
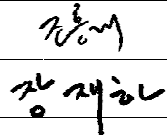

Evaluation Data

	SMPS
	CSF50-S
Rev. No.	A

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Evaluation data

1. CSF50-3R3

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. CSF50-05

1. Input characteristics
2. Output characteristics

3. CSF50-09

1. Input characteristics
2. Output characteristics

4. CSF50-12

1. Input characteristics
2. Output characteristics

5. CSF50-15

1. Input characteristics
2. Output characteristics

6. CSF50-24

1. Input characteristics
2. Output characteristics

7. CSF50-48

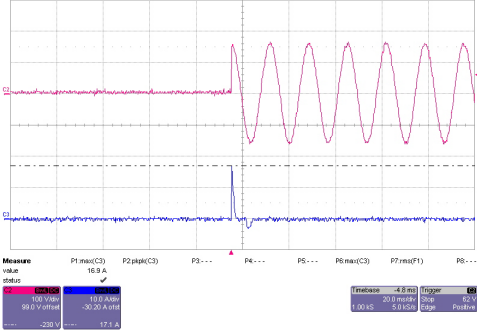
1. Input characteristics
2. Output characteristics

1-1. CSF50-3R3 Input characteristics

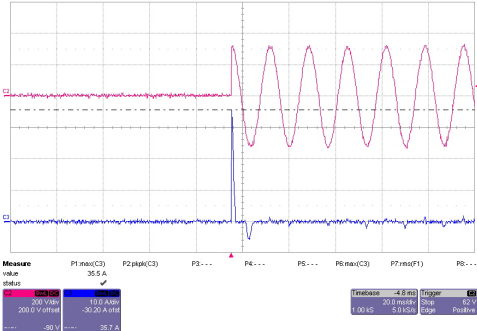
- ◆ Oscilloscope : WAVE PRO 7000(LeCroy)
 - ◇ CH2 : Input voltage – ADP305 High voltage differential probe(BW:200MHz)
 - ◇ CH3 : Input current – AP015 current probe (BW:20MHz)
- ◆ Digital Multimeter : FLUKE189 (FLUKE)

입력	출력	측정값	파형	비고
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(1) Inrush Current Characteristics (110V)

$V_{in} = 110V$	$I_o = 100\%$	$I_{inrush} = 16.9A$		CH2 100V/div 20.0ms/div CH3 10.0A/div 20.0ms/div
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(2) Inrush Current Characteristics (220V)

$V_{in} = 220V$	$I_o = 100\%$	$I_{inrush} = 35.5A$		CH2 200V/div 20.0ms/div CH3 10.0A/div 20.0ms/div
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(3) Input Current & Efficiency Characteristics

I_o \ V_{in}		Condition $T_a : 25^\circ C$					
		85V	110V	132V	170V	220V	264V
Load (min)	Input Current	0.00A	0.00A	0.00A	0.00A	0.00A	0.00A
	Efficiency	–	–	–	–	–	–
Load (50%)	Input Current	0.267A	0.206A	0.172A	0.141A	0.109A	0.091A
	Efficiency	72%	72%	72%	68%	68%	68%
Load (100%)	Input Current	0.516A	0.404A	0.337A	0.276A	0.213A	0.178A
	Efficiency	75%	74%	74%	70%	70%	70%

1-2. CSF50-3R3 Output characteristics

- ◆ Oscilloscope : WAVE PRO 7000(LeCroy)
 - ◇ CH2 : Output current – AP015 current probe (BW:20MHz)
 - ◇ CH4 : Output voltage – DA1855 Differential Probe
- ◆ Digital Multimeter : FLUKE189 (FLUKE)

입력	출력	측정값	파형				비고
(1) Line & Load Regulation Characteristics							
Condition Ta : 25°C							
V_{in}	85V	110V	132V	170V	220V	264V	Line Regulation
I_o							
Load (min)	3.314V	3.314V	3.314V	3.313V	3.313V	3.314V	1mV
Load (50%)	3.312V	3.311V	3.311V	3.311V	3.309V	3.309V	3mV
Load (100%)	3.309V	3.309V	3.309V	3.309V	3.307V	3.309V	2mV
Load Regulation	5mV	5mV	5mV	4mV	6mV	5mV	

(2) Dynamic Load Response Characteristics (100Hz)

$V_{in} = 220V$	$I_o = 0 \sim 100\%$ 100Hz	$V_{over} = 30mV$ $V_{under} = 36mV$		CH2 5.00A/div 2.00ms/div CH4 20.0mV/div 2.00ms/div
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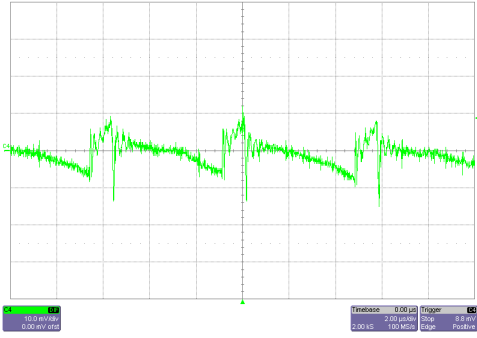
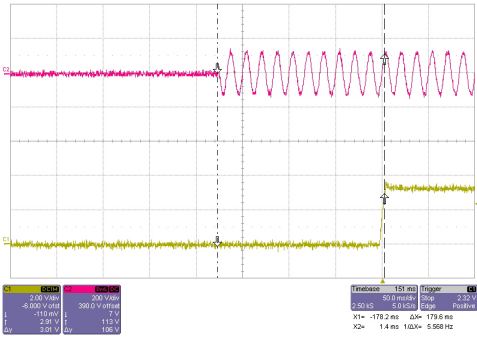
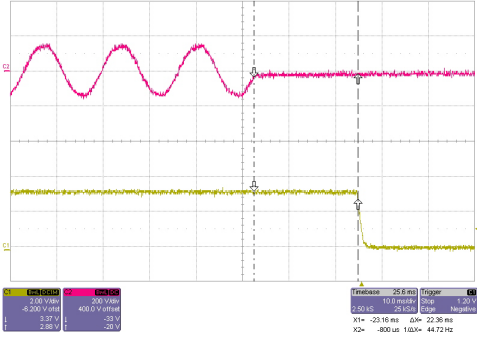
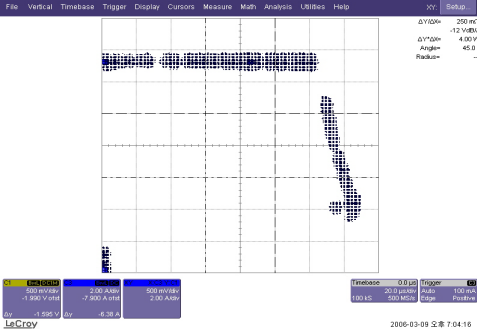
(3) Dynamic Load Response Characteristics (1KHz)

