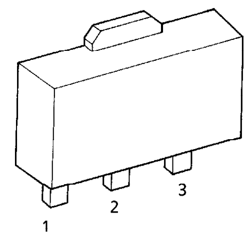
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA78L05F, TA78L06F, TA78L08F, TA78L09F, TA78L10F TA78L12F, TA78L15F, TA78L18F, TA78L20F, TA78L24F

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

FEATURES

- Best suited to power supply for TTL / CMOS
- No external part needed
- Built-in thermal protective circuit
- Built-in short-circuit current limiting
- Max. output current 150mA. ($T_j = 25°C$)
- Packaged in POWER MINI. (SOT-89)

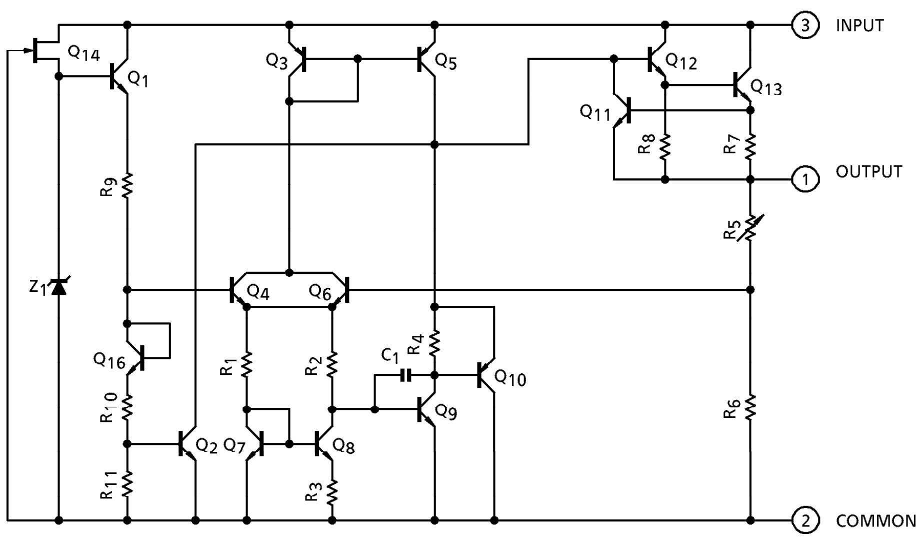


1. OUTPUT
2. COMMON (CASE)
3. INPUT

HSOP3-P-1.50

Weight : 0.05g (Typ.)

EQUIVALENT CIRCUIT



TYPE	MARKING
TA78L05F	AE
TA78L06F	BE
TA78L08F	CE
TA78L09F	DE
TA78L10F	EE
TA78L12F	FE
TA78L15F	GE
TA78L18F	HE
TA78L20F	IE
TA78L24F	JE

961001EBA2

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Input Voltage	TA78L05F	V_{IN}	35	V
	TA78L06F			
	TA78L08F			
	TA78L09F			
	TA78L10F			
	TA78L12F			
	TA78L15F			
	TA78L18F		40	
	TA78L20F			
	TA78L24F			
Power Dissipation	(Ta = 25°C)	P_D	500	mW
Operating Temperature		T_{opr}	− 30~75	°C
Storage Temperature		T_{stg}	− 55~150	°C
Operating Junction Temperature		T_j	− 30~150	°C
Thermal Resistance		$R_{th\ (j\text{-}a)}$	250	°C / W

