

POSITIVE VOLTAGE REGULATORS

MC1723G MC1723CG

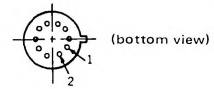
MONOLITHIC VOLTAGE REGULATOR

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

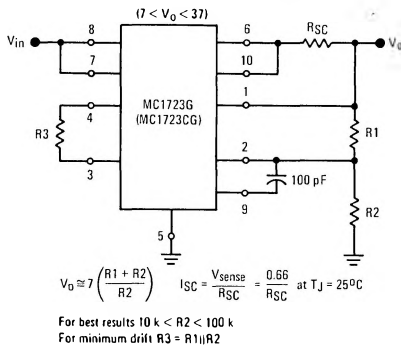


FIGURE 2 – TYPICAL NPN CURRENT BOOST CONNECTION

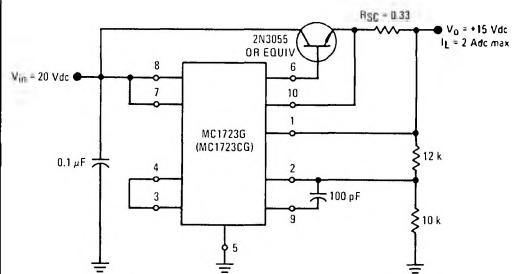
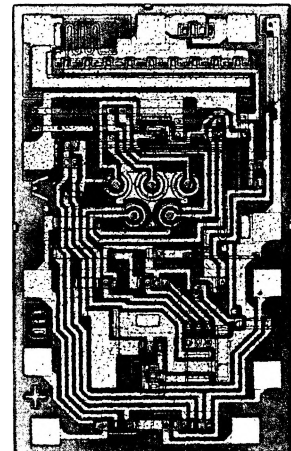
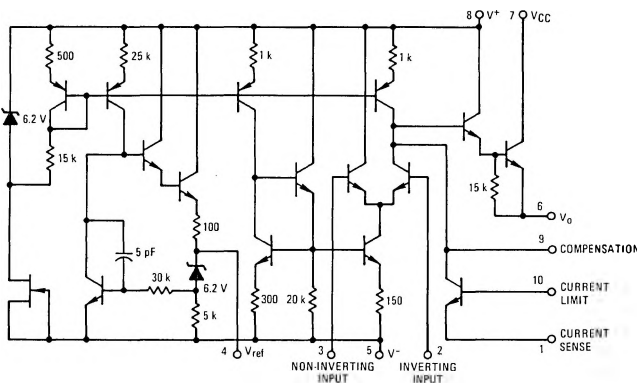


FIGURE 3 – CIRCUIT SCHEMATIC



MC1723G, MC1723CG (continued)

MAXIMUM RATINGS ($T_A = +25^{\circ}\text{C}$ 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	mA _{dc}
Current from V_{ref}	I_{ref}	15	mA _{dc}
Power Dissipation and Thermal Characteristics $T_A = +25^{\circ}\text{C}$ Derate above $T_A = +25^{\circ}\text{C}$ Thermal Resistance, Junction to Air $T_C = +25^{\circ}\text{C}$ Derate above $T_A = +25^{\circ}\text{C}$ Thermal Resistance, Junction to Case	P_D $1/\theta_{JA}$ θ_{JA} P_D $1/\theta_{JC}$ θ_{JC}	0.8 6.8 5.44 1.8 14.4 69.4	Watt mW/ $^{\circ}\text{C}$ $^{\circ}\text{C}/\text{W}$ Watts mW/ $^{\circ}\text{C}$ $^{\circ}\text{C}/\text{W}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +150	$^{\circ}\text{C}$

OPERATING TEMPERATURE RANGE

Ambient Temperature MC1723CG MC1723G	T_A	0 to +75 -55 to +125	$^{\circ}\text{C}$
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ELECTRICAL CHARACTERISTICS (Unless otherwise noted: $T_A = +25^{\circ}\text{C}$, $V_{in} = 12\text{ Vdc}$, $V_o = 5\text{ Vdc}$, $I_L = 1\text{ mA}$, $R_{SC} = 0$, $C_1 = 100\text{ pF}$, $C_{ref} = 0$ and divider impedance as seen by the error amplifier $\leq 10\text{ k}\Omega$ connected as shown in Figure 1)

