

California Instruments Asterion AC 3kVA Series

High Performance Programmable AC / DC Power Source

500 VA - 18000 VA
200 / 400 Vac
250 / 500 Vdc

Advanced Features

- High power density in 1U/ 2U chassis up to 3kVA
- Intuitive touch panel control
- Innovative iX2™ current doubling technology
- Multi-language display for global operation
- Auto paralleling for higher power
- Single phase 1U models and 1 or 3 phase selectable 2U models
- Complete avionic test suites (optional)
- ATE version available in both 1U and 2U



Performance. Reliance. Brilliance.

Inspired by the enduring power of a brilliant star, the California Instruments Asterion line of AC power sources by AMETEK Programmable Power combines intelligence and flexibility to create an advanced platform of AC solutions. This easy-to-configure design features sophisticated technology for delivering high performance, programmable AC and DC power. Its sleek design packs maximum power density into a low-profile form factor with an intuitive touch screen interface placing that power at your fingertips. Centralized control and unparalleled modularity make Asterion the most adaptable platform on the market. Its groundbreaking capabilities set the standard for affordable, precision power sources.

Maximize rack space utilization with leading AC power density in a 1U/2U chassis.

Employ full output power over widest voltage range with iX2™ technology.

Quickly and expertly control the AC source with intuitive touchscreen.

Control via Front Panel Touchscreen & Encoder or available digital control interfaces.

The Asterion AC Series is Digital Signal Processor (DSP) controlled and can be operated from the intuitive, easy to use front panel touchscreen or the Ethernet LXI, USB and RS232 standard control interfaces, as well as through the optional GPIB control interface.

The touchscreen function group icons include a Dashboard, Output Programming Parameters, Measurements, Sequencing, Configuration, Control Interfaces, Applications, and System Settings. Function selection and parameter entry can be achieved either by direct selection from the touchscreen or by using the encoder selector button. The control resolution is adjusted by a dynamic rate change algorithm that combines the benefits of precise control over small parameter changes with quick sweeps through the entire range.

Applications

The Asterion AC Series is designed for testing today’s complex electronics, including avionics, telecommunications and commercial electronics requiring low profile, light weight power sources with high power density. Other applications include:

- Commercial and military avionics test
- AC power simulation
- Manufacturing and process control
- Frequency & voltage conversion
- IEC standards testing
- ATE applications

iX2™ Constant-Power Mode Output Characteristic

The iX2™ Constant-Power mode has an output characteristic where full rated output power is available from 50% of full-scale output voltage to 100% of full-scale output voltage, as depicted in the graphs of Figure 1 1 and Figure 1 2. The output current versus output voltage follows a constant-power relation where the output current would be 200% of the full-scale value when the output voltage is 50% of full scale. The current ratings are also a function of output frequency, as shown in Figure 1 1 for the AST 751, AST 1501, AST 2253, and AST 3003 models above 500 Hz, and in Figure 1 2 for the AST 501 and AST 1503 models above 1 kHz.

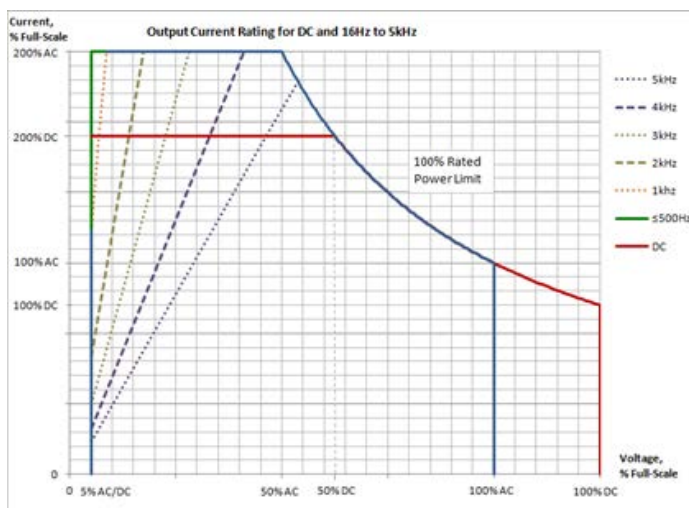


Figure 1 1. iX2™ Constant-Power: Output Current Versus Voltage, AST 751, AST 1501, AST 2253, AST 3003 (1-Phase)

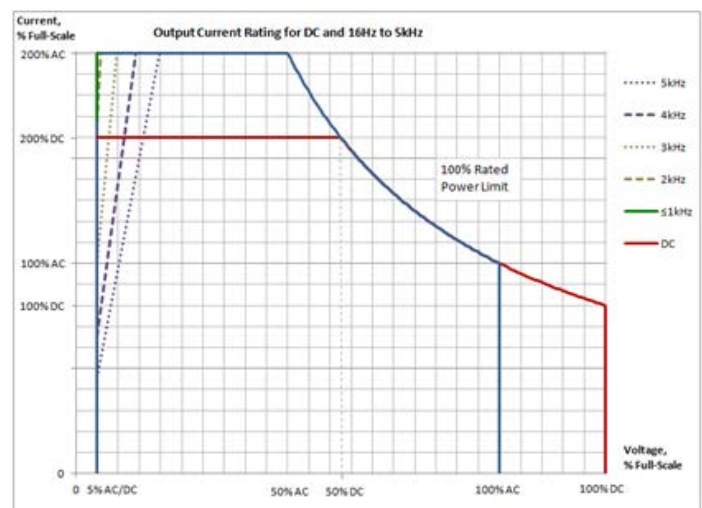


Figure 1 2. iX2™ Constant-Power: Output Current Versus Voltage, AST 501, AST 1503, AST 3003 (3-Phase)

Asterion AC Virtual Panels (Graphical User Interface)

Virtual Panels allow remote control of the Asterion AC power source as well as programming communication and monitoring for the Asterion ATE model without front panel display.

The screenshot displays the Asterion AC Virtual Panels GUI, which is organized into several functional areas:

- Settings:** Includes sections for Output Mode (AC, DC, AC+DC), Voltage Range (200.0, 400.0), Phase Mode (1-phase), and Overload Mode (Constant).
- Waveform Generation:** Features a Frequency (Hz) control set to 400.00 and a Phase A section with Amplitude (V) set to 115.00 and Phase A set to 115.
- Measurements Analysis:** Includes a Remote Inhibit Level (HIGH, LOW) and a Remote Inhibit Mode (LATC).
- IEC Tests:** A row of test mode buttons: 411, 413, 414, 417, 428, 429, 160, 704, ABD, 350, AMD, 787.
- Avionics Tests:** A row of test mode buttons: 411, 413, 414, 417, 428, 429, 160, 704, ABD, 350, AMD, 787.
- Simulation Mode:** Shows the device name AST-A501, Serial No. 12345, Firmware version 1.0, and Software Version 1.0 (Beta 6.1). Hardware Interface is set to Simulation.
- WaveForm Display:** A graph showing a square wave voltage signal. A data grid is visible below the graph.
- Acquisition Control:** Includes Offset (Mili Second) set to 2.00, Trigger Phase set to 0, and Sampling (Micro Second) set to 46.88.
- Transient List Editor:** A panel for configuring transient tests, including Phase Selection (Volt A, Volt B, Volt C), Type (VoltageStep, VoltageDrop, VoltageSurgeOrSag, FrequencySweep, FrequencyStep, VoltageFrequencyStep, Delay), and Execution Mode (Run: 1 Times).
- Waveform Display (Detailed):** A graph titled "Voltage for phase A @ 400 Hz" showing a sine wave. A data table at the bottom provides key parameters:

