

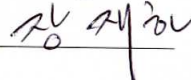


귀중

Evaluation Data

품 목	SMPS
품 명	CSF75-DW
Rev. No.	A

2009 년 05 월 26 일

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Evaluation data

1. CSF75-BDW

1-1. Input characteristics

- . Inrush Current Characteristics
- . Inrush Current & Efficiency characteristics

1-2. 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. CSF75-BHW

2-1. Input characteristics

- . Inrush Current Characteristics
- . Inrush Current & Efficiency characteristics

2-2. 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

1-1. CSF75-BDW Input characteristics

(1) Oscilloscope : WAVESURPER 454 (LeCroy)

◇ CH2 : ADP305 (High voltage differential probe)

◇ CH3 : AP015 (Current probe)

입력	출력	측정값	파형	비고
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(1) Inrush current characteristics (110V)

<p>$V_{in} = 110V$</p>	<p>CH1 $I_o=100\%$ (6.0A)</p> <p>CH2 $I_o=100\%$ (3.5A)</p>	<p>$I_{inrush} = 15.6[A]$</p>		<p>Ch2 200V/div 20ms/div</p> <p>Ch3 10A/div 20ms/div</p>
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(2) Inrush current characteristics (220V)

<p>$V_{in} = 220V$</p>	<p>CH1 $I_o=100\%$ (6.0A)</p> <p>CH2 $I_o=100\%$ (3.5A)</p>	<p>$I_{inrush} = 30.0[A]$</p>		<p>Ch2 200V/div 20ms/div</p> <p>Ch3 20A/div 20ms/div</p>
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(3) Inrush current & Efficiency characteristics

Condition $T_a : 25^\circ C$

Load \ Input Voltage		85V	110V	132V	170V	220V	264V
		Input Current[A]	0.09	0.10	0.09	0.04	0.04
$I_o=Min\%$ (CH1=0.6A, CH2=0A)	Efficiency[%]	-	-	-	-	-	-
	Input Current[A]	0.86	0.72	0.64	0.46	0.39	0.34
$I_o=50\%$ (CH1=3.0A, CH2=1.75A)	Efficiency[%]	73.77	71.28	68.70	76.27	71.71	68.57
	Input Current[A]	1.68	1.39	1.22	0.88	0.74	0.67
$I_o=100\%$ (CH1=6.0A, CH2=3.5A)	Efficiency[%]	75.47	75.86	75.07	79.03	78.00	75.70

1-2. CSF75-BDW Output characteristics

(1) Digital Power Meter : YOKOGAWA WT210, Electronic Load : EUL-600XL
 $V_{in} = 85 \sim 132V/170 \sim 264V$, $I_o = \text{min} \sim 100\%$

(1) Line & Load Regulation Characteristics

Condition $T_a : 25^\circ\text{C}$

Load \ Input Voltage		85V	110V	132V	170V	220V	264V	Line Regulation [mV]
		Line Regulation [mV]						
I _o =Min% (CH1=0.6A, CH2=0A)	CH1	4.999	4.999	4.999	4.999	4.999	4.999	0
	CH2	12.020	12.020	12.020	12.020	12.020	12.019	1
I _o =50% (CH1=3.0A, CH2=1.75A)	CH1	4.995	4.993	4.991	4.994	4.992	4.990	5
	CH2	12.017	12.017	12.016	12.017	12.017	12.016	1
I _o =100% (CH1=6.0A, CH2=3.5A)	CH1	4.990	4.987	4.984	4.988	4.985	4.982	8
	CH2	12.015	12.015	12.014	12.014	12.013	12.013	2
Load Regulation [mV]	CH1	9	12	15	11	14	17	-
	CH2	5	5	6	6	7	6	-

1-3. CS75-BDW Output characteristics

(1) Oscilloscope : WAVEPRO 7000 (LeCroy)

◇ CH2 : PP005A (Passive Voltage probe)

