

TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

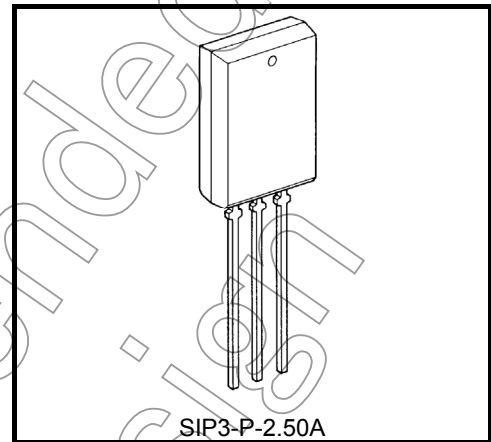
TA78M05SB, TA78M06SB, TA78M08SB, TA78M09SB, TA78M10SB, TA78M12SB, TA78M15SB, TA78M18SB, TA78M20SB, TA78M24SB

Output Current of 0.5 A, Three-Terminal Positive Voltage Regulators
5 V, 6 V, 8 V, 9 V, 10 V, 12 V, 15 V, 18 V, 20 V, 24 V

The TA78M××SB series of fixed-voltage monolithic integrated circuit voltage regulators is designed for a wide range of applications. These regulators employ internal current-limiting, thermal-shutdown and safe-area compensation, making them essentially indestructible. One of these regulators can drive up to 0.5 A of output current.

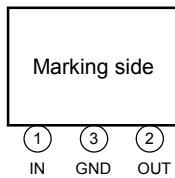
Features

- Suitable for CMOS, TTL and the power supply of other digital ICs
- Maximum output current of 0.5 A.
- Internal overheating protection.
- Internal overcurrent protection.
- Package in the plastic case TPL (P_D = 1.8 W).

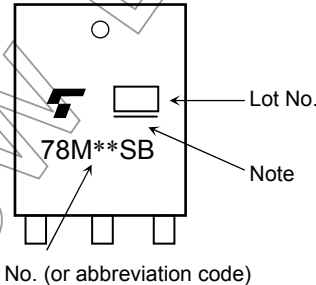


Weight: 1.5 g (typ.)

Pin Assignment



Marking

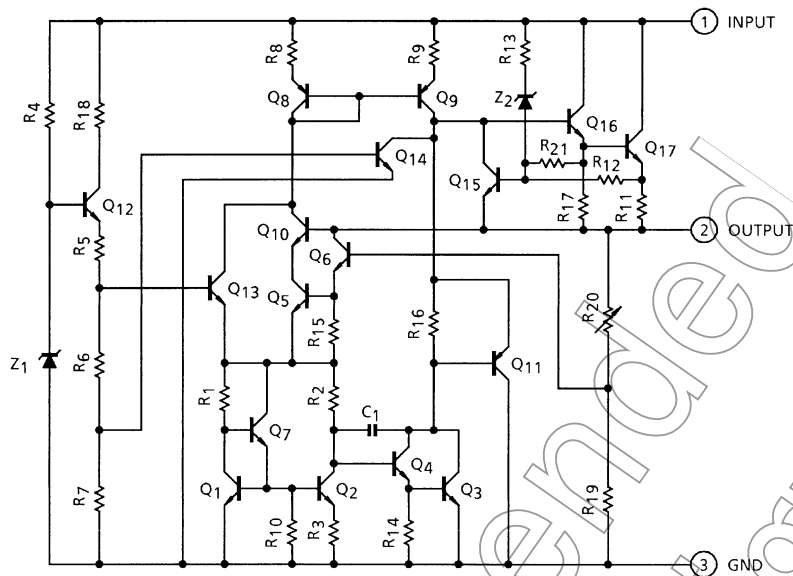


Note: A line under a Lot No. identifies the indication of product Labels.
Underlined: [[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

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.

The product(s) in this document (“Product”) contain functions intended to protect the Product from temporary small overloads such as minor short-term overcurrent or overheating. The protective functions do not necessarily protect Product under all circumstances. When incorporating Product into your system, please design the system (1) to avoid such overloads upon the Product, and (2) to shut down or otherwise relieve the Product of such overload conditions immediately upon occurrence. For details, please refer to the notes appearing below in this document and other documents referenced in this document.

Equivalent Circuit



Absolute Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit	
Input voltage	V_{IN}	35	V	
				TA78M05SB
				TA78M06SB
				TA78M08SB
				TA78M09SB
				TA78M10SB
				TA78M12SB
				TA78M15SB
		TA78M18SB		
		TA78M20SB		
TA78M24SB	40			
Output current	I_{OUT}	0.5	A	
Power dissipation (Ta = 25°C)	P_D	1.8	W	
Operating temperature	T_{opr}	-30 to 85	°C	
Storage temperature	T_{stg}	-55 to 150	°C	
Junction temperature	T_j	150	°C	
Thermal resistance	$R_{th(j-a)}$	69.4	°C/W	

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).

