Elektronische Bauelemente

SGPLM386

Low Voltage Audio Power Amplifier

RoHS Compliant Product
A suffix of "-C" specifies halogen and lead-free

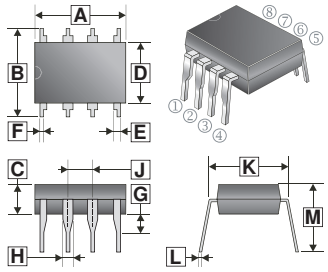
DESCRIPTION

The SGPLM386 is a power amplifier, designed for use in low voltage consumer applications. The gain is internally set to 20 to keep external part count low, but the addition of an external resistor and capacitor between pin 1 and pin 8 will increase the gain to any value up from 20 to 200. The inputs are ground referenced while the output automatically biases to one-half the supply voltage. The quiescent power drain is only 24 milliwatts when operating from a 6 voltage supply, making the SGPLM386 ideal for battery operation.

FEATURES

- Battery operation
- Minimum external parts
- Wide supply voltage range: 4V~12V
- Low quiescent current drain: 4mA
- Voltage gains: 20~200
- Ground referenced input
- Self-centering output quiescent voltage
- Low distortion: 0.2% (AV=20, VS=6V, RL=8Ω, PO=125mW, f=1kHz)

DIP-8

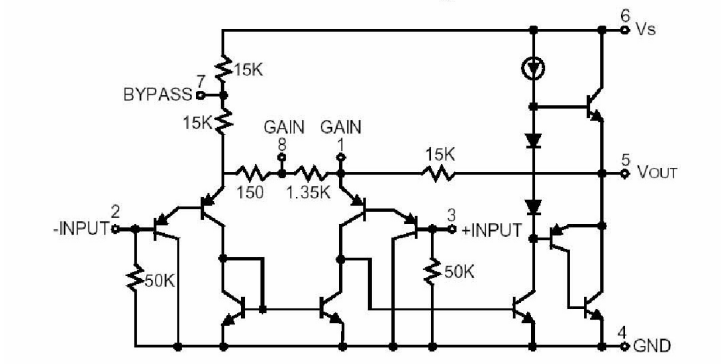


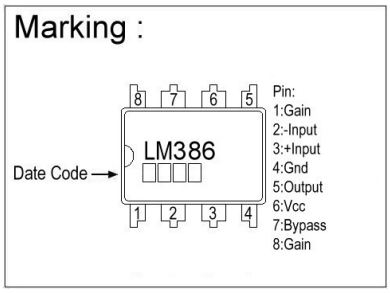
REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	9.017	10.16	G	0.381	-
B	-	10.92	H	1.143	1.778
C	2.921	4.953	J	2.540 TYP.	
D	6.096	7.112	K	7.620	8.255
E	0.762	1.143	L	0.203	0.358
F	0.356	0.559	M	-	9.144

APPLICATIONS

- AM-FM radio amplifiers
- Portable tape player amplifiers
- Intercoms
- TV sound systems
- Line drivers
- Ultrasonic drivers
- Small servo drivers
- Power converters

EQUIVALENT SCHEMATIC AND CONNECTION DIAGRAM





ABSOLUTE MAXIMUM RATINGS [2]

Parameter	Symbol	Ratings	Unit
Supply Voltage	V_{CC}	15	V
Power Dissipation	P_D	1.25	W
Input Voltage	V_i	-0.4~0.4	V
Operation Temperature	T_{OPR}	0~70	℃
Storage & Junction Temperature	T_{STG}, T_J	-65~150, 150	℃

ELECTRICAL CHARACTERISTICS [1, 2] (T_A=25℃, unless otherwise specified)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Operating Supply Voltage	V_S	4	-	12	V	
Quiescent Current	I_Q	-	4	8	mA	V_S=6V, V_{IN}=0
Output Power	P_O	230	-	-	mW	V_S=6V, R_L=8Ω, THD=10%
		480	-	-		V_S=9V, R_L=8Ω, THD=10%
Voltage Gain	G_V	-	26	-	dB	V_S=6V, f=1kHz 10μF from Pin1 to Pin8
		-	46	-		
Bandwidth	BW	-	300	-	kHz	V_S=6V, Pin1 to Pin8 open
Total Harmonic Distortion	THD	-	0.2	-	%	P_O=125mW, V_S=6V, f=1kHz R_L=8Ω, Pin1 to Pin8 open
Power Supply Rejection Ration	PSRR	-	50	-	dB	V_S=6V, f=1kHz, C_{BYPASS}=10μF Pin1 to Pin8 open Referred to output
Input Resistance	R_{IN}	-	50	-	KΩ	
Input Bias Current	I_{BIAS}	-	250	-	nA	V_S=6V, Pin2 to Pin3 open

