

## Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Input Voltage (for $V_O = 5V$ to $12V$ ) (for $V_O = 15V$ )	$V_I$	35 40	V V
Power Dissipation	PD	Internally limited	-
Thermal Resistance, Junction to Air (Note1, 2) $T_a = +25^\circ C$	$R_{\theta JA}$	65	$^\circ C/W$
Thermal Resistance, Junction to Case (Note1) $T_c = +25^\circ C$	$R_{\theta JC}$	2.5	$^\circ C/W$
Operating Junction Temperature Range	$T_J$	0 ~ +125	$^\circ C$
Storage Temperature Range	$T_{STG}$	-65 ~ +150	$^\circ C$

### Note:

- Thermal resistance test board  
Size: 76.2mm \* 114.3mm \* 1.6mm(1S0P)  
JEDEC standard: JESD51-3, JESD51-7
- Assume no ambient airflow.

## Electrical Characteristics(KA78T05)

( $V_I = 10V$ ,  $I_O = 3.0A$ ,  $0^\circ C \leq T_J \leq +125^\circ C$ ,  $P_O \leq P_{MAX}$  (Note3), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	$V_O$	$5mA \leq I_O \leq 3.0A$ , $T_J = +25^\circ C$ $7.3V \leq V_I \leq 20V$ , $5mA \leq I_O \leq 2.0A$	4.8 4.75	5.0 5.0	5.2 5.25	V
Line Regulation (Note4)	$\Delta V_O$	$7.2V \leq V_I \leq 35V$ , $I_O = 5mA$ , $T_J = +25^\circ C$ $7.2V \leq V_I \leq 35V$ , $I_O = 1.0A$ , $T_J = +25^\circ C$ $7.5V \leq V_I \leq 20V$ , $I_O = 2.0A$ , $T_J = +25^\circ C$ $8.0V \leq V_I \leq 12V$ , $I_O = 3.0A$ , $T_J = +25^\circ C$	-	3.0	25	mV
Load Regulation (Note4)	$\Delta V_O$	$5mA \leq I_O \leq 3.0A$ , $T_J = +25^\circ C$ $5mA \leq I_O \leq 3.0A$	-	10 15	30 80	mV mV
Thermal Regulation	$REG_T$	Pulse = 10ms, $P = 20W$ $T_A = +25^\circ C$	-	0.002	0.03	% $V_O/W$
Quiescent Current	$I_Q$	$5mA \leq I_O \leq 3.0A$ , $T_J = +25^\circ C$ $5mA \leq I_O \leq 3.0A$	-	3.5 4.0	5.0 6.0	mA mA
Quiescent Current Change	$\Delta I_Q$	$7.2V \leq V_I \leq 35V$ , $I_O = 5mA$ $T_J = +25^\circ C$ ; $7.5V \leq V_I \leq 20V$ , $I_O = 2.0A$ ; $5mA \leq I_O \leq 3.0A$ , $T_J = +25^\circ C$	-	0.1	0.8	mA
Ripple Rejection	RR	$f = 120Hz$ , $8V \leq V_I \leq 18V$ , $I_O = 2.0A$ $T_J = +25^\circ C$	-	75	-	dB
Dropout Voltage	$V_D$	$I_O = 3A$ , $T_J = +25^\circ C$	-	2.2	2.5	V
Output Noise Voltage	$V_N$	$T_A = +25^\circ C$ , $10Hz \leq f \leq 100kHz$	-	10	-	$\mu V/V_O$
Peak Output Current	$I_{PK}$	$T_A = +25^\circ C$	-	5.0	-	A
Output Resistance	$R_O$	$f = 1.0kHz$	-	2.0	-	$m\Omega$
Short Circuit Current Limit	$I_{SC}$	$V_I = 35V$ , $T_J = +25^\circ C$	-	1.5	2.5	A
Average Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	$I_O = 5.0mA$	-	0.2	-	$mV/^\circ C$

### Note:

- Although power dissipation is internally limited, specifications apply only for  $P_O \leq P_{max}$ ,  $P_{max} = 25W$
- Load and line regulation are specified at constant junction temperature. Change in  $V_O$  due heating effects must be taken into account separately. Pulse testing with low duty is used.