TA78M05SB

Electrical Characteristics

(Unless otherwise specified, $V_{IN} = 10\text{ V}$, $I_{OUT} = 350\text{ mA}$, $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$, $C_{IN} = 0.33\text{ }\mu\text{F}$, $C_{OUT} = 0.1\text{ }\mu\text{F}$)

Characteristics		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit	
Output voltage		V_{OUT}	1	$T_j = 25^\circ\text{C}$	4.8	5.0	5.2	V	
Line regulation		Reg-line	1	$T_j = 25^\circ\text{C}$	$7\text{ V} \leq V_{IN} \leq 25\text{ V}$, $I_{OUT} = 200\text{ mA}$	—	4	100	mV
					$8\text{ V} \leq V_{IN} \leq 25\text{ V}$, $I_{OUT} = 200\text{ mA}$	—	2	50	
Load regulation		Reg-load	1	$T_j = 25^\circ\text{C}$	$5\text{ mA} \leq I_{OUT} \leq 500\text{ mA}$	—	25	100	mV
					$5\text{ mA} \leq I_{OUT} \leq 200\text{ mA}$	—	10	50	
Output voltage		V_{OUT}	1	$T_j = 25^\circ\text{C}$	$7\text{ V} \leq V_{IN} \leq 20\text{ V}$, $5\text{ mA} \leq I_{OUT} \leq 350\text{ mA}$	4.75	—	5.25	V
Quiescent current		I_B	1	$T_j = 25^\circ\text{C}$	—	4.5	8.0	mA	
Quiescent current change		Line	ΔI_B	1	$T_j = 25^\circ\text{C}$	—	—	0.8	mA
		Load	ΔI_{BO}					1	
Output noise voltage		V_{NO}	2	$T_a = 25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$	—	50	200	μV_{rms}	
Ripple rejection		R.R.	3	$f = 120\text{ Hz}$, $I_{OUT} \geq 100\text{ mA}$, $8\text{ V} \leq V_{IN} \leq 18\text{ V}$, $T_j = 25^\circ\text{C}$	62	69	—	dB	
Short circuit current limit		I_{SC}	1	$T_j = 25^\circ\text{C}$	—	960	—	mA	
Dropout voltage		V_D	1	$T_j = 25^\circ\text{C}$	—	1.7	—	V	
Average temperature coefficient of output voltage		T_{CVO}	1	$I_{OUT} = 5\text{ mA}$	—	-0.6	—	$\text{mV}/^\circ\text{C}$	

Not Recommended for New

TA78M06SB

Electrical Characteristics

(Unless otherwise specified, $V_{IN} = 11\text{ V}$, $I_{OUT} = 350\text{ mA}$, $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$, $C_{IN} = 0.33\ \mu\text{F}$, $C_{OUT} = 0.1\ \mu\text{F}$)

Characteristics		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit	
Output voltage		V_{OUT}	1	$T_j = 25^\circ\text{C}$	5.75	6.0	6.25	V	
Line regulation		Reg-line	1	$T_j = 25^\circ\text{C}$	$8\text{ V} \leq V_{IN} \leq 25\text{ V}$, $I_{OUT} = 200\text{ mA}$	—	4	100	mV
					$9\text{ V} \leq V_{IN} \leq 25\text{ V}$, $I_{OUT} = 200\text{ mA}$	—	2	50	
Load regulation		Reg-load	1	$T_j = 25^\circ\text{C}$	$5\text{ mA} \leq I_{OUT} \leq 500\text{ mA}$	—	25	120	mV
					$5\text{ mA} \leq I_{OUT} \leq 200\text{ mA}$	—	10	60	
Output voltage		V_{OUT}	1	$T_j = 25^\circ\text{C}$	$8\text{ V} \leq V_{IN} \leq 21\text{ V}$, $5\text{ mA} \leq I_{OUT} \leq 350\text{ mA}$	5.7	—	6.3	V
Quiescent current		I_B	1	$T_j = 25^\circ\text{C}$	—	4.5	8.0	mA	
Quiescent current change		Line	ΔI_B	1	$T_j = 25^\circ\text{C}$	—	—	0.8	mA
		Load	ΔI_{BO}					1	
Output noise voltage		V_{NO}	2	$T_a = 25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$	—	55	220	μV_{rms}	
Ripple rejection		R.R.	3	$f = 120\text{ Hz}$, $I_{OUT} = 100\text{ mA}$, $9\text{ V} \leq V_{IN} \leq 19\text{ V}$, $T_j = 25^\circ\text{C}$	59	66	—	dB	
Short circuit current limit		I_{SC}	1	$T_j = 25^\circ\text{C}$	—	960	—	mA	
Dropout voltage		V_D	1	$T_j = 25^\circ\text{C}$	—	1.7	—	V	
Average temperature coefficient of output voltage		T_{CVO}	1	$I_{OUT} = 5\text{ mA}$	—	-0.7	—	$\text{mV}/^\circ\text{C}$	

Not Recommended for New

TA78M08SB

Electrical Characteristics

(Unless otherwise specified, $V_{IN} = 14\text{ V}$, $I_{OUT} = 350\text{ mA}$, $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$, $C_{IN} = 0.33\text{ }\mu\text{F}$, $C_{OUT} = 0.1\text{ }\mu\text{F}$)

Characteristics		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit	
Output voltage		V_{OUT}	1	$T_j = 25^\circ\text{C}$	7.7	8.0	8.3	V	
Line regulation		Reg-line	1	$T_j = 25^\circ\text{C}$	$10.5\text{ V} \leq V_{IN} \leq 25\text{ V}$, $I_{OUT} = 200\text{ mA}$	—	5	100	mV
					$11\text{ V} \leq V_{IN} \leq 25\text{ V}$, $I_{OUT} = 200\text{ mA}$	—	3	50	
Load regulation		Reg-load	1	$T_j = 25^\circ\text{C}$	$5\text{ mA} \leq I_{OUT} \leq 500\text{ mA}$	—	26	160	mV
					$5\text{ mA} \leq I_{OUT} \leq 200\text{ mA}$	—	10	80	
Output voltage		V_{OUT}	1	$T_j = 25^\circ\text{C}$	$10.5\text{ V} \leq V_{IN} \leq 23\text{ V}$, $5\text{ mA} \leq I_{OUT} \leq 350\text{ mA}$	7.6	—	8.4	V
Quiescent current		I_B	1	$T_j = 25^\circ\text{C}$	—	4.6	8.0	mA	
Quiescent current change		Line	ΔI_B	1	$T_j = 25^\circ\text{C}$	—	—	0.8	mA
		Load	ΔI_{BO}					1	
Output noise voltage		V_{NO}	2	$T_a = 25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$	—	60	250	μV_{rms}	
Ripple rejection		R.R.	3	$f = 120\text{ Hz}$, $I_{OUT} = 100\text{ mA}$, $11.5\text{ V} \leq V_{IN} \leq 21.5\text{ V}$, $T_j = 25^\circ\text{C}$	56	63	—	dB	
Short circuit current limit		I_{SC}	1	$T_j = 25^\circ\text{C}$	—	960	—	mA	
Dropout voltage		V_D	1	$T_j = 25^\circ\text{C}$	—	1.7	—	V	
Average temperature coefficient of output voltage		T_{CVO}	1	$I_{OUT} = 5\text{ mA}$	—	-1.0	—	$\text{mV}/^\circ\text{C}$	

