POSITIVE VOLTAGE REGULATORS

MC1723G
MC1723CG

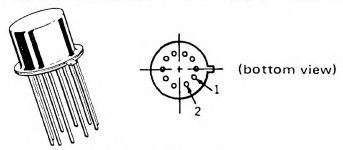
MONOLITHIC VOLTAGE REGULATOR

The MC1723 is a positive or negative voltage regulator designed to deliver load current to 150 mAdc. Output current capability can be increased to several amperes through use of one or more external pass transistors. MC1723 is specified for operation over the military temperature range (-55°C to +125°C) and the MC1723C over the commercial temperature range (0 to +75°C)

- Output Voltage Adjustable from 2 Vdc to 37 Vdc
- Output Current to 150 mAdc Without External Pass Transistors
- 0.01% Line and 0.03% Load Regulation
- Adjustable Short-Circuit Protection

VOLTAGE REGULATOR

MONOLITHIC SILICON EPITAXIAL PASSIVATED INTEGRATED CIRCUIT



METAL PACKAGE
CASE 603-03

FIGURE 1 – TYPICAL CIRCUIT CONNECTION

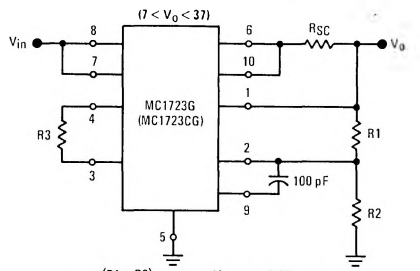


FIGURE 2 – TYPICAL NPN CURRENT BOOST CONNECTION

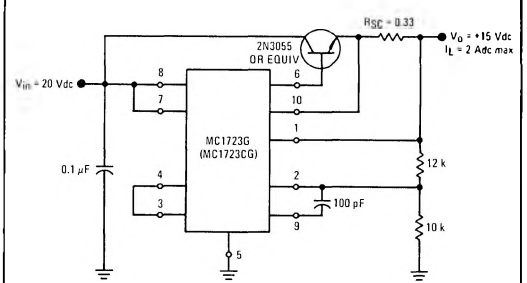
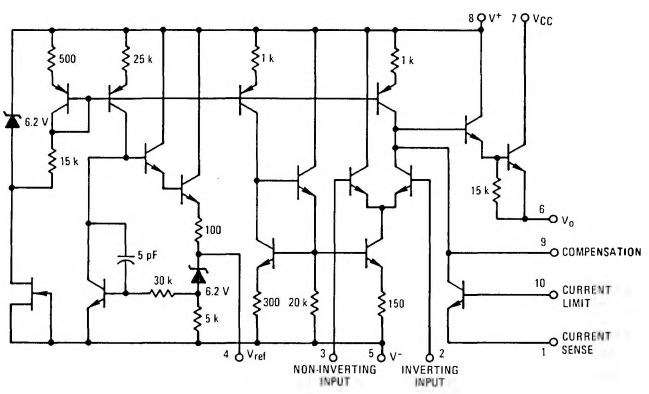
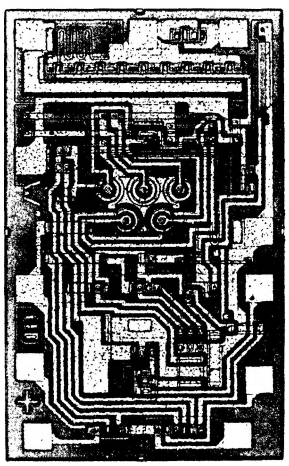


FIGURE 3 – CIRCUIT SCHEMATIC





See Packaging Information Section for outline dimensions.

MAXIMUM RATINGS (T_A = +25°C unless otherwise noted)

Rating		Symbol	Value	Unit
Pulse Voltage from V^+ to V^- (50 ms)	MC1723	$V_{in(p)}$	50	V_{peak}
Continuous Voltage from V^+ to V^-		V_{in}	40	Vdc
Input-Output Voltage Differential		$V_{in}-V_o$	40	Vdc
Maximum Output Current		I_L	150	mAdc
Current from V_{ref}		I_{ref}	15	mAdc
Power Dissipation and Thermal Characteristics				
T_A = +25°C		P_D	0.8	Watt
Derate above T_A = +25°C		$1/\theta_{JA}$	6.8	mW/°C
Thermal Resistance, Junction to Air		θ_{JA}	5.44	°C/W
T_C = +25°C		P_D	1.8	Watts
Derate above T_A = +25°C		$1/\theta_{JC}$	14.4	mW/°C
Thermal Resistance, Junction to Case		θ_{JC}	69.4	°C/W
Operating and Storage Junction Temperature Range		T_J, T_{stg}	-65 to +150	°C

