

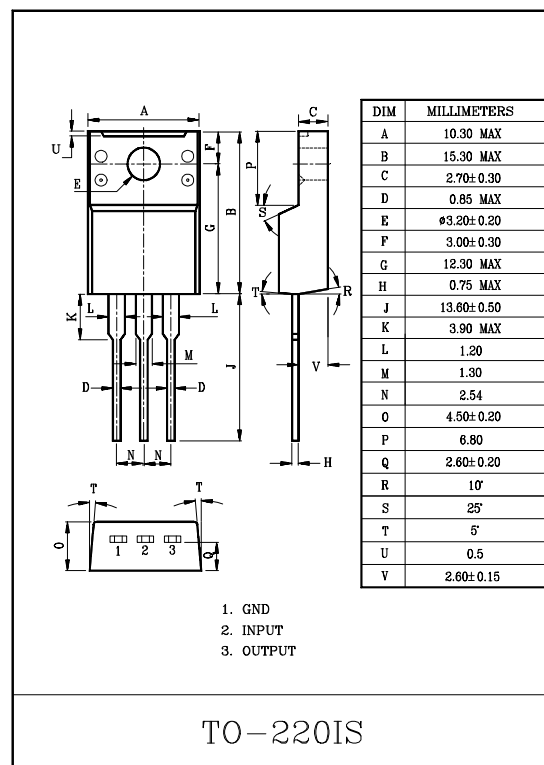
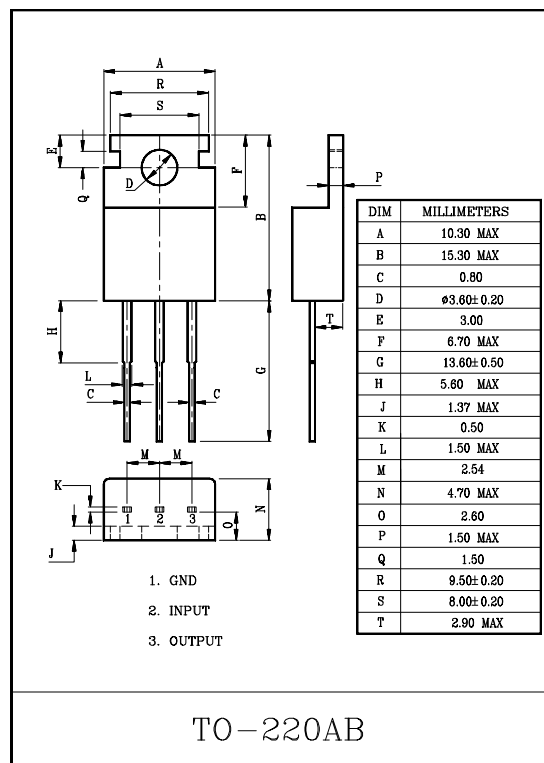
1A THREE TERMINAL NEGATIVE VOLTAGE REGULATORS
-5V, -6V, -8V, -9V, -10V, -12V, -15V, -18V, -20V, -24V

FEATURES:

- Suitable for C-MOS, TTL, and the other digital IC power supply.
- Internal thermal overload protecting.
- Internal short circuit current limiting.
- Output current in excess of 1.0A.

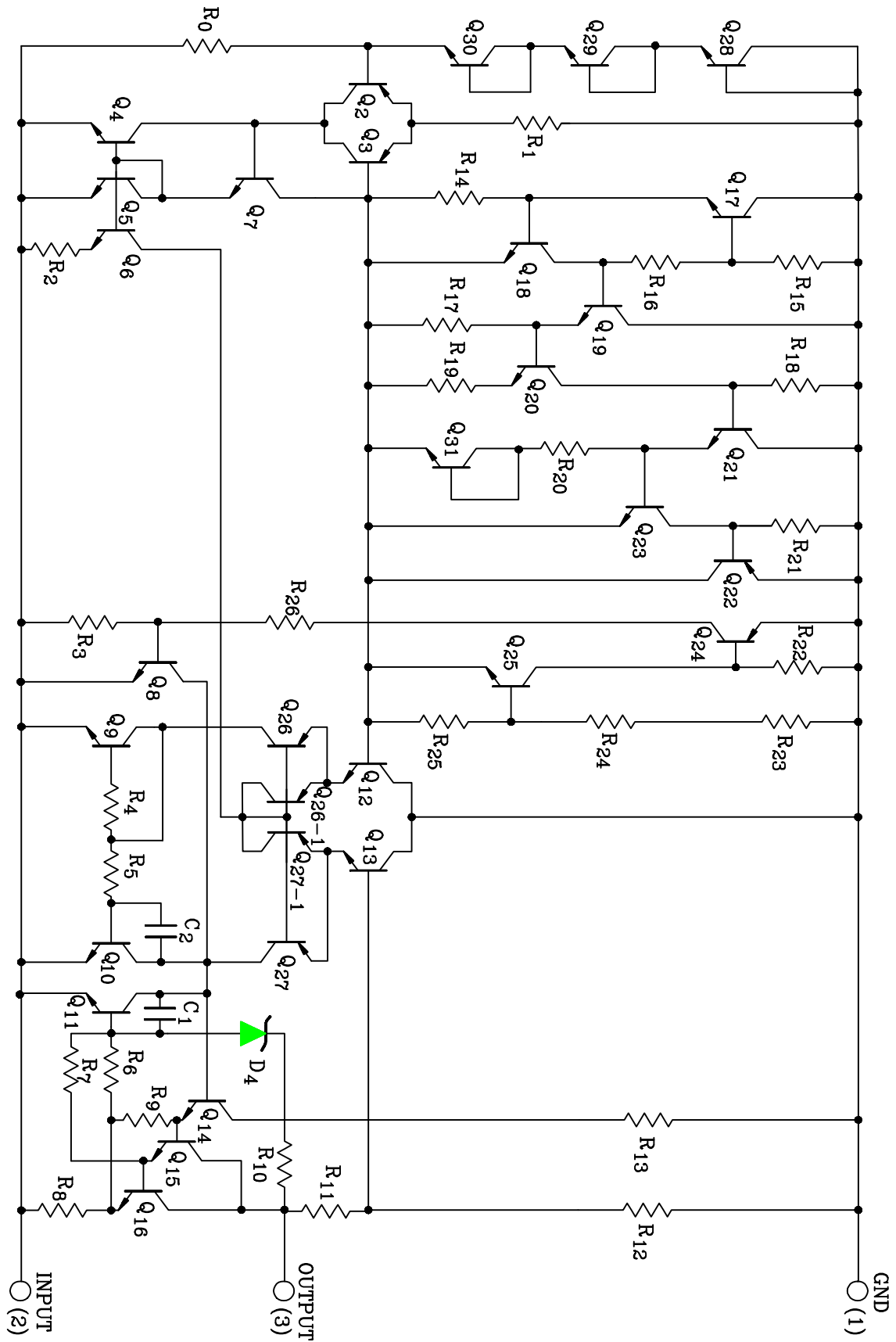
MAXIMUM RATINGS (Ta=25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Input Voltage	KIA7905P/PI~ KIA7915P/PI	V _{IN}	-35	V
	KIA7918P/PI~ KIA7924P/PI		-40	
Power Dissipation (Tc=25°C)		P _D	20.8	W
Operating Junction Temperature		T _j	-30~150	°C
Operating Temperature		T _{opr}	-30~75	°C
Storage Temperature		T _{stg}	-55~150	°C



KIA7905P/PI ~ KIA7924P/PI

EQUIVALENT CIRCUIT



KIA7905P/PI ~ KIA7924P/PI

ELECTRICAL CHARACTERISTICS

KIA7905P/PI

(Unless otherwise specified, $V_{IN} = -10V$, $I_{OUT} = 500mA$, $0^{\circ}C \leq T_j \leq 125^{\circ}C$, $C_{IN} = 2.2\mu F$, $C_{OUT} = 1\mu F$)

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage	V _{OUT}	1	T _j =25℃		-5.2	-5.0	-4.8	V
Input Regulation	Reg line	1	T _j =25℃	-12V ≤ V _{IN} ≤ -8V	-	5	50	mV
				-25V ≤ V _{IN} ≤ -7V	-	10	100	
Load Regulation	Reg load	1	T _j =25℃	5mA ≤ I _{OUT} ≤ 1.5A	-	10	100	mV
				250mA ≤ I _{OUT} ≤ 750mA	-	3	50	
Output Voltage	V _{OUT}	1	-20V ≤ V _{IN} ≤ -7V 5mA ≤ I _{OUT} ≤ 1.0A		-5.25	-5.0	-4.75	V
Quiescent Current	I _B	1	T _j =25℃		-	3	6	mA
Quiescent Current Change	ΔI _{BI}	1	-25V ≤ V _{IN} ≤ -8V		-	0.1	1.3	mA
	ΔI _{BO}		5mA ≤ I _{OUT} ≤ 1.0A		-	0.05	0.5	
Output Noise Voltage	V _{NO}	2	T _a =25℃, 10Hz ≤ f ≤ 100kHz		-	100	-	μV _{rms}
Ripple Rejection Ratio	RR	3	f=120Hz, I _{OUT} =20mA,		54	60	-	dB
Short Circuit Current Limit	I _{SC}	1	T _j =25℃		-	1.9	-	A
Average Temperature Coefficient of Output Voltage	T _{CVO}	1	I _{OUT} =5.0mA		-	-0.4	-	mV/℃
Dropout Voltage	V _D	1	T _j =25℃, I _{OUT} =1A		-	2.0	-	V

KIA7905P/PI ~ KIA7924P/PI

ELECTRICAL CHARACTERISTICS

KIA7906P/PI

(Unless otherwise specified, $V_{IN} = -11V$, $I_{OUT} = 500mA$, $0^{\circ}C \leq T_j \leq 125^{\circ}C$, $C_{IN} = 2.2\mu F$, $C_{OUT} = 1\mu F$)

CHARACTERISTIC		SYMBOL	TEST CIRCUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage		V _{OUT}	1	T _j =25℃		-6.25	-6.0	-5.75	V
Input Regulation		Reg line	1	T _j =25℃	-13V ≤ V _{IN} ≤ -9V	-	5	60	mV
					-25V ≥ V _{IN} ≥ -8V	-	10	120	
Load Regulation		Reg load	1	T _j =25℃	5mA ≤ I _{OUT} ≤ 1.5A	-	10	120	mV
					250mA ≤ I _{OUT} ≤ 750mA	-	3	60	
Output Voltage		V _{OUT}	1	-21V ≤ V _{IN} ≤ -9V 5mA ≤ I _{OUT} ≤ 1.0A		-6.3	-6.0	-5.7	V
Quiescent Current		I _B	1	T _j =25℃		-	3	6	mA
Quiescent Current Change	Line	ΔI _{BI}	1	-25V ≤ V _{IN} ≤ -9V		-	-	1.3	mA
	Load	ΔI _{BO}		5mA ≤ I _{OUT} ≤ 1.0A		-	-	0.5	
Output Noise Voltage		V _{NO}	2	T _a =25℃, 10Hz ≤ f ≤ 100kHz		-	130	-	μV _{rms}
Ripple Rejection Ratio		RR	3	f=120Hz, I _{OUT} =20mA,		54	60	-	dB
Short Circuit Current Limit		I _{SC}	1	T _j =25℃		-	1.9	-	A
Average Temperature Coefficient of Output Voltage		T _{CVO}	1	I _{OUT} =5mA		-	-0.5	-	mV/℃
Dropout Voltage		V _D	1	T _j =25℃, I _{OUT} =1A		-	2.0	-	V

KIA7905P/PI ~ KIA7924P/PI

ELECTRICAL CHARACTERISTICS

KIA7908P/PI

(Unless otherwise specified, $V_{IN} = -14V$, $I_{OUT} = 500mA$, $0^{\circ}C \leq T_j \leq 125^{\circ}C$, $C_{IN} = 2.2\mu F$, $C_{OUT} = 1\mu F$)

CHARACTERISTIC		SYMBOL	TEST CIRCUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage		V _{OUT}	1	T _j =25℃		-8.3	-8.0	-7.7	V
Input Regulation		Reg line	1	T _j =25℃	-17V ≤ V _{IN} ≤ -11V	-	5	80	mV
					-25V ≤ V _{IN} ≤ -10.5V	-	10	100	
Load Regulation		Reg load	1	T _j =25℃	5mA ≤ I _{OUT} ≤ 1.5A	-	12	160	mV
					250mA ≤ I _{OUT} ≤ 750mA	-	4	80	
Output Voltage		V _{OUT}	1	-23V ≤ V _{IN} ≤ -11.5V 5mA ≤ I _{OUT} ≤ 1.0A		-8.4	-8.0	-7.6	V
Quiescent Current		I _B	1	T _j =25℃		-	3	6	mA
Quiescent Current Change	Line	ΔI _{BI}	1	-25V ≤ V _{IN} ≤ -11.5V		-	0.1	1.0	mA
	Load	ΔI _{BO}		5mA ≤ I _{OUT} ≤ 1.0A		-	0.05	0.5	
Output Noise Voltage		V _{NO}	2	T _a =25℃, 10Hz ≤ f ≤ 100kHz		-	175	-	μV _{rms}
Ripple Rejection Ratio		RR	3	f=120Hz, I _{OUT} =20mA,		54	60	-	dB
Short Circuit Current Limit		I _{SC}	1	T _j =25℃		-	1.9	-	A
Average Temperature Coefficient of Output Voltage		T _{CVO}	1	I _{OUT} =5mA		-	-0.6	-	mV/℃
Dropout Voltage		V _D	1	T _j =25℃, I _{OUT} =1A		-	2.0	-	V

KIA7905P/PI ~ KIA7924P/PI

ELECTRICAL CHARACTERISTICS

KIA7909P/PI

(Unless otherwise specified, $V_{IN} = -15V$, $I_{OUT} = 500mA$, $0^{\circ}C \leq T_j \leq 125^{\circ}C$, $C_{IN} = 2.2\mu F$, $C_{OUT} = 1\mu F$)

CHARACTERISTIC		SYMBOL	TEST CIRCUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage		V _{OUT}	1	T _j =25℃		-9.3	-9.0	-8.7	V
Input Regulation		Reg line	1	T _j =25℃	-19V ≤ V _{IN} ≤ -13V	-	5	90	mV
					-26V ≤ V _{IN} ≤ -11.5V	-	10	100	
Load Regulation		Reg load	1	T _j =25℃	5mA ≤ I _{OUT} ≤ 1.5A	-	10	150	mV
					250mA ≤ I _{OUT} ≤ 750mA	-	5	120	
Output Voltage		V _{OUT}	1	-24V ≤ V _{IN} ≤ -11.5V 5mA ≤ I _{OUT} ≤ 1.0A		-9.4	-9.0	-8.6	V
Quiescent Current		I _B	1	T _j =25℃		-	3	6	mA
Quiescent Current Change	Line	ΔI _{BI}	1	-26.5V ≤ V _{IN} ≤ -13V		-	0.1	1.0	mA
	Load	ΔI _{BO}		5mA ≤ I _{OUT} ≤ 1.0A		-	0.05	0.5	
Output Noise Voltage		V _{NO}	2	T _a =25℃, 10Hz ≤ f ≤ 100kHz		-	180	-	μV _{rms}
Ripple Rejection Ratio		RR	3	f=120Hz, I _{OUT} =20mA,		54	60	-	dB
Short Circuit Current Limit		I _{SC}	1	T _j =25℃		-	1.9	-	A
Average Temperature Coefficient of Output Voltage		T _{CVO}	1	I _{OUT} =5mA		-	-0.7	-	mV/℃
Dropout Voltage		V _D	1	T _j =25℃, I _{OUT} =1A		-	2.0	-	V

KIA7905P/PI ~ KIA7924P/PI

ELECTRICAL CHARACTERISTICS

KIA7910IP/PI

(Unless otherwise specified, $V_{IN} = -16V$, $I_{OUT} = 500mA$, $0^{\circ}C \leq T_j \leq 125^{\circ}C$, $C_{IN} = 2.2\mu F$, $C_{OUT} = 1\mu F$)

