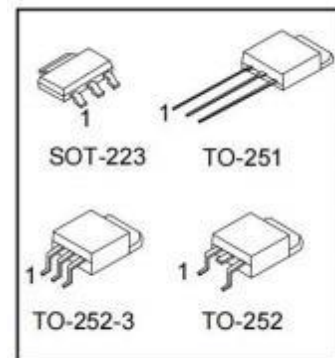


General Description

The L78MXX three-terminal positive regulators are available in the TO-252 package with several fixed output voltages making it useful in a wide range of applications.

Features

- Output Current up to 700mA
- Output Voltages of 5,6,8,9, 12, 15, 18,24V
- Thermal Overload Protection Short Circuit Protection
- Output Transistor Safe Operating area (SOA)Protection



Ordering Information

DEVICE	Package Type	MARKING	Packing	Packing QTY
XBLW L78MXXHDTR	TO-252-2	78MXXH	Tape	2500/Reel

Remarks:"XXrepresents the output voltage value , such as L78M05HDTR stands for 5V

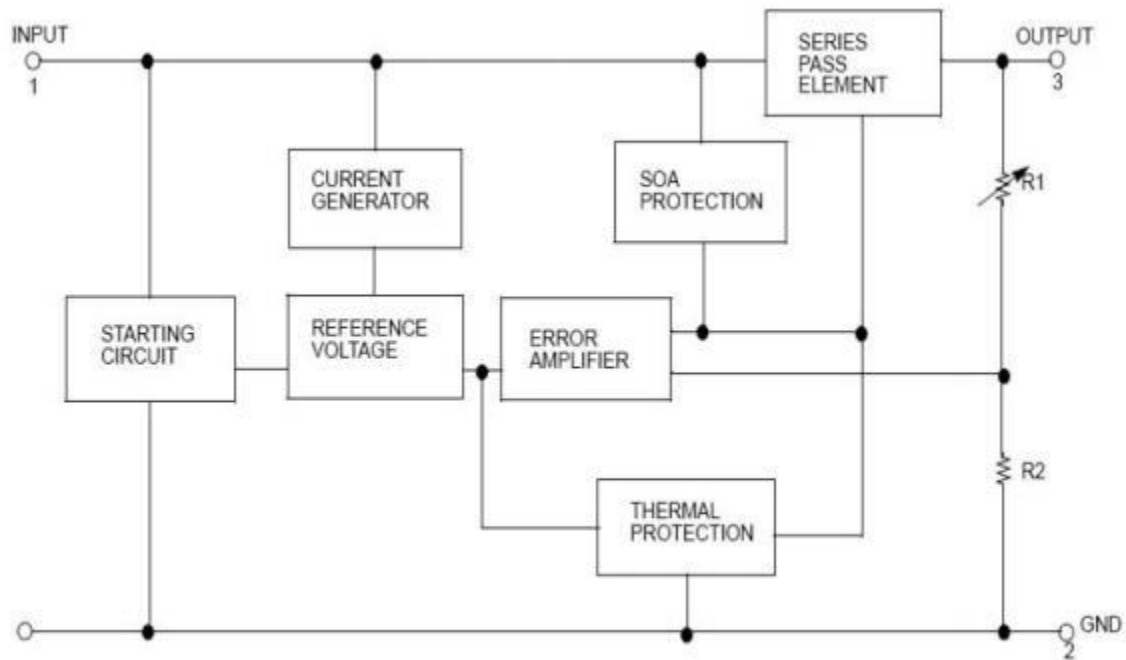
Absolute Maximum Ratings

Parameter		Symbol	Ratings	Unit
Input Voltage		V_{IN}	35	V
Output Current		I_{OUT}	700	mA
Power Dissipation ($T_c=25^{\circ}C$)	SOT-223	P_O	1	W
	TO-251/TO-252 TO-252-3		2	
Operating Junction Temperature		T_J	-20 ~ 125	$^{\circ}C$
Storage Temperature		T_{STG}	-55 ~ +150	$^{\circ}C$

