

TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

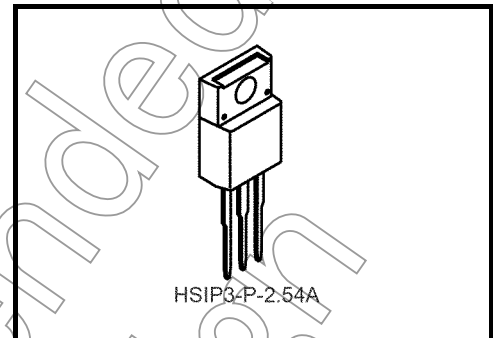
TA7805S, TA78057S, TA7806S, TA7807S, TA7808S, TA7809S, TA7810S, TA7812S, TA7815S, TA7818S, TA7820S, TA7824S

Three Terminal Positive Voltage Regulators

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

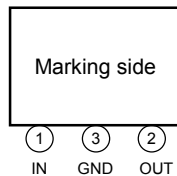
Features

- Suitable for CMOS, TTL, the power supply of other digital ICs
- Internal thermal overload protection
- Internal short circuit current limiting
- Maximum output current of 1 A
- Metal fin (tab) is fully covered with mold resin.
(T0-220 NIS package)

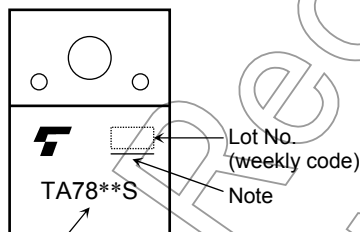


Weight: 1.7 g (typ.)

Pin Assignment



Marking



Part No. (or abbreviation code)

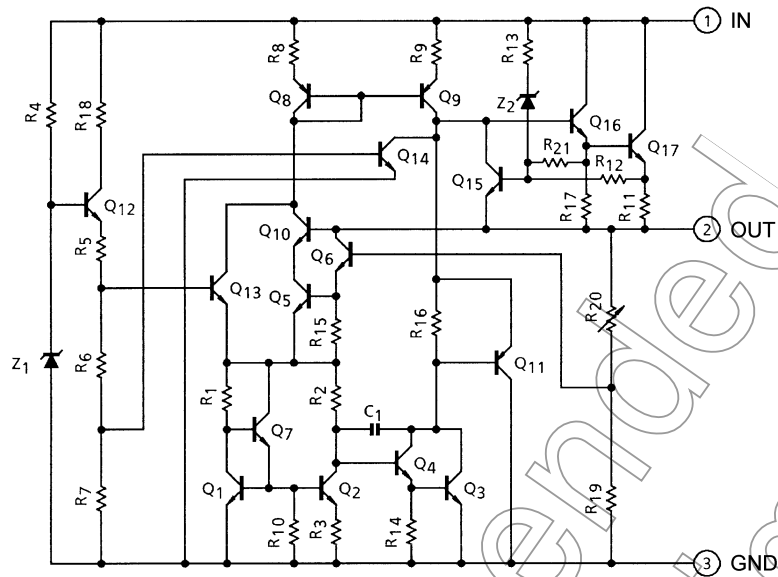
Note: A line under a Lot No. identifies the indication of product Labels.

Not underlined: [[Pb]]/INCLUDES > MCV

Underlined: [[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product. The RoHS is the Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

Equivalent Circuit



Absolute Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit	
Input voltage	V_{IN}	TA7805S	35	V
		TA78057S		
		TA7806S		
		TA7807S		
		TA7808S		
		TA7809S		
		TA7810S		
		TA7812S		
		TA7815S		
		TA7818S		
		TA7820S		
		TA7824S		
Power dissipation	P_D	(Ta = 25°C)	2	W
		(Tc = 25°C)	20	
Operating temperature	T_{opr}	-30 to 85	°C	
Storage temperature	T_{stg}	-55 to 150	°C	
Junction temperature	T_j	150	°C	
Thermal resistance	$R_{th(j-c)}$	6.25	°C/W	
	$R_{th(j-a)}$	62.5		

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).

TA7805S

Electrical Characteristics

(Unless otherwise specified, $V_{IN} = 10\text{ V}$, $I_{OUT} = 500\text{ mA}$, $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit	
Output voltage	V_{OUT}	1	$T_j = 25^\circ\text{C}$, $I_{OUT} = 100\text{ mA}$	4.8	5.0	5.2	V	
Line regulation	Reg-line	1	$T_j = 25^\circ\text{C}$	$7.0\text{ V} \leq V_{IN} \leq 25\text{ V}$	—	3	100	mV
				$8.0\text{ V} \leq V_{IN} \leq 12\text{ V}$	—	1	50	
Load regulation	Reg-load	1	$T_j = 25^\circ\text{C}$	$5\text{ mA} \leq I_{OUT} \leq 1.4\text{ A}$	—	15	100	mV
				$250\text{ mA} \leq I_{OUT} \leq 750\text{ mA}$	—	5	50	
Output voltage	V_{OUT}	1	$T_j = 25^\circ\text{C}$ $7.0\text{ V} \leq V_{IN} \leq 20\text{ V}$ $5.0\text{ mA} \leq I_{OUT} \leq 1.0\text{ A}$	4.75	—	5.25	V	
Quiescent current	I_B	1	$T_j = 25^\circ\text{C}$, $I_{OUT} = 5\text{ mA}$	—	4.2	8.0	mA	
Quiescent current change	ΔI_B	1	$7.0\text{ V} \leq V_{IN} \leq 25\text{ V}$, $I_{OUT} = 5\text{ mA}$, $T_j = 25^\circ\text{C}$	—	—	1.3	mA	
Output noise voltage	V_{NO}	2	$T_a = 25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$ $I_{OUT} = 50\text{ mA}$	—	50	—	μV_{rms}	
Ripple rejection	R.R.	3	$f = 120\text{ Hz}$, $8.0\text{ V} \leq V_{IN} \leq 18\text{ V}$ $I_{OUT} = 50\text{ mA}$, $T_j = 25^\circ\text{C}$	62	78	—	dB	
Dropout voltage	V_D	1	$I_{OUT} = 1.0\text{ A}$, $T_j = 25^\circ\text{C}$	—	2.0	—	V	
Short circuit current limit	I_{SC}	1	$T_j = 25^\circ\text{C}$	—	1.6	—	A	
Average temperature coefficient of output voltage	T_{CVO}	1	$I_{OUT} = 5\text{ mA}$	—	-0.6	—	$\text{mV}/^\circ\text{C}$	

