

MC1538R MC1438R

POWER BOOSTER

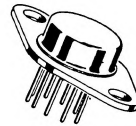
MONOLITHIC POWER BOOSTER

The MC1538/MC1438 is designed as a high current gain amplifier (70 dB), with unity voltage gain that can deliver load currents up to ± 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 – ± 5.0 mA dc to ± 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

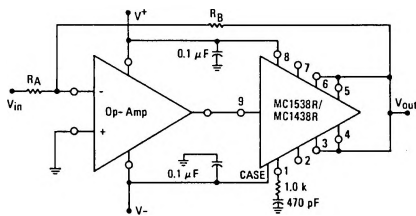


Weight ≈ 6.315 grams

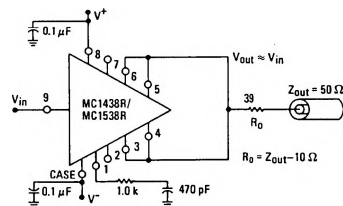
Case connected to V^-

TYPICAL APPLICATIONS

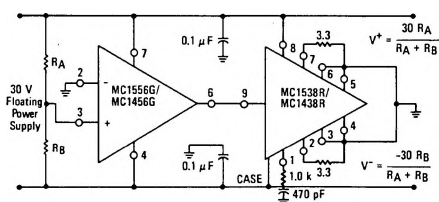
OPERATIONAL AMPLIFIER BOOST CIRCUIT



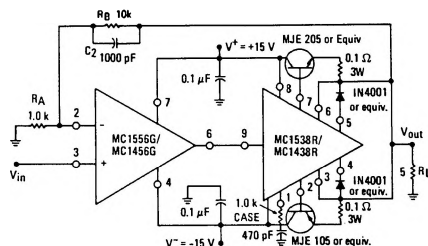
DIGITAL OR ANALOG LINE DRIVER



POWER SUPPLY SPLITTER



SERVO/POWER AMPLIFIER



MC1538R, MC1438R (continued)

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

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

OPERATING TEMPERATURE RANGE

Ambient Temperature	MC1438R MC1538R	T _A	0 to +75 -55 to +125	°C

ELECTRICAL CHARACTERISTICS

(R_L = 300 ohms, T_C = +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 _V	0.9	0.95	1.0	0.85	0.95	1.0	V/V
Current Gain (A _I = ΔI _O /ΔI _{in})	1	-	A _I	-	3000	-	-	3000	-	A/A
Output Impedance (f = 1.0 kHz)	1	-	Z _{out}	-	10	-	-	10	-	Ohms
Input Impedance (f = 1.0 kHz)	1	-	Z _{in}	-	400	-	-	400	-	k ohms
Output Voltage Swing	1	3	V _{out}	±12	±13	-	±11	±12	-	Vdc
Input Bias Current	2	-	I _b	-	60	200	-	60	300	μAdc
Output Offset Voltage	2	1	V _{oo}	-	25	150	-	25	200	mVdc
Small Signal Bandwidth (R _L = 300 ohms) (V _{in} = 0 Vdc, V _{in} = 100 mV (rms))	1	-	BW _{3 dB}	-	8.0	-	-	8.0	-	MHz
Power Bandwidth (V _{out} = 20 V _{p-p} , THD = 5%)	1	3	PBW	-	1.5	-	-	1.5	-	MHz
Total Harmonic Distortion (f = 1.0 kHz, V _{out} = 20 V _{p-p})	1	3	THD	-	0.5	-	-	0.5	-	%
Short-Circuit Output Current (R ₁ = R ₂ = ∞) (R ₁ = R ₂ = 3.3 ohms) Adjustable Range	3 3 4,5	2	I _{SC}	75 - -	95 300 5.0 to 300	125 - -	65 - -	95 300 5.0 to 300	140 - -	mAdc
Power Supply Sensitivity (V ⁻ constant) (V ⁺ constant)	2	-	S ⁺ S ⁻	- -	1.0 1.0	- -	- -	1.0 1.0	- -	mV/V
Power Supply Current (R _L = ∞, V _{in} = 0)	2	-	I _{D+} or I _{D-}	4.5	6.0	10	2.5	6.0	15	mAdc
Power Dissipation (R _L = ∞, V _{in} = 0)	2	3	P _D	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_{SC}, is adjustable by varying R₁, R₂, R₃ and R₄. The positive current limit is set by R₁ or R₃, and the negative current limit is set by R₂ or R₄. See Figures 4 and 5 for curves of short-circuit current versus R₁, R₂, R₃ and R₄.

Note 3. V⁺ = +15 V, V⁻ = -15 V.