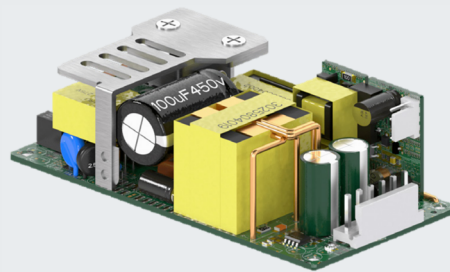


# SL POWER NGB150 SERIES

150 Watts Single Output  
Medical / Industrial Grade



Medical



Industrial

## PRODUCT DESCRIPTION

Advanced Energy's SL Power NGB150 series of open-frame AC-DC power supplies features ITE and medical safety approvals. The series offers a choice of five single output models, with voltages of 12V, 15V, 19V, 24V, or 48V. Each model also provides an optional 5V standby output and 12V fan output. NGB150 series power supplies provide 150Watts of output power with 200LFM forced air, and have a typical full load power conversion efficiency of 90%. All models have output overvoltage, short circuit and overload protection and a 2 x 4 x 1.35 inch form factor.

## AT A GLANCE

### Total Power

150 Watts

### Input Voltage

85 to 264 Vac

### # of Outputs

Single



RoHS

## SPECIAL FEATURES

- 150W with 200LFM Air Flow
- 120W Convection Cooled
- 2" X 4" X 1.35" Size
- Universal Input 85 to 264Vac
- ± 10% Adjustment Range
- 5V Standby @ 0.5A
- 12V Fan Output @ 0.4A
- Meets Class B Emissions Levels
- -20°C to 70°C Operating Temperature Range
- Meets 4<sup>th</sup> Edition EMC
- Less than 100uA Leakage Current
- ROHS Compliant
- REACH Compliant

## SAFETY

- UL/CSA/IEC/EN 60601-1
- UL/CSA/IEC/EN 62368-1
- Demko

## TYPICAL APPLICATIONS

- ITE
- Medical

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## SECTION 1 MODEL NUMBERS

Model Number	Output Voltage	Max Output Current		Max Output Power	Regulation	Ripple P/P(PARD)
		With 200LFM Air Flow	Convection			
NGB150S12K	12V	12.5A	10A	150W	± 2%	120mV
NGB150S15K	15V	10.0A	8.0A	150W	± 2%	150mV
NGB150S19K	19V	7.9A	6.32A	150W	± 2%	190mV
NGB150S24K	24V	6.25A	5.0A	150W	± 2%	240mV
NGB150S48K	48V	3.13A	2.5A	150W	± 2%	480mV
NGB150S12C	12V	12.5A	10A	150W	± 2%	120mV
NGB150S15C	15V	10.0A	8.0A	150W	± 2%	150mV
NGB150S19C	19V	7.9A	6.32A	150W	± 2%	190mV
NGB150S24C	24V	6.25A	5.0A	150W	± 2%	240mV
NGB150S48C	48V	3.13A	2.5A	150W	± 2%	480mV

Note 1 - "K" in model number refers to Class I model. "C" in model number refers to Class II model.

Note 2 - Product can be supplied without the 5V standby and fan output if not needed. Insert the letter A after the S in the model number for this option (for example: NGB150SA12K).

## Options

None

## 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 (convection)	NGB150S12 NGB150S15 NGB150S19 NGB150S24 NGB150S48	$P_{O,maxCC}$	- - - - -	- - - - -	120 120 120 120 120	W
Maximum Output Power (forced air - 200LFM)	NGB150S12 NGB150S15 NGB150S19 NGB150S24 NGB150S48	$P_{O,maxFA}$	- - - - -	- - - - -	150 150 150 150 150	W
Isolation Voltage						
Input to output	All Models		-	-	4000	Vac
Input to ground	All Models		-	-	1500	Vac
Outputs to ground	All Models		-	-	1500	Vac
Ambient Operating Temperature	All Models	$T_A$	-20	-	+70 <sup>1</sup>	°C
Storage Temperature	All Models	$T_{STG}$	-40	-	+85	°C
Humidity (non-condensing)	All Models		5	-	95	%
Altitude Operating	All Models		-500	-	5,000	m

## 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 ( $I_O = I_{O,max}$ , $I_{SB} = I_{SB,max}$ )	$V_{IN,AC} = 90Vac$	$I_{IN,max}$	-	-	2.5	A
Power Factor	$V_{IN,AC} = 230Vac$ $I_O = 80\% \text{ to } 100\% I_{O,max}$	PF	0.9	-	-	-
Startup Surge Current (Inrush)	Cold start	$I_{IN,surge}$	-	-	80	$A_{PK}$
Operating Efficiency @ 25°C	$I_O = I_{O,max}$ $V_{IN,AC} = 115/230Vac$	$\eta$	91	-	-	%
Hold Up Time	$V_{IN,AC} = 115Vac$ $I_O = I_{O,max}$	$t_{Hold-Up}$	16	-	-	ms
Turn On Delay	$V_{IN,AC} = 115Vac$	$t_{Turn-On}$	0	-	3000	ms
Leakage Current (Output to Earth)	NC $V_{IN,AC} = 264Vac$ $f_{IN,AC} = 60 \text{ Hz}$	$I_{IN,leakage}$	-	-	500	$\mu A$
Leakage Current (Output to Input)	NC SFC $V_{IN,AC} = 264Vac$ $f_{IN,AC} = 60 \text{ Hz}$	$I_{IN,leakage}$	- -	- -	100 500	$\mu A$ $\mu A$
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
Line Regulation		All	$\pm\%V_O$	-	-	0.5	%
Load Regulation		Main & Standby Output Fan Output	$\pm\%V_O$ $\pm\%V_{O, Fan}$	- -	- -	2 20	% %
Capacitive Load		All	$I_O$	-	-	100	uF/A
Output Adjust Range		All	$\pm\%V_O$	-	-	10	%
Output Voltage	NGB150S12 NGB150S15 NGB150S19 NGB150S24 NGB150S48	All	$V_O$	- - - - -	12.0 15.0 19.0 24.0 48.0	- - - - -	V
	All models		$V_{SB}$	-	5.0	-	V
	All models		$V_{FAN}$	-	12.0	-	V
Convection Output Current	NGB150S12 NGB150S15 NGB150S19 NGB150S24 NGB150S48	Convection cooling	$I_O$	0 0 0 0 0	- - - - -	10 8.0 6.32 5.0 2.5	A
	All models		$I_{SB}$	0	-	0.5	A
	All models		$I_{FAN}$	0	-	0.4	A
Convection Output Power <sup>1</sup>	NGB150S12 NGB150S15 NGB150S19 NGB150S24 NGB150S48	Convection cooling	$P_O$	- - - - -	- - - - -	120 120 120 120 120	W
Forced Air Output Current	NGB150S12 NGB150S15 NGB150S19 NGB150S24 NGB150S48	200 LFM forced air cooling	$I_O$	0 0 0 0 0	- - - - -	12.5 10.0 7.9 6.25 3.13	A
	All models		$I_{SB}$	0	-	0.5	A
	All models		$I_{FAN}$	0	-	0.4	A
Forced Air Output Power <sup>2</sup>	NGB150S12 NGB150S15 NGB150S19 NGB150S24 NGB150S48	200 LFM forced air cooling	$P_O$	- - - - -	- - - - -	150 150 150 150 150	W
Output Ripple, pk-pk	See note 3	$\pm\%V_O$	-	-	1	%	Output Ripple, pk-pk

Note 1 - The max output power under convection condition will linearly derate to 110Watts from 90Vac input to 85Vac input. The output power derates linearly to 60Watts at 70°C above 50°C ambient temperature.

Note 2 - The max output power under forced air condition will linearly derate to 130Watts from 90Vac input to 85Vac input. The output power derates linearly to 75Watts at 70°C above 50°C ambient temperature.

Note 3 - Measure with a 0.1uF ceramic capacitor in parallel with a 10uF low ESR capacitor using a 20MHz bandwidth limited oscilloscope.

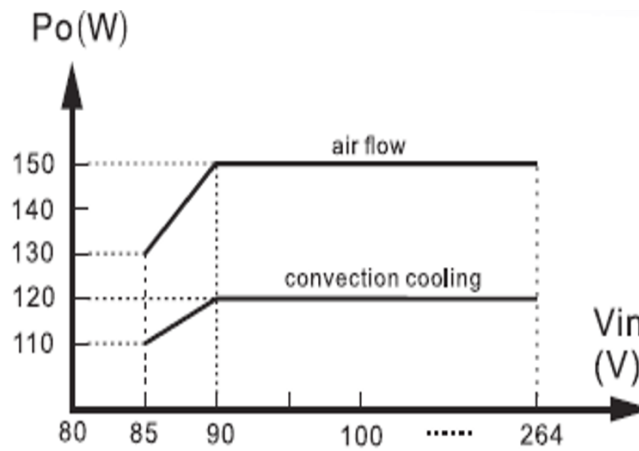
## SECTION 2 ELECTRICAL SPECIFICATIONS

### 2.3 Output Specifications

Table 3. Output Specifications Con't						
Parameter	Condition	Symbol	Min	Typ	Max	Unit
$V_O$ Dynamic Response Peak Deviation	50% load change Slew rate = 0.2A/ $\mu$ s	$\pm\%V_O$	-	-	5	%
$V_O$ Over Voltage Protection	Latch off	$\%V_O$	115	-	155	%
$V_O$ Over Current Protection	Hiccup Mode, Auto Recovery	$\%I_O$	120	-	180	%
Over Temperature Protection	All		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.

