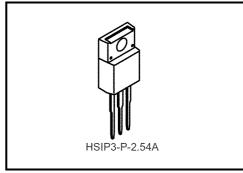
TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

TA78DL05BS,TA78DL06BS,TA78DL08BS,TA78DL09BS, TA78DL10BS,TA78DL12BS,TA78DL15BS

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

Three-Terminal Low Dropout Voltage Regulator

The TA78DL××BS series consists of positive fixed output voltage regulator IC capable of sourcing current up to 250 mA. Due to the features of low dropout voltage and low standby current, these devices are useful for battery powered equipment. This series includes current limiting, thermal shutdown, overvoltage protection, input fault protection and excessive transient protection circuits internally.

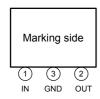


Weight: 1.7 g (typ.)

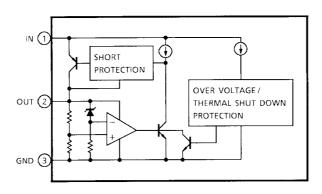
Features

- Low standby current of 500 μA typical.
- Maximum output current up to 250 mA.
- Low dropout voltage of less than 0.6 V (@ $I_{OUT} = 0.2 \text{ A}$).
- Multi-protection: Reverse connection of power supply, 60 V load dump, thermal shut down and current limiting.
- Metal fin (tab) is fully covered with mold resin. (TO-220 NIS package)

Pin Assignment



Block Diagram





Maximum Ratings (Ta = 25°C)

Characteris	tics	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	2	W
Power dissipation	(Tc = 25°C)	FD	20	VV
Operating temperature		T _{opr}	-40~95	°C
Storage temperature		T _{stg}	-55~150	°C
Junction temperature		Tj	150	°C
Thermal resistance		R _{th (j-c)}	6.25	°C/W
		R _{th (j-a)}	62.5	C/VV
Storage temperature-tin	пе	T _{sol}	260 (10s)	°C

TA78DL05BS Electrical Characteristics (Unless otherwise specified, V_{IN} = 14 V, I_{OUT} = 10 mA, T_j = 25°C)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Тур.	Max	Unit
Output voltage	V _{OUT}	_	5.35 V ≤ V _{IN} ≤ 26 V, -40°C ≤ Ta ≤ 85°C	4.5	5.0	5.5	٧
Line regulation	Reg·line	1 — H	9 V ≤ V _{IN} ≤ 16 V	_	2	10	- mV
			6 V ≤ V _{IN} ≤ 26 V	_	4	30	
Load regulation	Reg·load	_	10 mA ≤ I _{OUT} ≤ 200 mA	_	14	50	mV
Quiescent current	Ι _Β	_	I _{OUT} ≤ 10 mA, 6 V ≤ V _{IN} ≤ 26 V	_	0.5	1	mA
Dropout voltage	V _D	_	I _{OUT} = 50 mA	_	0.15	0.3	V
	V_{D}		I _{OUT} = 200 mA	_	0.4	0.6	
Max operating voltage	V _{IN}	_	_	29	33	_	V



TA78DL06BS Electrical Characteristics (Unless otherwise specified, V_{IN} = 14 V, I_{OUT} = 10 mA, T_j = 25°C)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Тур.	Max	Unit
Output voltage	V _{OUT}	_	6.35 V ≤ V _{IN} ≤ 26 V, -40°C ≤ Ta ≤ 85°C	5.4	6.0	6.6	V
Line regulation	Reg·line		10 V ≤ V _{IN} ≤ 17 V	_	2	12	- mV
		_	7 V ≤ V _{IN} ≤ 26 V	_	5	36	
Load regulation	Reg·load	_	10 mA ≤ I _{OUT} ≤ 200 mA	_	17	60	mV
Quiescent current	I _B	_	I _{OUT} ≤ 10 mA, 7 V ≤ V _{IN} ≤ 26 V	_	0.55	_	mA
Dropout voltage	Vo	_	I _{OUT} = 50 mA	_	0.15	0.3	V
	V_{D}		I _{OUT} = 200 mA	_	0.4	0.6	
Max operating voltage	V _{IN}	_	_	29	33	_	V

TA78DL08BS Electrical Characteristics (Unless otherwise specified, V_{IN} = 16 V, I_{OUT} = 10 mA, T_j = 25°C)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Тур.	Max	Unit
Output voltage	V _{OUT}	_	8.35 V ≤ V _{IN} ≤ 26 V, -40°C ≤ Ta ≤ 85°C	7.2	8	8.8	V
Line regulation	Reg-line $- \frac{12 \text{ V} \le \text{V}_{\text{IN}} \le 19 \text{ V}}{9 \text{ V} \le \text{V}_{\text{IN}} \le 26 \text{ V}} - \frac{12 \text{ V} \le \text{V}_{\text{IN}} \le 19 \text{ V}}{9 \text{ V}}$	3	16	mV			
		_	9 V ≤ V _{IN} ≤ 26 V	_	6	45	1110
Load regulation	Reg·load	_	10 mA ≤ I _{OUT} ≤ 200 mA	_	22	80	mV
Quiescent current	Ι _Β	_	I _{OUT} ≤ 10 mA, 9 V ≤ V _{IN} ≤ 26 V	_	0.6	1	mA
Dropout voltage	Vo		I _{OUT} = 50 mA	_	0.15	0.3	V
	V_{D}		I _{OUT} = 200 mA	_	0.4	0.6	
Max operating voltage	V _{IN}	_	_	29	33	_	V

