TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

TA78DS05BP, TA78DS06BP, TA78DS08BP, TA78DS09BP, TA78DS10BP, TA78DS12BP, TA78DS15BP, TA78DS05CP

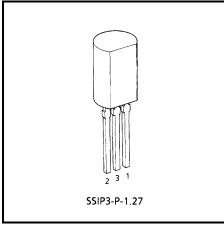
5 V, 6 V, 8 V, 9 V, 10 V, 12 V, 15 V

Low Dropout Voltage Regulator

The TA78DS××BP series consists fixed-positive-output voltage regulator ICs capable of sourcing current up to 30 mA. Due to the features of low dropout voltage and low standby current, these devices are useful for battery-powered equipment. This series includes built-in current limiting, thermal shutdown, over voltage protection, input fault protection and excessive transient protection circuits.

Features

- Low standby current of 600 μA typical.
- Maximum output current of 30 mA.
- Low dropout voltage of less than 0.3 V.
- Multi-protection:
 Reverse connection of power supply, 60V load dump, thermal shut down and current limiting.
- Available in the plastic TO-92 MOD package.

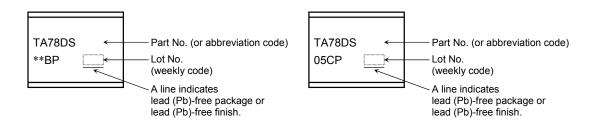


Weight: 0.36 g (Typ.)

Pin Assignment

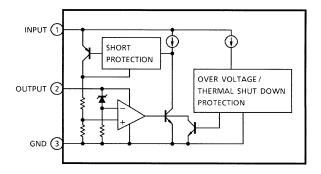


Marking





Block Diagram



Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Operating input voltage		V _{IN}	29	V
Input voltage of surge		V _{IN}	60	V
Power dissipation	(Ta = 25°C)	P _D	800	mW
Operating temperature		T _{opr}	-40~85	°C
Storage temperature		T _{stg}	-55~150	°C
Junction temperature		Tj	150	°C
Thermal resistance		R _{th (j-a)}	156	°C/W
Soldering temperature t	ime	T _{sol}	260 (10 s)	°C

Note: 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).



TA78DS05BP Electrical Characteristics (Unless otherwise specified, V_{IN} = 14 V, I_{OUT} = 5 mA, C_{IN} = 0.1 μ F, C_{OUT} = 3.3 μ F, T_j = 25°C)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Тур.	Max	Unit
			5.35 V ≤ V _{IN} ≤ 26 V	4.75	5.0	5.25	
Output voltage	Vout	_	5.35 V ≤ V _{IN} ≤ 26 V, -40°C ≤ Ta ≤ 85°C	4.5	5.0	5.5	V
Line regulation	Pogulino	1 — F	9.0 V ≤ V _{IN} ≤ 16 V	_	1	10	- mV
	Reg·line		6.0 V ≤ V _{IN} ≤ 26 V	_	4	30	
Load regulation	Reg·load	_	5.0 mA ≤ I _{OUT} ≤ 30 mA	_	1	50	mV
Quiescent current	IB	_	I _{OUT} = 0 mA	_	0.6	1	mA
Quiescent current	ıВ		6 V ≤ V _{IN} ≤ 26 V, I _{OUT} = 5 mA	_	0.7	1	ША
Dropout voltage	V _D		I _{OUT} = 5 mA	_	0.1	0.2	V
Dropout voltage	۷۵		I _{OUT} = 10 mA	_	0.2	0.3	, v
Max operating voltage	V _{IN}	_	_	29	33	_	V