#### Output Power vs Input Voltage Curve



## SECTION 2 ELECTRICAL SPECIFICATIONS

### 2.4 NGB150S12x Performance Curves

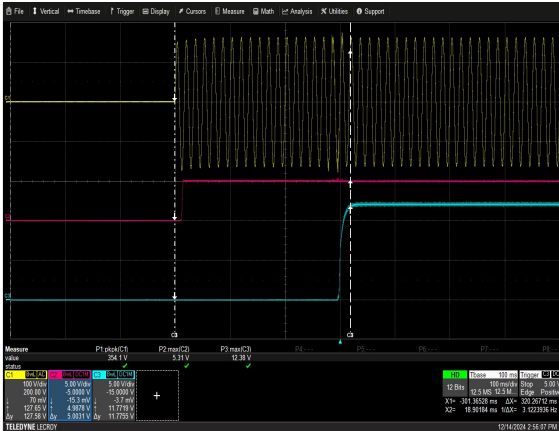


Figure 1: NGB150S12x Turn-On Delay via AC Mains  
 $V_{in} = 115\text{Vac}$  Load:  $I_o = 12.5\text{A}$   $I_{SB} = 0.5\text{A}$   
 Ch 1: AC Mains Ch 2:  $V_{SB}$  Ch 3:  $V_o$



Figure 2: NGB150S12x Hold-Up Time  
 $V_{in} = 115\text{Vac}$  Load:  $I_o = 12.5\text{A}$   $I_{SB} = 0.5\text{A}$   
 Ch 1: AC Mains Ch 2:  $V_{SB}$  Ch 3:  $V_o$

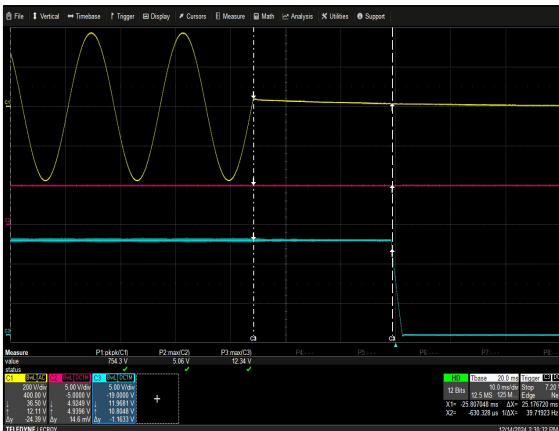


Figure 3: NGB150S12x Hold-Up Time  
 $V_{in} = 264\text{Vac}$  Load:  $I_o = 12.5\text{A}$   $I_{SB} = 0.5\text{A}$   
 Ch 1: AC Mains Ch 2:  $V_{SB}$  Ch 3:  $V_o$

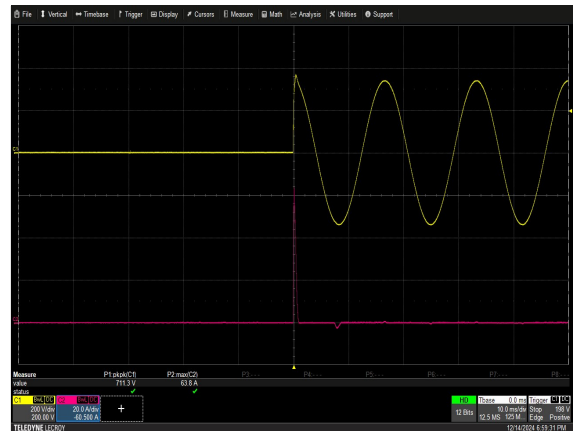


Figure 4: NGB150S12x Inrush Current  
 $V_{in} = 240\text{Vac}$  Load:  $I_o = 0\text{A}$ , Turn on at 90 deg  
 Ch 1:  $V_{IN}$  Ch 2:  $I_{IN}$

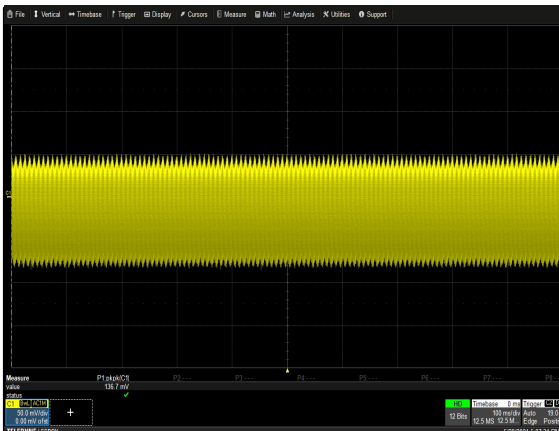


Figure 5: NGB150S12x Ripple and Noise Measurement  
 $V_{in} = 230\text{Vac}$  Load:  $I_o = 12.5\text{A}$   $I_{SB} = 0.5\text{A}$   
 Ch 1:  $V_o$



Figure 6: NGB150S12x Output Voltage Startup Characteristic  
 $V_{in} = 90\text{Vac}$  Load:  $I_o = 12.5\text{A}$   $I_{SB} = 0.5\text{A}$   
 Ch 1:  $V_o$

## SECTION 2 ELECTRICAL SPECIFICATIONS

### 2.4 NGB150S15x Performance Curves



Figure 7: NGB150S12x Turn Off Characteristic  
 Load:  $I_o = 12.5A$   $I_{SB} = 0.5A$   
 Ch 1:  $V_o$



Figure 8: NGB150S12x Transient Response -  $V_o$  Deviation  
 50% to 100% load change  $9.6mA/\mu S$  slew rate,  $V_{in} = 230Vac$   
 Ch 1:  $V_o$  Ch 2:  $I_o$

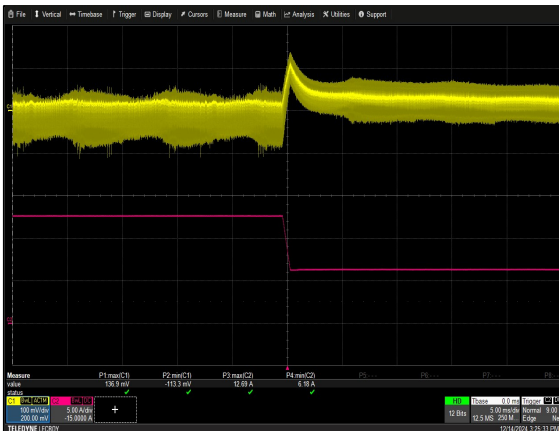


Figure 9: NGB150S12x Transient Response -  $V_o$  Deviation  
 100% to 50% load change  $9.6mA/\mu S$  slew rate,  $V_{in} = 230Vac$   
 Ch 1:  $V_o$  Ch 2:  $I_o$

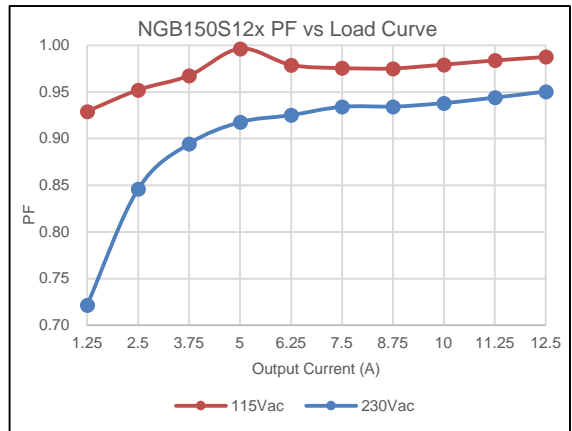


Figure 10: NGB150S12x PF vs Load Curve  
 Loading:  $I_{o\_main} = I_{o,max}$

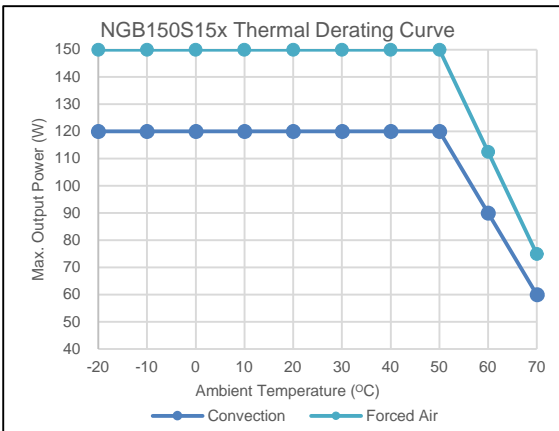


Figure 11: NGB150S12x Thermal Derating Curves

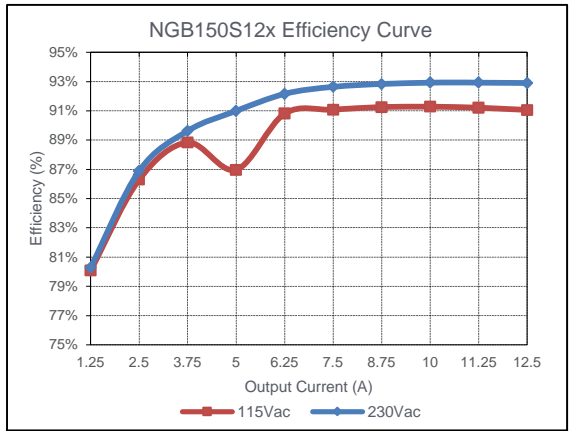


Figure 12: NGB150S12x Efficiency Curve @ 25°C  
 Loading:  $I_{o\_main} = 10\%$  increment to  $I_{o,max}$

## SECTION 2 ELECTRICAL SPECIFICATIONS

### 2.4 NGB150S15x Performance Curves



Figure 13: NGB150S15x Turn-On Delay via AC Mains  
 $V_{in} = 115\text{Vac}$  Load:  $I_O = 10\text{A}$   $I_{SB} = 0.5\text{A}$   
 Ch 1: AC Mains Ch 2:  $V_{SB}$  Ch 3:  $V_O$

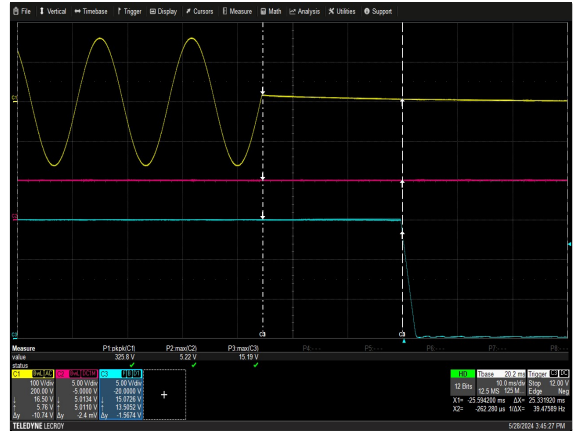


Figure 14: NGB150S15x Hold-Up Time  
 $V_{in} = 115\text{Vac}$  Load:  $I_O = 10\text{A}$   $I_{SB} = 0.5\text{A}$   
 Ch 1: AC Mains Ch 2:  $V_{SB}$  Ch 3:  $V_O$