$V_{in} = 220V$	$I_o = 0 \sim 100\%$ 1kHz	$V_{over} = 32mV$ $V_{under} = 24mV$		CH2 5.00A/div 200us/div CH4 20.0mV/div 200us/div
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1-3. CSF50-3R3 Output characteristics

◆ Oscilloscope : WAVE PRO 7000(LeCroy)

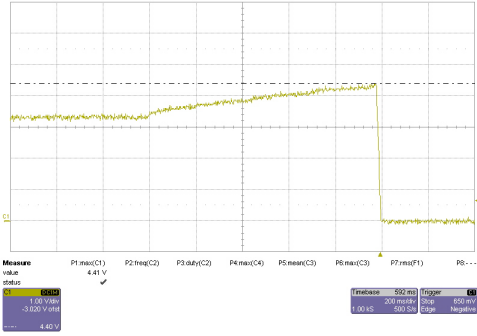
- ◇ CH1 : Output current – AP015 current probe (BW:20MHz)
- ◇ CH2 : Input voltage – ADP305 High voltage differential probe(BW:200MHz)
- ◇ CH3 : Output voltage – DA1855 Differential Probe

입력	출력	측정값	파형	비고
(1) Ripple & Noise characteristics.				
Vin= 220V	I _O = 100%	V _{Ripple} = 16mV V _{Noise} = 26mV		CH3 10.0mV/div 2.00us/div
(2) Turn on time characteristics				
Vin= 85V	I _O = 100%	t _{turn on} = 179.6ms		CH2 200V/div 50.0ms/div CH3 2.00V/div 50.0ms/div
(3) Hold up characteristics				
Vin= 100V	I _O = 100%	t _{hold up} = 22.36ms		CH2 200V/div 10.0ms/div CH3 2.00V/div 10.0ms/div
(4) Over Current protection characteristics				
Vin= 220V	I _O = 110~145%	O.C.P = 12.73A		X(CH1) 2.00A/div 20.0us/div Y(CH3) 500mV/div 20.0us/div

1-4. CSF50-3R3 Output characteristics

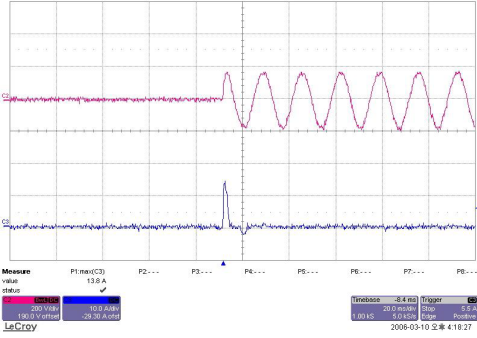
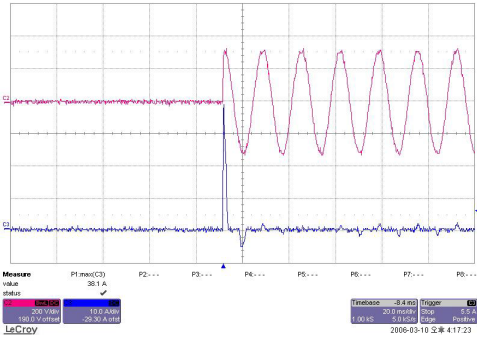
◆ Oscilloscope : WAVE PRO 7000(LeCroy)

◇ CH1 : Output voltage - ADP305 High voltage differential probe(BW:200MHz)

입력	출력	측정값	파형	비고
(1) Over-voltage protection characteristics				
Vin= 220V	I _o = 10%	O.V.P = 4.41V		CH1 1.00V/div 200ms/div

2-1. CSF50-05 Input characteristics

- ◆ Oscilloscope : WAVE PRO 7000(LeCroy)
 - ◇ CH2 : Input voltage – ADP305 High voltage differential probe(BW:200MHz)
 - ◇ CH3 : Input current – AP015 current probe (BW:20MHz)
- ◆ Digital Multimeter : FLUKE189 (FLUKE)

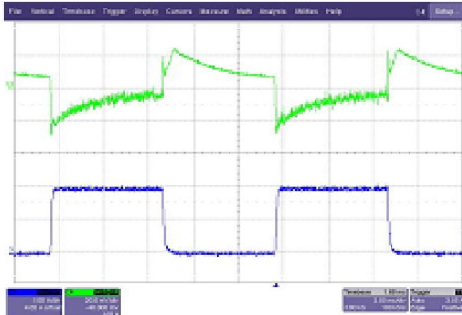
입력	출력	측정값	파형	비고		
(1) Inrush Current Characteristics (110V)						
Vin= 110V	Io= 100%	$I_{inrush} = 13.8A$		CH2 200V/div 20.0ms/div CH3 10.0A/div 20.0ms/div		
(2) Inrush Current Characteristics (220V)						
Vin= 220V	Io= 100%	$I_{inrush} = 38.1A$		CH2 200V/div 20.0ms/div CH3 10.0A/div 20.0ms/div		
(3) Input Current & Efficiency Characteristics						
Condition Ta : 25°C						
Io \ Vin	85V	110V	132V	170V	220V	264V
Load (min)	Input Current	0.00A	0.00A	0.00A	0.00A	0.00A
	Efficiency	-	-	-	-	-
Load (50%)	Input Current	0.381A	0.298A	0.248A	0.198A	0.155A
	Efficiency	77%	76%	76%	74%	73%
Load (100%)	Input Current	0.742A	0.581A	0.484A	0.385A	0.302A
	Efficiency	79%	78%	78%	76%	75%

