

Evaluation Data

품 목	SMPS
품 명	CSF600-S
Rev. No.	B

2008 년 12 월 02 일

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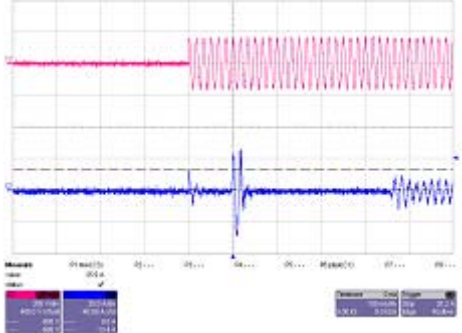
8. CSF600-48

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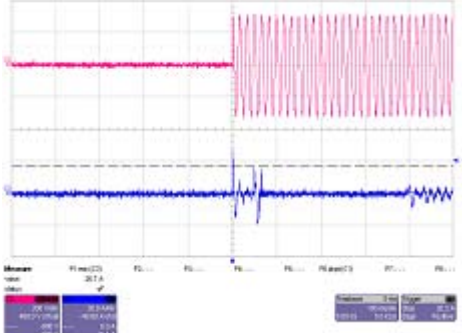
1-1-1. CSF600-3R3 Input characteristics

(1) Oscilloscope : WAVE PRO 7000 (LeCroy)
 CH2 : AC INPUT VOLTAGE - ADP305 (High Voltage Differential Probe)
 CH3 : AC INPUT CURRENT - AP015 (Current Probe)

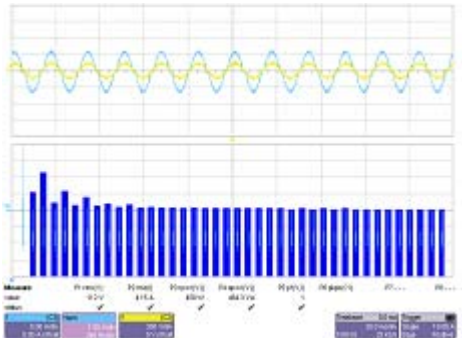
(1) Inrush Current Characteristics (110V)

$V_{in} = 110V$	$I_o = 100\%$	$I_{rush\ 1} = 13.4[A]$ $I_{rush\ 2} = 25.9[A]$		CH2() 200V/div 100ms/div CH3() 20A/div 100ms/div
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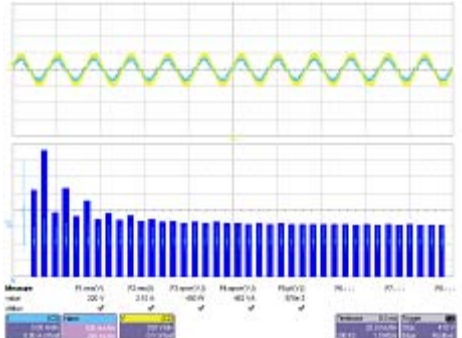
(2) Inrush Current Characteristics (220V)

$V_{in} = 220V$	$I_o = 100\%$	$I_{rush\ 1} = 26.7[A]$ $I_{rush\ 2} = 16.4[A]$		CH2() 200V/div 100ms/div CH3() 20A/div 100ms/div
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(3) Input Voltage & Current Characteristics (110V)

$V_{in} = 110V$	$I_o = 100\%$	$V_{rms} = 112[V]$ $I_{rms} = 4.15[A]$		CH2() 350V/div 20ms/div CH3() 5A/div 20ms/div
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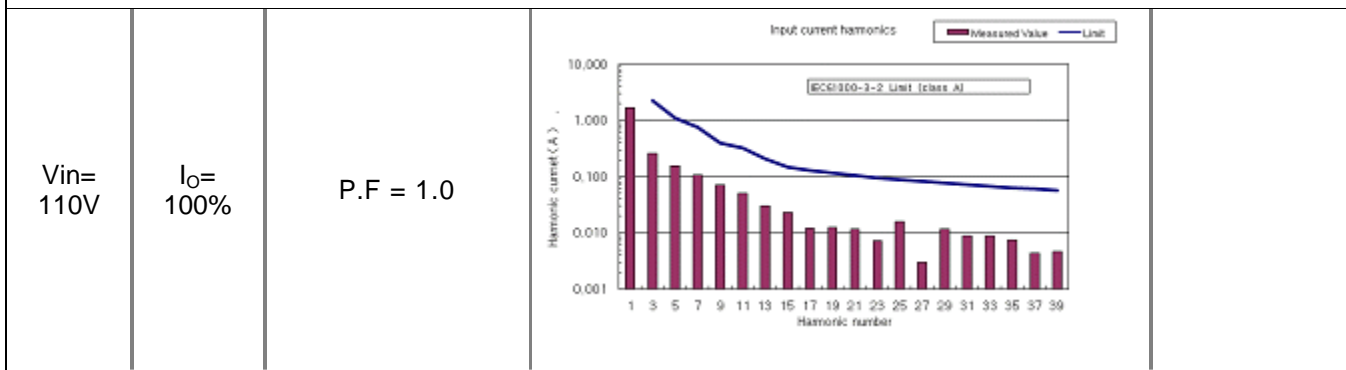
(4) Input Voltage & Current Characteristics (220V)

$V_{in} = 220V$	$I_o = 100\%$	$V_{rms} = 220[V]$ $I_{rms} = 2.10[A]$		CH2() 350V/div 20ms/div CH3() 5A/div 20ms/div
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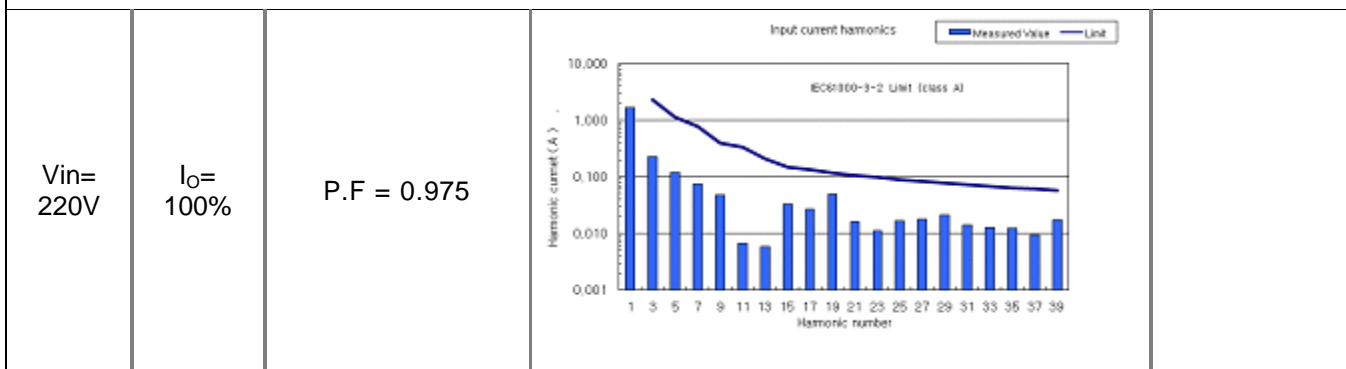
1-1-2. CSF600-3R3 Input characteristics

(1) Oscilloscope : WAVE PRO 7000 (LeCroy)
 CH2 : AC INPUT VOLTAGE - ADP305 (High Voltage Differential Probe)
 CH3 : AC INPUT CURRENT - AP015 (Current Probe)

(1) Input Line Harmonics Chart (110V)



(2) Input Line Harmonics Chart (220V)



(3) Input Current & Efficiency Characteristics

Condition Ta : 25

Vin		85V	110V	132V	170V	220V	264V
Io	Load (min)	0.370A	0.289A	0.254A	0.228A	0.236A	0.245A
	Input Current	0.370A	0.289A	0.254A	0.228A	0.236A	0.245A
	Efficiency	-	-	-	-	-	-
	Load (50%)	2.814A	2.152A	1.798A	1.401A	1.098A	0.952A
	Input Current	2.814A	2.152A	1.798A	1.401A	1.098A	0.952A
	Efficiency	68.97%	69.62%	69.88%	70.81%	71.49%	71.89%
	Load (100%)	5.770A	4.345A	3.579A	2.760A	2.143A	1.821A
	Input Current	5.770A	4.345A	3.579A	2.760A	2.143A	1.821A
	Efficiency	67.07%	68.77%	69.57%	70.06%	70.81%	71.12%

1-2-1. CSF600-3R3 Output characteristics

(1) Oscilloscope : WAVE PRO 7000 (LeCroy), Electronic Load : EUL - 600XL
 CH2 : OUTPUT VOLTAGE - PP005A (Passive Voltage Probe)
 CH3 : OUTPUT CURRENT - CP500 (Current Probe)
 Digital Multimeter : FLUKE189 (FLUKE)

(1) Line & Load Regulation Characteristics

Condition Ta : 25

V_{in} \ I_o	85V	110V	132V	170V	220V	264V	Line Regulation
Load (min)	3.301V	3.301V	3.301V	3.301V	3.301V	3.301V	0mV
Load (50%)	3.300V	3.300V	3.300V	3.300V	3.300V	3.300V	0mV
Load (100%)	3.300V	3.300V	3.300V	3.300V	3.300V	3.300V	0mV
Load Regulation	1mV	1mV	1mV	1mV	1mV	1mV	

(3) Dynamic Load Response Characteristics (100Hz)

$V_{in} = 220V$	$I_o = 0 \sim 100\%$ 100Hz	$+V_{PK} = 120mV$ (3.63%) $-V_{PK} = 194mV$ (5.83%)		CH2() 200mV/div 5ms/div CH3() 50A/div 5ms/div
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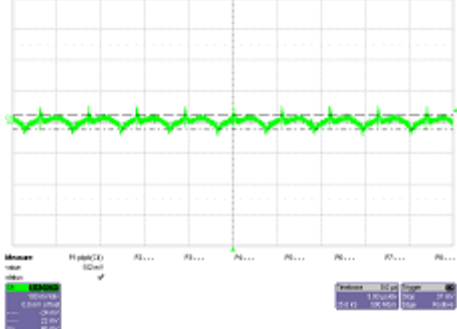
(4) Dynamic Load Response Characteristics (1KHz)

$V_{in} = 220V$	$I_o = 0 \sim 100\%$ 1kHz	$+V_{PK} = 83mV$ (2.51%) $-V_{PK} = 98mV$ (2.94%)		CH2() 200mV/div 500us/div CH3() 50A/div 500us/div
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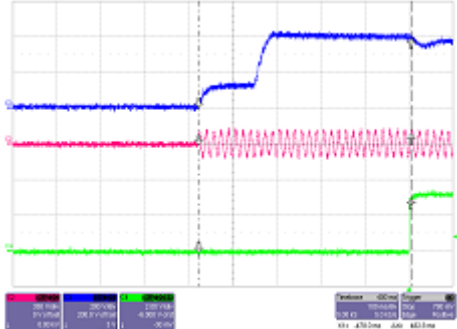
1-2-2. CSF600-3R3 Output characteristics

(1) Oscilloscope : WAVE PRO 7000 (LeCroy)
 CH4 : BNC Cable 1.5m, 50 Ω , Band Width : 200Mhz
 CH2 : AC INPUT VOLTAGE - ADP305 (High Voltage Differential Probe)
 CH3 : PFC OUTPUT VOLTAGE - ADP305 (High Voltage Differential Probe)
 CH4 : OUTPUT VOLTAGE - PP005A (Passive Voltage Probe)

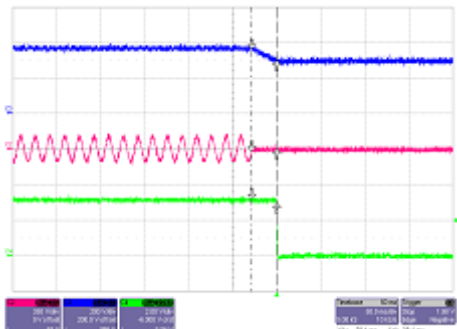
(1) Ripple & Noise characteristics.

