查询PA34供应商 捷多邦，专业PCB打样工厂，24小时加急出货

PA34

HTTP://WWW.APEXMICROTECH.COM (800) 546-APEX (800) 546-2739

PRELIMINARY

FEATURES

- LOW COST
- WIDE COMMON MODE RANGE —
  Includes negative supply
- WIDE SUPPLY VOLTAGE RANGE
  Single supply: 5V to 40V
  Split supplies: ±2.5V to ±20V
- HIGH EFFICIENCY — |Vs–2.2V| at 2.5A typ
- HIGH OUTPUT CURRENT — 2.5A min
- INTERNAL CURRENT LIMIT
- LOW DISTORTION

APPLICATIONS

- HALF & FULL BRIDGE MOTOR DRIVERS
- AUDIO POWER AMPLIFIER
  STEREO — 18W RMS per channel
  BRIDGE — 36W RMS per package
- IDEAL FOR SINGLE SUPPLY SYSTEMS
  5V — Peripherals
  12V — Automotive
  28V — Avionic

DESCRIPTION

The PA34 consist of a monolithic power op amp in a 7-pin T0220 package.

The wide common mode input range includes the negative rail, facilitating single supply applications. It is possible to have a “ground based” input driving a single supply amplifier with ground acting as the “second” or “bottom” supply of the amplifier.

The output stage is also well protected. They possess internal current limit circuits. While the device is well protected, the Safe Operating Area (SOA) curve must be observed. Proper heatsinking is required for maximum reliability.

The tab of the 7 pin plastic package is tied to $-V_S$.

Graphic for PA34
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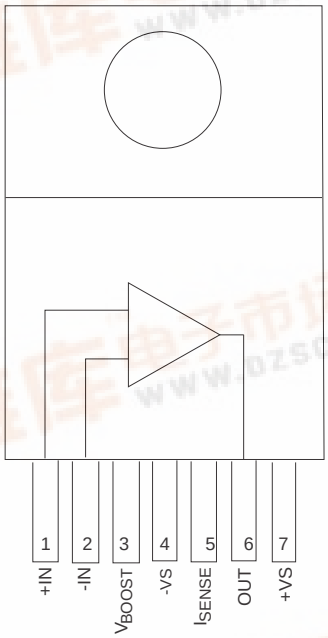
EXTERNAL CONNECTIONS

PA34



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ABSOLUTE MAXIMUM RATINGS

SUPPLY VOLTAGE, total	5V to 40V
OUTPUT CURRENT	SOA
POWER DISSIPATION, internal (per amplifier)	25W
INPUT VOLTAGE, differential	$\pm V_S$
INPUT VOLTAGE, common mode	$+V_S$, $-V_S$–.5V
JUNCTION TEMPERATURE, max[1]	150°C
TEMPERATURE, pin solder—10 sec max	300°C
TEMPERATURE RANGE, storage	–65°C to 150°C
OPERATING TEMPERATURE RANGE, case	–55°C to 125°C

