TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

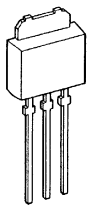
TA48018F, TA4802F, TA48025F, TA4803F, TA48033F, TA4805F,
TA48018S, TA4802S, TA48025S, TA4803S, TA48033S, TA4805S

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

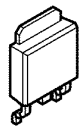
The TA48**F/S series consists of fixed-positive-output, low-dropout regulators with an output current of 1 A (max) that utilize V-PNP transistors for the output stage. In response to the need for low-voltage and low-power dissipation devices which are used in consumer electronics and industrial appliances, the series offers devices with low output voltages: 1.8 V, 2 V, 2.5 V, 3 V, 3.3 V, 5 V.

(1) TA48**F



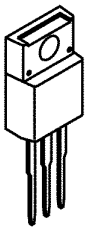
HSIP3-P-2.30B

(2) TA48**F (TE16L1, N)



HSOP3-P-2.30D

(3) TA48**S



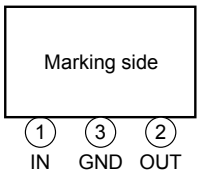
HSIP3-P-2.54A

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.)

Features

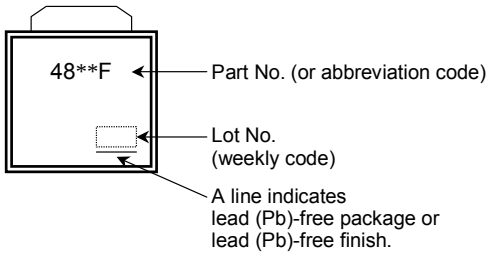
- Maximum output current: 1 A
- Output voltage accuracy: V_{OUT} ± 3% (@T_j = 25°C)
- Low standby current: 800 μA (typ.) (@I_{OUT} = 0 A)
- Low starting quiescent current
- Low-dropout voltage: V_D = 0.5 V (max) (@I_{OUT} = 0.5 A)
- Protection function: overheat/overcurrent
- Package type: PW-MOLD (TA48**F 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

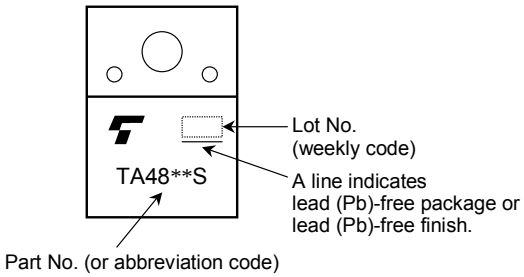


Marking

(1) (2) TA48F** Series



(3) TA48**S Series

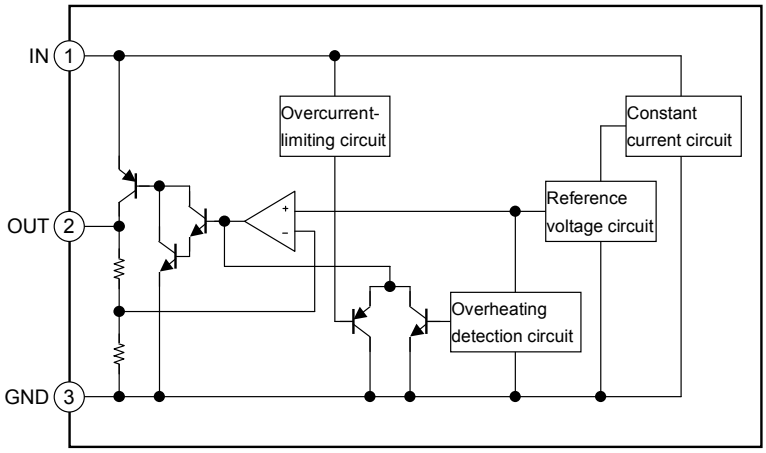


Note: The "**" part of each product number varies according to the output voltage of the product.

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



Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating	Unit
Input voltage		V_{IN}	16	V
Output current		I_{OUT}	1	A
Operating temperature		$Ta_{(opr)}$	−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.

