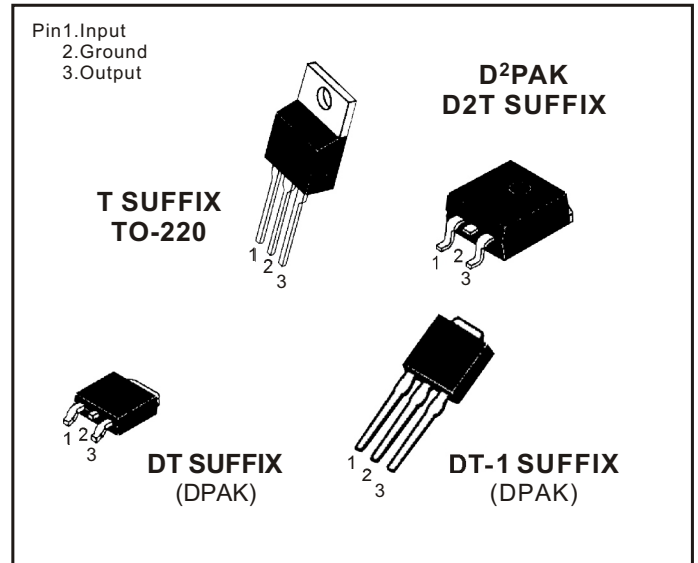


This series of fixed-voltage monolithic integrated-circuit voltage regulators designed for a wide range of applications. These applications include on-card regulation for elimination of noise and distribution problems associated with single-point regulation. Each of these regulators can deliver up to 500 mA of output current. The internal current limiting and tamale shutdown features of these regulators make them essentially immune to overload.



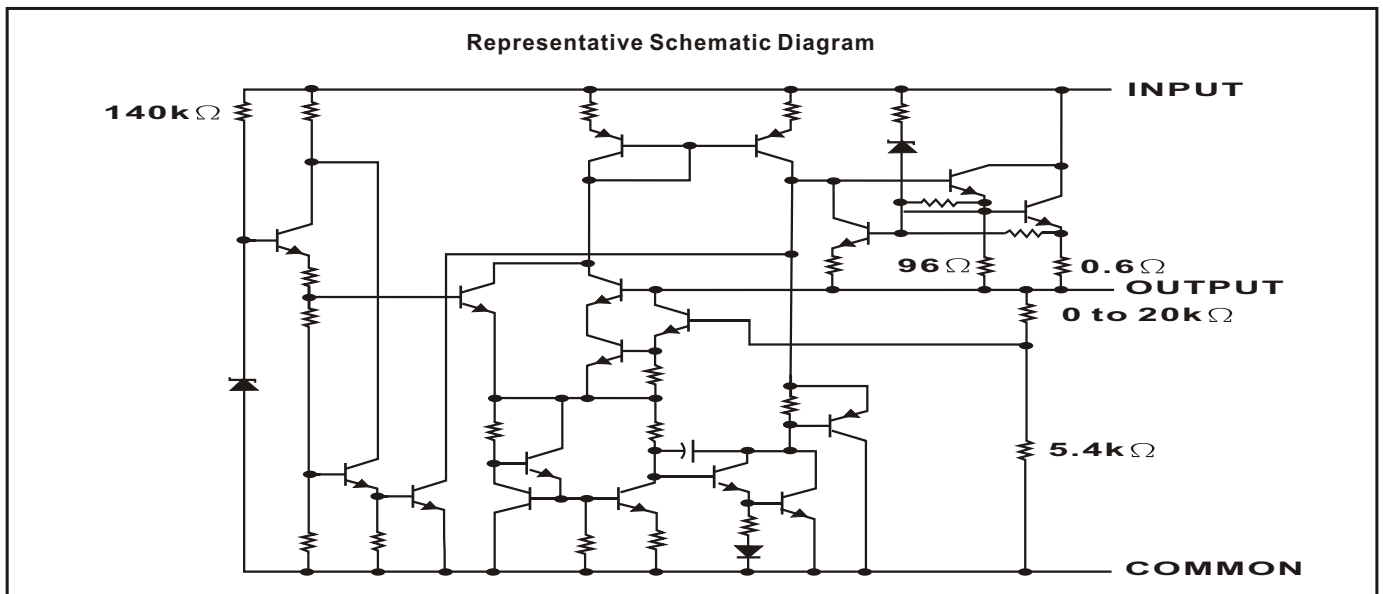
FEATURES

- Terminal Regulators.
- Output Current Up to 500mA.
- No External Components.
- Internal Thermal Overload Protection.
- High Power Dissipation Capability.
- Internal Short-Circuit Current Limiting.
- Output Transistor Safe-Area Compensation.

