

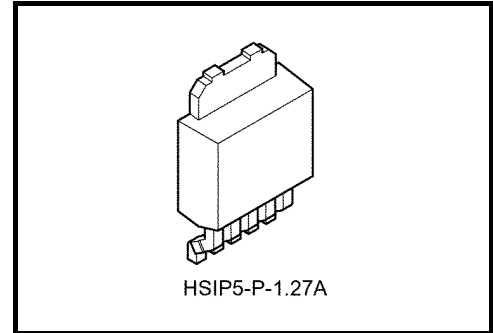
TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

TA48S018F, TA48S02F, TA48S025F, TA48S03F, TA48S033F, TA48S05F

1-A Output Current and Low Dropout Voltage Regulator with ON/OFF Control Switch

The TA48S**F series consists of small-surface mount type low-dropout regulators with an output current of 1 A (maximum) and an ON/OFF control switch. Control by an EN (ON/OFF) terminal enables the regulator to be operated only when required (output ON).

Therefore these newly developed regulators are suitable for use in the power supply circuits of AV, OA and other digital devices equipped with a stand-by function, and of battery-operated portable data devices of various types, where they will contribute to energy saving. Moreover, the regulators have an output voltage line-up starting from 1.8V, and which corresponds to the under-voltage of various devices.

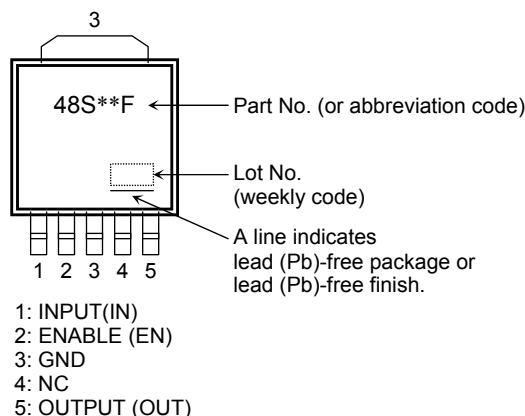


Weight: 0.29 g (typ.)

Features

- Built-in ON/OFF control function (active high)
- Maximum output current: 1 A
- Low output voltage: 1.8/2.0/2.5/3.0/3.3/5.0 V
- Output voltage accuracy: $V_{OUT} \pm 3\%$ (@ $T_j = 25^\circ\text{C}$)
- Low standby current: 800 μA (typ.) (@ $I_{OUT} = 0$ A)
- Low quiescent current (output OFF mode): 0.5 μA (typ.)
- Low-dropout voltage: 0.5 V (max) (@ $I_{OUT} = 0.5$ A)
- Protection function: Over current/over temperature/ASO
- Package type: Surface-mount 5-pin PW-MOLD

Pin Assignment



Note: The “**” in each product name is replaced with the output voltage of each product.

Pin Connections

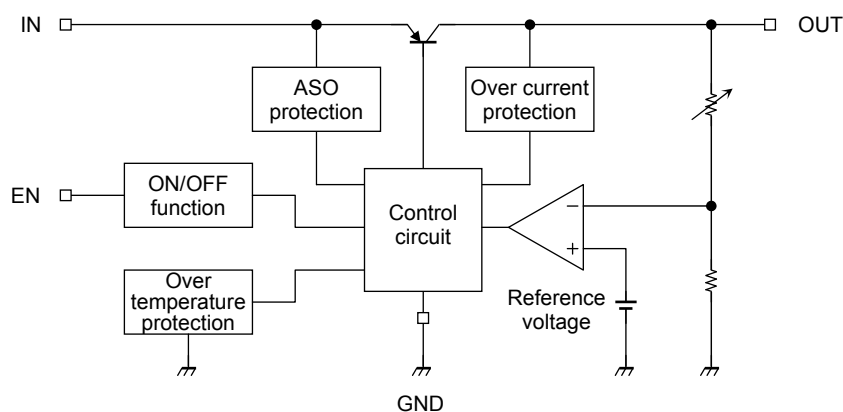
Pin No.	Symbol	Description
1	IN	Input terminal. Connected by capacitor (C_{IN}) to GND.
2	EN	Output ON/OFF control terminal Output is ON when this pin is set to "High", OFF when this pin is open or set to "Low"
3	GND	Ground terminal
4	NC	Non-connection
5	OUT	Output terminal. Connected by capacitor (C_{OUT}) to GND.

