MODEL 1212
CURRENT PREAMPLIFIER

DL Instruments, LLC

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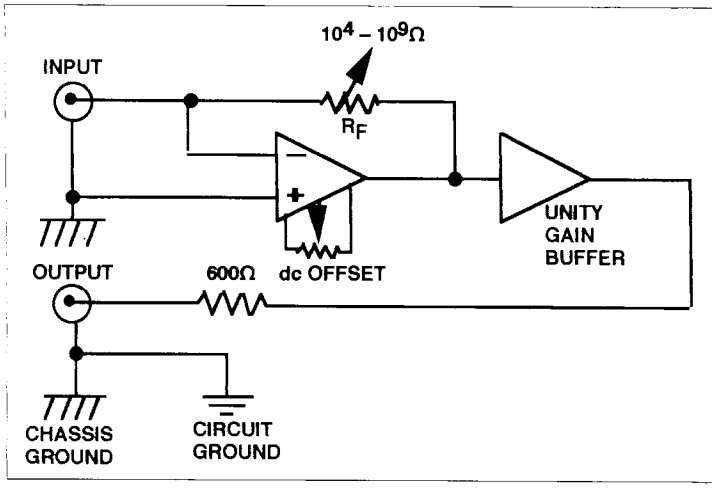
The Model 1212 Current Preamplifier is designed as a low cost, general purpose, benchtop instrument to provide a high performance detection system for small ac and dc currents. The 1212 operates with a virtual ground at its input which mitigates unpredictable high frequency rolloff due to input cables and stray capacitance. The zero input impedance also allows photodiode detectors to operate linearly over a very wide dynamic range and photomultiplier tubes to operate with minimal distortion. Like the Model 564, it is optimized to have the widest bandwidth consistent with standard lock–ins, yet not be overpeaked when operated with moderate capacitance transducers such as small area PIN photodiodes. Models 1211 and 1641, by comparison, are more highly damped, and work with higher capacitance input devices. The 1212 is switchable for operation directly from an ac power line or from internal, sealed, lead–acid, rechargeable batteries.

The input stage of the 1212 utilizes a low noise configuration (7nV$\sqrt{Hz}$ typical) which assures good noise performance in the presence of adverse input shunt capacitance to ground. Likewise, the output noise (typically under 40 nV$\sqrt{Hz}$) contributes little to the system noise – particularly at 10^{-5} A/V sensitivity and above, where output noise is dominated by Johnson noise of the feedback resistor, R_F.

The 600 Ω front panel output BNC is short circuit proof and may be loaded by over 20 feet of 50 Ω coaxial cable before significant high frequency rolloff occurs. The internal output buffer makes the 1212 immune to any capacitive loading effects at the outputs, resulting in stable operation even when both the input and output have large capacitve loads.

SPECIFICATIONS

dc GAIN ACCURACY ±1% max
dc OPEN LOOP GAIN >250,000
INPUT LEAKAGE CURRENT ± 25 pA max @25°C
INPUT OFFSET VOLTAGE Adjustable to 0 V
POWER CONSUMPTION 105–130 Vac or 210–260 Vac 47/440 Hz, 40 W
BATTERY OPERATING TIME 20 hours
RECHARGE TIME 8 hours
OUTPUT SWING 15 V p–p (5 Vrms) min
OUTPUT IMPEDANCE 600 Ω
OUTPUT POLARITY Inverted
OVERLOAD DETECTION Before nonlinearity (±9 V typical)
OPERATING TEMPERATURE 5°C to 70°C
DIMENSIONS 320 x 137 x 66 mm (2.6" high x 5.4" wide x 12.6" deep)
WEIGHT 3 kg (6.5 lb)



