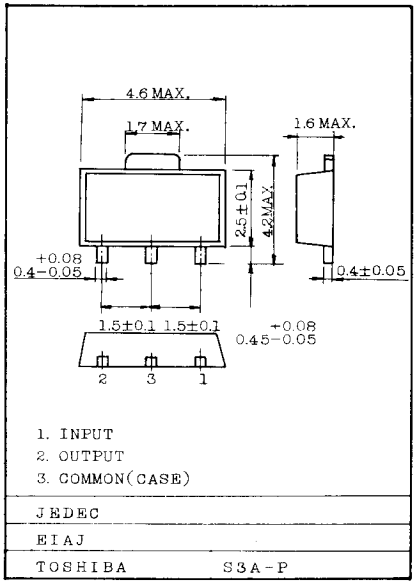
TA78L05F ~ TA78L24F

o 5V, 6V, 8V, 9V, 10V, 12V, 15V, 18V, 20V, 24V
3-TERMINAL POSITIVE VOLTAGE REGULATORS

- Best suited to power supply for TTL/C^2 MOS.
- No external part needed.
- Built-in thermal protective circuit.
- Max. output current 150mA. (T_j = 25°C)
- Packaged in POWER MINI.

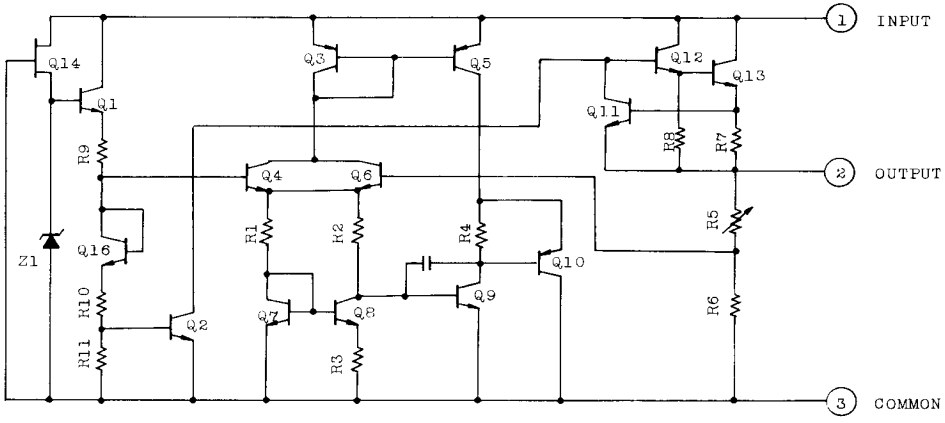
Unit in mm



MAXIMUM RATING (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Input Voltage	(5V ∿ 15V)	V_{IN}	35	V
	(18V ∿ 24V)	V_{IN}	40	V
Power Dissipation		P_D	500	mW
Operating Temperature		T_{opr}	-30 ∿ 75	°C
Storage Temperature		T_{stg}	-55 ∿ 150	°C

EQUIVALENT CIRCUIT



ELECTRICAL CHARACTERISTICS

(V_{IN} = 10V, I_{OUT} = 40mA, C_{IN} = 0.33μF, C_{OUT} = 0.1μF, 0°C < T_j < 125°C)

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION		MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	1	T_j=25°C		4.75	5.0	5.25	V
Input Regulation	Reg Line	1	T_j=25°C	7.0V ≦ V_{IN} ≦ 20V	-	55	150	mV
				8.0V ≦ V_{IN} ≦ 20V	-	45	100	
Load Regulation	Reg Load	1	T_j=25°C	1.0mA ≦ I_{OUT} ≦ 100mA	-	11	60	mV
				1.0mA ≦ I_{OUT} ≦ 40mA	-	5.0	30	
Output Voltage	V_{OUT}	1	7.0V ≦ V_{IN} ≦ 20V, 1.0mA ≦ I_{OUT} ≦ 40mA		4.65	-	5.3	V
			V_{IN} = 10V, 1.0mA ≦ I_{OUT} ≦ 70mA		4.65	-	5.3	
Quiescent Current	I_B	1	T_j = 25°C		-	3.1	6.0	mA
			T_j = 125°C		-	-	5.5	
Quiescent Current Change	ΔI_B	1	8.0V ≦ V_{IN} ≦ 20V		-	-	1.5	mA
	ΔI_B	1	1.0mA ≦ I_{OUT} ≦ 40mA		-	-	0.1	
Output Noise Voltage	V_{NO}	1	Ta=25°C, 10Hz ≦ f ≦ 100kHz		-	40	-	μV
Long Term Stability	$\Delta V_{OUT}/\Delta t$	1			-	12	-	mV/1.0kHrs
Ripple Rejection Ratio	RR	2	f = 120Hz, 8.0V ≦ V_{IN} ≦ 18V, T_j = 25°C		41	49	-	dB
Dropout Voltage	$\lvert V_{IN} - V_{OUT} \rvert$	1	T_j = 25°C		-	1.7	-	V
Average Temperature Coefficient of Output Voltage	T_{CVO}	1	I_{OUT} = 5mA		-	-0.6	-	mV/°C