TA78DS05CP Electrical Characteristics (Unless otherwise specified, V_{IN} = 14 V, I_{OUT} = 5 mA, C_{IN} = 0.1 μ F, C_{OUT} = 3.3 μ F, T_j = 25°C)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Тур.	Max	Unit
			5.35 V ≤ V _{IN} ≤ 26 V	4.8	5.0	5.2	
Output voltage	V _{OUT}	_	5.35 V ≤ V _{IN} ≤ 26 V, -40°C ≤ Ta ≤ 85°C	4.75	5.0	5.25	V
Line regulation	Pogulino	1 — F	9.0 V ≤ V _{IN} ≤ 16 V	_	1	10	- mV
	Reg·line		6.0 V ≤ V _{IN} ≤ 26 V	_	4	30	
Load regulation	Reg·load	_	5.0 mA ≤ I _{OUT} ≤ 30 mA	_	1	50	mV
Quiescent current	IB	_	I _{OUT} = 0 mA	_	0.6	1	mA
Quescent current	ıВ		6 V ≤ V _{IN} ≤ 26 V, I _{OUT} = 5 mA	_	0.7	1	ША
Dranout voltage	VD	_	I _{OUT} = 5 mA	_	0.1	0.2	V
Dropout voltage	\ 		I _{OUT} = 10 mA	_	0.2	0.3	٧
Max operating voltage	V _{IN}	_	_	29	33	_	V



TA78DS06BP Electrical Characteristics (Unless otherwise specified, V_{IN} = 14 V, I_{OUT} = 5 mA, C_{IN} = 0.1 μ F, C_{OUT} = 3.3 μ F, T_j = 25°C)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Тур.	Max	Unit
			6.35 V ≤ V _{IN} ≤ 26 V	5.7	6.0	6.3	
Output voltage	Vout	_	6.35 V ≤ V _{IN} ≤ 26 V, -40°C ≤ Ta ≤ 85°C	5.4	6.0	6.6	V
Line regulation	Regiline		10 V ≤ V _{IN} ≤ 17 V	_	1	20	- mV
	Regulile	_	7.0 V ≤ V _{IN} ≤ 26 V	_	4	40	
Load regulation	Reg·load	_	5.0 mA ≤ I _{OUT} ≤ 30 mA	_	1	60	mV
Quiescent current	IB	_	I _{OUT} = 0 mA	_	0.6	1.1	mA
Quiescent current	l 'B		7 V ≤ V _{IN} ≤ 26 V, I _{OUT} = 5 mA	_	0.7	1.1	ША
Dropout voltage	V _D		I _{OUT} = 5 mA	_	0.1	0.2	V
Diopout voitage	VD		I _{OUT} = 10 mA	_	0.2	0.3	v
Max operating voltage	VIN	_	_	29	33	_	V

TA78DS08BP Electrical Characteristics (Unless otherwise specified, V_{IN} = 14 V, I_{OUT} = 5 mA, C_{IN} = 0.1 μ F, C_{OUT} = 3.3 μ F, T_j = 25°C)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Тур.	Max	Unit
			8.35 V ≤ V _{IN} ≤ 26 V	7.6	8.0	8.4	
Output voltage	V _{OUT}	_	$8.35 \text{ V} \le \text{V}_{\text{IN}} \le 26 \text{ V},$ $-40^{\circ}\text{C} \le \text{Ta} \le 85^{\circ}\text{C}$	7.2	8.0	8.8	V
Line regulation	Reg·line	_	12 V ≤ V _{IN} ≤ 19 V	_	2	30	- mV
	Reguine		$9.0 \text{ V} \le \text{V}_{\text{IN}} \le 26 \text{ V}$	_	5	60	
Load regulation	Reg·load	_	5.0 mA ≤ I _{OUT} ≤ 30 mA	_	4	80	mV
Quiescent current			I _{OUT} = 0 mA	_	0.7	1.2	mA
Quiescent current	Ι _Β	_	9 V \leq V _{IN} \leq 26 V, I _{OUT} = 5 mA	_	0.8	1.2	ША
Dropout voltage	V _D		I _{OUT} = 5 mA	_	0.1	0.2	V
Dropout voltage	۷۵		I _{OUT} = 10 mA	_	0.2	0.3	٧
Max operating voltage	V _{IN}	_	_	29	33	_	V