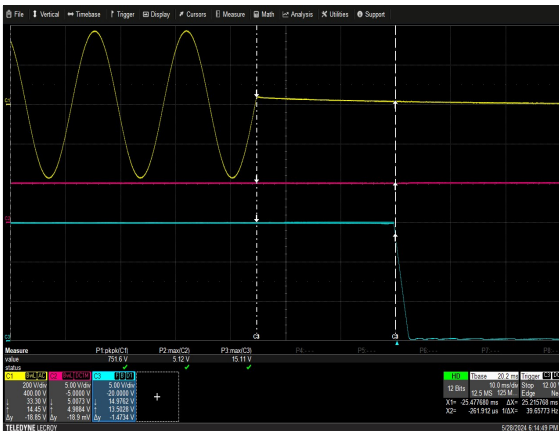


Figure 15: NGB150S15x Hold-Up Time  
 $V_{in} = 264\text{Vac}$  Load:  $I_O = 10\text{A}$   $I_{SB} = 0.5\text{A}$   
 Ch 1: AC Mains Ch 2:  $V_{SB}$  Ch 3:  $V_O$

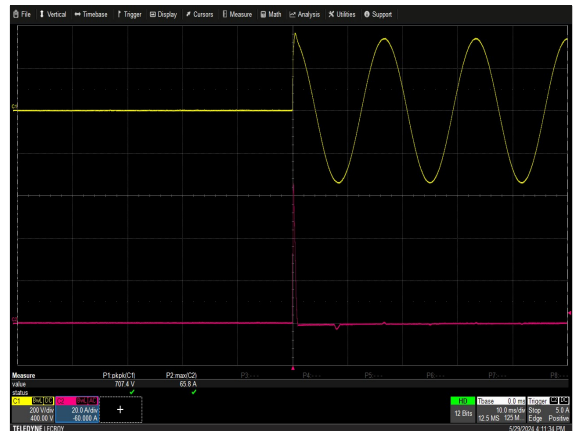


Figure 16: NGB150S15x Inrush Current  
 $V_{in} = 240\text{Vac}$  Load:  $I_O = 0\text{A}$ , Turn on at 90 deg  
 Ch 1:  $V_{IN}$  Ch 2:  $I_{IN}$

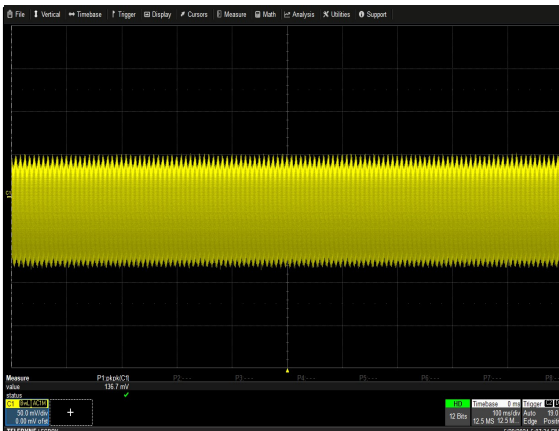


Figure 17: NGB150S15x Ripple and Noise Measurement  
 $V_{in} = 230\text{Vac}$  Load:  $I_O = 10\text{A}$   $I_{SB} = 0.5\text{A}$   
 Ch 1:  $V_O$



Figure 18: NGB150S15x Output Voltage Startup Characteristic  
 $V_{in} = 90\text{Vac}$  Load:  $I_O = 10\text{A}$   $I_{SB} = 0.5\text{A}$   
 Ch 1:  $V_O$

## SECTION 2 ELECTRICAL SPECIFICATIONS

### 2.4 NGB150S15x Performance Curves



Figure 19: NGB150S15x Turn Off Characteristic  
Load:  $I_o = 10A$   $I_{SB} = 0.5A$   
Ch 1:  $V_o$

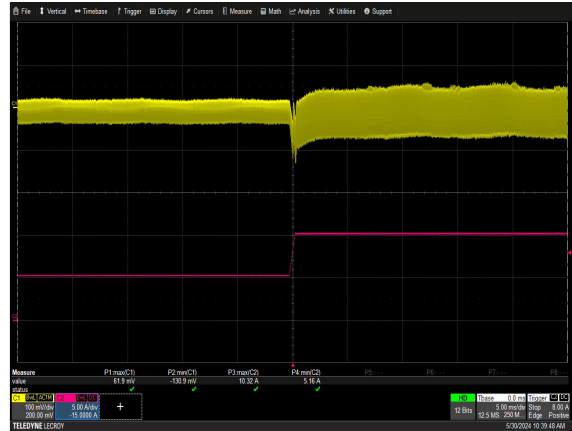


Figure 20: NGB150S15x Transient Response -  $V_o$  Deviation  
50% to 100% load change  $9.6mA/\mu S$  slew rate,  $V_{in} = 230Vac$   
Ch 1:  $V_o$  Ch 2:  $I_o$

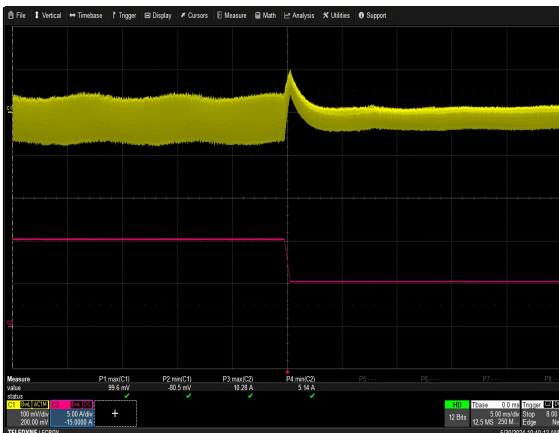


Figure 21: NGB150S15x Transient Response -  $V_o$  Deviation  
100% to 50% load change  $9.6mA/\mu S$  slew rate,  $V_{in} = 230Vac$   
Ch 1:  $V_o$  Ch 2:  $I_o$

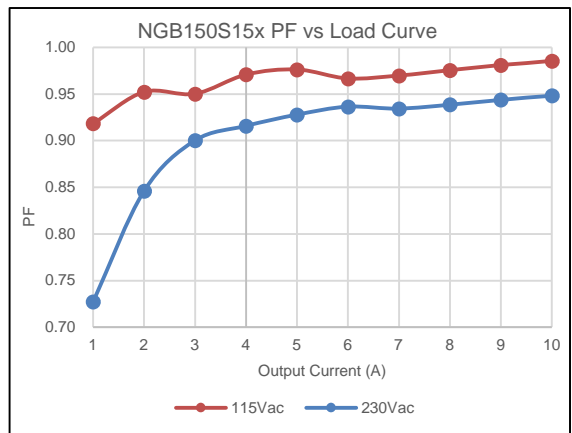


Figure 22: NGB150S15x PF vs Load Curve  
Loading:  $I_{o\_main} = I_{o,max}$

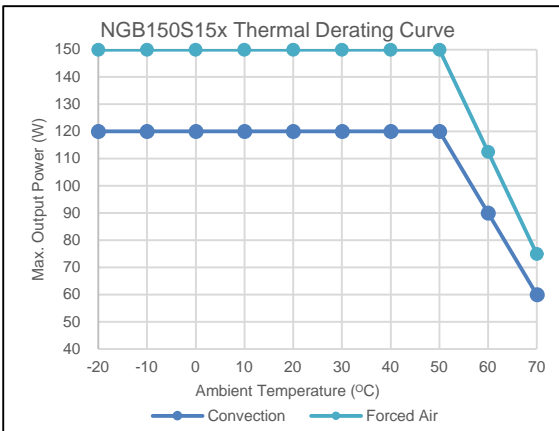


Figure 23: NGB150S15x Thermal Derating Curves

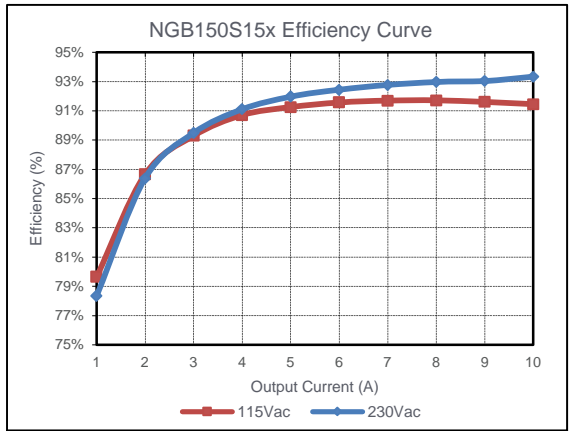
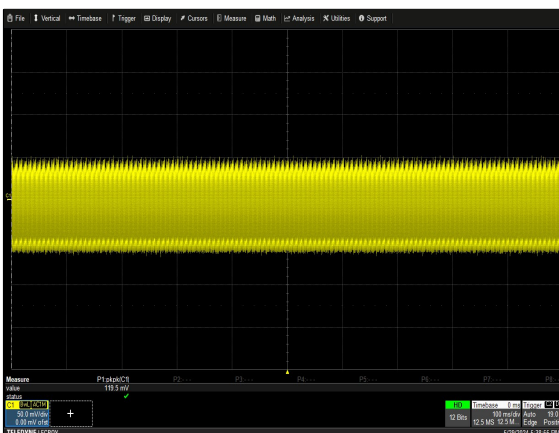
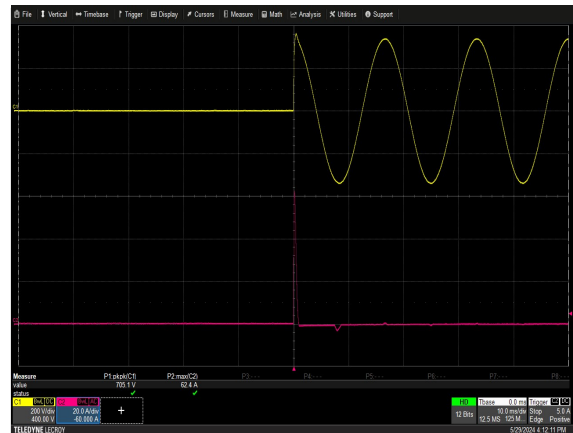
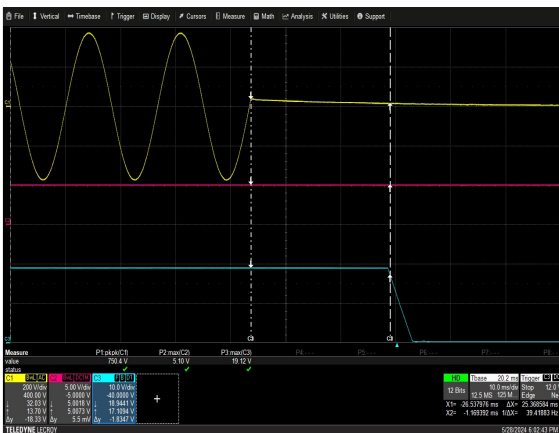
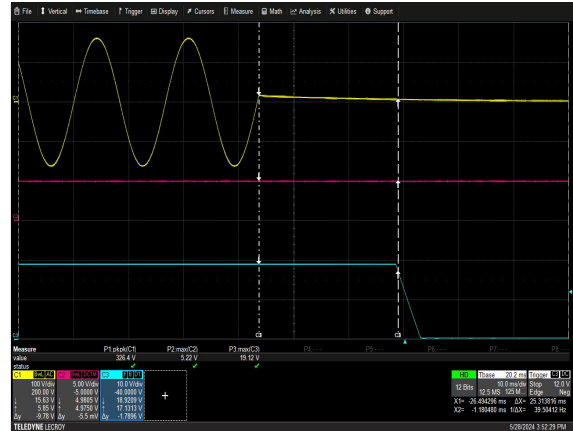
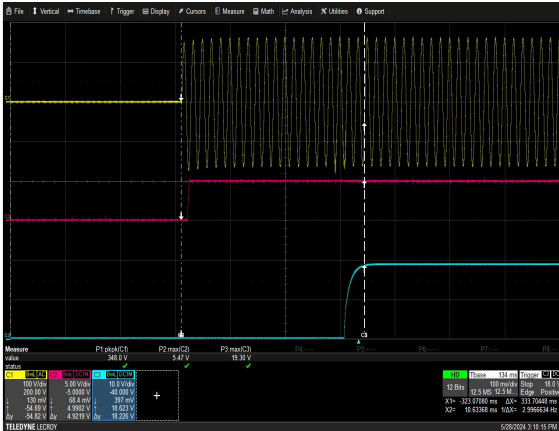