TA78057S

Electrical Characteristics

(Unless otherwise specified, $V_{IN} = 10.7\text{ V}$, $I_{OUT} = 500\text{ mA}$, $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit	
Output voltage	V_{OUT}	1	$T_j = 25^\circ\text{C}$, $I_{OUT} = 100\text{ mA}$	5.47	5.7	5.93	V	
Line regulation	Reg-line	1	$T_j = 25^\circ\text{C}$	$7.7\text{ V} \leq V_{IN} \leq 25\text{ V}$	—	4	110	mV
				$8.7\text{ V} \leq V_{IN} \leq 12.7\text{ V}$	—	2	55	
Load regulation	Reg-load	1	$T_j = 25^\circ\text{C}$	$5\text{ mA} \leq I_{OUT} \leq 1.4\text{ A}$	—	15	110	mV
				$250\text{ mA} \leq I_{OUT} \leq 750\text{ mA}$	—	5	55	
Output voltage	V_{OUT}	1	$T_j = 25^\circ\text{C}$ $7.7\text{ V} \leq V_{IN} \leq 20.7\text{ V}$ $5.0\text{ mA} \leq I_{OUT} \leq 1.0\text{ A}$	5.42	—	5.98	V	
Quiescent current	I_B	1	$T_j = 25^\circ\text{C}$, $I_{OUT} = 5\text{ mA}$	—	4.3	8.0	mA	
Quiescent current change	ΔI_B	1	$7.7\text{ V} \leq V_{IN} \leq 25\text{ V}$, $I_{OUT} = 5\text{ mA}$, $T_j = 25^\circ\text{C}$	—	—	1.3	mA	
Output noise voltage	V_{NO}	2	$T_a = 25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$ $I_{OUT} = 50\text{ mA}$	—	55	—	μV_{rms}	
Ripple rejection	R.R.	3	$f = 120\text{ Hz}$, $8.8\text{ V} \leq V_{IN} \leq 18.8\text{ V}$, $I_{OUT} = 50\text{ mA}$, $T_j = 25^\circ\text{C}$	62	77	—	dB	
Dropout voltage	V_D	1	$I_{OUT} = 1.0\text{ A}$, $T_j = 25^\circ\text{C}$	—	2.0	—	V	
Short circuit current limit	I_{SC}	1	$T_j = 25^\circ\text{C}$	—	1.5	—	A	
Average temperature coefficient of output voltage	T_{CVO}	1	$I_{OUT} = 5\text{ mA}$	—	-0.7	—	$\text{mV}/^\circ\text{C}$	

TA7806S

Electrical Characteristics

(Unless otherwise specified, $V_{IN} = 11\text{ V}$, $I_{OUT} = 500\text{ mA}$, $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit	
Output voltage	V_{OUT}	1	$T_j = 25^\circ\text{C}$, $I_{OUT} = 100\text{ mA}$	5.75	6.0	6.25	V	
Line regulation	Reg-line	1	$T_j = 25^\circ\text{C}$	$8.0\text{ V} \leq V_{IN} \leq 25\text{ V}$	—	4	120	mV
				$9\text{ V} \leq V_{IN} \leq 13\text{ V}$	—	2	60	
Load regulation	Reg-load	1	$T_j = 25^\circ\text{C}$	$5\text{ mA} \leq I_{OUT} \leq 1.4\text{ A}$	—	15	120	mV
				$250\text{ mA} \leq I_{OUT} \leq 750\text{ mA}$	—	5	60	
Output voltage	V_{OUT}	1	$T_j = 25^\circ\text{C}$ $8\text{ V} \leq V_{IN} \leq 21\text{ V}$ $5.0\text{ mA} \leq I_{OUT} \leq 1.0\text{ A}$	5.7	—	6.3	V	
Quiescent current	I_B	1	$T_j = 25^\circ\text{C}$, $I_{OUT} = 5\text{ mA}$	—	4.3	8.0	mA	
Quiescent current change	ΔI_B	1	$8.0\text{ V} \leq V_{IN} \leq 25\text{ V}$, $I_{OUT} = 5\text{ mA}$, $T_j = 25^\circ\text{C}$	—	—	1.3	mA	
Output noise voltage	V_{NO}	2	$T_a = 25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$ $I_{OUT} = 50\text{ mA}$	—	55	—	μV_{rms}	
Ripple rejection	R.R.	3	$f = 120\text{ Hz}$, $9\text{ V} \leq V_{IN} \leq 19\text{ V}$ $I_{OUT} = 50\text{ mA}$, $T_j = 25^\circ\text{C}$	61	77	—	dB	
Dropout voltage	V_D	1	$I_{OUT} = 1.0\text{ A}$, $T_j = 25^\circ\text{C}$	—	2.0	—	V	
Short circuit current limit	I_{SC}	1	$T_j = 25^\circ\text{C}$	—	1.5	—	A	
Average temperature coefficient of output voltage	T_{CVO}	1	$I_{OUT} = 5\text{ mA}$	—	-0.7	—	$\text{mV}/^\circ\text{C}$	

TA7807S

Electrical Characteristics

(Unless otherwise specified, $V_{IN} = 12\text{ V}$, $I_{OUT} = 500\text{ mA}$, $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit	
Output voltage	V_{OUT}	1	$T_j = 25^\circ\text{C}$, $I_{OUT} = 100\text{ mA}$	6.72	7.0	7.28	V	
Line regulation	Reg-line	1	$T_j = 25^\circ\text{C}$	$9\text{ V} \leq V_{IN} \leq 25\text{ V}$	—	5	140	mV
				$10\text{ V} \leq V_{IN} \leq 14\text{ V}$	—	2	70	
Load regulation	Reg-load	1	$T_j = 25^\circ\text{C}$	$5\text{ mA} \leq I_{OUT} \leq 1.4\text{ A}$	—	15	140	mV
				$250\text{ mA} \leq I_{OUT} \leq 750\text{ mA}$	—	5	70	
Output voltage	V_{OUT}	1	$T_j = 25^\circ\text{C}$ $9\text{ V} \leq V_{IN} \leq 22\text{ V}$ $5.0\text{ mA} \leq I_{OUT} \leq 1.0\text{ A}$	6.65	—	7.35	V	
Quiescent current	I_B	1	$T_j = 25^\circ\text{C}$, $I_{OUT} = 5\text{ mA}$	—	4.3	8.0	mA	
Quiescent current change	ΔI_B	1	$9\text{ V} \leq V_{IN} \leq 25\text{ V}$, $I_{OUT} = 5\text{ mA}$, $T_j = 25^\circ\text{C}$	—	—	1.3	mA	
Output noise voltage	V_{NO}	2	$T_a = 25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$ $I_{OUT} = 50\text{ mA}$	—	60	—	μV_{rms}	
Ripple rejection	R.R.	3	$f = 120\text{ Hz}$, $10\text{ V} \leq V_{IN} \leq 20\text{ V}$ $I_{OUT} = 50\text{ mA}$, $T_j = 25^\circ\text{C}$	59	75	—	dB	
Dropout voltage	V_D	1	$I_{OUT} = 1.0\text{ A}$, $T_j = 25^\circ\text{C}$	—	2.0	—	V	
Short circuit current limit	I_{SC}	1	$T_j = 25^\circ\text{C}$	—	1.3	—	A	
Average temperature coefficient of output voltage	T_{CVO}	1	$I_{OUT} = 5\text{ mA}$	—	-0.8	—	$\text{mV}/^\circ\text{C}$	

