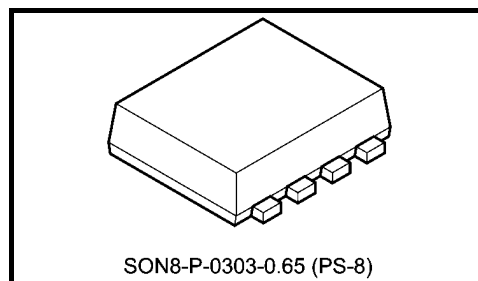


TA48LS015F,TA48LS018F,TA48LS025F,TA48LS033F,TA48LS05F**300 mA Output Current and Low Dropout Voltage Regulator with ON/OFF Control Switch**

The TA48LS***F series consists of small-surface mount type low-dropout regulators with an output current of 300 mA (Max) 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 1.5 V, corresponding to the lower voltage of various devices.



Weight: 0.017 g (typ.)

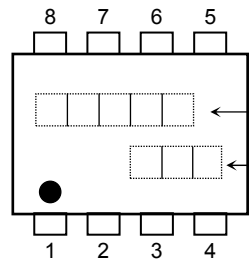
Features

- Built-in ON/OFF control function (active high)
- Maximum output current : 300 mA
- Low output voltage : 1.5 / 1.8 / 2.5 / 3.3 / 5.0 V
- Output voltage accuracy : $V_{OUT} \pm 2.5\%$ (@ $T_j = 25^\circ\text{C}$)
- Low quiescent current : 1 mA (Typ.) (@ $I_{OUT} = 0\text{ A}$)
- Low standby current (output OFF mode): 0.2 μA (Typ.)
- Low-dropout voltage : 0.5 V (Max) (@ $V_{OUT} \geq 1.8\text{ V}$, $I_{OUT} = 150\text{ mA}$)
- Protection function : Overcurrent / Thermal shutdown
- Package type : PS-8

The product(s) in this document (“Product”) contain functions intended to protect the Product from temporary small overloads such as minor short-term overcurrent or overheating. The protective functions do not necessarily protect Product under all circumstances. When incorporating Product into your system, please design the system (1) to avoid such overloads upon the Product, and (2) to shut down or otherwise relieve the Product of such overload conditions immediately upon occurrence. For details, please refer to the notes appearing below in this document and other documents referenced in this document.

Marking / Pin Assignment

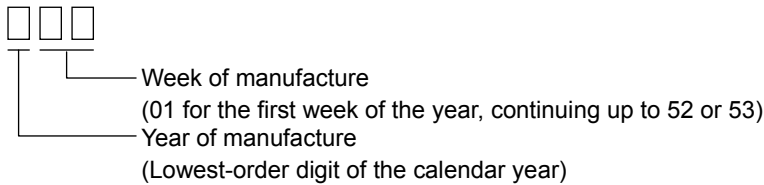
Part No.	Part No. (abbreviation code)
TA48LS015F	LS015
TA48LS018F	LS018
TA48LS025F	LS025
TA48LS033F	LS033
TA48LS05F	LS05



- 1 : N.C.
- 2 to 4 : GND
- 5 : IN
- 6 : EN
- 7 : N.C.
- 8 : OUT

(●) on the lower left of the marking indicates Pin 1.

* Lot No.: The lot no. consists of three digits. The first digit represents the last digit of the year of manufacture, and the following two digits indicates the week of manufacture between 01 and either 52 or 53.



Pin Description

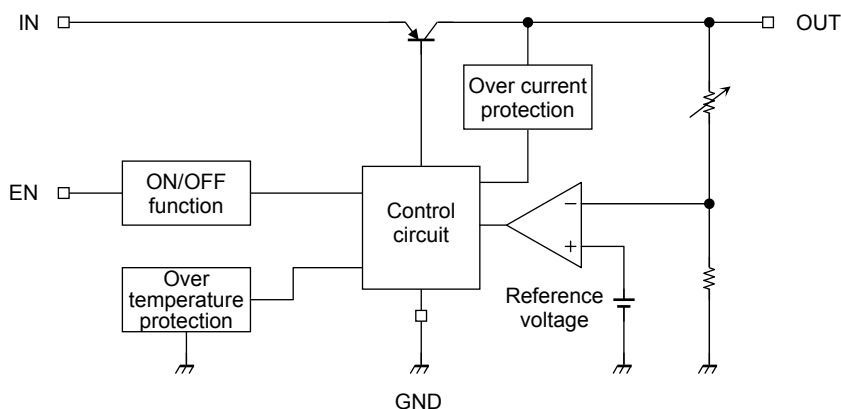
Pin No.	Symbol	Description
1	N.C.	Non-connection
2 to 4	GND	Ground terminal
5	IN	Input terminal. Connected by capacitor (C_{IN}) to GND.
6	EN	Output ON/OFF control terminal. Output is ON when this pin is set to "High", OFF when this pin is open or set to "Low".
7	N.C.	Non-connection
8	OUT	Output terminal.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