2-2. CSF50-05 Output characteristics

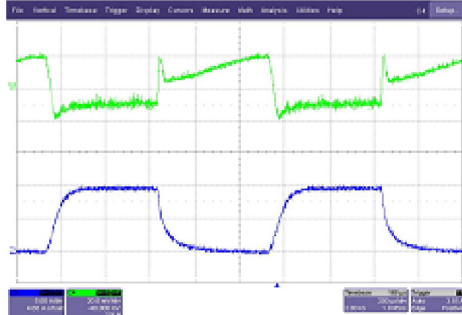
- ◆ Oscilloscope : WAVE PRO 7000(LeCroy)
 - ◇ CH2 : Output current – AP015 current probe (BW:20MHz)
 - ◇ CH4 : Output voltage – DA1855 Differential Probe
- ◆ Digital Multimeter : FLUKE189 (FLUKE)

입력	출력	측정값	파형				비고
(1) Line & Load Regulation Characteristics							
Condition Ta : 25°C							
V_{in}	85V	110V	132V	170V	220V	264V	Line Regulation
I_o							
Load (min)	5.032V	5.033V	5.031V	5.033V	5.033V	5.033V	2mV
Load (50%)	5.028V	5.028V	5.028V	5.029V	5.028V	5.029V	2mV
Load (100%)	5.022V	5.023V	5.023V	5.023V	5.025V	5.025V	3mV
Load Regulation	10mV	10mV	8mV	10mV	8mV	8mV	

(2) Dynamic Load Response Characteristics (100Hz)

$V_{in} = 220V$	$I_o = 0 \sim 100\%$ 100Hz	$V_{over} = 24mV$ $V_{under} = 28mV$		<p>CH2 5.00A/div 2.00ms/div</p> <p>CH4 20.0mV/div 2.00ms/div</p>
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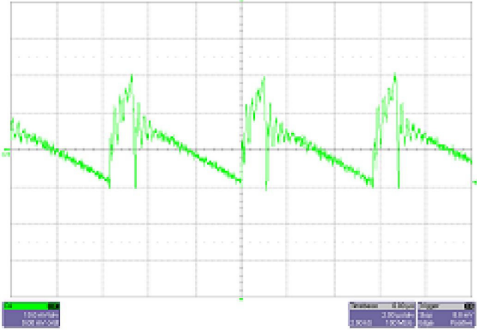
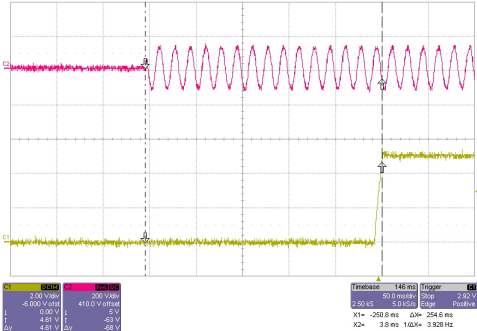
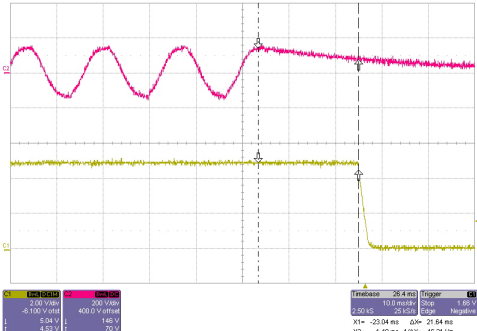
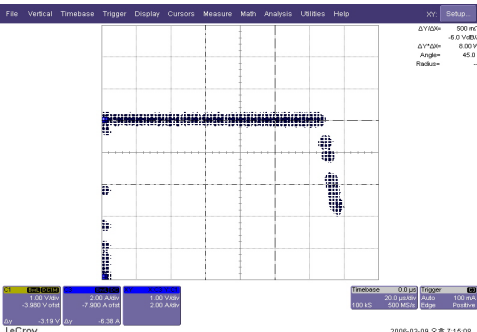
(3) Dynamic Load Response Characteristics (1KHz)

$V_{in} = 220V$	$I_o = 0 \sim 100\%$ 1kHz	$V_{over} = 22mV$ $V_{under} = 19mV$		<p>CH2 5.00A/div 200us/div</p> <p>CH4 20.0mV/div 200us/div</p>
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2-3. CSF50-05 Output characteristics

◆ Oscilloscope : WAVE PRO 7000(LeCroy)

- ◇ CH1 : Output current – AP015 current probe (BW:20MHz)
- ◇ CH2 : Input voltage – ADP305 High voltage differential probe(BW:200MHz)
- ◇ CH3 : Output voltage – DA1855 Differential Probe