TA7808S

Electrical Characteristics

(Unless otherwise specified, $V_{IN} = 14\text{ V}$, $I_{OUT} = 500\text{ mA}$, $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit	
Output voltage	V_{OUT}	1	$T_j = 25^\circ\text{C}$, $I_{OUT} = 100\text{ mA}$	7.7	8.0	8.3	V	
Line regulation	Reg-line	1	$T_j = 25^\circ\text{C}$	$10.5\text{ V} \leq V_{IN} \leq 25\text{ V}$	—	6	160	mV
				$11\text{ V} \leq V_{IN} \leq 17\text{ V}$	—	2	80	
Load regulation	Reg-load	1	$T_j = 25^\circ\text{C}$	$5\text{ mA} \leq I_{OUT} \leq 1.4\text{ A}$	—	12	160	mV
				$250\text{ mA} \leq I_{OUT} \leq 750\text{ mA}$	—	4	80	
Output voltage	V_{OUT}	1	$T_j = 25^\circ\text{C}$ $10.5\text{ V} \leq V_{IN} \leq 23\text{ V}$ $5.0\text{ mA} \leq I_{OUT} \leq 1.0\text{ A}$	7.6	—	8.4	V	
Quiescent current	I_B	1	$T_j = 25^\circ\text{C}$, $I_{OUT} = 5\text{ mA}$	—	4.3	8.0	mA	
Quiescent current change	ΔI_B	1	$10.5\text{ V} \leq V_{IN} \leq 25\text{ V}$, $I_{OUT} = 5\text{ mA}$, $T_j = 25^\circ\text{C}$	—	—	1.0	mA	
Output noise voltage	V_{NO}	2	$T_a = 25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$ $I_{OUT} = 50\text{ mA}$	—	70	—	μV_{rms}	
Ripple rejection	R.R.	3	$f = 120\text{ Hz}$, $11.5\text{ V} \leq V_{IN} \leq 21.5\text{ V}$ $I_{OUT} = 50\text{ mA}$, $T_j = 25^\circ\text{C}$	58	74	—	dB	
Dropout voltage	V_D	1	$I_{OUT} = 1.0\text{ A}$, $T_j = 25^\circ\text{C}$	—	2.0	—	V	
Short circuit current limit	I_{SC}	1	$T_j = 25^\circ\text{C}$	—	1.1	—	A	
Average temperature coefficient of output voltage	T_{CVO}	1	$I_{OUT} = 5\text{ mA}$	—	-1.0	—	$\text{mV}/^\circ\text{C}$	

TA7809S

Electrical Characteristics

(Unless otherwise specified, $V_{IN} = 15\text{ V}$, $I_{OUT} = 500\text{ mA}$, $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit	
Output voltage	V_{OUT}	1	$T_j = 25^\circ\text{C}$, $I_{OUT} = 100\text{ mA}$	8.64	9.0	9.36	V	
Line regulation	Reg-line	1	$T_j = 25^\circ\text{C}$	$11.5\text{ V} \leq V_{IN} \leq 26\text{ V}$	—	7	180	mV
				$13\text{ V} \leq V_{IN} \leq 19\text{ V}$	—	2.5	90	
Load regulation	Reg-load	1	$T_j = 25^\circ\text{C}$	$5\text{ mA} \leq I_{OUT} \leq 1.4\text{ A}$	—	12	180	mV
				$250\text{ mA} \leq I_{OUT} \leq 750\text{ mA}$	—	4	90	
Output voltage	V_{OUT}	1	$T_j = 25^\circ\text{C}$ $11.5\text{ V} \leq V_{IN} \leq 24\text{ V}$ $5.0\text{ mA} \leq I_{OUT} \leq 1.0\text{ A}$	8.55	—	9.45	V	
Quiescent current	I_B	1	$T_j = 25^\circ\text{C}$, $I_{OUT} = 5\text{ mA}$	—	4.3	8.0	mA	
Quiescent current change	ΔI_B	1	$11.5\text{ V} \leq V_{IN} \leq 26\text{ V}$, $I_{OUT} = 5\text{ mA}$, $T_j = 25^\circ\text{C}$	—	—	1.0	mA	
Output noise voltage	V_{NO}	2	$T_a = 25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$ $I_{OUT} = 50\text{ mA}$	—	75	—	μV_{rms}	
Ripple rejection	R.R.	3	$f = 120\text{ Hz}$, $12.5\text{ V} \leq V_{IN} \leq 22.5\text{ V}$ $I_{OUT} = 50\text{ mA}$, $T_j = 25^\circ\text{C}$	56	72	—	dB	
Dropout voltage	V_D	1	$I_{OUT} = 1.0\text{ A}$, $T_j = 25^\circ\text{C}$	—	2.0	—	V	
Short circuit current limit	I_{SC}	1	$T_j = 25^\circ\text{C}$	—	1.0	—	A	
Average temperature coefficient of output voltage	T_{CVO}	1	$I_{OUT} = 5\text{ mA}$	—	-1.1	—	$\text{mV}/^\circ\text{C}$	

TA7810S

Electrical Characteristics

(Unless otherwise specified, $V_{IN} = 16\text{ V}$, $I_{OUT} = 500\text{ mA}$, $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit	
Output voltage	V_{OUT}	1	$T_j = 25^\circ\text{C}$, $I_{OUT} = 100\text{ mA}$	9.6	10.0	10.4	V	
Line regulation	Reg-line	1	$T_j = 25^\circ\text{C}$	$12.5\text{ V} \leq V_{IN} \leq 27\text{ V}$	—	8	200	mV
				$14\text{ V} \leq V_{IN} \leq 20\text{ V}$	—	2.5	100	
Load regulation	Reg-load	1	$T_j = 25^\circ\text{C}$	$5\text{ mA} \leq I_{OUT} \leq 1.4\text{ A}$	—	12	200	mV
				$250\text{ mA} \leq I_{OUT} \leq 750\text{ mA}$	—	4	100	
Output voltage	V_{OUT}	1	$T_j = 25^\circ\text{C}$ $12.5\text{ V} \leq V_{IN} \leq 25\text{ V}$ $5.0\text{ mA} \leq I_{OUT} \leq 1.0\text{ A}$	9.5	—	10.5	V	
Quiescent current	I_B	1	$T_j = 25^\circ\text{C}$, $I_{OUT} = 5\text{ mA}$	—	4.3	8.0	mA	
Quiescent current change	ΔI_B	1	$12.5\text{ V} \leq V_{IN} \leq 27\text{ V}$, $I_{OUT} = 5\text{ mA}$, $T_j = 25^\circ\text{C}$	—	—	1.0	mA	
Output noise voltage	V_{NO}	2	$T_a = 25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$ $I_{OUT} = 50\text{ mA}$	—	80	—	μV_{rms}	
Ripple rejection	R.R.	3	$f = 120\text{ Hz}$, $13.5\text{ V} \leq V_{IN} \leq 23.5\text{ V}$ $I_{OUT} = 50\text{ mA}$, $T_j = 25^\circ\text{C}$	55	72	—	dB	
Dropout voltage	V_D	1	$I_{OUT} = 1.0\text{ A}$, $T_j = 25^\circ\text{C}$	—	2.0	—	V	
Short circuit current limit	I_{SC}	1	$T_j = 25^\circ\text{C}$	—	0.9	—	A	
Average temperature coefficient of output voltage	T_{CVO}	1	$I_{OUT} = 5\text{ mA}$	—	-1.3	—	$\text{mV}/^\circ\text{C}$	