Not Recommended for New

TA78M09SB

Electrical Characteristics

(Unless otherwise specified, $V_{IN} = 15\text{ V}$, $I_{OUT} = 350\text{ mA}$, $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$, $C_{IN} = 0.33\ \mu\text{F}$, $C_{OUT} = 0.1\ \mu\text{F}$)

Characteristics		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit	
Output voltage		V_{OUT}	1	$T_j = 25^\circ\text{C}$	8.64	9.0	9.36	V	
Line regulation		Reg-line	1	$T_j = 25^\circ\text{C}$	$11.5\text{ V} \leq V_{IN} \leq 26\text{ V}$, $I_{OUT} = 200\text{ mA}$	—	5	100	mV
					$13\text{ V} \leq V_{IN} \leq 26\text{ V}$, $I_{OUT} = 200\text{ mA}$	—	3	50	
Load regulation		Reg-load	1	$T_j = 25^\circ\text{C}$	$5\text{ mA} \leq I_{OUT} \leq 500\text{ mA}$	—	26	180	mV
					$5\text{ mA} \leq I_{OUT} \leq 200\text{ mA}$	—	10	90	
Output voltage		V_{OUT}	1	$T_j = 25^\circ\text{C}$	$11.5\text{ V} \leq V_{IN} \leq 24\text{ V}$, $5\text{ mA} \leq I_{OUT} \leq 350\text{ mA}$	8.55	—	9.45	V
Quiescent current		I_B	1	$T_j = 25^\circ\text{C}$	—	4.6	8.0	mA	
Quiescent current change		Line	ΔI_B	1	$T_j = 25^\circ\text{C}$	—	—	0.8	mA
		Load	ΔI_{BO}					1	
Output noise voltage		V_{NO}	2	$T_a = 25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$	—	60	270	μV_{rms}	
Ripple rejection		R.R.	3	$f = 120\text{ Hz}$, $I_{OUT} = 100\text{ mA}$, $12.5\text{ V} \leq V_{IN} \leq 22.5\text{ V}$, $T_j = 25^\circ\text{C}$	56	63	—	dB	
Short circuit current limit		I_{SC}	1	$T_j = 25^\circ\text{C}$	—	960	—	mA	
Dropout voltage		V_D	1	$T_j = 25^\circ\text{C}$	—	1.7	—	V	
Average temperature coefficient of output voltage		T_{CVO}	1	$I_{OUT} = 5\text{ mA}$	—	-1.1	—	$\text{mV}/^\circ\text{C}$	

Not Recommended for New

TA78M10SB

Electrical Characteristics

(Unless otherwise specified, $V_{IN} = 16\text{ V}$, $I_{OUT} = 350\text{ mA}$, $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$, $C_{IN} = 0.33\text{ }\mu\text{F}$, $C_{OUT} = 0.1\text{ }\mu\text{F}$)

Characteristics		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit	
Output voltage		V_{OUT}	1	$T_j = 25^\circ\text{C}$	9.6	10.0	10.4	V	
Line regulation		Reg-line	1	$T_j = 25^\circ\text{C}$	$12.5\text{ V} \leq V_{IN} \leq 26\text{ V}$, $I_{OUT} = 200\text{ mA}$	—	6	100	mV
					$14\text{ V} \leq V_{IN} \leq 26\text{ V}$, $I_{OUT} = 200\text{ mA}$	—	3	50	
Load regulation		Reg-load	1	$T_j = 25^\circ\text{C}$	$5\text{ mA} \leq I_{OUT} \leq 500\text{ mA}$	—	26	200	mV
					$5\text{ mA} \leq I_{OUT} \leq 200\text{ mA}$	—	10	100	
Output voltage		V_{OUT}	1	$T_j = 25^\circ\text{C}$	$12.5\text{ V} \leq V_{IN} \leq 25\text{ V}$, $5\text{ mA} \leq I_{OUT} \leq 350\text{ mA}$	9.5	—	10.5	V
Quiescent current		I_B	1	$T_j = 25^\circ\text{C}$	—	4.7	8.0	mA	
Quiescent current change		Line	ΔI_{BI}	1	$T_j = 25^\circ\text{C}$	—	—	0.8	mA
		Load	ΔI_{BO}					1	
Output noise voltage		V_{NO}	2	$T_a = 25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$	—	65	280	μV_{rms}	
Ripple rejection		R.R.	3	$f = 120\text{ Hz}$, $I_{OUT} = 100\text{ mA}$, $13.5\text{ V} \leq V_{IN} \leq 23.5\text{ V}$, $T_j = 25^\circ\text{C}$	55	62	—	dB	
Short circuit current limit		I_{SC}	1	$T_j = 25^\circ\text{C}$	—	960	—	mA	
Dropout voltage		V_D	1	$T_j = 25^\circ\text{C}$	—	1.7	—	V	
Average temperature coefficient of output voltage		T_{CVO}	1	$I_{OUT} = 5\text{ mA}$	—	-1.3	—	$\text{mV}/^\circ\text{C}$	