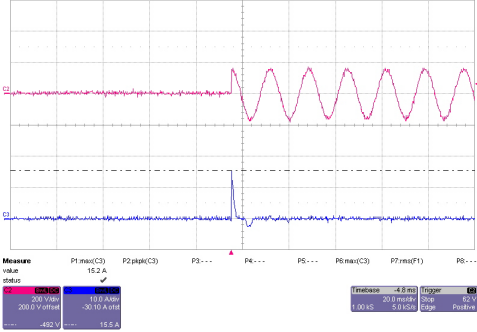
입력	출력	측정값	파형	비고
(1) Ripple & Noise characteristics.				
Vin= 220V	I _O = 100%	V _{Ripple} = 30mV V _{Noise} = 33mV		CH3 10.0mV/div 2.00us/div
(2) Turn on time characteristics				
Vin= 85V	I _O = 100%	t _{turn on} = 254.6ms		CH2 200V/div 50.0ms/div CH3 2.00V/div 50.0ms/div
(3) Hold up characteristics				
Vin= 100V	I _O = 100%	t _{hold up} = 21.64ms		CH2 200V/div 10.0ms/div CH3 2.00V/div 10.0ms/div
(4) Over Current protection characteristics				
Vin= 220V	I _O = 110~145%	O.C.P = 12.82A		X(CH1) 2.00A/div 20.0us/div Y(CH3) 1.00V/div 20.0us/div

3-1. CSF50-09 Input characteristics

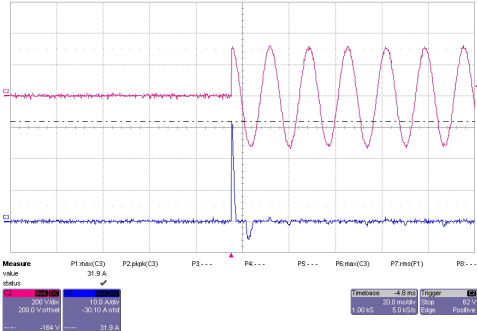
- ◆ Oscilloscope : WAVE PRO 7000(LeCroy)
 - ◇ CH2 : Input voltage – ADP305 High voltage differential probe(BW:200MHz)
 - ◇ CH3 : Input current – AP015 current probe (BW:20MHz)
- ◆ Digital Multimeter : FLUKE189 (FLUKE)

입력	출력	측정값	파형	비고
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(1) Inrush Current Characteristics (110V)

$V_{in} = 110V$	$I_o = 100\%$	$I_{inrush} = 15.2A$		CH2 200V/div 20.0ms/div CH3 10.0A/div 20.0ms/div
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(2) Inrush Current Characteristics (220V)

$V_{in} = 220V$	$I_o = 100\%$	$I_{inrush} = 31.9A$		CH2 200V/div 20.0ms/div CH3 10.0A/div 20.0ms/div
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(3) Input Current & Efficiency Characteristics

V_{in}		Condition $T_a : 25^\circ C$					
		85V	110V	132V	170V	220V	264V
I_o	Load (min)	0.00A	0.00A	0.00A	0.00A	0.00A	0.00A
	Efficiency	–	–	–	–	–	–
Load (50%)	Input Current	0.371A	0.290A	0.242A	0.198A	0.153A	0.127A
	Efficiency	79%	78%	78%	74%	74%	74%
Load (100%)	Input Current	0.723A	0.566A	0.471A	0.385A	0.297A	0.248A
	Efficiency	81%	80%	80%	76%	76%	76%

3-2. CSF50-09 Output characteristics

- ◆ Oscilloscope : WAVE PRO 7000(LeCroy)
 - ◇ CH2 : Output current – AP015 current probe (BW:20MHz)
 - ◇ CH4 : Output voltage – DA1855 Differential Probe
- ◆ Digital Multimeter : FLUKE189 (FLUKE)

입력	출력	측정값	파형				비고
(1) Line & Load Regulation Characteristics							
Condition Ta : 25°C							
V_{in}	85V	110V	132V	170V	220V	264V	Line Regulation
I_o							
Load (min)	8.994V	8.995V	8.999V	9.001V	8.989V	9.008V	14mV
Load (50%)	8.991V	8.993V	8.996V	8.999V	8.985V	9.004V	13mV
Load (100%)	8.988V	8.990V	8.992V	8.997V	8.979V	8.998V	10mV
Load Regulation	6mV	5mV	7mV	6mV	10mV	10mV	

(2) Dynamic Load Response Characteristics (100Hz)

$V_{in} = 220V$	$I_o = 0 \sim 100\%$ 100Hz	$V_{over} = 29mV$ $V_{under} = 32mV$		CH2 2.00A/div 2.00ms/div CH4 20.0mV/div 2.00ms/div
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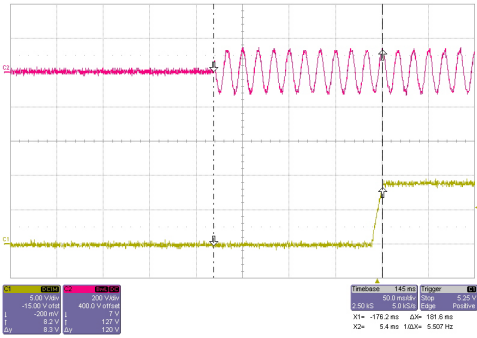
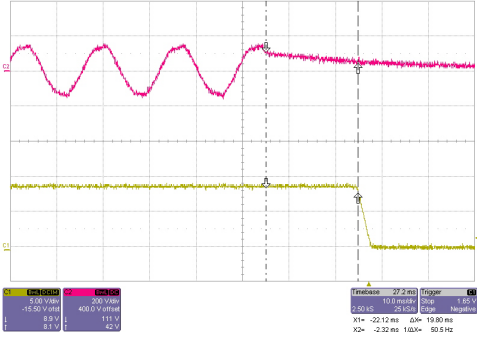
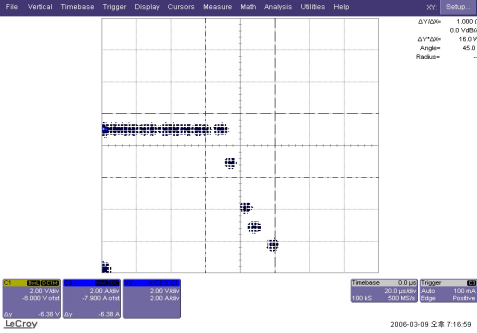
(3) Dynamic Load Response Characteristics (1KHz)