Thermal Data

Parameter		Symbol	Ratings	Unit
Power Dissipation ($T_c=25^{\circ}C$)	SOT-223	θ_{JC}	15	$^{\circ}C/W$
	TO-251/TO-252 TO-252-3		12.5	

Block Diagram



Electrical Characteristics (L78M05)

(Refer to the test circuits, $0 < T_j < +125^{\circ}\text{C}$, $I_o=350\text{mA}$, $V_i=10\text{V}$, unless otherwise specified, $C_1=0.33\mu\text{F}$, $C_o=0.1\mu\text{F}$)

Parameter	Symbol	Conditions	Value			Unit
			Min	Typ	Max	
Output Voltage	V_o	$I_o=5\text{mA}\sim 350\text{mA}$ $V_i=7\sim 20\text{V}$	4.75	5	5.25	V
Line Regulation(Note)	ΔV_o	$I_o=200\text{mA}$ $T_j=25^{\circ}\text{C}$			100	mV
		$V_i=7\text{V}\sim 25\text{V}$ $V_i=8\text{V}\sim 25\text{V}$			50	
Load Regulation(Note)	ΔV_o	$T_j=25^{\circ}\text{C}$			100	mV
		$I_o=5\text{mA}\sim 500\text{mA}$ $I_o=5\text{mA}\sim 200\text{mA}$			50	
Quiescent Current	I_Q	$T_j=25^{\circ}\text{C}$			6.0	mA
Quiescent Current Change	ΔI_Q	$I_o=5\text{mA}\sim 350\text{mA}$			0.5	mA
		$I_o=200\text{mA}$, $V_i=8\sim 25\text{V}$			0.8	
Output Voltage Drift	$\Delta V/\Delta T$	$I_o=5\text{mA}$, $T_j=0\sim 125^{\circ}\text{C}$		-0.5		mV/ $^{\circ}\text{C}$
Output Noise Voltage	V_N	$f=10\text{Hz}\sim 100\text{KHz}$		40		μV
Ripple Rejection	RR	$f=120\text{Hz}$, $V_i=8\sim 18\text{V}$		80		dB
Dropout Voltage	V_D	$T_j=25^{\circ}\text{C}$, $I_o=500\text{mA}$		2		V
Short Circuit Current	I_{SC}	$T_j=25^{\circ}\text{C}$, $V_i=35\text{V}$		800		mA
Peak Current	I_{PK}	$T_j=25^{\circ}\text{C}$		900		mA

Notes:

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

Electrical Characteristics (L78M06)

(Refer to the test circuits, $0 < T_j < +125^{\circ}\text{C}$, $I_o=350\text{mA}$, $V_i=11\text{V}$, unless otherwise specified, $C_1=0.33\mu\text{F}$, $C_o=0.1\mu\text{F}$)

Parameter	Symbol	Conditions	Value			Unit
			Min	Typ	Max	
Output Voltage	V_o	$I_o=5\text{mA}\sim 350\text{mA}$ $V_i=8\sim 21\text{V}$	5.7	6	6.3	V
Line Regulation(Note)	ΔV_o	$I_o=200\text{mA}$ $T_j=25^{\circ}\text{C}$			100	mV
					50	
Load Regulation(Note)	ΔV_o	$T_j=25^{\circ}\text{C}$			120	mV
					60	
Quiescent Current	I_Q	$T_j=25^{\circ}\text{C}$			6.0	mA
Quiescent Current Change	ΔI_Q	$I_o=5\text{mA}\sim 350\text{mA}$			0.5	mA
		$I_o=200\text{mA}$, $V_i=9\sim 25\text{V}$			0.8	
Output Voltage Drift	$\Delta V/\Delta T$	$I_o=5\text{mA}$, $T_j=0\sim 125^{\circ}\text{C}$		-0.5		mV/ $^{\circ}\text{C}$
Output Noise Voltage	V_N	$f=10\text{Hz}\sim 100\text{KHz}$		45		μV
Ripple Rejection	RR	$f=120\text{Hz}$, $V_i=9\sim 19\text{V}$		80		dB
Dropout Voltage	V_D	$T_j=25^{\circ}\text{C}$, $I_o=500\text{mA}$		2		V
Short Circuit Current	I_{SC}	$T_j=25^{\circ}\text{C}$, $V_i=35\text{V}$		800		mA
Peak Current	I_{PK}	$T_j=25^{\circ}\text{C}$		900		mA

