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DIGITAL POWER METER
MODEL 66201/66202

Chroma's 66201/66202 Digital Power Meters are designed for single-phase measurements of AC power signals and related parameters common to most electronic products. Instead of traditional analog measurement circuits, the 66201/66202 use state-of-the-art DSP digitizing technology. The internal 16 bits analog/digital converters with sampling rates of up to 240kHz provide both high speed and high accuracy measurements which is unprecedented within the industry for this class of power meters current on the market.

The instruments include a four part display with 7-segment LED front panel readouts. Users can easily select desired parameters and readouts at a touch of a button. Instruments also include optional remote control using USB or GPIB interfaces via rear panel connections. The 66201/66202 are packaged in a 2U high, half rack enclosure suitable for benchtop or system integration.

The Model 66201 includes simple measurement functions designed for low power applications (maximum current 2A). Examples of these devices are AC adapters, battery chargers, LCD monitors, and similar devices. Included measurement data is as following :

1. Voltage : Vrms, Vpeak+, Vpeak-
2. Current : Irms, Ipeak+, Ipeak-
3. Power : Watts, Power Factor,
Apparent Power VA,
Reactive Power VAR
4. Current Crest Factor & Frequency

The Model 66202 includes a 2-shunt design to provide highly accurate readings for both low and high current measurements. In addition to the parameters measured by Model 66201, the 66202 includes Inrush current, Total Harmonic Distortion of V/I, and Energy measurements. With these practical functions, the Model 66202 is suitable for the most demanding of R&D and quality control departments.

USB GPIB CE

MODEL 66201/66202

Key Features

- Voltage Range : 150/300/500 Vrms
- Current Range :
  Model 66201 - 0.01/0.1/0.4/2 Arms
  Model 66202 - 0.01/0.1/0.4/2 Arms
  0.2/2/8/20 Arms
- Frequency Range : DC, 15Hz~10kHz
- Embedded high speed DSP, 16 bits Analog/ Digital converters
- 10 mA minimum current range & 0.1mW power resolution
- Meets ENERGY STAR / IEC 62301 / EN 50564 / ErP measurement requirements
- Accumulated energy methods for unstable power measurement
- User-define criteria provides automatic PASS/FAIL indications
- Half rack width and 2U height, suitable for system integration
- Dual current shunt design provides high accuracy over a wide current range (Model 66202)
- THD and user-specify order distortion measurement (Model 66202)
- Inrush current and energy measurement (Model 66202)
- Interface options : USB or USB+GPIB
- Voltage/ Current harmonics measurement up to 50 orders



Chroma

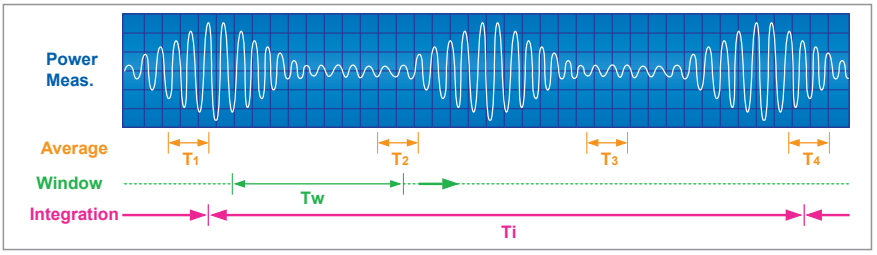
APPLICATIONS

Average Mode and Integration Mode for Power Measurement

When using a traditional power meter, unstable measurement data can occur if the UUT power consumption levels are unstable or operating in non-linear modes (i.e. power supply hiccup modes). This is due to load current conditions which maybe different for different measurement aperture windows (T1, T2, T3 and T4 below). A simple averaging calculation can only provide a visual stable value but still lose some transient data.

A Window Mode method that calculates all data within the user-defined window time (Tw) is recommended. So, users can get a real average value without any data lose. An accumulated energy approach method (i.e. integration mode) for power measurements is also provided. This integration mode calculates active power values by integrating energy from V and I in a user-defined time period (Ti). In this way, users can achieve accurate readings with guaranteed transient-free variations.

The 66200 meters provide a 10 mA minimum current range with crest factor 4, and 0.1 mW measurement resolution for low power application (<10W), and less than 2% uncertainty even for No-Load mode power measurements. These functions make 66200 an ideal choice for ENERGY STAR / IEC 62301 / ErP measurement requirements.



