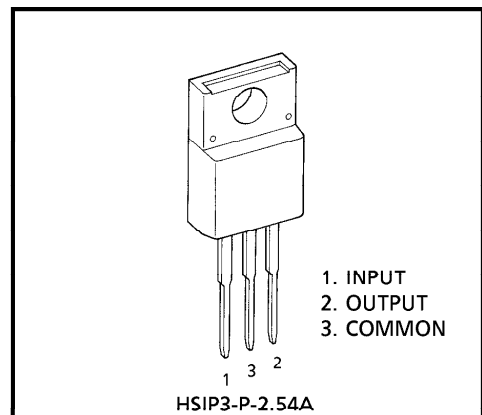## TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT   SILICON MONOLITHIC

TA7805S, TA78057S, TA7806S, TA7807S, TA7808S, TA7809S
TA7810S, TA7812S, TA7815S, TA7818S, TA7820S, TA7824S

THREE TERMINAL POSITIVE VOLTAGE REGULATORS

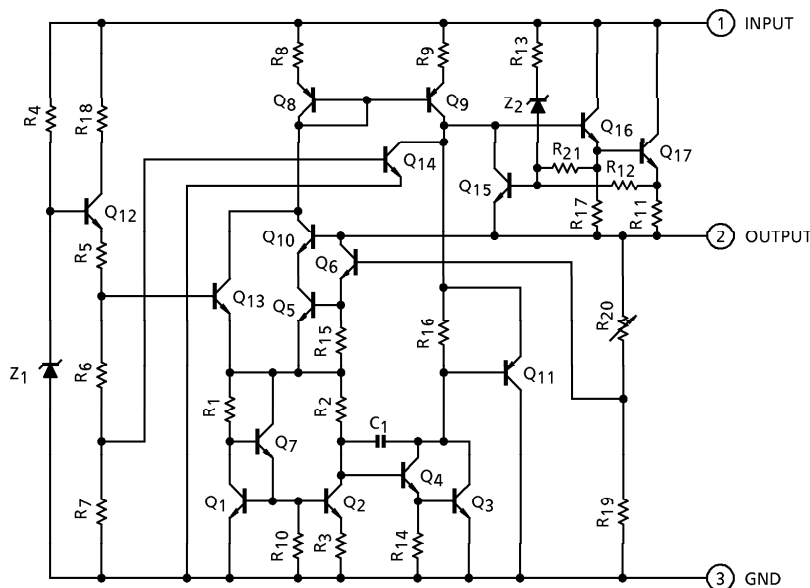# 5V, 5.7V, 6V, 7V, 8V, 9V, 10V, 12V, 15V, 18V, 20V, 24V

FEATURES

- Suitable for CMOS, TTL, the other digital IC's power supply

- Internal thermal overload protection

- Internal short circuit current limiting

- Output current in excess of 1A

- Metal Fin (Tab) is fully covered with Mold Resin. (T0-220 NIS package)

1. INPUT
2. OUTPUT
3. COMMON

HSIP3-P-2.54A

Weight : 1.7g (Typ.)

EQUIVALENT CIRCUIT

961001EBA2

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Input Voltage	TA7805S	V_{IN}	35	V
	TA78057S			
	TA7806S			
	TA7807S			
	TA7808S			
	TA7809S			
	TA7810S			
	TA7812S			
	TA7815S			
	TA7818S		40	
	TA7820S			
	TA7824S			
Power Dissipation	(Ta = 25°C)	P_D	2	W
	(Tc = 25°C)		20	
Operating Temperature		T_{opr}	−30~75	°C
Storage Temperature		T_{stg}	−55~150	°C
Operating Junction Temperature		T_j	−30~150	°C
Thermal Resistance		$R_{th\,(j\text{-}c)}$	6.25	°C / W
		$R_{th\,(j\text{-}a)}$	62.5	

TA7805S
ELECTRICAL CHARACTERISTICS (V_{IN} = 10V, I_{OUT} = 500mA, 0°C $\leq T_j \leq$ 125°C, unless otherwise specified)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	1	T_j = 25°C, I_{OUT} = 100mA		4.8	5.0	5.2	V
Line Regulation	Reg.line	1	T_j = 25°C	7.0V $\leq V_{IN} \leq$ 25V	—	3	100	mV
				8.0V $\leq V_{IN} \leq$ 12V	—	1	50	
Load Regulation	Reg.load	1	T_j = 25°C	5mA $\leq I_{OUT} \leq$ 1.4A	—	15	100	mV
				250mA $\leq I_{OUT} \leq$ 750mA	—	5	50	
Output Voltage	V_{OUT}	1	T_j = 25°C	7.0V $\leq V_{IN} \leq$ 20V 5.0mA $\leq I_{OUT} \leq$ 1.0A, $P_D \leq$ 15W	4.75	—	5.25	V
Quiescent Current	I_B	1	T_j = 25°C, I_{OUT} = 5mA		—	4.2	8.0	mA
Quiescent Current Change	ΔI_B	1	7.0V $\leq V_{IN} \leq$ 25V		—	—	1.3	mA
Output Noise Voltage	V_{NO}	2	Ta = 25°C, 10Hz $\leq$ f $\leq$ 100kHz I_{OUT} = 50mA		—	50	—	μV_{rms}
Ripple Rejection	R.R.	3	f = 120Hz, 8.0V $\leq V_{IN} \leq$ 18V I_{OUT} = 50mA, T_j = 25°C		62	78	—	dB
Dropout Voltage	V_D	1	I_{OUT} = 1.0A, T_j = 25°C		—	2.0	—	V
Short Circuit Current Limit	I_{SC}	1	T_j = 25°C		—	1.6	—	A
Average Temperature Coefficient of Output Voltage	T_{CVO}	1	I_{OUT} = 5mA		—	−0.6	—	mV / °C

