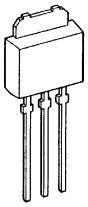
TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

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

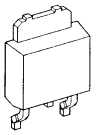
The TA48M**F series consists of fixed-positive-output, low dropout regulators with an output current of 500 mA (max). In response to the need for low voltage devices, the series offers devices with low output voltages of 2.5 V, 3 V, 3.3 V, 3.45 V, and 4 V, which are not included in the existing TA78DM**S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

TA48M**F (S)



HSIP3-P-2.30B

TA48M**F (LBS1, S) (TE16L, S)



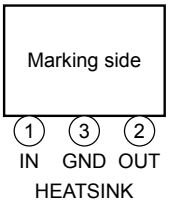
HSOP3-P-2.30A

Weight
HSIP3-P-2.30B: 0.36 g (typ.)
HSOP3-P-2.30A: 0.36 g (typ.)

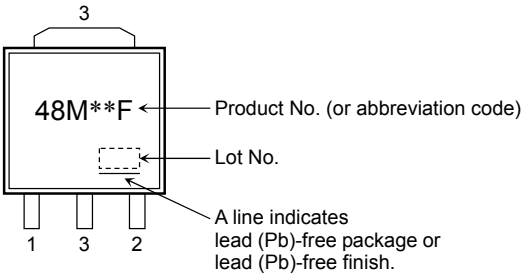
Features

- 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.
- PW-Mold package:
  Surface-mount type for reflow soldering is also supported.

Pin Assignment



Marking



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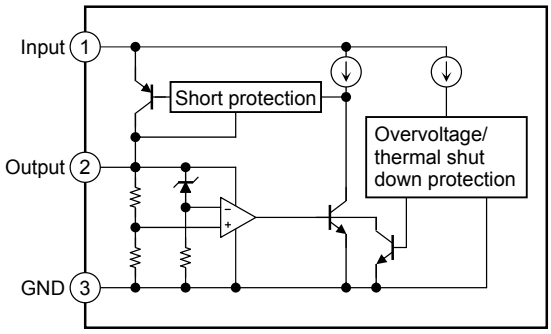
Ordering Method (Note 1)

	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 pro-forma product name is replaced with the output voltage of each product.
For example: for 3 V, "TA48M03F"

Block Diagram



Absolute Maximum Ratings (Ta = 25°C)

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

Note: 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

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

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TA48M025F

Electrical Characteristics

(unless otherwise specified, V_{IN} = 4.5 V, I_{OUT} = 250 mA, T_j = 25°C, C_{IN} = 0.1 μF, C_{OUT} = 10 μF)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	—	—	2.4	2.5	2.6	V
		—	3.5 V ≤ V_{IN} ≤ 16 V, 5 mA ≤ I_{OUT} ≤ 500 mA, 0°C ≤ T_j ≤ 125°C	2.375	2.5	2.625	
Line regulation	Reg·line	—	3.5 V ≤ V_{IN} ≤ 16 V	—	7	18	mV
Load regulation	Reg·load	—	5 mA ≤ I_{OUT} ≤ 500 mA	—	45	90	mV
Quiescent current	I_B	—	3.5 V ≤ V_{IN} ≤ 16 V, I_{OUT} = 0 mA	—	0.8	1.4	mA
		—	3.5 V ≤ V_{IN} ≤ 16 V, I_{OUT} = 250 mA	—	12	25	
Output noise voltage	V_{NO}	—	10 Hz ≤ f ≤ 100 kHz, I_{OUT} = 50 mA	—	72	—	μVrms
Ripple rejection	R.R.	—	f = 120 Hz, 3.5 V ≤ V_{IN} ≤ 16 V, I_{OUT} = 50 mA	62	72	—	dB
Dropout voltage	V_D	—	I_{OUT} = 250 mA	—	0.17	0.35	V
		—	I_{OUT} = 500 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

