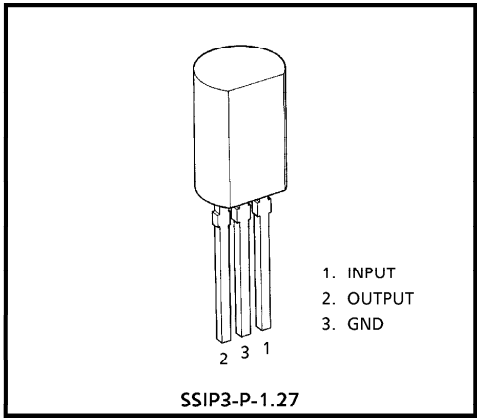


TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC  
**TA78DS05BP, TA78DS06BP, TA78DS08BP, TA78DS09BP**  
**TA78DS10BP, TA78DS12BP, TA78DS15BP, TA78DS05CP**

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

**LOW DROPOUT VOLTAGE REGULATOR**

The TA78DSx xBP 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.

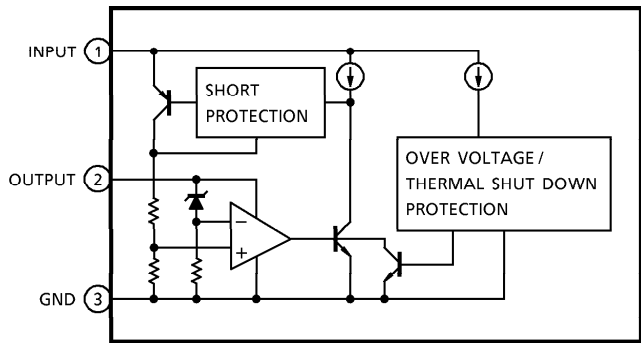


Weight : 0.36g (Typ.)

**FEATURES**

- Low Standby Current of 600 $\mu$ 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

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● The products described in this document are subject to foreign exchange and foreign trade control laws.

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● The information contained herein is subject to change without notice.

**MAXIMUM RATINGS** (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Operating Input Voltage	V <sub>IN</sub>	29	V
Input Voltage of Surge	V <sub>IN</sub>	60	V
Power Dissipation (Ta = 25°C)	P <sub>D</sub>	800	mW
Operating Temperature	T <sub>opr</sub>	- 40~85	°C
Storage Temperature	T <sub>stg</sub>	- 55~150	°C
Operating Junction Temperature	T <sub>j</sub>	- 40~150	°C
Thermal Resistance	R <sub>th(j-a)</sub>	156	°C/W
Soldering Temperature-Time	T <sub>sol</sub>	260 (10s)	°C

TA78DS05BP

**ELECTRICAL CHARACTERISTICS**

(Unless otherwise specified, V<sub>IN</sub> = 14V, I<sub>OUT</sub> = 5mA, C<sub>IN</sub> = 0.1μF, C<sub>OUT</sub> = 3.3μF, T<sub>j</sub> = 25°C)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V <sub>OUT</sub>	—	5.35V ≤ V <sub>IN</sub> ≤ 26V	4.75	5.0	5.25	V
			5.35V ≤ V <sub>IN</sub> ≤ 26V - 40°C ≤ Ta ≤ 85°C	4.5	5.0	5.5	
Line Regulation	Reg-Line	—	9.0V ≤ V <sub>IN</sub> ≤ 16V	—	1	10	mV
			6.0V ≤ V <sub>IN</sub> ≤ 26V	—	4	30	
Load Regulation	Reg-Load	—	5.0mA ≤ I <sub>OUT</sub> ≤ 30mA	—	1	50	mV
Quiescent Current	I <sub>B</sub>	—	I <sub>OUT</sub> = 0	—	0.6	1	mA
			6V ≤ V <sub>IN</sub> ≤ 26V, I <sub>OUT</sub> = 5mA	—	0.7	1	
Dropout Voltage	V <sub>D</sub>	—	I <sub>OUT</sub> = 5mA	—	0.1	0.2	V
			I <sub>OUT</sub> = 10mA	—	0.2	0.3	
Max. Operating Voltage	V <sub>IN</sub>	—	—	29	33	—	V

