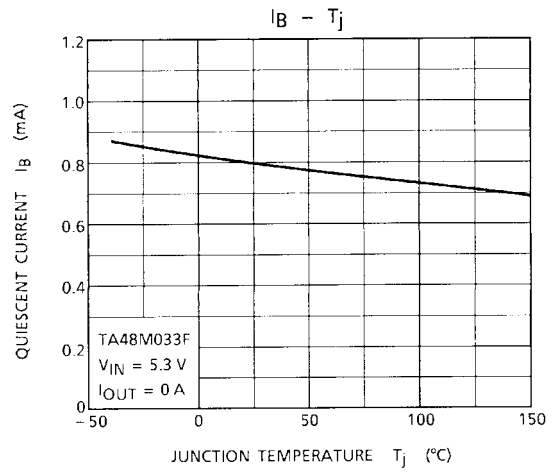
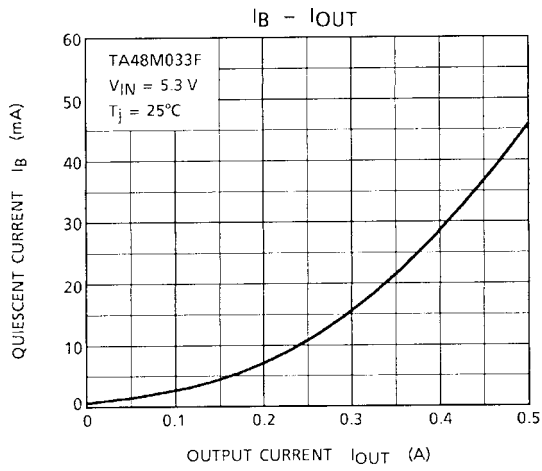
Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Output voltage	$V_{OUT}$	—	—	4.8	5.0	5.2	V
		—	$6\text{ V} \leq V_{IN} \leq 18\text{ V}$ , $5\text{ mA} \leq I_{OUT} \leq 500\text{ mA}$ , $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	4.75	5.0	5.25	
Line regulation	Reg-line	—	$6\text{ V} \leq V_{IN} \leq 18\text{ V}$	—	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**

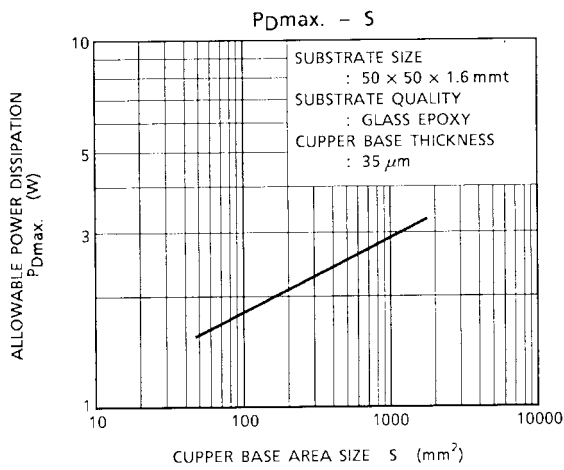
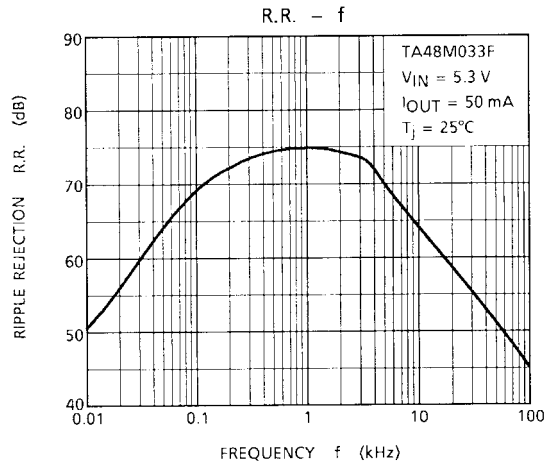
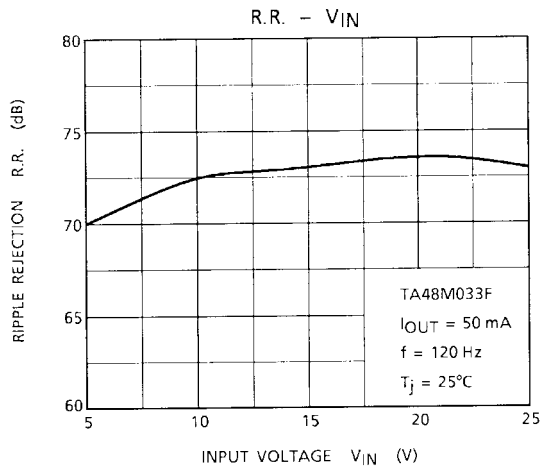
Connect the input terminal and GND, and the output terminal and GND, by capacitor respectively. The capacitances should be determined experimentally. In particular, adequate investigation should be made so that there is no problem even at time of high or low temperature.

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.