TA78057S

ELECTRICAL CHARACTERISTICS (V_{IN} = 10.7V, I_{OUT} = 500mA, 0°C ≤ T_j ≤ 125°C, unless otherwise specified)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	1	T_j = 25°C, I_{OUT} = 100mA		5.47	5.7	5.93	V
Line Regulation	Reg.line	1	T_j = 25°C	7.7V ≤ V_{IN} ≤ 25V	—	4	110	mV
				8.7V ≤ V_{IN} ≤ 12.7V	—	2	55	
Load Regulation	Reg.load	1	T_j = 25°C	5mA ≤ I_{OUT} ≤ 1.4A	—	15	110	mV
				250mA ≤ I_{OUT} ≤ 750mA	—	5	55	
Output Voltage	V_{OUT}	1	T_j = 25°C	7.7V ≤ V_{IN} ≤ 20.7V 5.0mA ≤ I_{OUT} ≤ 1.0A, P_D ≤ 15W	5.42	—	5.98	V
Quiescent Current	I_B	1	T_j = 25°C, I_{OUT} = 5mA		—	4.3	8.0	mA
Quiescent Current Change	ΔI_B	1	7.7V ≤ V_{IN} ≤ 25V		—	—	1.3	mA
Output Noise Voltage	V_{NO}	2	Ta = 25°C, 10Hz ≤ f ≤ 100kHz I_{OUT} = 50mA		—	55	—	μV_{rms}
Ripple Rejection	R.R.	3	f = 120Hz, 8.8V ≤ V_{IN} ≤ 18.8V I_{OUT} = 50mA, T_j = 25°C		62	77	—	dB
Dropout Voltage	V_D	1	I_{OUT} = 1.0A, T_j = 25°C		—	2.0	—	V
Short Circuit Current Limit	I_{SC}	1	T_j = 25°C		—	1.5	—	A
Average Temperature Coefficient of Output Voltage	T_{CVO}	1	I_{OUT} = 5mA		—	−0.7	—	mV / °C

TA7806S

ELECTRICAL CHARACTERISTICS ($V_{IN} = 11V$, $I_{OUT} = 500mA$, $0°C \leqq T_j \leqq 125°C$, unless otherwise specified)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	1	$T_j = 25°C$, $I_{OUT} = 100mA$		5.75	6.0	6.25	V
Line Regulation	Reg.line	1	$T_j = 25°C$	$8.0V \leqq V_{IN} \leqq 25V$	—	4	120	mV
				$9V \leqq V_{IN} \leqq 13V$	—	2	60	
Load Regulation	Reg.load	1	$T_j = 25°C$	$5mA \leqq I_{OUT} \leqq 1.4A$	—	15	120	mV
				$250mA \leqq I_{OUT} \leqq 750mA$	—	5	60	
Output Voltage	V_{OUT}	1	$T_j = 25°C$ $8V \leqq V_{IN} \leqq 21V$ $5.0mA \leqq I_{OUT} \leqq 1.0A$, $P_D \leqq 15W$		5.7	—	6.3	V
Quiescent Current	I_B	1	$T_j = 25°C$, $I_{OUT} = 5mA$		—	4.3	8.0	mA
Quiescent Current Change	ΔI_B	1	$8.0V \leqq V_{IN} \leqq 25V$		—	—	1.3	mA
Output Noise Voltage	V_{NO}	2	$Ta = 25°C$, $10Hz \leqq f \leqq 100kHz$ $I_{OUT} = 50mA$		—	55	—	μV_{rms}
Ripple Rejection	R.R.	3	$f = 120Hz$, $9V \leqq V_{IN} \leqq 19V$ $I_{OUT} = 50mA$, $T_j = 25°C$		61	77	—	dB
Dropout Voltage	V_D	1	$I_{OUT} = 1.0A$, $T_j = 25°C$		—	2.0	—	V
Short Circuit Current Limit	I_{SC}	1	$T_j = 25°C$		—	1.5	—	A
Average Temperature Coefficient of Output Voltage	T_{CVO}	1	$I_{OUT} = 5mA$		—	−0.7	—	mV / °C

TA7807S
ELECTRICAL CHARACTERISTICS ($V_{IN} = 12V$, $I_{OUT} = 500mA$, $0°C \leqq T_j \leqq 125°C$, unless otherwise specified)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	1	$T_j = 25°C$, $I_{OUT} = 100mA$		6.72	7.0	7.28	V
Line Regulation	Reg.line	1	$T_j = 25°C$	$9V \leqq V_{IN} \leqq 25V$	—	5	140	mV
				$10V \leqq V_{IN} \leqq 14V$	—	2	70	
Load Regulation	Reg.load	1	$T_j = 25°C$	$5mA \leqq I_{OUT} \leqq 1.4A$	—	15	140	mV
				$250mA \leqq I_{OUT} \leqq 750mA$	—	5	70	
Output Voltage	V_{OUT}	1	$T_j = 25°C$ $9V \leqq V_{IN} \leqq 22V$ $5.0mA \leqq I_{OUT} \leqq 1.0A$, $P_D \leqq 15W$		6.65	—	7.35	V
Quiescent Current	I_B	1	$T_j = 25°C$, $I_{OUT} = 5mA$		—	4.3	8.0	mA
Quiescent Current Change	ΔI_B	1	$9V \leqq V_{IN} \leqq 25V$		—	—	1.3	mA
Output Noise Voltage	V_{NO}	2	$Ta = 25°C$, $10Hz \leqq f \leqq 100kHz$ $I_{OUT} = 50mA$		—	60	—	μV_{rms}
Ripple Rejection	R.R.	3	$f = 120Hz$, $10V \leqq V_{IN} \leqq 20V$ $I_{OUT} = 50mA$, $T_j = 25°C$		59	75	—	dB
Dropout Voltage	V_D	1	$I_{OUT} = 1.0A$, $T_j = 25°C$		—	2.0	—	V
Short Circuit Current Limit	I_{SC}	1	$T_j = 25°C$		—	1.3	—	A
Average Temperature Coefficient of Output Voltage	T_{CVO}	1	$I_{OUT} = 5mA$		—	−0.8	—	mV / °C

