

TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

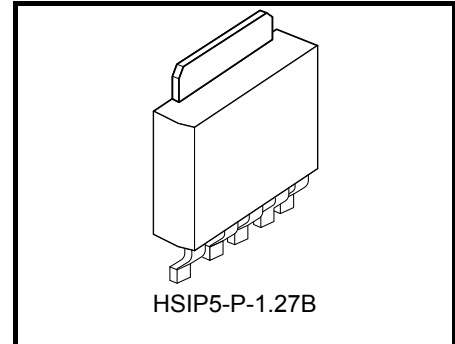
TA58MS05F, TA58MS06F, TA58MS08F, TA58MS09F, TA58MS12F

500 mA Output Current and Low Dropout Voltage Regulator with ON/OFF Control Switch

The TA58MS**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). Low dropout voltage and standby current make the TA58MS**F Series suitable for applications requiring low power consumption.

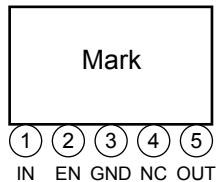
Features

- Built-in ON/OFF control function (active high)
- Maximum output current : 500 mA
- Output voltage : 5 / 6 / 8 / 9 / 12 V
- Output voltage accuracy : $V_{OUT} \pm 3\%$ (@ $T_j = 25^\circ\text{C}$)
- Low quiescent current : 2.5 mA (Typ.) (@ $I_{OUT} = 0\text{ A}$)
- Low standby current (output OFF mode): 1 μA (Typ.)
- Low-dropout voltage : 0.7 V (Max) (@ $I_{OUT} = 500\text{ mA}$)
- Protection function : Over current protection/ thermal shutdown / Reverse connection of power supply / 60 V load dump
- Package type : Surface-mount New PW-Mold5pin

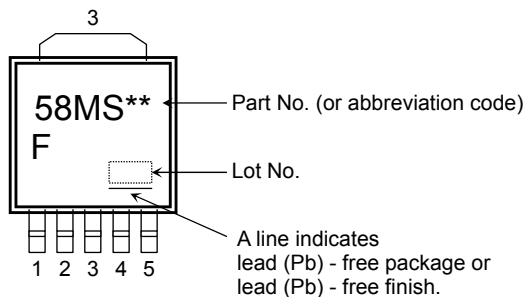


Weight : 0.36 g (Typ.)

Pin Assignment



Marking



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

Pin Description

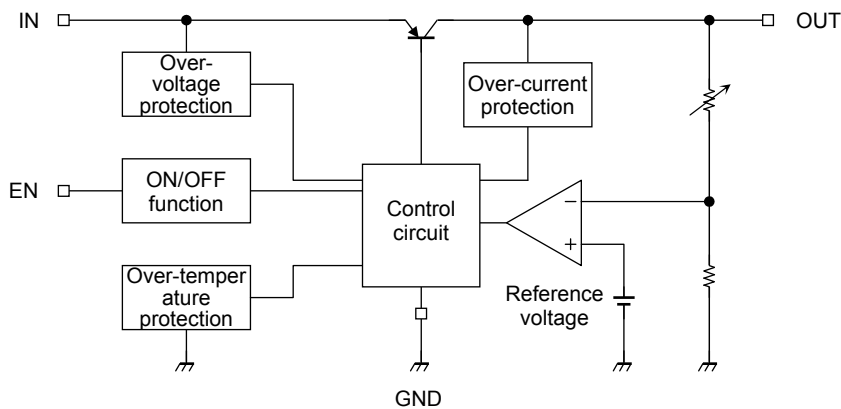
Pin No.	Symbol	Description
1	IN	Input terminal. Connected by capacitor (C_{IN}) to GND.
2	EN	Output ON/OFF control terminal. Output is ON when this pin is set to "High", OFF when this pin is open or set to "Low".
3	GND	Ground terminal
4	NC	Non-connection
5	OUT	Output terminal. Connected by capacitor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

How to Order

Product No.	Package	Package Type and Capacity
TA58MS**F (TE16L1,Q (Note2)	New PW-Mold5pin : Surface-mount	Tape (2000 pcs/reel)

Note 2: 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	DC	V _{IN (DC)}	29	V
	Pulse	V _{IN (Pulse)}	60(τ = 200ms)	V
EN Input voltage		V _{EN}	V _{IN (DC)}	V
Output current		I _{OUT}	500	mA
Junction temperature		T _j	150	°C
Storage temperature		T _{stg}	-55~150	°C
Power dissipation	Ta = 25°C	P _D	1	W
	Tc = 25°C		10	

Note 3: Do not apply current and voltage (including reverse polarity) to any pin that is not specified.