CHARACTERISTIC		SYMBOL	TEST CIRCUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage		V _{OUT}	1	T _j =25℃		-10.4	-10	-9.6	V
Input Regulation		Reg line	1	T _j =25℃	-20V ≤ V _{IN} ≤ -14V	-	5	100	mV
					-27V ≤ V _{IN} ≤ -12.5V	-	10	110	
Load Regulation		Reg load	1	T _j =25℃	5mA ≤ I _{OUT} ≤ 1.5A	-	10	180	mV
					250mA ≤ I _{OUT} ≤ 750mA	-	6	120	
Output Voltage		V _{OUT}	1	-25V ≤ V _{IN} ≤ -12.5V 5mA ≤ I _{OUT} ≤ 1.0A		-10.5	-10	-9.5	V
Quiescent Current		I _B	1	T _j =25℃		-	3	6	mA
Quiescent Current Change	Line	ΔI _{BI}	1	-27.5V ≤ V _{IN} ≤ -14V		-	0.1	1.0	mA
	Load	ΔI _{BO}		5mA ≤ I _{OUT} ≤ 1.0A		-	0.05	0.5	
Output Noise Voltage		V _{NO}	2	Ta=25℃, 10Hz ≤ f ≤ 100kHz		-	190	-	μV _{rms}
Ripple Rejection Ratio		RR	3	f=120Hz, I _{OUT} =20mA		54	60	-	dB
Short Circuit Current Limit		I _{SC}	1	T _j =25℃		-	1.9	-	A
Average Temperature Coefficient of Output Voltage		T _{CVO}	1	I _{OUT} =5mA		-	-0.7	-	mV/℃
Dropout Voltage		V _D	1	T _j =25℃, I _{OUT} =1A		-	2.0	-	V

KIA7905P/PI ~ KIA7924P/PI

ELECTRICAL CHARACTERISTICS

KIA7912P/PI

(Unless otherwise specified, $V_{IN} = -18V$, $I_{OUT} = 500mA$, $0^{\circ}C \leq T_j \leq 125^{\circ}C$, $C_{IN} = 2.2\mu F$, $C_{OUT} = 1\mu F$)

CHARACTERISTIC		SYMBOL	TEST CIRCUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage		V _{OUT}	1	T _j =25℃		-12.5	-12	-11.5	V
Input Regulation		Reg line	1	T _j =25℃	-22V ≤ V _{IN} ≤ -16V	-	6	120	mV
					-30V ≤ V _{IN} ≤ -14.5V	-	12	240	
Load Regulation		Reg load	1	T _j =25℃	5mA ≤ I _{OUT} ≤ 1.5A	-	12	240	mV
					250mA ≤ I _{OUT} ≤ 750mA	-	4	120	
Output Voltage		V _{OUT}	1	-27V ≤ V _{IN} ≤ -15.5V 5mA ≤ I _{OUT} ≤ 1.0A		-12.6	-12	-11.4	V
Quiescent Current		I _B	1	T _j =25℃		-	3	6	mA
Quiescent Current Change	Line	ΔI _{BI}	1	-30V ≤ V _{IN} ≤ -15V		-	0.1	1.0	mA
	Load	ΔI _{BO}		5mA ≤ I _{OUT} ≤ 1.0A		-	0.05	0.5	
Output Noise Voltage		V _{NO}	2	Ta=25℃, 10Hz ≤ f ≤ 100kHz		-	200	-	μV _{rms}
Ripple Rejection Ratio		RR	3	f=120Hz, I _{OUT} =20mA,		54	60	-	dB
Short Circuit Current Limit		I _{SC}	1	T _j =25℃		-	1.9	-	A
Average Temperature Coefficient of Output Voltage		T _{CVO}	1	I _{OUT} =5mA		-	-0.8	-	mV/℃
Dropout Voltage		V _D	1	T _j =25℃, I _{OUT} =1A		-	2.0	-	V

KIA7905P/PI ~ KIA7924P/PI

ELECTRICAL CHARACTERISTICS

KIA7915P/PI

(Unless otherwise specified, $V_{IN} = -23V$, $I_{OUT} = 500mA$, $0^{\circ}C \leq T_j \leq 125^{\circ}C$, $C_{IN} = 2.2\mu F$, $C_{OUT} = 1\mu F$)

