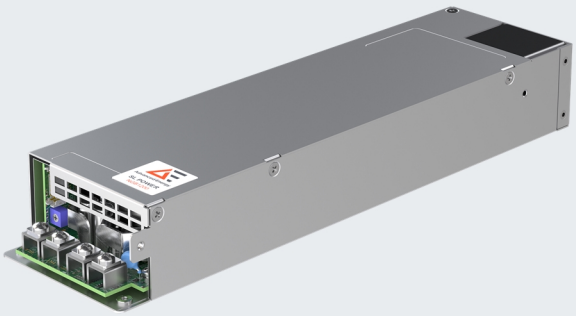
SL POWER NGB1200 SERIES

1200 Watts Single Output Medical / Industrial Grade



Medical

Industrial

PRODUCT DESCRIPTION

Advanced Energy's SL Power NGB1200 series AC-DC power supply features ITE and medical safety approvals. The series offers a choice of three single output models, with voltages of 12V, 24V, or 48V. Each model also provides a 5V standby output. NGB1200 series power supplies provide 1200W of output power, and have a typical full load power conversion efficiency of 90%. All models have output overvoltage, short circuit and overload protection and a 3 x 10.8 x 1.6 inch form factor.

AT A GLANCE

Total Power

1200 Watts

Input Voltage

85 to 264 Vac

# of Outputs

Single

RoHS

SPECIAL FEATURES

- Up to 1200W output power
- 3" X 10.8" X 1.6" size
- Universal input 80 to 264Vac
- Meets Class B emissions levels
- 7 years electrolytic capacitor life
- -10°C to 70°C operating temperature range
- Meets 4th edition/heavy industrial EMC
- Less than 100µA leakage current
- Class I input version
- 3 years warranty
- RoHS compliant
- REACH compliant

SAFETY

- IEC/EN/UL 60601-1, 3rd Edition, BF Rated
- IEC/EN/UL 62368-1
- UKCA Mark
- CE Mark

TYPICAL APPLICATIONS

- ITE
- Medical

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SECTION 1 MODEL NUMBERS

Model Number	Output Voltage	Output Current	Output Power	Standby Output
NGB1200S12K	12V	100A	1200W	5V @ 2A
NGB1200S24K	24V	50A	1200W	5V @ 2A
NGB1200S48K	48V	25A	1200W	5V @ 2A

Options

None

Family Comparison

Model Number	Output Voltages	Output Power	Standby Output	Dimension
NGB250 Series	12V, 15V, 24V, 28V, 48V, 56V	250W	-	4” x 2” x 1.5”
NGB425 Series	12V, 15V, 24V, 35V, 48V	425W	5V @ 1A	5” x 3” x 1.5”
NGB660 Series	12V, 15V, 24V, 48V	660W	5V @ 1A	6” x 4” x 1.6”
NGB800 Series	12V, 15V, 24V, 48V	800W	5V @ 2A	8” x 5” x 1.6”
NGB1200 Series	12V, 24V, 48V	1200W	5V @ 2A	10.8” x 3” x 1.6”

SECTION 2 ELECTRICAL SPECIFICATIONS

2.1 Absolute Maximum Ratings

Stress in excess of those listed in the "Absolute Maximum Ratings" may cause permanent damage to the power supply. These are stress ratings only and functional operation of the unit is not implied at these or any other conditions above those given in the operational sections of this TRN. Exposure to any absolute maximum rated condition for extended periods may adversely affect the power supply's reliability.

Table 1. Absolute Maximum Ratings

Parameter	Model	Symbol	Min	Typ	Max	Unit
Input Voltage AC continuous operation	All models	$V_{IN,AC}$	85	-	264	Vac
Maximum Output Power (forced air – internal fan)	All models	$P_{O,maxFA}$	-	-	1200	W
Isolation Voltage[1] Input to output (2 MOPP) Input to ground (1 MOPP) Outputs to ground (1 MOPP)	 All Models All Models All Models		 - - -	 - - -	 4500 1500 1500	 Vac Vac Vac
Ambient Operating Temperature	All Models	T_A	-10	-	+70[2]	^{O}C
Storage Temperature	All Models	T_{STG}	-40	-	+85	^{O}C
Humidity (non-condensing)	All Models		5	-	95	%
Altitude Operating Non-operating	 All Models All Models		 -500 -500	 - -	 5,000 12,192	 m m

Note 1 - BF rated. 2s dwell time.
Note 2 - Derate output power linearly above 50^{O}C to 50% at 70^{O}C.

SECTION 2 ELECTRICAL SPECIFICATIONS

2.2 Input Specifications

Table 2. Input Specifications

Parameter	Condition	Symbol	Min	Typ	Max	Unit
Operating Input Voltage, AC	All	$V_{IN,AC}$	85	115/230	264	Vac
Input AC Frequency	All	$f_{IN,AC}$	47	50/60	63	Hz
Maximum Steady State Input Current ($I_O = I_{O,max}$, $I_{SB} = I_{SB,Max}$)	$V_{IN,AC}$ = 115Vac $V_{IN,AC}$ = 230Vac	$I_{IN,max}$	- -	- -	15 7.5	A
No Load Input Current (V_O On, I_{SB} = 0)	$V_{IN,AC}$ = 115/230Vac	$I_{IN,no-load}$	-	200	-	mA
No Load Input Power (V_O On, I_{SB} = 0)	$V_{IN,AC}$ = 115/230Vac	$P_{IN,no-load}$	-	4	-	W
Standby Input Current (V_O Off, I_{SB} = 0)	$V_{IN,AC}$ = 115/230Vac	$I_{IN,Standby}$	-	-	1.0	A
Standby Input Power (V_O Off, I_{SB} = 0)	$V_{IN,AC}$ = 115/230Vac	$P_{IN,Standby}$	-	-	1.0	W
Startup Surge Current (Inrush)	Cold start $V_{IN,AC}$ = 264Vac	$I_{IN,surge}$	-	-	40	A
Input Fuse	Internal, L and N 250Vac		-	-	20	A
Switching Frequency	All	$f_{SW,PFC}$	-	115	-	kHz
Operating Efficiency @ 25°C	$I_O = I_{O,max}$ $V_{IN,AC}$ = 115/230Vac	η	90	-	-	%
Leakage Current (Input to Earth)	$V_{IN,AC}$ = 264Vac $f_{IN,AC}$ = 60 Hz NC	$I_{IN,leakage}$	-	-	500	µA
Leakage Current (Output to Earth)	$V_{IN,AC}$ = 264Vac $f_{IN,AC}$ = 60 Hz NC/SFC	$I_{IN,leakage}$	-	-	100/500	µA
Harmonic Line Currents	All	THD	Per EN61000-3-2			

