

### Features

• Output Current in Excess of 3.0A

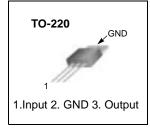
AIRCHILD

SEMICONDUCTOR®

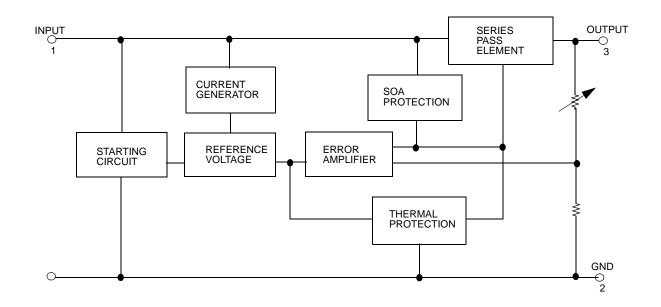
- Output Transistor Safe Operating Area Compensation
- Power Dissipation :25W
- Internal Short Circuit Current Limiting
- Internal Thermal Overload Protection
- Output Voltage Offered in 4% Tolerance
- No External Components Required
- Output Voltage of 5,12 and 15V

## Description

This family of fixed voltage regulators are monolithic integrated circuit capable of driving loads in excess of 3.0 A.



### Internal Block Diagram



### **Absolute Maximum Ratings**

Parameter	Symbol	Value	Unit
Input Voltage (for $V_O = 5V$ to 12V) (for $V_O = 15V$ )	VI	35 40	V V
Power Dissipation	PD	Internally limited	
Thermal Resistance, Junction to Air (Note1, 2) Ta = +25°C	RθJA	65	°C/W
Thermal Resistance, Junction to Case (Note1) Tc = +25°C	RθJC	2.5	°C/W
Operating Junction Temperature Range	Tj	0 ~ +125	°C
Storage Temperature Range	TSTG	-65 ~ +150	°C

Note:

1. Thermal resistance test board Size: 76.2mm \* 114.3mm \* 1.6mm(1S0P) JEDEC standard: JESD51-3, JESD51-7

2. Assume no ambient airflow.

# **Electrical Characteristics(MC78T05)**

(VI = 10V, IO = 3.0 A,  $0^{\circ}C \le T_J \le +125^{\circ}C$ , Po  $\le P_{MAX}$  (Note3), unless otherwise specified. )

Parameter	Symbol	Conditions	Min.	Тур.	Max.	Unit
Output Voltage	Vo	$5mA \le lo \le 3.0A$ , $T_J = +25^{\circ}C$ $7.3V \le VI \le 20V$ , $5mA \le lo \le 2.0A$		5.0 5.0	5.2 5.25	V
Line Regulation (Note4)	ΔVo	$\begin{array}{l} 7.2 V \leq VI \leq 35 V \ , \ Io=5mA, \ T_J=+25^{\circ}C \\ 7.2 V \leq VI \leq 35 V \ , \ Io=1.0A, \ T_J=+25^{\circ}C \\ 7.5 V \leq VI \leq 20 V, \ Io=2.0A, \ T_J=+25^{\circ}C \\ 8.0 V \leq VI \leq 12 V, \ Io=3.0A, \ T_J=+25^{\circ}C \end{array}$		3.0	25	mV
Load Regulation (Note4)	ΔVo	$5mA \leq Io \leq 3.0A$ , $T_J$ = +25°C $5mA \leq Io \leq 3.0A$	-	10 15	30 80	mV mV
Thermal Regulation	REGT	Pulse =10ms, P = 20W TA = +25°C	-	0.002	0.03	%Vo/W
Quiescent Current	lQ	$5mA \leq Io \leq 3.0A$ , $T_J$ = +25°C $5mA \leq Io \leq 3.0A$	-	3.5 4.0	5.0 6.0	mA mA
Quiescent Current Change	ΔlQ	$7.2V \le VI \le 35V$ , Io = 5mA T <sub>J</sub> = +25°C ; $7.5V \le VI \le 20V$ , Io =2.0A ; 5mA $\le$ Io $\le 3.0A$ , T <sub>J</sub> = +25°C	-	0.1	0.8	mA
Ripple Rejection	RR	$f$ = 120Hz, 8V $\leq$ VI $\leq$ 18V, I_0 = 2.0A T_J = +25 $^{\circ}\text{C}$	-	75	-	dB
Dropout Voltage	VD	lo = 3A ,TJ = +25°C	-	2.2	2.5	V
Output Noise Voltage	VN	$T_A = +25^{\circ}C$ , $10Hz \le f \le 100kHz$	-	10	-	μV/Vo
Peak Output Current	IPK	TA = +25°C	-	5.0	-	А
Output Resistance	Ro	f = 1.0kHz	-	2.0	-	mΩ
Short Circuit Current Limit	lsc	VI = 35V, TJ =+25°C	-	1.5	2.5	А
Average Temperature Coefficient of Output Voltage	$\Delta VO/\Delta T$	lo = 5.0mA	-	0.2	-	mV/°C

#### Note:

3. Although power dissipation is internally limited, specifications apply only for  $PO \le Pmax$ , Pmax = 25W

4. Load and line regulation are specified at constant junction temperature. Change in Vo due heating effects must be taken into account separately. Pulse testing with low duty is used.