Figure 24: NGB150S15x Efficiency Curve @ 25°C  
Loading:  $I_{o\_main} = 10\%$  increment to  $I_{o,max}$

## SECTION 2 ELECTRICAL SPECIFICATIONS

### 2.4 NGB150S19x Performance Curves



## SECTION 2 ELECTRICAL SPECIFICATIONS

### 2.4 NGB150S19x Performance Curves



Figure 31: NGB150S19x Turn Off Characteristic  
 Load:  $I_o = 7.9A$   $I_{SB} = 0.5A$   
 Ch 1:  $V_O$

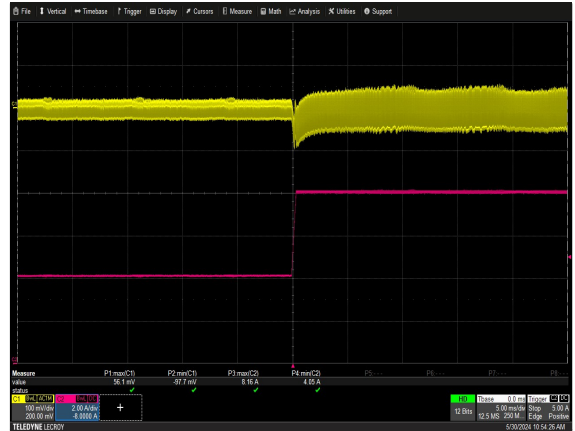


Figure 32: NGB150S19x Transient Response -  $V_O$  Deviation  
 50% to 100% load change  $9.6mA/\mu s$  slew rate,  $V_{in} = 230Vac$   
 Ch 1:  $V_O$  Ch 2:  $I_O$

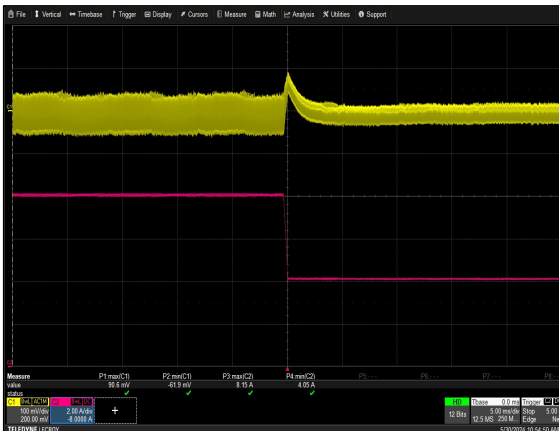


Figure 33: NGB150S19x Transient Response -  $V_O$  Deviation  
 100% to 50% load change  $9.6mA/\mu s$  slew rate,  $V_{in} = 230Vac$   
 Ch 1:  $V_O$  Ch 2:  $I_O$

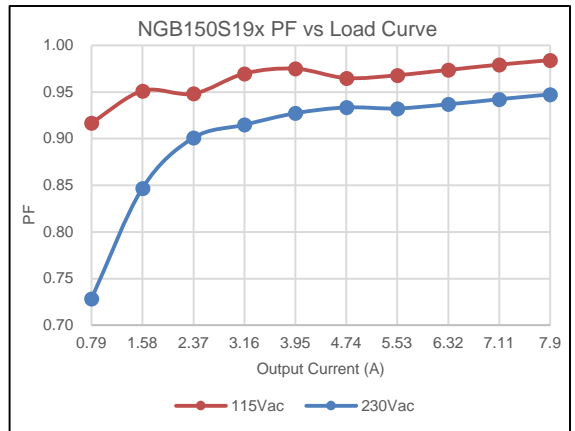


Figure 34: NGB150S19x PF vs Load Curve  
 Loading:  $I_{o\_main} = I_{o,max}$

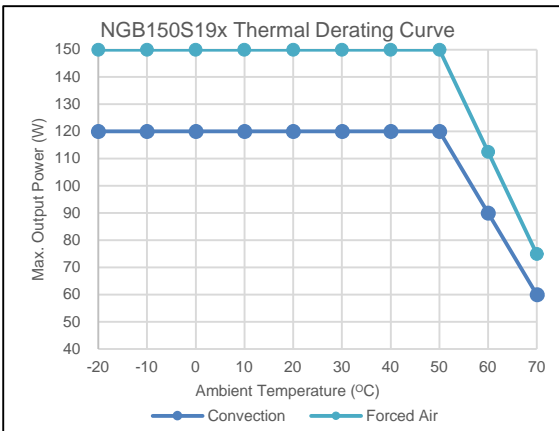


Figure 35: NGB150S19x Thermal Derating Curves

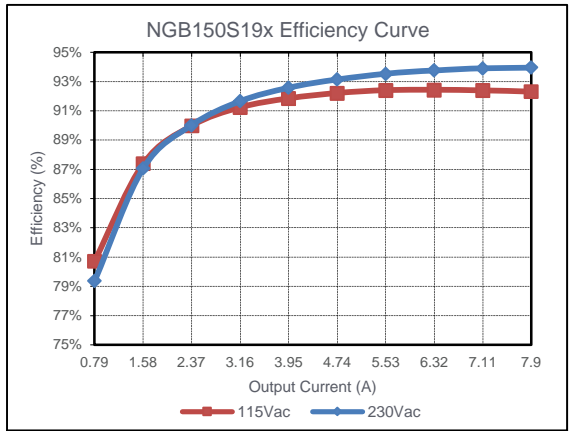


Figure 36: NGB150S19x Efficiency Curve @ 25°C  
 Loading:  $I_{o\_main} = 10\%$  increment to  $I_{o,max}$

## SECTION 2 ELECTRICAL SPECIFICATIONS

### 2.4 NGB150S24x Performance Curves

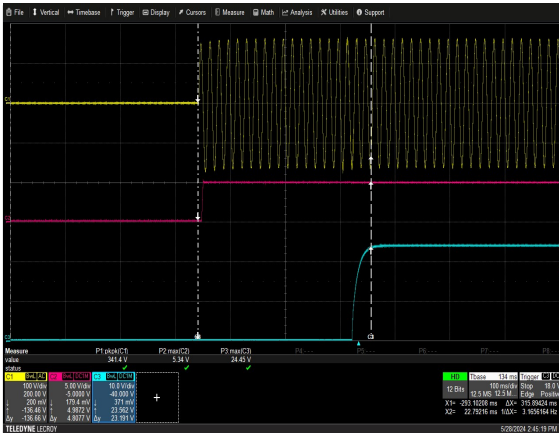


Figure 37: NGB150S24x Turn-On Delay via AC Mains  
 $V_{in} = 115\text{Vac}$  Load:  $I_O = 6.25\text{A}$   $I_{SB} = 0.5\text{A}$   
 Ch 1: AC Mains Ch 2:  $V_{SB}$  Ch 3:  $V_O$

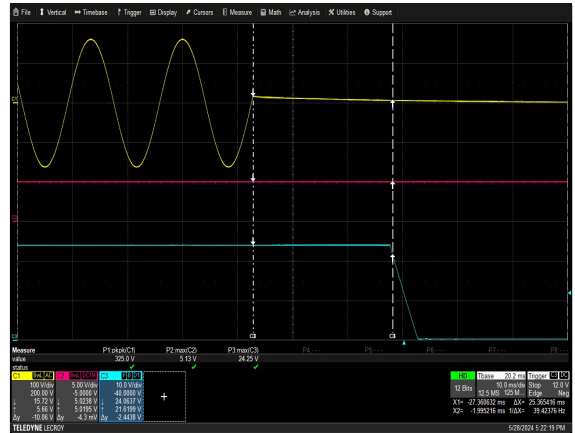


Figure 38: NGB150S24x Hold-Up Time  
 $V_{in} = 115\text{Vac}$  Load:  $I_O = 6.25\text{A}$   $I_{SB} = 0.5\text{A}$   
 Ch 1: AC Mains Ch 2:  $V_{SB}$  Ch 3:  $V_O$

