3-TERMINAL POSITIVE VOLTAGE REGULATOR LM78MXX

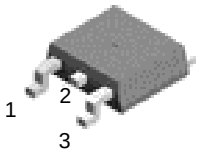
FEATURES

- Output current in excess of 0.5A
- No external components required
- Internal short circuit current limiting
- Output Voltage of 5V, 6V, 8V, 9V, 12V, 15V, 18V, 24V
- Internal thermal overload protection
- Output transistor safe-area compensation

DESCRIPTION

The LM78MXX series of three terminal positive regulators are available in the TO-252 package and with several fixed output voltages making them useful in a wide range of applications.

TO-252-3L PKG



PIN 1. VIN PIN 2. GND PIN 3. VOUT

ORDERING INFORMATION

Device	Package
LM78MXXRS	TO-252-3L

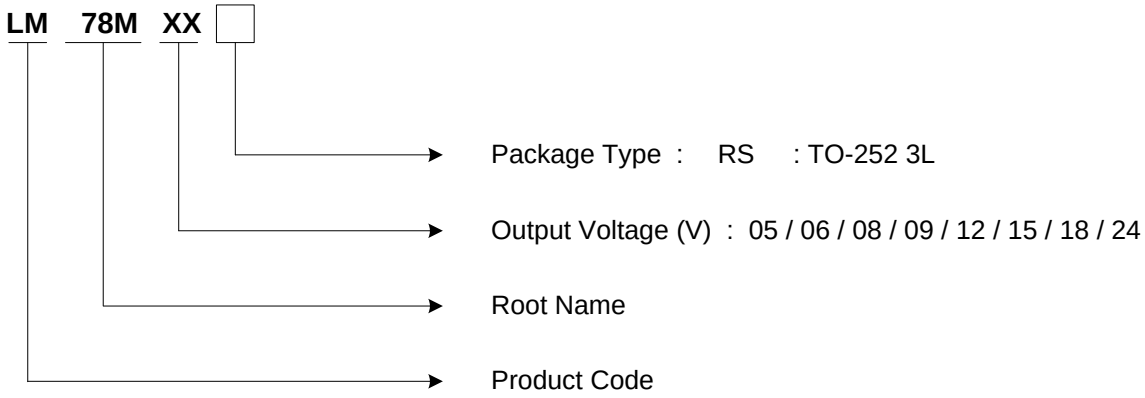
X.X : Output Voltage = 05, 06, 08, 09, 12, 15, 18, 24

Absolute Maximum Ratings

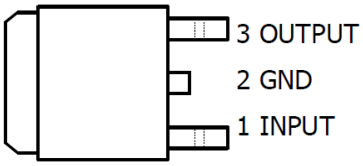
CHARACTERISTIC		SYMBOL	MIN.	MAX.	UNIT
Input Voltage	LM78M05 ~ 18	V_{IN}	-	35	V
	LM78M24	V_{IN}	-	40	
Storage Temperature Range		T_{STG}	-65	150	℃
Operating Junction Temperature Range		T_{JOPR}	-40	125	℃

Ordering Information

V_{OUT}	Package	Order No.	Description	Supplied As	Status
5.0V	TO-252-3L	LM78M05RS	0.5A, Positive	Reel	Active
6.0V	TO-252-3L	LM78M06RS	0.5A, Positive	Reel	Contact us
8.0V	TO-252-3L	LM78M08RS	0.5A, Positive	Reel	Contact us
9.0V	TO-252-3L	LM78M09RS	0.5A, Positive	Reel	Contact us
12V	TO-252-3L	LM78M12RS	0.5A, Positive	Reel	Contact us
15V	TO-252-3L	LM78M15RS	0.5A, Positive	Reel	Active
18V	TO-252-3L	LM78M18RS	0.5A, Positive	Reel	Contact us
24V	TO-252-3L	LM78M24RS	0.5A, Positive	Reel	Contact us



PIN CONFIGURATION



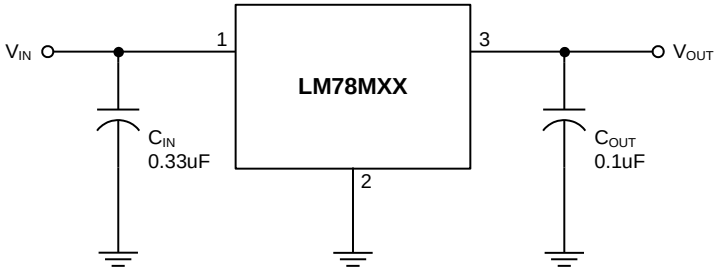
TO-252-3L

PIN DESCRIPTION

Pin No.	TO-252-3L PKG	
	Name	Function
1	VIN	Input Voltage
2	GND	Ground
3	VOUT	Output Voltage

* Heatsink surface connected to Pin 2.