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°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	—	1.7	—	A
		V_{IN} = 12 V, T_j = 25°C	—	1.8	—	

Note 2: The maximum ratings should not be exceeded when the IC is actually used.

TA48018F/S
Electrical Characteristics
(Unless otherwise specified C_{IN} = 0.33 μF, C_{OUT} = 10 μF, T_j = 25°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 ≦ V_{IN} ≦ 12 V, 5 mA ≦ I_{OUT} ≦ 1 A, 0°C ≦ T_j ≦ 125°C	1.72	1.8	1.88	
Line regulation	Reg·line	2.8 V ≦ V_{IN} ≦ 12 V, I_{OUT} = 0.5 A	—	5	20	mV
Load regulation	Reg·load	V_{IN} = 3.8 V, 5 mA ≦ I_{OUT} ≦ 1 A	—	5	20	mV
Quiescent current	I_B	2.8 V ≦ V_{IN} ≦ 12 V, I_{OUT} = 0 A	—	0.8	1.8	mA
		2.8 V ≦ V_{IN} ≦ 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 ≦ f ≦ 100 kHz	—	75	—	μVrms
Ripple rejection	R.R.	2.8 V ≦ V_{IN} ≤ 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°C ≦ T_j ≦ 125°C	—	0.15	—	mV/°C

TA4802F/S
Electrical Characteristics
(Unless otherwise specified, C_{IN} = 0.33 μF, C_{OUT} = 10 μF, T_j = 25°C)

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

TA48025F/S
Electrical Characteristics
(Unless otherwise specified, C_{IN} = 0.33 μF, C_{OUT} = 10 μF, T_j = 25°C)

Characteristics	Symbol	Test Conditions	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	V_{IN} = 4.5 V, I_{OUT} = 0.5 A	2.425	2.5	2.575	V
		3.5 V ≦ V_{IN} ≦ 12 V, 5 mA ≦ I_{OUT} ≦ 1 A, 0°C ≦ T_j ≦ 125°C	2.388	2.5	2.612	
Line regulation	Reg·line	3.5 V ≦ V_{IN} ≦ 12 V, I_{OUT} = 0.5 A	—	5	20	mV
Load regulation	Reg·load	V_{IN} = 4.5 V, 5 mA ≦ I_{OUT} ≦ 1 A	—	5	20	mV
Quiescent current	I_B	3.5 V ≦ V_{IN} ≦ 12 V, I_{OUT} = 0 A	—	0.8	1.8	mA
		3.5 V ≦ V_{IN} ≦ 12 V, I_{OUT} = 1 A	—	10	20	
Starting quiescent current	I_{Bstart}	V_{IN} = 2.1 V, I_{OUT} = 0 A	—	0.9	5	mA
		V_{IN} = 2.65 V, I_{OUT} = 1 A	—	12	30	
Output noise voltage	V_{NO}	V_{IN} = 4.5 V, I_{OUT} = 50 mA 10 Hz ≦ f ≦ 100 kHz	—	95	—	μVrms
Ripple rejection	R.R.	3.5 V ≦ V_{IN} ≤ 12 V, I_{OUT} = 50 mA f = 120 Hz	52	68	—	dB
Dropout voltage	V_D	I_{OUT} = 0.5 A	—	0.3	0.5	V
		I_{OUT} = 1 A	—	0.4	—	
Average temperature coefficient of output voltage	T_{CVO}	V_{IN} = 4.5 V, I_{OUT} = 5 mA, 0°C ≦ T_j ≦ 125°C	—	0.24	—	mV/°C

TA4803F/S
Electrical Characteristics
(Unless otherwise specified, C_{IN} = 0.33 μF, C_{OUT} = 10 μF, T_j = 25°C)

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

TA48033F/S
Electrical Characteristics
(Unless otherwise specified, C_{IN} = 0.33 μF, C_{OUT} = 10 μF, T_j = 25°C)

