

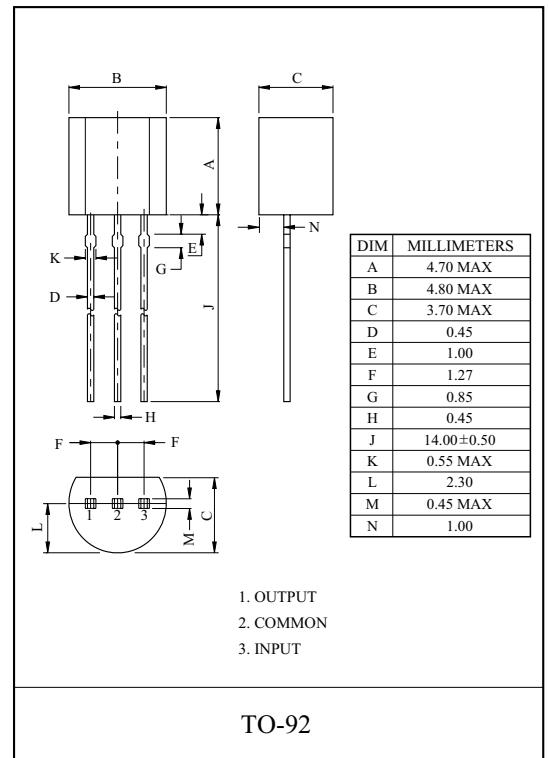
THREE TERMINAL POSITIVE VOLTAGE REGULATORS 5V, 6V, 8V, 9V, 10V, 12V, 15V, 18V, 20V, 24V.

FEATURES

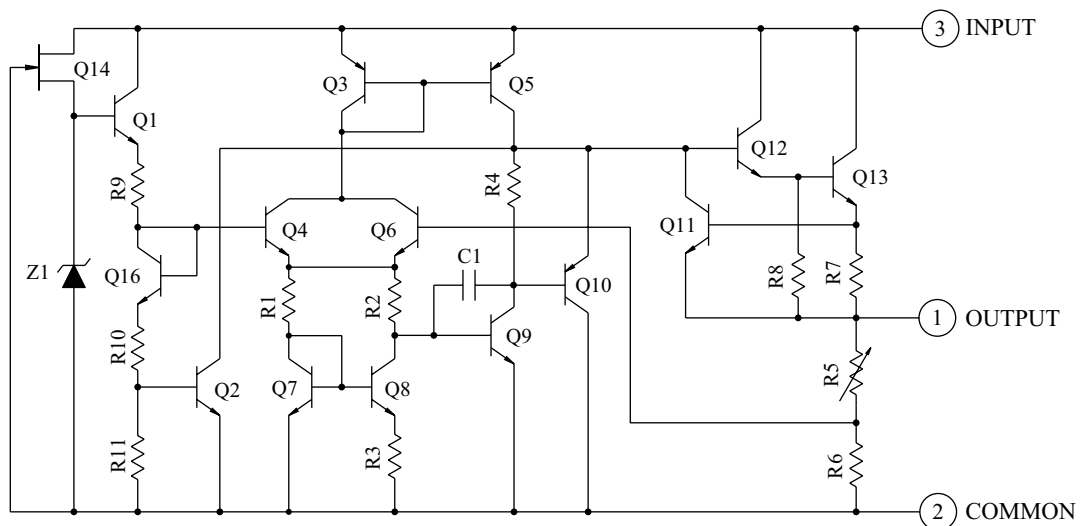
- Suitable for TTL, DTL, HTL, C-MOS Power Supply.
- Internal Short-Circuit Current Limiting.
- Internal Thermal Overload Protection.
- Maximum Output Current of 150mA ($T_j=25^\circ\text{C}$).
- Packaged in TO-92.

MAXIMUM RATINGS ($T_a=25^\circ\text{C}$)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Input Voltage	(5V ~ 15V)	V_{IN}	35	V
	(18V ~ 24V)		40	V
Power Dissipation		P_D	600	mW
Operating Junction Temperature		T_j	-30 ~ 150	
Operating Temperature		T_{opr}	-30 ~ 85	
Storage Temperature		T_{stg}	-55 ~ 150	



EQUIVALENT CIRCUIT



KIA78S05P~KIA78S24P

ELECTRICAL CHARACTERISTICS

KIA78S05P

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

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Output Voltage	V_{OUT}	1	$T_j=25$	4.8	5.0	5.2	V	
Input Regulation	Reg line	1	$T_j=25$	$7.0V \leq V_{IN} \leq 20V$	-	55	150	mV
				$8.0V \leq V_{IN} \leq 20V$	-	45	100	
Load Regulation	Reg load	1	$T_j=25$	$1.0mA \leq I_{OUT} \leq 100mA$	-	11	60	mV
				$1.0mA \leq I_{OUT} \leq 40mA$	-	5.0	30	
Output Voltage	V_{OUT}	1	$T_j=25$	$7.0V \leq V_{IN} \leq 20V$ $1.0mA \leq I_{OUT} \leq 40mA$	4.75	-	5.25	V
				$V_{IN}=10V$, $1.0mA \leq I_{OUT} \leq 70mA$	4.75	-	5.25	
Quiescent Current	I_B	1	$T_j=25$		-	3.1	6.0	mA
				$T_j=125$	-	-	5.5	
Quiescent Current Change	I_B	1	$T_j=25$	$8.0V \leq V_{IN} \leq 20V$	-	-	1.5	mA
				$1.0mA \leq I_{OUT} \leq 40mA$	-	-	0.1	
Output Noise Voltage	V_{NO}	1	$T_a=25$, $10Hz \leq f \leq 100kHz$	-	40	-	μV_{rms}	
Long Term Stability	V_{OUT}/t	1		-	12	-	mV/ 1.0kHrs	
Ripple Rejection Ratio	RR	2	$f=120Hz$, $8.0V \leq V_{IN} \leq 18V$, $T_j=25$	41	49	-	dB	
Dropout Voltage	$ V_{IN}-V_{OUT} $	1	$T_j=25$	-	1.7	-	V	
Average Temperature Coefficient of Output Voltage	TC_{VO}	1	$I_{OUT}=5mA$	-	-0.6	-	mV/	

KIA78S05P~KIA78S24P

ELECTRICAL CHARACTERISTICS

KIA78S06P

(Unless otherwise specified, $V_{IN}=11V$, $I_{OUT}=40mA$, $C_{IN}=0.33\mu F$, $C_{OUT}=0.1\mu F$, $0 < T_j < 125$)

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Output Voltage	V_{OUT}	1	$T_j=25$	5.76	6.0	6.24	V	
Input Regulation	Reg line	1	$T_j=25$	8.1V V_{IN} 21V	-	50	150	mV
				9.0V V_{IN} 21V	-	45	110	
Load Regulation	Reg load	1	$T_j=25$	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	5.7	-	6.3	V
				$V_{IN}=11V$, 1.0mA I_{OUT} 70mA	5.7	-	6.3	
Quiescent Current	I_B	1		$T_j=25$	-	3.1	6.0	mA
				$T_j=125$	-	-	5.5	
Quiescent Current Change	I_B	1		9.0V V_{IN} 20V	-	-	1.5	mA
				1.0mA I_{OUT} 40mA	-	-	0.1	
Output Noise Voltage	V_{NO}	1	$T_a=25$, 10Hz f 100kHz	-	40	-	μV_{rms}	
Long Term Stability	V_{OUT}/t	1		-	14	-	mV/ 1.0kHrs	
Ripple Rejection Ratio	RR	2	$f=120Hz$, 9.0V V_{IN} 19V, $T_j=25$	39	47	-	dB	
Dropout Voltage	$ V_{IN}-V_{OUT} $	1	$T_j=25$	-	1.7	-	V	
Average Temperature Coefficient of Output Voltage	TC_{VO}	1	$I_{OUT}=5mA$	-	-0.7	-	mV/	

KIA78S05P~KIA78S24P

ELECTRICAL CHARACTERISTICS

KIA78S08P

(Unless otherwise specified, $V_{IN}=14V$, $I_{OUT}=40mA$, $C_{IN}=0.33\mu F$, $C_{OUT}=0.1\mu F$, $0 < T_j < 125$)

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Output Voltage	V_{OUT}	1	$T_j=25$	7.7	8.0	8.3	V	
Input Regulation	Reg line	1	$T_j=25$	$10.5V < V_{IN} < 23V$	-	20	175	mV
				$11V < V_{IN} < 23V$	-	12	125	
Load Regulation	Reg load	1	$T_j=25$	$1.0mA < I_{OUT} < 100mA$	-	15	80	mV
				$1.0mA < I_{OUT} < 40mA$	-	7.0	40	
Output Voltage	V_{OUT}	1		$10.5V < V_{IN} < 23V$ $1.0mA < I_{OUT} < 40mA$	7.6	-	8.4	V
				$V_{IN}=14V, 1.0mA < I_{OUT} < 70mA$	7.6	-	8.4	
Quiescent Current	I_B	1		$T_j=25$	-	3.1	6.5	mA
				$T_j=125$	-	-	6.0	
Quiescent Current Change	I_B	1		$11V < V_{IN} < 23V$	-	-	1.5	mA
				$1.0mA < I_{OUT} < 40mA$	-	-	0.1	
Output Noise Voltage	V_{NO}	1	$T_a=25$, $10Hz < f < 100kHz$	-	60	-	μV_{rms}	
Long Term Stability	V_{OUT}/t	1		-	20	-	mV/ 1.0kHrs	
Ripple Rejection Ratio	RR	2	$f=120Hz, 12V < V_{IN} < 23V,$ $T_j=25$	37	45	-	dB	
Dropout Voltage	$ V_{IN}-V_{OUT} $	1	$T_j=25$	-	1.7	-	V	
Average Temperature Coefficient of Output Voltage	TC_{VO}	1	$I_{OUT}=5mA$	-	-0.8	-	mV/	

KIA78S05P~KIA78S24P

ELECTRICAL CHARACTERISTICS

KIA78S09P

(Unless otherwise specified, $V_{IN}=15V$, $I_{OUT}=40mA$, $C_{IN}=0.33\mu F$, $C_{OUT}=0.1\mu F$, $0 \leq T_j \leq 125$)