Typical Applications



Note)

1. To specify an output voltage, substitute voltage for "XX".
2. C_{OUT} improves stability and transient response.

ELECTRICAL CHARACTERISTICS

LM78M05 (Vin=10V, Io=0.5A, C_{IN}=0.33μF, C_{OUT}=0.1μF, T_A =+25°C, unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITION(Note 1)	MIN.	TYP.	MAX.	UNIT
Output Voltage(Note 2)	V_{OUT}	I_O=500mA	4.9	5.0	5.1	V
		5mA ≤ Io ≤ 350mA 7V ≤ V_{IN} ≤ 20V	4.8	5.0	5.2	
Line Regulation	ΔV_{LINE}	7V ≤ V_{IN} ≤ 25V, I_O=200mA	-	-	100	mV
		8V ≤ V_{IN} ≤ 25V, I_O=350mA	-	-	50	
Load Regulation	ΔV_{LOAD}	5mA ≤ Io ≤ 500mA	-	-	100	mV
		5mA ≤ Io ≤ 200mA	-	-	50	
Quiescent Current	I_Q		-	-	6.0	mA
Quiescent Current Change	ΔI_Q	8V ≤ V_{IN} ≤ 25V, I_O=200mA	-	-	0.8	mA
		5mA ≤ Io ≤ 500mA	-	-	0.5	
Dropout Voltage	V_D	0 ≤ I_O ≤ 350mA	-	2.0	2.2	V

LM78M06 (Vin=11V, Io=0.5A, C_{IN}=0.33μF, C_{OUT}=0.1μF, T_A =+25°C, unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITION(Note 1)	MIN.	TYP.	MAX.	UNIT
Output Voltage(Note 2)	V_{OUT}	I_O=500mA	5.88	6.0	6.12	V
		5mA ≤ Io ≤ 350mA 8V ≤ V_{IN} ≤ 21V	5.76	6.0	6.24	
Line Regulation	ΔV_{LINE}	8V ≤ V_{IN} ≤ 25V, I_O=200mA	-	-	100	mV
		9V ≤ V_{IN} ≤ 25V, I_O=350mA	-	-	50	
Load Regulation	ΔV_{LOAD}	5mA ≤ Io ≤ 500mA	-	-	120	mV
		5mA ≤ Io ≤ 200mA	-	-	50	
Quiescent Current	I_Q		-	-	6.0	mA
Quiescent Current Change	ΔI_Q	9V ≤ V_{IN} ≤ 25V, I_O=200mA	-	-	0.8	mA
		5mA ≤ Io ≤ 500mA	-	-	0.5	
Dropout Voltage	V_D	0 ≤ I_O ≤ 350mA	-	2.0	2.2	V

LM78M08 (Vin=14V, Io=0.5A, C_{IN}=0.33μF, C_{OUT}=0.1μF, T_A =+25°C, unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITION(Note 1)	MIN.	TYP.	MAX.	UNIT
Output Voltage(Note 2)	V_{OUT}	I_O=500mA	7.84	8.0	8.16	V
		5mA ≤ Io ≤ 350mA 10.5V ≤ V_{IN} ≤ 23V	7.68	8.0	8.32	
Line Regulation	ΔV_{LINE}	10.5V ≤ V_{IN} ≤ 25V, I_O=200mA	-	-	100	mV
		11V ≤ V_{IN} ≤ 25V, I_O=350mA	-	-	50	
Load Regulation	ΔV_{LOAD}	5mA ≤ Io ≤ 500mA	-	-	160	mV
		5mA ≤ Io ≤ 200mA	-	-	80	
Quiescent Current	I_Q		-	-	6.0	mA
Quiescent Current Change	ΔI_Q	10.5V ≤ V_{IN} ≤ 25V, I_O=200mA	-	-	0.8	mA
		5mA ≤ Io ≤ 500mA	-	-	0.5	
Dropout Voltage	V_D	0 ≤ I_O ≤ 350mA	-	2.0	2.2	V