Notes:

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

Electrical Characteristics (L78M08)

(Refer to the test circuits, $0 < T_j < +125^{\circ}\text{C}$, $I_o=350\text{mA}$, $V_i=14\text{V}$, unless otherwise specified, $C_1=0.33\mu\text{F}$, $C_o=0.1\mu\text{F}$)

Parameter	Symbol	Conditions	Value			Unit
			Min	Typ	Max	
Output Voltage	V_o	$I_o=5\text{mA}\sim 350\text{mA}$ $V_i=10.5\sim 23\text{V}$	7.6	8	8.4	V
Line Regulation(Note)	ΔV_o	$I_o=200\text{mA}$ $T_j=25^{\circ}\text{C}$			100	mV
					50	
Load Regulation(Note)	ΔV_o	$T_j=25^{\circ}\text{C}$			160	mV
					80	
Quiescent Current	I_Q	$T_j=25^{\circ}\text{C}$			6.0	mA
Quiescent Current Change	ΔI_Q	$I_o=5\text{mA}\sim 350\text{mA}$			0.5	mA
		$I_o=200\text{mA}$, $V_i=10.5\sim 25\text{V}$			0.8	
Output Voltage Drift	$\Delta V/\Delta T$	$I_o=5\text{mA}$, $T_j=0\sim 125^{\circ}\text{C}$		-0.8		mV/ $^{\circ}\text{C}$
Output Noise Voltage	V_N	$f=10\text{Hz}\sim 100\text{KHz}$		52		μV
Ripple Rejection	RR	$f=120\text{Hz}$, $V_i=11.5\sim 21.5\text{V}$		80		dB
Dropout Voltage	V_D	$T_j=25^{\circ}\text{C}$, $I_o=500\text{mA}$		2		V

Short Circuit Current	I _{SC}	T _j =25°C ,V _I =35V		800		mA
Peak Current	I _{PK}	T _j =25°C		900		mA

Notes:

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

Electrical Characteristics (L78M09)

(Refer to the test circuits, 0 < T_j < +125°C, I_O=350mA, V_I= 15V, unless otherwise specified, C₁= 0.33μF, C_O=0. 1μF)

Parameter	Symbol	Conditions	Value			Unit
			Min	Typ	Max	
Output Voltage	V _O	I _O = 5mA~350mA V _I = 11.5~24V	8.45	9	9.55	V
Line Regulation(Note)	ΔV _O	I _O = 200mA T _j =25°C	V _I = 11.5V~25V		100	mV
			V _I = 12V~25V		50	
Load Regulation(Note)	ΔV _O	T _j =25°C	I _O = 5mA~500mA		180	mV
			I _O = 5mA~200mA		90	
Quiescent Current	I _Q	T _j =25°C			6.0	mA
Quiescent Current Change	ΔI _Q	I _O = 5mA~350mA			0.5	mA
		I _O =200mA,V _I = 11.5~25V			0.8	
Output Voltage Drift	ΔV/ΔT	I _O =5mA,T _j =0~125°C		-0.8		mV/°C
Output Noise Voltage	V _N	f=10Hz~100KHz		52		μV
Ripple Rejection	RR	f=120Hz,V _I = 12.5~22.5V		80		dB
Dropout Voltage	V _D	T _j =25°C ,I _O = 500mA		2		V
Short Circuit Current	I _{SC}	T _j =25°C ,V _I =35V		800		mA
Peak Current	I _{PK}	T _j =25°C		900		mA

Notes:

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

Electrical Characteristics (L78M12)