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Output Voltage	V_{OUT}	1	$T_j=25$	8.64	9.0	9.36	V	
Input Regulation	Reg line	1	$T_j=25$	11.4V V_{IN} 24V	-	80	200	mV
				12V V_{IN} 24V	-	20	160	
Load Regulation	Reg load	1	$T_j=25$	1.0mA I_{OUT} 100mA	-	17	90	mV
				1.0mA I_{OUT} 40mA	-	8.0	45	
Output Voltage	V_{OUT}	1	$T_j=25$	11.4V V_{IN} 24V 1.0mA I_{OUT} 40mA	8.55	-	9.45	V
				$V_{IN}=15V$, 1.0mA I_{OUT} 70mA	8.55	-	9.45	
Quiescent Current	I_B	1	$T_j=25$		-	3.2	6.5	mA
				$T_j=125$	-	-	6.0	
Quiescent Current Change	I_B	1	$T_j=25$	11.5V V_{IN} 26V	-	-	1.5	mA
				1.0mA I_{OUT} 40mA	-	-	0.1	
Output Noise Voltage	V_{NO}	1	$T_a=25$, 10Hz f 100kHz	-	65	-	μV_{rms}	
Long Term Stability	V_{OUT}/t	1		-	21	-	mV/ 1.0kHrs	
Ripple Rejection Ratio	RR	2	$f=120Hz$, 12V V_{IN} 24V, $T_j=25$	36	44	-	dB	
Dropout Voltage	$ V_{IN}-V_{OUT} $	1	$T_j=25$	-	1.7	-	V	
Average Temperature Coefficient of Output Voltage	TC_{VO}	1	$I_{OUT}=5mA$	-	-0.85	-	mV/	

KIA78S05P~KIA78S24P

ELECTRICAL CHARACTERISTICS

KIA78S10P

(Unless otherwise specified, $V_{IN}=16V$, $I_{OUT}=40mA$, $C_{IN}=0.33\mu F$, $C_{OUT}=0.1\mu F$, $\theta_{JA}=125$)

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Output Voltage	V_{OUT}	1	$T_j=25$	9.6	10	10.4	V	
Input Regulation	Reg line	1	$T_j=25$	12.5V V_{IN} 25V	-	80	230	mV
				13V V_{IN} 25V	-	30	170	
Load Regulation	Reg load	1	$T_j=25$	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	9.5	-	10.5	V	
			$V_{IN}=16V$, 1.0mA I_{OUT} 70mA	9.5	-	10.5		
Quiescent Current	I_B	1	$T_j=25$	-	3.2	6.5	mA	
			$T_j=125$	-	-	6.0		
Quiescent Current Change	I_B	1	13V V_{IN} 25V	-	-	1.5	mA	
			1.0mA I_{OUT} 40mA	-	-	0.1		
Output Noise Voltage	V_{NO}	1	$T_a=25$, 10Hz f 100kHz	-	70	-	μV_{rms}	
Long Term Stability	V_{OUT}/t	1		-	22	-	mV/ 1.0kHrs	
Ripple Rejection Ratio	RR	2	$f=120Hz$, 13V V_{IN} 24V, $T_j=25$	36	43	-	dB	
Dropout Voltage	$ V_{IN}-V_{OUT} $	1	$T_j=25$	-	1.7	-	V	
Average Temperature Coefficient of Output Voltage	TC_{VO}	1	$I_{OUT}=5mA$	-	-0.9	-	mV/	

KIA78S05P~KIA78S24P

ELECTRICAL CHARACTERISTICS

KIA78S12P

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

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Output Voltage	V_{OUT}	1	$T_j=25$	11.5	12	12.5	V	
Input Regulation	Reg line	1	$T_j=25$	14.5V V_{IN} 27V	-	120	250	mV
				16V V_{IN} 27V	-	100	200	
Load Regulation	Reg load	1	$T_j=25$	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	11.4	-	12.6	V	
				$V_{IN}=19V$, 1.0mA I_{OUT} 70mA	11.4	-		12.6
Quiescent Current	I_B	1	$T_j=25$	-	3.2	6.5	mA	
			$T_j=125$	-	-	6.0		
Quiescent Current Change	I_B	1	16V V_{IN} 27V	-	-	1.5	mA	
			1.0mA I_{OUT} 40mA	-	-	0.1		
Output Noise Voltage	V_{NO}	1	$T_a=25$, 10Hz f 100kHz	-	80	-	μV_{rms}	
Long Term Stability	V_{OUT}/t	1		-	24	-	mV/ 1.0kHrs	
Ripple Rejection Ratio	RR	2	$f=120Hz$, 15V V_{IN} 25V, $T_j=25$	36	41	-	dB	
Dropout Voltage	$ V_{IN}-V_{OUT} $	1	$T_j=25$	-	1.7	-	V	
Average Temperature Coefficient of Output Voltage	TC_{VO}	1	$I_{OUT}=5mA$	-	-1.0	-	mV/	

KIA78S05P~KIA78S24P

ELECTRICAL CHARACTERISTICS

KIA78S15P

(Unless otherwise specified, $V_{IN}=23V$, $I_{OUT}=40mA$, $C_{IN}=0.33\mu F$, $C_{OUT}=0.1\mu F$, $0 \leq T_j \leq 125$)

