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SUPPLY VOLTAGE, $+V_S$ to $-V_S$	200V
SUPPLY VOLTAGE, $+V_B$	$+V_S$ + 15V[6]
SUPPLY VOLTAGE, $-V_B$	$-V_S$ – 15V[6]
OUTPUT CURRENT, peak	12A, within SOA
POWER DISSIPATION, internal, DC	100W
INPUT VOLTAGE	$+V_B$ to $-V_B$
TEMPERATURE, pin solder, 10s	225°C.
TEMPERATURE, junction[2]	150°C.
TEMPERATURE RANGE, storage	-40 to 105°C.
OPERATING TEMPERATURE, case	-40 to 85°C.

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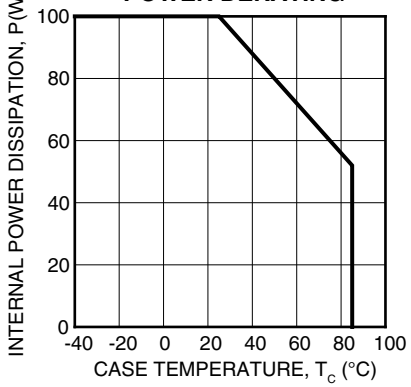
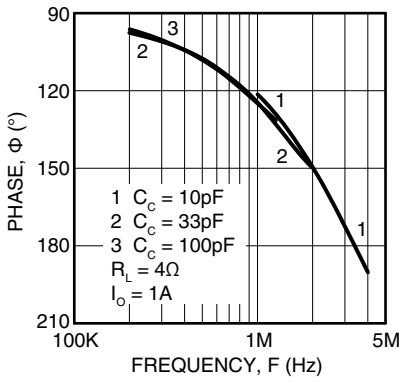
PARAMETER	TEST CONDITIONS[1]	MP108 MIN	MP108 TYP	MP108 MAX	MP108A MIN	MP108A TYP	MP108A MAX	UNITS
INPUT								
OFFSET VOLTAGE			1	5		*	3	mV
OFFSET VOLTAGE vs. temperature	Full temperature range		20	50		*	*	µV/°C
OFFSET VOLTAGE vs. supply				20			*	µV/V
BIAS CURRENT, initial[3]				100			70	pA
BIAS CURRENT vs. supply				0.1			*	pA/V
OFFSET CURRENT, initial				50			30	pA
INPUT RESISTANCE, DC			10^{11}			*		Ω
INPUT CAPACITANCE			4			*		pF
COMMON MODE VOLTAGE RANGE				$+V_B$ - 15			*	V
COMMON MODE VOLTAGE RANGE				$-V_B$ + 15			*	V
COMMON MODE REJECTION, DC		92			*			dB
NOISE	1MHz bandwidth, 1kΩ R_S		10			*		µV RMS
GAIN								
OPEN LOOP @ 15Hz	R_L = 10KΩ, C_C = 10pF	96			*			dB
GAIN BANDWIDTH PRODUCT @ 1MHz	C_C = 10pF		10			*		MHz
PHASE MARGIN	Full temperature range	45			*			degrees
OUTPUT								
VOLTAGE SWING	I_O = 10A	$+V_S$ - 10	$+V_S$ - 8.6		*	*		V
VOLTAGE SWING	I_O = -10A	$-V_S$ + 10	$-V_S$ + 7		*	*		V
VOLTAGE SWING	I_O = 10A, $+V_B$ = $+V_S$ +10V	$+V_S$ - 1.6			*			V
VOLTAGE SWING	I_O = -10A, $-V_B$ = $-V_S$ -10V	$-V_S$ + 5.1			*			V
CURRENT, continuous, DC		10			11			A
SLEW RATE, A_V = -20	C_C = 10pF	150	170		*	*		V/µS
SETTLING TIME, to 0.1%	2V Step		1			*		µS
RESISTANCE	No load, DC		5			*		Ω
POWER BANDWIDTH $180V_{P-P}$	C_C = 10pF, $+V_S$ = 100V, $-V_S$ = -100V		300			*		kHz
POWER SUPPLY								
VOLTAGE		±15	±75	±100	*	*	*	V
CURRENT, quiescent			50	65		*	*	mA
THERMAL								
RESISTANCE, AC, junction to case[5]	Full temperature range, f ≤ 60Hz			1			*	°C/W
RESISTANCE, DC, junction to case	Full temperature range, f < 60Hz			1.25			*	°C/W
RESISTANCE, junction to air	Full temperature range			13			*	°C/W
TEMPERATURE RANGE, case		-40		85	*		*	°C

