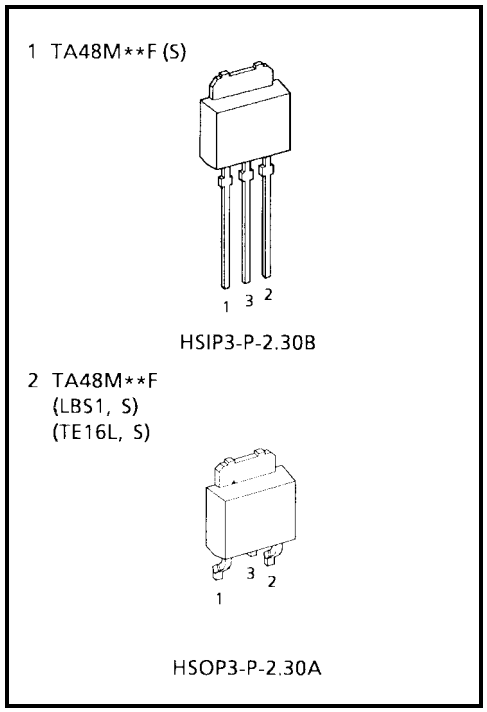
TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

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).

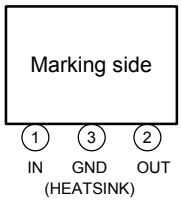


Weight
HSIP3-P-2.30B: 0.36 g (Typ.)
HSOP3-P-2.30A: 0.36 g (Typ.)

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.
- Power mold package:
  Surface-mount type for reflow soldering is also supported.

Pin Assignment

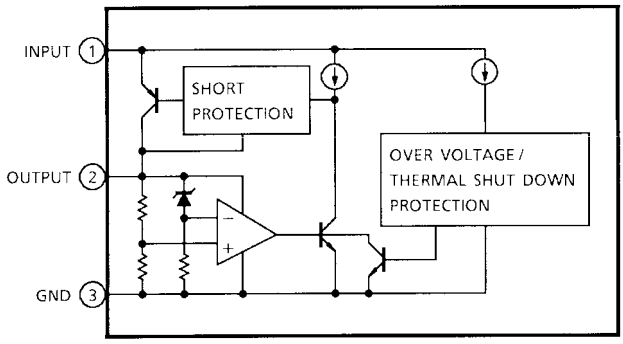


Ordering Method (Note 1)

	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	(Ta = 25°C)	P_D	1	W
	(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 V, I_{OUT} = 250 mA, T_j = 25°C, C_{IN} = 0.1 µF, C_{OUT} = 10 µF, 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 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	—	μV_{rms}
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
(V_{IN} = 5 V, I_{OUT} = 250 mA, T_j = 25°C, C_{IN} = 0.1 µF, C_{OUT} = 10 µF, 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 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	—	μV_{rms}
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

TA48M033F
Electrical Characteristics
(V_{IN} = 5.3 V, I_{OUT} = 250 mA, T_j = 25°C, C_{IN} = 0.1 µF, C_{OUT} = 10 µF, 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 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	—	μV_{rms}
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
(V_{IN} = 5.45 V, I_{OUT} = 250 mA, T_j = 25°C, C_{IN} = 0.1 µF, C_{OUT} = 10 µF, 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 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	—	μV_{rms}
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

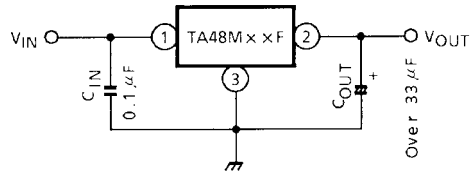
TA48M04F
Electrical Characteristics
(V_{IN} = 6 V, I_{OUT} = 250 mA, T_j = 25°C, C_{IN} = 0.1 µF, C_{OUT} = 10 µF, unless otherwise specified)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	—	—	3.84	4.0	4.16	V
		—	5 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	—	μV_{rms}
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
(V_{IN} = 7 V, I_{OUT} = 250 mA, T_j = 25°C, C_{IN} = 0.1 µF, C_{OUT} = 10 µF, 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 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	—	μV_{rms}
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

