

귀중

Evaluation Data

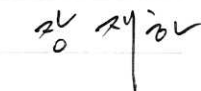
품 목	SMPS
품 명	CSF30-DE,DW
Rev. No.	A

2008 년 06 월 27 일

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Evaluation data

1. CSF30-DD

1. Input characteristics
 - . Inrush Current Characteristics
 - . Input Current & Efficiency Characteristics
2. Output characteristics
 - . Line & Load Regulation Characteristics
 - . Dynamic Load Response Characteristics
 - . Ripple & Noise Characteristics
 - . Turn on Time Characteristics
 - . Hold up Time Characteristics
 - . Over Current Protection Characteristics
 - . Over Voltage Protection Characteristics

2. CSF30-EE

1. Input characteristics
2. Output characteristics

3. CSF30-BDW

1. Input characteristics
2. Output characteristics

4. CSF30-BHW

1. Input characteristics
2. Output characteristics

5. CSF30-BBW

1. Input characteristics
2. Output characteristics

6. CSF30-DDW

1. Input characteristics
2. Output characteristics

7. CSF30-EEW

1. Input characteristics
2. Output characteristics

1-1. CSF30-DD Input characteristics

(1) Oscilloscope : Wave Surfer 454(LeCroy)

CH3 : INPUT VOLTAGE - ADP300 High voltage differential probe

CH2 : INPUT CURRENT - AP015 current probe

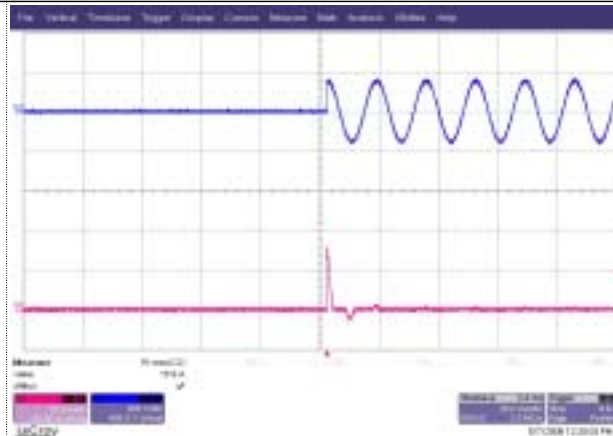
(2) Digital Multimeter : FLUKE189 (FLUKE)

(1) Inrush Current Characteristics (110V)

Vin=
110V

Io=
100%

I_{rush} = 15.9A



CH3
200V/div
10.0ms/div

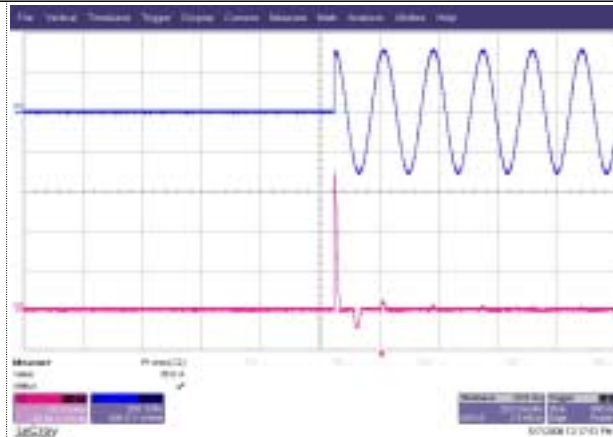
CH2
10.0A/div
10.0ms/div

(2) Inrush Current Characteristics (220V)

Vin=
220V

Io=
100%

I_{rush} = 35.0A



CH3
200V/div
10.0ms/div

CH2
10.0A/div
10.0ms/div

(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	0.065A	0.059A	0.056A	0.058A	0.065A	0.070A
	Efficiency	-	-	-	-	-	-
Load (50%)	Input Current	0.361A	0.290A	0.253A	0.213A	0.188A	0.172A
	Efficiency	72.69%	73.17%	72.93%	71.90%	70.53%	68.48%
Load (100%)	Input Current	0.716A	0.557A	0.471A	0.385A	0.329A	0.299A
	Efficiency	69.59%	71.92%	72.74%	72.76%	71.78%	70.32%

1-2. CSF30-DD Output characteristics

(1) Digital Multimeter : FLUKE189 (FLUKE)

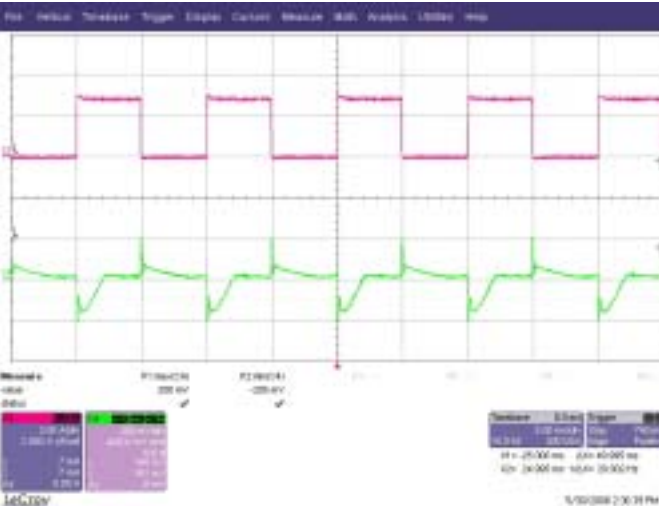

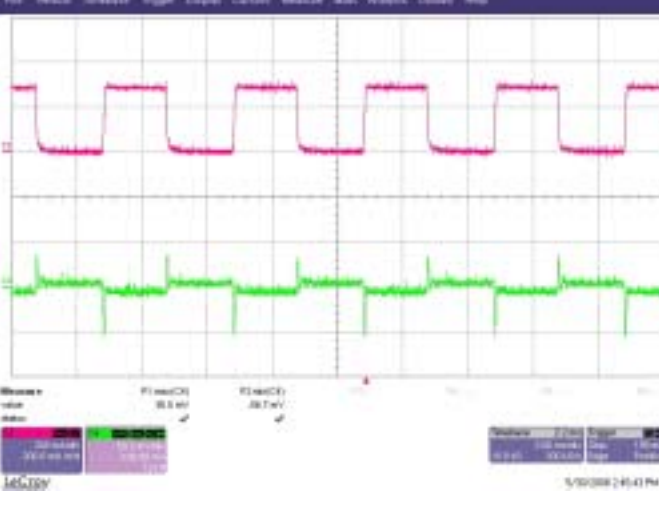
(1) Line & Load Regulation Characteristics								Condition Ta : 25
CH1								
V_{in} / I_o	85V	110V	132V	170V	220V	264V	Line Regulation [mV]	
Load (min)	5.011V	5.011V	5.011V	5.010V	5.010V	5.010V	1mV	
Load (50%)	5.009V	5.009V	5.009V	5.009V	5.009V	5.009V	0mV	
Load (100%)	5.008V	5.008V	5.007V	5.007V	5.007V	5.007V	1mV	
Load Regulation	3mV	3mV	4mV	3mV	3mV	3mV		
CH2								
V_{in} / I_o	85V	110V	132V	170V	220V	264V	Line Regulation [mV]	
Load (min)	11.87V	11.88V	11.88V	11.88V	11.88V	11.88V	0mV	
Load (50%)	11.87V	11.87V	11.87V	11.88V	11.88V	11.88V	10mV	
Load (100%)	11.86V	11.87V	11.87V	11.87V	11.87V	11.87V	10mV	
Load Regulation	10mV	10mV	10mV	10mV	10mV	10mV		
CH3								
V_{in} / I_o	85V	110V	132V	170V	220V	264V	Line Regulation [mV]	
Load (min)	12.12V	12.11V	12.11V	12.11V	12.11V	12.11V	10mV	
Load (50%)	12.11V	12.10V	12.11V	12.10V	12.10V	12.10V	10mV	
Load (100%)	12.11V	12.10V	12.10V	12.10V	12.10V	12.10V	10mV	
Load Regulation	10mV	10mV	10mV	10mV	10mV	10mV		
(2) CSF15-DD Cross Regulation characteristics								Condition Ta : 25
Channel NO.	CH1		CH2		CH3			
Input Voltage								
220VAC	min%	5.010	100%	11.86	100%	11.95		
	min%	5.010	50%	11.87	50%	12.10		
	50%	5.009	0%	11.88	0%	12.11		
	100%	5.009	0%	11.88	0%	12.12		
Cross Regulation[mV]		1mV		20mV		70mV		

1-3. CSF30-DD Dynamic load response characteristics

(1) Oscilloscope : Wave Surfer 454(LeCroy)

CH2 : CURRENT WAVE FORM - AP015 Current probe

CH4 : VOLTAGE WAVE FORM - PP005 Passive probe

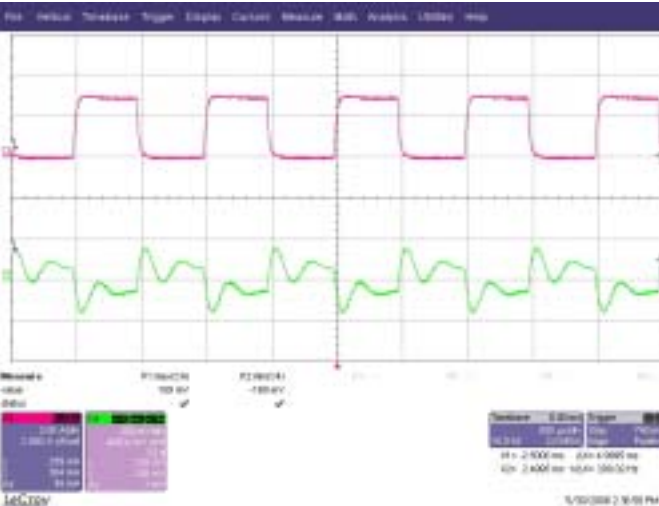

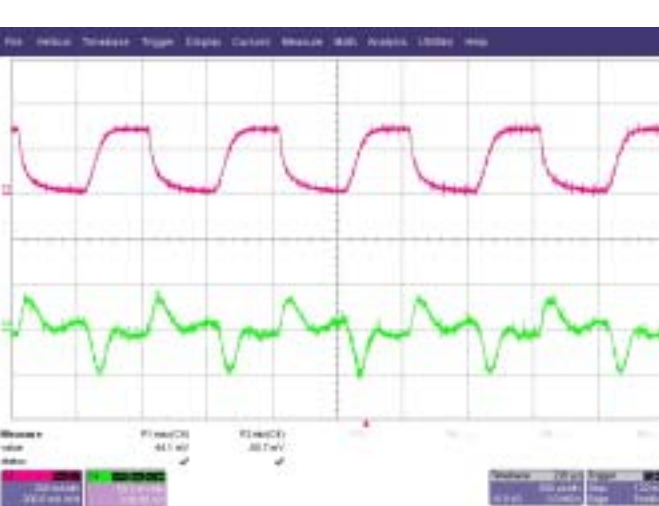
220VAC	OUTPUT 5V/3A $I_o =$ 0~100% 100Hz	CH1 : $+V_{PK} = 208\text{mV}$ (4.1%) $-V_{PK} = 205\text{mV}$ (4.1%)		CH2 2.00A/div 5.00ms/div CH4 200mV/div 5.00ms/div
220VAC	OUTPUT 12V/1.0A $I_o =$ 0~100% 100Hz	CH2 : $+V_{PK} = 26\text{mV}$ (0.22%) $-V_{PK} = 31\text{mV}$ (0.26%)		CH2 500mA/div 5.00ms/div CH4 50.0mV/div 5.00ms/div
220VAC	OUTPUT 12V/0.3A $I_o =$ 0~100% 100Hz	CH3 : $+V_{PK} = 36\text{mV}$ (0.30%) $-V_{PK} = 57\text{mV}$ (0.47%)		CH2 200mA/div 5.00ms/div CH4 20.0mV/div 5.00ms/div

1-4. CSF30-DD Dynamic load response characteristics

(1) Oscilloscope : Wave Surfer 454(LeCroy)

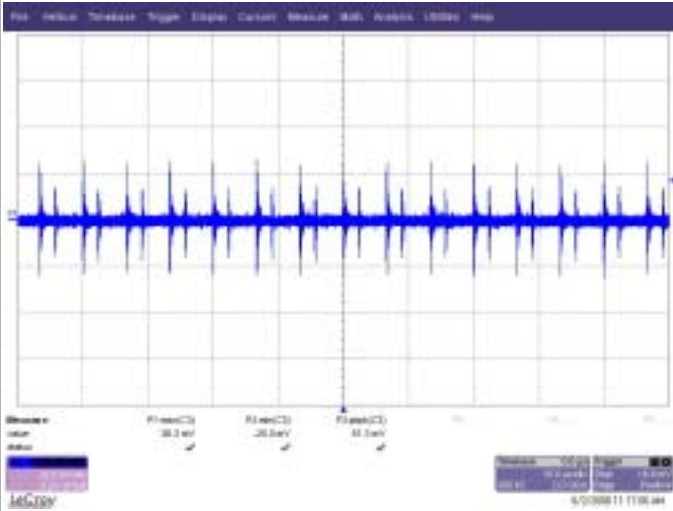
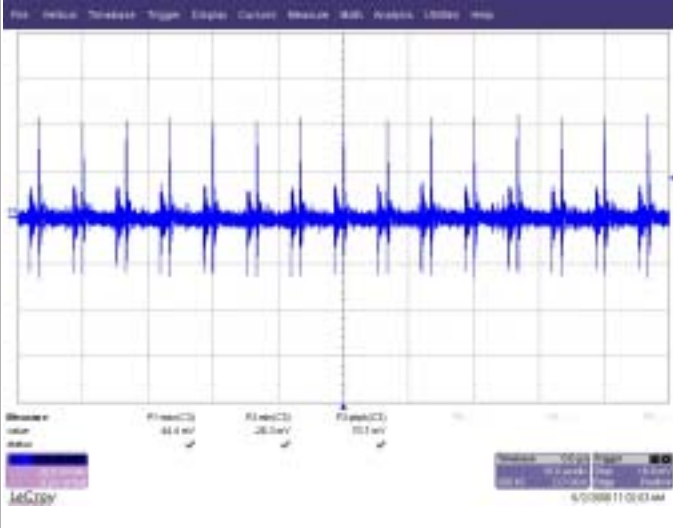
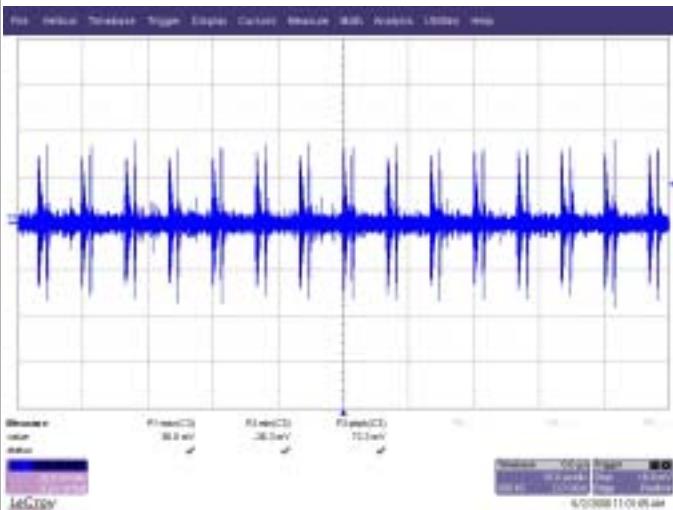
CH2 : CURRENT WAVE FORM - AP015 Current probe

CH4 : VOLTAGE WAVE FORM - PP005 Passive probe

220VAC	OUTPUT 5V/3.0A $I_o =$ 0~100% 1KHz	CH1 : $+V_{PK} = 159\text{mV}$ (3.1%) $-V_{PK} = 160\text{mV}$ (3.2%)		CH2 2.00A/div 500us/div CH4 200mV/div 500us/div
220VAC	OUTPUT 12V/1.0A $I_o =$ 0~100% 1KHz	CH2 : $+V_{PK} = 29\text{mV}$ (0.22%) $-V_{PK} = 37\text{mV}$ (0.31%)		CH2 500mA/div 500us/div CH4 50.0mV/div 500us/div
220VAC	OUTPUT 12V/0.3A $I_o =$ 0~100% 1KHz	CH3 : $+V_{PK} = 44\text{mV}$ (0.36%) $-V_{PK} = 55\text{mV}$ (0.46%)		CH2 200mA/div 500us/div CH4 50.0mV/div 500us/div

