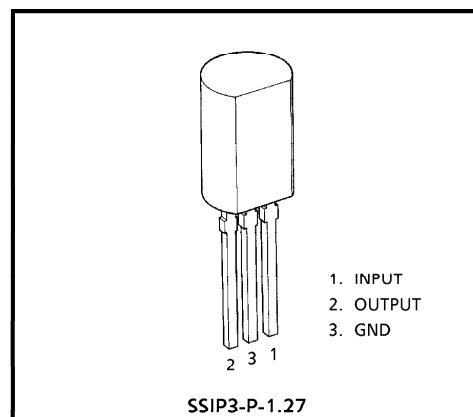


TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

**TA78DS05BP, TA78DS06BP, TA78DS08BP, TA78DS09BP
TA78DS10BP, TA78DS12BP, TA78DS15BP, TA78DS05CP**
5V, 6V, 8V, 9V, 10V, 12V, 15V

LOW DROPOUT VOLTAGE REGULATOR

The TA78DS××BP series consists of positive fixed output voltage regulator IC capable of sourcing current up to 30mA. 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, over voltage protection, input fault protection and excessive transient protection circuits internally.

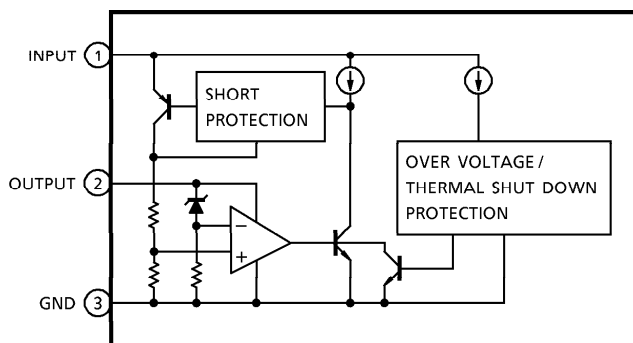


Weight : 0.36g (Typ.)

FEATURES

- Low Standby Current of 600 μ A Typical.
- Maximum Output Current Up to 30mA.
- Low Dropout Voltage of Less than 0.3V.
- Multi-protection : Reverse Connection of Power Supply, 60V Load Dump, Thermal Shut Down and Current Limiting.
- Available in the Plastic TO-92 MOD Package

BLOCK DIAGRAM



961001EBA2

- TOSHIBA is continually working to improve the quality and the reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to observe standards of safety, and to avoid situations in which a malfunction or failure of a TOSHIBA product could cause loss of human life, bodily injury or damage to property. In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent products specifications. Also, please keep in mind the precautions and conditions set forth in the TOSHIBA Semiconductor Reliability Handbook.
- The products described in this document are subject to foreign exchange and foreign trade control laws.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice.

MAXIMUM RATINGS ($T_a = 25^\circ\text{C}$)

CHARACTERISTIC	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
Operating Junction Temperature	T_j	-40~150	°C
Thermal Resistance	$R_{th(j-a)}$	156	°C/W
Soldering Temperature-Time	T_{sol}	260 (10s)	°C

TA78DS05BP

ELECTRICAL CHARACTERISTICS(Unless otherwise specified, $V_{IN} = 14\text{V}$, $I_{OUT} = 5\text{mA}$, $C_{IN} = 0.1\mu\text{F}$, $C_{OUT} = 3.3\mu\text{F}$, $T_j = 25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	—	$5.35\text{V} \leq V_{IN} \leq 26\text{V}$	4.75	5.0	5.25	V
			$5.35\text{V} \leq V_{IN} \leq 26\text{V}$ $-40^\circ\text{C} \leq T_a \leq 85^\circ\text{C}$	4.5	5.0	5.5	
Line Regulation	Reg-Line	—	$9.0\text{V} \leq V_{IN} \leq 16\text{V}$	—	1	10	mV
			$6.0\text{V} \leq V_{IN} \leq 26\text{V}$	—	4	30	
Load Regulation	Reg-Load	—	$5.0\text{mA} \leq I_{OUT} \leq 30\text{mA}$	—	1	50	mV
Quiescent Current	I_B	—	$I_{OUT} = 0$	—	0.6	1	mA
			$6\text{V} \leq V_{IN} \leq 26\text{V}$, $I_{OUT} = 5\text{mA}$	—	0.7	1	
Dropout Voltage	V_D	—	$I_{OUT} = 5\text{mA}$	—	0.1	0.2	V
			$I_{OUT} = 10\text{mA}$	—	0.2	0.3	
Max. Operating Voltage	V_{IN}	—	—	29	33	—	V