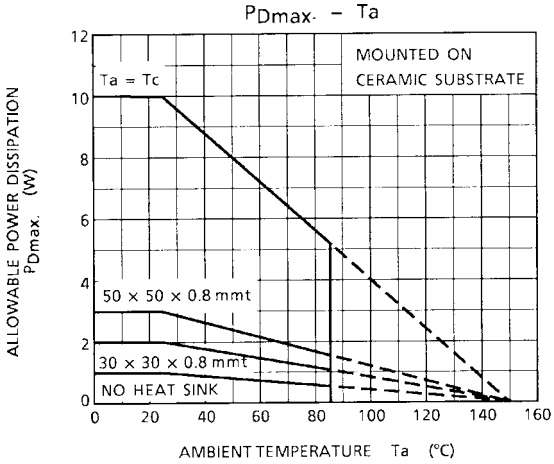
Standard Application Circuit



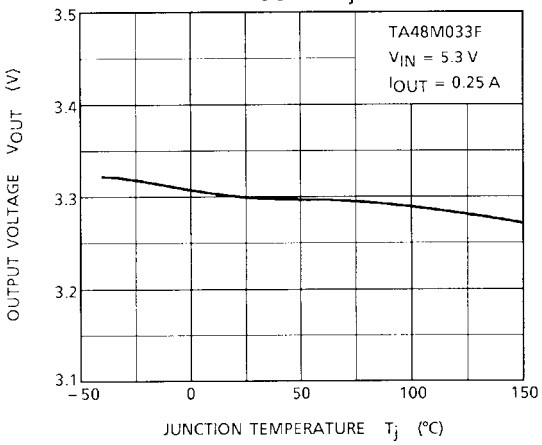
Connect the input terminal and GND, and the output terminal and GND, by capacitor respectively.
The capacitances should be determined experimentally. In particular, adequate investigation should be made so that there is no problem even at time of high or low temperature.

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.