Unstable Current of UUT

THD Measurement and User Define Orders Distortion

The Model 66202 Digital Power Meter can measure voltage and current Total Harmonic Distortion (THD) directly which can be displayed in percentage format. For some requirements (ENERGY STAR), users need to verify the THD of AC supply voltage when supplying the UUT in the specified mode not to exceed 2%, up to and including the 13th harmonic (as specified in IEC 62301).

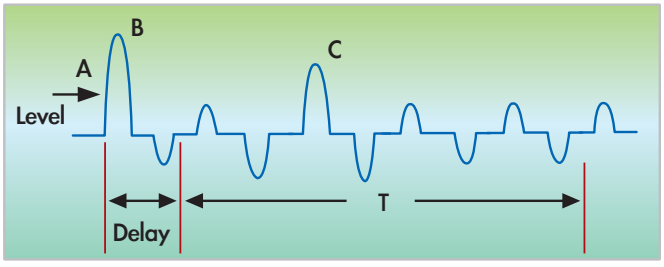
The Model 66202 also provides a function to define a user-specify distortion order n, (n is from 2 to 50) for measuring harmonic distortion. The calculation formula is listed below. Thus, the instrument can easily measure distortion values as required by the ENERGY STAR requirements.

$$THD_V = \frac{\sqrt{V_2^2 + V_3^2 + V_4^2 + V_5^2 + \ldots V_n^2}}{V_1}$$

Where Vn = rms value of nth harmonic of the voltage signal.

Inrush Current Measurement

The Model 66202 Digital Power Meter provides inrush current (Is) measurement function. Users can set a current level for triggering the starting point of measurement. Users also can use an external TTL signal to trigger inrush current measurement through a port of the Control-Signals on real panel. The delay parameter can help users to ignore the peak value B after the trigger point A. The parameter, T, can let users set a time period for measuring the peak value during Time T. The application is to avoid getting the inrush current value that is caused by X capacitor of a power supply.



Low Pass Filter

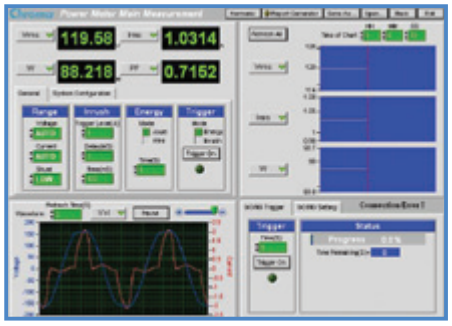
The maximum measurement bandwidth of the 66200 Digital Power Meter is 50kHz. However, the high frequency component is not desirable to be included in all measurement application. For example, the input switching noise current of power supply may not influence the power measurement, but increase the real reading of current. In order to get a proper value, a low pass filter is necessary to reject the switching component. Users can set the parameter filter ON in the system configuration setting. The bandwidth will be reduced to about 5kHz to reject high frequency content but still meets the 3kHz requirement of ENERGY STAR test.

User-defined Criteria for GO/NG Test

The 66200 Digital Power Meters allow users to perform GO/NG functions by presetting pass/fail limits. If the measured values are within these limits, the Pass indicator illuminates green. Fail results in red illumination.

66200 Softpanel and Power Efficiency Test Softpanel

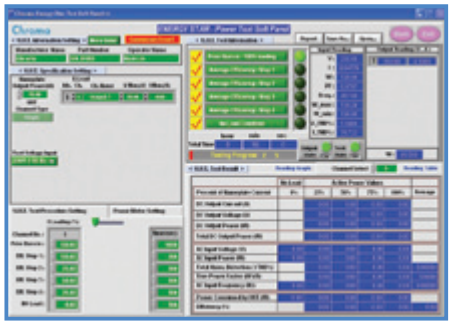
The 66200 Digital Power Meters offers an optional interface operation softpanel. Users can use a PC to control or get measured data by USB or GPIB remote interface. Not only the measured value, it shows voltage/current waveform, parameters - time relative charts. The Recording function let users save data to a file for long time measurement. So, it is easy to meet ENERGY STAR measurement requirement that accumulating true power values at an interval of 1 reading per second and record the average (arithmetic mean) value observed during 5 minute period. The standard IEC 61000-3-2 current harmonic limitation test also be built in the softpanel for pre-compliance test. Another Average Efficiency Test Softpanel integrates Chroma's AC Source, electronic DC Load and 66202 power meter for testing average efficiency of power supplies automatically. Users can set the loading and test steps on the software. After finishing the test, it will generate the result and testing report. The IEC 61000-3-2 current harmonic limit test is also available with softpanel for pre-complisnce test.



