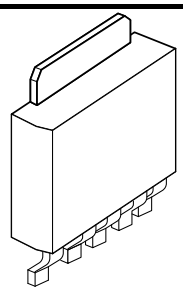
TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

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.



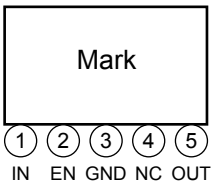
HSIP5-P-1.27B

Weight : 0.36 g (Typ.)

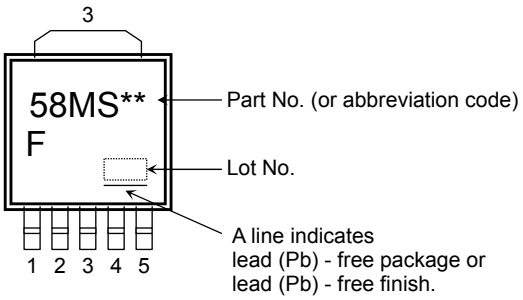
Features

- 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} ± 3% (@T_j = 25°C)
- Low quiescent current : 2.5 mA (Typ.) (@I_{OUT} = 0 A)
- Low standby current (output OFF mode): 1μA (Typ.)
- Low-dropout voltage : 0.7 V (Max) (@I_{OUT} = 500m A)
- Protection function : Over current protection/ thermal shutdown / Reverse connection of power supply / 60 V load dump
- Package type : Surface-mount New PW-Mold5pin

Pin Assignment



Marking



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

Pin Description

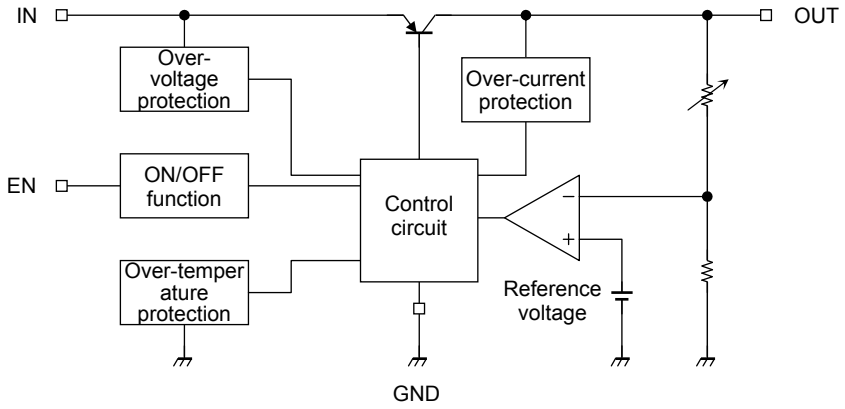
Pin No.	Symbol	Description
1	IN	Input terminal. Connected by capacitor (C_{IN}) to GND.
2	EN	Output ON/OFF control terminal. Output is ON when this pin is set to “High”, OFF when this pin is open or set to “Low”.
3	GND	Ground terminal
4	NC	Non-connection
5	OUT	Output terminal. Connected by capacitor (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, $V_{EN} = V_{IN}$, $C_{IN} = 1\ \mu F$, $C_{OUT} = 10\ \mu F$, $T_j = 25°C$)

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

TA58MS06F

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

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

TA58MS08F

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

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 ≦ V_{IN} ≦ 26 V, I_{OUT} = 10 mA, -40°C ≦ T_j ≦ 105°C	8.68	8.00	8.32	
Line regulation	Reg·line	9 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 10 mA	—	3	20	mV
Load regulation	Reg·load	V_{IN} = 16 V, 10 mA ≦ I_{OUT} ≦ 500 mA		10	30	mV
Quiescent current	I_B	9 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 0 A	—	2.5	5.0	mA
		9 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 500 mA	—	30	50	
Quiescent current (OFF mode)	$I_{B(OFF)}$	9 V ≦ V_{IN} ≦ 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, $V_{EN} = V_{IN}$, $C_{IN} = 1\ \mu F$, $C_{OUT} = 10\ \mu F$, $T_j = 25°C$)

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 ≦ V_{IN} ≦ 26 V, I_{OUT} = 10 mA, -40°C ≦ T_j ≦ 105°C	8.64	9.00	9.36	
Line regulation	Reg·line	10 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 10 mA	—	3	20	mV
Load regulation	Reg·load	V_{IN} = 16 V, 10 mA ≦ I_{OUT} ≦ 500 mA	—	10	30	mV
Quiescent current	I_B	10 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 0 A	—	2.5	5.0	mA
		10 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 500 mA	—	30	50	
Quiescent current (OFF mode)	$I_{B(OFF)}$	10 V ≦ V_{IN} ≦ 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