$V_{in} = 220V$	$I_o = 0 \sim 100\%$ 1kHz	$V_{over} = 24mV$ $V_{under} = 12mV$		CH2 2.00A/div 200us/div CH4 20.0mV/div 200us/div
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3-3. CSF50-09 Output characteristics

◆ Oscilloscope : WAVE PRO 7000(LeCroy)

- ◇ CH1 : Output current – AP015 current probe (BW:20MHz)
- ◇ CH2 : Input voltage – ADP305 High voltage differential probe(BW:200MHz)
- ◇ CH3 : Output voltage – DA1855 Differential Probe

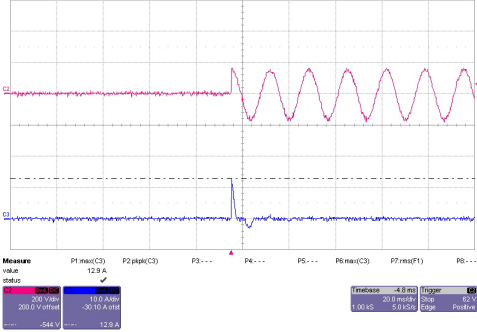
입력	출력	측정값	파형	비고
(1) Ripple & Noise characteristics.				
Vin= 220V	I _O = 100%	V _{Ripple} = 36mV V _{Noise} = 45mV		CH3 20.0mV/div 2.00us/div
(2) Turn on time characteristics				
Vin= 85V	I _O = 100%	t _{turn on} = 181.6ms		CH2 200V/div 50.0ms/div CH3 5.00V/div 50.0ms/div
(3) Hold up characteristics				
Vin= 100V	I _O = 100%	t _{hold up} = 19.80ms		CH2 200V/div 10.0ms/div CH3 5.00V/div 10.0ms/div
(4) Over Current protection characteristics				
Vin= 220V	I _O = 110~145%	O.C.P = 7.13A		X(CH1) 2.00A/div 20.0us/div Y(CH3) 2.00V/div 20.0us/div

4-1. CSF50-12 Input characteristics

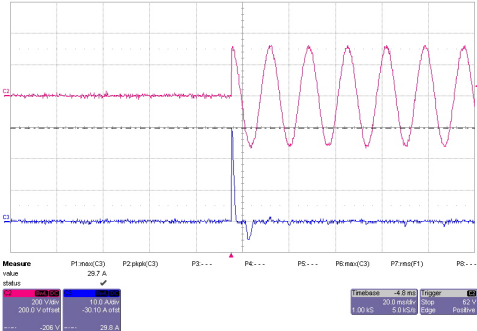
- ◆ Oscilloscope : WAVE PRO 7000(LeCroy)
 - ◇ CH2 : Input voltage – ADP305 High voltage differential probe(BW:200MHz)
 - ◇ CH3 : Input current – AP015 current probe (BW:20MHz)
- ◆ Digital Multimeter : FLUKE189 (FLUKE)

입력	출력	측정값	파형	비고
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(1) Inrush Current Characteristics (110V)

$V_{in} = 110V$	$I_o = 100\%$	$I_{inrush} = 12.9A$		CH2 200V/div 20.0ms/div CH3 10.0A/div 20.0ms/div
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(2) Inrush Current Characteristics (220V)

$V_{in} = 220V$	$I_o = 100\%$	$I_{inrush} = 29.7A$		CH2 200V/div 20.0ms/div CH3 10.0A/div 20.0ms/div
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(3) Input Current & Efficiency Characteristics

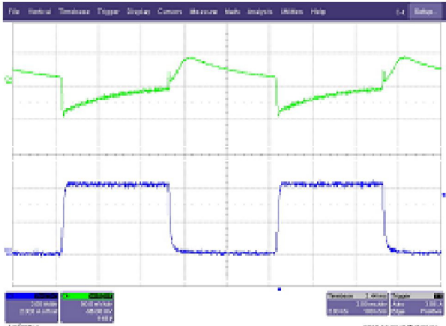
I_o \ V_{in}		Condition $T_a : 25^\circ C$					
		85V	110V	132V	170V	220V	264V
Load (min)	Input Current	0.00A	0.00A	0.00A	0.00A	0.00A	0.00A
	Efficiency	–	–	–	–	–	–
Load (50%)	Input Current	0.376A	0.290A	0.242A	0.190A	0.149A	0.124A
	Efficiency	78%	78%	78%	77%	76%	76%
Load (100%)	Input Current	0.722A	0.565A	0.471A	0.370A	0.289A	0.241A
	Efficiency	81%	80%	80%	79%	78%	78%

4-2. CSF50-12 Output characteristics

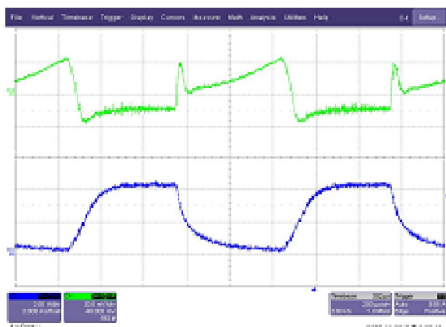
- ◆ Oscilloscope : WAVE PRO 7000(LeCroy)
 - ◇ CH2 : Output current – AP015 current probe (BW:20MHz)
 - ◇ CH4 : Output voltage – DA1855 Differential Probe
- ◆ Digital Multimeter : FLUKE189 (FLUKE)

입력	출력	측정값	파형				비고
(1) Line & Load Regulation Characteristics							
Condition Ta : 25°C							
V_{in}	85V	110V	132V	170V	220V	264V	Line Regulation
I_o							
Load (min)	12.00V	12.00V	12.00V	12.01V	12.01V	12.00V	10mV
Load (50%)	12.00V	12.00V	12.00V	12.00V	12.01V	12.00V	10mV
Load (100%)	12.00V	12.00V	12.00V	12.00V	12.00V	12.00V	0mV
Load Regulation	0mV	0mV	0mV	10mV	10mV	0mV	