◇ CH3 : AP015 (Current probe)

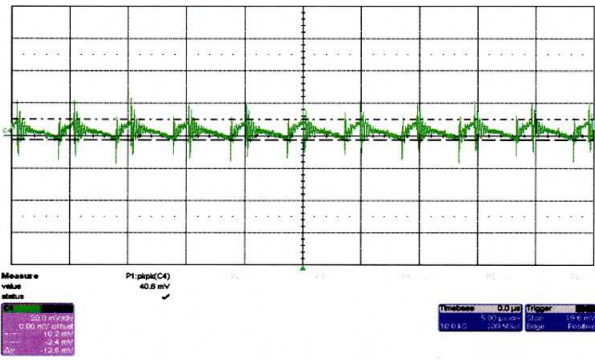
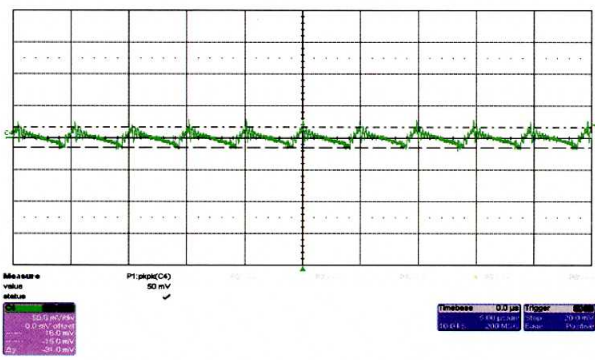
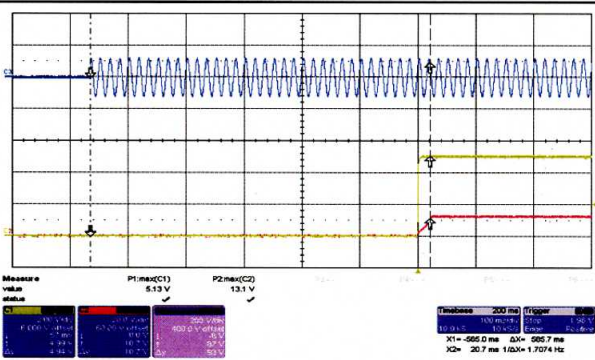
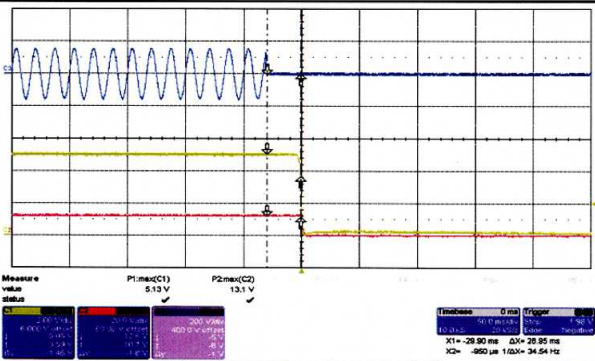
(1) Dynamic Load Response Characteristics (100Hz)

입력	출력	측정값	파형	비고
$V_{in} = 220V$	CH1 $I_o = 10\% \leftrightarrow 100\%$ (0.6A ~ 6.0A) CH2 $I_o = 100\%$ (3.5A)	CH1(5V) $+V_{pk} = 22.5[mV]$ (0.45%) $-V_{pk} = 20.5[mV]$ (0.41%)		Ch2 50mV/div 5ms/div Ch3 2A/div 5ms/div
$V_{in} = 220V$	CH1 $I_o = 100\%$ (6.0A) CH2 $I_o = 0\% \leftrightarrow 100\%$ (0A ~ 3.5A)	CH2(12V) $+V_{pk} = 138[mV]$ (1.15%) $-V_{pk} = 158[mV]$ (1.31%)		Ch2 200mV/div 5ms/div Ch3 2A/div 5ms/div
$V_{in} = 220V$	CH1 $I_o = 10\% \leftrightarrow 100\%$ (0.6A ~ 6.0A) CH2 $I_o = 100\%$ (3.5A)	CH1(5V) $+V_{pk} = 25.0[mV]$ (0.50%) $-V_{pk} = 29.0[mV]$ (0.58%)		Ch2 50mV/div 500us/div Ch3 2A/div 500us/div
$V_{in} = 220V$	CH1 $I_o = 100\%$ (6.0A) CH2 $I_o = 0\% \leftrightarrow 100\%$ (0A ~ 3.5A)	CH2(12V) $+V_{pk} = 28.5[mV]$ (0.23%) $-V_{pk} = 30.5[mV]$ (0.25%)		Ch2 50mV/div 500us/div Ch3 2A/div 500us/div