LM78M09 (Vin=16V, Io=0.5A, C_{IN}=0.33μF, C_{OUT}=0.1μF, T_A =+25°C, unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITION(Note 1)	MIN.	TYP.	MAX.	UNIT
Output Voltage(Note 2)	V_{OUT}	I_O=500mA	8.82	9.0	9.18	V
		5mA ≤ Io ≤ 350mA 11.5V ≤ V_{IN} ≤ 24V	8.64	9.0	9.36	
Line Regulation	ΔV_{LINE}	11.5V ≤ V_{IN} ≤ 26V, I_O=200mA	-	-	100	mV
		12V ≤ V_{IN} ≤ 26V, I_O=350mA	-	-	50	
Load Regulation	ΔV_{LOAD}	5mA ≤ Io ≤ 500mA	-	-	180	mV
		5mA ≤ Io ≤ 200mA	-	-	90	
Quiescent Current	I_Q		-	-	6.0	mA
Quiescent Current Change	ΔI_Q	11.5V ≤ V_{IN} ≤ 26V, I_O=200mA	-	-	0.8	mA
		5mA ≤ Io ≤ 500mA	-	-	0.5	
Dropout Voltage	V_D	0 ≤ I_O ≤ 350mA	-	2.0	2.2	V

LM78M12 (Vin=19V, Io=0.5A, C_{IN}=0.33μF, C_{OUT}=0.1μF, T_A =+25°C, unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITION(Note 1)	MIN.	TYP.	MAX.	UNIT
Output Voltage(Note 2)	V_{OUT}	I_O=500mA	11.76	12.0	12.24	V
		5mA ≤ Io ≤ 350mA 14.5V ≤ V_{IN} ≤ 27V	11.52	12.0	12.48	
Line Regulation	ΔV_{LINE}	14.5V ≤ V_{IN} ≤ 30V, I_O=200mA	-	-	100	mV
		16V ≤ V_{IN} ≤ 30V, I_O=350mA	-	-	50	
Load Regulation	ΔV_{LOAD}	5mA ≤ Io ≤ 500mA	-	-	240	mV
		5mA ≤ Io ≤ 200mA	-	-	120	
Quiescent Current	I_Q		-	-	6.0	mA
Quiescent Current Change	ΔI_Q	14.5V ≤ V_{IN} ≤ 30V, I_O=200mA	-	-	0.8	mA
		5mA ≤ Io ≤ 500mA	-	-	0.5	
Dropout Voltage	V_D	0 ≤ I_O ≤ 350mA	-	2.0	2.2	V

LM78M15 (Vin=23V, Io=0.5A, C_{IN}=0.33μF, C_{OUT}=0.1μF, T_A =+25°C, unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITION(Note 1)	MIN.	TYP.	MAX.	UNIT
Output Voltage(Note 2)	V_{OUT}	I_O=500mA	14.7	15.0	15.3	V
		5mA ≤ Io ≤ 350mA 17.5V ≤ V_{IN} ≤ 30V	14.4	15.0	15.6	
Line Regulation	ΔV_{LINE}	17.5V ≤ V_{IN} ≤ 30V, I_O=200mA	-	-	100	mV
		20V ≤ V_{IN} ≤ 30V, I_O=350mA	-	-	50	
Load Regulation	ΔV_{LOAD}	5mA ≤ Io ≤ 500mA	-	-	300	mV
		5mA ≤ Io ≤ 200mA	-	-	150	
Quiescent Current	I_Q		-	-	6.0	mA
Quiescent Current Change	ΔI_Q	17.5V ≤ V_{IN} ≤ 30V, I_O=200mA	-	-	0.8	mA
		5mA ≤ Io ≤ 500mA	-	-	0.5	
Dropout Voltage	V_D	0 ≤ I_O ≤ 350mA	-	2.0	2.2	V

