

MC78TXX

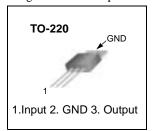
3-Terminal 3A Positive Voltage Regulator

Features

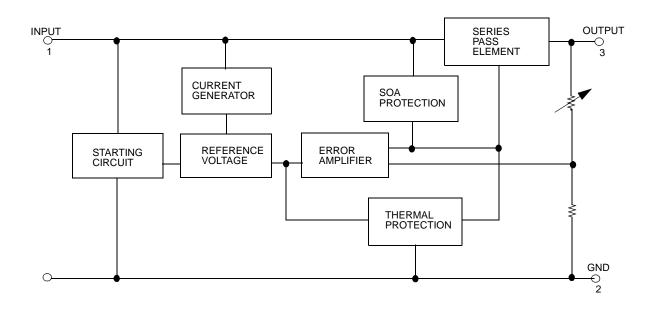
- Output Current in Excess of 3.0A
- Output Transistor Safe Operating Area Compensation
- Power Dissipation :25W
- Internal Short Circuit Current Limiting
- · Internal Thermal Overload Protection
- Output Voltage Offered in 4% Tolerance
- No External Components Required
- Output Voltage of 5,12 and 15V

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)	Vı	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	T _{STG}	-65 ~ +150	°C

Note:

- 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° C \leq TJ \leq +125 $^{\circ}$ C, Po \leq PMAX (Note3), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Тур. Мах.		Unit
Output Voltage	Vo	5mA ≤ lo ≤ 3.0A , TJ = +25°C 7.3V ≤ VI ≤ 20V, 5mA ≤ lo ≤ 2.0A		5.0 5.0	5.2 5.25	V
Line Regulation (Note4)	ΔVο	7.2V ≤ VI ≤ 35V , Io=5mA, TJ =+25°C 7.2V ≤ VI ≤ 35V , Io=1.0A, TJ = +25°C 7.5V ≤ VI ≤ 20V, Io =2.0A, TJ = +25°C 8.0V ≤ VI ≤ 12V, Io =3.0A, TJ = +25°C		3.0	25	mV
Load Regulation (Note4)	ΔVΟ	$5\text{mA} \leq \text{Io} \leq 3.0\text{A}$, $\text{T}_{\text{J}} = +25^{\circ}\text{C}$ $5\text{mA} \leq \text{Io} \leq 3.0\text{A}$	-	10 15	30 80	mV mV
Thermal Regulation	REGT	Pulse =10ms, P = 20W T _A = +25°C		0.002	0.03	%Vo/W
Quiescent Current	IQ	$5\text{mA} \le \text{lo} \le 3.0\text{A}$, $T_J = +25^{\circ}\text{C}$ $5\text{mA} \le \text{lo} \le 3.0\text{A}$		3.5 4.0	5.0 6.0	mA mA
Quiescent Current Change	ΔlQ	$7.2V \le VI \le 35V$, Io = 5mA $T_J = +25^{\circ}C$; $7.5V \le VI \le 20V$, Io =2.0A; $5mA \le Io \le 3.0A$, $T_J = +25^{\circ}C$		0.1	0.8	mA
Ripple Rejection	RR	$f = 120Hz, 8V \le VI \le 18V, I_0 = 2.0A$ $T_J = +25^{\circ}C$	-	75	-	dB
Dropout Voltage	VD	Io = 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	•	Α
Output Resistance	Ro	f = 1.0kHz	-	2.0	-	mΩ
Short Circuit Current Limit	Isc	VI = 35V, TJ =+25°C	-	1.5	2.5	Α
Average Temperature Coefficient of Output Voltage	ΔV0/ΔΤ	Io = 5.0mA	-	0.2	-	mV/°C

- 3. Although power dissipation is internally limited, specifications apply only for Po ≤ 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° C \leq TJ \leq +125 $^{\circ}$ C, Po \leq PMAX (Note1), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Тур.	Max.	Unit
Output Voltage	Vo	$5mA \le lo \le 3.0A$, $T_J = +25^{\circ}C$ $14.5V \le VI \le 27V$, $5mA \le lo \le 2.0A$		12 12	12.5 12.8	V
Line Regulation (Note2)	ΔVο	$\begin{array}{l} 14.5 V \leq VI \leq 35 V, \ lo=5 mA, \ T_J = +25^{\circ}C \\ 14.5 V \leq VI \leq 35 V, \ lo=1.0 A, \ T_J = +25^{\circ}C \\ 14.9 V \leq VI \leq 28 V, \ lo = 2.0 A, \ T_J = +25^{\circ}C \\ 16 V \leq VI \leq 22 V, \ lo = 3.0 A, \ T_J = +25^{\circ}C \\ \end{array}$		6.0	45	mV
Load Regulation (Note2)	ΔVο	$5\text{mA} \le \text{Io} \le 3.0\text{A}, \text{T}_{\text{J}} = +25^{\circ}\text{C}$ $5\text{mA} \le \text{Io} \le 3.0\text{A}$	-	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	$5mA \le lo \le 3.0A, TJ = +25^{\circ}C$ $5mA \le lo \le 3.0A$		3.5 4.0	5.0 6.0	mA mA
Quiescent Current Change	ΔlQ	$14.5V \le VI \le 35V$, $Io = 5mA$ $T_J = +25^{\circ}C$; $14.9V \le VI \le 27V$, $Io = 2.0A$; $5mA \le Io \le 3.0A$, $T_J = +25^{\circ}C$	-	0.1	0.8	mA
Ripple Rejection	RR	$f = 120Hz, 15V \le V_I \le 25V, Io = 2.0A$ $T_J = +25^{\circ}C$	-	67	-	dB
Dropout Voltage	VD	lo = 3A,T _J =+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 _A =+25°C	-	5.0	-	Α
Output Resistance	Ro	f = 1.0kHz	ı	2.0	ı	mΩ
Short Circuit Current Limit	Isc	VI = 35V, TJ =+25°C	-	1.5	2.5	Α
Average Temperature Coefficient of Output Voltage	ΔV _O /ΔΤ	lo = 5.0mA	-	0.5	-	mV/°C