1-5. CSF30-DD Ripple & Noise characteristics

(1) Oscilloscope : Wave Surfer 454(LeCroy)
 CH3 : BNC Cable Probe(50 , 1.5m)
 Band Width : 200MHz

220VAC	$I_o=100\%$	<p>CH1 Ripple&Noise 51.3mV_{p-p}</p>		<p>CH3 20.0mV/div 10.0us/div</p>
220VAC	$I_o=100\%$	<p>CH2 Ripple&Noise 70.7mV_{p-p}</p>		<p>CH3 20.0mV/div 10.0us/div</p>
220VAC	$I_o=100\%$	<p>CH3 Ripple&Noise 72.3mV_{p-p}</p>		<p>CH3 20.0mV/div 10.0us/div</p>

1-6. CSF30-DD Output characteristics

(1) Oscilloscope : Wave Surfer 454(LeCroy)

CH3 : INPUT VOLTAGE - ADP300 High voltage differential probe

CH4 : OUTPUT VOLTAGE - PP005A passive probe

(1) Turn on time characteristics

$V_{in} =$
100V

$I_o =$
100%

$t_{turn\ on} = 708ms$



CH4
2.00V/div
200ms/div

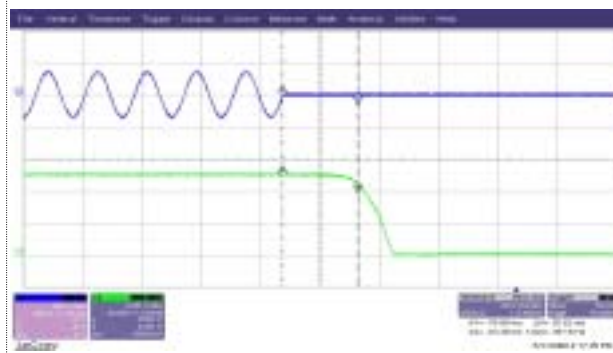
CH3
200V/div
200ms/div

(2) Hold up characteristics

$V_{in} =$
100V

$I_o =$
100%

$t_{hold\ up} = 25.5ms$



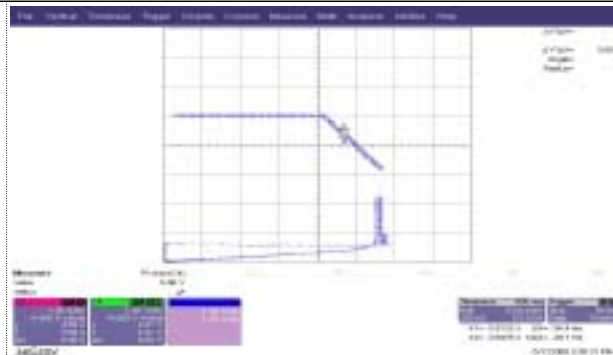
CH4
2.00V/div
20.0ms/div

CH3
200V/div
20.0ms/div

(3) Over Current protection characteristics

$V_{in} =$
220V

O.C.P = 4.69A



X
1.00A/div
5.00s/div

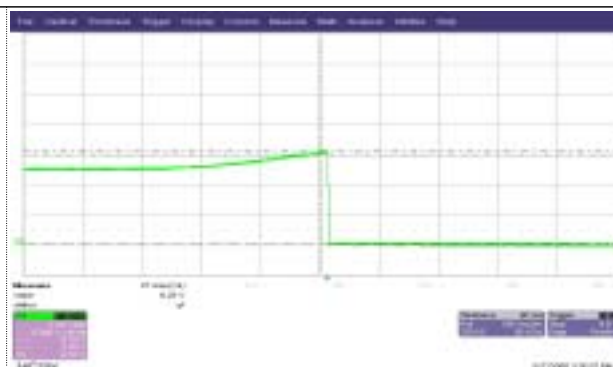
Y
1.00V/div
5.00s/div

(4) Over Voltage protection characteristics

$V_{in} =$
220V

$I_o =$
10%

O.V.P = 6.20V



CH3
2.00V/div
500ms/div

2-1. CSF30-EE Input characteristics

(1) Oscilloscope : Wave Surfer 454(LeCroy)

CH3 : INPUT VOLTAGE - ADP300 High voltage differential probe

CH2 : INPUT CURRENT - AP015 current probe

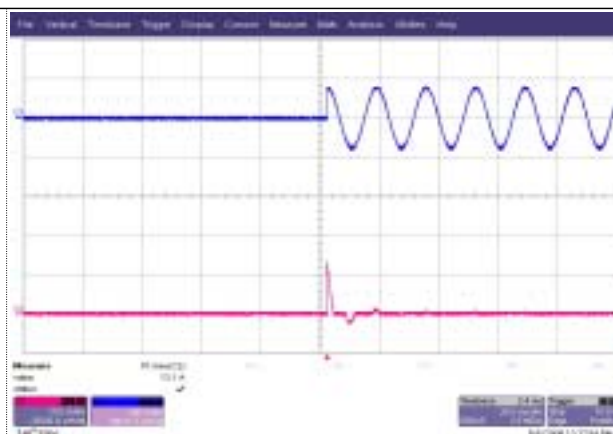
(2) Digital Multimeter : FLUKE189 (FLUKE)

(1) Inrush Current Characteristics (110V)

Vin=
110V

I_o=
100%

I_{rush} =13.1 A



CH3
200V/div
20.0ms/div

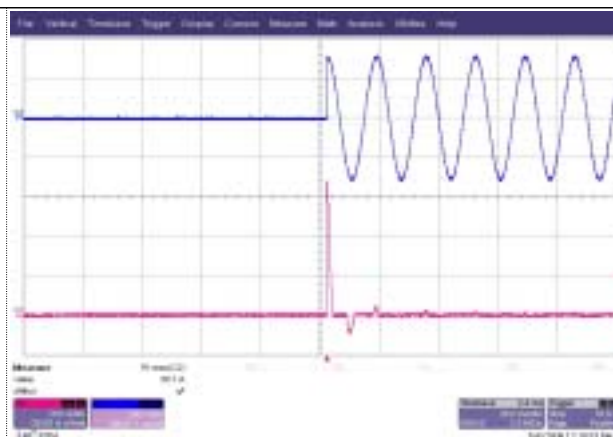
CH2
10.0A/div
20.0ms/div

(2) Inrush Current Characteristics (220V)

Vin=
220V

I_o=
100%

I_{rush} = 34.1A



CH3
200V/div
20.0ms/div

CH2
10.0A/div
20.0ms/div

(3) Input Current & Efficiency Characteristics

Condition Ta : 25

Vin \ I _o		Condition Ta : 25					
		85V	110V	132V	170V	220V	264V
Load (min)	Input Current	0.058A	0.056A	0.055A	0.056A	0.064A	0.067A
	Efficiency	-	-	-	-	-	-
Load (50%)	Input Current	0.346A	0.280A	0.245A	0.206A	0.185A	0.165A
	Efficiency	74.03%	75.17%	75.33%	75.11%	71.50%	68.49%
Load (100%)	Input Current	0.678A	0.536A	0.453A	0.374A	0.318A	0.282A
	Efficiency	71.71%	73.37%	74.69%	74.83%	73.97%	72.44%

2-2. CSF30-EE Output characteristics

(1) Digital Multimeter : FLUKE189 (FLUKE)

(1) Line & Load Regulation Characteristics								Condition Ta : 25
$V_{in} \backslash I_o$	85V	110V	132V	170V	220V	264V	Line Regulation [mV]	
Load (min)	5.013V	5.013V	5.012V	5.012V	5.012V	5.012V	1mV	
Load (50%)	5.011V	5.011V	5.010V	5.010V	5.010V	5.010V	1mV	
Load (100%)	5.010V	5.010V	5.009V	5.009V	5.009V	5.009V	1mV	
Load Regulation	3mV	3mV	3mV	3mV	3mV	3mV		
$V_{in} \backslash I_o$	85V	110V	132V	170V	220V	264V	Line Regulation [mV]	
Load (min)	15.11V	15.11V	15.11V	15.11V	15.11V	15.11V	0mV	
Load (50%)	15.10V	15.10V	15.11V	15.11V	15.11V	15.11V	1mV	
Load (100%)	15.10V	15.10V	15.10V	15.10V	15.10V	15.10V	0mV	
Load Regulation	10mV	10mV	10mV	10mV	10mV	10mV		
$V_{in} \backslash I_o$	85V	110V	132V	170V	220V	264V	Line Regulation [mV]	
Load (min)	15.08V	15.08V	15.08V	15.08V	15.08V	15.08V	0mV	
Load (50%)	15.08V	15.08V	15.08V	15.08V	15.08V	15.08V	0mV	
Load (100%)	15.07V	15.07V	15.07V	15.07V	15.07V	15.07V	0mV	
Load Regulation	10mV	10mV	10mV	10mV	10mV	10mV		
(2) CSF15-EE Cross Regulation characteristics								
Channel NO.	CH1		CH2		CH3			
Input Voltage								
220VAC	min%	5.011	100%	15.10	100%	15.00		
	min%	5.011	50%	15.11	50%	15.07		
	50%	5.010	0%	15.12	0%	15.08		
	100%	5.009	0%	15.12	0%	15.08		
Cross Regulation[mV]		2mV		2mV		80mV		



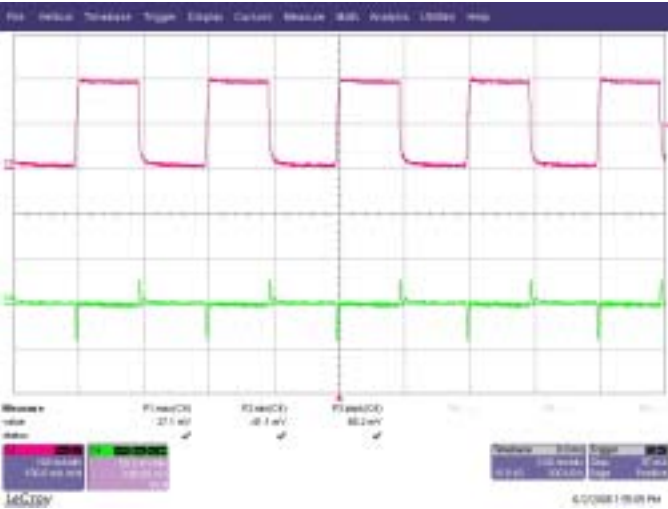
2-3. CSF30-EE Dynamic load response characteristics

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(1) Oscilloscope : Wave Surfer 454(LeCroy)

CH2 : CURRENT WAVE FORM - AP015 Current probe

CH4 : VOLTAGE WAVE FORM - PP005 Passive probe

<p>220VAC</p>	<p>OUTPUT 5V/3.0A</p> <p>$I_o =$ 0~100% 100Hz</p>	<p>CH1 :</p> <p>+V_{PK}=208mV (4.2%)</p> <p>-V_{PK}=200mV (4.0%)</p>		<p>CH2 2.00A/div 5.00ms/div</p> <p>CH4 200mV/div 5.00ms/div</p>
<p>220VAC</p>	<p>OUTPUT 15V/0.8A</p> <p>$I_o =$ 0~100% 100Hz</p>	<p>CH2 :</p> <p>+V_{PK}=35mV (0.23%)</p> <p>-V_{PK}=29mV (0.20%)</p>		<p>CH2 500mA/div 5.00ms/div</p> <p>CH4 50.0mV/div 5.00ms/div</p>
<p>220VAC</p>	<p>OUTPUT 15V/0.2A</p> <p>$I_o =$ 0~100% 100Hz</p>	<p>CH3 :</p> <p>+V_{PK}=27mV (0.18%)</p> <p>-V_{PK}=41mV (0.27%)</p>		<p>CH2 100mA/div 5.00ms/div</p> <p>CH4 50.0mV/div 5.00ms/div</p>

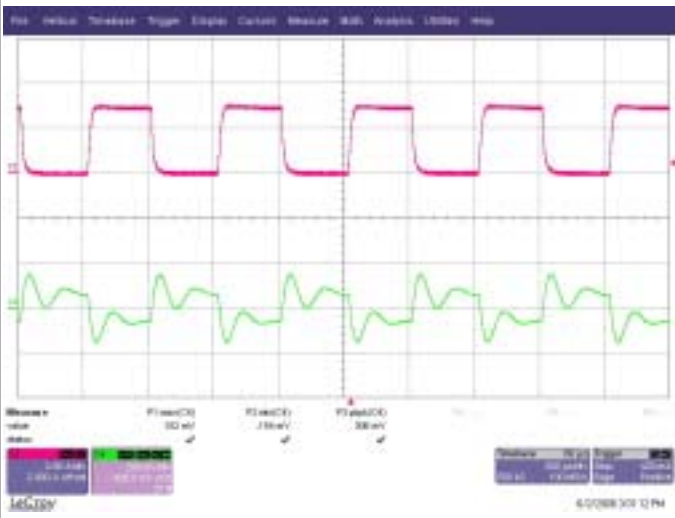
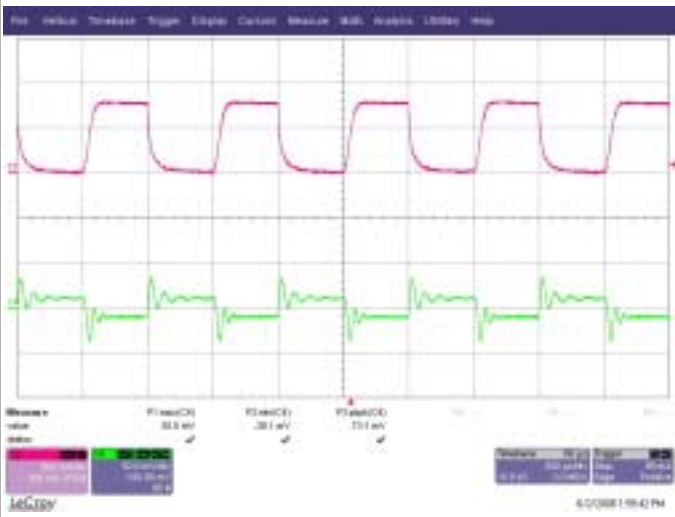
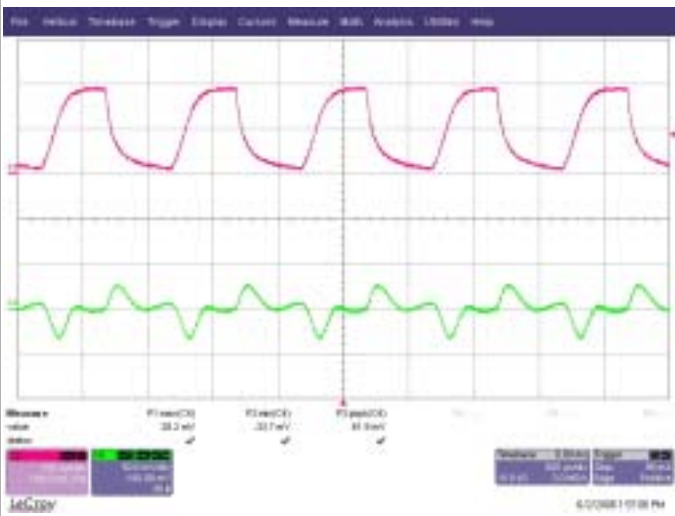
2-4. CSF30-EE Dynamic load response characteristics

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(1) Oscilloscope : Wave Surfer 454(LeCroy)

CH2 : CURRENT WAVE FORM - AP015 Current probe

CH4 : VOLTAGE WAVE FORM - PP005 Passive probe

220VAC	OUTPUT 5V/3.0A $I_o =$ 0~100% 1KHz	CH1 : $+V_{PK} = 152mV$ (3.0%) $-V_{PK} = 154mV$ (3.0%)		CH2 2.00A/div 500us/div CH4 200mV/div 500us/div
220VAC	OUTPUT 15V/0.8A $I_o =$ 0~100% 1KHz	CH2 : $+V_{PK} = 35mV$ (0.23%) $-V_{PK} = 38mV$ (0.25%)		CH2 500mA/div 500us/div CH4 50.0mV/div 500us/div
220VAC	OUTPUT 15V/0.2A $I_o =$ 0~100% 1KHz	CH3 : $+V_{PK} = 28mV$ (0.18%) $-V_{PK} = 33mV$ (0.22%)		CH2 200mA/div 500us/div CH4 50.0mV/div 500us/div