**Electrical Characteristics(KA78T12)** (Continued)(V<sub>I</sub> = 19V, I<sub>O</sub> = 3.0 A, 0°C ≤ T<sub>J</sub> ≤ +125°C, P<sub>O</sub> ≤ P<sub>MAX</sub> (Note1), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V <sub>O</sub>	5mA ≤ I <sub>O</sub> ≤ 3.0A, T <sub>J</sub> = +25°C 14.5V ≤ V <sub>I</sub> ≤ 27V, 5mA ≤ I <sub>O</sub> ≤ 2.0A	11.5 11.4	12 12	12.5 12.8	V
Line Regulation (Note2)	ΔV <sub>O</sub>	14.5V ≤ V <sub>I</sub> ≤ 35V, I <sub>O</sub> = 5mA, T <sub>J</sub> = +25°C 14.5V ≤ V <sub>I</sub> ≤ 35V, I <sub>O</sub> = 1.0A, T <sub>J</sub> = +25°C 14.9V ≤ V <sub>I</sub> ≤ 28V, I <sub>O</sub> = 2.0A, T <sub>J</sub> = +25°C 16V ≤ V <sub>I</sub> ≤ 22V, I <sub>O</sub> = 3.0A, T <sub>J</sub> = +25°C	-	6.0	45	mV
Load Regulation (Note2)	ΔV <sub>O</sub>	5mA ≤ I <sub>O</sub> ≤ 3.0A, T <sub>J</sub> = +25°C 5mA ≤ I <sub>O</sub> ≤ 3.0A	-	10 15	30 80	mV mV
Thermal Regulation	REG <sub>T</sub>	Pulse = 10ms, P = 20W T <sub>A</sub> = +25°C	-	0.002	0.03	%V <sub>O</sub> /W
Quiescent Current	I <sub>Q</sub>	5mA ≤ I <sub>O</sub> ≤ 3.0A, T <sub>J</sub> = +25°C 5mA ≤ I <sub>O</sub> ≤ 3.0A	-	3.5 4.0	5.0 6.0	mA mA
Quiescent Current Change	ΔI <sub>Q</sub>	14.5V ≤ V <sub>I</sub> ≤ 35V, I <sub>O</sub> = 5mA T <sub>J</sub> = +25°C ; 14.9V ≤ V <sub>I</sub> ≤ 27V, I <sub>O</sub> = 2.0A 5mA ≤ I <sub>O</sub> ≤ 3.0A, T <sub>J</sub> = +25°C	-	0.1	0.8	mA
Ripple Rejection	RR	f = 120Hz, 15V ≤ V <sub>I</sub> ≤ 25V, I <sub>O</sub> = 2.0A T <sub>J</sub> = +25°C	-	67	-	dB
Dropout Voltage	V <sub>D</sub>	I <sub>O</sub> = 3A, T <sub>J</sub> = +25°C	-	2.2	2.5	V
Output Noise Voltage	V <sub>N</sub>	T <sub>A</sub> = +25°C, 10Hz ≤ f ≤ 100kHz	-	10	-	μV/V <sub>O</sub>
Peak Output Current	I <sub>PK</sub>	T <sub>A</sub> = +25°C	-	5.0	-	A
Output Resistance	R <sub>O</sub>	f = 1.0kHz	-	2.0	-	mΩ
Short Circuit Current Limit	I <sub>SC</sub>	V <sub>I</sub> = 35V, T <sub>J</sub> = +25°C	-	1.5	2.5	A
Average Temperature Coefficient of Output Voltage	ΔV <sub>O</sub> /ΔT	I <sub>O</sub> = 5.0mA	-	0.5	-	mV/°C

**Note:**

1. Although power dissipation is internally limited, specifications apply only for P<sub>O</sub> ≤ P<sub>max</sub>, P<sub>max</sub> = 25W
2. Load and line regulation are specified at constant junction temperature. Change in V<sub>O</sub> due heating effects must be taken into account separately. Pulse testing with low duty is used. ( P<sub>MAX</sub> = 25W)