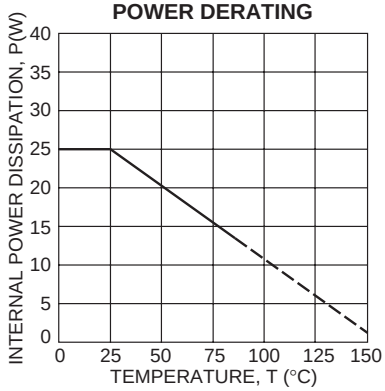
SPECIFICATIONS

		PA34			
PARAMETER	**TEST CONDITIONS[2]**	**MIN**	**TYP**	**MAX**	**UNITS**
INPUT					
OFFSET VOLTAGE, initial			1.5	10	mV
OFFSET VOLTAGE, vs. temperature	Full temperature range		15		µV/°C
BIAS CURRENT, initial		35	1000	nA	
COMMON MODE RANGE	Full temperature range	$-V_S$–.3		$+V_S$–2	dB
COMMON MODE REJECTION, DC	Full temperature range	60	85		dB
POWER SUPPLY REJECTION	Full temperature range	60	80		dB
GAIN					
OPEN LOOP GAIN	Full temperature range	80	100		dB
GAIN BANDWIDTH PRODUCT	A_V = 40dB		600		kHz
PHASE MARGIN	Full temperature range		65		°
POWER BANDWIDTH	$V_{O(P-P)}$ = 28V		13.6		kHz
OUTPUT					
CURRENT, peak		2.5			A
CURRENT, limit			3.0		A
SLEW RATE		.5	1.2		V/µs
CAPACITIVE LOAD DRIVE	A_V = 1		.22		µF
VOLTAGE SWING	Full temp. range, I_O = 100mA	$\|V_S\|$ –1.0	$\|V_S\|$ –0.8		V
VOLTAGE SWING	Full temp. range, I_O = 1A	$\|V_S\|$ –1.8	$\|V_S\|$ –1.4		V
VOLTAGE SWING	I_O = 2.5A	$\|V_S\|$ –3.0	$\|V_S\|$ –2.8		V
VOLTAGE SWING	I_O = 3.0A				V
POWER SUPPLY					
VOLTAGE, V_{SS}[3]		5[4]	30	40	V
CURRENT, quiescent, total			45	90	mA
THERMAL					
RESISTANCE, DC junction to case			5.0		°C/W
RESISTENCE,AC junction to case			3.7		°C/W
RESISTANCE, junction to air			30		°C/W
TEMPERATURE RANGE, case	Meets full range specifications	–25		85	°C

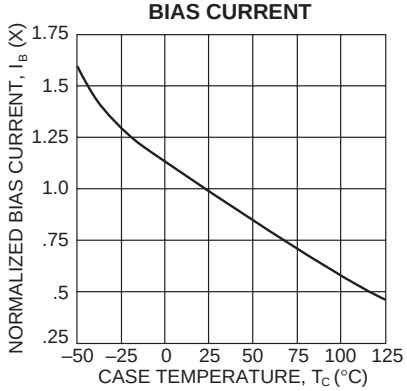
NOTES:

1. Long term operation at the maximum junction temperature will result in reduced product life. Derate internal power dissipation to achieve high MTTF.
2. Unless otherwise noted, the following conditions apply: $\pm V_S$ = ±15V, T_C = 25°C.
3. $+V_S$ and $–V_S$ denote the positive and negative supply rail respectively. V_{SS} denotes the total rail-to-rail supply voltage.
4. Current limit may not function properly below V_{SS} = 6V, however SOA violations are unlikely in this area.