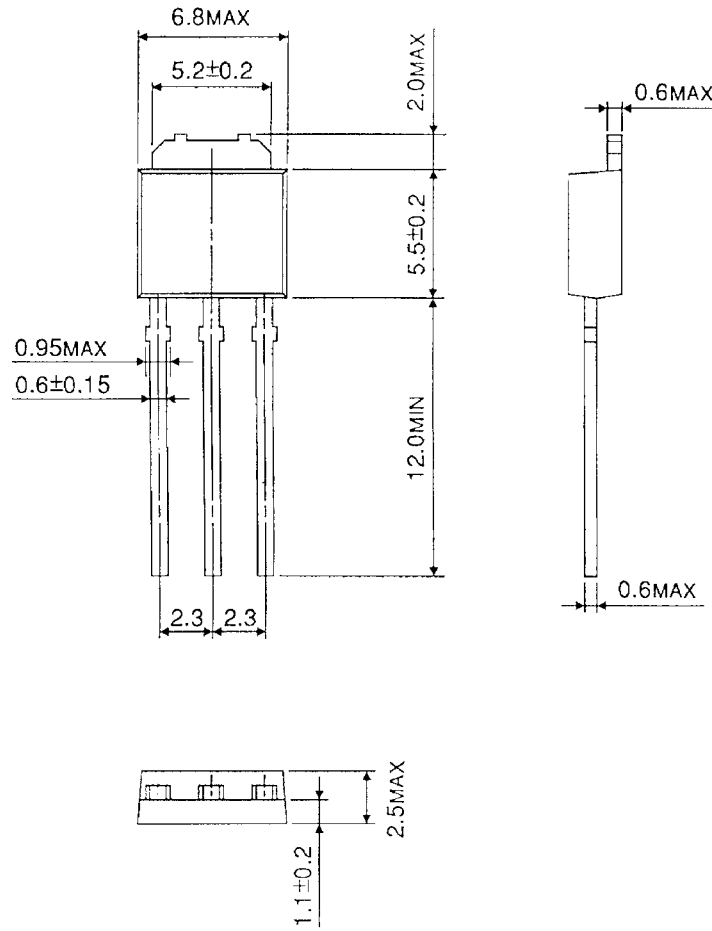




## Package Dimensions

HSIP3-P-2.30B

Unit : mm

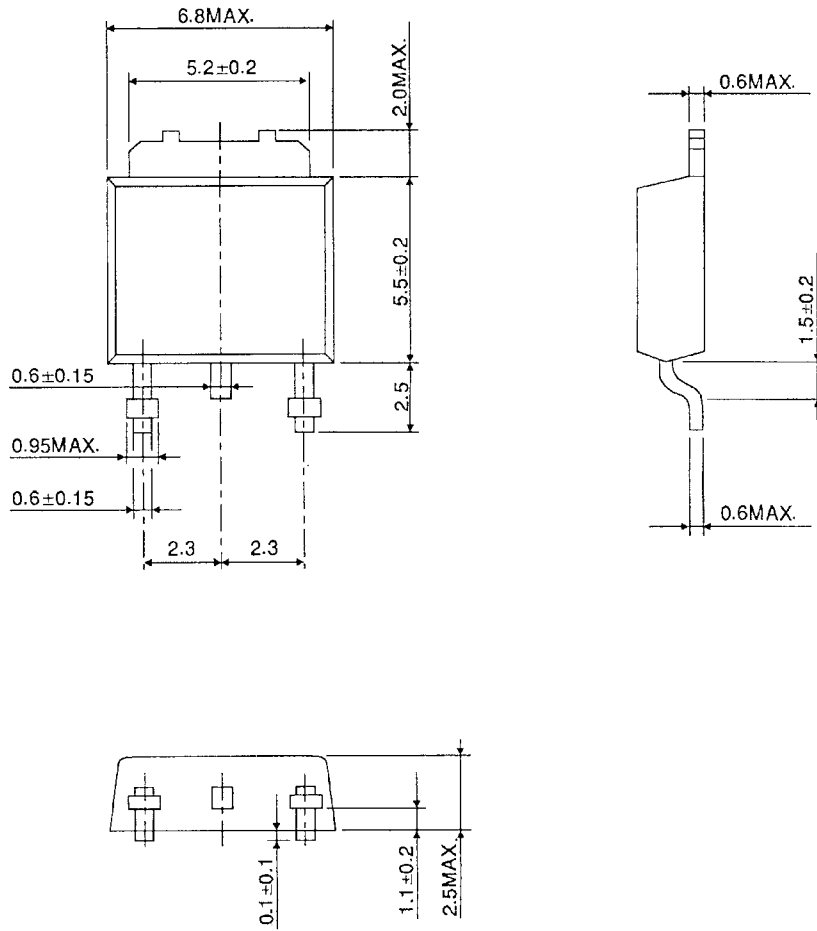


Weight : 0.36 g (Typ.)

## Package Dimensions

HSOP3-P-2.30A

Unit : mm



Weight : 0.36 g (Typ.)

**RESTRICTIONS ON PRODUCT USE**

000707EBA

- 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 are subject to the foreign exchange and foreign trade laws.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice.