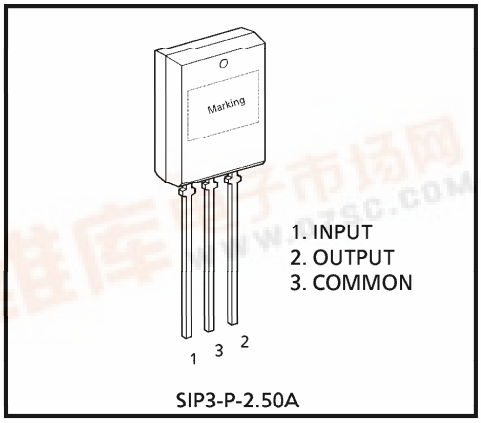
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

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

0.5A THREE TERMINAL POSITIVE VOLTAGE REGULATORS

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

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 driver up to 0.5A of output current.



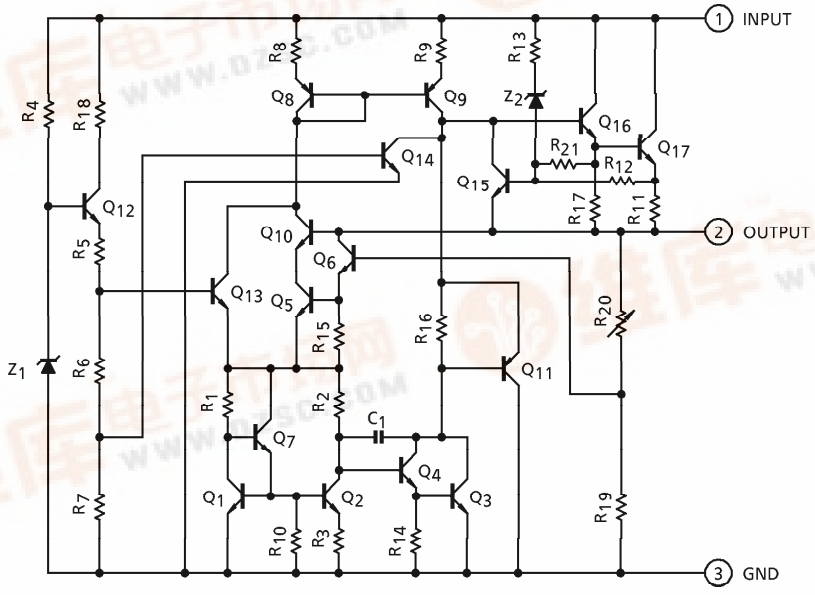
SIP3-P-2.50A

Weight : 1.5g (Typ.)

FEATURES

- Suitable for CMOS, TTL and the other Digital IC's Power Supply.
- Output Current in Excess of 0.5A
- Internal Thermal Overload Protection
- Internal Short Circuit Current Limiting
- Package in the Plastic Case TPL (P_D = 1.8W)

EQUIVALENT CIRCUIT



961001EBA2

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Input Voltage	TA78M05SB	V_{IN}	35	V
	TA78M06SB			
	TA78M08SB			
	TA78M09SB			
	TA78M10SB			
	TA78M12SB			
	TA78M15SB			
	TA78M18SB		40	
	TA78M20SB			
	TA78M24SB			
Power Dissipation	(Ta = 25°C)	P_D	1.8	W
Operating Temperature		T_{opr}	−30~75	°C
Storage Temperature		T_{stg}	−55~150	°C
Operating Junction Temperature		T_j	−30~150	°C
Thermal Resistance		$R_{th\ (j-a)}$	69.4	°C / W

TA78M05SB

ELECTRICAL CHARACTERISTICS

(V_{IN} = 10V, I_{OUT} = 350mA, 0°C ≦ T_j ≦ 125°C, C_{IN} = 0.33μF, C_{OUT} = 0.1μF, unless otherwise noted)

CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage		V_{OUT}	1	T_j = 25°C		4.8	5.0	5.2	V
Line Regulation		Reg.line	1	T_j = 25°C	7V ≦ V_{IN} ≦ 25V I_{OUT} = 200mA	—	4	100	mV
					8V ≦ V_{IN} ≦ 25V I_{OUT} = 200mA	—	2	50	
Load Regulation		Reg.load	1	T_j = 25°C	5mA ≦ I_{OUT} ≦ 500mA	—	25	100	mV
					5mA ≦ I_{OUT} ≦ 200mA	—	10	50	
Output Voltage		V_{OUT}	1	T_j = 25°C	7V ≦ V_{IN} ≦ 20V 5mA ≦ I_{OUT} ≦ 350mA	4.75	—	5.25	V
Quiescent Current		I_B	1	T_j = 25°C		—	4.5	8.0	mA
Quiescent Current Change	Line	ΔI_{BI}	1	8.5V ≦ V_{IN} ≦ 25.5V, I_{OUT} = 200mA		—	—	0.8	mA
	Load	ΔI_{BO}	1	5mA ≦ I_{OUT} ≦ 350mA		—	—	0.5	
Output Noise Voltage		V_{NO}	2	Ta = 25°C, 10Hz ≦ f ≦ 100kHz		—	50	200	μV_{rms}
Ripple Rejection		R.R.	3	f = 120Hz, I_{OUT} = 100mA 8V ≦ V_{IN} ≦ 18V, T_j = 25°C		62	69	—	dB
Short Circuit Current Limit		I_{SC}	1	T_j = 25°C		—	960	—	mA
Dropout Voltage		V_D	1	Ta = 25°C		—	1.7	—	V
Average Temperature Coefficient Of Output Voltage		T_{CVO}	1	I_{OUT} = 5mA		—	−0.6	—	mV / °C

TA78M06SB

ELECTRICAL CHARACTERISTICS

(V_{IN} = 11V, I_{OUT} = 350mA, 0°C ≦ T_j ≦ 125°C, C_{IN} = 0.33μF, C_{OUT} = 0.1μF, unless otherwise noted)

CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage		V_{OUT}	1	T_j = 25°C		5.75	6.0	6.25	V
Line Regulation		Reg.line	1	T_j = 25°C	8V ≦ V_{IN} ≦ 25V I_{OUT} = 200mA	—	4	100	mV
					9V ≦ V_{IN} ≦ 25V I_{OUT} = 200mA	—	2	50	
Load Regulation		Reg.load	1	T_j = 25°C	5mA ≦ I_{OUT} ≦ 500mA	—	25	120	mV
					5mA ≦ I_{OUT} ≦ 200mA	—	10	60	
Output Voltage		V_{OUT}	1	T_j = 25°C	8V ≦ V_{IN} ≦ 21V 5mA ≦ I_{OUT} ≦ 350mA	5.7	—	6.3	V
Quiescent Current		I_B	1	T_j = 25°C		—	4.5	8.0	mA
Quiescent Current Change	Line	ΔI_{BI}	1	9.5V ≦ V_{IN} ≦ 25.5V, I_{OUT} = 200mA		—	—	0.8	mA
	Load	ΔI_{BO}	1	5mA ≦ I_{OUT} ≦ 350mA		—	—	0.5	
Output Noise Voltage		V_{NO}	2	Ta = 25°C, 10Hz ≦ f ≦ 100kHz		—	55	220	μV_{rms}
Ripple Rejection		R.R.	3	f = 120Hz, I_{OUT} = 100mA 9V ≦ V_{IN} ≦ 19V, T_j = 25°C		59	66	—	dB
Short Circuit Current Limit		I_{SC}	1	T_j = 25°C		—	960	—	mA
Dropout Voltage		V_D	1	Ta = 25°C		—	1.7	—	V
Average Temperature Coefficient Of Output Voltage		T_{CVO}	1	I_{OUT} = 5mA		—	−0.7	—	mV / °C

TA78M08SB

ELECTRICAL CHARACTERISTICS

(V_{IN} = 14V, I_{OUT} = 350mA, 0°C ≦ T_j ≦ 125°C, C_{IN} = 0.33μF, C_{OUT} = 0.1μF, unless otherwise noted)

CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage		V_{OUT}	1	T_j = 25°C		7.7	8.0	8.3	V
Line Regulation		Reg.line	1	T_j = 25°C	10.5V ≦ V_{IN} ≦ 25V I_{OUT} = 200mA	—	5	100	mV
					11V ≦ V_{IN} ≦ 25V I_{OUT} = 200mA	—	3	50	
Load Regulation		Reg.load	1	T_j = 25°C	5mA ≦ I_{OUT} ≦ 500mA	—	26	160	mV
					5mA ≦ I_{OUT} ≦ 200mA	—	10	80	
Output Voltage		V_{OUT}	1	T_j = 25°C	10.5V ≦ V_{IN} ≦ 23V 5mA ≦ I_{OUT} ≦ 350mA	7.6	—	8.4	V
Quiescent Current		I_B	1	T_j = 25°C		—	4.6	8.0	mA
Quiescent Current Change	Line	ΔI_{BI}	1	11V ≦ V_{IN} ≦ 25.5V, I_{OUT} = 200mA		—	—	0.8	mA
	Load	ΔI_{BO}	1	5mA ≦ I_{OUT} ≦ 350mA		—	—	0.5	
Output Noise Voltage		V_{NO}	2	Ta = 25°C, 10Hz ≦ f ≦ 100kHz		—	60	250	μV_{rms}
Ripple Rejection		R.R.	3	f = 120Hz, I_{OUT} = 100mA 11.5V ≦ V_{IN} ≦ 21.5V, T_j = 25°C		56	63	—	dB
Short Circuit Current Limit		I_{SC}	1	T_j = 25°C		—	960	—	mA
Dropout Voltage		V_D	1	Ta = 25°C		—	1.7	—	V
Average Temperature Coefficient Of Output Voltage		T_{CVO}	1	I_{OUT} = 5mA		—	− 1.0	—	mV / °C

TA78M09SB

ELECTRICAL CHARACTERISTICS

(V_{IN} = 15V, I_{OUT} = 350mA, 0°C ≦ T_j ≦ 125°C, C_{IN} = 0.33μF, C_{OUT} = 0.1μF, unless otherwise noted)

CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage		V_{OUT}	1	T_j = 25°C		8.64	9.0	9.36	V
Line Regulation		Reg.line	1	T_j = 25°C	11.5V ≦ V_{IN} ≦ 26V I_{OUT} = 200mA	—	5	100	mV
					13V ≦ V_{IN} ≦ 26V I_{OUT} = 200mA	—	3	50	
Load Regulation		Reg.load	1	T_j = 25°C	5mA ≦ I_{OUT} ≦ 500mA	—	26	180	mV
					5mA ≦ I_{OUT} ≦ 200mA	—	10	90	
Output Voltage		V_{OUT}	1	T_j = 25°C	11.5V ≦ V_{IN} ≦ 24V 5mA ≦ I_{OUT} ≦ 350mA	8.55	—	9.45	V
Quiescent Current		I_B	1	T_j = 25°C		—	4.6	8.0	mA
Quiescent Current Change	Line	ΔI_{BI}	1	12V ≦ V_{IN} ≦ 26.5V, I_{OUT} = 200mA		—	—	0.8	mA
	Load	ΔI_{BO}	1	5mA ≦ I_{OUT} ≦ 350mA		—	—	0.5	
Output Noise Voltage		V_{NO}	2	Ta = 25°C, 10Hz ≦ f ≦ 100kHz		—	60	270	μV_{rms}
Ripple Rejection		R.R.	3	f = 120Hz, I_{OUT} = 100mA 12.5V ≦ V_{IN} ≦ 22.5V, T_j = 25°C		56	63	—	dB
Short Circuit Current Limit		I_{SC}	1	T_j = 25°C		—	960	—	mA
Dropout Voltage		V_D	1	Ta = 25°C		—	1.7	—	V
Average Temperature Coefficient Of Output Voltage		T_{CVO}	1	I_{OUT} = 5mA		—	−1.1	—	mV / °C

TA78M10SB

ELECTRICAL CHARACTERISTICS

(V_{IN} = 16V, I_{OUT} = 350mA, 0°C ≦ T_j ≦ 125°C, C_{IN} = 0.33μF, C_{OUT} = 0.1μF, unless otherwise noted)

CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage		V_{OUT}	1	T_j = 25°C		9.6	10.0	10.4	V
Line Regulation		Reg.line	1	T_j = 25°C	12.5V ≦ V_{IN} ≦ 26V I_{OUT} = 200mA	—	6	100	mV
					14V ≦ V_{IN} ≦ 26V I_{OUT} = 200mA	—	3	50	
Load Regulation		Reg.load	1	T_j = 25°C	5mA ≦ I_{OUT} ≦ 500mA	—	26	200	mV
					5mA ≦ I_{OUT} ≦ 200mA	—	10	100	
Output Voltage		V_{OUT}	1	T_j = 25°C	12.5V ≦ V_{IN} ≦ 25V 5mA ≦ I_{OUT} ≦ 350mA	9.5	—	10.5	V
Quiescent Current		I_B	1	T_j = 25°C		—	4.7	8.0	mA
Quiescent Current Change	Line	ΔI_{BI}	1	13V ≦ V_{IN} ≦ 26.5V, I_{OUT} = 200mA		—	—	0.8	mA
	Load	ΔI_{BO}	1	5mA ≦ I_{OUT} ≦ 350mA		—	—	0.5	
Output Noise Voltage		V_{NO}	2	Ta = 25°C, 10Hz ≦ f ≦ 100kHz		—	65	280	μV_{rms}
Ripple Rejection		R.R.	3	f = 120Hz, I_{OUT} = 100mA 13.5V ≦ V_{IN} ≦ 23.5V, T_j = 25°C		55	62	—	dB
Short Circuit Current Limit		I_{SC}	1	T_j = 25°C		—	960	—	mA
Dropout Voltage		V_D	1	Ta = 25°C		—	1.7	—	V
Average Temperature Coefficient Of Output Voltage		T_{CVO}	1	I_{OUT} = 5mA		—	−1.3	—	mV / °C

TA78M12SB

ELECTRICAL CHARACTERISTICS

(V_{IN} = 19V, I_{OUT} = 350mA, 0°C ≦ T_j ≦ 125°C, C_{IN} = 0.33μF, C_{OUT} = 0.1μF, unless otherwise noted)

CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage		V_{OUT}	1	T_j = 25°C		11.5	12.0	12.5	V
Line Regulation		Reg.line	1	T_j = 25°C	14.5V ≦ V_{IN} ≦ 30V I_{OUT} = 200mA	—	7	100	mV
					16V ≦ V_{IN} ≦ 30V I_{OUT} = 200mA	—	3	50	
Load Regulation		Reg.load	1	T_j = 25°C	5mA ≦ I_{OUT} ≦ 500mA	—	27	240	mV
					5mA ≦ I_{OUT} ≦ 200mA	—	10	120	
Output Voltage		V_{OUT}	1	T_j = 25°C	14.5V ≦ V_{IN} ≦ 27V 5mA ≦ I_{OUT} ≦ 350mA	11.4	—	12.6	V
Quiescent Current		I_B	1	T_j = 25°C		—	4.8	8.0	mA
Quiescent Current Change	Line	ΔI_{BI}	1	15V ≦ V_{IN} ≦ 30.5V, I_{OUT} = 200mA		—	—	0.8	mA
	Load	ΔI_{BO}	1	5mA ≦ I_{OUT} ≦ 350mA		—	—	0.5	
Output Noise Voltage		V_{NO}	2	Ta = 25°C, 10Hz ≦ f ≦ 100kHz		—	70	300	μV_{rms}
Ripple Rejection		R.R.	3	f = 120Hz, I_{OUT} = 100mA 15V ≦ V_{IN} ≦ 25V, T_j = 25°C		55	62	—	dB
Short Circuit Current Limit		I_{SC}	1	T_j = 25°C		—	960	—	mA
Dropout Voltage		V_D	1	Ta = 25°C		—	1.7	—	V
Average Temperature Coefficient Of Output Voltage		T_{CVO}	1	I_{OUT} = 5mA		—	−1.6	—	mV / °C