1-4. CSF75-BDW Output characteristics

(1) Oscilloscope : WAVESURPER 454 (LeCroy)

- ◇ CH1 : PP007-WS (Passive Voltage probe)
- ◇ CH2 : PP005A (Passive Voltage probe)
- ◇ CH3 : ADP305 (High voltage differential probe)
- ◇ CH4 : BNC Cable, Band Width : 200MHz

입력	출력	측정값	파형	비고
(1) Ripple & Noise characteristics				
Vin = 220V	CH1 Io=100% (6.0A) CH2 Io=100% (3.5A)	CH1(5V) Ripple&NOISE :12.6/40.6[mV]		Ch4 20mV/div 5us/div
Vin = 220V	CH1 Io=100% (6.0A) CH2 Io=100% (3.5A)	CH2(12V) Ripple&NOISE :31.0/50.0[mV]		Ch4 50mV/div 5us/div
(2) Turn on time characteristics				
Vin = 85V	CH1 Io=100% (6.0A) CH2 Io=100% (3.5A)	CH1(5V) Turn on time = 566.2[ms] CH2(12V) Turn on time = 585.7[ms]		Ch1 2V/div Ch2 20V/div Ch3 200V/div 100ms/div(공통)
(3) Hold up time characteristics				
Vin = 85V	CH1 Io=100% (6.0A) CH2 Io=100% (3.5A)	CH1(5V) Hold up time = 9.0[ms] CH2(12V) Hold up time = 9.3[ms]		Ch1 2V/div Ch2 20V/div Ch3 200V/div 50ms/div(공통)

1-5. CSF75-BDW Output characteristics

(1) Oscilloscope : WAVE RUNNER LT374L (LeCroy)

◇ CH2 : PP005A (Passive Voltage probe)

◇ CH3 : AP015 (Current probe)

(2) Oscilloscope : WAVESURPER 454 (LeCroy)

◇ CH2 : PP005A (Passive Voltage probe)

입력	출력	측정값	파형	비고
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(1) Over Current protection characteristics

<p>Vin = 220V</p>	<p>CH1 Io=0%~가변 (6.0A)</p> <p>CH2 Io=100% (3.5A)</p>	<p>CH1(5V)</p> <p>OCP= 10.6[A]</p> <p>IoUT= 176.6[%] 주1)</p>		<p>Ch2 2A/div 5ms/div</p> <p>Ch3 1V/div 5ms/div</p>
<p>Vin = 220V</p>	<p>CH1 Io=100% (6.0A)</p> <p>CH2 Io=0%~가변 (3.5A)</p>	<p>CH2(12V)</p> <p>OCP= 4.95[A]</p> <p>IoUT= 141.4[%]</p>		<p>Ch2 1A/div 5ms/div</p> <p>Ch3 2V/div 5ms/div</p>

(2) Over voltage protection characteristics

<p>Vin = 220V</p>	<p>CH1 Io=10% (0.6A)</p> <p>CH2 Io=100% (3.5A)</p>	<p>CH1(5V)</p> <p>OVP = 6.69[V]</p> <p>VoUT=134[%] 주2)</p>		<p>Ch2 2V/div 20ms/div</p>
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주1) DUAL인 경우 출력부하를 W(와트)로 환산 할 때의 OCP SPEC.