Notes:

1. All voltages are measured with respect to the ground pin, unless otherwise specified.
2. Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is functional, but do not guarantee specific performance limits. Electrical Characteristics state DC and AC electrical specifications under particular test conditions which guarantee specific performance limits. This assumes that the device is within the Operating Ratings. Specifications are not guaranteed for parameters where no limit is given, however, the typical value is a good indication of device performance.
3. For operation in ambient temperatures above 25℃ , the device must be derated based on a 150℃ maxim um junction temperature and 1) a thermal resistance of 107℃/W, junction to ambien t for the dual-in-line package and 2)a thermal resistance of 170℃ /W for the small outline package.

APPLICATION HINTS

GAIN CONTROL

To make the SGPLM386 a more versatile amplifier, two pins (1 and 8) are provided for gain control. With pins 1 and 8 open the 1.35KΩ resistor sets the gain at 20 (26dB), If a capacitor is put from pin 1 to 8,bypassing the 1.35 kΩ resistor, the gain will go up to 200 (46dB). If a resistor is placed in series with the capacitor the gain can be set to any value from 20 to 200.Gain control can also be done by capacitively coupling a resistor (or FET) prom pin 1 to ground.

Additional external components can be placed in parallel with the internal feedback resistors to tailor the gain and frequency response for individual applications. For example we can compensate poor speaker bass response by frequency shaping the feedback path. This is done with a series RC from pin 1 to 5 (paralleling the internal 15kΩ resistor). For 6 dB effective bass boost: R=15kΩ, the lowest value for good stable operation in R=10k, if pin 8 is open, If pins 1 and 8 are bypassed then R as low as 2kΩ can be used. This restriction is because the amplifier is only compensated for closed-loop gains greater than 9.

INPUT BIASING

The schematic show that both input are biased to ground with a 50kΩ resistor. The base current of the input transistors is about 250nA, so the inputs are at about 12.5mW when left open. If the dc source resistance driving the SGPLM386 is higher than 250kΩ it will contribute very little additional offset (about 2.5mW at the input, 50mW at the output). If the dc source resistance is less than 10k, then shorting the unused input to ground will keep the offset low (about 2.5mW at the input, 50mW at the output). For dc source resistance between these values we can eliminate excess offset by putting a resistor from the unused input to ground, equal in value to the dc source resistance. Of course all offset problems are eliminated if the input is capacitively coupled.

When using the SGPLM386 with higher gains (bypassing the 1.35kΩ resistor between pin1 and 8) it is necessary to bypass the unused input, preventing degradation of gain and possible instabilities. This is done with a 0.1μF capacitor or a short to ground depending on the dc source resistance on the driven input.