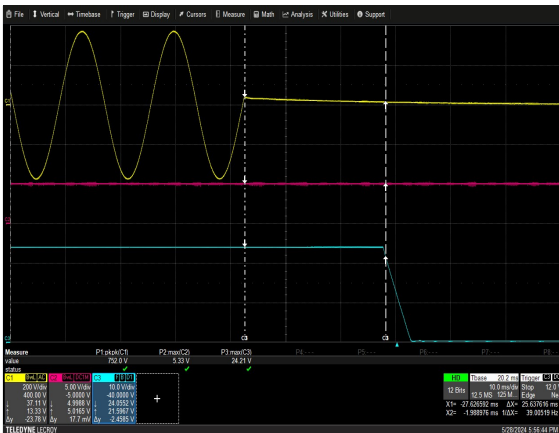


Figure 39: NGB150S24x Hold-Up Time  
 $V_{in} = 264\text{Vac}$  Load:  $I_O = 6.25\text{A}$   $I_{SB} = 0.5\text{A}$   
 Ch 1: AC Mains Ch 2:  $V_{SB}$  Ch 3:  $V_O$

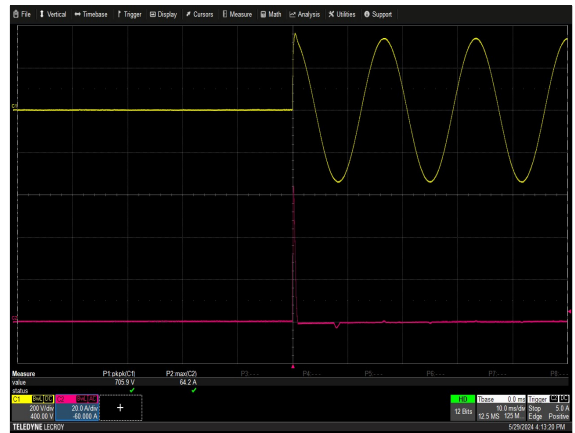


Figure 40: NGB150S24x Inrush Current  
 $V_{in} = 240\text{Vac}$  Load:  $I_O = 0\text{A}$ , Turn on at 90 deg  
 Ch 1:  $V_{IN}$  Ch 2:  $I_{IN}$

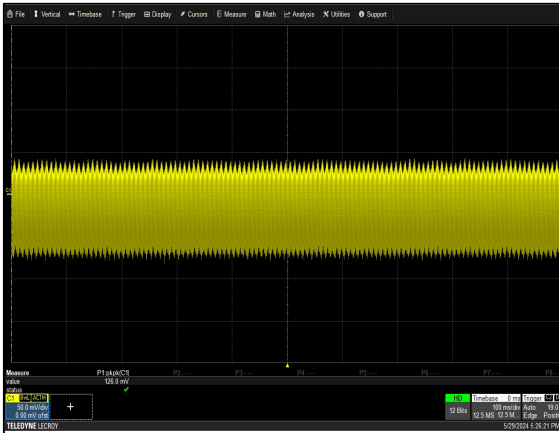


Figure 41: NGB150S24x Ripple and Noise Measurement  
 $V_{in} = 230\text{Vac}$  Load:  $I_O = 6.25\text{A}$   $I_{SB} = 0.5\text{A}$   
 Ch 1:  $V_O$

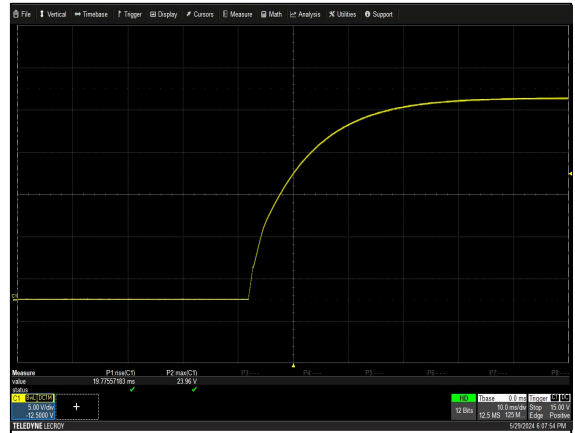


Figure 42: NGB150S24x Output Voltage Startup Characteristic  
 $V_{in} = 90\text{Vac}$  Load:  $I_O = 6.25\text{A}$   $I_{SB} = 0.5\text{A}$   
 Ch 1:  $V_O$

## SECTION 2 ELECTRICAL SPECIFICATIONS

### 2.4 NGB150S24x Performance Curves



Figure 43: NGB150S24x Turn Off Characteristic  
Load:  $I_o = 6.25A$   $I_{SB} = 0.5A$   
Ch 1:  $V_o$



Figure 44: NGB150S24x Transient Response -  $V_o$  Deviation  
50% to 100% load change  $9.6mA/\mu s$  slew rate,  $V_{in} = 230Vac$   
Ch 1:  $V_o$  Ch 2:  $I_o$

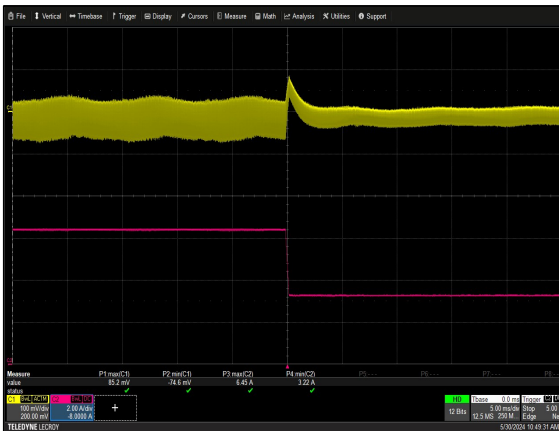


Figure 45: NGB150S24x Transient Response -  $V_o$  Deviation  
100% to 50% load change  $9.6mA/\mu s$  slew rate,  $V_{in} = 230Vac$   
Ch 1:  $V_o$  Ch 2:  $I_o$

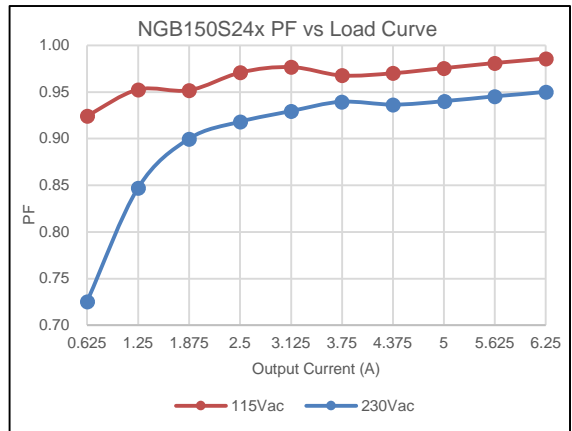


Figure 46: NGB150S24x PF vs Load Curve  
Loading:  $I_{o\_main} = I_{o,max}$

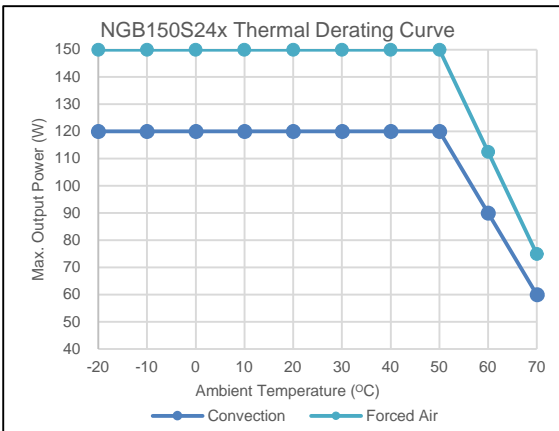


Figure 47: NGB150S24x Thermal Derating Curves

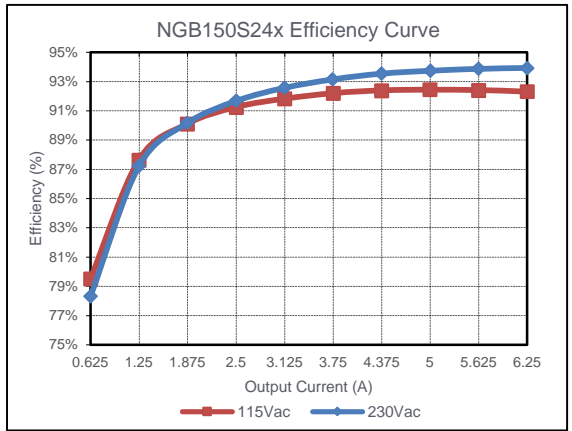


Figure 48: NGB150S24x Efficiency Curve @ 25°C  
Loading:  $I_{o\_main} = 10\%$  increment to  $I_{o,max}$

## SECTION 2 ELECTRICAL SPECIFICATIONS

### 2.4 NGB150S48x Performance Curves

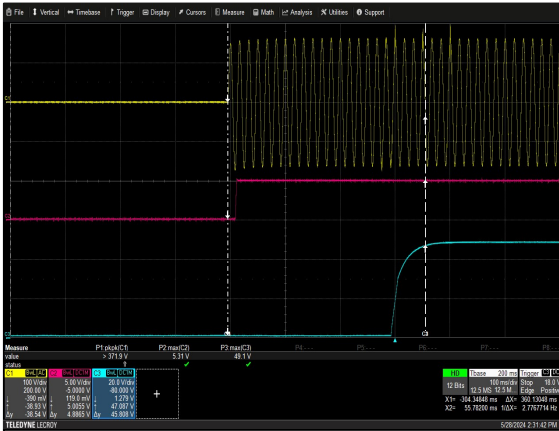


Figure 49: NGB150S48x Turn-On Delay via AC Mains  
 $V_{in} = 115\text{Vac}$  Load:  $I_o = 3.13\text{A}$   $I_{SB} = 0.5\text{A}$   
 Ch 1: AC Mains Ch 2:  $V_{SB}$  Ch 3:  $V_o$