OPERATING TEMPERATURE RANGE

Ambient Temperature	T_A		°C
MC1723CG		0 to +75	
MC1723G		-55 to +125	

ELECTRICAL CHARACTERISTICS (Unless otherwise noted: T_A = +25°C, V_{in} = 12 Vdc, V_o = 5 Vdc, I_L = 1 mAdc, R_{SC} = 0, C1 = 100 pF, C_{ref} = 0 and divider impedance as seen by the error amplifier ≤ 10 kΩ connected as shown in Figure 1)

Characteristic	Symbol	MC1723 Min	MC1723 Typ	MC1723 Max	MC1723C Min	MC1723C Typ	MC1723C Max	Unit
Input Voltage Range	V_{in}	9.5	–	40	9.5	–	40	Vdc
Output Voltage Range	V_o	2.0	–	37	2.0	–	37	Vdc
Input-Output Voltage Differential	$V_{in}-V_o$	3.0	–	38	3.0	–	38	Vdc
Reference Voltage	V_{ref}	6.95	7.15	7.35	6.80	7.15	7.50	Vdc
Standby Current Drain (I_L = 0, V_{in} = 30 V)	I_b	–	2.3	3.5	–	2.3	4.0	mAdc
Output Noise Voltage (f = 100 Hz to 10 kHz)	V_n							μV(rms)
C_{ref} = 0		–	20	–	–	20	–	
C_{ref} = 5.0 μF		–	2.5	–	–	2.5	–	
Average Temperature Coefficient of Output Voltage T_{low} ① < T_A < T_{high} ②	TCV_o	–	0.002	0.015	–	0.003	0.015	%/°C
Line Regulation	Reg_{in}							% V_o
(T_A = +25°C) 12 V < V_{in} < 15 V		–	0.01	0.1	–	0.01	0.1	
(T_A = +25°C) 12 V < V_{in} < 40 V		–	0.02	0.2	–	0.1	0.5	
(T_{low} ① < T_A < T_{high} ②) 12 V < V_{in} < 15 V		–	–	0.3	–	–	0.3	
Load Regulation (1.0 mA < I_L < 50 mA)	Reg_{load}							% V_o
T_A = +25°C		–	0.03	0.15	–	0.03	0.2	
T_{low} ① < T_A < T_{high} ②		–	–	0.6	–	–	0.6	
Ripple Rejection (f = 50 Hz to 10 kHz)	Rej_R							dB
C_{ref} = 0		–	74	–	–	74	–	
C_{ref} = 5.0 μF		–	86	–	–	86	–	
Short Circuit Current Limit (R_{SC} = 10 Ω, V_o = 0)	I_{SC}	–	65	–	–	65	–	mAdc
Long Term Stability	$\Delta V_o/\Delta t$	–	0.1	–	–	0.1	–	%/1000 hrs.

① T_{low} = 0°C for MC1723CG
= -55°C for MC1723G

② T_{high} = +75°C for MC1723CG
= +125°C for MC1723G

TYPICAL CHARACTERISTICS

(V_{in} = 12 Vdc, V_o = 5.0 Vdc, I_L = 1.0 mAdc, R_{SC} = 0, T_A = +25°C unless otherwise noted)