TA78L05F

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, $V_{IN} = 10V$, $I_{OUT} = 40mA$, $C_{IN} = 0.33\mu F$, $C_{OUT} = 0.1\mu F$, $0°C \leqq T_j \leqq 125°C$)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	1	$T_j = 25°C$		4.75	5.0	5.25	V
Line Regulation	Reg.line	1	$T_j = 25°C$	$7.0V \leqq V_{IN} \leqq 20V$	—	55	150	mV
				$8.0V \leqq V_{IN} \leqq 20V$	—	45	100	
Load Regulation	Reg.load	1	$T_j = 25°C$	$1.0mA \leqq I_{OUT} \leqq 100mA$	—	11	60	mV
				$1.0mA \leqq I_{OUT} \leqq 40mA$	—	5.0	30	
Output Voltage	V_{OUT}	1	$T_j = 25°C$	$7.0V \leqq V_{IN} \leqq 20V$ $1.0mA \leqq I_{OUT} \leqq 40mA$	4.65	—	5.35	V
				$1.0mA \leqq I_{OUT} \leqq 70mA$	4.65	—	5.35	
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	$8.0V \leqq V_{IN} \leqq 20V$		—	—	1.5	mA
			$1.0mA \leqq I_{OUT} \leqq 40mA$		—	—	0.1	
Output Noise Voltage	V_{NO}	2	$Ta = 25°C$, $10Hz \leqq f \leqq 100kHz$		—	40	—	μV_{rms}
Long Term Stability	$\Delta V_{OUT} / \Delta t$	1	—		—	12	—	mV / 1.0kh
Ripple Rejection Ratio	R.R.	3	$f = 120Hz$ $8.0V \leqq V_{IN} \leqq 18V$, $T_j = 25°C$		41	49	—	dB
Dropout Voltage	$\lvert V_{IN} - V_{OUT} \rvert$	1	$T_j = 25°C$, $I_{OUT} = 150mA$		—	1.7	—	V
Average Temperature Coefficient of Output Voltage	T_{CVO}	1	$I_{OUT} = 5mA$		—	−0.6	—	mV / °C

TA78L06F

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, V_{IN} = 11V, 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		5.7	6.0	6.3	V
Line 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	T_j = 25°C	8.1V ≦ V_{IN} ≦ 21V 1.0mA ≦ I_{OUT} ≦ 40mA	5.58	—	6.42	V
				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
			1.0mA ≦ I_{OUT} ≦ 40mA		—	—	0.1	
Output Noise Voltage	V_{NO}	2	Ta = 25°C 10Hz ≦ f ≦ 100kHz		—	40	—	μV_{rms}
Long Term Stability	$\Delta V_{OUT} / \Delta t$	1	—		—	14	—	mV / 1.0kh
Ripple Rejection Ratio	R.R.	3	f = 120Hz 9.0V ≦ V_{IN} ≦ 19V, T_j = 25°C		39	47	—	dB
Dropout Voltage	$\lvert V_{IN}\text{-}V_{OUT}\rvert$	1	T_j = 25°C, I_{OUT} = 150mA		—	1.7	—	V
Average Temperature Coefficient of Output Voltage	T_{CVO}	1	I_{OUT} = 5mA		—	−0.7	—	mV / °C

TA78L08F

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, 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
Line 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	T_j = 25°C	10.5V ≦ V_{IN} ≦ 23V 1.0mA ≦ I_{OUT} ≦ 40mA	7.44	—	8.56	V
				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
			1.0mA ≦ I_{OUT} ≦ 40mA		—	—	0.1	
Output Noise Voltage	V_{NO}	2	Ta = 25°C 10Hz ≦ f ≦ 100kHz		—	60	—	μV_{rms}
Long Term Stability	$\Delta V_{OUT} / \Delta t$	1	—		—	20	—	mV / 1.0kh
Ripple Rejection Ratio	R.R.	3	f = 120Hz 12V ≦ V_{IN} ≦ 23V, T_j = 25°C		37	45	—	dB
Dropout Voltage	$\|V_{IN}-V_{OUT}\|$	1	T_j = 25°C, I_{OUT} = 150mA		—	1.7	—	V
Average Temperature Coefficient of Output Voltage	T_{CVO}	1	I_{OUT} = 5mA		—	−0.8	—	mV / °C

TA78L09F

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, 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
Line 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	T_j = 25°C	11.4V ≦ V_{IN} ≦ 24V 1.0mA ≦ I_{OUT} ≦ 40mA	8.37	—	9.63	V
				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
			1.0mA ≦ I_{OUT} ≦ 40mA		—	—	0.1	
Output Noise Voltage	V_{NO}	2	Ta = 25°C 10Hz ≦ f ≦ 100kHz		—	65	—	μV_{rms}
Long Term Stability	$\Delta V_{OUT} / \Delta t$	1	—		—	21	—	mV / 1.0kh
Ripple Rejection Ratio	R.R.	3	f = 120Hz 12V ≦ V_{IN} ≦ 24V, T_j = 25°C		36	44	—	dB
Dropout Voltage	$\lvert V_{IN}\text{-}V_{OUT}\rvert$	1	T_j = 25°C, I_{OUT} = 150mA		—	1.7	—	V
Average Temperature Coefficient of Output Voltage	T_{CVO}	1	I_{OUT} = 5mA		—	− 0.85	—	mV / °C

TA78L10F

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, $V_{IN} = 16V$, $I_{OUT} = 40mA$, $C_{IN} = 0.33\mu F$, $C_{OUT} = 0.1\mu F$, $0°C \leqq T_j \leqq 125°C$)

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	1	$T_j = 25°C$		9.5	10	10.5	V
Line Regulation	Reg.line	1	$T_j = 25°C$	$12.5V \leqq V_{IN} \leqq 25V$	—	80	230	mV
				$13V \leqq V_{IN} \leqq 25V$	—	30	170	
Load Regulation	Reg.load	1	$T_j = 25°C$	$1.0mA \leqq I_{OUT} \leqq 100mA$	—	18	90	mV
				$1.0mA \leqq I_{OUT} \leqq 40mA$	—	8.5	45	
Output Voltage	V_{OUT}	1	$T_j = 25°C$	$12.5V \leqq V_{IN} \leqq 25V$ $1.0mA \leqq I_{OUT} \leqq 40mA$	9.3	—	10.7	V
				$1.0mA \leqq I_{OUT} \leqq 70mA$	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	$13V \leqq V_{IN} \leqq 25V$		—	—	1.5	mA
			$1.0mA \leqq I_{OUT} \leqq 40mA$		—	—	0.1	
Output Noise Voltage	V_{NO}	2	$Ta = 25°C$ $10Hz \leqq f \leqq 100kHz$		—	70	—	μV_{rms}
Long Term Stability	$\Delta V_{OUT} / \Delta t$	1	—		—	22	—	mV / 1.0kh
Ripple Rejection Ratio	R.R.	3	$f = 120Hz$ $13V \leqq V_{IN} \leqq 24V$, $T_j = 25°C$		36	43	—	dB
Dropout Voltage	$\lvert V_{IN}-V_{OUT} \rvert$	1	$T_j = 25°C$, $I_{OUT} = 150mA$		—	1.7	—	V
Average Temperature Coefficient of Output Voltage	T_{CVO}	1	$I_{OUT} = 5mA$		—	−0.9	—	mV / °C

TA78L12F

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, $V_{IN} = 19V$, $I_{OUT} = 40mA$, $C_{IN} = 0.33\mu F$, $C_{OUT} = 0.1\mu F$, $0°C \leqq T_j \leqq 125°C$)

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
Line Regulation	Reg.line	1	$T_j = 25°C$	$14.5V \leqq V_{IN} \leqq 27V$	—	120	250	mV
				$16V \leqq V_{IN} \leqq 27V$	—	100	200	
Load Regulation	Reg.load	1	$T_j = 25°C$	$1.0mA \leqq I_{OUT} \leqq 100mA$	—	20	100	mV
				$1.0mA \leqq I_{OUT} \leqq 40mA$	—	10	50	
Output Voltage	V_{OUT}	1	$T_j = 25°C$	$14.5V \leqq V_{IN} \leqq 27V$ $1.0mA \leqq I_{OUT} \leqq 40mA$	11.16	—	12.84	V
				$1.0mA \leqq I_{OUT} \leqq 70mA$	11.16	—	12.84	
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	$16V \leqq V_{IN} \leqq 27V$		—	—	1.5	mA
			$1.0mA \leqq I_{OUT} \leqq 40mA$		—	—	0.1	
Output Noise Voltage	V_{NO}	2	Ta = 25°C $10Hz \leqq f \leqq 100kHz$		—	80	—	μV_{rms}
Long Term Stability	$\Delta V_{OUT} / \Delta t$	1	—		—	24	—	mV / 1.0kh
Ripple Rejection Ratio	R.R.	3	f = 120Hz $15V \leqq V_{IN} \leqq 25V$, $T_j = 25°C$		36	41	—	dB
Dropout Voltage	$\lvert V_{IN}-V_{OUT} \rvert$	1	$T_j = 25°C$, $I_{OUT} = 150mA$		—	1.7	—	V
Average Temperature Coefficient of Output Voltage	T_{CVO}	1	$I_{OUT} = 5mA$		—	– 1.0	—	mV / °C