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Output Voltage	V_{OUT}	1	$T_j=25$	14.4	15	15.6	V	
Input Regulation	Reg line	1	$T_j=25$	$17.5V \leq V_{IN} \leq 30V$	-	130	300	mV
				$20V \leq V_{IN} \leq 30V$	-	110	250	
Load Regulation	Reg load	1	$T_j=25$	$1.0mA \leq I_{OUT} \leq 100mA$	-	25	150	mV
				$1.0mA \leq I_{OUT} \leq 40mA$	-	12	75	
Output Voltage	V_{OUT}	1	$17.5V \leq V_{IN} \leq 30V$ $1.0mA \leq I_{OUT} \leq 40mA$	14.25	-	15.75	V	
				$V_{IN}=23V, 1.0mA \leq I_{OUT} \leq 70mA$	14.25	-		15.75
Quiescent Current	I_B	1	$T_j=25$	-	3.3	6.5	mA	
				$T_j=125$	-	-		6.0
Quiescent Current Change	I_B	1	$20V \leq V_{IN} \leq 30V$ $1.0mA \leq I_{OUT} \leq 40mA$	-	-	1.5	mA	
				-	-	0.1		
Output Noise Voltage	V_{NO}	1	$T_a=25$, 10Hz f 100kHz	-	90	-	μV_{rms}	
Long Term Stability	V_{OUT}/t	1		-	30	-	mV/ 1.0kHrs	
Ripple Rejection Ratio	RR	2	$f=120Hz, 18.5V \leq V_{IN} \leq 28.5V,$ $T_j=25$	34	40	-	dB	
Dropout Voltage	$ V_{IN}-V_{OUT} $	1	$T_j=25$	-	1.7	-	V	
Average Temperature Coefficient of Output Voltage	TC_{VO}	1	$I_{OUT}=5mA$	-	-1.3	-	mV/	

KIA78S05P~KIA78S24P

ELECTRICAL CHARACTERISTICS

KIA78S18P

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

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Output Voltage	V_{OUT}	1	$T_j=25$	17.3	18	18.7	V	
Input Regulation	Reg line	1	$T_j=25$	21.4V V_{IN} 33V	-	32	325	mV
				22V V_{IN} 33V	-	27	275	
Load Regulation	Reg load	1	$T_j=25$	1.0mA I_{OUT} 100mA	-	30	170	mV
				1.0mA I_{OUT} 40mA	-	15	75	
Output Voltage	V_{OUT}	1	$T_j=25$	21.4V V_{IN} 33V 1.0mA I_{OUT} 40mA	17.1	-	18.9	V
				$V_{IN}=27V$, 1.0mA I_{OUT} 70mA	17.1	-	18.9	
Quiescent Current	I_B	1	$T_j=25$		-	3.3	6.5	mA
				$T_j=125$	-	-	6.0	
Quiescent Current Change	I_B	1	$T_j=25$	22V V_{IN} 33V	-	-	1.5	mA
				1.0mA I_{OUT} 40mA	-	-	0.1	
Output Noise Voltage	V_{NO}	1	$T_a=25$, 10Hz f 100kHz	-	150	-	μV_{rms}	
Long Term Stability	V_{OUT}/t	1		-	45	-	mV/ 1.0kHrs	
Ripple Rejection Ratio	RR	2	$f=120Hz$, 23V V_{IN} 33V, $T_j=25$	32	38	-	dB	
Dropout Voltage	$ V_{IN}-V_{OUT} $	1	$T_j=25$	-	1.7	-	V	
Average Temperature Coefficient of Output Voltage	TC_{VO}	1	$I_{OUT}=5mA$	-	-1.5	-	mV/	

KIA78S05P~KIA78S24P

ELECTRICAL CHARACTERISTICS

KIA78S20P

(Unless otherwise specified, $V_{IN}=29V$, $I_{OUT}=40mA$, $C_{IN}=0.33\mu F$, $C_{OUT}=0.1\mu F$, $0 < T_j < 125$)

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Output Voltage	V_{OUT}	1	$T_j=25$	19.2	20	20.8	V	
Input Regulation	Reg line	1	$T_j=25$	$23.5V < V_{IN} < 35V$	-	33	330	mV
				$24V < V_{IN} < 35V$	-	28	285	
Load Regulation	Reg load	1	$T_j=25$	$1.0mA < I_{OUT} < 100mA$	-	33	180	mV
				$1.0mA < I_{OUT} < 40mA$	-	17	90	
Output Voltage	V_{OUT}	1	$23.5V < V_{IN} < 35V$ $1.0mA < I_{OUT} < 40mA$	19.0	-	21.0	V	
				$V_{IN}=29V, 1.0mA < I_{OUT} < 70mA$	19.0	-		21.0
Quiescent Current	I_B	1	$T_j=25$	-	3.3	6.5	mA	
				$T_j=125$	-	-		6.0
Quiescent Current Change	I_B	1	$24V < V_{IN} < 35V$ $1.0mA < I_{OUT} < 40mA$	-	-	1.5	mA	
				-	-	0.1		
Output Noise Voltage	V_{NO}	1	$T_a=25$, 10Hz $< f < 100kHz$	-	170	-	μV_{rms}	
Long Term Stability	V_{OUT}/t	1		-	49	-	mV/ 1.0kHrs	
Ripple Rejection Ratio	RR	2	$f=120Hz, 25V < V_{IN} < 35V,$ $T_j=25$	31	37	-	dB	
Dropout Voltage	$ V_{IN}-V_{OUT} $	1	$T_j=25$	-	1.7	-	V	
Average Temperature Coefficient of Output Voltage	TC_{VO}	1	$I_{OUT}=5mA$	-	-1.7	-	mV/	