(2) Dynamic Load Response Characteristics (100Hz)

$V_{in} = 220V$	$I_o = 0 \sim 100\%$ 100Hz	$V_{over} = 42mV$ $V_{under} = 48mV$		<p>CH2 2.00A/div 2.00ms/div</p> <p>CH4 50.0mV/div 2.00ms/div</p>
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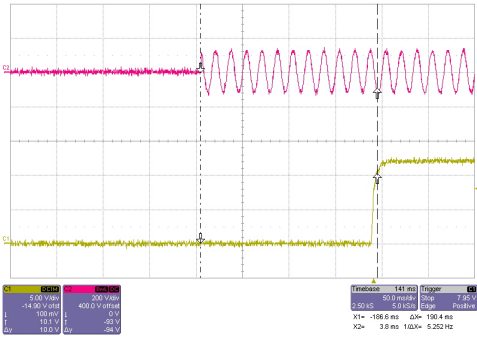
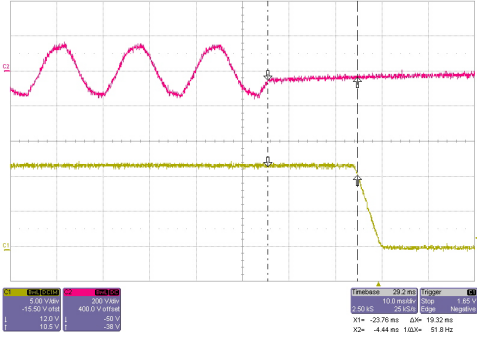
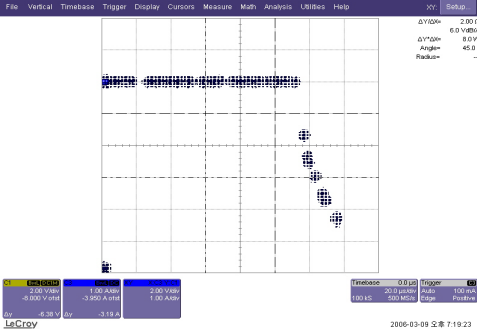
(3) Dynamic Load Response Characteristics (1KHz)

$V_{in} = 220V$	$I_o = 0 \sim 100\%$ 1kHz	$V_{over} = 20mV$ $V_{under} = 16mV$		<p>CH2 2.00A/div 200us/div</p> <p>CH4 20.0mV/div 200us/div</p>
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4-3. CSF50-12 Output characteristics

◆ Oscilloscope : WAVE PRO 7000(LeCroy)

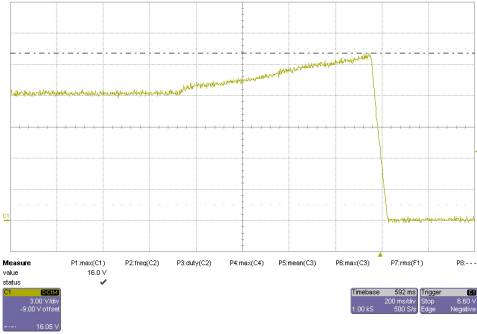
- ◇ CH1 : Output current – AP015 current probe (BW:20MHz)
- ◇ CH2 : Input voltage – ADP305 High voltage differential probe(BW:200MHz)
- ◇ CH3 : Output voltage – DA1855 Differential Probe

입력	출력	측정값	파형	비고
(1) Ripple & Noise characteristics.				
Vin= 220V	I _O = 100%	V _{Ripple} = 15mV V _{Noise} = 33mV		CH3 10.0mV/div 2.00us/div
(2) Turn on time characteristics				
Vin= 85V	I _O = 100%	t _{turn on} = 190.4ms		CH2 200V/div 50.0ms/div CH3 5.00V/div 50.0ms/div
(3) Hold up characteristics				
Vin= 100V	I _O = 100%	t _{hold up} = 19.32ms		CH2 200V/div 10.0ms/div CH3 5.00V/div 10.0ms/div
(4) Over Current protection characteristics				
Vin= 220V	I _O = 110~145%	O.C.P = 5.42A		X(CH1) 1.00A/div 20us/div Y(CH3) 2.00V/div 20us/div

4-4. CSF50-12 Output characteristics

◆ Oscilloscope : WAVE PRO 7000(LeCroy)

◇ CH1 : Output voltage - ADP305 High voltage differential probe(BW:200MHz)

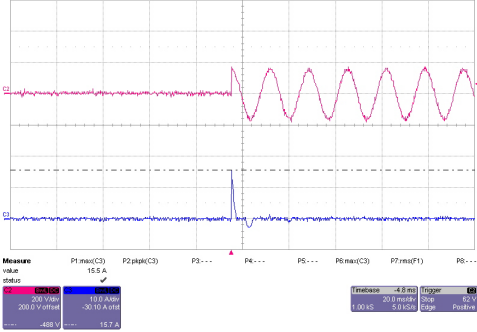
입력	출력	측정값	파형	비고
(1) Over-voltage protection characteristics				
Vin= 220V	I _O = 10%	O.V.P = 16.0V		CH1 3.00V/div 200ms/div

5-1. CSF50-15 Input characteristics

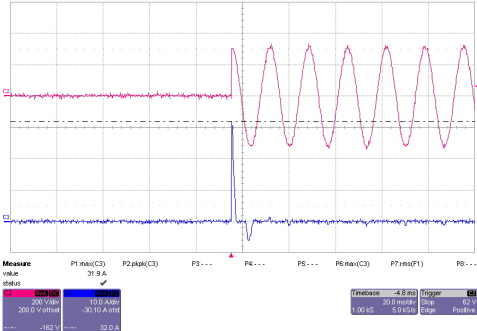
- ◆ Oscilloscope : WAVE PRO 7000(LeCroy)
 - ◇ CH2 : Input voltage – ADP305 High voltage differential probe(BW:200MHz)
 - ◇ CH3 : Input current – AP015 current probe (BW:20MHz)
- ◆ Digital Multimeter : FLUKE189 (FLUKE)