TA78L15F

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, 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
Line Regulation	Reg.line	1	T_j = 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	T_j = 25°C	17.5V ≦ V_{IN} ≦ 30V 1.0mA ≦ I_{OUT} ≦ 40mA	13.95	—	16.05	V
				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
			1.0mA ≦ I_{OUT} ≦ 40mA		—	—	0.1	
Output Noise Voltage	V_{NO}	2	Ta = 25°C 10Hz ≦ f ≦ 100kHz		—	90	—	μV_{rms}
Long Term Stability	$\Delta V_{OUT} / \Delta t$	1	—		—	30	—	mV / 1.0kh
Ripple Rejection Ratio	R.R.	3	f = 120Hz 18.5V ≦ V_{IN} ≦ 28.5V, T_j = 25°C		34	40	—	dB
Dropout Voltage	$\|V_{IN}-V_{OUT}\|$	1	T_j = 25°C, I_{OUT} = 150mA		—	1.7	—	V
Average Temperature Coefficient of Output Voltage	T_{CVO}	1	I_{OUT} = 5mA		—	− 1.3	—	mV / °C

TA78L18F

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, $V_{IN}=27V$, $I_{OUT}=40mA$, $C_{IN}=0.33\mu F$, $C_{OUT}=0.1\mu F$, $0°C \leqq T_j \leqq 125°C$)

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	1	$T_j=25°C$		17.1	18	18.9	V
Line Regulation	Reg.line	1	$T_j=25°C$	$21.4V \leqq V_{IN} \leqq 33V$	—	32	325	mV
				$22V \leqq V_{IN} \leqq 33V$	—	27	275	
Load Regulation	Reg.load	1	$T_j=25°C$	$1.0mA \leqq I_{OUT} \leqq 100mA$	—	30	170	mV
				$1.0mA \leqq I_{OUT} \leqq 40mA$	—	15	75	
Output Voltage	V_{OUT}	1	$T_j=25°C$	$21.4V \leqq V_{IN} \leqq 33V$ $1.0mA \leqq I_{OUT} \leqq 40mA$	16.74	—	19.26	V
				$1.0mA \leqq I_{OUT} \leqq 70mA$	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	$22V \leqq V_{IN} \leqq 33V$		—	—	1.5	mA
			$1.0mA \leqq I_{OUT} \leqq 40mA$		—	—	0.1	
Output Noise Voltage	V_{NO}	2	$Ta=25°C$ $10Hz \leqq f \leqq 100kHz$		—	150	—	μV_{rms}
Long Term Stability	$\Delta V_{OUT} / \Delta t$	1	—		—	45	—	mV / 1.0kh
Ripple Rejection Ratio	R.R.	3	$f=120Hz$ $23V \leqq V_{IN} \leqq 33V$, $T_j=25°C$		32	38	—	dB
Dropout Voltage	$\lvert V_{IN}-V_{OUT} \rvert$	1	$T_j=25°C$, $I_{OUT}=150mA$		—	1.7	—	V
Average Temperature Coefficient of Output Voltage	T_{CVO}	1	$I_{OUT}=5mA$		—	−1.5	—	mV / °C

TA78L20F

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, 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
Line 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	T_j = 25°C	23.5V ≦ V_{IN} ≦ 35V 1.0mA ≦ I_{OUT} ≦ 40mA	18.6	—	21.4	V
				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
			1.0mA ≦ I_{OUT} ≦ 40mA		—	—	0.1	
Output Noise Voltage	V_{NO}	2	Ta = 25°C 10Hz ≦ f ≦ 100kHz		—	170	—	μV_{rms}
Long Term Stability	ΔV_{OUT} / Δt	1	—		—	49	—	mV / 1.0kh
Ripple Rejection Ratio	R.R.	3	f = 120Hz 25V ≦ V_{IN} ≦ 35V, T_j = 25°C		31	37	—	dB
Dropout Voltage	$\|V_{IN}-V_{OUT}\|$	1	T_j = 25°C, I_{OUT} = 150mA		—	1.7	—	V
Average Temperature Coefficient of Output Voltage	T_{CVO}	1	I_{OUT} = 5mA		—	− 1.7	—	mV / °C

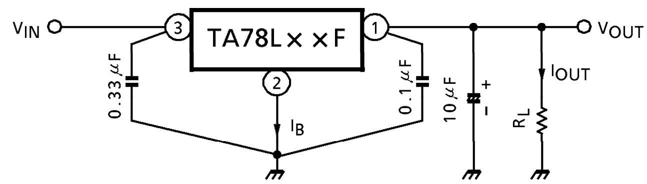
TA78L24F

ELECTRICAL CHARACTERISTICS

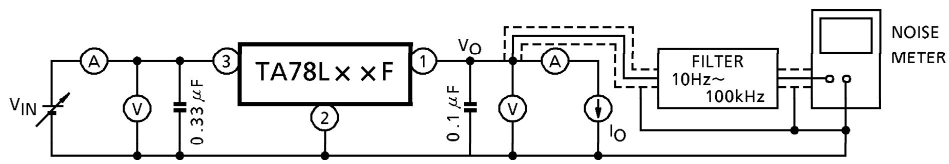
(Unless otherwise specified, $V_{IN} = 33V$, $I_{OUT} = 40mA$, $C_{IN} = 0.33\mu F$, $C_{OUT} = 0.1\mu F$, $0°C \leqq T_j \leqq 125°C$)