TA7808S
ELECTRICAL CHARACTERISTICS (V_{IN} = 14V, I_{OUT} = 500mA, 0°C ≦ T_j ≦ 125°C, unless otherwise specified)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	1	T_j = 25°C, I_{OUT} = 100mA		7.7	8.0	8.3	V
Line Regulation	Reg.line	1	T_j = 25°C	10.5V ≦ V_{IN} ≦ 25V	—	6	160	mV
				11V ≦ V_{IN} ≦ 17V	—	2	80	
Load Regulation	Reg.load	1	T_j = 25°C	5mA ≦ I_{OUT} ≦ 1.4A	—	12	160	mV
				250mA ≦ I_{OUT} ≦ 750mA	—	4	80	
Output Voltage	V_{OUT}	1	T_j = 25°C	10.5V ≦ V_{IN} ≦ 23V 5.0mA ≦ I_{OUT} ≦ 1.0A, P_D ≦ 15W	7.6	—	8.4	V
Quiescent Current	I_B	1	T_j = 25°C, I_{OUT} = 5mA		—	4.3	8.0	mA
Quiescent Current Change	ΔI_B	1	10.5V ≦ V_{IN} ≦ 25V		—	—	1.0	mA
Output Noise Voltage	V_{NO}	2	Ta = 25°C, 10Hz ≦ f ≦ 100kHz I_{OUT} = 50mA		—	70	—	μV_{rms}
Ripple Rejection	R.R.	3	f = 120Hz, 11.5V ≦ V_{IN} ≦ 21.5V I_{OUT} = 50mA, T_j = 25°C		58	74	—	dB
Dropout Voltage	V_D	1	I_{OUT} = 1.0A, T_j = 25°C		—	2.0	—	V
Short Circuit Current Limit	I_{SC}	1	T_j = 25°C		—	1.1	—	A
Average Temperature Coefficient of Output Voltage	T_{CVO}	1	I_{OUT} = 5mA		—	– 1.0	—	mV / °C

TA7809S
ELECTRICAL CHARACTERISTICS (V_{IN} = 15V, I_{OUT} = 500mA, 0°C ≦ T_j ≦ 125°C, unless otherwise specified)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	1	T_j = 25°C, I_{OUT} = 100mA		8.64	9.0	9.36	V
Line Regulation	Reg.line	1	T_j = 25°C	11.5V ≦ V_{IN} ≦ 26V	—	7	180	mV
				13V ≦ V_{IN} ≦ 19V	—	2.5	90	
Load Regulation	Reg.load	1	T_j = 25°C	5mA ≦ I_{OUT} ≦ 1.4A	—	12	180	mV
				250mA ≦ I_{OUT} ≦ 750mA	—	4	90	
Output Voltage	V_{OUT}	1	T_j = 25°C	11.5V ≦ V_{IN} ≦ 24V 5.0mA ≦ I_{OUT} ≦ 1.0A, P_D ≦ 15W	8.55	—	9.45	V
Quiescent Current	I_B	1	T_j = 25°C, I_{OUT} = 5mA		—	4.3	8.0	mA
Quiescent Current Change	ΔI_B	1	11.5V ≦ V_{IN} ≦ 26V		—	—	1.0	mA
Output Noise Voltage	V_{NO}	2	Ta = 25°C, 10Hz ≦ f ≦ 100kHz I_{OUT} = 50mA		—	75	—	μV_{rms}
Ripple Rejection	R.R.	3	f = 120Hz, 12.5V ≦ V_{IN} ≦ 22.5V I_{OUT} = 50mA, T_j = 25°C		56	72	—	dB
Dropout Voltage	V_D	1	I_{OUT} = 1.0A, T_j = 25°C		—	2.0	—	V
Short Circuit Current Limit	I_{SC}	1	T_j = 25°C		—	1.0	—	A
Average Temperature Coefficient of Output Voltage	T_{CVO}	1	I_{OUT} = 5mA		—	− 1.1	—	mV / °C

TA7810S
ELECTRICAL CHARACTERISTICS ($V_{IN} = 16V$, $I_{OUT} = 500mA$, $0°C \leqq T_j \leqq 125°C$, unless otherwise specified)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	1	$T_j = 25°C$, $I_{OUT} = 100mA$		9.6	10.0	10.4	V
Line Regulation	Reg.line	1	$T_j = 25°C$	$12.5V \leqq V_{IN} \leqq 27V$	—	8	200	mV
				$14V \leqq V_{IN} \leqq 20V$	—	2.5	100	
Load Regulation	Reg.load	1	$T_j = 25°C$	$5mA \leqq I_{OUT} \leqq 1.4A$	—	12	200	mV
				$250mA \leqq I_{OUT} \leqq 750mA$	—	4	100	
Output Voltage	V_{OUT}	1	$T_j = 25°C$ $12.5V \leqq V_{IN} \leqq 25V$ $5.0mA \leqq I_{OUT} \leqq 1.0A$, $P_D \leqq 15W$		9.5	—	10.5	V
Quiescent Current	I_B	1	$T_j = 25°C$, $I_{OUT} = 5mA$		—	4.3	8.0	mA
Quiescent Current Change	ΔI_B	1	$12.5V \leqq V_{IN} \leqq 27V$		—	—	1.0	mA
Output Noise Voltage	V_{NO}	2	$Ta = 25°C$, $10Hz \leqq f \leqq 100kHz$ $I_{OUT} = 50mA$		—	80	—	μV_{rms}
Ripple Rejection	R.R.	3	$f = 120Hz$, $13.5V \leqq V_{IN} \leqq 23.5V$ $I_{OUT} = 50mA$, $T_j = 25°C$		55	72	—	dB
Dropout Voltage	V_D	1	$I_{OUT} = 1.0A$, $T_j = 25°C$		—	2.0	—	V
Short Circuit Current Limit	I_{SC}	1	$T_j = 25°C$		—	0.9	—	A
Average Temperature Coefficient of Output Voltage	T_{CVO}	1	$I_{OUT} = 5mA$		—	−1.3	—	mV / °C