$V_{in}=220V$	$I_o=100\%$	Ripple 46mV Ripple & Noise 102mV _{P-P}		CH4() 100mV/div 5us/div Terminal Elec - cap:47uF Film - cap:0.1uF
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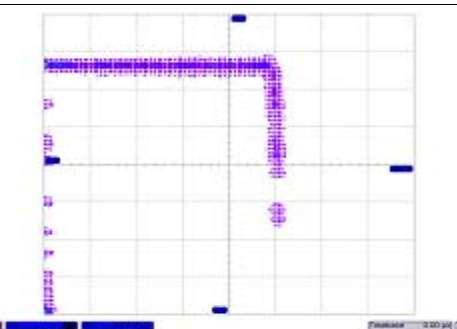
(2) Turn on time characteristics

$V_{in}=85V$	$I_o=100\%$	$T_{on} = 482.8ms$		CH2() 350V/div 100ms/div CH3() 200V/div 100ms/div CH4() 2V/div 100ms/div
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(3) Hold up characteristics

$V_{in}=85V$	$I_o=100\%$	$T_{off} = 28.1ms$		CH2() 350V/div 50ms/div CH3() 200V/div 50ms/div CH4() 2V/div 50ms/div
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(4) Over Current protection characteristics

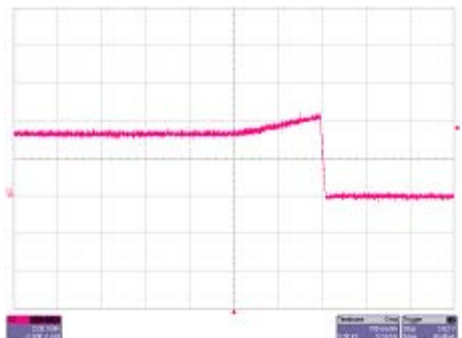
$V_{in}=220V$		$OCP=127[A]$ (127%)		X 25A/div 500ns/div Y 500mV/div 500ns/div
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1-2-3. CSF600-3R3 Output characteristics

(1) Oscilloscope : WAVE PRO 7000 (LeCroy)
 CH2 : OUTPUT VOLTAGE - PP005A (Passive Voltage Probe)

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(1) Over-voltage protection characteristics

<p> $V_{in} = 220V$ $I_o = 100\%$ </p>	<p> $OVP = 4.16[V]$ (126%) </p>		<p> CH2() 2V/div 100ms/div (+S, -S Open) </p>
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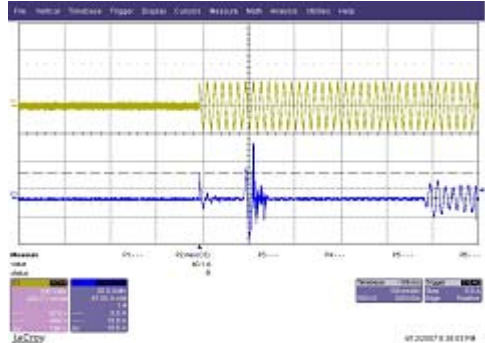
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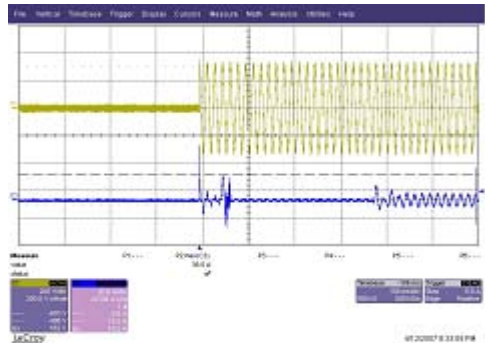
2-1-1. CSF600-05 Input characteristics

(1) Oscilloscope : WAVE SURFER 454 (LeCroy)
 CH1 : AC INPUT VOLTAGE - ADP305 (High Voltage Differential Probe)
 CH3 : AC INPUT CURRENT - AP015 (Current Probe)

(1) Inrush Current Characteristics (110V)

<p>$V_{in} = 110V$</p>	<p>$I_o = 100\%$</p>	<p>$I_{rush\ 1} = 18.6[A]$</p> <p>$I_{rush\ 2} = 40.1[A]$</p>		<p>CH1() 200V/div 100ms/div</p> <p>CH3() 20A/div 100ms/div</p>
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(2) Inrush Current Characteristics (220V)

<p>$V_{in} = 220V$</p>	<p>$I_o = 100\%$</p>	<p>$I_{rush\ 1} = 39.5[A]$</p> <p>$I_{rush\ 2} = 18.2[A]$</p>		<p>CH1() 200V/div 100ms/div</p> <p>CH3() 20A/div 100ms/div</p>
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(3) Input Voltage & Current Characteristics (110V)

<p>$V_{in} = 110V$</p>	<p>$I_o = 100\%$</p>	<p>$V_{rms} = 112[V]$</p> <p>$I_{rms} = 6.46[A]$</p>		<p>CH1() 350V/div 20ms/div</p> <p>CH2() 10A/div 20ms/div</p>
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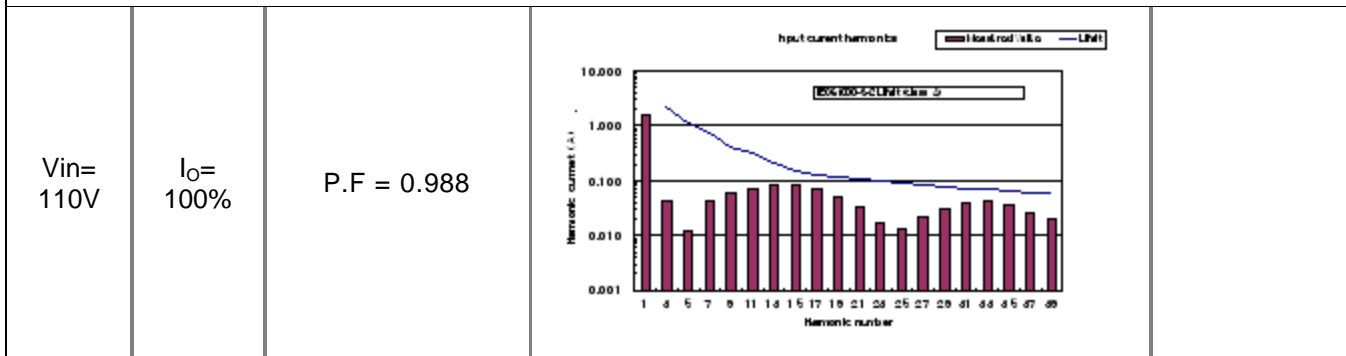
(4) Input Voltage & Current Characteristics (220V)

<p>$V_{in} = 220V$</p>	<p>$I_o = 100\%$</p>	<p>$V_{rms} = 220[V]$</p> <p>$I_{rms} = 3.16[A]$</p>		<p>CH1() 350V/div 20ms/div</p> <p>CH2() 10A/div 20ms/div</p>
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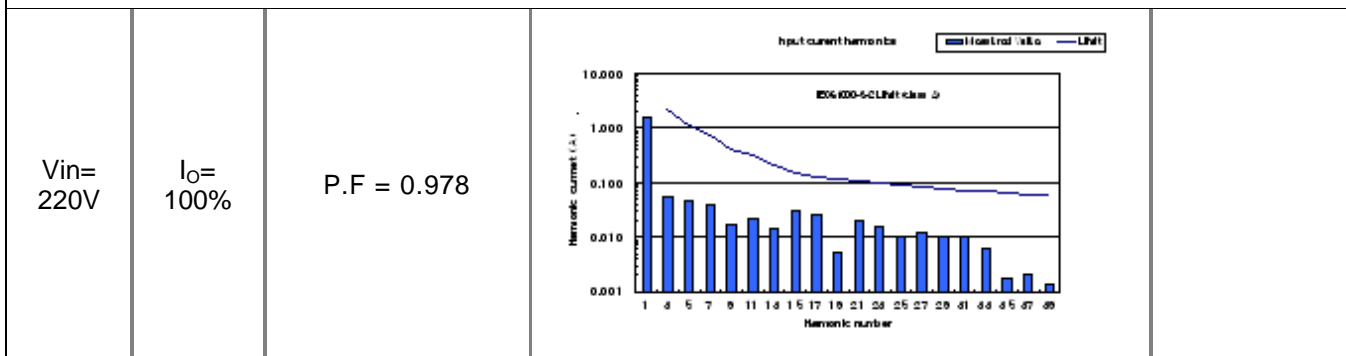
2-1-2. CSF600-05 Input characteristics

(1) Oscilloscope : WAVE PRO 7000 (LeCroy)
 CH1 : AC INPUT VOLTAGE - ADP305 (High Voltage Differential Probe)
 CH2 : AC INPUT CURRENT - AP015 (Current Probe)

(1) Input Line Harmonics Chart (110V)



(2) Input Line Harmonics Chart (220V)



(3) Input Current & Efficiency Characteristics

Condition Ta : 25

Vin		85V	110V	132V	170V	220V	264V
I _o	Load (min)	0.292A	0.268A	0.242A	0.243A	0.256A	0.255A
	Input Current						
Load (50%)	Efficiency	-	-	-	-	-	-
	Input Current	3.810A	3.060A	2.482A	2.004A	1.532A	1.327A
Load (100%)	Efficiency	72.67%	74.18%	75.30%	75.30%	76.22%	76.45%
	Input Current	8.410A	6.230A	5.170A	4.018A	3.030A	2.575A
Load (100%)	Efficiency	70.00%	72.46%	73.52%	74.73%	75.41%	75.98%
	Input Current						

2-2-1. CSF600-05 Output characteristics

(1) Oscilloscope : WAVE SURFER 454 (LeCroy), Electronic Load : EUL - 600XL
 CH2 : OUTPUT VOLTAGE - PP005A (Passive Voltage Probe)
 CH3 : OUTPUT CURRENT - Current Hole Sensor, PP005A (Passive Voltage Probe)
 Digital Multimeter : FLUKE189 (FLUKE)

(1) Line & Load Regulation Characteristics

Condition Ta : 25

V_{in} \ I_o	85V	110V	132V	170V	220V	264V	Line Regulation
Load (min)	5.004V	5.004V	5.004V	5.004V	5.004V	5.004V	0mV
Load (50%)	5.003V	5.003V	5.003V	5.003V	5.003V	5.003V	0mV
Load (100%)	5.002V	5.003V	5.003V	5.003V	5.003V	5.003V	1mV
Load Regulation	2mV	1mV	1mV	1mV	1mV	1mV	

(3) Dynamic Load Response Characteristics (100Hz)

V_{in} = 220V	I_o = 0~100% 100Hz	$+V_{PK} = 137\text{mV}$ (2.74%) $-V_{PK} = 182\text{mV}$ (3.62%)		CH2() 200mV/div 5ms/div CH3() 2V/div (50A/div) Current Hole Sensor HCS - 20 - 100 - AP (100A/4V)
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(4) Dynamic Load Response Characteristics (1KHz)

V_{in} = 220V	I_o = 0~100% 1kHz	$+V_{PK} = 88\text{mV}$ (1.76%) $-V_{PK} = 156\text{mV}$ (3.12%)		CH2() 200mV/div 500us/div CH3() 2V/div (50A/div) Current Hole Sensor HCS - 20 - 100 - AP (100A/4V)
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2-2-2. CSF600-05 Output characteristics

(1) Oscilloscope : WAVE SURFER 454 (LeCroy)

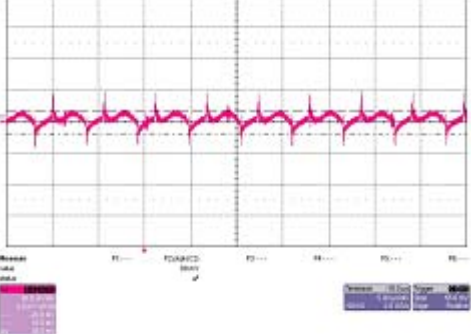
CH2 : BNC Cable 1.5m, 50 , Band Width : 200Mhz

CH1 : AC INPUT VOLTAGE - ADP305 (High Voltage Differential Probe)

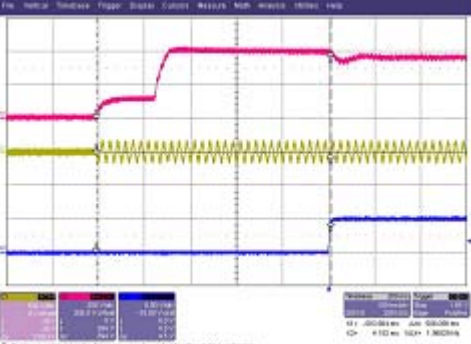
CH2 : PFC OUTPUT VOLTAGE - ADP305 (High Voltage Differential Probe)

CH3 : OUTPUT VOLTAGE - PP005A (Passive Voltage Probe)

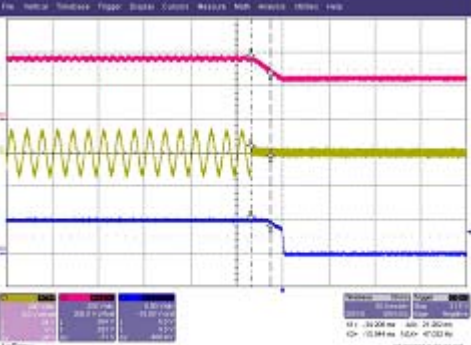
(1) Ripple & Noise characteristics.

