#442-617
#442-618

μA78MG • μA79MG

4-TERMINAL POSITIVE AND NEGATIVE ADJUSTABLE VOLTAGE REGULATORS

FAIRCHILD LINEAR INTEGRATED CIRCUITS

GENERAL DESCRIPTION – The μA78MG and μA79MG are 4-Terminal Adjustable Voltage Regulators. They are designed to deliver continuous load currents of up to 500 mA with a maximum input voltage of 40 V for the positive regulator 78MG and – 40 V for the negative regulator 79MG. Output current capability can be increased to greater than 10 A through use of one or more external transistors. The output voltage range of the 78MG positive voltage regulator is 5 V to 30 V and the output voltage range of the negative 79MG is –30 V to –2.2 V. For systems requiring both a positive and negative, the 78MG and 79MG are excellent for use as a dual tracking regulator. These 4-terminal voltage regulators are constructed using the Fairchild Planar* process.

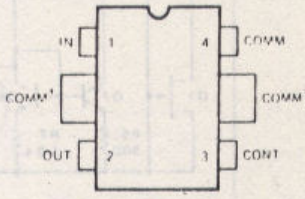
- OUTPUT CURRENT IN EXCESS OF 0.5 A
- μA78MG POSITIVE OUTPUT VOLTAGE 5 TO 30 V
- μA79MG NEGATIVE OUTPUT VOLTAGE –30 V TO –2.2 V
- INTERNAL THERMAL OVERLOAD PROTECTION
- INTERNAL SHORT CIRCUIT CURRENT PROTECTION
- OUTPUT TRANSISTOR SAFE AREA PROTECTION
- POWER MINI DUAL IN-LINE PACKAGE

ABSOLUTE MAXIMUM RATINGS

Input Voltage	
μA78MG, μA79MGC	40V
μA79MG, μA79MGC	–40V
Control Pin Voltage	
μA78MG, μA78MGC	$0 \leq V \leq V_{OUT}$
μA79MG, μA79MGC	$-V_{OUT} \leq -V \leq 0$
Power Dissipation	Internally Limited
Operating Junction Temperature Range (Note 1)	
Military (μA78MG, μA79MG)	–55°C to 150°C
Commercial (μA78MGC, μA79MGC)	0°C to 150°C
Storage Temperature Range	
4-Pin TO-39	–65°C to +150°C
Power Mini DIP and Power TAB	–55°C to +150°C
Lead Temperature	
Power TAB and Power Mini DIP (Soldering, 10 s)	230°C
4-Pin TO-39 (Soldering, 60 s)	300°C

μA78MG
CONNECTION DIAGRAMS
(TOP VIEWS)

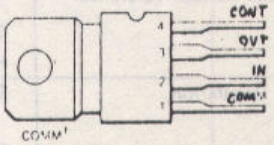
POWER MINI DIP
PACKAGE OUTLINE 9V
PACKAGE CODE T2



ORDER INFORMATION

TYPE	PART NO.
μA78MGC	μA78MGT2C

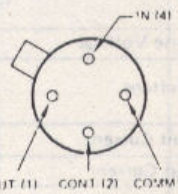
POWER TAB
PACKAGE OUTLINE 8Z
PACKAGE CODE U1



ORDER INFORMATION

TYPE	PART NO.
μA78MGC	μA78MGU1C

4-PIN TO-39
PACKAGE OUTLINE 5K
PACKAGE CODE H



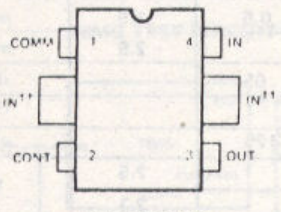
ORDER INFORMATION

TYPE	PART NO.
μA78MG	μA78MGHM
μA78MG	μA78MGHC

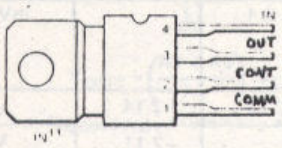
†NOTE:
Heat sink tabs connected to common through device substrate.