TA7812S

ELECTRICAL CHARACTERISTICS (V_{IN} = 19V, I_{OUT} = 500mA, 0°C $\leq T_j \leq$ 125°C, unless otherwise specified)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	1	T_j = 25°C, I_{OUT} = 100mA		11.5	12.0	12.5	V
Line Regulation	Reg.line	1	T_j = 25°C	14.5V $\leq V_{IN} \leq$ 30V	—	10	240	mV
				16V $\leq V_{IN}$ = 22V	—	3	120	
Load Regulation	Reg.load	1	T_j = 25°C	5mA $\leq I_{OUT} \leq$ 1.4A	—	12	240	mV
				250mA $\leq I_{OUT} \leq$ 750mA	—	4	120	
Output Voltage	V_{OUT}	1	T_j = 25°C	14.5V $\leq V_{IN} \leq$ 27V 5.0mA $\leq I_{OUT} \leq$ 1.0A, $P_D \leq$ 15W	11.4	—	12.6	V
Quiescent Current	I_B	1	T_j = 25°C, I_{OUT} = 5mA		—	4.3	8.0	mA
Quiescent Current Change	ΔI_B	1	14.5V $\leq V_{IN} \leq$ 30V		—	—	1.0	mA
Output Noise Voltage	V_{NO}	2	Ta = 25°C, 10Hz $\leq f \leq$ 100kHz I_{OUT} = 50mA		—	90	—	μV_{rms}
Ripple Rejection	R.R.	3	f = 120Hz, 15V $\leq V_{IN} \leq$ 25V I_{OUT} = 50mA, T_j = 25°C		55	71	—	dB
Dropout Voltage	V_D	1	I_{OUT} = 1.0A, T_j = 25°C		—	2.0	—	V
Short Circuit Current Limit	I_{SC}	1	T_j = 25°C		—	0.7	—	A
Average Temperature Coefficient of Output Voltage	T_{CVO}	1	I_{OUT} = 5mA		—	– 1.6	—	mV / °C

TA7815S
ELECTRICAL CHARACTERISTICS ($V_{IN} = 23V$, $I_{OUT} = 500mA$, $0°C \leq T_j \leq 125°C$, unless otherwise specified)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	1	$T_j = 25°C$, $I_{OUT} = 100mA$		14.4	15.0	15.6	V
Line Regulation	Reg.line	1	$T_j = 25°C$	$17.5V \leq V_{IN} \leq 30V$	—	11	300	mV
				$20V \leq V_{IN} \leq 26V$	—	3	150	
Load Regulation	Reg.load	1	$T_j = 25°C$	$5mA \leq I_{OUT} \leq 1.4A$	—	12	300	mV
				$250mA \leq I_{OUT} \leq 750mA$	—	4	150	
Output Voltage	V_{OUT}	1	$T_j = 25°C$ $17.5V \leq V_{IN} \leq 30V$ $5.0mA \leq I_{OUT} \leq 1.0A$, $P_D \leq 15W$		14.25	—	15.75	V
Quiescent Current	I_B	1	$T_j = 25°C$, $I_{OUT} = 5mA$		—	4.4	8.0	mA
Quiescent Current Change	ΔI_B	1	$17.5V \leq V_{IN} \leq 30V$		—	—	1.0	mA
Output Noise Voltage	V_{NO}	2	$Ta = 25°C$, $10Hz \leq f \leq 100kHz$ $I_{OUT} = 50mA$		—	110	—	μV_{rms}
Ripple Rejection	R.R.	3	$f = 120Hz$, $18.5V \leq V_{IN} \leq 28.5V$ $I_{OUT} = 50mA$, $T_j = 25°C$		54	70	—	dB
Dropout Voltage	V_D	1	$I_{OUT} = 1.0A$, $T_j = 25°C$		—	2.0	—	V
Short Circuit Current Limit	I_{SC}	1	$T_j = 25°C$		—	0.5	—	A
Average Temperature Coefficient of Output Voltage	T_{CVO}	1	$I_{OUT} = 5mA$		—	−2.0	—	mV / °C

TA7818S
ELECTRICAL CHARACTERISTICS (V_{IN} = 27V, I_{OUT} = 500mA, 0°C ≦ T_j ≦ 125°C, unless otherwise specified)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	1	T_j = 25°C, I_{OUT} = 100mA		17.3	18.0	18.7	V
Line Regulation	Reg.line	1	T_j = 25°C	21V ≦ V_{IN} ≦ 33V	—	13	360	mV
				24V ≦ V_{IN} ≦ 30V	—	4	180	
Load Regulation	Reg.load	1	T_j = 25°C	5mA ≦ I_{OUT} ≦ 1.4A	—	12	360	mV
				250mA ≦ I_{OUT} ≦ 750mA	—	4	180	
Output Voltage	V_{OUT}	1	T_j = 25°C	21V ≦ V_{IN} ≦ 33V 5.0mA ≦ I_{OUT} ≦ 1.0A, P_D ≦ 15W	17.1	—	18.9	V
Quiescent Current	I_B	1	T_j = 25°C, I_{OUT} = 5mA		—	4.5	8.0	mA
Quiescent Current Change	ΔI_B	1	21V ≦ V_{IN} ≦ 33V		—	—	1.0	mA
Output Noise Voltage	V_{NO}	2	Ta = 25°C, 10Hz ≦ f ≦ 100kHz I_{OUT} = 50mA		—	125	—	μV_{rms}
Ripple Rejection	R.R.	3	f = 120Hz, 22V ≦ V_{IN} ≦ 32V I_{OUT} = 50mA, T_j = 25°C		52	68	—	dB
Dropout Voltage	V_D	1	I_{OUT} = 1.0A, T_j = 25°C		—	2.0	—	V
Short Circuit Current Limit	I_{SC}	1	T_j = 25°C		—	0.4	—	A
Average Temperature Coefficient of Output Voltage	T_{CVO}	1	I_{OUT} = 5mA		—	−2.5	—	mV / °C