How to Order (Note 1)

Product No.	Package	Package Type and Capacity
TA48S**F (TE16L1)	PW-MOLD 5 Pin: Surface-mount	Tape (2000 pcs/reel)

Note 1: The "**" in each product number is replaced with the output voltage of each product.

Block Diagram



Absolute Maximum Rating (Ta = 25°C) (Note 2)

Characteristic	Symbol	Rating	Unit
Input voltage	V_{IN}	16	V
EN Input voltage	V_{EN}	16	V
Output current	I_{OUT}	1	A
Operating temperature	T_{opr}	-40~85	°C
Junction temperature	T_j	150	°C
Storage temperature	T_{stg}	-55~150	°C
Power dissipation	Ta = 25°C	P_D	W
	Tc= 25°C		
Thermal resistance	junction-ambient	$R_{th(j-a)}$	°C/W
	junction-case	$R_{th(j-c)}$	

Note 2: Do not apply current and voltage (including reverse polarity) to any pin that is not specified.

Note 3: 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 (Reference) (Note 3)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Over temperature	$T_{SD} (T_j)$	—	—	160	—	°C
Peak circuit current	I_{PEAK}	$V_{IN} = V_{OUT} + 2 V, T_j = 25^\circ C$	—	1.5	—	A
Short circuit current	I_{SC}	$V_{IN} = V_{OUT} + 2 V, T_j = 25^\circ C$	—	1.5	—	A

Note 4: Ensure that the devices operate within the limits of the maximum rating when in actual use.

TA48S018F

Electrical Characteristics

(Unless otherwise specified, $V_{EN} = 3.8 \text{ V}$, $C_{IN} = 0.33 \mu\text{F}$, $C_{OUT} = 10 \mu\text{F}$, $T_j = 25^\circ\text{C}$)

Characteristics	Symbol	Test Conditions	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	$V_{IN} = 3.8 \text{ V}$, $I_{OUT} = 0.5 \text{ A}$	1.746	1.8	1.854	V
		$2.8 \text{ V} \leq V_{IN} \leq 12 \text{ V}$, $5 \text{ mA} \leq I_{OUT} \leq 1 \text{ A}$, $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	1.72	1.8	1.88	
Line regulation	Reg·line	$2.8 \text{ V} \leq V_{IN} \leq 12 \text{ V}$, $I_{OUT} = 0.5 \text{ A}$	—	5	20	mV
Load regulation	Reg·load	$V_{IN} = 3.8 \text{ V}$, $5 \text{ mA} \leq I_{OUT} \leq 1 \text{ A}$	—	5	20	mV
Quiescent current	I_B	$2.8 \text{ V} \leq V_{IN} \leq 12 \text{ V}$, $I_{OUT} = 0 \text{ A}$	—	0.8	1.8	mA
		$2.8 \text{ V} \leq V_{IN} \leq 12 \text{ V}$, $I_{OUT} = 1 \text{ A}$	—	10	20	
Starting quiescent current	I_{Bstart}	$V_{IN} = 2.1 \text{ V}$, $I_{OUT} = 0 \text{ A}$	—	0.7	5	mA
		$V_{IN} = 2.5 \text{ V}$, $I_{OUT} = 1 \text{ A}$	—	10	30	
Output noise voltage	V_{NO}	$V_{IN} = 3.8 \text{ V}$, $I_{OUT} = 50 \text{ mA}$, $10 \text{ Hz} \leq f \leq 100 \text{ kHz}$	—	75	—	μVrms
Ripple rejection	R.R.	$2.8 \text{ V} \leq V_{IN} \leq 12 \text{ V}$, $I_{OUT} = 50 \text{ mA}$, $f = 120 \text{ Hz}$	53	65	—	dB
Dropout voltage	V_D	$I_{OUT} = 0.5 \text{ A}$	—	0.3	0.5	V
		$I_{OUT} = 1 \text{ A}$	—	0.5	—	
Quiescent current (OFF mode)	$I_{B(OFF)}$	$V_{EN} = 0.4 \text{ V}$, $2.8 \text{ V} \leq V_{IN} \leq 12 \text{ V}$	—	0.5	5	μA
Output control voltage (ON)	$V_{EN(ON)}$	$I_{OUT} = 0.1 \text{ A}$	2	—	—	V
Output control voltage (OFF)	$V_{EN(OFF)}$	—	—	—	0.8	V
Output control current (ON)	$I_{EN(ON)}$	$V_{IN} = V_{EN} = 3.8 \text{ V}$, $I_{OUT} = 0.1 \text{ A}$	—	20	100	μA
Output control current (OFF)	$I_{EN(OFF)}$	$V_{IN} = 3.8 \text{ V}$, $V_{EN} = 0 \text{ V}$	—	0.1	2	μA