V rms	V THD	I THD	I rms	LCF	Power	PF
115	2.3	2.3	4.36	2.2	350.98	0.7

Specifications

AC/DC Output Specifications			
Model	AST 501	AST 751	AST 1501
Enclosure	1U (44.45mm / 1.75in)	1U (44.45mm / 1.75in)	1U (44.45mm / 1.75in)
Output Phase	1-Phase	1-Phase	1-Phase
Output Power	500 VA/ 500 W	750 VA/ 750 W	1,500 VA/ 1,500 W; derate output power from 1,500 W at 103.5 VAC to 1,300 W at 90 VAC
AC and AC+DC Output Current, Full-Scale	Low-Range: 2.5 A (RMS) at 200 VAC. High-Range: 1.25 A (RMS) at 400 VAC.	Low-Range: 3.75 A (RMS) at 200 VAC. High-Range: 1.88 A (RMS) at 400 VAC.	Low-Range: 7.5 A (RMS) at 200 VAC. High-Range: 3.75A (RMS) at 400 VAC.
DC Output Current, Full-Scale	Low-Range: 2.0 ADC at 250 VDC. High-Range: 1.0 ADC at 500 VDC.	Low-Range: 3.0 ADC at 250 VDC. High-Range: 1.5 ADC at 500 VDC.	Low-Range: 6.0 ADC at 250 VDC. High-Range: 3.0 ADC at 500 VDC.
Model	AST 1503	AST 2253	AST 3003
Enclosure	2U (88.9mm / 3.5in)	2U (88.9mm / 3.5in)	2U (88.9mm / 3.5in)
Output Phase	1-Phase/3-Phase	1-Phase/3-Phase	1-Phase/3-Phase
Output Power	1,500 VA/1,500 W; 500 W, maximum per phase; derate output power from 1,500 W at 103.5 VAC to 1,300W at 90 VAC.	2,250 VA/2,250 W; 750W, maximum per phase; derate output power from 1,900 W at 132 VAC to 1,300W at 90 VAC.	3,000 VA/ 3,000 W; 1,000 W, maximum per phase; derate output power from 3,000 W at 207 VAC to 2,600W at 180 VAC, and 1,900 W at 132 VAC to 1,300W at 90 VAC.
AC and AC+DC Output Current, Full-Scale, per phase	Low-Range: 2.5 A (RMS) at 200 VAC. High-Range: 1.25 A (RMS) at 400 VAC. 1-Phase mode: X3.	Low-Range: 3.75 A (RMS) at 200 VAC. High-Range: 1.88 A (RMS) at 400 VAC. 1-Phase mode: X3.	Low-Range: 5 A (RMS) at 200 VAC. High-Range: 2.5A (RMS) at 400 VAC. 1-Phase mode: X3.
DC Output Current, Full-Scale, per phase	Low-Range: 2.0 ADC at 250 VDC. High-Range: 1.0 ADC at 500 VDC. 1-Phase mode: X3.	Low-Range: 3.0 ADC at 250 VDC. High-Range: 1.5 ADC at 500 VDC. 1-Phase mode: X3.	Low-Range: 4.0 ADC at 250 VDC. High-Range: 2.0 ADC at 500 VDC. 1-Phase mode: X3.

AC/DC Output Specifications Continued	
Model	All Models
Maximum RMS Output Current	200% of the full-scale RMS current at $\leq 50\%$ of full-scale voltage. Refer to Figure 1-1 and Figure 1-2 for graphs of current rating as a function of output frequency.
iX2™ Constant-Power Mode	Constant-Power output capability in each output voltage range with full rated output power from 50% of full-scale output voltage to 100% of full-scale; the output current increases to 200% of rated current at 50% full-scale output voltage from 100% rated current at 100% of full-scale voltage. Refer to Figure 1-1 and Figure 1-2 for graphs of current rating as a function of output frequency.
AC and AC+DC Output Voltage, Full-Scale	Low-Range: 0 to 200 V(RMS); High-Range: 0 to 400 V(RMS)
DC Output Voltage, Full-Scale	Low-Range: 0 to 250 VDC; High-Range: 0 to 500 VDC
DC Offset Voltage, Typical	± 20 mVDC, ≥ 40 Hz
Output Float Voltage	566 V(PK), maximum from either output terminal to chassis
Voltage Programming Accuracy	$\pm(0.1\%$ of actual + 0.2% of full-scale) for DC, and AC 16 Hz to 1 kHz; >1 kHz, add $\pm 0.2\%$ of full-scale/kHz; add $\pm 0.1\%$ of full scale for AC+DC mode. Valid from 5% of full-scale to 200 VAC(RMS)/250 VDC in low-range and 400 VAC(RMS)/500 VDC in high-range; with sense leads connected.
Voltage Resolution	≤ 0.02 V, AC, DC, and AC+DC mode
Voltage Temperature Coefficient, Typical	≤ 100 ppm/ $^{\circ}$ C of full-scale
Voltage Stability, Typical	$\pm 0.1\%$ of full-scale over 8 hours; with constant line, load, and temperature; with sense leads connected
Voltage Distortion	0.25% maximum, 16 Hz to 100 Hz; 0.5% maximum, >100 Hz to 500 Hz; and 1% maximum, >500 Hz to 1 kHz, plus 1%/kHz to 5 kHz; with full linear load or no load
Voltage Slew Rate, Typical	≥ 10 V/ μ s with full-scale programmed voltage step
Current Programming Range	Programmable from zero to 200% of full-scale rating in each output range. Refer to Figure 1-1 and Figure 1-2 for graphs of current rating as a function of output frequency.
Current Programming Accuracy	$\pm(0.3\%$ of actual + 0.5% of full-scale) for DC, and AC 16 Hz to 1 kHz; >1 kHz, add $\pm 0.3\%$ of full-scale/kHz; add $\pm 0.1\%$ of full-scale for AC+DC mode. Valid from 5% of full-scale to 100% of full-scale.
Line Regulation	$\pm 0.015\%$ of full-scale voltage, for a $\pm 10\%$ input line change; DC, or 40 Hz to 5 kHz.
Load Regulation	$\pm 0.025\%$ of full-scale voltage, for 100% of rated resistive load change; DC, or 40 Hz to 1 kHz, above 1 kHz, add $\pm 0.015\%$ of full-scale/kHz

AC/DC Output Specifications Continued	
Model	All Models
Voltage and Current Programming Overrange, Typical	1% of full-scale
Noise Level, Typical	AC output: 450 mV(RMS), low-range; 750 mV(RMS), high-range; at ≥ 40 Hz output frequency; bandwidth, 20 kHz to 1 MHz; DC output: 400 mV(RMS), low-range; 700 mV(RMS), high-range; bandwidth, 20 Hz to 1 MHz.
Remote Sense	5 V(RMS), maximum total output lead drop (2.5 V per lead)
Crest Factor	AST 751, AST 1501, AST 2253: 5:1 of full-scale current in each output range (ratio of peak output current to RMS full-scale output current). AST 501, AST 1503, AST 3303: 7:1 of full-scale current in each output range (ratio of peak output current to RMS full-scale output current).
Power Factor	0, lagging to 0, leading
Frequency Range	Standard models: DC, and 16 Hz to 1.3 kHz; LF option: DC, and 16 Hz to 550 Hz; HF option: DC, and 16 Hz to 5.5 kHz.
Frequency Accuracy	Standard models: $\pm(0.01\%$ of actual + frequency resolution/2); FC option: $\pm 0.25\%$.
Frequency Resolution	0.01 Hz resolution, 16-81.91 Hz; 0.1 Hz resolution, 82-819.1 Hz; 1 Hz resolution, 820-5000 Hz; with LKM/LKS option: 1 Hz resolution, 16-5500 Hz.
Frequency Temperature Coefficient, Typical	10 ppm/ $^{\circ}$ C of full-scale
Phase Programming Range	0.0 $^{\circ}$ to 360.0 $^{\circ}$, relative to external synchronization signal; in multi-phase group, Auxiliary unit output voltage is relative to the Master unit Phase A output voltage, with the Master unit as reference 0 $^{\circ}$.
Phase Accuracy	$\pm 1^{\circ}$, 16 Hz to 100 Hz; $\pm 2^{\circ}$ >100 Hz to 1 kHz, plus $\pm 1^{\circ}$ /kHz above 1 kHz
Phase Programming Resolution	$\pm 0.4^{\circ}$

