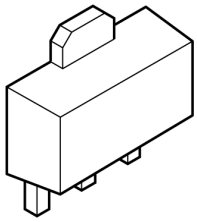
TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

TA48L018F, TA48L02F, TA48L025F, TA48L03F, TA48L033F, TA48L05F

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 0.15 A

The TA48L**F 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 for use 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.



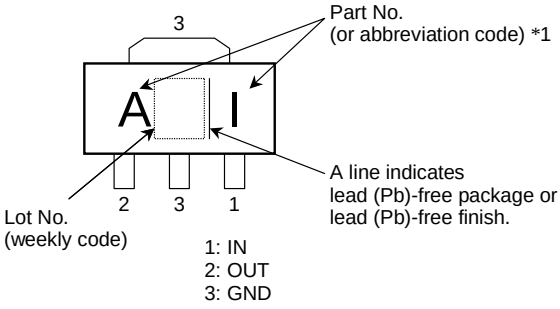
HSOP3-P-1.50

Weight: 0.05 g (typ.)

Features

- Maximum output current: 0.15 A
- Output voltage accuracy: V_{OUT} ± 3% (@T_j = 25°C)
- Low standby current: 400 μA (typ.) (@I_{OUT} = 0 A)
- Low-dropout voltage: V_D = 0.5 V (max) (@I_{OUT} = 100 mA)
- Protection function: overheat/overcurrent
- Package type: PW-MINI (SOT-89) package

Pin Assignment/Marking

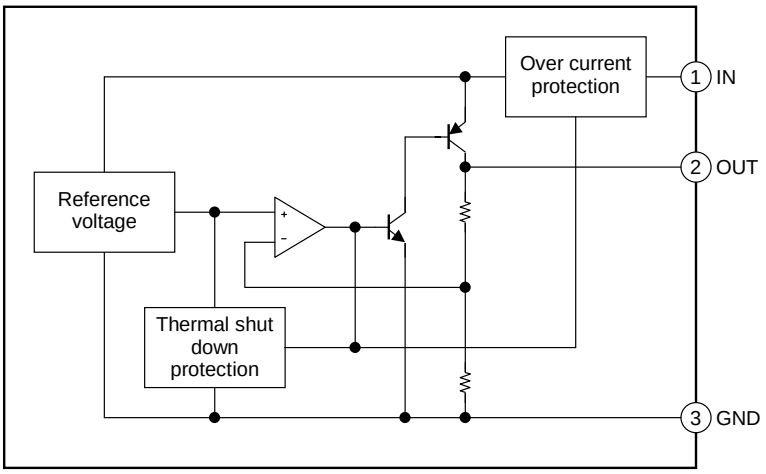


	Part No. (or abbreviation code)	Part No.
*1	AI	TA48L018F
	BI	TA48L02F
	CI	TA48L025F
	DI	TA48L03F
	EI	TA48L033F
	FI	TA48L05F

How to Order

Product No.	Package	Packing Type and Unit for Orders
TA48L**F	PW-MINI (SOT-89) Surface-mount package	On cut tape (TE12L): 100/tape section
TA48L**F (TE12L)		Embossed tape: 1000 pcs/tape

Block Diagram



Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Input voltage		V_{IN}	16	V
Output current		I_{OUT}	0.15	A
Operating temperature		T_{opr}	−40~85	°C
Junction temperature		T_j	150	°C
Storage temperature		T_{stg}	−55~150	°C
Power dissipation		P_D	0.5	W
Thermal resistance	(Junction to ambient)	$R_{th(j-a)}$	250	°C/W

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	—	0.27	—	A
Short circuit current	I_{SC}	$V_{IN} = V_{OUT} + 2$ V, $T_j = 25$°C	—	0.27	—	A

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

TA48L018F
Electrical Characteristics
(C_{IN} = 0.33 μF, C_{OUT} = 3.3 μF, T_j = 25°C, unless otherwise specified)