(unless otherwise specified, V_{IN} = 5 V, I_{OUT} = 250 mA, T_j = 25°C, C_{IN} = 0.1 μF, C_{OUT} = 10 μF)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	—	—	2.88	3.0	3.12	V
		—	4 V ≤ V_{IN} ≤ 16 V, 5 mA ≤ I_{OUT} ≤ 500 mA, 0°C ≤ T_j ≤ 125°C	2.85	3.0	3.15	
Line regulation	Reg·line	—	4 V ≤ V_{IN} ≤ 16 V	—	8	21	mV
Load regulation	Reg·load	—	5 mA ≤ I_{OUT} ≤ 500 mA	—	45	95	mV
Quiescent current	I_B	—	4 V ≤ V_{IN} ≤ 16 V, I_{OUT} = 0 mA	—	0.8	1.4	mA
		—	4 V ≤ V_{IN} ≤ 16 V, I_{OUT} = 250 mA	—	12	25	
Output noise voltage	V_{NO}	—	10 Hz ≤ f ≤ 100 kHz, I_{OUT} = 50 mA	—	90	—	μVrms
Ripple rejection	R.R.	—	f = 120 Hz, 4 V ≤ V_{IN} ≤ 16 V, I_{OUT} = 50 mA	60	70	—	dB
Dropout voltage	V_D	—	I_{OUT} = 250 mA	—	0.17	0.35	V
		—	I_{OUT} = 500 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

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TA48M033F

Electrical Characteristics

(unless otherwise specified, V_{IN} = 5.3 V, I_{OUT} = 250 mA, T_j = 25°C, C_{IN} = 0.1 μF, C_{OUT} = 10 μF)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	—	—	3.168	3.3	3.432	V
		—	4.3 V ≤ V_{IN} ≤ 16 V, 5 mA ≤ I_{OUT} ≤ 500 mA, 0°C ≤ T_j ≤ 125°C	3.135	3.3	3.465	
Line regulation	Reg·line	—	4.3 V ≤ V_{IN} ≤ 16 V	—	10	23	mV
Load regulation	Reg·load	—	5 mA ≤ I_{OUT} ≤ 500 mA	—	45	105	mV
Quiescent current	I_B	—	4.3 V ≤ V_{IN} ≤ 16 V, I_{OUT} = 0 mA	—	0.8	1.4	mA
		—	4.3 V ≤ V_{IN} ≤ 16 V, I_{OUT} = 250 mA	—	12	25	
Output noise voltage	V_{NO}	—	10 Hz ≤ f ≤ 100 kHz, I_{OUT} = 50 mA	—	90	—	μVrms
Ripple rejection	R.R.	—	f = 120 Hz, 4.3 V ≤ V_{IN} ≤ 16 V, I_{OUT} = 50 mA	60	70	—	dB
Dropout voltage	V_D	—	I_{OUT} = 250 mA	—	0.17	0.35	V
		—	I_{OUT} = 500 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

(unless otherwise specified, V_{IN} = 5.45 V, I_{OUT} = 250 mA, T_j = 25°C, C_{IN} = 0.1 μF, C_{OUT} = 10 μF)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	—	—	3.312	3.45	3.588	V
		—	4.45 V ≤ V_{IN} ≤ 16 V, 5 mA ≤ I_{OUT} ≤ 500 mA, 0°C ≤ T_j ≤ 125°C	3.278	3.45	3.622	
Line regulation	Reg·line	—	4.45 V ≤ V_{IN} ≤ 16 V	—	12	25	mV
Load regulation	Reg·load	—	5 mA ≤ I_{OUT} ≤ 500 mA	—	45	110	mV
Quiescent current	I_B	—	4.45 V ≤ V_{IN} ≤ 16 V, I_{OUT} = 0 mA	—	0.8	1.4	mA
		—	4.45 V ≤ V_{IN} ≤ 16 V, I_{OUT} = 250 mA	—	12	25	
Output noise voltage	V_{NO}	—	10 Hz ≤ f ≤ 100 kHz, I_{OUT} = 50 mA	—	90	—	μVrms
Ripple rejection	R.R.	—	f = 120 Hz, 4.45 V ≤ V_{IN} ≤ 16 V, I_{OUT} = 50 mA	60	70	—	dB
Dropout voltage	V_D	—	I_{OUT} = 250 mA	—	0.17	0.35	V
		—	I_{OUT} = 500 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