## Electrical Characteristics (MC78T12) (Continued)

(VI = 19V, IO = 3.0 A,  $0^{\circ}C \le T_J \le +125^{\circ}C$ , Po  $\le P_{MAX}$  (Note1), unless otherwise specified. )

Parameter	Symbol	Conditions	Min.	Тур.	Max.	Unit
Output Voltage	Vo	$5mA \le lo \le 3.0A$ , TJ =+25°C 14.5V $\le$ VI $\le$ 27V, 5mA $\le$ lo $\le$ 2.0A		12 12	12.5 12.8	V
Line Regulation (Note2)	ΔVο	$\begin{array}{l} 14.5 V \leq VI \leq 35 V, \mbox{ lo=5mA, TJ =+}25^\circ C \\ 14.5 V \leq VI \leq 35 V, \mbox{ lo=1.0A, TJ =+}25^\circ C \\ 14.9 V \leq VI \leq 28 V, \mbox{ lo =2.0A, TJ =+}25^\circ C \\ 16 V \leq VI \leq 22 V, \mbox{ lo =3.0A, TJ =+}25^\circ C \\ \end{array}$		6.0	45	mV
Load Regulation (Note2)	ΔVO	$5mA \le Io \le 3.0A$ , TJ =+25°C $5mA \le Io \le 3.0A$	-	10 15	30 80	mV mV
Thermal Regulation	REGT	Pulse =10ms, P = 20W TA = +25°C		0.002	0.03	%Vo/W
Quiescent Current	IQ	$\begin{array}{l} 5\text{mA} \leq \text{lo} \leq 3.0\text{A}, \ \text{TJ} = +25^{\circ}\text{C} \\ 5\text{mA} \leq \text{lo} \leq 3.0\text{A} \end{array}$		3.5 4.0	5.0 6.0	mA mA
Quiescent Current Change	ΔlQ	$ \begin{array}{l} 14.5 V \leq VI \leq 35 V, \mbox{ lo} = 5 m A \\ T_J = +25 ^{\circ} C \ ; \\ 14.9 V \leq VI \leq 27 V, \mbox{ lo} = 2.0 A \ ; \\ 5 m A \leq \mbox{ lo} \leq 3.0 A, \ T_J = +25 ^{\circ} C \end{array} $		0.1	0.8	mA
Ripple Rejection	RR	f = 120Hz, $15V \le V_I \le 25V$ , Io = 2.0A TJ =+25°C		67	-	dB
Dropout Voltage	VD	lo = 3A,TJ =+25°C		2.2	2.5	V
Output Noise Voltage	VN	$T_A = +25^{\circ}C$ , $10Hz \le f \le 100kHz$		10	-	μV/Vo
Peak Output Current	IPK	T <sub>A</sub> =+25°C		5.0	-	А
Output Resistance	Ro	f = 1.0kHz		2.0	-	mΩ
Short Circuit Current Limit	lsc	VI = 35V, TJ =+25°C	-	1.5	2.5	А
Average Temperature Coefficient of Output Voltage	$\Delta V_O / \Delta T$	lo = 5.0mA	-	0.5	-	mV/°C

### Note:

1. Although power dissipation is internally limited, specifications apply only for PO ≤ Pmax, Pmax = 25W

2. Load and line regulation are specified at constant junction temperature. Change in Vo due heating effects must be taken into account separately. Pulse testing with low duty is used. ( PMAX = 25W)

### Electrical Characteristics (MC78T15) (Continued)

(VI = 23V, IO = 3.0 A,  $0^{\circ}C \le T_J \le +125^{\circ}C$ , Po  $\le P_{MAX}$  (Note1), unless otherwise specified. )

