

VOLTAGE REGULATORS

Fixed Output Voltage Regulators

- Low-cost monolithic circuits for positive and/or negative regulation at currents from 100 mA to 1.5A
- Ideal for on-card regulation of subsystems
- Internal current limiting thermal shutdown and safe-area compensation

FIXED-VOLTAGE, 3-TERMINAL REGULATORS FOR POSITIVE OR NEGATIVE POLARITY POWER SUPPLIES.

V _{out} Volts	Tol.† Volts	I _O mA Max	Device Type Positive Output	Device Type Negative Output	V _{in} Min/Max	Reg _{line} mV	Reg _{load} mV	ΔV _O /ΔT mV/°C Typ	Case	
2	±0.1	1500	—	MC7902C	5.5/35	40	120	1.0	1, 221A	
3	±0.15	100	—	MC79L03AC	4.7/30	60	72	—	29, 79	
	±0.3			MC79L03C		80				
5	±0.5	100	MC78L05C	MC79L05C	6.7/30	200	60	—	29, 79	
	±0.25	500	MC78L05AC	MC79L05AC	7/35	150				100
			MC78M05C	—		1.1	1, 79			
	±0.4	1500	LM109	—	8.0/35	50	1.0	—	1	
			LM209	—			0.6			1
	±0.25	—	LM309	—	7/35	100	1.0	1, 221A		
	±0.35	—	**MC7805*	—	7.5/35	10	50	0.6	1	
	±0.25	—	MC7805C	MC7905C	7/35	50	100	—	1, 221A	
		±0.2	**MC7805A*	—			50			1
	±0.25	—	**MC7805AC	—	7/35	50	100	—	1	
±0.25		**LM140-5*	—	50			1			
5.2	±0.26	1500	—	MC7905.2C	7.2/35	105	105	1.0	1, 221A	
			—	—	8/35	100	120	1.0	79, 221A	
6	±0.3	500	MC78M06C	—	9/35	60	100	0.7	1	
	±0.35	1500	**MC7806*	—	8/35	120	120		1, 221A	
			MC7806C	MC7906C	8.6/35	11	50		1	
	±0.3	—	**MC7806A*	—	8/35	60	60		1, 221A	
	±0.24	—	**MC7806AC	—	8/35	60	100		—	1
		±0.3	**LM140-6*	—			60			
±0.3	—	**LM340-6	—	—	—	—	—	—		
8	±0.8	100	MC78L08C	—	9.7/30	200	80	1.0	29, 79	
			MC78L08AC	—	10/35	100	160		79, 221A	
	±0.4	500	MC78M08C	—	11.5/35	80	100		1	
			**MC7808*	—	10/35	160	160		1, 221A	
	±0.3	1500	MC7808C	MC7908C	10.6/35	13	50		1	
			**MC7808A*	—	10.5/35	80	80		1, 221A	
	±0.3	—	**MC7808AC	—	10.5/35	80	100		—	1
		±0.4	**LM140-8*	—			80			
±0.4	—	**LM340-8	—	—	—	—	—	—		
12	±1.2	100	MC78L12C	MC79L12C	13.7/35	250	100	—	29, 79	
			MC78L12AC	MC79L12AC						14/35
	±0.6	500	MC78M12C	—	15.5/35	120	120		1.5	1
			**MC7812*	—	14.5/35	240	240			1, 221A
	±0.5	1500	MC7812C	MC7912C	14.8/35	18	50		1	
			**MC7812A*	—	14.5/35	100	100		1, 221A	
	±0.6	—	**MC7812AC	—	14.5/35	120	120		1.5	1
		±0.6	**LM140-12*	—			120			
±0.6	—	**LM340-12	—	—	—	—	—	—		

**1979 New Product Introductions
 *T_J = -55 to +150°C
 †Output Voltage Tolerance for Worst Case

(continued)

Fixed Output Voltage Regulators (continued)