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TA48M04F

Electrical Characteristics

(unless otherwise specified, V_{IN} = 6 V, I_{OUT} = 250 mA, T_j = 25°C, C_{IN} = 0.1 μF, C_{OUT} = 10 μF)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	—	—	3.84	4.0	4.16	V
		—	5 V ≤ V_{IN} ≤ 16 V, 5 mA ≤ I_{OUT} ≤ 500 mA, 0°C ≤ T_j ≤ 125°C	3.8	4.0	4.2	
Line regulation	Reg·line	—	5 V ≤ V_{IN} ≤ 16 V	—	11	28	mV
Load regulation	Reg·load	—	5 mA ≤ I_{OUT} ≤ 500 mA	—	45	115	mV
Quiescent current	I_B	—	5 V ≤ V_{IN} ≤ 16 V, I_{OUT} = 0 mA	—	0.9	1.4	mA
		—	5 V ≤ V_{IN} ≤ 16 V, I_{OUT} = 250 mA	—	13	25	
Output noise voltage	V_{NO}	—	10 Hz ≤ f ≤ 100 kHz, I_{OUT} = 50 mA	—	110	—	μVrms
Ripple rejection	R.R.	—	f = 120 Hz, 5 V ≤ V_{IN} ≤ 16 V, I_{OUT} = 50 mA	58	68	—	dB
Dropout voltage	V_D	—	I_{OUT} = 250 mA	—	0.17	0.35	V
		—	I_{OUT} = 500 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

(unless otherwise specified, V_{IN} = 7 V, I_{OUT} = 250 mA, T_j = 25°C, C_{IN} = 0.1 μF, C_{OUT} = 10 μF)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	—	—	4.8	5.0	5.2	V
		—	6 V ≤ V_{IN} ≤ 18 V, 5 mA ≤ I_{OUT} ≤ 500 mA, 0°C ≤ T_j ≤ 125°C	4.75	5.0	5.25	
Line regulation	Reg·line	—	6 V ≤ V_{IN} ≤ 18 V	—	15	35	mV
Load regulation	Reg·load	—	5 mA ≤ I_{OUT} ≤ 500 mA	—	50	135	mV
Quiescent current	I_B	—	6 V ≤ V_{IN} ≤ 18 V, I_{OUT} = 0 mA	—	1.0	1.4	mA
		—	6 V ≤ V_{IN} ≤ 18 V, I_{OUT} = 250 mA	—	13	25	
Output noise voltage	V_{NO}	—	10 Hz ≤ f ≤ 100 kHz, I_{OUT} = 50 mA	—	125	—	μVrms
Ripple rejection	R.R.	—	f = 120 Hz, 6 V ≤ V_{IN} ≤ 18 V, I_{OUT} = 50 mA	58	68	—	dB
Dropout voltage	V_D	—	I_{OUT} = 250 mA	—	0.17	0.35	V
		—	I_{OUT} = 500 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

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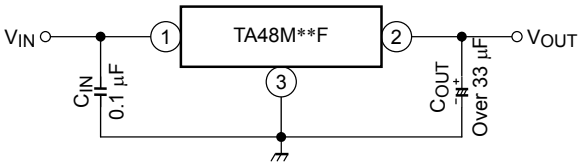
Standard Application Circuit



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 temperatures.

Note: Depending on the type of capacitor being used to connect to the output, characteristics (capacitance, frequency and others) may decline and the output may oscillate. To prevent this, Toshiba recommends a tantalum electrolytic capacitor that has a small fluctuation in capacitance characteristics.