ELECTRICAL CHARACTERISTICS

(V_{IN} = 11V, I_{OUT} = 40mA, C_{IN} = 0.33μF, C_{OUT} = 0.1μF, 0°C < T_j < 125°C)

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION		MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	1	T_j=25°C		5.7	6.0	6.3	V
Input Regulation	Reg Line	1	T_j=25°C	8.1V ≦ V_{IN} ≦ 21V	-	50	150	mV
				9.0V ≦ V_{IN} ≦ 21V	-	45	110	
Load Regulation	Reg Load	1	T_j=25°C	1.0mA ≦ I_{OUT} ≦ 100mA	-	12	70	mV
				1.0mA ≦ I_{OUT} ≦ 40mA	-	5.5	35	
Output Voltage	V_{OUT}	1	8.1V ≦ V_{IN} ≦ 21V, 1.0mA ≦ I_{OUT} ≦ 40mA		5.58	-	6.42	V
			V_{IN} = 11V, 1.0mA ≦ I_{OUT} ≦ 70mA		5.58	-	6.42	
Quiescent Current	I_B	1	T_j = 25°C		-	3.1	6.0	mA
			T_j = 125°C		-	-	5.5	
Quiescent Current Change	ΔI_B	1	9.0V ≦ V_{IN} ≦ 20V		-	-	1.5	mA
	ΔI_B	1	1.0mA ≦ I_{OUT} ≦ 40mA		-	-	0.1	
Output Noise Voltage	V_{NO}	1	Ta = 25°C, 10Hz ≦ f ≦ 100kHz		-	40	-	μV
Long Term Stability	$\Delta V_{OUT}/\Delta t$	1			-	14	-	mV/1.0kHrs
Ripple Rejection Ratio	RR	2	f = 120Hz, 9.0V ≦ V_{IN} ≦ 19V, T_j = 25°C		39	47	-	dB
Dropout Voltage	$\lvert V_{IN} - V_{OUT} \rvert$	1	T_j = 25°C		-	1.7	-	V
Average Temperature Coefficient of Output Voltage	T_{CVO}	1	I_{OUT} = 5mA		-	-0.7	-	mV/°C

ELECTRICAL CHARACTERISTICS

(V_{IN} = 14V, I_{OUT} = 40mA, C_{IN} = 0.33μF, C_{OUT} = 0.1μF, 0°C < T_j < 125°C)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	1	T_j=25°C		7.6	8.0	8.4	V
Input Regulation	Reg Line	1	T_j=25°C	10.5V ≦ V_{IN} ≦ 23V	–	20	175	mV
				11V ≦ V_{IN} ≦ 23V	–	12	125	
Load Regulation	Reg Load	1	T_j=25°C	1.0mA ≦ I_{OUT} ≦ 100mA	–	15	80	mV
				1.0mA ≦ I_{OUT} ≦ 40mA	–	7.0	40	
Output Voltage	V_{OUT}	1	10.5V ≦ V_{IN} ≦ 23V. 1.0mA ≦ I_{OUT} ≦ 40mA		7.44	–	8.56	V
			V_{IN} = 14V, 1.0mA ≦ I_{OUT} ≦ 70mA		7.44	–	8.56	
Quiescent Current	I_B	1	T_j = 25°C		–	3.1	6.5	mA
			T_j = 125°C		–	–	6.0	
Quiescent Current Change	ΔI_B	1	11V ≦ V_{IN} ≦ 23V		–	–	1.5	mA
	ΔI_B	1	1.0mA ≦ I_{OUT} ≦ 40mA		–	–	0.1	
Output Noise Voltage	V_{NO}	1	Ta=25°C, 10Hz ≦ f ≦ 100kHz		–	60	–	μV
Long Term Stability	$\Delta V_{OUT}/\Delta t$	1			–	20	–	mV/1.0kHrs
Ripple Rejection Ratio	RR	2	f = 120Hz 12V ≦ V_{IN} ≦ 23V, T_j = 25°C		37	45	–	dB
Dropout Voltage	$\lvert V_{IN}-V_{OUT}\rvert$	1	T_j = 25°C		–	1.7	–	V
Average Temperature Coefficient of Output Voltage	T_{CVO}	1	I_{OUT} = 5mA		–	-0.8	–	mV/°C

ELECTRICAL CHARACTERISTICS

(V_{IN} = 15V, I_{OUT} = 40mA, C_{IN} = 0.33μF, C_{OUT} = 0.1μF, 0°C < T_j < 125°C)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	1	T_j=25°C		8.55	9.0	9.45	V
Input Regulation	Reg Line	1	T_j=25°C	11.4V ≦ V_{IN} ≦ 24V	-	80	200	mV
				12V ≦ V_{IN} ≦ 24V	-	20	160	
Load Regulation	Reg Load	1	T_j=25°C	1.0mA ≦ I_{OUT} ≦ 100mA	-	17	90	mV
				1.0mA ≦ I_{OUT} ≦ 40mA	-	8.0	45	
Output Voltage	V_{OUT}	1	11.4V ≦ V_{IN} ≦ 24V, 1.0mA ≦ I_{OUT} ≦ 40mA		8.37	-	9.63	V
			V_{IN} = 15V, 1.0mA ≦ I_{OUT} ≦ 70mA		8.37	-	9.63	
Quiescent Current	I_B	1	T_j = 25°C		-	3.2	6.5	mA
			T_j = 125°C		-	-	6.0	
Quiescent Current Change	ΔI_B	1	12V ≦ V_{IN} ≦ 24V		-	-	1.5	mA
	ΔI_B	1	1.0mA ≦ I_{OUT} ≦ 40mA		-	-	0.1	
Output Noise Voltage	V_{NO}	1	Ta = 25°C, 10Hz ≦ f ≦ 100kHz		-	65	-	μV
Long Term Stability	$\Delta V_{OUT}/\Delta t$	1			-	21	-	mV/1.0kHrs
Ripple Rejection Ratio	RR	2	f = 120Hz, 12V ≦ V_{IN} ≦ 24V, T_j = 25°C		36	44	-	dB
Dropout Voltage	$\lvert V_{IN}-V_{OUT}\rvert$	1	T_j = 25°C		-	1.7	-	V
Average Temperature Coefficient of Output Voltage	T_{CVO}	1	I_{OUT} = 5mA		-	-0.85	-	mV/°C

ELECTRICAL CHARACTERISTICS

(V_{IN} = 16V, I_{OUT} = 40mA, C_{IN} = 0.33μF, C_{OUT} = 0.1μF, 0°C < T_j < 125°C)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	1	T_j=25°C		9.5	10	10.5	V
Input Regulation	Reg Line	1	T_j=25°C	12.5V ≦ V_{IN} ≦ 25V	-	80	230	mV
				13V ≦ V_{IN} ≦ 25V	-	30	170	
Load Regulation	Reg Load	1	T_j=25°C	1.0mA ≦ I_{OUT} ≦ 100mA	-	18	90	mV
				1.0mA ≦ I_{OUT} ≦ 40mA	-	8.5	45	
Output Voltage	V_{OUT}	1	12.5V ≦ V_{IN} ≦ 25V, 1.0mA ≦ I_{OUT} ≦ 40mA		9.3	-	10.7	V
			V_{IN} = 16V, 1.0mA ≦ I_{OUT} ≦ 70mA		9.3	-	10.7	
Quiescent Current	I_B	1	T_j = 25°C		-	3.2	6.5	mA
			T_j = 125°C		-	-	6.0	
Quiescent Current Change	ΔI_B	1	13V ≦ V_{IN} ≦ 25V		-	-	1.5	mA
	ΔI_B	1	1.0mA ≦ I_{OUT} ≦ 40mA		-	-	0.1	
Output Noise Voltage	V_{NO}	1	Ta = 25°C, 10Hz ≦ f ≦ 100kHz		-	70	-	μV
Long Term Stability	$\Delta V_{OUT}/\Delta t$	1			-	22	-	mV/1.0kHrs
Ripple Rejection Ratio	RR	2	f = 120Hz, 13V ≦ V_{IN} ≦ 24V, T_j = 25°C		36	43	-	dB
Dropout Voltage	$\lvert V_{IN} - V_{OUT} \rvert$	1	T_j = 25°C		-	1.7	-	V
Average Temperature Coefficient of Output Voltage	T_{CVO}	1	I_{OUT} = 5mA		-	-0.9	-	mV/°C

ELECTRICAL CHARACTERISTICS

(V_{IN} = 19V, I_{OUT} = 40mA, C_{IN} = 0.33μF, C_{OUT} = 0.1μF, 0°C < T_j < 125°C)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	1	T_j=25°C		11.4	12	12.6	V
Input Regulation	Reg Line	1	T_j=25°C	14.5V ≦ V_{IN} ≦ 27V	-	120	250	mV
				16V ≦ V_{IN} ≦ 27V	-	100	200	
Load Regulation	Reg Load	1	T_j=25°C	1.0mA ≦ I_{OUT} ≦ 100mA	-	20	100	mV
				1.0mA ≦ I_{OUT} ≦ 40mA	-	10	50	
Output Voltage	V_{OUT}	1	14.5V ≦ V_{IN} ≦ 27V, 1.0mA ≦ I_{OUT} ≦ 40mA		11.16	-	12.84	V
			V_{IN} = 19V, 1.0mA ≦ I_{OUT} ≦ 70mA		11.16	-	12.84	
Quiescent Current	I_B	1	T_j=25°C		-	3.2	6.5	mA
			T =125°C		-	-	6.0	
Quiescent Current Change	ΔI_B	1	16V ≦ V_{IN} ≦ 27V		-	-	1.5	mA
	ΔI_B	1	1.0mA ≦ I_{OUT} ≦ 40mA		-	-	0.1	
Output Noise Voltage	V_{NO}	1	Ta=25°C, 10Hz ≦ f ≦ 100kHz		-	80	-	μV
Long Term Stability	$\Delta V_{OUT}/\Delta t$	1			-	24	-	mV/1.0kHrs
Ripple Rejection Ratio	RR	2	f = 120Hz, 15V ≦ V_{IN} ≦ 25V, T_j = 25°C		36	41	-	dB
Dropout Voltage	$\lvert V_{IN} - V_{OUT} \rvert$	1	T_j=25°C		-	1.7	-	V
Average Temperature Coefficient of Output Voltage	T_{CVO}	1	I_{OUT} = 5mA		-	-1.0	-	mV/°C

ELECTRICAL CHARACTERISTICS

(V_{IN} = 23V, I_{OUT} = 40mA, C_{IN} = 0.33μF, C_{OUT} = 0.1μF, 0°C < T_j < 125°C)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	1	T_j=25°C		14.25	15	15.75	V
Input Regulation	Reg Line	1	Tj=25°C	17.5V ≦ V_{IN} ≦ 30V	-	130	300	mV
				20V ≦ V_{IN} ≦ 30V	-	110	250	
Load Regulation	Reg Load	1	T_j=25°C	1.0mA ≦ I_{OUT} ≦ 100mA	-	25	150	mV
				1.0mA ≦ I_{OUT} ≦ 40mA	-	12	75	
Output Voltage	V_{OUT}	1	17.5V ≦ V_{IN} ≦ 30V, 1.0mA = I_{OUT} = 40mA		13.95	-	16.05	V
			V_{IN} = 23V, 1.0mA ≦ I_{OUT} ≦ 70mA		13.95	-	16.05	
Quiescent Current	I_B	1	T_j = 25°C		-	3.3	6.5	mA
			T_j = 125°C		-	-	6.0	
Quiescent Current Change	ΔI_B	1	20V ≦ V_{IN} ≦ 30V		-	-	1.5	mA
	ΔI_B	1	1.0mA ≦ I_{OUT} ≦ 40mA		-	-	0.1	
Output Noise Voltage	V_{NO}	1	Ta = 25°C, 10Hz ≦ f ≦ 100kHz		-	90	-	μV
Long Term Stability	$\Delta V_{OUT}/\Delta t$	1			-	30	-	mV/1.0kHrs
Ripple Rejection Ratio	RR	2	f = 120Hz, 18.5V ≦ V_{IN} ≦ 28.5V, T_j = 25°C		34	40	-	dB
Dropout Voltage	$\lvert V_{IN}-V_{OUT}\rvert$	1	T_j = 25°C		-	1.7	-	V
Average Temperature Coefficient of Output Voltage	T_{CVO}	1	I_{OUT} = 5mA		-	-1.3	-	mV/°C

ELECTRICAL CHARACTERISTICS

(V_{IN} = 27V, I_{OUT} = 40mA, C_{IN} = 0.33μF, C_{OUT} = 0.1μF, 0°C < T_j < 125°C)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	1	T_j=25°C		17.1	18	18.9	V
Input Regulation	Reg Line	1	T_j=25°C	21.4V ≦ V_{IN} ≦ 33V	-	32	325	mV
				22V ≦ V_{IN} ≦ 33V	-	27	275	
Load Regulation	Reg Load	1	T_j=25°C	1.0mA ≦ I_{OUT} ≦ 100mA	-	30	170	mV
				1.0mA ≦ I_{OUT} ≦ 40mA	-	15	75	
Output Voltage	V_{OUT}	1	21.4V ≦ V_{IN} ≦ 33V, 1.0mA ≦ I_{OUT} ≦ 40mA		16.74	-	19.26	V
			V_{IN} = 27V, 1.0mA ≦ I_{OUT} ≦ 70mA		16.74	-	19.26	
Quiescent Current	I_B	1	T_j = 25°C		-	3.3	6.5	mA
			T_j = 125°C		-	-	6.0	
Quiescent Current Change	ΔI_B	1	22V ≦ V_{IN} ≦ 33V		-	-	1.5	mA
	ΔI_B	1	1.0mA ≦ I_{OUT} ≦ 40mA		-	-	0.1	
Output Noise Voltage	V_{NO}	1	Ta = 25°C, 10Hz ≦ f ≦ 100kHz		-	150	-	μV
Long Term Stability	$\Delta V_{OUT}/\Delta t$	1			-	45	-	mV/1.0kHrs
Ripple Rejection Ratio	RR	2	f = 120Hz, 23V ≦ V_{IN} ≦ 33V, T_j = 25°C		32	38	-	dB
Dropout Voltage	$\lvert V_{IN}-V_{OUT}\rvert$	1	T_j = 25°C		-	1.7	-	V
Average Temperature Coefficient of Output Voltage	T_{CVO}	1	I_{OUT} = 5mA		-	-1.5	-	mV/°C

ELECTRICAL CHARACTERISTICS

(V_{IN} = 29V, I_{OUT} = 40mA, C_{IN} = 0.33μF, C_{OUT} = 0.1μF, 0°C < T_j < 125°C)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	1	T_j=25°C		19.0	20	21.0	V
Input Regulation	Reg Line	1	T_j=25°C	23.5V ≦ V_{IN} ≦ 35V	-	33	330	mV
				24V ≦ V_{IN} ≦ 35V	-	28	285	
Load Regulation	Reg Load	1	T_j=25°C	1.0mA ≦ I_{OUT} ≦ 100mA	-	33	180	mV
				1.0mA ≦ I_{OUT} ≦ 40mA	-	17	90	
Output Voltage	V_{OUT}	1	23.5V ≦ V_{IN} ≦ 35V. 1.0mA ≦ I_{OUT} ≦ 40mA		18.6	-	21.4	V
			V_{IN} = 29V, 1.0mA ≦ I_{OUT} ≦ 70mA		18.6	-	21.4	
Quiescent Current	I_B	1	T_j = 25°C		-	3.3	6.5	mA
			T_j = 125°C		-	-	6.0	
Quiescent Current Change	ΔI_B	1	24V ≦ V_{IN} ≦ 35V		-	-	1.5	mA
	ΔI_B	1	1.0mA ≦ I_{OUT} ≦ 40mA		-	-	0.1	
Output Noise Voltage	V_{NO}	1	Ta = 25°C, 10Hz ≦ f ≦ 100kHz		-	170	-	μV
Long Term Stability	$\Delta V_{OUT}/\Delta t$	1			-	49	-	mV/1.0kHrs
Ripple Rejection Ratio	RR	2	f = 120Hz, 25V ≦ V_{IN} ≦ 35V, T_j = 25°C		31	37	-	dB
Dropout Voltage	$\lvert V_{IN} - V_{OUT} \rvert$	1	T_j = 25°C		-	1.7	-	V
Average Temperature Coefficient of Output Voltage	T_{CVO}	1	I_{OUT} = 5mA		-	-1.7	-	mV/°C

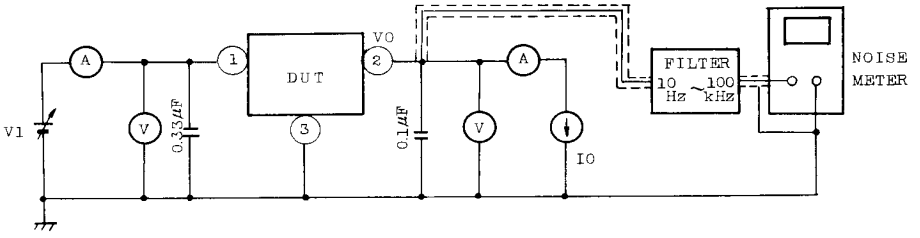
ELECTRICAL CHARACTERISTICS

(V_{IN} = 33V, I_{OUT} = 40mA, C_{IN} = 0.33μF, C_{OUT} = 0.1μF, 0°C < T_j < 125°C)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	1	T_j=25°C		22.8	24	25.2	V
Input Regulation	Reg Line	1	T_j=25°C	27.5V ≦ V_{IN} ≦ 38V	-	35	350	mV
				28V ≦ V_{IN} ≦ 38V	-	30	300	
Load Regulation	Reg Load	1	T_j=25°C	1.0mA ≦ I_{OUT} ≦ 100mA	-	40	200	mV
				1.0mA ≦ I_{OUT} ≦ 40mA	-	20	100	
Output Voltage	V_{OUT}	1	27.5V ≦ V_{IN} ≦ 38V, 1.0mA ≦ I_{OUT} ≦ 40mA		22.32	-	25.68	V
			V_{IN} = 33.V, 1.0mA ≦ I_{OUT} ≦ 70mA		22.32	-	25.68	
Quiescent Current	I_B	1	T_j = 25°C		-	3.5	6.5	mA
			T_j = 125°C		-	-	6.0	
Quiescent Current Change	ΔI_B	1	28V ≦ V_{IN} ≦ 38V		-	-	1.5	mA
	ΔI_B	1	1.0mA ≦ I_{OUT} ≦ 40mA		-	-	0.1	
Output Noise Voltage	V_{NO}	1	Ta = 25°C, 10Hz ≦ f ≦ 100kHz		-	200	-	μV
Long Term Stability	$\Delta V_{OUT}/\Delta t$	1			-	56	-	mV/1.0kHrs
Ripple Rejection Ratio	RR	2	f = 120Hz, 29V ≦ V_{IN} ≦ 39V, T_j = 25°C		31	35	-	dB
Dropout Voltage	$\lvert V_{IN} - V_{OUT} \rvert$	1	T_j = 25°C		-	1.7	-	V
Average Temperature Coefficient of Output Voltage	T_{CVO}	1	T_{OUT} = 5mA		-	-2.0	-	mV/°C

