

# MC1538R MC1438R

# POWER BOOSTER

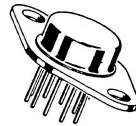
## MONOLITHIC POWER BOOSTER

The MC1538/MC1438 is designed as a high current gain amplifier (70 dB), with unity voltage gain that can deliver load currents up to  $\pm 300$  mA dc. This device is ideally suited to follow an operational amplifier (such as MC1556/MC1456) for driving low impedance loads and improving the overall circuit performance.

- High Input Impedance – 0.4 Meg-Ohm typ – when driving the MC1538/MC1438, the gain of an operational amplifier will approach the unloaded open-loop gain. Internal power dissipation of the operational amplifier will be independent of output voltage and therefore thermal drift will be reduced.
- Large Power Bandwidth – 1.5 MHz typ – considerably better than present operational amplifiers. Bandwidth and slew rate will be limited by the operational amplifier, not the MC1538/MC1438.
- Low Output Impedance – 10 Ohms typ – allows the MC1538/MC1438 to drive a capacitive load with greatly reduced phase shift compared with an operational amplifier. Output voltage swing capability is much increased when driving small load impedances.
- Adjustable Current Limit –  $\pm 5.0$  mA dc to  $\pm 300$  mA dc
- Excellent Power-Supply Rejection – 1.0 mV/V typ
- Current Gain – 3000 typ

## POWER BOOSTER INTEGRATED CIRCUIT FOR OPERATIONAL AMPLIFIERS EPITAXIAL PASSIVATED

CASE 614

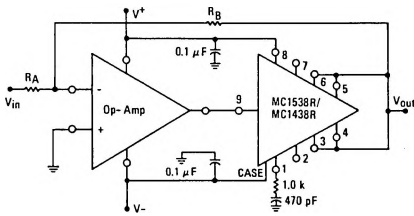


Weight  $\approx 6.315$  grams

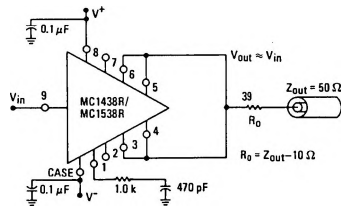
Case connected to  $V^-$

## TYPICAL APPLICATIONS

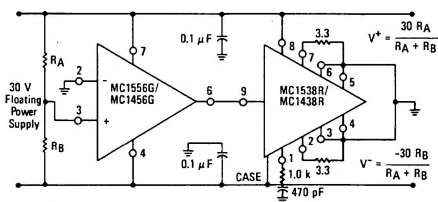
### OPERATIONAL AMPLIFIER BOOST CIRCUIT



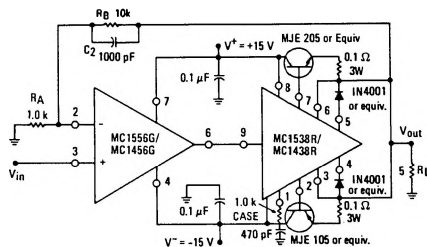
### DIGITAL OR ANALOG LINE DRIVER



### POWER SUPPLY SPLITTER



### SERVO/POWER AMPLIFIER



# MC1538R, MC1438R (continued)

## MAXIMUM RATINGS (T<sub>C</sub> = +25°C unless otherwise noted)

Rating	Symbol	MC1538R	MC1438R	Unit
Power Supply Voltage	V <sup>+</sup> V <sup>-</sup>	+22 -22	+18 -18	Vdc
Input-Output Voltage Differential	V <sub>in</sub> - V <sub>out</sub>	-14.5, +44	-14, +36	Vdc
Input Voltage Swing	V <sub>in</sub>	V <sup>+</sup> or V <sup>-</sup>		Vdc
Load Current	I <sub>L</sub>	350		mAdc
Power Dissipation and Thermal Characteristics				
T <sub>A</sub> = +25°C	P <sub>D</sub>	3.0		Watts
Derate above T <sub>A</sub> = +25°C	1/θ <sub>JA</sub>	24		mW/°C
Thermal Resistance, Junction to Air	θ <sub>JA</sub>	41.6		°C/W
T <sub>C</sub> = +25°C	P <sub>D</sub>	17.5		Watts
Derate above T <sub>C</sub> = +25°C	1/θ <sub>JC</sub>	140		mW/°C
Thermal Resistance, Junction to Case	θ <sub>JC</sub>	7.15		°C/W
Operating and Storage Junction Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	-65 to +150		°C