CH1(5V) 7.44A ~ 12.48A

CH2(12V) 4.1A ~ 6.2A

주2) Oscilloscope를 이용한 트리거 측정 방법과 VR 단자를 가변한 측정 방법에는 아래와 같이 편차가 있음.

- Oscilloscope를 이용한 트리거 측정시 : 6.69V (134%)

- VR 단자 가변시 : 6.29V (125.8%)

2-1. CSF75-BHW Input characteristics

- (1) Oscilloscope : WAVESURPER 454 (LeCroy)
- ◇ CH2 : ADP305 (High voltage differential probe)
 - ◇ CH3 : AP015 (Current probe)

입력	출력	측정값	파형	비고
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(1) Inrush current characteristics (110V)

$V_{in} = 110V$	CH1 $I_o=100\%$ (6.0A) CH2 $I_o=100\%$ (2.0A)	$I_{inrush} = 12.5[A]$		Ch2 200V/div 20ms/div Ch3 5A/div 20ms/div
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(2) Inrush current characteristics (220V)

$V_{in} = 220V$	CH1 $I_o=100\%$ (6.0A) CH2 $I_o=100\%$ (2.0A)	$I_{inrush} = 35.6[A]$		Ch2 200V/div 20ms/div Ch3 20A/div 20ms/div
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(3) Inrush current & Efficiency Characteristics

Condition $T_a : 25^\circ C$

Load \ Input Voltage		85V	110V	132V	170V	220V	264V
		Input Current[A]	0.10	0.10	0.09	0.04	0.04
$I_o=Min\%$ (CH1=0.6A, CH2=0A)	Efficiency[%]	-	-	-	-	-	-
	Input Current[A]	0.91	0.77	0.68	0.46	0.40	0.36
$I_o=50\%$ (CH1=3.0A, CH2=1.0A)	Efficiency[%]	75.43	72.62	70.14	77.38	73.30	69.64
	Input Current[A]	1.79	1.46	1.29	0.96	0.79	0.70
$I_o=100\%$ (CH1=6.0A, CH2=2.0A)	Efficiency[%]	78.0	78.07	77.22	80.99	79.51	77.38

2-2. CSF75-BHW Output characteristics

(1) Digital Power Meter : YOKOGAWA WT210, Electronic Load : EUL-600XL
 $V_{in} = 85 \sim 132V / 170 \sim 264V$, $I_o = \text{min} \sim 100\%$

(1) Line & Load Regulation Characteristics

Condition $T_a : 25^\circ\text{C}$

Load \ Input Voltage		85V	110V	132V	170V	220V	264V	Line Regulation [mV]
		Load						
I _o =Min% (CH1=0.6A, CH2=0A)	CH1	4.969	4.969	4.969	4.969	4.969	4.969	0
	CH2	23.929	23.929	23.929	23.930	23.930	23.929	1
I _o =50% (CH1=3.0A, CH2=1.0A)	CH1	4.960	4.954	4.947	4.958	4.952	4.949	15
	CH2	23.928	23.928	23.927	23.927	23.927	23.927	1
I _o =100% (CH1=6.0A, CH2=2.0A)	CH1	4.955	4.947	4.940	4.951	4.944	4.937	18
	CH2	23.928	23.926	23.925	23.925	23.925	23.925	3
Load Regulation [mV]	CH1	14	22	29	18	25	32	-
	CH2	1	3	4	5	5	5	-

2-3. CSF75-BHW Output characteristics

- (1) Oscilloscope : WAVEPRO 7000 (LeCroy)
 ◇ CH2 : PP005A (Passive Voltage probe)
 ◇ CH3 : AP015 (Current probe)

(1) Dynamic Load Response Characteristics(100Hz)