V _{out} Volts	Tol.† Volts	I _O mA Max	Device Type		V _{in} Min/Max	Reg _{line} mV	Reg _{load} mV	ΔV _O /ΔT mV/°C Typ	Case	
			Positive Output	Negative Output						
15	±1.5 ±0.75	100	MC78L15C	MC79L15C	16.7/35	300	150	—	29, 79	
			MC78L15AC	MC79L15A						
		500	MC78M15C	—	17/35	100	300	1.0	79, 221A	
		1500	**MC7815*	—	18.5/35	150	150	1.8	1	
	±0.6	MC7815C	MC7915C	17.5/35	300	300	1, 221A			
		**MC7815A*	—	17.9/35	22	50	1			
		**MC7815AC	—	—	100	1, 221A				
		**LM140-15*	—	17.5/35	150	150	1			
±0.75	**LM340-15	—	—	—	—	—	1			
18	±1.8 ±0.9	100	MC78L18C	MC79L18C	19.7/35	325	170	—	29, 79	
			MC78L18AC	MC79L18AC						
		500	MC78M18C	—	20/35	100	360	1.0	79, 221A	
		1500	**MC7818*	—	22/35	180	180	2.3	1	
	±0.7	MC7818C	MC7918C	21/35	360	360	1, 221A			
		**MC7818A*	—	—	31	50	1			
		**MC7818AC	—	—	100	1, 221A				
		**LM140-18*	—	—	180	180	1			
±0.9	**LM340-18	—	—	—	—	—	1			
20	±1.0	500	MC78M20C		—	22/40	10	400	1.1	79, 221A
			MC78L24C		MC79L24C	25.7/40	350	200	—	29, 79
24	±2.4 ±1.2	100	MC78L24C	MC79L24C	25.7/40	350	200	—	29, 79	
			MC78L24AC	MC79L24AC						
		500	MC78M24C	—	26/40	100	480	1.2	79, 221A	
		1500	**MC7824*	—	28/40	240	240	3.0	1	
	±1.0	MC7824C	MC7924C	27/40	480	480	1, 221A			
		**MC7824A*	—	27.3/40	36	50	1			
		**MC7824AC	—	27/40	100	1, 221A				
		**LM140-24*	—	—	240	240	1			
±1.2	**LM340-24	—	—	—	—	—	1			

**1979 New Product Introductions

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†Output Voltage Tolerance for Worst Case

Variable Output Voltage Regulators

POSITIVE OUTPUT REGULATORS

I _O mA Max	Device Type	S U F F ; X	V _{out} Volts		V _{in} Volts		V _{in} - V _{out} Differ- ential Volts Min	P _D Watts Max		Regulation % V _{out} @ T _A = 25°C Typ		T _C V _{out} Typ %/°C	T _J = °C Max	Case		
			Min	Max	Min	Max		T _C = 25°C	T _C = 25°C	Line	Load					
20	LM305	H	4.5	40	8.5	50	3.0	0.4	1.3	0.06	0.1	0.007	85	601		
	LM205							0.68	1.6						100	
	LM105							30	2.7						150	
100	**LM317L	H, Z	1.2	37	5.0	40	3.0	Internally Limited		0.04	0.5	0.006	125	29, 79		
	**LM217L									0.02	0.3				0.004	150
	**LM117L*									0.003	0.003					
150	MC1723	CP	2.0	37	9.5	40	3.0	0.65	—	0.1	0.3	0.003	150	646		
		CG						0.8	2.1			0.1			0.003	
		G						—	—			0.2		0.002	175	602
		CL						1.0	—			0.1		0.003		
		L						—	—			0.2		0.002		
250	MC1469	G	2.5	32	9	35	3.0	0.68	1.8	0.03	0.13	0.002	150	603		
	MC1569			37	8.5	40	2.7								0.015	
600	MC1469	R	2.5	32	9.0	35	3.0	3.0	14.0	0.03	0.05	0.002	150	614		
	MC1569			37	8.5	40	2.7								0.015	
1500	LM317	T	1.2	37	5.0	40	3.0	Internally Limited		0.07	1.5	0.006	125	221A		
	LM317	H, K										0.004			79, 1	
	LM217											0.003		150		
	LM117*											0.05		1.0		

*T_J = -55 to +150°C

**1979 New Product Introductions

Variable Output Voltage Regulators (continued)

NEGATIVE OUTPUT REGULATORS

I _O mA Max	Device Type	S U F F I X	V _{out} Volts		V _{in} Volts		V _{in} - V _{out} Differ- ential Volts Min	P _D Watts Max		Regulation % V _{out} @ T _A = 25°C Typ		TC V _{out} Typ %/°C	T _J = °C Max	Case		
			Min	Max	Min	Max		TC = 25°C	TC = 25°C	Line	Load					
20	LM304	H	0.035	30	8.0	40	2.0	0.4	1.3	0.1	0.05	0.007	80	603		
	LM204		0.015	40				50	0.68						1.6	150
	LM104								2.7							
250	MC1463	G	3.8	32	9.0	35	3.0	0.68	1.8	0.03	0.05	0.002	150	603		
	MC1563		3.6	33	8.5	40	2.7			0.015	0.13					
600	MC1463	R	3.8	34	9.0	35	3.0	2.4	9.0	0.03	0.05	0.002	175	614		
	MC1563		3.6	37	8.5	40	2.7			0.015						

Switching Regulators

Used as the control circuit in PWM, push-pull, bridge and series type switchmode supplies. The devices include the reference, oscillator, pulse-width modulator, phase splitter and output sections. Frequency and duty cycle are independently adjustable.