AC Input Specifications			
Model	AST 501	AST 751	AST 1501
Enclosure	1U	1U	1U
Input Voltage, Nominal Rating	100VAC-120VAC/ 200-240 VAC; 1-Phase and 3-Phase, line-neutral or line-line .	100VAC-120VAC/ 200-240 VAC; 1-Phase and 3-Phase, line-neutral or line-line.	100VAC-120VAC/ 200-240 VAC; 1-Phase and 3-Phase, line-neutral or line-line.
Input Voltage, Operating Range	90-132 VAC/ 180VAC-264VAC	90-132 VAC/ 180VAC-264VAC	90-132 VAC/ 180VAC-264VAC; refer to output power section for derating as a function of input voltage.
Input Current, Maximum with 1-Phase Input	7.6 A(RMS) at 90 VAC	11 A(RMS) at 90 VAC	20 A(RMS) at 90 VAC to 103.5 VAC
Input Current, Maximum with 3-Phase Input	4.4 A(RMS) at 90 VAC	6.5 A(RMS) at 90 VAC	13 A(RMS) at 90 VAC
Model	AST 1503	AST 2253	AST 3003
Enclosure	2U	2U	2U
Input Voltage, Nominal Rating	100VAC-120VAC/ 200-240 VAC; 1-Phase and 3-Phase, line-neutral or line-line.	100VAC-120VAC/ 200-240 VAC; 1-Phase and 3-Phase, line-neutral or line-line.	100VAC-120VAC/ 200-240 VAC; 1-Phase and 3-Phase, line-neutral or line-line.
Input Voltage, Operating Range	90-132 VAC/ 180VAC-264VAC; refer to output power section for derating as a function of input voltage.	90-132 VAC/ 180VAC-264VAC; refer to output power section for derating as a function of input voltage.	90-132 VAC/ 180VAC-264VAC; refer to output power section for derating as a function of input voltage.
Input Current, Maximum with 1-Phase Input	20 A(RMS) at 90 VAC to 103.5 VAC;	20 A(RMS) at 90 VAC to 132 VAC; 15 A(RMS) at 180 VAC.	20 A(RMS) at 90 VAC to 132 VAC; 20 A(RMS) at 180 VAC to 207 VAC.
Input Current, Maximum with 3-Phase Input	13 A(RMS) at 90 VAC to 103.5 VAC, line-to line	10 A(RMS) at 180 VAC, line-to line	13 A(RMS) at 180 VAC, line-to line

AC Input Specifications Continued	
Model	All Models
Input Frequency, Nominal Rating	50 Hz, 60 Hz, 400 Hz
Input Frequency Range	47-440 Hz
Inrush Current, typical	30 A (PK) at 264 VAC
Efficiency ¹ , typical	75%
Power Factor ² , typical	0.98; active PFC
Hold-Up Time ³ , typical	≥10 ms
Isolation Voltage	2200 VAC, input to output; 1350 VAC, input to chassis
¹ At full load and DC or 16 Hz to 1 kHz output frequency, with AC input voltage of 115 V(RMS) or 230 V(RMS), and 50/60 Hz input frequency	
² At full load, with 1-phase AC input voltage of 115 V(RMS) or 230 V(RMS), and 50/60 Hz input frequency	
³ At full load and with AC input voltage of 115 V(RMS) or 230 V(RMS)	

AC Output Measurement	
Parameter	Specification ¹
Voltage Range, Full-Scale	AC and AC+DC output: 0-500 V(RMS)
Voltage Accuracy	±(0.1% of actual + 0.2% of full-scale) for AC 16 Hz to 1 kHz; >1 kHz, add ±0.2% of full-scale/kHz; add ±0.1% of full-scale for AC+DC mode. Valid from 5% of full-scale to 200 VAC(RMS) in low-range and 400 VAC(RMS) in high-range; with sense leads connected.
Voltage Resolution	20 mV
Current Range, Maximum	AST 501, AST 751, AST 1503, AST 2253: 7.5 A(RMS) per phase; AST 1501, AST 3003: 15 A(RMS) per phase; AST 2253 (1-Phase): 22.5 A(RMS); AST 3003 (1-Phase): 30 A(RMS); 1-phase mode in 3-phase models: X3
Current Accuracy	±(0.3% of actual + 0.5% of maximum) for AC 16 Hz to 1 kHz; >1 kHz, add ±0.3% of maximum/kHz; add ±0.1% of maximum for AC+DC mode. Valid from 5% of full-scale to 100% of full-scale.
Current Resolution	2 mA; 1-phase mode in 3-phase models: 6 mA.
Peak Current Range, Full-Scale	AST 501, AST 751, AST 1503, AST 2253: ± 0-37.5 A(PK) per phase; AST 1501, AST 3003: ± 0-75 A(PK) per phase; AST 2253 (1-Phase): 112.5 A(PK); AST 3003 (1-Phase): 150 A(PK); 1-phase mode in 3-phase models: X3.
Peak Current Accuracy	±(0.5% of actual + 0.5% of maximum) for AC 16 Hz to 1 kHz; >1 kHz, add ±0.3% of maximum/kHz; add ±0.1% of maximum for AC+DC mode. Valid from 5% of full-scale to 100% of full-scale.

AC Output Measurement Continued	
Parameter	Specification ¹
Peak Current Resolution	5 mA; 1-phase mode in 3-phase models: 15 mA.
Frequency Range	16 Hz to 5.0 kHz
Frequency Accuracy	$\pm(0.01\%$ of actual + frequency resolution/2)
Frequency Resolution	0.01 Hz: 16-81.91 Hz; 0.1 Hz: 82.0-819.1 Hz; 1 Hz: 820-5.0 kHz
Phase Range	0-360°
Phase Accuracy	$\pm 1^\circ$, 16 Hz to 100 Hz; $\pm 2^\circ$, >100 Hz to 1 kHz; $\pm 5^\circ$, >1 kHz
Phase Resolution	0.1°, 16-100 Hz; 1°, >100 Hz to 5 kHz
Real Power Range, Full-Scale	0-1.5 kW; 1-phase mode in 3-phase models: 4.5 kW.
Real Power Accuracy	$\pm(0.4\%$ of actual + 0.7% of full-scale) for AC 16 Hz to 1 kHz; >1 kHz, add $\pm 0.4\%$ of full-scale/kHz; add $\pm 0.2\%$ of full-scale for AC+DC mode.
Real Power Resolution	1 W; 1-phase mode in 3-phase models: 3 W.
Apparent Power, Full-Scale	0-1.5 kVA; 1-phase mode in 3-phase models: 4.5 kVA.
Apparent Power Accuracy	$\pm(0.4\%$ of actual + 0.7% of full-scale) for AC 16 Hz to 1 kHz; >1 kHz, add $\pm 0.4\%$ of full-scale/kHz; add $\pm 0.2\%$ of full-scale for AC+DC mode.
Apparent Power Resolution	1 VA; 1-phase mode in 3-phase models: 3 VA.
Power Factor Range	0-1
Power Factor Accuracy	$\pm 2\%$ of full-scale
Power Factor Resolution	0.01
¹ Accuracy specifications apply above 100 counts of resolution; for multi-chassis configurations, multiply the output current and power, and their accuracy specifications, by the number of chassis; power factor accuracy applies for PF > 0.5 and output apparent power > 50% of maximum rating; frequency measurement specifications valid for output voltage >5% of full-scale.	

DC Output Measurement	
Parameter	Specification ¹
Voltage Range, Full-Scale	±500 VDC
Voltage Accuracy	±(0.1% of actual + 0.2% of full-scale); valid from 5% of full-scale to 250 VDC and 500 VDC in high-range; with sense leads connected.
Voltage Resolution	25 mV
Current Range, Maximum	AST 501, AST 751, AST 1503, AST 2253: 0-7.5 ADC per phase; AST 1501, AST 3003: 0-15 ADC per phase; AST 2253 (1-Phase): 22.5 ADC; AST 3003 (1-Phase): 30 ADC; 1-phase mode in 3-phase models: X3.
Current Accuracy	±(0.3% of actual + 0.5% of full-scale); valid from 5% of full-scale to 100% of full-scale.
Current Resolution	2 mA; 1-phase mode in 3-phase models: 6 mA.
Peak Current Range, Full-Scale	AST 501, AST 751, AST 1503, AST 2253: ± 0-37.5 A(PK) per phase; AST 1501, AST 3003:: ± 0-75 A(PK) per phase; AST 2253 (1-Phase): 112.5 A(PK); AST 3003 (1-Phase): 150 A(PK); 1-phase mode in 3-phase models: X3.
Peak Current Accuracy	±(0.5% of actual + 0.5% of maximum); valid from 5% of full-scale to 100% of full-scale.
Peak Current Resolution	5 mA; 1-phase mode in 3-phase models: 15 mA.
Power Range, Full-Scale	0-1.5 kW; 1-phase mode in 3-phase models: 4.5 kW..
Power Accuracy	±(0.4% of actual + 0.7% of full-scale)
Power Resolution	1 W
¹ Accuracy specifications apply above 100 counts of resolution; for multi-chassis configurations, multiply the output current and power, and their accuracy specifications, by the number of chassis.	