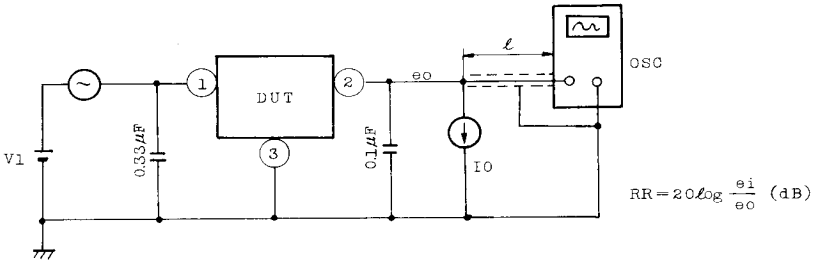
TEST CIRCUIT

1. V_{OUT}, Reg.line, Reg.load, V_{OUT}, I_B, ΔI_B, V_{NO}, $\Delta V_{OUT}/\Delta t$, $|V_{IN}-V_{OUT}|$, TC_{VO}

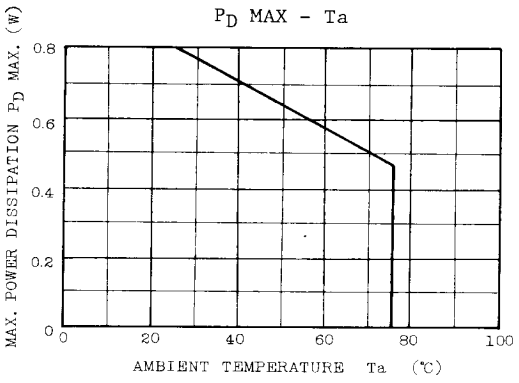


2. RR

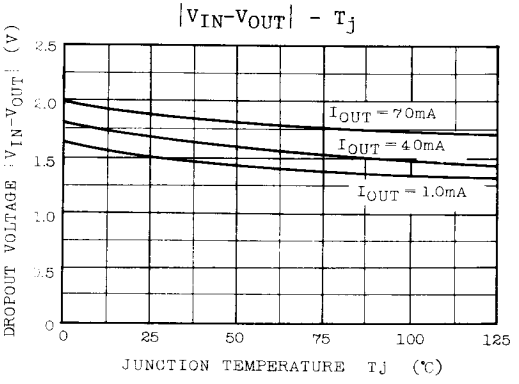
$e_i = 1V_{p-p}$
$f = 120Hz$
$\ell \leq 30cm$



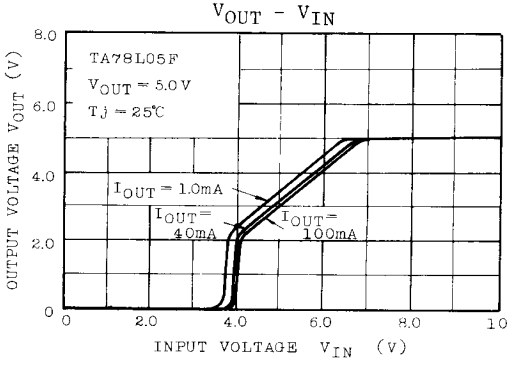
P_D MAX - Ta



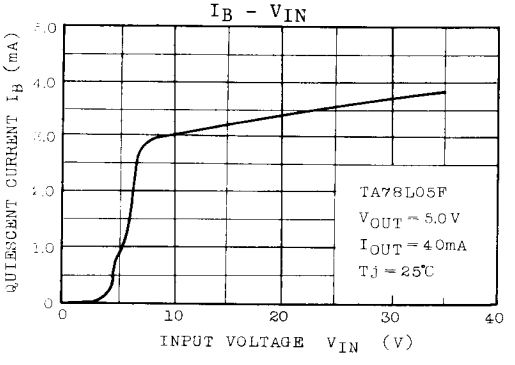
$|V_{IN}-V_{OUT}|$ - T_j



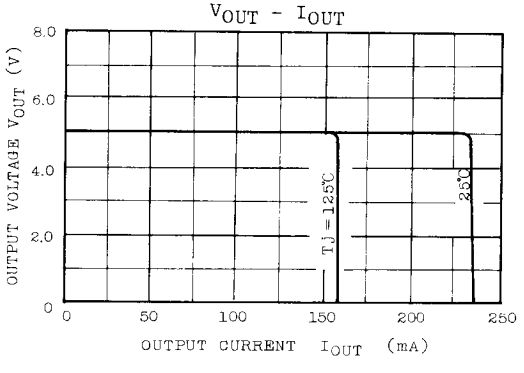
V_{OUT} - V_{IN}



I_B - V_{IN}

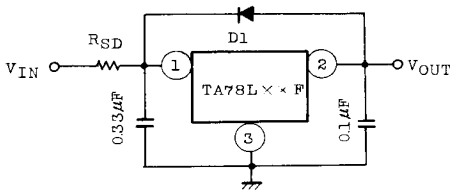


V_{OUT} - I_{OUT}



EXAMPLES OF TYPICAL CIRCUIT

(1) Example of Typical Circuit



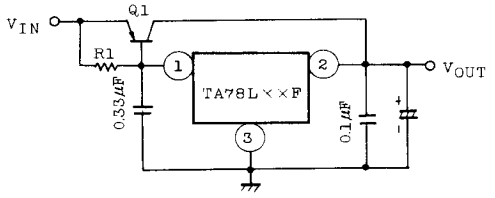
D_1 : IC protective diode

When surge voltage is applied to IC output terminal or $V_{IN} < V_{OUT}$ at time of power On/OFF, always connect the high speed switching diode D_1.

