Multi-channel High Precision Power Analyzer AN87660(F) Series



- Six-channel synchronous power analysis.
- Basic Accuracy: 0.05% of reading + 0.05% of range
- Measurement Bandwidth: DC, 0.5Hz~100kHz
- Sampling Rate: 200kSps
- Maximum Voltage: Standard 1000V (DC1500V)
- Maximum Current: 20A (standard) 50A/5A (optional), support for mixed configurations, optional sensors available
- LCD Display: Full touchscreen experience, customizable display interface, waveform display
- Data Storage: Customizable storage items, export in CSV format

Production Application

- Analysis of standby power consumption and power for single-phase/three-phase household and commercial appliances
- Analysis of power, efficiency, and harmonics for photovoltaic inverters
- Measurement of electrical performance for electric vehicles and charging piles
- Power and harmonics analysis for power electronics, transformers, and generators
- Power and harmonics analysis for variable frequency drives and variable frequency motors
- Analysis of power, harmonics, and surge current for switching power supplies
- Power analysis for lighting systems and LED lighting

Perfect Size: Standard 3U height, meets system integration requirements

Features

- Multi-channel Configuration: Configurable with 1 to 6 channels for synchronous measurement units, adaptable for various load measurement needs such as single-phase,
- three-phase three by two, three-phase four by two, four-phase (DC + three-phase three), etc. (applicable to loads like air conditioners, inverters, variable frequency drives, motors).
- High Accuracy: Utilizes high-speed FPGA + ARM dual-core processing, 16-bit high-speed high-precision AD converter, achieving a basic accuracy of up to 0.1%, with a fastest data update cycle of 100ms.

Wide Power Range: Each channel can measure currents up to 50A (optional specifications include 20A, 5A, 1A, etc., supporting mixed configurations), with a minimum power resolution of 0.1mW, meeting requirements for standby power consumption measurement and rated power measurement.

Wide Bandwidth: Dual-use for AC and DC signals, with a power measurement bandwidth ranging from DC, 0.5Hz to 100kHz, suitable for measuring power of various standard and non-standard sinusoidal waveform loads.

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Multi-channel Harmonic Analysis: Capable of simultaneous harmonic analysis on six channels, measuring up to 50th harmonic, distortion analysis, and displaying harmonic content of each order and total content intuitively.-

- Multi-channel Frequency Measurement: Six channels can perform frequency measurements simultaneously.
- Line Filtering: Employs low-pass filters of 500Hz and 5.5kHz, capable of measuring the fundamental value of PWM waveforms and filtering out high-frequency interference from switch mode power supplies.
- Sensors: Ratio function, supports conventional I-I, V-V type voltage/current transformers: supports BNC interface I-V type current sensors, with a maximum input voltage of 10V, optional high-current sensors available.
- Efficiency Calculation: Simultaneously measures input and output energy consumption of devices, and calculates their efficiency.
- Energy Accumulation: Capable of separately accumulating forward energy, reverse energy, and comprehensive energy, facilitating measurement for energy transactions.



OV				NAXHO			RING 1 2 1P3V	з V	4 5 6 INTEG 1P3W 5
ELEM	ENT							۸	U1 15VA SCILINE
Urms	V	0.000	0.000	0.000	0.000	0.000	0.000	1	11 100mA 🖪 SO FREQ
Irms	Α	0.00m	0.00m	0.00m	0.00m	0.00m	0.00m		U2 15V A SC LINE 12 100mA SC FREQ
P	W	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		ELEMENT S
s	VA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		U3 15V SC LINE 13 100m A SC FREQ
0	var	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		U4 15V SO LINE
PF		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		14 500mA 🔼 SC FREQ
РН	۰	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		US 15V SO LINE
fU	Hz	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		ELEMENT 0
fl	Hz	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	v	U6 15VA SC LINE 16 500mAA SC EREC
UPD/	ATE O	00733(500	ims) 🛄				R 0		2006-02-07 14:29:20

Full numerical

			KHOLD AVG STORE JCHLOCK KEYLOCK	WIRING 1 2 3 1P3W	4 5 6 INTEG 1P3W 🧐
1822.1122					ELEMENT 1
848 7		显示		I1 🗈	U1 15V SC LINE 11 100mA SC EREC
MILLER		THD	0.00%	0.00%	ELEMENT 2
Urms1	0.000 V	次数	含量百分比 ◎	含量百分比 🖻	U2 15V SC LINE
			0.00%	0.00%	12 100mA 🔼 SCI EBEC)
Irms1	Am00.0		0.00%	0.00%	ELEMENT 3
P1	0.0000 W		0.00%	0.00%	U3 15V 🛛 SCI LINE
P1	0.0000 W		0.00%	0.00%	IS 100mA SCI FREG
S4	0.0000 VA	5	0.00%	0.00%	ELEMENT 4
× 1			0.00%	0.00%	U4 15V SC LINE 14 500mA SC FEEQ
06	0.0000 var	7	0.00%	0.00%	ELEMENT 6
			0.00%	0.00%	US 15V SO LINE
UrmsG1	0.000 V	9	0.00%	0.00%	15 500mA 🖪 SQ EBEQ
		10	0.00%	0.00%	ELEMENT 6
IrmsG2	0.00mA	11	0.00%	0.00%	U6 15V SC LINE
					16 500mA 🔼 SQ EREQ
UPDATE	0001073(500m	5)	点击蓝框更改	测试项 🔒 🗔	2006-02-07 14:32:10

List display



Waveform Display

PEAK U1 U2 U3 U4 U5 U6 OVER 11 12 13 14 15 16	HOLD MAXHOLD AVG STORE HARM TOUCHLOCK KEYLOCK	WIRING 1 2 3 1P3W	456 NTEG 1P3W 🦻
Urms1	0.000 \	/	U1 15V SC LINE
onnor	0.000	V	2 U2 15V SC LINE 12 100mA SC FRE
lrms1	0.00m	A	3 ELEMENT 8 U3 15V SC LINE I3 100m A SC FREC
P1	0.0000		
	0.0000		6 14 500mA 🛛 SCI FREE FELEMENT 5 7 U5 15V 🖾 SCI LINE
PF1	0.0000		15 500mA 🖾 SQ EREC 8 / Element 6
			U6 15V SC LINE 16 500mA SC FREG
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4-item display

PEAK U1 U2 U3 U4 U5 U6 OVER 11 12 13 14 15 16	HOLD MAXHOLD AVG STORE HARM TOUCHLOCK KEYLOCK	WIRING	1 2 3 4 5 6 NTEG 1P3W 1P3W 🦻
Urms1	0.000 V		
Irms1	0.00mA		1 11 100mA 3 SC FREG ELEMENT 2 2 112 15V 3 SC LINE
P1	0.0000 W		I2 100mA SC FIEC
S1	0.0000 VA		4 U3 15V SC LINE 13 100mAZ SC FREQ
Q1	0.0000 var		5 U4 15VIS SCILLE
PF1	0.0000		
fU1	0.0000 Hz		7 IS SOUTH SO FREE
fl1	0.0000 Hz		U6 15V SC LINE 16 500mA SC FREQ
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8-item display



通道				3					
电压量程									
电流量程	AUTO	AUTO	AL	JTO	AUTO	AUTO	AUTO	AUTO	测试设置
线路滤波									29 IL Q A
频率滤波	OFF ON					OFF ON	OFF ON	OFF ON	谐波设置
电流源	cui						CUR		
同步源	U1						U1	NONE	档位编辑
电压变比	1.0	1	2	3	+/-	Del	1.0		122 Lin. 409 Tex
电流变比	1.0	4	5	6		Esc	1.0	1000.0	效率计算
BNC变比	1.00	4	5	0		Lac	1.000		
		7	8	9	0	Ę			



Channel configuration

The multi-channel power analyzer supports various wiring configurations, including 1P2W, 1P3W, 3P3W, 3V3A, 3P4W, etc. In these configurations, adjacent input units with numbers greater than the currently selected unit are grouped together as a wiring set.

Wiring method	Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6
1P2W	1P2W	1P2W	1P2W	1P2W	1P2W	1P2W
1P3W	1P3W	1P3W	1P3W	1P3W	1P3W	
3P3W	3P3W	3P3W	3P3W	3P3W	3P3W	
3V3A	3V3A	3V3A	3V3A	3V3A		
3P4W	3P4W	3P4W	3P4W	3P4W		

Application

Photovoltaic inverter power measurement

- Complies with "GB/T 37409-2019 Technical Specification for Testing of Photovoltaic Grid-Connected Inverters"
- Voltage range: 0~1000V (DC1500V)
- Current range: 0~50A/current sensor
- Capable of simultaneously measuring input, output (single-phase, three-phase) power, and power factor
- Automatic efficiency calculation
- 50th harmonic, distortion analysis
- Bidirectional power measurement for buying and selling electricity



Wiring metho	od Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6
Single-phas	e 1P2W	1P2W	1P2W	1P2W	1P2W	1P2W
PV inverter	s DC	AC				
Three-phas	e 3P	3P3W/3V3A/3P4W			1P2W	1P2W
PV inverter	s	AC		DC		

Electric vehicle electrical performance measurement

- Multi-channel, capable of simultaneously detecting multiple parameters: OBC (On-Board Charger), charging piles efficiency testing, battery charge and discharge performance, power conversion performance, motor performance, etc.
- AC/DC, maximum current 50A, expandable with larger current sensors.

- High accuracy, basic accuracy 0.1%, minimum power resolution 0.1mW
- Capable of measuring instantaneous effective value, average value, peak value, energy consumption, etc., of AC and DC signals.
- Power supplies, UPS power measurement
- Current range: 0~1A/5A/20A/50A
- Power bandwidth: DC, 0.5Hz~100kHz
- Capable of simultaneously measuring input, output (single-phase, three-phase) power, monitoring battery charge and discharge
- Automatic efficiency calculation

	relay	fuse	charger	Charging pi	les
DC/DC converte	rs				
navigation				00.00	
motor	C			00.00	
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		11		,	
	*		$\langle \rangle$		
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wire 0	Connector	Contr	oller bat	tery	
	1. 0				

Wiring method	Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6
UPS	1P2W	1P2W	1P2W	3P3W/3V3A/3P4		P4W
	Mains Input	Battery	Battery	Power Supply Ou		utput

- Household appliance performance evaluation, standby power consumption measurement
- Complies with IEC 62301-2011 standard
- Current range: 0~1A/5A/20A/50A, capable of measuring rated power and standby power
- Minimum power resolution: 0.1mW
- 50th harmonic, distortion analysis

Wiring method	Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6
Electric Vehicle	1P2W	1P2W	1P2W	1P2W	1P2W	1P2W

Frequency converters power measurement

- Complies with GB12668 standard
- Power bandwidth: DC, 0.5Hz~100kHz
- Current range: 0~50A/current sensor
- Capable of simultaneously measuring input and output power
- 50th harmonic, distortion analysis

Wiring method	Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	
Household	1P2W	1P2W	1P2W	1P2W	1P2W	1P2W	
appliances	18200	1P2VV	18200	18200	18200	17200	
Commercial				25/14/			
appliances		3P4W	3P4W		3P4W		

Wiring method	Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6		
Frequency	3P3W/3V3A/3P4W			3P3W/3V3A/3P4W				
Converter	353	W/3V3A/3	-411	555	W/3V3A/3P	-400		

Measurement of lighting and LED power

- Current range: 0~1A/5A/50A
- Minimum power resolution: 0.1mW
- Can measure input and output power, power factor, efficiency of the driver power supply
- 50th harmonic, distortion analysis