<p>V_{in} = 220V</p>	<p>I_o = 100%</p>	<p>Ripple 36.5mV</p> <p>Ripple & Noise 89mV_{P-P}</p>		<p>CH2() 50mV/div 5us/div</p> <p>Terminal Elec - cap:47uF Film - cap:0.1uF</p>
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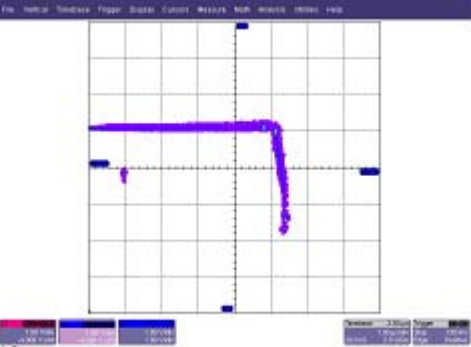
(2) Turn on time characteristics

<p>V_{in} = 85V</p>	<p>I_o = 100%</p>	<p>T_{on} = 508.0ms</p>		<p>CH1() 500V/div 100ms/div</p> <p>CH2() 200V/div 100ms/div</p> <p>CH3() 5V/div 100ms/div</p>
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(3) Hold up characteristics

<p>V_{in} = 85V</p>	<p>I_o = 100%</p>	<p>T_{off} = 21.26ms</p>		<p>CH1() 200V/div 50ms/div</p> <p>CH2() 200V/div 50ms/div</p> <p>CH3() 5V/div 50ms/div</p>
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(4) Over Current protection characteristics

<p>V_{in} = 220V</p>		<p>OCP=130[A] (130%)</p>		<p>X 1V/div (25A/div)</p> <p>Y 1V/div 1us/div</p> <p>Current Hole Sensor HCS - 20 - 100 - AP (100A/4V)</p>
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2-2-3. CSF600-05 Output characteristics

(1) Oscilloscope : WAVE SURFER 454 (LeCroy)
 CH2 : OUTPUT VOLTAGE - PP005A (Passive Voltage Probe)

(1) Over-voltage protection characteristics

<p>$V_{in} = 220V$</p>	<p>$I_o = 100\%$</p>	<p>OVP = 6.4[V] (128%)</p>		<p>CH2() 2V/div 100ms/div (+S, -S Open)</p>
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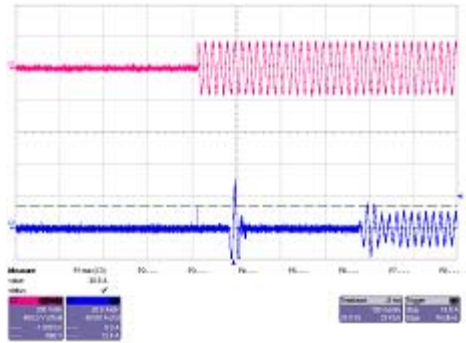
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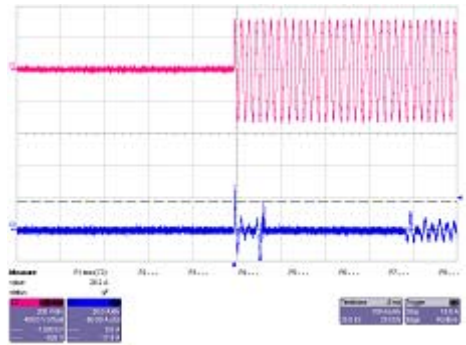
3-1-1. CSF600-09 Input characteristics

(1) Oscilloscope : WAVE PRO 7000 (LeCroy)
 CH2 : AC INPUT VOLTAGE - ADP305 (High Voltage Differential Probe)
 CH3 : AC INPUT CURRENT - AP015 (Current Probe)

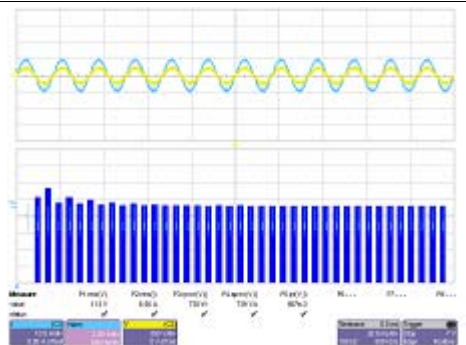
(1) Inrush Current Characteristics (110V)

$V_{in} = 110V$	$I_o = 100\%$	$I_{rush\ 1} = 13.4[A]$ $I_{rush\ 2} = 30.8[A]$		CH2() 200V/div 100ms/div CH3() 20A/div 100ms/div
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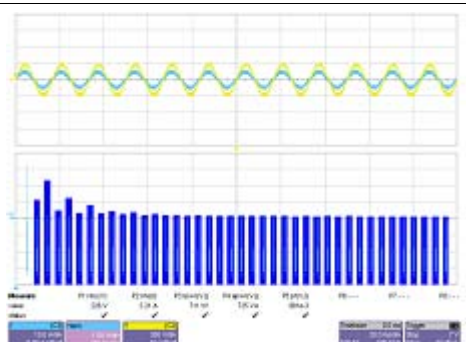
(2) Inrush Current Characteristics (220V)

$V_{in} = 220V$	$I_o = 100\%$	$I_{rush\ 1} = 28.2[A]$ $I_{rush\ 2} = 17.4[A]$		CH2() 200V/div 100ms/div CH3() 20A/div 100ms/div
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(3) Input Voltage & Current Characteristics (110V)

$V_{in} = 110V$	$I_o = 100\%$	$V_{rms} = 113[V]$ $I_{rms} = 6.56[A]$		CH2() 350V/div 20ms/div CH3() 5A/div 20ms/div
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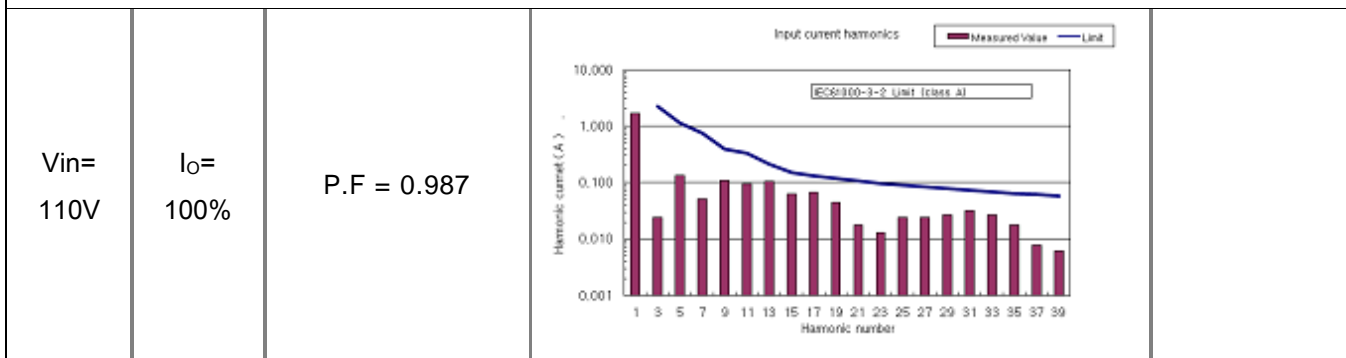
(4) Input Voltage & Current Characteristics (220V)

$V_{in} = 220V$	$I_o = 100\%$	$V_{rms} = 226[V]$ $I_{rms} = 3.21[A]$		CH2() 350V/div 20ms/div CH3() 5A/div 20ms/div
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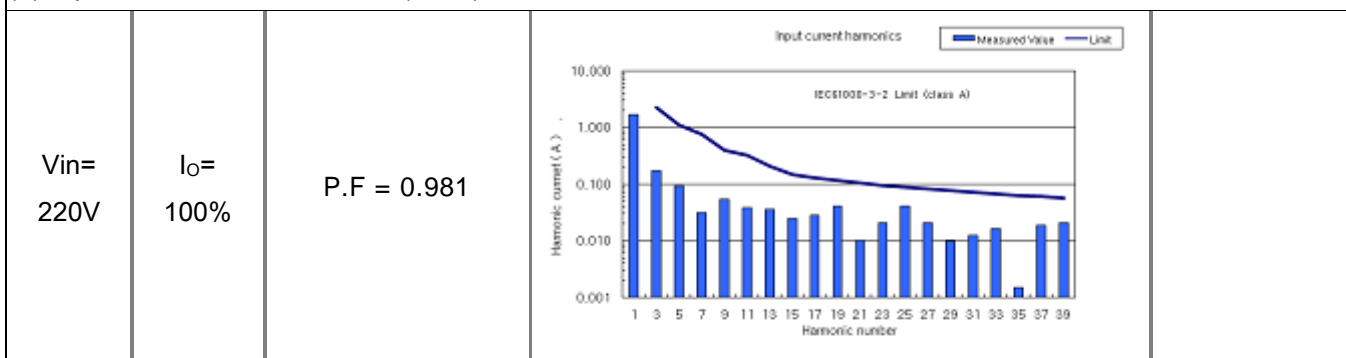
3-1-2. CSF600-09 Input characteristics

(1) Oscilloscope : WAVE PRO 7000 (LeCroy)
 CH2 : AC INPUT VOLTAGE - ADP305 (High Voltage Differential Probe)
 CH3 : AC INPUT CURRENT - AP015 (Current Probe)

(1) Input Line Harmonics Chart (110V)



(2) Input Line Harmonics Chart (220V)



(3) Input Current & Efficiency Characteristics

Condition Ta : 25

Vin		85V	110V	132V	170V	220V	264V
Io	Input Current	0.338A	0.274A	0.239A	0.215A	0.232A	0.243A
Load (min)	Efficiency	-	-	-	-	-	-
Load (50%)	Input Current	4.472A	3.197A	2.808A	2.170A	1.697A	1.435A
Load (50%)	Efficiency	77.94%	80.26%	80.70%	81.93%	82.47%	82.61%
Load (100%)	Input Current	9.190A	6.820A	5.600A	4.290A	3.300A	2.767A
Load (100%)	Efficiency	75.60%	78.99%	80.48%	82.02%	83.05%	83.51%

3-2-1. CSF600-09 Output characteristics

(1) Oscilloscope : WAVE PRO 7000 (LeCroy), Electronic Load : EUL - 600XL
 CH2 : OUTPUT VOLTAGE - PP005A (Passive Voltage Probe)
 CH3 : OUTPUT CURRENT - CP500 (Current Probe)
 Digital Multimeter : FLUKE189 (FLUKE)

(1) Line & Load Regulation Characteristics

Condition Ta : 25

I_o \ V_{in}	85V	110V	132V	170V	220V	264V	Line Regulation
Load (min)	9.007V	9.007V	9.006V	9.006V	9.007V	9.006V	1mV
Load (50%)	9.006V	9.006V	9.006V	9.006V	9.006V	9.006V	0mV
Load (100%)	9.005V	9.005V	9.005V	9.005V	9.005V	9.005V	0mV
Load Regulation	2mV	2mV	1mV	1mV	2mV	1mV	

(3) Dynamic Load Response Characteristics (100Hz)

$V_{in} = 220V$	$I_o = 0 \sim 100\%$ 100Hz	$+VPK = 81mV$ (0.90%) $-VPK = 132mV$ (1.46%)		CH2() 200mV/div 5ms/div CH3() 20A/div 5ms/div
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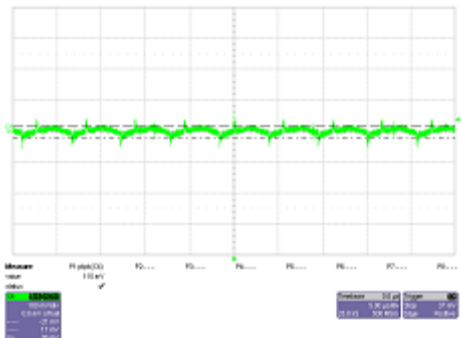
(4) Dynamic Load Response Characteristics (1KHz)

$V_{in} = 220V$	$I_o = 0 \sim 100\%$ 1kHz	$+VPK = 60mV$ (0.66%) $-VPK = 109mV$ (1.21%)		CH2() 200mV/div 500us/div CH3() 20A/div 500us/div
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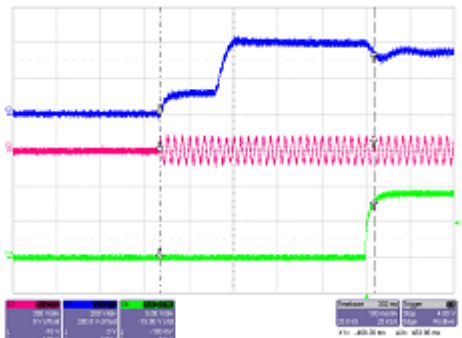
3-2-2. CSF600-09 Output characteristics

(1) Oscilloscope : WAVE PRO 7000 (LeCroy)
 CH4 : BNC Cable 1.5m, 50 Ω , Band Width : 200Mhz
 CH2 : AC INPUT VOLTAGE - ADP305 (High Voltage Differential Probe)
 CH3 : PFC OUTPUT VOLTAGE - ADP305 (High Voltage Differential Probe)
 CH4 : OUTPUT VOLTAGE - PP005A (Passive Voltage Probe)

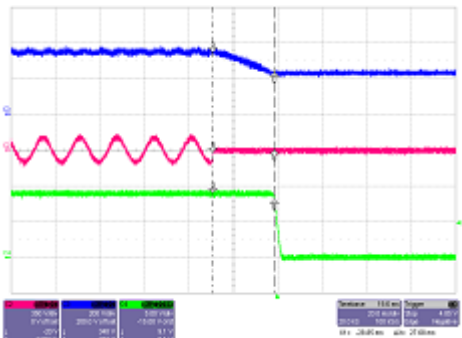
(1) Ripple & Noise characteristics.