Note 4: 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)}	125	°C/ W
Thermal resistance, junction to case	R _{th (j-c)}	12.5	°C/ W

Recommended operating conditions

Characteristic	Symbol	Min	Typ.	Max	Unit
Operating junction temperature	T _{j(opr)}	-40	—	135	°C

Protection Function (Reference)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Thermal shutdown	T _{SD}	V _{IN} = 14 V (05~06F)/ 16 V (08~09F)/ 18 V (12F)	—	175	—	°C
Peak circuit current	I _{PEAK}	V _{IN} = 14 V (05~06F)/ 16 V (08~09F)/ 18 V (12F), T _j = 25°C	—	1	—	A
Short circuit current	I _{SC}	V _{IN} = 14 V (05~06F)/ 16 V (08~09F)/ 18 V (12F), T _j = 25°C	—	200	—	mA
Over voltage protection	V _{IN}	T _j = 25°C	29	45	—	V

Note 5: Ensure that the devices operate within the limits of the maximum rating when in actual use.

Note 6: When the input voltage exceeds 29 V, the overvoltage protection circuit is activated to turn off the output voltage.

TA58MS05F

Electrical Characteristics (unless otherwise specified, $V_{EN} = V_{IN}$, $C_{IN} = 1 \mu\text{F}$, $C_{OUT} = 10 \mu\text{F}$, $T_j = 25^\circ\text{C}$)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	$V_{IN} = 14 \text{ V}$, $I_{OUT} = 10 \text{ mA}$	4.85	5.00	5.15	V
		$6 \text{ V} \leq V_{IN} \leq 26 \text{ V}$, $I_{OUT} = 10 \text{ mA}$, $-40^\circ\text{C} \leq T_j \leq 105^\circ\text{C}$	4.8	5.0	5.2	
Line regulation	Reg·line	$6 \text{ V} \leq V_{IN} \leq 26 \text{ V}$, $I_{OUT} = 10 \text{ mA}$	—	3	20	mV
Load regulation	Reg·load	$V_{IN} = 14 \text{ V}$, $10 \text{ mA} \leq I_{OUT} \leq 500 \text{ mA}$	—	10	30	
Quiescent current	I_B	$6 \text{ V} \leq V_{IN} \leq 26 \text{ V}$, $I_{OUT} = 0 \text{ A}$	—	2.5	5.0	mA
		$6 \text{ V} \leq V_{IN} \leq 26 \text{ V}$, $I_{OUT} = 500 \text{ mA}$	—	30	50	
Quiescent current (OFF mode)	$I_{B(OFF)}$	$6 \text{ V} \leq V_{IN} \leq 26 \text{ V}$, $V_{EN} = 0.4 \text{ V}$	—	0.1	1.0	μA
Dropout voltage	V_D	$I_{OUT} = 250 \text{ mA}$	—	0.3	0.4	V
		$I_{OUT} = 500 \text{ mA}$	—	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)	$I_{EN(ON)}$	$V_{IN} = 14 \text{ V}$, $V_{EN} = 5 \text{ V}$	—	125	175	μA

TA58MS06F

Electrical Characteristics (unless otherwise specified, $V_{EN} = V_{IN}$, $C_{IN} = 1 \mu\text{F}$, $C_{OUT} = 10 \mu\text{F}$, $T_j = 25^\circ\text{C}$)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	$V_{IN} = 14 \text{ V}$, $I_{OUT} = 10 \text{ mA}$	5.82	6.00	6.18	V
		$7 \text{ V} \leq V_{IN} \leq 26 \text{ V}$, $I_{OUT} = 10 \text{ mA}$, $-40^\circ\text{C} \leq T_j \leq 105^\circ\text{C}$	5.76	6.00	6.24	
Line regulation	Reg·line	$7 \text{ V} \leq V_{IN} \leq 26 \text{ V}$, $I_{OUT} = 10 \text{ mA}$	—	3	20	mV
Load regulation	Reg·load	$V_{IN} = 14 \text{ V}$, $10 \text{ mA} \leq I_{OUT} \leq 500 \text{ mA}$	—	10	30	mV
Quiescent current	I_B	$7 \text{ V} \leq V_{IN} \leq 26 \text{ V}$, $I_{OUT} = 0 \text{ A}$	—	2.5	5.0	mA
		$7 \text{ V} \leq V_{IN} \leq 26 \text{ V}$, $I_{OUT} = 500 \text{ mA}$	—	30	50	
Quiescent current (OFF mode)	$I_{B(OFF)}$	$7 \text{ V} \leq V_{IN} \leq 26 \text{ V}$, $V_{EN} = 0.4 \text{ V}$	—	0.1	1.0	μA
Dropout voltage	V_D	$I_{OUT} = 250 \text{ mA}$	—	0.3	0.4	V
		$I_{OUT} = 500 \text{ mA}$	—	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)	$I_{EN(ON)}$	$V_{IN} = 14 \text{ V}$, $V_{EN} = 5 \text{ V}$	—	125	175	μA