SECTION 2 ELECTRICAL SPECIFICATIONS

2.3 Output Specifications

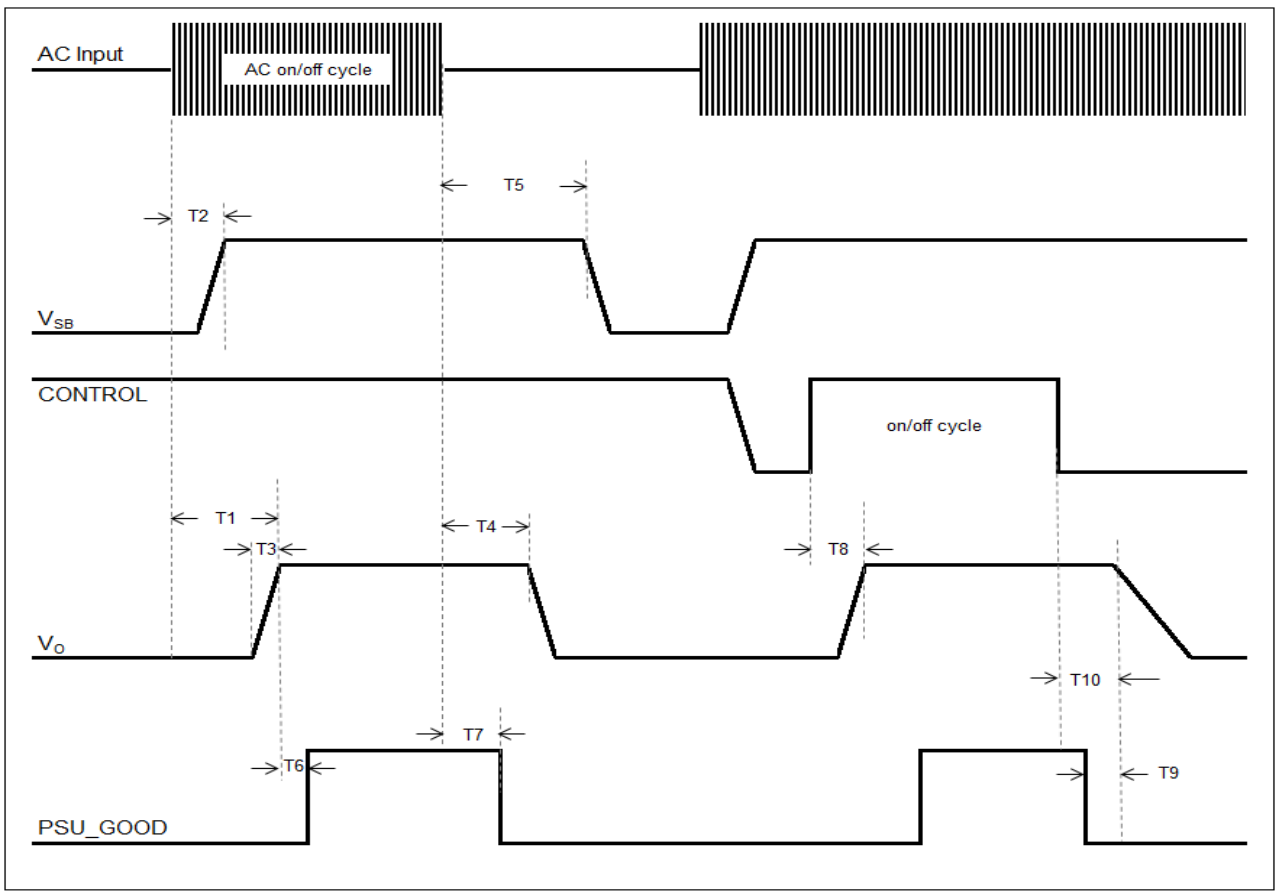
Table 3. Output Specifications

Parameter		Condition	Symbol	Min	Typ	Max	Unit
Factory Set Point Tolerance @ 25°C		$V_{IN,AC}$ = 115Vac I_O = 50%$I_{O,max}$	±%V_O	-	±1	-	%
Line Regulation		All	±%V_O	-	-	1	%
Load Regulation		All	±%V_O	-	-	2	%
Total Regulation		Inclusive of set point, line, load temperature change, warm-up drift and cross regulation	±%V_O	-	-	5	%
Output Adjust Range		All	±%V_O	-	-	5	%
Output Voltage	NGB1200S12 NGB1200S24 NGB1200S48	All	V_O	- - -	12.0 24.0 48.0	- - -	V
	All models		V_{SB}	-	5.0	-	V
Output Current	NGB1200S12 NGB1200S24 NGB1200S48	All	I_O	0 0 0	- - -	100 50 25	A
	All models		I_{SB}	0	-	2.0	A
Load Capacitance		Startup		-	-	3000	µF
V_O Dynamic Response	Peak Deviation Settling time	50% load change from 25% to 100% of $I_{O,max}$ Slew rate = 0.2A/µs	±%V_O $T_{Settling}$	- -	- -	3.5 500	% µs
V_O Turn On Overshoot		All	±%V_O	-	-	5	%
V_O Turn Off Overshoot		All	±%V_O	-	-	1	%
Output Ripple, pk-pk	NGB1200S12	Measure with a 0.1µF ceramic capacitor in parallel with a 10µF low ESR capacitor, 0 to 20MHz bandwidth	±%V_O	-	-	1.25	%
	NGB1200S24 NGB1200S48		±%V_O	-	-	1	%
	All models		±%V_{SB}	-	-	3	%
V_O Over Voltage Protection		Latch off I_O < 50% $I_{O,max}$	%V_O	110	-	130	%
V_O Over Current Protection		Hiccup	%I_O	110	-	180	%
Over Temperature Protection		All		Shutdown, Auto Recovery			
Short Circuit Protection		All		Hiccup Mode, Auto Recovery			

Note - Unless otherwise noted, all parameters are specified at nominal input (115/230Vac), 25°C ambient operating temperature, no load to full rated output power, and nominal output voltage.

SECTION 2 ELECTRICAL SPECIFICATIONS

2.4 System Timing Specifications



Label	Parameter	Min	Typ	Max	Unit
T1	Turn-On Time - Main outputs (115Vac, full Load)	500	-	1000	ms
T2	Turn-On Time - V_{SB} output	-	-	100	ms
T3	Rise Time, 10%Vo to output voltage in regulation from 90Vac input at both 0% & 100% load	-	-	100	ms
T4	Hold up time - All outputs stay within regulation after loss of AC. Measured at 70% of full load. 12V model 24V&48V model	18 20	- -	- -	ms ms
T5	Hold up time - V_{SB} stays within regulation after loss of AC	100	-	-	ms
T6	Delay from output voltages within regulation limits to POWER_GOOD asserted at turn on.	-	200	-	ms
T7	Delay from loss of AC to de-assertion of POWER_GOOD (1A load).	-	350	-	ms
T8	Delay from CONTROL active to output voltage within regulation limits.	-	630	-	ms
T9	Delay from POWER_GOOD de-asserted to output voltages out of regulation limits.	-	5	-	ms
T10	Delay from CONTROL deactive to output voltage out of regulation.	-	10	-	ms

SECTION 2 ELECTRICAL SPECIFICATIONS

2.5 NGB1200S12K Performance Curves

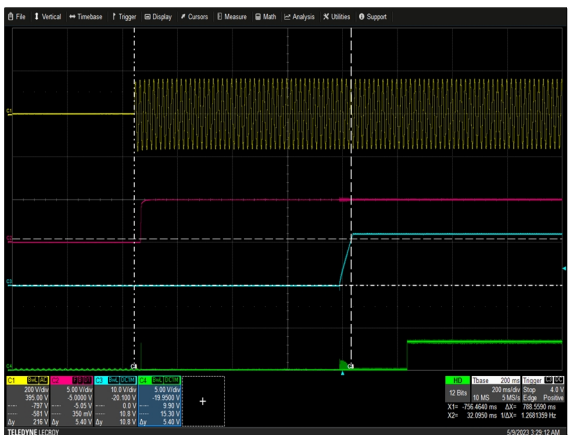


Figure 1: NGB1200S12K Turn-on Delay via AC Mains
Vin = 115Vac Load: Io = 100A
Ch 1: V_{IN} Ch 2: V_{SB} Ch 3: Vo Ch 4: POWER_GOOD

Figure 2: NGB1200S12K Turn-on Delay via Control
Vin = 115Vac Load: Io = 100A
Ch 1: V_{IN} Ch 2: Control Ch 3: Vo Ch 4: POWER_GOOD

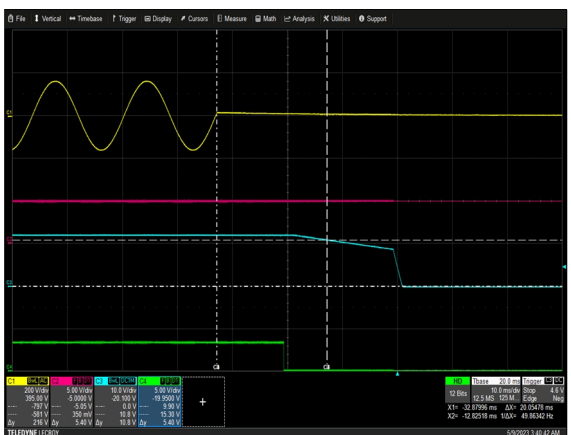


Figure 3: NGB1200S12K Hold-up Time
Vin = 115Vac Load: Io = 70A (70% load)
Ch 1: V_{IN} Ch 2: V_{SB} Ch 3: Vo Ch 4: POWER_GOOD

Figure 4: NGB1200S12K Hold-up Time
Vin = 115Vac Load: Io = 100A (100% load)
Ch 1: V_{IN} Ch 2: V_{SB} Ch 3: Vo Ch 4: POWER_GOOD

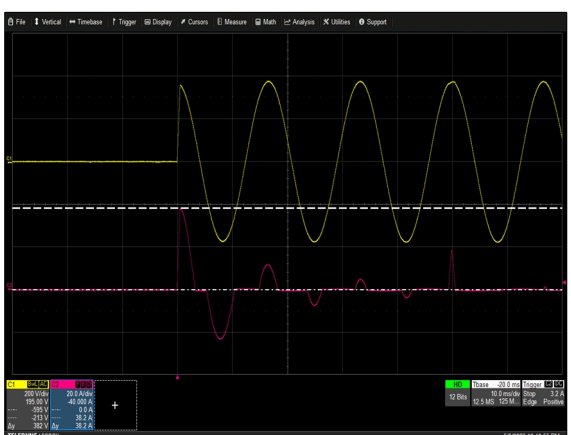


Figure 5: NGB1200S12K Inrush Current
Vin = 264Vac Load: Io = 0A, Turn on at 90 deg
Ch 1: V_{IN} Ch 2: I_{IN}

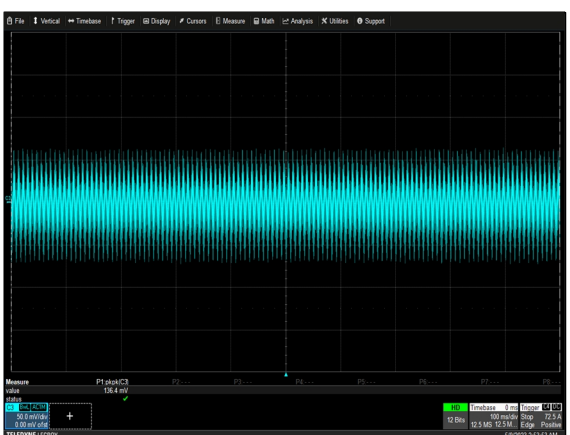


Figure 6: NGB1200S12K Ripple and Noise Measurement
Vin = 115Vac Load: Io = 100A
Ch 3: Vo

SECTION 2 ELECTRICAL SPECIFICATIONS

2.5 NGB1200S12K Performance Curves

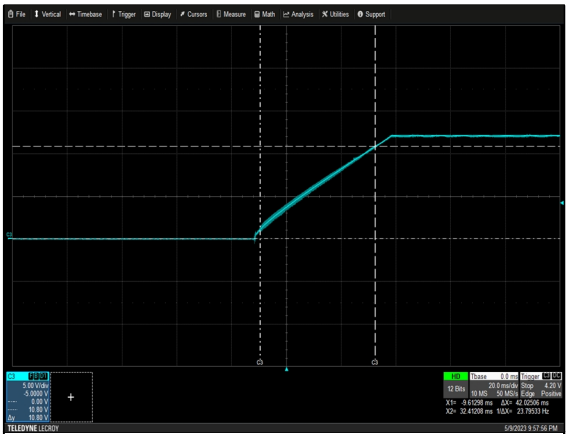


Figure 7: NGB1200S12K Output Voltage Startup Characteristic
Vin = 90Vac Load: Io = 100A
Ch 3: Vo