Characteristics	Symbol	Test Conditions	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	V_{IN} = 3.8 V, I_{OUT} = 40 mA	1.746	1.8	1.854	V
		2.8 V ≦ V_{IN} ≦ 12 V, 5 mA ≦ I_{OUT} ≦ 100 mA, 0°C ≦ T_j ≦ 125°C	1.71	1.8	1.89	
Line regulation	Reg · line	2.8 V ≦ V_{IN} ≦ 12 V, I_{OUT} = 40 mA	—	2	20	mV
Load regulation	Reg · load	V_{IN} = 3.8 V, 5 mA ≦ I_{OUT} ≦ 150 mA	—	18	40	mV
Quiescent current	I_B	2.8 V ≦ V_{IN} ≦ 12 V, I_{OUT} = 0 A	—	0.4	0.8	mA
		2.8 V ≦ V_{IN} ≦ 12 V, I_{OUT} = 100 mA	—	1	5	
Starting quiescent current	I_{Bstart}	V_{IN} = 2.1 V, I_{OUT} = 0 A	—	0.5	1.5	mA
		V_{IN} = 2.1 V, I_{OUT} = 100 mA	—	5	20	
Output noise voltage	V_{NO}	V_{IN} = 3.8 V, I_{OUT} = 40 mA, 10 Hz ≦ f ≦ 100 kHz	—	45	—	μVrms
Ripple rejection	R.R.	2.8 V ≦ V_{IN} ≦ 12 V, I_{OUT} = 40 mA, f = 120 Hz	54	72	—	dB
Dropout voltage	V_D	I_{OUT} = 40 mA	—	0.28	0.4	V
		I_{OUT} = 100 mA	—	0.32	0.5	
Average temperature coefficient of output voltage	T_{CVO}	V_{IN} = 3.8 V, I_{OUT} = 5 mA, 0°C ≦ T_j ≦ 125°C	—	0.3	—	mV/°C

TA48L02F
Electrical Characteristics
(C_{IN} = 0.33 μF, C_{OUT} = 3.3 μF, T_j = 25°C, unless otherwise specified)

Characteristics	Symbol	Test Conditions	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	V_{IN} = 4.0 V, I_{OUT} = 40 mA	1.94	2.0	2.06	V
		3.0 V ≦ V_{IN} ≦ 12 V, 5 mA ≦ I_{OUT} ≦ 100 mA, 0°C ≦ T_j ≦ 125°C	1.90	2.0	2.10	
Line regulation	Reg · line	3.0 V ≦ V_{IN} ≦ 12 V, I_{OUT} = 40 mA	—	2	20	mV
Load regulation	Reg · load	V_{IN} = 4.0 V, 5 mA ≦ I_{OUT} ≦ 150 mA	—	18	40	mV
Quiescent current	I_B	3.0 V ≦ V_{IN} ≦ 12 V, I_{OUT} = 0 A	—	0.4	0.8	mA
		3.0 V ≦ V_{IN} ≦ 12 V, I_{OUT} = 100 mA	—	1	5	
Starting quiescent current	I_{Bstart}	V_{IN} = 2.1 V, I_{OUT} = 0 A	—	0.5	1.5	mA
		V_{IN} = 2.1 V, I_{OUT} = 100 mA	—	5	20	
Output noise voltage	V_{NO}	V_{IN} = 4.0 V, I_{OUT} = 40 mA, 10 Hz ≦ f ≦ 100 kHz	—	55	—	μVrms
Ripple rejection	R.R.	3.0 V ≦ V_{IN} ≦ 12 V, I_{OUT} = 40 mA, f = 120 Hz	52	70	—	dB
Dropout voltage	V_D	I_{OUT} = 40 mA	—	0.2	0.35	V
		I_{OUT} = 100 mA	—	0.3	0.5	
Average temperature coefficient of output voltage	T_{CVO}	V_{IN} = 4.0 V, I_{OUT} = 5 mA, 0°C ≦ T_j ≦ 125°C	—	0.35	—	mV/°C

TA48L025F
Electrical Characteristics
(C_{IN} = 0.33 μF, C_{OUT} = 3.3 μF, T_j = 25°C, unless otherwise specified)