TA48S02F

Electrical Characteristics

(Unless otherwise specified, $V_{EN} = 4.0 \text{ V}$, $C_{IN} = 0.33 \mu\text{F}$, $C_{OUT} = 10 \mu\text{F}$, $T_j = 25^\circ\text{C}$)

Characteristics	Symbol	Test Conditions	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	$V_{IN} = 4.0 \text{ V}$, $I_{OUT} = 0.5 \text{ A}$	1.94	2.0	2.06	V
		$3.0 \text{ V} \leq V_{IN} \leq 12 \text{ V}$, $5 \text{ mA} \leq I_{OUT} \leq 1 \text{ A}$, $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	1.91	2.0	2.09	
Line regulation	Reg·line	$3.0 \text{ V} \leq V_{IN} \leq 12 \text{ V}$, $I_{OUT} = 0.5 \text{ A}$	—	5	20	mV
Load regulation	Reg·load	$V_{IN} = 4.0 \text{ V}$, $5 \text{ mA} \leq I_{OUT} \leq 1 \text{ A}$	—	5	20	mV
Quiescent current	I_B	$3.0 \text{ V} \leq V_{IN} \leq 12 \text{ V}$, $I_{OUT} = 0 \text{ A}$	—	0.8	1.8	mA
		$3.0 \text{ V} \leq V_{IN} \leq 12 \text{ V}$, $I_{OUT} = 1 \text{ A}$	—	10	20	
Starting quiescent current	I_{Bstart}	$V_{IN} = 2.1 \text{ V}$, $I_{OUT} = 0 \text{ A}$	—	0.7	5	mA
		$V_{IN} = 2.6 \text{ V}$, $I_{OUT} = 1 \text{ A}$	—	10	30	
Output noise voltage	V_{NO}	$V_{IN} = 4.0 \text{ V}$, $I_{OUT} = 50 \text{ mA}$, $10 \text{ Hz} \leq f \leq 100 \text{ kHz}$	—	80	—	μVrms
Ripple rejection	R.R.	$3.0 \text{ V} \leq V_{IN} \leq 12 \text{ V}$, $I_{OUT} = 50 \text{ mA}$, $f = 120 \text{ Hz}$	52	65	—	dB
Dropout voltage	V_D	$I_{OUT} = 0.5 \text{ A}$	—	0.25	0.5	V
		$I_{OUT} = 1 \text{ A}$	—	0.4	—	
Quiescent current (OFF mode)	$I_{B(OFF)}$	$V_{EN} = 0.4 \text{ V}$, $3.0 \text{ V} \leq V_{IN} \leq 12 \text{ V}$	—	0.5	5	μA
Output control voltage (ON)	$V_{EN(ON)}$	$I_{OUT} = 0.1 \text{ A}$	2	—	—	V
Output control voltage (OFF)	$V_{EN(OFF)}$	—	—	—	0.8	V
Output control current (ON)	$I_{EN(ON)}$	$V_{IN} = V_{EN} = 4.0 \text{ V}$, $I_{OUT} = 0.1 \text{ A}$	—	25	100	μA
Output control current (OFF)	$I_{EN(OFF)}$	$V_{IN} = 4.0 \text{ V}$, $V_{EN} = 0 \text{ V}$	—	0.1	2	μA

TA48S025F

Electrical Characteristics

(Unless otherwise specified, $V_{EN} = 4.5\text{ V}$, $C_{IN} = 0.33\ \mu\text{F}$, $C_{OUT} = 10\ \mu\text{F}$, $T_j = 25^\circ\text{C}$)