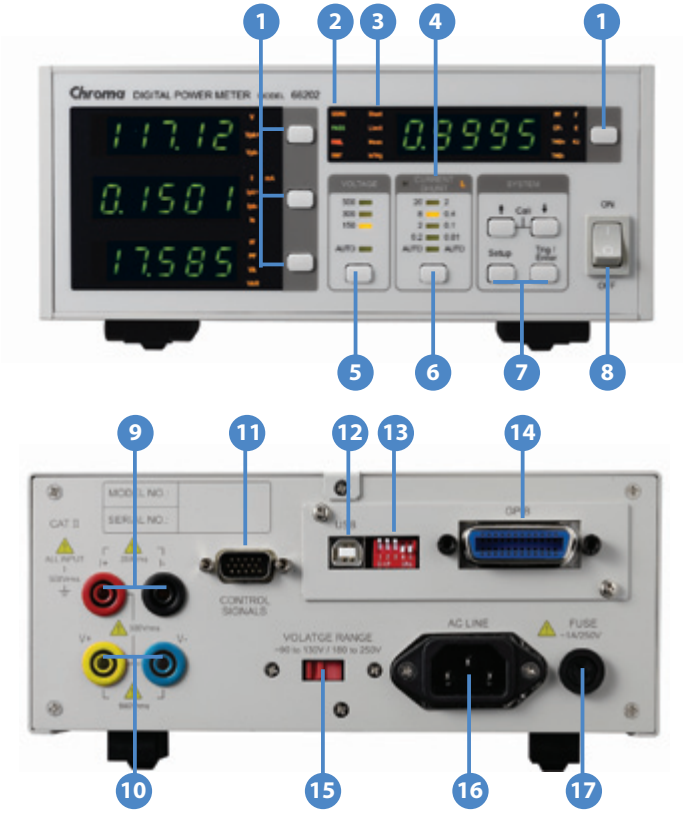
66200 Softpanel



IEC 61000-3-2 Current Harmonic Test


Power Efficiency Test Softpanel

PANEL DESCRIPTION



1. Parameter selection key
2. GO/NoGo indicator
3. System setting indicator
4. High/Low shunt indicator
5. Voltage range selection key
6. Current range selection key
7. System configuration setting
8. Power ON/OFF switch
9. Current measurement inputs
10. Voltage measurement inputs
11. Control signals
12. USB remote interface
13. GPIB address setting
14. GPIB remote interface
15. Input power line range selector
16. AC Input power
17. AC Input fuse

ORDERING INFORMATION

66201 : Digital Power Meter
66202 : Digital Power Meter
A662001 : USB Remote Interface Board
A662002 : GPIB+USB Remote Interface Board
A662003 : Measurement Test Fixture (250V/10A)
A662004 : Rack Mounting Kit for 66200 Series
A662005 : USB Cable (180cm)
A662006 : External CT 50 Arms for Model 66202
A662007 : External CT 100 Arms for Model 66202
A662008 : Power Efficiency Test Softpanel
A662009 : Softpanel for Model 66200 Series
A600009 : GPIB Cable (200cm)
A600010 : GPIB Cable (60cm)