(Refer to the test circuits, 0 < T_j < +125°C, I_O=350mA, V_I= 19V, unless otherwise specified, C₁= 0.33μF, C_O=0. 1μF)

Parameter	Symbol	Conditions	Value			Unit
			Min	Typ	Max	
Output Voltage	V _O	I _O = 5mA~350mA V _I = 14.5~27V	11.4	12	12.6	V
Line Regulation(Note)	ΔV _O	I _O = 200mA T _j =25°C	V _I = 14.5V~30V		100	mV
			V _I = 16V~30V		50	
Load Regulation(Note)	ΔV _O	T _j =25°C	I _O = 5mA~500mA		240	mV
			I _O = 5mA~200mA		120	
Quiescent Current	I _Q	T _j =25°C			6.0	mA
Quiescent Current Change	ΔI _Q	I _O = 5mA~350mA			0.5	mA

		$I_o=200\text{mA}, V_I=14.5\sim 30\text{V}$			0.8	
Output Voltage Drift	$\Delta V/\Delta T$	$I_o=5\text{mA}, T_j=0\sim 125^\circ\text{C}$		-0.8		mV/°C
Output Noise Voltage	V_N	$f=10\text{Hz}\sim 100\text{KHz}$		75		μV
Ripple Rejection	RR	$f=120\text{Hz}, V_I=15\sim 25\text{V}$		80		dB
Dropout Voltage	V_D	$T_j=25^\circ\text{C}, I_o=500\text{mA}$		2		V
Short Circuit Current	I_{SC}	$T_j=25^\circ\text{C}, V_I=35\text{V}$		800		mA
Peak Current	I_{PK}	$T_j=25^\circ\text{C}$		900		mA

Notes:

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

Electrical Characteristics (L78M15)

(Refer to the test circuits, $0 < T_j < +125^\circ\text{C}$, $I_o=350\text{mA}$, $V_I=23\text{V}$, unless otherwise specified, $C_1=0.33\mu\text{F}$, $C_o=0.1\mu\text{F}$)

Parameter	Symbol	Conditions		Value			Unit
				Min	Typ	Max	
Output Voltage	V_o	$I_o=5\text{mA}\sim 350\text{mA}$ $V_I=17.5\sim 30\text{V}$		14.25	15	15.75	V
Line Regulation(Note)	ΔV_o	$I_o=200\text{mA}$ $T_j=25^\circ\text{C}$	$V_I=17.5\text{V}\sim 30\text{V}$			100	mV
			$V_I=20\text{V}\sim 30\text{V}$			50	
Load Regulation(Note)	ΔV_o	$T_j=25^\circ\text{C}$	$I_o=5\text{mA}\sim 500\text{mA}$			300	mV
			$I_o=5\text{mA}\sim 200\text{mA}$			150	
Quiescent Current	I_Q	$T_j=25^\circ\text{C}$				6.0	mA
Quiescent Current Change	ΔI_Q	$I_o=5\text{mA}\sim 350\text{mA}$				0.5	mA
		$I_o=200\text{mA}, V_I=17.5\sim 30\text{V}$				0.8	
Output Voltage Drift	$\Delta V/\Delta T$	$I_o=5\text{mA}, T_j=0\sim 125^\circ\text{C}$			-1.0		mV/°C
Output Noise Voltage	V_N	$f=10\text{Hz}\sim 100\text{KHz}$			100		μV
Ripple Rejection	RR	$f=120\text{Hz}, V_I=18.5\sim 28.5\text{V}$			70		dB
Dropout Voltage	V_D	$T_j=25^\circ\text{C}, I_o=500\text{mA}$			2		V
Short Circuit Current	I_{SC}	$T_j=25^\circ\text{C}, V_I=35\text{V}$			800		mA
Peak Current	I_{PK}	$T_j=25^\circ\text{C}$			900		mA

Notes:

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

Electrical Characteristics (L78M18)

(Refer to the test circuits, $0 < T_j < +125^\circ\text{C}$, $I_o=350\text{mA}$, $V_I=26\text{V}$, unless otherwise specified, $C_1=0.33\mu\text{F}$, $C_o=0.1\mu\text{F}$)

