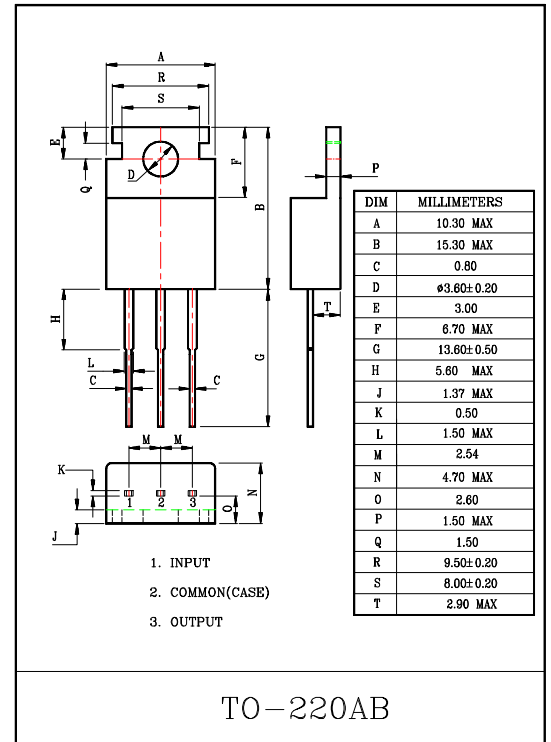


THREE TERMINAL POSITIVE VOLTAGE REGULATORS  
5V, 8V, 12V, 15V.

KIA78M×× Series of three-terminal positive voltage regulators employ built-in current limiting, thermal shutdown, and safe-operating area protection which makes them virtually immune to damage from output overloads. With adequate heatsinking, they can deliver in excess of 0.5A output current.

### FEATURES

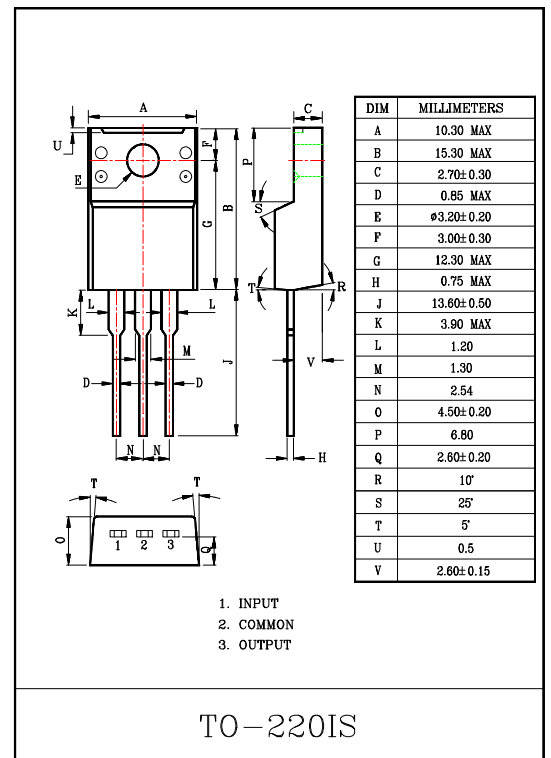
- Output current in excess of 0.5A.
- No external components.
- Internal thermal overload protection.
- Internal short circuit current limiting.
- Output transistor safe-area compensation.
- Available in TO-220AB and TO-220IS package.



### MAXIMUM RATINGS (Ta=25°C)

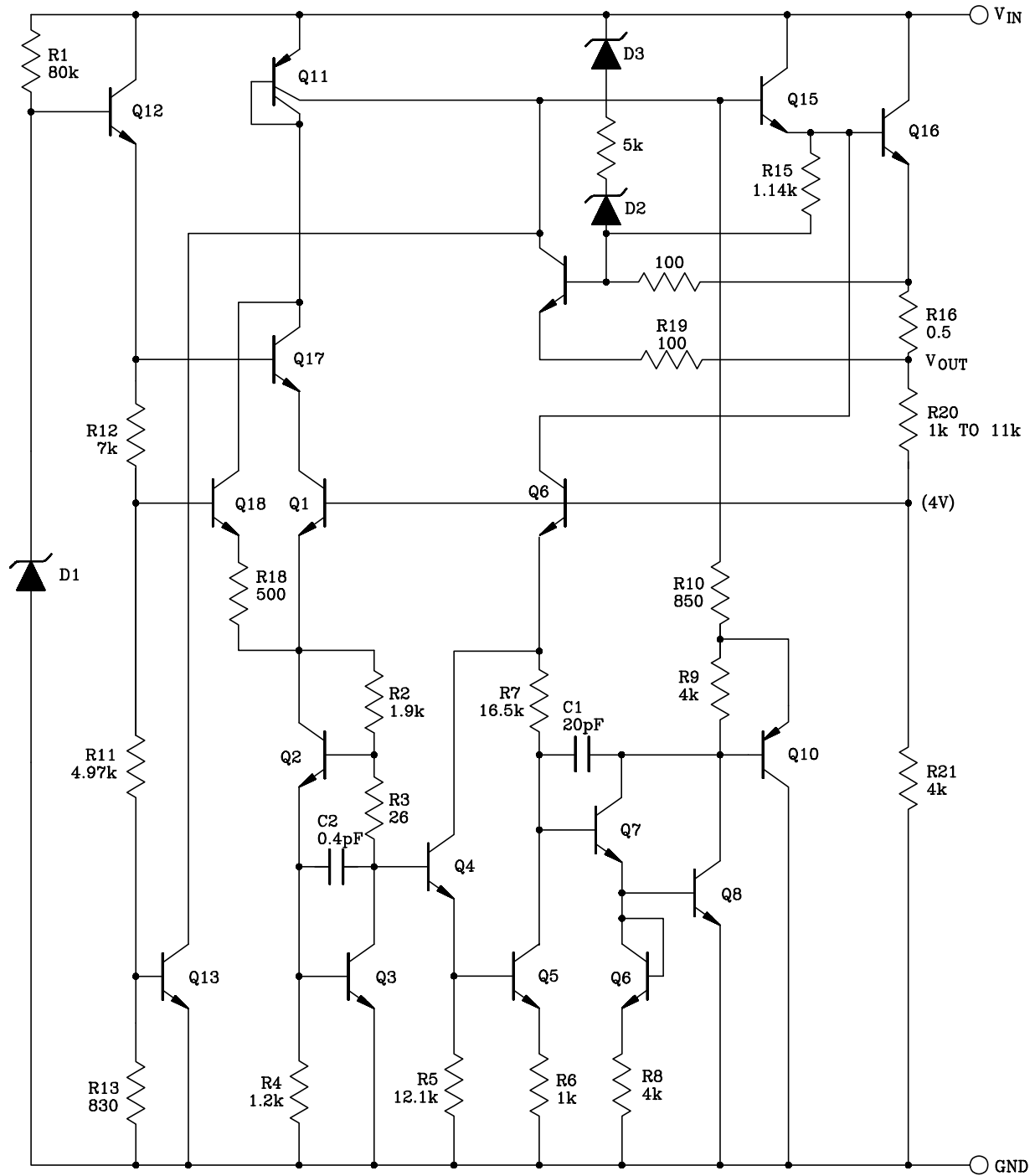
CHARACTERISTIC	SYMBOL	RATING	UNIT
Input Voltage	V <sub>IN</sub>	35	V
Power Dissipation	P <sub>D</sub>	Internally Limited	(Note1)
Operating Junction Temperature	T <sub>j</sub>	-40~125	°C
Storage Temperature	T <sub>stg</sub>	-55~150	°C
Soldering Temperature (10 seconds)	T <sub>sol</sub>	260	°C

- \* Note1 : • Thermal Resistance Junction-Cases.  
(R<sub>QjC</sub>=5°C/W.)  
• Thermal Resistance Junction-Air.  
(R<sub>QjA</sub>=65°C/W.)



# KIA78M05P/PI ~ KIA78M15P/PI

## EQUIVALENT CIRCUIT



# KIA78M05P/PI ~ KIA78M15P/PI

## ELECTRICAL CHARACTERISTICS

### KIA78M05P/PI

(unless otherwise specified :  $V_{IN}=10V$ ,  $C_{IN}=0.33\mu F$ ,  $C_O=0.1\mu F$ )

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_O$	$I_O=500mA$	4.8	5.0	5.2	V
		$5mA \leq I_O \leq 500mA$ $P_D \leq 7.5W$ , $7.5V \leq V_{IN} \leq 20V$	4.75	5.0	5.25	
Line Regulation	$V_{Reg}$ Line	$7.2V \leq V_{IN} \leq 25V$ , $I_O=100mA$	-	-	50	mV
		$7.2V \leq V_{IN} \leq 25V$ , $I_O=500mA$	-	-	100	
Load Regulation	$V_{Reg}$ Load	$5mA \leq I_O \leq 500mA$	-	-	100	mV
Quiescent Current	$I_B$	$I_O=500mA$	-	4	6	mA
Quiescent Current Change	$\Delta I_B$	$5mA \leq I_O \leq 500mA$	-	-	0.5	mA
		$7.5V \leq V_{IN} \leq 25V$ , $I_O=500mA$	-	-	1.0	mA
Output Noise Voltage	$V_{NO}$	$f=10Hz \sim 100kHz$	-	40	-	$\mu V$
Ripple Rejection	R•R	$f=120Hz$ , $I_O=500mA$	65	78	-	dB
Dropout Voltage	$V_D$	$I_O=500mA$	-	2.0	-	V
Long Term Stability	$\Delta V_O$	$I_O=500mA$	-	-	20	mV/khrs
Short Circuit Current	$I_{SC}$	$V_I=35V$	-	300	-	mA
Output Voltage Drift	$\Delta V_O / \Delta T$	$I_O=5mA$ , $T_j=0 \sim 125^\circ C$	-	-0.5	-	mV/ $^\circ C$

# KIA78M05P/PI ~ KIA78M15P/PI

## ELECTRICAL CHARACTERISTICS

### KIA78M08P/PI

(unless otherwise specified :  $V_{IN}=14V$ ,  $C_{IN}=0.33\mu F$ ,  $C_O=0.1\mu F$ )

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_O$	$I_O=500mA$	7.7	8	8.3	V
		$5mA \leq I_O \leq 500mA$ $P_D \leq 7.5W$ , $10.5V \leq V_{IN} \leq 23V$	7.6	8	8.4	
Line Regulation	$V_{Reg}$ Line	$10.5V \leq V_{IN} \leq 25V$ , $I_O=100mA$	-	-	80	mV
		$10.5V \leq V_{IN} \leq 25V$ , $I_O=500mA$	-	-	160	
Load Regulation	$V_{Reg}$ Load	$5mA \leq I_O \leq 500mA$	-	-	160	mV
Quiescent Current	$I_B$	$I_O=500mA$	-	4	6	mA
Quiescent Current Change	$\Delta I_B$	$5mA \leq I_O \leq 500mA$	-	-	0.5	mA
		$10.5V \leq V_{IN} \leq 25V$ , $I_O=500mA$	-	-	1.0	mA
Output Noise Voltage	$V_{NO}$	$f=10Hz \sim 100kHz$	-	50	-	$\mu V$
Ripple Rejection	R•R	$f=120Hz$ , $I_O=500mA$	65	75	-	dB
Dropout Voltage	$V_D$	$I_O=500mA$	-	2.0	-	V
Long Term Stability	$\Delta V_O$	$I_O=500mA$	-	-	40	mV/khrs
Short Circuit Current	$I_{SC}$	$V_I=35V$	-	300	-	mA
Output Voltage Drift	$\Delta V_O / \Delta T$	$I_O=5mA$ , $T_j=0 \sim 125^\circ C$	-	-0.5	-	mV/ $^\circ C$

# KIA78M05P/PI ~ KIA78M15P/PI

## ELECTRICAL CHARACTERISTICS

### KIA78M12P/PI

(unless otherwise specified :  $V_{IN}=19V$ ,  $C_{IN}=0.33\mu F$ ,  $C_O=0.1\mu F$ )

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_O$	$I_O=500mA$	11.5	12	12.5	V
		$5mA \leq I_O \leq 500mA$ $P_D \leq 7.5W$ , $14.8V \leq V_{IN} \leq 27V$	11.4	12	12.6	
Line Regulation	$V_{Reg}$ Line	$14.5V \leq V_{IN} \leq 30V$ , $I_O=100mA$	-	-	120	mV
		$14.5V \leq V_{IN} \leq 30V$ , $I_O=500mA$	-	-	240	
Load Regulation	$V_{Reg}$ Load	$5mA \leq I_O \leq 500mA$	-	-	240	mV
Quiescent Current	$I_B$	$I_O=500mA$	-	4	6	mA
Quiescent Current Change	$\Delta I_B$	$5mA \leq I_O \leq 500mA$	-	-	0.5	mA
		$14.8V \leq V_{IN} \leq 30V$ , $I_O=500mA$	-	-	1.0	mA
Output Noise Voltage	$V_{NO}$	$f=10Hz \sim 100kHz$	-	75	-	$\mu V$
Ripple Rejection	$R \cdot R$	$f=120Hz$ , $I_O=500mA$	65	75	-	dB
Dropout Voltage	$V_D$	$I_O=500mA$	-	2.0	-	V
Long Term Stability	$\Delta V_O$	$I_O=500mA$	-	-	48	mV/khrs
Short Circuit Current	$I_{SC}$	$V_{IN}=35V$	-	300	-	mA
Output Voltage Drift	$\Delta V_O / \Delta T$	$I_O=5mA$ , $T_j=0 \sim 125^\circ C$	-	-0.5	-	mV/ $^\circ C$

# KIA78M05P/PI ~ KIA78M15P/PI

## ELECTRICAL CHARACTERISTICS

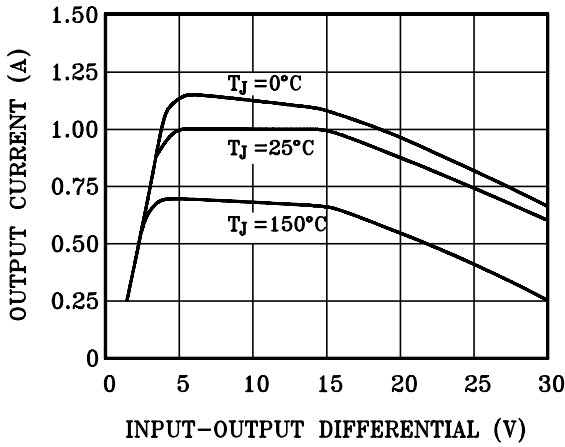
### KIA78M15P/PI

(unless otherwise specified :  $V_{IN}=19V$ ,  $C_{IN}=0.33\mu F$ ,  $C_O=0.1\mu F$ )

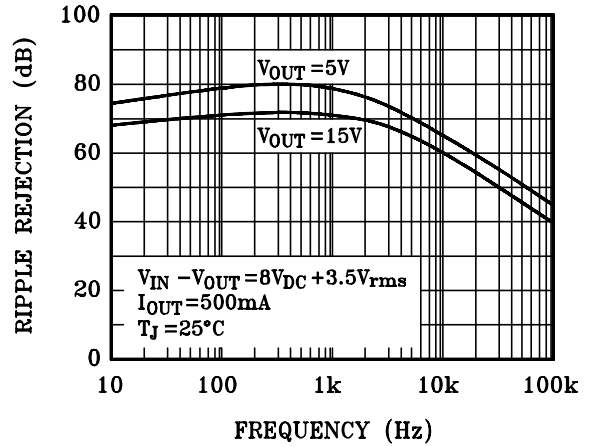
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_O$	$I_O=500mA$	14.4	15	15.6	V
		$5mA \leq I_O \leq 500mA$ $P_D \leq 7.5W$ , $18V \leq V_{IN} \leq 30V$	14.25	15	15.75	
Line Regulation	$V_{Reg \text{ Line}}$	$17.6V \leq V_{IN} \leq 30V$ , $I_O=100mA$	-	-	150	mV
		$17.6V \leq V_{IN} \leq 30V$ , $I_O=500mA$	-	-	300	
Load Regulation	$V_{Reg \text{ Load}}$	$5mA \leq I_O \leq 500mA$	-	-	300	mV
Quiescent Current	$I_B$	$I_O=500mA$	-	4	6	mA
Quiescent Current Change	$\Delta I_B$	$5mA \leq I_O \leq 500mA$	-	-	0.5	mA
		$18V \leq V_{IN} \leq 30V$ , $I_O=500mA$	-	-	1.0	mA
Output Noise Voltage	$V_{NO}$	$f=10Hz \sim 100kHz$	-	90	-	$\mu V$
Ripple Rejection	$R \cdot R$	$f=120Hz$ , $I_O=500mA$	65	70	-	dB
Dropout Voltage	$V_D$	$I_O=500mA$	-	2.0	-	V
Load Term Stability	$\Delta V_O$	$I_O=500mA$	-	-	60	mV/khrs
Short Circuit Current	$I_{SC}$	$V_{IN}=35V$	-	300	-	mA
Output Voltage Drift	$\Delta V_O / \Delta T$	$I_O=5mA$ , $T_j=0 \sim 125^\circ C$	-	-1	-	mV/ $^\circ C$