KIA78S05P~KIA78S24P

ELECTRICAL CHARACTERISTICS

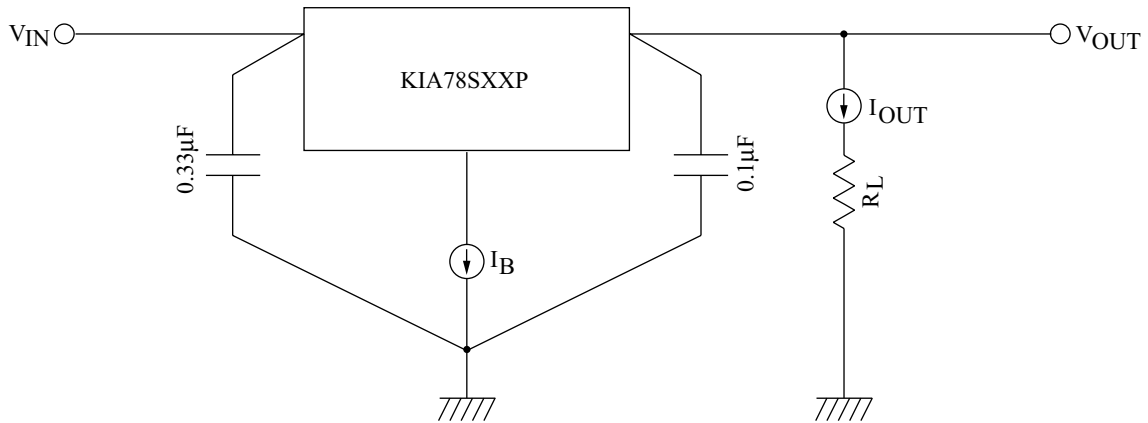
KIA78S24P

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

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Output Voltage	V_{OUT}	1	$T_j=25$	23	24	25	V	
Input Regulation	Reg line	1	$T_j=25$	$27.5V < V_{IN} < 38V$	-	35	350	mV
				$28V < V_{IN} < 38V$	-	30	300	
Load Regulation	Reg load	1	$T_j=25$	$1.0mA < I_{OUT} < 100mA$	-	40	200	mV
				$1.0mA < I_{OUT} < 40mA$	-	20	100	
Output Voltage	V_{OUT}	1	$T_j=25$	$27.5V < V_{IN} < 38V$ $1.0mA < I_{OUT} < 40mA$	22.8	-	25.2	V
				$V_{IN}=33V, 1.0mA < I_{OUT} < 70mA$	22.8	-	25.2	
Quiescent Current	I_B	1	$T_j=25$		-	3.5	6.5	mA
				$T_j=125$	-	-	6.0	
Quiescent Current Change	I_B	1	$T_j=25$	$28V < V_{IN} < 38V$	-	-	1.5	mA
				$1.0mA < I_{OUT} < 40mA$	-	-	0.1	
Output Noise Voltage	V_{NO}	1	$T_a=25$, $10Hz < f < 100kHz$	-	200	-	μV_{rms}	
Long Term Stability	V_{OUT}/t	1		-	56	-	mV/ 1.0kHrs	
Ripple Rejection Ratio	RR	2	$f=120Hz, 29V < V_{IN} < 39V,$ $T_j=25$	31	35	-	dB	
Dropout Voltage	$ V_{IN}-V_{OUT} $	1	$T_j=25$	-	1.7	-	V	
Average Temperature Coefficient of Output Voltage	TC_{VO}	1	$I_{OUT}=5mA$	-	-2.0	-	mV/	