입력	출력	측정값	파형	비고
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(1) Inrush Current Characteristics (110V)

$V_{in} = 110V$	$I_o = 100\%$	$I_{inrush} = 15.5A$		CH2 200V/div 20.0ms/div CH3 10.0A/div 20.0ms/div
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(2) Inrush Current Characteristics (220V)

$V_{in} = 220V$	$I_o = 100\%$	$I_{inrush} = 31.9A$		CH2 200V/div 20.0ms/div CH3 10.0A/div 20.0ms/div
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(3) Input Current & Efficiency Characteristics

I_o \ V_{in}		Condition $T_a : 25^\circ C$					
		85V	110V	132V	170V	220V	264V
Load (min)	Input Current	0.00A	0.00A	0.00A	0.00A	0.00A	0.00A
	Efficiency	–	–	–	–	–	–
Load (50%)	Input Current	0.370A	0.290A	0.241A	0.192A	0.148A	0.119A
	Efficiency	79%	78%	78%	76%	76%	76%
Load (100%)	Input Current	0.720A	0.563A	0.469A	0.374A	0.289A	0.241A
	Efficiency	81%	80%	80%	78%	78%	78%

5-2. CSF50-15 Output characteristics

- ◆ Oscilloscope : WAVE PRO 7000(LeCroy)
 - ◇ CH2 : Output current – AP015 current probe (BW:20MHz)
 - ◇ CH4 : Output voltage – DA1855 Differential Probe
- ◆ Digital Multimeter : FLUKE189 (FLUKE)

입력	출력	측정값	파형				비고
(1) Line & Load Regulation Characteristics							
Condition Ta : 25°C							
V_{in}	85V	110V	132V	170V	220V	264V	Line Regulation
I_o							
Load (min)	14.95V	14.95V	14.95V	14.95V	14.96V	14.95V	10mV
Load (50%)	14.95V	14.95V	14.95V	14.95V	14.95V	14.95V	0mV
Load (100%)	14.94V	14.94V	14.95V	14.95V	14.95V	14.94V	10mV
Load Regulation	10mV	10mV	0mV	0mV	10mV	10mV	

(2) Dynamic Load Response Characteristics (100Hz)

$V_{in} = 220V$	$I_o = 0 \sim 100\%$ 100Hz	$V_{over} = 50mV$ $V_{under} = 55mV$		<p>CH2 2.00A/div 2.00ms/div</p> <p>CH4 50.0mV/div 2.00ms/div</p>
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(3) Dynamic Load Response Characteristics (1KHz)

$V_{in} = 220V$	$I_o = 0 \sim 100\%$ 1kHz	$V_{over} = 20mV$ $V_{under} = 16mV$		<p>CH2 2.00A/div 200us/div</p> <p>CH4 20.0mV/div 200us/div</p>
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5-3. CSF50-15 Output characteristics

◆ Oscilloscope : WAVE PRO 7000(LeCroy)

- ◇ CH1 : Output current – AP015 current probe (BW:20MHz)
- ◇ CH2 : Input voltage – ADP305 High voltage differential probe(BW:200MHz)
- ◇ CH3 : Output voltage – DA1855 Differential Probe

입력	출력	측정값	파형	비고
(1) Ripple & Noise characteristics.				
$V_{in} = 220V$	$I_o = 100\%$	$V_{Ripple} = 20mV$ $V_{Noise} = 31mV$		CH3 10.0mV/div 2.00us/div
(2) Turn on time characteristics				
$V_{in} = 85V$	$I_o = 100\%$	$t_{turn\ on} = 197.8ms$		CH2 200V/div 50.0ms/div CH3 5.08V/div 50.0ms/div
(3) Hold up characteristics				
$V_{in} = 100V$	$I_o = 100\%$	$t_{hold\ up} = 18.92ms$		CH2 200V/div 10.0ms/div CH3 5.00V/div 10.0ms/div
(4) Over Current protection characteristics				
$V_{in} = 220V$	$I_o = 110\sim 145\%$	O.C.P = 4.52A		X(CH1) 1.00A/div 20.0us/div Y(CH3) 2.00V/div 20.0us/div

6-1. CSF50-24 Input characteristics

- ◆ Oscilloscope : WAVE PRO 7000(LeCroy)
 - ◇ CH2 : Input voltage – ADP305 High voltage differential probe(BW:200MHz)
 - ◇ CH3 : Input current – AP015 current probe (BW:20MHz)
- ◆ Digital Multimeter : FLUKE189 (FLUKE)

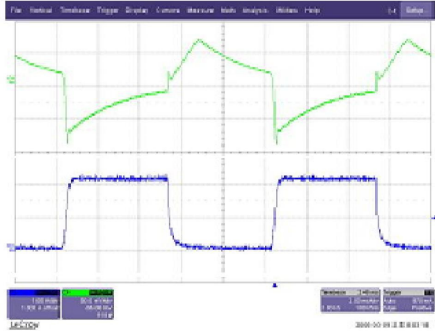
입력	출력	측정값	파형	비고				
(1) Inrush Current Characteristics (110V)								
$V_{in} = 110V$	$I_o = 100\%$	$I_{inrush} = 14.2A$		CH2 200V/div 20.0ms/div CH3 10.0A/div 20.0ms/div				
(2) Inrush Current Characteristics (220V)								
$V_{in} = 220V$	$I_o = 100\%$	$I_{inrush} = 30.1A$		CH2 200V/div 20.0ms/div CH3 10.0A/div 20.0ms/div				
(3) Input Current & Efficiency Characteristics								
Condition Ta : 25°C								
V_{in}		85V	110V	132V	170V	220V	264V	
I_o	Load (min)	Input Current	0.00A	0.00A	0.00A	0.00A	0.00A	0.00A
	Load (50%)	Input Current	0.365A	0.286A	0.238A	0.189A	0.146A	0.122A
	Load (100%)	Input Current	0.709A	0.555A	0.462A	0.368A	0.284A	0.237A
		Efficiency	80%	79%	79%	77%	77%	77%
		Efficiency	82%	81%	81%	79%	79%	79%