TYPICAL PERFORMANCE CHARACTERISTICS

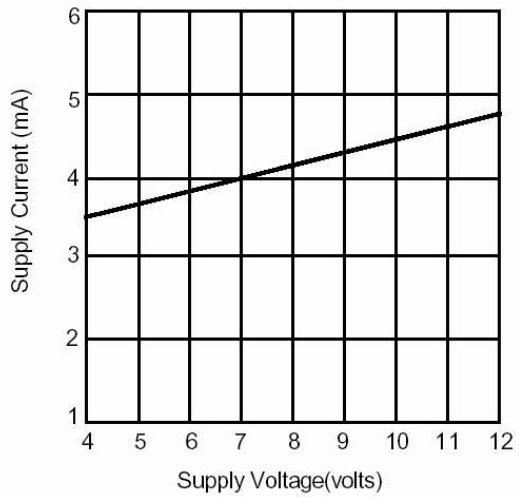


Fig 1. Quiescent Supply Current vs. Supply Voltage

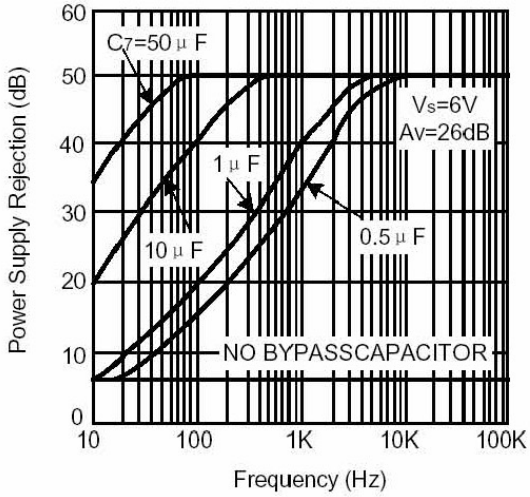


Fig 2. Power Supply Rejection Ratio (Referred to the output) vs. Frequency

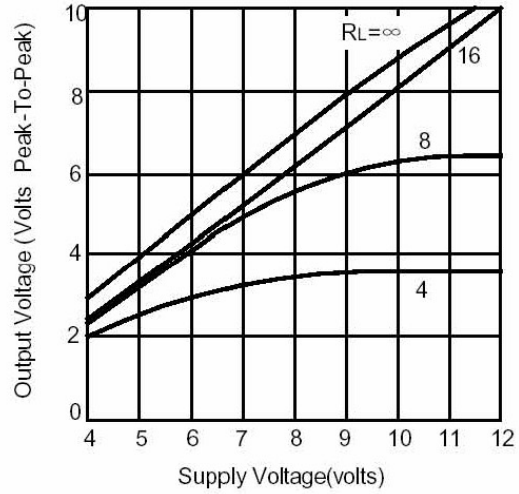


Fig 3. Peak-to-Peak Voltage Swing vs. Supply Voltage