Figure 8: NGB1200S12K Turn Off Characteristic via Control
Vin = 115Vac Load: Io = 100A
Ch 2: Control Ch 3: Vo Ch 4: POWER_GOOD

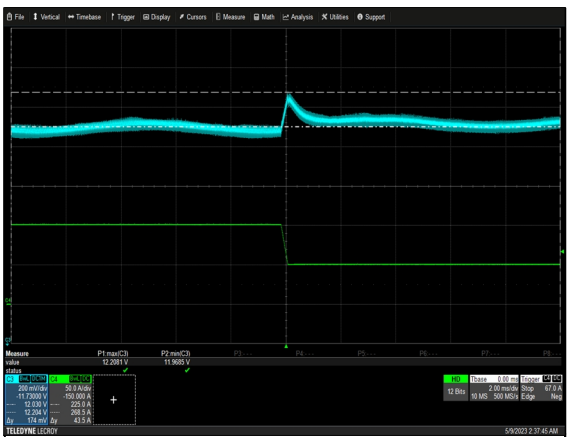


Figure 9: NGB1200S12K Transient Response - Vo Deviation
Vin = 115Vac Load: Io = 100% to 50%, 0.2A/µs slew rate
Ch 3: Vo Ch 4: Io

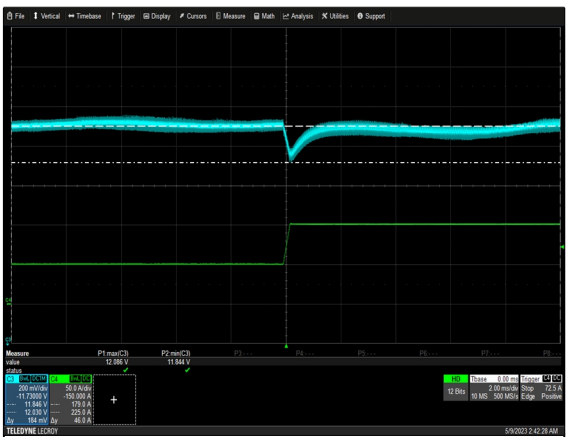


Figure 10: NGB1200S12K Transient Response - Vo Deviation
Vin = 115Vac Load: Io = 50% to 100%, 0.2A/µs slew rate
Ch 3: Vo Ch 4: Io

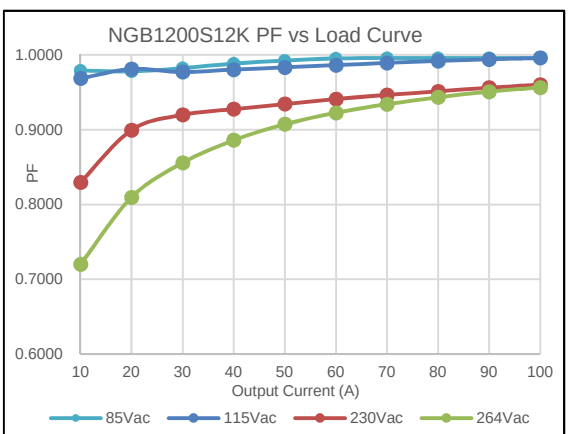


Figure 11: NGB1200S12K PF vs Load Curve

Loading: I_{o_main} = 10%$I_{o,max}$ to $I_{o,max}$

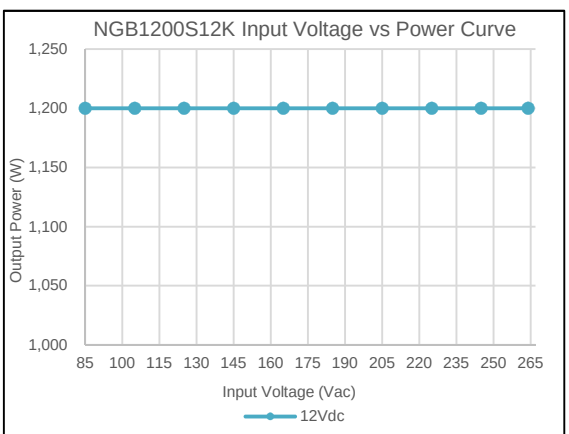


Figure 12: NGB1200S12K Input Voltage vs Output Power Curve

Loading: I_{o_main} = $I_{o,max}$

SECTION 2 ELECTRICAL SPECIFICATIONS

2.5 NGB1200S12K Performance Curves

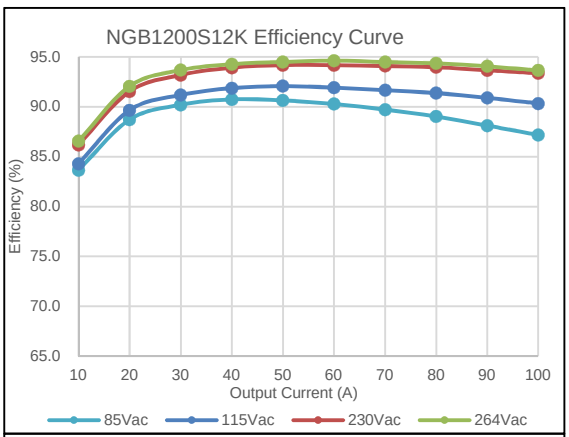


Figure 13: NGB1200S12K Efficiency Curve @ 25°C

Loading: I_{o_main} = 10%$I_{o,max}$ increment to $I_{o,max}$

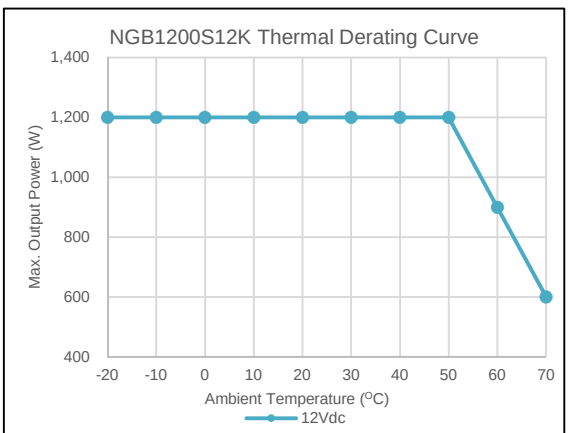


Figure 14: NGB1200S12K Thermal Derating Curves

Vin = 115Vac

SECTION 2 ELECTRICAL SPECIFICATIONS

2.5 NGB1200S24K Performance Curves

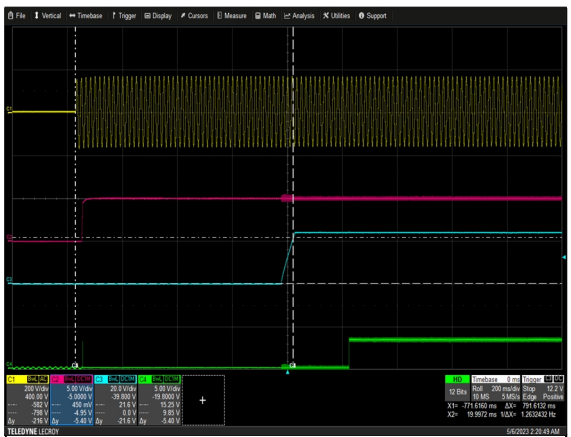


Figure 15: NGB1200S24K Turn-on Delay via AC Mains
Vin = 115Vac Load: Io = 50A
Ch 1: V_{IN} Ch 2: V_{SB} Ch 3: Vo Ch 4: POWER_GOOD

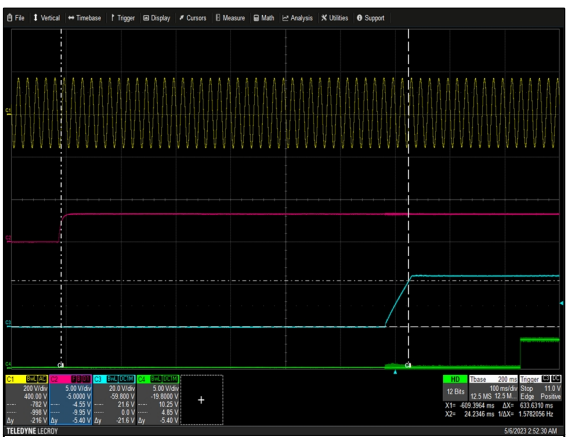


Figure 16: NGB1200S24K Turn-on Delay via Control
Vin = 115Vac Load: Io = 50A
Ch 1: V_{IN} Ch 2: Control Ch 3: Vo Ch 4: POWER_GOOD