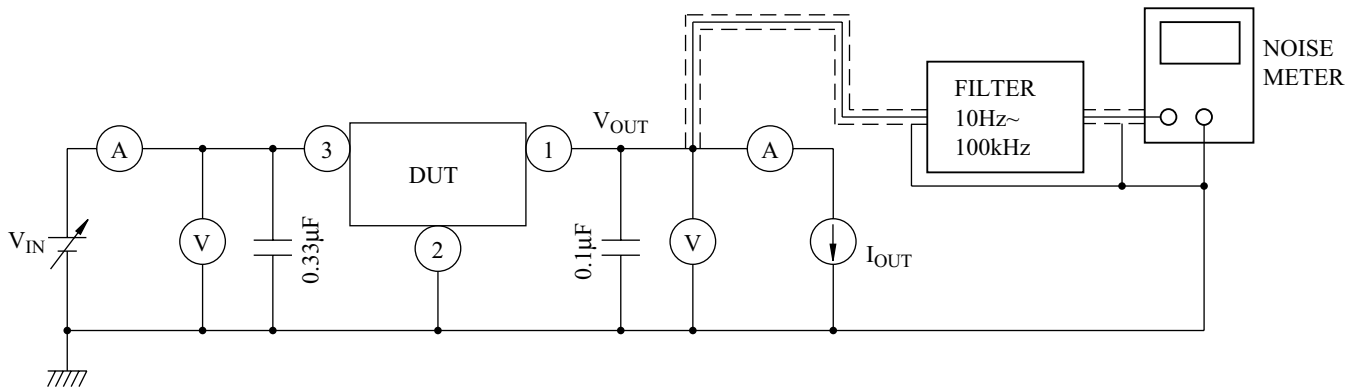
KIA78S05P~KIA78S24P

TEST CIRCUIT / STANDARD APPLICATION CIRCUIT



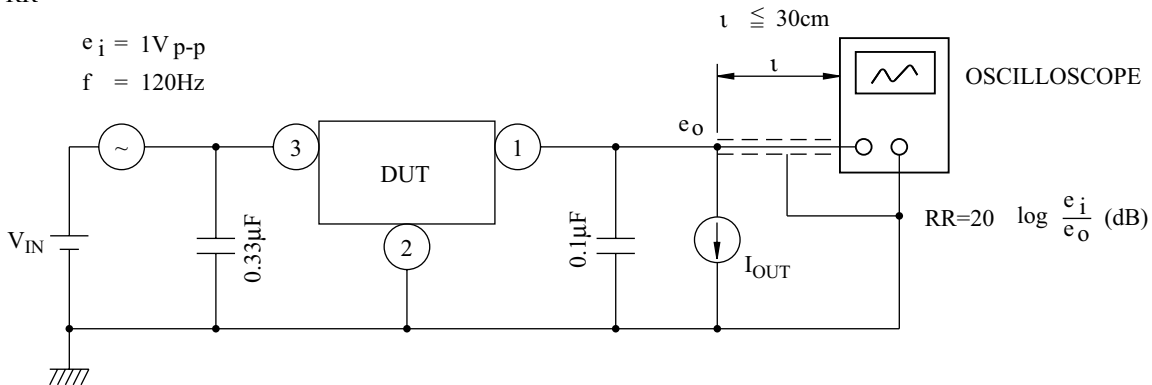
TEST CIRCUIT

1. V_{OUT} , $\text{Reg} \cdot \text{line}$, $\text{Reg} \cdot \text{load}$, V_{OUT} , I_B , ΔI_B , V_{NO} , $DV_{OUT} / \Delta t$, $|V_{IN} - V_{OUT}|$, TCV_O



2. RR

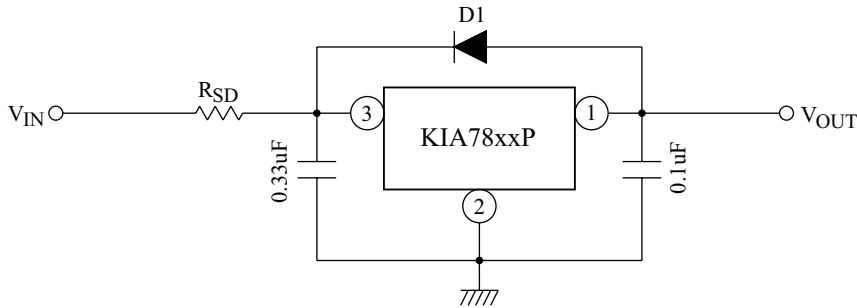
$e_i = 1V_{p-p}$
 $f = 120Hz$



KIA78S05P~KIA78S24P

APPLICATION CIRCUIT

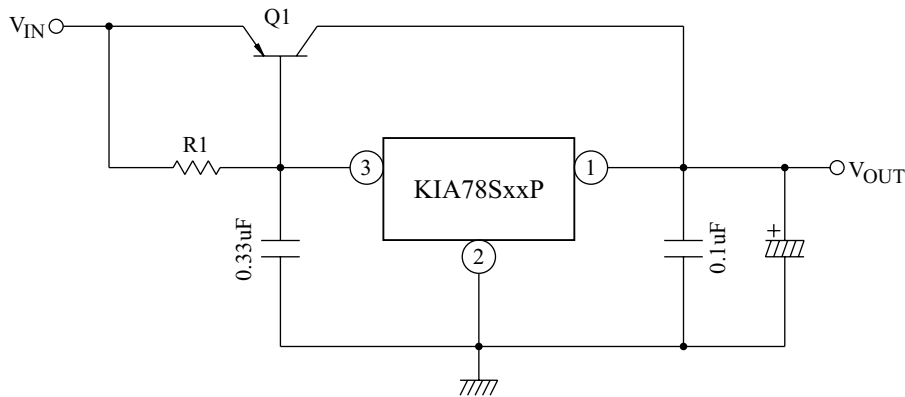
(1) STANDARD APPLICATION



D1 : Protection Diode High speed diode D1 should be connected as shown in the figure if the condition $V_{IN} < V_{OUT}$ might occur by surge voltage or power supply ON/OFF

R_{SD} : Power limiting resistor for large V_{IN} , resistor R_{SD} is needed to limit IC power dissipation