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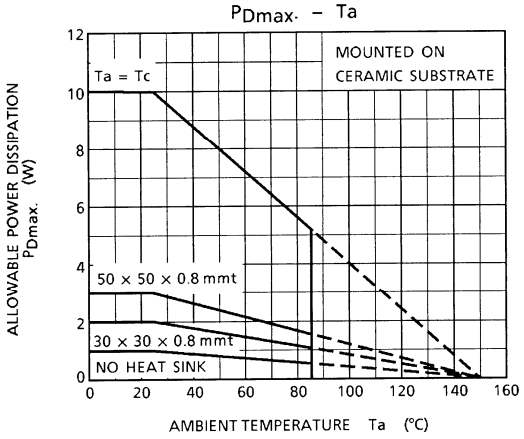
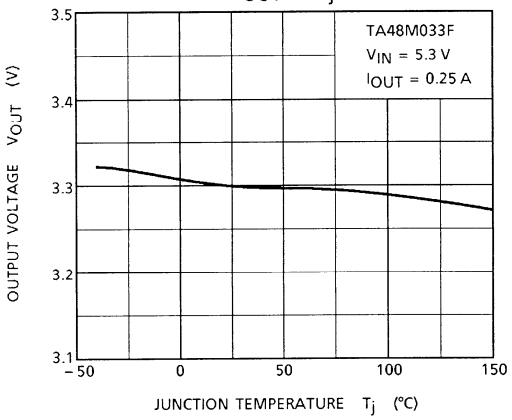
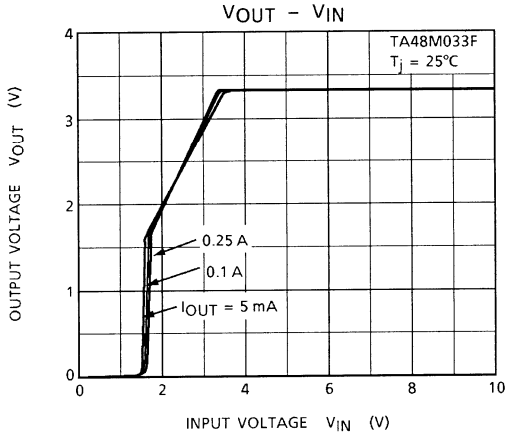
$P_{Dmax.}$ – Ta