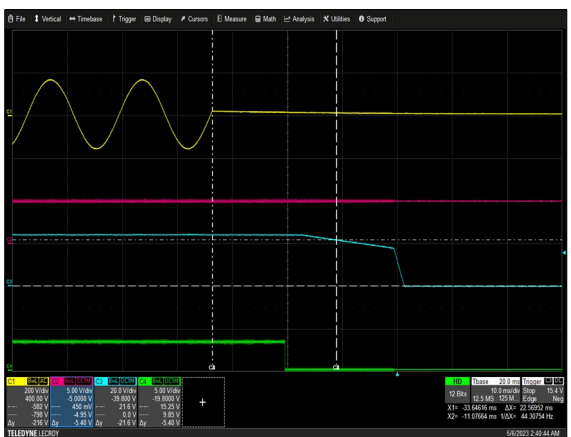


Figure 17: NGB1200S24K Hold-up Time
Vin = 115Vac Load: Io = 35A (70% load)
Ch 1: V_{IN} Ch 2: V_{SB} Ch 3: Vo Ch 4: POWER_GOOD

Figure 18: NGB1200S24K Hold-up Time
Vin = 115Vac Load: Io = 50A (100% load)
Ch 1: V_{IN} Ch 2: V_{SB} Ch 3: Vo Ch 4: POWER_GOOD

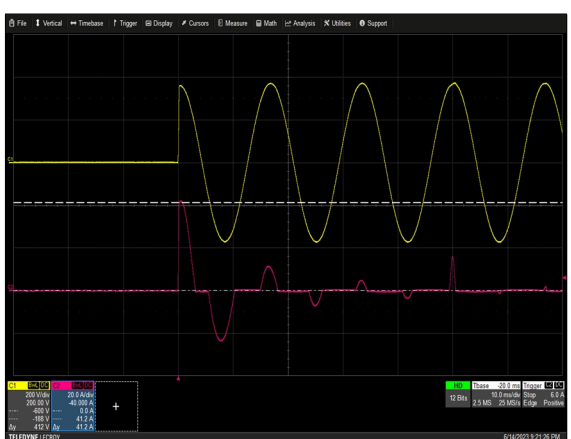


Figure 19: NGB1200S24K Inrush Current
Vin = 264Vac Load: Io = 0A, Turn on at 90 deg
Ch 1: V_{IN} Ch 2: I_{IN}

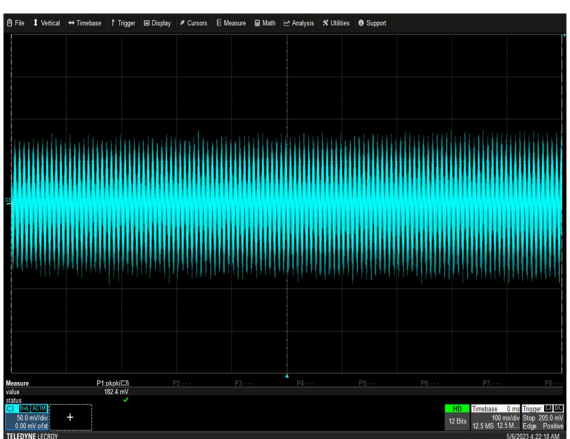


Figure 20: NGB1200S24K Ripple and Noise Measurement
Vin = 115Vac Load: Io = 50A
Ch 3: Vo

SECTION 2 ELECTRICAL SPECIFICATIONS

2.5 NGB1200S24K Performance Curves

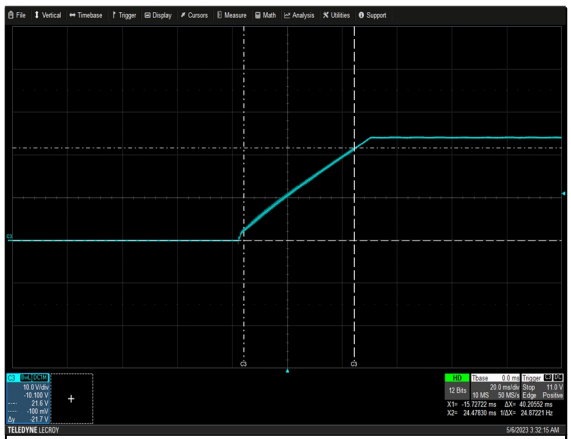


Figure 21: NGB1200S24K Output Voltage Startup Characteristic
Vin = 90Vac Load: Io = 50A
Ch 3: Vo

Figure 22: NGB1200S24K Turn Off Characteristic via Control
Vin = 115Vac Load: Io = 50A
Ch 2: Control Ch 3: Vo Ch 4: POWER_GOOD

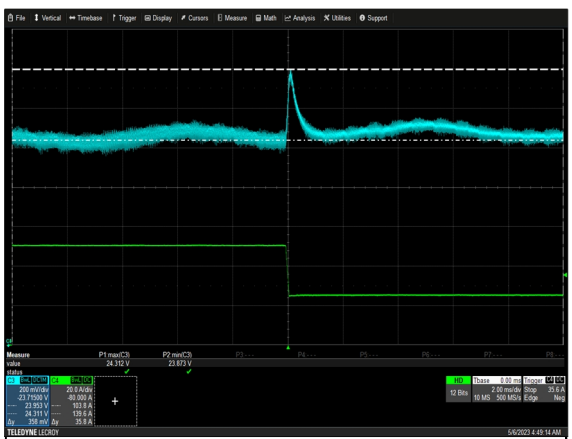


Figure 23: NGB1200S24K Transient Response - Vo Deviation
Vin = 115Vac Load: Io = 100% to 50%, 0.2A/µs slew rate
Ch 3: Vo Ch 4: Io

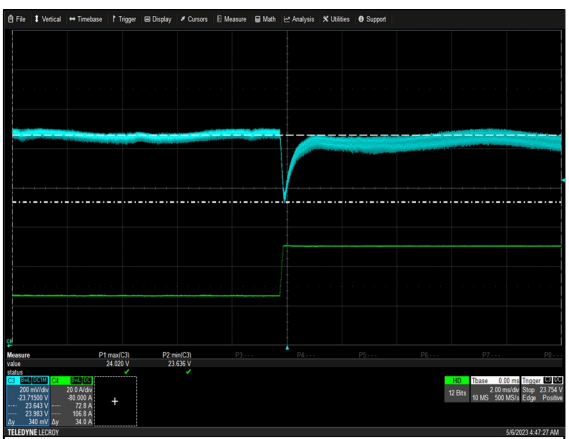


Figure 24: NGB1200S24K Transient Response - Vo Deviation
Vin = 115Vac Load: Io = 50% to 100%, 0.2A/µs slew rate
Ch 3: Vo Ch 4: Io