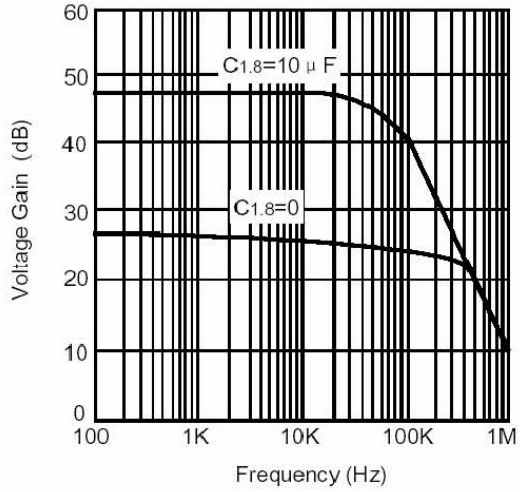


Fig 4. Voltage Gain vs. Frequency

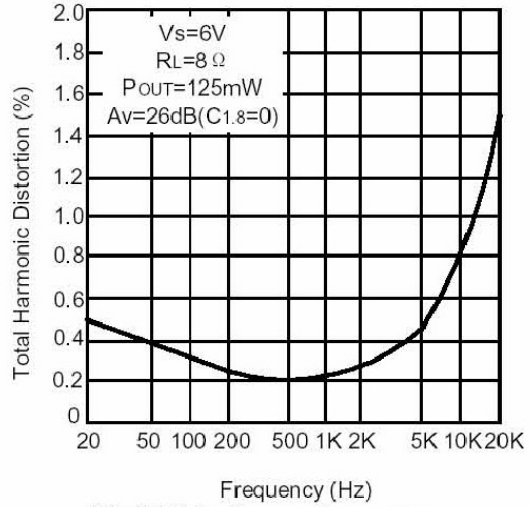


Fig 5. Distortion vs. Frequency

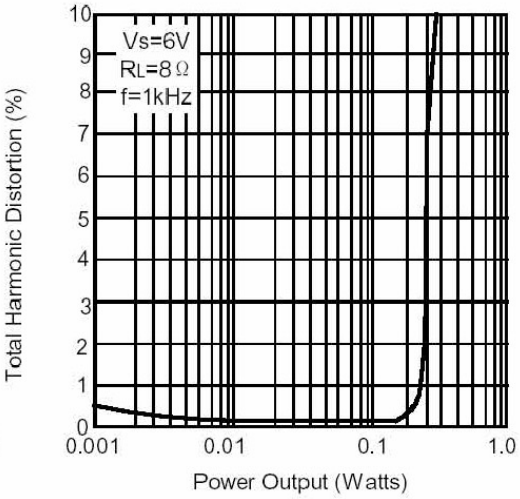


Fig 6. Distortion vs. Output Power

TYPICAL PERFORMANCE CHARACTERISTICS

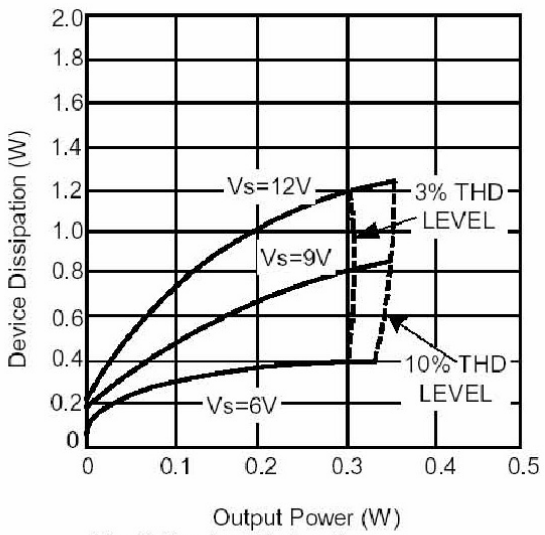


Fig 7. Device Dissipation vs. Output Power -4Ω Load