Model 1212 Block Diagram

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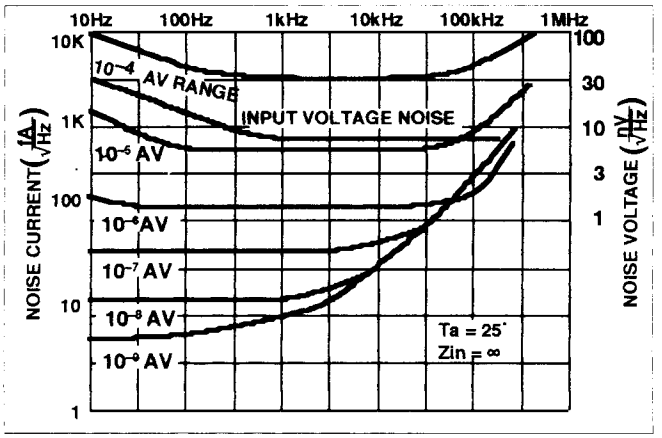
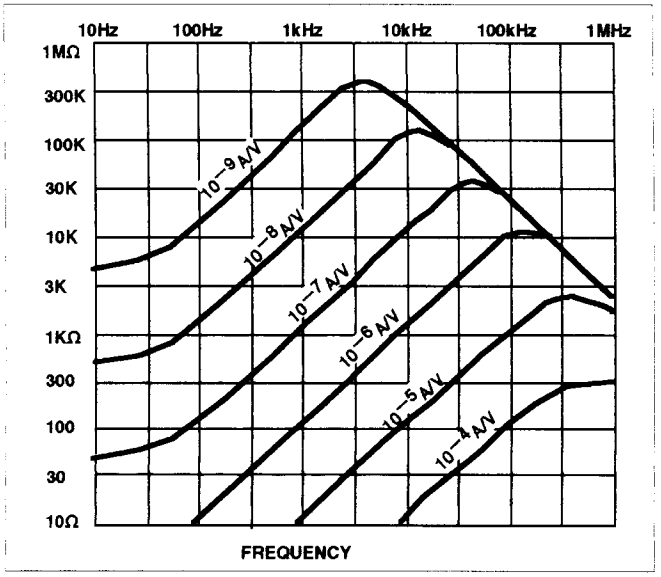
Range A/V	Full Scale p–p	Min 3 dB Frequency *	Open Circuit Input Noise** A/√Hz
10^{-9}	10nA	4 kHz	5.0×10^{-15}
10^{-8}	100nA	12 kHz	1.3×10^{-14}
10^{-7}	1μA	45 kHz	4.1×10^{-14}
10^{-6}	10μA	100 kHz	1.3×10^{-13}
10^{-5}	100μA	180 kHz	5.0×10^{-13}
10^{-4}	1mA	200 kHz	3.0×10^{-12}

* for small capacitance loading at input
** Johnson noise from feedback resistor plus amplifier voltage noise at room temperature, typical

ac Characteristics



Noise Voltage and Effective Noise Current



Input Impedance

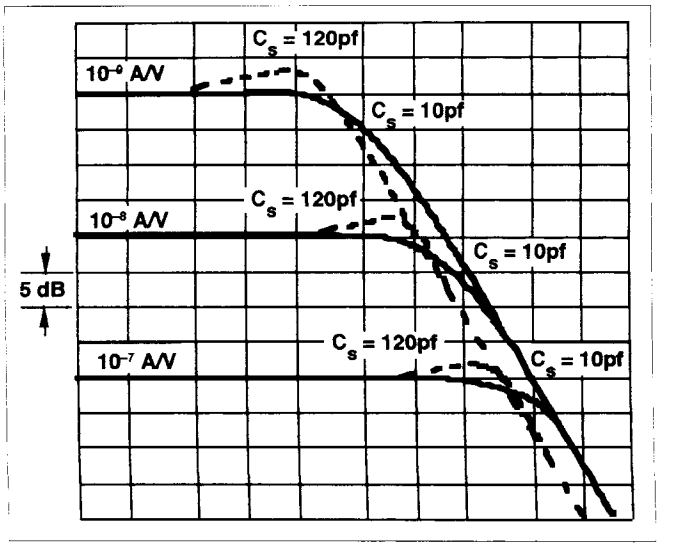
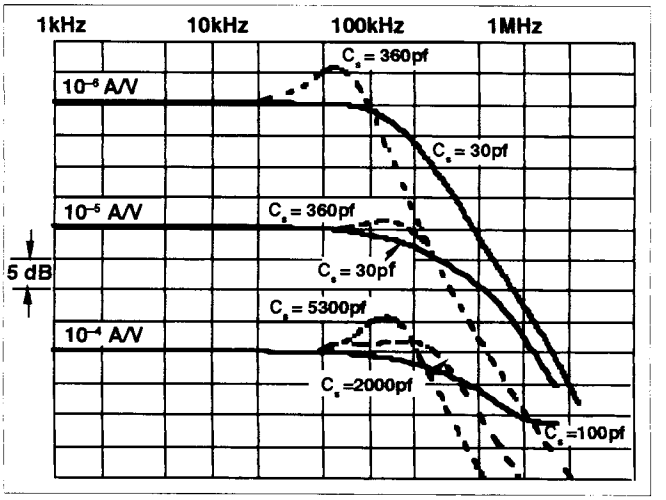


Figure 20 Frequency Response vs Source Shunt Capacitance



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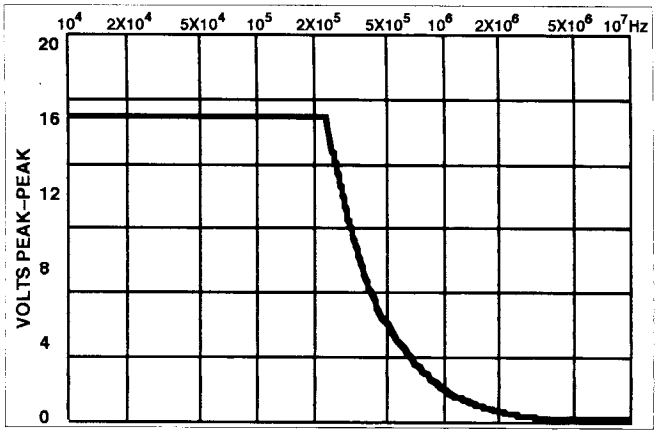

Maximum Sinusoidal Output Swing vs Frequency

For more information contact

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