<p>V_{in}= 220V</p>	<p>I_o=100%</p>	<p>Ripple 38mV</p> <p>Ripple & Noise 115mV_{P-P}</p>		<p>CH4() 100mV/div 5us/div</p> <p>Terminal Elec - cap:47uF Film - cap:0.1uF</p>
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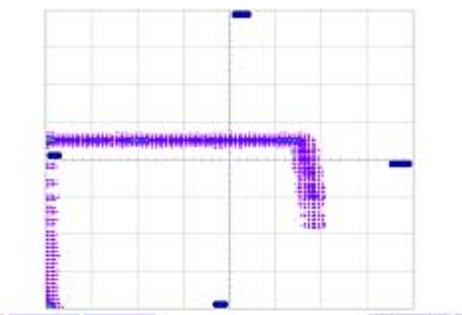
(2) Turn on time characteristics

<p>V_{in}= 85V</p>	<p>I_o=100%</p>	<p>T_{on} = 483.9ms</p>		<p>CH2() 350V/div 100ms/div</p> <p>CH3() 200V/div 100ms/div</p> <p>CH4() 5V/div 100ms/div</p>
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(3) Hold up characteristics

<p>V_{in}= 85V</p>	<p>I_o=100%</p>	<p>T_{off} = 27.68ms</p>		<p>CH2() 350V/div 20ms/div</p> <p>CH3() 200V/div 20ms/div</p> <p>CH4() 5V/div 20ms/div</p>
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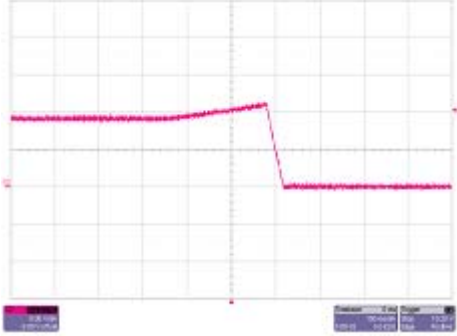
(4) Over Current protection characteristics

<p>V_{in}= 220V</p>		<p>OCP=87.0[A] (130%)</p>		<p>X 15A/div 500ns/div</p> <p>Y 2V/div 500ns/div</p>
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3-2-3. CSF600-09 Output characteristics

(1) Oscilloscope : WAVE PRO 7000 (LeCroy)
 CH2 : OUTPUT VOLTAGE - PP005A (Passive Voltage Probe)

(1) Over-voltage protection characteristics

$V_{in} = 220V$	$I_o = 100\%$	$OVP = 10.86[V]$ (120%)		CH2() 5V/div 100ms/div (+S, -S Open)

4-1-1. CSF600-12 Input characteristics

(1) Oscilloscope : WAVE SURFER 454 (LeCroy)
 CH1 : AC INPUT VOLTAGE - ADP305 (High Voltage Differential Probe)
 CH3 : AC INPUT CURRENT - AP015 (Current Probe)

(1) Inrush Current Characteristics (110V)

$V_{in} = 110V$	$I_o = 100\%$	$I_{rush\ 1} = 19.0[A]$ $I_{rush\ 2} = 31.9[A]$		CH1() 200V/div 100ms/div CH3() 20A/div 100ms/div
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(2) Inrush Current Characteristics (220V)

$V_{in} = 220V$	$I_o = 100\%$	$I_{rush\ 1} = 38.8[A]$ $I_{rush\ 2} = 24.0[A]$		CH1() 200V/div 100ms/div CH3() 20A/div 100ms/div
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(3) Input Voltage & Current Characteristics (110V)

$V_{in} = 110V$	$I_o = 100\%$	$V_{rms} = 112[V]$ $I_{rms} = 7.15[A]$		CH1() 350V/div 20ms/div CH2() 10A/div 20ms/div
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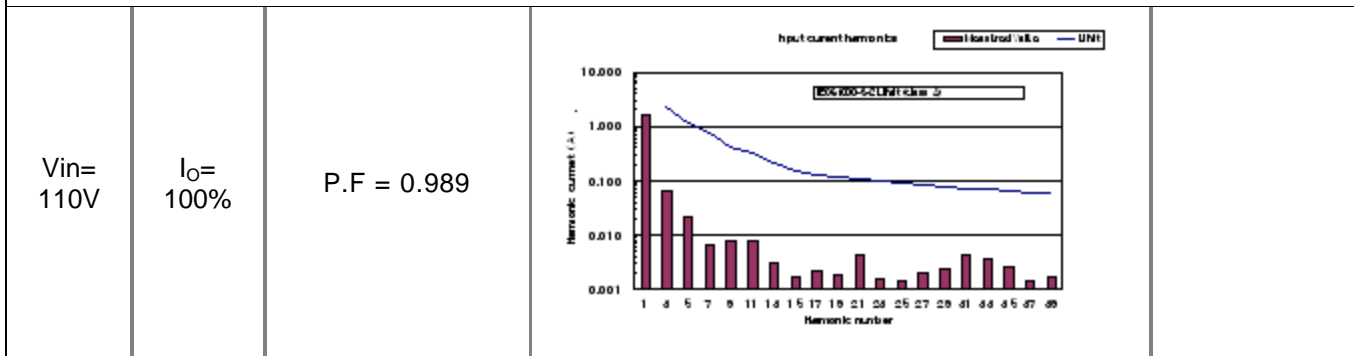
(4) Input Voltage & Current Characteristics (220V)

$V_{in} = 220V$	$I_o = 100\%$	$V_{rms} = 224[V]$ $I_{rms} = 3.40[A]$		CH1() 350V/div 20ms/div CH2() 10A/div 20ms/div
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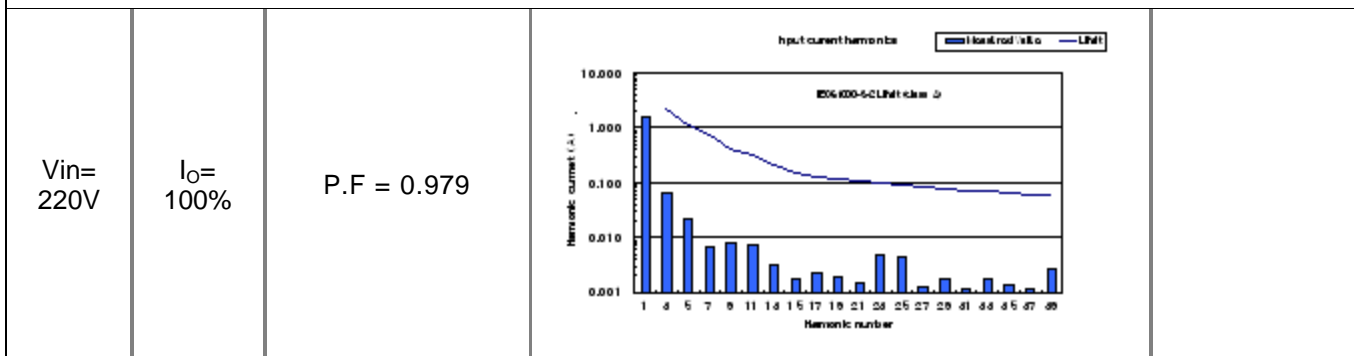
4-1-2. CSF600-12 Input characteristics

(1) Oscilloscope : WAVE PRO 7000 (LeCroy)
 CH1 : AC INPUT VOLTAGE - ADP305 (High Voltage Differential Probe)
 CH2 : AC INPUT CURRENT - AP015 (Current Probe)

(1) Input Line Harmonics Chart (110V)



(2) Input Line Harmonics Chart (220V)



(3) Input Current & Efficiency Characteristics

Condition Ta : 25

Io \ Vin		85V	110V	132V	170V	220V	264V
		85V	110V	132V	170V	220V	264V
Load (min)	Input Current	0.298A	0.278A	0.251A	0.254A	0.262A	0.257A
	Efficiency	-	-	-	-	-	-
Load (50%)	Input Current	4.360A	3.520A	2.880A	2.270A	1.761A	1.515A
	Efficiency	75.18%	77.12%	77.51%	78.32%	79.36%	79.28%
Load (100%)	Input Current	9.300A	7.280A	5.730A	4.410A	3.365A	2.845A
	Efficiency	75.28%	77.72%	79.36%	80.75%	81.63%	82.07%

4-2-1. CSF600-12 Output characteristics

(1) Oscilloscope : WAVE SURFER 454 (LeCroy), Electronic Load : EUL - 600XL
 CH2 : OUTPUT VOLTAGE - PP005A (Passive Voltage Probe)
 CH1 : OUTPUT CURRENT - Current Hole Sensor, PP005A (Passive Voltage Probe)
 Digital Multimeter : FLUKE189 (FLUKE)

(1) Line & Load Regulation Characteristics

Condition Ta : 25

V_{in} \ I_o	85V	110V	132V	170V	220V	264V	Line Regulation
Load (min)	11.997V	11.998V	11.997V	11.998V	11.997V	11.997V	1mV
Load (50%)	11.996V	11.996V	11.996V	11.996V	11.996V	11.996V	0mV
Load (100%)	11.996V	11.996V	11.996V	11.996V	11.996V	11.996V	0mV
Load Regulation	1mV	2mV	1mV	2mV	1mV	1mV	

(3) Dynamic Load Response Characteristics (100Hz)

V_{in} = 220V	I_o = 0~100% 100Hz	$+VPK = 131mV$ (1.09%) $-VPK = 224V$ (1.87%)		CH2() 200mV/div 5ms/div CH1() 1V/div (25A/div) Current Hole Sensor HCS-20-100-AP (100A/4V)
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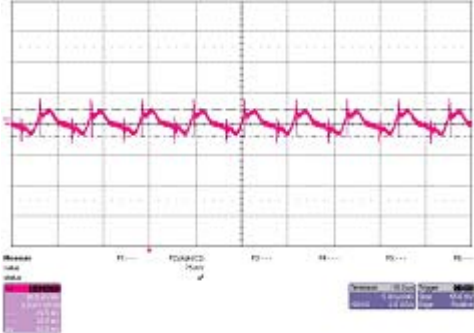
(4) Dynamic Load Response Characteristics (1KHz)

V_{in} = 220V	I_o = 0~100% 1kHz	$+VPK = 106mV$ (0.88%) $-VPK = 106mV$ (0.88%)		CH2() 200mV/div 500us/div CH1() 1V/div (25A/div) Current Hole Sensor HCS-20-100-AP (100A/4V)
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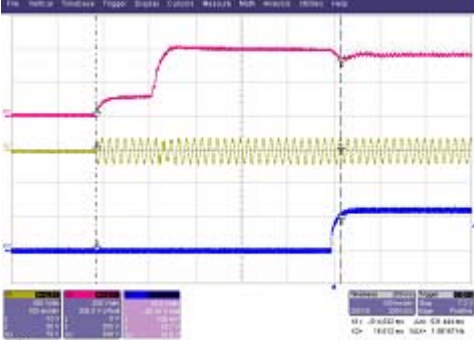
4-2-2. CSF600-12 Output characteristics

(1) Oscilloscope : WAVE SURFER 454 (LeCroy)
 CH2 : BNC Cable 1.5m, 50 , Band Width : 200Mhz
 CH1 : AC INPUT VOLTAGE - ADP305 (High Voltage Differential Probe)
 CH2 : PFC OUTPUT VOLTAGE - ADP305 (High Voltage Differential Probe)
 CH3 : OUTPUT VOLTAGE - PP005A (Passive Voltage Probe)

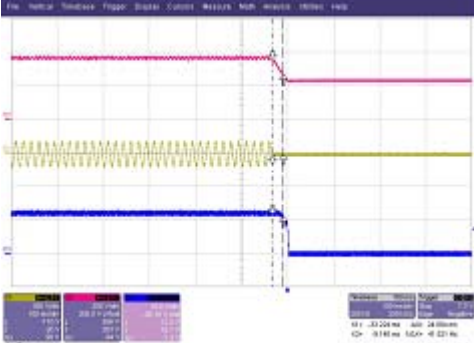
(1) Ripple & Noise characteristics.