Not Recommended for New

TA78M12SB

Electrical Characteristics

(Unless otherwise specified, $V_{IN} = 19\text{ V}$, $I_{OUT} = 350\text{ mA}$, $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$, $C_{IN} = 0.33\text{ }\mu\text{F}$, $C_{OUT} = 0.1\text{ }\mu\text{F}$)

Characteristics		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit	
Output voltage		V_{OUT}	1	$T_j = 25^\circ\text{C}$	11.5	12.0	12.5	V	
Line regulation		Reg-line	1	$T_j = 25^\circ\text{C}$	$14.5\text{ V} \leq V_{IN} \leq 30\text{ V}$, $I_{OUT} = 200\text{ mA}$	—	7	100	mV
					$16\text{ V} \leq V_{IN} \leq 30\text{ V}$, $I_{OUT} = 200\text{ mA}$	—	3	50	
Load regulation		Reg-load	1	$T_j = 25^\circ\text{C}$	$5\text{ mA} \leq I_{OUT} \leq 500\text{ mA}$	—	27	240	mV
					$5\text{ mA} \leq I_{OUT} \leq 200\text{ mA}$	—	10	120	
Output voltage		V_{OUT}	1	$T_j = 25^\circ\text{C}$	$14.5\text{ V} \leq V_{IN} \leq 27\text{ V}$, $5\text{ mA} \leq I_{OUT} \leq 350\text{ mA}$	11.4	—	12.6	V
Quiescent current		I_B	1	$T_j = 25^\circ\text{C}$	—	4.8	8.0	mA	
Quiescent current change		Line	ΔI_B	1	$T_j = 25^\circ\text{C}$	—	—	0.8	mA
		Load	ΔI_{BO}					1	
Output noise voltage		V_{NO}	2	$T_a = 25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$	—	70	300	μV_{rms}	
Ripple rejection		R.R.	3	$f = 120\text{ Hz}$, $I_{OUT} = 100\text{ mA}$, $15\text{ V} \leq V_{IN} \leq 25\text{ V}$, $T_j = 25^\circ\text{C}$	55	62	—	dB	
Short circuit current limit		I_{SC}	1	$T_j = 25^\circ\text{C}$	—	960	—	mA	
Dropout voltage		V_D	1	$T_j = 25^\circ\text{C}$	—	1.7	—	V	
Average temperature coefficient of output voltage		T_{CVO}	1	$I_{OUT} = 5\text{ mA}$	—	-1.6	—	$\text{mV}/^\circ\text{C}$	

Not Recommended for New

TA78M15SB

Electrical Characteristics

(Unless otherwise specified, $V_{IN} = 23\text{ V}$, $I_{OUT} = 350\text{ mA}$, $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$, $C_{IN} = 0.33\ \mu\text{F}$, $C_{OUT} = 0.1\ \mu\text{F}$)

Characteristics		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit	
Output voltage		V_{OUT}	1	$T_j = 25^\circ\text{C}$	14.4	15.0	15.6	V	
Line regulation		Reg-line	1	$T_j = 25^\circ\text{C}$	$17.5\text{ V} \leq V_{IN} \leq 30\text{ V}$, $I_{OUT} = 200\text{ mA}$	—	8	100	mV
					$20\text{ V} \leq V_{IN} \leq 30\text{ V}$, $I_{OUT} = 200\text{ mA}$	—	4	50	
Load regulation		Reg-load	1	$T_j = 25^\circ\text{C}$	$5\text{ mA} \leq I_{OUT} \leq 500\text{ mA}$	—	27	300	mV
					$5\text{ mA} \leq I_{OUT} \leq 200\text{ mA}$	—	10	150	
Output voltage		V_{OUT}	1	$T_j = 25^\circ\text{C}$	$17.5\text{ V} \leq V_{IN} \leq 30\text{ V}$, $5\text{ mA} \leq I_{OUT} \leq 350\text{ mA}$	14.25	—	15.75	V
Quiescent current		I_B	1	$T_j = 25^\circ\text{C}$	—	4.8	8.0	mA	
Quiescent current change		Line	ΔI_B	1	$T_j = 25^\circ\text{C}$	—	—	0.8	mA
		Load	ΔI_{BO}					1	
Output noise voltage		V_{NO}	2	$T_a = 25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$	—	80	450	μV_{rms}	
Ripple rejection		R.R.	3	$f = 120\text{ Hz}$, $I_{OUT} \geq 100\text{ mA}$, $18.5\text{ V} \leq V_{IN} \leq 28.5\text{ V}$, $T_j = 25^\circ\text{C}$	54	61	—	dB	
Short circuit current limit		I_{SC}	1	$T_j = 25^\circ\text{C}$	—	960	—	mA	
Dropout voltage		V_D	1	$T_j = 25^\circ\text{C}$	—	1.7	—	V	
Average temperature coefficient of output voltage		T_{CVO}	1	$I_{OUT} = 5\text{ mA}$	—	-2.0	—	$\text{mV}/^\circ\text{C}$	

Not Recommended for New

TA78M18SB

Electrical Characteristics

(Unless otherwise specified, $V_{IN} = 27\text{ V}$, $I_{OUT} = 350\text{ mA}$, $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$, $C_{IN} = 0.33\text{ }\mu\text{F}$, $C_{OUT} = 0.1\text{ }\mu\text{F}$)