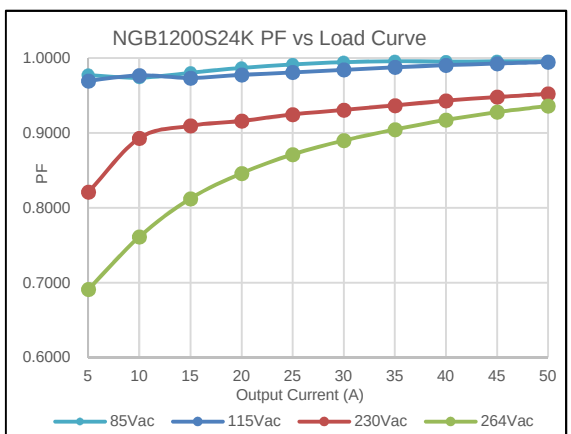


Figure 25: NGB1200S24K PF vs Load Curve

Loading: I_{o_main} = 10%$I_{o,max}$ to $I_{o,max}$

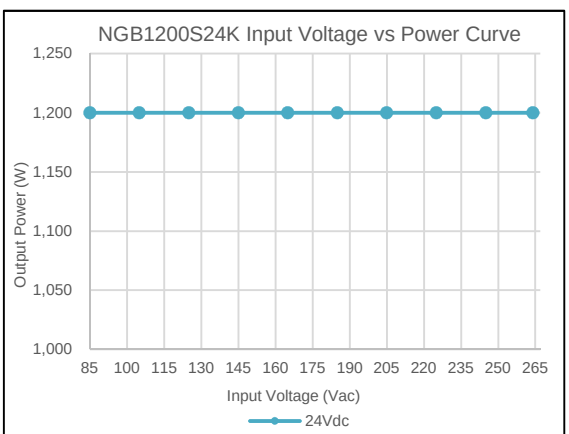


Figure 26: NGB1200S24K Input Voltage vs Output Power Curve

Loading: I_{o_main} = $I_{o,max}$

SECTION 2 ELECTRICAL SPECIFICATIONS

2.5 NGB1200S24K Performance Curves

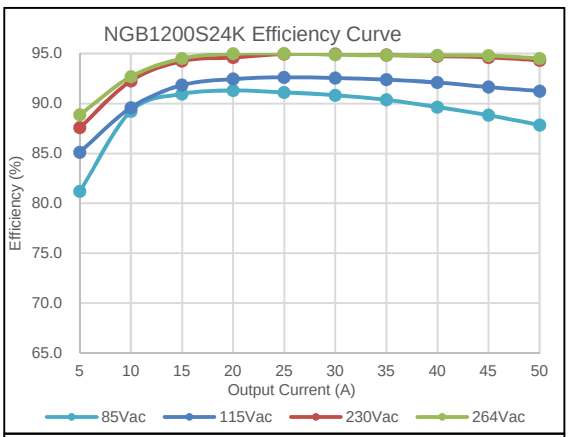


Figure 27: NGB1200S24K Efficiency Curve @ 25°C

Loading: I_{o_main} = 10%$I_{o,max}$ increment to $I_{o,max}$

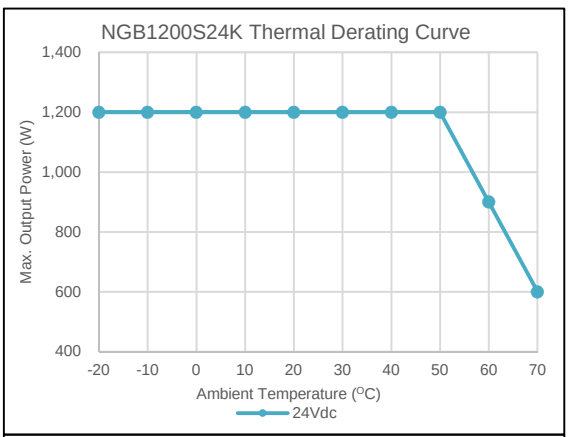


Figure 28: NGB1200S24K Thermal Derating Curves

Vin = 115Vac

SECTION 2 ELECTRICAL SPECIFICATIONS

2.5 NGB1200S48K Performance Curves

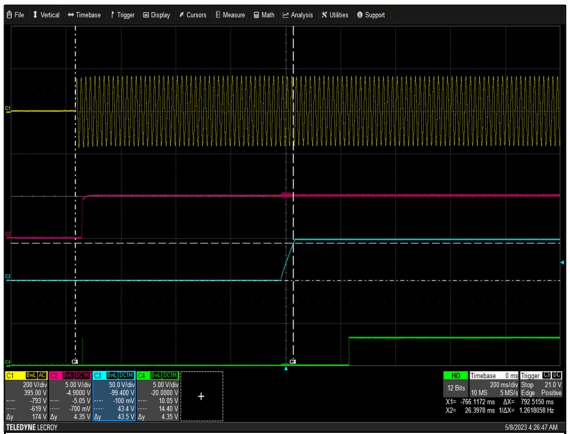


Figure 29: NGB1200S48K Turn-on Delay via AC Mains
Vin = 115Vac Load: Io = 25A
Ch 1: V_{IN} Ch 2: V_{SB} Ch 3: Vo Ch 4: POWER_GOOD

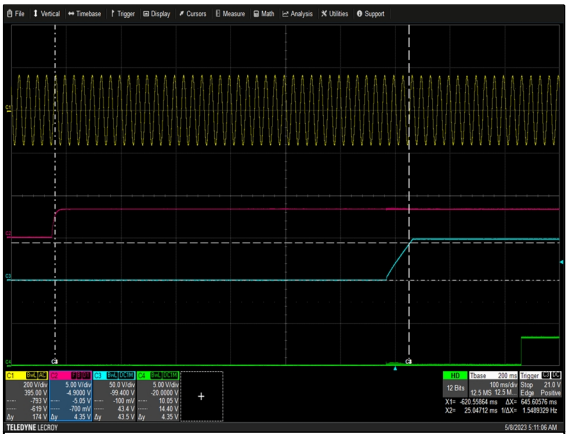


Figure 30: NGB1200S48K Turn-on Delay via Control
Vin = 115Vac Load: Io = 25A
Ch 1: V_{IN} Ch 2: Control Ch 3: Vo Ch 4: POWER_GOOD

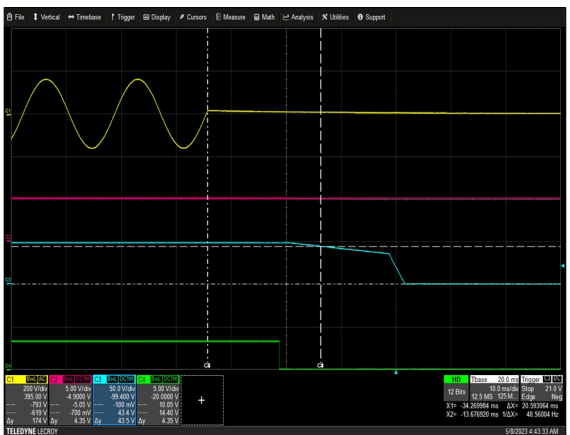


Figure 31: NGB1200S48K Hold-up Time
Vin = 115Vac Load: Io = 17.5A (70% load)
Ch 1: V_{IN} Ch 2: V_{SB} Ch 3: Vo Ch 4: POWER_GOOD

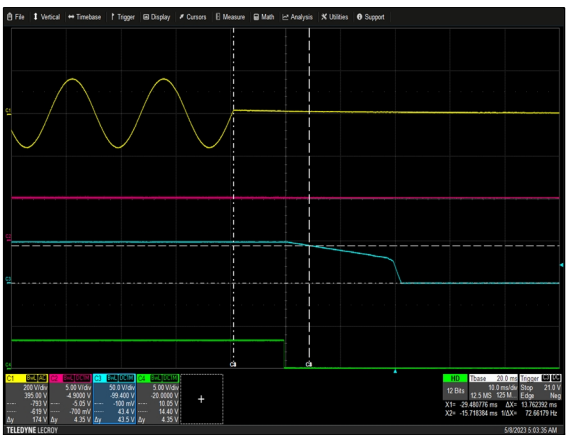


Figure 32: NGB1200S48K Hold-up Time
Vin = 115Vac Load: Io = 25A (100% load)
Ch 1: V_{IN} Ch 2: V_{SB} Ch 3: Vo Ch 4: POWER_GOOD

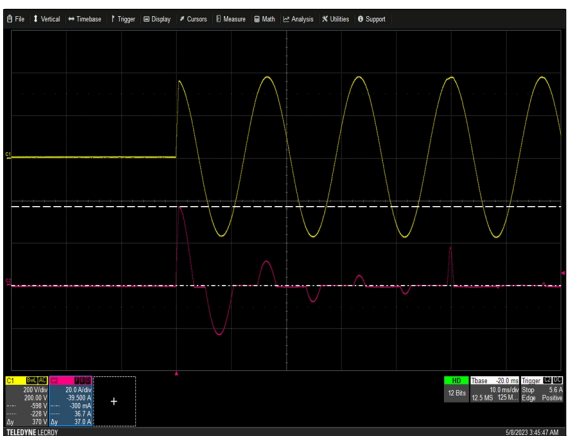


Figure 33: NGB1200S48K Inrush Current
Vin = 264Vac Load: Io = 0A, Turn on at 90 deg
Ch 1: V_{IN} Ch 2: I_{IN}

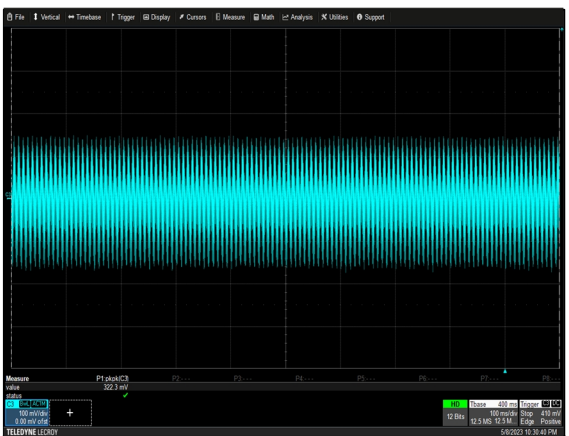


Figure 34: NGB1200S48K Ripple and Noise Measurement
Vin = 115Vac Load: Io = 25A
Ch 3: Vo

SECTION 2 ELECTRICAL SPECIFICATIONS

2.5 NGB1200S48K Performance Curves

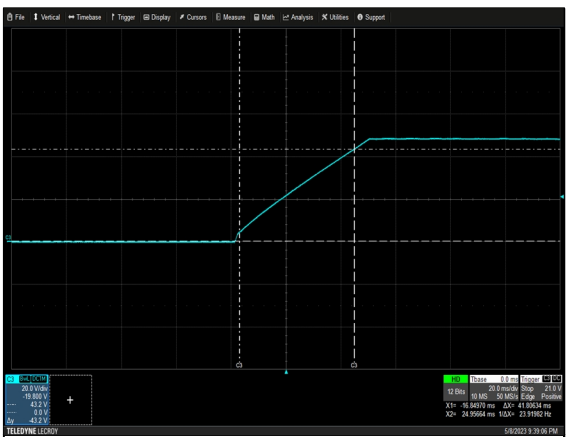


Figure 35: NGB1200S48K Output Voltage Startup Characteristic
Vin = 90Vac Load: Io = 25A
Ch 3: Vo

Figure 36: NGB1200S48K Turn Off Characteristic via Control
Vin = 115Vac Load: Io = 25A
Ch 2: Control Ch 3: Vo Ch 4: POWER_GOOD

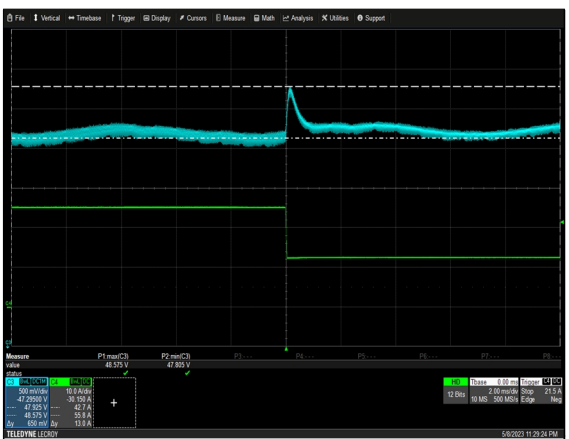


Figure 37: NGB1200S48K Transient Response - Vo Deviation
Vin = 115Vac Load: Io = 100% to 50%, 0.2A/µs slew rate
Ch 3: Vo Ch 4: Io