TA78M15SB

ELECTRICAL CHARACTERISTICS

(V_{IN} = 23V, I_{OUT} = 350mA, 0°C ≦ T_j ≦ 125°C, C_{IN} = 0.33μF, C_{OUT} = 0.1μF, unless otherwise noted)

CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage		V_{OUT}	1	T_j = 25°C		14.4	15.0	15.6	V
Line Regulation		Reg.line	1	T_j = 25°C	17.5V ≦ V_{IN} ≦ 30V I_{OUT} = 200mA	—	8	100	mV
					20V ≦ V_{IN} ≦ 30V I_{OUT} = 200mA	—	4	50	
Load Regulation		Reg.load	1	T_j = 25°C	5mA ≦ I_{OUT} ≦ 500mA	—	27	300	mV
					5mA ≦ I_{OUT} ≦ 200mA	—	10	150	
Output Voltage		V_{OUT}	1	T_j = 25°C	17.5V ≦ V_{IN} ≦ 30V 5mA ≦ I_{OUT} ≦ 350mA	14.25	—	15.75	V
Quiescent Current		I_B	1	T_j = 25°C		—	4.8	8.0	mA
Quiescent Current Change	Line	ΔI_{BI}	1	18V ≦ V_{IN} ≦ 30.5V, I_{OUT} = 200mA		—	—	0.8	mA
	Load	ΔI_{BO}	1	5mA ≦ I_{OUT} ≦ 350mA		—	—	0.5	
Output Noise Voltage		V_{NO}	2	Ta = 25°C, 10Hz ≦ f ≦ 100kHz		—	80	450	μV_{rms}
Ripple Rejection		R.R.	3	f = 120Hz, I_{OUT} = 100mA 18.5V ≦ V_{IN} ≦ 28.5V, T_j = 25°C		54	61	—	dB
Short Circuit Current Limit		I_{SC}	1	T_j = 25°C		—	960	—	mA
Dropout Voltage		V_D	1	Ta = 25°C		—	1.7	—	V
Average Temperature Coefficient Of Output Voltage		T_{CVO}	1	I_{OUT} = 5mA		—	−2.0	—	mV / °C

TA78M18SB

ELECTRICAL CHARACTERISTICS

(V_{IN} = 27V, I_{OUT} = 350mA, 0°C ≦ T_j ≦ 125°C, C_{IN} = 0.33μF, C_{OUT} = 0.1μF, unless otherwise noted)

CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage		V_{OUT}	1	T_j = 25°C		17.3	18.0	18.7	V
Line Regulation		Reg.line	1	T_j = 25°C	21V ≦ V_{IN} ≦ 33V I_{OUT} = 200mA	—	9	100	mV
					24V ≦ V_{IN} ≦ 33V I_{OUT} = 200mA	—	5	50	
Load Regulation		Reg.load	1	T_j = 25°C	5mA ≦ I_{OUT} ≦ 500mA	—	28	360	mV
					5mA ≦ I_{OUT} ≦ 200mA	—	10	180	
Output Voltage		V_{OUT}	1	T_j = 25°C	21V ≦ V_{IN} ≦ 33V 5mA ≦ I_{OUT} ≦ 350mA	17.1	—	18.9	V
Quiescent Current		I_B	1	T_j = 25°C		—	4.8	8.0	mA
Quiescent Current Change	Line	ΔI_{BI}	1	21.5V ≦ V_{IN} ≦ 33.5V, I_{OUT} = 200mA		—	—	0.8	mA
	Load	ΔI_{BO}	1	5mA ≦ I_{OUT} ≦ 350mA		—	—	0.5	
Output Noise Voltage		V_{NO}	2	Ta = 25°C, 10Hz ≦ f ≦ 100kHz		—	90	490	μV_{rms}
Ripple Rejection		R.R.	3	f = 120Hz, I_{OUT} = 100mA 22V ≦ V_{IN} ≦ 32V, T_j = 25°C		53	60	—	dB
Short Circuit Current Limit		I_{SC}	1	T_j = 25°C		—	960	—	mA
Dropout Voltage		V_D	1	Ta = 25°C		—	1.7	—	V
Average Temperature Coefficient Of Output Voltage		T_{CVO}	1	I_{OUT} = 5mA		—	− 2.5	—	mV / °C

TA78M20SB

ELECTRICAL CHARACTERISTICS

(V_{IN} = 29V, I_{OUT} = 350mA, 0°C ≦ T_j ≦ 125°C, C_{IN} = 0.33μF, C_{OUT} = 0.1μF, unless otherwise noted)

CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage		V_{OUT}	1	T_j = 25°C		19.2	20.0	20.8	V
Line Regulation		Reg.line	1	T_j = 25°C	23V ≦ V_{IN} ≦ 35V I_{OUT} = 200mA	—	10	100	mV
					24V ≦ V_{IN} ≦ 35V I_{OUT} = 200mA	—	6	50	
Load Regulation		Reg.load	1	T_j = 25°C	5mA ≦ I_{OUT} ≦ 500mA	—	28	400	mV
					5mA ≦ I_{OUT} ≦ 200mA	—	10	200	
Output Voltage		V_{OUT}	1	T_j = 25°C	23V ≦ V_{IN} ≦ 35V 5mA ≦ I_{OUT} ≦ 350mA	19.0	—	21.0	V
Quiescent Current		I_B	1	T_j = 25°C		—	4.9	8.0	mA
Quiescent Current Change	Line	ΔI_{BI}	1	23.5V ≦ V_{IN} ≦ 35.5V, I_{OUT} = 200mA		—	—	0.8	mA
	Load	ΔI_{BO}	1	5mA ≦ I_{OUT} ≦ 350mA		—	—	0.5	
Output Noise Voltage		V_{NO}	2	Ta = 25°C, 10Hz ≦ f ≦ 100kHz		—	95	540	μV_{rms}
Ripple Rejection		R.R.	3	f = 120Hz, I_{OUT} = 100mA 24V ≦ V_{IN} ≦ 34V, T_j = 25°C		53	60	—	dB
Short Circuit Current Limit		I_{SC}	1	T_j = 25°C		—	960	—	mA
Dropout Voltage		V_D	1	Ta = 25°C		—	1.7	—	V
Average Temperature Coefficient Of Output Voltage		T_{CVO}	1	I_{OUT} = 5mA		—	− 3.0	—	mV / °C

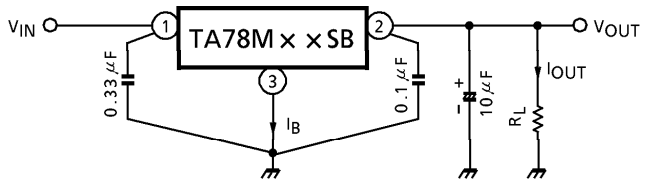
TA78M24SB

ELECTRICAL CHARACTERISTICS

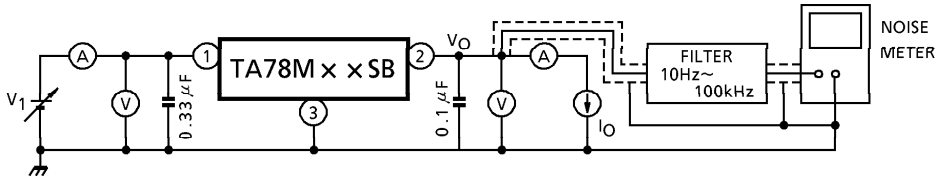
(V_{IN} = 33V, I_{OUT} = 350mA, 0°C ≦ T_j ≦ 125°C, C_{IN} = 0.33μF, C_{OUT} = 0.1μF, unless otherwise noted)

CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage		V_{OUT}	1	T_j = 25°C		23.0	24.0	25.0	V
Line Regulation		Reg.line	1	T_j = 25°C	27V ≦ V_{IN} ≦ 38V I_{OUT} = 200mA	—	12	100	mV
					28V ≦ V_{IN} ≦ 38V I_{OUT} = 200mA	—	7	50	
Load Regulation		Reg.load	1	T_j = 25°C	5mA ≦ I_{OUT} ≦ 500mA	—	30	480	mV
					5mA ≦ I_{OUT} ≦ 200mA	—	10	240	
Output Voltage		V_{OUT}	1	T_j = 25°C	27V ≦ V_{IN} ≦ 38V 5mA ≦ I_{OUT} ≦ 350mA	22.8	—	25.2	V
Quiescent Current		I_B	1	T_j = 25°C		—	5.0	8.0	mA
Quiescent Current Change	Line	ΔI_{BI}	1	27.5V ≦ V_{IN} ≦ 38.5V, I_{OUT} = 200mA		—	—	0.8	mA
	Load	ΔI_{BO}	1	5mA ≦ I_{OUT} ≦ 350mA		—	—	0.5	
Output Noise Voltage		V_{NO}	2	Ta = 25°C, 10Hz ≦ f ≦ 100kHz		—	115	650	μV_{rms}
Ripple Rejection		R.R.	3	f = 120Hz, I_{OUT} = 100mA 28V ≦ V_{IN} ≦ 38V, T_j = 25°C		50	57	—	dB
Short Circuit Current Limit		I_{SC}	1	T_j = 25°C		—	960	—	mA
Dropout Voltage		V_D	1	Ta = 25°C		—	1.7	—	V
Average Temperature Coefficient Of Output Voltage		T_{CVO}	1	I_{OUT} = 5mA		—	−3.5	—	mV / °C

