

R101/401 GENERAL-PURPOSE LOW-COST TRUE-RMS COMPUTING SUB-SYSTEMS

- Lowest Cost — save 75% to 95% over other circuit techniques or devices having comparable performance.
- Accuracies to $\pm 0.1\%$ $\pm 5\text{mV}$
- 50kHz and 500kHz bandwidths

Model R101 and Model R401 True-RMS Computing Subsystems are complete plug-in modules for computing the true-RMS value of virtually any input signal from DC to 500kHz (Model R101) or 50kHz (Model R401), including AC/DC combinations, to an accuracy of $\pm 0.1\%$. They require only a power supply (± 14.7 to $\pm 15.3\text{VDC}$, 12mA), a scale-factor potentiometer, and an offset-trimming potentiometer to be completely operational at full rated accuracy, with a 0-10VDC, 0-5mA output range (short-circuit protected). Both models perform a measurement in a small fraction of the time required by thermocouple-type instruments, and at a small fraction of the cost.

APPLICATIONS

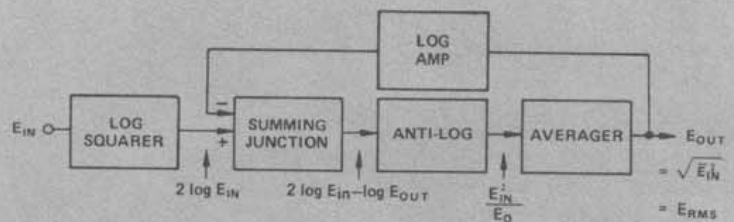
- Low-Cost True-RMS AC Interface for digital panel meters (DPM's), digital voltmeters (DVM's), and digital multimeters (DMM's).
- True-RMS Sensor for constant-RMS voltage or current regulators.
- True-RMS Converter for vibration and distortion energy measurements.
- True-RMS Converter for sub-audio to low-RF noise energy measurements.

APPLICATION NOTES

Power. Model R101 requires only 10mA, Model R401 only 12mA, at 14.7 to 15.3VDC. Power supply sensitivities are only 2mV/% and 1mV/%, respectively.

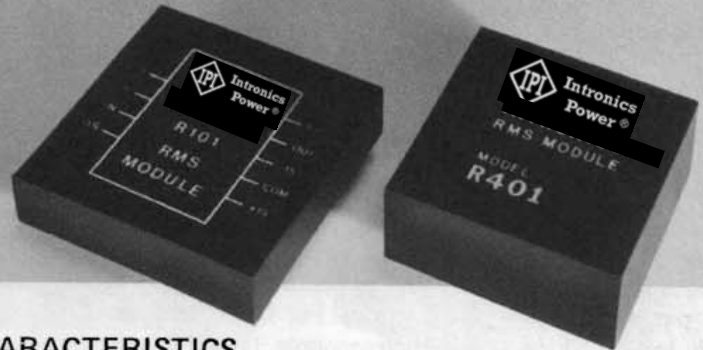
Trimming. Terminals are provided for connection of external trimming potentiometers for scale-factor adjustment (500 Ohms) and offset-voltage zeroing (20 kilohms), to attain full rated measurement accuracy.

Averaging. The internal averaging capacitor can be paralleled at external terminals, to increase the averaging time constant for meaningful measurement of low-frequency inputs.



The Models R101 and R401 combine log-function techniques with an explicit computation of E_{RMS} : squaring the absolute value of the input, averaging the squarer output, then taking the square root of that average.

$$(DC) E_{OUT} = \sqrt{E_{IN}^2} = E_{IN} \text{ (RMS)}$$



CHARACTERISTICS

(typical @ $+25^\circ\text{C}$ and $\pm 15\text{VDC}$ supply unless otherwise noted)	General Purpose R101	Low Cost R401
ACCURACY Error, Max. no adj.* (Offset + % Reading) Error, max., with adj. (Offset + % Reading)	$\pm 10\text{mV} \pm 0.4\%$ $\pm 10\text{mV} \pm 0.1\%$	$\pm 10\text{mV} \pm 0.2\%$ $\pm 5\text{mV} \pm 0.1\%$
CREST FACTOR For .25% Reading Error For 1.0% Reading Error	1.5/1 2/1	1.5/1 2/1
INPUT/OUTPUT Input Voltage Range, max.** Input Impedance Output Voltage Range, max. Output Current (S.C. protected) Output Impedance, DC	$\pm 10\text{V}$ $1\text{M}\Omega$ 0 to +10V 5mA 0.1Ω	$\pm 10\text{V}$ $2\text{k}\Omega$ 0 to +10V 5mA 0.1Ω
DYNAMIC RESPONSE Freq. for 1% Error, 20V PP Input Sine Freq. for 1% Error, 2V PP Input Sine Output Filter Time Constant	500kHz 50kHz 2msec. + 20ms/ μF	25kHz 50kHz 20msec + 20ms/ μF
TEMPERATURE & SUPPLY STABILITY Output Offset Drift, max. Scale Factor Drift, max. Supply Sensitivity	$500\mu\text{V}/^\circ\text{C}$ $0.02\%/^\circ\text{C}$ 2mV/%	$100\mu\text{V}/^\circ\text{C}$ $0.02\%/^\circ\text{C}$ 1mV/%
POWER SUPPLY Voltage (Rated Performance) Current, Quiescent	± 14.7 to $\pm 15.3\text{VDC}$ 10mA	± 14.7 to $\pm 15.3\text{VDC}$ 12mA
TEMPERATURE RANGE† Operating (Rated Performance) Storage	0°C to $+85^\circ\text{C}$ -55°C to $+100^\circ\text{C}$	0°C to $+70^\circ\text{C}$ -55°C to $+100^\circ\text{C}$
DIMEN. & PINOUTS , (page 72) Approximate Weight Socket	Figure A 1 ounce S112	Figure B 1 ounce S108

*R101 requires offset adjustment.

**Note: $\pm 10\text{V}$ sinewave input = 7.07V RMS

†Available in extended temperature ranges. Consult Factory for price and delivery.

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