CHARACTERISTIC		SYMBOL	TEST CIRCUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage		V _{OUT}	1	T _j =25℃		-15.6	-15	-14.4	V
Input Regulation		Reg line	1	T _j =25℃	-26V ≤ V _{IN} ≤ -20V	-	6	150	mV
					-30V ≤ V _{IN} ≤ -17.5V	-	12	300	
Load Regulation		Reg load	1	T _j =25℃	5mA ≤ I _{OUT} ≤ 1.5A	-	12	300	mV
					250mA ≤ I _{OUT} ≤ 750mA	-	4	150	
Output Voltage		V _{OUT}	1	-30V ≤ V _{IN} ≤ -18V 5mA ≤ I _{OUT} ≤ 1.0A		-15.75	-15	-14.25	V
Quiescent Current		I _B	1	T _j =25℃		-	3	6	mA
Quiescent Current Change	Line	ΔI _{BI}	1	-30V ≤ V _{IN} ≤ -17.5V		-	0.1	1.0	mA
	Load	ΔI _{BO}		5mA ≤ I _{OUT} ≤ 1.0A		-	0.05	0.5	
Output Noise Voltage		V _{NO}	2	Ta=25℃, 10Hz ≤ f ≤ 100kHz		-	250	-	μV _{rms}
Ripple Rejection Ratio		RR	3	f=120Hz, I _{OUT} =20mA,		54	60	-	dB
Short Circuit Current Limit		I _{SC}	1	T _j =25℃		-	1.9	-	A
Average Temperature Coefficient of Output Voltage		T _{CVO}	1	I _{OUT} =5mA		-	-0.9	-	mV/℃
Dropout Voltage		V _D	1	T _j =25℃, I _{OUT} =1A		-	2.0	-	V

KIA7905P/PI ~ KIA7924P/PI

ELECTRICAL CHARACTERISTICS

KIA7918P/PI

(Unless otherwise specified, $V_{IN} = -27V$, $I_{OUT} = 500mA$, $0^{\circ}C \leq T_j \leq 125^{\circ}C$, $C_{IN} = 2.2\mu F$, $C_{OUT} = 1\mu F$)

CHARACTERISTIC		SYMBOL	TEST CIRCUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage		V _{OUT}	1	T _j =25℃		-18.7	-18	-17.3	V
Input Regulation		Reg line	1	T _j =25℃	-30V ≤ V _{IN} ≤ -24V	-	8	180	mV
					-33V ≤ V _{IN} ≤ -21V	-	15	360	
Load Regulation		Reg load	1	T _j =25℃	5mA ≤ I _{OUT} ≤ 1.5A	-	15	360	mV
					250mA ≤ I _{OUT} ≤ 750mA	-	5	180	
Output Voltage		V _{OUT}	1	-33V ≤ V _{IN} ≤ -22.5V 5mA ≤ I _{OUT} ≤ 1.0A		-18.85	-18	-17.15	V
Quiescent Current		I _B	1	T _j =25℃		-	3	6	mA
Quiescent Current Change	Line	ΔI _{BI}	1	-33V ≤ V _{IN} ≤ -22V		-	-	1.0	mA
	Load	ΔI _{BO}		5mA ≤ I _{OUT} ≤ 1.0A		-	-	0.5	
Output Noise Voltage		V _{NO}	2	Ta=25℃, 10Hz ≤ f ≤ 100kHz		-	300	-	μV _{rms}
Ripple Rejection Ratio		RR	3	f=120Hz, I _{OUT} =20mA,		54	60	-	dB
Short Circuit Current Limit		I _{SC}	1	T _j =25℃		-	1.9	-	A
Average Temperature Coefficient of Output Voltage		T _{CVO}	1	I _{OUT} =5mA		-	-1.0	-	mV/℃
Dropout Voltage		V _D	1	T _j =25℃, I _{OUT} =1A		-	2.0	-	V

KIA7905P/PI ~ KIA7924P/PI

ELECTRICAL CHARACTERISTICS

KIA7920P/PI

(Unless otherwise specified, $V_{IN} = -30V$, $I_{OUT} = 500mA$, $0^{\circ}C \leq T_j \leq 125^{\circ}C$, $C_{IN} = 2.2\mu F$, $C_{OUT} = 1\mu F$)