Characteristic	Symbol	MC1723			MC1723C			Unit
		Min	Typ	Max	Min	Typ	Max	
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 ($I_L = 0$, $V_{in} = 30\text{ V}$)	I_b	—	2.3	3.5	—	2.3	4.0	mA _{dc}
Output Noise Voltage ($f = 100\text{ Hz}$ to 10 kHz) $C_{ref} = 0$ $C_{ref} = 5.0\text{ }\mu\text{F}$	V_n	— —	20 2.5	— —	— —	20 2.5	— —	$\mu\text{V(rms)}$
Average Temperature Coefficient of Output Voltage $T_{low} \text{ ①} < T_A < T_{high} \text{ ②}$	TCV_o	—	0.002	0.015	—	0.003	0.015	%/ $^{\circ}\text{C}$
Line Regulation ($T_A = +25^{\circ}\text{C}$) $\begin{cases} 12\text{ V} < V_{in} < 15\text{ V} \\ 12\text{ V} < V_{in} < 40\text{ V} \end{cases}$ ($T_{low} \text{ ①} < T_A < T_{high} \text{ ②}$) $12\text{ V} < V_{in} < 15\text{ V}$	Reg_{in}	— — —	0.01 0.02 —	0.1 0.2 0.3	— — —	0.01 0.1 —	0.1 0.5 0.3	% V_o
Load Regulation ($1.0\text{ mA} < I_L < 50\text{ mA}$) $T_A = +25^{\circ}\text{C}$ $T_{low} \text{ ①} < T_A < T_{high} \text{ ②}$	Reg_{load}	— —	0.03 —	0.15 0.6	— —	0.03 —	0.2 0.6	% V_o
Ripple Rejection ($f = 50\text{ Hz}$ to 10 kHz) $C_{ref} = 0$ $C_{ref} = 5.0\text{ }\mu\text{F}$	Rej_R	— —	74 86	— —	— —	74 86	— —	dB
Short Circuit Current Limit ($R_{SC} = 10\text{ }\Omega$, $V_o = 0$)	I_{SC}	—	65	—	—	65	—	mA _{dc}
Long Term Stability	$\Delta V_o / \Delta t$	—	0.1	—	—	0.1	—	%/1000 hrs.

① $T_{low} = 0^{\circ}\text{C}$ for MC1723CG
= -55°C for MC1723G

② $T_{high} = +75^{\circ}\text{C}$ for MC1723CG
= $+125^{\circ}\text{C}$ for MC1723G

MC1723G, MC1723CG (continued)

TYPICAL CHARACTERISTICS

($V_{in} = 12\text{ Vdc}$, $V_O = 5.0\text{ Vdc}$, $I_L = 1.0\text{ mAdc}$, $R_{SC} = 0$, $T_A = +25^\circ\text{C}$ unless otherwise noted)