FIGURE 4 – MAXIMUM LOAD CURRENT AS A FUNCTION OF INPUT-OUTPUT VOLTAGE DIFFERENTIAL

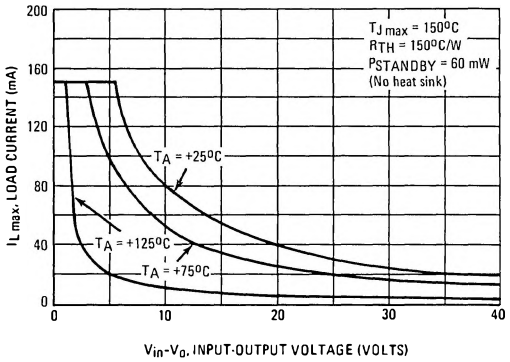


FIGURE 5 – LOAD REGULATION CHARACTERISTICS WITHOUT CURRENT LIMITING

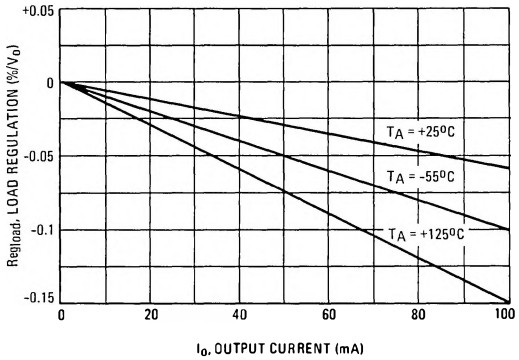


FIGURE 6 – LOAD REGULATION CHARACTERISTICS WITH CURRENT LIMITING

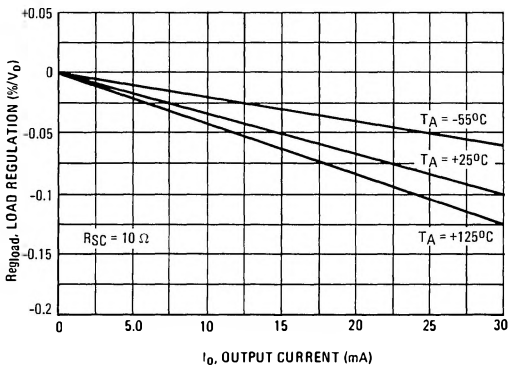


FIGURE 7 – LOAD REGULATION CHARACTERISTICS WITH CURRENT LIMITING

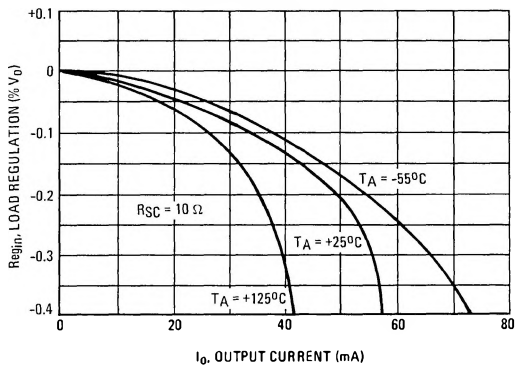


FIGURE 8 – CURRENT LIMITING CHARACTERISTICS

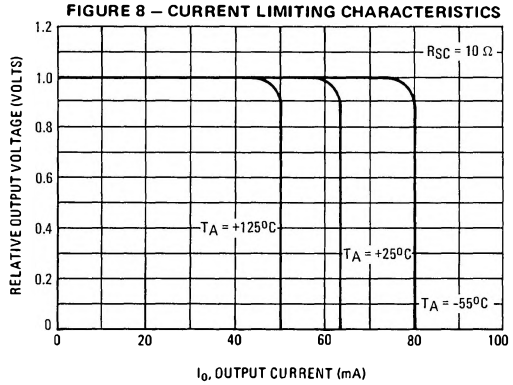
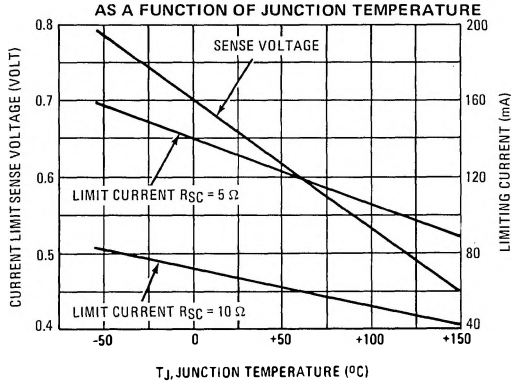


FIGURE 9 – CURRENT LIMITING CHARACTERISTICS AS A FUNCTION OF JUNCTION TEMPERATURE



TYPICAL CHARACTERISTICS (continued)