LM78M18 (Vin=26V, Io=0.5A, C_{IN}=0.33μF, C_{OUT}=0.1μF, T_A =+25°C, unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITION(Note 1)	MIN.	TYP.	MAX.	UNIT
Output Voltage(Note 2)	V_{OUT}	I_O=500mA	17.64	18.0	18.36	V
		5mA ≤ Io ≤ 350mA 20.5V ≤ V_{IN} ≤ 33V	17.28	18.0	18.72	
Line Regulation	ΔV_{LINE}	21V ≤ V_{IN} ≤ 33V, I_O=200mA	-	-	100	mV
		24V ≤ V_{IN} ≤ 30V, I_O=350mA	-	-	50	
Load Regulation	ΔV_{LOAD}	5mA ≤ Io ≤ 500mA	-	-	360	mV
		5mA ≤ Io ≤ 200mA	-	-	180	
Quiescent Current	I_Q		-	-	6.0	mA
Quiescent Current Change	ΔI_Q	21V ≤ V_{IN} ≤ 33V, I_O=200mA	-	-	0.8	mA
		5mA ≤ Io ≤ 500mA	-	-	0.5	
Dropout Voltage	V_D	0 ≤ I_O ≤ 350mA	-	2.0	2.2	V

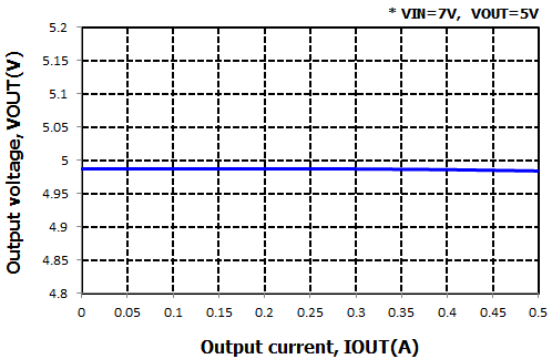
LM78M24 (Vin=33V, Io=0.5A, C_{IN}=0.33μF, C_{OUT}=0.1μF, T_A =+25°C, unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITION(Note 1)	MIN.	TYP.	MAX.	UNIT
Output Voltage(Note 2)	V_{OUT}	I_O=500mA	23.52	24.0	24.48	V
		5mA ≤ Io ≤ 350mA 27V ≤ V_{IN} ≤ 38V	23.04	24.0	24.96	
Line Regulation	ΔV_{LINE}	27V ≤ V_{IN} ≤ 38V, I_O=200mA	-	-	100	mV
		28V ≤ V_{IN} ≤ 38V, I_O=350mA	-	-	50	
Load Regulation	ΔV_{LOAD}	5mA ≤ Io ≤ 500mA	-	-	480	mV
		5mA ≤ Io ≤ 200mA	-	-	240	
Quiescent Current	I_Q		-	-	6.0	mA
Quiescent Current Change	ΔI_Q	27V ≤ V_{IN} ≤ 38V, I_O=200mA	-	-	0.8	mA
		5mA ≤ Io ≤ 500mA	-	-	0.5	
Dropout Voltage	V_D	0 ≤ I_O ≤ 350mA	-	2.0	2.2	V

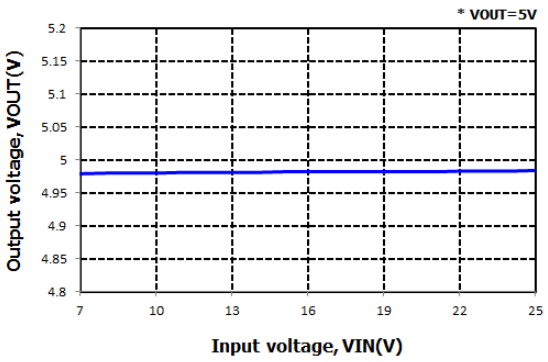
Note 1. Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately.
All characteristics are measured with a 0.33uF capacitor across the input and a 0.1uF capacitor across the output.
Note 2. This specification applies only for DC power dissipation permitted by absolute maximum ratings.