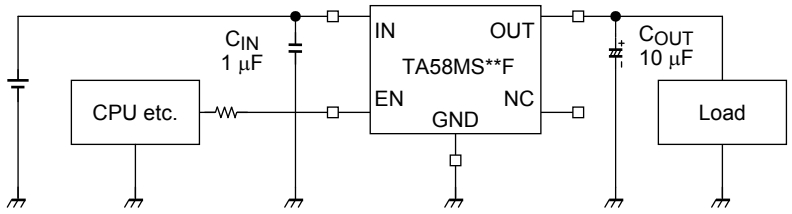
Electrical Characteristics (unless otherwise specified, $V_{EN} = V_{IN}$, $C_{IN} = 1\ \mu F$, $C_{OUT} = 10\ \mu F$, $T_j = 25°C$)

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 ≦ V_{IN} ≦ 26 V, I_{OUT} = 10 mA, -40°C ≦ T_j ≦ 105°C	11.52	12.00	12.48	
Line regulation	Reg·line	13 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 10 mA	—	3	20	mV
Load regulation	Reg·load	V_{IN} = 18 V, 10 mA ≦ I_{OUT} ≦ 500 mA		10	30	mV
Quiescent current	I_B	13 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 0 A	—	2.5	5.0	mA
		13 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 500 mA	—	30	50	
Quiescent current (OFF mode)	$I_{B(OFF)}$	13 V ≦ V_{IN} ≦ 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

- Tj = 25°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

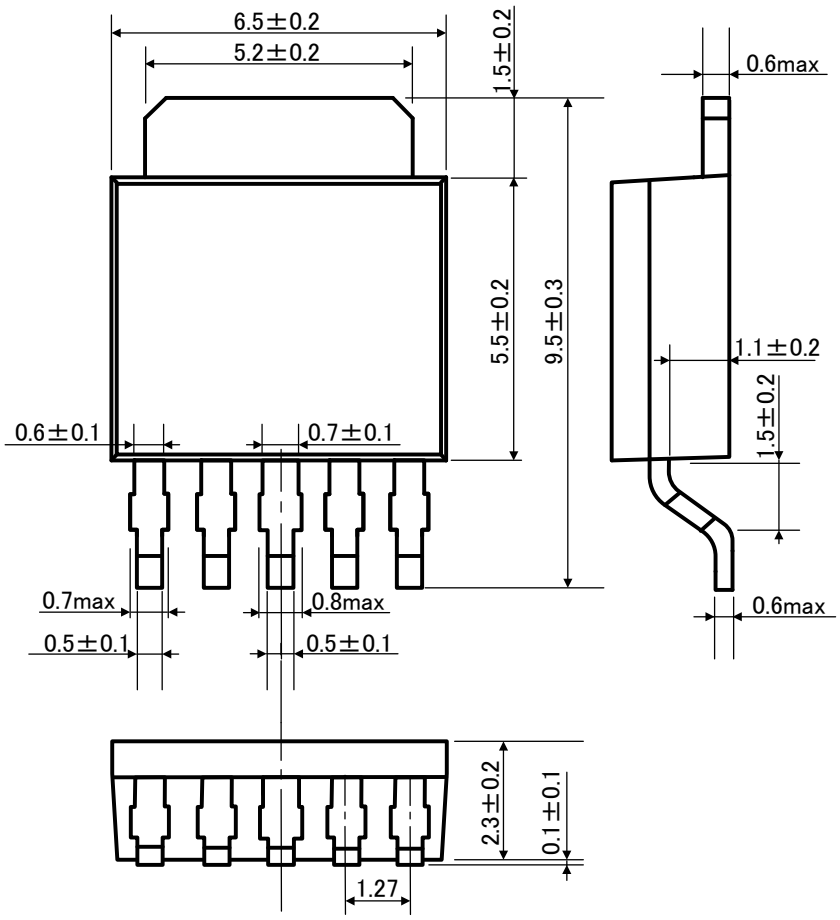


- Place C_{IN} as close as possible to the input terminal and GND. Place C_{OUT} as close as possible to the output terminal and GND. Although capacitor C_{OUT} acts to smooth the dc output voltage during suspension of output oscillation or load change, it might cause output oscillation in a cold environment 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.)

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