How to Order

Part No.	Package Type and Capacity
TA48LS***F(TE85L, F)	Tape (3000 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)

Characteristic	Symbol	Rating	Unit
Input voltage	V _{IN}	14	V
EN Input voltage	V _{EN}	14	V
Output current	I _{OUT}	300	mA
Operating junction temperature	T _{jopr}	-40 to 150	°C
Junction temperature	T _j	150	°C
Storage temperature	T _{stg}	-55 to 150	°C
Power dissipation(Note 4)	Ta = 25°C P _D	1.2	W

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

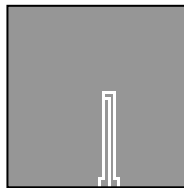
Note 3: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) 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).

Thermal Characteristics

Characteristic	Symbol	Max	Unit
Thermal resistance, junction to ambient	R _{th(j-a)}	102	°C/W

Note 4: Glass epoxy board



Material: FR-4
25.4 × 25.4 × 1.6
Unit: (mm)
Cu base thickness: 35 μm

Operating Input Voltage Range

Characteristic	Symbol	Min	Typ.	Max	Unit	
Input voltage	V _{OUT} ≤ 1.8V	V _{IN}	2.5(Note5)	—	14.0	V
	V _{OUT} ≥ 2.5V		V _{OUT} + V _D	—	14.0	

Note 5: This is the voltage at which the IC begins operating. V_D must be considered when determining the best input voltage for the application.

Protection Function (Reference)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Thermal shutdown	T _{SD}	V _{IN} = 2.5 V (015F) / 2.8 V (018F) / 3.5 V (025F) / 4.3 V (033F) / 6.0 V (05F)	150	170	—	°C
Thermal shutdown hysteresis width	T _{SD(hys)}		—	15	—	°C
Peak circuit current	I _{PEAK}	V _{IN} = V _{OUT} + 2 V, T _j = 25°C	300	500	—	mA
		V _{IN} = V _{OUT} + 5 V, T _j = 25°C	300	500	—	
Short circuit current	I _{SC}	V _{IN} = V _{OUT} + 2 V, T _j = 25°C	—	300	—	mA
		V _{IN} = 14V, T _j = 25°C	—	300	—	

Note 6: Protection features do not guarantee that the device will be kept below the absolute maximum rated conditions. Ensure that the devices operate within the limits of the maximum rating when in actual use.

TA48LS015F

Electrical Characteristics

(Unless otherwise specified, $V_{EN} = V_{IN}$, $C_{IN} = 0.33 \mu\text{F}$, $C_{OUT} = 1 \mu\text{F}$, $T_j = 25^\circ\text{C}$)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	$V_{IN} = 3.5 \text{ V}$, $I_{OUT} = 150 \text{ mA}$	1.462	1.500	1.538	V
Line regulation	Reg·line	$2.5 \text{ V} \leq V_{IN} \leq 6.5 \text{ V}$, $I_{OUT} = 150 \text{ mA}$	—	1	20	mV
Load regulation	Reg·load	$V_{IN} = 3.5 \text{ V}$, $5 \text{ mA} \leq I_{OUT} \leq 300 \text{ mA}$	—	2	20	mV
Quiescent current	I_B	$2.5 \text{ V} \leq V_{IN} \leq 6.5 \text{ V}$, $I_{OUT} = 0 \text{ A}$	—	1.0	1.7	mA
		$2.5 \text{ V} \leq V_{IN} \leq 6.5 \text{ V}$, $I_{OUT} = 300 \text{ mA}$	—	5	10	
Quiescent current (OFF mode)	$I_{B(OFF)}$	$2.5 \text{ V} \leq V_{IN} \leq 6.5 \text{ V}$, $V_{EN} = 0.4 \text{ V}$	—	0.2	5.0	μA
Starting quiescent current	I_{Bstart}	$V_{IN} = 2.1 \text{ V}$, $I_{OUT} = 0 \text{ A}$	—	1.00	2.3	mA
		$V_{IN} = 2.2 \text{ V}$, $I_{OUT} = 300 \text{ mA}$	—	5.3	18.0	
Output noise voltage	V_{NO}	$V_{IN} = 3.5 \text{ V}$, $I_{OUT} = 50 \text{ mA}$, $10 \text{ Hz} \leq f \leq 100 \text{ kHz}$	—	45	—	μV_{rms}
Ripple rejection	R.R.	$V_{IN} = 3.5 \text{ V}$, $I_{OUT} = 50 \text{ mA}$, $f = 120 \text{ Hz}$	—	75	—	dB
Dropout voltage	V_D	$I_{OUT} = 150 \text{ mA}$	—	0.5	0.7	V
		$I_{OUT} = 300 \text{ mA}$	—	0.7	1.0	
Output control voltage (ON)	$V_{EN(ON)}$	—	2	—	—	V
Output control voltage (OFF)	$V_{EN(OFF)}$	—	—	—	0.8	V
Output control current (ON)	$I_{EN(ON)}$	$V_{IN} = V_{EN} = 3.5 \text{ V}$	—	32	50	μA
Average temperature coefficient of output voltage	T_{CVO}	$V_{IN} = 3.5 \text{ V}$, $I_{OUT} = 5 \text{ mA}$, $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	—	0.14	—	$\text{mV}/^\circ\text{C}$