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
Line Regulation	Reg.line	1	$T_j = 25°C$	$27.5V \leqq V_{IN} \leqq 38V$	—	35	350	mV
				$28V \leqq V_{IN} \leqq 38V$	—	30	300	
Load Regulation	Reg.load	1	$T_j = 25°C$	$1.0mA \leqq I_{OUT} \leqq 100mA$	—	40	200	mV
				$1.0mA \leqq I_{OUT} \leqq 40mA$	—	20	100	
Output Voltage	V_{OUT}	1	$T_j = 25°C$	$27.5V \leqq V_{IN} \leqq 38V$ $1.0mA \leqq I_{OUT} \leqq 40mA$	22.32	—	25.68	V
				$1.0mA \leqq I_{OUT} \leqq 70mA$	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	$28V \leqq V_{IN} \leqq 38V$		—	—	1.5	mA
			$1.0mA \leqq I_{OUT} \leqq 40mA$		—	—	0.1	
Output Noise Voltage	V_{NO}	2	$Ta = 25°C$ $10Hz \leqq f \leqq 100kHz$		—	200	—	μV_{rms}
Long Term Stability	$\Delta V_{OUT} / \Delta t$	1	—		—	56	—	mV / 1.0kh
Ripple Rejection Ratio	R.R.	3	$f = 120Hz$ $29V \leqq V_{IN} \leqq 39V$, $T_j = 25°C$		31	35	—	dB
Dropout Voltage	$\lvert V_{IN}-V_{OUT} \rvert$	1	$T_j = 25°C$, $I_{OUT} = 150mA$		—	1.7	—	V
Average Temperature Coefficient of Output Voltage	T_{CVO}	1	$I_{OUT} = 5mA$		—	−2.0	—	mV / °C