Characteristics	Symbol	Test Conditions	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	V_{IN} = 4.5 V, I_{OUT} = 40 mA	2.425	2.5	2.575	V
		3.5 V ≦ V_{IN} ≦ 12 V, 5 mA ≦ I_{OUT} ≦ 100 mA, 0°C ≦ T_j ≦ 125°C	2.375	2.5	2.625	
Line regulation	Reg · line	3.5 V ≦ V_{IN} ≦ 12 V, I_{OUT} = 40 mA	—	2	20	mV
Load regulation	Reg · load	V_{IN} = 4.5 V, 5 mA ≦ I_{OUT} ≦ 150 mA	—	18	40	mV
Quiescent current	I_B	3.5 V ≦ V_{IN} ≦ 12 V, I_{OUT} = 0 A	—	0.4	0.8	mA
		3.5 V ≦ V_{IN} ≦ 12 V, I_{OUT} = 100 mA	—	1	5	
Starting quiescent current	I_{Bstart}	V_{IN} = 2.4 V, I_{OUT} = 0 A	—	0.5	1.5	mA
		V_{IN} = 2.4 V, I_{OUT} = 100 mA	—	7	20	
Output noise voltage	V_{NO}	V_{IN} = 4.5 V, I_{OUT} = 40 mA, 10 Hz ≦ f ≦ 100 kHz	—	65	—	μVrms
Ripple rejection	R.R.	3.5 V ≦ V_{IN} ≦ 12 V, I_{OUT} = 40 mA, f = 120 Hz	52	70	—	dB
Dropout voltage	V_D	I_{OUT} = 40 mA	—	0.16	0.35	V
		I_{OUT} = 100 mA	—	0.27	0.5	
Average temperature coefficient of output voltage	T_{CVO}	V_{IN} = 4.5 V, I_{OUT} = 5 mA, 0°C ≦ T_j ≦ 125°C	—	0.45	—	mV/°C

TA48L03F
Electrical Characteristics
(C_{IN} = 0.33 μF, C_{OUT} = 3.3 μF, T_j = 25°C, unless otherwise specified)

Characteristics	Symbol	Test Conditions	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	V_{IN} = 5.0 V, I_{OUT} = 40 mA	2.91	3.0	3.09	V
		4.0 V ≦ V_{IN} ≦ 12 V, 5 mA ≦ I_{OUT} ≦ 100 mA, 0°C ≦ T_j ≦ 125°C	2.85	3.0	3.15	
Line regulation	Reg · line	4.0 V ≦ V_{IN} ≦ 12 V, I_{OUT} = 40 mA	—	2	20	mV
Load regulation	Reg · load	V_{IN} = 5.0 V, 5 mA ≦ I_{OUT} ≦ 150 mA	—	18	40	mV
Quiescent current	I_B	4.0 V ≦ V_{IN} ≦ 12 V, I_{OUT} = 0 A	—	0.4	0.8	mA
		4.0 V ≦ V_{IN} ≦ 12 V, I_{OUT} = 100 mA	—	1	5	
Starting quiescent current	I_{Bstart}	V_{IN} = 2.8 V, I_{OUT} = 0 A	—	0.5	1.5	mA
		V_{IN} = 2.8 V, I_{OUT} = 100 mA	—	7	20	
Output noise voltage	V_{NO}	V_{IN} = 5.0 V, I_{OUT} = 40 mA, 10 Hz ≦ f ≦ 100 kHz	—	80	—	μVrms
Ripple rejection	R.R.	4.0 V ≦ V_{IN} ≦ 12 V, I_{OUT} = 40 mA, f = 120 Hz	50	68	—	dB
Dropout voltage	V_D	I_{OUT} = 40 mA	—	0.16	0.35	V
		I_{OUT} = 100 mA	—	0.27	0.5	
Average temperature coefficient of output voltage	T_{CVO}	V_{IN} = 5 V, I_{OUT} = 5 mA, 0°C ≦ T_j ≦ 125°C	—	0.5	—	mV/°C

TA48L033F
Electrical Characteristics
(C_{IN} = 0.33 μF, C_{OUT} = 3.3 μF, T_j = 25°C, unless otherwise specified)

