

MICRO ELECTRONICS

ML78LXX series

100mA POSITIVE
VOLTAGE REGULATORS

The ML78LXX series are three-terminal positive voltage regulators for applications that require a regulated supply of fixed output voltage and current up to 100mA.

These regulators available in four fixed output voltage options from 5V, 12V, 15V and 18V. They feature internal current limiting, thermal shutdown and safe area compensation making them essentially blow proof.

They also feature low output impedance, low quiescent current and low noise, these make them ideal as the replacement of the conventional regulator circuit consisted of zener diode and resistor.

FEATURES

- Output current of 100mA
- Internal short-circuit current limiting
- Internal thermal overload protection
- Output transistor safe area protection
- No external component required
- No external adjustment required
- Output voltage tolerances of $\pm 5\%$ (ML78L00A) and $\pm 10\%$ (ML78L00 without A suffix)
- Output voltage adjustable by external components

CASE TO-92



Pin:
1. output
2. ground
3. input

003001

R

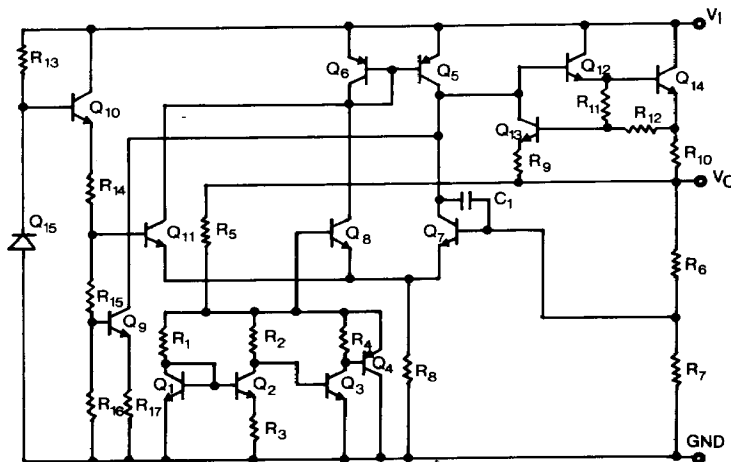
S-49

T-3001

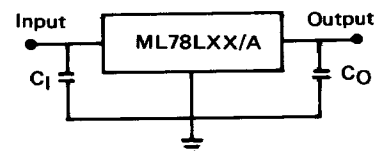
ABSOLUTE MAXIMUM RATINGS:

Input Voltage	ML78L05/A ML78L12/A, 15/A, 18/A	V_I	30V 35V
Power Dissipation		P_d	500mW
Operating Temperature Range		T_{opr}	0°C to $+70^{\circ}\text{C}$
Junction Temperature		T_j	150°C
Storage Temperature Range		T_{stg}	-65°C to $+150^{\circ}\text{C}$

EQUIVALENT CIRCUIT



STANDARD APPLICATION



The input voltage must remain at least 2V above the output voltage.

C_I is required if regulator is located an appreciable distance from power supply filter.

C_O is for improvement of transient response.



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ML78LXX series

100mA POSITIVE VOLTAGE REGULATORS

ML78L05/A ELECTRICAL CHARACTERISTICS: ($V_I = 10V$, $I_O = 40mA$, $C_I = 0.33\mu F$, $C_O = 0.1\mu F$, $0^\circ C < T_j < +125^\circ C$ unless otherwise noted)

PARAMETER	SYMBOL	ML78L05			ML78L05A			UNIT	TEST CONDITIONS
		MIN	TYP	MAX	MIN	TYP	MAX		
Output Voltage	V_O	4.6	5	5.4	4.8	5	5.2	V	$T_j = +25^\circ C$
Line Regulation	ΔV_O		55	200		55	150	mV	$T_j = +25^\circ C$ $I_O = 40mA$ $7V \leq V_I \leq 20V$ $8V \leq V_I \leq 20V$
			45	150		45	100	mV	
Load Regulation	ΔV_O		11	60		11	60	mV	$T_j = +25^\circ C$ $1mA \leq I_O \leq 100mA$ $1mA \leq I_O \leq 40mA$
			5	30		5	30	mV	
Output Voltage	V_O	4.5		5.5	4.75		5.25	V	$7V \leq V_I \leq 20V$ $1mA \leq I_O \leq 40mA$ $V_I = 10V$ $1mA \leq I_O \leq 70mA$
		4.5		5.5	4.75		5.25	V	
Quiescent Current	I_Q		3.8	6		3.8	6	mA	$T_j = +25^\circ C$ $T_j = +125^\circ C$
				5.5			5.5	mA	
Quiescent Current Change	ΔI_Q			1.5			1.5	mA	$8V \leq V_I \leq 20V$ $1mA \leq I_O \leq 40mA$
				0.2			0.1	mA	
Output Noise Voltage	$\bar{E}_n$		40			40		μV	$T_A = +25^\circ C$ $10Hz \leq f \leq 100kHz$
Long Term Stability	$\Delta V_O / \Delta t$		12			12		mV/kHrs.	
Ripple Rejection	$\Delta V_I / \Delta V_O$	40	49		41	49		dB	$T_j = +25^\circ C$ $I_O = 40mA$ $f = 120Hz$ $8V \leq V_I \leq 18V$
Input-Output Voltage Differential	$V_I - V_O$		1.7			1.7		V	$T_j = +25^\circ C$

ML78L12/A ELECTRICAL CHARACTERISTICS ($V_I = 19V$, $I_O = 40mA$, $C_I = 0.33\mu F$, $C_O = 0.1\mu F$, $0^\circ C < T_j < +125^\circ C$ unless otherwise noted)

PARAMETER	SYMBOL	ML78L12			ML78L12A			UNIT	TEST CONDITIONS
		MIN	TYP	MAX	MIN	TYP	MAX		
Output Voltage	V_O	11.1	12	12.9	11.5	12	12.5	V	$T_j = +25^\circ C$
Line Regulation	ΔV_O		120	250		120	250	mV	$T_j = +25^\circ C$ $I_O = 40mA$ $14.5V \leq V_I \leq 27V$ $16V \leq V_I \leq 27V$
			100	200		100	200	mV	
Load Regulation	ΔV_O		20	100		20	100	mV	$T_j = +25^\circ C$ $1mA \leq I_O \leq 100mA$ $1mA \leq I_O \leq 40mA$
			10	50		10	50	mV	
Output Voltage	V_O	10.8		13.2	11.4		12.6	V	$14.5V \leq V_I \leq 27V$ $1mA \leq I_O \leq 40mA$ $V_I = 19V$ $1mA \leq I_O \leq 70mA$
		10.8		13.2	11.4		12.6	V	
Quiescent Current	I_Q		4.2	6.5		4.2	6.5	mA	$T_j = +25^\circ C$ $T_j = +125^\circ C$
				6			6	mA	
Quiescent Current Change	ΔI_Q			1.5			1.5	mA	$16V \leq V_I \leq 27V$ $1mA \leq I_O \leq 40mA$
				0.2			0.1	mA	
Output Noise Voltage	$\bar{E}_n$		80			80		μV	$T_A = +25^\circ C$ $10Hz \leq f \leq 100kHz$
Long Term Stability	$\Delta V_O / \Delta t$		24			24		mV/kHrs.	
Ripple Rejection	$\Delta V_I / \Delta V_O$	36	42		37	42		dB	$T_j = +25^\circ C$ $I_O = 40mA$ $f = 120Hz$ $15V \leq V_I \leq 25V$
Input-Output Voltage Differential	$V_I - V_O$		1.7			1.7		V	$T_j = +25^\circ C$

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ML78L15/A ELECTRICAL CHARACTERISTICS: ($V_I = 23V$, $I_O = 40mA$, $C_I = 0.33\mu F$, $C_O = 0.1\mu F$, $0^\circ C < T_J < +125^\circ C$ unless otherwise noted)

PARAMETER	SYMBOL	ML78L15 MIN TYP MAX			ML78L15A MIN TYP MAX			UNIT	TEST CONDITIONS
Output Voltage	V_O	13.8	15	16.2	14.4	15	15.6	V	$T_J = +25^\circ C$
Line Regulation	ΔV_O		130	300		130	300	mV	$T_J = +25^\circ C$ $I_O = 40mA$ $17.5V \leq V_I \leq 30V$
			110	250		110	250	mV	$20V \leq V_I \leq 30V$
Load Regulation	ΔV_O		25	150		25	150	mV	$T_J = +25^\circ C$ $1mA \leq I_O \leq 100mA$
			12	75		12	75	mV	$1mA \leq I_O \leq 40mA$
Output Voltage	V_O	13.5		16.5	14.25		15.75	V	$17.5V \leq V_I \leq 30V$ $1mA \leq I_O \leq 40mA$
		13.5		16.5	14.25		15.75	V	$V_I = 23V$ $1mA \leq I_O \leq 70mA$
Quiescent Current	I_Q		4.4	6.5		4.4	6.5	mA	$T_J = +25^\circ C$
				6			6	mA	$T_J = +125^\circ C$
Quiescent Current Change	ΔI_Q			1.5			1.5	mA	$20V \leq V_I \leq 30V$
				0.2			0.1	mA	$1mA \leq I_O \leq 40mA$
Output Noise Voltage	$\bar{E}_n$		90			90		μV	$T_A = +25^\circ C$ $10Hz \leq f \leq 100kHz$
Long Term Stability	$\Delta V_O / \Delta t$		30			30		mV/kHrs.	
Ripple Rejection	$\Delta V_I / \Delta V_O$	33	39		34	39		dB	$T_J = +25^\circ C$ $I_O = 40mA$ $f = 120Hz$ $18.5V \leq V_I \leq 28.5V$
Input-Output Voltage Differential	$V_I - V_O$		1.7			1.7		V	$T_J = +25^\circ C$

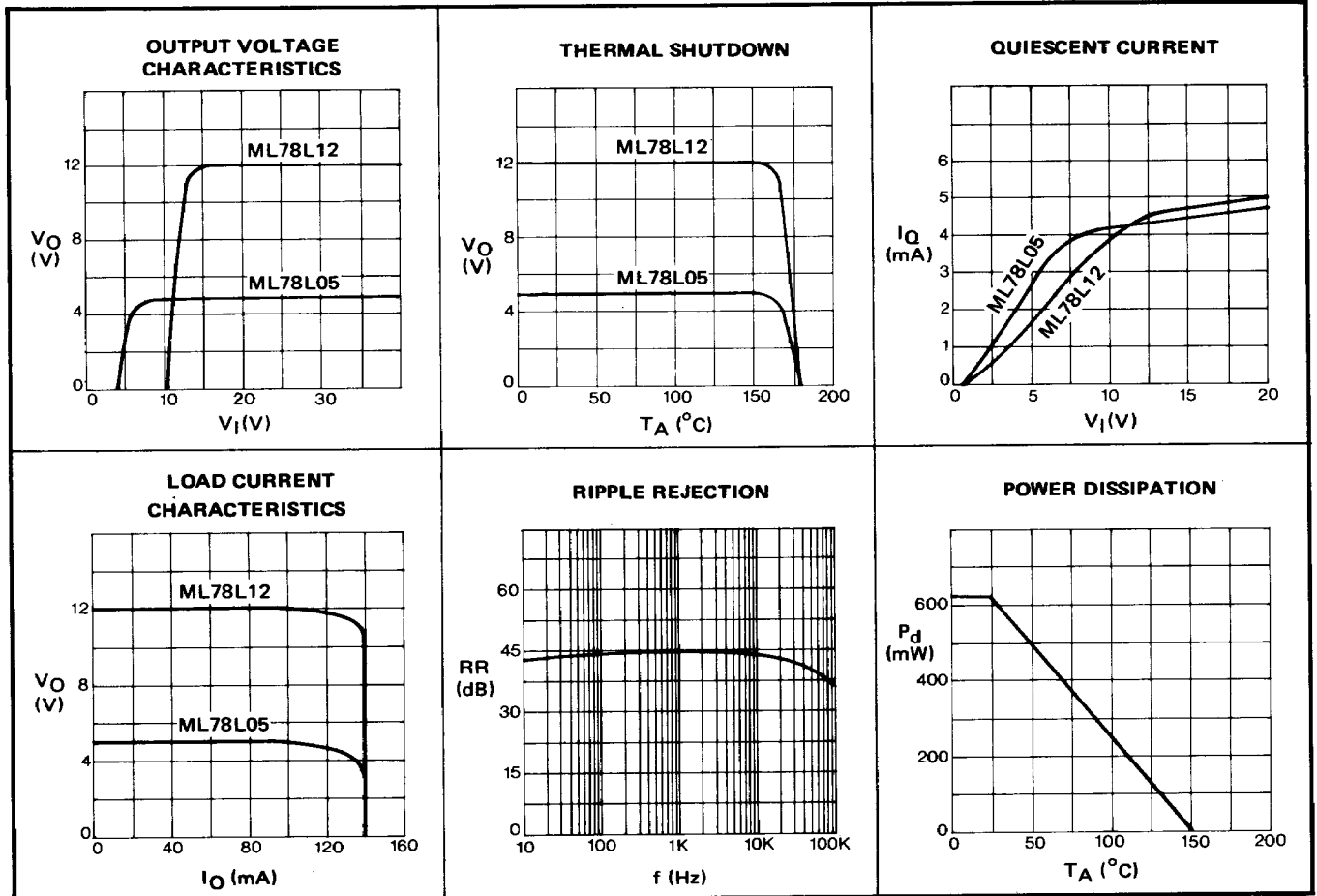
ML78L18/A ELECTRICAL CHARACTERISTICS: ($V_I = 27V$, $I_O = 40mA$, $C_I = 0.33\mu F$, $C_O = 0.1\mu F$, $0^\circ C < T_J < +125^\circ C$ unless otherwise noted)