^{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)

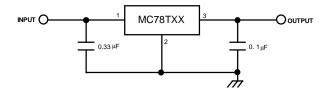
(VI = 23V, IO = 3.0 A, 0° C \leq TJ \leq +125 $^{\circ}$ C, Po \leq PMAX (Note1), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Тур.	Max.	Unit
Output Voltage	Vo	$5mA \le Io \le 3.0A$, $T_J = +25^{\circ}C$ $17.5V \le VI \le 30V$, $5mA \le Io \le 2.0A$		15 15	15.6 15.75	V
Line Regulation (Note2)	ΔVο	17.6V ≤ VI ≤ 40V, Io=5mA, TJ =+25°C 17.6V ≤ VI ≤ 40V, Io=1.0A, TJ =+25°C 18V ≤ VI ≤ 30V, Io =2.0A, TJ =+25°C 20V ≤ VI ≤ 26V, Io =3.0A, TJ =+25°C		7.5	55	mV
Load Regulation (Note2)	ΔVο	$5mA \le Io \le 3.0A, T_J = +25^{\circ}C$ $5mA \le Io \le 3.0A$		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	$5\text{mA} \le \text{lo} \le 3.0\text{A}, \text{TJ} = +25^{\circ}\text{C}$ $5\text{mA} \le \text{lo} \le 3.0\text{A}$		3.5 4.0	5.0 6.0	mA mA
Quiescent Current Change	ΔlQ	$17.6V \le VI \le 40V$, $Io = 5mA$ $T_J = +25^{\circ}C$; $18V \le VI \le 30V$, $Io = 2.0A$; $5mA \le Io \le 3.0A$, $T_J = +25^{\circ}C$		0.1	0.8	mA
Ripple Rejection	RR	$\begin{split} f &= 120 Hz, \ 18.5 V \leq V_I \leq 28.5 V, \ Io = 2.0 A \\ T_J &= +25^{\circ} C \end{split}$	-	65	-	dB
Dropout Voltage	VD	Io = 3A ,T _J = +25°C	-	2.2	2.5	V
Output Noise Voltage	٧N	$T_A = +25^{\circ}C$, $10Hz \le f \le 100kHz$	-	10	-	μV/Vo
Peak Output Current	IPK	$T_A = +25^{\circ}C$	-	5.0	-	Α
Output Resistance	Ro	f = 1.0kHz	-	2.0	•	mΩ
Short Circuit Current Limit	Isc	$VI = 40V, TJ = +25^{\circ}C$	-	1.0	2.0	Α
Average Temperature Coefficient of Output Voltage	ΔV _O /ΔT	Io = 5.0mA	-	0.5	-	mV/°C

^{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



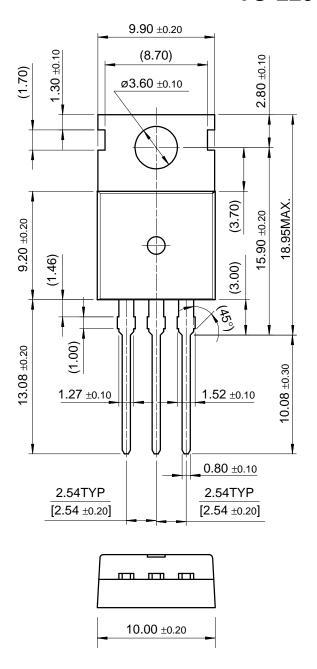
- 1. To specify an output voltage, substitute voltage value for "XX".
- 2. Bypass Capacitors are recommend for optimum stability and transient response and should be located as close as possible to the regulator

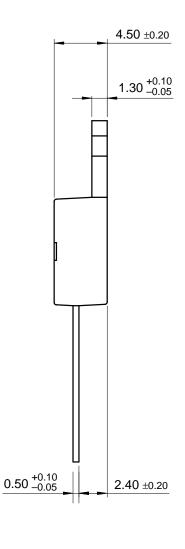
Mechanical Dimensions

Package

Dimensions in millimeters

TO-220





Ordering Information

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

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