μA79MG
CONNECTION DIAGRAMS
(TOP VIEWS)

POWER MINI DIP
PACKAGE OUTLINE 9V
PACKAGE CODE T2



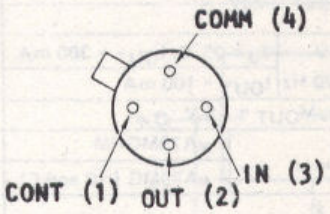
POWER TAB
PACKAGE OUTLINE 8Z
PACKAGE CODE U1



ORDER INFORMATION

TYPE	PART NO.
μA79MG	μA79MGU1C

4-LEAD TO-39
PACKAGE OUTLINE 5K
PACKAGE CODE H

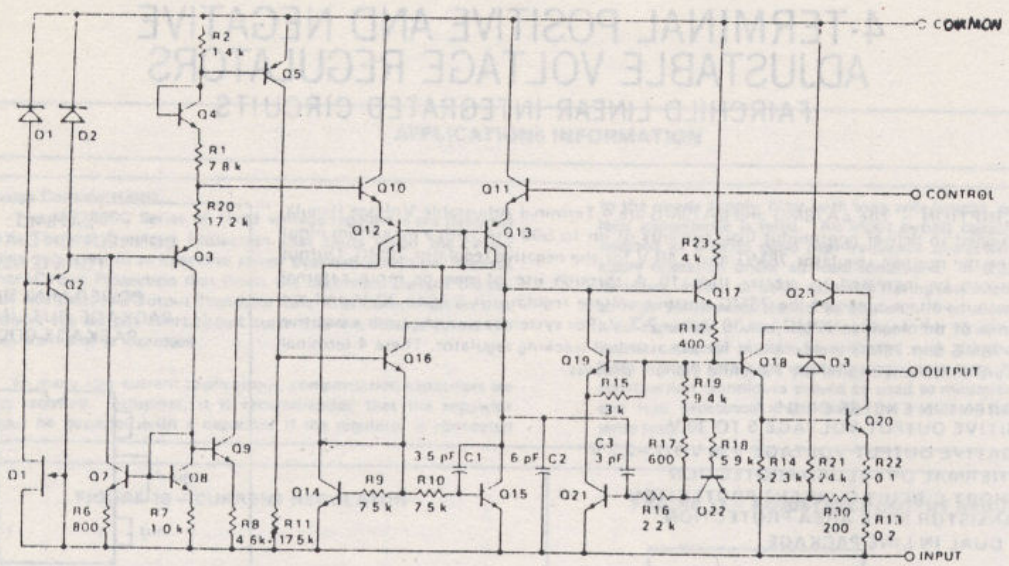


ORDER INFORMATION

TYPE	PART NO.
μA79MG	μA79MGHM
μA79MGC	μA79MGHC

††NOTE:
Heat sink tabs connected to input through device substrate. Not recommended for direct electrical connection.

79MG EQUIVALENT CIRCUIT



Resistor values in Ω unless otherwise noted.

μA79MG (C, HC, HM)

ELECTRICAL CHARACTERISTICS Unless otherwise specified, the following specifications apply: $0°C < T_J < 125°C$ for μA79MGHC and μA79MGC, $-55°C \leq T_J \leq 150°C$ for μA79MGHM, $V_{IN} = -10$ V, $I_{OUT} = 350$ mA, Test Circuit 2.

PARRMETER	CONDITION (Note 1)		MIN	TYP	MAX	UNITS
Input Voltage Range	$T_J = 25°C$		-40		7.0	V
Output Voltage Range	$V_{IN} = V_{OUT} - 5$ V		-30		-2.23	V
Output Voltage Tolerance	$V_{OUT} - 15$ V ≤ V_{IN} ≤ $V_{OUT} - 3$ V, 5 mA ≤ I_{OUT} ≤ 350 mA, $P_D \leq 5$ W, $V_{INMAX} = -38$ V	$T_J = 25°C$			4.0	%(V_{OUT})
					5.0	%(V_{OUT})
Line Regulation	$T_J = 25°C$, $I_{OUT} = 200$ mA, $V_{OUT} \geq -10$ V ($V_{OUT} - 20$ V) ≤ V_{IN} ≤ ($V_{OUT} - 2.5$ V)				1.0	%(V_{OUT})
	$T_J = 25°C$, $I_{OUT} = 200$ mA, $V_{OUT} \leq -10$ V ($V_{OUT} - 15$ V) ≤ V_{IN} ≤ ($V_{OUT} - 3$ V)				0.75	%(V_{OUT})
	($V_{OUT} - 7$ V) ≤ V_{IN} ≤ ($V_{OUT} - 3$ V)				0.67	%(V_{OUT})
Load Regulation	$V_{IN} = V_{OUT} - 7$ V, 5 mA ≤ I_{OUT} ≤ 500 mA, $T_J = 25°C$				1.0	%(V_{OUT})
Control Pin Current	$T_J = 25°C$				3.0	μA
					2.0	μA
Quiescent Current	$T_J = 25°C$			0.5	1.5	mA
					2.5	mA
Ripple Rejection	-18 V ≤ V_{IN} ≤ -8 V, $V_{OUT} = -5$ V, f = 120 Hz	$T_J = 25°C$, $I_{OUT} = 300$ mA	54	65		dB
		$I_{OUT} = 100$ mA	50			dB
Output Noise Voltage	10 Hz ≤ f ≤ 100 kHz, $V_{OUT} = -5$ V			125		μV
Dropout Voltage	(Note 2)	μA79MGHM			2.5	V
		μA79MG (HC and C)			2.3	
Short Circuit Current	$V_{IN} = -35$ V			100		mA
Peak Output Current				650		mA
Average Temperature Coefficient of Output Voltage	$V_{OUT} = -5$ V, $I_{OUT} = 5$ mA			-0.4		mV/°C
Control Pin Voltage (Reference)	$T_J = 25°C$		-2.32	-2.23	-2.14	V
			-2.35		-2.11	V