TA48LS018F

Electrical Characteristics

(Unless otherwise specified, $V_{EN} = V_{IN}$, $C_{IN} = 0.33 \mu\text{F}$, $C_{OUT} = 1 \mu\text{F}$, $T_j = 25^\circ\text{C}$)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	$V_{IN} = 3.8 \text{ V}$, $I_{OUT} = 150 \text{ mA}$	1.755	1.800	1.845	V
Line regulation	Reg·line	$2.8 \text{ V} \leq V_{IN} \leq 6.8 \text{ V}$, $I_{OUT} = 150 \text{ mA}$	—	1	20	mV
Load regulation	Reg·load	$V_{IN} = 3.8 \text{ V}$, $5 \text{ mA} \leq I_{OUT} \leq 300 \text{ mA}$	—	2	20	mV
Quiescent current	I_B	$2.8 \text{ V} \leq V_{IN} \leq 6.8 \text{ V}$, $I_{OUT} = 0 \text{ A}$	—	1.0	1.7	mA
		$2.8 \text{ V} \leq V_{IN} \leq 6.8 \text{ V}$, $I_{OUT} = 300 \text{ mA}$	—	5	10	
Quiescent current (OFF mode)	$I_{B(OFF)}$	$2.8 \text{ V} \leq V_{IN} \leq 6.8 \text{ V}$, $V_{EN} = 0.4 \text{ V}$	—	0.2	5.0	μA
Starting quiescent current	I_{Bstart}	$V_{IN} = 2.1 \text{ V}$, $I_{OUT} = 0 \text{ A}$	—	1.00	2.3	mA
		$V_{IN} = 2.3 \text{ V}$, $I_{OUT} = 300 \text{ mA}$	—	5.6	18.0	
Output noise voltage	V_{NO}	$V_{IN} = 3.8 \text{ V}$, $I_{OUT} = 50 \text{ mA}$, $10 \text{ Hz} \leq f \leq 100 \text{ kHz}$	—	45	—	μV_{rms}
Ripple rejection	R.R.	$V_{IN} = 3.8 \text{ V}$, $I_{OUT} = 50 \text{ mA}$, $f = 120 \text{ Hz}$	—	75	—	dB
Dropout voltage	V_D	$I_{OUT} = 150 \text{ mA}$	—	0.23	0.50	V
		$I_{OUT} = 300 \text{ mA}$	—	0.5	0.7	
Output control voltage (ON)	$V_{EN(ON)}$	—	2	—	—	V
Output control voltage (OFF)	$V_{EN(OFF)}$	—	—	—	0.8	V
Output control current (ON)	$I_{EN(ON)}$	$V_{IN} = V_{EN} = 3.8 \text{ V}$	—	35	55	μA
Average temperature coefficient of output voltage	T_{CVO}	$V_{IN} = 3.8 \text{ V}$, $I_{OUT} = 5 \text{ mA}$, $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	—	0.15	—	$\text{mV}/^\circ\text{C}$