Characteristics	Symbol	Test Conditions	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	V_{IN} = 5.3 V, I_{OUT} = 40 mA	3.2	3.3	3.4	V
		4.3 V ≦ V_{IN} ≦ 12 V, 5 mA ≦ I_{OUT} ≦ 100 mA, 0°C ≦ T_j ≦ 125°C	3.135	3.3	3.465	
Line regulation	Reg · line	4.3 V ≦ V_{IN} ≦ 12 V, I_{OUT} = 40 mA	—	2	20	mV
Load regulation	Reg · load	V_{IN} = 5.3 V, 5 mA ≦ I_{OUT} ≦ 150 mA	—	18	40	mV
Quiescent current	I_B	4.3 V ≦ V_{IN} ≦ 12 V, I_{OUT} = 0 A	—	0.4	0.8	mA
		4.3 V ≦ V_{IN} ≦ 12 V, I_{OUT} = 100 mA	—	1	5	
Starting quiescent current	I_{Bstart}	V_{IN} = 3.0 V, I_{OUT} = 0 A	—	0.5	1.5	mA
		V_{IN} = 3.0 V, I_{OUT} = 100 mA	—	7	20	
Output noise voltage	V_{NO}	V_{IN} = 5.3 V, I_{OUT} = 40 mA, 10 Hz ≦ f ≦ 100 kHz	—	85	—	μVrms
Ripple rejection	R.R.	4.3 V ≦ V_{IN} ≦ 12 V, I_{OUT} = 40 mA, f = 120 Hz	50	68	—	dB
Dropout voltage	V_D	I_{OUT} = 40 mA	—	0.16	0.35	V
		I_{OUT} = 100 mA	—	0.27	0.5	
Average temperature coefficient of output voltage	T_{CVO}	V_{IN} = 5.3 V, I_{OUT} = 5 mA, 0°C ≦ T_j ≦ 125°C	—	0.55	—	mV/°C

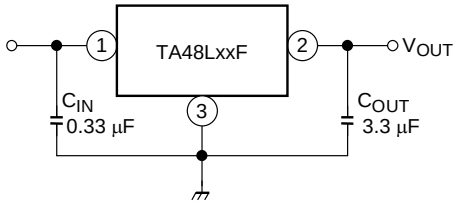
TA48L05F
Electrical Characteristics
(C_{IN} = 0.33 μF, C_{OUT} = 3.3 μF, T_j = 25°C, unless otherwise specified)

Characteristics	Symbol	Test Conditions	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	V_{IN} = 7.0 V, I_{OUT} = 40 mA	4.85	5.0	5.15	V
		6.0 V ≦ V_{IN} ≦ 12 V, 5 mA ≦ I_{OUT} ≦ 100 mA, 0°C ≦ T_j ≦ 125°C	4.75	5.0	5.25	
Line regulation	Reg · line	6.0 V ≦ V_{IN} ≦ 12 V, I_{OUT} = 40 mA	—	2	20	mV
Load regulation	Reg · load	V_{IN} = 7.0 V, 5 mA ≦ I_{OUT} ≦ 150 mA	—	18	45	mV
Quiescent current	I_B	6.0 V ≦ V_{IN} ≦ 12 V, I_{OUT} = 0 A	—	0.4	0.8	mA
		6.0 V ≦ V_{IN} ≦ 12 V, I_{OUT} = 100 mA	—	1	5	
Starting quiescent current	I_{Bstart}	V_{IN} = 4.5V,I_{OUT} = 0 A	—	0.5	1.5	mA
		V_{IN} = 4.5 V, I_{OUT} = 100 mA	—	7	20	
Output noise voltage	V_{NO}	V_{IN} = 7.0V, I_{OUT} = 40 mA, 10 Hz ≦ f ≦ 100 kHz	—	135	—	μVrms
Ripple rejection	R.R.	6.0 V ≦ V_{IN} ≦ 12 V, I_{OUT} = 40 mA, f = 120 Hz	50	64	—	dB
Dropout voltage	V_D	I_{OUT} = 40 mA	—	0.16	0.35	V
		I_{OUT} = 100 mA	—	0.27	0.5	
Average temperature coefficient of output voltage	T_{CVO}	V_{IN} = 7.0 V, I_{OUT} = 5 mA, 0°C ≦ T_j ≦ 125°C	—	0.85	—	mV/°C