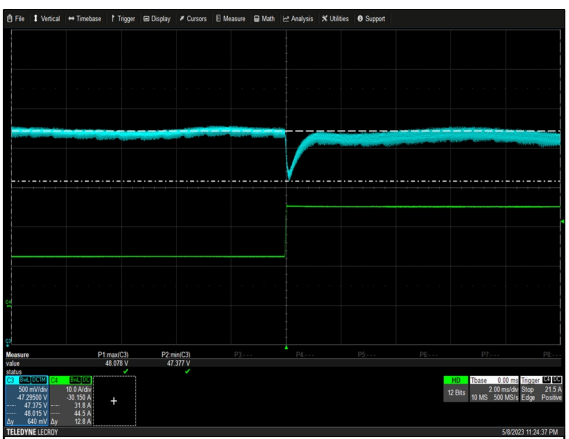


Figure 38: NGB1200S48K Transient Response - Vo Deviation
Vin = 115Vac Load: Io = 50% to 100%, 0.2A/µs slew rate
Ch 3: Vo Ch 4: Io

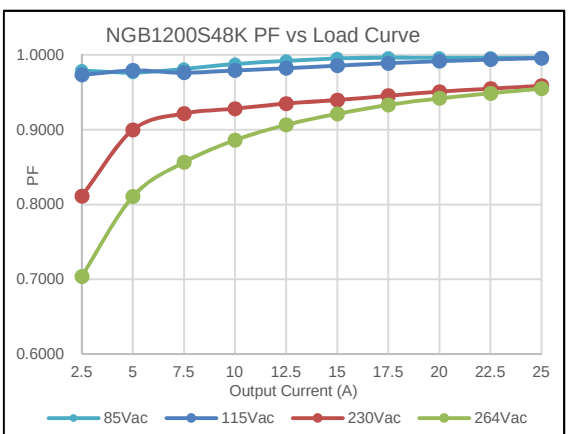


Figure 39: NGB1200S48K PF vs Load Curve

Loading: $I_{o\_main} = I_{o,max}$

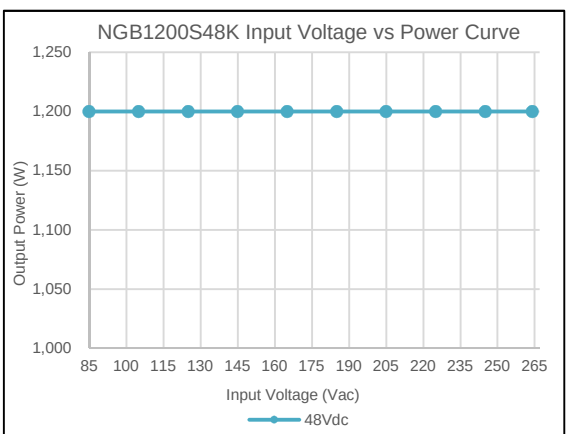


Figure 40: NGB1200S48K Input Voltage vs Output Power Curve

Loading: $I_{o\_main} = I_{o,max}$

SECTION 2 ELECTRICAL SPECIFICATIONS

2.5 NGB1200S48K Performance Curves

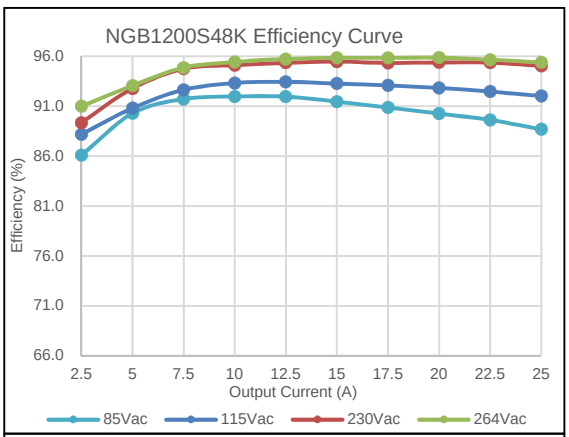


Figure 41: NGB1200S48K Efficiency Curve @ 25°C

Loading: I_{o_main} = 10%$I_{o,max}$ increment to $I_{o,max}$

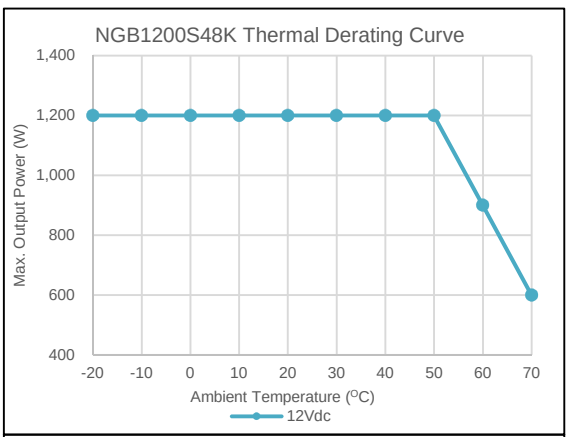


Figure 42: NGB1200S48K Thermal Derating Curves

Vin = 115Vac

SECTION 2 ELECTRICAL SPECIFICATIONS

2.6 Protection Function Specifications

Input Fuse

NGB1200 series power supply is equipped with internal non user serviceable 12 A, 250 Vac fuse for fault protection in both the line and neutral lines input.

Over Voltage Protection (OVP)

The power supply main output will latch off (less than 50% loading) during output overvoltage with the AC line recycled to reset the latch.

NGB1200S12

Parameter	Min	Typ	Max	Unit
V_O Output Overvoltage	13.2	/	15.6	V

NGB1200S24

Parameter	Min	Typ	Max	Unit
V_O Output Overvoltage	26.4	/	31.2	V

NGB1200S48

Parameter	Min	Typ	Max	Unit
V_O Output Overvoltage	52.8	/	62.4	V

Short Circuit Protection (SCP)

The power supply will withstand a continuous short circuit with no permanent damage. The power supply will enter hiccup mode and automatically restart when the short circuit is removed. A short is defines as impedance less than 50 milliohms.

Over Temperature Protection (OTP)

The power supply latches off during over-temperature condition and returns back to normal operation when the power supply is cooled down. The power supply might experience over-temperature conditions during a persistent overload on the output. Overload conditions can be caused by external faults. OTP might also be entered due to a loss of control of the environmental conditions, e.g. an increase in the converter's ambient temperature due to a failing fan or external cooling system etc.

SECTION 2 ELECTRICAL SPECIFICATIONS

Over Current Protection (OCP)

NGB1200 series power supply includes internal current limit circuitry to prevent damage in the event of overload or short circuit. In the event of overloads, the output voltage may deviate from the regulation band but recovery is automatic when the load is reduced to within specified limits.

NGB1200S12

Parameter	Min	Typ	Max	Unit
V_O Output Overcurrent	110	/	180	A

NGB1200S24

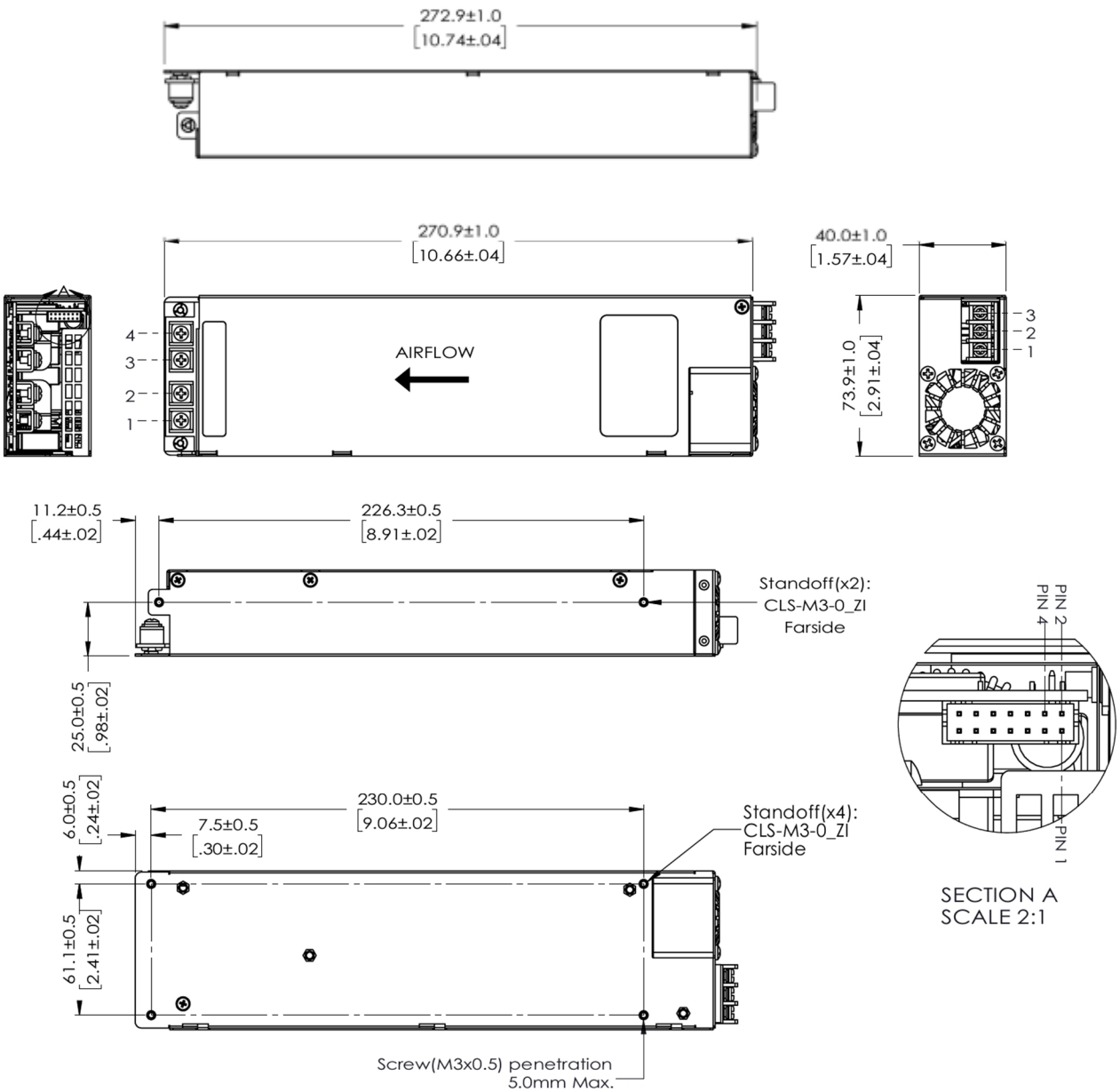
Parameter	Min	Typ	Max	Unit
V_O Output Overcurrent	55	/	90	A