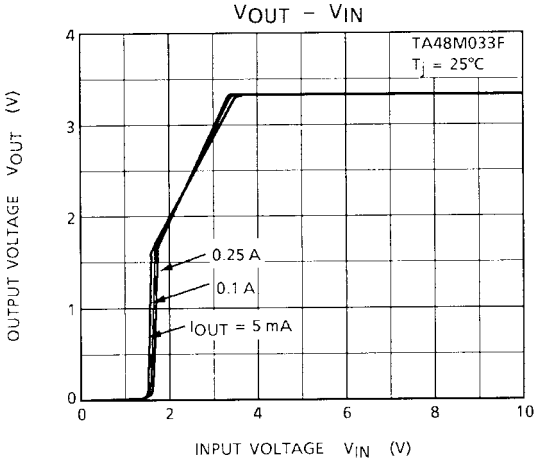
$P_{Dmax.}$ – Ta



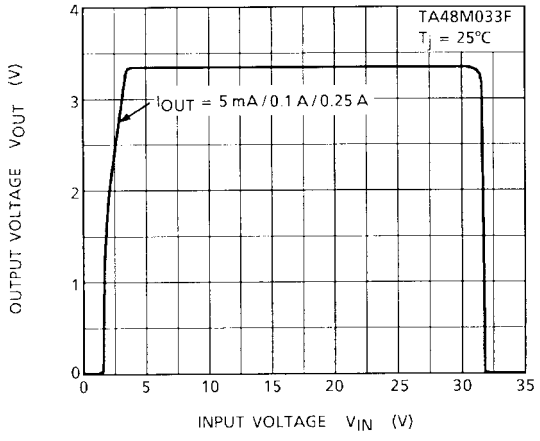
V_{OUT} – T_j



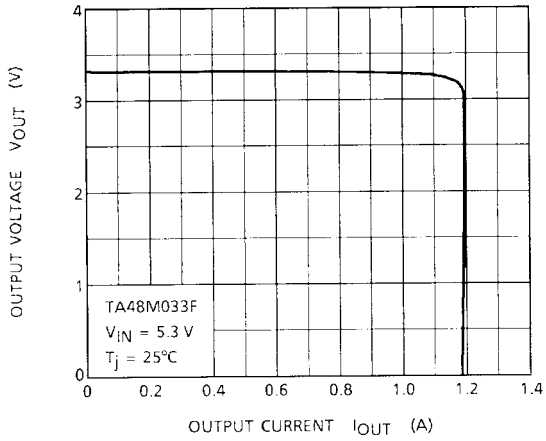
V_{OUT} – V_{IN}



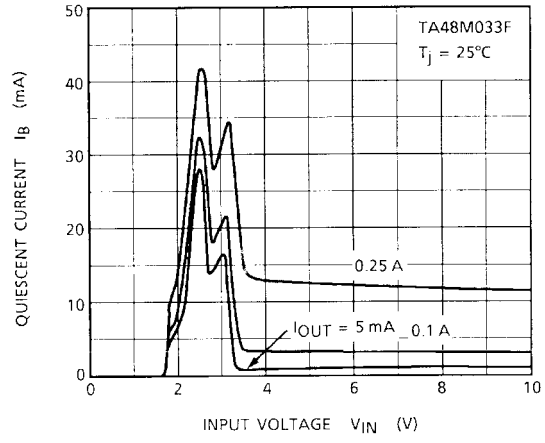
V_{OUT} – V_{IN}

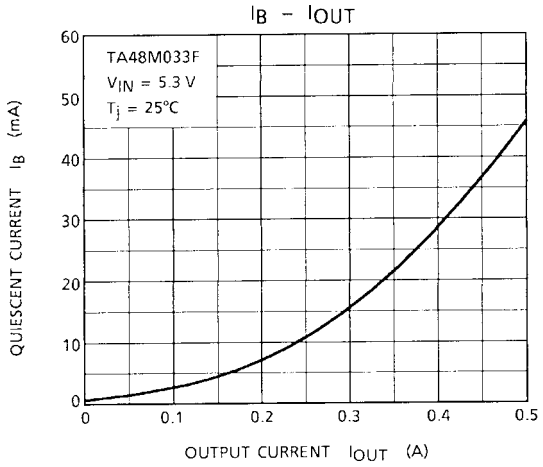


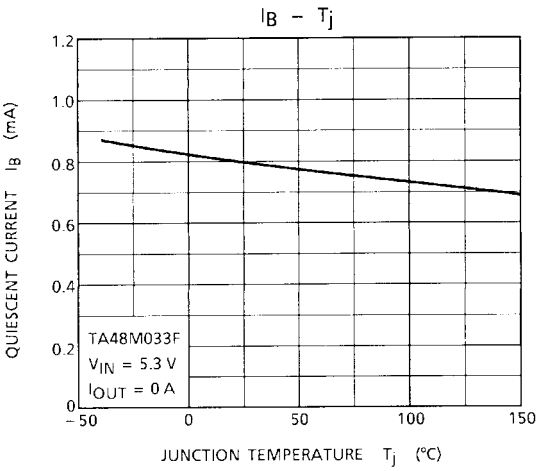
V_{OUT} – I_{OUT}

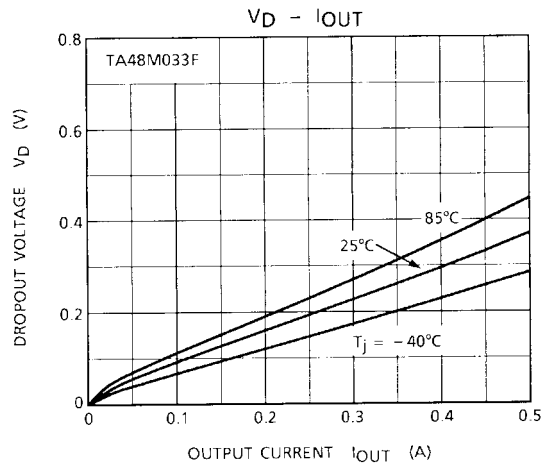