Parameter	Symbol	Conditions		Value			Unit
				Min	Typ	Max	
Output Voltage	V_o	$I_o=5\text{mA}\sim 350\text{mA}$ $V_I=20.5\sim 33\text{V}$		17.1	18	18.9	V
Line Regulation(Note)	ΔV_o	$I_o=200\text{mA}$	$V_I=21\text{V}\sim 33\text{V}$			100	mV

		T _j =25°C	V _I =24V~33V			50	
Load Regulation(Note)	ΔV_O	T _j =25°C	I _O = 5mA~500mA			360	mV
			I _O = 5mA~200mA			180	
Quiescent Current	I _Q	T _j =25°C				6.0	mA
Quiescent Current Change	ΔI_Q	I _O =5mA~350mA				0.5	mA
		I _O =200mA, V _I =21V~33V				0.8	
Output Voltage Drift	$\Delta V/\Delta T$	I _O =5mA, T _j =0~125°C			-1.2		mV/°C
Output Noise Voltage	V _N	f=10Hz~100KHz			100		μV
Ripple Rejection	RR	f=120Hz, V _I =22~32V			70		dB
Dropout Voltage	V _D	T _j =25°C, I _O =500mA			2		V
Short Circuit Current	I _{SC}	T _j =25°C, V _I =35V			800		mA
Peak Current	I _{PK}	T _j =25°C			900		mA

Notes:

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

Electrical Characteristics (L78M24)

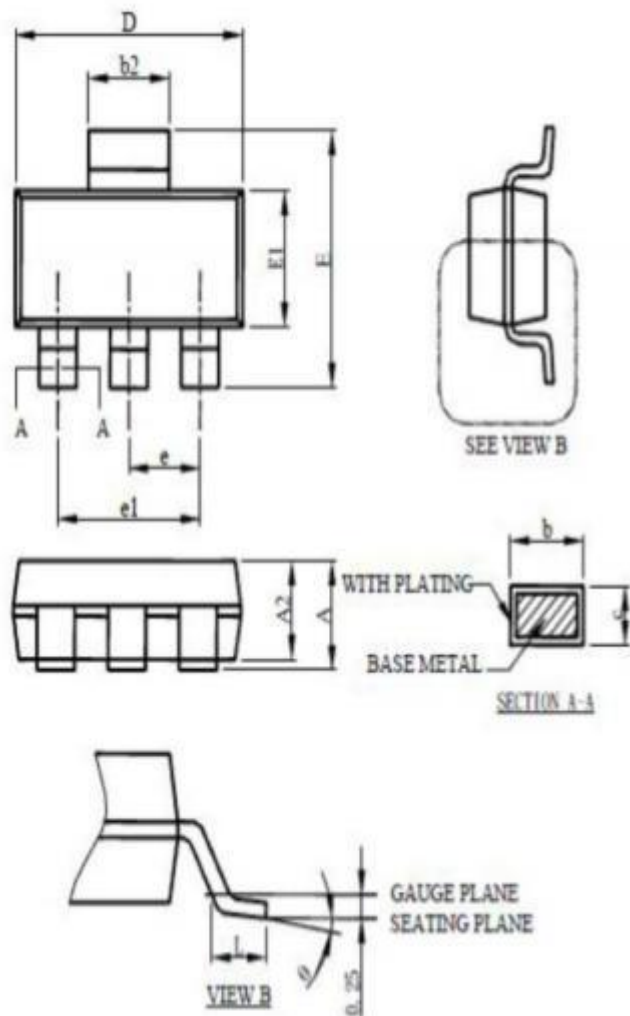
(Refer to the test circuits, 0 < T_J < +125°C, I_O=350mA, V_I=33V, unless otherwise specified, C₁=0.33μF, C_O=0.1μF)