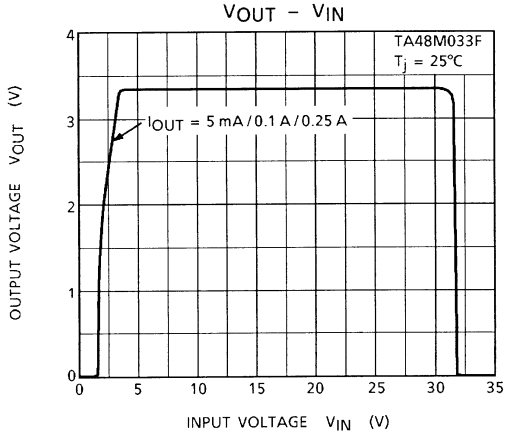
V_{OUT} – T_j



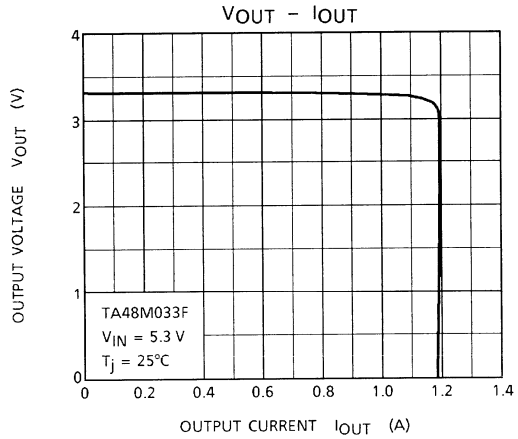
V_{OUT} – V_{IN}



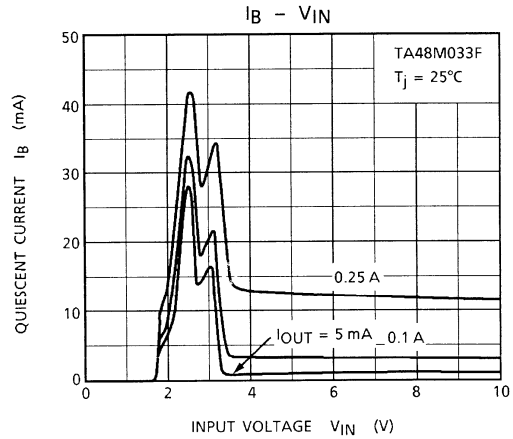
V_{OUT} – V_{IN}



V_{OUT} – I_{OUT}



I_B – V_{IN}



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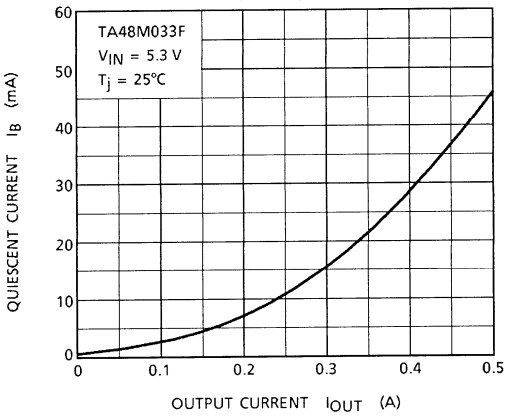
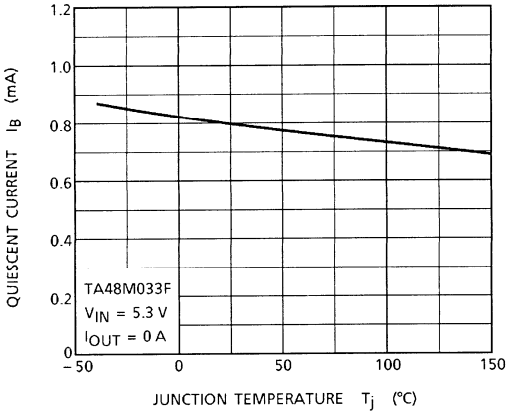
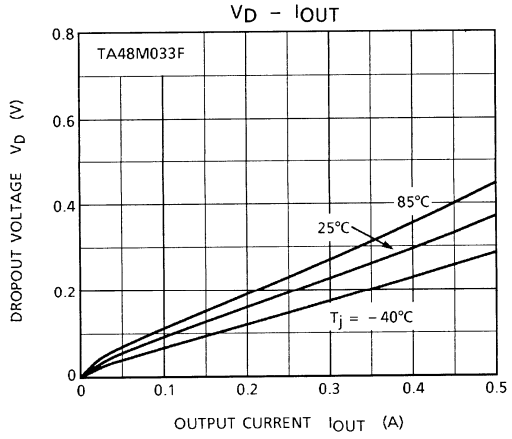
I_B – I_{OUT}