NGB1200S48

Parameter	Min	Typ	Max	Unit
V_O Output Overcurrent	27	/	45	A

SECTION 3 MECHANICAL SPECIFICATIONS

3.1 Mechanical Outlines



All dimensions in mm (inches)

SECTION 3 MECHANICAL SPECIFICATIONS

3.2 Mechanical Data

Table 4. Mechanical Data	
Dimensions (L x W x D)	10.8” x 3” x 1.6” (272.9 x 73.9 x 40.0 mm)
Weight	830 g (1.83 lbs)
Cooling	Built in fan
3D Model Link	https://slpower.com/product-detail?IdProduct=398#settings2
Audible Noise	PSU has fan speed control function vs load condition 0%,10%,25%,100% should have different noise level. (test per ISO7999, load at 0%, 10%, 25%, 100%, transient step loads from 0 to 25%, 25 to 50%, 50 to 100% at 10hz rep rate, from 1m distance)

3.3 Unit Packaging Requirement

Table 5. Mechanical Data	
Inserted Instructions	Instruction sheet to be provided with all units packaged in individual unit box if used.
Individual Unit Packing	Units can be packed in egg crate type cartons for production quantities. Individual product shipments include an individual unit box.
Master Carton Shipping Box	Only anti-static packing material may be used inside the box. Exterior box sealing tape is anti-static type.
Individual Carton Packing Box (When Used)	Individual carton is labelled with RoHS sticker and individual label showing unit serial number, manufacturing date, manufacturing part number, bar codes, country of origin.

SECTION 3 MECHANICAL SPECIFICATIONS

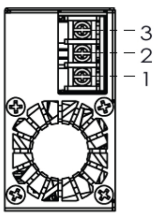
3.4 Connector Definitions

AC Input Connector - J1

Pin 1 - Line

Pin 2 - Neutral

Pin 3 - Ground



Output Connector - J201

Pin 1 - +Vout

Output Connector - J200

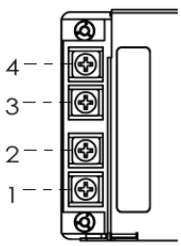
Pin 2 - +Vout

Output Connector - J203

Pin 3 - Return

Output Connector - J204

Pin 4 - Return



Signal Header – J900

Pin 1 - Return

Pin 2 - + Remote Sense

Pin 3 - CONTROL

Pin 4 - Return

Pin 5 - Spare

Pin 6 - Spare

Pin 7 - Spare

Pin 8 - POWER_GOOD

Pin 9 - Spare

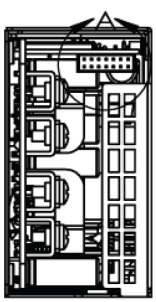
Pin 10 - Spare

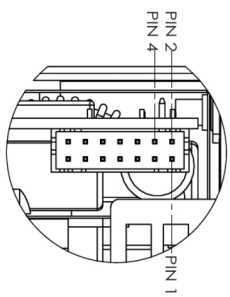
Pin 11 - Return

Pin 12 - Spare

Pin 13 - 5VSB

Pin 14 - 5VSB





SECTION A
SCALE 2:1

SECTION 3 MECHANICAL SPECIFICATIONS

Power / Signal Mating Connectors and Pin Types

Table 6. Mating Connectors for NGB1200 Series

Reference	Vendor	Mating Connector or Equivalent	Mating Pins or Equivalent
J1	Molex	19141-0052/0053	/
J200, J201, J203, J204	Molex	19141-0058/0063/0065/0059/0064/0066	/
J900	Landwin	2050S1400 (housing)	2053T021N (pins)

SECTION 4 ENVIRONMENTAL SPECIFICATIONS

4.1 EMC Immunity

NGB1200 series power supply is designed to meet the following EMC immunity specifications.

Table 7. Environmental Specifications

Test Item	Standard	Test Level	Criteria
Conducted Emissions	EN 55011/15/32, CISPR 11/15/32, FCC Part 15.107	Class B. Measured at 10%, 50%, and 100% load steps; 6db margin typ, at 120 and 230Vac	-
Radiated Emissions	EN 55011/15/32, CISPR 11/15/32, FCC Part 15.107	Class A. Measured at 10%, 50%, and 100% load steps; 3db margin typ, at 120 and 230Vac	-
Harmonic Current Emissions	EN 61000-3-2	Class A at 230Vac, 100% load	-
Voltage fluctuations & Flicker	IEC 61000-3-3	-	-
Electro Static Discharge (ESD) Immunity	EN 55024/IEC 61000-4-2 IEC 60601-1-2, 4th Edition, Table 4	Level 4. ±8kV contact, ±15kV air	A
Radiated RF EM Fields Susceptibility	EN 55022/EN 61000-4-3 IEC 60601-1-2, 4th Edition, Table 4	10V/m, 80MHz to 2.7GHz, 80% AM at 1kHz	-
Electrical Fast Transients (EFT) / Bursts	EN 55024/IEC 61000-4-4, IEC 60601-1-2, 4th Edition, Table 5	Level 4. ±4kV, 100Khz rep rate, 40A	A
Surges - Line to Line (DM) and Line to GND (CM)	EN 55024/IEC 61000-4-5 IEC 60601-1-2, 4th Edition	Level 4. ±2kV DM, ±4kV CM	A
Conducted Disturbances Induced by RF Fields	EN 55022/IEC 61000-4-6 IEC 60601-1-2, 4th Edition, Table 5	3.6V/m - Level 4, 0.15 to 80Mhz; 12V/m in ISM and amateur radio bands between 0.15Mhz and 80Mhz, 80% AM at 1KHz	-
Rated Power Frequency Magnetic Fields	EN 55024/IEC 61000-4-8 IEC 60601-1-2, 4th Edition, Table 4	Level 4. 30A/m, 50/60 Hz	-
Voltage Interruptions, Dips, Sags & Surges[1]	EN 55024/IEC/EN 61000-4-11: 100% dip for 10ms, at 0, 45, 90, 135, 180, 225, 270 and 315 degrees IEC 60601-1-2, 4th Edition, Table 5	100% for 20ms, 0 deg, 50% load 100% for 20ms, 0 deg, 100% load 100% for 5000ms (250/300 cycles), 100% load 60% for 100ms, 100% load 30% for 500ms, 100% load	A B B B B

Note 1 - Performance criteria are based on EN 55024. According to the standards, performance criteria are defined as following:
A - Normal performance during and after the test
B - Temporary degradation, self-recoverable
C - Temporary degradation, operator intervention required to recover the operation
D - Permanent damage

SECTION 4 ENVIRONMENTAL SPECIFICATIONS

4.2 Safety Certifications

The NGB1200 series power supply is intended for inclusion in other equipment and the installer must ensure that it is in compliance with all the requirements of the end application. This product is only for inclusion by professional installers within other equipment and must not be operated as a stand alone product.

Table 8. Safety Certifications for NGB1200 Series Power Supply

Standard	Agency	Description
UL 62368-1, UL 60601-1, 3rd Edition Complies with BF rated application requirement	UL	US Requirements
CAN/CSA-C22.2 No. 62368-1, 60601-1 Complies with BF rated application requirement	CSA	Canada Requirements
EN 62368-1, EN 60601-1, 3rd Edition Complies with BF rated application requirement	Demko	Denmark Requirements
CB Certificate and Report Design to meet 5000m and 50^{O}C, 93% RH with 120 h (tropical standard) according to GB 4943.1-2011, IEC 62368-1, IEC 60601-1. Complies with BF rated application requirement	-	All CENELEC Countries
CE Marking	-	LVD + RoHS
UKCA Marking	-	UKCA Marking

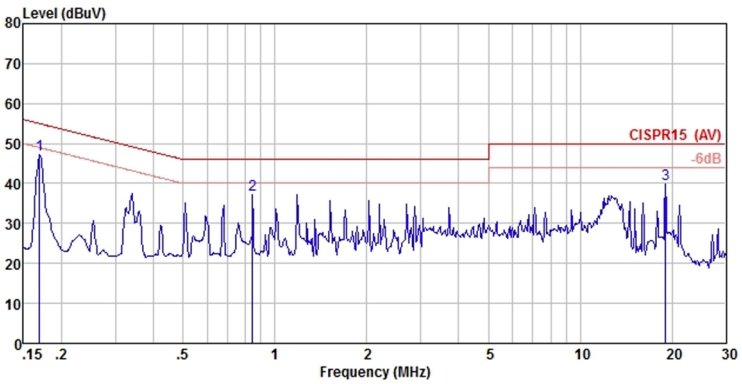
SECTION 4 ENVIRONMENTAL SPECIFICATIONS

4.3 EMI Emissions

The NGB1200 series has been designed to comply with the Class B limits of EMI requirements of EN 55022 (FCC Part 15) and CISPR 22 (EN 55032) for emissions and relevant sections of EN 61000 (IEC 61000) for immunity.

