

MICRO ELECTRONICS

ML78L00-FBE* SERIES

3-TERMINAL POSITIVE VOLTAGE REGULATOR

The **ML78L00-FBE*** series of 3-Terminal Positive Voltage Regulators. These regulators employ internal current-limiting and thermal-shutdown, making them essentially indestructible. If adequate heat sinking is provided, they can deliver up to 100mA output current. They are intended as fixed voltage regulators in a wide range of applications including local or on-card regulation for elimination of noise and distribution problems associated with single-point regulation. In addition, they can be used with power pass elements to make high-current voltage regulators. The **ML78L00-FBE** series used as a zener diode/resistor combination replacement, offers an effective output impedance improvement of typically two orders of magnitude, along with lower quiescent current and lower noise.

* Parts of **FBE** are satisfied with requirements of directive 2002/95/EC on RoHS.

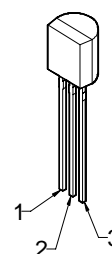
ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

PARAMETER	SYMBOL	MAXIMUM RATINGS	UNIT
Input Voltage	V _{IN}	(ML78L05A to ML78L10A)	30
		(ML78L12A to ML78L18A)	35
		(ML78L24A)	40
Output Current	I _o	100	mA
Power Dissipation	P _D	500	mW
Operating Temperature Range	T _{opr}	-40 to +85	°C
Storage Temperature Range	T _{stg}	-40 to +150	°C

Package Outline

TO-92



1. OUT
2. GND
3. IN

ELECTRICAL CHARACTERISTICS

(T_j=25°C, C_{IN}=0.33μF, C_o=0.1μF)

Measurement is to be conducted is pulse testing.

PARAMETER	SYMBOL	TEST CONDITIONS			MIN.	TYP.	MAX.	UNIT
ML78L05A								
Output Voltage	V _o	V _{IN} =10V	I _o =40mA		4.75	5.0	5.25	V
Line Regulation 1	Δ V _o V _{in} 1	V _{IN} =7V to 20V	I _o =40mA		-	-	150	mV
Line Regulation 2	Δ V _o V _{in} 2	V _{IN} =8V to 20V	I _o =40mA		-	-	100	mV
Load Regulation 1	Δ V _o I _o 1	V _{IN} =10V	I _o =1 to 40mA		-	-	30	mV
Load Regulation 2	Δ V _o I _o 2	V _{IN} =10V	I _o =1 to 100mA		-	-	60	mV
Quiescent Current	I _Q	V _{IN} =10V	I _o =0mA		-	3.8	6	mA
Average Temperature Coefficient of Output Voltage	Δ V _o / Δ T	V _{IN} =10V	I _o =1mA		-	0.4	-	mV/°C
Ripple Rejection	RR	8V<V _{IN} <18V	I _o =40mA	e _{in} =1Vp-p f=120Hz	41	49	-	dB
Output Noise Voltage	V _{NO}	V _{IN} =10V	BW=10Hz to 100KHz	I _o =40mA	-	42	-	μV
ML78L06A								
Output Voltage	V _o	V _{IN} =11V	I _o =40mA		5.7	6.0	6.3	V
Line Regulation 1	Δ V _o V _{in} 1	V _{IN} =8V to 20V	I _o =40mA		-	-	175	mV
Line Regulation 2	Δ V _o V _{in} 2	V _{IN} =9V to 20V	I _o =40mA		-	-	125	mV
Load Regulation 1	Δ V _o I _o 1	V _{IN} =11V	I _o =1 to 40mA		-	-	40	mV
Load Regulation 2	Δ V _o I _o 2	V _{IN} =11V	I _o =1 to 100mA		-	-	80	mV
Quiescent Current	I _Q	V _{IN} =11V	I _o =0mA		-	3.9	6	mA
Average Temperature Coefficient of Output Voltage	Δ V _o / Δ T	V _{IN} =11V	I _o =1mA		-	0.5	-	mV/°C
Ripple Rejection	RR	9V<V _{IN} <19V	I _o =40mA	e _{in} =1Vp-p f=120Hz	40	48	-	dB
Output Noise Voltage	V _{NO}	V _{IN} =11V	BW=10Hz to 100KHz	I _o =40mA	-	46	-	μV



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Sep-05

ELECTRICAL CHARACTERISTICS

(Tj=25°C, CIN=0.33μF, Co=0.1μF)

Measurement is to be conducted is pulse testing.

PARAMETER	SYMBOL	TEST CONDITIONS			MIN.	TYP.	MAX.	UNIT
ML78L08A								
Output Voltage	Vo	VIN=14V	Io=40mA		7.6	8.0	8.4	V
Line Regulation 1	Δ Vo Vin 1	VIN=10.5V to 23V	Io=40mA		-	-	175	mV
Line Regulation 2	Δ Vo Vin 2	VIN=11V to 23V	Io=40mA		-	-	125	mV
Load Regulation 1	Δ Vo Io 1	VIN=14V	Io=1 to 40mA		-	-	40	mV
Load Regulation 2	Δ Vo Io 2	VIN=14V	Io=1 to 100mA		-	-	80	mV
Quiescent Current	IQ	VIN=14V	Io=0mA		-	4.0	6	mA
Average Temperature Coefficient of Output Voltage	Δ Vo / Δ T	VIN=14V	Io=1mA		-	0.6	-	mV/°C
Ripple Rejection	RR	13V<VIN<23V	Io=40mA	ein=1Vp-p f=120Hz	37	46	-	dB
Output Noise Voltage	VNO	VIN=14V	BW=10Hz to 100KHz	Io=40mA	-	54	-	μV
ML78L09A								
Output Voltage	Vo	VIN=16V	Io=40mA		8.55	9.0	9.45	V
Line Regulation 1	Δ Vo Vin 1	VIN=12V to 24V	Io=40mA		-	-	175	mV
Line Regulation 2	Δ Vo Vin 2	VIN=13V to 24V	Io=40mA		-	-	125	mV
Load Regulation 1	Δ Vo Io 1	VIN=16V	Io=1 to 40mA		-	-	40	mV
Load Regulation 2	Δ Vo Io 2	VIN=16V	Io=1 to 100mA		-	-	90	mV
Quiescent Current	IQ	VIN=16V	Io=0mA		-	4.1	6	mA
Average Temperature Coefficient of Output Voltage	Δ Vo / Δ T	VIN=16V	Io=1mA		-	0.65	-	mV/°C
Ripple Rejection	RR	15V<VIN<25V	Io=40mA	ein=1Vp-p f=120Hz	38	45	-	dB
Output Noise Voltage	VNO	VIN=16V	BW=10Hz to 100KHz	Io=40mA	-	58	-	μV
ML78L10A								
Output Voltage	Vo	VIN=17V	Io=40mA		9.5	10.0	10.5	V
Line Regulation 1	Δ Vo Vin 1	VIN=13V to 25V	Io=40mA		-	-	175	mV
Line Regulation 2	Δ Vo Vin 2	VIN=14V to 25V	Io=40mA		-	-	125	mV
Load Regulation 1	Δ Vo Io 1	VIN=17V	Io=1 to 40mA		-	-	40	mV
Load Regulation 2	Δ Vo Io 2	VIN=17V	Io=1 to 100mA		-	-	90	mV
Quiescent Current	IQ	VIN=17V	Io=0mA		-	4.2	6	mA
Average Temperature Coefficient of Output Voltage	Δ Vo / Δ T	VIN=17V	Io=1mA		-	0.7	-	mV/°C
Ripple Rejection	RR	15V<VIN<25V	Io=40mA	ein=1Vp-p f=120Hz	37	44	-	dB
Output Noise Voltage	VNO	VIN=17V	BW=10Hz to 100KHz	Io=40mA	-	62	-	μV
ML78L12A								
Output Voltage	Vo	VIN=19V	Io=40mA		11.4	12.0	12.6	V
Line Regulation 1	Δ Vo Vin 1	VIN=14.5V to 27V	Io=40mA		-	-	250	mV
Line Regulation 2	Δ Vo Vin 2	VIN=16V to 27V	Io=40mA		-	-	200	mV
Load Regulation 1	Δ Vo Io 1	VIN=19V	Io=1 to 40mA		-	-	50	mV
Load Regulation 2	Δ Vo Io 2	VIN=19V	Io=1 to 100mA		-	-	100	mV
Quiescent Current	IQ	VIN=19V	Io=0mA		-	4.3	6.5	mA
Average Temperature Coefficient of Output Voltage	Δ Vo / Δ T	VIN=19V	Io=1mA		-	0.9	-	mV/°C
Ripple Rejection	RR	15V<VIN<25V	Io=40mA	ein=1Vp-p f=120Hz	37	42	-	dB
Output Noise Voltage	VNO	VIN=19V	BW=10Hz to 100KHz	Io=40mA	-	70	-	μV