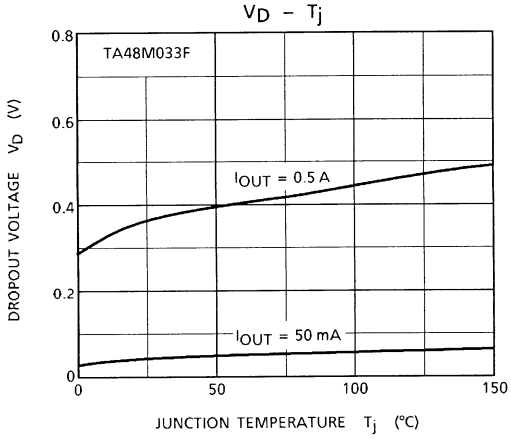
I_B – T_j



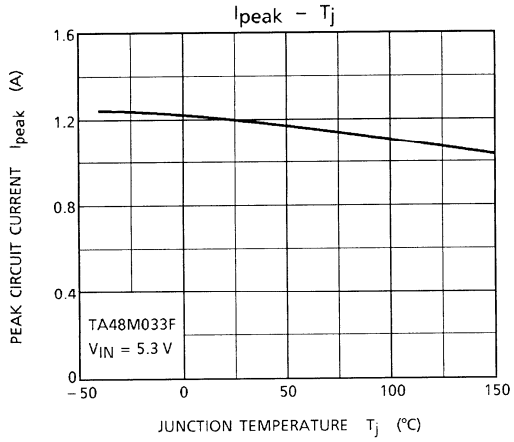
V_D – I_{OUT}



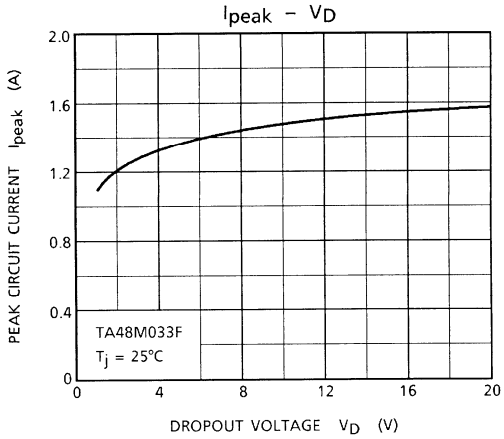
V_D – T_j



I_{peak} – T_j



I_{peak} – V_D



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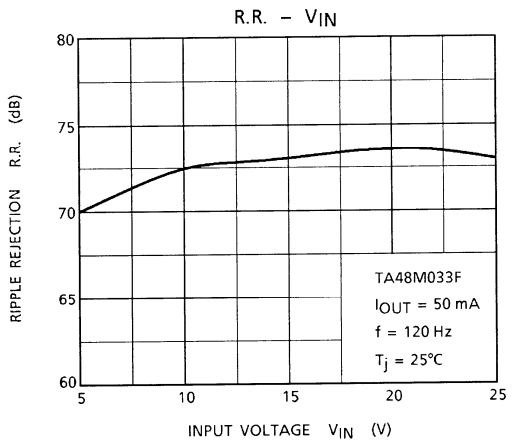