CHARACTERISTIC		SYMBOL	TEST CIRCUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage		V _{OUT}	1	T _j =25℃		-20.8	-20	-19.2	V
Input Regulation		Reg line	1	T _j =25℃	-32V ≤ V _{IN} ≤ -26V	-	10	180	mV
					-35V ≤ V _{IN} ≤ -24V	-	18	360	
Load Regulation		Reg load	1	T _j =25℃	5mA ≤ I _{OUT} ≤ 1.5A	-	18	360	mV
					250mA ≤ I _{OUT} ≤ 750mA	-	10	180	
Output Voltage		V _{OUT}	1	-35V ≤ V _{IN} ≤ -24V 5mA ≤ I _{OUT} ≤ 1.0A		-21.0	-20	-19.0	V
Quiescent Current		I _B	1	T _j =25℃		-	3	6	mA
Quiescent Current Change	Line	ΔI _{BI}	1	-36.5V ≤ V _{IN} ≤ -25V		-	-	1.0	mA
	Load	ΔI _{BO}		5mA ≤ I _{OUT} ≤ 1.0A		-	-	0.5	
Output Noise Voltage		V _{NO}	2	Ta=25℃, 10Hz ≤ f ≤ 100kHz		-	350	-	μV _{rms}
Ripple Rejection Ratio		RR	3	f=120Hz, I _{OUT} =20mA,		54	60	-	dB
Short Circuit Current Limit		I _{SC}	1	T _j =25℃		-	1.9	-	A
Average Temperature Coefficient of Output Voltage		T _{CVO}	1	I _{OUT} =5mA		-	-1.0	-	mV/℃
Dropout Voltage		V _D	1	T _j =25℃, I _{OUT} =1A		-	2.0	-	V

KIA7905P/PI ~ KIA7924P/PI

ELECTRICAL CHARACTERISTICS

KIA7924P/PI

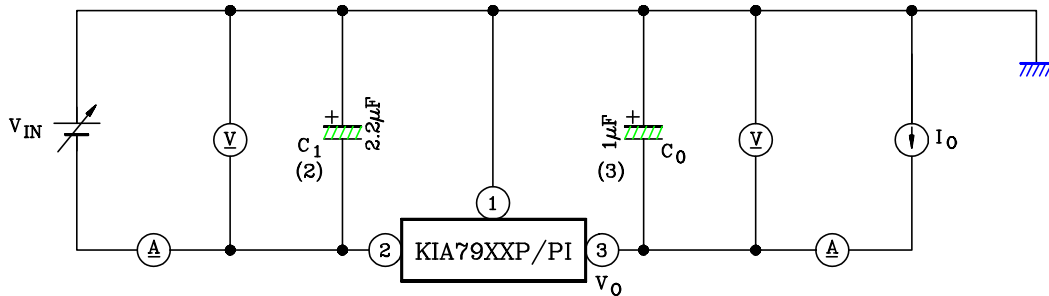
(Unless otherwise specified, $V_{IN} = -33V$, $I_{OUT} = 500mA$, $0^{\circ}C \leq T_j \leq 125^{\circ}C$, $C_{IN} = 0.33\mu F$, $C_{OUT} = 0.1\mu F$)

CHARACTERISTIC		SYMBOL	TEST CIRCUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage		V _{OUT}	1	T _j =25℃		-25	-24	-23	V
Input Regulation		Reg line	1	T _j =25℃	-36V ≤ V _{IN} ≤ -30V	-	8	240	mV
					-38V ≤ V _{IN} ≤ -27V	-	15	480	
Load Regulation		Reg load	1	T _j =25℃	5mA ≤ I _{OUT} ≤ 1.5A	-	15	480	mV
					250mA ≤ I _{OUT} ≤ 750mA	-	5	240	
Output Voltage		V _{OUT}	1	-38V ≤ V _{IN} ≤ -27V 5mA ≤ I _{OUT} ≤ 1.0A		-25.2	-24	-22.5	V
Quiescent Current		I _B	1	T _j =25℃		-	3	6	mA
Quiescent Current Change	Line	ΔI _{BI}	1	-38V ≤ V _{IN} ≤ -27V		-	-	1.0	mA
	Load	ΔI _{BO}		5mA ≤ I _{OUT} ≤ 1.0A		-	-	0.5	
Output Noise Voltage		V _{NO}	2	T _a =25℃, 10Hz ≤ f ≤ 100kHz		-	400	-	μV _{rms}
Ripple Rejection Ratio		RR	3	f=120Hz, I _{OUT} =20mA,		54	60	-	dB
Short Circuit Current Limit		I _{SC}	1	T _j =25℃		-	1.9	-	A
Average Temperature Coefficient of Output Voltage		T _{CVO}	1	I _{OUT} =5mA		-	-1.0	-	mV/℃
Dropout Voltage		V _D	1	T _a =25℃, I _{OUT} =1A		-	2.0	-	V