Characteristics	Symbol	Test Conditions	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	$V_{IN} = 4.5\text{ V}$, $I_{OUT} = 0.5\text{ A}$	2.425	2.5	2.575	V
		$3.5\text{ V} \leq V_{IN} \leq 12\text{ V}$, $5\text{ mA} \leq I_{OUT} \leq 1\text{ A}$, $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	2.388	2.5	2.612	
Line regulation	Reg·line	$3.5\text{ V} \leq V_{IN} \leq 12\text{ V}$, $I_{OUT} = 0.5\text{ A}$	—	5	20	mV
Load regulation	Reg·load	$V_{IN} = 4.5\text{ V}$, $5\text{ mA} \leq I_{OUT} \leq 1\text{ A}$	—	5	20	mV
Quiescent current	I_B	$3.5\text{ V} \leq V_{IN} \leq 12\text{ V}$, $I_{OUT} = 0\text{ A}$	—	0.8	1.8	mA
		$3.5\text{ V} \leq V_{IN} \leq 12\text{ V}$, $I_{OUT} = 1\text{ A}$	—	10	20	
Starting quiescent current	I_{Bstart}	$V_{IN} = 2.1\text{ V}$, $I_{OUT} = 0\text{ A}$	—	0.9	5	mA
		$V_{IN} = 2.7\text{ V}$, $I_{OUT} = 1\text{ A}$	—	12	30	
Output noise voltage	V_{NO}	$V_{IN} = 4.5\text{ V}$, $I_{OUT} = 50\text{ mA}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$	—	95	—	μVrms
Ripple rejection	R.R.	$3.5\text{ V} \leq V_{IN} \leq 12\text{ V}$, $I_{OUT} = 50\text{ mA}$, $f = 120\text{ Hz}$	52	64	—	dB
Dropout voltage	V_D	$I_{OUT} = 0.5\text{ A}$	—	0.2	0.5	V
		$I_{OUT} = 1\text{ A}$	—	0.3	—	
Quiescent current (OFF mode)	$I_{B(OFF)}$	$V_{EN} = 0.4\text{ V}$, $3.5\text{ V} \leq V_{IN} \leq 12\text{ V}$	—	0.5	5	μA
Output control voltage (ON)	$V_{EN(ON)}$	$I_{OUT} = 0.1\text{ A}$	2	—	—	V
Output control voltage (OFF)	$V_{EN(OFF)}$	—	—	—	0.8	V
Output control current (ON)	$I_{EN(ON)}$	$V_{IN} = V_{EN} = 4.5\text{ V}$, $I_{OUT} = 0.1\text{ A}$	—	30	100	μA
Output control current (OFF)	$I_{EN(OFF)}$	$V_{IN} = 4.5\text{ V}$, $V_{EN} = 0\text{ V}$	—	0.1	2	μA

TA48S03F

Electrical Characteristics

(Unless otherwise specified, $V_{EN} = 5.0\text{ V}$, $C_{IN} = 0.33\ \mu\text{F}$, $C_{OUT} = 10\ \mu\text{F}$, $T_j = 25^\circ\text{C}$)

Characteristics	Symbol	Test Conditions	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	$V_{IN} = 5.0\text{ V}$, $I_{OUT} = 0.5\text{ A}$	2.91	3.0	3.09	V
		$4.0\text{ V} \leq V_{IN} \leq 12\text{ V}$, $5\text{ mA} \leq I_{OUT} \leq 1\text{ A}$, $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	2.865	3.0	3.135	
Line regulation	Reg·line	$4.0\text{ V} \leq V_{IN} \leq 12\text{ V}$, $I_{OUT} = 0.5\text{ A}$	—	5	20	mV
Load regulation	Reg·load	$V_{IN} = 5.0\text{ V}$, $5\text{ mA} \leq I_{OUT} \leq 1\text{ A}$	—	5	20	mV
Quiescent current	I_B	$4.0\text{ V} \leq V_{IN} \leq 12\text{ V}$, $I_{OUT} = 0\text{ A}$	—	0.8	1.8	mA
		$4.0\text{ V} \leq V_{IN} \leq 12\text{ V}$, $I_{OUT} = 1\text{ A}$	—	10	20	
Starting quiescent current	I_{Bstart}	$V_{IN} = 2.1\text{ V}$, $I_{OUT} = 0\text{ A}$	—	1.1	5	mA
		$V_{IN} = 2.8\text{ V}$, $I_{OUT} = 1\text{ A}$	—	13	30	
Output noise voltage	V_{NO}	$V_{IN} = 5.0\text{ V}$, $I_{OUT} = 50\text{ mA}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$	—	110	—	μVrms
Ripple rejection	R.R.	$4.0\text{ V} \leq V_{IN} \leq 12\text{ V}$, $I_{OUT} = 50\text{ mA}$, $f = 120\text{ Hz}$	50	63	—	dB
Dropout voltage	V_D	$I_{OUT} = 0.5\text{ A}$	—	0.2	0.5	V
		$I_{OUT} = 1\text{ A}$	—	0.3	—	
Quiescent current (OFF mode)	$I_{B(OFF)}$	$V_{EN} = 0.4\text{ V}$, $4.0\text{ V} \leq V_{IN} \leq 12\text{ V}$	—	0.5	5	μA
Output control voltage (ON)	$V_{EN(ON)}$	$I_{OUT} = 0.1\text{ A}$	2	—	—	V
Output control voltage (OFF)	$V_{EN(OFF)}$	—	—	—	0.8	V
Output control current (ON)	$I_{EN(ON)}$	$V_{IN} = V_{EN} = 5.0\text{ V}$, $I_{OUT} = 0.1\text{ A}$	—	35	100	μA
Output control current (OFF)	$I_{EN(OFF)}$	$V_{IN} = 5.0\text{ V}$, $V_{EN} = 0\text{ V}$	—	0.1	2	μA