Standard Application

A common ground is required between the input and the output voltages. The input voltage must remain typically 2.0V above the output voltage even during the low point on the input ripple voltage.

* C_{in} is required if regulator is located in appreciable distance from power supply filter.
 ** C_o is not needed for stability; however, it does improve transient response.



ABSOLUTE MAXIMUM RATINGS OVER OPERATING TEMPERATURE RANGE (unless otherwise noted)

Characteristics	LM78M05 THRU LM78M20	LM78M24	UNIT
Input voltage	35	40	V
Operating free-air, case, or virtual junction temperature range	0 to 150	0 to 150	
Storage temperature range	-65 to 150	-65 to 150	C
Lead temperature 1.6 mm (1/16 inch) from case for 10 seconds	260	260	

RECOMMENDED OPERATING CONDITIONS

PARAMETER		MIN	MAX	UNIT
Input voltage, V_I	LM78M05	7	25	V
	LM78M06	8	25	
	LM78M08	10.5	25	
	LM78M09	11.5	26	
	LM78M10	12.5	28	
	LM78M12	14.5	30	
	LM78M15	17.5	30	
	LM78M18	20.5	33	
	LM78M20	23	35	
	LM78M24	26.5	39	
Output current, I_O			500	mA
Operating virtual junction temperature, T_J		0	125	C

LM78M05 ELECTRICAL CHARACTERISTICS AT SPECIFIED VIRTUAL JUNCTION TEMPERATURE, $V_I=10V, I_O=350mA$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS*		LM78M05			UNIT
			MIN	TYP	MAX	
Output voltage**		25°C	4.8	5	5.2	V
	$I_O = 5mA$ to 350mA, $V_I = 7V$ to 20V, $P \leq 15W$	0°C to 125°C	4.75	5	5.25	
Input regulation	$V_I = 7V$ to 25V, $I_O = 200mA$	25°C		3	100	mV
	$V_I = 8V$ to 25V, $I_O = 200mA$			1	50	
Ripple rejection	$V_I = 8V$ to 18V, $I_O = 100mA$	0°C to 125°C	62			dB
	$f = 120Hz$, $I_O = 300mA$	25°C	62	80		
Output regulation	$I_O = 5mA$ to 500mA	25°C		15	100	mV
	$I_O = 5mA$ to 200mA			5	50	
Temperature coefficient of output voltage	$I_O = 5mA$	0°C to 125°C		-1.0		mV/°C
Output noise voltage	$f = 10Hz$ to 100KHz	25°C		40	200	μV
Dropout voltage		25°C		2.0	2.5	V
Bias current		25°C		4.2	6	mA
Bias current change	$V_I = 8V$ to 25V, $I_O = 200mA$	0°C to 125°C			0.8	
	$I_O = 5mA$ to 350mA				0.5	
Short-circuit output current		25°C		300		
Peak output current		25°C		0.7		A

LM78M06 ELECTRICAL CHARACTERISTICS AT SPECIFIED VIRTUAL JUNCTION TEMPERATURE, $V_I=11V, I_O=350mA$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS*		LM78M06			UNIT
			MIN	TYP	MAX	
Output voltage**		25°C	5.75	6	6.25	V
	$I_O = 5mA$ to 350mA, $V_I = 8V$ to 21V, $P \leq 15W$	0°C to 125°C	5.7	6	6.3	
Input regulation	$V_I = 8V$ to 25V, $I_O = 200mA$	25°C		5	100	mV
	$V_I = 9V$ to 25V, $I_O = 200mA$			1.5	50	
Ripple rejection	$V_I = 9V$ to 19V, $I_O = 100mA$	0°C to 125°C	59			dB
	$f = 120Hz$, $I_O = 300mA$	25°C	59	80		
Output regulation	$I_O = 5mA$ to 500mA	25°C		18	120	mV
	$I_O = 5mA$ to 200mA			10	60	
Temperature coefficient of output voltage	$I_O = 5mA$	0°C to 125°C		-1		mV/°C
Output noise voltage	$f = 10Hz$ to 100KHz	25°C		45		μV
Dropout voltage		25°C		2.0		V
Bias current		25°C		4.3	6	mA
Bias current change	$V_I = 9V$ to 25V, $I_O = 200mA$	0°C to 125°C			0.8	
	$I_O = 5mA$ to 350mA				0.5	
Short-circuit output current		25°C		270		
Peak output current		25°C		0.7		A