I _O ±mA Max	V _{CC} Volts		f _o kHz		Device Number	Suffix	T _A °C	Case
	Min	Max	Min	Max				
40	10	30	2.0	100	MC3420	P	0 to +70	648
					L	620		
					L	620		
					MC3520	L	-55 to +125	620

Special Regulators

FLOATING VOLTAGE AND CURRENT REGULATORS

Designed for laboratory type power supplies. Voltage is limited only by the breakdown voltage of associated, external, series-pass transistors.

V _{out} Volts		I _O mA Max	Device Type	S U F F I X	V _{aux} Volts		P _D Watts Max	ΔV _{ref} /V _{ref} %		ΔI _L /I _L % Max	TC V _{out} %/°C Typ	Case
Min	Max				Min	Max		Line	Load			
0	*	*	MC1466	L	21	30	0.75	0.015	0.015	0.2	0.01	632
			MC1566	L	20	35		0.004	0.004	0.1		

*Dependent on characteristics of external series-pass elements.

DUAL ±15 V TRACKING REGULATORS.

Internally, the device is set for ±15 V, but an external adjustment can change both outputs simultaneously, from 8.0 V to 20 V.

V _{out} Volts		I _O mA Max	V _{in} Volts		Device Type	S U F F I X	P _D Watts Max	Reg _{line} mV	Reg _{load} mV	TC %/°C (T _{low} to T _{high}) Typ	T _A °C	Case	
Min	Max		Min	Max									
14.8	15.2	±100	17	30	MC1468	G	0.8	10	10	3.0	0 to +75	603C	
						L	1.0					632	
						R	2.4					614	
					MC1568	G	0.8					-55 to +125	603C
						L	1.0						632
						R	2.4						614

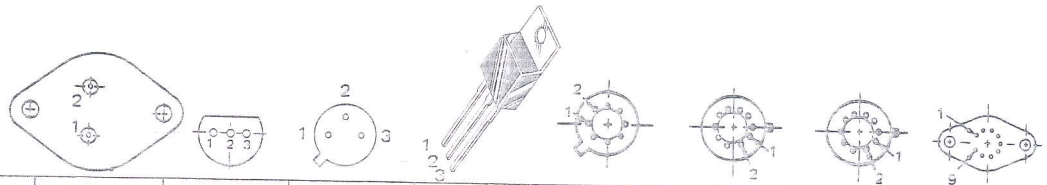
Special Regulators (continued)

LOW TEMPERATURE DRIFT, LOW VOLTAGE REFERENCE

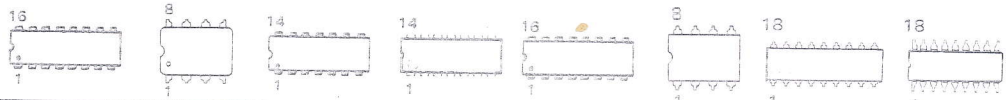
V _{out} Volts Typ	I _O mA Max	ΔV _{out} /ΔT ppm/°C Max	Device Type	Suffix	Reg _{line} mV Max	Reg _{load} mV Max	T _A °C	Case	
2.5 ± 25 mV	10	40	MC1403	U	3/4.5 (Note 1)	10 (Note 3)	0 to +70	693	
		25	MC1403A				-55 to +125		
		55	MC1503						
		25	MC1503A						
5.0 ± 50 mV		40	MC1404U5		6.0 (Note 2)		0 to +70		
		25	MC1404AU5						-55 to +125
		55	MC1504U5						
		25	MC1504AU5						
6.25 ± 60 mV		40	MC1404U6				0 to +70		
		25	MC1404AU6						-55 to +125
		55	MC1504U6						
		25	MC1504AU6						
10 ± 100 mV	40	MC1404U10	0 to +70						
	25	MC1404AU10		-55 to +125					
	55	MC1504U10							
	25	MC1504AU10							

- Notes: 1. $4.5 \leq V_I \leq 15 \text{ V} / 15 \leq V_I \leq 40 \text{ V}$
 2. $V_{in} = V_{out} + 2.5 \text{ V to } 40 \text{ V}$
 3. $0 \text{ mA} < I_O < 10 \text{ mA}$

Package Styles



CASE	1 (TO-3)	29 (TO-92)	79 (TO-39)	221A (TO-220)	601	603 (TO-5 Type)	603C	614 (TO-66)
MATERIAL	Metal	Plastic	Metal	Plastic	Metal	Metal	Metal	Metal
SUFFIX	SK, K, KC	P, Z	G, H	T	G, H	G, H	G	R



CASE	620	626	632 (TO-116)	646	648	693	701	726
MATERIAL	Ceramic	Plastic	Ceramic	Plastic	Plastic	Ceramic	Ceramic	Plastic
SUFFIX	J, L	P or P1	L	P or P2	N, P	U	J	N