TA7820S
ELECTRICAL CHARACTERISTICS (V_{IN} = 29V, I_{OUT} = 500mA, 0°C ≤ T_j ≤ 125°C, unless otherwise specified)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	1	T_j = 25°C, I_{OUT} = 100mA		19.2	20.0	20.8	V
Line Regulation	Reg.line	1	T_j = 25°C	23V ≤ V_{IN} ≤ 35V	—	15	400	mV
				26V ≤ V_{IN} ≤ 32V	—	5	200	
Load Regulation	Reg.load	1	T_j = 25°C	5mA ≤ I_{OUT} ≤ 1.4A	—	12	400	mV
				250mA ≤ I_{OUT} ≤ 750mA	—	4	200	
Output Voltage	V_{OUT}	1	T_j = 25°C 23V ≤ V_{IN} ≤ 35V 5.0mA ≤ I_{OUT} ≤ 1.0A, P_D ≤ 15W		19.0	—	21.0	V
Quiescent Current	I_B	1	T_j = 25°C, I_{OUT} = 5mA		—	4.6	8.0	mA
Quiescent Current Change	ΔI_B	1	23V ≤ V_{IN} ≤ 35V		—	—	1.0	mA
Output Noise Voltage	V_{NO}	2	Ta = 25°C, 10Hz ≤ f ≤ 100kHz I_{OUT} = 50mA		—	135	—	μV_{rms}
Ripple Rejection	R.R.	3	f = 120Hz, 24V ≤ V_{IN} ≤ 34V I_{OUT} = 50mA, T_j = 25°C		50	66	—	dB
Dropout Voltage	V_D	1	I_{OUT} = 1.0A, T_j = 25°C		—	2.0	—	V
Short Circuit Current Limit	I_{SC}	1	T_j = 25°C		—	0.4	—	A
Average Temperature Coefficient of Output Voltage	T_{CVO}	1	I_{OUT} = 5mA		—	− 3.0	—	mV / °C

TA7824S

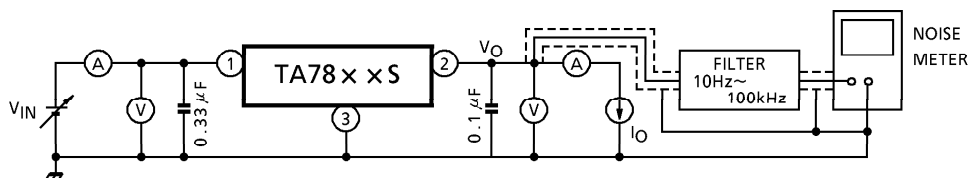**ELECTRICAL CHARACTERISTICS** ($V_{IN} = 33V$, $I_{OUT} = 500mA$, $0°C \leqq T_j \leqq 125°C$, unless otherwise specified)