TA7812S

Electrical Characteristics

(Unless otherwise specified, $V_{IN} = 19\text{ V}$, $I_{OUT} = 500\text{ mA}$, $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit	
Output voltage	V_{OUT}	1	$T_j = 25^\circ\text{C}$, $I_{OUT} = 100\text{ mA}$	11.5	12.0	12.5	V	
Line regulation	Reg-line	1	$T_j = 25^\circ\text{C}$	$14.5\text{ V} \leq V_{IN} \leq 30\text{ V}$	—	10	240	mV
				$16\text{ V} \leq V_{IN} \leq 22\text{ V}$	—	3	120	
Load regulation	Reg-load	1	$T_j = 25^\circ\text{C}$	$5\text{ mA} \leq I_{OUT} \leq 1.4\text{ A}$	—	12	240	mV
				$250\text{ mA} \leq I_{OUT} \leq 750\text{ mA}$	—	4	120	
Output voltage	V_{OUT}	1	$T_j = 25^\circ\text{C}$ $14.5\text{ V} \leq V_{IN} \leq 27\text{ V}$ $5.0\text{ mA} \leq I_{OUT} \leq 1.0\text{ A}$	11.4	—	12.6	V	
Quiescent current	I_B	1	$T_j = 25^\circ\text{C}$, $I_{OUT} = 5\text{ mA}$	—	4.3	8.0	mA	
Quiescent current change	ΔI_B	1	$14.5\text{ V} \leq V_{IN} \leq 30\text{ V}$, $I_{OUT} = 5\text{ mA}$, $T_j = 25^\circ\text{C}$	—	—	1.0	mA	
Output noise voltage	V_{NO}	2	$T_a = 25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$ $I_{OUT} = 50\text{ mA}$	—	90	—	μV_{rms}	
Ripple rejection	R.R.	3	$f = 120\text{ Hz}$, $15\text{ V} \leq V_{IN} \leq 25\text{ V}$ $I_{OUT} = 50\text{ mA}$, $T_j = 25^\circ\text{C}$	55	71	—	dB	
Dropout voltage	V_D	1	$I_{OUT} = 1.0\text{ A}$, $T_j = 25^\circ\text{C}$	—	2.0	—	V	
Short circuit current limit	I_{SC}	1	$T_j = 25^\circ\text{C}$	—	0.7	—	A	
Average temperature coefficient of output voltage	T_{CVO}	1	$I_{OUT} = 5\text{ mA}$	—	-1.6	—	$\text{mV}/^\circ\text{C}$	

TA7815S

Electrical Characteristics

(Unless otherwise specified, $V_{IN} = 23\text{ V}$, $I_{OUT} = 500\text{ mA}$, $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit	
Output voltage	V_{OUT}	1	$T_j = 25^\circ\text{C}$, $I_{OUT} = 100\text{ mA}$	14.4	15.0	15.6	V	
Line regulation	Reg-line	1	$T_j = 25^\circ\text{C}$	$17.5\text{ V} \leq V_{IN} \leq 30\text{ V}$	—	11	300	mV
				$20\text{ V} \leq V_{IN} \leq 26\text{ V}$	—	3	150	
Load regulation	Reg-load	1	$T_j = 25^\circ\text{C}$	$5\text{ mA} \leq I_{OUT} \leq 1.4\text{ A}$	—	12	300	mV
				$250\text{ mA} \leq I_{OUT} \leq 750\text{ mA}$	—	4	150	
Output voltage	V_{OUT}	1	$T_j = 25^\circ\text{C}$ $17.5\text{ V} \leq V_{IN} \leq 30\text{ V}$ $5.0\text{ mA} \leq I_{OUT} \leq 1.0\text{ A}$	14.25	—	15.75	V	
Quiescent current	I_B	1	$T_j = 25^\circ\text{C}$, $I_{OUT} = 5\text{ mA}$	—	4.4	8.0	mA	
Quiescent current change	ΔI_B	1	$17.5\text{ V} \leq V_{IN} \leq 30\text{ V}$, $I_{OUT} = 5\text{ mA}$, $T_j = 25^\circ\text{C}$	—	—	1.0	mA	
Output noise voltage	V_{NO}	2	$T_a = 25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$ $I_{OUT} = 50\text{ mA}$	—	110	—	μV_{rms}	
Ripple rejection	R.R.	3	$f = 120\text{ Hz}$, $18.5\text{ V} \leq V_{IN} \leq 28.5\text{ V}$ $I_{OUT} = 50\text{ mA}$, $T_j = 25^\circ\text{C}$	54	70	—	dB	
Dropout voltage	V_D	1	$I_{OUT} = 1.0\text{ A}$, $T_j = 25^\circ\text{C}$	—	2.0	—	V	
Short circuit current limit	I_{SC}	1	$T_j = 25^\circ\text{C}$	—	0.5	—	A	
Average temperature coefficient of output voltage	T_{CVO}	1	$I_{OUT} = 5\text{ mA}$	—	-2.0	—	$\text{mV}/^\circ\text{C}$	

TA7818S

Electrical Characteristics

(Unless otherwise specified, $V_{IN} = 27\text{ V}$, $I_{OUT} = 500\text{ mA}$, $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit	
Output voltage	V_{OUT}	1	$T_j = 25^\circ\text{C}$, $I_{OUT} = 100\text{ mA}$	17.3	18.0	18.7	V	
Line regulation	Reg-line	1	$T_j = 25^\circ\text{C}$	$21\text{ V} \leq V_{IN} \leq 33\text{ V}$	—	13	360	mV
				$24\text{ V} \leq V_{IN} \leq 30\text{ V}$	—	4	180	
Load regulation	Reg-load	1	$T_j = 25^\circ\text{C}$	$5\text{ mA} \leq I_{OUT} \leq 1.4\text{ A}$	—	12	360	mV
				$250\text{ mA} \leq I_{OUT} \leq 750\text{ mA}$	—	4	180	
Output voltage	V_{OUT}	1	$T_j = 25^\circ\text{C}$ $21\text{ V} \leq V_{IN} \leq 33\text{ V}$ $5.0\text{ mA} \leq I_{OUT} \leq 1.0\text{ A}$	17.1	—	18.9	V	
Quiescent current	I_B	1	$T_j = 25^\circ\text{C}$, $I_{OUT} = 5\text{ mA}$	—	4.5	8.0	mA	
Quiescent current change	ΔI_B	1	$21\text{ V} \leq V_{IN} \leq 33\text{ V}$, $I_{OUT} = 5\text{ mA}$, $T_j = 25^\circ\text{C}$	—	—	1.0	mA	
Output noise voltage	V_{NO}	2	$T_a = 25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$ $I_{OUT} = 50\text{ mA}$	—	125	—	μV_{rms}	
Ripple rejection	R.R.	3	$f = 120\text{ Hz}$, $22\text{ V} \leq V_{IN} \leq 32\text{ V}$ $I_{OUT} = 50\text{ mA}$, $T_j = 25^\circ\text{C}$	52	68	—	dB	
Dropout voltage	V_D	1	$I_{OUT} = 1.0\text{ A}$, $T_j = 25^\circ\text{C}$	—	2.0	—	V	
Short circuit current limit	I_{SC}	1	$T_j = 25^\circ\text{C}$	—	0.4	—	A	
Average temperature coefficient of output voltage	T_{CVO}	1	$I_{OUT} = 5\text{ mA}$	—	-2.5	—	$\text{mV}/^\circ\text{C}$	