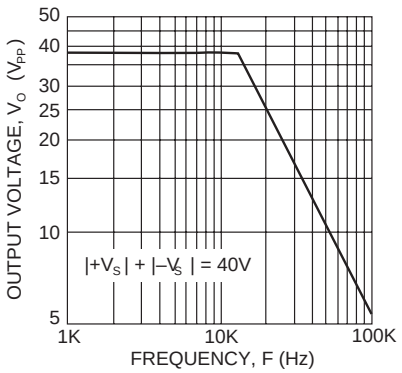
POWER DERATING



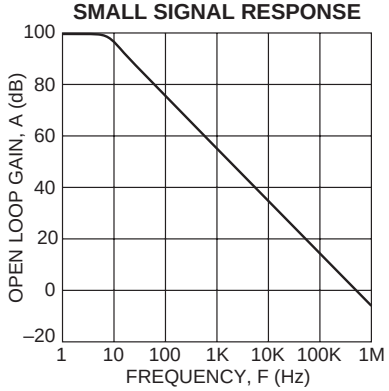
BIAS CURRENT



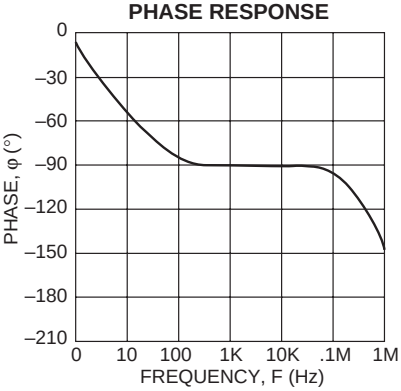
POWER RESPONSE



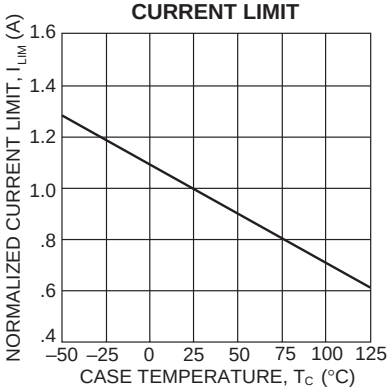
SMALL SIGNAL RESPONSE



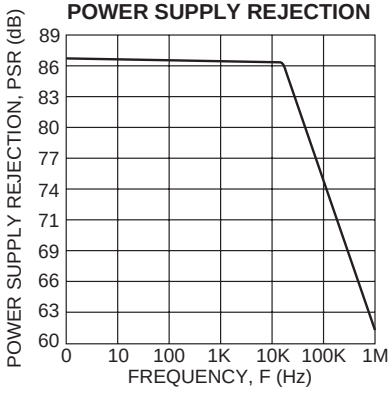
PHASE RESPONSE



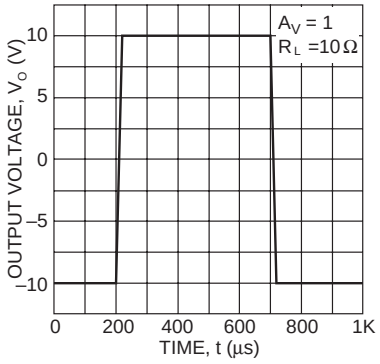
CURRENT LIMIT



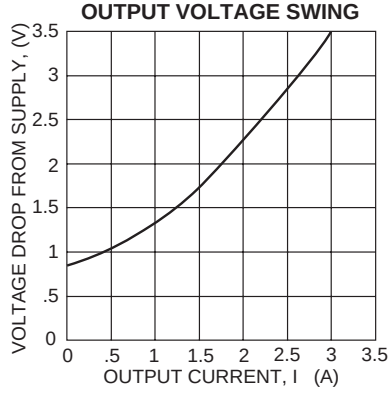
POWER SUPPLY REJECTION



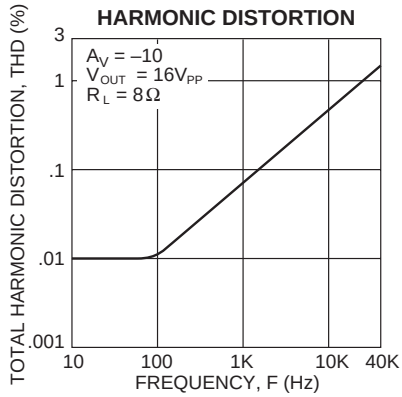
PULSE RESPONSE



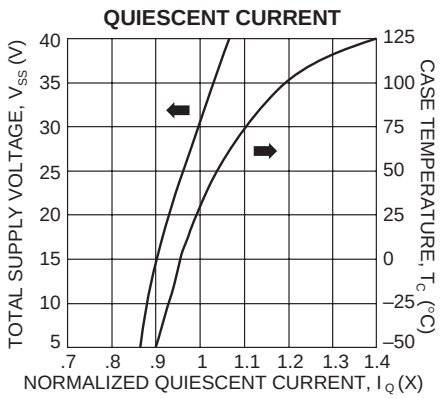
OUTPUT VOLTAGE SWING



HARMONIC DISTORTION



QUIESCENT CURRENT

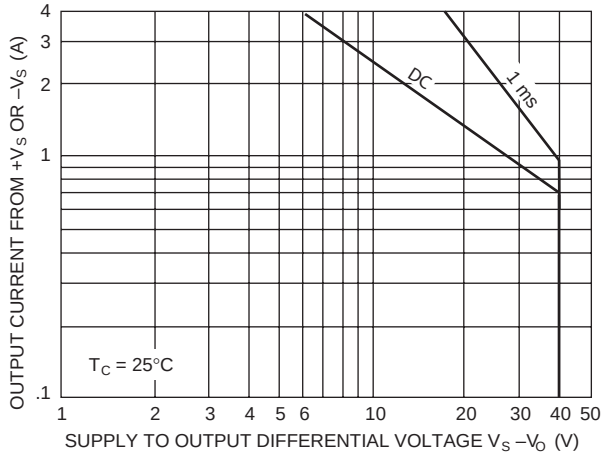


GENERAL

Please read Application Note 1 "General Operating Considerations" which covers stability, supplies, heat sinking, mounting, current limit, SOA interpretation, and specification interpretation. Visit www.apexmicrotech.com for design tools that help automate tasks such as calculations for stability, internal power dissipation, current limit and heat sink selection. The "Application Notes" and "Technical Seminar" sections contain a wealth of information on specific types of applications. Package outlines, heat sinks, mounting hardware and other accessories are located in the "Packages and Accessories" section. Evaluation Kits are available for most Apex product models, consult the "Evaluation Kit" section for details. For the most current version of all Apex product data sheets, visit www.apexmicrotech.com.