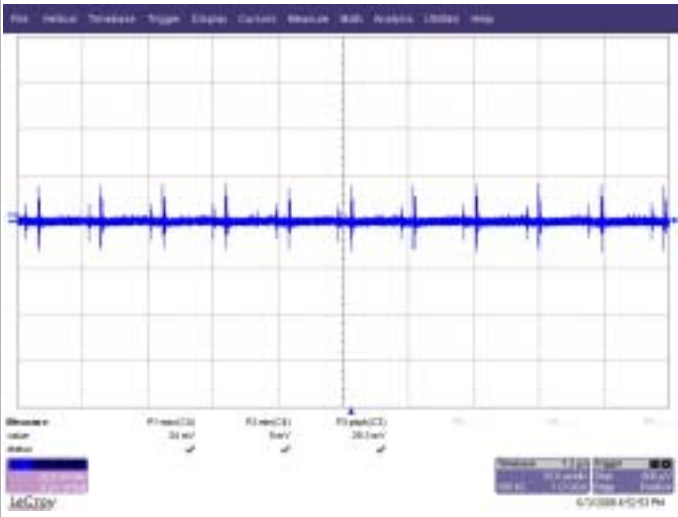
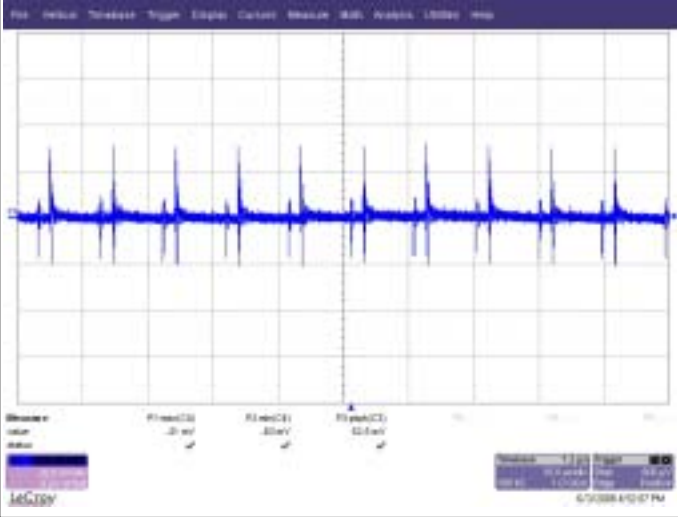
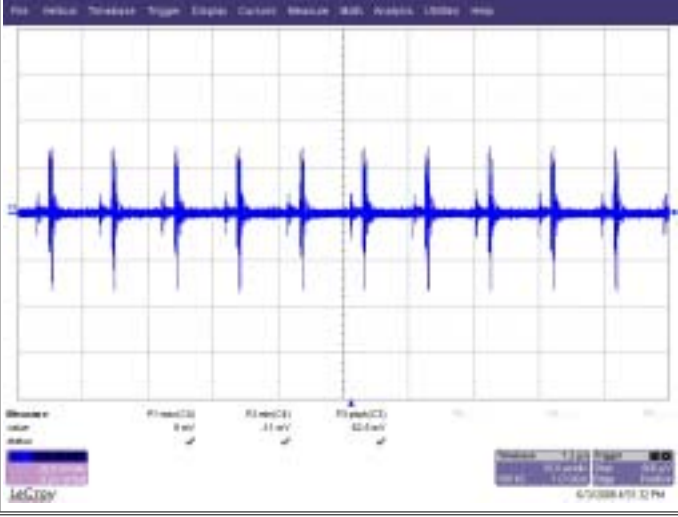
2-5. CSF30-EE Ripple & Noise characteristics

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(1) Oscilloscope : Wave Surfer 454(LeCroy)

CH3 : BNC Cable Probe(50 , 1.5m)

Band Width : 200MHz

220VAC	$I_o=100\%$	CH1 Ripple&Noise 29.3mV _{p-p}		CH3 20.0mV/div 10.0us/div
220VAC	$I_o=100\%$	CH2 Ripple&Noise 52.5mV _{p-p}		CH3 20.0mV/div 10.0us/div
220VAC	$I_o=100\%$	CH3 Ripple&Noise 62.5mV _{p-p}		CH3 20.0mV/div 10.0us/div

2-6. CSF30-EE Output characteristics

(1) Oscilloscope : Wave Surfer 454(LeCroy)

CH3 : INPUT VOLTAGE - ADP300 High voltage differential probe

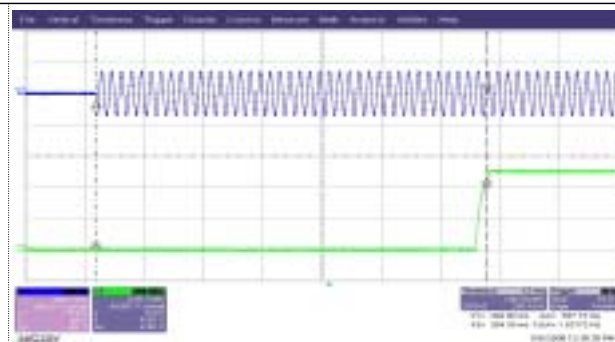
CH4 : OUTPUT VOLTAGE - PP005A passive probe

(1) Turn on time characteristics

$V_{in} =$
100V

$I_o =$
100%

$t_{turn\ on} = 657ms$



CH4
2.00V/div
100ms/div

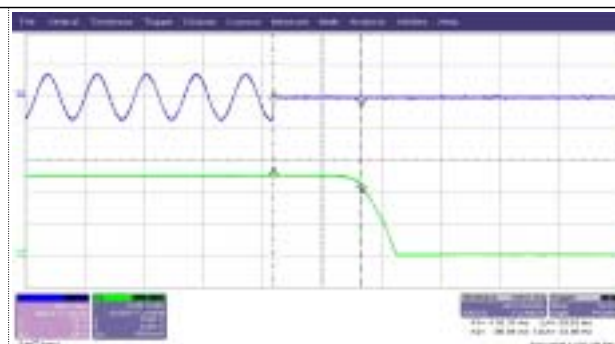
CH3
200V/div
100ms/div

(2) Hold up characteristics

$V_{in} =$
100V

$I_o =$
100%

$t_{hold\ up} = 29.5ms$



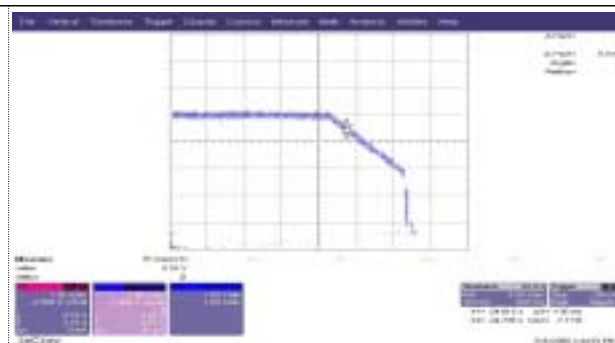
CH4
2.00V/div
20.0ms/div

CH3
200V/div
20.0ms/div

(3) Over Current protection characteristics

$V_{in} =$
220V

O.C.P = 4.75A



X
1.00A/div
5.00s/div

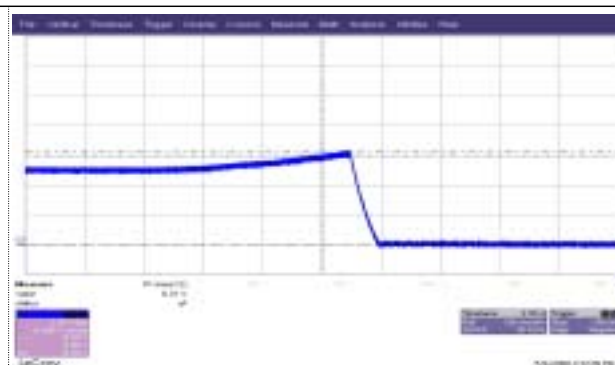
Y
1.00V/div
5.00s/div

(4) Over Voltage protection characteristics

$V_{in} =$
220V

$I_o =$
10%

O.V.P = 6.20V



CH3
2.00V/div
500ms/div

3-1. CSF30-BDW Input characteristics

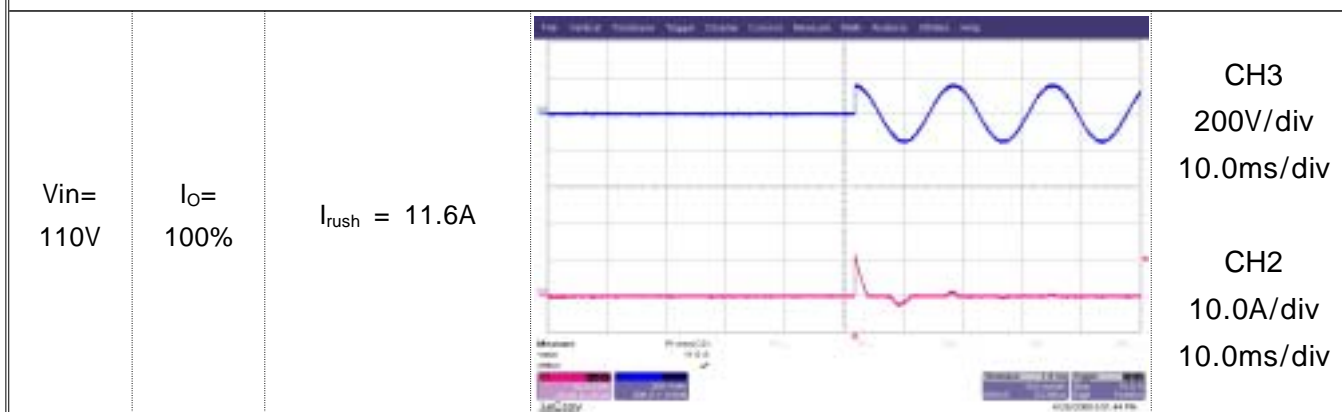
(1) Oscilloscope : Wave Surfer 454(LeCroy)

CH3 : INPUT VOLTAGE - ADP300 High voltage differential probe

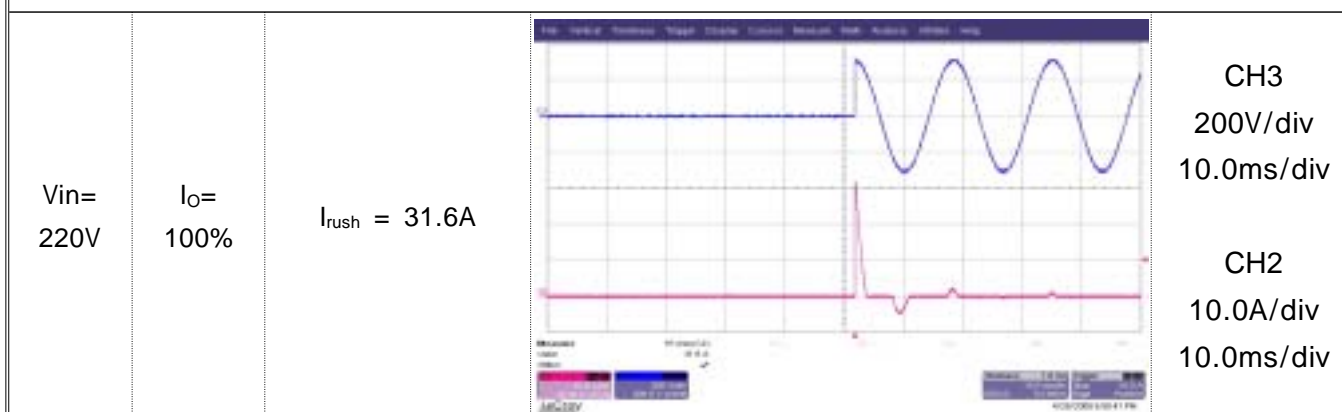
CH2 : INPUT CURRENT - AP015 current probe

(2) Digital Multimeter : FLUKE189 (FLUKE)

(1) Inrush Current Characteristics (110V)



(2) Inrush Current Characteristics (220V)



(3) Input Current & Efficiency Characteristics

		Condition $T_a : 25$						
		V_{in}	85V	110V	132V	170V	220V	264V
I_o								
Load (min)	Input Current		0.072A	0.062A	0.058A	0.054A	0.061A	0.055A
	Efficiency		-	-	-	-	-	-
Load (50%)	Input Current		0.355A	0.299A	0.261A	0.216A	0.192A	0.172A
	Efficiency		74.55%	72.71%	73.20%	72.44%	69.39%	67.38%
Load (100%)	Input Current		0.706A	0.570A	0.484A	0.401A	0.341A	0.330A
	Efficiency		70.63%	71.23%	72.82%	73.22%	72.17%	71.18%

3-2. CSF30-BDW Output characteristics

(1) Digital Multimeter : FLUKE189 (FLUKE)

(1) Line & Load Regulation Characteristics								Condition Ta : 25
CH1								
V_{in} / I_o	85V	110V	132V	170V	220V	264V	Line Regulation [mV]	
Load (min)	5.009V	5.009V	5.009V	5.009V	5.008V	5.008V	1mV	
Load (50%)	5.007V	5.007V	5.007V	5.007V	5.007V	5.007V	0mV	
Load (100%)	5.005V	5.005V	5.005V	5.005V	5.005V	5.005V	0mV	
Load Regulation [mV]	4mV	4mV	4mV	4mV	3mV	3mV		
CH2								
V_{in} / I_o	85V	110V	132V	170V	220V	264V	Line Regulation [mV]	
Load (min)	12.07V	12.07V	12.07V	12.07V	12.07V	12.08V	10mV	
Load (50%)	12.06V	12.06V	12.06V	12.06V	12.06V	12.06V	0mV	
Load (100%)	12.05V	12.05V	12.05V	12.05V	12.05V	12.05V	0mV	
Load Regulation [mV]	20mV	20mV	20mV	20mV	20mV	30mV		
(2) CSF15-DD Cross Regulation characteristics								Condition Ta : 25
Channel NO.	CH1				CH2			
Input Voltage								
220VAC	min%	5.008V		100%	11.96V			
	min%	5.008V		50%	12.06V			
	50%	5.007V		0%	12.06V			
	100%	5.006V		0%	12.06V			
Cross Regulation[mV]	2mV		100mV					

3-3. CSF30-BDW Dynamic load response characteristics

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(1) Oscilloscope : Wave Surfer 454(LeCroy)

CH2 : CURRENT WAVE FORM - AP015 Current probe

CH4 : VOLTAGE WAVE FORM - PP005 Passive probe

<p>220VAC</p>	<p>OUTPUT 5V/3.0A</p> <p>$I_o =$ 0~100% 100Hz</p>	<p>CH1 :</p> <p>+V_{PK}=221mV (4.4%)</p> <p>-V_{PK}=193mV (3.8%)</p>		<p>CH2 2.00A/div 5.00ms/div</p> <p>CH4 200mV/div 5.00ms/div</p>
<p>220VAC</p>	<p>OUTPUT 12V/1.3A</p> <p>$I_o =$ 0~100% 100Hz</p>	<p>CH2 :</p> <p>+V_{PK}=37mV (0.31%)</p> <p>-V_{PK}=41mV (0.34%)</p>		<p>CH2 1.00A/div 5.00ms/div</p> <p>CH4 50.0mV/div 5.00ms/div</p>