A662003 Measurement Test Fixture

SPECIFICATIONS

Model	66201	66202
Channel	1	1
Parameters	V, Vpk, I, Ipk, W, VA, VAR, PF, CF_I, F	V, Vpk, I, Ipk, Is, W, VA, VAR, PF, CF_I, F, THD_V, THD_I, Energy
AC Voltage		
Range	150/300/500Vrms (CF = 1.6)	150/300/500Vrms (CF = 1.6)
Accuracy	15Hz - 1kHz: 0.1% of rdg + 0.08% of rng 1kHz - 10kHz: (0.1+0.05*KHz)% of rdg + 0.08% of rng	15Hz - 1kHz: 0.1% of rdg + 0.08% of rng 1kHz - 10kHz: (0.1+0.05*KHz)% of rdg + 0.08% of rng
Harmonics Accuracy	--	15Hz - 1kHz: 0.1% of rdg + 0.08% of rng 1kHz - 10kHz: (0.1+0.05*KHz)% of rdg + 0.08% of rng
Input Resistance	1MΩ	1MΩ
AC Current		
Range	0.01/0.1/0.4/2 Arms (CF=4) *1	SHUNT H : 0.2/2/8/20Arms (CF=2@0.2/2/8A, CF = 4@ 20A) SHUNT L : 0.01/0.1/0.4/2Arms (CF=4)
Accuracy *2	0.01A Range: 15Hz - 1kHz: 0.1% of rdg + 0.25% of rng 1kHz - 10kHz: (0.1+0.05 x kHz)% + 0.25% of rng 0.1A/0.4A/2A Range: 15Hz - 1kHz: 0.1% of rdg + 0.1% of rng 1kHz - 10kHz: (0.1+0.05 x kHz)% + 0.1% of rng	SHUNT H: 0.2A Range: 15Hz - 1kHz: 0.1% of rdg + 0.12% of rng 1kHz - 10kHz: (0.1+0.05 x kHz)% + 0.12% of rng 2A/8A/20A Range: 15Hz - 1kHz: 0.1% of rdg + 0.1% of rng 1kHz - 10kHz: (0.1+0.05 x kHz)% + 0.1% of rng SHUNT L: 0.01A Range: 15Hz - 1kHz: 0.1% of rdg + 0.25% of rng 1kHz - 10kHz: (0.1+0.05 x kHz)% + 0.25% of rng 0.1A/0.4A/2A Range: 15Hz - 1kHz: 0.1% of rdg + 0.1% of rng 1kHz - 10kHz: (0.1+0.05 x kHz)% + 0.1% of rng
Harmonics Accuracy	--	SHUNT H: 0.2A Range: 15Hz - 1kHz: 0.1% of rdg + 0.12% of rng 1kHz - 10kHz: (0.1+0.05 x kHz)% + 0.12% of rng 2A/8A/20A Range: 15Hz - 1kHz: 0.1% of rdg + 0.1% of rng 1kHz - 10kHz: (0.1+0.05 x kHz)% + 0.1% of rng SHUNT L: 0.01A Range: 15Hz - 1kHz: 0.1% of rdg + 0.25% of rng 1kHz - 10kHz: (0.1+0.05 x kHz)% + 0.25% of rng 0.1A/0.4A/2A Range: 15Hz - 1kHz: 0.1% of rdg + 0.1% of rng 1kHz - 10kHz: (0.1+0.05 x kHz)% + 0.1% of rng
Power		
Range	1.5W ~ 1000W, 12 ranges	1.5W ~ 10kW, 24 ranges
Accuracy	47Hz~63Hz : 0.1% of rdg + 0.1% of rng 15Hz~1kHz : (0.1+ 0.2/PF x kHz)% of rdg+0.18% of rng	47Hz~63Hz : 0.1% of rdg + 0.1% of rng 15Hz~1kHz : (0.1+ 0.2/PF x kHz)% of rdg+0.18% of rng
	For EN 50564 (300V x 100mA range) 0.1% of rdg + 0.05% of rng	For EN 50564 (300V x 100mA range) 0.1% of rdg + 0.05% of rng
Power Factor accuracy *3	0.006+(0.003/PF) x kHz	0.006+(0.003/PF) x kHz
Frequency		
Range	DC, 15Hz ~ 10kHz	DC, 15Hz ~ 10kHz
Measuring Condition	Voltage (10 ~ 100% of the voltage range)	Voltage (10 ~ 100% of the voltage range)
Others		
Display Resolution	5 Digits	
Display update rate	0.25~2 sec	
Input Voltage	90V ~ 130V /180V ~ 250V, 50Hz/ 60Hz, 30VA	
Interface	Option: USB or GPIB+USB	
Operating Temperature	0˚C ~ 40˚C	
Storage	-40˚C ~ 85˚C	
Safety & EMC	CE (include EMC & LVD)	
Dimension (H x W x D)	88 x 212 x 348.1 mm / 3.46 x 8.35 x 13.7 inch (excluding projections)	
Weight	Approx. 3.8 kg / 8.37 lbs	

The specifications are valid only after the power meter is turned on more than one hour in a thermally stable environment.

Note*1 : The maximum measurable current of 66201 is 4 Arms.

Note*2 : The current accuracy applies temperature range 23 ± 1˚C for 0.01A & 0.2A(CF=2). For all the other current ranges, the spec. applied under 23 ± 5˚C.

Note*3 : The PF spec. applies only when the signals are higher then 50% of the selected voltage and current ranges.

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