Characteristics	Symbol	Test Conditions	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	V_{IN} = 5.3 V, I_{OUT} = 0.5 A	3.2	3.3	3.4	V
		4.3 V ≦ V_{IN} ≦ 12 V, 5 mA ≦ I_{OUT} ≦ 1 A, 0°C ≦ T_j ≦ 125°C	3.152	3.3	3.448	
Line regulation	Reg·line	4.3 V ≦ V_{IN} ≦ 12 V, I_{OUT} = 0.5 A	—	5	20	mV
Load regulation	Reg·load	V_{IN} = 5.3 V, 5 mA ≦ I_{OUT} ≦ 1 A	—	5	20	mV
Quiescent current	I_B	4.3 V ≦ V_{IN} ≦ 12 V, I_{OUT} = 0 A	—	0.8	1.8	mA
		4.3 V ≦ V_{IN} ≦ 12 V, I_{OUT} = 1 A	—	10	20	
Starting quiescent current	I_{Bstart}	V_{IN} = 2.1 V, I_{OUT} = 0 A	—	1.1	5	mA
		V_{IN} = 2.8 V, I_{OUT} = 1 A	—	13	30	
Output noise voltage	V_{NO}	V_{IN} = 5.3 V, I_{OUT} = 50 mA 10 Hz ≦ f ≦ 100 kHz	—	115	—	μVrms
Ripple rejection	R.R.	4.3 V ≦ V_{IN} ≤ 12 V, I_{OUT} = 50 mA f = 120 Hz	50	66	—	dB
Dropout voltage	V_D	I_{OUT} = 0.5 A	—	0.3	0.5	V
		I_{OUT} = 1 A	—	0.4	—	
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

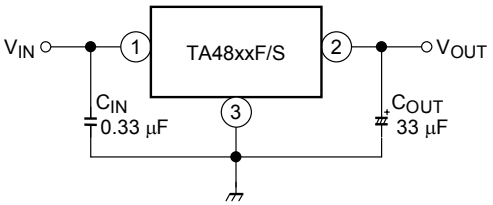
TA4805F/S
Electrical Characteristics
(Unless otherwise specified, C_{IN} = 0.33 μF, C_{OUT} = 10 μF, T_j = 25°C)

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

Electrical Characteristics for All Products

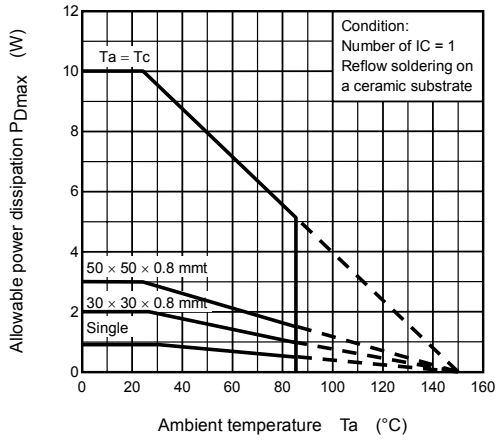
Generally, the characteristics of power supply ICs change according to temperature fluctuations.
The specification T_j = 25℃ is based on a state where temperature increase has no effect (assuming no fluctuation in the characteristics) as ascertained by pulse tests.

Standard Application Circuit

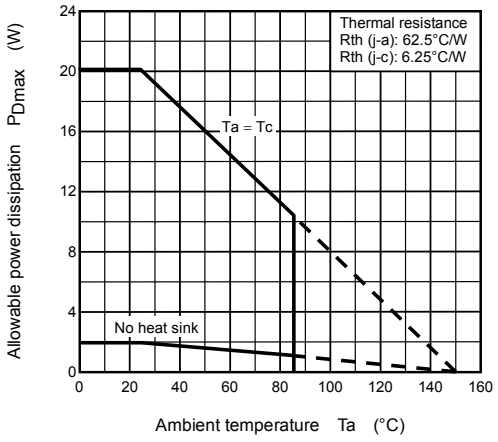


Be sure to connect a capacitor near the input terminal and output terminal between both terminals and GND.
The capacitances should be determined experimentally. In particular, adequate investigation should be made so that there is no problem even in high or low temperature.

