52149/52174 79HG REPLACEMENT	NEGATIVE ADJUSTABLE 5-AMP VOLTAGE REGULATOR	Mii HYBRID MICROELECTRONICS PRODUCTS DIVISION

Features:

- Replacement for 79HG
- 5.0A Output Current
- Internal Current And Thermal Overload Protection
- Internal Short Circuit Current Limit
- Low Drop-Out Voltage (Typically -2.2 V @ 5.0 A)
- 50W Power Dissipation
- Electrically Isolated Case
- Steel TO-3 Case

Applications:

- Designed for use in general purpose applications where adjustability is advantageous.
- Military and Hi Rel Industrial applications where hermeticity is required.

ORDER INFORMATION

52149	Standard
52174	MIL-STD-883 Screened

DESCRIPTION

The 52149/52174, which is a replacement for the 79HG, is an adjustable 4-terminal voltage regulator capable of supplying in excess of 5 A over a –24 V to -2.55 V output range. This Hybrid Voltage Regulator has been designed with all the inherent characteristics of the monolithic 4-terminal regulator; i.e., full thermal overload and short circuit protection. It is packaged in a hermetically sealed 4-pin, TO-3 package providing 50W power dissipation. The regulator consists of a monolithic chip driving a discrete series-pass element and short circuit detection transistors.

ABSOLUTE MAXIMUM RATINGS

Input Voltage	-35 V
Internal Power Dissipation @T_C = 25°C	50W
Maximum Input-to-Output Voltage Differential	35 V
Operating Junction Temperature	150°C
Storage Temperature Range	-55°C to +150°C
Pin Temperature (Soldering, 60 seconds)	300°C
Commercial Temperature Range 52149	0°C to +125°C
Military Temperature Range 52174	-55°C to +125°C

ELECTRICAL CHARACTERISTICS

T_J = 25ºC, V_{IN} = -10V and I_{OUT} = -2.0A unless otherwise specified

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage Range		-7.0		-35	V
Nominal Output Voltage Range	$V_{IN} = V_{OUT}$ -5V	2.55		24	V
Output Voltage Tolerance	$40V \le V_{IN} \le -7V$			4	% (V_{OUT})
Line Regulation	$40V \le V_{IN} \le -7V$		0.4	1.0	% (V_{OUT})
Load Regulation	$V_{IN} = V_{OUT}$ -10V $-10mA \le I_{OUT} \le -5.0A$		0.7	1.0	% (V_{OUT})
Control Pin Current				3.0	µA
Quiescent Current	V_{IN} = -10V			7.0	mA
Ripple Rejection	$-18V \le V_{IN} \le -8.5V$ V_{OUT} = -5V, f = 120 Hz		50		dB
Output Noise Voltage	V_{OUT} = -5V, 10 Hz ≤ f ≤ 100kHz		200		µV
Dropout Voltage	I_{OUT} = -5A @ -0.95 V_{OUT}		-2.2		V
Short-Circuit Current Limit	V_{IN} = -15V		8	12	A
Control Pin voltage (Reference)	V_{IN} = -10V	-2.65		-2.45	V

DESIGN CONSIDERATIONS

This device has thermal overload protection from excessive power and internal short circuit protection, which limits the circuit's maximum current. Thus, the device is protected from overload abnormalities. Although the internal power dissipation is limited, the junction temperature must be kept below the maximum specified temperature (150ºC). It is recommended, by the manufacturer, that the maximum junction temperature be kept as low as possible for increased reliability. To calculate the maximum junction temperature or heat sink required, the following thermal resistance values should be used.

Package	θ_{JC}	
	Typical	Max
TO-3	1.8	2.5

$$P_{D(MAX)} = \frac{T_{J(MAX)} - T_A}{\theta_{JC} + \theta_{CA}} \qquad \theta_{CA} = \theta_{CS} + \theta_{SA}$$

Solving for $T_J = T_A + P_D (\theta_{JC} + \theta_{CA})$

Where:
T_J = Junction Temperature
T_A = Ambient Temperature
P_D = Power Dissipation
θ_{CS} = Case-to-heat sink thermal resistance
θ_{JC} = Junction-to-case thermal resistance
θ_{CA} = Case-to-ambient thermal resistance
θ_{SA} = Heat sink-to-ambient thermal resistance

The device is designed to operate without external compensation components. However, the amount of external filtering of these voltage regulators depends upon the circuit layout. If in a specific application the regulator is more than four inches from the filter capacitor, a 2µF solid tantalum capacitor should be used at the input. A 1µF capacitor should be used at the output to reduce transients created by fast switching loads, as seen in the basic test circuit. These filter capacitors must be located as close to the regulator as possible.