## OPERATING TEMPERATURE RANGE

Ambient Temperature	MC1438R MC1538R	T <sub>A</sub>	0 to +75 -55 to +125	°C

## ELECTRICAL CHARACTERISTICS

(R<sub>L</sub> = 300 ohms, T<sub>C</sub> = +25°C unless otherwise noted.)

Characteristic (Linear Operation)	Fig	Note	Symbol	MC1538R			MC1438R			Unit
				Min	Typ	Max	Min	Typ	Max	
Voltage Gain (f = 1.0 kHz)	1	-	A <sub>V</sub>	0.9	0.95	1.0	0.85	0.95	1.0	V/V
Current Gain (A <sub>I</sub> = ΔI <sub>O</sub> /ΔI <sub>in</sub> )	1	-	A <sub>I</sub>	-	3000	-	-	3000	-	A/A
Output Impedance (f = 1.0 kHz)	1	-	Z <sub>out</sub>	-	10	-	-	10	-	Ohms
Input Impedance (f = 1.0 kHz)	1	-	Z <sub>in</sub>	-	400	-	-	400	-	k ohms
Output Voltage Swing	1	3	V <sub>out</sub>	±12	±13	-	±11	±12	-	Vdc
Input Bias Current	2	-	I <sub>b</sub>	-	60	200	-	60	300	μAdc
Output Offset Voltage	2	1	V <sub>oo</sub>	-	25	150	-	25	200	mVdc
Small Signal Bandwidth (R <sub>L</sub> = 300 ohms) (V <sub>in</sub> = 0 Vdc, V <sub>in</sub> = 100 mV (rms))	1	-	BW <sub>3 dB</sub>	-	8.0	-	-	8.0	-	MHz
Power Bandwidth (V <sub>out</sub> = 20 V <sub>p-p</sub> , THD = 5%)	1	3	PBW	-	1.5	-	-	1.5	-	MHz
Total Harmonic Distortion (f = 1.0 kHz, V <sub>out</sub> = 20 V <sub>p-p</sub> )	1	3	THD	-	0.5	-	-	0.5	-	%
Short-Circuit Output Current (R <sub>1</sub> = R <sub>2</sub> = ∞) (R <sub>1</sub> = R <sub>2</sub> = 3.3 ohms)	3 3	2	I <sub>SC</sub>	75 -	95 300	125 -	65 -	95 300	140 -	mAdc
Adjustable Range	4,5	-		-	5.0 to 300	-	-	5.0 to 300	-	
Power Supply Sensitivity (V <sup>-</sup> constant) (V <sup>+</sup> constant)	2	-	S <sup>+</sup> S <sup>-</sup>	- -	1.0 1.0	- -	- -	1.0 1.0	- -	mV/V
Power Supply Current (R <sub>L</sub> = ∞, V <sub>in</sub> = 0)	2	-	I <sub>D+</sub> or I <sub>D-</sub>	4.5	6.0	10	2.5	6.0	15	mAdc
Power Dissipation (R <sub>L</sub> = ∞, V <sub>in</sub> = 0)	2	3	P <sub>D</sub>	150	180	300	75	180	450	mW

Note 1. Output offset Voltage is the quiescent dc output voltage with the input grounded.

Note 2. Short-Circuit Current, I<sub>SC</sub>, is adjustable by varying R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub> and R<sub>4</sub>. The positive current limit is set by R<sub>1</sub> or R<sub>3</sub>, and the negative current limit is set by R<sub>2</sub> or R<sub>4</sub>. See Figures 4 and 5 for curves of short-circuit current versus R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub> and R<sub>4</sub>.

Note 3. V<sup>+</sup> = +15 V, V<sup>-</sup> = -15 V.