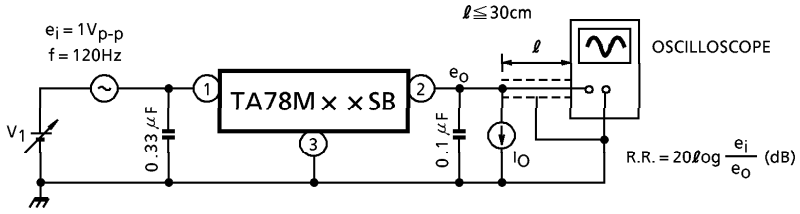
TEST CIRCUIT 1 / STANDARD APPLICATION



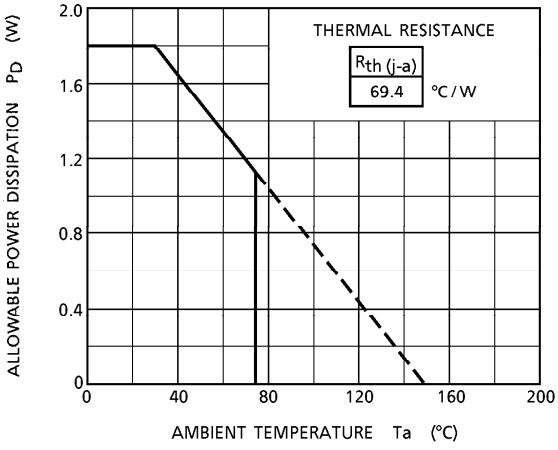
TEST CIRCUIT 2 V_{NO}



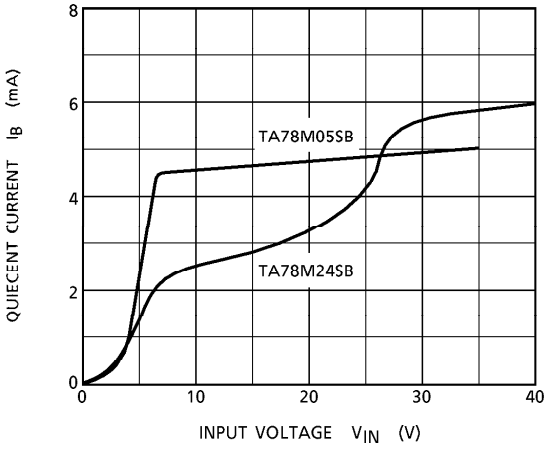
TEST CIRCUIT 3 R.R.



