LM78TXX

3-Terminal 3A Positive Voltage Regulator

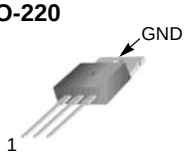
Features

- 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

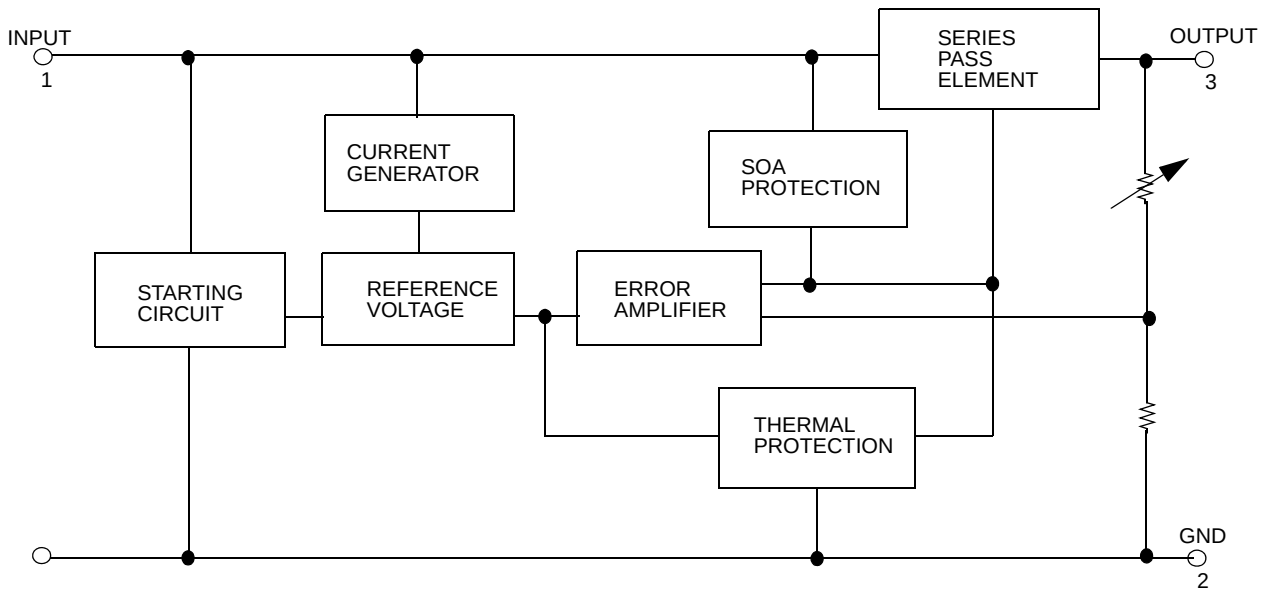
This family of fixed voltage regulators are monolithic integrated circuit capable of driving loads in excess of 3.0 A.

TO-220



1.Input 2. GND 3. Output

Internal Block Diagram



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) Ta = +25°C	$R\theta JA$	65	°C/W
Thermal Resistance, Junction to Case (Note1) Tc = +25°C	$R\theta JC$	2.5	°C/W
Operating Junction Temperature Range	T_J	0 ~ +125	°C
Storage Temperature Range	T_{STG}	-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(LM78T05)

(V_I = 10V, I_O = 3.0 A, 0°C ≤ T_J ≤ +125°C, Po ≤ P_{MAX} (Note3), unless otherwise specified.)

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

Note:

3. Although power dissipation is internally limited, specifications apply only for P_O ≤ 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(LM78T12) (Continued)