# KIA78M05P/PI ~ KIA78M15P/PI

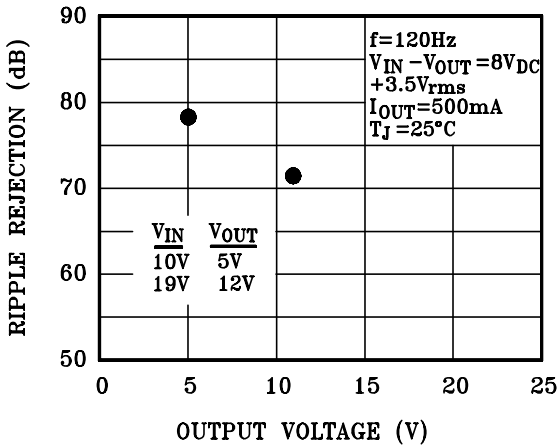
PEAK OUTPUT CURRENT



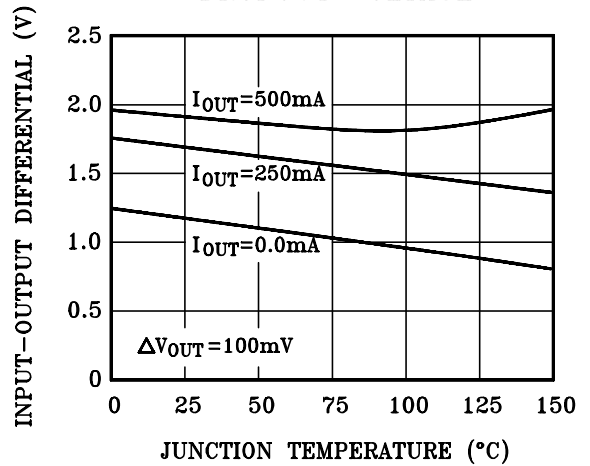
RIPPLE REJECTION



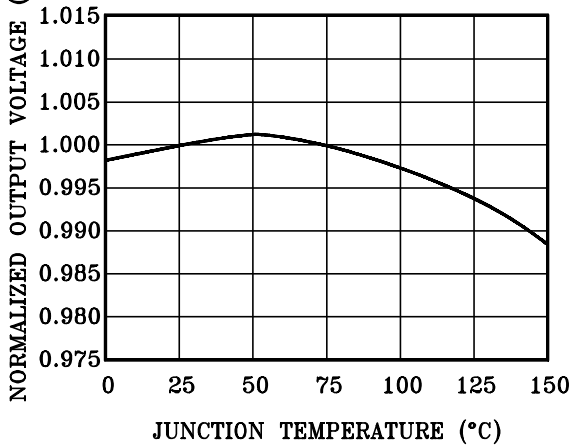
RIPPLE REJECTION



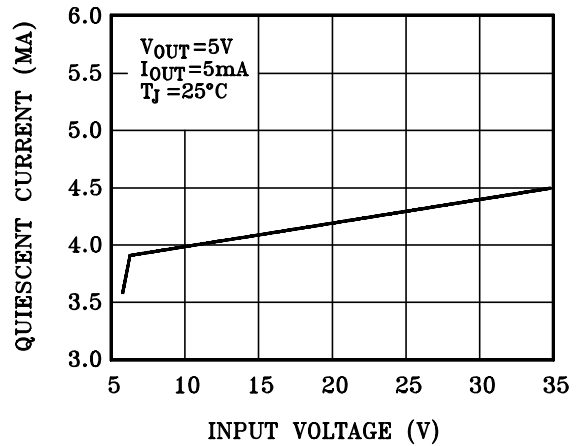
DROPOUT VOLTAGE



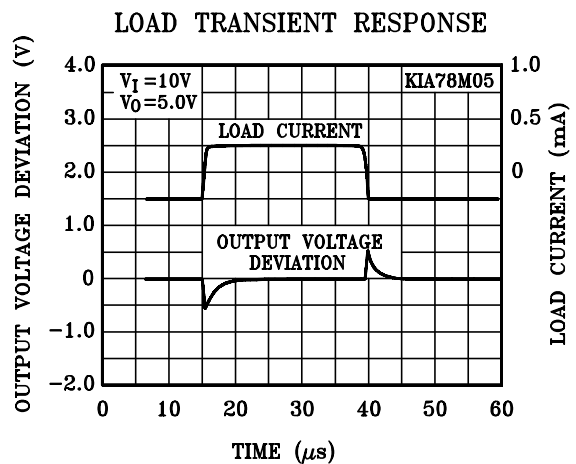
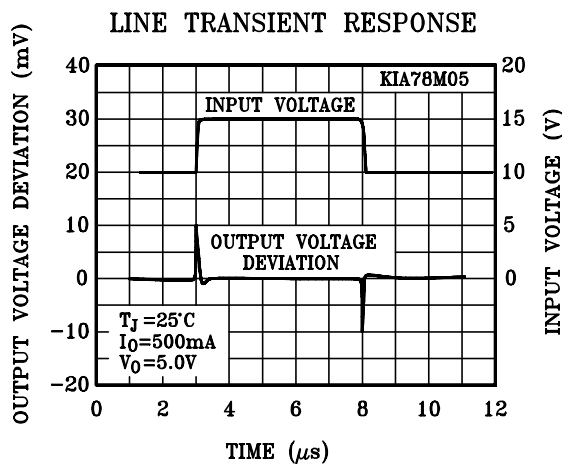
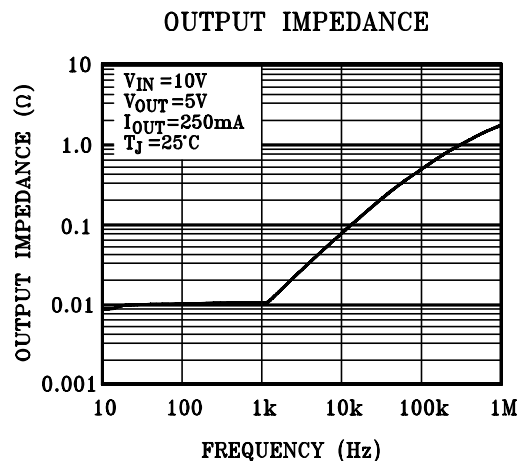
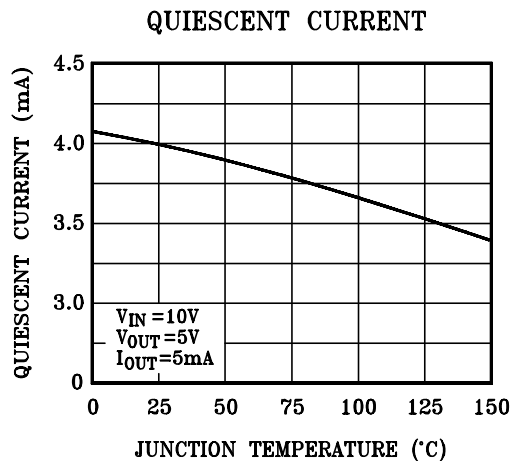
OUTPUT VOLTAGE  
(Normalized to 1V at  $T_J = 25^\circ\text{C}$ )



QUIESCENT CURRENT



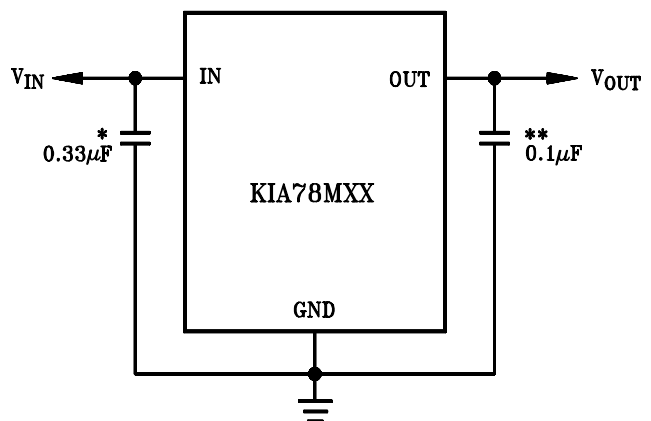
# KIA78M05P/PI ~ KIA78M15P/PI



## Design Considerations

The KIA78MXX fixed voltage regulator series has built-in thermal overload protection which prevents the device from being damaged due to excessive junction temperature.

The regulators also contain internal short-circuit protection which limits the maximum output current, and safe-area protection for the pass transistor which reduces the short circuit current as the voltage across the pass transistor is increased. Although the internal power dissipation is automatically limited, the maximum junction temperature of the device must be kept below +125°C in order to meet data sheet specifications. An adequate heatsink should be provided to assure this limit is not exceeded under worst-case operating conditions (maximum input voltage and load current) if reliable performance is to be obtained.



\* Required if regulator input is more than 4 inches from input filter capacitor (or if no input filter capacitor is used).

\*\* Optional for improved transient response.