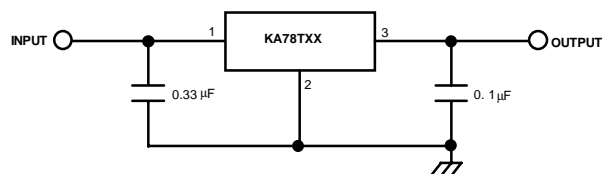
**Electrical Characteristics(KA78T15)** (Continued)(V<sub>I</sub> = 23V, I<sub>O</sub> = 3.0A, 0°C ≤ T<sub>J</sub> ≤ +125°C, P<sub>O</sub> ≤ P<sub>MAX</sub> (Note1), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V <sub>O</sub>	5mA ≤ I <sub>O</sub> ≤ 3.0A, T <sub>J</sub> = +25°C 17.5V ≤ V <sub>I</sub> ≤ 30V, 5mA ≤ I <sub>O</sub> ≤ 2.0A	14.4 14.25	15 15	15.6 15.75	V
Line Regulation (Note2)	ΔV <sub>O</sub>	17.6V ≤ V <sub>I</sub> ≤ 40V, I <sub>O</sub> = 5mA, T <sub>J</sub> = +25°C 17.6V ≤ V <sub>I</sub> ≤ 40V, I <sub>O</sub> = 1.0A, T <sub>J</sub> = +25°C 18V ≤ V <sub>I</sub> ≤ 30V, I <sub>O</sub> = 2.0A, T <sub>J</sub> = +25°C 20V ≤ V <sub>I</sub> ≤ 26V, I <sub>O</sub> = 3.0A, T <sub>J</sub> = +25°C	-	7.5	55	mV
Load Regulation (Note2)	ΔV <sub>O</sub>	5mA ≤ I <sub>O</sub> ≤ 3.0A, T <sub>J</sub> = +25°C 5mA ≤ I <sub>O</sub> ≤ 3.0A	-	10 15	30 80	mV mV
Thermal Regulation	REG <sub>T</sub>	Pulse = 10ms, P = 20W T <sub>A</sub> = +25°C	-	0.002	0.03	%V <sub>O</sub> /W
Quiescent Current	I <sub>Q</sub>	5mA ≤ I <sub>O</sub> ≤ 3.0A, T <sub>J</sub> = +25°C 5mA ≤ I <sub>O</sub> ≤ 3.0A	-	3.5 4.0	5.0 6.0	mA mA
Quiescent Current Change	ΔI <sub>Q</sub>	17.6V ≤ V <sub>I</sub> ≤ 40V, I <sub>O</sub> = 5mA T <sub>J</sub> = +25°C ; 18V ≤ V <sub>I</sub> ≤ 30V, I <sub>O</sub> = 2.0A ; 5mA ≤ I <sub>O</sub> ≤ 3.0A, T <sub>J</sub> = +25°C	-	0.1	0.8	mA
Ripple Rejection	RR	f = 120Hz, 18.5V ≤ V <sub>I</sub> ≤ 28.5V, I <sub>O</sub> = 2.0A T <sub>J</sub> = +25°C	-	65	-	dB
Dropout Voltage	V <sub>D</sub>	I <sub>O</sub> = 3A, T <sub>J</sub> = +25°C	-	2.2	2.5	V
Output Noise Voltage	V <sub>N</sub>	T <sub>A</sub> = +25°C, 10Hz ≤ f ≤ 100kHz	-	10	-	μV/V <sub>O</sub>
Peak Output Current	I <sub>PK</sub>	T <sub>A</sub> = +25°C	-	5.0	-	A
Output Resistance	R <sub>O</sub>	f = 1.0kHz	-	2.0	-	mΩ
Short Circuit Current Limit	I <sub>SC</sub>	V <sub>I</sub> = 40V, T <sub>J</sub> = +25°C	-	1.0	2.0	A
Average Temperature Coefficient of Output Voltage	ΔV <sub>O</sub> /ΔT	I <sub>O</sub> = 5.0mA	-	0.5	-	mV/°C