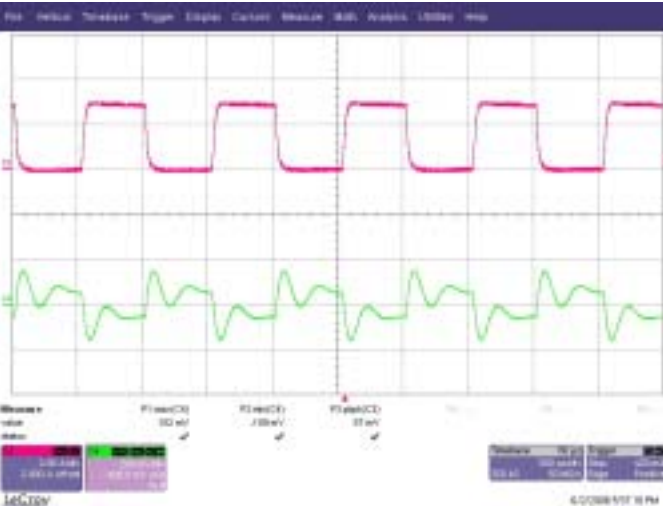
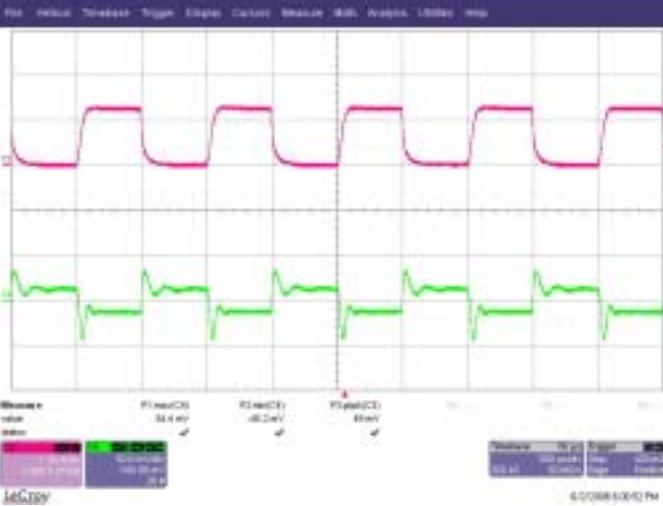
3-4. CSF30-BDW Dynamic load response characteristics

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(1) Oscilloscope : Wave Surfer 454(LeCroy)

CH2 : CURRENT WAVE FORM - AP015 Current probe

CH4 : VOLTAGE WAVE FORM - PP005 Passive probe

<p>220VAC</p>	<p>OUTPUT 5V/3.0A</p> <p>$I_o =$ 0~100% 1KHz</p>	<p>CH1 :</p> <p>+V_{PK}=152mV (3.0%)</p> <p>-V_{PK}=159mV (3.1%)</p>		<p>CH2 2.00A/div 500us/div</p> <p>CH4 200mV/div 500us/div</p>
<p>220VAC</p>	<p>OUTPUT 12V/1.3A</p> <p>$I_o =$ 0~100% 1KHz</p>	<p>CH2 :</p> <p>+V_{PK}=34mV (0.28%)</p> <p>-V_{PK}=45mV (0.37%)</p>		<p>CH2 1.00A/div 500us/div</p> <p>CH4 50.0mV/div 500us/div</p>

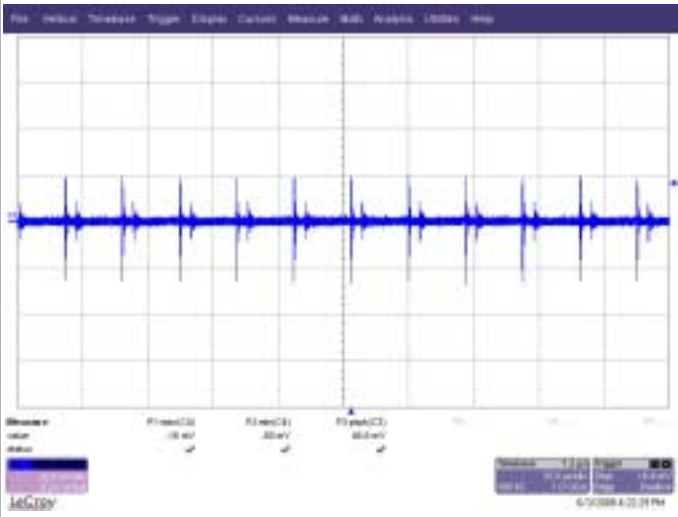
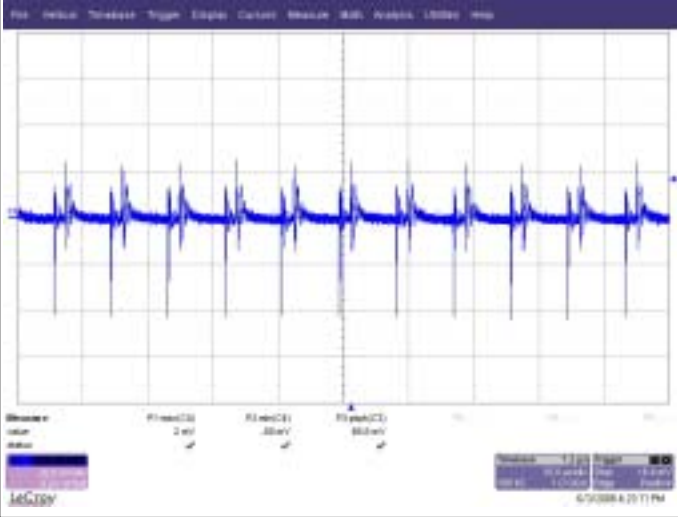
3-5. CSF30-BDW Ripple & Noise characteristics

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(1) Oscilloscope : Wave Surfer 454(LeCroy)

CH3 : BNC Cable Probe(50 , 1.5m)

Band Width : 200MHz

220VAC	$I_o=100\%$	CH1 Ripple&Noise 46.8mV _{p-p}		CH3 20.0mV/div 10.0us/div
220VAC	$I_o=100\%$	CH2 Ripple&Noise 68.8mV _{p-p}		CH3 20.0mV/div 10.0us/div

3-6. CSF30-BDW Output characteristics

(1) Oscilloscope : Wave Surfer 454(LeCroy)

CH3 : INPUT VOLTAGE - ADP300 High voltage differential probe

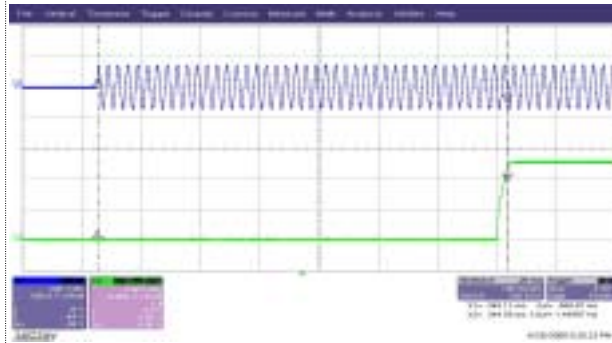
CH4 : OUTPUT VOLTAGE - PP005A passive probe

(1) Turn on time characteristics

$V_{in} =$
V

$I_o =$
100%

$t_{turn\ on} = 689ms$



CH4
2.00V/div
100ms/div

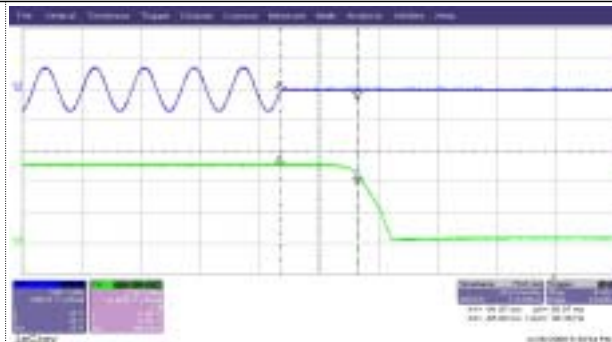
CH2
200V/div
100ms/div

(2) Hold up characteristics

$V_{in} =$
100V

$I_o =$
100%

$t_{hold\ up} = 26.0ms$



CH4
2.00V/div
20.0ms/div

CH2
200V/div
20.0ms/div

(3) Over Current protection characteristics

$V_{in} =$
220V

O.C.P = 4.81A



X
1.00A/div
5.00s/div

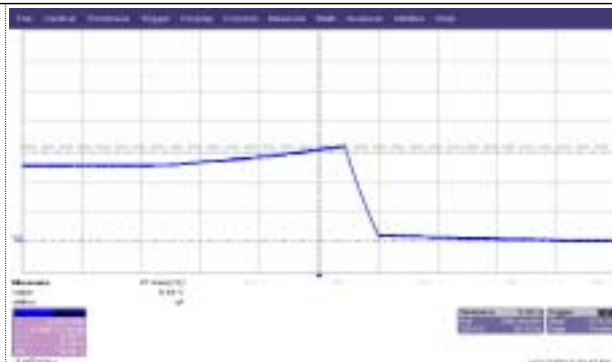
Y
1.00V/div
5.00s/div

(4) Over Voltage protection characteristics

$V_{in} =$
220V

$I_o =$
10%

O.V.P = 6.34V



CH3
2.00V/div
500ms/div

4-1. CSF30-BHW Input characteristics

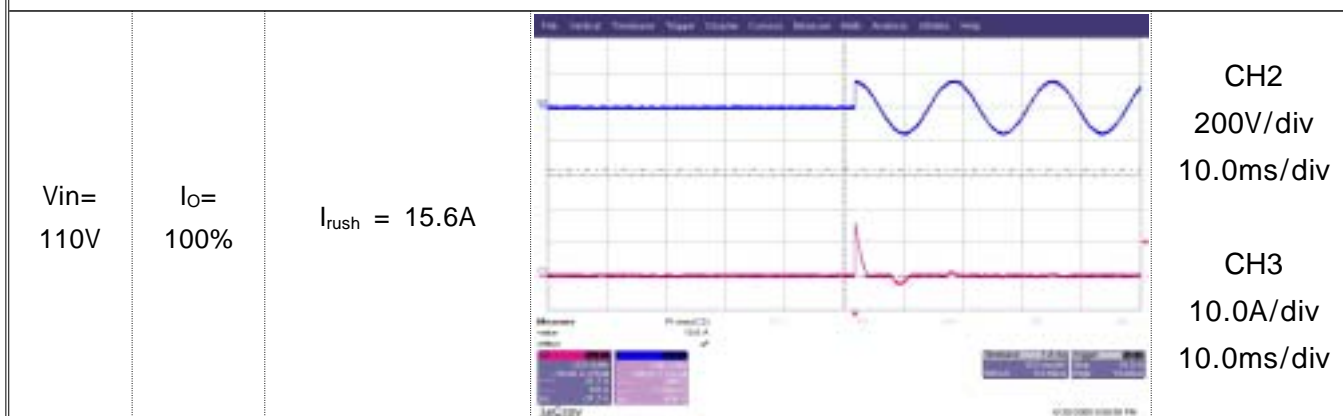
(1) Oscilloscope : Wave Surfer 454(LeCroy)

CH3 : INPUT VOLTAGE - ADP300 High voltage differential probe

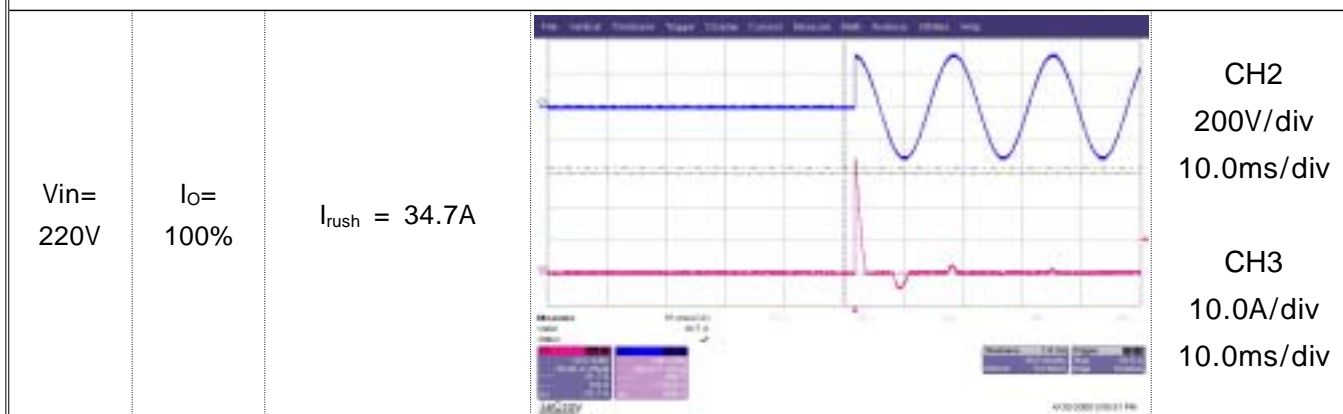
CH2 : INPUT CURRENT - AP015 current probe

(2) Digital Multimeter : FLUKE189 (FLUKE)

(1) Inrush Current Characteristics (110V)



(2) Inrush Current Characteristics (220V)



(3) Input Current & Efficiency Characteristics

		Condition $T_a : 25$					
V_{in}		85V	110V	132V	170V	220V	264V
I_o							
Load (min)	Input Current	0.069A	0.065A	0.064A	0.066A	0.072A	0.070A
	Efficiency	-	-	-	-	-	-
Load (50%)	Input Current	0.337A	0.272A	0.237A	0.202A	0.183A	0.167A
	Efficiency	75.02%	76.33%	75.47%	74.21%	67.51%	67.11%
Load (100%)	Input Current	0.439A	0.352A	0.299A	0.239A	0.205A	0.188A
	Efficiency	71.61%	74.62%	75.57%	75.47%	73.79%	71.96%

4-2. CSF30-BHW Output characteristics

(1) Digital Multimeter : FLUKE189 (FLUKE)

(1) Line & Load Regulation Characteristics								Condition Ta : 25
CH1								
Input Voltage Load	85V	110V	132V	170V	220V	264V	Line Regulation [mV]	
Io=min% (0.1A)	5.008V	5.007V	5.007V	5.006V	5.006V	5.006V	2mV	
Io=50% (0.35A)	5.006V	5.005V	5.005V	5.004V	5.004V	5.004V	2mV	
Io=100% (0.7A)	5.004V	5.003V	5.003V	5.002V	5.002	5.002V	2mV	
Load Regulation [mV]	4mV	4mV	4mV	4mV	4mV	4mV		
CH2								
Input Voltage Load	85V	110V	132V	170V	220V	264V	Line Regulation [mV]	
Io=0% (0A)	24.08V	24.09V	24.09V	24.09V	24.09V	24.09V	10mV	
Io=50% (0.35A)	24.08V	24.08V	24.08V	24.08V	24.08V	24.08V	0mV	
Io=100% (0.7A)	24.07V	24.07V	24.07V	24.07V	24.07V	24.07V	0mV	
Load Regulation [mV]	10mV	20mV	20mV	20mV	20mV	20mV		
(2) CSF15-DDW Cross Regulation characteristics								Condition Ta : 25
Channel NO.	CH1				CH2			
Input Voltage								
220VAC	min%	5.005V		100%	23.99V			
	min%	5.005V		50%	24.08V			
	50%	5.003V		0%	24.10V			
	100%	5.001V		0%	24.10V			
Cross Regulation[mV]	4mV		110mV					

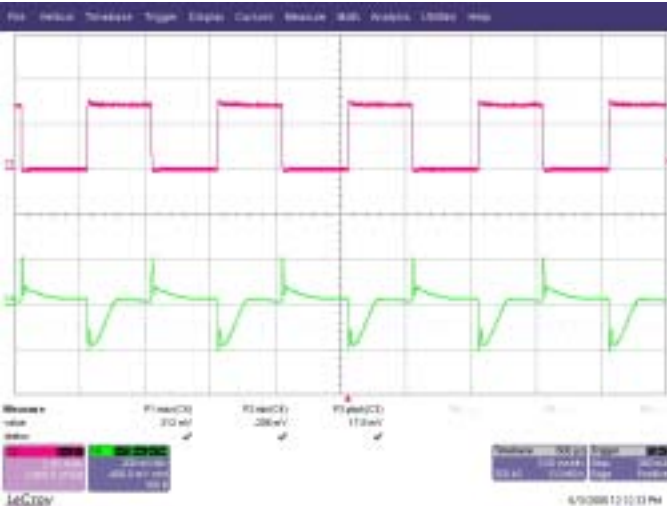

4-3. CSF30-BHW Dynamic load response characteristics

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(1) Oscilloscope : Wave Surfer 454(LeCroy)