6-2. CSF50-24 Output characteristics

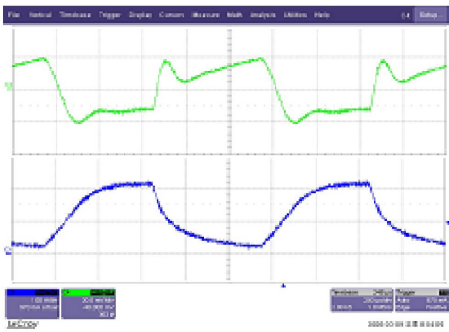
- ◆ Oscilloscope : WAVE PRO 7000(LeCroy)
 - ◇ CH2 : Output current – AP015 current probe (BW:20MHz)
 - ◇ CH4 : Output voltage – DA1855 Differential Probe
- ◆ Digital Multimeter : FLUKE189 (FLUKE)

입력	출력	측정값	파형				비고
(1) Line & Load Regulation Characteristics							
Condition Ta : 25°C							
V_{in}	85V	110V	132V	170V	220V	264V	Line Regulation
I_o							
Load (min)	24.02V	24.01V	24.01V	24.01V	24.01V	24.01V	10mV
Load (50%)	24.02V	24.01V	24.02V	24.01V	24.01V	24.01V	10mV
Load (100%)	24.02V	24.01V	24.02V	24.02V	24.01V	24.01V	10mV
Load Regulation	0mV	0mV	10mV	10mV	0mV	0mV	

(3) Dynamic Load Response Characteristics (100Hz)

$V_{in} = 220V$	$I_o = 0 \sim 100\%$ 100Hz	$V_{over} = 70mV$ $V_{under} = 90mV$		<p>CH2 1.00A/div 2.00ms/div</p> <p>CH4 50.0mV/div 2.00ms/div</p>
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(4) Dynamic Load Response Characteristics (1KHz)

$V_{in} = 220V$	$I_o = 0 \sim 100\%$ 1kHz	$V_{over} = 20mV$ $V_{under} = 23mV$		<p>CH2 1.00A/div 200us/div</p> <p>CH4 20.0mV/div 200us/div</p>
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6-3. CSF50-24 Output characteristics

◆ Oscilloscope : WAVE PRO 7000(LeCroy)

- ◇ CH1 : Output current – AP015 current probe (BW:20MHz)
- ◇ CH2 : Input voltage – ADP305 High voltage differential probe(BW:200MHz)
- ◇ CH3 : Output voltage – DA1855 Differential Probe

입력	출력	측정값	파형	비고
(1) Ripple & Noise characteristics.				
$V_{in} = 220V$	$I_o = 100\%$	$V_{Ripple} = 19mV$ $V_{Noise} = 23mV$		CH3 10.0mV/div 2.00us/div
(2) Turn on time characteristics				
$V_{in} = 85V$	$I_o = 100\%$	$t_{turn\ on} = 229.8ms$		CH2 200V/div 50.0ms/div CH3 10.0V/div 50.0ms/div
(3) Hold up characteristics				
$V_{in} = 100V$	$I_o = 100\%$	$t_{hold\ up} = 19.08ms$		CH2 200V/div 10.0ms/div CH3 10.0V/div 10.0ms/div
(4) Over Current protection characteristics				
$V_{in} = 220V$	$I_o = 110\sim 145\%$	$O.C.P = 2.86A$		X(CH1) 500A/div 20.0us/div Y(CH3) 5.00V/div 20.0us/div

7-1. CSF50-48 Input characteristics

- ◆ Oscilloscope : WAVE PRO 7000(LeCroy)
 - ◇ CH2 : Input voltage – ADP305 High voltage differential probe(BW:200MHz)
 - ◇ CH3 : Input current – AP015 current probe (BW:20MHz)
- ◆ Digital Multimeter : FLUKE189 (FLUKE)

입력	출력	측정값	파형				비고
(1) Inrush Current Characteristics (110V)							
(2) Inrush Current Characteristics (220V)							
(3) Input Current & Efficiency Characteristics							
Condition Ta : 25°C							
Vin		85V	110V	132V	170V	220V	264V
Load (min)	Input Current	0.00A	0.00A	0.00A	0.00A	0.00A	0.00A
	Efficiency	-	-	-	-	-	-
Load (50%)	Input Current	A	A	A	A	A	A
	Efficiency	%	%	%	%	%	%
Load (100%)	Input Current	A	A	A	A	A	A
	Efficiency	%	%	%	%	%	%

7-3. CSF50-48 Output characteristics

◆ Oscilloscope : WAVE PRO 7000(LeCroy)

- ◇ CH1 : Output voltage - PP005A passive probe (BW:20MHz)
- ◇ CH2 : Input voltage - ADP305 High voltage differential probe(BW:200MHz)
- ◇ CH4 : Output voltage - DA1855 Differential Probe

입력	출력	측정값	파형	비고
(1) Ripple & Noise characteristics.				
(2) Turn on time characteristics				
(3) Hold up characteristics				
(4) Over Current protection characteristics				

7-4. CSF50-48 Output characteristics

◆ Oscilloscope : WAVE PRO 7000(LeCroy)

◇ CH1 : Output voltage - ADP305 High voltage differential probe(BW:200MHz)

입력	출력	측정값	파형	비고
(1) Over-voltage protection characteristics				