TA78DL09BS Electrical Characteristics (Unless otherwise specified, V_{IN} = 16 V, I_{OUT} = 10 mA, T_j = 25°C)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Тур.	Max	Unit
Output voltage	V _{OUT}	_	9.35 V ≤ V _{IN} ≤ 26 V, -40°C ≤ Ta ≤ 85°C	8.1	9	9.9	V
Line regulation	Reg·line -	I — F	13 V ≤ V _{IN} ≤ 20 V	_	3	18	mV
			10 V ≤ V _{IN} ≤ 26 V	_	7	50	
Load regulation	Reg·load	_	10 mA ≤ I _{OUT} ≤ 200 mA	_	25	90	mV
Quiescent current	I _B	_	I _{OUT} ≤ 10 mA, 10 V ≤ V _{IN} ≤ 26 V	_	0.65	_	mA
Dropout voltage	V _D	_	I _{OUT} = 50 mA	_	0.15	0.3	V
			I _{OUT} = 200 mA	_	0.4	0.6	
Max operating voltage	V _{IN}	_	_	29	33	_	V



TA78DL10BS Electrical Characteristics (Unless otherwise specified, V_{IN} = 16 V, I_{OUT} = 10 mA, T_j = 25°C)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Тур.	Max	Unit
Output voltage	V _{OUT}	_	10.35 V ≤ V _{IN} ≤ 26 V, -40°C ≤ Ta ≤ 85°C	9	10	11	V
Line regulation	Reg·line		14 V ≤ V _{IN} ≤ 21 V	_	4	20	- mV
		_	11 V ≤ V _{IN} ≤ 26 V	_	8	60	
Load regulation	Reg·load	_	10 mA ≤ I _{OUT} ≤ 200 mA	_	28	100	mV
Quiescent current	I _B	_	I _{OUT} ≤ 10 mA, 11 V ≤ V _{IN} ≤ 26 V	_	0.7	_	mA
Dropout voltage	Vo	_	I _{OUT} = 50 mA	_	0.15	0.3	V
	V_{D}		I _{OUT} = 200 mA	_	0.4	0.6	
Max operating voltage	V _{IN}	_	_	29	33	_	V

TA78DL12BS Electrical Characteristics (Unless otherwise specified, V_{IN} = 18 V, I_{OUT} = 10 mA, T_j = 25°C)

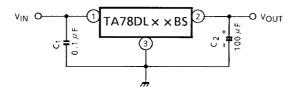
Characteristics	Symbol	Test Circuit	Test Condition	Min	Тур.	Max	Unit
Output voltage	V _{OUT}	_	12.35 V ≤ V _{IN} ≤ 26 V, -40°C ≤ Ta ≤ 85°C	10.8	12	13.2	V
Line regulation	Dogulino	ne $-\frac{16 \text{ V} \le \text{V}_{\text{IN}} \le 23 \text{ V}}{13 \text{ V} \le \text{V}_{\text{IN}} \le 26 \text{ V}}$	5	24	mV		
	Reg·line		13 V ≤ V _{IN} ≤ 26 V	_	10	70	1111
Load regulation	Reg·load	_	10 mA ≤ I _{OUT} ≤ 200 mA	_	33	120	mV
Quiescent current	Ι _Β	_	I _{OUT} ≤ 10 mA, 13 V ≤ V _{IN} ≤ 26 V	_	0.8	١	mA
Dropout voltage	\/-		I _{OUT} = 50 mA	_	0.15	0.3	V
	V _D		I _{OUT} = 200 mA	_	0.4	0.6	
Max operating voltage	V _{IN}	_	_	29	33	_	V

TA78DL15BS Electrical Characteristics (Unless otherwise specified, V_{IN} = 20 V, I_{OUT} = 10 mA, T_j = 25°C)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Тур.	Max	Unit
Output voltage	V _{OUT}	_	15.35 V ≤ V _{IN} ≤ 26 V, -40°C ≤ Ta ≤ 85°C	13.5	15	16.5	٧
Line regulation Reg	Reg·line		19 V ≤ V _{IN} ≤ 26 V	_	6	30	mV
	Regulite	_	16 V ≤ V _{IN} ≤ 26 V	_	12	80	
Load regulation	Reg·load	_	10 mA ≤ I _{OUT} ≤ 200 mA	_	40	150	mV
Quiescent current	I _B	_	I _{OUT} ≤ 10 mA, 16 V ≤ V _{IN} ≤ 26 V	_	0.9	_	mA
Dropout voltage	\/-	_	I _{OUT} = 50 mA	_	0.15	0.3	V
	V_D		I _{OUT} = 200 mA	_	0.4	0.6	
Max operating voltage	V _{IN}	_	_	29	33	_	V