TA48LS025F

Electrical Characteristics

(Unless otherwise specified, $V_{EN} = V_{IN}$, $C_{IN} = 0.33 \mu\text{F}$, $C_{OUT} = 1 \mu\text{F}$, $T_j = 25^\circ\text{C}$)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	$V_{IN} = 4.5 \text{ V}$, $I_{OUT} = 150 \text{ mA}$	2.437	2.500	2.563	V
Line regulation	Reg·line	$3.5 \text{ V} \leq V_{IN} \leq 7.5 \text{ V}$, $I_{OUT} = 150 \text{ mA}$	—	1	20	mV
Load regulation	Reg·load	$V_{IN} = 4.5 \text{ V}$, $5 \text{ mA} \leq I_{OUT} \leq 300 \text{ mA}$	—	2	20	mV
Quiescent current	I_B	$3.5 \text{ V} \leq V_{IN} \leq 7.5 \text{ V}$, $I_{OUT} = 0 \text{ A}$	—	1.0	1.7	mA
		$3.5 \text{ V} \leq V_{IN} \leq 7.5 \text{ V}$, $I_{OUT} = 300 \text{ mA}$	—	5	10	
Quiescent current (OFF mode)	$I_{B(OFF)}$	$3.5 \text{ V} \leq V_{IN} \leq 7.5 \text{ V}$, $V_{EN} = 0.4 \text{ V}$	—	0.2	5.0	μA
Starting quiescent current	I_{Bstart}	$V_{IN} = 2.1 \text{ V}$, $I_{OUT} = 0 \text{ A}$	—	1.20	3.5	mA
		$V_{IN} = 2.2 \text{ V}$, $I_{OUT} = 300 \text{ mA}$	—	7.2	18.0	
Output noise voltage	V_{NO}	$V_{IN} = 4.5 \text{ V}$, $I_{OUT} = 50 \text{ mA}$, $10 \text{ Hz} \leq f \leq 100 \text{ kHz}$	—	55	—	μV_{rms}
Ripple rejection	R.R.	$V_{IN} = 4.5 \text{ V}$, $I_{OUT} = 50 \text{ mA}$, $f = 120 \text{ Hz}$	—	70	—	dB
Dropout voltage	V_D	$I_{OUT} = 150 \text{ mA}$	—	0.2	0.5	V
		$I_{OUT} = 300 \text{ mA}$	—	0.4	0.6	
Output control voltage (ON)	$V_{EN(ON)}$	—	2	—	—	V
Output control voltage (OFF)	$V_{EN(OFF)}$	—	—	—	0.8	V
Output control current (ON)	$I_{EN(ON)}$	$V_{IN} = V_{EN} = 4.5 \text{ V}$	—	44	65	μA
Average temperature coefficient of output voltage	T_{CVO}	$V_{IN} = 4.5 \text{ V}$, $I_{OUT} = 5 \text{ mA}$, $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	—	0.2	—	$\text{mV}/^\circ\text{C}$

TA48LS033F

Electrical Characteristics

(Unless otherwise specified, $V_{EN} = V_{IN}$, $C_{IN} = 0.33 \mu\text{F}$, $C_{OUT} = 1 \mu\text{F}$, $T_j = 25^\circ\text{C}$)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	$V_{IN} = 5.3 \text{ V}$, $I_{OUT} = 150 \text{ mA}$	3.217	3.300	3.383	V
Line regulation	Reg·line	$4.3 \text{ V} \leq V_{IN} \leq 8.3 \text{ V}$, $I_{OUT} = 150 \text{ mA}$	—	2	20	mV
Load regulation	Reg·load	$V_{IN} = 5.3 \text{ V}$, $5 \text{ mA} \leq I_{OUT} \leq 300 \text{ mA}$	—	3	20	mV
Quiescent current	I_B	$4.3 \text{ V} \leq V_{IN} \leq 8.3 \text{ V}$, $I_{OUT} = 0 \text{ A}$	—	1.0	1.7	mA
		$4.3 \text{ V} \leq V_{IN} \leq 8.3 \text{ V}$, $I_{OUT} = 300 \text{ mA}$	—	5	10	
Quiescent current (OFF mode)	$I_{B(OFF)}$	$4.3 \text{ V} \leq V_{IN} \leq 8.3 \text{ V}$, $V_{EN} = 0.4 \text{ V}$	—	0.2	5.0	μA
Starting quiescent current	I_{Bstart}	$V_{IN} = 2.1 \text{ V}$, $I_{OUT} = 0 \text{ A}$	—	1.4	4.0	mA
		$V_{IN} = 2.8 \text{ V}$, $I_{OUT} = 300 \text{ mA}$	—	8.3	18.0	
Output noise voltage	V_{NO}	$V_{IN} = 5.3 \text{ V}$, $I_{OUT} = 50 \text{ mA}$, $10 \text{ Hz} \leq f \leq 100 \text{ kHz}$	—	60	—	μV_{rms}
Ripple rejection	R.R.	$V_{IN} = 5.3 \text{ V}$, $I_{OUT} = 50 \text{ mA}$, $f = 120 \text{ Hz}$	—	70	—	dB
Dropout voltage	V_D	$I_{OUT} = 150 \text{ mA}$	—	0.2	0.5	V
		$I_{OUT} = 300 \text{ mA}$	—	0.3	0.6	
Output control voltage (ON)	$V_{EN(ON)}$	—	2	—	—	V
Output control voltage (OFF)	$V_{EN(OFF)}$	—	—	—	0.8	V
Output control current (ON)	$I_{EN(ON)}$	$V_{IN} = V_{EN} = 5.3 \text{ V}$	—	53	75	μA
Average temperature coefficient of output voltage	T_{CVO}	$V_{IN} = 5.3 \text{ V}$, $I_{OUT} = 5 \text{ mA}$, $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	—	0.3	—	$\text{mV}/^\circ\text{C}$