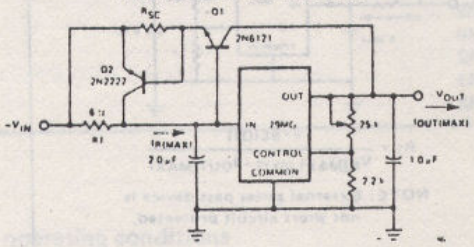
NOTE: The convention for Negative Regulators is the Algebraic value, thus -15 is less than -10 V.

TYPICAL APPLICATIONS FOR 79MG

Bypass capacitors are recommended for stable operation of the μA79MG over the input voltage and output current ranges. Output bypass capacitors will improve the transient response of the regulator.

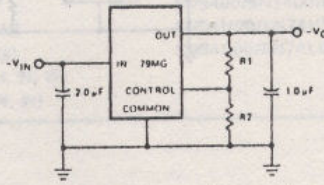
The bypass capacitors, (2 μF on the input, 1 μF on the output) should be ceramic or solid tantalum which have good high frequency characteristics. If aluminum electrolytics are used, their values should be 10 μF or larger. The bypass capacitors should be mounted with the shortest leads, and if possible, directly across the regulator terminals.

NEGATIVE HIGH CURRENT SHORT CIRCUIT PROTECTED REGULATOR



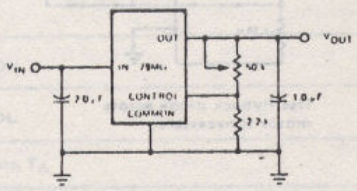
$$R1 = \frac{\beta V_{BE(Q1)}}{V_{R(MAX)}(\beta+1) - I_{OUT(MAX)}}$$

BASIC NEGATIVE REGULATOR

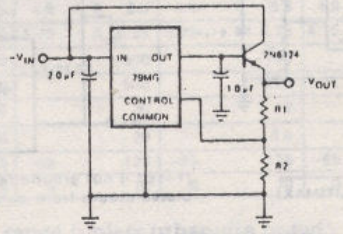


$$V_{OUT} = -V_{CONT}\left(\frac{R1 + R2}{R2}\right)$$

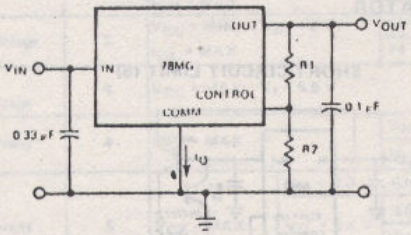
−30 V TO −2.2 V ADJUSTABLE REGULATOR



NEGATIVE HIGH CURRENT VOLTAGE REGULATOR EXTERNAL SERIES PASS



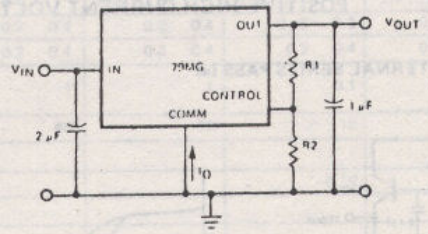
78MG TEST CIRCUIT 1



$$V_{OUT} = \left(\frac{R1 + R2}{R2}\right) V_{CONTROL}$$

$V_{CONTROL}$ Nominally = 5 V

79MG TEST CIRCUIT 2



$$V_{OUT} = \left(\frac{R1 + R2}{R2}\right) V_{CONTROL}$$

$V_{CONTROL}$ Nominally = −2.23 V

Recommended R2 current ≈ 1 mA
R2 = 5 kΩ (78MG)
R2 = 2.2 kΩ (79MG)