ELECTRICAL CHARACTERISTICS

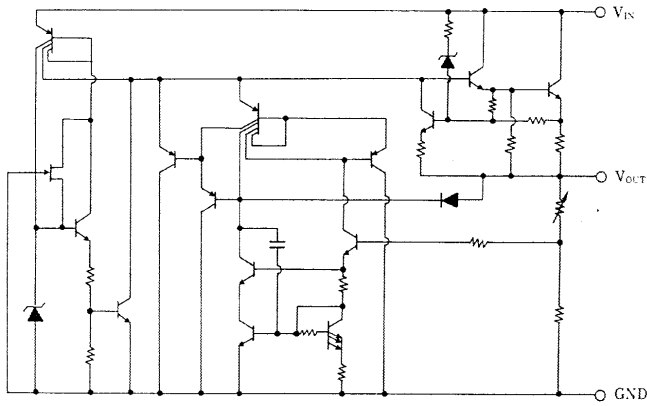
(Tj=25°C, C_{IN}=0.33μF, Co=0.1μF)

Measurement is to be conducted is pulse testing.

PARAMETER	SYMBOL	TEST CONDITIONS			MIN.	TYP.	MAX.	UNIT
ML78L15A								
Output Voltage	V _o	V _{IN} =23V	I _o =40mA		14.25	15.0	15.75	V
Line Regulation 1	Δ V _o / V _{in} 1	V _{IN} =17.5V to 30V	I _o =40mA		-	-	300	mV
Line Regulation 2	Δ V _o / V _{in} 2	V _{IN} =19V to 30V	I _o =40mA		-	-	250	mV
Load Regulation 1	Δ V _o / I _o 1	V _{IN} =23V	I _o =1 to 40mA		-	-	75	mV
Load Regulation 2	Δ V _o / I _o 2	V _{IN} =23V	I _o =1 to 100mA		-	-	150	mV
Quiescent Current	I _Q	V _{IN} =23V	I _o =0mA		-	4.6	6.5	mA
Average Temperature Coefficient of Output Voltage	Δ V _o / Δ T	V _{IN} =23V	I _o =1mA		-	1	-	mV/°C
Ripple Rejection	RR	18.5V < V _{IN} < 28.5V	I _o =40mA	e _{in} =1Vp-p f=120Hz	34	39	-	dB
Output Noise Voltage	V _{NO}	V _{IN} =23V	BW=10Hz to 100KHz	I _o =40mA	-	82	-	μV
ML78L18A								
Output Voltage	V _o	V _{IN} =26V	I _o =40mA		17.1	18.0	18.9	V
Line Regulation 1	Δ V _o / V _{in} 1	V _{IN} =20.5V to 33V	I _o =40mA		-	-	360	mV
Line Regulation 2	Δ V _o / V _{in} 2	V _{IN} =22V to 33V	I _o =40mA		-	-	300	mV
Load Regulation 1	Δ V _o / I _o 1	V _{IN} =26V	I _o =1 to 40mA		-	-	90	mV
Load Regulation 2	Δ V _o / I _o 2	V _{IN} =26V	I _o =1 to 100mA		-	-	180	mV
Quiescent Current	I _Q	V _{IN} =26V	I _o =0mA		-	4.7	6.5	mA
Average Temperature Coefficient of Output Voltage	Δ V _o / Δ T	V _{IN} =26V	I _o =1mA		-	1.1	-	mV/°C