Characteristics		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit	
Output voltage		V_{OUT}	1	$T_j = 25^\circ\text{C}$	17.3	18.0	18.7	V	
Line regulation		Reg-line	1	$T_j = 25^\circ\text{C}$	$21\text{ V} \leq V_{IN} \leq 33\text{ V}$, $I_{OUT} = 200\text{ mA}$	—	9	100	mV
					$24\text{ V} \leq V_{IN} \leq 33\text{ V}$, $I_{OUT} = 200\text{ mA}$	—	5	50	
Load regulation		Reg-load	1	$T_j = 25^\circ\text{C}$	$5\text{ mA} \leq I_{OUT} \leq 500\text{ mA}$	—	28	360	mV
					$5\text{ mA} \leq I_{OUT} \leq 200\text{ mA}$	—	10	180	
Output voltage		V_{OUT}	1	$T_j = 25^\circ\text{C}$	$21\text{ V} \leq V_{IN} \leq 33\text{ V}$, $5\text{ mA} \leq I_{OUT} \leq 350\text{ mA}$	17.1	—	18.9	V
Quiescent current		I_B	1	$T_j = 25^\circ\text{C}$	—	4.8	8.0	mA	
Quiescent current change		Line	ΔI_B	1	$T_j = 25^\circ\text{C}$	—	—	0.8	mA
		Load	ΔI_{BO}					1	
Output noise voltage		V_{NO}	2	$T_a = 25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$	—	90	490	μV_{rms}	
Ripple rejection		R.R.	3	$f = 120\text{ Hz}$, $I_{OUT} = 100\text{ mA}$, $22\text{ V} \leq V_{IN} \leq 32\text{ V}$, $T_j = 25^\circ\text{C}$	53	60	—	dB	
Short circuit current limit		I_{SC}	1	$T_j = 25^\circ\text{C}$	—	960	—	mA	
Dropout voltage		V_D	1	$T_j = 25^\circ\text{C}$	—	1.7	—	V	
Average temperature coefficient of output voltage		T_{CVO}	1	$I_{OUT} = 5\text{ mA}$	—	-2.5	—	$\text{mV}/^\circ\text{C}$	

Not Recommended for New

TA78M20SB

Electrical Characteristics

(Unless otherwise specified, $V_{IN} = 29\text{ V}$, $I_{OUT} = 350\text{ mA}$, $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$, $C_{IN} = 0.33\text{ }\mu\text{F}$, $C_{OUT} = 0.1\text{ }\mu\text{F}$)

Characteristics		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit		
Output voltage		V_{OUT}	1	$T_j = 25^\circ\text{C}$	19.2	20.0	20.8	V		
Line regulation		Reg-line	1	$T_j = 25^\circ\text{C}$	$23\text{ V} \leq V_{IN} \leq 35\text{ V}$, $I_{OUT} = 200\text{ mA}$	—	10	100	mV	
					$24\text{ V} \leq V_{IN} \leq 35\text{ V}$, $I_{OUT} = 200\text{ mA}$	—	6	50		
Load regulation		Reg-load	1	$T_j = 25^\circ\text{C}$	$5\text{ mA} \leq I_{OUT} \leq 500\text{ mA}$	—	28	400	mV	
					$5\text{ mA} \leq I_{OUT} \leq 200\text{ mA}$	—	10	200		
Output voltage		V_{OUT}	1	$T_j = 25^\circ\text{C}$	$23\text{ V} \leq V_{IN} \leq 35\text{ V}$, $5\text{ mA} \leq I_{OUT} \leq 350\text{ mA}$	19.0	—	21.0	V	
Quiescent current		I_B	1	$T_j = 25^\circ\text{C}$	—	4.9	8.0	mA		
Quiescent current change		Line	ΔI_{BI}	1	$T_j = 25^\circ\text{C}$	$23.5\text{ V} \leq V_{IN} \leq 35.5\text{ V}$, $I_{OUT} = 200\text{ mA}$	—	—	0.8	mA
		Load	ΔI_{BO}				1	$5\text{ mA} \leq I_{OUT} \leq 350\text{ mA}$	—	
Output noise voltage		V_{NO}	2	$T_a = 25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$	—	95	540	μV_{rms}		
Ripple rejection		R.R.	3	$f = 120\text{ Hz}$, $I_{OUT} = 100\text{ mA}$, $24\text{ V} \leq V_{IN} \leq 34\text{ V}$, $T_j = 25^\circ\text{C}$	53	60	—	dB		
Short circuit current limit		I_{SC}	1	$T_j = 25^\circ\text{C}$	—	960	—	mA		
Dropout voltage		V_D	1	$T_j = 25^\circ\text{C}$	—	1.7	—	V		
Average temperature coefficient of output voltage		T_{CVO}	1	$I_{OUT} = 5\text{ mA}$	—	-3.0	—	$\text{mV}/^\circ\text{C}$		

Not Recommended for New

TA78M24SB

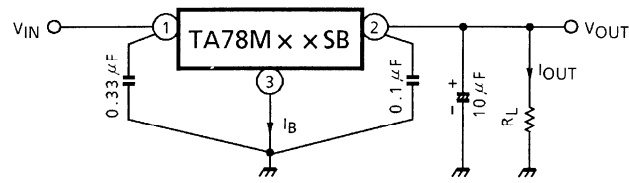
Electrical Characteristics

(Unless otherwise specified, $V_{IN} = 33\text{ V}$, $I_{OUT} = 350\text{ mA}$, $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$, $C_{IN} = 0.33\text{ }\mu\text{F}$, $C_{OUT} = 0.1\text{ }\mu\text{F}$)