LM78M08 ELECTRICAL CHARACTERISTICS AT SPECIFIED VIRTUAL JUNCTION TEMPERATURE, $V_I=14V, I_O=350mA$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS*		LM78M08			UNIT
			MIN	TYP	MAX	
Output voltage**		25°C	7.7	8	8.3	V
	$I_O = 5mA$ to 350mA, $V_I = 10.5V$ to 23V, $P \leq 15W$	0°C to 125°C	7.6	8	8.4	
Input regulation	$V_I = 10.5V$ to 25V, $I_O = 200mA$	25°C		6	100	mV
	$V_I = 11V$ to 25V, $I_O = 200mA$			2	50	
Ripple rejection	$V_I = 11.5V$ to 21.5V, $I_O = 100mA$	0°C to 125°C	56			dB
	$f = 120Hz$, $I_O = 300mA$	25°C	56	80		
Output regulation	$I_O = 5mA$ to 500mA	25°C		20	160	mV
	$I_O = 5mA$ to 200mA			10	80	
Temperature coefficient of output voltage	$I_O = 5mA$	0°C to 125°C		-1		mV/°C
Output noise voltage	$f = 10Hz$ to 100KHz	25°C		52		μV
Dropout voltage		25°C		2.0		V
Bias current		25°C		4.6	6	mA
Bias current change	$V_I = 10.5V$ to 25V, $I_O = 200mA$	0°C to 125°C			0.8	
	$I_O = 5mA$ to 350mA				0.5	
Short-circuit output current		25°C		250		
Peak output current		25°C		0.7		A

LM78M09 ELECTRICAL CHARACTERISTICS AT SPECIFIED VIRTUAL JUNCTION TEMPERATURE, $V_I=16V, I_O=350mA$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS*		LM78M09			UNIT
			MIN	TYP	MAX	
Output voltage**		25°C	8.65	9	9.35	V
	$I_O = 5mA$ to 350mA, $V_I = 11.5V$ to 24V, $P \leq 15W$	0°C to 125°C	8.55	9	9.45	
Input regulation	$V_I = 11.5V$ to 26V, $I_O = 200mA$	25°C		6	100	mV
	$V_I = 12V$ to 26V, $I_O = 200mA$			2	50	
Ripple rejection	$V_I = 13V$ to 23V, $I_O = 100mA$	0°C to 125°C	56			dB
	$f = 120Hz$, $I_O = 300mA$	25°C	56	80		
Output regulation	$I_O = 5mA$ to 500mA	25°C		20	180	mV
	$I_O = 5mA$ to 200mA			10	90	
Temperature coefficient of output voltage	$I_O = 5mA$	0°C to 125°C		-1		mV/°C
Output noise voltage	$f = 10Hz$ to 100KHz	25°C		60		μV
Dropout voltage		25°C		2.0		V
Bias current		25°C		4.6	6	mA
Bias current change	$V_I = 11.5V$ to 26V, $I_O = 200mA$	0°C to 125°C			0.8	
	$I_O = 5mA$ to 350mA				0.5	
Short-circuit output current		25°C		250		A
Peak output current		25°C		0.7		

LM78M10 ELECTRICAL CHARACTERISTICS AT SPECIFIED VIRTUAL JUNCTION TEMPERATURE, $V_I=17V, I_O=350mA$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS*		LM78M10			UNIT
			MIN	TYP	MAX	
Output voltage**		25°C	9.6	10	10.4	V
	$I_O = 5mA$ to 350mA, $V_I = 12.5V$ to 25V, $P \leq 15W$	0°C to 125°C	9.5	10	10.5	
Input regulation	$V_I = 12.5V$ to 28V, $I_O = 200mA$	25°C		7	100	mV
	$V_I = 14V$ to 20V, $I_O = 200mA$			2	50	
Ripple rejection	$V_I = 13V$ to 23V, $I_O = 100mA$	0°C to 125°C	59			dB
	$f = 120Hz$, $I_O = 300mA$	25°C	55	80		
Output regulation	$I_O = 5mA$ to 500mA	25°C		20	200	mV
	$I_O = 5mA$ to 200mA			10	100	
Temperature coefficient of output voltage	$I_O = 5mA$	0°C to 125°C		-1.0		mV/°C
Output noise voltage	$f = 10Hz$ to 100KHz	25°C		70		μV
Dropout voltage		25°C		2.0		V
Bias current		25°C		4.6	6	mA
Bias current change	$V_I = 12.5V$ to 28V, $I_O = 200mA$	0°C to 125°C			0.8	
	$I_O = 5mA$ to 350mA				0.5	
Short-circuit output current		25°C		245		A
Peak output current		25°C		0.7		