<p>$V_{in}=220V$</p>	<p>$I_o=100\%$</p>	<p>Ripple 43mV</p> <p>Ripple & Noise 75mV_{P-P}</p>		<p>CH2() 50mV/div 5us/div</p> <p>Terminal Elec - cap:47uF Film - cap:0.1uF</p>
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(2) Turn on time characteristics

<p>$V_{in}=85V$</p>	<p>$I_o=100\%$</p>	<p>$T_{on} = 531.4ms$</p>		<p>CH1() 350V/div 100ms/div</p> <p>CH2() 200V/div 100ms/div</p> <p>CH3() 10V/div 100ms/div</p>
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(3) Hold up characteristics

<p>$V_{in}=85V$</p>	<p>$I_o=100\%$</p>	<p>$T_{off} = 24.08ms$</p>		<p>CH1() 350V/div 100ms/div</p> <p>CH2() 200V/div 100ms/div</p> <p>CH3() 10V/div 100ms/div</p>
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(4) Over Current protection characteristics

<p>$V_{in}=220V$</p>		<p>OCP=65[A] (130%)</p>		<p>X 0.5V/div (12.5A/div)</p> <p>Y 2V/div 10us/div</p> <p>Current Hole Sensor HCS - 20 - 100 - AP (100A/4V)</p>
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5-1-1. CSF600-15 Input characteristics

(1) Oscilloscope : WAVE PRO 7000 (LeCroy)
 CH2 : AC INPUT VOLTAGE - ADP305 (High Voltage Differential Probe)
 CH3 : AC INPUT CURRENT - AP015 (Current Probe)

(1) Inrush Current Characteristics (110V)

<p>$V_{in} = 110V$</p>	<p>$I_o = 100\%$</p>	<p>Inrush 1 = 12.6[A] Inrush 2 = 35.6[A]</p>		<p>CH2() 200V/div 100ms/div CH3() 20A/div 100ms/div</p>
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(2) Inrush Current Characteristics (220V)

<p>$V_{in} = 220V$</p>	<p>$I_o = 100\%$</p>	<p>Inrush 1 = 29.4[A] Inrush 2 = 13.0[A]</p>		<p>CH2() 200V/div 100ms/div CH3() 20A/div 100ms/div</p>
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(3) Input Voltage & Current Characteristics (110V)

<p>$V_{in} = 110V$</p>	<p>$I_o = 100\%$</p>	<p>$V_{rms} = 112[V]$ $I_{rms} = 6.66[A]$</p>		<p>CH2() 350V/div 20ms/div CH3() 10A/div 20ms/div</p>
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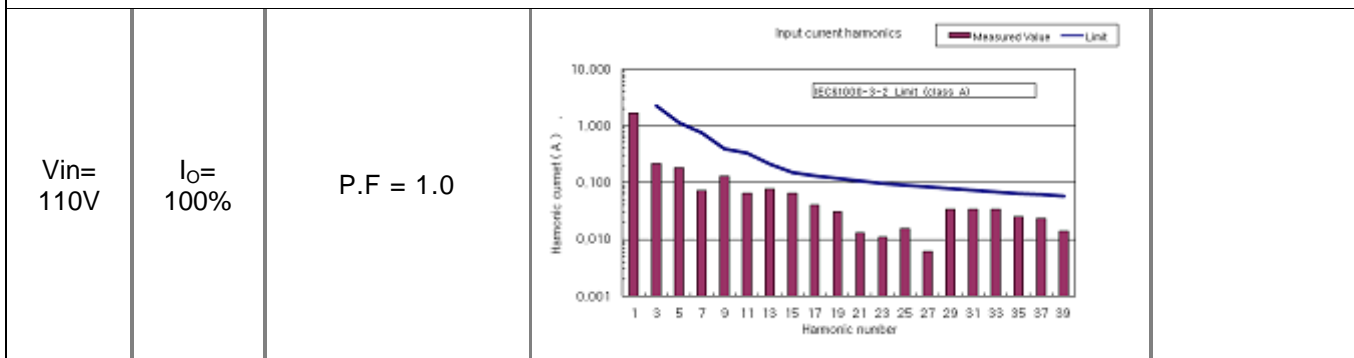
(4) Input Voltage & Current Characteristics (220V)

<p>$V_{in} = 220V$</p>	<p>$I_o = 100\%$</p>	<p>$V_{rms} = 226[V]$ $I_{rms} = 3.19[A]$</p>		<p>CH2() 350V/div 20ms/div CH3() 10A/div 20ms/div</p>
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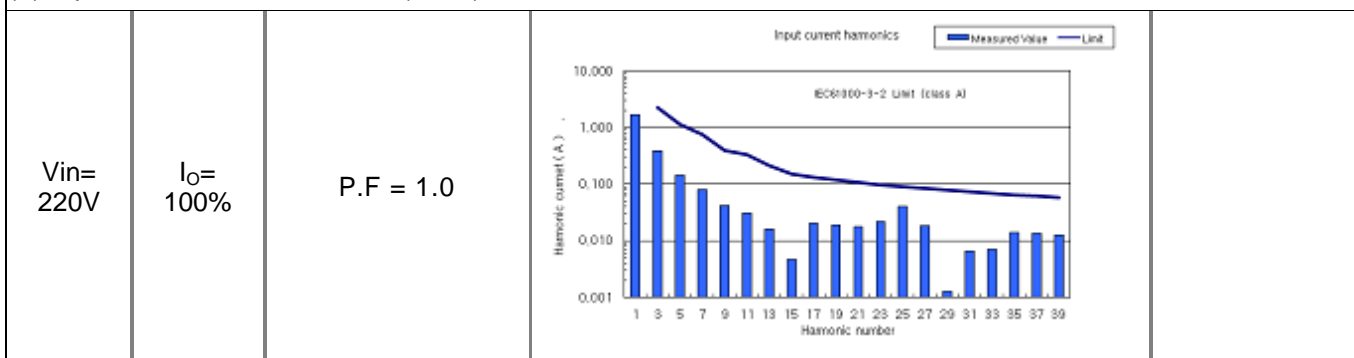
5-1-2. CSF600-15 Input characteristics

(1) Oscilloscope : WAVE PRO 7000 (LeCroy)
 CH2 : AC INPUT VOLTAGE - ADP305 (High Voltage Differential Probe)
 CH3 : AC INPUT CURRENT - AP015 (Current Probe)

(1) Input Line Harmonics Chart (110V)



(2) Input Line Harmonics Chart (220V)



(3) Input Current & Efficiency Characteristics

Condition Ta : 25

Vin		85V	110V	132V	170V	220V	264V
Load (min)	Input Current	0.387A	0.298A	0.267A	0.232A	0.233A	0.244A
	Efficiency	-	-	-	-	-	-
Load (50%)	Input Current	4.770A	3.620A	3.004A	2.328A	1.805A	1.534A
	Efficiency	73.62%	75.60%	75.98%	76.76%	77.58%	77.98%
Load (100%)	Input Current	9.320A	6.880A	5.670A	4.350A	3.350A	2.824A
	Efficiency	75.13%	78.26%	79.61%	81.01%	81.89%	82.34%

5-2-1. CSF600-15 Output characteristics

(1) Oscilloscope : WAVE PRO 7000 (LeCroy), Electronic Load : EUL - 600XL
 CH2 : OUTPUT VOLTAGE - PP005A (Passive Voltage Probe)
 CH3 : OUTPUT CURRENT - CP500 (Current Probe)
 Digital Multimeter : FLUKE189 (FLUKE)

(1) Line & Load Regulation Characteristics

Condition Ta : 25

I_o \ V_{in}	85V	110V	132V	170V	220V	264V	Line Regulation
Load (min)	15.009V	15.008V	15.006V	15.006V	15.006V	15.006V	3mV
Load (50%)	15.008V	15.008V	15.007V	15.007V	15.006V	15.006V	2mV
Load (100%)	15.009V	15.009V	15.008V	15.008V	15.007V	15.007V	2mV
Load Regulation	1mV	1mV	2mV	2mV	1mV	1mV	

(3) Dynamic Load Response Characteristics (100Hz)

$V_{in} = 220V$	$I_o = 0 \sim 100\%$ 100Hz	+VPK = 104mV (0.69%) -VPK = 158mV (1.05%)		CH2() 200mV/div 5ms/div CH3() 20A/div 5ms/div
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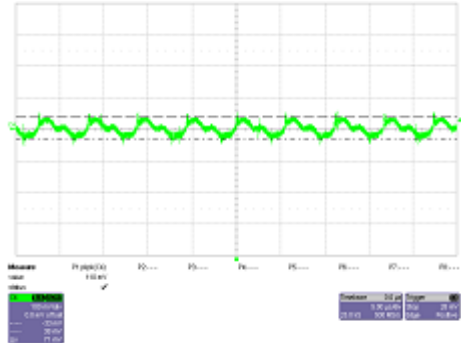
(4) Dynamic Load Response Characteristics (1KHz)

$V_{in} = 220V$	$I_o = 0 \sim 100\%$ 1kHz	+VPK = 81mV (0.54%) V -VPK = 96mV (0.64%)		CH2() 200mV/div 500us/div CH3() 20A/div 500us/div
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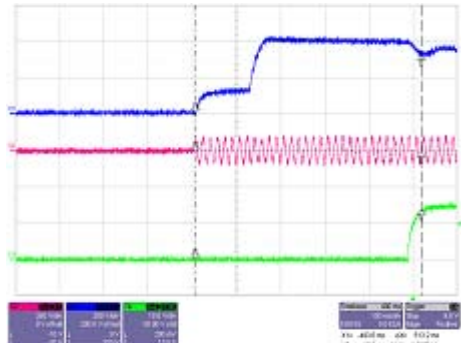
5-2-2. CSF600-15 Output characteristics

(1) Oscilloscope : WAVE PRO 7000 (LeCroy)
 CH4 : BNC Cable 1.5m, 50 Ω , Band Width : 200Mhz
 CH2 : AC INPUT VOLTAGE - ADP305 (High Voltage Differential Probe)
 CH3 : PFC OUTPUT VOLTAGE - ADP305 (High Voltage Differential Probe)
 CH4 : OUTPUT VOLTAGE - PP005A (Passive Voltage Probe)

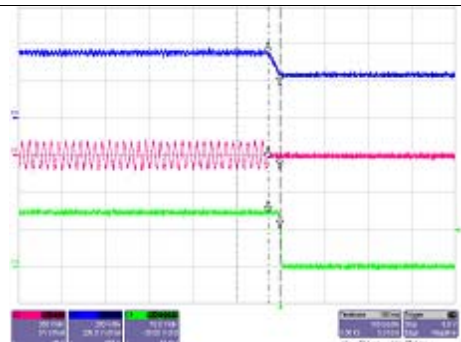
(1) Ripple & Noise characteristics.

<p>$V_{in}=220V$</p>	<p>$I_o=100\%$</p>	<p>Ripple 71mV</p> <p>Ripple & Noise 110mV_{P-P}</p>		<p>CH4() 100mV/div 5us/div</p> <p>Terminal Elec-cap:47uF Film-cap:0.1uF</p>
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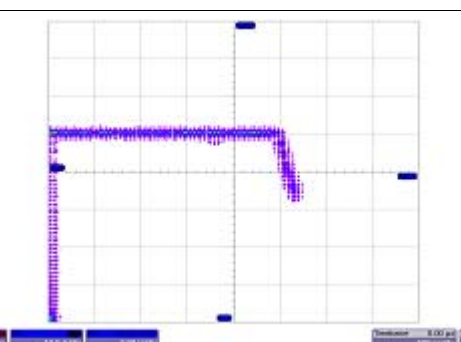
(2) Turn on time characteristics

<p>$V_{in}=85V$</p>	<p>$I_o=100\%$</p>	<p>$T_{on} = 513.2ms$</p>		<p>CH2() 350V/div 100ms/div</p> <p>CH3() 200V/div 100ms/div</p> <p>CH4() 10V/div 100ms/div</p>
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(3) Hold up characteristics

<p>$V_{in}=85V$</p>	<p>$I_o=100\%$</p>	<p>$T_{off} = 27.4ms$</p>		<p>CH2() 350V/div 100ms/div</p> <p>CH3() 200V/div 100ms/div</p> <p>CH4() 10V/div 100ms/div</p>
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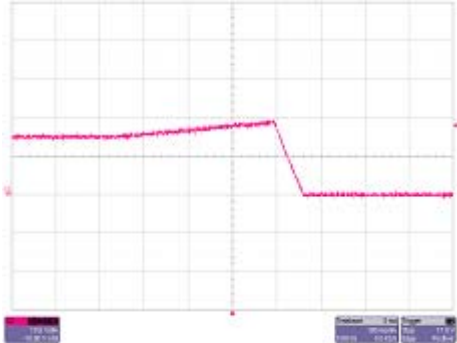
(4) Over Current protection characteristics

<p>$V_{in}=220V$</p>		<p>OCP=52.0[A] (130%)</p>		<p>X 10A/div 500ns/div</p> <p>Y 3V/div 500ns/div</p>
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5-2-3. CSF600-15 Output characteristics

(1) Oscilloscope : WAVE PRO 7000 (LeCroy)
 CH2 : OUTPUT VOLTAGE - PP005A (Passive Voltage Probe)


(1) Over-voltage protection characteristics

<p>V_{in} = 220V</p>	<p>I_o = 100%</p>	<p>OVP = 18.75[V] (125%)</p>		<p>CH2() 10V/div 100ms/div (+S, -S Open)</p>