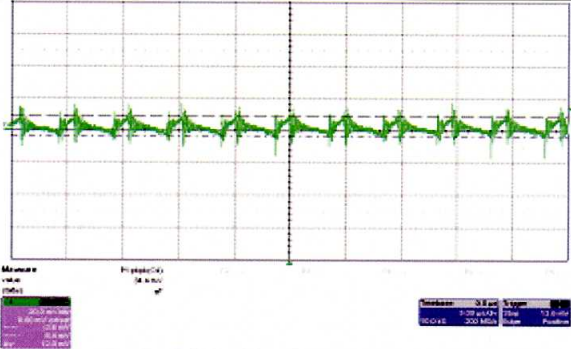
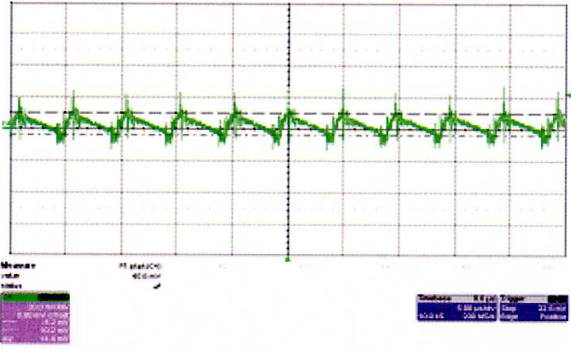
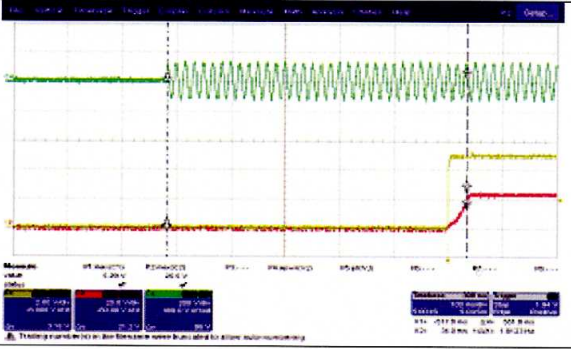
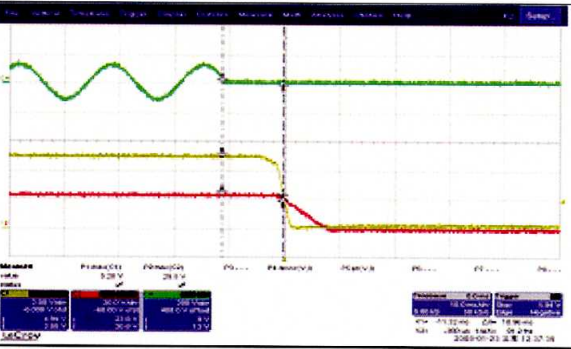
입력	출력	측정값	파형	비고
$V_{in} = 220V$	CH1 $I_o=10\% \leftrightarrow 100\%$ (0.6A~6.0A) CH2 $I_o=100\%$ (2.0A)	CH1(5V) $+V_{pk}=21.0[mV]$ (0.42%) $-V_{pk}=23.0[mV]$ (0.46%)		Ch2 50mV/div 5ms/div Ch3 2A/div 5ms/div
$V_{in} = 220V$	CH1 $I_o=10\% \leftrightarrow 100\%$ (6.0A) CH2 $I_o=100\%$ (0~2.0A)	CH1(24V) $+V_{pk}=164[mV]$ (0.68%) $-V_{pk}=178[mV]$ (0.74%)		Ch2 200mV/div 5ms/div Ch3 1A/div 5ms/div

(2) Dynamic Load Response Characteristics(1KHz)