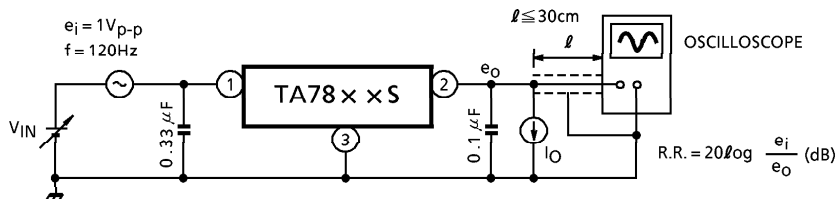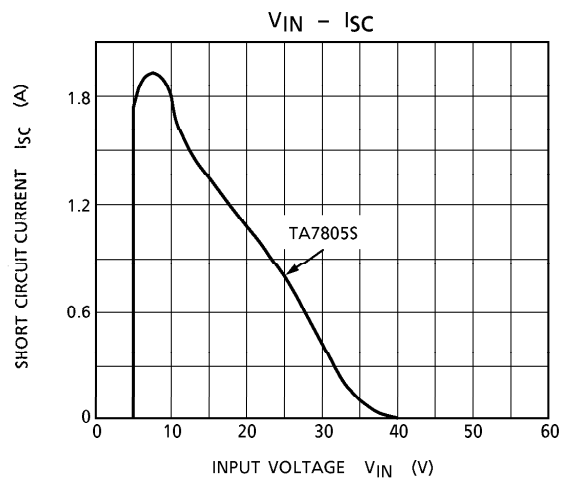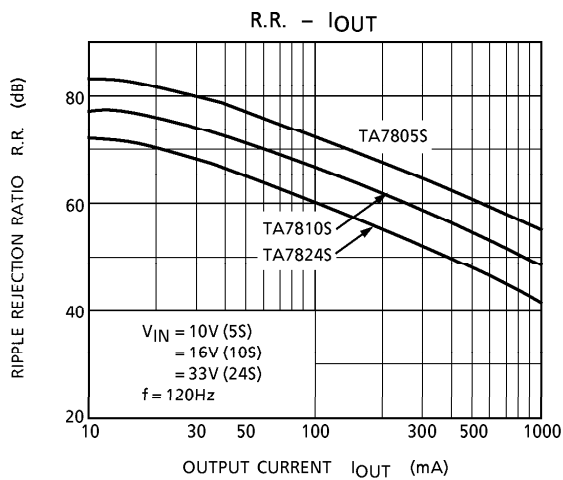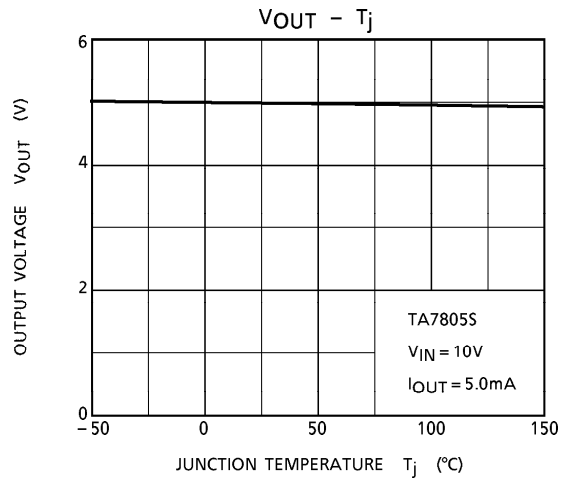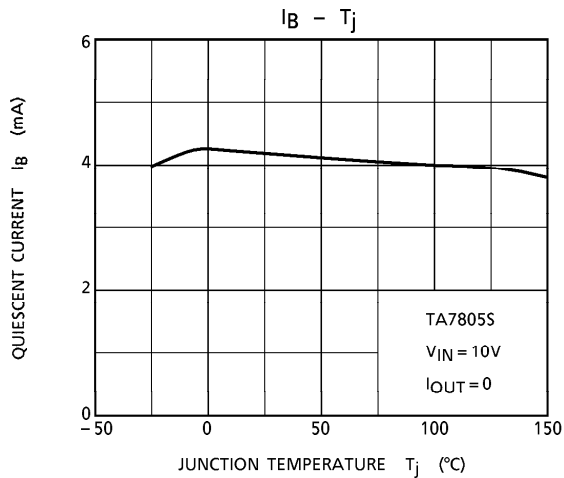| CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	1	$T_j = 25°C$, $I_{OUT} = 100mA$		23.0	24.0	25.0	V
Line Regulation	Reg.line	1	$T_j = 25°C$	$27V \leqq V_{IN} \leqq 38V$	—	18	480	mV
				$30V \leqq V_{IN} \leqq 36V$	—	6	240	
Load Regulation	Reg.load	1	$T_j = 25°C$	$5mA \leqq I_{OUT} \leqq 1.4A$	—	12	480	mV
				$250mA \leqq I_{OUT} \leqq 750mA$	—	4	240	
Output Voltage	V_{OUT}	1	$T_j = 25°C$ $27V \leqq V_{IN} \leqq 38V$ $5.0mA \leqq I_{OUT} \leqq 1.0A$, $P_D \leqq 15W$		22.8	—	25.2	V
Quiescent Current	I_B	1	$T_j = 25°C$, $I_{OUT} = 5mA$		—	4.6	8.0	mA
Quiescent Current Change	ΔI_B	1	$27V \leqq V_{IN} \leqq 38V$		—	—	1.0	mA
Output Noise Voltage	V_{NO}	2	$Ta = 25°C$, $10Hz \leqq f \leqq 100kHz$ $I_{OUT} = 50mA$		—	150	—	μV_{rms}
Ripple Rejection	R.R.	3	$f = 120Hz$, $28V \leqq V_{IN} \leqq 38V$ $I_{OUT} = 50mA$, $T_j = 25°C$		50	66	—	dB
Dropout Voltage	V_D	1	$I_{OUT} = 1.0A$, $T_j = 25°C$		—	2.0	—	V
Short Circuit Current Limit	I_{SC}	1	$T_j = 25°C$		—	0.3	—	A
Average Temperature Coefficient of Output Voltage	T_{CVO}	1	$I_{OUT} = 5mA$		—	−3.5	—	mV / °C

TEST CIRCUIT 1 / STANDARD APPLICATION CIRCUIT
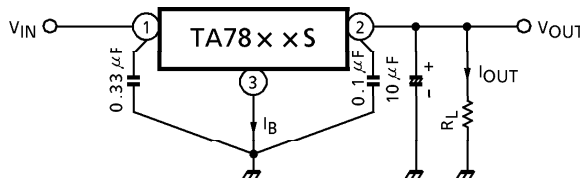
TEST CIRCUIT 2 V_{NO}

TEST CIRCUIT 3 R.R.

$R.R. = 20\ell og \dfrac{e_i}{e_o}$ (dB)

$I_B - T_j$

QUIESCENT CURRENT I_B (mA)

TA7805S
$V_{IN} = 10V$
$I_{OUT} = 0$

JUNCTION TEMPERATURE T_j (°C)

$V_{OUT} - T_j$

OUTPUT VOLTAGE V_{OUT} (V)

TA7805S
$V_{IN} = 10V$
$I_{OUT} = 5.0mA$

JUNCTION TEMPERATURE T_j (°C)

R.R. $- I_{OUT}$

RIPPLE REJECTION RATIO R.R. (dB)

TA7805S
TA7810S
TA7824S

$V_{IN} = 10V$ (5S)
$= 16V$ (10S)
$= 33V$ (24S)
$f = 120Hz$

OUTPUT CURRENT I_{OUT} (mA)

$V_{IN} - I_{SC}$

SHORT CIRCUIT CURRENT I_{SC} (A)

TA7805S

INPUT VOLTAGE V_{IN} (V)

10

$V_D - T_j$

$\Delta V_O = 2\%$ OF OUTPUT VOLTAGE

DROPOUT VOLTAGE V_D (V)

$I_{OUT} = 1A$
200mA
0

JUNCTION TEMPERATURE T_j (°C)

$P_D - Ta$

ALLOWABLE POWER DISSIPATION P_D (W)