Harmonic Measurement	
Parameter	Specification
Frequency, Fundamental	16-81.91 Hz, 82.0-819.1 Hz, 820-960 Hz
Fundamental Frequency Resolution	0.01 Hz: 16-81.91 Hz; 0.1 Hz: 82.0-819.1 Hz; 1 Hz: 820-960 Hz
Harmonic Frequency	32 Hz to 48 kHz; 2nd to 50th harmonic
Fundamental Voltage Accuracy	$\pm(0.2\%$ of actual + 0.3% of full-scale) for 16 Hz to 960 Hz..
Fundamental Voltage Resolution	20 mV
Harmonic Voltage Accuracy	$\pm(0.2\%$ of actual + 0.3% of full-scale + 0.3% of full-scale/kHz).
Harmonic Voltage Resolution	20 mV
Fundamental Current Accuracy	$\pm(0.4\%$ of actual + 0.4% of full-scale) for 16 Hz to 960 Hz.
Fundamental Current Resolution	2 mA; 1-phase mode in 3-phase models: 6 mA.
Harmonic Current Accuracy	$\pm(0.4\%$ of actual + 0.6% of full-scale + 0.4% of maximum/kHz).
Harmonic Current Resolution	2 mA; 1-phase mode in 3-phase models: 6 mA.

Protection Functions	
Output Overvoltage Protection (OVP)	Programmable to 115% of full-scale output voltage; exceeding OVP threshold results in shutdown of output.
Output Current Limit Protection	User-selectable constant-current mode or current-limit mode, with programmable current setpoint; in constant-current mode, output current is regulated to setpoint; in current limit mode, exceeding current-limit setpoint results in shutdown of output; current limit delay: programmable from 100 ms to 5s.
AC Input Overcurrent Protection	Internal fuses in each phase for fault isolation; not user replaceable
AC Input Undervoltage Protection	Automatic shutdown for insufficient AC input voltage
AC Input Transient Protection	Protection to withstand EN61326-1, Class-A surge levels
Overtemperature Protection (OTP)	Internal temperature monitors cause shutdown of output if temperature thresholds are exceeded

Environmental	
Parameter	Specification
Operating Temperature	0°C to 40°C (32° F to 104° F)
Storage Temperature	-40°C to 85°C (-40°F to 185° F)
Altitude	2000 m (6,562 ft)
Relative Humidity	5-95 %, non-condensing
Vibration	MIL-PRF-28800F, Class 3; 5-500 Hz per Paragraph 4.5.5.3.1.
Shock	MIL-PRF-28800F, Class 3; 30G half-sine with 11ms duration per Paragraph 4.5.5.4.1.
Transportation Integrity	ISTA Test Procedure 1A

Mechanical	
Parameter	Specification
1U Dimensions	H, 1.75" (44.45 mm); W (front panel), 19.0" (483 mm); D, 23.0" (584 mm); H, 1.75" (44.45 mm); W (chassis), 16.9" (429 mm); D, 23.0" (584 mm).
2U Dimensions	H, 3.47" (88.1 mm); W (front panel), 18.9" (480 mm); D, 23.0" (584 mm); H, 3.47" (88.1 mm); W (chassis), 16.9" (429 mm); D, 23.0" (584 mm).
1U Unit Weight	AST 501/751: 19 lb / 8.6 kg; AST 1501: 22 lb / 10 kg.
2U Unit Weight	AST 1503/2253: xx lb / x.x kg; AST 3003: xx lb / xx kg.
1U Shipping Weight	AST 501/751: 29 lb / 63.8kg; AST 1501: 32 lb / 70.4 kg.
2U Shipping Weight	AST 1503/2253: xx lb / xxkg; AST 3003: 54 lb / 24.5 kg.
Chassis Material	Steel with plastic front panel
Chassis Finish	Galvanized Zinc, G90
Installation	Protective covers are provided for AC input and AC/DC output; bench-top: removable feet for the chassis; rack-mount: per ANSI-EIA-310-D, with front panel mounting flanges and chassis provisions for mounting rack slides; slides option available.
Cooling	Force-air cooling; linear, variable fan speed control; air intake at front/sides and exhaust at rear.
Acoustic Noise	1U Models: 65 dBA, maximum; measured at 1 m with A-weighting; 2U Models: 65 dBA, maximum; measured at 1 m with A-weighting.

Regulatory Compliance	
Parameter	Specification
EMC	CE marked for EMC Directive 89/336/EEC per EN61326-1:2013, Class-A for emissions and immunity as required for the EU CE Mark.
Safety	CSA NRTL certified for US and Canada to CAN/CSA-C22.2 No. 61010-1-12, UL 61010-1 Third Edition. CE marked for LVD compliance 2006/95/EC to EN 61010-1 Third Edition as required for the EU CE mark.
CE Mark LVD Categories	Installation Overvoltage Category: II; Pollution Degree: 2; Class II equipment; indoor use only.
RoHS	CE marked for compliance with EU Directive 2011/65/EU for Restriction of Hazardous Substances in Electrical and Electronic Equipment.

Operational Characteristics	
Parameter	Characteristic
Parallel Operation	Multi-chassis configurations could be formed with up to six units paralleled in 1-phase or multi-phase groups, using one master unit and up to five units operating as auxiliary units. Setup of the multi-chassis configuration is automatically accomplished when the chassis are interconnected with the interface cables, and require no user setup, except to wire the outputs.
Output Relays	Isolation and range relays are provided internally to automatically configure the outputs, turn the output on/off, and disconnect the load from the output amplifier when in the off state.
Non-Volatile Memory	16 complete instrument setups and transient lists, 100 events per list.
Transient Generator	Output could be controlled to produce transient events with 500 μ s programming resolution: Voltage: drop, step, sag, surge, sweep; Frequency: step, sag, surge, sweep; Voltage and Frequency: step, sweep.
Reliability	MTBF: AST 501, AST 751, AST 1501, > 110,000 hr; calculation method: Telecordia SR-332, Issue 3; method: Method I (Parts Count), Case 2 (Temp 40°C, Stress 50%, Burn-in 4 hr); ambient temperature: 40°C; temperature variation: 10°C; environment: Ground, Fixed, Controlled; duty cycle: 100%; stress factor: 50%; quality level: 1; upper confidence level: 90%
Calibration	Calibration interval is 1 year; calibration is firmware-based through the digital interface or Virtual Panels.
Fault Identification	On-board diagnostics identify when an assembly has experienced a fault.
XLOAD Output Characteristic	User-selectable XLOAD mode provides revised regulation characteristics for additional stability margins when driving large capacitive loads.
Automatic Level Control (ALC)	User-selectable ALC operation enables a digitally implemented feedback control loop to provide precise regulation of the RMS value of the output voltage.
LF, option	Low frequency option: output frequency range of 16 Hz to 550 Hz.
HF, option	High frequency option: output frequency range of 16 Hz to 5.5 kHz.
FC, option	Reduced frequency control option: \pm 0.25% accuracy of output frequency; deletes external waveform programming signal.

<p>LKM , option (Clock and Lock Mode)</p>	<p>Clock and Lock interface option for master unit; multi-phase configurations could be formed with up to six units using the Clock and Lock signal interface. One unit acts as the master and provides the reference signals to the other slave units. Clock and Lock interface option, master unit.</p>
<p>LKS , option (Clock and Lock Mode)</p>	<p>Clock and Lock interface option for auxiliary unit; multi-phase configurations could be formed with up to six units using the Clock and Lock signal interface. One unit acts as the master and provides the reference signals to the other slave units.</p>
<p>MB, option</p>	<p>Upgrades all chassis to Enhanced models in a multi-chassis configuration.</p>

Front Panel Options	
Option	Description
<p>Enhanced</p>	<p>Touch-Panel, TFT color LCD display with menu-based control; rotary encoder for menu navigation and parameter adjustment and entry, with integrated selection switch. POWER switch: turns unit on/off. OUTPUT switch: turns output of the unit on/off. OUTPUT LED: integrated into the OUTPUT switch; indicates that the output of the unit has been turned on. CC LED: indicates that the unit is in constant-current mode and the output current is being regulated. CV LED; indicates that the unit is in constant-voltage mode and the output voltage is being regulated. HI RNG LED: indicates that the high-voltage output range has been selected; FAULT LED: indicates that an internal fault has been detected and the output has been shut down. REM LED: AST 501, AST 751, AST 1501, indicates that the unit is under control of the remote digital interface, and LXI status annunciation. AST 1503, AST 2253, AST 3003: indicates that the unit is under control of the remote digital interface. LXI LED: AST 1503, AST 2253, AST 3003, LXI status annunciation.</p>
<p>ATE</p>	<p>No front-panel display; only status indicators. POWER switch: turns unit on/off. UPDATE switch: enables bootloader for firmware upgrade. POWER LED: indicates that the POWER switch has turned the unit on. OUTPUT LED: indicates that the output of the unit has been turned on. CC LED: indicates that the unit is in constant-current mode and the output current is being regulated. CV LED; indicates that the unit is in constant-voltage mode and the output voltage is being regulated. HI RNG LED: indicates that the high-voltage output range has been selected. FAULT LED: indicates that an internal fault has been detected and the output has been shut down. REM/LAN LED: indicates that the unit is under control of the remote digital interface, and LXI status annunciation.</p>