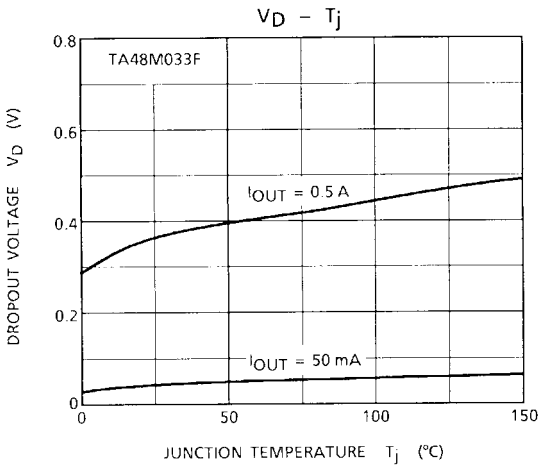
I_B – V_{IN}

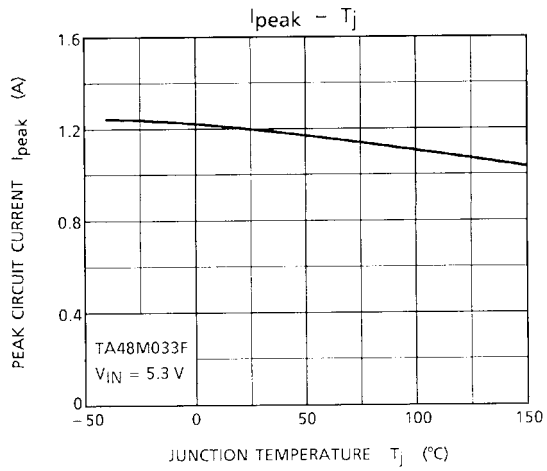


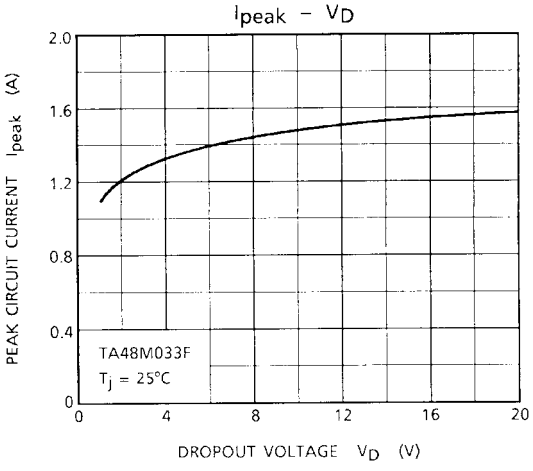

I_B – I_{OUT}
TA48M033F
V_{IN} = 5.3 V
T_j = 25°C
QUIESCENT CURRENT I_B (mA)
OUTPUT CURRENT I_{OUT} (A)


I_B – T_j
TA48M033F
V_{IN} = 5.3 V
I_{OUT} = 0 A
QUIESCENT CURRENT I_B (mA)
JUNCTION TEMPERATURE T_j (°C)