6-1-1. CSF600-24 Input characteristics

(1) Oscilloscope : WAVE SURFER 454 (LeCroy)
 CH1 : AC INPUT VOLTAGE - ADP305 (High Voltage Differential Probe)
 CH2 : AC INPUT CURRENT - AP015 (Current Probe)


(1) Inrush Current Characteristics (110V)

<p>$V_{in} = 110V$</p> <p>$I_o = 100\%$</p>		<p>$I_{rush\ 1} = 17.0[A]$</p> <p>$I_{rush\ 2} = 30.0[A]$</p>		<p>CH1() 200V/div 100ms/div</p> <p>CH2() 20A/div 100ms/div</p>
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(2) Inrush Current Characteristics (220V)

<p>$V_{in} = 220V$</p> <p>$I_o = 100\%$</p>		<p>$I_{rush\ 1} = 37.5[A]$</p> <p>$I_{rush\ 2} = 29.0[A]$</p>		<p>CH1() 200V/div 100ms/div</p> <p>CH2() 20A/div 100ms/div</p>
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(3) Input Voltage & Current Characteristics (110V)

<p>$V_{in} = 110V$</p> <p>$I_o = 100\%$</p>		<p>$V_{rms} = 112[V]$</p> <p>$I_{rms} = 6.90[A]$</p>		<p>CH1() 350V/div 20ms/div</p> <p>CH2() 10A/div 20ms/div</p>
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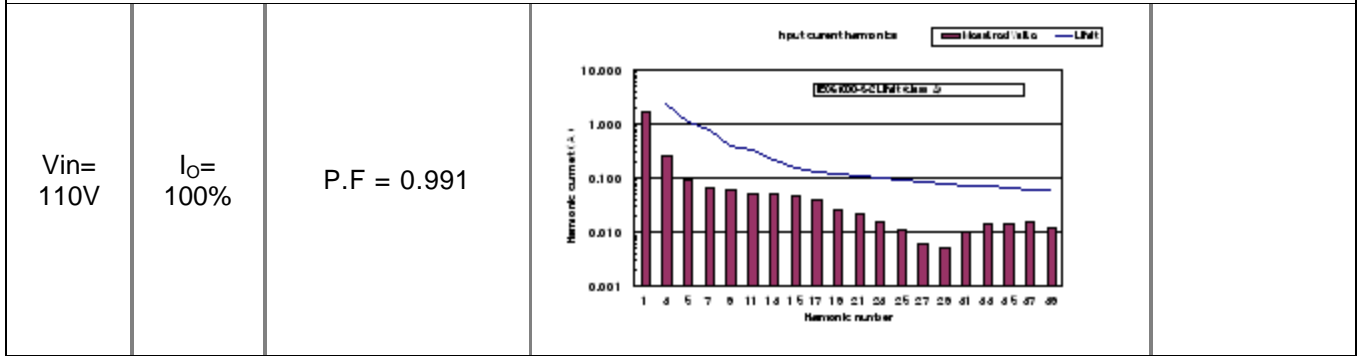
(4) Input Voltage & Current Characteristics (220V)

<p>$V_{in} = 220V$</p> <p>$I_o = 100\%$</p>		<p>$V_{rms} = 224[V]$</p> <p>$I_{rms} = 3.29[A]$</p>		<p>CH1() 350V/div 20ms/div</p> <p>CH2() 10A/div 20ms/div</p>
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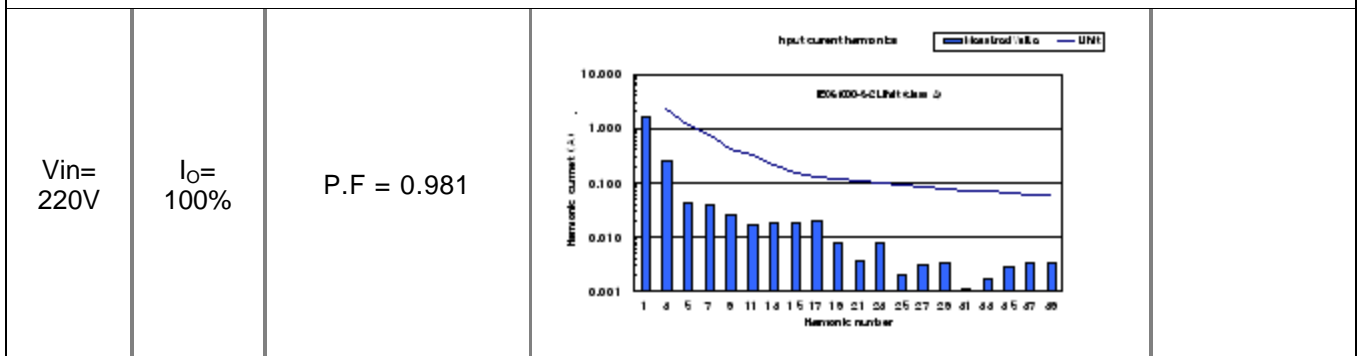
6-1-2. CSF600-24 Input characteristics

(1) Oscilloscope : WAVE PRO 7000 (LeCroy)
 CH1 : AC INPUT VOLTAGE - ADP305 (High Voltage Differential Probe)
 CH2 : AC INPUT CURRENT - AP015 (Current Probe)

(1) Input Line Harmonics Chart (110V)



(2) Input Line Harmonics Chart (220V)



(3) Input Current & Efficiency Characteristics

Condition Ta : 25

Vin		85V	110V	132V	170V	220V	264V
Load (min)	Input Current	0.293A	0.241A	0.209A	0.208A	0.220A	0.236A
	Efficiency	-	-	-	-	-	-
Load (50%)	Input Current	4.630A	3.450A	2.880A	2.220A	1.730A	1.478A
	Efficiency	76.12%	78.71%	78.78%	79.78%	80.42%	80.92%
Load (100%)	Input Current	9.160A	6.730A	5.590A	4.260A	3.270A	2.770A
	Efficiency	77.02%	79.89%	81.19%	82.64%	83.56%	84.03%

6-2-1. CSF600-24 Output characteristics

(1) Oscilloscope : WAVE SURFER 454 (LeCroy), Electronic Load : EUL - 600XL
 CH2 : OUTPUT VOLTAGE - PP005A (Passive Voltage Probe)
 CH3 : OUTPUT CURRENT - Current Hole Sensor, PP005A (Passive Voltage Probe)
 Digital Multimeter : FLUKE189 (FLUKE)

(1) Line & Load Regulation Characteristics

Condition Ta : 25

V_{in} \ I_o	85V	110V	132V	170V	220V	264V	Line Regulation
Load (min)	24.059V	24.059V	24.063V	24.062V	24.063V	24.061V	4mV
Load (50%)	24.057V	24.059V	24.061V	24.060V	24.062V	24.061V	5mV
Load (100%)	24.059V	24.060V	24.061V	24.060V	24.061V	24.061V	2mV
Load Regulation	2mV	1mV	2mV	2mV	2mV	0mV	

(3) Dynamic Load Response Characteristics (100Hz)

$V_{in} = 220V$	$I_o = 0 \sim 100\%$ 100Hz	+VPK = 180mV (0.75%) -VPK = 320mV (1.30%)		CH2() 500mV/div 5ms/div CH1() 500mV/div (12.5A/div) Current Hole Sensor HCS-20-100-AP (100A/4V)
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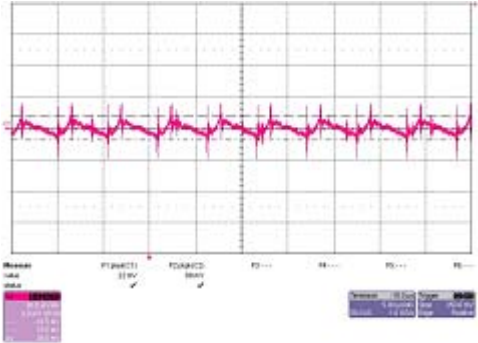
(4) Dynamic Load Response Characteristics (1KHz)

$V_{in} = 220V$	$I_o = 0 \sim 100\%$ 1kHz	+VPK = 170mV (0.70%) -VPK = 220mV (0.91%)		CH2() 500mV/div 500us/div CH1() 500mV/div (12.5A/div) Current Hole Sensor HCS-20-100-AP (100A/4V)
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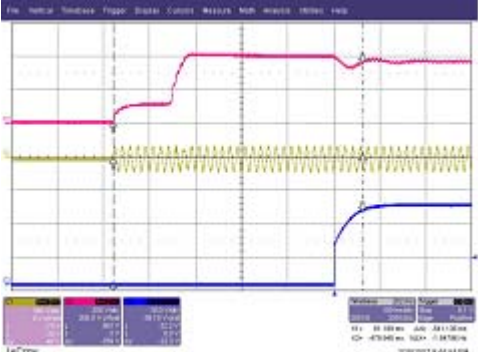
6-2-2. CSF600-24 Output characteristics

(1) Oscilloscope : WAVE SURFER 454 (LeCroy)
 CH2 : BNC Cable 1.5m, 50 , Band Width : 200Mhz
 CH1 : AC INPUT VOLTAGE - ADP305 (High Voltage Differential Probe)
 CH2 : PFC OUTPUT VOLTAGE - ADP305 (High Voltage Differential Probe)
 CH3 : OUTPUT VOLTAGE - PP005A (Passive Voltage Probe)

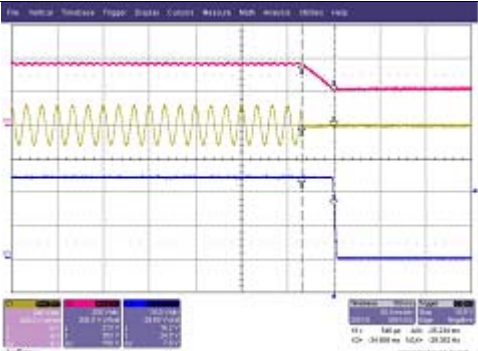
(1) Ripple & Noise characteristics.

<p>$V_{in}=220V$</p>	<p>$I_o=100\%$</p>	<p>Ripple 38mV</p> <p>Ripple & Noise 89mV_{P-P}</p>		<p>CH2() 50mV/div 5us/div</p> <p>Terminal Elec - cap:47uF Film - cap:0.1uF</p>
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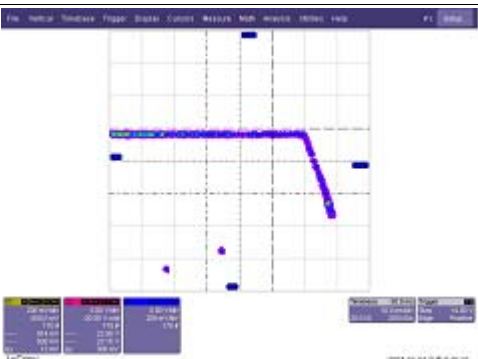
(2) Turn on time characteristics

<p>$V_{in}=85V$</p>	<p>$I_o=100\%$</p>	<p>$T_{on} = 541.1ms$</p>		<p>CH1() 350V/div 100ms/div</p> <p>CH2() 200V/div 100ms/div</p> <p>CH3() 10V/div 100ms/div</p>
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(3) Hold up characteristics

<p>$V_{in}=85V$</p>	<p>$I_o=100\%$</p>	<p>$T_{off} = 35.23ms$</p>		<p>CH1() 200V/div 50ms/div</p> <p>CH2() 200V/div 50ms/div</p> <p>CH3() 10V/div 50ms/div</p>
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(4) Over Current protection characteristics

<p>$V_{in}=220V$</p>		<p>OCP=31[A] (124%)</p>		<p>X 0.2V/div (5A/div)</p> <p>Y 5V/div 10ms/div</p> <p>Current Hole Sensor HCS-20-100-AP (100A/4V)</p>
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6-2-3. CSF600-24 Output characteristics

(1) Oscilloscope : WAVE SURFER 454 (LeCroy)
 CH2 : OUTPUT VOLTAGE - PP005A (Passive Voltage Probe)

(1) Over-voltage protection characteristics

<p>Vin= 220V</p>	<p>I_o= 100%</p>	<p>OVP =30.1[V] (131%)</p>		<p>CH3() 10V/div 1s/div</p> <p>(+S, -S Open)</p>
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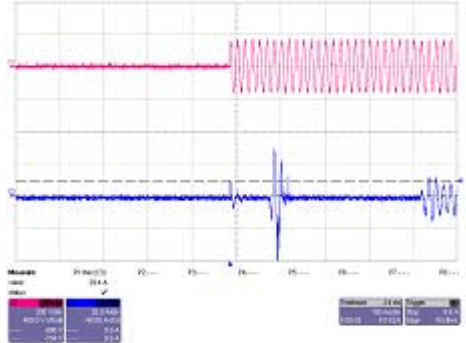
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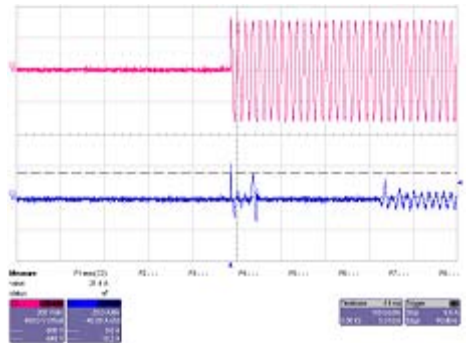
7-1-1. CSF600-28 Input characteristics