Ripple Rejection	RR	21.5V < V _{IN} < 31.5V	I _o =40mA	e _{in} =1Vp-p f=120Hz	32	36	-	dB
Output Noise Voltage	V _{NO}	V _{IN} =26V	BW=10Hz to 100KHz	I _o =40mA	-	89	-	μV
ML78L24A								
Output Voltage	V _o	V _{IN} =32V	I _o =40mA		22.8	24.0	25.2	V
Line Regulation 1	Δ V _o / V _{in} 1	V _{IN} =26.5V to 39V	I _o =40mA		-	-	480	mV
Line Regulation 2	Δ V _o / V _{in} 2	V _{IN} =29V to 39V	I _o =40mA		-	-	400	mV
Load Regulation 1	Δ V _o / I _o 1	V _{IN} =32V	I _o =1 to 40mA		-	-	120	mV
Load Regulation 2	Δ V _o / I _o 2	V _{IN} =32V	I _o =1 to 100mA		-	-	240	mV
Quiescent Current	I _Q	V _{IN} =32V	I _o =0mA		-	4.8	6.5	mA
Average Temperature Coefficient of Output Voltage	Δ V _o / Δ T	V _{IN} =32V	I _o =1mA		-	1.4	-	mV/°C
Ripple Rejection	RR	27.5V < V _{IN} < 37.5V	I _o =40mA	e _{in} =1Vp-p f=120Hz	30	33	-	dB
Output Noise Voltage	V _{NO}	V _{IN} =32V	BW=10Hz to 100KHz	I _o =40mA	-	97	-	μV

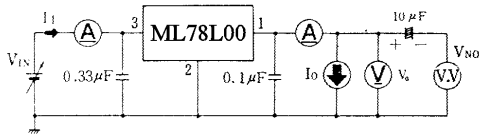
ML78L00-FBE SERIES

■ Equivalent Circuit

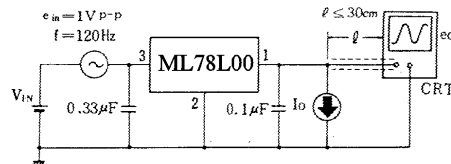


■ Test Circuit

1. Output Voltage, Line Regulation, Load Regulation, Quiescent Current, Average Temperature Coefficient of Output Voltage, Output Noise Voltage, Peak Output/Short-Circuit Current
2. Ripple Rejection

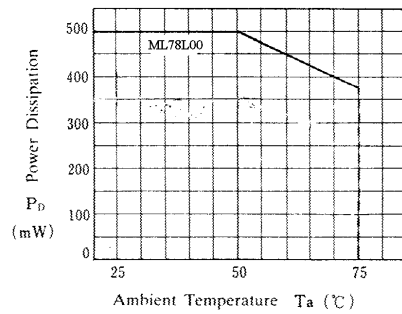


- Measurement is to be conducted in pulse testing.
- $I_Q = I_1 - I_o$



$$RR = 20 \log_{10} \left(\frac{e_{in}}{e_o} \right) \text{ (dB)}$$

■ Ambient Temperature vs. Power Dissipation



ML78L00-FBE SERIES

Typical Characteristics