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

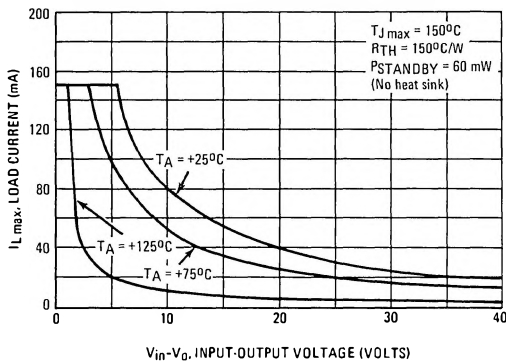


FIGURE 5 – LOAD REGULATION CHARACTERISTICS WITHOUT CURRENT LIMITING

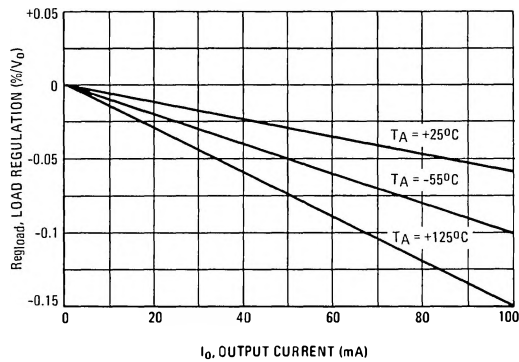


FIGURE 6 – LOAD REGULATION CHARACTERISTICS WITH CURRENT LIMITING

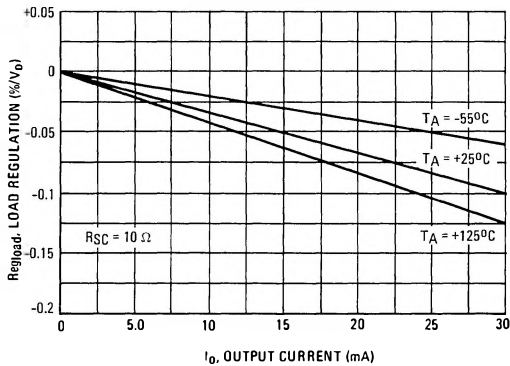


FIGURE 7 – LOAD REGULATION CHARACTERISTICS WITH CURRENT LIMITING

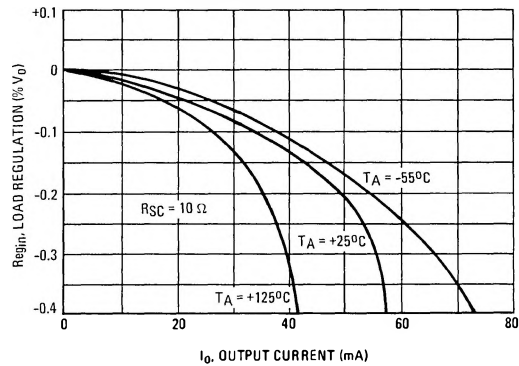


FIGURE 8 – CURRENT LIMITING CHARACTERISTICS

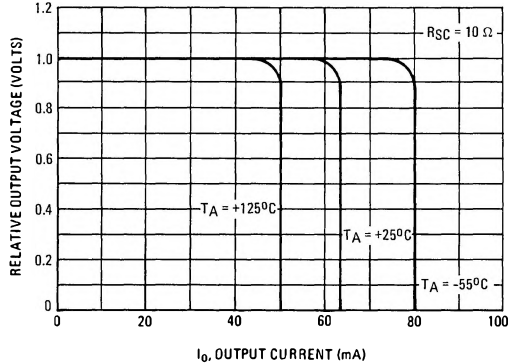
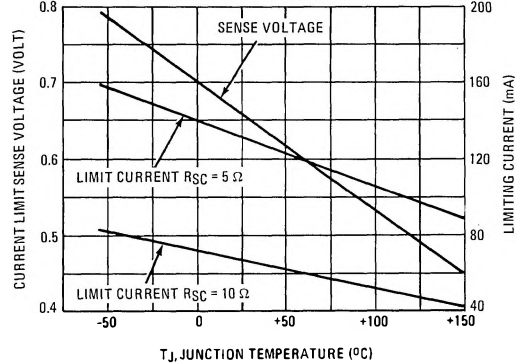


FIGURE 9 – CURRENT LIMITING CHARACTERISTICS AS A FUNCTION OF JUNCTION TEMPERATURE



TYPICAL CHARACTERISTICS (continued)