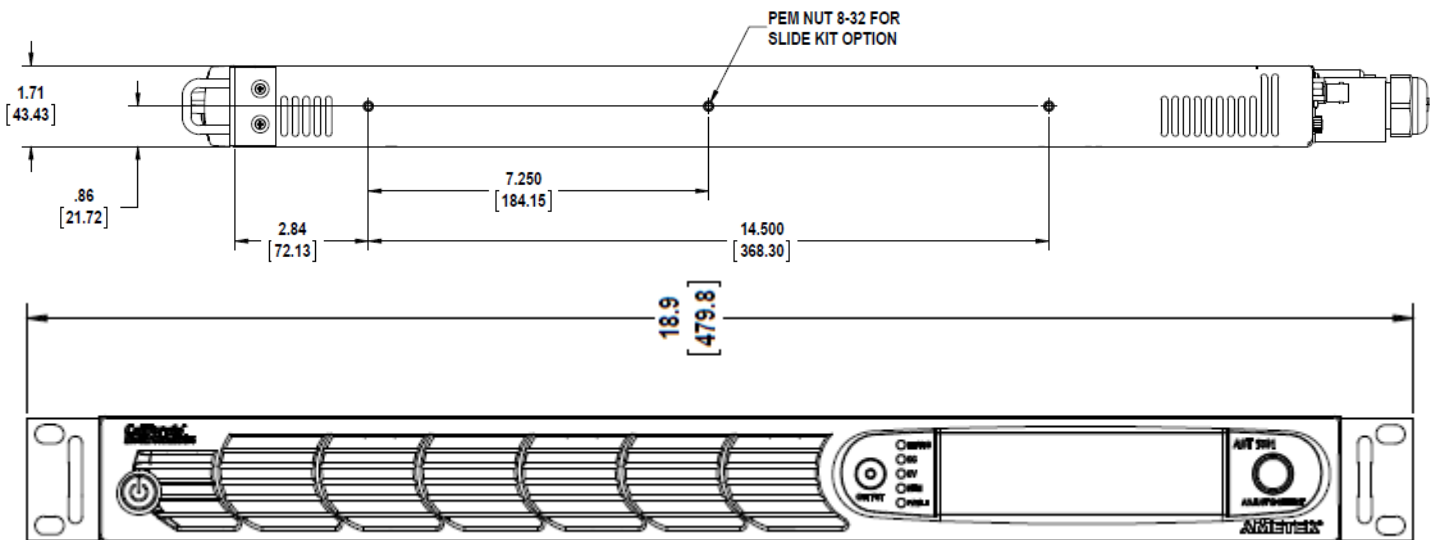
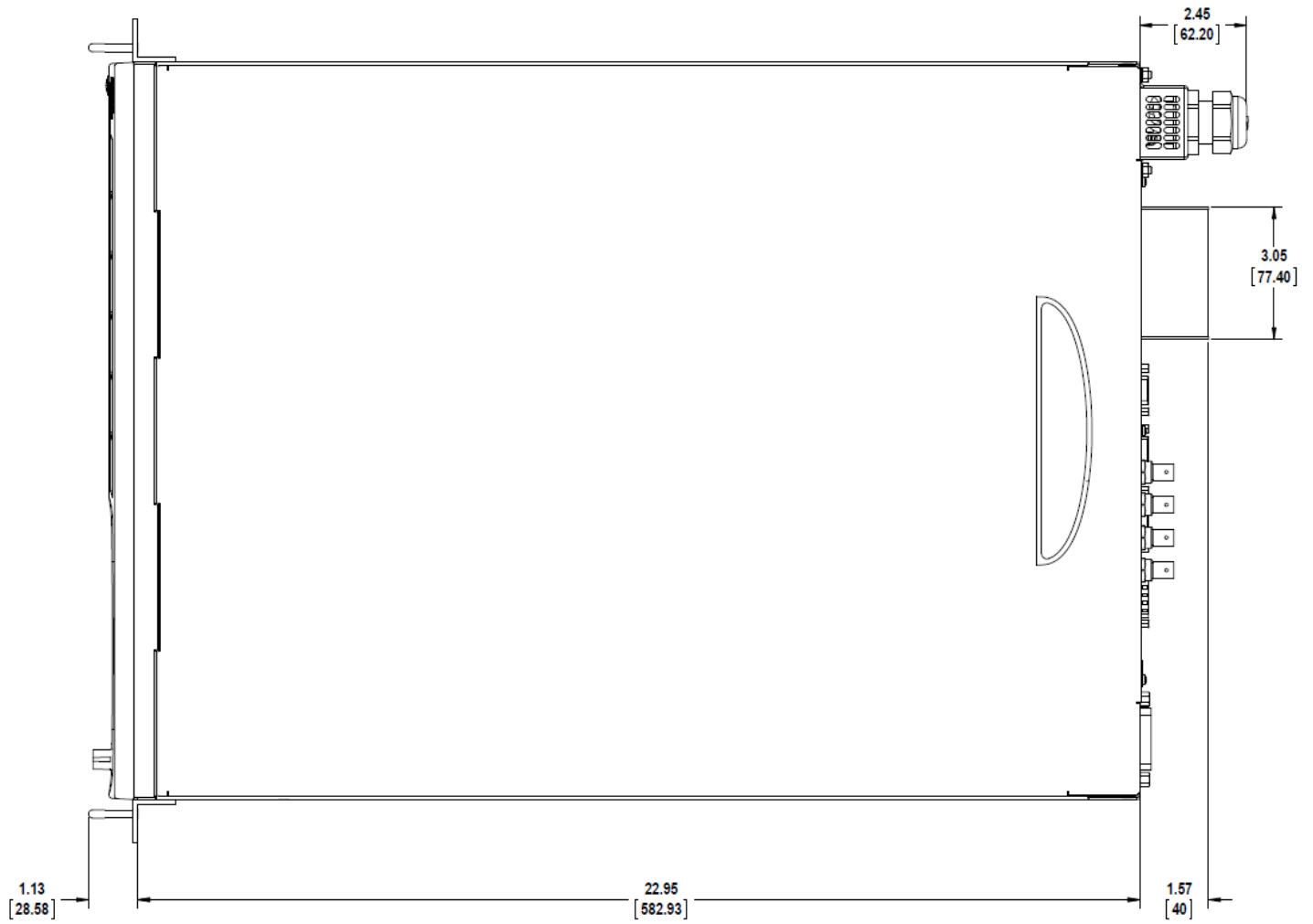
Firmware / Software Options	
Option ¹	Description
B787, (MC)	Avionics Electrical Power Quality Test Software; Boeing 787B3-0147 A/B/C (B787).
AMD, (MC)	Avionics Electrical Power Quality Test Software; Airbus AMD24 C (A400M).
B787 & AMD, (MC)	Includes both B787 and AMD options.
AVSTD, (MC)	Avionics Electrical Power Quality Test Software Package; includes 160 (RTCA/DO160 E/F/G), 704 (MIL-STD 704 A/B/C/D/E/F), ABD (Airbus ADB100.1.8 D/E), A350 (Airbus ADB100.1.8.1 B/C).
AVALL, (MC)	Avionics Electrical Power Quality Test Software Package; includes AVSTD, B787, AMD.
411, (MC)	IEC 61000-4-11 voltage dips and interruptions EMC test software.
413, (MC)	IEC 61000-4-13 harmonics and Inter-harmonics EMC test hardware and software.
411 & 413, (MC)	Includes both 411 and 413 options.
MC	Options are installed in all chassis of a multi-chassis (MC) configuration.
¹ For Avionics options, reference the Avionics Software Manual (P/N 4994-971) for test details. All options require the use of the provided Asterion Virtual Panels, graphical user interface Windows application software (reference CD ROM CIC496).	