TA7820S

Electrical Characteristics

(Unless otherwise specified, $V_{IN} = 29\text{ V}$, $I_{OUT} = 500\text{ mA}$, $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit	
Output voltage	V_{OUT}	1	$T_j = 25^\circ\text{C}$, $I_{OUT} = 100\text{ mA}$	19.2	20.0	20.8	V	
Line regulation	Reg-line	1	$T_j = 25^\circ\text{C}$	$23\text{ V} \leq V_{IN} \leq 35\text{ V}$	—	15	400	mV
				$26\text{ V} \leq V_{IN} \leq 32\text{ V}$	—	5	200	
Load regulation	Reg-load	1	$T_j = 25^\circ\text{C}$	$5\text{ mA} \leq I_{OUT} \leq 1.4\text{ A}$	—	12	400	mV
				$250\text{ mA} \leq I_{OUT} \leq 750\text{ mA}$	—	4	200	
Output voltage	V_{OUT}	1	$T_j = 25^\circ\text{C}$ $23\text{ V} \leq V_{IN} \leq 35\text{ V}$ $5.0\text{ mA} \leq I_{OUT} \leq 1.0\text{ A}$	19.0	—	21.0	V	
Quiescent current	I_B	1	$T_j = 25^\circ\text{C}$, $I_{OUT} = 5\text{ mA}$	—	4.6	8.0	mA	
Quiescent current change	ΔI_B	1	$23\text{ V} \leq V_{IN} \leq 35\text{ V}$, $I_{OUT} = 5\text{ mA}$, $T_j = 25^\circ\text{C}$	—	—	1.0	mA	
Output noise voltage	V_{NO}	2	$T_a = 25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$ $I_{OUT} = 50\text{ mA}$	—	135	—	μV_{rms}	
Ripple rejection	R.R.	3	$f = 120\text{ Hz}$, $24\text{ V} \leq V_{IN} \leq 34\text{ V}$ $I_{OUT} = 50\text{ mA}$, $T_j = 25^\circ\text{C}$	50	66	—	dB	
Dropout voltage	V_D	1	$I_{OUT} = 1.0\text{ A}$, $T_j = 25^\circ\text{C}$	—	2.0	—	V	
Short circuit current limit	I_{SC}	1	$T_j = 25^\circ\text{C}$	—	0.4	—	A	
Average temperature coefficient of output voltage	T_{CVO}	1	$I_{OUT} = 5\text{ mA}$	—	-3.0	—	$\text{mV}/^\circ\text{C}$	

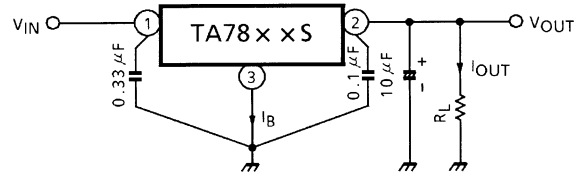
TA7824S

Electrical Characteristics

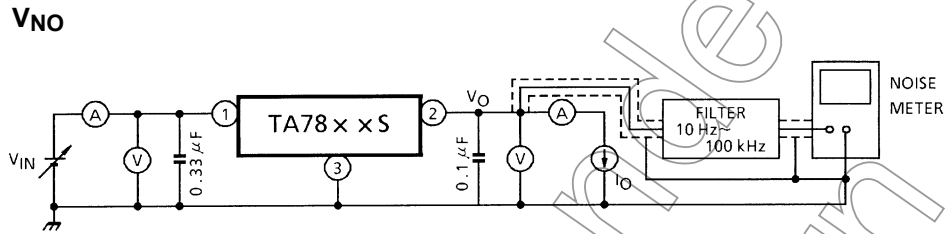
(Unless otherwise specified, $V_{IN} = 33\text{ V}$, $I_{OUT} = 500\text{ mA}$, $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit	
Output voltage	V_{OUT}	1	$T_j = 25^\circ\text{C}$, $I_{OUT} = 100\text{ mA}$	23.0	24.0	25.0	V	
Line regulation	Reg-line	1	$T_j = 25^\circ\text{C}$	$27\text{ V} \leq V_{IN} \leq 38\text{ V}$	—	18	480	mV
				$30\text{ V} \leq V_{IN} \leq 36\text{ V}$	—	6	240	
Load regulation	Reg-load	1	$T_j = 25^\circ\text{C}$	$5\text{ mA} \leq I_{OUT} \leq 1.4\text{ A}$	—	12	480	mV
				$250\text{ mA} \leq I_{OUT} \leq 750\text{ mA}$	—	4	240	
Output voltage	V_{OUT}	1	$T_j = 25^\circ\text{C}$ $27\text{ V} \leq V_{IN} \leq 38\text{ V}$ $5.0\text{ mA} \leq I_{OUT} \leq 1.0\text{ A}$	22.8	—	25.2	V	
Quiescent current	I_B	1	$T_j = 25^\circ\text{C}$, $I_{OUT} = 5\text{ mA}$	—	4.6	8.0	mA	
Quiescent current change	ΔI_B	1	$27\text{ V} \leq V_{IN} \leq 38\text{ V}$, $I_{OUT} = 5\text{ mA}$, $T_j = 25^\circ\text{C}$	—	—	1.0	mA	
Output noise voltage	V_{NO}	2	$T_a = 25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$ $I_{OUT} = 50\text{ mA}$	—	150	—	μV_{rms}	
Ripple rejection	R.R.	3	$f = 120\text{ Hz}$, $28\text{ V} \leq V_{IN} \leq 38\text{ V}$ $I_{OUT} = 50\text{ mA}$, $T_j = 25^\circ\text{C}$	50	66	—	dB	
Dropout voltage	V_D	1	$I_{OUT} = 1.0\text{ A}$, $T_j = 25^\circ\text{C}$	—	2.0	—	V	
Short circuit current limit	I_{SC}	1	$T_j = 25^\circ\text{C}$	—	0.3	—	A	
Average temperature coefficient of output voltage	T_{CVO}	1	$I_{OUT} = 5\text{ mA}$	—	-3.5	—	$\text{mV}/^\circ\text{C}$	