(1) Oscilloscope : WAVE PRO 7000 (LeCroy)
 CH2 : AC INPUT VOLTAGE - ADP305 (High Voltage Differential Probe)
 CH3 : AC INPUT CURRENT - AP015 (Current Probe)

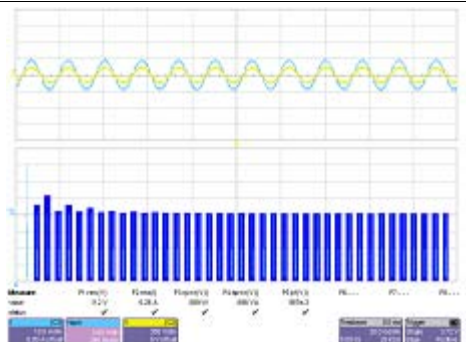
(1) Inrush Current Characteristics (110V)

<p>$V_{in} = 110V$</p>	<p>$I_o = 100\%$</p>	<p>Irush 1 = 9.6[A] Irush 2 = 29.4[A]</p>		<p>CH2() 200V/div 100ms/div</p> <p>CH3() 20A/div 100ms/div</p>
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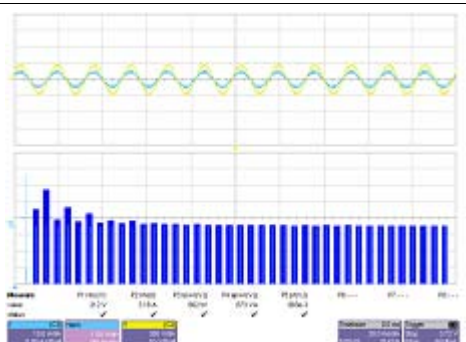
(2) Inrush Current Characteristics (220V)

<p>$V_{in} = 220V$</p>	<p>$I_o = 100\%$</p>	<p>Irush 1 = 21.4[A] Irush 2 = 15.2[A]</p>		<p>CH2() 200V/div 100ms/div</p> <p>CH3() 20A/div 100ms/div</p>
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(3) Input Voltage & Current Characteristics (110V)

<p>$V_{in} = 110V$</p>	<p>$I_o = 100\%$</p>	<p>$V_{rms} = 112[V]$ $I_{rms} = 6.26[A]$</p>		<p>CH2() 350V/div 20ms/div</p> <p>CH3() 10A/div 20ms/div</p>
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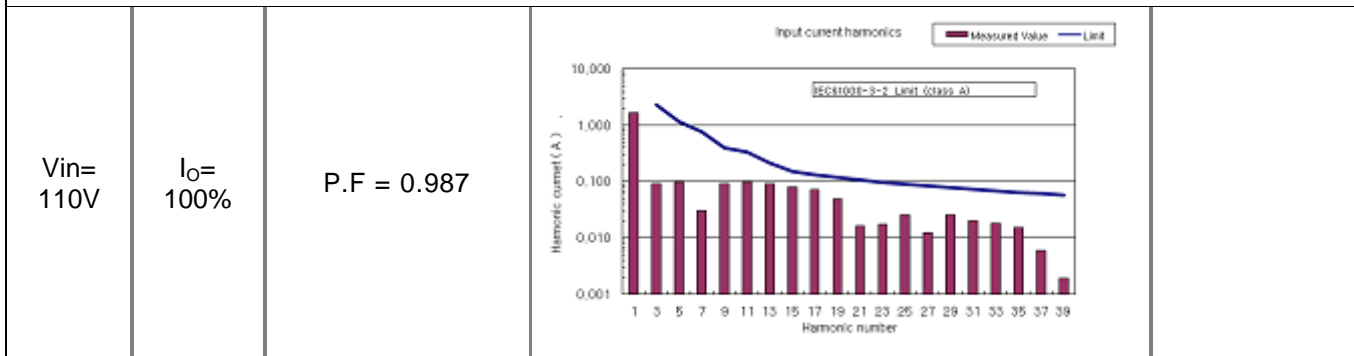
(4) Input Voltage & Current Characteristics (220V)

<p>$V_{in} = 220V$</p>	<p>$I_o = 100\%$</p>	<p>$V_{rms} = 212[V]$ $I_{rms} = 3.18[A]$</p>		<p>CH2() 350V/div 20ms/div</p> <p>CH3() 10A/div 20ms/div</p>
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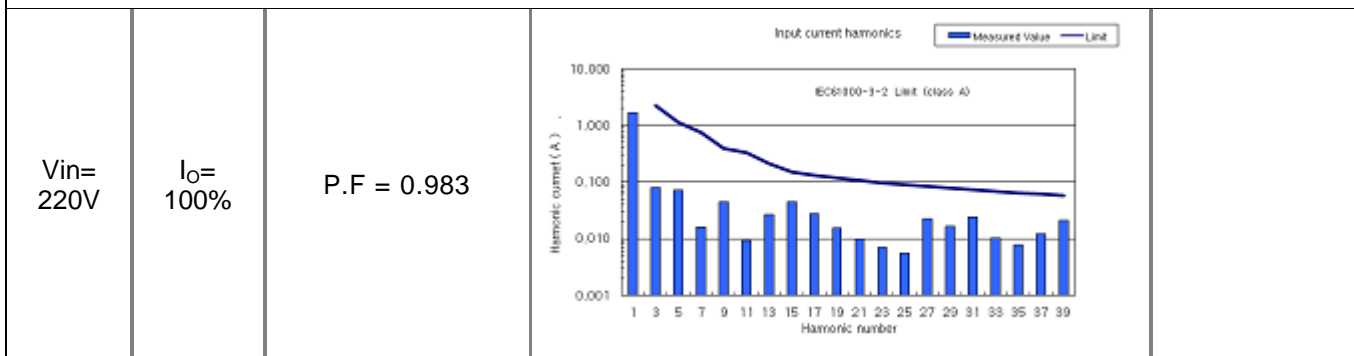
7-1-2. CSF600-28 Input characteristics

(1) Oscilloscope : WAVE PRO 7000 (LeCroy)
 CH2 : AC INPUT VOLTAGE - ADP305 (High Voltage Differential Probe)
 CH3 : AC INPUT CURRENT - AP015 (Current Probe)

(1) Input Line Harmonics Chart (110V)



(2) Input Line Harmonics Chart (220V)



(3) Input Current & Efficiency Characteristics

Condition Ta : 25

Vin		85V	110V	132V	170V	220V	264V
Load (min)	Input Current	0.351A	0.284A	0.246A	0.228A	0.240A	0.249A
	Efficiency	-	-	-	-	-	-
Load (50%)	Input Current	4.593A	3.502A	2.899A	2.221A	1.715A	1.454A
	Efficiency	75.80%	77.42%	78.23%	79.48%	80.89%	81.77%
Load (100%)	Input Current	8.920A	6.680A	5.530A	4.230A	3.220A	2.701A
	Efficiency	77.82%	80.44%	81.64%	83.11%	84.64%	85.73%

7-2-1. CSF600-28 Output characteristics

(1) Oscilloscope : WAVE PRO 7000 (LeCroy), Electronic Load : EUL - 600XL
 CH2 : OUTPUT VOLTAGE - PP005A (Passive Voltage Probe)
 CH3 : OUTPUT CURRENT - CP500 (Current Probe)
 Digital Multimeter : FLUKE189 (FLUKE)

(1) Line & Load Regulation Characteristics

Condition Ta : 25

I_o \ V_{in}	85V	110V	132V	170V	220V	264V	Line Regulation
Load (min)	28.005V	28.005V	28.004V	28.005V	28.004V	28.005V	1mV
Load (50%)	28.004V	28.005V	28.004V	28.004V	28.003V	28.004V	2mV
Load (100%)	28.004V	28.004V	28.004V	28.004V	28.004V	28.003V	1mV
Load Regulation	1mV	1mV	0mV	1mV	1mV	2mV	

(3) Dynamic Load Response Characteristics (100Hz)

$V_{in} = 220V$	$I_o = 0 \sim 100\%$ 100Hz	+VPK = 304mV (1.08%) -VPK = 293mV (1.04%)		CH2() 500mV/div 5ms/div CH3() 10A/div 5ms/div
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(4) Dynamic Load Response Characteristics (1KHz)

$V_{in} = 220V$	$I_o = 0 \sim 100\%$ 1kHz	+VPK = 260mV (0.92%) V -VPK = 227mV (0.81%)		CH2() 500mV/div 500us/div CH3() 10A/div 500us/div
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7-2-2. CSF600-28 Output characteristics

(1) Oscilloscope : WAVE PRO 7000 (LeCroy)

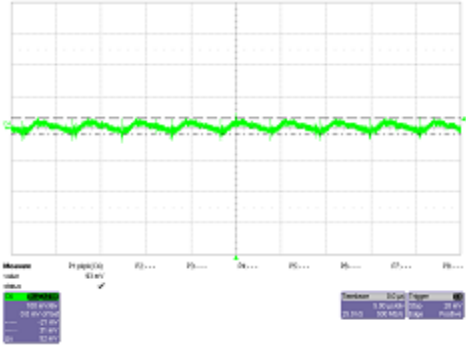
CH4 : BNC Cable 1.5m, 50 Ω , Band Width : 200Mhz

CH2 : AC INPUT VOLTAGE - ADP305 (High Voltage Differential Probe)

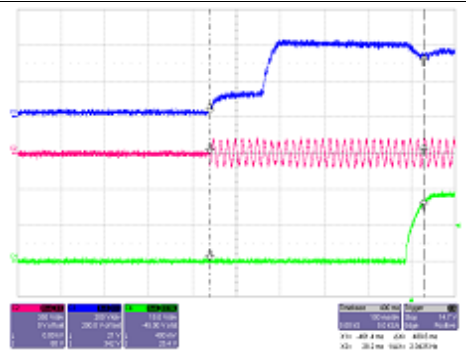
CH3 : PFC OUTPUT VOLTAGE - ADP305 (High Voltage Differential Probe)

CH4 : OUTPUT VOLTAGE - PP005A (Passive Voltage Probe)

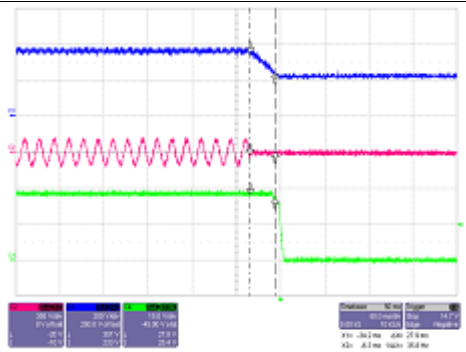
(1) Ripple & Noise characteristics.

<p>V_{in}= 220V</p>	<p>I_o=100%</p>	<p>Ripple 52mV</p> <p>Ripple & Noise 93mV_{P-P}</p>		<p>CH4() 100mV/div 5us/div</p> <p>Terminal Elec - cap:47uF Film - cap:0.1uF</p>
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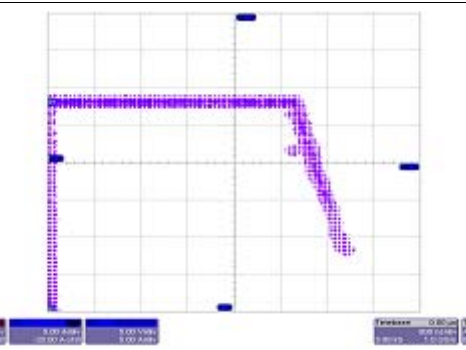
(2) Turn on time characteristics

<p>V_{in}= 85V</p>	<p>I_o=100%</p>	<p>T_{on} = 489.6ms</p>		<p>CH2() 350V/div 100ms/div</p> <p>CH3() 200V/div 100ms/div</p> <p>CH4() 15V/div 100ms/div</p>
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(3) Hold up characteristics

<p>V_{in}= 85V</p>	<p>I_o=100%</p>	<p>T_{off} = 27.9ms</p>		<p>CH2() 350V/div 100ms/div</p> <p>CH3() 200V/div 100ms/div</p> <p>CH4() 15V/div 100ms/div</p>
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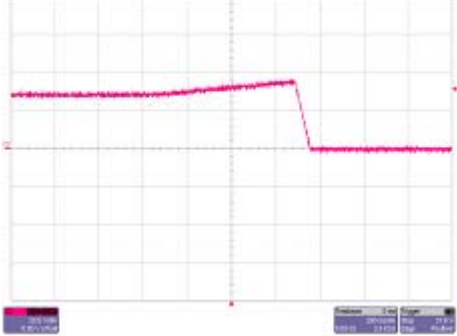
(4) Over Current protection characteristics