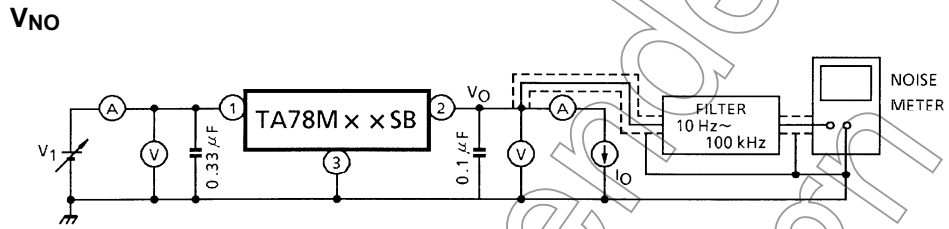
Characteristics		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit	
Output voltage		V_{OUT}	1	$T_j = 25^\circ\text{C}$	23.0	24.0	25.0	V	
Line regulation		Reg-line	1	$T_j = 25^\circ\text{C}$	$27\text{ V} \leq V_{IN} \leq 38\text{ V}$, $I_{OUT} = 200\text{ mA}$	—	12	100	mV
					$28\text{ V} \leq V_{IN} \leq 38\text{ V}$, $I_{OUT} = 200\text{ mA}$	—	7	50	
Load regulation		Reg-load	1	$T_j = 25^\circ\text{C}$	$5\text{ mA} \leq I_{OUT} \leq 500\text{ mA}$	—	30	480	mV
					$5\text{ mA} \leq I_{OUT} \leq 200\text{ mA}$	—	10	240	
Output voltage		V_{OUT}	1	$T_j = 25^\circ\text{C}$	$27\text{ V} \leq V_{IN} \leq 38\text{ V}$, $5\text{ mA} \leq I_{OUT} \leq 350\text{ mA}$	22.8	—	25.2	V
Quiescent current		I_B	1	$T_j = 25^\circ\text{C}$	—	5.0	8.0	mA	
Quiescent current change		Line	ΔI_{BI}	1	$T_j = 25^\circ\text{C}$	—	—	0.8	mA
		Load	ΔI_{BO}						
Output noise voltage		V_{NO}	2	$T_a = 25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$	—	115	650	μV_{rms}	
Ripple rejection		R.R.	3	$f = 120\text{ Hz}$, $I_{OUT} = 100\text{ mA}$, $28\text{ V} \leq V_{IN} \leq 38\text{ V}$, $T_j = 25^\circ\text{C}$	50	57	—	dB	
Short circuit current limit		I_{SC}	1	$T_j = 25^\circ\text{C}$	—	960	—	mA	
Dropout voltage		V_D	1	$T_j = 25^\circ\text{C}$	—	1.7	—	V	
Average temperature coefficient of output voltage		T_{CVO}	1	$I_{OUT} = 5\text{ mA}$	—	-3.5	—	$\text{mV}/^\circ\text{C}$	