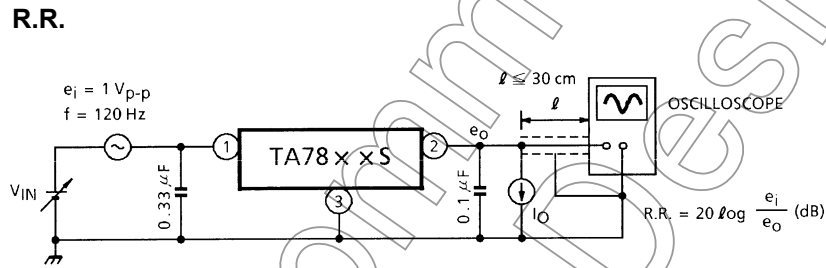
Test Circuit 1/Standard Application Circuit



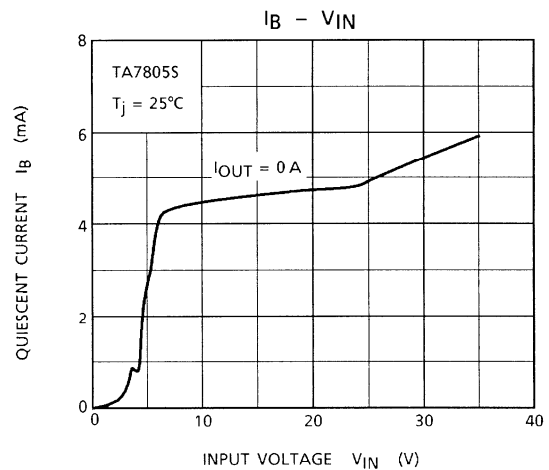
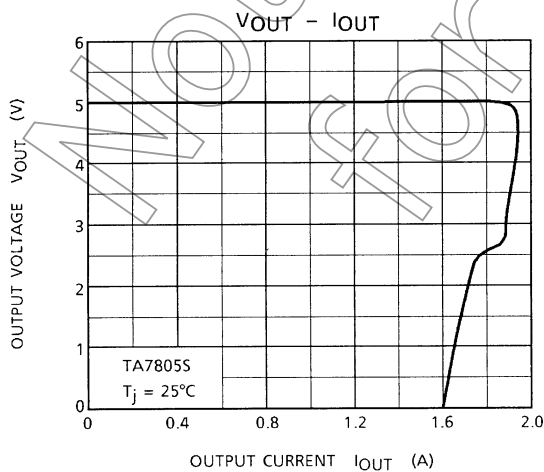
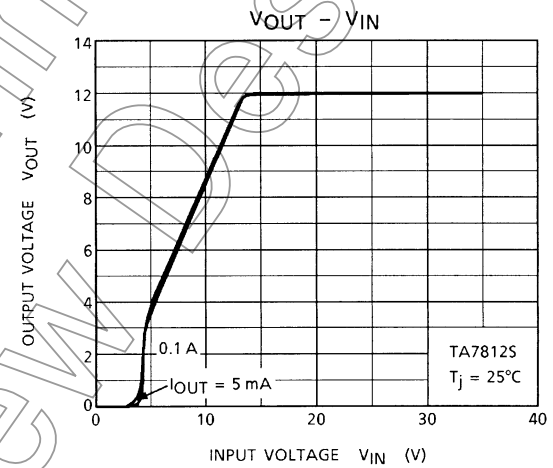
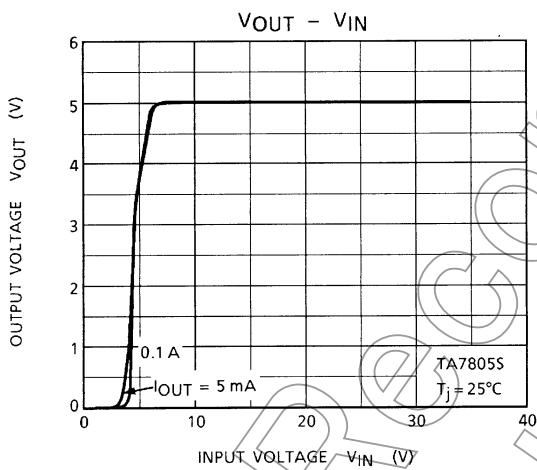
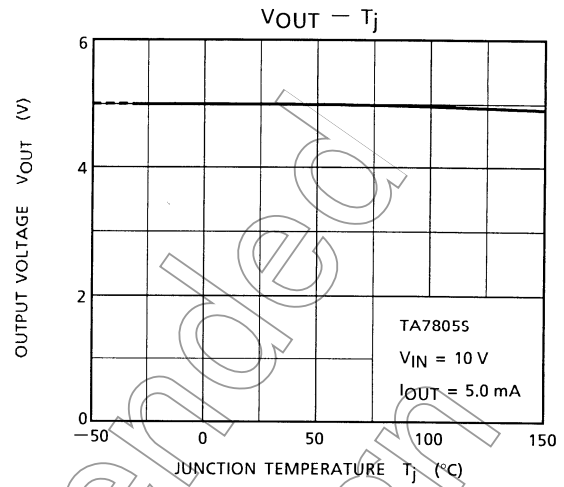
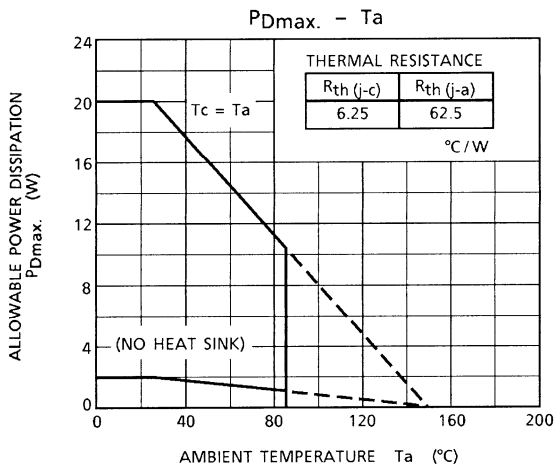
Test Circuit 2