TA78DS09BP Electrical Characteristics (Unless otherwise specified, V_{IN} = 14 V, I_{OUT} = 5 mA, C_{IN} = 0.1 μ F, C_{OUT} = 3.3 μ F, T_j = 25°C)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Тур.	Max	Unit
			9.35 V ≤ V _{IN} ≤ 26 V	8.55	9.0	9.45	
Output voltage	Vout	_	9.35 V ≤ V _{IN} ≤ 26 V, -40°C ≤ Ta ≤ 85°C	8.1	9.0	9.9	V
Line regulation	Pogulino		13 V ≤ V _{IN} ≤ 20 V	_	2	35	mV
Line regulation	Reg·line	_	10 V ≤ V _{IN} ≤ 26 V	_	5	70	IIIV
Load regulation	Reg·load	_	5.0 mA ≤ I _{OUT} ≤ 30 mA	_	4	90	mV
	IB	_	I _{OUT} = 0 mA	_	0.7	1.3	
Quiescent current			10 V ≤ V _{IN} ≤ 26 V, I _{OUT} = 5 mA	_	0.8	1.3	mA
Dranout voltage	V-		I _{OUT} = 5 mA	_	0.1	0.2	V
Dropout voltage	V_D		I _{OUT} = 10 mA	_	0.2	0.3	\ \ \
Max operating voltage	V _{IN}	_	_	29	33	_	V

TA78DS10BP Electrical Characteristics (Unless otherwise specified, V_{IN} = 14 V, I_{OUT} = 5 mA, C_{IN} = 0.1 μ F, C_{OUT} = 3.3 μ F, T_j = 25°C)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Тур.	Max	Unit
			10.35 V ≤ V _{IN} ≤ 26 V	9.5	10.0	10.5	
Output voltage	Vout	_	10.35 V ≤ V _{IN} ≤ 26 V, -40°C ≤ Ta ≤ 85°C	9.0	10.0	11.0	V
Line regulation	Pogulino		14 V ≤ V _{IN} ≤ 21 V	_	3	40	- mV
Line regulation	Reg·line	_	11 V ≤ V _{IN} ≤ 26 V	_	7	80	
Load regulation	Reg·load	_	5.0 mA ≤ I _{OUT} ≤ 30 mA	_	6	100	mV
			I _{OUT} = 0 mA	_	0.7	1.4	
Quiescent current	I _B	_	$11 \text{ V} \leq \text{V}_{\text{IN}} \leq 26 \text{ V},$ $\text{I}_{\text{OUT}} = 5 \text{ mA}$	_	0.8	1.4	mA
Dranout voltage	\/-		I _{OUT} = 5 mA	_	0.1	0.2	V
Dropout voltage	V _D		I _{OUT} = 10 mA	_	0.2	0.3	V
Max operating voltage	V _{IN}	_	_	29	33	_	V

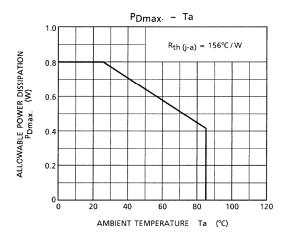


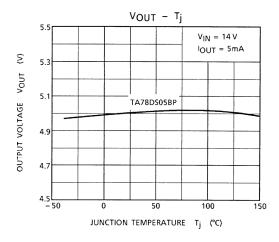
TA78DS12BP Electrical Characteristics (Unless otherwise specified, V_{IN} = 18 V, I_{OUT} = 5 mA, C_{IN} = 0.1 μ F, C_{OUT} = 3.3 μ F, T_j = 25°C)

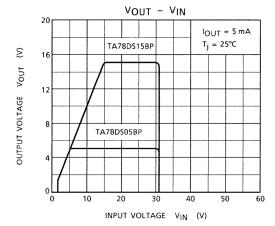
Characteristics	Symbol	Test Circuit	Test Condition	Min	Тур.	Max	Unit
			12.35 V ≤ V _{IN} ≤ 26 V	11.4	12.0	12.6	
Output voltage	Vout	_	12.35 V ≤ V _{IN} ≤ 26 V, -40°C ≤ Ta ≤ 85°C	10.8	12.0	13.2	V
Line regulation	Reg·line		16 V ≤ V _{IN} ≤ 23 V	_	4	50	mV
Line regulation	Regime		13 V ≤ V _{IN} ≤ 26 V	_	8	100	IIIV
Load regulation	Reg·load	_	5.0 mA ≤ I _{OUT} ≤ 30 mA	_	2	120	mV
	IB	_	I _{OUT} = 0 mA	_	0.8	1.5	
Quiescent current			13 V ≤ V _{IN} ≤ 26 V, I _{OUT} = 5 mA	_	1.0	1.5	mA
Dropout voltage	V-		I _{OUT} = 5 mA	_	0.1	0.2	V
Diopout voitage	V_D		I _{OUT} = 10 mA	_	0.2	0.3	
Max operating voltage	V _{IN}	_	_	29	33	_	V