PARAMETER	SYMBOL	ML78L18 MIN TYP MAX			ML78L18A MIN TYP MAX			UNIT	TEST CONDITIONS
Output Voltage	V_O	16.6	18	19.4	17.3	18	18.7	V	$T_J = +25^\circ C$
Line Regulation	ΔV_O		32	325		45	325	mV	$T_J = +25^\circ C$ $I_O = 40mA$ $21.4V \leq V_I \leq 33V$
			27	275		35	275	mV	$20.7V \leq V_I \leq 33V$
								mV	$22V \leq V_I \leq 33V$
								mV	$21V \leq V_I \leq 33V$
Load Regulation	ΔV_O		30	170		30	170	mV	$T_J = +25^\circ C$ $1mA \leq I_O \leq 100mA$
			15	85		15	85	mV	$1mA \leq I_O \leq 40mA$
Output Voltage	V_O	16.2		19.8	17.1		18.9	V	$1mA \leq I_O \leq 40mA$ $21.4V \leq V_I \leq 33V$
		16.2		19.8	17.1		18.9	V	$20.7V \leq V_I \leq 33V$
								V	$V_I = 27V$ $1mA \leq I_O \leq 70mA$
Quiescent Current	I_Q		3.1	6.5		3.1	6.5	mA	$T_J = +25^\circ C$
				6			6	mA	$T_J = +125^\circ C$
Quiescent Current Change	ΔI_Q			1.5			1.5	mA	$22V \leq V_I \leq 33V$
				0.2			0.1	mA	$21V \leq V_I \leq 33V$
								mA	$1mA \leq I_O \leq 40mA$
Output Noise Voltage	$\bar{E}_n$		150			150		μV	$T_A = +25^\circ C$ $10Hz \leq f \leq 100kHz$
Long Term Stability	$\Delta V_O / \Delta t$		45			45		mV/kHrs.	
Ripple Rejection	$\Delta V_I / \Delta V_O$	32	46		33	48		dB	$T_J = +25^\circ C$ $I_O = 40mA$ $f = 120Hz$ $23V \leq V_I \leq 33V$
Input-Output Voltage Differential	$V_I - V_O$		1.7			1.7		V	$T_J = +25^\circ C$

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ML78LXX series TYPICAL ELECTRICAL CHARACTERISTICS $T_J = 25^\circ\text{C}$



TYPICAL APPLICATIONS