LM78M12 ELECTRICAL CHARACTERISTICS AT SPECIFIED VIRTUAL JUNCTION TEMPERATURE, $V_I=19V, I_O=350mA$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS*		LM78M12			UNIT
			MIN	TYP	MAX	
Output voltage**		25°C	11.5	12	12.5	V
	$I_O = 5mA$ to 350mA, $V_I = 14.5V$ to 27V, $P \leq 15W$	0°C to 125°C	11.4	12	12.6	
Input regulation	$V_I = 14.5V$ to 30V, $I_O = 200mA$	25°C		10	100	mV
	$V_I = 16V$ to 30V, $I_O = 200mA$			3	50	
Ripple rejection	$V_I = 15V$ to 25V, $I_O = 100mA$	0°C to 125°C	55			dB
	$f = 120Hz$, $I_O = 300mA$	25°C	55	80		
Output regulation	$I_O = 5mA$ to 500mA	25°C		25	240	mV
	$I_O = 5mA$ to 200mA			10	120	
Temperature coefficient of output voltage	$I_O = 5mA$	0°C to 125°C		-1.0		mV/°C
Output noise voltage	$f = 10Hz$ to 100KHz	25°C		75		μV
Dropout voltage		25°C		2.0		V
Bias current		25°C		4.6	6	mA
Bias current change	$V_I = 14.5V$ to 30V, $I_O = 200mA$	0°C to 125°C			0.8	
	$I_O = 5mA$ to 350mA				0.5	
Short-circuit output current		25°C		240		A
Peak output current		25°C		0.7		

LM78M15 ELECTRICAL CHARACTERISTICS AT SPECIFIED VIRTUAL JUNCTION TEMPERATURE, $V_I=23V, I_O=350mA$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS*		LM78M15			UNIT
			MIN	TYP	MAX	
Output voltage**		25°C	14.5	15	15.6	V
	$I_O = 5mA$ to 350mA, $V_I = 17.5V$ to 30V, $P \leq 15W$	0°C to 125°C	14.25	15	15.75	
Input regulation	$V_I = 17.5V$ to 30V, $I_O = 200mA$	25°C		12	100	mV
	$V_I = 20V$ to 30V, $I_O = 200mA$			3	50	
Ripple rejection	$V_I = 18.5V$ to 28.5V, $f = 120Hz$	$I_O = 100mA$	0°C to 125°C	54		dB
		$I_O = 300mA$	25°C	54	70	
Output regulation	$I_O = 5mA$ to 500mA	25°C		25	300	mV
	$I_O = 5mA$ to 200mA			10	150	
Temperature coefficient of output voltage	$I_O = 5mA$	0°C to 125°C		-1.0		mV/°C
Output noise voltage	$f = 10Hz$ to 100KHz	25°C		90		μV
Dropout voltage		25°C		2.0		V
Bias current		25°C		4.7	6	mA
Bias current change	$V_I = 17.5V$ to 30V, $I_O = 200mA$	0°C to 125°C			0.8	
	$I_O = 5mA$ to 350mA				0.5	
Short-circuit output current		25°C		240		
Peak output current		25°C		0.7		A