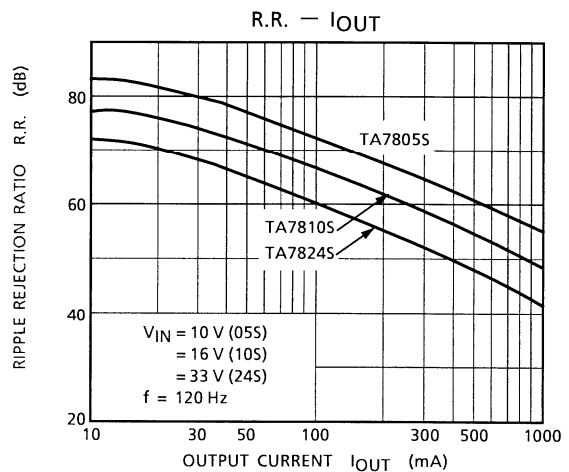
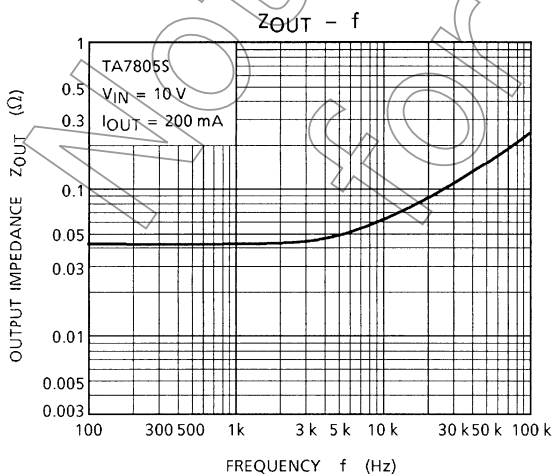
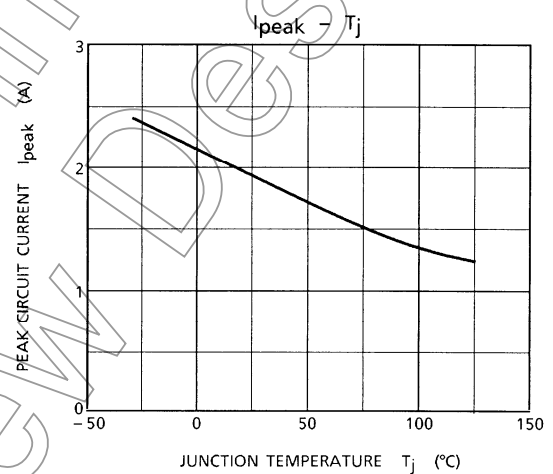
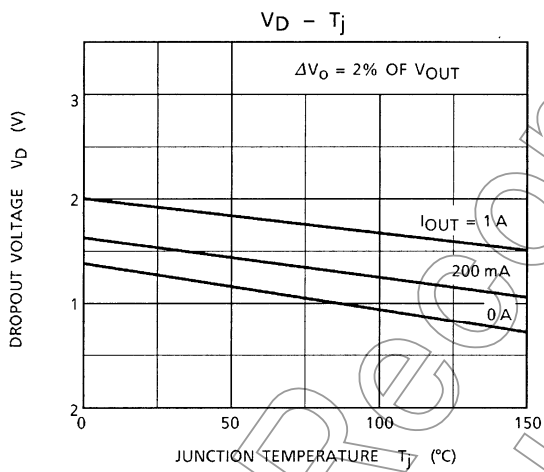
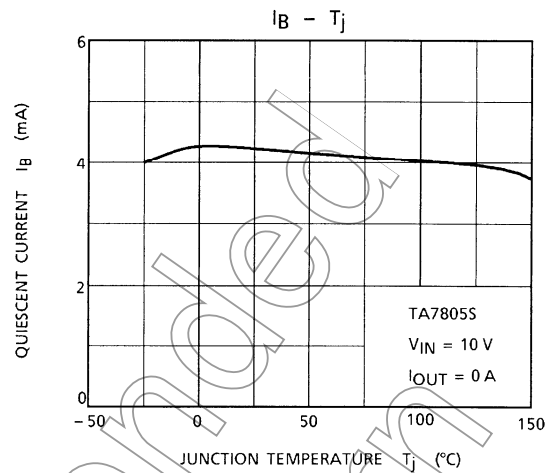
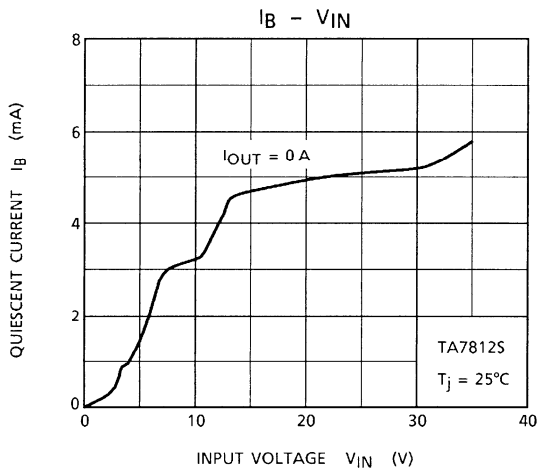


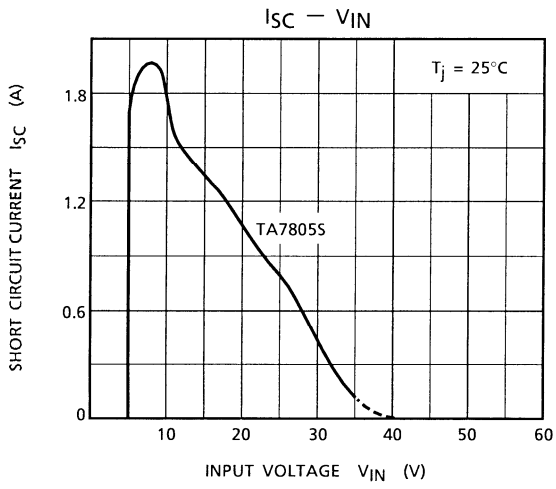
Test Circuit 3



Not Recommended for New



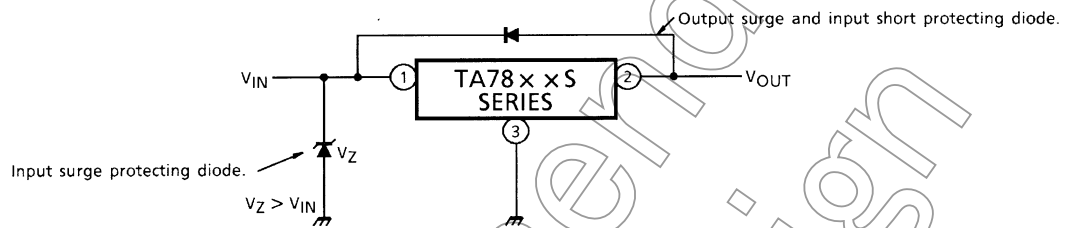




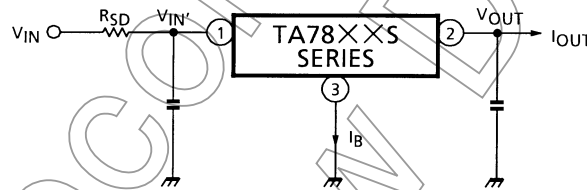
Not Recommended for New Design

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 the case of a voltage boost application.
- (2) If a surge voltage exceeding the maximum rating is applied to the input terminal or if a voltage in excess of the input terminal voltage is applied to the output terminal, the circuit may be destroyed. Particular care is necessary in the case of the latter. Circuit destruction may also occur if the input terminal shorts to GND in a state of normal operation, causing the output terminal voltage to exceed the input voltage (GND potential) and the electrical charge of the chemical capacitor connected to the output terminal to flow into the input side. Where these risks exist, take steps such as connecting zener and general silicon diodes to the circuit, as shown in the figure below.



- (3) When the input voltage is too high, the power dissipation of the three-terminal regulator, which is a series regulator, increases, causing the junction temperature to rise. In such a case, it is recommended to reduce the power dissipation, and hence the junction temperature, by inserting a power-limiting resistor \$R_{SD}\$ in the input terminal.