CH2 : CURRENT WAVE FORM - AP015 Current probe

CH4 : VOLTAGE WAVE FORM - PP005 Passive probe

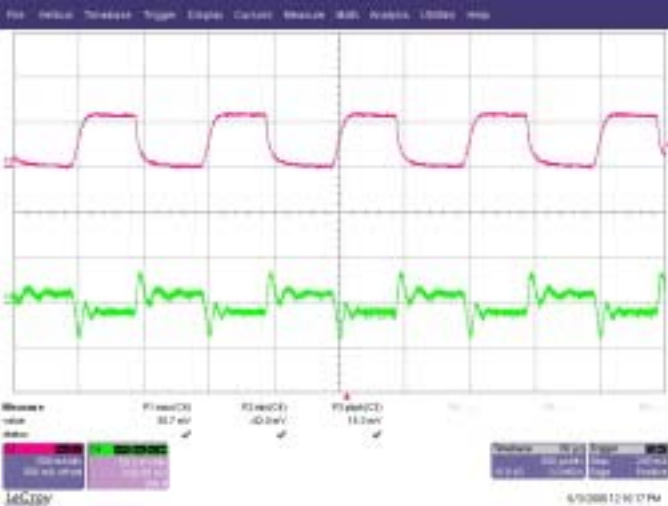
<p>220VAC</p>	<p>OUTPUT 5V/3.0A</p> <p>$I_o =$ 0~100% 100Hz</p>	<p>CH1 :</p> <p>+V_{PK}=212mV (4.2%)</p> <p>-V_{PK}=206mV (4.1%)</p>		<p>CH2 2.00A/div 5.00ms/div</p> <p>CH4 200mV/div 5.00ms/div</p>
<p>220VAC</p>	<p>OUTPUT 24V/0.6A</p> <p>$I_o =$ 0~100% 100Hz</p>	<p>CH2 :</p> <p>+V_{PK}=35mV (0.14%)</p> <p>-V_{PK}=31mV (0.13%)</p>		<p>CH2 500mA/div 5.00ms/div</p> <p>CH4 50mV/div 5.00ms/div</p>

4-4. CSF30-BHW Dynamic load response characteristics

(1) Oscilloscope : Wave Surfer 454(LeCroy)

CH2 : CURRENT WAVE FORM - AP015 Current probe

CH4 : VOLTAGE WAVE FORM - PP005 Passive probe

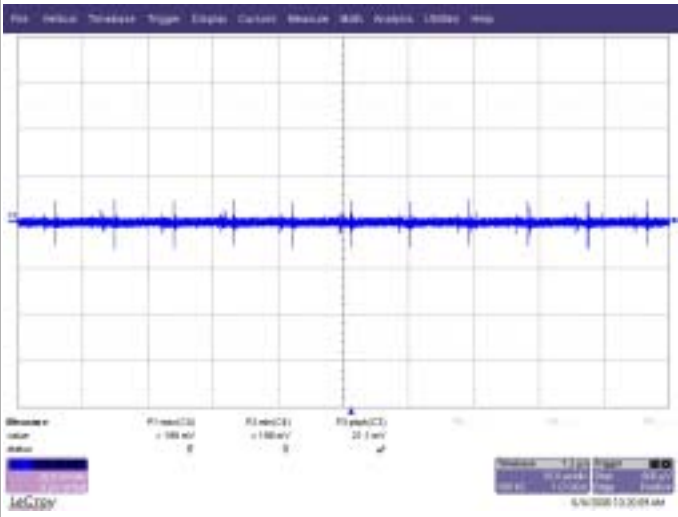
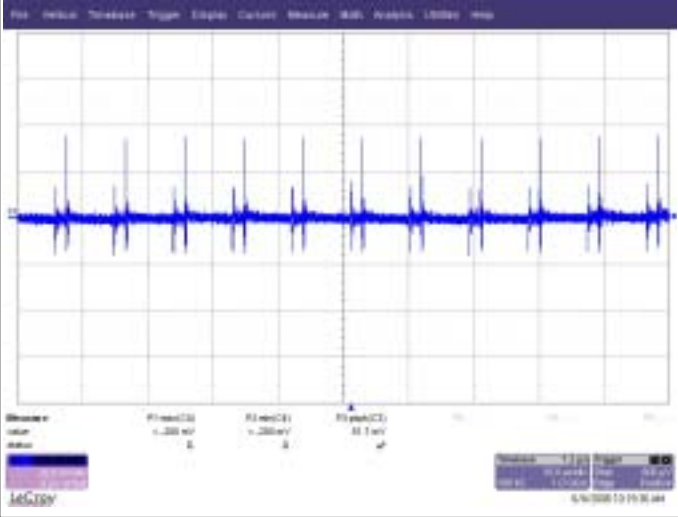
220VAC	OUTPUT 5V/1.3A $I_o =$ 0~100% 1KHz	CH1 : $+V_{PK} = 148\text{mV}$ (2.9%) $-V_{PK} = 154\text{mV}$ (3.0%)		CH2 2.00A/div 500us/div CH4 200mV/div 500us/div
220VAC	OUTPUT 12V/0.6A $I_o =$ 0~100% 1KHz	CH2 : $+V_{PK} = 35\text{mV}$ (0.14%) $-V_{PK} = 42\text{mV}$ (0.17%)		CH2 500mA/div 500us/div CH4 50mV/div 500us/div

4-5. CSF30-BHW Ripple & Noise characteristics

(1) Oscilloscope : Wave Surfer 454(LeCroy)

CH3 : BNC Cable Probe(50 , 1.5m)

Band Width : 200MHz

220VAC	$I_o=100\%$	CH1 Ripple&Noise 21.1mV _{p-p}		CH3 20.0mV/div 10.0us/div
220VAC	$I_o=100\%$	CH2 Ripple&Noise 51.7mV _{p-p}		CH3 20.0mV/div 10.0us/div

4-6. CSF30-BHW Output characteristics

(1) Oscilloscope : Wave Surfer 454(LeCroy)

CH3 : INPUT VOLTAGE - ADP300 High voltage differential probe

CH4 : OUTPUT VOLTAGE - PP005A passive probe

(1) Turn on time characteristics

$V_{in} =$
100V

$I_o =$
100%

$t_{turn\ on} = 646ms$



CH4
2.00V/div
200ms/div

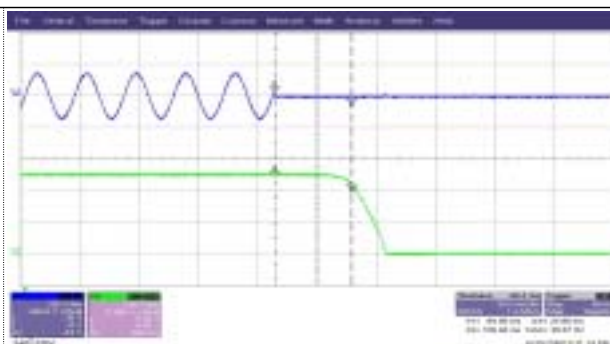
CH3
200V/div
200ms/div

(2) Hold up characteristics

$V_{in} =$
100V

$I_o =$
100%

$t_{hold\ up} = 25.8ms$



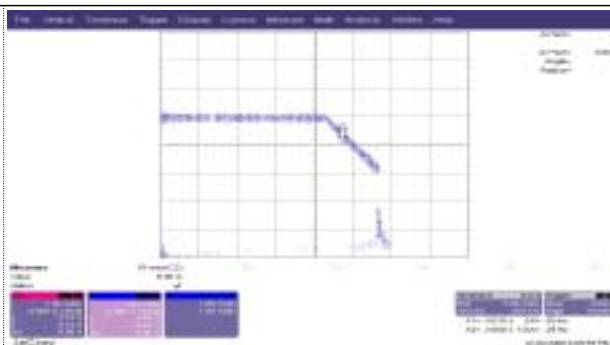
CH4
2.00V/div
20.0ms/div

CH3
200V/div
20.0ms/div

(3) Over Current protection characteristics

$V_{in} =$
220V

O.C.P = 4.72A



X
1.00A/div
5.00s/div

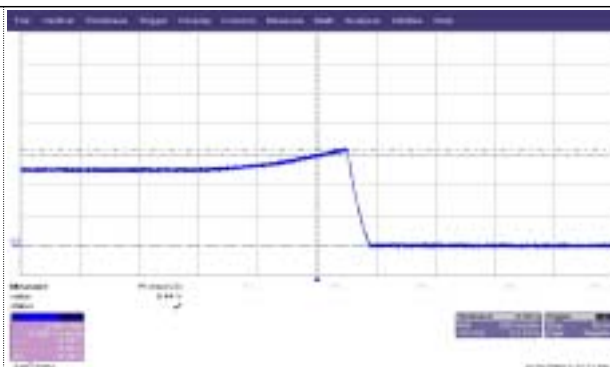
Y
1.00V/div
5.00s/div

(4) Over Voltage protection characteristics

$V_{in} =$
220V

$I_o =$
10%

O.V.P = 6.34V



CH3
2.00V/div
500ms/div

5-1. CSF30-BBW Input characteristics

(1) Oscilloscope : Wave Surfer 454(LeCroy)

CH3 : INPUT VOLTAGE - ADP300 High voltage differential probe

CH2 : INPUT CURRENT - AP015 current probe

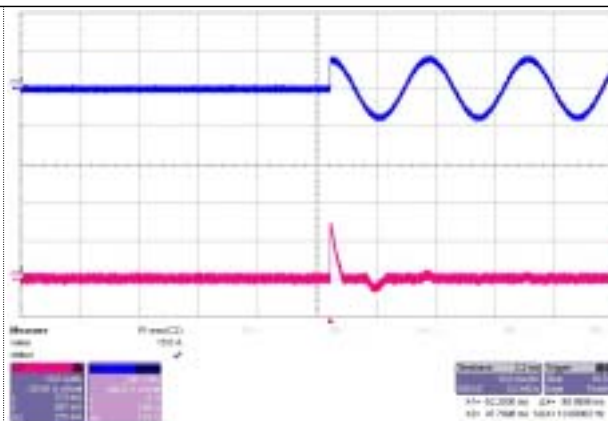
(2) Digital Multimeter : FLUKE189 (FLUKE)

(1) Inrush Current Characteristics (110V)

$V_{in} =$
110V

$I_o =$
100%

$I_{rush} = 15.0A$



CH3
200V/div
10.0ms/div

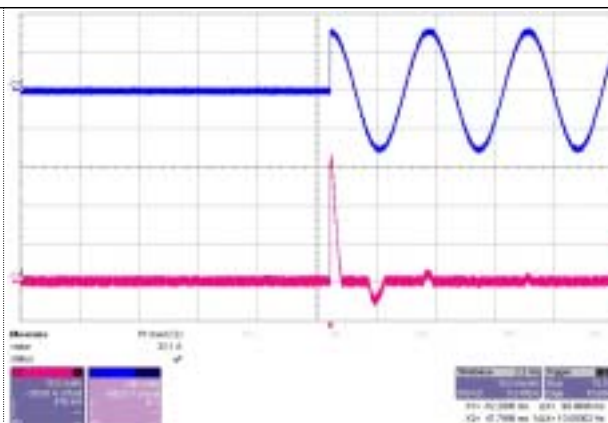
CH2
10.0A/div
10.0ms/div

(2) Inrush Current Characteristics (220V)

$V_{in} =$
220V

$I_o =$
100%

$I_{rush} = 33.1A$



CH3
200V/div
10.0ms/div

CH2
10.0A/div
10.0ms/div

(3) Input Current & Efficiency Characteristics

Condition $T_a : 25$

V_{in}		I_o					
		85V	110V	132V	170V	220V	264V
Load (min)	Input Current	0.055A	0.049A	0.048A	0.048A	0.054A	0.056A
	Efficiency	-	-	-	-	-	-
Load (50%)	Input Current	0.260A	0.213A	0.187A	0.160A	0.145A	0.131A
	Efficiency	70.05%	70.19%	69.90%	67.58%	64.02%	60.98%
Load (100%)	Input Current	0.471A	0.372A	0.324A	0.271A	0.237A	0.210A
	Efficiency	72.80%	74.40%	74.46%	73.72%	72.32%	69.60%

5-2. CSF30-BBW Output characteristics

(1) Digital Multimeter : FLUKE189 (FLUKE)

(1) Line & Load Regulation Characteristics								Condition Ta : 25
CH1								
Input Voltage Load	85V	110V	132V	170V	220V	264V	Line Regulation [mV]	
Io=min% (0.1A)	5.002V	5.002V	5.002V	5.002V	5.001V	5.001V	1mV	
Io=50% (0.25A)	5.000V	5.000V	5.000V	5.000V	4.999V	4.999V	1mV	
Io=100% (0.5A)	4.998V	4.999V	4.999V	4.999V	4.998V	4.999V	1mV	
Load Regulation [mV]	4mV	3mV	3mV	3mV	3mV	2mV		
CH2								
Input Voltage Load	85V	110V	132V	170V	220V	264V	Line Regulation [mV]	
Io=min% (0.1A)	5.003V	5.002V	5.002V	5.002V	5.002V	5.002V	1mV	
Io=50% (0.25A)	5.003V	5.002V	5.002V	5.002V	5.001V	5.001V	2mV	
Io=100% (0.5A)	5.001V	5.001V	5.001V	5.001V	5.000V	5.000V	1mV	
Load Regulation [mV]	2mV	1mV	1mV	1mV	2mV	2mV		
(2) CSF15-EEW Cross Regulation characteristics								Condition Ta : 25
Channel NO.	CH1				CH2			
Input Voltage	0%		5.188V	100%		4.816V		
220VAC	0%		5.112V	50%		4.893V		
	50%		4.889V	0%		5.116V		
	100%		4.812V	0%		5.192V		
			376mV			376mV		
Cross Regulation[mV]			376mV			376mV		

5-3. CSF30-BBW Dynamic load response characteristics

(1) Oscilloscope : Wave Surfer 454(LeCroy)

CH2 : CURRENT WAVE FORM - AP015 Current probe

CH4 : VOLTAGE WAVE FORM - PP005 Passive probe

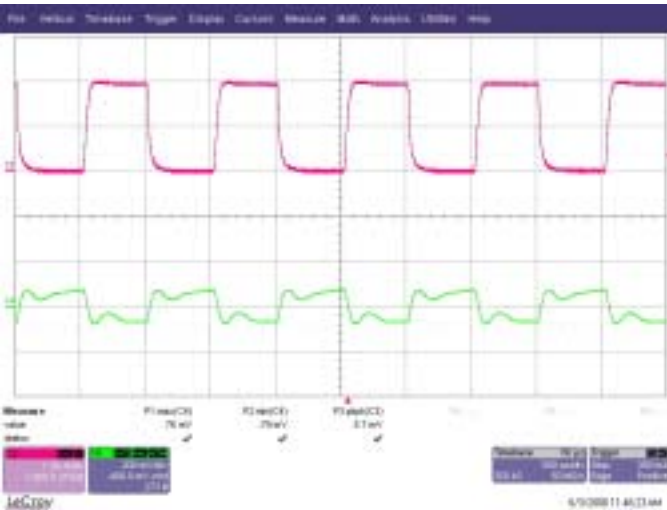
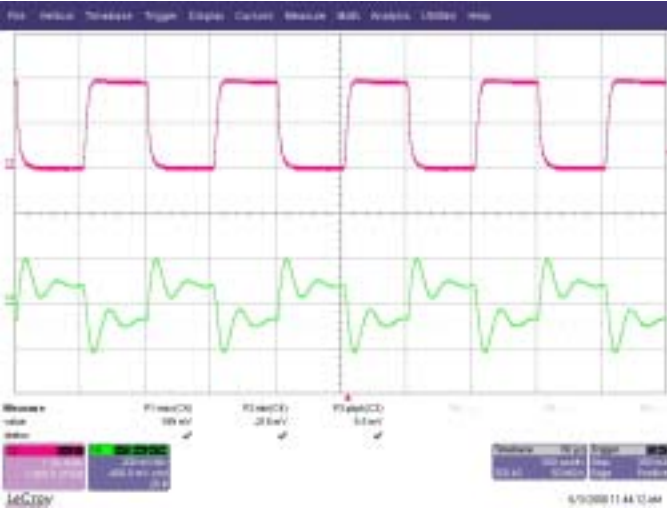
<p>220VAC</p>	<p>OUTPUT 5V/2.0A</p> <p>$I_o =$ 0~100% 100Hz</p>	<p>CH1 :</p> <p>+V_{PK}=116mV (2.3%)</p> <p>-V_{PK}=120mV (2.4%)</p>		<p>CH2 1.00A/div 5.00ms/div</p> <p>CH4 200mV/div 5.00ms/div</p>
<p>220VAC</p>	<p>OUTPUT 5V/2.0A</p> <p>$I_o =$ 0~100% 100Hz</p>	<p>CH2 :</p> <p>+V_{PK}=116mV (2.3%)</p> <p>-V_{PK}=115mV (2.3%)</p>		<p>CH2 1.00A/div 5.00ms/div</p> <p>CH4 200mV/div 5.00ms/div</p>
<p>220VAC</p>	<p>OUTPUT 10V/2.0A</p> <p>$I_o =$ 0~100% 100Hz</p>	<p>CH1 - CH2:</p> <p>+V_{PK}=254mV (2.5%)</p> <p>-V_{PK}=278mV (2.7%)</p>		<p>CH2 1.00A/div 5.00ms/div</p> <p>CH34 200mV/div 5.00ms/div</p>