CURRENT LIMIT

Current limit is internal to the amplifier, the typical value is shown in the current limit specification.



SAFE OPERATING AREA (SOA)

The SOA curves combine the effect of all limits for this power op amp. For a given application, the direction and magnitude of the output current should be calculated or measured and checked against the SOA curves. This is simple for resistive loads but more complex for reactive and EMF generating loads. The following guidelines may save extensive analytical efforts.

Under transient conditions, capacitive and dynamic* inductive loads up to the following maximum are safe:

±Vs	CAPACITIVE LOAD	INDUCTIVE LOAD
20V	200µF	7.5mH
15V	500µF	25mH
10V	5mF	35mH
5V	50mF	150mH

* If the inductive load is driven near steady state conditions, allowing the output voltage to drop more than 6V below the supply rail while the amplifier is current limiting, the inductor should be capacitively coupled or the supply voltage must be lowered to meet SOA criteria.

NOTE: For protection against sustained, high energy flyback, external fast-recovery diodes should be used.

MONOLITHIC AMPLIFIER STABILITY CONSIDERATIONS

All monolithic power op amps use output stage topologies that present special stability problems. This is primarily due to non-complementary (both devices are NPN) output stages with a mismatch in gain and phase response for different polarities of output current. It is difficult for the op amp manufacturer to optimize compensation for all operating conditions.

The recommended R-C network of 1 ohm in series with 0.1µF from output to AC common (ground or a supply rail, with adequate bypass capacitors) will prevent local output stage oscillations.

The amplifiers are internally compensated for unity gain stability, no additional compensation is required.

THERMAL CONSIDERATIONS

The PA34 may require a thermal washer which is electrically insulating since the tab is tied to $-V_S$. This can result in thermal impedances for $R_{\theta CS}$ of up to 1°C/W or greater.

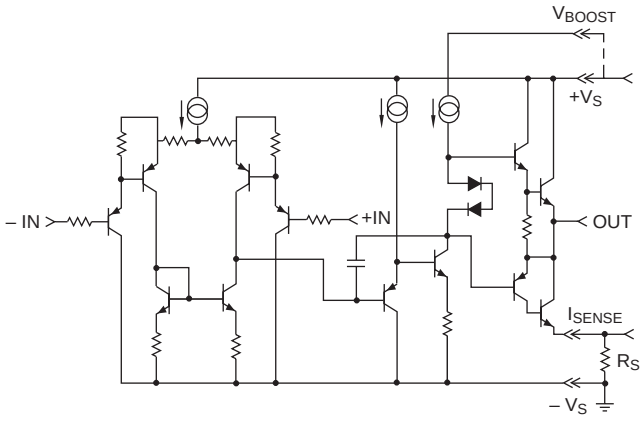


FIGURE 2. EQUIVALENT SCHEMATIC

ADDITIONAL PA34 PIN FUNCTIONS

V_{BOOST}

The V_{BOOST} pin is the positive terminal for the load of the second stage of the amplifier. When that terminal is connected to a voltage greater than $+V_S$ it will provide more drive to the upper output transistor, which is a darlington connected emitter follower. This will better saturate the output transistor.

When V_{BOOST} is about 5 Volts greater than $+V_S$ the positive output can swing 0.5 Volts closer to the rail. This is as much improvement as is possible.

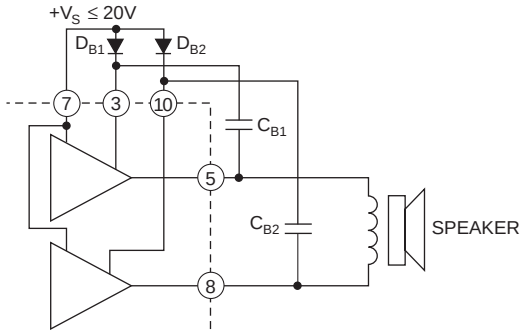


FIGURE 3. SIMPLE BOOTSTRAPPING IMPROVES POSITIVE OUTPUT SWING. CONNECT PINS 3 AND 10 TO V_S IF NOT USED. TYPICAL CURRENTS ARE 12mA EACH.