(2) A. CURRENT BOOST VOLTAGE REGULATOR



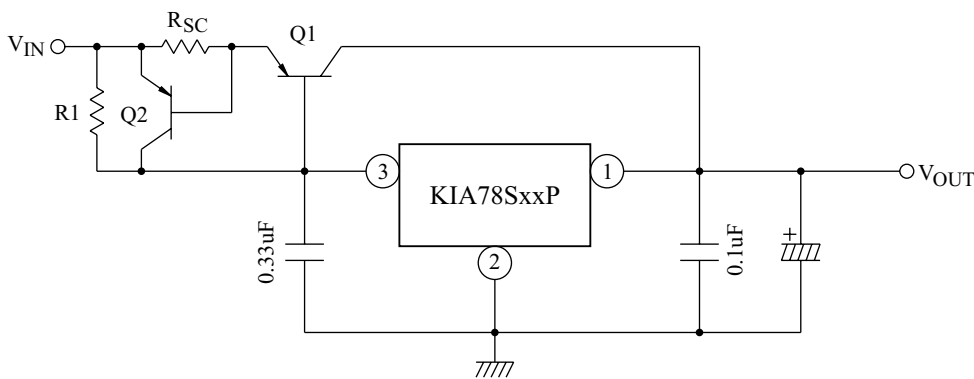
Heat sink is needed for Q1

$$R1 \leq \frac{V_{BE1}}{I_{B(MAX)}}$$

where, V_{BE1} : V_{BE} of external transistor Q1

$I_{B(MAX)}$: Quiescent current of IC

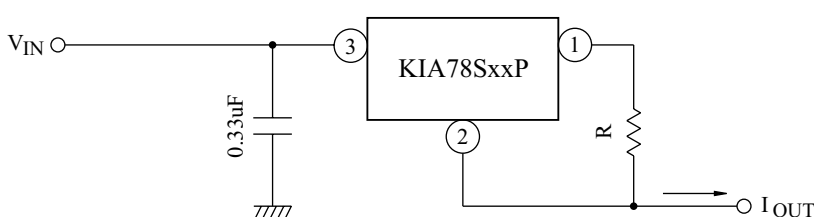
B. SHORT-CIRCUIT PROTECTION



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

where, I_{SC} : Short-Circuit current

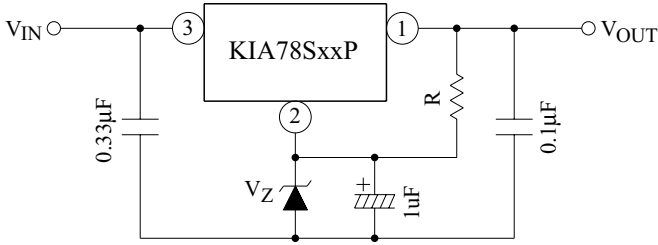
(3) CURRENT REGULATOR



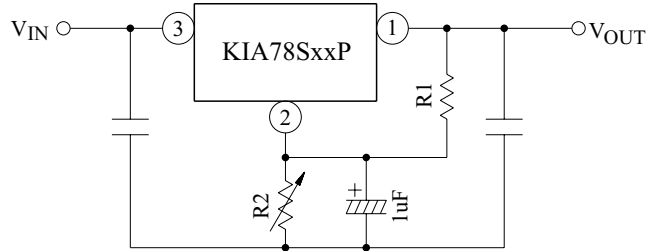
$$I_{OUT} = \frac{V_{OUT}}{R} + I_B$$

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(4) VOLTAGE BOOST REGULATOR

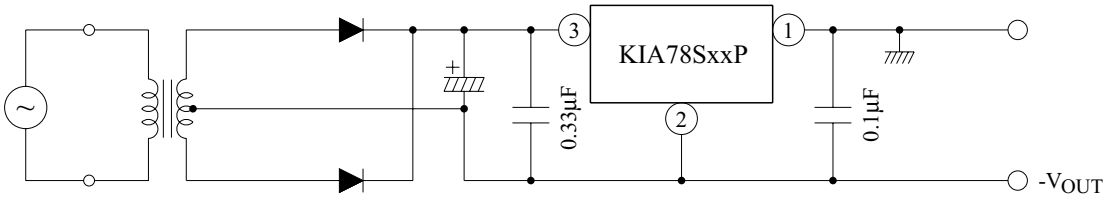


$V_{OUT} = V_Z + V_{OUT} \text{ (of IC)}$
 A little of current in resistor R is needed.

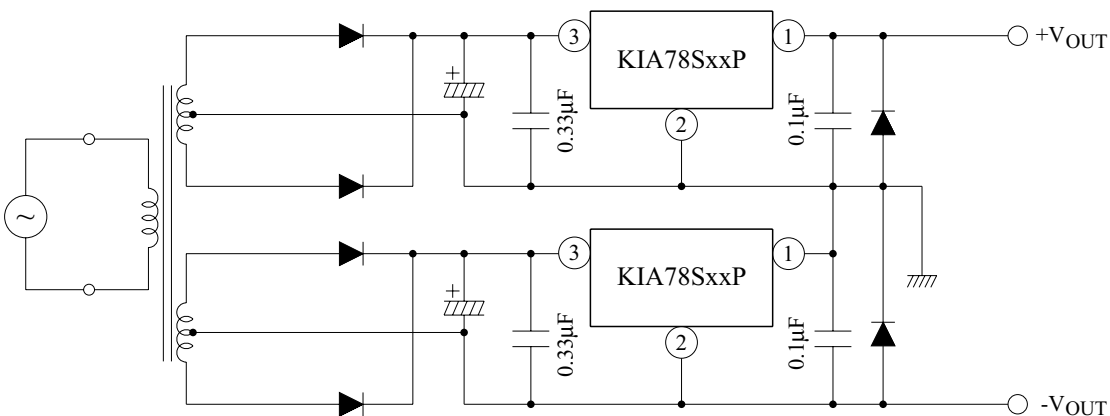


$$V_{OUT} = R2 \left(I_B + \frac{V_{OUT} \text{ (of IC)}}{R1} \right) + V_{OUT} \text{ (of IC)}$$