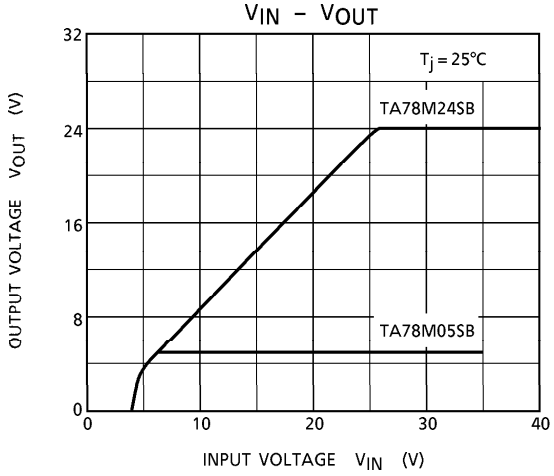
P_D – Ta



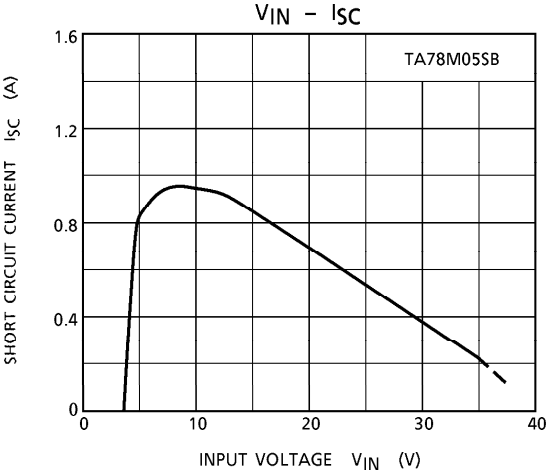
V_{IN} – I_B



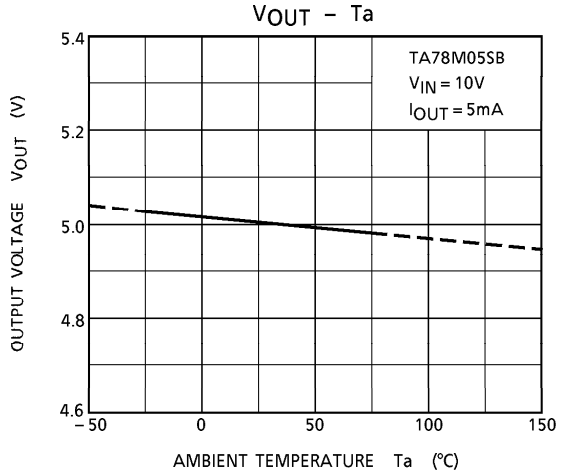
V_{IN} – V_{OUT}



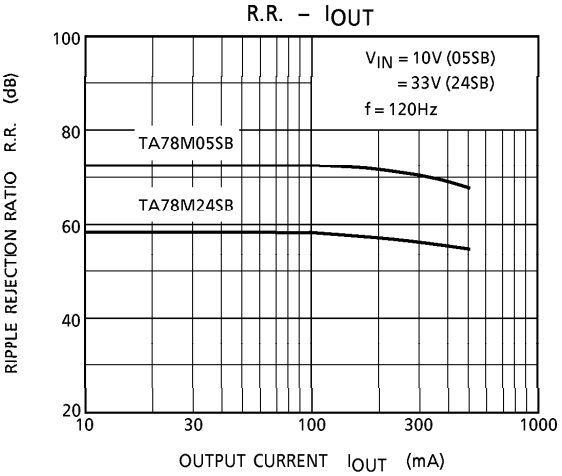
V_{IN} – I_{SC}



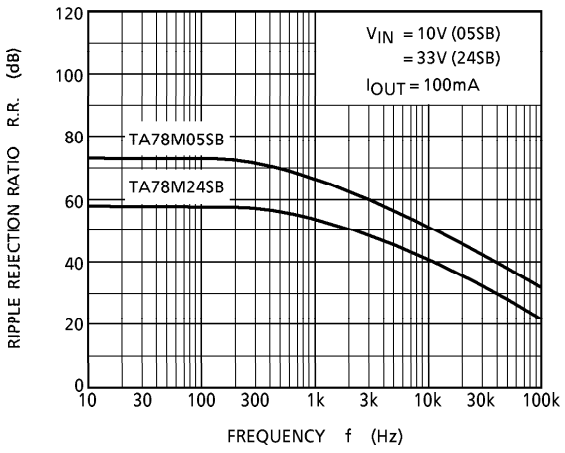
V_{OUT} – Ta



R.R. – I_{OUT}



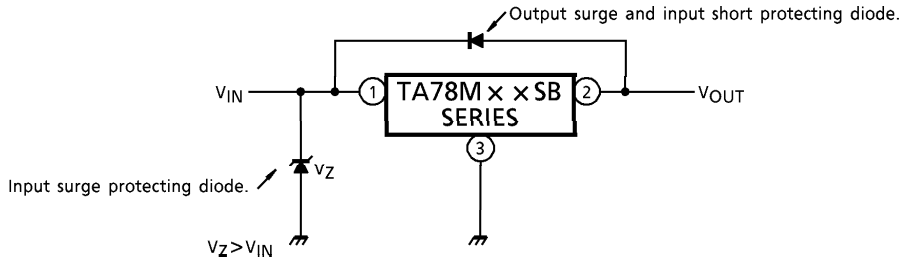
R.R. – f


RIPPLE REJECTION RATIO R.R. (dB)
120
100
80
60
40
20
0
10
30
100
300
1k
3k
10k
30k
100k
FREQUENCY f (Hz)
V_{IN} = 10V (05SB)
= 33V (24SB)
I_{OUT} = 100mA
TA78M05SB
TA78M24SB

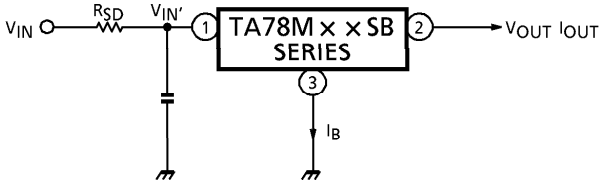
PRECAUTIONS ON APPLICATION

(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 sorts 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.

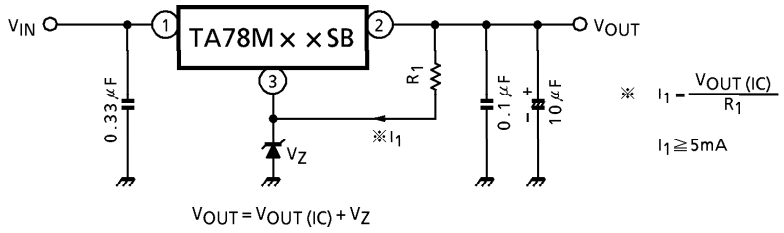
$$R_{SD} < \frac{V_{IN} - V_{IN'}}{I_{OUT} + I_B}$$

(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.