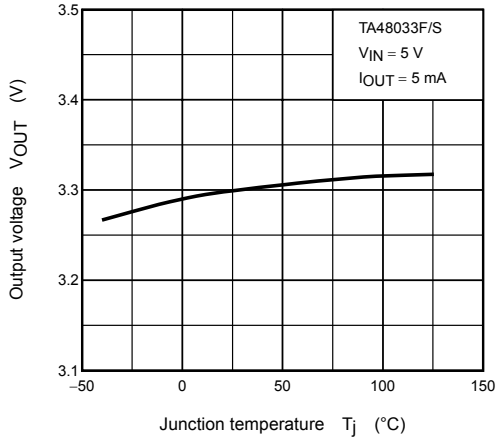
TA48**F
P_{Dmax} – Ta



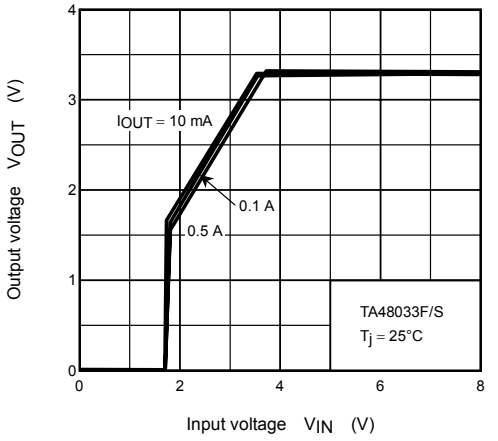
TA48**S
P_{Dmax} – Ta



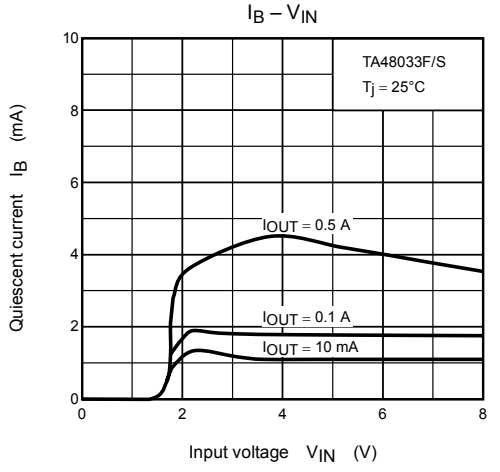
V_{OUT} – T_j



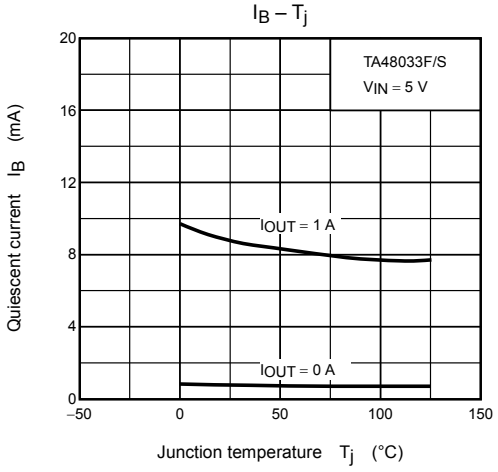
V_{OUT} – V_{IN}



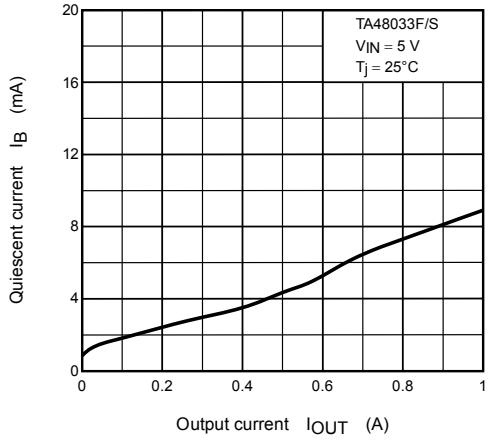
I_B – V_{IN}



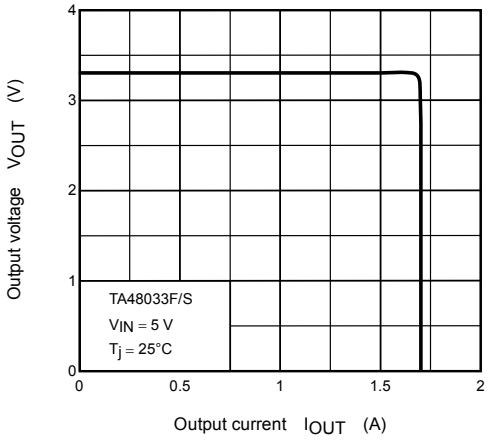