TA78DS05CP

**ELECTRICAL CHARACTERISTICS**

(Unless otherwise specified, V<sub>IN</sub> = 14V, I<sub>OUT</sub> = 5mA, C<sub>IN</sub> = 0.1μF, C<sub>OUT</sub> = 3.3μF, T<sub>j</sub> = 25°C)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V <sub>OUT</sub>	—	5.35V ≤ V <sub>IN</sub> ≤ 26V	4.8	5.0	5.2	V
			5.35V ≤ V <sub>IN</sub> ≤ 26V - 40°C ≤ Ta ≤ 85°C	4.75	5.0	5.25	
Line Regulation	Reg-Line	—	9.0V ≤ V <sub>IN</sub> ≤ 16V	—	1	10	mV
			6.0V ≤ V <sub>IN</sub> ≤ 26V	—	4	30	
Load Regulation	Reg-Load	—	5.0mA ≤ I <sub>OUT</sub> ≤ 30mA	—	1	50	mV
Quiescent Current	I <sub>B</sub>	—	I <sub>OUT</sub> = 0	—	0.6	1	mA
			6V ≤ V <sub>IN</sub> ≤ 26V, I <sub>OUT</sub> = 5mA	—	0.7	1	
Dropout Voltage	V <sub>D</sub>	—	I <sub>OUT</sub> = 5mA	—	0.1	0.2	V
			I <sub>OUT</sub> = 10mA	—	0.2	0.3	
Max. Operating Voltage	V <sub>IN</sub>	—	—	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,  $V_{IN} = 18V$ ,  $I_{OUT} = 5mA$ ,  $C_{IN} = 0.1\mu F$ ,  $C_{OUT} = 3.3\mu F$ ,  $T_j = 25^\circ C$ )

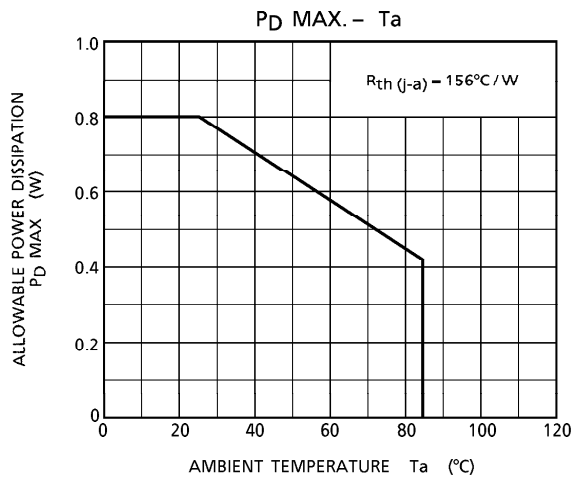
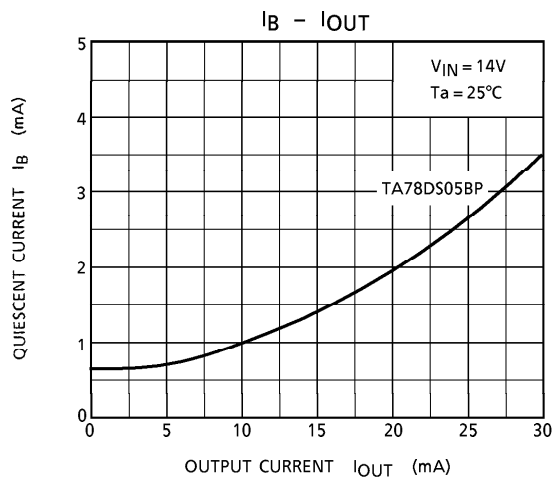
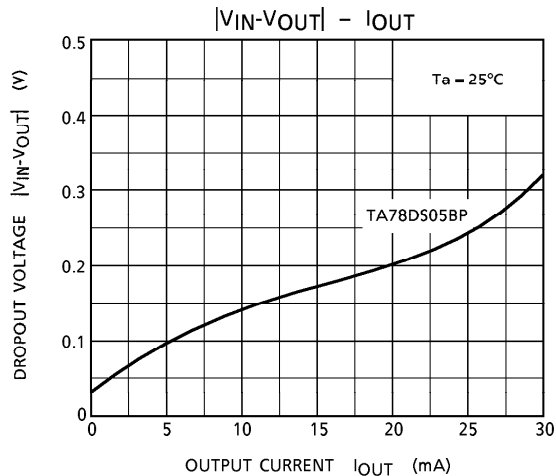
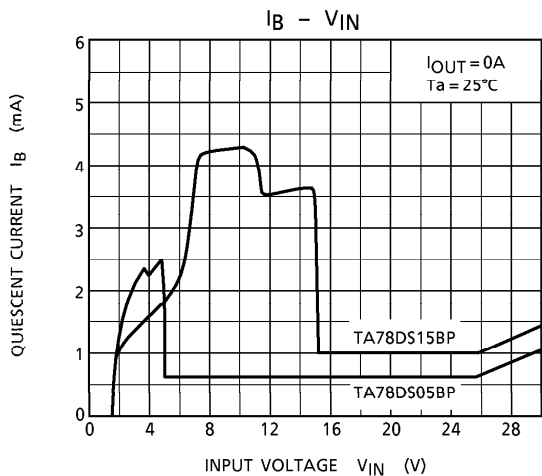
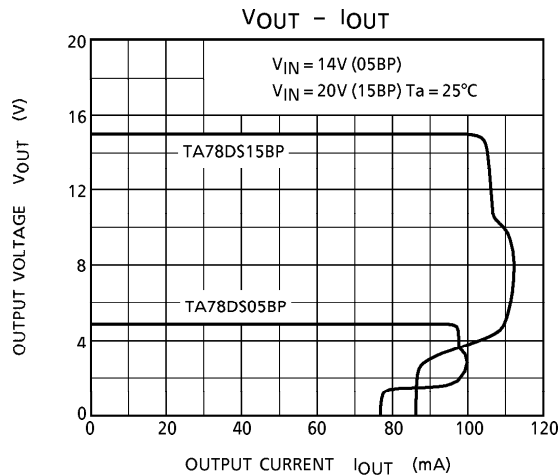
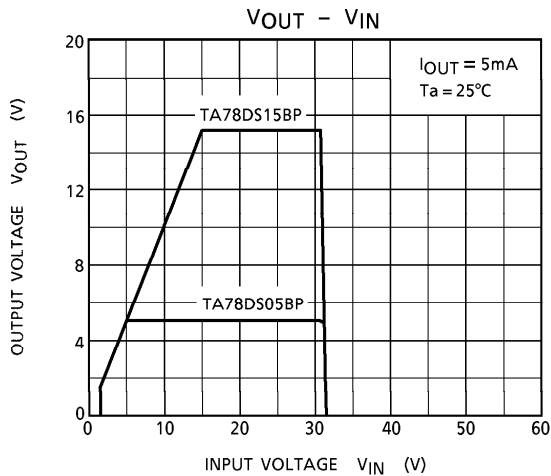
CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_{OUT}$	—	$12.35V \leq V_{IN} \leq 26V$	11.4	12.0	12.6	V
			$12.35V \leq V_{IN} \leq 26V$ $-40^\circ C \leq T_a \leq 85^\circ C$	10.8	12.0	13.2	
Line Regulation	Reg-Line	—	$16V \leq V_{IN} \leq 23V$	—	4	50	mV
			$13V \leq V_{IN} \leq 26V$	—	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