**Note:**

1. Although power dissipation is internally limited, specifications apply only for P<sub>O</sub> ≤ P<sub>max</sub>, P<sub>max</sub> = 25W
2. Load and line regulation are specified at constant junction temperature. Change in V<sub>O</sub> due heating effects must be taken into account separately. Pulse testing with low duty is used. ( P<sub>MAX</sub> = 25W)

## Typical Application

**Notes:**

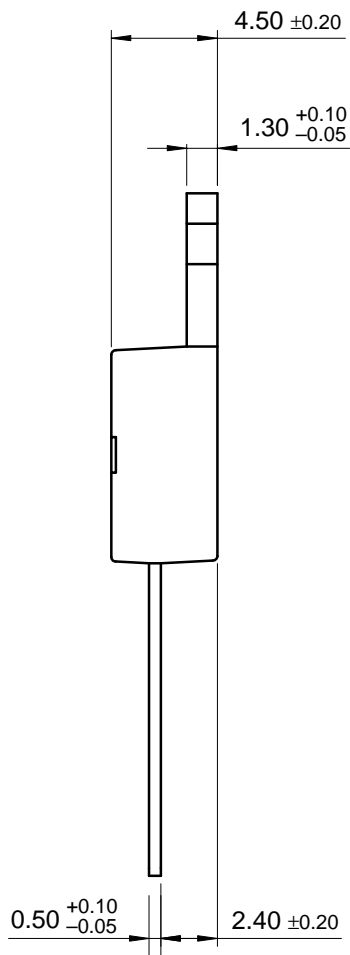
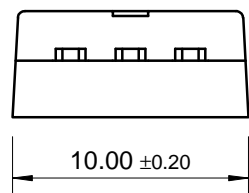
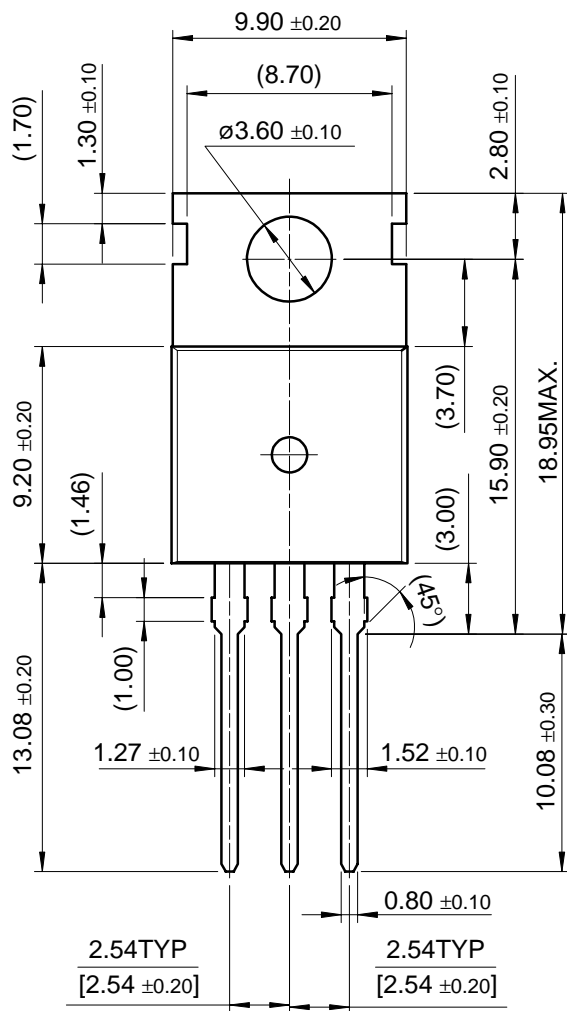
1. To specify an output voltage, substitute voltage value for "XX".
2. Bypass Capacitors are recommend for optimum stability and transient response and should be located as close as possible to the regulator

## Mechanical Dimensions

### Package

Dimensions in millimeters

### TO-220



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## Ordering Information

Product Number	Package	Operating Temperature
KA78T05	TO-220	0 ~ +125°C
KA78T12		
KA78T15		

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