I_B – T_j



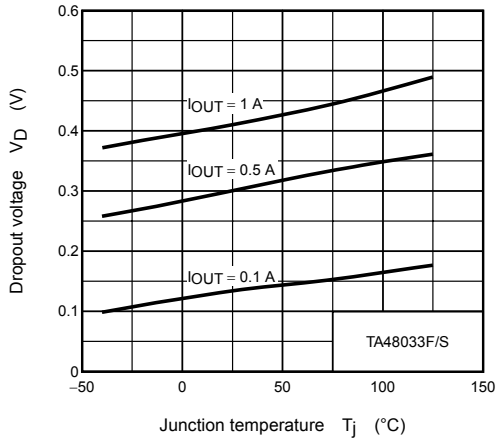
$I_B - I_{OUT}$



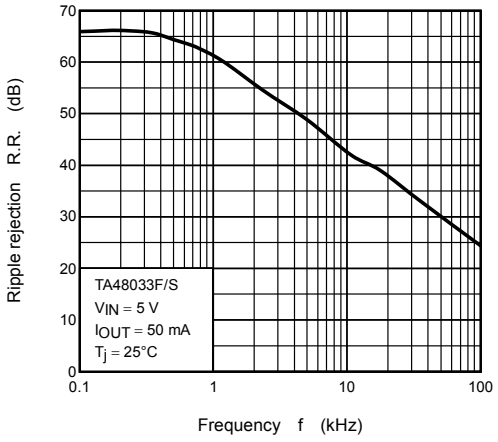
$V_{OUT} - I_{OUT}$



$V_D - T_j$



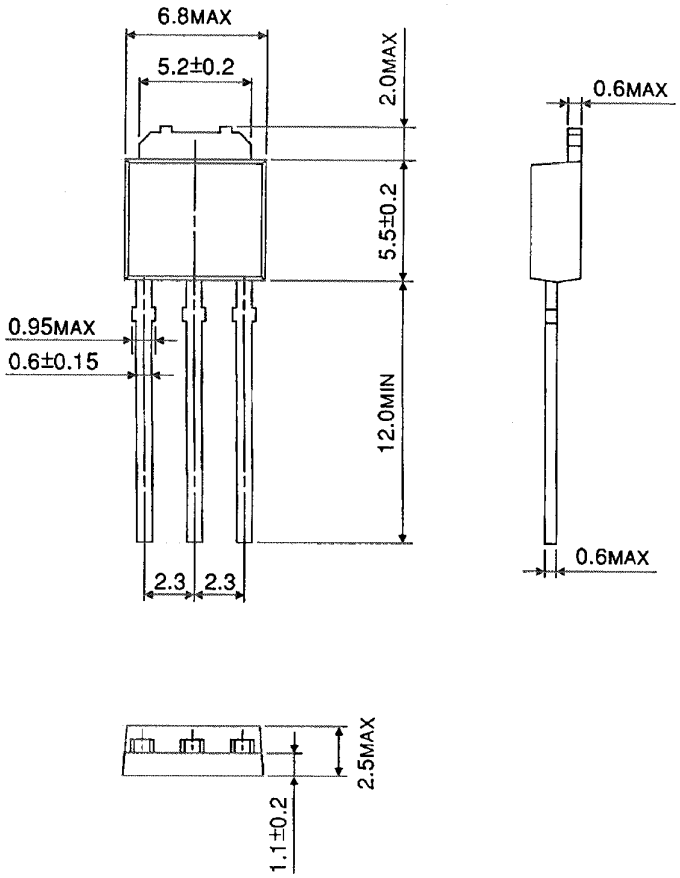
R.R. – f



Package Dimensions

HSIP3-P-2.30B

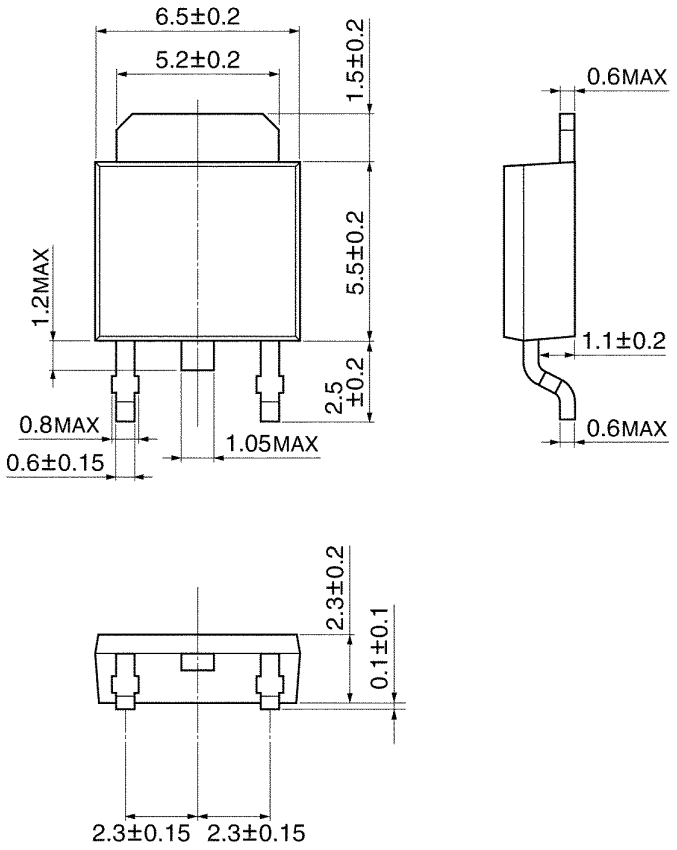
Unit : mm



Weight: 0.36 g (typ.)