THERMAL RESISTANCE	
J-C	J-A
6.0	62.5

°C / W

$Tc = Ta$

(NO HEAT SINK)

AMBIENT TEMPERATURE Ta (°C)

$Z_{OUT} - f$

TA7805S
$V_{IN} = 10V$
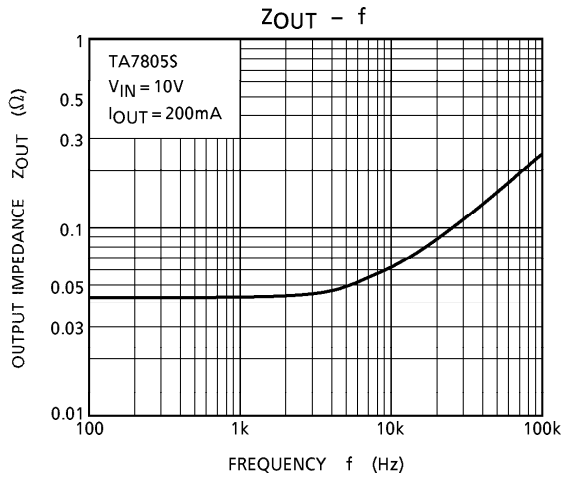$I_{OUT} = 200mA$

Axis labels:
OUTPUT IMPEDANCE Z_{OUT} (Ω)

FREQUENCY f (Hz)

## PRECAUTIONS ON APPLICATION

(1)   In regard to GND, be careful not to apply a negative voltage to the input/output terminal. Further, special care is necessary in case of a voltage boost application.

(2)   When a surge voltage exceeding maximum rating is applied to the input terminal or when a voltage in excess of the input terminal voltage is applied to the output terminal, the circuit may be destroyed.
Specially, in the latter case, great care is necessary.
Further, if the input terminal shorts to GND in a state of normal operation, the output terminal voltage becomes higher than the input voltage (GND potential), and the electric charge of a chemical capacitor connected to the output terminal flows into the input side, which may cause the destruction of circuit.
In these cases, take such steps as a zener diode and a general silicon diode are connected to the circuit, as shown in the following figure.
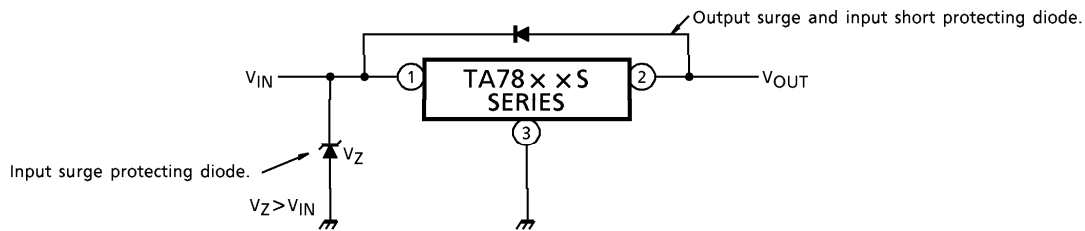
(3)   When the input voltage is too high, the power dissipation of three terminal regulator increases because of series regulator, so that the junction temperature rises. In such a case, it is recommended to reduce the power dissipation by inserting the power limiting resistor R_{SD} in the input terminal, and to reduce the junction temperature as a result.
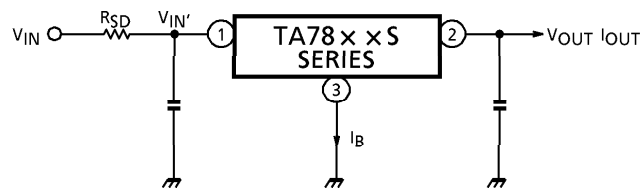
The power dissipation P_D of IC is expressed in the following equation.

$$P_D = (V_{IN}' - V_{OUT}) \cdot I_{OUT} + V_{IN}' \cdot I_B$$

If V_{IN}' is reduced below the lowest voltage necessary for the IC, the parasitic oscillation will be caused according to circumstances.
In determing the resistance value of R_{SD}, design with margin should be made by making reference to the following equation.

$$R_{SD} < \frac{V_{IN} - V_{IN}'}{I_{OUT} + I_B}$$

(4)   Connect the input terminal and GND, and the output terminal and GND, by capacitor respectively. The capacitances should be determined experimentally because they depend on prented patterns. In particular, adequate investigation should be made so that there is no problem even at time of high or low temperature.

(5)   Installation of IC for power supply
For obtaining high reliability on the heat sink design of the regulator IC, it is generally required to derate more than 20% of maximum junction temperature $(T_j$ MAX.) .
Further, full consideration should be given to the installation of IC to the heat sink.

(a)   Heat sink design

The thermal resistance of IC itself is required from the viewpoint of the design of elements, but the thermal resistance from the IC package to the open air varies with the contact thermal resistance.
TABLE 1 shows how much the value of the contact thermal resistance $(\theta_C + \theta_S)$ is changed by insulating sheet (mica) and heat sink grease.

TABLE 1   Unit : °C / W

PACKAGE	MODEL No.	TORQUE	MICA	$\theta_C + \theta_S$
TO-220NIS	TA78×× S	0.6N·m	Not Provided	0.4~0.6 (1.0~1.5)

The figures given in parentheses denote the values at time of no grease.

The package of regulator IC serves as GND, therefore, usually use the value at time of "no mica."

(b)   Silicon grease

When a circuit not exceeding maximum rating is designed, it is to be desired that the grease should be used if possible. If it is required that the contact thermal resistance is reduced from the viewpoint of the circuit design, it is recommended that the following methods be adopted.