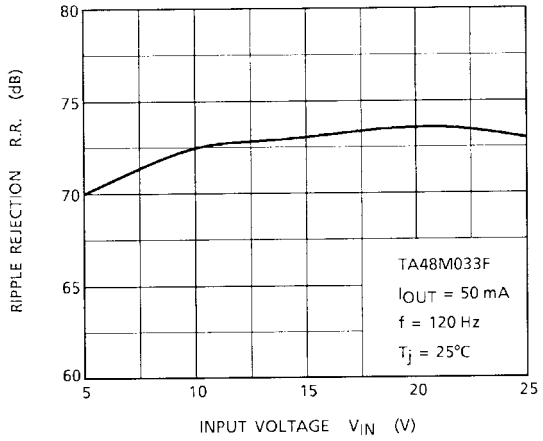

V_D – I_{OUT}
TA48M033F
85°C
25°C
T_j = –40°C
DROPOUT VOLTAGE V_D (V)
OUTPUT CURRENT I_{OUT} (A)


V_D – T_j
TA48M033F
I_{OUT} = 0.5 A
I_{OUT} = 50 mA
DROPOUT VOLTAGE V_D (V)
JUNCTION TEMPERATURE T_j (°C)

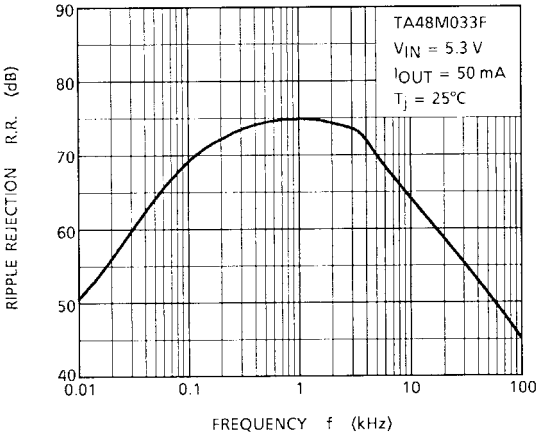

I_{peak} – T_j
TA48M033F
V_{IN} = 5.3 V
PEAK CIRCUIT CURRENT I_{peak} (A)
JUNCTION TEMPERATURE T_j (°C)


I_{peak} – V_D
TA48M033F
T_j = 25°C
PEAK CIRCUIT CURRENT I_{peak} (A)
DROPOUT VOLTAGE V_D (V)