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

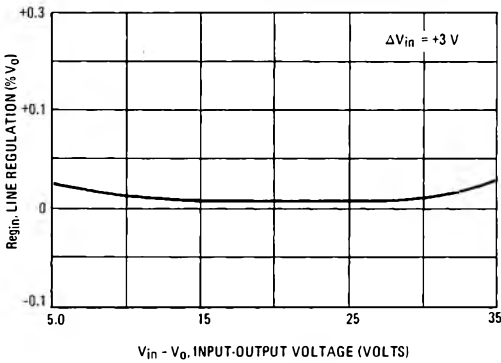


FIGURE 11 – LOAD REGULATION AS A FUNCTION OF INPUT-OUTPUT VOLTAGE DIFFERENTIAL

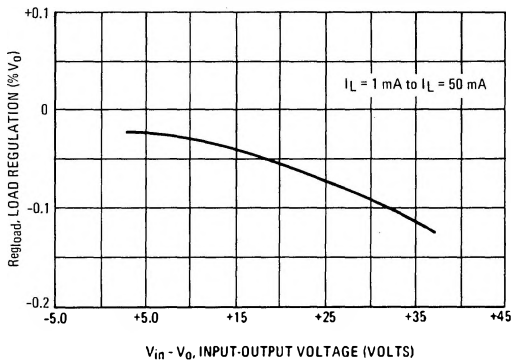


FIGURE 12 – STANDBY CURRENT DRAIN AS A FUNCTION OF INPUT VOLTAGE

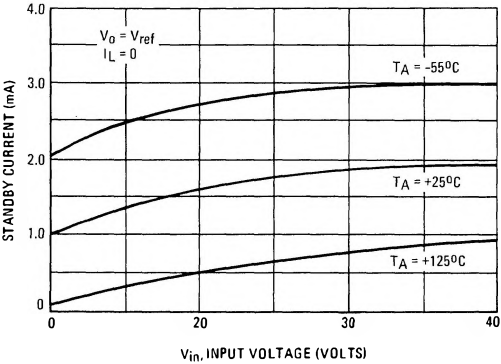


FIGURE 13 – LINE TRANSIENT RESPONSE

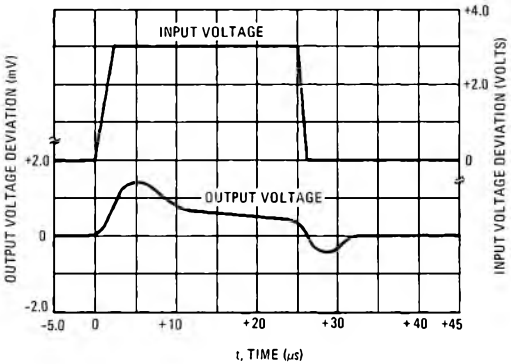


FIGURE 14 – LOAD TRANSIENT RESPONSE

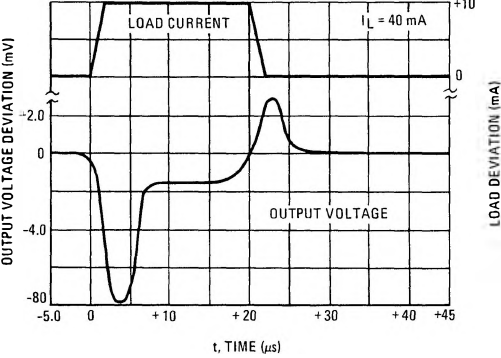
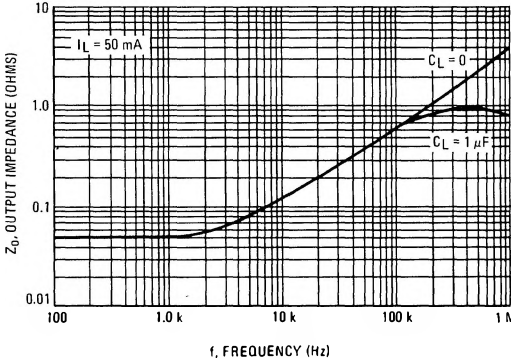


FIGURE 15 – OUTPUT IMPEDANCE AS FUNCTION OF FREQUENCY



MC1723G, MC1723CG (continued)