Package Dimensions

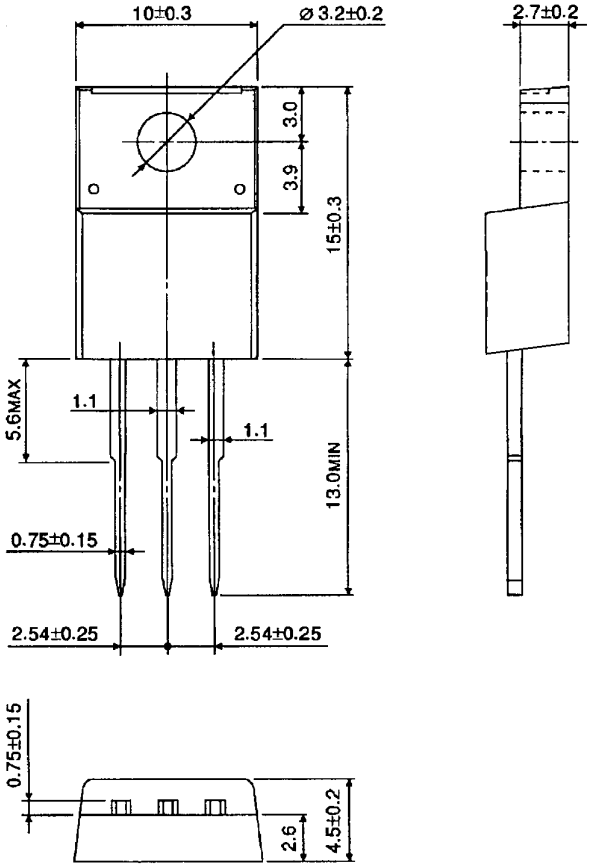
HSOP3-P-2.30D Unit: mm



Weight: 0.36 g (typ.)

Package Dimensions

HSIP3-P-2.54A Unit : mm



Weight: 1.7 g (typ.)

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  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.
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