(5) NEGATIVE REGULATOR



(6) POSITIVE AND NEGATIVE REGULATOR



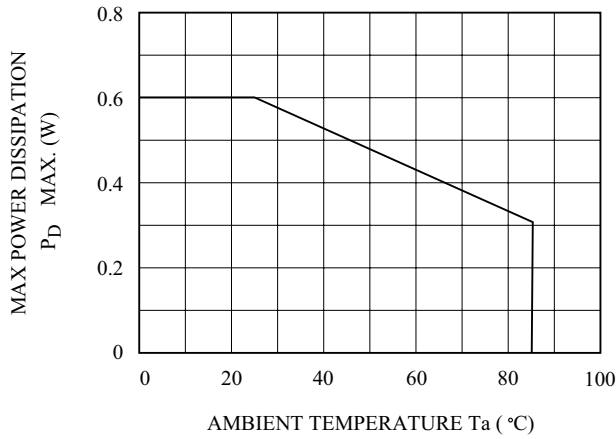
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PRECAUTIONS FOR USE

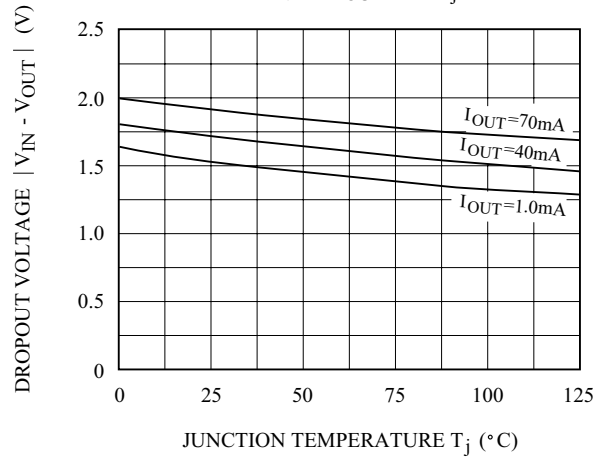
When such a high voltage as exceeds 10V beyond the fixed output voltage (Typ. Value) of IC is applied to the output terminal of IC, the IC may be destroyed. In such a case, it is advised to prevent an excessive voltage from being applied to the IC by connecting a zener diode between the output terminal and the GND. Especially, in the current boost circuit as shown in example (2) of application circuits, an input voltage may be suddenly applied to the output terminal of IC in the form of steps, and that in case of light load, an excessive voltage may be transiently applied to the output terminal of IC: So that great care should be taken to this matter. In this case, in addition to the above, it may become necessary to consider such a countermeasure as the output capacitor in use is replaced with a capacitor of larger capacitance, or as R1 (a resistor for IC bias current) or bypass is replaced with a resistor of smaller resistance according to circumstances, or as the input voltage is gradually raised.

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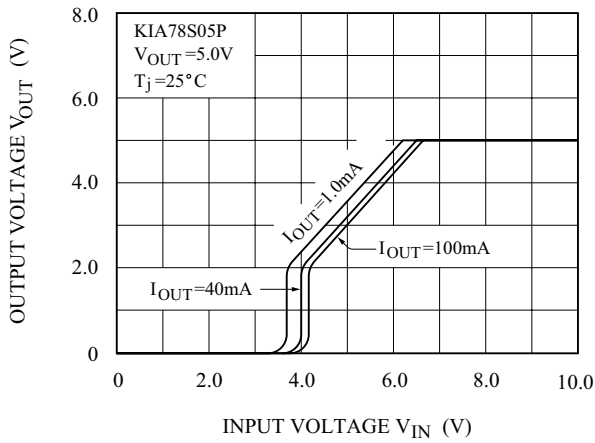
P_D MAX - T_a



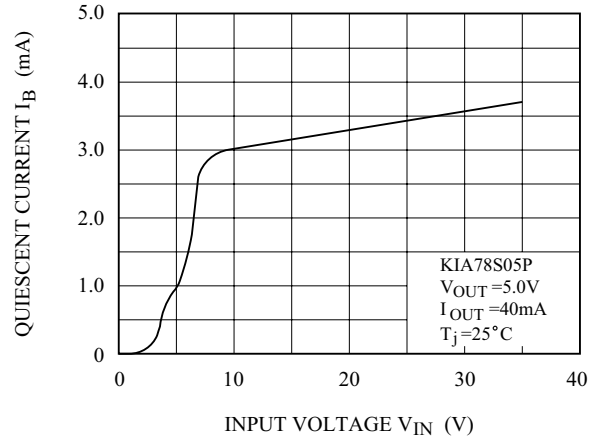
$|V_{IN} - V_{OUT}| - T_j$



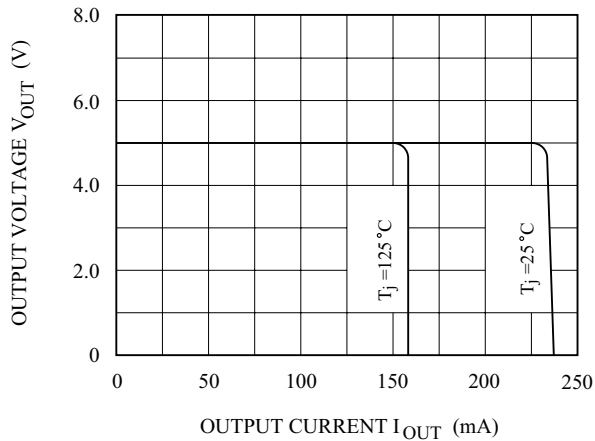
$V_{OUT} - V_{IN}$



$I_B - V_{IN}$



$V_{OUT} - I_{OUT}$



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