TA48LS05F

Electrical Characteristics

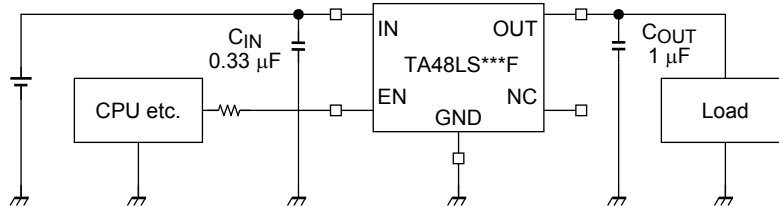
(Unless otherwise specified, $V_{EN} = V_{IN}$, $C_{IN} = 0.33 \mu\text{F}$, $C_{OUT} = 1 \mu\text{F}$, $T_j = 25^\circ\text{C}$)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	$V_{IN} = 7 \text{ V}$, $I_{OUT} = 150 \text{ mA}$	4.875	5.000	5.125	V
Line regulation	Reg·line	$6 \text{ V} \leq V_{IN} \leq 10 \text{ V}$, $I_{OUT} = 150 \text{ mA}$	—	3	20	mV
Load regulation	Reg·load	$V_{IN} = 7 \text{ V}$, $5 \text{ mA} \leq I_{OUT} \leq 300 \text{ mA}$	—	4	20	mV
Quiescent current	I_B	$6 \text{ V} \leq V_{IN} \leq 10 \text{ V}$, $I_{OUT} = 0 \text{ A}$	—	1.0	1.7	mA
		$6 \text{ V} \leq V_{IN} \leq 10 \text{ V}$, $I_{OUT} = 300 \text{ mA}$	—	5	10	
Quiescent current (OFF mode)	$I_{B(OFF)}$	$6 \text{ V} \leq V_{IN} \leq 10 \text{ V}$, $V_{EN} = 0.4 \text{ V}$	—	0.2	5.0	μA
Starting quiescent current	I_{Bstart}	$V_{IN} = 2.1 \text{ V}$, $I_{OUT} = 0 \text{ A}$	—	1.3	4.2	mA
		$V_{IN} = 3.0 \text{ V}$, $I_{OUT} = 300 \text{ mA}$	—	8.5	18.0	
Output noise voltage	V_{NO}	$V_{IN} = 7 \text{ V}$, $I_{OUT} = 50 \text{ mA}$, $10 \text{ Hz} \leq f \leq 100 \text{ kHz}$	—	70	—	μV_{rms}
Ripple rejection	R.R.	$V_{IN} = 7 \text{ V}$, $I_{OUT} = 50 \text{ mA}$, $f = 120 \text{ Hz}$	—	70	—	dB
Dropout voltage	V_D	$I_{OUT} = 150 \text{ mA}$	—	0.2	0.5	V
		$I_{OUT} = 300 \text{ mA}$	—	0.3	0.6	
Output control voltage (ON)	$V_{EN(ON)}$	—	2	—	—	V
Output control voltage (OFF)	$V_{EN(OFF)}$	—	—	—	0.8	V
Output control current (ON)	$I_{EN(ON)}$	$V_{IN} = V_{EN} = 7 \text{ V}$	—	73	100	μA
Average temperature coefficient of output voltage	T_{CVO}	$V_{IN} = 7 \text{ V}$, $I_{OUT} = 5 \text{ mA}$, $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	—	0.45	—	$\text{mV}/^\circ\text{C}$

Electrical Characteristics Common to All Products

- $T_j = 25^\circ\text{C}$ in the measurement conditions of each item is the standard condition when 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.