TYPICAL APPLICATIONS

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

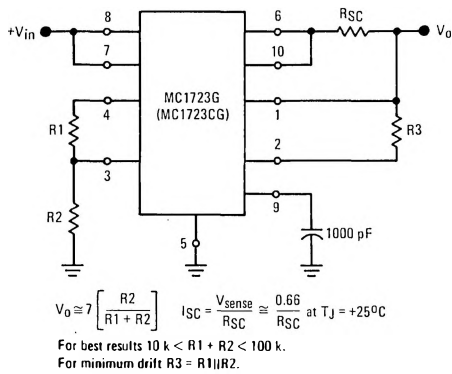


FIGURE 17 – MC1723,C FOLDBACK CONNECTION

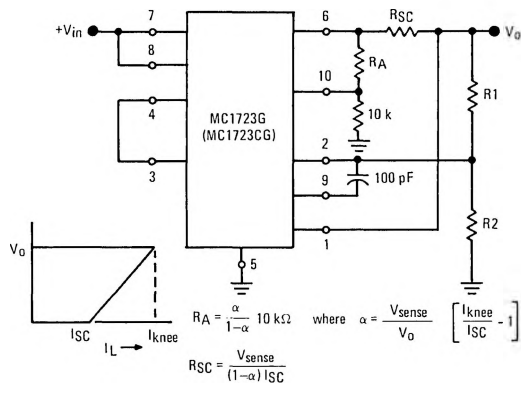


FIGURE 18 – +5 V, 1-AMPERE SWITCHING REGULATOR

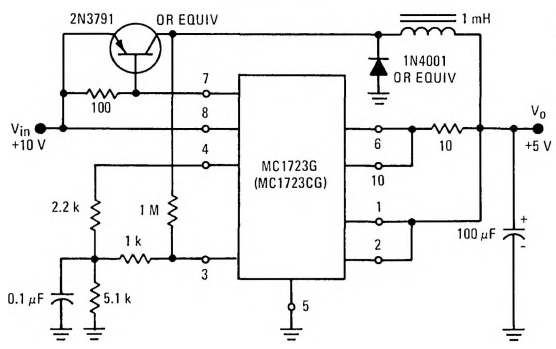


FIGURE 19 – +5 V, 1-AMPERE HIGH EFFICIENCY REGULATOR

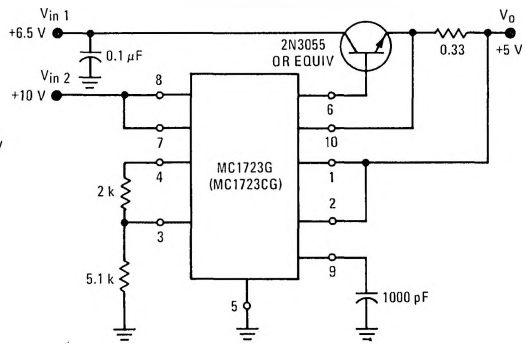


FIGURE 20 – +15 V, 1-AMPERE REGULATOR WITH REMOTE SENSE

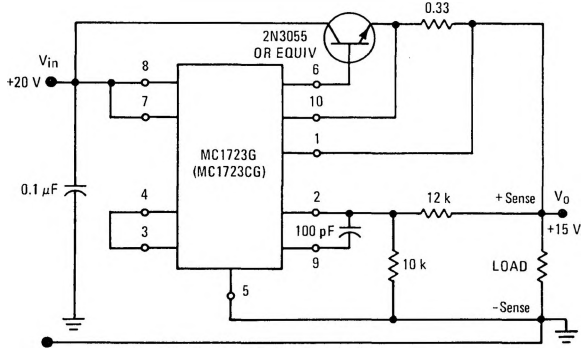
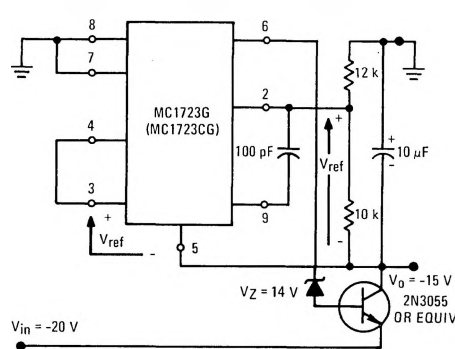


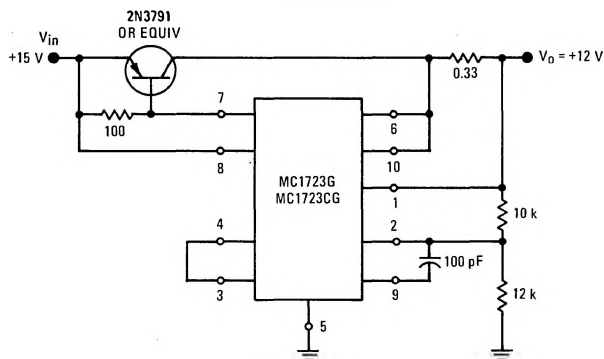
FIGURE 21 – -15 V NEGATIVE REGULATOR



MC1723G, MC1723CG (continued)

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.