R_{SD}: Power limiting resistor

If V_{IN} is too high, always connect R_{SD} in order to reduce power consumption of IC.

(2) A. Current boosting circuit



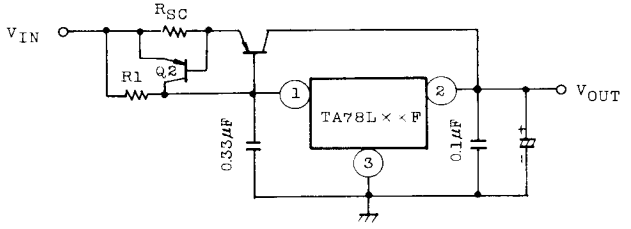
Use a required radiation plate for Q_1.

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

where, V_{BE1} : V_{BE} of external transistor Q_1

I_B MAX: Max. bias current of IC

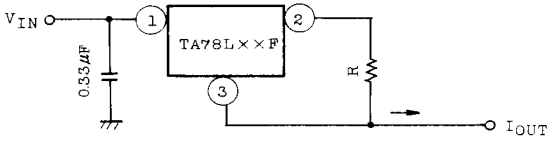
B. Current boosting circuit with output short-circuit protective circuit



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

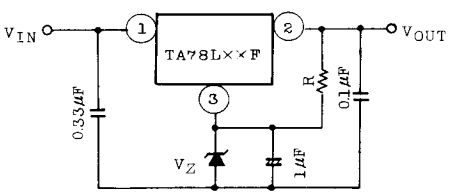
where, I_{SC}: Short-circuit current

(3) Constant-current circuit



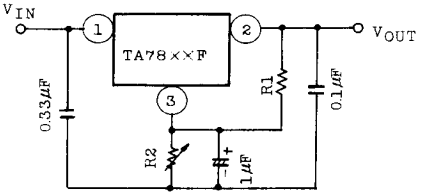
$$I_{OUT} = \frac{V_{OUT}}{R} + I_B$$

(4) Voltage boosting circuit



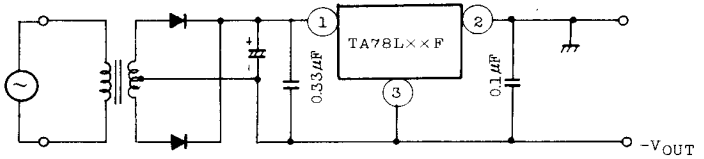
$V_{OUT} = V_Z + V_{OUT}$(of IC)

Apply current of several mA to R.

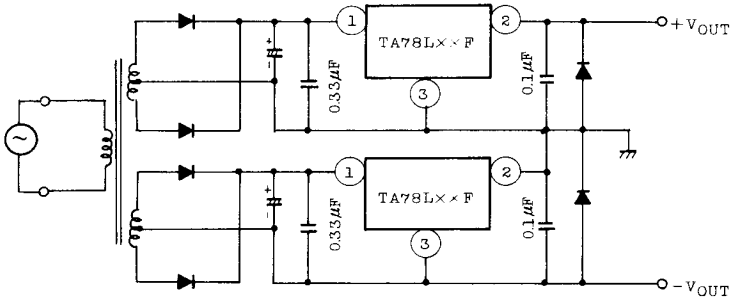


$$V_{OUT} = R_2\left(I_B + \frac{V_{OUT(of\,IC)}}{R_1}\right) + V_{OUT}(\text{of IC})$$

(5) Negative power supply



(6) Positive/negative power supply



Precautions for Use

If high voltage in excess of output voltage (TYP. value) of IC is applied to its output terminal, IC may be destroyed. In this case, connect a Zener diode between the output terminal and GND to prevent application of excessive voltage. In particular, in such a current boosting circuit as shown in Application Circuit Example (2), if input voltage is suddenly applied by stages and furthermore, load is light, excessive voltage may be applied transiently to the output termianl of IC. In such a case as this, it may become necessary to increase capacity of output capacitor as appropriate, use a smaller R1 (a resistor for bypassing IC bias current) or gradually rise input voltage in addition to use of a Zener diode as mentioned above.