TA58MS08F

Electrical Characteristics (unless otherwise specified, $V_{EN} = V_{IN}$, $C_{IN} = 1 \mu F$, $C_{OUT} = 10 \mu F$, $T_j = 25^\circ C$)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	$V_{IN} = 16 V, I_{OUT} = 10 mA$	7.76	8.00	8.24	V
		$9 V \leq V_{IN} \leq 26 V, I_{OUT} = 10 mA, -40^\circ C \leq T_j \leq 105^\circ C$	8.68	8.00	8.32	
Line regulation	Reg·line	$9 V \leq V_{IN} \leq 26 V, I_{OUT} = 10 mA$	—	3	20	mV
Load regulation	Reg·load	$V_{IN} = 16 V, 10 mA \leq I_{OUT} \leq 500 mA$	—	10	30	mV
Quiescent current	I_B	$9 V \leq V_{IN} \leq 26 V, I_{OUT} = 0 A$	—	2.5	5.0	mA
		$9 V \leq V_{IN} \leq 26 V, I_{OUT} = 500 mA$	—	30	50	
Quiescent current (OFF mode)	$I_{B(OFF)}$	$9 V \leq V_{IN} \leq 26 V, V_{EN} = 0.4 V$	—	0.1	1.0	μA
Dropout voltage	V_D	$I_{OUT} = 250 mA$	—	0.3	0.4	V
		$I_{OUT} = 500 mA$	—	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)	$I_{EN(ON)}$	$V_{IN} = 16 V, V_{EN} = 5 V$	—	125	175	μA

TA58MS09F

Electrical Characteristics (unless otherwise specified, $V_{EN} = V_{IN}$, $C_{IN} = 1 \mu F$, $C_{OUT} = 10 \mu F$, $T_j = 25^\circ C$)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	$V_{IN} = 16 V, I_{OUT} = 10 mA$	8.73	9.00	9.27	V
		$10 V \leq V_{IN} \leq 26 V, I_{OUT} = 10 mA, -40^\circ C \leq T_j \leq 105^\circ C$	8.64	9.00	9.36	
Line regulation	Reg·line	$10 V \leq V_{IN} \leq 26 V, I_{OUT} = 10 mA$	—	3	20	mV
Load regulation	Reg·load	$V_{IN} = 16 V, 10 mA \leq I_{OUT} \leq 500 mA$	—	10	30	mV
Quiescent current	I_B	$10 V \leq V_{IN} \leq 26 V, I_{OUT} = 0 A$	—	2.5	5.0	mA
		$10 V \leq V_{IN} \leq 26 V, I_{OUT} = 500 mA$	—	30	50	
Quiescent current (OFF mode)	$I_{B(OFF)}$	$10 V \leq V_{IN} \leq 26 V, V_{EN} = 0.4 V$	—	0.1	1.0	μA
Dropout voltage	V_D	$I_{OUT} = 250 mA$	—	0.3	0.4	V
		$I_{OUT} = 500 mA$	—	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)	$I_{EN(ON)}$	$V_{IN} = 16 V, V_{EN} = 5 V$	—	125	175	μA