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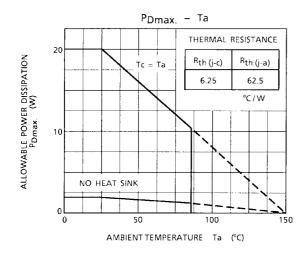
Application Circuit

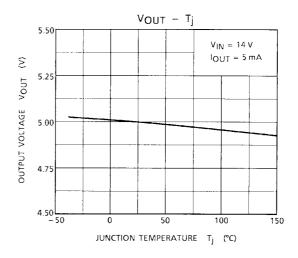


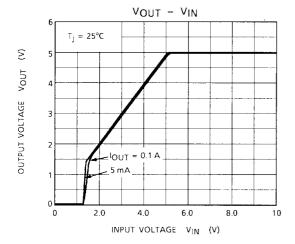
 $Capacitor \ CIN/COUT \ must be guaranteed to operate of the temperature \ range \ that \ the \ regulator \ should \ be \ operated \ correctly.$

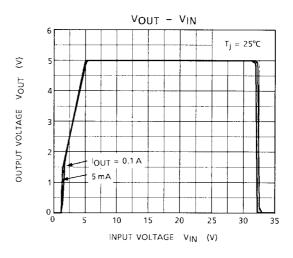
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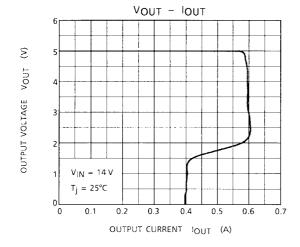
The equivalent series resistance (ESR) of COUT must be less than 1 Ω in operating temperature range.

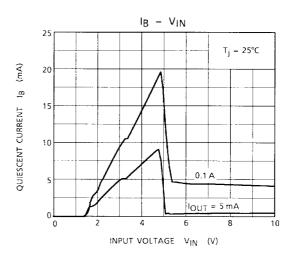




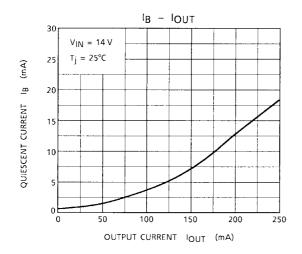


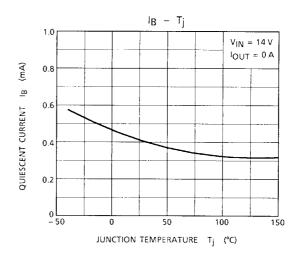


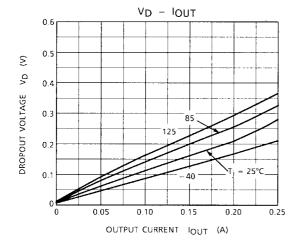


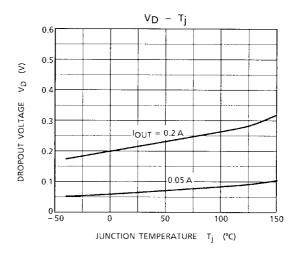


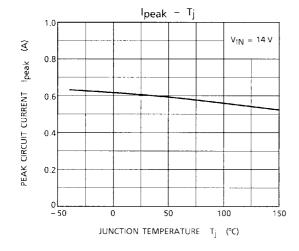
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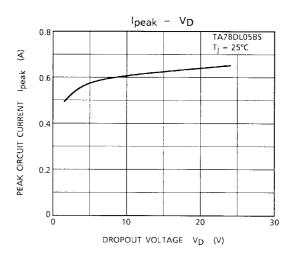








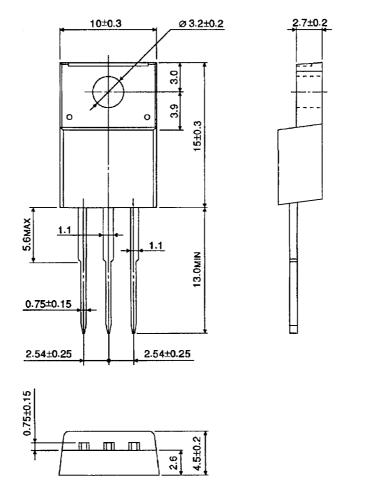




Unit: mm

Package Dimensions

HSIP3-P-2.54A



Weight: 1.7 g (typ.)

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000707EBA

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