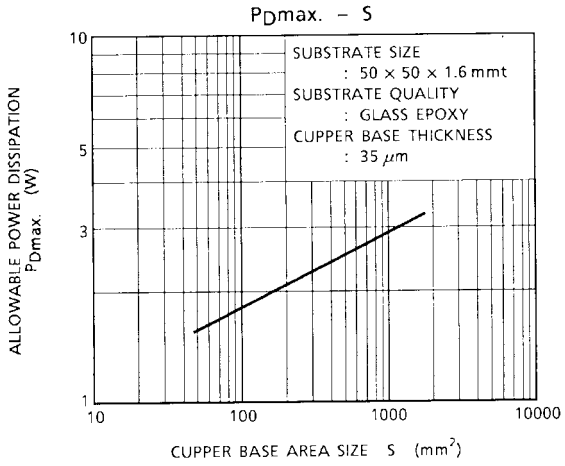
R.R. – V_{IN}



R.R. – f

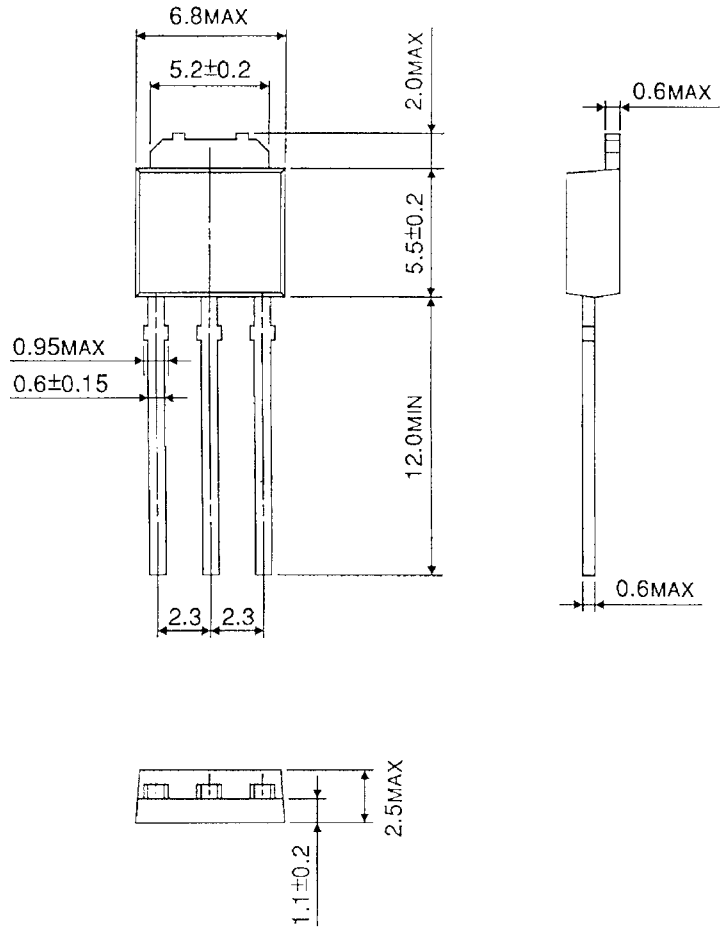


$P_D$max. – S



Package Dimensions

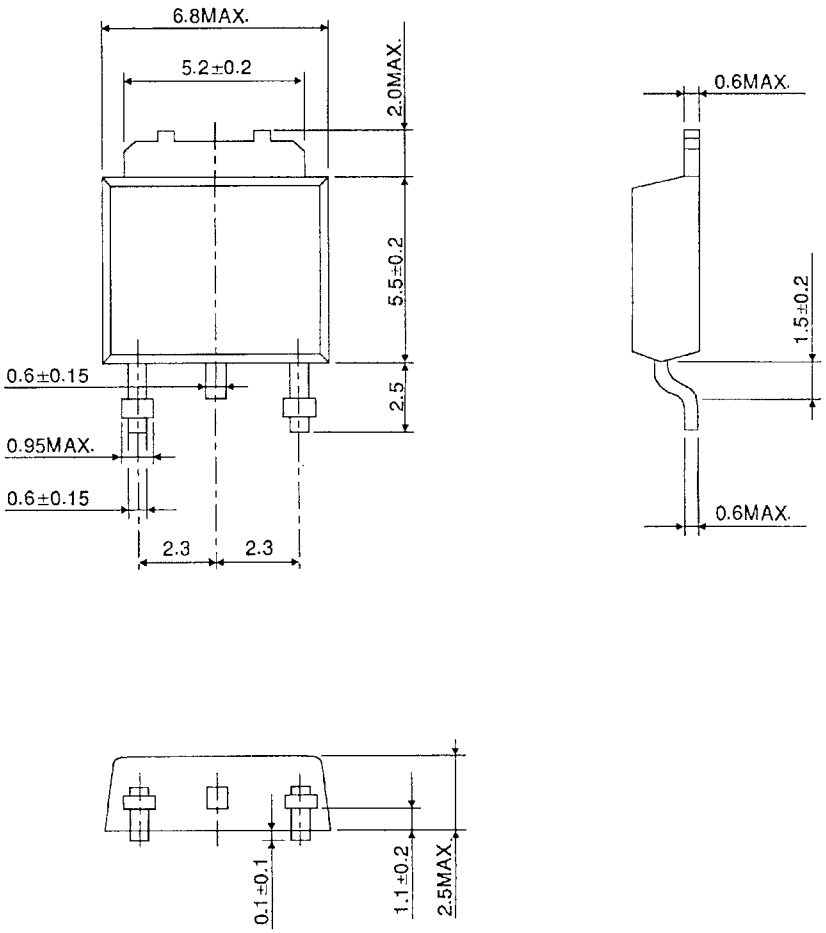
HSIP3-P-2.30B Unit : mm



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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