V_{BOOST} pin requires approximately 10–12mA of current. Dynamically it represents 1K Ω impedance. The maximum voltage that can be applied to V_{BOOST} is 40 volts with respect to $–V_S$. There is no limit to the difference between $+V_S$ and V_{BOOST}.

Figure 3 shows a bootstrap which dynamically couples the output waveform onto the V_{BOOST} pin. This causes V_{BOOST} to swing positive from it's initial value, which is equal to $+V_S$ -0.7 V (one diode drop), an amount equal to the output. In other words, if V_{BOOST} was initially 19.3, and the output swings positive 18 Volts, the voltage on the V_{BOOST} pin will swing to 19.3 -0.7 + 18 or 36.6. The capacitor needs to be sized based on a 1K Ω impedance and the lowest frequency required by the circuit. For example, 20Hz will require > 8uF.

I_{SENSE}

The I_{SENSE} pin is in series with the negative half of the output stage only. Current will flow through this pin only when negative current is being outputted. The current that flows in this pin is the same current that flows in the output (if –1A flows in the output, the I_{SENSE} pin will have 1A of current flow, if +1A flows in the output the I_{SENSE} pin will have 0 current flow).

The resistor choice is arbitrary and is selected to provide whatever voltage drop the engineer desires, up to a maximum of 1.0 volt. However, any voltage dropped across the resistor will subract from the swing to rail. For instance, assume a +/–12 volt power supply and a load that requires +/–1A. With no current sense resistor the output could swing +/–10.2 volts. If a 1 Ω resistor is used for current sense (which will drop 1 Volt at 1 Amp) then the output could swing +10.2, –9.2 Volts.

Figure 4 shows the PA34 I_{SENSE} feature being used to obtain a Transconductance function. In this example, amplifier "A" is the master and amplifier "B" is the slave. Feedback from sensing resistors R_S is applied to the summing network and scaled to the inverting input of amplifier "A" where it is compared to the input voltage. The current sensing feedback imparts a Transconductance feature to the amplifiers transfer function. In other words, the voltage developed across the sensing resistors is directly proportional to the output current. Using this voltage as a feedback source allows expressing the gain of the circuit in amperes vs input voltage. The transfer funcion is approximately:

$$I_L = (V_{IN} – V_{REF}) * R_{IN} / R_{FB} / R_s$$

In the illustration, resistors R_{IN}, R_{FB} and R_S determine gain.

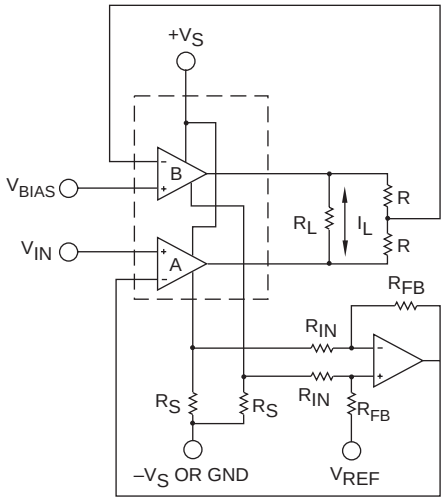


FIGURE 4. I_{SENSE} TRANSCONDUCTANCE BRIDGING AMPLIFIER

V_{BIAS} should be set midway between $+V_S$ and $-V_S$, Vref is usually ground in dual supply systems or used for level translation in single supply systems.

MOUNTING PRECAUTIONS

1. Always use a heat sink. Even unloaded, the PA34 can dissipate up to 3.6 watts. A thermal washer or thermal grease should always be used.
2. Avoid bending the leads. Such action can lead to internal damage.
3. Always fasten the tab to the heat sink before the leads are soldered to fixed terminals.
4. Strain relief must be provided if there is any probability of axial stress to the leads.

This data sheet has been carefully checked and is believed to be reliable, however, no responsibility is assumed for possible inaccuracies or omissions. All specifications are subject to change without notice.