Power Analyzer

Exceeding & Trustworthy

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Power Analyzer

LAC Power Supply

DC Power Suppl

Wiring method	Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6
Lighting	1P2W	1P2W	1P2W	1P2W	1P2W	1P2W

Specifications

Model	AN87660(F)				
Measurement Channels - x	1~6				
Wiring Method	1P2W (Single-phase 2-wire) 1P3W (Single-phase 3-wire) 3P3W (3-phase 3-wire, 2 voltage 2 current)				
Willing Method	3P3W (3V3A) (3-phase 3-wire, 3 voltage 3 current) 3P4W (3-phase 4-wire)				
	$\label{eq:Voltage} \mbox{Voltage (U), Current (I), Active Power (P), Reactive Power (Q), Apparent Power (S), Power Factor (\lambda), }$				
	Voltage Frequency (fU), Current Frequency (fI), Phase Angle (Φ), Efficiency (η), Total Energy (Wh),				
Measurement Parameters	Forward Energy (Wh+), Reverse Energy (Wh-), Current Integration (Ah), 50th Harmonic Analysis (HDF),				
	Voltage and Current Total Harmonic Distortion (THD), Peak Voltage (Vpk), Peak Current (lpk),				
	Voltage Peak Factor (CfU), Current Peak Factor (CfI)				
Input Impedance	Voltage: Approximately 2MΩ, Direct Current Input: Approximately 2.5mΩ (50A specification),				
input impedance	Current Sensor Input: Approximately 100kΩ				
AD Sampling Rate	Around 200kS/s				
Peak Crest Factor at Full Range	3 or 6				
	When the crest factor is 3: 15/30/60/100/150/300/600/1000*[V],				
Voltage Rated Range (direct input)	When the crest factor is 6: 7.5/15/30/50/75/150/300/500*[V],				
	*The maximum range crest factor is 1.5				
	When the crest factor is 3:				
	20A current: 500m/1/2/5/10/20*[A]				
	Optional:				
	50A current: 1/2/5/10/20/50°[A]				
	5A current: 100m/200m/500m/1/2/5*[A]				
	1A current: 20m/50m/100m/200m/500m/1*[A]				
Current Rated Range (direct input)	When the crest factor is 6:				
	20A current: 250m/0.5/1/2.5/5/10*[A]				
	Optional:				
	50A current: 0.5/1/2.5/5/10/25*[A] 2				
	5A current: 50m/100m/250m/0.5/1/2.5*[A]				
	1A current: 10m/25m/50m/100m/250m/0.5*[A]				
	*The maximum range crest factor is 1.5				
Current Rated Range (BNC sensor)	Optional: 200m/500m/1/2/5/10[V]				
Voltage, Current Range	(1%~110%)*×range				
Accuracy Range	*For voltage 1000V and current maximum range, the accuracy range is (1% to 100%) * range				
Accuracy Kange	For Fortage Forty and current maximum range, the accuracy range is (170 to Forty) Tallige				
Power Factor Range	$\pm(0.001\sim1.000)$				
	DC ±(0.05% × display value + 0.05% × range)				
	0.1Hz≤f≤66Hz ±(0.05% × display value + 0.05% × range)				
Voltage Measurement Accuracy	66Hz <f≤1khz +="" 0.1%="" display="" range)<="" td="" value="" ±(0.1%="" ×=""></f≤1khz>				
	$1 kHz < f \leq 10 kHz \qquad \qquad \pm (\{0.1 + 0.05 \times (f - 1)\}\% \times display \ value + 0.2\% \times range)$				
	10kHz < f≤100kHz ±({0.5 + 0.04 × (f - 10)}% × display value + 0.3% × range)				