TA48S033F

Electrical Characteristics

(Unless otherwise specified, $V_{EN} = 5.3 \text{ V}$, $C_{IN} = 0.33 \mu\text{F}$, $C_{OUT} = 10 \mu\text{F}$, $T_j = 25^\circ\text{C}$)

Characteristics	Symbol	Test Conditions	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	$V_{IN} = 5.3 \text{ V}$, $I_{OUT} = 0.5 \text{ A}$	3.2	3.3	3.4	V
		$4.3 \text{ V} \leq V_{IN} \leq 12 \text{ V}$, $5 \text{ mA} \leq I_{OUT} \leq 1 \text{ A}$, $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	3.152	3.3	3.448	
Line regulation	Reg·line	$4.3 \text{ V} \leq V_{IN} \leq 12 \text{ V}$, $I_{OUT} = 0.5 \text{ A}$	—	5	20	mV
Load regulation	Reg·load	$V_{IN} = 5.3 \text{ V}$, $5 \text{ mA} \leq I_{OUT} \leq 1 \text{ A}$	—	5	20	mV
Quiescent current	I_B	$4.3 \text{ V} \leq V_{IN} \leq 12 \text{ V}$, $I_{OUT} = 0 \text{ A}$	—	0.8	1.8	mA
		$4.3 \text{ V} \leq V_{IN} \leq 12 \text{ V}$, $I_{OUT} = 1 \text{ A}$	—	10	20	
Starting quiescent current	I_{Bstart}	$V_{IN} = 2.1 \text{ V}$, $I_{OUT} = 0 \text{ A}$	—	1.1	5	mA
		$V_{IN} = 2.9 \text{ V}$, $I_{OUT} = 1 \text{ A}$	—	13	30	
Output noise voltage	V_{NO}	$V_{IN} = 5.3 \text{ V}$, $I_{OUT} = 50 \text{ mA}$, $10 \text{ Hz} \leq f \leq 100 \text{ kHz}$	—	115	—	μVrms
Ripple rejection	R.R.	$4.3 \text{ V} \leq V_{IN} \leq 12 \text{ V}$, $I_{OUT} = 50 \text{ mA}$, $f = 120 \text{ Hz}$	48	61	—	dB
Dropout voltage	V_D	$I_{OUT} = 0.5 \text{ A}$	—	0.2	0.5	V
		$I_{OUT} = 1 \text{ A}$	—	0.3	—	
Quiescent current (OFF mode)	$I_{B(OFF)}$	$V_{EN} = 0.4 \text{ V}$, $4.3 \text{ V} \leq V_{IN} \leq 12 \text{ V}$	—	0.5	5	μA
Output control voltage (ON)	$V_{EN(ON)}$	$I_{OUT} = 0.1 \text{ A}$	2	—	—	V
Output control voltage (OFF)	$V_{EN(OFF)}$	—	—	—	0.8	V
Output control current (ON)	$I_{EN(ON)}$	$V_{IN} = V_{EN} = 5.3 \text{ V}$, $I_{OUT} = 0.1 \text{ A}$	—	35	100	μA
Output control current (OFF)	$I_{EN(OFF)}$	$V_{IN} = 5.3 \text{ V}$, $V_{EN} = 0 \text{ V}$	—	0.1	2	μA

TA48S05F

Electrical Characteristics

(Unless otherwise specified, $V_{EN} = 7.0 \text{ V}$, $C_{IN} = 0.33 \mu\text{F}$, $C_{OUT} = 10 \mu\text{F}$, $T_j = 25^\circ\text{C}$)