TA78DS05CP

ELECTRICAL CHARACTERISTICS(Unless otherwise specified, $V_{IN} = 14\text{V}$, $I_{OUT} = 5\text{mA}$, $C_{IN} = 0.1\mu\text{F}$, $C_{OUT} = 3.3\mu\text{F}$, $T_j = 25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	—	$5.35\text{V} \leq V_{IN} \leq 26\text{V}$	4.8	5.0	5.2	V
			$5.35\text{V} \leq V_{IN} \leq 26\text{V}$ $-40^\circ\text{C} \leq T_a \leq 85^\circ\text{C}$	4.75	5.0	5.25	
Line Regulation	Reg-Line	—	$9.0\text{V} \leq V_{IN} \leq 16\text{V}$	—	1	10	mV
			$6.0\text{V} \leq V_{IN} \leq 26\text{V}$	—	4	30	
Load Regulation	Reg-Load	—	$5.0\text{mA} \leq I_{OUT} \leq 30\text{mA}$	—	1	50	mV
Quiescent Current	I_B	—	$I_{OUT} = 0$	—	0.6	1	mA
			$6\text{V} \leq V_{IN} \leq 26\text{V}$, $I_{OUT} = 5\text{mA}$	—	0.7	1	
Dropout Voltage	V_D	—	$I_{OUT} = 5\text{mA}$	—	0.1	0.2	V
			$I_{OUT} = 10\text{mA}$	—	0.2	0.3	
Max. Operating Voltage	V_{IN}	—	—	29	33	—	V

TA78DS06BP

ELECTRICAL CHARACTERISTICS(Unless otherwise specified, $V_{IN} = 14V$, $I_{OUT} = 5mA$, $C_{IN} = 0.1\mu F$, $C_{OUT} = 3.3\mu F$, $T_j = 25^\circ C$)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	—	$6.35V \leq V_{IN} \leq 26V$	5.7	6.0	6.3	V
			$6.35V \leq V_{IN} \leq 26V$ $-40^\circ C \leq T_a \leq 85^\circ C$	5.4	6.0	6.6	
Line Regulation	Reg-Line	—	$10V \leq V_{IN} \leq 17V$	—	1	20	mV
			$7.0V \leq V_{IN} \leq 26V$	—	4	40	
Load Regulation	Reg-Load	—	$5.0mA \leq I_{OUT} \leq 30mA$	—	1	60	mV
Quiescent Current	I_B	—	$I_{OUT} = 0$	—	0.6	1.1	mA
			$7V \leq V_{IN} \leq 26V$, $I_{OUT} = 5mA$	—	0.7	1.1	
Dropout Voltage	V_D	—	$I_{OUT} = 5mA$	—	0.1	0.2	V
			$I_{OUT} = 10mA$	—	0.2	0.3	
Max. Operating Voltage	V_{IN}	—	—	29	33	—	V

TA78DS08BP

ELECTRICAL CHARACTERISTICS(Unless otherwise specified, $V_{IN} = 14V$, $I_{OUT} = 5mA$, $C_{IN} = 0.1\mu F$, $C_{OUT} = 3.3\mu F$, $T_j = 25^\circ C$)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	—	$8.35V \leq V_{IN} \leq 26V$	7.6	8.0	8.4	V
			$8.35V \leq V_{IN} \leq 26V$ $-40^\circ C \leq T_a \leq 85^\circ C$	7.2	8.0	8.8	
Line Regulation	Reg-Line	—	$12V \leq V_{IN} \leq 19V$	—	2	30	mV
			$9.0V \leq V_{IN} \leq 26V$	—	5	60	
Load Regulation	Reg-Load	—	$5.0mA \leq I_{OUT} \leq 30mA$	—	4	80	mV
Quiescent Current	I_B	—	$I_{OUT} = 0$	—	0.7	1.2	mA
			$9V \leq V_{IN} \leq 26V$, $I_{OUT} = 5mA$	—	0.8	1.2	
Dropout Voltage	V_D	—	$I_{OUT} = 5mA$	—	0.1	0.2	V
			$I_{OUT} = 10mA$	—	0.2	0.3	
Max. Operating Voltage	V_{IN}	—	—	29	33	—	V