5-4. CSF30-BBW Dynamic load response characteristics

(1) Oscilloscope : Wave Surfer 454(LeCroy)

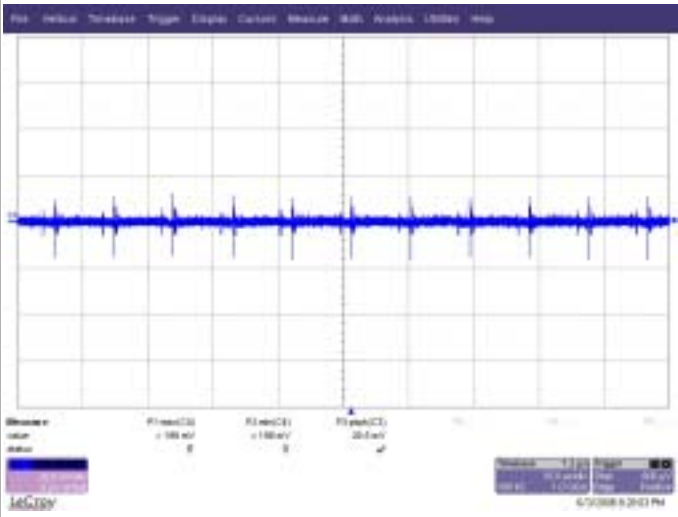
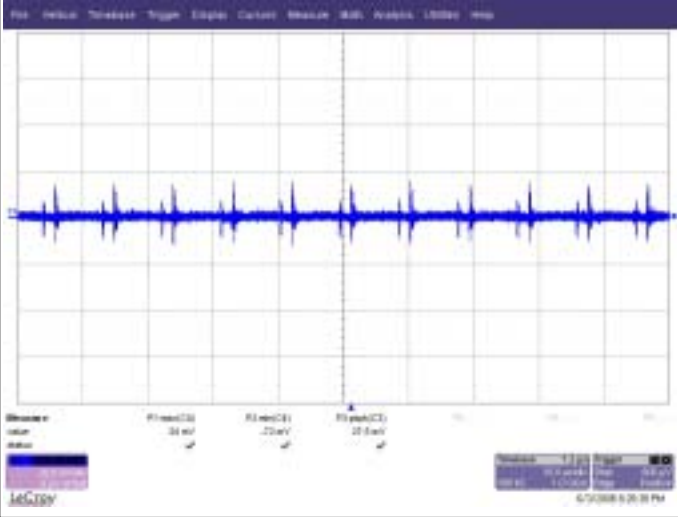
CH2 : CURRENT WAVE FORM - AP015 Current probe

CH4 : VOLTAGE WAVE FORM - PP005 Passive probe

220VAC	OUTPUT 5V/2.0A $I_o =$ 0~100% 1KHz	CH1 : $+V_{PK} = 76\text{mV}$ (1.5%) $-V_{PK} = 79\text{mV}$ (1.6%)		CH2 1.00A/div 500us/div CH4 200mV/div 500us/div
220VAC	OUTPUT 5V/2.0A $I_o =$ 0~100% 1KHz	CH2 : $+V_{PK} = 82\text{mV}$ (1.6%) $-V_{PK} = 84\text{mV}$ (1.6%)		CH2 1.00A/div 500us/div CH4 200mV/div 500us/div
220VAC	OUTPUT 10V/2.0A $I_o =$ 0~100% 1KHz	CH1 - CH2: $+V_{PK} = 199\text{mV}$ (2.1%) $-V_{PK} = 218\text{mV}$ (2.2%)		CH2 1.00A/div 500us/div CH4 200mV/div 500us/div

5-5. CSF30-BBW Ripple & Noise characteristics

(1) Oscilloscope : Wave Surfer 454(LeCroy)
 CH3 : BNC Cable Probe(50 , 1.5m)
 Band Width : 200MHz

220VAC	$I_o=100\%$	CH1 Ripple&Noise 28.5mV _{p-p}		CH3 20.0mV/div 10.0us/div
220VAC	$I_o=100\%$	CH2 Ripple&Noise 27.5mV _{p-p}		CH3 20.0mV/div 10.0us/div

5-6. CSF30-BBW Output characteristics

(1) Oscilloscope : Wave Surfer 454(LeCroy)

CH3 : INPUT VOLTAGE - ADP300 High voltage differential probe

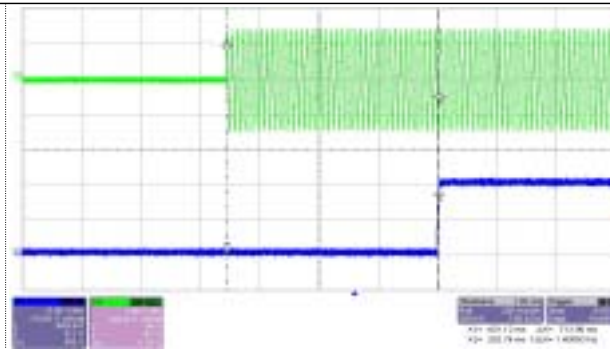
CH4 : OUTPUT VOLTAGE - PP005A passive probe

(1) Turn on time characteristics

Vin=
100V

I_o=
100%

t_{turn on} = 713ms



CH3
5.00V/div
200ms/div

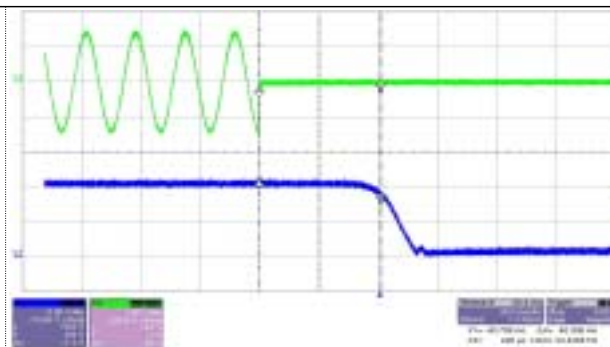
CH4
200V/div
200ms/div

(2) Hold up characteristics

Vin=
100V

I_o=
100%

t_{hold up} = 40.9ms



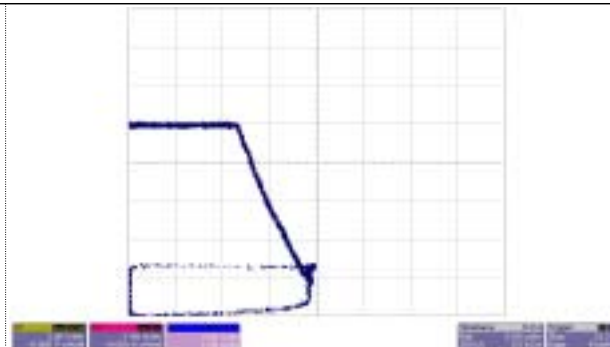
CH3
5.00V/div
20.0ms/div

CH4
100V/div
20.0ms/div

(3) Over Current protection characteristics

Vin=
220V

O.C.P = 2.45A



X
1.00A/div
5.00s/div

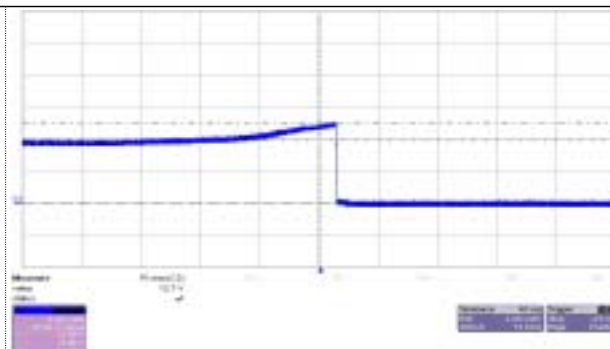
Y
2.00V/div
5.00s/div

(4) Over Voltage protection characteristics

Vin=
220V

I_o=
10%

O.V.P = 12.45V



CH3
5.00V/div
2.00s/div

6-1. CSF30-DDW Input characteristics

(1) Oscilloscope : Wave Surfer 454(LeCroy)

CH3 : INPUT VOLTAGE - ADP300 High voltage differential probe

CH2 : INPUT CURRENT - AP015 current probe

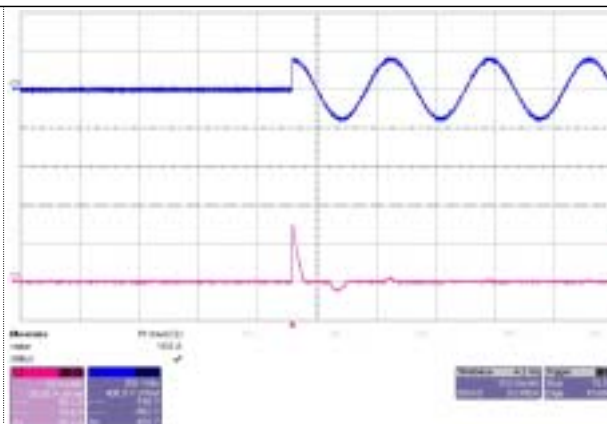
(2) Digital Multimeter : FLUKE189 (FLUKE)

(1) Inrush Current Characteristics (110V)

$V_{in} =$
110V

$I_o =$
100%

$I_{rush} = 15.0A$



CH3
200V/div
10.0ms/div

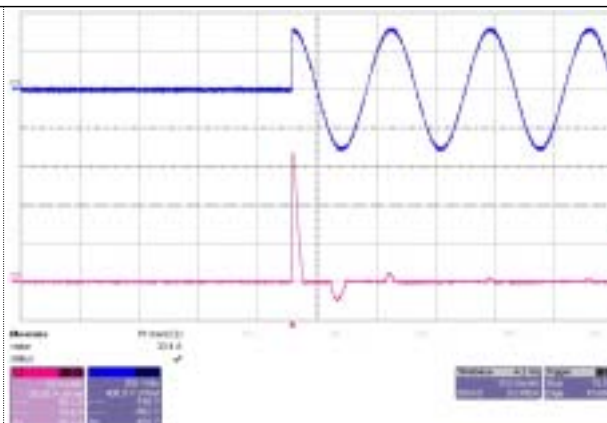
CH4
10.0A/div
10.0ms/div

(2) Inrush Current Characteristics (220V)

$V_{in} =$
220V

$I_o =$
100%

$I_{rush} = 33.4A$



CH3
200V/div
10.0ms/div

CH4
10.0A/div
10.0ms/div

(3) Input Current & Efficiency Characteristics

Condition $T_a : 25$

I_o \ V_{in}		85V	110V	132V	170V	220V	264V
		Load (min)	Input Current	0.064A	0.059A	0.056A	0.055A
	Efficiency	-	-	-	-	-	-
Load (50%)	Input Current	0.372A	0.304A	0.264A	0.228A	0.194A	0.175A
	Efficiency	74.32%	74.93%	74.68%	73.10%	71.04%	69.24%
Load (100%)	Input Current	0.696A	0.541A	0.463A	0.387A	0.327A	0.292A
	Efficiency	74.93%	77.39%	78.23%	77.90%	76.75%	75.23%

6-2. CSF30-DDW Output characteristics

(1) Digital Multimeter : FLUKE189 (FLUKE)

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(1) Line & Load Regulation Characteristics

Condition Ta : 25

CH1

Input Voltage Load	85V	110V	132V	170V	220V	264V	Line Regulation [mV]
Io=min% (0.1A)	12.00V	12.00V	12.00V	12.00V	12.00V	12.00V	0mV
Io=50% (0.25A)	12.00V	12.00V	12.00V	12.00V	12.00V	12.00V	0mV
Io=100% (0.5A)	12.00V	12.00V	11.99V	11.99V	11.99V	11.99V	10mV
Load Regulation [mV]	0mV	0mV	10mV	10mV	10mV	10mV	

CH2

Input Voltage Load	85V	110V	132V	170V	220V	264V	Line Regulation [mV]
Io=min% (0.1A)	12.00V	12.00V	12.00V	12.00V	12.00V	12.00V	0mV
Io=50% (0.25A)	12.00V	12.00V	12.00V	12.00V	12.00V	12.00V	0mV
Io=100% (0.5A)	11.99V	11.99V	11.99V	11.99V	11.99V	11.99V	0mV
Load Regulation [mV]	10mV	10mV	10mV	10mV	10mV	10mV	

(2) CSF15-EEW Cross Regulation characteristics

Condition Ta : 25

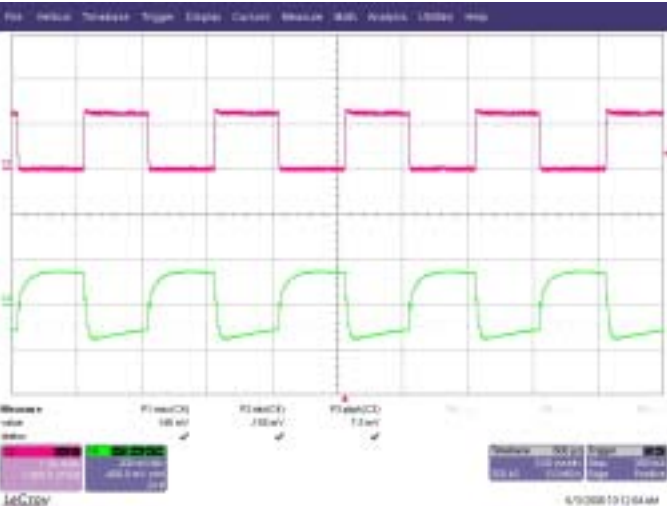
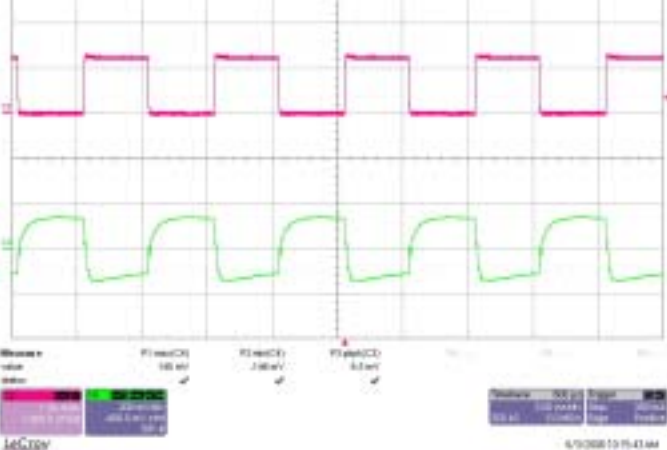
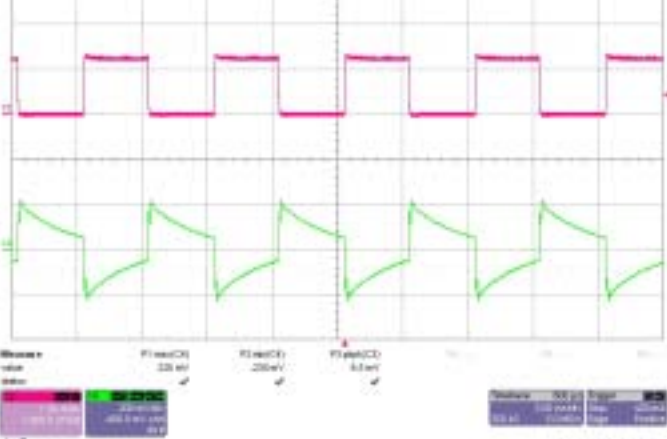
Channel NO.	CH1		CH2	
Input Voltage				
220VAC	0%	12.23V	100%	11.76V
	0%	12.14V	50%	11.86V
	50%	11.85V	0%	12.14V
	100%	11.77V	0%	12.22V
Cross Regulation[mV]		460mV		460mV