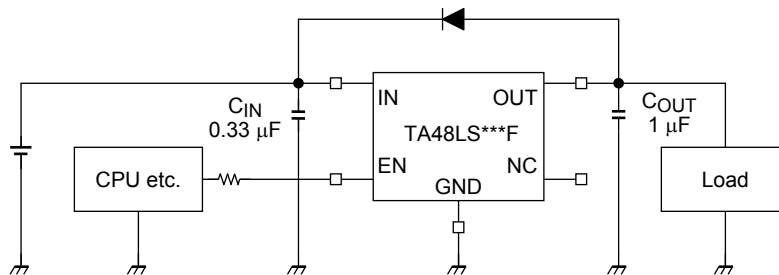
Application Circuit Example



- Be sure to connect a capacitor near the input terminal and output terminal between both terminals and GND. The use of a monolithic ceramic capacitor (B Characteristic or X7R) of low ESR (equivalent series resistance) is recommended. The IC may oscillate due to external conditions (output current, temperature, or the type of the capacitor used). The type of capacitor required must be determined by the actual application circuit in which the IC is used.

Usage Precautions

- The IC might be destroyed if a voltage greater than the input terminal voltage is applied to the output terminal, or if the input terminal is connected to GND during operation. To prevent such an occurrence, connect a diode as in the following diagram.