LM78M18 ELECTRICAL CHARACTERISTICS AT SPECIFIED VIRTUAL JUNCTION TEMPERATURE, $V_I=27V, I_O=350mA$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS*		LM78M18			UNIT
			MIN	TYP	MAX	
Output voltage**		25°C	17.3	18	18.7	V
	$I_O = 5mA$ to 350mA, $V_I = 21V$ to 33V, $P \leq 15W$	0°C to 125°C	17.1	18	18.9	
Input regulation	$V_I = 21V$ to 33V, $I_O = 200mA$	25°C		15	100	mV
	$V_I = 24V$ to 33V, $I_O = 200mA$			5	50	
Ripple rejection	$V_I = 22V$ to 32V, $f = 120Hz$	$I_O = 100mA$	0°C to 125°C	53		dB
		$I_O = 300mA$	25°C	53	70	
Output regulation	$I_O = 5mA$ to 500mA	25°C		25	360	mV
	$I_O = 5mA$ to 200mA			10	180	
Temperature coefficient of output voltage	$I_O = 5mA$	0°C to 125°C		-1.0		mV/°C
Output noise voltage	$f = 10Hz$ to 100KHz	25°C		110		μV
Dropout voltage		25°C		2.0		V
Bias current		25°C		4.8	6	mA
Bias current change	$V_I = 21V$ to 33V, $I_O = 200mA$	0°C to 125°C			0.8	
	$I_O = 5mA$ to 350mA				0.5	
Short-circuit output current		25°C		240		
Peak output current		25°C		0.7		A

LM78M20 ELECTRICAL CHARACTERISTICS AT SPECIFIED VIRTUAL JUNCTION TEMPERATURE, $V_I=29V, I_O=350mA$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS*		LM78M20			UNIT
			MIN	TYP	MAX	
Output voltage**		25°C	19.2	20	20.8	V
	$I_O = 5mA$ to 350mA, $V_I = 21V$ to 35V, $P \leq 15W$	0°C to 125°C	19	20	21	
Input regulation	$V_I = 23V$ to 35V, $I_O = 200mA$	25°C		18	100	mV
	$V_I = 24V$ to 35V, $I_O = 200mA$			7	50	
Ripple rejection	$V_I = 24V$ to 34V, $f = 120Hz$	$I_O = 100mA$	0°C to 125°C	53		dB
		$I_O = 300mA$	25°C	53	70	
Output regulation	$I_O = 5mA$ to 500mA	25°C		25	400	mV
	$I_O = 5mA$ to 200mA			10	200	
Temperature coefficient of output voltage	$I_O = 5mA$	0°C to 125°C		-1.2		mV/°C
Output noise voltage	$f = 10Hz$ to 100KHz	25°C		110		μV
Dropout voltage		25°C		2.0		V
Bias current		25°C		4.9	6	mA
Bias current change	$V_I = 23V$ to 35V, $I_O = 200mA$	0°C to 125°C			0.8	
	$I_O = 5mA$ to 350mA				0.5	
Short-circuit output current		25°C		240		A
Peak output current		25°C		0.7		

LM78M24 ELECTRICAL CHARACTERISTICS AT SPECIFIED VIRTUAL JUNCTION TEMPERATURE, $V_I=33V, I_O=350mA$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS*		LM78M24			UNIT
			MIN	TYP	MAX	
Output voltage**		25°C	23	24	25	V
	$I_O = 5mA$ to 350mA, $V_I = 27V$ to 38V, $P \leq 15W$	0°C to 125°C	22.8	24	25.2	
Input regulation	$V_I = 27V$ to 38V, $I_O = 200mA$	25°C		10	100	mV
	$V_I = 28V$ to 38V, $I_O = 200mA$			5	50	
Ripple rejection	$V_I = 28V$ to 38V, $f = 120Hz$	$I_O = 100mA$	0°C to 125°C	50		dB
		$I_O = 300mA$	25°C	50	70	
Output regulation	$I_O = 5mA$ to 500mA	25°C		25	480	mV
	$I_O = 5mA$ to 200mA			10	240	
Temperature coefficient of output voltage	$I_O = 5mA$	0°C to 125°C		-1.2		mV/°C
Output noise voltage	$f = 10Hz$ to 100KHz	25°C		170		μV
Dropout voltage		25°C		2.0		V
Bias current		25°C		5	6	mA
Bias current change	$V_I = 27V$ to 38V, $I_O = 200mA$	0°C to 125°C			0.8	
	$I_O = 5mA$ to 350mA				0.5	
Short-circuit output current		25°C		240		A
Peak output current		25°C		0.7		

* 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.

** This specification applies only for dc power dissipation permitted by absolute maximum ratings.

* 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 $0.33 \mu\text{F}$ capacitor across the input and a $0.1 \mu\text{F}$ capacitor across the output.

** This specification applies only for dc power dissipation permitted by absolute maximum ratings.