The power dissipation \$P_D\$ of the IC is expressed in the following equation.

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

Reducing \$V_{IN}'\$ below the lowest voltage necessary for the IC will cause ripple, deterioration in output regulation and, in certain circumstances, parasitic oscillation.

To determine the resistance value of \$R_{SD}\$, design with a margin, referring to the following equation.

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

- (4) Be sure to connect a capacitor near the input terminal and output terminal between both terminals and GND. The capacitances should be determined experimentally because they depend on PCB patterns. In particular, adequate investigation should be made to ensure there is no problem even in high or low temperatures

(5) Installation of IC for power supply

To obtain high reliability on the heat sink design of a regulator IC, it is generally required to derate more than 20% of maximum junction temperature ($T_j \text{ max}$).

Further, full consideration should be given to the installation of a heat sink in the IC.

(a) Heat sink design

The thermal resistance of the 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	0.6 N·m	Not provided	0.4 to 0.6 (1.0 to 1.5)

The figures given in parentheses denote the values for when there is no grease.

The regulator IC package serves as GND, therefore of the value for when there is “no mica” should be used.

(b) Silicone grease

In the design of a circuit not exceeding the maximum rating, grease should be used if possible. If it is necessary to reduce the contact thermal resistance for the sake of circuit design, the following methods are recommended.

If using grease, use YG6260 (TOSHIBA SILICON CORPORATION).

(c) Torque

When installing the IC on a heat sink or the like, tighten the IC with a torque of less than the rated value. Tightening in excess of the rated value may cause internal elements of the IC to be adversely affected. Therefore, great care should be given to the installation procedure.

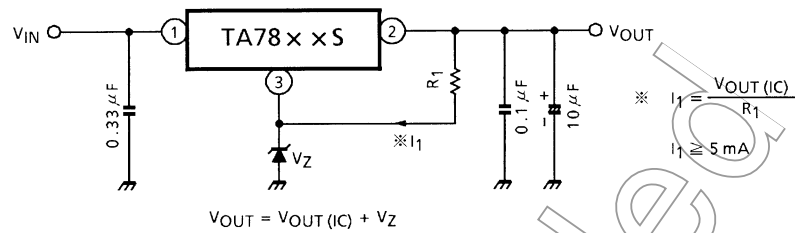
Further, if polycarbonate screws are used, the torque causes a change with the passage of time, which may lessen the effect of radiation.

Not Recommended for New Design

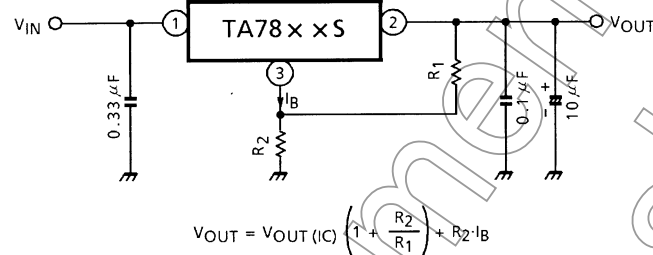
Application Circuits

(1) Voltage boost regulator

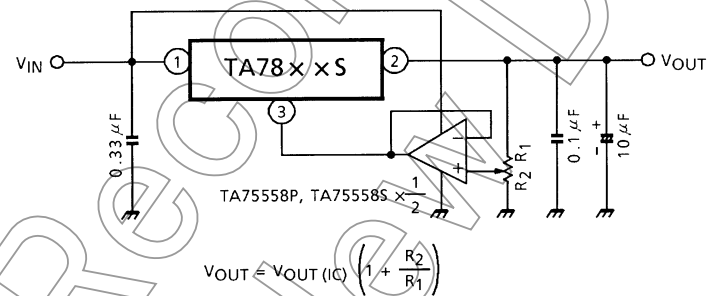
(a) Voltage boost by use of zener diode



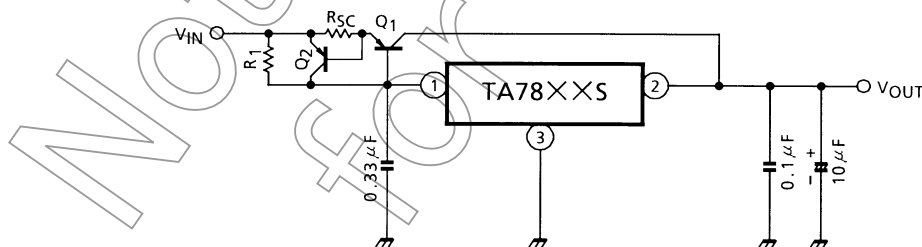
(b) Voltage boost by use of resistor



(c) Adjustable output regulator



(2) Current boost regulator



Heat sink is needed for Q₁.

$$R_1 \leq \frac{V_{BE1}}{I_B \text{ MAX}}$$

where,

V_{BE1} : V_{BE} of external transistor Q₁.

$I_B \text{ MAX}$: Quiescent current of IC.

$$R_{SC} = \frac{V_{BE2}}{I_{SC}}$$

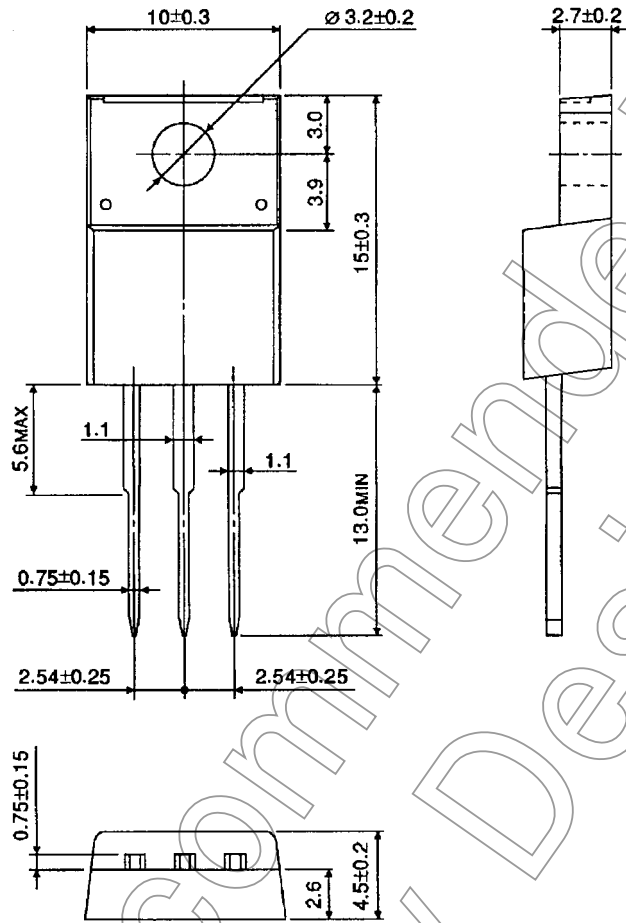
where,

I_{SC} : Short-circuit current.

Package Dimensions

HSIP3-P-2.54A

Unit: mm



Weight: 1.7 g (typ.)

Not Recommended for New Design

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