TA78DS09BP

ELECTRICAL CHARACTERISTICS(Unless otherwise specified, $V_{IN} = 14V$, $I_{OUT} = 5mA$, $C_{IN} = 0.1\mu F$, $C_{OUT} = 3.3\mu F$, $T_j = 25^\circ C$)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	—	$9.35V \leq V_{IN} \leq 26V$	8.55	9.0	9.45	V
			$9.35V \leq V_{IN} \leq 26V$ $-40^\circ C \leq T_a \leq 85^\circ C$	8.1	9.0	9.9	
Line Regulation	Reg-Line	—	$13V \leq V_{IN} \leq 20V$	—	2	35	mV
			$10V \leq V_{IN} \leq 26V$	—	5	70	
Load Regulation	Reg-Load	—	$5.0mA \leq I_{OUT} \leq 30mA$	—	4	90	mV
Quiescent Current	I_B	—	$I_{OUT} = 0$	—	0.7	1.3	mA
			$10V \leq V_{IN} \leq 26V$, $I_{OUT} = 5mA$	—	0.8	1.3	
Dropout Voltage	V_D	—	$I_{OUT} = 5mA$	—	0.1	0.2	V
			$I_{OUT} = 10mA$	—	0.2	0.3	
Max. Operating Voltage	V_{IN}	—	—	29	33	—	V

TA78DS10BP

ELECTRICAL CHARACTERISTICS(Unless otherwise specified, $V_{IN} = 14V$, $I_{OUT} = 5mA$, $C_{IN} = 0.1\mu F$, $C_{OUT} = 3.3\mu F$, $T_j = 25^\circ C$)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	—	$10.35V \leq V_{IN} \leq 26V$	9.5	10.0	10.5	V
			$10.35V \leq V_{IN} \leq 26V$ $-40^\circ C \leq T_a \leq 85^\circ C$	9.0	10.0	11.0	
Line Regulation	Reg-Line	—	$14V \leq V_{IN} \leq 21V$	—	3	40	mV
			$11V \leq V_{IN} \leq 26V$	—	7	80	
Load Regulation	Reg-Load	—	$5.0mA \leq I_{OUT} \leq 30mA$	—	6	100	mV
Quiescent Current	I_B	—	$I_{OUT} = 0$	—	0.7	1.4	mA
			$11V \leq V_{IN} \leq 26V$, $I_{OUT} = 5mA$	—	0.8	1.4	
Dropout Voltage	V_D	—	$I_{OUT} = 5mA$	—	0.1	0.2	V
			$I_{OUT} = 10mA$	—	0.2	0.3	
Max. Operating Voltage	V_{IN}	—	—	29	33	—	V