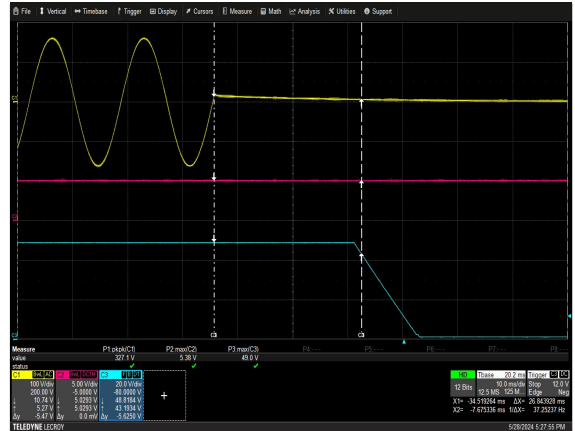


Figure 50: NGB150S48x Hold-Up Time  
 $V_{in} = 115\text{Vac}$  Load:  $I_o = 3.13\text{A}$   $I_{SB} = 0.5\text{A}$   
 Ch 1: AC Mains Ch 2:  $V_{SB}$  Ch 3:  $V_o$

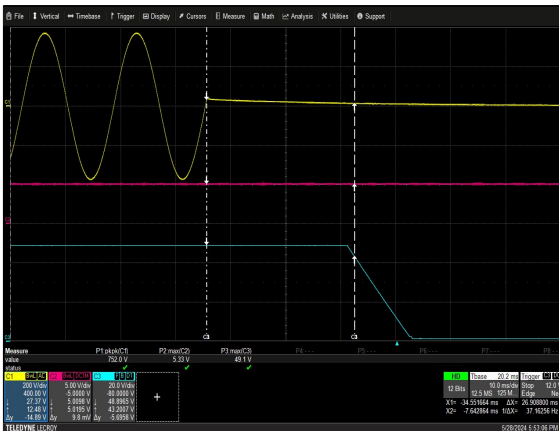


Figure 51: NGB150S48x Hold-Up Time  
 $V_{in} = 264\text{Vac}$  Load:  $I_o = 3.13\text{A}$   $I_{SB} = 0.5\text{A}$   
 Ch 1: AC Mains Ch 2:  $V_{SB}$  Ch 3:  $V_o$

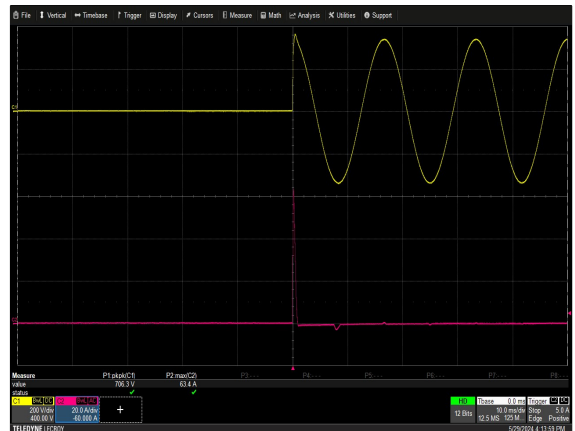


Figure 52: NGB150S48x Inrush Current  
 $V_{in} = 240\text{Vac}$  Load:  $I_o = 0\text{A}$ , Turn on at 90 deg  
 Ch 1:  $V_{IN}$  Ch 2:  $I_{IN}$

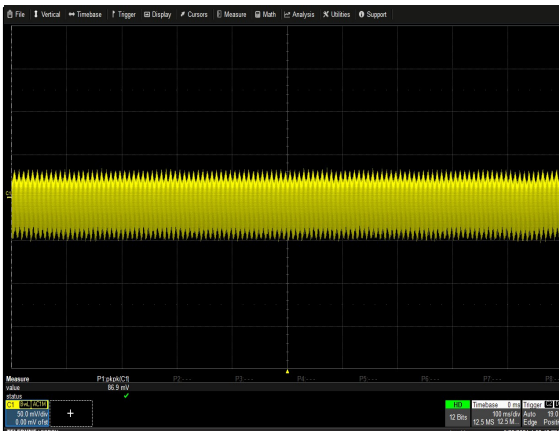


Figure 53: NGB150S48x Ripple and Noise Measurement  
 $V_{in} = 230\text{Vac}$  Load:  $I_o = 3.13\text{A}$   $I_{SB} = 0.5\text{A}$   
 Ch 1:  $V_o$



Figure 54: NGB150S48x Output Voltage Startup Characteristic  
 $V_{in} = 90\text{Vac}$  Load:  $I_o = 3.13\text{A}$   $I_{SB} = 0.5\text{A}$   
 Ch 1:  $V_o$

## SECTION 2 ELECTRICAL SPECIFICATIONS

### 2.4 NGB150S48x Performance Curves

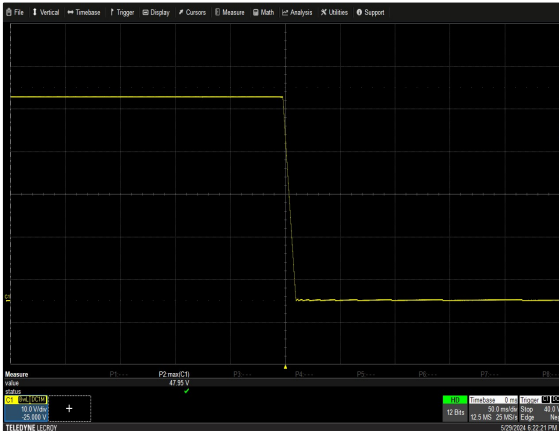


Figure 55: NGB150S48x Turn Off Characteristic  
 Load:  $I_o = 3.13A$   $I_{SB} = 0.5A$   
 Ch 1:  $V_o$

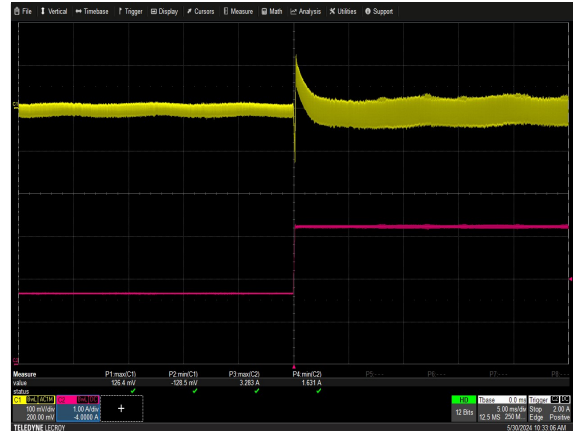


Figure 56: NGB150S48x Transient Response -  $V_o$  Deviation  
 50% to 100% load change  $9.6mA/\mu s$  slew rate,  $V_{in} = 230Vac$   
 Ch 1:  $V_o$  Ch 2:  $I_o$

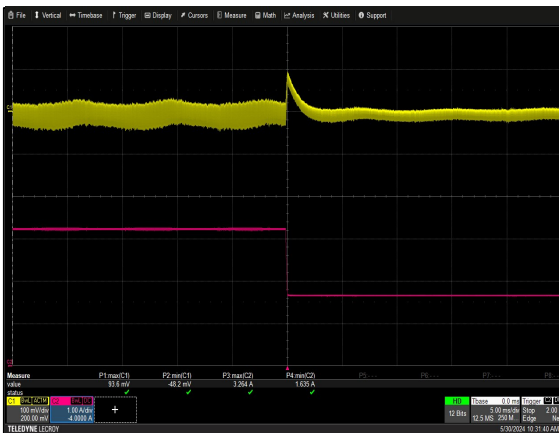


Figure 57: NGB150S48x Transient Response -  $V_o$  Deviation  
 100% to 50% load change  $9.6mA/\mu s$  slew rate,  $V_{in} = 230Vac$   
 Ch 1:  $V_o$  Ch 2:  $I_o$

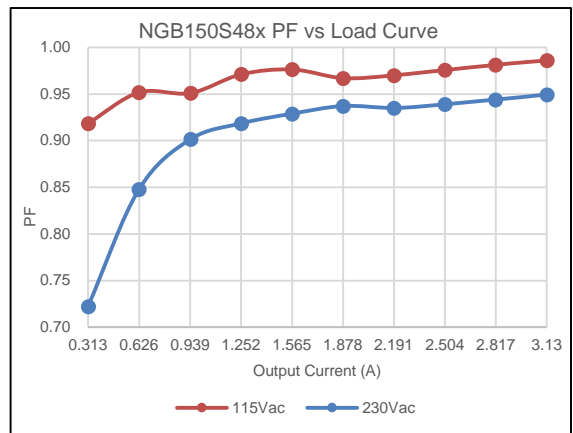


Figure 58: NGB150S48x PF vs Load Curve  
 Loading:  $I_{o\_main} = I_{o,max}$

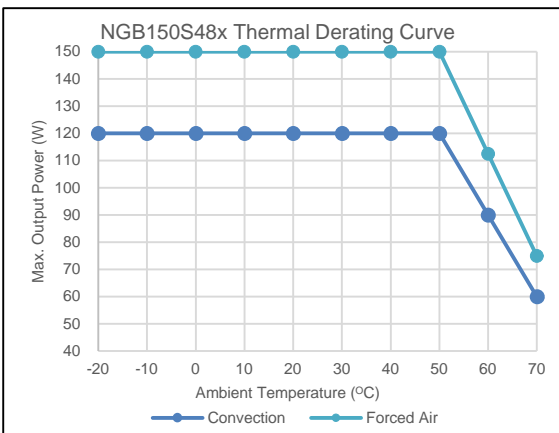


Figure 59: NGB150S48x Thermal Derating Curves

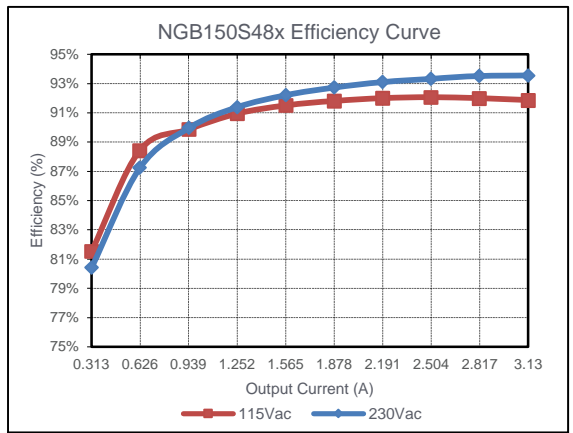


Figure 60: NGB150S48x Efficiency Curve @ 25°C  
 Loading:  $I_{o\_main} = 10\%$  increment to  $I_{o,max}$

## SECTION 2 ELECTRICAL SPECIFICATIONS

### 2.5 Protection Function Specifications

#### Over Voltage Protection (OVP)

The power supply main output will latch off during output overvoltage with the AC line recycled to reset the latch.