TA58MS12F

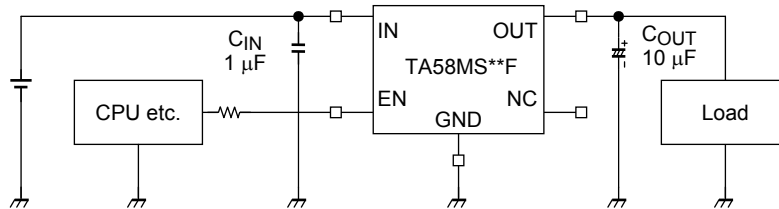
Electrical Characteristics (unless otherwise specified, $V_{EN} = V_{IN}$, $C_{IN} = 1 \mu F$, $C_{OUT} = 10 \mu F$, $T_j = 25^\circ C$)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	$V_{IN} = 18 V, I_{OUT} = 10 mA$	11.64	12.00	12.36	V
		$13 V \leq V_{IN} \leq 26 V, I_{OUT} = 10 mA, -40^\circ C \leq T_j \leq 105^\circ C$	11.52	12.00	12.48	
Line regulation	Reg·line	$13 V \leq V_{IN} \leq 26 V, I_{OUT} = 10 mA$	—	3	20	mV
Load regulation	Reg·load	$V_{IN} = 18 V, 10 mA \leq I_{OUT} \leq 500 mA$	—	10	30	mV
Quiescent current	I_B	$13 V \leq V_{IN} \leq 26 V, I_{OUT} = 0 A$	—	2.5	5.0	mA
		$13 V \leq V_{IN} \leq 26 V, I_{OUT} = 500 mA$	—	30	50	
Quiescent current (OFF mode)	$I_{B(OFF)}$	$13 V \leq V_{IN} \leq 26 V, V_{EN} = 0.4 V$	—	0.1	1.0	μA
Dropout voltage	V_D	$I_{OUT} = 250 mA$	—	0.3	0.4	V
		$I_{OUT} = 500 mA$	—	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)	$I_{EN(ON)}$	$V_{IN} = 18 V, V_{EN} = 5 V$	—	125	175	μA

Electrical Characteristics Common to All Products

- $T_j = 25^\circ\text{C}$ in the measurement conditions of each item is a regulation for where 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.

Standard Application Circuit

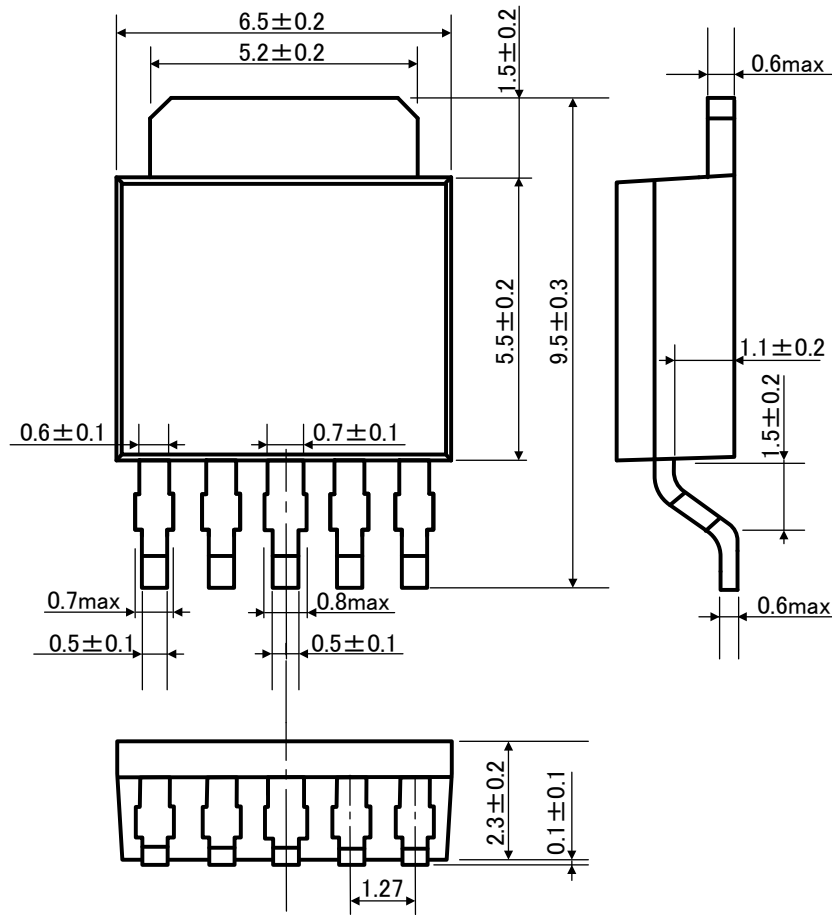


- Place C_{IN} as close as possible to the input terminal and GND. Place C_{OUT} as close as possible to the output terminal and GND. Although capacitor C_{OUT} acts to smooth the dc output voltage during suspension of output oscillation or load change, it might cause output oscillation in a cold environment due to increased capacitor ESR. It is therefore recommended to use a capacitor with small temperature sensitivity. Also, ensure that the regulator performance is satisfactory over the operating temperature range of the target system.
- Note that, depending on the load conditions, a steep increase in the input voltage (V_{IN}) may cause a momentary rise in output voltage (V_{OUT}) even if the EN (enable) pin is Low.

Package Dimensions

HSIP5-P-1.27B

Unit : mm



Weight: 0.36 g (Typ.)

RESTRICTIONS ON PRODUCT USE

20070701-EN

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