Conducted Emissions

The applicable standard for conducted emissions is EN 55022 (FCC Part 15). Conducted noise can appear as both differential mode and common mode noise currents. Differential mode noise is measured between the two input lines, with the major components occurring at the supply fundamental switching frequency and its harmonics. Common mode noise, a contributor to both radiated emissions and input conducted emissions, is measured between the input lines and system ground and can be broadband in nature.



The NGB1200 series power supply have internal EMI filters to ensure the convertor's conducted EMI levels comply with EN 55022 (FCC Part 15) Class B and EN 55022 (CISPR 22) Class B limits.

Sample of EN 55022 Conducted EMI Measurement at 120Vac input tested at Line.

Conducted EMI emissions specifications of the NGB1200 series:

Parameter	Model	Symbol	Min	Typ	Max	Unit
FCC Part 15, Class B	All	Margin	-	-	6	dB
CISPR 11/15/32 Class B	All	Margin	-	-	6	dB

Radiated Emissions

Unlike conducted EMI, radiated EMI performance in a system environment may differ drastically from that in a stand-alone power supply. The shielding effect provided by the system enclosure may bring the EMI level from Class A to Class B. It is thus recommended that radiated EMI be evaluated in a system environment. The applicable standard is EN 55022 Class B (FCC Part 15). Testing AC-DC convertors as a stand-alone component to the exact requirements of EN 55022 can be difficult, because the standard calls for 1m leads to be attached to the input and outputs and aligned such as to maximize the disturbance. In such a set-up, it is possible to form a perfect dipole antenna that very few AC-DC convertors could pass. However, the standard also states that "an attempt should be made to maximize the disturbance consistent with the typical application by varying the configuration of the test sample".

SECTION 4 ENVIRONMENTAL SPECIFICATIONS

4.4 Operating Temperature

The NGB1200 series power supply will start and operate at an ambient temperature from -10°C to 70°C. PSU performance will derate above from 50°C to 70°C. PSU will derate output power linearly above 50°C to 50% rated output at 70°C.

4.5 Storage and Shipping Temperature

The NGB1200 series power supply can be stored or shipped at temperatures between -40°C and +85°C.

4.6 Altitude

The NGB1200 series power supply will operate within specifications at altitudes from -500m to 5,000m above sea level. The power supply will not be damaged when stored at altitudes from -500m to 12,192m above sea level.

4.7 Humidity

The NGB1200 series power supply will operate within specifications when subjected to a relative humidity from 5% to 95% non-condensing.

4.8 Vibration

Non-Operating Random Vibration (Per IEC 60068-2-64)

Acceleration	1.0 gRMS
Frequency Range	10 to 500 Hz
Direction	3 mutually perpendicular axis
Duration	3 minutes per axis
Sweep Rate	1 octave / min, 10 sweeps / axes

Operating Random Vibration (Per IEC 60068-2-64)

Acceleration	1.5 gRMS, 0.003 g²/Hz
Frequency Range	5 to 500 Hz
Direction	3 mutually perpendicular axis
Duration	10 minutes per axis

Operating Sinusoidal Vibration (Per IEC 60068-2-6)

Acceleration	1.0 gRMS
Frequency Range	10 to 150 Hz
Direction	3 mutually perpendicular axis
Duration	3 minutes per axis
Sweep Rate	1 octave / min, 20 sweeps / axis

Transportation Vibration:

Random vibration per MIL-STD-810E, Method 514.4, Cat. 1, Figure 514.4-1, 1 hr in each of three axes

SECTION 4 ENVIRONMENTAL SPECIFICATIONS

4.9 Shock (Per IEC 60068-2-27)

Non-Operating Half-Sine Shock

Acceleration	50 g
Duration	6 ms
Pulse	Half-Sine
Number of Shock	3 shocks in each of 6 faces

Operating Half-Sine Shock

Acceleration	20 g
Duration	10 ms
Pulse	Half-Sine
Number of Shock	6 shocks total

SECTION 5 RELIABILITY SPECIFICATIONS

Table 9. Reliability Specifications	
Parameter	**Specification**
MTBF	>500K hours (Using Telcordia SR-332, Issue 3 at 110V & 220V, for both 25^{O}C and 50^{O}C)
Warranty	3 Years
E-Cap Lifetime	All specified E-Caps exceed 7-year life based on calculations at 40^{O}C thermal environment. (115Vac/60Hz & 230Vac/50Hz, ambient 25^{O}C at 24 hours per day, 365 days/year, 6 power up cycles per day.)
Life Cycle AC Power On / Off Test	>10,000 cycles for each of the following: 230Vac input with 100% load at 1 seconds on, 59 seconds off, and at 100Vac input at 10 seconds on, 50 seconds off

SECTION 6 POWER AND CONTROL SIGNAL DESCRIPTIONS

AC Input (J1)

This connector supplies the AC Mains to the NGB1200 series power supply.

Pin 1 - Line

Pin 2 - Neutral

Pin 3 - Ground

Main Output

These terminals provide the main output for the NGB1200. The +Vout and the Return terminals are the positive and negative rails, respectively of the main output of the NGB1200 series power supply.

J201 - Pin 1 - +Vout

J200 - Pin 2 - +Vout

J203 - Pin 3 - Return

J204 - Pin 4 - Return

Signal Connector (J900)

The NGB1200 series contains a 14-pin signal header providing analog control interface, standby power and fan output.

S+ Main Output Remote Sense - (Pin 2)

The main output of the NGB1200 is equipped with a remote sensing capability that will compensate for a power path drop. This feature is implemented by connecting the main output remote sense (pin 2) to the positive rail of the main output at a location that is near to the load. Care should be taken in the routing of the sense lines as any noise sources or additional filtering components introduced into the voltage rail may affect the stability of the power supply. The NGB1200 will operate appropriately without the sense line connected; however it is recommended that the sense line be connected directly to the main output terminals if remote sensing is not required. This remote sense circuit will not raise the power supply's output voltage to the OVP trip level.

Main output remote sense has no effect on the standby output (V_{SB}).

CONTROL (Pin 3)

This signal input pin controls the normal turning on and off of the main output of the NGB1200 power supply. The power supply main output (V_O) will be enabled when this signal is pulled high or left open. The power supply output (except V_{SB} output) will be disabled when this input is pulled low.

POWER_GOOD (Pin 8)

POWER_GOOD signal will be high once the DC output rises to within the regulation (on turn-on), and go low if the DC output falls below the regulation range.

The POWER_GOOD is an output signal driven high by the power supply to indicate that all outputs are valid. If any of the power supply outputs fails below its regulation limits, this output will be driven low. The output signal is an open drain output internally pulled up in the power supply to internal standby supply.

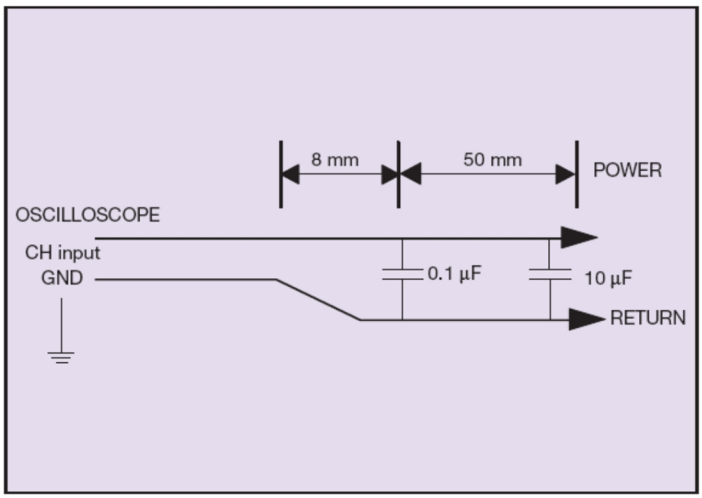
Standby Output, Standby Output Return - (Pins 13, 14, 1, 4, 11)

The NGB1200 provides a regulated 5V/2A standby output voltage to power critical circuitry that must remain active regardless of the on/off status of the power supply's main output. The standby output voltage is available whenever a valid AC input voltage is applied to the unit.

SECTION 7 APPLICATION NOTES

Output Ripple and Noise Measurement

The setup outlined in the diagram below has been used for output voltage ripple and noise measurements on the NGB1200 series. When measuring output ripple and noise, a scope jack in parallel with a 0.1µF ceramic chip capacitor, and a 10µF tantalum capacitor will be used. Oscilloscope can be set to 20MHz bandwidth for this measurement.



SECTION 8 RECORD OF REVISION AND CHANGES

Issue	Date	Description	Originators
1.0	09.11.2023	First issue	A. Zhang

Note – If you have any feedback for this document, feel free to contact kathy.wang@aei.com.

ABOUT ADVANCED ENERGY

Advanced Energy (AE) has devoted more than three decades to perfecting power for its global customers. AE designs and manufactures highly engineered, precision power conversion, measurement and control solutions for mission-critical applications and processes.

Our products enable customer innovation in complex applications for a wide range of industries including semiconductor equipment, industrial, manufacturing, telecommunications, data center computing, and medical. With deep applications know-how and responsive service and support across the globe, we build collaborative partnerships to meet rapid technological developments, propel growth for our customers, and innovate the future of power.

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