    A : Use Thercon (NOTE)
    B : Use YG6260 (TOSHIBA SILICON CORPORATION) , if grease is used.
    (NOTE)   Thercon is a registered trademark of Fuji High Polymer Kogyo K.K..
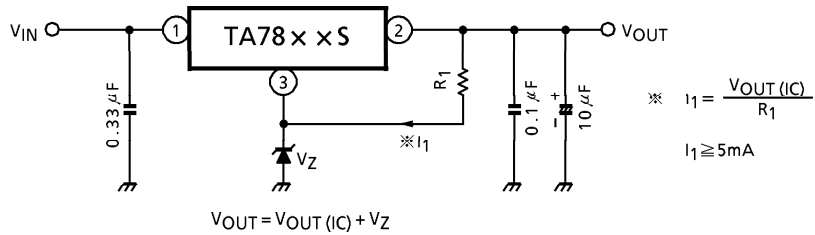
(c)   Torque

When installing IC on a heat sink or the like, tighten the IC with the torque of less than the rated value. If it is tightened with the torque in excess of the rated value, sometimes the internal elements of the IC are adversely affected. Therefore, great care should be given to the installing operation.
Further, if polycarbonate screws are used, the torque causes a change with the passage of time, which may lessen the effect of radiation.
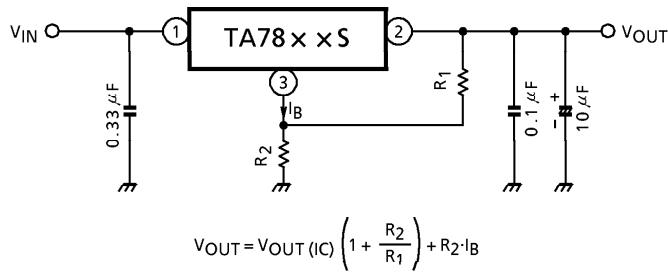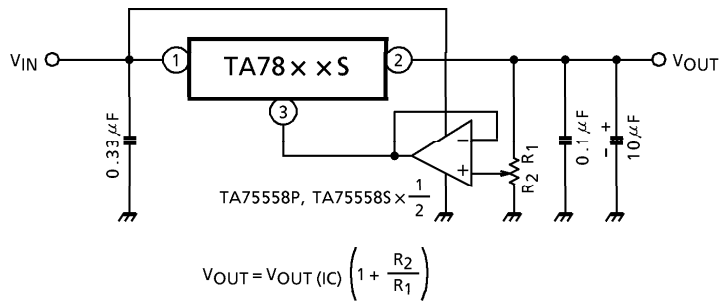
APPLICATION CIRCUITS

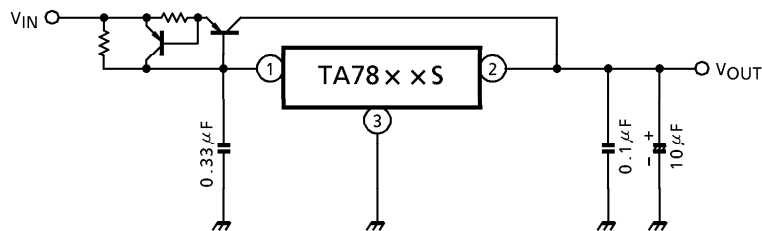(1)   VOLTAGE BOOST REGULATOR

(a)   Voltage boost by use of zener diode

$$\text{※}\quad I_1 = \frac{V_{OUT\,(IC)}}{R_1}$$

$$I_1 \geqq 5mA$$

$$V_{OUT} = V_{OUT\,(IC)} + V_Z$$

(b)   Voltage boost by use of resistor

$$V_{OUT} = V_{OUT\,(IC)}\left(1 + \frac{R_2}{R_1}\right) + R_2 \cdot I_B$$

(c)   Adjustable output regulator

TA75558P, TA75558S × $\frac{1}{2}$

$$V_{OUT} = V_{OUT\,(IC)}\left(1 + \frac{R_2}{R_1}\right)$$

(2)   CURRENT BOOST REGULATOR

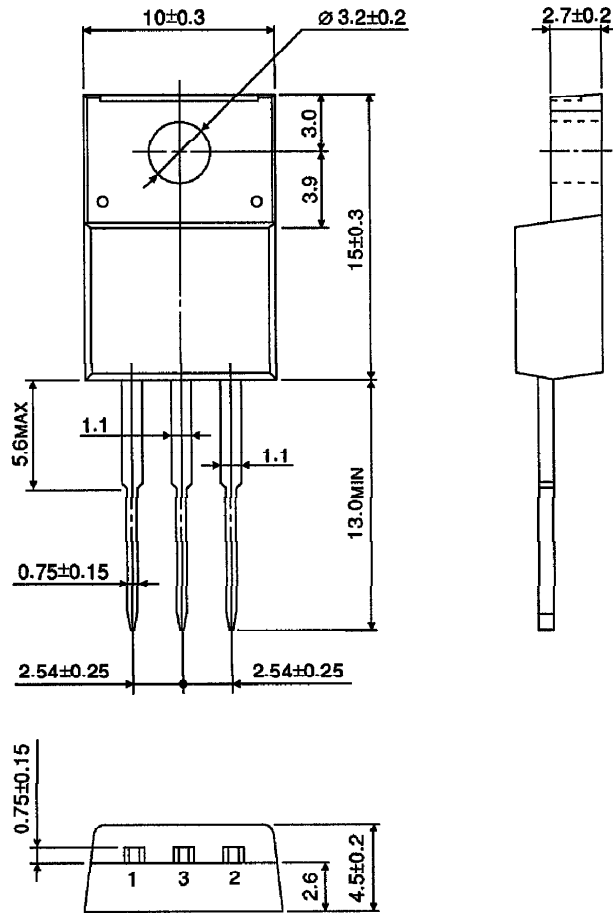## OUTLINE DRAWING
HSIP3-P-2.54A

Unit : mm

Weight : 1.7g (Typ.)