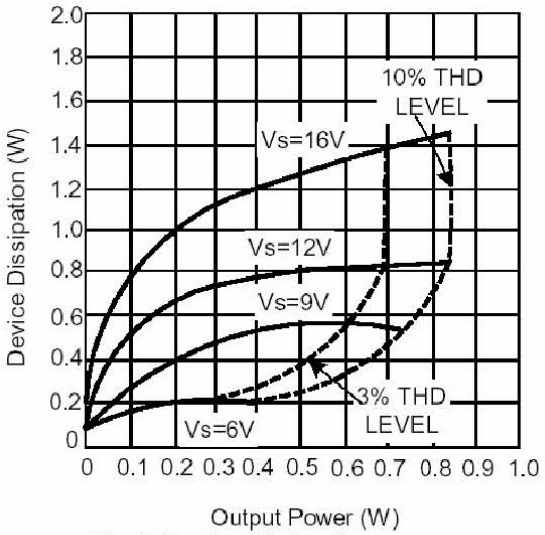


Fig 8. Device Dissipation vs. Output Power -8Ω Load

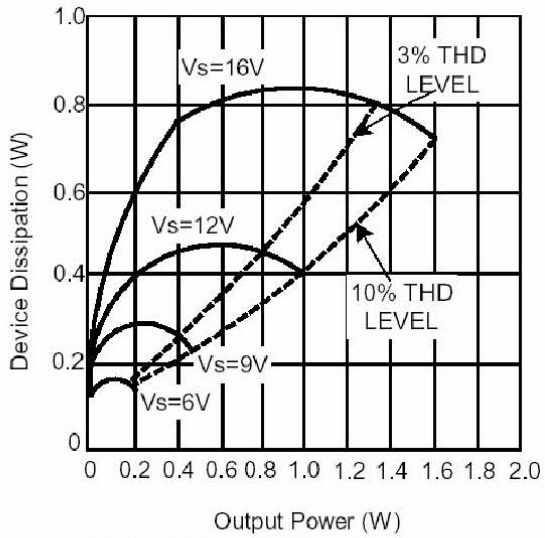


Fig 9. Device Dissipation vs. Output Power -16Ω Load

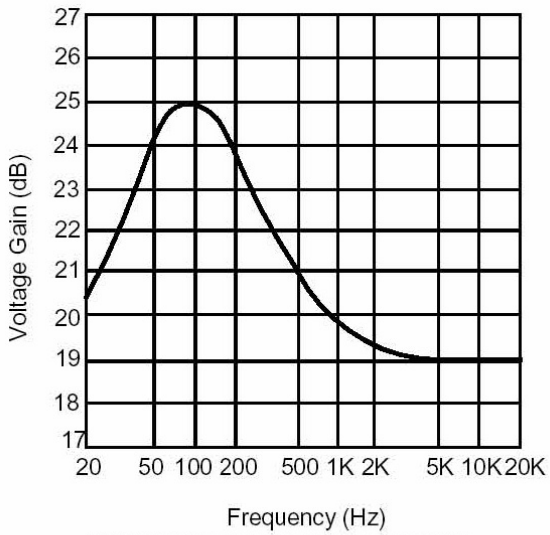
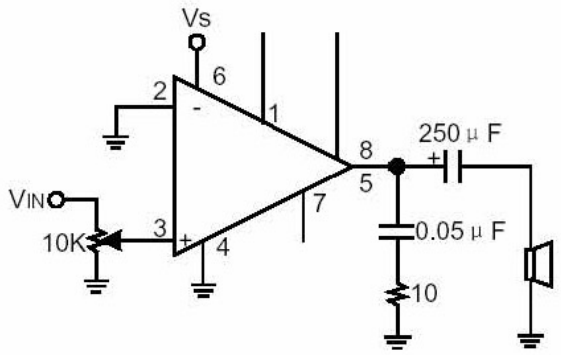
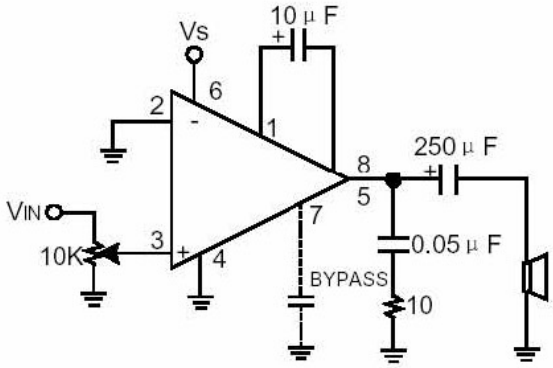