TA78DS12BP

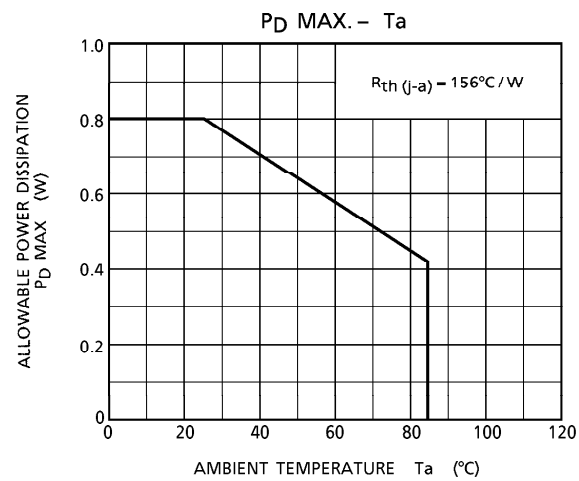
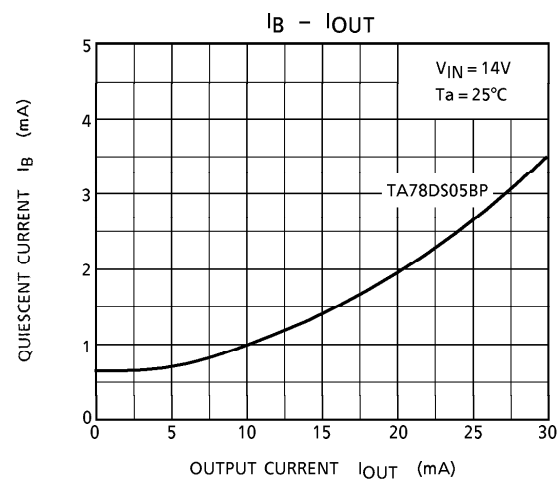
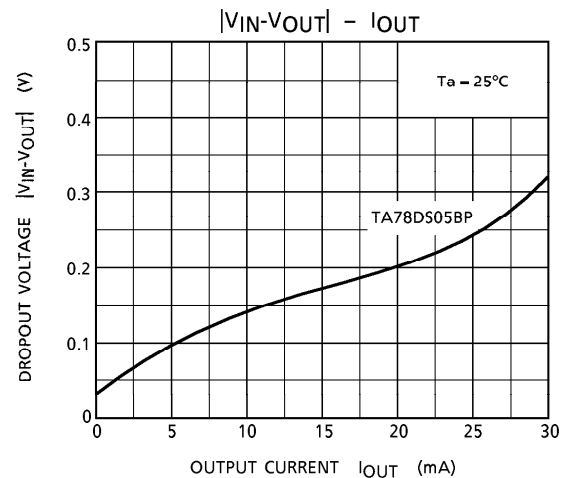
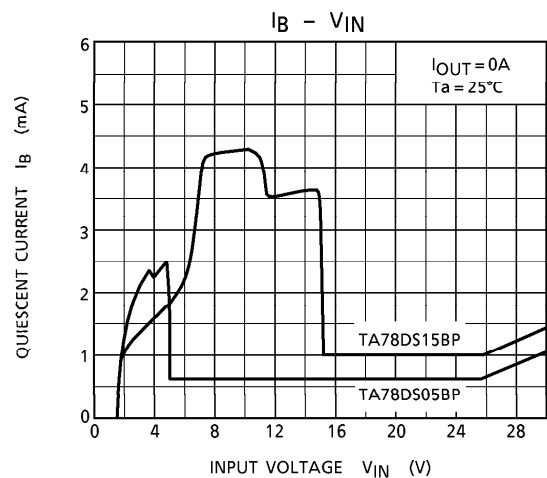
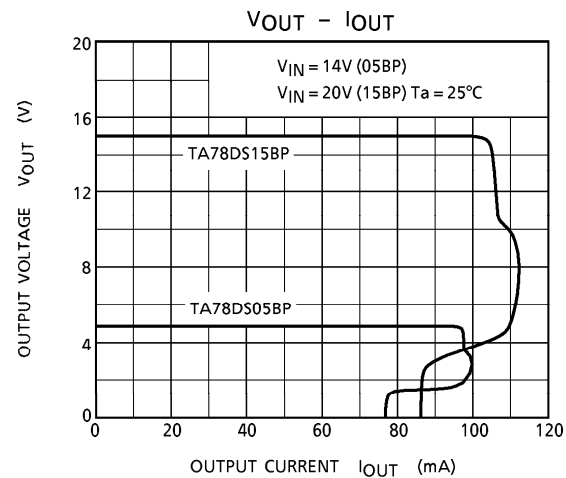
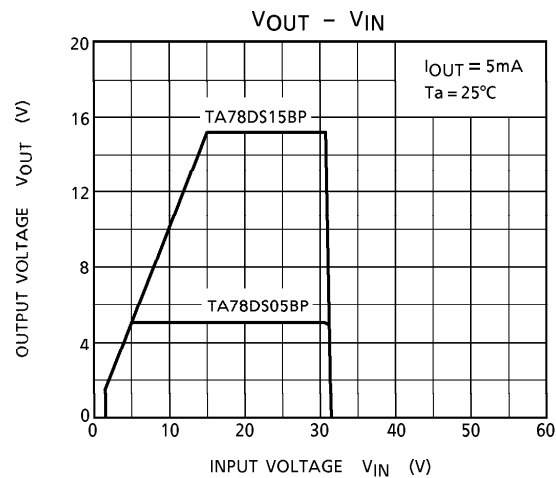
ELECTRICAL CHARACTERISTICS(Unless otherwise specified, $V_{IN} = 18V$, $I_{OUT} = 5mA$, $C_{IN} = 0.1\mu F$, $C_{OUT} = 3.3\mu F$, $T_j = 25^\circ C$)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	—	$12.35V \leq V_{IN} \leq 26V$	11.4	12.0	12.6	V
			$12.35V \leq V_{IN} \leq 26V$ $-40^\circ C \leq T_a \leq 85^\circ C$	10.8	12.0	13.2	
Line Regulation	Reg-Line	—	$16V \leq V_{IN} \leq 23V$	—	4	50	mV
			$13V \leq V_{IN} \leq 26V$	—	8	100	
Load Regulation	Reg-Load	—	$5.0mA \leq I_{OUT} \leq 30mA$	—	2	120	mV
Quiescent Current	I_B	—	$I_{OUT} = 0$	—	0.8	1.5	mA
			$13V \leq V_{IN} \leq 26V$, $I_{OUT} = 5mA$	—	1.0	1.5	
Dropout Voltage	V_D	—	$I_{OUT} = 5mA$	—	0.1	0.2	V
			$I_{OUT} = 10mA$	—	0.2	0.3	
Max. Operating Voltage	V_{IN}	—	—	29	33	—	V