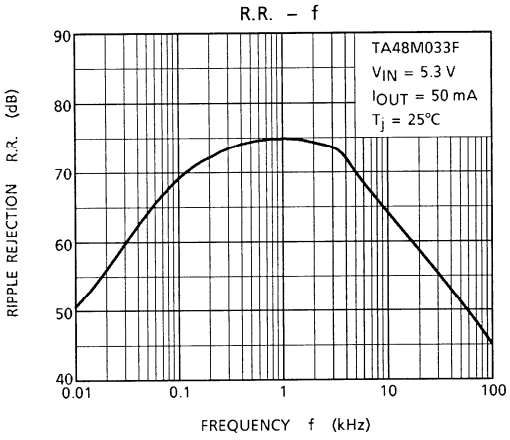

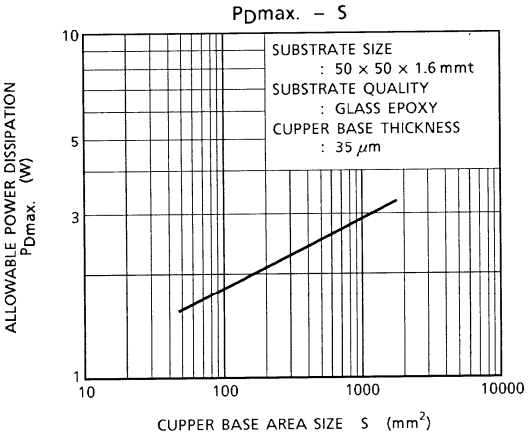

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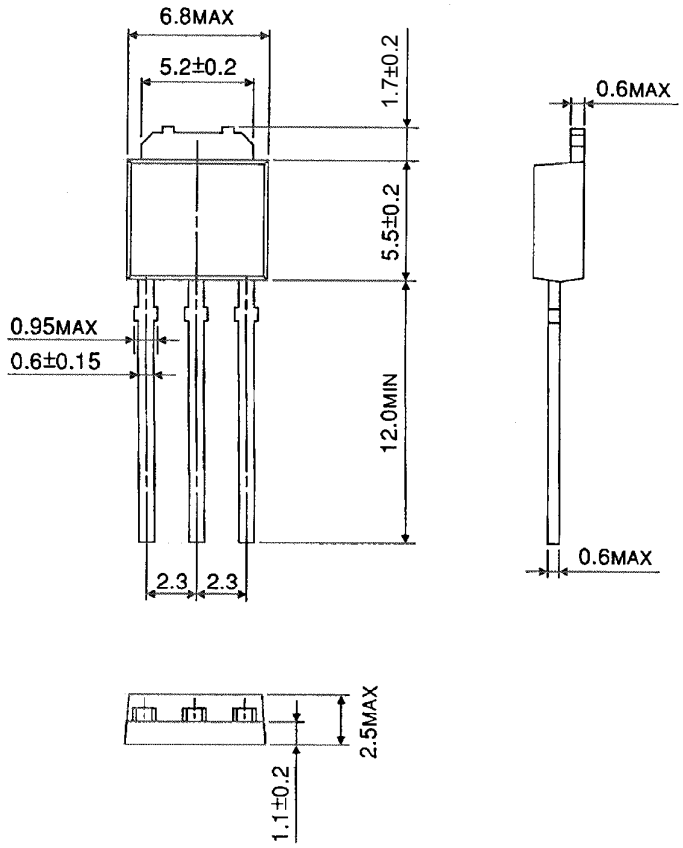
Package Dimensions

HSIP3-P-2.30B

Unit : mm



Weight: 0.36 g (typ.)

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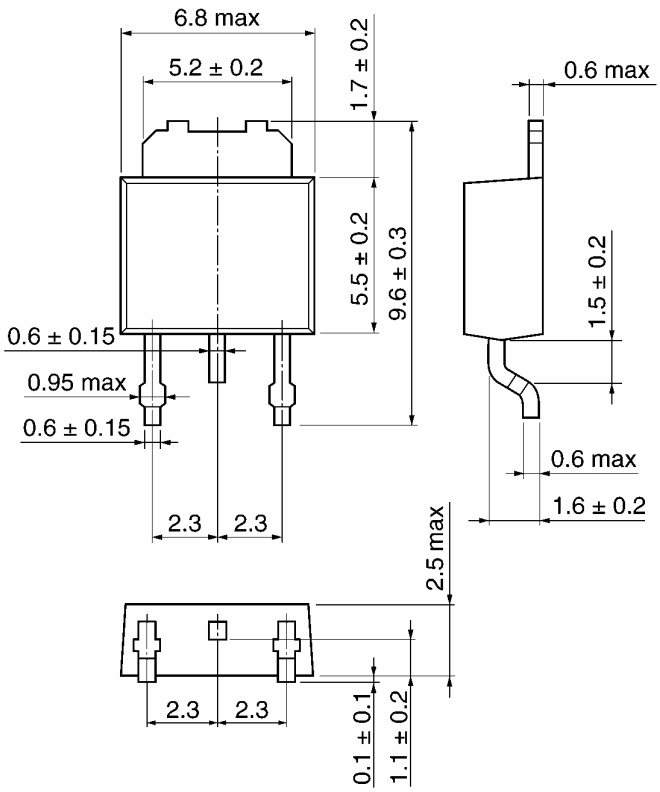
Package Dimensions

HSOP3-P-2.30A

Unit: mm



Weight: 0.36 g (typ.)

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