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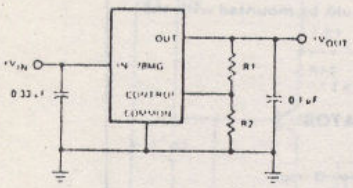
TYPICAL APPLICATIONS FOR μA78MG

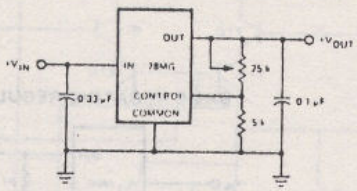
In many μA78MG applications, compensation capacitors may not be required. However, for stable operation of the regulator over all input voltage and output current ranges, bypassing of the input and output (0.33 μF and 0.1 μF, respectively) is recommended. Input bypassing is necessary if the regulator is located far from the filter capacitor of the power supply. Bypassing the output will improve the transient response of the regulator.

BASIC POSITIVE REGULATOR

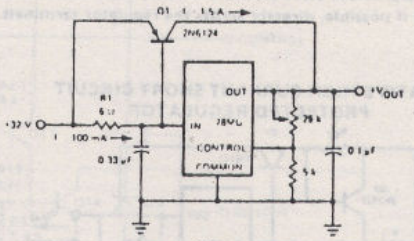


$$V_{OUT} = V_{CONT}\left(\frac{R1 + R2}{R2}\right)$$

POSITIVE 5 TO 30 V ADJUSTABLE REGULATOR



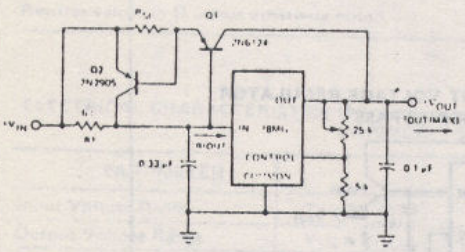
POSITIVE 5 TO 30 V ADJUSTABLE REGULATOR I_{OUT} > 1.5 A



$$R1 = \frac{\beta V_{BE(Q1)}}{V_{R(MAX)}(\beta+1) - I_{OUT(MAX)}}$$

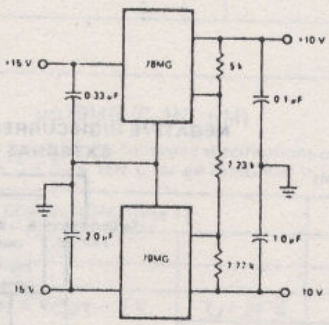
NOTE: External series pass device is not short circuit protected.

POSITIVE HIGH CURRENT SHORT CIRCUIT PROTECTED REGULATOR



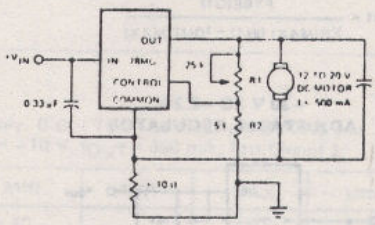
$$R1 = \frac{\beta V_{BE(Q1)}}{V_{R(MAX)}(\beta+1) - I_{OUT(MAX)}}$$

±10 V, 500 mA DUAL TRACKING REGULATOR



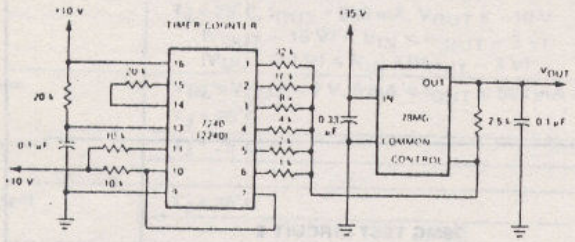
If load is not ground referenced, connect reverse biased diodes from outputs to ground.

MOTOR SPEED CONTROL

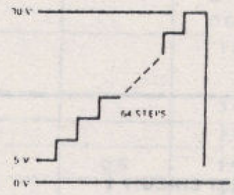


Use flyback diode across motor if necessary.

PROGRAMMABLE SUPPLY

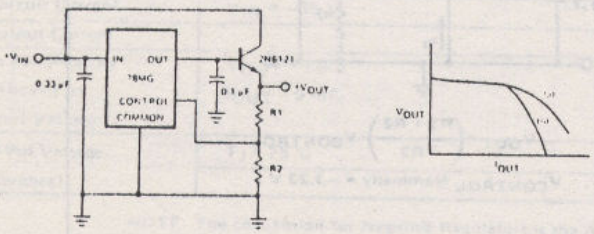


OUTPUT WAVEFORM



POSITIVE HIGH CURRENT VOLTAGE REGULATOR

EXTERNAL SERIES PASS (a)



SHORT CIRCUIT LIMIT (b)