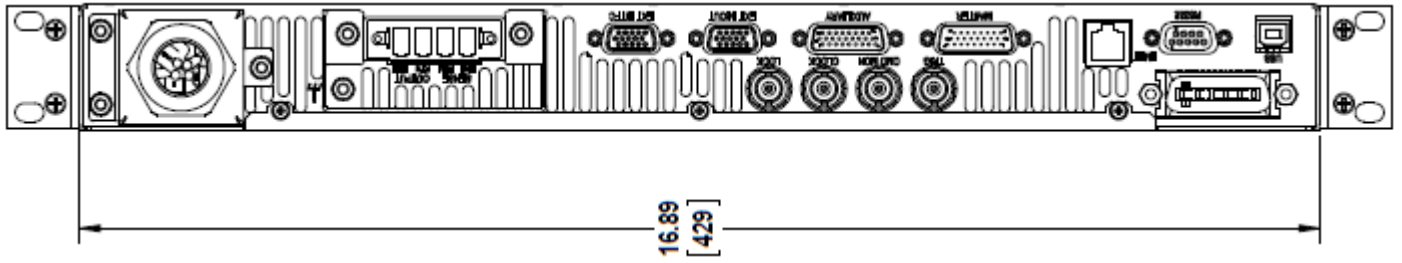
Remote Control Digital Interface Characteristics	
Interface	Characteristics
LAN	Ethernet 10BASE-T and 100BASE-T over twisted-pair cables compliant with IEEE 802.3; Connector: 8P8C modular jack.
USB	Serial interface compliant to USB 2.0; Connector: Type-B receptacle.
RS-232C	Serial interface compliant to RS-232C; Protocol: data bits, 7 with parity and 8 without parity; stop bits, 2; baud rate, 9600 to 115200; handshake, CTS and RTS; Connector: Subminiature-D, 9-contact receptacle.
IEEE-488 (Option)	Parallel interface complies with IEEE-488.1, IEEE-488.2, and the SCPI command specification; command execution response time, 10 ms, typical; connector: IEEE-488.1 compliant.
Firmware Upgrade	Firmware can be upgraded through the USB or RS-232 interfaces. Upgrade through LAN or IEEE-488 is not supported.

Remote Control Analog/Digital Signal Characteristics	
Function	Characteristics
External Analog Programming of Output Voltage Waveform	<p>Signal input for output voltage waveform programming by external analog reference;</p> <p>user-selectable signal ranges: 0-1.77 V(RMS)/0-3.54 V(RMS)/0-7.07 V(RMS) for zero to full-scale RMS output voltage, with AC input waveform at 16Hz to 5.5 kHz;</p> <p>programming accuracy, $\pm 2\%$ of full-scale output;</p> <p>individual inputs provided for each output phase; input impedance, 40 kΩ, typical;</p> <p>safety isolation SELV-rated, referenced to chassis;</p> <p>user-selectable function with the same input signal connection as External Analog Output Voltage Amplitude Programming.</p>
External Analog Programming of Output Voltage Amplitude	<p>Signal input for output voltage amplitude programming of waveform that is set by internal controller reference;</p> <p>user-selectable signal ranges: 0-2.5 VDC/0-5 VDC/0-10 VDC for zero to full-scale RMS of internally programmed output voltage;</p> <p>programming accuracy, $\pm 2\%$ of full-scale output;</p> <p>individual inputs provided for each output phase; input impedance, 40 kΩ, typical;</p> <p>safety isolation SELV-rated, referenced to chassis;</p> <p>user-selectable function with the same input signal connection as External Analog Output Voltage Waveform Programming.</p>
External Analog Modulation of Output Voltage	<p>Signal input for output voltage modulation of waveform set by internal controller reference;</p> <p>0-5 V(RMS) signal range for 0-20% of full-scale output voltage amplitude modulation;</p> <p>programming accuracy, $\pm 2\%$ of full-scale output;</p> <p>individual inputs provided for each output phase; input impedance, 40 kΩ, typical;</p> <p>safety isolation SELV-rated, referenced to chassis.</p>
Trigger Output	<p>Signal output with dual function: user-selectable as either function trigger or list trigger;</p> <p>function trigger provides a pulse for any programmable change in output voltage or frequency; list trigger provides a pulse if programmed as part of list transients;</p> <p>pulse logic level, user-selectable as active-high or active-low; pulse duration, 400 μs;</p> <p>rear panel BNC connector; safety isolation SELV-rated, referenced to chassis.</p>
Output Voltage Monitor Outputs	<p>Signal outputs for each output phase for monitoring the waveform of the command signal of the output amplifier;</p> <p>0 -5 V(RMS) signal range for zero to full-scale output voltage;</p> <p>rear panel BNC connector; safety isolation SELV-rated, referenced to chassis.</p>
Trigger Input	<p>Signal input for external trigger for execution of programmed value;</p> <p>logic level, TTL-compatible;</p> <p>signal return common to signals, Synchronization Clock and Remote Inhibit;</p> <p>safety isolation SELV-rated.</p>
Synchronization Signal (SYNC) Input	<p>Signal input for external square wave clock to control the output frequency and phase of the waveform generated by the internal generator;</p> <p>logic level, TTL-compatible;</p> <p>signal return common to signals, Trigger Input and Remote Inhibit;</p> <p>safety isolation SELV-rated.</p>

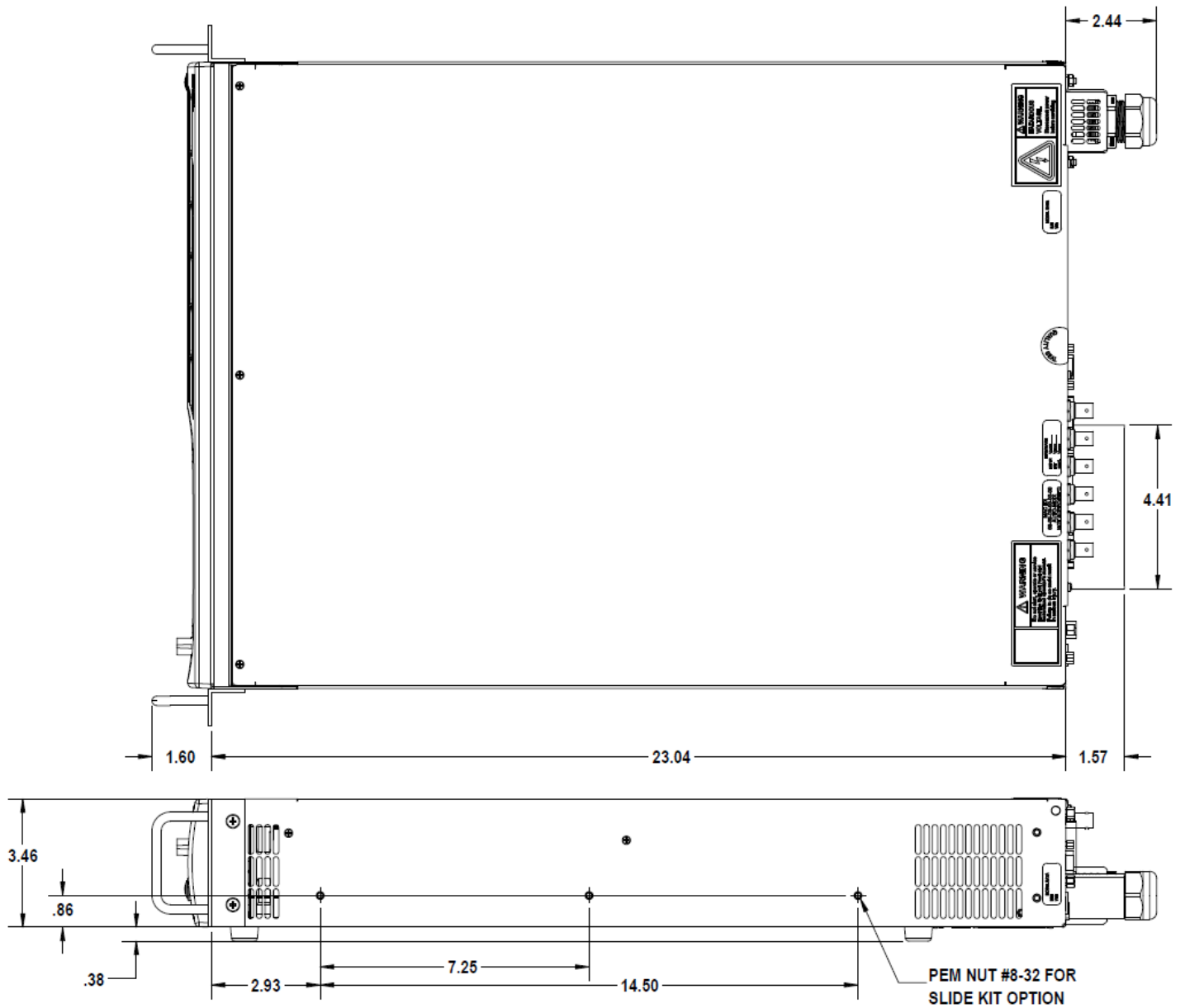
Remote Control Analog/Digital Signal Characteristics Continued	
Function	Characteristics
Remote Inhibit Input	Signal input to turn the output on/off; logic level, TTL-compatible; user-selectable as active-high or active-low; signal return common to signals, Trigger Input and Synchronization Clock; safety isolation SELV-rated.
Summary Fault Output	Signal output indicating that a fault condition is present; solid-state, normally-closed ac/dc switch; logic level, active-low (open-circuit when fault is not present); switch ratings: 50V, maximum peak voltage; 0.1A, maximum current; 2.5Ω, maximum resistance; 1μA, maximum off-state leakage current; isolated from all other signals; safety isolation SELV-rated.
LKM (Option)	Signal outputs for Master Clock and Lock signals used in synchronizing two or more AC sources; logic level, TTL-compatible; rear panel BNC connectors for each signal; safety isolation SELV-rated, referenced to chassis.
LKS (Option)	Signal inputs for Auxiliary Clock and Lock signals used in synchronizing two or more AC sources; logic level, TTL-compatible; rear panel BNC connectors for each signal; safety isolation SELV-rated, referenced to chassis.