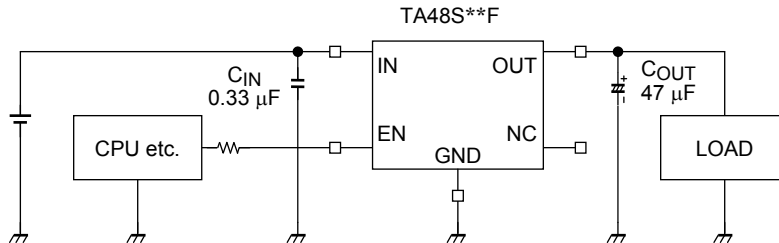
Characteristics	Symbol	Test Conditions	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	$V_{IN} = 7 \text{ V}$, $I_{OUT} = 0.5 \text{ A}$	4.85	5.0	5.15	V
		$6.0 \text{ V} \leq V_{IN} \leq 12 \text{ V}$, $5 \text{ mA} \leq I_{OUT} \leq 1 \text{ A}$, $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	4.775	5.0	5.225	
Line regulation	Reg·line	$6.0 \text{ V} \leq V_{IN} \leq 12 \text{ V}$, $I_{OUT} = 0.5 \text{ A}$	—	5	20	mV
Load regulation	Reg·load	$V_{IN} = 7.0 \text{ V}$, $5 \text{ mA} \leq I_{OUT} \leq 1 \text{ A}$	—	5	30	mV
Quiescent current	I_B	$6.0 \text{ V} \leq V_{IN} \leq 12 \text{ V}$, $I_{OUT} = 0 \text{ A}$	—	0.8	1.8	mA
		$6.0 \text{ V} \leq V_{IN} \leq 12 \text{ V}$, $I_{OUT} = 1 \text{ A}$	—	10	20	
Starting quiescent current	I_{Bstart}	$V_{IN} = 2.1 \text{ V}$, $I_{OUT} = 0 \text{ A}$	—	1.3	5	mA
		$V_{IN} = 3.0 \text{ V}$, $I_{OUT} = 1 \text{ A}$	—	14	30	
Output noise voltage	V_{NO}	$V_{IN} = 7.0 \text{ V}$, $I_{OUT} = 50 \text{ mA}$, $10 \text{ Hz} \leq f \leq 100 \text{ kHz}$	—	150	—	μVrms
Ripple rejection	R.R.	$6.0 \text{ V} \leq V_{IN} \leq 12 \text{ V}$, $I_{OUT} = 50 \text{ mA}$, $f = 120 \text{ Hz}$	48	60	—	dB
Dropout voltage	V_D	$I_{OUT} = 0.5 \text{ A}$	—	0.2	0.5	V
		$I_{OUT} = 1 \text{ A}$	—	0.3	—	
Quiescent current (OFF mode)	$I_{B(OFF)}$	$V_{EN} = 0.4 \text{ V}$, $6.0 \text{ V} \leq V_{IN} \leq 12 \text{ V}$	—	0.5	5	μA
Output control voltage (ON)	$V_{EN(ON)}$	$I_{OUT} = 0.1 \text{ A}$	2	—	—	V
Output control voltage (OFF)	$V_{EN(OFF)}$	—	—	—	0.8	V
Output control current (ON)	$I_{EN(ON)}$	$V_{IN} = V_{EN} = 7.0 \text{ V}$, $I_{OUT} = 0.1 \text{ A}$	—	50	100	μA
Output control current (OFF)	$I_{EN(OFF)}$	$V_{IN} = 7.0 \text{ V}$, $V_{EN} = 0 \text{ V}$	—	0.1	2	μA

Precaution on Application

$T_j = 25^\circ\text{C}$ in the measurement conditions of each item is a regulation for where a pulse test is carried out and any drift in the electrical characteristic due to a rise in the junction temperature of the chip may be disregarded.