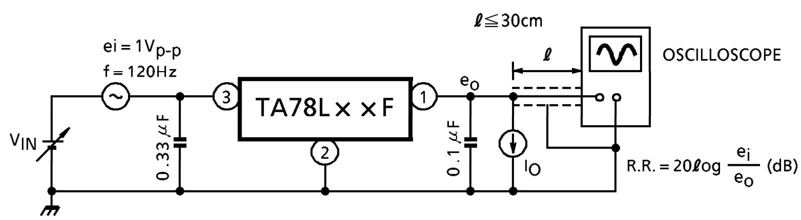
TEST CIRCUIT 1 / STANDARD APPLICATION

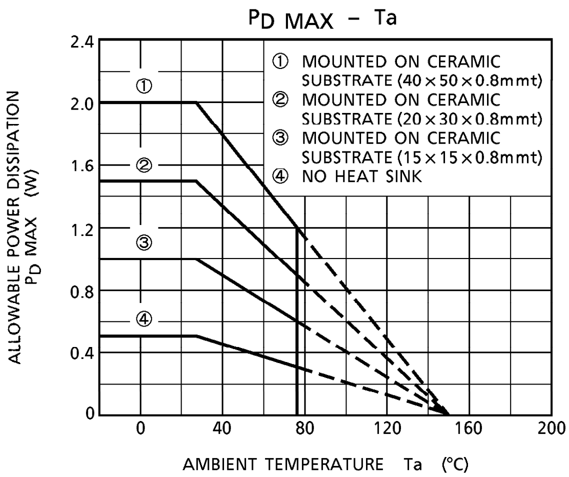


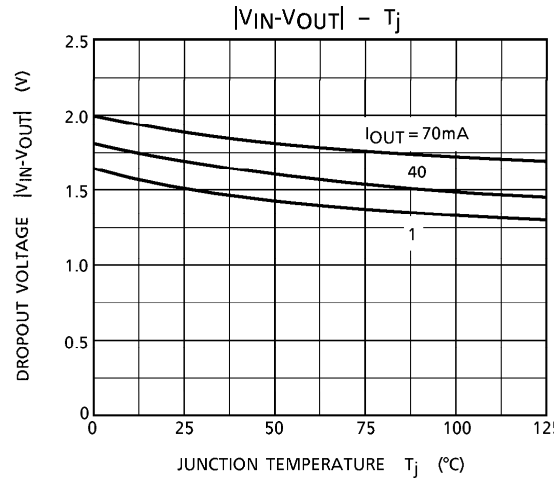
TEST CIRCUIT 2 V_{NO}

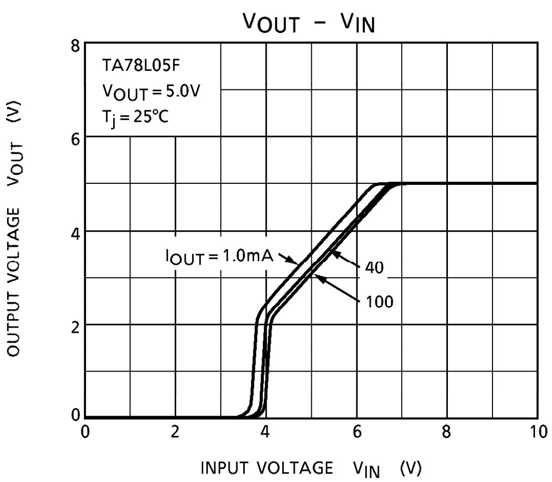


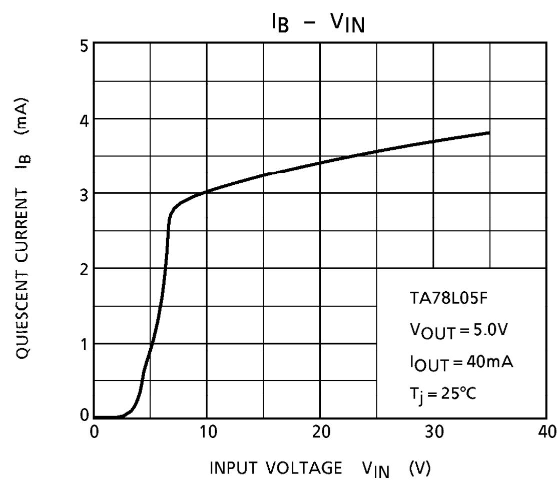
TEST CIRCUIT 3 R.R.

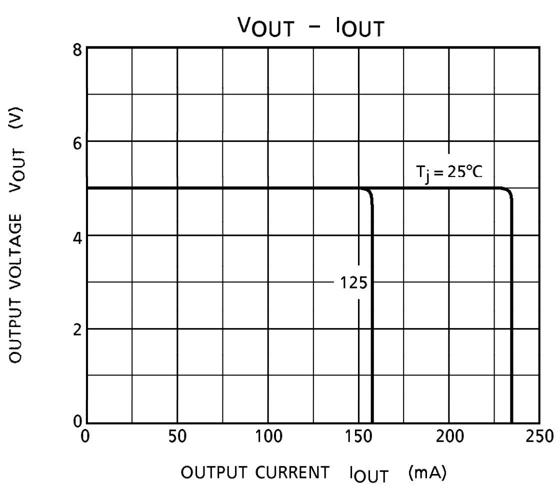



PD MAX – Ta
ALLOWABLE POWER DISSIPATION PD MAX (W)
AMBIENT TEMPERATURE Ta (°C)
① MOUNTED ON CERAMIC SUBSTRATE (40 × 50 × 0.8mmt)
② MOUNTED ON CERAMIC SUBSTRATE (20 × 30 × 0.8mmt)
③ MOUNTED ON CERAMIC SUBSTRATE (15 × 15 × 0.8mmt)
④ NO HEAT SINK
2.4
2.0
1.6
1.2
0.8
0.4
0
40
80
120
160
200


|VIN-VOUT| – Tj
DROPOUT VOLTAGE |VIN-VOUT| (V)
JUNCTION TEMPERATURE Tj (°C)
IOUT = 70mA
40
1
2.5
2.0
1.5
1.0
0.5
0
25
50
75
100
125


VOUT – VIN
TA78L05F
VOUT = 5.0V
Tj = 25°C
IOUT = 1.0mA
40
100
OUTPUT VOLTAGE VOUT (V)
INPUT VOLTAGE VIN (V)
8
6
4
2
0
10


IB – VIN
QUIESCENT CURRENT IB (mA)
INPUT VOLTAGE VIN (V)
TA78L05F
VOUT = 5.0V
IOUT = 40mA
Tj = 25°C
5
4
3
2
1
0
10
20
30
40