6-3. CSF30-DDW Dynamic load response characteristics

(1) Oscilloscope : Wave Surfer 454(LeCroy)

CH2 : CURRENT WAVE FORM - AP015 Current probe

CH4 : VOLTAGE WAVE FORM - PP005 Passive probe

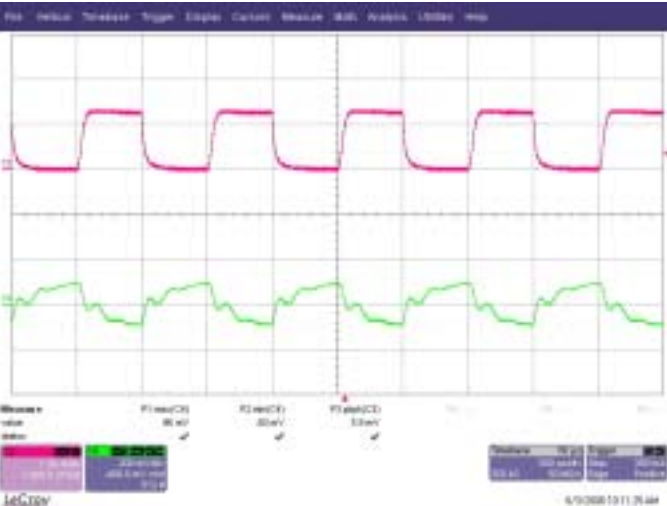
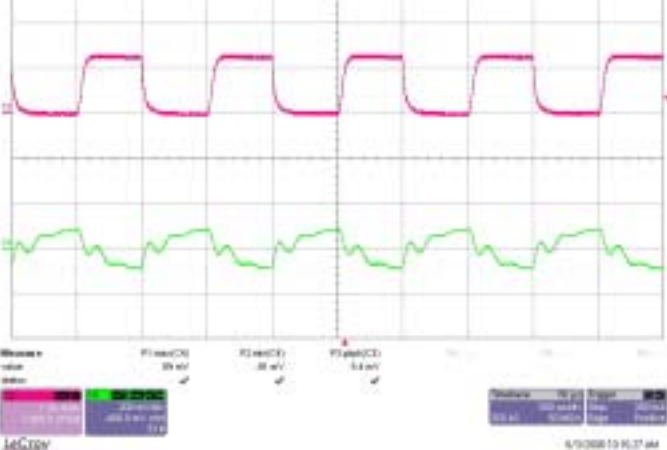
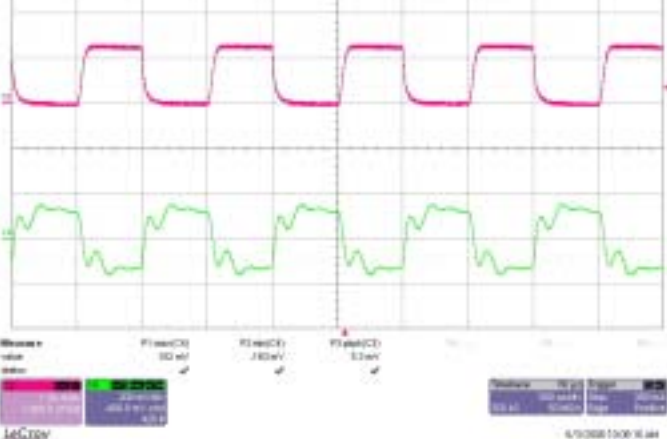
220VAC	OUTPUT 12V/1.3A $I_o =$ 0~100% 100Hz	CH1 : $+V_{PK} = 148\text{mV}$ (1.2%) $-V_{PK} = 155\text{mV}$ (1.3%)		CH2 1.00A/div 5.00ms/div CH4 200mV/div 5.00ms/div
220VAC	OUTPUT 12V/1.3A $I_o =$ 0~100% 100Hz	CH2 : $+V_{PK} = 140\text{mV}$ (1.2%) $-V_{PK} = 146\text{mV}$ (1.2%)		CH2 1.00A/div 5.00ms/div CH4 200mV/div 5.00ms/div
220VAC	OUTPUT 24V/1.3A $I_o =$ 0~100% 100Hz	CH1 - CH2: $+V_{PK} = 220\text{mV}$ (0.91%) $-V_{PK} = 230\text{mV}$ (0.95%)		CH2 1.00A/div 5.00ms/div CH4 200mV/div 5.00ms/div

6-4. CSF30-DDW Dynamic load response characteristics

(1) Oscilloscope : Wave Surfer 454(LeCroy)

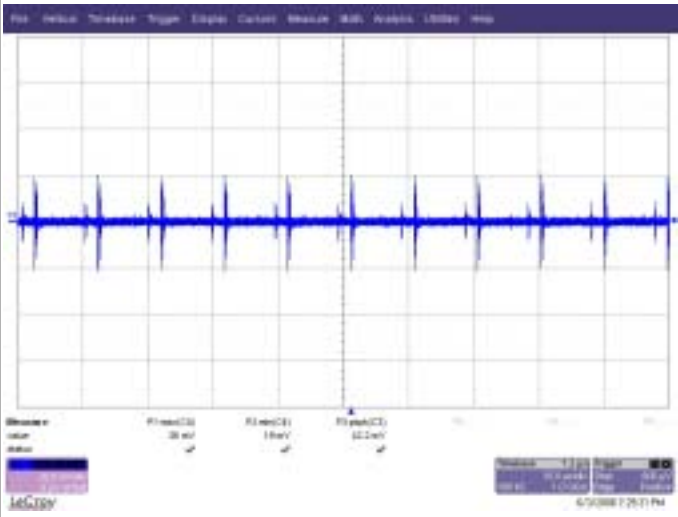
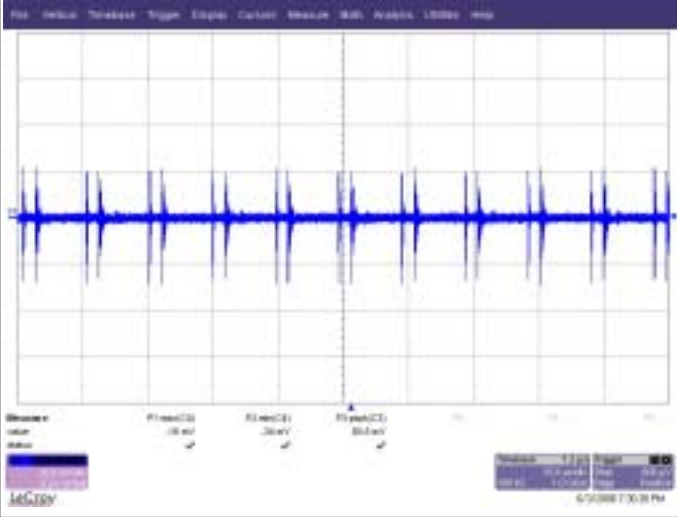
CH2 : CURRENT WAVE FORM - AP015 Current probe

CH4 : VOLTAGE WAVE FORM - PP005 Passive probe

220VAC	<p>OUTPUT 12V/1.3A</p> <p>$I_o =$ 0~100% 1KHz</p>	<p>CH1 :</p> <p>+V_{PK}=96mV (0.8%)</p> <p>-V_{PK}=93mV (0.8%)</p>		<p>CH2 1.00A/div 500us/div</p> <p>CH4 200mV/div 500us/div</p>
220VAC	<p>OUTPUT 12V/1.3A</p> <p>$I_o =$ 0~100% 1KHz</p>	<p>CH2 :</p> <p>+V_{PK}=89mV (0.7%)</p> <p>-V_{PK}=91mV (0.8%)</p>		<p>CH2 1.00A/div 500us/div</p> <p>CH4 200mV/div 500us/div</p>
220VAC	<p>OUTPUT 24V/1.3A</p> <p>$I_o =$ 0~100% 1KHz</p>	<p>CH1 - CH2:</p> <p>+V_{PK}=152mV (0.6%)</p> <p>-V_{PK}=163mV (0.7%)</p>		<p>CH2 1.00A/div 500us/div</p> <p>CH4 500mV/div 500us/div</p>

6-5. CSF30-DDW Ripple & Noise characteristics

(1) Oscilloscope : Wave Surfer 454(LeCroy)
 CH3 : BNC Cable Probe(50 , 1.5m)
 Band Width : 200MHz

220VAC	$I_o=100\%$	CH1 Ripple&Noise 42.2mV _{p-p}		CH3 20.0mV/div 10.0us/div
220VAC	$I_o=100\%$	CH2 Ripple&Noise 50.5mV _{p-p}		CH3 20.0mV/div 10.0us/div

6-6. CSF30-DDW Output characteristics

(1) Oscilloscope : Wave Surfer 454(LeCroy)

CH3 : INPUT VOLTAGE - ADP300 High voltage differential probe

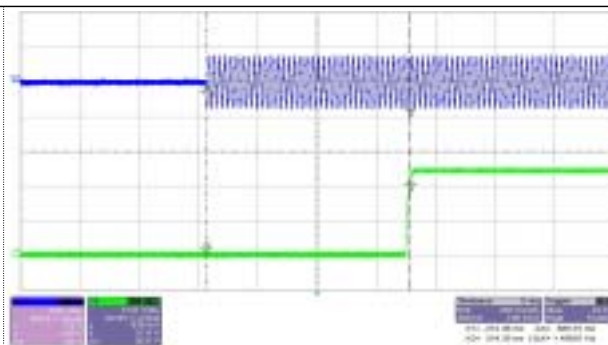
CH4 : OUTPUT VOLTAGE - PP005A passive probe

(1) Turn on time characteristics

$V_{in} =$
100V

$I_o =$
100%

$t_{turn\ on} = 686ms$



CH4
10.0V/div
200ms/div

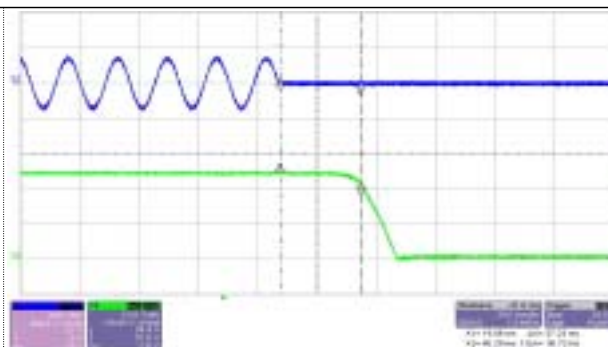
CH3
200V/div
200ms/div

(2) Hold up characteristics

$V_{in} =$
100V

$I_o =$
100%

$t_{hold\ up} = 27.2ms$



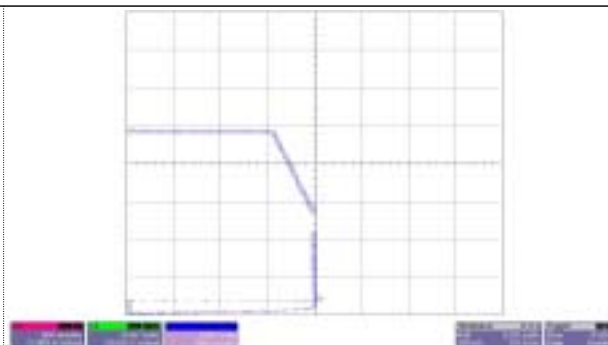
CH4
10.0V/div
20.0ms/div

CH3
200V/div
20.0ms/div

(3) Over Current protection characteristics

$V_{in} =$
220V

O.C.P = 1.65A



X
500mA/div
5.00s/div

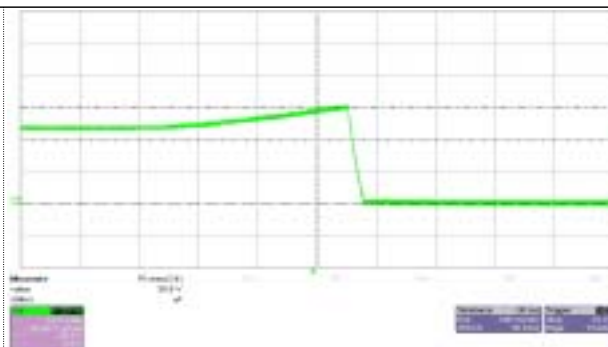
Y
5.00V/div
5.00s/div

(4) Over Voltage protection characteristics

$V_{in} =$
220V

$I_o =$
10%

O.V.P = 30.4V



CH4
10.0V/div
500ms/div

7-1. CSF30-EEW Input characteristics

(1) Oscilloscope : Wave Surfer 454(LeCroy)

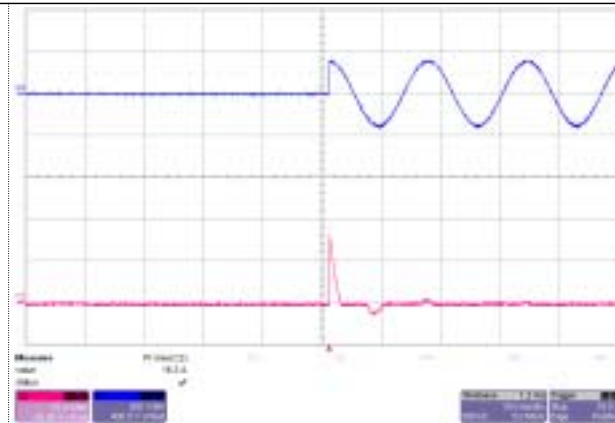
CH3 : INPUT VOLTAGE - ADP300 High voltage differential probe

CH2 : INPUT CURRENT - AP015 current probe

(2) Digital Multimeter : FLUKE189 (FLUKE)

(1) Inrush Current Characteristics (110V)

$V_{in} = 110V$ $I_o = 100\%$
 $I_{rush} = 16.3A$

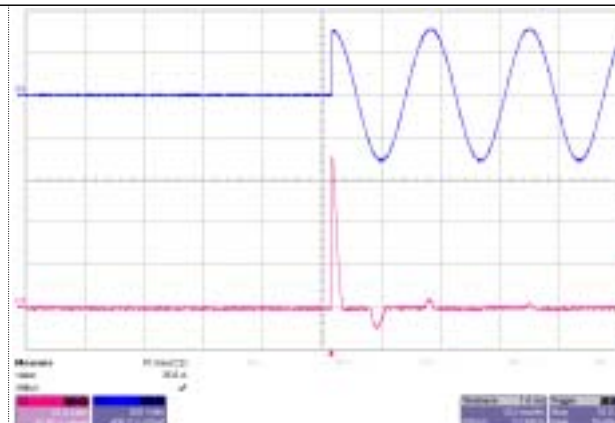


CH3
200V/div
10.0ms/div

CH4
10.0A/div
10.0ms/div

(2) Inrush Current Characteristics (220V)

$V_{in} = 220V$ $I_o = 100\%$
 $I_{rush} = 35.6A$



CH3
200V/div
10.0ms/div

CH4
10.0A/div
10.0ms/div

(3) Input Current & Efficiency Characteristics

Condition $T_a : 25$

V_{in}		I_o					
		85V	110V	132V	170V	220V	264V
Load (min)	Input Current	0.071A	0.059A	0.054A	0.055A	0.060A	0.064A
	Efficiency	-	-	-	-	-	-
Load (50%)	Input Current	0.362A	0.294A	0.255A	0.220A	0.195A	0.170A
	Efficiency	74.75%	75.74%	75.03%	73.55%	70.81%	68.58%
Load (100%)	Input Current	0.671A	0.527A	0.448A	0.380A	0.327A	0.184A
	Efficiency	76.21%	78.33%	78.95%	78.70%	77.07%	75.42%

7-2. CSF30-EEW Output characteristics

(1) Digital Multimeter : FLUKE189 (FLUKE)