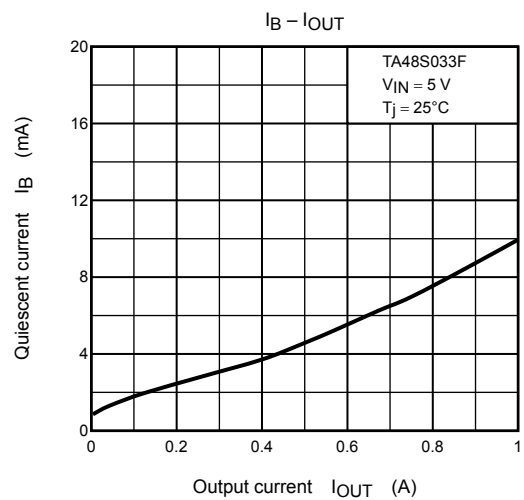
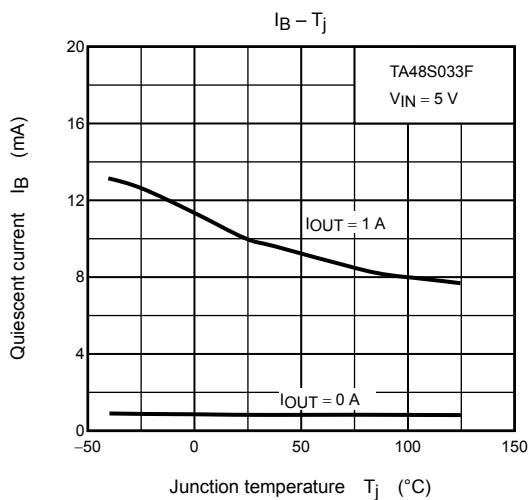
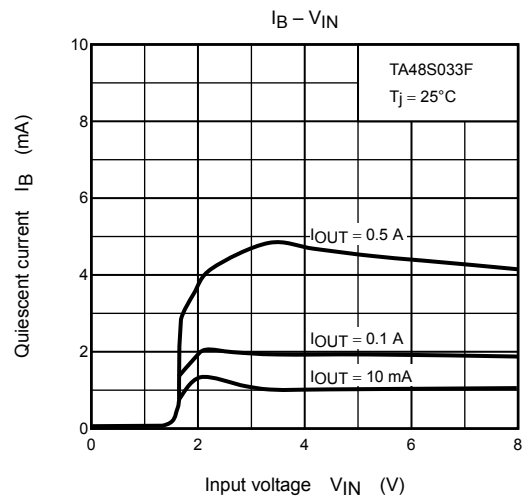
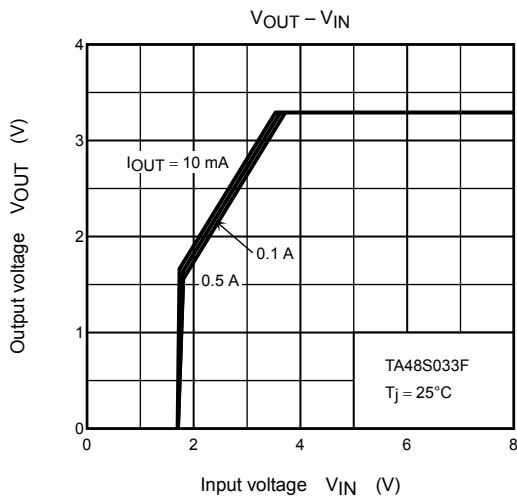
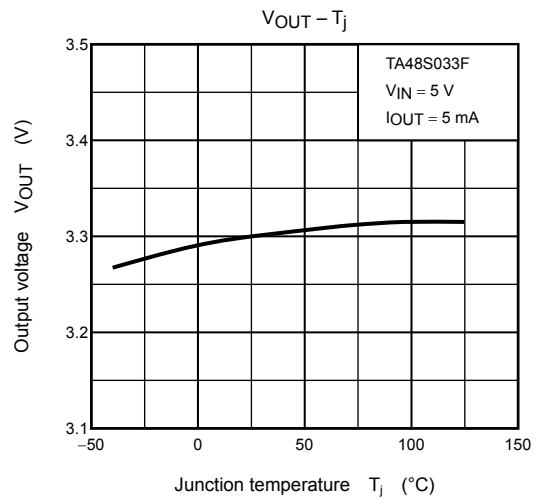
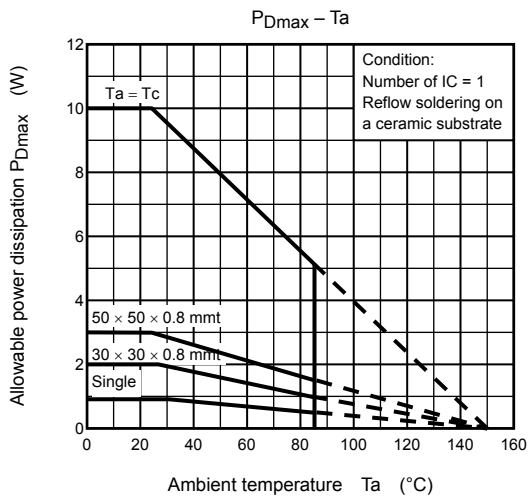
Depending on the load conditions, a steep increase in the input voltage applied (V_{IN}) may cause a momentary rise in output voltage (V_{OUT}) even if the EN (enable) pin is Low. Treat with care.