FIGURE 10 – LINE REGULATION AS A FUNCTION OF INPUT-OUTPUT VOLTAGE DIFFERENTIAL

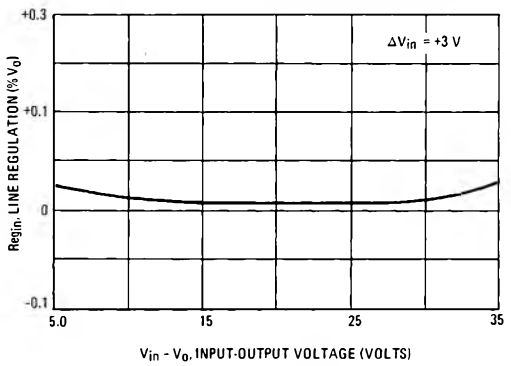


FIGURE 11 – LOAD REGULATION AS A FUNCTION OF INPUT-OUTPUT VOLTAGE DIFFERENTIAL

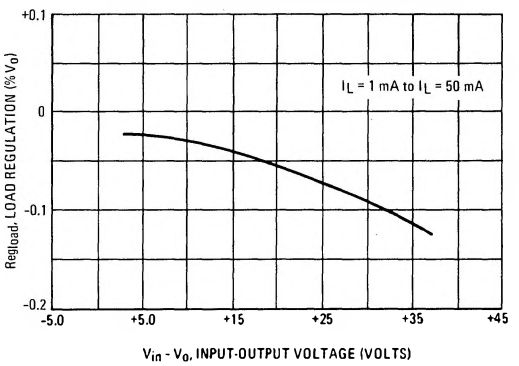


FIGURE 12 – STANDBY CURRENT DRAIN AS A FUNCTION OF INPUT VOLTAGE

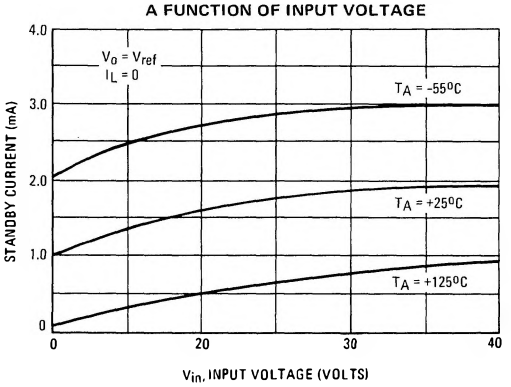


FIGURE 13 – LINE TRANSIENT RESPONSE

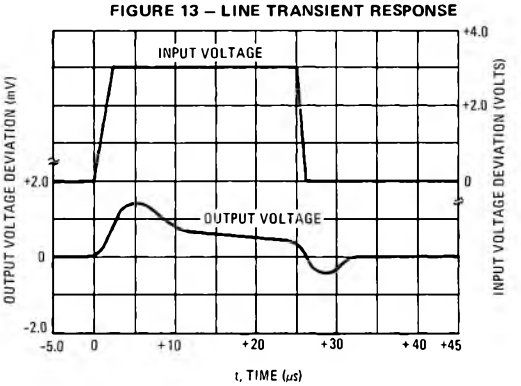


FIGURE 14 – LOAD TRANSIENT RESPONSE

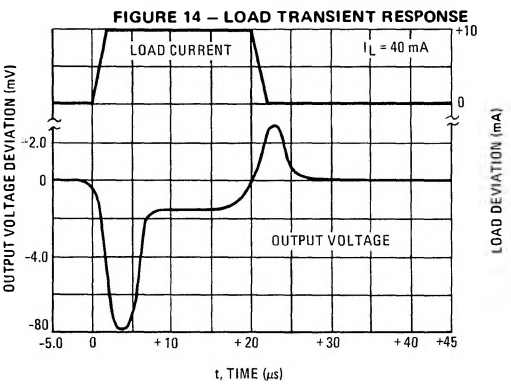
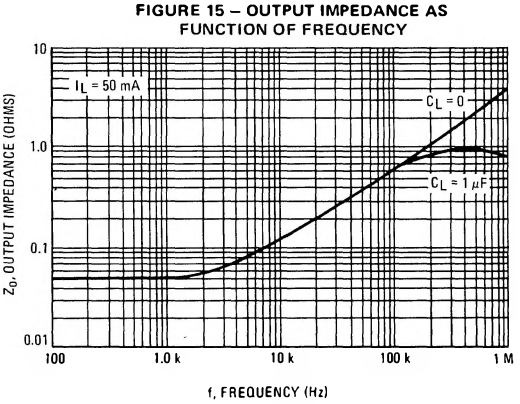