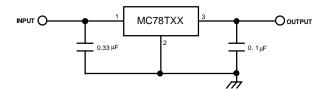
Parameter	Symbol	Conditions	Min.	Тур.	Max.	Unit
Output Voltage	Vo	$\begin{array}{l} 5\text{mA} \leq \text{lo} \leq 3.0\text{A}, \ \text{T}\text{J} = +25^{\circ}\text{C} \\ 17.5\text{V} \leq \text{VI} \leq 30\text{V}, \ 5\text{mA} \leq \text{lo} \leq 2.0\text{A} \end{array}$		15 15	15.6 15.75	V
Line Regulation (Note2)	ΔVο	$\begin{array}{l} 17.6 V \leq VI \leq 40 V, \ \text{Io}{=}5\text{mA}, \ \text{TJ} = +25^\circ\text{C} \\ 17.6 V \leq VI \leq 40 V, \ \text{Io}{=}1.0\text{A}, \ \text{TJ} = +25^\circ\text{C} \\ 18 V \leq VI \leq 30 V, \ \text{Io} = 2.0\text{A}, \ \text{TJ} = +25^\circ\text{C} \\ 20 V \leq VI \leq 26 V, \ \text{Io} = 3.0\text{A}, \ \text{TJ} = +25^\circ\text{C} \\ \end{array}$		7.5	55	mV
Load Regulation (Note2)	ΔVo	$\begin{array}{l} 5mA \leq lo \leq 3.0A, \ T_J =+25^{\circ}C \\ 5mA \leq lo \leq 3.0A \end{array}$	-	10 15	30 80	mV mV
Thermal Regulation	REGT	Pulse =10ms, P = 20W TA = +25°C	-	0.002	0.03	%Vo/W
Quiescent Current	IQ	$\begin{array}{l} 5mA \leq lo \leq 3.0A, \ TJ =+25^{\circ}C \\ 5mA \leq lo \leq 3.0A \end{array}$	-	3.5 4.0	5.0 6.0	mA mA
Quiescent Current Change	ΔlQ	$\begin{array}{l} 17.6V \leq VI \leq 40V, \mbox{ lo} = 5mA \\ T_J = +25^{\circ}C \ ; \\ 18V \leq VI \leq 30V, \ \mbox{ lo} = 2.0A \ ; \\ 5mA \leq \mbox{ lo} \leq 3.0A, \ T_J = +25^{\circ}C \end{array}$		0.1	0.8	mA
Ripple Rejection	RR	f = 120Hz, 18.5V $\leq$ VI $\leq$ 28.5V, Io = 2.0A TJ =+25°C		65	-	dB
Dropout Voltage	VD	$Io = 3A$ , $T_J = +25^{\circ}C$	-	2.2	2.5	V
Output Noise Voltage	VN	$T_A = +25^{\circ}C$ , $10Hz \le f \le 100kHz$		10	-	μV/Vo
Peak Output Current	IPK	T <sub>A</sub> = +25°C		5.0	-	А
Output Resistance	Ro	f = 1.0kHz		2.0	-	mΩ
Short Circuit Current Limit	lsc	VI = 40V, TJ = +25°C	-	1.0	2.0	А
Average Temperature Coefficient of Output Voltage	$\Delta V_O / \Delta T$	lo = 5.0mA	-	0.5	-	mV/°C

### Note:

1. Although power dissipation is internally limited, specifications apply only for PO ≤ Pmax, Pmax = 25W

2. Load and line regulation are specified at constant junction temperature. Change in Vo due heating effects must be taken into account separately. Pulse testing with low duty is used. ( $P_{MAX} = 25W$ )

## **Typical Application**



Note:

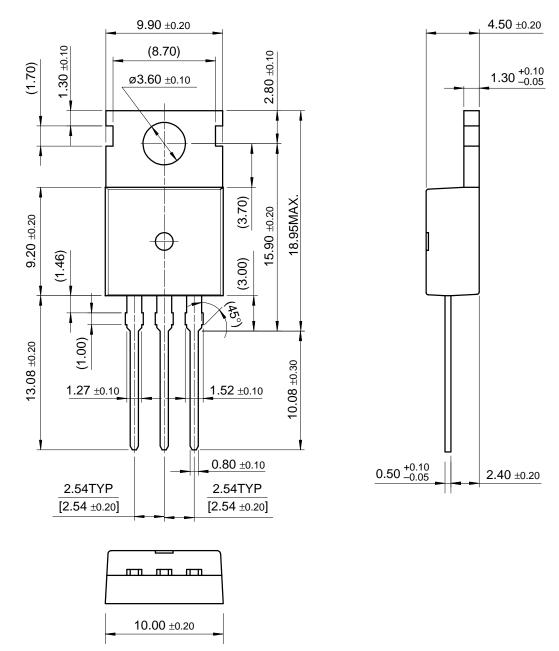
- 1. To specify an output voltage, substitute voltage value for "XX".
- 2. Bypass Capacitors are recommend for optimum stability and transient response and should be located as close as possible to the regulator

### **Mechanical Dimensions**

### Package

### **Dimensions in millimeters**

**TO-220** 



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# **Ordering Information**

Product Number	Package	Operating Temperature
MC78T05CT		
MC78T12CT	TO-220	0 ~ +125°C
MC78T15CT		

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