NOTES:
1. Unless otherwise noted: T_C=25°C, compensation C_C=100pF, DC input specifications are value given, power supply voltage is typical rating.
2. Long term operation at the maximum junction temperature will result in reduced product life. Derate internal power dissipation to achieve high MTBF.
3. Doubles for every 10°C of case temperature increase.
4. $+V_S$ and $-V_S$ denote the positive and negative supply voltages to the output stage. $+V_B$ and $-V_B$ denote the positive and negative supply voltages to the input stages.
5. Rating applies if the output current alternates between both output transistors at a rate faster than 60Hz.
6. Power supply voltages $+V_B$ and $-V_B$ must not be less than $+V_S$ and $-V_S$ respectively.

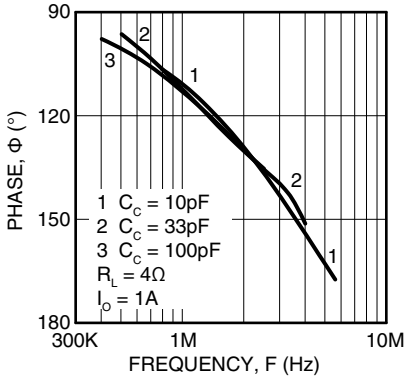
POWER DERATING



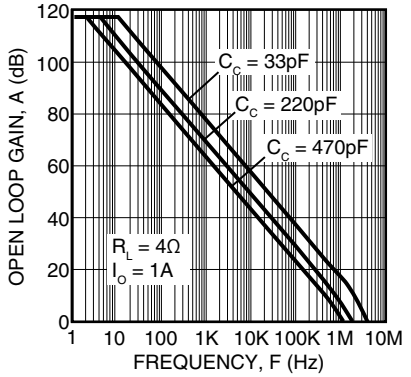
PHASE RESPONSE W/ BOOST



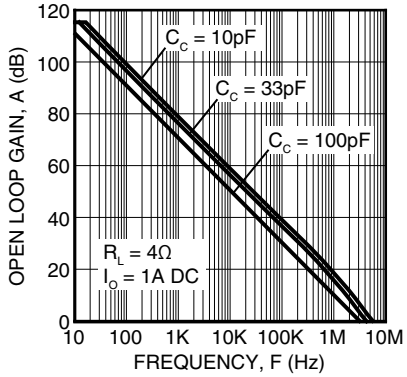
PHASE RESPONSE W/O BOOST



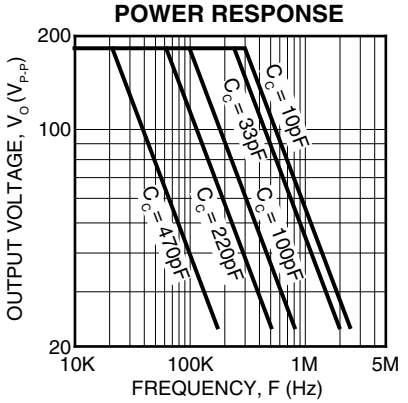
SMALL SIGNAL RESPONSE W/ BOOST



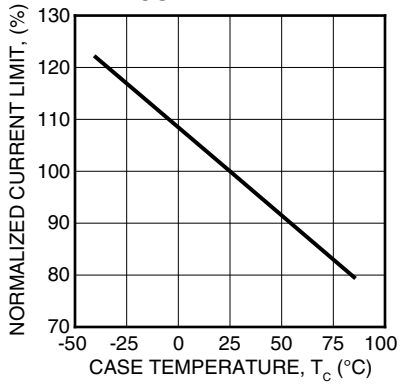
SMALL SIGNAL RESPONSE W/O BOOST



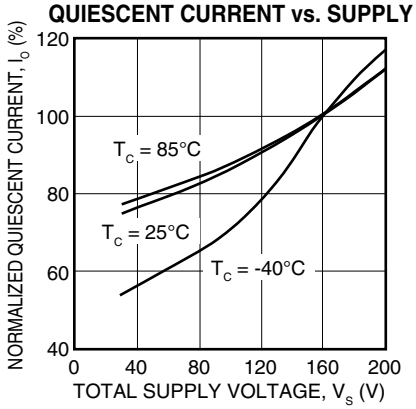
POWER RESPONSE



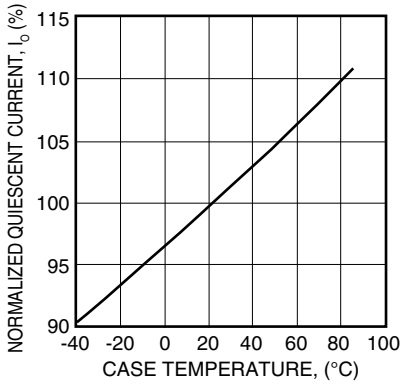
CURRENT LIMIT



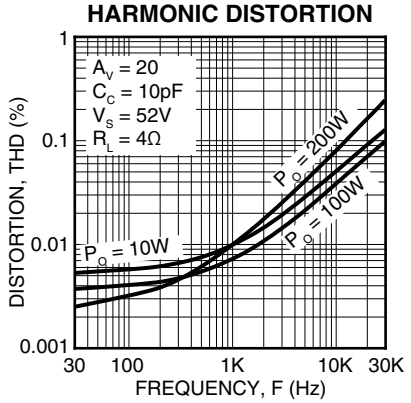
QUIESCENT CURRENT vs. SUPPLY



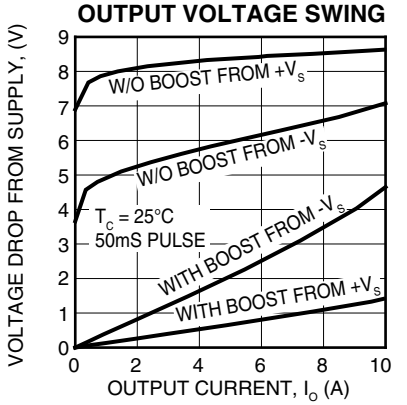
QUIESCENT CURRENT vs. TEMPERATURE



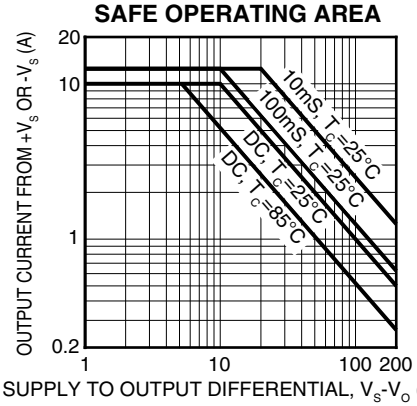
HARMONIC DISTORTION



OUTPUT VOLTAGE SWING



SAFE OPERATING AREA



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Please read Application Note 1 "General Operating Considerations" which covers stability, power supplies, heat sinking, mounting, current limit, SOA interpretation, and specification interpretation. Visit www.cirrus.com for design tools that help automate tasks such as calculations for stability, internal power dissipation, current limit, heat sink selection, Apex Precision Power's complete Application Notes library, Technical Seminar Workbook and Evaluation Kits.

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The MP108 has two ground pins (pins 3, 32). These pins provide a return for the internal capacitive bypassing of the small signal portions of the MP108. The two ground pins are **not** connected together on the substrate. Both of these pins are required to be connected to the system signal ground.

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The MOSFET output stage of the MP108 is not limited by second breakdown considerations as in bipolar output stages. Only thermal considerations and current handling capabilities limit the SOA (see Safe Operating Area graph on previous page). The output stage is protected against transient flyback by the parasitic body diodes of the output stage MOSFET structure. However, for protection against sustained high energy flyback external fast-recovery diodes must be used.