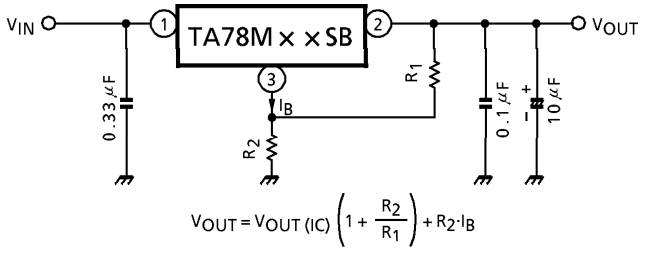
APPLICATION CIRCUITS

(1) VOLTAGE BOOST REGULATOR

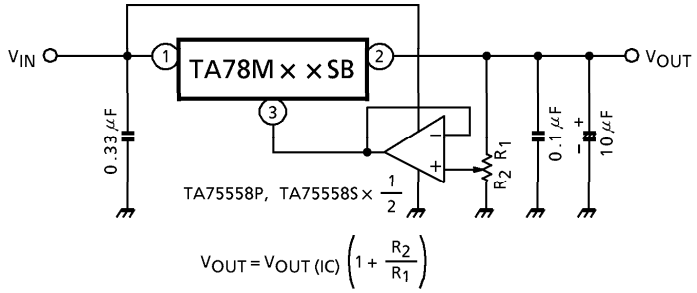
(a) Voltage boost by use of zener diode



(b) Voltage boost by use of resistor

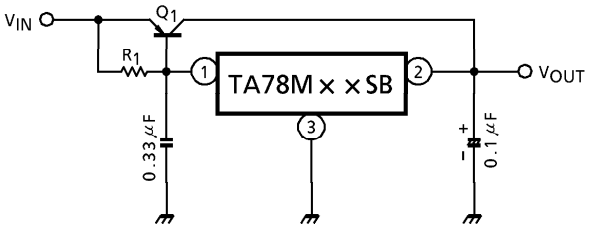


(c) Adjustable output regulator



(2) CURRENT BOOST REGULATOR

(a) CURRENT BOOST VOLTAGE REGULATOR



Heat sink is needed for Q_1

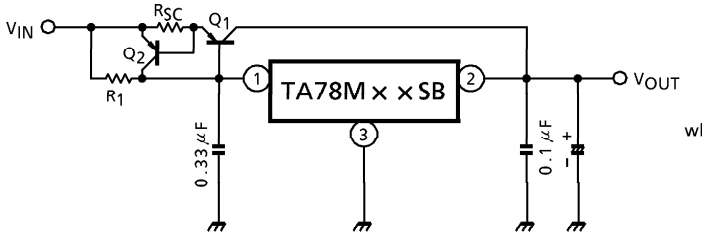
$$R_1 \leqq \frac{V_{BE1}}{I_{B\ MAX}}$$

where,

V_{BE1} : V_{BE} of external transistor Q_1.

$I_{B\ MAX}$: Quiescent current of IC.

(b) SHORT-CIRCUIT PROTECTION

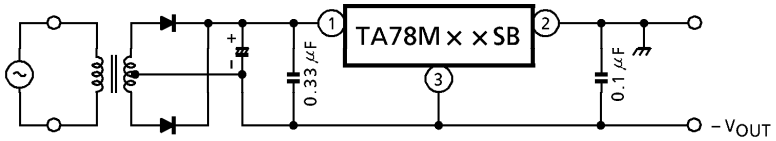


$$R_{SC} = \frac{V_{BE2}}{I_{SC}}$$

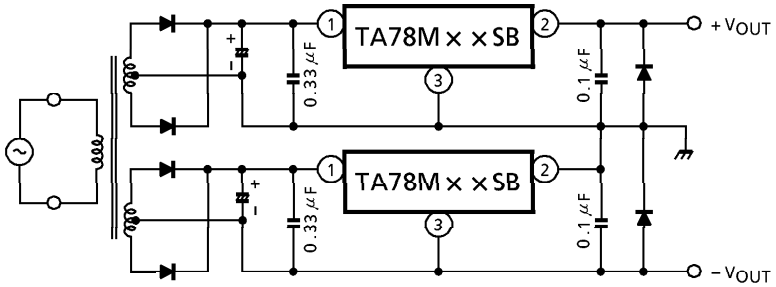
where,

I_{SC} : Short-circuit current

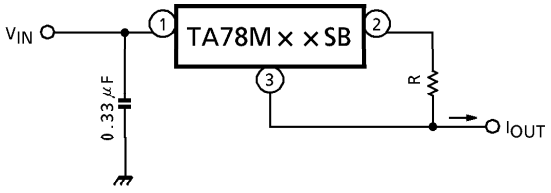
(3) NEGATIVE REGULATOR



(4) POSITIVE AND NEGATIVE REGULATOR



(5) CURRENT REGULATOR

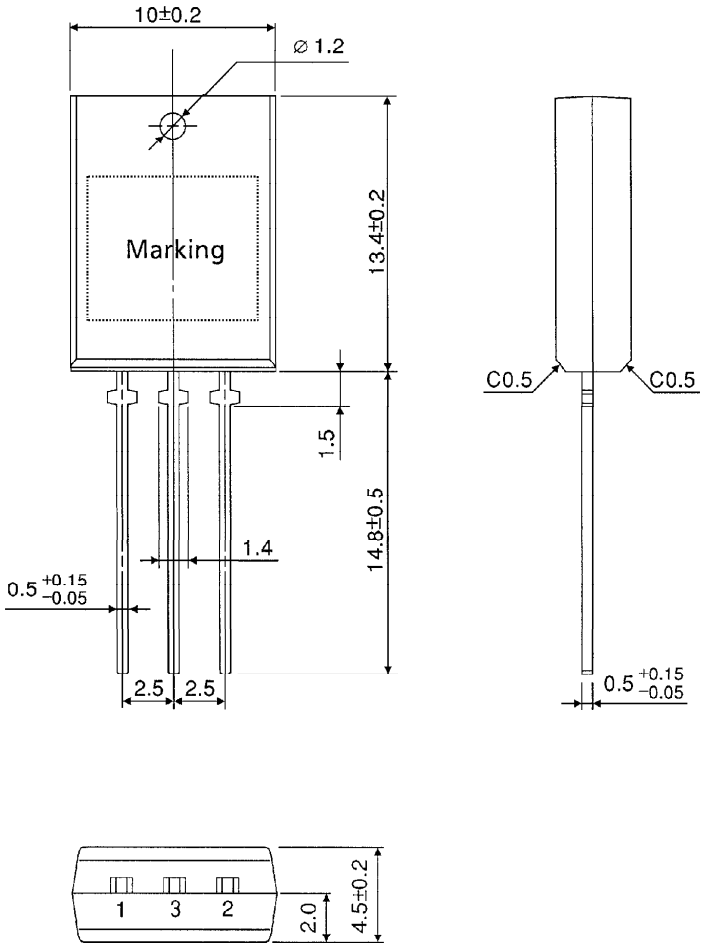


$$I_{OUT} = \frac{V_{OUT}}{R} + I_B$$

OUTLINE DRAWING

SIP3-P-2.50A

Unit : mm



Weight : 1.5g (Typ.)