KIA7905P/PI ~ KIA7924P/PI

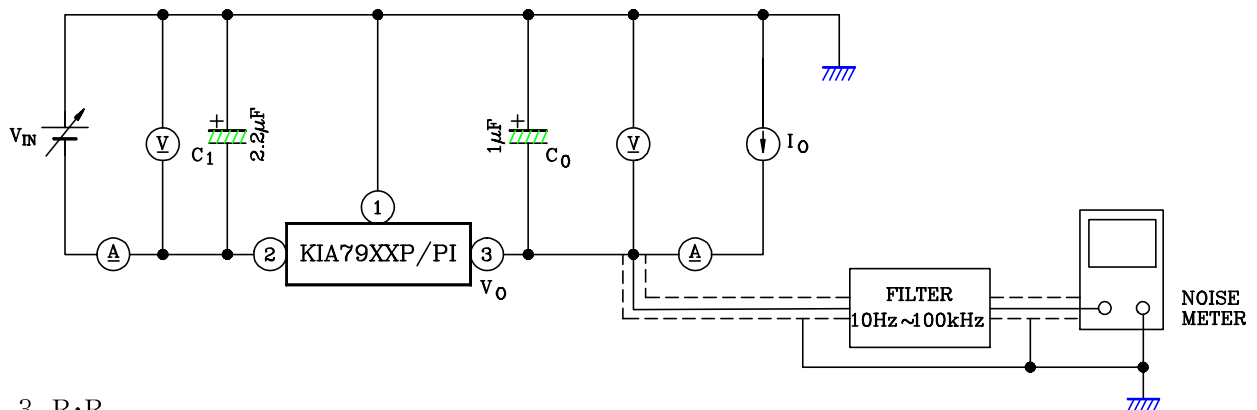
TEST CIRCUIT

1. V_{OUT} , Reg•Line, Reg•Load, I_B , ΔI_B , V_D , T_{CVO}

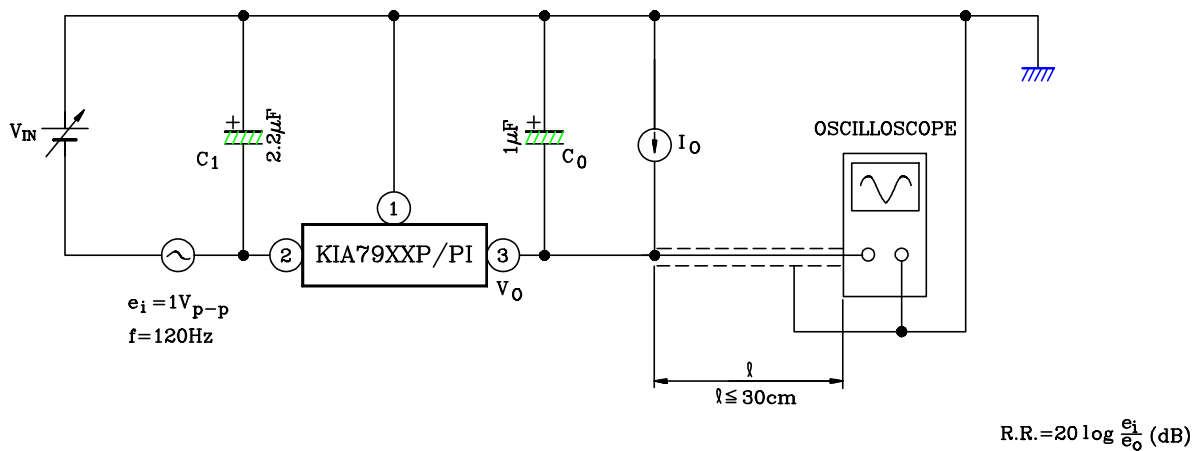


- Notes :
- (1) To specify an output voltage, substitute voltage value for "XX"
 - (2) Required for stability. For value given, capacitor must be solid tantalum. If aluminium electrolytics are used, at least ten times value shown should be selected. C_1 is required if regulator is located an appreciable distance from power supply filter.
 - (3) To improve transient response. If large capacitors are used, a high current diode from input to output (1N4001 or similar) should be introduced to protect the device from momentary input short circuit.

2. V_{NO}



3. R•R



KIA7905P/PI ~ KIA7924P/PI