Electrical Characteristics for All Products

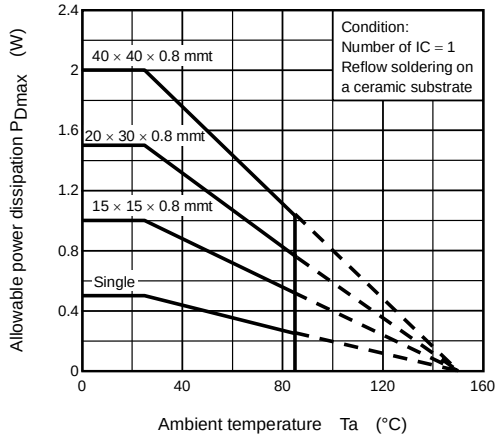
Generally, the characteristics of power supply ICs change according to temperature fluctuations.
The specification T_j = 25℃ is based on a state where temperature increase has no effect (assuming no fluctuation in the characteristics) as ascertained by pulse tests.

Standard Application Circuit

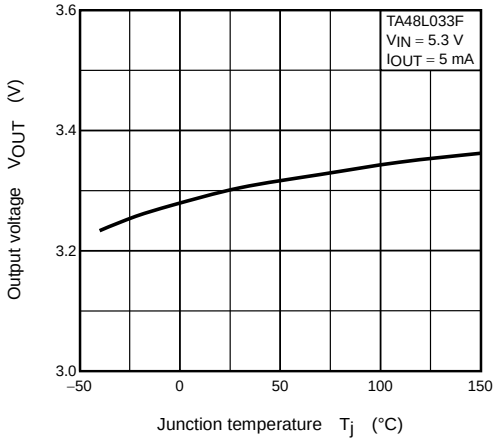


Be sure to connect a capacitor near the input terminal and output terminal between both terminals and GND.
The capacitances should be determined experimentally. In particular, adequate investigation should be made so that there is no problem even in high or low temperatures.