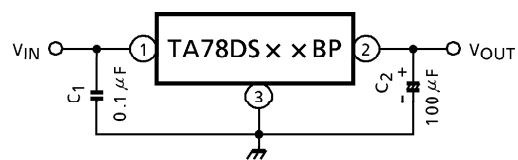
**ELECTRICAL CHARACTERISTICS**

(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



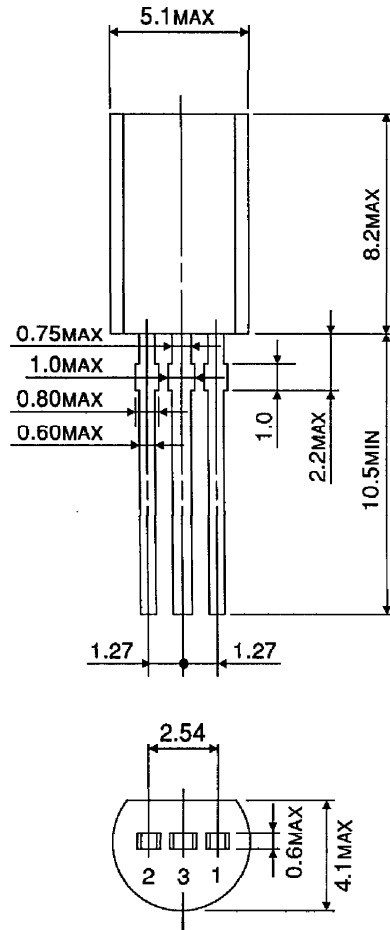
## APPLICATION CIRCUIT



Capacitor  $C_2$  must be guaranteed to operate of the temperature range that the regulator should be operated correctly, 100  $\mu\text{F}$  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.)