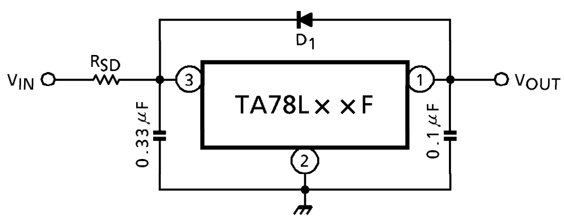

VOUT – IOUT
OUTPUT VOLTAGE VOUT (V)
OUTPUT CURRENT IOUT (mA)
Tj = 25°C
125
8
6
4
2
0
50
100
150
200
250

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 terminal of IC. In such a case as this, it may become necessary to increase capacity of output capacitor as appropriate, use a smaller R_1 (a resistor for bypassing IC bias current) or gradually rise input voltage in addition to use of a Zener diode as mentioned above.

APPLICATION CIRCUIT

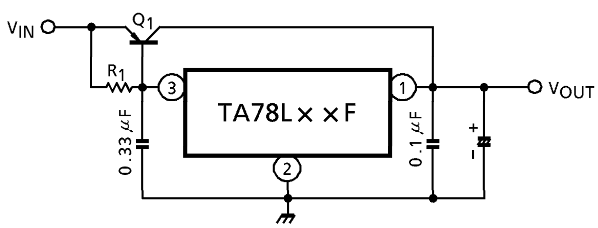
(1) STANDARD APPLICATION



D_1 : IC protective diode
When surge voltage is applied to IC output terminal or $V_{IN} < V_{OUT}$ at the time of power ON / OFF, always connect the high speed swithing 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 BOOST VOLTAGE REGULATOR

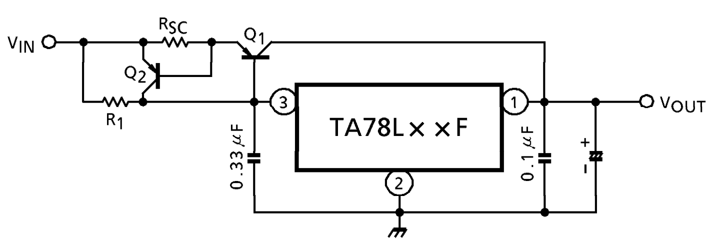


Use a required rediation plate for Q_1.

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

where, V_{BE1} : V_{BE} of external transistor Q_1.
I_B MAX : Max. bias current of IC.

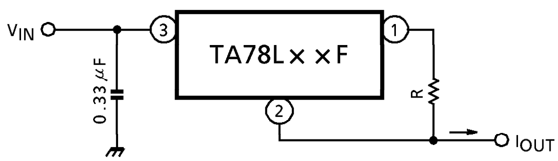
B. SHORT-CIRCUIT PROTECTION



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

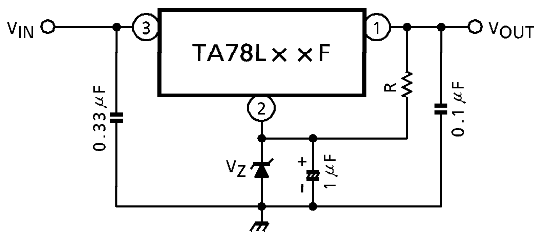
where, I_{SC} : Short-Circuit current

(3) CURRENT REGULATOR

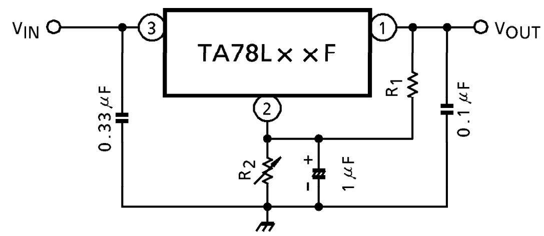


$$I_{OUT} = \frac{V_{OUT}}{R} + I_B$$

(4) VOLTAGE BOOST REGULATOR

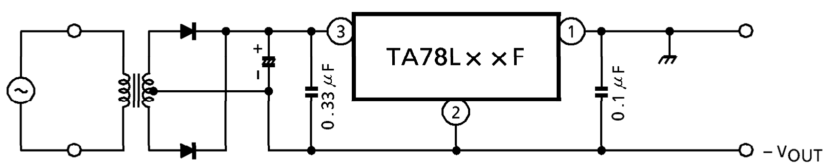


$V_{OUT} = V_Z + V_{OUT}$ (of IC)
Apply current of several mA to R.