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The external compensation capacitor C_C is connected between pins 5 and 6. Unity gain stability can be achieved with any capacitor value larger than 100pF for a minimum phase margin of 45 degrees. At higher gains more phase shift can usually be tolerated in most designs and the compensation capacitor value can be reduced resulting in higher bandwidth and slew rate. Use the typical operating curves as a guide to select C_C for the application. An NPO (COG) type capacitor is required rated for the full supply voltage (200V).

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Although the MP108 can withstand differential input voltages up to ±25V, additional external protection is recommended. In most applications 1N4148 signal diodes connected anti-parallel across the input pins is sufficient. In more demanding applications where bias current is important diode connected JFETs such as 2N4416 will be required. See Q1 and Q2 in Figure 1. In either case the differential input voltage will be clamped to ±0.7V. This is usually sufficient overdrive to produce the maximum power bandwidth. Some applications will also need over voltage protection devices connected to the power supply rails. Unidirectional zener diode transient suppressors are recommended. The zeners clamp transients to voltages within the power supply rating and also clamp power supply reversals to ground. Whether the zeners are used or not the system power supply should be evaluated for transient performance including power-on overshoot and power-off polarity reversals as well as line regulation. See Z1 and Z2 in Figure 1.

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Bypass capacitors to power supply terminals $+V_S$ and $-V_S$ must be connected physically close to the pins to prevent local parasitic oscillation in the output stage of the MP108. Use electrolytic capacitors at least 10µF per output amp required. Bypass the electrolytic capacitors with high quality ceramic capacitors (X7R) 0.1µF or greater. In most applications power supply terminals $+V_B$ and $-V_B$ will be connected to $+V_S$ and $-V_S$ respectively. Supply voltages $+V_B$ and $-V_B$ are bypassed internally but both ground pins 3 and 32 must be connected to the system signal ground to be effective. In all cases power to the buffer amplifier stage of the MP108 at pins 8 and 25 must be connected to $+V_B$ and $-V_B$ at pins 4 and 30 respectively. Provide local bypass capacitors at pins 8 and 25. See the external connections diagram on page 1.

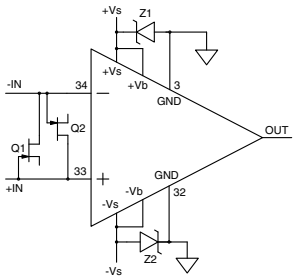

FIGURE 1
OVERVOLTAGE PROTECTION

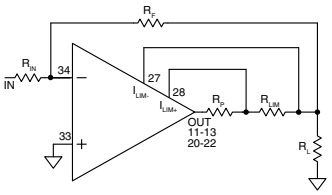

FIGURE 2
4 WIRE CURRENT LIMIT

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The two current limit sense lines are to be connected directly across the current limit sense resistor. For the current limit to work correctly pin 28 must be connected to the amplifier output side and pin 27 connected to the load side of the current limit resistor R_{LIM} as shown in Figure 2. This connection will bypass any parasitic resistances RP, formed by socket and solder joints as well as internal amplifier losses. The current limiting resistor may not be placed anywhere in the output circuit except where shown in Figure 2. The value of the current limit resistor can be calculated as follows: $R_{LIM} = .65/I_{LIMIT}$

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With the boost feature the small signal stages of the amplifier are operated at a higher supply voltages than the amplifierís high current output stage. $+V_B$ (pins 4,8) and $-V_B$ (pins 25,30) are connected to the small signal stages and $+V_S$ (pins 14-16) and $-V_S$ (pins 17-19) are connected to the high current output stage. An additional 10V on the $+V_B$ and $-V_B$ pins is sufficient to allow the small signal stages to drive the output stage into the triode region and improve the output voltage swing for extra efficient operation when required. When the boost feature is not needed $+V_S$ and $-V_S$ are connected to the $+V_B$ and $-V_B$ pins respectively. The $+V_B$ and $-V_B$ pins must not be operated at supply voltages less than $+V_S$ and $-V_S$ respectively.

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The substrate of the MP108 is an insulated metal substrate. It is required that it be connected to signal ground. Connect pin 2 (back plate) to signal ground. The back plate will then be AC grounded to signal ground through a 1µF capacitor.

CONTACTING CIRRUS LOGIC SUPPORT

For all Apex Precision Power product questions and inquiries, call toll free 800-546-2739 in North America.
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