FIGURE 15 – OUTPUT IMPEDANCE AS FUNCTION OF FREQUENCY



TYPICAL APPLICATIONS

FIGURE 16 – TYPICAL CONNECTION FOR $2<V_O<7$

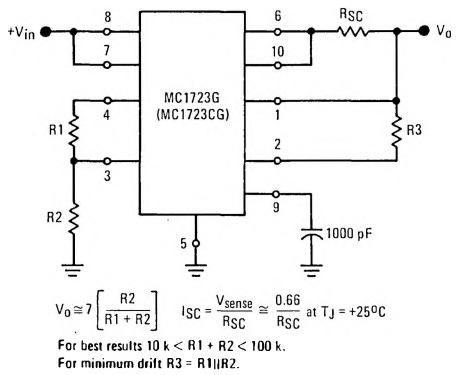


FIGURE 17 – MC1723,C FOLDBACK CONNECTION

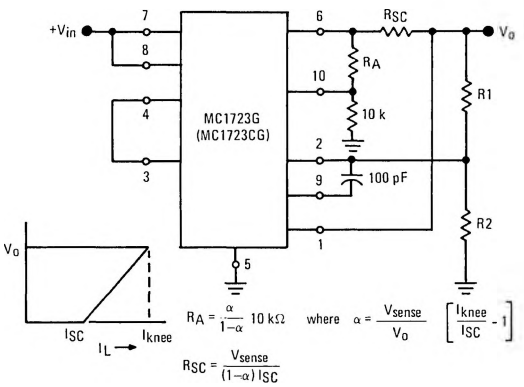


FIGURE 18 – +5 V, 1-AMPERE SWITCHING REGULATOR

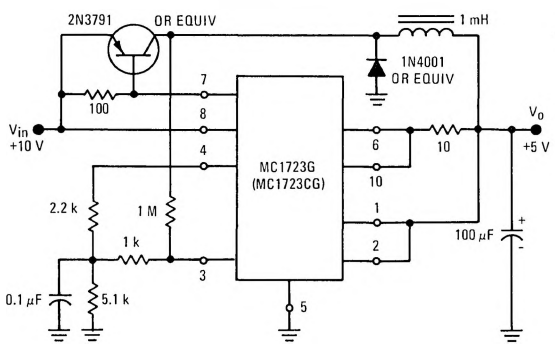


FIGURE 19 – +5 V, 1-AMPERE HIGH EFFICIENCY REGULATOR

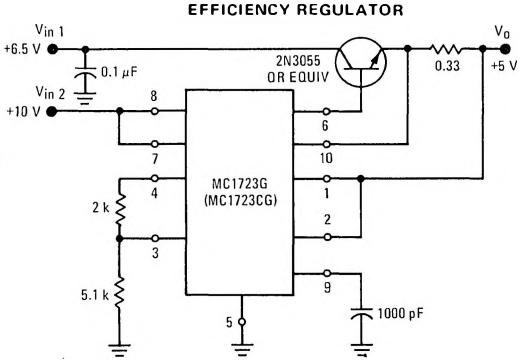


FIGURE 20 – +15 V, 1-AMPERE REGULATOR WITH REMOTE SENSE

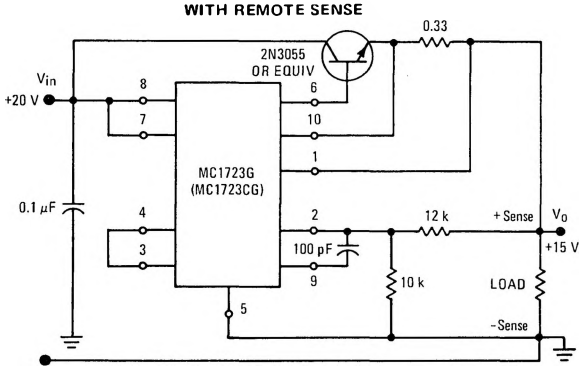
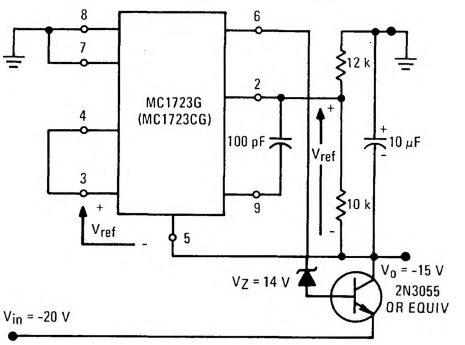
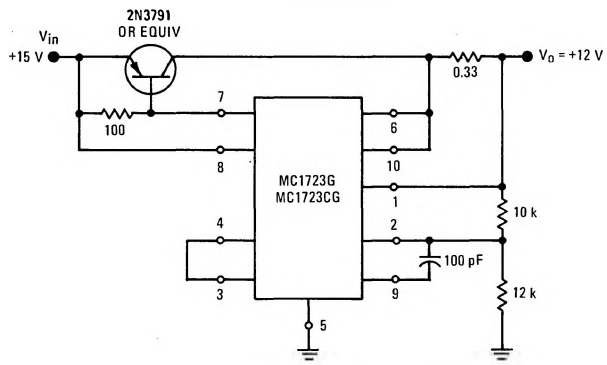


FIGURE 21 – -15 V NEGATIVE REGULATOR



TYPICAL APPLICATIONS (continued)

FIGURE 22 – +12 V, 1-AMPERE REGULATOR USING PNP CURRENT BOOST



See current MCC1723/1723C data sheet for standard linear chip information.