Not Recommended for New

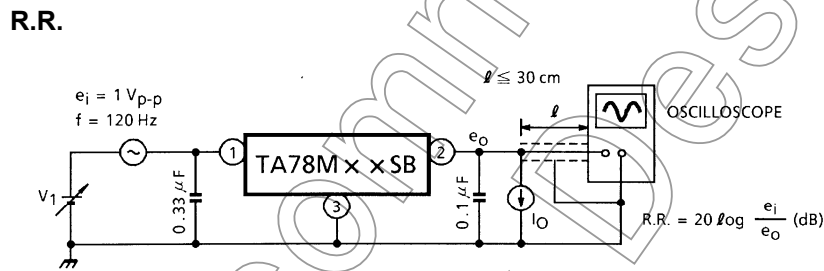
Test Circuit 1 / Standard Application



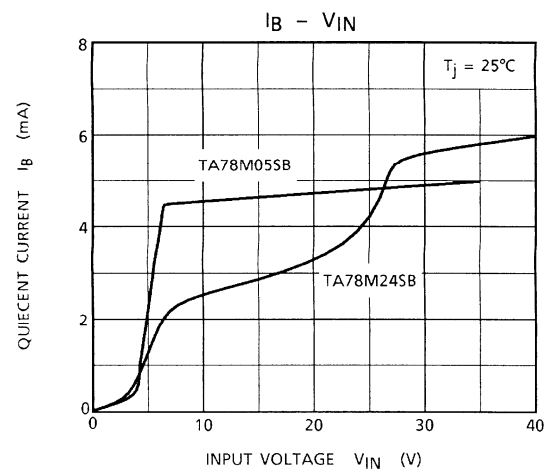
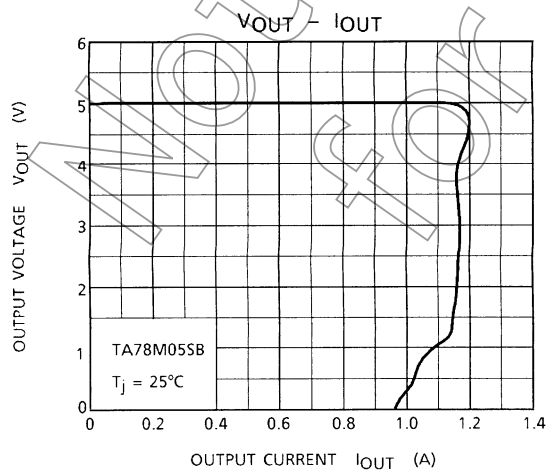
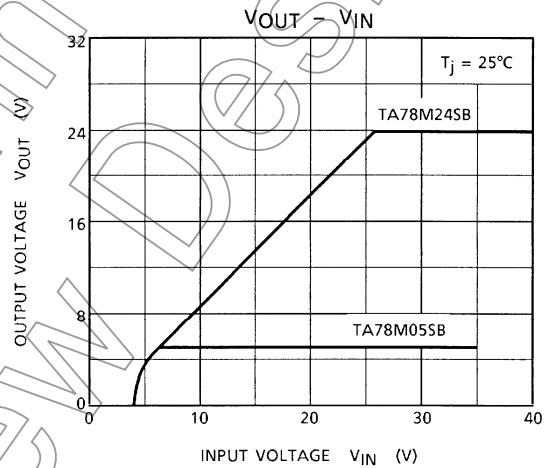
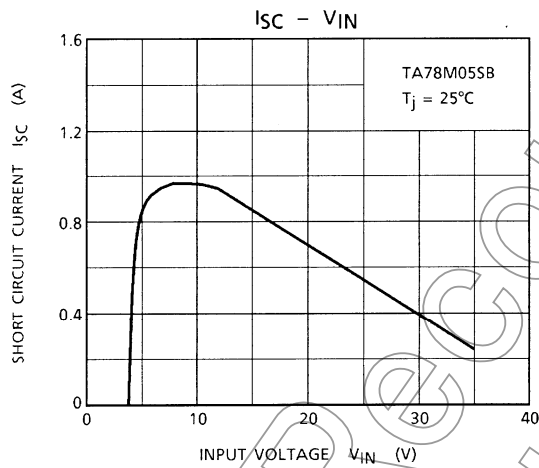
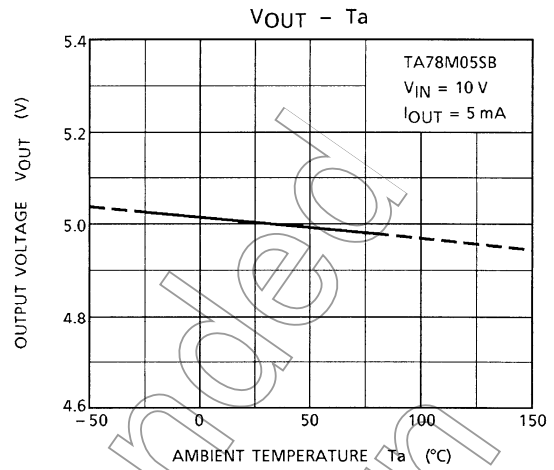
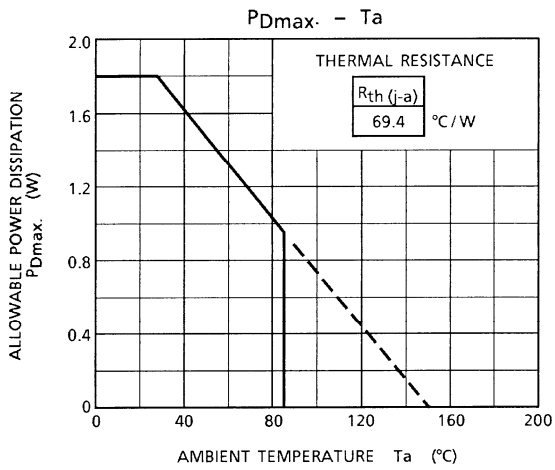
Test Circuit 2

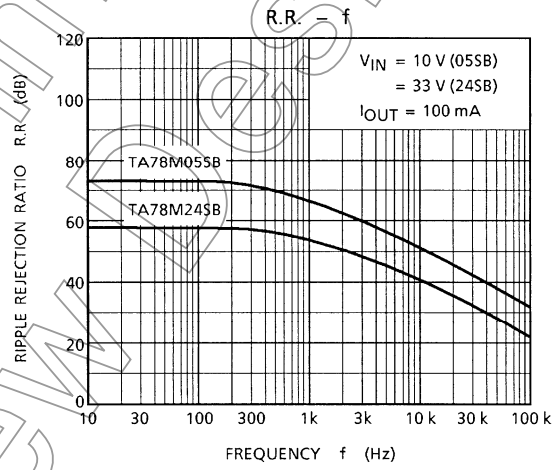
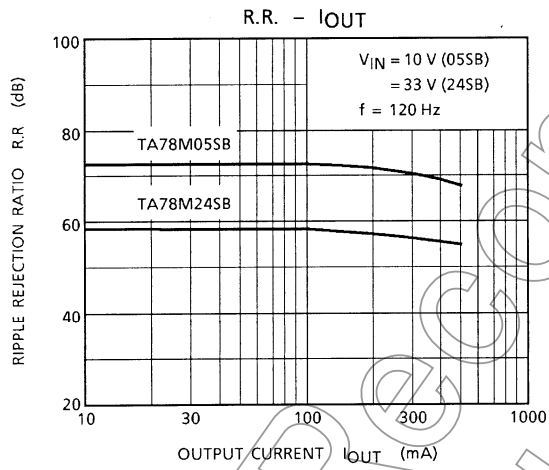
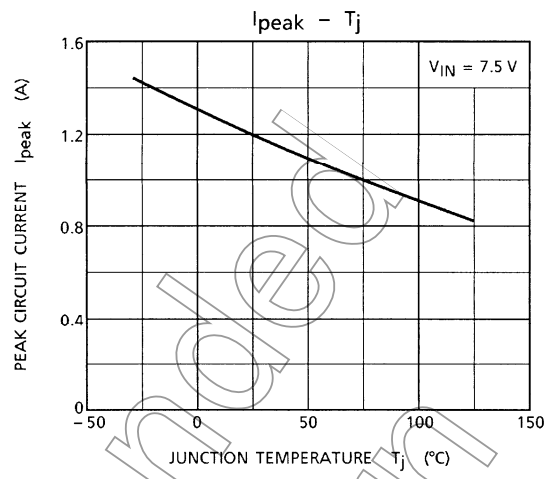
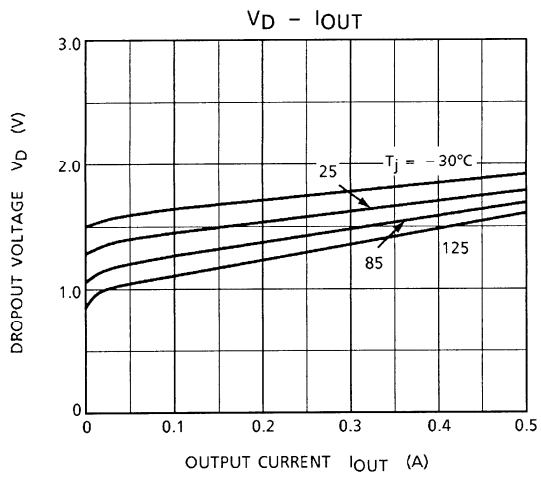