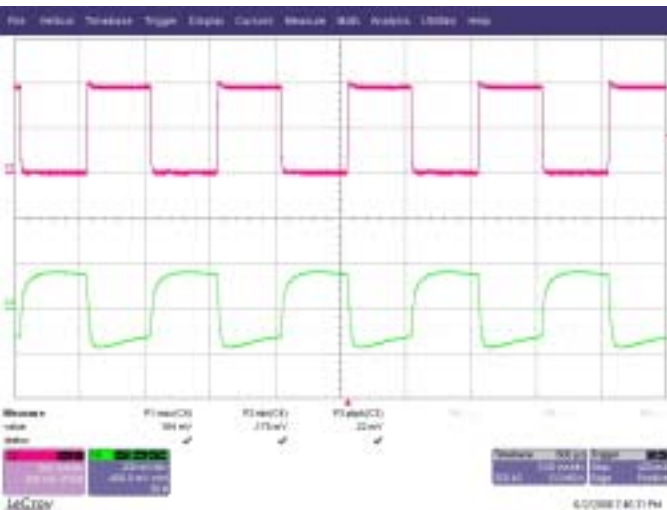
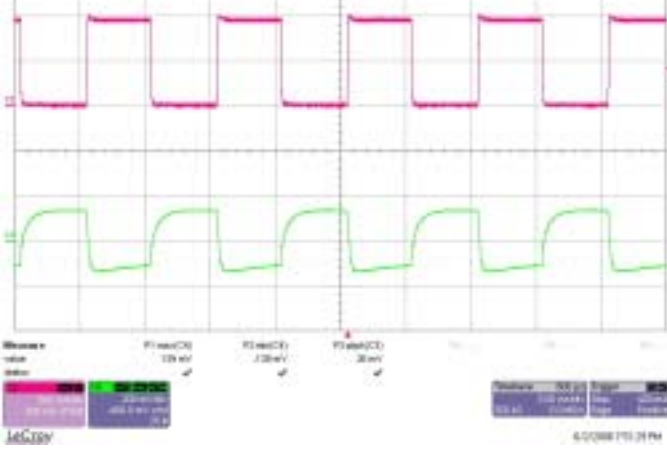
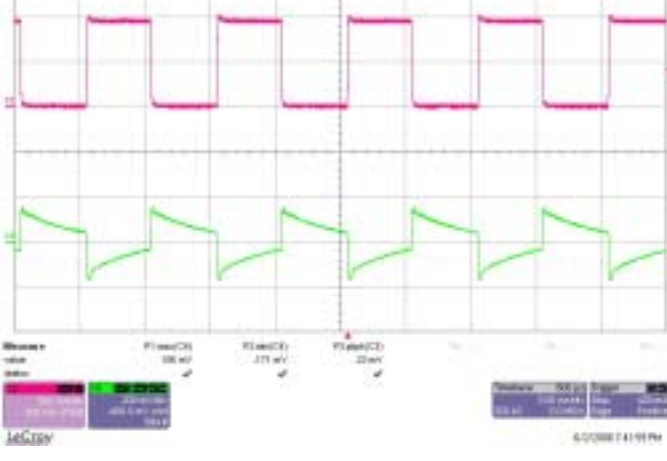
(1) Line & Load Regulation Characteristics								Condition Ta : 25
CH1								
Input Voltage Load	85V	110V	132V	170V	220V	264V	Line Regulation [mV]	
Io=min% (0.1A)	15.01V	15.01V	15.01V	15.01V	15.01V	15.00V	10mV	
Io=50% (0.25A)	15.01V	15.00V	15.00V	15.00V	15.00V	15.00V	10mV	
Io=100% (0.5A)	15.00V	15.00V	15.00V	15.00V	15.00V	15.00V	0mV	
Load Regulation [mV]	10mV	10mV	10mV	10mV	10mV	0mV		
CH2								
Input Voltage Load	85V	110V	132V	170V	220V	264V	Line Regulation [mV]	
Io=min% (0.1A)	15.01V	15.01V	15.01V	15.01V	15.01V	15.01V	0mV	
Io=50% (0.25A)	15.01V	15.01V	15.01V	15.01V	15.01V	15.01V	0mV	
Io=100% (0.5A)	15.01V	15.01V	15.01V	15.01V	15.01V	15.01V	0mV	
Load Regulation [mV]	0mV	0mV	0mV	0mV	0mV	0mV		
(2) CSF15-EEW Cross Regulation characteristics								Condition Ta : 25
Channel NO.	CH1				CH2			
Input Voltage	0%		15.25V		100%		14.78V	
220VAC	0%		15.15V		50%		14.88V	
	50%		14.86V		0%		15.16V	
	100%		14.76V		0%		15.27V	
	Cross Regulation[mV]				490mV			

7-3. CSF30-EEW Dynamic load response characteristics

(1) Oscilloscope : Wave Surfer 454(LeCroy)

CH2 : CURRENT WAVE FORM - AP015 Current probe

CH4 : VOLTAGE WAVE FORM - PP005 Passive Voltage probe

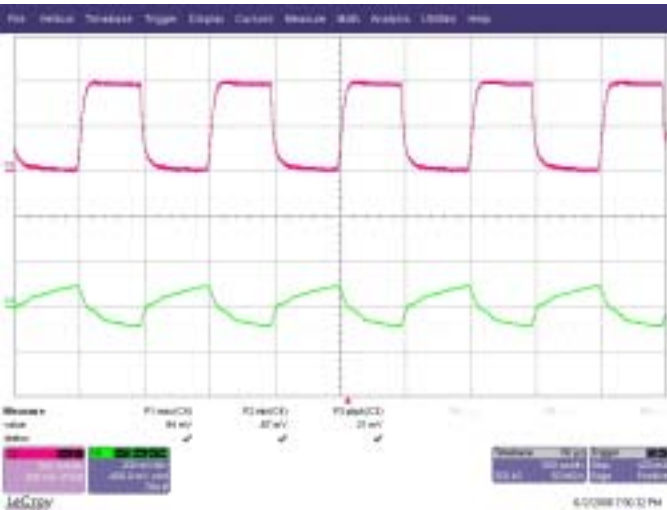
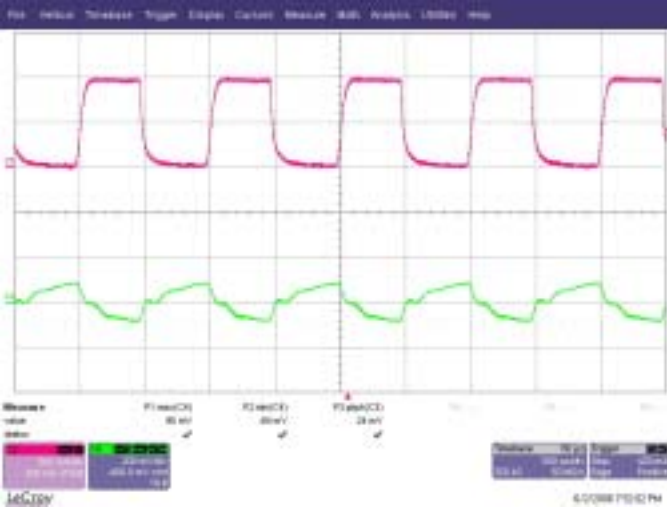
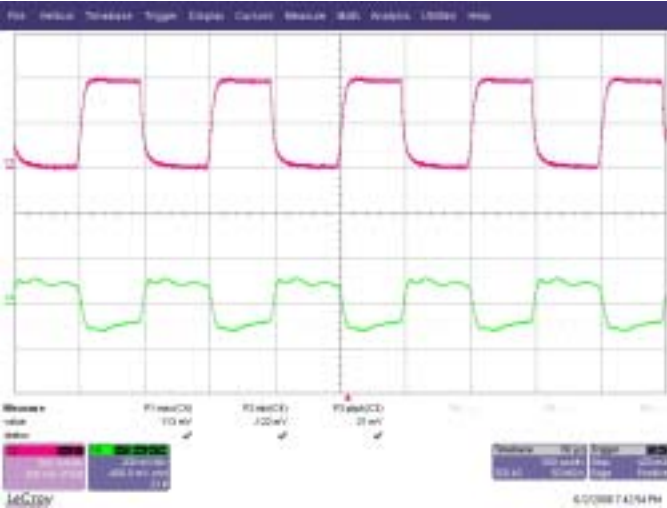
220VAC	OUTPUT 15V/1.0A $I_o =$ 0~100% 100Hz	CH1 : $+V_{PK} = 164\text{mV}$ (1.1%) $-V_{PK} = 175\text{mV}$ (1.1%)		CH2 500mA/div 5.00ms/div CH4 200mV/div 5.00ms/div
220VAC	OUTPUT 15V/1.0A $I_o =$ 0~100% 100Hz	CH2 : $+V_{PK} = 139\text{mV}$ (0.9%) $-V_{PK} = 138\text{mV}$ (0.9%)		CH2 500mA/div 5.00ms/div CH4 200mV/div 5.00ms/div
220VAC	OUTPUT 30V/1.0A $I_o =$ 0~100% 100Hz	CH1 - CH2: $+V_{PK} = 156\text{mV}$ (0.5%) $-V_{PK} = 171\text{mV}$ (0.5%)		CH2 500mA/div 5.00ms/div CH4 200mV/div 5.00ms/div

7-4. CSF30-EEW Dynamic load response characteristics

(1) Oscilloscope : Wave Surfer 454(LeCroy)

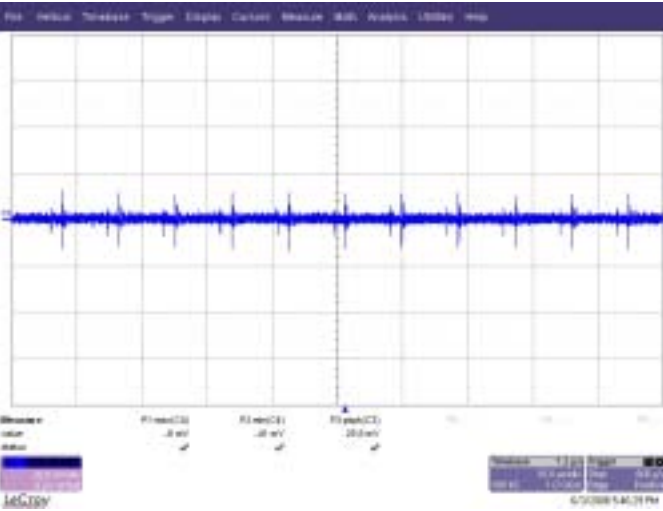
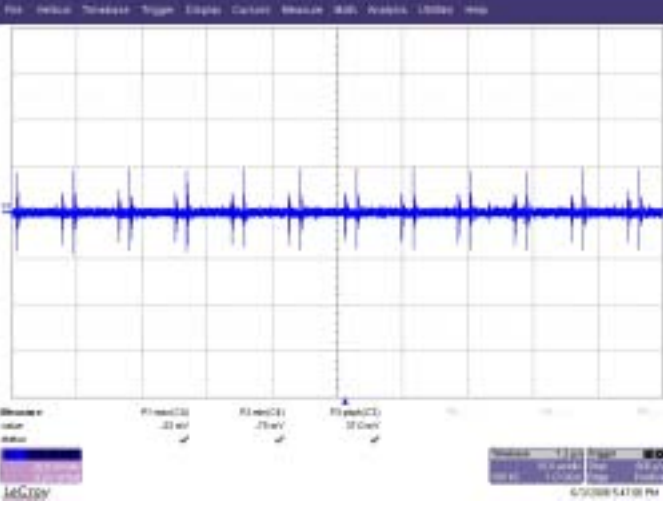
CH2 : CURRENT WAVE FORM - AP015 Current probe

CH4 : VOLTAGE WAVE FORM - PP005 Passive probe

220VAC	OUTPUT 15V/1.0A $I_o =$ 0~100% 1KHz	CH1 : $+V_{PK} = 94\text{mV}$ (0.6%) $-V_{PK} = 87\text{mV}$ (0.6%)		CH2 500mA/div 500us/div CH4 200mV/div 500us/div
220VAC	OUTPUT 15V/1.0A $I_o =$ 0~100% 1KHz	CH2 : $+V_{PK} = 90\text{mV}$ (0.6%) $-V_{PK} = 84\text{mV}$ (0.5%)		CH2 500mA/div 500us/div CH4 200mV/div 500us/div
220VAC	OUTPUT 30V/1.0A $I_o =$ 0~100% 1KHz	CH1 - CH2: $+V_{PK} = 113\text{mV}$ (0.3%) $-V_{PK} = 122\text{mV}$ (0.4%)		CH2 500mA/div 500us/div CH4 200mV/div 500us/div

7-5. CSF30-EEW Ripple & Noise characteristics

(1) Oscilloscope : Wave Surfer 454(LeCroy)
 CH3 : BNC Cable Probe(50 , 1.5m)
 Band Width : 200MHz

220VAC	$I_o=100\%$	<p>CH1 Ripple&Noise 25.8mV_{p-p}</p>		<p>CH3 20.0mV/div 10.0us/div</p>
220VAC	$I_o=100\%$	<p>CH2 Ripple&Noise 37.0mV_{p-p}</p>		<p>CH3 20.0mV/div 10.0us/div</p>

7-6. CSF30-EEW Output characteristics

(1) Oscilloscope : Wave Surfer 454(LeCroy)

CH3 : INPUT VOLTAGE - ADP300 High voltage differential probe

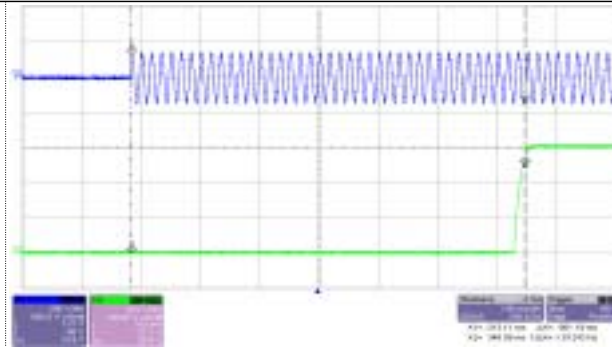
CH4 : OUTPUT VOLTAGE - PP005A passive probe

(1) Turn on time characteristics

$V_{in} =$
100V

$I_o =$
100%

$t_{turn\ on} = 661ms$



CH4
10.0V/div
100ms/div

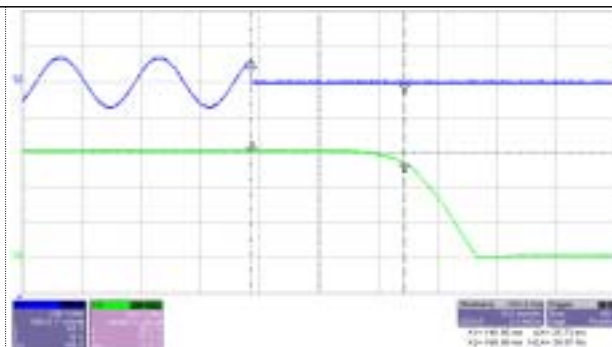
CH3
200V/div
100ms/div

(2) Hold up characteristics

$V_{in} =$
100V

$I_o =$
100%

$t_{hold\ up} = 25.7ms$



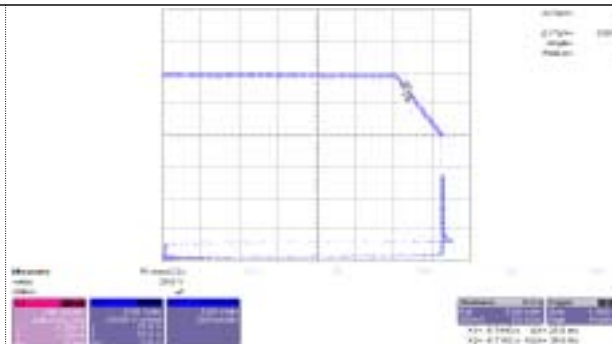
CH4
10.0V/div
10.0ms/div

CH3
200V/div
10.0ms/div

(3) Over Current protection characteristics

$V_{in} =$
220V

O.C.P = 1.27A



X
200mA/div
5.00s/div

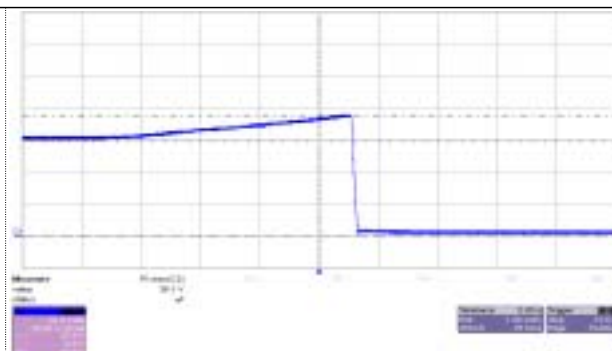
Y
5.00V/div
5.00s/div

(4) Over Voltage protection characteristics

$V_{in} =$
220V

$I_o =$
10%

O.V.P = 37.9V



CH3
10.0V/div
1.00s/div