Parameter	Symbol	Conditions		Value			Unit
				Min	Typ	Max	
Output Voltage	V _O	I _O = 5mA~350mA V _I =27~38V		22.8	24	25.2	V
Line Regulation(Note)	ΔV_O	I _O = 200mA T _j =25°C	V _I =27V~38V			100	mV
			V _I =28V~38V			50	
Load Regulation(Note)	ΔV_O	T _j =25°C	I _O = 5mA~500mA			480	mV
			I _O = 5mA~200mA			240	
Quiescent Current	I _Q	T _j =25°C				6.0	mA
Quiescent Current Change	ΔI_Q	I _O =5mA~350mA				0.5	mA
		I _O =200mA, V _I =27V~38V				0.8	
Output Voltage Drift	$\Delta V/\Delta T$	I _O =5mA, T _j =0~125°C			-1.2		mV/°C
Output Noise Voltage	V _N	f=10Hz~100KHz			170		μV
Ripple Rejection	RR	f=120Hz, V _I =28~38V			70		dB
Dropout Voltage	V _D	T _j =25°C, I _O =500mA			2		V
Short Circuit Current	I _{SC}	T _j =25°C, V _I =35V			800		mA
Peak Current	I _{PK}	T _j =25°C			900		mA

Notes:

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

SOT-223

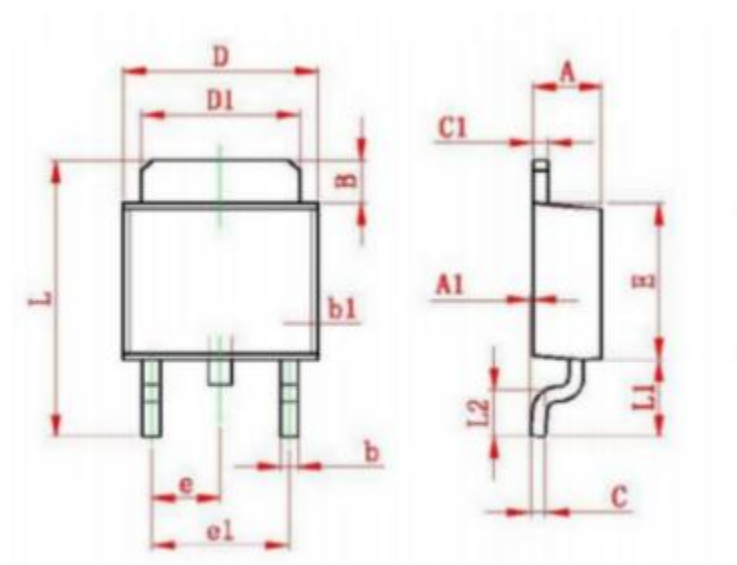


Package Information

Symbol	SOT-223	
	MILLIMETERS	
	MIN.	MAX.
A		1.80
A1	0.02	0.10
A2	1.55	1.65
b	0.66	0.84
b2	2.90	3.10
c	0.23	0.33
D	6.30	6.70
E	6.70	7.30

E1	3.30	3.70
e	2.30 BSC	
e1	4.60 BSC	
L	0.90	
θ	0°	8°

TO252



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
B	1.350	1.650	0.053	0.065
b	0.500	0.700	0.020	0.028
b1	0.700	0.900	0.028	0.035
c	0.430	0.580	0.017	0.023
c1	0.430	0.580	0.017	0.023
D	6.350	6.650	0.250	0.262
D1	5.200	5.400	0.205	0.213
E	5.400	5.700	0.213	0.224
e	2.300 TYP		0.091 TYP	
e1	4.500	4.700	0.177	0.185
L	9.500	9.900	0.374	0.390
L1	2.550	2.900	0.100	0.114
L2	1.400	1.780	0.055	0.070
V	3.80 REF		0.150 REF	

Statement:

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[AP2210K-3.0TRE1](#) [AP2113AMTR-G1](#) [NJW4104U2-33A-TE1](#) [MP2013AGG-5-P](#) [NCV8775CDT50RKG](#) [NJM2878F3-45-TE1](#) [S-](#)
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