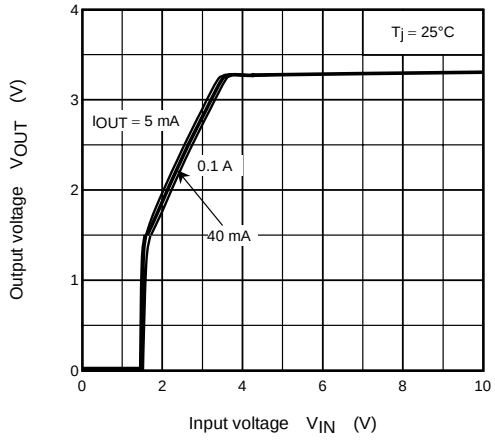
P_{Dmax} – Ta



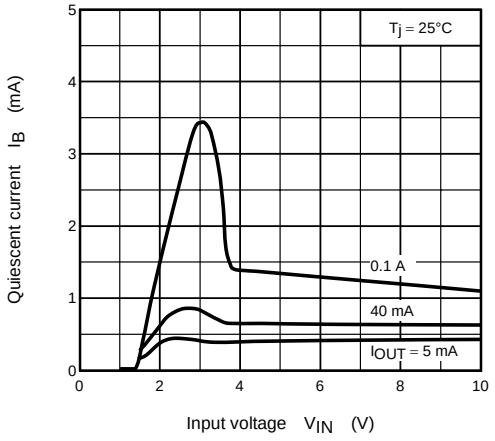
V_{OUT} – T_j



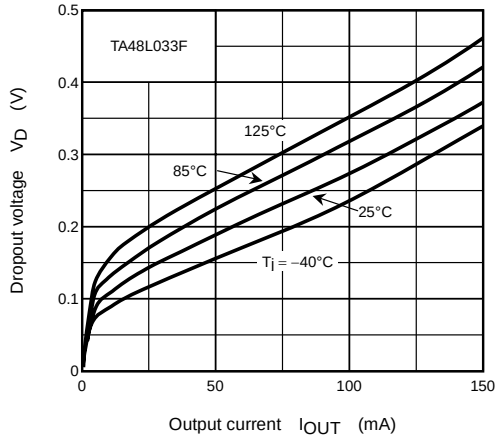
V_{OUT} – V_{IN}



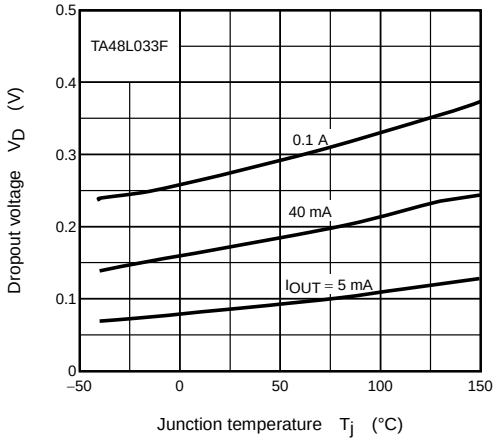
I_B – V_{IN}



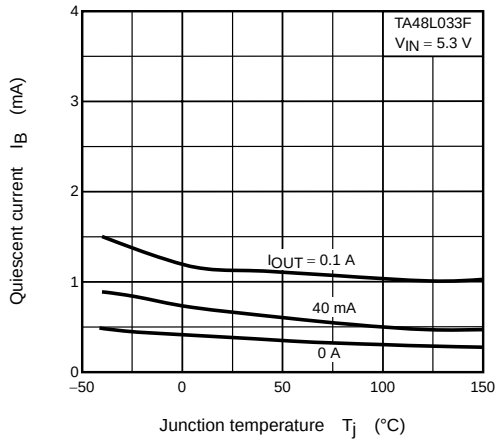
V_D – I_{OUT}



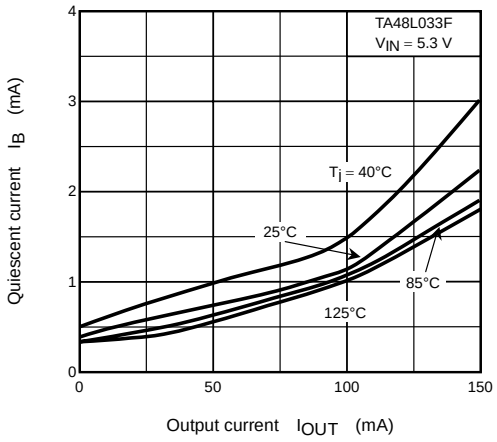
V_D – T_j



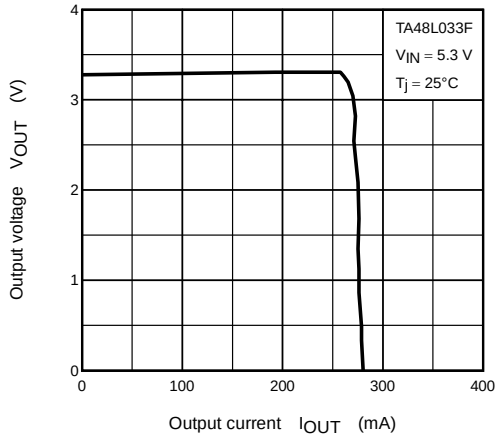