Safety Analyzer

	DC	±(0.05% × display value + 0.05% × range)		
	0.1Hz≤f≤66Hz	±(0.05% × display value + 0.05% × range)		
Current Measurement Accuracy	66Hz <f≤1khz< td=""><td>\pm(0.1% × display value + 0.1% × range)</td></f≤1khz<>	\pm (0.1% × display value + 0.1% × range)		
	1kHz <f≤10khz< td=""><td>$\pm((0.1 \times f)\%$ display value + 0.2% × range)</td></f≤10khz<>	$\pm((0.1 \times f)\%$ display value + 0.2% × range)		
	10kHz <f≤100khz< td=""><td>±({1 + 0.08 × (f - 10)}% × display value + 0.3% × range)</td></f≤100khz<>	±({1 + 0.08 × (f - 10)}% × display value + 0.3% × range)		
	DC	±(0.05% × display value + 0.05% × range)		
	0.5Hz≤f<45Hz	±(0.1% × display value + 0.1% × range)		
	45Hz≤f≤66Hz	±(0.05% × display value + 0.05% × range)		
Power Measurement Accuracy	66Hz <f≤1khz< td=""><td>±(0.2% × display value + 0.1% × range)</td></f≤1khz<>	±(0.2% × display value + 0.1% × range)		
	1kHz <f≤10khz< td=""><td>$\pm({0.2 + 0.1 \times (f - 1)}\% \times display value + 0.2\% \times range)$</td></f≤10khz<>	$\pm({0.2 + 0.1 \times (f - 1)}\% \times display value + 0.2\% \times range)$		
	10kHz <f≤50khz< td=""><td>$\pm(\{0.2+0.1\times(f-1)\}\%\times display value + 0.3\%\times range)$</td></f≤50khz<>	$\pm(\{0.2+0.1\times(f-1)\}\%\times display value + 0.3\%\times range)$		
	50kHz <f≤100khz< td=""><td>$\pm(\{5.1+0.18\times(f-50)\}\%\times display value + 0.3\%\times range)$</td></f≤100khz<>	$\pm(\{5.1+0.18\times(f-50)\}\%\times display value + 0.3\%\times range)$		
Active Power Resolution	0.1mW			
Frequency Measurement Range	DC, 0.5Hz \sim 100kHz			
Frequency Measurement Accuracy	±0.1% × display value			
Harmonic Measurement	11Hz to 600Hz, 1 to 50th harmonic content, total distortion			
Energy Measurement Range	0 to 999999MWh (Resolution: 1mWh / 0.01mAh)			
Energy Measurement Accuracy	±(0.	.1% × display value + 0.1% × full scale)		
Extended Uncertainty	Voltage, current, power, frequency, and energy accuracy \leq 0.20%			
Filtering Function	500Hz and 5.5kHz voltage line, current line, and frequency filtering			
Ratio Function	1 ~ 50000			
Data Update Cycle	100m / 200m / 500m / 1/ 2 / 5 /10[s]			
Control Interface	Standard: RS-232, Digital Input/Output Interface, Ethernet Port; Optional: RS-485, GPIB			
Display	7-inch LCD touchscreen			
Dimensions	426×132.5×430.3 (W,front panel)×(H, front pane)×(D,excluding terminal posts)mm			
	422×128.5 (W, chassis)×(H, chassis) mm			
Cutout Dimensions	42.	2^120.3 (W, Chassis)^(11, Chassis) 11111		
Cutout Dimensions Base Height	42.	17.5 mm		

Any changes to the above parameter specifications will not be notified separately.

[Conditions]

Temperature: 23±5 C, Humidity: 30%~75%RH, Input Waveform: Sinusoidal Wave, Common Mode Voltage: 0V, Line Filter: OFF, Frequency Filter: ON below 440Hz, Power Factor λ : 1, Crest Factor: 3. After preheating, under wiring conditions, zero adjustment or change of range. In the measurement accuracy formula, f represents frequency, with unit kHz.

When the data update rate is 100ms, all accuracies are added to 0.05% of the reading.

Due to the influence of temperature changes after zero adjustment or range change:

Voltage DC accuracy increases by 0.02%/C of the range, Current DC accuracy increases by 500µA/C, External sensor DC accuracy increases by 50µV/C, Power DC accuracy increases by the product of voltage and current influences.