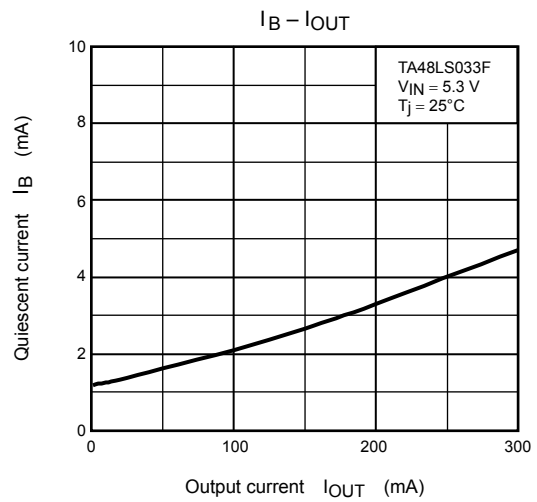
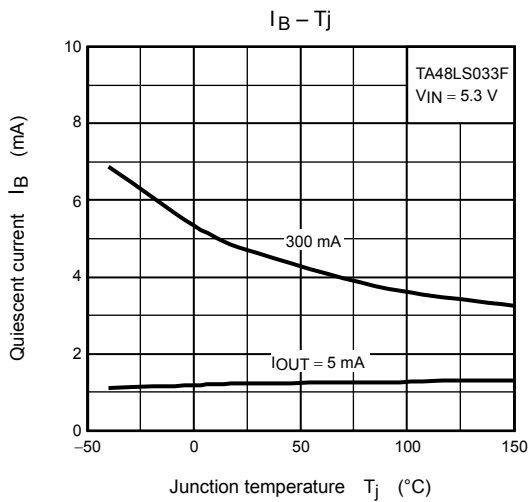
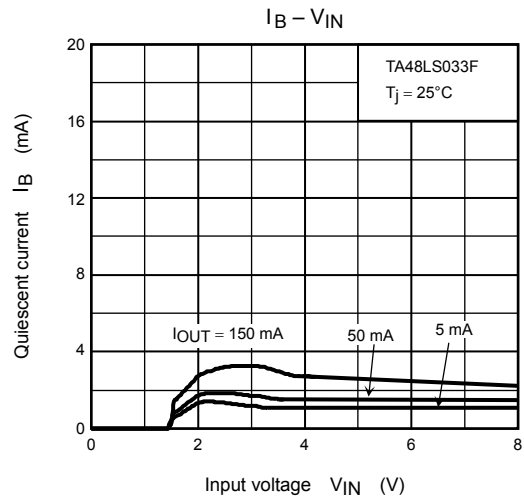
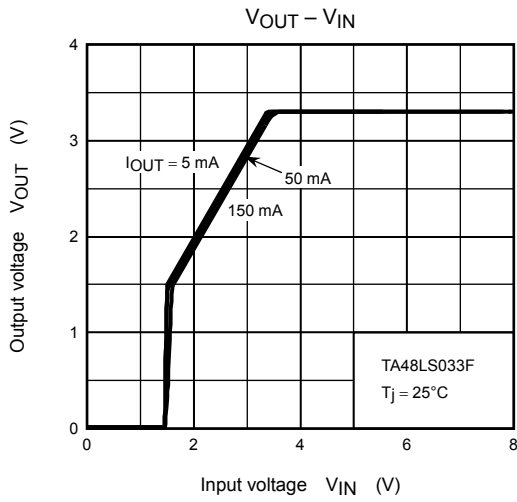
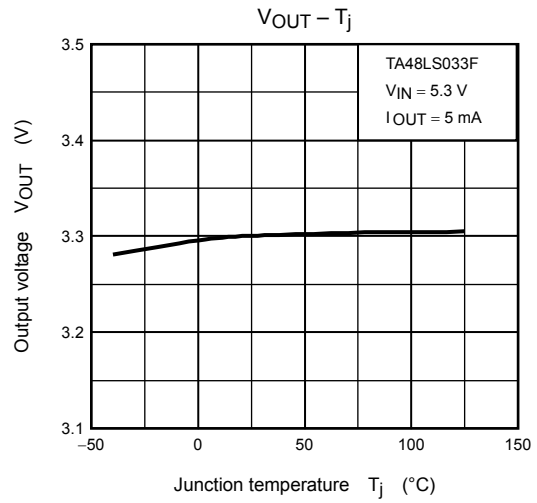
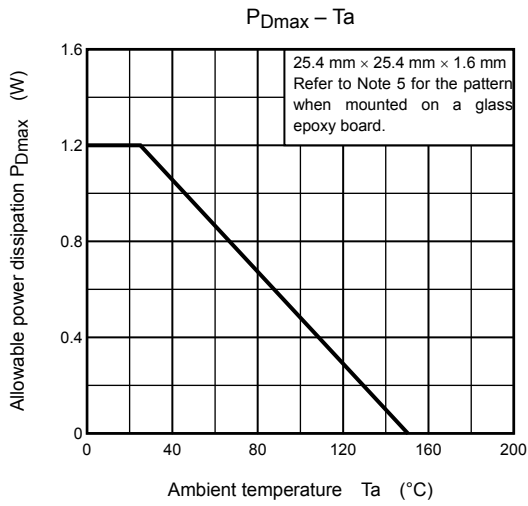
- There is a possibility that internal parasitic devices may be generated when momentary transients cause a terminal's potential to fall below that of the GND terminal. In such case, that the device could be destroyed. The voltage of each terminal and any state must therefore never fall below the GND potential.
- 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.
- Low voltage
Do not apply voltage to the Product that is lower than the minimum operating voltage, or the Product's protective functions will not operate properly and the Product may be permanently damaged.