(V_I = 19V, I_O = 3.0 A, 0°C ≤ T_J ≤ +125°C, Po ≤ P_{MAX} (Note1), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	Vo	5mA ≤ Io ≤ 3.0A , T_J =+25°C 14.5V ≤ VI ≤ 27V, 5mA ≤ Io ≤ 2.0A	11.5 11.4	12 12	12.5 12.8	V
Line Regulation (Note2)	ΔV_O	14.5V ≤ VI ≤ 35V, Io=5mA, T_J =+25°C 14.5V ≤ VI ≤ 35V, Io=1.0A, T_J =+25°C 14.9V ≤ VI ≤ 28V, Io =2.0A, T_J =+25°C 16V ≤ VI ≤ 22V, Io =3.0A, T_J =+25°C	-	6.0	45	mV
Load Regulation (Note2)	ΔV_O	5mA ≤ Io ≤ 3.0A, T_J =+25°C 5mA ≤ Io ≤ 3.0A	-	10 15	30 80	mV mV
Thermal Regulation	REG_T	Pulse =10ms, P = 20W T_A = +25°C	-	0.002	0.03	%Vo/W
Quiescent Current	I_Q	5mA ≤ Io ≤ 3.0A, T_J =+25°C 5mA ≤ Io ≤ 3.0A	-	3.5 4.0	5.0 6.0	mA mA
Quiescent Current Change	ΔI_Q	14.5V ≤ VI ≤ 35V, Io = 5mA T_J =+25°C ; 14.9V ≤ VI ≤ 27V, Io =2.0A ; 5mA ≤ Io ≤ 3.0A, T_J =+25°C	-	0.1	0.8	mA
Ripple Rejection	RR	f = 120Hz, 15V ≤ V_I ≤ 25V, Io = 2.0A T_J =+25°C	-	67	-	dB
Dropout Voltage	V_D	Io = 3A,T_J =+25°C	-	2.2	2.5	V
Output Noise Voltage	V_N	T_A =+25°C, 10Hz ≤ f ≤ 100kHz	-	10	-	μV/Vo
Peak Output Current	I_{PK}	T_A =+25°C	-	5.0	-	A
Output Resistance	Ro	f = 1.0kHz	-	2.0	-	mΩ
Short Circuit Current Limit	Isc	VI = 35V, T_J =+25°C	-	1.5	2.5	A
Average Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	Io = 5.0mA	-	0.5	-	mV/°C

Note:

1. Although power dissipation is internally limited, specifications apply only for P_O ≤ 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)

Electrical Characteristics(LM78T15) (Continued)

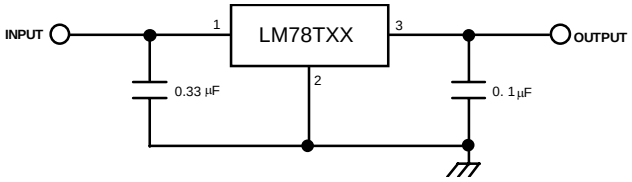
(V_I = 23V, I_O = 3.0 A, 0°C ≤ T_J ≤ +125°C, Po ≤ P_{MAX} (Note1), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	Vo	5mA ≤ Io ≤ 3.0A, T_J =+25°C 17.5V ≤ VI ≤ 30V, 5mA ≤ Io ≤ 2.0A	14.4 14.25	15 15	15.6 15.75	V
Line Regulation (Note2)	ΔV_O	17.6V ≤ VI ≤ 40V, Io=5mA, T_J =+25°C 17.6V ≤ VI ≤ 40V, Io=1.0A, T_J =+25°C 18V ≤ VI ≤ 30V, Io =2.0A, T_J =+25°C 20V ≤ VI ≤ 26V, Io =3.0A, T_J =+25°C	-	7.5	55	mV
Load Regulation (Note2)	ΔV_O	5mA ≤ Io ≤ 3.0A, T_J =+25°C 5mA ≤ Io ≤ 3.0A	-	10 15	30 80	mV mV
Thermal Regulation	REG_T	Pulse =10ms, P = 20W T_A = +25°C	-	0.002	0.03	%Vo/W
Quiescent Current	I_Q	5mA ≤ Io ≤ 3.0A, T_J =+25°C 5mA ≤ Io ≤ 3.0A	-	3.5 4.0	5.0 6.0	mA mA
Quiescent Current Change	ΔI_Q	17.6V ≤ VI ≤ 40V, Io = 5mA T_J =+25°C ; 18V ≤ VI ≤ 30V, Io =2.0A ; 5mA ≤ Io ≤ 3.0A, T_J =+25°C	-	0.1	0.8	mA
Ripple Rejection	RR	f = 120Hz, 18.5V ≤ V_I ≤ 28.5V, Io = 2.0A T_J =+25°C	-	65	-	dB
Dropout Voltage	V_D	Io = 3A ,T_J = +25°C	-	2.2	2.5	V
Output Noise Voltage	V_N	T_A = +25°C, 10Hz ≤ f ≤ 100kHz	-	10	-	μV/Vo
Peak Output Current	I_{PK}	T_A = +25°C	-	5.0	-	A
Output Resistance	Ro	f = 1.0kHz	-	2.0	-	mΩ
Short Circuit Current Limit	Isc	VI = 40V, T_J = +25°C	-	1.0	2.0	A
Average Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	Io = 5.0mA	-	0.5	-	mV/°C

Note:

1. Although power dissipation is internally limited, specifications apply only for P_O ≤ 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:

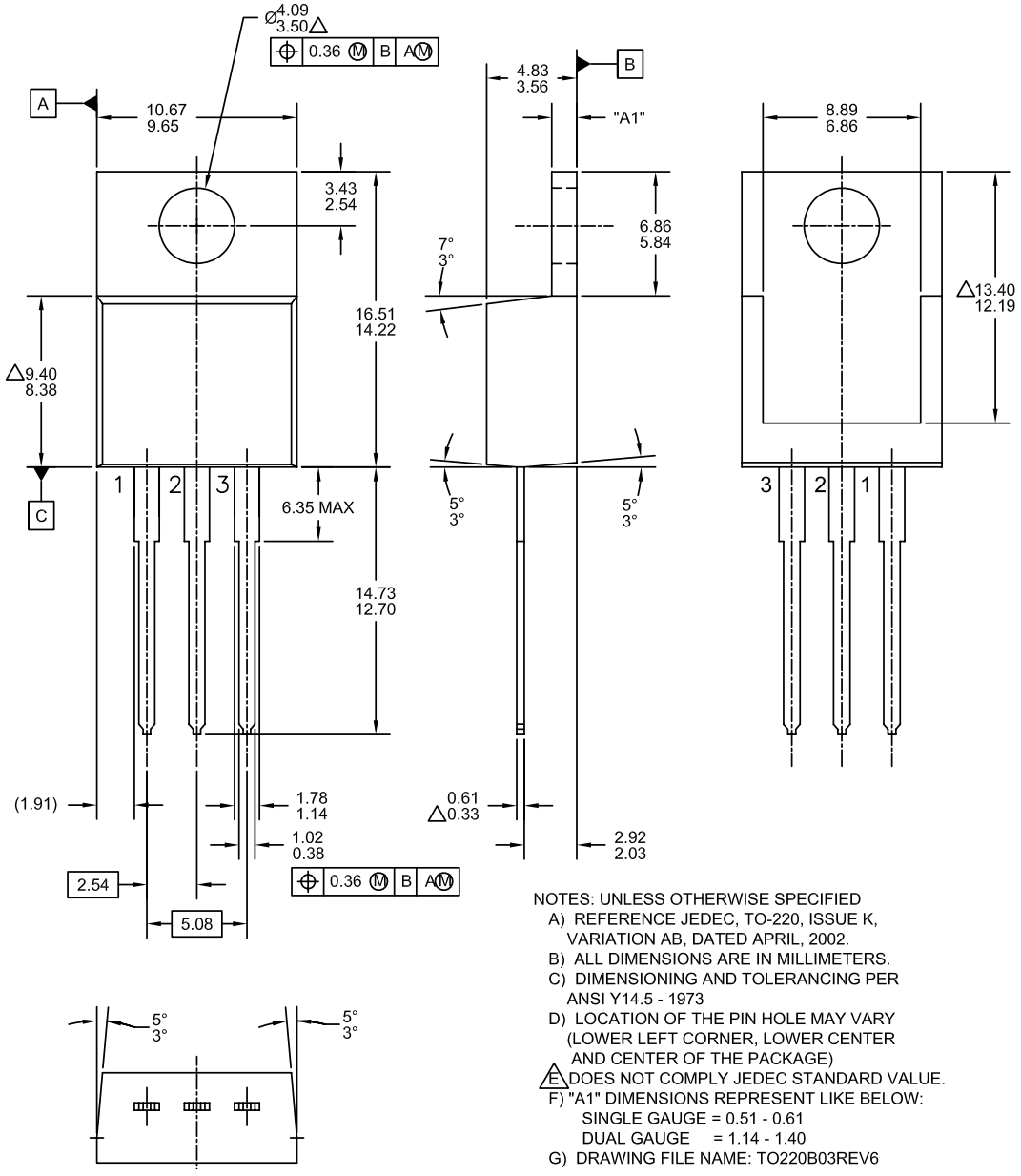
1. To specify an output voltage, substitute voltage value for “XX”.
2. Bypass Capacitors are recommend for optimum stability and transient response and should be located as close as possible to the regulator

Mechanical Dimensions

Package

Dimensions in millimeters

TO-220 [SINGLE GAUGE]



NOTES: UNLESS OTHERWISE SPECIFIED

A) REFERENCE JEDEC, TO-220, ISSUE K, VARIATION AB, DATED APRIL, 2002.

B) ALL DIMENSIONS ARE IN MILLIMETERS.

C) DIMENSIONING AND TOLERANCING PER ANSI Y14.5 - 1973

D) LOCATION OF THE PIN HOLE MAY VARY (LOWER LEFT CORNER, LOWER CENTER AND CENTER OF THE PACKAGE)

△E DOES NOT COMPLY JEDEC STANDARD VALUE.

F) "A1" DIMENSIONS REPRESENT LIKE BELOW:
SINGLE GAUGE = 0.51 - 0.61
DUAL GAUGE = 1.14 - 1.40

G) DRAWING FILE NAME: TO220B03REV6

Ordering Information

Product Number	Package	Operating Temperature
LM78T05CT	TO-220	0 ~ +125°C
LM78T12CT		
LM78T15CT		

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