##### NGB150S12

Parameter	Min	Typ	Max	Unit
V <sub>O</sub> Output Overvoltage	13.8	/	18.6	V

##### NGB150S15

Parameter	Min	Typ	Max	Unit
V <sub>O</sub> Output Overvoltage	17.25	/	23.25	V

##### NGB150S19

Parameter	Min	Typ	Max	Unit
V <sub>O</sub> Output Overvoltage	21.85	/	29.45	V

##### NGB150S24

Parameter	Min	Typ	Max	Unit
V <sub>O</sub> Output Overvoltage	27.6	/	37.2	V

##### NGB150S48

Parameter	Min	Typ	Max	Unit
V <sub>O</sub> Output Overvoltage	55.2	/	74.4	V

#### Short Circuit Protection (SCP)

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

#### Over Temperature Protection (OTP)

The power supply shut down 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

### 2.5 Protection Function Specifications

#### Over Current Protection (OCP)

NGB150 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 range but recovery is automatic when the load is reduced to be within specified limits.

##### NGB150S12

Parameter	Min	Typ	Max	Unit
V <sub>O</sub> Output Overcurrent with Convection Cooling	12	/	18	A
V <sub>O</sub> Output Overcurrent with 200LFM Forced Air	15	/	22.5	A

##### NGB150S15

Parameter	Min	Typ	Max	Unit
V <sub>O</sub> Output Overcurrent with Convection Cooling	9.6	/	14.4	A
V <sub>O</sub> Output Overcurrent with 200LFM Forced Air	12	/	18	A

##### NGB150S19

Parameter	Min	Typ	Max	Unit
V <sub>O</sub> Output Overcurrent with Convection Cooling	7.584	/	11.376	A
V <sub>O</sub> Output Overcurrent with 200LFM Forced Air	9.48	/	14.22	A

##### NGB150S24

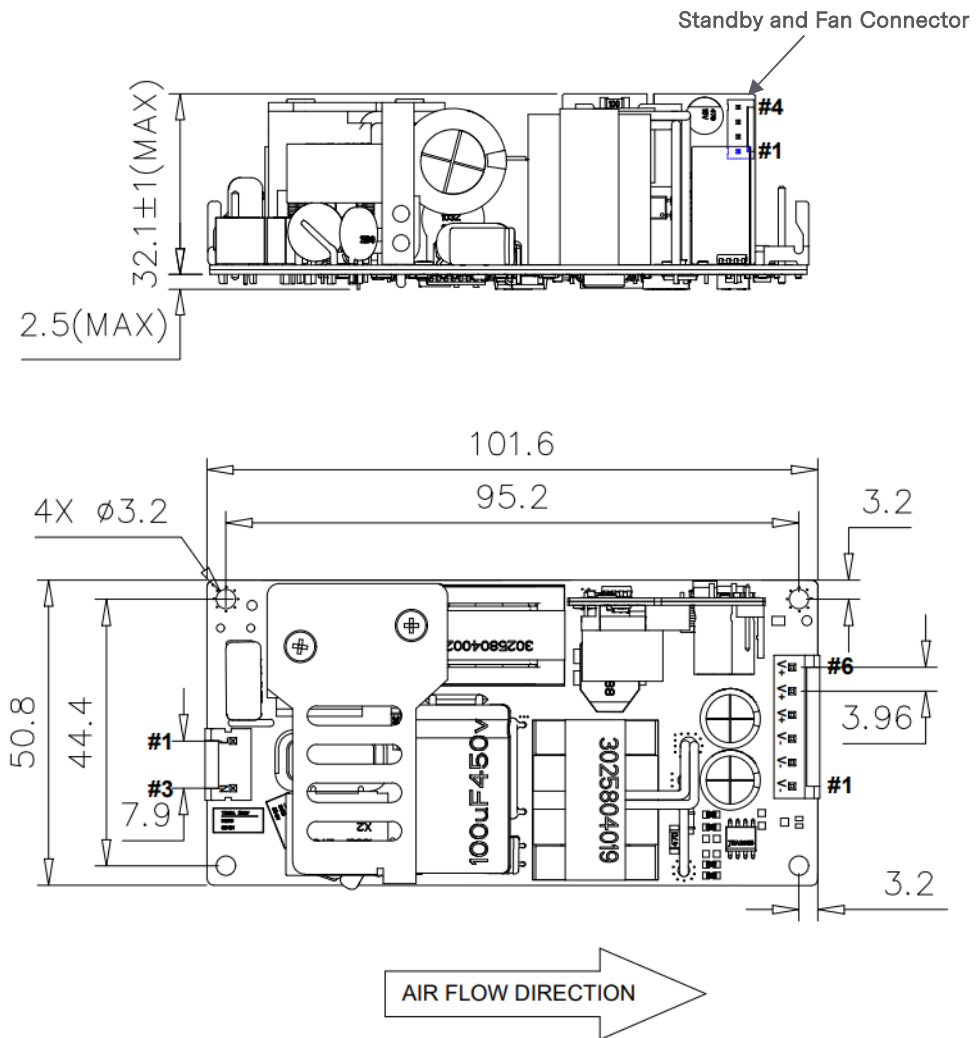
Parameter	Min	Typ	Max	Unit
V <sub>O</sub> Output Overcurrent with Convection Cooling	6	/	9	A
V <sub>O</sub> Output Overcurrent with 200LFM Forced Air	7.5	/	11.25	A

##### NGB150S48

Parameter	Min	Typ	Max	Unit
V <sub>O</sub> Output Overcurrent with Convection Cooling	3	/	4.5	A
V <sub>O</sub> Output Overcurrent with 200LFM Forced Air	3.756	/	5.634	A

## SECTION 3 MECHANICAL SPECIFICATIONS

### 3.1 Mechanical Outlines (Dimensions and Mounting Locations)



Note 1 - All dimension

Note 2 - The NGB150 series dimensions is 2" x 4" x 1.35".

Note 3 - Weight: 180 g.

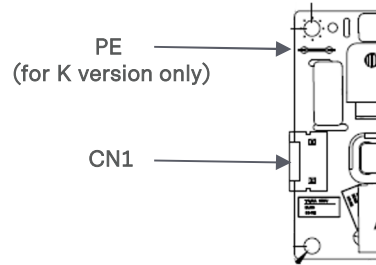
## SECTION 3 MECHANICAL SPECIFICATIONS

### 3.2 Connector Definitions

#### AC Input Connector - CN1

Pin 1 - Neutral

Pin 3 - Line



#### DC Output Connector - CN2

Pin 1 - -Vo

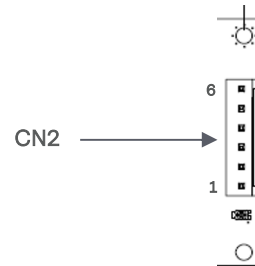
Pin 2 - -Vo

Pin 3 - -Vo

Pin 4 - +Vo

Pin 5 - +Vo

Pin 6 - +Vo



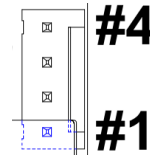
#### Standby and Fan Connector - SCN1

Pin 1 - 5V Standby

Pin 2 - 5V Standby Return

Pin 3 - 12V Fan Output

Pin 4 - 12V Fan Return



## SECTION 3 MECHANICAL SPECIFICATIONS

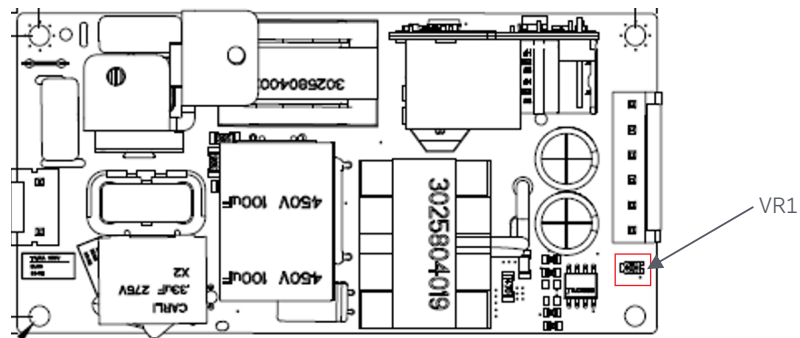
### 3.3 Power / Signal Mating Connectors and Pin Types

Table 4. Mating Connectors for NGB150 Series			
Reference	Vendor	Mating Connector or Equivalent	Mating Pins or Equivalent
Input Connector (CN1)	TE/AMP	640445-3	640250-3
Grounding Terminal Faston Tab 0.187" <sup>1</sup>	Molex	19002-0005	/
Main Output Connector (CN2)	TE/AMP	640445-6	640250-6
Standby and Fan Connector (SCN1)	Landwin	2511P0400T	2600S0400

Note 1: For Class I models only.

### 3.4 Potentiometer Definitions

VR1 – Main output voltage adjustment



## SECTION 4 ENVIRONMENTAL SPECIFICATIONS

### 4.1 EMC Immunity

NGB150 series power supply is designed to meet the following EMC immunity specifications.