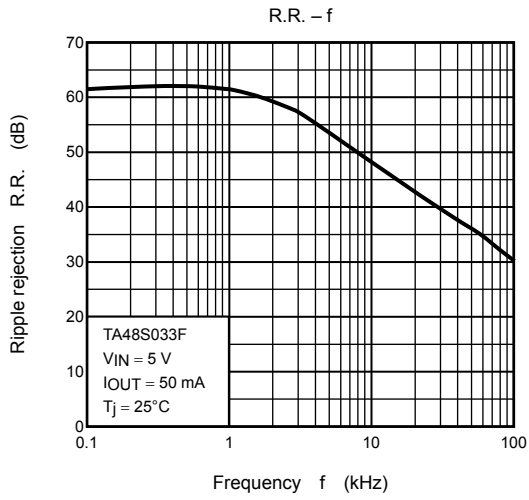
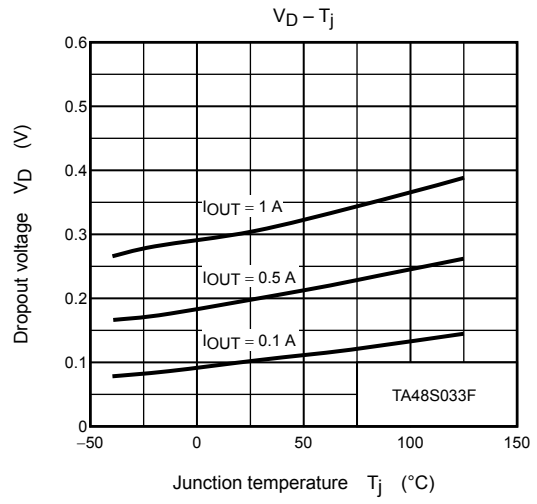
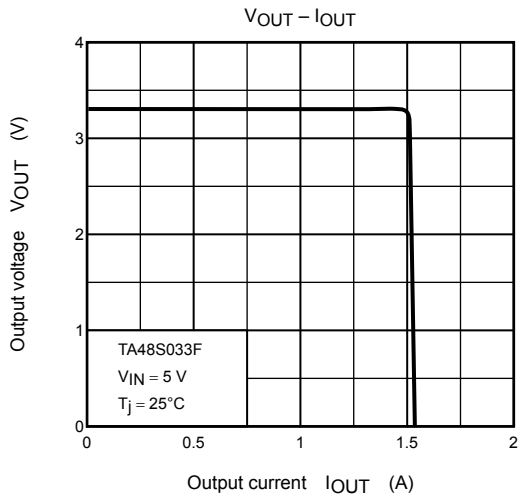
Standard Application Circuit



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 to ensure there are no problems even in high or low temperatures.

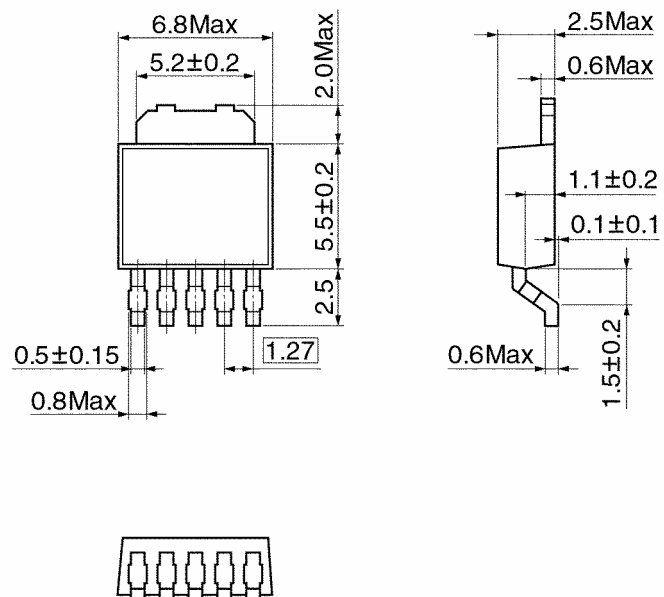




Package Dimensions

HSIP5-P-1.27A

Unit: mm



Weight: 0.29 g (typ.)

RESTRICTIONS ON PRODUCT USE

20070701-EN

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