$I_B - T_j$



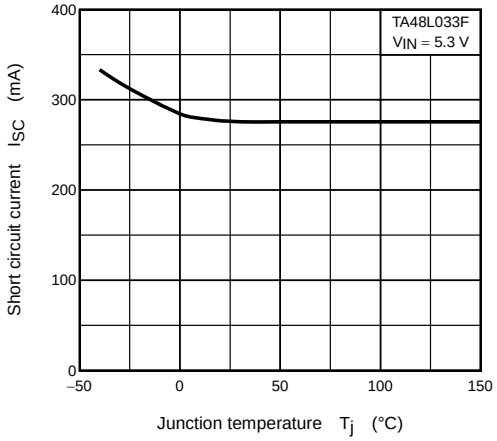
$I_B - I_{OUT}$



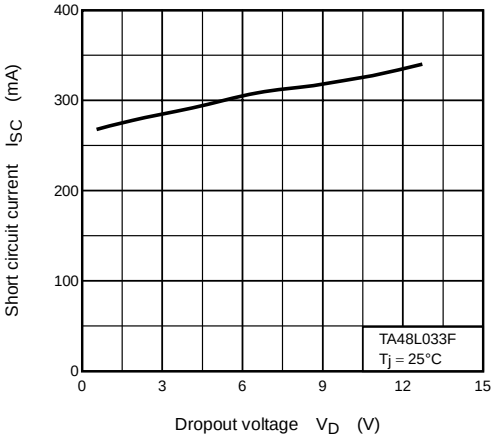
$V_{OUT} - I_{OUT}$



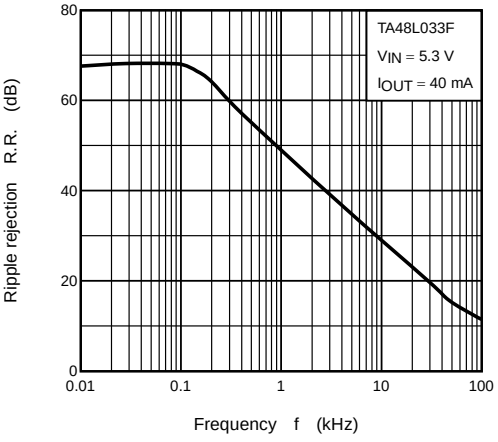
$I_{SC} - T_j$



$I_{SC} - V_D$

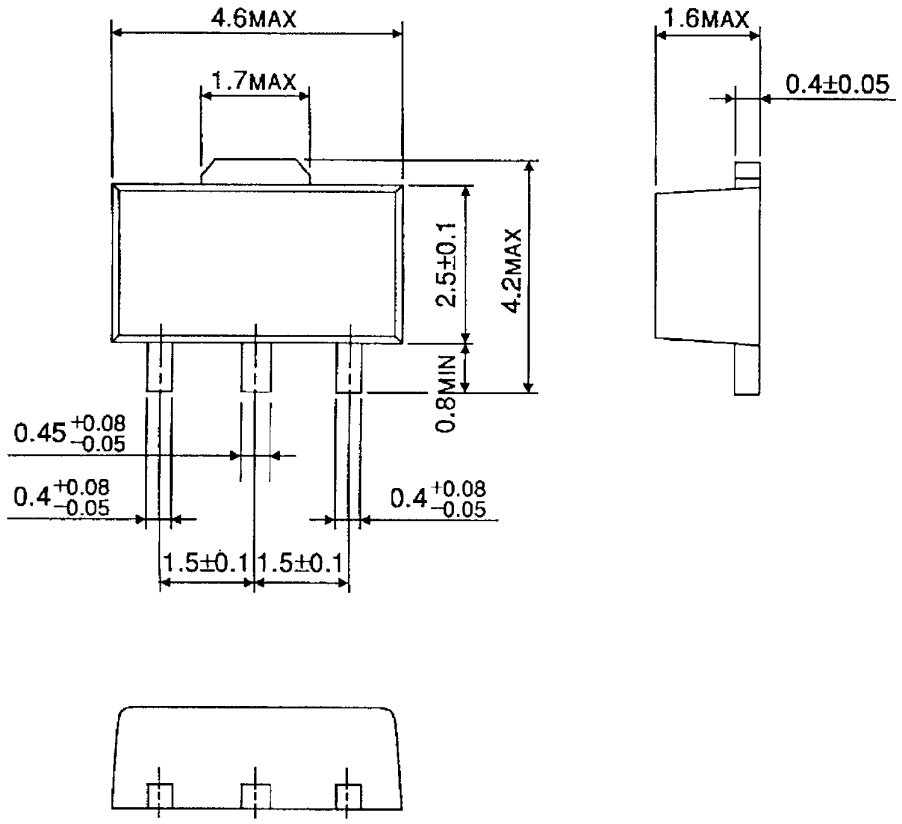


R.R. – f



Package Dimensions

HSOP3-P-1.50 Unit : mm



Weight: 0.05 g (typ.)

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