TYPICAL OPERATING CHARACTERISTICS

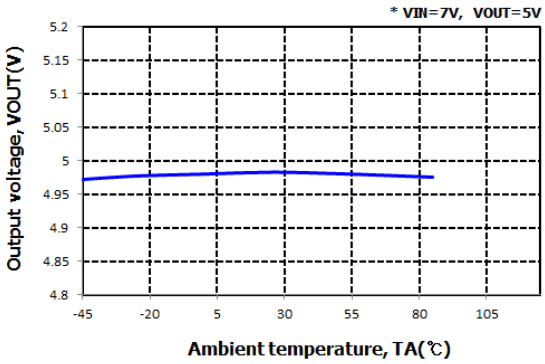
- VOUT vs. IOUT



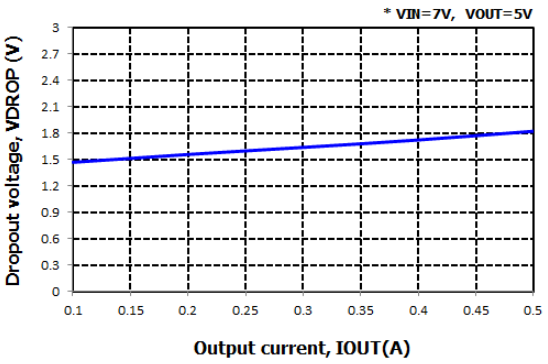
- VOUT vs. VIN



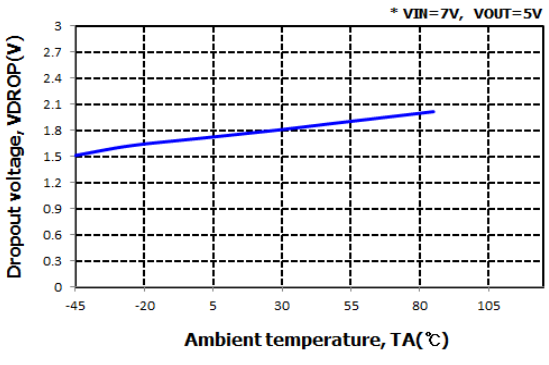
- VOUT vs. TA



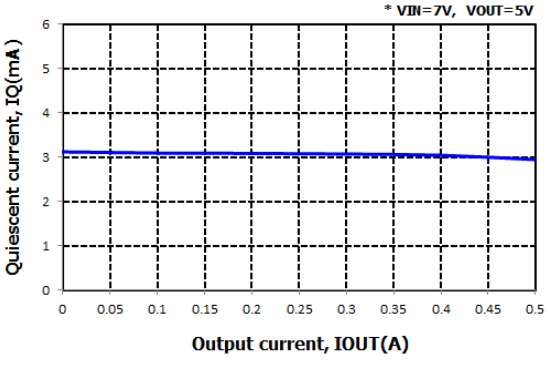
- VDROP vs. IOUT



- VDROP vs. TA

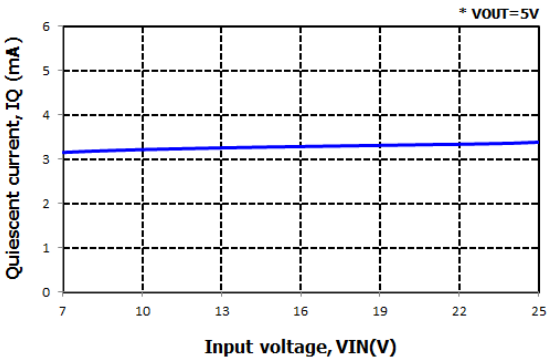


- IQ vs. IOUT

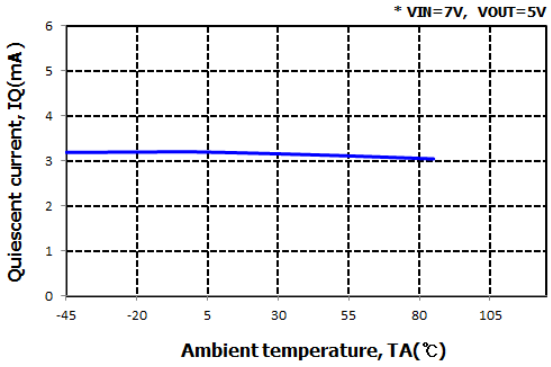


TYPICAL OPERATING CHARACTERISTICS (Continued)

- IQ vs. VIN



- IQ vs. TA



REVISION NOTICE

The description in this datasheet can be revised without any notice to describe its electrical characteristics properly.