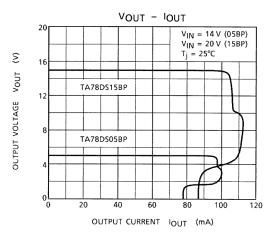
TA78DS15BP Electrical Characteristics (Unless otherwise specified, V_{IN} = 20 V, I_{OUT} = 5 mA, C_{IN} = 0.1 μ F, C_{OUT} = 3.3 μ F, T_j = 25°C)

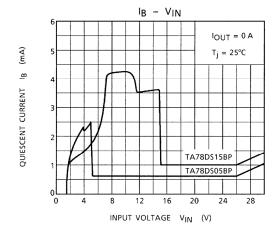
Characteristics	Symbol	Test Circuit	Test Condition	Min	Тур.	Max	Unit
			15.35 V ≤ V _{IN} ≤ 26 V	14.25	15.0	15.75	
Output voltage	V _{OUT}	_	15.35 V ≤ V _{IN} ≤ 26 V, -40°C ≤ Ta ≤ 85°C	13.5	15.0	16.5	V
Line regulation	Reg·line		19 V ≤ V _{IN} ≤ 26 V	_	5	60	mV
Line regulation	Reguine	_	16 V ≤ V _{IN} ≤ 26 V	_	8	130	IIIV
Load regulation	Reg·load	_	5.0 mA ≤ I _{OUT} ≤ 30 mA	_	1	150	mV
		_	I _{OUT} = 0 mA	_	1.0	1.6	mA
Quiescent current	I _B		16 V ≤ V _{IN} ≤ 26 V, I _{OUT} = 5 mA	_	1.2	1.6	
Dropout voltago	\/-		I _{OUT} = 5 mA	_	0.1	0.2	V
Dropout voltage	V _D	_	I _{OUT} = 10 mA	_	0.2	0.3	V
Max operating voltage	V _{IN}	_	_	29	33	_	V

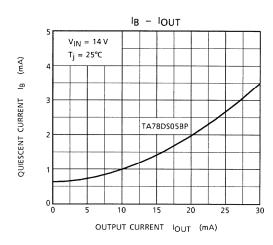


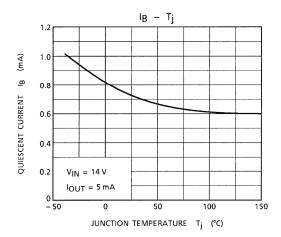


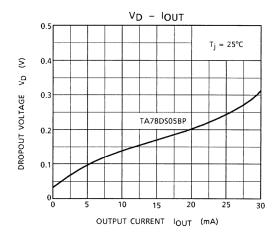


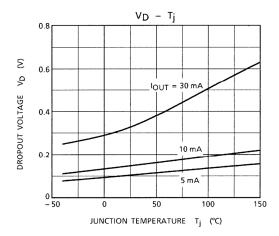


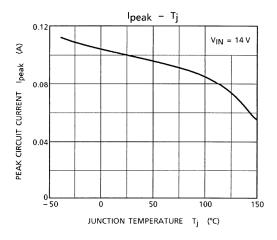


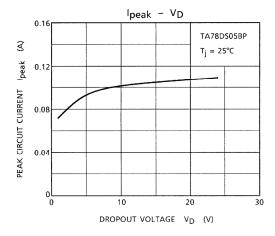








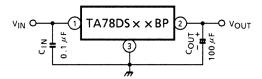




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Application Circuit



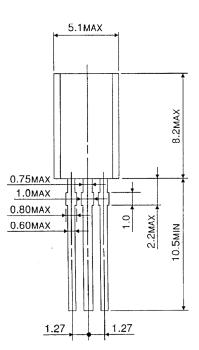
The capacitors $C_{\mbox{IN}}/C_{\mbox{OUT}}$ must be guaranteed to operate within the temperature range in which the regulator operates correctly.

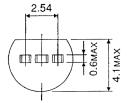
The equivalent series resistance (ESR) of C_{OUT} must be less than 1 Ω inside the operating temperature range.

Unit: mm

Package Dimensions

SSIP3-P-1.27





Weight: 0.36 g (Typ.)

RESTRICTIONS ON PRODUCT USE

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