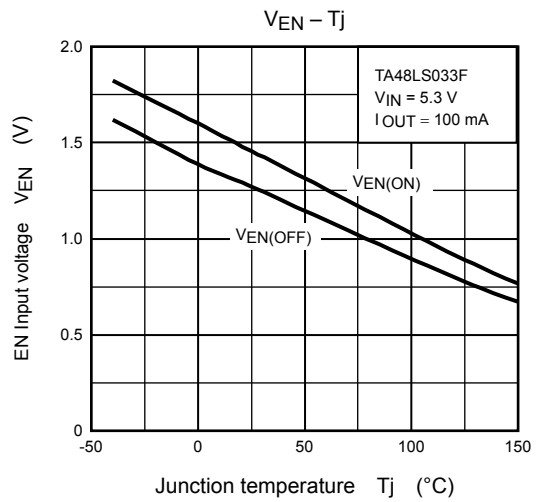
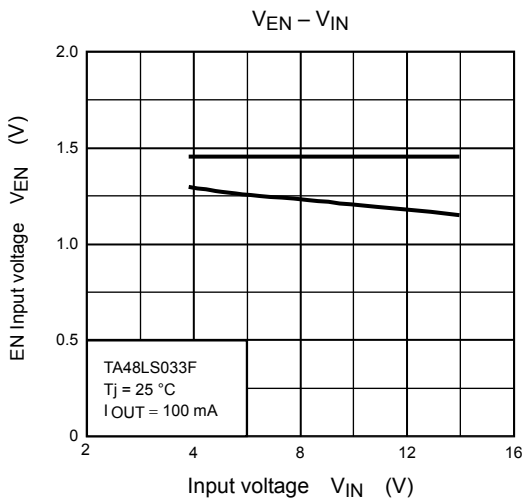
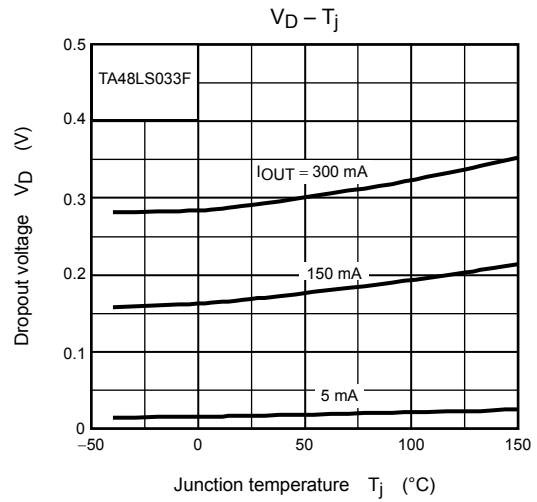
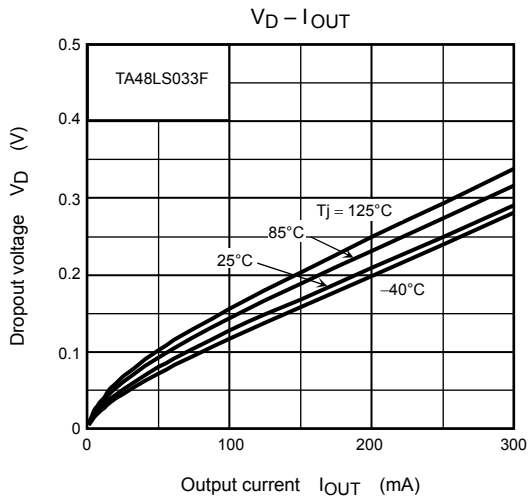
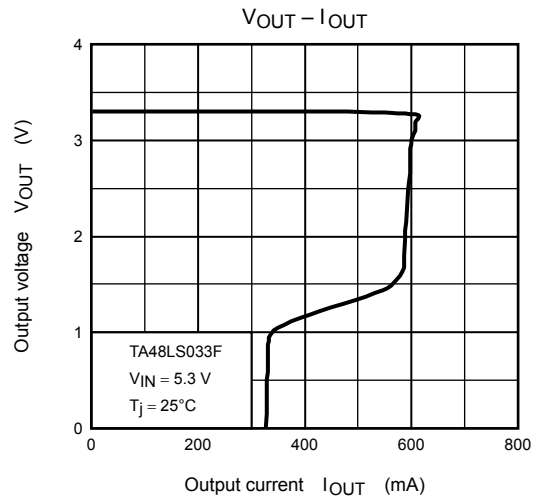
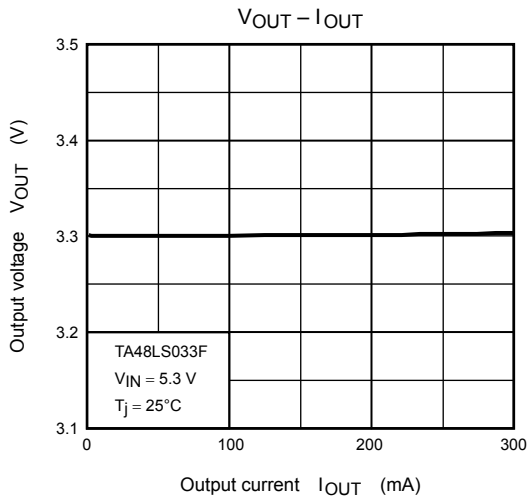
- Overcurrent Protection

The overcurrent protection circuits in the Product are designed to temporarily protect Product from minor overcurrent of brief duration. When the overcurrent protective function in the Product activates, immediately cease application of overcurrent to Product. Improper usage of Product, such as application of current to Product exceeding the absolute maximum ratings, could cause the overcurrent protection circuit not to operate properly and/or damage Product permanently even before the protection circuit starts to operate.

- Thermal shutdown Protection

The thermal shutdown circuits in the Product are designed to temporarily protect Product from minor overheating of brief duration. When the overheating protective function in the Product activates, immediately correct the overheating situation. Improper usage of Product, such as the application of heat to Product exceeding the absolute maximum ratings, could cause the thermal shutdown protection circuit not to operate properly and/or damage Product permanently even before the protection circuit starts to operate.





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