Fig 10. Frequency Response with Bass Boost

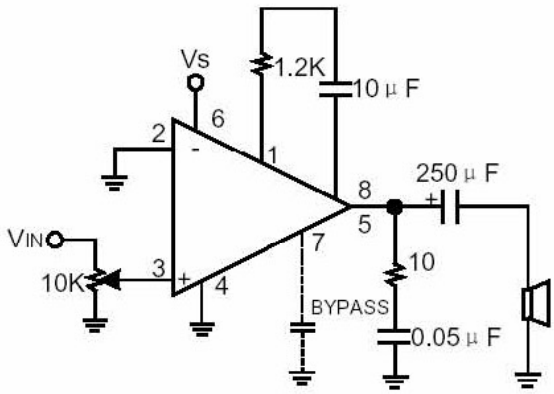
TYPICAL APPLICATIONS



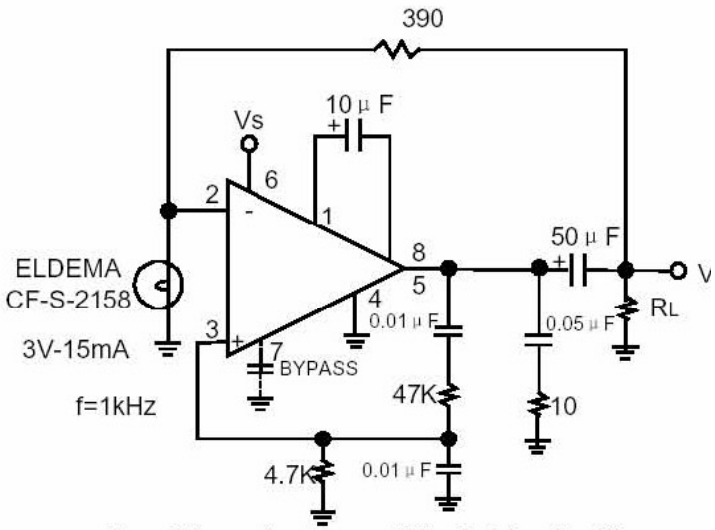
Amplifier with Gain=20
Minimum Parts



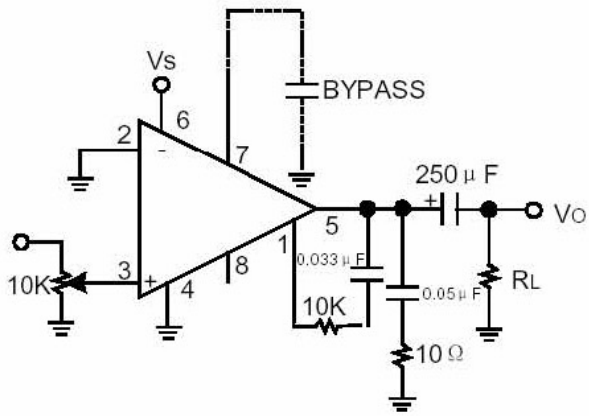
Amplifier with Gain=200



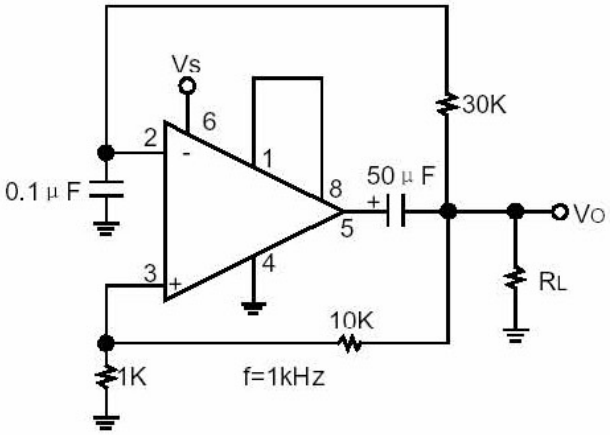
Amplifier with Gain=50



Low Distortion Power Wienbridge Oscillator

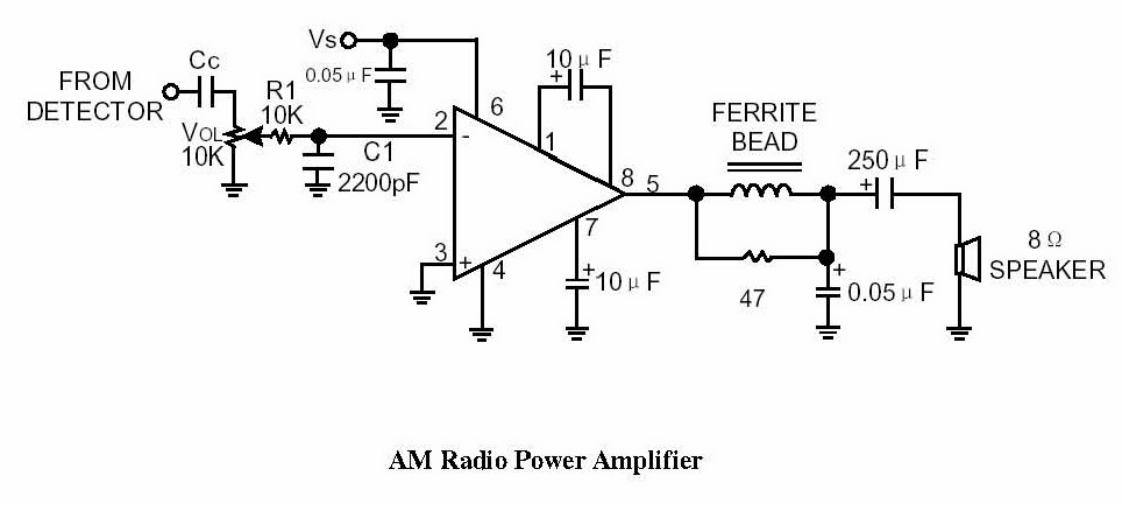


Amplifier with Bass Boost



Square Ware Oscillator

TYPICAL APPLICATIONS



AM Radio Power Amplifier

Notes:

4. Twist supply lead and supply ground very tightly.
5. Twist speaker lead and ground very tightly.
6. Ferrite bead in Ferroxcube K5-001-001/3B with 3 turns of wire.
7. R1C1 band limits input signals.
8. All components must be spaced very closely to IC.