Table 5. Environmental Specifications			
Test Items	Standard	Test Level	Criteria <sup>1</sup>
Conducted Emissions	EN55011/15/32, CISPR11/15/32, FCC Part 15.107	Class B, measured at 10%, 50%, and 100% load steps at 120/230 Vac	3db margin typ.
Radiated Emissions	EN55011/15/32, CISPR11/15/32, FCC Part 15.107	Class B, measured at 10%, 50%, and 100% load steps at 120/230 Vac	3db margin typ.
Harmonic Current Emissions	EN61000-3-2	-	A
Flicker	IEC61000-3-3	-	-
Electro-Static Discharge (ESD) Immunity	EN55024/IEC61000-4-2, Level 4 IEC60601-1-2, 4th Edition, Table 4	+/- 8kV contact, +/- 15kV air	A
Radiated RF EM Fields Susceptibility	EN55022/EN61000-4-3 IEC60601-1-2, 4th Edition, Table 4	10V/m, 80MHz-2.7GHz, 80% AM at 1kHz	A
Electrical Fast Transients (EFT) / Bursts	EN55024/IEC61000-4-4, Level 4 IEC60601-1-2, 4th Edition, Table 5	+/-4kV, 100kHz rep rate	A
Surges - Line to Line (DM) and Line to GND (CM)	EN55024/IEC61000-4-5, Level 4 IEC60601-1-2, 4th Edition	+/-2kV DM, +/-4kV CM	A
Conducted Disturbances Induced by RF Fields	EN55022/IEC61000-4-6 IEC60601-1-2, 4th Edition, Table 5	-	A
Rated Power Frequency Magnetic Fields	EN55024/IEC1000-4-8, Level 4 IEC60601-1-2, 4th Edition, Table 4	30A/m, 50/60 Hz	-
Voltage Interruptions, Dips, Sags & Surges <sup>1</sup>	EN55024/IEC/EN61000-4-11: IEC60601-1-2, 4th Edition, Table 5	--100% dip for 10ms, at 0, 45, 90, 135, 180, 225, 270 and 315 degrees --100% dip for 20ms, 0 deg, full load --100% dip for 20ms, 0 deg, half load --100% dip for 500ms (250/300 cycles) --60% dip for 100ms --30% dip for 500ms	B A B B A

Note 1 - Performance criteria are based on EN55024. 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 NGB150 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.

Agency	Description
UL	US Requirements UL62368-1, UL60601-1, 3rd Edition, BF rated
CSA	Canada Requirements CAN/CSA-C22.2 No. 62368-1, 60601-1, BF rated
Demko	Denmark Requirements EN 62368-1, EN60601-1, 3rd Edition, BF rated
CB Certificate and Report	Design to meet 5000m and 50°C, 93% RH with 120 h (tropical standard) according to GB4943.1-2011, IEC62368-1, IEC60601-1, BF rated
CE	CE Marking (LVD)

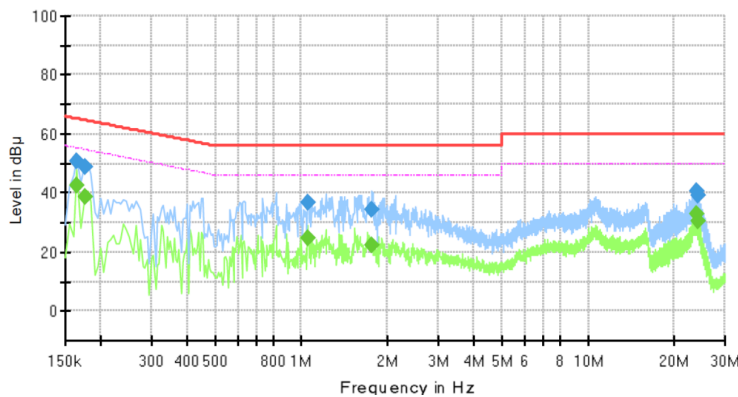
## SECTION 4 ENVIRONMENTAL SPECIFICATIONS

### 4.3 EMI Emissions

The NGB150 series has been designed to comply with the Class B limits of EMI requirements of EN55022 (FCC Part 15) and CISPR 22 (EN55032) for emissions and relevant sections of EN61000 (IEC 61000) for immunity.

#### Conducted Emissions

The applicable standard for conducted emissions is EN55032 (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 NGB150 series power supply have internal EMI filters to ensure the convertor's conducted EMI levels comply with EN55022 (FCC Part 15) Class B and EN55032 (CISPR 22) Class B limits.

Sample of EN55032 Conducted EMI Measurement at 230Vac input tested at Neutral.

Conducted EMI emissions specifications of the NGB150 series:

Parameter	Model	Symbol	Min	Typ	Max	Unit
FCC Part 15, Class B	All	Margin	-	-	3	dB
CISPR11/15/32 Class B	All	Margin	-	-	3	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 EN55032 Class B (FCC Part 15). Testing AC-DC convertors as a stand-alone component to the exact requirements of EN55032 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

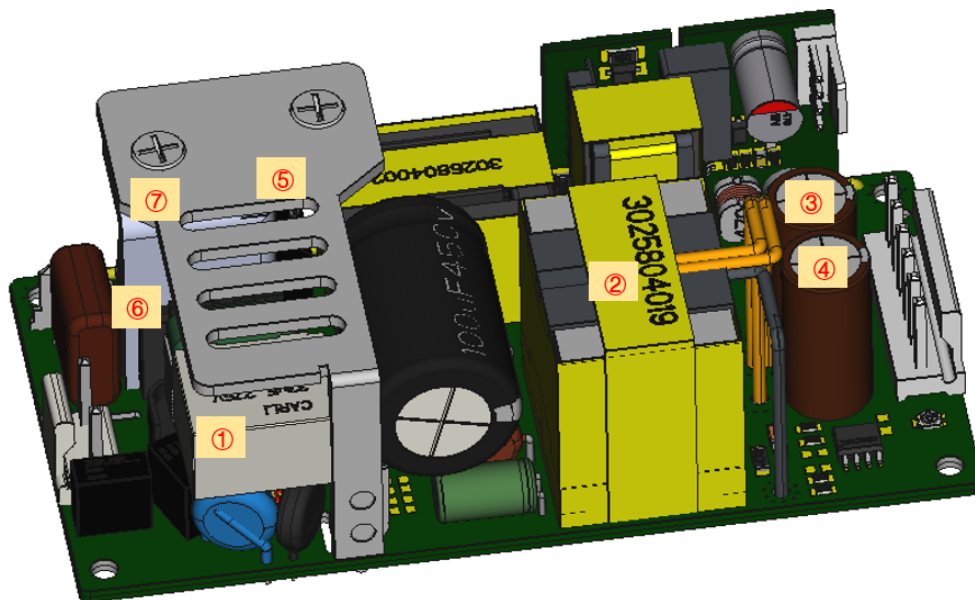
### 4.4 Operating Temperature

The NGB150 series power supply will start and operate at an ambient temperature from -20°C to 70°C. PSU performance will derate from 50°C to 70°C. PSU will derate output power linearly above 50°C to 50% rated output current at 70°C.

### 4.5 Thermal Data

The following table lists components of NGB150 series and their maximal allowed temperature, as confirmed to safety report. Monitoring and keeping these parts below the listed values helps to keep the power supply within the given limits by safety agencies.

No.	Description	Hazardous Voltage	Reference Designator	Max. Allowed Temperature
1	X capacitor	Yes	CX1	100°C
2	Power transformer	Yes	T1	130°C
3	Electrolytic capacitor (output)	Yes	EC3	105°C
4	Electrolytic capacitor (output)	Yes	EC4	105°C
5	PFC boost transistor	Yes	Q1	150°C
6	Diodes bridge	Yes	BD1	150°C
7	EMI Choke (Pi)	Yes	L1	130°C



## SECTION 4 ENVIRONMENTAL SPECIFICATIONS

### 4.6 Storage and Shipping Temperature

The NGB150 series power supply can be stored or shipped at temperatures between -40°C and +85°C.

### 4.7 Altitude

The NGB150 series power supply will operate within specifications at altitudes from -500m to 5,000m above sea level.

### 4.8 Humidity

The NGB150 series power supply will operate within specifications when subjected to a relative humidity from 5% to 95% non-condensing.

## SECTION 5 POWER AND CONTROL SIGNAL DESCRIPTIONS

### 5.1 AC Input (CN1)

This connector supplies the AC Mains to the NGB150 series power supply.

Pin 1 - Neutral

Pin 3 - Line

### 5.2 Earth Ground (GND)

Only class I (K version) products have this tab. The tab connector is the safety ground connection and should be connected to AC input earth ground.

GND - Earth Ground (Safety Ground)

### 5.3 Main Output (CN2)

These terminals provide the main output for the NGB150 series. The Vo and the Output Return terminals are the positive and negative rails, respectively of the main output of the NGB150 series power supply.

Pin 1 to 3 - Output Return

Pin 4 to 6 - +Vo

### 5.4 Main Output Voltage Adjustment

The main output of the NGB150 series power supply can be adjusted by +/- 10% from its nominal output voltage via the potentiometer VR1.

### 5.5 Standby and Fan Output (SCN1)

The NGB150 series power supply contains a 4-pin header connector, providing 5V at 0.5A standby output and 12V at 0.4A fan output for powering a cooling fan or as aux power source.

Pin 1 - 5V Standby

Pin 2 - 5V Standby Return

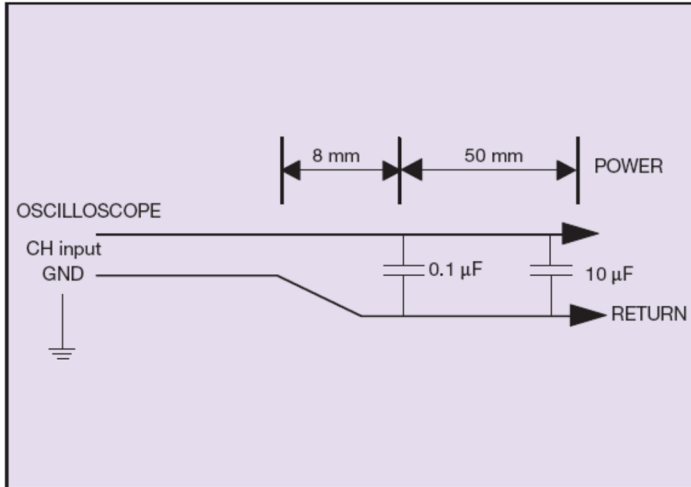
Pin 3 - 12V Fan Output

Pin 4 - 12V Fan Return

## SECTION 6 APPLICATION NOTES

### 6.1 Output Ripple and Noise Measurement

The setup outlined in the diagram below has been used for output voltage ripple and noise measurements on the NGB150 series. When measuring output ripple and noise, a scope jack in parallel with a 0.1 $\mu$ F ceramic chip capacitor, and a 10 $\mu$ F tantalum capacitor will be used. Oscilloscope can be set to 20MHz bandwidth for this measurement.



**SECTION 7 RECORD OF REVISION AND CHANGES**

Issue	Date	Description	Originators
1.0	06.05.2024	First issue	K. Jiao
1.1	09.30.2024	Add thermal data	J. Zhang
1.2	07.28.2025	Update OCP errors and delete needless description on CN2	K. Jiao



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