Test Circuit 3



Not Recommended for New Design





Not for New Comment

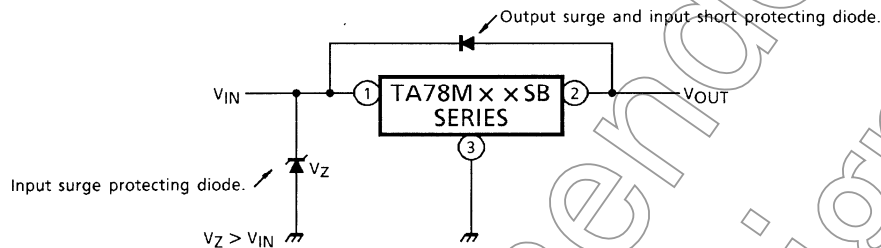
Usage Precautions

- (1) In regard to GND, be careful not to apply a negative voltage to the input/output terminal.
- (2) If a surge voltage exceeding the absolute 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.

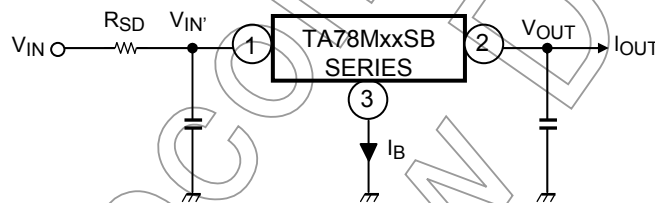
Particular care is necessary in the case of the latter.

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 printed circuit board patterns. In particular, adequate investigation should be made to ensure there is no problem even in high or low temperatures.

- Low voltage

Do not apply voltage to the Product that is lower than the minimum operating voltage, or the Product's protective functions will not operate properly and the Product may be permanently damaged.

- Overcurrent Protection

The overcurrent protection circuits in the Product are designed to temporarily protect Product from minor overcurrent of brief duration. When the overcurrent protective function in the Product activates, immediately cease application of overcurrent to Product. Improper usage of Product, such as application of current to Product exceeding the absolute maximum ratings, could cause the overcurrent protection circuit not to operate properly and/or damage Product permanently even before the protection circuit starts to operate.

- Overheating Protection

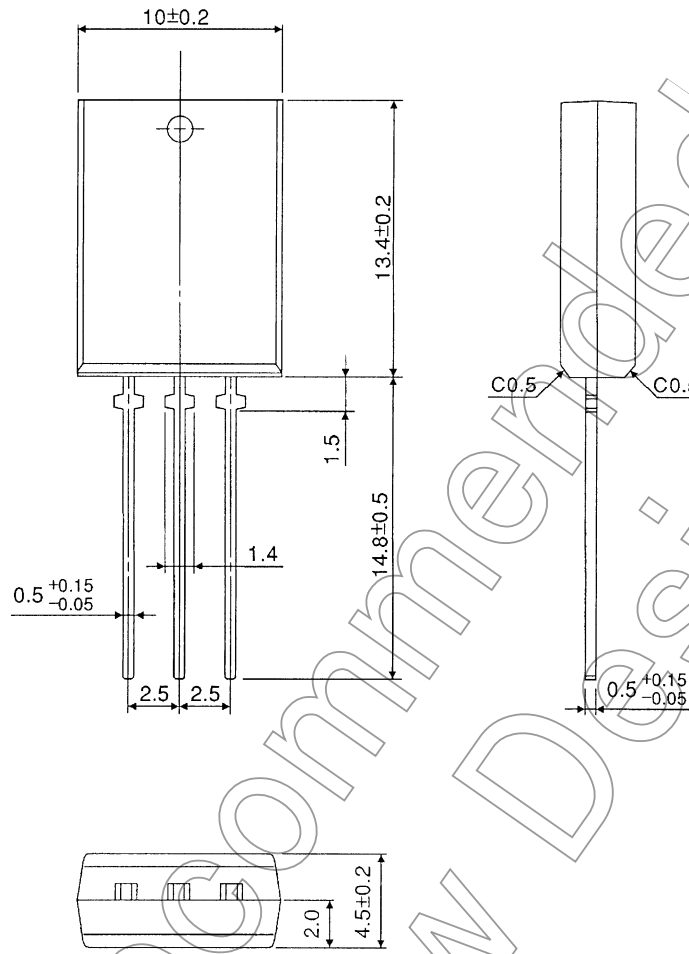
The thermal shutdown circuits in the Product are designed to temporarily protect Product from minor overheating of brief duration. When the overheating protective function in the Product activates, immediately correct the overheating situation. Improper usage of Product, such as the application of heat to Product exceeding the absolute maximum ratings, could cause the overheating protection circuit not to operate properly and/or damage Product permanently even before the protection circuit starts to operate.

Not Recommended
for New Design

Package Dimensions

SIP3-P-2.50A

Unit : mm



Weight : 1.5 g (Typ.)

Not Recommended for New Design

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