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 ±0.1% ±5mV**
- **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 ±0.1%. They require only a power supply (±14.7 to ±15.3VDC, 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

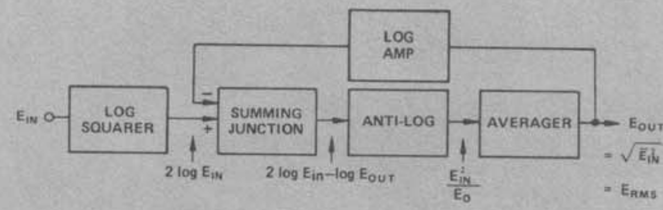
- Low-Cost True-RMS AC Interface for digital panel meters (DPM's), digital voltmeters (DVM's), and digital multimeters (DMM's).
- True-RMS Sensor for constant-RMS voltage or current regulators.
- True-RMS Converter for vibration and distortion energy measurements.
- True-RMS Converter for sub-audio to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

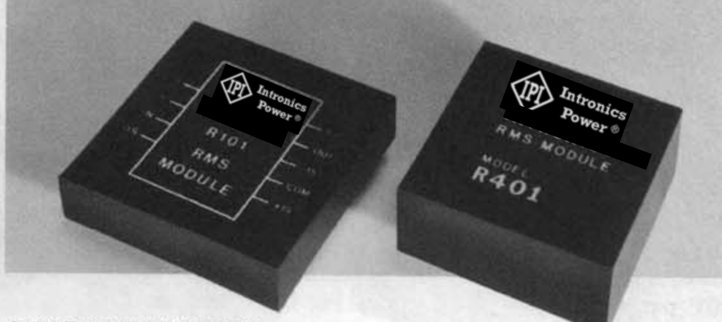
Trimming. Terminals are provided for connection of external trimming potentiometers for scale-factor adjustment (500 Ohms) and offset-voltage zeroing (20 kilohms), to attain full rated measurement accuracy.

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.

$$(DC)\ E_{out} = \sqrt{\overline{E^2{}_{in}}} = E_{in}\ (RMS)$$



CHARACTERISTICS

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

*R101 requires offset adjustment.

**Note: ±10V sinewave input = 7.07V RMS

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

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