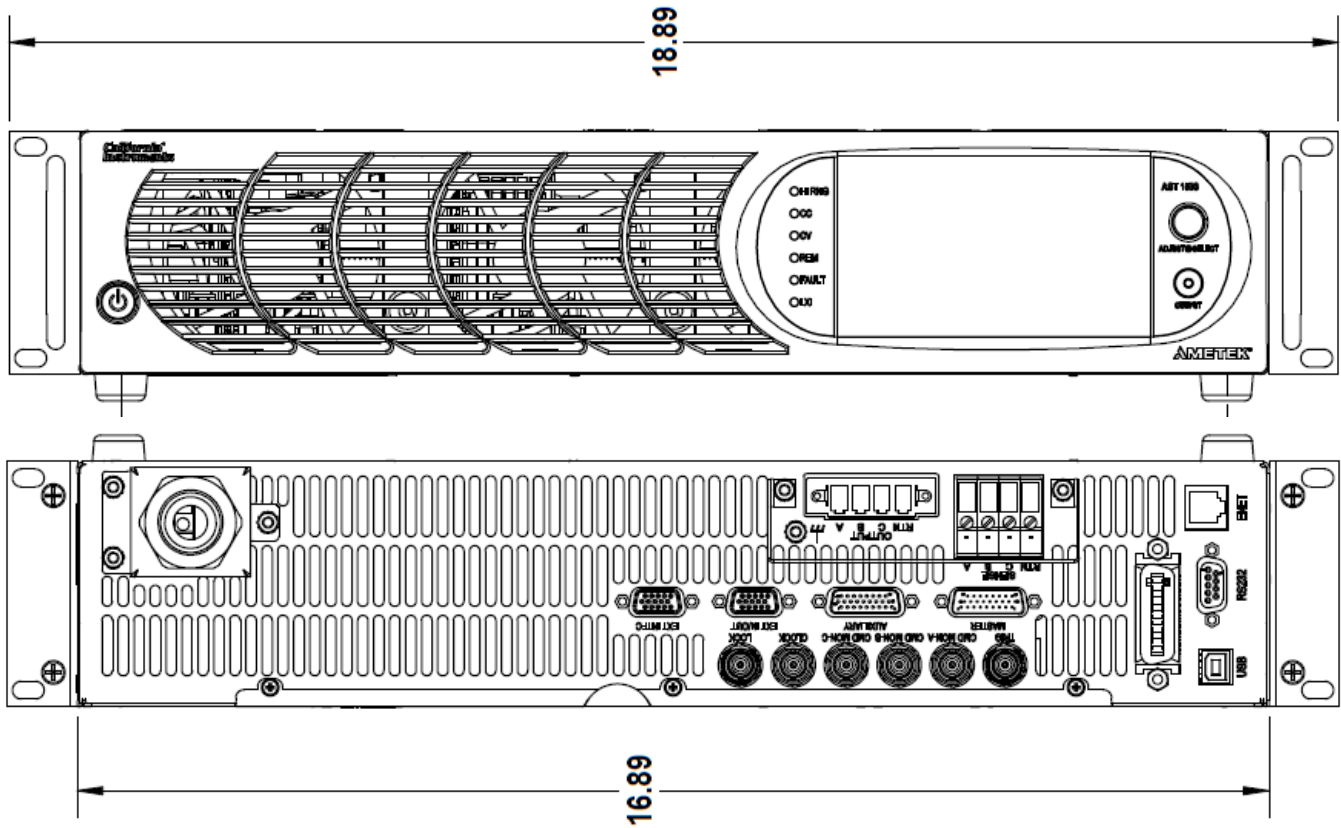
Chassis Dimension Drawings (1U)



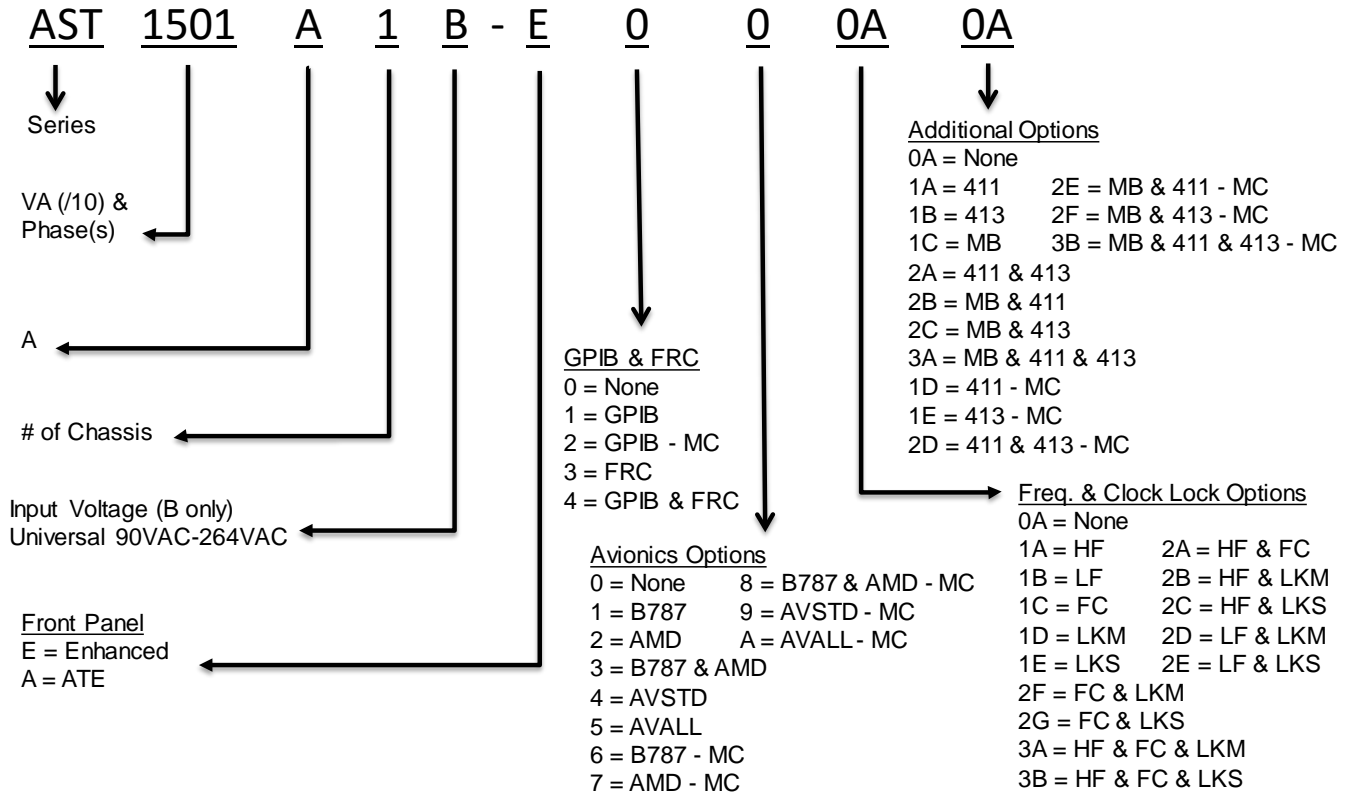


Chassis Dimension Drawings (2U)





Options & Order Information



Options and model descriptions:

Base Models	# of chassis	Phase(s) Out	Description	Size
AST0501A1	1	1	Programmable 500VA, 1 Phase, Dual Voltage Range	1U
AST0751A1	1	1	Programmable 750VA, 1 Phase, Dual Voltage Range	1U
AST1501A1	1	1	Programmable 1500VA, 1 Phase, Dual Voltage Range	1U
AST1503A1	1	1 or 3	Programmable 1500VA, 1/3 Phase, Dual Voltage Range	2U
AST2253A1	1	1 or 3	Programmable 2250VA, 1/3 Phase, Dual Voltage Range	2U
AST3003A1	1	1 or 3	Programmable 3000VA, 1/3 Phase, Dual Voltage Range	2U
Multi-Chassis (MC) Packages	# of chassis	Phase(s) Out	Description	Size
AST1001A2 ^{1,2}	2	1	Programmable 1000VA, 1 Phase (includes two AST0501A1)	2U
AST3001A2 ^{1,2}	2	1	Programmable 3000VA, 1 Phase (includes two AST1501A1)	2U
AST4501A3 ^{1,2}	3	1	Programmable 4500VA, 1 Phase (includes three AST1501A1)	3U
AST1002A2 ^{3,4}	2	2	Programmable 1000VA, 2 Phase (Split-Phase) (includes two AST0501A1)	2U
AST1502A2 ^{3,4}	2	2	Programmable 1500VA, 2 (Split-Phase) (includes two AST0751A1)	2U
AST3002A2 ^{3,4}	2	2	Programmable 3000VA, 2 Phase (Split-Phase) (includes two AST1501A1)	2U
AST4503A2 ^{1,2}	2	1 or 3	Programmable 4500VA, 3 Phase (includes two AST2253A1)	4U
AST6003A2 ^{1,2}	2	1 or 3	Programmable 6000VA, 3 Phase (includes two AST3003A1)	4U
AST9003A3 ^{1,2}	3	1 or 3	Programmable 9000VA, 3 Phase (includes three AST3003A1)	6U
Consult Factory for higher power and/or additional phase configurations				
¹ ATE version Multi-Chassis Packages include all ATE version chassis. Any chassis can be the master. One Parallel Communication System Interface Cable (PN: 890-010-26) is included for each non-master chassis.				
² Enhanced Version Multi-Chassis Packages include one Enhanced version chassis as the master. The remaining chassis are ATE version. For all Enhanced version chassis see "MB" option. One Parallel Communication System Interface Cable (PN: 890-010-26) is included for each non-master chassis.				
³ ATE version Two Phase Multi-Chassis Packages include all ATE version chassis with LKM option on the master unit and LKS option on the remaining chassis. Required Clock & Lock BNC cables and BNC Tees are included. NOTE: Requires direct programming over individual LAN (LXI) or GPIB connection for each chassis/phase. This configuration is not supported in Virtual Panels Software.				
⁴ Enhanced version Two Phase Multi-Chassis Packages include all Enhanced version chassis with LKM option on the master chassis and LKS option on the remaining chassis. Required Clock & Lock BNC cables and BNC Tees are included. NOTE: Requires direct programming from individual front panel or over individual LAN (LXI) or GPIB connection for each chassis/phase. This configuration is not supported in Virtual Panels Software.				

Asterion - Options				
Option		Description		
GPIB & FRC NOTES				
NONE				
GPIB	4	GPIB Interface		
GPIB - MC		Install option(s) on all chassis in (MC) Packages. Price = option price(s) (above) * # chassis		
FRC	3, 4	Fast Range Change Option (With FRC Range Change Function will execute in < 6mS)		Consult Factory for Availability
GPIB & FRC	3, 4			Consult Factory for Availability
AVIONICS NOTES				
NONE				
B787	1	Avionics Electrical Power Quality Test Software - Boeing 787B3-0147 A/B/C (B787)		
AMD	1	Avionics Electrical Power Quality Test Software - Airbus AMD24 C (A400M)		
B787 & AMD		Avionics Electrical Power Quality Test Software - B787 & AMD		
AVSTD	1	Avionics Electrical Power Quality Test Software Package - includes 160 (RTC/DO160 E/F/G), 704 (MIL-STD 704 A/B/C/D/E/F), ABD (Airbus ADB100.1.8 D/E), A350 (Airbus ADB100.1.8.1 B/C)		
AVALL	1	Avionics Electrical Power Quality Test Software Package - includes AVSTD, B787, AMD		
B787 - MC	1	Install option(s) on all chassis in (MC) Packages. Price = option price(s) (above) * # chassis		
AMD - MC	1	Install option(s) on all chassis in (MC) Packages. Price = option price(s) (above) * # chassis		
B787 & AMD - MC	1	Install option(s) on all chassis in (MC) Packages. Price = option price(s) (above) * # chassis		
AVSTD - MC	1	Install option(s) on all chassis in (MC) Packages. Price = option price(s) (above) * # chassis		
AVALL - MC	1	Install option(s) on all chassis in (MC) Packages. Price = option price(s) (above) * # chassis		

Frequency / Clock Lock Options	NOTES	
NONE		
HF*	3, 4	High Frequency up to 5,500Hz
LF*	3, 4	Limits Output Frequency to 500Hz
FC	3, 4	Limits Output Frequency Control to 0.25%
LKM**	3, 4	Clock / Lock Master Required Clock & Lock BNC cables and BNC Tees are included
LKS**	3, 4	Clock / Lock Auxiliary Required Clock & Lock BNC cables and BNC Tees are included
HF & FC	3, 4	Consult Factory for Availability
HF & LKM	3, 4	Consult Factory for Availability
HF & LKS	3, 4	Consult Factory for Availability
LF & LKM	3, 4	
LF & LKS	3, 4	
FC & LKM	3, 4	
FC & LKS	3, 4	
HF & FC & LKM	3, 4	
HF & FC & LKS	3, 4	
* = Mutually Exclusive		
** = Mutually Exclusive (Only Use LKMLKS to create multi-phase configurations. Do not connect LKMLKS chassis outputs together to increase output current)		
Additional Options NOTES Consult Factory for availability		
NONE		
411	1	IEC61000-4-11 Voltage Dips and Interruptions
413	1, 4	IEC61000-4-13 Interharmonics Generator
MB	2, 4	Upgrades ATE version chassis in a Multi-Chassis configuration to Enhanced version chassis Price = option price * # chassis
411 & 413	1, 4	
MB & 411	1	Install MB on all chassis, 411 on master only in (MC) Packages. Price = MB price (above) * # chassis + 411 Price
MB & 413	1, 4	Install MB on all chassis, 413 on master only in (MC) Packages. Price = MB price (above) * # chassis + 413 Price
MB & 411 & 413	1, 4	Install MB on all chassis, 411 & 413 on master only in (MC) Packages. Price = MB price (above) * # chassis + 411 & 413 Price
411 - MC	1	Install option(s) on all chassis in (MC) Packages. Price = option price(s) (above) * # chassis
413 - MC	1, 4	Install option(s) on all chassis in (MC) Packages. Price = option price(s) (above) * # chassis
411 & 413 - MC	1, 4	Install option(s) on all chassis in (MC) Packages. Price = option price(s) (above) * # chassis
MB & 411 - MC	1	Install option(s) on all chassis in (MC) Packages. Price = option price(s) (above) * # chassis
MB & 413 - MC	1, 4	Install option(s) on all chassis in (MC) Packages. Price = option price(s) (above) * # chassis
MB & 411 & 413 - MC	1, 4	Install option(s) on all chassis in (MC) Packages. Price = option price(s) (above) * # chassis
ACCESSORIES NOTES		
5330201-01R	3	Rack Slides (1 pair)
890-010-26		Parallel Communication System Interface Cable (60") One required for each auxiliary chassis in a parallel configuration
250562		Clock/Lock System Multi-Phase Cable (36") & BNC Tee Two supplied with each chassis with LKMLKS option
VPEss	1	Virtual Panels Essentials (Windows GUI software) Download from Web Site
VPAdv	1	Virtual Panels Advanced (Windows GUI software) Activation key to upgrade VPEss to VPAdv
AST-Z540	3, 4	ANSI Z540 Certified Calibration
AST-17025	3, 4	ISO 17025 Certified Calibration
NOTES:		
¹ Not available on split-phase packages (AST1002A2, AST1502A2, and AST3002A2)		
² Per ATE chassis in Multi-Chassis (MC) Packages		
³ Per Chassis		
⁴ Not retrofittable. Must be specified at time of original order		

Warranty Statement:

AMETEK Programmable Power Inc. warrants its products to be free from defects in material and workmanship. The warranty period is from the date of original shipment of the product to the original purchaser (see website for warranty periods by product). Asterion AC comes with a one (1) year warranty. Extended warranties available.