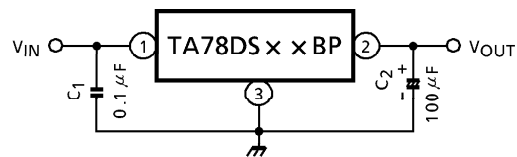
TA78DS15BP

ELECTRICAL CHARACTERISTICS(Unless otherwise specified, $V_{IN} = 20V$, $I_{OUT} = 5mA$, $C_{IN} = 0.1\mu F$, $C_{OUT} = 3.3\mu F$, $T_j = 25^\circ C$)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	—	$15.35V \leq V_{IN} \leq 26V$	14.25	15.0	15.75	V
			$15.35V \leq V_{IN} \leq 26V$ $-40^\circ C \leq T_a \leq 85^\circ C$	13.5	15.0	16.5	
Line Regulation	Reg-Line	—	$19V \leq V_{IN} \leq 26V$	—	5	60	mV
			$16V \leq V_{IN} \leq 26V$	—	8	130	
Load Regulation	Reg-Load	—	$5.0mA \leq I_{OUT} \leq 30mA$	—	1	150	mV
Quiescent Current	I_B	—	$I_{OUT} = 0$	—	1.0	1.6	mA
			$16V \leq V_{IN} \leq 26V$, $I_{OUT} = 5mA$	—	1.2	1.6	
Dropout Voltage	V_D	—	$I_{OUT} = 5mA$	—	0.1	0.2	V
			$I_{OUT} = 10mA$	—	0.2	0.3	
Max. Operating Voltage	V_{IN}	—	—	29	33	—	V



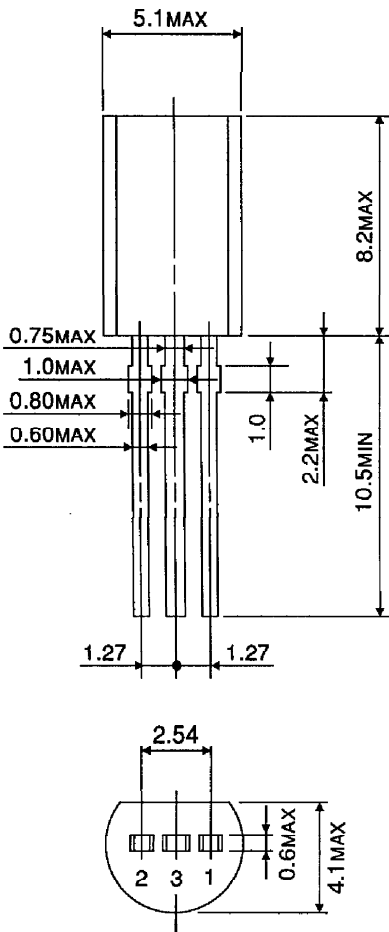
APPLICATION CIRCUIT



Capacitor C_2 must be guaranteed to operate of the temperature range that the regulator should be operated correctly, $100 \mu F$ is a suitable value to suppress the oscillation phenomenon at the output terminal.

OUTLINE DRAWING
SSIP3-P-1.27

Unit : mm



Weight : 0.36g (Typ.)