<p>V_{in}= 220V</p>		<p>OCP=28.0[A] (130%)</p>		<p>X 5A/div 500ns/div</p> <p>Y 5V/div 500ns/div</p>
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7-2-3. CSF600-28 Output characteristics

(1) Oscilloscope : WAVE PRO 7000 (LeCroy)
 CH2 : OUTPUT VOLTAGE - PP005A (Passive Voltage Probe)

(1) Over-voltage protection characteristics

<p>V_{in} = 220V</p>	<p>I_o = 100%</p>	<p>OVP = 34.8[V] (124%)</p>		<p>CH2() 20V/div 200ms/div (+S, -S Open)</p>

8-1-1. CSF600-48 Input characteristics

(1) Oscilloscope : WAVE SURFER 454 (LeCroy)
 CH1 : AC INPUT VOLTAGE - ADP305 (High Voltage Differential Probe)
 CH3 : AC INPUT CURRENT - AP015 (Current Probe)

(1) Inrush Current Characteristics (110V)

<p>$V_{in} = 110V$</p>	<p>$I_o = 100\%$</p>	<p>Irush 1 = 19.0[A] Irush 2 = 41.9[A]</p>		<p>CH1() 200V/div 100ms/div CH3() 20A/div 100ms/div</p>
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(2) Inrush Current Characteristics (220V)

<p>$V_{in} = 220V$</p>	<p>$I_o = 100\%$</p>	<p>Irush 1 = 39.4[A] Irush 2 = 26.4[A]</p>		<p>CH1() 200V/div 100ms/div CH3() 20A/div 100ms/div</p>
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(3) Input Voltage & Current Characteristics (110V)

<p>$V_{in} = 110V$</p>	<p>$I_o = 100\%$</p>	<p>$V_{rms} = 112[V]$ $I_{rms} = 6.84[A]$</p>		<p>CH1() 350V/div 20ms/div CH2() 10A/div 20ms/div</p>
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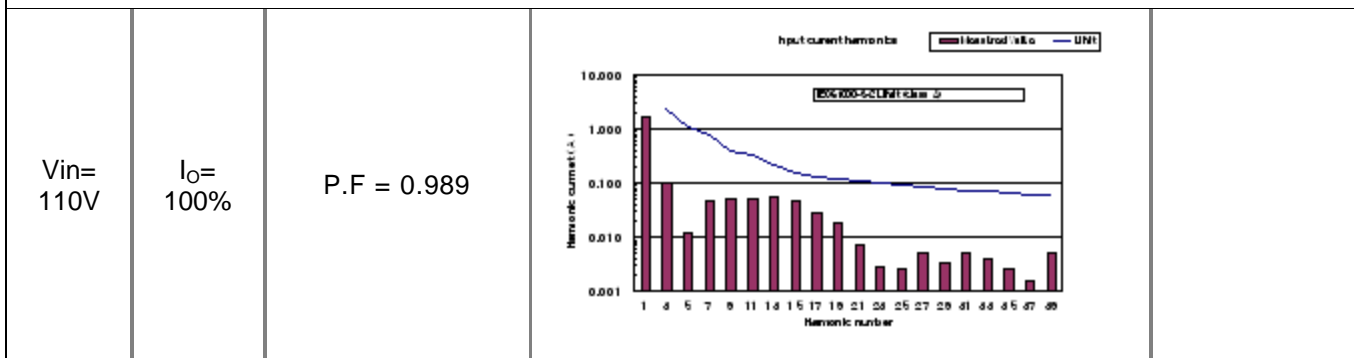
(4) Input Voltage & Current Characteristics (220V)

<p>$V_{in} = 220V$</p>	<p>$I_o = 100\%$</p>	<p>$V_{rms} = 225[V]$ $I_{rms} = 3.25[A]$</p>		<p>CH1() 350V/div 20ms/div CH2() 10A/div 20ms/div</p>
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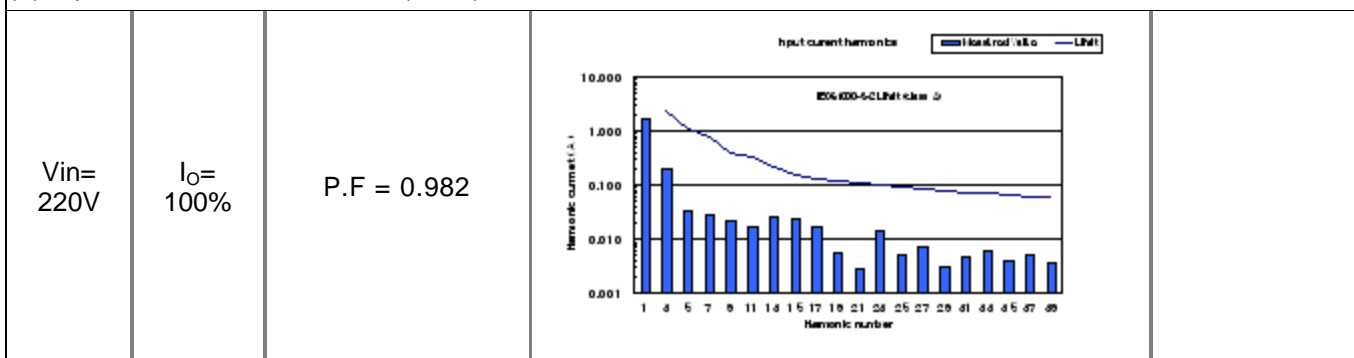
8-1-2. CSF600-48 Input characteristics

(1) Oscilloscope : WAVE PRO 7000 (LeCroy)
 CH1 : AC INPUT VOLTAGE - ADP305 (High Voltage Differential Probe)
 CH2 : AC INPUT CURRENT - AP015 (Current Probe)

(1) Input Line Harmonics Chart (110V)



(2) Input Line Harmonics Chart (220V)



(3) Input Current & Efficiency Characteristics

Condition Ta : 25

Io \ Vin		85V	110V	132V	170V	220V	264V
		85V	110V	132V	170V	220V	264V
Load (min)	Input Current	0.267A	0.222A	0.194A	0.202A	0.210A	0.226A
	Efficiency	-	-	-	-	-	-
Load (50%)	Input Current	4.616A	3.400A	2.854A	2.200A	1.718A	1.470A
	Efficiency	76.78%	79.16%	79.26%	80.21%	80.95%	81.27%
Load (100%)	Input Current	8.970A	6.650A	5.480A	4.190A	3.236A	2.712A
	Efficiency	78.74%	81.52%	82.87%	84.27%	85.10%	85.47%

8-2-1. CSF600-48 Output characteristics

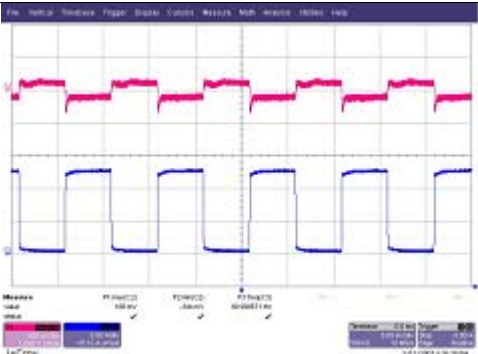
(1) Oscilloscope : WAVE SURFER 454 (LeCroy), Electronic Load : EUL - 600XL
 CH2 : OUTPUT VOLTAGE - PP005A (Passive Voltage Probe)
 CH3 : OUTPUT CURRENT - AP015 (Current Probe)
 Digital Multimeter : FLUKE189 (FLUKE)

(1) Line & Load Regulation Characteristics

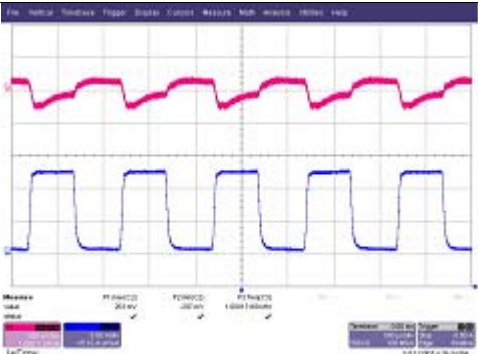
Condition Ta : 25

V_{in} \ I_o	85V	110V	132V	170V	220V	264V	Line Regulation
Load (min)	48.034V	48.034V	48.034V	48.033V	48.034V	48.030V	4mV
Load (50%)	48.027V	48.025V	48.027V	48.027V	48.027V	48.024V	3mV
Load (100%)	48.027V	48.026V	48.028V	48.027V	48.027V	48.025V	3mV
Load Regulation	7mV	9mV	7mV	6mV	7mV	6mV	

(3) Dynamic Load Response Characteristics (100Hz)

$V_{in}=220V$	$I_o=0\sim 100\%$ 100Hz	$+VPK = 182mV$ (0.37%) $-VPK = 303mV$ (0.63%)		CH2() 500mV/div 5ms/div CH3() 5A/div 5ms/div
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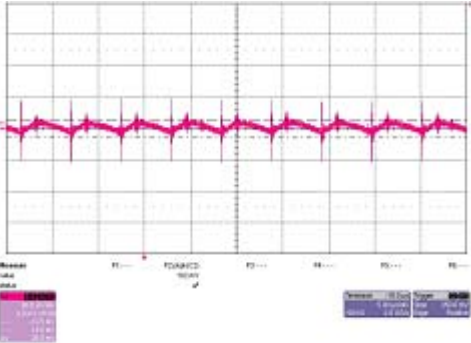
(4) Dynamic Load Response Characteristics (1KHz)

$V_{in}=220V$	$I_o=0\sim 100\%$ 1kHz	$+VPK = 166mV$ (0.34%) $-VPK = 240mV$ (0.34%)		CH2() 500mV/div 500us/div CH3() 5A/div 500us/div
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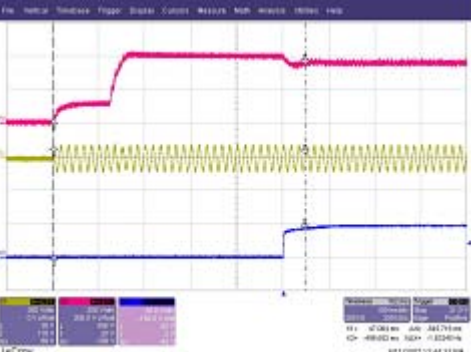
8-2-2. CSF600-48 Output characteristics

(1) Oscilloscope : WAVE SURFER 454 (LeCroy)
 CH2 : BNC Cable 1.5m, 50 , Band Width : 200Mhz
 CH1 : AC INPUT VOLTAGE - ADP305 (High Voltage Differential Probe)
 CH2 : PFC OUTPUT VOLTAGE - ADP305 (High Voltage Differential Probe)
 CH3 : OUTPUT VOLTAGE - PP005A (Passive Voltage Probe)

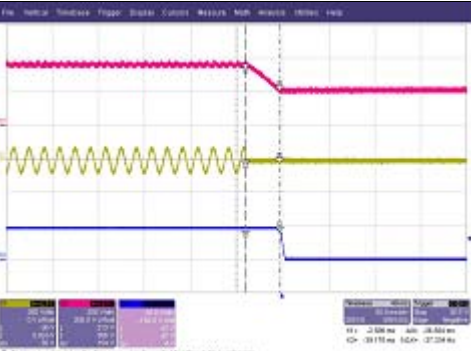
(1) Ripple & Noise characteristics.

<p>V_{in}= 220V</p>	<p>I_o=100%</p>	<p>Ripple 26.5mV</p> <p>Ripple & Noise 102mV_{P-P}</p>		<p>CH2() 50mV/div 5us/div</p> <p>Terminal Elec - cap:47uF Film - cap:0.1uF</p>
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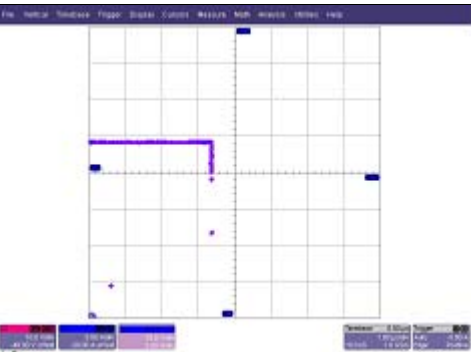
(2) Turn on time characteristics

<p>V_{in}= 85V</p>	<p>I_o=100%</p>	<p>T_{on} = 545.7ms</p>		<p>CH1() 350V/div 100ms/div</p> <p>CH2() 200V/div 100ms/div</p> <p>CH3() 50V/div 100ms/div</p>
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(3) Hold up characteristics

<p>V_{in}= 85V</p>	<p>I_o=100%</p>	<p>T_{off} = 36.58ms</p>		<p>CH1() 350V/div 50ms/div</p> <p>CH2() 200V/div 50ms/div</p> <p>CH3() 50V/div 50ms/div</p>
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(4) Over Current protection characteristics

<p>V_{in}= 220V</p>		<p>OCP=16.5[A] (132%)</p>		<p>X 5A/div 1us/div</p> <p>Y 10V/div 1us/div</p>
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