Caution: Permanent damage can result from forcing the output voltage higher than the input voltage. A protection diode from output to input should be used if this condition exists.

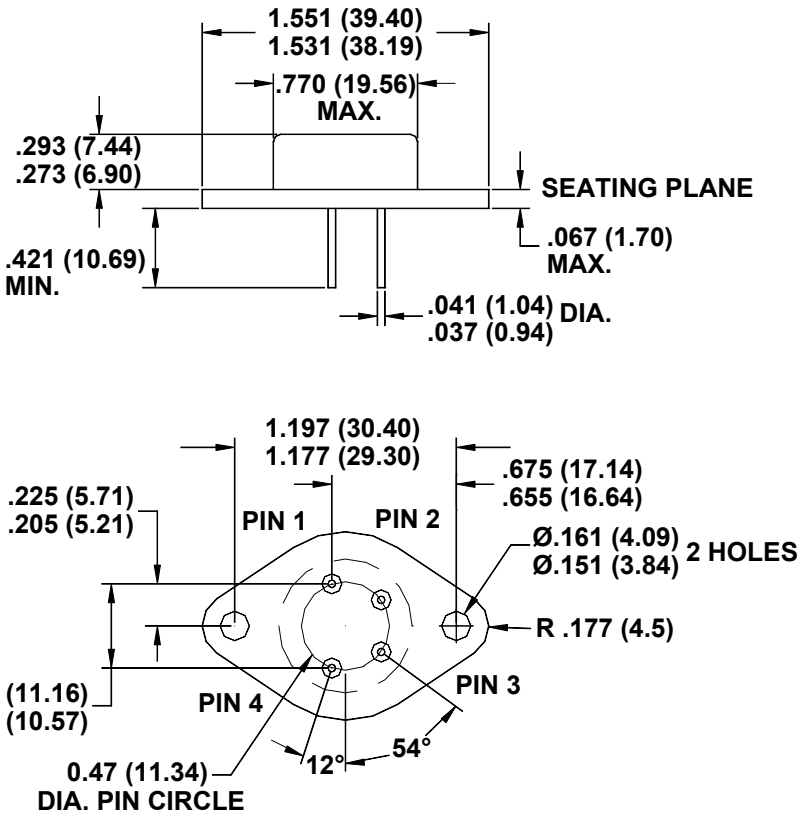
VOLTAGE OUTPUT

The device has an adjustable output voltage from -2.55 to -24V which can be programmed by the external resistor network (potentiometer or two fixed resistors) using the relationship:

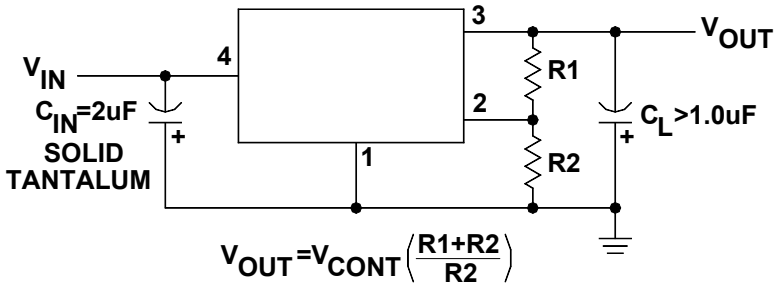
$$V_{OUT} = V_{CONTROL} \frac{R1 + R2}{R2}$$

Example: If R1 = 0Ω and R2 = 5kΩ, Then
V_{OUT} = -2.55 V nominal,
or, if R1 = 12.8 kΩ and R2 = 2.1 kΩ then
V_{OUT} = -18V.

Mechanical Configuration



Basic Test Circuit Adjustable Output Voltage



Note: All Dimension in notes and Millimeters (parenthesis)