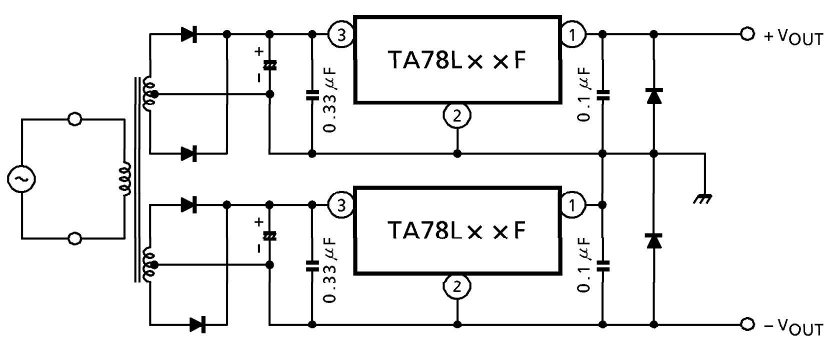


$$V_{OUT} = R_2 \left(I_B + \frac{V_{OUT}\text{ (of IC)}}{R_1}\right) + V_{OUT}\text{ (of IC)}$$

(5) NEGATIVE REGULATOR



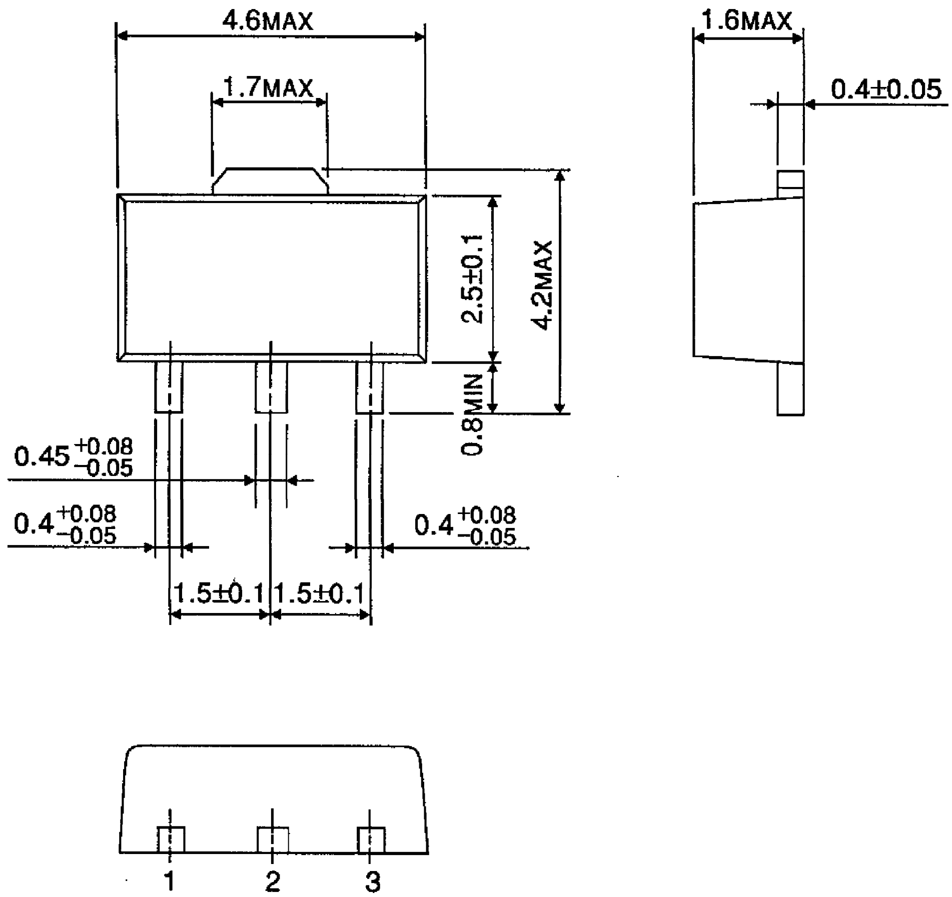
(6) POSITIVE AND NEGATIVE REGULATOR



OUTLINE DRAWING

HSOP3-P-1.50

Unit : mm



Weight : 0.05g (Typ.)