$V_{in} = 220V$	CH1 $I_o=10\% \leftrightarrow 100\%$ (0.6A~6.0A) CH2 $I_o=100\%$ (2.0A)	CH1(5V) $+V_{pk}=27.0[mV]$ (0.54%) $-V_{pk}=30.5[mV]$ (0.61%)		Ch2 50mV/div 500us/div Ch3 2A/div 500us/div
$V_{in} = 220V$	CH1 $I_o=10\% \leftrightarrow 100\%$ (6.0A) CH2 $I_o=100\%$ (0~2.0A)	CH1(24V) $+V_{pk}=39.0[mV]$ (0.16%) $-V_{pk}=36.0[mV]$ (0.15%)		Ch2 100mV/div 500us/div Ch3 1A/div 500us/div

2-4. CSF75-BHW Output characteristics

- (1) Oscilloscope : WAVESURPER 454 (LeCroy)
- ◇ CH1 : PP007-WS (Passive Voltage probe)
 - ◇ CH2 : PP005A (Passive Voltage probe)
 - ◇ CH3 : ADP305 (High voltage differential probe)
 - ◇ CH4 : BNC Cable, Band Width : 200MHz

입력	출력	측정값	파형	비고
(1) Ripple & Noise characteristics				
Vin = 220V	CH1 Io=100% (6.0A) CH2 Io=100% (2.0A)	CH1(5V) Ripple&NOISE :12.0/34.4[mV]		Ch4 20mV/div 5us/div
Vin = 220V	CH1 Io=100% (6.0A) CH2 Io=100% (2.0A)	CH2(24V) Ripple&NOISE :14.4/40.6[mV]		Ch4 20mV/div 5us/div
(2) Turn on time characteristics				
Vin = 85V	CH1 Io=100% (6.0A) CH2 Io=100% (2.0A)	CH1 Turn on time = 519.2[ms] CH2 Turn on time = 551.8[ms]		Ch1 2V/div Ch2 20V/div Ch3 200V/div 100ms/div(공통)
(3) Hold up time characteristics				
Vin = 85V	CH1 Io=100% (6.0A) CH2 Io=100% (2.0A)	CH1 Hold up time = 9.62[ms] CH2 Hold up time = 10.96[ms]		Ch1 2V/div Ch2 20V/div Ch4 200V/div 50ms/div(공통)

2-5. CSF75-BHW Output characteristics

(1) Oscilloscope : WAVERUNNER LT374L (LeCroy)

◇ CH2 : PP005A (Passive Voltage probe)

◇ CH3 : AP015 (Current probe)

(2) Oscilloscope : WAVEPRO 7000 (LeCroy)

◇ CH2 : PP005A (Passive Voltage probe)

입력	출력	측정값	파형	비고
(1) Over Current protection characteristics				
Vin = 220V	CH1 Io=0%~가변 (6.0A) CH2 Io=100% (2.0A)	CH1(5V) OCP=10.21[A] I _{OUT} =170.1[%] 주1)		Ch2 2A/div 5ms/div Ch3 1V/div 5ms/div
Vin = 220V	CH1 Io=100% (6.0A) CH2 Io=0%~가변 (2.0A)	CH2(24V) OCP=2.7[A] I _{OUT} =135[%]		Ch2 0.5A/div 5ms/div Ch3 5V/div 5ms/div
(2) Over voltage protection characteristics				
Vin = 220V	CH1 Io=10% (6.0A) CH2 Io=100% (2.0A)	CH1(5V) OVP = 6.56[V] V _{OUT} =131[%] 주2)		Ch1 2V/div 20ms/div

주1) DUAL인 경우 출력부하를 W(와트)로 환산 할 때의 OCP SPEC.

CH1(5V) 7.56A ~ 13.02A

CH2(24V) 2.32A ~ 3.46A

주2) Oscilloscope를 이용한 트리거 측정 방법과 VR 단자를 가변한 측정 방법에는 아래와 같이 편차가 있음.

- Oscilloscope를 이용한 트리거 측정시 : 6.56V (131%)

- VR 단자 가변시 : 6.25V (125.0%)